REQUEST FOR PROPOSAL

RFP # 989

Barton Dam Piezometer Installation and Slope Stability Analysis

City of Ann Arbor
Public Services Area / Water Treatment Services Unit

Due Date: December 20, 2016 by 2:00p.m. (local time)

Issued By:

City of Ann Arbor
Procurement Unit
301 E. Huron Street
Ann Arbor, MI 48104

TABLE OF CONTENTS

SECTION 1- GENERAL INFORMATION

A. OBJECTIVE

The City of Ann Arbor is seeking the services of a geotechnical engineering firm to perform the installation of piezometers, perform the stability analysis of the embankment, develop recommendations for remediation (if necessary), coordinate and respond to the Federal Energy Regulatory Commission (FERC), and other related work. The drilling and installation of piezometers can be subcontracted.

B. QUESTIONS ABOUT AND CLARIFICATIONS OF THE REQUEST FOR PROPOSAL

All questions regarding this Request for Proposal (RFP) shall be submitted via e-mail. Questions will be accepted and answered in accordance with the terms and conditions of this RFP.

All questions shall be submitted on or before December 12, 2016 at 10:00 a.m., and should be addressed as follows:

Scope of Work/Proposal Content questions shall be e-mailed to Glen Wiczorek, P.E., Water Treatment Plant Engineer – gwiczorek@a2gov.org

RFP Process and Compliance questions shall be e-mailed to Colin Spencer, Buyer - cspencer@a2gov.org

Should any prospective consultant be in doubt as to the true meaning of any portion of this RFP, or should the consultant find any ambiguity, inconsistency, or omission therein, the consultant shall make a written request for an official interpretation or correction by the due date got questions above.

All interpretations, corrections, or additions to this RFP will be made only as an official addendum that will be posted to a2gov.org and MITN.info and it shall be the consultant's responsibility to ensure they have received all addenda before submitting a proposal. Any addendum issued by the City shall become part of the RFP, and must be incorporated in the proposal where applicable.

C. PRE-PROPOSAL MEETING

There will be no pre-proposal meeting.

D. PROPOSAL FORMAT

To be considered, each firm must submit a response to this RFP using the format provided in Section III. No other distribution of proposals is to be made by the consultant. An official authorized to bind the consultant to its provisions must sign the

proposal in ink. Each proposal must remain valid for at least ninety days from the due date of this RFP.

Proposals should be prepared simply and economically providing a straightforward, concise description of the consultant's ability to meet the requirements of the RFP. Mistakes may be crossed out and corrected and must be initialed in ink by the person signing the proposal.

E. SELECTION CRITERIA

Responses to this RFP will be evaluated using a point system as shown in Section III. A selection committee comprised of staff from the City will complete the evaluation.

The fee proposals will not be reviewed at the initial evaluation. After initial evaluation, the City will determine top consultants, and open only those fee proposals. The City will then determine which, if any, firms will be interviewed. During the interviews, the selected firms will be given the opportunity to discuss their proposal, qualifications, past experience, and their fee proposal in more detail. The City further reserves the right to interview the key personnel assigned by the selected consultant to this project.

All proposals submitted may be subject to clarifications and further negotiation. All agreements resulting from negotiations that differ from what is represented within the RFP or in the consultant's response shall be documented and included as part of the final contract.

F. SEALED PROPOSAL SUBMISSION

All proposals are due and must be delivered to the City Procurement Unit on, or before, December 20, 2016 at 2:00 p.m. (local time). Proposals submitted late or via oral, telephonic, telegraphic, electronic mail or facsimile **will not** be considered or accepted.

Each respondent must submit in a sealed envelope

- **one (1) original proposal**
- **three (3) additional proposal copies**
- **one (1) digital copy of the proposal preferably on a flash drive as one file in PDF format**

Each respondent must submit in a single separate sealed envelope marked Fee Proposal

- **two (2) copies of the fee proposal**

The fee proposal and all costs must be separate from the rest of the proposal.

Proposals submitted must be clearly marked: **"RFP No.989 – Barton Dam Piezometer Installation and Slope Stability Analysis**" and list the consultant's name and address.

Proposals must be addressed and delivered to:
City of Ann Arbor
c/o Customer Service
301 East Huron Street
P.O. Box 8647
Ann Arbor, MI 48107

All proposals received on or before the due date will be publicly opened and recorded on the due date. No immediate decisions will be rendered.

Hand delivered proposals must be date/time stamped by the Customer Service Department at the address above in order to be considered. Delivery hours are 9:00 a.m. to 3:00 p.m. Monday through Friday, excluding Holidays.

The City will not be liable to any consultant for any unforeseen circumstances, delivery, or postal delays. Postmarking on the due date will not substitute for receipt of the proposal. Consultants are responsible for submission of their proposal. Additional time will not be granted to a single consultant. However, additional time may be granted to all consultants at the discretion of the City.

A proposal will be disqualified if:

1. **The fee proposal is not contained within a separate sealed envelope.**
2. **The fee proposal is submitted as part of the digital copy. Provide fee proposal in hard copy only.**
3. **The forms provided as Attachment B - City of Ann Arbor Non-Discrimination Declaration of Compliance, Attachment C - City of Ann Arbor Living Wage Declaration of Compliance, Attachment D - Vendor Conflict of Interest Disclosure Form of the RFP Document must be included in submitted proposals.**

Proposals that fail to provide these completed forms listed above upon proposal opening will be deemed non-responsive and will not be considered for award.

G. DISCLOSURES

Under the Freedom of Information Act (Public Act 442), the City is obligated to permit review of its files, if requested by others. All information in a consultant's proposal is subject to disclosure under this provision. This act also provides for a complete disclosure of contracts and attachments thereto.

H. TYPE OF CONTRACT

A sample of the Professional Services Agreement is included as Appendix A. Those who wish to submit a proposal to the City are required to review the sample agreement carefully. **The City will not entertain changes to its Professional Services Agreement.**

The City reserves the right to award the total proposal, to reject any or all proposals in whole or in part, and to waive any informality or technical defects if, in the City's sole judgment, the best interests of the City will be so served.

This RFP and the selected consultant's response thereto, shall constitute the basis of the scope of services in the contract by reference.

I. HUMAN RIGHTS REQUIREMENTS

All contractors proposing to do business with the City shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the Section 9:158 of the Ann Arbor City Code. Breach of the obligation not to discriminate as outlined in Attachment B shall be a material breach of the contract. Contractors are required to post a copy of Ann Arbor's Non-Discrimination Ordinance attached at all work locations where its employees provide services under a contract with the City.

J. WAGE REQUIREMENTS

The Attachments provided herein outline the requirements for payment of prevailing wages or of a "living wage" to employees providing service to the City under this contract. The successful consultant must comply with all applicable requirements and provide documentary proof of compliance when requested.

K. CONFLICT OF INTEREST DISCLOSURE

The City of Ann Arbor Purchasing Policy requires that the consultant complete a Conflict of Interest Disclosure form. A contract may not be awarded to the selected consultant unless and until the Procurement Unit and the City Administrator have reviewed the Disclosure form and determined that no conflict exists under applicable federal, state, or local law or administrative regulation. Not every relationship or situation disclosed on the Disclosure Form may be a disqualifying conflict. Depending on applicable law and regulations, some contracts may awarded on the recommendation of the City Administrator after full disclosure, where such action is allowed by law, if demonstrated competitive pricing exists and/or it is determined the award is in the best interest of the City. A copy of the Conflict of Interest Disclosure Form is attached.

L. COST LIABILITY

The City of Ann Arbor assumes no responsibility or liability for costs incurred by the consultant prior to the execution of a Professional Services Agreement. The liability of the City is limited to the terms and conditions outlined in the Agreement. By submitting a proposal, consultant agrees to bear all costs incurred or related to the preparation, submission, and selection process for the proposal.

M. DEBARMENT

Submission of a proposal in response to this RFP is certification that the Respondent is not currently debarred, suspended, proposed for debarment, and declared ineligible or voluntarily excluded from participation in this transaction by any State or Federal departments or agency. Submission is also agreement that the City will be notified of any changes in this status.

N. PROPOSAL PROTEST

All proposal protests must be in writing and filed with the Purchasing Manager within five (5) business days of the award action. The consultant must clearly state the reasons for the protest. If a consultant contacts a City Service Area/Unit and indicates a desire to protest an award, the Service Area/Unit shall refer the consultant to the Purchasing Manager. The Purchasing Manager will provide the consultant with the appropriate instructions for filing the protest. The protest shall be reviewed by the City Administrator or designee, whose decision shall be final.

O. SCHEDULE

The proposals submitted should define an appropriate schedule in accordance with the requirements of the Proposed Work Plan in Section III.

The following is the schedule for this RFP process.

Activity/Event	**Anticipated Date**
Written Question Deadline	December 12, 2016, 10:00 a.m.
Proposal Due Date	December 20, 2016, 2:00 p.m.
Tentative Interviews (if needed)	T.B.D.
Selection/Negotiations	January 2017
Expected City Council Authorizations	March 2017

The above schedule is for information purposes only and is subject to change at the City's discretion.

P. IRS FORM W-9

The selected consultant will be required to provide the City of Ann Arbor an IRS form W-9.

Q. RESERVATION OF RIGHTS

1. The City reserves the right in its sole and absolute discretion to accept or reject any or all proposals, or alternative proposals, in whole or in part, with or without cause.
2. The City reserves the right to waive, or not waive, informalities or irregularities in terms or conditions of any proposal if determined by the City to be in its best interest.
3. The City reserves the right to request additional information from any or all consultants.
4. The City reserves the right to reject any proposal that it determines to be unresponsive and deficient in any of the information requested within RFP.
5. The City reserves the right to determine whether the scope of the project will be entirely as described in the RFP, a portion of the scope, or a revised scope be implemented.
6. The City reserves the right to select one or more consultants to perform services.
7. The City reserves the right to retain all proposals submitted and to use any ideas in a proposal regardless of whether that proposal is selected. Submission of a proposal indicates acceptance by the firm of the conditions contained in this RFP, unless clearly and specifically noted in the proposal submitted.
8. The City reserves the right to disqualify proposals that fail to respond to any requirements outlined in the RFP, or failure to enclose copies of the required documents outlined within RFP.

SECTION II - SCOPE OF SERVICES

1. Background

The City of Ann Arbor (City) owns, operates and maintains the Barton Dam (FERC ID 3142). The Dam was originally constructed in 1913 and is comprised of a powerhouse, spillway section and earthen embankments.

The right earthen embankment is approximately 1,500 feet long with a crest width of approximately 12 feet. The right embankment is constructed of mixed sand, clay and gravel overlying the stratified foundation soils consisting of interspersed layers of sand, gravel, and silty to sand clay. The upstream slope is generally 3H:1V and the downstream slope is generally 2H:1V. Riprap protection exists on the upstream slope and grass covers the downstream slope.

A series of seventy-five (75), 6-inch seepage drain tiles, spaced at approximately 15 feet, exist in the right embankment and discharge into a drainage ditch running along the toe of the embankment. Embankment seepage flows eastwards in the drainage ditch to a small pond at the toe of the right embankment near the spillway structure and is discharged to the river downstream of spillway via an 18-inch corrugated metal pipe.

In December 2014, in response to observed boils and seepage, the City hired a geotechnical engineering firm (CTI) to install six piezometers at Toe Drain 39/40. The piezometers were installed in three pairs. CTI analyzed 12 months of piezometer data, reviewed the slope stability of the embankment, and developmed recommendations. This analysis was completed in November 2015. It was CTI's assessment that seepage from the impoundment is passing through the sand layer in the foundation beneath the embankment.

Prior to implementing any recommendations from the CTI assessment, the City requested an independent peer review to be performed on the CTI report and the piezometer data. The City hired NTH Consultants to perform this task. It was NTH's assessment that rather than the seepage coming from the impoundment to the north, the seepage could be coming from high groundwater conditions to the south (railroad side of the embankment).

Because of the lack of clarity on the source and direction of seepage that the City is experiencing in the vicinity of Toe Drain 39/40, the City desires the installation of additional piezometers to more accurately define the groundwater regime.

The CTI and NTH reports are available for review at the Water Treatment Plant. Please contact the City to coordinate a time for review, if desired. Signing a non-disclosure agreement will be required.

2. Scope of Services

A. Review background data, soil borings, piezometer measurements, previous reports, etc.
B. Prepare the following deliverables which include, but are not limited to:
    a. Development of project plan. The project plan shall include such items as depth of each piezometer, number of piezometers recommended, proposed locations of piezometers, justification or basis for the recommendations, etc.
    b. Location map of proposed piezometers. The City has a background drawing already available. See attached sketch showing a preliminary layout of proposed piezometer locations. Consultant is responsible for verifying or modifying.
    c. Section drawing of proposed piezometers in the embankment.
    d. Piezometer detail drawing.
    e. As-built plan and section with surveyed elevations. Licensed surveyor shall also include elevations of impoundment, tail water, embankment, cross section, upland pond levels, etc.
    f. Plot of piezometer data and interpretation of the results. The Consultant shall collect 12-months' worth of piezometer data. If the data appears to be consistent, the Consultant shall begin their analysis after 6-months of collected data.
    g. Soil boring logs, laboratory data, and graphical presentation of strata.
    h. Seepage analyses and hydraulic gradients.
    i. Perform stability analysis of the embankment including determination of factors of safety, calculations, and/or program outputs. Stability analysis shall meet FERC requirements.
    j. Stability analysis shall be performed for various load conditions including normal headwater, high flood water, and different groundwater levels.
    k. Develop trigger levels for alarm conditions based on piezometer levels.
    l. Develop Standard Operating Procedure (SOP) for the measurement and logging for piezometer readings.
    m. Prepare report of findings and recommendations. Report shall include, but not be limited to the following:
        i. Alternatives for remediation. Consultant shall evaluate a variety of alternatives with differing complexities, construction techniques, construction costs, etc. A "do nothing" alternative shall be included. The effectiveness and feasibility of each alternative shall be compared.
        ii. Construction cost estimates for each alternative.
        iii. Assessment of urgency. This assessment shall be tied to the engineering calculations of the seepage analyses, stability analysis, safety factors, trigger levels, etc.
        iv. Proposed schedule for implementation of recommendations.
        v. Consultant shall determine whether this is a localized condition near TD 39/40, or if this is a global condition for the full 1,500-foot

embankment. Consultant shall strategize to what extent the remediation measures are to be employed.

C. Coordination with FERC
   a. All deliverables will be submitted to FERC. Consultant shall prepare cover letters on City electronic letterhead to assist with the submittals.
   b. Consultant shall respond to all questions raised by FERC.
   c. FERC previously submitted some questions following their review of the two reports by CTI and NTH. Excerpts from FERC's September 16, 2016 letter are as follows. Consultant's scope of work shall address and respond to each FERC question.
      i. CTI and NTH assumptions of shear strength parameters for the embankment fill and foundation materials were different. Limited information is available on embankment material stratigraphy and soil parameters for input into the stability analyses (NTH's report, Page 11). Subsequent engineering analysis should include a thorough evaluation of the field exploration and laboratory testing data in order to accurately characterize the embankment fills and foundation for the stability and seepage analyses.
      ii. Seepage analyses for estimating seepage flows and hydraulic gradients during normal pool and flood surcharge pool (FERC Guidelines Chapter 4 – Embankment Dams) were not included in the previous reports. These analyses are required to evaluate embankment stability and the potential effects of seepage gradients on the migration of fines. In the subsequent evaluation your consultant should perform seepage analyses incorporating the combined effect of the impoundment as well as the southernmost/westernmost highland's groundwater conditions defined based on data collected from pertinent piezometers. Piezometer data should be used to calibrate the seepage models. The analyses should include computation of seepage flows and hydraulic gradient distributions within the embankment and foundation, with particular attention to the foundation area near the toe drain.
      iii. The engineering analyses of the embankment and foundation should include an assessment of the impacts of internal erosion resulting from the migration of fines through the open joints of the toe drain tiles and the gravel material surrounding the drains. The condition of the drains was reported in the 2013 Part 12D Consultant's Safety Inspection Report (Section 1.2.5, page 3). Progressive migration of fines has the potential to compromise the integrity of the embankment and its foundation. The evaluation of the potential for fines migration should be based on the seepage analyses described above. The project history of migration of fines from some toe drains along with the quantity of solids collected at TD-23 between February 2014 and January 2015 should be considered in these evaluations.

iv. The subsurface exploration program should be prepared in accordance with FERC's "Guidelines for Drilling in the Near Embankment Dams and Their Foundations" available at the link below. Slot size of piezometer screens and gradation of filter material should be selected to prevent migration of embankment and foundation material into the piezometers. Detail selection criteria and description of the selected piezometer screen and filter materials should be included in the final subsurface exploration plan.
http://www.ferc.gov/industries/hydropower/safety/guidelines/eng-guide/drilling.asp.

v. The final exploration plan will determine the need for a geophysical survey, the location, number, and depth of borings, material sampling and testing requirements, piezometer locations and depths, and other pertinent information. The consultant should review any available geotechnical studies, project design and construction documentation, and available laboratory information in order to determine the information required to fill in gaps in the existing model of the hydro-geologic regime. The scope shall then be finalized in order to characterize shear strength and hydraulic conductivity parameters of the embankment fill and foundation materials for slope stability and seepage analyses.

vi. The number and location of borings and piezometers to be included in the final plan should consider groundwater observations at the following locations:
    1. Seepage and boils located near toe drain tiles TD-39 and TD-40.
    2. Near toe drain TD-23 where the largest seepage flows and fines migration discharge have historically been recorded. The highest seepage flows noted in TD-23 may be the result of localized conditions not present in other areas of the embankment and foundation.

D. Consultant shall perform the drilling and the installation of the piezometers either as self-performed work or as subcontracted with a qualified drilling company. Drilling shall include but not be limited to the following:
    a. Drill additional test borings as well as the installation of additional piezometers to better evaluate the subsurface groundwater regime and assess whether or not the presence of seepage and occasional boils are associated with leakage through or beneath the dam embankment or are originating from the higher upland areas to the south and west. More specifically:
        i. At approximately three locations, drill additional deep borings and install nested piezometers. One set of piezometers would be installed at the top of slope, one near the base of the railroad embankment and one between the railroad and upland pond to the south. Potential locations of the borings and piezometers are

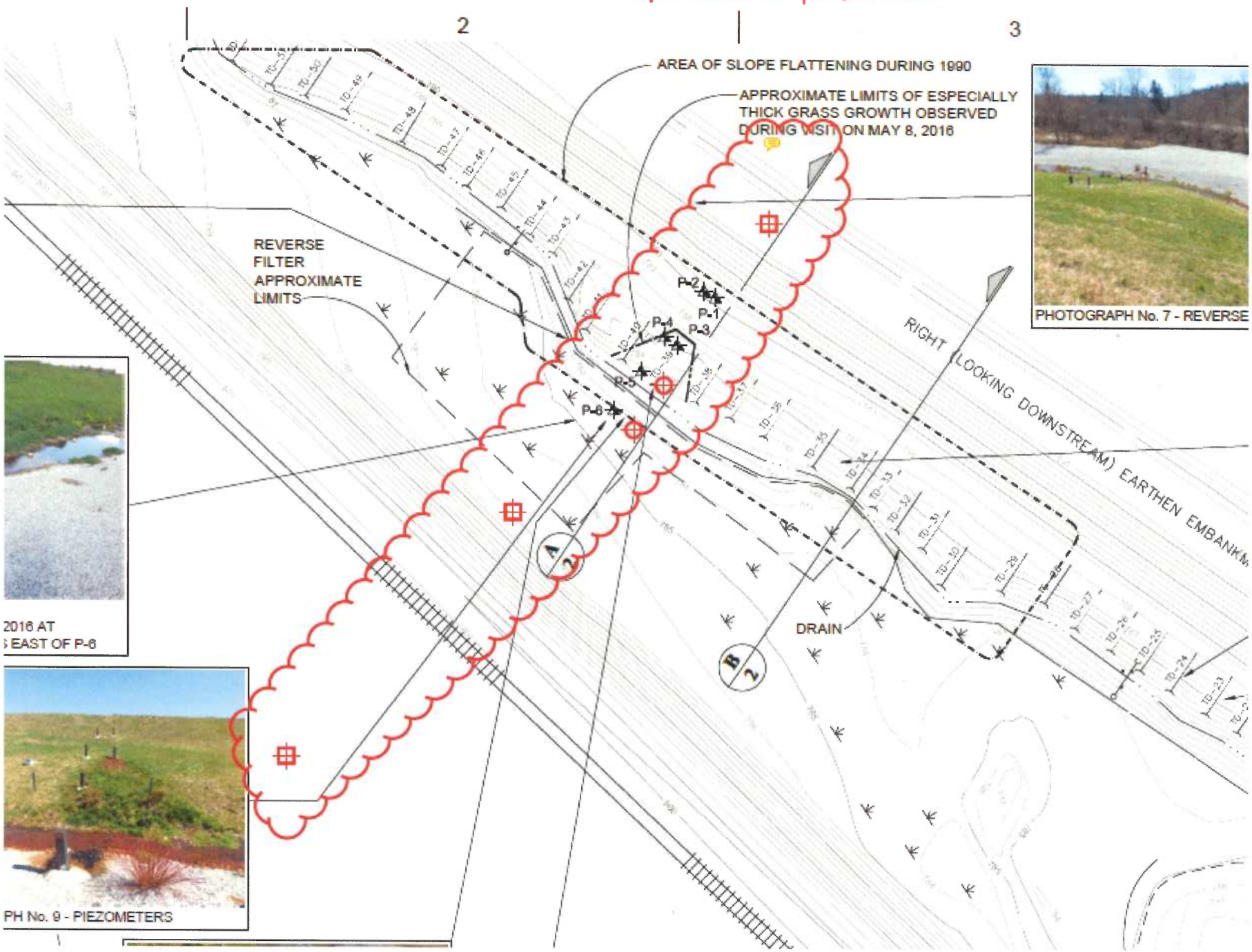
shown on Figure 1. Borings would be extended into the foundations soil until a relatively impermeable material is encountered. The piezometers would then be installed in the overlying embankment soils and the underlying granular foundation soils. **Consultant shall review the available documentation and confirm the assumptions. Consultant shall determine if one cross section of piezometers is sufficient. Consultant can recommend additional piezometers should there appear to be justification.**

ii. At approximately two locations adjacent to the toe drains, drill shallow borings to depths of 10 to 15-feet to better define ground conditions and install shallow piezometers.
iii. Piezometers would be installed to specific depths to better define the groundwater regime.
iv. Work shall include conducting a detailed field visual inspection of the area south of the railroad embankment to identify any groundwater or surface water features that may provide additional clarification to the marshy ground and elevated piezometric levels beyond the toe drain of the right embankment.
v. Consultant shall collect 12 months of piezometric data depending on consistency and stabilization. Once piezometric levels have stabilized, Consultant shall use the data to evaluate groundwater levels and flow patterns in the vicinity of the wells and right embankment.
vi. Based on the groundwater levels and flow patterns, evaluate their associated impact on the dam stability as well as previously determined factors of safety.
vii. Based on the new data, evaluate remedial measures to mitigate any negative impacts.

b. Additional drilling requirements include:
   i. Contact Miss Dig prior to drilling.
   ii. Prior to proposing, Consultant shall investigate accessibility for drilling equipment. There is limited clearance through the railroad via duct which provides access to the site. The steep slopes also present a challenge to the drilling operation. These conditions will affect the type of equipment suited for this project.
   iii. All drilling and piezometer installation shall be performed in accordance with FERC's Guidelines for Drilling In and Near Embankment Dams and their Foundations. A copy of these guidelines are included in the Appendix of this RFP.
   iv. Spoils shall be removed from the site.
   v. Soil samples of the different strata shall be jarred and given to the City.
   vi. Piezometer pipes shall extend approximately 3-feet above grade. If water levels and artesian pressures require taller piezometer pipes above grade, Consultant shall provide clear extension pipe

Possible Piezometer Locations

FIGURE 1



sections that can be fitted to the top.

vii. Piezometers shall be protected by the steel case, square in shape with a locking cap. The cap shall have a hasp. The City shall provide the locks.

viii. The steel case shall be set into concrete, approximately 12-inches thick, with rebar for crack control. A numbering system identifying each piezometer shall be scored into the concrete.

1. The scope of work shall also include the replacement of two concrete bases at existing piezometers that have cracked and displaced.

ix. Care shall be taken to avoid rutting and turf damage. Top soil, seed, and mulch shall be placed should damage occur.

x. If water levels in the piezometers are near grade or above grade, a tee shall be installed in the piezometer pipe to allow flow and reduce the potential for freezing.

E. Toe Drain 23

a. Toe Drain 23 has historically and consistently exhibited a large discharge flow in comparison to the other toe drains. A silt sock was installed and has demonstrated that a small passage of fines exists. An internal screen was installed in the toe drain to restrict the migration of fines, but it was found to blind quickly. This resulted in seepage through the joints in the toe drain, ultimately daylighting at the face of the embankment.

b. Consultant shall review Toe Drain 23 and its performance.

c. Fines discharging from TD 23 were collected on a monthly basis using a silt sock. Consultant shall review the collected fines samples.

i. The samples include a mixture of fines and iron bacteria. Consultant shall separate the fines and measure the volume for up to six samples.

ii. Compare the fines to the embankment and foundation materials collected from the piezometer borings.

d. Provide a recommendation to restrict the migration of fines.

e. Provide a sketch reflecting the recommendation.

f. Prepare a technical memorandum (separate from the piezometer report) presenting the findings associated with TD 23, recommendations, construction cost estimate, etc.

F. Meetings

a. Consultant shall attend up to 5 meetings, one of which may include attendance at a City Council Meeting. The preparation of some presentation slides may be necessary.

b. Consultant shall participate in conference calls with FERC as needed.

SECTION III - MINIMUM INFORMATION REQUIRED

PROPOSAL FORMAT

Consultants should organize Proposals into the following Sections:

A. Professional Qualifications
B. Past Involvement with Similar Projects
C. Proposed Work Plan
D. Fee Proposal (include in a separate sealed envelope clearly marked "Fee Proposal")
E. Authorized Negotiator
F. Attachments

The following describes the elements that should be included in each of the proposal sections and the weighted point system that will be used for evaluation of the proposals.

A. Professional Qualifications – 20 points

1. State the full name and address of your organization and, if applicable, the branch office or other subsidiary element that will perform, or assist in performing, the work hereunder. Indicate whether it operates as an individual, partnership, or corporation. If as a corporation, include whether it is licensed to operate in the State of Michigan.

2. Include the name of executive and professional personnel by skill and qualification that will be employed in the work. Show where these personnel will be physically located during the time they are engaged in the work. Indicate which of these individuals you consider key to the successful completion of the project. Identify only individuals who will do the work on this project by name and title. Resumes and qualifications are required for all proposed project personnel, including all subcontractors. Qualifications and capabilities of any subcontractors must also be included.

3. State history of the firm, in terms of length of existence, types of services provided, etc. Identify the technical details that make the firm uniquely qualified for this work.

B. Past involvement with Similar Projects – 30 points

The written proposal must include a list of specific experience in the project area and indicate proven ability in implementing similar projects for the firm **and** the individuals to be involved in the project. A complete list of client references must be provided for similar projects recently completed. It shall include the firm/agency name, address, telephone number, project title, and contact person.

C. Proposed Work Plan – 30 points

Provide a detailed and comprehensive description of how the Consultant intends to provide the services requested in this RFP. This discussion shall include, but not be limited to: how the project(s) will be managed and scheduled, how and when data will be delivered to the City, communication and coordination, the working relationship between the consultant and City staff, and the company's general philosophy in regards to providing the requested services.

Consultants shall include in this section a detailed project schedule. As a guideline in preparing the schedule, the following is provided below. Consultant shall make adjustments in their proposal as needed.

Approximate Project Schedule

- City Council award March 2017
- Insurance, Bonds, Endorsements, Signed Contracts April 2017.
- Project Kick Off May 2017
- Develop Project plan and Submit to FERC May 2017
- Drill and Install Piezometers July 2017
- 12 Months of Data Collection July 2017 through July 2018
- Analysis, Stability Calculations July 2018 through February 2019
- Prepare and Submit Final Report July 2019

Consultants shall be evaluated on the clarity, thoroughness, and content of their responses to the above items.

D. Fee Proposal - 20 points

Fee schedules shall be submitted in a separate, sealed, envelope as part of the proposal. Fee quotations are to include the names, title, hourly rates, overhead factors, and any other relevant details. The proposal should highlight key staff and positions that would likely be involved with projects. Consultants shall be capable of justifying the details of the fee proposal relative to personnel costs, overhead, how the overhead rate is derived, material and time.

In order to assist with the evaluation of the proposals, the fee schedule shall present the fee and hours subtotaled as follows:

a. Drilling, Piezometer Installation and monthly piezometer measuring
b. Stability Analysis/Calculations
c. All Other Piezometer Work including report, meetings, FERC coordination, deliverables, etc.
d. Toe Drain 23 evaluation and recommendations

E. Authorized Negotiator

Include the name, phone number, and e-mail address of persons(s) in your organization authorized to negotiate the agreement with the City

F. Attachments

Legal Status of Consultant, Conflict of Interest Form, Living Wage Compliance Form, and the Non-Discrimination Form must be completed and returned with the proposal. These elements should be included as attachments to the proposal submission.

PROPOSAL EVALUATION

1. The selection committee will evaluate each proposal by the above-described criteria and point system (A through C) to select a short-list of firms for further consideration. The City reserves the right to reject any proposal that it determines to be unresponsive and deficient in any of the information requested for evaluation. A proposal with all the requested information does not guarantee the proposing firm to be a candidate for an interview. The committee may contact references to verify material submitted by the consultants.

2. The committee then will schedule interviews with the selected firms if necessary. The selected firms will be given the opportunity to discuss in more detail their qualifications, past experience, proposed work plan and fee proposal.

3. The interview must include the project team members expected to complete a majority of work on the project, but no more than six members total. The interview shall consist of a presentation of up to thirty minutes (or the length provided by the committee) by the consultant, including the person who will be the project manager on this contract, followed by approximately thirty minutes of questions and answers. Audiovisual aids may be used during the oral interviews. The committee may record the oral interviews.

4. The firms interviewed will then be re-evaluated by the above criteria (A through C), and adjustments to scoring will be made as appropriate. After evaluation of the proposals, further negotiation with the selected firm may be pursued leading to the award of a contract by City Council, if suitable proposals are received.

The City reserves the right to waive the interview process and evaluate the consultants based on their proposals and fee schedules alone and open fee schedules before or prior to interviews.

The City will determine whether the final scope of the project to be negotiated will be entirely as described in this RFP, a portion of the scope, or a revised scope.

Work to be done under this contract is generally described through the detailed specifications and must be completed fully in accordance with the contract documents.

Any proposal that does not conform fully to these instructions may be rejected.

PREPARATION OF PROPOSALS

Proposals should have no plastic bindings but will not be rejected as non-responsive for being bound. Staples or binder clips are acceptable. Proposals should be printed double sided on recycled paper. Proposals should not be more than 25 sheets (50 sides), not including required attachments and resumes.

Each person signing the proposal certifies that he or she is the person in the consultant's firm/organization responsible for the decision as to the fees being offered in the Proposal and has not and will not participate in any action contrary to the terms of this provision.

ADDENDA

If it becomes necessary to revise any part of the RFP, notice of the addendum will be posted to Michigan Inter-governmental Trade Network (MITN) www.mitn.info and/or the City of Ann Arbor web site www.A2gov.org for all parties to download.

Each consultant must acknowledge in a cover letter all addenda it has received. The failure of a consultant to receive or acknowledge receipt of any addenda shall not relieve the consultant of the responsibility for complying with the terms thereof. The City will not be bound by oral responses to inquiries or written responses other than official written addenda.

SECTION IV - ATTACHMENTS

Attachment A - Legal Status of Respondent

Attachment B – Non-Discrimination Ordinance Declaration of Compliance Form

Attachment C – Living Wage Declaration of Compliance Form

Attachment D – Vendor Conflict of Interest Disclosure Form

Attachment E – Non-Discrimination Ordinance Poster

Attachment F – Living Wage Ordinance Poster

ATTACHMENT A
LEGAL STATUS OF RESPONDENT

(The Respondent shall fill out the provision and strike out the remaining ones.)

The Respondent is:

- A corporation organized and doing business under the laws of the state of _____, for whom _____ bearing the office title of _____, whose signature is affixed to this proposal, is authorized to execute contracts on behalf of respondent.*

  *If not incorporated in Michigan, please attach the corporation's Certificate of Authority

- A limited liability company doing business under the laws of the State of _____, whom _____ bearing the title of _____ whose signature is affixed to this proposal, is authorized to execute contract on behalf of the LLC.

- A partnership organized under the laws of the State of _____ and filed with the County of _____ , whose members are (attach list including street and mailing address for each.)

- An individual, whose signature with address, is affixed to this RFP.

Respondent has examined the basic requirements of this RFP and its scope of services, including all Addendum (if applicable) and hereby agrees to offer the services as specified in the RFP.

_____Date: _____,
Signature

(Print) Name _____ Title _____

Firm: _____

Address: _____

Contact Phone _____ Fax _____

Email _____

ATTACHMENT B
CITY OF ANN ARBOR DECLARATION OF COMPLIANCE

Non-Discrimination Ordinance

The "non discrimination by city contractors" provision of the City of Ann Arbor Non-Discrimination Ordinance (Ann Arbor City Code Chapter 112, Section 9:158) requires all contractors proposing to do business with the City to treat employees in a manner which provides equal employment opportunity and does not discriminate against any of their employees, any City employee working with them, or any applicant for employment on the basis of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight. It also requires that the contractors include a similar provision in all subcontracts that they execute for City work or programs.

In addition the City Non-Discrimination Ordinance requires that all contractors proposing to do business with the City of Ann Arbor must satisfy the contract compliance administrative policy adopted by the City Administrator. A copy of that policy may be obtained from the Purchasing Manager

The Contractor agrees:

(a) To comply with the terms of the City of Ann Arbor's Non-Discrimination Ordinance and contract compliance administrative policy.

(b) To post the City of Ann Arbor's Non-Discrimination Ordinance Notice in every work place or other location in which employees or other persons are contracted to provide services under a contract with the City.

(c) To provide documentation within the specified time frame in connection with any workforce verification, compliance review or complaint investigation.

(d) To permit access to employees and work sites to City representatives for the purposes of monitoring compliance, or investigating complaints of non-compliance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services in accordance with the terms of the Ann Arbor Non-Discrimination Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Non-Discrimination Ordinance, obligates the Contractor to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract.

_____
Company Name

_____
Signature of Authorized Representative Date

_____
Print Name and Title

_____
Address, City, State, Zip

_____
Phone/Email address

Questions about the Notice or the City Administrative Policy, Please contact:
Procurement Office of the City of Ann Arbor
(734) 794-6500

Revised 3/31/15 Rev. 0 NDO-2

ATTACHMENT C
CITY OF ANN ARBOR
LIVING WAGE ORDINANCE DECLARATION OF COMPLIANCE

The Ann Arbor Living Wage Ordinance (Section 1:811-1:821 of Chapter 23 of Title I of the Code) requires that an employer who is (a) a contractor providing services to or for the City for a value greater than $10,000 for any twelve-month contract term, or (b) a recipient of federal, state, or local grant funding administered by the City for a value greater than $10,000, or (c) a recipient of financial assistance awarded by the City for a value greater than $10,000, shall pay its employees a prescribed minimum level of compensation (i.e., Living Wage) for the time those employees perform work on the contract or in connection with the grant or financial assistance. The Living Wage must be paid to these employees for the length of the contract/program.

Companies employing fewer than 5 persons and non-profits employing fewer than 10 persons are exempt from compliance with the Living Wage Ordinance. If this exemption applies to your company/non-profit agency please check here [ ] *No. of employees* ___

The Contractor or Grantee agrees:

(a) To pay each of its employees whose wage level is not required to comply with federal, state or local prevailing wage law, for work covered or funded by a contract with or grant from the City, no less than the Living Wage. The current Living Wage is defined as $12.93/hour for those employers that provide employee health care (as defined in the Ordinance at Section 1:815 Sec. 1 (a)), or no less than $14.43/hour for those employers that do not provide health care. The Contractor or Grantor understands that the Living Wage is adjusted and established annually on April 30 in accordance with the Ordinance and covered employers shall be required to pay the adjusted amount thereafter to be in compliance (Section 1:815(3).

Check the applicable box below which applies to your workforce

[ ] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage without health benefits

[ ] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage with health benefits

(b) To post a notice approved by the City regarding the applicability of the Living Wage Ordinance in every work place or other location in which employees or other persons contracting for employment are working.

(c) To provide to the City payroll records or other documentation within ten (10) business days from the receipt of a request by the City.

(d) To permit access to work sites to City representatives for the purposes of monitoring compliance, and investigating complaints or non-compliance.

(e) To take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee covered by the Living Wage Ordinance or any person contracted for employment and covered by the Living Wage Ordinance in order to pay the living wage required by the Living Wage Ordinance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services or agrees to accept financial assistance in accordance with the terms of the Living Wage Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Living Wage Ordinance, obligates the Employer/Grantee to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract or grant of financial assistance.

_____
Company Name

_____
Signature of Authorized Representative Date

_____
Print Name and Title

_____
Address, City, State, Zip

_____
Phone/Email address

Questions about this form? Contact Procurement Office City of Ann Arbor Phone: 734/794-6500

Revised 2/17/16 Rev 0 LW-2

ATTACHMENT D

VENDOR CONFLICT OF INTEREST DISCLOSURE FORM

All vendors interested in conducting business with the City of Ann Arbor must complete and return the Vendor Conflict of Interest Disclosure Form in order to be eligible to be awarded a contract. Please note that all vendors are subject to comply with the City of Ann Arbor's conflict of interest policies as stated within the certification section below.

If a vendor has a relationship with a City of Ann Arbor official or employee, an immediate family member of a City of Ann Arbor official or employee, the vendor shall disclose the information required below.

1. No City official or employee or City employee's immediate family member has an ownership interest in vendor's company or is deriving personal financial gain from this contract.
2. No retired or separated City official or employee who has been retired or separated from the City for less than one (1) year has an ownership interest in vendor's Company.
3. No City employee is contemporaneously employed or prospectively to be employed with the vendor.
4. Vendor hereby declares it has not and will not provide gifts or hospitality of any dollar value or any other gratuities to any City employee or elected official to obtain or maintain a contract.
5. Please note any exceptions below:

Conflict of Interest Disclosure*	
Name of City of Ann Arbor employees, elected officials or immediate family members with whom there may be a potential conflict of interest.	( ) Relationship to employee ( ) Interest in vendor's company ( ) Other (please describe in box below)

*Disclosing a potential conflict of interest does not disqualify vendors. In the event vendors do not disclose potential conflicts of interest and they are detected by the City, vendor will be exempt from doing business with the City.

I certify that this Conflict of Interest Disclosure has been examined by me and that its contents are true and correct to my knowledge and belief and I have the authority to so certify on behalf of the Vendor by my signature below:

Vendor Name	**Vendor Phone Number**

Signature of Vendor Authorized Representative	**Date**	**Printed Name of Vendor Authorized Representative**

ATTACHMENT E
CITY OF ANN ARBOR NON-DISCRIMINATION ORDINANCE

Relevant provisions of Chapter 112, Nondiscrimination, of the Ann Arbor City Code are included below. You can review the entire ordinance at www. a2gov.org/departments/city-clerk

Intent: It is the intent of the city that no individual be denied equal protection of the laws; nor shall any individual be denied the enjoyment of his or her civil or political rights or be discriminated against because of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight.

Discriminatory Employment Practices: No person shall discriminate in the hire, employment, compensation, work classifications, conditions or terms, promotion or demotion, or termination of employment of any individual. No person shall discriminate in limiting membership, conditions of membership or termination of membership in any labor union or apprenticeship program.

Discriminatory Effects: No person shall adopt, enforce or employ any policy or requirement which has the effect of creating unequal opportunities according to actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight for an individual to obtain housing, employment or public accommodation, except for a bona fide business necessity. Such a necessity does not arise due to a mere inconvenience or because of suspected objection to such a person by neighbors, customers or other persons.

Nondiscrimination by City Contractors: All contractors proposing to do business with the City of Ann Arbor shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the guidelines of this section. All city contractors shall ensure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity and tends to eliminate inequality based upon any classification protected by this chapter. All contractors shall agree not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of any applicable protected classification. All contractors shall be required to post a copy of Ann Arbor's Non-Discrimination Ordinance at all work locations where its employees provide services under a contract with the city.

Complaint Procedure: If any individual has a grievance alleging a violation of this chapter, he/she has 180 calendar days from the date of the individual's knowledge of the allegedly discriminatory action or 180 calendar days from the date when the individual should have known of the alleged discriminatory action to file a complaint with the city's Human Rights Commission. If an individual fails to file a complaint alleging a violation of this chapter within the specified time frame, the complaint will not be considered by the Human Rights Commission. The complaint should be made in writing to the Human Rights Commission. The complaint may be filed in person with the City Clerk, by e-mail (hrc@a2gov.org), by phone (734-794-6141) or by mail (Ann Arbor Human Rights Commission, PO Box 8647, Ann Arbor, MI 48107). The complaint must contain information about the alleged discrimination, such as name, address, phone number of the complainant and location, date and description of the alleged violation of this chapter.

Private Actions For Damages or Injunctive Relief: To the extent allowed by law, an individual who is the victim of discriminatory action in violation of this chapter may bring a civil action for appropriate injunctive relief or damages or both against the person(s) who acted in violation of this chapter.

ATTACHMENT F

CITY OF ANN ARBOR LIVING WAGE ORDINANCE

RATE EFFECTIVE APRIL 30, 2016 - ENDING APRIL 29, 2017

$12.93 per hour
If the employer provides health care benefits*

$14.43 per hour
If the employer does **NOT** provide health care benefits*

Employers providing services to or for the City of Ann Arbor or recipients of grants or financial assistance from the City of Ann Arbor for a value of more than $10,000 in a twelve-month period of time must pay those employees performing work on a City of Ann Arbor contract or grant, the above living wage.

ENFORCEMENT

The City of Ann Arbor may recover back wages either administratively or through court action for the employees that have been underpaid in violation of the law. Persons denied payment of the living wage have the right to bring a civil action for damages in addition to any action taken by the City.

Violation of this Ordinance is punishable by fines of not more than $500/violation plus costs, with each day being considered a separate violation. Additionally, the City of Ann Arbor has the right to modify, terminate, cancel or suspend a contract in the event of a violation of the Ordinance.

* Health Care benefits include those paid for by the employer or making an employer contribution toward the purchase of health care. The employee contribution must not exceed $.50 an hour for an average work week; and the employer cost or contribution must equal no less than $1/hr for the average work week.

The Law Requires Employers to Display This Poster Where Employees Can Readily See It.

For Additional Information or to File a Complaint Contact Colin Spencer at 734/794-6500 or cspencer@a2gov.org

Revised 2/17/16 Rev.0

LW-1

APPENDIX A: SAMPLE PROFESSIONAL SERVICES AGREEMENT

If a contract is awarded, the selected Firm(s) will be required to adhere to a set of general contract provisions which will become a part of any formal agreement. These provisions are general principles which apply to all contractors/service providers to the City of Ann Arbor. The required provisions are:

SAMPLE PROFESSIONAL SERVICES AGREEMENT BETWEEN

_____
AND THE CITY OF ANN ARBOR
FOR _____

The City of Ann Arbor, a Michigan municipal corporation, having its offices at 301 E. Huron St. Ann Arbor, Michigan 48103 ("City"), and _____
_____
("Contractor") a(n) _____ _____
(State where organized) (Partnership, Sole Proprietorship, or Corporation)
with its address at _____
agree as follows on this _____ day of _____, 20___.

The Contractor agrees to provide services to the City under the following terms and conditions:

I. DEFINITIONS

Administering Service Area/Unit means _____.

Contract Administrator means _____, acting personally or through any assistants authorized by the Administrator/Manager of the Administering Service Area/Unit.

Deliverables means all Plans, Specifications, Reports, Recommendations, and other materials developed for and delivered to City by Contractor under this Agreement

Project means _____.
Project name

II. DURATION

This Agreement shall become effective on _____, 20____, and shall remain in effect until satisfactory completion of the Services specified below unless terminated as provided for in Article XI.

III. SERVICES

A. The Contractor agrees to provide _____
type of service
("Services") in connection with the Project as described in Exhibit A. The City retains the right to make changes to the quantities of service within the general scope of the Agreement at any time by a written order. If the changes add to or deduct from the extent of the services, the

contract sum shall be adjusted accordingly. All such changes shall be executed under the conditions of the original Agreement.

B. Quality of Services under this Agreement shall be of the level of quality performed by persons regularly rendering this type of service. Determination of acceptable quality shall be made solely by the Contract Administrator.

C. The Contractor shall perform its Services for the Project in compliance with all statutory, regulatory and contractual requirements now or hereafter in effect as may be applicable to the rights and obligations set forth in the Agreement.

D. The Contractor may rely upon the accuracy of reports and surveys provided to it by the City (if any) except when defects should have been apparent to a reasonably competent professional or when it has actual notice of any defects in the reports and surveys.

IV. INDEPENDENT CONTRACTOR

The Parties agree that at all times and for all purposes under the terms of this Agreement each Party's relationship to any other Party shall be that of an independent contractor. Each Party will be solely responsible for the acts of its own employees, agents, and servants. No liability, right, or benefit arising out of any employer/employee relationship, either express or implied, shall arise or accrue to any Party as a result of this Agreement.

V. COMPENSATION OF CONTRACTOR

A. The Contractor shall be paid in the manner set forth in Exhibit B. Payment shall be made monthly, unless another payment term is specified in Exhibit B, following receipt of invoices submitted by the Contractor, and approved by the Contract Administrator.

B. The Contractor will be compensated for Services performed in addition to the Services described in Section III, only when the scope of and compensation for those additional Services have received prior written approval of the Contract Administrator.

C. The Contractor shall keep complete records of work performed (e.g. tasks performed/hours allocated) so that the City may verify invoices submitted by the Contractor. Such records shall be made available to the City upon request and submitted in summary form with each invoice.

VI. INSURANCE/INDEMNIFICATION

A. The Contractor shall procure and maintain during the life of this contract such insurance policies, including those set forth in Exhibit C, as will protect itself and the City from all claims for bodily injuries, death or property damage which may arise under this contract; whether the act(s) or omission(s) giving rise to the claim

were made by the Contractor, any subcontractor or anyone employed by them directly or indirectly. In the case of all contracts involving on-site work, the

Contractor shall provide to the City, before the commencement of any work under this contract, documentation satisfactory to the City demonstrating it has obtained the policies and endorsements required by Exhibit C.

B. Any insurance provider of Contractor shall be admitted and authorized to do business in the State of Michigan and shall carry and maintain a minimum rating assigned by A.M. Best & Company's Key Rating Guide of "A-" Overall and a minimum Financial Size Category of "V". Insurance policies and certificates issued by non-admitted insurance companies are not acceptable unless approved in writing by the City.

C. To the fullest extent permitted by law, Contractor shall indemnify, defend and hold the City, its officers, employees and agents harmless from all suits, claims, judgments and expenses, including attorney's fees, resulting or alleged to result, from any acts or omissions by Contractor or its employees and agents occurring in the performance of or breach in this Agreement, except to the extent that any suit, claim, judgment or expense are finally judicially determined to have resulted from the City's negligence or willful misconduct or its failure to comply with any of its material obligations set forth in this Agreement.

VII. COMPLIANCE REQUIREMENTS

A. Nondiscrimination. The Contractor agrees to comply, and to require its subcontractor(s) to comply, with the nondiscrimination provisions of MCL 37.2209. The Contractor further agrees to comply with the provisions of Section 9:158 of Chapter 112 of the Ann Arbor City Code and to assure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity.

B. Living Wage. If the Contractor is a "covered employer" as defined in Chapter 23 of the Ann Arbor City Code, the Contractor agrees to comply with the living wage provisions of Chapter 23 of the Ann Arbor City Code. The Contractor agrees to pay those employees providing Services to the City under this Agreement a "living wage," as defined in Section 1:815 of the Ann Arbor City Code, as adjusted in accordance with Section 1:815(3); to post a notice approved by the City of the applicability of Chapter 23 in every location in which regular or contract employees providing services under this Agreement are working; to maintain records of compliance; if requested by the City, to provide documentation to verify compliance; to take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee or person contracted for employment in order to pay the living wage required by Section 1:815; and otherwise to comply with the requirements of Chapter 23.

VIII. WARRANTIES BY THE CONTRACTOR

A. The Contractor warrants that the quality of its Services under this Agreement shall conform to the level of quality performed by persons regularly rendering this type of service.

B. The Contractor warrants that it has all the skills, experience, and professional licenses necessary to perform the Services specified in this Agreement.

C. The Contractor warrants that it has available, or will engage, at its own expense, sufficient trained employees to provide the Services specified in this Agreement.

D. The Contractor warrants that it is not, and shall not become overdue or in default to the City for any contract, debt, or any other obligation to the City including real and personal property taxes.

E. The Contractor warrants that its proposal for services was made in good faith, it arrived at the costs of its proposal independently, without consultation, communication or agreement, for the purpose of restricting completion as to any matter relating to such fees with any competitor for these Services; and no attempt has been made or shall be made by the Contractor to induce any other perform or firm to submit or not to submit a proposal for the purpose of restricting competition.

IX. OBLIGATIONS OF THE CITY

A. The City agrees to give the Contractor access to the Project area and other City-owned properties as required to perform the necessary Services under this Agreement.

B. The City shall notify the Contractor of any defects in the Services of which the Contract Administrator has actual notice.

X. ASSIGNMENT

A. The Contractor shall not subcontract or assign any portion of any right or obligation under this Agreement without prior written consent from the City. Notwithstanding any consent by the City to any assignment, Contractor shall at all times remain bound to all warranties, certifications, indemnifications, promises and performances, however described, as are required of it under the Agreement unless specifically released from the requirement, in writing, by the City.

B. The Contractor shall retain the right to pledge payment(s) due and payable under this Agreement to third parties.

XI. TERMINATION OF AGREEMENT

A. If either party is in breach of this Agreement for a period of fifteen (15) days following receipt of notice from the non-breaching party with respect to a breach, the non-breaching party may pursue any remedies available to it against the breaching party under applicable law, including but not limited to, the right to terminate this Agreement without further notice. The waiver of any breach by any party to this Agreement shall not waive any subsequent breach by any party.

B. The City may terminate this Agreement, on at least thirty (30) days advance notice, for any reason, including convenience, without incurring any penalty, expense or

liability to Contractor, except the obligation to pay for Services actually performed under the Agreement before the termination date.

C. Contractor acknowledges that, if this Agreement extends for several fiscal years, continuation of this Agreement is subject to appropriation of funds for this Project. If funds to enable the City to effect continued payment under this Agreement are not appropriated or otherwise made available, the City shall have the right to terminate this Agreement without penalty at the end of the last period for which funds have been appropriated or otherwise made available by giving written notice of termination to Contractor. The Contract Administrator shall give Contractor written notice of such non-appropriation within thirty (30) days after it receives notice of such non-appropriation.

D. The provisions of Articles VI and VIII shall survive the expiration or earlier termination of this Agreement for any reason. The expiration or termination of this Agreement, for any reason, shall not release either party from any obligation or liability to the other party, including any payment obligation that has already accrued and Contractor's obligation to deliver all Deliverables due as of the date of termination of the Agreement.

XII. REMEDIES

A. This Agreement does not, and is not intended to, impair, divest, delegate or contravene any constitutional, statutory and/or other legal right, privilege, power, obligation, duty or immunity of the Parties.

B. All rights and remedies provided in this Agreement are cumulative and not exclusive, and the exercise by either party of any right or remedy does not preclude the exercise of any other rights or remedies that may now or subsequently be available at law, in equity, by statute, in any agreement between the parties or otherwise.

C. Absent a written waiver, no act, failure, or delay by a Party to pursue or enforce any rights or remedies under this Agreement shall constitute a waiver of those rights with regard to any existing or subsequent breach of this Agreement. No waiver of any term, condition, or provision of this Agreement, whether by conduct or otherwise, in one or more instances, shall be deemed or construed as a continuing waiver of any term, condition, or provision of this Agreement. No waiver by either Party shall subsequently effect its right to require strict performance of this Agreement.

XIII. NOTICE

All notices and submissions required under this Agreement shall be delivered to the respective party in the manner described herein to the address stated in this Agreement or such other address as either party may designate by prior written notice to the other. Notices given under this Agreement shall be in writing and shall be personally delivered, sent by next day express delivery service, certified mail, or first class U.S. mail postage prepaid, and addressed to the person listed below. Notice will be deemed given on the date when one of the following first occur: (1) the date of actual receipt; (2) the next business day when notice is sent next day express delivery service or personal delivery; or (3) three days after mailing first class or certified U.S. mail.

If Notice is sent to the CONTRACTOR, it shall be addressed and sent to:

If Notice is sent to the CITY, it shall be addressed and sent to:

City of Ann Arbor

_____
(insert name of Administering Service Area Administrator)

301 E. Huron St.
Ann Arbor, Michigan 48103

XIV. CHOICE OF LAW AND FORUM

This Agreement will be governed and controlled in all respects by the laws of the State of Michigan, including interpretation, enforceability, validity and construction, excepting the principles of conflicts of law. The parties submit to the jurisdiction and venue of the Circuit Court for Washtenaw County, State of Michigan, or, if original jurisdiction can be established, the United States District Court for the Eastern District of Michigan, Southern Division, with respect to any action arising, directly or indirectly, out of this Agreement or the performance or breach of this Agreement. The parties stipulate that the venues referenced in this Agreement are convenient and waive any claim of non-convenience.

XV. OWNERSHIP OF DOCUMENTS

Upon completion or termination of this Agreement, all documents (i.e., Deliverables) prepared by or obtained by the Contractor as provided under the terms of this Agreement shall be delivered to and become the property of the City. Original basic survey notes, sketches, charts, drawings, partially completed drawings, computations, quantities and other data shall remain in

the possession of the Contractor as instruments of service unless specifically incorporated in a deliverable, but shall be made available, upon request, to the City without restriction or limitation on their use. The City acknowledges that the documents are prepared only for the Project. Prior to completion of the contracted Services the City shall have a recognized proprietary interest in the work product of the Contractor.

Unless otherwise stated in this Agreement, any intellectual property owned by Contractor prior to the effective date of this Agreement (i.e., Preexisting Information) shall remain the exclusive property of Contractor even if such Preexisting Information is embedded or otherwise incorporated in materials or products first produced as a result of this Agreement or used to develop Deliverables. The City's right under this provision shall not apply to any Preexisting Information or any component thereof regardless of form or media.

XV. CONFLICTS OF INTEREST OR REPRESENTATION

Contractor certifies it has no financial interest in the Services to be provided under this Agreement other than the compensation specified herein. Contractor further certifies that it presently has no personal or financial interest, and shall not acquire any such interest, direct or indirect, which would conflict in any manner with its performance of the Services under this Agreement.

Contractor agrees to advise the City if Contractor has been or is retained to handle any matter in which its representation is adverse to the City. The City's prospective consent to the Contractor's representation of a client in matters adverse to the City, as identified above, will not apply in any instance where, as the result of Contractor's representation, the Contractor has obtained sensitive, proprietary or otherwise confidential information of a non-public nature that, if known to another client of the Contractor, could be used in any such other matter by the other client to the material disadvantage of the City. Each matter will be reviewed on a case by case basis.

XVII. SEVERABILITY OF PROVISIONS

Whenever possible, each provision of this Agreement will be interpreted in a manner as to be effective and valid under applicable law. However, if any provision of this Agreement or the application of any provision to any party or circumstance will be prohibited by or invalid under applicable law, that provision will be ineffective to the extent of the prohibition or invalidity without invalidating the remainder of the provisions of this Agreement or the application of the provision to other parties and circumstances.

XVIII. EXTENT OF AGREEMENT

This Agreement, together with any affixed exhibits, schedules or other documentation, constitutes the entire understanding between the City and the Contractor with respect to the subject matter of the Agreement and it supersedes, unless otherwise incorporated by reference herein, all prior representations, negotiations, agreements or understandings whether written or

oral. Neither party has relied on any prior representations, of any kind or nature, in entering into this Agreement. No terms or conditions of either party's invoice, purchase order or other administrative document shall modify the terms and conditions of this Agreement, regardless of the other party's failure to object to such form. This Agreement shall be binding on and shall inure to the benefit of the parties to this Agreement and their permitted successors and permitted assigns and nothing in this Agreement, express or implied, is intended to or shall confer on any other person or entity any legal or equitable right, benefit, or remedy of any nature whatsoever under or by reason of this Agreement. This Agreement may only be altered, amended or modified by written amendment signed by the Contractor and the City. This Agreement may be executed in counterparts, each of which shall be deemed an original, but all of which together shall be deemed to be one and the same agreement.

FOR CONTRACTOR

By _____
Type Name

Its

FOR THE CITY OF ANN ARBOR

By _____
Christopher Taylor, Mayor

By _____
Jacqueline Beaudry, City Clerk

Approved as to substance

_____
City Administrator

_____
Type Name
Service Area Administrator

Approved as to form and content

_____
Stephen K. Postema, City Attorney

EXHIBIT A
SCOPE OF SERVICES

(Insert/Attach Scope of Work & Deliverables Schedule)

EXHIBIT B
COMPENSATION

General

Contractor shall be paid for those Services performed pursuant to this Agreement inclusive of all reimbursable expenses (if applicable), in accordance with the terms and conditions herein. The Compensation Schedule below/attached states nature and amount of compensation the Contractor may charge the City:

(insert/Attach Negotiated Fee Arrangement)

EXHIBIT C
INSURANCE REQUIREMENTS

Effective the date of this Agreement, and continuing without interruption during the term of this Agreement, Contractor shall provide certificates of insurance to the City on behalf of itself, and when requested any subcontractor(s). The certificates of insurance shall meet the following minimum requirements.

A. The Contractor shall have insurance that meets the following minimum requirements:

1. Professional Liability Insurance or Errors and Omissions Insurance protecting the Contractor and its employees in an amount not less than $1,000,000.

2. Worker's Compensation Insurance in accordance with all applicable state and federal statutes. Further, Employers Liability Coverage shall be obtained in the following minimum amounts:

   Bodily Injury by Accident - $500,000 each accident
   Bodily Injury by Disease - $500,000 each employee
   Bodily Injury by Disease - $500,000 each policy limit

3. Commercial General Liability Insurance equivalent to, as a minimum, Insurance Services Office form CG 00 01 07 98 or current equivalent. The City of Ann Arbor shall be an additional insured. There shall be no added exclusions or limiting endorsements which diminish the City's protections as an additional insured under the policy. Further, the following minimum limits of liability are required:

$1,000,000	Each occurrence as respect Bodily Injury Liability or Property Damage Liability, or both combined
$2,000,000	Per Job General Aggregate
$1,000,000	Personal and Advertising Injury

4. Motor Vehicle Liability Insurance, including Michigan No-Fault Coverages, equivalent to, as a minimum, Insurance Services Office form CA 00 01 07 97 or current equivalent. Coverage shall include all owned vehicles, all non-owned vehicles and all hired vehicles. Further, the limits of liability shall be $1,000,000 for each occurrence as respects Bodily Injury Liability or Property Damage Liability, or both combined.

5. Umbrella/Excess Liability Insurance shall be provided to apply in excess of the Commercial General Liability, Employers Liability and the Motor Vehicle coverage enumerated above, for each occurrence and for aggregate in the amount of $1,000,000.

B. Insurance required under A.3 above shall be considered primary as respects any other valid or collectible insurance that the City may possess, including any self-insured retentions the City may have; and any other insurance the City does possess shall be considered excess insurance only and shall not be required to contribute with this insurance. Further, the Contractor agrees to waive any right of recovery by its insurer against the City.

C. Insurance companies and policy forms are subject to approval of the City Attorney, which approval shall not be unreasonably withheld. Documentation must provide and demonstrate an unconditional 30 day written notice of cancellation in favor of the City of Ann Arbor. Further, the documentation must explicitly state the following: (a) the policy number; name of insurance company; name and address of the agent or authorized representative; name and address of insured; project name; policy expiration date; and specific coverage amounts; (b) any deductibles or self-insured retentions which shall be approved by the City, in its sole discretion; (c) that the policy conforms to the requirements specified. Contractor shall furnish the City with satisfactory certificates of insurance and endorsements prior to commencement of any work. Upon request, the Contractor shall provide within 30 days a copy of the policy(ies) to the City. If any of the above coverages expire by their terms during the term of this contract, the Contractor shall deliver proof of renewal and/or new policies to the Administering Service Area/Unit at least ten days prior to the expiration date.

APPENDIX B: FERC GUIDELINES FOR DRILLING IN AND NEAR EMBANKMENT DAMS AND THEIR FOUNDATIONS

GUIDELINES FOR DRILLING IN AND NEAR EMBANKMENT DAMS AND THEIR FOUNDATIONS

1.0 INTRODUCTION/PURPOSE

1.1 Objective

The primary purpose of this document is to provide guidance for drilling in and near embankment dams and their foundations. Of special emphasis is the prevention of damage to the embankment, structures, and their foundations from hydraulic fracturing, heave, erosion, filter/drain contamination, or other mechanisms during drilling-related activities.

The need for any investigation (drilling, testing, etc.) at a dam site should have been presented to and accepted by FERC prior to developing an investigation program requiring drilling activities in or adjacent to a dam. In addition, it should have been demonstrated that any potential damage to the structure created by the drilling and associated processes is outweighed by the need for the drilling data. It is not the purpose of this document to provide an all-inclusive guidance or best practices on considerations for the development of a subsurface exploration or investigation program for a dam.

A guiding principle inherent in any potential dam investigation or testing is DO NO HARM. In developing investigation plans it is important to identify the potential risks and develop and implement plans to mitigate, manage, or avoid those risks.

These guidelines are appropriate for FERC-regulated embankment dam or other earthen water retaining structures (levee, canal embankment, etc.) – any earthen structure that's responsible for holding back water or serves to provide direct support to the feature or element that is holding back the water, including its foundation.

Much of the information in Sections 3.0 and 4.0 of these guidelines have been taken from or modified from the following documents:

1. U.S. Army Corps of Engineers, "Drilling in Earth Embankments and Levees", ER 1110-1-1807, Washington, DC, December 31, 2014.

2. Bureau of Reclamation, "Guidelines for Drilling and Sampling in Embankment Dams", Denver, CO, August 2010.

1.2 Scope

Much of the information contained in this guideline has principles and applications to other forms and purposes of investigation, maintenance, construction, modification, or other activity that physically penetrates the dam or foundation, including:

- Test pits/trenches
- Drilling holes/borings and probes

- Dynamic loads/pulses/blasts
- Excavations, including grading/regrading and foundation installations/construction
- Utility installation, including buried conduits, utility vaults, utility poles, etc.
- Concrete removal/demolition
- Drain and relief well cleaning/maintenance
- Toe drain/drainage feature modifications/repair
- Penetrations, including conduits, horizontal drilling activities, etc.
- Grouting or other pressure injection/testing activities
- Removal of large vegetation, trees, and root balls

These apply to any area subject to seepage pressures, stability influences or have the potential to cause harm to the water retaining structure or its foundation.

2.0 BACKGROUND

There is a very real potential for damaging structures during the drilling process if these guidelines are not followed. Damage created by hydraulic fracturing during the drilling process (use of inappropriate drilling methods), improper in-situ sampling techniques, and/or unacceptable methods of completing (backfilling) borings can open seepage paths which could create conditions conducive to internal erosion (piping) and ultimately dam failure. Although not particularly well documented, there are a number of case histories that have highlighted the potential dangers that can happen as the result of improper planning, using improper drilling methods in dams, not having the appropriate drilling equipment and contingency plans, not having knowledgeable field staff present on-site during the drilling operations, and other factors (France, 2002).

There is also some not well publicized guidance on precautions in developing investigation programs, precautions on appropriate drilling methods, and other 'rules of thumb' that are important to consider and others that should be avoided.

Drilling in embankments often does not provide conclusive data related to seepage and piping problems within a structure. The chance of finding a disturbed zone in a dam by drilling is small, and there could be great risk. Piezometers can be installed to monitor seepage problems, but they are only effective if the problem area is known. One case for drilling into embankments could be to collect samples to evaluate filter criteria of transition zones within the structure. This can be accomplished with shallow drilling, preferably above the phreatic surface in the dam and sometimes at angles into the structure to target transition zones. Holes could be drilled from the crest or downstream shell of the structure, index tests performed, and soil samples obtained. Care must be taken during drilling to be sure that internal drainage features are not damaged or contaminated. If drilling must be performed in a dam subject to seepage and piping problems, seepage flows need to be monitored continuously during the investigation, and drilling fluids need to be controlled as discussed in the section on drilling.

Dams with seepage problems may require investigation to determine the condition, location, or even whether drains exist in the structure. In these cases, test pit excavations may be attempted. However, the possibility for piping of the foundation into an excavation or drill hole could exist

and should be carefully assessed. Some dams already may have evidence of critical gradient development at the toe or into drains or manholes. Drilling at the toe of the dam is risky even if seepage is not evident. If there is concern about the occurrence of piping, a contingency plan must be developed. For example, for test pitting at the toe, if critical gradient piping is a concern, materials to stop progressive erosion in the trench must be ready. For this situation, it is recommended to stockpile fine (C33 concrete sand) and coarse processed aggregates and geotextiles at or near the site to filter and plug the excavation. If drill holes must be advanced under a critical gradient condition, one should consider the construction of drill berms at the toe.

Liquefaction investigations often require drilling through the shell or crest of a dam to perform standard penetration tests (SPTs) in embankment core and/or unconsolidated foundation materials under the structure. Testing can also be performed at the downstream toe, but these soils often are not consolidated like those under the dam, and at times it is preferable to test the material under the structure. However, holes are often drilled in alluvium at the toe of a structure. Materials also can be investigated in accessible test pits to evaluate the density of the soil. In some cases, drilling can be performed from the crest of the dam as long as the cutoff trench or wall is not penetrated. Access roads may be required on the downstream slope or, in rarer occurrences, on the upstream slope if water levels allow.

The preferred method of determining SPT results in loose sands below the water table is by fluid rotary drilling where the mud pressures and hydrostatic forces can be used to stabilize the sands. However, in locations that include concerns with possible hydraulic fracturing, use of hollow-stem augers (HSA) is preferred.

In 2000, a FEMA-sponsored workshop was convened with a group of experts with respect to dam safety issues associated with seepage through embankments and their foundations (FEMA, 2000). As part of that workshop, the participants offered the following recommendations relative to the investigation and monitoring of seepage problems and concerns:

- Although actual investigation practices vary widely, it was the consensus of the workshop participants that the recommended state-of-the-practice should be that drilling should not be done in the core of an existing embankment dam unless absolutely necessary, and then only with carefully planned precautions and dry drilling (e.g., auger) methods. The risk of hydraulic fracturing is too great to support drilling in the core without appropriate justification.

- It was the consensus of the workshop participants that drilling or test pitting should not be done at the downstream toe of a dam with water stored in the reservoir, without contingency plans and stockpiling of weighted filter materials (e.g., sand and gravel) to be used in the event of a seepage incident. It is also essential that such explorations be completed with the on-site presence of experienced personnel with the knowledge to react appropriately to any seepage incidents that may occur.

- It was the consensus of the workshop participants that they generally advised against installing piezometers in an embankment core, unless there were very compelling reasons for the instruments. The workshop participants felt that, in most cases, piezometers in the

core do not provide significant additional understanding of the performance of the dam beyond that which can be obtained from piezometers in the upstream and downstream shells, which are much safer locations for the instruments.

- Piezometers are tools whose careful installation and subsequent data interpretation, in conjunction with other investigative techniques, may provide valuable information in diagnosing seepage conditions. However, the limitations of what the piezometers record must be recognized, and the piezometer data must be used in conjunction with other information (e.g., seepage rates, seepage locations, etc.) to correctly diagnose seepage conditions. Since piping channels in embankments are often relatively long, narrow features, it is highly unlikely that piezometers will be located at exactly the correct locations to provide direct data regarding the piping phenomenon.

3.0 PLANNING/PROJECT INFORMATION

When planning an investigation program, the first consideration is if the need for the data to be collected justifies the cost and potential risk to the structure created by the data collection process. A determination of potential consequences if no action is taken should be made. These consequences should include both risk and likelihood for worsening conditions, which could drive up future cost of remediation if required. When and where possible, the determination of consequences should be performed with available data. However, a scaled down investigation program may be required before an adequate assessment can be performed.

If data collection is justified, a multidiscipline exploration team should be formed to determine exploration components required to adequately address the data needs. The exploration team should consist of engineers, geologists, and others with the requisite knowledge and experience in planning and conducting field exploration programs for dams. The exploration team should thoroughly discuss data needs and investigation plans to ensure compatibility.

A thorough search of all available records should precede any investigation program. Sources of information that could be useful in evaluating the need to collect additional data include:

- Geologic mapping, logs, and reports from previous investigations and construction
- Owner and FERC project files
- Supporting Technical Information (STI) document
- Current and past consultant files
- Records of design and construction, including photographs
- Archived records
- Project records at field offices and at the project site.

The exploration program should consider:

- Purpose of the investigation
- Cost of the exploration
- Required sample type and size (disturbed or undisturbed)
- Acceptable drilling and investigative methods

- Depth, diameter, and inclination of drilling required
- Materials to be drilled and sampled
- Utilities, surface and underground obstacles, and accessibility
- Location of any seepage cutoff walls, blankets and drainage features and pipes
- Dam foundation geometry and drilling hazards
- Instrumentation and completion requirements

The investigation may also require clearances, permits, and traffic control plans. The investigation schedule must allow time to obtain clearances and permits. In most cases, National Environmental Policy Act (NEPA) compliance activities will be required. Under the National Historic Preservation Act, some sites may require inspection by an archeologist and a permit from the State Historic Preservation Officer (SHPO).

4.0 DRILLING ACTIVITIES

4.1 General

Drilling into, in close proximity to, or through dams and their foundations may pose significant risk to the structures. Water, compressed air, and various drilling fluids have been used as circulating media while drilling through dams and their foundations. Although these methods have been successful in accomplishing the intended purposes, there have been incidents of damage to embankments and foundations (Sherard, 1973). While using air (including air with foam), there have been reports of loss of circulation with pneumatic fracturing of the embankment as evidenced by connections to other borings and blowouts on embankment slopes. While using water and drilling mud as the circulating medium, there have been similar reports of erosion and/or hydraulic fracturing of the embankment or foundation materials. Conversely, there have been cases where heave, borehole collapse, and significant disturbance have occurred while drilling in granular materials below the groundwater level. This typically has been the result of not using a proper drilling fluid to balance the water pressures in the soil or using high energy systems that induce heave in order to evacuate the cuttings. There is a delicate balance between too much induced fluid pressure that will cause hydraulic fracture and not enough fluid pressure that will result in borehole instability, heave, or significant sample disturbance. Other potential damaging effects include: creating preferential seepage paths due to improper backfilling, inadequate protection of embankment from drilling fluids during foundation rock coring, erosion and widening of cracks, and inadvertently clogging filters or drains with drilling fluid or grout.

All drilling and associated activities that use fluid or other circulation or stabilization media need to be evaluated for the potential to hydraulically fracture the embankment or foundation. These activities include but are not limited to the use of drilling fluids, backfilling borings after completion, backfill grouting of instrumentation, backfill grouting of casings, water testing for permeability, piezometer rehabilitation, etc. The risk will vary with the selected methods and the site conditions. Every drilling operation must be well thought out and must have benefits of successful completion that confidently outweigh the risk of potential negative impacts.

4.2 Drilling Hazards

The following is a brief discussion of some common drilling hazards that must be considered, evaluated, and mitigated for in developing and implementing an exploration program.

4.2.1 Hydraulic Fracturing

Excessive pressures from water, air, drilling fluid, or grout can fracture embankment and foundation materials. Hydraulic fracturing problems have occurred while drilling in embankments as evidenced by reports of loss of fluid circulation, blowouts into nearby borings, seepage of drilling fluids on the face of the embankment, and other similar situations. Hydraulic fracture can occur in both cohesive materials and cohesionless materials, and bedrock. It has been found that in soils, hydraulic fracturing can occur when the borehole pressure exceeds the lowest total confining stress (minimum principal stress, $\sigma 3$) plus some additional strength (Sherard, 1986). The additional strength can be approximated by the undrained shear strength of the soil. The minor principal confining stress ($\sigma 3$) in a normally consolidated soil with a level ground condition is typically the horizontal stress, which can be reasonably estimated. However, the minor principal confining stress in and under an embankment is difficult to determine and can vary significantly from idealized geostatic conditions. Effects from the side slope geometry, piezometric surface, abutment configuration, foundation rock geometry, embedded structures, compaction stress, and settlement history all are significant and can influence in-situ stress conditions. Typical drilling methods that use circulation fluids can quickly create induced fluid pressures that exceed the minimum confining stress. This often occurs when the return path for the fluid clogs or blocks off and the induced fluid pressures quickly increase. The use of non-pressurized stabilizing fluids is preferable, yet in some subsurface conditions, hydraulic fracture can occur under gravity pressure. Low stress zones may exist within and under embankments. It is possible for the confining stress in these locations to be much less than the gravity pressure exerted by a drilling fluid or grout.

Certain embankment locations and conditions have a higher potential for hydraulic fracturing due to geometric configurations that create zones of low confining stress. Sherard 1973 and 1986 are good references that provide a comprehensive evaluation of the issues along with numerous case histories. Locations and conditions where hydraulic fracturing by drilling media is more likely to occur and have the higher potential of damaging the structure include the following:

- Near and over steep abutments that create low confining or tensile stress conditions.
- Adjacent to rock overhangs on abutments.
- Adjacent to buried structures or abrupt foundation geometry change that creates a differential settlement condition and a zone of lower soil stress transfer.
- Adjacent to conduits where narrow zones of soil backfill were placed between the structure and rock face.
- Dam cores that can experience more settlement than the adjacent shells.
- Dams in very narrow valleys. Arching keeps full confining stresses from developing.
- Near abutments where abrupt changes in geometry occur.

- In areas where the embankment is subject to differential settlement due to large differences in thickness of adjacent compressible foundation or embankment soils.

Accurately estimating in-situ embankment stresses can be difficult for the conditions listed above. In some cases, it may be helpful to calculate static stresses including seepage forces within the embankment. The results of such computations can aid in evaluating the maximum applied drilling fluid pressures or static grouting head for borehole backfill. However, with any such computation, judgment is required in applying the results.

Additional references on hydraulic fracturing are included in Appendix A.

4.2.2 Artesian Conditions/Blowout

In situations where the presence of higher fluid pressures in the subsurface materials is suspected, either at the ground surface or at depth, it may be necessary to install a surface casing to control artesian pressures if the pressures are anticipated to be significant and/or derived directly from reservoir head. Surface casing of slightly larger diameter than the augers or drill string to be used is grouted in place and allowed to set prior to advancing the borehole to depth. If flow from the borehole occurs, the surface casing provides a means of controlling it by blocking off the space between the augers/drill rods and well casing. When the static water level is very near the ground surface or artesian conditions prevail, one should consider elevating the drilling rig on a temporary drill berm to raise the drill hole collar elevation. In extreme cases, the berm should consist of filter zones. Specific details such as height of the drill pad and amount of surface casing must be developed on a case-by-case basis dependent upon specific conditions present at the site. Even if artesian pressures are not expected at a given site, potential risk requires contingency plans be in place in case these conditions arise.

If holes must be advanced at the toe of a dam that has a critical gradient condition, planning and precautions should be developed. In all cases, issues of this nature should be identified and addressed by the exploration team prior to commencement of work. In these areas, it is necessary to maintain a positive hydrostatic pressure on the drill hole to prevent a "blowout." In instances when higher pressures are not anticipated, the addition of commercial densifiers to the drill mud may successfully address the concern.

4.2.3 Erosion

The introduction of drilling fluids into cracks, either existing or formed by hydraulic fracture, can potentially cause erosion along the crack walls. This will enlarge the crack and could lead to an increased potential for internal erosion. Existing subsurface cracks are common in many dams and are often the result of differential settlement. The locations most at risk for existing cracks are typically the same areas that have low confining stress and have the highest risk for hydraulic fracture to occur.

4.2.4 Contamination of Filter/Drainage Features

In addition to hydraulic fracturing, the use of drilling fluids can pose a contamination risk for internal drainage features if the drill fluid or sealing grout migrates into and clogs the drain or filter materials. Avoid drilling near drains or seepage blankets that may become contaminated by fluids. If drain penetration is justified, special provisions must be taken to prevent contamination. Special provisions may also be required for protecting the drainage features while backfilling the hole (such as placement of filter material through the zone of the drain or filter and installing lower and upper seals).

4.2.5 Heave and Sample Disturbance

Drilling programs that include performing in-situ tests or undisturbed sampling may require the use of drilling fluid to offset the confining stress relieved by the drilling of the hole. There have been cases where the failure to prevent stress relief or heave of granular soils below the water table have led to invalid in-situ test results and subsequently invalid interpretation of the subsurface conditions. This has occurred for both tests performed in drill holes and test performed in casings installed by methods that did not control heave or disturbance.

BOR (1999) contains methods to deal with heaving sands while drilling and performing Standard Penetration Tests. If high quality undisturbed samples of fine grained soils are required for shear strength testing, then drilling mud may be required to prevent the soil from failing in undrained triaxial extension. See Ladd and DeGroot (2004) for a discussion on clay sample disturbance due to drilling.

Prior to embarking on any drilling activity, the exploration team should consider, at a minimum, these potential drilling hazards and develop the drilling plans to avoid or mitigate these hazards. If the hazards cannot be avoided, then the risks must be evaluated and mitigated in the drilling plan.

4.3 Drilling Methods

There are numerous drilling methods available to perform geotechnical investigations. The American Society of Testing and Materials (ASTM D6286) provides a comprehensive guide for drilling methods and groups individual practices for eight drilling methods (ASTM, 2006). Other good texts on drilling include The Bureau of Reclamations Earth Manual, Part I, Third Edition, Chapter 2 (BOR, 1998), the Australian Drilling Manual (ADI, 1992), and the National Drill Association Drilling Manual (NDI, 1990). Details of these drilling methods are not discussed in-depth in this guide.

Nine major drilling methods are briefly discussed below. Table 1 provides a quick reference to each method. All drilling methods that use air or fluid media have the potential to create hydraulically-induced fractures. Air drilling methods use high pressures and are well known for causing fracturing with air traveling long distances. Therefore, drilling with air as the drilling medium should never be considered when there is potential to encounter the core of an embankment dam.

The drilling methods listed below are in order of preference for use in drilling and sampling in embankment dams. Only the first three are considered preferred methods.

All drilling programs in dams should be designed to minimize the need for any drilling fluid such as air, gas, water, mud, polymers, slurries or any other drilling fluid that could pressurize the borehole soils. If the drilling objective can be performed using dry methods such as augers or sonic drilling they should be employed in lieu of methods that require fluids. If drilling fluids must be used due to the drilling objective or the subsurface conditions, the drilling plan must contain an analysis of the potential to cause damage and a plan that covers the measures that will be used to minimize the risk (see Section 4.8 for additional information). The use of pressurized air or foam should only be considered when drilling in materials that will not transmit pressures to the soil core or other critical features or when the air pressure is reliably isolated from the borehole soils. Drilling in an open graded rockfill shell may be an example of when using air may be appropriate. All drilling programs that propose the use of stabilizing or circulating fluids or other media will require an additional level of review.

1. **Hollow-Stem Auger** – Hollow-stem auguring (HSA) is a preferred method of drilling in the core and most other areas of an embankment dam without restriction. Blowout prevention measures, such as sealable surface casing, should be used prior to advancing augers in areas where there is potential to encounter artesian conditions. If no fluid is added to the auger column, it does not pressurize the embankment and no potential for hydraulic fracturing exists. However, for SPT testing, it may be required to add some fluid to stabilize loose sands and gravels. In instances when groundwater is encountered or fluids are added to the process, the auger string should be raised and lowered slowly to avoid pressurization, negatively and positively, respectively, of any open hole. Using a hollow-stem auger permits sampling in the embankment and allows sampling/testing of the foundation through the auger's hollow-stem which acts as casing. Continuous sampling is described in ASTM D6151 (ASTM, 2008). Small diameter cores of 3 to 4 inches in diameter can be taken in 5-foot-lengths using the split inner sampling barrel. High quality, undisturbed samples can be taken with larger diameter HSA (6-inch ID and larger) in acrylic liners that provide samples suitable for laboratory testing.

2. **Sonic Drilling** ASTM D6914 (ASTM, 2010) – Sonic (vibratory) drilling is a preferred method of drilling in the core and other areas of embankment dams. This method uses a double casing system and vibrating drill head to set up standing waves or resonance to the drill steel to advance the boring. This method of drilling is favored due to its lack of drill fluid and rapid speed of drilling. The drilling process first advances a core barrel. The core barrel is removed, and the sample is extruded while the outer casing is then advanced to the end of the sampling run. There are no cuttings generated, and there is some compaction of soil around the annulus of the drill. Crowd-in and crowd-out bits are used depending on the formation. Some water (static water, not under pressure) is required for dry cohesive formations to lubricate the drill stem. The cores, typically 4 to 5 inches in diameter, are useful for lithology determination and samples may be adequate for standard engineering properties laboratory analysis, but does not meet criteria for many laboratory tests requiring undisturbed samples (Dustman, et al, 1992). Since there

is uncertainty as to the extent of disturbance to the adjacent foundation material from the vibratory drilling process, sonic drilling should not be used if SPT, undisturbed sampling, and certain in-situ testing are required.

3. **Cable Tool or Churn Drilling** ASTM D5783 (ASTM 2000a) – Cable tool or churn drilling, with minor restriction, is a preferred method of drilling in embankment dams. This is an older method of drilling that is infrequently used. Drill action is by up and down movement of the drill string and jars (bit). The drill string is regularly pulled and a bucket-grab tool is inserted to remove/sample the cuttings. Water is often added to the hole to mix the cuttings into slurry. SPTs can be completed below the bottom of the casing. This method of drilling is rated high in desirability because it does not use a full column of drilling fluid and, therefore, has low potential for fracturing. Drilling speed is fairly comparable to HSA drilling. One variation of this "chop and drive" technique employs continuous circulation of water to bring cuttings to the surface and should not be used in the core of an embankment dam.

4. **Dual Rotation Drilling** ASTM D5781 (ASTM 2000b) – Dual rotation drilling is not a preferred method for drilling in embankment dams, and its use in embankment core material must be approved by FERC prior to use. The dual rotary drilling method advances both the casing and the drill string/bit separately. The upper and lower rotary drives feed independently by use of separate hydraulic cylinders. Distances between the bit tip and casing shoe are adjustable. With the bit advancing ahead of the shoe, drilling becomes more aggressive. These bit to shoe relationships allow the pressurized drilling medium to come in contact with the unprotected hole wall, and potential for hydraulic fracturing increases. When drilling in embankment core material, the bit should not be advanced ahead of the shoe. In those instances when the bit advances ahead of the shoe they should be recorded on the daily drill report and, subsequently, geologic log for future reference. In all cases, use of clear water or air as a drilling medium is not allowed in embankment core material. Fluid pump pressure must remain low and pressures carefully monitored when this method is used in or near the embankment core. When starting circulation, pumping should be increased gradually to reduce the occurrence and increase the ability to observe evidence of hydraulic fracturing. A pressure relief valve set to the maximum allowable pressure is required.

5. **Fluid Rotary Drilling** ASTM D5783 (ASTM 2000c) – Fluid rotary drilling is not a preferred method for drilling in embankment dams, and its use in embankment core material must be approved by FERC prior to use. This drilling method uses a rotary cutting bit with circulation of water or drilling mud (bentonite or polymer). Cuttings are returned to the surface and dropped in settling tanks. Ideal bentonite drill mud mixtures do not exceed 72 lb/ft and have 60- to 70-second marsh funnel viscosities; however, higher viscosities may be necessary where artesian conditions are encountered. Casing is often advanced with the boring. In all cases, use of clear water as a drilling medium should not be allowed in embankment core material. Fluid pressure must be very low and carefully monitored when this method is used in or near the embankment core. When starting circulation, pumping should be increased gradually to reduce the occurrence and increase the ability to maximum allowable pressure is recommended.

Fluid rotary is the preferred method for SPT testing for liquefaction (see ASTM D6066), where it is recommended to keep the hole full of fluid during the test to stabilize sands. Since drilling fluid is being used, this method has a high potential for hydraulic fracturing. Raising and lowering drill bits, sampling tools, and drill rods should be done slowly so as not to induce negative fluid pressures or increase fluid pressures.

6. **Becker Drilling/Penetration Testing** – Becker drilling is not a preferred method for drilling in embankment dams, and its use in embankment core material must be approved by FERC prior to use. Becker drilling may be one of two methods. The closed bit system advances a closed bit by means of hammering with a double acting diesel hammer. This method frequently is used in coarser grained material where SPT data likely would be invalid. The open bit method advances an open bit by using of the double acting diesel hammer. In this method, disturbed samples may be collected. High-pressure air is forced down the outer annulus of the dual casing system and returned up the inner casing. The returning air carries soil cutting up to the ground surface. Open bit Becker drilling is prohibited when drilling in or near the core section of an embankment dam.

7. **Wire Line and Casing Advancer** ASTM D5876 (ASTM 2000d) – Wire line and casing advancer systems are not preferred methods for drilling in embankment dams, and their use in embankment core material must be approved by FERC prior to use. These drilling systems use fluid rotary action to remove the cuttings with the exception that the fluid flows up the annulus between the rods and the borehole wall. In all cases, use of clear water as a drilling medium should not be allowed in embankment core material. Fluid pressure must be very low and carefully monitored when this method is used in or near the embankment core. When starting or restarting circulation, pumping should be increased gradually to reduce the occurrence and increase the ability to observe evidence of hydraulic fracturing. A pressure relief valve set to the maximum allowable pressure is recommended. Since fluid is circulated up the annulus between the soil and drill rod, there is increased chance of blocking circulation and possible fracturing. The drill rods act as casing and are equipped with a cutting bit. Either a core barrel or cleanout bit lock into the lead section of the drill rods and is latched by wire line. This results in rapid drilling and reduced rod trip time during coring operations. Some wire line drilling systems have soil core barrels, but their success is limited. Wire line diamond drilling is the primary method of rock core drilling (see ASTM D2113 on Diamond Drilling (ASTM 1999)). Typically, augers, casing, or other methods are used to set a protective casing through the embankment and foundation soils and then fluid rotary drilling is used to core and water test the foundation rock.

8. **Drill Through/Drive Casing Advancer** ASTM D5872 (ASTM 2000e) - Drill through/ drive casing advancers are not preferred methods for drilling in embankment dams and their use in embankment core material should not be considered. The drills have a casing driver (hammer) and a rotary rock bit or down hole hammer that may be rotated through the casing hammer. Down-the-Hole hammers (DTH) and air are used in coarse boulders deposits and hard rock while rock bits and fluids might be used in dirtier gravel cobble soils. One version of DTH, known as ODEX, has a swing out bit which over-reams the

hole for the casing. Air flow to circulate cuttings has to be rather high, but can be reduced by introduction of foam. To minimize fracturing when drilling with air, the drill bit should be held just inside the casing so a protective seal remains at the bottom of the casing. This practice is not possible when using ODEX, which requires the bit to advance before the casing.

9. **Air Rotary** ASTM D5782 (ASTM 2000f) - Air rotary is not a preferred method for drilling in embankment dams and its use should not be considered in embankment core material. This class of drilling is very similar to drill through drive casing systems except the hole may be left open (uncased) exposing the complete borehole wall to air flow. Without the protection casing provides, the possibility exists for circulation blockage, possible fracturing, and degradation/opening/erosion of any weak seam exposed along the sides of the borehole. One example of this type is the air track drill.

Table 1 – Drilling in Embankment Dams – Drilling Methods

	Drilling Methods	Restriction	Recommendations
Preferred Drilling Methods	Auger	None	Raise and lower auger string slowly when fluid in hole
	Sonic/Vibratory	None	Core not suitable for higher level laboratory testing
	Cable Tool/Churn	Chop and drive variation not allowed	Samples are of cuttings and are highly disturbed
Restricted Drilling Methods	Dual Rotation	Approval of drilling method required Clear water as drilling media not allowed Fluid pressure must be very low Bit must not be advanced beyond shoe Open bit methods are not allowed	Monitor fluid pressure closely Use pressure relief valves to cap fluid pressure Increase pump pressure gradually Monitor fluid viscosity closely
	Fluid Rotary		
	Becker		
	Wireline/Casing Advancers		
Prohibited Drilling Methods	Drill Through/ Drive Casing Advancers	Not allowed in or near the core of embankment dams. Approval of drilling method required for other areas. Will only be considered in extraordinary circumstances	Not allowed in or near the core of embankment dams. Approval of drilling method required for other areas. Will only be considered in extraordinary circumstances
	Air Rotary		

There are some general procedures that should be followed when using drilling fluids to limit the risk of damage:

- Tools should be sized and designed to minimize the likelihood of the return flow clogging.

- Methods that require the cuttings to flow through a small annulus between the tools or casing and the borehole wall should not be used.

- Fluid discharges from the bit should always be upward, not downward into the formation material or lateral into the sidewalls that could lead to excessive disturbance or erosion.

- Lower and raise drill tools slowly to avoid pressure changes in the drill hole; this is especially important when using tools with restricted annulus space below the groundwater as the pressure changes are more severe and can lead to suction and surging problems.

- Drilling feed rate must be slow enough to avoid crowding the bit and, thus, minimize the chance of inducing fracturing. The bit must be of a design such that pressure buildup is minimized.

- Drilling media properties, pressure, and return should be continuously monitored. A floating needle pressure valve is required to record maximum pressure spikes that can occur instantaneously and are often unnoticed.

- When media circulation is required, a pressure controlled release ("pop off") valve should be on the pump.

- In some conditions, casing can be advanced ahead of the drilling bit to reduce the risk of hydraulic fracturing by confining the drilling fluids within the casing.

- Great care should be taken during washing of the hole.

- Casing should be pushed or driven and not jetted. Except in special circumstances, casing must precede the drilling.

- When core drilling rock, the embankment or foundation soil above top of rock must be protected and isolated from the circulating drilling fluid. Fractures in the bedrock must be considered as potential flow paths in contact with the overlying soil.

- A pause or suspension in drilling operations (breaks, meals, overnight/weekend, etc.) should not leave the borehole in a critical state that could result in damage to the embankment.

4.4 In-Situ Testing/Sampling

The actual process of advancing the boring is not the only potential hazard that can lead to hydraulic fracturing and other adverse impacts of the drilling, sampling, disturbance, and

performance of the structure. Raising and lowering drill rods, casing, or other drill steel too quickly can induce significant positive or negative fluid pressures.

In-situ testing that includes applying hydraulic pressures through static head (falling head or constant head permeability tests) or pressure induced head (packer pressure tests, etc.) can result in excessive hydraulic pressures that could lead to hydraulic fracturing. In-situ testing and sampling methods and procedures must be aware of the potential to create these conditions. The Bureau of Reclamations' *Engineering Geology Field Manual* is an excellent reference to assist in determining applied and total hydraulic fluid pressures from in situ tests (BOR, 1998).

4.5 Hole Completion

All boreholes and other penetrations (including direct push sampling, Cone Penetration Test soundings, Standard Penetration Testing, Becker Penetration Testing, etc.) in and around embankment dams must be sealed after completion. Completing a borehole by backfilling with drill cuttings is not acceptable. There are a variety of acceptable methods to complete a borehole.

All boreholes and similar penetrations in the impervious portions of an embankment dam and their foundations must be backfilled by tremie-placed cement-bentonite grout or bentonite pellets/chips, except when an alternative backfill method compatible with instrument installation is approved. The drilling plan must address the possibility of confined and separate groundwater aquifers and demonstrate safe completion which avoids cross-contamination and leakage. The grout must be designed to obtain strength equal to or greater than the soil or rock. Note that some instrumentation installations may require additional considerations for the grout strength. Gravity grouting techniques should be used for backfilling boreholes.

For borings that penetrate zones with low confining stress it is possible to induce hydraulic fracturing even from gravity pressure alone. When grouting borings in these locations or if significant grout losses are observed, the grout backfilling should be done in stages allowing the grout to set between stages.

For pervious portions of the dam (drainage features, filters, etc.), the borehole must be backfilled by tremie placement of granular materials that are sized to provide drainage without being susceptible to migration through the pervious embankment or foundation materials or segregation during placement.

Lutenegger, et.al. (1995) is a good source for borehole backfill guidelines.

Special procedures and materials may be required for installation of instrumentation in boreholes.

Borehole completion is often not well documented. Recommended inclusions in borehole completion documentation include intervals of various backfilling materials, calculated volume of material necessary to fill each interval, and actual volume of material required to fill each interval. Detailed records of borehole completion are important and, as in the case of backfill

material volumes significantly higher or lower than calculated, may be indicative of conditions significantly different than anticipated.

Below are some general guidelines that can be considered in borehole completion.

- **High Solids Bentonite Grout** - Tremie grouting with high solids bentonite is an acceptable method of completing boreholes in embankment dams. Mixes which yield 20 to 30 percent solids should be used. Stage up tremie grouting methods should be used in the embankment with the casing (i.e. hollow-stem augers, rods, etc.) pulled incrementally to ensure hole wall stability. The bentonite slurry should always be injected through a tremie pipe to ensure the best possible placement and most thorough borehole completion.

- **Neat Cement Grout** - Neat cement grout is another acceptable method of completing boreholes in embankment dams. The best results are achieved when the mix consists of 5 to 7 gallons of water to one sack, 94 lbs of Type I or Type II Portland cement (using higher water contents may result in excessive shrinkage, cracking, and bleed water). Commonly, the addition of up to 3 percent powdered bentonite by dry mass of cement is used for pumping ease and to reduce shrinkage and cracking after curing – although a myriad of other compounds are also available. Additives such as calcium chloride or carboxylic acid can be used to control set times, but shrinkage factor must be considered. Using type K cement or adding up to 1 percent gypsum or aluminum powder by weight will give the cement expansive properties, which may be advantageous in embankment dams where internal seepage is an issue. As with the bentonite grout, stage up tremie grouting methods should be used in the embankment core with the casing pulled incrementally to ensure borehole wall stability. The grout should always be injected through a tremie pipe to ensure the best possible placement and most thorough borehole completion.

- **Bentonite Pellets or Chips** - The use of bentonite pellets or chips may be an acceptable method of completing boreholes in embankment dams. However, there are some conditions under which bentonite pellets or chips should not be considered and only tremie grouting is acceptable. Bentonite pellets or chips, including those treated to retard or delay flocculation, should not be used in cases where there is a chance the depth of water in the hole could slow the bentonite fall and allow flocculation prior to the bentonite reaching hole bottom. Additionally, even in a dry hole, there must be adequate annular space available to allow the bentonite to fall to the borehole bottom without bridging. It is advisable to always place both solid bentonite and grout through a tremie pipe.

- **Instrument Installations** - Instrumentation installations require special completions. For piezometers, sand packs are placed in the influence zone and a bentonite seal is placed above the sand pack to prevent any contamination of the sand pack from sealing materials placed above it. The bentonite seal is typically bentonite pellets. A common error in placing the seal is not allowing bentonite time to hydrate. Pellets should be allowed a minimum of 1 to 2 hours to hydrate prior to placing additional backfill material above the

seal. Alternatively, piezometers can be installed in fully grouted holes. While it is possible to place two piezometers in a typical 4-inch inside diameter hollow stem auger or casing, only one piezometer is recommended, and no more than two instruments should be allowed in a single boring. Difficulty in providing a good seal between multiple riser pipes may result in communication between influence zones. Other instrument installations (slope inclinometer casing, geophysical casing, etc.) will require additional considerations.

4.6 Drilling Personnel

Because of the potential to do harm, drilling in a dam should only be performed by experienced and qualified personnel. This includes the lead drill rig operator and the engineer or geologist who is the on-site representative responsible for the drilling program and the safety of the dam. Schedule, budget, and other issues should be considered secondary to the safety and integrity of the structure and those potentially impacted by its compromise.

Drill rig operators must have a minimum of 5 years of experience drilling with the equipment and procedures described in the drilling program. When the drilling plan includes drilling in or in the vicinity of dam or appurtenant structure foundations or abutments or within an embankment dam, the drill rig operators must have demonstrated embankment dam drilling experience clearly indicated in their resume.

All drilling activities must be conducted in the presence of a qualified geotechnical engineer or engineering geologist who will be responsible for maintaining the integrity of the structure and the inspection of the drilling operation. Qualified is by combination of education, training, and experience as indicated in Table 2.

Table 2 – Minimum Qualifications of Responsible On-site Personnel

Factor	**Low Hazard Dams**	**Significant and High Hazard Dams**
Education	Minimum B.S. in Civil Engineering or Geology (or licensed as a professional engineer, professional geologist, or certified engineering geologist)	
Training	Independent study or formal training in the identification and mitigation of drilling hazards in embankment dams	
Experience	Minimum of two years of general drilling experience	Minimum of four years of embankment dam drilling experience

While there are many inspectors with significant years of experience with drill procedures, classifying soils and rock, and in-situ testing methods, they may only have limited knowledge and experience with dams and may be unaware of potential damage to critical dam features caused by certain drilling procedures. Therefore it is critical that a combination of education,

training, and experience be demonstrated and clearly shown on the resume of the geotechnical engineer or geologist inspecting the work.

The project manager directing the drilling program must also be an experienced geotechnical engineer that is a licensed professional engineer or a licensed professional geologist or certified engineering geologist with at least ten years' experience in dams-related work.

Both the drill rig operator and the on-site geotechnical engineer/engineering geologist must also be familiar with these guidelines. It is essential that drill rig operators and the geotechnical engineer/engineering geologist be well trained and aware of the causes of and the problems resulting from hydraulic fracturing and artesian conditions and have the equipment, materials, and experience to correct and remediate damage to the embankment and foundation.

4.7 Other Considerations

Emergency Communications - No dam should be drilled or investigated without a thorough review of the Emergency Action Plan (EAP). FERC-regulated dams have EAPs in place. The EAP lists the key individuals who should be contacted and informed of proposed activities. There are documented case histories where drilling has caused incidents with dams and knowledge of the EAP and good communications were key contributors to safely solving the problems.

Monitoring - During drilling operations, the dam embankment should be continuously inspected and monitored using appropriate procedures and instrumentation at the dam site. The proposed monitoring should be used to evaluate any impacts from of the drilling activity and assist in detecting any unanticipated changes. The type of monitoring (piezometer, inclinometers, etc.), frequency of readings, and purpose for monitoring should be carefully considered. If appropriate, threshold limits could be determined for specific drilling scenarios. It may be necessary to perform daily inspections of the dam for a period of time after the drilling operations have concluded.

Reporting - All incidents of damage or potential damage related to drilling and associated activities for dams must be reported. If a sudden loss of drill media occurs during any embankment drilling within the core, drilling must be stopped immediately. Action should be taken to stop the loss of drill fluid. The reason for loss should be determined and if hydraulic fracturing may have been the reason for the fluid loss, FERC should be notified immediately.

Construction/Remediation Drilling Activities - Drilling activities performed during construction or remediation phases are often overlooked as opposed to drilling that occurs under the traditional exploration phases. There are numerous examples of dams which required remediation after reservoir filling and the embankment or foundation was damaged. Many of these dams required remedial grouting immediately after construction, and the grouting contractor used air drilling, rapidly resulting in fracturing of blankets and foundations. Jet grouting contractors drill holes with very high air/fluid pressures at rapid rates. Contractors want to drill fast, but drilling fast may cause blockage and loss of the circulating fluid and hydraulic fracturing. It is imperative that, for remediation construction projects, and instrumentation

installation contracts, project geologists and engineers identify drilling methods and confirm they are appropriately screened to avoid damage to the dam or foundation. If there is concern, a team should be formed to review the drilling methods and ensure the contract documents have appropriate provisions to avoid damage to the dam and foundation.

Exemptions - Drilling required for immediate emergency measures where delays required to develop the drilling plans and to obtain the necessary reviews and acceptances would result in unacceptable risk of damage or failure, may be exempted from the requirements to prepare a drilling plan, as approved by the Regional Engineer. Emergency drilling should be appropriately expedited but should follow the general guidelines presented in this guideline.

4.8 Evaluation of Potential Risks

The licensee must thoroughly evaluate the risks associated with the proposed drilling and indicate how they intend to mitigate them. Among other topics, the potential risks of causing hydraulic fracturing of the embankment, as well as the potential risks of causing seepage, instability, or other potential dam safety issues as a result of the proposed drilling program must be evaluated and addressed. The risk evaluation must include an assessment of the potential impact of the drilling operations and the location of the boreholes in relation to areas of the dam that may be more susceptible to hydraulic fracturing, as discussed in Section 4.2.1.

Aside from comparing the planned drilling locations with the areas of the embankment and soil types that are more susceptible to hydraulic fracturing, the proposed drilling procedures must also be evaluated with respect to their likelihood of causing hydraulic fracturing or other dam safety issues. This includes the instrumentation installation procedures, borehole completion/abandonment procedures, and emergency procedures if a potential dam safety issue is identified during the drilling. Special attention should be given to highlighting the specific procedures and contingency plans that will be utilized to protect the dam from potential hydraulic fracturing and other potential risks.

5.0 DRILLING PROGRAM PLAN (DPP)

An approved Drilling Program Plan (DPP) is required for any exploration drilling, instrument installation, or remediation drilling (including grouting) work to occur on an embankment dam, in proximity of the dam in which the drilling methods could pose a risk to the dam, or the dam's foundation and abutments. DPPs shall be prepared and reviewed by experienced geotechnical engineers and/or engineering geologists familiar with subsurface exploration techniques and methods. It is paramount that all existing subsurface information is thoroughly evaluated and understood by the exploration team prior to developing a plan for additional drilling. In order to understand and communicate subsurface conditions and estimate drilling risk, the existing subsurface information must be assimilated into essential plan and section drawings showing proposed drill holes and depths, target sample areas and proposed instrumentation. The DPP must also comply with good environmental practices and comply with site environmental provisions/restrictions, which may need coordination with DHAC and outside agencies.

The DPP must be reviewed and accepted by the FERC Regional Engineer prior to beginning the

drilling program. Depending on the particular dam and scope of the project involved, the review process may also require additional coordination with FERC headquarters staff in Washington, D.C. and/or DHAC. As stated in our Annual Letter, this plan must be submitted for our review a minimum of **30 days** prior to beginning the drilling work. However, licensees are encouraged to inform the FERC project engineer of the planned drilling program and begin discussions with him or her regarding the proposed drilling well in advance of this deadline.

In addition, the licensee is encouraged to set up either a face-to-face meeting or conference call with the Regional Engineer and headquarters staff, as appropriate, once the specifics of the proposed drilling program have been developed. Ideally, this meeting should take place as soon as possible but no later than *a minimum of two weeks* prior to submission of the DPP. The purpose of this meeting and early coordination with the FERC project engineer is to ensure that both the licensee and FERC share a common understanding of the requirements of the project and the DPP, and there are no delays associated with FERC's review or potential issues with the plan.

FERC's primary concern in evaluating the licensee's DPP will be ensuring that the planned drilling program will "do no harm" to the existing dam. A thorough, well-organized, and well-developed DPP, including the various items highlighted in these guidelines, will assist FERC in its review by demonstrating that the licensee fully understands the risks associated with the drilling program, and is taking the appropriate measures to mitigate them.

In general, the DPP must include the following information, as a minimum:

1. Name and description of project.

2. Purpose of site disturbing activity.

3. Description of the proposed site exploration activity (drilling, test pitting, etc.). Include plan view showing location of activity (ies), proposed drill hole depths, sampling intervals, insitu testing, and instrument installations.

4. Describe and show anticipated site conditions. Show location of known subsurface conditions and features. Describe subsurface units. Describe understanding of ground water conditions and phreatic surface, including the potential to encounter artesian conditions. Use cross sections and profiles to graphically illustrate.

5. Describe proposed equipment, methods, and processes. For example, for any activity that introduces a fluid in or near the water retaining feature or its foundation, detail how fluid pressures will be measured and monitored. For example, for falling head permeability tests, show how the introduction of a column of water will not cause excess water pressures in the embankment that could lead to hydraulic fracturing. Likewise, for grouting of boreholes, describe how if staged grouting will be required and how the maximum height of grout column will be determined to prevent hydraulic fracturing.

6. Identify project personnel and qualifications/experience, including resumes.

7. Risk identification and mitigation plan. Identify and describe potential risks imposed by site disturbing activities. Identify and describe risk mitigation plan. For example, for any activity at the toe of a water retaining feature, describe the risk mitigation plan should unexpected artesian conditions be encountered.

8. Identify communication plan with names and phone numbers. Include a list of emergency equipment and supplies to have on site (phone/radio, filter materials, grout materials, light plant, etc.).

9. Provide an overall schedule and duration of drilling activities.

Specific requirements for the DPP are included in Appendix B.

6.0 REPORTING REQUIREMENTS

The DPP should provide details on the documentation, logging, and submission of drilling data. The field inspector's boring log should be submitted to FERC within 24 hours after completion of backfilling the boring. When feasible, draft field boring logs should be submitted daily, along with daily work logs. Since there is always a possibility that some changes will need to be made in the field due to the specific subsurface conditions encountered, the DPP should describe how changes and deviations from the approved DPP will be communicated and coordinated with FERC. Also, any significant differences from expected conditions which could be an indication of a potentially serious dam safety issue must be reported immediately to the FERC Regional Engineer.

7.0 REFERENCES

ADI, 1992, "Australian Drilling Manual", Third Edition, Australian Drilling Industry Training Committee, NSW 2113, Australia.

ASTM, 1999, "Standard Practice for Rock Core Drilling and Sampling of Rock for Site Investigations", D2113, West Conshohocken, Pennsylvania.

ASTM, 2000a, "Standard Guide for Use of Cable-Tool Drilling and Sampling Methods for Geoenvironmental Exploration and Installation of Subsurface Water- Quality Monitoring Devices", D5875-95, West Conshohocken, Pennsylvania.

ASTM, 2000b, "Standard Guide for Use of Dual-Wall Reverse-Circulation Drilling for Geoenvironmental Exploration and the Installation of Subsurface Water- Quality Monitoring Devices", D5781-95, West Conshohocken, Pennsylvania.

ASTM, 2000c, "Standard Guide for Use of Direct Rotary Drilling with Water-Based Drilling Fluid for Geoenvironmental Exploration and the Installation of Subsurface Water- Quality Monitoring Devices", D5783-95, West Conshohocken, Pennsylvania.

ASTM, 2000d, "Standard Guide for Use of Direct Rotary Wireline Casing Advancement Drilling Methods for Geoenvironmental Exploration and Installation of Subsurface Water-Quality Monitoring Devices", D5876-95, West Conshohocken, Pennsylvania.

ASTM, 2000e, "Standard Guide for Use of Casing Advancement Drilling Methods for Geoenvironmental Exploration and Installation of Subsurface Water- Quality Monitoring Devices", D5872-95, West Conshohocken, Pennsylvania.

ASTM, 2000f, "Standard Guide for Use of Direct Air-Rotary Drilling for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices", D5782-95, West Conshohocken, Pennsylvania.

ASTM, 2006, "Standard Guide for Selection of Drilling Methods for Environmental Site Characterization", D6286-98, West Conshohocken, Pennsylvania.

ASTM, 2008, "Standard Practice for Using Hollow-Stem Augers for Geotechnical Exploration and Soil Sampling", D6151-08, West Conshohocken, Pennsylvania.

ASTM, 2010, "Standard Practice for Sonic Drilling for Site Characterization and the Installation of Subsurface Monitoring Devices", D6914-04, West Conshohocken, Pennsylvania.

BOR, 2010, "Guidelines for Drilling and Sampling in Embankment Dams", Bureau of Reclamation, Denver, Colorado.

BOR, 1990, "Earth Manual, Part II", Third Edition, Bureau of Reclamation, Denver, Colorado.

BOR, 1998, "Earth Manual, Part I", Third Edition, Bureau of Reclamation, Denver, Colorado.

BOR, 1999, "Standard Penetration Test: Drillers/Operators Guide, Report Number DSO- 98-17," J. Farrar, Dam Safety Office, Bureau of Reclamation, Denver, Colorado.

Dustman, J.R., R. Davis, and T. Oouthoudt, 1992, "Soil, Bedrock, and Groundwater Sampling Using Rotasonic Drilling Techniques,", Proccedings of the Sixth National Outdoor Action Conference on Aquifer Restoration, Groundwater Monitoring, Geophysical Methods, National Ground Water Association, Las Vegas, Nevada.

FEMA, 2000, "Research Needs Workshop: Seepage through Embankment Dams", Federal Emergency Management Agency, Washington, DC.

France, J.W., 2002, "Two Embankment Dam Seepage Incidents," Technical Workshop No. 9, Responding to Dam Safety Emergencies, National Dam Safety Program, National Emergency Training Center, Emmitsburg, Maryland.

Ladd, C. C., and D.J DeGroot, 2004 (revised). "Recommended Practice for Soft Ground Site Characterization," Arthur Casagrande lecture, Proc. 12th Pan-American Conf. on Soil Mech. and Geot. Engineering.

Lutenegger, A.J., D.J. Degroot, C. Mizra and M. Bozozuk, 1995, "Recommended Guidelines for Sealing Geotechnical Exploratory Holes, Report 378," National Cooperative Highway Research Program, Transportation Research Board, National Academy Press, Washington, DC.

NDA, 1990, "Drillers Manual," National Drilling Association, accessed at www.ndu4u.com, Brunswick, Ohio.

Schaefer, J.A., D.B. Paul, and D.D. Boyer, 2011, "Safe Grouting Pressures for Dam Remediation", USSD Annual Meeting, Nashville, Tennessee.

Sherard, J.L., 1973, "Embankment Dam Cracking," Embankment Dam Engineering, S. Poulos and R. Hirschfeld, Eds., John Wiley and Sons, New York, N.Y., pp. 272-353.

Sherard, J.L., 1986, "Hydraulic Fracturing in Embankment Dams", ASCE Journal of Geotechnical Engineering, Volume 112, No. 10, pp. 905-927.

USACE, 2014, "Drilling in Earth Embankments and Levees", ER 1110-1-1807, U.S. Army Corps of Engineers, Washington, DC.

APPENDIX A

ADDITIONAL HYDRAULIC FRACTURING REFERENCES

Albritton, J., Jackson, L., and Bangert, R., "Foundation Grouting Practices at Corps of Engineers Dams", Technical Report GL-84-13, US Army Corps of Engineers, October 1984.

Alfaro, M.C., and Wong, C.K., "Laboratory studies of fracturing of low-permeability soils", Canadian Geotechnical Journal, 38, 303-315, 2001.

Andersen, K.H., Rawlings, C.G. Lunne, T.A., and By, T.H., "Estimation of hydraulic fracture pressure in clay", Canadian Geotechnical Journal, 31, 817-828, 1994.

Bjerrum, L., Nash, J. K. T. L., Kennard, R.M. & Gibson, R.E., "Hydraulic fracturing in field permeablity testing", Geotechnique, 22, 319-32, 1972.

Bozozuk, M., "Minor principal stress measurements in marine clay with hydraulic fracture tests", Proceedings, Engineering Foundation Conference on Subsurface Exploration for Underground Excavation and Heavy Construction, Henniker, N.H., August 1974.

Bureau of Reclamation, "Engineering Geology Field Manual," Vol I and II, Second Edition, Denver, CO, 1998.

Calcagno, Frank, Jr., USBR, "Hydraulic Fracture Study of the Tiber Spillway Cofferdam", AEG Newsletter 26/4 October 1983.

Casagrande, A. and Covaarrubias, S.W., "Cracking of earth and rockfill dams, tension zones in embankments caused by conduits and cutoff walls", Contract Report S-70-7, U.S. Army Engineer Waterways Experiment Station, July 1970.

Chang, H., "Hydraulic fracturing in particulate materials", Doctoral Thesis, Georgia Institute of Technology, November 2004.

Chen, Yu-jiong, and Zhang, Shu-lu, "Test embankment of fracture grouting", Journal of Geotechnical Engineering, Vol. 115, No. 11, November 1989.

Clough, R.W. and Woodward, R.J. III, "Analysis of embankment stresses and deformations", Journal of Soil Mechanics and Foundations Division, Proceedings of ASCE, Vol. 93, No. SM4, July 1967.

Elwood, D., and Moore, I., "Hydraulic fracture experiments in sand and gravel and approximations for maximum allowable mud pressure", North American Society for Trenchless Technology, No Dig Show, Mar-Apr 2009.

Hamouche, K.K., Leroueil, S., Roy, M., and Lutenegger, A.J., "In situ evaluation of K0 in eastern Canada clays", Canadian Geotechnical Journal, vol 32, pgs 677-688, 1995.

Independent panel to review cause of Teton Dam failure, 1976, Failure of Teton Dam: Report to the U.S. Department of Interior and State of Idaho.

Kulhawy, F.H., and Duncan, J.M., "Stresses and movements in Oroville dam", Journal of Soil Mechanics and Foundations Division, Proceedings of ASCE, Vol. 98, No. SM7, July 1972.

Lo, K.Y. and Kaniaru, K., "Hydraulic fracture in earth and rock-fill dams", Canadian Geotechnical Journal, Vol 27, 496-506, 1990.

McCook, D.K, and Grotrian, K.O., "Using SIGMA/W to predict hydraulic fracture in an earthen embankment", Proceedings: Dam Safety, ASDSO, September 2010.

Mori, A. and Tamura, M., "Hydrofracturing pressure of cohesive soils", Soils and Foundations, Japanese Society of Soil Mechanics and Foundation Engineering, Vol. 27, No. 1, 14-22, Mar 1987.

Schmertmann, J. H., "Measure and use of the insitu lateral stress", The Practice of Foundation Engineer, Department of Civil Engineering, Northwestern University, 1985.

Seed, H.B., and Duncan, J.M., 1981, "The Teton Dam - a retrospective review", Proceedings of the Tenth international Conference on Soil Mechanics and Foundation Engineering, Stockholm, Sweden, June 1981, p. 219-238.

Sherard, J.L., "Loss of water in boreholes in impervious embankment sections", Proceedings, 10th ICOLD Congress, Montreal, Vol. VI, 1970, 377-381.

Sherard, J.L., Decker, R.S. and Ryker, N.L., "Hydraulic fracturing in low dams of dispersive clay," Proceedings of the Specialty Conference on Performance of Earth and Earth-Supported Structures, ASCE, June, 1972, Vol. 1, Part I, pp. 563-590.

Staheli, K., Price, C.G., and Wetter, L., "Effectiveness of hydrofracture prediction for HDD design", North American Society for Trenchless Technology, No Dig Show, May, 2010.

US Army Corps of Engineers, "Foundation completion report Patoka lake dam, Indiana", Appendix E, Analysis of Grouting Effectiveness and Distribution as Observed During Excavation, July 1979.

US Army Corps of Engineers, "Installation of Pipelines Beneath Levees Using Horizontal Directional Drilling, Technical Report CPAR-GL-98-1, April 1998.

Xia, H. and Moore, I.D., "Estimation of Maximum Mud Pressure in Purely Cohesive Material during Directional Drilling, Geomechanics and Geoengineering: An International Journal, Vol. 1, No.1, 3-11. 2006.

Yanagisawa, E. and Panah, A.K., "Two dimensional study of hydraulic fracturing criteria in cohesive soils", Soils and Foundations, Japanese Society of Soil Mechanics and Foundation Engineering, Vol. 34, No. 1, 1-9, Mar. 1994.

PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

DRILLING PROGRAM PLAN (DPP) OUTLINE FOR DRILLING IN AND NEAR EMBANKMENT DAMS

Drilling in and near embankment dams must subscribe carefully to the "do no harm" philosophy. Dams are not places for standard investigation techniques; they require different drilling procedures because there are significant risks. Incorrect drilling, grouting, or borehole abandonment procedures could lead to damage of the structure by hydrofracturing, erosion, drain contamination or other mechanisms, during drilling operations, instrumentation installation, borehole completion, and borehole abandonment. All design and field personnel need to understand the existing subsurface conditions and potential problems and damage that the drilling could trigger.

An approved Drilling Program Plan (DPP) is required for any exploration drilling or remediation drilling (including grouting) work to occur in or near an embankment dam. DPPs shall be prepared and approved by experienced geotechnical engineers and/or engineering geologists familiar with subsurface exploration techniques and methods.

The following outline describes the basic information that should be developed and included in the DPP that is to be submitted by the licensee. Additional information, discussion, and recommendations on the items presented in Appendix B are provided in the guidelines. It is strongly recommended that the DPP follow the following organizational structure.

1. Purpose

The purpose of the drilling program needs to be clearly defined and summarized in the plan. The DPP should provide sufficient discussion, details, and figures to ensure that the proposed exploration will accomplish its goals and prevent damage to the dam. The need for any investigation (drilling, testing, etc.) at a dam site should have been presented to and accepted by FERC prior to developing a DPP program. In addition, it should have been demonstrate that any potential damage to the structure created by the drilling and associated processes is outweighed by the need for the drilling data.

2. Existing Information

Before preparing a DPP, the licensee or its consultant should review the subsurface, design, and construction information available in the Supporting Technical Information Document (STI) and their files to properly evaluate the risks associated with the proposed drilling program. The information review typically includes, but is not limited to:

- Subsurface profiles and piezometric conditions;
- Geologic mapping, logs, and reports portraying information from previous investigations and construction;
- Foundation reports;
- Embankment construction reports;

- As-built drawings;
- Archived records;
- Construction reports;
- Construction photos;
- Instrumentation plans; and
- Available laboratory analyses.

Based on this review, a summary of the existing information should be included in the DPP.

3. Essential Geologic and Engineering Drawings

The DPP should include a complete set of drawings depicting the current subsurface conditions. This detailed set of foundation and embankment drawings typically requires a plan drawing showing all previous subsurface investigation locations, profile drawings, and sections of the embankment in the areas of proposed exploration. The sections should be drawn to scale (no vertical exaggeration) and should show the locations and depths of the proposed borings along with all available factual information and appropriate geologic or engineering interpretations. The information on the plan, profile and sections should be detailed, include all available data significant to the planned explorations, and be supplemented by additional discussion in the text of the DPP, as appropriate. At a minimum, the following information should be included, as applicable:

- Embankment zones, including added berms, filters, blankets, and drains;
- Estimated extent of any other zones of interest;
- Details of subsurface material classifications, including relevant laboratory test results such as Atterberg Limits, grain size analyses, and dispersivity test results, as applicable;
- Geologic contacts and continuity supported by all nearby drilling and sampling details;
- Contours of the top of rock or any other layer of particular interest;
- Piezometer locations showing screened influence zones and recorded piezometric levels tied to the reservoir water level. Whether or not the dam includes active piezometers, the estimated phreatic surface through the embankment should be clearly shown on all relevant cross-section drawings included in the DPP. In addition, the basis for determination of the estimated phreatic surface should be clearly described in the DPP.
- Inclinometer locations showing any shear zones or areas of deformation;
- Standard Penetration Test (SPT) blow counts or other in-situ test results;
- Geophysical data, where useful (e.g. downhole and/or crosshole shear wave velocity profiles);
- Seepage areas tied to geologic units; and
- Location of all structures, including seepage control features, outlet works, etc.

4. Drilling Scope and Methodology

The plan should thoroughly describe the scope and methods that will be used for the drilling program. At a minimum, the following information should be included:

- Number, location, depth, diameter, and inclination of the proposed borings;
- Drilling and sampling methods, including a description of the drilling equipment to be used (e.g. track-mounted vs. truck-mounted drill rig). The DPP should include justification for the proposed methods and equipment based on the expected subsurface conditions. In particular, if any drilling fluids will be used to advance the borings, the DPP must include a detailed explanation of why these procedures must be used, how the potential for hydraulic fracturing will be mitigated, and how continuous monitoring of the fluid pressures will be accomplished during the drilling. The allowable fluid pressures so as to prevent hydraulic fracturing should be included in the DPP, along with supporting calculations, as appropriate.
- List of ASTM standards and methods that will be followed to perform the drilling.
- Anticipated materials to be drilled and sampled;
- Required sample types (disturbed or undisturbed), sizes, and anticipated depths;
- Procedures for identifying underground utilities, and other surface or subsurface obstacles prior to the drilling; and
- Site Access and accessibility of the boring locations (see paragraph 11). .

5. Field and Laboratory Testing Program

The DPP should provide information on the proposed testing program, which should include both field and laboratory testing. A detailed description of the in-situ testing proposed at each boring should be provided, including the type, location (depth), and specific testing method(s) (i.e. ASTM standards, etc.) to be used. The plan should also describe the anticipated laboratory testing program.

6. Instrumentation Installation

If instrumentation is being installed in one or more borings, the materials, location, and procedures that will be used to construct and install the proposed instrument should be described in the DPP. Appropriate figures including installation details for the instruments should also be drafted and included in the plan. For piezometers and monitoring wells, these details should include the following items, at a minimum:

- Installation depth;
- Pipe material type, length, and diameter, as well as the methods that will be used to centralize the pipe;
- Depth of screened interval and the slotted screen size;
- Type, gradation, depth range, and annular thickness of the filter/drain pack material. The DPP must demonstrate that the proposed filter/drain pack material will adequately meet filter and drainage compatibility criteria with both the surrounding embankment soils and the slotted screen size of the piezometers/wells.
- Type, mixture, depth range, and annular thickness of the bentonite or cement grout seal, as applicable;
- Procedures for monument installation or other near-surface (i.e. within the upper five feet) abandonment methods, as applicable; and
- Procedures for developing the piezometers/wells. In particular, if water or air pressures

will be introduced, the DPP must include reasons why these pressures must be used in order to develop the piezometer/well and indicate how this will be implemented so as to avoid causing any damage to the piezometer/well or surrounding embankment. The DPP must indicate how continuous monitoring of the fluid pressures will be accomplished during the development process, state an allowable fluid pressure that will not be exceeded, and include supporting calculations, as appropriate.

7. Monitoring

The DPP should provide details on any proposed monitoring and evaluation of the drilling activity. The plan should describe the type of monitoring (piezometer, inclinometers, etc.), frequency, and purpose for monitoring. If appropriate, threshold limits could be determined for specific drilling scenarios.

8. Emergency Procedures

A discussion should be provided as to what materials and methods will be used to prevent damage to the dam should problems such as loss of drilling fluids, artesian pressures or seepage be encountered during the explorations. The plan should include an emergency contact list and personnel notification flow chart.

9. Borehole Completion

All boreholes in and around embankment dams should be sealed after completion. Completing a borehole by backfilling with drill cuttings is not acceptable. The proposed materials (grout mix) and field procedures that will be used to backfill the borehole should be described in the DPP, along with the estimated quantities required to backfill the borehole. Additional information on backfilling of boreholes is provided in the guidance.

10. Personnel Experience

The DPP should clearly indicate the specific personnel that will be on site either performing or observing the drilling work, and their respective roles and responsibilities. Resumes for all of the relevant project personnel (including the project manager, field geologist/engineer, and lead driller) should be included in the DPP or submitted prior to start of work. The level of experiences required for each of the specific personnel performing the work is described in the guidelines.

11. Site Access, and Environmental Consideration

The DPP should include information on the proposed procedures to access the boring locations, which may include details for constructing and maintaining access roads and for mitigating any adverse impacts that might be caused by its construction. The DPP, if applicable, should address any adverse impact to the embankment stability or seepage from the construction of access roads within the footprint of the dam. For access roads which will be constructed through areas of previously undisturbed ground, additional consultation with FERC's Division of Hydropower

Administration and Compliance (DHAC) will be required prior to FERC approval of the DPP. The DPP should describe the procedures for identifying underground utilities, and other surface or subsurface obstacles prior to the drilling.

12. Documentation and Coordination

The DPP should provide details on the documentation, logging, and submission of drilling data. Since there is always a possibility that some changes will need to be made in the field due to the specific subsurface conditions encountered, the DPP should describe how changes and deviations from the approved DPP will be communicated and coordinated with FERC. Also, any significant differences from expected conditions which could be an indication of a potentially serious dam safety issue must be reported immediately to the FERC Regional Engineer.

In addition, the DPP should include an overall schedule and duration of drilling activities.

13. Evaluation of Potential Risks

The DPP must document the licensees' assessment of the risks associated with the proposed drilling and indicate how they intend to avoid or mitigate them. Among other topics, this section should address the risks of causing hydraulic fracturing of the embankment, as well as the risks of causing erosion, blowout, contamination of drainage materials, or other potential dam safety issues as a result of the proposed drilling program. The DPP should also outline the nearby instruments whose behavior will be monitored during the investigation, their expected response, and contingency plans for unexpected response.

APPENDIX C: INSURANCE AND ENDORSEMENT TEMPLATE

Client#: 40124 E&LCO

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:
	PHONE (A/C, No, Ext): FAX (A/C, No):
	E-MAIL ADDRESS:
	PRODUCER CUSTOMER ID #:

INSURED	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A	
	INSURER B :	
	INSURER C :	
	INSURER D :	
	INSURER E	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	GENERAL LIABILITY						EACH OCCURRENCE	$1,000,000
	[X] COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence)	$500,000
	[ ] CLAIMS-MADE [X] OCCUR						MED EXP (Any one person)	$10,000
							PERSONAL & ADV INJURY	$1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$2,000,000
	[ ] POLICY [X] PRO-JECT [ ] LOC						PRODUCTS - COMP/OP AGG	$2,000,000
								$
A	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
	[X] ANY AUTO						BODILY INJURY (Per person)	$
	[ ] ALL OWNED AUTOS						BODILY INJURY (Per accident)	$
	[ ] SCHEDULED AUTOS						PROPERTY DAMAGE (Per accident)	$
	[X] HIRED AUTOS							$
	[X] NON-OWNED AUTOS							$
A & C	[X] UMBRELLA LIAB [X] OCCUR						EACH OCCURRENCE	$ 1,000,000
	[X] EXCESS LIAB [ ] CLAIMS-MADE						AGGREGATE	$ 1,000,000
	[ ] DEDUCTIBLE							$
	[X] RETENTION $ 0							$
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N						[X] WC STATU-TORY LIMITS [ ] OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? [N] N/A (Mandatory in NH)						E.L. EACH ACCIDENT	$500,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$500,000
							E.L. DISEASE - POLICY LIMIT	$500,000
A	Lease/Rented Eqpt							
	Install Floater							

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101. Additional Remarks Schedule, if more space is required)

RE: Job Description: Water Treatment Plant,

ITB#4 . City of Ann Arbor is included as additional insured in accordance with the

(See Attached Descriptions)

CERTIFICATE HOLDER	CANCELLATION
City of Ann Arbor Michigan Attn: Water Treatment Plant 301 East Huron St Ann Arbor, MI 48104	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE

© 1988-2009 ACORD CORPORATION. All rights reserved.

DESCRIPTIONS (Continued from Page 1)

policy provisions of the general liability and automobile liability policies as required by written contract. General Liability policy evidenced herein is primary to other insurance available to an additional insured but only in accordance with the policy's provisions as required by written contract. A waiver of subrogation is granted in favor of City of Ann Arbor, Michigan in accordance with the policy provisions of the General Liability, Auto Liability and Workers Compensation policies as required by written contract. 30 Day Notice of Cancellation applies. (11/15)

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

CONTRACTOR'S BLANKET ADDITIONAL INSURED ENDORSEMENT

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE FORM

Policy Number	Agency Number	Policy Effective Date
PolicyExpiration Date	Date	Account Number
Named Insured	Agency	Issuing Company

1. a. **SECTION II - WHO IS AN INSURED** is amended to add as an insured any person or organization:

   (1) Whom you are required to add as an additional insured on this policy under a written contract or written agreement relating to your business; or

   (2) Who is named as an additional insured under this policy on a certificate of insurance.

   b. The written contract, written agreement, or certificate of insurance must:

   (1) Require additional insured status for a time period during the term of this policy; and

   (2) Be executed prior to the "bodily injury", "property damage", or "personal and advertising injury" leading to a claim under this policy.

   c. If, however:

   (1) "Your work" began under a letter of intent or work order; and

   (2) The letter of intent or work order led to a written contract or written agreement within 30 days of beginning such work; and

   (3) Your customer's customary contracts require persons or organizations to be named as additional insureds;

   we will provide additional insured status as specified in this endorsement.

2. **SECTION II - WHO IS AN INSURED** is amended to add the following:

   If the additional insured is:

   a. An individual, their spouse is also an additional insured.

   b. A partnership or joint venture, members, partners, and their spouses are also additional insureds.

   c. A limited liability company, members and managers are also additional insureds.

   d. An organization other than a:

   (1) Partnership;

   (2) Joint venture; or

   (3) Limited liability company;

   executive officers and directors of the organization are also additional insureds. Stockholders are also additional insureds, but only with respect to their liability as stockholders.

   e. A trust, trustees are also insureds, but only with respect to their duties as trustees.

Includes copyrighted material of Insurance Services Office, Inc.

3. The insurance provided under this endorsement is limited as follows:

   a. That person or organization is an additional insured only with respect to liability arising out of:

      (1) Premises you:

         (a) Own;

         (b) Rent;

         (c) Lease; or

         (d) Occupy; or

      (2) Ongoing operations performed by you or on your behalf. If, however, the written contract, written agreement, or certificate of insurance also requires completed operations coverage, we will also provide completed operations coverage for that additional insured.

   b. Premises, as respects paragraph **3.a.(1)** above, include common or public areas about such premises if so required in the written contract or written agreement.

   c. Additional insured status provided under paragraphs **3.a.(1)(b)** or **3.a.(1)(c)** above does not extend beyond the end of a premises lease or rental agreement.

   d. Ongoing operations, as respects paragraph **3.a.(2)** above, does not apply to "bodily injury" or "property damage" occurring after:

      (1) All work to be performed by you or on your behalf for the additional insured(s) at the site of the covered operations is complete, including related materials, parts or equipment (other than service, maintenance or repairs); or

      (2) That portion of "your work" out of which the injury or damage arises is put to its intended use by any person or organization other than another contractor working for a principal as a part of the same project.

   e. The limits of insurance that apply to the additional insured are the least of those specified in the:

      (1) Written contract;

      (2) Written agreement;

      (3) Certificate of insurance; or

      (4) Declarations of this policy.

      The limits of insurance are inclusive of and not in addition to the limits of insurance shown in the Declarations.

   f. The insurance provided to the additional insured does not apply to "bodily injury", "property damage", or "personal and advertising injury" arising out of an architect's, engineer's, or surveyor's rendering of, or failure to render, any professional services, including but not limited to:

      (1) The preparing, approving, or failing to prepare or approve:

         (a) Maps;

         (b) Drawings;

         (c) Opinions;

         (d) Reports;

         (e) Surveys;

         (f) Change orders;

         (g) Design specifications; and

      (2) Supervisory, inspection, or engineering services.

Includes copyrighted material of Insurance Services Office, Inc.

g. **SECTION IV – COMMERCIAL GENERAL LIABILITY CONDITIONS**, paragraph **4. Other Insurance** is deleted and replaced with the following:

4. Other Insurance.

Coverage provided by this endorsement is excess over any other valid and collectible insurance available to the additional insured whether:

a. Primary;

b. Excess;

c. Contingent; or

d. On any other basis;

unless the written contract, written agreement, or certificate of insurance requires this insurance be primary. In that case, this insurance will be primary without contribution from such other insurance available to the additional insured.

h. If the written contract, written agreement, or certificate of insurance as outlined above requires additional insured status by use of CG 20 10 11 85, then the terms of that endorsement, shown below, are incorporated into this endorsement to the extent such terms do not restrict coverage otherwise provided by this endorsement:

ADDITIONAL INSURED - OWNERS, LESSEES OR CONTRACTORS (FORM B)

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART.

SCHEDULE

Name of Person or Organization: Blanket Where Required by Written Contract, Agreement, or Certificate of Insurance that the terms of CG 20 10 11 85 apply

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

WHO IS AN INSURED (Section II) is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of "your work" for that insured by or for you.

Copyright, Insurance Services Office, Inc., 1984

CG 20 10 11 85

i. If the written contract, written agreement, or certificate of insurance as outlined above requires additional insured status by use of an Insurance Services Office (ISO) endorsement, then the coverage provided under this CG 70 48 endorsement does not apply. Additional insured status is limited to that provided by the ISO endorsement.

Includes copyrighted material of Insurance Services Office, Inc.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADVANTAGE
COMMERCIAL AUTOMOBILE BROAD FORM ENDORSEMENT

This endorsement modifies insurance provided under the

BUSINESS AUTO COVERAGE FORM

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by the endorsement.

The premium for this endorsement is $ INCLUDED

1. **EXTENDED CANCELLATION CONDITION**

   COMMON POLICY CONDITIONS - CANCELLATION, Paragraph **A.2.** is replaced by the following:

   2. We may cancel this policy by mailing or delivering to the first Named Insured written notice of cancellation at least:

      a. 10 days before the effective date of cancellation if we cancel for nonpayment of premium; or

      b. 60 days before the effective date of cancellation if we cancel for any other reason.

2. **BROAD FORM INSURED**

   SECTION II - LIABILITY COVERAGE A.1. WHO IS AN INSURED is amended by the addition of the following:

   d. Any organization you newly acquire or form, other than a partnership, joint venture or limited liability company, and over which you maintain ownership or a majority interest, will qualify as a Named Insured. However,

      (1) Coverage under this provision is afforded only until the end of the policy period;

      (2) Coverage does not apply to "accidents" or "loss" that occurred before you acquired or formed the organization; and

      (3) Coverage does not apply to an organization that is an "insured" under any other policy or would be an "insured" but for its termination or the exhausting of its limit of insurance.

   e. Any "employee" of yours using:

      (1) A covered "auto" you do not own, hire or borrow, or a covered "auto" not owned by the "employee" or a member of his or her household, while performing duties related to the conduct of your business or your personal affairs; or

      (2) An "auto" hired or rented under a contract or agreement in that "employee's" name, with your permission, while performing duties related to the conduct of your business. However, your "employee" does not qualify as an insured under this paragraph (2) while using a covered "auto" rented from you or from any member of the "employee's" household.

   f. Your members, if you are a limited liability company, while using a covered "auto" you do not own, hire, or borrow, while performing duties related to the conduct of your business or your personal affairs.

   g. Any person or organization with whom you agree in a written contract, written agreement or permit, to provide insurance such as is afforded under this policy, but only with respect to your covered "autos".

      This provision does not apply:

      (1) Unless the written contract or agreement is executed or the permit is issued prior to the "bodily injury" or "property damage";

Includes copyrighted material of Insurance Services Office, Inc.

(2) To any person or organization included as an insured by an endorsement or in the Declarations; or

(3) To any lessor of "autos" unless:

(a) The lease agreement requires you to provide direct primary insurance for the lessor;

(b) The "auto" is leased without a driver; and

(c) The lease had not expired.

Leased "autos" covered under this provision will be considered covered "autos" you own and not covered "autos" you hire.

h. Any legally incorporated organization or subsidiary in which you own more than 50% of the voting stock on the effective date of this endorsement.

This provision does not apply to "bodily injury" or "property damage" for which an "insured" is also an insured under any other automobile policy or would be an insured under such a policy, but for its termination or the exhaustion of its limits of insurance, unless such policy was written to apply specifically in excess of this policy.

3. **COVERAGE EXTENSIONS - SUPPLEMENTARY PAYMENTS**

Under **SECTION II - LIABILITY COVERAGE, A.2.a. Supplementary Payments**, paragraphs (2) and (4) are deleted and replaced with the following:

(2) Up to $2500 for the cost of bail bonds (including bonds for related traffic law violations) required because of an "accident" we cover. We do not have to furnish these bonds.

(4) All reasonable expenses incurred by the "insured" at our request, including actual loss of earnings up to $500 a day because of time off from work.

4. **AMENDED FELLOW EMPLOYEE EXCLUSION**

SECTION II - LIABILITY COVERAGE, B. EXCLUSIONS, paragraph **5. Fellow Employee** is deleted and replaced by the following:

5. **Fellow Employee**

"Bodily injury" to:

a. Any fellow "employee" of the "insured" arising out of and in the course of the fellow "employee's" employment or while performing duties related to the conduct of your business. However, this exclusion does not apply to your "employees" that are officers, managers, supervisors or above. Coverage is excess over any other collectible insurance.

b. The spouse, child, parent, brother or sister of that fellow "employee" as a consequence of paragraph **a.** above.

5. **HIRED AUTO PHYSICAL DAMAGE COVERAGE AND LOSS OF USE EXPENSE**

A. **Under SECTION III - PHYSICAL DAMAGE COVERAGE, A. COVERAGE**, the following is added:

If any of your owned covered "autos" are covered for Physical Damage, we will provide Physical Damage coverage to "autos" that you or your "employees" hire or borrow, under your name or the "employee's" name, for the purpose of doing your work. We will provide coverage equal to the broadest physical damage coverage applicable to any covered "auto" shown in the Declarations, Item Three, Schedule of Covered Autos You Own, or on any endorsements amending this schedule.

B. Under **SECTION III - PHYSICAL DAMAGE COVERAGE, A.4. COVERAGE EXTENSIONS,** paragraph **b. Loss of Use Expenses** is deleted and replaced with the following:

b. **Loss Of Use Expenses**

For Hired Auto Physical Damage, we will pay expenses for which an "insured" becomes legally responsible to pay for loss of use of a vehicle rented or hired without a driver, under a written rental contract or agreement. We will pay for loss of use expenses if caused by:

Includes copyrighted material of Insurance Services Office, Inc.

(1) Other than collision, only if the Declarations indicate that Comprehensive Coverage is provided for any covered "auto";

(2) Specified Causes of Loss, only if the Declarations indicate that Specified Causes Of Loss Coverage is provided for any covered "auto"; or

(3) Collision, only if the Declarations indicate that Collision Coverage is provided for any covered "auto".

However, the most we will pay for any expenses for loss of use is $30 per day, to a maximum of $2,000.

C. Under **SECTION IV – BUSINESS AUTO CONDITIONS**, paragraph **5.b. Other Insurance** is deleted and replaced by the following:

b. For Hired Auto Physical Damage Coverage, the following are deemed to be covered "autos" you own:

1. Any covered "auto" you lease, hire, rent or borrow; and

2. Any covered "auto" hired or rented by your "employee" under a contract in that individual "employee's" name, with your permission, while performing duties related to the conduct of your business.

However, any "auto" that is leased, hired, rented or borrowed with a driver is not a covered "auto", nor is any "auto" you hire from any of your "employees", partners (if you are a partnership), members (if you are a limited liability company), or members of their households.

6. **LOAN OR LEASE GAP COVERAGE**

Under **SECTION III - PHYSICAL DAMAGE COVERAGE, A. COVERAGE**, the following is added:

If a covered "auto" is owned or leased and if we provide Physical Damage Coverage on it, we will pay, in the event of a covered total "loss", any unpaid amount due on the lease or loan for a covered "auto", less:

(a) The amount paid under the Physical Damage Coverage Section of the policy; and

(b) Any:

(1) Overdue lease or loan payments including penalties, interest or other charges resulting from overdue payments at the time of the "loss";

(2) Financial penalties imposed under a lease for excessive use, abnormal wear and tear or high mileage;

(3) Costs for extended warranties, Credit Life Insurance, Health, Accident or Disability Insurance purchased with the loan or lease;

(4) Security deposits not refunded by a lessor; and

(5) Carry-over balances from previous loans or leases.

7. **RENTAL REIMBURSEMENT**

SECTION III - PHYSICAL DAMAGE COVERAGE, A. COVERAGE, paragraph **4. Coverage Extensions** is deleted and replaced by the following:

4. Coverage Extensions

(a) We will pay up to $75 per day to a maximum of $2000 for transportation expense incurred by you because of covered "loss". We will pay only for those covered "autos" for which you carry Collision Coverage or either Comprehensive Coverage or Specified Causes of Loss Coverage. We will pay for transportation expenses incurred during the period beginning 24 hours after the covered "loss" and ending, regardless of the policy's expiration, when the covered "auto" is returned to use or we pay for its "loss". This coverage is in addition to the otherwise applicable coverage you have on a covered "auto". No deductibles apply to this coverage.

(b) This coverage does not apply while there is a spare or reserve "auto" available to you for your operation.

Includes copyrighted material of Insurance Services Office, Inc.

8. **AIRBAG COVERAGE**

SECTION III - PHYSICAL DAMAGE, B. EXCLUSIONS, Paragraph 3. is deleted and replaced by the following:

We will not pay for "loss" caused by or resulting from any of the following unless caused by other "loss" that is covered by this insurance:

a. Wear and tear, freezing, mechanical or electrical breakdown. However, this exclusion does not include the discharge of an airbag.

b. Blowouts, punctures or other road damage to tires.

9. **GLASS REPAIR - WAIVER OF DEDUCTIBLE**

SECTION III - PHYSICAL DAMAGE COVERAGE, D. DEDUCTIBLE is amended to add the following:

No deductible applies to glass damage if the glass is repaired rather than replaced.

10. **COLLISION COVERAGE – WAIVER OF DEDUCTIBLE**

SECTION III - PHYSICAL DAMAGE COVERAGE, D. DEDUCTIBLE is amended to add the following:

When there is a "loss" to your covered "auto" insured for Collision Coverage, no deductible will apply if the "loss" was caused by a collision with another "auto" insured by us.

11. **KNOWLEDGE OF ACCIDENT**

SECTION IV - BUSINESS AUTO CONDITIONS, A. LOSS CONDITIONS, 2. DUTIES IN THE EVENT OF ACCIDENT, CLAIM, SUIT OR LOSS, paragraph a. is deleted and replaced by the following:

a. You must see to it that we are notified as soon as practicable of an "accident", claim, "suit" or "loss". Knowledge of an "accident", claim, "suit" or "loss" by your "employees" shall not, in itself, constitute knowledge to you unless one of your partners, executive officers, directors, managers, or members (if you are a limited liability company) has knowledge of the "accident", claim, "suit" or "loss". Notice should include:

(1) How, when and where the "accident" or "loss" occurred;

(2) The "insured's" name and address; and

(3) To the extent possible, the names and addresses of any injured persons and witnesses.

12. **TRANSFER OF RIGHTS (BLANKET WAIVER OF SUBROGATION)**

SECTION IV - BUSINESS AUTO CONDITIONS A.5. TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US is deleted and replaced by the following:

If any person or organization to or for whom we make payment under this Coverage Form has rights to recover damages from another, those rights are transferred to us. That person or organization must do everything necessary to secure our rights and must do nothing after "accident" or "loss" to impair them. However, if the insured has waived rights to recover through a written contract, or if your work was commenced under a letter of intent or work order, subject to a subsequent reduction in writing with customers whose customary contracts require a waiver, we waive any right of recovery we may have under this Coverage Form.

13. **UNINTENTIONAL FAILURE TO DISCLOSE HAZARDS**

SECTION IV - BUSINESS AUTO CONDITIONS, B. GENERAL CONDITIONS, 2. CONCEALMENT, MISREPRESENTATION OR FRAUD is amended by the addition of the following:

We will not deny coverage under this Coverage Form if you unintentionally fail to disclose all hazards existing as of the inception date of this policy. You must report to us any knowledge of an error or omission in your representations as soon as practicable after its discovery. This provision does not affect our right to collect additional premium or exercise our right of cancellation or non-renewal.

Includes copyrighted material of Insurance Services Office, Inc.

14. BLANKET COVERAGE FOR CERTAIN OPERATIONS IN CONNECTION WITH RAILROADS

When required by written contract or written agreement, the definition of "insured contract" is amended as follows:

- The exception contained in paragraph **H.3.** relating to construction or demolition operations on or within 50 feet of a railroad; and
- Paragraph **H.a.**

are deleted with respect to the use of a covered "auto" in operations for, or affecting, a railroad.

Includes copyrighted material of Insurance Services Office, Inc.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

POLICY CHANGES

POLICY CHANGE NUMBER: 4

POLICY NUMBER	POLICY CHANGES EFFECTIVE	COMPANY
ACCOUNT NUMBER	POLICY PERIOD	GROUP NAME GROUP NUMBER
NAMED INSURED		AUTHORIZED REPRESENTATIVE

COVERAGE PARTS AFFECTED
GL

CHANGES

☐	Insured's Name	☐	Insured's Mailing Address
☐	Policy Number	☐	Company
☐	Effective/Expiration Date	☐	Insured's Legal Status/Business of Insured
☐	Payment Plan	☐	Premium Determination
☐	Additional Interested Parties	☐	Coverage Forms and Endorsements
☐	Limits/Exposures	☐	Deductibles
☐	CoveredProperty/Location Description	☐	Classification/Class Codes
☐	Rates	☐	Underlying Insurance

DESCRIPTION OF CHANGE:

ADDING A 30 DAY NOTICE OF CANCELLATION IN FAVOR OF THE CITY OF ANN ARBOR MICHIGAN

THE ABOVE AMENDMENTS RESULT IN A CHANGE IN THE PREMIUM AS FOLLOWS:

[X] NO CHANGES	[ ] TO BE ADJUSTED AT AUDIT	ADDITIONAL PREMIUM	RETURN PREMIUM
This endorsement reflects a net premium change Total Policy Premium: Taxes and Surcharges: Balance to Minimum:			

AUTHORIZED REPRESENTATIVE SIGNATURE

IL 70 44 07 08

Includes copyrighted material of Insurance Services Office, Inc. with its permission.
Insurance Services Office, Inc., 2004

12/07/2015

AGENT COPY

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

NOTICE OF CANCELLATION, NONRENEWAL OR MATERIAL CHANGE - THIRD PARTY

This endorsement modifies insurance provided under the following:

AUTO DEALERS COVERAGE FORM
BUSINESS AUTO COVERAGE FORM
BUSINESS AUTO PHYSICAL DAMAGE COVERAGE FORM
COMMERCIAL GENERAL LIABILITY COVERAGE FORM
COMMERCIAL UMBRELLA LIABILITY COVERAGE FORM
GARAGE COVERAGE FORM
MOTOR CARRIER COVERAGE FORM
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE FORM
TRUCKERS COVERAGE FORM

Subject to the cancellation provisions of the Coverage Form to which this endorsement is attached, we will not:

1. Cancel;
2. Nonrenew; or
3. Materially change (reduce or restrict)

this Coverage Form until we provide at least 30 days written notice of such cancellation, nonrenewal or material change. Written notice will be to the person or organization named in the Schedule. Such notice will be by certified mail with return receipt requested.

This notification of cancellation, nonrenewal or material change to the person or organization named in the Schedule is intended as a courtesy only. Our failure to provide such notification will not:

1. Extend any Coverage Form cancellation date;
2. Negate the cancellation as to any insured or any certificate holder;
3. Provide any additional insurance that would not have been provided in the absence of this endorsement; or
4. Impose liability of any kind upon us.

This endorsement does not entitle the person or organization named in the Schedule to any benefits, rights or protection under this Coverage Form.

SCHEDULE

Name Of Person Or Organization	Mailing Address
CITY OF ANN ARBOR MICHIGAN	301 EAST HURON STREET ANN ARBOR, MI 48104

Forms and Endorsements Schedule

Policy Number: **Effective Date:**

Named Insured:

Form Number	Description
COMMON FORMS	
IL 70 68 07 14	NOTICE OF CANCELLATION, NONRENEWAL OR MATERIAL CHANGE - THIRD PARTY