Supplemental Specifications

General Requirements
SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 1503

MOBILIZATION

621.1 DESCRIPTION
This work shall consist of preparatory and final work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to and from the project site; for the establishment of all offices, buildings and other facilities necessary for work on the project; and, for all other work and operations which must be performed or costs incurred prior to beginning work on the project.

621.2 MOBILIZATION ADMINISTRATION REQUIREMENTS

621.2.1 DEFINITIONS
The following definitions shall apply:

a) Total original contract amount shall mean the total amount bid as compensation for the contract.

b) Total original contract amount less mobilization and demobilization shall mean the total amount bid as compensation for the contract less the amounts bid for mobilization.

621.2.2 GENERAL
It is the intent of this specification to provide for the Contractor to:

a) Receive 100% of the amount bid for mobilization by the time the Contractor has performed 10% of the total original contract amount bid less the amount bid for mobilization.

621.2.3 PAYMENT PROCEDURES FOR MOBILIZATION
The following will apply in effecting mobilization payments:

a) When the Contractor is eligible for payment of less than 5% of the total original contract amount bid less mobilization, the Contractor will be paid 25% of the amount bid for mobilization.

b) When the Contractor is eligible for payment of from 5% to less than 10% of the total original amount bid less mobilization, the Contractor will be paid 50% of the amount bid for mobilization minus any mobilization amount already paid.

c) When the Contractor is eligible for payment of 10% or more of the total original contract amount less mobilization, the Contractor will be paid 100% of the amount bid for mobilization minus any mobilization amount already paid.
621.2.4 PAYMENT CALCULATIONS

\[
P_M = \text{Mobilization Payment} \\
M = \text{Total amount bid for Mobilization} \\
f_M = \text{Mobilization payment percentage factor} = 0.25, \text{ or } 0.50, \text{ or } 1.0, \text{ as applicable} \\
P_M = M \times f_M
\]

EXAMPLE 1
MOBILIZATION

Total Original Contract Amount Bid ................................................................. $110,000
Amount Bid for Mobilization ............................................................................ $ 5,000
Total Original Contract Amount Less Mobilization ................................. $105,000

Percent of Work Completed  \( f_M \)  \( M \)  \( P_M \)

\(<5\% \text{ of } $102,000 \quad 0.25 \quad x \quad 5,000 \quad = \quad $1,250 \)

\( >5\% \text{ to } <10\% \text{ of } $102,000 \quad 0.50 \quad x \quad 5,000 \quad = \quad $2,500^* \)

\( \geq 10\% \text{ of } $102,000 \quad 1.00 \quad x \quad 5,000 \quad = \quad $5,000^* \)

*minus previously paid amounts

621.3 METHOD OF MEASUREMENT
Mobilization will be measured by lump sum unit.

621.4 BASIS OF PAYMENT
Mobilization will be paid for at the contract price per Mobilization Bid Item. The amount Bid for Mobilization shall not exceed 5% of the Total Base Bid.

No additional payments will be made for demobilization and remobilization due to shutdowns or suspensions of the work or for other mobilization and demobilization activities required to complete the contract.
SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 1504

NPDES COMPLIANCE

630.1 SCOPE OF WORK

The work under this section includes compliance with the U.S. Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES) Regulations for Storm Water Discharges from construction sites. A Storm Water Pollution Prevention Plan (SWPPP). This work consists of developing and maintaining this plan to control erosion, pollution, sediment and runoff during the construction of the project.

630.2 MEASUREMENT AND PAYMENT

630.2.1 UNIT PRICE BID PROPOSALS: For Unit Price Bid Proposals, NPDES compliance shall be paid for as follows:

630.2.1.1 Fifteen (15) percent of the Lump Sum unit price amount shall be paid after the Contractor has completed an EPA Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under a NPDES General Permit, or a Low Erosivity Waiver (LEW) form, if applicable. A copy of the EPA acceptance of the NOI or LEW must be delivered to the Owner. All required erosion control measures sufficient to begin construction must also be in place. This will be defined in the plan specifications and/or the SWP3.

630.2.1.2 Payment for an additional sixty (60) percent of the Lump Sum unit price amount shall be prorated based on the Actual Percent Complete on the Application for Payment as approved by the Architect, Engineer or Landscape Architect. For example, if the Contractor is 20% complete, the contractor can take the 20% (0.2) and multiply it by half of the Lump Sum unit price amount, and receive that portion.

In order to receive payments, the field inspection forms must be sent in with the Application for Payment each month. If there are deficiencies maintaining or implementing the SWP3 and its Best Management Practices (BMPs), the payment will be withheld until the deficiencies are corrected.

630.2.1.3 The remaining twenty-five (25) percent of the Lump Sum unit price amount will be based on the completion and submittal to EPA of an EPA Notice of Termination (NOT) of Coverage Under a NPDES General Permit for Storm Water Discharges Associated with Construction Activity, and BMP removal. A copy of the NOT acceptance verification from EPA must be delivered to the Owner. BMPs must be removed as defined in the plan specifications or SWP3. This is done in case there are some BMPs that must remain until final stabilization is met, and that there are no more NPDES concerns for the Contractor.

END OF SECTION
SECTION 1505

CONTROL OF STORM WATER AND NUISANCE FLOW

1505.1 DESCRIPTION
This work covers the control of storm and nuisance flow water in the vicinity of this project.

1505.2 CONSTRUCTION REQUIREMENTS
All permanent work shall be performed in areas free from water. The CONTRACTOR shall construct and maintain all dikes and drainage ditches necessary for the elimination of water from work areas and shall furnish, install, maintain, and operate all necessary pumping and other dewatering equipment required for dewatering the various work areas. Two (2) types of flow can be expected;

1) Continuous or intermittent flow through the main arroyo;

2) Local sheet flow from adjacent properties or adjacent streets.

The CONTRACTOR is responsible for adequacy of the scheme or plans, or for furnishing all equipment, labor and materials necessary for dewatering the work areas and breaking up and removing such ice or snow as may have formed or settled in the work area. The CONTRACTOR shall be fully responsible for all dewatering operations, and the cost of all dewatering operations shall be included in the lump sum price for this work. The CONTRACTOR shall also be responsible for removal of any sediment deposited by storm and nuisance water, and the cost of sediment removal work shall be included in the lump sum price for this work.

In the event that storm flow, snowmelt or other water flows overtop the Contractor’s diversion method, the Contractor will be responsible for any and all damage, including damage to the existing channel and any damage to new work and is responsible for immediate resolution and repair in a manner acceptable to SSACFCA.

Diversion methods may be by use of sand bag diversion channels, sand bag dams, pumping or piping around or over the work areas, or any method or combination.

1505.3 BASIS OF PAYMENT
The bid item for this effort will be on a Lump Sum (LS) basis. Providing and maintaining the diversion and care of water, regardless of the amount of water actually handled, shall be paid for as follows:

Payment for protection of project from water will be made as a percentage of the dollar amount of work completed to date minus the Mobilization bid item and Protection of the Project From Water During Construction bid item.

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection of Project from Water During Construction</td>
<td>LS</td>
</tr>
</tbody>
</table>

END OF SECTION
SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 1506

CONSTRUCTION STAKING

1506.1 DESCRIPTION
This work consists of construction staking lines, grades, and layouts by the Contractor in accordance with the plans and specifications and as directed by the Engineer for the control and completion of the project.

1506.2 MATERIALS
The Contractor shall furnish all stakes, templates, straightedges, surveying equipment and other devices necessary for establishing, checking, marking, and maintaining points, including P.I.'s, P.C.'s, P.T.'s, and lines, grades and layouts. As directed by the Engineer, points shall be referenced so that they may later be re-established.

1506.3 CONSTRUCTION REQUIREMENTS
Local Survey Control has been set for vertical and horizontal control throughout the construction area. These stakes and marks shall constitute the field control by and in accordance with which the Contractor shall establish other necessary controls and perform the work.

The Contractor shall be responsible for all other control, slope stakes, cut stakes, offset stakes, bench marks, blue tops or other staking necessary for proper execution of the work, or as requested by the Project Manager, to assure compliance with the plans.

1506.4 CONSTRUCTION SURVEYS
The contractor shall obtain and pay for the services of a Professional Surveyor registered in the State of New Mexico to perform surveys of earthwork quantities, during and at the completion of the project construction. These surveys shall consist of the following phases.

Phase 1: A cross section survey, with no greater than 50 foot spacing, to determine the location of existing ground prior to construction after clearing and grubbing and after removal of the trash and debris. Cross section data collected shall be of sufficient spacing, including all breaks in the terrain to be able to create an original ground digital terrain model (DTM). The "original ground" DTM shall be submitted to the Engineer for review and acceptance prior to proceeding with excavation, embankment or export of excess material. Cross section data must be sufficient to determine earthwork quantities.

Phase 2: Cross-section and location surveys that may be made during the excavation and backfill construction for the purposes of verifying the contractor's work. Where shown, the excavation dimensions (pay limits for unclassified excavation, backfill and sub-excavation) shown on the plans shall be used to determine the excavation cross-section for payment to the contractor. The cross-section data must be sufficient to verify the limits of excavation.

Phase 3: A cross-section survey, at the same locations as the cross-sections in Phase 1 to determine the location of the finish grade at the completion of construction.

Phase 4: The Phase 4 Survey will be completed during construction to demonstrate compliance with
the design grades shown on the plan set. Phase 4 Survey will also include the update and completion of as-builds for the project and the submittal on a weekly basis of as-builds on a set of the construction drawings, to the satisfaction of the Project Manager.

All surveys must be certified by the Professional Surveyor and include complete documentation. Cross sections of the Phase 1, 2 and 3 surveys and the pay limit for excavation as shown on the plans must be used by the Professional Surveyor to compute the quantity of excavation, subject to the provisions for measurement in Section 203. Volume shall be based on the “average end area” computation. All computations of excavation and backfill must be submitted to the Engineer in sufficient detail. This submittal shall be such that methods and computations can be fully verified and are subject to approval by the Engineer. The Contractor shall also submit the electronic survey point files, including break lines, in a format compatible with Civil3D such that the Engineer can use the data for verification of cut/fill quantities.

At the end of the Project, RESPEC will transcribe the as-built information provided by the Contractor onto the mylar record drawing. The Contractor’s Professional Surveyor will be required to stamp, sign and certify the information shown on the mylar As-Built drawings.

1506.5 METHOD OF MEASUREMENT

Submit a construction-staking schedule of values as part of Construction Progress Meetings or monthly progress schedule to the Project Manager for approval.

1506.6 BASIS OF PAYMENT

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Staking by the Contractor</td>
<td>Lump Sum</td>
</tr>
</tbody>
</table>

SSCAFCA will make partial payments in accordance with the approved construction-staking schedule of values.

END OF SECTION
SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 1507

TESTING AND QUALITY ASSURANCE

1507.1 GENERAL
A. This Section includes testing and quality control measures required on this project. The Section is additional to requirements specified for testing and quality assurance in the standard specifications and other supplemental specifications.
B. Materials and equipment are subject to inspection, sampling, and testing before acceptance of the work.

1507.2 RELATED WORK
A. General and Supplemental General Conditions of the Contract.

1507.3 REFERENCES AND DEFINITIONS
A. All materials and equipment shall be tested, by the CONTRACTOR, pursuant to their technical specification (unless otherwise specified herein) and the manufacturer’s recommendations.
B. Structure shall include but is not limited to: parking lots, pavement, sidewalk, curb and gutter, foundations, structural concrete, piping, wet-wells, manholes, retaining walls, junction boxes, and buildings.

1507.4 SUBMITTALS
A. Test Reports from tests performed by independent testing firm: Submit for acceptance, complete test reports from approved independent testing laboratories certifying that product conforms to performance characteristics and testing requirements specified herein and in other supplemental/standard specifications. Independent firm to submit reports to the ENGINEER and CONTRACTOR, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
B. Test Reports from tests performed by CONTRACTOR: Submit for acceptance, complete test reports from CONTRACTOR certifying that product conforms to performance characteristics and testing requirements specified herein and in other supplemental/standard specifications.

1507.5 QUALITY ASSURANCE
A. Quality Assurance/Control of Installation – The CONTRACTOR shall:
   1. Comply fully with manufacturers’ instructions, including each step in sequence.
2. Request clarifications from ENGINEER before proceeding should manufacturers’ instructions conflict with Contract Documents.

3. Request clarification from ENGINEER before proceeding should specified reference standards conflict with Contract Documents. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

4. Comply with specified standards as a minimum quality for the work except when more stringent specified tolerances, codes, or requirements indicate higher standards or more precise workmanship are required.

5. Make sure work is performed by qualified persons.

6. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

B. Testing Laboratory Services

1. Reports will be submitted by the independent firm to the ENGINEER and CONTRACTOR, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

1507.6 TESTING METHODS

Testing methods shall comply with ASTM Standards and as specified in the technical specifications for the project.

1507.7 EXECUTION

A. Testing Laboratory Services

1. The CONTRACTOR will employ and pay for services of an independent testing firm to perform testing.

2. The independent firm will perform tests and other services specified in individual Specification Sections and as required by the OWNER.

3. CONTRACTOR shall:
   a) Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.
   b) Notify ENGINEER and independent firm 8 hours prior to expected time for operations requiring services.
   c) Make arrangements with independent firm and pay for additional samples and tests required for CONTRACTOR’S use.

B. Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the ENGINEER. No additional payment will be made for re-testing due to failing tests.
1507.8 TESTING FREQUENCY AND TYPE OF TESTING

Frequency and type of testing shall be per the requirements listed in the specifications for each type of Work. The Engineer may increase and/or add testing for any Work items. The Testing Allowance will be adjusted for increases in testing by Section 1507.9.D.

1507.9 MEASUREMENT AND PAYMENT

Testing shall be paid for as an allowance on a Lump Sum basis. The Contractor may request percent of LS cost payments during construction, however, the Contractor shall provide actual testing lab invoices as back-up for the percent complete that is being requested in a Pay Application.

Testing allowances are provided as part of the project and invoiced for testing will be paid for through this allowance.

Costs included in testing price include:

A. Cost of engaging an independent testing firm, execution of tests by the testing firm, and reporting results by the testing firm.

B. Costs of incidental labor and facilities required to assist testing firm.

C. Costs of testing laboratory services used by CONTRACTOR separate from Contract Document requirements

D. Costs of re-testing due to failure of previous tests will be included in the cost for testing and no additional payment will be made for this work.

The CONTRACTOR shall submit two copies of the testing firm’s invoice to OWNER with Pay Application. Reimbursement to the Contractor will be for actual invoiced costs and no mark-up will be added to this invoice. The Contractor shall receive reimbursement for actual invoice of testing firm upon certification that payment has been made to the testing laboratory. Payment will be made at the next application for payment from OWNER.

END OF SECTION
SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 1508
PROJECT RECORD DOCUMENTS

1508.1 GENERAL

This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

1508.2 RECORD DRAWINGS

Record Prints: Maintain one set of red-lined prints of the Contract Drawings and Shop Drawings. These prints shall be updated no less frequently than once per week. These prints will be reviewed for verification of updates by the construction observer on a regular basis, depending on the length of the contract. Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with ENGINEER.

1508.2.1 Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Mark whichever drawing is most capable of showing field conditions fully. Require individual or entity who obtained record data, whether individual or entity is Installer, SUB-CONTRACTOR, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

1508.2.2 Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-references on the Contract Drawings.

1508.2.3 Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

1508.2.4 Note Construction Change Directive numbers (field orders or Request for Information changes), alternate numbers, Change Order numbers, and similar identification, where applicable.

1508.2.5 Verification of current record prints status will be included in the monthly payment approval process that will be noted by the construction’s observer’s field reports.
1508.3 RECORD SPECIFICATIONS

Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later. Note related Change Orders, field order notes, Request for Information (RFI) notes, Record Product Data, and Record Drawings where applicable.

1508.4 MISCELLANEOUS RECORD SUBMITTALS

Assemble Certifications, Lab Test Reports, and Field Test Reports required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1508.5 SUBMITTALS

See New Mexico Standard Specifications For Public Works Construction Section 1502.

1508.6 RECORDING AND MAINTENANCE

1508.6.1 Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur.

1508.6.2 Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. It is not advisable to use Project Record Documents for construction purposes. Provide access to Project Record Documents for Engineer’s reference on the project site.

1508.7 MEASUREMENT AND PAYMENT

The cost of project record documents shall be incidental to the Work and no separate payment shall be made for this effort. However, the Project Record Documents shall be reviewed per Section 1508.2.5 and they shall be updated prior to pay applications being processed.

END OF SECTION
SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 1510
PROJECT SIGN

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The CONTRACTOR shall provide, erect, and maintain for the duration of the construction project one identification sign at each construction site. The CONTRACTOR shall also provide, erect and maintain additional signs as necessary for Storm Water Pollution Prevention Plan (SWPPP) and labor notification.

1.2 RELATED SECTIONS

A. General and Supplemental General Conditions of the Contract and Division 1.
B. Section 103: Submittal Procedures

1.3 REFERENCES

A. Where all or part of a Federal, American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), American Water Works Association (AWWA), New Mexico Standard Specifications for Public Works Construction, etc., standard is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 PERFORMANCE REQUIREMENTS

A. SWPPP Sign

1. If a SWPPP is required, a sign or other notice must be posted conspicuously near the main entrance of the construction site. If displaying near the main entrance is infeasible, the notice can be posted in a local public building such as the town hall or public library. The sign or other notice must contain the following information.

2. A copy of the completed Notice of Intent as submitted to the EPA Stormwater Notice Processing Center; and

3. If the location of the SWPPP or the name and telephone number of the contact person for scheduling SWPPP viewing times has changed (i.e., is different than that submitted to EPA in the NOI), the current location of the SWPPP and name and telephone number of a contact person for scheduling viewing times.

4. For linear projects, the sign or other notice must be posted at a publicly accessible location near the active part of the construction projects (e.g., where a pipeline project crosses a public road).

B. Labor Sign

1. A sign shall also include all notification and sign requirements from the following so that they are weather tight.
a. Equal employment opportunity poster
b. Federal and State wage rate information
c. Safety posters
d. Official announcements and notices

C. Project Sign

1. SIGN DIMENSIONS: 1200 mm x 2400 mm x 19 mm (approx. 4’ x 8’ x ¾”) plywood panel (APA RATED A-B GRADE–EXTERIOR)
2. Sign shall be white background with black letters
3. Final information regarding CONTRACTOR will be supplied after the project has been awarded.
4. 

---

[2]

Lisbon Pond Construction

[SOUTHERN SANDOVAL COUNTY ARROYO FLOOD CONTROL AUTHORITY]

ENGINEER
RESPEC
5971 Jefferson St. Suite 101
ALBUQUERQUE, NM 87109
(TELEPHONE N°: 505-253-9718)

CONTRACTOR
(NAME)
(ADDRESS)
(CITY, STATE, ZIP CODE)
(TELEPHONE N°: 505-000-0000)

SSCAFCA
1041 COMMERCIAL DR. SE
RIO RANCHO NM, 87124
(TELEPHONE N°: 505-892-5266)

FUNDING
[CONTRACT AWARD AMOUNT]

[1-1/2” wide red outline, with rounded corners @ interior box]
1.5 SUBMITTALS

A. General: Submit listed submittals in accordance with conditions of the Contract and STS 103.

B. Shop drawings: Submit clear, concise drawing showing model number, size, arrangement and configuration of all products specified. Minimum sheet size is 8.5” X 11”.

1.6 QUALITY ASSURANCE

A. Sign Paint (Primer, Paint and Finishes): The paint used for the sign shall be specifically designated for exterior use. It shall resist weathering and fading for the indicated construction schedule.

1.7 DELIVERY, STORAGE AND HANDLING

A. The CONTRACTOR is responsible for the safe storage of the equipment until it is incorporated in the completed project.

B. The material and equipment shall be stored and handled per the manufacturer’s recommendations.

PART 2 PRODUCTS

2.1 MATERIALS

A. The sign(s) shall be painted on one side with a background color of white not smaller than 4’ x 8’, marine grade plywood.

PART 3 EXECUTION

3.1 CONTRACTOR’S RESPONSIBILITY

A. The CONTRACTOR is responsible for furnishing and installing the PRODUCT including all site preparation, and other items necessary for the proper installation and operation of the PRODUCT.

3.2 EXAMINATION

A. Examine all products for compliance with this section.

B. Proceed with installation only after unsatisfactory conditions have been corrected. Immediately correct all deficiencies and conditions which would cause improper execution of Work specified in this Section and subsequent Work.

C. Verify that the PRODUCT dimensions are correct and project conditions are suitable for installation. Do not proceed with installation until conditions deficiencies have been corrected.
D. Proceeding with Work specified in this Section shall be interpreted to mean that all conditions were determined to be acceptable prior to start of Work.

3.3 INSTALLATION

A. Each sign shall be mounted on two 4" x 4" posts, with the bottom of the sign at least four feet above grade. The identification sign shall be mounted level and at the location designated by the Architect/ENGINEER or the OWNER'S Project Manager.

B. Keep signs and supports clean. Repair deterioration and damage.

C. Remove signs, framing, supports, and foundations to a depth of 2 feet upon completion of the project. Restore the area to a condition equal to or better than before construction.

D. The signs shall be salvaged to the OWNER or disposed of by the CONTRACTOR at the OWNER's direction at the end of the construction project.

END OF SECTION 1510
DESCRIPTION
This work shall consist of furnishing, installing, and maintaining Temporary Plastic Barrier Fences of the type and at the locations shown in the plans or where directed by the Engineer.

MATERIALS
Materials for Temporary Plastic Barrier Fences shall meet the following requirements:

- **Fence**: High-density polyethylene mesh, ultraviolet-stabilized min. 2 years; minimum height 4.0 feet. Color: high-visibility orange or green. When used to protect trees or other vegetation, color shall be high-visibility orange.
- **Posts**: Rigid metal or wood posts, minimum length 6.0 feet.
- **Ties**: Steel wire, #14 gauge or nylon cable ties.
- **Warning signs**: Sheet metal, plastic or other rigid, waterproof material, 1.5 feet by 2.0 feet with 4 inch black letters on a white background. Text shall be: "Protected Site - Keep Out" unless otherwise specified.

CONSTRUCTION DETAILS
Fences shall be erected prior to moving construction equipment onto any area designated for protection.

The line of fences as indicated on the plans shall be staked or marked out on the ground by the Contractor and approved by the Engineer before any fence is installed. Where used for protection of individual trees, fence shall be placed at the drip line (extent of canopy). If not possible, placement shall be as close to the drip line as possible and in no case less than 5.0 feet away from the tree trunk.

On approval of the stakeout, posts shall be securely driven on 6.0 foot-maximum centers, normal to the ground, to a depth 1/3 of the total post length. Plastic barrier fence shall be placed along the side of all posts. Ends of fencing segments shall overlap a distance of at least one half the fence height.

Fencing shall be secured to posts with wire or cable ties at top, middle and bottom of post. Fastener shall be tight enough to prevent the fencing from slipping down. Overlaps shall also be securely fastened.

Barrier fence which is not orange in color shall be flagged at 6.0 foot intervals with red or orange florescent tape. Warning signs shall be mounted on the fence at no more than 100 foot intervals.

Maintenance shall commence immediately after erection of the fence and continue until one week prior to acceptance of the contract, and shall consist of: replacing damaged post(s) and fencing; re-fastening and tightening fencing; and restoring fence to its intended height.

Fencing used for tree or other vegetation protection shall not be temporarily removed to allow equipment access over a protected area, except as required for items of work specifically shown on the plans and approved by the Engineer in writing.
ITEM 607.41010010 - TEMPORARY PLASTIC BARRIER FENCE

METHOD OF MEASUREMENT
The quantity to be measured for payment will be the number of feet of Temporary Plastic Barrier Fence erected, measured along the top, to the nearest whole foot.

BASIS OF PAYMENT
The unit price bid shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work. Relocation of a fence from one location to another as directed by the Engineer shall be considered as a new location and will be separately paid.
ADS SANITITE® HP 12”–60” SANITARY PIPE SPECIFICATION

SCOPE
This specification describes 12- through 60-inch (300 to 1500 mm) ADS SaniTite HP pipe for use in gravity-flow sanitary sewer applications.

PIPE REQUIREMENTS
ADS 12” – 30” (300 to 750mm) SaniTite HP dual pipe shall have a smooth interior and annular exterior corrugations; 30”-60” SaniTite HP triplewall pipe shall have smooth interior and exterior surfaces with annular inner corrugations.

• 12- through 60-inch (300 to 1500 mm) pipe shall meet ASTM F2764*
• 12- through 60-inch (300 to 1500 mm) pipe shall have a minimum pipe stiffness of 46 pi when tested in accordance with ASTM D2412
• Manning’s “n” value for use in design shall be 0.012.

JOINT PERFORMANCE
Pipe shall be joined with a gasketed integral bell & spigot joint meeting the requirements of ASTM F2764*.

• 12- through 60-inch (300 to 1500 mm) shall be watertight according to the requirements of ASTM D3212, with the addition of a 15 psi pressure requirement. Spigot shall have two gaskets meeting the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gaskets are free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.

• 12- through 60-inch (300 to 1500 mm) diameters shall have a reinforced bell with a polymer composite band installed by the manufacturer.

FITTINGS
Fittings and connections shall provide a watertight connection according to the requirements of ASTM D3212. Gaskets, when present, shall meet ASTM F477.

FIELD PIPE AND JOINT PERFORMANCE
To assure watertightness, field performance verification may be accomplished by testing in accordance with ASTM F1417 or ASTM F2487. Appropriate safety precautions must be used when field-testing any pipe material.

MATERIAL PROPERTIES
Polypropylene compound for pipe and fitting production shall be an impact modified copolymer meeting the material requirements of ASTM F2764*.

INSTALLATION
Installation shall be in accordance with ASTM D2321 and ADS recommended installation guidelines, with the exception that minimum cover in traffic areas for 12- through 48-inch (300 to 1200 mm) diameters shall be one foot (0.3 m) and for 60-inch (1500mm) diameters the minimum cover shall be 2-ft (0.6m) in single run applications. Backfill for minimum cover situations shall consist of Class 1 or Class 2 (minimum 90% SPD) material. Maximum fill heights depend on embedment material and compaction level; please refer to Technical Note 2.05.

PIPE DIMENSIONS

<table>
<thead>
<tr>
<th>Nominal Diameter (mm)</th>
<th>12 (300)</th>
<th>15 (375)</th>
<th>18 (450)</th>
<th>21 (535)</th>
<th>24 (600)</th>
<th>30 (750)</th>
<th>36 (900)</th>
<th>42 (1050)</th>
<th>48 (1200)</th>
<th>60 (1500)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Pipe O.D. (mm)</td>
<td>12.1 (307)</td>
<td>14.9 (378)</td>
<td>18.0 (457)</td>
<td>21.1 (536)</td>
<td>24.1 (612)</td>
<td>30.1 (765)</td>
<td>36.7 (907)</td>
<td>41.8 (1062)</td>
<td>47.3 (1201)</td>
<td>59.3 (1506)</td>
</tr>
<tr>
<td>Average Pipe I.D. (mm)</td>
<td>14.5 (368)</td>
<td>17.6 (447)</td>
<td>21.2 (538)</td>
<td>24.8 (629)</td>
<td>28.0 (711)</td>
<td>35.4 (899)</td>
<td>41.1 (1044)</td>
<td>47.2 (1199)</td>
<td>53.8 (1367)</td>
<td>66.5 (1689)</td>
</tr>
</tbody>
</table>

* ASTM F2736 has been incorporated into the latest version of ASTM F2764.
ADS WATERSTOP™ GASKET SPECIFICATION

Scope
This specification describes the ADS WaterStop gasket available in 12- to 60-inch (300 to 1500 mm) diameters and used for a field installed seal that prevents water infiltration or exfiltration at manhole connections.

Material Properties
The ADS WaterStop gasket is made of a polyisoprene compound which meets the physical property requirements of ASTM C923.

Installation
Installation shall be in accordance with ADS recommended installation instructions. Contact your local ADS representative or visit www.ads-pipe.com for a copy of the latest installation guidelines.

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Recommended Min. Hole, in.</th>
<th>Min. Distance Pipe Invert to Structure Invert, in</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>19.5</td>
<td>3.7</td>
</tr>
<tr>
<td>15</td>
<td>23</td>
<td>4</td>
</tr>
<tr>
<td>18</td>
<td>26.5</td>
<td>4.2</td>
</tr>
<tr>
<td>24</td>
<td>33.3</td>
<td>4.5</td>
</tr>
<tr>
<td>30</td>
<td>40.5</td>
<td>5.2</td>
</tr>
<tr>
<td>36</td>
<td>47</td>
<td>5.5</td>
</tr>
<tr>
<td>42</td>
<td>53</td>
<td>5.7</td>
</tr>
<tr>
<td>48</td>
<td>59</td>
<td>5.7</td>
</tr>
<tr>
<td>54*</td>
<td>65</td>
<td>6.4</td>
</tr>
<tr>
<td>60</td>
<td>72</td>
<td>6.4</td>
</tr>
</tbody>
</table>

* Check with Sales Representative for availability
1012.1 GENERAL:

Work under this section consists of preparing all area indicated on the plans for native grass seeding, furnishing and installing all seed, fertilizer and soil amendments as specified herein and on the plans, or as authorized by the ENGINEER.

1012.2 REFERENCES:

1012.2.1 This Publication:

Section 1011

1012.3 WORK AREA/TIMING:

1012.3.1 Areas that are disturbed by the CONTRACTOR that are outside the construction limits shown on the plans or authorized by the ENGINEER shall be seeded with native grasses as specified herein at no cost to the OWNER.

1012.3.2 The seeding of disturbed areas shall commence upon completion of the other work in the area.

1012.4 MATERIALS:

1012.4.1 Native Seed: The native seed species and rate of application shall be as shown below and shall be used based on the type of soil or as specified on the plans or in the Supplemental Technical Specification.

1012.4.1.1 Sandy Soils. Seed rate is given in pounds of pure live seed (P.L.S.) per acre.

<table>
<thead>
<tr>
<th>Variety/ Common Name</th>
<th>Genus/ Species</th>
<th>P.L.S/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Paloma&quot; Indian Rice grass</td>
<td>Oryzopsis hymenoides</td>
<td>5.0</td>
</tr>
<tr>
<td>&quot;Viva&quot; Galleta grass</td>
<td>Hilaria jamesii</td>
<td>1.0</td>
</tr>
<tr>
<td>&quot;Niner&quot; Side oats grama</td>
<td>Bouteloua curtipendula</td>
<td>3.0</td>
</tr>
<tr>
<td>&quot;Hatchita&quot; Blue grama</td>
<td>Bouteloua gracilis</td>
<td>1.0</td>
</tr>
<tr>
<td>Sand dropseed (NM Region)</td>
<td>Sporobolus cryptandrus</td>
<td>1.0</td>
</tr>
<tr>
<td>Sand dropseed (de-winged) (NM Region)</td>
<td>Sporobolus cryptandrus</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Total rate 12.0 lbs/ac

1012.4.1.2 Clay, Clay Loam, and Sandy gravelly clay loam soils. Seed rate is given in pounds of pure live seed (P.L.S.) per acre.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Genus/species PLS/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Paloma&quot; Indian rice grass</td>
<td>Oryzopsis hymenoides 2.0</td>
</tr>
<tr>
<td>&quot;Viva&quot; Galleta grass</td>
<td>Hilaria jamesii 2.0</td>
</tr>
<tr>
<td>&quot;Niner&quot; Side oats grama</td>
<td>Bouteloua curtipendula 2.0</td>
</tr>
<tr>
<td>&quot;Hatchita&quot; Blue grama</td>
<td>Bouteloua gracilis 3.0</td>
</tr>
<tr>
<td>Sand dropseed (NM Region)</td>
<td>Sporobolus cryptandrus 1.0</td>
</tr>
<tr>
<td>Sand dropseed (de-winged)</td>
<td>Sporobolus cryptandrus 1.0</td>
</tr>
</tbody>
</table>

Total rate 11.0 lbs/ac

NOTE: If the area to be seeded is along a recreational trail of any type the seed mixes for either type of soil listed above shall exclude the one (1) pound per acre of Four-wing saltbush. The seeding rate shall be lowered by one (1) pound per acre.

1012.4.1.3 Seeds may be pre-mixed by a seed dealer. Each bag of seed shall be sealed and labeled by the seed dealer in accordance with Federal Seed Laws and New Mexico Department of Agriculture Labeling Laws. This includes: variety, kind of seed, lot number, purity, germination, percent crop, percent inert, percent weed (including noxious weeds), origin, test data and net weight. Federal Seed Laws require that analysis shall be no older than 5 months for seed shipped interstate and no older than 9 months for seed shipped intra-state. The ENGINEER shall receive all labels from all bags of seed used for verification.

1012.4.2 Fertilizer and Soil Amendments: Unless otherwise specified on the plans or in the Supplemental Technical Specification, no fertilizer or other soil amendments are required on areas specified to receive native seeding. If fertilizer and/or other soil amendments are required they shall be in accordance with Section 1011 of these specifications.
1012.4.3 MULCH:

1012.4.3.1 Hay Mulch: Perennial native or introduced grasses of fine-stemmed varieties shall be used unless otherwise specified on the plans. At least 65 percent of the herbage by weight of each bale of hay shall be 10 inches in length or longer. Hay with noxious seed or plants will not be acceptable. Rotted, brittle, or moldy hay will not be acceptable. Marsh grass or prairie hay composed of native grass of species to be seeded will be acceptable. Tall wheat grass, intermediate wheat grass, switch grass, or orchard hay will be acceptable if cut prior to seed formation. Marsh grass hay shall be composed of mid and tall native, usually tough and wiry grass and grass-like plants found in the lowland areas within the Rocky Mountain region. Hay shall be properly cured prior to use. Hay which is brittle, short fibered or improperly cured is not acceptable.

1012.5.2 Straw Mulch: Small grain such as wheat, barley, rye, or oats will not be allowed except by prior approval of the ENGINEER and with the concurrence of the Air Division, Environmental Health Department. Alfalfa or the stalks of corn, maize or sorghum is not acceptable. Material which is brittle, shorter than 10 inches or which breaks or fragments during the crimping operation will not be acceptable.

1012.4.3.3 Gravel Mulch: Gravel mulch shall be crushed or screened gravel 3/4" to 1" maximum size with a minimum of one fractured face unless otherwise specified.

1012.4.3.4 Erosion Control Mats, Fabric or Blankets: The type of erosion control mats, fabric or blankets used shall be as specified or allowed on the plans or in the Supplemental Technical Specifications.

1012.5 SEED BED PREPARATION:

1012.5.1 General:

1012.5.1.1 Prior to the starting of any seed bed preparation the final grades of all earth work shall be inspected and approved by the ENGINEER.

1012.5.1.2 No preparation shall be performed when the surface is wet or muddy or when the soil moisture content is such that the soil is not fully loosened by the discing operation.

1012.5.1.3 The extent of seed bed preparation shall not exceed the area on which seeding, mulching and crimping operations can be completed prior to crusting or wind or water erosion of the prepared surface. If erosion, crusting or re-compaction occurs, the affected area shall be re-worked beginning with seed bed preparation. Depth of preparation must be approved by the ENGINEER prior to the seeding and mulching operations.

1012.5.2 Mechanical Preparation: The seed bed shall be loosened to a minimum depth of 6" (six inches) by means of disc or harrow. Area of heavy or compacted soil may require additional preparation such as chiseling or ripping if discing alone does not result in preparation to the full minimum depth of 6". The soil shall be worked to a smooth surface free of clods, stones 4" and larger or any other debris or foreign material that could interfere with seeding or crimping equipment operations.

1012.5.3 Hand Preparation: Areas which cannot be prepared with mechanized equipment because of small size irregular shape or slope angle may be prepared to a minimum depth of 2" using hand tools or a rototiller. Any such areas will be specified on the plans.

1012.6 SEEDING:

1012.6.1 General:

1012.6.1.1 Seeding shall not start until the seed bed preparation has been inspected and approved by the ENGINEER.

1012.6.1.2 No more area may be seeded than can be covered with mulch and crimped, or covered with gravel mulch or erosion control mats by the end of the work day. No seeding operations may be conducted when steady wind speed exceeds 10 miles per hour. If winds exceed 10 mph while seeding is underway, seeding operations will be halted and any areas seeded to that point completed.

1012.6.2 Seed Application:

1012.6.2.1 Drill Seeding: Drill seeding is required unless otherwise specified on the plans or in the Supplemental Technical Specifications. Seed shall be applied with a "rangeland" type seed drill equipped with packer wheels. Seed shall be drilled to a maximum depth of 1/2" unless otherwise specified. Direction of seeding shall be across slopes and on the contour whenever possible.

1012.6.2.2 Broadcast Seeding: Seed may be applied using the broadcast method when size, irregular shape or slope angle exceeding 3.1
prevents the use of a seed drill. Seed may be broadcast by hand or by means of a mechanical seeder provided that the seed is evenly distributed over the seeding area. Areas of broadcast seeding will be hand raked to cover seed. Areas which are broadcast seeded shall be seeded at rate which is double that used for drill seeding.

1012.6.2.3 Seeding With Gravel Mulch: Areas to receive gravel mulch will be seeded at the broadcast seed rate with 1/2 the seed applied prior to application of gravel and 1/2 the seed applied on the surface of the gravel. Water shall be applied in quantity sufficient to wash seed from the surface and into the gravel.

1012.6.2.4 Hydro Seeding: Hydro seeding will not be allowed on areas of non-irrigated native grass seeding unless specified on the plans or in the Supplemental Technical Specifications or authorized by the ENGINEER.

1012.7 MULCHING:

1012.7.1 General:

1012.7.1.1 All seeded areas shall be mulched unless otherwise specified on the plans or in the Supplemental Technical Specifications.

1012.7.1.2 On seeded areas that are level or have slopes 3:1 or less, any of the four (4) types of mulching or erosion control specified herein may be used. On seeded areas that have slopes steeper than 3:1 only gravel mulch or erosion control materials may be used as specified on the plans and in the Supplemental Technical Specifications.

1012.7.2 Hay Mulch: Hay mulch shall be applied at a minimum rate of 1.5 tons per acre of air dry hay.

1012.7.3 Straw Mulch: Straw mulch shall be applied at a minimum rate of 2.5 tons per acre of air dry straw.

1012.7.4 Crimping: Hay and/or Straw mulch shall be crimped into the soil. The mulch shall be spread uniformly over the area either by hand or with a mechanical mulch spreader. When spread by hand, the bales of mulch shall be torn apart and fluffed before spreading. Mulching will not be permitted when wind velocity exceeds 15 miles per hour. The mulch shall be wetted down and allowed to soften for 15 to 20 minutes prior to crimping. A heavy disc such as a mulch-tiller, with flat serrated discs at least 1/4 inch in thickness, having dull edges and the disc spaced 6 inches to 8 inches apart shall be used to crimp (or anchor) the mulch into the soil to a minimum depth of 2 inches or as specified on the plans or the Supplemental Technical Specifications. The discs shall be of sufficient diameter to prevent the frame of the equipment from dragging the mulch.

The crimping operations shall be across the slope where practical but not be parallel to prevailing winds or by tight interlocking “S” curves to avoid straight crimp lines.

If small grain straw mulch is used it shall be crimped in two (2) directions in a cross-hatch pattern.

1012.7.5 Gravel Mulch: Gravel mulch shall be placed by hand or by mechanized equipment that provides full coverage at a uniform thickness of 2 inches in depth.

1012.7.6 Erosion Control Mats, Fabric or Blankets: the type of erosion control mats, fabric or blankets used shall be as specified on the plans or the Supplemental Technical Specifications or as approved by the ENGINEER. The anchoring of the erosion control items shall be as per the manufacturer's recommendations.

1012.8 PROTECTION OF NATIVE GRASS SEEDED AREA:

1012.8.1 GENERAL: The CONTRACTOR shall be responsible for protecting and caring for seeded areas until final acceptance of the work and shall repair at his expense any damage to seeded areas caused by pedestrian or vehicular traffic or vandalism.

1012.9 INSPECTION FOR NATIVE GRASS AREA:

1012.9.1 The following inspection shall be the minimum required inspections to native grass during the course of construction. Additional inspections shall be made at any time at the discretion of the ENGINEER.

1012.9.2 It shall be the responsibility of the CONTRACTOR to notify the ENGINEER, in writing, 48 hours in advance of each required inspection.

1012.9.3 The sequence of required inspections shall not be changed from the sequence listed below. The CONTRACTOR shall not proceed with work of the next sequence without written approval of the work of the previous sequence. Payment will
not be approved for items which have not been inspected and approved in writing.

1012.9.3.1 Each phase of soil preparation shall be inspected in process.

1012.9.3.2 Finish grade shall be inspected.

1012.9.3.3 Seed shall be inspected prior to seeding.

1012.9.3.4 Seeded area shall be inspected after completion.

1012.9.3.5 Final inspection of the project and acceptance.

1012.10 MEASUREMENT AND PAYMENT

1012.10.1 MEASUREMENT: The measurement of native grass seeding shall be by the acre.

1012.10.2 Payment: Payment shall be made at the contract unit price per acre of native grass seeding complete in place, which shall include the seed, fertilizer, (if required) area preparation, seeding, soil amendments, (if required) and mulching.
Supplemental Specifications

Geotechnical Report
GEOTECHNICAL ENGINEERING SERVICES REPORT
JOB NO. 1-91201

LISBON DAM PROJECT
RIO RANCHO, NEW MEXICO

SUPPLEMENTAL REPORT TO
GEOTECHNICAL ENGINEERING SERVICES REPORT NO. 1-80714
PREPARED BY GEO-TEST, INC.
OCTOBER 8, 2019

PREPARED FOR:
RESPEC
February 19, 2020
Job No. 1-91201

RESPEC
5971 Jefferson St. NE, Suite 101
Albuquerque, NM 87109

ATTN: E. Christian Naidu, P.E.

RE: Geotechnical Engineering Services Report
Lisbon Dam Project
Rio Rancho, New Mexico

Dear Mr. Naidu:

Submitted herein is the Geotechnical Engineering Services Report for the above referenced project. The report contains the results of our field investigation and laboratory testing as well as supplemental embankment foundation and construction, slope stability, excavation and site grading recommendations.

It has been a pleasure to serve you on this project. If you should have any questions, please contact our Albuquerque office.

Respectfully submitted:
GEO-TEST, INC.

Reviewed by:
Patrick R. Whorton, E.I.
# Table of Contents

INTRODUCTION ........................................................................................................... 4  
PROJECT HISTORY .................................................................................................. 4  
PROPOSED CONSTRUCTION .................................................................................... 4  
FIELD EXPLORATION .............................................................................................. 5  
LABORATORY TESTING .......................................................................................... 5  
SITE CONDITIONS .................................................................................................... 5  
SUBSURFACE SOIL CONDITIONS .............................................................................. 5  
CONCLUSIONS AND RECOMMENDATIONS ............................................................ 6  
DAM EMBANKMENT FOUNDATION ........................................................................ 6  
DAM EMBANKMENT CONSTRUCTION ................................................................... 7  
SEEPAGE AND INTERNAL DRAINAGE .................................................................... 8  
EMBANKMENT SETTLEMENT .................................................................................... 8  
PRINCIPAL SPILLWAY ............................................................................................. 8  
EMERGENCY SPILLWAY .......................................................................................... 10  
EROSION ................................................................................................................... 10  
SITE GRADING ......................................................................................................... 11  
EXCAVATIONS ......................................................................................................... 13  
EARTHWORK FACTORS .......................................................................................... 13  
REVIEW AND INSPECTION .................................................................................... 13  
CLOSURE .................................................................................................................. 14  
BORING LOCATION MAP ....................................................................................... 15  
BORING LOGS ......................................................................................................... 16  
SUMMARY OF LABORATORY RESULTS .............................................................. 21  
GRAIN SIZE DISTRIBUTION ................................................................................... 23
INTRODUCTION

This report presents the results of geotechnical engineering services performed by this firm for the proposed new Lisbon Dam to be constructed in Rio Rancho, New Mexico.

The objectives of this investigation were to:

1) Evaluate the nature and engineering properties of the soils underlying the dam and pond site.

2) Provide updated recommendations for the design and construction of the detention dam including embankment foundation preparation and construction, considering slope stability, settlement, and seepage.

The investigation includes subsurface exploration, representative soil sampling, laboratory testing of the samples, performing an engineering analysis and preparation of this report.

PROJECT HISTORY

The purpose of this investigation was to gather information relative to the physical properties of the underlying site soils and utilize the information to provide supplemental recommendations to the Geotechnical Engineering Services Report number 1-80714 Lisbon Dam and Channel provided for the Southern Sandoval County Arroyo and Flood Control Authority (SSCAFCA) by this firm through Bohannan Huston, Inc. on October 8, 2018. Supplemental recommendations are provided herein to address changes to the project design which have developed since the report was written. Specifically, the relocation of the principal and emergency spillways as well as the addition of an auxiliary pond located on the south side of Inca Rd.

PROPOSED CONSTRUCTION

It is understood that the project consists of the construction of a new earth flood control embankment dam with an associated pond located north of Inca Rd. between Acicate Rd. and Afuste Rd. in Rio Rancho. It is understood that the embankment height will be on the order of 16 feet with horizontal to vertical slopes of 4 to 1 on the upstream face and 6 to 1 on the downstream face. The emergency spillway will be located at the northwest corner of the pond as opposed to over the crest of the dam as previously proposed. The emergency spillway will discharge into a new cut channel and parallel the pond on the west side. The principal spillway will consist of a 36 inch diameter pipe exiting from the east side of the dam then turn south and discharge into the Lisbon Channel located south of Tulip St. It is also understood that the dam will not be under the jurisdiction of the New Mexico State Engineers Office. It is our understanding that the reservoir area will be partially excavated to provide the borrow material for the embankments as well as to provide storm water storage.
FIELD EXPLORATION

A total of five (5) additional exploratory borings were drilled at the site within areas not directly explored during the original investigation. One (1) boring was drilled to a depth of 10 feet below existing grade along the new proposed spillway alignment. One (1) boring was drilled to a depth of 10 feet below existing grade within the proposed auxiliary pond site. One (1) boring was drilled to a depth of 20 feet below existing grade at the downstream toe of the proposed dam. One (1) boring was drilled to a depth of 10 feet below existing grade at the proposed primary spillway ported riser location. One (1) boring was drilled to a depth of 25 feet below existing grades at the proposed emergency spillway location. The locations of the borings are shown on the attached Boring Location Map, Figure 1. During the test drilling, the soils encountered in the borings were continuously examined, visually classified, and logged. The boring logs are presented in a following section of this report. Drilling was accomplished with a truck mounted drill rig using 5.5-inch diameter continuous flight hollow stem auger. Subsurface materials were sampled at five foot intervals or less utilizing an open tube split barrel sampler driven by a standard penetration test hammer.

LABORATORY TESTING

Selected samples were tested in the laboratory to determine certain engineering properties of the soils. Moisture contents were determined to evaluate the various soil deposits with depth. The results of these tests are presented on the boring logs.

Sieve analysis and Atterberg limits tests were performed on selected samples to aid in soil classification. The results of these tests are presented in the Summary of Laboratory Results and on the individual test reports presented in a following section of this report.

SITE CONDITIONS

The Lisbon Dam site is located in northwest Rio Rancho just north of Inca Road and bordered by Acicate Rd. to the west and Afuste Rd. to the east. The site is bisected by an arroyo which flows from north to south through the approximate center of the site. The entire site slopes downward from north to south with the east and west halves of the site generally sloping downward toward the arroyo. The site is populated with native shrubs and grasses and a few small juniper trees.

SUBSURFACE SOIL CONDITIONS

As indicated by the original exploratory borings, the subsurface profile underlying the Lisbon Dam site consists primarily of clayey, silty and poorly graded sands which extend to the full depths explored. These soils consist of low plasticity to non-plastic clayey and silty sand throughout most of the site with the exception of the area near and within the arroyo where the soils consist of non-plastic poorly graded sand which extends to a depth of 7 feet.
below existing site grades. The soils throughout the site range from medium dense to very dense with occasional loose soils being present in the near surface soils at depths of about 2.5 feet.

As indicated by the additional borings conducted as part of this supplemental investigation, the majority of the soils encountered in the additional borings were similar to those encountered during the original investigation. The exception would be a layer of silty gravel encountered between 7.5 and 9.5 feet at boring location 2 as well as a layer of high plasticity clay with sand encountered between 4.5 and 8 feet below existing surface grade.

No free groundwater was encountered in the borings and soil moisture contents were relatively low throughout the extent of the borings.

CONCLUSIONS AND RECOMMENDATIONS

Given the data collected from the additional borings conducted as part of this investigation; it is concluded that a majority of the recommendations contained within the original geotechnical report prepared by this firm for the subject project do not require modification. As such, much of the original geotechnical report remains unchanged. Relevant portions of the original report have been included as italicized text in this report. These sections of the original report are included herein in an effort to consolidate the reports. These sections have not been changed from the original report. Supplemental recommendations which were not included in the original report are included hereafter as non-italicized text.

DAM EMBANKMENT FOUNDATION

The density of near surface soils beneath the Lisbon Dam site are generally loose to dense and most soils were found to have a low moisture content and would be likely to experience settlement upon significant moisture increase. In addition, the soils located in and near the existing arroyo are courser grained with a higher hydraulic conductivity than near surface soils throughout the remainder of the site. This would lead to a difference in seepage rates beneath the dam. Therefore, in order to provide a stable and uniform surface for the construction of the dam, it is recommended that the subsurface soils beneath the dam, which will comprise the dam foundation, be overexcavated to such an extent as to remove the clean course sands, or to such an extent as to provide for a minimum of 3 feet of properly compacted structural fill beneath the dam and principle spillway, whichever is the greater depth of overexcavation. The limits of the overexcavation should also and extend a minimum distance of 3 feet beyond the perimeter of the dam. Detailed recommendations for dam embankment design and the required site grading are presented in the following sections of this report.

Clearing, grubbing and stripping will be required over the entire embankment foundation areas extending a distance of at least 5 feet horizontally beyond the limits of the embankment. The resulting foundation areas should then be overexcavated to such an extent as to remove all existing clean course grained
sands, as determined by the geotechnical engineer; or to such an extent as to provide for a minimum 3 feet of structural fill beneath the embankment, whichever is the greater depth of overexcavation. The overexcavation should also extend a minimum of 3 feet laterally from the embankment perimeter. Once the overexcavation has been completed, the native cut surface should be densified by scarifying to a depth of 12 inches, moisture conditioning to the optimum moisture content or above to a depth of 5 feet below the bottom of the overexcavation and subjected to a minimum of 20 passes with a heavy (20 ton or greater) vibratory roller. The embankment should then be placed from this elevation in accordance with the Site Grading section of this report.

As an alternative to moisture conditioning 5 feet below the bottom of the overexcavation and performing the 20 passes of a heavy vibratory roller; the depth of overexcavation may be increased to such an extent as to provide for 8 feet of properly compacted structural fill beneath all embankments, or to such an extent as to remove all clean, course sands, whichever is the greater depth of overexcavation.

**DAM EMBANKMENT CONSTRUCTION**

The stability of constructed dam embankment slopes was analyzed using the two-dimensional limit equilibrium stability program STABLPRO by Ensoft. Bishop’s Method of Slices was used to develop factors of safety against slip on a circular failure plane for both static and pseudo-static loading conditions.

Based on our analysis and given a dam with a height of 16 feet, a crest width of 10 feet a 4:1 (H:V) upstream slope and 6:1 downstream slope, constructed in conformance with the recommendations presented in the Site Grading section of this report, the following factors of safety were determined.

<table>
<thead>
<tr>
<th>Slope (H:V)</th>
<th>Static FS</th>
<th>Pseudo-Static FS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:1</td>
<td>3.883</td>
<td>1.946</td>
</tr>
<tr>
<td>6:1</td>
<td>5.099</td>
<td>2.130</td>
</tr>
</tbody>
</table>

As a factor of safety of 1.0 would be considered unstable and factors of 2.0 and 1.3 would be considered stable for static and pseudo-static slopes respectively, a dam built to the dimensions detailed above and constructed as recommended herein would be considered stable. Furthermore, the dam height could safely be increased to 24 feet given the above configuration while maintaining an acceptable factor of safety, if desired.

*It is assumed that the native sands encountered will be the primary material utilized for the construction of the embankment slopes. The slope stability analysis was conducted using the soil characteristics of the sampled onsite material such that the calculated slope stability applies only to these materials. Should import material be required for embankment construction, the soils should conform to the structural fill requirements presented in the Site Grading section of this report and be approved by the geotechnical engineer.*
For the purposes of this analysis, a horizontal pseudo-static coefficient of 0.20 g was utilized in the analyses based on 100% of the predicted peak ground acceleration within 50 years with a 2 percent probability of exceedance.

Embankments with a lesser height, wider crest and flatter slope will have factors of safety higher than those listed above such that they would also be deemed acceptable.

Should alternative embankment configurations be considered which do not conform to the embankment configurations and dimensions discussed above, this firm should be notified, and additional slope stability analysis can be performed for the embankment design chosen.

The native soils encountered at the pond area may be readily excavated using normal earthmoving equipment and, as previously mentioned, may be reused as structural fill for the construction of the dam embankment, although some blending may be required to meet the specifications for structural fill. Cut slopes may be excavated at a maximum temporary slope of 1.5:1 (H:V) and permanent slopes should be graded or created at a maximum 2:1 slope. A discussion of acceptable cut, embankment and temporary slopes is presented in later sections of this report.

SEEPAGE AND INTERNAL DRAINAGE

The project consists of a flood control structure to be constructed on normally dry watercourse. Maximum storm water detention time is 24 hours or less. Based upon the results of the laboratory tests, this is not nearly enough time to develop steady state seepage. Accordingly, seepage analysis and internal drainage design is not considered necessary. In addition, filter/drain material around the principal spillway pipe to control seepage is not considered necessary provided the embankment fill is carefully placed around the pipe as recommended in the Site Grading section of this report.

EMBANKMENT SETTLEMENT

Total settlement of the embankments is a function of internal embankment settlement and foundation settlement. Maximum foundation settlements are estimated to be on the order of 1½ inches, and internal embankment settlements are estimated to be on the order of 1 inch or less. However, since the vast majority of both foundation and embankment settlements will be elastic and occur during construction, only minor settlement, less than ¾ inch is anticipated upon completion of construction.

PRINCIPAL SPILLWAY

If the bottom of the pipe is not directly supported by the dam foundation structural fill, as described above, the native soils should be overexcavated to provide for a minimum of 3 feet of compacted structural fill beneath the pipe extending a minimum of 3 feet laterally beyond the pipe. The resulting excavated area should be moistened to the optimum moisture content or
above to a minimum depth of 5 feet and subjected to a minimum of 20 passes with a minimum 20 ton vibratory compactor. The surface should then be compacted to a minimum of 95 percent of maximum dry density as determined in accordance with ASTM D-1557. The pipe should then be backfilled with structural fill meeting the requirements presented in the Site Grading section of this report.

The soils encountered at the proposed ported riser inlet location were found to be medium dense to dense non-plastic silty sand. These soils will provide adequate support for the riser structure in their present condition and require no special site treatment beyond densification. Densification of the exposed native soils should consist of scarifying to a depth of 8 inches, moisture conditioning to the optimum moisture content or above and compacting the subgrade to a minimum of 95 percent of maximum dry density as determined in accordance with ASTM D-1557.

For the portion of the spillway pipe that will extend beyond a distance of 3 feet from the perimeter of the dam, the minimum 3 foot of structural fill over 5 feet of moisture conditioned compacted native soils supporting the spillway pipe will not be required. Instead the pipe should be installed as recommended below.

Once trench excavations are complete and prior to the placement of piping or bedding materials, all loose or disturbed soils in the bottom of the excavations should be removed so that undisturbed native soils are exposed throughout. Bedding and pipe embedment materials to be used around the pipes should conform to the pipe manufacturer’s recommendations and should be placed and compacted in accordance with project specifications, local requirements or governing jurisdiction.

All soils encountered at the site are considered suitable for use as trench backfill and may be used above or below the manufacturer approved embedment materials, provided the backfill soils are inspected and approved by the geotechnical engineer. Any material to be imported as trench backfill should be tested and approved by the geotechnical engineer prior to importation or placement.

Soils along the proposed principal spillway alignment consist of loose, dry, silty sands to the full depth explored. Excavation of these soils can be readily accomplished using normal earthmoving equipment; however, due to the dry condition of the sands, tracked equipment is advisable.

Excavated slopes for the construction of trenches should be designed and constructed in accordance with OSHA 29 CFR 1926, Subpart P, and any applicable state or local regulations. The contractor should be responsible for all temporary trench slopes excavated along the proposed utility lines and the design of any required temporary shoring, as applicable. Shoring, bracing, and benching should be performed by the contractor in accordance with applicable safety standards.
Excavated temporary and permanent slopes should not exceed 1.5 to 1 (horizontal to vertical). Spoil piles and heavy equipment should not be allowed within 5 feet of the top of the slopes.

**EMERGENCY SPILLWAY**

The emergency spillway may be constructed in the northwest corner of the pond as proposed. The native soils in this area were found to be medium to very dense such that the proposed emergency spillway structure may be supported on either native soils or properly compacted embankment fill. However, high plasticity clay was encountered in this area between 4.5 and 8 feet below existing grades. This clay has the potential to expand or heave upon increases in moisture content. As such, these soils are not considered suitable to provide reliable support of the emergency spillway structure.

Based on the above, it is recommended that any structure associated with the inlet to the emergency spillway be founded on a minimum of 3.0 feet of properly compacted, non-expansive structural fill. This may be accomplished by overexcavation of the native soils and replacement with structural fill. The soils exposed at the base of the overexcavation should be densified before placement of structural fill. Within the emergency spillway channel, densification of the exposed native soils should consist of scarifying to a depth of 8 inches, moisture conditioning to the optimum moisture content or above and compacting the subgrade to a minimum of 95 percent of maximum dry density as determined in accordance with ASTM D-1557 or ASTM D-698 for clay soils. Structural fill should then be placed and compacted according to the method outlined in the Site Grading section of the report. Any embankments associated with the emergency spillway should be constructed as recommended for the dam embankment.

**EROSION**

The onsite soils anticipated to be used as dam embankment fill and which will comprise cut slopes throughout the project are low cohesive granular soils. As such, slopes constructed with these soils will be subject to both sheet and rill erosion. As a general rule the amount of erosion to be expected is directly related to how steep the slope in question is with steeper slopes experiencing more erosion that flatter slopes.

As stated in previous sections, permanent project slopes may be as steep as 2:1 for the dam embankment and 1:1 for levees and still have adequate factors of safety against slope failure. Although stable, these steeper slopes will likely experience greater erosion than flatter slopes which may compromise the stability and integrity of the slopes. Therefore, the stability of all slopes recommended herein should be considered contingent upon the implementation of proper erosion protection.
SITE GRADING

The following general guidelines should be included in the project construction specifications to provide a basis for quality control during site grading. It is recommended that all structural fill and backfill be placed and compacted under engineering observation and in accordance with the following:

1) Clearing, grubbing and stripping will be required over the entire dam embankment area. Stumps, matted roots, or rocks larger than 2 inches in diameter should be removed from within 18 inches of the foundation areas. Stripping and preparation of dam embankment foundation areas should extend a minimum of 5 feet horizontally beyond embankment limits. Stripping should be achieved only by cutting, i.e., ground depressions or narrow sections of tributary arroyos should not be inadvertently filled during the foundation preparation.

2) After clearing, grubbing and required excavations, the existing site soils throughout the foundation areas should be overexcavated to such an extent as to provide for at least 3 feet of properly compacted structural fill beneath the dam embankments and principal spillway. However, all clean, coarse grained soils underlying the proposed dam embankment should be removed in their entirety as determined by the geotechnical engineer. The overexcavation limits should extend laterally a minimum of 3 feet beyond the embankment and pipe perimeters and 2 feet, or as far as practical, beyond the levee perimeters. The soils exposed at the base of the overexcavation should be densified before placement of structural fill.

3) Densification of native soils beneath the dam and principal spillway shall consist of moisture conditioning to the optimum moisture content or above for a minimum depth of 5 feet. This may be accomplished by ponding of water in the excavation and allowing the ponded water to infiltrate the native soils. Once the required moisture content has been achieved to the required depth the entire area to receive structural fill should be subjected to a minimum of 20 passes with a minimum 20 ton (combined static and dynamic) vibratory compactor. The upper 12 inches should then be compacted to a minimum of 95 percent of the maximum dry density at or above the optimum moisture content as determined in accordance with ASTM D-1557.

4) Densification of the native soils beneath the dam and principal spillway may alternatively be accomplished by extending the depth of overexcavation 5 feet so as to provide for a minimum of 8 feet of properly compacted structural fill beneath the embankments and the spillway. The bottom of the extended overexcavation should be densified prior to the placement of structural fill by scarifying a minimum of 8 inches of exposed cut surface, moisture conditioning to optimum moisture content or above and compacting to a minimum of 95 percent of maximum density as determined by ASTM D-1557.
5) Densification of native soils outside the dam embankment shall consist of scarifying to a depth of 8 inches, moisture conditioning to the optimum moisture content or above and compacting the subgrade to a minimum of 95 percent of maximum dry density as determined in accordance with ASTM D-1557 or ASTM D-698 for clay soils.

6) The results of this investigation indicate that most of the native soils will be suitable for use as structural fill for dam embankments; however, some blending may be required to meet the structural fill specifications below. Should imported fill be required, it should also meet the specifications for structural fill.

7) All structural fill and backfill should be free of vegetation and debris and contain no rocks larger than 3 inches. Gradation of the backfill material, as determined in accordance with ASTM D-422, should be as follows:

<table>
<thead>
<tr>
<th>Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 inch</td>
<td>100</td>
</tr>
<tr>
<td>No. 4</td>
<td>60 - 100</td>
</tr>
<tr>
<td>No. 200</td>
<td>10 - 35</td>
</tr>
</tbody>
</table>

8) Fill or backfill, consisting of soil approved by the geotechnical engineer, should be placed in controlled compacted layers not exceeding 8 inches (compacted) with approved compaction equipment. All structural fill material should be blended as necessary to produce a homogeneous embankment. No lifts of high permeability material or material differing substantially from the lift below should be permitted. Sheepsfoot or vibratory sheepsfoot or segmented steel wheel type compactors should be used. If the compactors “walk out” during compaction, or if it is desired to use flat wheel compactors, the upper 1 to 2 inches of the lift should be scarified prior to placing a subsequent lift. The embankment should be raised uniformly. All compaction should be accomplished to a minimum of 95 percent of maximum dry density as determined in accordance with ASTM D-1557. The moisture content of the structural fill during compaction should be at or 3 percent above the optimum moisture content. With any vibratory compactor, vibrations should be controlled or eliminated to avoid damage to adjacent structures or infrastructure.

9) Fill below and above the principal spillway pipe should be placed and compacted as outlined above. In the zone within 3 feet of the pipe, fill should be placed in maximum 6 inch lifts, moisture conditioned and compacted as outlined above, using manually controlled walk behind rolling compactors, vibratory plate compactors or jumping jacks capable of compacting the soil immediately adjacent to and beneath the haunches of the pipe. Continuous observation and testing should be performed by a representative of the geotechnical engineer during the backfilling process to verify proper placement and compaction around the pipes.
10) Tests for degree of compaction should be determined in accordance with ASTM D-1556 or ASTM D-6938. Continuous, full time observation and field tests should be conducted during fill and backfill placement by a representative of the geotechnical engineer to assist the contractor in evaluating the required degree of compaction. If less than the required compaction is required, additional compaction effort should be made with adjustment of the moisture content as necessary until 95 percent compaction is obtained.

**EXCAVATIONS**

The results of this investigation indicate that the surficial soils can be readily excavated using normal earth moving and excavation equipment. Temporary construction excavations should be maintained at slopes of 1.5:1 (H:V) or flatter. Surcharge loads including construction traffic and excavated spoil materials should be maintained at least 15 feet from the crest of any excavation slope. Surface water should be routed such that it does not flow down the face of the excavation slopes. Where insufficient space exists for open cut excavations, a shoring system will be required. All excavations should comply with all applicable safety regulations.

**EARTHWORK FACTORS**

Experience dictates shrinkage factors greater than calculated values. Stripping, subgrade preparation, hauling and wind losses, and ground compaction, both in the borrow (reservoir) areas and within the embankment foundation areas are all factors in shrinkage. We recommend using a shrinkage factor on the order of 25 percent.

**REVIEW AND INSPECTION**

This report has been prepared to aid in the evaluation of this site and to assist in the design of this project. It is recommended that the geotechnical engineer be provided the opportunity to review the final design drawings and specifications in order to determine whether the recommendations in this report are applicable to the final design. Review of the final design drawings and specifications should be noted in writing by the geotechnical engineer.

In order to permit correlation between the conditions encountered during construction and to confirm recommendations presented herein, it is recommended that the geotechnical engineer be retained to perform continuous observations and testing during the earthwork portion of this project. Observation and testing should be performed during construction to confirm that suitable fill and embankment soils are placed upon competent materials.
CLOSURE

Our conclusions, recommendations and opinions presented herein are:

1) Based upon our evaluation and interpretation of the findings of the field and laboratory program.

2) Based upon an interpolation of soil conditions between and beyond the explorations.

3) Subject to confirmation of the conditions encountered during construction.

4) Based upon the assumption that sufficient observation will be provided during construction.

5) Prepared in accordance with generally accepted professional geotechnical engineering principles and practice.

This report has been prepared for the sole use of RESPEC, specifically to aid in the design of the proposed Lisbon Dam project in Rio Rancho, New Mexico, and not for use by any third parties without consent.

We make no other warranty, either expressed or implied. Any person using this report for bidding or construction purposes should perform such independent investigation as they deem necessary to satisfy themselves as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project. If conditions encountered during construction appear to be different than indicated by this report, this office should be notified.

All soil samples will be discarded 60 days after the date of this report unless we receive a specific request to retain the samples for a longer period of time.
## LOG OF TEST BORINGS

### GROUNDWATER DEPTH

**NO: 1**

**During Drilling:** none  
**After 24 Hours:**

<table>
<thead>
<tr>
<th>DEPTH (FT)</th>
<th>LOG</th>
<th>SAMPLE INTERVAL</th>
<th>TYPE</th>
<th>N. BLOWS/FT</th>
<th>MOISTURE</th>
<th>DRY DENSITY (pcf)</th>
<th>USC</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>SS</td>
<td>2-3-5/8</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>SS</td>
<td>7-10-17</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>SS</td>
<td>5-19-19</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>SS</td>
<td>3-3-5/8</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LEGEND**

- **SS** - Split Spoon  
- **AC** - Auger Cuttings  
- **UD/SL** - Undisturbed Sleeve  
- **ST** - Shelby Tube  
- **AMSL** - Above Mean Sea Level  
- **CS** - Continuous Sampler  
- **UD** - Undisturbed  

Stratification lines represent approximate boundaries between soil types. Transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
### LOG OF TEST BORINGS

**NO: 2**

**During Drilling:** none

**After 24 Hours:**

<table>
<thead>
<tr>
<th>DEPTH (FT)</th>
<th>LOG</th>
<th>SAMPLE INTERVAL</th>
<th>TYPE</th>
<th>N. BLOWS/FT</th>
<th>MOISTURE %</th>
<th>DRY DENSITY (pcf)</th>
<th>USC</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>SS</td>
<td>2-3-3</td>
<td>6</td>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>SS</td>
<td>4-4-4</td>
<td>8</td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>SS</td>
<td>11-13-10</td>
<td>23</td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>SS</td>
<td>11-17-30</td>
<td>47</td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DESCRIPTION**

- POORLY GRADED SAND with SILT, non-plastic, loose to medium dense, dry, light brown
- SILTY GRAVEL, non-plastic, dry, light brown/gray
- SILTY SAND, non-plastic, dense, dry, light brown

*Stopped Auger @ 9 feet
Stopped Sampler @ 10.5 feet*

---

### LEGEND

- SS - Split Spoon
- AC - Auger Cuttings
- UD/SL - Undisturbed Sleeve
- GM - Groundwater Depth
- SM - Subsurface Profile

### Notes

Stratification lines represent approximate boundaries between soil types. Transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
**LOG OF TEST BORINGS**

**GROUNDWATER DEPTH**

**NO: 3**

**During Drilling:** none

**After 24 Hours:**

<table>
<thead>
<tr>
<th>DEPTH (Ft)</th>
<th>LOG SAMPLE INTERVAL</th>
<th>SAMPLE TYPE</th>
<th>BLows/FT</th>
<th>MOISTURE %</th>
<th>DRY DENSITY (pcf)</th>
<th>USC</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>SS</td>
<td>3-3-3-3</td>
<td>7</td>
<td>6</td>
<td>SM</td>
<td></td>
<td>SILTY SAND, non-plastic, loose, dry, light brown</td>
</tr>
<tr>
<td>10</td>
<td>SS</td>
<td>5-4-4-4</td>
<td>6</td>
<td>8</td>
<td>SP</td>
<td></td>
<td>POORLY GRADED SAND, non-plastic, dense, dry, light brown/gray</td>
</tr>
<tr>
<td>15</td>
<td>SS</td>
<td>4-4-5-4</td>
<td>5</td>
<td>9</td>
<td>SM</td>
<td></td>
<td>SILTY SAND, non-plastic, dense, dry, light brown</td>
</tr>
<tr>
<td>20</td>
<td>SS</td>
<td>11-16-18-18</td>
<td>2</td>
<td>34</td>
<td></td>
<td></td>
<td>Stopped Auger @ 14 feet</td>
</tr>
<tr>
<td>25</td>
<td>SS</td>
<td>20-23-24-24</td>
<td>4</td>
<td>47</td>
<td></td>
<td></td>
<td>Stopped Sampler @ 15.5 feet</td>
</tr>
</tbody>
</table>

**LEGEND**

SS - Split Spoon
AC - Auger Cuttings
UD/SL - Undisturbed Sleeve
SSCAFCA Lisbon Dam Project
PROJECT NO: 1-91201

Stratification lines represent approximate boundaries between soil types. Transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
**LOG OF TEST BORINGS**

**GROUNDWATER DEPTH**

**NO: 4**

**During Drilling:** none  
**After 24 Hours:**

<table>
<thead>
<tr>
<th>DEPTH (FT)</th>
<th>LOG</th>
<th>SAMPLE (TYPE)</th>
<th>N. BLOWS/FT</th>
<th>MOISTURE %</th>
<th>DRY DENSITY (pcf)</th>
<th>USC</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>SS</td>
<td>4-9-12</td>
<td>21</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>SS</td>
<td>14-17-18</td>
<td>35</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>SS</td>
<td>13-13-11</td>
<td>24</td>
<td>5</td>
<td></td>
<td></td>
<td>SM</td>
</tr>
<tr>
<td>20</td>
<td>SS</td>
<td>13-25-36</td>
<td>61</td>
<td>3</td>
<td></td>
<td></td>
<td>SILTY SAND, non-plastic, medium to very dense, moist to dry, light brown</td>
</tr>
</tbody>
</table>

**Stopped Auger @ 9 feet**  
**Stopped Sampler @ 10.5 feet**

**Project:** SCAFCA Lisbon Dam Project  
**Date:** 01/28/2020  
**Project No:** 1-91201  
**Elevation:**  
**Type:** 5.5" OD HSA

**LEGEND**
- SS - Split Spoon  
- AC - Auger Cuttings  
- UD/SL - Undisturbed Sleeve  
- SM - Silty Sand  
- CS - Continuous Sampler  
- UD - Undisturbed  
- ST - Shelby Tube  

Stratification lines represent approximate boundaries between soil types. Transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
# LOG OF TEST BORINGS

**NO: 5**

**During Drilling:** none  
**After 24 Hours:**

<table>
<thead>
<tr>
<th>DEPTH (FT)</th>
<th>LOG SAMPLE INTERVAL</th>
<th>TYPE</th>
<th>N. BLOWS/FT</th>
<th>MOISTURE %</th>
<th>DRY DENSITY (pcf)</th>
<th>USC</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td>SS</td>
<td>1-4-20</td>
<td>8</td>
<td></td>
<td></td>
<td>SILTY SAND, non-plastic, medium dense to dense, dry, light brown</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>SS</td>
<td>15-13-19</td>
<td>3</td>
<td></td>
<td></td>
<td>CLAY with SAND, high plasticity, hard, slightly moist, brown</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>SS</td>
<td>7-15-19</td>
<td>3</td>
<td></td>
<td></td>
<td>POORLY GRADED SAND with SILT, non-plastic, dense to very dense, dry, light brown</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>SS</td>
<td>34-44-40</td>
<td>3</td>
<td></td>
<td></td>
<td>SILTY SAND, non-plastic, dense, dry, light brown</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>SS</td>
<td>12-16-22</td>
<td>2</td>
<td></td>
<td></td>
<td>Stopped Auger @ 24 feet, Stopped Sampler @ 25.5 feet</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>SS</td>
<td>9-13-25</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LEGEND**

SS - Split Spoon  
AC - Auger Cuttings  
UD/SL - Undisturbed Sleeve  
AMSL - Above Mean Sea Level  
CS - Continuous Sampler  
UD - Undisturbed  
ST - Shelby Tube

Stratification lines represent approximate boundaries between soil types. Transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
### SUMMARY OF LABORATORY RESULTS

#### SIEVE ANALYSIS

<table>
<thead>
<tr>
<th>TEST HOLE</th>
<th>DEPTH (FEET)</th>
<th>UNIFIED CLASS</th>
<th>(%) MOIST</th>
<th>LL</th>
<th>PI</th>
<th>NO 200</th>
<th>NO 100</th>
<th>NO 40</th>
<th>NO 10</th>
<th>NO 4</th>
<th>3/8&quot;</th>
<th>1/2&quot;</th>
<th>3/4&quot;</th>
<th>1&quot;</th>
<th>1 1/2&quot;</th>
<th>2&quot;</th>
<th>4&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.0</td>
<td></td>
<td></td>
<td>8.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3.0</td>
<td>SM</td>
<td>4.0</td>
<td>NP</td>
<td>NP</td>
<td>25</td>
<td>52</td>
<td>93</td>
<td>99</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>5.0</td>
<td></td>
<td></td>
<td>5.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>10.0</td>
<td></td>
<td>2.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1.0</td>
<td></td>
<td></td>
<td>5.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3.0</td>
<td></td>
<td></td>
<td>3.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5.0</td>
<td>SP-SM</td>
<td>5.3</td>
<td>NP</td>
<td>NP</td>
<td>9</td>
<td>33</td>
<td>68</td>
<td>88</td>
<td>93</td>
<td>96</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10.0</td>
<td>SM</td>
<td>3.9</td>
<td>NP</td>
<td>NP</td>
<td>13</td>
<td>32</td>
<td>67</td>
<td>87</td>
<td>93</td>
<td>97</td>
<td>98</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1.0</td>
<td></td>
<td>6.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3.0</td>
<td></td>
<td>5.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>5.0</td>
<td>SM</td>
<td>4.7</td>
<td>NP</td>
<td>NP</td>
<td>40</td>
<td>71</td>
<td>92</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>10.0</td>
<td></td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>15.0</td>
<td>SM</td>
<td>4.2</td>
<td>NP</td>
<td>NP</td>
<td>17</td>
<td>53</td>
<td>88</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1.0</td>
<td></td>
<td>11.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3.0</td>
<td></td>
<td>4.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5.0</td>
<td>SM</td>
<td>4.8</td>
<td>NP</td>
<td>NP</td>
<td>18</td>
<td>39</td>
<td>58</td>
<td>82</td>
<td>96</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>10.0</td>
<td></td>
<td>2.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1.0</td>
<td>SM</td>
<td>8.0</td>
<td>NP</td>
<td>NP</td>
<td>20</td>
<td>54</td>
<td>81</td>
<td>92</td>
<td>96</td>
<td>99</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3.0</td>
<td></td>
<td>2.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LL = LIQUID LIMIT**  
**PI = PLASTICITY INDEX**  
**NP = NON PLASTIC or NO VALUE**

---

**Project:** SSCAFCA Lisbon Dam Project  
**Location:** Rio Rancho, NM  
**Number:** 1-91201
### SUMMARY OF LABORATORY RESULTS

**Project:** SSCAFCA Lisbon Dam Project  
**Location:** Rio Rancho, NM  
**Number:** 1-91201

<table>
<thead>
<tr>
<th>Test Hole</th>
<th>Depth (Feet)</th>
<th>Unified Class</th>
<th>(％) Moist</th>
<th>LL</th>
<th>PI</th>
<th>No 200</th>
<th>No 100</th>
<th>No 40</th>
<th>No 10</th>
<th>No 4</th>
<th>3/8”</th>
<th>1/2”</th>
<th>3/4”</th>
<th>1”</th>
<th>1 1/2”</th>
<th>2”</th>
<th>4”</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5.0</td>
<td>CH</td>
<td>19.7</td>
<td>61</td>
<td>35</td>
<td>74</td>
<td>86</td>
<td>98</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>10.0</td>
<td>SP-SM</td>
<td>2.6</td>
<td>NP</td>
<td>NP</td>
<td>8</td>
<td>53</td>
<td>90</td>
<td>98</td>
<td>99</td>
<td>99</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>15.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>25.0</td>
<td>SM</td>
<td>2.3</td>
<td>NP</td>
<td>NP</td>
<td>12</td>
<td>27</td>
<td>56</td>
<td>87</td>
<td>95</td>
<td>97</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LL** = LIQUID LIMIT  
**PI** = PLASTICITY INDEX  
**NP** = NON PLASTIC or NO VALUE
GRANular SIZE DISTRIBUTION

Specimen Identification | Classification | LL | PL | PI | Cc | Cu |
---|---|---|---|---|---|---|
● 1 | 3.0 | SILTY SAND(SM) | NP | NP | NP |
▲ 2 | 5.0 | POORLY GRADED SAND with SILT(SP-SM) | NP | NP | NP | 0.72 | 4.37 |
★ 3 | 5.0 | SILTY SAND(SM) | NP | NP | NP |
● 3 | 15.0 | SILTY SAND(SM) | NP | NP | NP |

Specimen Identification | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
---|---|---|---|---|---|---|---|---|
● 1 | 3.0 | 4.75 | 0.185 | 0.085 | 0.0 | 74.9 | 25.1 |
▲ 2 | 5.0 | 12.5 | 0.338 | 0.138 | 0.077 | 7.0 | 84.1 | 8.9 |
★ 3 | 5.0 | 9.5 | 0.117 | 0.139 | 7.0 | 79.6 | 13.4 |
● 3 | 15.0 | 2 | 0.185 | 0.097 | 1.0 | 59.0 | 40.0 |

GEO-TEST

Project: SSCAFCA Lisbon Dam Project
Location: Rio Rancho, NM
Number: 1-91201
GRAIN SIZE DISTRIBUTION

Specimen Identification | Classification                  | LL | PL | PI | Cc | Cu
--- | --- | --- | --- | --- | ---
● 4 | 5.0 | SILTY SAND(SM) | NP | NP | NP
▲ 5 | 1.0 | SILTY SAND(SM) | NP | NP | NP
▲ 5 | 5.0 | FAT CLAY with SAND(CH) | 61 | 26 | 35
★ 5 | 10.0 | POORLY GRADED SAND with SILT(SP-SM) | NP | NP | NP | 0.78 | 2.38
● 5 | 25.0 | SILTY SAND(SM) | NP | NP | NP | 0.80 | 7.83

Specimen Identification | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay
--- | --- | --- | --- | --- | --- | --- | --- | ---
● 4 | 5.0 | 9.5 | 0.489 | 0.111 | 4.0 | 77.7 | 18.3
▲ 5 | 1.0 | 12.5 | 0.19 | 0.092 | 4.0 | 76.1 | 19.9
▲ 5 | 5.0 | 2 | 0.0 | 0.0 | 25.7 | 74.3
★ 5 | 10.0 | 12.5 | 0.183 | 0.105 | 0.077 | 1.0 | 90.7 | 8.3
● 5 | 25.0 | 12.5 | 0.524 | 0.167 | 5.0 | 82.6 | 12.4

Project: SSCAFCA Lisbon Dam Project
Location: Rio Rancho, NM
Number: 1-91201

GEO-TEST
Dear Mr. Naidu:

In accordance with your request, submitted herewith is Addendum No. 1 to our geotechnical engineering services report for the above referenced project. The objective of this addendum is to update the embankment slope stability analysis present in the report which was performed for 4:1 and 6:1 (H:V) slopes for an embankment 16 feet tall with a 10 foot crest. It is understood that the embankment design has been adjusted since the report was written and now the embank will have 3:1 slopes in some locations with the same height and crest width. As such, a slope stability analysis was performed for the 3:1 slope which generated the following factors of safety.

<table>
<thead>
<tr>
<th>Slope (H:V)</th>
<th>Static FS</th>
<th>Pseudo-Static FS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:1</td>
<td>3.114</td>
<td>1.757</td>
</tr>
</tbody>
</table>

As a factor of safety of 1.0 would be considered unstable and factors of 2.0 and 1.3 would be considered stable for static and pseudo-static slopes respectively, a dam built to the dimensions detailed above and constructed as recommended in the Site Grading section of the geotechnical report would be considered stable.

Any recommendations or data provided in the original report which has not been directly addressed by this addendum remain valid and unchanged. This addendum should be attached to the original report and made a part thereof. If you should have any questions, please contact the undersigned in the Geo-Test, Inc. Albuquerque Office at (505) 857-0933.

Respectfully submitted:
GEO-TEST, INC.  Reviewed By:

Patrick R. Whorton, E.I.  Robert D. Booth, P.E.

Copyright© 2020, GEO-TEST, INC.