

JANICE K. BREWER
Governor



HERBERT R. GUENTHER
Director

ARIZONA DEPARTMENT OF WATER RESOURCES

3550 North Central Avenue, Second Floor
PHOENIX, ARIZONA 85012-2105
(602) 771-8500

December 29, 2009

Basil Boyd, Water Resource Hydrologist
City of Tempe
31 East 5th Street
Tempe, Arizona 85281

**Subject: Rio Salado Town Lake Dam (07.66)
December 4, 2009 Dam Safety Inspection Report
Finding of No Safety Deficiency**

Dear Mr. Boyd:

Enclosed for your information and action is a copy of the Arizona Department of Water Resources (Department) report of the most recent inspection conducted by Craig Brown on December 4, 2009 on the above listed dam. Along with the enclosed invoice, please remit payment in the amount of \$132 to:

Peggy Beckett
Arizona Department of Water Resources
Surface Water Division
3550 North Central Avenue
Phoenix, Arizona 85012

In compliance with Arizona Revised Statutes (A.R.S.) § 41-1009, this letter notifies you that the inspection found no safety deficiencies that must be corrected. The dam safety inspection report identifies maintenance and repair action items that need to be addressed at the dam before the next scheduled inspection. Please provide the Department a schedule of when you intend to do this work and also notify us in writing when you complete the items listed in the report. For additional information on how to conduct these repairs, please refer to the inspection report and/or contact the Department.

The Department has reviewed the size and hazard potential classifications for the dam. The classifications have not changed from **small** size and **significant** hazard potential.

Please keep in mind that future regional or local development could change or increase the hazard potential of the dam. It is your responsibility to monitor downstream

development and notify the Department of any activity which might change the hazard potential classification.


It is Department policy to review the License of Approval of each operating dam within state jurisdiction following its dam safety inspection. Based on the findings of the inspection and a review of our files, the License, issued September 14, 1999, requires no changes and remains in full force and effect.

On December 22, 2009 the Department received your work plan to replace each of the bladders tentatively starting in early 2010. We are in the process of reviewing the work plan and will return any comments to you as to whether an application will be required for this work.

The next inspection by the Department is tentatively scheduled for December of 2012. We will contact you in advance to arrange a mutually convenient inspection date and time. Please notify the Department promptly of any unusual or alarming condition, which may occur at the dam.

If you or anyone connected this dam have any questions regarding this letter, please contact Craig Brown at 602-771-8653.

Sincerely,

 1-7-10

Michael Johnson, Ph.D., P.E.
Assistant Director
Surface Water Division

Enclosures

**ARIZONA DEPARTMENT OF WATER RESOURCES
OFFICE OF WATER ENGINEERING – DAM SAFETY SECTION
INFLATABLE RUBBER DAM / CONCRETE DAM SAFETY INSPECTION REPORT**

Each item of the checklist should be completed. Repair is required when obvious problems are observed. Monitoring is recommended if there is a potential for problem to occur in the future. Investigation is necessary if the reason for the observed problem is not obvious.

SID: 07.66	DAM NAME: Rio Salado (Tempe Town Lake)	TYPE: Inflatable Rubber	PURPOSE: Recreation	NOT APPLICABLE	NO	YES	MONITOR	REPAIR	INVESTIGATE	
CONTACT(S): Basil Boyd, R.G. – City of Tempe			REPORT DATE: December 17, 2009							
INSPECTED BY: Craig Brown <i>CB</i>			INSPECTION DATE: December 4, 2009							
REVIEWED BY: Michael Johnson, PhD., P.E. <i>MJ</i>			DATE: 1-7-10							
DESIGN DAM CREST ELEVATION: 1,148		DESIGN SPILLWAY CREST ELEVATION: 1,148								
DESIGN TOTAL FREEBOARD (FT): 16		MEASURED TOTAL FREEBOARD (FT): N/A								
STATUTORY DAM HEIGHT (FT): 16		STRUCTURAL HEIGHT (FT): 40								
DAM CREST LENGTH (FT): 902	UPSTREAM SLOPE: 0	DOWNSTREAM SLOPE: 0								
DAM CREST WIDTH (FT): 16	GPS: Lat.: 33°26'01.4" Long.: 111°56'56.0"	WATER RIGHTS: 33-96623								
RSRVR. AREA (AC): 214	RSRVR. STORAGE (AC-FT): 2,419	MAX. STORAGE (AC-FT): 2,846								
INFLOW DESIGN FLOOD / SAFE FLOOD-PASSING CAPACITY: .25 PMF										
RESERVOIR LEVEL DURING INSPECTION: Just below the top of the bladders of the downstream dam; Upstream dam: nearly submerged			PHOTOS: Yes							Page 1 of 5

COMPLIANCE CHECKLIST

I. CONDITION SUMMARY / LICENSE / EAP / NEXT INSPECTION					
a. Recorded downstream hazard: Significant Should hazard be revised?		X			
b. If High Hazard, estimate downstream persons-at-risk (PAR): N/A Is there a significant increase since the last inspection?	X				
c. Recorded size: Small Should size be revised?		X			
d. Any safety deficiencies? No Describe:		X			
e. Any Statute or Rule violations? No Describe and list required action:		X			
f. Safe storage level on License: Elevation: 1148, crest of the spillway. Should level be revised?		X			
g. Any License violations? No Describe and list required action:		X			
h. Date of current License: September 14, 1999 Should new License be issued?		X			
i. Date of last Emergency Action Plan revision: June 10, 2009 Should EAP be revised?		X			
j. Normal inspection frequency: Triennial Should inspection frequency be revised?		X			
k. Recommended date for next inspection: December 2012					

MONITORING CHECKLIST

2. INSTRUMENTATION AND MONITORING								
a. Describe: (23) Piezometers; 3 upstream & 20 downstream: <ul style="list-style-type: none"> • PZ-UD-1 (north) – standpipe • PZ-UD-2 (center) – standpipe • PZ-UD-3 (south) – standpipe • DS-1 to DS-20 – vibrating wire transducer type that report to a digital data logger (15) Downstream and 3 local benchmarks <ul style="list-style-type: none"> • 9000 (fixed benchmark) • 9001-CP-1 (d/s left abutment) – 5/8-inch threaded bolt • 9002-CP-2 (d/s left abutment) – 5/8-inch threaded bolt • 9003-CP-3 (d/s right abutment) – 5/8-inch threaded bolt • 9004-CP-4 (d/s right abutment) – 5/8-inch threaded bolt • 9005-BR-2 (fixed benchmark) • 9006-BR-1 (fixed benchmark) • 9011-PM-1 (d/s south pier) – Chicago steel tape peanut • 9012-PM-2 (d/s center pier) – Chicago steel tape peanut • 9013-PM-3 (d/s north pier) – Chicago steel tape peanut • 9013-PM-4 (d/s north pier) – Chicago steel tape peanut • 9015-PM-5 (d/s center pier) – Chicago steel tape peanut • 9016-PM-6 (d/s south pier) – Chicago steel tape peanut • V-1 (d/s apron right abutment) – 2-in. brass cap • V-2 (d/s apron north pier) – 2-in. brass cap • V-3 (d/s apron center pier) – 2-in. brass cap • V-4 (d/s apron south pier) – 2-in. brass cap • V-5 (d/s apron left abutment) – 2-in. brass cap (1) USGS Gage Station No. 09512162 – located in Indian Bend Wash @ Curry Road. Emergency deflation control panel, blowers 1-4 and PLC control panel all located in the control house located above the right abutment. See photos 1-4. Control via a PC (located in the control house) operated frequently by SRP personnel.								
b. Any repair or replacement required? Describe: 8 of the downstream piezometers were damaged during the high flows in early 2005 and are no longer functional. Specifically: DS-2, DS-6, DS-7, DS-9, DS-17, DS-18, DS-19, and DS-20. There are plans to replace all of the damaged piezometers located in the foundation slab. Piezometers located within the stilling basin do not require replacement. See photo 10.						X		X
c. Date of last monitoring report: 2009 annual report Should new readings be taken and new report provided?						X		

STRUCTURAL CHECKLIST

3. DOWNSTREAM DAMS – LEFT ABUTMENT (South) 10.5-ft. thick reinforced mass concrete at a 1.5:1 slope founded on compacted granular fill; abutment is capped w/ an 8-ft. high reinforced concrete parapet wall.								
a. Cracks, spalls or scaling? Minor hairline cracks throughout most of the structure; this is being continuously monitored. A crack survey was recently completed and the results will be forwarded to the Department as normal.						X	X	
Crack location: Throughout Orient.: Random Length.: Width: Type:								
b. Offsets of lift lines/joints?						X		
Joint/lift line location:								
c. Seepage at lift lines? Location: Estimated seepage amount:						X		
d. Concrete deterioration? Location:						X		
e. Exposed Rebar? Location:						X		
f. Foundation Movement?						X		
g. Cracks/displacement in parapet walls? There are two cracks (vertical & horizontal), 1-inch wide x 1/2-inch deep, see photo 18. Location: Contact between the left abutment (foundation slab) and the concrete apron. Indications of past repair are evident. This needs to be repaired (sealed) again.						X		X
h. Erosion? Erosion of the concrete was observed in a small area just below the baffle blocks and the 108-inch storm drain evidently caused by the high flows. This area should be repaired to prevent any further damage due to subsequent flows. See photo 21.						X		X
4. DOWNSTREAM DAMS – BLADDER NO. 1 (South) Approximately 1-inch thick material; 180-ft. long at the base; 16-ft. high* when fully inflated. Crest elevation is: 1148.0-ft. (USGS Datum). See photo 17. An algae coating covers most of the downstream face of the bladder. * Bladder is approximately 1-inch lower than bladders 2-4 due to some repair work since the last inspection. As a result water spills over the top of this bladder before spilling over bladders 2-4. Trash/debris routinely collects at the bottom.								
a. Damage? As indicated in the previous report (2006). 3 major repairs (patches) were performed in 2002 on the								

d. Anchors in poor condition?		X				
e. Seepage from anchors? There was some minor seepage observed from the base anchors at several locations. Flow could not be detected.			X	X		

9. DOWNSTREAM DAMS – RIGHT PIER (North) 29-ft. high; 27-ft. wide x 60.6-ft. long at the pier base; reinforced mass concrete.

a. Cracks, spalls or scaling? Minor hairline cracks throughout, monitor.			X	X		
Crack location: Various throughout. Orientation: Random. Length.: Width: Type:						
b. Offsets of lift lines/construction joints?		X				
Joint/lift line location:						
c. Seepage at lift lines? Location: Estimated seepage amount:		X				
d. Concrete deterioration? Location:		X				
e. Exposed rebar? Location:		X				

10. DOWNSTREAM DAMS – BLADDER NO. 4 (North) Approximately 1-inch thick; 180-foot long at bladder base; 16-ft. high when fully inflated; crest elevation: 1148-ft. (USGS datum). See photo 6.

a. Damage?		X				
Damage location: Orientation: Length: Width: General Description:						
b. Cuts?		X				
Cut location: Orientation: Length: Width:						
c. Abrasions?		X				
Abrasion location: Orientation: Length: Width:						
d. Anchors in poor condition?		X				
e. Seepage from anchors? Minor seepage from both the north and south ends with no flow detected. Monitor.			X	X		

11. DOWNSTREAM DAMS – RIGHT ABUTMENT (North) 10-ft. thick reinforced mass concrete at a 1.5:1 slope founded on compacted granular fill; abutment is capped w/ an 8-ft. high reinforced concrete parapet wall.

a. Cracks, spalling, or scaling? Minor hairline cracks throughout most of the structure. Monitor.			X	X		
Crack location: Various Orientation: Random Length.: Width: Type:						
b. Offsets of lift lines/joints?		X				
Joint/lift line location:						
c. Seepage at lift lines? Location: Estimated seepage amount:		X				
d. Concrete deterioration? Location:		X				
e. Exposed Rebar? Location:		X				
f. Foundation Movement?		X				
g. Cracks/displacement in parapet walls? Location:		X				
h. Erosion?		X				

12. DOWNSTREAM DAMS – SPLASH PAD APRON & STILLING BASIN 35-ft. wide x 1.5-ft. thick reinforced concrete stilling basin. Rip rap is placed along the entire length of the stilling basin. See photos 5, 9, & 22. During the high flows in early 2005 rip rap was damaged or washed away downstream below bladders 2-4 and had to be replaced. Riprap has been replaced below bladders 2-3 and has not been replaced below bladder # 4. There are plans to replace the riprap in the near future. See photo 16.

a. Cracks, spalls or scaling? Minor hairline cracks observed throughout most of the visible portion. The stilling basin was full of water and only a portion was visible.			X	X		
Crack location: Various Orientation: Random Length.: Width: Type:						
b. Offsets of lift lines/joints?		X				
Joint/lift line location:						
c. Seepage at construction joints? Location: Estimated seepage amount:		X				
d. Concrete deterioration? Location:		X				
e. Exposed rebar? Location:		X				

f. Obstructions or restrictions?		X				
g. Do the baffles show:						
1. Signs of deterioration?		X				
2. Covered with debris?		X				
3. Signs of inadequacy?		X				

13. DOWNSTREAM DRAINAGE – SEEPAGE CONTROL

a. Internal drains flowing? Unable to access - drains were covered by riprap.						X
b. Boils at or beyond toe?		X				
c. Seepage at or beyond toe?		X				
d. Does seepage contain fines?		X				

14. DOWNSTREAM EMERGENCY SPILLWAY CONTROLS – The crest of the bladders acts as the spillway control, elevation 1148-ft.

a. Damage? None visible.		X				
Damage location: Orientation: Length: Width: General Description:						
b. Cuts? None visible.		X				
Cut location: Orientation: Length: Width:						
c. Abrasions? None visible.		X				
Abrasion location: Orientation: Length: Width:						
d. Debris present?		X				
e. Where is control? Crest of the bladder.						

15. DOWNSTREAM OUTLET CHANNEL – Unlined Salt River channel, see photo 7.

a. Eroding or backcutting? Rip rap downstream of bladder # 4 requires replacement.			X		X	
b. Sloughing?		X				
c. Obstructed or restricted?		X				

RESERVOIR CHECKLIST

16. RESERVOIR							
a. High water marks?		X					
b. Erosion/Slides into pool area?		X					
c. Sediment accumulation?		X					
d. Floating debris present?		X					
e. Depressions, sinkholes or vortices?		X					
f. Low ridges/saddles allowing overflow?		X					
g. Structures below dam crest elevation? Several floating boat docks and a “safe harbor” marina.			X	X			

ADDITIONAL COMMENTS AND RECOMMENDATIONS:

- As recommended in the 2006 ADWR report, the integrity of the 108-inch storm drain pipe should be evaluated following completion of the Tempe Center of the Performing Arts building currently under construction.

Rio Salado Lake Dam (07.66)
Safety Inspection Conducted on 12/4/2009
Photographer: Craig Brown

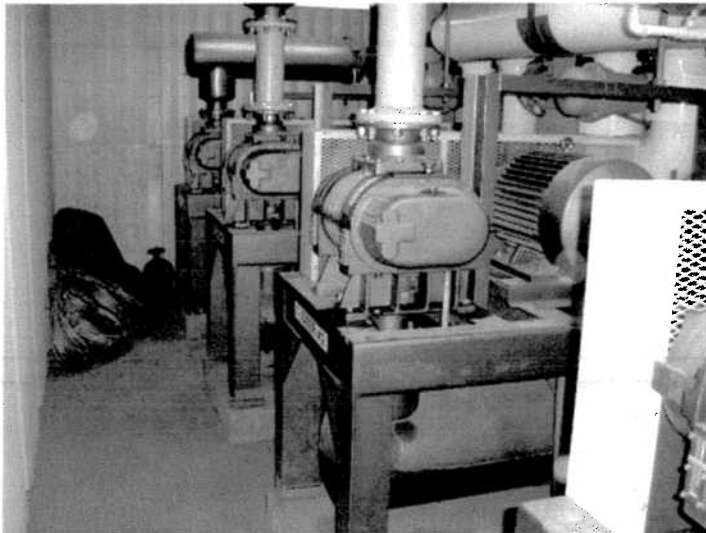


PHOTO NUMBER: 1
PHOTO DIRECTION: North
DESCRIPTION: Blowers #1-3 located inside of the control room above the right abutment of the downstream dam.

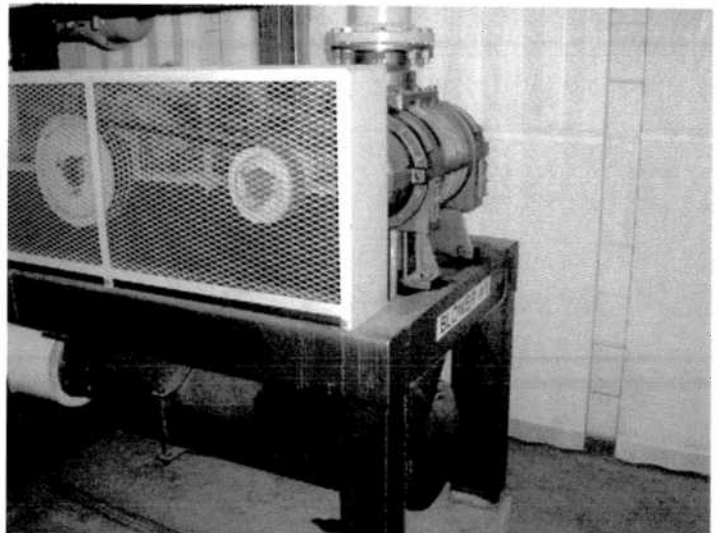


PHOTO NUMBER: 2
PHOTO DIRECTION: South
DESCRIPTION: Blower #1 located inside of the control room.



PHOTO NUMBER: 3
PHOTO DIRECTION: North
DESCRIPTION: View of the PLC panel located inside of the control building above the right abutment of the dam.

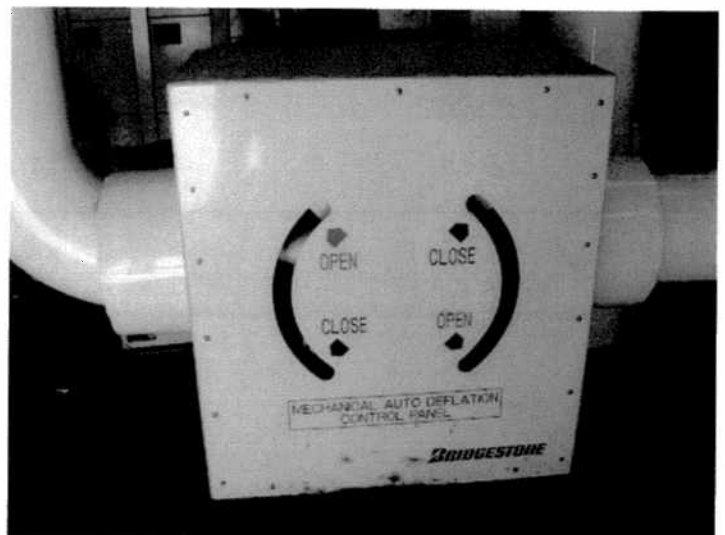


PHOTO NUMBER: 4
PHOTO DIRECTION: North
DESCRIPTION: Emergency deflation panel located inside of the control building.

Rio Salado Lake Dam (07.66)
Safety Inspection Conducted on 12/4/2009
Photographer: Craig Brown

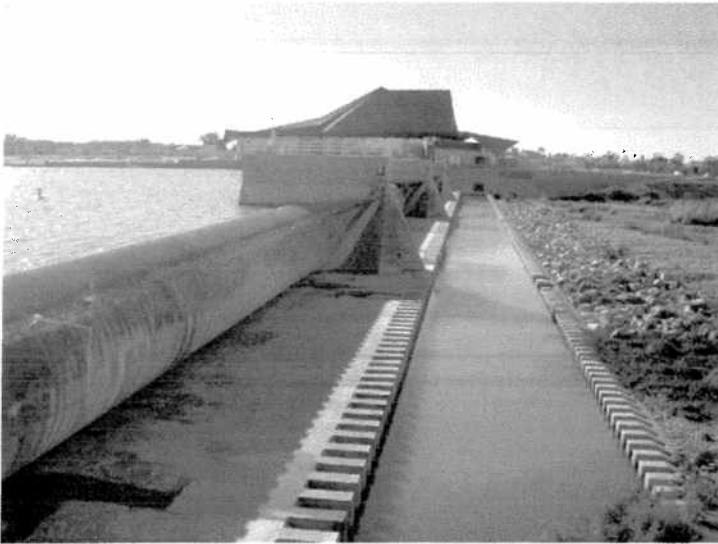


PHOTO NUMBER: 5
PHOTO DIRECTION: South
DESCRIPTION: Along the downstream side of the dam as seen from above the right abutment. Bladder #4 is in the foreground.



PHOTO NUMBER: 6
PHOTO DIRECTION: Southeast
DESCRIPTION: Close-up view of bladder #4 as seen from above. The white paint spots represent a recent crack survey.



PHOTO NUMBER: 7
PHOTO DIRECTION: West
DESCRIPTION: Toward downstream as seen from above the right abutment or north side of the river bank.

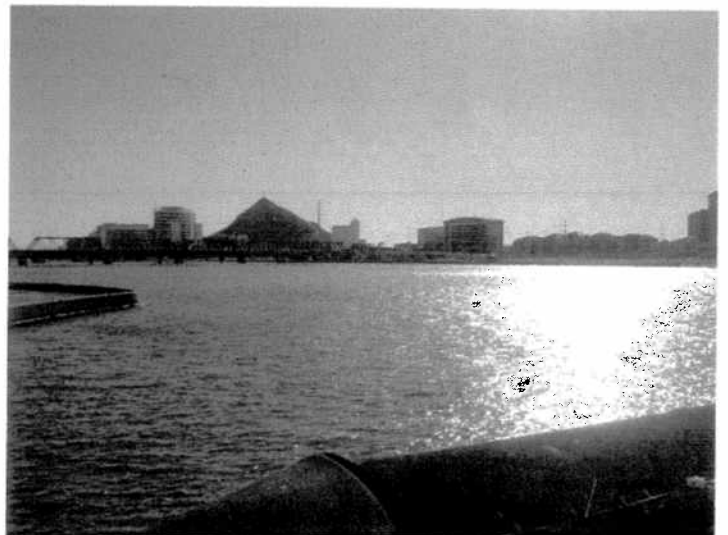


PHOTO NUMBER: 8
PHOTO DIRECTION: East
DESCRIPTION: Toward upstream as seen from above the right abutment or north side of the river bank.

Rio Salado Lake Dam (07.66)
Safety Inspection Conducted on 12/4/2009
Photographer: Craig Brown



PHOTO NUMBER: 9
PHOTO DIRECTION: South
DESCRIPTION: Another view along the stilling basin and foundation slab from the right abutment.

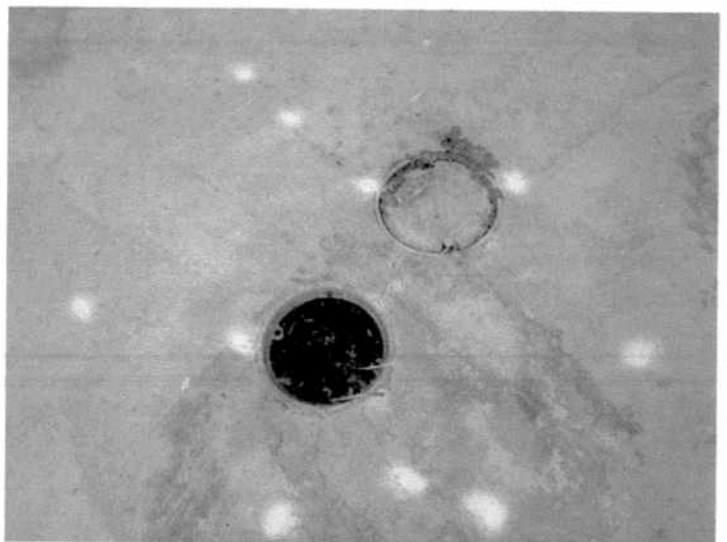


PHOTO NUMBER: 10
PHOTO DIRECTION: Down
DESCRIPTION: One of the piezometers located in the foundation slab below bladder #4.

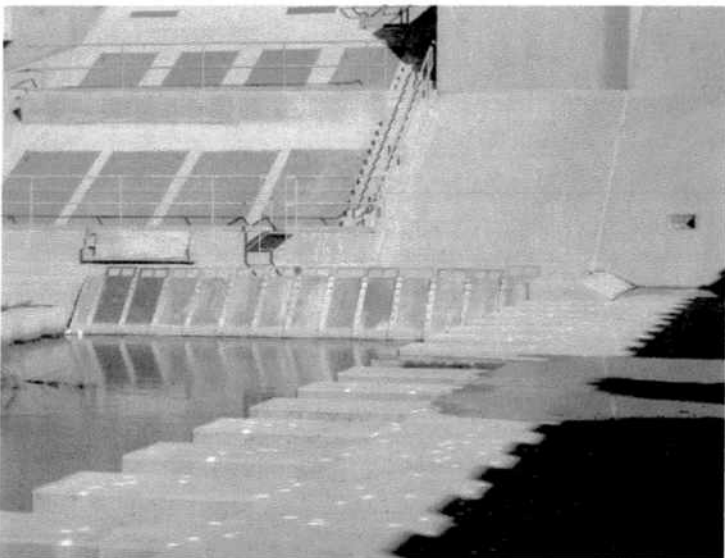


PHOTO NUMBER: 11
PHOTO DIRECTION: North
DESCRIPTION: Screens (trash racks) located over the inlet structure of the downstream dam at the right abutment.



PHOTO NUMBER: 12
PHOTO DIRECTION: North
DESCRIPTION: Along the downstream side of bladder #1.

Rio Salado Lake Dam (07.66)
Safety Inspection Conducted on 12/4/2009
Photographer: Craig Brown



PHOTO NUMBER: 13
PHOTO DIRECTION: East
DESCRIPTION: Close-up view of one of the repair patches; this one located on bladder #4.



PHOTO NUMBER: 14
PHOTO DIRECTION: North
DESCRIPTION: Along the downstream side of bladder #3.



PHOTO NUMBER: 15
PHOTO DIRECTION: North
DESCRIPTION: Along the downstream side of bladder #2.

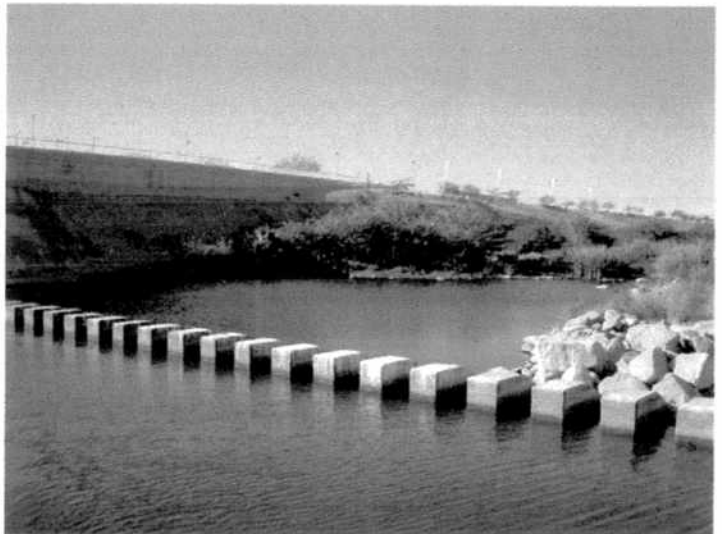


PHOTO NUMBER: 16
PHOTO DIRECTION: West
DESCRIPTION: Toward downstream below bladder #1 and the area of missing riprap. There are plans to replace the riprap in the near future.

Rio Salado Lake Dam (07.66)
Safety Inspection Conducted on 12/4/2009
Photographer: Craig Brown



PHOTO NUMBER: 17
PHOTO DIRECTION: North
DESCRIPTION: Along the downstream side of bladder #1. Bladder #1 is slightly lower than the other three and thus acts as an emergency spillway.



PHOTO NUMBER: 18
PHOTO DIRECTION: Down
DESCRIPTION: Close-up view of cracks at the contact between the left abutment and the concrete apron. 2.5-inches long x 1-inch wide x 1/2-inch deep: **Repair – seal.**



PHOTO NUMBER: 19
PHOTO DIRECTION: West
DESCRIPTION: Toward downstream as seen from the foundation slab below bladder #1.

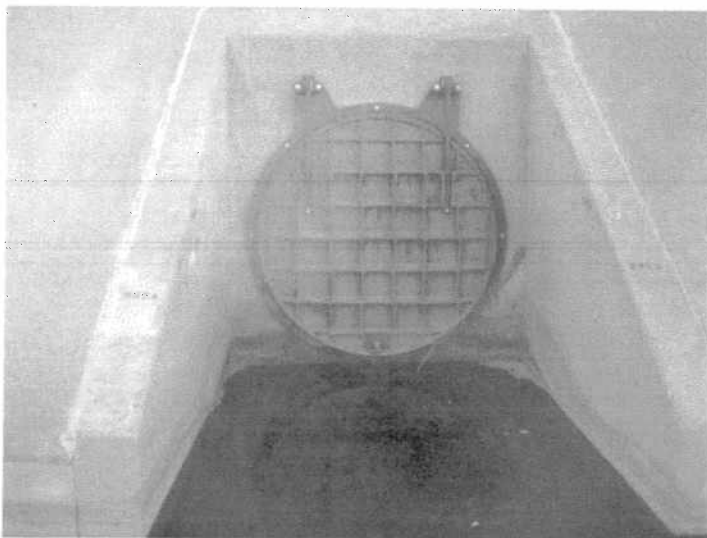


PHOTO NUMBER: 20
PHOTO DIRECTION: South
DESCRIPTION: 108-inch storm drain located under the Tempe Center for the Arts building.

Rio Salado Lake Dam (07.66)
Safety Inspection Conducted on 12/4/2009
Photographer: Craig Brown

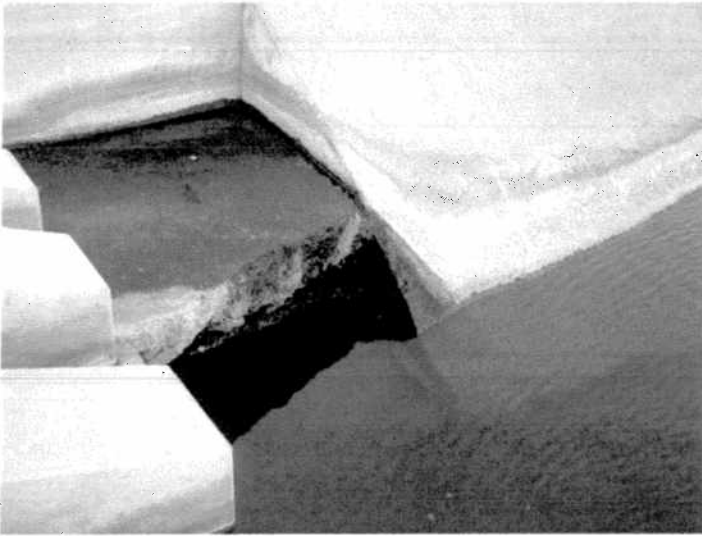


PHOTO NUMBER: 21
PHOTO DIRECTION: Down
DESCRIPTION: Eroded section of concrete at the left (south) abutment of the downstream dam located just below the 108-inch storm drain.

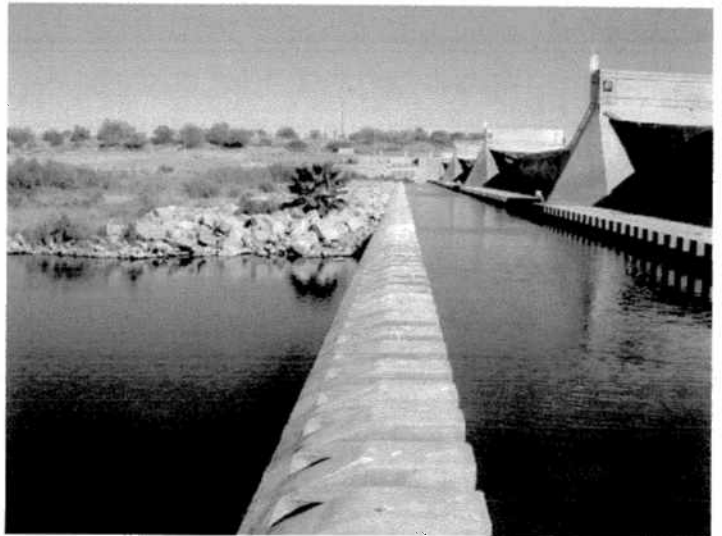


PHOTO NUMBER: 22
PHOTO DIRECTION: North
DESCRIPTION: Along the stilling basin and concrete foundation section as seen from below bladder # 1 of the downstream dam.



PHOTO NUMBER: 23
PHOTO DIRECTION: North
DESCRIPTION: View of the nearly submerged upstream dam as seen from the south bank.