



Annette DeMaria, P.E., PMP
Executive Director

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TO: Karen Mondora, ARC Technical Committee Chair

FROM: Emily Levine, Technical Committee Coordinator

DATE: February 15, 2023

SUBJECT: 2022 IDEP Investigation Summary

In 2022, ARC staff continued to work on an ongoing illicit discharge investigation in Oakland County and assisted Wayne County with investigations in Livonia and Inkster. These investigations were in accordance with the Rouge River Collaborative Illicit Discharge Elimination Plan. These investigations were prompted by the outfall screening efforts conducted in 2018 and 2019, as well as additional sampling conducted by Wayne County in 2020.

The results of the investigations are summarized in Table 1. More detail can be found in the investigation reports which were sent to the communities (Attachment A).

Table 1. Status and Results of Illicit Discharge Investigations

| Permittee | Outfall ID | Status | Result |
|---------------|--------------|---------|--|
| Beverly Hills | BV51 | Ongoing | Further investigation required |
| Livonia | U2008221 | Ongoing | An illicit connection was identified and corrected. Follow-up investigation revealed that an additional pollutant source may be present, resulting in further investigation required |
| Livonia | L1619 | Ongoing | Further investigation required |
| Inkster | Perrin Drain | Ongoing | Tap identified, further investigation required |

In addition, ARC staff conducted sampling in accordance with the ARC's Collaborative Total Maximum Daily Load (TMDL) Implementation Plan requirements. This included completing DO monitoring in Johnson Creek for two months, screening 83 outfalls for *E. coli*, and sampling 28 instream sites for suspended sediment. More information about this can be found in the 2022 Rouge River Water Quality Assessment Report.

Cooperating Partners:

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Rouge River Advisory Council
SEMCOG
Southeastern Oakland
County Water Authority

In 2023, ARC staff will continue source investigations on the outstanding issues in accordance with the Plan and as directed by the Technical Committee. This will also include additional investigations that are in response to results from the 2022 TMDL sampling efforts.

P:\Alliance of Rouge Communities\2023 Alliance of Rouge Communities\Tech Committee\Facilitation\Feb 2023\2022 OC IDEP Summary.docx

Attachment A
Community-specific Investigation Reports

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Cooperating Partners:

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Friends of the Rouge
Great Lakes Water Authority
Rouge River Advisory Council
SEMCOG
Southeastern Oakland
County Water Authority

TO: Neil Johnson, Village of Beverly Hills Director of Public Services

FROM: Emily Levine, ARC Staff

DATE: November 7, 2022

SUBJECT: IDEP Investigation Results: Outfall BV51 (Sleepy Hollow Lane)

ARC staff continued illicit discharge investigation on storm drain outfall BV51 in response to findings from the 2018 outfall screening and 2019 and 2020 investigations. Our investigations did not reveal the source of *E. coli* entering the drain and no illicit connection has been identified.

Background

Outfall BV51 was investigated due to the high *E. coli* concentrations found during the outfall survey conducted in 2018. At that time, the *E. coli* concentration was 3,076 MPN/100 ml which can be indicative of an illicit discharge containing sanitary sewage. ARC staff reinspected the outfall in 2019 and found *E. coli* concentrations at 201 and >24,196 MPN/100 ml respectively.

ARC staff reinspected the outfall on August 19, September 15, and November 17, 2020. As was the case in 2019, the results varied greatly in 2020, with *E. coli* concentrations of 573, >24,196, and 1,081 MPN/100 ml respectively (See Table 1). The results from the September and November sampling events showed Human *Bacteroides* concentrations of 72,000 and <354 gene copies/100 ml respectively. There were no physical signs (ex: odor, staining, debris, organic growth) of a sewage discharge to the storm drain in the outfall or any of the manholes. Likewise, there were no obvious signs of animal fecal impacts to the drain.

The outfall drains a portion of Sleepy Hollow Lane, Fiddlers Cove Road, and Metamora Lane. The receiving water is an unnamed tributary of the Rouge River (Figure 1).

Results

Based on sampling results from previous inspections, ARC staff coordinated with the Oakland County Water Resource Commissioner (OCWRC) to televise the drain west of Outfall BV51 on May 19, 2021. Only the west line was televised because flow had not been observed coming from the north and south during dry weather. A tap was identified in the storm drain that was believed to be a possible illicit connection, although no staining or evidence of sewage was observed (Figure 2). Based on the pipe's location and direction, it appeared to be coming from the house at 31349 Sleepy Hollow Lane. On July 23, 2021, ARC staff coordinated with the Village of Beverly Hills to dye test 31349 Sleepy Hollow Lane. The dye testing revealed that all three bathrooms in the house were correctly connected to the sanitary drain and no dye was observed entering the storm drain.

ARC staff coordinated with the Village of Beverly Hills and OCWRC to televise the remainder of the storm drain on July 26, 2022. The drains from BV51-1 to BV51-2, and the drain from BV51-3 to BV51-2 were televised. BV51-2 is buried. No possible illicit connection was identified.

Table 1. Sampling Results (*E. coli* in MPN/100 mL and Human *Bacteroides* in gene copies/100 ml)

| | <i>E. coli</i> | <i>E. coli</i> | <i>E. coli</i> | <i>E. coli</i> | <i>E. coli</i> | Human <i>Bacteroides</i> | <i>E. coli</i> | Human <i>Bacteroides</i> |
|--------|----------------|----------------|----------------|----------------|----------------|-----------------------------|----------------|-----------------------------|
| | 7/9/18 | 8/15/19 | 9/19/19 | 8/19/20 | 9/15/20 | 9/15/20 | 11/17/20 | 11/17/20 |
| BV51-0 | 3,076 | 201 | >24,196 | 573 | >24,196 | 72,000 | 1,081 | <354 |

Conclusions and Recommendations

Work to date indicates that no illicit connection has been identified upstream of BV51. The manhole at BV51-2 is buried. We recommend digging up BV51-2 to be able to further investigate it and sample the manhole.

This work is being completed as outlined in the Rouge River Collaborative IDEP Plan in compliance with the Village's MS4 permit and as a result of your ARC membership. If you have any questions, I can be reached at 313-963-6600 or elevine@ectinc.com.

X:\Alliance of Rouge Communities\2021 Alliance of Rouge Communities\Tech Com\OC IDEP\BV51 2021 IDEP close-out Summary.docx

Figure 1. Storm Drain and Sampling Locations

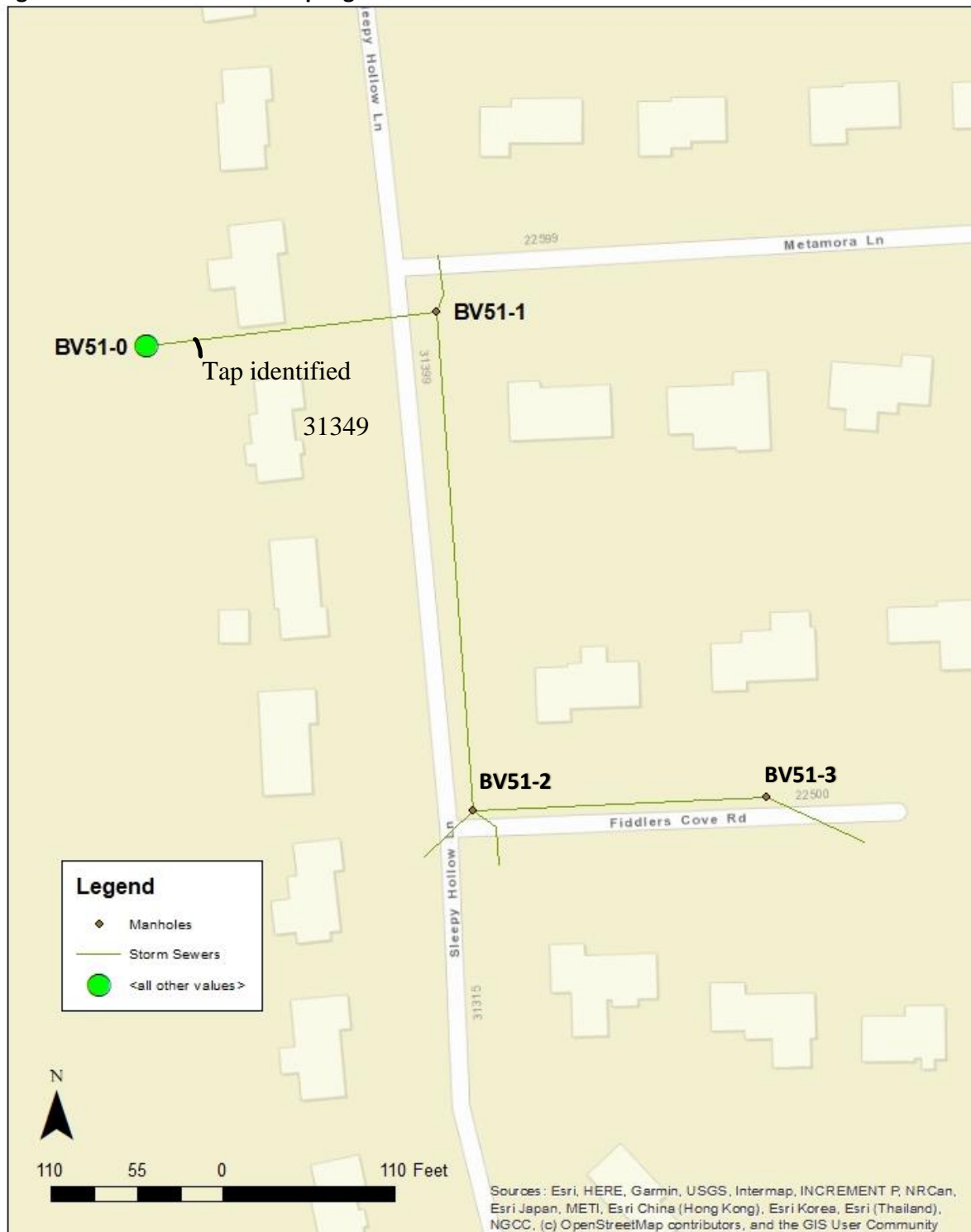


Figure 2. Tap to Storm Drain at 14.2 ft east of BV51-0



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TO: Doug Moore, City of Livonia

FROM: Emily Levine, ARC Staff

DATE: January 6, 2023

SUBJECT: IDEP Investigation Results: Outfall L1619

ARC staff continued the illicit discharge investigation on storm drain outfall L1619 in response to findings from the 2018 outfall screening and subsequent investigations conducted by Wayne County. Our investigations have not identified an illicit connection and further investigation is recommended.

Background

Outfall L1619 was investigated due to the high *E. coli* concentrations found during the outfall survey conducted in 2018. At that time, the *E. coli* concentration was 15,531 MPN/100 ml which is indicative of an illicit discharge containing sanitary sewage. Wayne County conducted follow-up investigations, which narrowed down the source to being upstream of a manhole located in the grass along the north side of Seven Mile Road, near a Chicken Shack restaurant (Figure 1). *E. coli* and Human *Bacteroides* levels at this manhole have been found to be elevated (Table 1).

The drainage area of the manhole in front of the Chicken Shack was unclear, as the storm drain map provided by the City of Livonia appears to be incomplete. Therefore, televising was recommended to determine the extent of the storm drain and search for any illicit connections.

Results

ECT worked with a televising crew on December 21, 2022 to televise the line starting at the manhole by the Chicken Shack along Seven Mile Road and ending at Middlebelt Road (Figure 2). Eight manholes were encountered along this section of pipe. No taps were found between manholes and the line ended at a 12" pipe that was bulkheaded. Inlets in the manholes appear to connect to catch basins along Seven Mile Road and to the parking areas of the businesses to the north of the storm drain. The CCTV report is included as Attachment A.

Cooperating Partners:

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Friends of the Rouge
Great Lakes Water Authority
Rouge River Advisory Council
SEMOG
Southeastern Oakland
County Water Authority

Table 1. Sampling Results (*E. coli* in MPN/100 mL and Human *Bacteroides* in gene copies/100 ml)

| | <i>E. coli</i> | <i>E. coli</i> | <i>E. coli</i> | <i>E. coli</i> | Human <i>Bacteroides</i> |
|------------------------|----------------|----------------|----------------|----------------|-----------------------------|
| | 7/16/18 | 12/9/20 | 12/16/20 | 11/10/21 | 11/10/21 |
| L1619 | 15,531 | 630 | | 3,076 | 95 |
| 29050 Dardanella | | <100 | | | |
| Seven Mile WC MS4 East | | | 61 | | |
| Chicken Shack | | | 2,000 | 1,616 | 1,541,053 |

Conclusions and Recommendations

The source of the elevated *E. coli* at this outfall remains unclear. Additional inspections of catch basins and their connections along Seven Mile Road, upstream of the Chicken Shack are recommended.

This work is being completed as outlined in the Rouge River Collaborative IDEP Plan in compliance with the City's MS4 permit and as a result of your ARC membership. If you have any questions, you can reach me at 248-763-1407 or elevine@ectinc.com.

X:\Alliance of Rouge Communities\2022 Alliance of Rouge Communities\Tech Committee\IDEP investigations\Livonia\1619\L1619 2022 IDEP Summary.docx

Figure 1. Storm Drain and Sampling Location

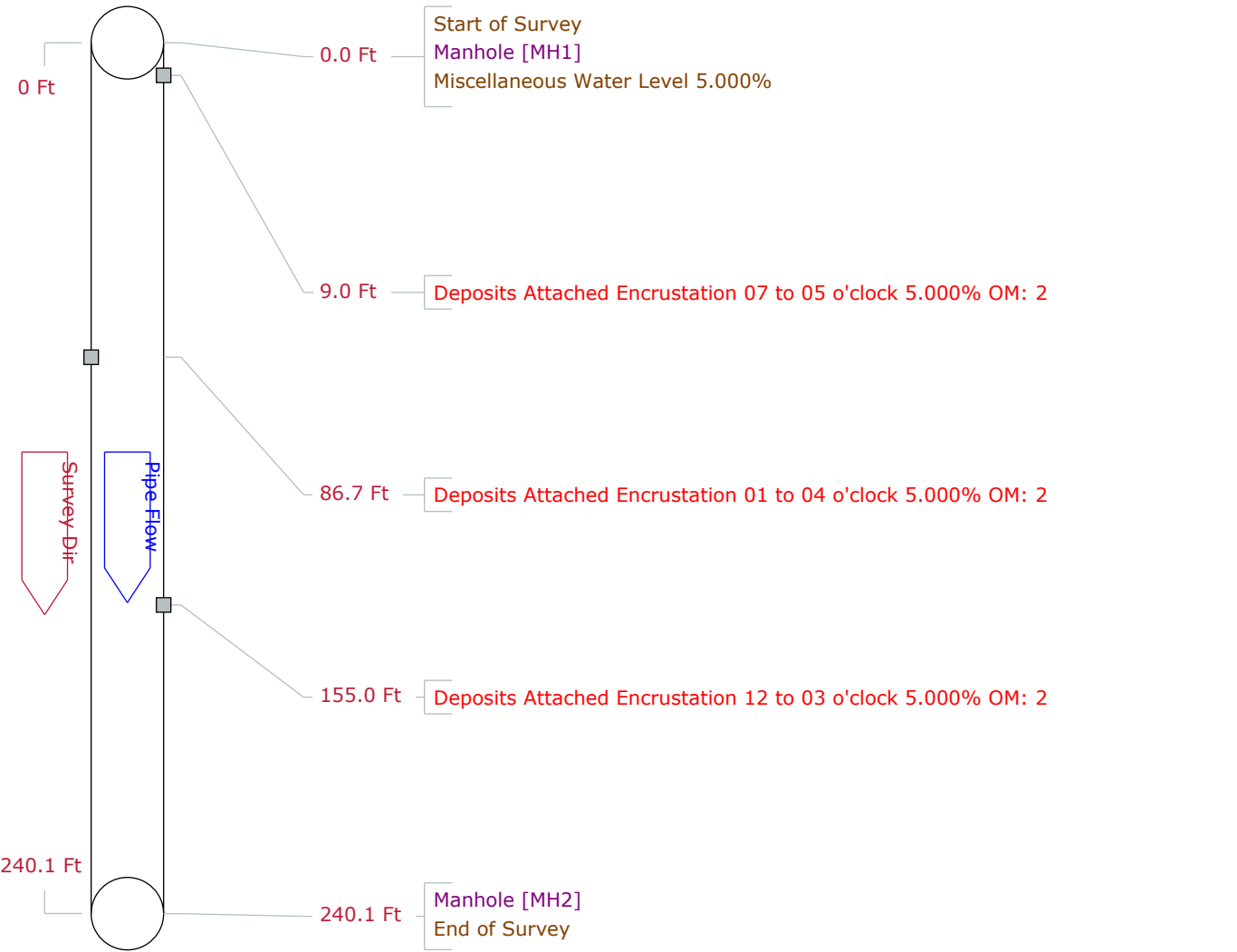


Figure 2. Televised Line Map



Attachment A. CCTV Inspection Reports

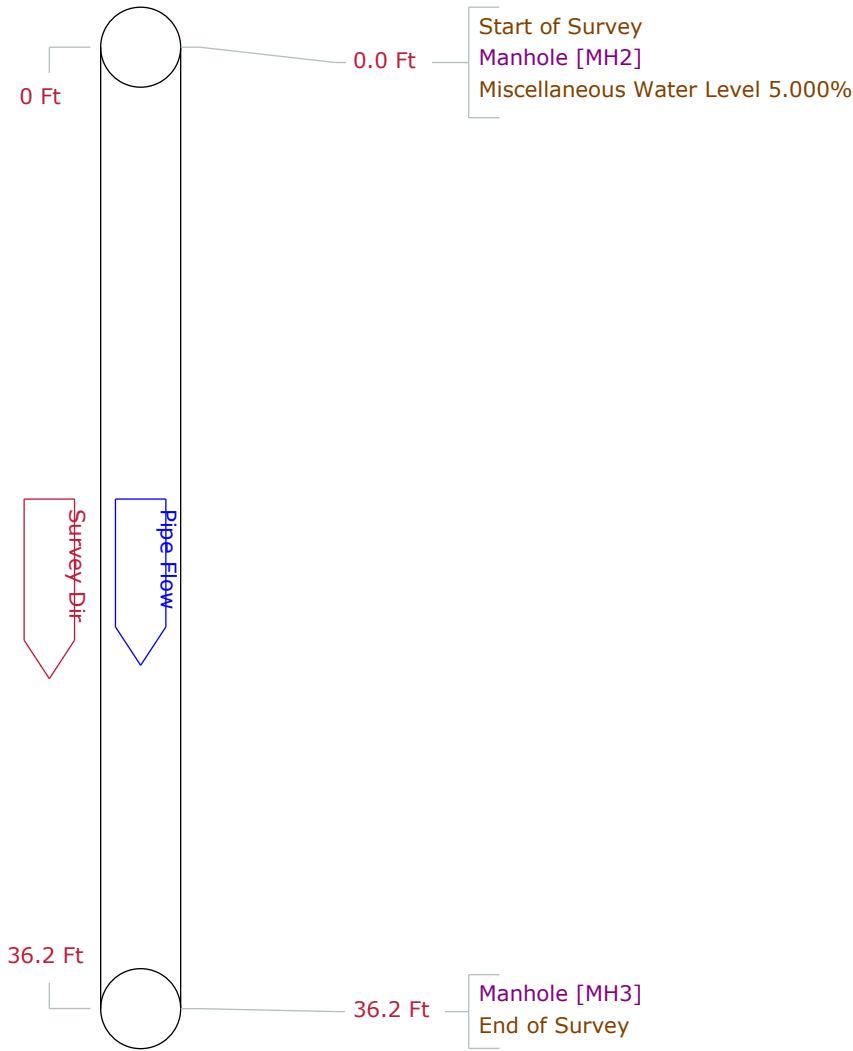
| | | | | | | | |
|------------------|----------------|-------------------|----------------------------|-----------------|-----------------|------------------------------|---------------|
| Setup | 1 | Surveyed By | PIPETEK-RD | Certificate # | P0038923-082022 | Owner | LIVONIA |
| Reviewed By | | Reviewer # | | Work Order | | | |
| Customer | ETC | | | P/O # | | | |
| Media Label | MH1A | Project | ETC_STORM_TV_RD_12-21-2022 | | | | |
| Date | 2022/12/21 | Time | 8:49 | Weather | Pre-Cleaning | N | Date Cleaned |
| Flow control | Not Controlled | Survey Purpose | Routine Assessment | | | | Direction |
| Street | 7 MILE | City | LIVONIA | | | | Drainage area |
| Location Code | | | | Pipe Use | Stormwater Pipe | | |
| Location details | CHICKEN SHACK | | | Height | 18 | Width | ins |
| Shape | Circular | Material | Reinforced Concrete Pipe | Lining | | | |
| Coating | | Pipe Joint length | Ft | Total length | Ft | Structural O & M | |
| Length Surveyed | 240.10 Ft | Year Constructed | | Year Renewed | | Miscellaneous Constructional | |
| Additional info | | | | | | | |
| Up | MH1 | Rim to invert | | Grade to invert | | Rim to grade | Ft |
| Down | MH2 | Rim to invert | | Grade to invert | | Rim to grade | Ft |



Pipe Graphic Report of PLR MH2A

for ECT

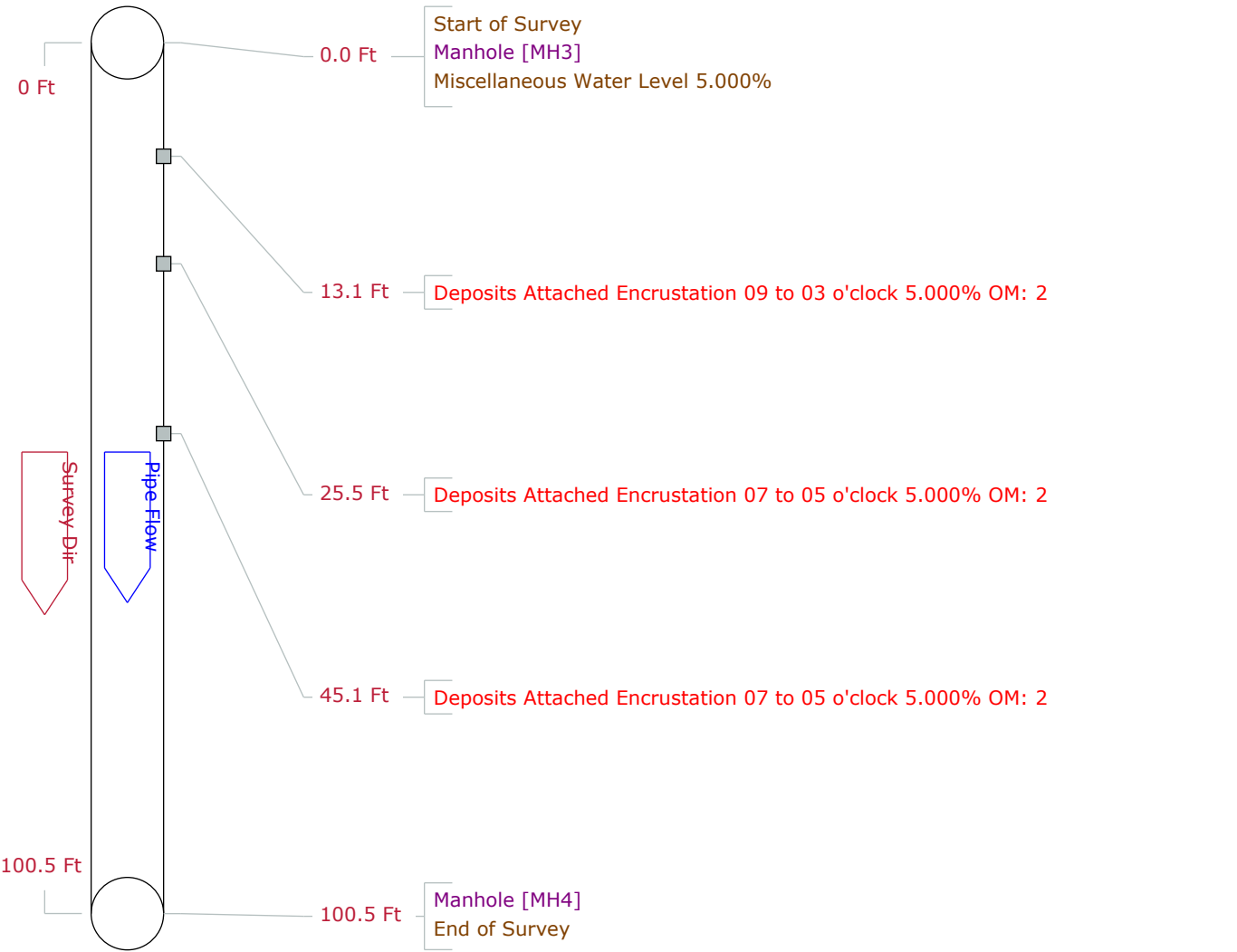
| | | | | | | | | | | |
|------------------|----------------|-------------|------------------|----------------------------|--------------------------|-----------------|--------------|-----------------|---|--------------|
| Setup | 2 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | LIVONIA | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | |
| Customer | ETC | | | | P/O # | | | | | |
| Media Label | MH2A | | Project | ETC_STORM_TV_RD_12-21-2022 | | | | | | |
| Date | 2022/12/21 | | Time | 9:11 | | Weather | Pre-Cleaning | | N | Date Cleaned |
| Flow control | Not Controlled | | Survey Purpose | Routine Assessment | | | | | Direction | Downstream |
| Street | 7 MILE | | | | City | LIVONIA | | Drainage area | | |
| Location Code | | | | Pipe Use | | | | Stormwater Pipe | | |
| Location details | | | | Height | | | | 18 | Width | ins |
| Shape | Circular | | | Material | Reinforced Concrete Pipe | | | Lining | | |
| Coating | | | | Pipe Joint length | Ft | Total length | | Ft | <div><div>Structural</div><div>O & M</div><div>Miscellaneous</div><div>Constructional</div></div> | |
| Length Surveyed | 36.20 | Ft | Year Constructed | Year Renewed | | | | | | |
| Additional info | | | | | | | | | | |
| Up | MH2 | | | Rim to invert | Grade to invert | | | Rim to grade | Ft | |
| Down | MH3 | | | Rim to invert | Grade to invert | | | Rim to grade | Ft | |



Pipe Graphic Report of PLR MH3A

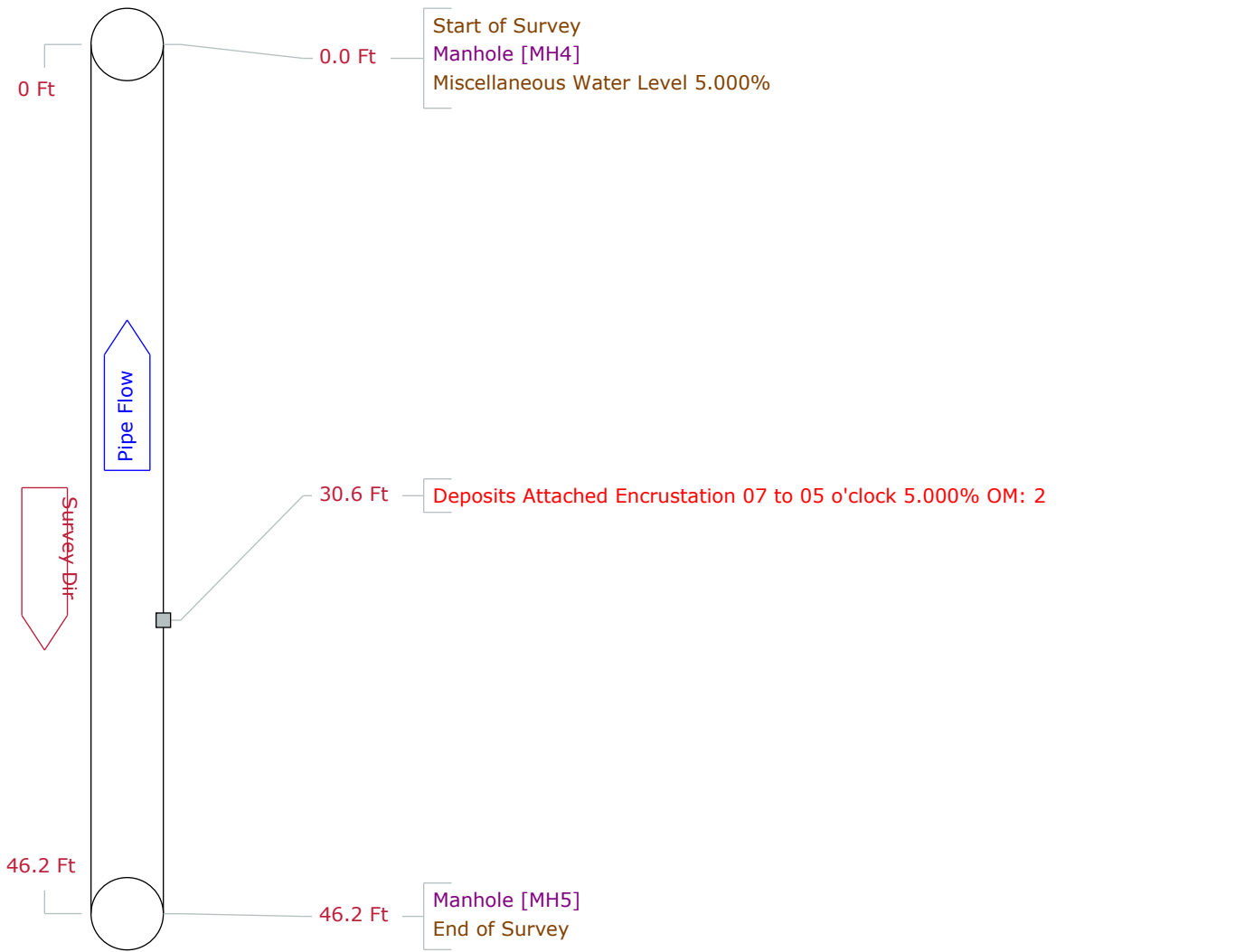
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| | | | | | | | |
|------------------|----------------|-------------------|----------------------------|-----------------|-----------------|---------------|----------------|
| Setup | 3 | Surveyed By | PIPETEK-RD | Certificate # | P0038923-082022 | Owner | LIVONIA |
| Reviewed By | | Reviewer # | | Work Order | | | |
| Customer | ETC | | | P/O # | | | |
| Media Label | MH3A | Project | ETC_STORM_TV_RD_12-21-2022 | | | | |
| Date | 2022/12/21 | Time | 9:41 | Weather | Pre-Cleaning | N | Date Cleaned |
| Flow control | Not Controlled | Survey Purpose | Routine Assessment | | | | Direction |
| Street | 7 MILE | City | LIVONIA | | | | Drainage area |
| Location Code | | | | Pipe Use | Stormwater Pipe | | |
| Location details | | | | Height | 18 | Width | ins |
| Shape | Circular | Material | Reinforced Concrete Pipe | Lining | | | |
| Coating | | Pipe Joint length | Ft | Total length | Ft | Structural | O & M |
| Length Surveyed | 100.50 Ft | Year Constructed | | Year Renewed | | Miscellaneous | Constructional |
| Additional info | | | | | | | |
| Up | MH3 | Rim to invert | | Grade to invert | | Rim to grade | Ft |
| Down | MH4 | Rim to invert | | Grade to invert | | Rim to grade | Ft |

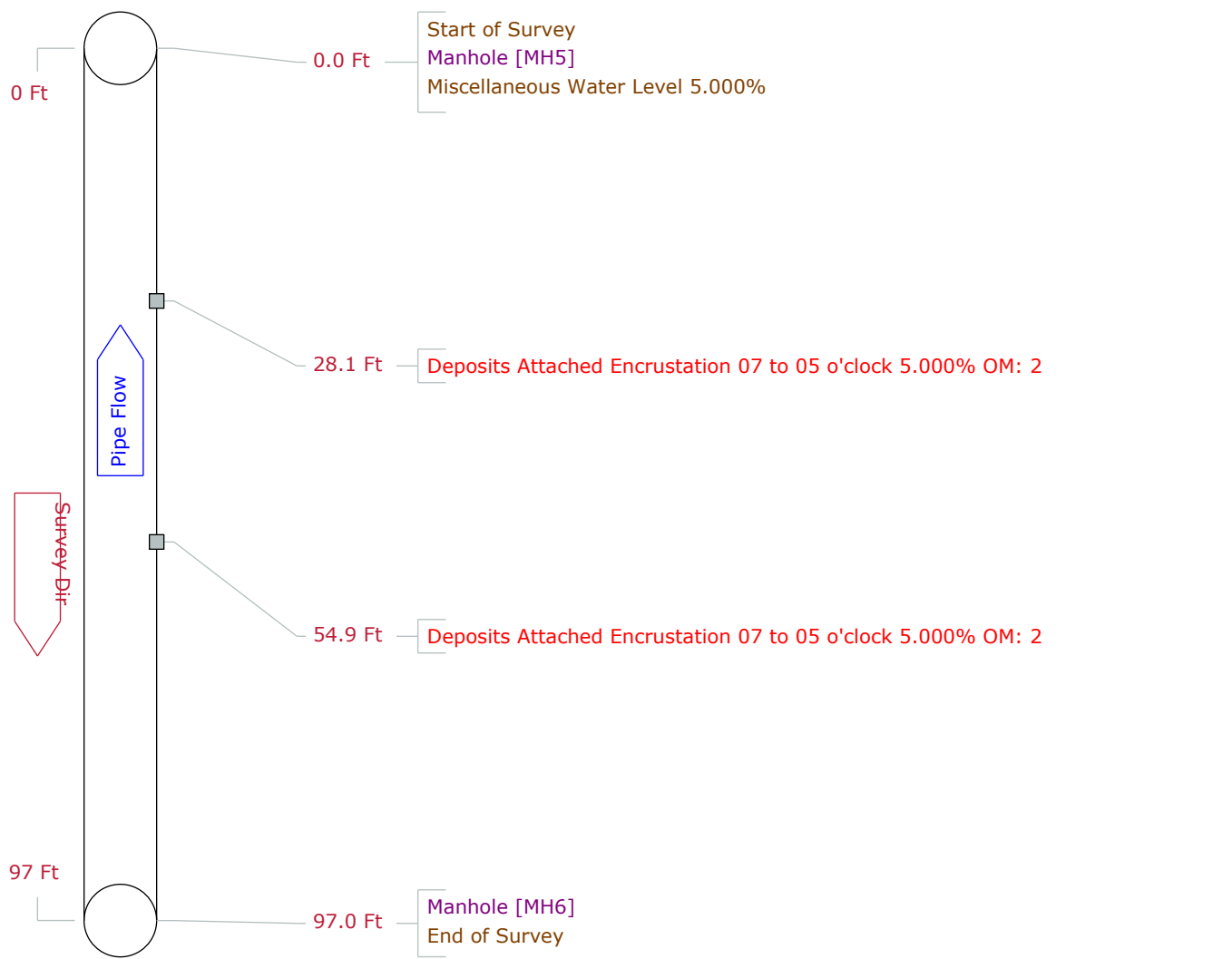


Pipe Graphic Report of PLR MH4A for ECT

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|------------------|----------------|-------------------|----------------------------|-----------------|-----------------|--|---------------|
| Setup | 4 | Surveyed By | PIPETEK-RD | Certificate # | P0038923-082022 | Owner | LIVONIA |
| Reviewed By | | Reviewer # | | Work Order | | | |
| Customer | ETC | | | P/O # | | | |
| Media Label | MH4A | Project | ETC_STORM_TV_RD_12-21-2022 | | | | |
| Date | 2022/12/21 | Time | 9:52 | Weather | Pre-Cleaning | N | Date Cleaned |
| Flow control | Not Controlled | Survey Purpose | Routine Assessment | | | | Direction |
| Street | 7 MILE | City | LIVONIA | | | | Drainage area |
| Location Code | | | | Pipe Use | Stormwater Pipe | | |
| Location details | | | | Height | 18 | Width | ins |
| Shape | Circular | Material | Reinforced Concrete Pipe | Lining | | | |
| Coating | | Pipe Joint length | Ft | Total length | Ft | Structural O & M Miscellaneous Constructional | |
| Length Surveyed | 46.20 | Year Constructed | | Year Renewed | | | |
| Additional info | | | | | | | |
| Up | MH5 | Rim to invert | | Grade to invert | | Rim to grade | Ft |
| Down | MH4 | Rim to invert | | Grade to invert | | Rim to grade | Ft |



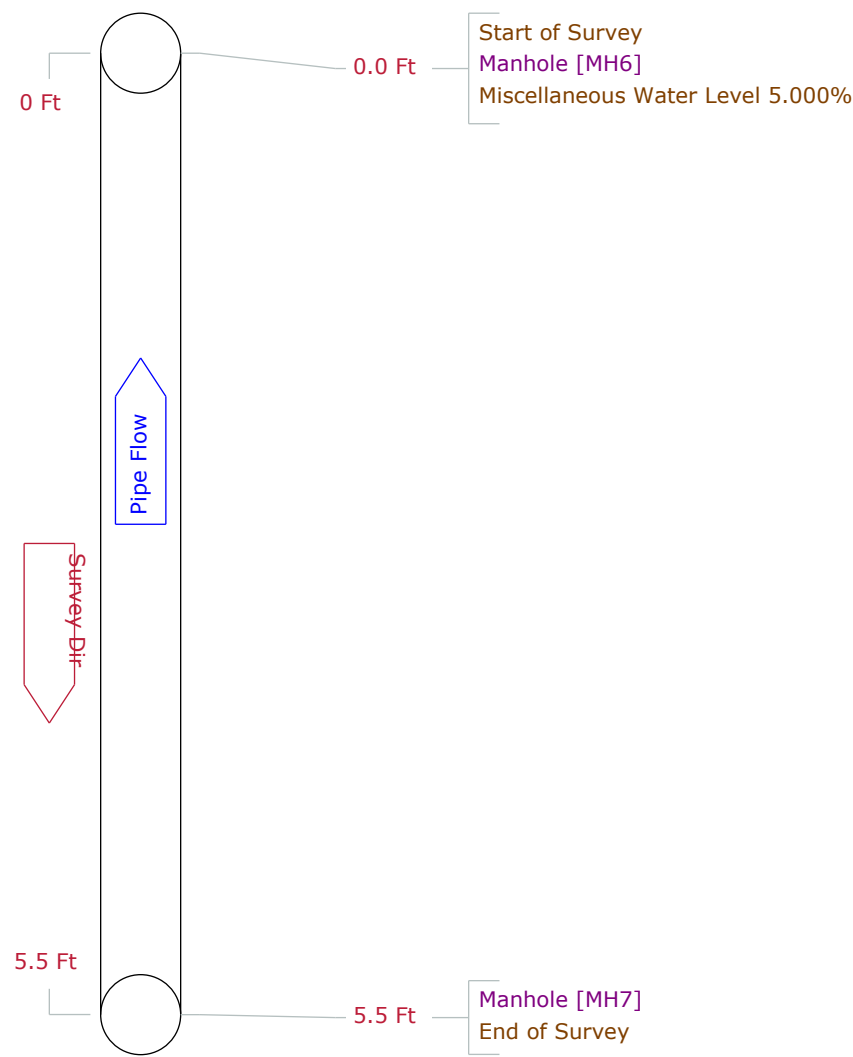
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|------------------|-----|----------------|------------|------------------|----------------------------|--------------------|--------------|--|--------------------------------|-----------|--------------|
| Setup | 5 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | LIVONIA | | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | | |
| Customer | | ETC | | | P/O # | | | | | | |
| Media Label | | MH5A | | Project | ETC_STORM_TV_RD_12-21-2022 | | | | | | |
| Date | | 2022/12/21 | | Time | 10:13 | | Weather | Pre-Cleaning | | N | Date Cleaned |
| Flow control | | Not Controlled | | Survey Purpose | | Routine Assessment | | | | Direction | Upstream |
| Street | | 7 MILE | | | City | LIVONIA | | | Drainage area | | |
| Location Code | | | | | | | | Pipe Use | Stormwater Pipe | | |
| Location details | | | | | | | | Height | 18 | Width | ins |
| Shape | | Circular | | Material | Reinforced Concrete Pipe | | | Lining | | | |
| Coating | | | | | Pipe Joint length | Ft | Total length | Ft | <div>StructuralO & M</div> | | |
| Length Surveyed | | 97.00 | Ft | Year Constructed | Year Renewed | | | <div>MiscellaneousConstructional</div> | | | |
| Additional info | | | | | | | | | | | |
| Up | MH6 | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft | |
| Down | MH5 | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft | |



Pipe Graphic Report of PLR MH6A

for ECT

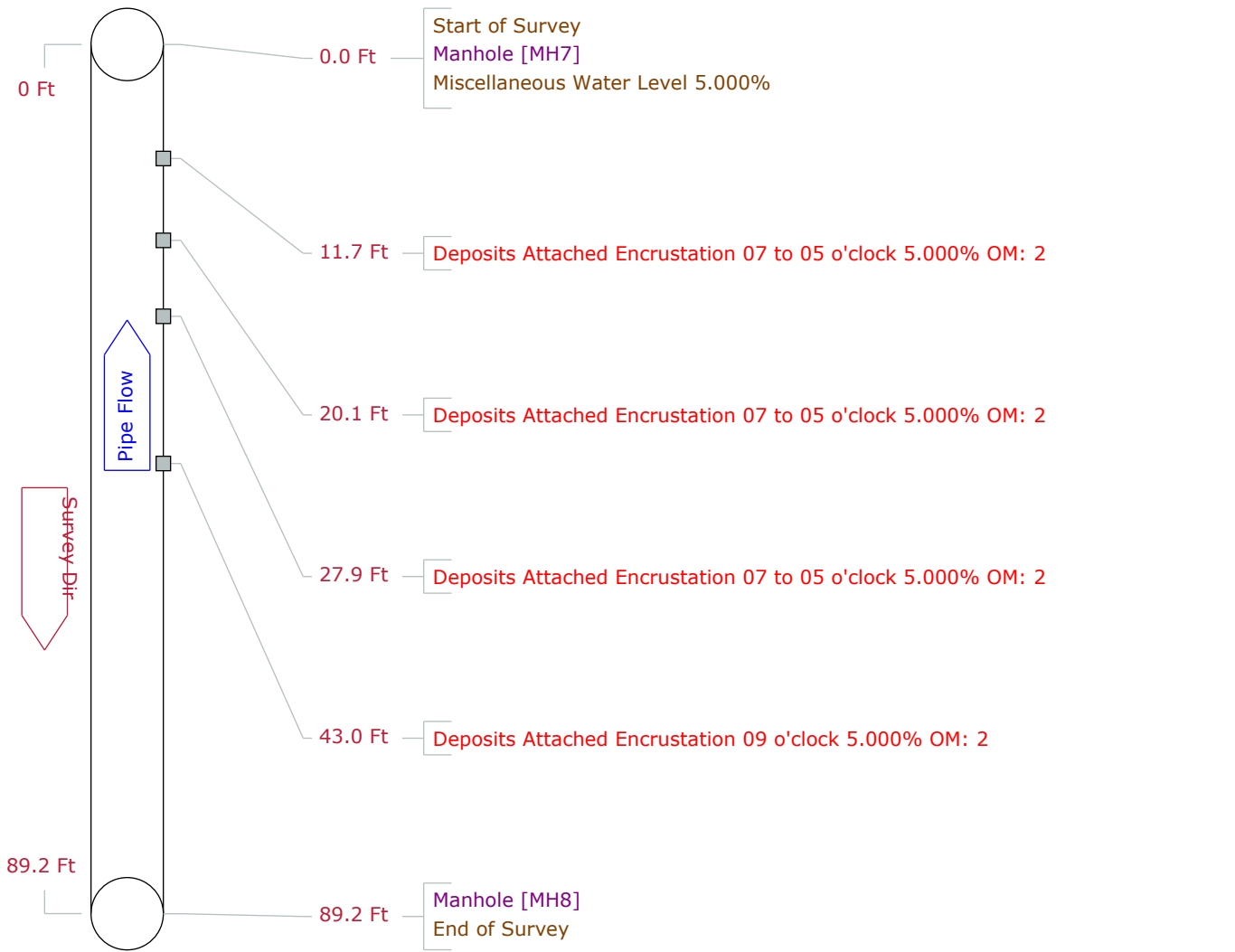
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|------------------|----------------|-------------------|----------------------------|-----------------|-----------------|---------------------------------|---------------|
| Setup | 6 | Surveyed By | PIPETEK-RD | Certificate # | P0038923-082022 | Owner | LIVONIA |
| Reviewed By | | Reviewer # | | Work Order | | | |
| Customer | ETC | | | P/O # | | | |
| Media Label | MH6A | Project | ETC_STORM_TV_RD_12-21-2022 | | | | |
| Date | 2022/12/21 | Time | 10:36 | Weather | Pre-Cleaning | N | Date Cleaned |
| Flow control | Not Controlled | Survey Purpose | Routine Assessment | | | | Direction |
| Street | 7 MILE | City | LIVONIA | | | | Drainage area |
| Location Code | | | | Pipe Use | Stormwater Pipe | | |
| Location details | | | | Height | 18 | Width | ins |
| Shape | Circular | Material | Reinforced Concrete Pipe | Lining | | | |
| Coating | | Pipe Joint length | Ft | Total length | Ft | Structural O & M | |
| Length Surveyed | 05.50 | Year Constructed | | Year Renewed | | Miscellaneous Constructional | |
| Additional info | | | | | | | |
| Up | MH7 | Rim to invert | | Grade to invert | | Rim to grade | Ft |
| Down | MH6 | Rim to invert | | Grade to invert | | Rim to grade | Ft |



Pipe Graphic Report of PLR MH7A

for ECT

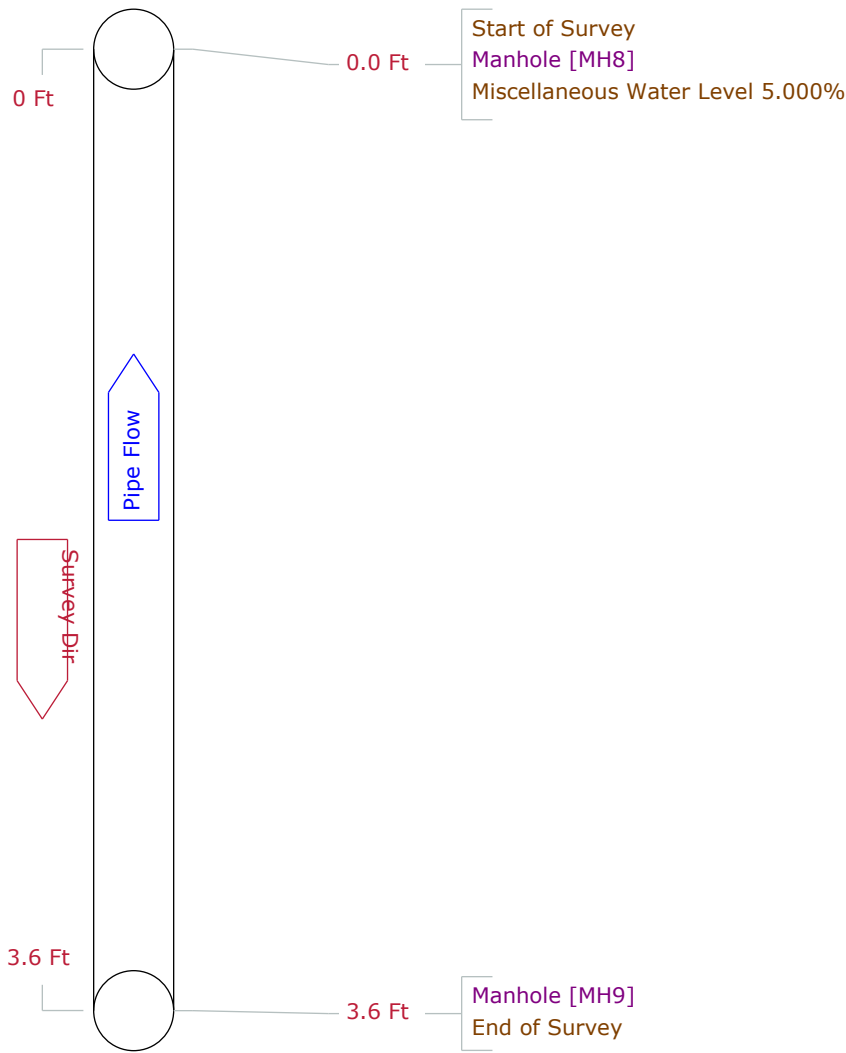
| | | | | | | | | | | | |
|------------------|-----|----------------|------------|------------------|----------------------------|--------------------------|--------------|--|--------------------------------|-----------|--------------|
| Setup | 7 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | LIVONIA | | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | | |
| Customer | | ETC | | | P/O # | | | | | | |
| Media Label | | MH7A | | Project | ETC_STORM_TV_RD_12-21-2022 | | | | | | |
| Date | | 2022/12/21 | | Time | 11:03 | | Weather | Pre-Cleaning | | N | Date Cleaned |
| Flow control | | Not Controlled | | Survey Purpose | | Routine Assessment | | | | Direction | Upstream |
| Street | | 7 MILE | | | City | LIVONIA | | | Drainage area | | |
| Location Code | | | | | | | | Pipe Use | Stormwater Pipe | | |
| Location details | | | | | | | | Height | 18 | Width | ins |
| Shape | | Circular | | | Material | Reinforced Concrete Pipe | | | Lining | | |
| Coating | | | | | Pipe Joint length | Ft | Total length | Ft | <div>StructuralO & M</div> | | |
| Length Surveyed | | 89.20 | Ft | Year Constructed | Year Renewed | | | <div>MiscellaneousConstructional</div> | | | |
| Additional info | | | | | | | | | | | |
| Up | MH8 | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft | |
| Down | MH7 | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft | |



Pipe Graphic Report of PLR MH8A

for ECT

| | | | | | | | | | | |
|------------------|----------------|-------------|-------------------|----------------------------|-----------------|-----------------|-----------------|---|-----------|--------------|
| Setup | 8 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | LIVONIA | |
| Reviewed By | | | Reviewer # | | | | Work Order | | | |
| Customer | ETC | | | | | | P/O # | | | |
| Media Label | MH8A | | Project | ETC_STORM_TV_RD_12-21-2022 | | | | | | |
| Date | 2022/12/21 | | Time | 11:34 | | Weather | Pre-Cleaning | | N | Date Cleaned |
| Flow control | Not Controlled | | Survey Purpose | Routine Assessment | | | | | Direction | Upstream |
| Street | 7 MILE | | | | City | LIVONIA | | Drainage area | | |
| Location Code | | | | | | Pipe Use | Stormwater Pipe | | | |
| Location details | | | | | | Height | 12 | Width | ins | |
| Shape | Circular | | Material | Reinforced Concrete Pipe | | | Lining | | | |
| Coating | | | Pipe Joint length | Ft | Total length | | Ft | <div><div>Structural</div><div>O & M</div><div>Miscellaneous</div><div>Constructional</div></div> | | |
| Length Surveyed | 03.60 | Ft | Year Constructed | Year Renewed | | | | | | |
| Additional info | | | | | | | | | | |
| Up | MH9 | | Rim to invert | | Grade to invert | | Rim to grade | | Ft | |
| Down | MH8 | | Rim to invert | | Grade to invert | | Rim to grade | | Ft | |



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Cooperating Partners:

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Great Lakes Water Authority
Rouge River Advisory Council
SEMCOG
Southeastern Oakland
County Water Authority

TO: Doug Moore, City of Livonia

FROM: Emily Levine, ARC Staff

DATE: January 6, 2023

SUBJECT: IDEP Investigation Results: Outfall U2008221

ARC staff continued the illicit discharge investigation on storm drain outfall U2008221 in response to findings from the 2018 outfall screening and subsequent investigations. Our 2022 investigations identified an illicit connection coming from Saint Mary's Hospital. This connection was corrected by the hospital. Follow-up sampling to confirm that the connection was corrected revealed that a suspicious discharge still exists. Investigations to identify the source of this second discharge remain underway.

Background

Outfall U2008221 was investigated due to the high *E. coli* concentrations found during the outfall survey conducted in 2018. At that time, the *E. coli* concentration was >24,196 MPN/100 ml which is indicative of an illicit discharge containing sanitary sewage. ARC staff reinspected the outfall in 2019 and found *E. coli* concentrations at non-detect and >6,000 MPN/100 ml respectively, with Human *Bacteroides* concentrations of 1,010,000 gene copies/100 ml coinciding with the elevated *E. coli* levels.

It was initially uncertain where the outfall was draining from, as it is located in a culvert underneath Levan Road (Figure 1). Nonetheless, in 2019 and 2021 Wayne County conducted sampling within the manholes along the east side of Levan Road. However, these investigations did not reveal the source of the suspicious discharge.

Results

In May of 2022, the outfall was resampled by ARC staff and *E. coli* concentrations were >24,196 MPN/100 ml, with Human *Bacteroides* concentrations of 631,578,947 gene copies/100 ml (Table 1). At that time, it was determined that the outfall connects to private storm drains in the parking lot of Saint Mary's Hospital, located on the west side of Levan Road.

Inspections of manholes and review of utility drawings for the Hospital parking lot revealed a suspicious tap to the storm drain (Figure 2). Representatives from the Hospital cooperated with the City of Livonia and dye tested the area of the hospital closest to the tap. It was found that a section of the old emergency room had an illicit connection to the storm drain, which was subsequently corrected.

ECT resampled the outfall on November 3, 2022 to confirm that the corrected illicit connection had effectively reduced the *E. coli* levels coming from the outfall and found *E. coli* levels of 10 MPN/100 ml. However, during this sampling, bubbles that looked like soap were observed coming from the outfall (Figure 3). A test for surfactants was conducted in the field and surfactants level of 2.0 ppm was found. This indicates that although the *E. coli* source has been effectively eliminated, an additional pollutant source appears to be present that has been contributing surfactants to the river. Follow-up investigations were conducted later in November 2022. Surfactants levels of 2.0 ppm were consistently found in manholes in the hospital parking lot upstream of the outfall leading to the southern section of the parking lot. Due to a car being parked over a manhole, the investigation was not completed, and additional investigation is needed to narrow down the source of the surfactants.

Table 1. Sampling Results (*E. coli* in MPN/100 mL and Human *Bacteroides* in gene copies/100 ml)

| | <i>E. coli</i> | <i>E. coli</i> | <i>E. coli</i> | Human <i>Bacteroides</i> | <i>E. coli</i> | Human <i>Bacteroides</i> | <i>E. coli</i> | Surfactants |
|----------|----------------|----------------|----------------|-----------------------------|----------------|-----------------------------|----------------|-------------|
| | 7/16/18 | 12/12/19 | 12/19/19 | 12/19/19 | 5/13/22 | 5/13/22 | 11/3/22 | 11/3/22 |
| U2008221 | >24,196 | ND | >6,000 | 1,010,000 | >24,196 | 631,578,947 | 10 | 2.0 ppm |

Conclusions and Recommendations

Work to date indicates that correcting an illicit connection has effectively eliminated the *E. coli* source for this outfall. However, an additional pollutant source remains that is contributing surfactants to the stormwater. Further investigation is necessary to determine where the surfactants are coming from and eliminate this pollutant source.

This work is being completed as outlined in the Rouge River Collaborative IDEP Plan in compliance with the City's MS4 permit and as a result of your ARC membership. If you have any questions, you can reach me at 248-763-1407 or elevine@ectinc.com.

X:\Alliance of Rouge Communities\2022 Alliance of Rouge Communities\Tech Committee\IDEP investigations\Livonia\U2008221\U2008221 2022 IDEP Summary.docx

Figure 1. Storm Drain and Sampling Location

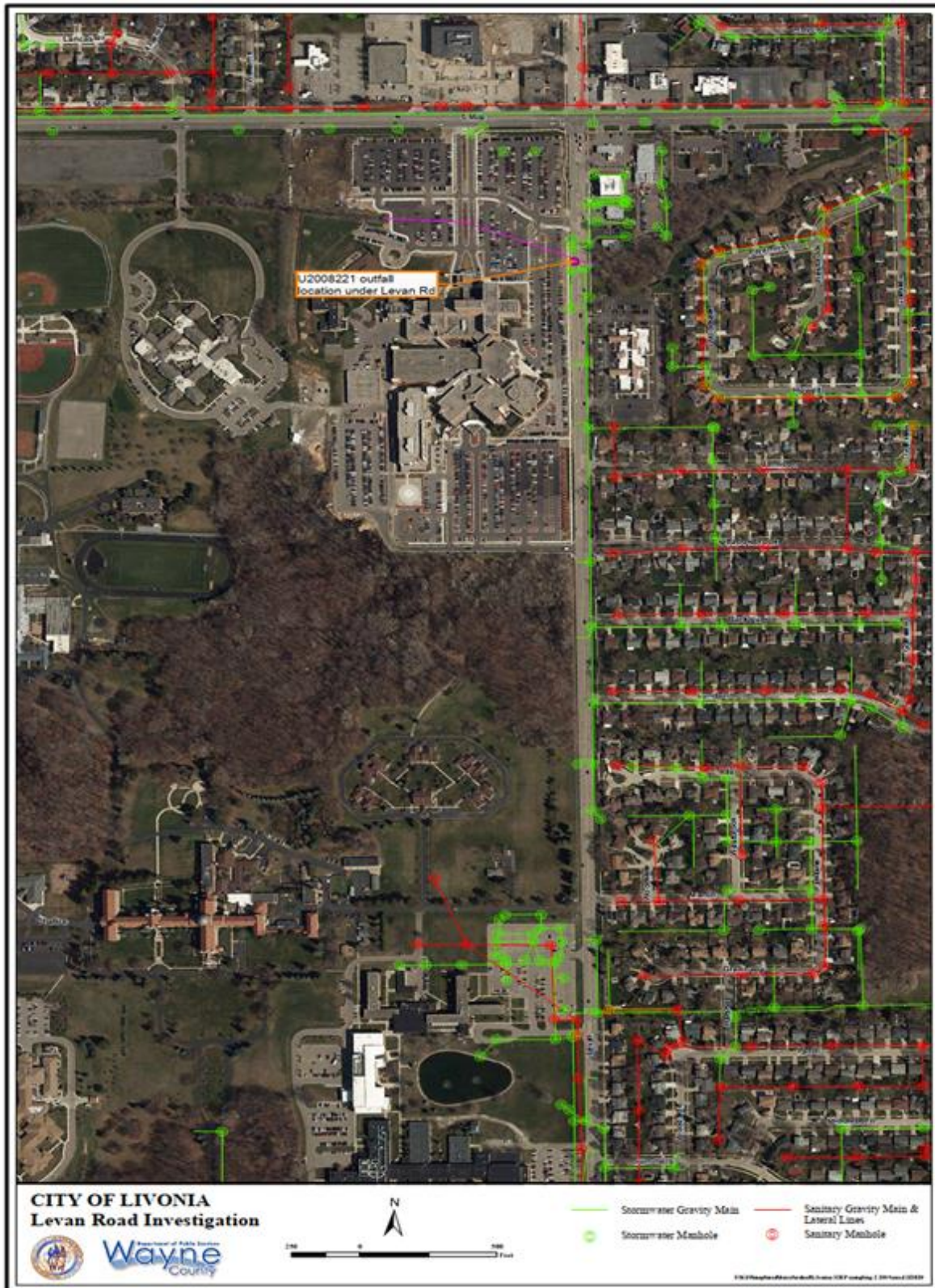


Figure 2. Tap to Storm Drain in parking lot of Saint Mary's Hospital



Figure 3. Bubbly water coming from the outfall



Annette DeMaria, P.E., PMP
Executive Director



Auburn Hills
Beverly Hills
Bingham Farms
Birmingham
Bloomfield Hills
Bloomfield Twp.
Canton Twp.
Commerce Twp.
Dearborn Heights
Farmington
Farmington Hills
Franklin
Garden City
Henry Ford College
Inkster
Lathrup Village
Livonia
Melvindale
Northville
Northville Twp.
Novi
Oak Park
Oakland County
Orchard Lake
Plymouth
Plymouth Twp.
Redford Twp.
Rochester Hills
Romulus
Schoolcraft College
Southfield
Troy
University of
Michigan-Dearborn
Van Buren Twp.
Walled Lake
Washtenaw County
Wayne
Wayne County
Wayne County Airport
Authority
West Bloomfield Twp.
Westland
Wixom

Cooperating Partners:

Cranbrook Institute of Science
Friends of the Rouge
Great Lakes Water Authority
Rouge River Advisory Council
SEMCOG
Southeastern Oakland
County Water Authority

TO: Patrick Cullen, Wayne County Deputy Drain Commissioner

FROM: Emily Levine, ARC Staff

DATE: February 7, 2023

SUBJECT: IDEP Investigation Results: Perrin Drain

Cc: Jerome Bivens, City of Inkster
Sue Thompson, Wayne County Department of Public Works
Environmental Services Division

ARC staff has partnered with Wayne County to conduct an illicit discharge investigation on the Perrin Drain in response to findings of high *E. coli* in samples collected from the Lower Rouge River by Wayne County.

Background

The Perrin Drain flows into the Lower Rouge River upstream of John Daly Road. Once an open creek, the drain is now contained in an underground pipe from southeast of Inkster Road and Avondale Street, continuing upstream through the neighborhood to the northwest of that intersection, towards Cherry Hill Road and Middlebelt Road (Figure 1). Samples collected from near the outlet in September and October of 2020 had elevated *E. coli* levels. Additional samples collected from various upstream manholes on October 29, 2020 showed some elevated *E. coli* levels. Additional sampling was conducted in March 2021 which resulted in a recommendation to televise portions of the storm drain system.

Results

Based on the sample results from 2020 and 2021, ARC staff had the drains along Helen Street and Tromley Street televised in December of 2022. Although excessive sediment was found in the storm drain on Tromley Street, no evidence was found of illicit connections. On Helen Street, a tap was identified coming from the east side of Helen Street, south of the intersection with Cherry Hill Road (Figure 1).

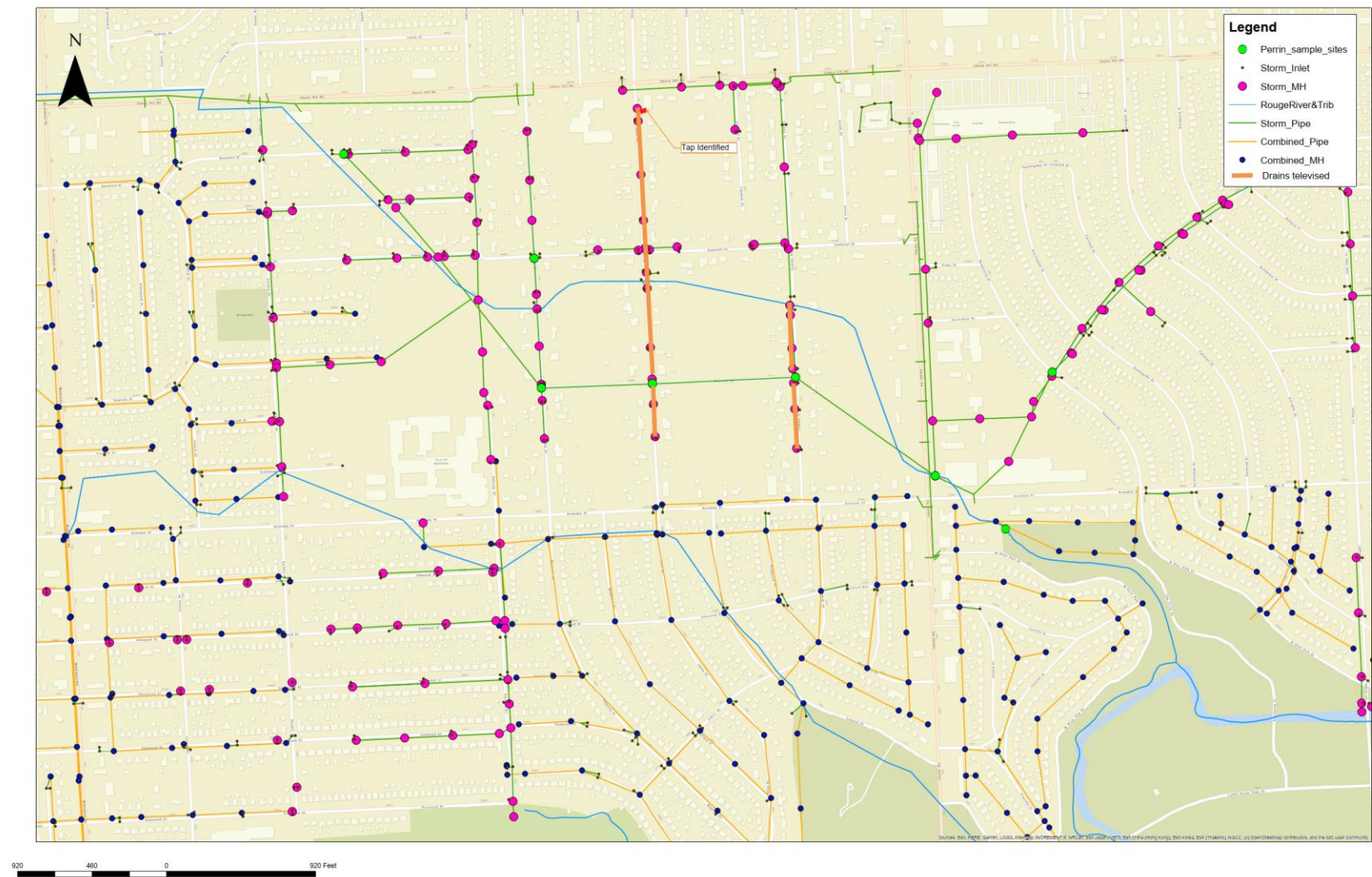
Conclusions and Recommendations

It is unclear whether the tap that was identified is an illicit connection or draining stormwater. Therefore, additional sampling immediately downstream of the tap is recommended to test for *E. coli* and human *Bacteroides*. If elevated levels are found, then dye testing the nearby apartment building may be the recommended next step.

This work is being completed as outlined in the Rouge River Collaborative IDEP Plan in compliance with the County's and City's MS4 permits and as a result of your ARC membership. If you have any questions, I can be reached at 248-763-1407 or elevine@ectinc.com.

Figure 1. Storm Drain and Sampling Locations

Perrin Drain Televising Locations



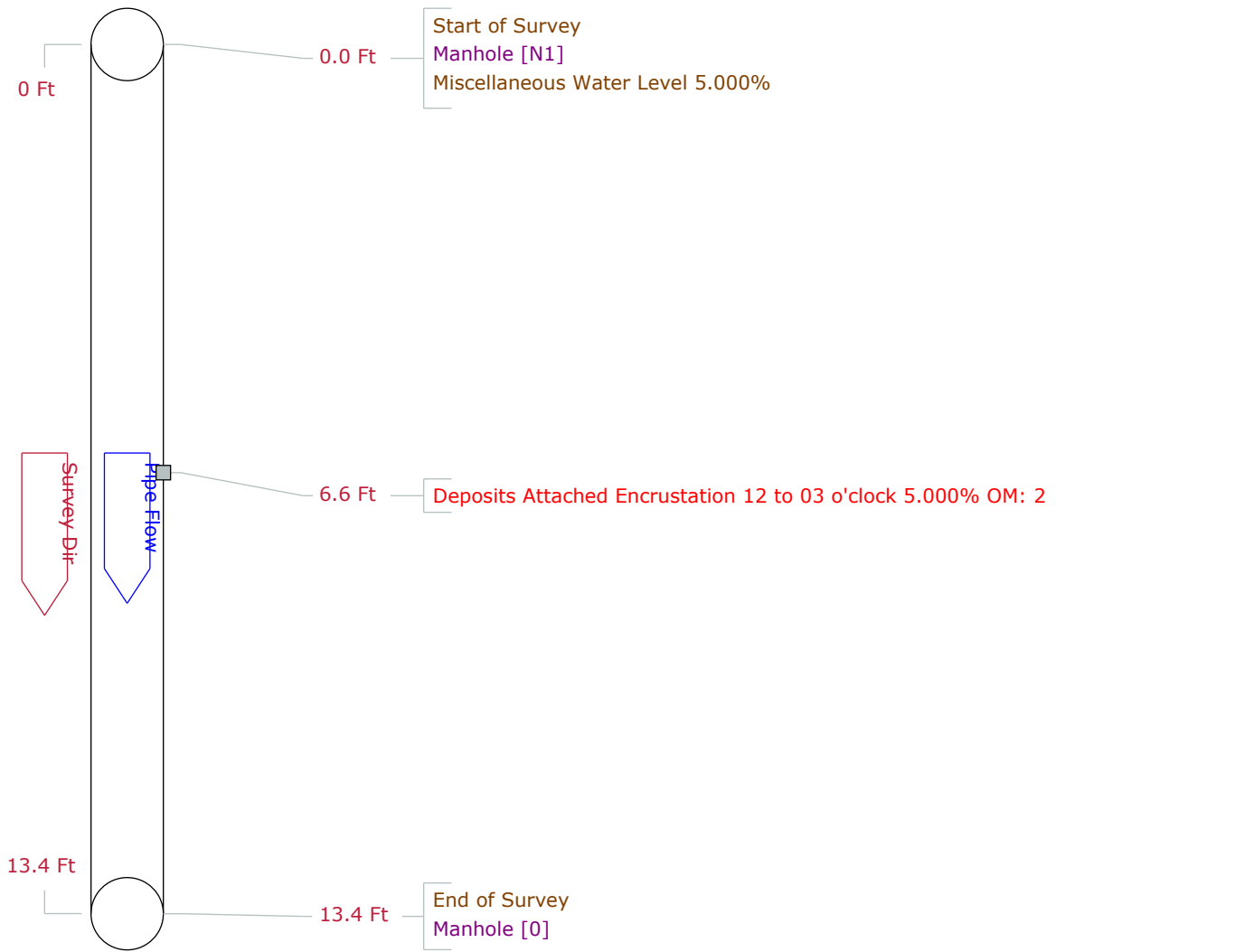
[Type here]

Figure 2. Tap in drain along Helen Street, south of Cherry Hill Road



Attachment A: CCTV Inspection Reports

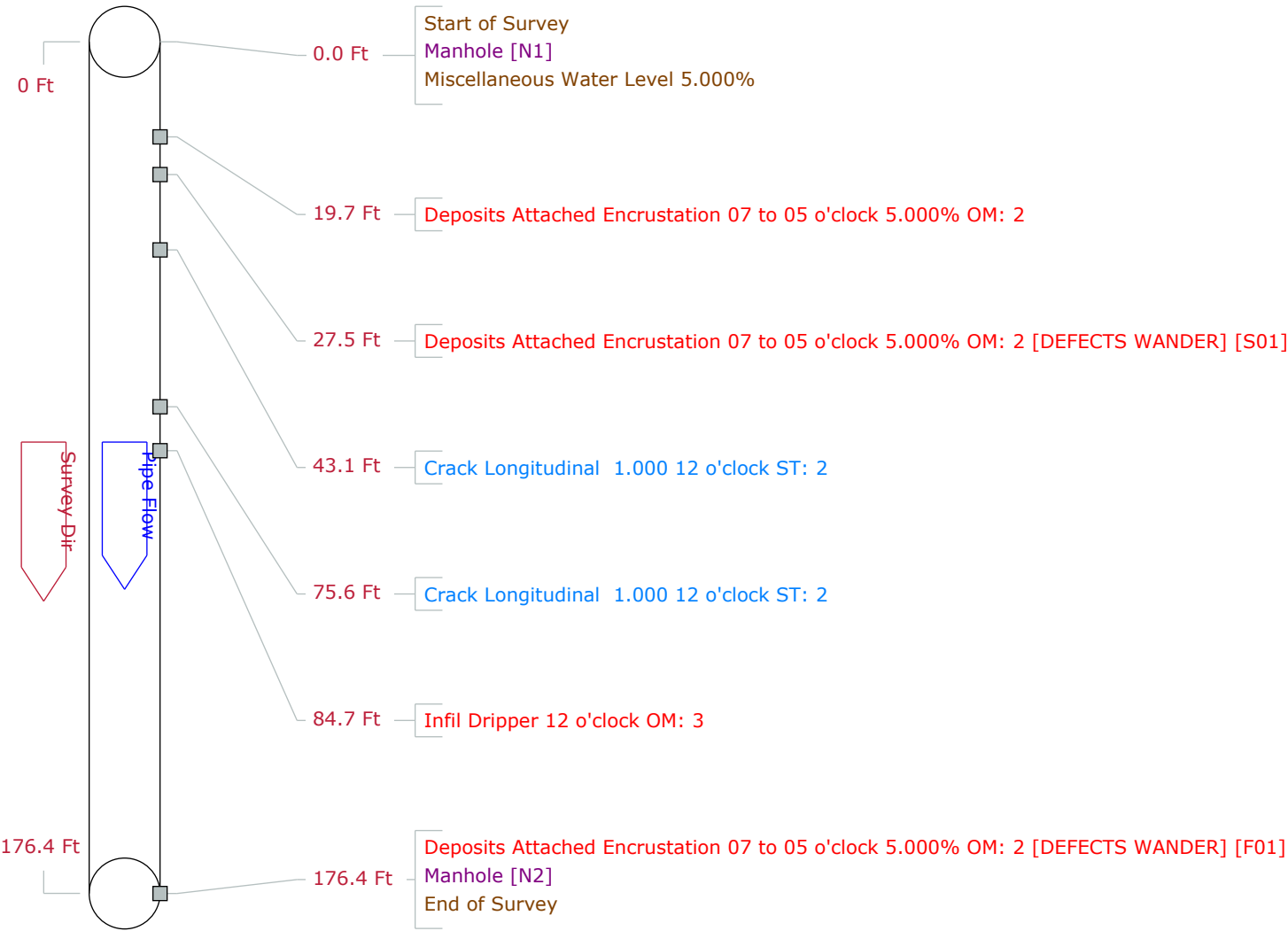
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|------------------|---|-----------------|------------|------|-------------------|------------------|----------------------------|--------------------------|--------------|---------------|-----------------|---|-------|--------------|---|--|
| Setup | 9 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | INKSTER | | | | | | | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | | | | | | | |
| Customer | | ETC | | | P/O # | | | | | | | | | | | |
| Media Label | | N1A | | | Project | | ETC_STORM_TV_RD_12-21-2022 | | | | | | | | | |
| Date | | 2022/12/21 | | Time | | 13:02 | | Weather | | Pre-Cleaning | | N | | Date Cleaned | | |
| Flow control | | Not Controlled | | | Survey Purpose | | | Routine Assessment | | | Direction | | | Downstream | | |
| Street | | TROMLEY (SOUTH) | | | City | | INKSTER | | | Drainage area | | | | | | |
| Location Code | | | | | | | | Pipe Use | | | Stormwater Pipe | | | | | |
| Location details | | PERRIN | | | | | | Height | | | 12 | | Width | | ins | |
| Shape | | Circular | | | Material | | | Reinforced Concrete Pipe | | | Lining | | | | | |
| Coating | | | | | Pipe Joint length | | | Ft | | Total length | | | Ft | | <div><div>Structural</div><div>O & M</div><div>Miscellaneous</div><div>Constructional</div></div> | |
| Length Surveyed | | 13.40 | | Ft | | Year Constructed | | | Year Renewed | | | | | | | |
| Additional info | | | | | | | | | | | | | | | | |
| Up | | S2 | | | Rim to invert | | | Grade to invert | | | Rim to grade | | | Ft | | |
| Down | | S3 | | | Rim to invert | | | Grade to invert | | | Rim to grade | | | Ft | | |



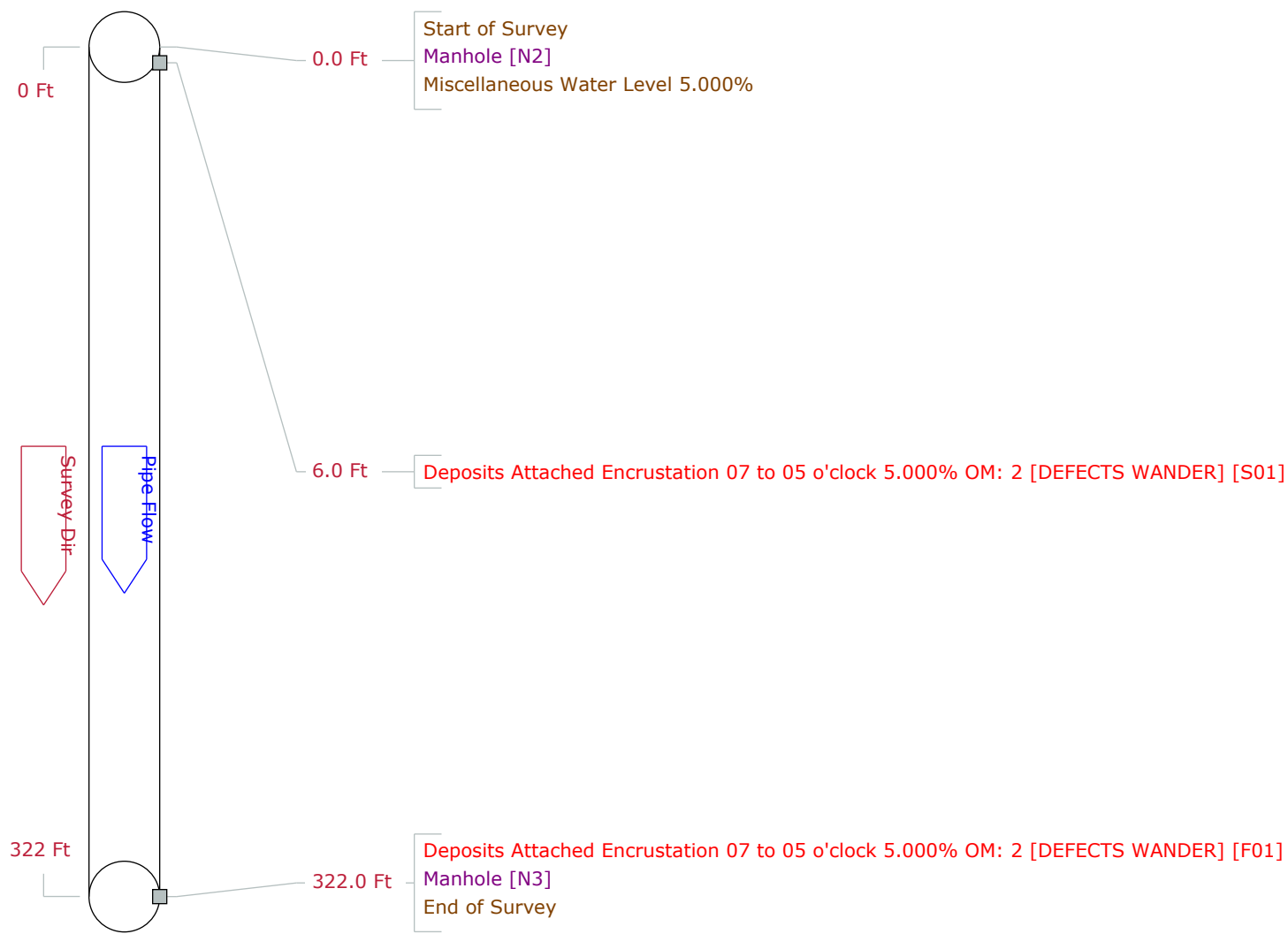
Pipe Graphic Report of PLR N1A-1

for ECT

| | | | | | | | |
|------------------|-----------------|-------------------|----------------------------|-----------------|-----------------|---------------|----------------|
| Setup | 10 | Surveyed By | PIPETEK-RD | Certificate # | P0038923-082022 | Owner | INKSTER |
| Reviewed By | | Reviewer # | | Work Order | | | |
| Customer | ETC | | | P/O # | | | |
| Media Label | N1A-1 | Project | ETC_STORM_TV_RD_12-21-2022 | | | | |
| Date | 2022/12/21 | Time | 13:11 | Weather | Pre-Cleaning | N | Date Cleaned |
| Flow control | Not Controlled | Survey Purpose | Routine Assessment | | | | Direction |
| Street | TROMLEY (SOUTH) | City | INKSTER | | | | Drainage area |
| Location Code | | | | Pipe Use | Stormwater Pipe | | |
| Location details | PERRIN | | | Height | 12 | Width | ins |
| Shape | Circular | Material | Reinforced Concrete Pipe | Lining | | | |
| Coating | | Pipe Joint length | Ft | Total length | Ft | Structural | O & M |
| Length Surveyed | 176.40 Ft | Year Constructed | | Year Renewed | | Miscellaneous | Constructional |
| Additional info | | | | | | | |
| Up | N1 | Rim to invert | | Grade to invert | | Rim to grade | Ft |
| Down | N2 | Rim to invert | | Grade to invert | | Rim to grade | Ft |



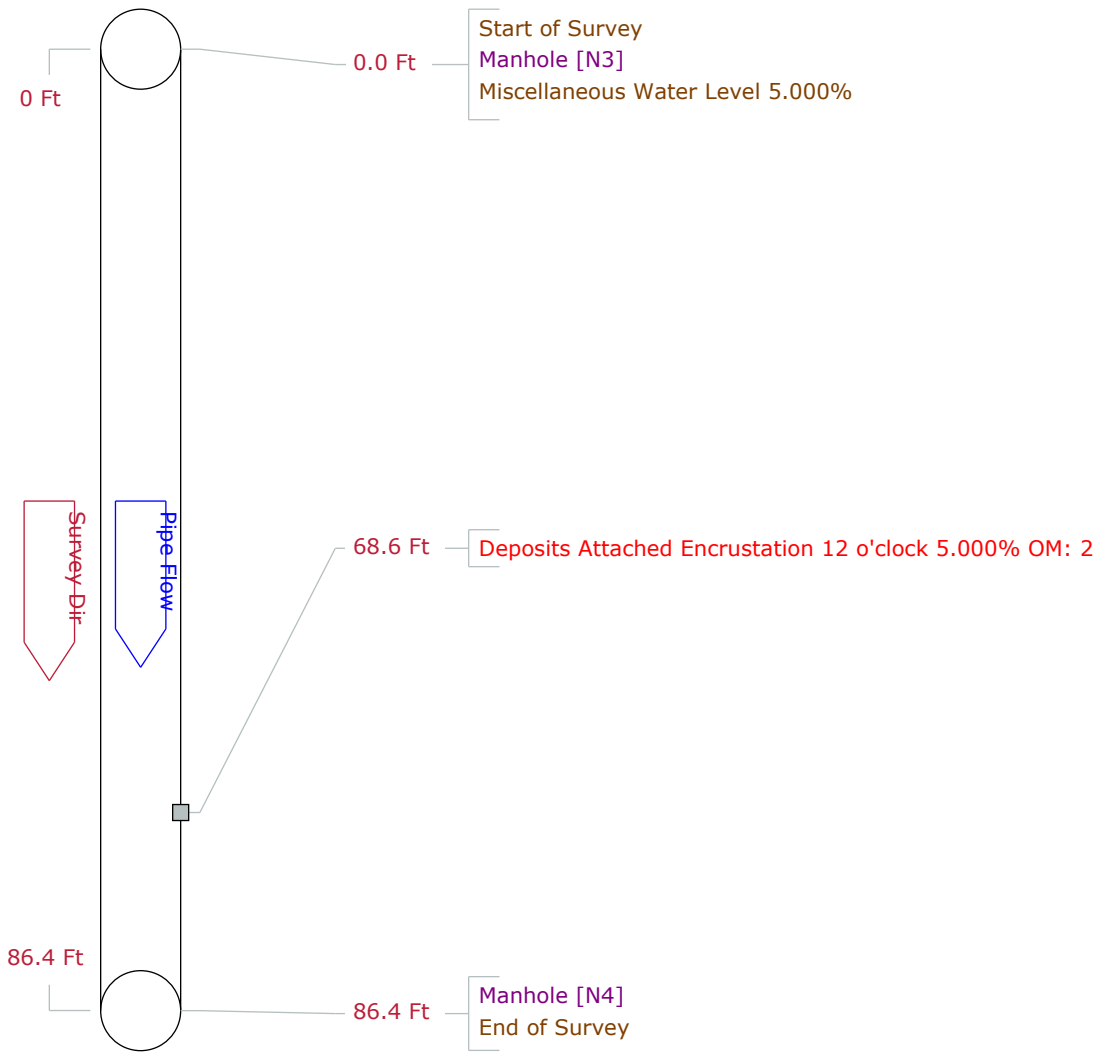
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| Reviewed By | | Reviewer # | | Work Order | | | |
| Customer | ETC | | | P/O # | | | |
| Media Label | N2A | Project | ETC_STORM_TV_RD_12-21-2022 | | | | |
| Date | 2022/12/21 | Time | 13:48 | Weather | Pre-Cleaning | N | Date Cleaned |
| Flow control | Not Controlled | Survey Purpose | Routine Assessment | | | | Direction |
| Street | TROMLEY (SOUTH) | City | INKSTER | | | | Drainage area |
| Location Code | | | | Pipe Use | Stormwater Pipe | | |
| Location details | PERRIN | | | Height | 12 | Width | ins |
| Shape | Circular | Material | Reinforced Concrete Pipe | Lining | | | |
| Coating | | Pipe Joint length | Ft | Total length | Ft | <div>StructuralO & M</div> <div>MiscellaneousConstructional</div> | |
| Length Surveyed | 322.00 Ft | Year Constructed | | Year Renewed | | | |
| Additional info | | | | | | | |
| Up | N2 | Rim to invert | | Grade to invert | | Rim to grade | Ft |
| Down | N3 | Rim to invert | | Grade to invert | | Rim to grade | Ft |



Pipe Graphic Report of PLR N3A

for ECT

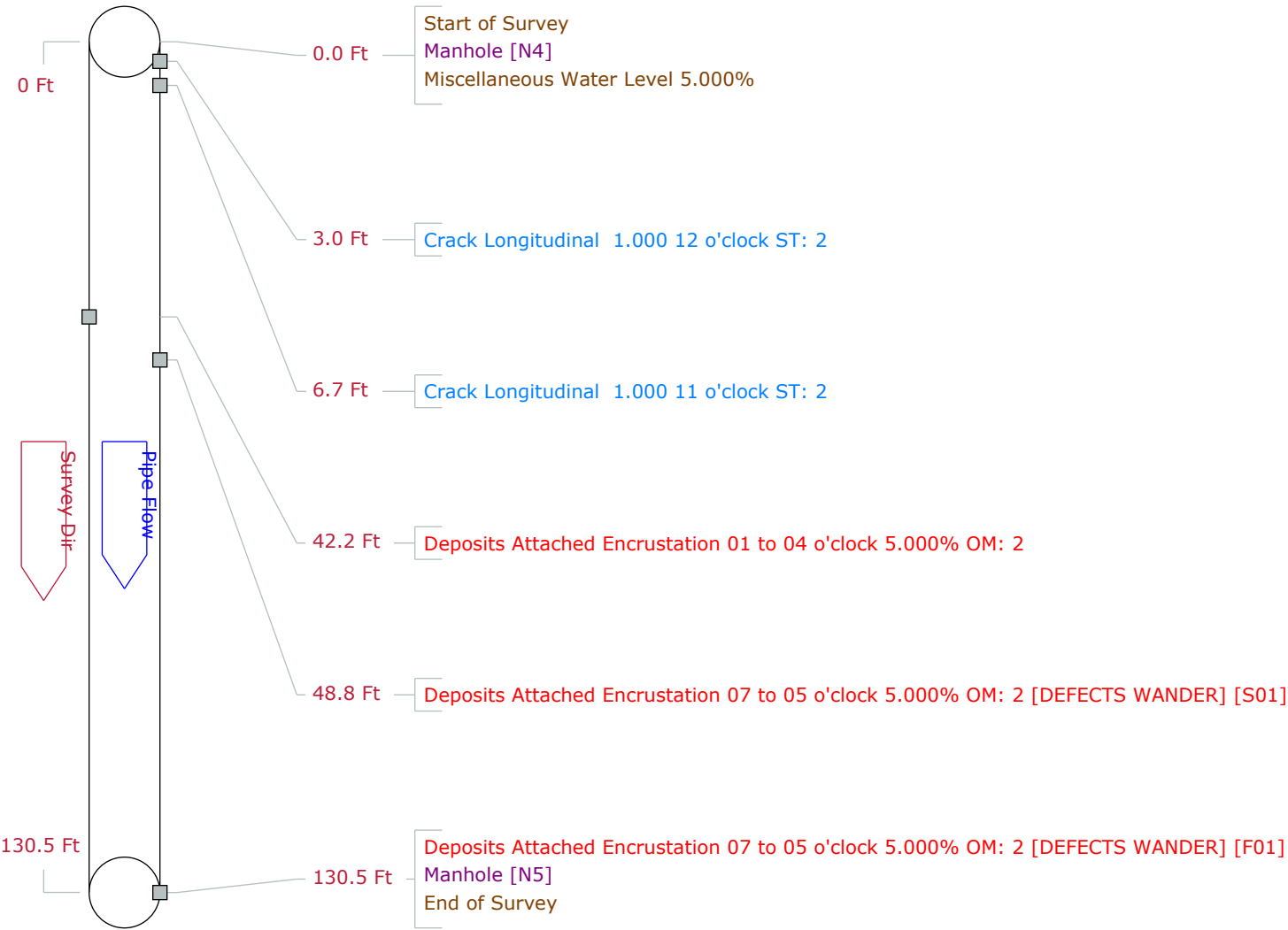
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| Setup | 12 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | INKSTER | | | | | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | | | | | |
| Customer | | ETC | | | P/O # | | | | | | | | | |
| Media Label | | N3A | | | Project | ETC_STORM_TV_RD_12-21-2022 | | | | | | | | |
| Date | | 2022/12/21 | | Time | | 14:05 | | Weather | | Pre-Cleaning | N | Date Cleaned | | |
| Flow control | | Not Controlled | | Survey Purpose | | | Routine Assessment | | | Direction | | | Downstream | |
| Street | | TROMLEY (SOUTH) | | | | City | | INKSTER | | Drainage area | | | | |
| Location Code | | | | | | | | Pipe Use | | Stormwater Pipe | | | | |
| Location details | | PERRIN | | | | | | Height | | 12 | Width | | ins | |
| Shape | | Circular | | | | Material | | Reinforced Concrete Pipe | | Lining | | | | |
| Coating | | | | | | Pipe Joint length | | Ft | Total length | | Ft | Structural | | O & M |
| Length Surveyed | | 86.40 | | Ft | Year Constructed | | Year Renewed | | <div>Miscellaneous</div> <div>Constructional</div> | | | | | |
| Additional info | | | | | | | | | | | | | | |
| Up | N3 | | | | Rim to invert | | | Grade to invert | | | Rim to grade | | Ft | |
| Down | N4 | | | | Rim to invert | | | Grade to invert | | | Rim to grade | | Ft | |



Pipe Graphic Report of PLR N4A

for ECT

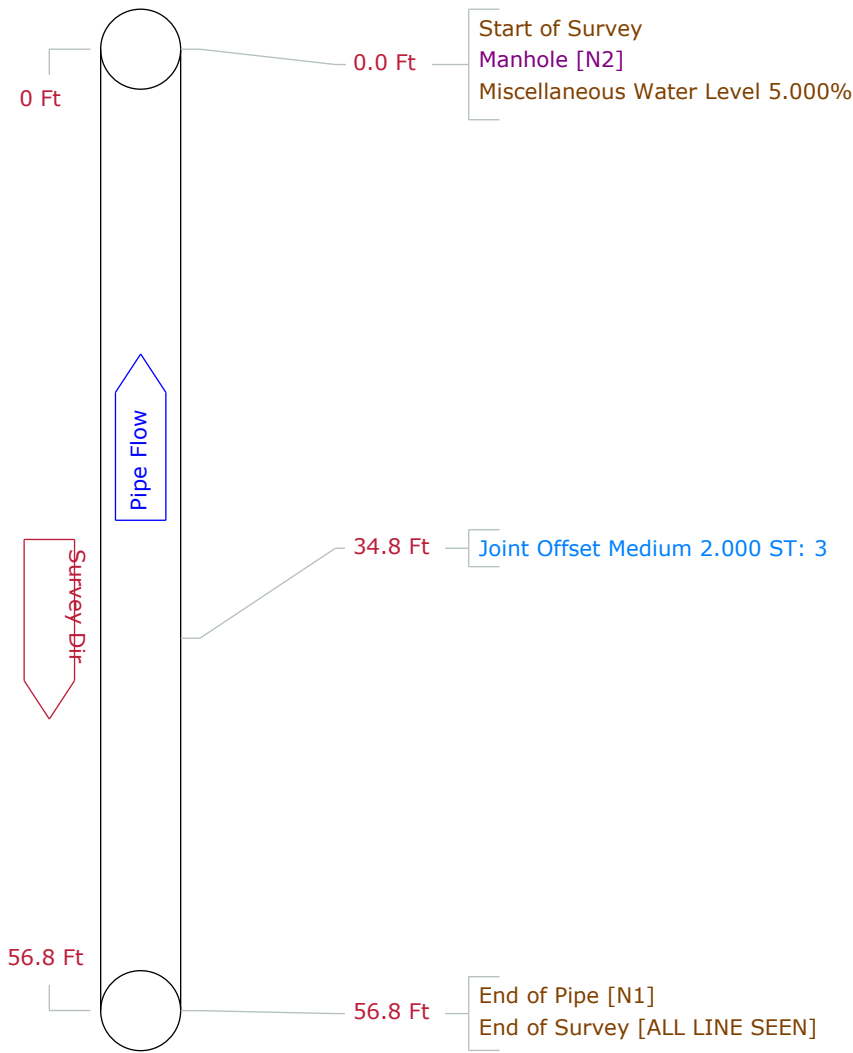
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| Setup | 13 | Surveyed By | PIPETEK-RD | Certificate # | P0038923-082022 | Owner | INKSTER |
| Reviewed By | | Reviewer # | | Work Order | | | |
| Customer | ETC | | | P/O # | | | |
| Media Label | N4A | Project | ETC_STORM_TV_RD_12-21-2022 | | | | |
| Date | 2022/12/21 | Time | 14:39 | Weather | Pre-Cleaning | N | Date Cleaned |
| Flow control | Not Controlled | Survey Purpose | Routine Assessment | | | | Direction |
| Street | HELEN | City | INKSTER | | | | Drainage area |
| Location Code | | | | Pipe Use | Stormwater Pipe | | |
| Location details | PERRIN | | | Height | 18 | Width | ins |
| Shape | Circular | Material | Reinforced Concrete Pipe | Lining | | | |
| Coating | | Pipe Joint length | Ft | Total length | Ft | Structural | O & M |
| Length Surveyed | 130.50 Ft | Year Constructed | | Year Renewed | | Miscellaneous | Constructional |
| Additional info | | | | | | | |
| Up | N4 | Rim to invert | | Grade to invert | | Rim to grade | Ft |
| Down | N5 | Rim to invert | | Grade to invert | | Rim to grade | Ft |



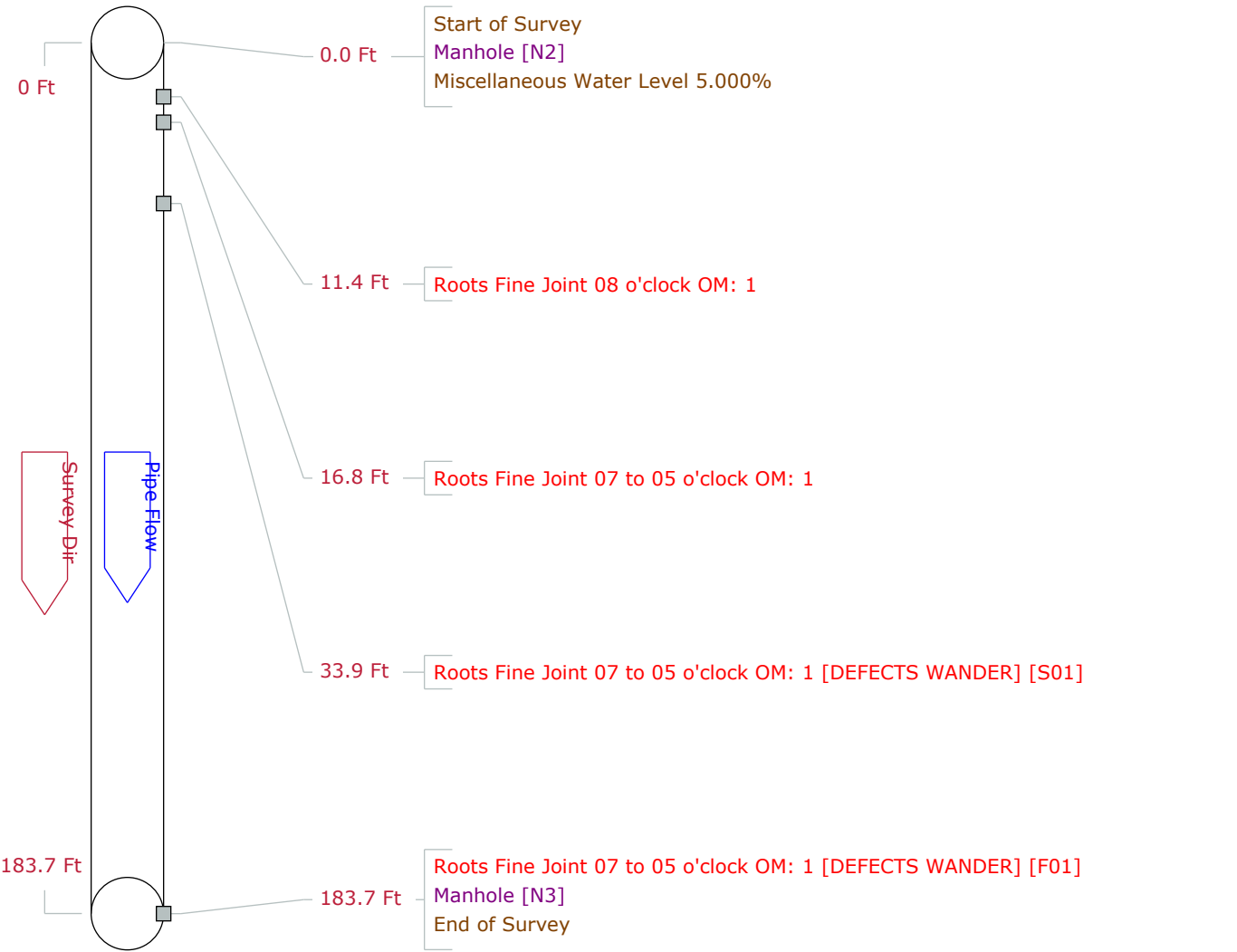
Pipe Graphic Report of PLR N1A-1

for ECT

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| Setup | 14/28 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | INKSTER | | | | | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | | | | | |
| Customer | | ETC | | | P/O # | | | | | | | | | |
| Media Label | | N1A-1 | | | Project | ECT_STORM_TV_RD_12-21-2022 | | | | | | | | |
| Date | | 2022/12/22 | | Time | 12:46 | | Weather | Pre-Cleaning | | N | Date Cleaned | | | |
| Flow control | | Not Controlled | | | Survey Purpose | | | | Routine Assessment | | | Direction | Upstream | |
| Street | | TROMLEY (SOUTH) | | | | City | | INKSTER | | Drainage area | | | | |
| Location Code | | | | | | | | Pipe Use | | Stormwater Pipe | | | | |
| Location details | | PERRIN | | | | | | Height | | 12 | Width | ins | | |
| Shape | | Circular | | | | Material | | Reinforced Concrete Pipe | | Lining | | | | |
| Coating | | | | | | Pipe Joint length | | Ft | Total length | | Ft | <div><div>Structural</div><div>O & M</div><div>Miscellaneous</div><div>Constructional</div></div> | | |
| Length Surveyed | | 56.80 | | Ft | Year Constructed | | Year Renewed | | | | | | | |
| Additional info | | Reverse set up on sheet:29 | | | | | | | | | | | | |
| Up | N1 | | | | Rim to invert | | | Grade to invert | | | Rim to grade | | Ft | |
| Down | N2 | | | | Rim to invert | | | Grade to invert | | | Rim to grade | | Ft | |



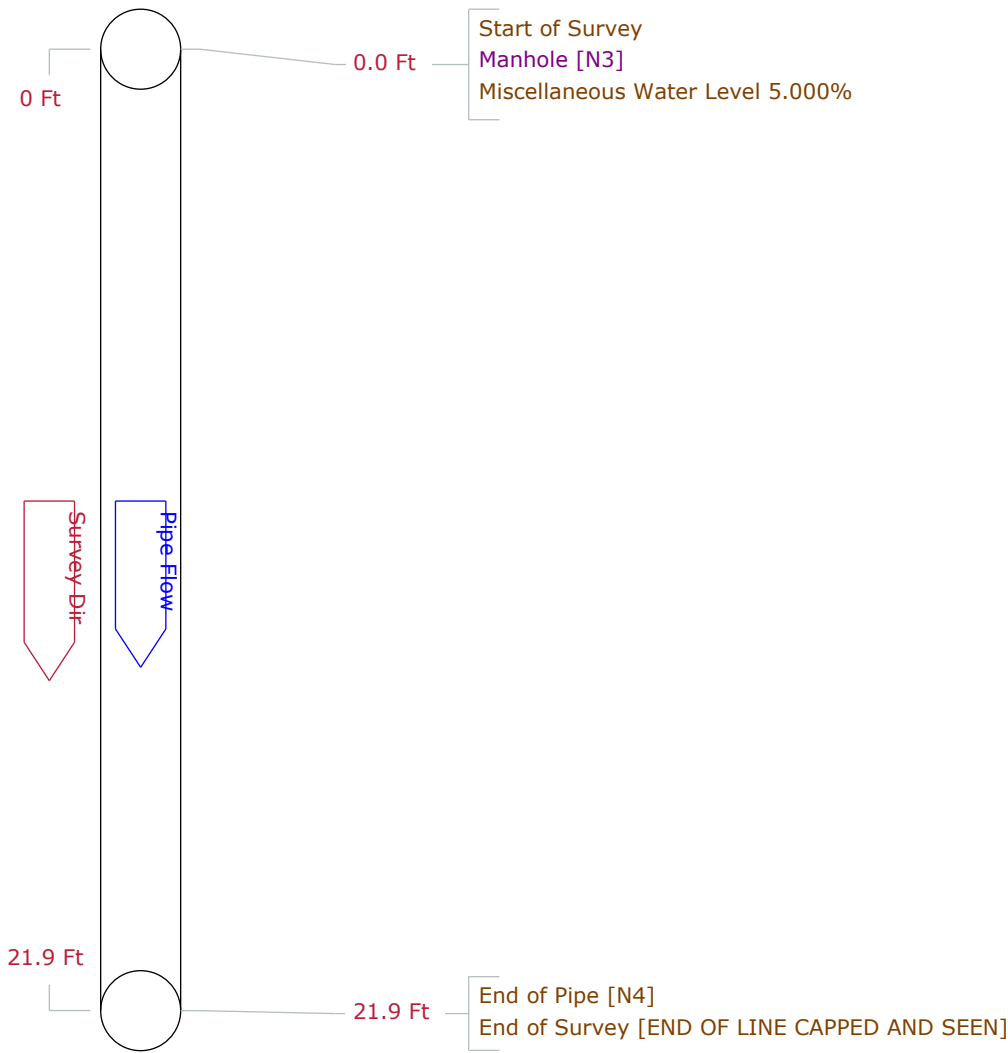
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|------------------|-----------------|-------------------|----------------------------|-----------------|-----------------|---------------|----------------|
| Setup | 15 | Surveyed By | PIPETEK-RD | Certificate # | P0038923-082022 | Owner | INKSTER |
| Reviewed By | | Reviewer # | | Work Order | | | |
| Customer | ETC | | | P/O # | | | |
| Media Label | N2A | Project | ECT_STORM_TV_RD_12-21-2022 | | | | |
| Date | 2022/12/22 | Time | 13:02 | Weather | Pre-Cleaning | N | Date Cleaned |
| Flow control | Not Controlled | Survey Purpose | Routine Assessment | | | | Direction |
| Street | TROMLEY (SOUTH) | City | INKSTER | | | | Drainage area |
| Location Code | | | | Pipe Use | Stormwater Pipe | | |
| Location details | PERRIN | | | Height | 12 | Width | ins |
| Shape | Circular | Material | Reinforced Concrete Pipe | Lining | | | |
| Coating | | Pipe Joint length | Ft | Total length | Ft | Structural | O & M |
| Length Surveyed | 183.70 Ft | Year Constructed | | Year Renewed | | Miscellaneous | Constructional |
| Additional info | | | | | | | |
| Up | N2 | Rim to invert | | Grade to invert | | Rim to grade | Ft |
| Down | N3 | Rim to invert | | Grade to invert | | Rim to grade | Ft |



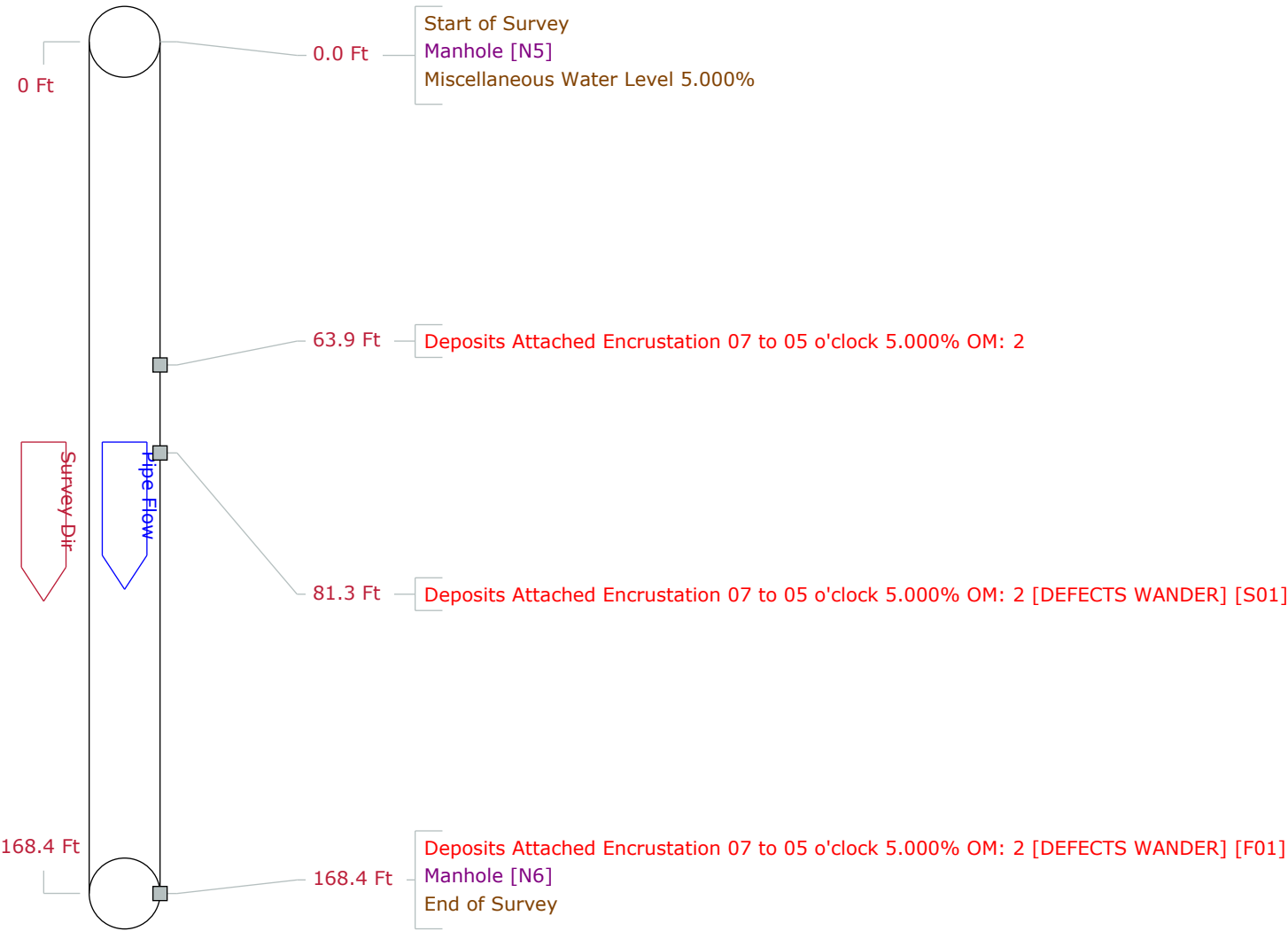
Pipe Graphic Report of PLR N3A

for ECT

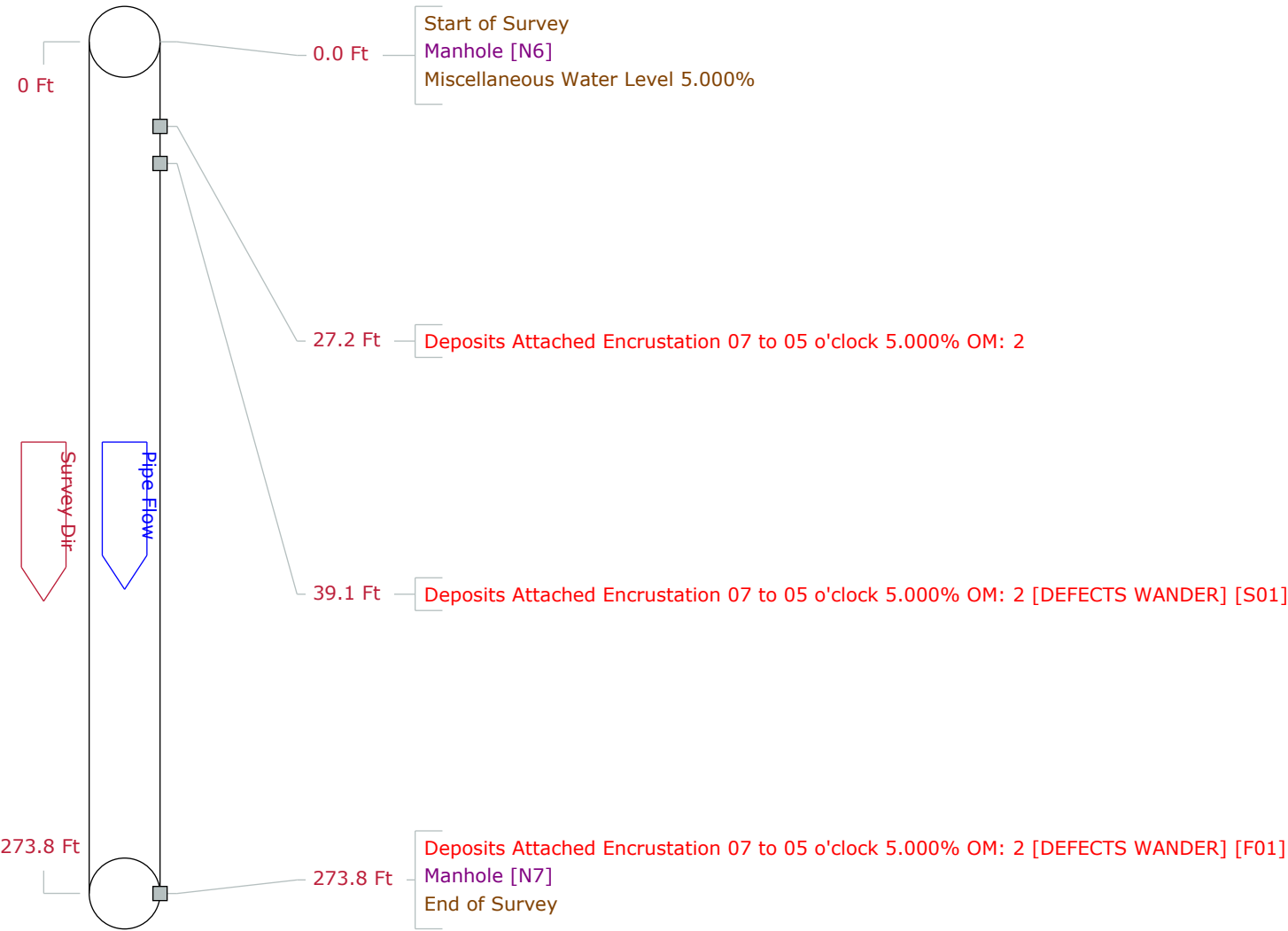
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| Setup | 16 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | INKSTER | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | |
| Customer | | ETC | | | P/O # | | | | | |
| Media Label | | N3A | | | Project | ECT_STORM_TV_RD_12-21-2022 | | | | |
| Date | | 2022/12/22 | | Time | 13:37 | | Weather | | Pre-Cleaning N | |
| Flow control | | Not Controlled | | Survey Purpose | | Routine Assessment | | Direction Downstream | | |
| Street | | TROMLEY (SOUTH) | | | City | | INKSTER | | Drainage area | |
| Location Code | | | | | | | Pipe Use | | Stormwater Pipe | |
| Location details | | PERRIN | | | | | Height 12 | | Width ins | |
| Shape | | Circular | | | Material | | Reinforced Concrete Pipe | | Lining | |
| Coating | | | | | Pipe Joint length | | Ft | | Total length | |
| Length Surveyed | | 21.90 | | Ft | | Year Constructed | | Year Renewed | | |
| | | | | | | | | | | |
| Up | | N3 | | | Rim to invert | | Grade to invert | | Rim to grade | |
| Down | | N4 | | | Rim to invert | | Grade to invert | | Rim to grade | |
| | | | | | | | | | | |



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| Setup | 17 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | INKSTER | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | |
| Customer | | ETC | | | P/O # | | | | | |
| Media Label | | N5A | | | Project | ECT_STORM_TV_RD_12-21-2022 | | | | |
| Date | | 2022/12/22 | | Time | 8:45 | | Weather | | Pre-Cleaning N | |
| Flow control | | Not Controlled | | Survey Purpose | | Routine Assessment | | | Direction Downstream | |
| Street | | HELEN | | | City | | INKSTER | | Drainage area | |
| Location Code | | | | | | | Pipe Use | | Stormwater Pipe | |
| Location details | | PERRIN | | | | | Height 18 | | Width ins | |
| Shape | | Circular | | | Material | | Reinforced Concrete Pipe | | Lining | |
| Coating | | | | | Pipe Joint length | | Ft | | Total length | |
| Length Surveyed | | 168.40 Ft | | Year Constructed | | Year Renewed | | <div><div>Structural</div><div>O & M</div><div>Miscellaneous</div><div>Constructional</div></div> | | |
| Additional info | | | | | | | | | | |
| Up | N5 | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft |
| Down | N6 | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft |



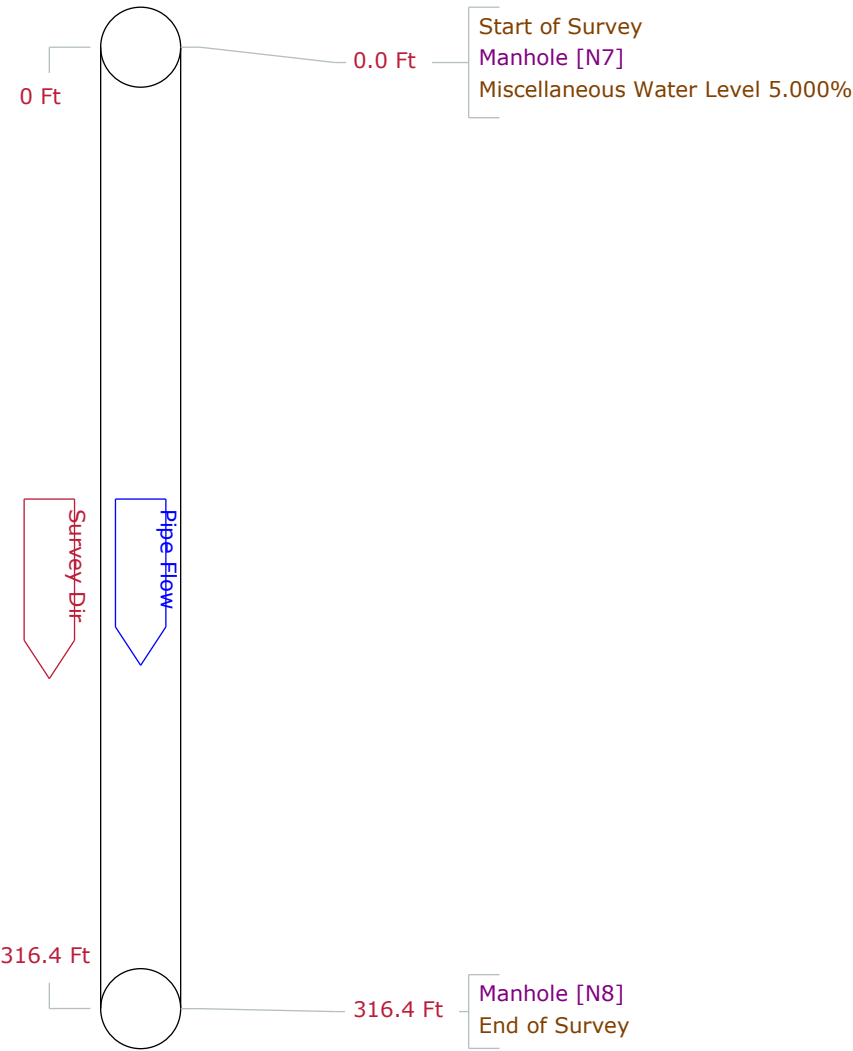
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|------------------|----|----------------|------------|------------------|-------------------|----------------------------|--------------------------|---|-----------------|----------------------|--------------|--|
| Setup | 18 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | INKSTER | | | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | | | |
| Customer | | ETC | | | P/O # | | | | | | | |
| Media Label | | N6A | | | Project | ECT_STORM_TV_RD_12-21-2022 | | | | | | |
| Date | | 2022/12/22 | | Time | 9:31 | | Weather | | Pre-Cleaning N | | Date Cleaned | |
| Flow control | | Not Controlled | | | Survey Purpose | | Routine Assessment | | | Direction Downstream | | |
| Street | | HELEN | | | City | | INKSTER | | | Drainage area | | |
| Location Code | | | | | | | Pipe Use | | Stormwater Pipe | | | |
| Location details | | PERRIN | | | | | Height 18 | | Width | | ins | |
| Shape | | Circular | | | Material | | Reinforced Concrete Pipe | | | Lining | | |
| Coating | | | | | Pipe Joint length | | Ft | | Total length | | Ft | |
| Length Surveyed | | 273.80 Ft | | Year Constructed | | Year Renewed | | <div><div>Structural</div><div>O & M</div><div>Miscellaneous</div><div>Constructional</div></div> | | | | |
| Additional info | | | | | | | | | | | | |
| Up | N6 | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft | | |
| Down | N7 | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft | | |



Pipe Graphic Report of PLR N7A

for ECT

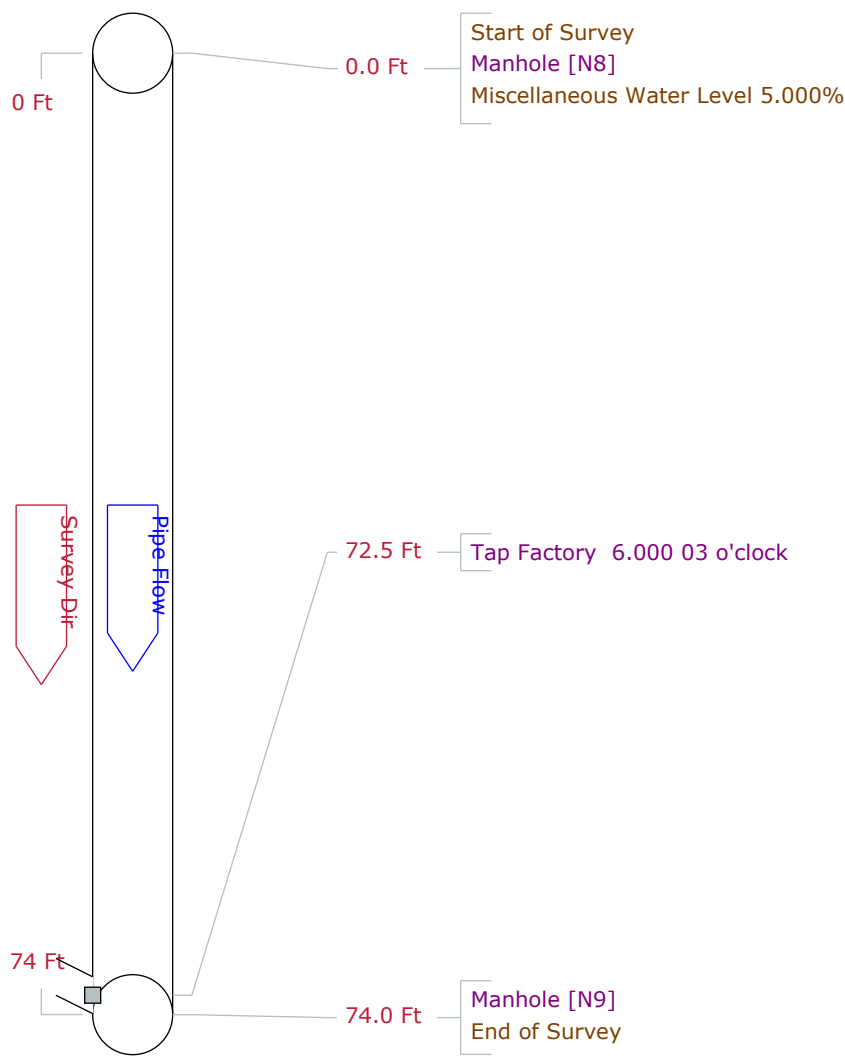
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|------------------|----|----------------|------------|------------------|-------------------|----------------------------|--------------------------|---|----------------------|----|
| Setup | 19 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | INKSTER | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | |
| Customer | | ETC | | | P/O # | | | | | |
| Media Label | | N7A | | | Project | ECT_STORM_TV_RD_12-21-2022 | | | | |
| Date | | 2022/12/22 | | Time | 9:41 | | Weather | | Pre-Cleaning N | |
| Flow control | | Not Controlled | | Survey Purpose | | Routine Assessment | | | Direction Downstream | |
| Street | | HELEN | | | City | | INKSTER | | Drainage area | |
| Location Code | | | | | | | Pipe Use | | Stormwater Pipe | |
| Location details | | PERRIN | | | | | Height 18 | | Width ins | |
| Shape | | Circular | | | Material | | Reinforced Concrete Pipe | | Lining | |
| Coating | | | | | Pipe Joint length | | Ft | | Total length | |
| Length Surveyed | | 316.40 Ft | | Year Constructed | | Year Renewed | | <div><div>Structural</div><div>Miscellaneous</div><div>O & M</div><div>Constructional</div></div> | | |
| Additional info | | | | | | | | | | |
| Up | N7 | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft |
| Down | N8 | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft |



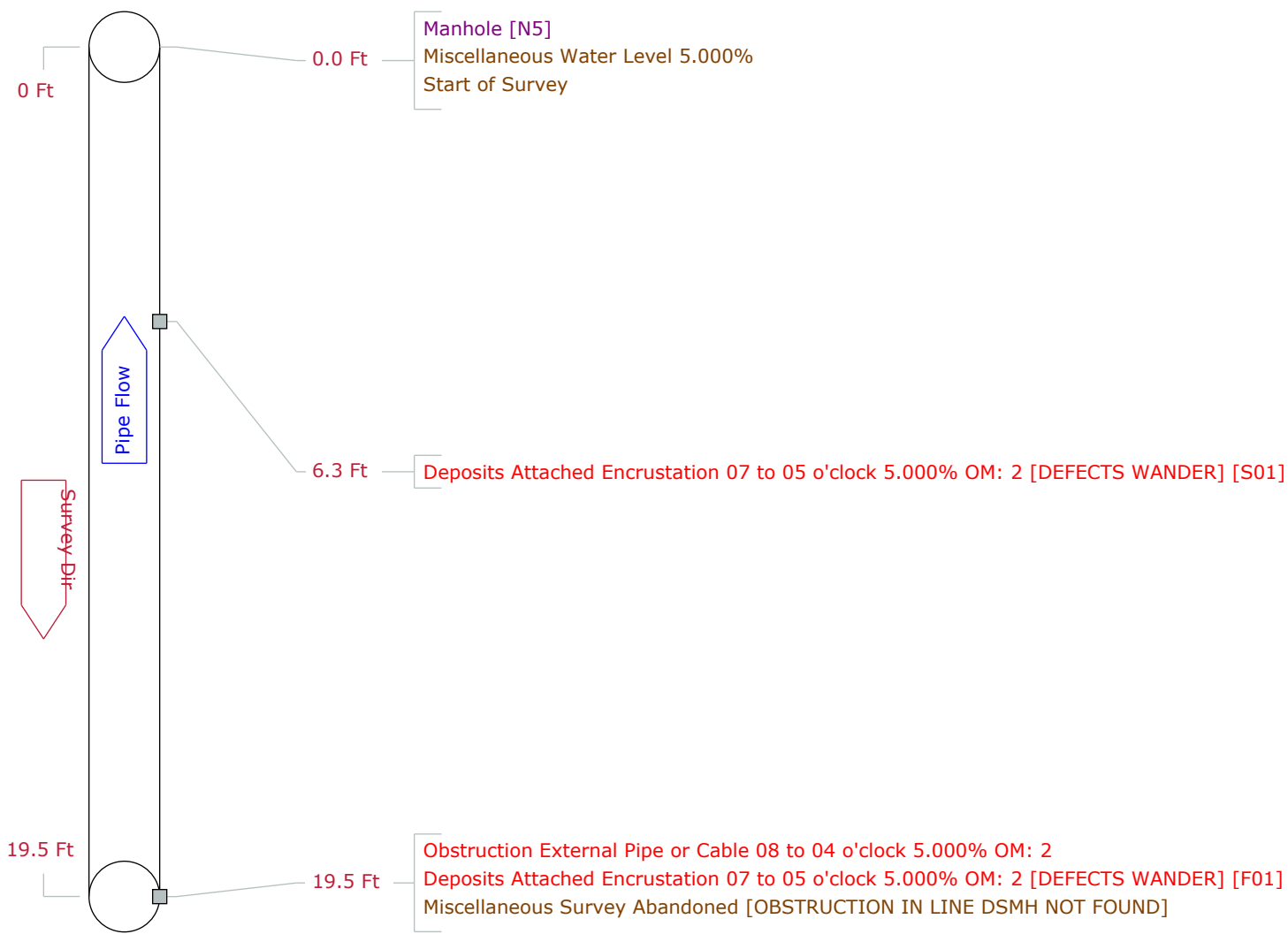
Pipe Graphic Report of PLR N8A

for ECT

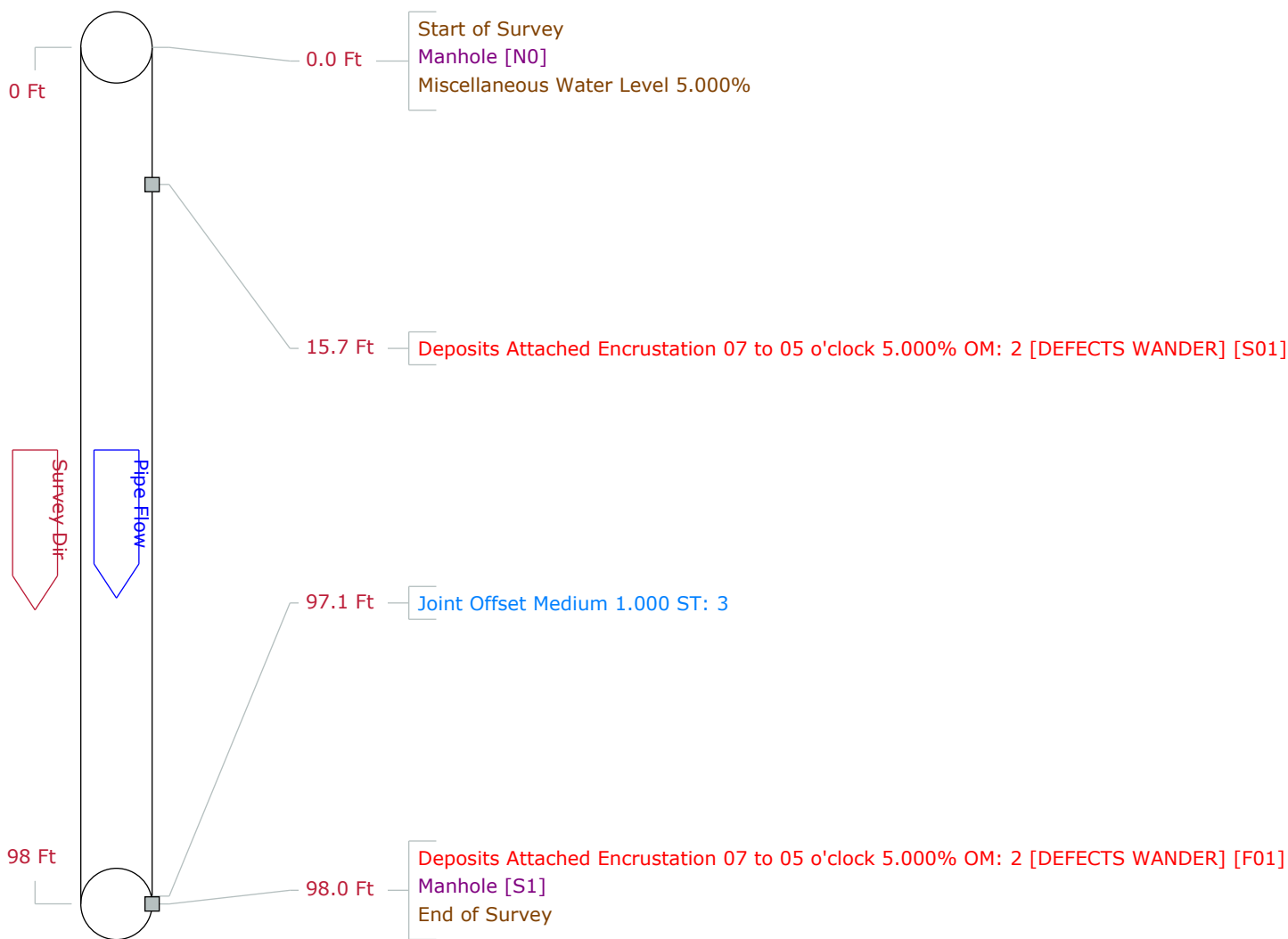
| | | | | | | | | | | |
|------------------|----------------|-------------|-------------------|----------------------------|---------------|-----------------|--|--------------------------------|-----------|--------------|
| Setup | 20 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | INKSTER | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | |
| Customer | ETC | | | | P/O # | | | | | |
| Media Label | N8A | | Project | ECT_STORM_TV_RD_12-21-2022 | | | | | | |
| Date | 2022/12/22 | | Time | 9:52 | | Weather | Pre-Cleaning | | N | Date Cleaned |
| Flow control | Not Controlled | | Survey Purpose | Routine Assessment | | | | | Direction | Downstream |
| Street | HELEN | | | | City | INKSTER | | Drainage area | | |
| Location Code | | | | | | Pipe Use | Stormwater Pipe | | | |
| Location details | PERRIN | | | | Height | 12 | | Width | ins | |
| Shape | Circular | | Material | Reinforced Concrete Pipe | | | Lining | | | |
| Coating | | | Pipe Joint length | Ft | Total length | | Ft | <div>StructuralO & M</div> | | |
| Length Surveyed | 74.00 | | Ft | Year Constructed | Year Renewed | | <div>MiscellaneousConstructional</div> | | | |
| Additional info | | | | | | | | | | |
| Up | N8 | | Rim to invert | | | Grade to invert | | Rim to grade | | Ft |
| Down | N9 | | Rim to invert | | | Grade to invert | | Rim to grade | | Ft |



| | | | | | | | | | | | | | | |
|------------------|----|----------------|------------|----------------|-------------------|--------------------|----------------------------|--------------|-----------------|--|-------|--------------|--------------------------------|--|
| Setup | 21 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | INKSTER | | | | | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | | | | | |
| Customer | | ETC | | | P/O # | | | | | | | | | |
| Media Label | | N5B | | | Project | | ECT_STORM_TV_RD_12-21-2022 | | | | | | | |
| Date | | 2022/12/22 | | Time | | 10:30 | | Weather | | Pre-Cleaning N | | Date Cleaned | | |
| Flow control | | Not Controlled | | Survey Purpose | | Routine Assessment | | | | Direction | | Upstream | | |
| Street | | HELEN | | | City | | INKSTER | | Drainage area | | | | | |
| Location Code | | | | | | | Pipe Use | | Stormwater Pipe | | | | | |
| Location details | | PERRIN | | | | | Height | | 18 | | Width | | ins | |
| Shape | | Circular | | | Material | | Reinforced Concrete Pipe | | Lining | | | | | |
| Coating | | | | | Pipe Joint length | | Ft | | Total length | | Ft | | <div>StructuralO & M</div> | |
| Length Surveyed | | 19.50 | | Ft | | Year Constructed | | Year Renewed | | <div>MiscellaneousConstructional</div> | | | | |
| Additional info | | | | | | | | | | | | | | |
| Up | | SOMERSET EAST | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft | | | |
| Down | | N5 | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft | | | |

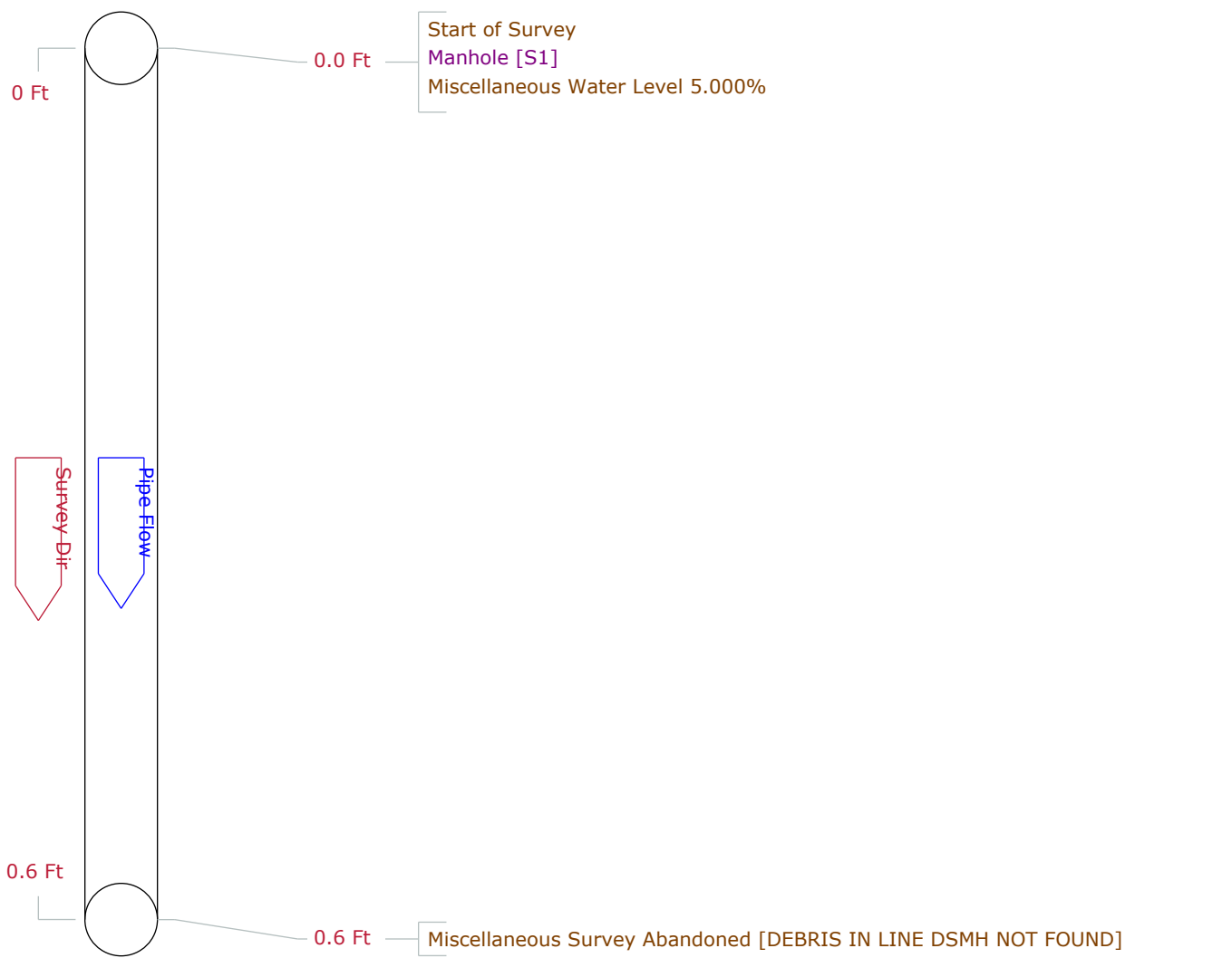


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|------------------|----|----------------|------------|----------------|---------------|--------------------|----------------------------|--------------------------|---------|---|--|--------------|--|
| Setup | 22 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | INKSTER | | | | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | | | | |
| Customer | | ETC | | | P/O # | | | | | | | | |
| Media Label | | N0A | | | Project | | ECT_STORM_TV_RD_12-21-2022 | | | | | | |
| Date | | 2022/12/22 | | Time | | 10:59 | | Weather | | Pre-Cleaning N | | Date Cleaned | |
| Flow control | | Not Controlled | | Survey Purpose | | Routine Assessment | | | | Direction | | Downstream | |
| Street | | HELEN (SOUTH) | | | | City | | INKSTER | | Drainage area | | | |
| Location Code | | | | | | | | Pipe Use | | Stormwater Pipe | | | |
| Location details | | PERRIN | | | | | | Height 12 | | Width | | ins | |
| Shape | | Circular | | | | Material | | Reinforced Concrete Pipe | | Lining | | | |
| Coating | | | | | | Pipe Joint length | | Ft | | Total length | | Ft | |
| Length Surveyed | | 98.00 | | Ft | | Year Constructed | | Year Renewed | | <div><div>Structural</div><div>O & M</div><div>Miscellaneous</div><div>Constructional</div></div> | | | |
| Additional info | | | | | | | | | | | | | |
| Up | | N0 | | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft | |
| Down | | S1 | | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft | |

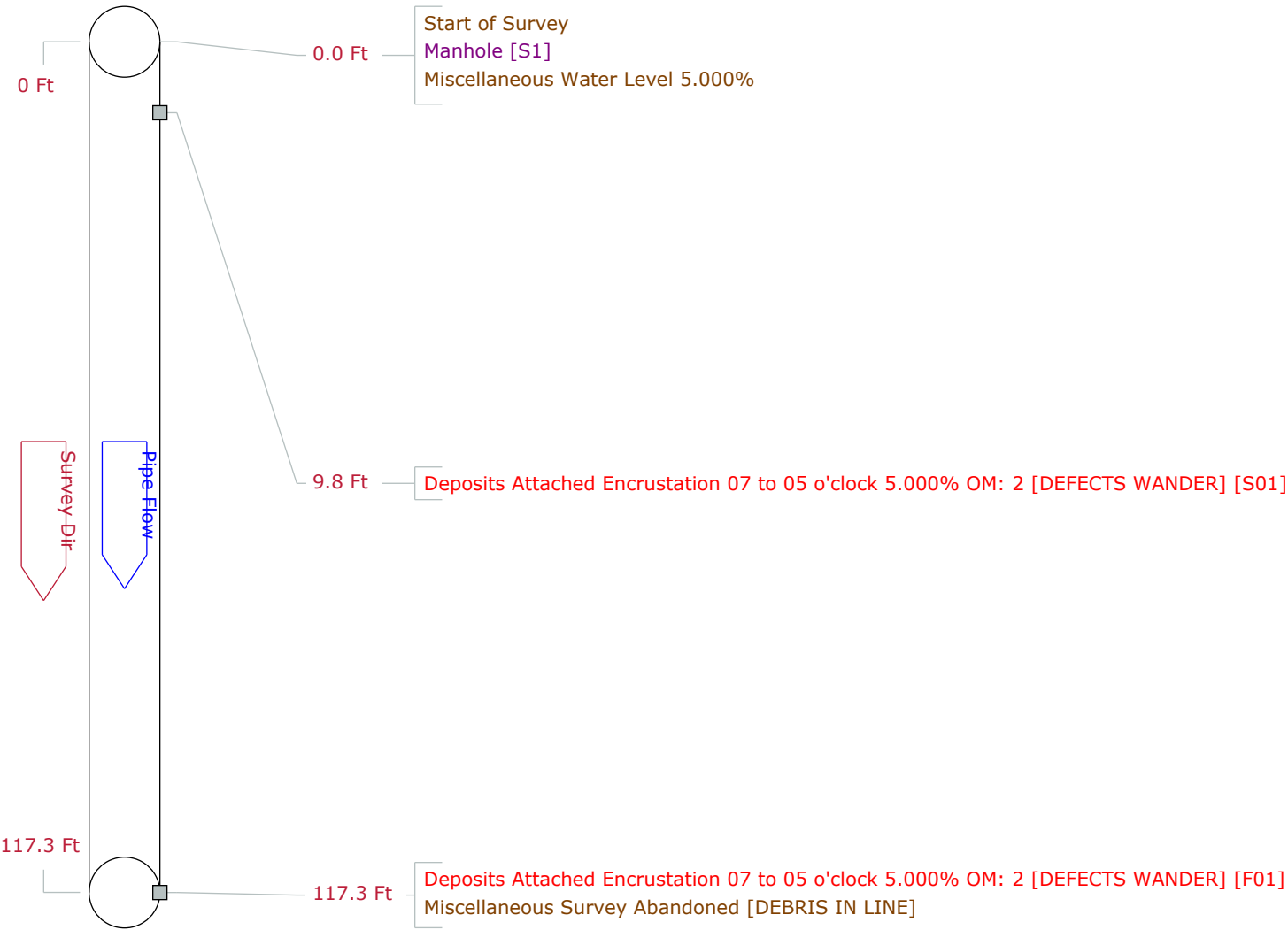


Pipe Graphic Report of PLR SOUTH 1for ECT

| | | | | | | | |
|------------------|-----------------|-------------------|----------------------------|-----------------|-----------------|--|---------------|
| Setup | 23 | Surveyed By | PIPETEK-RD | Certificate # | P0038923-082022 | Owner | INKSTER |
| Reviewed By | | Reviewer # | | Work Order | | | |
| Customer | ETC | | | P/O # | | | |
| Media Label | SOUTH 1 | Project | ECT_STORM_TV_RD_12-21-2022 | | | | |
| Date | 2022/12/22 | Time | 11:41 | Weather | Pre-Cleaning | N | Date Cleaned |
| Flow control | Not Controlled | Survey Purpose | Routine Assessment | | | | Direction |
| Street | TROMLEY (SOUTH) | City | INKSTER | | | | Drainage area |
| Location Code | | | | Pipe Use | Stormwater Pipe | | |
| Location details | PERRIN | | | Height | 12 | Width | ins |
| Shape | Circular | Material | Reinforced Concrete Pipe | Lining | | | |
| Coating | | Pipe Joint length | Ft | Total length | Ft | <div>StructuralO & M MiscellaneousConstructional</div> | |
| Length Surveyed | 00.60 | Year Constructed | | Year Renewed | | | |
| Additional info | DSMH Not Found | | | | | | |
| Up | S1 | Rim to invert | | Grade to invert | | Rim to grade | Ft |
| Down | 0 | Rim to invert | | Grade to invert | | Rim to grade | Ft |



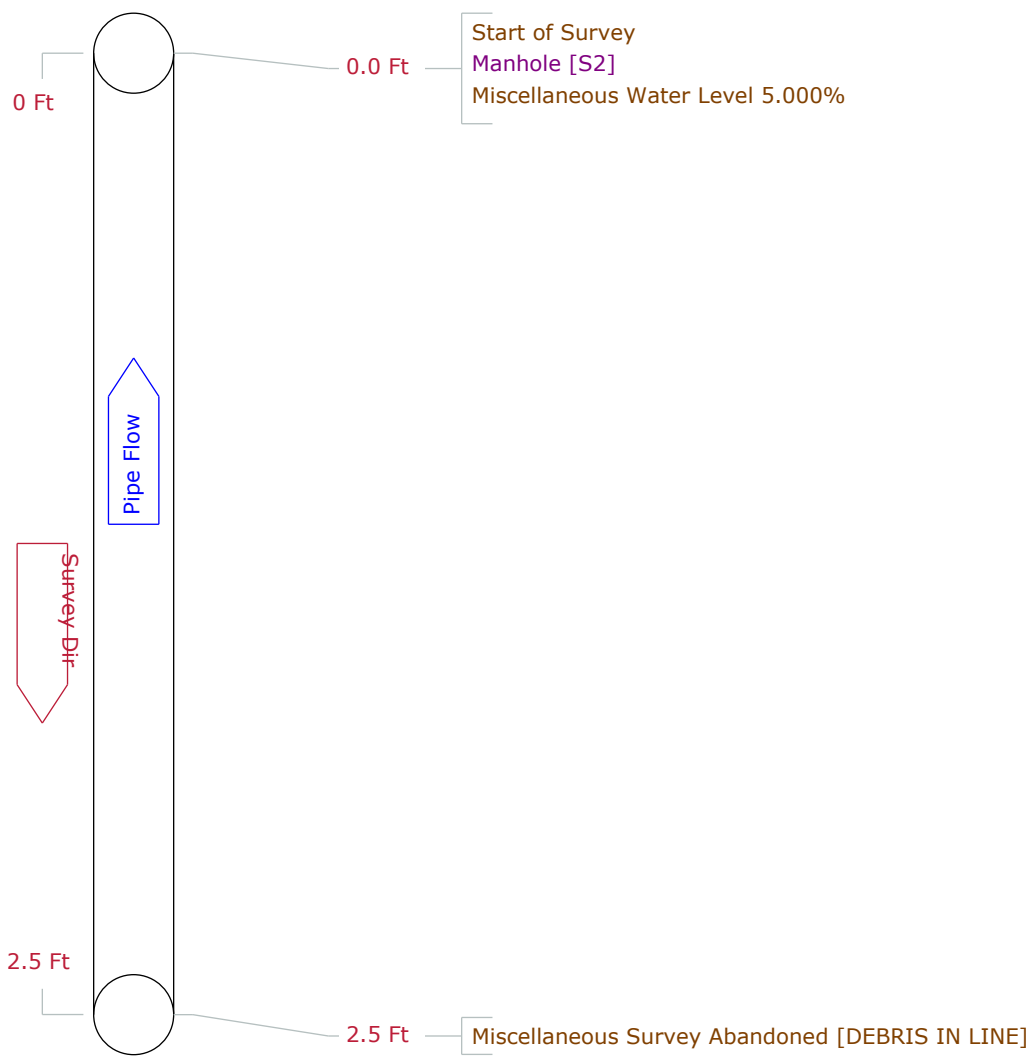
| | | | | | | | | | | |
|------------------|-----------------|-------------|------------------|----------------------------|--------------------------|--|--------------|-----------------|--------------------------------|--------------|
| Setup | 24/25 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | INKSTER | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | |
| Customer | ETC | | | | P/O # | | | | | |
| Media Label | S1A | | Project | ECT_STORM_TV_RD_12-21-2022 | | | | | | |
| Date | 2022/12/22 | | Time | 11:51 | | Weather | Pre-Cleaning | | N | Date Cleaned |
| Flow control | Not Controlled | | Survey Purpose | Routine Assessment | | | | | Direction | Downstream |
| Street | TROMLEY (SOUTH) | | | | City | INKSTER | | | Drainage area | |
| Location Code | | | | | | | Pipe Use | Stormwater Pipe | | |
| Location details | PERRIN | | | | Height | 12 | | Width | ins | |
| Shape | Circular | | | Material | Reinforced Concrete Pipe | | | Lining | | |
| Coating | | | | Pipe Joint length | Ft | Total length | | Ft | <div>StructuralO & M</div> | |
| Length Surveyed | 117.30 Ft | | Year Constructed | Year Renewed | | <div>MiscellaneousConstructional</div> | | | | |
| Additional info | | | | | | | | | | |
| Up | S1 | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft |
| Down | S2 | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft |



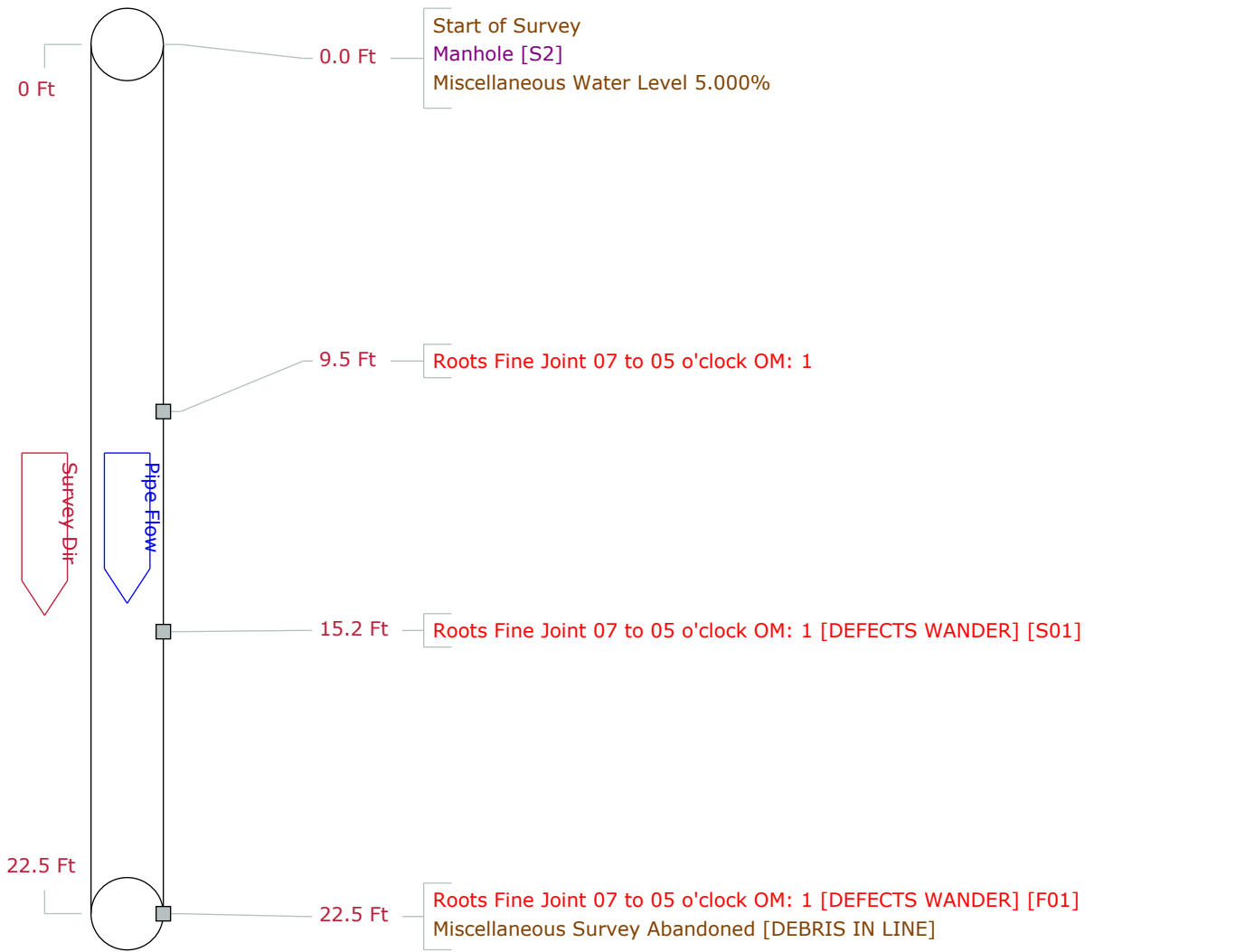
Pipe Graphic Report of PLR S1A

for ECT

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|------------------|----------------------------|-------------------|----------------------------|-----------------|-----------------|---------------|----------------|
| Setup | 25/24 | Surveyed By | PIPETEK-RD | Certificate # | P0038923-082022 | Owner | INKSTER |
| Reviewed By | | Reviewer # | | Work Order | | | |
| Customer | ETC | | | P/O # | | | |
| Media Label | S1A | Project | ECT_STORM_TV_RD_12-21-2022 | | | | |
| Date | 2022/12/22 | Time | 12:03 | Weather | Pre-Cleaning | N | Date Cleaned |
| Flow control | Not Controlled | Survey Purpose | Routine Assessment | | Direction | Upstream | |
| Street | TROMLEY (SOUTH) | City | INKSTER | Drainage area | | | |
| Location Code | | Pipe Use | Stormwater Pipe | | | | |
| Location details | PERRIN | Height | 12 | Width | ins | | |
| Shape | Circular | Material | Reinforced Concrete Pipe | Lining | | | |
| Coating | | Pipe Joint length | Ft | Total length | Ft | Structural | O & M |
| Length Surveyed | 02.50 | Year Constructed | | Year Renewed | | Miscellaneous | Constructional |
| Additional info | Reverse set up on sheet:24 | | | | | | |
| Up | S1 | Rim to invert | | Grade to invert | | Rim to grade | Ft |
| Down | S2 | Rim to invert | | Grade to invert | | Rim to grade | Ft |



| | | | | | | | | | | | |
|------------------|----|-----------------|------------|----------------|----------------------------|--------------------|--------------------------|-----------------|---------------|--------------|---|
| Setup | 26 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | INKSTER | | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | | |
| Customer | | ETC | | | P/O # | | | | | | |
| Media Label | | S2A | | Project | ECT_STORM_TV_RD_12-21-2022 | | | | | | |
| Date | | 2022/12/22 | | Time | 12:14 | | Weather | Pre-Cleaning | | N | Date Cleaned |
| Flow control | | Not Controlled | | Survey Purpose | | Routine Assessment | | | | Direction | Downstream |
| Street | | TROMLEY (SOUTH) | | | City | INKSTER | | | Drainage area | | |
| Location Code | | | | | Pipe Use | | | Stormwater Pipe | | | |
| Location details | | PERRIN | | | Height | | | 12 | Width | ins | |
| Shape | | Circular | | | Material | | Reinforced Concrete Pipe | | Lining | | |
| Coating | | | | | Pipe Joint length | | Ft | Total length | | Ft | <div><div>Structural</div><div>O & M</div><div>Miscellaneous</div><div>Constructional</div></div> |
| Length Surveyed | | 22.50 | | Ft | Year Constructed | | Year Renewed | | | | |
| Additional info | | | | | | | | | | | |
| Up | S2 | | | Rim to invert | | | Grade to invert | | | Rim to grade | Ft |
| Down | S3 | | | Rim to invert | | | Grade to invert | | | Rim to grade | Ft |



Pipe Graphic Report of PLR N1A-1

for ECT

| | | | | | | | | | | | | |
|------------------|-------|-----------------|------------|------|------------------|----------------------------|--------------------------|--------------------|---------------|-----|---|------------|
| Setup | 28/14 | Surveyed By | PIPETEK-RD | | Certificate # | P0038923-082022 | | Owner | INKSTER | | | |
| Reviewed By | | Reviewer # | | | Work Order | | | | | | | |
| Customer | | ETC | | | P/O # | | | | | | | |
| Media Label | | N1A-1 | | | Project | ECT_STORM_TV_RD_12-21-2022 | | | | | | |
| Date | | 2022/12/22 | | Time | 12:38 | | Weather | Pre-Cleaning | | N | Date Cleaned | |
| Flow control | | Not Controlled | | | Survey Purpose | | | Routine Assessment | | | Direction | Downstream |
| Street | | TROMLEY (SOUTH) | | | | City | INKSTER | | Drainage area | | | |
| Location Code | | | | | | Pipe Use | | Stormwater Pipe | | | | |
| Location details | | PERRIN | | | | Height | | 12 | Width | ins | | |
| Shape | | Circular | | | | Material | Reinforced Concrete Pipe | | Lining | | | |
| Coating | | | | | | Pipe Joint length | | Ft | Total length | Ft | <div>Structural</div> <div>Miscellaneous</div> <div>O & M</div> <div>Constructional</div> | |
| Length Surveyed | | 50.00 | | Ft | Year Constructed | | Year Renewed | | | | | |
| Additional info | | | | | | | | | | | | |
| Up | N1 | | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft | |
| Down | N2 | | | | Rim to invert | | Grade to invert | | Rim to grade | | Ft | |

