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PITTSYLVANIA COUNTY, VIRGINIA

PITTSYLVANIA COUNTY
BOARD OF SUPERVISORS

REQUEST FOR PROPOSAL
RFP: 202200505

A/E SERVICES FOR
CHERRYSTONE CREEK 1 and CHERRYSTONE 2A
DAM REHABILITATION PROJECT DESIGNS

May 5, 2022

CONTACTS: CONNIE GIBSON, PURCHASING MANAGER

Pittsylvania County, Virginia
RFP # 202200505
Cherrystone Creek 1 and 2A Dam Rehabilitation Project Design

GENERAL INSTRUCTIONS TO OFFERORS

DUE DATE: Sealed Proposals will be received until **June 2, 2022,** no later than **2:00P.M.**. Failure to submit proposals to the correct location by the designated date and hour will result in disqualification.

ADDRESS: One original and (4) copies and an electronic copy of the proposals should be mailed or hand delivered to:

Pittsylvania County Purchasing Department
Att: Connie Gibson
1 Center Street
Chatham, VA 24531.

All Proposals must be in a sealed envelope or box and clearly marked in the lower left corner: **"Sealed Proposal - RFP #20220505, "Cherrystone Creek Dam Projects"** Proposals not so marked or sealed shall be returned to the offeror and will not be considered.

Proposals shall clearly indicate the legal name, address and telephone number of the offeror (company, firm, partnership, individual). Proposals shall be signed above the typed or printed name and include the title of the individual signing on behalf of the offeror (see page 2). All expenses for making Proposals to Pittsylvania County shall be borne by the offeror. **All Proposals shall be received by 2:00P.M., June 2, 2022.** Any proposal received after this time and date will not be considered. The offeror has the sole responsibility to have the proposal received by the Pittsylvania County Purchasing Department at the above address and by the above stated time and date.

Note: The County of Pittsylvania, Virginia does not discriminate against faith-based organizations in accordance with the *Code of Virginia,* §§ 2.2-4343.1, 1950 as amended or against a bidder or offeror because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by Federal, State, and County law relating to discrimination in employment or contracting.

In Compliance with this Request for Proposal the named party hereby submits a proposal in response to Pittsylvania County to furnish services described in this RFP. The entire proposal, including Technical proposal, Proposal Cover Sheet, and any supplemental materials required to be provided by the offeror pursuant to the terms and conditions of the RFP, constitute the entire proposal.

The party hereby certifies that such is genuine and not collusive or sham; that said offeror has not colluded, conspired, connived or agreed, directly or indirectly, with any bidder or person, to put in a sham bid or to refrain from bidding, and has not in any manner, directly or indirectly, sought by agreement or collusion or communication or conference, with any person to fix the bid price or affiant or any bidder, or to fix any overhead, profit or cost element of said bid price, or of that of any other bidder, or to secure any advantage against Pittsylvania County or any person interested in the proposed contract.

The party submitting the forgoing Proposal acknowledges the provisions, terms and conditions of this RFP, including all attachments and addenda, and agrees to be bound by those provisions, terms and conditions. Further, the party certifies that all information submitted in response to this RFP is correct and true. The person signing this form shall be an authorized signatory officer of the corporation or an individual authorized by the By-Laws of the Corporation that has been given authoritative responsibility to bind the firm in a contract.

Name and Address Of Firm:

_____ Date: _____

_____ By: _____
(Signature in Ink by Officer of the Corporation)

_____

_____ Name: _____
(Please Print)

_____Zip Code_____ Title: _____

Phone: (____) _____ Fax: (_____) _____

E-mail: _____ State of Incorporation: _____

State Corporation Commission #: _____

Receipt of the following Addenda are acknowledged: **Attach a copy of your company's SCC certificate and a list of officers**

Addendum No. _____, dated_____
(Please note all addenda's)

(Return this Form)

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A. Purpose:

The Town of Chatham, Pittsylvania County, and the Pittsylvania Soil and Water Conservation District, hereinafter called "Local Sponsors" are issuing a Request for Proposal (RFP)for professional engineering services for the final design and construction of the rehabilitation projects. This shall also include performance of all operations necessary to prepare a final design, construction contract documents and provide construction management and oversight for the rehabilitation of Cherrystone Creek Dam 1 and Cherrystone Creek Dam 2A.
This also includes permit assistance as required. The Cherrystone Creek 1 and Cherrystone Creek 2A is identified by the Virginia Department of Conservation and Recreation (DCR), Office of Dam Safety and Floodplain Management, as inventory numbers 143002 and 143003.

B. Project History and Evolution:

During the mid-1960's the US Soil Conservation Service entered into a watershed agreement with; Pittsylvania County, Pittsylvania Soil and Water Conservation District, and the Town of Chatham to conduct studies aimed at alleviating chronic flooding in the Cherrystone Creek Watershed. The agreement was in accordance with The Watershed Protection and Flood Protection Act (Public Law 566, 83rd Congress;68 Stat. 666). The studies ultimately resulted in the construction of two earthen flood control dams in the watershed. Cherrystone Dam No. 1 (Cherrystone) was constructed on Cherrystone Creek and nearby Cherrystone Dam 2A (Roaring Fork) was built on Roaring Fork Creek, a tributary to Cherrystone Creek. Since that time the dams have prevented major flooding and damage in the watershed. Cherrystone Dam No.1 is about 57 feet high and 780 feet long and impounds a lake of approximately 120 acres at full pool. Cherrystone Dam No. 2A (Roaring Fork Dam) is about 68 feet high and 400 long and impounds a lake of approximately 45 acres at full pool.

Because of a water supply component to the operation, the watershed agreement assigned the responsibility for maintenance of the dams to the Town of Chatham, though they were located outside the town limits in Pittsylvania County. Upon enactment of the Virginia Dam Safety Regulations, Cherrystone Creek Dams No. 1 and 2A came under regulation by the State of Virginia. Since that time, the Town of Chatham has maintained the dams and holds the operating license from DCR.

In 2008, the Virginia Impounding Structure Regulations (dam safety laws) were modified to require that regulated dams undergo a dam break analysis to simulate various failure modes and that emergency action plans be developed to promote public safety in the event of a large spillway release or potential failure of the dam. The result of the studies indicated that the dam were not "significant hazard" as originally thought but should be classified as "high hazard"

dams. Consequently, the emergency (auxiliary) spillways for each dam were determined to be undersized and not capable of safely passing the flood requirements for a high hazard dam. Since that time, Virginia DCR has issued Conditional Operating Certificates for each dam pending studies and a plan to correct the spillway deficiencies providing the dams were otherwise well maintained and inspected per state regulations for high hazard dams.

Since the dams were designed by the U S Natural Resource Conservation Service (NRCS - formerly the US Soil Conservation Service -SCS), the Town of Chatham applied for assistance with the required studies under the NRCS Watershed Rehabilitation (dam rehabilitation) Program. The request was approved and federal funding was provided for planning studies covering both dams. The federal government funded 100% of the cost for the studies.

Copies of these studies are available from the Town of Chatham and can be found online at the USDA Natural Resource Conservation Service - Virginia web site under the Watershed Rehabilitation plans. The total project cost for Cherrystone Creek Dam No. 1 is projected at $12,968,300 of which $8,859,000 (65%) would be paid by the NRCS Small Watershed Rehabilitation program should federal funds be appropriated for the work. Local sponsors would be responsible for the balance. Likewise, the estimated costs for Cherrystone Creek Dam No. 2A are $8,183,700 and $5,536,900 respectively. It is noted that the NRCS project, as required by their regulations, addresses any deficiencies found in the project as well as upgrades of the structures to meet current NRCS criteria.

Cherrystone Creek 1 Project Agreement SOW Attachment

Technical Specification for

Cherrystone Creek 1 and 2A Dam Rehabilitation Project Design

A. Scope of Work

The work shall consist of all operations described herein to produce a design and provide construction bidding documents and construction contract administration to include all oversight of the construction for Cherrystone Creek Dam 1 and to produce a design and provide construction bidding documents and construction contract administration to include oversight of the construction contract for Cherrystone Creek 2A. All engineering work will be performed under direct supervision of a registered Professional Engineer licensed in the Commonwealth of Virginia, who will affix his/her Professional Engineering stamp (seal) on all engineering drawings, documents and certifications.

The design shall conform to the functional requirements of the Supplemental Watershed Plan No. 2 and Environmental Assessment for Cherrystone Creek 1 (Plan) and Supplement Watershed Olan No. 3 and Environmental Assessment for Cherrystone Creek 1 (Plan) 2A, these specifications, and applicable federal, state, and local laws and regulations. The design shall provide for an installation that will accomplish the intended purpose described in the Plan; provide for the safety of the public; be economical to construct, operate, and maintain; be compatible with the specific site conditions; and provide a visual resource that enhances the adjacent landscape and is aesthetically pleasing.

Pittsylvania County has entered into a Cooperative Agreement with the USDA Natural Resources Conservation Service (NRCS) for the rehabilitation of the structure as detailed in the Plans. The final design for the rehabilitation of the structure will be submitted to NRCS for review and approval.

B. General

1. “A-E” refers to the Architecture/Engineering firm or other entity selected or contracted to perform the work defined in the Technical Specification through work orders, agreements or other contracting methods.
2. “Project Manager” (PM) refers to the individual designated as the point of contact for the A-E selected to perform the work defined in this Technical Specification. All decisions and communication will be coordinated through the PM.
3. "Contracting Officer" (CO) is the individual with the authority to enter into, administer and/or terminate contracts and make related determinations and findings for the entity awarding the contract.
4. “Quality Assurance/ Quality Control (QA/QC) Plan” refers to activities performed by the A-E to ensure and document that the work performed has been properly developed and meets the minimum requirements of the contract. It is the A-E’s responsibility to have a detailed and functional QA/QC Plan and a designated QA/QC Officer.

5. All work shall be performed in a professional manner in accordance with, at a minimum, the criteria of the NRCS engineering policy, guidance, standards, some of which are listed in Section C. Reference Materials, other standards specifically approved by the CO for use on this project, and all applicable local, state, and federal laws and regulations.

6. Coordination shall be maintained between the A-E and the CO to the extent necessary to ensure the CO's awareness of and concurrence with the progress of the design and other matters concerning the development of the general or specific elements of the design.

7. The A-E shall report to the CO any omissions, discrepancies, or inadequacies in the data furnished by the CO as a basis for design. The need for supplemental data or additional investigations will be conveyed to the CO in writing with suggestions for corrective actions. If corrective actions approved by the CO cause changes to the work which impact on task order performance time and/or task order costs, the CO must be notified prior to any changes. The CO must authorize any changes to task order performance time and/or task order costs by written modification to the task order.

8. The A-E shall maintain a record of all notices, computations, drawings, and other pertinent data for the design. These records shall be neatly recorded and organized into a Design Folder. Assumptions made as a basis for design shall be clearly stated, and all sources of reference data shall be listed in the Design Report. Upon completion and acceptance of the design, all information compiled during the project work, including field data, field notes, survey information, photographs, etc., shall be submitted to the CO.

9. All work shall be performed in conformance with conditions set forth in the permits and in conformance with applicable federal, state, and local laws and regulations.

C. Reference Materials

1. The A-E will obtain the reference information through internet access unless otherwise noted. Non-NRCS documents will be obtained by the A-E. This section is not intended to be an all-inclusive list. Other reference information may be necessary to complete the work described in this specification.

2. The following NRCS reference materials are available through the internet, except as otherwise noted, at http://directives.sc.egov.usda.gov/,

   a. NRCS National Engineering Manual (NEM)

   b. NRCS National Engineering Handbook (NEH), Parts 628, 630, 631, 633, 636, 641, 642, 650, 653, and 654 and Sections 3, 5, 6, 8, 11, and 14

   c. National Operation and Maintenance Manual

   d. NRCS Technical Releases

TR 5	Structural Design of Underground Conduits
TR17	Geologic Investigation for Watershed Planning

TR 18	Computation of Joint Extensibility Requirements
TR 20	Computer Program for Project Formulation Hydrology *
TR 25	Design of Open Channels
TR 26	The Use of Soils Containing More Than 5 Percent Rock Larger Than the Number 4 Sieve
TR 27	Laboratory and Field Test Procedures for Control of Density and Moisture of Compacted Earth Embankments
TR 29	Hydraulics of Two-Way Covered Risers
TR 30	Structural Design of Standard Covered Risers
TR 31	Structural Analysis and Design at Low Stage Inlets
TR 37	Structural Analysis and Design at Base of Riser with Conduit Openings in Both Endwalls
TR 39	Hydraulics of Broad-Crested Spillways
TR 42	Single Cell Rectangular Conduits - Criteria and Procedures for Structural Design
TR 43	Single Cell Rectangular Conduits - Catalog of Standard Designs (applicable portions furnished on request)
TR 45	Twin Cell Rectangular Conduits - Criteria and Procedures for Structural Design
TR 48	Water Resources Site Analysis Computer Program “SITES”
TR 49	Criteria for the Hydraulic Design of Impact Basins Associated with Full Flow in Pipe Conduits
TR 50	Design of Rectangular Structural Channels
TR 54	Structural Design of SAF Stilling Basin
TR 55	Urban Hydrology for Small Watersheds *
TR 60	Earth Dams and Reservoirs, current edition or draft versions and referenced materials may be utilized for task order
TR 62	Engineering Layout, Notes, Staking and Calculations
TR 63	Structural Design of Monolithic Straight Drop Spillways
TR 65	Procedure to Establish Priorities in Landscape Architecture
TR 66	Simplified Dam-Breach Routing Procedure
TR 67	Reinforced Concrete Strength Design
TR 68	Seismic Analysis of Risers
TR 69	Riprap for Slope Protection Against Wave Action
TR 70	Hydraulic Proportioning of Two-Way Covered Baffle Inlet Riser
TR 77	Design and Installation of Flexible Conduits *
TR 78	The Characterization of Rock for Hydraulic Erodibility

e. NRCS Design Notes:

DN 1	Scour Protection at Base of Risers to Drop Inlet Spillways
DN 2	Required Three-Edge Bearing Strength for Ridge Pipe
DN 3	Detail of Riprap above Berm on Earth Dam
DN 4	Cradle Modification Where a Rock Foundation Hiatus Exits
DN 5	Some Comments on Flexural and Anchorage Bond Stresses
DN 7	Variation in Joint Extensibility Requirements as Sectional Conduit is Moved Up or Down from Embankment Foundation Interface
DN 8	Entrance Head Losses in Drop Inlet Spillways
DN 9	Use of AWWA C302 Pipe for Principal Spillway Conduits
DN 10	Special Designs of Single Cell Rectangular Conduits
DN 12	Control of Underground Corrosion
DN 14	Cavitation Potential at an Irregularity
DN 15	Submerged Weir Flow
DN 17	Some Comments on the Location of Riser-Conduit Articulation Joints
DN 18	"Unattached" ES Drawings
DN 19	Input Data for Design Unit Programs
DN 21	Guide to Substitution of Higher Strength Steel in Reinforced Concrete *
DN 24	Guide for the Use of Geotextiles

f. NRCS Soil Mechanics Notes:

SMN 3	Soil Mechanics Considerations for Embankment Drains
SMN 5	Flow Net Construction and Use *
SMN 6	Glossary, Symbols, Abbreviations and Conversion Factors *
SMN 7	The Mechanics of Seepage Analysis
SMN 8	Soil Mechanics Testing Standards
SMN 9	Permeability of Selected Clean Sands and Gravels
SMN 12	Portable Pinhole Test Apparatus
SMN 13	Dispersive Clays

g. NRCS Geology Notes:

GN 3	Geologic Investigation Process *
GN 4	Photography of Rock Cores
GN 5	Soil Sample Size Requirements for Soil Mechanics Laboratory Testing

h. NRCS National Watershed Program Manual

* *These items have been deleted from the directives system and are no longer available from the internet.*

3. The following materials, and other materials not listed but pertinent to the design, shall be obtained by the A-E, as necessary.

a. American Society for Testing and Materials (ASTM) technical standards.

b. U. S. Army Corps of Engineers

EM 1110-2-1901 Seepage Analysis and Control for Dams
EM 1110-2-1902 Slope Stability
EM 1110-2-1906 Laboratory Soils Testing
EM 1110-2-1908 Instrumentation of Embankment Dams and Levees
EM 1110-2-2006 Engineering and Design; Roller Compacted Concrete.
EM 1110-2-2200 Gravity Dam Design, June 30, 1995
EM 1110-2-2300 Engineering and Design; General Design and Construction Considerations for Earth and Rockfill Dams
EM 1110-1-1802 Geophysical Exploration for Engineering and Environmental Investigations, 8/1995
EM 1110-1-2908 Rock Foundations, November 30, 1994
EM 1110-2-4300 Instrumentation for Concrete Structures, November 30, 1987
EM 1110-2-6050 Response Spectra and Seismic Analysis for Concrete Hydraulic Structures, June 30, 1999

c. American Concrete Institute (ACI) - several references are applicable, a few are listed below.

207.5R-Current - Roller Compacted Mass Concrete.
318-Current – Building Code Requirements for Structural Concrete and Commentary
350-Current – Code Requirements for Environmental Engineering Concrete Structures and Commentary

d. American Institute of Steel Construction, 15th Edition Structural Steel Manual

e. Bureau of Reclamation - several references are applicable, a few are listed below.

Design Standards No. 13. Embankment Dams
Design of Small Dams
Engineering Geology Field Manual, 2nd Ed. Volumes 1 and 2
Guidelines for Drilling in Embankments, August 1996
Embankment Dam Instrument Manual January 1987
Earth Manual, U.S. Department of Interior, Third Edition, Part 1 1998, Part 2 1990.
Design Criteria for Concrete Arch and Gravity Dams, U.S. Department of Interior, Engineering Monograph No.19, February 1997.
Design of Gravity Dams, U.S. Department of Interior, 1976.
Guidelines for Designing and Constructing Roller-Compacted Concrete Dams, U.S. Department of Interior, ACER Technical Memorandum No.8, 1987.
Groundwater Manual, U.S. Department of Interior, Second Edition, 1995
Concrete Dam Instrumentation Manual, U.S. Department of Interior, October 1987

Physical Properties of Plastic Pipe Used in Reclamation Toe Drains, Report DSO-09-01, September 2009

f. FEMA 65, Federal Guidelines for Dam Safety, Earthquake Analysis and Design of Dams, May 2005

g. American Society of Civil Engineers (ASCE), Minimum Design Loads for Buildings and Other Structures, current edition

h. International Code Council, Incorporated (ICC), International Building Code, current edition

i. USGS Earthquake Hazards Program

j. FEMA L-266, Conduits through Embankment Dams-Best Practices for Design, Construction, Problem Identification and Evaluation, Inspection, Maintenance, Renovation, and Repair September 2005

k. FEMA P-675, Technical Manual: Plastic Pipe Used in Embankment Dams: Best Practices for Design, Construction, Problem Identification and Evaluation, Inspection, Maintenance, Renovation, and Repair

D. AVAILABLE INFORMATION

The following information is available and will be provided to the A-E.

1. As-built drawings and design folders.
2. Engineering Reports.
3. Geologic Investigation Reports.
4. Original and supplemental Watershed Work Plans.
5. Operation and Maintenance (O&M) Agreement and Plan.
6. Report of investigations developed for the site.
7. National Inventory of Dams (NID) data.
8. Contact information for the NRCS local field office.
9. Any applicable forms and/or data sheets.

Any other existing information or existing materials that may be available from NRCS and deemed by the A-E as necessary for completing this work must be requested in writing to the CO.

E. Supervision

The A-E shall designate in writing to the CO a principal member of the A-E's Team who will serve as the Project Manager (PM) for the project and be responsible for supervising the work. The PM shall be a currently registered Professional Engineer in the Commonwealth of Virginia. The PM shall be fully cognizant of contract requirements for the performance of the work and requirements of meeting the performance schedule. All work performed for this contract shall meet the requirements as established by the Commonwealth of Virginia for PE laws, rules, and regulations and all work shall be performed under the complete

direction and control of the PM.

The PM shall have a minimum of ten years of responsible experience in performing the role of project manager related to the planning, design, construction, and operation of large earth embankments and concrete or RCC dams. The candidate shall also meet the requirements for one of the supervisory personnel as described below.

PM will provide all project management and coordination necessary for completion of all activities outlined in this Technical Specification. PM will also monitor labor utilization, project schedule, and project budget on a regular basis. PM will be responsible for ensuring that the project budget is being strictly adhered to and that deliverables are submitted in accordance with the approved performance schedule. PM will be fully responsible for performance of A-E's personnel, including sub- consultants.

F. PERSONNEL

1. The A-E shall submit for the CO's approval the names and qualifications of all personnel who will be supervising and performing work on this contract. The work detailed by this Technical Specification shall be performed by the personnel who have been approved by the CO to perform the work. Less experienced and/or less qualified personnel shall not be utilized for the performance of this contract unless approved in advance by the CO. The required information shall be submitted within thirty (30) calendar days of the issuance of the Notice-To- Proceed (NTP).

2. The employees designated by the A-E and approved by the CO as PM, Supervisors, Project Engineers, and Project Geologist, shall serve in these capacities throughout the life of the project. If an assigned employee must be replaced by the A-E, the replacement candidate must have the same or greater qualifications as the original employee. The A-E shall submit documents supporting the replacement candidate's qualifications. The CO will have fourteen
(14) calendar days after submission of all documentation to evaluate and approve or disapprove the replacement candidate.

3. The A-E shall submit for the CO's approval the names and qualifications of all subcontractors who will be performing work on this contract. If an assigned subcontractor must be replaced by the A-E, the replacement candidate must have the same or greater qualifications as the original subcontractor. The A-E shall submit documents supporting the replacement subcontractor's qualifications. The CO will have fourteen (14) calendar days after submission of all documentation to evaluate and approve or disapprove the replacement subcontractor.

4. All work must be conducted by experienced interdisciplinary staff under the direct supervision of a Professional Engineer currently licensed in the Commonwealth of Virginia.

5. Supervisory personnel assigned by the A-E to this project shall have the following minimum qualifications:

   a. Supervisory Geologist

      (1) The candidate shall have a minimum of fifteen years responsible experience in subsurface investigations of foundations, borrow areas, cut slopes,

embankments, spillways, and channels related to the design, construction and operation of large earth embankments and concrete or roller compacted concrete (RCC) dams.

(2) The candidate shall have a relevant bachelor's degree from a four-year college or university accredited by the Accreditation Board for Engineering and Technology (ABET) or CO approved equivalent.

(3) The candidate shall be currently registered as a Professional Geologist by a state that registers geologists, and/or licensed as a Certified Professional Geologist by the American Institute of Professional Geologists.

(4) The candidate shall have at least ten years of field experience directly related to the investigation of foundations and reservoir areas for large earth embankment, concrete gravity, or RCC water supply or flood control dams.

(5) The candidate shall be fully knowledgeable in field procedures, drilling techniques, sampling, and laboratory and field tests commonly used to evaluate foundation conditions.

(6) The candidate shall understand the engineering properties of soil and rock foundations required for strength, stability, impermeability and durability and shall have a complete understanding of how these properties relate to and affect the operations of the constructed works.

(7) The candidate shall be knowledgeable in the evaluation of seepage potential and able to make recommendations on the need for relief wells, drainage galleries, grouting, cutoffs, and surface treatment of exposed rock.

(8) The candidate shall have a minimum of five years of experience in the evaluation of test data and the preparation of drawings, construction specifications and written reports.

b. Supervisory Geotechnical Engineer

(1) The candidate shall have a minimum of fifteen years of responsible experience in the investigation and design of foundations, borrow areas, cut slopes, embankments, spillways, and channels related to the design, construction and operation of large earth embankments and concrete or RCC dams.

(2) The candidate shall have a relevant bachelor's degree from an ABET accredited college or university or CO approved equivalent.

(3) The candidate shall be currently registered as a Professional Engineer.

(4) The candidate shall have at least ten years of experience directly related to the investigation, design and construction of large water supply and

flood control dams. A minimum of five years of experience shall be in the design and investigation of foundations for large embankments and/or foundations for large RCC or concrete water supply and flood control dams.

(5) The candidate shall be fully knowledgeable and experienced in subsurface investigations for large dam sites including the retrieval, preparation and shipping

of undisturbed and disturbed samples and the performance of field tests to determine the in place physical properties of soil and rock.

(6) The candidate shall have the knowledge and experience necessary to select representative soil samples for laboratory tests; to specify the type and quantity of lab tests necessary to obtain the physical soil properties required for design, engineering and functional analysis; and the ability to analyze the adequacy of test data for proper testing procedure and reasonableness of result.

(7) The candidate shall have the ability, through training and experience, to determine the internal and external loads acting on dams and foundations from surcharges, seepage forces, construction, operation of the works, and seismic activity.

(8) The candidate shall be proficient in the analysis of dam embankments and foundations for stability against failure from excessive movement, settlement, subsidence, rotation, sliding, or piping, by using methods of analysis commonly employed by the NRCS, the Army Corps of Engineers, and the Bureau of Reclamation.

(9) Candidate experience shall include responsibility for the design of features associated with dam construction that collect, filter and discharge seepage, including chimney, blanket, and toe drains, drainage galleries, relief wells, impervious blankets, cutoffs, grout curtains, and slurry trenches.

(10) The candidate shall be knowledgeable in the evaluation of erosion potential in unlined spillways.

(11) The candidate shall also demonstrate a minimum of 10 years of experience in the preparation of construction drawings and construction specifications for dam construction.

c. Supervisory Structural Engineer

(1) The candidate shall have a minimum of fifteen years of responsible experience in the design of reinforced concrete structures for large earthfill and large concrete and roller compacted concrete gravity dams and appurtenances.

(2) Design experience shall include responsibility for the analysis and design of concrete intake towers, spillways, retaining walls, conduits, culverts, channels, energy dissipaters, and stilling basins.

(3) The candidate shall have a relevant bachelor's degree from an ABET accredited college or university or CO approved equivalent.

(4) The candidate shall be currently registered as a Professional Engineer.

(5) The candidate shall have the ability, through experience and training, to determine the internal and external forces from static and dynamic loads acting on structures from soil, water, dead load surcharges, equipment, construction, seismic activity, and operation of the works.

(6) The candidate shall be proficient in the analysis of one way and two way slabs,

deep beams, members subject to bending, compression, tension, shear, and torsion, and footings supported on yielding and non-yielding foundations.

(7) The candidate shall be fully knowledgeable of the requirements of the most recent editions of ACI-318 and ACI-350 and shall recognize and become familiar with specific concrete design criteria established by NRCS for the design of NRCS hydraulic structures.

(8) The candidate shall demonstrate experience in the preparation of construction drawings and construction specifications for dam construction.

d. Supervisory Hydraulic Engineer and Hydrologist

(1) The candidate shall have a minimum of fifteen years responsible experience in the hydraulic design of large flood control and water supply dams and associated structures such as intake towers, spillways, conduits, culverts, channels, energy dissipaters, and stilling basins.

(2) The candidate shall have a relevant bachelor's degree from an ABET accredited college or university or CO approved equivalent.

(3) The candidate shall be currently registered as a Professional Engineer.

(4) The candidate shall be completely knowledgeable of the theory and methods used by computer programs commonly employed for hydrologic and hydraulic analysis such as the Army Corps of Engineers HEC 1, HEC- HMS and HEC - RAS programs as well as the Natural Resources Conservation Service's TR20 and SITES programs.

(5) The candidate shall be able to provide a complete design solution for complex problems involving watershed rainfall/runoff analysis, subcritical and supercritical flow, flow down steep slopes, air entrained flow, gravity and pressure pipe flow, and energy dissipation of high velocity flow.

(6) The candidate shall be knowledgeable in the theory and application of the principals of impulse-momentum, specific energy, distribution of velocity, and conservation of energy and shall have experience in the analysis of hydraulic structures using lab models.

e. The candidate shall be knowledgeable in the evaluation of erosion potential in unlined spillways. Engineering Seismologist

(1) The candidate shall have a minimum of fifteen years responsible experience in seismic hazard analyses for major engineering projects including dams, nuclear power plants, mining, and/or waste disposal facilities.

(2) The candidate shall have a relevant advanced degree from an ABET accredited four year college or university or CO approved equivalent.

(3) The candidate shall have relevant experience in regional studies of earthquake sources and processes, determination of source parameters and characteristics from both literature and field reconnaissance, and determination of magnitude

and distance for features of significance.

(4) The candidate shall have relevant experience in determine attenuation of ground shaking with distance and source characteristics, including random earthquakes.

(5) The candidate shall have relevant experience in site response evaluation and development of ground motions for design of large earthfill and concrete dams.

(6) The candidate shall have relevant experience in design team participation for the design of large earthfill and concrete dams, and the provision of earthquake information to all interested parties.

6. Project personnel assigned by the A-E to this project shall have the following minimum qualifications:

   a. Project Engineers and Project Geologists

      (1) Project engineers and project geologists assigned by the A-E to this project shall be supervised and directed by the supervisory personnel listed above.

      (2) It is expected that project engineers and project geologists will be assigned to and be responsible for performing much of the day to day work required to collect and analyze design data, develop and compare design alternatives, and to prepare construction drawings and construction specifications.

      (3) Project engineers and project geologists shall have a relevant bachelor's degree from an ABET accredited four-year college or university or CO approved equivalent.

      (4) The project engineers and project geologists shall have a minimum of seven years of experience with at least five years of experience in the field of design, engineering, and construction of large dams.

      (5) Project engineers and project geologists shall have a minimum of five years of experience in the specific field of design and engineering for which they will be performing work on this project (ex. soils, reinforced

      concrete structural design, flood control and water resources hydrology and hydraulics, etc.).

7. Support staff personnel assigned by the A-E to this project shall have the following minimum qualifications:

   a. Support Staff Engineers, Designers, Geologists and Technicians

      (1) Support staff engineers, designers, geologists and technicians may only be used for routine repetitive calculations, development and preparation of input data for computer programs, computing volumes, areas, or measuring lengths, and the preparation of cross section and profile drawings necessary for preliminary design.

      (2) Support staff engineers, supervised directly by a project engineer, may be used for simple designs and design calculations that involve the application of fundamental principles of engineering such as simply supported beams, storm drainage culverts, site grading, and non-complex reinforced concrete design.

(3) Project engineers shall direct support staff engineers in setting up load conditions and selecting procedures for design and analysis of the problem.

(4) Project engineers shall check all work performed by support staff engineers.

(5) Support staff engineers assigned to this project shall have a relevant bachelors from a four year ABET accredited college or university or CO approved equivalent.

b. Steel Detailer

(1) The A-E may, with the approval of the CO, use a steel detailer for the layout and preparation of drawings, which show the placement, lap detail, and dimension of bar bends for reinforcing steel in concrete structures.

(2) Steel detailers shall have a minimum of five years of experience in the preparation of steel detail drawings.

(3) The A-E will be required to show that steel detailers have the experience, knowledge, and training required and are completely knowledgeable with the requirements of the latest versions of ACI 318 and ACI 315 for steel detailing.

c. Monitoring Well Driller

G. An individual having a minimum of ten years' experience with the installation of monitoring wells and working for a company certified in the Commonwealth of Virginia for well drilling.

1. Monthly progress meetings will be held virtually or in a mutually agreed to format to discuss project progress and other project issues. The A-E shall provide an agenda 2 days prior to the meeting.
2. Work submitted by the A-E will be reviewed by the CO, coordinating with NRCS, and will usually be discussed with the A-E at conferences arranged for that purpose.
3. Specified conferences shall be scheduled by the A-E at least ten (10) days prior to the conference date. Specified conferences are identified for individual items in Sections M thru W.
4. In addition to specified conferences, other conferences shall be held whenever requested by the CO or A-E during which questions relating to the project will be discussed, work previously performed will be reviewed, and decisions made with a view toward expediting the completion of the contract.
5. The CO and the A-E will mutually agree upon schedules for other "as-needed" conferences.
6. The A-E shall provide the CO, at the time of scheduling, an agenda, a summary of the proposal, and a complete set of pertinent computations, sketches, notes, and drawings that are necessary for complete review of the proposal.
7. All site conferences, unless specified otherwise or conditions warrant another location, shall be held at the project site or virtually as determined by the CO.

8. Other specified conferences shall be held at the location determined by the CO.
9. Unspecified called conferences shall be held at a CO and A-E mutually agreed upon location.
10. Work that, in the opinion of the CO, does not require conference discussions may be reviewed and approved by correspondence, virtually, or email conversations.
11. The A-E shall record and prepare minutes of all meetings summarizing discussions and decisions reached during conferences or telephone conversations and furnish the notes to the CO within five (5) calendar days. The CO will provide concurrence or comments within ten workdays after receipt. The minutes and corresponding comments can be submitted electronically. In this case the copies shall be sent to the persons identified by the CO.

H. Review Procedures

1. Work submitted by the A-E will be reviewed by the CO who will coordinate technical review and approval with NRCS. Submittals will usually be discussed with the A-E at conferences arranged for that purpose. All submitted materials will be clearly and uniquely identified by date of submittal, dam site name, applicable pay item, and status (e.g., preliminary, final, revised, etc.).
2. NRCS review of the individual design components does not relieve the A-E of responsibility for completing a final design that meets NRCS criteria as determined by an independent review.
3. Work that, in the opinion of the CO, does not require conference discussions may be reviewed and approved by correspondence.
4. At any stage in the development of a design it may be necessary to obtain the concurrence of the CO in the selection of alternative details or other matters affecting the development of specific elements of the design. In each such case a design memorandum shall be prepared. The memorandum shall contain all pertinent facts, computations, sketches, notes, schedules, and drawings that are necessary for complete review of the proposal. The memorandum shall be submitted for CO review and approval. The CO shall provide comments to the A- E within 45 days of the submittal. Such memorandum will be incorporated into the Design Folder.
5. NRCS will coordinate an independent review of the design. NRCS will conduct reviews of the design in accordance with the NRCS National Engineering Manual, Part 520.26. NRCS shall participate in specified conferences and review submitted materials as needed. NRCS reviews may be conducted at any stage during the design process. The A-E shall cooperate with NRCS and shall furnish all data and information necessary to accomplish the review.

I. Presentation of Work

1. All work shall be performed in a professional manner in accordance with the criteria of NRCS engineering policies and standards, the standards listed in Section C, other standards specifically approved by the CO for use on this project and Virginia Dam Safety regulations.

2. All notes, computations, drawings, and other data shall be complete, recorded neatly, checked by personnel equally or more qualified as those performing the original computations, and organized in a manner that will allow reproduction of copies and incorporation into reports with minimum editing and revision. Computations shall be in accordance with NRCS computation standards for engineering work. The sources of data, procedures, equations, parameters, and all other items utilized in the computations for analysis and design shall be clearly and completely referenced and cited.

3. Design drawings, diagrams, graphs, sketches, or other pictorial representations should be physically incorporated into the computation file whenever the size and scale are appropriate. Such included drawings may be of reduced size.

4. Design drawings that must be drawn to larger size sheets and cannot be folded to computation sheet size shall be cited at the appropriate place in the computations by notation that fully identifies the drawings and their file location.

5. Project designs shall be prepared using computer aided design methods. Two sets of electronic files of project data (survey data, topographic data, profile and cross section data, quantity computations, etc.) shall be furnished on flash drives..Project files shall be in AutoCAD Civil 3D CADD format or a format that can be readily converted to Civil 3D CADD without loss of data or properties.

6. All notes, computations, reports, design memorandums, computation sheets, construction specifications, bid schedules, performance time estimate, etc. shall be prepared in appropriate Microsoft compatible software and shall be converted to PDF format for final reporting.

7. Preliminary construction and geology drawings shall be drafted in accordance with the requirements of NRCS NEM, except that drawing size shall be 34 inches wide by 22 inches tall. The drawings shall have graphic scales.

8. Final construction and geology drawings shall conform to the requirements of NRCS NEM, shall be 34 inches wide by 22 inches tall, and have graphic scales. All construction drawings shall be complete, accurate, and of sufficient detail such that the proposed work can be installed without additional or supplemental shop drawings.

9. All drawings shall be submitted in PDF format as well as in AutoCAD DWG format on flash drives.

10. Construction drawings shall contain summaries of those quantities that will be significant in construction or will aid the Construction Contractor in ordering materials and estimating costs. Such quantities may or may not be pay items in the construction contract. The following list of examples of quantities to be included on the drawings is not meant to be all inclusive. The quantities for fill volumes for each respective zone of the dam, steel reinforcement quantities including steel schedule, concrete quantities, water supply pipe and fitting quantities, impact basin grating fixture quantities, seeding and mulching quantities, and fencing quantities are examples of quantities that should be shown on the drawings.

11. The cover sheet shall contain, in addition to the items listed in the NEM, a map showing the location of the watershed in the state and the drainage area boundaries of

the watershed and structure.

12. Breach inundation maps shall be presented on photographic enlargements of the appropriate flood plain sections of the aerial photographs. The boundaries of the breach routing and auxiliary spillway routing shall be drafted. The area of each routing shall be filled with cross-hatching.

13. Project specific construction specifications will be developed. Specifications must be compatible with all provisions in the contract documents and equivalent to the NRCS standard specifications in NEH 642. The specifications must contain sufficient detail to ensure that the completed project achieves similar standards of quality to NRCS construction efforts.

14. Final copies of all specifications shall be provided in MS Word and PDF formats. Final specifications in MS Word and PDF format shall be furnished on flash drives or as approved by the CO.

15. Photographic documentation or video recording documentation used to provide visual information related to the planning or design of the dam or rehabilitation of the dam shall be properly identified with the following minimum data: project name, project location (i.e., county & state), subject of the photo or video tape, contract number, work order number, date, and photographer/camera person's name. In the case of video recordings, complete audio description should be included on the video to include the above information and to assist in communicating the intended message. Where necessary to provide a reference to scale, an item of known size shall be included in the photo or video. In addition to the photos and videos, an index of the photographic and video recordings shall be included in the Design Folder.

16. All design reports, materials, supporting documentation, drawings, specifications, etc. shall be organized in a Design Folder. The Design Folder shall follow the format detailed in NEM Part 511 Subpart B – Documentation.

17. GIS file formats may be acceptable for certain instances where DWG format is specified at the discretion of the CO. The A-E shall make a written request with justification for utilizing file formats other than DWG.

J. Basis for Design

1. The design shall conform to the functional requirements of:
   a. Supplemental Watershed Plan No. 2 and Environmental Assessment for Cherrystone Creek 1.
   b. The materials listed in Section C, Reference Materials, and this technical specification.
2. The design shall include the complete design of the dam, or complete design of the rehabilitation of the dam, and all appurtenant works.
3. It is anticipated that the new structure or the rehabilitation of the existing structure will consist of a combination of the following components:
   a. Embankment Dams: Earthfill, rockfill, or some combination of these materials.

b. Concrete Dams: Roller compacted concrete (RCC) or Concrete or combination of these materials.

c. Principal Spillway (outlet works): a multi-stage reinforced concrete inlet with a reinforced concrete pipe or box conduit and an appropriate terminal structure.

d. Auxiliary Spillway: an earthen, rock, reinforced concrete, RCC, or surface lined auxiliary spillway adjacent to or remote from the dam, a reinforced concrete, RCC or hardened chute over a dam or Concrete/RCC structure; along with appropriate control and energy dissipation structures, or some combination of these auxiliary spillway structures.

4. A water release system for low-flow augmentation may be incorporated into the design of the structure. The release system will consist of a gated opening in the principal spillway inlet structure.

5. A water control gate and all necessary appurtenances shall be provided to drain the reservoir and to by-pass water during construction. Water release structures shall have provisions to reduce the potential for debris or trash to enter the water passage.

6. A water supply pipeline with appropriate valves and fittings shall be designed to be installed through a newly installed dam to convey water to the downstream side of the dam, as needed. The size of the pipeline shall be based on required flow rate or shall be dictated by others.

7. The design criteria and methods stipulated in the reference materials listed in Section C. Reference Materials shall be used. Unless otherwise approved by the CO, the design criteria must meet or exceed that stated in the NRCS references. Use of listed reference materials does not necessarily assure that all aspects of design have been fully addressed.

8. Where design features or methods are encountered that are not included in Section C. Reference Materials, or where the use of other criteria or methods would, in the A-E's opinion, be advantageous, a written request for approval shall be submitted to the CO outlining the proposed method or solution. The written request shall include justification for using such criteria and/or methods. Such criteria or methods shall not be used until receipt of written concurrence from the CO.

9. Design methods not covered in NRCS or other references listed in Section C shall conform to accepted engineering practices and be approved by the CO. Assumptions used as a basis for design shall be clearly stated. All sources of reference data shall be listed in the Design Report.

K. Division of Work

For the purpose of contract administration, the work shall be divided as follows.

1. Phase I – Plan of Work and Quality Assurance/Quality Control

a. Item 1. Plan of Work and Quality Assurance/Quality Control Plan

2. Phase II – Supporting Documentation, Development of Design Data

a. Item 2. Field Surveys and Mapping

b. Item 3. Geotechnical Field Investigation, Interpretation and Conclusions, and

Reporting

c. Item 4. Rock and Soil Mechanics Testing, Evaluation, Interpretation and Conclusions, and Reporting

d. Item 5. Existing Structural Conditions, Investigation, Testing, Evaluation, Interpretation and Conclusions, and Reporting

3. Phase III - Preliminary Design

a. Item 6. Hydrology

b. Item 7. Hydraulic Design and Proportioning

c. Item 8. Preliminary Foundation, Geotechnical, Structural, and Site Design

4. Phase IV – Final Design

a. Item 9. Detail Designs, Specifications, Cost and Time Estimates, and Design Report

b. Item 10. Final Design, Specifications, Cost and Time Estimates, and Design Report

L. Delivery Schedule

A Delivery Schedule is provided in Technical Specification Attachment 1. The Delivery Schedule shows the performance time allocated for each Phase and Item of work and the corresponding CO/NRCS review time.

M. Item 1 – Plan of Work and Quality Assurance/Quality Control Plan

1. Scope

Item 1 of the work shall consist of performing the following items:

a. Contractor will develop and follow a Quality Assurance/Quality Control (QA/QC) Plan for the Project.

(1) A copy of the Contractor's QA/QC Plan will be submitted to the CO and NRCS at the Preliminary Plan of Work Conference. The Contractor's QA/QC officer will be charged with responsibility of the Plan's implementation and documentation of QA/QC activities. An update on all QA/QC activities will be reported in the progress reports. All work performed by the Contractor's personnel, including sub-consultants, will be in accordance with the Contractor's QA/QC Plan.

(2) All submittals, including memoranda, reports and studies, will undergo quality management reviews in accordance with the Contractor's documented QA/QC processes for the Project. The purpose of the QC review is to verify that the resulting work products meets acceptable practice standards and that the documents have been properly coordinated to the satisfaction of the CO and NRCS. The QC reviewer will inform the Project team of any exception or proposed improvement that may be noted. QC reviews will be provided for all submittals. The QC reviews will be conducted prior to submittal to allow time for incorporation of any recommended revisions.

b. Reviewing reports, data, calculations, and information provided by NRCS.

c. Documenting the NRCS engineering job class for the project.

d. Locating and reviewing additional existing data pertinent to the work at hand.

e. Conducting field reconnaissance(s) with NRCS to assess the extent and character of the work.

f. Identifying the detailed tasks necessary to accomplish the proposed work.

g. Estimating the costs and time required for each task.

h. Preparing a comprehensive plan of work defining the project goals and priorities, the tasks to be performed and their products, the estimated staff hours and associated cost of performing each task, and the schedule for completing each task.

i. Preparing a preliminary engineer's estimate for the cost of construction. This preliminary engineer's estimate for the cost of construction shall be based on the best information available at the time Item 1, Plan of Work is completed.

j. The plan of work shall be based on the production of work that meets the criteria from the listed references in Paragraph C.1. Use of additional criteria or methods shall be in accordance with Paragraph H.4. and Paragraph J.8. The source of criteria proposed for each task will be clearly documented in the plan of work.

2. Conferences

Meetings between the A-E and the CO for the subject work shall be in accordance with Section G and shall be held as follows:

a. Preliminary Plan of Work Conference

Timing After work order is issued for project.

Location Onsite or virtual.

Topics Review existing information and field reconnaissance report, review QA/QC Plan.

b. Final Plan of Work Conference

Timing Prior to finalizing the plan of work.

Location Onsite or virtual.

Topics Finalize the plan of work for specific project.

c. Other conferences as needed.

3. Completion and Acceptance of the Work

a. For the review segment of Item 1 of the work, the A-E shall submit to the CO:

(1) PDF and supporting files of the preliminary plan of work.

(2) PDF and supporting files of the preliminary cost estimate and schedule for completing each task of the design.

(3) PDF and supporting files of the preliminary engineer's estimate for the cost

of construction.

b. The CO will furnish review comments on the work to the A-E within fifteen (15) days after receiving the preliminary plan of work, cost estimate and schedule, and preliminary engineer's estimate for the cost of construction. The A-E shall make all necessary corrections to the work and will document the responses and actions taken as a result of the CO's review comments.

   The documented responses shall be submitted with the final submittals for this item.

c. Final approval and acceptance of the work will be made by the CO after all corrections are made and all required material has been submitted. The required submittals are:

   (1) Final QA/QC Plan.

   (2) PDF and supporting files of the final plan of work.

   (3) PDF and supporting files of the final cost estimate and schedule for completing each task of the design.

   (4) PDF and supporting files of the revised preliminary engineer's estimate for the cost of construction.

   (5) One (1) copy of the each of the final items on a flash drive.

N. Item 2. Field Surveys and Mapping

1. Scope

   The A-E shall conduct or gather detailed field surveys of the dam site, auxiliary spillway, borrow areas, access road(s), downstream impact areas, and other associated areas in order to provide sufficient data to perform the flood routings, layouts, and analysis required to design the rehabilitation of the dam and its associated works, and prepare specifications for the project. This item shall also include surveys to determine the location and elevation of all test holes and pits excavated as a part of this contract. Also included will be the establishment of permanent type benchmarks and control or reference points, and the plotting of preliminary cross sections and contour maps of the area surveyed.

2. Requirements

   a. Original survey notes and records shall be kept in bound survey notebooks of standard type. Notebooks used for this purpose shall contain only notes and records pertaining to this contract. Each notebook shall be clearly referenced to the watershed and site. A separate set of notebooks shall be used for different sites. All surveys shall be indexed in the front part of each book. Each set of notes shall show the survey, party members, date, and other pertinent information.

   b. Data from electronic surveys shall be printed and transferred to electronic files for inclusion in the Design Report. Provide electronic data files in standard ASCII comma delimited format as follows: point number, northing (y), easting (x), elevation (z), description. Submit files on flash drives. Data from electronic surveys shall be

fully referenced as to equipment used, survey party members, date of survey, and other pertinent information.

c. Field surveys shall be performed to such detail as to provide all survey information necessary to perform the design work required in this contract. Field books shall, as a minimum, contain the survey information required by NEM 540 for each type of survey performed.

d. Field surveys will be conducted to establish vertical and horizontal control at the dam site, through the flood pool, and through the downstream valley to the extent required for breach inundation mapping. Control will be adequate to serve as ground control for aerial photography, as baselines for topographic surveys, as a reference for locating drill holes and test pits, and as a basis for construction layout of the dam, or the rehabilitation of the dam, and its appurtenances.

(1) Traverses shall be of such precision that:

(i) The linear error of closure (in feet) shall not exceed 1 in 5,000.

(ii) The angular error of closure (in minutes) shall not exceed one-minute times the square root of the number of angles in the traverse.

(2) Horizontal control will be based on State Plane Coordinates NAD1983 VA South coordinate system.

(3) Vertical control will be based on the North American Vertical Datum of 1988 (NAVD88).

(4) At the dam site, horizontal control points shall be established by closed traverse. Traverse points shall be set in key locations and shall not be more than 500 feet apart. They shall be permanently established with metal or concrete monuments. The monuments shall be clearly marked in the field and shall be referenced so that they can be readily re- established. A minimum of three reference points shall be set for each traverse point.

(5) In the flood pool and in the downstream valley, horizontal control points may be established by open traverse procedures. Traverse points shall be set in locations that facilitate future surveys and shall not be more than 1,500 feet apart. Traverse points shall be established and referenced as described in this section.

(6) All bench levels shall be closed circuits. Bench level circuits shall be of such precision that the error of closure (in feet) shall not exceed plus or minus 0.05 times the square root of the length of the circuit (in miles). The elevation of all benchmarks (BM) and temporary benchmarks (TBM) shall be determined to the nearest 0.01 foot.

(7) Permanent benchmarks will be set at key locations to facilitate future surveys and in a manner that assures their preservation. At the dam location, benchmarks shall be no more than 500 feet apart. In the flood pool and in the downstream valley, benchmarks shall be no more than 1,500 feet apart. Benchmarks shall be established with metal or concrete monuments and clearly marked in the field. Each benchmark shall be referenced with a minimum of

three reference points.

e. Field surveys shall be conducted, and a preliminary topographic map prepared for the area of the dam and its appurtenances.

(1) The survey shall extend 300 feet beyond the footprint of the dam and its appurtenances.

(2) Topographic maps shall be developed to such precision that:

(i) Of points chosen at random, the percentage whose error in elevation exceeds one-half the specified contour interval shall not exceed 5 percent.

(ii) Average horizontal error shall not exceed 1 percent.

(iii) Percentage error in scaled areas shall not exceed 2 percent.

(3) When performing surveys, rod readings shall be obtained and recorded at all breaks in slopes and other locations as needed to accurately describe existing conditions. In the dam area, the average distance between points surveyed shall not exceed 50 feet.

(4) The initial reference line or baseline shall be selected at the planned location of the centerline of the dam and shall be stationed from left to right when facing downstream. Baselines and reference lines shall be stationed to avoid the use of negative stations.

(5) Within the area surveyed, all physical and cultural features such as houses, barns, building, pipelines, gas wells, roads, bridges, ponds, streams, mine openings, fences, utility poles, springs, seeps, escarpments, exposures, and any other features shall be located and identified on the topographic map.

(6) All maps, cross sections, and drawings shall be developed in accordance with furnished NRCS reference materials and Section I.

(i) Topographic maps of the surveyed areas shall have a contour interval of 1 foot. Index contours shall be at 5 foot intervals. In the flood pool, contours shall be provided at least 50 feet above the maximum stage during flood routing. At the dam site, the topographic map shall cover the area specified in Section M. In the downstream valley, contours will be provided high enough on the valley wall to fully contain the routed breach hydrograph.

(ii) Electronic map files and drawing files shall be in DWG format. Each discrete type of data will be contained on a separate layer. An index of the layer names, properties, and the data contained will be furnished.

(iii) Vertical and horizontal control points shall be shown and identified. The descriptions and references for each control point shall be shown. A table listing the coordinates shall be provided.

f. A base sheet displaying the dam and auxiliary spillway area with contour lines shall be prepared. This sheet is to be used to display the plan view of the dam and auxiliary spillway, locations of baselines, geologic boring and test pit locations, geologic map, and other displays where the plan view of the dam is required and topographic

information is desirable.

g. After the initial survey data is evaluated and the preliminary drawing detailing the plan view of the layout of the dam, spillway(s), and drainage system is completed, the field layout and surveys for the geological investigation will be performed.

h. During the geological investigation, additional surveys will be performed to determine the location and elevation of all test holes and pits. Additional surveys shall also be completed to develop true profiles of the final locations selected for the auxiliary spillway, drainage system, centerline of the dam and principal spillway, and other works.

3. Reports and Maps

a. Reports and maps shall be prepared in accordance with Section I.

b. A preliminary report of the survey process will be developed.

c. Closure computations, reference mark sketches, benchmark descriptions, and similar data shall be documented in the report.

d. Field books containing the original survey notes and/or electronic survey data files shall be available for review. These books and/or files shall be retained by the A-E until the completion of the final design phase. At that time, the field books and/or files containing the original survey notes and original plottings developed as a part of this phase shall be furnished to the CO.

e. Base sheets shall be prepared. Sheets will include:

(1) The area of the dam site and the flood pool to depict the construction limits, required land rights, and maximum flood pool limit.

(2) The area of the dam site and downstream valley to depict the inundation limits resulting from the breach hydrograph analysis.

f. The A-E shall prepare a topographic map to provide sufficient data to perform the flood routings and analysis required to design the rehabilitation of the dam, and its associated works.

g. A topographic map covering the flood pool, the dam site, and the downstream valley for a sufficient distance downstream to cover all impacted locations shall be produced.

h. The location of surveyed hydraulic cross sections shall be shown and the sections shall be identified.

i. The topographic map shall be contained in a single electronic file. The file shall be in DWG format and shall be suitable for use in AutoCAD Civil 3D 2020. Each discrete type of data will be contained on a separate layer. Primary contours shall be on two layers allowing plotting at one foot and two foot intervals. Index contours shall be on two layers allowing plotting at 5 foot and 10 foot intervals. An index of layer names, properties, and description of data contained will be furnished.

4. Conferences

Meetings between the A-E and the CO for the subject work shall be in accordance with Section G and shall be held as follows:

a. Mapping Conference

Timing After completion of the required mapping.

Location Onsite or virtual.

Topics Review of the preliminary topographic map and base sheets.

b. Other conferences as needed.

5. Completion and Acceptance of Work

a. Final approval and acceptance of the work will be made by the CO after all required material has been submitted. The required submittals are:

(1) PDF and supporting files of the preliminary report.

(2) PDF and supporting files of the preliminary topographic map, base sheets and hydraulic sections.

b. The CO will furnish review comments on the work to the A-E within fifteen (15) days after receiving the report, mapping and CADD files on flash drives. The A-E shall make all necessary corrections to the work and will document the responses and actions taken as a result of the CO's review comments. The documented responses shall be submitted with the final submittal.

c. Final approval and acceptance of the work will be made by the CO after all corrections are made and all required material has been submitted. The required submittals are:

(1) PDF, CADD and supporting files of the final mapping, report and base sheets.

O. Item 3 - Geotechnical Field Investigation, Interpretation and Conclusions, and Reporting

1. Scope

The A-E shall perform geotechnical investigations as required by NEM Part 531 Geology. This will include field testing and sampling of earth and rock materials for laboratory testing, geologic and engineering analysis, and reports as necessary to provide information adequate to serve as a basis for planning or design of the structure and appurtenances. Geologic investigations, logs, and applicable portions of the Geotechnical reports shall be prepared and signed by the supervisory geologist or by the supervisory geotechnical engineer. For the rehabilitation of existing dams, the sediment in the pool shall be considered and included in the investigation, along with other appropriate investigations, interpretation, and reporting to determine any potential problems associated with the rehabilitation of the dam or foundation.

2. General Requirements

(1) Coordination with the NRCS Geologist is required.

(2) Prior to the start of detailed geotechnical investigation, the A-E shall submit to the CO a memorandum report that outlines the A-E's plan of operations and schedule for accomplishing the work. The plan will be reviewed and approved by the CO prior to the start of fieldwork. The geotechnical investigation plan shall be based on a physical reconnaissance of the site including a detailed surface geologic map and consideration of data included in reports of preliminary investigations and surveys and as-built information for the rehabilitation of existing structures. The plan shall include the number, kind, and location of pits and drill holes, the purpose of the investigation and its applicability to the planning or design, and the location for the storage of rock cores. The plan shall be developed and shall be approved by the supervisory geotechnical engineer and shall show clearly how the work will effectively accomplish the requirements of this contract. The plan shall include a preliminary layout drawing of the structure showing the location of each of its components and the extent of the proposed investigation. The plan shall also include the erosion and sediment control measures that will be installed and maintained during the investigation.

(i) The CO will furnish review comments to the A-E within fifteen (15) days after receiving the preliminary plan. The A-E shall make all necessary corrections to the work and will document the responses and actions taken as a result of the CO's review comments. The documented responses shall be submitted with the final submittal.

(ii) Final approval and acceptance of the plan will be made by the CO after all corrections are made.

(3) During the progress of the investigation, the A-E shall promptly notify the CO of any unexpected conditions encountered that would require a material change in the A-E proposed plan or scope of investigation. In this event, the A-E shall furnish the CO with a revised plan and scope of investigation for review and concurrence. The revised plan will be reviewed and agreed to prior to performance of the work and incorporation of the change.

(4) The A-E shall notify the CO of impending completion of work under this phase in sufficient time to arrange an on-site conference at least two weeks prior to the scheduled completion date of investigation. The status of the investigation and the plan for closeout of the field investigation will be reviewed at this time. The proposed materials testing program for the site will be discussed at this time.

b. The A-E shall submit drilling plans and obtain all necessary permits for subsurface investigation as required by the state. A licensed driller if required by the state shall conduct drilling. The A-E shall submit application permits for monitoring wells as required by the state. Site Preparation

(1) Site preparation shall include furnishing of all equipment necessary to perform all the operations necessary to clear routes and build access for drilling equipment.

(2) Care shall be taken to avoid causing any undue erosion when constructing the access. The approved sediment and erosion control plan measures shall be

installed and maintained throughout the investigation.

(3) Cleared debris shall be placed in piles where practical and placed so as not to cause ponding of water. Where appropriate and safe, piles of wood debris can be burned, and when directed by the CO, materials that are not to be burned shall be hauled off site and disposed of at a location approved by the CO.

(4) Care shall be taken so that streams are disturbed as little as possible.

3. Subsurface Investigations

The required investigations may include, but are not limited to, disturbed and undisturbed soil sampling, rock core drilling, permeability testing, in-situ rock testing, and excavation of test pits and trenches, and collection of sediment from the existing reservoir. Test holes, which cannot otherwise be maintained open, shall be lined with PVC casing or equivalent until static groundwater level is confirmed by leaving the hole open for at least 24 hours, and until a change of less than 0.1 foot in 24 hours in the borehole water elevation is observed.

a. Mobilization and Demobilization

This work shall consist of delivery to the site, setting up on the site and removal from the site all equipment, material, supplies, and personnel required to accomplish the work under this item. Delivery of additional equipment to the site required to perform the work in conformance with the specifications and assembling thereof as the work progresses, shall be considered a part of mobilization whether or not such equipment has been specified as required.

b. Auger Borings

Hollow-Stem Auger Drilling capable of continuous sampling will be the primary method used to sample soil and weak or highly weathered rock for logging and index testing. Hollow-Stem Auger Drilling shall be accomplished as prescribed by ASTM D-6151. Track mounted drilling rigs shall be used for existing embankment investigations, unless otherwise approved by the CO. The embankments shall not be excavated to provide a level working surface.

(1) Earth Boring

This work shall consist of drilling a 3 ½-inch minimum diameter hole through soil, unconsolidated material, and weathered rock to a given elevation to obtain samples or perform tests. Any material which cannot

be penetrated with other than rock coring equipment is not included in earth boring.

Any conventional power rotary drill rig fully equipped with accessories, in good operating condition and capable of obtaining continuous samples to selected depths is acceptable. Auger boring shall be accomplished as described by NEH Section 8 and Bureau of Reclamation (BOR), Earth Manual.

Any standard method for advancing the hole, excluding blasting, is acceptable down to one foot above the sampling elevation. Air and/or water shall not be

used during drilling/boring in existing embankments, unless otherwise approved by the CO. The bottom one foot will be advanced with a cleanout jet auger, or other tool approved by the CO. Bottom discharge bits will not be permitted in the one foot area immediately above a desired sampling or testing elevation. Casing of adequate size is permitted but must not extend below the sampling level. In special cases the CO may allow drilling mud in lieu of casing.

(2) Earth Boring, Large Diameter

This work shall consist of auger drilling holes with diameters greater than 6 5/8-inch inside diameter as described in section a) above.

c. Penetration Test and Split Barrel Drive (SPT) Samples

(1) This procedure is used to measure the resistance of subsurface materials to the penetration of sampling tools and to obtain representative soil samples for identification.

(2) The hole shall be advanced to the test section by acceptable methods.

(3) The minimum diameter of hole above the test section shall be 3-1/2 inches.

(4) As necessary, the test hole shall be kept open above the test section by drilling mud or by hollow-stem augers unless otherwise approved by the CO. In no case shall hollow-stem augers or wash bits proceed in advance of the sampling elevation.

(5) The casing shall be kept full of water when sampling below the ground water level.

(6) Standard penetration tests shall be in accordance with ASTM D-1586 or ASTM D-6066 as applicable.

(7) A ball check valve in the sampler head is required so fluid can escape through the top of the sampler.

(8) The minimum length of the sampler shall be 24 inches. The cutting shoe shall be of hardened steel and shall be replaced when it becomes dented, distorted, or in any way damaged.

(9) Core retainers, sand traps, or other devices shall be available at the worksite should the standard spoon not retain a sample.

d. Drive Sampling, Large Diameter

(1) Drive sampling is a procedure to measure the resistance of subsurface materials to the penetration of the sampling tool and to obtain representative soil samples for identification and testing.

(2) The sampler tube shall have an outside diameter of 3-inches and the inside diameter of the cutting shoe shall be 2 ½-inches. A ball check valve in the sampler head is required so fluid can escape through the top of the sampler. The minimum length of the sampler shall be no less than 24 inches. The cutting shoe will be of hardened steel and will be replaced when it becomes dented, distorted

or in any way damaged. Core retainers, sand traps or other devices approved by the CO shall be available at the work site should the standard tube not retain a sample.

(3) The driving assembly will consist of a 300-pound hammer or weight, a drive head and a guide pipe. The assembly shall be so arranged that the hammer falls freely from a height of 30 inches above the drive head.

(4) Tools such as bucket auger, push tube, or dry barrel sampler may be used to enlarge the hole or clean the casing where permeability test are not required. The minimum hole diameter shall be 3 ½-inches.

(5) Test hole will be cased with appropriate size casing to adequately retrieve sample but must not extend below sampling level.

(6) Samples shall be taken with the standard split tube continuously to a depth approved by the CO. Thereafter samples shall be taken at every change in stratum or as determined by the CO. Casing shall not proceed in advance of the sampling elevation.

(7) The split tube sampler will be driven vertically into the soil with the 300- pound hammer dropped from a height of 2.5 feet above the drive head. Normally, the sampler will be driven 1.5 feet per run, but in cases of wet flowing material, the sampler will be seated 1.0 to 1.5 feet and then driven another 1.0 foot.

(8) Casing will be used when permeability tests are needed and when the test hole will not stand open without support. Drilling mud may be substituted for casing where no permeability or pressure tests are needed. The first two runs can be made without enlarging the test hole but below that the test hole shall be enlarged after each run with the split tube. The tool for enlarging the hole shall be a fishtail bit so designed that the water courses direct water into the side of the wall at least one inch above the bottom of the bit at a downward angle of between 40 and 50 degrees with the vertical or other approved tool such as a push tube or auger. Jetting or wash borings will not be permitted. Each sample will be logged and placed in a wide-mouth airtight sample container. Each type of material from each run will be placed in a separate container and labeled as specified in ASTM D-1586.

(9) Samples shall not be allowed to freeze and shall not be exposed to hot sunlight for long periods. Samples shall be delivered to a place in the vicinity of the work as outlined in the approved investigation plan.

(10) The driller's log shall be kept in a manner consistent with the procedures outlined in ASTM D-1586.

e. Rock Core Borings

(1) Cores from bedrock are obtained to determine its composition, extent, and characteristics; and to characterize rock for a specific engineering purpose by assessing material, mass, and geohydrologic properties. Rock core borings shall be accomplished as prescribed by ASTM D-2113. The specific method of

obtaining cores shall be suitable to retrieve the core without altering the core to the extent that the core does not represent the rock material or feature being sampled.

(2) Rock quality designation (RQD) shall be determined in accordance with ASTM Designation D-6032.

(3) Rock cores shall be carefully preserved. Rock cores shall be preserved and transported as prescribed in ASTM D-5079.

(4) Rock cores shall be stored until after completion of the construction contract at a location agreed to in the geology investigation plan.

(5) Rock core will be logged in accordance with BOR Geology Field Manual

(6) Rock is to be classified according to NEH 628 Chapter 52; Table 52-1.

(7) Rock cores shall be documented according to Geology Note (GN) 4, Photography of Rock Core Samples

(8) Rock cores diameters shall be NX size unless otherwise identified in the geotechnical field investigation plan and approved by the CO.

(9) The drilling equipment shall be capable of drilling vertical or angled holes as identified in the geotechnical field investigation plan.

(10) Large Diameter Rock Core Borings shall be considered as borings with diameters greater than or equal to 6-inches unless otherwise approved by the CO.

f. Undisturbed Samples

(1) General

(i) Undisturbed samples of soil and soft weathered rock shall be obtained by appropriate equipment such that the soil sample is subjected to a minimum degree of disturbance. The samples obtained shall represent as accurately as possible the natural condition of the soil and shall be suitable for laboratory testing. A sufficient number of samples shall be obtained to characterize all soil and rock units and their discontinuities.

(ii) The type of device used for obtaining undisturbed samples will vary according to the nature of the material to be recovered. Undisturbed soil samples shall be obtained as prescribed in ASTM D-1587 or as described below in sections b) or c).

(iii) Undisturbed samples shall be handled, transported, and stored as prescribed in NEM Part 531, Geology, 531.5.

(iv) Samples taken solely for the purpose of logging shall remain at the site.

(2) Undisturbed Samples, Shelby and Piston shall be performed according to ASTM D-1587, Standard Practice for Thin-Walled Tube Geotechnical Sampling of Soils for Geotechnical Purposes or ASTM D-6519, Standard Practice for Sampling of Soil Using the Hydraulically Operated Stationary Piston Sampler.

(3) Undisturbed Samples, Denison shall be performed by a method approved by the CO as specified below. The Denison test is used to obtain large undisturbed samples of dense or gravelly soil for laboratory testing.

(4) Sampling Equipment

(i) A 6-inch i.d. x 7 ¾-inch o.d. Denison barrel that takes 24-inch samples is required. The Denison barrel must be in good condition. The inner barrel must have a pressure check valve and must rotate freely within the outer barrel.

(ii) The A-E must provide at least two bit lengths so that the Denison sampler can be assembled and operated in the following two arrangements: 1) the inner shoe flush with the bottom of the teeth on the bit, and 2) the inner shoe recessed one-half inch from the bottom of the teeth on the bit.

(iii) Denison liners (24-inches long) of 20-gauge galvanized metal with crimped seams are required for each sample. Each liner must be free of dents, rust, or corrosion so that the sample will enter with the least amount of friction.

(iv) Both ring and basket type core lifters or catchers must be available for use in the Denison sampler. The A-E will provide waterproof marking ink or paint and waterproof tags for each sample.

(5) Sampling Procedure

(i) The sampler shall be rotated into the soil at a vertical angle and at a speed that allows a smooth penetration. Drilling water and/or air may be used to flush the cuttings from the hole; but samples disturbed by jetting action of water or air will not be acceptable. Drilling shall continue until a sample 24-inches in length has been cut. Rotation shall then be stopped and the sampler carefully withdrawn from the hole after a 30-second pause to allow swelling of the sample.

(ii) Removal of the liner and sample from the inner barrel shall be done with care. Damaged liners or broken samples will be cause for rejection of the samples. Acceptable samples will be cleaned, sealed, and marked. Liners containing acceptable samples will be marked as to: 1) state, 2) watershed, 3) site number, 4) hole number, 5) surface elevation, 6) top depth of sample, 7) top and bottom of sample, and 8) any other significant descriptive information.

(iii) Care in handling of all undisturbed samples shall always be taken to avoid dropping, jarring, or rolling to eliminate the possibility of any shock or sudden movement which might alter the condition of the sample.

(6) Permeability Testing

(i) The permeability of subsurface materials shall be calculated from appropriate field permeability tests or as described below. The tests shall be identified and described in the geotechnical field investigation plan.

(ii) The drill hole shall be advanced through the test section by acceptable

methods.

(iii) Drilling fluid additives shall not be used in advancing holes for permeability testing.

(iv) Test requirements, and calculations shall be in accordance with Bureau of Reclamation, Groundwater Manual, U.S. Department of Interior, Second Edition, 1995, and NRCS NEH 8, Chapter 2.

(v) Any deviation from the above permeability test methods, or methods shown below, shall be identified in the geotechnical field investigation plan and approved by the CO.

(7) Water Pressure Testing

(i) The hydraulic pressure testing shall mean the operation of forcing water under pressure into subsurface rock formations through predrilled holes. The purpose of the work is to determine the foundation permeability under various pressures.

(ii) Equipment and Supplies - Water pumps with minimum capacities of delivering 50 gallons per minute at discharge pressures of 100 psi at the hole; double expander packers with rubber expansion elements set 5 feet apart for NX drill holes; water pipes so arranged that water may be admitted below the bottom expanding element or between the two expanders and connected to the pressure pump through a pressure relief valve, pressure gage, and water meter reading in gallons. Pneumatic packers of at least one foot in length shall also be included. An accurate calibration chart dated not more than 90 days prior to commencement of work shall be submitted for each water meter used. The accuracy of the meter shall be within plus or minus 2% of the

actual flow. Supplies shall include all accessory valves, gages, stopcocks, plugs, expanders, water for testing, stand- by-pumps, pressure tanks, fuel, pipes, pressure hose, tools, and other items necessary for maintaining uninterrupted tests for each boring to be tested.

(8) Procedure

(i) Location of zones to be pressure tested will be identified in the geotechnical field investigation plan. Generally, holes will be tested in 5-feet or 10-feet intervals, as identified in the geotechnical field investigation plan and approved by the CO, from bottom to top. For each test section, the maximum water pressure at the upper expander shall not exceed 0.43 psi/foot of depth unless otherwise indicated in the geotechnical field investigation plan.

(ii) The pressure gage shall be located immediately down flow from the water meter and at an elevation equal to the top of the drill hole. It shall be located as near the drill hole as practicable. The test shall be conducted in two parts.

(iii) Water Pressure Holding Test.

The water pressure in the test section shall be raised to a level specified in the geotechnical field investigation plan. A stopcock will be closed so the

pressure is confined in the test section. The drop in pressure will be recorded in minutes and seconds for each drop in 5 psi or intervals as identified in the geotechnical field investigation plan. If the pressure drop does not exceed 10 psi per minute, it shall be taken as evidence that there is no appreciable leakage in that particular test section. Once the holding tests have been completed at the initial test pressure, a second holding test may be required on the same test section at pressures exceeding the initial pressure.

(iv) Pressure Flow Test

Water shall be pumped into the hole at specified constant pressure, as outlined in the geotechnical field investigation plan or as directed in the field by the supervisory geologist or supervisory geotechnical engineer, and water loss in gallons per minute shall be recorded.

(9) Records

(i) Complete records shall be kept. The A-E may use his own data sheet for recording test information; but it shall contain the required information, including depth of ground water at date of test and height of gage above the ground level. Data shall be included in the geotechnical field investigation report.

(ii) The volume and pressure of water applied to each stage shall be monitored by using a nutating disk water meter and a dial type mechanical needle pressure gauge at regular time intervals or by usingelectronic measuring devices coupled to a computer for real time display of the flow and pressure. The field instruments output data to the computer at a frequency of one reading per second. The method of monitoring shall be agreed to by the A-E and CO.

(iii) If real time display of data is selected, then it shall be used to calculate other parameters such as the effective stage pressure and Lugeon value of the stage. The data shall be displayed in the form of three charts: pressure chart, flow rate chart, and Lugeon value chart.

(10) Open-End Permeability Testing

(i) The open-end permeability test is used to determine the permeability of soil or bedrock. The installation and removal of standpipes and the measurement of constant water level are considered a part of the open-end permeability test.

(ii) Equipment

Equipment required for this test is the same as required for the Standard Penetration Test and additional materials including a water meter, standpipe, hoses, pipes, hand tools, and fittings. The A-E shall furnish the following: a 50 gpm pump, a one-inch water meter that records the flow in gallons, the specified amount of standpipe, all hoses, pipes, hand tools, and fittings required. An accurate calibration chart dated not more than 90 days prior to commencement of work shall be submitted for each water meter used. The

accuracy of the meter shall be within plus or minus 2% of the actual flow.

The standpipe shall be standard water pipe of not less than one inch in size with couplings small enough to fit inside the casing. The standpipe must be straight and open so that water measurements can be taken inside the pipe. The perforated portion shall be four 1/8-inch holes per foot of pipe. All pipe, hose, or fittings used in connection with the water meter shall not be smaller than the normal size of the meter.

(iii) Procedure

Permeability

Casing will be seated tightly at the top of the test section. The casing will be cleaned out using a baffled fishtail bit so designed that the water courses direct water into the side of the wall at least one inch above the bottom of the bit at a downward angle of between 40 and 50 degrees with the vertical or other equipment identified in the geotechnical field investigation plan and approved by the CO. The split tube sampler or rock core barrel will be centered with the casing at the base of the hole and will be driven or drilled a specified depth below the casing shoe. The split tube sampler will be rotated one full turn and then withdrawn slowly from the soil. The depth of hole will be determined to make certain that the entire sample has been removed. If the depth of hole does not correspond to depth of sampler, other

attempts to remove the unrecovered portion will be made. When the entire sample has been removed, the hole will be measured and the test will continue. A notation as to the depth of hole and the amount of unrecovered sample, if any, remaining in the hole, will be placed on the test data sheet.

After the hole has been cleaned to the proper depth, clear water will be directed into the test hole in a manner to cause the least possible disturbance in the unprotected portion of the test hole.

The casing will then be filled to an easily discernible point below the top of the casing to prevent possible water loss from overflow and the level will be kept at that point by adding water. The amount of water added will be measured and recorded for each time increment until a constant rate is reached.

Ground Water Observation

After completion of the drilling and testing, the standpipe will be placed in the hole prior to removal of the casing. The casing will then be removed and the hole covered or protected so that animals or children cannot disturb the pipe or hole.

(iv) Records

Complete records shall be kept. The A-E may use their own data sheet for recording test information but it shall contain the required information. Data shall be included in the geotechnical field investigation report.

(11) Rock Boring, with Water or Other Drilling Fluids

(i) This method may be used for advancing the hole in unconsolidated and consolidated materials. This method is not to be used as the primary method of exploration and is not to be used during the collection of materials for testing.

(ii) The Contractor shall furnish rotary drilling equipment capable of circulating cuttings to the surface; however, compressed air shall not be used.

(iii) Pumps shall have the capacity to circulate drilling fluids to the surface from the depths specified.

(iv) Tricone roller bits shall be utilized and designed in a manner to prevent disturbance in the bottom of the hole. Other types of bits may be used for wash borings. However, bottom discharge bits will not be permitted in the one-foot zone above the sampling or testing depth.

(v) When required, drilling additives shall be added to stabilize a borehole.

(vi) Drilling bits shall be advanced continuously at a rate that will provide a clean and stable hole.

(vii) Density of drilling fluid shall be sufficient to lift cuttings to the surface.

(viii) Holes will be cased through overburden when it is necessary to prevent seepage of overburden material into the hole.

(ix) An accurate and complete log of all test holes shall include state, project, date, location, test hole number, depth and type of rock, hardness and ease or difficulty of drilling or boring, and the depth or elevation of ground water after completion of each hole and on a daily basis (at the start of work) or as identified in geotechnical field investigation plan until water depth conditions have been established.

(12) Drill Hole Backfilling

All test holes, except those selected for observation wells, shall be closed at the ground surface in accordance with Drilling Specification 459 – Grouting Drill Holes.

(13) Observation Wells and Piezometers

(i) Selected test holes shall be developed as semi-permanent or permanent observation wells or piezometers. These installations shall be monitored periodically during the course of the site investigation and be left in a condition so that subsequent monitoring can be accomplished. The A-E shall be responsible for the operation and maintenance of the test holes and instrumentation through the design.

(ii) The observation wells shall be constructed with slotted PVC screen with a

filter pack designed for the in-situ materials around and extending at least 12 inches above the screened section. The compatibility of the filter pack and in-situ materials shall meet the requirements of NEH Part 633, Chapter 26, unless otherwise approved by the CO.

(iii) PVC Schedule 40 one-inch minimum diameter pipe shall extend to the ground surface. A one-foot thick bentonite seal shall be placed above the filter pack and the remainder of the hole filled by tremie pipe with cement/bentonite grout to two feet below ground surface. A lockable, four-inch square by five feet steel well cover shall be grouted in place at the ground surface to protect the exposed portion of the well pipe. A 3-foot by 3-foot by 4-inch thick concrete pad shall be constructed around the well. The A-E shall provide locks for all well covers. All locks shall be keyed alike. The construction and completion of the well shall meet all Virginia laws and regulations.

(14) Test Pits and Trenches

(i) This work consists of the excavation of pits and/or trenches for observation of subsurface conditions and obtaining samples.

(ii) All OSHA safety rules and regulations shall be followed during pit and trench excavations. A "competent" A-E employee shall evaluate each

pit and/or trench to determine safety from cave-in prior to permitting anyone to enter the pit or trench. Pits and/or trenches of questionable safety shall not be entered. Where necessary, pit and/or trench walls shall be shored.

(iii) Pumps of adequate size shall be used to dewater test pits and trenches used for logging and sampling.

(15) Access Road & Sediment Control Measures

This work shall consist of all labor, materials, equipment, and incidentals necessary to construct and grade the access to the work locations and to implement all sediment control measures as identified in the geotechnical field investigation plan as required to complete the work.

(16) Seeding and Mulching

(i) This work shall consist of all labor, materials, equipment, and incidentals necessary to seed and mulch all areas disturbed during the geotechnical investigation. The work shall be done in accordance with NEH, Part 642, Construction Specification 6 and NRCS Field Office Technical Guide (FOTG), Section IV, Conservation Practice Standard 342, Critical Area Planting.

(ii) The seed mix shall be determined on a per site basis and approved by the CO prior to commencing the seeding operation.

(17) In-situ rock testing

(i) Rock modulus shall be determined in accordance with ASTM D-4971, D-

4394, or D- 4395.

(ii) Shear strength of in situ rock discontinuities as a function of stress normal to the sheared plane shall be determined in accordance with ASTM D-4554.

(iii) Shear wave velocity shall be determined in accordance with ASTM D- 4428 or D-5777.

(18) Collection of Disturbed Samples

(i) Disturbed soil samples may be collected for laboratory classification and testing to determine engineering properties when used as fill material. Samples may be taken from driven split barrels, bucket auger borings, continuous sampler used with hollow- stem augers, or excavated pits and trenches or other suitable methods as identified in the geotechnical field investigation plan.

(ii) The size of the sample should be sufficient to perform the intended tests. Sample size requirements for rocky soils are noted in Geology Note 5.

(iii) Samples shall be transported to an agreed to storage location near the site. Samples shall be stored at this location no longer than forty-eight (48) hours before shipment to the testing laboratory. Samples shall be handled, transported, and stored as prescribed in NEM Part 531, Geology, 531.5.

(19) Closing Test Holes

All test holes, except those selected for observation wells, shall be closed at the ground surface in accordance with Drilling Specification 459 – Grouting Drill Holes.

4. Investigation Requirements

a. The investigation shall address any geotechnical concerns the site presents. Investigation shall be accomplished as prescribed by NEM Part 531, Geology. The investigation may include test pits and trenches as well as soil auger boring or other drilling methods, diamond core boring, and in-situ rock testing.

b. All geotechnical subsurface investigations shall be conducted in accordance with Virginia laws and regulations.

c. A log of each test hole and/or pit shall conform to the requirements of ASTM D-5434 and ASTM D-2113. Original logs of the boreholes shall be provided in an appendix of the report.

d. Wash borings and probing shall be considered adequate only for determining approximate bedrock profiles.

e. Upon completion of the work, the A-E shall:

(1) Shape borrow areas from which ramp and access road materials were obtained to provide positive drainage (side slopes shall be 2 horizontal to 1 vertical or flatter).

(2) Restore the land surface to stable and free draining slopes to minimize erosion. Protect areas of concentrated flow from excessive erosion by armoring with site rock or by other suitable means.

(3) When clearing for investigation, debris shall be placed in piles. Where appropriate and safe, piles of wood debris can be burned, and when directed by the CO, unburned materials shall be hauled off site and disposed of at a location approved by the CO. It is encouraged this material be disposed of in an environmentally considerate manner.

(4) Seed and mulch all disturbed areas to grass cover.

(5) Existing improvements, such as farm roads, driveways, fencing, etc. that are disturbed during the geologic investigations shall be restored to their original condition or better as directed by CO.

(i) Existing earthfill dams and appurtenances shall not be modified in any way unless approved otherwise by the CO in advance of the investigation. Permanent pools shall not be drained unless approved otherwise by the CO in advance of the investigation.

(6) Remove from the site all scrap or abandoned equipment, materials, and/or supplies of any nature.

5. Specific Requirements

a. Borrow Area Investigations

(1) Areas from which materials are to be borrowed for use in earth embankments shall be explored and sampled. The volume of borrow material explored and determined to be suitable for use in the structure should exceed the estimated required volume by at least 50 percent. Borrow areas will be explored so that representative samples are removed throughout the depth of exploration. Samples collected from continuous flight augers or wash borings shall not be considered representative.

(2) Samples representing each significant kind of borrow material available for use shall be collected for laboratory testing.

(3) Soil auger borings, hollow-stem auger drilling with continuous sampler, or excavated test pits shall be used for detailed soil classification and for sampling. Backhoes may be used for any or all borrow area soil investigations for logging and sampling.

(4) Rock, if encountered, shall be investigated with rock core borings or test pits.

(5) The proposed fill material shall be tested to determine if the soil is dispersive.

(6) Excavated soils to be used in the structure which contain more than five percent rock (larger than the No. 4 sieve) will be sampled and tested according to NRCS TR 26 and 27.

(7) All borrow materials shall be fully described and classified as to methods

required for excavation and shall be sampled and tested for use as earth or rock embankment materials, aggregate for roller compacted concrete, or rock riprap. If on site aggregate for RCC is not acceptable, then off site or commercial aggregate shall be evaluated for suitability for construction.

b. Reservoir Area Investigation

The reservoir area and the reservoir rim shall be investigated to the degree necessary to:

(1) Assess the potential of seepage or the existence of seepage to and from the pool.

(2) Assess the extent and estimated volume of landslides that can influence the reservoir area.

(3) Correlate with subsurface information at the dam site.

(4) Aid in the assessment of influent water quality.

c. Seismic Hazard Assessment

The seismic hazard assessment shall conform to the requirements of TR60 and shall:

(1) Obtain and evaluate existing geologic, geophysical and seismologic information available and prepare a seismotectonic evaluation of the area to determine that there are no active or capable faults at the site. The study shall include an assessment of the suitability of existing data to definitively evaluate the existence of faults at the site.

(2) Obtain a probabilistic seismic hazard curve for the site from the USGS Earthquakes Hazard Program, (accessible at website http://eqhazmaps.usgs.gov/)

(3) Earthquake loading considered shall be based on the annual exceedance probability listed below. Peak ground acceleration (PGA) and other associated earthquake characteristics shall be obtained from the United States Geological Survey (USGS), National Earthquake Hazards Program or other suitable source. If the earthquake loading is not determined from the USGS program, the rationale for the proposed loading must be stated. Earthquake loading at the base of the embankment must include consideration of foundation conditions at the site. Hazard classifications listed in the table are the overall hazard classification, usually controlled by the hazard represented by the dam during flood storage.

Hazard Class	Annual Exceedance Probability	Return Period (Years)	Approximate probability of exceedance in 50 years
Low	1 x 10-3	1,000	5 %
Significant	4 x 10-4	2,500	2 %
High (With no potential for loss of life from failure at permanent pool)	2 x 10-4	5,000	1 %

High (With potential for loss of life from failure at permanent pool)	1 x 10-4	10,000	0.5 %

(4) The requirements above may be superseded by current NRCS policy and/or design guidance. The A-E shall utilize the most current NRCS seismic hazard analysis policy and design guidance available at the start of the design process.

d. Foundation Investigation

(1) Hollow-stem auger drilling sampled with split spoons or continuous sampler, or water or mud rotary drilling with split spoon samples shall be used for logging of soil and poorly consolidated formations and for obtaining samples for index testing. The split spoon test samples may also be used for continuous logging and sample collection for index testing.Unless otherwise approved by the CO, water will not be used in or adjacent to an existing dam.

(2) Rock coring shall be conducted to determine, but not limited to, stratigraphy, permeability, and integrity of the bedrock and to identify significant features such as faults, joints, and solution features. The coring shall be adequate to ensure correlation throughout the foundation (including the abutments) and to fully delineate and assess any potential geologic hazards. Angle and vertical borings shall be required to fully delineate the foundation.

(3) Foundation testing shall be conducted as required to adequately characterize the engineering properties of the foundation required for the structure design. This shall include but is not limited to determination of the deformation modulus and anisotropy of each type of material within the foundation. Testing shall also determine the effects the discontinuities have on the effective deformation modulus. Shear strength of each type of material and discontinuities shall be determined. Shear wave velocity shall be determined if needed. Permeability of each material type in the foundation and effective permeability of the overall foundation shall be determined, along with any information required for design of treatment features such as excavation of inadequate materials, grouting, drainage, or treatments for specific foundation areas.

e. Auxiliary Spillway Investigation

(1) The auxiliary spillway investigation earth material sampling and laboratory sample testing shall be in sufficient detail to comply with procedures outlined in NRCS-NEH Part 628, Chapter 52. Sufficient borings will be made to accurately delineate and describe all spillway materials as prescribed in NEM Part 531, Geology, 531.6.

(2) Samples representing each significant kind of material available for use shall be collected for laboratory testing to determine its quality for use as embankment fill.

(3) Soil auger borings, hollow-stem auger drilling with continuous sampler, or

excavated test pits shall be used for detailed soil classification and for sampling.

(4) Rock shall be investigated with rock core borings or test pits. Rock shall be profiled and quantities determined for rock excavation.

(5) The proposed fill material shall be tested to determine if the soil is dispersive.

(6) Excavated soils to be used in the dam embankment structure or other fill which contain more than 5 percent rock larger than the No. 4 sieve will be sampled and tested according to NRCS TR 26 and 27.

(7) All auxiliary spillway materials available for use shall be fully described and classified as to methods required for excavation and shall be sampledand tested for use as earth or rock embankment materials, aggregate for roller compacted concrete, or rock riprap.

(8) All soil and rock material in the auxiliary spillway shall be assessed for resistance to erosion from flowing water, construction quality, excavation characteristics, and slope stability. The character of material shall be determined to a depth appropriate for the structure as required by references in 1) above. Rock material shall be appropriately assessed according to NEH Part 631, Chapter 4.

6. On-Site Review

The A-E Geologist and Geotechnical Engineer shall attend the required site conferences.

7. Investigation Reports

a. The A-E shall prepare a report giving a detailed assessment of the geotechnical data including geologic conditions at the site. The report shall narratively and graphically address the investigation findings, geologic interpretations, and the geotechnical engineer's professional conclusions and opinions pertaining to design, construction, and performance of works. All findings, including drilling logs, field test data, photographs, and sample lists, shall be included in the report. Insofar as possible, interpretations and conclusions shall be displayed graphically as well as explained narratively. Maps, profiles, cross sections, isopach, and other graphical displays developed from interpretations based on application of sound geologic and geotechnical-engineering principals shall be included in the conclusions.

b. The report shall generally conform to the guidance for detailed site investigation reports contained in NEM Part 531, Geology, 531.7 and as prescribed in ASTM D-420, Section 13. The A-E shall furnish the CO PDF and supporting files of the report.

8. Conferences

Meetings between the A-E and the CO for the subject work shall be in accordance with Section G and shall be held as follows:

a. Pre-Investigation/NRCS Geologist Coordination Conference

Timing Prior to the start of geotechnical investigations.

Location TBD

Topics Review site investigation plan, review permit requirements.

b. Prior to Completion of Investigation Conference

Timing Prior to completion of geotechnical investigations.

Location TBD

Topics Review investigation findings, modify site investigation plan as necessary, review proposed material testing plan.

c. Preliminary Investigation Report Conference

Timing After submission of the preliminary investigation report.

Location TBD

Topics Review of the preliminary investigation report.

d. Other conferences as needed.

9. Completion and Acceptance of Work

a. For the review segment of Item 4 of the work, the A-E shall submit to the CO:

(1) PDF and supporting files of the Preliminary Investigation Report

b. The CO will furnish review comments on the work to the A-E within thirty (30) days after receiving the Preliminary Report. The A-E shall make all necessary corrections to the work and will document the responses and actions taken as a result of the CO's review comments. The documented responses shall be submitted with the final submittal for each item.

c. Final approval and acceptance of the work will be made by the CO after all corrections are made and all required material has been submitted. The required submittals are:

(1) 2 bound paper copies, PDF, MS Word, and supporting files of the Final Geotechnical Investigation Plan

(2) 2 bound paper copies, PDF, MS Word, and supporting files of the Final Investigation Report.

(3) 2 paper and 1 electronic copy of the CADD files for the final geologic evaluation maps, profiles, and cross sections on flash drives.

P. Item 4 – Rock and Soil Mechanics Testing, Evaluation, Interpretation and Conclusions, and Reporting

1. Scope

The A-E shall perform rock and soil mechanics laboratory testing, engineering analysis, and reporting as necessary to provide data adequate to serve as a basis for planning or design and construction control of the works.

2. Definitions

   Terms relating to rock and soil mechanics shall be used in accordance with ASTM D-653.

3. Rock and Soil Mechanics Testing, Geotechnical Analysis, and Recommendations

   The requirements for testing are contained in Part I. The requirements for geotechnical analysis and preparation of the recommendations report are contained in Part II.

Part I – Rock and Soil Mechanics Testing

1. Scope

   Perform rock and soil mechanics laboratory testing adequate to serve as a basis for design and construction control of the works. The rock and soils testing program shall include index and engineering property tests where appropriate.
   Each sample tested for engineering properties shall represent a delineated deposit, strata, or feature of known or assumed horizontal and vertical extent.

   Testing shall be representative of the range of materials at the site. Testing methods shall be compatible with the type of engineering analysis made and the field conditions that will exist. Laboratory testing shall be supervised by qualified geotechnical engineers.

2. Coordination

   Prior to the initiation of laboratory testing, the A-E shall submit for review and approval by the CO, a Rock and Soil Mechanics Testing Program Plan detailing the number and kinds of tests to be performed, the sources of materials to be tested, test procedures to be used, and a schedule for completion. The Plan shall include narrative statements indicating the purpose of performing the proposed tests or the use to be made of the test results and a reference to the delineated materials represented by the samples to be tested. The CO shall have thirty days to review and comment on the testing program.

3. General Requirements

   a. All rock and soil samples shall be tested as soon as possible after the laboratory receives them in order to reduce storage time and possible disturbance from unnecessary handling. Care is to be taken with undisturbed samples to assure that the water content (except for removal of free water) and physical condition do not change prior to testing. If undisturbed samples are to be stored more than 7 days before testing, they shall be stored in a room with controlled, high humidity.

   b. All samples shall be inspected and photographed prior to testing and after testing, as appropriate, and the general condition of the sample noted. Any unusual conditions shall be reported. Any sample disturbance shall be described and, in the case of tube samples, the amount of wash material, compression, or other distortion shall be measured and reported.

   c. Any other information that the testing organization feels will be pertinent to the

engineering application of the test results should be reported.

d. The laboratory shall visually describe all samples and classify each according to the Unified Soil Classification System. A log of each undisturbed sample will be made if changes in the character of the soil are noted within a single sample. This log will show the exact location of test samples.

e. All necessary soil tests shall be made on a sufficient number of samples to provide adequate data for design and subsequent construction control of the works.

4. Specific Requirements for Testing

a. Rock testing shall be done in accordance with the methods or procedures listed for the following tests. If other procedures are used or other tests are deemed necessary, they shall be those generally accepted by the engineering profession and approved by the CO. The report forms should identify the project and sample and show all data pertinent to the test including weights and measurements of the sample, method of testing, and conditions of test such as density and moisture content. Test results should be shown graphically where possible. A tabulated summary of test results, such as NRCS Form SCS-354, shall be compiled for inclusion in the report.

(1) Rock core specimens shall be prepared in accordance with ASTM D- 4543.

(2) The unconfined compressive strength of intact rock core specimens shall be determined in accordance with ASTM D-2938.

(3) The direct tensile strength of intact cylindrical rock specimens shall be determined in accordance with ASTM D-2936.

(4) Direct shear strength tests for intact rock specimens or planes of weakness shall be in accordance with ASTM D-5607.

(5) Compressive strength and elastic moduli of intact rock core specimens under varying states of stress and temperatures shall be determined in accordance with ASTM D-7012.

(6) Slake durability of shales and similar weak rocks shall be in accordance with ASTM D-4644.

(7) Unit weight of rock shall be in accordance with USACE EM 1110-2-1906 Appendix II or specific gravity by ASTM C97, Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone

(8) Rock point load tests shall be in accordance with ASTM D-5731

b. Soil testing shall be done in accordance with the methods or procedures listed for the following tests. If other procedures are used or other tests are deemed necessary, they shall be those generally accepted by the geotechnical engineering profession, have established testing protocols, and be approved by the CO. The report forms should identify the project and sample and show all data pertinent to the test including weights and measurements of the sample, method of testing, and conditions of test such as density and moisture content. Test results should be

shown graphically where possible. A tabulated summary of test results, such as NRCS Form SCS-354, shall be compiled for inclusion in the report.

(1) Grain Size Analysis of Soils Method ASTM D-422

(2) Atterberg Limits Method ASTM D-4318

(3) Specific Gravity Method ASTM D-854 Compaction (moisture-density) Method ASTM D-698

(4) Maximum Index Density of Cohesionless Soils Method ASTM D-4253

(5) Minimum Index Density of Cohesionless Soils Method ASTM D-4254

(6) Permeability Method ASTM D-5084

(7) Dry Unit Weight U.S. Army, Corps of Engineers EM 1110-2-1906 Appendix II

(8) Consolidation and Permeability Method ASTM D-2435

(i) The minimum sample size shall be 2-1/2 inches in diameter by ¾ inch thick.

(ii) Foundation samples tested for design will be saturated at the start of the test.

(iii) Load increments will be added to 32,000 psf or until the straight line or virgin portion of the void ratio-pressure curve is obtained.

(iv) At least one point will be determined on the unload or rebound portion of the void ratio- pressure curve for foundation samples.

(v) Water content, density, and degree of saturation will be determined both before and after testing. (This will require a specific gravity determination.)

(vi) All consolidation-time curves will be included in the report.

(vii) Consolidation results will be plotted as void-ratio vs. log of pressure. Overburden pressure, preconsolidation pressure (if any) and compression index will be shown on the void-ratio vs. pressure plot for foundation samples. Consolidation results will be plotted as void ratio vs. square root of t for low plasticity soils. The coefficient of consolidation will be computed and shown.

(9) Shear

(i) Triaxial Compression – Method ASTM D-2850 for unconsolidated undrained test and Method ASTM D-4767 for consolidated undrained test.

(ii) Direct Shear – Method ASTM D-3080.

(iii) Special Requirements

Shear tests on materials with maximum particle sizes less than ¾" diameter will be triaxial compression tests except for those non-plastic soils that cannot be trimmed or remolded for triaxial testing.

Triaxial, consolidated, undrained tests with pore pressures measured (CU) will be performed on representative samples of materials proposed for use in each zone of the embankment. Tests will usually be performed on saturated samples; however, triaxial, consolidated, drained tests may be performed at the highest probable placement

moisture to represent embankment materials above the fully developed phreatic line.

Triaxial, consolidated, undrained tests with pore pressures measured (CU) will be performed on critical and representative foundation samples, except as noted in (a) above.

Saturation will be considered satisfactory if a B parameter of 0.95 or higher is measured.

Triaxial, unconsolidated, undrained tests (UU) of embankment materials at the highest likely placement moistures and of foundation materials at saturation will be made if sampling and testing reveal the presence of foundation strata which might cause end of construction stability analysis to be critical.

For triaxial tests on undisturbed samples, the initial degree of saturation of samples must be measured prior to testing. The back pressure required to obtain at least 99 percent saturation of the samples will be calculated from the following equation:

$$U_o = 14.7 * \left[\frac{100-(1-H)S_o}{100-(1-H)S_f} - 1 \right]$$

Where:

U_o = required pressure, psi

H = Henry's constant = 0.018 for air dissolved in water at 22 degrees Celsius

S_o = initial degree of saturation S_f =

final degree of saturation

In triaxial, consolidated, undrained (CU) and triaxial, unconsolidated, undrained tests (UU) tests, if 2 7/8" diameter specimens are used, a gradation analysis will be required for each specimen in the test to ensure that the three samples tested represent the same soil type.
This requirement is in addition to the other requirements of the test including measurement of dry density and water contents on the test specimens. This requirement is needed because the length of the test specimens is at least 6 inches and obtaining 3 samples totaling 18 inches in length from a single Shelby tube sample will be unlikely.
When test specimens are obtained from separate Shelby tube samples in offset

test holes, this requirement is necessary to verify similarity of specimens used to constitute the test. If 1.4-inch diameter specimens are used in the shear test and they are obtained from the same horizontal interval of a 5" or larger diameter Shelby tube sample, this requirement in Paragraph 4.b.9.c.(7) above is waived.

Samples will be tested to 15 percent strain and the stress-strain curves will be included in the report. A plot of pore pressure versus strain will also be included. A p-q diagram (stress path) shall also be included.

The maximum principal effective stress ratio (σ 1eff/ σ 3eff) or the maximum deviator stress may be used as failure criterion, or the use of a p-q diagram (stress path) may be used to define the failure envelope.

A minimum of three separate specimens shall be used to define the Mohr diagrams.

Water content, dry density, gradation, and a B parameter (when measured) will be determined and reported for each specimen.

Visual differences between specimens will be noted and visual failure condition of each specimen will be noted.

Plots of Mohr's circles and envelopes for both total and effective stress (when measured) will be included in the report.

(10) Dispersion

(i) Double Hydrometer Dispersion Test Method ASTM D-4221

(ii) Crumb Test Method ASTM D-6572

(11) No Erosion Filter Test Method identified in plan & approved by CO

(12) Organic Content by Loss on Ignition Method ASTM D-2974

c. Other materials, such as aggregate for concrete, concrete, sediment, and water, shall be tested as necessary and shall be done in accordance with the methods or procedures identified in the rock and soil mechanics testing plan. If other procedures are used or other tests are deemed necessary, they shall be those generally accepted by the engineering profession and approved by the CO. The report forms should identify the project and sample and show all data pertinent to the test including weights and measurements of the sample, method of testing, and conditions of test such as density and moisture content. Test results should be shown graphically where possible. A tabulated summary of test results, such as NRCS Form SCS-354, shall be compiled for inclusion in the report.

Aggregate

(1) Organic Impurities ASTM C-40

(2) Soundness of Aggregate ASTM C-88

(3) Abrasion Resistance - Small Aggregate ASTM C-131

(4) Abrasion Resistance - Large Aggregate ASTM C-535

(5) Clay Lumps and Friable Materials ASTM C-142

5. Reports

   a. Upon completion of laboratory testing, the A-E shall produce a Rock and Soil Mechanics Laboratory Testing Report. The report shall include:

      (1) Results of all tests, including raw data and computations.

      (2) The original test data sheets (or suitable copies) for all tests performed shall be included in a separate report that accompanies the test data.

6. Conferences

   Meetings between the A-E and the CO for the subject work shall be in accordance with Section G and shall be held as follows:

   a. Rock and Soil Mechanics Testing

      Timing Prior to the start of rock and soil mechanics testing.

      Location TBD

      Topics Review of Rock and Soil Mechanics Testing Program Plan.

   b. Preliminary Laboratory Testing Report Conference

      Timing After submission of Rock and Soil Mechanics Laboratory Testing Report.

      Location TBD

      Topics Review of preliminary rock and soil mechanics testing report.

   c. Other conferences as needed.

7. Completion and Acceptance of Work

   a. For the review segment of Item 4, Part I, of the work, the A-E shall submit to the CO:

      (1) PDF, MS Word, and supporting files of the Preliminary Rock and Soil Mechanics Laboratory Testing Report.

   b. The CO will furnish review comments on the work to the A-E within fifteen (15) days after receiving the Preliminary Report. The A-E shall make all necessary corrections to the work and will document the responses and actions taken as a result of the CO's review comments. The documented responses shall be submitted with the final submittal of the Report.

   c. Final approval and acceptance of the work will be made by the CO after all corrections are made and all required material has been submitted. The required submittals are:

      (1) 2 bound paper copies, PDF, MS Word, and supporting files of the Final Rock and Soil Mechanics Laboratory Testing Report.

Part II - Interpretations and Analysis of Test Results and Recommendations for Planning, Design, and Construction

1. Scope

The A-E shall evaluate the results of the geotechnical investigation and the rock and soil mechanics laboratory testing program, perform the necessary engineering analysis, and develop a report outlining the conclusions that shall be adequate to provide design, construction, and monitoring recommendations of all elements of the project.

2. General

The A-E shall furnish the CO PDF, MS Word, and supporting files of a Geotechnical Report that summarizes all interpretations and analyses made and recommendations for the planning and/or design, construction and/or rehabilitation, and monitoring of the structure(s). Summary of index and engineering properties based on test results, suggested design parameters, and estimated available quantities of all construction materials represented by the respective samples shall be included in the report. A narrative description of the relative quality of the soil and rock materials in terms of their engineering characteristics as construction or foundation materials shall be included in the report.

The report shall give detailed assessment of the rock and soil mechanics testing results. The report shall narratively and graphically address the testing results and the geotechnical engineer's professional conclusions and opinions pertaining to planning and/or design, construction/rehabilitation, and performance of the works. Maps, profiles, cross sections, isopach, and other graphical displays developed from interpretations based on application of sound geologic and geotechnical-engineering principals shall be included in the report. The report shall include all information required in this specification and any other material considered by the A-E to be relevant to the planning and/or design. Unless otherwise specified, computations and other material adequate to document the work shall be included in the geotechnical report.

The report shall generally conform to the guidance for detailed rock and soil mechanics testing reports contained in NRCS NEM, Part 531 and Part 533 and other NRCS references, as appropriate.

a. The report shall include but not be limited to the following information:

(1) The A-E shall summarize the site parameters and material parameters that affect the planning and/or design of the project. The completed report shall include a summary of material strengths, moduli, consolidation, permeability, moisture-density relationships, and any other applicable engineering properties. The report shall include estimated quantities of each material that might be critical to the completion of the earth fill. The summary shall include, as appropriate, sections on foundation bedrock, foundation soils, proposed embankment fill materials, and auxiliary spillway materials.

(2) The A-E shall provide recommendations for the planning and/or design of the structures based on the interpretation and conclusions made from the rock and soil mechanics testing results in conjunction with the interpretation and conclusions made from the geotechnical field investigation. The recommendations shall include information and/or design parameters to be used in the design or treatment of foundation cutoff, foundation preparation (rock and soil), foundation

grouting, principal spillway, auxiliary spillway (rock and soil), embankment zoning and placement of materials, slope stability, settlement, seepage, deformation and stability, instrumentation, and evaluation of existing features (for rehabilitation). The items listed below shall be addressed based on the interpretation and analysis of the test results and shall be included in this report as appropriate.

(i) Foundation Cutoff

The A-E shall provide recommendations for the design of the foundation cutoff for the structure. Recommendations shall include depths along the embankment alignment, dewatering methods (as appropriate), surface treatment, and any other information pertinent to the design of the foundation cutoff for the construction of a new dam or the rehabilitation of an existing dam.

(ii) Foundation Preparation (Soil)

The A-E shall provide recommendations for any special foundation preparation procedures, including removal, preloading, staged construction, dewatering, etc.

(iii) Foundation Preparation (Rock)

The A-E shall provide recommendations for treatment of rock foundation necessary to protect the structure and, if applicable, to provide a cutoff of seepage.

Recommendations for pressure grouting, dental grouting, grout curtains, slush grouting, gunite protection, cleaning operation, or other special treatments shall be included as appropriate.

(iv) Principal Spillway Considerations

The A-E shall provide recommendations for the design and installation of the principal spillway riser and conduit. Recommendations shall include information relative to the preparation of the foundation, parameters for estimating joint gap, parameters for calculating loading, drainage measures necessary to protect against piping along the conduit, and type and placement methods for backfill.

(v) Auxiliary Spillway Evaluation (Soil Materials)

The A-E shall provide an analysis of test results on auxiliary spillway samples and provide recommendations on parameters for planning and/or design of the auxiliary spillway to resist breaching, design of auxiliary spillway side slopes, and drainage measures or other special structural measures to ensure the proper functioning of the spillway.

Parameters required for NRCS SITES computer stability and integrity analysis of the auxiliary spillway breaching shall be developed and provided using procedures of NRCS NEH 628, Chapters 50, 51, and
52. The parameters shall be based on field observation and evaluations and

laboratory tests on samples from representative strata in the auxiliary spillway.

Supplemental tests necessary to assess the erosion resistance of auxiliary spillway soils shall be performed. Analysis of test results effect on auxiliary spillway design shall be noted.

A narrative and/or tabular summary of data with appropriate visual aids, that adequately convey recommendations for design, shall be included in the report.

(vi) Auxiliary Spillway Evaluation (Rock)

The A-E shall provide recommendations for the design of the ASW relating to rock conditions. Analysis of rock material properties shall be based on geological information, rock cores, and appropriate engineering tests. Procedures of NEH Part 631, Chapter 4 shall be used to classify the rocks and to provide qualitative guidance to design.

Parameters required for NRCS SITES computer stability and integrity analysis of the auxiliary spillway breaching shall be developed and provided using procedures of NRCS NEH 628, Chapters 50, 51, and
52. The parameters shall be based on field observations and evaluations and laboratory tests on samples from representative strata in the auxiliary spillway.

A summary of the analysis and recommendations for design shall be included in the report.

Appropriate geologic maps and drawings to document conclusions concerning the rock features that affect design shall be included.

A narrative and/or tabular summary of data with appropriate visual aids, that adequately convey recommendations for design, shall be included in the report.

(vii) Embankment Zoning and Placement of Materials

The A-E shall provide recommendations for an embankment zoning plan and for placement of materials. The recommendations shall be based on the types of soil/rock materials available, relative quantities of each, their sequence of availability during construction, and engineering properties.

For the rehabilitation of existing dams, the report shall address the existing condition of the embankment and the apparent zoning of materials in the embankment.

(viii) Slope Stability Analysis

The A-E shall provide recommendations for conducting the slope stability analysis, including strength parameters, and for design features necessary to satisfy stability requirements.

(ix) Settlement Analysis

The A-E shall provide recommendations to estimate settlement in the embankment and foundation of the proposed structure as necessary to provide design parameters such as overbuild, jointing methods for roller compacted concrete or reinforced concrete (if a RCC or reinforced concrete is part of the rehabilitation), joint gap parameters for conduits, and, as necessary, to predict the occurrence of problems such as excessive differential settlement. Recommendations for design measures to mitigate any predicted problems shall be included.

(x) Seepage Analysis

The A-E shall provide recommendations including material characteristics for the analysis of the potential for seepage through the dam, foundation, and abutments of the structure. Recommendations shall be made for any required design features.

Recommendations may include dam and/or foundation drain types.

(xi) Deformation and Stability Analysis

The A-E shall provide recommendations for and the calculation of deformation moduli to be used in the dam analysis, the relative deformation between different material types in the foundation, in directions both transverse and parallel to the dam axis, and the stress conditions that may result from different foundation conditions.

The A-E shall include recommendations for design measures to mitigate any potential problems from foundation deformation or relative deformation.

The A-E shall determine the compressive strength to be used in dam analysis of foundation units and provide design recommendations to address any problems identified from low or differential compressive strengths.

The A-E shall determine design values for shear and cohesion for intact foundation rock, rock discontinuities, and dam/foundation contact. The foundation shear resistance shall be appropriate for the range of applied normal loads expected.

(xii) Instrumentation

The A-E shall evaluate the need and provide recommendations for instrumentation to monitor performance of the structure prior to design and construction. A narrative shall be included which details the behavior being monitored and the rationale for monitoring the behavior.

Specific design recommendations shall include instrument types, numbers, and locations. Recommendations shall include a plan for monitoring the instruments, and processing and recording the data. Operation and maintenance of the instrumentation shall be included in the report.

Consideration of instrumentation shall include, but not be limited to instruments needed to, detect movements of structural elements (existing

or proposed), measure effectiveness of seepage control measures (existing or proposed), and measure seismic events.

If instrumentation is not recommended, a summary statement indicating the rationale for arriving at this decision shall be included.

A narrative summary of the recommendations, together with any necessary illustrations, shall be included in the report. A separate section shall be included that contain recommendations for monitoring the instruments.

(xiii) Sediment in Existing Pool

The A-E shall evaluate the existing sediment deposited behind the existing embankment and shall evaluate the present condition capacity of sediment storage available. The evaluation may use information from the Plan supplemented by field observation of current conditions.

If additional storage will be required for rehabilitation, then the A-E shall make recommendations for testing procedures of the sediment and make recommendations for the disposal of the existing sediment or part of the existing sediment. If drawdown of the reservoir will be required during rehabilitation construction an assessment of sediment transport and measures for erosion control will be incorporated into the design.

3. Conferences

Meetings between the A-E and the CO for the subject work shall be in accordance with Section G and shall be held as follows:

a. No conferences are required.

b. Other conferences as needed.

4. Completion and Acceptance of Work

a. For the review segment of Item 5, Part II of the work, the A-E shall submit to the CO:

(1) PDF, MS Word, and supporting files of the Geotechnical Report.

b. The CO will furnish review comments on the work to the A-E within fifteen (15) days after receiving the Report. The A-E shall make all necessary corrections to the work and will document the responses and actions taken as

a result of the CO's review comments. The documented responses shall be submitted with the final submittal of the Report.

c. Final approval and acceptance of the work will be made by the CO after all corrections are made and all required material has been submitted. The required submittals are:

(1) 2 bound paper copies, PDF, MS Word, and supporting files of the Final Geotechnical Report.

Q. Item 5 – Existing Structural Conditions, Investigation, Testing, Evaluation, Interpretation and Conclusions, and Reporting

1. Scope

   The A-E shall perform investigations as necessary to determine the condition of existing structures. This will include field testing and sampling of materials for laboratory testing and engineering analysis, and reports as necessary, to provide data adequate to serve as a basis for the evaluation of existing structures for the purpose of the rehabilitation of existing dams. All investigations, testing, interpretation, evaluation, and reporting of rock and soil shall not be included as part of this item of work. This work shall be part of Item 4 - Geotechnical Field Investigation, Interpretation and Conclusions, and Reporting and Item 5 – Rock and Soil Mechanics Testing, Evaluation, Interpretation and Conclusions, and Reporting.

2. Coordination

   a. Prior to the start of detailed structural measures investigation, the A-E shall submit to the CO PDF, MS Word, and supporting files of a memorandum report that outlines the A-E's plan of operations and schedule for accomplishing the work. The plan will be reviewed and approved by the CO prior to the start of fieldwork. The structural measures investigation and testing plan shall be based on information included in reports, surveys, and as-built information and the physical reconnaissance of the site. The plan shall include the number, kind, location, procedures of investigations and testing, the purpose of the investigation and testing and its applicability to the design; and the plan shall show clearly how the work will effectively accomplish the requirements of this contract. The plan shall include a layout drawing of the structure showing the location of each of its components and the extent of the proposed investigation and testing. The plan shall also include the erosion and sediment control measures, as necessary, which will be installed and maintained during the investigation.

      (i) The CO will furnish review comments to the A-E within fifteen (15) days after receiving the preliminary plan. The A-E shall make all necessary corrections to the work and will document the responses and actions taken as a result of the CO’s review comments. The documented responses shall be submitted with the final submittal.

      (ii) Final approval and acceptance of the plan will be made by the CO after all corrections are made.

   b. During the progress of the investigation and testing, the A-E shall promptly notify the CO of any unexpected conditions encountered that would direct a material change in the A-E proposed plan or scope of investigation. In this event, the A-E shall furnish the CO with PDF, MS Word, and supporting files of a revised plan and scope of investigation for review and concurrence. The revised plan will be reviewed and agreed to prior to the incorporation of the change.

   c. Prior to the initiation of laboratory testing, the A-E shall submit for review and agreement by the CO, any revisions to the testing program detailing the number and kinds of tests to be performed, the sources of materials to be tested, test procedures to be used, and a schedule for completion. The revised plan shall include narrative statements indicating the purpose of performing the proposed tests or the use to be

made of the test results. The CO shall have 15 days to review and comment on the revised testing program.

3. General Requirements

   a. All investigations, testing, interpretation, evaluation, and reporting of rock and soil shall not be part of this item of work. This work shall be part of Item 4 - Geotechnical Field Investigation, Interpretation and Conclusions, and Reporting and Item 5 – Rock and Soil Mechanics Testing, Evaluation, Interpretation and Conclusions, and Reporting.

   b. The investigation shall address any structural concerns the site presents. Investigations shall be accomplished as prescribed in appropriate ASTM or ACI standards or as approved by the CO. Investigations shall include reinforced concrete structures (i.e., intake risers and outlet works), drains, gates, valves, and other structures.

   c. A log of each investigation location shall be recorded as per industry standards.

   d. Upon completion of any destructive testing, the A-E shall ensure that the void is repaired by appropriate means, as outlined in the investigation and testing plan and approved by the CO.

   e. Existing improvements, such as farm roads, driveways, fencing, etc. that are disturbed during the investigations shall be restored to their original condition or better as directed by the CO.

      (1) Existing structures shall not be modified in anyway unless approved by the CO in advance of the investigation.

      (2) The A-E shall not lower the permanent pool without prior approval from the CO.

   f. All samples removed from existing structures shall be tested as soon as possible after the laboratory receives them in order to reduce storage time and possible disturbance from unnecessary handling.

   g. All samples shall be inspected prior to testing and the general condition of the sample noted. Any unusual conditions shall be reported. Any sample disturbance shall be described and shall be measured and reported.

   h. Any other information that the testing organization feels will be pertinent to the engineering application of the test results should be reported.

   i. All necessary tests shall be made on a sufficient number of samples to provide adequate data for design and subsequent rehabilitation of the existing structures.

4. Specific Requirements for Investigations and Testing

   a. The required investigations may include, but are not limited to, destructive and nondestructive sampling. All investigations shall be described and detailed in the investigation plan.

   b. Testing shall be done in accordance with the methods or procedures listed in the

investigation and testing plan. If other procedures are used or other tests are deemed necessary, they shall be those generally accepted by the engineering profession and approved by the CO. The report forms should identify the project and sample and show all data pertinent to the test including weights and measurements of the sample, method of testing, and conditions of test specimens. Test results should be shown graphically where possible. A tabulated summary of test results shall be compiled for inclusion in the report. The report shall include photographs of the test specimens and other significant features as appropriate.

5. Specific Requirements for Interpretations and Analysis of Test Results and Recommendations for Rehabilitation

   a. The A-E shall evaluate the results of the investigations and the laboratory testing program, perform the necessary engineering analysis, and develop a report that shall be adequate to provide rehabilitation recommendations of all structural elements of the rehabilitation project.

   b. The A-E shall prepare a report giving a detailed assessment of the structural measures investigation and testing. The report shall narratively and graphically address the investigation findings, interpretations, and the engineer's professional conclusions and opinions pertaining to the rehabilitation of works. All findings, including logs, field test data, photographs, and sample lists, shall be included in the report. Insofar as possible, interpretations shall be displayed graphically as well as explained narratively. Maps, profiles, cross sections, and other graphical displays developed from interpretations based on application of sound engineering principals shall be included.

   c. Reports and drawings shall be prepared in accordance with Section I and NRCS National Engineering Manual Part 511.11(b). The A-E shall furnish the CO PDF, MS Word, and supporting files of the preliminary report.

6. Conferences

   Meetings between the A-E and the CO for the subject work shall be in accordance with Section G and shall be held as follows:

   a. Pre- Investigation Conference

      Timing Prior to investigation of structural measures.

      Location TBD

      Topics Review of investigation and testing plan.

   b. Preliminary Existing Structural Condition Evaluation Report Conference

      Timing After submission of preliminary Existing Structural Condition Evaluation Report.

      Location TBD

      Topics Review of preliminary Existing Structural Condition Evaluation Report.

   c. Other conferences as needed.

7. Completion and Acceptance of Work

   For the review segment of Item 6 of the work, the A-E shall submit to the CO:

   a. Existing Structural Condition Evaluation Report

      (1) PDF, MS Word, and supporting files of the preliminary Existing Structural Condition Evaluation Report.

      (2) The CO will furnish review comments on the work to the A-E within thirty (30) days after receiving the preliminary Existing Structural Condition Evaluation Report. The A-E shall make all necessary corrections to the work and will document the responses and actions taken as a result of the CO's review comments. The documented responses shall be submitted with the final submittal of the Report.

      (3) Final approval and acceptance of the work will be made by the CO after all corrections are made and all required material has been submitted. The required submittals are 2 bound paper copies, PDF, MS Word, and supporting files of the Final Report.

R. Item 6 Hydrology

1. Scope

2. The A-E shall determine the hydrologic characteristics of the watershed in accordance with the procedures in NRCS NEH Part 630, Virginia NRCS Hydrologic and Hydraulic Analysis Guidance (1/7/20) and other applicable references.

3. Requirements

   a. The A-E shall determine the parameters required for performing the hydraulic proportioning and design of the dam, or the rehabilitation of a dam, and its associated works.

      (1) Published data (such as Soil Survey Reports) and remote sensing data (such as aerial photography) will be supplemented by field observations and measurements as necessary to obtain an accurate assessment of the hydrologic characteristics.

      (2) The drainage area will be delineated and measured. The drainage area will be divided into sub-areas as appropriate for the computation of design hydrographs. A map will be prepared based on U.S.G.S topographic mapping that shows the dam site and the drainage area boundaries.

      (3) Rainfall-runoff relationships (Runoff Curve Number) shall be determined for each sub-area based on the soils, vegetation, and land use.

      (4) Time of concentration and travel time shall be computed for each sub-area based on the velocity of flow over land surfaces and in stream channels.

   b. The A-E shall determine the reservoir storage characteristics (stage-storage curve) for the dam site.

c. Precipitation data shall be assembled and documented for all hydrologic design criteria pertinent to the site. Both functional and safety criteria will be included. The volumes, rates, durations, and time distributions will be determined.

d. The A-E shall perform preliminary flood routings to assist in determining the required extent of field surveys, aerial photography, and geologic investigations.

4. Reports

Reports shall be prepared in accordance with Section I and NRCS National Engineering Manual Part 511.11(b).

5. Conferences

Meetings between the A-E and the CO for the subject work shall be in accordance with Section G and shall be held as follows:

a. Preliminary Hydrology Report Conference

Timing After submission of the preliminary hydrology report.

Location TBD

Topics Preliminary hydrology computations and Report.

b. Other conferences as needed.

6. Completion and Acceptance of Work

a. For the review segment of Item 7 of the work, the A-E shall submit to the CO PDF, MS Word, and supporting files of the preliminary hydrology computations and Hydrology Report.

b. The CO will furnish review comments on the work to the A-E within fifteen (15) days after receiving the preliminary Hydrology Report. The A-E shall make all necessary corrections to the work and will document the responses

and actions taken as a result of the CO's review comments. The documented responses shall be submitted with the final submittal of the Report.

c. Final approval and acceptance of the work will be made by the CO after all corrections are made and all required material has been submitted. The required submittals are 2 bound paper copies, PDF, MS Word, and supporting files of the Final Report.

S. Item 7 - Hydraulic Design and Proportioning

1. Scope

The A-E shall develop the final hydraulic design of the dam and associated works based upon the requirements of this contract, Section J. Basis for Design, and the data obtained from previous items. The A-E shall also prepare the final breach inundation map for the dam.

2. Design

a. Design criteria will be selected, established, and recorded. The A-E and CO shall

establish design criteria not prescribed in the contract during design conferences.

b. The hydraulic design will finalize the storage capacities at the site location and the stage discharge requirements of all associated works. The critical elevations, dimensions, and capacities of all water control structures and equipment will be determined.

c. Drawings will be prepared to the extent necessary to depict the location and dimensions of the dam or the modification of the dam and associated works, and the elevations, grades, profiles, cross sections, and dimensions of all water control structures and equipment.

d. A plan for diversion and care of the stream during construction will be prepared.

3. Breach Inundation

a. The breach inundation map will be prepared in accordance with Virginia Dam Safety criteria, NRCS National Operation and Maintenance Manual criteria and NRCS National Engineering Manual, Paragraph 520.27. The A-E will determine the downstream limit of analysis and mapping required to meet the applicable criteria.

b. Procedures for developing and routing hydrographs will be established by the A-E and CO during design conferences and shall meet the minimum criteria outlined in Virginia Dam Safety regulations, TR-60 and the NEM.

c. Downstream of the dam, hydraulic cross sections will be based on mapping previously prepared under this contract or as agreed by the CO. Data will be supplemented as needed with field surveys to describe bridges, roadways, channel dimensions, and other features where more detailed data is required. Land use, energy loss coefficients, and other salient characteristics will be determined by field reconnaissance.

4. Reports

Reports shall be prepared in accordance with Section I and NRCS National Engineering Manual Part 511.11(b).

5. Conferences

Meetings between the A-E and the CO for the subject work shall be in accordance with Section G and shall be held as follows:

a. Pre-Hydraulic Design Conference

Timing At the start of hydraulic design.

Location TBD

Topics Finalize design criteria, determine inundation mapping procedures.

b. Preliminary Hydraulic Design and Inundation Map Conference

Timing After submission of the preliminary hydraulic design and preliminary inundation map.

Location TBD

Topics Review of the preliminary hydraulic design, review of the preliminary inundation map.

c. Other conferences as needed.

6. Completion and Acceptance of Work

a. For the review segment of Item 8 of the work, the A-E shall submit to the CO:

(1) PDF, MS Word, and supporting files of the preliminary Hydraulic Design Report.

(2) PDF, MS Word, DWG, and supporting files of the preliminary hydraulic design and proportioning drawings.

(3) PDF, MS Word, and supporting files of the preliminary breach inundation computations and routings.

(4) PDF, DWG, and supporting files of the preliminary breach inundation map.

b. The CO will furnish review comments on the work to the A-E within thirty (30) days after receiving the preliminary Hydraulic Design Report. The A-E shall make all necessary corrections to the work and will document the responses and actions taken as a result of the CO's review comments. The documented responses shall be submitted with the final submittals for this Item.

c. Final approval and acceptance of the work will be made by the CO after all corrections are made and all required material has been submitted. The required submittals are:

(1) 2 bound paper copies, PDF, MS Word, and supporting files of the final Hydraulic Design Report.

(2) 2 bound paper copies, PDF, MS Word, DWG, and supporting files of the revised preliminary hydraulic design and proportioning drawings.

(3) 2 bound paper copies, PDF, MS Word, DWG and supporting files of the final breach inundation computations and routings.

(4) 2 bound paper copies, PDF, MS Word, DWG, GIS and supporting files of the final breach inundation map.

T. Item 8 – Preliminary Foundation, Geotechnical, Structural, and Site Design

1. Scope

The A-E shall develop the preliminary design for the site based upon the requirements of this contract, Section J., Basis for Design, and the data obtained from previous items. The preliminary design shall incorporate the data resulting from previous contract items. A preliminary Design Folder shall be produced.

The preliminary design must develop the general features of the structural works, including the selection of the most suitable structure features, the optimum layout and arrangement of the elements of the structural system and the types and locations of the

appurtenant works. The general features must be developed by the means of comparative design studies and cost estimates prepared with full consideration of foundation and topographical site conditions, economy and feasibility of construction, and operation and maintenance.

The level of detail required for this phase of design will vary with the individual design task being considered. Design tasks that include basic analysis necessary to size and configure project features or which are required to evaluate alternative designs shall be developed more fully than design tasks which are independent.

2. Design

   a. Preliminary designs shall provide the CO sufficient detail to determine if and how the functional and technical requirements of the design will be met. Alternatives considered for different aspects of the project shall be described, along with the A-E's recommended approach. The CO may select one of the options presented or require consideration of alternate approaches. The designer's approach to the solution of technical details and compliance with criteria or design guidelines shall be provided. Any design criteria not yet determined for specific elements of the project will be established and recorded in the preliminary design phase. The A-E and CO shall establish criteria not prescribed in the contract in design conferences. If the A-E proposes an approach which is not in compliance with criteria prescribed in the contract, a justification will be included for the CO's consideration.

   b. The following miscellaneous items (not all inclusive) shall be incorporated into the design (as applicable):

      (1) Condition of existing dams and appurtenances.

      (2) A water control gate or gates to drain the pool and by-pass water during construction.

      (3) A discharge system for low-flow augmentation and cold water release.

      (4) Facilities to draw water from the reservoir for delivery to a treatment plant.

      (5) A ladder to permit access to the top of the principal spillway inlet.

      (6) Fencing as needed to protect the structure and provide for public safety.

      (7) Erosion and sediment control plan.

      (8) Instrumentation plan.

   c. The preliminary foundation and embankment design shall be prepared. This design shall develop preliminary plans for zoning the embankment fill, and the general plans for the foundation treatment, drainage systems, and seepage control.

   d. Embankment Zoning and Placement of Materials

      (1) The A-E shall prepare preliminary embankment zoning plans and the placement of materials – including specified placement densities, and placement moisture contents, placement methods, drainage or transition zones, and inspection construction control guidelines.

(2) The A-E shall devise a zoning plan to guide placement of these different types of materials in appropriate zones of the embankment based on the types of soil/rock materials available, relative quantities of each, their sequence of availability during construction, and engineering properties.

(3) The zoning plan shall:

(i) Reflect the quantities of available types of material in the proportioning of zones.

(ii) Consider the sequence in which materials will become available during construction.

(iii) Include placement densities and moisture content and/or placement methods for each type of material used.

(iv) Include types of field inspection tests for each material type.

(v) Consider the need for any transition filters and/or drains between zones and include design if applicable.

(vi) Conform to the requirements in TR 60.

(4) A schematic illustration of the zoning plan and a tabular summary of placement requirements shall be developed.

(5) A narrative summary of rationale used in developing the zoning plan and other significant recommendations shall be included in the design.

e. Slope Stability analyses shall be performed within the general guidelines shown in TR 60, with the following additional provisions:

(1) The stability condition at the end-of-construction need not be analyzed if, in the opinion of the A-E, and mutually agreed to by the CO, it would be less critical than the seepage or sudden drawdown condition. It will be analyzed, however, for embankments on foundations with soft clay deposits or embankments over 40 feet in height constructed primarily of fine-grained soils.

(2) Partial pool conditions shall be analyzed for municipal reservoirs where fluctuations of the normal pool level may be expected. Procedures in TR60 shall be utilized to evaluate the effects of rapid drawdown due to the anticipated range of operating levels.

(3) Analyses may be made using a computer program that has the capability of searching for the most critical failure surface. The CO shall approve the computer program to be used and the method of analyses it employs.

(4) For the sudden drawdown analyses, an acceptable alternative to the use of a composite strength envelope for embankment soils may be used if approved by the CO.

(5) Minimum acceptable safety factors for the design selected shall be as outlined in TR 60.

(6) Assumptions used regarding the selection of shear parameters and the

appropriate type of analyses shall be clearly stated. Assumptions used in developing an assumed phreatic surface and any uplift shall be clearly stated and shown.

(7) A graphical and tabular summary of the results of the slope stability analysis shall be included in the report. Only the most critical failure surfaces for each condition analyzed need be shown in the summary. However, the details of the analyses shall be discussed in the report. A narrative summary of the rationale used in selecting methods of analyses, any assumptions pertinent to the analyses, and selection of design recommendations to improve stability shall be included in the report.

(8) Complete computer printouts of input and output files of stability analysis calculations need not be included in the report. However, upon request, this information must be made available to the CO. The computer input and output files shall be submitted with the submittals.

f. The settlement analyses shall be based on geological site conditions, engineering properties determined by laboratory tests, or by documented reference to data that can be correlated. Calculations shall be made for any potential differential settlement problems in a direction both transverse and parallel to the embankment centerline.

(1) Settlement analysis shall be conducted on the following items and on other items as applicable to the design:

(i) Maximum settlement in the foundation/cutoff trench and embankment.

(ii) Estimated percentage of total settlement occurring during construction. Settlement beneath the principal spillway conduit.

(iii) Alternatives for correcting problem situations, including shaping of natural slopes, excavation and removal of highly compressible deposits, pre-wetting or removal of collapsible soils, or other special procedures such as pre-loading and staged construction for soft clays.

(2) A narrative summary of conditions analyzed and assumptions, together with results of the analyses, shall be included in the report. Any correlations used will be clearly stated.

g. Foundation Preparation (Soil and Rock)

(1) Preliminary treatments of foundations preparatory to construction shall be detailed.

(2) Preliminary designs for removal of undesirable material shall include:

(i) Rationale for selection of the alternative, including cost considerations.

(ii) The lateral and vertical extent of recommended removal.

(iii) Suggested field procedures for identifying materials to be removed.

(iv) Alternative methods of treatment considered.

(3) Preliminary designs for methods other than removal for treating undesirable foundation materials shall include:

(i) Rationale for selection of the alternative, including cost considerations.

(ii) Details of recommended procedures adequate for design.

(4) Removal of unsuitable material and/or other types of foundation treatment shall be identified on a plotted cross section of the alignment that includes plotted logs of test holes.

(5) Treatment methods other than removal shall be accompanied by sufficient graphical or visual materials to provide an adequate basis for selection.

(6) The preliminary design of the foundation cutoff shall include:

(i) Location with respect to centerline.

(ii) Depths along the embankment alignment

(iii) Side slopes and bottom width.

(iv) Backfill material and method of placement.

(v) Methods of dewatering, if appropriate.

(vi) Surface treatment of bottom and side slopes.

h. Deformation and stability analysis.

(1) The A-E shall include design measures to mitigate any potential problems from foundation deformation or relative deformation.

(2) The A-E shall develop alternatives for correcting foundation problems; including shaping of natural slopes or excavations, excavation and removal of unsuitable rock, or other special procedures such as compaction grouting shall be fully supported.

(3) A narrative summary of conditions analyzed together with results of the analyses shall be included in the report. Any correlations used will be clearly stated.

i. The A-E shall analyze the potential for seepage (and the existence of seepage of an existing dam) through the dam, foundation, and abutments of the structure.

(1) Analyses shall be numerical methods suitable to the complexity and hazard of the site conditions. Assumptions or models used shall be clearly stated. Alternatively, with the concurrence of the CO, appropriate graphical procedures listed in archived SMN 5 and SMN 7 may be used.

(2) The design shall include, but will not necessarily be limited to:

(i) Dam and/or foundation drain types.

(ii) Dimensions and recommended gradation of materials for each drainage zone.

(iii) Lateral and vertical extent of drainage installation with respect to

embankment.

(iv) Any special measures required for treating uplift or high seepage quantities such as relief wells, blanketing of reservoir areas, seepage berms, etc.

(3) Filters shall be designed in accordance with procedures in NEH Part 633, Chapter 26.

(4) Seepage quantities shall be estimated, as necessary, to ensure that drainage zones and collector pipes are adequately sized and, where appropriate, for use in a water budget analysis of the reservoir. Numerical models, or alternatively, with the concurrence of the CO, procedures of SMN 3, archived SMN 5, and SMN 7, or other documented procedures accepted by the engineering profession, may be used.

(5) A narrative summary of the methods employed in the analysis of seepage and of recommended design measures, accompanied by suitable illustrations, if appropriate, shall be included in the report. Illustrations of flow nets or other models used in the analysis shall be included.

j. The preliminary layout and excavation plan for the auxiliary spillway shall be developed. The design shall adequately address measures needed to ensure the integrity and stability of the spillway system using the SITES model.

(1) Auxiliary Spillway Evaluation (Soil Materials)

Preliminary cut slope configurations in excavated auxiliary spillways shall be based on appropriate engineering property tests and/or correlations, together with a stability analysis of the slope using accepted procedures.

Recommendations for other special spillway features such as drainage, stability, berms, etc., to mitigate unusual problems shall be clearly documented and justified.

A summary of the stability analyses performed, together with assumed material properties and computational methods employed, shall be furnished. Assumptions as to water table, soil profiles, etc. shall be clearly stated.

Appropriate drawings shall be furnished for special design features recommended, together with sufficient narrative to adequately describe the features and furnish the basis for design.

Complete computations and computer printouts for the stability analysis are not required. However, upon request, this information must be made available to the CO. Computer input and output files shall be included with the submittals.

(2) Auxiliary Spillway Evaluation (Rock)

Slope stability analyses will be based on material property tests or assumptions, as mutually agreed to by the A-E and CO. Computational methods and other assumptions employed regarding rock profiles, cross sectional configurations, water tables, etc., shall be clearly stated.

Stability analyses shall be summarized using appropriate visual and narrative aids

to describe the analyses. Assumptions as to material properties, profiles, the water table, and computational methods employed shall be clearly stated and shown graphically where appropriate.

A narrative and/or tabular summary of data with appropriate visual aids, that adequately convey recommendations for design, shall be included in the report.

(3) The layout plan for the principal and auxiliary spillway systems shall be developed. Spillway evaluation shall include an analysis of the availability of applicable design guidelines, and evaluation of the need for a physical hydraulic model study. Performance of a physical hydraulic model study is external to this contract.

(4) Preliminary structural designs shall be developed to the extent that external (global) stability of all structural elements is demonstrated and the sizes and dimensions of major structural elements are determined. The load conditions, including but not limited to hydraulic and seismic loading, used in the analysis shall be documented. The safety factors used shall be documented.

(5) Utilities affected by the construction work areas including borrow areas shall be identified. Utilities, mine openings, and any other feature in the reservoir area that may affect the operation of the dam will be identified.

(6) Preliminary construction considerations involved in implementation of the design shall be included. Unique, or critical issues, or issues which have a significant impact on the cost or duration of construction shall be identified. Approaches to address these issues shall be recommended.

(7) The A-E shall develop a preliminary Bid Schedule with an initial cost estimate and a listing of the anticipated construction and material specifications that will be utilized.

(8) The A-E shall develop a preliminary Quality Assurance Plan detailing construction inspection procedures.

(9) Preliminary dam designs shall be prepared. Design of dam shall meet the requirements set forth in the applicable references included in Item C, and Virginia Dam Safety regulations. If there are conflicts in the requirements, the most stringent shall apply. The preliminary layout, plan and sections of the structure shall be provided, and shall include the relationship of appurtenances with the main structure.

(10) A preliminary RCC mix design shall be completed as necessary. The preliminary RCC mix design shall be developed to an extent adequate to develop the preliminary cost estimate including requirements for cementitious materials, aggregate, and joint treatment.

(11) Plans and sections presented in preliminary design documents shall include reference information from the field and laboratory reports.

(12) The adequacy of sediment storage for the rehabilitation of an existing dam shall be analyzed. If adequate storage is not currently available, then the

alternatives for increasing future sediment storage shall be developed. If the sediment is to be disturbed, then adequate testing of the sediment materials shall be conducted to determine the potential outlets for the sediment. If disturbance of sediment is anticipated from necessary reservoir drawdown, provisions for erosion control of the sediment need included in the design.

(13) The A-E shall prepare a Land Rights Map. The map shall be prepared electronically with the latest Digital Orthophoto Quarter Quadrangle (DOQQ) as the background. Sheets shall be at a sufficient scale to clearly delineate the required features. Multiple sheets may be required. The land rights map(s) shall show the following features:

(i) Existing physical features in the project area.

(ii) Proposed project feature locations and project boundary.

(iii) Major project features.

(iv) Easement limits.

(v) Property lines and owners with addresses, if available.

(vi) Utilities and owners with contact name and phone number and addresses, if available.

(vii) Road numbers and names.

(viii) Access routes for construction and maintenance.

(ix) Table of easement requirements by property owner(s).

(x) Map scale and North arrow.

(xi) Legends and title block.

(xii) Match line between corresponding sheets, if applicable.

(xiii) Unless otherwise specifically identified in the Scope of Work for the individual Task Order, the A-E shall furnish the electronic drawing file in *.dwg (Autodesk Civil 3D) format and a minimum of four (4) sets of check prints to the CO for review.

3. Reports

Reports shall be prepared in accordance with Section I and NRCS National Engineering Manual Part 511.11(b).

a. The report shall include:

(1) Computations and notes developed during the preparation of the design and a summary of data used as a basis for design.

(2) Structural site topographic map showing in detail the layout of the dam, principal spillway, auxiliary spillway, drainage system, outlet works, and other appropriate appurtenances.

(3) Cross sectional views of the dam along the centerline of the principal

spillway showing lines, grades, and elevations of a) dam, b) principal spillway, including inlet, conduit, and terminal works, c) foundation excavation, d) seepage control, and e) exit channel.

(4) Cross sectional views of the dam along the centerline of the auxiliary spillway showing lines, grades, and elevations of a) dam b) lateral containment c) outlet works d) exit channel.

(5) Cross sectional and profile views of the dam showing: a) elevations and dimensions, b) materials, c) seepage control measures, and d) foundation excavation and treatment.

(6) Additional drawings of the auxiliary spillway, water intake structure, seepage control systems, outlet structures, and any other drawings needed to illustrate to the CO the work to be performed.

4. Conferences

Meetings between the A-E and the CO for the subject work shall be in accordance with Section G and shall be held as follows: Pre-Preliminary Design Conference

Timing Prior to start of Preliminary Design.

Location TBD

Topics Establish/review of design Criteria.

a. Preliminary Design Conference

Timing After submission of the preliminary design.

Location TBD

Topics Review of the preliminary design.

b. Other conferences as needed.

5. Completion and Acceptance of Work

a. For the review segment of Item 9 of the work, the A-E shall submit to the CO PDF, MS Word, and supporting files of the preliminary Design Folder, including the preliminary Design Report and preliminary construction drawings.

b. The CO will furnish review comments on the work to the A-E within thirty (30) days after receiving the preliminary submittals. The A-E shall make all necessary corrections to the work and will document the responses and actions taken as a result of the CO's review comments. The documented responses shall be submitted with the final submittals for this Item.

c. Final approval and acceptance of the work will be made by the CO when review comments are furnished to the A-E.

U. Item 9 – Detailed Design, Specifications, Cost and Time Estimates, and Design Report

1. Scope

After the preliminary design has been reviewed and approved by the CO, the A-E shall proceed with the design of the structure. Comments and recommendations received from the CO pertaining to the Preliminary Design shall be incorporated into this phase of the project. This phase shall consist of the detailed design of the structure and all structural measures, including the principal spillway and water intake structure, outlet works, auxiliary spillway, foundation, dam and the necessary drainage systems, as applicable. The design shall be at 90% completion at the completion of this phase.

2. Design

   a. Design criteria for all elements of the project will be as established and recorded in the preliminary design. Final structural designs, dimensions, and quantities will be determined under this item of work.

   b. Plans and specifications for temporary and permanent erosion control measures shall meet state and local erosion control regulations. Erosion shall be controlled during the construction period and an adequate stand of

      permanent vegetation shall be established on all disturbed areas including emptied reservoirs.

   c. The design shall comply with federal, state and local laws and regulations.

   d. Detailed construction drawings and specifications shall be prepared. The construction drawings shall include all details required to facilitate the construction of the works. Drafting standards shall be in accordance with NEM 541 and NEH, Part 641. Construction and material specification will be prepared to supplement the drawings and state the quality of the work.

   e. Final design requirements for the RCC mix, as applicable, shall be determined and specified. The design shall determine and specify all required placement and long term properties of the RCC mix. Requirements for the construction contractor's laboratory and field RCC mix development and validation testing shall be specified.

   f. All elements of the preliminary design shall be updated and pertinent items not previously developed will be prepared. Such items include but are not limited to:

      (1) Construction Quality Assurance Plan.

      (2) Construction Inspection Staffing Plan.

      (3) Operation and maintenance plan developed according to the National Operation and Maintenance Manual.

   g. The preliminary design bid schedule with engineers cost estimate shall be updated. Estimated quantities shall be calculated for each item on the bid schedule. Each item shall include an item number, specification number, quantity, unit cost, and total cost.

   h. An estimated performance time schedule for construction shall be prepared. This schedule will show the major items of work, the estimated performance time required for each item, items that may be performed concurrently with other items, the amount and type of equipment considered in estimating the performance time, and the total

estimated performance time in calendar days required for completion of all work. In computing the work time, the workdays and hours shall be considered as five (5) days a week and eight (8) hours per day, unless otherwise agreed to by A-E and CO. An adequate allowance shall be made for mobilization time. An appropriate allowance will be made for delays due to adverse weather conditions.

The time schedule for construction shall include weekends, holidays, and appropriate winter shutdown periods.

i. Construction considerations shall be prepared.

j. The Design Report shall show all computations, alternate designs considered, design notes, and all other pertinent information, in accordance with NRCS NEM 511.10 and 511.11.

3. Checkout

Prior to submitting the detailed design specifications and Design Report to the CO, the A-E shall have a detailed review and check conducted by a person other than the original designer to determine that: (a) the design documentation, drawings, specifications, and estimates are complete and compatible; (b) all elevations, dimensions, and quantities are correct; and (c) designs, design documentation, drawings, specifications, and estimates meet all requirements of the specifications.

4. Reports

Reports shall be prepared in accordance with Section I and NRCS National Engineering Manual Part 511.11(b).

5. Conferences

Meetings between the A-E and the CO for the subject work shall be in accordance with Section G and shall be held as follows:

a. 50% Complete Conference

Timing When work is 50% complete.

Location TBD

Topics Progress review.

b. Detailed Design Conference

Timing After submission of the Detailed Design, Cost and Time Estimates, and Design Report.

Location TBD

Topics Review of the Detailed Design, Cost and Time Estimates, and Design Report.

c. Other conferences as needed.

6. Completion and Acceptance of Work

a. For the review segment of Item 10 of the work, the A-E shall submit to the CO

(1) PDF, MS Word, DWG, and supporting files of the Design Folder including the Design Report, design data, specifications, cost and time estimates, and operation and maintenance plan.

(2) PDF and DWG and supporting files of the complete construction drawings.

b. The CO will furnish review comments on the work to the A-E within forty-five days after receiving the items. The A-E shall make all necessary corrections to the work and will document the responses and actions taken as a result of the CO's review comments. The documented responses shall be submitted with the final submittals for this Item.

c. Final approval and acceptance of the work will be made by the CO after all corrections are made and all required material has been submitted. The required submittals are:

(1) PDF, MS Word, DWG, and supporting files of the detailed design, specifications, cost and time estimates, and Design Report.

(2) PDF and DWG and supporting files of the complete construction drawings.

d. NRCS will perform an independent review of the Design Folder prepared for this item. Estimated time for the independent review is 60 days.

V. Item 10 – Final Design, Specifications, Cost and Time Estimates, and Design Report

1. Scope

This item consists of A-E completion and assembly of the final design package.

2. Design

a. NRCS independent review comments will be addressed prior to proceeding with final design. A report will be prepared that addresses the NRCS independent review comments, A-E responses to the comments and any required actions to address the comments. The CO will approve the A-E responses to the comments and any required actions to address the comments prior to moving forward with the final design process.

b. Following the completion and approval of the resolution of NRCS independent review comments, the A-E shall complete and assemble the final Design Folder that includes the Design Report, specifications, and construction drawings. The final design package shall incorporate all NRCS comments on previous submittals. The drawings and specifications at this stage shall constitute a biddable package conforming to all applicable standards, codes, and engineering practices. Major changes to the basic design will not be permitted at this time, unless the changes are the result of previous review comments, changes in scope, or unforeseen problems.

c. Alternate designs or solutions that were considered and rejected are not required to be included except where mention of alternatives and reasons for selections are pertinent.

d. The Design Folder will become a permanent record for future reference. The report shall contain all materials pertinent to the final design. The material shall be

consolidated into one document. Such drawings as are necessary for proper explanation of the subject matter shall be reproduced to 11 inches in the binding edge and shall be included in the report. The Report shall be sectionalized and indexed in a logical manner, in accordance with NRCS NEM 511.10 and 511.11.

3. Reports

   Reports shall be prepared in accordance with Section I and NRCS National Engineering Manual Part 511.11(b).

4. Conferences

   Meetings between the A-E and the CO for the subject work shall be in accordance with Section G and shall be held as follows:

   a. Independent Review Conference

      Timing After receipt of the independent review comments.

      Location TBD

      Topics Review of the independent review comments.

   b. Final Design Conference

      Timing After submission of the Final Design.

      Location TBD

      Topics Review of the Final Design.

   c. Other conferences as needed.

5. Completion and Acceptance of Work

   a. For the review segment of Item 11 of the work, the A-E shall submit to the CO

      (1) PDF and MSWord of the report addressing the independent review comments.

      (2) PDF, MS Word, DWG, and supporting files of the complete final Design Folder including the Design Report, specifications, Construction Quality Assurance Plan, Construction Inspection Staffing Plan, operation and maintenance plan and other required items.

      (3) PDF and DWG and supporting files of the final construction drawings.

   b. The CO will furnish review comments to the A-E forty-five days after receiving the final Design Folder. The A-E shall make all necessary corrections to the work and will document the responses and actions taken as a result of the CO's review comments. The documented responses shall be submitted with the final submittals for this item.

   c. Final approval and acceptance of the work will be made by the CO after all corrections are made and all required material has been submitted. The required submittals are:

      (1) One (1) original copy of the complete final Design Folder. The A-E shall affix

the proper seals and signatures to the original copy of the final Design Folder.

(2) Three (3) copies of the complete final Design Folder including a single PDF file on a flash drive.

(3) One (1) original copy of the final specifications and drawings. The A-E shall affix the proper seals and signatures to the original copy of the final drawings, specifications, quality assurance plan, inspecting staffing plan, operation and maintenance plan and any other pertinent items.

(4) Three (3) copies of the Construction Quality Assurance Plan, Construction Inspection Staffing Plan, operation and maintenance plan and any other pertinent items.

(5) One (1) copy of the final specifications, Construction Quality Assurance Plan, Construction Inspection Staffing Plan, operation and maintenance plan and any other pertinent items in MS Word format on flash drives.

(6) One (1) copy of the final specifications, Construction Quality Assurance Plan, Construction Inspection Staffing Plan, operation and maintenance plan and any other pertinent items in a single PDF file on flash drives.

(7) One (1) copy of the complete final construction drawings plotted in accordance with Section I, Paragraph 5. The A-E shall affix the proper seals and signatures to the final construction drawings.

(8) Six (6) copies of the complete final construction drawings.

(9) One (1) copy of the CADD files for the complete final construction drawings on a flash drive.

(10) One (1) copy of the final construction drawings in a single PDF file on a flash drive.

(11). **All reports, billing, etc. for each dam project shall be tracked and identified separately.**

DELIVERY SCHEDULE

PHASE	DURATION Calendar days_
Phase 1- Plan of Work and Quality Assurance/Quality Control	45 days
CO/NRCS Review	15 days
Phase II- Supporting Documentation, Development of Design Data	150 days
CO/NRCS review	105 days
Phase III- Preliminary Design	90 days
CO/NRCS review	75 days
Phase IV- Final Design	60 days
CO/NRCS review	90 days
Total Duration	630 days

PROPOSAL REQUIREMENTS:

a. The proposal will set forth full, accurate, and complete information as required by this section and other sections of this RFP. Any material misrepresentation in the proposal could result in rejection of the proposal, termination of any subsequent contract, or any other appropriate administrative and/or legal actions.

b. Proposals should be prepared simply and economically, providing a straightforward, concise description of the firm's capabilities for satisfying the requirements of the RFP. Emphasis should be on completeness and clarity of content.

c. Each copy of the proposal shall be bound in a single volume where practical. All documentation submitted with the proposal shall be included in that single bound volume. Elaborate brochures and other representations beyond those sufficient for presenting a complete and effective proposal are neither required nor desired. Offerors shall provide one original and four (4) copies and one (1) identical electronic PDF copy (on CD or thumb drive) of the proposal documents.

d. Complete proposals shall include the following:

1. A statement of the offeror's understanding of the work to be performed.
2. Information as to the offeror's background and experience relative to the services being required.
3. Listing of previous clients who can be contacted as reference, for whom similar services have been provided. Listing shall include name and address of organization, point of contact, and phone number.
4. Information as to the size and organizational structure of the offeror's firm.
5. The proposal shall also include résumés identifying the type of professional personnel that will be employed to perform the contract. Résumés should describe the experience, education, background, specific or technical accomplishments and any special qualifications applicable to contract performance.
6. Describe financial stability of the firm, including agreement to carry insurance in the amounts of not less than $2,000,000 in Commercial General Liability, $5,000,000 in Professional Liability, $1,000,000 Worker's Compensation, and $1,000,000 Vehicle Accident Insurance; or other such insurance as is satisfactory and may be approved by the County.
7. Number, type and value of current projects and effect of these on offeror's ability to provide services as required during this contract.
8. Geographic location of the firm (or office carrying out the work) in proximity to the County.
9. Evidence of past performance relative to ability to complete projects on schedule and within estimated construction cost.
10. Any other special experience and qualifications relative to this project desired to be included by the offeror.

EVALUATION OF PROPOSALS: SELECTION FACTORS AND AWARD

All proposals meeting the requirements of this RFP shall be reviewed and rated by a County evaluation committee according to the criteria listed below. The County expressly reserves the right to reject all proposals received. Furthermore, the County expressly reserves the right to reject any and all proposals, and to waive any of the terms, conditions, and provisions contained in the RFP. The following criteria will be used in evaluating the responses to this RFP, with each criterion weighted as indicated:

Evaluation Criteria	Points
Qualifications and experience of the firm in performing similar project and working with National Resources Conservation Services	25
Experience and qualifications of key individuals to be assigned to the work	10
Ability to meet time requirement	15
Firm's demonstrated understanding of the tasks and quality assurance approach/procedure	25
Overall quality and completeness of proposal	25
	100

a. The Selection Committee will evaluate the most responsive proposals as deemed by staff and may also ask questions of a clarifying nature from offerors as required. Each committee member will complete a proposal evaluation form for each submission received. A composite rating will be developed which indicates the group's collective ranking of the written proposals in a descending order.

b. Following evaluation of the written proposals as submitted, the County shall engage in individual discussions with the offeror or offerors deemed fully qualified, responsible, and suitable based on the written proposals and with emphasis on professional competence. Such offerors shall be encouraged to elaborate on their qualifications, as well as alternative concepts, and to answer questions from evaluation team members. At the conclusion of discussion, based on evaluation factors as set at the time of issuance of this proposal and all information developed in the selection process to this point, the County shall select in the order of preference two or more Offerors whose professional qualifications and proposed services are deemed most meritorious.

c. Negotiations shall then be conducted, beginning with the Offeror ranked first. If a contract satisfactory and advantageous to the County can be negotiated at a price considered fair and reasonable, the award shall be made to that Offeror. Otherwise, negotiations with the Offeror ranked first shall be formally terminated and negotiations conducted with the Offeror ranked second, and so on until such a contract can be negotiated at a fair and reasonable price. Should the County determine in writing and in its sole discretion that only one Offeror is fully qualified or that one Offeror is clearly more highly qualified and suitable than the others under consideration, a contract may be negotiated and awarded to that Offeror. **Pittsylvania County reserves the right to award a contract to more than one Offeror, if it is in the County's best interest**.

SPECIAL TERMS AND CONDITIONS

PRECEDENCE OF TERMS: In the event there is a conflict between the general terms and conditions, Federal requirements and any special terms and conditions which may be included in this solicitation for use in a particular procurement, the special terms and conditions shall apply.

CLARIFICATION OF TERMS: If any prospective offeror has questions about the specifications or other solicitation documents, the prospective offeror should contact the contact person whose name appears on the face of this Request for Proposal, no later than five (5) days before the opening date. Any revisions to the solicitation will be made only by addendum issued by the County.

QUALIFICATIONS OF OFFERORS: The County may make such reasonable investigations as deemed proper and necessary to determine the ability of the offeror to perform the work, and the offeror shall furnish to the County all such information and data for this purpose as may be requested. The County reserves the right to inspect offeror's physical facilities prior to award to satisfy questions regarding the offerors capabilities. The County further reserves the right to reject any proposal if the evidence submitted by, or investigations of, such offeror fails to satisfy the County that such offeror is properly qualified to carry out the obligations of the contract and to complete the work or furnish the item(s) contemplated therein.

OWNERSHIP OF MATERIAL: Ownership of all data, material and documentation originated and prepared for the County pursuant to this Request for Proposal shall belong exclusively to the County and be subject to public inspection in accordance with the Virginia Freedom of Information Act. Trade secrets or proprietary information submitted by an offeror shall not be subject to public disclosure under the Virginia Freedom of Information Act (Virginia Code § 2.2-3700 et seq.); however, the offeror must invoke the protection of this section prior to or upon submission of the data or other materials and must identify the data or other materials to be protected and state the reasons why protection is necessary.

Ownership of Documents: Electronic files including but not limited to geotechnical, hydrologic, hydraulic modeling, stability and integrity analysis and calculations shall be provided as well as any GIS or AutoCAD, HEC, and all other electronic files of any work and any other information required to run the models.

a. GIS files can be in ESRI File Geodatabase or ESRI Shapefile formats, and shall have an appropriate and correctly defined spatial reference system assigned (horizontal & vertical). Area features shall be represented by properly closed polygons, this includes inundation zones and drainage basins.
b. AutoCAD Files shall be compatible with Civil 3D
c. All provided electronic files shall be complete enough to reproduce and rerun the modeling input parameters to produce the same model outputs.

CANCELLATION OF CONTRACT: The County reserves the right to cancel and terminate any resulting contract, in part or in whole, without penalty, upon 60 days written notice to the successful offeror.

ADDITIONAL SERVICES: In the event that the County requires additional services of a similar nature as those included in the scope of services in this solicitation, the Firm shall provide the County with a written estimate of the total costs to complete the work required. If the County determines that the estimated price is not fair and reasonable, it has the right to ask the Firm to reevaluate the estimate. If the revised estimate is determined to be not fair and reasonable, the County reserves the right to obtain additional quotes from other Firms.

PITTSYLVANIA COUNTY
BOARD OF SUPERVISORS

PURCHASING DEPARTMENT
(various general terms may not be applicable to this RFP)

I. GENERAL CONDITIONS AND INSTRUCTIONS TO BIDDERS/OFFERORS

1. Reservation of County Rights:

The County reserves the right to accept or reject any or all bids, to waive any informality and to make an award to a party other than the low bidder, if deemed in the best interest of the County, subject to the provisions under the Virginia Public Procurement Act.

The County does not discriminate against faith-based organizations.

2. Laws of the Commonwealth:

Any purchase order/contract resulting from this bid process shall be governed; in all respects whether as to its validity, construction, capacity, performance or otherwise; by the laws of the Commonwealth. Successful bidders providing goods to the County herewith assure the County that they are conforming to the provisions of the Civil Rights Act of 1964, as amended, as well as the Virginia Fair Employment Act of 1975, as amended, where applicable and Section 2.2-4311 of the Virginia Public Procurement Act which provides:

In every contract of over $10,000 the provisions in 1 and 2 below apply:

(1) During the performance of this contract, the contractor agrees as follows:

A. Nondiscrimination Clause: The contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability, or other basis prohibited by state law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of the contractor. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

B. Equal Opportunity Employer: The contractor, in all solicitations or advertisements for employees placed by or on behalf of the contractor, will state that such contractor is an equal opportunity employer.

C. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.

(2) Subcontractors: The contractor will include the provisions of the foregoing paragraphs A, B, and C in every subcontract or purchase order of over $10,000 so that the provisions will be binding upon each subcontractor or vendor.

(3) Drug Free Workplace – During the performance of this contract, the contractor agrees to (i) provide a drug-free workplace for the contractor's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, possession, or use of a controlled substance or marijuana is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the contractor that the contractor maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over $10,000, so that such provision will be binding upon each subcontractor or vendor.

3. Tax Exemption:

The County is exempt from State sales, and use taxes and will issue a Certificate of Exemption upon request. Deliveries against any items of this bid procedure shall be free from any excise or transportation taxes. Excise exemption registration NO. 54-600-1508 may be used when required or necessary on behalf of the County.

4. Modifications, Additions, or Changes:

Modifications, additions, or changes to the terms and conditions of this invitation to bid may be cause for rejection of your bid. All bids shall be entered on the official bid forms, if provided. Bidders who attach or submit bids on their or any other forms may be considered unresponsive and may be rejected if an official bid form is provided.

5. Delivery Point:

Except when otherwise specified herein, all items shall be F.O.B. delivered to any point within the County as directed by the Central Purchasing Department.

6. Transportation and Packaging:

The authorized agent by signing this bid certifies and warrants that the bid price offered for F.O.B. destination, includes only the actual freight rate costs at the lowest and best rate and is based on the actual weight of the goods to be shipped. Except as otherwise specified herein, standard commercial packaging, packing and shipping containers shall be used. All shipping containers shall be properly and legibly marked or labeled on the outside with the commodity description and number, size and quantity.

7. Evaluation of Bid Documents:

If any prospective bidder is in doubt as to the true meaning of any part of the specifications or other bid documents, the prospective bidders shall submit a written request, within the time frame provided, after receipt of the invitation to bid to the Central

Purchasing Department. The Central Purchasing Department will have final authority to review any discrepancies or deficiencies in the specifications and then make the necessary interpretations or revisions. Interpretations or revisions shall be made official by the issuance of any necessary addendum and distributed to all potential bidders. The Central Purchasing Department will not be responsible for explanations or interpretations of the bid documents, except as issued in writing by the Purchasing Manager and/or County Administrator.

8. Default:

In the case of default by the successful bidder or failure to deliver the goods or services ordered by the time specified, the Department of Central Purchasing, after due written notice may procure these goods or services from other sources and hold the defaulting vendor responsible for any excess cost occasioned thereby.

9. Anti-Collusion Certification:

The authorized agent by signing this bid certifies and warrants that this bid is made without prior understanding, agreement, or connection with any corporation, firm or person submitting a bid for the same materials, supplies, equipment or services, and is in all respects fair and without collusion or fraud. The signing agent understands collusive bidding is a violation of the Virginia Governmental Frauds Act and Federal Law and can result in fines, prison sentences, and civil damage awards. The signing agent also agrees to abide by all conditions of this bid and certifies that he or she is duly authorized to sign this bid for the bidder represented herein.

10. Kickbacks:

The signing agent certifies and warrants that neither he/she nor the bidder from whom he/she is authorized to act has offered or received any kickback from any other bidder, suppliers, manufacturer, or subcontractor in connection with his/her bid on this solicitation. A kickback is defined as an inducement for the award of a contract, subcontracts or order, in the form of any payment, loan, subscription, advance, deposit of money, services or anything, present or promised, unless consideration of substantially equal or greater value is exchange. Further, no person shall demand or receive any payment, loan, subscription, advance, deposit of money, services or anything of value in return for an agreement not to compete on a public contract.

11. Gifts by Bidder, Offeror, Contractor, or Subcontractor:

No bidder, offeror, contractor, or subcontractor, shall confer on any public employee or official having formal responsibility for a procurement transaction, any payment, loan, subscription, advance, deposit of money, services or anything of more than nominal value, present or promised, unless consideration of substantially equal or greater value is exchanged.

12. Termination/Cancellation of Contract:

Subject to the provisions below, the contract may be terminated by either party upon thirty (30) days advance written notice to the other party; but if any work or service hereunder is in progress, but not completed as of the date of termination, then this

contract may be extended upon written approval of the County until said work or services are completed and accepted.

A. Termination for Convenience

In the event that this contract is terminated or cancelled upon request and for the convenience of the County, without the required thirty (30) days advance written notice, then the County shall negotiate reasonable termination costs, if applicable.

B. Termination for Cause

Termination by the County for cause, default or negligence on the party of the appraiser or firm shall be excluded from the foregoing provision; termination costs, if any, shall not apply. The thirty (30) days advance notice requirement is waived in the event of Termination of Cause.

C. Non-Appropriation Clause/Termination due to Unavailability of Funds in Succeeding Fiscal Years

When funds are not appropriated or otherwise made available to support continuation of performance in a subsequent fiscal year, the contract shall be cancelled and the contractor shall be reimbursed for the reasonable value of any non-recurring costs incurred but not amortized in the price of the supplies or services delivered under the contract.

13. Quantities:

Quantities set forth in this invitation are estimates only, and the successful bidder shall supply at bid prices actual quantities as ordered regardless of whether such total quantities are more or less than those shown.

14. Ordering:

All orders from the County shall be issued by the Central Purchasing Department. A County purchase order number is required for the contract; yet partial order quantities and deliveries will be accepted upon request or as outlined in the Special Specifications, by the Central Purchasing Department. No other department or personnel other than those in the Central Purchasing Department of the County are qualified to issue purchase orders, make changes in orders, or accept delivery on orders under this contract without specific written authorization being received by the contractor from the Central Purchasing Department or as otherwise specified in the Special Specifications.

15. Invoices/Billing Process:

Invoices for items ordered, delivered, and accepted by the Central Purchasing Department or authorized departments shall be submitted by the contractor directly to the Accounting Department, at the address shown on the purchase order. The purchase order number must be referenced on all invoices regardless of quantities delivered, backordered, etc. Any outstanding quantities not included in the billing or invoice should be shown on a separate statement specifically marked, as not being an invoice for payment yet is an accountability of items and cost outstanding.

16. Discounts:

All bids will be evaluated and awarded on net prices. Cash discounts will not be considered in making awards. If cash discounts for prompt payment are offered, it must be clearly shown on the bid forms in the space provided. On monthly invoices any payment terms must be clearly marked. The County will attempt to take advantage of any such discounts provided our timetable allows us to do so.

17. Hold Harmless:

The successful contractor assumes and agrees to indemnify, defend and hold harmless Pittsylvania County, Virginia, its officers, agents, and employees from any claims, damages and actions of any kind or nature, whether at law or in equity, arising from or caused by the use of any materials, labor, goods, or equipment of any kind or nature furnished by the contractor, provided that such liability is not attributable to the sole negligence on the part of the using agency or to the manner outlined by the contractor and description literature or specifications submitted with the contractor's bid.

18. Warranty:

The contractor shall provide warranty documents on any material, goods or equipment of any kind or nature provided by the contractor, his subcontractor or other agents. The warranty shall be in effect for the period of time specified.

19. Contractual Intent

Upon successful award of this bid by the County, it is the County's intent to have a written contract fully executed by all participating parties. This contract shall delineate the capacity, performances and considerations for all parties involved.

The contents of the bid submitted by the successful bidder and the bid specifications shall become a part of any contract awarded as a result of these specifications. The successful vendor will be expected to sign a "Standard Contract for Services" with the County.

Sample contracts may be submitted by either party at the time of the bid, however, the County reserves the right to use its uniform contract format over all samples submitted.

20. Insurance

By signing and submitting a bid/proposal under this solicitation, the Bidder/Offeror certifies that if awarded the contract, it will maintain all required Worker's Compensation, Employer's Liability, Commercial General Liability and Automobile Liability insurance coverage during the entire term of the contract and that all insurance coverage will be provided by insurance companies authorized to sell insurance in Virginia by the Virginia State Corporation Commission. Copies of insurance certificates shall be submitted with all bids/proposals.

MINIMUM INSURANCE COVERAGES AND LIMITS:

1. Workers' Compensation - Statutory requirements and benefits. Coverage is compulsory for employers of three or more employees, to include the employer. Contractors who fail to notify the County of increases in

the number of employees that change their workers' compensation requirements under the *Code of Virginia* during the course of the contract shall be in noncompliance with the contract.

2. Employer's Liability - $100,000.

3. Commercial General Liability - $1,000,000 per occurrence and $2,000,000 in the aggregate. Commercial General Liability is to include bodily injury and property damage, personal injury and advertising injury, products and completed operations coverage. Pittsylvania County shall be added as an additional insured to the policy by an endorsement.

4. Automobile Liability - $1,000,000 combined single limit. (Required only if a motor vehicle not owned by the County is to be used in the contract. Contractor must assure that the required coverage is maintained by the Contractor (or third party owner of such motor vehicle.)

Profession/Service	**Limits**
Accounting	$1,000,000 per occurrence, $3,000,000 aggregate
Architecture	$2,000,000 per occurrence, $6,000,000 aggregate
Asbestos Design, Inspection or Abatement	$1,000,000 per occurrence, $3,000,000 aggregate
Health Care Practitioner (to include Dentists, Licensed Dental Hygienists, Optometrists, Registered or Licensed Practical Nurses, Pharmacists, Physicians, Podiatrists, Chiropractors, Physical Therapists, Physical Therapist Assistants, Clinical Psychologists, Clinical Social Workers, Professional Counselors, Hospitals, or Health Maintenance Organizations.)	$2,150,000 per occurrence, $4,250,000 aggregate
(Limits increase each July 1 through fiscal year 2031per *Code of Virginia* § 8.01-581.15.)	
Insurance/Risk Management	$1,000,000 per occurrence, $3,000,000 aggregate
Landscape/Architecture	$1,000,000 per occurrence, $1,000,000 aggregate
Legal	$1,000,000 per occurrence, $5,000,000 aggregate
Professional Engineer	$2,000,000 per occurrence, $6,000,000 aggregate
Surveying	$1,000,000 per occurrence, $1,000,000 aggregate

21. Use of Name Brands Within These Specifications:

The name of a certain brand, make, manufacturer, or definite specification is to denote the quality to the specific brand, make, manufacturer, or specification named; it is to set forth and convey to prospective bidders the general style, type, character and quality of article desired, and wherever in specifications or contract documents a particular brand, make of materials, device or equipment shall be regarded merely as a standard. Any other brand, make of material, device or equipment which is recognized the equal of that specified, considering quality, workmanship and economy of operation and is suitable for the purpose intended, shall be considered responsive to the specifications.

22. Access To Records:

The County Administrator or his duly authorized agent, shall, until the expiration of three (3) years following the final payment on this Agreement, have access to and the right to examine and copy any directly pertinent books, documents, papers, and records of Lessor and Assignee involving transactions related to this Agreement. Lessor and Assignee shall have the reciprocal right, until the expiration of three (3) years following final payment on this Agreement, to have access to and examine and copy any directly pertinent books, documents, papers and records of the County Administrator in the event of

STATEMENT OF DISCLAIMER

RE: _____ (BID OR RFP #)

This is to certify that no employee, official, or elected officer of the County of Pittsylvania has a proprietary interest in the company, corporation, partnership, or other organization, furnishing the goods and/or services, or stands to benefit personally from the furnishing of such goods or services as referenced above.

FIRM: _____

BY: _____

TITLE: _____

CONTRACTOR ELIGIBILITY CERTIFICATION

This is to certify that this person/firm/corporation has not been barred from bidding on contracts by any agency of the Commonwealth of Virginia, nor is this person/firm/corporation a part of any firm/corporation that has been barred from bidding on contracts by any agency of the Commonwealth of Virginia.

_____
Name of Official

_____
Title

_____

RETURN THIS PAGE

Federal Requirements
CONTRACT TERMS AND CONDITIONS

Civil Rights Requirements – 29 U.S.C. § 62, 42 U.S.C. § 2000, 42 U.S.C. § 602, 42 U.S.C. § 12112, 42 U.S.C. § 12132, 49 U.S.C. § 5332

a. Nondiscrimination – In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, section 202 of the Americans with Disabilities Act of 1990, 42 U.S.C. § 12132, and all other provisions of Federal law, the CONTRACTOR agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, age, or disability. In addition, the CONTRACTOR agrees to comply with applicable Federal implementing regulations.

b. Equal Employment Opportunity – The following equal employment opportunity requirements apply to the underlying contract:

a. Race, Color, Creed, National Origin, Sex – In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, the CONTRACTOR agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 CFR Parts 60 et seq., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal Statutes, executive orders, regulations, and Federal policies that may in the future affect activities undertaken in the course of this Project. The CONTRACTOR agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the CONTRACTOR agrees to comply with any implementing requirements the funding federal agency may issue.

b. Age – In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. § § 623 and other applicable law, the CONTRACTOR agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the CONTRACTOR agrees to comply with any implementing requirements the funding federal agency may issue.

c. Disabilities – In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the CONTRACTOR agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 CFR Part 1630, pertaining to employment of persons with disabilities. In addition, the CONTRACTOR agrees to comply with any implementing requirements the funding federal agency my issue.

c. The CONTRACTOR also agrees to include these requirements in each subcontract financed in whole or in part with Federal Assistance, modified only if necessary to identify the affected parties.

Energy Conservation – 42 U.S.C. 6321 et seq.

The CONTRACTOR agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act.

i. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the (write in the name of the Federal agency) may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

Certification of eligibility.

i. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
ii. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
iii. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

Contract Work Hours and Safety Standards Act. The Agency Head shall cause or require the contracting officer to insert the following clauses set forth in paragraphs (b)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by § 5.5(a) or 4.6 of part 4 of this title. As used in this paragraph, the terms *laborers* and *mechanics* include watchmen and guards.

i. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

ii. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

iii. Withholding for unpaid wages and liquidated damages. Pittsylvania County shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

iV. Recycled Products – 42 U.S.C. 6962

The Recycled Products requirements apply to all contracts for items designated by the EPA, when COG or the CONTRACTOR procures $10,000 or more of one of these items during the fiscal year, or has procured $10,000 or more of such items in the previous fiscal year, using federal funds.

The CONTRACTOR agrees to comply with all requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited to regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.

Clean Water Requirements – 33 U.S.C. 1251 et seq.

d. The CONTRACTOR agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended. The CONTRACTOR agrees to report each violation to COG and understands and agrees that COG will, in turn, report each violation as required to assure notification to appropriate federal agencies including the appropriate EPA Regional Office.
e. The CONTRACTOR also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance.

Clean Air – 42 U.S.C. 7401 et seq

The Clean Air requirements apply to all contracts exceeding $100,000, including indefinite quantities where the amount is expected to exceed $100,000 in any year.

1. The CONTRACTOR agrees to comply with all applicable standards, orders or regulations issued

pursuant to the Clean Air Act, as amended, 42 U.S.C. §§ 7401 et seq. The CONTRACTOR agrees to report each violation to COG and understands and agrees that COG will, in turn, report each violation as required to assure notification to the funding federal agency, if any, and the appropriate EPA regional office.

2. The CONTRACTOR also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance.

Recycled Products – 42 U.S.C. 6962

The Recycled Products requirements apply to all contracts for items designated by the EPA, when COG or the CONTRACTOR procures $10,000 or more of one of these items during the fiscal year, or has procured $10,000 or more of such items in the previous fiscal year, using federal funds.

The CONTRACTOR agrees to comply with all requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited to regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.

Program Fraud and False or Fraudulent Statements and Related Acts – 31 U.S.C. 3801 et seq.

a. The CONTRACTOR acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § 3801 et. seq. and all appropriate federal agency regulations apply to its actions pertaining to this Project. Upon execution of the underlying contract, the CONTRACTOR certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract of the Federally assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the CONTRACTOR further acknowledges that if it makes, or caused to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the CONTRACTOR or to the extent the Federal Government deems appropriate.
b. The CONTRACTOR also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance, the Federal Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on the CONTRACTOR, to the extent the Federal Government deems appropriate.
c. The CONTRACTOR agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to the provisions.

Lobbying Certification (31 U.S.C. 1352 et seq.)

(*To be submitted with each bid or offer exceeding $100,000)*
The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal Loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of and Federal contract, grant, loan, or cooperative agreement.
2. If any funds or than Federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form—LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein as been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, *et.seq.*)]
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction by 31, U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

[Note: Pursuant to 31 U.S.C. § 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such expenditure or failure.]

The CONTRACTOR, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the CONTRACTOR understands and agrees that the provisions of 31 U.S.C. A 3801, *et seq*., apply to this certification and disclosure, if any.

_____Signature of CONTRACTOR Authorized Official

_____Name and Title of CONTRACTOR Authorized Official

_____Date

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