

**STRUCTURE S-250C**  
**INSPECTION DATE: 3/30/2020**



Single Barrel, 72" Diameter x 111' Long

Location:	Jane Green South
	Levee L-74W
Latitude:	27.8233 N
Longitude:	80.7548 W
Type:	Gated Culvert
No. Barrels:	One
Inspection	
Start Date:	3/30/2020
End Date:	3/30/2020

TEAM MEMBERS	
Lead Engineer	Jeffrey O'Connor, P.E.
Dive Supervisor	Jordan Klingler
Diver	Aaron Willard
Diver – Standby	Natasha Daniel
Dive Tender	Ben Harpel
Dive Tender	
Animal Control	TJ McDonagh
SJRWMD Agent	

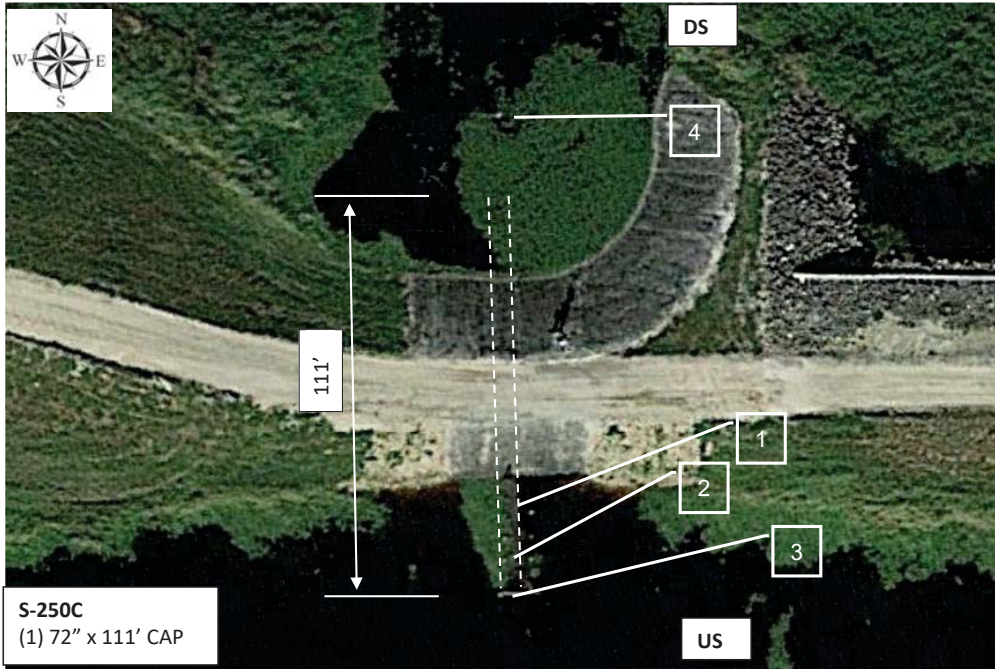
Respectfully Submitted,  
**UNDERWATER ENGINEERING SERVICES, INC.**  
3306 Enterprise Road  
Fort Pierce, FL 34982  
(772) 337-3116 Lic. No. CA3703  
Jeffrey O'Connor, P.E. (FL 50914)  
Vice President  
Project Manager



Digitally signed by  
Jeffrey H O'Connor  
Date: 2020.06.25  
10:49:45 -04'00'

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**Aerial View of Structure**



**S-250C**  
(1) 72" x 111' CAP

No.	Item No.	Inspection Item	Rating	Deficiency
1	US114	Structural Support and Bracing	C-3	The access pier hardware has corrosion; One missing cap beam bolt
2	DS115	Culverts	C-3	Piles of twigs and logs from 92' penetration in the culvert to the gate.
3	DS152	Gate Guides	C-3	The bolts between the frame, riser and timber piles has heavy corrosion.
4	DS1000	Additional Items	C-3	The downstream metal staff gauge board has corrosion and missing letters.

### Structure Description and Method of Underwater Inspection

Structure S-250C 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 March 30, 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 82 degrees F. and the weather was mostly clear. The underwater visibility ranged from 2 to 4 feet. The water level was approximately 22.3 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: All the cross bracing hardware for the access pier has moderate to heavy corrosion with the washers having greater than 50% loss of section and the nuts having 30 to 50% loss of section. The cap beam at the 3rd bent from shore, east side, is missing one of two bolts. The timber members have minor to moderate checking.
  - Recommended Action: Replace the access pier cross bracing hardware and the missing bolt on the 3<sup>rd</sup> bent cap, east side. Monitor the timber for advanced decay or damage.
- Item DS115: A pile of twigs and branches, with some up to 4" diameter x 6' long, is present at 92' of penetration from the downstream end and extending to the gate [10:30]. The debris is on the bottom and floating on the top. There is a vertical angle and a diagonal brace bolted to the 3:00 side of the culvert

exterior near the downstream end.

- Recommended Action: Remove the timber debris from the culvert - it has the potential to clog and impact the flow capacity of the culvert. Monitor the brace on the culvert exterior for loosening or damage to the culvert.
- Item DS152: The hardware between the gate frame and the riser (and through the pier piles) are carbon steel. The washers have corroded 100% and are missing. The bolt heads have moderate corrosion. The connected parts are aluminum.
  - Recommended Action: Replace the hardware connecting the gate frame to the riser and through the piles with stainless steel hardware.
- Item DS1000: The downstream staff gauge has missing numbers at the 23 foot mark and below water. The timber board has minor to moderate checking.
  - Recommended Action: Replace the numbers on the gauge board or replace the gauge board.

#### Items Rated C-2

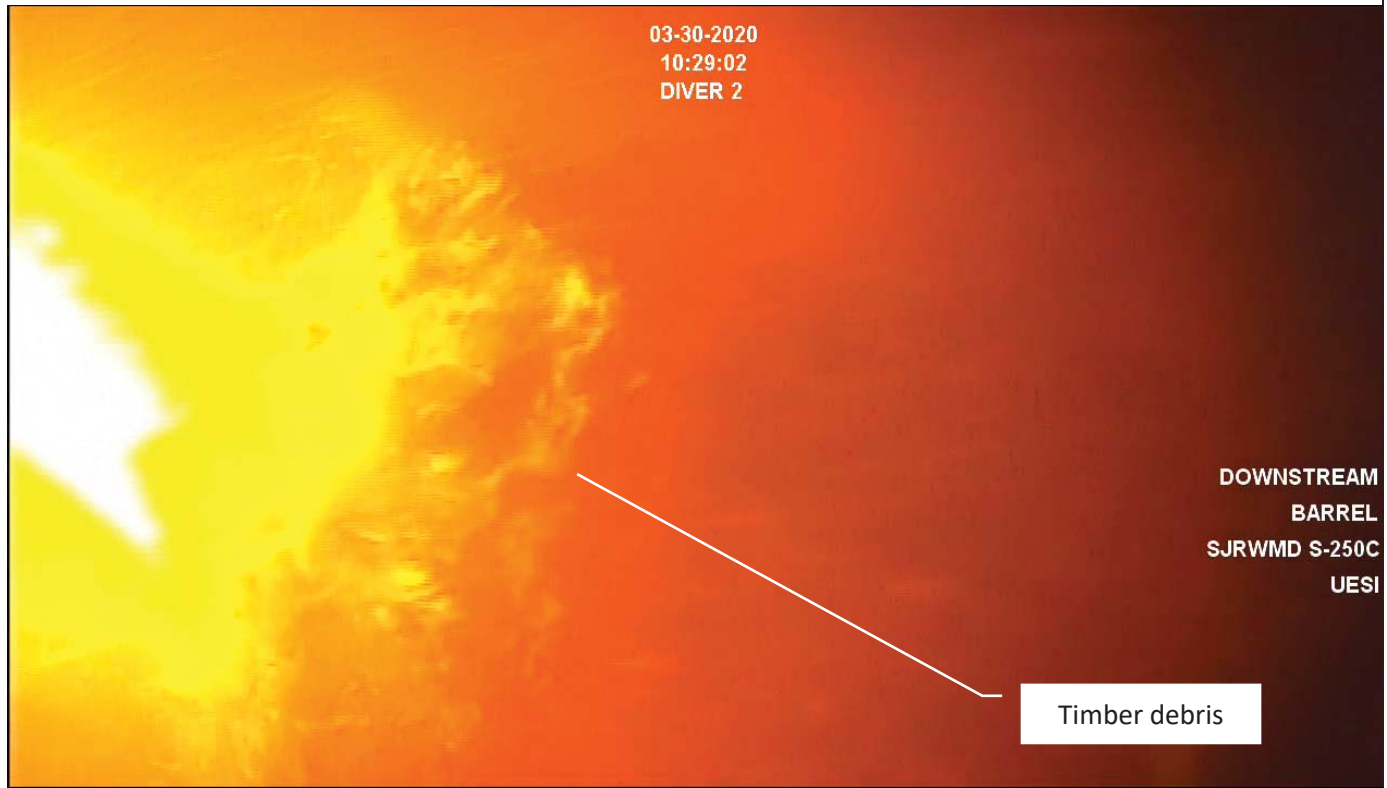
There were no items rated C-2.

**PHOTOGRAPHS**

Item No.: US114 Structural Support	Rating: C-3	Photo Description: Access pier with corroded hardware
Deficiency: All the cross bracing hardware for the access pier has moderate to heavy corrosion with the washers having greater than 50% loss of section and the nuts having 30 to 50% loss of section.		
Probable Cause: The corrosion on the hardware is due to chemical attack from the water. The missing bolt may not have been installed.		
Recommendation: Replace all the hardware for the access pier with stainless steel hardware. Install a new cap beam bolt where missing.		



Item No.: DS115 Culvert	Rating: C-3	Photo Description: Pile of timber in culvert
Deficiency: A pile of twigs and branches, with some up to 4" diameter x 6' long, is present at 92' of penetration from the downstream end and extending to the gate. The debris is on the bottom and floating on the top.		
Probable Cause: The vegetation is natural with a low flow condition.		
Recommendation: Remove the timber debris from the culvert - it has the potential to clog and impact the flow capacity of the culvert.		



Item No.: DS152 Gate Guides	Rating: C-3	Photo Description: Corroded hardware
Deficiency: The hardware between the gate frame and the riser (and through the pier piles) is carbon steel. The washers have corroded 100% and are missing. The bolt heads have moderate corrosion. The connected parts are aluminum		
Probable Cause: The corrosion was due to chemical attack from the water and galvanic corrosion due to contact of dissimilar metals.		
Recommendation: Replace the hardware connecting the gate frame to the riser with stainless steel hardware.		



Item No.: DS1000  Additional Items	Rating: C-3	Photo Description: D/S staff gauge has corrosion
Deficiency: The downstream staff gauge has missing numbers at the 23 foot mark and below water.		
Probable Cause: The corrosion was due to chemical attack from the water and possible galvanic corrosion due to contact of dissimilar metals.		
Recommendation: Replace the numbers on the gauge board or replace the gauge board.		





# **APPENDIX**

# **CHECKLISTS**

Structure Name/No.: S-250C

**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 - Pump mat in place		
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	1	No deficiencies noted		
US52	Structural - General Timber Condition	3	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		
US114	Structural Support, Bracing or Frames	3	(1) C-3: All of the cross bracing hardware for the access pier has moderate to heavy corrosion with the washers having greater than 50% loss of section and the nuts having 30 to 50% loss of section [11:18 to 11:49]. (2) C-3: The cap beam at the 3rd bent from shore, east side, is missing one of two bolts [11:24]. (3) C-2: The timber members have minor to moderate checking.	Replace all of the hardware for the access pier with stainless steel hardware. Install a new cap beam bolt where missing. Monitor the timber for the pier for advanced checking and decay.	The corrosion on the hardware is due to chemical attack from the water. The missing bolt may not have been installed. The timber checking is natural for a structure of this age and in its environment.
US115	Culverts	1	No deficiencies noted		

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

US116	Risers	1	No deficiencies noted		
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**UPSTREAM GATES**

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
US151	Structure Gate(s)	1	Fixed plate weir - No deficiencies noted.		
US152	Gate Guides and Gate Control	3	Refer to DS152		
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-250C**

**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 - Pump mat in place		
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	3	Refert to DS115		
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		
DS115	Culverts	3	(1) C-3: A pile of twigs and branches, with some up to 4" diameter x 6' long, is present at 92' of penetration from the downstream end and extending to the gate [10:30]. The debris is on the bottom and floating on the top. (2) C-2: There is a vertical angle and a diagonal brace bolted to the 3:00 side of the culvert exterior [11:03].	Remove the timber debris to prevent clogging. Monitor the brace on the culvert exterior for loosening or damage to the culvert.	The vegetation is natural with a low flow condition. The exterior brace is assumed to have been installed to help stabilize the barrel during installation of the pump mat and that it serves no purpose at this time.

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

**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	3	The hardware between the gate frame and the riser (and through the pier piles) is carbon steel. The washers have corroded 100% and are missing. The bolt heads have moderate corrosion. The connected parts are aluminum [10:40].	Replace the hardware connecting the gate frame to the riser with stainless steel hardware.	The corrosion was due to chemical attack from the water and galvanic corrosion due to contact of dissimilar metals.
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 missing numbers at the 23 foot mark and below water. (2) C-2: The timber board has minor to moderate checking. [10:54 - 10:59].	Replace the numbers on the gauge board or replace the gauge board. Monitor the timber for advanced checking or damage.	The corrosion was due to chemical attack from the water and possible galvanic corrosion due to contact of dissimilar metals. The timber checking is natural for a structure of this age and in its environment.