

**STRUCTURE S-250B**  
**INSPECTION DATE: 2/11/2020**



Single Barrel, 72" Diameter x 111' Long

Location:	Jane Green South
	Levee L-74W
Latitude:	27.8229 N
Longitude:	80.7659 W
Type:	Gated Culvert
No. Barrels:	One
Inspection	
Start Date:	2/11/2020
End Date:	2/11/2020

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

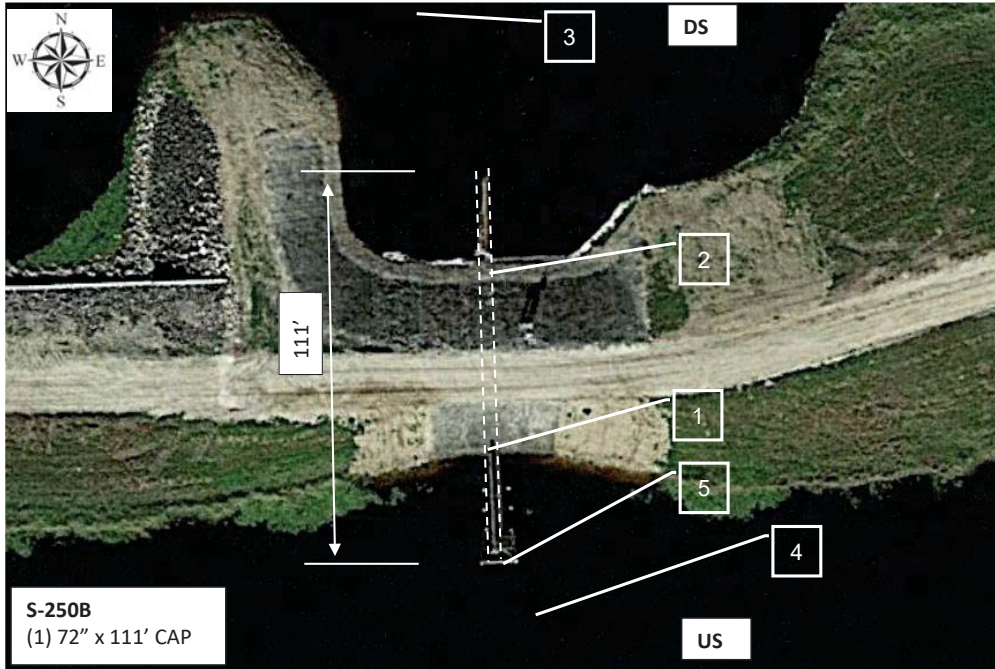
Respectfully Submitted,  
**UNDERWATER ENGINEERING SERVICES, INC.**  
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Fort Pierce, FL 34982  
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Jeffrey O'Connor, P.E. (FL 50914)  
Vice President  
Project Manager



Digitally signed by Jeffrey H  
O'Connor  
Date: 2020.06.25 10:45:01 -04'00'

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**Aerial View of Structure**



No.	Item No.	Inspection Item	Rating	Deficiency
1	US114	Structural Support and Bracing	C-3	The access pier hardware, stringer brackets have corrosion; timbers have decay
2	DS115	Culverts	C-3	Piles of twigs and logs at 25' and 85' penetration in the culvert.
3	DS1000	Additional Items	C-3	The downstream metal staff gauge board has minor to moderate corrosion.
4	US2	Riprap	C-2	No riprap detected upstream – no scour either.
5	DS151	Structure Gate	C-2	Water was flowing between the weir plate and the horizontal channel.

### Structure Description and Method of Underwater Inspection

Structure S-250B is a gated culvert comprised of one barrel, extending south (gated end) to north under Levee L-74W. The barrel is a CAP, 72 inches diameter by 111 feet long. The south end has an access pier comprised of timber piles and a timber superstructure. There is a fixed gate or weir plate at the upstream end.

The underwater inspection was performed by a 5-person dive team on February 11, 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 80 degrees F. and the weather was mostly clear. The underwater visibility ranged from 2 to 4 feet. The water level was approximately 21.4 Ft per the D/S staff gauge (numbers and portion of gauge were missing).

### 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

There were no items rated C-4.

#### Items Rated C-3

- Item US114: The access pier hardware for the cross bracing has moderate corrosion with moderate section loss of up to 20%. The Bent 2 (from shore) pile cap has only one of two bolts on the east side. The steel hanger brackets for the timber beams have moderate corrosion with up to 15% section loss. The south cap board on the northern bent, west pile has decay 4" high x 6" wide (up to hardware) x 1" deep.
  - Recommended Action: Replace the access pier cross bracing hardware, pile cap hardware, stringer hangers, and south cap beam, north bent, west pile. Monitor the timber condition for advanced decay. Consider replacing the pier elements. The piles can remain.
- Item DS115: The culvert has piles of twigs and logs from 25' to 38' of penetration from the downstream end. There is another collection of timber debris between 85' and 95' of penetration.

- Recommended Action: Remove the vegetation from inside of the culvert - it has the potential to clog and impact the flow capacity of the culvert.
- Item DS1000: The downstream staff gauge has minor to moderate corrosion on the metal gauge board above and below water
  - Replace the downstream metal staff gauge board.

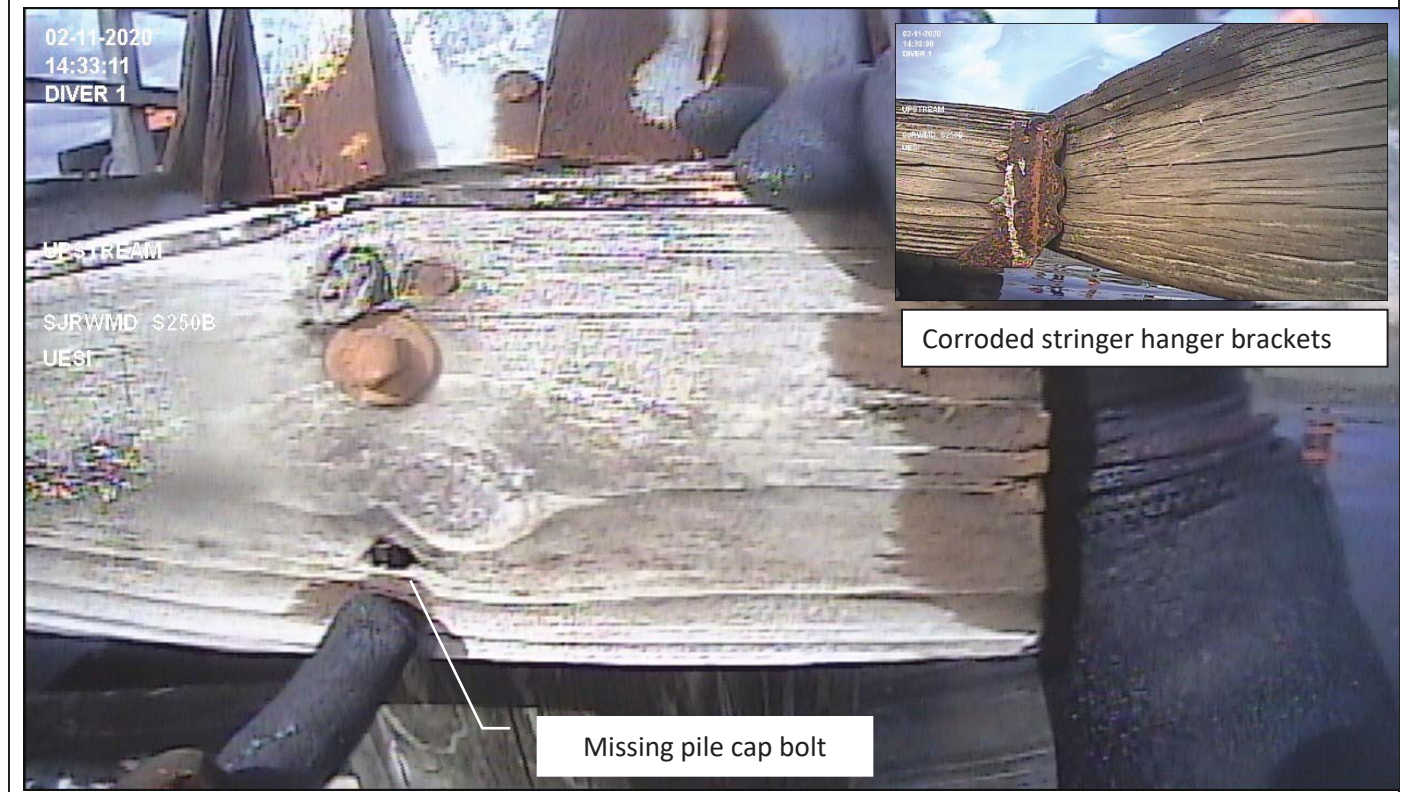
Items Rated C-2

- Item US2: No riprap detected on the upstream side – no scour detected either.
  - Recommended Action: Monitor the upstream area for scour.
- Item DS151: The gate is a fixed weir plate. Water was flowing between the vertical weir plate and the channel.
  - Recommended Action: Monitor the flow between the weir plate and the channel and seal if necessary.

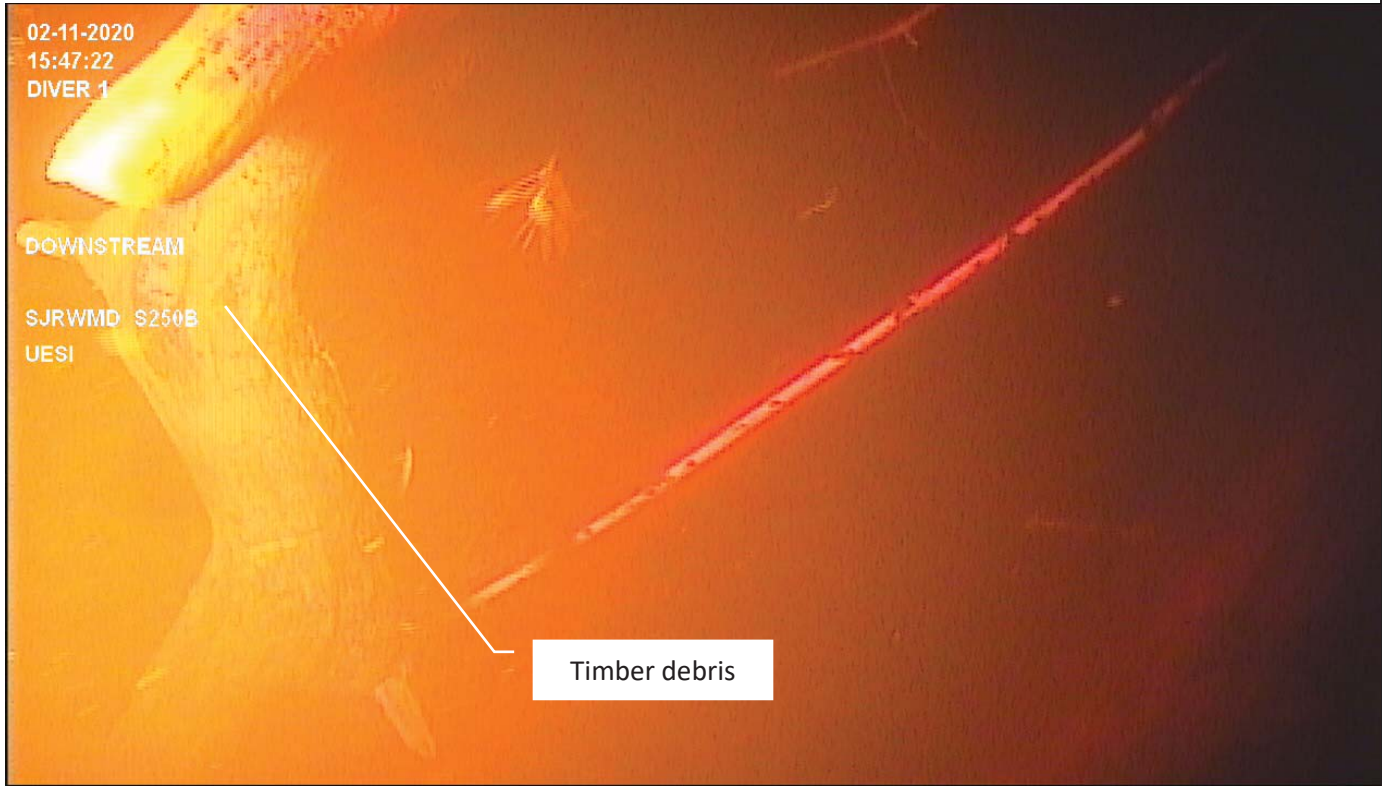


**PHOTOGRAPHS**

Item No.: US114 Structural Support and Bracing	Rating: C-3	Photo Description: Access pier with corroded hardware
Deficiency: The Bent 2 (from shore) pile cap has only one of two bolts on the east side. The access pier hardware for the cross bracing has moderate corrosion with moderate section loss of up to 20%. The steel hanger brackets for the timber beams have moderate corrosion with up to 15% section loss.		
Probable Cause: The corrosion was due to failed galvanizing, by age breakdown and chemical attack from the water. The missing pile cap bolt either failed from corrosion or was not installed.		
Recommendation: Replace the access pier cross bracing hardware, pile cap hardware, stringer hangers, and south cap beam, north bent, west pile. Consider replacing the pier.		



Item No.: DS115 Culvert	Rating: C-3	Photo Description: Pile of vegetation in culvert
Deficiency: The culvert has piles of twigs and logs from 25' to 38' of penetration from the downstream end. There is another collection of timber debris between 85' and 95' of penetration.		
Probable Cause: The vegetation is natural with a low flow condition.		
Recommendation: Remove the vegetation from inside of the culvert - it has the potential to clog and impact the flow capacity of the culvert.		





Item No.: DS1000 Additional Items	Rating: C-3	Photo Description: D/S staff gauge has corrosion
Deficiency: The downstream staff gauge has minor to moderate corrosion on the metal gauge board above and below water.		
Probable Cause: The corrosion is due to chemical attack from the water.		
Recommendation: Replace the downstream staff gauge board.		



# **APPENDIX**

# **CHECKLISTS**



**Structure Name/No.: S-250B**

**UPSTREAM EROSION CONTROL**

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
US1	Slope/Banks of Channel	1	No deficiencies noted		
US2	Rip Rap	2	No riprap detected on upstream side. No scour observed either. [14:41].	Monitor area upstream of structure for scour.	Either riprap was not installed or it is completely covered in soft material.
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	NA	Item not present		
US51	Structural - General Metal Condition	3	Refer to US114		
US52	Structural - General Timber Condition	2	Refer to US114		
US53	Construction Joints (Bolts, Welds)	NA	Item not present		
US54	Channels for Stoplogs or Flashboards	NA	Item not present		
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	NA	Item not present		
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		

**Structure Name/No.: S-250B**

			(1) C-3: The access pier hardware for the cross bracing has moderate corrosion with moderate section loss of up to 20%. (2) C-3: The Bent 2 (from shore) pile cap has only one of two bolts on the east side. (3) C-3: The steel hanger brackets for the beams have moderate corrosion with up to 15% section loss. (4) C-3: The south cap board on the northern bent, west pile has decay 4" high x 6" wide (up to hardware) x 1" deep. (5) C-2: The stringers and decking have minor to moderate decay [14:29 to 14:52] .		
US114	Structural Support, Bracing or Frames	3		Replace the access pier cross bracing hardware, pile cap hardware, stringer hangers, and south cap beam, north bent, west pile. Monitor the timber condition for advanced decay. Consider replacing the pier elements. The piles can remain.	The corrosion was due to failed galvanizing, by age breakdown and chemical attack from the water. The timber decay is natural from the age of the structure and the wet environment.
US115	Culverts	1	No deficiencies noted		
US116	Risers	1	No deficiencies noted		

**UPSTREAM GATES**

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
US151	Structure Gate(s)	2	Fixed gate/weir. Refer to DS151		
US152	Gate Guides and Gate Control	NA	Item not present		
US153	Gate Seals & Mating Surface	NA	Item not present		
US154	Cathodic Protection (entire structure)	NA	Item not present		
US155	Operator/Actuator Components	NA	Item not present		
US156	Emergency Closure Gates	NA	Item not present		
US306	Navigation Lock Miter Gates	NA	Item not present		

**Structure Name/No.: S-250B**

**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	1	No deficiencies noted		
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-250B**

DS115	Culverts	3	(1) C-3: The culvert has piles of twigs and logs from 25' to 38' of penetration from the downstream end [15:46]. There is another collection of timber debris between 85' and 95' of penetration [15:57]. (2) C-2: There are four drilled holes, approximately 3/4" diameter (1.5" maximum) from 5' to 6' of penetration, located at the 1:00, 2:30, 3:00 and 10:00 positions. Neither water nor soil is coming through. They appear to be drilled holes [15:40].	Remove the vegetation from the culvert - it has the potential to clog and impact the flow capacity of the culvert. Monitor the drilled holes and patch if flow or soil infiltrates.	The vegetation is natural with a low flow condition. The drilled holes were most likely planned for some type of splice.
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**DOWNSTREAM GATES**

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
DS151	Structure Gate(s)	2	The gate is a fixed weir plate. Water was flowing between the vertical weir plate and the channel [16:05].	Monitor the flow between the weir plate and the channel and seal if necessary.	There may have never been a welded connection between the weir plate and the channel.
DS152	Gate Guides and Gate Control	1	No deficiencies noted		
DS153	Gate Seals & Mating Surface	1	No deficiencies noted		
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	3	(1) C-3: The downstream staff gauge has minor to moderate corrosion on the metal gauge board above and below water [16:22]. (2) C-2: The timber board and the timber support pile have minor to moderate decay and checking. The board hardware has minor corrosion [16:25].	Replace the downstream metal staff gauge board. The timber board and pile can remain.	The metal gauge board corrosion is due to chemical attack from the water.