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January 31, 2018

**Edward Kotyk**

City of Aztec  
610 Western Avenue  
Aztec, New Mexico 87410

RE: Raw Water Reservoir No. 1 Sediment Pond  
GEOMAT Project No. 171-2828

As requested by Andrew Galloway of the City of Aztec, on January 9, 2018, the undersigned and George Madrid, P.E. performed a geotechnical evaluation by drilling and sampling four hand-auger borings at the City of Aztec Reservoir No. 1 Sediment Pond (pond). The objectives of our services were to evaluate the firmness and thickness of the existing sediment in the pond and to provide geotechnical opinions and recommendations for the excavation and removal of the collected sediment layer.

Per Mr. Galloway, it is our understanding the pond was originally constructed with a bentonite clay liner system. Additionally, concrete side slopes were added around the perimeter of the pond during subsequent construction phases. We also understand the pond has been drained of free standing water and not in use for approximately one year. It is not known by GEOMAT whether sediment has been dredged from the pond in the past.

Conditions at the pond at the time of our field work are illustrated in the following photographs. Figure 1 shows the view looking east from the top of the embankment at the northwest corner of the pond. The pond inlet is located to the bottom left outside the photograph, the intake tower is to the center left, and several of the fabric baffles separating the pond into five different cells can be seen across the pond. The slope of the concrete sides is constant around the pond, but the depth from the top of the embankment to the top of the sediment varies across the pond. As depicted in Figure 2, the surface of the pond bottom was dry and cracked and no standing water was visible. The depth and width of the surface cracks varied across the pond, but ranged from approximately 1-inch to 10-inches wide and 2-inches to 3-feet deep, resulting in soil pieces that were on the order of 10-inches wide by 18-inches long. The degree of cracking was less pronounced around the perimeter of the pond and became more prominent towards the center. The photograph in Figure 2 was taken adjacent to Boring No. B-2.



Figure 1 – View looking east from the top of the embankment from the northwest corner of the pond.



Figure 2 – Cracking in the surface of the pond adjacent to Boring No. B-2.

GEOMAT performed drilling and sampling of four hand-auger borings to the depths where the clay liner material appeared to be encountered. Select samples obtained from our field borings were returned to our laboratory and tested to determine the moisture content. Conditions encountered in the test borings and the approximate boring locations within the pond are presented in Table 1 and Figure 3, respectively.

Table 1 – Test borings depths, soil descriptions, and moisture contents.

| Boring No. | Depth Below Existing Grade (ft.) | Description of Soils Visual Method, ASTM D2488                                   | Moisture Content, ASTM D2216 (%) |
|------------|----------------------------------|--|----------------------------------|
| B-1        | 0 to 2.4                         | Sediment, Lean Clay with Sand, Firm, Dry, Bag Sample at 0.3'                     | 7.1                              |
|            | 2.4 to 7.0                       | Sediment, Lean Clay with Sand, Very Soft, Free Water at 2.4', Bag Sample at 4.0' | 53.2                             |
|            | 7.0 (est. liner depth)           | Apparent Clay Liner, Fat Clay, Soft, Wet   | --                               |
| B-2        | 0 to 2.7                         | Sediment, Lean Clay with Sand, Firm, Dry   | --                               |
|            | 2.7 to 3.8                       | Sediment, Lean Clay with Sand, Very Soft, Moist, Bag Sample at 3.2'              | 40.3                             |
|            | 3.8 (est. liner depth)           | Apparent Clay Liner, Fat Clay, Soft, Moist, Bag Sample at 3.8'                   | 44.9                             |
| B-3        | 0 to 2.7                         | Sediment, Sandy Lean Clay, Firm, Dry   | --                               |
|            | 2.7 to 5.1                       | Sediment, Lean Clay with Sand, Very Soft, Moist, Bag Sample at 4.8'              | 36.6                             |
|            | 5.1 (est. liner depth)           | Apparent Clay Liner, Fat Clay, Soft, Moist                                       | --                               |
| B-4        | 0 to 2.3                         | Sediment, Lean Clay with Sand, Firm, Dry   | --                               |
|            | 2.3 to 4.3                       | Sediment, Lean Clay with Sand, Very Soft, Free Water at 4.2', Bag Sample at 3.7' | 35.0                             |
|            | 4.3 (est. liner depth)           | Apparent Clay Liner, Fat Clay, Soft, Wet   | --                               |

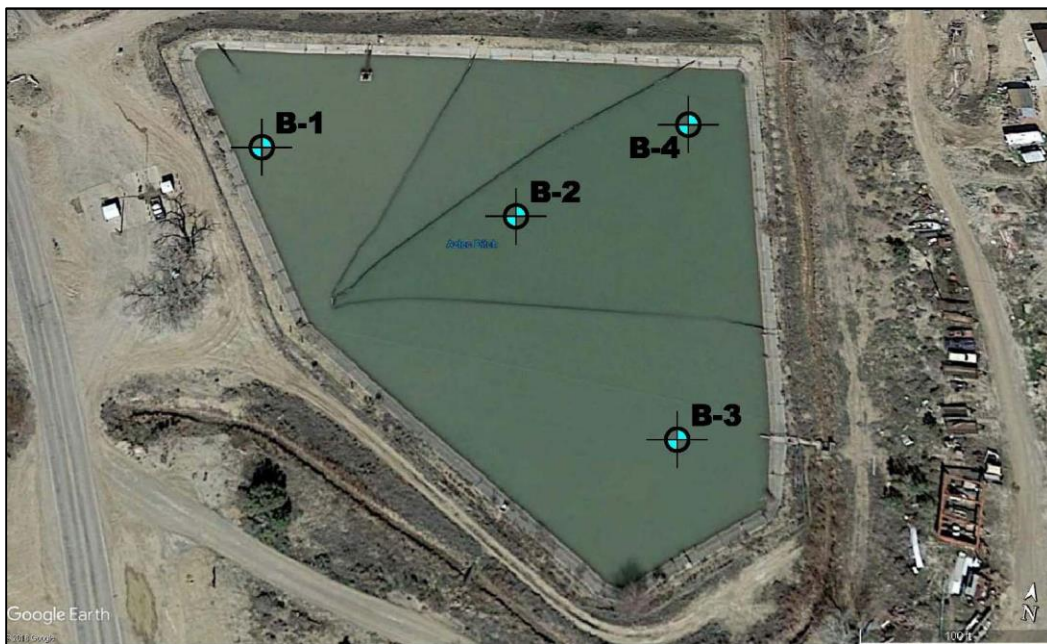


Figure 3 – Test borings approximate locations within Reservoir No. 1.

Three different conditions were encountered in each of the borings. The soils at the ground surface to depths of approximately 2 to 3 feet were relatively firm, dry, and structured in blocky, creviced islands as depicted in Figure 2. The soils encountered at depths ranging from 2 to 3 feet and extending from 4 to 7 feet were soft to very soft. The soils at these depths were moist to

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wet, with free water being encountered in two of the borings. At depths of approximately 4 to 7 feet, a homogenous, soft, and moist to wet material was encountered, which had the consistency of a fat clay.

Based on our findings and understanding of the project, we present the following conclusions and recommendations:

- The upper portions of the soils in the pond, although creviced, appear suitable to support light construction equipment.
- The type of equipment that will be suitable for use will have to be determined based on field trials. However, lightweight rubber-tracked equipment may be required.
- The firmness of the existing pond surface material is expected to vary across the pond enough that the type(s) of equipment used to excavate and transport the sediment material may have to be changed for different areas of the pond, depending on the specific conditions encountered.
- The sediment could be removed with a lightweight rubber-tracked excavator and small dump trucks by excavating the sediment to the full depth operating on the dry surface soils and working systematically across the such as to always operate on the dry surface soils.
- If there are areas of the pond where it is not possible to excavate the sediment due to unstable material, the following alternatives could be attempted:
  - Allowing wet areas to dry until they become stable
  - Use of lighter weight equipment
  - Placement of soil stabilization fabric and/or geogrid under the equipment operating areas
- We recommend use of a trial procedure of this method before the entire excavation process is begun.

The analyses and recommendations in this report are based in part upon data obtained from the field exploration. The nature and extent of variations beyond the location of test borings may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations of this report.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this or similar localities at the same time. No warranty, express or implied, is intended or made. We prepared the report as an aid in design of the proposed project. This report is not a bidding document. Any

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contractor reviewing this report must draw his own conclusions regarding site conditions and specific construction equipment and techniques to be used on this project.

Thank you for this opportunity to be of service to you on this project. If you have any questions or need additional information, please let us know.

Sincerely yours,  
GEOMAT Inc.



Nathaniel J. Compton, P.E.

Copies to: Addressee (1), Andrew Galloway (1), Steve Mueller (1), Kathy Lamb (1)