GPI Greenman-Pedersen, Inc.
Engineering and Construction Services

Underwater Inspection of
SFN - 1806564
Morgana Run Culvert under Interstate 77 and East 49th Street
(CUY-77-1318)
October 31, 2014
For
Ohio Department of Transportation
District-12

(General View of Brick Arch Structure)

Eric Thorkildsen, P.E. 78663
Reviewer

By

GPI/Greenman-Pedersen, Inc.

Contents

Structure Inventory Data

Structure Data - General Information

Structure Type:	Brick Cathedral Arch Culvert/Reinforced Concrete Culvert
Structure Dimensions:	16’ x 9’ triple brick layer arch
Total Length:	Inspection length 200 L.F.

Channel Description - General Description of Channel

The Morgana Run Culvert, CUY-77-1318 (SFN 1806564) is located under Interstate 77 and East 49th Street in Cleveland, Ohio. The brick arch culvert was built in 1914 and is connected on the west end to a reinforced concrete box culvert that continues in a westerly direction under the Heidtman Steel property. The culvert was constructed to act as a conduit to carry Morgana Run under East 49th and the I-77 corridor. Entry to the culvert was gained from a 65 foot deep manhole located in East 49th Street.

Inspection Report

Inspection Inventory and Appraisal Information

Structure Location Information

Structure File Number:	1806564
Facility:	Interstate 77
Feature:	Morgana Run
County:	Cuyahoga

Inspection Data

Team Leader-Diver:	James Henry
P.E. Reviewer:	Eric Thorkildsen, P.E.
Dive Team:	Marty Lee Faulk Michael Mango Douglas Hedrick, PE, PS
Type of Equipment Used:	Dry suit/Wading/Probing
Date:	10/31/2014
Water Temperature:	46 Degrees F
Waterway Velocity (Current):	Approximately 5 Foot/Second
Depth Turbidity (Visibility):	Approximately 3”
Type of Material of Invert:	Brick formed invert 48” wide and 6” deep
Presence & Condition of Riprap or Scour Countermeasures:	There is a diversion weir located at the intersection of the sewer running parallel with East 49th Street. A mortar coating has been applied to a 48” diameter pipe entering the brick culvert at station 97+00.

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Structure Inspection Data

Structure Inspected:	Brick Arch Culvert under both East 49th Street and Interstate 77.
General Configuration:	Brick Arch culvert has rounded bottom with a defined invert. The sides curve outward with a teardrop arch above.
Maximum Water Depth at Structure Inspected:	Very minimal flow was present throughout portions of the culvert at the time of the inspection. Water levels varied between 0" to 4". Water that was flowing appeared to flow at a velocity of approximately 5 feet per second. Indications of debris along the top portions of the steel support beam, indicates the culvert flows at or near capacity during peak rain events.

Description of Structure

CUY-77-1318 is a brick arch culvert that eventually ties into a concrete structure over 250 feet west of the Interstate 77 crossing. This structure was constructed to enclose Morgana Run under Interstate 77 and East 49th Street. The brick culvert was originally constructed around 1914, with the reinforced concrete sections being added later. The inspection commenced at the entry manhole, located at East 49th Street, with an arbitrary station of 0+00 and traversed up station in a westerly direction.

Inspection Operations

The permit confined space inspection was performed by Greenman-Pedersen Inc. on October 31, 2014. This regularly scheduled Underwater Inspection included a 100% Level I inspection. Prior to entering the culvert, remote air sample readings were taken. The interior area tested at 20.9% for oxygen which was comparable to the outside air for oxygen levels and there were no detectable levels of carbon monoxide, hydrogen sulfide or combustible gases; however as a precaution, fresh air was pumped into the underground culvert. Access was gained via the existing manhole rungs and a safety tether, to assist in the descent of the 65 foot deep manhole. A steel tripod with winch was positioned at the manhole site and available in the case an emergency extraction was necessary. Full time communications were hardwired between the inspection team and the surface. Full body dry suits and remote air monitors were

worn by both inspectors, with the monitors continuously checked for any signs of harmful gases. In addition the team carried halogen flashlight, sounding hammers and measuring devices to aid in inspection.

The previous inspection report dated November 1, 2010, was available for condition comparison purposes.

The Team commenced the inspection at the entry manhole and was able to walk the entire length of the culvert and use wading, probing and tactile methods to complete the inspection. All appurtenances entering the main culverts were inspected for soundness and separation. The brick walls were examined for seepage and efflorescence.

Inspection Findings

Brick Arch Culvert- under I-77

- Station 0+05: There is a diversion weir which runs in a north-south direction, parallel with I-77 and East 49th Street. This weir intersects the flow coming from the east, under East49th Street and directs it in a northerly direction in a 20"x 24" brick invert. (See Photograph # 3). There is a crack in the weir wall that runs through the entire depth of the wall. It has remained unchanged since the last inspection.(See Photograph #4)
- Station 0+12: There is a W 8 by 14(estimated) steel beam running perpendicular to the brick culvert at approximately two-thirds of the height of the culvert, from the bottom invert. This beam is deflected in both a horizontal and vertical direction. Horizontal deflection is approximately 2"from level and the vertical deflection (sweep) is approximately 5" to 6". This deflection does not appear to be a recent development as the joint at the brick wall shows little to no change from previous reports. (See Photographs #5 , #6 and #8)
- Station 0+15 to 0+30: There is a horizontal separation in the brick joint along the North wall with heavy efflorescence. This separation is approximately 15 feet long and is located 7.5 feet above the floor of the culvert (See Photographs # 7 & #8)
- Station 97+00: There is a 48 inch diameter pipe entering from the south that has been coated with mortar slurry. The treatment appears to extend into the pipe for at least 40-50 feet, and possibly further. Slurry treatment appears to have been hand applied with a trowel or other tools.(See Photographs #9 & #10)
- Remaining sections of the culvert exhibit minor mortar loss and efflorescence but overall condition is very good. (See Photograph # 11)

Brick Arch Culvert- under East 49th Street

- The brick culvert under East 49th Street was inspected as a courtesy for the Cuyahoga County Engineer. This section carries water from the east and is intersected by the diversion weir near the entry manhole. At the time of inspection there was little to no water flowing through this section of pipe. The pipe is in good condition, similar to the section under Interstate 77.

- There is minor seepage and efflorescence at the crown of the culvert. There were no conduits or pipes entering the culvert in this section. (See Photograph #12).

Comparison to Previous Report and Summary of Inspection

The conditions encountered with this inspection show little to no change in conditions from the 2010 inspection report, with the exception of the placement of a white mortar slurry coat applied to the 48 inch diameter pipe located at Station 97+00. The overall condition of both portions of the brick arch culverts remains good, with moderate to heavy efflorescence at several locations.

Conclusions and Recommendations

- Re-inspect the culvert at the normal maximum recommended interval of five (5) years and after a significant event such as flooding or other phenomenon that could affect the structural integrity of the culvert.
- Continue to monitor the deflection in the steel beam located at Station 0+12 and the large joint separation between stations 0+15 to 0+30.

Appendix A

Location Map

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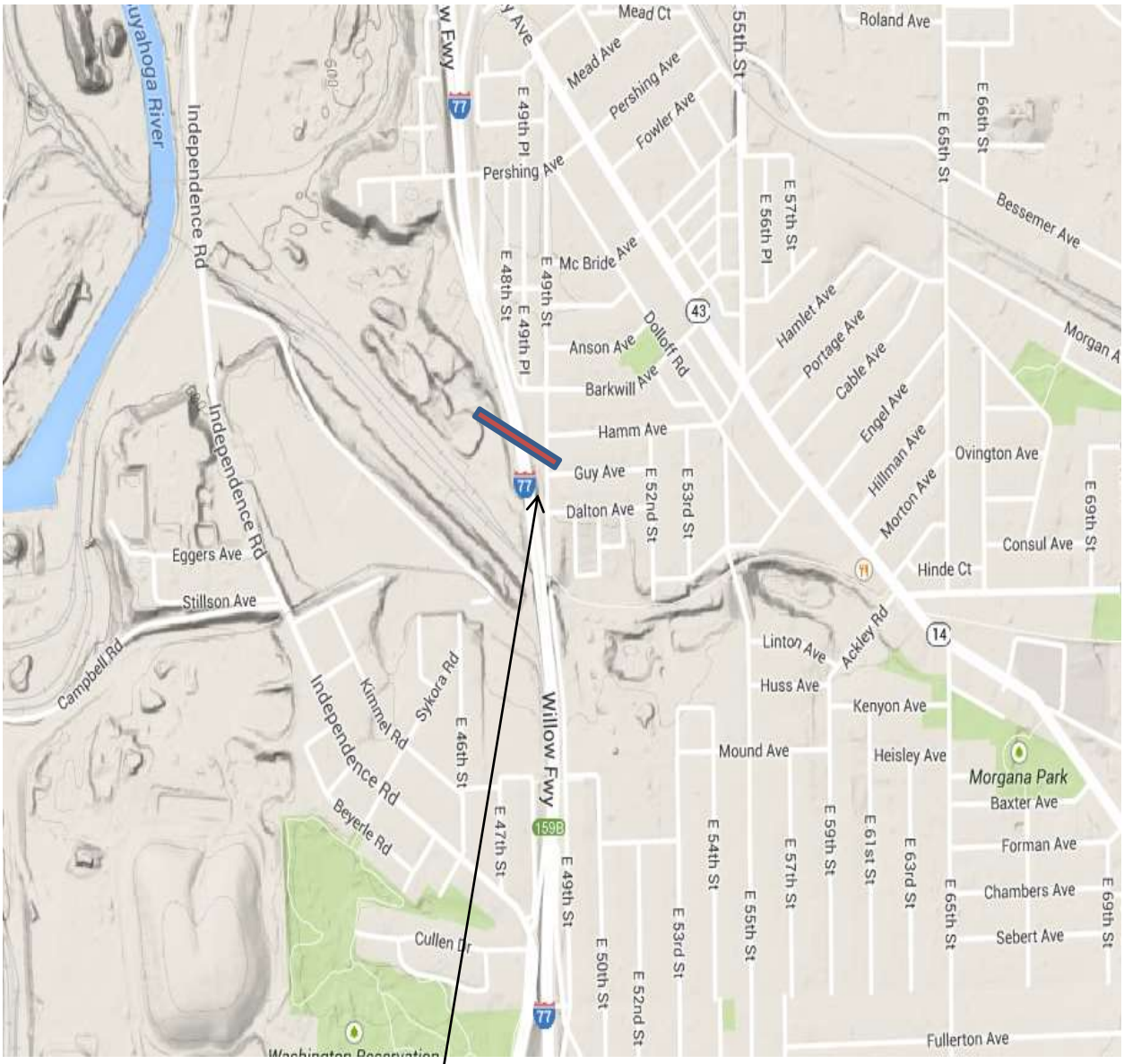
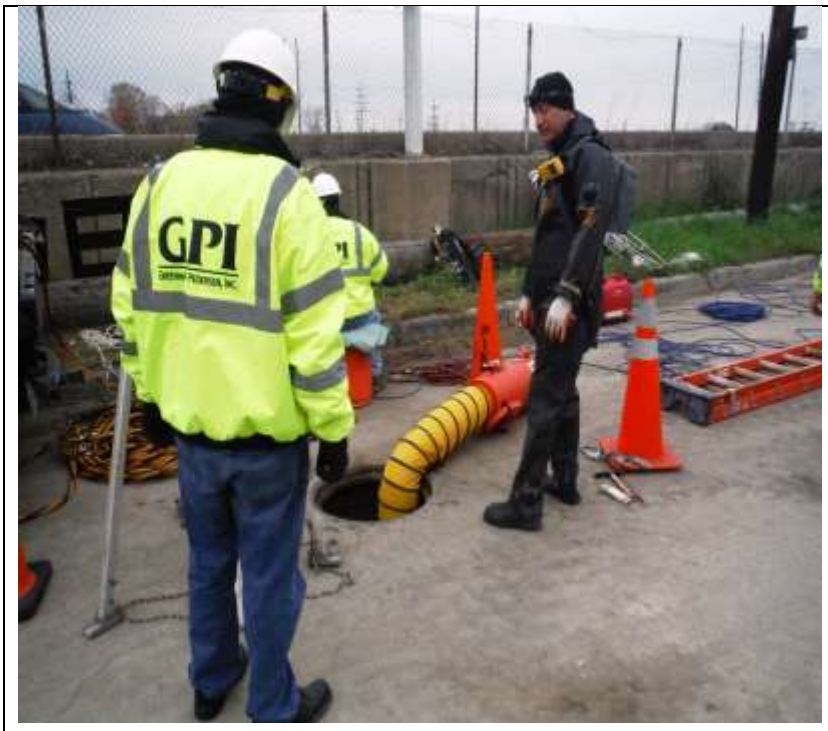

Cuyahoga River
Independence Rd
W Fwy
Mead Ct
Mead Ave
Pershing Ave
Fowler Ave
E 49th Pl
Pershing Ave
E 55th St
Roland Ave
E 66th St
E 65th St
Bessemer Ave
E 57th St
E 56th Pl
Mc Bride Ave
E 48th St
E 49th St
E 49th Pl
Anson Ave
Dalloff Rd
Barkwill Ave
Hamlet Ave
Portage Ave
Cable Ave
Engel Ave
Hillman Ave
Morton Ave
Morgan A
Hamm Ave
Guy Ave
Dalton Ave
E 52nd St
E 53rd St
Ovington Ave
E 69th St
Consul Ave
Hinde Ct
Eggers Ave
Stillson Ave
Campbell Rd
Linton Ave
Ackley Rd
Huss Ave
Kenyon Ave
Kimmel Rd
Sykora Rd
E 46th St
Willow Fwy
Mound Ave
Heisley Ave
Morgana Park
Baxter Ave
Beyerle Rd
E 47th St
E 49th St
E 54th St
E 59th St
E 61st St
E 63rd St
Forman Ave
Chambers Ave
E 65th St
E 69th St
Cullen Dr
E 50th St
E 53rd St
E 55th St
E 57th St
Sebert Ave
Fullerton Ave
CUY-77-1318

Appendix B

Photographs

	Photograph 1 Culvert Entrance through manhole on East 49th Street Safety Equipment in place.
	Photograph 2 View of entry manhole from East 49th Street. Note tether as manhole is over 65 feet deep. Station 0+00

	Photograph 3 Intercepting invert and weir. Sewer line running parallel with East 49th Street Station 0+05
	Photograph 4 Crack in Weir Wall Station 0+05

	Photograph 5 Steel Beam in Brick Arch Culvert Station 0+12
	Photograph 6 Steel Beam in Brick Arch Culvert Station 0+12

Photograph 7

Heavy Efflorescence and joint separation

Station 0+15 to 0+30

Photograph 8

Detailed View of Steel Beam and Brick Culvert interface.

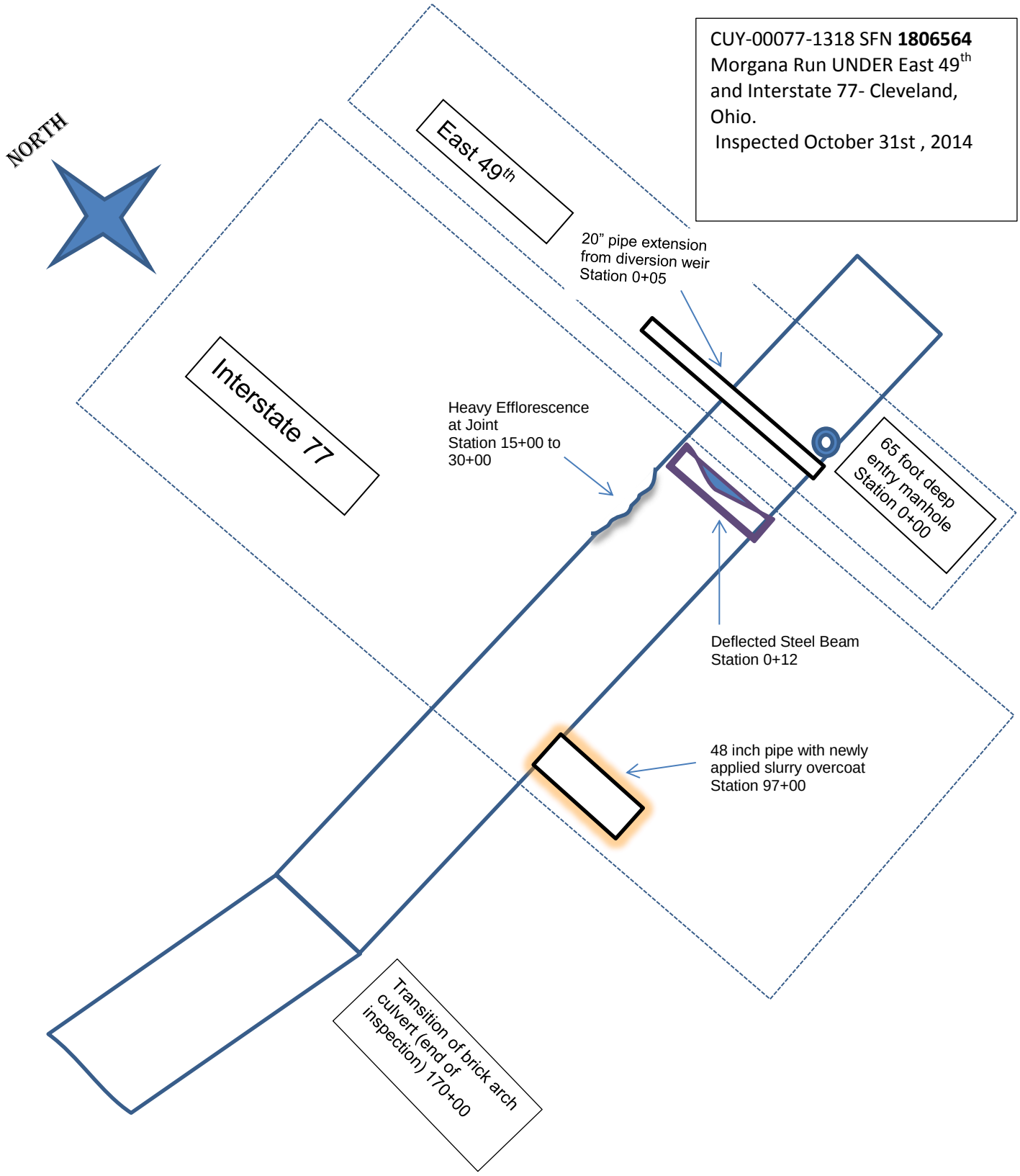
Station 0+12

	Photograph 9 Mortar Slurry Coated 48" Diameter Pipe Station 97+00
	Photograph 10 Mortar Slurry Coated 48" Diameter Pipe Station 97+00

	Photograph 11 Brick Culvert Under Interstate 77
	Photograph 12 Brick Culvert under East 49th Street.

Appendix C

CULVERT PLAN


CUY-00077-1318 SFN **1806564**
Morgana Run UNDER East 49th and Interstate 77- Cleveland, Ohio.
Inspected October 31st , 2014
NORTH
East 49th
Interstate 77
20" pipe extension from diversion weir Station 0+05
Heavy Efflorescence at Joint Station 15+00 to 30+00
65 foot deep entry manhole Station 0+00
Deflected Steel Beam Station 0+12
48 inch pipe with newly applied slurry overcoat Station 97+00
Transition of brick arch culvert (end of inspection) 170+00

Appendix D

Confined Space Permit

UESI Confined Space Entry Permit (PAGE 1 OF 2)

INSTRUCTIONS: No one will enter a confined space until permit is complete.

1) Complete before entry begins.
2) Post permit entrance to confined in the confined complete.
3) Send completed permit to safety officer for review within 24 hours of completion of work.

GENERAL INFORMATION:

JOBSITE:

Permit Begins: Date: 10/3/14 Time: 1000 AM PM Permit Expires: Date: 10/3/14 Time: 0001

Location & Description of confined space: CUY-77-1318, I-77 AND EAST 49TH ST. CLEVE

Purpose of entry: CULVERT CONDITION INSPECTION

INDIVIDUAL

AUTHORIZED PERSON IN CHARGE: JAMES HENRY

AUTHORIZED ATTENDANTS

1) JAMES HENRY
2) MARTIN LEE FR...
3) MICHAEL MANC...
4)

1)
2)
3)
4)

METHOD OF COMMUNICATION (i.e. voice, visual, voice/visual, (radio), etc.)

Describe: HARD WIRE COMMUNICATION

Hard Hats Yes (No)

RESPIRATORS REQUIRED FOR ENTRY

RESCUE EQUIPMENT REQUIRED

SCBA	Yes (No)
Harness/Lifeline	
Tripod/Man lift	
Winch	
First Aid Kit	
Stretcher	
OTHER:_____	

EMERGENCY SERVICES:

911
IDENTIFY SERVICE

CELL
Method Of Communication

11
Contact Number

ISOLATION REQUIREMENTS (Please Circle Appropriate Method, Check Yes or No, and Initial

Electrical: Disconnect - Lockout Tagged - Breakers Pulled – Other:	NONE	Yes ___ No ✓	Initials MLF
Other:		Yes ___ No ✓	Initials MLF
Other:		Yes ___ No ✓	Initials MLF
Other:		Yes ___ No ✓	Initials MLF
Other:		Yes ___ No ✓	Initials MLF
Other:		Yes ___ No ✓	Initials MLF
Other:		Yes ___ No ✓	Initials MLF
Other:			
Other:			

Underwater Engineering Services, Inc.

SAFETY PROGRAM			

UESI Confined Space Entry Permit (PAG 2 OF 2)

ACCEPTABLE ENTRY CONDITIONS

Oxygen: to 23.5%	Flammable/Combu %	LEL (NONE
Hydrogen Sulfide:	Carbon Monoxid	PPM Other: NONE

(Normal Ranges: Oxygen: 19.5 % to 23.5 %, Flammable: 10 %, Hydrogen Sulfide: 10 PPM, (oxide: PPM)

TESTING AND MONITORING CHECKLIST

Make, Model & Serial # of T ipment: IS RVT ... 1316 ...13 0C

Date Equipment Calibrated: 08/14 | Intermitte ng: 0C ... | Continuous Monitoring

Date:	10314								
Time:	0600 AP	0620 AP	A/P	A/P	A/P				A/P
Oxygen:	20.9 %	20.9 %	%	%	%				%
LEL:	0 %	0 %	%	%	%				%
CO:	0 PP	0 PPM	PPM	PPM	PPM				PPM
H2S:	0 PPM	0 PPM	PPM	PPM	PPM				PPM
Toxic:									
Tested By:	MLF								

CONFINED SPACE HAZARDS CHECKLIST (Please Check Yes No)

			If Yes, How Is Hazard Controlled
(... 3%)			
Oxygen E .5%)			
To: nosphere			
mmable/Combustible Atmosphere			
Electrical			
Mechanical			
E pment			
Pipelines			
Bacteria/Infectio			
Insects/Rodents			
Temperature			
Falls			
Other			

MLF

HOT WORK PERMIT

Is A Hot Work Permit Required? Yes (No) If Yes, Is It Attached To This Permit? Yes No

SIGNATURE OF ATTENDANTS AND ENTRANTS

confined space k and its safety aspects have been explained to us, and we have read and understand the above permit. We consider it safe to proceed with the space entry (Please sign, date, and initial below).

ATTENDANTS	Date:	Initials:	ENTRANTS	Date:	Initials:
1)			1)		
2)	Date: 10314	Initials: MLF	2)	Date: 10314	Initials:
3)	Date: 10314	Initials:	3)	Date: 10314	Initial:
4)	Date:	Initials:	4)	Date:	Initial

ON AUTHORIZING ENTRY

Signature: Date: 10/31/14 Time: 12:45 AM/ PM

CANCELLATION OF PERMIT

Cancelled by (Signature): Date Cancelled: Time Cancelled: AM PM

Reason Permit Was Cancelled:

Engineer