



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
DNRB11007

PAGE
1

ADDRESS CORRESPONDENCE TO ATTENTION OF:
FRANK WHITTAKER 304-558-2316

VENDOR

RFQ COPY
 TYPE NAME/ADDRESS HERE

SHIP TO

DIVISION OF NATURAL RESOURCES
 PARKS & RECREATION SECTION
 324 4TH AVENUE
 SOUTH CHARLESTON, WV
 25303-1228 304-558-3397

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
08/10/2010				

BID OPENING DATE: 08/24/2010 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
***** ADDENDUM NO. 1 *****						
THIS ADDENDUM IS ISSUED TO PROVIDE THE ATTACHED TECHNICAL QUESTION, AGENCY RESPONSE AND INSPECTION REPORTS.						
THE BID OPENING DATE AND TIME HAVE NOT CHANGED.						
***** END ADDENDUM NO. 1 *****						
0001	1	LS		906-00-00-001		
AE ERVICES						
***** THIS IS THE END OF RFQ DNRB11007 ***** TOTAL:						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
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TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE
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WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

GENERAL TERMS & CONDITIONS
REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)

1. Awards will be made in the best interest of the State of West Virginia.
 2. The State may accept or reject in part, or in whole, any bid.
 3. Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required \$125 fee.
 4. All services performed or goods delivered under State Purchase Order/Contracts are to be continued for the term of the Purchase Order/Contracts, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods this Purchase Order/Contract becomes void and of no effect after June 30.
 5. Payment may only be made after the delivery and acceptance of goods or services.
 6. Interest may be paid for late payment in accordance with the *West Virginia Code*.
 7. Vendor preference will be granted upon written request in accordance with the *West Virginia Code*.
 8. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.
 9. The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.
 10. The laws of the State of West Virginia and the *Legislative Rules* of the Purchasing Division shall govern the purchasing process.
 11. Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.
 12. **BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, the State may deem this contract null and void, and terminate such contract without further order.
 13. **HIPAA BUSINESS ASSOCIATE ADDENDUM:** The West Virginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, is available online at www.state.wv.us/admin/purchase/vrc/hipaa.htm and is hereby made part of the agreement. Provided that the Agency meets the definition of a Cover Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.
 14. **CONFIDENTIALITY:** The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures, and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in <http://www.state.wv.us/admin/purchase/privacy/noticeConfidentiality.pdf>.
 15. **LICENSING:** Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, and the West Virginia Insurance Commission. The vendor must provide all necessary releases to obtain information to enable the director or spending unit to verify that the vendor is licensed and in good standing with the above entities.
 16. **ANTITRUST:** In submitting a bid to any agency for the State of West Virginia, the bidder offers and agrees that if the bid is accepted the bidder will convey, sell, assign or transfer to the State of West Virginia all rights, title and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the State of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to the bidder.
- I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, limited liability company, partnership, or person or entity submitting a bid for the same material, supplies, equipment or services and is in all respects fair and without collusion or Fraud. I further certify that I am authorized to sign the certification on behalf of the bidder or this bid.

INSTRUCTIONS TO BIDDERS

1. Use the quotation forms provided by the Purchasing Division. Complete all sections of the quotation form.
2. Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as **EQUAL** to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.
3. Unit prices shall prevail in case of discrepancy. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.
4. All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications: Department of Administration, Purchasing Division, 2019 Washington Street East, P.O. Box 50130, Charleston, WV 25305-0130
5. Communication during the solicitation, bid, evaluation or award periods, except through the Purchasing Division, is strictly prohibited (W.Va. C.S.R. §148-1-6.6).

ADDENDUM #1

EXPRESSION OF INTEREST Cacapon Resort State Park Dams Engineering Investigation and Certificate of Approval

The following information is offered as addendum #1 to the above referenced EOI.

The following question was received prior to the deadline for technical questions:

“Are there any available reports identifying the components or features of the dams not in compliance with current dam safety regulations that we can review prior to sending our Expression of Interest?”

In response the attached recent inspection reports are provided for review.

**PERIODIC DAM INSPECTION (2009)
CACAPON STATE PARK LAKE DAM
(INDIAN RUN DAM - LOWER)
ID # 06503
MORGAN COUNTY, WEST VIRGINIA**

CIVIL TECH PROJECT NO. 09145

SUBMITTED TO:
WEST VIRGINIA DIVISION OF NATURAL RESOURCES
PARKS AND RECREATION
CHARLESTON, WEST VIRGINIA

SUBMITTED BY:
CIVIL TECH ENGINEERING, INC.
HURRICANE, WEST VIRGINIA

OCTOBER 2009

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CIVIL TECH ENGINEERING, INC.
300A Prestige Drive
Hurricane, West Virginia 25526
Phone: 304-757-8094 Fax: 304-757-8095

October 23, 2009

Mr. Bradley S. Leslie, PE
WVDNR - Parks and Recreation
Capitol Complex, Building 3, Room 714
1900 Kanawha Blvd., East
Charleston, West Virginia 25305-0662

Subject: Periodic Dam Safety Inspection (2009)
Lower (Indian Run) Cacapon Park Dam - ID #06503
Morgan County, West Virginia
Civil Tech Project No. 09145

Dear Mr. Leslie:

As authorized, we have completed the subject inspection. The inspection was performed on October 19, 2009. The attendees at the meeting included:

- ▶ Conrad Baston – WVDEP, Dam Safety Section
- ▶ Mark Pennington - Civil Tech Engineering (writer)

Provided herein is a general description of the dam and appurtenances, observations made during the inspection, and our conclusions and recommendations. Based on available information, the dam does not have a certificate of approval and has been assigned a Class 1 Hazard Rating by the WVDEP Dam Safety Section. Copies of past inspection reports were reviewed prior to performing the current inspection to familiarize ourselves with any problems or concerns which have been noted at the dam in the past. Our company inspected this dam on October 8, 1998, October 29, 2002, and October 4, 2007. The reader is referred to Civil Tech reports dated October 16, 1998, November 4, 2002, and October 12, 2007 for additional information concerning the results of those inspections.

Cacapon Park Dam Inspection – Indian Run (2009)
Civil Tech Project No. 09145
October 23, 2009

General Description of the Dam

The dam is located in Cacapon State Park in Morgan County, West Virginia. The structure impounds Indian Creek, which is a tributary of Sleepy Creek. The lake formed by the dam serves as a recreation impoundment and is located about 1 mile downstream of an upper dam which is used as a water supply reservoir for the state park and golf course. The dam is an earthen, or rock fill structure with a stone masonry spillway located in the right abutment (right facing downstream). No information was available in the Dam Safety file in Charleston pertaining to the construction details or age of the dam. However, it is believed the dam may be constructed with a concrete or stone masonry center core wall. Normal pool is maintained by the masonry spillway which serves as both a principal and emergency spillway. A stone guide wall is located along the left side of the masonry spillway. This wall protects the dam from erosion and appears to support the embankment along the left side of the spillway. A 2 x 2 ft. concrete box culvert drain outlet has been incorporated into the left guide wall of the stone spillway. This box culvert appears to be a drain pipe for the lake. Recent information obtained indicates the culvert has an in lake valve housed upstream of the left spillway guide wall. Information provided by the Park Superintendent suggests this valve is operational. According to Tom Ambrose, the Park Superintendent, the lake level is lowered about 4 to 5 ft. in the spring each year for beach and dock maintenance. Mr. Ambrose was cautioned about the drawdown rate since rapid drawdown of the lake level could result in slope instability with the reservoir rim and dam. A maximum drawdown rate of 12 inches per day is recommended. However, the lake rim and dam should be monitored during drawdown and a slower rate may be needed depending on the performance of these slopes. See Figure 1 for a site sketch of the dam and spillway.

Dam Inspection Observations

The following observations were made during our joint inspection with WVDEP personnel performed on October 19, 2009. At the time of our inspection, it was sunny and cool. The lake pool level appeared to be near normal and clear.

Dam Embankment

Downstream Slope: The downstream dam embankment is slightly irregular, but did not exhibit any signs of slope instability or seepage. See Photo No.s 3 and 4. The following was noted:

Cacapon Park Dam Inspection – Indian Run (2009)
Civil Tech Project No. 09145
October 23, 2009

1. The dam is visually estimated to be about 20 to 25 ft. tall with a downstream slope of 2:1 (H:V), or steeper.
2. Grass cover was well mowed and appears to be adequate.
3. Several large tree stumps were present on the downstream slope where trees had been removed in the past. These stumps have generally rotted and are no longer visible. However, depressions in the ground surface can be seen where the stumps were located. These areas should be monitored for seepage in the future. A prominent hole resulting from stump rot is visible in the left groin near the dam crest and can be seen in Photo 3.
4. An animal burrow was observed on the left side of the dam near the toe and left groin area during our inspection performed in 1998. See Figure 1. This burrow was not visible during the 2002 inspection and was observed to be inactive during the recent 2007 inspection. The burrow was not present at the time of this inspection.
5. Similar to our past inspections, no seepage was noted on the slope or at the toe of the dam. Based on our review of past inspection reports, a wet area has been noted to be present downstream of the toe of the dam on the left side as shown on Figure 1. This area was dry during our recent inspection as well as the inspections performed in 2007, 2005, and 1998. However, standing water was present in this area during our 2002 inspection. The reader will note, it was raining during that inspection and this area is poorly drained. Since the area is currently dry and was dry in 2007, 2005, and 1998, it is our opinion the source of this water is surface runoff and poor drainage, not seepage from the dam.

Upstream: The upstream embankment slope was uniformly grass covered and showed no signs of slope instability. See Photograph Nos. 5 and 6 for views of the upstream embankment slope. The following was noted:

1. The upstream slope visually appears to be constructed at a 3:1 (H:V) slope or flatter.
2. The slope is protected with rip-rap extending about 2 to 4 ft. above normal pool. The rip rap appears to be in acceptable condition and no erosion was observed along the pool

Cacapon Park Dam Inspection -- Indian Run (2009)
Civil Tech Project No. 09145
October 23, 2009

level.

3. In past inspections, several large tree stumps were present on the upstream slope where trees were removed. During our 2002 inspection, it was noted these stumps were beginning to rot and a hole was present in the slope adjacent to a stump located close to the spillway. This stump was removed and the hole was filled following our 2002 inspection. See Photo No. 7.

Dam Crest: The dam crest is relatively uniform with no apparent signs of subsidence or erosion. See Photo No.s 1 and 2. The following was noted:

1. Vegetative cover has been established on the dam crest except for one bare area located adjacent to the spillway on the right side of the dam. This bare area should be re-vegetated.
2. Roots from trees previously located on the upstream slope of the dam were visible at the surface on the dam crest during past inspections. These roots have rotted and are not a concern.

Principal/Emergency Spillway

As mentioned previously, normal pool is maintained by a stone masonry spillway located within the right abutment of the dam (right facing downstream). See Figure 1 and Photograph Nos. 8, 9, 15, and 16 for views of the spillway. The following was noted:

1. The spillway visually appears to be about 50 to 100 ft. wide and has been constructed with an approximate 1/2:1 (H to V) downstream slope and what appears to be about a 5:1 upstream slope. The spillway has been abutted against sandstone rock on the right side and includes a stone masonry guide wall on the left side adjacent to the dam.
2. We understand some of the stones forming the right end of the control section of the spillway were washed out during high flow in 1996. This damage concentrated flow in that area and caused some erosion of the sandstone bedrock downstream of the spillway. The eroded area is shown on Photo No. 9. We understand the stones which were washed

Cacapon Park Dam Inspection – Indian Run (2009)
Civil Tech Project No. 09145
October 23, 2009

out appear were replaced at that time. However, some of the spillway stones were observed to be missing and erosion of the sandstone bedrock is progressing in this area. See Figure 1 and Photo No.s 15 and 16. As discussed with Mr. Ambrose, the missing stones should be replaced and the bedrock erosion filled with concrete as maintenance. Failure to make these repairs timely could allow the spillway to wash out again and result in the loss of the pool.

3. A stone guide wall is present on the left side of the spillway (left facing downstream). See Photo No.s 10 and 13. As can be seen, this wall extends downstream and upstream of the spillway control section and supports the embankment along the left side of the spillway structure. The wall has been constructed with a cutoff wall which extends perpendicularly from the structure into the crest of the embankment. This cut off wall can be seen on Photo No. 12 and may be the exposed end of a stone masonry core wall in the dam. However, this cannot be confirmed based on our visual inspection. No seepage was observed around the wall during this or past inspections. Also, similar to past inspections, the guide wall appears to be in relatively good condition and did not exhibit evidence of damage, tilt, or distortion due to scour or earth pressure. However, as shown in Photograph No. 13, the wall does exhibit some loose mortar and vegetative growth. All loose mortar should be chipped out and replaced. All vegetation should be removed. As shown in Photo No. 14, the upstream portion of the wall also appears to have been reinforced with concrete placed around the original stone structure. No information is available concerning this possible repair.
4. As shown on Photo Nos. 10, 12, and 13, a new wooden fence was added along the edge of the left spillway guide wall prior to our 2007 inspection. This restricts access to the steep drop off over the wall and is an improvement for pedestrian safety. Also, the vertical chambers previously open at the top of the left guidewall at the dam crest have been covered with concrete. See Photo No. 12.

Drain Pipe

The dam has been constructed with a 2 x 2 ft. concrete box culvert which we believe may serve as a drain pipe for the lake. This box culvert can be seen on Figure 1 and Photo No.11. The following was noted:

Cacapon Park Dam Inspection – Indian Run (2009)
Civil Tech Project No. 09145
October 23, 2009

1. The inlet to the box culvert appears to consist of two vertical chambers located along the left side of the spillway as shown on Figure 1. Based on recent information obtained, we understand the culvert is drained by an in-lake valve located somewhere upstream of the spillway guide wall. The chambers have been capped with concrete and are not accessible.
2. A view of the box culvert outlet is shown in Photo No. 11. Flow was observed exiting the outlet which is an indication the valve or culvert is leaking. The culvert is broken at the outlet and the interior condition of the same could not be determined.
3. Sycamore trees and other vegetation are growing at the outlet to the box culvert during our last inspection have been removed. These trees and vegetation should be removed periodically.

Conclusions and Recommendations

Based on our visual inspection, no serious deficiencies or problems which affect the safe functioning of the dam were noted. Items which were noted and should be treated as maintenance/monitoring are as follows:

1. The seepage occurring within the drain pipe should be monitored for increased flow and/or a change in the flow condition such as muddy flow. If this should occur, immediate investigation and repairs should be implemented.
2. The eroded rock present near the right side of the spillway should be monitored for further erosion. As discussed during our inspection, we believe this area should be filled with concrete and the missing spillway stones replaced to avoid possible loss of pool and more extensive damage.
3. Loose, cracked, and missing mortar in the stone masonry should be repaired as required to maintain the integrity of the riser and left spillway guidewall.

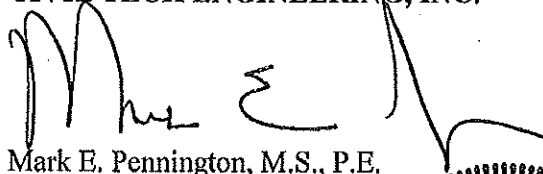
Cacapon Park Dam Inspection – Indian Run (2009)
Civil Tech Project No. 09145
October 23, 2009

At present, the dam does not have a certificate of approval from Dam Safety. We recommend a complete engineering evaluation be performed for this structure. A hazard analysis should also be performed to determine the appropriate hazard class for the dam, and any modifications necessary to insure the structure meets current Dam Safety regulations for the hazard classification determined to be appropriate.

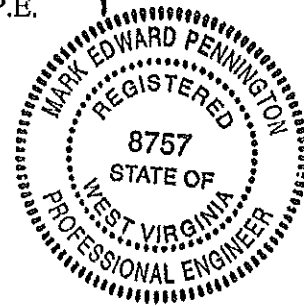
We trust this report satisfies your needs at this time. Attached is an inspection verification statement as required by the WVDEP Dam Safety Section. If you have any questions or comments, or if we can be of any further assistance, please feel free to contact us. Two copies of this report have been forwarded to the WVDEP, Dam Safety Section.

Very truly yours,

CIVIL TECH ENGINEERING, INC.



Mark E. Pennington, M.S., P.E.
Principal Engineer



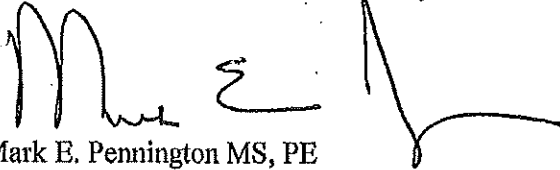
cc: Mr. Conrad Baston WVDEP-Dam Safety with two copies of this report.

Cacapon Park Dam Inspection – Indian Run (2009)
Civil Tech Project No. 09145
October 23, 2009

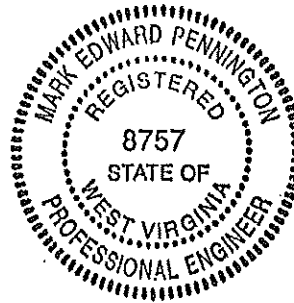
ENGINEER'S VERIFICATION STATEMENT

I hereby verify that I conducted a visual inspection of the Cacapon Park Dam (ID# 06503) and its appurtenances on October 19, 2009. The attached report documents: 1) the current conditions observed; 2) any maintenance items necessary to prolong safe functioning of the dam; 3) any conditions observed during the inspection which indicate the dam has a serious problem* and; 4) any conditions that will not allow proper operation of the dam during normal or maximum reservoir water level conditions.

*as defined in Section 2.47 of the Dam Safety Rules



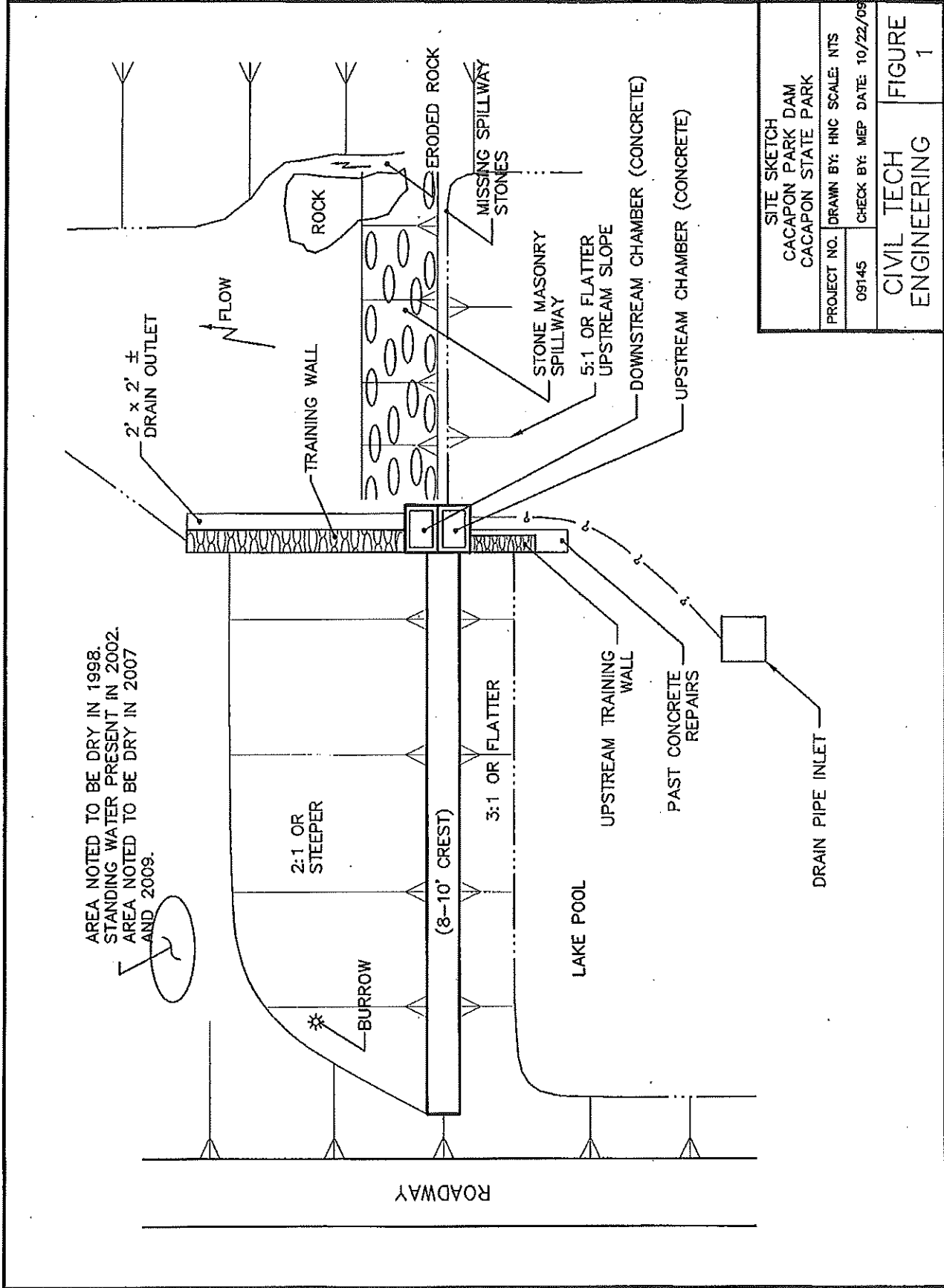
Mark E. Pennington MS, PE
Registered Professional Engineer No. 8757



Date 10-23-09

Engineer's Seal

C:\Users\james\Documents\2010\2010-09-15\2010-09-15.dwg



AREA NOTED TO BE DRY IN 1998.
 STANDING WATER PRESENT IN 2002.
 AREA NOTED TO BE DRY IN 2007
 AND 2009.

SITE SKETCH CACAPON PARK DAM CACAPON STATE PARK	
PROJECT NO. 09145 DRAWN BY: HNC SCALE: NTS	CHECK BY: MEP DATE: 10/22/09
CIVIL TECH ENGINEERING	
FIGURE 1	

PHOTOGRAPHS



Photo No. 1: Dam crest facing right.



Photo No. 4: Downstream slope facing left.



Photo No. 2: Dam crest facing left.



Photo No. 5: Upstream slope facing right.



Photo No. 3: Downstream slope facing right.



Photo No. 6: Upstream slope facing left.



Photo No. 7: Old stump removed and hole filled near the principal spillway guide wall.



Photo No. 10: Left spillway wall.



Photo No. 8: Principal spillway.



Photo No. 11: Box culvert outlet. Flow was observed on this date even though the gate was closed.



Photo No. 9: Bedrock erosion and old repair along the right end of the principal spillway.



Photo No. 12: The concrete top on the old drain gate well is in good condition. Some of the stone masonry is in need of mortar repair.



Photo No. 13: Left spillway guidewall facing upstream.



Photo No. 16: Missing spillway stones.



Photo No. 14: Left spillway guidewall.



Photo No. 15: Erosion area and missing spillway stones.

**PERIODIC DAM INSPECTION (2009)
CACAPON STATE PARK RESERVOIR DAM
(UPPER DAM)
ID # 06502
MORGAN COUNTY, WEST VIRGINIA**

CIVIL TECH PROJECT NO. 09144

SUBMITTED TO:
WEST VIRGINIA DIVISION OF NATURAL RESOURCES
PARKS AND RECREATION
CHARLESTON, WEST VIRGINIA

SUBMITTED BY:
CIVIL TECH ENGINEERING, INC.
HURRICANE, WEST VIRGINIA

OCTOBER 2009

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CIVIL TECH ENGINEERING, INC.
300A Prestige Drive
Hurricane, West Virginia 25526
Phone: 304-757-8094 Fax: 304-757-8095

October 23, 2009

Mr. Bradley S. Leslie, PE
WVDNR - Parks and Recreation
Capitol Complex, Building 3, Room 714
1900 Kanawha Blvd., East
Charleston, West Virginia 25305-0662

Subject: Periodic Dam Safety Inspection (2009)
Upper Cacapon Reservoir Dam - ID # 06502
Morgan County, West Virginia
Civil Tech Project No. 09144

Dear Mr. Leslie:

As authorized, we have completed the subject inspection. The inspection was performed on October 19, 2009. The inspection was performed by:

- ▶ Conrad Baston – WVDEP, Dam Safety Section
- ▶ Mark Pennington - Civil Tech Engineering (writer)

Provided herein is a general description of the dam and appurtenances, observations made during the inspection, and our conclusions and recommendations. Based on available information, the dam does not have a certificate of approval and has been assigned a Class 1 Hazard Rating by the WVDEP Dam Safety Section. Copies of past inspection reports were reviewed prior to performing the current inspection to familiarize ourselves with any problems or concerns which have been noted at the dam in the past. Our company last inspected this dam on October 8, 1998, October 29, 2002, and October 4, 2007. The reader is referred to Civil Tech reports dated October 16, 1998, November 4, 2002, and October 12, 2007 for additional information concerning the results of those inspections

Cacapon Reservoir (Upper) Dam Inspection (2009)
Civil Tech Project No. 09144
October 23, 2009

General Description of the Dam

The dam is located in Cacapon State Park in Morgan County, West Virginia. The structure impounds Indian Creek, which is a tributary of Sleepy Creek. The dam serves as a water supply reservoir for the park and golf course, and is constructed in series with the Cacapon Park Dam (Indian Run Dam) which is located about 1 mile downstream. The dam is an earthen structure which is reported to have been constructed with a clay core. The dam is about 36 ft. tall and 550 ft. long. There is approximately 8 ft. of freeboard between the normal pool and dam crest elevation. An earth lined emergency spillway is located within the left abutment of the dam (left facing downstream). There is about 4 ft. of freeboard between the emergency spillway crest and the dam crest. Normal pool is maintained by a double chamber concrete riser located within the reservoir upstream of the dam. The upstream chamber of the riser serves as a wet well intake for the water supply pumping system. The pumps for the system are mounted on the top of the riser. Water enters the wet well by openings in the top of the riser (when the lake is at normal pool) and by what is believed to be a gated opening in the back wall of the structure. The downstream chamber of the riser drains into a 42 inch diameter corrugated metal pipe that extends through the dam and outlets at the downstream toe in a concrete outlet structure. Flow into the principal spillway outlet pipe is controlled by a wall which separates the downstream and upstream riser chambers and also serves as a weir. A drain gate is located in the bottom of the center weir wall of the riser. Both the wet well gate and the drain gate are operated from the top of the riser. The riser can be accessed by a bridge which spans between the top of the structure and the dam.

Dam Inspection Observations

The following observations were made during our joint inspection with WVDEP personnel performed on October 19, 2009. At the time of our inspection, it was sunny and cool. The lake pool level was about 5 ft. below normal due to dry weather, leakage, and pumping from the reservoir for water supply purposes. The reader will recall the pool was about 8 ft. below normal during our 2007 inspection. Prior to the inspection, we discussed the performance of the dam with Tom Ambrose, Park Superintendent. Mr. Ambrose reported the performance of the dam since our last inspection had been normal.

Cacapon Reservoir (Upper) Dam Inspection (2009)
Civil Tech Project No. 09144
October 23, 2009

Dam Embankment

Downstream Slope: The downstream slope is shown on Photo No.s 1 and 2. The following was noted:

1. Vegetation is adequate except for the thin areas located on the slope above the principal spillway outlet. The bare area located in the right groin has been armored with rip rap since our last inspection. See Photo No. 3.
2. The downstream slope is reported to be constructed at an approximate 2:1 (H:V) angle. Visually, the slope appears to be slightly steeper than 2:1. The slope is relatively uniform and did not exhibit any signs of slope instability. What appears to be a game trail located above the principal spillway outlet gives the appearance of slope movement. Since the slope above the principal spillway outlet is steeper than the adjacent embankment, this area should be monitored for evidence of instability in the future.
3. Seepage areas were noted in the 1998 inspection in the left and right dam groins near the toe of the embankment. The right groin seepage area has been consistently wet with a slight flow of water during all past inspections. A slight flow was also observed during this inspection. The left groin seepage area was flowing in 2002 but was dry during this inspection and has been dry during all other inspections. See Photo Nos. 1 and 4. As during past inspections, flow was clear in these seepage areas.
4. A new seepage area was noted on the face of the dam on the left side during the 2002 inspection which was not noted in 1998. This seepage area was also present during the current inspection. Views of this area are shown on Photo Nos. 1 and 5. Clear standing water was observed in the left seep area at the time of this inspection. However, no flow was observed. The reader will note this area was dry at the time of the last inspection. At the time of the 2007 inspection, the lake pool was approximately 3 ft. lower than the pool observed during this inspection. This increased pool may be responsible for the seepage observed during this inspection and suggests the source of the dam leakage may be positioned between a level which is 5 to 8 ft. below the normal pool. A maintenance person for the park who stopped by during the inspection stated the seep dries up during the summer. We believe the seepage dries up when the pool level drops down to 8 ft. or

Cacapon Reservoir (Upper) Dam Inspection (2009)
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October 23, 2009

more below normal pool. To confirm this, Park personnel should record the lake level along with seepage observations monthly during routine inspections. Considering the relatively high location of the seepage on the embankment slope, we recommend the seepage be monitored closely for increased flow, muddy flow, etc. especially during higher pool levels. If a high pool level should occur, the owner should observe the seepage rate and condition of the flow on a daily basis while the reservoir is returning to normal and for a period of time after the lake level returns to normal. The seeps should also be monitored closely during storm events which produce an elevated pool. Notes should be made following each inspection along with observations concerning weather and pool level. Should the seepage increase in magnitude or become muddy, this may be an indication of a serious problem. Should this occur, the owner should respond in accordance with the Monitoring and Emergency Action Plan and should contact appropriate authorities including the WVDEP Dam Safety Section immediately.

5. The left groin of the dam is protected with rip-rap which was reportedly constructed to protect the dam from erosion caused by emergency spillway operation.

Upstream: The upstream embankment slope is reportedly constructed at an approximate 3:1 (H:V) slope. See Photo No.s 6 thru 8. The following was noted:

1. The slope was uniformly grass covered above the normal pool level and showed no signs of slope instability.
2. The pool level was about 5 ft. below normal at the time of our inspection.
3. There is minor erosion occurring at the normal pool line due to wave action particularly on the right side of the dam. See Photo No. 8. However, this erosion does not appear to have progressed significantly since 2002, is minor, and not a concern at present. The owner should consider installing rip rap in this area in the future to avoid additional and more serious erosion.

Dam Crest: The dam crest is relatively uniform with no apparent signs of subsidence or significant erosion. See Photo No.s 9 and 10. The following was noted:

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1. Vegetative cover has been established on the dam crest except for the left side of the dam which is open to vehicle traffic and bare. The crest is also bare on the right end adjacent to the natural hillside. Depressions and standing water were noted on the left side of the crest in the 1998 inspection. These depressions were due to minor vehicle rutting. The low areas were filled with crushed stone prior to our 2002 inspection. These areas have remained filled and do not appear to be a concern except for one small area shown on Photo No. 9 where minor rutting has occurred and standing water was present. As noted in 2002, some minor erosion appears to be occurring on the right end of the crest and the adjacent embankment slope due to surface runoff from the adjacent hillside. See Photo No. 11. This erosion does not appear to have progressed since 2002.
2. The control building for the pumping system is located on the dam crest. A fence has been erected around the control building to minimize unauthorized access. See Photo No.s 9 and 10.
3. As noted in our 1998 and 2002 inspections, access to the dam crest area is not restricted by a gate or cable. We recommend access to the crest be restricted from vehicle traffic with a gate or cable.

Emergency Spillway

The dam is constructed with a 125 ft. wide emergency spillway located in the left abutment. The spillway is constructed in earth and is primarily grass lined with some bare areas and thin gravel surface. A paved roadway also passes through the left side of the spillway. See Photo No. 12. The spillway does not show any signs of recent or past operation. Based on the way the spillway is constructed, if it should operate, flow would drain down the left groin of the dam. The groin area is protected with rip-rap. However, we do not believe the rip-rap is sufficient to protect the embankment from erosion during spillway operation.

Principal Spillway

Normal pool is maintained by a double chamber concrete drop inlet located within the reservoir upstream of the dam. The concrete riser drains into a 42 inch diameter corrugated metal pipe that extends through the dam and outlets at the downstream toe in a concrete outlet

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structure. See Photo No.s 13 thru 19. The following was noted:

1. The riser is a double chambered structure with a center weir wall. The rear chamber appears to serve as a wet well for the pump intake. The front chamber serves as the principal spillway pipe outlet.
2. A walk bridge is provided for access to the riser which spans between the dam crest to the top of the riser structure. Access to the riser bridge was not restricted during our 1998 inspection. However, prior to our 2002 inspection, a fence and gate were added to the bridge to restrict access. See Photo No. 13. There is no safety rail around the top of the riser structure which could be hazardous. The gate was locked at the time of our inspection. Therefore, we were not able to access the top of the riser for inspection.
3. A trash rack is provided around the openings to the riser. The portion of the riser which was exposed above the pool level appeared to be in good condition with no cracking, spalling, or other obvious deterioration of the concrete. The trash rack, pumps, piping, and drain gate operators have been painted since our last inspection. However, the bent bar located along the downstream side of the riser has not been repaired. See Photograph No. 14.
4. The drain gate for the riser is located in the base of the weir wall. According to Park personnel, the stem operator for the drain gate is broken and the gate is not operable.
5. The 42 inch drain pipe terminates at the toe of the dam in a concrete outlet structure. The structure appears to be in good condition and there was no evidence of spalling, cracking, or deterioration. See Photo No.s 15 thru 17.
6. The outlet of the 42 inch CMP was not restricted to access during our 1998 inspection. The bar screen shown on Photo No. 16 was provided prior to our 2002 inspection and has been screwed to the concrete structure to prevent unauthorized access. However, this bar screen also prevented our entry to examine the interior of the pipe on the date of this inspection. Similar to our past inspections, flow was exiting the pipe on this date even though there was no flow entering the pipe at the riser (the lake level was below the normal pool inlet level). The flow at the pipe outlet was visually estimated to be about ½

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to 1 inch deep and was similar to that observed in 2002, 2005, and 2007. This flow indicates there is a leak in the riser and/or the pipe. To investigate this potential problem further, our engineer and one of Dam Safety's engineers entered the pipe to examine the interior of the same in 1998. We advanced into the pipe a distance of about 80 feet upstream of the outlet. The reader should refer to that report for details concerning that inspection. However, in general, the pipe had deflected at the joints as much as 3 to 12 inches, standing water was present upstream of each joint, and significant leaks were observed. **As discussed in the 1998 report, the condition of this pipe is a serious concern and, as discussed herein, warrants a more detailed inspection and evaluation.**

7. The stream channel downstream of the outlet structure is in good condition and does not exhibit evidence of erosion caused by high flow. See Photo No. 17.
8. Underdrain outlet pipes are located within the concrete wingwall on each side of the principal spillway structure. Available information indicates these pipes collect seepage from an underdrain constructed downstream of the clay core. Both pipes were flowing steadily on this date and the flow was noted to be similar to that observed during past inspections. The seepage flow was iron stained and was estimated to be on the order of 1 to 2 gpm. See Photo No.s 18 and 19.

Conclusions and Recommendations

Based on our visual inspection, several concerns were noted which could affect the safe functioning of the dam under normal and flood conditions. These items included:

1. The emergency spillway is directed to flow toward the left groin of the dam. The rip-rap present in this area is not considered adequate to prevent erosion of the dam if the spillway should operate. An engineering evaluation should be performed to determine the frequency of spillway operation and associated depth and velocity of flow. Based on this information, appropriate measures should be implemented to prevent erosion of the dam during spillway operation.
2. The seepage noted within the left and right downstream groin areas of the dam should be

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monitored closely for any changes in the magnitude of flow or color. We understand this seepage has been present during past inspections and has not changed significantly since that time. Therefore, this old seepage is considered normal and routine periodic monitoring should be sufficient. **However, as recommended during our 2002 inspection, the seepage observed on the downstream face of the dam is a more serious concern and should be monitored closely.** We are concerned that potential serious conditions could result in the future if this seepage should increase in magnitude or become muddy. Specific recommendations for monitoring are provided herein. However, the actual monitoring schedule and requirements will be dictated by the WVDEP Dam Safety Section. Should seepage flow increase or become muddy, appropriate action should be taken in accordance with the Monitoring and Emergency Action Plan and appropriate authorities including the WVDEP Dam Safety Section should be contacted immediately.

3. The leakage occurring within the 42 inch diameter principal spillway pipe is a serious concern which could lead to significant damage to the dam and possible dam failure. We suggest plans be implemented as soon as possible to investigate and repair the pipe. In the interim, the pipe should be monitored closely for excessive flow when the pool level is below normal. The flow should be examined to determine if it is muddy which could indicate piping of soil fines from the dam embankment is occurring. Also, the dam embankment should be monitored for any holes or depressions especially along the alignment of the pipe, and the lake should be monitored for swirls or vortexes forming in the vicinity of the pipe alignment. If any of these conditions are noted, appropriate action should be taken in accordance with the Monitoring and Emergency Action Plan and appropriate authorities including the WVDEP Dam Safety Section should be contacted immediately.
4. The condition of the drain gate and repairs needed to restore the function of the unit should be evaluated by divers.

Items which were noted and should be treated as maintenance/monitoring are as follows:

1. A safety rail should be provided around the top of the riser.

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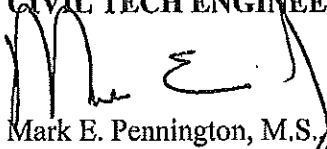
2. The bent trash rack bar should be straightened.
3. The bare areas on the dam should be re-vegetated.
4. Access to the dam crest should be restricted by a gate and/or cable.
5. Surface runoff from the hillside to the right of the dam should be diverted away from the dam crest.

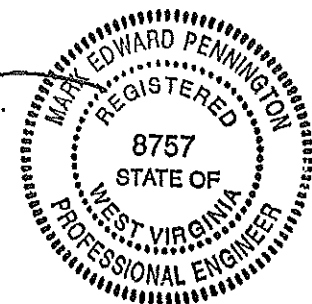
At present the dam does not have a certificate of approval from Dam Safety. We recommend a complete engineering evaluation be performed to determine the measures required to obtain a certificate of approval. A hazard analysis should be performed to determine the appropriate hazard class for the dam. A complete analysis of the outlet pipe and drain gate should be performed to determine repairs which will be required. The seepage should be investigated and remediated as required.

We trust this report satisfies your needs at this time. Attached is an inspection verification statement as required by the WVDEP Dam Safety Section. If you have any questions or comments, or if we can be of any further assistance, please feel free to contact us. Two copies of this report have been forwarded to the WVDEP, Dam Safety Section.

Very truly yours,

CIVIL TECH ENGINEERING, INC.


Mark E. Pennington, M.S., P.E.
Principal Engineer



cc: Mr. Conrad Baston -- WVDEP-Dam Safety with two copies of the report.

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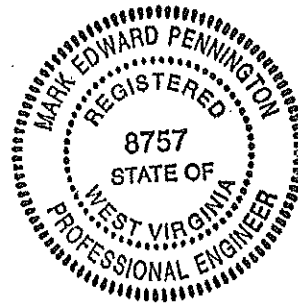
ENGINEER'S VERIFICATION STATEMENT

I hereby verify that I conducted a visual inspection of the Cacapon Reservoir Dam (ID# 06502) and its appurtenances on October 19, 2009. The attached report documents: 1) the current conditions observed; 2) any maintenance items necessary to prolong safe functioning of the dam; 3) any conditions observed during the inspection which indicate the dam has a serious problem* and; 4) any conditions that will not allow proper operation of the dam during normal or maximum reservoir water level conditions.

*as defined in Section 2.47 of the Dam Safety Rules



Mark E. Pennington MS, PE
Registered Professional Engineer No. 8757



Date 10-23-09

Engineer's Seal

PHOTOGRAPHS

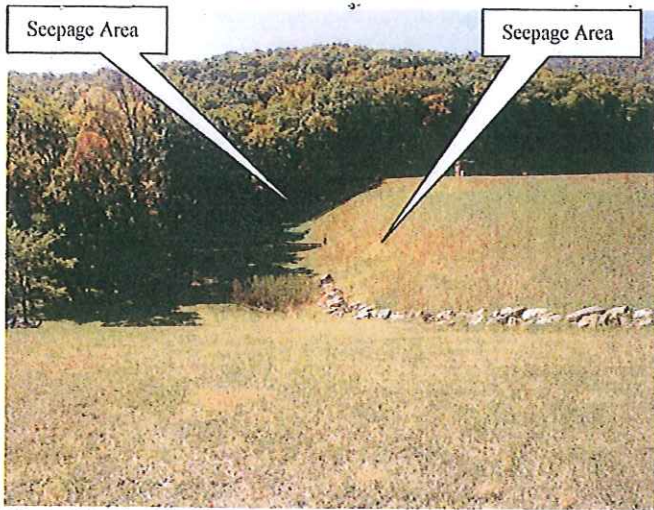


Photo No. 1: Downstream slope facing right.



Photo No. 4: Right groin seepage area.



Photo No. 2: Downstream slope facing left.



Photo No. 5: Seepage area on the downstream slope near the left groin.



Photo No. 3: New rip rap placed in the right groin where bare soil had been present at the time of our last inspection.



Photo No. 6: Upstream slope facing left.



Photo No. 7: Upstream slope facing right.



Photo No. 10: Dam crest facing left.



Photo No. 8: Erosion near the right abutment.



Photo No. 11: Erosion on slope to the right of crest.



Photo No. 9: Dam crest facing right.



Photo No. 12: Emergency spillway facing upstream.

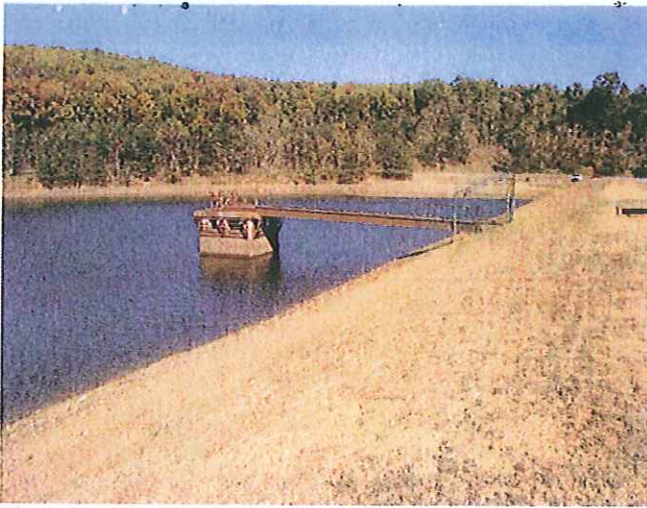


Photo No. 13: Principal spillway riser.



Photo No. 16: 42" CMP drain pipe outlet. Note small flow.

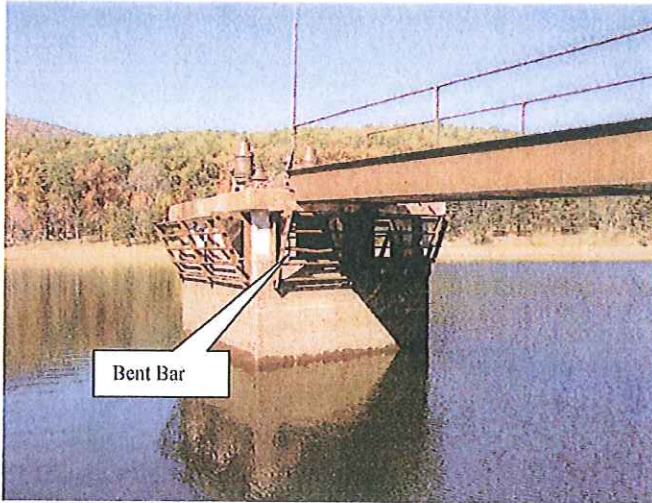


Photo No. 14: Riser.



Photo No. 17: Principal spillway stilling basin and stream channel.



Photo No. 15: Principal spillway outlet structure.



Photo No. 18: Left underdrain outlet.



Photo No. 19: Right underdrain outlet.