



LOGAN DIVING & SALVAGE

2815 SAINT JOHNS BLUFF
JACKSONVILLE, FLORIDA 32246
TEL: (904) 731-0000 FAX: (904) 731-5493
MARINE SPECIALTY CONTRACTOR
FL SCC131151014

POST INCIDENT
UNDERWATER INVESTIGATION
INTRACOASTAL WATERWAY
SUBAQUEOUS WATER MAIN CROSSING
FOR
UTILITIES COMMISSION NEW SMYRNA BEACH
JANUARY 18, 2018

UNDERWATER SURVEY SERVICES WERE REQUESTED TO PERFORM AN INSPECTION OF THE 12" DUCTILE IRON WM SUBAQUEOUS CROSSING ON THE NORTH SIDE OF THE NORTH CAUSEWAY BRIDGE DUE TO SUSPECTED PIPELINE FAILURE.

DIVERS UTILIZING SURFACE SUPPLIED AIR DIVING EQUIPMENT WITH HARD WIRE COMMUNICATIONS INSPECTED THE UTILITY CROSSING. DIVING OPERATIONS WERE CONDUCTED FROM A 28' DIVE BOAT. UNDERWATER PHOTOGRAPHY AND VIDEO WAS UTILIZED TO DOCUMENT EXISTING CONDITIONS DURING THE INSPECTION.

THE CROSSING WAS INSPECTED IN MARCH OF 2017 PRE-HURRICANE IRMA AND FOUND TO BE IN SERVICEABLE CONDITION. POST HURRICANE INSPECTION JANUARY 18TH, 2018 FOUND THE PIPELINE FAILED AND LEAKING.

DIVING INSPECTION FINDINGS ARE AS FOLLOWS:

POST HURRICANE IRMA – 12" DUCTILE IRON WATER MAIN NORTH BRIDGE

THE 12" DUCTILE IRON WATER MAIN WAS INSPECTED POST HURRICANE IRMA ON JANUARY 18, 2018 FOLLOWING THE SUSPECTED FAILURE OF THE PIPE.

THE DIVER LOCATED THE SOURCE OF THE LEAK AT A PREVIOUS CLAMP AND SPOOL PIECE REPAIR TO THE PIPELINE. INITIAL INSPECTION REVEALED APPROXIMATELY 6' OF VERTICAL SCOUR DIRECTLY BENEATH THE PIPE AND EXISTING REPAIR CLAMP ASSEMBLY. VERTICAL ALIGNMENT OF THE EAST AND WEST PIPES WAS NOTED AS SLIGHTLY OFF ELEVATION. HORIZONTAL ALIGNMENT ALSO IS SUSPECTED TO BE SLIGHTLY OFF. FURTHER INVESTIGATION REVEALED THE EAST CLAMP FAILED AND WAS LEAKING AT THE GASKET RETAINER RING TO THE SPOOL PIECE. THE GASKET MATERIAL WAS PROTRUDING OUT FROM BOTH ENDS OF THE EAST CLAMP. PREVIOUSLY INSTALLED CEMENT RIP RAP BAG SUPPORT PIERS WERE FOUND UNDERMINED AND FAILED.

THE DIVER NOTED THE PRESENCE OF FAILED HARDWARE ON THE EAST CLAMP. THE FAILED HARDWARE WAS NOTED ON ALL SIDES OF THE CLAMP AND INCLUDED 1 MISSING BOLT AND 6 FAILED EYELETS. 4 OF THE 8 BOLTS APPEAR TO STILL BE INTACT.

THE WEST CLAMP WAS FOUND IN PLACE. ALL HARDWARE WAS IN PLACE AND NO LEAKS OR GASKET MATERIAL WAS VISIBLE.

INSPECTION OF THE PIPELINE EAST AND WEST OF THE SPOOL PIECE AREA REVEALED THAT THE GROUND LINE BENEATH THE PIPE HAS CHANGED DRASTICALLY SINCE THE LAST INSPECTION OF MARCH 2017.

THE PIPE ON THE EAST SIDE OF THE REPAIR CLAMPS AND SPOOL PIECE WAS SUSPENDED AND UNSUPPORTED FOR A TOTAL LENGTH OF APPROXIMATELY 65 LINEAL FEET. THIS AREA OF SUSPENSION INCLUDES 3 UNSUPPORTED PIPE JOINTS WHICH ARE NOW SUSPENDED IN AN IMMINENT FAILURE CONDITION. THE MAXIMUM HEIGHT OF SUSPENSION EAST OF THE REPAIR IS APPROXIMATELY 3'.

THE PIPE ON THE WEST SIDE OF THE REPAIR WAS SUSPENDED AND UNSUPPORTED FOR APPROXIMATELY 17'. THE MAXIMUM HEIGHT OF SUSPENSION WEST OF THE REPAIR IS APPROXIMATELY 4 1/2'.

PRE-HURRICANE IRMA - 12" DUCTILE IRON WATER MAIN NORTH BRIDGE:

PREVIOUS INSPECTION OF THE 12" DUCTILE IRON WATER MAIN WAS COMPLETED ON MARCH 2, 2017 PRIOR TO HURRICANE IRMA AND DOCUMENTED THE FOLLOWING:

121' OF THE 12" DI WM WAS FOUND EXPOSED, OF THE 121' OF EXPOSURE, 20' OF THE 12" DI WM WAS FOUND COMPLETELY SUSPENDED AND UNSUPPORTED.

STA. 5+35 TO STA. 5+15 PIPE WAS SUSPENDED 24" MAXIMUM

STA. 5+05 TO STA. 4+14 PIPE WAS FOUND TO BE EXPOSED, SOME PARTS OF THE PIPE WERE COVERED BUT THE JOINTS WERE EXPOSED ON AVERAGE 30 – 50%.

CLAMPS AND SPOOL PIECE INSTALLED ON JANUARY 17, 2014 WERE FOUND 50% EXPOSED BETWEEN STA. 4+85 AND STA. 4+80. NO MOVEMENT, DAMAGE, OR LEAKS NOTED ON REPAIR CLAMPS AND SPOOL PIECE.

SYNOPSIS:

POST HURRICANE IRMA 12" WM NORTH BRIDGE CROSSING

SUSPENDED PIPE REFERS TO SECTIONS OF THE 12" UNDERWATER WATER MAIN THAT ARE CURRENTLY UNSUPPORTED AND STRESSED. BALL AND SOCKET OR BELL AND SPIGOT PIPE IS DESIGNED TO BE SUPPORTED AND ARE NOT DESIGNED TO HAVE EXCESSIVE FREE SPANS OF UNSUPPORTED PIPE AND JOINTS. PIPE JOINTS, WHERE SUSPENDED, ARE CURRENTLY EXPERIENCING ADDITIONAL STRESS TO THE BELL AND SPIGOT SECTIONS (MALE AND FEMALE) DUE TO NO BEDDING OR UNIFORM SOIL SUPPORT BELOW PIPE.

EXPOSED PIPE REFERS TO SECTIONS OF PIPE THAT ARE UNCOVERED LAYING ON THE BOTTOM OF THE RIVER BED. EXPOSED SECTIONS THAT ARE NOT BURIED ARE SUBJECTED TO ACCELERATED CORROSION RATES AND DAMAGE FROM VESSEL GROUND TACKLE AND TRANSIENT DEBRIS.

SUBAQUEOUS PIPELINE CROSSINGS ARE TYPICALLY DESIGNED AND PERMITTED TO BE BURIED FOR THEIR ENTIRETY TO PROTECT AGAINST THE NEGATIVE EFFECTS OF EXPOSURE AND SUSPENSION OUTLINED ABOVE.

CURRENT SUSPENDED SECTIONS OF PIPE ARE NOW IN AN IMMINENT FAILURE CONDITION POST HURRICANE IRMA ATTRIBUTABLE TO THE EXTREME SCOUR EXPERIENCED DURING THE HURRICANE.

STEPS TO PROVIDE SUPPORT, IMMOBILIZATION AND PROTECTION SHOULD BE TAKEN IMMEDIATELY. INDUSTRY STANDARD REPAIR METHOD IS THE CEMENT RIP RAP BAG REPAIR. CEMENT RIP RAP BAGS ARE USED TO BUILD UP THE GROUND LINE BENEATH THE SUSPENDED/SCOURED OUT PIPELINE AND RESTORE SUPPORT. PIPELINES ARE SUPPORTED UNDERNEATH AND COVERED ON TOP IN A PYRAMID TYPE FASHION TO SUPPORT AND PROTECT THE PIPES AS WELL AS INDUCE SILTATION TO FURTHER PROTECT THE CROSSINGS.

DUE TO THE EXTREME TIDAL SURGE, WIND DRIVEN CURRENTS AND ACCELERATED WATER FLOW EXPERIENCED DURING HURRICANE IRMA AT THE CROSSING, WE BELIEVE THE PIPELINES GROUND LINE WAS SCOURED OUT BENEATH DURING THE STORM, LEAVING IT UNSUPPORTED AND SUSPENDED (HANGING) FOR A DISTANCE OF AT LEAST 82+'. THIS LACK OF SUPPORT LIKELY CAUSED THE UNSUPPORTED JOINTS TO SHIFT DOWNWARD AND REACH THEIR MAXIMUM DEFLECTION, ULTIMATELY CAUSING FAILURE OF THE REPAIRED SECTION (EAST CLAMP).

THE CROSSING NOW HAS 82' OF SUSPENDED AND UNSUPPORTED PIPE. 62' OF WHICH DID NOT EXIST BEFORE HURRICANE IRMA. THE CURRENT UNSUPPORTED JOINTS HAVE ALREADY MOVED DOWNWARD IN ELEVATION (DROOPED) TO MAXIMUM JOINT DEFLECTION WITH NO SUPPORT AND ARE EXPERIENCING EXCESSIVE STRESS/STRAIN ON THE JOINTS (BELL/SPIGOT).

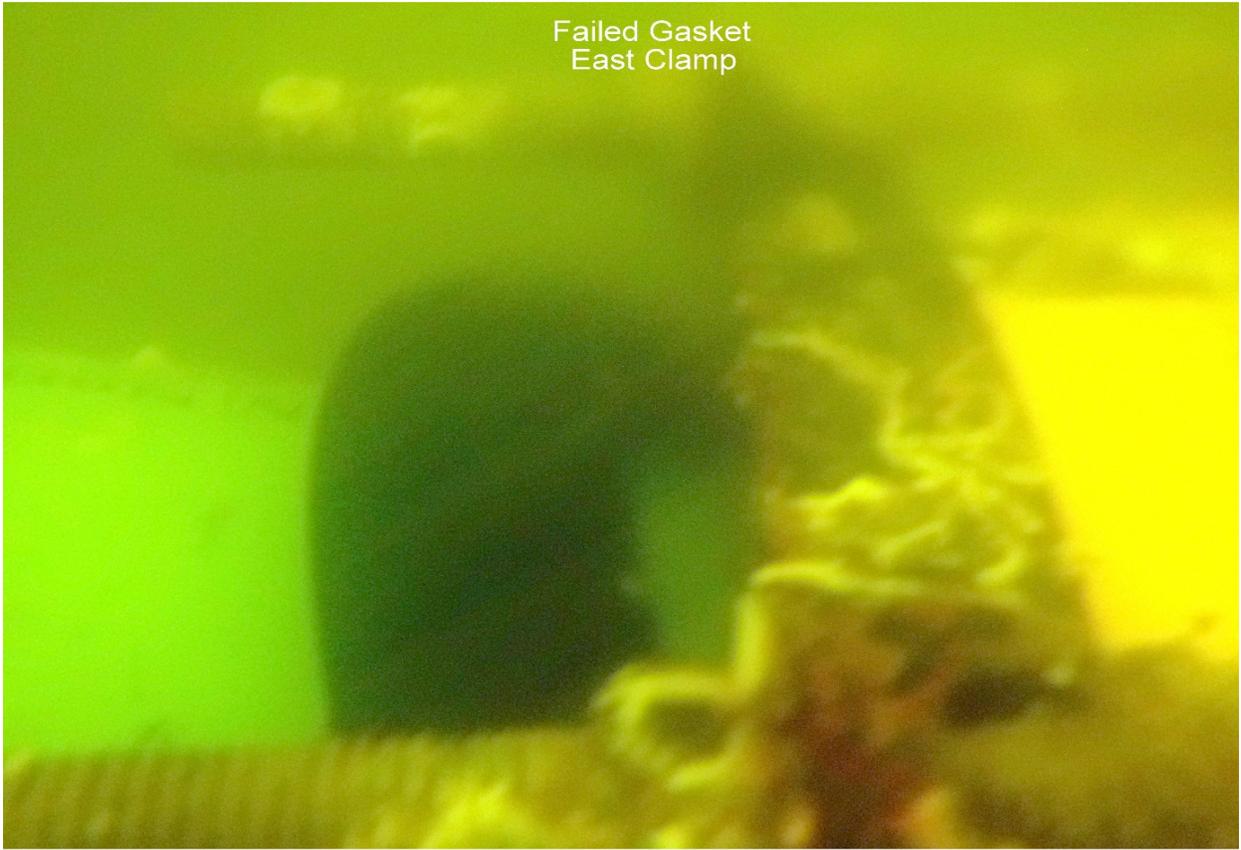
WE HAVE DOCUMENTED THE SAME UNDERWATER CONDITIONS POST HURRICANE IRMA FOR THE CITY OF COCOA AND THE CITY OF MELBOURNE. COCOA'S 36" PCCP WM WAS SCOURED OUT BENEATH AND FAILED COMPLETELY IN THE INDIAN RIVER AND WAS ALSO SEVERELY SCOURED OUT BENEATH IN THE BANANA RIVER. MELBOURNE'S 20" DI WAS SCOURED OUT IN THE INDIAN RIVER WITH THE PIPELINE LEFT SUSPENDED AND UNSUPPORTED AS WELL. BOTH WERE REPAIRED AS DESCRIBED ABOVE VIA THE CEMENT RIP RAP BAG METHOD.

RECOMMENDATIONS:

- 1) APPLY FOR USACOE PERMITS (EMERGENCY BASIS) TO INSTALL CEMENT RIP RAP BAGS ABOVE AND BELOW THE PIPE TO PROVIDE SUPPORT, IMMOBILIZATION, AND PROTECTION.
- 2) SUPPORT THE PIPELINE AT EACH JOINT INITIALLY VIA THE CEMENT BAG METHOD IN PIERS.
- 3) REMOVE FAILED CLAMP/S. REALIGN PIPE SECTIONS AND INSTALL NEW CLAMPS AND SPOOL PIECE.
- 4) PROVIDE SUPPORT, IMMOBILIZATION, STABILIZATION, AND PROTECTION VIA THE CEMENT BAG METHOD TO ALL SECTIONS OF PIPE SUSPENDED AND EXPOSED.
- 5) INSPECT ALL CITY OWNED UNDERWATER UTILITIES CROSSINGS IN THE AREA TO DOCUMENT CURRENT EXISTING POST INCIDENT CONDITIONS.
- 6) DOCUMENT ALL HURRICANE IRMA RELATED DAMAGE TO CITY SUBAQUEOUS UTILITIES/ASSETS.

SCOTT C. ANDERSON
PRESIDENT
LOGAN DIVING & SALVAGE
WWW.LOGANDIVING.COM

Failed Gasket
East Clamp



Failed Hardware
East Clamp

