

# SCOPE OF WORK

## ATTACHMENT A -- SCOPE OF WORK SERVICES INSPECTION OF NJDOT OWNED DAMS

The CONSULTANT shall:

- A. Contact governing agencies or authorities prior to the CONSULTANT's performance of the work covered in this Agreement in order to provide to the STATE letters and documents approving access, inspections of Dam Structures and appurtenant structures, and other related activities. Adhere to security measures specified for bridge inspections.
- B. Submit a field inspection schedule to the STATE within twenty (20) working days after receipt of written direction from the STATE to proceed with this project. The schedule will include the Structure Number, Dam Name, Date of the previous inspection, Date of submission of Preliminary Dam Survey Report and any specialized equipment necessary to perform the inspection for all dam structures listed in Appendix 1, which is attached hereto and incorporated into this Scope of Work ("Dam Structures").
- C. Review any previous inspection reports provided by the STATE, County or any other governing agency. This will include, but not be limited to the following: Phase 1 Dam Survey Reports by the Army Corps of Engineers, Formal, Regular or Informal Dam Survey Reports by the STATE, Emergency Action Plans by the STATE and Operation and Maintenance Manuals by the STATE. Also, locate and review any available plans for the construction of the Dam Structure.
- D. Perform a Title Search, **if required**, to determine conclusively which portions of the Dam Structure are owned by which governmental or private entities.
- E. Perform a Formal Dam Inspection Survey of each of the Dam Structures as mandated by N.J.S.A. 58:4-1 and N.J.A.C. 7:20 to determine the following:
  1. A review of prior regular and formal inspection reports should be undertaken to evaluate trends in performance.
  2. The inspection and performance evaluation of Class I and Class II dams under the supervision of a qualified, New Jersey licensed professional engineer to review and determine the safety and integrity of the dam and appurtenant structures.
  3. A detailed field examination and must include a thorough review of the records on project design, construction, and performance. Where appropriate, a reanalysis employing advanced methods and modern design criteria and practices should be conducted in order to determine if the structure meets current design criteria. In addition, formal inspections require that the long-term behavioral patterns revealed by instrumentation and spillway discharges be closely examined. Detailed underwater inspections must be included as needed.
  4. A Department approved Emergency Action Plan and Operation and Maintenance Manual

must be confirmed and their adequacy determined. All addresses, e-mail, and phone numbers contained within the Emergency Action Plan must be verified and current. Inspection reports will be deemed incomplete without this information. Technical experts and specialists may be required to evaluate individual features and conditions; however, a qualified New Jersey licensed professional engineer must make the final coordinated evaluation.

5. The design of the dam as compared to current standards.
  6. The re-classification of the dam, if warranted, after completion of the hydraulic/hydrology study and review of downstream parameters.
- F. Within two (2) months of the date on which the STATE deems the Formal Dam Inspection Survey detailed in Paragraph D. above to have been completed, the STATE may order the CONSULTANT to expand the scope of work of this Project to include a second Regular Dam Inspection Survey of any or all of the Dam Structures. Unless otherwise agreed to by the STATE, all second Regular Dam Inspection Survey work will be performed in accordance with the provisions of this agreement within the recommended frequency as specified for the various Dam Structures based on their classifications. Payment for all work associated with the second routine survey will be made in accordance with the *Extra Work* provisions set forth in Part II, Paragraph D of this Agreement.
- G. Perform the tests and inspections utilizing a multi-disciplinary team consisting of hydraulic and geotechnical engineers, and where needed, a structural engineer, utilizing all data and historical records provided by the STATE, County or governing agency. The tests and inspections shall be performed in accordance with the "Model State Dam Safety Program" Manual by FEMA dated September 1986, the "NPDP Guidelines for Reporting the Performance of Dams" Manual dated August 1994 and the "*Guidelines for Inspection of Existing Dams*" dated January 2008, and shall include, but not necessarily be limited to, the following:
1. EMBANKMENT DAMS AND DIKES:
    - a. Embankment Material
    - b. Internal and/or External Drainage System
    - c. Junctions with Abutments or Embankments
    - d. Upstream and Downstream Slopes including Slope Protections
    - e. Abutments and Toe Areas
  2. CONCRETE AND MASONRY DAMS:
    - a. Concrete and/or Masonry Embankments
    - b. Internal and/or External Drainage Systems
    - c. Junctions with Abutments or Embankments
    - d. Upstream and Downstream Slopes including Slope Protections

- e. Abutments and Toe Areas
- f. Galleries
- g. Foundations

3. SPILLWAYS AND OUTLET WORKS:

- a. Primary and Auxiliary Spillways
- b. Entrance Channel
- c. Spillway Crest
- d. Drop Box
- e. Spillway Wingwalls
- f. Downstream Apron
- g. Culverts
- h. Trash Racks
- i. Chutes
- j. Stilling Basin
- k. Exit Channel
- l. Low Level Outlet
- m. Stilling Basin for Low Level Outlet
- n. Exit Channel for Low Level Outlet

4. OTHER FEATURES:

- a. Instrumentation (Monumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.)
- b. Reservoir
- c. Appurtenant Structures (Power House, Gatehouse, Penstocks, Water Supply, Etc.)

H. Perform underwater inspections and evaluations of the Dam Structures in accordance with the “*New Jersey Department of Transportation Underwater and Inspection and Evaluation of New Jersey Bridges Guidelines Manual*”, dated June 1994. For those Dam Structures requiring an underwater diving inspection, as indicated in the CONSULTANT Proposal, or as requested by the STATE, the inspection shall be performed by a qualified STATE approved diver from the

mud line to the high- water line, inspecting all concrete, timber or other materials for deterioration including cracks, spalls, marine borer damage, rot, necking, erosion or any other defects or deterioration.

- I. Measure, probe, or otherwise make all efforts to determine the nature or cause of any abnormal movements, detected or suspected, of the Dam Structure using routine inspection procedures.
- J. -If concurred in by the STATE, arrange for and/or conduct work of a special nature in addition to the items described within this scope of work. Such work may include, but not be limited to, the following:
  - 1. Inspecting inaccessible areas by rigging, excavating or removing portions of the Dam Structure.
  - 2. Coring, boring, sampling or testing to determine the existing construction materials used to build the Dam Structure.
  - 3. Providing highway and/or waterway traffic control which may require services of supervision and/or evaluation.

The CONSULTANT will be compensated for special nature work approved by the STATE in accordance with Paragraph II.A. above, unless the STATE, in its sole discretion, determines that the work is *Extra Work*, in which case the CONSULTANT will be compensated in accordance with Paragraph II.D. above.

- K. Sufficiently check any available “as built” plans in the field to ensure that the plans are truly representative of the Dam Structure before they are used in stress calculations or evaluations. Where plans are not available or where the available plans are incomplete, drawings of the Dam Structure are to be made using 22” x 36” format and based on field measurements. Said drawings are to include a plan, elevation, typical cross sections and other details as necessary at a scale of 3/16” = 1’-0” or other as appropriate.
- L. Utilize and maintain a Microsoft Access database and Coding Guide for the Dam Structure Inspection Program. The Access database must include, but not be limited to, the following data fields: Date of Last and Previous Formal, Routine, Informal, Emergency, Interim and Phase 1 inspections; “Inspected By” field for the Last and Previous Formal, Routine, Informal, Emergency, Interim and Phase 1 inspections; Route; Milepoint; County; Municipality; Dam Structure Number; Dam Structure Type; Year Dam was Built; Spillway Type; Low Level Outlet Type; Dam Classification Category; Maximum Height of Dam; Maximum Depth of Impoundment; Structure Number (when applicable); Structure Type (when applicable); Condition Codes for the Dam Structure and major Dam Structure Elements; Listing of Recommended Repairs; Estimated Cost of Recommended Repairs; Year of Repair Cost Estimate; Dam Spillway Capacity; Date of *Emergency Action Plan*; Developed by field for *Emergency Action Plan*; Date of *Operations and Maintenance Manual*; Developed by field for *Operations and Maintenance Manual*; Plus any additional data fields that may become apparent.
- M. Render a professional evaluation of each Dam Structure in the form of a *Formal Dam Inspection Survey Report*, prepared in accordance with the “*Guidelines for Inspection of Existing Dams*” dated January 2008 and any subsequent revisions. The report shall be signed and sealed by the CONSULTANT’S Project Manager indicating his Professional Engineer’s License Number.

Each of the *Formal Dam Inspection Survey Reports* shall include, but not be limited to, the following for each Dam Structure:

1. Description of the Dam Structure site including, but not necessarily limited to, the following: Dam Structure Number, Route, Milepoint, Dam Structure Type, County, Municipality, Inspection Date and Type, Inspected By, Previous Inspection Date and Type, Previously Inspected By, Bridge Structure Type, Etc. Tie location of existing dam structure into the National Spacial Reference System (NSRS) utilizing GPS, NAD 83 (Horizontal) and NAVD 88 (Vertical) datums. Summary of the comments and conclusions for the Dam Structure regarding it's current condition and assessment of the design (structural, geotechnical and hydraulic) as compared to current standards. Also, specify the assigned Dam Classification Category (Class I, II, III or IV) and the reasons for such assignment. Develop reclassification request for any Dam Structure with supporting documents and calculations for submission to DSS.
2. Calculations for the adequacy of the dam spillway to accommodate the design storm (100 year minimum) using the current Hydraulic Engineering Circular (HEC) criteria. Computer output analyses utilizing the current HEC-1 and HEC-2 software programs shall be included. If review of previous reports indicates that previous HEC calculations are still valid and correct, reference to these calculations may be substituted.
3. Recommendations with estimated costs for repairs to the Dam Structure, and any action required to maintain the safety of said dam. Indicate any permits required for all Emergency, Priority or Maintenance repairs recommended. Also, include recommendations necessary to bring the existing Dam Structure up to hydraulic, structural, geometric and/or geotechnical design standards as needed.
4. Comments on the structural, geotechnical and geometric adequacy of the Dam Structure as compared to a modern design of said structure. If "as-built" drawings are unavailable, the use of coring, boring or sieve analysis may be utilized to determine the existing design of the Dam Structure in order to make said analysis.
5. Drawings of the Dam Structure made in accordance with Paragraph K., above, which shall be reduced in size to a maximum of 11" x 17" and included in the report. Original "as-built" drawings may be utilized to meet the requirements set forth under this clause.
6. Completed "*Visual Inspection Checklist*" of the Dam Structure shall be included as field notes. The format to be used is as specified in the "*Guidelines for Inspection of Existing Dams*" dated January 2008.
7. **High quality** Color digital photographs of the Dam Structure showing plan and elevation views of the Dam Structure and spillways along with all appurtenant structures. Also, include photographs of all repairable defects.
8. Access database as specified in Paragraph L. above including all relevant historic, location and descriptive data for the Dam Structure along with data describing the Formal Dam Inspection Survey and future Formal, Routine, Informal and Emergency Dam Inspection Surveys plus the relevant *Emergency Action Plan* and *Operation and Maintenance Manual* data as specified below.
9. Statewide, Vicinity and Local color maps pin-pointing the location of the Dam Structure.

The dam name, route, milepoint, structure number (if appropriate) and dam structure number are to be shown on each map. The Vicinity Map scale shall use the USGS Quadrangle Map Scale (or similar as approved). The Local Map scale shall be sufficient such that the boundary of the impoundment is clearly visible on the map.

10. Summary of the results of the Title Search as specified in Section D. above.
  11. Provide an electronic copy of Dam Inspection Report using Adobe Acrobat (file format shall be PDF/A-1b) in accordance with the current version of SDMS Contractors Specifications.  
Notes: Any documents scanned in order to be included in the PDF file must be at least 400 dpi in resolution (".png" file format is preferable). Also, we would prefer that text documents not be scanned, if possible, but rather directly PDFed.)
- N. Render a professional evaluation of each Dam Structure in the form of an *Emergency Action Plan*, prepared in accordance with the N.J.A.C. 7:20-1.7(f) and "*Model State Dam Inspection Program*" Manual by FEMA dated September 1986 and the "*Guidelines for Developing and Emergency Action Plan*" dated May 1996 revised March 2011. The *Emergency Action Plan* shall include, but not be limited by, the following:
1. Description of the Dam Structure site similar to that included in the Formal Dam Survey Inspection Report.
  2. Summary specifying the Purpose, Use, Access, Inundation Area and Method of Emergency Drawdown for the impoundment and Dam Structure.
  3. Description of the Location and Directions to the Owners Emergency Operations Center for the Dam Structure.
  4. Summary of the responsibilities for the Dam Structure "Owner/Operator", "NJ-OEM" (Office of Emergency Management), "County-OEM", "Municipal OEM" and NJDEP-DSS. Also, include an "Emergency Notification Directory", "Emergency Communication Diagram", "Notification Form "A"" (Dam Emergency Information for Dam Emergencies and Dam Breach Conditions) and an "Emergency Evacuation Plan."
  5. Section including forms specifying "Emergency Condition Identification" including "Dam Advisory Condition", "Dam Warning Condition", "Dam Emergency Condition" and "Dam Breach Conditions" plus an "Observation/Response Checklist".
  6. Backwater Analysis and Hydraulic Analysis of the downstream flood zone considering all flow restricting structures and parameters located downstream of the Dam Structure using HEC-1, HEC-2 and DAMBRK software programs for the following dam breach conditions:
    - a. Sunny Day Failure
    - b. 100 Year Storm Event Failure
    - c. Probable Maximum Precipitation (PMP) Storm Event Failure
  7. Maps as specified under Section M.9. as specified above. However, three additional Local maps shall clearly show the extent of the inundation for the Sunny Day, 100 Year Storm

and PMP Storm failure events.

8. Section including forms specifying “Emergency Repair Resources”, “Form “B”” (Summary of Available On-Site Materials and/or Equipment), “Form “C”” (Summary of Available Off-Site Materials), “Form “D”” (Summary of Available Off-Site Equipment), “Termination” and “Recovery.”
  9. Section including “Training” specifying responsibilities and training contents.
- O. Render a professional evaluation of each Dam Structure and impoundment in the form of an *Operations and Maintenance Manual*, prepared in accordance with N.J.A.C. 7:20-1.11 “Dam Operating Requirements and Inspections: New and Existing Dams”. The Manual shall be developed in consultation with any owners as determined under the Section D “Title Search.” The *Operations and Maintenance Manual* shall include, but not be limited by, the following two parts:
1. Part One shall include an Introduction, Project Description, Project Authorizations, Project History and List of Project Contacts.
  2. Part Two shall include the operation and maintenance instructions for major project facilities and equipment and a schedule for maintenance.
- P. **Based on standard Priority Repair procedures**, provide immediate notification to the STATE, County or any governing agency, in writing, of any adverse conditions found during the inspection survey that would jeopardize the safety of the dam or appurtenant structures. **All priority repairs shall be submitted electronically and in writing with recommendation and repair scheme.**
- Q. Within two (2) weeks of the date of inspection, submit the actual inspection date of the Dam Structure to the STATE.
- R. Submit, within thirty (30) days of the date of completion of inspection of the Dam Structures, a list of any additional Dam Structures that may require inspections at intervals more frequent than those specified under the applicable regulations (Interim Inspections). The list shall include a description of the Dam Structure component area that requires the Interim Inspection, Dam Structure Number, Dam Name and the recommended inspection interval. The reason for the increased frequency of inspection must also be specified.
- S. After review and approval by the STATE of the submitted list, perform Interim Inspections in accordance with the STATE guidelines set forth in Paragraph R. above. Interim Inspection shall be comprised of Informal Dam Surveys of only those Dam Structure component areas previously identified in the approved list. The Interim Inspection shall be documented with a letter format report to the STATE.
- T. Perform only those Interim, Emergency, or Special Inspections which can be accomplished within the time period for completion of work established by this Agreement and any Consultant Contract Modification hereto. Costs incurred in performing the Interim, Emergency, or Special Inspections of Dam Structures not previously identified shall be paid as *Extra Work* by Consultant Contract Modification.
- U. Submit to the STATE the required number of copies of the preliminary *Formal Dam Inspection Survey, Emergency Action Plan* and *Operations and Maintenance Manual* for each

Dam Structure within twelve (12) months from the *Notice to Proceed*, unless otherwise specified in Consultant Contract Modifications. In the event any such reports are not in compliance with the current format as determined by the STATE, the CONSULTANT shall rectify them and resubmit them as preliminary reports.

- V. Act upon all comments submitted relative to all reviews of the preliminary reports referenced in Section U. above. The CONSULTANT will address or include all comments in the final reports. Revise all Dam Structure database records as and when directed by the STATE.
- W. Submit, to the STATE, the following:
  - 1. Submit the required number of signed-and-sealed hard copies of the final reports for each Dam Structure within fifteen (15) months from the Notice to Proceed, unless otherwise specified in Consultant Contract Modifications.
  - 2. Submit a PDF CD for each report prepared according to the requirements of the most recent SDMS Contractors Specifications.
  - 3. If Dam data available in CombIS, obtain a NJDOT Combined Inspection System (CombIS) ID, enter required data into CombIS for each structure, load all final PDF reports and working files to CombIS, and submit through CombIS for approval (for this project, approval is limited to acknowledgement that all required deliverables have been loaded to CombIS). Also, be available to perform some testing of CombIS with regards to Dam report submission procedures if required.
  - 4. Submit the final Microsoft Access Database according to the requirements of NJDOT, along with the letter required of all database submissions in the SDMS Contractors Specifications

Acceptance, when satisfactory, of each final report, **and all other deliverables**, will be provided to the CONSULTANT.

- X. The work pursuant to this Agreement shall be deemed complete upon acceptance of each of the final reports, **and receipt of all deliverables specified in the above section**. In no event shall the services required by this Agreement be deemed complete until the STATE has advised the CONSULTANT, pursuant to the terms of Paragraph F. of this Attachment A., whether the CONSULTANT must perform second Regular Dam Inspection Survey work.