

Force Main and ARV Condition Assessment Report and Remedial Measures Plan

**CONSENT DECREE
DOJ No. 90-5-1-1-09767**

**The United States Environmental Protection Agency
And
Texas Commission on Environmental Quality**



Tyler Water Utilities

October 2018



PIPELINE ANALYSIS^{LLC}
WASTEWATER COLLECTION SYSTEM ENGINEERS

CITY OF TYLER
CONSENT DECREE, DOJ No. 90-5-1-1-09767

Force Main Assessment and Remedial Measures Program Report
October 2018

Enclosed is the City of Tyler Force Main Assessment and Remedial Measures Program Report. The report structure follows the requirements listed in Section V. COMPLIANCE REQUIREMENTS, Sub-part F. Force Main Assessment and Remedial Measures Program of *United States et. al v. City of Tyler* Consent Decree.

CERTIFICATION:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering such information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including possibility of fine and imprisonment for knowing violations.

Scott Taylor, P.E.
Managing Director of Utilities and Public Works

Date

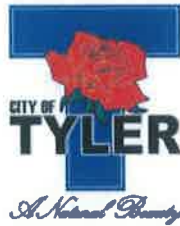
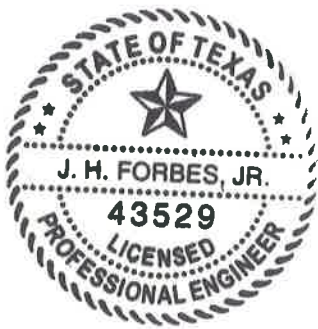
CITY OF TYLER

Force Main and ARV

Condition Assessment Report and Improvement Plan

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October 2018

 9-24-18

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1. Executive Summary

The City of Tyler, Texas has approximately 94,360 linear feet of force main piping and 13 air release valves (ARVs) currently in service. Force mains convey wastewater under pressure where gravity flow is not possible. Three percent (3%) of the City's wastewater system piping is represented by force mains and they are considered some of the most critical pipes in the system. Force mains sometimes consist of ferrous materials that are less commonly used in gravity sewer systems. Ferrous materials are susceptible to both internal corrosion from the wastewater flow and hydrogen sulfide gases, as well as external corrosion due to the environment in which the pipe is buried. Even for force mains that consist of a non-ferrous pipe material, metal fittings and valves are typically installed along the pipe length, which are at a higher risk of failure over time. The design for force mains often includes ARVs installed at high points and abrupt slope changes along the force main. ARVs are susceptible to failure due to corrosion, buildup of grease and debris, improper installation, inadequate maintenance, or inadequate working space in the ARV manhole vaults.

The purpose of this report is to perform a condition assessment of all force mains and air release valves in the City of Tyler and provide a Force Main and ARV Improvement Plan that would recommend improvements/remedial measures necessary for the force mains and air release valves.

Pipeline Analysis LLC staff conducted field inspections of the force mains and ARVs in the City of Tyler's wastewater collection system between December 11, 2017 and February 27, 2018. The on-field inspections enabled the staff to verify plans and GIS data and confirm the location of force mains and valves. All deviations from available plans were noted and updated GIS coordinates were recorded for all assets inspected.

Twenty-four (24) force mains were inspected in field. Most force mains were found to be in good condition. Twenty-seven (27) ARVs were identified from plans and GIS database. Six (6) additional ARVs which were not mentioned in the plans were also located in the field. However, out of the ARVs mentioned in the plans, only thirteen (13) ARVs could be field located. These ARVs were inspected and it was observed that a number of the ARVs were made of ductile iron and were in poor condition due to corrosion. As a result, seven (7) ARVs were identified to be in need of replacement. It was also identified that the ARV vaults were in poor condition for ARVs on the Pilot Truck force main. The vaults were undersized with no access for operations and maintenance. The Crossing force main ARV manhole was surcharged at the time of inspection and had to be dewatered in order for the ARV to be inspected.

Based on the condition assessment, recommendations for improvements have been provided as a part of the scope of this report. A summary of the Force Main and ARV Improvement Plan is provided in **Table 1-1**.

The preliminary opinion of probable construction cost for the implementation of the Force Main & ARV Improvement Plan presented in **Table 1-1** was estimated to be \$220,188.

Table 1-1: Summary of Force Main and ARV Improvement Plan

FORCE MAIN IMPROVEMENT PLAN	Total Cost
Nottingham Lane Force Main	\$ 61,100
Total Construction Cost	\$ 61,100
Engineering and Administrative Services (25%) =	\$ 15,275
Total Project Cost for Force Main Improvement Plan	\$ 76,375

ARV IMPROVEMENT PLAN	Total Cost
Bellwood Force Main ARV 1222	\$ 14,300
Nottingham Lane Force Main ARV 1350	\$ 12,350
Pilot Truck Force Main ARV 1260	\$ 17,550
Pilot Truck Force Main ARV 1291	\$ 17,550
Rustic Park Force Main ARV 1310	\$ 12,350
Crossing Force Main ARV 1300	\$ 22,750
Shackleford Creek ARV 1230	\$ 14,950
Prevention of Inflow into ARV manholes	\$ 3,250
Total Construction Cost	\$ 115,050
Engineering and Administrative Services (25%) =	\$ 28,763
Total Project Cost for ARV Improvement Plan	\$ 143,813

TOTAL PROJECT COST FOR FORCE MAIN AND ARV	\$ 220,188
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2. Introduction

The City of Tyler covers an area of almost fifty three (53) square miles and has a population of over 104,000 (2016). The Tyler Water Utility (TWU) owns and maintains a wastewater system for over 30,000 customers. The wastewater system comprises of two wastewater treatment plants (WWTP) - The Southside Wastewater Treatment Plant and the Westside Wastewater Treatment Plant. The wastewater collection system further consists of twenty four (24) lift stations and over three (3) million linear feet of wastewater collection lines. Of these wastewater collection lines, 94,360 linear feet are wastewater force mains (FM), which convey wastewater under pressure and represent approximately 3% of wastewater collection pipelines. They are considered some of the most critical pipes in the system. The design of these force mains includes air release valves (ARVs) strategically placed at different locations in the wastewater collection system.

Due to the topographical conditions in Tyler, cost implications and practical difficulties in laying deep sewer lines, gravity flow is not available in many areas. Force mains are used in such locations to lift wastewater from low to high elevations. Existing force mains consist of various materials such as asbestos cement (AC), ductile iron (DI), polyvinyl chloride (PVC) and high density polyethylene (HDPE). The older force mains in the City are generally made of ferrous materials which creates susceptibility to both internal corrosion from the wastewater flows as well as hydrogen sulfide gases and external corrosion due to the environment in which the pipe is buried in. Although several force mains in newer sections of the City are made of PVC to avoid issues related to corrosion, the fittings along these force mains are often made of ductile iron, which is also susceptible to corrosion and could become a concern in the future if not adequately protected.

The design of force mains often includes ARVs installed at high points and abrupt slope changes along the force main. ARVs are susceptible to failure due to corrosion, buildup of grease and debris, improper installation, inadequate maintenance, or inadequate working space in the ARV manhole vaults. These ARVs are often a high risk failure point due to them being mechanical and being subjected to corrosion. Regular force main & ARV inspections are needed to ensure proper functionality and so that any foreseeable maintenance issues may be promptly addressed.

2.1 Purpose and Scope

The purpose of this report is to present the findings of the condition assessment for force mains and ARVs in the City of Tyler's wastewater collection system. The field inspections were conducted by Pipeline Analysis LLC, between December 11, 2017 and February 27, 2018. Based on the inspections and input from TWU staff the following information is presented for the force mains and ARVs:

- Construction material
- Known/Estimated Installation Date
- Diameter
- Length
- Special Corrosion Protection Measures, if any
- Average Daily Dry Weather Flow Rate

- Peak Flow Rate at Maximum Lift Station Discharge Capacity
- Redundant or stand-by Force Mains, if any
- Carrying Capacity and Typical Operating Mode for Redundant Force Mains

This report identifies defects based on the results of the condition assessment and provides a Force Main and ARV Improvement Plan. The Force Main and ARV Improvement Plan consists of recommendations to fix identified defects in the force mains and ARVs. Each recommendation is presented along with an estimated cost for improvement and anticipated schedule for completion.

2.2 Methodology

The field inspection of the force mains and ARVs associated with each lift station in Tyler was carried out between December 11, 2017 and February 27, 2018 by Pipeline Analysis LLC staff. Prior to the field inspection, a condition assessment form was developed for the force main and ARVs to guide the assessment and ensure uniformity in presenting results. **Appendix B** shows the sample condition assessment form used for assessing the force mains and ARVs.

For the condition assessment, a list of ARVs in the system and maps of the force main locations was provided by TWU staff. An above ground assessment of each force main was conducted to document any observed or suspected force main defects. Pipeline Analysis staff walked the length of each force main to observe any defects, exposed pipes, moist ground, caved surfaces, etc. Each defect identified was documented and photographed. Each ARV was located in the field and GPS coordinates were recorded. The ARV was then assessed for any defects and observations were noted and photographed. The GIS coordinates of the force mains lift stations and discharge manholes, ARVs and check valves assessed has been provided in **Table 2-1**.

In addition to field inspections, pump performance tests and lift station wet well level surveys were conducted at each lift station. These results and hydraulic calculations were used to calculate the approximate average daily dry weather flow rate and peak flow rate at maximum lift station discharge capacity for each force main. The calculated values for average flow and peak flow obtained are intended to be updated using the wastewater collection system hydraulic model for the City of Tyler. The flows for the force mains have been calculated and presented in **Table 3-1**.

Table 2-1: Force Main, ARV and Check Valve Locations

Force Mains						
Item	Lift Station	Discharge Manhole	LS Longitude	LS Latitude	Discharge Longitude	Discharge Latitude
1	Animal Shelter	SSMHT0005904	-95.25868635	32.35674855	-95.26719457	32.35246301
2	Bellwood	SSMHT0000923	-95.36088439	32.32830587	-95.37013674	32.33038015
3	Brooks	Shackleford Wet Well	-95.29853784	32.23659368	-95.29367913	32.25268077
4	Charleston	SSMHT0006562	-95.24605666	32.32191925	-95.25137825	32.32285797
5	CR 46 New Harmony	SSMHT0000153	-95.42909328	32.41251067	-95.42010491	32.41124224
6	Crossing	SSMHT0007622	-95.34858277	32.26449912	-95.34310903	32.27081001
7	Dixie	SSMHT0001289	-95.36621143	32.35370904	-95.3653146	32.3503429
8	East Grande	SSMHT0006978	-95.24945298	32.27544251	-95.26145995	32.28760825
9	Faulkner	SSMHT0007420	-95.31820501	32.25229115	-95.3180565	32.25632187
10	Gilley Creek	SSMHT0007667	-95.2393482	32.29570519	-95.25426724	32.28928797
11	Greenbriar	SSMHT0003146	-95.37864819	32.32272802	-95.37622259	32.35088651
12	Highway 31 West	SSMHT0000491	-95.39967791	32.32998635	-95.38933801	32.33137721
13	Hamptons	SSMHT0007784	-95.23186864	32.30082306	-95.23135701	32.29780709
14	Haverhill	SSMHT0006438	-95.24780165	32.32797642	-95.25499826	32.33286093
15	Hogan	SSMHT0007612	-95.35850798	32.31495223	-95.3560322	32.31904087
16	Highway 69 North	SSMHT0000214	-95.37668926	32.45117634	-95.3811661	32.44780302
17	Nottingham	SSMHT0006438	-95.24484085	32.33467142	-95.25499826	32.33286093
18	Oak Creek	SSMHT0007876	-95.35180315	32.25263095	-95.33311949	32.25552575
19	Pilot Truck	SSMHT0007280	-95.2825738	32.44346262	-95.27886722	32.41108109
20	Rustic Park	SSMHT0005664	-95.26858137	32.37980238	-95.27447549	32.37711594
21	Shoreline	SSMHT0007197	-95.36654809	32.32541464	-95.3712056	32.32598666
22	Shackleford Creek	SSMHT0007416	-95.29367913	32.25268077	-95.31448363	32.25636635
23	Stewart	SSMHT0007630	-95.36297662	32.31721642	-95.36086999	32.3197726
24	University Park	SSMHT0007589	-95.24350114	32.31817134	-95.24465088	32.31372906

Air Release Valves (ARVs)				
Item	Lift Station Force Main	ARV ID	Longitude	Latitude
1	Bellwood	1221	-95.36159181	32.32889751
2	Bellwood	1222	-95.36272305	32.33266647
3	Shackleford	1230	-95.30610607	32.25659622
4	Shackleford	1231	-95.30608803	32.25659665
5	Pilot Truck	1260	-95.28004441	32.42159757
6	Pilot Truck	1291	-95.2824034	32.44013004
7	Crossing	1300	-95.34536463	32.26580631
8	Rustic Park	1310	-95.26856528	32.37904581
9	Nottingham Lane	1350	-95.24765725	32.33446046
10	East Grande	2020	-95.24961185	32.27668751
11	Highway 31 West	2050	-95.39355627	32.33112183
12	Highway 31 West	2060	-95.39224042	32.33119068
13	Oak Creek	1330A	-95.3472385	32.25373621

Check Valve				
Item	Lift Station Force Main	ARV ID	Longitude	Latitude
1	Pilot Truck	1271A	-95.28036263	32.42631878

3. Force Main and ARV Condition Assessment

3.1 Introduction

The EPA Consent Decree requires the following information for all force mains in the wastewater collection system.

- Construction material
- Known/Estimated Installation Date
- Diameter
- Length
- Special Corrosion Protection Measures, if any
- Average Daily Dry Weather Flow Rate
- Peak Flow Rate at Maximum Lift Station Discharge Capacity
- Redundant or stand-by Force Mains, if any
- Carrying Capacity and Typical Operating Mode for Redundant Force Mains

This information was obtained from multiple sources including construction plans, GIS data, field inspections, pump performance tests and hydraulic calculations. No redundant force mains are present in the system. The required information for the twenty four (24) force mains is summarized below in **Table 3-1**. The average daily dry weather flow rate and the peak flow rate at maximum lift station discharge capacity are estimated based on hydraulic calculations and will be updated upon the completion of the City of Tyler Wastewater Collection System Hydraulic Model.

Table 3-1: Force Main Inventory

Item	Force Main	Discharge Manhole	Length of Force Main (LF)	Diameter of Force Main (inch)	Material	Estimated Time of Installation	Average Daily Dry Weather Flow Rate (GPM)	Peak Flow Rate at Max. LS Discharge Capacity (GPM)
WEST BASIN								
1	Animal Shelter	SSMHT0005904	3657	3	PVC	2001	40	41
2	Bellwood	SSMHT0000923	5479	6	PVC	1979	276	341
3	CR 46 New Harmony	SSMHT0000153	1725	18	PVC	2013	2683	3636
4	Dixie	SSMHT0001289	1577	4	DI at Lift Station & PVC at Discharge MH	1987	40	77
5	Greenbriar	SSMHT0003146	10393	24	AC	1979	854	1170
6	Haverhill	SSMHT0006438	3021	4	PVC	1984	399	796
7	Highway 31	SSMHT0000491	2960	6	Steel (DIP)	2016	278	303
8	Highway 69N	SSMHT0000214	1974	8	PVC	2013	250	507
9	Hogan	SSMHT0007612	1937	6	DI at Lift Station & PVC at Discharge MH	2007	151	242
10	Nottingham Lane	SSMHT0006438	3601	4	PVC	2009	161	306
11	Pilot Truck	SSMHT0007280	12055	6	Steel	2009	221	259
12	Rustic Park	SSMHT0005664	2692	4	PVC	2005	149	168
13	Shoreline	SSMHT0007197	1526	4	VCP	2005	177	221
14	Stewart	SSMHT0007630	1551	4	PVC	2005	114	116
15	University Park	SSMHT0007589	2037	6	PVC		134	153
SOUTH BASIN								
16	Brooks	Shackleford Wet Well	5267	12	PVC	1987	803	1251
17	Charleston	SSMHT0006562	2555	6	PVC	2000	184	194
18	Crossing	SSMHT0007622	3714	6	PVC	2005	317	628
19	East Grande	SSMHT0006978	3273	6	PVC	2015	576	648
20	Faulkner	SSMHT0007420	1497	4	PVC	2002	11	11
21	Gilley Creek	SSMHT0007667	4552	18	AC	1974	1677	2345
22	Hamptons	SSMHT0007784	1151	6	PVC	2008	180	358
23	Oak Creek	SSMHT0007876	6683	8	PVC	2016	470	1250
24	Shackleford Creek	SSMHT0007416	9480	8	VCP	1987	487	600

Notes:

1. The flow rates for the new Oak Creek force main have been obtained from the Oak Creek Lift Station Engineering Design Report
2. Average daily dry weather flow and peak flow rate at maximum lift station discharge capacity have been determined by using pump performance testing data and hydraulic calculations. These values will be updated upon the completion of the City of Tyler Wastewater Hydraulic Model.

3.2 Field Condition Assessment Findings

Pipeline Analysis LLC, staff conducted a field inspection of the force mains and ARVs in the City of Tyler's wastewater collection system. The inspections were conducted between December 11, 2017 and February 27, 2018 and included an above ground visual inspection of the entire length of the force main along with inspections of ARV vaults and discharge manholes. Out of the twenty four (24) force mains assessed, most were found to be in good condition. Twenty seven (27) ARVs were identified from plans and GIS database. Six (6) additional ARVs which were not mentioned in the plans were also located in the field. However, out of the ARVs mentioned in the plans, only thirteen (13) ARVs could be field located. Those ARVs that could not be located with metal detectors are assumed to not exist. The following observations and defects were identified for the force mains and ARVs that could be field located and inspected:

- **Bellwood Force Main:** Two additional ARVs were located in the field which were not a part of the original plans. Both ARVs were located at 10632 CR 1138. ARV 1222 was found to be in poor condition and did not release air when operated.
- **Nottingham Lane Force Main:** A section of the force main is exposed at a creek crossing approximately 100 feet west of CR 274 due to surface erosion. No surface defects were noted during the assessment. Minor corrosion was observed on ARV 1350 and the valve did not operate freely.
- **Pilot Truck Force Main:** The force main showed no visible defects. Two (2) new ARVs were located at approximately 1220 feet (ARV 1291) and 6368 feet (ARV 1271A) south of the Pilot Truck lift station. ARV 1260 was also located and found to be in critical condition due to corrosion.
- **Rustic Park Force Main:** ARV 1310 was found to be in poor condition and could not be operated. No defects were noted along the length of the force main.
- **Crossing Force Main:** ARV 1300 was located and it was observed that the ARV vault was full of water. The ARV did not release air when operated.
- **Faulkner Force Main:** The construction plans for the force main indicate a 2-inch PVC force main. However, at the discharge manhole, it was observed that the force main was a 4-inch cast iron/ ductile iron pipe.
- **Oak Creek Force Main:** A new ARV was located at the crossing of Cumberland and Old Jackville Highway. However, no valves were observed on the ARV.
- **Shackleford Force Main:** A new ARV was located at 205 Cumberland Road. On inspection of ARV 1230 and ARV 1231, minor corrosion was observed and no air was released when ARV 1230 was operated.

Table 3-2 and **Table 3-3** summarize the defects identified in the force mains and ARVs during the condition assessment respectively. In addition, **Appendix A** presents the following information for each force main:

- Location map showing length of force main and location of ARVs
- Lift Station Location Photograph
- Force Main Inspection Form
- ARV Inspection Form (if applicable)
- Manhole Inspection Form (if applicable)
- Photographs Documenting Observations and Defects (if applicable)
- Hydraulic calculations for Average Daily Dry Weather Flow and Flow Rate Peak Flow Rate at Maximum Lift Station Discharge Capacity.

Table 3-2: Force Main Condition Assessment Summary

FORCE MAINS			
Item	Lift Station	Discharge Manhole	Condition
West Basin			
1	Animal Shelter	SSMHT0005904	No defects
2	Bellwood	SSMHT0000923	No defects
3	CR 46 New Harmony	SSMHT0000153	No defects
4	Dixie	SSMHT0001289	No defects
5	Greenbriar	SSMHT0003146	No defects
6	Haverhill	SSMHT0006438	No defects
7	Highway 31 West	SSMHT0000491	No defects
8	Highway 69 North	SSMHT0000214	No defects
9	Hogan	SSMHT0007612	No defects
10	Nottingham Lane	SSMHT0006438	Exposed Force Main
11	Pilot Truck	SSMHT0007280	No defects
12	Rustic Park	SSMHT0005664	No defects
13	Shoreline	SSMHT0007197	No defects
14	Stewart	SSMHT0007630	No defects
15	University Park	SSMHT0007589	No defects
South Basin			
16	Brooks	Shackleford Wet Well	No defects
17	Charleston	SSMHT0006562	No defects
18	Crossing	SSMHT0007622	No defects
19	East Grande	SSMHT0006978	No defects
20	Faulkner	SSMHT0007420	No defects
21	Gilley Creek	SSMHT0007667	No defects
22	Hamptons	SSMHT0007784	No defects
23	Oak Creek	SSMHT0007876	No defects
24	Shackleford Creek	SSMHT0007416	No defects

Table 3-3: ARV Condition Assessment Summary

AIR RELEASE VALVES (ARV)				
Item	Lift Station Force Main	ARV ID	Condition	Comments
West Basin				
1	Bellwood	1221	Good Condition	Install Inflow Dish
2	Bellwood	1222	Poor	Replace ARV. Replace MH ring, cover and concrete collar. Install Inflow Dish.
3	CR 46 New Harmony	1020		Could not be located with metal detector
4	Greenbriar	1030		Could not be located with metal detector
5	Highway 31 West	2050	Fair Condition	Install Inflow Dish on ARV manhole
6	Highway 31 West	2060	Fair Condition	Install Inflow Dish on ARV manhole
7	Highway 31 West	2040		Could not be located with metal detector
8	Nottingham Lane	1350	Poor	Replace ARV. Install Inflow Dish on ARV manhole.
9	Nottingham Lane	1040		Could not be located with metal detector
10	Pilot Truck	1260	Critical	Replace ARV and ARV Vault
11	Pilot Truck	1291	Poor	Replace ARV and ARV Vault
12	Pilot Truck	1270		Could not be located with metal detector
13	Pilot Truck	180		Could not be located with metal detector
14	Rustic Park	1310	Poor	Replace ARV. Install Inflow Dish on ARV manhole.
15	Rustic Park	1340		Could not be located with metal detector
16	University Park	1050		Could not be located with metal detector
South Basin				
17	Crossing	1300	Poor	Replace ARV and address surcharged vault. Replace manhole ring and cover.
18	East Grande	2020	Good Condition	Install Inflow Dish on ARV manhole
19	East Grande	2010		Could not be located with metal detector
20	East Grande	2030		Could not be located with metal detector
21	Oak Creek	1330A	Good Condition	Install Inflow Dish on ARV manhole
22	Oak Creek	1320		Could not be located with metal detector
23	Oak Creek	1330		Could not be located with metal detector
24	Shackleford Creek	1230	Poor	Replace ARV. Install Inflow Dish on ARV manhole.
25	Shackleford Creek	1231	Fair Condition	Install Inflow Dish.
26	Shackleford Creek	1200		Could not be located with metal detector
27	Shackleford Creek	1231		Could not be located with metal detector
CHECK VALVES				
Item	Lift Station Force Main	Valve ID	Condition	Comments
1	Pilot Truck	1271A	Good Condition	

4. Force Main and ARV Improvement Plan

The condition assessment of the force mains and ARVs in Tyler was performed and the findings of the assessment are presented in Section 3. Based on the results of the assessment and input from TWU staff, a list of improvements was developed for each force main. While most force mains and ARVs were found to be in good condition, the following improvements are recommended for the defects identified on some force mains and ARVs:

- **Nottingham Lane Force Main:** A section of the force main is exposed at a creek crossing approximately 100 feet west of CR 274 due to surface erosion. While no surface defects were noted, in order to avoid the potential for future structural damage to the force main, it is recommended that the site be addressed to protect the force main from future erosion. It is also recommended to encase the 4-inch PVC pipe in a casing to prevent any structural damage to the pipe.
- The following ARVs were identified to be in poor/critical condition and are recommended to be replaced. The ARVs listed below showed signs of corrosion. It is recommended to replace the ARVs with corrosion resistant nylon coated or 316 stainless steel ARVs. Example specifications for the recommended ARV have been included in **APPENDIX C** of the report.
 - ARV 1222 on Bellwood force main
 - ARV 1350 on Nottingham Lane force main
 - ARV 1260 and ARV vault on Pilot Truck force main
 - ARV 1291 and ARV vault on Pilot Truck Force Main
 - ARV 1310 on Rustic Park force main
 - ARV 1300 on Crossing force main
 - ARV 1230 on Shackleford Creek force main

These recommendations are presented in the Force Main Improvement Plan in **Table 4-1** and the ARV Improvement Plan in **Table 4-2**. Each recommended improvement is presented with an associated cost. These cost estimates were developed using cost information from similar previous projects and budget level quotes from vendors. The costs presented include both cost of material and labor and are based on 2018 dollars. A 30% contingency is included while calculating the cost for each individual force main and ARV to account for allowances for unidentified project elements and increase in market prices over time.

All recommended improvements listed under the Force Main and ARV Improvement Plan are to be completed within three (3) years of the effective date of the Consent Decree (April 10, 2017). The Annual Report to EPA/TCEQ will summarize the status of these projects.

Table 4-1: Force Main Improvement Plan

RECOMMENDED IMPROVEMENTS FOR FORCE MAINS					
RECOMMENDED IMPROVEMENTS FOR NOTTINGHAM LANE FORCE MAIN					
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	\$ 3,000	\$ 3,000
2	Horizontal Directional Drill or Bore 8" Steel Casing	100	LF	\$ 150	\$ 15,000
3	Dewatering by Well Pointing (for boring)	1	LS	\$ 10,000	\$ 10,000
4	Remove Existing 4" PVC at Aerial Crossing	100	LF	\$ 40	\$ 4,000
5	Stabilize Site with Fill and Erosion Protection for Removal of Existing Pipe	50	CY	\$ 100	\$ 5,000
6	Install 4" PVC Pipe in 8" Casing	100	LF	\$ 40	\$ 4,000
7	Reconnect to Existing Force Main	2	EA	\$ 1,500	\$ 3,000
8	Site Cleanup	1	LS	\$ 3,000	\$ 3,000
CONSTRUCTION COST					\$ 47,000
CONTINGENCY (30%)					\$ 14,100
TOTAL COST					\$ 61,100

ESTIMATED TOTAL CONSTRUCTION COST FOR FORCE MAIN IMPROVEMENTS=	\$ 61,100
<i>Engineering and Administrative Services (25%) =</i>	\$ 15,275
TOTAL PROJECT COST FOR FORCE MAIN IMPROVEMENTS =	\$ 76,375

Table 4-2: ARV Improvement Plan

RECOMMENDED IMPROVEMENTS FOR AIR RELEASE VALVES					
RECOMMENDED IMPROVEMENTS FOR BELLWOOD ARV 1222					
ITEM	DEFECT	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	\$ 2,500	\$ 2,500
2	Excavate Manhole Bottom to Access Force Main	1	LS	\$ 1,000	\$ 1,000
3	Install 2" Reinforced Nylon/316 SS ARV Assembly Including Valves, Fittings, Appurtenances and Saddle	1	LS	\$ 6,000	\$ 6,000
4	Replace Manhole Ring, Cover and Concrete Collar	1	LS	\$ 1,500.00	\$ 1,500
CONSTRUCTION COST					\$ 11,000
CONTINGENCY (30%)					\$ 3,300
TOTAL COST					\$ 14,300
RECOMMENDED IMPROVEMENTS FOR NOTTINGHAM LANE ARV 1350					
ITEM	DEFECT	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	\$ 2,500	\$ 2,500
2	Excavate Manhole Bottom to Access Force Main	1	LS	\$ 1,000	\$ 1,000
3	Install 2" Reinforced Nylon/316 SS ARV Assembly Including Valves, Fittings, Appurtenances and Saddle	1	LS	\$ 6,000	\$ 6,000
CONSTRUCTION COST					\$ 9,500
CONTINGENCY (30%)					\$ 2,850
TOTAL COST					\$ 12,350
RECOMMENDED IMPROVEMENTS FOR PILOT ARV 1260					
ITEM	DEFECT	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	\$ 2,500	\$ 2,500
2	Replace Existing ARV Vault with New Manhole to Provide Access for O&M	1	LS	\$ 5,000	\$ 5,000
3	Install 2" Reinforced Nylon/316 SS ARV Assembly Including Valves, Fittings, Appurtenances and Saddle	1	LS	\$ 6,000	\$ 6,000
CONSTRUCTION COST					\$ 13,500
CONTINGENCY (30%)					\$ 4,050
TOTAL COST					\$ 17,550
RECOMMENDED IMPROVEMENTS FOR PILOT ARV 1291					
ITEM	DEFECT	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	\$ 2,500	\$ 2,500
2	Remove and Replace Existing ARV Vault with New Manhole to Provide Access for O&M	1	LS	\$ 5,000	\$ 5,000
3	Install 2" Reinforced Nylon/316 SS ARV Assembly Including Valves, Fittings, Appurtenances and Saddle	1	LS	\$ 6,000	\$ 6,000
CONSTRUCTION COST					\$ 13,500
CONTINGENCY (30%)					\$ 4,050
TOTAL COST					\$ 17,550

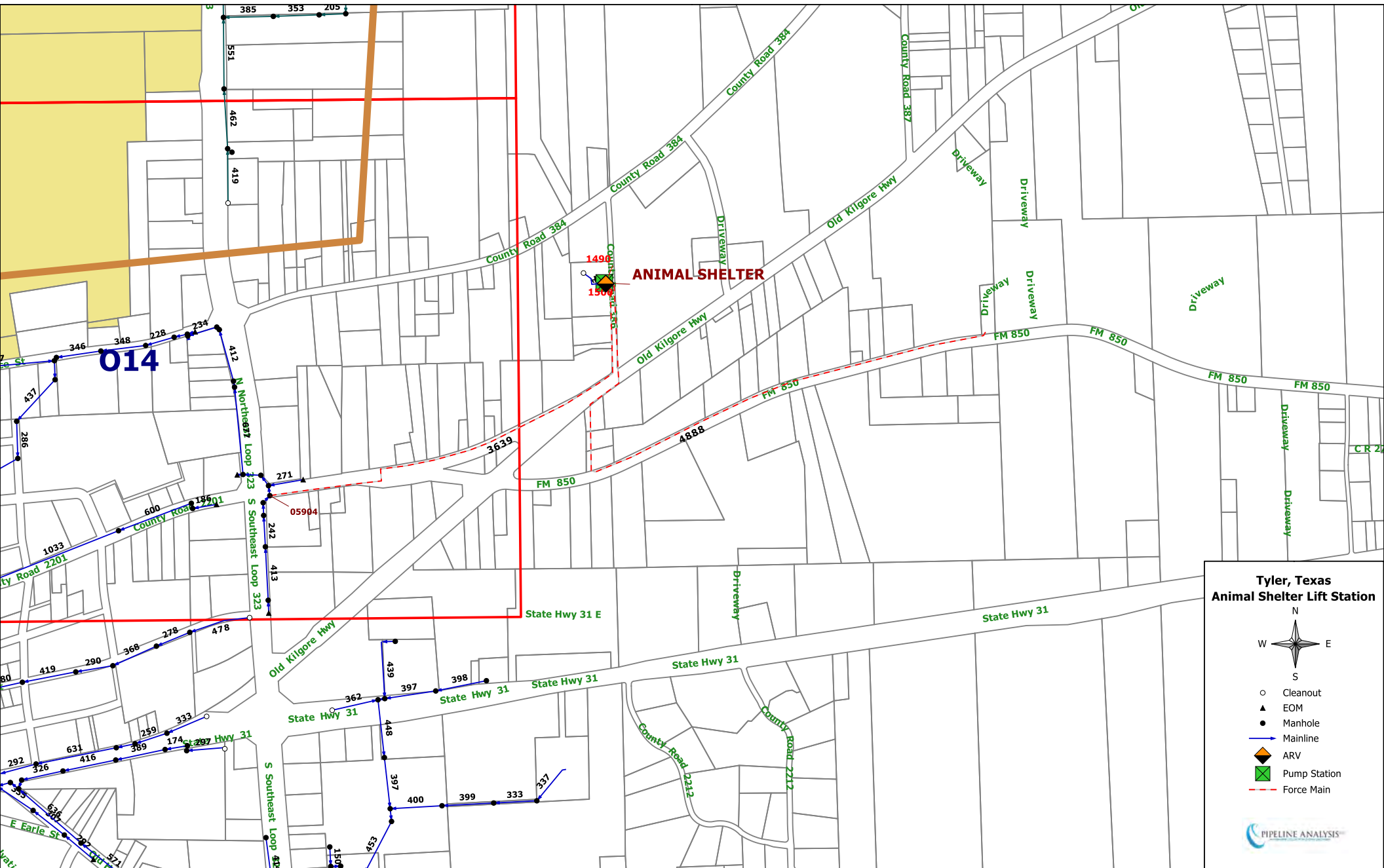
Table 4-2: ARV Improvement Plan

RECOMMENDED IMPROVEMENTS FOR RUSTIC PARK ARV 1310					
ITEM	DEFECT	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	\$ 2,500	\$ 2,500
2	Excavate Manhole Bottom to Access Force Main	1	LS	\$ 1,000	\$ 1,000
3	Install 2" Reinforced Nylon/316 SS ARV Assembly Including Valves, Fittings, Appurtenances and Saddle	1	LS	\$ 6,000	\$ 6,000
CONSTRUCTION COST				\$	9,500
CONTINGENCY (30%)				\$	2,850
TOTAL COST				\$	12,350
RECOMMENDED IMPROVEMENTS FOR CROSSING ARV 1300					
ITEM	DEFECT	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	\$ 2,500	\$ 2,500
2	Install 2" Reinforced Nylon/316 SS ARV Assembly Including Valves, Fittings, Appurtenances and Saddle	1	LS	\$ 6,000	\$ 6,000
3	Install drain in existing Manhole or Replace Manhole to Avoid Manhole Surcharge	1	LS	\$ 5,000	\$ 5,000
4	Install new manhole ring and cover to prevent I/I	1	LS	\$ 2,000	\$ 2,000
5	Traffic Control	1	LS	\$ 2,000	\$ 2,000
CONSTRUCTION COST				\$	17,500
CONTINGENCY (30%)				\$	5,250
TOTAL COST				\$	22,750
RECOMMENDED IMPROVEMENTS FOR SHACKLEFORD ARV 1230					
ITEM	DEFECT	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	\$ 2,500	\$ 2,500
2	Traffic Control	1	LS	\$ 2,000	\$ 2,000
3	Excavate Manhole Bottom to Access Force Main	1	LS	\$ 1,000	\$ 1,000
4	Install 2" Reinforced Nylon/316 SS ARV Assembly Including Valves, Fittings, Appurtenances and Saddle	1	LS	\$ 6,000	\$ 6,000
CONSTRUCTION COST				\$	11,500
CONTINGENCY (30%)				\$	3,450
TOTAL COST				\$	14,950
RECOMMENDED IMPROVEMENTS FOR PREVENTION OF I/I INTO ARV MANHOLES					
ITEM	DEFECT	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Install Inflow Dish	10	EA	\$ 250	\$ 2,500
CONSTRUCTION COST				\$	2,500
CONTINGENCY (30%)				\$	750
TOTAL COST				\$	3,250
ESTIMATED TOTAL COST FOR ARV IMPROVEMENTS					\$ 115,050
<i>Engineering and Administrative Services (25%) =</i>					\$ 28,763
TOTAL PROJECT COST FOR ARV IMPROVEMENTS =					\$ 143,813

APPENDIX A

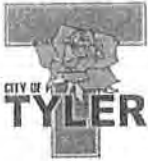
FORCE MAIN AND AIR RELEASE VALVE INSPECTION RESULTS

Item	Lift Station	Page
1	Animal Shelter	2
2	Bellwood	5
3	CR 46 New Harmony	13
4	Dixie	16
5	Greenbriar	19
6	Haverhill	22
7	Highway 31 West	25
8	Highway 69 North	31
9	Hogan	34
10	Nottingham	37
11	Pilot Truck	43
12	Rustic Park	54
13	Shoreline	60
14	Stewart	63
15	University Park	66
16	Brooks	69
17	Charleston	72
18	Crossing	75
19	East Grande	81
20	Faulkner	87
21	Gilley Creek	90
22	Hamptons	93
23	Oak Creek	96
24	Shackleford Creek	100



Animal Shelter Lift Station





Force Main Inspection Form

Work Order No.:

17420 WO1D

Inspector:

Date:

12/13/2017

CMR

FM Asset ID:

ANIMAL SHELTER L.S.

Lift Station ID:

117354

Force Main Length:

3639

Force Main Material:

Force Main Material:

HD=HDPE
DU=Ductile Iron
ASB=Asbestos
PVC=Plastic
OT=Other

FM Inspection Method:



Visual



CCTV



Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

.

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material:

Surface Material

P=Paved
U=Unpaved

Distance from Lift Station:

Dist. From DS Discharge:

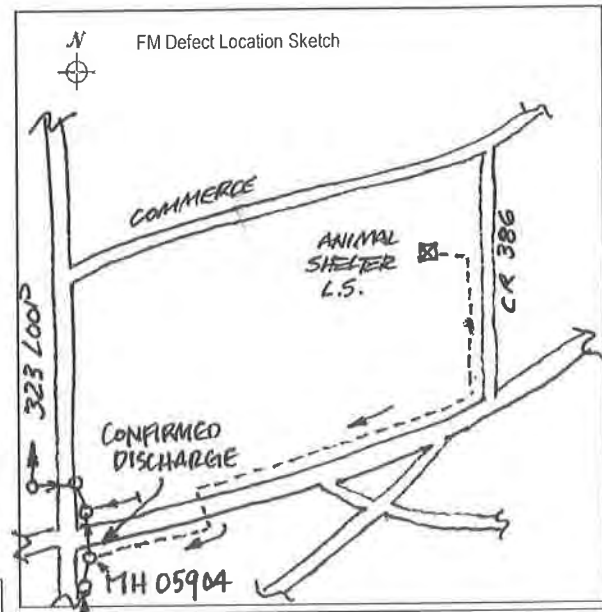
Defect GPS Latitude:

Defect GPS Longitude:

- .

Photo No.

Description



Comments NO ARV'S SHOWN ON PLANS
WALKED FORCE LINE, NO ARV'S LOCATED.
NO DEFECTS ALONG SURFACE.
CONFIRMED DISCHARGE LOCATION PER PLANS.
AT MH 05904

Bellwood Lift Station





Force Main Inspection Form

Work Order No.:

17420 W01D

Inspector:

Date:

12/21/2017

AA

FM Asset ID:

BELLWOOD L STA

Lift Station ID:

1220

Force Main Length:

5495

Force Main Material:

Force Main Material:

HD-HDPE
DU-Ductile Iron
ASB-Asbestos
PVC-Plastic
OT-Other

FM Inspection Method:



Visual



CCTV



Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

Defect No.:

Defect Address:

Defect Location:

Defect Type:

Leak Potential:

Surface Cover:

Surface Material:

Distance from Lift Station:

Dist. From DS Discharge:

Defect GPS Latitude:

Defect GPS Longitude:

Photo No.

Description

Defect Location:

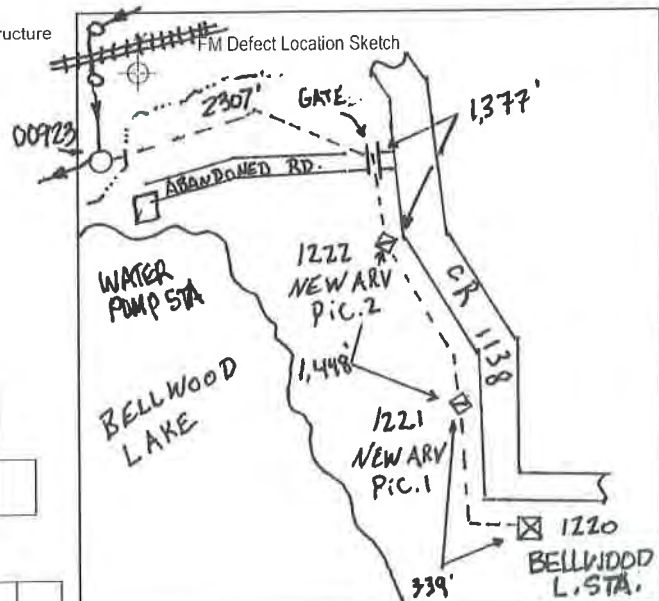
ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT-Other

Leak Potential:

N=None
L=Light
M=Moderate
S=Severe

Surface Material:

P=Paved
U=Unpaved



Comments: WALKED FORCE MAIN..
LOCATED 2 ARV NOT SHOWN ON
PLANS.

NO SURFACE DEFECTS NOTED.
CONFIRMED DISCHARGE LOCATION
AT MH 00923

BOTH ARV ADDRESSES 10362 CR 1138

Air Release Valve (ARV) Inspection Form

Physical address of ARV: 9250 CR 1138

Work Order No: W010 ARV Asset Code: 1221

Date of Inspection: 1/05/2018 Make and Model No.: APCO

Latitude Coordinates: Longitude Coordinates: -

Project Number: 17-420

Inspector: AA

Company: PA

1. Was the manhole/vault surcharged? ☐ Y ☒ N
2. Was the isolation valve exercised? ☐ Y ☐ N
3. Was the drainage valve exercised? ☐ Y ☐ N
4. Was an internal inspection conducted? ☒ Y ☐ N
5. Any visible leaks? ☐ Y ☒ N
6. Was air released from the valve? ☒ Y ☐ N
7. Were photos of the valve taken? ☒ Y ☐ N

FM Material ☒ Steel ☐ PVC
☐ HDPE ☐ Other

FM Diameter (in) 6

FM Crown Thickness (in)
(metal FM only measured) .

Rim-to-Invert Dist. (ft) 6.12

ARV Size (in)

MH Cover Size (in) 24

H2S Concentration 0

CONDITION

G= Good F=Fair P=Poor
C=Critical N=Not Applicable
FM Protective Coating:

Manhole Cover: G

Manhole Ring: G

MH/Vault Wall: G

MH/Vault Bench: G

ARV Pipe Strap -

ARV Body G

ARV bolts/nuts G

ARV Isolation valve

ARV Drain valve

PHOTO NO DESCRIPTION

04	AREA
05	INTERNAL

Comments: PVC FORCE LINE VISIBLE IN MH.
6.12' TOP OF PIPE TO RIM
AIR RELEASED WHILE ON SITE
UPPER VALVE CLOSED... OPERATES FINE
LOWER VALVE CLOSED... OPENS 1/2 TURN

Signature:

BELLWOOD L. STA

Manhole Form

1115 Main Street
Garland, Texas 75040
800-637-0164

Date: 1/5/18 **Project:** 17.420 W01D **Basin:** **Map No.** **Crew:** AA/LD

MH No.: ARV 1221 **Address:** 9250 C.R. 1138

DS Length: 1,448 **Asset Type:** (M) CO EOL PS T **Status:** (D) CNL CNO B LG D N S H

Lid Type: S (D) B O **No. Vent Holes:** 2 **Asset Mat'l.:** B (D) F SB SC O

Grade: X (A) B **Inch:** 1 **Inflow Dish:** Y (N) Condition: Good Defective **Inflow Potential:** N (L) M S

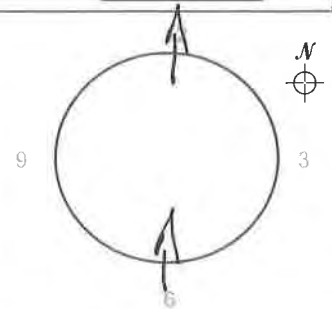
Area Photo: 4 **Internal Photo:** 5 **Surface Cover:** SH **Surf. Mat'l.:** P Asphalt Concrete U **Debris:** in.

GPS: ☒ **MH Diameter:** 48 Std.=48 inch
C.O. Diameter: inch

Defects:

Def#	Photo	Loc	Type	Rate	Roots	I/I

General Comments:



Pipes:

Photo	In/Out	Size	Material	Clock	Depth	Drop	Surface Cov	Surface Mat'l	Debris	Connecting ID
	D		PVC	12	6.12		SH	U		ARV 1222

Map Update



PREVIOUS TRIMBLE

DISTANCE FROM ARV 1221 TO 1222:

1,448

TOP VALVE - IS CLOSED. OPENS FINE.
 BOTTOM VALVE. IS CLOSED. OPENS HALF A
 TURN.
 BUTTON ON TOP OF ARV WORKS.

BELLWOOD UNKNOWN PIPE SIZE.
 HALF PIPE UNDER GRAVEL.

PVC PIPE. THICK TEST
 UNSUCCESSFUL.

Definitions:

Asset Type: M=Manhole; CO=Cleanout; EOL= End of Line; PS=Pump Station; T=Tee Connection

Status: Y=Yes; CNL=Could Not Locate; CNO=Can Not Open; B=Buried; S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner

Lid Type: S=Solid; V=Vented; B=Bolted; OT=Other (specify/comment)

Asset Mat'l: B=Brick; C=Concrete; F=Fiberglass; SB=Sealed Brick; SC=Sealed Concrete; O=Other (specify/comment)

Grade: X=At grade; A=Above; B=Below

Defect Rate: Light, Moderate, Severe

Roots: Light, Moderate, Severe

I/I Potential: N=None; L=Light; M=Moderate; S=Severe

Surface Cover: ST=Street; GU=Gutter; AL=Alley; DW=Driveway; SW=Sidewalk; FD=Field; TW=Trees/Woods; PL=Parking Lot; SH=Road Shoulder; DD=Drainage Ditch; CR=Creek; WB=Within Building; YD=Yard; OT=Other

Surface Mat'l: P=Paved (designate Asphalt or Concrete); U=Unpaved

Defect Location: LD=Lid; FR=Frame; FS=Frame Seal; CH=Chimney; CO=Cone; WA=Wall; ST=Steps; BN=Bench; PS=Pipe Seal; IN=Invert; CAP=Cleanout Cap; COP=Cleanout Pipe

Defect Type: BPS=Bad Pipe Seal; BRK=Broken; CRK=Cracked; CCL=Collapsed; DET=Deteriorated; HOL=Hole; JNT=Joint; LOO=Loose; MBR=Missing Brick or Mortar; MIS=Missing

Air Release Valve (ARV) Inspection Form



Physical address of ARV: 9 2 5 0 C R 1 1 3 8

Work Order No: W 0 1 D ARV Asset Code: 1 2 2 2

Date of Inspection: 1 / 0 5 / 2 0 1 8 Make and Model No.: A P C O

Latitude Coordinates: Longitude Coordinates: -

Project Number: 1 7 - 4 2 0

Inspector: A A

Company: P A

- 1 Was the manhole/vault surcharged? ☐ Y ☒ N
- 2 Was the isolation valve exercised? ☒ Y ☐ N
- 3 Was the drainage valve exercised? ☒ Y ☐ N
- 4 Was an internal inspection conducted? ☒ Y ☐ N
- 5 Any visible leaks? ☐ Y ☒ N
- 6 Was air released from the valve? ☐ Y ☒ N
- 7 Were photos of the valve taken? ☒ Y ☐ N

FM Material ☐ Steel ☒ PVC
☐ HDPE ☐ Other

FM Diameter (in) 6

FM Crown Thickness (in)
(metal FM only measured) .

Rim-to-Invert Dist. (ft) 5 . 5 6

ARV Size (in)

MH Cover Size (in) 2 4

H2S Concentration 0

CONDITION

G= Good F=Fair P=Poor
C=Critical N=Not Applicable
FM Protective Coating:

Manhole Cover: G

Manhole Ring: P

MH/Vault Wall: G

MH/Vault Bench: G

ARV Pipe Strap -

ARV Body F

ARV bolts/nuts P

ARV Isolation valve F

ARV Drain valve F

PHOTO NO DESCRIPTION

01	AREA
02	INTERNAL
03	FRAME LOOSE

Comments: TOP OF PVC FORCE LINE VISIBLE.
DEPTH FROM TOP OF PIPE.
2 VALVES... BOTH OPERATE FINE BUT
HAVE MINOR RUST.
NO AIR RELEASED WHILE OPERATING VALVES

Signature: BELLWOOD L. STA.

Date: 1/5/18 **Project:** 17-420 WOLD **Basin:** **Map No.** **Crew:** AA / LD

MH No.: ARV 1222 **Address:** 9250 COUNTY RD 1138

DS Length: **Asset Type:** M CO EOL PS T **Status:** Y CNL CNO B LG D N S H

Lid Type: S V B O **No. Vent Holes:** **Asset Mat'l.:** B C F SB SC O

Grade: X A B **Inch:** 2 **Inflow Dish:** Y N Condition: Good Defective **Inflow Potential:** N L M S

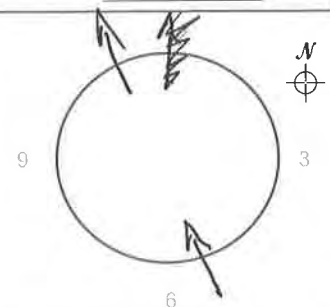
Area Photo: 1 **Internal Photo:** 2 **Surface Cover:** SH **Surf. Mat'l.:** P Asphalt Concrete U X **Debris:** 6 in.

GPS: ☒ **MH Diameter:** 48 Std.=48 inch **C.O. Diameter:** inch

Defects:

Def#	Photo	Loc	Type	Rate	Roots	I/I
	3	CH	JNT	M	N	E

General Comments:



Pipes:

Photo	In/Out	Size	Material	Clock	Depth	Drop	Surface Cov	Surface Mat'l	Debris	Connecting ID
1	0			11	5.56		SH	U		1

Map Update



DEPTH 5.56 UNKNOWN PIPE SIZE.
 HALF OF PIPE UNDER GRAVEL. PVC PIPE.

PREVIOUS TREMBLE

TOP VALVE IS OFF. TURNS OPEN FINE.
 BOTTOM VALVE IS OFF. TURNS OPEN FINE.
 WATER DISCHARGES.

BELLWOOD, THICK TEST WAS UNSUCCESSFUL.

Definitions:

Asset Type: M=Manhole; CO=Cleanout; EOL= End of Line; PS=Pump Station; T=Tee Connection

Status: Y=Yes; CNL=Could Not Locate; CNO=Can Not Open; B=Buried; S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner

Lid Type: S=Solid; V=Vented; B=Bolted; OT=Other (specify/comment)

Asset Mat'l: B=Brick; C=Concrete; F=Fiberglass; SB=Sealed Brick; SC=Sealed Concrete; O=Other (specify/comment)

Grade: X=At grade; A=Above; B=Below

Defect Rate: Light, Moderate, Severe

Roots: Light, Moderate, Severe

I/I Potential: N=None; L=Light; M=Moderate; S=Severe

Surface Cover: ST=Street; GU=Gutter; AI=Alley; DW=Driveway; SW=Sidewalk; FD=Field; TW=Trees/Woods; PL=Parking Lot; SH=Road Shoulder; DD=Drainage Ditch; CR=Creek; WB=Within Building; YD=Yard; OT=Other

Surface Mat'l: P=Paved (designate Asphalt or Concrete); U=Unpaved

Defect Location: LD=Lid; FR=Frame; FS=Frame Seal; CH=Chimney; CO=Cone; WA=Wall; ST=Steps; BN=Bench; PS=Pipe Seal; IN=Invert; CAP=Cleanout Cap; COP=Cleanout Pipe

Defect Type: BPS=Bad Pipe Seal; BRK=Broken; CRK=Cracked; CCL=Collapsed; DET=Deteriorated; HOL=Hole; JNT=Joint; LOO=Loose; MBR=Missing Brick or Mortar; MIS=Missing

Bellwood FM & ARV Photos



ARV 1221 Bellwood Manhole and Area in Good Condition



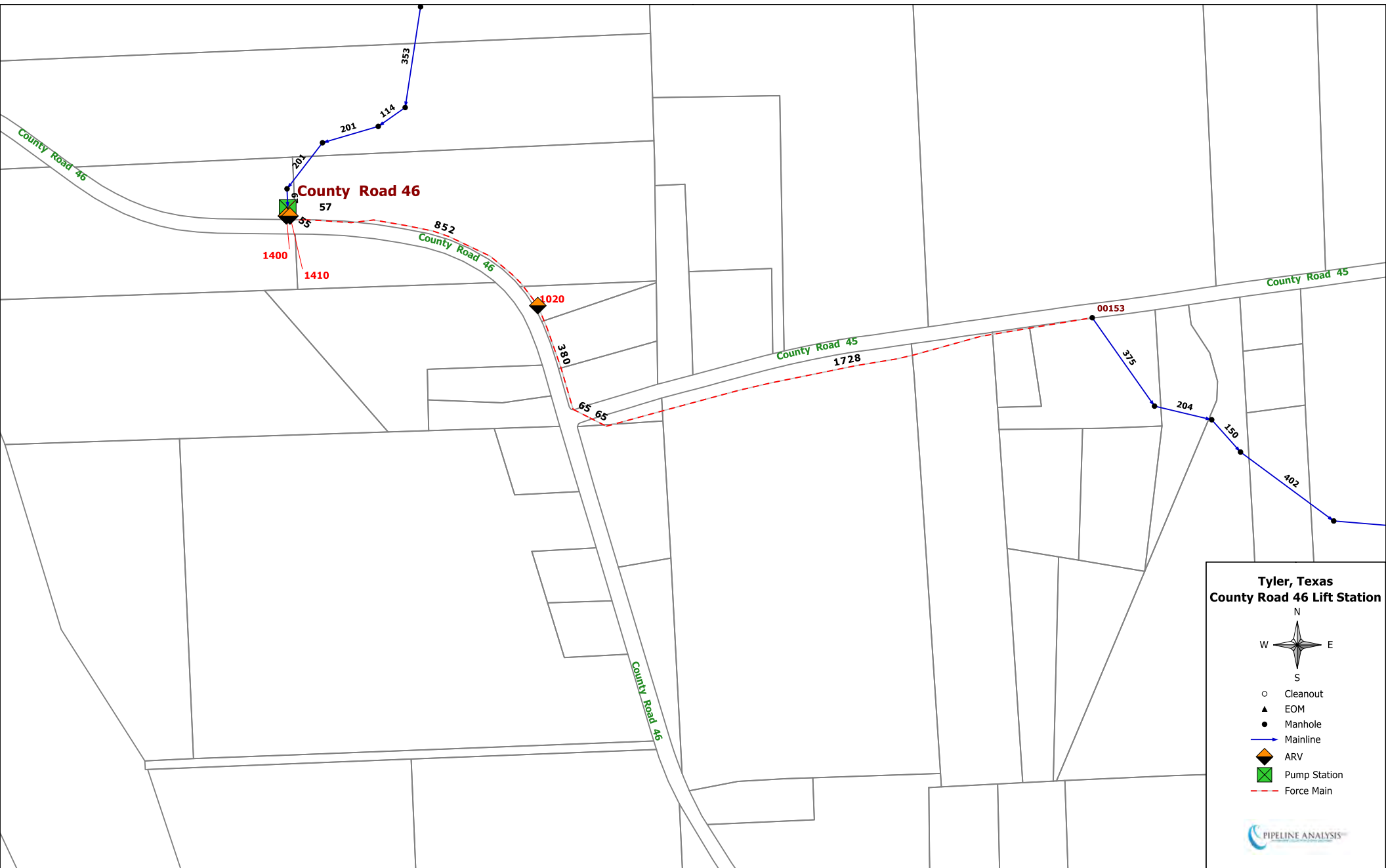
ARV 1221 Bellwood Force Main Visible in Manhole; Air Released While on Site



ARV 1222 Bellwood Area in Good Condition, Manhole Ring in Poor Condition



ARV 1222 Bellwood Top of Force Main Visible in Manhole; (2) Valves Operate With Minor Rust, No Air Released While Operating Valves



New Harmony Lift Station



Work Order No.:

Date:

Inspector:

FM Asset ID:

Lift Station ID:

Force Main Length:

Force Main Material:

FM Inspection Method: ☒ Visual ☐ CCTV ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

Defect No.:

Defect Address:

Defect Location:

Defect Type:

Leak Potential:

Surface Cover:

Surface Material:

Distance from Lift Station:

Dist. From DS Discharge:

Defect GPS Latitude:

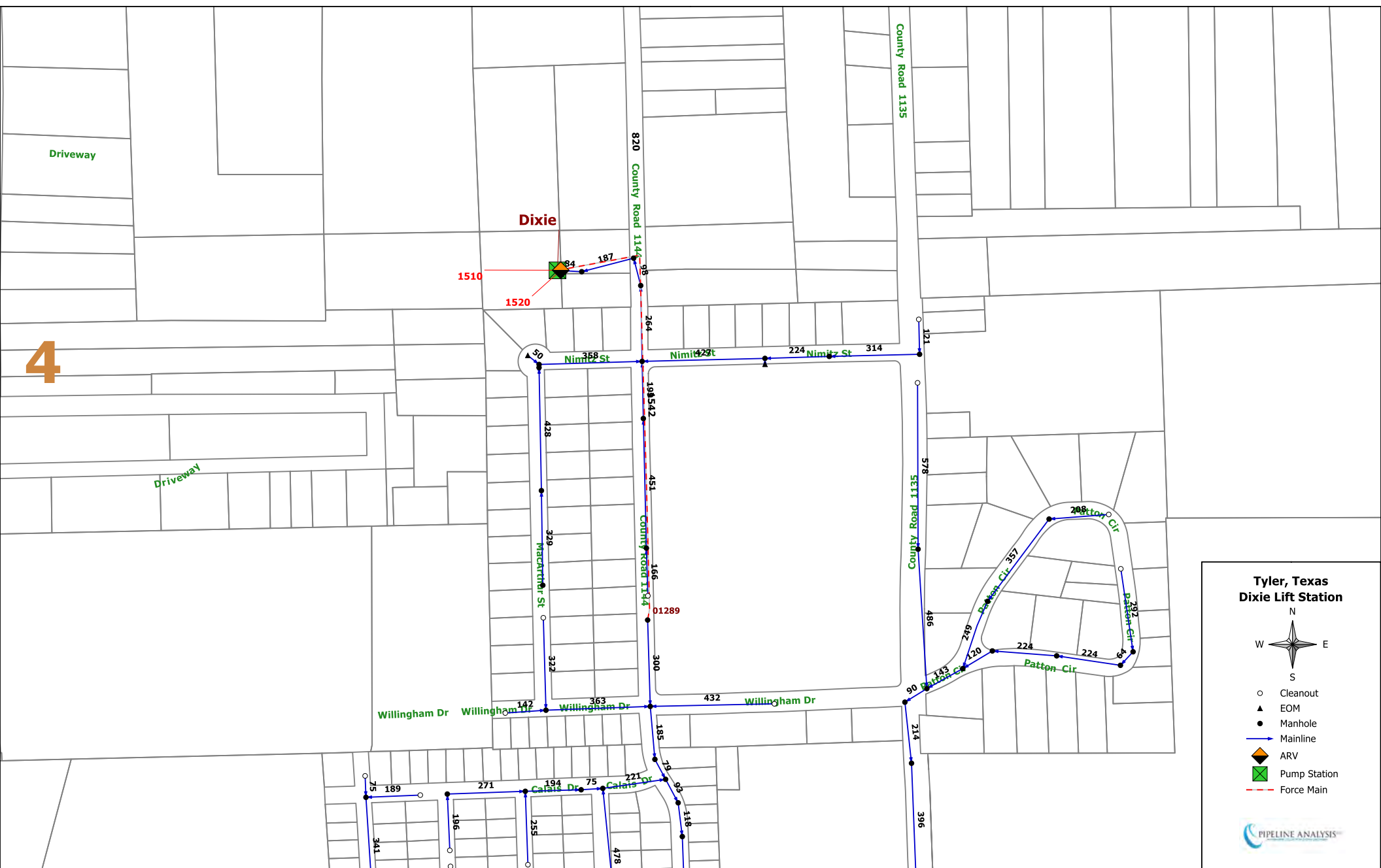
Defect GPS Longitude:

Photo No.

Description

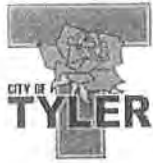
Comments

Comments WALKED FORCE MAN
METAL DETECTED FOR ARV SHOWN
ON PLANS BUT CAN'T LOCATE
NO SURFACE DEFECTS NOTED
DISCHARGE LOCATION CONFIRMED.
© M4 00153



Dixie Lift Station





Force Main Inspection Form

Work Order No.:

17420 W010

Inspector:

CMR

Date:

12/11/2017

FM Asset ID:

DIXIE LS

Lift Station ID:

117348

Force Main Length:

1445

Force Main Material:

Force Main Material:

HD-HDPE
DU-Ductile Iron
ASB-Asbestos
PVC-Plastic
OT-Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

FM Inspection Method:

☒ Visual
 ☐ CCTV
 ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material:

Surface Material

P=Paved
U=Unpaved

Distance from Lift Station:

Dist. From DS Discharge:

Defect GPS Latitude:

Defect GPS Longitude:

Photo No.

Description

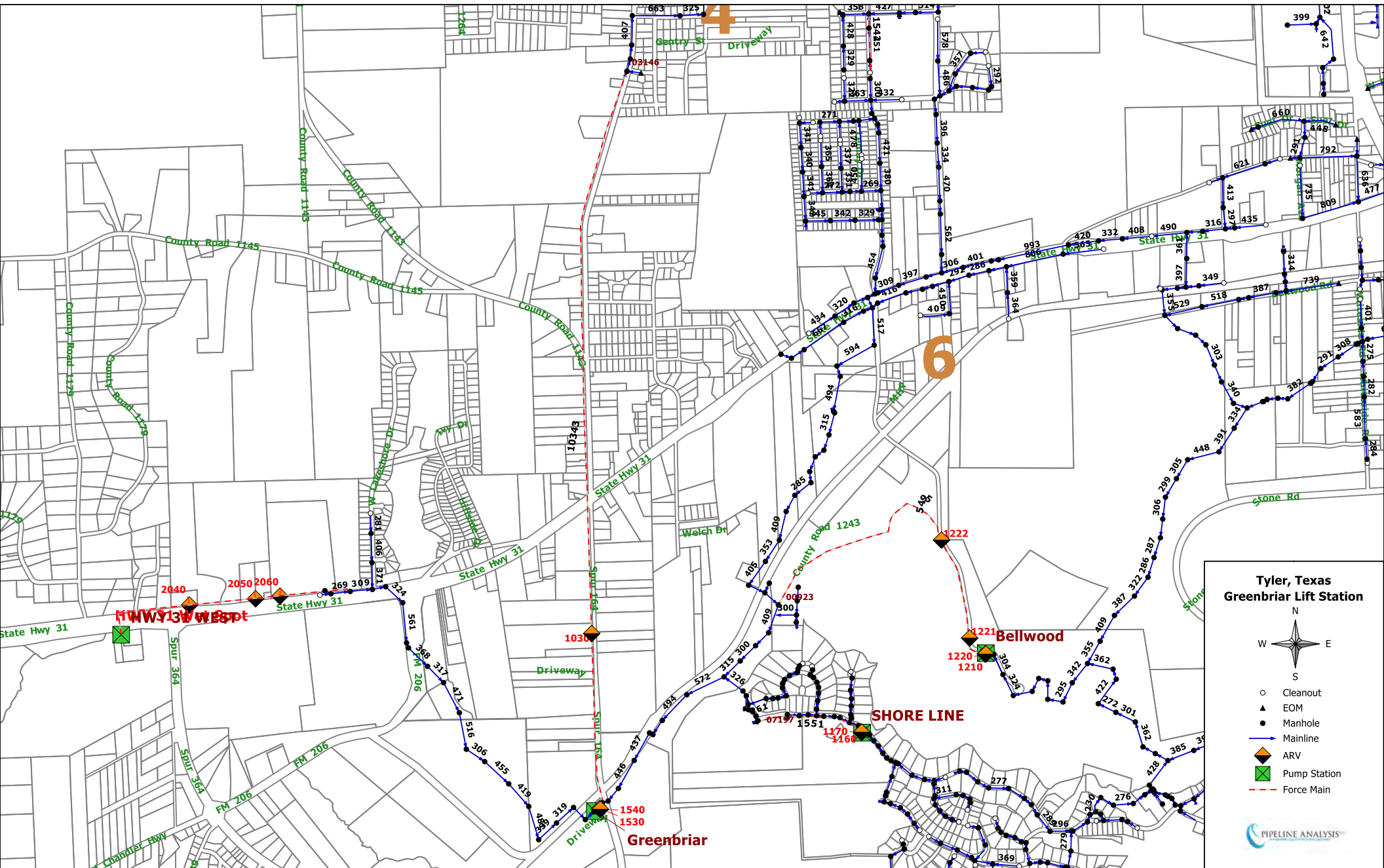


FM Defect Location Sketch



Comments

WALKED FORCE LINE.. NO DEFECTS
LOCATED..
4" 12IN @ L.STA. 4" PVC AT DISCHARGE.
CONFIRMED DISCHARGE LOCATION. AS
SHOWN ON PLANS AT MH 01289
NO ARV SHOWN ON PLANS
NONE LOCATED



Greenbriar Lift Station





Force Main Inspection Form

Work Order No.:

17420 W01D

Inspector:

Date:

12/20/2017

AA

FM Asset ID:

GREENBRIAR L STA

Lift Station ID:

1530

Force Main Length:

10343

Force Main Material:

HD-HDPE
DU-Ductile Iron
ASB-Asbestos
PVC-Plastic
OT-Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

Force Main Material:

FM Inspection Method:

☒ Visual ☐ CCTV ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material

P=Paved
U=Unpaved

Surface Material:

Distance from Lift Station:

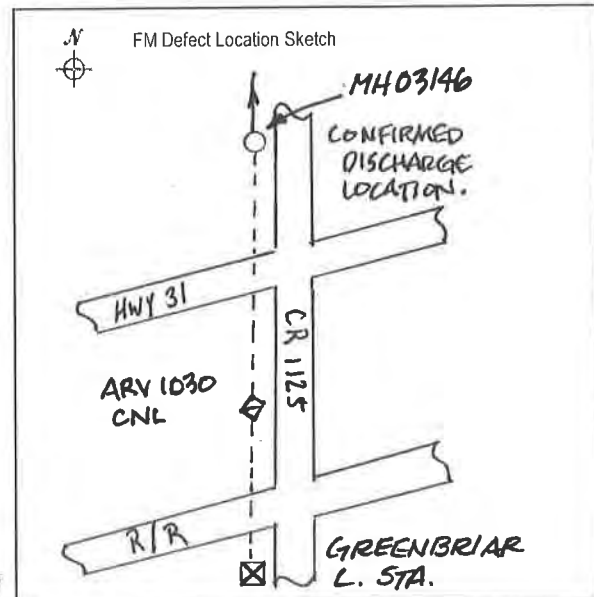
Dist. From DS Discharge:

Defect GPS Latitude:

Defect GPS Longitude:

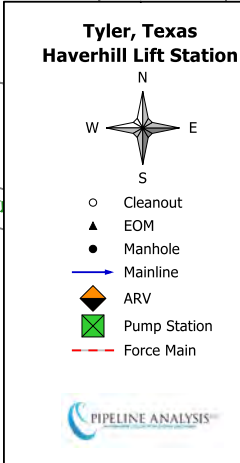
Photo No.

Description



Comments

WALKED FORCE MAIN
NO SURFACE DEFECTS NOTED
COULD NOT LOCATE ARV 1030
(METAL DETECTED)
CONFIRMED DISCHARGE
LOCATION AS SHOWN ON PLANS
AT MH 03146



Haverhill Lift Station





Force Main Inspection Form

Work Order No.:

17420 W01D

Inspector:

AA

Date:

12/20/2017

FM Asset ID:

HAVERHILL L STA

Lift Station ID:

1560

Force Main Length:

3002

Force Main Material:

Force Main Material:

HD-HDPE
DU-Ductile Iron
ASB-Asbestos
PVC-Plastic
OT-Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

FM Inspection Method:

☒ Visual☐ CCTV☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

.

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material:

Surface Material

P=Paved
U=Unpaved

Distance from Lift Station:

Dist. From DS Discharge:

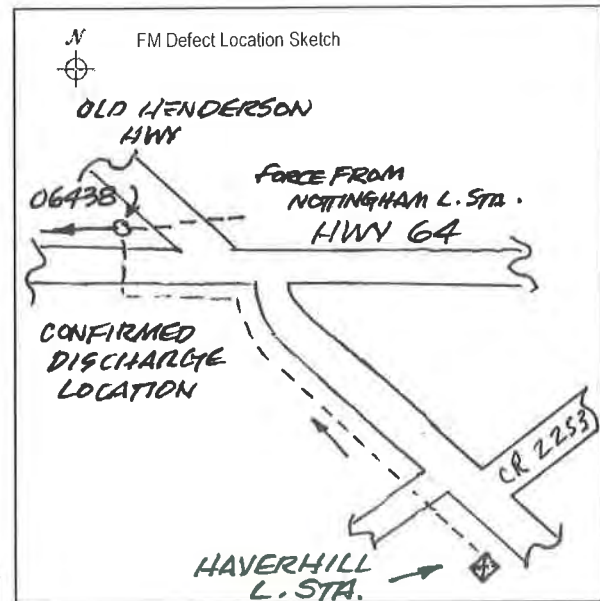
Defect GPS Latitude:

Defect GPS Longitude:

- .

Photo No.

Description

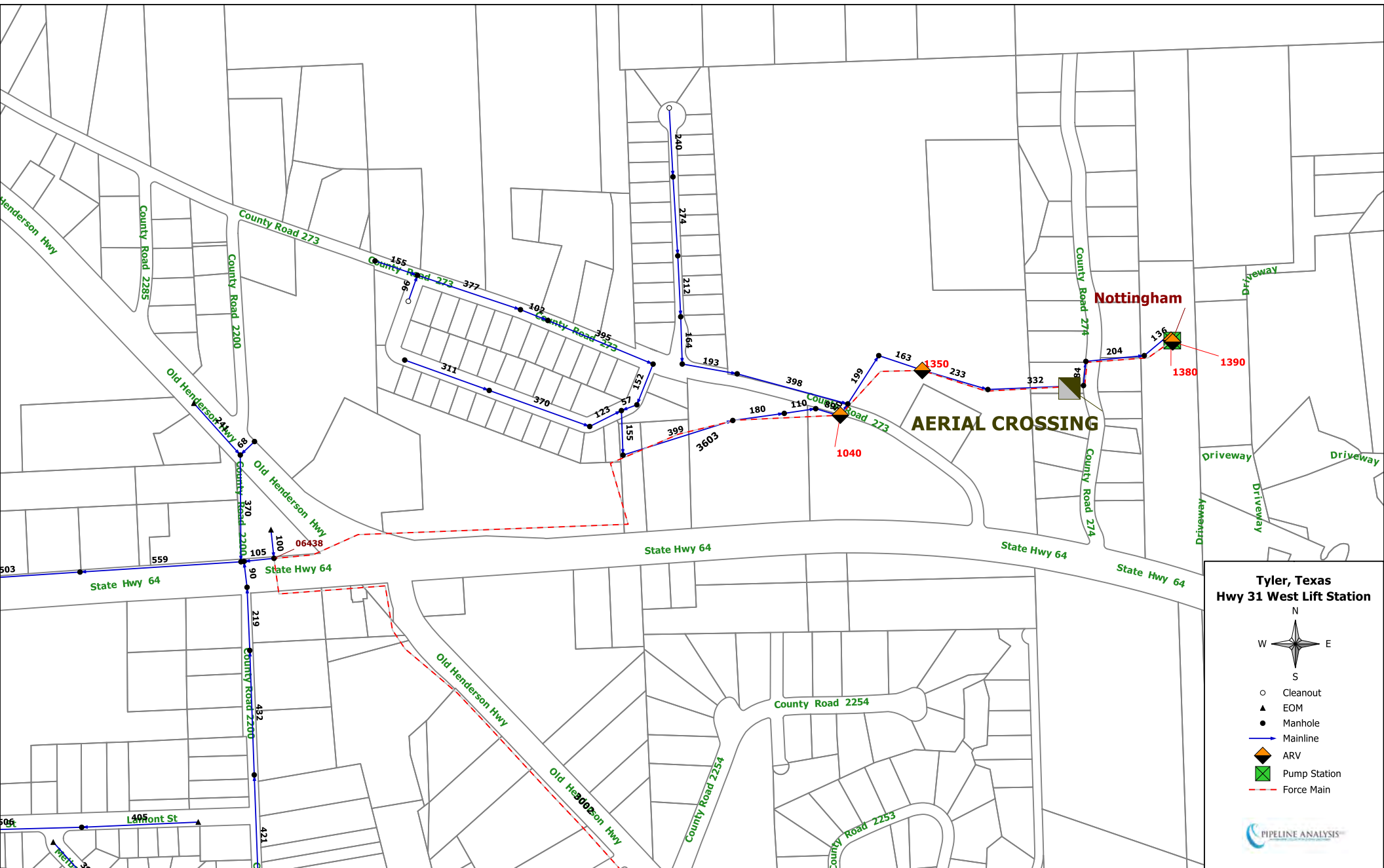


Comments

WALKED FORCE MAIN, NO ARV
LOCATED.

NO SURFACE DEFECTS NOTED.

CONFIRMED DISCHARGE LOCATION
AT MH 06438



Hwy 31 Lift Station



WEST.



Force Main Inspection Form

Work Order No.:

17420 W01D

Inspector:

CMR

Date:

12/11/2017

FM Asset ID:

H W Y 31 L S

Lift Station ID:

N O N E

Force Main Length:

Force Main Material:

?

Force Main Material:

HD=HDPE
DU=Ductile Iron
ASB=Asbestos
PVC=Plastic
OT=Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

FM Inspection Method:

☒ Visual ☐ CCTV ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

Defect No.:

1

Defect Address:

13838 HWY 31 W

Defect Location:

OT

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

N

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

SH

Surface Material:

U

Surface Material

P=Paved
U=Unpaved

Distance from Lift Station:

Dist. From DS Discharge:

Defect GPS Latitude:

✓

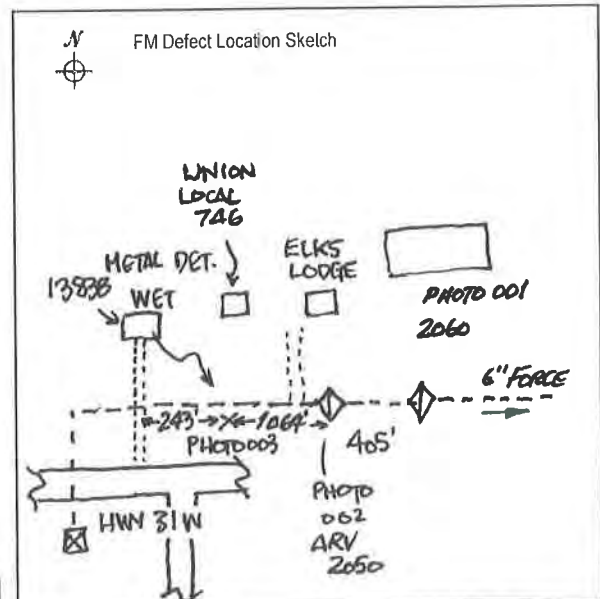
Defect GPS Longitude:

✓

Photo No.

Description

03 OVERLINE



Comments PHOTO 3 WET SPOT 243' E OF CL OF 13838 DRIVEWAY. METAL DETECTED FOR ARV 2040.. WET SPOT AT APPROX. LOCATION.. NO OTHER SURFACE DEFECTS NOTED. LOCATED ARV'S 2050 AND 2060.
PIC 1 ARV 2060
PIC 2 ARV 2050
PIC 3 WET SPOT AT VICINITY OF ARV 2040.. (CNL)
COULD NOT CONFIRM DISCHARGE LOC.
PLAN SHOWS @ MH 00491

Air Release Valve (ARV) Inspection Form

Physical address of ARV: **E L K S L O D G E H W Y 3 1 W**

Work Order No: **W O I D** ARV Asset Code: **2 0 5 0**

Date of Inspection: **1 / 2 6 / 2 0 1 8** Make and Model No.: **A P C O**

Latitude Coordinates: **-** Longitude Coordinates: **-**

Project Number: **1 7 - 4 2 0**

Inspector: **A A**

Company: **P A**

- 1 Was the manhole/vault surcharged? ☐ Y ☒ N
- 2 Was the isolation valve exercised? ☐ Y ☐ N
- 3 Was the drainage valve exercised? ☐ Y ☐ N
- 4 Was an internal inspection conducted? ☒ Y ☐ N
- 5 Any visible leaks? ☐ Y ☒ N
- 6 Was air released from the valve? ☐ Y ☒ N
- 7 Were photos of the valve taken? ☒ Y ☐ N

FM Material ☒ Steel ☐ PVC
☐ HDPE ☐ Other

FM Diameter (in) **4**

FM Crown Thickness (in)
(metal FM only measured) **.**

Rim-to-Invert Dist. (ft) **3 . 2 2**

ARV Size (in) **3 2**

MH Cover Size (in) **3 2**

H2S Concentration **0**



CONDITION

G= Good F=Fair P=Poor
C=Critical N=Not Applicable
FM Protective Coating: **G**

Manhole Cover: **G**

Manhole Ring: **G**

MH/Vault Wall: **G**

MH/Vault Bench:

ARV Pipe Strap

ARV Body **G**

ARV bolts/nuts **G**

ARV Isolation valve

ARV Drain valve

PHOTO NO DESCRIPTION

01	AREA
02	INTERNAL

Comments: **FORCE LINE NOT VISIBLE IN MH.
32" LID. , 1 VALVE ON ARV..
TURNS BUT NO AIR RELEASED.
FORCE DIAM @ L.STA. IS 4" STEEL/DUCTILE?
MH ABOVE GRADE 5"**

Signature: **HWY 31 W. L. STA.**

Air Release Valve (ARV) Inspection Form

Physical address of ARV: **A R M E D R E S E R V E C T R H W Y 3 1 W**

Work Order No: **W 0 1 0** ARV Asset Code: **2 0 6 0**

Date of Inspection: **1 / 2 6 / 2 0 1 8** Make and Model No.: **A P C O**

Latitude Coordinates: Longitude Coordinates: **-**

Project Number: **1 7 - 4 2 0**

Inspector: **A A**

Company: **P A**

1. Was the manhole/vault surcharged? ☐ Y ☒ N
2. Was the isolation valve exercised? ☐ Y ☐ N
3. Was the drainage valve exercised? ☐ Y ☐ N
4. Was an internal inspection conducted? ☒ Y ☐ N
5. Any visible leaks? ☐ Y ☒ N
6. Was air released from the valve? ☐ Y ☒ N
7. Were photos of the valve taken? ☒ Y ☐ N

FM Material ☒ Steel ☐ PVC
☐ HDPE ☐ Other

FM Diameter (in) **4**

FM Crown Thickness (in)
(metal FM only measured) **.**

Rim-to-Invert Dist. (ft) **3 . 2 6**

ARV Size (in)

MH Cover Size (in) **3 2**

H2S Concentration **0**



CONDITION

G= Good F=Fair P=Poor
C=Critical N=Not Applicable
FM Protective Coating:

Manhole Cover: **G**

Manhole Ring: **G**

MH/Vault Wall: **G**

MH/Vault Bench: **G**

ARV Pipe Strap: **-**

ARV Body: **G**

ARV bolts/nuts: **G**

ARV Isolation valve:

ARV Drain valve:

PHOTO NO DESCRIPTION

03	AREA
04	INTERNAL

Comments: **FORCE LINE NOT VISIBLE IN MH. ONLY 1 VALVE VISIBLE, TURNS PROPERLY BUT NO AIR RELEASED. MH ABOVE GRADE 6" FORCE MAIN DIAM AT L. STA. IS 4"**

Signature: **HWY 31 W. L. STA.**

Highway 31 West FM & ARV Photos



Highway 31 West Wet Spot 243' East of 13838; Leak to needing to be identified



ARV 2050 Highway 31 West Manhole and Area in Good Condition



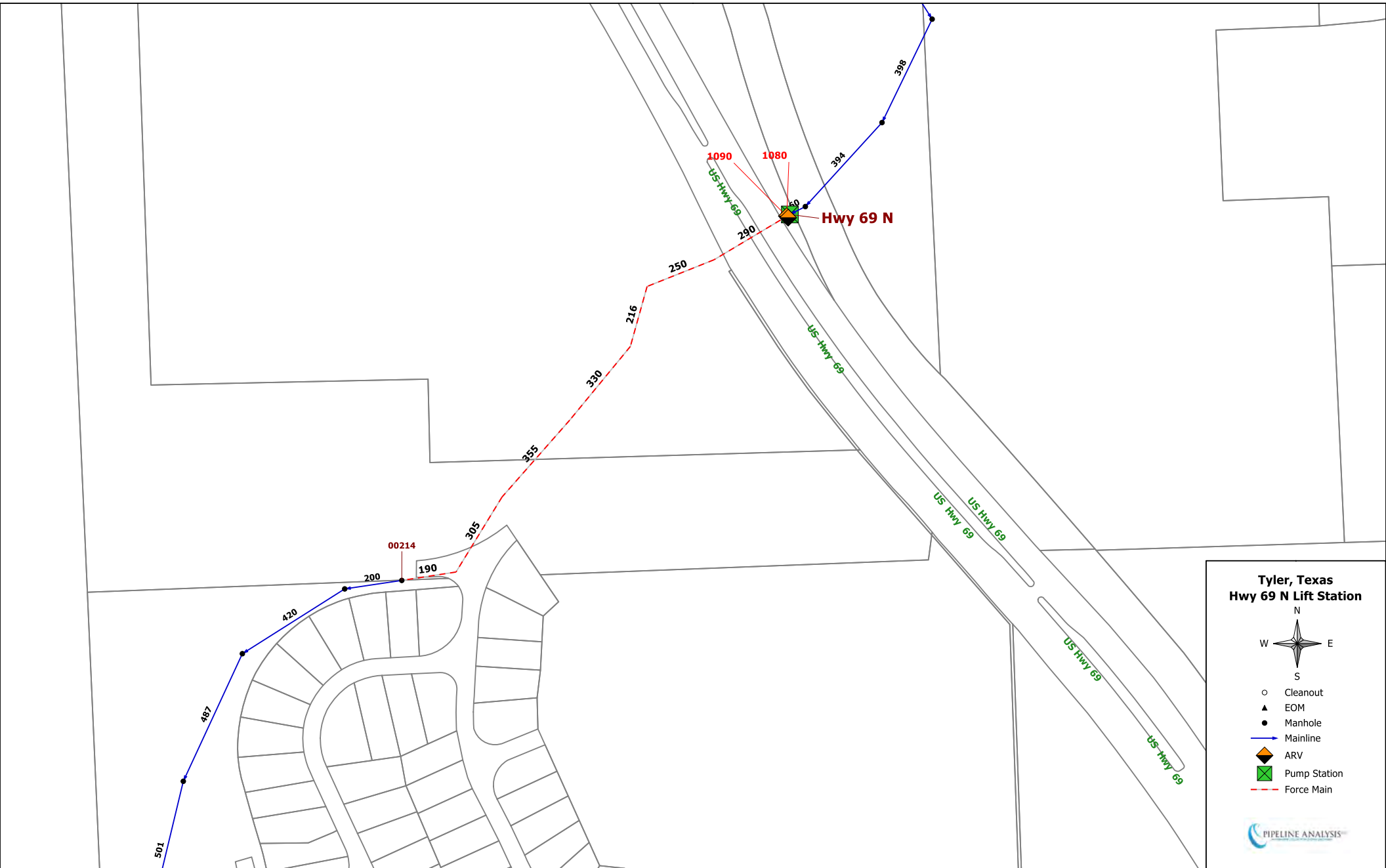
ARV 2050 Highway 31 West Air Release Valve in Good Condition, Valve Turns but No Air Was Released; Force Main not Visible in Manhole



ARV 2060 Highway 31 West Area and Manhole in Good Condition



ARV 2060 Highways 31 West Force Main not Visible in Manhole; ARV Turns Properly but No Air Was Released



Hwy 69N Lift Station



WEST



Force Main Inspection Form

Work Order No.:

17420 W01D

Inspector:

Date:

12/12/2017

CMR

FM Asset ID:

HWY 69 N L STA

Lift Station ID:

109324

Force Main Length:

1936

Force Main Material:

HD=HDPE
DU=Ductile Iron
ASB=Asbestos
PVC=Plastic
OT=Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

Force Main Material:

FM Inspection Method:

☒ Visual ☐ CCTV ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material

P=Paved
U=Unpaved

Surface Material:

Distance from Lift Station:

Dist. From DS Discharge:

Defect GPS Latitude:

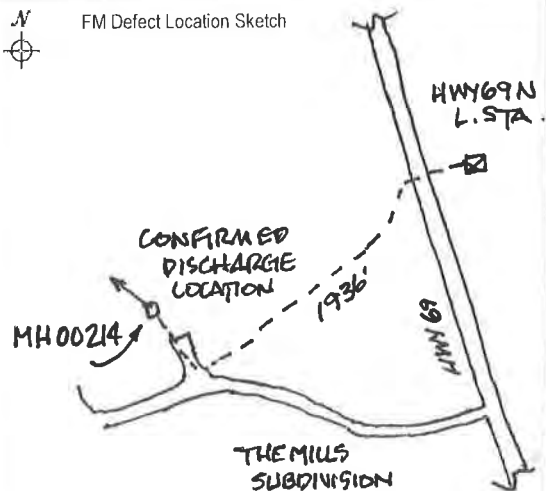
Defect GPS Longitude:

Photo No.

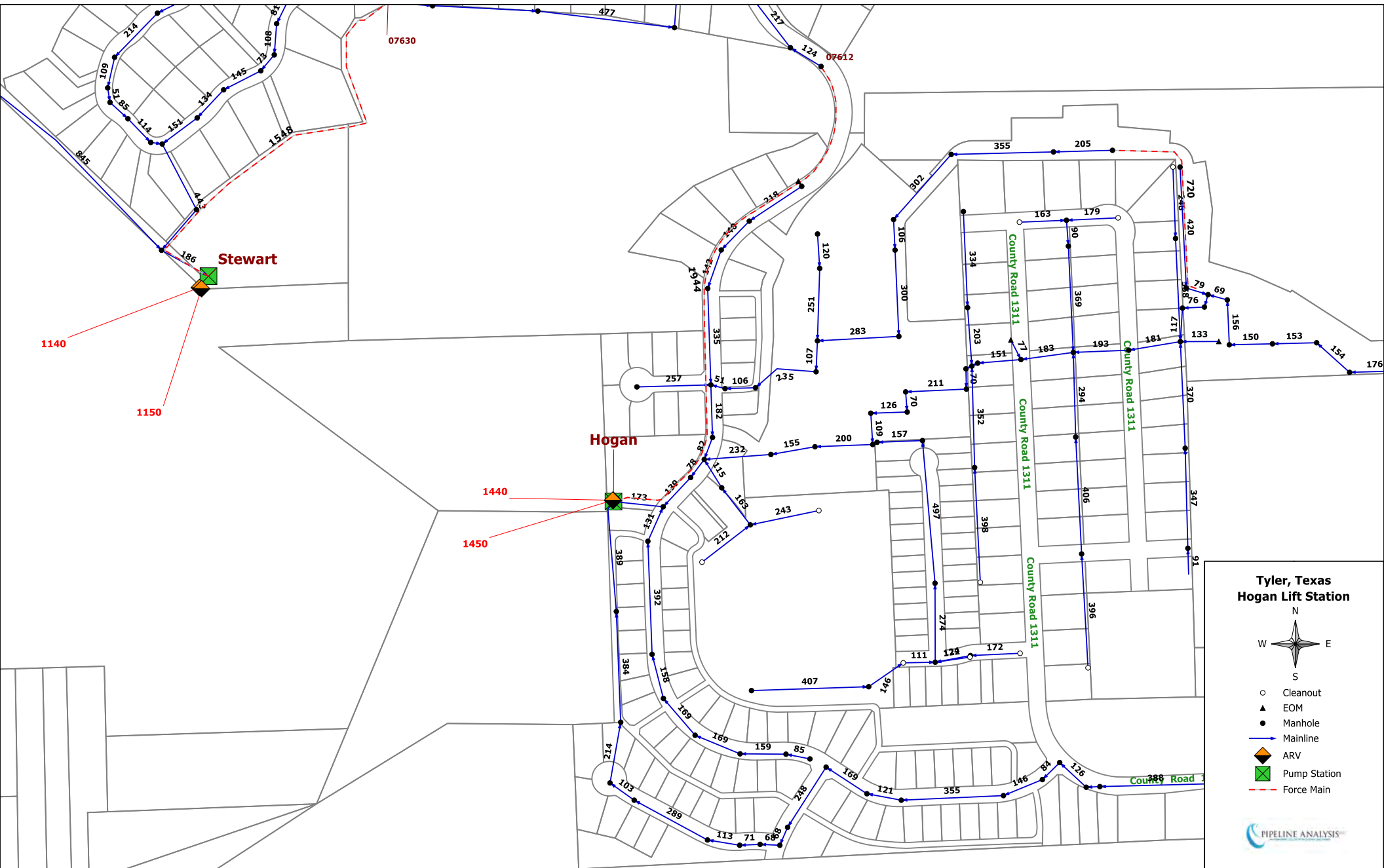
Description



FM Defect Location Sketch



Comments WALKED FORCE LINE, NO ARV SHOWN AND NONE FOUND. NO DEFECTS FROM/ALONG SURFACE NOTED. CONFIRMED 6" PVC FORCE MAIN AT LOCATION PER PLANS AT MH 00214



Hogan Lift Station





Force Main Inspection Form

Work Order No.:

17420 W O I D

Inspector:

Date:

12 / 12 / 2017

CMR

FM Asset ID:

H O G A N L S

Lift Station ID:

1 1 7 3 7 2

Force Main Length:

1 9 4 4

Force Main Material:

Force Main Material:

HD-HDPE
DU-Ductile Iron
ASB-Asbestos
PVC-Plastic
OT-Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

FM Inspection Method:

☒ Visual ☐ CCTV ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

.

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material:

Surface Material

P=Paved
U=Unpaved

Distance from Lift Station:

Dist. From DS Discharge:

Defect GPS Latitude:

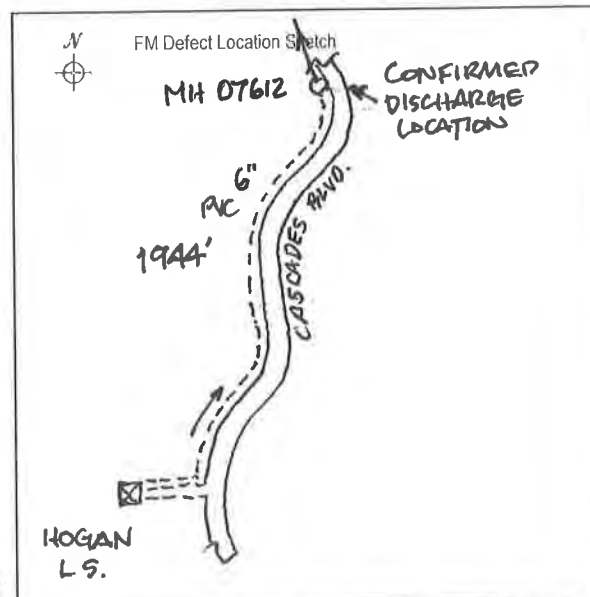
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Defect GPS Longitude:

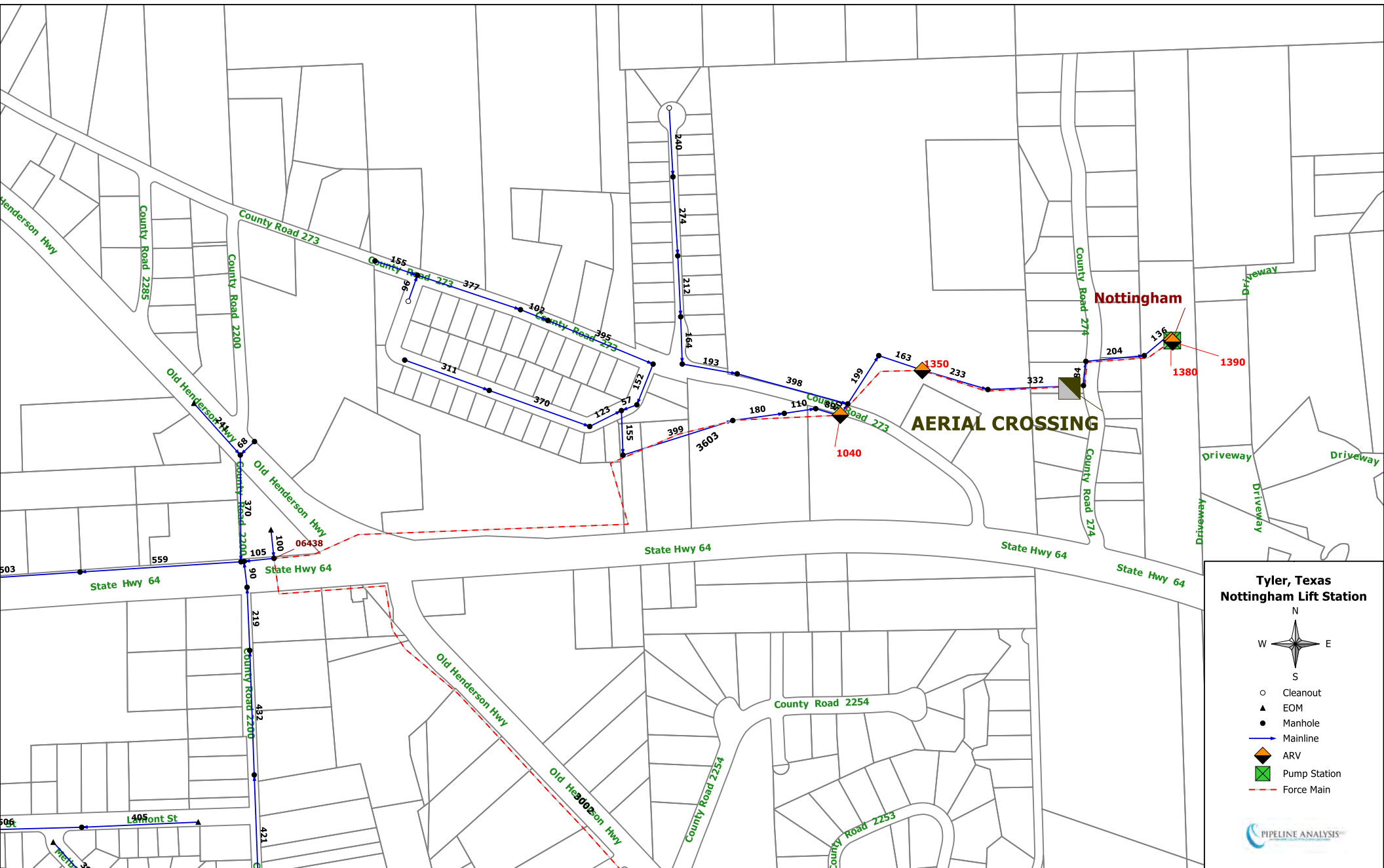
- .

Photo No.

Description



Comments NO ARV'S SHOWN ON PLANS. WALKED FORCE LINE. NO SURFACE DEFECTS NOTED. NO ARV'S LOCATED. CONFIRMED DISCHARGE LOCATION AS SHOWN ON PLANS. AT MH 07612 6 IRON @ LS, 6" PVC @ DISCHARGE MH.



Nottingham Lift Station



Air Release Valve (ARV) Inspection Form



Physical address of ARV: 9799 CR 274

Work Order No: W010 ARV Asset Code: 1350

Date of Inspection: 1/5/2018 Make and Model No.: APCO

Latitude Coordinates: Longitude Coordinates: -

Project Number: 17-420

Inspector: AA

Company: PA

FM Material ☐ Steel ☒ PVC
☐ HDPE ☐ Other

FM Diameter (in) 4

FM Crown Thickness (in)
(metal FM only measured) .

Rim-to-Invert Dist. (ft) 5.54

ARV Size (in)

MH Cover Size (in) 32

H2S Concentration 0

CONDITION

G= Good F=Fair P=Poor
C=Critical N=Not Applicable

FM Protective Coating:

Manhole Cover: G

Manhole Ring: G

MH/Vault Wall: G

MH/Vault Bench: G

ARV Pipe Strap -

ARV Body G

ARV bolts/nuts G

ARV Isolation valve F

ARV Drain valve F

- 1 Was the manhole/vault surcharged? ☐ Y ☒ N
- 2 Was the isolation valve exercised? ☒ Y ☐ N
- 3 Was the drainage valve exercised? ☒ Y ☐ N
- 4 Was an internal inspection conducted? ☒ Y ☐ N
- 5 Any visible leaks? ☐ Y ☒ N
- 6 Was air released from the valve? ☐ Y ☒ N
- 7 Were photos of the valve taken? ☒ Y ☐ N

PHOTO NO DESCRIPTION

17	AREA
18	INTERNAL
19	BODY - VALVES
20	LABEL
02	AERIAL CROSSING

Comments: CROWN OF FORCE LINE VISIBLE IN MH 2 VALVES WOULD NOT TURN, SEE PIC, MINOR RUST.

Signature:

NOTTINGHAM L. STA

Date: 1/5/18 Project: 17-420 W01D Basin: _____ Map No. _____ Crew: AA/LD

MH No.: ARV 1350 Address: 9799 CR 274

DS Length: _____ Asset Type: (M) CO EOL PS T Status: (O) CNL CNO B LG D N S H

Lid Type: (S) V B O _____ No. Vent Holes: _____ Asset Mat'l.: B (C) F SB SC O

Grade: X (A) B Inch: 13 Inflow Dish: Y (N) Condition: _____ Good _____ Defective Inflow Potential: (N) L M S

Area Photo: 17 Internal Photo: 18 Surface Cover: TW Surf. Mat'l.: P _____ Asphalt _____ Concrete U Debris: _____ in.

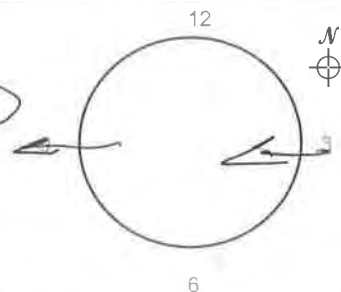
GPS: _____ MH Diameter: 48 Std.=48 inch
C.O. Diameter: _____ inch

Defects:

Def#	Photo	Loc	Type	Rate	Roots	I/I

General Comments:

NOTHING HAM
32" LID
MH DEPTH: 5.54
PIPE DEPTH: 5.33



Pipes:

Photo	In/Out	Size	Material	Clock	Depth	Drop	Surface Cov	Surface Mat'l	Debris	Connecting ID
	<u>D</u>	<u>6</u>	<u>PVC</u>	<u>9</u>	<u>5.33</u>		<u>TW</u>	<u>U</u>		<u>ARV 1040</u>

Map Update

N

VALVES WOULD NOT TURN
SEE PHOTOS 017, 018, 019 & 020
PHOTO 002 AERIAL CROSSING

Definitions:

Asset Type: M=Manhole; CO=Cleanout; EOL= End of Line; PS=Pump Station; T=Tee Connection

Status: Y=Yes; CNL=Could Not Locate; CNO=Can Not Open; B=Buried; S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner

Lid Type: S=Solid; V=Vented; B=Bolted; OT=Other (specify/comment)

Asset Mat'l: B=Brick; C=Concrete; F=Fiberglass; SB=Sealed Brick; SC=Sealed Concrete; O=Other (specify/comment)

Grade: X=At grade; A=Above; B=Below

Defect Rate: Light, Moderate, Severe

Roots: Light, Moderate, Severe

I/I Potential: N=None; L=Light; M=Moderate; S=Severe

Surface Cover: ST=Street; GU=Gutter; AL=Alley; DW=Driveway; SW=Sidewalk; FD=Field; TW=Trees/Woods; PL=Parking Lot; SH=Road Shoulder; DD=Drainage Ditch; CR=Creek; WB=Within Building; YD=Yard; OT=Other

Surface Mat'l: P=Paved (designate Asphalt or Concrete); U=Unpaved

Defect Location: LD=Lid; FR=Frame; FS=Frame Seal; CH=Chimney; CO=Cone; WA=Wall; ST=Steps; BN=Bench; PS=Pipe Seal; IN=Invert; CAP=Cleanout Cap; COP=Cleanout Pipe

Defect Type: BPS=Bad Pipe Seal; BRK=Broken; CRK=Cracked; CCL=Collapsed; DET=Deteriorated; HOL=Hole; JNT=Joint; LOO=Loose; MBR=Missing Brick or Mortar; MIS=Missing

Nottingham Lane FM & ARV Photos



ARV 1350 Nottingham Area and Manhole in Good Condition



ARV 1350 Nottingham Force Main Crown Visible in Manhole; (2) Valves on ARV



Nottingham Erosion



ARV 1350 Nottingham ARV With (2) Valves That Did Not Turn With Minor Rust
Nottingham Erosion

Pilot Lift Station



Air Release Valve (ARV) Inspection Form

Physical address of ARV: **NO # HWY 14**

Work Order No: **WO 1 D** ARV Asset Code: **1 2 6 0**

Date of Inspection: **1 / 4 / 20 1 8** Make and Model No.: **N**

Latitude Coordinates: **.** Longitude Coordinates: **-**

Project Number: **1 7 - 4 2 0**

Inspector: **A A**

Company: **P A**

- 1 Was the manhole/vault surcharged? ☐ Y ☒ N
- 2 Was the isolation valve exercised? ☐ Y ☒ N
- 3 Was the drainage valve exercised? ☐ Y ☒ N
- 4 Was an internal inspection conducted? ☒ Y ☐ N
- 5 Any visible leaks? ☐ Y ☒ N
- 6 Was air released from the valve? ☒ Y ☐ N
- 7 Were photos of the valve taken? ☒ Y ☐ N

FM Material ☒ Steel ☐ PVC
☐ HDPE ☐ Other

FM Diameter (in) **6**

FM Crown Thickness (in)
(metal FM only measured) **.**

Rim-to-Invert Dist. (ft) **2 . 4 8**

ARV Size (in) **-**

MH Cover Size (in) **1 5 x 2 4**

H2S Concentration **0**

CONDITION

G= Good F=Fair P=Poor
C=Critical N=Not Applicable
FM Protective Coating:

Manhole Cover: **G**

Manhole Ring: **-**

MH/Vault Wall: **G**

MH/Vault Bench: **G**

ARV Pipe Strap: **-**

ARV Body: **C**

ARV bolts/nuts: **C**

ARV Isolation valve:

ARV Drain valve:

PHOTO NO DESCRIPTION

06	AREA
07	INTERNAL
08	CORROSION

Comments: **FORCE LINE NOT VISIBLE IN VAULT
ONLY 1 VALVE, WOULD NOT OPERATE.
ARV RELEASED WHILE ON SITE.
VAULT IS 18" X 30" POLY VALVE BOX
MODERATE TO SEVERE BOLT & BODY
CORROSION.**

Signature: **PILOT L. STA**

PILOT

WEST



Manhole Form

1115 Main Street
Garland, Texas 75040
800-637-0164

Date: 1/4/18 Project: 17.420 W01D Basin: _____ Map No. _____ Crew: AA/LD

MH No.: ARV 1260

Address: HWY 14

DS Length: _____

Asset Type: M CO EOL PS T ARV Status: ☒ CNL ☐ CNO ☐ B ☐ LG ☐ D ☐ N ☐ S ☐ H

Lid Type: S ☒ B ☐ O _____

No. Vent Holes: _____

Asset Mat'l.: B ☒ C ☐ F ☐ SB ☐ SC ☐ O _____

Grade: X ☒ A ☐ B Inch: 2

Inflow Dish: Y ☒ N ☐ Condition: ☐ Good ☐ Defective

Inflow Potential: N L M S

Area Photo: 6

Internal Photo: 7

Surface Cover: SL

Surf. Mat'l.: P ☐ Asphalt ☒ Concrete U ☒ X

Debris: _____ in.

GPS: ☒

MH Diameter: ☒ Std.=48 inch

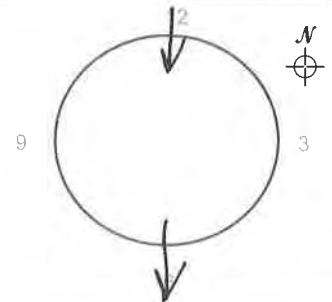
C.O. Diameter: _____ inch

Defects:

Def#	Photo	Loc	Type	Rate	Roots	I/I
	<u>8</u>	<u>ARV</u>	<u>DET</u>	<u>S</u>	<u>N</u>	<u>N</u>

General Comments:

18X30
VAULT



Pipes:

Photo	In/Out	Size	Material	Clock	Depth	Drop	Surface Cov	Surface Mat'l	Debris	Connecting ID
	<u>0</u>			<u>6</u>	<u>2.48</u>		<u>SL</u>	<u>U</u>		

Map Update



ARV ACTIVATED WHILE ON SITE.
BUT IS CORRODED
SEE PHOTOS.

Definitions:

Asset Type: M=Manhole; CO=Cleanout; EOL= End of Line; PS= Pump Station; T=Tee Connection

Status: Y=Yes; CNL=Could Not Locate; CNO=Can Not Open; B=Buried; S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner

Lid Type: S=Solid; V=Vented; B=Bolted; OT=Other (specify/comment)

Asset Mat'l: B=Brick; C=Concrete; F=Fiberglass; SB=Sealed Brick; SC=Sealed Concrete; O=Other (specify/comment)

Grade: X=At grade; A=Above; B=Below

Defect Rate: Light, Moderate, Severe

Roots: Light, Moderate, Severe

I/I Potential: N=None; L=Light; M=Moderate; S=Severe

Surface Cover: ST=Street; GU=Gutter; AL=Alley; DW=Driveway; SW=Sidewalk; FD=Field; TW=Trees/Woods; PL=Parking Lot; SH=Road Shoulder; DD=Drainage Ditch; CR=Creek; WB=Within Building; YD=Yard; OT=Other

Surface Mat'l: P=Paved (designate Asphalt or Concrete); U=Unpaved

Defect Location: LD=Lid; FR=Frame; FS=Frame Seal; CH=Chimney; CO=Cone; WA=Wall; ST=Steps; BN=Bench; PS=Pipe Seal; IN=Invert; CAP=Cleanout Cap; COP=Cleanout Pipe

Defect Type: BPS=Bad Pipe Seal; BRK=Broken; CRK=Cracked; CCL=Collapsed; DET=Deteriorated; HOL=Hole; JNT=Joint; LOO=Loose; MBR=Missing Brick or Mortar; MIS=Missing

Air Release Valve (ARV) Inspection Form

Physical address of ARV: 116 KENSHIRE DR

Work Order No: W010 ARV Asset Code: 1271A CHECK VAL

Date of Inspection: 1/4/2018 Make and Model No.: MMX

Latitude Coordinates: Longitude Coordinates: -

Project Number: 17-420

Inspector: AA

Company: PA

1. Was the manhole/vault surcharged? ☐ Y ☒ N
2. Was the isolation valve exercised? ☐ Y ☒ N
3. Was the drainage valve exercised? ☐ Y ☒ N
4. Was an internal inspection conducted? ☒ Y ☐ N
5. Any visible leaks? ☐ Y ☒ N
6. Was air released from the valve? ☐ Y ☒ N
7. Were photos of the valve taken? ☒ Y ☐ N

FM Material ☒ Steel ☐ PVC
☐ HDPE ☐ Other

FM Diameter (in) 6

FM Crown Thickness (in) (metal FM only measured) .

Rim-to-Invert Dist. (ft) 2.02

ARV Size (in)

MH Cover Size (in)

H2S Concentration

CONDITION

G= Good F=Fair P=Poor
C=Critical N=Not Applicable

FM Protective Coating:

Manhole Cover: G

Manhole Ring: N

MH/Vault Wall: G

MH/Vault Bench: G

ARV Pipe Strap: N

ARV Body: N

ARV bolts/nuts: N

ARV Isolation valve: N

ARV Drain valve: N

PHOTO NO DESCRIPTION

09	AREA
10	INTERNAL
21	VALVE LABEL
22	VALVE LABEL

Comments: VAULT IS 49"X65" W/ALUMINUM COVER
THIS IS A CHECK VALVE... NOT ARV.
VAULT DEPTH 4.14' PIPE DEPTH 2.02

Signature:

PILOT L. STA.

Manhole Form

1115 Main Street
 Garland, Texas 75040
 800-637-0164

Date: 1/4/18 Project: 17420 W01D Basin: _____ Map No. _____ Crew: AA/LP

MH No.: ARV 1271A Address: 116 KENSHIRE DR.

DS Length: 1,727 Asset Type: M CO EOL PS T ARV Status: (Y) CNL CNO B LG D N S H

Lid Type: (S) V B O _____ No. Vent Holes: _____ Asset Mat'l.: B O F SB SC O

Grade: X (A) B Inch: 2 Inflow Dish: (Y) (N) Condition: _____ Good _____ Defective Inflow Potential: (N) L M S

Area Photo: 9 Internal Photo: 10 Surface Cover: SH Surf. Mat'l.: P (Asphalt) U (Concrete) Debris: _____ in.

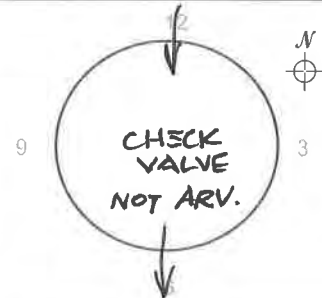
GPS: ✓ MH Diameter: _____ Std.=48 inch
 C.O. Diameter: _____ inch

Defects:

Def#	Photo	Loc	Type	Rate	Roots	I/I

General Comments:

VAULT DEPTH:
4.14
 VAULT 49"x65"
 PIPE DEPTH 2.02



Pipes:

Photo	In/Out	Size	Material	Clock	Depth	Drop	Surface Cov	Surface Mat'l	Debris	Connecting ID
	<u>O</u>		<u>IR</u>	<u>6</u>	<u>2.02</u>		<u>SH</u>	<u>✓</u>		<u>1260</u>

Map Update



NOTE: THIS IS CHECK VALVE
 NO AN ARV
 SEE PHOTOS 009, 010, 021 & 022

Definitions:

Asset Type: M=Manhole; CO=Cleanout; EOL= End of Line; PS= Pump Station; T= Tee Connection

Status: Y=Yes; CNL=Could Not Locate; CNO=Can Not Open; B=Buried; S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner

Lid Type: S=Solid; V=Vented; B=Bolted; OT=Other (specify/comment)

Asset Mat'l: B=Brick; C=Concrete; F=Fiberglass; SB=Sealed Brick; SC=Sealed Concrete; O=Other (specify/comment)

Grade: X=At grade; A=Above; B=Below

Defect Rate: Light, Moderate, Severe

Roots: Light, Moderate, Severe

I/I Potential: N=None; L=Light; M=Moderate; S=Severe

Surface Cover: ST=Street; GU=Gutter; AL=Alley; DW=Driveway; SW=Sidewalk; FD=Field; TW=Trees/Woods; PL=Parking Lot; SH=Road Shoulder; DD=Drainage Ditch; CR=Creek; WB=Within Building; YD=Yard; OT=Other

Surface Mat'l: P=Paved (designate Asphalt or Concrete); U=Unpaved

Defect Location: LD=Lid; FR=Frame; FS=Frame Seal; CH=Chimney; CO=Cone; WA=Wall; ST=Steps; BN=Bench; PS=Pipe Seal; IN=Invert; CAP=Cleanout Cap; COP=Cleanout Pipe

Defect Type: BPS=Bad Pipe Seal; BRK=Broken; CRK=Cracked; CCL=Collapsed; DET=Deteriorated; HOL=Hole; JNT=Joint; LOO=Loose; MBR=Missing Brick or Mortar; MIS=Missing

Air Release Valve (ARV) Inspection Form



Physical address of ARV: 12048 HWY 14

Work Order No: W010 ARV Asset Code: 1291

Date of Inspection: 1/4/2018 Make and Model No.: APCO

Latitude Coordinates: Longitude Coordinates: -

Project Number: 17-420

Inspector: AA

Company: PA

CONDITION
G= Good F=Fair P=Poor
C=Critical N=Not Applicable
FM Protective Coating:

Manhole Cover: G

Manhole Ring: N

MH/Vault Wall: G

MH/Vault Bench: G

ARV Pipe Strap: N

ARV Body: G

ARV bolts/nuts: G

ARV Isolation valve: N

ARV Drain valve: N

FM Material ☒ Steel ☐ PVC
☐ HDPE ☐ Other

FM Diameter (in) 6

FM Crown Thickness (in)
(metal FM only measured) .

Rim-to-Invert Dist. (ft) 1.72

ARV Size (in)

MH Cover Size (in) 14 x 24

H2S Concentration 0

1. Was the manhole/vault surcharged? ☐ Y ☒ N
2. Was the isolation valve exercised? ☐ Y ☒ N
3. Was the drainage valve exercised? ☐ Y ☒ N
4. Was an internal inspection conducted? ☒ Y ☐ N
5. Any visible leaks? ☐ Y ☒ N
6. Was air released from the valve? ☒ Y ☐ N
7. Were photos of the valve taken? ☒ Y ☐ N

PHOTO NO DESCRIPTION

11	AREA
12	INTERNAL
13	ARV TOP
14	ARV BODY

Comments: FORCE LINE NOT VISIBLE IN VAULT
VAULT IS 16"x 29" POLY/PLASTIC VALVE BOX
VALVE OPERATED WHILE ON SITE
NO VALVES ON BODY... LOCATIONS CAPPED

Signature: PILOT L STA.

Manhole Form

1115 Main Street
Garland, Texas 75040
800-637-0164

Date: 1/4/18 Project: 17-420 W01D Basin: _____ Map No. _____ Crew: AA/LP

MH No.: ARV 1291 Address: 12048 Hwy 14

DS Length: _____ Asset Type: M CO EOL PS T Status: Y CNL CNO B LG D N S H

Lid Type: S V B O _____ No. Vent Holes: 1 Asset Mat'l.: B C F SB SC PLASTIC

Grade: X A B Inch: 3 Inflow Dish: Y N Condition: Good Defective Inflow Potential: N L M S

Area Photo: 11 Internal Photo: 12 Surface Cover: SH Surf. Mat'l.: P Asphalt Concrete U Debris: _____ in.

GPS: _____ MH Diameter: _____ Std.=48 inch
C.O. Diameter: _____ inch

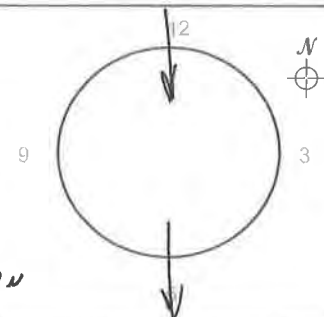
Defects:

Def#	Photo	Loc	Type	Rate	Roots	I/I

General Comments:

16 X 29 PLASTIC
VAULT

PILOT LIFT STATION



Pipes:

Photo	In/Out	Size	Material	Clock	Depth	Drop	Surface Cov	Surface Mat'l	Debris	Connecting ID
	<u>O</u>			<u>6</u>	<u>1.72</u>		<u>SH</u>	<u>V</u>		<u>ARV 1280</u>

Map Update



VALVE LOCATIONS ARE CAPPED.
ARV OPERATED WHILE ON SITE

SEE PHOTOS 011, 012, 013 & 014

PILOT LS

Definitions:

Asset Type: M=Manhole; CO=Cleanout; EOL= End of Line; PS= Pump Station; T=Tee Connection

Status: Y=Yes; CNL=Could Not Locate; CNO=Can Not Open; B=Buried; S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner

Lid Type: S=Solid; V=Vented; B=Bolted; OT=Other (specify/comment)

Asset Mat'l: B=Brick; C=Concrete; F=Fiberglass; SB=Sealed Brick; SC=Sealed Concrete; O=Other (specify/comment)

Grade: X=At grade; A=Above; B=Below

Defect Rate: Light, Moderate, Severe

Roots: Light, Moderate, Severe

I/I Potential: N=None; L=Light; M=Moderate; S=Severe

Surface Cover: ST=Street; GU=Gutter; AL=Alley; DW=Driveway; SW=Sidewalk; FD=Field; TW=Trees/Woods; PL=Parking Lot; SH=Road Shoulder; DD=Drainage Ditch; CR=Creek; WB=Within Building; YD=Yard; OT=Other

Surface Mat'l: P=Paved (designate Asphalt or Concrete); U=Unpaved

Defect Location: LD=Lid; FR=Frame; FS=Frame Seal; CH=Chimney; CO=Cone; WA=Wall; ST=Steps; BN=Bench; PS=Pipe Seal; IN=Invert; CAP=Cleanout Cap; COP=Cleanout Pipe

Defect Type: BPS=Bad Pipe Seal; BRK=Broken; CRK=Cracked; CCL=Collapsed; DET=Deteriorated; HOL=Hole; JNT=Joint; LOO=Loose; MBR=Missing Brick or Mortar; MIS=Missing

Pilot Truck FM & ARV Photos



ARV 1260 Pilot Area and Vault in Good Condition



ARV 1260 Pilot Force Main Not Visible in Manhole; (1)
Valve Not Operable



ARV 1260 Pilot ARV With Moderate to Severe
Corrosion on Bolt and Body



ARV 1271 Pilot Area and Vault in Good Condition



ARV 1271 Pilot Check Valve in Good Condition



ARV 1291 Pilot Area and Vault in Good Condition



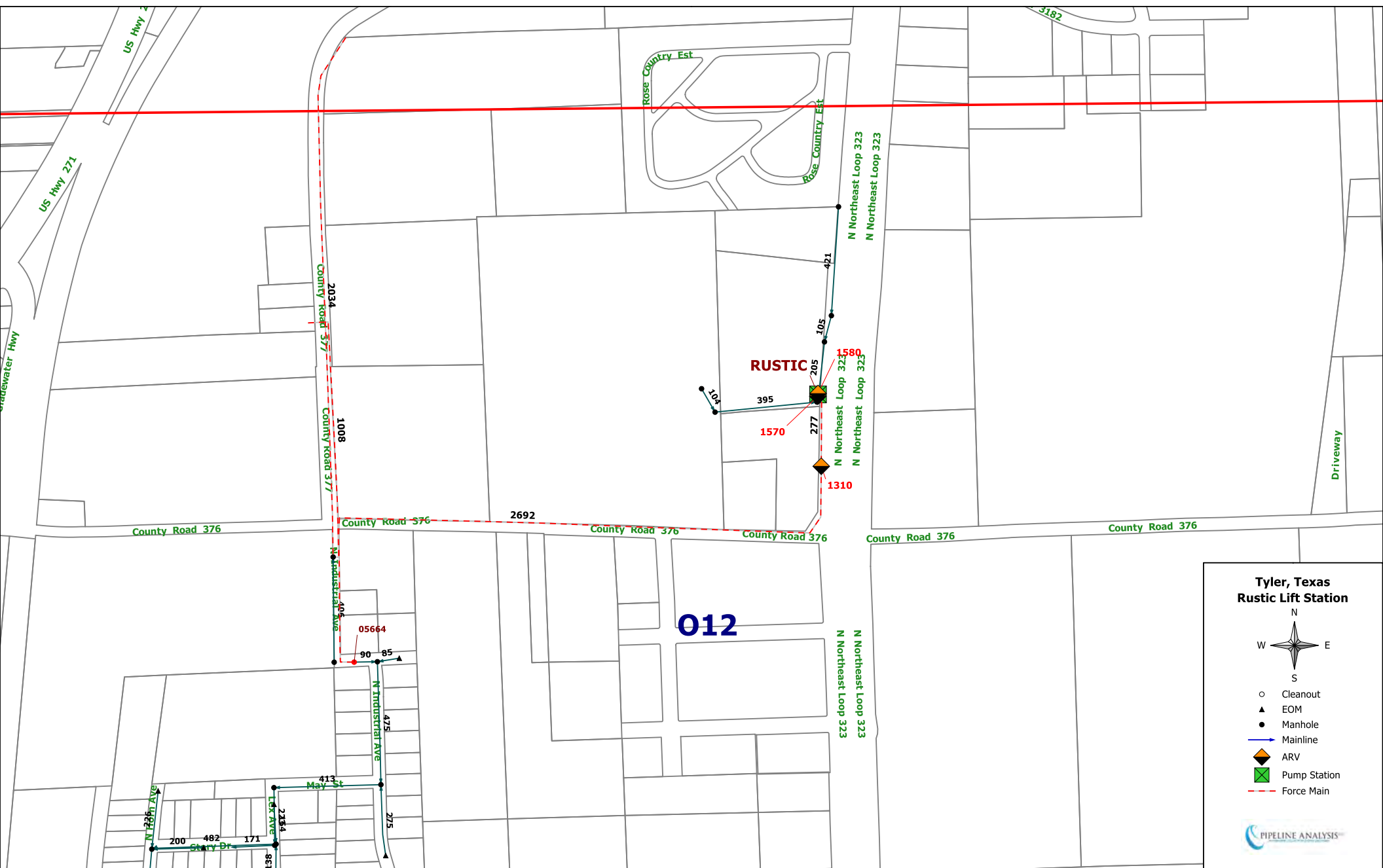
ARV 1291 Pilot Force Main Not Visible in Vault; ARV Operated While on Site, Valve Locations Capped



ARV 1291 Pilot Top of ARV



ARV 1291 Pilot Arv Body with Capped Valve Locations



Rustic Park Lift Station





Force Main Inspection Form

Work Order No.:

17420 WO10

Inspector:

CMR

Date:

12/12/2017

FM Asset ID:

RUSTIC LS

Lift Station ID:

117356

Force Main Length:

3375

Force Main Material:

HD-HDPE
DU-Ductile Iron
ASB-Asbestos
PVC-Plastic
OT-Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

Force Main Material:

FM Inspection Method:

☒ Visual ☐ CCTV ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential
N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material:

Surface Material
P=Paved
U=Unpaved

Distance from Lift Station:

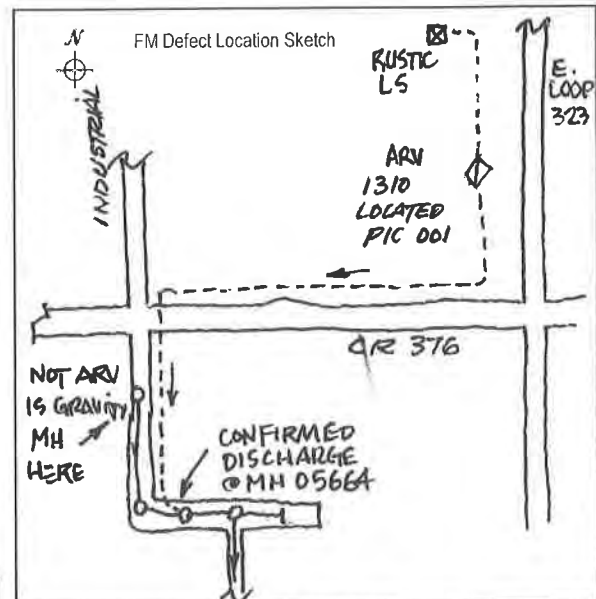
Dist. From DS Discharge:

Defect GPS Latitude:

Defect GPS Longitude:

Photo No.

Description



Comments WALKED FORCE LINE LOCATED ARV 1310... ARV 1340 DNE.. THERE IS GRAVITY MH AT THAT LOCATION SHOWN. NO DEFECTS NOTED ALONG FORCE LINE. DISCHARGE CONFIRMED PER PLANS 4" PVC. AT MH 05664

Air Release Valve (ARV) Inspection Form

Physical address of ARV: 3 2 8 4 N E L O O P 3 2 3

Work Order No: W 0 1 0 ARV Asset Code: 1 3 1 0

Date of Inspection: 1 / 0 5 / 2 0 1 8 Make and Model No.: -

Latitude Coordinates: Longitude Coordinates: -

Project Number: 1 7 - 4 2 0

Inspector: A A

Company: P A

1. Was the manhole/vault surcharged? ☐ Y ☒ N
2. Was the isolation valve exercised? ☒ Y ☐ N
3. Was the drainage valve exercised? ☒ Y ☐ N
4. Was an internal inspection conducted? ☒ Y ☐ N
5. Any visible leaks? ☐ Y ☒ N
6. Was air released from the valve? ☐ Y ☒ N
7. Were photos of the valve taken? ☒ Y ☐ N

FM Material ☐ Steel ☒ PVC
☐ HDPE ☐ Other

FM Diameter (in) 4

FM Crown Thickness (in)
(metal FM only measured) .

Rim-to-Invert Dist. (ft) 4 . 4 7

ARV Size (in)

MH Cover Size (in) 2 4

H2S Concentration 0

CONDITION

G= Good F=Fair P=Poor
C=Critical N=Not Applicable

FM Protective Coating:

Manhole Cover: G

Manhole Ring: G

MH/Vault Wall: G

MH/Vault Bench: G

ARV Pipe Strap F

ARV Body F

ARV bolts/nuts F

ARV Isolation valve F

ARV Drain valve F

PHOTO NO DESCRIPTION

15	AREA
16	INTERNAL

Comments: FORCE LINE VISIBLE IN MH
4" PVC . DEPTH TO TOP OF PIPE
MODERATE CORROSION ON ARV PIPE STRAP
MINOR RUST ON 3 VALVES
NO MFG./MODEL VISIBLE
UPPER & MIDDLE VALVES TURN 1/2
LOWER VALVE SPINS .
Signature: _____
RUSTIC L. STA.



Manhole Form

1115 Main Street
Garland, Texas 75040
800-637-0164

Date: 1/5/18 Project: 17-420 W010 Basin: Map No. Crew:

MH No.: ARV 1310

Address: 3284 N. E. Loop 323

DS Length:

Asset Type: M CO EOL PS T

Status: Y CNL CNO B LG D N S H

Lid Type: S V B O

No. Vent Holes: 2

Asset Mat'l.: B C F SB SC O

Grade: X A B Inch: 13

Inflow Dish: Y N Condition: Good Defective

Inflow Potential: N M S

Area Photo: 15

Internal Photo: 16

Surface Cover: 10

Surf. Mat'l.: P Asphalt Concrete U

Debris: in.

GPS:

MH Diameter: 49 Std.=48 inch

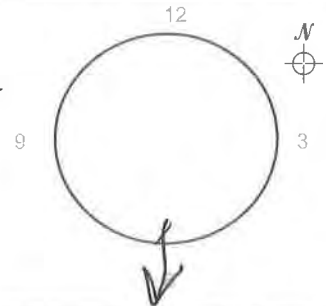
C.O. Diameter: inch

Defects:

Def#	Photo	Loc	Type	Rate	Roots	I/I

General Comments:

MH DEPTH: 4.47



Pipes:

Photo	In/Out	Size	Material	Clock	Depth	Drop	Surface Cov	Surface Mat'l	Debris	Connecting ID
	D				4.47		SH	L		0000

Map Update



TOP VALVE WAS CLOSED AND
TURNED HALF WAY.
MIDDLE VALVE WAS CLOSED AND TURNED
HALF WAY.
BOTTOM VALVE KEPT TURNING.
4" PVC PIPE

Definitions:

Asset Type: M=Manhole; CO=Cleanout; EOL= End of Line; PS= Pump Station; T= Tee Connection

Status: Y=Yes; CNL=Could Not Locate; CNO=Can Not Open; B=Buried; S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner

Lid Type: S=Solid; V=Vented; B=Bolted; OT=Other (specify/comment)

Asset Mat'l: B=Brick; C=Concrete; F=Fiberglass; SB=Sealed Brick; SC=Sealed Concrete; O=Other (specify/comment)

Grade: X=At grade; A=Above; B=Below

Defect Rate: Light, Moderate, Severe

Roots: Light, Moderate, Severe

I/I Potential: N=None; L=Light; M=Moderate; S=Severe

Surface Cover: ST=Street; GU=Gutter; AI=Alley; DW=Driveway; SW=Sidewalk; FD=Field; TW=Trees/Woods; PL=Parking Lot; SH=Road Shoulder; DD=Drainage Ditch; CR=Creek; WB=Within Building; YD=Yard; OT=Other

Surface Mat'l: P=Paved (designate Asphalt or Concrete); U=Unpaved

Defect Location: LD=Lid; FR=Frame; FS=Frame Seal; CH=Chimney; CO=Cone; WA=Wall; ST=Steps; BN=Bench; PS=Pipe Seal; IN=Invert; CAP=Cleanout Cap; COP=Cleanout Pipe

Defect Type: BPS=Bad Pipe Seal; BRK=Broken; CRK=Cracked; CCL=Collapsed; DET=Deteriorated; HOL=Hole; JNT=Joint; LOO=Loose; MBR=Missing Brick or Mortar; MIS=Missing

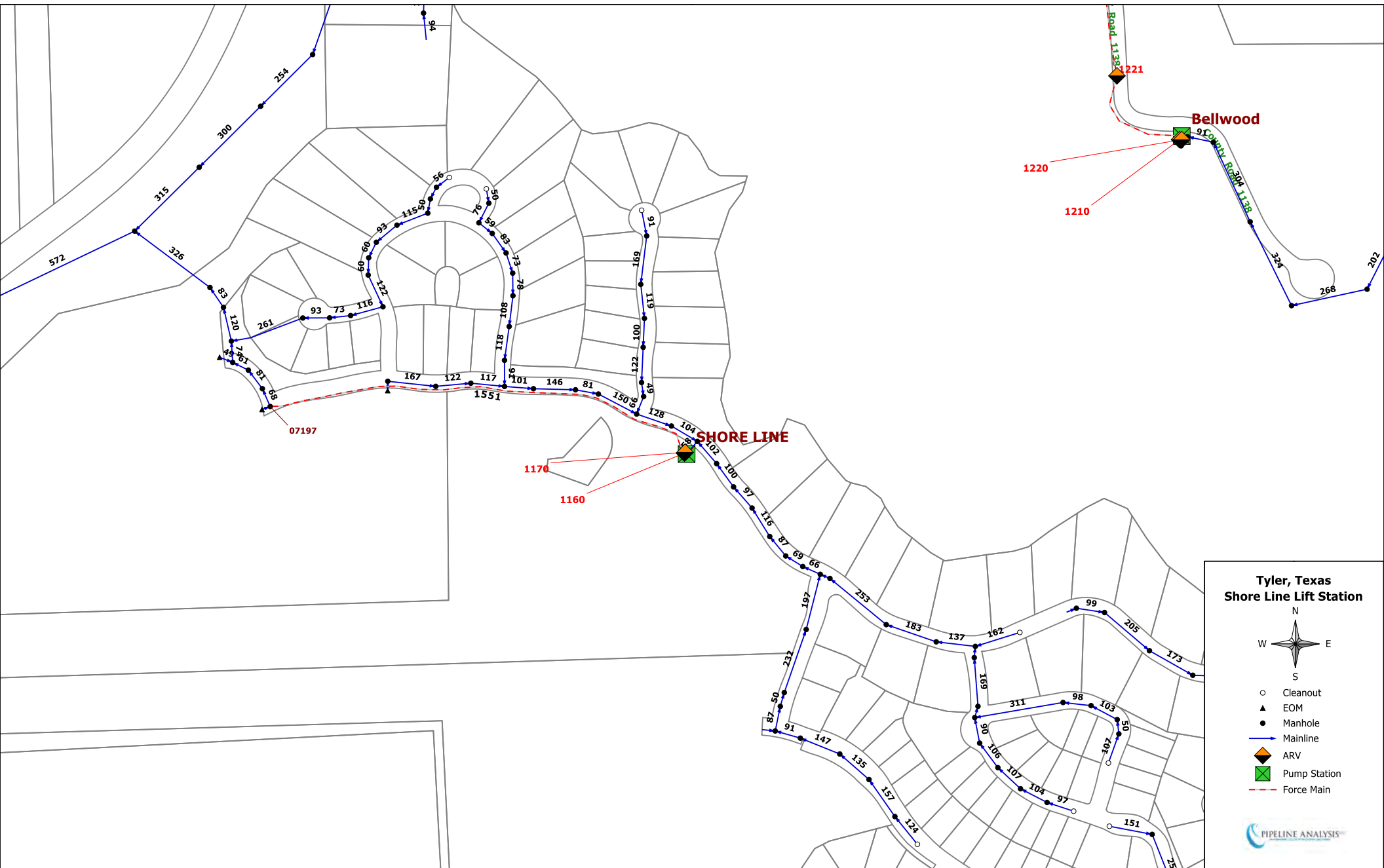
Rustic Park FM & ARV Photos



ARV 1310 Rustic Area and Manhole in Good Condition



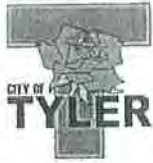
ARV 1310 Rustic Force Main Line Visible in Manhole;
Moderate Corrosion on ARV Pipe Strap with Minor
Rust on (3) Valves



Shoreline Drive Lift Station



WEST



Force Main Inspection Form

Work Order No.:

1 7 4 2 0 W O I D

Inspector:

Date:

1 2 / 1 2 / 2 0 1 7

C M R

FM Asset ID:

S H O R E L I N E L S

Lift Station ID:

1 1 1 1 1 4

Force Main Length:

1 5 5 1

Force Main Material:

Force Main Material:

HD=HDPE
DU=Ductile Iron
ASB=Asbestos
PVC=Plastic
OT=Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

FM Inspection Method:

☒ Visual ☐ CCTV ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

.

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material

P=Paved
U=Unpaved

Surface Material:

Distance from Lift Station:

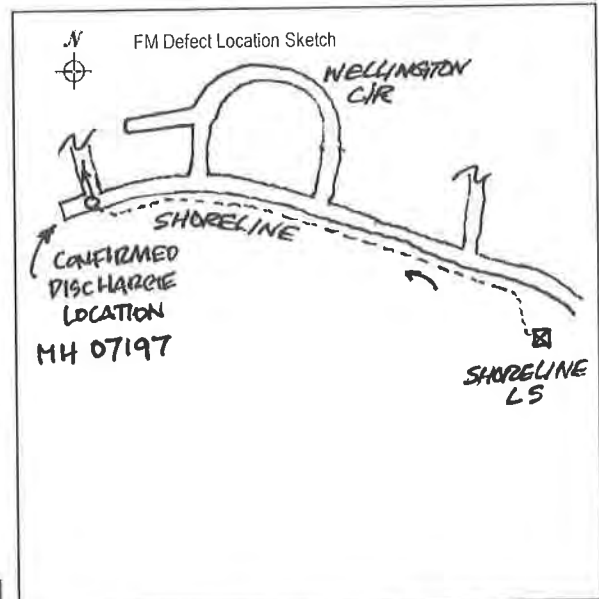
Dist. From DS Discharge:

Defect GPS Latitude:

Defect GPS Longitude:

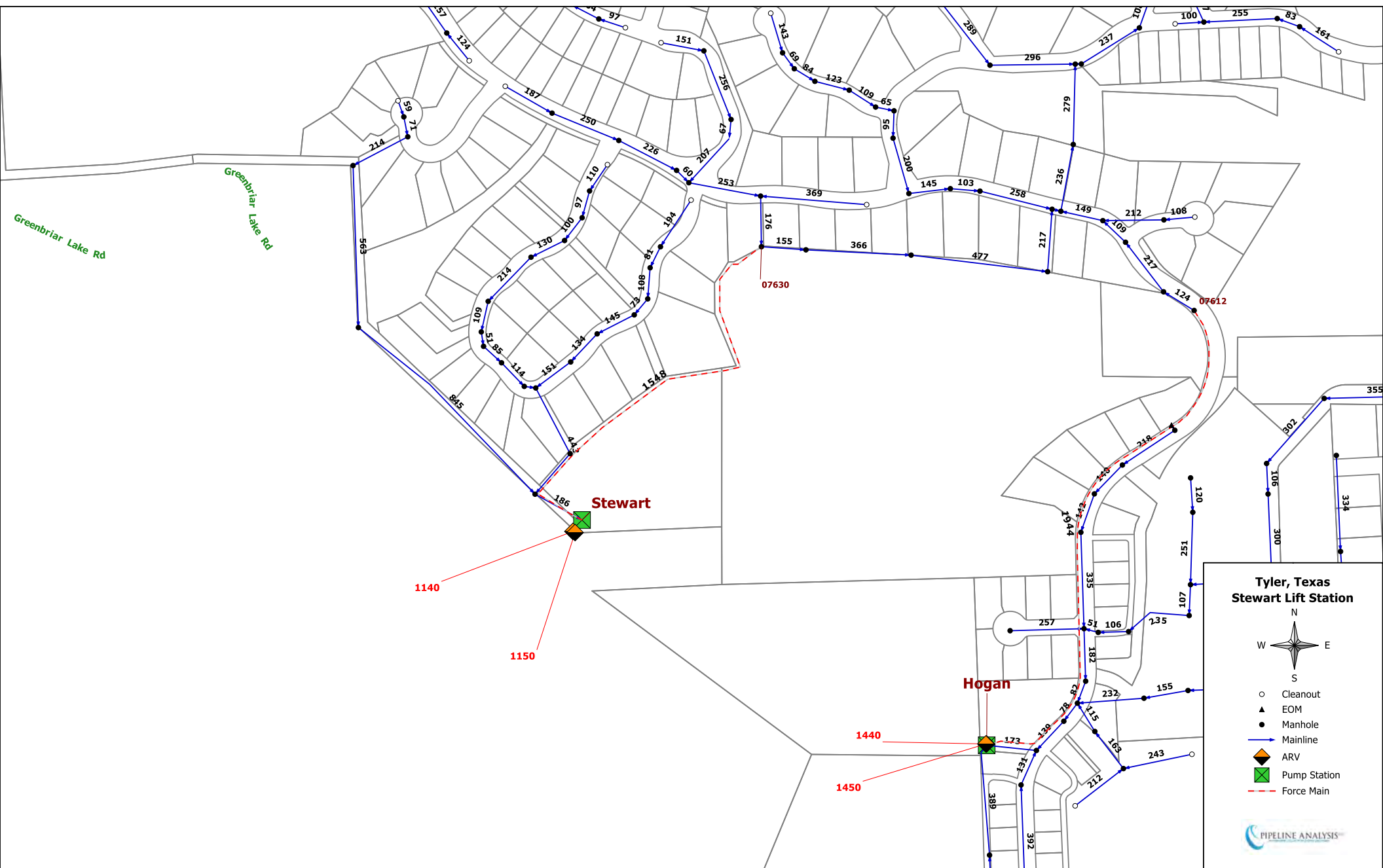
Photo No.

Description



Comments WALKED FORCE LINE, NO ARV SHOWN ON PLANS... NONE LOCATED. NO DEFECTS ALONG FORCE LINE.

CONFIRMED DISCHARGE LOCATION AT MH 07197



Stewart Lift Station





Force Main Inspection Form

Work Order No.:

17420 W01D
12/12/2017

Inspector:

CMR

FM Asset ID:

STEWART LS

Lift Station ID:

117374

Force Main Length:

1548

Force Main Material:

Force Main Material:

HD-HDPE
DU-Ductile Iron
ASB-Asbestos
PVC-Plastic
OT-Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

FM Inspection Method:

☒ Visual ☐ CCTV ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material

P=Paved
U=Unpaved

Surface Material:

Distance from Lift Station:

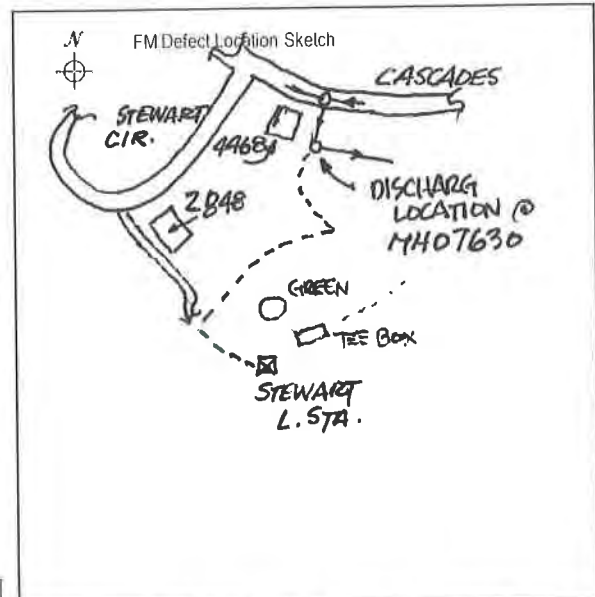
Dist. From DS Discharge:

Defect GPS Latitude:

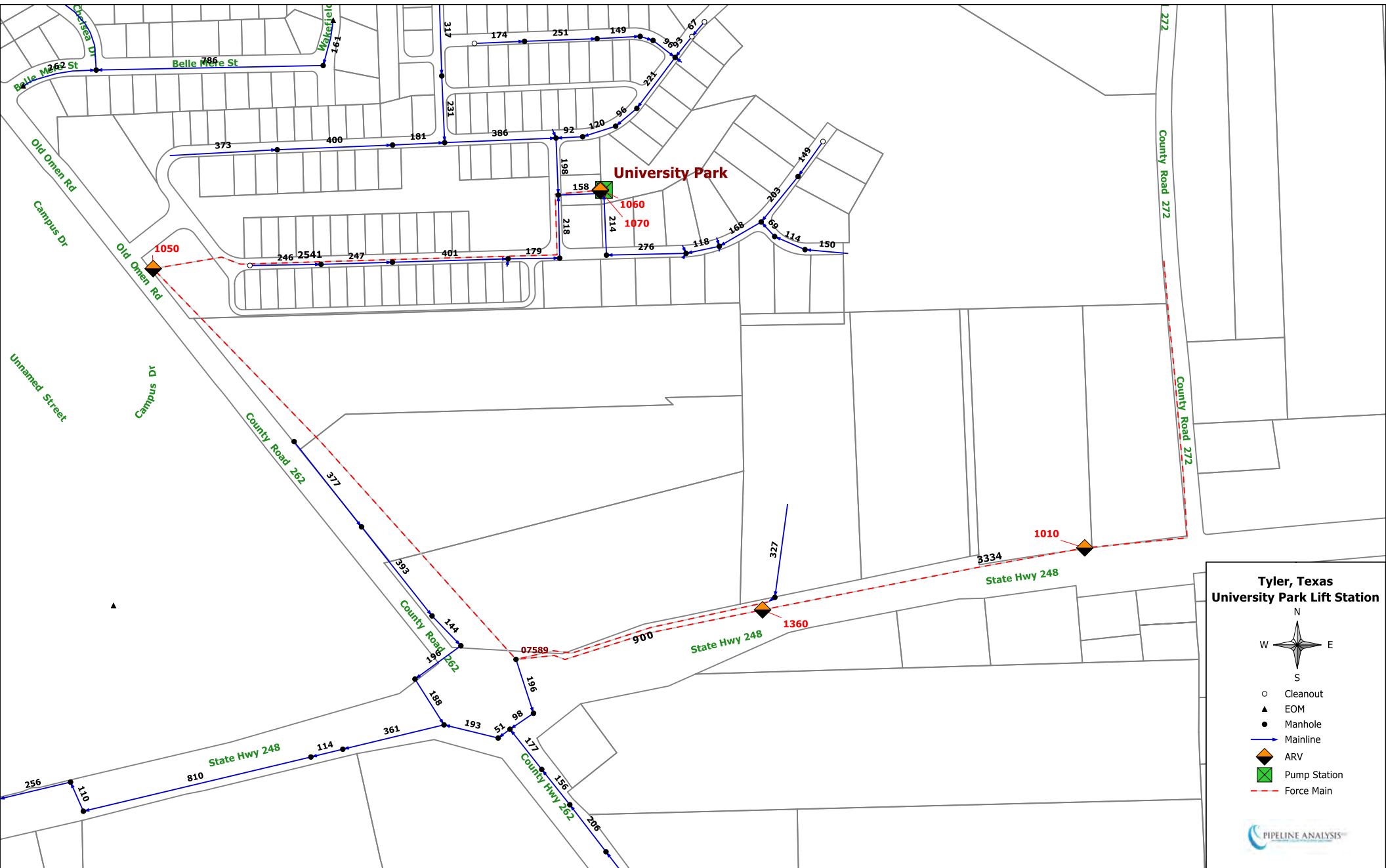
Defect GPS Longitude:

Photo No.

Description

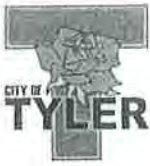


Comments: WALKED FORCE LINE ... NO ARV SHOWN ON PLANS ... NONE LOCATED
NO SURFACE DEFECTS NOTED
4" PVC DISCHARGE CONFIRMED AS SHOWN ON PLANS AT MH 07630



University Park Lift Station





Force Main Inspection Form

Work Order No.:

17420 W01D

Inspector:

AA

Date:

12/16/2017

FM Asset ID:

UNIVERSITY PARK

Lift Station ID:

1060

Force Main Length:

2541

Force Main Material:

Force Main Material:

HD-HDPE
DU-Ductile Iron
ASB-Asbestos
PVC-Plastic
OT-Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

FM Inspection Method:

☒ Visual ☐ CCTV ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material

P=Paved
U=Unpaved

Surface Material:

Distance from Lift Station:

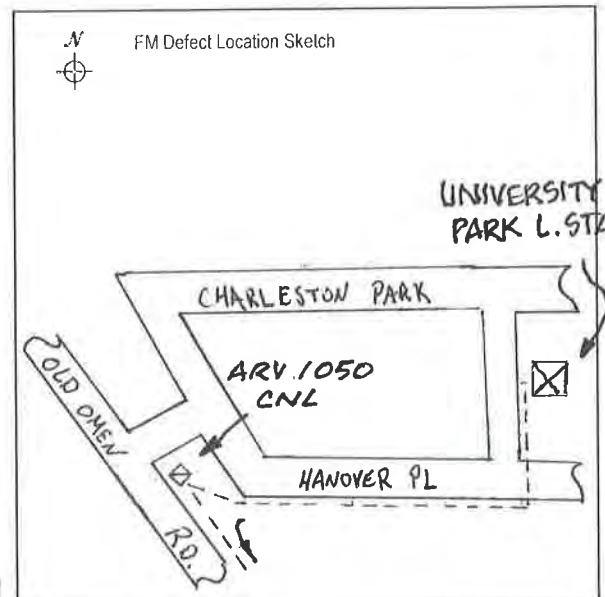
Dist. From DS Discharge:

Defect GPS Latitude:

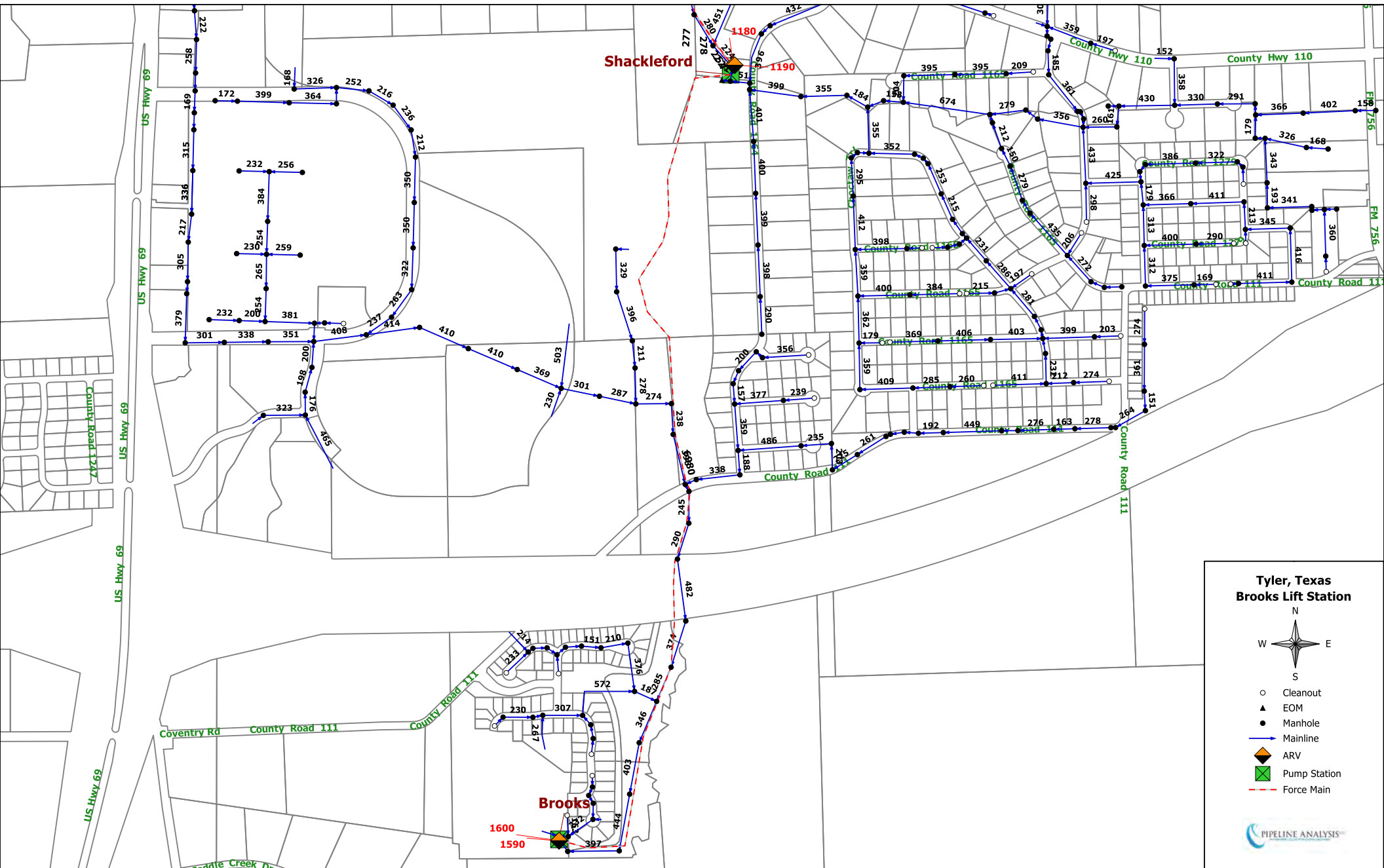
Defect GPS Longitude:

Photo No.

Description

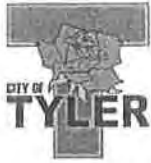


Comments WALKED FORCE MAIN .
NO SURFACE DEFECT NOTED
COUL NOT LOCATE ARV 1050
CONFIRMED DISCHARGE
LOCATION @ MH 07589



Brooks Lift Station





Force Main Inspection Form

Work Order No.:

17420 W01D

Inspector:

AA

Date:

01/09/2018

FM Asset ID:

BROOKS L STA

Lift Station ID:

1600

Force Main Length:

Force Main Material:

Force Main Material:

HD-HDPE
DU-Ductile Iron
ASB-Asbestos
PVC-Plastic
OT-Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

FM Inspection Method:

☒ Visual ☐ CCTV ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

.

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material

P=Paved
U=Unpaved

Surface Material:

Distance from Lift Station:

Dist. From DS Discharge:

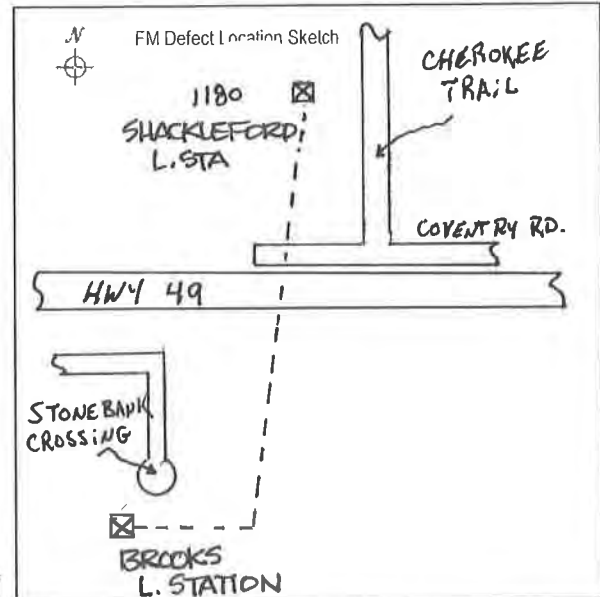
Defect GPS Latitude:

Defect GPS Longitude:

-

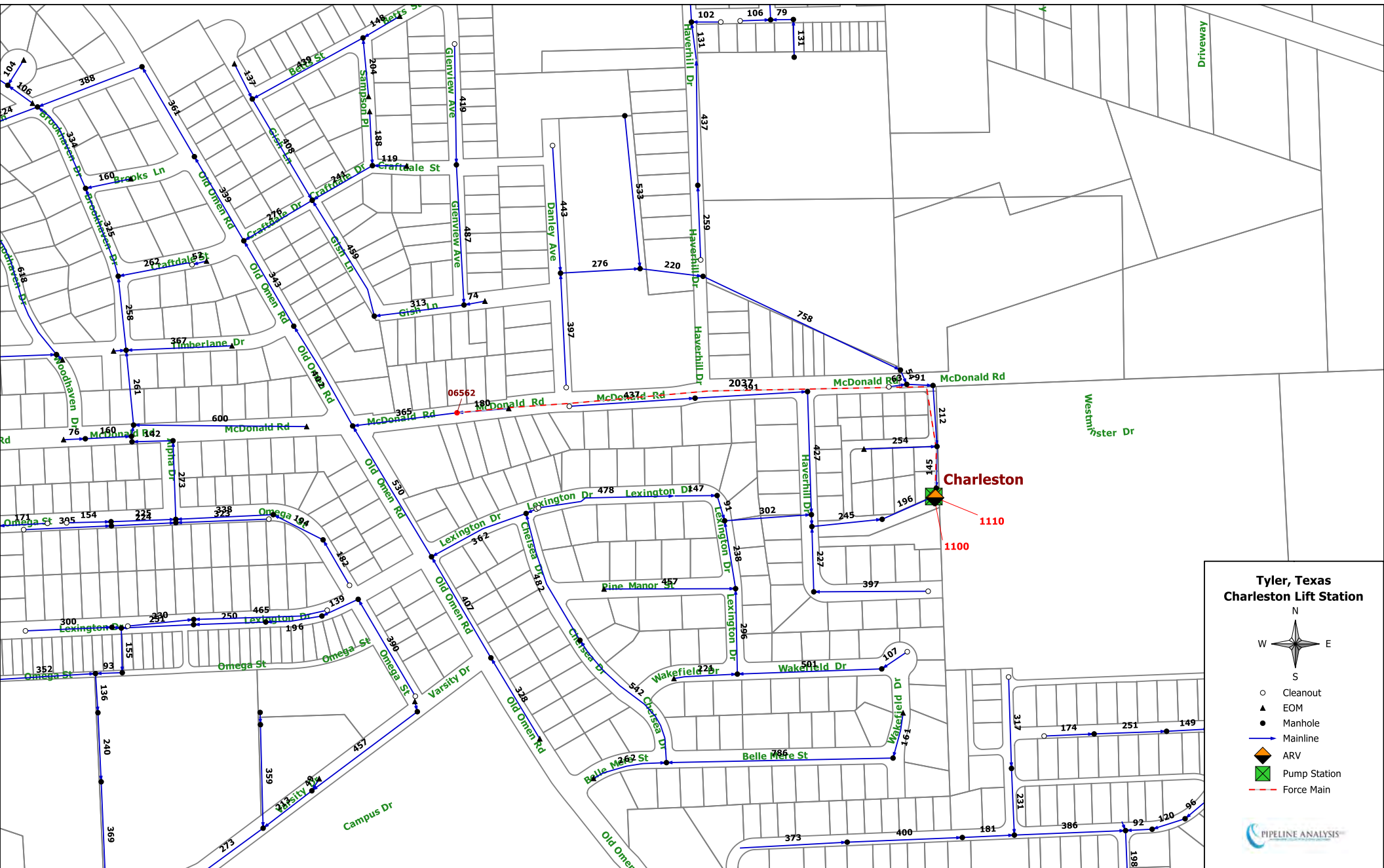
Photo No.

Description



Comments

WALKED FORCE MAIN.
NO ARV LOCATED, NONE SHOWN
ON PLANS.
NO SURFACE DEFECTS NOTED.



Charleston Lift Station





Force Main Inspection Form

Work Order No.:

17420 W01D

Inspector:

Date:

12/16/2017

AA

FM Asset ID:

CHARLESTON L STA

Lift Station ID:

1110

Force Main Length:

2037

Force Main Material:

Force Main Material:

HD=HDPE
DU=Ductile Iron
ASB=Asbestos
PVC=Plastic
OT=Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

FM Inspection Method:

☒ Visual
 ☐ CCTV
 ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material:

Surface Material

P=Paved
U=Unpaved

Distance from Lift Station:

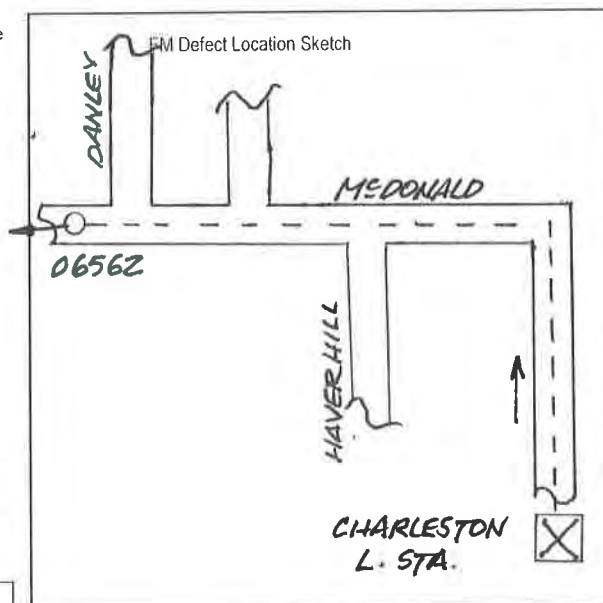
Dist. From DS Discharge:

Defect GPS Latitude:

Defect GPS Longitude:

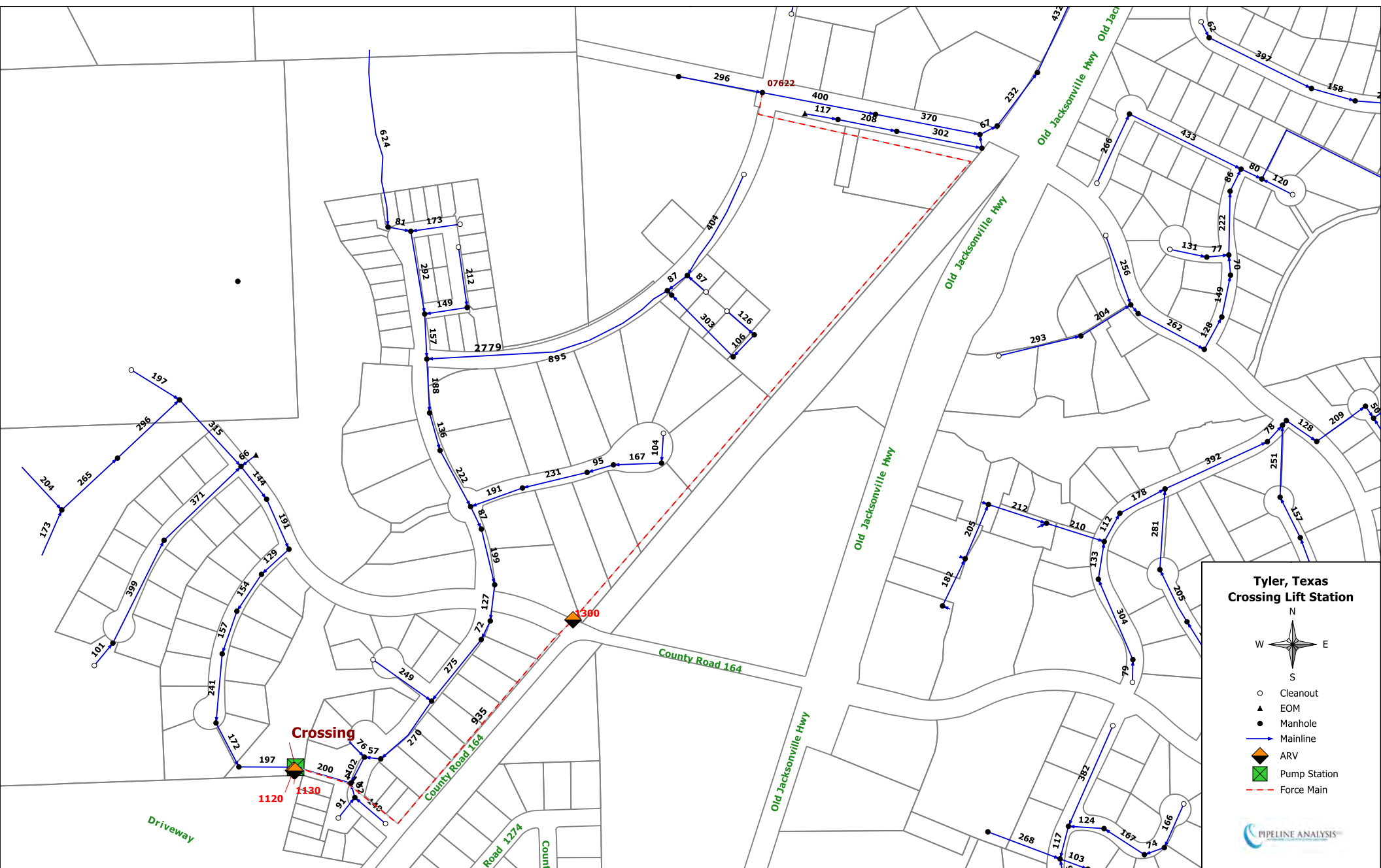
Photo No.

Description



Comments

WALKED FORCE MAIN
NO ARV LOCATED.
NO SURFACE DEFECTS NOTED
CONFIRMED DISCHARGE LOCATION
AT MH 06562 6" PVC



The Crossings Lift Station





Force Main Inspection Form

Work Order No.:

1	7	4	2	0	W	0	1	D	
0	1	/	0	9	/	2	0	1	8

Inspector:

A	A		
---	---	--	--

FM Asset ID:

C	R	O	S	S	I	N	G	L	S	T	A		
---	---	---	---	---	---	---	---	---	---	---	---	--	--

Lift Station ID:

1	1	2	0						
---	---	---	---	--	--	--	--	--	--

Force Main Length:

2	4	1	7
---	---	---	---

Force Main Material:

--	--	--

Force Main Material:

HD=HDPE
DU=Ductile Iron
ASB=Asbestos
PVC=Plastic
OT=Other

FM Inspection Method:

☒ Visual ☐ CCTV ☐ Other

FM Pipe Class:

--	--	--	--	--	--	--	--

FM Pipe Wall Thickness (new):

--	--	--	--	--	--	--	--

Defect No.:

--	--

Defect Address:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Defect Location:

--	--	--

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

--	--	--

Leak Potential:

--	--

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

--	--

Surface Material

P=Paved
U=Unpaved

Surface Material:

--	--

Distance from Lift Station:

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Dist. From DS Discharge:

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Defect GPS Latitude:

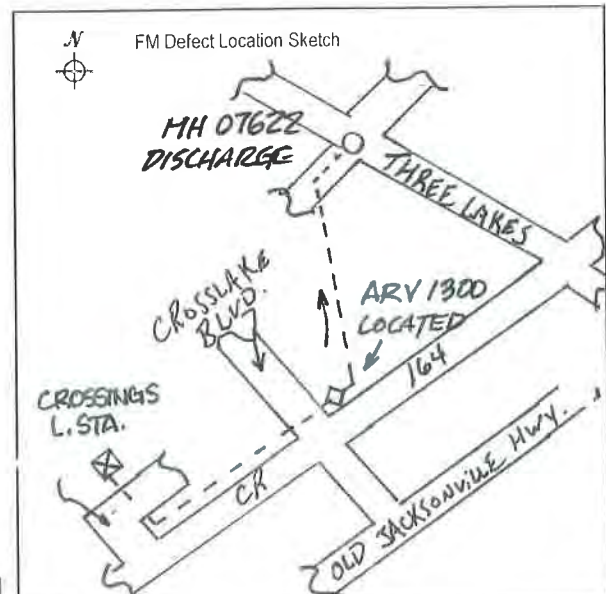
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Defect GPS Longitude:

-							
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Photo No.

Description



Comments

WALKED FORCE MAIN.
LOCATED ARV 1300 .. FULL OF WATER
NO SURFACE DEFECTS NOTED.
CONFIRMED DISCHARGE AT MH
07622 6" PVC.

Air Release Valve (ARV) Inspection Form

Physical address of ARV: **7522 CROSS RD**

Work Order No: **17420 W010** ARV Asset Code: **1300**

Date of Inspection: **2/27/2018** Make and Model No.: **APCO**

Latitude Coordinates: **-** Longitude Coordinates: **-**

Project Number: **17-420**

Inspector: **AA**

Company: **PA**



CONDITION

G= Good F=Fair P=Poor
C=Critical N=Not Applicable
FM Protective Coating: **N**

Manhole Cover: **G**
Manhole Ring: **G**
MH/Vault Wall: **G**
MH/Vault Bench: **G**
ARV Pipe Strap: **G**
ARV Body: **G**
ARV bolts/nuts: **G**
ARV Isolation valve: **F**
ARV Drain valve: **N**

- 1 Was the manhole/vault surcharged? ☒ Y ☐ N
- 2 Was the isolation valve exercised? ☒ Y ☐ N
- 3 Was the drainage valve exercised? ☐ Y ☒ N
- 4 Was an internal inspection conducted? ☒ Y ☐ N
- 5 Any visible leaks? ☐ Y ☒ N
- 6 Was air released from the valve? ☐ Y ☒ N
- 7 Were photos of the valve taken? ☒ Y ☐ N

FM Material ☐ Steel ☒ PVC
☐ HDPE ☐ Other

FM Diameter (in) **6**
FM Crown Thickness (in)
(metal FM only measured) **.**
Rim-to-Invert Dist. (ft) **4.60**
ARV Size (in) **24**
MH Cover Size (in) **24**
H2S Concentration **0**

PHOTO NO DESCRIPTION

01	AREA
02	INTERNAL
03	ARV
04	VALVE

Comments: **STRUCTURE WAS PUMPED OUT.
PIPE DEPTH 4.60', MH DEPTH 5.94'.
ONE VALVE WOULD NOT TURN.
DID NOT RELEASE AIR WHILE ON SITE.
NO ARV SIZE OR MODEL VISIBLE.**

Signature: **CROSSINGS L. STA.**

Manhole Form

1115 Main Street
Garland, Texas 75040
800-637-0164

Date: 1/11/18 Project: 17-420 W/OID FM Basin: Map No. Crew: AA/LD

MH No.: ARV 1300

Address: 2400 CR 164

DS Length: /

Asset Type: M CO EOL PS T

Status: CNL CNO B LG D N S H

Lid Type: S V B O

No. Vent Holes:

Asset Mat'l.: B C F SB SC O

Grade: X A B Inch:

Inflow Dish: Y N Condition: Good Defective

Inflow Potential: N L M S

Area Photo: 29/7

Internal Photo: 30/8

Surface Cover: 51

Surf. Mat'l.: P Asphalt Concrete U

Debris: in.

GPS:

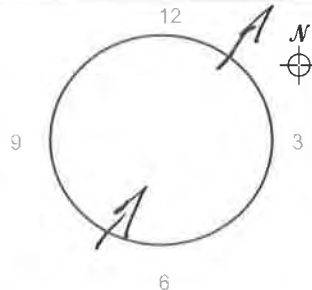
MH Diameter: 48 Std.=48 inch

C.O. Diameter: inch

Defects:

Def#	Photo	Loc	Type	Rate	Roots	I/I

General Comments:

MH SURCHARGED.
UNABLE TO SEE
PIPE OR VALVES

Pipes:

Photo	In/Out	Size	Material	Clock	Depth	Drop	Surface Cov	Surface Mat'l	Debris	Connecting ID
	D		/	2	5.88		40	U		

Map Update



STRUCTURE FULL OF WATER.

CROSSING L. STA.

Definitions:

Asset Type: M=Manhole; CO=Cleanout; EOL= End of Line; PS= Pump Station; T=Tee Connection

Status: Y=Yes; CNL=Could Not Locate; CNO=Can Not Open; B=Buried; S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner

Lid Type: S=Solid; V=Vented; B=Bolted; OT=Other (specify/comment)

Asset Mat'l: B=Brick; C=Concrete; F=Fiberglass; SB=Sealed Brick; SC=Sealed Concrete; O=Other (specify/comment)

Grade: X=At grade; A=Above; B=Below

Defect Rate: Light, Moderate, Severe

Roots: Light, Moderate, Severe

I/I Potential: N=None; L=Light; M=Moderate; S=Severe

Surface Cover: ST=Street; GU=Gutter; AL=Alley; DW=Driveway; SW=Sidewalk; FD=Field; TW=Trees/Woods; PL=Parking Lot; SH=Road Shoulder; DD=Drainage Ditch; CR=Creek; WB=Within Building; YD=Yard; OT=Other

Surface Mat'l: P=Paved (designate Asphalt or Concrete); U=Unpaved

Defect Location: LD=Lid; FR=Frame; FS=Frame Seal; CH=Chimney; CO=Cone; WA=Wall; ST=Steps; BN=Bench; PS=Pipe Seal; IN=Invert; CAP=Cleanout Cap; COP=Cleanout Pipe

Defect Type: BPS=Bad Pipe Seal; BRK=Broken; CRK=Cracked; CCL=Collapsed; DET=Deteriorated; HOL=Hole; JNT=Joint; LOO=Loose; MBR=Missing Brick or Mortar; MIS=Missing

Crossing FM & ARV Photos



ARV 1300 Crossings Manhole and Area in Good Condition, Minor Corrosion on Manhole



ARV 1300 Crossings Manhole Surcharged



ARV 1300 Crossings Air Release Valve in Fair Condition



ARV 1300 Crossings Valve in Good Condition



ARV 1300 Crossing Manhole Ring and Cover in Good Condition



ARV 1300 Crossing Manhole Surcharged



East Grande Lift Station



Work Order No.:

1	7	4	2	0		W	0	1	D
0	1	/	0	8	/	2	0	1	8

A	A		
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E	A	S	T			G	R	A	N	D	E			L	S	T	A
---	---	---	---	--	--	---	---	---	---	---	---	--	--	---	---	---	---

						N	O	N	E
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4	5	4	7
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☒ Visual ☐ CCTV ☐ Other

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[illegible]

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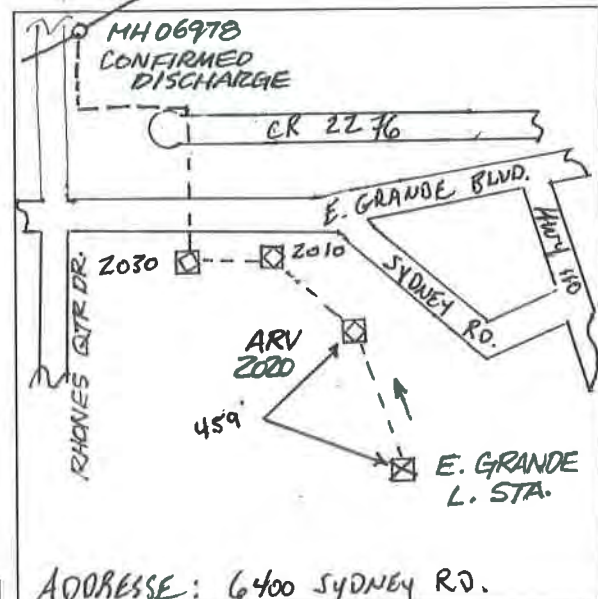
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Description

[illegible]

P=Paved
U=Unpaved



Comments **WALKED FORCE MAIN
LOCATED ARV 2020... DID NOT FIND
2010 OR 2030.. METAL DETECTED.**

NO SURFACE DEFECTS NOTED.
CONFIRMED DISCHARGE
LOCATION AT MH 06978

Date: 1/11/2018 Project: 17-410 W01D Basin: _____ Map No. _____ Crew: AA-L7

MH No.: ARV 2020 Address: 6400 SYDNEY RD.

DS Length: _____ Asset Type: M CO EOL PS T Status: N CNL CNO B LG D N S H

Lid Type: S V B O _____ No. Vent Holes: 4 Asset Mat'l.: B C F SB SC O

Grade: X A B Inch: _____ Inflow Dish: Y N Condition: _____ Good _____ Defective Inflow Potential: N L M S

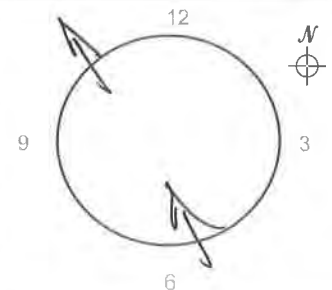
Area Photo: _____ Internal Photo: _____ Surface Cover: FD Surf. Mat'l.: P U Debris: 4 in.

GPS: _____ MH Diameter: 48 Std.=48 inch
C.O. Diameter: _____ inch

Defects:

Def#	Photo	Loc	Type	Rate	Roots	I/I

General Comments:



Pipes:

Photo	In/Out	Size	Material	Clock	Depth	Drop	Surface Cov	Surface Mat'l	Debris	Connecting ID
	<u>O</u>			<u>10</u>	<u>3.08</u>		<u>FD</u>	<u>U</u>		<u>ARV 2010</u>

Map Update

PIPE NOT VISIBLE IN MH.
3 - VALVES CLOSED...
EACH TURNS 1/2
SEE PHOTOS. 023 & 024

E. GRANDE L. STA.

Definitions:

Asset Type: M=Manhole; CO=Cleanout; EOL= End of Line; PS= Pump Station; T=Tee Connection

Status: Y=Yes; CNL=Could Not Locate; CNO=Can Not Open; B=Buried; S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner

Lid Type: S=Solid; V=Vented; B=Bolted; OT=Other (specify/comment)

Asset Mat'l: B=Brick; C=Concrete; F=Fiberglass; SB=Sealed Brick; SC=Sealed Concrete; O=Other (specify/comment)

Grade: X=At grade; A=Above; B=Below

Defect Rate: Light, Moderate, Severe

Roots: Light, Moderate, Severe

I/I Potential: N=None; L=Light; M=Moderate; S=Severe

Surface Cover: ST=Street; GU=Gutter; AL=Alley; DW=Driveway; SW=Sidewalk; FD=Field; TW=Trees/Woods; PL=Parking Lot; SH=Road Shoulder; DD=Drainage Ditch; CR=Creek; WB=Within Building; YD=Yard; OT=Other

Surface Mat'l: P=Paved (designate Asphalt or Concrete); U=Unpaved

Defect Location: LD=Lid; FR=Frame; FS=Frame Seal; CH=Chimney; CO=Cone; WA=Wall; ST=Steps; BN=Bench; PS=Pipe Seal; IN=Invert; CAP=Cleanout Cap; COP=Cleanout Pipe

Defect Type: BPS=Bad Pipe Seal; BRK=Broken; CRK=Cracked; CCL=Collapsed; DET=Deteriorated; HOL=Hole; JNT=Joint; LOO=Loose; MBR=Missing Brick or Mortar; MIS=Missing

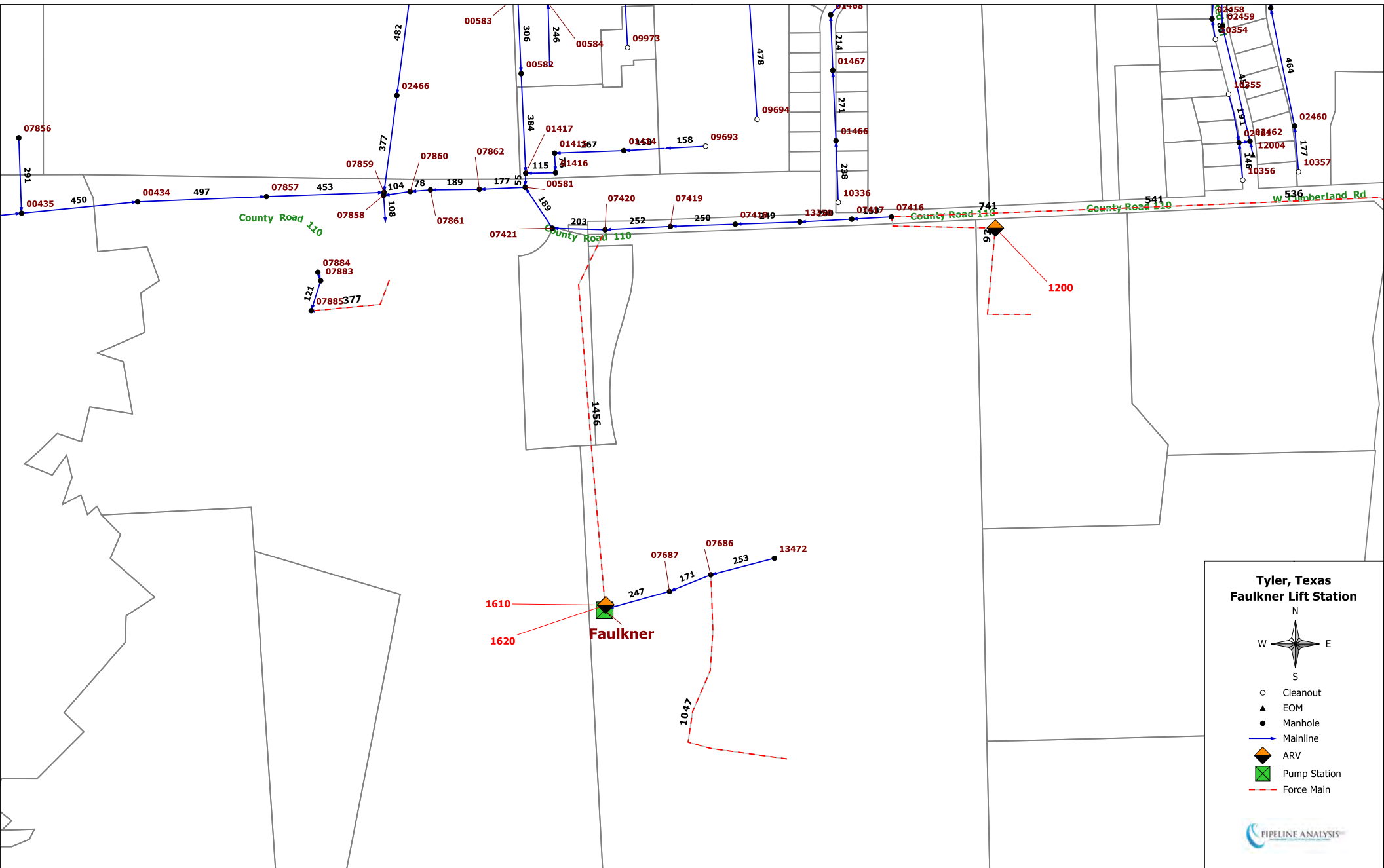
East Grande FM & ARV Photos



ARV 2020 East Grande Air Release Valve in Good Condition; Force Main not Visible



ARV 2020 East Grande Area in Good Condition



Faulkner Lift Station





Force Main Inspection Form

Work Order No.:

17420 W01D

Inspector:

Date:

2/27/2018

AA

FM Asset ID:

FAULKNER L STA

Lift Station ID:

Force Main Length:

1493

Force Main Material:

PVC

Force Main Material:

HD-HDPE
DU-Ductile Iron
ASB-Asbestos
PVC-Plastic
OT-Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

FM Inspection Method:

☒ Visual ☐ CCTV ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material

P=Paved
U=Unpaved

Surface Material:

Distance from Lift Station:

Dist. From DS Discharge:

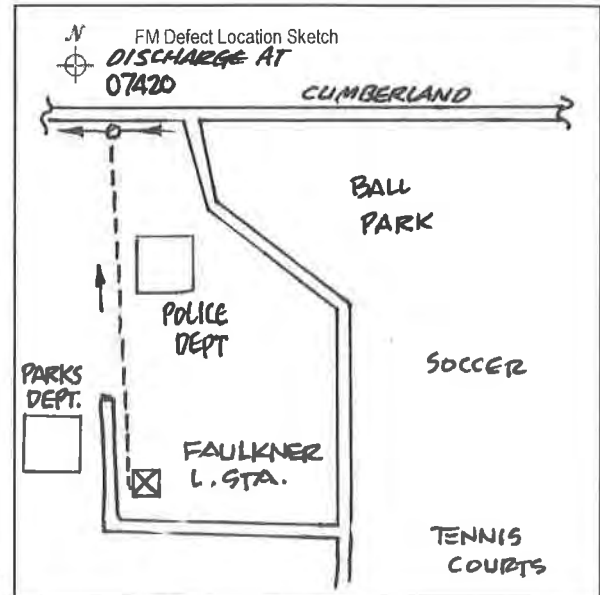
Defect GPS Latitude:

Defect GPS Longitude:

Photo No.

Description

02 DISCHARGE LOC.



Comments WALKED FORCE LINE...
NO ARV'S LOCATED... NONE SHOWN
ON PLANS.
NO DEFECTS NOTED ALONG FORCE LINE.
CONFIRMED DISCHARGE LOCATION
AT MH 07420...
PIPE AT DISCHARGE IS 4" CAST/DUCTILE
BUT PLANS SHOW 2" PVC FORCE LINE.

Gilley Lift Station





Force Main Inspection Form

Work Order No.:

17420 W01D

Inspector:

Date:

12/21/2017

AA

FM Asset ID:

GILLEY CREEK LS

Lift Station ID:

1480

Force Main Length:

Force Main Material:

Force Main Material:

HD-HDPE
DU-Ductile Iron
ASB-Asbestos
PVC-Plastic
OT-Other

FM Inspection Method:



Visual



CCTV



Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

Defect No.:

Defect Address:

Defect Location:

Defect Type:

Leak Potential:

Surface Cover:

Surface Material:

Distance from Lift Station:

Dist. From DS Discharge:

Defect GPS Latitude:

Defect GPS Longitude:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Material

P=Paved
U=Unpaved

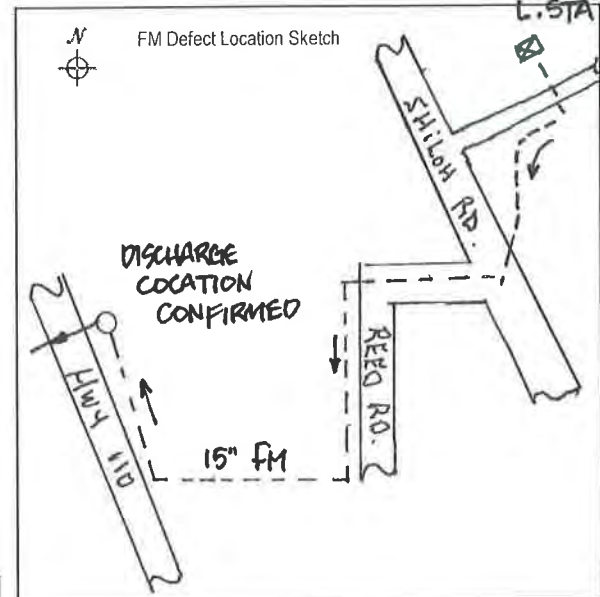


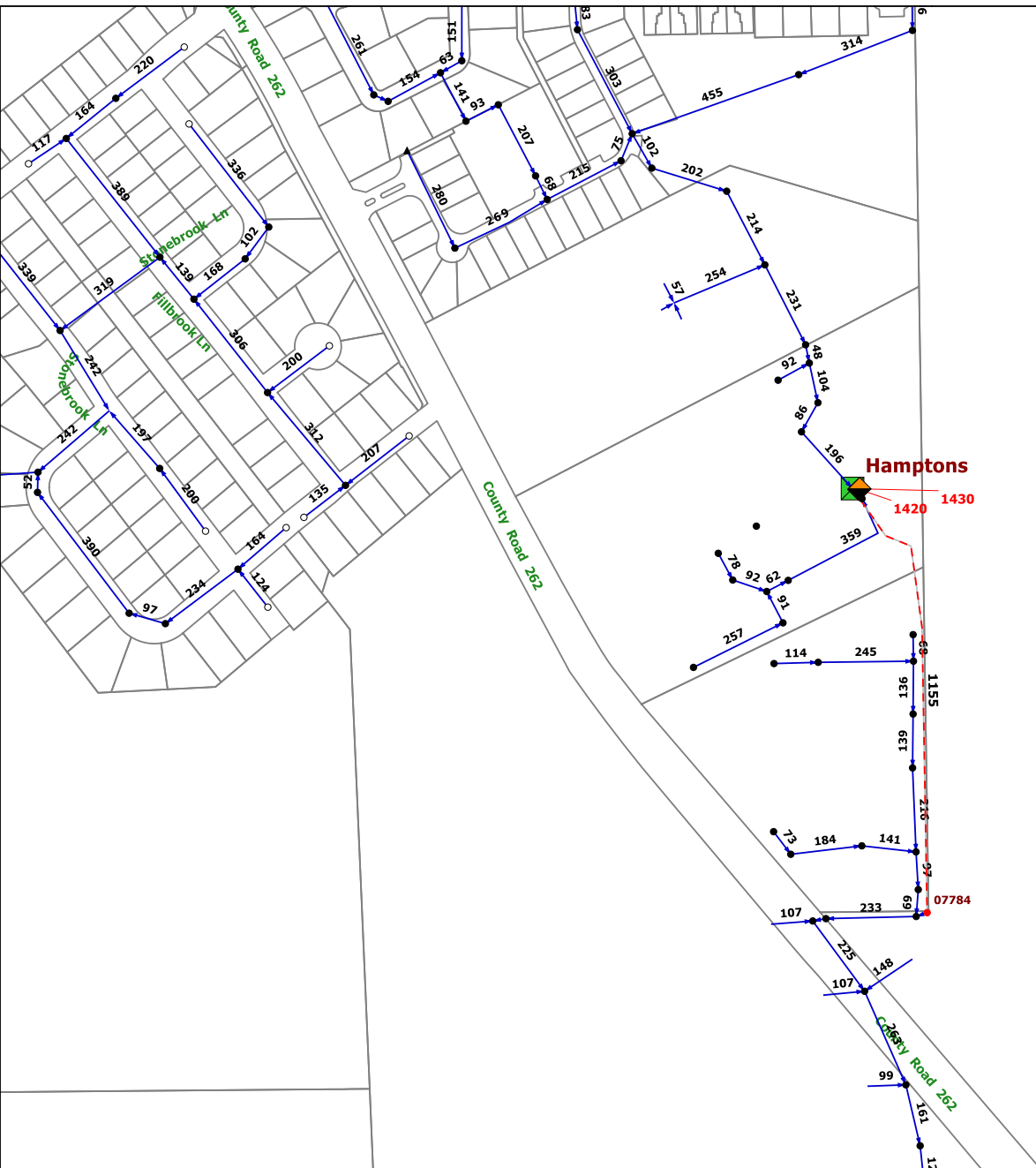
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Description

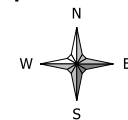
Comments WALKED FORCE MAIN

NO SURFACE DEFECTS NOTED.
NO ARV SHOWN & NONE FOUND.
CONFIRMED DISCHARGE LOCATION
AS ON PLAN MH 07667

ADDRESS is 9127 CR 2120



Tyler, Texas Hamptons Lift Station



- Cleanout
- ▲ EOM
- Manhole
- Mainline
- ◆ ARV
- ⊠ Pump Station
- - - Force Main



Hamptons Lift Station





Force Main Inspection Form

Work Order No.:

17420 W01D

Inspector:

Date:

01/08/2018

AA

FM Asset ID:

HAMPTONS L STA

Lift Station ID:

1420

Force Main Length:

1155

Force Main Material:

Force Main Material:

HD-HDPE
DU-Ductile Iron
ASB-Asbestos
PVC-Plastic
OT-Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

FM Inspection Method:

☒ Visual
 ☐ CCTV
 ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material

P=Paved
U=Unpaved

Surface Material:

Distance from Lift Station:

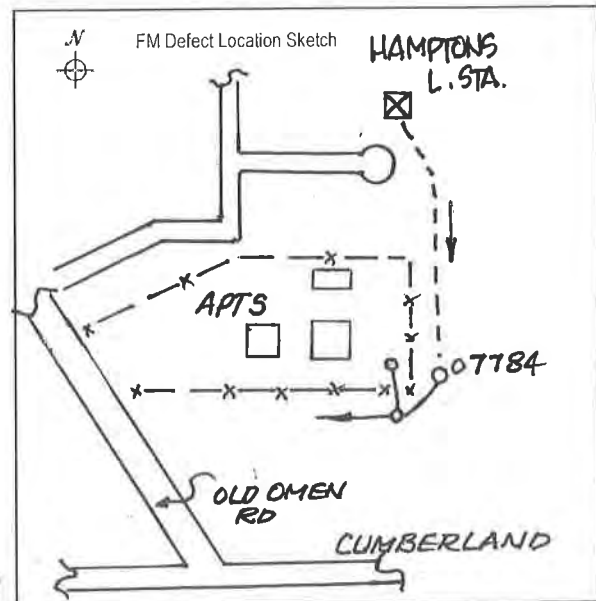
Dist. From DS Discharge:

Defect GPS Latitude:

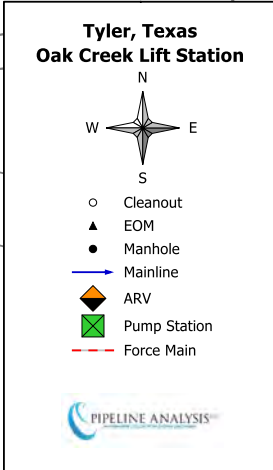
Defect GPS Longitude:

Photo No.

Description



Comments: **WALKED FORCE MAIN**
NO ARV SHOWN NOR LOCATED.
COULD NOT CONFIRM DISCHARGE
LOCATION... CNL MH
PLAN SHOWS DISCHARGE AT
MH 07784 BUT COULD NOT LOCATE





Force Main Inspection Form

Work Order No.:

17420 W01D
2/5/2018

Inspector:

AA

FM Asset ID:

OAK CREEK L STA

Lift Station ID:

Force Main Length:

6683

Force Main Material:

Force Main Material:

HD-HDPE
DU-Ductile Iron
ASB-Asbestos
PVC-Plastic
OT-Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

FM Inspection Method:

☒ Visual ☐ CCTV ☐ Other

FM Pipe Class:

FM Pipe Wall Thickness (new):

Defect No.:

Defect Address:

Defect Location:

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

Leak Potential:

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

Surface Material

P=Paved
U=Unpaved

Surface Material:

Distance from Lift Station:

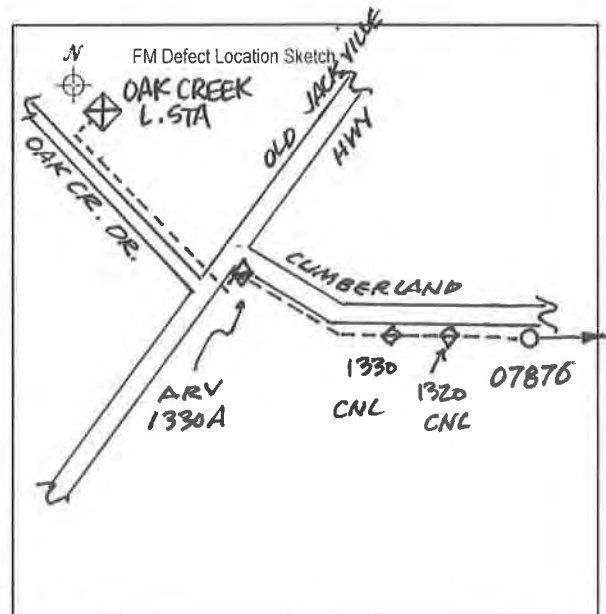
Dist. From DS Discharge:

Defect GPS Latitude:

Defect GPS Longitude:

Photo No.

Description



Comments WALKED FORCE MAIN
LOCATED 1 ARV NOT SHOWN ON MAP.
ARV'S 1320 & 1330 NOT LOCATED.
NO SURFACE DEFECTS NOTED.
CONFIRMED DISCHARGE AT
M14 07876

Air Release Valve (ARV) Inspection Form



Physical address of ARV: **OAK CREEK L STA**

Work Order No: **W01D** ARV Asset Code: **1330A**

Date of Inspection: **2 / 5 / 2018** Make and Model No.: **APCO**

Latitude Coordinates: **-** Longitude Coordinates: **-**

Project Number: **17-420**

Inspector: **AA**

Company: **PA**

FM Material ☐ Steel ☐ PVC
☐ HDPE ☐ Other

FM Diameter (in) **3.95**

FM Crown Thickness (in)
(metal FM only measured) **3.95**

Rim-to-Invert Dist. (ft) **3.95**

ARV Size (in) **24**

MH Cover Size (in) **24**

H2S Concentration **0**

CONDITION

G= Good F=Fair P=Poor
C=Critical N=Not Applicable

FM Protective Coating: **N**

Manhole Cover: **G**

Manhole Ring: **G**

MH/Vault Wall: **G**

MH/Vault Bench: **G**

ARV Pipe Strap: **N**

ARV Body: **G**

ARV bolts/nuts: **G**

ARV Isolation valve: **N**

ARV Drain valve: **N**

1. Was the manhole/vault surcharged? ☐ Y ☒ N
2. Was the isolation valve exercised? ☐ Y ☒ N
3. Was the drainage valve exercised? ☐ Y ☒ N
4. Was an internal inspection conducted? ☒ Y ☐ N
5. Any visible leaks? ☐ Y ☒ N
6. Was air released from the valve? ☐ Y ☒ N
7. Were photos of the valve taken? ☒ Y ☐ N

PHOTO NO DESCRIPTION

01	AREA
02	INTERNAL
03	GEN. PHOTO

Comments: **FORCE LINE NOT VISIBLE,
NO VALVES ON ARV.**

Signature: _____

OAK CREEK L. STA.

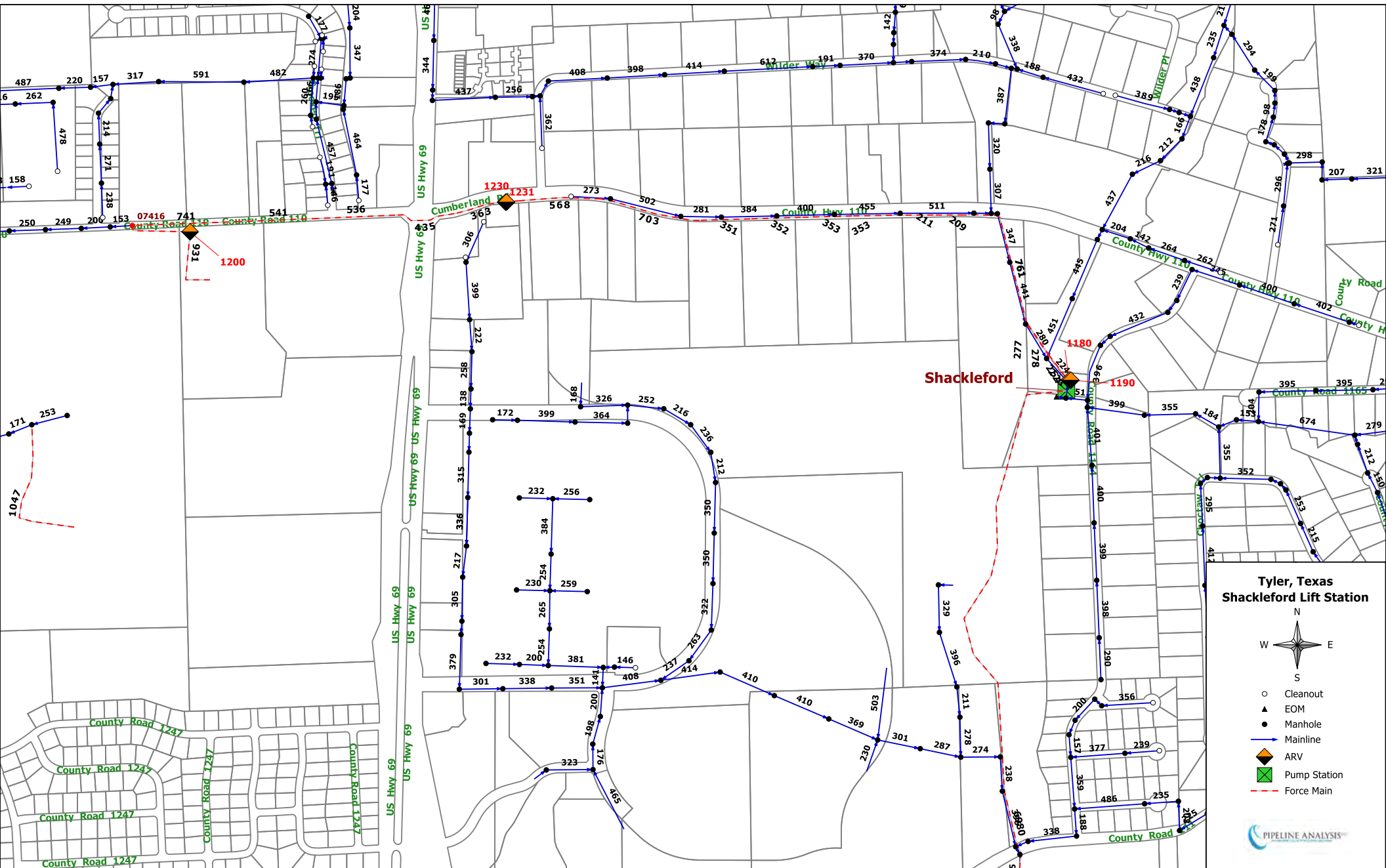
Oak Creek FM & ARV Photos



ARV 1330 Oak Creek Area and Manhole in Good Condition



ARV 1330 Oak Creek Force Main Not Visible in Manhole; No Valves on ARV



Shackleford Creek Lift Station



Air Release Valve (ARV) Inspection Form

Physical address of ARV: **205 CUMBERLAND RD**

Work Order No: **W01D** ARV Asset Code: **1230**

Date of Inspection: **1/11/2018** Make and Model No.: **APCO**

Latitude Coordinates: **-** Longitude Coordinates: **-**

Project Number: **17-420**

Inspector: **AA**

Company: **PA**

1. Was the manhole/vault surcharged? ☐ Y ☒ N
2. Was the isolation valve exercised? ☒ Y ☐ N
3. Was the drainage valve exercised? ☒ Y ☐ N
4. Was an internal inspection conducted? ☒ Y ☐ N
5. Any visible leaks? ☐ Y ☒ N
6. Was air released from the valve? ☐ Y ☒ N
7. Were photos of the valve taken? ☒ Y ☐ N

FM Material ☒ Steel ☐ PVC
☐ HDPE ☐ Other

FM Diameter (in) **2.99**

FM Crown Thickness (in)
(metal FM only measured) **2.99**

Rim-to-Invert Dist. (ft) **2.99**

ARV Size (in) **24**

MH Cover Size (in) **24**

H2S Concentration **0**



CONDITION

G= Good F=Fair P=Poor
C=Critical N=Not Applicable
FM Protective Coating: **G**

Manhole Cover: **G**

Manhole Ring: **G**

MH/Vault Wall: **G**

MH/Vault Bench: **G**

ARV Pipe Strap: **-**

ARV Body: **G**

ARV bolts/nuts: **F**

ARV Isolation valve: **P**

ARV Drain valve: **P**

PHOTO NO DESCRIPTION

27	AREA
28	INTERNAL

Comments: **FORCE LINE NOT VISIBLE IN MH
TOP VALVE ONLY TURNED 1/2 TURN MINOR RUST
MIDDLE VALVE TURNS 1/2 TURNS MINOR RUST
LOWER VALVE ONLY SPINS.. MODERATE RUST
FORCE MAIN DIAM. AT DISCHARGE LOC. IS 8"
IRON.**

Signature: **SHACKLEFORD L. STA.**

Manhole Form

1115 Main Street
Garland, Texas 75040
800-637-0164

Date: 1/11/2018 Project: 17.420 W01D Basin: Map No. Crew: AA/UD

MH No.: ARV 1230

Address: 205 CUMBERLAND RD.

DS Length: —

Asset Type: ☒ CO EOL PS TStatus: ☒ CNL CNO B LG D N S HLid Type: ☒ V B O

No. Vent Holes:

Asset Mat'l.: B ☒ F SB SC OGrade: ☒ A B Inch:Inflow Dish: Y ☒ N Condition: Good DefectiveInflow Potential: ☒ N L M S

Area Photo: 27/5

Internal Photo: 28/6

Surface Cover: ST

Surf. Mat'l.: ☒ Asphalt U

Debris: 3 in.

GPS:

MH Diameter: 48 Std.=48 inch

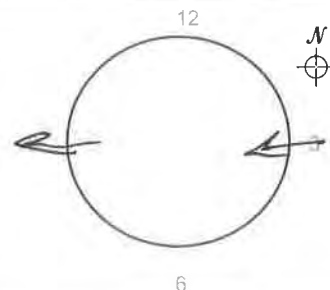
C.O. Diameter: inch

Defects:

Def#	Photo	Loc	Type	Rate	Roots	I/I

General Comments:

UNABLE TO
SEE PIPES,



Pipes:

Photo	In/Out	Size	Material	Clock	Depth	Drop	Surface Cov	Surface Mat'l	Debris	Connecting ID
	0			9	2.99		ST	P		ARV 1200

Map Update



TOP VALVE CLOSED. TURNS HALF TURN
MIDDLE VALVE: CLOSED. TURNS HALF TURN
BOTTOM VALVE: ONLY SPINS

Definitions:

Asset Type: M=Manhole; CO=Cleanout; EOL= End of Line; PS=Pump Station; T=Tee Connection

Status: Y=Yes; CNL=Could Not Locate; CNO=Can Not Open; B=Buried; S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner

Lid Type: S=Solid; V=Vented; B=Bolted; OT=Other (specify/comment)

Asset Mat'l: B=Brick; C=Concrete; F=Fiberglass; SB=Sealed Brick; SC=Sealed Concrete; O=Other (specify/comment)

Grade: X=At grade; A=Above; B=Below

Defect Rate: Light, Moderate, Severe

Roots: Light, Moderate, Severe

I/I Potential: N=None; L=Light; M=Moderate; S=Severe

Surface Cover: ST=Street; GU=Gutter; AL=Alley; DW=Driveway; SW=Sidewalk; FD=Field; TW=Trees/Woods; PL=Parking Lot; SH=Road Shoulder; DD=Drainage Ditch; CR=Creek; WB=Within Building; YD=Yard; OT=Other

Surface Mat'l: P=Paved (designate Asphalt or Concrete); U=Unpaved

Defect Location: LD=Lid; FR=Frame; FS=Frame Seal; CH=Chimney; CO=Cone; WA=Wall; ST=Steps; BN=Bench; PS=Pipe Seal; IN=Invert; CAP=Cleanout Cap; COP=Cleanout Pipe

Defect Type: BPS=Bad Pipe Seal; BRK=Broken; CRK=Cracked; CCL=Collapsed; DET=Deteriorated; HOL=Hole; JNT=Joint; LOO=Loose; MBR=Missing Brick or Mortar; MIS=Missing

Air Release Valve (ARV) Inspection Form

Physical address of ARV: 205 CUMBERLAND RD

Work Order No: W01D ARV Asset Code: 1231

Date of Inspection: 1/11/2018 Make and Model No.: APCO

Latitude Coordinates: Longitude Coordinates: -

Project Number: 17-420

Inspector: AA

Company: PA

- 1 Was the manhole/vault surcharged? ☐ Y ☒ N
- 2 Was the isolation valve exercised? ☒ Y ☐ N
- 3 Was the drainage valve exercised? ☒ Y ☐ N
- 4 Was an internal inspection conducted? ☒ Y ☐ N
- 5 Any visible leaks? ☐ Y ☒ N
- 6 Was air released from the valve? ☒ Y ☐ N
- 7 Were photos of the valve taken? ☐ Y ☐ N

FM Material ☒ Steel ☐ PVC
☐ HDPE ☐ Other

FM Diameter (in) 8

FM Crown Thickness (in)
(metal FM only measured) .

Rim-to-Invert Dist. (ft) 3.06

ARV Size (in)

MH Cover Size (in) 24

H2S Concentration 0



CONDITION

G= Good F=Fair P=Poor
C=Critical N=Not Applicable

FM Protective Coating:

Manhole Cover: G

Manhole Ring: G

MH/Vault Wall: G

MH/Vault Bench: G

ARV Pipe Strap -

ARV Body G

ARV bolts/nuts G

ARV Isolation valve F

ARV Drain valve F

PHOTO NO DESCRIPTION

27	AREA
26	INTERNAL

Comments: FORCE LINE NOT VISIBLE IN MH.
MH DEPTH 3.06'
TOP VALVE OPENS 1/2 TURN
MIDDLE VALVE OPENS 1/2 TURN
LOWER VALVE OPENS 1/2 TURN & RELEASED AIR
FORCE MAIN @ DISCHARGE LOCATION
IS STEEL/DUCTILE 8" DIAM.

Signature: _____

SHACKLEFORD L. STA



Manhole Form

1115 Main Street
Garland, Texas 75040
800-637-0164

Date: 1/11/18 Project: 17.420 W010 FM Basin: _____ Map No. _____ Crew: AA/LD

MH No.: ARV 1231

Address: 205 CUMBERLAND RD.

DS Length: 4'

Asset Type: (M) CO EOL PS T

Status: (Y) CNL CNO B LG D N S H

Lid Type: (S) V B O

No. Vent Holes: _____

Asset Mat'l.: (B) C F SB SC O

Grade: (X) A B Inch: _____

Inflow Dish: (Y) (N) Condition: _____ Good _____ Defective

Inflow Potential: (N) L M S

Area Photo: 25/3

Internal Photo: 26/4

Surface Cover: ST

Surf. Mat'l.: (P) Asphalt U _____ Concrete

Debris: 3 in.

GPS: _____

MH Diameter: 48 Std.=48 inch

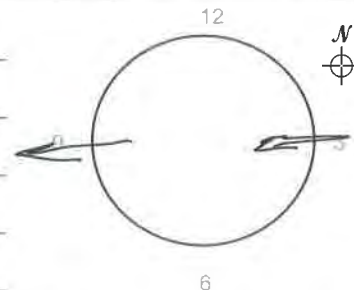
C.O. Diameter: _____ inch

Defects:

Def#	Photo	Loc	Type	Rate	Roots	I/I

General Comments:

UNABLE TO
SEE PIPES



Pipes:

Photo	In/Out	Size	Material	Clock	Depth	Drop	Surface Cov	Surface Mat'l	Debris	Connecting ID
	<u>O</u>			<u>9</u>	<u>3.06</u>		<u>ST</u>	<u>P</u>		<u>ARV 1230</u>

Map Update



TOP VALVE - CLOSED. TURNS HALF
A TURN.

MIDDLE VALVE - CLOSED. TURNS HALF
A TURN

BOTTOM VALVE - CLOSED. TURNS HALF
A TURN. RELEASED AIR.

ARV OPERATED WHILE ON SITE.

Definitions:

Asset Type: M=Manhole; CO=Cleanout; EOL= End of Line; PS=Pump Station; T=Tee Connection

Status: Y=Yes; CNL=Could Not Locate; CNO=Can Not Open; B=Buried; S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner

Lid Type: S=Solid; V=Vented; B=Bolted; OT=Other (specify/comment)

Asset Mat'l: B=Brick; C=Concrete; F=Fiberglass; SB=Sealed Brick; SC=Sealed Concrete; O=Other (specify/comment)

Grade: X=At grade; A=Above; B=Below

Defect Rate: Light, Moderate, Severe

Roots: Light, Moderate, Severe

I/I Potential: N=None; L=Light; M=Moderate; S=Severe

Surface Cover: ST=Street; GU=Gutter; AL=Alley; DW=Driveway; SW=Sidewalk; FD=Field; TW=Trees/Woods; PL=Parking Lot; SH=Road Shoulder; DD=Drainage Ditch; CR=Creek; WB=Within Building; YD=Yard; OT=Other

Surface Mat'l: P=Paved (designate Asphalt or Concrete); U=Unpaved

Defect Location: LD=Lid; FR=Frame; FS=Frame Seal; CH=Chimney; CO=Cone; WA=Wall; ST=Steps; BN=Bench; PS=Pipe Seal; IN=Invert; CAP=Cleanout Cap; COP=Cleanout Pipe

Defect Type: BPS=Bad Pipe Seal; BRK=Broken; CRK=Cracked; CCL=Collapsed; DET=Deteriorated; HOL=Hole; JNT=Joint; LOO=Loose; MBR=Missing Brick or Mortar; MIS=Missing

Shackleford Creek FM & ARV Photos



ARV 1230 Shackleford Force Main not Visible in Manhole; Minor Rust on Top and Middle Valve Opening Half Way, Moderate Rust on Lower Valve and Only Spins



ARV 1230 Shackleford Manhole and Area in Good Condition



ARV 1231 Shackleford Force Main not Visible in Manhole; Top, Middle and Lower Valve Open to ½ Turn and Released Air



ARV 1231 Shackleford Manhole and Area in Good Condition

**APPENDIX B:
SAMPLE CONDITION ASSESSMENT
FORM**

Air Release Valve (ARV) Inspection Form



Physical address of ARV: [grid]

Work Order No: [grid] ARV Asset Code: [grid]

Date of Inspection: [grid]

Make and Model No.:

Latitude Coordinates: [grid]

Longitude Coordinates

Project Number: [grid]

Inspector: [grid]

Company: [grid]

CONDITION

G= Good F=Fair P=Poor
C=Critical N=Not Applicable

FM Protective Coating: [grid]
Manhole Cover: [grid]
Manhole Ring: [grid]
MH/Vault Wall: [grid]
MH/Vault Bench: [grid]
ARV Pipe Strap [grid]
ARV Body [grid]
ARV bolts/nuts [grid]
ARV Isolation valve [grid]
ARV Drain valve [grid]

FM Material [grid] Steel [grid] PVC [grid]
[grid] HDPE [grid] Other [grid]

FM Diameter (in) [grid]

FM Crown Thickness (in) [grid]
(metal FM only measured)

Rim-to-Invert Dist. (ft) [grid]

ARV Size (in) [grid]

MH Cover Size (in) [grid]

H2S Concentration [grid]

1. Was the manhole/vault surcharged? [Y] [N]
2. Was the isolation valve exercised? [Y] [N]
3. Was the drainage valve exercised? [Y] [N]
4. Was an internal inspection conducted? [Y] [N]
5. Any visible leaks? [Y] [N]
6. Was air released from the valve? [Y] [N]
7. Were photos of the valve taken? [Y] [N]

PHOTO NO DESCRIPTION

[grid]

Comments:

Signature:



Force Main Inspection Form

Work Order No.:

--	--	--	--	--	--	--	--	--	--

Inspector:

--	--	--	--

Date:

		/		/					
--	--	---	--	---	--	--	--	--	--

FM Asset ID:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Lift Station ID:

--	--	--	--	--	--	--	--	--	--

Force Main Length:

--	--	--	--

Force Main Material:

HD-HDPE
DU-Ductile Iron
ASB-Asbestos
PVC-Plastic
OT-Other

Defect Type:

MFC=MH Frame/Cover
LK=Leaks
EXP=Exposed Pipe
EXT=External Damage
GSK=Gaskets
COA=Coatings
NFV=Non Functional Valve
MAV=Missing ARV
OT=Other

Surface Cover:

ST=Street; AL=Alley
YD=Yard; FD=Field
TW=Trees/Woods
DW=Driveway
GU=Gutter
SH=Shoulder
SW=Sidewalk
DD=Drainage Ditch
PL=Parking Lot
OT=Other

Force Main Material:

--	--	--

FM Inspection Method:

☐ Visual ☐ CCTV ☐ Other

FM Pipe Class:

--	--	--	--	--	--	--	--

FM Pipe Wall Thickness (new):

		.			
--	--	---	--	--	--

Defect No.:

--	--

Defect Address:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Defect Location:

--	--	--

Defect Location:

ARV= Air Release Valve
FM=Force Main
MHS=Manhole Structure
OT=Other

Defect Type:

--	--	--

Leak Potential:

--

Leak Potential

N=None
L=Light
M=Moderate
S=Severe

Surface Cover:

--	--

Surface Material

P=Paved
U=Unpaved

Surface Material:

--

Distance from Lift Station:

--	--	--	--

Dist. From DS Discharge:

--	--	--	--

Defect GPS Latitude:

		.				
--	--	---	--	--	--	--

Defect GPS Longitude:

-			.				
---	--	--	---	--	--	--	--

Photo No.

Description



FM Defect Location Sketch

Comments

APPENDIX C: ARV STANDARD SPECIFICATIONS

COMBINATION AIR VALVES FOR WASTEWATER

D-025L

1 SCOPE

- 1.1** This specification is intended to cover the design, manufacture, and testing of 2 inch through 4 inch Combination Wastewater Air Valves for working pressures up to 150 psig designed specifically for use in sewage applications.
- 1.2** Combination Air Valves shall be float operated valves designed to release accumulated air or gas from a piping system while the system is in operation and under pressure. In addition the valves shall discharge large quantities of air during pipe filling operations and intake large quantities of air during pipe draining and water column separation.

2 STANDARDS, APPROVALS and VERIFICATION

- 2.1** The valve manufacturer shall have ISO 9001 and ISO 14001 certifications.

3 DESIGN

- 3.1** The valve body shall be conical in shape to maintain maximum air gap between the wastewater and the sealing mechanism. Wastewater shall not come in contact with the sealing mechanism at any time during normal operation at the valve's working pressure. The valve shall have a double float design with the upper float enclosed in the upper section of the valve. The lower float shall be located in the main body of the valve. The valve shall be designed to ensure a drip tight sealing at operating pressure as low as 3 psi.
- 3.2** The float shall operate in concert with a rolling seal design that creates the closure of the valve preventing water from escaping the valve at system operation under pressure of 3 psig and higher, while being able to automatically adjust its position to allow for controlled intermittent air release. Valves that do not incorporate the rolling seal solution shall not be considered equal or acceptable. Valve designs that do not intentionally allow for intermittent release of air during operation shall not be considered equal or acceptable.
- 3.3** A spring cushioned joint between the sealing mechanism and float/stainless steel rod assembly shall perform without jamming or allowing air escape under vibrations or float bouncing related to the turbulence from pump start and stop or flow fluctuations. High velocity air will not shut the valve.
- 3.4** The valve shall have an 1 1/2 inch male NPT camlock connection at its outlet for connection of a vent pipe or for use in valve flushing or cleaning.
- 3.5** The valve shall have two 1/4 inch ball valves, one connected to the lower valve body and one connected to the upper valve body to relieve internal pressure.
- 3.6** The valve shall have a funnel shaped lower body to automatically drain wastewater and other debris from the valve.

- 3.7** The working pressure shall range from 3 to 250 psi and the valve shall be tested to 360 psi. Air valves which are not rated for minimum sealing pressure of 3 psi and maximum working pressure of 250 psi shall not be considered equal or acceptable. The maximum working temperature shall be 140 degrees F with maximum intermittent temperatures of up to 194 degrees F.
- 3.8** The valves shall be manufactured with flanged inlet to meet requested flange standards.
- 3.9** Valves in 2 in and 3 in sizes shall also be available with a threaded NPT connection.
- 3.10** Valves installed at lift stations shall have non-slam attachment installed on the air valve discharge. Non-slam attachment will throttle air discharge through smaller discharge orifice which will reduce velocity of approaching water column. When vacuum relief is required, the check valve in the attachment opens to allow large volume of air to enter pipeline.

4 MATERIALS

- 4.1** The body and lower flange shall be constructed of reinforced nylon (standard) or 316 stainless steel (optional). (Alternate materials of construction are available. Please consult with your local authorized representative for appropriate material combinations).
- 4.2** The upper float shall be made of solid polypropylene and have a rolling seal mechanism constructed of nylon, EPDM and stainless steel components.
- 4.3** The lower float shall be constructed of polypropylene and shall have a minimum clearance of 1" from each side wall to prevent blockage of the float.
- 4.4** All metal hardware shall be 316 stainless steel. All O-rings shall be of BUNA-N with pressure ratings equivalent to the overall working pressure of the valve.

5 TESTING

- 5.1** All valves supplied under this section shall be hydraulically tested to a minimum pressure of 360 psi. Valves which are not tested to a minimum pressure of 360 psi shall not be considered equal or acceptable.

6 MANUFACTURER

- 6.1** All valve manufacturers shall have a minimum of Ten (10) years' experience in manufacturing air valves for water and waste water applications.
- 6.2** All air valves shall be accompanied by a written Five (5) year warranty.
- 6.3** All combination air valves shall be model ARI D-025L as manufactured by ARI or approved equal.
- 6.4** All valves shall be installed in accordance with the manufacturers' recommendations and the installation shall include an isolation valve for control and valve maintenance.

COMBINATION AIR VALVE FOR WASTEWATER MODEL D-025L



A. Installation

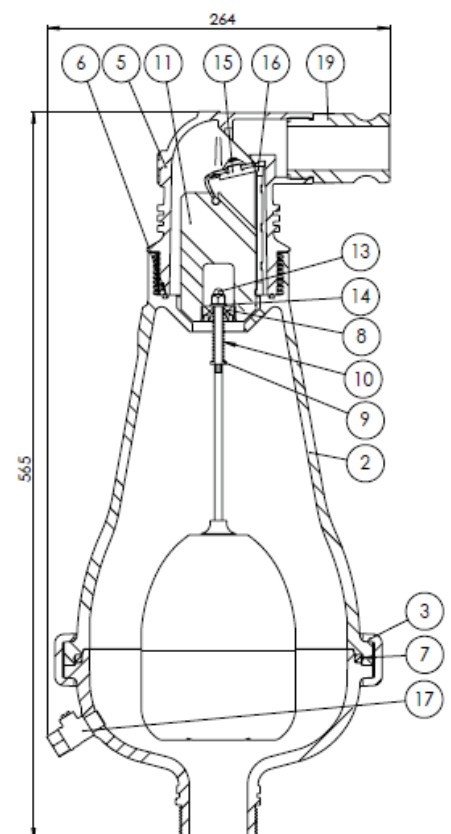
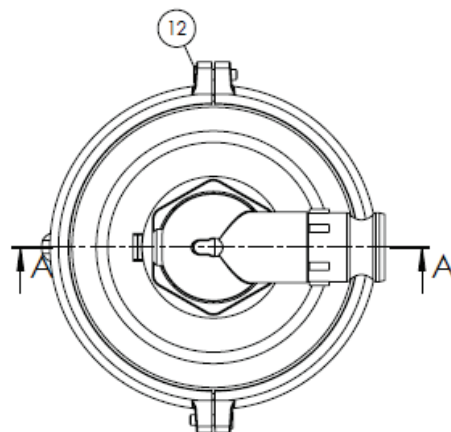
1. The SAV (sewage air valve) should be installed vertically on a riser on the crown of the pipeline.
2. An inlet isolating valve should be installed underneath the SAV.
3. Do not turn the plastic head (5) of the SAV, separately. It can cause a leakage.
4. To change the direction of drainage outlet, open the main body-clamp and turn the air valve upper body.
5. For flanges, fit protective washer for each bolt.

Warning! Do not remove or disassemble the air valve from pipeline before performing the following steps:

1. Turn off riser shut off valve.
2. Open up pressure release valve located on the base of the D-025L and the shut off valve.
3. Remove valve from line only after ensuring that internal pressure in the valve has been released.

B. Periodic Maintenance for SAV without back wash assembly (Each 6 months and according to liquid quality).

1. Shut the isolating valve underneath the air valve.
2. Open pressure relief valve (17) and make sure that internal pressure inside the SAV body is released.
3. Open and remove the two parts of the clamp.(3)
4. Pull out the top part, wash the mechanism and the inside of the SAV.
5. Reassemble the two parts and tighten the screws (3 - 12)
Pay attention to correct placement of the seal's O-Ring (7)
6. Re-open the inlet isolating valve.



TROUBLE SHOOTING

SYMPTOM	CAUSE	CORRECTIVE ACTION
Cam-lock broken	Valve was hit or thrown around	This does not hurt the function of the valve. Order replacement part .
Valve leaking from middle of body	O-ring seal not in place, or the clamps are not properly tightened	Often the maintenance people open the valve to see what is inside and do not close it properly or lose the o-ring or do not put the o-ring back in place. Check for debris in this area and wash out valve and return to service.
Valve leaking from the top, at connection of D040 to valve body	If leaking from the Cam-lock then shut off valve, release pressure from the ball valve and open to clean. If liquid is getting to the top section there is something that is preventing the valve from closing properly.	Close shutoff and release static pressure, then open the valve at clamps. Fully clean out the insides, with hot water if possible. Check the top float assembly and the rolling seal. Replace parts as necessary.
Threaded pipe connection is leaking	The nylon thread was compromised in installation	Suggest a double threaded nipple fitting for future use. Replace the bottom section and O-ring.
Valve body exploded	Line pressure spikes, and water-hammer/surge Incorrect valve selection or placement.	Obtain field report from end-user, and check position of valve on line. D-025 is not recommended for the pump stations due to the design of the float, which can close under air pressure and cause water hammer and surges. This is a system problem, so contact ARI immediately, for analysis of issue and recommendations.
Valve spits and then seals	The liquid is entering the valve at high velocity and the lighter material on top of the water is thrown past the float and out the top before the water arrives. The D025 is used as first valve after pump, and placed at some distance.	Recommend to switch to a D-020. This happens at start up and is common when there is a half full pipe with light material floating on top of the liquid when the pump turns on and the valve is attached to the flat portion of the pipe.



D-025 L 250 psi



Combination Air Valve for Wastewater

Description

The D-025 L Combination Air Valve combines an air & vacuum component and an air release component in a single body. The valve is specifically designed to operate with liquids carrying solid particles such as wastewater and effluents. The combination air valve discharges air (gas) during the filling or charging of the system, admits air into the system during drainage and at water column separation and releases accumulated air (gas) from the system while it is operating under pressure. The valve's unique design enables the separation of the liquid from the sealing mechanism and assures optimum working conditions.

Applications

- Wastewater & water treatment plants.
- Wastewater and effluent water transmission lines.

Operation

The air & vacuum component discharges air at high flow rates during the filling of the system and admits air into the system at high flow rates during drainage and at water column separation.

High velocity air will not blow the float shut. Water will lift the float which activates the sealing of the valve.

At any time during system operation, should internal pressure of the system fall below atmospheric pressure, air will enter the system.

The smooth discharge of air reduces pressure surges and other destructive phenomena.

The intake of air in response to negative pressure protects the system from destructive vacuum conditions and prevents damage caused by water column separation. Air entry is essential to efficiently drain the system.

The air release component releases entrapped air in pressurized systems.

Without air valves, pockets of accumulated air may cause the following hydraulic disturbances:

- Restriction of effective flow due to a reduction of the flow area. In extreme cases this will cause complete flow stoppage.
- Obstruction of efficient hydraulic transmission due to air flow disturbances.
- Acceleration of cavitation damages.
- Increase in pressure transients and surges.
- Internal corrosion of pipes, fittings and accessories.
- Dangerous high-energy bursts of compressed air.
- Inaccuracies in flow metering.

As the system fills and is pressurized, the combination wastewater air valve functions in the following stages:

1. Air (gas) is discharged by the valve
2. When the liquid level reaches the valve's lower portion, the lower float is lifted, pushing the sealing mechanism to its sealing position.
3. The entrapped air is confined in a pocket between the liquid and the sealing mechanism. The air pressure is equal to the system pressure.
4. Increases in system pressure compress the trapped air in the upper section of the conical chamber. The conical shape assures the height of the air gap. This enables separation of the liquid from the sealing mechanism.
5. Entrapped air (gas), accumulating at peaks and along the system, rises to the top of the valve and displaces the liquid in the valve's body.
6. When the liquid level lowers to a point where the float is no longer buoyant, the float drops, unsealing the rolling seal. The air release orifice opens and allows part of the air that accumulated in the upper portion of the valve to be released to the atmosphere.
7. Liquid enters the valve. The float rises, pushing the rolling seal to its sealing position. The remaining air gap prevents the wastewater from fouling the mechanism.

When internal pressure falls below atmospheric pressure (negative pressure):

1. The floats will drop down, immediately opening the air & vacuum and air release orifices.
2. Air will enter into the system.

Main Features

- Working pressure range: 0.7 - 250 psi.
- Testing pressure: 360 psi.
- Maximum working temperature: 140° F.
- Maximum intermittent temperature: 194° F.
- The unique design of the valve prevents contact between the wastewater and the sealing mechanism by creating an air gap at the top of the valve. These features are achieved by:
 - The conical body shape: designed to maintain the maximum distance between the liquid and the sealing mechanism and still obtain minimum body length.
 - Independent spring-guided linkage between the lower float/rod assembly and the upper float sealing mechanism: allows free movement of the float and rod. Vibrations and movement of the lower float due to turbulence will not unseal the upper float sealing mechanism.
 - The Rolling Seal Mechanism: less sensitive to pressure differentials than a direct float seal. It accomplishes this by having a comparably

large orifice for a wide pressure range (up to 250 psi).

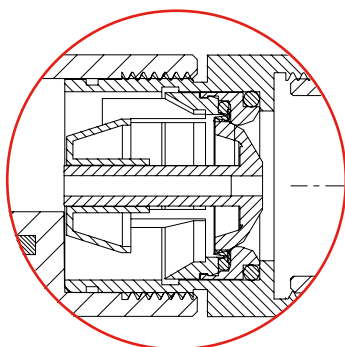
- Funnel-shaped lower body: designed to ensure that residue wastewater matter will fall back into the system and be carried away by the main pipe.
- All inner metal parts made of stainless steel. Float made of composite materials.
- 1 ½" threaded discharge outlet enables connection of a vent pipe.
- Dynamic design allows for high capacity air discharge while preventing premature closure.
- The ball valve can be opened to release trapped pressure and drain the valve body prior to maintenance and for back-flushing during maintenance.

Valve Selection

- These valves are available in 2", 3" with a NPT male threaded connection or flanged (flange attached to the NPT threaded connection) - flange standard upon request.
- Valve is manufactured in stainless steel, also available in reinforced nylon.
- With a One-way, Out-only attachment, allows for air discharge only, prevents air intake.
- With a Vacuum Breaker, In-only attachment, allows for air intake only, prevents air discharge.
- With a Non-Slam discharge-throttling attachment, allows for free air intake, throttles air discharge.
- **D-025 L LP** for Low Pressure, Working pressure range: 1- 87 psi.

Note

- The D-025 L air valve is intended for use with raw wastewater.
- For use with aggressive liquids, please consult with our application engineers or with the marketing dept.
- For best suitability, it is recommended to send the fluid chemical properties along with the valve request.
- Upon ordering, please specify: model, size, working pressure, thread and flange standard and type of liquid.

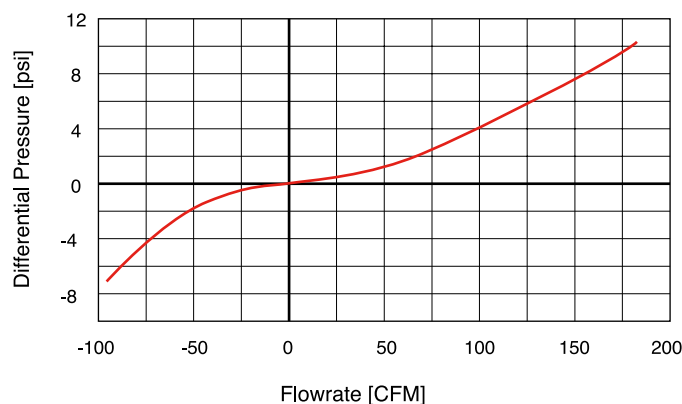


D-025 L-NS

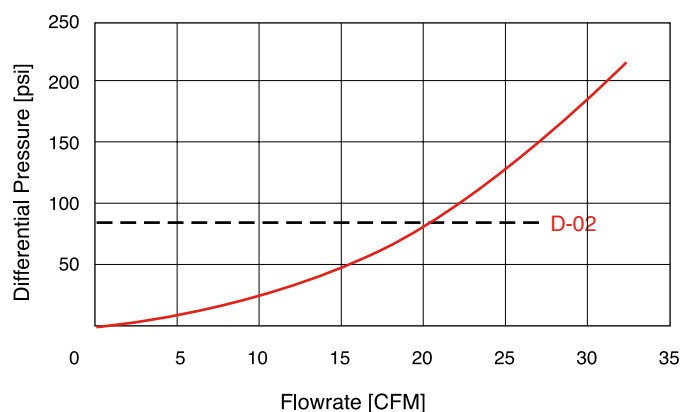
D-025 L Non-Slam Single Orifice Add-on Component Data Table

Inlet Size	Discharge Orifice	Total NS Area	NS Orifice	Switching Point	Flow at 5.8 psi
2", 3"	1.5 Inch	0.02 Sq.In.	0.16 Inch	Spring loaded Normally closed	10.3 CFM

AIR & VACUUM FLOWRATE



AIR RELEASE FLOWRATE



D-025 L Body Made of Nylon

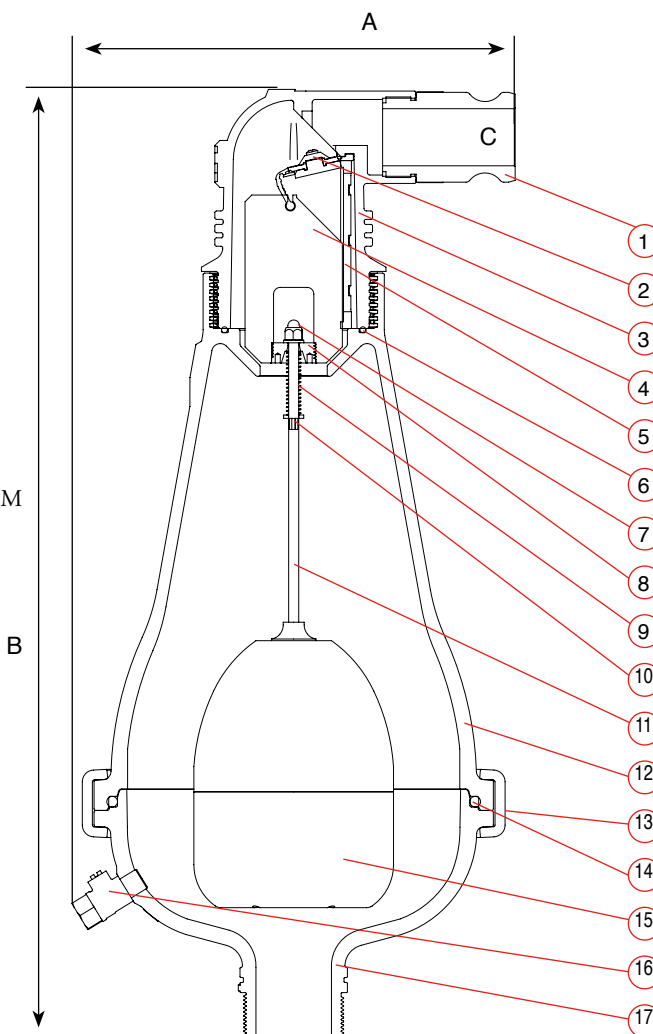
DIMENSIONS AND WEIGHTS

Inlet Size	Dimensions Inch		Connection C	Weight Lbs.	Orifice Area Sq.in	
	A	B			Air Rel.	A / V
2" Nylon	10.4	22.3	1½" Camlock	15.0	0.018	1.246
3" Nylon	10.4	22.3	1½" Camlock	15.2	0.018	1.246



PARTS LIST AND SPECIFICATION

No.	Part	Material
1.	Discharge Outlet	Polypropylene
2.	D-025 L Rolling Seal Assembly	Reinforced Nylon + E.P.D.M. + Stainless Steel SAE 316
	D-025 L LP Rolling Seal Assembly	Reinforced Nylon + Silicon + Stainless Steel SAE 316
3.	Body	Reinforced Nylon
4.	Float	Foamed Polypropylene
5.	Clamping Stem	Reinforced Nylon
6.	O-Ring	BUNA-N
7.	Domed Nut	Stainless Steel SAE 316
8.	Stopper	Polypropylene
9.	Spring	Stainless Steel SAE 316
10.	Washer	Stainless Steel SAE 316
11.	Stem	Stainless Steel SAE 316
12.	Body	Reinforced Nylon
13.	Clamp	Stainless Steel ASTM A744 CF8M
14.	O-Ring	BUNA-N
15.	Float	Polypropylene
16.	Tap 1/4 "	Stainless Steel SAE 316
17.	Base	Reinforced Nylon



D-025 L Body Made of Stainless Steel

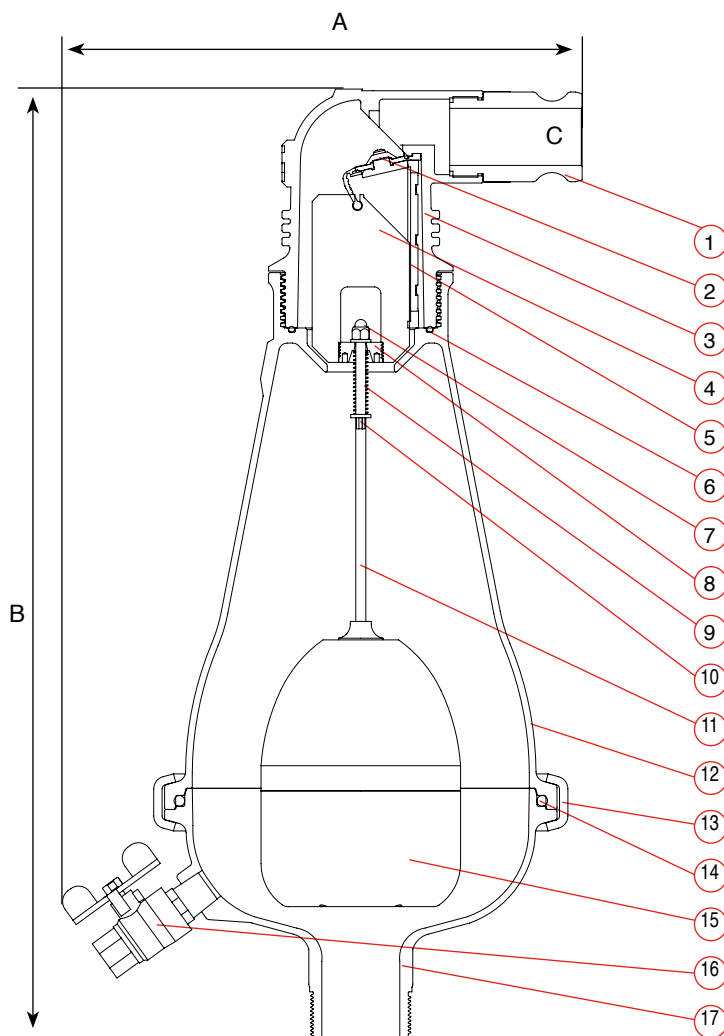
DIMENSIONS AND WEIGHTS

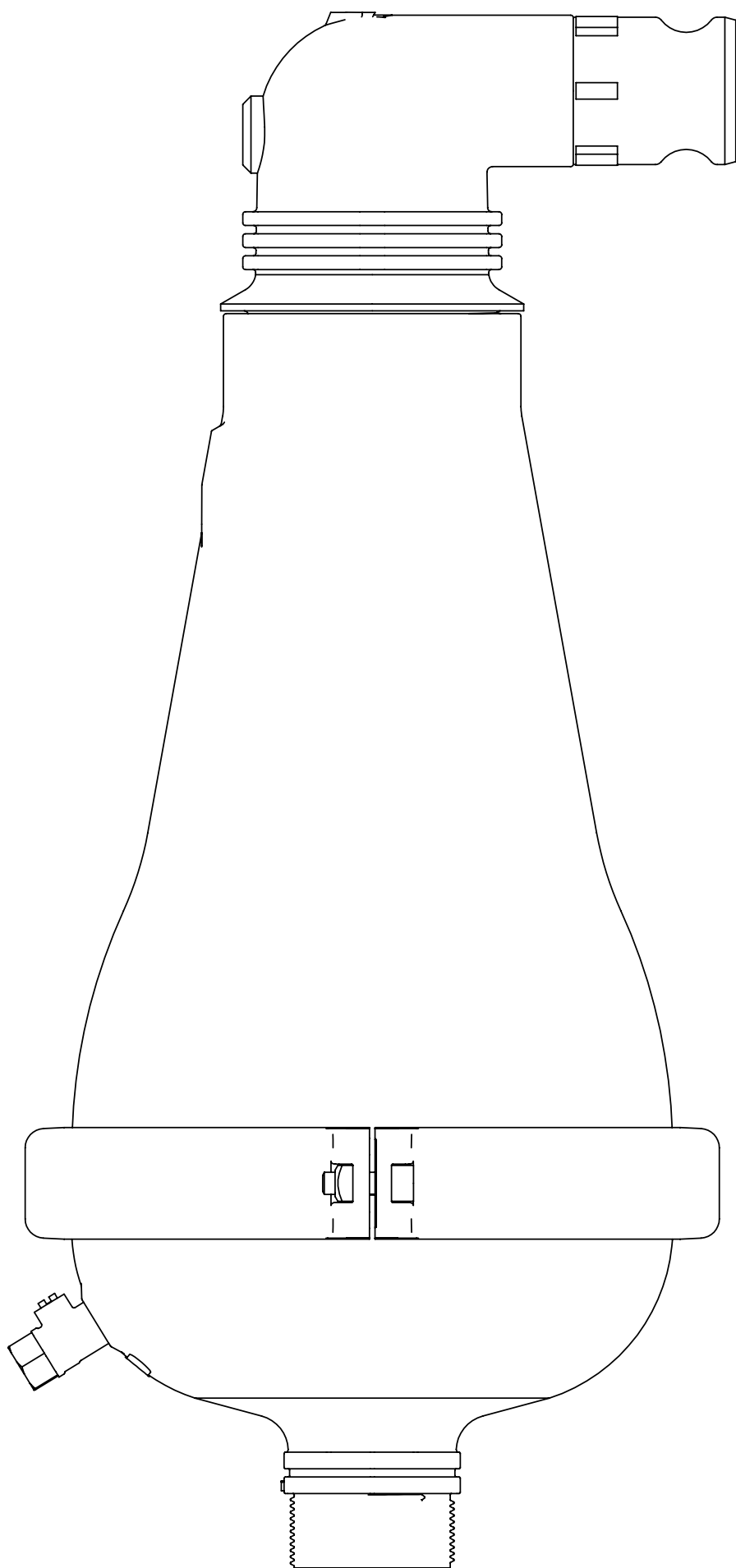
Inlet Size	Dimensions Inch		Connection C	Weight Lbs.	Orifice Area Sq.in	
	A	B			Air Rel.	A / V
2" ST	12.1	22.3	1½" Camlock	27.8	0.018	1.246
3" ST	12.1	22.3	1½" Camlock	28.4	0.018	1.246



PARTS LIST AND SPECIFICATION

No.	Part	Material
1.	Discharge Outlet	Polypropylene
2.	Rolling Seal Assembly	Reinforced Nylon + E.P.D.M. + Stainless Steel SAE 316
3.	Body	Reinforced Nylon
4.	Float	Foamed Polypropylene
5.	Clamping Stem	Reinforced Nylon
6.	O-Ring	BUNA-N
7.	Domed Nut	Stainless Steel SAE 316
8.	Stopper	Polypropylene
9.	Spring	Stainless Steel SAE 316
10.	Washer	Stainless Steel SAE 316
11.	Stem	Stainless Steel SAE 316
12.	Body	Stainless Steel ASTM A744 CF8M
13.	Clamp	Stainless Steel ASTM A744 CF8M
14.	O-Ring	BUNA-N
15.	Float	Polypropylene
16.	Ball Valve 1/2 "	Stainless Steel SAE 316
17.	Base	Stainless Steel ASTM A744 CF8M





Next Generation Air Control



Waterworks

Air Valves Series

BERMAD's new advanced line of air valves now joins its extensive line of hydraulic control valves to create comprehensive control solutions for pressurized pipelines and networks. System engineers and end-users can now design and install far more optimized solutions for their system requirements.

The new line of BERMAD Air Valves include Metal Air Valves ranging from 2" to 12" (DN50 - DN300) and Plastic Air Valves from ¾" to 3" (DN20 - DN80) for a variety of Water, Sewage and Waste water pipeline and networks offering:

- Higher flow rates
- Low pressure sealing
- Minimal spray effect
- Built-in surge protection (anti-slam feature)
- Versatile design for easy installation
- Reliable structure



BERMAD continues its long tradition of meeting customer needs with efficient, convenient and cost-effective solutions bringing to market today's most advanced air valves for Waterworks, Sewage and Wastewater systems.



Water Control Solutions



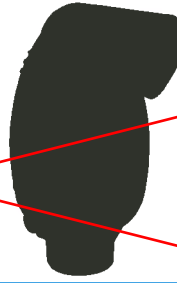
A30

Automatic (Air Release)
Air Valve,
Plastic body



A71

Automatic (Air Release)
Air Valve,
Stainless Steel body



C30

Combination Air Valve,
Plastic body



C30-C

Combination Air Valve,
Ductile Iron body



C70

Combination Air Valve,
Ductile Iron body,
Down outlet



C70-SP

Combination Air Valve,
Ductile Iron body
Mushroom outlet
with Surge Protection



C70-SP

Combination Air Valve,
Ductile Iron body
Side outlet
with Surge Protection



C50-P

Combination Air Valve
for Sewage and Wastewater,
Plastic body



C50-G

Combination Air Valve
for Sewage and Wastewater,
Stainless Steel & Plastic body



C50-N

Combination Air Valve
for Sewage and Wastewater,
Stainless Steel body



C60/C65

Combination Air Valve
for Sewage and Wastewater,
Ductile Iron body



Sewage and Wastewater Combination Air Valve

Model C50

BERMAD C50 is a high quality combination air valve for a variety of sewage and wastewater networks and operating conditions. It evacuates air during pipeline filling, allows efficient release of air and gas pockets from pressurized pipes, and enables large volume air intake in the event of network draining.

With its advanced aerodynamic design and double orifice, this valve provides excellent protection against air and gas accumulation and vacuum formation with improved sealing under low pressure conditions.



Typical Applications

- Sewage and wastewater pumping stations – Air relief and vacuum prevention.
- Sewage and wastewater pipelines – Protection against air and gas accumulation and vacuum formation at elevations, slope change points and at road/river crossings.
- Municipal and industrial wastewater treatment plants – Protection against air and gas accumulation and vacuum formation.

Features and Benefits

- Straight flow body with large diameter automatic orifice – Higher than usual flow rates.
- Aerodynamic, full-body kinetic shield – Prevents premature closing without disturbing air intake or discharge.
- Dynamic sealing – Prevents leakage under low pressure conditions (1.5 PSI).
- Elongated body design – Prevents solids from making contact with valve's operating parts.
- Compact, simple and reliable structure with fully corrosion-resistant parts – Lower maintenance and increased life span.
- Two inlets – Enabling back flushing and drainage.
- Factory approval and Quality Control – Performance and specification tested and measured with specialized test bench for air valves.

Additional Features

- Surge Protection (anti-slam) – Smoother operation, preventing damage to the valve and the system (C50-SP).
- Inflow Prevention – Prevents intake of atmospheric air in cases where this could lead to damaged pumps, required re-priming, or disruption of siphons (C50-IP).
- Drainage Valve.



Principles of Operation

Pipeline filling:

During the filling process of a pipeline, high air flow is forced out through the kinetic orifice of the air valve. Once water enters the valve's chamber, the float buoyed upwards causes the kinetic orifice to close. The unique aerodynamic structure of the valve body and float ensures that the float cannot be closed before water reaches the valve.

Pressurized Operation:

During pressurized operation of the pipeline, air accumulates in the upper part of the air valve chamber, causing the float to gravitate downwards. This in turn causes the automatic orifice to open, releasing the accumulated air. Once the air is discharged, the water level and float rise, causing the automatic orifice to close.

Pipeline Draining:

When a pipeline is drained, a negative differential pressure is created causing atmospheric air to push the float down. The kinetic orifice stays open and air enters the valve chamber, preventing vacuum formation in the pipe.

Surge Protection (anti-slam):

The anti-slam device is fitted to the air valve outlet. In the event of a pressure surge it partially closes the valve's outlet. The approaching water column decelerates due to the resistance of the rising air pressure in the valve.

Inflow Prevention:

The inflow prevention mechanism is a Normally Closed check device fitted on the valve's outlet and preventing flow of atmospheric air into the valve.

Valve Selection

- Body Material – Glass-reinforced Nylon
- Inlet sizes – 2", 3", 4"
- Connections:
 - 2" Threaded Male & Female NPT
 - 2-3" Flanged ANSI/ASME150
- Outlets – Sideways (2" NPT threaded), downwards (1 1/2" NPT threaded)
- Additional features:
 - Surge Protection (C50-SP)
 - Inflow Prevention (C50-IP)

Operational Data

- Pressure rating: ANSI/ASME150
- Operating pressure range: 1.5 - 150 PSI
- Operating temperature: Up to 140°F

Orifice Specifications

Size	Kinetic		Automatic
Inch	D [Inch]	Ad [Sq Inch]	Ad [Sq Inch]
2	1 3/4	2 1/2	0.0189
3	1 3/4	2 1/2	0.0189
4	1 3/4	2 1/2	0.0189

Dimensions and Weights

Size	Connection	Side Outlet		
Inch		D (Inch)	H (Inch)	Weight (lb)
2	Threaded	9 1/16	18 1/16	12.1
2	Flanged	9 1/16	18 13/16	14.3
3	Flanged	9 1/16	18 13/16	15
4	Flanged	9 1/16	18 13/16	15.5

BERMAD Waterworks



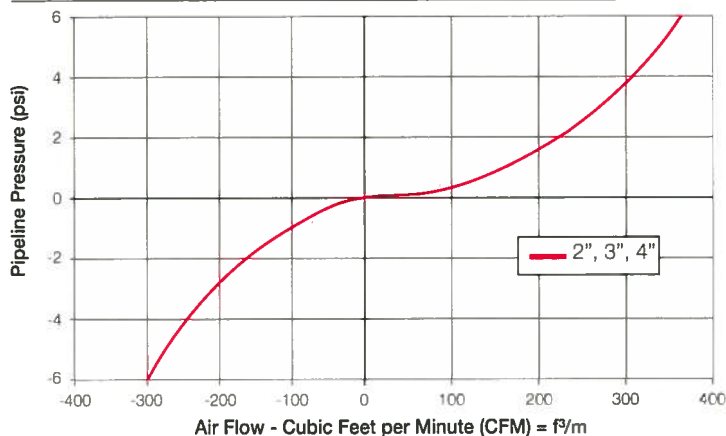
Model C50

Air Valves Series

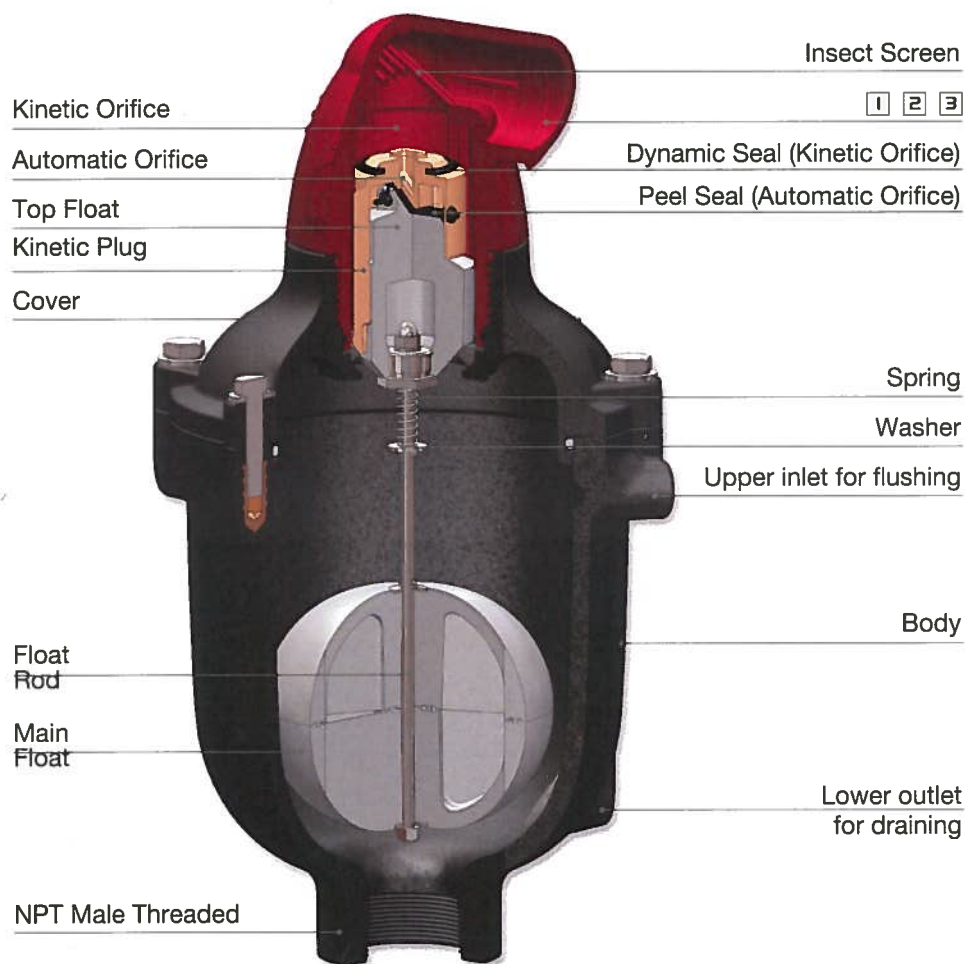
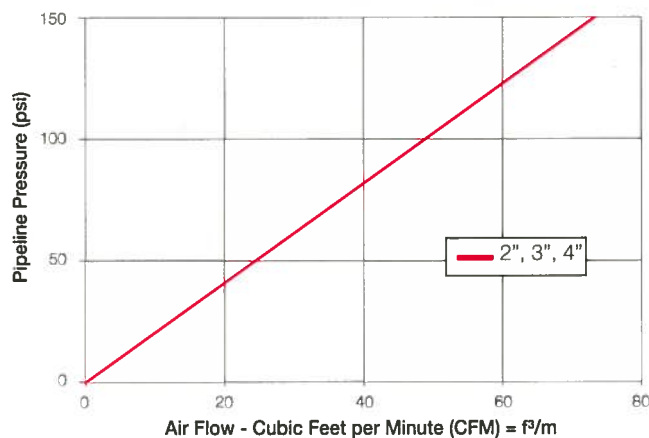
Air Flow Performance Charts

Air Relief and Intake

(Pipeline Filling, Draining and Vacuum Conditions)



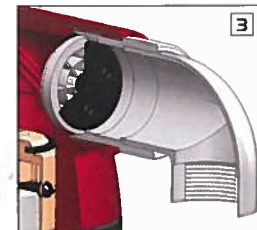
Air Release (Pressurized Operation)



Down outlet and
1 1/2" connection to
drainage pipe



Surge Protection
(anti slam) - (C50-SP)



Inflow Prevention
(C50-IP)



Parts List and Materials

	Description	Material	Standards/Remarks
1	Body BSP/NPT Female	Glass Reinforced Nylon	
1a	Body BSP/NPT Male	Glass Reinforced Nylon	
2	Cover-2"-Sewage	Glass Reinforced Nylon	
3	Down Outlet	Polypropylene	
4	2-C-Body	Glass Reinforced Nylon	
5	Top Float	Polypropylene	
6	Main Float	Polypropylene	
7	Kinetic Plug	Polyamide	
8	Peel Seal	EPDM	
9	Kinetic Seal	EPDM	
10	Hex domed Nut	Stainless Steel	AISI/SAE S30400 DIN1587 A2
11	Washer	Stainless Steel	AISI/SAE S30400 DIN1587 A2
12	Float Rod	Stainless Steel	AISI/SAE S30400 DIN1587 A2
13	Top Float Nut	Polyamide	
14	Spring	Stainless Steel	AISI/SAE S30300
15	Washer	Stainless Steel	AISI/SAE S30400 DIN9021 A2
16	Nut	Stainless Steel	AISI/SAE S30400 DIN934 A2
17	O-Ring	EPDM	
18	Bolt	Stainless Steel	AISI/SAE S30400 DIN933 A2
19	Washer	Stainless Steel	AISI/SAE S30400 DIN125A A2
20	Washer	EPDM	
21	O-Ring	EPDM	
22	Exit	Polypropylene	Only C50-SP, C50-IP
23	Grid	Glass Reinforced Nylon	Only C50-SP, C50-IP
24	Surge Protection Seal	EPDM	Only C50-SP
25	Flow Prevention Seal	EPDM	Only C50-IP
26	O-Ring	EPDM	Only C50-SP, C50-IP



VENT-O-MAT[®]

SERIES RGX



Jim Meroney
Pipeline Products Company
817-368-5058
jimmeroney@aol.com

"Anti-Surge"
Sewage Air Release and Vacuum Break Valves

For Effective Air Release Vacuum Protection
and Surge Alleviation

VENT-O-MAT®

SEWAGE AIR RELEASE & VACUUM BREAK VALVES SERIES RGX

"ANTI - SURGE"

The Unique defence against pipe bursts and pipeline system damage!

Vent-O-Mat Series RGX has evolved from a long lineage of research and development into a product that has proven unsurpassed for air release, vacuum protection, surge alleviation and pipeline flow enhancement.

The basis of the Vent-O-Mat design is in the understanding of the physical laws that govern air valve and pipeline operation. Reaction to pipeline dynamics is therefore instantaneous and protection provided is relevant to the pipeline's needs.

Vent-O-Mat Series RGX truly represents the pinnacle of valve design evolution. This valve design provides the most comprehensive, effective and efficient pipeline protection relative to initial cost of any other available pipeline component. This can easily be gauged from the below:

Automatic Surge Protection

The unique Series RGX valve incorporates as standard, three design features to automatically protect a pipeline, under all pipeline operating conditions, from the destructive surge and water hammer phenomena. These features are independent of any mechanical devices ensuring reaction in a very low milli second time span.

Effective Air Release

The RGX design ensures effective de-aeration under all pipeline flow and operating conditions, via either one of three discharge orifices.

Vacuum Protection

The RGX series large orifice diameters equal the nominal size of the valve. This ensures the least possible resistance to the intake of air and consequently the least possible negative pressure within a draining pipeline. The use of solid, cylindrical floats ensures instantaneous reaction, discourages the "Venturi" phenomenon and is a further guarantee of effective vacuum protection.

Guaranteed Performance

The RGX has been designed and developed to provide the optimum usable and safe performance relative to all functions. Selection data has been substantiated through third party testing and can therefore be confidently referenced.

The surge protection function of the RGX design has been incorporated in the well-known **SURGE 2000** surge analysis software programme and can be analysed with great accuracy in other commercially available surge analysis programmes such as FLOWMASTER and TRANSAM.

Unparalleled Service

Vent-O-Mat is committed to customer service and to the selling of solutions. Our highly dedicated team is available at all times to assist with air valve sizing and positioning. Assistance is also provided in finding the most cost effective and/or efficient surge protection strategy relevant to the pipeline's needs.

International Representation

Vent-O-Mat is represented in the following countries and regions:

- * USA
- * Canada
- * Carribean
- * United Arab Emirates
- * South America

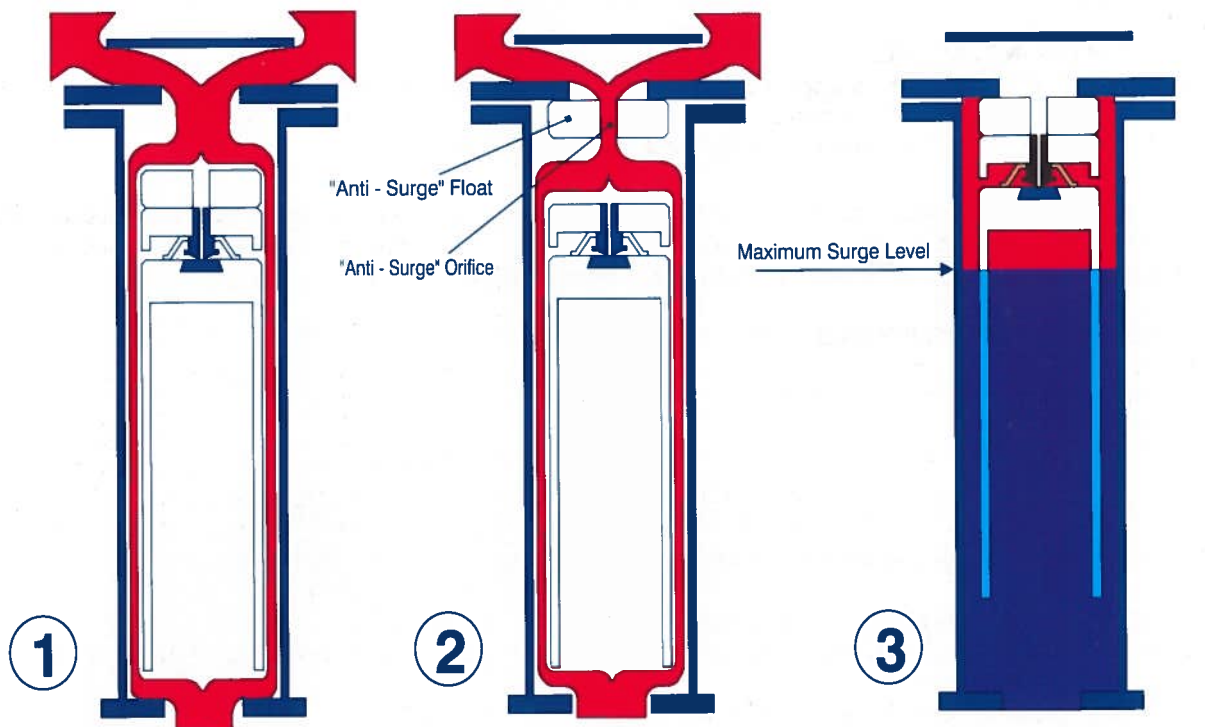
- * Thailand
- * Germany
- * Kenya
- * Egypt
- * UK

- * South Africa
- * Zimbabwe
- * Tanzania
- * Malawi
- * Zambia

- * Namibia
- * Hong Kong
- * Taiwan
- * New Zealand
- * Vietnam

- * Kuwait
- * Brazil
- * France
- * Singapore
- * Australia

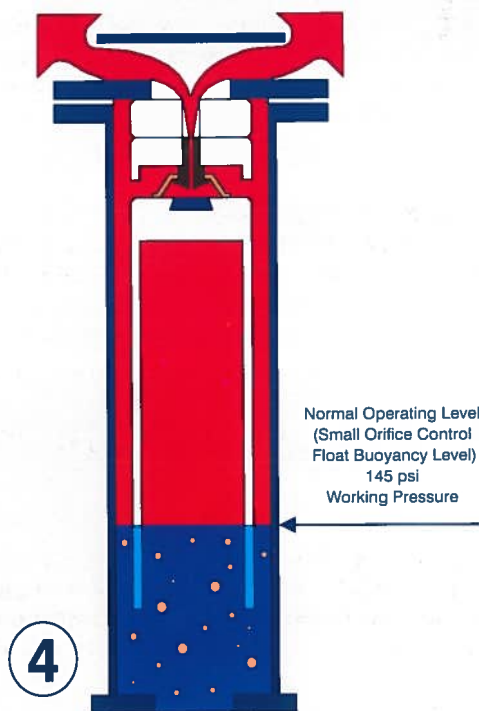
Series RGX OPERATION



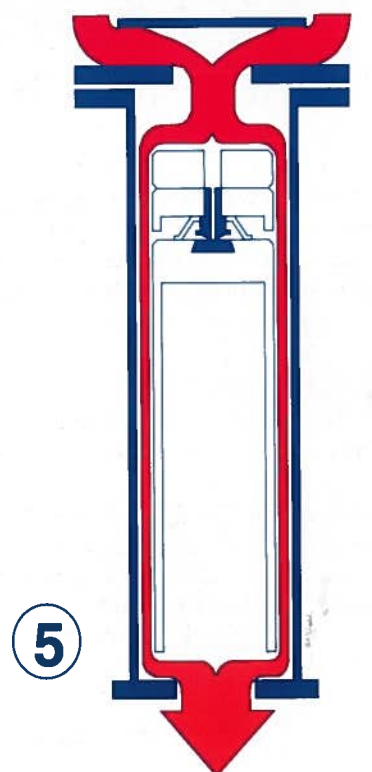
1
PIPELINE FILLING
(SUB CRITICAL SEWAGE/ EFFLUENT
APPROACH VELOCITY)

2
PIPELINE FILLING
(EXCESSIVE SEWAGE/ EFFLUENT
APPROACH VELOCITY)

3
PIPELINE FULLY CHARGED



4
PRESSURIZED AIR/GAS RELEASE
PIPELINE OPERATING



5
VACUUM RELIEF (AIR INTAKE)
PIPELINE DRAINING

Series RGX

OPERATION

PRE NOTES:

A) VENTING OF A FILLING PIPELINE:

The operation of a conventional sewage air release valve is such that fast approaching sewage/effluent is almost instantaneously halted by the valve's closure. Consequently a transient pressure rise or shock of potentially damaging proportions can be generated in a pipeline system, even at normal filling rates.

In addition to venting through the Large Orifice when sewage/ effluent approach velocities are sub critical, the Vent -O- Mat series RGX sewage air release valves feature an automatic "Anti - Surge" Orifice device that serves to decelerate sewage/ effluent approaching at excessive speed, thereby limiting pressure rise in the pipeline.

B) SURGE ALLEVIATION - PIPELINE PRESSURIZED:

In instances where a pipeline experiences liquid column separation due to pump stoppage, high shock pressures can be generated when the separated column rejoins.

The Vent -O- Mat series RGX takes in air through the unobstructed large orifice when column separation occurs, but controls the discharge of air/gas through the "Anti-Surge" Orifice as the separated column commences to rejoin. The rejoining impact velocity is thereby sufficiently reduced to prevent an unacceptably high surge pressure in the system. In the same way the series RGX valve prevents high surge pressures resulting from liquid oscillation in a pipeline.

1. PIPELINE FILLING (SUB CRITICAL SEWAGE/ EFFLUENT APPROACH VELOCITY)

Air/gas flows through the annular area around the control float assembly and to atmosphere through the large orifice.

2. PIPELINE FILLING (EXCESSIVE SEWAGE/ EFFLUENT APPROACH VELOCITY)

In reaction to an increase in air/gas flow, the "Anti - Surge" float closes the large orifice and air/gas is forced through the "Anti Surge" Orifice resulting in a deceleration of the approaching liquid due to the resistance of rising air/gas pressure in the valve.

Attention is drawn to Pre Notes (A) and (B) above.

3. PIPELINE FULLY CHARGED

Sewage/effluent has entered the valve chamber and buoyed the floats to close both the large and the small orifice. The design's compression/ volume relationship prevents the media from ever exceeding the maximum surge level indicated in diagram 3. The resultant sewage/ effluent free area protects against the fouling of the orifice seals by solids or high viscous substances - for this reason **NO FLUSHING CONNECTION ARE NECESSARY.**

4. PRESSURIZED AIR/ GAS RELEASE - PIPELINE OPERATING

The volume of disentrained air/gas increases in the valve and displaces the sewage/effluent to the lower, normal operating level (small orifice control float buoyancy level). Any additional lowering of the sewage/effluent level, as would occur when more air/gas enters the valve, will result in the control float dropping away from the small orifice through which pressurized air/gas is then being discharged to atmosphere.

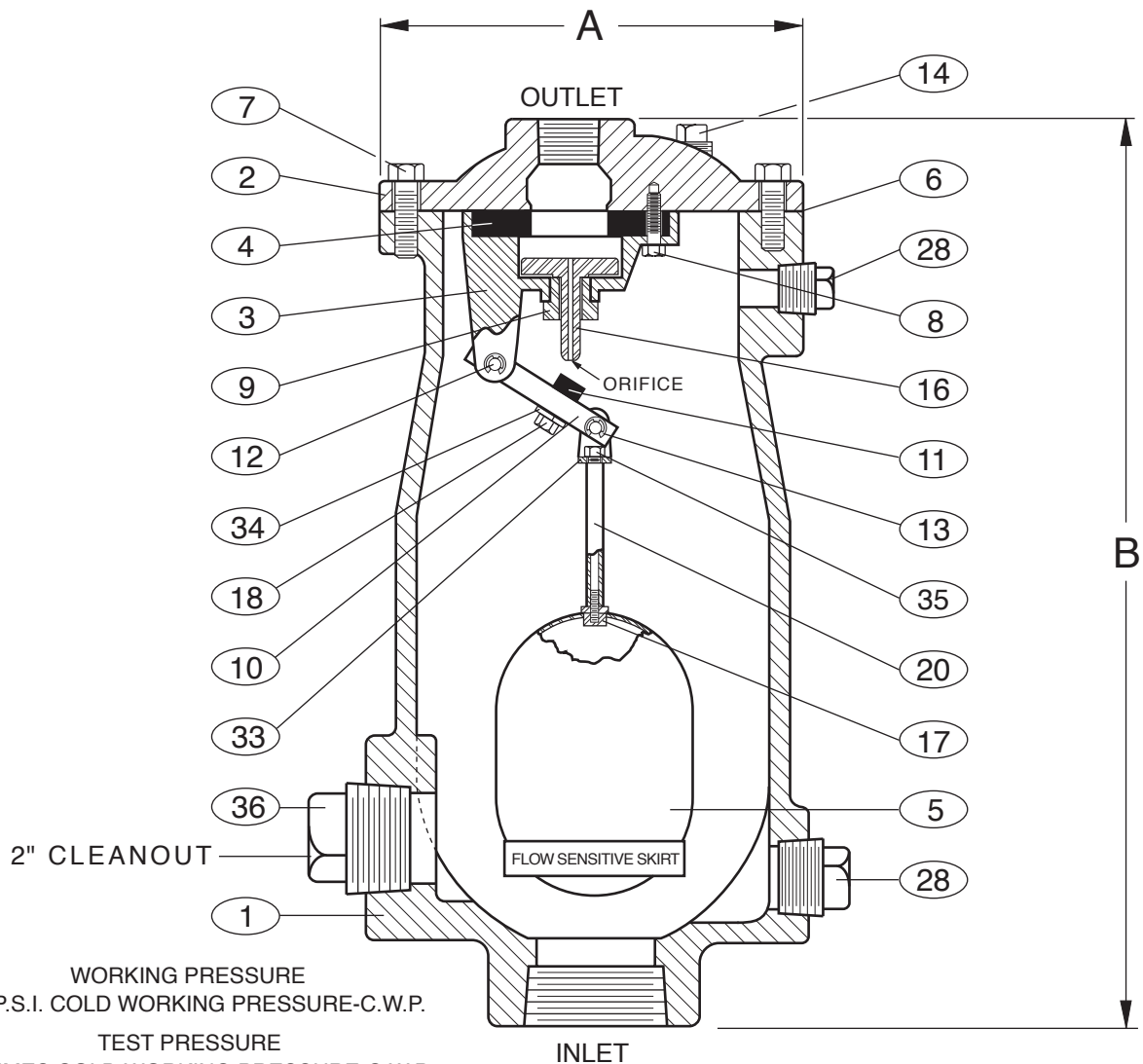
The control float will close the small orifice when sufficient air/gas has been released to restore the sewage effluent to the normal operating level.

The considerable sewage/effluent free area obviates the possibility of leaks that could otherwise be caused by solids entering the sealing areas - for this reason **NO FLUSHING CONNECTIONS ARE NECESSARY.**

5. VACUUM RELIEF (AIR INTAKE) - PIPELINE DRAINING

When the internal pipeline pressure reduces to atmosphere the "Anti - Surge " mechanism and control float assembly drops, opens the large orifice and allows the pipeline to take in air to displace the draining media so as to prevent undesirable low negative pressure*. The hollow, smooth side float design discourages adherence of solids and viscous substances which, therefore, tend to withdraw from the valve into the pipeline when draining occurs - for this reason **NO FLUSHING CONNECTIONS ARE NECESSARY.**

***NOTE:** Negative pressure values are dependant on valve size selection.



WORKING PRESSURE
150 P.S.I. COLD WORKING PRESSURE-C.W.P.
TEST PRESSURE
1.5 TIMES COLD WORKING PRESSURE-C.W.P.

VALVE SIZE	MODEL NO.	A	B	ORIFICE SIZE	INLET	OUTLET
1	801AS	7.00	14.75	1/8"	2"	1"
2	802AS	9.50	17.88	9/64"	2"	2"
3	803AS	11.00	19.25	11/64"	3"	3"
4	804AS	11.00	23.25	11/64"	4"	4"

1 BODY	9 BUSHING (2", 3" & 4")	18 LOCK NUT
2 COVER	10 FLOAT ARM	20 GUIDE SHAFT
3 BAFFLE	11 ORIFICE BUTTON	28 PIPE PLUG
4 SEAT	12 PIVOT PIN	33 CLEVIS
5 FLOAT	13 RETAINING RING	34 LOCK WASHER
6 GASKET	14 PIPE PLUG	35 GUIDE SHAFT RETAINER
7 COVER BOLT	16 PLUG	36 PIPE PLUG
8 RETAINING SCREW	17 FLOAT RETAINER	

SEE DRAWING NO. VM-801AS-M FOR STANDARD MATERIALS OF CONSTRUCTION.

Revised 9-5-12

STAINLESS STEEL WASTEWATER COMBINATION AIR VALVE

DATE 11-5-09

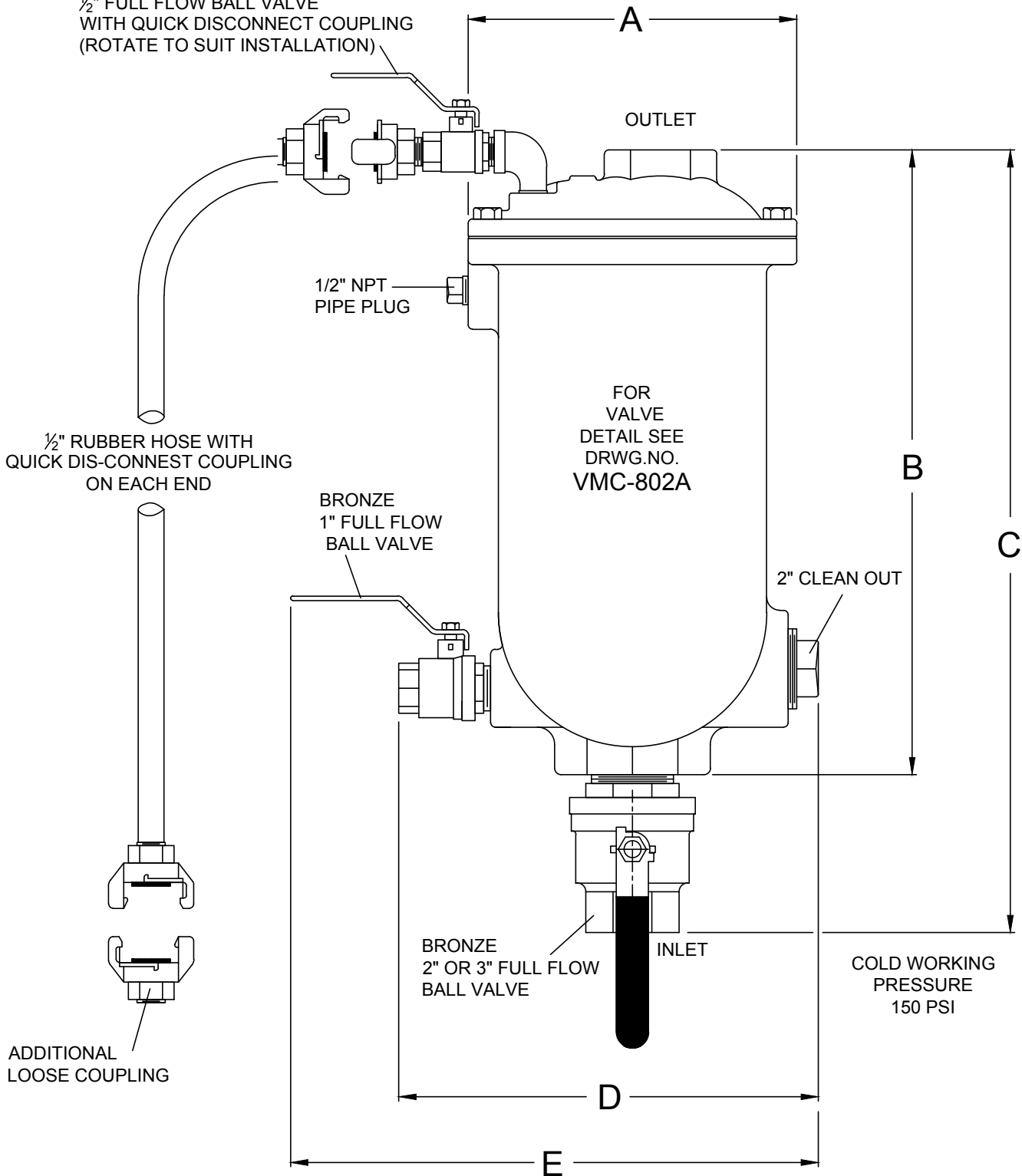
VAL-MATIC®

VALVE AND MANUFACTURING CORP.

DRWG. NO.

VM-801AS

BRONZE
 1/2" FULL FLOW BALL VALVE
 WITH QUICK DISCONNECT COUPLING
 (ROTATE TO SUIT INSTALLATION)



DRAWING DEPICTS 2" SIZE TO SCALE

VALVE SIZE	MODEL NUMBER	BWA KIT NUMBER	A	B	C	D	E
2"	802A	SPK-301ABW	9.50	18.06	22.62	12.13	15.25
3"	803A	SPK-303ABW	11.00	19.19	26.25	13.38	16.50

BACKWASH ACCESSORIES SHIPPED LOOSE

REV 9-29-15

WASTEWATER COMBINATION AIR VALVE

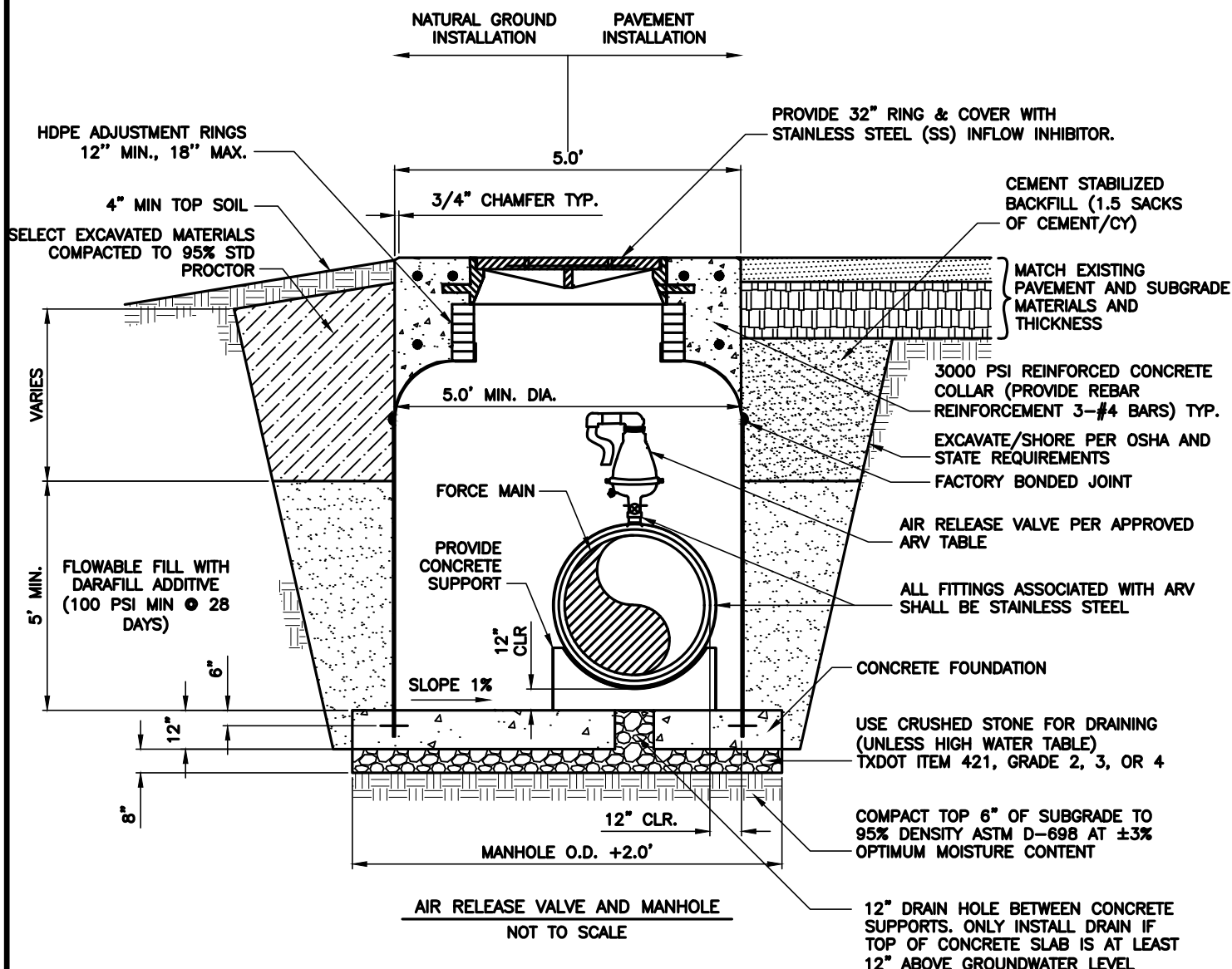
DATE 3-6-13

VAL-MATIC®

VALVE AND MANUFACTURING CORP.

DRWG. NO.
 VMC-802ABW

APPENDIX D: ARV STANDARD DETAIL



APPROVED ARVs		
MANUFACTURER	MODEL NAME	MATERIAL
A.R.I.	D-025 OR D-025 SHORT	316 SS OR REINFORCED NYLON
BERMAD	C50P, C50G, OR C50N	
VENT-O-MAT	SERIES RGX	
VAL-MATIC	SERIES 800	



engineers | architects | surveyors

801 NAVIGATION, SUITE 300
CORPUS CHRISTI, TX 78408

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FAX (361) 883-1986

WWW.LNVINC.COM

TBPE FIRM NO. F-366
TBPLS FIRM NO. 10126500

AIR RELEASE VALVE AND MANHOLE DETAIL

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BY: WILLIAM LOGAN BURTON, P.E.

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