ATTENTION: This is not an order. Read all instructions, terms and conditions carefully.

IMPORTANT: PROPOSAL AND ADDENDUM MUST BE RECEIVED BY 05-05-2020 @ 3:00 P.M. LEXINGTON, KY TIME

Offeror must acknowledge receipt of this and any addendum as stated in the Request for Proposal.

1. The following documents are being made available for reference on this project.
   - PowerPoint presentation from the virtual Pre-Bid Meeting held on 03/31/2020
   - Report of Preliminary Geotechnical Study
   - Current Request for Proposal Responder List

2. Written questions on this project have been received and will be answered in a forthcoming addendum as soon as possible.

OFFICIAL APPROVAL
UNIVERSITY OF KENTUCKY

[Signature]

________________________________________
Procurement Manager / (859) 323-5405

______________________________________
Typed or Printed Name
Request for Proposal UK-2057-20
Coldstream Laboratory / High-Tech Multi-Tenant Building Developer

Pre-Proposal Conference March 31, 2020
Coldstream Mission

develop new technologies.
generate licensing revenue.
create companies and products.
expand existing businesses.
grow well-paying jobs.
Lexington’s TBED Major Players

Entrepreneurs
Universities
Investors
Mentors
Events
Venues
BBDP
Coldstream Case Studies

UK Alum – 2-person office
2007 sold software company to HP ~$750mm
2016 sold to Open Text
Has grown to 110 employees

Started by UK’s College of Pharmacy
Grew to 80 employees
2015 sold to Piramal Pharma Solutions, India
Has grown to 120+ employees

2009 - Purchased lab equipment from former tenant
Has grown to over 100 employees
Virtual Tour
Coldstream Research Campus
Current Project Pipeline

- **Piramal Plant Expansion**
  - Doubling size of existing manufacturing plant
- **Multi-Family Residential Development**
  - 250 unit complex next to the Embassy Suites Hotel
- **A&W Restaurants – Corporate Headquarters**
- **Laboratory / High-Tech Multi-Tenant Building**
  - KTI master leases 20K sf, developer builds minimum 40K sf
Site Location
## Research Park Comparison

<table>
<thead>
<tr>
<th>Typical research park¹</th>
<th>Coldstream</th>
</tr>
</thead>
<tbody>
<tr>
<td>119 acres</td>
<td>735 acres</td>
</tr>
<tr>
<td>7 buildings</td>
<td>22 buildings</td>
</tr>
<tr>
<td>250,000 sf of space</td>
<td>1.37 million sf of space</td>
</tr>
<tr>
<td>90% occupied</td>
<td>93% occupied</td>
</tr>
<tr>
<td>25,000 sf incubator</td>
<td>0 sf incubator – (ASTeCC 13K sf)</td>
</tr>
<tr>
<td>26 organizations</td>
<td>50 organizations</td>
</tr>
<tr>
<td>850 employees</td>
<td>2,250 employees</td>
</tr>
</tbody>
</table>

¹Battelle Report August 2013 page 29 – Typical research park data are based on the median for all research parks in survey
Selection of Current Tenants
Contact Information

Matt Spalding
Purchasing Division
University of Kentucky
Phone: 859-536-1843
E-mail: matthew.spalding@uky.edu
Report of Preliminary Geotechnical Study

Coldstream Research Campus
University of Kentucky
Lexington, Kentucky

Prepared for
Parrott, Ely and Hurt
Lexington, Kentucky

March, 1993
March 1, 1993

Parrott, Ely and Hurt
Consulting Engineers, Inc.
P. O. Box 22738
Lexington, Kentucky 40522

Attn: Mr. Mike Woolum, P.E.

Re: Preliminary Geotechnical Study
Coldstream Research Campus
University of Kentucky
Lexington, Kentucky

Dear Mr. Woolum:

In accordance with our proposal dated June 16, 1993, Fuller, Mossbarger, Scott and May, Engineers, Inc. (FMSM) has completed a preliminary geotechnical engineering study of the Coldstream Research Campus of the University of Kentucky in Lexington, Kentucky. Included in this report are a general description of the site, a summary of published geologic literature pertinent to the site, a summary of our subsurface exploration, and preliminary geotechnical engineering recommendations for use in planning the development.

1. GENERAL INFORMATION AND SITE DESCRIPTION

The Coldstream Research Campus is located in the southwest quadrant of the intersection of Newtown Pike and the Interstate Route 64-75 common corridor in Lexington, Fayette County, Kentucky. This location is depicted on Figure 1, portions of the USGS Lexington East and Lexington West, Kentucky 7 ½-Minute Topographic Quadrangle Maps. The site is identified as the University of Kentucky Agricultural Experimental Station on the USGS maps.

The property occupies approximately 900 acres and is currently used as an agricultural research facility for the University of Kentucky. The property consists mostly of pasture and crop fields. The fields were typically covered with low grass or the remains of the previous season's crops. Buildings on the property include dwellings, barns, garages, roads, and other structures related to agricultural operations.
Figure 1
Preliminary Geotechnical Study
Portions of U.S.G.S. 7½-Minute Topographic Maps
Lexington East and Lexington West, Kentucky
Showing Site Location
Though preliminary roadway alignments and a general scheme for the development have been established, final development plans are not complete. This study has been performed to develop general information concerning the geologic character and geotechnical engineering properties of the substrate, to provide information concerning the availability and quality of borrow soils on the property, and to provide preliminary geotechnical engineering information for use in design of roadways.

2. **GENERAL SITE GEOLOGY**

The Coldstream Research Facility lies in the drainage basin of Cane Run Creek which flows to the northeast. The land is described as gently rolling with a topographic high of approximately 975 feet near the southeast corner of the property. A water tower is located in this area. The topographic low, approximately 880 feet, occurs near the northeast corner of the property where Cane Run Creek flows under the interstate. These elevations are estimated using U.S.G.S. topographic maps.

Cane Run Creek runs along the west side of the property. This creek is mapped as a perineal stream. An unnamed intermittent stream runs roughly parallel to the Interstate 64-75 common corridor along the northern boundary of the property. Relatively broad flood plains lie along these streamways.

Geologic maps of the property have been published by the U.S.G.S. The property is included on a map titled *Geologic Map of the Lexington East Quadrangle, Fayette and Bourbon Counties, Kentucky*, prepared in 1968 by William C. MacQuown, Jr. and Ernest Dobrovolny and on a map titled *Geologic Map of the Lexington West Quadrangle, Fayette and Scott Counties, Kentucky*, prepared in 1967 by Robert D. Miller.

Bedrock at the site is characterized by the Tanglewood, Millersberg and Cane Run members of the Lexington Limestone. These middle to upper Ordovician age (438 to 505 million years) rocks typically consist of limestone and shale. The surface weathers to a dark brown or yellow brown soil with limestone rubble. Weathering of the parent rock is typically irregular resulting in occasional deeply weathered zones in the substrate. Several depressions, sink holes, resulting from this irregular weathering, are mapped in and around the property.

3. **SUBSURFACE EXPLORATION**

Fifty five (55) auger borings, designated B-1 through B-55, were performed as part of this study. The borings were performed along proposed roadway alignments, in potential borrow areas, and along a portion of Cane Run Creek that may become an impoundment. Boring locations and elevations were determined by FMSM survey personnel during the drilling activities.
Each of the borings was advanced to auger refusal. As the borings were drilled, the soil cuttings were logged by the engineer with particular attention given to color, consistency and moisture content. Upon completion of the drilling activities soil samples were returned to our materials laboratory for analyses. Analyses included natural moisture content, Atterberg limits, specific gravity, grain size, moisture density relationships, and California Bearing Ratio.

4. RESULTS OF EXPLORATION

Information obtained from the exploration is presented in the appendix to this report. This information includes a Boring Location Plan, boring logs, and results of laboratory analyses. Ground surface elevations at the boring locations are presented on the boring logs.

The soils observed may be divided into two relatively distinct morphologic units. These include residual soils on the hillsides and alluvial soils along the streamways. The soils on the hillsides are typically described as fat clay with sand and the alluvial soils are described as either fat clay or lean clay with sand. Though the two morphologic units vary with respect to origin, their engineering properties are similar. Subsurface conditions are described as relatively uniform throughout each of the two units.

Free groundwater was not observed in the borings. The borings were backfilled immediately following their completion for protection of livestock. High groundwater levels should not be of concern in areas above the flood plains. Ground water is likely to be encountered in the substrate within the flood plains.

4.1. Summary of Test Borings

Test borings were drilled in each of eleven (11) geographic areas within the boundaries of the property. These areas include Roadways 1 through 8, Vile Road, Development Unit I, and an area along Cane Run Creek that may be developed as an impoundment. Boring information is summarized in the following boring summary tables. Descriptions of subsurface conditions in each of these areas follow the tables. Dimensions presented in the boring summary tables are approximate. Soil types are described in Section 4.2 of this report.
# SUMMARY OF ROADWAY BORINGS

## Roadway 1 and Development Unit I

<table>
<thead>
<tr>
<th>Boring</th>
<th>Station, Offset</th>
<th>Depth to Refusal (feet)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-25</td>
<td>10 +00, 150'R</td>
<td>14.0</td>
<td>1</td>
</tr>
<tr>
<td>B-1</td>
<td>13 +00, 150'R</td>
<td>11.5</td>
<td>1</td>
</tr>
<tr>
<td>B-2</td>
<td>21 +50, 200'R</td>
<td>3.6</td>
<td>1</td>
</tr>
<tr>
<td>B-3</td>
<td>26 +00, 200'R</td>
<td>14.9</td>
<td>1</td>
</tr>
<tr>
<td>B-4</td>
<td>31 +00</td>
<td>9.8</td>
<td>1</td>
</tr>
<tr>
<td>B-41*</td>
<td>--</td>
<td>12.7</td>
<td>1</td>
</tr>
<tr>
<td>B-42</td>
<td>--</td>
<td>9.9</td>
<td>1</td>
</tr>
<tr>
<td>B-43</td>
<td>--</td>
<td>5.8</td>
<td>1</td>
</tr>
<tr>
<td>B-44</td>
<td>--</td>
<td>5.2</td>
<td>1</td>
</tr>
<tr>
<td>B-45</td>
<td>--</td>
<td>14.3</td>
<td>1</td>
</tr>
<tr>
<td>B-46</td>
<td>--</td>
<td>7.0</td>
<td>1</td>
</tr>
<tr>
<td>B-47*</td>
<td>--</td>
<td>4.1</td>
<td>1</td>
</tr>
</tbody>
</table>

* These borings were performed near roadway alignments.

## Roadway 2

<table>
<thead>
<tr>
<th>Boring</th>
<th>Station, Offset</th>
<th>Depth to Refusal (feet)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-36</td>
<td>10 +00, 25'R</td>
<td>29.1</td>
<td>1</td>
</tr>
<tr>
<td>B-5</td>
<td>13 +50</td>
<td>13.5</td>
<td>1</td>
</tr>
<tr>
<td>B-6</td>
<td>22 +00</td>
<td>11.3</td>
<td>1</td>
</tr>
<tr>
<td>B-7</td>
<td>33 +50</td>
<td>6.3</td>
<td>1</td>
</tr>
<tr>
<td>B-8</td>
<td>38 +50</td>
<td>7.6</td>
<td>1</td>
</tr>
<tr>
<td>B-9</td>
<td>43 +00</td>
<td>12.3</td>
<td>1</td>
</tr>
<tr>
<td>B-10</td>
<td>52 +00</td>
<td>6.9</td>
<td>1</td>
</tr>
<tr>
<td>B-11</td>
<td>60 +00</td>
<td>8.9</td>
<td>2</td>
</tr>
<tr>
<td>B-12</td>
<td>65 +00</td>
<td>22.8</td>
<td>1</td>
</tr>
<tr>
<td>B-13</td>
<td>74 +50, 80'L</td>
<td>6.3</td>
<td>1</td>
</tr>
<tr>
<td>B-14</td>
<td>78 +50</td>
<td>6.9</td>
<td>1</td>
</tr>
<tr>
<td>B-39</td>
<td>89 +50</td>
<td>6.8</td>
<td>1</td>
</tr>
<tr>
<td>B-52*</td>
<td>--</td>
<td>6.2</td>
<td>1</td>
</tr>
</tbody>
</table>

* This boring was performed near the roadway alignment.
SUMMARY OF ROADWAY BORINGS  (Continued)

Roadway 3

<table>
<thead>
<tr>
<th>Boring</th>
<th>Station, Offset</th>
<th>Auger Refusal (feet)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-6</td>
<td>10 + 00</td>
<td>11.3</td>
<td>1</td>
</tr>
<tr>
<td>B-15</td>
<td>12 + 50</td>
<td>5.2</td>
<td>1</td>
</tr>
<tr>
<td>B-16</td>
<td>19 + 00</td>
<td>4.7</td>
<td>1</td>
</tr>
<tr>
<td>B-17</td>
<td>27 + 50, 20'L</td>
<td>5.3</td>
<td>2</td>
</tr>
<tr>
<td>B-18</td>
<td>34 + 50, 20'R</td>
<td>6.3</td>
<td>2</td>
</tr>
<tr>
<td>B-19</td>
<td>40 + 00</td>
<td>7.2</td>
<td>2</td>
</tr>
</tbody>
</table>

Roadway 4

<table>
<thead>
<tr>
<th>Boring</th>
<th>Station, Offset</th>
<th>Auger Refusal (feet)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-20</td>
<td>13 + 50</td>
<td>15.7</td>
<td>1</td>
</tr>
<tr>
<td>B-21</td>
<td>19 + 00, 40'R</td>
<td>6.4</td>
<td>1</td>
</tr>
<tr>
<td>B-22</td>
<td>26 + 00, 220'R</td>
<td>5.5</td>
<td>1</td>
</tr>
</tbody>
</table>

Roadway 5

<table>
<thead>
<tr>
<th>Boring</th>
<th>Station, Offset</th>
<th>Auger Refusal (feet)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-23</td>
<td>13 + 00</td>
<td>12.5</td>
<td>1</td>
</tr>
<tr>
<td>B-24</td>
<td>20 + 50, 20'R</td>
<td>4.6</td>
<td>1</td>
</tr>
<tr>
<td>B-53*</td>
<td>--</td>
<td>5.4</td>
<td>1</td>
</tr>
</tbody>
</table>

* These borings were performed near roadway alignments.
SUMMARY OF ROADWAY BORINGS (Continued)

Roadway 6

<table>
<thead>
<tr>
<th>Boring</th>
<th>Station, Offset</th>
<th>Auger Refusal (feet)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-25</td>
<td>10 +00, 150' L</td>
<td>14.0</td>
<td>1</td>
</tr>
<tr>
<td>B-26</td>
<td>15 +00, 100' L</td>
<td>4.0</td>
<td>1</td>
</tr>
<tr>
<td>B-27</td>
<td>21 +50, 50' L</td>
<td>23.5</td>
<td>3</td>
</tr>
<tr>
<td>B-28</td>
<td>26 +50, 80' L</td>
<td>4.9</td>
<td>1</td>
</tr>
<tr>
<td>B-32*</td>
<td>--</td>
<td>10.2</td>
<td>1</td>
</tr>
<tr>
<td>B-33*</td>
<td>--</td>
<td>11.0</td>
<td>1</td>
</tr>
</tbody>
</table>

* These borings were performed near roadway alignments.

Roadway 7

<table>
<thead>
<tr>
<th>Boring</th>
<th>Station, Offset</th>
<th>Auger Refusal (feet)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-29</td>
<td>12 +00, 80'L</td>
<td>4.1</td>
<td>1</td>
</tr>
<tr>
<td>B-30</td>
<td>14 +00, 80'L</td>
<td>12.5</td>
<td>3</td>
</tr>
</tbody>
</table>

Roadway 8

<table>
<thead>
<tr>
<th>Boring</th>
<th>Station, Offset</th>
<th>Auger Refusal (feet)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-39</td>
<td>10 +00</td>
<td>6.8</td>
<td>1</td>
</tr>
<tr>
<td>B-31</td>
<td>14 +50</td>
<td>9.2</td>
<td>1</td>
</tr>
</tbody>
</table>
### SUMMARY OF ROADWAY BORINGS (Continued)

**Viley Road**

<table>
<thead>
<tr>
<th>Boring</th>
<th>Station, Offset</th>
<th>Auger Refusal (feet)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-25</td>
<td>23+50, 50'R</td>
<td>14.0</td>
<td>1</td>
</tr>
<tr>
<td>B-34</td>
<td>29+00, 80'R</td>
<td>5.8</td>
<td>1</td>
</tr>
<tr>
<td>B-35</td>
<td>34+50, 70'R</td>
<td>7.6</td>
<td>1</td>
</tr>
<tr>
<td>B-36</td>
<td>38+50</td>
<td>29.1</td>
<td>1</td>
</tr>
<tr>
<td>B-37</td>
<td>44+00</td>
<td>5.1</td>
<td>1</td>
</tr>
<tr>
<td>B-38</td>
<td>49+50</td>
<td>6.7</td>
<td>2</td>
</tr>
<tr>
<td>B-39</td>
<td>55+00</td>
<td>6.8</td>
<td>1</td>
</tr>
</tbody>
</table>

### SUMMARY OF CANE RUN IMPOUNDMENT BORINGS

<table>
<thead>
<tr>
<th>Boring</th>
<th>Depth to Refusal (feet)</th>
<th>Soil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-48</td>
<td>6.4</td>
<td>2</td>
</tr>
<tr>
<td>B-49</td>
<td>3.8</td>
<td>2</td>
</tr>
<tr>
<td>B-50</td>
<td>7.2</td>
<td>2</td>
</tr>
</tbody>
</table>

### SUMMARY OF POTENTIAL BORROW SITE BORINGS

<table>
<thead>
<tr>
<th>Boring</th>
<th>Depth to Refusal (feet)</th>
<th>Soil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-40</td>
<td>8.9</td>
<td>1</td>
</tr>
<tr>
<td>B-51</td>
<td>5.0</td>
<td>1 - Possible Fill</td>
</tr>
<tr>
<td>B-54</td>
<td>4.1</td>
<td>1</td>
</tr>
<tr>
<td>B-55</td>
<td>11.3</td>
<td>1</td>
</tr>
</tbody>
</table>
Roadway 1 and Development Unit I

Borings B-1 through B-4 and B-25 are located along the alignment of Roadway 1. Roadway 1 crosses Development Unit I. Borings B-41 through B-47 were also drilled within the perimeter of Development Unit I.

Borings B-1 through B-4 and B-25, revealed from 3.6 to 14.9 feet of residual soil and topsoil over limestone bedrock. Borings B-41 through B-47 revealed from 4.1 to 12.7 feet of residual soils and topsoil over limestone bedrock. Topsoil thicknesses ranging from 0.8 to 1.0 foot were encountered at these boring locations. The residual soils are described as fat clay with sand, brown or yellow brown, and stiff to very stiff. Cobbles were encountered in Boring B-1 from eight feet to auger refusal at 11.5 feet.

Roadway 2

Borings B-5 through B-14, B-36 and B-39 were drilled along the alignment of Roadway 2. Boring B-52 was drilled north of the alignment near Boring B-13. These borings reveal from 6.3 to 22.8 feet of overburden over limestone bedrock. One foot of topsoil was observed in each of these borings. This roadway alignment crosses Cane Run Creek. Residual soils were encountered in all borings except B-11, where alluvial soils were encountered. The residual soils are described as fat clay with sand, brown, damp to moist, and stiff to very stiff. The alluvial soil encountered in Boring B-11 is described as lean clay with sand, moist, and stiff to very stiff.

Roadway 3

Borings B-6 and B-15 through B-19 were drilled along the alignment of Roadway 3. Borings B-6, B-15 and B-16 were drilled in residual soils and Borings B-17 through B-19 were drilled in alluvial soils within the floodplain of Cane Run Creek. Auger refusal was recorded at depths of 4.7 to 11.3 feet in borings B-6, B-15 and B-16. Cobbles were encountered in Boring B-16 below a depth of 4.0 feet. The residual soils are described as fat clay with sand, brown, and stiff to very stiff. Auger refusal was recorded at depths of 5.3 to 7.2 feet in borings B-17 through B-19. The alluvial soils are described as lean clay with sand, brown, moist and stiff.

Roadway 4

Borings B-20 through B-22 were drilled along the alignment of Roadway 4. Borings B-21 and B-22 were advanced to respective depths of 6.4 and 6.5 feet. Boring B-20 was advanced to a depth of 15.7 feet. The relatively deep penetration of Boring B-20 is suggestive of a sinkhole at this location. Residual soils encountered in these borings are described as fat clay with sand, brown and yellow brown with black mottling, damp to moist, and very stiff.
Roadway 5

Borings B-23 and B-24 were drilled along the alignment of proposed Roadway 5. Boring B-53 was drilled north of Boring B-23. Borings B-23 and B-24 were advanced to respective depths of 12.5 and 4.6 feet. Boring B-53 was advanced to a depth of 5.4 feet. The relatively deep penetration of Boring B-23 is suggestive of a sinkhole at this location. The residual soils encountered in these borings are described as fat clay with sand, brown, damp to moist, and stiff to very stiff.

Roadway 6

Borings B-25 through B-28 were drilled along the alignment of Roadway 6. Borings B-32 and B-33 were drilled north and west of this roadway. With the exception of Boring B-27, these test borings were drilled to depths ranging from 4.0 to 14.0 feet below the ground surface in residual soils. Boring B-27 was advanced to the depth of 23.5 feet in an alluvial deposit. Residual soils encountered in these borings are described as fat clay with sand, brown, moist, and stiff. The alluvial soils encountered in Boring B-27 are described as fat clay, dark brown, moist to wet, and exhibit medium consistency.

Roadway 7

Borings B-29 and B-30 were advanced to respective depths of 4.1 and 12.5 feet below the ground surface along the alignment of Roadway 7. Residual soils described as fat clay with sand, brown, damp and stiff to very stiff were encountered in Boring B-29. Alluvial soils described as fat clay, brown, and very stiff were encountered in Boring B-30.

Roadway 8

Borings B-31 and B-39 were drilled on the alignment of Roadway 8. These borings were advanced through residual soils to respective depths of 9.2 and 6.8 feet. Soils encountered in these borings are described as fat clay with sand, brown, damp and stiff.

Viley Road

Borings B-25 and B-34 through B-39 were drilled along the alignment of Viley Road. Boring B-25 was drilled through an embankment used to support an existing section of Viley Road. Nine feet of fill soils over residual soils were encountered in Boring B-25. Borings B-34 through B-37 and B-39 were drilled through residual soils. Borings B-34, B-35, B-37 and B-39 were advanced to depths ranging from 5.1 to 7.6 feet. Boring B-36 was advanced to a depth of 29.1 feet indicating uneven weathering of the substrate. Boring B-38 was drilled in the floodplain of Cane Run Creek to the depth of 6.7 feet. The residual soils encountered in these borings are described as fat clay with sand, brown, damp to moist and stiff. The alluvial soils are described as lean clay with sand, brown, damp and stiff.
Cane Run Impoundment

Borings B-48 through B-50 were performed in the floodplain of Cane Run Creek within the boundary of the area considered for an impoundment. These borings were advanced through alluvial soils to depths ranging from 3.8 to 7.2 feet. The alluvial soils encountered in these borings are described as lean clay with sand, brown, damp to moist, and very stiff.

Potential Borrow Sites

Borings B-40, B-51, B-54 and B-55 were performed at potential borrow sites on the property. Borings B-40 and B-51 were drilled in an area bounded by the alignments of proposed Roadways 2 and 3. Boring B-54 was performed on a hilltop near the eastern boundary of the site and Boring B-55 was performed near the southwest intersection of the alignments of proposed Roadway 2 and Viley road. These borings were advanced through residual soils to depths ranging from 4.1 to 11.3 feet. Soils encountered in these borings are described as fat clay with sand, brown, and stiff to very stiff. Some building rubble, including bricks and concrete, was encountered in the upper 1.5 feet of Boring B-5. This may either be trash dumped at the site, or an indication the site was previously developed.

4.2. Summary of Laboratory Analysis

Laboratory analysis of selected soil samples obtained from the borings indicates three relatively distinct soil types in the study area. The most common soils on the property are the residual soils found on the hillsides above the flood plains. Samples of these residual soils obtained from Borings B-39 and B-42 were retained and analyzed. Alluvial soils from Borings B-27 and B-48, drilled in the flood plain of Cane Run Creek, were also analyzed.

The residual soils from Borings B-39 and B-42 exhibit similar engineering index properties. Visual classifications of the residual soils from the other borings suggest soils throughout the site will have similar properties. Residual soils are therefore referred to as Soil Type I. Tested samples of these soils exhibit liquid limit values ranging from 57 percent to 59 percent, and plastic limit values ranging from 22 percent to 25 percent. Sand concentrations ranging from 20 to 24 percent were detected in the samples. This soil is described as fat clay with sand (CH). The sample from Boring B-42 was subjected to moisture-density and California Bearing Ratio (CBR) testing. A maximum density of 104 pounds per cubic foot at an optimum moisture content of 21.0 percent was determined. A CBR value of 2.7 was obtained using ASTM Method D-1883.

A noticeable difference in the plasticity characteristics of the alluvial soils was observed during the drilling operations. Soils observed in the northern reaches of the flood plain appeared to be less plastic than those in the southern reaches. These alluvial soils are therefore referred to respectively as Soil Type 2 and Soil Type 3.
Analysis of a soil sample obtained from Boring B-48, drilled in the northern reaches of the flood plain, revealed a liquid limit of 46 percent, a plastic limit of 23 percent, and a sand concentration of 18 percent. This soil is referred to as Soil Type 2 and is described as lean clay with sand (CL).

Analysis of a sample retained from Boring B-27 revealed a liquid limit of 51 percent, a plastic limit of 22 percent, and a sand concentration of 10 percent. This soil is referred to as Soil type 3 and is classified as fat clay (CH). Moisture-density and CBR testing was performed on this sample. A maximum-density of 100 pounds per cubic foot at an optimum moisture content of 23 percent was determined. A CBR value of 7.6 was determined using ASTM Method D-1883.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Two relatively distinct morphologic soil units are located on the property. These include alluvial soils in flood plains along stream ways, and residual soils on hillsides above the flood plains. Soil conditions are relatively uniform within each of the morphologic units. The alluvial soils are described as either fat clay or lean clay with sand, the residual soils are typically described as fat clay with sand.

5.2. Rocks beneath the soils consist of limestone and shales associated with various members of the Lexington Limestone formation. Weathering of this rock is typically irregular resulting in occasional deeply weathered zones in the substrate. Observed soil depths ranged from 5.6 to 29.1 feet. Large variations in depths to the top of rock occur within relatively short horizontal distances.

5.3. Soils encountered at the boring locations appear to be capable of supporting relatively lightly loaded structures on shallow foundation systems. However, due to concerns of differential settlement associated with sinkholes and large variations in the depth of the soils, deep foundations bearing on rock will likely be required to support relatively heavy foundation loads.

5.4. Soils at the site are described as lean to fat clay with sand. These soils are expected to be compactable only within a fairly narrow range of moisture contents. Weather conditions should therefore be taken into consideration in planning earthwork using the in-situ soils. A review of the boring logs in conjunction with proposed roadway alignments and grades indicates soils are deep enough to avoid significant rock excavation.

5.5. Soils in the proposed impoundment area were found to be fine grained and to have good retention properties with respect to the proposed impoundment.
5.6. This preliminary study should not be considered comprehensive. This study was performed to provide an indication of general site conditions within the areas explored. More detailed studies at proposed building locations and tailored to specific foundation and earthwork requirements are recommended prior to completion of development plans.

The preliminary conclusions and recommendations presented herein are based on information gathered from borings advanced during this exploration using that degree of care and skill ordinarily exercised under similar circumstances by respectable members of the engineering profession. No warranties can be made regarding the continuity of conditions between borings.

We appreciate the opportunity to have been of service to you. If we can be of further assistance, please contact our office.

Respectfully submitted,

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