

**STRUCTURE S-6A**  
**INSPECTION DATE: 2/13/2020**



Single Barrel, 48" Diameter x 102' Long

Location:	USJRB South
	Levee L-75
Latitude:	27.7000 N
Longitude:	80.6759 W
Type:	Gated Culvert
No. Barrels:	One
Inspection	
Start Date:	2/13/2020
End Date:	2/14/2020

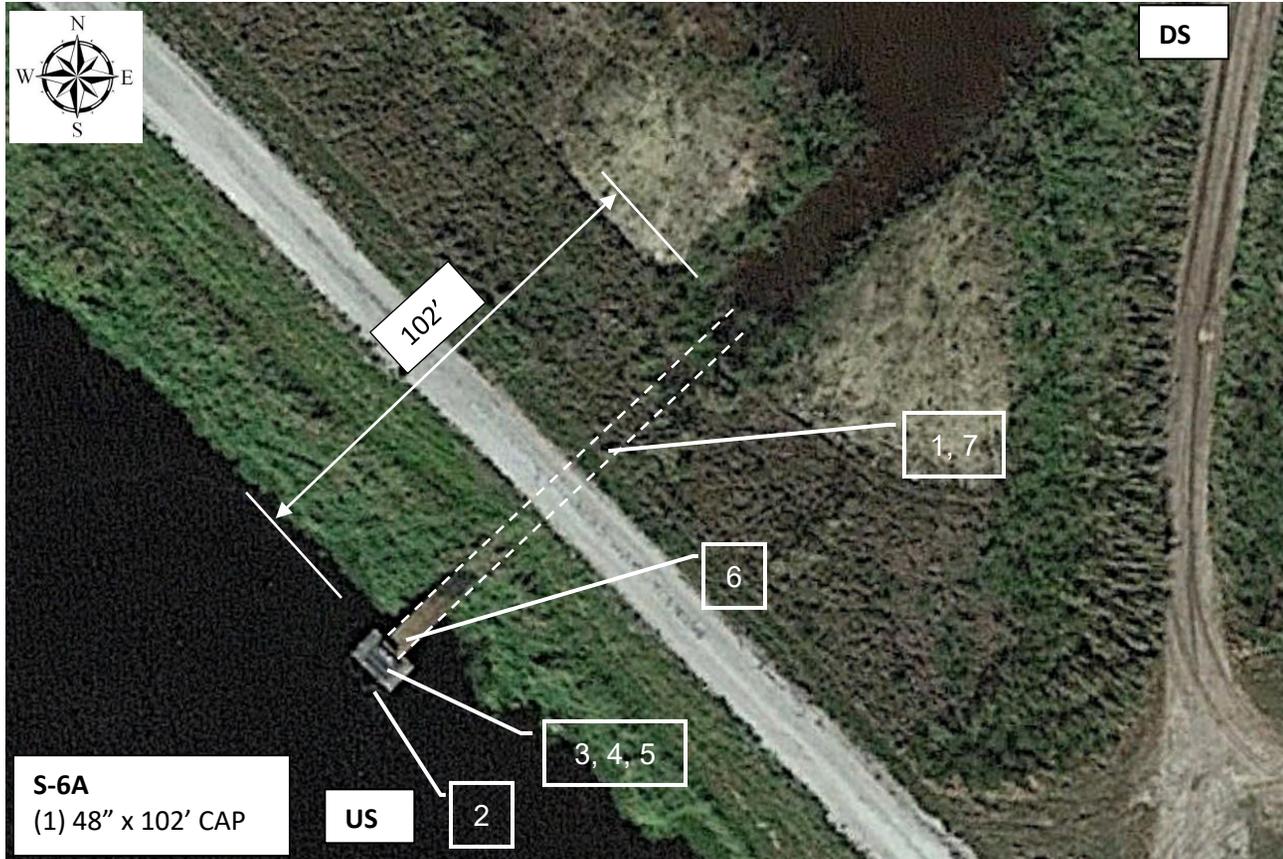
<b>TEAM MEMBERS</b>	
Lead Engineer	Jeffrey O'Connor, P.E.
Dive Supervisor	Jeremiah Duncan
Diver	Natasha Daniel
Diver – Standby	Dillon Sims
Dive Tender	Andre Lorenzo
Dive Tender	
Animal Control	TJ McDonagh
SJRWMD Agent	

Respectfully Submitted,  
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**Aerial View of Structure**



No.	Item No.	Inspection Item	Rating	Deficiency
1	DS115	Culvert	C-4	The culvert has numerous small holes with soil intrusion.
2	US54	Channels for Stoplogs	C-2	Minor to moderate corrosion on the stoplog channels.
3	US104	Headwall	C-2	The north wall has a mechanical spall.
4	US151	Structure Gate	C-2	The gate has minor to moderate corrosion with minor pitting.
5	US152	Gate Guides	C-2	The gate guides have minor to moderate corrosion with minor pitting.
6	DS153	Gate Seals	C-2	Several gate seal anchors at 12:00 have minor corrosion.
7	DS115	Culvert	C-2	Sealant exposed at 41' penetration and bituminous coating degrading and detaching.

### Structure Description and Method of Underwater Inspection

Structure S-6A is a gated culvert comprised of one barrel, extending southwest (gated end) to northeast under Levee L-75. The barrel is a CMP, 48 inches diameter by 102 feet long. The southwest end has an access pier comprised of a concrete T-beam superstructure supported by a buried concrete abutment and the concrete gate box. There is a gate at the upstream end.

The underwater inspection was performed by a 5-person dive team on February 13, 2020. The dive team worked from a dive trailer, using surface-supplied air, and accessed the structure areas from the bank.

The scope of services included the underwater inspection of the submerged structure components. The area extended 20 feet beyond the structure edges. There were no boat barriers.

The air temperature was 85 degrees F. and the weather was mostly clear. The underwater visibility ranged from 1 to 2 feet. The water level was unknown – there were no staff gauges present. The downstream end had 3 inches of water, so the penetration did not require diving.

### Rating System

- C-1: No action needed
- C-2: Monitor condition at next dive inspection (5 years)
- C-3: Schedule repair/replacement (for routine items)
- C-4: Schedule repair/replacement (for safety or operational items)
- C-5: Repair/replace immediately (for structural items)
- C-6: Critical - Repair/replace immediately (for operational items)

### Summary of Observations

#### Items Rated C-5 and Above

There were no items rated C-5 and above.

#### Items Rated C-4

- Item DS115: The culvert has small holes throughout the length. The holes are typically 1/16" to 1/8" wide by 1/8" to 1" long with soil intrusion observed. The first hole is at 45' in from the downstream end. Other holes are found at 48', 51', 62', 63' 76', 82' and 86'. Most are on the crown from 09:00 to 03:00.
  - Recommended Action: Schedule the culvert for relining.

#### Items Rated C-3

There were no items rated C-3.

#### Items Rated C-2

- Item US54: The stoplog channels have minor to moderate corrosion over 50% of the area and minor pitting,

up to 1/64" deep, covering 10% of the area.

- Recommended Action: Monitor the stoplog channels for advanced corrosion and pitting.
- Item US104: This element is for the gate box. The north side of the opening along the construction joint has a spall, 6" horizontal x 4" vertical x 1.5" penetration with no exposed rebar.
  - Recommended Action: Monitor the spall on the concrete wall for increased size or depth or corrosion bleed-through.
- Item US151: The gate has corrosion along the top stiffening member within 3' of the stem. The corrosion covers 90% of the area with pitting up to 1/32" deep. The remaining area of the gate has minor corrosion covering 10% of the area with most of the corrosion on the underside of the stiffening members.
  - Recommended Action: Monitor the gate metal for advanced corrosion and pitting.
- Item US152: The gate guides have minor corrosion over 30% of the area with pitting up to 1/64" deep over 5% of the area.
  - Recommended Action: Monitor the gate guide metal for advanced corrosion and pitting.
- Item DS153: Several anchor bolts for the seal, from 11:30 to 12:00 have minor surface corrosion.
  - Recommended Action: Monitor the anchors for advanced corrosion or section loss.
- Item DS115: (1) The field joint at 41' in from the downstream end has up to a 2" separation with sealant. The sealant has minor to moderate cracking. The upstream section has a minor bend at the 3:00 position, 1/2" x 10" long. (2) In general, the bituminous coating is intact from the 10:00 to 2:00 positions across the crown and it is easily removed from the 2:00 to the 10:00 positions through the invert.
  - Recommended Action: Per the C-4 rating above, schedule the culvert for relining.

**PHOTOGRAPHS**

Item No.: DS115 Culvert	Rating: C-4	Photo Description: Small holes with soil intrusion
Deficiency: The culvert has small holes throughout the length. The holes are typically 1/16" to 1/8" wide by 1/8" to 1" long with soil intrusion observed. The first hole is at 45' in from the downstream end. Other holes are found at 48', 51', 62', 63' 76', 82' and 86'. Most are on the crown from 09:00 to 03:00.		
Probable Cause: The holes are from corrosion caused by failed coating and chemical attack from the water.		
Recommendation: Schedule culvert lining.		



# APPENDIX

# CHECKLISTS

**Structure Name/No.: S-6A**

**UPSTREAM EROSION CONTROL**

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
US1	Slope/Banks of Channel	1	No deficiencies noted		
US2	Rip Rap	1	No deficiencies noted		
US3	Exposed erosion-Control Fabric	1	No deficiencies noted		
US4	Evidence of stone displacement (bedding stone)	1	No deficiencies noted		
US5	Channel Stabilization and erosion control	1	No deficiencies noted		

**UPSTREAM GENERAL**

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
US50	Structural - General Concrete Condition	2	Refer to US104		
US51	Structural - General Metal Condition	2	Refer to US54, US151 and US152		
US52	Structural - General Timber Condition	NA	Item not present		
US53	Construction Joints (Bolts, Welds)	NA	Item not present		
US54	Channels for Stoplogs or Flashboards	2	The stoplog channels have minor to moderate corrosion over 50% of the area and minor pitting, up to 1/64" deep, covering 10% of the area [14:19 to 14:26].	Monitor the stoplog channels for advanced corrosion and pitting.	The corrosion is due to chemical attack from the water.
US55	Settlement	1	No deficiencies noted		
US56	Shoaling/Scour	1	No deficiencies noted		
US57	Fouling/Marine Growth	1	No deficiencies noted		
US58	Debris	1	No deficiencies noted		
US59	Stilling Wells	NA	Item not present		
US60	Underwater Controls/Instruments	NA	Item not present		
US61	Fenders	NA	Item not present		

**UPSTREAM STRUCTURE**

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
US100	Wingwalls	NA	Item not present		
US101	Buttresses (support arms for wall)	NA	Item not present		
US102	Abutments	NA	Item not present		
US103	Retention Walls	NA	Item not present		
US104	Headwall	2	This element is for the gate box. The north side of the opening along the construction joint has a spall, 6" horizontal x 4" vertical x 1.5" penetration with no exposed rebar [14:33].	Monitor the spall on the concrete wall for increased size or depth or corrosion bleed-through.	The spall was most likely caused by an impact during construction.
US105	Expansion/Construction Joints	NA	Item not present		
US106	Sheetpiles and Bulkheads	NA	Item not present		
US107	Wales/Tiebacks	NA	Item not present		
US108	Intake Bays	NA	Item not present		
US109	Piers	NA	Item not present		
US110	Foundation	NA	Item not present		
US111	Weir/Weir crest	NA	Item not present		
US112	Baffles	NA	Item not present		
US113	Underwater Apron Slabs	NA	Item not present		
US114	Structural Support, Bracing or Frames	1	No deficiencies noted		
US115	Culverts	1	No deficiencies noted		
US116	Risers	1	No deficiencies noted		

**Structure Name/No.: S-6A**

**UPSTREAM GATES**

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
US151	Structure Gate(s)	2	The gate has corrosion along the top stiffening member within 3' of the stem. The corrosion covers 90% of the area with pitting up to 1/32" deep [14:41]. The remaining area of the gate has minor corrosion covering 10% of the area with most of the corrosion on the underside of the stiffening members.	Monitor the gate metal for advanced corrosion and pitting.	The corrosion is due to chemical attack from the water and isolated galvanic corrosion from contact of dissimilar metals.
US152	Gate Guides and Gate Control	2	The gate guides have minor corrosion over 30% of the area with pitting up to 1/64" deep over 5% of the area [14:42].	Monitor the gate guide metal for advanced corrosion and pitting.	The corrosion is due to chemical attack from the water.
US153	Gate Seals & Mating Surface	1	No deficiencies noted.		
US154	Cathodic Protection (entire structure)	NA	Item not present		
US155	Operator/Actuator Components	1	No deficiencies noted.		
US156	Emergency Closure Gates	NA	Item not present		
US306	Navigation Lock Miter Gates	NA	Item not present		

<b>Structure Name/No.: S-6A</b>
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### DOWNSTREAM EROSION CONTROL

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
DS1	Slope/Banks of Channel	1	No deficiencies noted		
DS2	Rip Rap	1	No deficiencies noted		
DS3	Exposed erosion-Control Fabric	1	No deficiencies noted		
DS4	Evidence of stone displacement (bedding stone)	1	No deficiencies noted		
DS5	Channel Stabilization and erosion control	1	No deficiencies noted		

### DOWNSTREAM GENERAL

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
DS50	Structural - General Concrete Condition	NA	Item not present		
DS51	Structural - General Metal Condition	3	Refer to DS115		
DS52	Structural - General Timber Condition	NA	Item not present		
DS53	Construction Joints (Bolts, Welds)	NA	Item not present		
DS54	Channels for Stoplogs or Flashboards	NA	Item not present		
DS55	Settlement	1	No deficiencies noted		
DS56	Shoaling/Scour	1	No deficiencies noted		
DS57	Fouling/Marine Growth	1	No deficiencies noted		
DS58	Debris	1	No deficiencies noted		
DS59	Stilling Wells	NA	Item not present		
DS60	Underwater Controls/Instruments	NA	Item not present		
DS61	Fenders	NA	Item not present		

### DOWNSTREAM STRUCTURE

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
DS100	Wingwalls	NA	Item not present		
DS101	Buttresses (support arms for wall)	NA	Item not present		
DS102	Abutments	NA	Item not present		
DS103	Retention Walls	NA	Item not present		
DS104	Headwall	NA	Item not present		
DS105	Expansion/Construction Joints	NA	Item not present		
DS106	Sheetpiles and Bulkheads	NA	Item not present		
DS107	Wales/Tiebacks	NA	Item not present		
DS108	Intake Bays	NA	Item not present		
DS109	Piers	NA	Item not present		
DS110	Foundation	NA	Item not present		
DS111	Weir/Weir crest	NA	Item not present		
DS112	Baffles	NA	Item not present		
DS113	Underwater Apron Slabs	NA	Item not present		
DS114	Structural Support, Bracing or Frames	NA	Item not present		

**Structure Name/No.: S-6A**

DS115	Culverts	4	<p>(1) C-4: The culvert has small holes throughout the length. The holes are typically 1/16" to 1/8" wide by 1/8" to 1" long with soil intrusion observed. The first hole is at 45' in from the downstream end. Other holes are found at 48', 51', 62', 63' 76', 82' and 86'. Most are on the crown from 09:00 to 03:00 [10:09 to 10:35]. (2) C-2: The field joint at 41' in from the downstream end has up to a 2" separation with sealant. The sealant has minor to moderate cracking. The upstream section has a minor bend at the 3:00 position, 1/2" x 10" long [10:05]. (3) C-2: In general, the bituminous coating is intact from the 10:00 to 2:00 positions across the crown and it is easily removed from the 2:00 to the 10:00 positions through the invert.</p>	Schedule culvert lining.	The holes are from corrosion caused by failed coating and chemical attack from the water.
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**DOWNSTREAM GATES**

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
DS151	Structure Gate(s)	1	No deficiencies noted		
DS152	Gate Guides and Gate Control	1	No deficiencies noted		
DS153	Gate Seals & Mating Surface	2	Several anchor bolts for the seal, from 11:30 to 12:00 have minor surface corrosion [10:40].	Monitor the anchors for advanced corrosion or section loss.	The corrosion is due to chemical attack from the water.
DS154	Cathodic Protection (entire structure)	NA	Item not present		
DS155	Operator/Actuator Components	NA	Item not present		
DS156	Emergency Closure Gates	NA	Item not present		
DS157	Navigation Lock Miter Gates	NA	Item not present		
DS1000	Additional Items and Comments	NA	Item not present		