STRUCTURE S-77
INSPECTION DATE: 4/9/2020

One Barrel, 40” x 352’ Long

Location:	USJRB South
	Levee L-77E
Latitude:	27.6474 N
Longitude:	80.6441 W
Type:	Pump Station
No. Barrels:	One
Inspection	
Start Date:	4/9/2020
End Date:	4/9/2020

TEAM MEMBERS	
Lead Engineer	Jeffrey O’Connor, P.E.
Dive Supervisor	Jordan Klingler
Diver	Brian Kilburn
Diver – Standby	Aaron Willard
Dive Tender	Natasha Daniel
Dive Tender	Ben Harpel
Animal Control	TJ McDonagh
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Respectfully Submitted,
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JEFFREY H. O'CONNOR LICENSE No. 50914 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally signed by Jeffrey H O'Connor
Date: 2020.06.25 11:13:29 -04'00'

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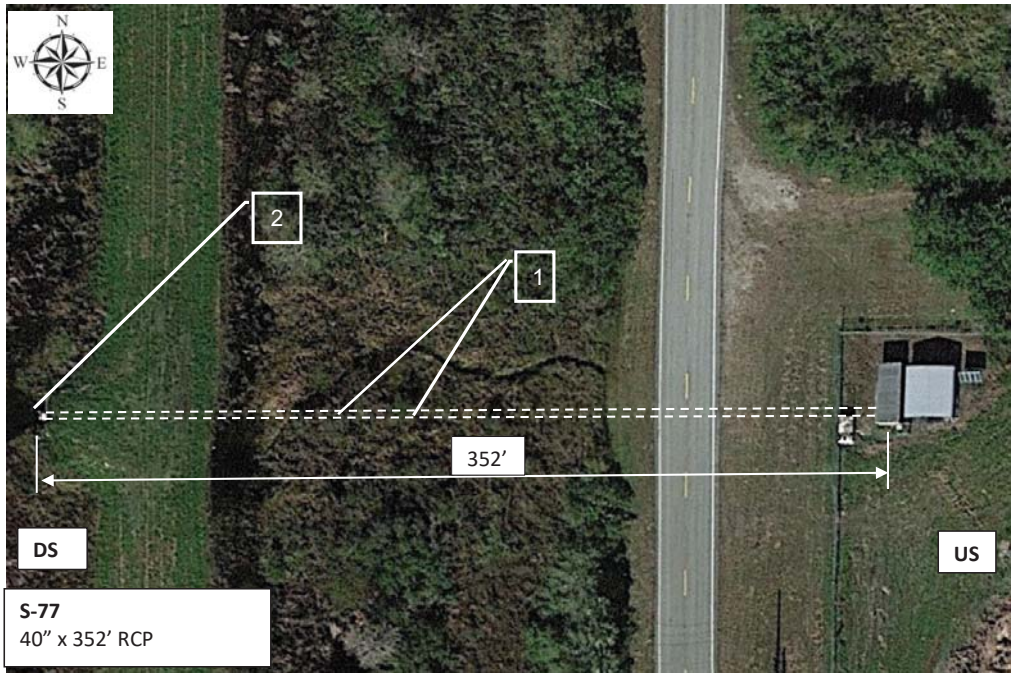
Aerial View of Structure



No.	Item No.	Inspection Item	Rating	Deficiency
1	PS200	Discharge Pipes	C-3	Joints at 215’ and 265’ from east missing joint sealant.
2	PS206	Backflow Gate	C-3	The flap gate seal has loss of adhesion.

Structure Description and Method of Underwater Inspection

Structure S-77 is a pump station comprised of one pump and discharge pipe, extending east (pump end) to west (discharge end) under Levee L-74N and under CR 512. The discharge pipe is concrete, 40” diameter and approximately 352’ from the pump room to the discharge.

The underwater inspection was performed by a 5-person dive team on April 9, 2020. The dive team worked from a dive trailer, using surface-supplied air, and accessed the structure areas from the bank. The discharge pipe was inspected starting from the sump room. The remaining 52’ was inspected by accessing through the discharge end.

The scope of services included the underwater inspection of the submerged structure components. The area extended 20 feet beyond the structure edges. Only the sump room was inspected on the upstream end.

The air temperature was 80 degrees F. and the weather was mostly clear. The underwater visibility ranged from 2 to 3 feet. No staff gauges were present on either end.

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 PS200: The joints at 215’ and 265’ in from the east end are missing grout for the full circumference, but with no evidence of soil intrusion. The joints appear to be approximately 10" wide with metal bands with minor corrosion.
    - Recommended Action: Clean the corrosion and install joint sealant at the Joints at 215' and 265' that were missing grout.
- Item PS206: The flap gate seal has lost adhesion to the metal flap gate over 1/4 of the circumference.
    - Recommended Action: Install new adhesive material for the flap gate seal.

Items Rated C-2

- Item PS200: [Note numbers match the checklist] (2) The discharge pipe has areas of overpour ranging in size from 1 sf to 6 sf and from 0.5” to 2” thick. The areas were located at 56', 107’, 165’, and 215’ in from east end. Discharge pipe also has a spalled section at 56' in from east end at the 12:00 position, area is 3" long x 3" wide x 1" deep. (3) The discharge pipe has a shallow spalled section of joint material 34' in from the west end at the 03:00 position, area is 2' long x 3" wide x .25" deep. (4) The discharge pipe has numerous cracks in joint material (all distances measured from the west end): (a) 34' at the 09:00 position, circumferential crack, 0.25” wide (max.) x 2' long with shallow 4" wide x .25" deep spall of top layer; (b) 33' across the crown from 09:00 to 03:00, 60” long x 1/16” wide; (c) 30' across the crown from 09:00 to 03:00, 60” long x 1/8” wide. (5) Shallow spalled section of joint material 27' in from the west end across the crown from 09:00 to 03:00, area is 2' long x 1.5" wide x .25" deep.
    - Recommended Action: Monitor the minor spalls, overpour areas and cracks in the joint material for additional damage.

PHOTOGRAPHS

Item No.: PS200 Discharge pipe	Rating: C-3	Photo Description: Missing grout sealant.
Deficiency: The joints at 215’ and 265’ in from the east end are missing grout for the full circumference, but with no evidence of soil intrusion. The metal bands have minor corrosion.		
Probable Cause: The missing joint material may not have been installed.		
Recommendation: Install joint sealant at the Joints at 215' and 265' that were missing grout.		

Item No.: PS206 Backflow Gate	Rating: C-3	Photo Description: Loss of seal adhesion
Deficiency: The flap gate seal has lost adhesion to the metal flap gate over 1/4 of the circumference.		
Probable Cause: The loss of adhesion may have been due to poor construction and degradation from the environment and use.		
Recommendation: Install new adhesive material for the flap gate seal.		

APPENDIX

CHECKLISTS

Structure No. S-77

UPSTREAM EROSION CONTROL

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
US1	Slope/Banks of Channel	NA	Item not present		
US2	Rip Rap	NA	Item not present		
US3	Exposed erosion-Control Fabric	NA	Item not present		
US4	Evidence of stone displacement (bedding stone)	NA	Item not present		
US5	Channel Stabilization and erosion control	NA	Item not present		

UPSTREAM GENERAL

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
US50	Structural - General Concrete Condition	1	No deficiencies noted		
US51	Structural - General Metal Condition	1	No deficiencies noted		
US52	Structural - General Timber Condition	NA	Item not present		
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	NA	Item not present		
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	1	No deficiencies noted		
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	NA	Item not present		
US115	Culverts	NA	Item not present		
US116	Risers	NA	Item not present		

UPSTREAM GATES

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
US151	Structure Gate(s)	NA	Item not present		
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		

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US156	Emergency Closure Gates	NA	Item not present		
US306	Navigation Lock Miter Gates	NA	Item not present		

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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	1	No deficiencies noted		
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	NA	Item not present		
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	1	No deficiencies noted		
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	NA	Item not present		

Structure No. S-77

DOWNSTREAM GATES

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
DS151	Structure Gate(s)	NA	Item not present		
DS152	Gate Guides and Gate Control	NA	Item not present		
DS153	Gate Seals & Mating Surface	NA	Item not present		
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		

Structure Name/No.: S-77

PUMP STATION

Finding #	Inspection Item	Rating	Comments	Recommended action	Probable cause
PS14	Engine Cooling System (Underwater)	NA	Item not present		
PS100	Screens and Trash Racks	NA	Item not present		
PS102	Intake Bell and Impellor #1	NA	Item not present		
PS103	Intake Bell and Impellor #2	NA	Item not present		
PS104	Intake Bell and Impellor #3	NA	Item not present		
PS105	Intake Bell and Impellor #4	NA	Item not present		
PS106	Intake Bell and Impellor #5	NA	Item not present		
PS107	Intake Bell and Impellor #6	NA	Item not present		
PS108	Bypass Gates (e.g. Slide Gates)	NA	Item not present		
PS200	Discharge Pipe #1	3	(1) C-3: The joints at 215' and 265' in from the east end are missing grout for the full circumference, but with no evidence of soil intrusion [10:57, 11:01]. The joints appear to be approximately 10" wide with metal bands with minor corrosion. (2) C-2: The discharge pipe has areas of overpour ranging in size from 1 sf to 6 sf and from 0.5" to 2" thick. The areas were located at 56' [10:36], 107' [10:44], 165' [10:54], 215' [10:57] in from east end. Discharge pipe also has a spalled section at 56' in from east end at the 12:00 position, area is 3" long x 3" wide x 1" deep [10:42].	Install joint sealant at the Joints at 215' and 265' that were missing grout. Monitor the minor spalls, overpour areas and cracks in the joint material for additional damage.	The missing joint material may not have been installed. The other items can most likely be traced back to construction work.
PS201	Discharge Pipe #2	NA	*Note: This is a continuing of PS200. This cell was used because the text would not print correctly when all in one cell.* (3) C-2: The discharge pipe has a shallow spalled section of joint material 34' in from the west end at the 03:00 position, area is 2' long x 3" wide x .25" deep [12:46]. (4) C-2: The discharge pipe has numerous cracks in joint material (all distances measured from the west end): (a) 34' at the 09:00 position, circumferential crack, 0.25" wide (max.) x 2' long with shallow 4" wide x .25" deep spall of top layer [12:48]; (b) 33' across the crown from 09:00 to 03:00, 60" long x 1/16" wide [12:50]; (c) 30' across the crown from 09:00 to 03:00, 60" long x 1/8" wide [12:55]. (5) C-2: Shallow spalled section of joint material 27' in from the west end across the crown from 09:00 to 03:00, area is 2' long x 1.5" wide x .25" deep [12:57].		
PS202	Discharge Pipe #3	NA	Item not present		
PS203	Discharge Pipe #4	NA	Item not present		
PS204	Discharge Pipe #5	NA	Item not present		
PS205	Discharge Pipe #6	NA	Item not present		

PS206	Backflow Gates	3	The flap gate seal has lost adhesion to the metal flap gate over 1/4 of the circumference.	Install new adhesive material for the flap gate seal.	The loss of adhesion may have been due to poor construction and degradation from the environment and use.
PS207	Bypass Culvert Interior	NA	Item not present		