



# **INTEGRATED WET WEATHER IMPROVEMENT PLAN**

## **PHASE 1**

### **BINDER 4**

#### **☐ Attachments**

- J. NPDES Permit
- K. Overflow Monitor Installation Reports
- L. Miscellaneous Information

**City of Lakewood, Ohio**  
September 1, 2016

**Attachment J**  
NPDES Permit



Application No. OH0026018

Issue Date: July 17, 2014

Effective Date: September 1, 2014

Expiration Date: August 31, 2019

Ohio Environmental Protection Agency  
Authorization to Discharge Under the  
National Pollutant Discharge Elimination System

In compliance with the provisions of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et. seq., hereinafter referred to as the "Act"), and the Ohio Water Pollution Control Act (Ohio Revised Code Section 6111),

City of Lakewood

is authorized by the Ohio Environmental Protection Agency, hereinafter referred to as "Ohio EPA," to discharge from the City of Lakewood wastewater treatment works located at 1699 Park Drive , Metropolitan Park, Lakewood , Ohio, Cuyahoga County and discharging to Lake Erie in accordance with the conditions specified in Parts I, II, III, IV, V, and VI of this permit.

This permit is conditioned upon payment of applicable fees as required by Section 3745.11 of the Ohio Revised Code.

This permit and the authorization to discharge shall expire at midnight on the expiration date shown above. In order to receive authorization to discharge beyond the above date of expiration, the permittee shall submit such information and forms as are required by the Ohio EPA no later than 180 days prior to the above date of expiration.

---

Craig W. Butler  
Director

Total Pages: 72

## Part I, A. - INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the effective date of the permit and lasting 27 months after the effective day of the permit, the permittee is authorized to discharge in accordance with the following limitations and monitoring requirements from the following outfall: 3PE00004001. See Part II, OTHER REQUIREMENTS, for locations of effluent sampling.

Table - Final Outfall - 001 - Initial - 001 - Initial

| Effluent Characteristic<br><br>Parameter          | Discharge Limitations         |         |                 |         |       |        |         | Monitoring Requirements |                                |                   |
|---------------------------------------------------|-------------------------------|---------|-----------------|---------|-------|--------|---------|-------------------------|--------------------------------|-------------------|
|                                                   | Concentration Specified Units |         | Loading* kg/day |         |       |        |         | Measuring Frequency     | Sampling Type                  | Monitoring Months |
|                                                   | Maximum                       | Minimum | Weekly          | Monthly | Daily | Weekly | Monthly |                         |                                |                   |
| 00010 - Water Temperature - C                     | -                             | -       | -               | -       | -     | -      | -       | 1/Day                   | Maximum Indicating Thermometer | All               |
| 00300 - Dissolved Oxygen - mg/l                   | -                             | -       | -               | -       | -     | -      | -       | 1/Day                   | Continuous                     | All               |
| 00335 - Chemical Oxygen Demand (Low Level) - mg/l | -                             | -       | -               | -       | -     | -      | -       | 1 / 2 Weeks             | 24hr Composite                 | All               |
| 00530 - Total Suspended Solids - mg/l             | -                             | -       | 30.0            | 20.0    | -     | 2044   | 1363    | 1/Day                   | 24hr Composite                 | All               |
| 00552 - Oil and Grease, Hexane Extr Method - mg/l | 10.0                          | -       | -               | -       | -     | -      | -       | 1/Week                  | Grab                           | All               |
| 00610 - Nitrogen, Ammonia (NH3) - mg/l            | -                             | -       | -               | -       | -     | -      | -       | 1/Day                   | 24hr Composite                 | All               |
| 00625 - Nitrogen Kjeldahl, Total - mg/l           | -                             | -       | -               | -       | -     | -      | -       | 1 / 2 Weeks             | 24hr Composite                 | All               |
| 00630 - Nitrite Plus Nitrate, Total - mg/l        | -                             | -       | -               | -       | -     | -      | -       | 1/Month                 | 24hr Composite                 | All               |
| 00665 - Phosphorus, Total (P) - mg/l              | -                             | -       | 1.5             | 1.0     | -     | 102    | 68.0    | 2/Week                  | 24hr Composite                 | All               |
| 00719 - Cyanide, Free - mg/l                      | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | Grab                           | Quarterly         |
| 01074 - Nickel, Total Recoverable - ug/l          | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | 24hr Composite                 | Quarterly         |
| 01079 - Silver, Total Recoverable - ug/l          | -                             | -       | -               | -       | -     | -      | -       | 1/Month                 | 24hr Composite                 | All               |
| 01094 - Zinc, Total Recoverable - ug/l            | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | 24hr Composite                 | Quarterly         |
| 01113 - Cadmium, Total Recoverable - ug/l         | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | 24hr Composite                 | Quarterly         |
| 01114 - Lead, Total Recoverable - ug/l            | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | 24hr Composite                 | Quarterly         |
| 01118 - Chromium, Total Recoverable - ug/l        | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | 24hr Composite                 | Quarterly         |
| 01119 - Copper, Total Recoverable - ug/l          | -                             | -       | -               | -       | -     | -      | -       | 1/Month                 | 24hr Composite                 | All               |

| Effluent Characteristic<br><br>Parameter            | Discharge Limitations         |         |                 |         |       |        |         | Monitoring Requirements |                |                   |
|-----------------------------------------------------|-------------------------------|---------|-----------------|---------|-------|--------|---------|-------------------------|----------------|-------------------|
|                                                     | Concentration Specified Units |         | Loading* kg/day |         |       |        |         | Measuring Frequency     | Sampling Type  | Monitoring Months |
|                                                     | Maximum                       | Minimum | Weekly          | Monthly | Daily | Weekly | Monthly |                         |                |                   |
| 01220 - Chromium, Dissolved Hexavalent - ug/l       | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | Grab           | Quarterly         |
| 31648 - E. coli - #/100 ml                          | -                             | -       | 284             | 126     | -     | -      | -       | 1/Day                   | Grab           | Summer            |
| 50050 - Flow Rate - MGD                             | -                             | -       | -               | -       | -     | -      | -       | 1/Day                   | Continuous     | All               |
| 50092 - Mercury, Total (Low Level) - ng/l           | 1700                          | -       | -               | 23.0    | 0.12  | -      | 0.00157 | 1/Month                 | Grab           | All               |
| 61425 - Acute Toxicity, Ceriodaphnia dubia - TUa    | -                             | -       | -               | -       | -     | -      | -       | 1/Year                  | 24hr Composite | August            |
| 61426 - Chronic Toxicity, Ceriodaphnia dubia - TUC  | -                             | -       | -               | -       | -     | -      | -       | 1/Year                  | 24hr Composite | August            |
| 61427 - Acute Toxicity, Pimephales promelas - TUa   | -                             | -       | -               | -       | -     | -      | -       | 1/Year                  | 24hr Composite | August            |
| 61428 - Chronic Toxicity, Pimephales promelas - TUC | -                             | -       | -               | -       | -     | -      | -       | 1/Year                  | 24hr Composite | August            |
| 61941 - pH, Maximum - S.U.                          | 9.0                           | -       | -               | -       | -     | -      | -       | 1/Day                   | Continuous     | All               |
| 61942 - pH, Minimum - S.U.                          | -                             | 6.5     | -               | -       | -     | -      | -       | 1/Day                   | Continuous     | All               |
| 70300 - Residue, Total Filterable - mg/l            | -                             | -       | -               | -       | -     | -      | -       | 1/Month                 | 24hr Composite | All               |
| 80082 - CBOD 5 day - mg/l                           | -                             | -       | 23.0            | 15.0    | -     | 1567   | 1022    | 1/Day                   | 24hr Composite | All               |

Notes for station 3PE00004001:

- \* Effluent loadings based on average design flow of 18 MGD.
- Free cyanide - See Part II, Item Q and X.
- Nickel, zinc, cadmium, lead, total chromium, and copper - See Part II, Item P.
- Silver - See Part II, Item Y
- Dissolved hexavalent chromium - See Part II, Item Q.
- Mercury - See Part II, Item Z, AA, AB, and AC.
- Acute and Chronic Toxicity - See Part II, Item AD.
- Quarterly sampling shall be completed in March, June, August and December.

# Part I, A. - FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning 27 months after effective date of this permit and lasting until the expiration date, the permittee is authorized to discharge in accordance with the following limitations and monitoring requirements from the following outfall: 3PE00004001. See Part II, OTHER REQUIREMENTS, for locations of effluent sampling.

Table - Final Outfall - 001 - Final

| Effluent Characteristic<br><br>Parameter          | Discharge Limitations         |         |        |         |                 |        |         | Monitoring Requirements |                                |                   |
|---------------------------------------------------|-------------------------------|---------|--------|---------|-----------------|--------|---------|-------------------------|--------------------------------|-------------------|
|                                                   | Concentration Specified Units |         |        |         | Loading* kg/day |        |         | Measuring Frequency     | Sampling Type                  | Monitoring Months |
|                                                   | Maximum                       | Minimum | Weekly | Monthly | Daily           | Weekly | Monthly |                         |                                |                   |
| 00010 - Water Temperature - C                     | -                             | -       | -      | -       | -               | -      | -       | 1/Day                   | Maximum Indicating Thermometer | All               |
| 00300 - Dissolved Oxygen - mg/l                   | -                             | -       | -      | -       | -               | -      | -       | 1/Day                   | Continuous                     | All               |
| 00335 - Chemical Oxygen Demand (Low Level) - mg/l | -                             | -       | -      | -       | -               | -      | -       | 1 / 2 Weeks             | 24hr Composite                 | All               |
| 00530 - Total Suspended Solids - mg/l             | -                             | -       | 30.0   | 20.0    | -               | 2044   | 1363    | 1/Day                   | 24hr Composite                 | All               |
| 00552 - Oil and Grease, Hexane Extr Method - mg/l | 10.0                          | -       | -      | -       | -               | -      | -       | 1 / 2 Weeks             | Grab                           | All               |
| 00610 - Nitrogen, Ammonia (NH3) - mg/l            | -                             | -       | -      | -       | -               | -      | -       | 1/Day                   | 24hr Composite                 | All               |
| 00625 - Nitrogen Kjeldahl, Total - mg/l           | -                             | -       | -      | -       | -               | -      | -       | 1 / 2 Weeks             | 24hr Composite                 | All               |
| 00630 - Nitrite Plus Nitrate, Total - mg/l        | -                             | -       | -      | -       | -               | -      | -       | 1/Month                 | 24hr Composite                 | All               |
| 00665 - Phosphorus, Total (P) - mg/l              | -                             | -       | 1.5    | 1.0     | -               | 102    | 68.0    | 2/Week                  | 24hr Composite                 | All               |
| 00665 - Phosphorus, Total (P) - mg/l              | 0.7                           | -       | -      | -       | -               | -      | -       | 1/Year                  | Calculated                     | October           |
| 00719 - Cyanide, Free - mg/l                      | -                             | -       | -      | -       | -               | -      | -       | 1/Quarter               | Grab                           | Quarterly         |
| 01074 - Nickel, Total Recoverable - ug/l          | -                             | -       | -      | -       | -               | -      | -       | 1/Quarter               | 24hr Composite                 | Quarterly         |
| 01079 - Silver, Total Recoverable - ug/l          | -                             | -       | -      | -       | -               | -      | -       | 1/Month                 | 24hr Composite                 | All               |
| 01094 - Zinc, Total Recoverable - ug/l            | -                             | -       | -      | -       | -               | -      | -       | 1/Quarter               | 24hr Composite                 | Quarterly         |
| 01113 - Cadmium, Total Recoverable - ug/l         | -                             | -       | -      | -       | -               | -      | -       | 1/Quarter               | 24hr Composite                 | Quarterly         |
| 01114 - Lead, Total Recoverable - ug/l            | -                             | -       | -      | -       | -               | -      | -       | 1/Quarter               | 24hr Composite                 | Quarterly         |
| 01118 - Chromium, Total Recoverable - ug/l        | -                             | -       | -      | -       | -               | -      | -       | 1/Quarter               | 24hr Composite                 | Quarterly         |

| Effluent Characteristic<br><br>Parameter            | Discharge Limitations         |         |                 |         |       |        |         | Monitoring Requirements |                |                   |
|-----------------------------------------------------|-------------------------------|---------|-----------------|---------|-------|--------|---------|-------------------------|----------------|-------------------|
|                                                     | Concentration Specified Units |         | Loading* kg/day |         |       |        |         | Measuring Frequency     | Sampling Type  | Monitoring Months |
|                                                     | Maximum                       | Minimum | Weekly          | Monthly | Daily | Weekly | Monthly |                         |                |                   |
| 01119 - Copper, Total Recoverable - ug/l            | -                             | -       | -               | -       | -     | -      | -       | 1/Month                 | 24hr Composite | All               |
| 01220 - Chromium, Dissolved Hexavalent - ug/l       | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | Grab           | Quarterly         |
| 31648 - E. coli - #/100 ml                          | -                             | -       | 284             | 126     | -     | -      | -       | 1/Day                   | Grab           | Summer            |
| 50050 - Flow Rate - MGD                             | -                             | -       | -               | -       | -     | -      | -       | 1/Day                   | Continuous     | All               |
| 50092 - Mercury, Total (Low Level) - ng/l           | 1700                          | -       | -               | 23.0    | 0.12  | -      | 0.00157 | 1/Month                 | Grab           | All               |
| 61425 - Acute Toxicity, Ceriodaphnia dubia - TUa    | -                             | -       | -               | -       | -     | -      | -       | 1/Year                  | 24hr Composite | August            |
| 61426 - Chronic Toxicity, Ceriodaphnia dubia - TUC  | -                             | -       | -               | -       | -     | -      | -       | 1/Year                  | 24hr Composite | August            |
| 61427 - Acute Toxicity, Pimephales promelas - TUa   | -                             | -       | -               | -       | -     | -      | -       | 1/Year                  | 24hr Composite | August            |
| 61428 - Chronic Toxicity, Pimephales promelas - TUC | -                             | -       | -               | -       | -     | -      | -       | 1/Year                  | 24hr Composite | August            |
| 61941 - pH, Maximum - S.U.                          | 9.0                           | -       | -               | -       | -     | -      | -       | 1/Day                   | Continuous     | All               |
| 61942 - pH, Minimum - S.U.                          | -                             | 6.5     | -               | -       | -     | -      | -       | 1/Day                   | Continuous     | All               |
| 70300 - Residue, Total Filterable - mg/l            | -                             | -       | -               | -       | -     | -      | -       | 1/Month                 | 24hr Composite | All               |
| 80082 - CBOD 5 day - mg/l                           | -                             | -       | 23.0            | 15.0    | -     | 1567   | 1022    | 1/Day                   | 24hr Composite | All               |

Notes for station 3PE00004001:

\* Effluent loadings based on average design flow of 18 MGD.

- Free cyanide - See Part II, Item Q and X.
- Nickel, zinc, cadmium, lead, total chromium, and copper - See Part II, Item P.
- Silver - See Part II, Item Y
- Dissolved hexavalent chromium - See Part II, Item Q.
- Mercury - See Part II, Item Z, AA, AB, and AC.
- Acute and Chronic Toxicity - See Part II, Item AD.
- Quarterly sampling shall be completed in March, June, August and December.
- Phosphorus - See Part II, Item AF and AG

## Part I, B. - CSO MONITORING LIMITATIONS AND MONITORING REQUIREMENTS

1. CSO Monitoring. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee shall monitor at Station Numbers 3PE00004002, 3PE00004052, 3PE00004053, 3PE00004054, 3PE00004055, 3PE00004056, 3PE00004057, 3PE00004058, and 3PE00004059 and report to the Ohio EPA in accordance with the following table. See Part II, OTHER REQUIREMENTS, for location of sludge sampling.

Table - CSO Monitoring - 002 - Final

| <u>Effluent Characteristic</u>            | <u>Discharge Limitations</u>  |         |                 |         |       |        |         | <u>Monitoring Requirements</u> |               |                   |
|-------------------------------------------|-------------------------------|---------|-----------------|---------|-------|--------|---------|--------------------------------|---------------|-------------------|
| Parameter                                 | Concentration Specified Units |         | Loading* kg/day |         |       |        |         | Measuring Frequency            | Sampling Type | Monitoring Months |
|                                           | Maximum                       | Minimum | Weekly          | Monthly | Daily | Weekly | Monthly |                                |               |                   |
| 00530 - Total Suspended Solids - mg/l     | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter                      | Grab          | Quarterly         |
| 74062 - Overflow Occurrence - No./Month   | -                             | -       | -               | -       | -     | -      | -       | When Disch.                    | Total         | All               |
| 74063 - Overflow Volume - Million Gallons | -                             | -       | -               | -       | -     | -      | -       | When Disch.                    | Total         | All               |
| 80082 - CBOD 5 day - mg/l                 | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter                      | Grab          | Quarterly         |
| 82517 - Duration of Discharge - Hours     | -                             | -       | -               | -       | -     | -      | -       | When Disch.                    | Total         | All               |

NOTES for Station Numbers 3PE00004002, 3PE00004052, 3PE00004053, 3PE00004054, 3PE00004055, 3PE00004056, 3PE00004057, 3PE00004058, and 3PE00004059:

- Note that each station will be given a separate DMR form (as was done in the previous permit) but this renewal only shows one table to create a more simplistic and efficient approach as all CSO outfalls will have the same monitoring requirements under this permit.
- Subject to the terms and conditions of this permit, including the General Effluent Limitations in Part III, Item 2, the permittee is authorized to discharge from this station only during wet weather periods when the flow in the sewer system exceeds the capacity of the sewer system.
- A Discharge Monitoring Report (DMR) for this station must be submitted every month.
- If this station is not monitored during a particular month: (1) Leave the data area blank; (2) Enter "Monitoring not required" in the Remarks section; and (3) PIN the eDMR.
- If this station is monitored during a particular month and there are no discharges during the entire month, select the "No Discharge" check box on the data entry form and PIN the eDMR.
- Data for Overflow Occurrence and Overflow Volume may be estimated if a measuring device is not available.

- Overflow Occurrences: If a discharge from this station occurs intermittently during a day, starting and stopping several times, count "1" occurrence for that day. If a discharge from this station occurs on more than one day but is the result of a continuing precipitation event, it should be counted as one occurrence. Report total occurrences for the month on Day 1 of the DMR.
- Overflow Volume shall be reported on each day there is a discharge through this station. Data for total suspended solids and CBOD shall be reported once per quarter during the first 30 minutes of discharge.
- See Part II, Items F, G and H.

Part I, B. - SSO MONITORING EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. SSO Monitoring. During the period beginning on the effective date of this permit, and lasting until the expiration date, the permittee shall monitor at Station Number 3PE00004300, and report to the Ohio EPA in accordance with the following table. See Part II, OTHER REQUIREMENTS, for location of sampling.

Table - SSO Monitoring - 300 - Final

| <u>Effluent Characteristic</u>          | <u>Discharge Limitations</u>  |         |                 |         |       |        |         | <u>Monitoring Requirements</u> |          |            |
|-----------------------------------------|-------------------------------|---------|-----------------|---------|-------|--------|---------|--------------------------------|----------|------------|
|                                         | Concentration Specified Units |         | Loading* kg/day |         |       |        |         | Measuring                      | Sampling | Monitoring |
| Parameter                               | Maximum                       | Minimum | Weekly          | Monthly | Daily | Weekly | Monthly | Frequency                      | Type     | Months     |
| 74062 - Overflow Occurrence - No./Month | -                             | -       | -               | -       | -     | -      | -       | 1/Month                        | Total    | All        |

NOTES for Station Number 3PE00004300:

- A sanitary sewer overflow is an overflow, spill, release, or diversion of wastewater from a sanitary sewer system. These overflows shall be monitored when they discharge. Only sanitary sewer overflows that enter waters of the state, either directly or through a storm sewer or other conveyance, must be reported under this monitoring station.
- For the purpose of counting occurrences, each location on the sanitary sewer system where there is an overflow, spill, release, or diversion of wastewater on a given day that enters waters of the state is counted as one occurrence. For example, if on a given day overflows occur from a manhole at one location and from a damaged pipe at another location and they both enter waters of the state, record two occurrences for that day. If overflows from both locations continue on the following day, record two occurrences for the following day. At the end of the month, total the daily occurrences and report this number in the first column of the first day of the month on the 4500 form. If there are no overflows during the entire month, report "zero" (0).
- All sanitary sewer overflows are prohibited.
- See Part II, Items I and J



## Part I, B. - SLUDGE MONITORING REQUIREMENTS

1. Sludge Monitoring. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee shall monitor the treatment works final sludge at Station Number 3PE00004581, and report to the Ohio EPA in accordance with the following table. See Part II, OTHER REQUIREMENTS, for location of sludge sampling.

Table - Sludge Monitoring - 581 - Final

| Effluent Characteristic<br><br>Parameter           | Discharge Limitations         |         |                 |         |       |        |         | Monitoring Requirements |               |                   |
|----------------------------------------------------|-------------------------------|---------|-----------------|---------|-------|--------|---------|-------------------------|---------------|-------------------|
|                                                    | Concentration Specified Units |         | Loading* kg/day |         |       |        |         | Measuring Frequency     | Sampling Type | Monitoring Months |
|                                                    | Maximum                       | Minimum | Weekly          | Monthly | Daily | Weekly | Monthly |                         |               |                   |
| 00400 - pH - S.U.                                  | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | Grab          | Quarterly - Alt.  |
| 00611 - Ammonia (NH3) In Sludge - mg/kg            | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | Composite     | Quarterly - Alt.  |
| 00627 - Nitrogen Kjeldahl, Total In Sludge - mg/kg | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | Composite     | Quarterly - Alt.  |
| 00668 - Phosphorus, Total In Sludge - mg/kg        | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | Composite     | Quarterly - Alt.  |
| 00938 - Potassium In Sludge - mg/kg                | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | Composite     | Quarterly - Alt.  |
| 01003 - Arsenic, Total In Sludge - mg/kg           | 75                            | -       | -               | -       | -     | -      | -       | 1/Quarter               | Composite     | Quarterly - Alt.  |
| 01028 - Cadmium, Total In Sludge - mg/kg           | 85                            | -       | -               | -       | -     | -      | -       | 1/Quarter               | Composite     | Quarterly - Alt.  |
| 01043 - Copper, Total In Sludge - mg/kg            | 4300                          | -       | -               | -       | -     | -      | -       | 1/Quarter               | Composite     | Quarterly - Alt.  |
| 01052 - Lead, Total In Sludge - mg/kg              | 840                           | -       | -               | -       | -     | -      | -       | 1/Quarter               | Composite     | Quarterly - Alt.  |
| 01068 - Nickel, Total In Sludge - mg/kg            | 420                           | -       | -               | -       | -     | -      | -       | 1/Quarter               | Composite     | Quarterly - Alt.  |
| 01093 - Zinc, Total In Sludge - mg/kg              | 7500                          | -       | -               | -       | -     | -      | -       | 1/Quarter               | Composite     | Quarterly - Alt.  |
| 01148 - Selenium, Total In Sludge - mg/kg          | 100                           | -       | -               | -       | -     | -      | -       | 1/Quarter               | Composite     | Quarterly - Alt.  |
| 51129 - Sludge Fee Weight - dry tons               | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | Total         | Quarterly - Alt.  |
| 70316 - Sludge Weight - Dry Tons                   | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | Total         | Quarterly - Alt.  |
| 71921 - Mercury, Total In Sludge - mg/kg           | 57                            | -       | -               | -       | -     | -      | -       | 1/Quarter               | Composite     | Quarterly - Alt.  |

| <u>Effluent Characteristic</u>       | <u>Discharge Limitations</u>  |         |                 |         |       |        |         | <u>Monitoring Requirements</u> |           |                     |
|--------------------------------------|-------------------------------|---------|-----------------|---------|-------|--------|---------|--------------------------------|-----------|---------------------|
|                                      | Concentration Specified Units |         | Loading* kg/day |         |       |        |         | Measuring                      | Sampling  | Monitoring          |
| Parameter                            | Maximum                       | Minimum | Weekly          | Monthly | Daily | Weekly | Monthly | Frequency                      | Type      | Months              |
| 78465 - Molybdenum In Sludge - mg/kg | 75                            | -       | -               | -       | -     | -      | -       | 1/Quarter                      | Composite | Quarterly -<br>Alt. |

- Monitoring is required when sewage sludge is removed from the permittee's facility for application to the land. The monitoring data shall be reported on the March, June, September, and December Discharge Monitoring Report (DMR). The monitoring data can be collected at any time during the reporting period.

- Metal analysis must be completed during each reporting period whether or not sewage sludge is removed from the facility and applied to the land. Alternatively, the number of composite samples collected and reported prior to the next land application event shall be increased to account for the reporting period(s) in which land application did not occur. If all accumulated sewage sludge has been removed and hauled to a landfill, incinerated or transferred to another NPDES permit holder, then the metal analysis is not required.

- If no sewage sludge is removed from the facility during the reporting period, enter the results for the metal analysis on the DMR and enter "0" for sludge weight and sludge fee weight.

- If no sewage sludge is removed from the facility during the reporting period and no metal analysis is completed during the reporting period, select the "No Discharge" check box on the data entry form and PIN the eDMR.

- If metal analysis has not been completed previously during each reporting period: when sewage sludge is removed from the facility all metal analysis results shall be reported on the applicable DMR by entering the separate results on different days within the DMR. For example, if no sewage sludge has been removed from the facility for a full calendar year, and quarterly monitoring is required by the permit, then five (four from the previous year and one for the current monitoring period) separate composite samples of the sewage sludge are required to be collected and analyzed for metals prior to removal from the facility. The first sample result may be entered on the first day of the DMR, the second result on the second day of the DMR, and so on. A note may then be added to indicate the actual day(s) when the samples were collected.
- It is recommended that composite samples of the sewage sludge be collected and analyzed close enough to the time of land application to be reflective of the sludge's current quality, but not so close that the results of the analysis are not available prior to land applying the sludge.
- The permittee shall maintain the appropriate records on site to verify that the requirements of Pathogen Reduction and Vector Attraction Reduction have been met.
- Units of mg/kg are on a dry weight basis.
- Sludge weight is a calculated total for the year. To convert from gallons of liquid sewage sludge to dry tons of sewage sludge:  $\text{dry tons} = \text{gallons} \times 8.34 \text{ (lbs/gallon)} \times 0.0005 \text{ (tons/lb)} \times \text{decimal fraction total solids}$ .
- Sludge fee weight means sludge weight, in dry U.S. tons, excluding any admixtures such as liming material or bulking agents.
- See Part II, Items S through W.

Part I, B. - SLUDGE MONITORING REQUIREMENTS

2. Sludge Monitoring. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee shall monitor the treatment works' final sludge at Station Number 3PE00004586, and report to the Ohio EPA in accordance with the following table. See Part II, OTHER REQUIREMENTS, for location of sludge sampling.

Table - Sludge Monitoring - 586 - Final

| <u>Effluent Characteristic</u>       | <u>Discharge Limitations</u>  |         |                 |         |       |        |         | <u>Monitoring Requirements</u> |          |            |
|--------------------------------------|-------------------------------|---------|-----------------|---------|-------|--------|---------|--------------------------------|----------|------------|
|                                      | Concentration Specified Units |         | Loading* kg/day |         |       |        |         | Measuring                      | Sampling | Monitoring |
| Parameter                            | Maximum                       | Minimum | Weekly          | Monthly | Daily | Weekly | Monthly | Frequency                      | Type     | Months     |
| 51129 - Sludge Fee Weight - dry tons | -                             | -       | -               | -       | -     | -      | -       | 1/Year                         | Total    | December   |

- Monitoring is required when sewage sludge is removed from the permittee's facility for disposal in a mixed solid waste landfill. The total Sludge Fee Weight of sewage sludge disposed of in a mixed solid waste landfill for the entire year shall be reported on the December Discharge Monitoring Report (DMR).

- If no sewage sludge is removed from the Permittee's facility for disposal in a mixed solid waste landfill during the year, select the "No Discharge" check box on the data entry form and PIN the eDMR.

- Sludge fee weight means sludge weight, in dry U.S. tons, excluding any admixtures such as liming material or bulking agents.

## Part I, B. - INFLUENT MONITORING REQUIREMENTS

1. Influent Monitoring. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee shall monitor the treatment works' influent wastewater at Station Number 3PE00004601, and report to the Ohio EPA in accordance with the following table. Samples of influent used for determination of net values or percent removal must be taken the same day as those samples of effluent used for that determination. See Part II, OTHER REQUIREMENTS, for location of influent sampling.

Table - Influent Monitoring - 601 - Final

| Effluent Characteristic<br><br>Parameter      | Discharge Limitations         |         |                 |         |       |        |         | Monitoring Requirements |                |                   |
|-----------------------------------------------|-------------------------------|---------|-----------------|---------|-------|--------|---------|-------------------------|----------------|-------------------|
|                                               | Concentration Specified Units |         | Loading* kg/day |         |       |        |         | Measuring Frequency     | Sampling Type  | Monitoring Months |
|                                               | Maximum                       | Minimum | Weekly          | Monthly | Daily | Weekly | Monthly |                         |                |                   |
| 00010 - Water Temperature - C                 | -                             | -       | -               | -       | -     | -      | -       | 1/Day                   | Continuous     | All               |
| 00045 - Total Precipitation - Inches          | -                             | -       | -               | -       | -     | -      | -       | 1/Day                   | Total          | All               |
| 00530 - Total Suspended Solids - mg/l         | -                             | -       | -               | -       | -     | -      | -       | 1/Day                   | 24hr Composite | All               |
| 00625 - Nitrogen Kjeldahl, Total - mg/l       | -                             | -       | -               | -       | -     | -      | -       | 1 / 2 Weeks             | 24hr Composite | All               |
| 00719 - Cyanide, Free - mg/l                  | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | Grab           | Quarterly         |
| 01074 - Nickel, Total Recoverable - ug/l      | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | 24hr Composite | Quarterly         |
| 01079 - Silver, Total Recoverable - ug/l      | -                             | -       | -               | -       | -     | -      | -       | 1/Month                 | 24hr Composite | All               |
| 01094 - Zinc, Total Recoverable - ug/l        | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | 24hr Composite | Quarterly         |
| 01113 - Cadmium, Total Recoverable - ug/l     | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | 24hr Composite | Quarterly         |
| 01114 - Lead, Total Recoverable - ug/l        | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | 24hr Composite | Quarterly         |
| 01118 - Chromium, Total Recoverable - ug/l    | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | 24hr Composite | Quarterly         |
| 01119 - Copper, Total Recoverable - ug/l      | -                             | -       | -               | -       | -     | -      | -       | 1/Month                 | 24hr Composite | All               |
| 01220 - Chromium, Dissolved Hexavalent - ug/l | -                             | -       | -               | -       | -     | -      | -       | 1/Quarter               | Grab           | Quarterly         |
| 50092 - Mercury, Total (Low Level) - ng/l     | -                             | -       | -               | -       | -     | -      | -       | 1/Month                 | Grab           | All               |
| 61941 - pH, Maximum - S.U.                    | -                             | -       | -               | -       | -     | -      | -       | 1/Day                   | Continuous     | All               |
| 61942 - pH, Minimum - S.U.                    | -                             | -       | -               | -       | -     | -      | -       | 1/Day                   | Continuous     | All               |
| 80082 - CBOD 5 day - mg/l                     | -                             | -       | -               | -       | -     | -      | -       | 1/Day                   | 24hr Composite | All               |

NOTES for Station Number 3PE00004601:

- Free cyanide - See Part II, Item R and X.
- Nickel, zinc, cadmium, lead, total chromium, and copper - See Part II, Item P.
- Dissolved hexavalent chromium and cyanide - See Part II, Item R.

## Part I, B. - UPSTREAM MONITORING REQUIREMENTS

1. Upstream Monitoring. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee shall monitor the treatment works' influent wastewater at Station Number 3PE00004801, and report to the Ohio EPA in accordance with the following table. See Part II, OTHER REQUIREMENTS, for location of sampling.

Table - Upstream Monitoring - 801 - Final

| <u>Effluent Characteristic</u>                                  |  | <u>Discharge Limitations</u>  |         |                 |         |       |                     | <u>Monitoring Requirements</u> |                   |        |         |
|-----------------------------------------------------------------|--|-------------------------------|---------|-----------------|---------|-------|---------------------|--------------------------------|-------------------|--------|---------|
| Parameter                                                       |  | Concentration Specified Units |         | Loading* kg/day |         |       | Measuring Frequency | Sampling Type                  | Monitoring Months |        |         |
|                                                                 |  | Maximum                       | Minimum | Weekly          | Monthly | Daily |                     |                                |                   | Weekly | Monthly |
| 61432 - 48-Hr. Acute Toxicity Ceriodaphnia dubia - % Affected   |  | -                             | -       | -               | -       | -     | -                   | -                              | 1/Year            | Grab   | August  |
| 61435 - 96-Hr. Acute Toxicity Pimephales promela - % Affected   |  | -                             | -       | -               | -       | -     | -                   | -                              | 1/Year            | Grab   | August  |
| 61438 - 7-Day Chronic Toxicity Ceriodaphnia dubia - % Affected  |  | -                             | -       | -               | -       | -     | -                   | -                              | 1/Year            | Grab   | August  |
| 61441 - 7-Day Chronic Toxicity Pimephales promelas - % Affected |  | -                             | -       | -               | -       | -     | -                   | -                              | 1/Year            | Grab   | August  |

NOTES for Station Number 3PE00004801:

- The parameters listed under outfall 3PE00004801 are part of biomonitoring sampling. See Part II, Item AD.3

## Part I, C - Schedule of Construction

### 1. Combined Sewer Overflow (CSO) and Sanitary Sewer Overflow (SSO) Flow Monitor Installation

In order to more accurately collect data for volume and overflow occurrences, the permittee shall install a flow or level monitoring device at any CSOs and SSOs that are currently without monitoring sensors. The installation shall occur as soon as practicable but not later than 24 months after the effective date of this permit. Data for Overflow Occurrence and Overflow Volume may be estimated until measuring devices are installed

### 2. Integrated Wet Weather Improvement Plan - Summary

The permittee has a sewer system that consists of separate storm sewers, separate sanitary sewers, and combined sewers.

Separate storm sewers are intended to convey storm water runoff directly to receiving streams/Lake Erie.

Separate sanitary sewers are designed to convey sanitary sewage directly to the wastewater treatment plant for full treatment. Sanitary sewage includes wastewater from homes and commercial establishments as well as wastewater from industries/medical facilities.

Combined sewers are designed to convey a combination of storm water and sanitary sewage. During wet weather, a portion of the combined sewage and storm water in these combined sewers is conveyed to the wastewater treatment plant for full treatment and a portion is discharged to receiving streams/Lake Erie.

As a result of ongoing sewer system studies, it is now understood that there are cross-connections at numerous locations between the separate storm sewers and separate sanitary sewers. These cross-connections are located at individual private property laterals as well as on the main sewers lines and stem from the original design of an 'over-under' sewer system. These cross-connections allow sewage to enter the storm sewers and discharge from the storm sewer outfalls during wet weather events, similar to a combined sewer. These cross-connections/discharges had not been previously identified and are still not completely understood in terms of location, number, and degree of contamination. Discharges from these cross-connections could possibly occur during dry weather as well if the sanitary sewer is undersized and/or is partially/completely obstructed.



The permittee discharges untreated sewage to waters that are considered a 'Sensitive Area' under the federal CSO Policy. These waters include Lake Erie and the Rocky River as both water bodies have a high degree of public use and contact.

The permittee shall develop an Integrated Wet Weather Improvement Plan to address overflows from the combined sewers as well as overflows from the separate storm and sanitary sewer system, specifically sewage overflows from storm sewers that are cross-connected with the sanitary sewers.

The goals of the Integrated Wet Weather Improvement Plan shall be to: bring all sewage overflow discharge points into compliance with the technology and water quality based requirements of the Clean Water Act and Ohio Revised Code Section 6111; to minimize water quality and human health impacts; and to minimize the discharge of pollutants. The Integrated Wet Weather Improvement Plan shall be implemented in accordance with federal policy that states the following: (i) SSOs are prohibited; (ii) Dry weather overflows must be eliminated; (iii) CSOs must be reduced to a level consistent with applicable water quality standards and the federal CSO policy.

The Wet Weather Improvement Plan shall also include an Initial Control Measure that will have a significant impact on reducing the volume and pollutant load of untreated sewage overflows within 8 years of the effective date of this permit.

The Integrated Wet Weather Improvement Plan shall be developed and submitted in two phases.

- Phase 1 shall include a full Characterization of the collection system (see below) and Planning Level Alternatives Analysis of control alternatives that will reduce the volume and frequency of sewage discharges (see below). Phase 1 shall also include Initial Design Specifications for the High Rate Treatment system proposed as the Initial Control Measure. Phase 1 is to be submitted within 24 months of the effective date of the permit.

- Phase 2 shall include a comprehensive Alternatives Analysis updated to consider results of the Pilot Separation Study the permittee expects to implement in the next three years. Phase 2 shall be submitted within 54 months of the effective date of the permit.

### 3. Integrated Wet Weather Improvement Plan - Phase 1

The permittee shall develop and submit to Ohio EPA Northeast District Office the Phase 1 Integrated Wet Weather Improvement Plan not later than 24 months after the effective date of this permit. (Event Code: 91299)

The Phase 1 Integrated Wet Weather Improvement Plan shall include, but not be limited to, the following:

a) Characterization of the collection system to identify sewage overflow discharge locations, volume and frequency of sewage discharges from those locations, and pollutant concentrations/loads discharged.

Characterization of the collection system shall include but not be limited to the following:

i. Comprehensive sewer collection map including the location of all sanitary sewers, storm sewers, combined sewers, and all associated outfalls. In addition, the map shall identify cross-connection locations between storm sewers and sanitary sewers (SSOs) as well as locations where there are illicit connections of sanitary laterals directly to the municipal separate storm sewer system (MS4). An outfall identification (ID) system shall be developed to assign a unique ID to each outfall from the system including CSO outfalls, (MS4) outfalls, and SSOs.

ii. Adequate characterization through monitoring, modeling and other means as appropriate, for a range of storm events to allow for the following:

(1) The response of sewer system in terms of volume and frequency of sewage discharges as well as the pollutant concentrations/loads discharged;

(2) Development and evaluation of various control alternatives including potential hydraulic capacities at the wastewater treatment plant.

iii. A summary of the monitoring data, modeling and calculations used in the characterization process.

b) A planning level development and evaluation of control alternatives to reduce/eliminate sewage discharges. The planning level evaluation shall consider possible outcomes of the pilot sewer separation study in development and evaluation of control alternatives;

The planning level development and evaluation of control alternatives shall include but not be limited to the following:

i. An assessment in terms of cost and effectiveness for a range of alternatives and control levels, where effectiveness shall be measured by the frequency of discharges, discharge volumes, and discharged pollutant loadings. Evaluated alternatives and control levels shall include but not be limited to the following:

- (1) Sewer separation, both in targeted local areas as well as system-wide;
- (2) Storage basins or tunnels;
- (3) Express sewers to convey sewage for treatment at the wastewater treatment plant (WWTP) or a satellite treatment system;
- (4) Increased treatment capacity at the WWTP as well as use of satellite treatment systems in the collection system. Use of physical-chemical treatment shall be evaluated at the WWTP and satellite treatment systems. The potential for increasing biological treatment capacity at the WWTP shall also be evaluated.
- (5) A combination of the above alternatives;
- (6) Alternatives that in a typical year will reduce sewage overflows to zero, one, two, three and four events system-wide. An event means one or more overflows from the sewer system that does not receive minimum treatment;
- (7) Control measures necessary to eliminate cross-connections between the separate sanitary sewers and storm sewers, both in targeted local areas as well as system-wide.

ii. Recommended Alternatives analysis

c) Design criteria for the High Rate Treatment System Initial Control Measure

At a minimum, the design criteria shall specify hydraulic design capacity and effluent quality of the proposed High Rate Treatment system. At a minimum, the high rate treatment system shall produce effluent quality similar or better than the expected industry standards at that time.

A basis of design shall be included that outlines and provides support for the proposed system, including, at a minimum, the technologies evaluated and the cost-benefits of those technologies in terms of cost and pollutant reduction.

4. Initial Control Measure

The City of Lakewood has proposed constructing a high rate treatment system at or near the wastewater treatment plant as the Initial Control Measure.

The Initial Control Measure shall be implemented in accordance with the following schedule:

- (1) Not later than 42 months from the effective date of this permit, the permittee shall submit an application for a permit-to-install (PTI) for the measure or measures. (Event Code: 88899)

(2) Not later than 54 months from the effective date of this permit or 6 months after the PTI approval, whichever is later, the permittee shall begin construction of the measure or measures. (Event Code: 3099)

(3) Not later than 96 months from the effective date of this permit, the permittee shall complete construction of the measure or measures. (Event Code: 4599)

(4) Notify the Northeast District Office within 7 days of completion of this item.

#### 5. Integrated Wet Weather Improvement Plan - Phase 2

The permittee shall develop and submit to Ohio EPA Northeast District Office a final Integrated Wet Weather Improvement Plan not later than 54 months after the effective date of this permit. (Event Code: 91299)

The final Integrated Wet Weather Improvement Plan shall include, but not be limited to, the following:

a) All updates to the characterization modeling that have taken place since the submission of the preliminary Wet Weather Improvement Plan

b) Evaluation of Alternatives

The permittee shall evaluate, in terms of cost and effectiveness, where effectiveness shall be measured by the frequency of discharges, discharge volumes, and discharged pollutant loadings, the alternatives that are listed in items 3(b).

c) A Recommended set of Alternatives and Implementation Schedule for the Recommended Alternatives.

d) An analysis of the impact on user rates and affordability for the Recommended Alternative and Implementation Schedule. This shall include the following:

i. Financial Capability Assessment

ii. Sewer Rate Study

## 6. Municipal Separate Storm Sewer System (MS4) Characterization Study

The permittee shall implement the following dry and wet weather MS4 outfall characterization study:

- a) Not later than 6 months from the effective date of this permit, the permittee shall provide a revised map of all MS4 outfalls reflective of storm outfalls 12" and larger in diameter thus removing yard drains, garage drains, etc. discharge pipes that are not MS4 outfalls. Any outfalls with a pipe diameter less than 12" and where a dry weather discharge is discovered shall be investigated. Such discharges shall be eliminated as soon as feasibly possible if they are discovered to contain sanitary discharge. The identification of these outfalls shall be consistent with the identification system developed as part of the system-wide sewer map required in Item 3(a). (Event Code: 88899)
- b) Not later than 2 months from the effective date of this permit, the permittee shall begin performing dry weather monitoring at each of the identified storm sewer outfalls in Item 6(a) above. Dry weather monitoring shall be conducted at least 72 hours after any precipitation event. (Event Code: 22099)

At a minimum, one visual dry weather inspection per year shall be performed at each identified storm sewer outfall during the 36-month study period, weather permitting. The inspections shall be performed on separate days, on different days of the week, and at different times of the day. Any flow observed during dry weather inspections should be documented and tested for sanitary wastewater indicators including, but not limited to, E. coli and ammonia.

If the dry weather flow is contaminated with sanitary wastewater, the overflow shall be reported as an SSO occurrence under Station 300.

c) If an illicit discharge is discovered, the discharge from the storm sewer outfall shall be reported as an SSO occurrence under Station 300.

d) The permittee shall develop and use a field form to document storm sewer inspections. At a minimum, the form shall include:

- i. Designated storm sewer outfall number and location;
- ii. Date and time of inspection;
- iii. Staff performing inspection;
- iv. Date and precipitation total from the most recent precipitation event;
- v. Pipe flow observed (e.g. none, <1/4 full, <1/2 full etc.);
- vi. Sample collected;
- vii. Comment section (odors, color, turbidity, floatables, etc.).

e) No later than 42 months after the effective date of this permit the permittee shall submit a summary of the data collected from Items a) through d) above in a Storm Sewer Characterization Study Report (Event Code: 21599). The permittee shall provide to the Northeast Ohio District office detailed yearly progress reports during this period. At a minimum the Report shall include the following:

- i. A list of all assigned storm sewer outfall numbers, location descriptions and corresponding map;
- ii A list of inspection dates;
- iii. For dry weather inspections include the reported pipe flow and comments from the inspection form, the results of the sampling conducted, date of most recent precipitation event, cause of any dry weather overflow, and a description of any corrective measures implemented;
- iv. A summary of all MS4 outfalls contaminated with sanitary wastewater.

## 7. Illicit Discharge Detection and Elimination

The permittee shall complete the required actions related to developing, implementing and enforcing a program to detect and eliminate illicit connections in the permittee's Municipal Separate Storm Sewer System (MS4) in accordance with the requirements of the Small MS4 Permit coverage issued to the City of Lakewood under Ohio EPA NPDES facility permit number 3GQ00073.

a) The permittee shall eliminate all newly discovered illicit connections to the MS4 as soon as possible but not later than within 12 months of discovery. Priority for elimination shall be given to illicit connections to the MS4 that result in dry weather discharges contaminated with sanitary wastewater. If the elimination of the discharge cannot be completed within 12 months, the permittee shall notify the OEPA Northeast District of the illicit discharge and the associated problems with eliminating the discharge. With written agreement from the OEPA Northeast District that elimination is not feasible within 12 months, the permittee shall provide semi-annual progress reports to the OEPA Northeast District office until the illicit discharge is eliminated and eliminate the discharge as quickly as feasibly possible. The report shall include specific tasks and estimated timelines to complete the elimination.

b) Upon review of the summary submitted under Item 6(e), OEPA personnel will review the summary that the permittee submitted and review dry weather screening procedures during the next permit renewal.

## 8. Annual Progress Report

Beginning April 1, 2015 and annually thereafter, the permittee shall report progress for activities in the previous calendar year on implementation of Items 3 and 7 above. The annual report shall, at a minimum, summarize results of the MS4 outfall screening, summarize illicit connection(s) identified, detection date of any illicit connection(s), corrective action(s) that have taken place, and elimination date(s). If the illicit connection has not been eliminated, provide a reason and timeline for elimination. Illicit connections resulting in dry weather discharge shall be identified. (Event Code 95999)

**\*\*NOTE:** Parts IV, V and VI of this permit apply to storm water discharges from the Lakewood Wastewater Treatment Plant, 1699 Metropark Drive, Lakewood, Ohio 44107.

NOTE: This NPDES permit, Ohio EPA permit number 3PE00004 expires within five years. This Schedule of Compliance includes items that extend beyond the term of the permit. The requirements of Schedule of Compliance Items 4 - Initial Control Measure, Item (3) including the compliance dates, will be included in permit 3PE00004 when it is renewed.

## Part II, Other Requirements

### A. Operator Certification Requirements

#### 1. Classification

- a. In accordance with Ohio Administrative Code 3745-7-04, the sewage treatment facility at this facility shall be classified as a Class IV facility.
- b. All sewerage (collection) systems that are tributary to this treatment works are Class II sewerage systems in accordance with paragraph (B)(1)(a) of rule 3745-7-04 of the Ohio Administrative Code.

#### 2. Operator of Record

- a. The permittee shall designate one or more operator of record to oversee the technical operation of the treatment works and sewerage (collection) system in accordance with paragraph (A)(2) of rule 3745-7-02 of the Ohio Administrative Code.
- b. Each operator of record shall have a valid certification of a class equal to or greater than the classification of the treatment works as defined in Part II, Item A.1 of this NPDES permit.
- c. Within three days of a change in an operator of record, the permittee shall notify the Director of the Ohio EPA of any such change on a form acceptable to Ohio EPA. The appropriate form can be found at the following website:

[http://www.epa.ohio.gov/portals/28/Documents/opcert/Operator\\_of\\_Record\\_Notification\\_Form.pdf](http://www.epa.ohio.gov/portals/28/Documents/opcert/Operator_of_Record_Notification_Form.pdf)

- d. Within 60 days of the effective date of this permit, the permittee shall notify the Director of Ohio EPA of the operators of record on a form acceptable to Ohio EPA.
- e. The operator of record for a class II, III, or IV treatment works or class II sewerage system may be replaced by a backup operator with a certificate one classification lower than the treatment works or sewerage system for a period of up to thirty consecutive days. The use of this provision does not require notification to the agency.
- f. Upon proper justification, such as military leave or long term illness, the director may authorize the replacement of the operator of record for a class II, III, or IV treatment works or class II sewerage system by a backup operator with a certificate one classification lower than the facility for a period of greater than thirty consecutive days. Such requests shall be made in writing to the appropriate district office.



### 3. Minimum Staffing Requirements

a. The permittee shall ensure that the treatment works operator of record is physically present at the facility in accordance with the minimum staffing requirements per paragraph (C)(1) of rule 3745-7-04 of the Ohio Administrative Code or the requirements from an approved 3745-7-04(C) minimum staffing hour reduction plan.

b. Sewerage (collection) system Operators of Record are not required to meet minimum staffing requirements in paragraph (C)(1) of rule 3745-7-04 of the Ohio Administrative Code.

c. If Ohio EPA approves a reduction in minimum staffing requirements based upon a facility operating plan, any change in the criteria under which the operating plan was approved (such as enforcement status, history of noncompliance, or provisions included in the plan) will require that the treatment works immediately return to the minimum staffing requirements included in paragraph (C)(1) of rule 3745-7-04 of the Ohio Administrative Code

B. The plant must be staffed and operated in accordance with the Ohio EPA approved Operation and Maintenance Manual.

C. Description of the location of the required sampling stations are as follows:

| Sampling Station | Description of Location                                               |
|------------------|-----------------------------------------------------------------------|
| 3PE00004001      | Final effluent                                                        |
| .                | (Lat: 41 N 28' 45"; Long: 81 W 51' 15")                               |
| 3PE00004002      | Combined Sewer Overflow. See Part II, Item F.                         |
| 3PE00004300      | SSO Monitoring                                                        |
| 3PE00004581      | Sludge prior to land application.                                     |
| 3PE00004586      | Sludge removed from the plant for disposal at a solid waste landfill. |
| 3PE00004601      | Plant influent                                                        |
| 3PE00004801      | Upstream Sampling (Location guidance can be found in                  |
| .                | "Reporting and Testing Guidance for Biomonitoring Required by         |
| .                | the Ohio Environmental Protection Agency" or contact Northeast        |
| .                | District Office for location recommendation)                          |

D. All parameters, except flow, need not be monitored on days when the plant is not normally staffed (Saturdays, Sundays, and Holidays). On those days, report "AN" on the monthly report form.

E. Effluent disinfection is not directly required, however, the entity is required to meet all applicable discharge permit limits. If disinfection facilities exist, they shall be maintained in an operable condition. Any design of wastewater treatment facilities should provide for the capability to install disinfection if required at a future time. Disinfection may be required if future bacteriological studies or emergency conditions indicate the need.

F. Subject to the terms and conditions of this permit, including the General Effluent Limitations in Part III, Item 2, the permittee is authorized to discharge from the following overflows only during wet weather periods when the flow in the sewer system exceeds the capacity of the sewer system. See Part I. B for monitoring and reporting requirements. Also see Part III, Item 11.

| Station Number | Description                                               | Receiving Stream |
|----------------|-----------------------------------------------------------|------------------|
| 3PE00004052    | Riverside at Madison                                      | Rocky River      |
| 3PE00004053    | WWTP West Drive entrance                                  | Rocky River      |
| 3PE00004054    | Scenic Drive - South end                                  | Rocky River      |
| 3PE00004055    | 16504 Edgewater                                           | Lake Erie        |
| 3PE00004056    | 15500 Edgewater                                           | Lake Erie        |
| 3PE00004057    | Lake Ave. at Lakewood Park                                | Lake Erie        |
| 3PE00004058    | 13919 Edgewater                                           | Lake Erie        |
| 3PE00004059    | 12900 Lake Ave.                                           | Lake Erie        |
| 3PE00004002    | Overflow chamber prior to the<br>Rocky River aerial sewer | Lake Erie        |
| .              |                                                           |                  |

#### G. Nine Minimum Controls

The entire wastewater treatment system shall be operated and maintained so that the total loading of pollutants discharged during wet weather is minimized. To accomplish this, the permittee shall utilize the following technologies:

- 1) provide proper operation and maintenance for the collection system and the combined sewer overflow points;
- 2) provide the maximum use of the collection system for storage of wet weather flow prior to allowing overflows;
- 3) review and modify the pretreatment program to minimize the impact of non-domestic discharges from combined sewer overflows; or if there is no pretreatment program review and modify local programs to minimize the impact of non-domestic discharges from combined sewer overflows;
- 4) maximize the capabilities of the POTW to treat wet weather flows, and maximize the wet weather flow to the wastewater treatment plant within the limits of the plant's capabilities;
- 5) prohibit dry weather overflows;
- 6) control solid and floatable materials in the combined sewer overflow discharge;

- 7) conduct required inspection, monitoring and reporting of CSOs;
- 8) implement pollution prevention programs that focus on reducing the level of contaminants in CSOs; and
- 9) implement a public notification program for areas affected by CSOs, especially beaches and recreation areas

#### H. Outfall Signage

The permittee shall maintain a permanent marker on the stream bank or shoreline at each outfall that is regulated under this NPDES permit. If a marker does not currently exist, the permittee shall install one within 4 months of the effective date of this permit. This includes final outfalls, bypasses, and combined sewer overflows. The marker shall consist at a minimum of the name of the establishment to which the permit was issued, the Ohio EPA permit number, and the outfall number and a contact telephone number. The information shall be printed in letters not less than two inches in height. The marker shall be a minimum of 2 feet by 2 feet and shall be a minimum of 3 feet above ground level. The sign shall not be obstructed such that persons in boats or persons swimming on the river or someone fishing or walking along the shore cannot read the sign. Vegetation shall be periodically removed to keep the sign visible. If the outfall is normally submerged the sign shall indicate that. If the outfall is a combined sewer outfall, the sign shall indicate that untreated human sewage may be discharged from the outfall during wet weather and that harmful bacteria may be present in the water. When an existing marker is replaced or reset, the new marker shall comply with the requirements of this section.

#### I. Sanitary Sewer Overflow Reporting

A sanitary sewer overflow is an overflow, spill, release, or diversion of wastewater from a sanitary sewer system. SSOs do not include wet weather discharges from combined sewer overflows specifically listed in Part II of this NPDES permit (if any). All SSOs are prohibited.

##### 1. Reporting for SSOs That Imminently and Substantially Endanger Human Health

###### a) Immediate Notification

You must notify Ohio EPA (1-800-282-9378) and the appropriate Board of Health (i.e., city or county) within 24 hours of learning of any SSO from your sewers or from your maintenance contract areas that may imminently and substantially endanger human health. The telephone report must identify the location, estimated volume and receiving water, if any, of the overflow. An SSO that may imminently and substantially endanger human health includes dry weather overflows, major line breaks, overflow events that result in fish kills or other significant harm, overflows that expose the general public to contact with raw sewage, and overflow events that occur in sensitive waters and high exposure areas such as protection areas for public drinking water intakes and waters where primary contact recreation occurs.

## b) Follow-Up Written Report

Within 5 days of the time you become aware of any SSO that may imminently and substantially endanger human health, you must provide the appropriate Ohio EPA district office a written report that includes:

- (i) the estimated date and time when the overflow began and stopped or will be stopped (if known);
- (ii) the location of the SSO including an identification number or designation if one exists
- (iii) the receiving water (if there is one);
- (iv) an estimate of the volume of the SSO (if known);
- (v) a description of the sewer system component from which the release occurred (e.g., manhole, constructed overflow pipe, crack in pipe);
- (vi) the cause or suspected cause of the overflow;
- (vii) steps taken or planned to reduce, eliminate, and prevent reoccurrence of the overflow and a schedule of major milestones for those steps; and
- (viii) steps taken or planned to mitigate the impact(s) of the overflow and a schedule of major milestones for those steps.

An acceptable 5-day follow-up written report can be filled-in or downloaded from the Ohio EPA Division of Surface Water Permits Program Technical Assistance Web page at [http://www.epa.ohio.gov/dsw/permits/technical\\_assistance.aspx](http://www.epa.ohio.gov/dsw/permits/technical_assistance.aspx).

## 2. Reporting for All SSOs, Including Those That Imminently and Substantially Endanger Human Health

### a) Discharge Monitoring Reports (DMR)

Sanitary sewer overflows that enter waters of the state, either directly or through a storm sewer or other conveyance, shall be reported on your Discharge Monitoring Reports (DMR). You must report the system-wide number of occurrences for SSOs that enter waters of the state in accordance with the requirements for station number 300. A monitoring table for this station is included in Part I, B of this NPDES permit. For the purpose of counting occurrences, each location on the sanitary sewer system where there is an overflow, spill, release, or diversion of wastewater on a given day is counted as one occurrence. For example, if on a given day overflows occur from a manhole at one location and from a damaged pipe at another location and they both enter waters of the state, you should record two occurrences for that day. If overflows from both locations continue on the following day, you should record two occurrences for the following day. At the end of the month, total the daily occurrences from all locations on your system and report this number using reporting code 74062 (Overflow Occurrence, No./Month) on the 4500 form for station number 300.

## b) Annual Report

You must prepare an annual report of all SSOs in your collection system, including those that do not enter waters of the state. The annual report must be in an acceptable format (see below) and must include:

- (i) A table that lists an identification number, a location description, and the receiving water (if any) for each existing SSO. If an SSO previously included in the list has been eliminated, this shall be noted. Assign each SSO location a unique identification by numbering them consecutively, beginning with 301.
- (ii) A table that lists the date that an overflow occurred, the unique ID of the overflow, the name of affected receiving waters (if any), and the estimated volume of the overflow (in millions of gallons). The annual report may summarize information regarding overflows of less than approximately 1,000 gallons.
- (iii) A table that summarizes the occurrence of water in basements (WIBs) by total number and by sewershed. The report shall include a narrative analysis of WIB patterns by location, frequency and cause. Only WIBs caused by a problem in the publicly-owned collection system must be included.

Not later than March 31 of each year, you must submit one copy of the annual report for the previous calendar year to the appropriate Ohio EPA district office and one copy to: Ohio EPA; Division of Surface Water; NPDES Permit Unit; P.O. Box 1049; Columbus, OH, 43216-1049. You also must provide adequate notice to the public of the availability of the report. Adequate public notice would include: notices posted at the community administration building, the public library and the post office; a public notice in the newspaper; or a notice sent out with all sewer bills.

An acceptable annual SSO report can be filled-in or downloaded from the Ohio EPA Division of Surface Water Permits Program Technical Assistance Web page at [http://www.epa.ohio.gov/dsw/permits/technical\\_assistance.aspx](http://www.epa.ohio.gov/dsw/permits/technical_assistance.aspx).

J. The permittee shall maintain in good working order and operate as efficiently as possible the "treatment works" and "sewerage system" as defined in ORC 6111.01 to achieve compliance with the terms and conditions of this permit and to prevent discharges to the waters of the state, surface of the ground, basements, homes, buildings, etc.

K. Composite samples shall be comprised of a series of grab samples collected over a 24-hour period and proportionate in volume to the sewage flow rate at the time of sampling. Such samples shall be collected at such times and locations, and in such a fashion, as to be representative of the facility's overall performance.

L. Grab samples shall be collected at such times and locations, and in such fashion, as to be representative of the facility's performance.

M. The treatment works must obtain at least 85 percent removal of carbonaceous biochemical oxygen demand (five-day) and suspended solids (see Part III, Item 1).

.

N. POTWs that accept hazardous wastes by truck, rail, or dedicated pipeline are considered to be hazardous waste treatment, storage, and disposal facilities (TSDFs) and are subject to regulation under the Resource Conservation and Recovery Act (RCRA). Under the "permit-by-rule" regulation found at 40 CFR 270.60(c), a POTW must:

- 1) comply with all conditions of its NPDES permit,
- 2) obtain a RCRA ID number and comply with certain manifest and reporting requirements under RCRA,
- 3) satisfy corrective action requirements, and
- 4) meet all federal, state, and local pretreatment requirements.

O. Final permit limitations based on preliminary or approved waste load allocations are subject to change based on modifications to or finalization of the allocation or report or changes to Water Quality Standards. Monitoring requirements and/or special conditions of this permit are subject to change based on regulatory or policy changes.

P. Sampling for these parameters at station 3PE00004001 and 3PE00004601 shall occur the same day.

Q. Sampling at station 3PE00004001 for these parameters shall occur one detention time (the time it takes for a volume of water to travel through the treatment plant) after sampling at station 3PE00004601 for the same parameters on the same day.

R. Sampling at station 3PE00004601 for these parameters shall occur one detention time (the time it takes for a volume of water to travel through the treatment plant) prior to sampling at station 3PE00004001 for the same parameters on the same day.

S. All disposal, use, storage, or treatment of sewage sludge by the the permittee shall comply with Chapter 6111. of the Ohio Revised Code, Chapter 3745-40 of the Ohio Administrative Code and any further requirements specified in this NPDES permit, and any other actions of the Director that pertain to the disposal, use, storage, or treatment of sewage sludge by the permittee.

T. Sewage sludge composite samples shall consist of a minimum of six grab samples collected at such times and locations, and in such fashion, as to be representative of the facility's sewage sludge.

U. No later than January 31 of each calendar year, the Permittee shall submit two (2) copies of a report summarizing the sewage sludge disposal, use, storage, or treatment activities of the Permittee during the previous calendar year. One copy of the report shall be sent to the Ohio EPA, Division of Surface Water, P.O. Box 1049, Columbus, Ohio 43216-1049, and one copy of the report shall be sent to the Northeast Ohio EPA District Office. The report shall be submitted on Ohio EPA Form 4229.

V. Each day when sewage sludge is removed from the wastewater treatment plant for use or disposal, a representative sample of sewage sludge shall be collected and analyzed for percent total solids. This value of percent total solids shall be used to calculate the total Sewage Sludge Weight (Discharge Monitoring Report code 70316) and/or total Sewage Sludge Fee Weight (Discharge Monitoring Report code 51129) removed from the treatment plant on that day. The results of the daily monitoring, and the weight calculations, shall be maintained on site for a minimum of five years. The test methodology used shall be from Part 2540 G of Standard Methods for the Examination of Water and Wastewater American Public Health Association, American Water Works Association, and Water Environment Federation, using the edition which is current on the issuance date of the permit. To convert from gallons of liquid sewage sludge to dry tons of sewage sludge:  $\text{dry tons} = \text{gallons} \times 8.34 \text{ (lbs/gallon)} \times 0.0005 \text{ (tons/lb)} \times \text{decimal fraction total solids}$ .

W. The Permittee may request authorization of land application sites in the following Ohio counties: Huron County, Lorain County, and Medina County.

X. Reserved

Y. The permittee shall use analytical procedures approved under 40 CFR 136 with MDLs (method detection limits) less than or equal to those listed below to comply with the monitoring requirements for the following parameters at stations 3PE00004001 and 3PE00004601 :

| Parameter | MDL (ug/L) |
|-----------|------------|
| Silver    | 0.5        |

Z. The permittee shall use EPA Method 1631 promulgated under 40 CFR 136 to comply with the influent and effluent mercury monitoring requirements of this permit. The method detection level for Method 1631 is 0.2 ng/L. The quantification level is 0.5 ng/l.

AA. General Mercury Variance

The permittee is granted a general mercury variance under the provisions of Rule 3745-33-07(D)(10) of the Ohio Administrative Code. The City of Lakewood has demonstrated that the facility is currently unable to comply with the monthly average water quality based effluent limit of 1.3 ng/l without construction of expensive end-of-pipe controls more stringent than those required by sections 301(b) and 306 of the Clean Water Act. The City of Lakewood is currently able to achieve an annual average mercury concentration of 12 ng/l. For general mercury variance purposes, the annual average mercury effluent concentration is defined as the average of the most recent 12 months of effluent data.

One of the conditions of the general mercury variance is that the permittee make reasonable progress towards attaining the water quality based effluent limits for mercury (1.b, below). To accomplish this, the permittee is required to continue implementing a pollutant minimization program (PMP) for mercury. The elements of a PMP include: a control strategy to locate, identify and, where cost-effective, reduce levels of mercury that contribute to discharge levels; periodic monitoring of sources and the treatment system; and annual reporting of results.

The plan of study that was part of the permittee's 2012 application for coverage under the general mercury variance included items associated with developing a control strategy and initial implementation of a PMP. By implementing the plan of study and meeting other conditions of its NPDES permit, the permittee has been taking actions consistent with a PMP for mercury. Condition 1.d below, requires the permittee to continue implementing a PMP for mercury.

1. As conditions of this variance, the permittee shall meet the following requirements:

- a. The permittee shall comply with the effluent limitations for mercury at outfall 3PE00004001 given in Part I, A. of this permit.
- b. The permittee shall make reasonable progress towards attaining the monthly average water quality-based effluent limit for mercury by complying with the general mercury variance conditions included in this NPDES permit.
- c. The permittee shall use EPA Method 1631 to comply with the influent and effluent mercury monitoring requirements of this permit.



d. The permittee shall continue implementing a PMP for mercury consistent with the plan of study included in the permittee's updated mercury variance application submitted on December 17, 2012 (original variance submitted on May 11, 2009) and any other relevant information submitted by the permittee, including the following activities:

- i. Identifying mercury sources
- ii. Reducing or eliminating known mercury sources
- iii. Conducting mercury sampling in the collection system
- iv. Distributing educational mercury related information to the public
- v. Visiting industrial, medical and dental offices to distribute questionnaires and reinforce implementing mercury reduction strategies

e. The permittee shall assess the impact of the mercury variance on public health, safety, and welfare by, as a minimum, monitoring for mercury in the facility's influent and effluent as required by this NPDES permit.

f. The permittee shall maintain an annual average mercury effluent concentration equal to or less than 12 ng/l.

g. On or prior to May 15th of each year, the permittee shall submit two copies of an annual PMP report to Ohio EPA, Division of Surface Water, P.O. Box 1049, Columbus, OH, 43216-1049. The annual PMP report shall include:

- i. All minimization program monitoring results for the year;
- ii. A list of potential sources of mercury;
- iii. A summary of all actions taken to meet the effluent limits for mercury; and
- iv. Any updates of the control strategy, including actions planned to reduce the levels of mercury in the treatment plant's final effluent.

The Ohio EPA Annual Mercury PMP Report and Appendices are available on the Division of Surface Water Permits Program Technical Assistance web page at [http://www.epa.ohio.gov/dsw/permits/technical\\_assistance.aspx](http://www.epa.ohio.gov/dsw/permits/technical_assistance.aspx) . Open the Mercury list.

h. Upon completion of the actions identified in the plan of study as required in Part II, Item AA.1.d. of this permit or upon submittal of the permittee's NPDES permit renewal application, whichever comes first, the permittee shall submit to Ohio EPA's Northeast District Office a certification stating that all permit conditions imposed to implement the plan of study and the PMP have been satisfied and whether compliance with the monthly average water quality based effluent limit for mercury has been achieved and can be maintained. This certification shall be accompanied by the following:

i. All available mercury influent and effluent data for the most recent 12 month period.

ii. Data documenting all known significant sources of mercury and the steps that have been taken to reduce or eliminate those sources; and

iii. A determination of the lowest mercury concentration that currently available data indicate can be reliably achieved through implementation of the PMP.

2. Exceedance of the annual average limit of 12 ng/l.

a. If at any time after the effective date of this permit, the permittee's annual average mercury effluent concentration exceeds 12 ng/l, the permittee shall:

i. Notify Ohio EPA's Northeast District Office not later than 30 days from the date of the exceedance.

ii. Submit an individual variance application, if a variance is desired, not later than 6 months from the date of the exceedance; or

iii. Request a permit modification not later than 6 months from the date of the exceedance for a compliance schedule to attain compliance with the water quality-based effluent limits for mercury.

b. If the permittee complies with either 2.a.ii or 2.a.iii, above, the general mercury variance conditions included in this NPDES permit will remain in effect until the date that the Director acts on the individual variance application or the date that the permit modification becomes effective.

c. If the permittee does not comply with either 2.a.ii or 2.a.iii, above, a monthly water-quality based effluent limit for mercury of 1.3 ng/l shall apply at outfall 3PE00004001 beginning 6 months from the date of the exceedance.

3. The requirements of Part II, Item AA.2 shall not apply if the permittee demonstrates to the satisfaction of the Director that the mercury concentration in the permittee's effluent exceeds 12 ng/l due primarily to the presence of mercury in the permittee's intake water.

#### AB. Permit Reopener for Mercury Variance Revisions

Ohio EPA may reopen and modify this permit at any time based upon Ohio EPA water quality standard revisions to the mercury variance granted in Part II, Item AA of this permit.

#### AC. Renewal of Mercury Variance

For renewal of the mercury variance authorized in this permit, the permittee shall include the following information with the submittal of the subsequent NPDES permit renewal application:

1. the certification described under Part II, Item AA.1.h., and all information required under Part II, Item AA.1.h.i. through Part II, Item AA.1.h.iii;
2. a status report on the progress being made implementing the pollutant minimization program (PMP). This information may be included in the annual PMP report required under Part II, Item AA.1.g;
3. a listing of the strategies and/or programs in the PMP which will be continued under the next renewal of this permit; and
4. a statement requesting the renewal of the mercury variance.

#### AD. Biomonitoring Program Requirements

As soon as possible but not later than three months after the effective date of this permit, the entity shall initiate an effluent biomonitoring program to determine the toxicity of the effluent from outfall 3PE00004001.

#### General Requirements

All toxicity testing conducted as required by this permit shall be done in accordance with "Reporting and Testing Guidance for Biomonitoring Required by the Ohio Environmental Protection Agency" (hereinafter, the "biomonitoring guidance"), Ohio EPA, July 1998 (or current revision). The Standard Operating Procedures (SOP) or verification of SOP submittal, as described in Section 1.B. of the biomonitoring guidance shall be submitted no later than three months after the effective date of this permit. If the laboratory performing the testing has modified its protocols, a new SOP is required.

## Testing Requirements

### 1. Chronic Bioassays

For the duration of this permit, the permittee shall conduct annual chronic toxicity tests using water fleas (*Ceriodaphnia dubia*) and fathead minnows (*Pimephales promelas*) on effluent samples from outfall 3PE00004001. These tests shall be conducted as specified in Section 3 of the biomonitoring guidance.

### 2. Acute Bioassays

Acute toxicity tests need not be performed for months in which chronic toxicity tests are conducted. Acute endpoints, as described in Section 2.H. of the biomonitoring guidance, shall be derived from the chronic test.

### 3. Testing of Ambient Water

In conjunction with the acute and chronic toxicity tests, upstream control water shall be collected at a point outside the zone of effluent and receiving water interaction at station 3PE00004801. Testing of ambient waters shall be done in accordance with Sections 2 and 3 of the biomonitoring guidance.

### 4. Data Review

#### a. Reporting

Following completion of each annual bioassay requirement, the permittee shall report results of the tests in accordance with Sections 2.H.1., 2.H.2.a., 3.H.1., and 3.H.2.a. of the biomonitoring guidance, including reporting the results on the monthly DMR and submitting a copy of the complete test report to Ohio EPA, Division of Surface Water, NPDES Permit Unit, P.O. Box 1049, Columbus, OH, 43216-1049.

Based on Ohio EPA's evaluation of the results, this permit may be modified to require additional biomonitoring, require a toxicity reduction evaluation, and/or contain whole effluent toxicity limits.

#### b. Definitions

$TU_a = \text{Acute Toxicity Units} = 100/LC_{50}$

$TU_c = \text{Chronic Toxicity Units} = 100/IC_{25}$

This equation for chronic toxicity units applies outside the mixing zone for warmwater, modified warmwater, exceptional warmwater, coldwater, and seasonal salmonid use designations except when the following equation is more restrictive (*Ceriodaphnia dubia* only):

$TU_c = \text{Chronic Toxic Units} = 100/\text{square root of } (NOEC \times LOEC)$

#### AE. Permit Reopener

Water quality based permit limitations in this permit may be revised based on updated wasteload allocations or use designation rules. This permit may be modified, or revoked and reissued, to include new water quality based effluent limits or other conditions that are necessary to comply with a revised wasteload allocation, or an approved total maximum daily loads (TMDL) report as required under Section 303 (d) of the Clean Water Act.

#### AF. Phosphorus Seasonal Average

The permittee shall comply with a seasonal average concentration of 0.7 mg/L total phosphorus for the period April 1 through September 30 beginning 27 months after the effective date of this permit and annually thereafter. The seasonal average shall be calculated as the arithmetic mean of the daily concentrations of total phosphorus for the entire season. The calculated seasonal average shall be reported on the DMR as a single value in the month of October. During all months, the permittee must also comply with the permitted daily and monthly and weekly concentration and loading limits specified in Part 1.A.

#### AG. Phosphorus Discharge Optimization

The permittee shall prepare and submit to the Department for approval a Phosphorus Discharge Optimization Evaluation plan. The plan shall include an evaluation of collected effluent data, possible source reduction measures, operational improvements, and minor facility modifications that will optimize reductions in phosphorus discharges from the WWTP. The plan shall include a proposed schedule for implementing discharge optimization measures identified through the evaluation process. The plan shall be completed and submitted to Ohio EPA by July 1, 2016. Upon approval of the plan by Ohio EPA, the permittee shall implement the measures, improvements, and modifications in accordance with the plan and schedule specified in the plan.

## PART III - GENERAL CONDITIONS

### 1. DEFINITIONS

"Daily discharge" means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

"Average weekly" discharge limitation means the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week. Each of the following 7-day periods is defined as a calendar week: Week 1 is Days 1 - 7 of the month; Week 2 is Days 8 - 14; Week 3 is Days 15 - 21; and Week 4 is Days 22 - 28. If the "daily discharge" on days 29, 30 or 31 exceeds the "average weekly" discharge limitation, Ohio EPA may elect to evaluate the last 7 days of the month as Week 4 instead of Days 22 - 28. Compliance with fecal coliform bacteria or E coli bacteria limitations shall be determined using the geometric mean.

"Average monthly" discharge limitation means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month. Compliance with fecal coliform bacteria or E coli bacteria limitations shall be determined using the geometric mean.

"85 percent removal" means the arithmetic mean of the values for effluent samples collected in a period of 30 consecutive days shall not exceed 15 percent of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period.

"Absolute Limitations" Compliance with limitations having descriptions of "shall not be less than," "nor greater than," "shall not exceed," "minimum," or "maximum" shall be determined from any single value for effluent samples and/or measurements collected.

"Net concentration" shall mean the difference between the concentration of a given substance in a sample taken of the discharge and the concentration of the same substances in a sample taken at the intake which supplies water to the given process. For the purpose of this definition, samples that are taken to determine the net concentration shall always be 24-hour composite samples made up of at least six increments taken at regular intervals throughout the plant day.

"Net Load" shall mean the difference between the load of a given substance as calculated from a sample taken of the discharge and the load of the same substance in a sample taken at the intake which supplies water to given process. For purposes of this definition, samples that are taken to determine the net loading shall always be 24-hour composite samples made up of at least six increments taken at regular intervals throughout the plant day.

"MGD" means million gallons per day.

"mg/l" means milligrams per liter.

"ug/l" means micrograms per liter.

"ng/l" means nanograms per liter.

"S.U." means standard pH unit.

"kg/day" means kilograms per day.

"Reporting Code" is a five digit number used by the Ohio EPA in processing reported data. The reporting code does not imply the type of analysis used nor the sampling techniques employed.

"Quarterly (1/Quarter) sampling frequency" means the sampling shall be done in the months of March, June, August, and December, unless specifically identified otherwise in the Effluent Limitations and Monitoring Requirements table.

"Yearly (1/Year) sampling frequency" means the sampling shall be done in the month of September, unless specifically identified otherwise in the effluent limitations and monitoring requirements table.

"Semi-annual (2/Year) sampling frequency" means the sampling shall be done during the months of June and December, unless specifically identified otherwise.

"Winter" shall be considered to be the period from November 1 through April 30.

"Bypass" means the intentional diversion of waste streams from any portion of the treatment facility.

"Summer" shall be considered to be the period from May 1 through October 31.

"Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

"Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

"Sewage sludge" means a solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works as defined in section 6111.01 of the Revised Code. "Sewage sludge" includes, but is not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment processes. "Sewage sludge" does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator, grit and screenings generated during preliminary treatment of domestic sewage in a treatment works, animal manure, residue generated during treatment of animal manure, or domestic septage.

"Sewage sludge weight" means the weight of sewage sludge, in dry U.S. tons, including admixtures such as liming materials or bulking agents. Monitoring frequencies for sewage sludge parameters are based on the reported sludge weight generated in a calendar year (use the most recent calendar year data when the NPDES permit is up for renewal).

"Sewage sludge fee weight" means the weight of sewage sludge, in dry U.S. tons, excluding admixtures such as liming materials or bulking agents. Annual sewage sludge fees, as per section 3745.11(Y) of the Ohio Revised Code, are based on the reported sludge fee weight for the most recent calendar year.

## 2. GENERAL EFFLUENT LIMITATIONS

The effluent shall, at all times, be free of substances:

- A. In amounts that will settle to form putrescent, or otherwise objectionable, sludge deposits; or that will adversely affect aquatic life or water fowl;
- B. Of an oily, greasy, or surface-active nature, and of other floating debris, in amounts that will form noticeable accumulations of scum, foam or sheen;
- C. In amounts that will alter the natural color or odor of the receiving water to such degree as to create a nuisance;
- D. In amounts that either singly or in combination with other substances are toxic to human, animal, or aquatic life;
- E. In amounts that are conducive to the growth of aquatic weeds or algae to the extent that such growths become inimical to more desirable forms of aquatic life, or create conditions that are unsightly, or constitute a nuisance in any other fashion;
- F. In amounts that will impair designated instream or downstream water uses.

## 3. FACILITY OPERATION AND QUALITY CONTROL

All wastewater treatment works shall be operated in a manner consistent with the following:

- A. At all times, the permittee shall maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee necessary to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with conditions of the permit.
- B. The permittee shall effectively monitor the operation and efficiency of treatment and control facilities and the quantity and quality of the treated discharge.
- C. Maintenance of wastewater treatment works that results in degradation of effluent quality shall be scheduled during non-critical water quality periods and shall be carried out in a manner approved by Ohio EPA as specified in the Paragraph in the PART III entitled, "UNAUTHORIZED DISCHARGES".



#### 4. REPORTING

A. Monitoring data required by this permit shall be submitted monthly on Ohio EPA 4500 Discharge Monitoring Report (DMR) forms using the electronic DMR (e-DMR) internet application. e-DMR allows permitted facilities to enter, sign, and submit DMRs on the internet. e-DMR information is found on the following web page:

<http://www.epa.ohio.gov/dsw/edmr/eDMR.aspx>

Alternatively, if you are unable to use e-DMR due to a demonstrated hardship, monitoring data may be submitted on paper DMR forms provided by Ohio EPA. Monitoring data shall be typed on the forms. Please contact Ohio EPA, Division of Surface Water at (614) 644-2050 if you wish to receive paper DMR forms.

B. DMRs shall be signed by a facility's Responsible Official or a Delegated Responsible Official (i.e. a person delegated by the Responsible Official). The Responsible Official of a facility is defined as:

1. For corporations - a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation; or the manager of one or more manufacturing, production or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;
2. For partnerships - a general partner;
3. For a sole proprietorship - the proprietor; or,
4. For a municipality, state or other public facility - a principal executive officer, a ranking elected official or other duly authorized employee.

For e-DMR, the person signing and submitting the DMR will need to obtain an eBusiness Center account and Personal Identification Number (PIN). Additionally, Delegated Responsible Officials must be delegated by the Responsible Official, either on-line using the eBusiness Center's delegation function, or on a paper delegation form provided by Ohio EPA. For more information on the PIN and delegation processes, please view the following web page:

<http://epa.ohio.gov/dsw/edmr/eDMR.aspx>

C. DMRs submitted using e-DMR shall be submitted to Ohio EPA by the 20th day of the month following the month-of-interest. DMRs submitted on paper must include the original signed DMR form and shall be mailed to Ohio EPA at the following address so that they are received no later than the 15th day of the month following the month-of-interest:

Ohio Environmental Protection Agency  
Lazarus Government Center  
Division of Surface Water - PCU  
P.O. Box 1049  
Columbus, Ohio 43216-1049

D. Regardless of the submission method, a paper copy of the submitted Ohio EPA 4500 DMR shall be maintained onsite for records retention purposes (see Section 7. RECORDS RETENTION). For e-DMR users, view and print the DMR from the Submission Report Information page after each original or revised DMR is submitted. For submittals on paper, make a copy of the completed paper form after it is signed by a Responsible Official or a Delegated Responsible Official.

E. If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified in Section 5. SAMPLING AND ANALYTICAL METHODS, the results of such monitoring shall be included in the calculation and reporting of the values required in the reports specified above.

F. Analyses of pollutants not required by this permit, except as noted in the preceding paragraph, shall not be reported to the Ohio EPA, but records shall be retained as specified in Section 7. RECORDS RETENTION.

#### 5. SAMPLING AND ANALYTICAL METHOD

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored flow. Test procedures for the analysis of pollutants shall conform to regulation 40 CFR 136, "Test Procedures For The Analysis of Pollutants" unless other test procedures have been specified in this permit. The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to insure accuracy of measurements.

#### 6. RECORDING OF RESULTS

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

- A. The exact place and date of sampling; (time of sampling not required on EPA 4500)
- B. The person(s) who performed the sampling or measurements;
- C. The date the analyses were performed on those samples;
- D. The person(s) who performed the analyses;
- E. The analytical techniques or methods used; and
- F. The results of all analyses and measurements.

## 7. RECORDS RETENTION

The permittee shall retain all of the following records for the wastewater treatment works for a minimum of three years except those records that pertain to sewage sludge disposal, use, storage, or treatment, which shall be kept for a minimum of five years, including:

- A. All sampling and analytical records (including internal sampling data not reported);
- B. All original recordings for any continuous monitoring instrumentation;
- C. All instrumentation, calibration and maintenance records;
- D. All plant operation and maintenance records;
- E. All reports required by this permit; and
- F. Records of all data used to complete the application for this permit for a period of at least three years, or five years for sewage sludge, from the date of the sample, measurement, report, or application.

These periods will be extended during the course of any unresolved litigation, or when requested by the Regional Administrator or the Ohio EPA. The three year period, or five year period for sewage sludge, for retention of records shall start from the date of sample, measurement, report, or application.

## 8. AVAILABILITY OF REPORTS

Except for data determined by the Ohio EPA to be entitled to confidential status, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the appropriate district offices of the Ohio EPA. Both the Clean Water Act and Section 6111.05 Ohio Revised Code state that effluent data and receiving water quality data shall not be considered confidential.

## 9. DUTY TO PROVIDE INFORMATION

The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking, and reissuing, or terminating the permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

## 10. RIGHT OF ENTRY

The permittee shall allow the Director or an authorized representative upon presentation of credentials and other documents as may be required by law to:

- A. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit.
- B. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit.
- C. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit.
- D. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

## 11. UNAUTHORIZED DISCHARGES

A. Bypass Not Exceeding Limitations - The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 11.B and 11.C.

### B. Notice

1. Anticipated Bypass - If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.

2. Unanticipated Bypass - The permittee shall submit notice of an unanticipated bypass as required in paragraph 12.B (24 hour notice).

### C. Prohibition of Bypass

1. Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:

a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

c. The permittee submitted notices as required under paragraph 11.B.

2. The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph 11.C.1.

## 12. NONCOMPLIANCE NOTIFICATION

### A. Exceedance of a Daily Maximum Discharge Limit

1. The permittee shall report noncompliance that is the result of any violation of a daily maximum discharge limit for any of the pollutants listed by the Director in the permit by e-mail or telephone within twenty-four (24) hours of discovery.

The permittee may report to the appropriate Ohio EPA district office e-mail account as follows (this method is preferred):

Southeast District Office: sedo24hournpdes@epa.state.oh.us  
Southwest District Office: swdo24hournpdes@epa.state.oh.us  
Northwest District Office: nwdo24hournpdes@epa.state.oh.us  
Northeast District Office: nedo24hournpdes@epa.state.oh.us  
Central District Office: cdo24hournpdes@epa.state.oh.us  
Central Office: co24hournpdes@epa.state.oh.us

The permittee shall attach a noncompliance report to the e-mail. A noncompliance report form is available on the following web site under the Monitoring and Reporting - Non-Compliance Notification section:

<http://epa.ohio.gov/dsw/permits/individuals.aspx>

Or, the permittee may report to the appropriate Ohio EPA district office by telephone toll-free between 8:00 AM and 5:00 PM as follows:

Southeast District Office: (800) 686-7330  
Southwest District Office: (800) 686-8930  
Northwest District Office: (800) 686-6930  
Northeast District Office: (800) 686-6330  
Central District Office: (800) 686-2330  
Central Office: (614) 644-2001

The permittee shall include the following information in the telephone noncompliance report:

- a. The name of the permittee, and a contact name and telephone number;
- b. The limit(s) that has been exceeded;
- c. The extent of the exceedance(s);
- d. The cause of the exceedance(s);
- e. The period of the exceedance(s) including exact dates and times;
- f. If uncorrected, the anticipated time the exceedance(s) is expected to continue; and,
- g. Steps taken to reduce, eliminate or prevent occurrence of the exceedance(s).

#### B. Other Permit Violations

1. The permittee shall report noncompliance that is the result of any unanticipated bypass resulting in an exceedance of any effluent limit in the permit or any upset resulting in an exceedance of any effluent limit in the permit by e-mail or telephone within twenty-four (24) hours of discovery.

The permittee may report to the appropriate Ohio EPA district office e-mail account as follows (this method is preferred):

Southeast District Office: sedo24hournpdes@epa.state.oh.us  
Southwest District Office: swdo24hournpdes@epa.state.oh.us  
Northwest District Office: nwdo24hournpdes@epa.state.oh.us  
Northeast District Office: nedo24hournpdes@epa.state.oh.us  
Central District Office: cdo24hournpdes@epa.state.oh.us  
Central Office: co24hournpdes@epa.state.oh.us

The permittee shall attach a noncompliance report to the e-mail. A noncompliance report form is available on the following web site:

<http://www.epa.ohio.gov/dsw/permits/permits.aspx>

Or, the permittee may report to the appropriate Ohio EPA district office by telephone toll-free between 8:00 AM and 5:00 PM as follows:

Southeast District Office: (800) 686-7330  
Southwest District Office: (800) 686-8930  
Northwest District Office: (800) 686-6930  
Northeast District Office: (800) 686-6330  
Central District Office: (800) 686-2330  
Central Office: (614) 644-2001

The permittee shall include the following information in the telephone noncompliance report:

- a. The name of the permittee, and a contact name and telephone number;
- b. The time(s) at which the discharge occurred, and was discovered;
- c. The approximate amount and the characteristics of the discharge;
- d. The stream(s) affected by the discharge;
- e. The circumstances which created the discharge;
- f. The name and telephone number of the person(s) who have knowledge of these circumstances;
- g. What remedial steps are being taken; and,
- h. The name and telephone number of the person(s) responsible for such remedial steps.

2. The permittee shall report noncompliance that is the result of any spill or discharge which may endanger human health or the environment within thirty (30) minutes of discovery by calling the 24-Hour Emergency Hotline toll-free at (800) 282-9378. The permittee shall also report the spill or discharge by e-mail or telephone within twenty-four (24) hours of discovery in accordance with B.1 above.

C. When the telephone option is used for the noncompliance reports required by A and B, the permittee shall submit to the appropriate Ohio EPA district office a confirmation letter and a completed noncompliance report within five (5) days of the discovery of the noncompliance. This follow up report is not necessary for the e-mail option which already includes a completed noncompliance report.

D. If the permittee is unable to meet any date for achieving an event, as specified in a schedule of compliance in their permit, the permittee shall submit a written report to the appropriate Ohio EPA district office within fourteen (14) days of becoming aware of such a situation. The report shall include the following:

1. The compliance event which has been or will be violated;
2. The cause of the violation;
3. The remedial action being taken;
4. The probable date by which compliance will occur; and,
5. The probability of complying with subsequent and final events as scheduled.

E. The permittee shall report all other instances of permit noncompliance not reported under paragraphs A or B of this section on their monthly DMR submission. The DMR shall contain comments that include the information listed in paragraphs A or B as appropriate.

F. If the permittee becomes aware that it failed to submit an application, or submitted incorrect information in an application or in any report to the director, it shall promptly submit such facts or information.

#### 13. RESERVED

#### 14. DUTY TO MITIGATE

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

## 15. AUTHORIZED DISCHARGES

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than, or at a level in excess of, that authorized by this permit shall constitute a violation of the terms and conditions of this permit. Such violations may result in the imposition of civil and/or criminal penalties as provided for in Section 309 of the Act and Ohio Revised Code Sections 6111.09 and 6111.99.

## 16. DISCHARGE CHANGES

The following changes must be reported to the appropriate Ohio EPA district office as soon as practicable:

A. For all treatment works, any significant change in character of the discharge which the permittee knows or has reason to believe has occurred or will occur which would constitute cause for modification or revocation and reissuance. The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. Notification of permit changes or anticipated noncompliance does not stay any permit condition.

B. For publicly owned treatment works:

1. Any proposed plant modification, addition, and/or expansion that will change the capacity or efficiency of the plant;

2. The addition of any new significant industrial discharge; and

3. Changes in the quantity or quality of the wastes from existing tributary industrial discharges which will result in significant new or increased discharges of pollutants.

C. For non-publicly owned treatment works, any proposed facility expansions, production increases, or process modifications, which will result in new, different, or increased discharges of pollutants.

Following this notice, modifications to the permit may be made to reflect any necessary changes in permit conditions, including any necessary effluent limitations for any pollutants not identified and limited herein. A determination will also be made as to whether a National Environmental Policy Act (NEPA) review will be required. Sections 6111.44 and 6111.45, Ohio Revised Code, require that plans for treatment works or improvements to such works be approved by the Director of the Ohio EPA prior to initiation of construction.

D. In addition to the reporting requirements under 40 CFR 122.41(l) and per 40 CFR 122.42(a), all existing manufacturing, commercial, mining, and silvicultural dischargers must notify the Director as soon as they know or have reason to believe:

1. That any activity has occurred or will occur which would result in the discharge on a routine or frequent basis of any toxic pollutant which is not limited in the permit. If that discharge will exceed the highest of the "notification levels" specified in 40 CFR Sections 122.42(a)(1)(i) through 122.42(a)(1)(iv).

2. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the "notification levels" specified in 122.42(a)(2)(i) through 122.42(a)(2)(iv).

## 17. TOXIC POLLUTANTS

The permittee shall comply with effluent standards or prohibitions established under Section 307 (a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement. Following establishment of such standards or prohibitions, the Director shall modify this permit and so notify the permittee.

## 18. PERMIT MODIFICATION OR REVOCATION

A. After notice and opportunity for a hearing, this permit may be modified or revoked, by the Ohio EPA, in whole or in part during its term for cause including, but not limited to, the following:

1. Violation of any terms or conditions of this permit;
2. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or
3. Change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

B. Pursuant to rule 3745-33-04, Ohio Administrative Code, the permittee may at any time apply to the Ohio EPA for modification of any part of this permit. The filing of a request by the permittee for a permit modification or revocation does not stay any permit condition. The application for modification should be received by the appropriate Ohio EPA district office at least ninety days before the date on which it is desired that the modification become effective. The application shall be made only on forms approved by the Ohio EPA.

## 19. TRANSFER OF OWNERSHIP OR CONTROL

This permit may be transferred or assigned and a new owner or successor can be authorized to discharge from this facility, provided the following requirements are met:

A. The permittee shall notify the succeeding owner or successor of the existence of this permit by a letter, a copy of which shall be forwarded to the appropriate Ohio EPA district office. The copy of that letter will serve as the permittee's notice to the Director of the proposed transfer. The copy of that letter shall be received by the appropriate Ohio EPA district office sixty (60) days prior to the proposed date of transfer;

B. A written agreement containing a specific date for transfer of permit responsibility and coverage between the current and new permittee (including acknowledgement that the existing permittee is liable for violations up to that date, and that the new permittee is liable for violations from that date on) shall be submitted to the appropriate Ohio EPA district office within sixty days after receipt by the district office of the copy of the letter from the permittee to the succeeding owner;

At anytime during the sixty (60) day period between notification of the proposed transfer and the effective date of the transfer, the Director may prevent the transfer if he concludes that such transfer will jeopardize compliance with the terms and conditions of the permit. If the Director does not prevent transfer, he will modify the permit to reflect the new owner.

## 20. OIL AND HAZARDOUS SUBSTANCE LIABILITY

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Clean Water Act.

## 21. SOLIDS DISPOSAL

Collected grit and screenings, and other solids other than sewage sludge, shall be disposed of in such a manner as to prevent entry of those wastes into waters of the state, and in accordance with all applicable laws and rules.

## 22. CONSTRUCTION AFFECTING NAVIGABLE WATERS

This permit does not authorize or approve the construction of any onshore or offshore physical structures or facilities or the undertaking of any work in any navigable waters.



### 23. CIVIL AND CRIMINAL LIABILITY

Except as exempted in the permit conditions on UNAUTHORIZED DISCHARGES or UPSETS, nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

### 24. STATE LAWS AND REGULATIONS

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Clean Water Act.

### 25. PROPERTY RIGHTS

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations.

### 26. UPSET

The provisions of 40 CFR Section 122.41(n), relating to "Upset," are specifically incorporated herein by reference in their entirety. For definition of "upset," see Part III, Paragraph 1, DEFINITIONS.

### 27. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

### 28. SIGNATORY REQUIREMENTS

All applications submitted to the Director shall be signed and certified in accordance with the requirements of 40 CFR 122.22.

All reports submitted to the Director shall be signed and certified in accordance with the requirements of 40 CFR Section 122.22.

### 29. OTHER INFORMATION

A. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

B. ORC 6111.99 provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$25,000 per violation.

C. ORC 6111.99 states that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than \$25,000 per violation.

D. ORC 6111.99 provides that any person who violates Sections 6111.04, 6111.042, 6111.05, or division (A) of Section 6111.07 of the Revised Code shall be fined not more than \$25,000 or imprisoned not more than one year, or both.

30. NEED TO HALT OR REDUCE ACTIVITY

40 CFR 122.41(c) states that it shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with conditions of this permit.

31. APPLICABLE FEDERAL RULES

All references to 40 CFR in this permit mean the version of 40 CFR which is effective as of the effective date of this permit.

32. AVAILABILITY OF PUBLIC SEWERS

Notwithstanding the issuance or non-issuance of an NPDES permit to a semi-public disposal system, whenever the sewage system of a publicly owned treatment works becomes available and accessible, the permittee operating any semi-public disposal system shall abandon the semi-public disposal system and connect it into the publicly owned treatment works.

## **Part IV. Storm Water Control Measures**

In Part IV.A and in Part VI, the term “minimize” means reduce and/or eliminate to the extent achievable using control measures (including best management practices) that are technologically available and economically practicable and achievable in light of best industry practice.

### **A. Control Measures.**

You shall select, design, install, and implement control measures (including best management practices) to address the selection and design considerations in Part IV.B, meet the control measures/best management practices in Part IV.C. The selection, design, installation, and implementation of these control measures shall be in accordance with good engineering practices and manufacturer’s specifications. Note that you may deviate from such manufacturer’s specifications where you provide justification for such deviation and include documentation of your rationale in the part of your SWPPP that describes your control measures, consistent with Part V.D.3. If you find that your control measures are not achieving their intended effect of minimizing pollutant discharges, you shall modify these control measures as expeditiously as practicable. Regulated storm water discharges from your facility include storm water run-on that commingles with storm water discharges associated with industrial activity at your facility.

### **B. Control Measure Selection and Design Considerations.**

You shall consider the following when selecting and designing control measures:

1. Preventing storm water from coming into contact with polluting materials is generally more effective, and less costly, than trying to remove pollutants from storm water;
2. Using control measures in combination is more effective than using control measures in isolation for minimizing pollutants in your storm water discharge;
3. Assessing the type and quantity of pollutants, including their potential to impact receiving water quality, is critical to designing effective control measures that will achieve the limits in this permit;
4. Minimizing impervious areas at your facility and infiltrating runoff onsite (including bioretention cells, green roofs, and pervious pavement, among other approaches) can reduce runoff and improve groundwater recharge and stream base flows in local streams, although care shall be taken to avoid ground water contamination;
5. Attenuating flow using open vegetated swales and natural depressions can reduce in-stream impacts of erosive flows;
6. Conserving and/or restoring of riparian buffers will help protect streams from storm water runoff and improve water quality; and
7. Using treatment interceptors (e.g., swirl separators and sand filters) may be appropriate in some instances to minimize the discharge of pollutants.

**C. Control Measures/Best Management Practices (BMPs)**

1. Minimize Exposure. You shall minimize the exposure of manufacturing, processing, and material storage areas (including loading and unloading, storage, disposal, cleaning, maintenance, and fueling operations) to rain, snow, snowmelt, and runoff by either locating these industrial materials and activities inside or protecting them with storm resistant coverings (although significant enlargement of impervious surface area is not recommended). In minimizing exposure, you should pay particular attention to the following:
  - a. Use grading, berming, or curbing to prevent runoff of contaminated flows and divert run-on away from these areas;
  - b. Locate materials, equipment, and activities so that leaks are contained in existing containment and diversion systems (confine the storage of leaky or leak-prone vehicles and equipment awaiting maintenance to protected areas);
  - c. Clean up spills and leaks promptly using dry methods (e.g., absorbents) to prevent the discharge of pollutants;
  - d. Use drip pans and absorbents under or around leaky vehicles and equipment or store indoors where feasible;
  - e. Use spill/overflow protection equipment;
  - f. Drain fluids from equipment and vehicles prior to on-site storage or disposal;
  - g. Perform all cleaning operations indoors, under cover, or in bermed areas that prevent runoff and run-on and also that capture any overspray; and
  - h. Ensure that all washwater drains to a proper collection system (i.e., not the storm water drainage system).
2. Good Housekeeping. You shall keep clean all exposed areas that are potential sources of pollutants, using such measures as sweeping at regular intervals, keeping materials orderly and labeled, and storing materials in appropriate containers.
3. Maintenance. You shall regularly inspect, test, maintain, and repair all industrial equipment and systems to avoid situations that may result in leaks, spills, and other releases of pollutants in storm water discharged to receiving waters. You shall maintain all control measures that are used to achieve the control measures/best management practices (BMPs) required by this permit in effective operating condition. Nonstructural control measures shall also be diligently maintained (e.g., spill response supplies available, personnel appropriately trained). If you find that your control measures need to be replaced or repaired, you shall make the necessary repairs or modifications as expeditiously as practicable.
4. Spill Prevention and Response Procedures. You shall minimize the potential for leaks, spills and other releases that may be exposed to storm water and develop plans for effective response to such spills if or when they occur. At a minimum, you shall implement:

- a. Procedures for plainly labeling containers (e.g., “Used Oil,” “Spent Solvents,” “Fertilizers and Pesticides,” etc.) that could be susceptible to spillage or leakage to encourage proper handling and facilitate rapid response if spills or leaks occur;
  - b. Preventative measures such as barriers between material storage and traffic areas, secondary containment provisions, and procedures for material storage and handling;
  - c. Procedures for expeditiously stopping, containing, and cleaning up leaks, spills, and other releases. Employees who may cause, detect, or respond to a spill or leak shall be trained in these procedures and have necessary spill response equipment available. If possible, one of these individuals should be a member of your storm water pollution prevention team (Part V.D.1); and
  - d. Where a leak, spill or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302, occurs during a 24-hour period, you shall notify the Ohio EPA in accordance with the requirements of Part III Item 12 of this permit.
5. Erosion and Sediment Controls. You shall stabilize exposed areas and contain runoff using structural and/or non-structural control measures to minimize onsite erosion and sedimentation, and the resulting discharge of pollutants. Among other actions you shall take to meet this limit, you shall place flow velocity dissipation devices at discharge locations and within outfall channels where necessary to reduce erosion and/or settle out pollutants. In selecting, designing, installing, and implementing appropriate control measures, you are encouraged to consult with the Ohio Department of Natural Resources (ODNR) Division of Soil and Water Conservation’s Rainwater and Land Development manual (<http://www.dnr.state.oh.us/tabid/9186/Default.aspx>), U.S. EPA’s internet-based resources relating to BMPs for erosion and sedimentation, including the sector-specific *Industrial Storm Water Fact Sheet Series*, ([www.epa.gov/npdes/stormwater/msgp](http://www.epa.gov/npdes/stormwater/msgp)), *National Menu of Storm Water BMPs* ([www.epa.gov/npdes/stormwater/menuofbmps](http://www.epa.gov/npdes/stormwater/menuofbmps)), and *National Management Measures to Control Nonpoint Source Pollution from Urban Areas* ([www.epa.gov/owow/nps/urbanmm/index.html](http://www.epa.gov/owow/nps/urbanmm/index.html)).
6. Management of Runoff. You shall divert, infiltrate, reuse, contain, or otherwise reduce storm water runoff, to minimize pollutants in your discharges. In selecting, designing, installing, and implementing appropriate control measures, you are encouraged to consult with the Ohio Department of Natural Resources (ODNR) Division of Soil and Water Conservation’s Rainwater and Land Development manual (<http://www.dnr.state.oh.us/tabid/9186/Default.aspx>), U.S. EPA’s internet-based resources relating to runoff management, including the sector-specific *Industrial Storm Water Fact Sheet Series*, ([www.epa.gov/npdes/stormwater/msgp](http://www.epa.gov/npdes/stormwater/msgp)), *National Menu of Storm Water BMPs* ([www.epa.gov/npdes/stormwater/menuofbmps](http://www.epa.gov/npdes/stormwater/menuofbmps)), and *National Management Measures to Control Nonpoint Source Pollution from Urban Areas* ([www.epa.gov/owow/nps/urbanmm/index.html](http://www.epa.gov/owow/nps/urbanmm/index.html)).
7. Salt Storage Piles or Piles Containing Salt. You shall enclose or cover storage piles of salt, or piles containing salt, used for deicing or other commercial or industrial purposes, including maintenance of paved surfaces. You shall implement appropriate measures (e.g., good housekeeping, diversions, containment) to minimize exposure resulting from adding to or removing materials from the pile.

8. Employee Training. You shall train all employees who work in areas where industrial materials or activities are exposed to storm water, or who are responsible for implementing activities necessary to meet the conditions of this permit (e.g., inspectors, maintenance personnel), including all members of your Pollution Prevention Team. Training shall cover both the specific control measures used to achieve the conditions in this Part, and monitoring, inspection, planning, reporting, and documentation requirements in other parts of this permit. Ohio EPA requires that training be conducted at least annually (or more often if employee turnover is high).
9. Non-Storm Water Discharges. You shall eliminate non-storm water discharges not authorized by an NPDES permit. The following are the non-storm water discharges authorized under this permit:
  - a. Discharges from fire-fighting activities (not planned exercises);
  - b. Fire hydrant flushings;
  - c. Potable water, including water line flushings;
  - d. Uncontaminated condensate from air conditioners, coolers, and other compressors and from the outside storage of refrigerated gases or liquids;
  - e. Irrigation drainage;
  - f. Landscape watering provided all pesticides, herbicides; and fertilizer have been applied in accordance with the approved labeling;
  - g. Pavement wash waters where no detergents are used and no spills or leaks of toxic or hazardous materials have occurred (unless all spilled material has been removed);
  - h. Routine external building washdown that does not use detergents;
  - i. Uncontaminated ground water or spring water;
  - j. Foundation or footing drains where flows are not contaminated with process materials; and
  - k. Incidental windblown mist from cooling towers that collects on rooftops or adjacent portions of your facility, but not intentional discharges from the cooling tower (e.g., “piped” cooling tower blowdown or drains).
10. Waste, Garbage and Floatable Debris. You shall ensure that waste, garbage, and floatable debris are not discharged to receiving waters by keeping exposed areas free of such materials or by intercepting them before they are discharged.
11. Dust Generation and Vehicle Tracking of Industrial Materials. You shall minimize generation of dust and off-site tracking of raw, final, or waste materials.

#### **D. Corrective Actions**

1. Conditions Requiring Review and Revision to Eliminate Problem. If any of the following conditions occur, you shall review and revise the selection, design, installation, and implementation of your control measures to ensure that the condition is eliminated and will not be repeated in the future:
  - a. An unauthorized release or discharge (e.g., spill, leak, or discharge of non-storm water not authorized by this or another NPDES permit) occurs at your facility;
  - b. A discharge violates a numeric effluent limit;
  - c. You become aware, or Ohio EPA determines, that your control measures are not stringent enough for the discharge to meet applicable water quality standards;
  - d. An inspection or evaluation of your facility by an Ohio EPA official or local MS4 operator determines that modifications to the control measures are necessary to meet the control measures/best management practices (BMPs) in this permit; or
  - e. You find in your routine facility inspection, quarterly visual assessment, or comprehensive site inspection that your control measures are not being properly operated and maintained.
2. Conditions Requiring Review to Determine if Modifications Are Necessary. If any of the following conditions occur, you shall review the selection, design, installation, and implementation of your control measures to determine if modifications are necessary to meet the Part IV.A conditions in this permit:
  - a. Construction or a change in design, operation, or maintenance at your facility significantly changes the nature of pollutants discharged in storm water from your facility, or significantly increases the quantity of pollutants discharged; or
  - b. Sampling results exceeds an applicable benchmark.
3. Corrective Action Deadlines. You shall document your discovery of any of the conditions listed in Part IV.D.1 and Part IV.D.2 within 24 hours of making such discovery. Subsequently, within 30 days of such discovery, you shall document any corrective action(s) to be taken to eliminate or further investigate the deficiency, or if no corrective action is needed, the basis for that determination. Specific documentation required within 24 hours and 30 days is detailed in Part IV.D.4. If you determine that changes are necessary following your review, any modifications to your control measures shall be made before the next storm event if possible, or as soon as practicable following that storm event. These time intervals are not grace periods, but are schedules considered reasonable for documenting your findings and for making repairs and improvements. They are included in this permit to ensure that the conditions prompting the need for these repairs and improvements are not allowed to persist indefinitely.
4. Corrective Action Report. Within 24 hours of discovery of any condition listed in Part IV.D.1 and Part IV.D.2, you shall document the following information (i.e., questions 3-5 of the Corrective Actions section in the Annual Reporting Form, available at [http://www.epa.state.oh.us/portals/35/permits/IndustrialStormWater\\_Final\\_GP\\_AppI\\_dec11.pdf](http://www.epa.state.oh.us/portals/35/permits/IndustrialStormWater_Final_GP_AppI_dec11.pdf)):
  - Identification of the condition triggering the need for corrective action review;
  - Description of the problem identified; and
  - Date the problem was identified.

Within 30 days of discovery of any condition listed in Part IV.D.1 and Part IV.D.2, you shall document the following information (i.e., questions 7-11 of the Corrective Actions section in the Annual Reporting Form):

- Summary of corrective action taken or to be taken (or, for triggering events identified in Part IV.D.2 where you determine that corrective action is not necessary, the basis for this determination);
- Notice of whether SWPPP modifications are required as a result of this discovery or corrective action;
- Date corrective action initiated; and
- Date corrective action completed or expected to be completed.

You shall include this documentation in an annual report as required in Part VI.C.2 and retain onsite with your SWPPP.

5. Effect of Corrective Action. If the event triggering the review is a permit violation (e.g., non-compliance with an effluent limit), correcting it does not remove the original violation. Additionally, failing to take corrective action in accordance with this section is an additional permit violation. Ohio EPA will consider the appropriateness and promptness of corrective action in determining enforcement responses to permit violations.
6. Substantially Identical Outfalls. If the event triggering corrective action is linked to an outfall that represents other substantially identical outfalls, your review shall assess the need for corrective action for each outfall represented by the outfall that triggered the review. Any necessary changes to control measures that affect these other outfalls shall also be made before the next storm event if possible, or as soon as practicable following that storm event.

## **E. Inspections**

Beginning on the effective date of this permit, you shall conduct the inspections in Part IV.E.1, Part IV.E.2, and Part IV.E.3 at your facility. Include the following areas in all inspections: access roads and rail lines; grit, screenings, and other solids handling, storage, or disposal areas; sludge drying beds; dried sludge piles; compost piles; and septage or hauled waste receiving station.

1. Routine Facility Inspections. Conduct routine facility inspections of all areas of the facility where industrial materials or activities are exposed to storm water, and of all storm water control measures used to comply with Part IV. Items A-C conditions contained in this permit. Routine facility inspections shall be conducted at least quarterly (i.e., once each calendar quarter) although in many instances, more frequent inspection (e.g., monthly) may be appropriate for some types of equipment, processes, and control measures or areas of the facility with significant activities and materials exposed to storm water. Perform these inspections during periods when the facility is in operation. You shall specify the relevant inspection schedules in your SWPPP document as required in Part IV. Items A-C. These routine inspections shall be performed by qualified personnel (for definition see VI - Definitions) with at least one member of your storm water pollution prevention team participating. At least once each calendar year, the routine facility inspection shall be conducted during a period when a storm water discharge is occurring.



You shall document the findings of each routine facility inspection performed and maintain this documentation onsite with your SWPPP. You are not required to submit your routine facility inspection findings to Ohio EPA, unless specifically requested to do so. At a minimum, your documentation of each routine facility inspection shall include:

- a. The inspection date and time;
- b. The name(s) and signature(s) of the inspector(s);
- c. Weather information and a description of any discharges occurring at the time of the inspection;
- d. Any previously unidentified discharges of pollutants from the site;
- e. Any control measures needing maintenance or repairs;
- f. Any failed control measures that need replacement;
- g. Any incidents of noncompliance observed; and
- h. Any additional control measures needed to comply with the permit requirements.

Any corrective action required as a result of a routine facility inspection shall be performed consistent with Part IV.D of this permit.

2. Quarterly Visual Assessment of Storm Water Discharges. Once each calendar quarter for the entire permit term, you shall collect a storm water sample from each outfall that requires sampling under this permit and conduct a visual assessment of each of these samples. These samples are not required to be collected consistent with 40 CFR Part 136 procedures but should be collected in such a manner that the samples are representative of the storm water discharge. The visual assessment shall be made:

- Of a sample in a clean, clear glass, or plastic container, and examined in a well-lit area;
- On samples collected within the first 30 minutes of an actual discharge from a storm event. If it is not possible to collect the sample within the first 30 minutes of discharge, the sample shall be collected as soon as practicable after the first 30 minutes and you shall document why it was not possible to take samples within the first 30 minutes. In the case of snowmelt, samples shall be taken during a period with a measurable discharge from your site; and
- For storm events, on discharges that occur at least 72 hours (3 days) from the previous discharge. The 72-hour (3-day) storm interval does not apply if you document that less than a 72-hour (3-day) interval is representative for local storm events during the sampling period. If it is not possible to collect the sample on discharges that occur at least 72 hours (3 days) from the previous discharge, the sample shall be collected as close to this storm interval as practicable and you shall document why it was not possible to take samples from a 72 hour (3 day) storm interval.
- Areas Subject to Snow: In areas subject to snow, at least one quarterly visual assessment shall capture snowmelt discharge.
- For the following water quality characteristics: color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of storm water pollution.

You shall document the results of your visual assessments and maintain this documentation onsite with your SWPPP. You are not required to submit your visual assessment findings to Ohio EPA,

unless specifically requested to do so. At a minimum, your documentation of the visual assessment shall include:

- Sample location(s);
- Sample collection date and time, and visual assessment date and time for each sample;
- Personnel collecting the sample and performing visual assessment, and their signatures;
- Nature of the discharge (i.e., runoff or snowmelt);
- Results of observations of the storm water discharge;
- Probable sources of any observed storm water contamination; and
- If applicable, why it was not possible to take samples within the first 30 minutes and/or from a 72 hour (3 day) storm interval.

Any corrective action required as a result of a quarterly visual assessment shall be performed consistent with Part IV.D of this permit.

The following are exceptions to quarterly visual assessments:

- Adverse Weather Conditions: When adverse weather conditions prevent the collection of samples during the quarter, you shall take a substitute sample during the next qualifying storm event. Documentation of the rationale for no visual assessment for the quarter shall be included with your SWPPP records. Adverse conditions are those that are dangerous or create inaccessibility for personnel, such as local flooding, high winds, or electrical storms, or situations that otherwise make sampling impractical, such as drought or extended frozen conditions.
  - Inactive and unstaffed sites: The requirement for a quarterly visual assessment does not apply at a facility that is inactive and unstaffed, as long as there are no industrial materials or activities exposed to storm water. To invoke this exception, you shall maintain a statement in your SWPPP indicating that the site is inactive and unstaffed, and that there are no industrial materials or activities exposed to precipitation, in accordance with the substantive requirements in 40 CFR 122.26(g)(4)(iii). The statement shall be signed and certified in accordance with Part III.28 of this permit. If circumstances change and industrial materials or activities become exposed to storm water or your facility becomes active and/or staffed, this exception no longer applies and you shall immediately resume quarterly visual assessments. If you are not qualified for this exception at the time you are authorized under this permit, but during the permit term you become qualified because your facility is inactive and unstaffed, and there are no industrial materials or activities that are exposed to storm water, then you shall include the same signed and certified statement as above and retain it with your records.
3. Comprehensive Site Inspections. You shall conduct annual comprehensive site inspections while you are covered under this permit. The annual period to conduct the comprehensive site inspections begins on the date Ohio EPA has granted your authorization to discharge under this permit. Should your coverage be administratively continued after the expiration date of this permit, you shall continue to perform these inspections annually until you are no longer covered. Comprehensive site inspections shall be conducted by qualified personnel with at least one member of your storm water pollution prevention team participating in the comprehensive site inspections. Your comprehensive site inspections shall cover all areas of the facility affected by the requirements in this permit,

including the areas identified in the SWPPP as potential pollutant sources (see Part V.D.2) where industrial materials or activities are exposed to storm water, any areas where control measures are used to comply with the conditions in Part IV. Items A-C, and areas where spills and leaks have occurred in the past 3 years. The inspections shall also include a review of monitoring data collected in accordance with Part VI.B. Inspectors shall consider the results of the past year's visual and analytical monitoring when planning and conducting inspections. Inspectors shall examine the following:

- Industrial materials, residue, or trash that may have or could come into contact with storm water;
- Leaks or spills from industrial equipment, drums, tanks, and other containers;
- Offsite tracking of industrial or waste materials, or sediment where vehicles enter or exit the site;
- Tracking or blowing of raw, final, or waste materials from areas of no exposure to exposed areas; and
- Control measures needing replacement, maintenance, or repair.

Storm water control measures required by this permit shall be observed to ensure that they are functioning correctly. If discharge locations are inaccessible, nearby downstream locations shall be inspected. Your annual comprehensive site inspection may also be used as one of the routine inspections, as long as all components of both types of inspections are included.

You shall document the findings of each comprehensive site inspection and maintain this documentation onsite with your SWPPP. In addition, you shall include this documentation in an annual report as required in Part VI.C.2. At a minimum, your documentation of the comprehensive site inspection shall include (see the Annual Reporting Form at [http://www.epa.state.oh.us/portals/35/permits/IndustrialStormWater\\_Final\\_GP\\_AppI\\_dec11.pdf](http://www.epa.state.oh.us/portals/35/permits/IndustrialStormWater_Final_GP_AppI_dec11.pdf)):

- The date of the inspection;
- The name(s) and title(s) of the personnel making the inspection;
- Findings from the examination of areas of your facility identified in Part IV.E.3;
- All observations relating to the implementation of your control measures including:
  - Previously unidentified discharges from the site;
  - Previously unidentified pollutants in existing discharges;
  - Evidence of, or the potential for, pollutants entering the drainage system;
  - Evidence of pollutants discharging to receiving waters at all facility outfall(s), and the condition of and around the outfall, including flow dissipation measures to prevent scouring, and
  - Additional control measures needed to address any conditions requiring corrective action identified during the inspection.
- Any required revisions to the SWPPP resulting from the inspection;
- Any incidents of noncompliance observed or a certification stating the facility is in compliance with this permit (if there is no noncompliance); and
- A statement signed and certified in accordance with Part III.28 of the permit.

Any corrective action required as a result of the comprehensive site inspection shall be performed consistent with Part IV.D of this permit.

## **Part V. Storm Water Pollution Prevention Plan (SWPPP)**

A storm water pollution prevention plan (SWPPP) shall be developed to address each outfall that discharges to waters of the state that contains storm water associated with industrial activity. Storm water pollution prevention plans shall be prepared in accordance with good engineering practices. The SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges associated with industrial activity from the facility. The SWPPP shall describe and ensure the implementation of practices which are to be used to reduce the pollutants in storm water discharges associated with industrial activity at the facility and to assure compliance with the terms and conditions of this permit. Facilities must implement the provisions of the storm water pollution prevention plan required under this part as a condition of this permit.

The SWPPP does not contain effluent limitations; the limitations are contained in Parts I and IV A-C of this permit. The SWPPP is intended to document the selection, design, and installation of control measures. As distinct from the SWPPP, the documentation requirements are intended to document the implementation (including inspection, maintenance, monitoring, and corrective action) of the permit requirements.

### **A. Deadlines for SWPPP Preparation and Compliance.**

1. The plan for a storm water discharge associated with industrial activity:
  - a. Shall be prepared within six months of the effective date of this permit ((and updated based on facility or materials handling changes as specified in Part V, Item C);
  - b. Shall provide for implementation and compliance with the terms of the plan within twelve months of the effective date of this permit.
2. Upon showing of good cause, the Director may establish a later date for preparing and compliance with a plan for a storm water discharge associated with industrial activity.

### **B. Signature and SWPPP Review.**

1. The plan shall be signed and dated in accordance with Part III, Item 28, and be retained on-site at the facility which generates the storm water discharge.
2. The permittee shall make plans immediately available upon request to the Ohio EPA Director, or authorized representative, or Regional Administrator of U.S. EPA, a local agency approving storm water management plans, or in the case of a storm water discharge associated with industrial activity which discharges through a municipal separate storm sewer system, to the operator of the municipal system.
3. The Director may notify the permittee at any time that the plan does not meet one or more of the minimum requirements of this Part. Within 30 days of such notification from the Director, the

permittee shall make the required changes to the plan and shall submit to the Director a written certification that the requested changes have been made.

4. All storm water pollution prevention plans required under this permit are considered reports that shall be available to the public under Section 308(b) of the Act. Confidential Business Information (CBI) may be withheld from the public, but may not be withheld from those staff cleared for CBI review within Ohio EPA. An interested party wishing a copy of a discharger's SWPPP will have to contact the Ohio EPA to obtain a copy.

### **C. Keeping Plans Current**

The permittee shall modify the plan whenever necessary to address any of the triggering conditions for corrective action in Part IV.D and to ensure that they do not reoccur, or to reflect changes implemented when a review following the triggering conditions in Part IV.D.2 indicates that changes to your control measures are necessary to meet the control measures/best management practices (BMPs) in this permit. Changes to your SWPPP document shall be made in accordance with the corrective action deadlines in Part IV.D.3 and Part IV.D.4.

Amendments to the plan may be reviewed by Ohio EPA in the same manner as Part IV.B above.

### **D. Contents of Plan.** The plan shall include, at a minimum, the following items:

1. Pollution Prevention Team. You shall identify the staff members (by name or title) that comprise the facility's storm water pollution prevention team as well as their individual responsibilities. Your storm water pollution prevention team is responsible for assisting the facility manager in developing and revising the facility's SWPPP as well as maintaining control measures and taking corrective actions where required. Each member of the storm water pollution prevention team shall have ready access to either an electronic or paper copy of applicable portions of this permit and your SWPPP.
2. Description of Potential Pollutant Sources. You shall document at your facility where industrial materials or activities are exposed to storm water and from which allowable non-storm water discharges are released. Industrial materials or activities, include, but are not limited to: material handling equipment or activities; industrial machinery; raw materials; industrial production and processes; and intermediate products, by-products, final product or waste product. For each area identified, the description shall include, at a minimum:
  - a. Site Description. Your SWPPP shall include:
    - i. A description of the industrial activities at your facility;
    - ii. A general location map (e.g. U.S. Geologic Survey (USGS) quadrangle map) with enough detail to identify the location of your facility and all receiving waters for your storm water discharges.
    - iii. A site map showing

- The size of the property in acres;
  - The location and extent of significant structures and impervious surfaces;
  - Directions of storm water flow (use arrows);
  - Locations of all existing structural control measures;
  - Locations of all receiving waters in the immediate vicinity of your facility;
  - Locations of all storm water conveyances including ditches, pipes and swales;
  - Locations of potential pollutant sources identified under Part IV J. 2.b;
  - Locations where significant spills or leaks identified under Part IV J. 2.b. have occurred;
  - Locations of all storm water monitoring points;
  - Locations of storm water inlets and outfalls, with a unique identification code for each outfall (e.g. Outfall 001, Outfall 002, etc), indicating any outfalls that are considered substantially identical to another outfall, and an approximate outline of the areas draining to each outfall;
  - Municipal separate storm sewer systems, where your storm water discharges to them;
  - Locations and descriptions of all non-storm water discharges identified under Part IV. C. 10;
  - Locations of the following activities where such activities are exposed to precipitation
    - o Fueling stations;
    - o Vehicle and equipment maintenance and/or cleaning areas;
    - o Loading/unloading areas;
    - o Immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility;
    - o Transfer areas for substances in bulk;
    - o Machinery; and
- b. Inventory of Exposed Materials. This includes a list of industrial activities exposed to storm water (e.g., material storage; equipment fueling, maintenance, and cleaning; cutting steel beams). This also includes a list of the pollutant(s) or pollutant constituents (e.g, crankcase oil, zinc, sulfuric acid, and cleaning solvents) associated with each identified activity. The pollutant list shall include all significant materials that have been handled, treated, stored, or disposed, and that have been exposed to storm water in the three years prior to the data you prepare or amend your SWPPP.
- c. Spills and Leaks. You shall document where potential spills and leaks could occur that could contribute pollutants to storm water discharges, and the corresponding outfall(s) that would be affected by such spills and leaks. You shall document all significant spills and leaks of oil or toxic or hazardous pollutants that actually occurred at exposed areas, or that drained to a storm water conveyance, in the three years prior to the date you prepare or amend your SWPPP. Note that significant spills and leaks include, but are not limited to, releases of oil or hazardous substances in excess of quantities that are reportable under CWA Section 311 (see 40 CFR 110.6 and 40 CFR 117.21) or Section 102 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 USC Section 9602. This permit

does not relieve you of the reporting requirements of 40 CFR 110, 40 CFR 117, and 40 CFR 302 relating to spills or other releases of oil or hazardous substances.

- d. **Sampling Data.** A summary of existing discharge sampling data describing pollutants in storm water discharges from the facility.
  - e. **Non-Storm Water Discharges.** You shall document that you have evaluated for the presence of non-storm water discharges and that all unauthorized discharges have been eliminated. Documentation of your evaluation shall include: 1) The date of any evaluation; 2) A description of the evaluation criteria used; 3) A list of the outfalls or onsite drainage points that were directly observed during the evaluation; 4) The different types of non-storm water discharge(s) and source locations; and 5) The action(s) taken, such as a list of control measures used to eliminate unauthorized discharge(s), if any were identified. For example, a floor drain was sealed, a sink drain was re-routed to sanitary, or an NPDES permit application was submitted for an unauthorized cooling water discharge. Keep a copy of all your current NPDES permits issued for wastewater and industrial, vehicle and equipment washwater discharges or, if an NPDES permit has not yet been issued, a copy of the pending application(s) with your SWPPP. If the washwater is handled in another manner, the disposal method shall be described and all pertinent documentation shall be retained onsite.
  - f. **Salt Storage.** You shall document the location of any storage piles containing salt used for deicing or other commercial or industrial purposes.
3. **Description of Control Measures.** You shall document the location and type of control measures you have installed and implemented at your site to achieve the control measures/best management practices (BMPs) in Part IV.C, and where applicable, in Part VI.A. You shall describe how you addressed the control measure selection and design considerations in Part IV.B. This documentation shall describe how the control measures at your site address both the pollutant sources identified in Part V.D.2 and any storm water run-on that commingles with any discharges covered under this permit. In addition to the other control measures, consider the following: routing contaminated storm water to the treatment works; or covering exposed materials (i.e., from the following areas: grit, screenings, and other solids handling, storage, or disposal areas; sludge drying beds; dried sludge piles; compost piles; and septage or hauled waste receiving station).
4. **Schedules and Procedures.**
- a. **Pertaining to Control Measures used to Comply with the Control Measures/Best Management Practices (BMPs).** The following shall be documented in your SWPPP:
    - i. **Good Housekeeping** (See Part IV.C.2) – A schedule for regular pickup and disposal of waste materials, along with routine inspections for leaks and conditions of drums, tanks and containers.
    - ii. **Maintenance** (See Part IV.C.3) – Preventative maintenance procedures, including regular inspections, testing, maintenance, and repair of all industrial equipment and systems, and

control measures, to avoid situations that may result in leaks, spills, and other releases, and any back-up practices in place should a runoff event occur while a control measure is off-line;

- iii. Spill Prevention and Response Procedures (See Part IV.C.4) – Procedures for preventing and responding to spills and leaks. You may reference the existence of other plans for Spill Prevention Control and Countermeasure (SPCC) developed for the facility under Section 311 of the CWA or BMP programs otherwise required by an NPDES permit for the facility, provided that you keep a copy of that other plan onsite and make it available for review consistent with Part V.B.4; and
  - iv. Employee Training (See Part IV.C.9) – A schedule for all types of necessary training. At a minimum, training shall address the following areas when applicable to a facility: petroleum product management; process chemical management; spill prevention and controls; fueling procedures; general good housekeeping practices; and proper procedures for using fertilizer, herbicides, and pesticides.
- b. Pertaining to Monitoring and Inspection. Where applicable, you shall document in your SWPPP your procedures for conducting analytical storm water monitoring. You shall document in your SWPPP your procedures for performing, as appropriate, the three types of inspections specified by this permit, including: 1) Routine facility inspections (See Part IV.E.1), 2) Quarterly visual assessment of storm water discharges (See Part IV.E.2), and 3) Comprehensive site inspections (See Part IV.E.3).
5. Documentation Requirements. You are required to keep inspection, monitoring, and certification records with your SWPPP that together keep your records complete and up-to-date, and demonstrate your full compliance with the conditions of this permit.



## Part VI. Sector Specific Requirements and Reporting

### A. Reporting and Recordkeeping

1. Annual Report. You shall complete an annual report that includes the findings from your Part IV.E.3 comprehensive site inspection and any corrective action documentation as required in Part IV.D.4. If corrective action is not yet completed at the time of completion of this annual report, you shall describe the status of any outstanding corrective action(s). In addition to the information required in Part IV.D.4 (Corrective Action Report) and Part IV.E.3 (Comprehensive Site Inspection Documentation), you shall include the following information with your annual report:
  - a. Facility name
  - b. Ohio EPA Facility permit number
  - c. Facility physical address
  - d. Contact person name, title, and phone number

You shall complete this report using the Annual Reporting Form provided by Ohio EPA at the following: [http://www.epa.gov/npdes/pubs/msgp2008\\_appendixi.pdf](http://www.epa.gov/npdes/pubs/msgp2008_appendixi.pdf). You shall keep the annual report with your SWPPP.

### B. Sector-Specific Requirements for Industrial Activity

- 1 Limitations on Coverage.- Prohibition of Non-Storm Water Discharges. Industrial wastewater and equipment and vehicle washwater are not authorized from storm water only outfalls by this permit.

### C. Definitions and Acronyms

**Action Area** – all areas to be affected directly or indirectly by the storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities, and not merely the immediate area involved in these discharges and activities.

**Best Management Practices (BMPs)** – schedules of activities, practices (and prohibitions of practices), structures, vegetation, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to surface waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. See 40 CFR 122.2.

**Co-located Industrial Activities** – Any industrial activities, excluding your primary industrial activity(ies), located on-site that are defined by the storm water regulations at 122.26(b)(14)(i)-(ix) and (xi). An activity at a facility is not considered co-located if the activity, when considered separately, does not meet the description of a category of industrial activity covered by the storm water regulations or identified by the SIC code list in Appendix D.

**Control Measure** – refers to any BMP or other method (including effluent limitations) used to prevent or reduce the discharge of pollutants to surface waters of the State.

**Director** – the Director of the Ohio Environmental Protection Agency (Ohio EPA).

**Discharge** – when used without qualification, means the "discharge of a pollutant." See 40 CFR 122.2.

**Discharge of a pollutant** – any addition of any “pollutant” or combination of pollutants to “surface waters of the State” from any “point source,” or any addition of any pollutant or combination of pollutants to the waters of the “contiguous zone” or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation. This includes additions of pollutants into surface waters of the State from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works. See 40 CFR 122.2.

**Discharge-related activities** – activities that cause, contribute to, or result in storm water and allowable non-storm water point source discharges, and measures such as the siting, construction and operation of BMPs to control, reduce, or prevent pollution in the discharges.

**Drought-stricken area** – a period of below average water content in streams, reservoirs, ground-water aquifers, lakes and soils.

**U.S. EPA Approved or Established Total Maximum Daily Loads (TMDLs)** – “U.S. EPA Approved TMDLs” are those that are developed by a State and approved by U.S. EPA. “U.S. EPA Established TMDLs” are those that are developed by U.S. EPA.

**Existing Discharger** – an operator applying for coverage under this permit for discharges authorized previously under an NPDES general or individual permit.

**Facility or Activity** – any NPDES “point source” (including land or appurtenances thereto) that is subject to regulation under the NPDES program. See 40 CFR 122.2.

**Federal Facility** – any buildings, installations, structures, land, public works, equipment, aircraft, vessels, and other vehicles and property, owned by, or constructed or manufactured for the purpose of leasing to, the federal government.

**Illicit Discharge** – is defined at 40 CFR 122.26(b)(2) and refers to any discharge to a municipal separate storm sewer that is not entirely composed of storm water, except discharges authorized under an NPDES permit (other than the NPDES permit for discharges from the MS4) and discharges resulting from fire fighting activities.

**Impaired Water** (or “Water Quality Impaired Water” or “Water Quality Limited Segment”) – A water is impaired for purposes of this permit if it has been identified by a State or U.S. EPA pursuant to Section 303(d) of the Clean Water Act as not meeting applicable State water quality standards (these waters are called “water quality limited segments” under 40 CFR 30.2(j)). Impaired waters include both waters with approved or established TMDLs, and those for which a TMDL has not yet been approved or established.

**Industrial Activity** – the 10 categories of industrial activities included in the definition of “storm water discharges associated with industrial activity” as defined in 40 CFR 122.26(b)(14)(i)-(ix) and (xi).

**Industrial Storm Water** – storm water runoff from industrial activity.

**Municipal Separate Storm Sewer** – a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

- (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or a designated and approved management agency under section 208 of the CWA that discharges to surface waters of the State;
- (ii) Designed or used for collecting or conveying storm water;
- (iii) Which is not a combined sewer; and
- (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2. See 40 CFR 122.26(b)(4) and (b)(7).

**New Discharger** – a facility from which there is a discharge, that did not commence the discharge at a particular site prior to August 13, 1979, which is not a new source, and which has never received a finally effective NPDES permit for discharges at that site. See 40 CFR 122.2.

**New Source** – any building, structure, facility, or installation from which there is or may be a “discharge of pollutants,” the construction of which commenced:

- after promulgation of standards of performance under section 306 of the CWA which are applicable to such source, or
- after proposal of standards of performance in accordance with section 306 of the CWA which are applicable to such source, but only if the standards are promulgated in accordance with section 306 within 120 days of their proposal. See 40 CFR 122.2.

**New Source Performance Standards (NSPS)** – technology-based standards for facilities that qualify as new sources under 40 CFR 122.2 and 40 CFR 122.29.

**No exposure** – all industrial materials or activities are protected by a storm-resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. See 40 CFR 122.26(g).

**Ohio EPA** – the Ohio Environmental Protection Agency.

**Operator** – any entity with a storm water discharge associated with industrial activity that meets either of the following two criteria:

- (i) The entity has operational control over industrial activities, including the ability to modify those activities; or
- (ii) The entity has day-to-day operational control of activities at a facility necessary to ensure compliance with the permit (e.g., the entity is authorized to direct workers at a facility to carry out activities required by the permit).

**Person** – an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof. See 40 CFR 122.2.

**Point source** – any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff. See 40 CFR 122.2.

**Pollutant** – dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal and agricultural waste discharged into water. See 40 CFR 122.2.

**Pollutant of concern** – A pollutant which causes or contributes to a violation of a water quality standard, including a pollutant which is identified as causing an impairment in a state's 303(d) list.

**Primary industrial activity** – includes any activities performed on-site which are (1) identified by the facility's primary SIC code; or (2) included in the narrative descriptions of 122.26(b)(14)(i), (iv), (v), or (vii), and (ix). [For co-located activities covered by multiple SIC codes, it is recommended that the primary industrial determination be based on the value of receipts or revenues or, if such information is not available for a particular facility, the number of employees or production rate for each process may be compared. The operation that generates the most revenue or employs the most personnel is the operation in which the facility is primarily engaged. In situations where the vast majority of on-site activity falls within one SIC code, that activity may be the primary industrial activity.] Narrative descriptions in 40 CFR 122.26(b)(14) identified above include: (i) activities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards; (iv) hazardous waste treatment storage, or disposal facilities including those that are operating under interim status or a permit under subtitle C of the Resource Conservation and Recovery Act (RCRA); (v) landfills, land application sites and open dumps that receive or have received industrial wastes; (vii) steam electric power generating facilities; and (ix) sewage treatment works with a design flow of 1.0 mgd or more.

**Qualified Personnel** – Qualified personnel are those who possess the knowledge and skills to assess conditions and activities that could impact storm water quality at your facility, and who can also evaluate the effectiveness of control measures.

**Reportable Quantity Release** – a release of a hazardous substance at or above the established legal threshold that requires emergency notification. Refer to 40 CFR Parts 110, 117, and 302 for complete definitions and reportable quantities for which notification is required.

**Runoff coefficient** – the fraction of total rainfall that will appear at the conveyance as runoff. See 40 CFR 122.26(b)(11).

**Semi-Arid Climate** – areas where annual rainfall averages from 10 to 20 inches.

**Significant materials** – includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under section 101(14) of CERCLA; any chemical the facility is required to report pursuant to section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with storm water discharges. See 40 CFR 122.26(b)(12).

**Special Aquatic Sites** – sites identified in 40 CFR 230 Subpart E. These are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region.

**Storm Water** – storm water runoff, snow melt runoff, and surface runoff and drainage. See 40 CFR 122.26(b)(13).

**Storm Water Discharges Associated with Construction Activity** – a discharge of pollutants in storm water runoff from areas where soil disturbing activities (e.g., clearing, grading, or excavating), construction materials, or equipment storage or maintenance (e.g., fill piles, borrow areas, concrete truck washout, fueling), or other industrial storm water directly related to the construction process (e.g., concrete or asphalt batch plants) are located. See 40 CFR 122.26(b)(14)(x) and 40 CFR 122.26(b)(15).

**Storm Water Discharges Associated with Industrial Activity** – the discharge from any conveyance that is used for collecting and conveying storm water and that is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NPDES program under Part 122. For the categories of industries identified in this section, the term includes, but is not limited to, storm water discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste waters (as defined at part 401 of this chapter); sites used for the storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and final products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to storm water. For the purposes of this paragraph, material handling activities include storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product, by-product or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with storm water drained from the above described areas. Industrial facilities include those that are federally, State, or municipally owned or operated that meet the description of the facilities listed in 40 CFR 122.26(b)(14).

**Surface Waters of the State** - Means all streams, lakes, ponds, marshes, watercourses, waterways, springs, irrigation systems, drainage systems, and all other bodies or accumulations of surface water,

natural or artificial, which are situated wholly or partly within, or border upon, this state, or are within its jurisdiction, except those private waters which do not combine or effect a junction with natural surface waters.

**Total Maximum Daily Loads (TMDLs)** – A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL includes wasteload allocations (WLAs) for point source discharges; load allocations (LAs) for nonpoint sources and/or natural background, and shall include a margin of safety (MOS) and account for seasonal variations. (See section 303(d) of the Clean Water Act and 40 CFR 130.2 and 130.7).

**Water Quality Impaired** – See ‘Impaired Water’.

**Water Quality Standards** – A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States and U.S. EPA adopt water quality standards to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act (See CWA sections 101(a)2 and 303(c)). Water quality standards also include an antidegradation policy. See P.U.D. o. 1 of Jefferson County et al v. Wash Dept of Ecology et al, 511 US 701, 705 (1994).

**“You” and “Your”** – as used in this permit are intended to refer to the permittee, the operator, or the discharger as the context indicates and that party’s facility or responsibilities. The use of “you” and “your” refers to a particular facility and not to all facilities operated by a particular entity. For example, “you shall submit” means the permittee shall submit something for that particular facility. Likewise, “all your discharges” would refer only to discharges at that one facility.

## **ABBREVIATIONS AND ACRONYMS**

BAT – Best Available Technology Economically Achievable

BOD5 – Biochemical Oxygen Demand (5-day test)

BMP – Best Management Practice

BPJ – Best Professional Judgment

BPT – Best Practicable Control Technology Currently Available

CERCLA – Comprehensive Environmental Response, Compensation and Liability Act

CGP – Construction General Permit

COD – Chemical Oxygen Demand

CWA – Clean Water Act (or the Federal Water Pollution Control Act, 33 U.S.C. §1251 *et seq*)

CWT – Centralized Waste Treatment

DMR – Discharge Monitoring Report

U.S. EPA – U. S. Environmental Protection Agency

FWS – U. S. Fish and Wildlife Service

LA – Load Allocations

MDMR – MSGP Discharge Monitoring Report

MGD – Million Gallons per Day

MOS – Margin of Safety

MS4 – Municipal Separate Storm Sewer System

MSDS – Material Safety Data Sheet

MSGP – Multi-Sector General Permit

NAICS – North American Industry Classification System

NMFS – U. S. National Marine Fisheries Service

NOI – Notice of Intent

NOT – Notice of Termination

NPDES – National Pollutant Discharge Elimination System

NRC – National Response Center

NTU – Nephelometric Turbidity Unit

OMB – U. S. Office of Management and Budget

ORW – Outstanding Resource Water

OSM – U. S. Office of Surface Mining

POTW – Publicly Owned Treatment Works

RCRA – Resource Conservation and Recovery Act

RQ – Reportable Quantity

SARA – Superfund Amendments and Reauthorization Act

SIC – Standard Industrial Classification

SMCRA – Surface Mining Control and Reclamation Act

SPCC – Spill Prevention, Control, and Countermeasures

SWPPP – Storm Water Pollution Prevention Plan

TMDL – Total Maximum Daily Load

TSDf – Treatment, Storage, or Disposal Facility

TSS – Total Suspended Solids

USGS – United States Geological Survey

WLA – Wasteload Allocation

WQS – Water Quality Standard

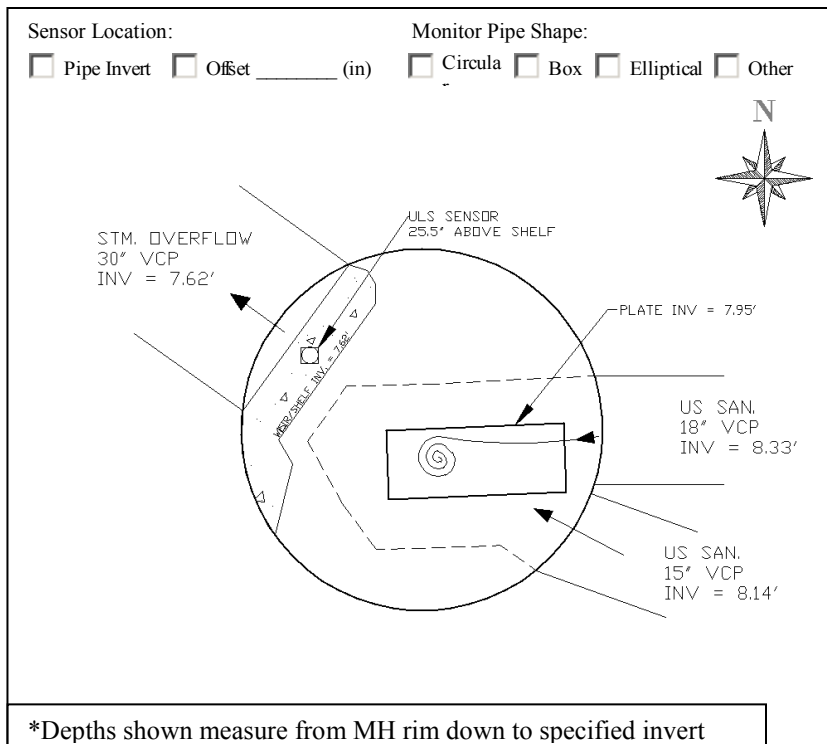
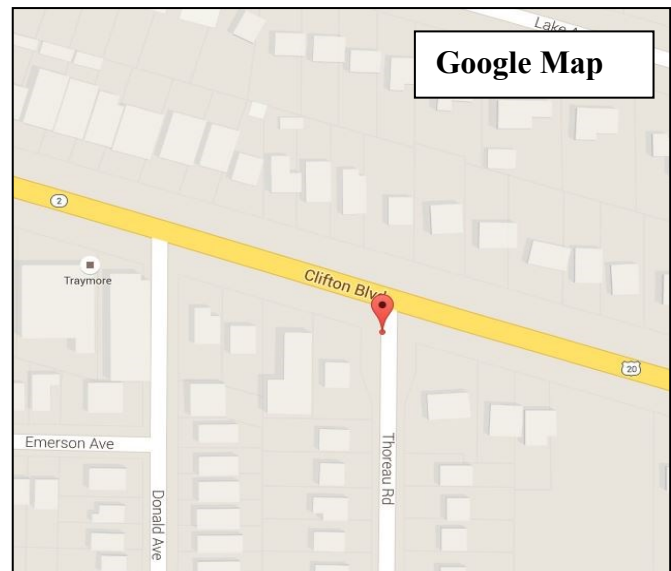


**Attachment K**  
Overflow Monitor Installation Reports

# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CSO-LEWS1035-A                                                                                                                                                                                                                                                                                                                                       |
| <b>Install Date/Time:</b>              | 11/3/15 @ 12:40 AM<br>Relocated on 2/12/16 @ 12:00 PM                                                                                                                                                                                                                                                                                                   |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                                                                                                                                                                                             |
| <b>Latitude:</b>                       | 41° 29' 23.28" N                                                                                                                                                                                                                                                                                                                                        |
| <b>Longitude:</b>                      | 81° 46' 44.6304" W                                                                                                                                                                                                                                                                                                                                      |
| <b>Address or Intersection:</b>        | Thoreau at Clifton                                                                                                                                                                                                                                                                                                                                      |
| <b>Location Description:</b>           | Manhole in brick crosswalk through Thoreau at Clifton intersection.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                                                                                                                                                            |
| <b>Notable Site/MH Conditions:</b>     | Sensor installed over newly leveled weir wall. Site is calibrated to weir = -0.1". Live readings and dry weather data show a dry level reading bounce of up to 0.40". Overflow should be considered as consistent, consecutive, high quality readings above 0.50".<br><br>Silt depth, oil/grease, overflow, surcharge evidence, structural damage, etc. |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                                                                                                                                                                                           |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                                                                                                                                                                                                    |
| <b>MH Condition:</b>                   | <input checked="" type="checkbox"/> Poor <input type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Great                                                                                                                                                                                                                     |
| <b>MH Depth (ft):</b><br>Rim to invert | 7.92'                                                                                                                                                                                                                                                                                                                                                   |

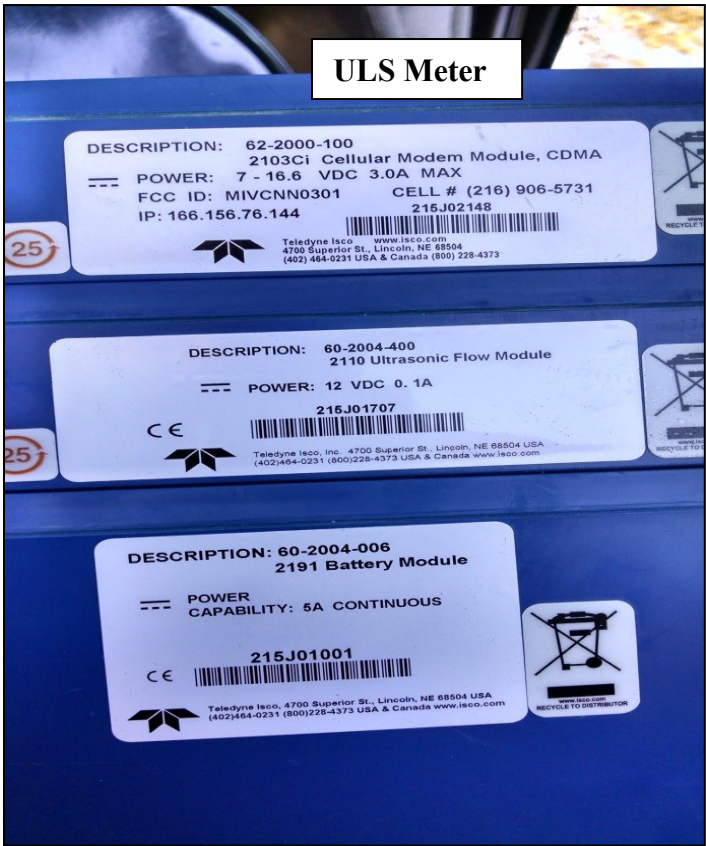
|                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                        |
| <b>Job #:</b> 14437                                                                                                            |
| <b>Meter Owner:</b>                                                                                                            |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav  |
| Other:                                                                                                                         |
| <b>Sensor type:</b><br><input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler    |
| Other:                                                                                                                         |
| <b>Recording Interval (min):</b> 5                                                                                             |
| <b>Cell Service Number:</b><br>(216) 906-5731                                                                                  |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-148<br>Ultrasonic Serial #: 215-J01-707 |
| <b>Collection Frequency:</b> 24 hours                                                                                          |
| <b>Lakewood Asset #:</b> 548289                                                                                                |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-LEWS1035-A |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |





# Flow Monitor Site Installation Sheet

|                                    |                                                                                                                                                      |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                    | LK_CSO-LEWS1040-A                                                                                                                                    |
| <b>Install Date/Time:</b>          | 10/27/15 @ 9:15 AM<br>Relocated on 12/9/15 @ 12:00 PM                                                                                                |
| <b>Install Crew:</b>               | John Kelly & George Stevens                                                                                                                          |
| <b>Latitude:</b>                   | 41° 29' 44.01" N                                                                                                                                     |
| <b>Longitude:</b>                  | 81° 46' 57.845" W                                                                                                                                    |
| <b>Address or Intersection:</b>    | Cliff Drive & Nicholson Avenue                                                                                                                       |
| <b>Location Description:</b>       | MH in tree lawn at corner of Cliff Drive & Nicholson Avenue<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc. |
| <b>Notable Site/MH Conditions:</b> | Shooting NW sanitary outlet. Level readings above 10.8" indicate overflow.<br><br>8" VCP on NE side from catch basin is plugged solid.               |

Client: Lakewood

Job #: 14437

**Meter Owner:**

**Meter Type:**

☐ Sigma ☒ Isco ☐ FloWav

Other:

**Sensor type:**

☒ ULS ☐ AV ☐ Sampler

Other:

**Recording Interval (min):** 5

**Cell Service Number:**

(216) 906-5976

Collection Methods:

Manual/cell/etc.: Cellular

Modem Serial #: 215-J02-151

Ultrasonic Serial #: 215-J01-703

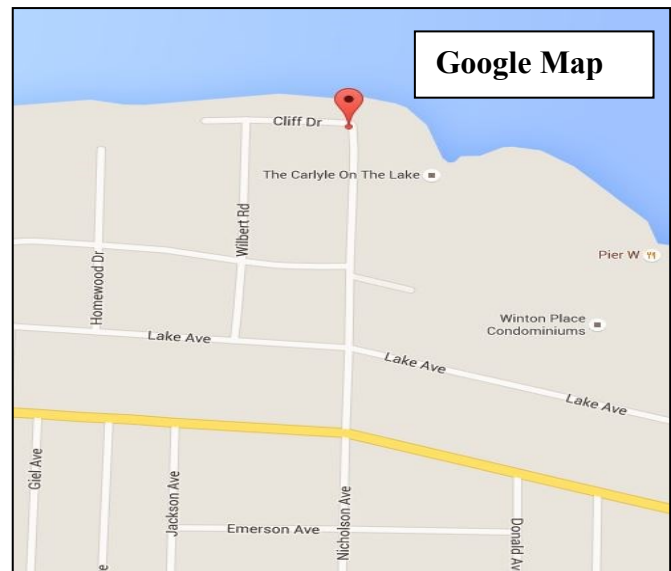
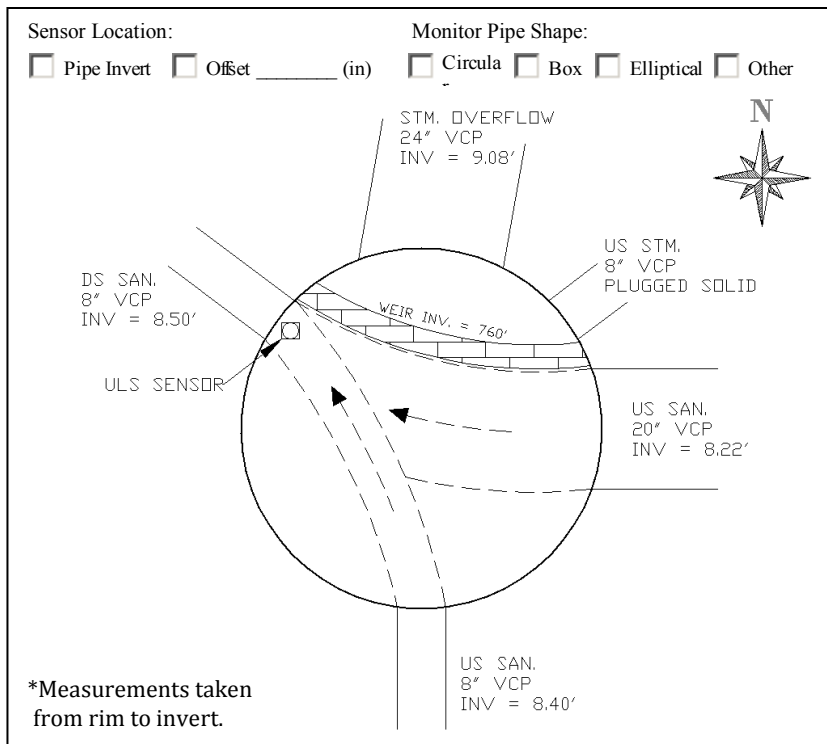
Collection Frequency: 24 hours

**Lakewood Asset #: 548290**

|                                        |                                                                                                                                                      |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                        |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                  |
| <b>MH Depth (ft):</b><br>Rim to invert | 8.40'                                                                                                                                                |



Site View



Google Map



# Flow Monitor Site Installation Sheet

**Meter Name:**

LK\_CSO-LEWS1040-A

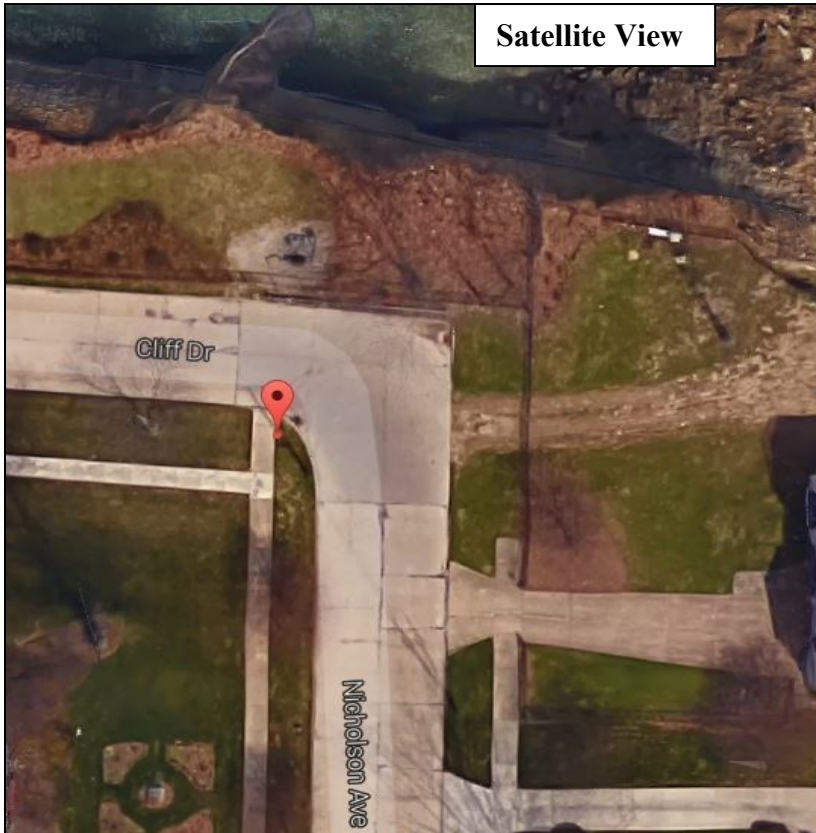
Client: Lakewood

Job #: 14437

**Installed Plan View**



**Satellite View**



**ULS Meter**

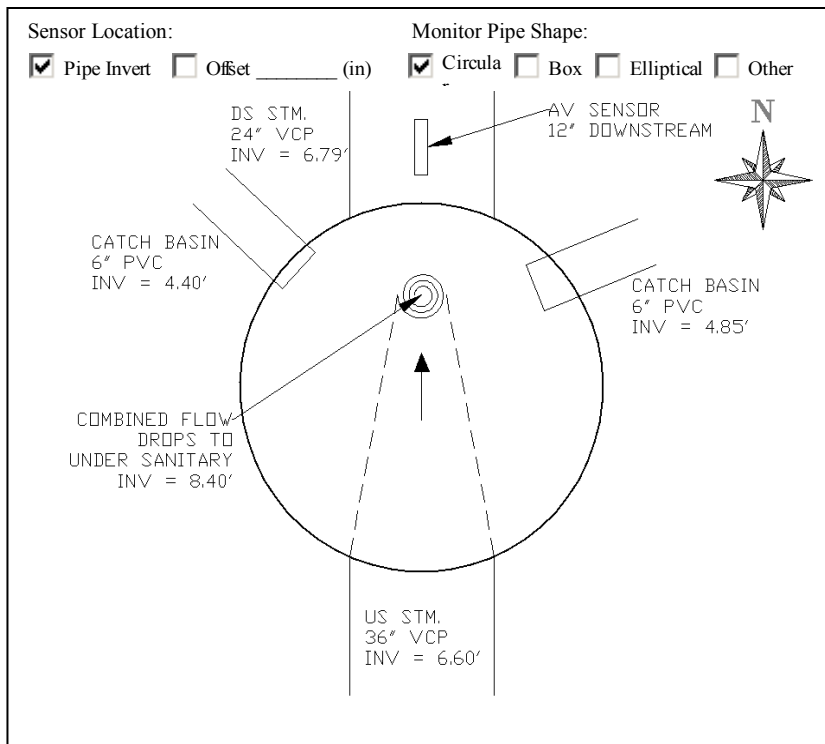




# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                                                                                  |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CS0-LEWS1040-C                                                                                                                                                                                                                |
| <b>Install Date/Time:</b>              | 10/22/15<br>2:45 PM                                                                                                                                                                                                              |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                                                                      |
| <b>Latitude:</b>                       | 41° 29' 2.85" N                                                                                                                                                                                                                  |
| <b>Longitude:</b>                      | 81° 46' 49.27" W                                                                                                                                                                                                                 |
| <b>Address or Intersection:</b>        | 1414 Grace Ave                                                                                                                                                                                                                   |
| <b>Location Description:</b>           | MH in crown of Grace Avenue south of Detroit Avenue<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                                                     |
| <b>Notable Site/MH Conditions:</b>     | Combined flow from south also coming from underneath 24" pipe. AV sensor facing downstream so overflows will record as negative velocities.<br><br>Silt depth, oil/grease, overflow, surcharge evidence, structural damage, etc. |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                                                                    |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                                                                             |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                                                                              |
| <b>MH Depth (ft):</b><br>Rim to invert | 6.76'                                                                                                                                                                                                                            |

|                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                                 |
| <b>Job #:</b> 14437                                                                                                                     |
| <b>Meter Owner:</b>                                                                                                                     |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other: |
| <b>Sensor type:</b><br><input type="checkbox"/> ULS <input checked="" type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:   |
| <b>Recording Interval (min):</b> 5                                                                                                      |
| <b>Cell Service Number:</b><br>(216) 906-6884                                                                                           |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Modem Serial #: 215-J02-157<br>AV Serial #: 215-H00-839                     |
| <b>Collection Frequency:</b> 24 hours                                                                                                   |
| <b>Lakewood Asset #:</b> 548273                                                                                                         |



|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-LEWS1040-C |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |

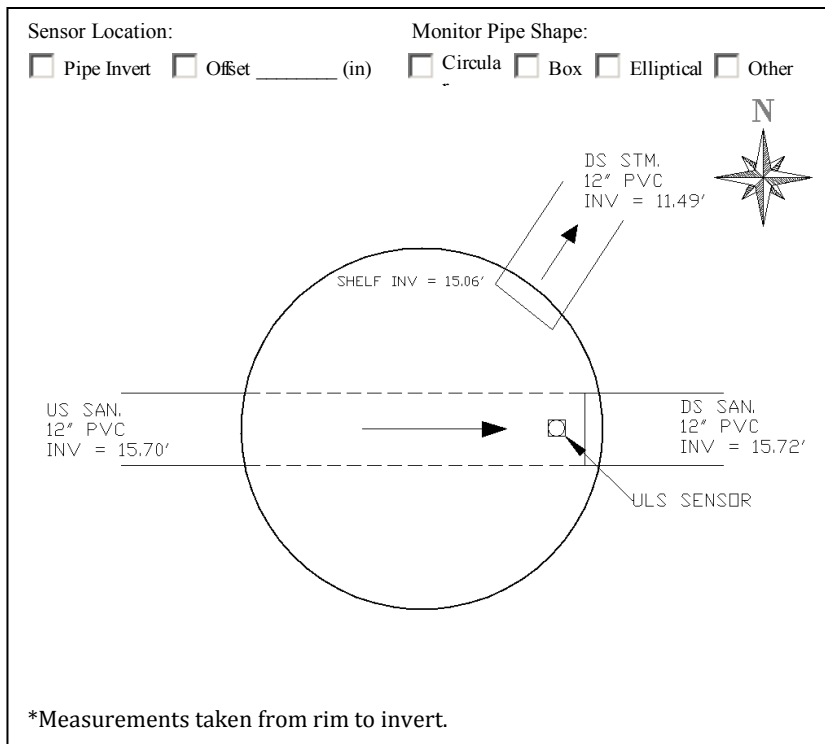
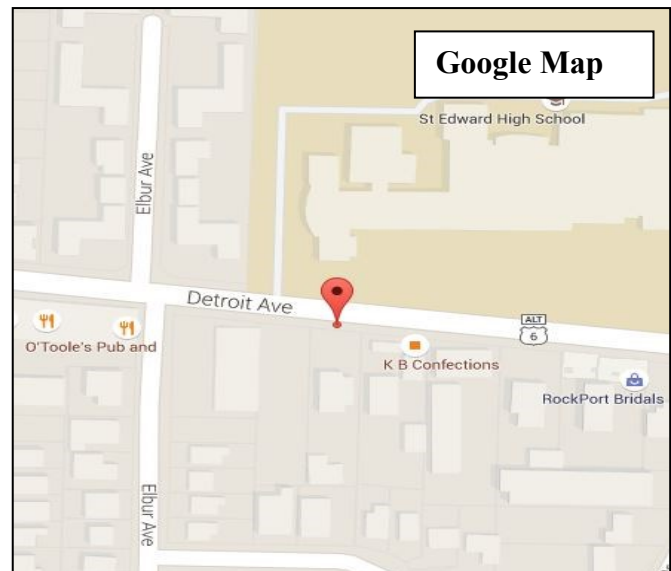




# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                                                                                       |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CSO-LEWS1040-D                                                                                                                                                                                                                     |
| <b>Install Date/Time:</b>              | 11/4/15 @ 8:58 AM<br>Relocated on 12/22/15 @ 1:39 PM                                                                                                                                                                                  |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                                                                           |
| <b>Latitude:</b>                       | 41° 29' 6.342" N                                                                                                                                                                                                                      |
| <b>Longitude:</b>                      | 81° 47' 8.2104" W                                                                                                                                                                                                                     |
| <b>Address or Intersection:</b>        | 13523 Detroit Avenue                                                                                                                                                                                                                  |
| <b>Location Description:</b>           | Manhole in parking spot on Detroit Avenue east of Elbur Avenue<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                                               |
| <b>Notable Site/MH Conditions:</b>     | Sensor installed over sanitary outlet on east side of manhole. Level readings above 50.76" indicate overflow out northeast bound storm outlet.<br><br>Siltng depth, oil/grease, overflow, surcharge evidence, structural damage, etc. |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                                                                         |
| <b>MH Material:</b>                    | <input type="checkbox"/> Brick <input checked="" type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                                                                                  |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                                                                                   |
| <b>MH Depth (ft):</b><br>Rim to invert | 15.71'                                                                                                                                                                                                                                |

|                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                     |
| <b>Job #:</b> 14437                                                                                                         |
| <b>Meter Owner:</b>                                                                                                         |
| <b>Meter Type:</b>                                                                                                          |
| <input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav                     |
| Other:                                                                                                                      |
| <b>Sensor type:</b>                                                                                                         |
| <input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler                        |
| Other:                                                                                                                      |
| <b>Recording Interval (min):</b> 5                                                                                          |
| <b>Cell Service Number:</b><br>(216) 906-5607                                                                               |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Modem Serial #: 215-J02-145<br>Ultrasonic Serial #: 215-H02-351 |
| <b>Collection Frequency:</b> 24 hours                                                                                       |
| <b>Lakewood Asset #:</b> 548287                                                                                             |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-LEWS1040-D |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |



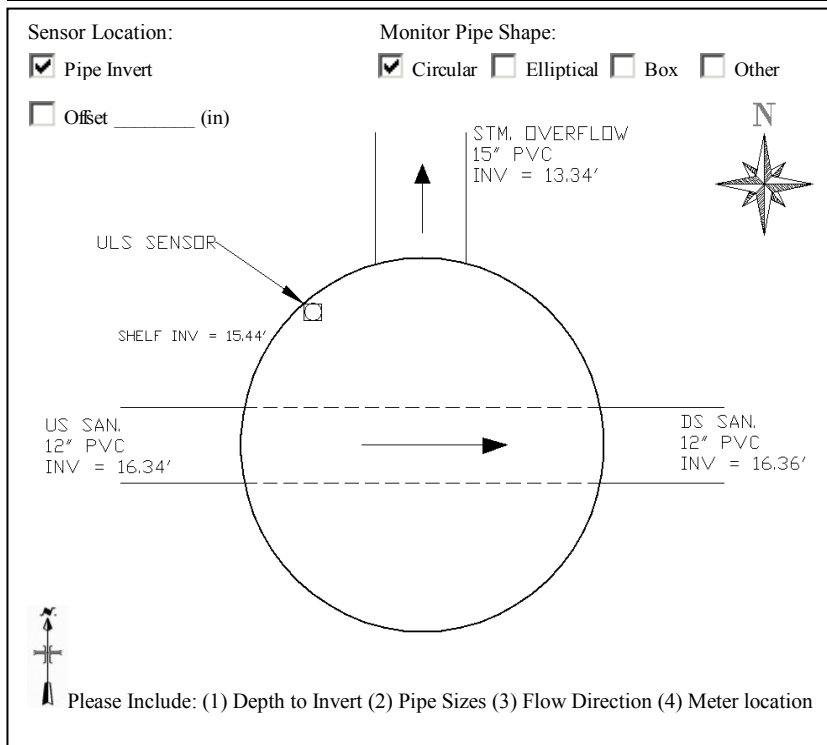
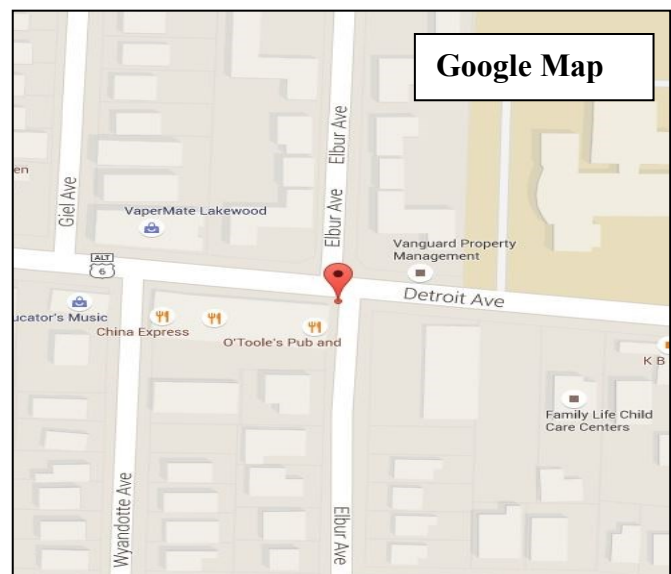


# Flow Monitor Site Installation Sheet

|                                                    |                                                                                                                                                                                                                    |  |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Site ID:</b>                                    | LK_CSO-LEWS1040-E                                                                                                                                                                                                  |  |
| <b>Install Date/Time:</b><br>Eastern Standard Time | 12/3/15 @ 3:00 PM<br>Reinstalled on 7/23/16 @ 9:30 AM                                                                                                                                                              |  |
| <b>Install Crew:</b>                               | Tim McLaughlin & John Kelly                                                                                                                                                                                        |  |
| <b>Latitude:</b><br>Use decimal                    | 41.485174° N                                                                                                                                                                                                       |  |
| <b>Longitude:</b><br>Use decimal                   | 81.786550° W                                                                                                                                                                                                       |  |
| <b>Address or Intersection:</b>                    | Detroit Avenue and Elbur Avenue                                                                                                                                                                                    |  |
| <b>Location Description:</b>                       | MH on right hand side of eastbound lane on Detroit Avenue about 5' into intersection with Elbur Avenue.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                   |  |
| <b>Notable Site/MH Conditions:</b>                 | Sensor was reinstalled over sanitary outlet on east side of MH. Overflow out of northbound pipe begins at levels of 34.93".<br><br>Siltng depth, oil/grease, overflow, surcharge evidence, structural damage, etc. |  |
| <b>Type of Sewer:</b>                              | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                                                      |  |
| <b>MH Material:</b>                                | <input type="checkbox"/> Brick <input checked="" type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                                                               |  |
| <b>MH Condition:</b>                               | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                                                                |  |
| <b>MH Depth (ft):</b><br>Rim to invert 16.39'      | <b>Sensor Depth (ft):</b><br>Rim to Sensor Head                                                                                                                                                                    |  |

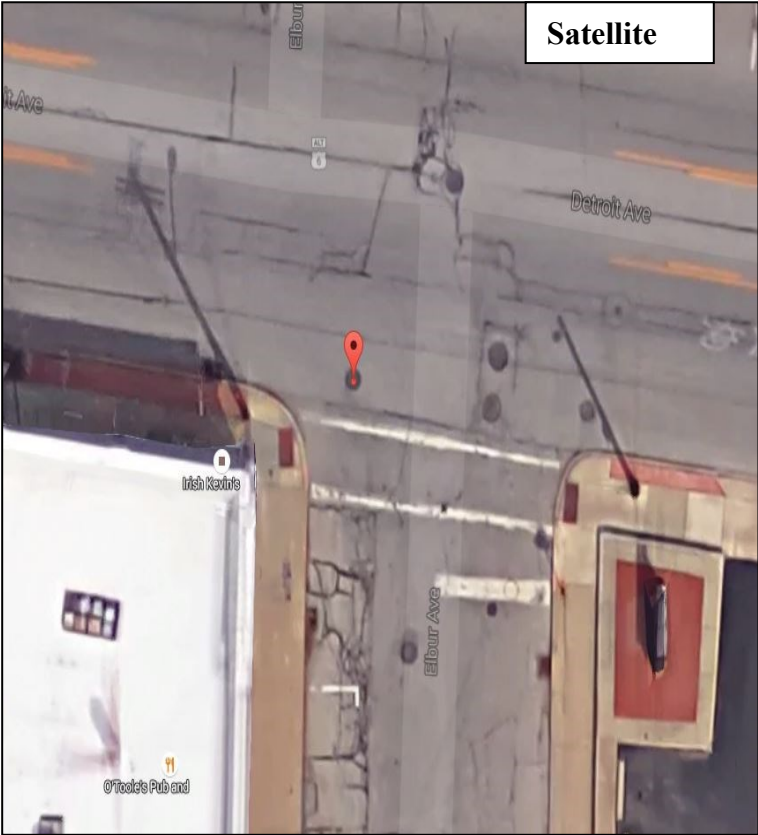
|                |          |
|----------------|----------|
| <b>Client:</b> | Lakewood |
| <b>Job #:</b>  | 14437    |

|                                  |                                                                                                                         |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Meter Owner:</b>              |                                                                                                                         |
| <b>Meter Type:</b>               | <input checked="" type="checkbox"/> Isco <input type="checkbox"/> Sigma <input type="checkbox"/> FloWav<br>Other: _____ |
| <b>Sensor type:</b>              | <input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other: _____    |
| <b>Recording Interval (min):</b> | 5                                                                                                                       |
| <b>Cell Service Number:</b>      | (216) 906-4946                                                                                                          |
| <b>Collection Methods:</b>       | Manual/cell/etc.: Cellular                                                                                              |
| <b>MEID #:</b>                   | 215-J02-140                                                                                                             |
| <b>Cell #:</b>                   | 216-H02-353                                                                                                             |
| <b>Collection Frequency:</b>     | 24 hours                                                                                                                |



|                 |                   |
|-----------------|-------------------|
| <b>Site ID:</b> | LK_CSO-LEWS1040-E |
|-----------------|-------------------|

|                |          |
|----------------|----------|
| <b>Client:</b> | Lakewood |
| <b>Job #:</b>  | 14437    |



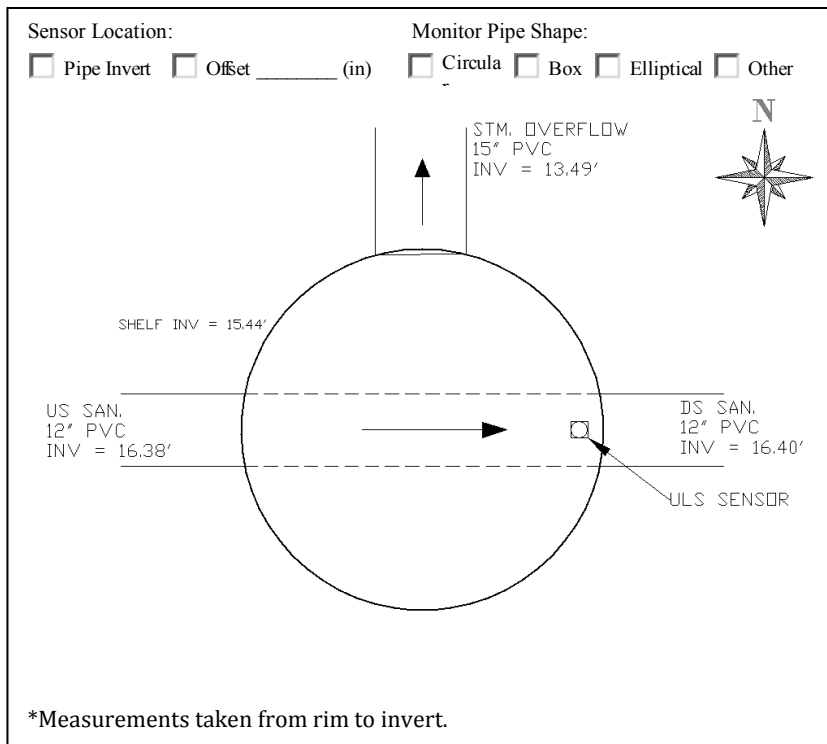
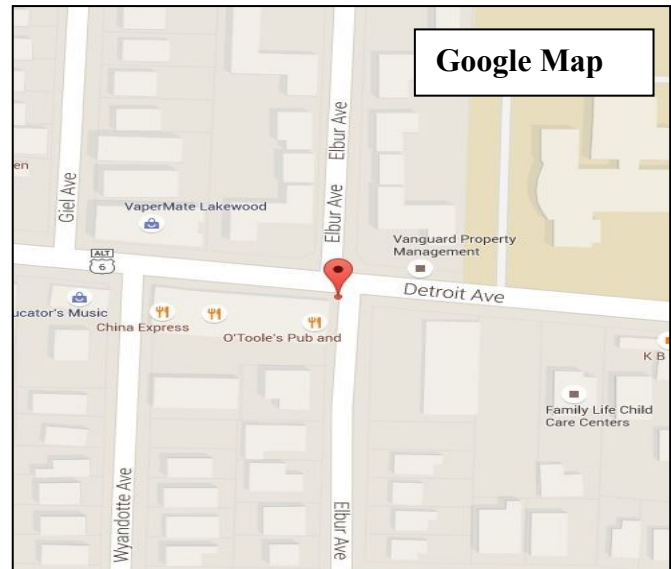


# Flow Monitor Site Installation Sheet

|                                    |                                                                                                                                                                                                                  |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                    | LK_CS0-LEWS1040-E                                                                                                                                                                                                |
| <b>Install Date/Time:</b>          | 11/3/15 @ 10:33 AM<br>Relocated on 12/18/15 @ 3:00 PM                                                                                                                                                            |
| <b>Install Crew:</b>               | John Kelly & George Stevens                                                                                                                                                                                      |
| <b>Latitude:</b>                   | 41.485174° N                                                                                                                                                                                                     |
| <b>Longitude:</b>                  | 81.786550° W                                                                                                                                                                                                     |
| <b>Address or Intersection:</b>    | Detroit Avenue at Elbur Avenue                                                                                                                                                                                   |
| <b>Location Description:</b>       | MH on right hand side of eastbound lane on Detroit Avenue about 5' into intersection with Elbur.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                        |
| <b>Notable Site/MH Conditions:</b> | Sensor installed over sanitary outlet on east side of manhole. Overflow out of north bound pipe begins at levels of 34.93".<br><br>Silt depth, oil/grease, overflow, surcharge evidence, structural damage, etc. |

|                                                                                                         |
|---------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                 |
| <b>Job #:</b> 14437                                                                                     |
| <b>Meter Owner:</b>                                                                                     |
| <b>Meter Type:</b>                                                                                      |
| <input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav |
| Other:                                                                                                  |
| <b>Sensor type:</b>                                                                                     |
| <input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler    |
| Other:                                                                                                  |
| <b>Recording Interval (min):</b> 5                                                                      |
| <b>Cell Service Number:</b>                                                                             |
| (216) 906-4946                                                                                          |
| <b>Collection Methods:</b>                                                                              |
| Manual/cell/etc.: Cellular                                                                              |
| Modem Serial #: 215-J02-140                                                                             |
| Ultrasonic Serial #: 215-H02-353                                                                        |
| <b>Collection Frequency:</b> 24 hours                                                                   |
| <b>Lakewood Asset #:</b> 548288                                                                         |

|                       |                                                                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type of Sewer:</b> | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                        |
| <b>MH Material:</b>   | <input type="checkbox"/> Brick <input checked="" type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place |
| <b>MH Condition:</b>  | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                  |
| <b>MH Depth (ft):</b> | 16.39'                                                                                                                                               |
| Rim to invert         |                                                                                                                                                      |



# Flow Monitor Site Installation Sheet

**Meter Name:**

LK\_CSO-LEWS1040-E

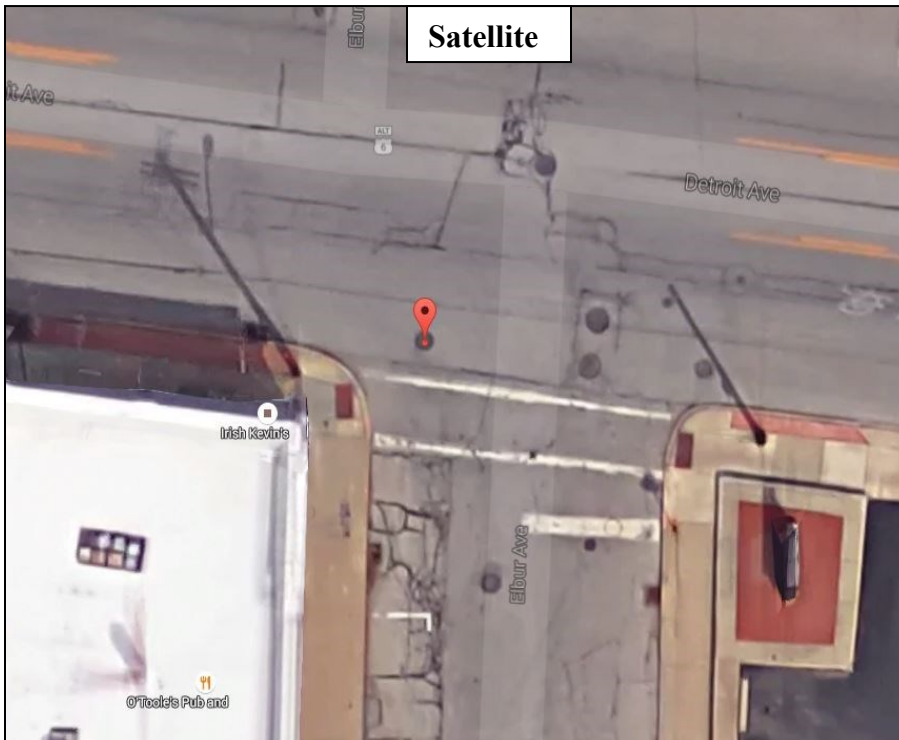
Client: Lakewood

Job #: 14437

**Installed Plan View**



**Satellite**



**ULS Meter**



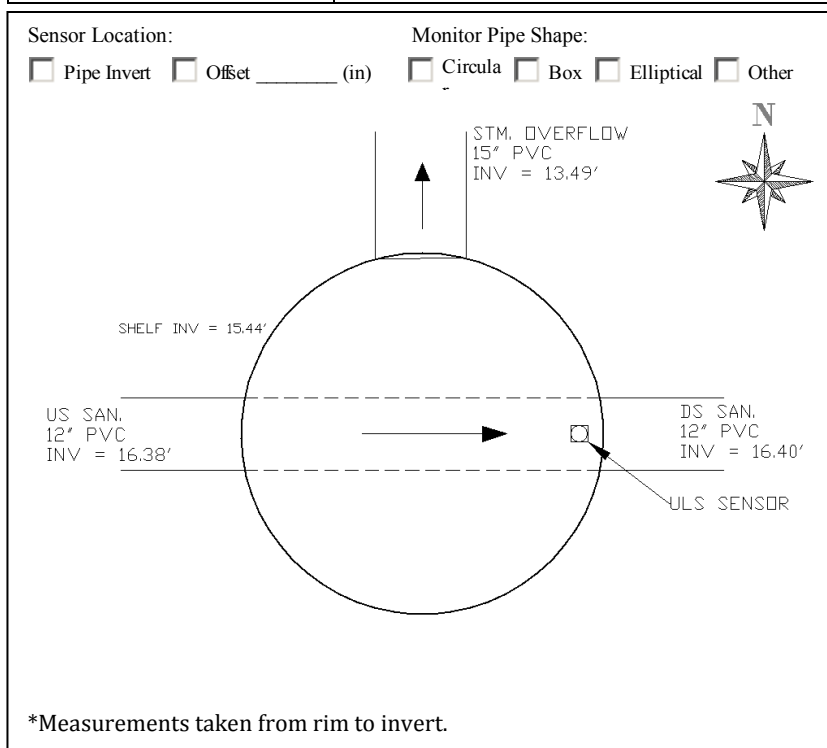
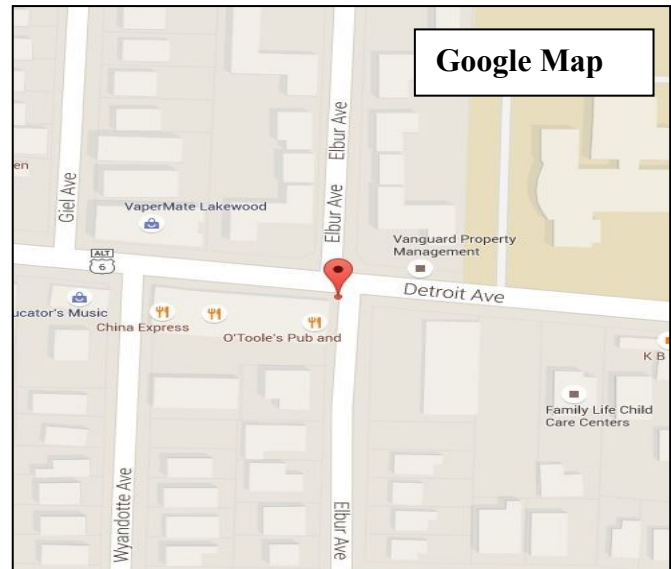


# Flow Monitor Site Installation Sheet

|                                    |                                                                                                                                                                                                                      |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                    | LK_CS0-LEWS1040-E                                                                                                                                                                                                    |
| <b>Install Date/Time:</b>          | 11/3/15 @ 10:33 AM<br>Relocated on 12/18/15 @ 3:00 PM                                                                                                                                                                |
| <b>Install Crew:</b>               | John Kelly & George Stevens                                                                                                                                                                                          |
| <b>Latitude:</b>                   | 41.485174° N                                                                                                                                                                                                         |
| <b>Longitude:</b>                  | 81.786550° W                                                                                                                                                                                                         |
| <b>Address or Intersection:</b>    | Detroit Avenue at Elbur Avenue                                                                                                                                                                                       |
| <b>Location Description:</b>       | MH on right hand side of eastbound lane on Detroit Avenue about 5' into intersection with Elbur.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                            |
| <b>Notable Site/MH Conditions:</b> | Sensor installed over sanitary outlet on east side of manhole. Overflow out of north bound pipe begins at levels of 34.93".<br><br>Siltling depth, oil/grease, overflow, surcharge evidence, structural damage, etc. |

|                                                                                                         |
|---------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                 |
| <b>Job #:</b> 14437                                                                                     |
| <b>Meter Owner:</b>                                                                                     |
| <b>Meter Type:</b>                                                                                      |
| <input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav |
| Other:                                                                                                  |
| <b>Sensor type:</b>                                                                                     |
| <input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler    |
| Other:                                                                                                  |
| <b>Recording Interval (min):</b> 5                                                                      |
| <b>Cell Service Number:</b> (216) 906-4946                                                              |
| <b>Collection Methods:</b>                                                                              |
| Manual/cell/etc.: Cellular                                                                              |
| Modem Serial #: 215-J02-140                                                                             |
| Ultrasonic Serial #: 215-H02-353                                                                        |
| <b>Collection Frequency:</b> 24 hours                                                                   |
| <b>Lakewood Asset #:</b> 548288                                                                         |

|                                        |                                                                                                                                                      |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                        |
| <b>MH Material:</b>                    | <input type="checkbox"/> Brick <input checked="" type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                  |
| <b>MH Depth (ft):</b><br>Rim to invert | 16.39'                                                                                                                                               |



# Flow Monitor Site Installation Sheet

**Meter Name:**

LK\_CSO-LEWS1040-E

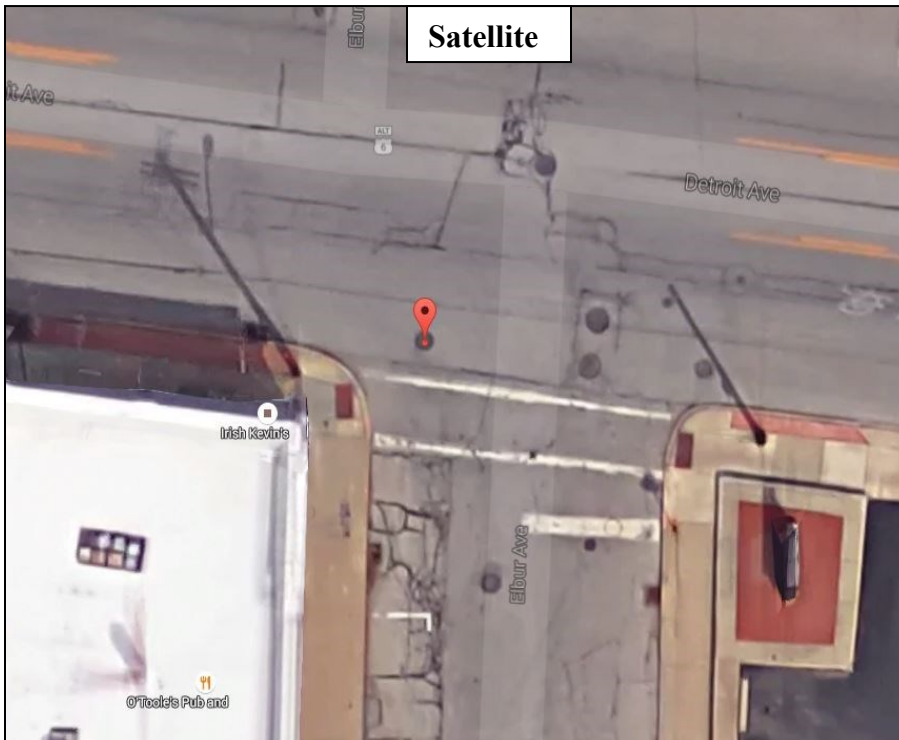
Client: Lakewood

Job #: 14437

**Installed Plan View**



**Satellite**



**ULS Meter**

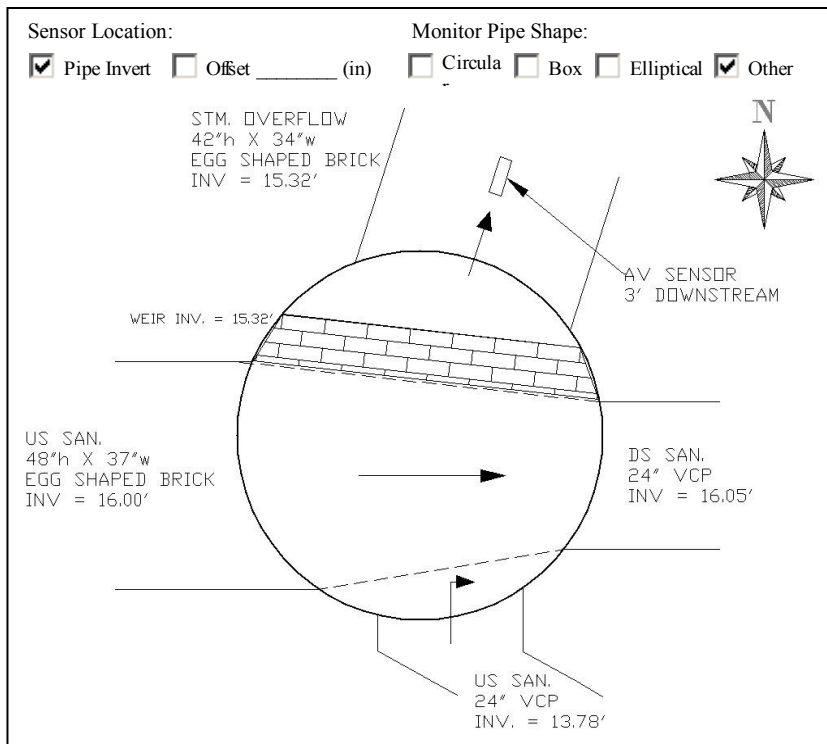
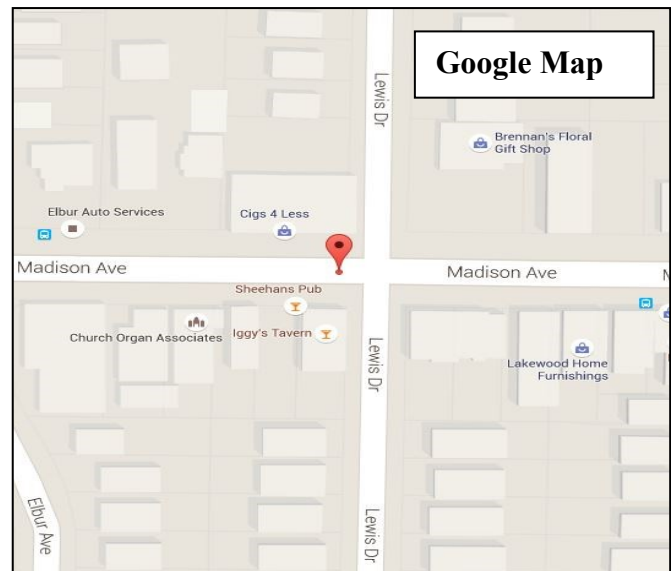




# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                            |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CS0-LEWS1040-G                                                                                                                                                          |
| <b>Install Date/Time:</b>              | 11/9/15<br>2:37 PM                                                                                                                                                         |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                |
| <b>Latitude:</b>                       | 41° 28' 37.27" N                                                                                                                                                           |
| <b>Longitude:</b>                      | 81° 47' 7.98" W                                                                                                                                                            |
| <b>Address or Intersection:</b>        | Madison Avenue at Lewis Avenue                                                                                                                                             |
| <b>Location Description:</b>           | MH in eastbound turning lane of Madison Ave.<br>Turning north onto Lewis Dr.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.      |
| <b>Notable Site/MH Conditions:</b>     | Normal flows will record as negative.<br>Egg shaped brick pipe: 42" high by 34" wide.<br><br>Silt depth, oil/grease, overflow, surcharge evidence, structural damage, etc. |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                              |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                       |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                             |
| <b>MH Depth (ft):</b><br>Rim to invert | 16.0'                                                                                                                                                                      |

|                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                                                          |
| <b>Job #:</b> 14437                                                                                                                                              |
| <b>Meter Owner:</b>                                                                                                                                              |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other:                          |
| <b>Sensor type:</b><br><input type="checkbox"/> ULS <input checked="" type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:                            |
| <b>Recording Interval (min):</b> 5                                                                                                                               |
| <b>Cell Service Number:</b> (216) 906-6879                                                                                                                       |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Modem Serial #: 215-J02-156<br>Area Velocity Serial #: 215-H00-840<br>Collection Frequency: 24 hours |
| <b>Lakewood Asset #: 548271</b>                                                                                                                                  |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-LEWS1040-G |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |



**AV Meter**

DESCRIPTION: 62-2000-100  
2103Ci Cellular Modem Module, CDMA

POWER: 7 - 16.6 VDC 3.0A MAX

FCC ID: MIVCNN0301 CELL # (216) 906-6879

IP: 166.156.76.156 215J02166

Teledyne Isco www.isco.com  
4700 Superior St., Lincoln, NE 68504  
(402) 464-0231 USA & Canada (800) 228-4373

Description: 60-2004-007 Area Velocity 2150 Flow Meter

POWER: 7-26 VDC 0.1A

U.S. Patent No's: 5,557,536  
Foreign Patents Pending

215H00840

Teledyne Isco, Inc. 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com

DESCRIPTION: 60-2004-006  
2191 Battery Module

POWER CAPABILITY: 5A CONTINUOUS

215J00959

Teledyne Isco, Inc. 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com

RECYCLE TO REUSE

# Flow Monitor Site Installation Sheet

|                                    |                                                                                                                                                                                                                                                           |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                    | LK_CSO-LEWS1040-H                                                                                                                                                                                                                                         |
| <b>Install Date/Time:</b>          | Installed on 10/22/15 @ 11:30 AM<br>Relocated on 5/24/16 @ 10:00 AM                                                                                                                                                                                       |
| <b>Install Crew:</b>               | George Stevens & John Kelly                                                                                                                                                                                                                               |
| <b>Latitude:</b>                   | 41° 28' 38.725" N                                                                                                                                                                                                                                         |
| <b>Longitude:</b>                  | 81° 47' 12.225" W                                                                                                                                                                                                                                         |
| <b>Address or Intersection:</b>    | 1682 Elbur Avenue<br>Just south of Madison Ave. intersection                                                                                                                                                                                              |
| <b>Location Description:</b>       | MH in crown of Elbur Avenue<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                                                                                                      |
| <b>Notable Site/MH Conditions:</b> | Area Velocity sensor installed 20" upstream in southern 36" storm inlet pipe. Normal flows will record as positive.<br><br>*The sensor was originally installed downstream facing downstream and had normally negative flows from 10/22/15 until 5/24/16. |

Client: Lakewood

Job #: 14437

**Meter Owner:**

**Meter Type:** ISCO 2110

☐ Sigma ☒ Isco ☐ FloWav

**Sensor type:**

☐ ULS ☒ AV ☐ Sampler

Other:

**Recording Interval:** 5 minutes

**Cell Service Number:**

(216) 906-5024

Collection Methods: **Cellular**

Modem Serial #: 215-J02-142

AV Serial #: 215-H00-864

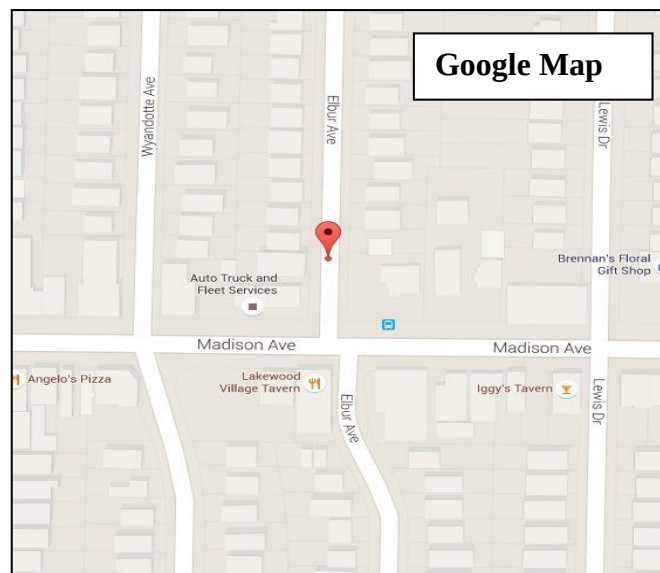
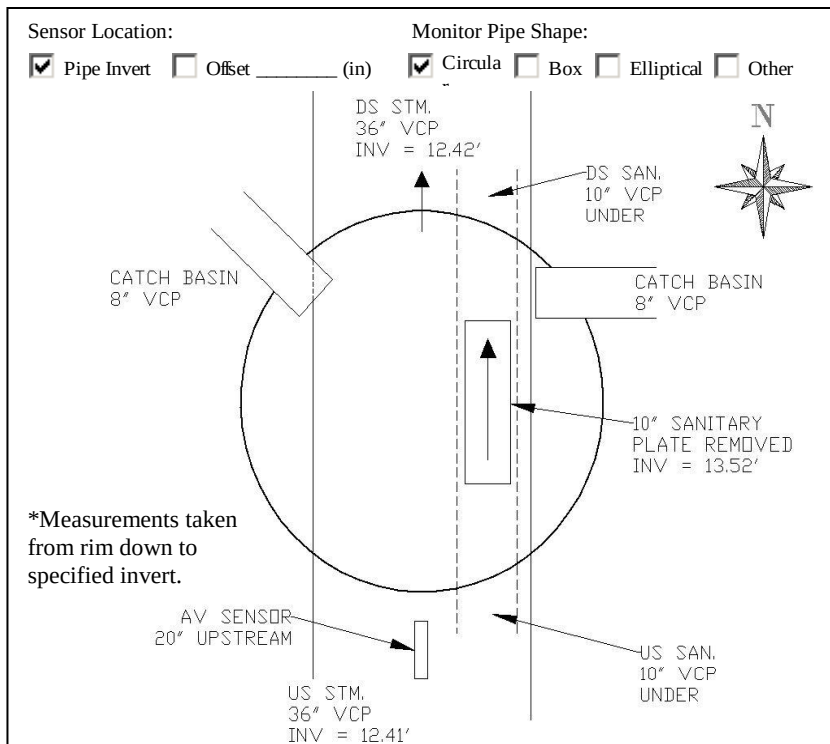
Collection Frequency: **24 hours**

Lakewood Asset #: **548270**

|                                        |                                                                                                                                                      |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                        |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                  |
| <b>MH Depth (ft):</b><br>Rim to invert | 12.1'                                                                                                                                                |



Site View

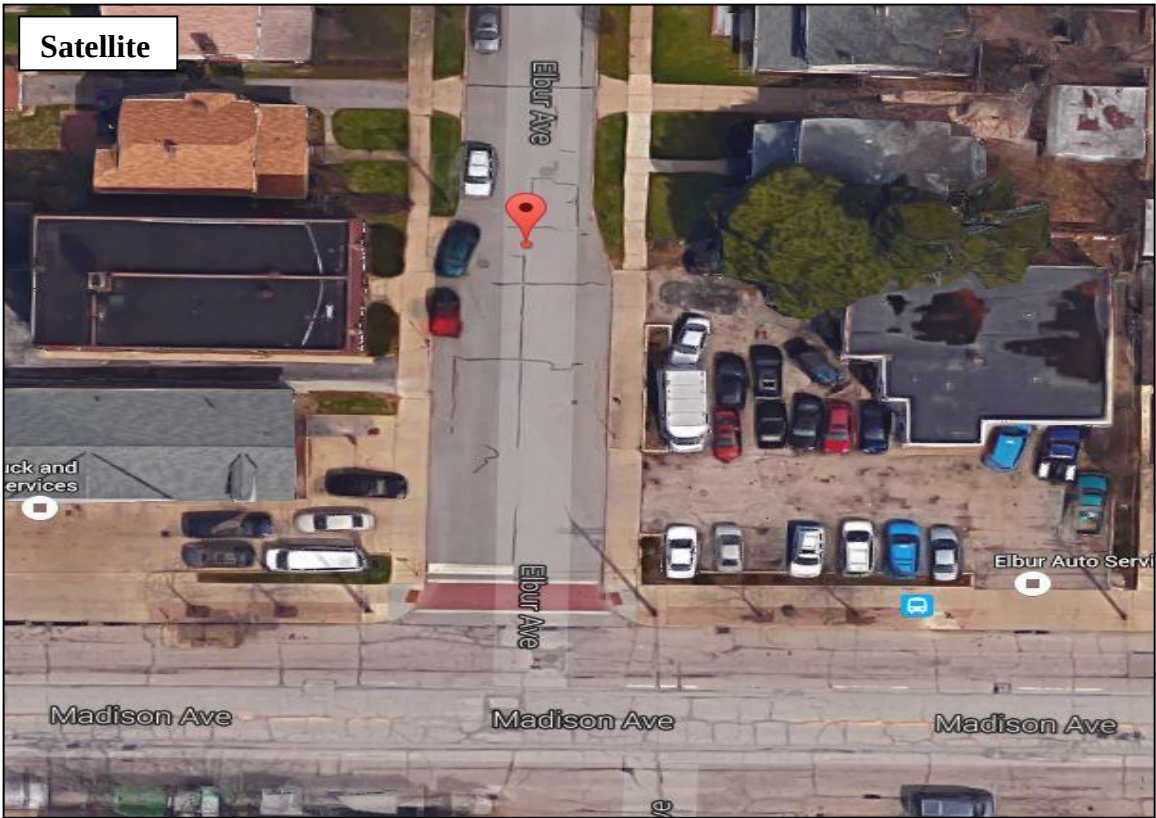


Google Map



|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-LEWS1040-H |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |



# Manhole Inspection

|               |                                                                                                                                                                                         |          |       |          |                       |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------|----------|-----------------------|
| PROJECT NAME: | Lakewood Integrated Wet Weather Improvements                                                                                                                                            | PROJECT# | 14437 | Date:    | 2/23/16               |
| LOCATION:     | Clarence Avenue @ Detroit Avenue                                                                                                                                                        |          |       | Weather: | 33° - Sun             |
| MANHOLE TYPE: | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-Side |          |       | Crew:    | G. Stevens & J. Kelly |
| MANHOLE I.D.: | LK_CSO-LEWS1040-B                                                                                                                                                                       |          |       |          |                       |

|                                                                                                                                                                 |                                           |                                      |                                |                                     |                                               |                                |       |   |              |    |   |    |   |         |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------|--------------------------------|-------------------------------------|-----------------------------------------------|--------------------------------|-------|---|--------------|----|---|----|---|---------|---|
| Manhole Info.                                                                                                                                                   | MANHOLE LOCATION                          |                                      |                                | CONFIGURATION OF MANHOLE            |                                               |                                |       |   |              |    |   |    |   |         |   |
|                                                                                                                                                                 | <input type="checkbox"/> Gutter           | <input type="checkbox"/> Parking Lot | <input type="checkbox"/> Yard  | <input type="checkbox"/> Concentric | <input checked="" type="checkbox"/> Eccentric | <input type="checkbox"/> Other |       |   |              |    |   |    |   |         |   |
|                                                                                                                                                                 | <input checked="" type="checkbox"/> Crown | <input type="checkbox"/> Treelawn    | <input type="checkbox"/> Field | MH Depth:                           | 8.92                                          | Ft.                            |       |   |              |    |   |    |   |         |   |
|                                                                                                                                                                 | <input type="checkbox"/> Drive            | <input type="checkbox"/> Ditch       | <input type="checkbox"/> Swale |                                     |                                               |                                |       |   |              |    |   |    |   |         |   |
| MATERIAL TYPE: <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Precast <input type="checkbox"/> Cast-in-Place <input type="checkbox"/> Other |                                           |                                      |                                |                                     |                                               |                                |       |   |              |    |   |    |   |         |   |
| GPS COORDINATES                                                                                                                                                 |                                           | LATITUDE: N                          | 41                             | °                                   | 29                                            | '                              | 4.884 | " | LONGITUDE W: | 81 | ° | 46 | ' | 53.7996 | " |

| Piping Config. | SIZE | DIRECTION                              | MATERIAL TYPE | INVERT DEPTH | TOP OF PIPE DEPTH | TYPE OF FLOW | LAMPING OBSERVATIONS           |
|----------------|------|----------------------------------------|---------------|--------------|-------------------|--------------|--------------------------------|
|                | 30"  | <input checked="" type="checkbox"/> N  | VCP           | 9.07'        |                   | STM          | Storm Overflow pipe            |
|                | 28"  | <input checked="" type="checkbox"/> S  | RCP           | 7.66'        |                   | SAN          | Over sanitary - drops to under |
|                |      | <input type="checkbox"/> E             |               |              |                   |              |                                |
|                |      | <input type="checkbox"/> W             |               |              |                   |              |                                |
|                | 8"   | <input checked="" type="checkbox"/> NW | VCP           | 6.48'        |                   | STM          | Catch Basin                    |
|                |      | <input checked="" type="checkbox"/> S  |               | 10.52'       |                   | SAN          | Under sanitary                 |
|                |      | <input type="checkbox"/>               |               |              |                   |              |                                |

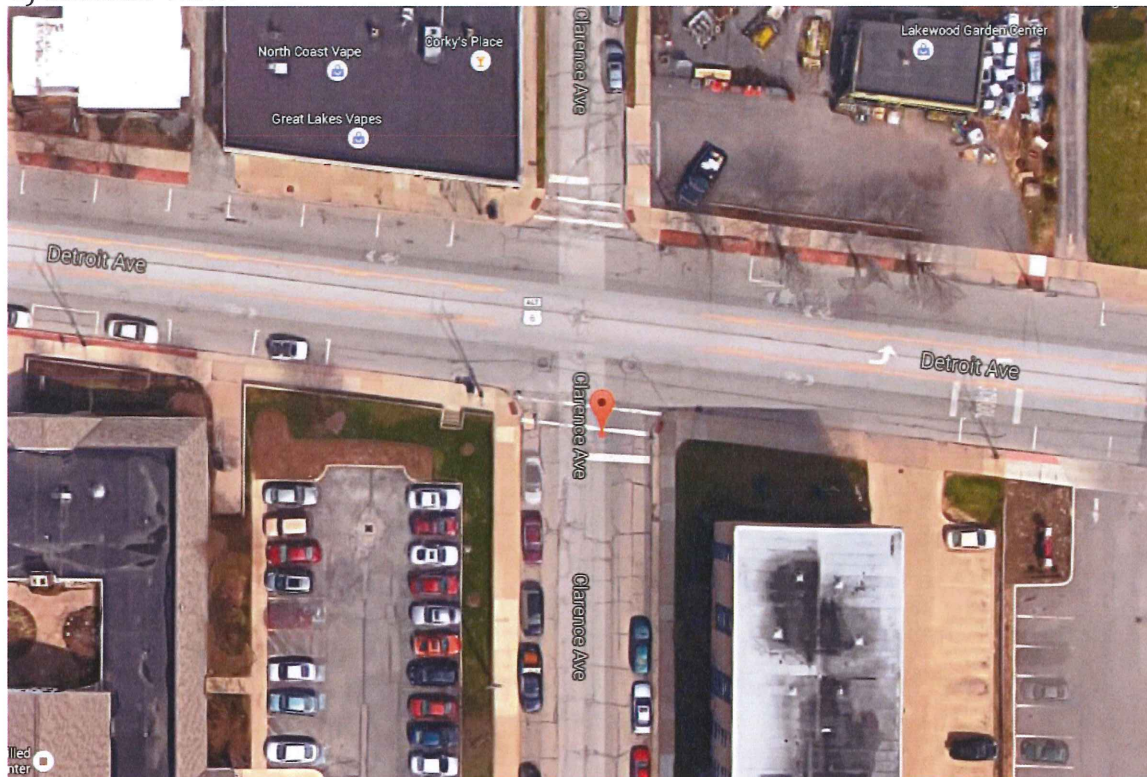
Material Types: VCP - Vitrified Clay; RCP - Reinforced Concrete; PVC - Plastic; DIP - Ductile Iron; TRS - Truss

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Comments | <p>Video shows infiltration from under the 28" southern inlet at about the 1:14 mark.</p> <p>Weir wall is 1.94' = 23.28" above the sanitary under pipe.</p> <p>Weir inverts = 8.70' on west end, 8.51' center, 8.55' on east end</p> <p>High water mark on eastern wall is approximately 6.7' down from the rim.</p> <p>Hitting the sanitary flow with an ultrasonic sensor will be difficult due to the size of the opening, the location in the mh, and the turbulence seen in the flow. Placing an AV in the overflow pipe will give us good indications of overflow events. There isn't a good spot to put an AV in the sanitary flow.</p> |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Pictures | Picture # | Description            | Picture # | Description                                  |
|----------|-----------|------------------------|-----------|----------------------------------------------|
|          | 1         | Satellite view         | 4         | Surround area facing NW                      |
|          | 2         | Site View facing north | 5         | Southern inlet showing possible infiltration |
|          | 3         | Plan View facing north | 6         | CAD Sketch                                   |



1) Satellite View:



2) Site View facing north:





3) Plan View facing north:



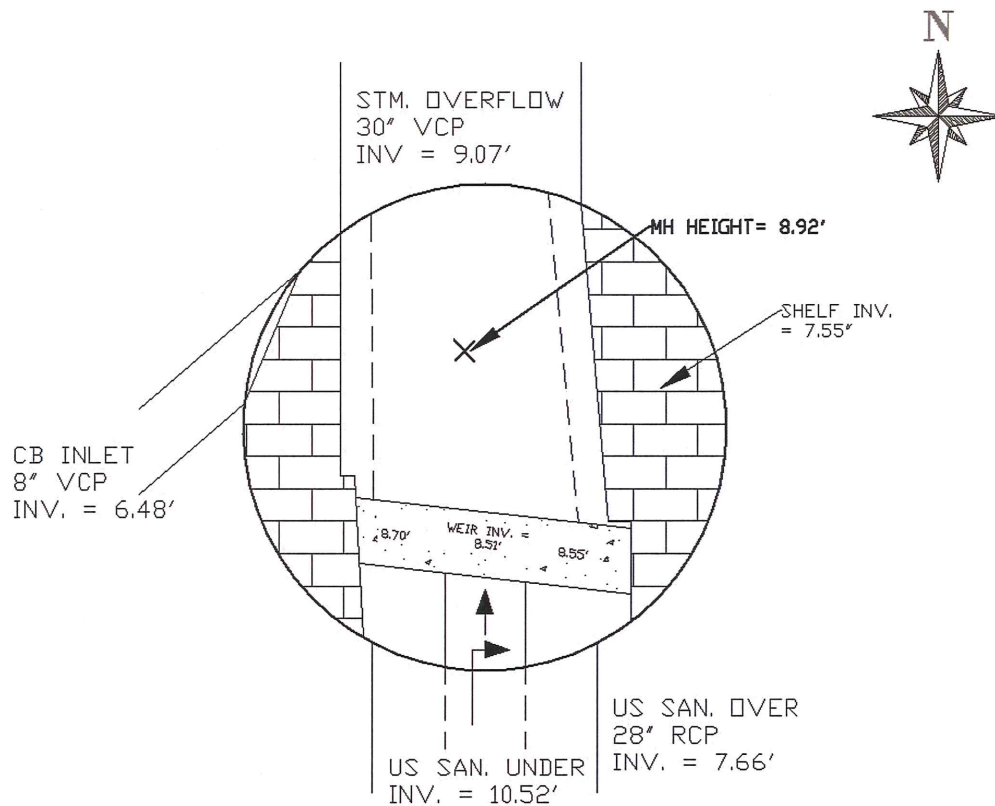
4) Surrounding area facing NW:



## 5) Southern inlet- possible under infiltration:



## 6) CAD Sketch:





# Manhole Inspection

|               |                                                                                                                                                                                         |          |       |          |                       |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------|----------|-----------------------|
| PROJECT NAME: | Lakewood Integrated Wet Weather Improvements                                                                                                                                            | PROJECT# | 14437 | Date:    | 2/15/16               |
| LOCATION:     | Wyandotte Avenue @ Detroit Avenue, Lakewood, OH                                                                                                                                         |          |       | Weather: | 33° Cloudy            |
| MANHOLE TYPE: | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-Side |          |       | Crew:    | G. Stevens & J. Kelly |
| MANHOLE I.D.: | LK_CSO-LEWS1040-F                                                                                                                                                                       |          |       |          |                       |

|                                                                                                                                                                 |                                           |                                      |                                |                                     |                                               |                                |       |   |              |    |   |    |   |       |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------|--------------------------------|-------------------------------------|-----------------------------------------------|--------------------------------|-------|---|--------------|----|---|----|---|-------|---|
| Manhole Info.                                                                                                                                                   | MANHOLE LOCATION                          |                                      |                                | CONFIGURATION OF MANHOLE            |                                               |                                |       |   |              |    |   |    |   |       |   |
|                                                                                                                                                                 | <input type="checkbox"/> Gutter           | <input type="checkbox"/> Parking Lot | <input type="checkbox"/> Yard  | <input type="checkbox"/> Concentric | <input checked="" type="checkbox"/> Eccentric | <input type="checkbox"/> Other |       |   |              |    |   |    |   |       |   |
|                                                                                                                                                                 | <input checked="" type="checkbox"/> Crown | <input type="checkbox"/> Treelawn    | <input type="checkbox"/> Field | MH Depth:                           | 9.26                                          | Ft.                            |       |   |              |    |   |    |   |       |   |
|                                                                                                                                                                 | <input type="checkbox"/> Drive            | <input type="checkbox"/> Ditch       | <input type="checkbox"/> Swale |                                     |                                               |                                |       |   |              |    |   |    |   |       |   |
| MATERIAL TYPE: <input type="checkbox"/> Brick <input checked="" type="checkbox"/> Precast <input type="checkbox"/> Cast-in-Place <input type="checkbox"/> Other |                                           |                                      |                                |                                     |                                               |                                |       |   |              |    |   |    |   |       |   |
| GPS COORDINATES                                                                                                                                                 |                                           | LATITUDE: N                          | 41                             | °                                   | 29                                            | '                              | 6.745 | " | LONGITUDE W: | 81 | ° | 47 | ' | 14.64 | " |

| Piping Config. | SIZE | DIRECTION                              | MATERIAL TYPE | INVERT DEPTH | TOP OF PIPE DEPTH | TYPE OF FLOW | LAMPING OBSERVATIONS           |
|----------------|------|----------------------------------------|---------------|--------------|-------------------|--------------|--------------------------------|
|                | 24"  | <input checked="" type="checkbox"/> N  | HDPE          | 9.41'        |                   | STM          |                                |
|                | 24"  | <input checked="" type="checkbox"/> S  | HDPE          | 9.05'        |                   | SAN          |                                |
|                |      | <input type="checkbox"/> E             |               |              |                   |              |                                |
|                |      | <input type="checkbox"/> W             |               |              |                   |              |                                |
|                | 10"  | <input checked="" type="checkbox"/> NW | PVC           | 10.16'       |                   | SAN          | Schedule 80 PVC: I.D. = 9.493" |
|                |      | <input type="checkbox"/>               |               |              |                   |              |                                |
|                |      | <input type="checkbox"/>               |               |              |                   |              |                                |

Material Types: VCP - Vitrified Clay; RCP - Reinforced Concrete; PVC - Plastic; DIP - Ductile Iron; TRS - Truss

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Comments | <p>The weir wall in this manhole is in good shape but is unsuitable for accurate flow measurements. We took three invert measurements along the weir. The northernmost elevation was 8.68', the center was 8.53', and the southern end was 8.42'. Photos 5 &amp; 6 are an attempt to show the slope of the weir wall.</p> <p>We could potentially measure the flow at the northwestern sanitary outlet with an AV or ULS sensor. Overflow would begin at heights of 17.76". The ULS sensor would need to be no higher than 37.63" from the sanitary flow. This would allow us to accurately measure levels down to 0.75" up to an overflow of 7.12" over the low point on the weir. An AV sensor in the sanitary outlet would work easily and be accurate above 0.5" levels. The other option would be an AV in the storm overflow pipe. This would give easily identifiable overflow events and accurate volumes.</p> |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Pictures | Picture # | Description            | Picture # | Description |
|----------|-----------|------------------------|-----------|-------------|
|          | 1         | Site View facing north | 4 & 5     | Weir wall   |
|          | 2         | Plan View facing north | 6         | CAD Sketch  |
|          | 3         | Street Map             |           |             |



1) Site View facing north:

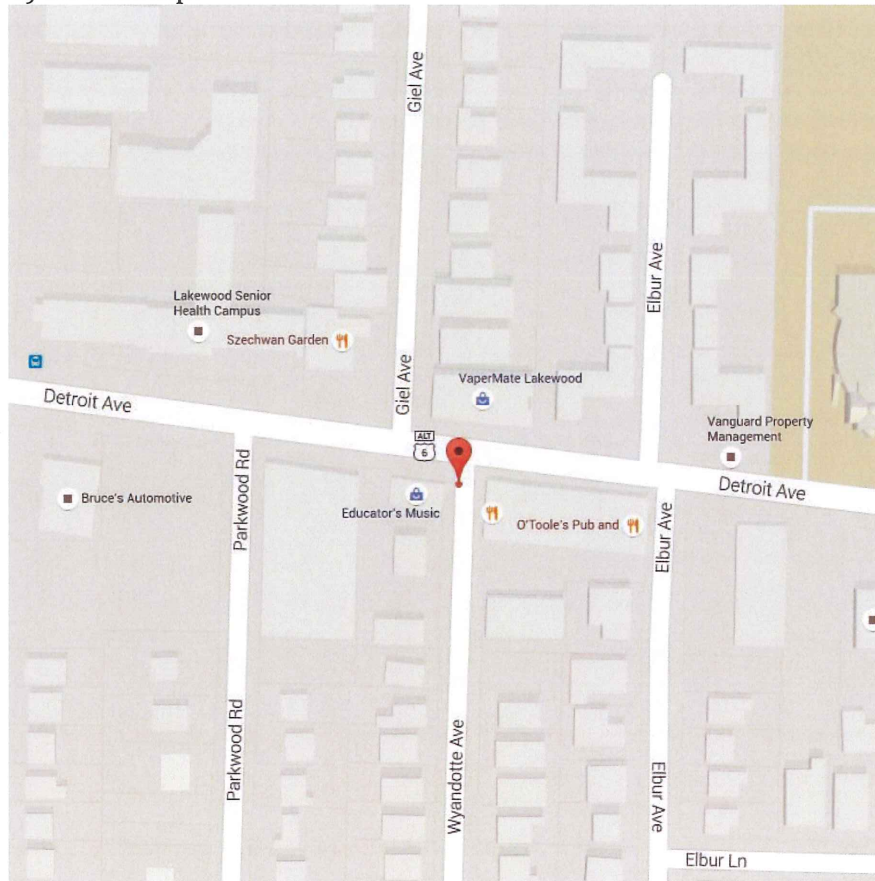


2) Plan View facing north:





4) Street Map:



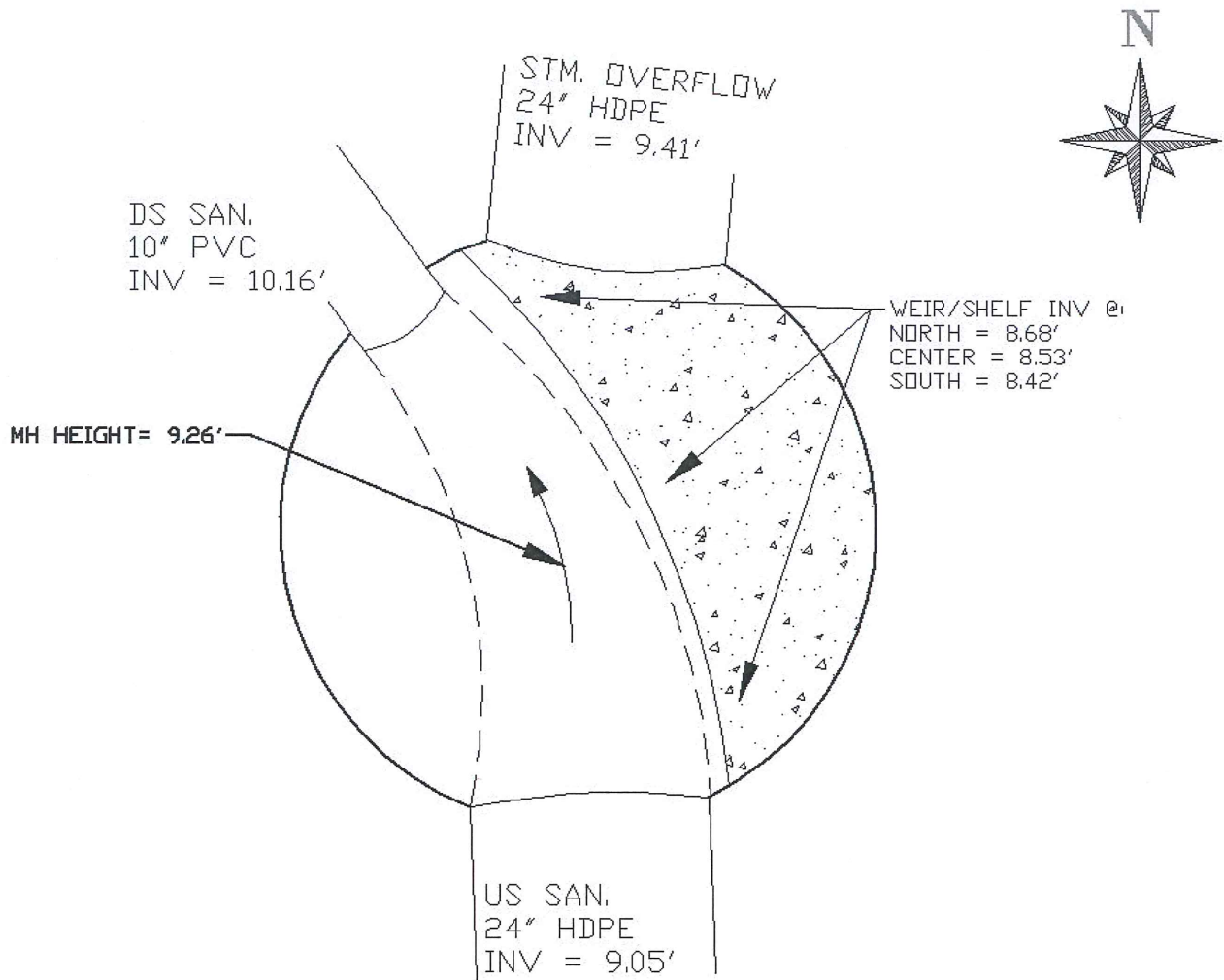
5) Weir wall:



5) Weir:



## 6) CAD Sketch



# Manhole Inspection

|               |                                                                                                                                                                                         |          |       |          |                       |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------|----------|-----------------------|
| PROJECT NAME: | Lakewood Integrated Wet Weather Improvements                                                                                                                                            | PROJECT# | 14437 | Date:    | 2/23/16               |
| LOCATION:     | 13455 Edgewater Drive at west side of driveway                                                                                                                                          |          |       | Weather: | 34° - Sun             |
| MANHOLE TYPE: | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-Side |          |       | Crew:    | G. Stevens & J. Kelly |
| MANHOLE I.D.: | LK_CSO-LEWS1055-A                                                                                                                                                                       |          |       |          |                       |

|                                                                                                                                                                 |                                            |                                      |                                |                                     |                                               |                                |         |   |              |    |   |    |   |        |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------------|--------------------------------|-------------------------------------|-----------------------------------------------|--------------------------------|---------|---|--------------|----|---|----|---|--------|---|
| Manhole Info.                                                                                                                                                   | MANHOLE LOCATION                           |                                      |                                | CONFIGURATION OF MANHOLE            |                                               |                                |         |   |              |    |   |    |   |        |   |
|                                                                                                                                                                 | <input checked="" type="checkbox"/> Gutter | <input type="checkbox"/> Parking Lot | <input type="checkbox"/> Yard  | <input type="checkbox"/> Concentric | <input checked="" type="checkbox"/> Eccentric | <input type="checkbox"/> Other |         |   |              |    |   |    |   |        |   |
|                                                                                                                                                                 | <input type="checkbox"/> Crown             | <input type="checkbox"/> Treelawn    | <input type="checkbox"/> Field | MH Depth:                           | 8.64                                          | Ft.                            |         |   |              |    |   |    |   |        |   |
|                                                                                                                                                                 | <input type="checkbox"/> Drive             | <input type="checkbox"/> Ditch       | <input type="checkbox"/> Swale |                                     |                                               |                                |         |   |              |    |   |    |   |        |   |
| MATERIAL TYPE: <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Precast <input type="checkbox"/> Cast-in-Place <input type="checkbox"/> Other |                                            |                                      |                                |                                     |                                               |                                |         |   |              |    |   |    |   |        |   |
| GPS COORDINATES                                                                                                                                                 |                                            | LATITUDE: N                          | 41                             | °                                   | 29                                            | '                              | 36.8376 | " | LONGITUDE W: | 81 | ° | 47 | ' | 5.9028 | " |

| Piping Config. | SIZE   | DIRECTION                               | MATERIAL TYPE | INVERT DEPTH | TOP OF PIPE DEPTH | TYPE OF FLOW | LAMPING OBSERVATIONS |
|----------------|--------|-----------------------------------------|---------------|--------------|-------------------|--------------|----------------------|
|                | 50-52" | <input checked="" type="checkbox"/> NNW | Brick         | 8.41'        |                   | STM          | Overflow pipe        |
|                | 50-52" | <input checked="" type="checkbox"/> SSE | Brick         | 8.30'        |                   | SAN          |                      |
|                | 8"     | <input checked="" type="checkbox"/> E   | HDPE          | 8.68'        |                   | SAN          |                      |
|                |        | <input type="checkbox"/> W              |               |              |                   |              |                      |
|                |        |                                         |               |              |                   |              |                      |
|                |        |                                         |               |              |                   |              |                      |
|                |        |                                         |               |              |                   |              |                      |

Material Types: VCP - Vitrified Clay; RCP - Reinforced Concrete; PVC - Plastic; DIP - Ductile Iron; TRS - Truss

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Comments | Weir Invert from rim = 8.32' on west side, 8.38' on east side.<br>Meter recommendations:<br>AV in downstream pipe on 8" spring band - would give us dry weather flows and overflow indication<br>ULS above downstream sanitary outlet - ULS at up to 37" above flow would give accurate dry readings down to 1" of flow and up to 22" of overflow indication.<br>AV in overflow on scissor band base would give easy overflow indication.<br>Humidity did not seem to be a problem at this site (the top of the brick sanitary pipes was dry)<br>High water mark was about 30" above sanitary invert |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Pictures | Picture # | Description            | Picture # | Description |
|----------|-----------|------------------------|-----------|-------------|
|          | 1         | Satellite view         | 4         | CAD Sketch  |
|          | 2         | Site View facing north |           |             |
|          | 3         | Plan View facing north |           |             |



1) Satellite view:



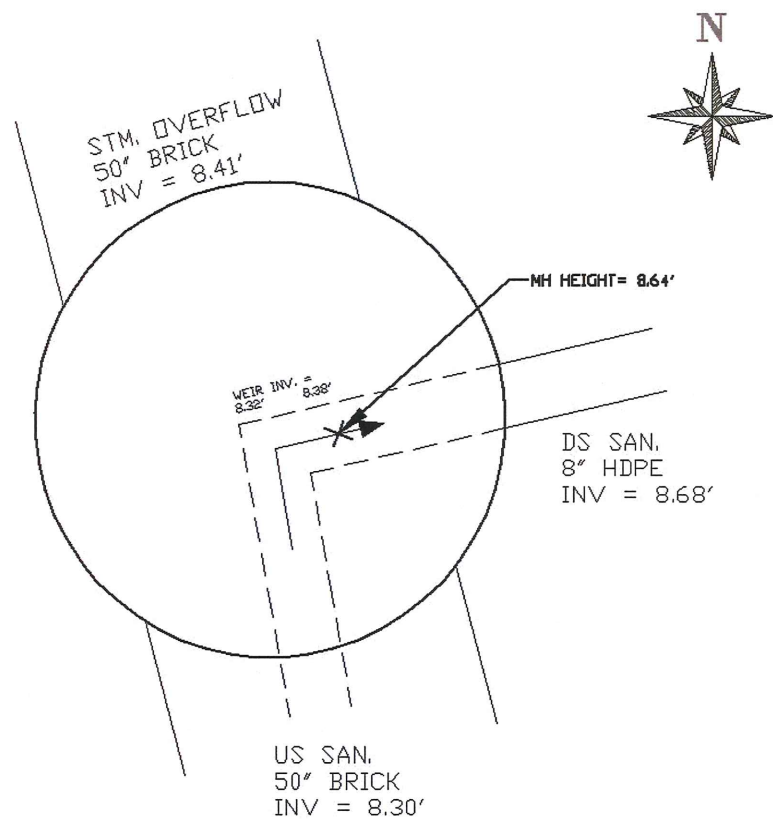
2) Site View facing north:



## 3) Plan View facing north:



## 4) CAD Sketch:





# Manhole Inspection

|               |                                                                                                                                                                                         |          |       |          |                       |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------|----------|-----------------------|
| PROJECT NAME: | Lakewood Integrated Wet Weather Improvements                                                                                                                                            | PROJECT# | 14437 | Date:    | 2/15/16               |
| LOCATION:     | Detroit Avenue @ Parkwood Avenue , Lakewood, OH                                                                                                                                         |          |       | Weather: | 33° Cloudy            |
| MANHOLE TYPE: | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-Side |          |       | Crew:    | G. Stevens & J. Kelly |
| MANHOLE I.D.: | LK_CSO-LEWS1055-C                                                                                                                                                                       |          |       |          |                       |

|                                                                                                                                                                 |                                            |                                      |                                |                                     |                                               |                                |        |   |              |    |   |    |   |         |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------------|--------------------------------|-------------------------------------|-----------------------------------------------|--------------------------------|--------|---|--------------|----|---|----|---|---------|---|
| Manhole Info.                                                                                                                                                   | MANHOLE LOCATION                           |                                      |                                | CONFIGURATION OF MANHOLE            |                                               |                                |        |   |              |    |   |    |   |         |   |
|                                                                                                                                                                 | <input checked="" type="checkbox"/> Gutter | <input type="checkbox"/> Parking Lot | <input type="checkbox"/> Yard  | <input type="checkbox"/> Concentric | <input checked="" type="checkbox"/> Eccentric | <input type="checkbox"/> Other |        |   |              |    |   |    |   |         |   |
|                                                                                                                                                                 | <input type="checkbox"/> Crown             | <input type="checkbox"/> Treelawn    | <input type="checkbox"/> Field | MH Depth:                           | 16.44                                         | Ft.                            |        |   |              |    |   |    |   |         |   |
|                                                                                                                                                                 | <input type="checkbox"/> Drive             | <input type="checkbox"/> Ditch       | <input type="checkbox"/> Swale |                                     |                                               |                                |        |   |              |    |   |    |   |         |   |
| MATERIAL TYPE: <input type="checkbox"/> Brick <input checked="" type="checkbox"/> Precast <input type="checkbox"/> Cast-in-Place <input type="checkbox"/> Other |                                            |                                      |                                |                                     |                                               |                                |        |   |              |    |   |    |   |         |   |
| GPS COORDINATES                                                                                                                                                 |                                            | LATITUDE: N                          | 41                             | °                                   | 29                                            | '                              | 7.1988 | " | LONGITUDE W: | 81 | ° | 47 | ' | 17.8044 | " |

| Piping Config. | SIZE | DIRECTION                             | MATERIAL TYPE | INVERT DEPTH | TOP OF PIPE DEPTH | TYPE OF FLOW | LAMPING OBSERVATIONS                                        |
|----------------|------|---------------------------------------|---------------|--------------|-------------------|--------------|-------------------------------------------------------------|
|                | 12"  | <input checked="" type="checkbox"/> N | PVC           | (10.22)      | 9.22              | STM          | Could not directly measure pipe invert due to manhole steps |
|                | 8"   | <input checked="" type="checkbox"/> S | PVC           | 15.68        |                   | SAN          |                                                             |
|                | 12"  | <input checked="" type="checkbox"/> E | PVC           | 16.48        |                   | SAN          |                                                             |
|                | 12"  | <input checked="" type="checkbox"/> W | PVC           | 16.33        |                   | SAN          |                                                             |
|                | 8"   | <input checked="" type="checkbox"/> S | PVC           | 10.49        |                   | SAN          |                                                             |
|                |      |                                       |               |              |                   |              |                                                             |
|                |      |                                       |               |              |                   |              |                                                             |

Material Types: VCP - Vitrified Clay; RCP - Reinforced Concrete; PVC - Plastic; DIP - Ductile Iron; TRS - Truss

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Comments | <p>All pipes appear to be schedule 80 PVC. Inside diameters are therefore = 7.565" for 8", &amp; 11.294" for 12". This is based on video of grade a grade rod at each pipe location.</p> <p>Similar manholes LEWS1040-D &amp; E show about a 3" average flow. To accurately measure 3" flow in a 12" pipe the sensor should be placed no higher than 74.23" above the flow. This site overflows at a height of 75.12". Thus to measure 1 inch of overflow the sensor would need to be placed 85.12 inches above the sanitary inlet invert. This means that an ultrasonic sensor is a poor choice at this location.</p> <p>An AV sensor placed in the sanitary outlet will record overflow depths, &amp; give us constant good data. The AV sensor could also be placed in the overflow pipe.</p> |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Pictures | Picture # | Description            | Picture # | Description |
|----------|-----------|------------------------|-----------|-------------|
|          | 1         | Intersection           | 4         | CAD Sketch  |
|          | 2         | Plan View facing north |           |             |
|          | 3         | Satellite View         |           |             |

1) Intersection



2) Plan View facing north

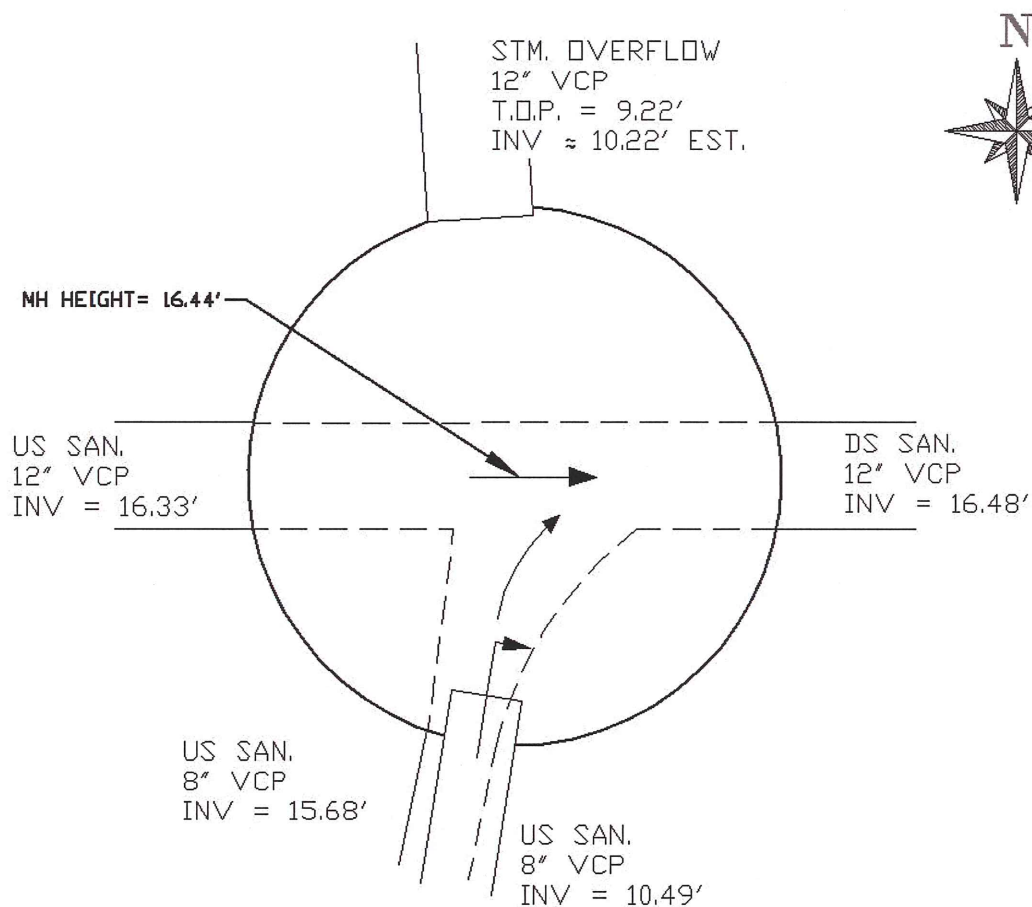




## 3) Satellite:

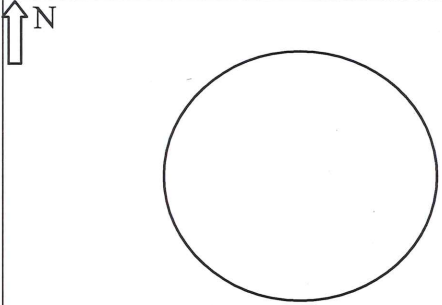


## 4) CAD Sketch



# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                         |                     |             |                 |                                        |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|-----------------|----------------------------------------|
| <b>Project Name:</b> | Lakewood Integrated Wet Weather Improvements                                                                                                                                            | <b>Project #</b>    | 14437       | <b>Date:</b>    | 2/23/2016                              |
| <b>Location:</b>     | X-Walk through Robinwood Ave. @ Detroit Ave.                                                                                                                                            |                     |             | <b>Weather:</b> | 35° - Sunny                            |
| <b>Latitude: N</b>   | 41.485398 N                                                                                                                                                                             | <b>Longitude W:</b> | 81.792078 W |                 |                                        |
| <b>Manhole Type:</b> | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |             |                 | <b>Crew:</b><br>G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LK_CSO-LEWS1055-D                                                                                                                                                                       |                     |             |                 |                                        |

|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                        |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                         | <b>Configuration of Manhole:</b>                                                                                                                                       | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input checked="" type="checkbox"/> Crown <input type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input checked="" type="checkbox"/> Concentric <input type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <input type="text" value="4.70"/> ft |  |

| Size (in) | Direction (N/W/E/S) | Material Type | Invert Depth (ft from Rim) | Crown Depth (ft from Rim) | Type of Flow | Lamping Observations                                |
|-----------|---------------------|---------------|----------------------------|---------------------------|--------------|-----------------------------------------------------|
| UNK.      | NNW                 | UNK.          | 5.01'                      |                           | SAN          | Restrictor plate allows ≈ 3" of flow to pass under. |
| 18"       | S                   | Cor. PVC      | 4.76'                      |                           | SAN          |                                                     |
| 18"       | NNW                 | Cor. PVC      | 4.65'                      |                           | STM          |                                                     |
|           |                     |               |                            |                           |              |                                                     |
|           |                     |               |                            |                           |              |                                                     |
|           |                     |               |                            |                           |              |                                                     |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

| Weir Length (ft): | High Water Mark (ft from Rim):                                             | Possibility of water falling onto sensor? (Y/N): | Obvious humidity concerns? (Y/N) |
|-------------------|----------------------------------------------------------------------------|--------------------------------------------------|----------------------------------|
| NA                | Stains on restrictor plate about 14" from sanitary invert = 3.86' from Rim | Unlikely to cause problems                       | NO                               |

## Comments:

Weir is 4.65' from rim at its low point. The restrictor plate was clogged upon arrival. It allows about 3" of sanitary flow before backing up. We released the clog with the survey rod which stopped the dry weather overflow that was occurring.

## Sensor Recommendation:

With the restrictor plate in place: We could place an ultrasonic above the sanitary outlet. Due to the non-uniform nature of the weir, we would not know the volume of an overflow but should have good indication of an event. An AV sensor in the overflow pipe would allow us to accurately measure overflow volumes and easily identify events. The amount of staining in the overflow pipe suggests overflow is very frequent at this site. Raising the restrictor plate may eliminate most dry weather overflow events.

-Pictures to be attached on separate sheets-



1) Satellite View:



2) Site View facing north:





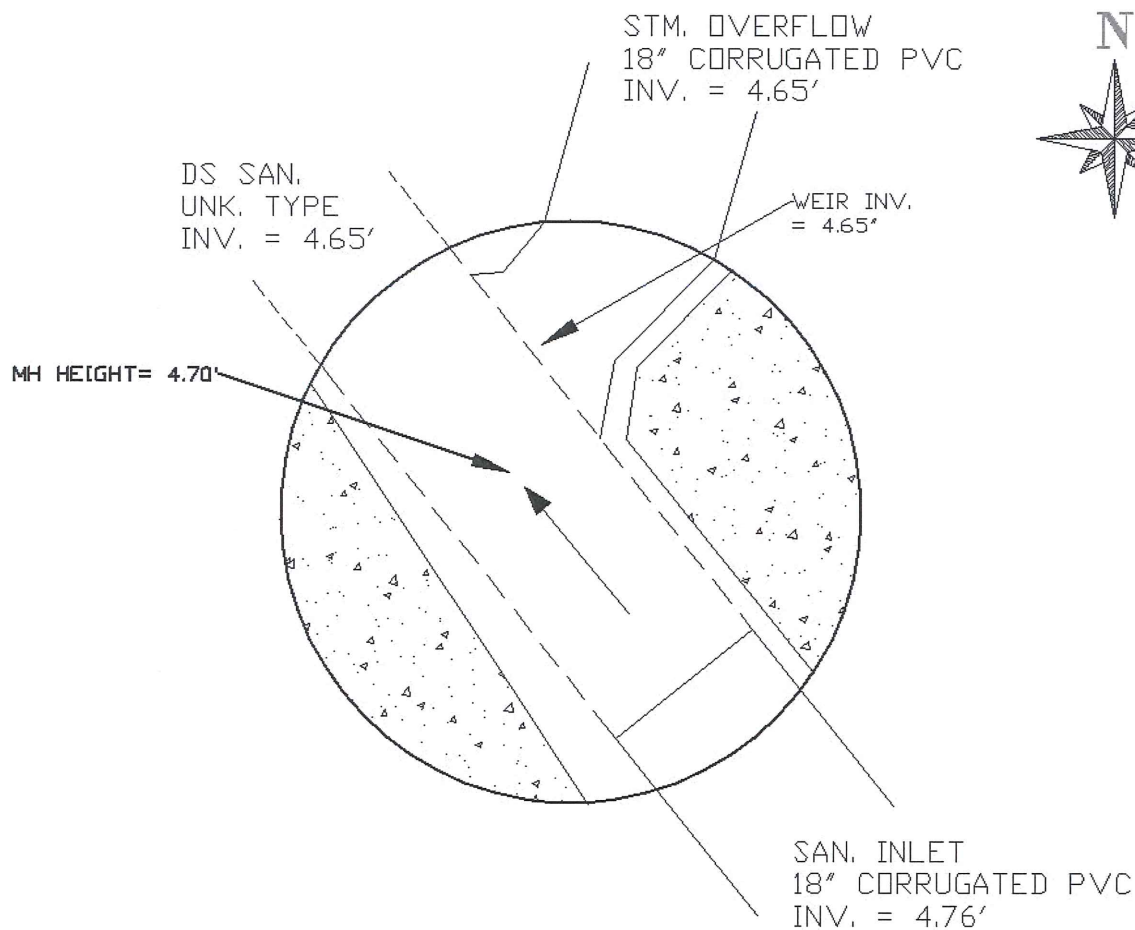
3) Plan View facing north:



4) Unclogged NNW sanitary outlet:

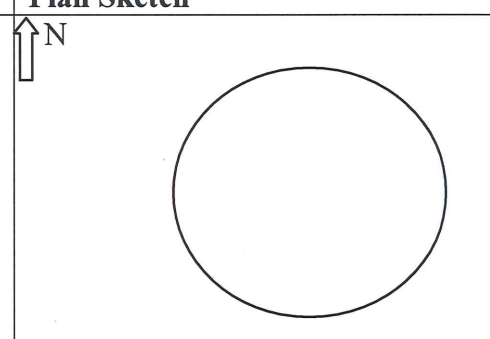






# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                         |                     |             |                 |                                     |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|-----------------|-------------------------------------|
| <b>Project Name:</b> | Lakewood Integrated Wet Weather Improvements                                                                                                                                            | <b>Project #</b>    | 14437       | <b>Date:</b>    | 2/23/2016                           |
| <b>Location:</b>     | NE corner of the Clifton Blvd. & Whippoorwill Ave. intersection.                                                                                                                        |                     |             | <b>Weather:</b> | 35° - Sunny                         |
| <b>Latitude: N</b>   | 41.491304 N                                                                                                                                                                             | <b>Longitude W:</b> | 81.787738 W |                 |                                     |
| <b>Manhole Type:</b> | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |             |                 | <b>Crew:</b> G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LK_CSO-LEWS1070-B                                                                                                                                                                       |                     |             |                 |                                     |

|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                       |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                         | <b>Configuration of Manhole:</b>                                                                                                                                                                      | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input type="checkbox"/> Crown <input checked="" type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input type="checkbox"/> Concentric <input checked="" type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <span style="border: 1px solid black; padding: 2px;">8.62</span> ft |  |

| Size (in) | Direction (N/W/E/S) | Material Type | Invert Depth (ft from Rim) | Crown Depth (ft from Rim) | Type of Flow | Lamping Observations     |
|-----------|---------------------|---------------|----------------------------|---------------------------|--------------|--------------------------|
| 10"       | E                   | VCP           | 8.61                       |                           | SAN.         | Low flow of $\leq 0.5''$ |
| 10"       | W                   | VCP           | 8.63                       |                           | SAN.         |                          |
| 8"        | SW                  | VCP           | 8.54                       |                           | STM.         |                          |
|           |                     |               |                            |                           |              |                          |
|           |                     |               |                            |                           |              |                          |
|           |                     |               |                            |                           |              |                          |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

| Weir Length (ft):               | High Water Mark (ft from Rim): | Possibility of water falling onto sensor? (Y/N): | Obvious humidity concerns? (Y/N) |
|---------------------------------|--------------------------------|--------------------------------------------------|----------------------------------|
| Broken pipe wall of TBD length. | 5.16' on northern wall         | Unlikely                                         | NO                               |

## Comments:

Weir Invert from rim = 8.51'

## Sensor Recommendation:

An ultrasonic sensor would need to be at most 34.26" above a 0.5" flow in a 12" pipe to take dry good dry level readings. This would be below the high water mark of about 41.5" from the sanitary invert, but we would get about 28" of above weir readings before the flow entered the sensors dead zone. An AV sensor in the downstream sanitary pipe would give good dry weather readings and easily identifiable overflow events, but we would not know the exact volume of overflow. An AV in the storm pipe would give indication of overflows and volumes of overflows, but would not give dry weather readings. We have multiple options in this mh.

-Pictures to be attached on separate sheets-



1) Satellite view:



2) Site View facing north:



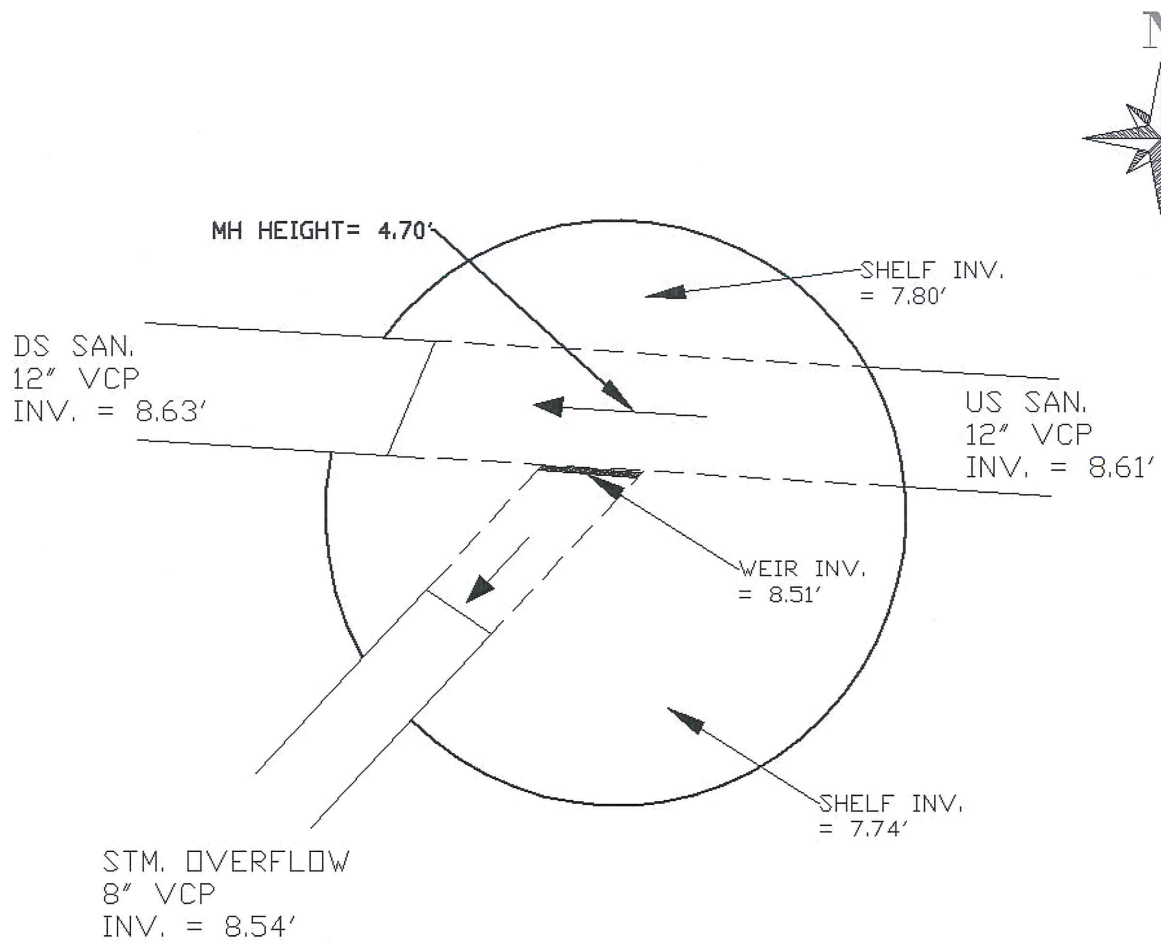


3) Plan View facing north:



4) Weir photo facing west from sanitary pipe:

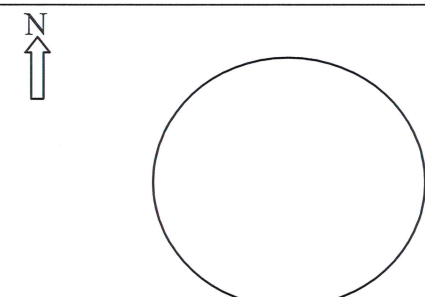






# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                                               |                     |            |                 |                                     |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------|-----------------|-------------------------------------|
| <b>Project Name:</b> | Lakewood Integrated Wet Weather Improvements                                                                                                                                                                  | <b>Project #</b>    | 14437      | <b>Date:</b>    | 3/24/2016                           |
| <b>Location:</b>     | North of Clifton Blvd. @ Marlowe Ave.                                                                                                                                                                         |                     |            | <b>Weather:</b> | 55° - Partly Cloudy                 |
| <b>Latitude: N</b>   | 41.491780N                                                                                                                                                                                                    | <b>Longitude W:</b> | 81.795405W |                 |                                     |
| <b>Manhole Type:</b> | <input checked="" type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Storm <input type="checkbox"/> Combined <input checked="" type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |            |                 | <b>Crew:</b> G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LK_CSO-LEWS1130-B                                                                                                                                                                                             |                     |            |                 |                                     |

|                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                 |                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                                               | <b>Configuration of Manhole:</b>                                                                                                                                                                                                                | <b>Plan Sketch</b>                                                                  |
| <input checked="" type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input type="checkbox"/> Crown <input checked="" type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input checked="" type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input type="checkbox"/> Concentric <input checked="" type="checkbox"/> Eccentric <input checked="" type="checkbox"/> Other<br>Upper Rim to Lower Rim = 4.64'<br>MH Depth: <span style="border: 1px solid black; padding: 2px;">12.90</span> ft |  |

| Size (in) | Direction (N/W/E/S) | Material Type | Invert Depth (ft from Rim) | Crown Depth (ft from Rim) | Type of Flow | Lamping Observations                                       |
|-----------|---------------------|---------------|----------------------------|---------------------------|--------------|------------------------------------------------------------|
| 12        | W                   | VCP           | 13.69                      | LOWER MH                  | SAN          | Eastern side is bulkheaded                                 |
| 12        | NW                  | VCP           | 12.65                      | LOWER MH                  | SAN          | Flow from northern manhole san. drop                       |
| 30        | E                   | VCP           | 8.14                       | UPPER MH                  |              | Packed with debris. Bulkheaded?                            |
| 30        | W                   | VCP           | 8.14                       | UPPER MH                  | STM          | Outlet                                                     |
| 30        | S                   | VCP           | 8.14                       | UPPER MH                  | STM          | Inlet. Trickle of flow over 4-5" of debris continues west. |
| 6         | E                   | VCP           | 1                          | UPPER MH                  | STM          | Probable CB inlet                                          |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

|                          |                                       |                                                         |                                         |
|--------------------------|---------------------------------------|---------------------------------------------------------|-----------------------------------------|
| <b>Weir Length (ft):</b> | <b>High Water Mark (ft from Rim):</b> | <b>Possibility of water falling onto sensor? (Y/N):</b> | <b>Obvious humidity concerns? (Y/N)</b> |
|                          | 10.317                                | NA                                                      | NA                                      |

## Comments:

The depth of the upper raceway is an educated estimate from other measurements and video evidence. The upper manhole consists of a chamber south of the lower manhole lid. This chamber has 3 identical 30" VCP pipes from the east and south heading west. There is also a small inlet above the eastern 30" that looks to be about 6" and is only about 12" below the upper rim. John saw that the upper eastern 30" was so packed with debris that it may be purposefully bulk headed.



1) Site View facing north:

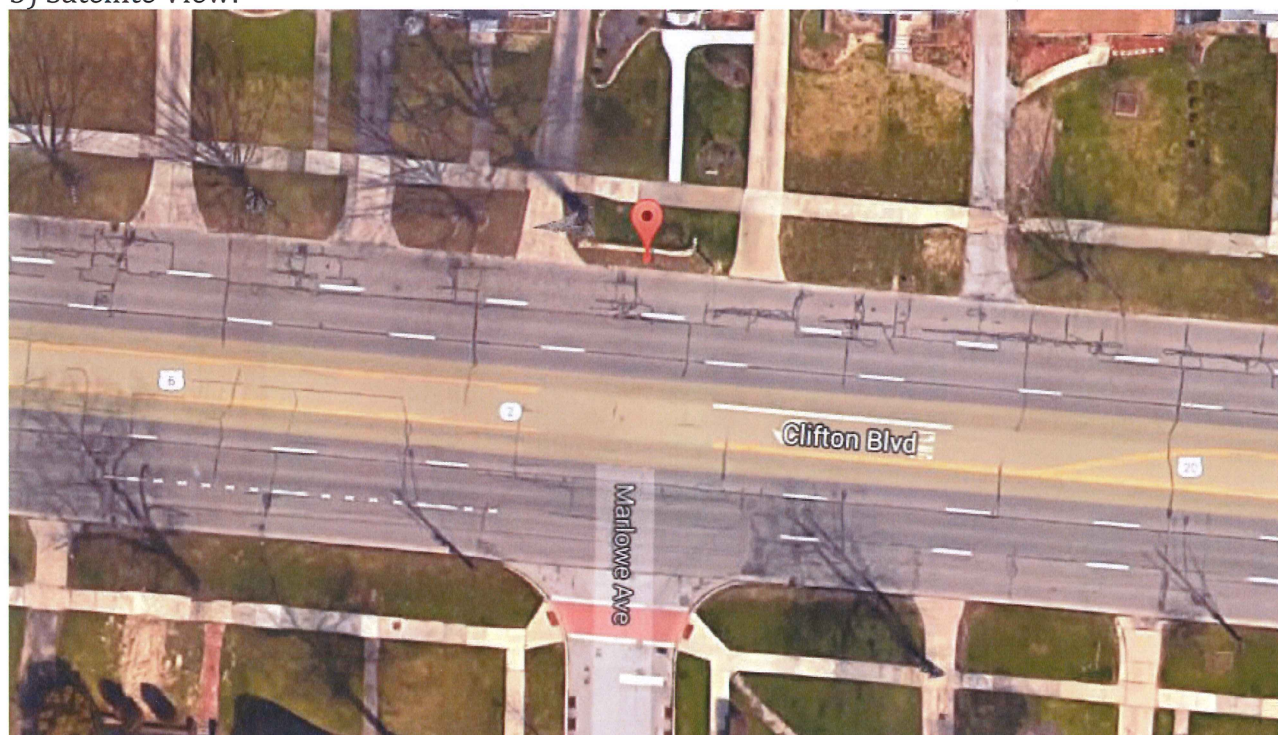


2) Plan View facing north: (Lower lid put back in place)





3) Satellite View:



4) Northern Manhole Plan View facing north: (southern pipe drops into lower chamber)





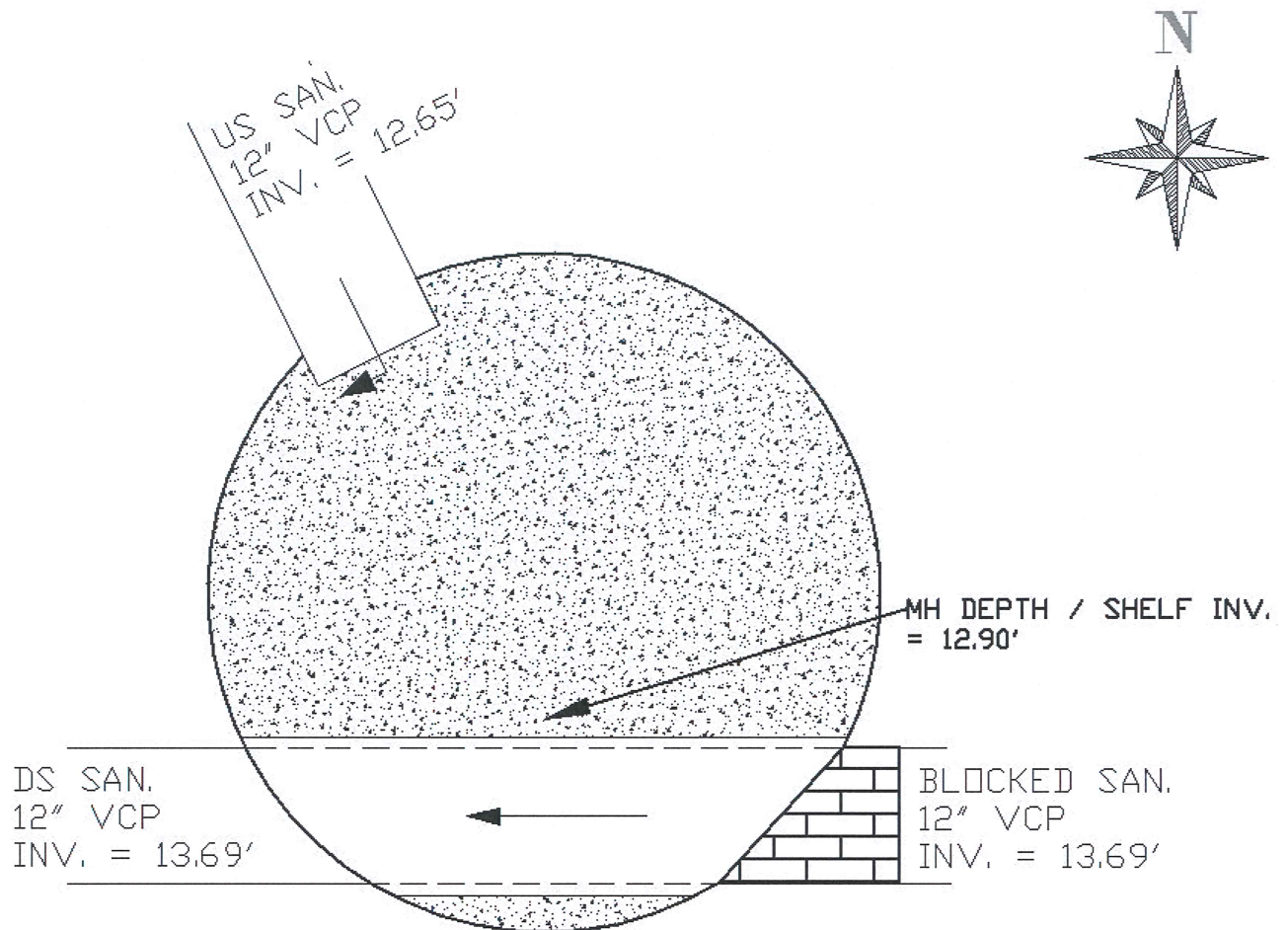
5) Lower MH – Eastern Sanitary bulkheaded:



6) Upper MH Chamber facing SE – Shows eastern and southern 30" inlets and 6" eastern inlets.

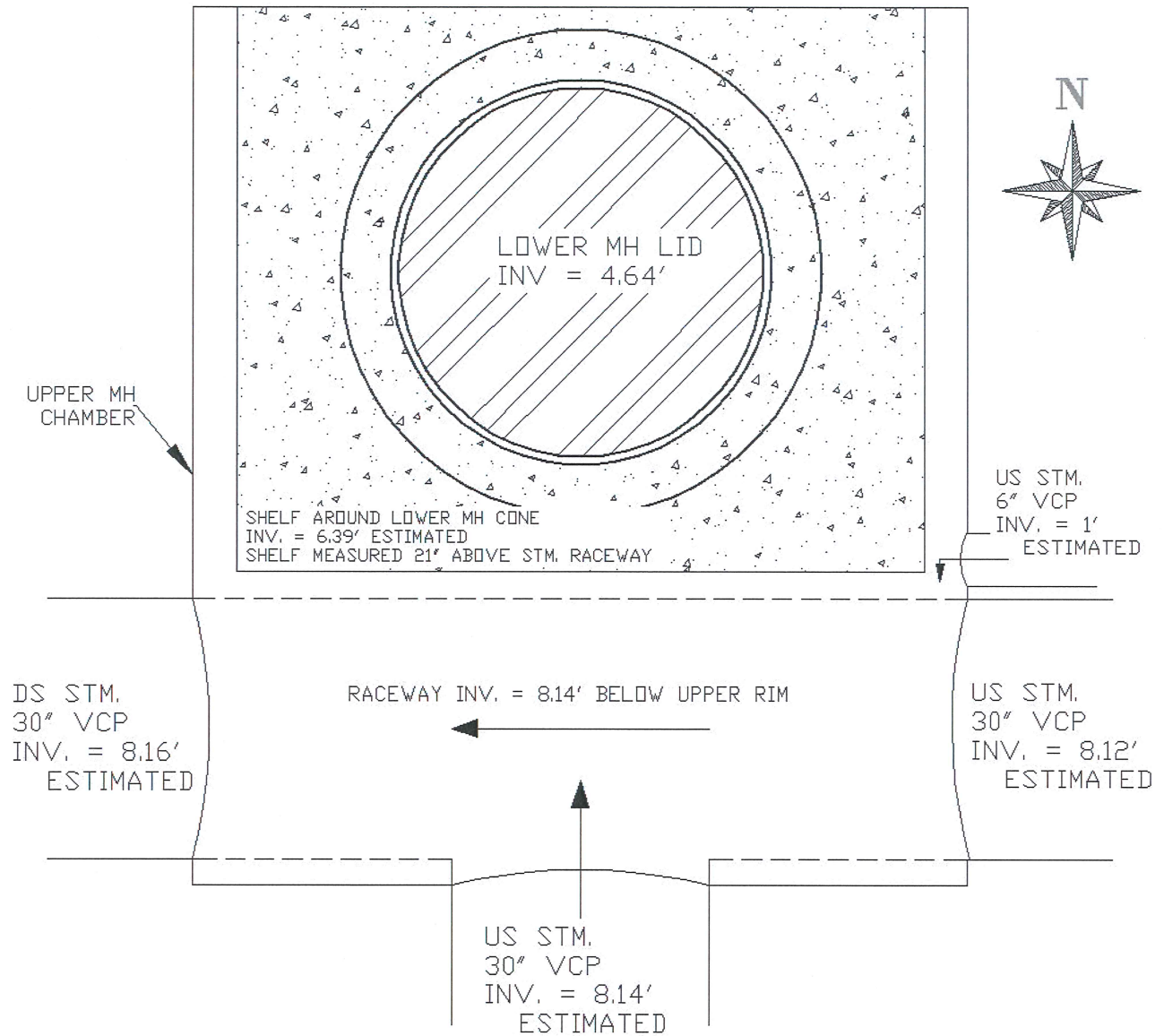


## 7) Lower MH CAD Sketch:

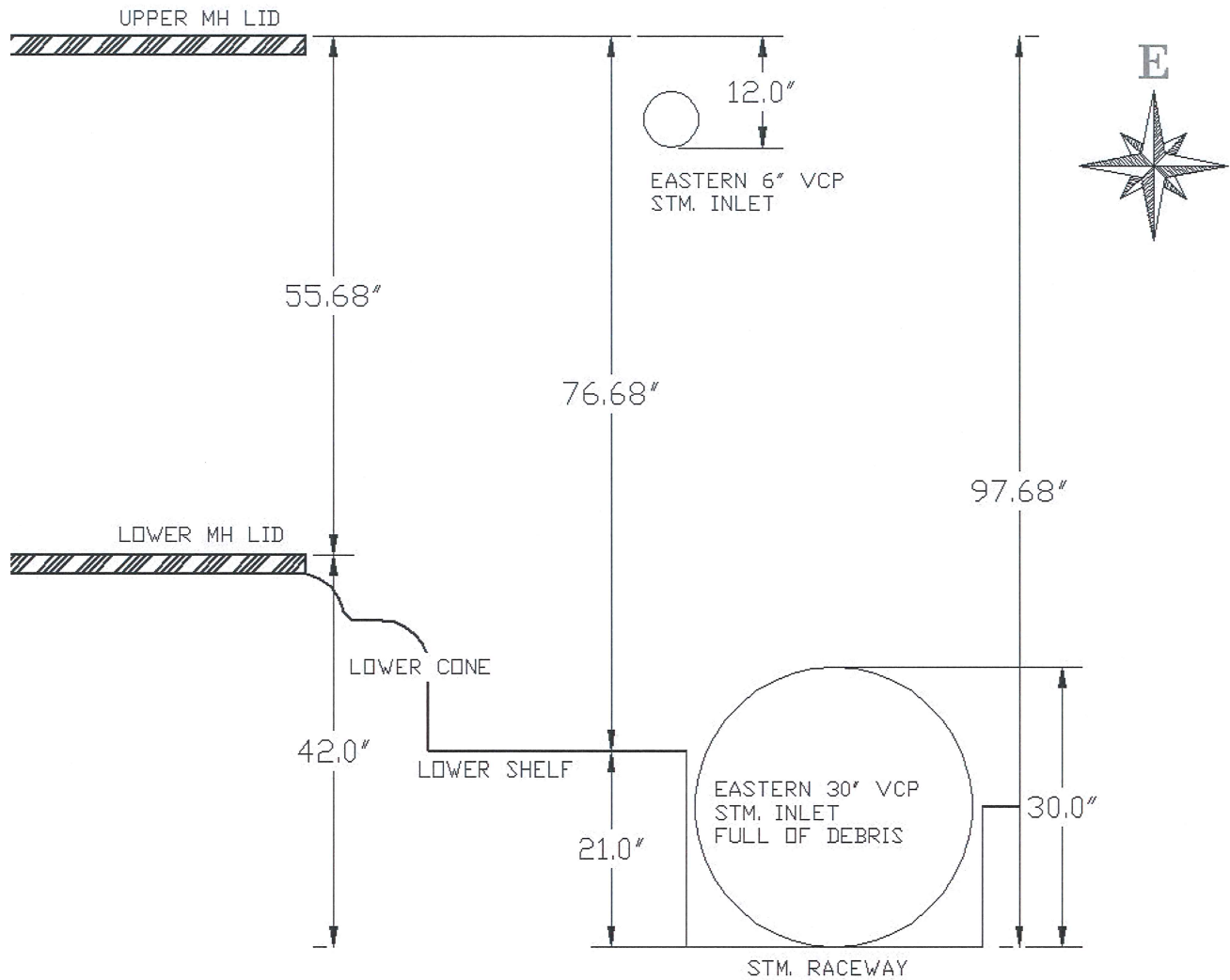




## 8) Upper MH CAD Sketch:

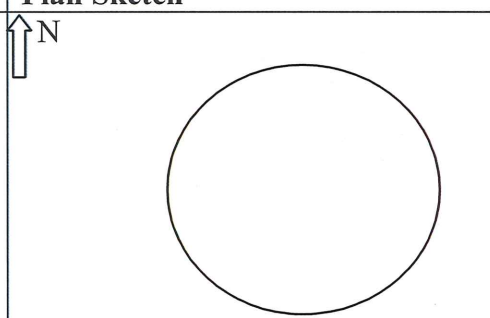


## 9) Upper Chamber Profile Sketch facing east:



# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                                    |                     |            |                 |                                     |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------|-----------------|-------------------------------------|
| <b>Project Name:</b> | Lakewood Integrated Wet Weather Improvements                                                                                                                                                       | <b>Project #</b>    | 14437      | <b>Date:</b>    | 3/9/2016                            |
| <b>Location:</b>     | SE corner of Belle Ave. & Clifton Blvd. intersection.                                                                                                                                              |                     |            | <b>Weather:</b> | 68° - Cloudy                        |
| <b>Latitude: N</b>   | 41.491574 N                                                                                                                                                                                        | <b>Longitude W:</b> | 81.79682 W |                 |                                     |
| <b>Manhole Type:</b> | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input checked="" type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |            |                 | <b>Crew:</b> G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LK_CSO-LEWS1130-C                                                                                                                                                                                  |                     |            |                 |                                     |

|                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                            |                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                                    | <b>Configuration of Manhole:</b>                                                                                                                                                           | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input type="checkbox"/> Crown <input checked="" type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input checked="" type="checkbox"/> Swale | <input type="checkbox"/> Concentric <input type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <span style="border: 1px solid black; padding: 2px;">7.98</span> ft |  |

| Size (in) | Direction (N/W/E/S) | Material Type | Invert Depth (ft from Rim) | Crown Depth (ft from Rim) | Type of Flow | Lamping Observations                                      |
|-----------|---------------------|---------------|----------------------------|---------------------------|--------------|-----------------------------------------------------------|
| 30        | S                   | VCP           | 7.82                       |                           | SAN          | Fast moving sanitary flow                                 |
| 12        | N                   | VCP           | 8.13                       |                           | SAN          | Outlet is in middle of manhole and continues north under. |
| 28        | N                   | VCP           | 6.90                       |                           | STM          | Overflow pipe                                             |
|           |                     |               |                            |                           |              |                                                           |
|           |                     |               |                            |                           |              |                                                           |
|           |                     |               |                            |                           |              |                                                           |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

|                          |                                       |                                                         |                                         |
|--------------------------|---------------------------------------|---------------------------------------------------------|-----------------------------------------|
| <b>Weir Length (ft):</b> | <b>High Water Mark (ft from Rim):</b> | <b>Possibility of water falling onto sensor? (Y/N):</b> | <b>Obvious humidity concerns? (Y/N)</b> |
|                          |                                       | No                                                      | No                                      |

**Comments:** Weir arcs upward. Shelf above sanitary outlet is at 6.68' from rim.

-Pictures to be attached on separate sheets-



1) Site View facing north:



2) Plan View facing north:

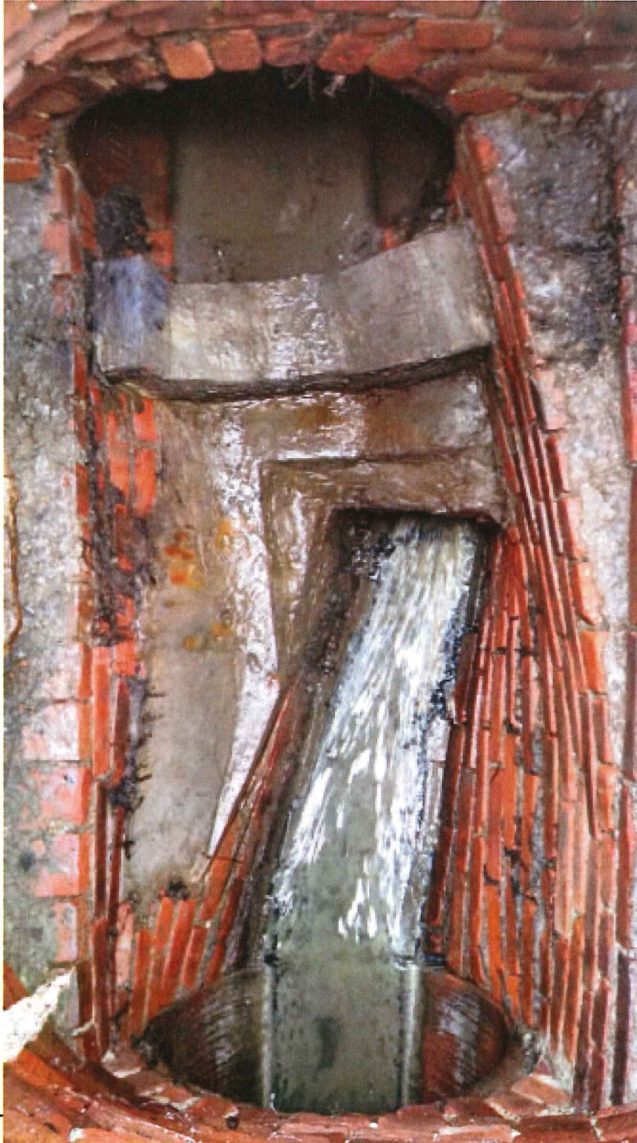
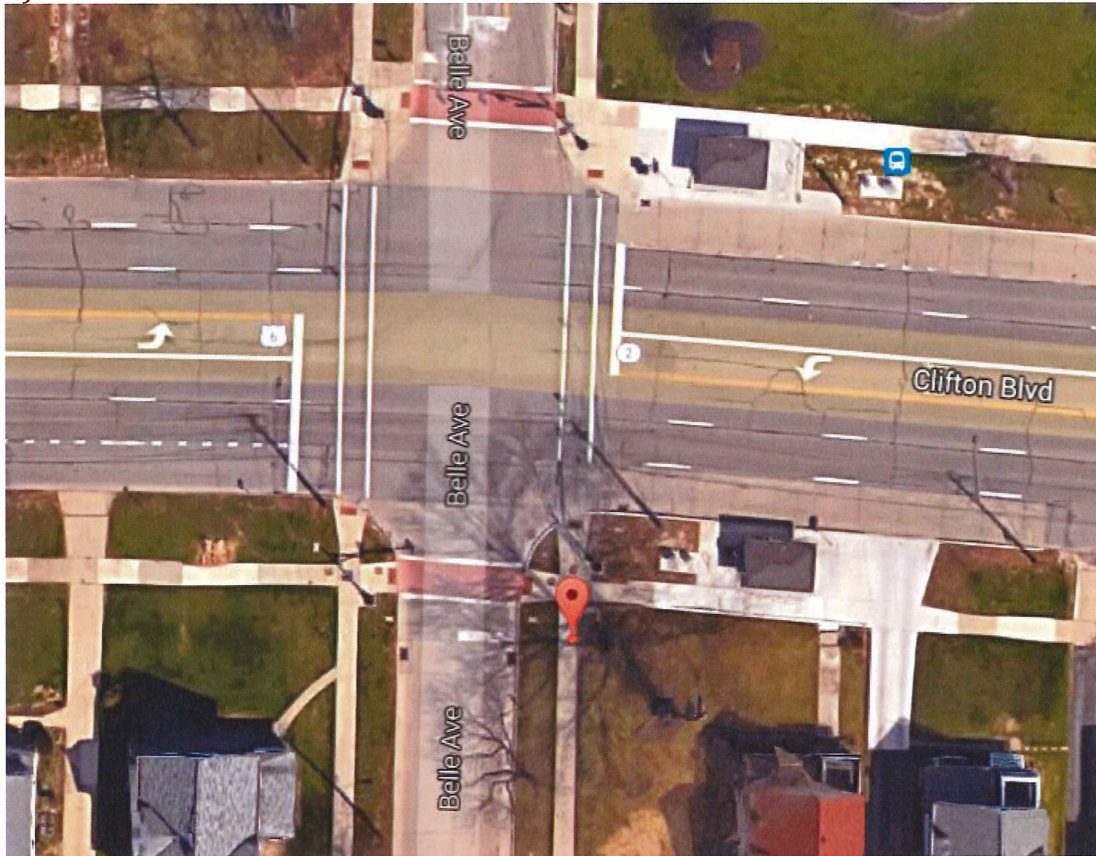


Photo is mirrored left to right. Sanitary actually flows NNW, not NNE as shown.



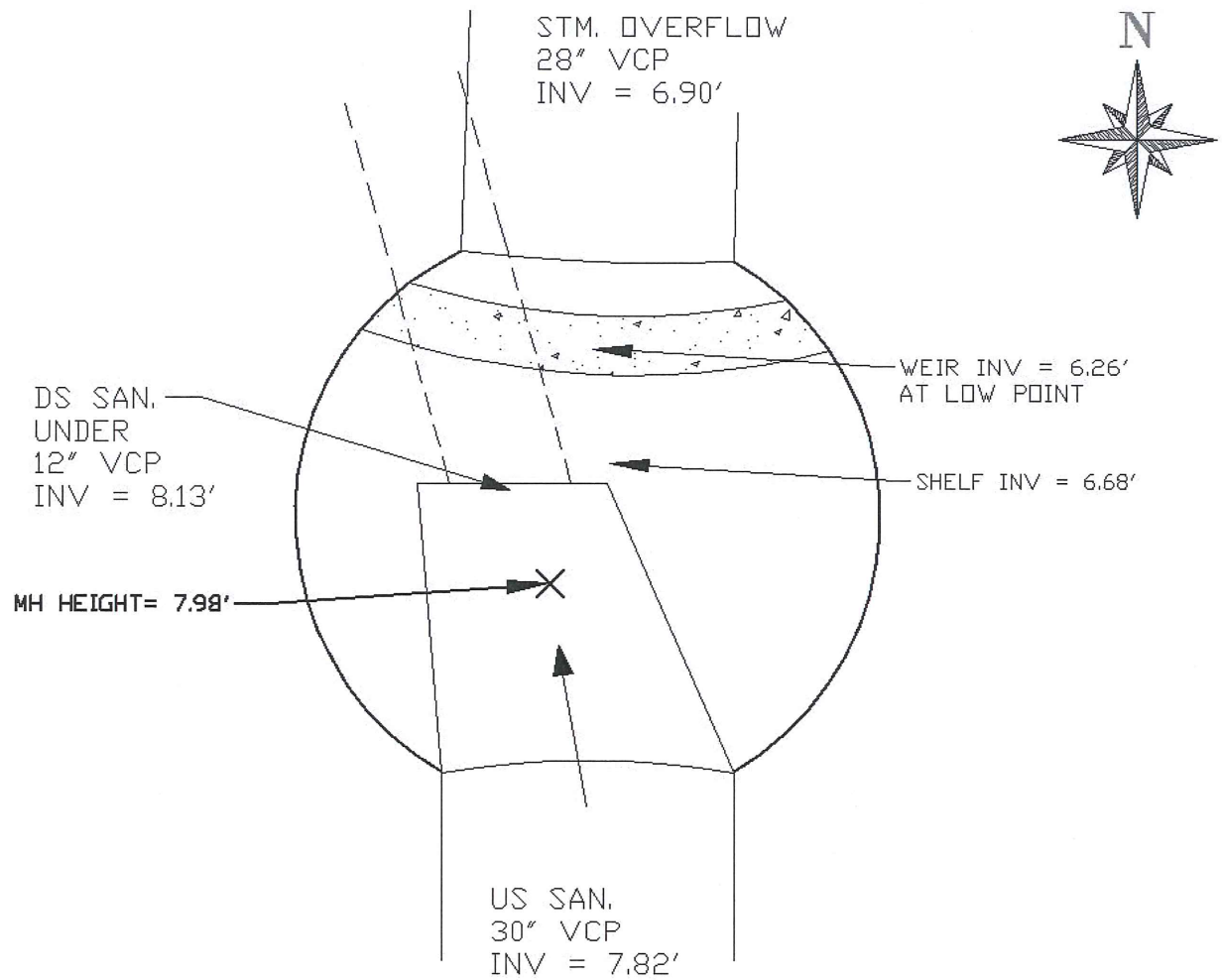
3) Satellite View:



4) Northern Overflow pipe:



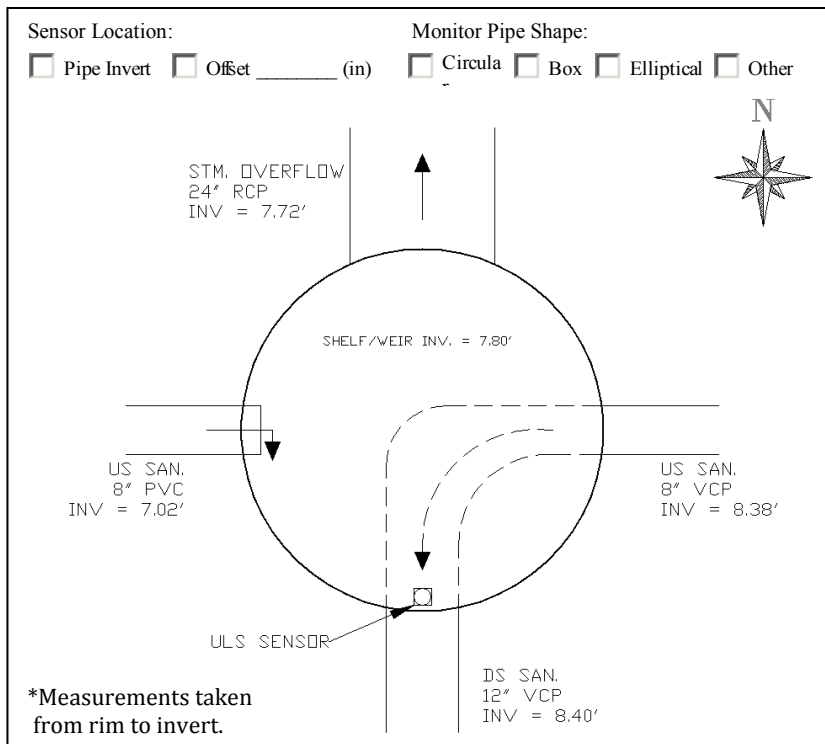
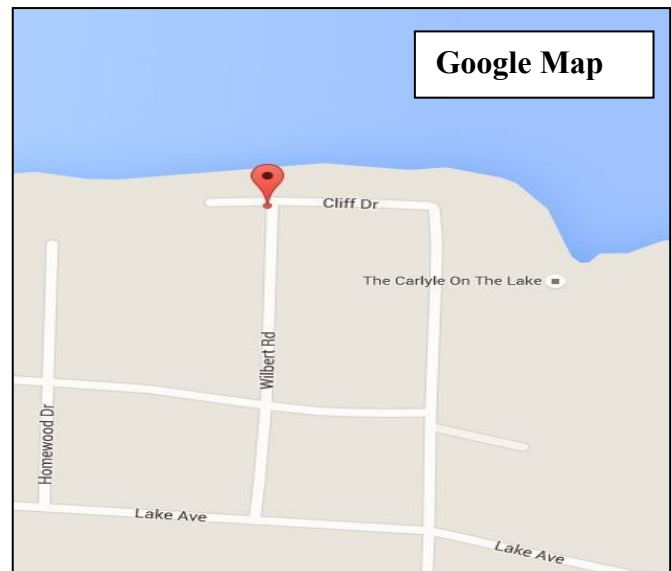
## 5) CAD Sketch:



# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                                     |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CSO-LEWS1045-A                                                                                                                                                                   |
| <b>Install Date/Time:</b>              | 10/27/15 @ 11:00 AM<br>Relocated on 12/9/15 @ 12:57 PM                                                                                                                              |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                         |
| <b>Latitude:</b>                       | 41° 29' 44.179" N                                                                                                                                                                   |
| <b>Longitude:</b>                      | 81° 47' 3.565" W                                                                                                                                                                    |
| <b>Address or Intersection:</b>        | Wilbert at Cliff Drive                                                                                                                                                              |
| <b>Location Description:</b>           | MH in crown of Wilbert just before intersection of Cliff Drive.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                            |
| <b>Notable Site/MH Conditions:</b>     | Ultrasonic sensor installed over sanitary outlet.<br>Overflow begins at 7.2" and above.<br><br>Lots of brick debris on shelf under 8" PVC from new grinder connection on west side. |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                       |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                                |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                                 |
| <b>MH Depth (ft):</b><br>Rim to invert | 8.28'                                                                                                                                                                               |

|                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                                                                                                               |
| <b>Job #:</b> 14437                                                                                                                                                                                                   |
| <b>Meter Owner:</b>                                                                                                                                                                                                   |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other:                                                                               |
| <b>Sensor type:</b><br><input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:                                                                                 |
| <b>Recording Interval (min):</b> 5                                                                                                                                                                                    |
| <b>Cell Service Number:</b><br>(216) 906-5251<br><b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Modem Serial #: 215-J02-143<br>Ultrasonic Serial #: 215-J01-705<br><b>Collection Frequency:</b> 24 hours |
| <b>Lakewood Asset #:</b> 548285                                                                                                                                                                                       |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-LEWS1045-A |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |

Installed Plan View



Satellite



ULS Meter

DESCRIPTION: 62-2000-100  
2103Ci Cellular Modem Module, CDMA  
POWER: 7 - 16.6 VDC 3.0A MAX  
FCC ID: MIVCNN0301 CELL # (216) 906-5251  
IP: 166.156.76.131 215J02143

Teledyne Isco  
www.isco.com  
4700 Superior St., Lincoln, NE 68504  
(402) 464-0231 USA & Canada (800) 228-4373

DESCRIPTION: 60-2004-400  
2110 Ultrasonic Flow Module  
POWER: 12 VDC 0.1A  
215J01705

Teledyne Isco, Inc. 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com

DESCRIPTION: 60-2004-006  
2191 Battery Module  
POWER CAPABILITY: 5A CONTINUOUS  
215J00982

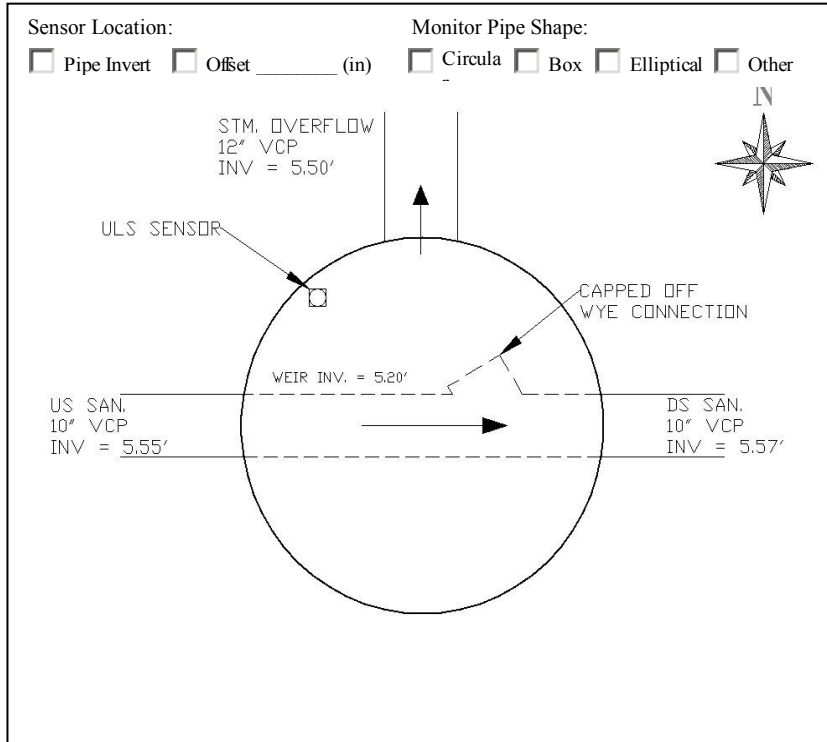
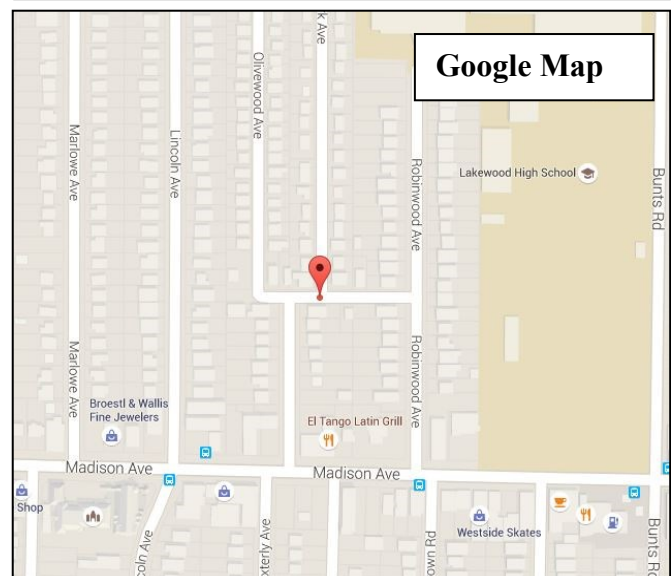
Teledyne Isco, 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com



# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CS0-LEWS1055-E                                                                                                                                                                                                                                                                                                                         |
| <b>Install Date/Time:</b>              | 10/26/15 @ 3:50 PM<br>City repairs done on 3/3/16                                                                                                                                                                                                                                                                                         |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                                                                                                                                                                               |
| <b>Latitude:</b>                       | 41° 28' 42.4813" N                                                                                                                                                                                                                                                                                                                        |
| <b>Longitude:</b>                      | 81° 47' 35.17" W                                                                                                                                                                                                                                                                                                                          |
| <b>Address or Intersection:</b>        | 14225 Cedarwood Ave. @ Blossom Park Ave.                                                                                                                                                                                                                                                                                                  |
| <b>Location Description:</b>           | MH in crown of Cedarwood Avenue<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                                                                                                                                                                                  |
| <b>Notable Site/MH Conditions:</b>     | Ultrasonic sensor installed above dry bottom. Manhole floor falls slightly from weir to sensor location to overflow. Positive readings indicate overflow. Calibrated shelf to -0.1".<br>*New manhole floor provides a better reflective surface and is slightly higher (about 4") than previous floor. They also capped off the open wye. |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                                                                                                                                                                             |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                                                                                                                                                                                      |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                                                                                                                                                                            |
| <b>MH Depth (ft):</b><br>Rim to invert | 5.56'                                                                                                                                                                                                                                                                                                                                     |

|                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                                 |
| <b>Job #:</b> 14437                                                                                                                     |
| <b>Meter Owner:</b>                                                                                                                     |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other: |
| <b>Sensor type:</b><br><input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:   |
| <b>Recording Interval (min):</b> 5                                                                                                      |
| <b>Cell Service Number:</b><br>(216) 906-6921                                                                                           |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Modem Serial #: 215-J02-158<br>Ultrasonic Serial #: 215-G02-833             |
| <b>Collection Frequency:</b> 24 hours                                                                                                   |
| <b>Lakewood Asset #:</b> 548284                                                                                                         |





# Flow Monitor Site Installation Sheet

**Meter Name:**

LK\_CSO-LEWS1055-E

**Client:** Lakewood

**Job #:** 14437

**Plan View**



**Satellite**



**ULS Meter**

DESCRIPTION: 62-2000-100  
2103Ci Cellular Modem Module, CDMA  
POWER: 7 - 16.6 VDC 3.0A MAX  
FCC ID: MIVCNN0301 CELL # (216) 906-6921  
IP: 166.156.76.159 215J02158



Teledyne Isco, Inc. 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada (800) 228-4373



DESCRIPTION: 60-2004-400  
2110 Ultrasonic Flow Module

POWER: 12 VDC 0.1A



215G02833

Teledyne Isco, Inc. 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com



DESCRIPTION: 60-2004-006  
2191 Battery Module

POWER  
CAPABILITY: 5A CONTINUOUS



215J00983



Teledyne Isco, Inc. 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com

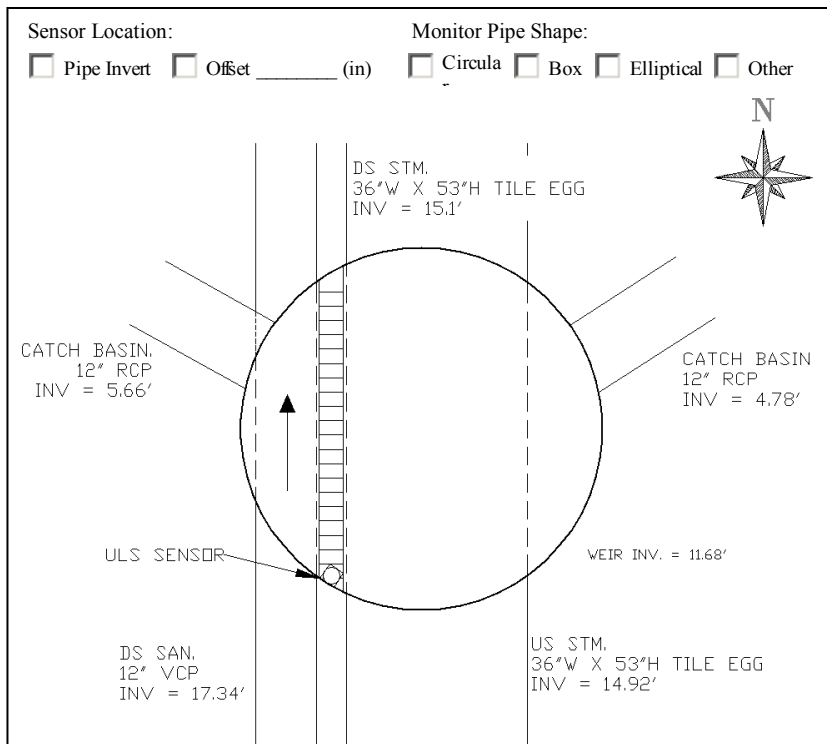
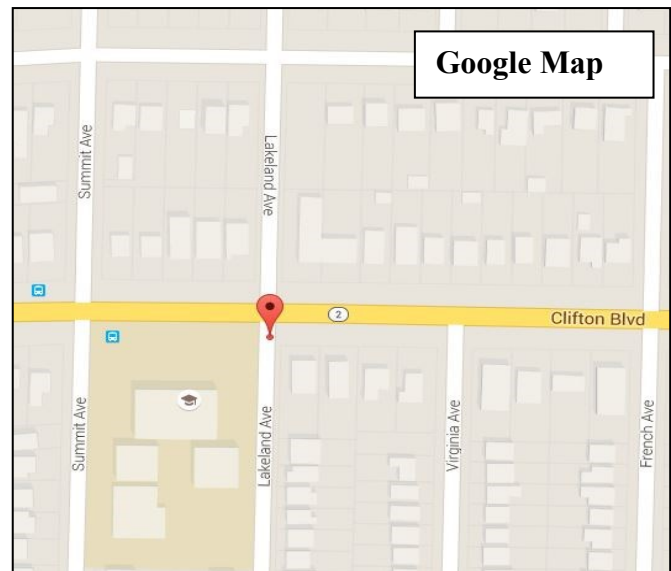




# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                         |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CSO-LEWS1180-A                                                                                                                                                       |
| <b>Install Date/Time:</b>              | 10/29/15<br>9:40 AM                                                                                                                                                     |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                             |
| <b>Latitude:</b>                       | 41.491754° N                                                                                                                                                            |
| <b>Longitude:</b>                      | 81.805890° W                                                                                                                                                            |
| <b>Address or Intersection:</b>        | Lakeland Avenue & Clifton Boulevard                                                                                                                                     |
| <b>Location Description:</b>           | MH in center of northbound Lakeland Ave. lane about 4' south of Clifton Avenue<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc. |
| <b>Notable Site/MH Conditions:</b>     | Install on sanitary side away from catch basins<br><br>Siltng depth, oil/grease, overflow, surcharge evidence, structural damage, etc.                                  |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                           |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                    |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                     |
| <b>MH Depth (ft):</b><br>Rim to invert | 17.34'                                                                                                                                                                  |

|                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                                 |
| <b>Job #:</b> 14437                                                                                                                     |
| <b>Meter Owner:</b>                                                                                                                     |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other: |
| <b>Sensor type:</b><br><input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:   |
| <b>Recording Interval (min):</b> 5                                                                                                      |
| <b>Cell Service Number:</b><br>(216) 906-6341                                                                                           |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-154<br>Ultrasonic Serial #: 215-J01-704          |
| <b>Collection Frequency:</b> 24 hours                                                                                                   |
| <b>Lakewood Asset #:</b> 548286                                                                                                         |



|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-LEWS1180-A |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |

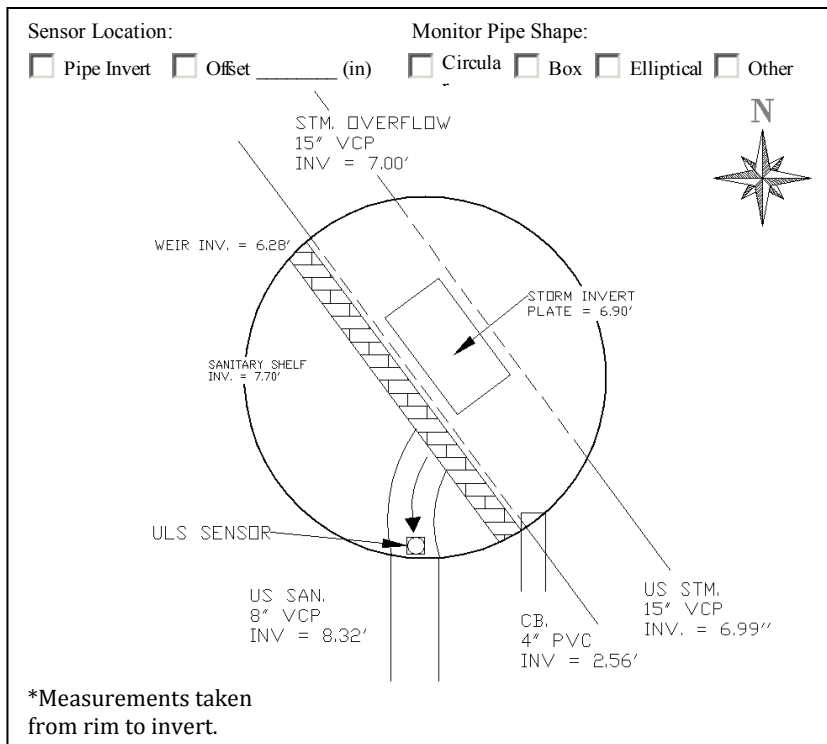
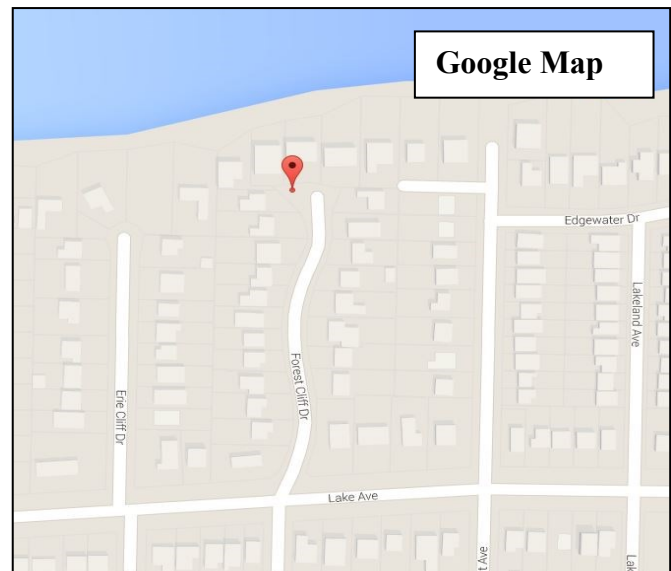




# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                        |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CSO-LEWS1210-A                                                                                                                                      |
| <b>Install Date/Time:</b>              | 10/29/15 @ 11:50 AM<br>Relocated on 12/10/15 @ 10:37 AM                                                                                                |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                            |
| <b>Latitude:</b>                       | 41° 29' 42.4" N                                                                                                                                        |
| <b>Longitude:</b>                      | 81° 48' 30.3" W                                                                                                                                        |
| <b>Address or Intersection:</b>        | 1040 Forest Cliff Drive<br>4' south of yellow house's driveway                                                                                         |
| <b>Location Description:</b>           | MH at north end of Forest Cliff Drive<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                         |
| <b>Notable Site/MH Conditions:</b>     | Sensor installed over sanitary outlet.<br><br>Overflow of weir begins above 24.48"<br>Overflow through holes in storm invert plate begins above 17.04" |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                          |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place   |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                    |
| <b>MH Depth (ft):</b><br>Rim to invert | 8.28'                                                                                                                                                  |

|                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                                 |
| <b>Job #:</b> 14437                                                                                                                     |
| <b>Meter Owner:</b>                                                                                                                     |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other: |
| <b>Sensor type:</b><br><input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:   |
| <b>Recording Interval (min):</b> 5                                                                                                      |
| <b>Cell Service Number:</b><br>(216) 906-8827                                                                                           |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-170<br>Ultrasonic Serial #: 215-J01-702          |
| <b>Collection Frequency:</b> 24 hours                                                                                                   |
| <b>Lakewood Asset #:</b> 548283                                                                                                         |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-LEWS1210-A |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |



**ULS Meter**

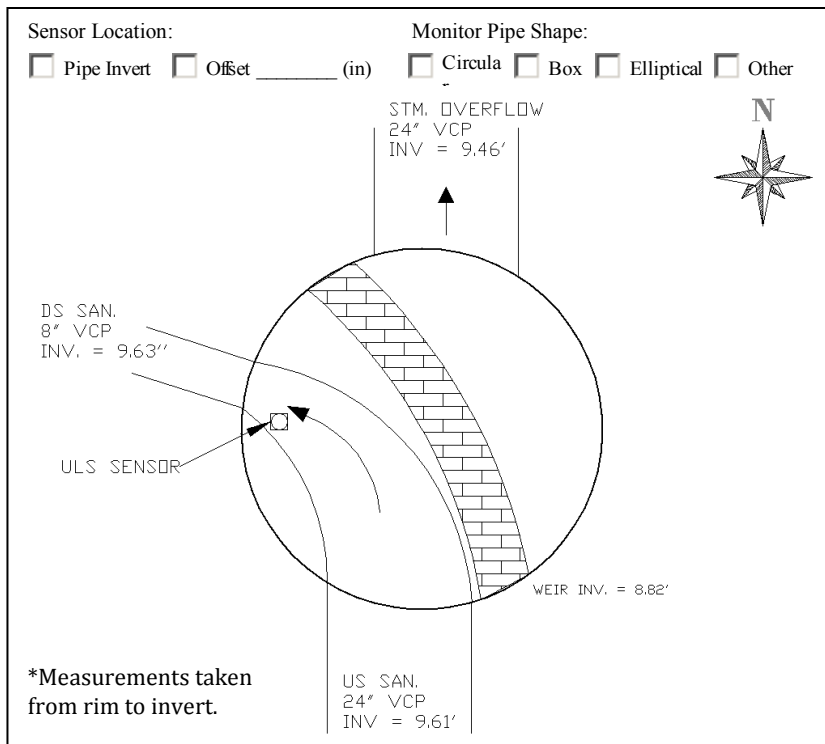
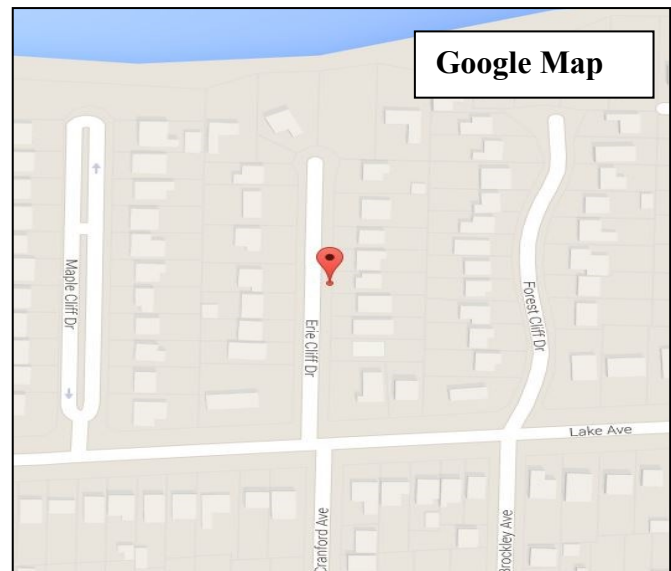
|                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                       |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  | <p>DESCRIPTION: 62-2000-100<br/>2103Ci Cellular Modem Module, CDMA<br/>POWER: 7 - 16.6 VDC 3.0A MAX<br/>FCC ID: MIVCNO0301 CELL # (216) 906-8827<br/>IP: 166.156.76.175 215J02170</p> <p> Teladyne Isco, Inc. 4700 Superior St. Lincoln, NE 68504 USA<br/>(402) 484-0231 (800) 228-4373 USA &amp; Canada (800) 228-4373</p>         |  |
|  | <p>DESCRIPTION: 60-2004-400<br/>2110 Ultrasonic Flow Module<br/>POWER: 12 VDC 0.1A<br/>215J01702</p> <p>  Teladyne Isco, Inc. 4700 Superior St. Lincoln, NE 68504 USA<br/>(402) 484-0231 (800) 228-4373 USA &amp; Canada www.isco.com</p>      |  |
|                                                                                     | <p>DESCRIPTION: 60-2004-006<br/>2191 Battery Module<br/>POWER CAPABILITY: 5A CONTINUOUS<br/>215J00958</p> <p>  Teladyne Isco, Inc. 4700 Superior St. Lincoln, NE 68504 USA<br/>(402) 484-0231 (800) 228-4373 USA &amp; Canada www.isco.com</p> |  |



# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                      |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CSO-LEWS1215-A                                                                                                                                    |
| <b>Install Date/Time:</b>              | 10/29/15 @ 2:00 PM<br>Relocated on 12/10/15 @ 12:48 PM                                                                                               |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                          |
| <b>Latitude:</b>                       | 41° 29' 38.6395" N                                                                                                                                   |
| <b>Longitude:</b>                      | 81° 48' 34.536" W                                                                                                                                    |
| <b>Address or Intersection:</b>        | 1083 Erie Cliff                                                                                                                                      |
| <b>Location Description:</b>           | Manhole in sidewalk at 1083 Erie Cliff<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                      |
| <b>Notable Site/MH Conditions:</b>     | Ultrasonic is shooting sanitary flow near the outlet.<br><br>Overflow is at levels above 9.72"                                                       |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                        |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                  |
| <b>MH Depth (ft):</b><br>Rim to invert | 9.54'                                                                                                                                                |

|                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                                 |
| <b>Job #:</b> 14437                                                                                                                     |
| <b>Meter Owner:</b>                                                                                                                     |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other: |
| <b>Sensor type:</b><br><input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:   |
| <b>Recording Interval (min):</b> 5                                                                                                      |
| <b>Cell Service Number:</b><br>(216) 906-6011                                                                                           |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-152<br>Ultrasonic Serial #: 215-H02-357          |
| <b>Collection Frequency:</b> 24 hours                                                                                                   |
| <b>Lakewood Asset #:</b> 548281                                                                                                         |





# Flow Monitor Site Installation Sheet

**Meter Name:**

LK\_CSO-LEWS1215-A

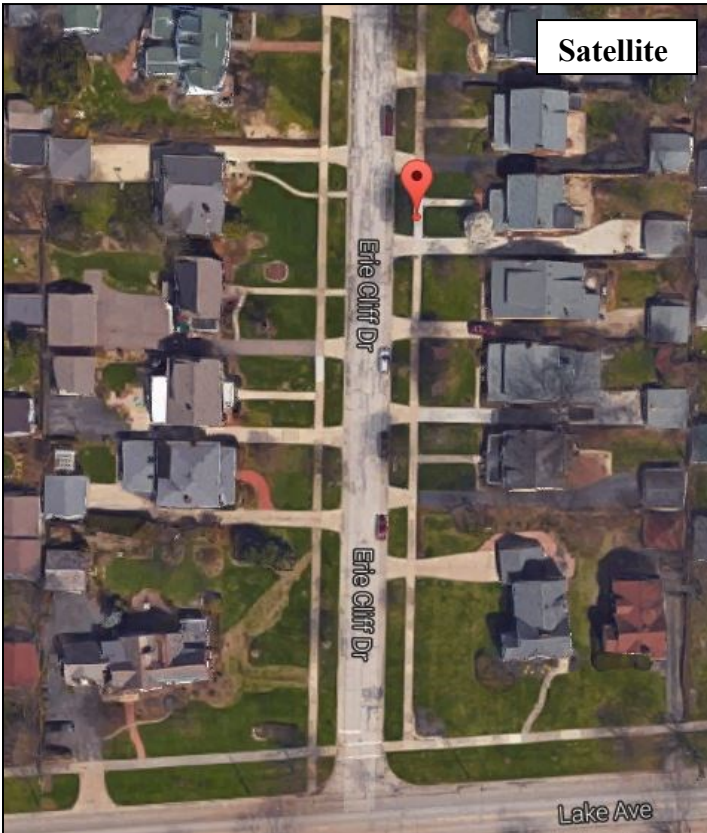
Client: Lakewood

Job #: 14437

Installed Plan View



Satellite



ULS Meter

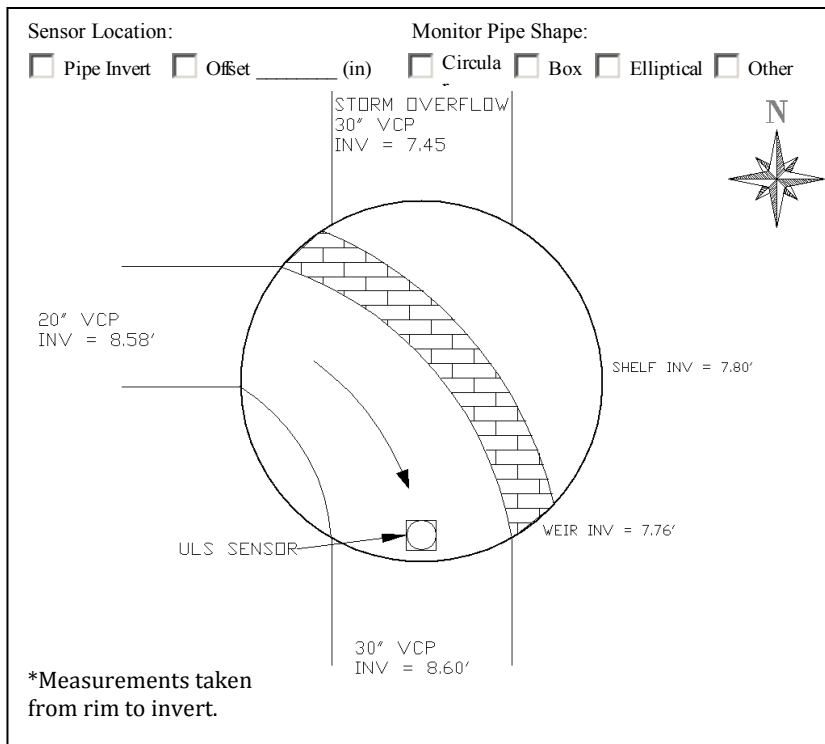
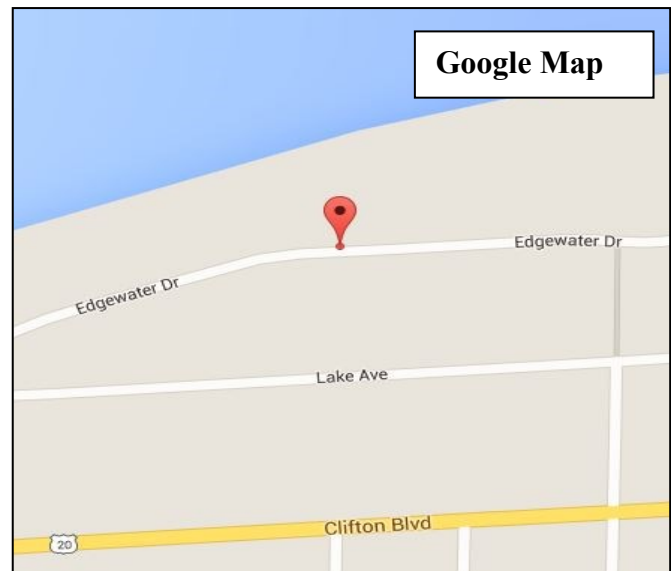
|    |                                                                                                                                                                                                                      |  |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 25 | <b>DESCRIPTION:</b> 62-2000-100<br>2103Ci Cellular Modem Module, CDMA<br><b>POWER:</b> 7 - 16.6 VDC 3.0A MAX<br><b>FCC ID:</b> MIVCNN0301 <b>CELL #</b> (216) 906-6011<br><b>IP:</b> 166.156.76.148 <b>215J02162</b> |  |
|    | <b>DESCRIPTION:</b> 60-2004-400<br>2110 Ultrasonic Flow Module<br><b>POWER:</b> 12 VDC 0.1A<br><b>215H02357</b>                                                                                                      |  |
|    | <b>DESCRIPTION:</b> 60-2004-006<br>2191 Battery Module<br><b>POWER CAPABILITY:</b> 5A CONTINUOUS<br><b>215J01000</b>                                                                                                 |  |



# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CSO-LEWS1285-A                                                                                                                                                                                                                                                                                                        |
| <b>Install Date/Time:</b>              | 10/30/15 @ 9:30 AM<br>Relocated on 12/10/15 @ 2:05 PM                                                                                                                                                                                                                                                                    |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                                                                                                                                                              |
| <b>Latitude:</b>                       | 41° 29' 37.950" N                                                                                                                                                                                                                                                                                                        |
| <b>Longitude:</b>                      | 81° 49' 0.1884" W                                                                                                                                                                                                                                                                                                        |
| <b>Address or Intersection:</b>        | 17216 Edgewater                                                                                                                                                                                                                                                                                                          |
| <b>Location Description:</b>           | MH in eastern driveway of 17216 Edgewater. Large grey house with 2 driveways.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                                                                                                                   |
| <b>Notable Site/MH Conditions:</b>     | Ultrasonic sensor installed on southern sanitary outlet. Weir begins to overflow at level readings above 10.08". Outlet rises an additional 3.69", thus site overflows and drains out northern storm outlet at levels above 13.77".<br><br>Silt depth, oil/grease, overflow, surcharge evidence, structural damage, etc. |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                                                                                                                                                            |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                                                                                                                                                                     |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                                                                                                                                                                      |
| <b>MH Depth (ft):</b><br>Rim to invert | 7.72'                                                                                                                                                                                                                                                                                                                    |

|                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                        |
| <b>Job #:</b> 14437                                                                                                            |
| <b>Meter Owner:</b>                                                                                                            |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav  |
| Other:                                                                                                                         |
| <b>Sensor type:</b><br><input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler    |
| Other:                                                                                                                         |
| <b>Recording Interval (min):</b> 5                                                                                             |
| <b>Cell Service Number:</b><br>(216) 906-5728                                                                                  |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-147<br>Ultrasonic Serial #: 215-H02-360 |
| <b>Collection Frequency:</b> 24 hours                                                                                          |
| <b>Lakewood Asset #:</b> 548280                                                                                                |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-LEWS1285-A |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |

Installed Plan View



Satellite



ULS Meter

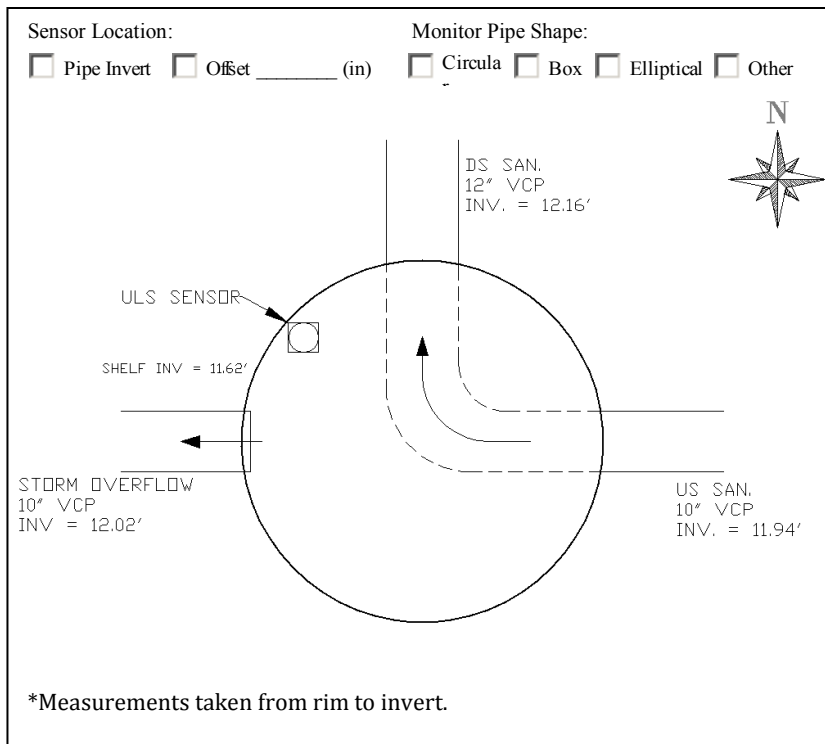
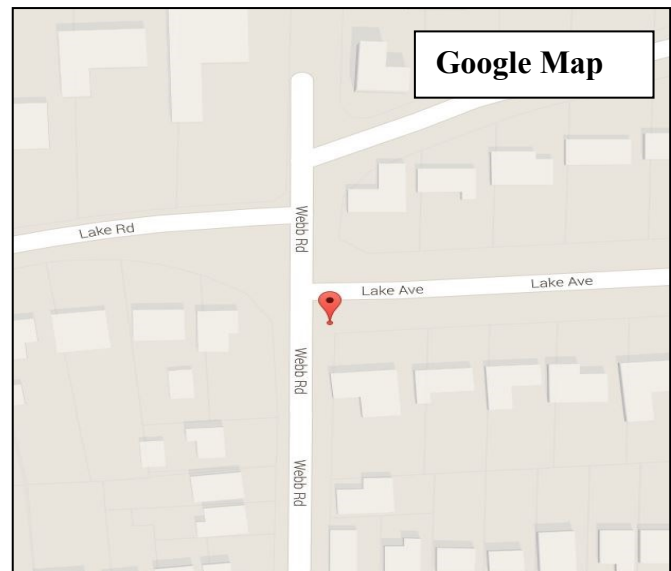




# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CSO-LEWS1295-B                                                                                                                                                                                                                                                                                                     |
| <b>Install Date/Time:</b>              | 10/29/15<br>11:00 AM                                                                                                                                                                                                                                                                                                  |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                                                                                                                                                           |
| <b>Latitude:</b>                       | 41° 29' 32.7696" N                                                                                                                                                                                                                                                                                                    |
| <b>Longitude:</b>                      | 81° 49' 12.54" W                                                                                                                                                                                                                                                                                                      |
| <b>Address or Intersection:</b>        | Lake Avenue & Webb                                                                                                                                                                                                                                                                                                    |
| <b>Location Description:</b>           | MH in sidewalk on south side of intersection. 6' south crosswalk on Lake Ave.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                                                                                                                |
| <b>Notable Site/MH Conditions:</b>     | ULS sensor shooting shelf. Calibrated level to -0.1" to minimize false readings. Sensor could not get a reading from the sanitary outlet and the sanitary inlet would not give real indications of overflow due to site conditions. Consistent, consecutive, high quality, positive level readings indicate overflow. |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                                                                                                                                                         |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                                                                                                                                                                  |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                                                                                                                                                                   |
| <b>MH Depth (ft):</b><br>Rim to invert | 12.0'                                                                                                                                                                                                                                                                                                                 |

|                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                        |
| <b>Job #:</b> 14437                                                                                                            |
| <b>Meter Owner:</b>                                                                                                            |
| <b>Meter Type:</b>                                                                                                             |
| <input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav                        |
| Other:                                                                                                                         |
| <b>Sensor type:</b>                                                                                                            |
| <input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler                           |
| Other:                                                                                                                         |
| <b>Recording Interval (min):</b> 5                                                                                             |
| <b>Cell Service Number:</b><br>(216) 906-5752                                                                                  |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-149<br>Ultrasonic Serial #: 215-H02-352 |
| <b>Collection Frequency:</b> 24 hours                                                                                          |
| <b>Lakewood Asset #:</b> 548279                                                                                                |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-LEWS1295-B |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |

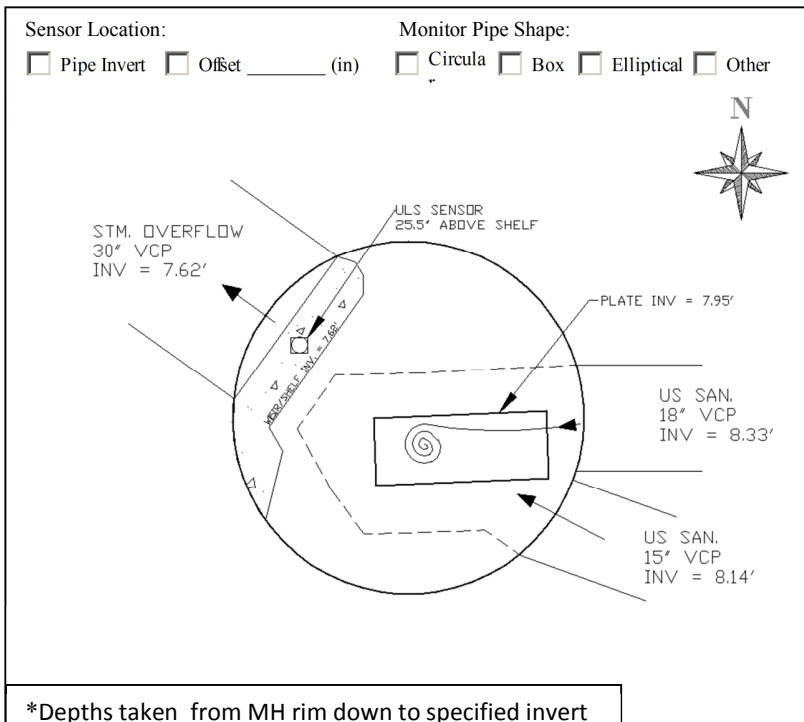
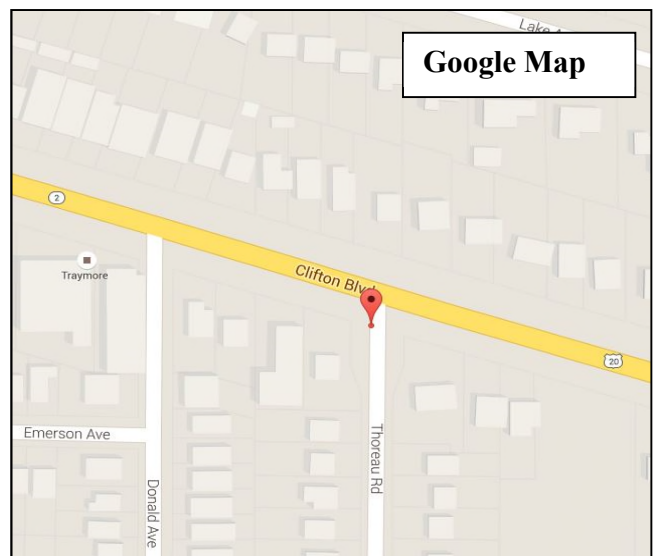




# Flow Monitor Site Installation Sheet

|                                    |                                                                                                                                                                                                                                                                    |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                    | LK_CSO-LEWS1035-A                                                                                                                                                                                                                                                  |
| <b>Install Date/Time:</b>          | 11/3/15 @ 12:40 AM<br>Relocated on 2/12/16 @ 12:00 PM                                                                                                                                                                                                              |
| <b>Install Crew:</b>               | John Kelly & George Stevens                                                                                                                                                                                                                                        |
| <b>Latitude:</b>                   | 41° 29' 23.28" N                                                                                                                                                                                                                                                   |
| <b>Longitude:</b>                  | 81° 46' 44.6304" W                                                                                                                                                                                                                                                 |
| <b>Address or Intersection:</b>    | Thoreau at Clifton                                                                                                                                                                                                                                                 |
| <b>Location Description:</b>       | Manhole in brick crosswalk through Thoreau at Clifton intersection.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                                                                       |
| <b>Notable Site/MH Conditions:</b> | Sensor installed over newly leveled weir wall. Site is calibrated to weir = -0.1". Live readings and dry weather data show a dry level reading bounce of up to 0.40". Overflow should be considered as consistent, consecutive, high quality readings above 0.50". |
| <b>Type of Sewer:</b>              | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                                                                                                      |
| <b>MH Material:</b>                | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                                                                                                               |
| <b>MH Condition:</b>               | <input checked="" type="checkbox"/> Poor <input type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Great                                                                                                                                |
| <b>MH Depth (ft):</b>              | 7.92'<br>Rim to invert                                                                                                                                                                                                                                             |

|                                                                                                         |
|---------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                 |
| <b>Job #:</b> 14437                                                                                     |
| <b>Meter Owner:</b>                                                                                     |
| <b>Meter Type:</b>                                                                                      |
| <input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav |
| Other:                                                                                                  |
| <b>Sensor type:</b>                                                                                     |
| <input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler    |
| Other:                                                                                                  |
| <b>Recording Interval (min):</b> 5                                                                      |
| <b>Cell Service Number:</b>                                                                             |
| (216) 906-5731                                                                                          |
| <b>Collection Methods:</b>                                                                              |
| Manual/cell/etc.: Cellular                                                                              |
| Cellular Serial #: 215-J02-148                                                                          |
| Ultrasonic Serial #: 215-J01-707                                                                        |
| <b>Collection Frequency:</b> 24 hours                                                                   |
| <b>Lakewood Asset #:</b> 548289                                                                         |





Flow Monitor Site Installation Sheet

|             |                   |
|-------------|-------------------|
| Meter Name: | LK_CSO-LEWS1035-A |
|-------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |

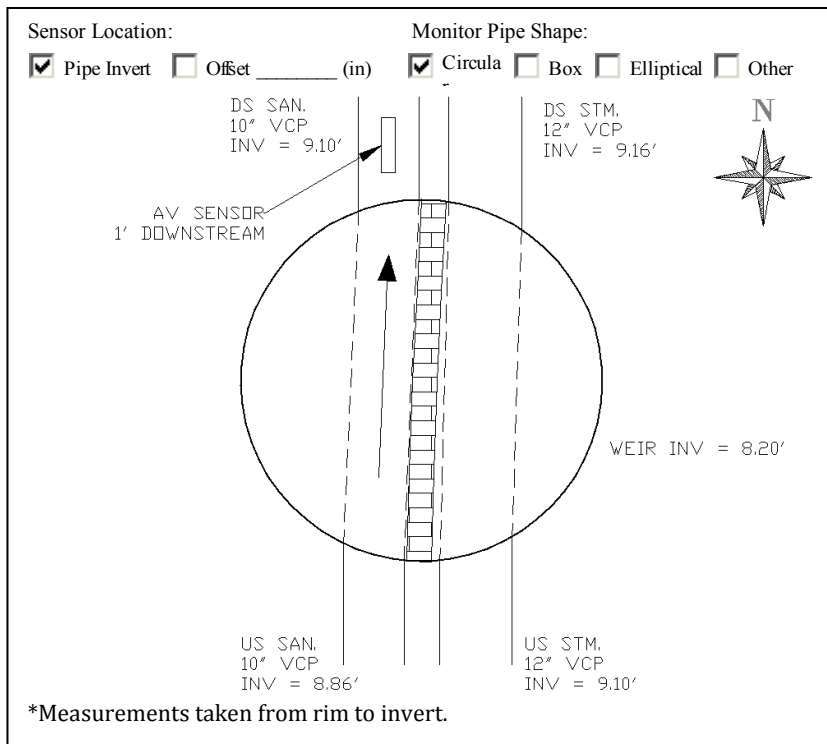
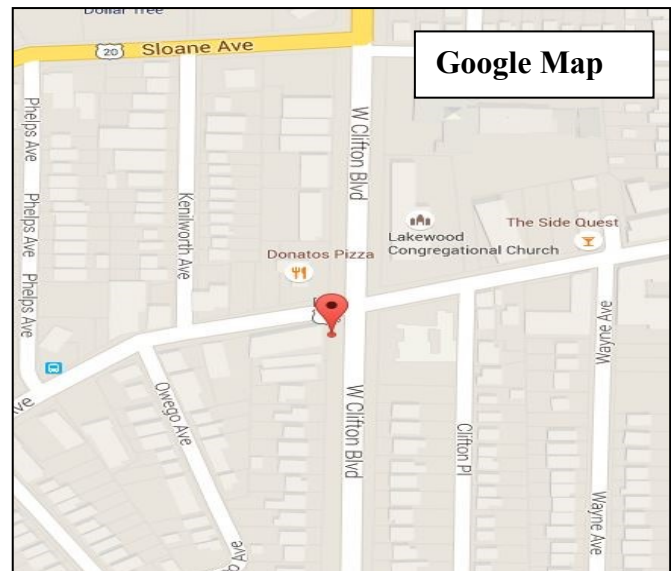




# Flow Monitor Site Installation Sheet

|                                    |                                                                                                                                                                         |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                    | LK_CSO-RRES1145-A                                                                                                                                                       |
| <b>Install Date/Time:</b>          | 11/5/15<br>9:39 AM                                                                                                                                                      |
| <b>Install Crew:</b>               | John Kelly & George Stevens                                                                                                                                             |
| <b>Latitude:</b>                   | 41° 29' 2.1768" N                                                                                                                                                       |
| <b>Longitude:</b>                  | 81° 49' 22.3788" W                                                                                                                                                      |
| <b>Address or Intersection:</b>    | 18101 Detroit Avenue                                                                                                                                                    |
| <b>Location Description:</b>       | Manhole in planter box on West Clifton side of building at 18101 Detroit Avenue.<br>AV sensor in downstream 10" sanitary pipe.<br>Normal flows will record as negative. |
| <b>Notable Site/MH Conditions:</b> | Manhole in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                                                  |
| <b>Type of Sewer:</b>              | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                           |
| <b>MH Material:</b>                | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                    |
| <b>MH Condition:</b>               | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                     |
| <b>MH Depth (ft):</b>              | 8.98'<br>Rim to invert                                                                                                                                                  |

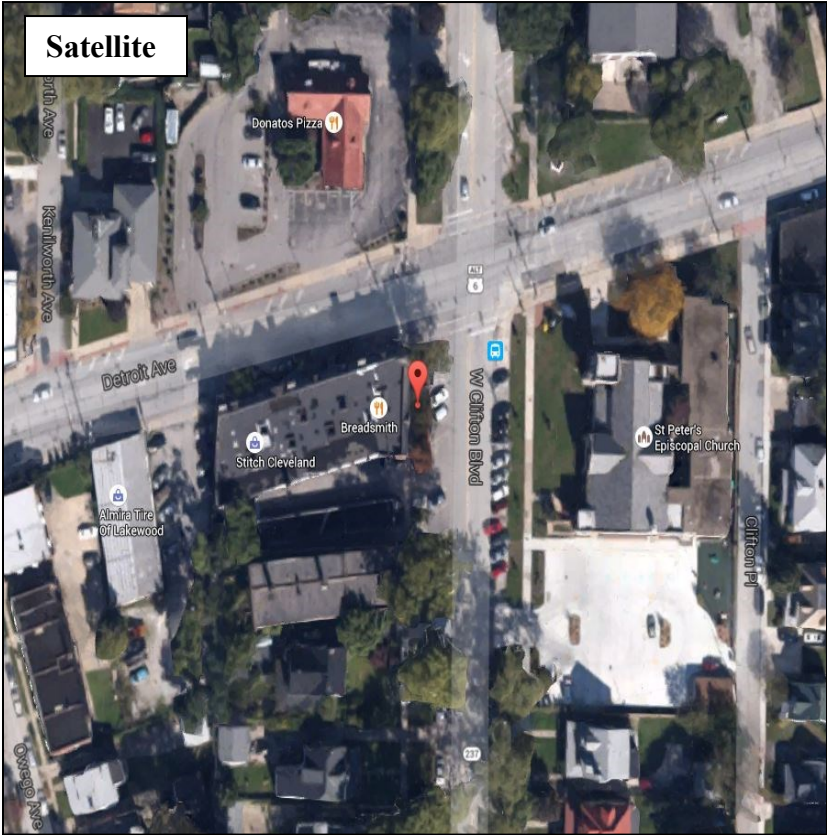
|                                                                                                         |
|---------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                 |
| <b>Job #:</b> 14437                                                                                     |
| <b>Meter Owner:</b>                                                                                     |
| <b>Meter Type:</b>                                                                                      |
| <input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav |
| Other:                                                                                                  |
| <b>Sensor type:</b>                                                                                     |
| <input type="checkbox"/> ULS <input checked="" type="checkbox"/> AV <input type="checkbox"/> Sampler    |
| Other:                                                                                                  |
| <b>Recording Interval (min):</b> 5                                                                      |
| <b>Cell Service Number:</b>                                                                             |
| (216) 906-4955                                                                                          |
| <b>Collection Methods:</b>                                                                              |
| Manual/cell/etc.: Cellular                                                                              |
| Cellular Serial #: 215-J02-141                                                                          |
| Area Velocity Serial #: 215-H00-865                                                                     |
| Collection Frequency: 24 hours                                                                          |
| <b>Lakewood Asset #:</b> 548272                                                                         |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-RRES1145-A |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |





# Flow Monitor Site Installation Sheet

|                                    |                                                                                                            |
|------------------------------------|------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                    | LK_CSO-RRES1145-C                                                                                          |
| <b>Install Date/Time:</b>          | 11/5/15<br>11:16 AM                                                                                        |
| <b>Install Crew:</b>               | John Kelly & George Stevens                                                                                |
| <b>Latitude:</b>                   | 41° 28' 56.9748" N                                                                                         |
| <b>Longitude:</b>                  | 81° 49' 22.4688" W                                                                                         |
| <b>Address or Intersection:</b>    | 1460 West Clifton                                                                                          |
| <b>Location Description:</b>       | Manhole in tree lawn on west side of street at 1460 West Clifton.<br>Normal flows will record as negative. |
| <b>Notable Site/MH Conditions:</b> | MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                          |
| <b>Notable Site/MH Conditions:</b> | Silting depth, oil/grease, overflow, surcharge evidence, structural damage, etc.                           |

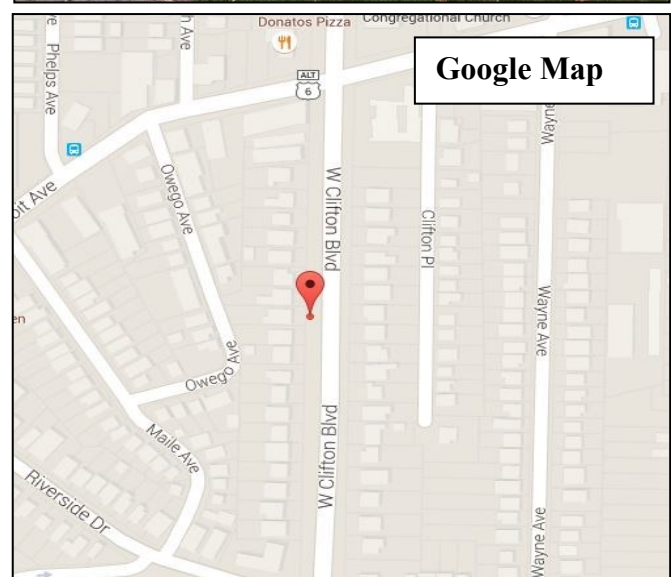
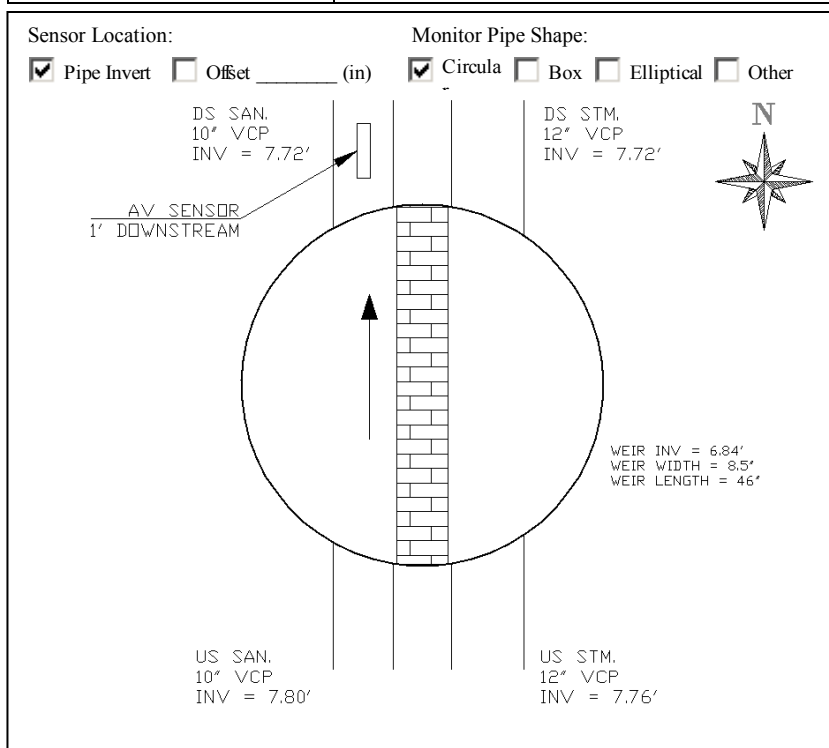
|                         |
|-------------------------|
| <b>Client:</b> Lakewood |
| <b>Job #:</b> 14437     |

|                                                                                                         |
|---------------------------------------------------------------------------------------------------------|
| <b>Meter Owner:</b>                                                                                     |
| <b>Meter Type:</b>                                                                                      |
| <input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav |
| Other:                                                                                                  |
| <b>Sensor type:</b>                                                                                     |
| <input type="checkbox"/> ULS <input checked="" type="checkbox"/> AV <input type="checkbox"/> Sampler    |
| Other:                                                                                                  |
| <b>Recording Interval (min):</b> 5                                                                      |
| <b>Cell Service Number:</b>                                                                             |
| (216) 906-5763                                                                                          |
| <b>Collection Methods:</b>                                                                              |
| Manual/cell/etc.: Cellular                                                                              |
| Cellular Serial #: 215-J02-150                                                                          |
| Area Velocity Serial #: 215-H00-866                                                                     |
| Collection Frequency: 24 hours                                                                          |
| <b>Lakewood Asset #:</b> 548269                                                                         |

|                       |                                                                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type of Sewer:</b> | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                        |
| <b>MH Material:</b>   | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place |
| <b>MH Condition:</b>  | <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Great                  |
| <b>MH Depth (ft):</b> | 7.77'                                                                                                                                                |
| Rim to invert         |                                                                                                                                                      |



**Site View**



**Google Map**



# Flow Monitor Site Installation Sheet

**Meter Name:**

LK\_CSO-RRES1145-C

Client: Lakewood

Job #: 14437

**Plan View**



**Satellite**



**ULS Meter**



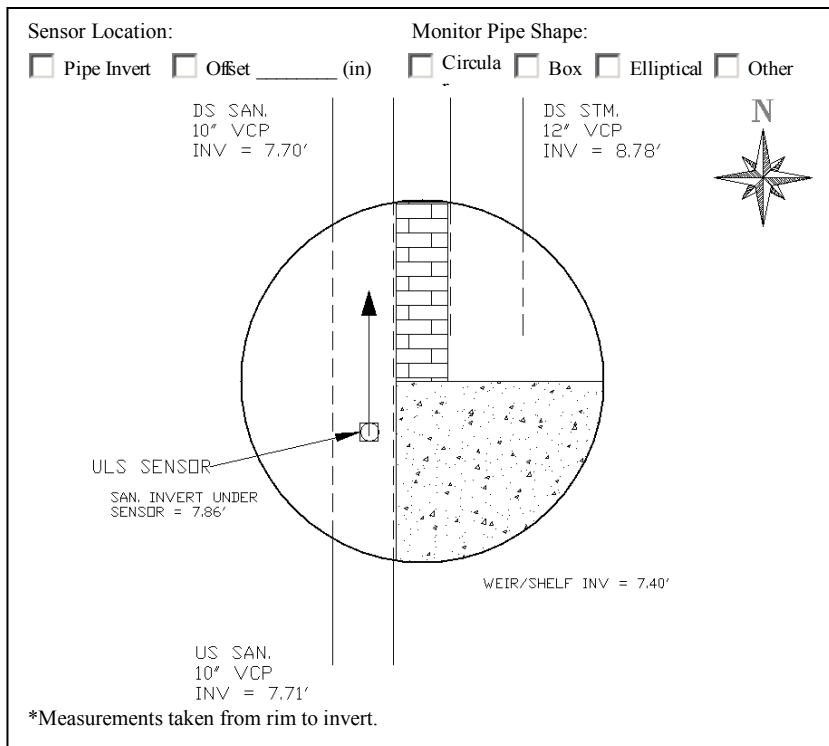
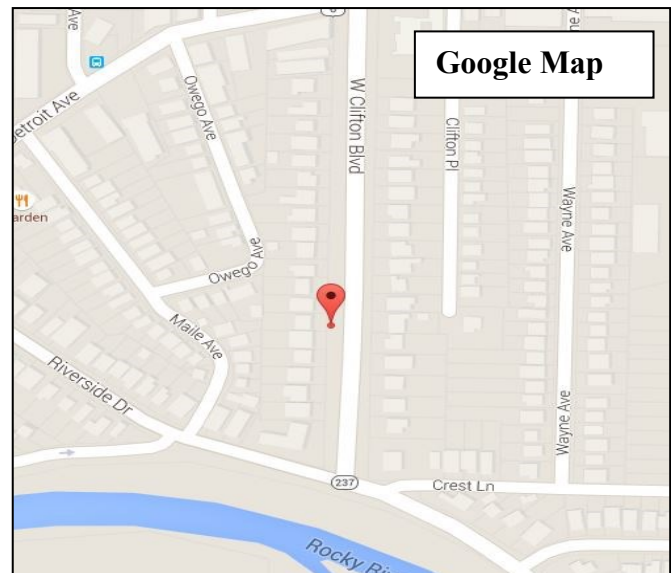


# Flow Monitor Site Installation Sheet

|                                    |                                                                                                                                                                                                          |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                    | LK_CSO-RRES1145-D                                                                                                                                                                                        |
| <b>Install Date/Time:</b>          | 11/2/15<br>2:30 PM                                                                                                                                                                                       |
| <b>Install Crew:</b>               | John Kelly & George Stevens                                                                                                                                                                              |
| <b>Latitude:</b>                   | 41° 28' 53.9364" N                                                                                                                                                                                       |
| <b>Longitude:</b>                  | 81° 49' 22.566" W                                                                                                                                                                                        |
| <b>Address or Intersection:</b>    | 1488 West Clifton                                                                                                                                                                                        |
| <b>Location Description:</b>       | Manhole in tree lawn on west side of West Clifton.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                              |
| <b>Notable Site/MH Conditions:</b> | Sensor installed above sanitary flow. Overflow up onto shelf and into storm outlet begins at readings of 5.52".<br><br>Siltling depth, oil/grease, overflow, surcharge evidence, structural damage, etc. |

|                                                                                                         |
|---------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                 |
| <b>Job #:</b> 14437                                                                                     |
| <b>Meter Owner:</b>                                                                                     |
| <b>Meter Type:</b>                                                                                      |
| <input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav |
| Other:                                                                                                  |
| <b>Sensor type:</b>                                                                                     |
| <input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler    |
| Other:                                                                                                  |
| <b>Recording Interval (min):</b> 5                                                                      |
| <b>Cell Service Number:</b>                                                                             |
| (216) 906-8590                                                                                          |
| <b>Collection Methods:</b>                                                                              |
| Manual/cell/etc.: Cellular                                                                              |
| Cellular Serial #: 215-J02-166                                                                          |
| Ultrasonic Serial #: 215-H02-358                                                                        |
| Collection Frequency: 24 hours                                                                          |
| <b>Lakewood Asset #: 548278</b>                                                                         |

|                       |                                                                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type of Sewer:</b> | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                        |
| <b>MH Material:</b>   | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place |
| <b>MH Condition:</b>  | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                  |
| <b>MH Depth (ft):</b> | 7.22'                                                                                                                                                |
| Rim to invert         |                                                                                                                                                      |

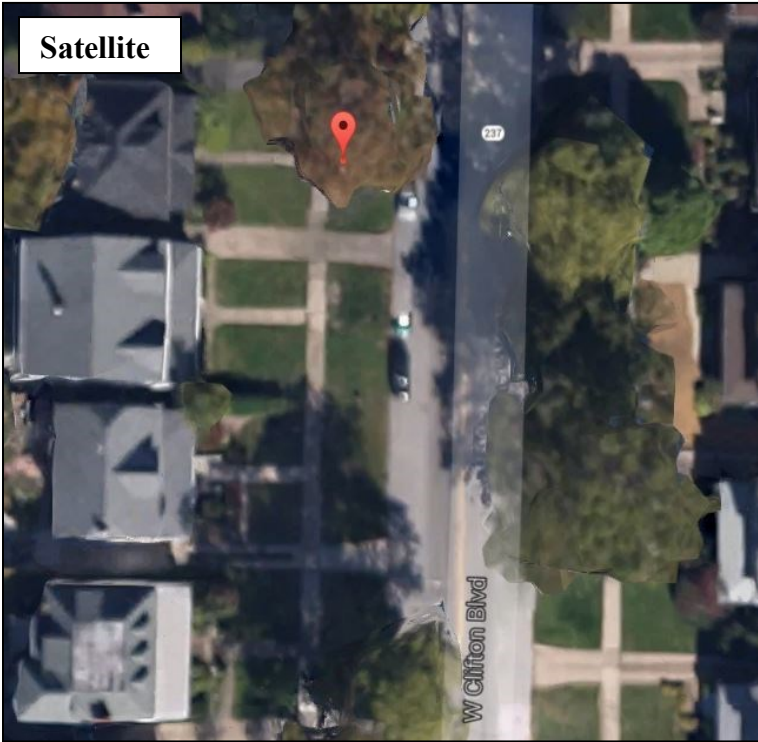




Flow Monitor Site Installation Sheet

|             |                   |
|-------------|-------------------|
| Meter Name: | LK_CSO-RRES1145-D |
|-------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |



ULS Meter

DESCRIPTION: 62-2000-100  
2103Ci Cellular Modem Module, CDMA  
--- POWER: 7 - 16.6 VDC 3.0A MAX  
FCC ID: MIVCNN0301 CELL # (216) 906-8590  
IP: 166.156.76.169 215J02166

Teledyne Isco www.isco.com  
4700 Superior St., Lincoln, NE 68504  
(402) 464-0231 USA & Canada (800) 228-4373

DESCRIPTION: 60-2004-400  
2110 Ultrasonic Flow Module  
--- POWER: 12 VDC 0.1A  
215H02358

Teledyne Isco, Inc. 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com

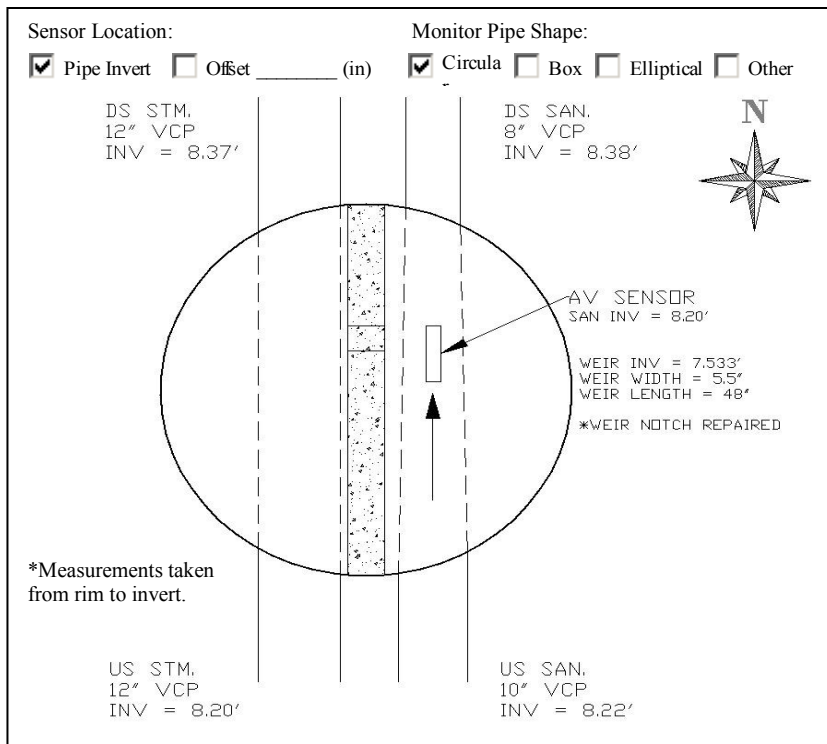
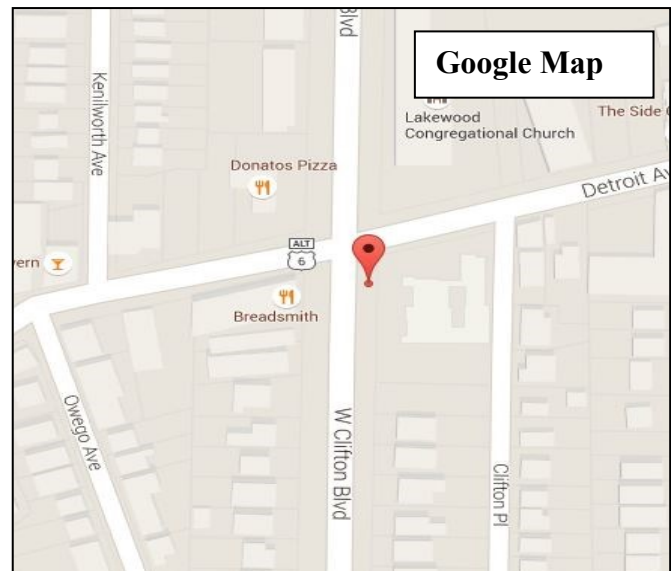
DESCRIPTION: 60-2004-006  
2191 Battery Module  
--- POWER CAPABILITY: 5A CONTINUOUS  
215J01008



# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                                                                                                                                    |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CSO-RRES1145-E                                                                                                                                                                                                                                                                  |
| <b>Install Date/Time:</b>              | 11/6/15 @ 10:34 AM<br>Weir repairs completed on 3/4/16 by city personnel                                                                                                                                                                                                           |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                                                                                                                        |
| <b>Latitude:</b>                       | 41° 29' 2.3748" N                                                                                                                                                                                                                                                                  |
| <b>Longitude:</b>                      | 81° 49' 21.342" W                                                                                                                                                                                                                                                                  |
| <b>Address or Intersection:</b>        | 18001 Detroit Avenue                                                                                                                                                                                                                                                               |
| <b>Location Description:</b>           | Manhole in tree lawn on east side of West Clifton at St. Peters church on Detroit Avenue.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                                                                 |
| <b>Notable Site/MH Conditions:</b>     | Installed AV sensor in sanitary raceway. Outlet dives sharply 45° down and west towards street.<br>Normal velocities and flows will record as positive.<br>Overflow begins at 8.0".<br>*Original install had almost constant dry weather overflows due to missing section of weir. |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                                                                                                                      |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                                                                                                                               |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Great                                                                                                                                                |
| <b>MH Depth (ft):</b><br>Rim to invert | 8.20'                                                                                                                                                                                                                                                                              |

|                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                                 |
| <b>Job #:</b> 14437                                                                                                                     |
| <b>Meter Owner:</b>                                                                                                                     |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other: |
| <b>Sensor type:</b><br><input type="checkbox"/> ULS <input checked="" type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:   |
| <b>Recording Interval (min):</b> 5                                                                                                      |
| <b>Cell Service Number:</b> (216) 906-6985                                                                                              |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-159<br>Area Velocity Serial #: 215-H02-605       |
| <b>Collection Frequency:</b> 24 hours                                                                                                   |
| <b>Lakewood Asset #:</b> 548267                                                                                                         |





**Meter Name:**

LK\_CSO-RRES1145-E

Client: Lakewood

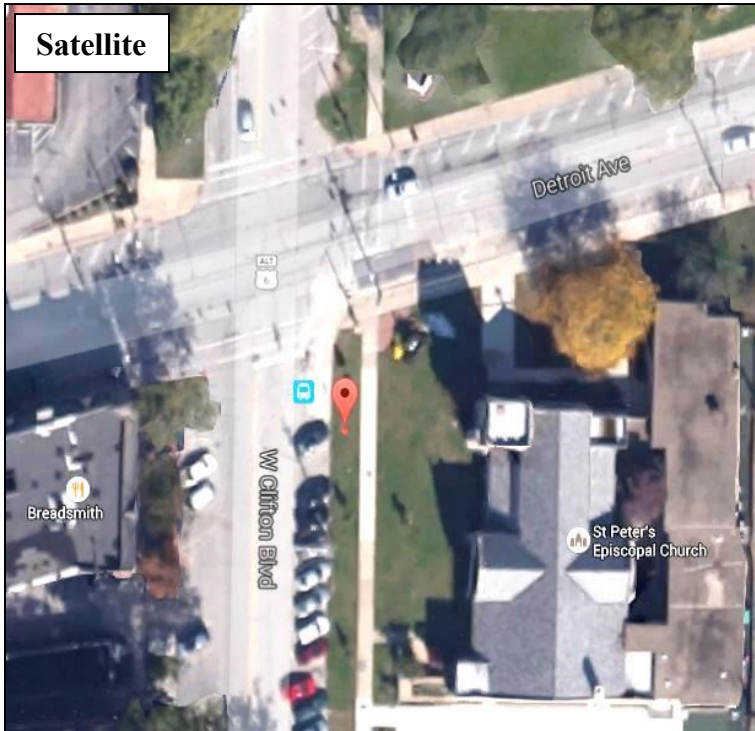
Job #: 14437

**Plan View**

**\*Notch shown no longer exists\***



**Satellite**



**AV Meter**

DESCRIPTION: 62-2000-100  
2103Ci Cellular Modem Module, CDMA  
POWER: 7 - 16.6 VDC 3.0A MAX  
FCC ID: MIVCNN0301 CELL # (216) 906-6985  
IP: 166.156.76.160 215J02159



Teledyne Isco www.isco.com  
4700 Superior St., Lincoln, NE 68504  
(402) 464-0231 USA & Canada (800) 228-4373

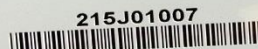
Description: 60-2004-007 Area Velocity 2150 Flow Meter  
POWER: 7-26 VDC 0.1A  
U.S. Patent No's: 5,557,536  
Foreign Patents Pending



215H02605  
Teledyne Isco, Inc. 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com

DESCRIPTION: 60-2004-006  
2191 Battery Module

POWER CAPABILITY: 5A CONTINUOUS



Teledyne Isco, 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com

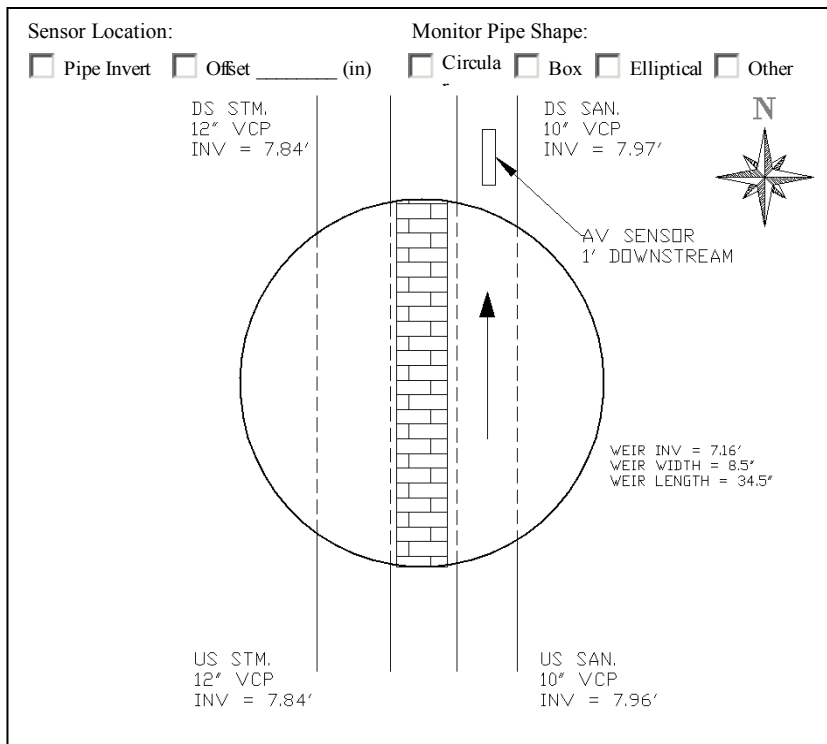
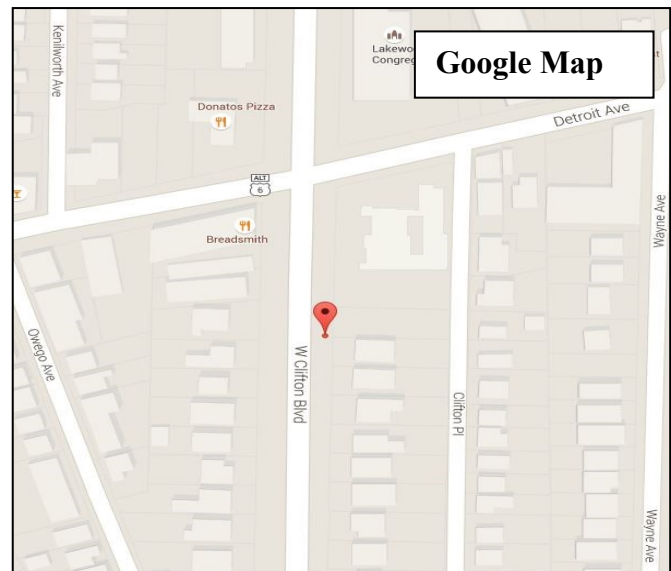




# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                              |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CSO-RRES1145-F                                                                                                                                                            |
| <b>Install Date/Time:</b>              | 11/4/15<br>12:00 PM                                                                                                                                                          |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                  |
| <b>Latitude:</b>                       | 41° 29' 0.2796" N                                                                                                                                                            |
| <b>Longitude:</b>                      | 81° 49' 21.3672" W                                                                                                                                                           |
| <b>Address or Intersection:</b>        | 1429 West Clifton                                                                                                                                                            |
| <b>Location Description:</b>           | Manhole in tree lawn at 1429 West Clifton.<br>Normal flows will record as negative.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc. |
| <b>Notable Site/MH Conditions:</b>     | Old gas or water pipes near manhole cover.<br><br>Silt depth, oil/grease, overflow, surcharge evidence, structural damage, etc.                                              |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                         |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                          |
| <b>MH Depth (ft):</b><br>Rim to invert | 8.94'                                                                                                                                                                        |

|                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                                 |
| <b>Job #:</b> 14437                                                                                                                     |
| <b>Meter Owner:</b>                                                                                                                     |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other: |
| <b>Sensor type:</b><br><input type="checkbox"/> ULS <input checked="" type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:   |
| <b>Recording Interval (min):</b> 5                                                                                                      |
| <b>Cell Service Number:</b><br>(216) 906-5724                                                                                           |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-146<br>Area Velocity Serial #: 215-H00-841       |
| <b>Collection Frequency:</b> 24 hours                                                                                                   |
| <b>Lakewood Asset #:</b> 548266                                                                                                         |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-RRES1145-F |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |



**AV Meter**

**DESCRIPTION:** 62-2000-100  
2103Ci Cellular Modem Module, CDMA

**POWER:** 7 - 16.6 VDC 3.0A MAX

**FCC ID:** MIVCNN0301      **CELL #** (216) 906-5724

**IP:** 166.156.76.138      215J02146

 Teledyne Isco    www.isco.com  
4700 Superior St., Lincoln, NE 68504  
(402) 464-0231 USA & Canada (800) 228-4373

 RECYCLE TO DISTRIBUTOR

**Description:** 60-2004-007 Area Velocity 2150 Flow Meter

**POWER:** 7-26 VDC 0.1A

**U.S. Patent No's:** 5,557,536  
Foreign Patents Pending

**215H00841**

  Teledyne Isco, Inc. 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com

 RECYCLE TO DISTRIBUTOR

**DESCRIPTION:** 60-2004-006  
2191 Battery Module

**POWER CAPABILITY:** 5A CONTINUOUS

**215J00967**

  Teledyne Isco, 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com

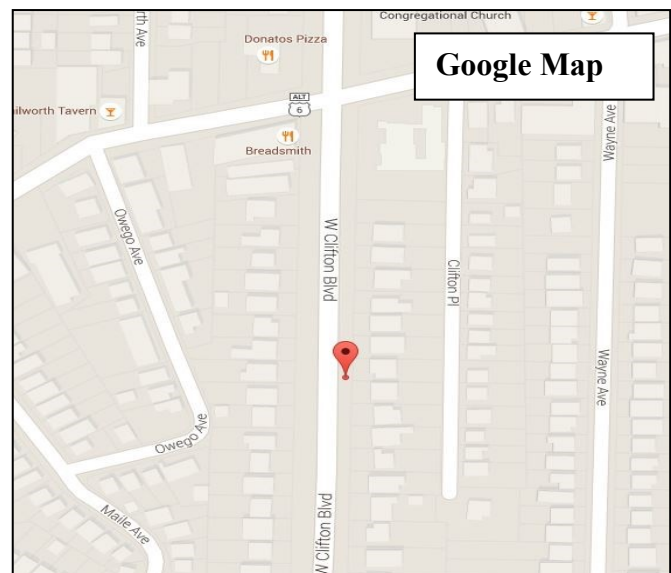
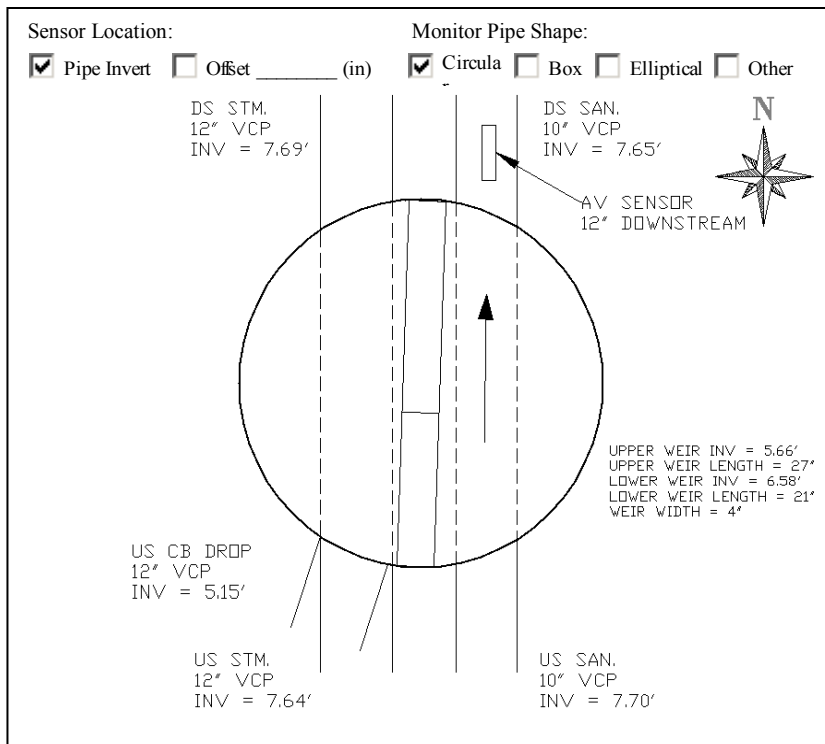
 RECYCLE TO DISTRIBUTOR



# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                          |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CS0-RRES1145-G                                                                                                                                        |
| <b>Install Date/Time:</b>              | 11/4/15<br>10:43 AM                                                                                                                                      |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                              |
| <b>Latitude:</b>                       | 41° 28' 56.865" N                                                                                                                                        |
| <b>Longitude:</b>                      | 81° 49' 21.462" W                                                                                                                                        |
| <b>Address or Intersection:</b>        | 1459 West Clifton                                                                                                                                        |
| <b>Location Description:</b>           | Manhole in driveway at 1459 West Clifton.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                       |
| <b>Notable Site/MH Conditions:</b>     | Shooting downstream 10" sanitary. Normal readings will be negative.<br><br>Silt depth, oil/grease, overflow, surcharge evidence, structural damage, etc. |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                            |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place     |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                      |
| <b>MH Depth (ft):</b><br>Rim to invert | 7.68'                                                                                                                                                    |

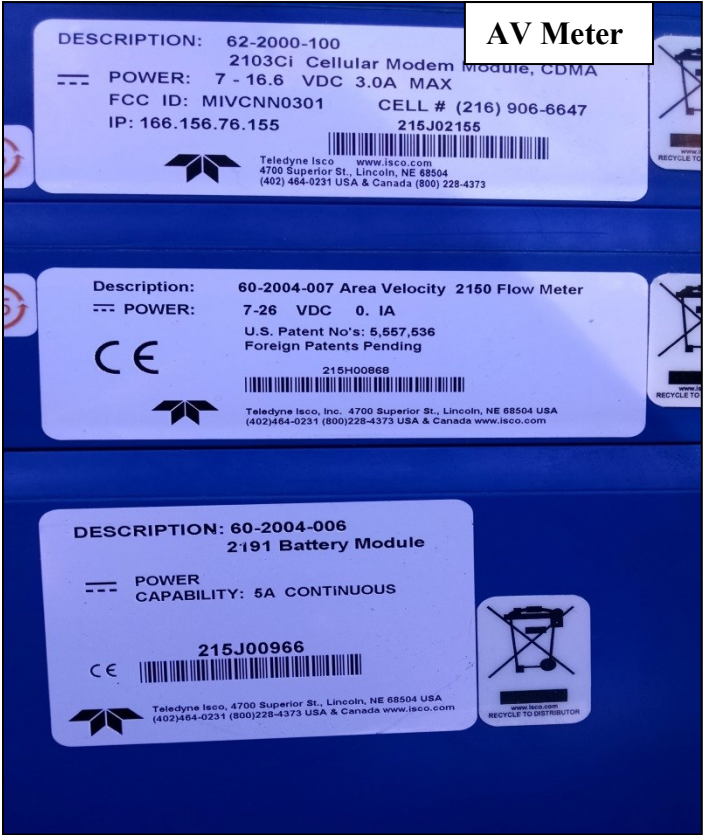
|                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                                                                                                                     |
| <b>Job #:</b> 14437                                                                                                                                                                                                         |
| <b>Meter Owner:</b>                                                                                                                                                                                                         |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other:                                                                                     |
| <b>Sensor type:</b><br><input type="checkbox"/> ULS <input checked="" type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:                                                                                       |
| <b>Recording Interval (min):</b> 5                                                                                                                                                                                          |
| <b>Cell Service Number:</b><br>(216) 906-6647<br><b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-155<br>Area Velocity Serial #: 215-H00-868<br><b>Collection Frequency:</b> 24 hours |
| <b>Lakewood Asset #:</b> 548268                                                                                                                                                                                             |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-RRES1145-G |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |

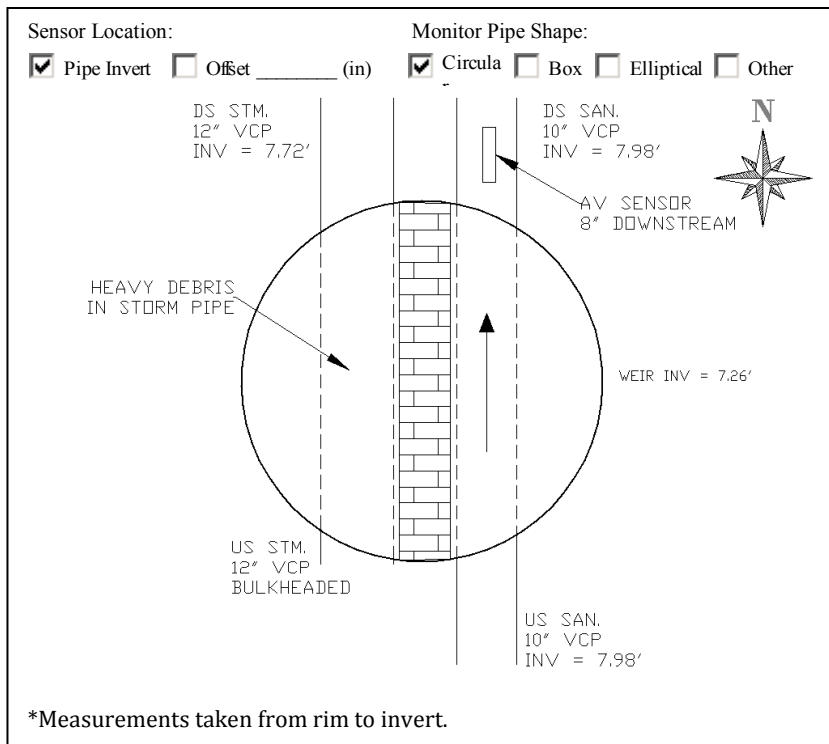
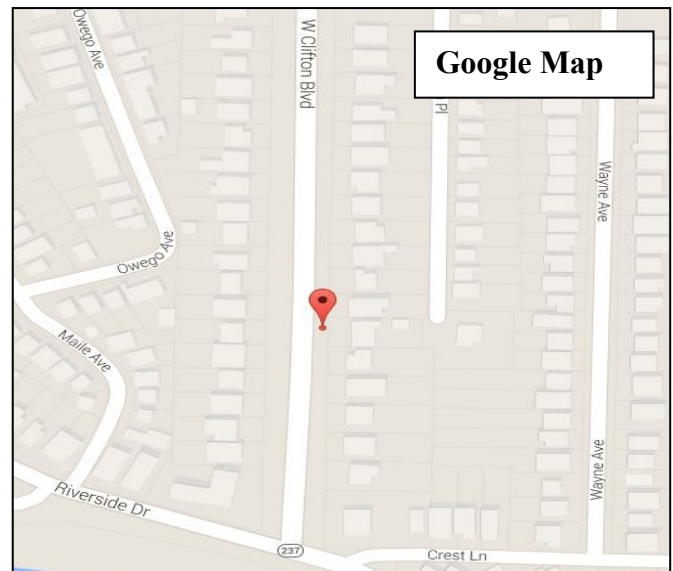




# Flow Monitor Site Installation Sheet

|                                    |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                    | LK_CSO-RRES1145-H                                                                                                                                                                                                                             | <b>Client:</b> Lakewood                                                                                                                                                                                                                                                                                                                       |
| <b>Install Date/Time:</b>          | 10/20/15<br>1:30 PM                                                                                                                                                                                                                           | <b>Job #:</b> 14437                                                                                                                                                                                                                                                                                                                           |
| <b>Install Crew:</b>               | John Kelly & George Stevens                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                               |
| <b>Latitude:</b>                   | 41.481699° N                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                               |
| <b>Longitude:</b>                  | 81.822637° W                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                               |
| <b>Address or Intersection:</b>    | 1491 West Clifton                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                               |
| <b>Location Description:</b>       | Manhole in tree lawn on east side of West Clifton.<br>1 foot west of sidewalk.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                                       | <b>Meter Owner:</b><br><b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other:<br><b>Sensor type:</b><br><input type="checkbox"/> ULS <input checked="" type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:<br><b>Recording Interval (min):</b> 5 |
| <b>Notable Site/MH Conditions:</b> | Sensor is installed facing downstream in the downstream sanitary pipe. Normal velocity readings will be negative. The storm pipe has debris that constricts outbound storm flow. The upstream storm side is blocked off, possibly on purpose. | <b>Cell Service Number:</b><br>(216) 906-6306<br><b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-153<br>Area Velocity Serial #: 215-H00-867<br>Collection Frequency: 24 hours<br><br><b>Lakewood Asset #: 548264</b>                                                                                   |

|                                        |                                                                                                                                                      |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                        |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                  |
| <b>MH Depth (ft):</b><br>Rim to invert | 7.98'                                                                                                                                                |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-RRES1145-H |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |

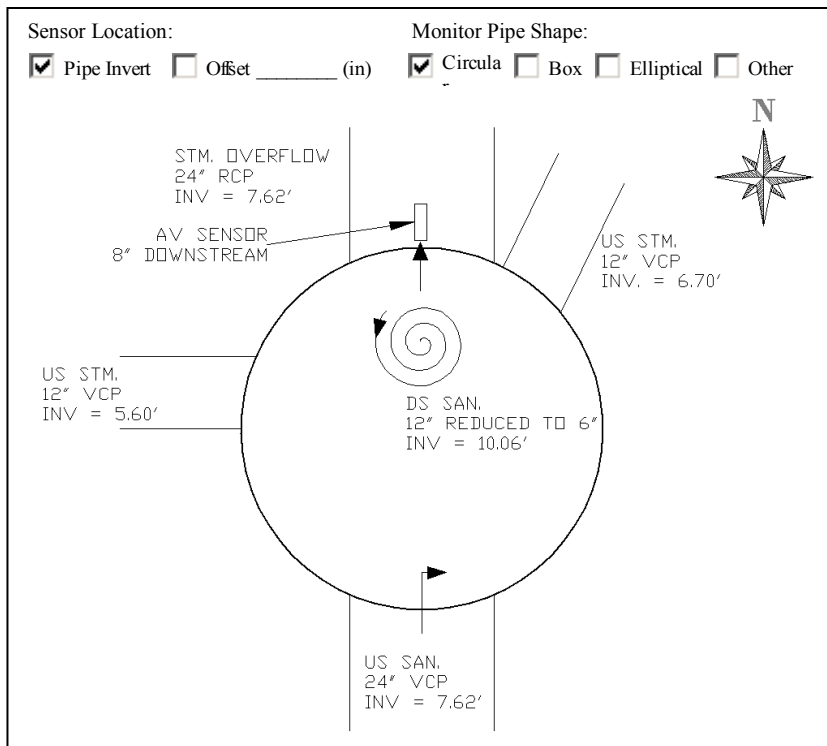
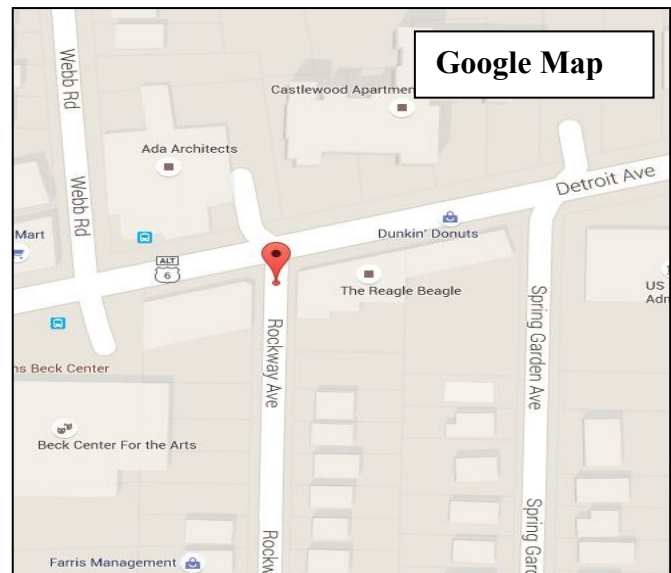




# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                                        |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CSO-RRES1145-J                                                                                                                                                                      |
| <b>Install Date/Time:</b>              | 10/26/15<br>12:30 PM                                                                                                                                                                   |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                            |
| <b>Latitude:</b>                       | 41° 29' 4.939" N                                                                                                                                                                       |
| <b>Longitude:</b>                      | 81° 49' 10.15" W                                                                                                                                                                       |
| <b>Address or Intersection:</b>        | Rockway Avenue @ Detroit Avenue                                                                                                                                                        |
| <b>Location Description:</b>           | Manhole in crown of Rockway Ave. about 1' south of stop bar.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                  |
| <b>Notable Site/MH Conditions:</b>     | Swapped out ULS installed on 10/23/15 for AV sensor originally assigned to site LK_CSO_RRES1145_P<br><br>Silt depth, oil/grease, overflow, surcharge evidence, structural damage, etc. |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                          |
| <b>MH Material:</b>                    | <input type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input checked="" type="checkbox"/> Cast-in-place                                   |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                                    |
| <b>MH Depth (ft):</b><br>Rim to invert | 10.06'                                                                                                                                                                                 |

|                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                                 |
| <b>Job #:</b> 14437                                                                                                                     |
| <b>Meter Owner:</b>                                                                                                                     |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other: |
| <b>Sensor type:</b><br><input type="checkbox"/> ULS <input checked="" type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:   |
| <b>Recording Interval (min):</b> 5                                                                                                      |
| <b>Cell Service Number:</b> (216) 906-8650                                                                                              |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-167<br>Area Velocity Serial #: 215-J00-871       |
| <b>Collection Frequency:</b> 24 hours                                                                                                   |
| <b>Lakewood Asset #:</b> 548260                                                                                                         |





|             |                   |
|-------------|-------------------|
| Meter Name: | LK_CSO-RRES1145-J |
|-------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |



DESCRIPTION: 62-2000-100  
2103Ci Cellular Modem Module, CDMA

POWER: 7 - 16.6 VDC 3.0A MAX

FCC ID: MIVCNN0301 CELL # (216) 906-8650

IP: 166.156.76.170 215J02167

Teledyne Isco www.isco.com  
4700 Superior St., Lincoln, NE 68504  
(402) 464-0231 USA & Canada (800) 228-4373

Description: 60-2004-007 Area Velocity 2150 Flow Meter

POWER: 7-26 VDC 0.1A

U.S. Patent No's: 5,557,536  
Foreign Patents Pending

215J00871

Teledyne Isco, Inc. 4700 Superior St., Lincoln, NE 68504 USA  
(402)464-0231 (800)228-4373 USA & Canada www.isco.com

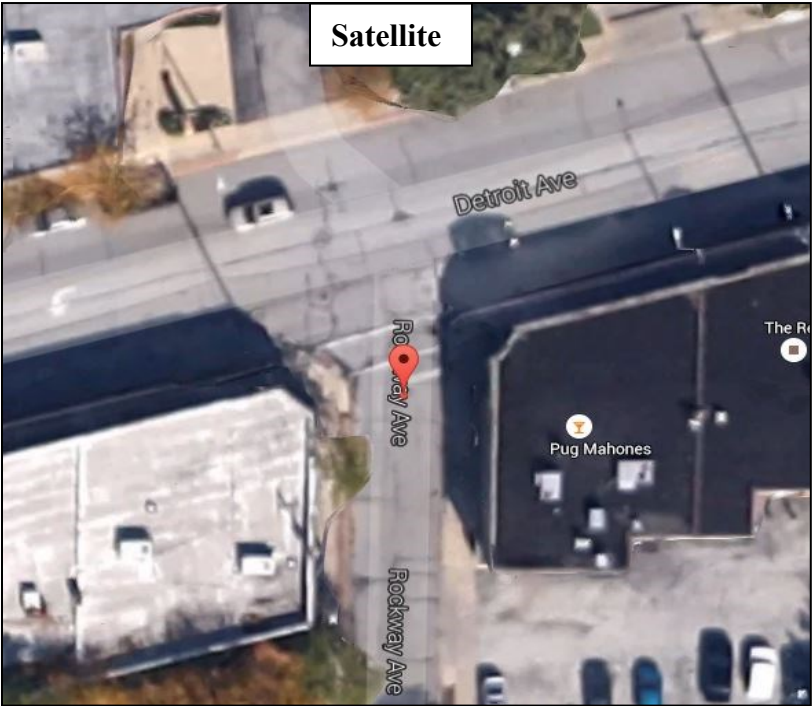
DESCRIPTION: 60-2004-006  
2191 Battery Module

POWER  
CAPABILITY: 5A CONTINUOUS

215J00961

Teledyne Isco, 4700 Superior St., Lincoln, NE 68504 USA  
(402)464-0231 (800)228-4373 USA & Canada www.isco.com

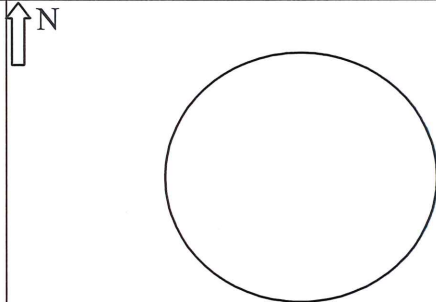
AV Meter





# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                         |                     |            |                 |                                        |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------|-----------------|----------------------------------------|
| <b>Project Name:</b> | Lakewood Integrated Wet Weather Improvements                                                                                                                                            | <b>Project #</b>    | 14437      | <b>Date:</b>    | 2/29/2016                              |
| <b>Location:</b>     | Larchmont Ave. @ Detroit Ave. MH on Larchmont at end of stop bar.                                                                                                                       |                     |            | <b>Weather:</b> | 35° - Sunny                            |
| <b>Latitude: N</b>   | 41.485301 N                                                                                                                                                                             | <b>Longitude W:</b> | 81.81664 W |                 |                                        |
| <b>Manhole Type:</b> | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |            |                 | <b>Crew:</b><br>G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LK_CSO-RRES1145-L                                                                                                                                                                       |                     |            |                 |                                        |

|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                         |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                         | <b>Configuration of Manhole:</b>                                                                                                                                                                        | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input checked="" type="checkbox"/> Crown <input type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input type="checkbox"/> Concentric <input checked="" type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <span style="border: 1px solid black; padding: 2px;">13.96</span> ft. |  |

| Size (in) | Direction (N/W/E/S) | Material Type | Invert Depth (ft. from Rim) | Crown Depth (ft. from Rim) | Type of Flow | Lamping Observations                                              |
|-----------|---------------------|---------------|-----------------------------|----------------------------|--------------|-------------------------------------------------------------------|
| 25        | N                   | VCP           | 12.99                       |                            | STM.         | Overflow pipe                                                     |
| 25        | S                   | VCP           | 12.86                       |                            | SAN.         | Combined sanitary flow drops about a foot to the northern outlet. |
| 10        | N                   | VCP           | 14.10                       |                            | SAN.         | Under                                                             |
|           |                     |               |                             |                            |              |                                                                   |
|           |                     |               |                             |                            |              |                                                                   |
|           |                     |               |                             |                            |              |                                                                   |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

|                           |                                        |                                                         |                                         |
|---------------------------|----------------------------------------|---------------------------------------------------------|-----------------------------------------|
| <b>Weir Length (ft.):</b> | <b>High Water Mark (ft. from Rim):</b> | <b>Possibility of water falling onto sensor? (Y/N):</b> | <b>Obvious humidity concerns? (Y/N)</b> |
|                           | Unknown                                | Walls of manhole were very wet during visit             | Possibly                                |

## Comments:

Possible humidity concerns make an ultrasonic a risky choice.

An AV in the downstream sanitary on 10" spring band will provide dry weather data and overflow event indication.

An AV in the storm overflow on scissor band will provide overflow event indication and volume measurements.

-Pictures to be attached on separate sheets-



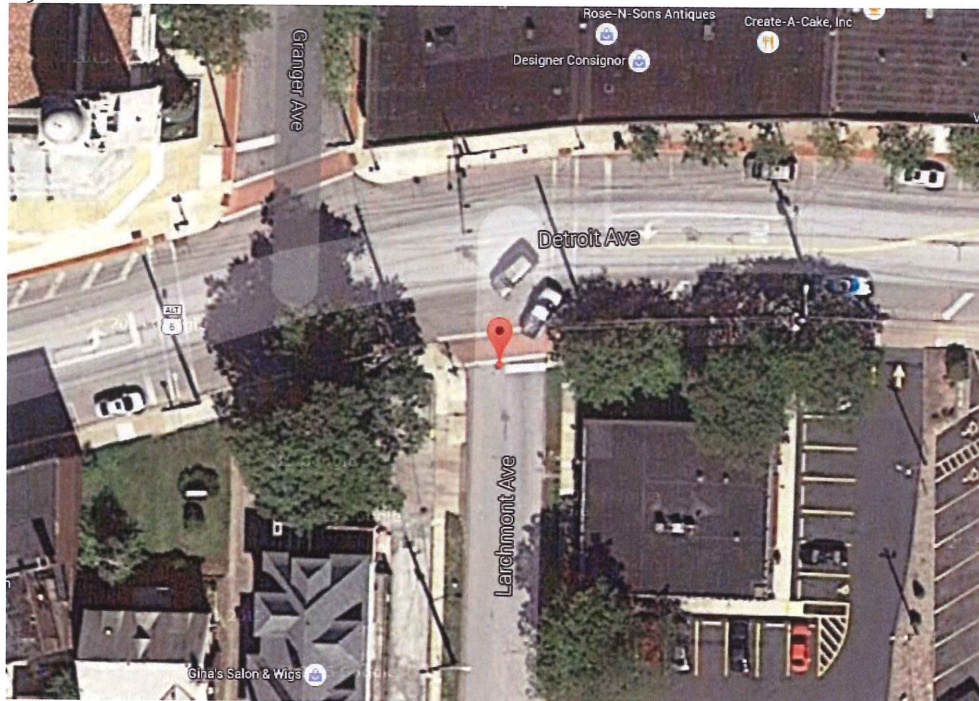
1) Site View facing north:



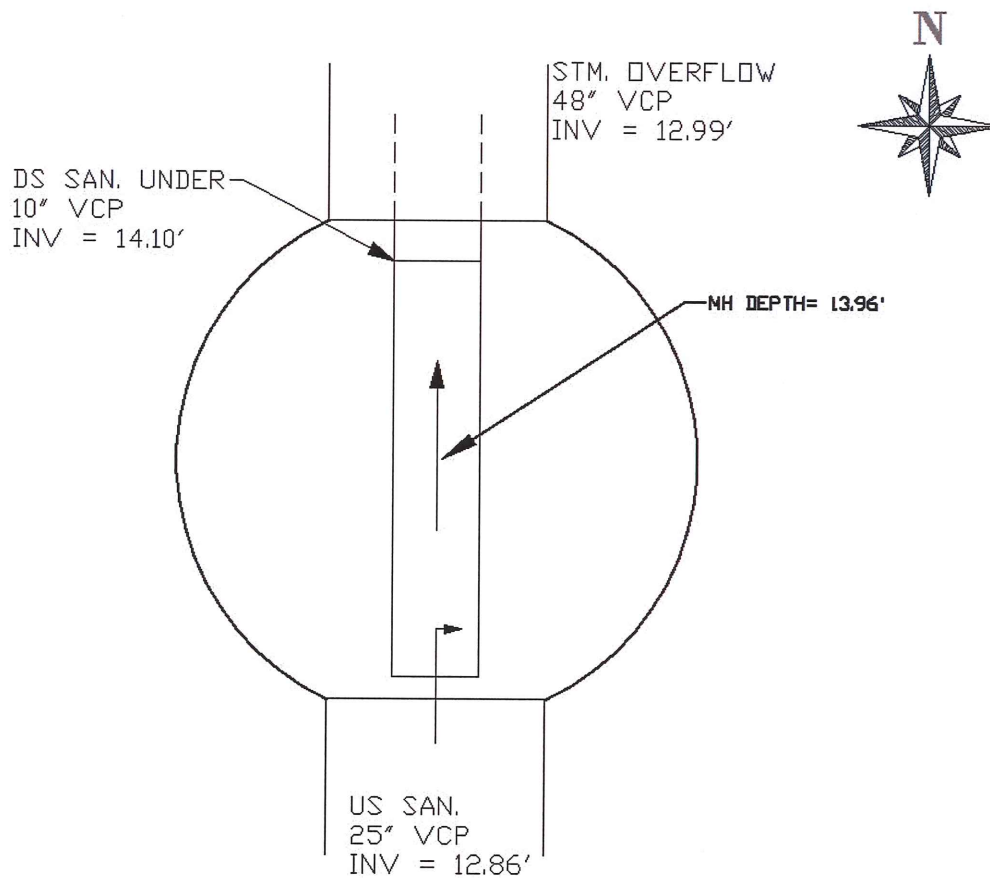
2) Plan View facing north:



## 3) Satellite View:



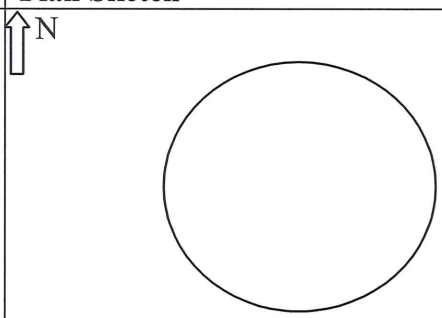
## 4) CAD Sketch:





# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                         |                     |             |                 |                                        |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|-----------------|----------------------------------------|
| <b>Project Name:</b> | Lakewood Integrated Wet Weather Improvements                                                                                                                                            | <b>Project #</b>    | 14437       | <b>Date:</b>    | 2/29/2016                              |
| <b>Location:</b>     | Wagar Avenue @ Detroit Avenue – btw. x-walk and stop bar on Wagar Ave.                                                                                                                  |                     |             | <b>Weather:</b> | 35° - Cloudy                           |
| <b>Latitude: N</b>   | 41.485189 N                                                                                                                                                                             | <b>Longitude W:</b> | 81.812653 W |                 |                                        |
| <b>Manhole Type:</b> | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |             |                 | <b>Crew:</b><br>G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LK_CSO-RRES1145-M                                                                                                                                                                       |                     |             |                 |                                        |

|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                        |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                         | <b>Configuration of Manhole:</b>                                                                                                                                                                       | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input checked="" type="checkbox"/> Crown <input type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input checked="" type="checkbox"/> Concentric <input type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <span style="border: 1px solid black; padding: 2px;">10.40</span> ft |  |

| Size (in) | Direction (N/W/E/S) | Material Type | Invert Depth (ft from Rim) | Crown Depth (ft from Rim) | Type of Flow | Lamping Observations                                           |
|-----------|---------------------|---------------|----------------------------|---------------------------|--------------|----------------------------------------------------------------|
| 24        | N                   |               | 9.78                       |                           | STM          | Overflow pipe with lateral connection a few inches downstream. |
| 8         | N                   |               | 10.52                      |                           | SAN          | Sanitary under outlet                                          |
| 18        | S                   |               | 7.73                       |                           | SAN          |                                                                |
| 10        | SW                  |               | 5.05                       |                           | STM          | Catch basin                                                    |
| 12        | SE                  |               | 4.14                       |                           | STM          | Catch basin                                                    |
|           |                     |               |                            |                           |              |                                                                |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

|                          |                                       |                                                         |                                         |
|--------------------------|---------------------------------------|---------------------------------------------------------|-----------------------------------------|
| <b>Weir Length (ft):</b> | <b>High Water Mark (ft from Rim):</b> | <b>Possibility of water falling onto sensor? (Y/N):</b> | <b>Obvious humidity concerns? (Y/N)</b> |
|                          | About 6' down on western wall.        | No.                                                     | MH was dry.                             |

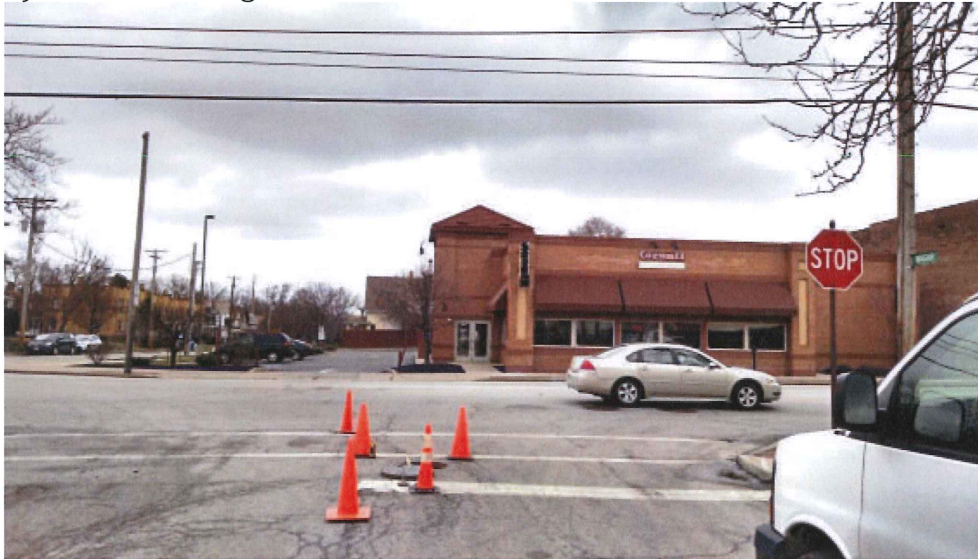
## Comments:

The lateral connection in the storm overflow prevents using an AV sensor there.  
 The catch basin storm inlets on the southern side will likely interfere with a Ultrasonic above the sanitary flow. The sanitary flow is also turbulent which makes ultrasonic measurement difficult.  
 An AV in the downstream sanitary on an 8" spring band should give good dry level readings and indication of overflow events. Alternatively, we could place an ultrasonic near the storm outlet such that positive readings = overflow.

-Pictures to be attached on separate sheets-



1) Site View facing north:

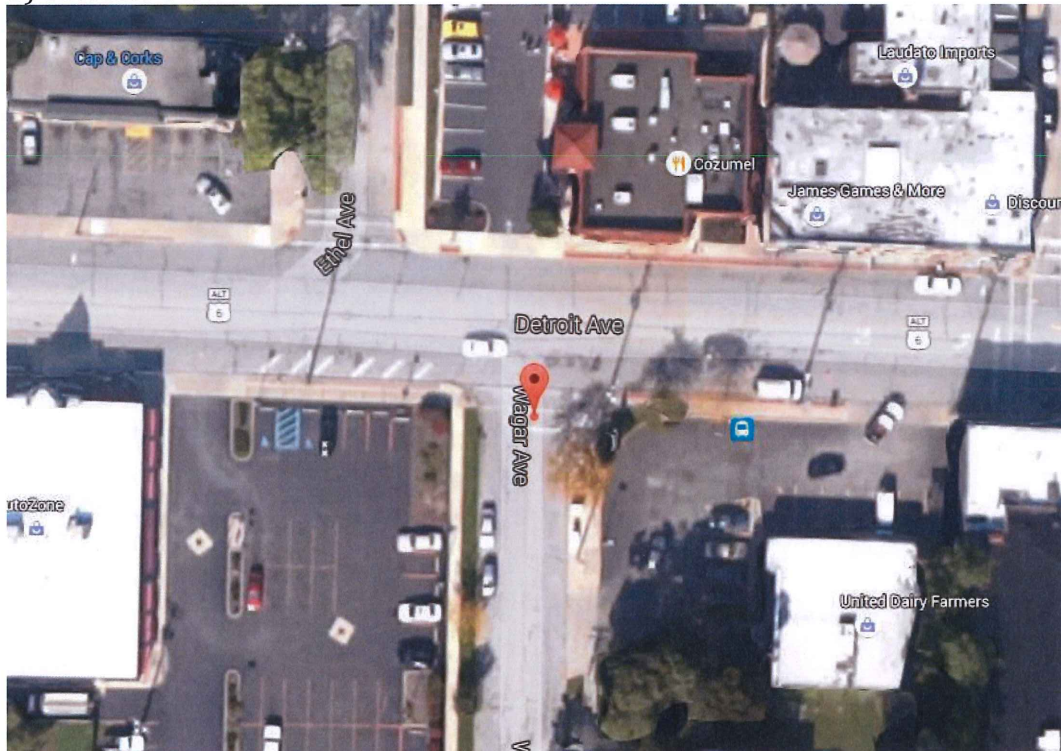


2) Plan View facing north:





3) Satellite View:

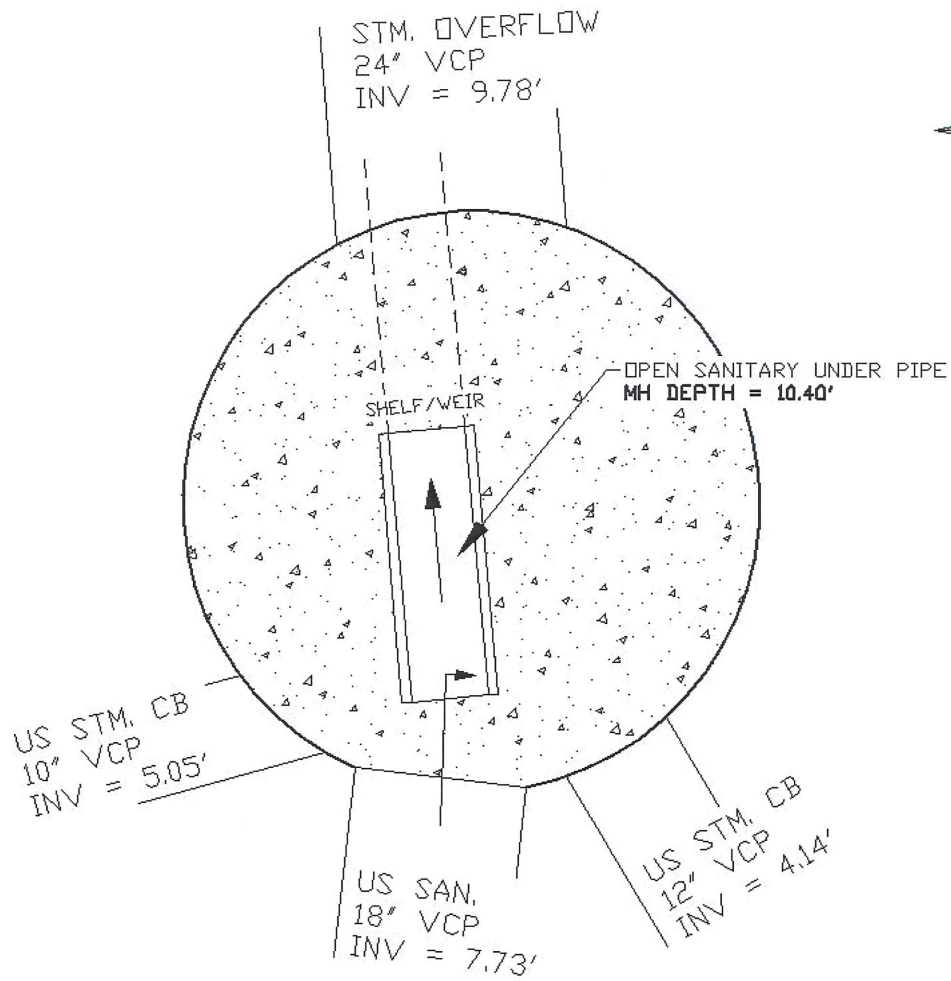


4) Storm overflow outlet with lateral:



5) CAD Sketch:

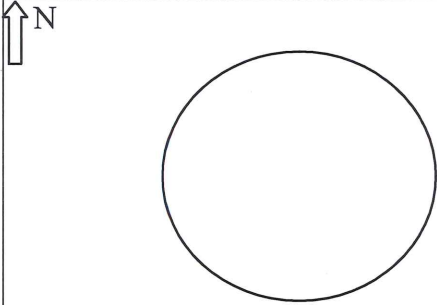
RRES1145-M





# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                         |                     |            |                 |                                     |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------|-----------------|-------------------------------------|
| <b>Project Name:</b> | Lakewood Integrated Wet Weather Improvements                                                                                                                                            | <b>Project #</b>    | 14437      | <b>Date:</b>    | 2/29/2016                           |
| <b>Location:</b>     | 1232 West Clifton in tree lawn at southern end of school                                                                                                                                |                     |            | <b>Weather:</b> | 40° - Sunny                         |
| <b>Latitude: N</b>   | 41.488872 N                                                                                                                                                                             | <b>Longitude W:</b> | 81.82247 W |                 |                                     |
| <b>Manhole Type:</b> | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |            |                 | <b>Crew:</b> G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LK_CSO-RRES1145-R                                                                                                                                                                       |                     |            |                 |                                     |

|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                       |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                         | <b>Configuration of Manhole:</b>                                                                                                                                                                      | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input type="checkbox"/> Crown <input checked="" type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input checked="" type="checkbox"/> Concentric <input type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <span style="border: 1px solid black; padding: 2px;">8.60</span> ft |  |

| Size (in) | Direction (N/W/E/S) | Material Type | Invert Depth (ft from Rim) | Crown Depth (ft from Rim) | Type of Flow | Lamping Observations                |
|-----------|---------------------|---------------|----------------------------|---------------------------|--------------|-------------------------------------|
| 12        | S                   | VCP           | 8.58                       |                           | STM          |                                     |
| 12        | N                   | VCP           | 8.63                       |                           | STM          |                                     |
| 10        | E                   | VCP           | 5.88                       |                           | STM          | Catch Basin inlet                   |
| 6-8"      | E                   | VCP           | 5.70                       | 4.64                      | SAN          | Open tee down to an under sanitary. |
|           |                     |               |                            |                           |              |                                     |
|           |                     |               |                            |                           |              |                                     |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

|                          |                                       |                                                         |                                         |
|--------------------------|---------------------------------------|---------------------------------------------------------|-----------------------------------------|
| <b>Weir Length (ft):</b> | <b>High Water Mark (ft from Rim):</b> | <b>Possibility of water falling onto sensor? (Y/N):</b> | <b>Obvious humidity concerns? (Y/N)</b> |
| 8" ø round open pipe.    | No evidence of a HWM.                 | No                                                      | No.                                     |

## Comments:

Investigate capping tee & verify x-connection on eastern side is from the catch basins or not.  
 - B.G.



1) Site View facing north:



2) Plan View facing north:





3) Storm inlet debris looking south:

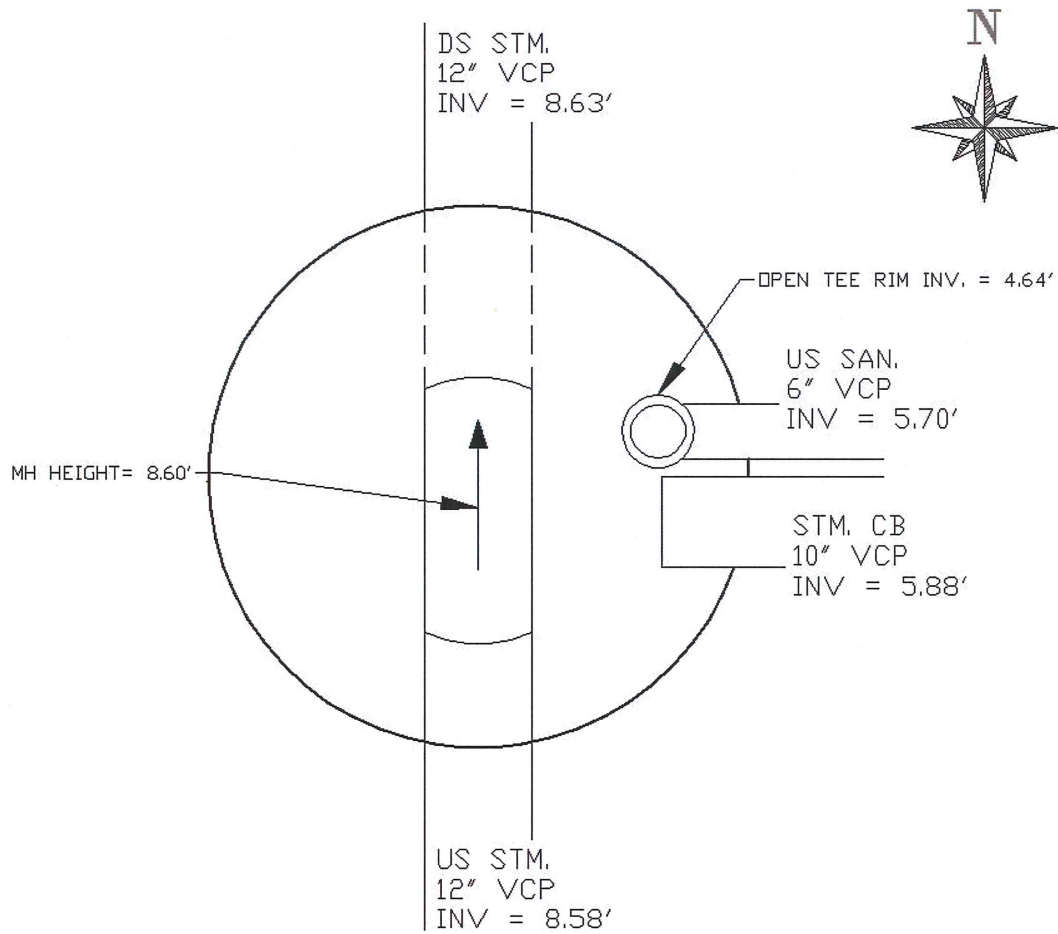


4) Satellite View:





## 5) CAD Sketch:

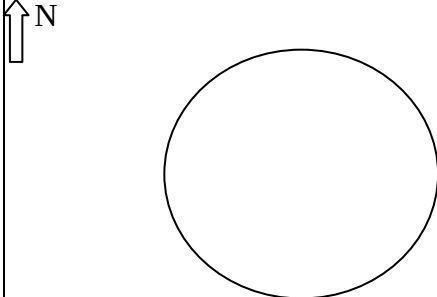


## 6) 1 of 2 Catch Basins in line with eastern x-connection:



# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                                    |                     |             |                 |                                        |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|-----------------|----------------------------------------|
| <b>Name:</b>         | Lakewood Integrated Wet Weather Improvements                                                                                                                                                       | <b>Project #</b>    | 14437       | <b>Date:</b>    | 2/29/2016                              |
| <b>Location:</b>     | Clifton Place @ Detroit. Just south of x-walk through Clifton Place.                                                                                                                               |                     |             | <b>Weather:</b> | 41° - Overcast                         |
| <b>Latitude: N</b>   | 41.484248 N                                                                                                                                                                                        | <b>Longitude W:</b> | 81.821931 W |                 |                                        |
| <b>Manhole Type:</b> | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input checked="" type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |             |                 | <b>Crew:</b><br>G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LK_CSO-RRES1155-I                                                                                                                                                                                  |                     |             |                 |                                        |

|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                        |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                         | <b>Configuration of Manhole:</b>                                                                                                                                       | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input checked="" type="checkbox"/> Crown <input type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input checked="" type="checkbox"/> Concentric <input type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <input type="text" value="8.15"/> ft |  |

| Size (in.) | Direction (N/W/E/S) | Material Type | Invert Depth (ft. from Rim) | Crown Depth (ft. from Rim) | Type of Flow | Lamping Observations                                   |
|------------|---------------------|---------------|-----------------------------|----------------------------|--------------|--------------------------------------------------------|
| 24         | N                   | VCP           | 8.60                        |                            | STM          | Overflow pipe                                          |
| 10         | E                   | VCP           | 4.90                        |                            | STM          | Catch Basin                                            |
| 18         | S                   | VCP           | 8.39                        |                            | COMB         |                                                        |
| 8          | S                   | VCP           | 9.86                        |                            | SAN          | Under continues northward under plate and storm outlet |
| 10         | SE                  | VCP           | 7.25                        |                            | STM          |                                                        |
|            |                     |               |                             |                            |              |                                                        |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

|                           |                                        |                                                         |                                          |
|---------------------------|----------------------------------------|---------------------------------------------------------|------------------------------------------|
| <b>Weir Length (ft.):</b> | <b>High Water Mark (ft. from Rim):</b> | <b>Possibility of water falling onto sensor? (Y/N):</b> | <b>Obvious humidity concerns? (Y/N):</b> |
| NA                        | No obvious high water mark.            | Damp walls with minimal/no dripping water.              | Maybe, probably ok.                      |

## Comments:

We may be able to lift the plate and place an AV on a 10" spring band in the downstream sanitary outlet. This would give dry weather flows as well as overflow indication.

An AV in the storm outlet would give overflow event indication and volumes but no dry weather flow.

It would be possible to place an ultrasonic sensor above the storm outlet. It would not be in a place to measure sanitary flows, but would provide overflow indication.



1) Site View facing north:



2) Plan View facing north:

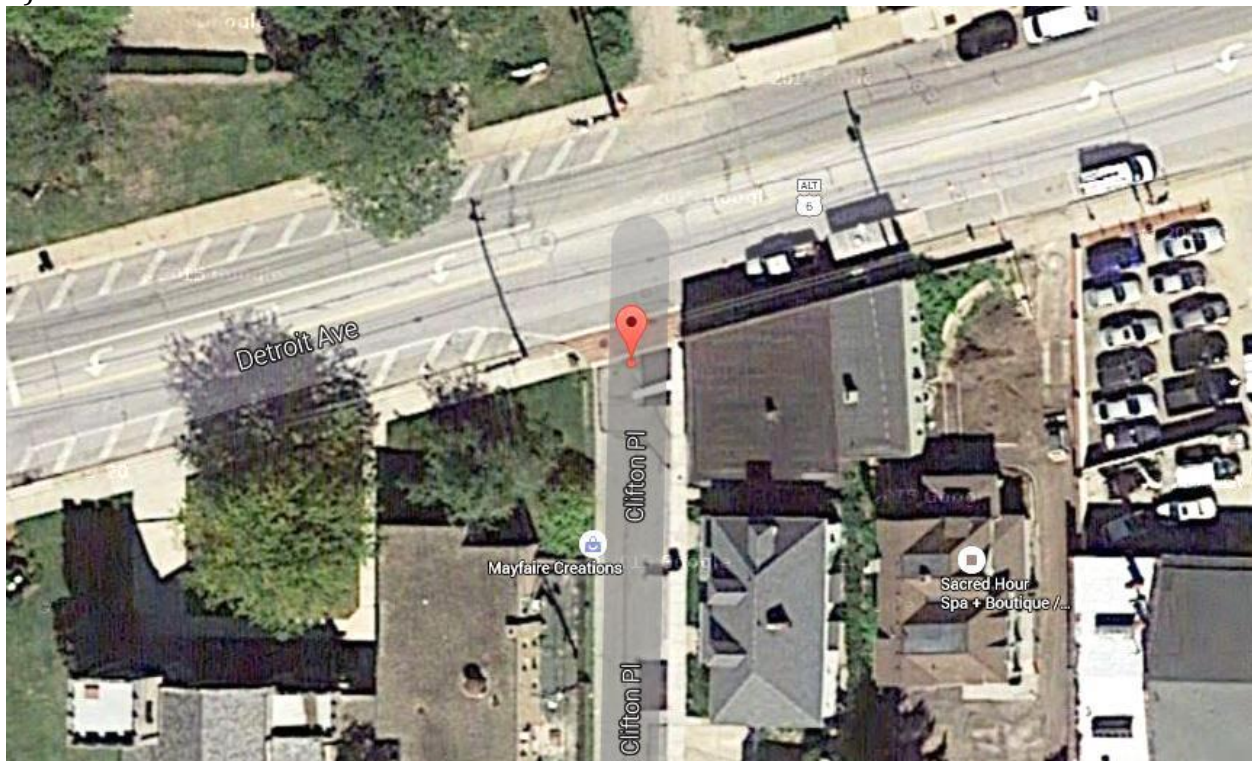




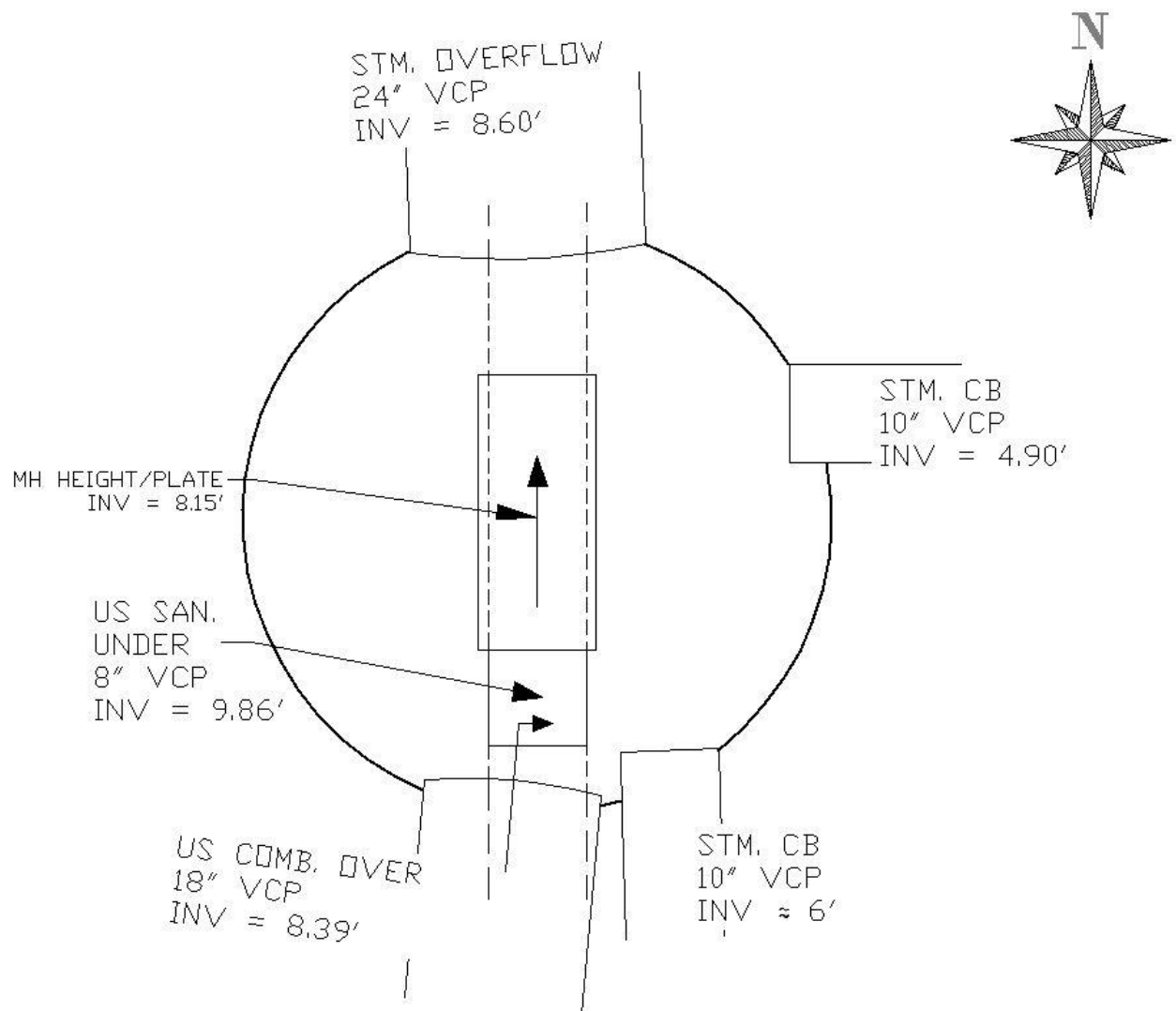
3) Northern downstream sanitary under:



4) Satellite View:

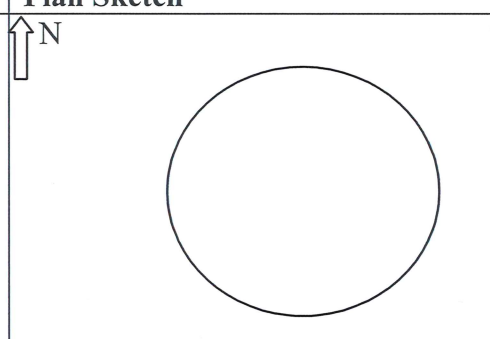


## 5) CAD Sketch:



# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                         |                     |            |                 |                                     |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------|-----------------|-------------------------------------|
| <b>Project Name:</b> | Lakewood Integrated Wet Weather Improvements                                                                                                                                            | <b>Project #</b>    | 14437      | <b>Date:</b>    | 3/22/2016                           |
| <b>Location:</b>     | Olive Avenue @ Hilliard Road                                                                                                                                                            |                     |            | <b>Weather:</b> | 57°                                 |
| <b>Latitude: N</b>   | 41.476711N                                                                                                                                                                              | <b>Longitude W:</b> | 81.809611W |                 |                                     |
| <b>Manhole Type:</b> | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |            |                 | <b>Crew:</b> G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LK_CSO-RRES1160-A                                                                                                                                                                       |                     |            |                 |                                     |

|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                        |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                         | <b>Configuration of Manhole:</b>                                                                                                                                                                       | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input checked="" type="checkbox"/> Crown <input type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input checked="" type="checkbox"/> Concentric <input type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <span style="border: 1px solid black; padding: 2px;">13.24</span> ft |  |

| Size (in) | Direction (N/W/E/S) | Material Type | Invert Depth (ft from Rim) | Crown Depth (ft from Rim) | Type of Flow | Lamping Observations                              |
|-----------|---------------------|---------------|----------------------------|---------------------------|--------------|---------------------------------------------------|
| 30        | N                   | RCP           | 13.22                      |                           | OVER         | Storm overflow to Madison STM.                    |
| 30        | S                   | RCP           | 13.39                      |                           | COMB.        | Inlet from south                                  |
| 12        | E                   | VCP           | 13.03                      |                           | STM          | Inlet: 2" – 4" of debris at invert                |
| 24        | W                   | RCP           | 13.14                      |                           | STM          | Inlet? – 1" – 3" of debris at invert              |
| 10        | S                   | HDPE          | 8.18                       |                           | CB           | Inlet – slow thick brown fluid dripping from pipe |
|           | DOWN                |               | 14.28                      |                           | SAN.         | Flow drops down to hidden under sanitary pipe.    |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

| Weir Length (ft): | High Water Mark (ft from Rim):  | Possibility of water falling onto sensor? (Y/N): | Obvious humidity concerns? (Y/N) |
|-------------------|---------------------------------|--------------------------------------------------|----------------------------------|
| NA                | Bottom step rung ≈ 10' from rim | Not likely                                       | No                               |

## Comments:

ULS above northern outlet may not tell us what is happening with the western pipe. Positive readings would indicate likely overflow.

AV in northern storm outlet on 30" scissor band will give definitive indication of overflow along with volumes and direction of flow.



1) Site View facing north:

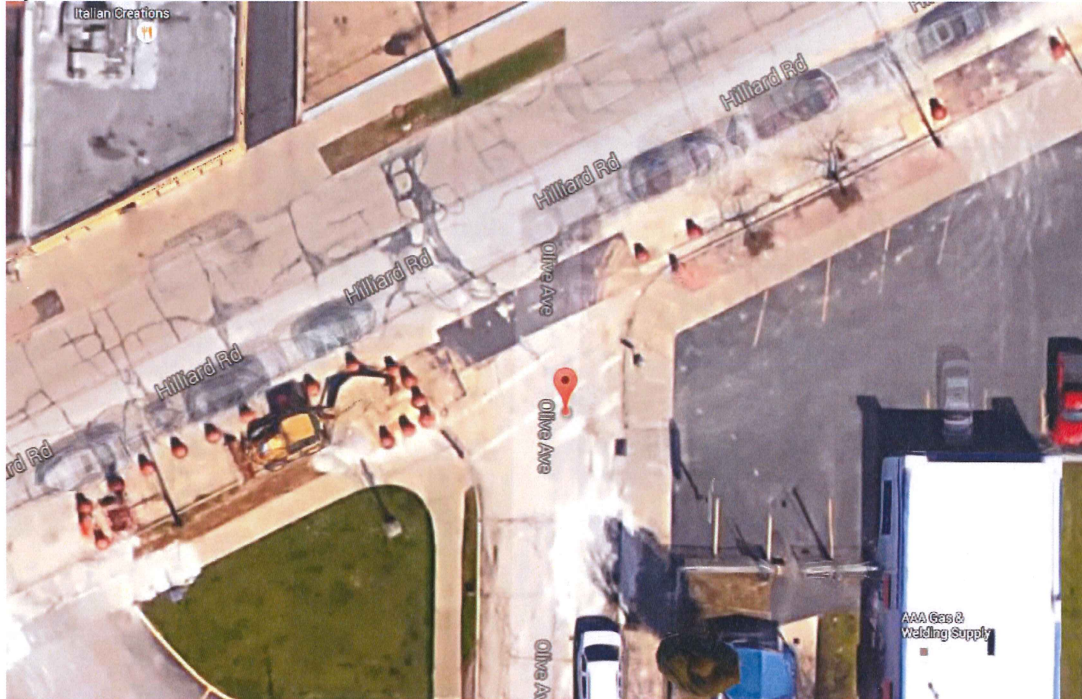


2) Plan View facing north:





3) Satellite View:

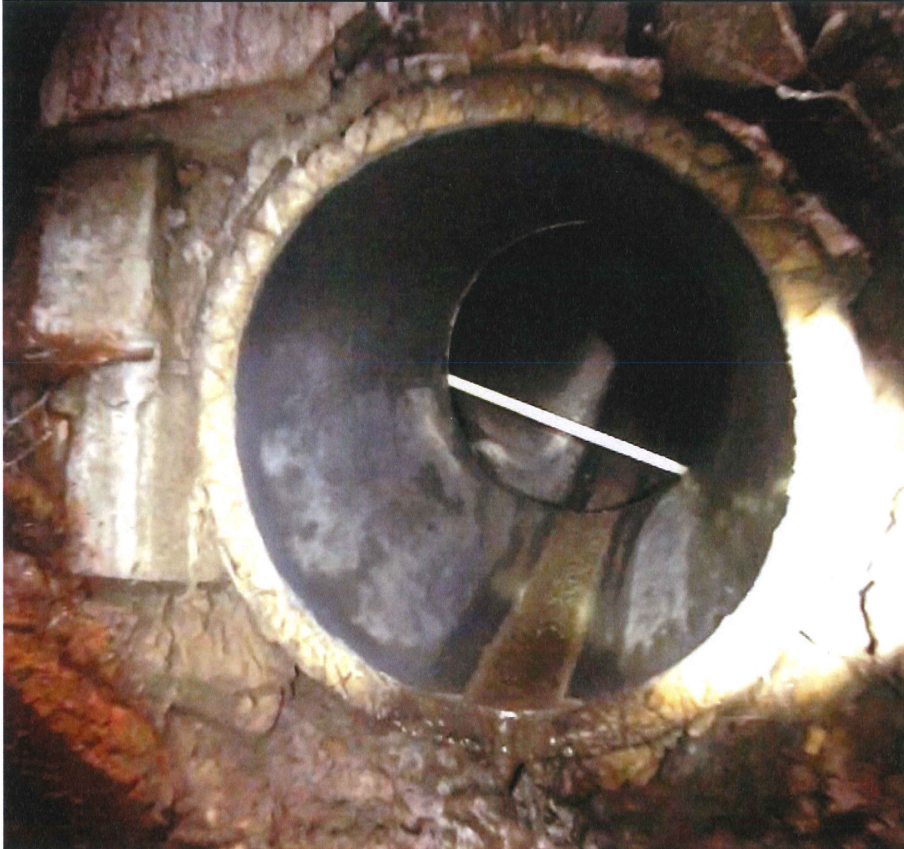


4) Southern Inlet – Combined flow





5) Southern Catch Basin Inlet:

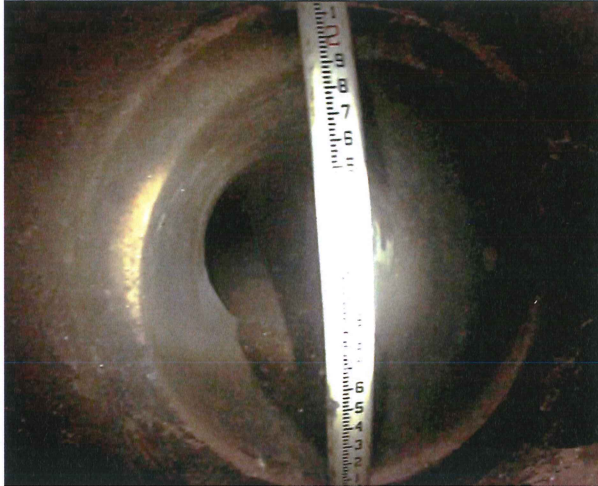


6) Western Inlet – 1"-2" of debris:

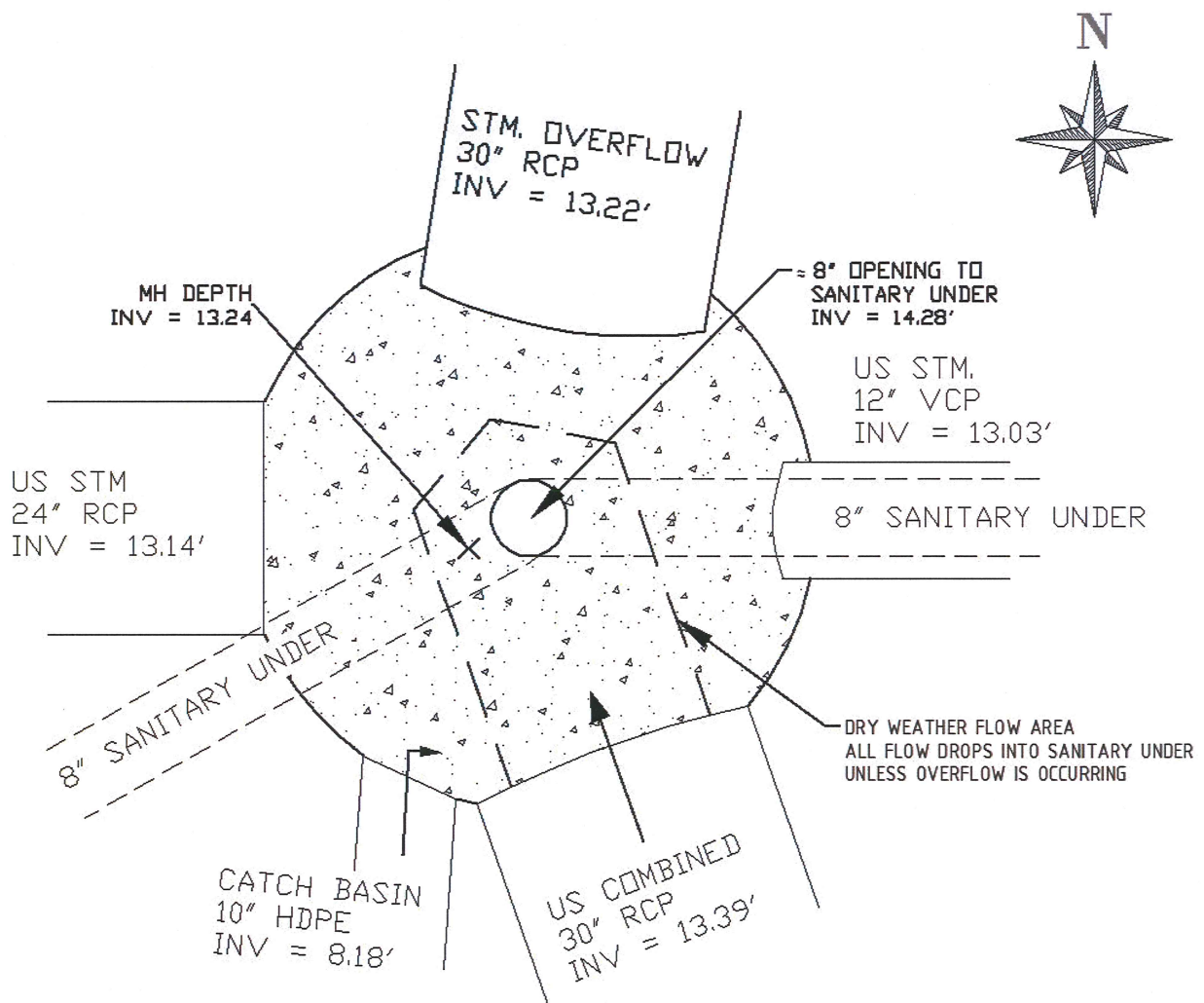




7) Western Inlet measured 24" – our model has 12":



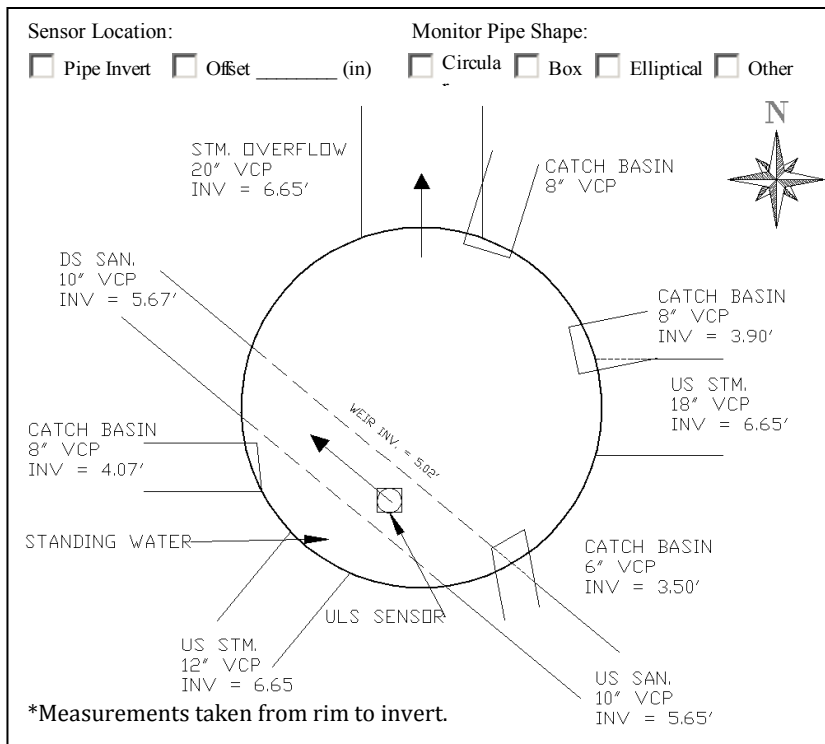
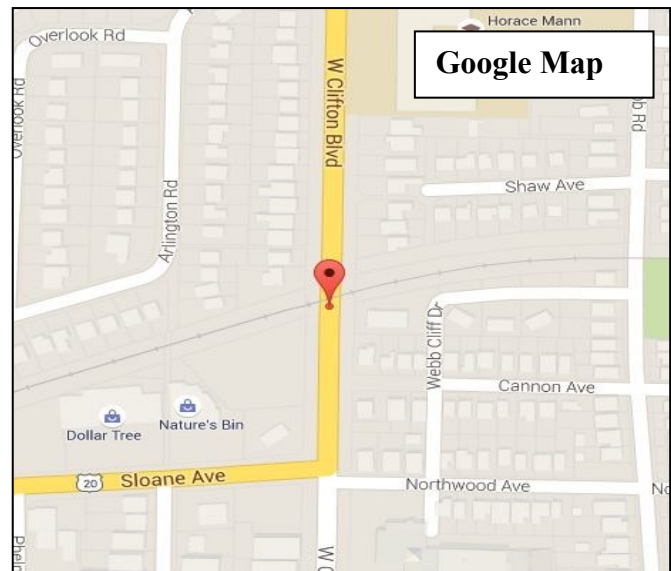
8) CAD Sketch:



# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                                 |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CSO-RRES1145-N                                                                                                                                                               |
| <b>Install Date/Time:</b>              | 10/27/15<br>2:15 PM                                                                                                                                                             |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                     |
| <b>Latitude:</b>                       | 41° 29' 13.7292" N                                                                                                                                                              |
| <b>Longitude:</b>                      | 81° 49' 21.4644" W                                                                                                                                                              |
| <b>Address or Intersection:</b>        | West Clifton south of RR overpass                                                                                                                                               |
| <b>Location Description:</b>           | Manhole in crown of West Clifton.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                      |
| <b>Notable Site/MH Conditions:</b>     | Sensor is shooting flow in open topped sanitary pipe. Overflow happens at 7.68" and above.<br><br>Silt depth, oil/grease, overflow, surcharge evidence, structural damage, etc. |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                   |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                            |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                             |
| <b>MH Depth (ft):</b><br>Rim to invert | 5.98'                                                                                                                                                                           |

|                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                                 |
| <b>Job #:</b> 14437                                                                                                                     |
| <b>Meter Owner:</b>                                                                                                                     |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other: |
| <b>Sensor type:</b><br><input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:   |
| <b>Recording Interval (min):</b> 5                                                                                                      |
| <b>Cell Service Number:</b> (216) 906-8710                                                                                              |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-169<br>Ultrasonic Serial #: 215-J01-708          |
| <b>Collection Frequency:</b> 24 hours                                                                                                   |
| <b>Lakewood Asset #:</b> 548265                                                                                                         |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-RRES1145-N |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |

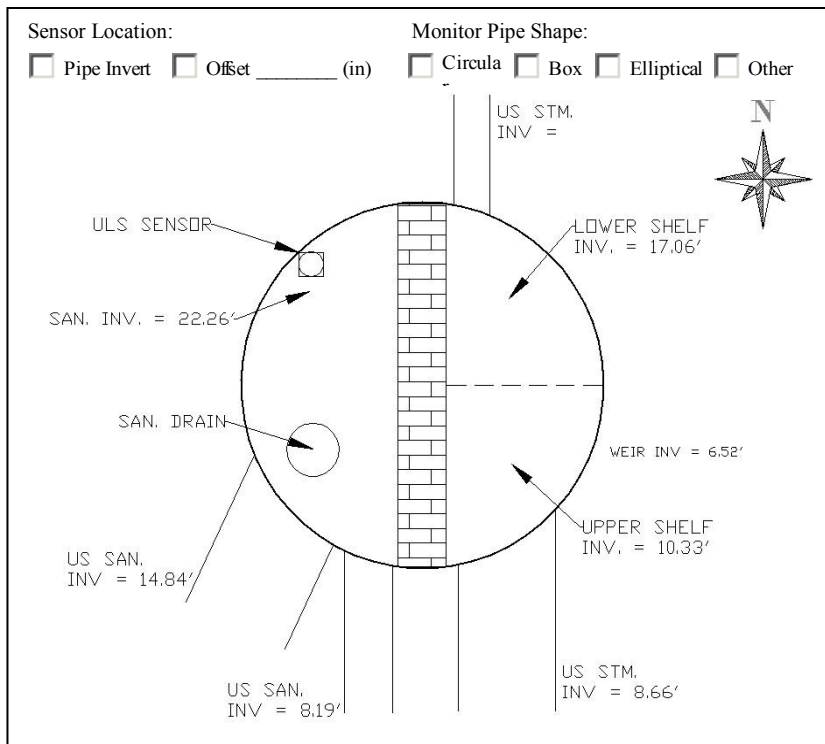
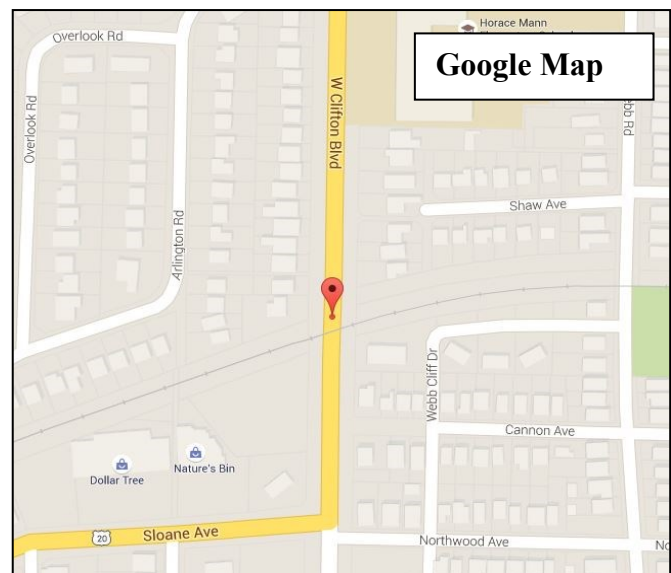




# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                                         |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CSO-RRES1145-O                                                                                                                                                                       |
| <b>Install Date/Time:</b>              | 11/9/15<br>11:20 AM                                                                                                                                                                     |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                             |
| <b>Latitude:</b>                       | 41° 29' 15.0324"                                                                                                                                                                        |
| <b>Longitude:</b>                      | 81° 49' 21.5184"                                                                                                                                                                        |
| <b>Address or Intersection:</b>        | 1278/1280 West Clifton Blvd.                                                                                                                                                            |
| <b>Location Description:</b>           | 32" MH just north of railroad overpass in centerline of West Clifton Blvd.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                     |
| <b>Notable Site/MH Conditions:</b>     | Meter originally designated as RRES1145_N.<br>Calibrating level at weir elevation using level and plate. Weir height used: 15.74' = 11.91'<br><br>Overflow begins above 15.74' = 11.91' |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                           |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                                    |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                                     |
| <b>MH Depth (ft):</b><br>Rim to invert | 22.26'                                                                                                                                                                                  |

|                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                        |
| <b>Job #:</b> 14437                                                                                                            |
| <b>Meter Owner:</b>                                                                                                            |
| <b>Meter Type:</b>                                                                                                             |
| <input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav                        |
| Other:                                                                                                                         |
| <b>Sensor type:</b>                                                                                                            |
| <input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler                           |
| Other:                                                                                                                         |
| <b>Recording Interval (min):</b> 5                                                                                             |
| <b>Cell Service Number:</b><br>(216) 906-8088                                                                                  |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-162<br>Ultrasonic Serial #: 215-G02-832 |
| <b>Collection Frequency:</b> 24 hours                                                                                          |
| <b>Lakewood Asset #:</b> 548262                                                                                                |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-RRES1145-O |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |

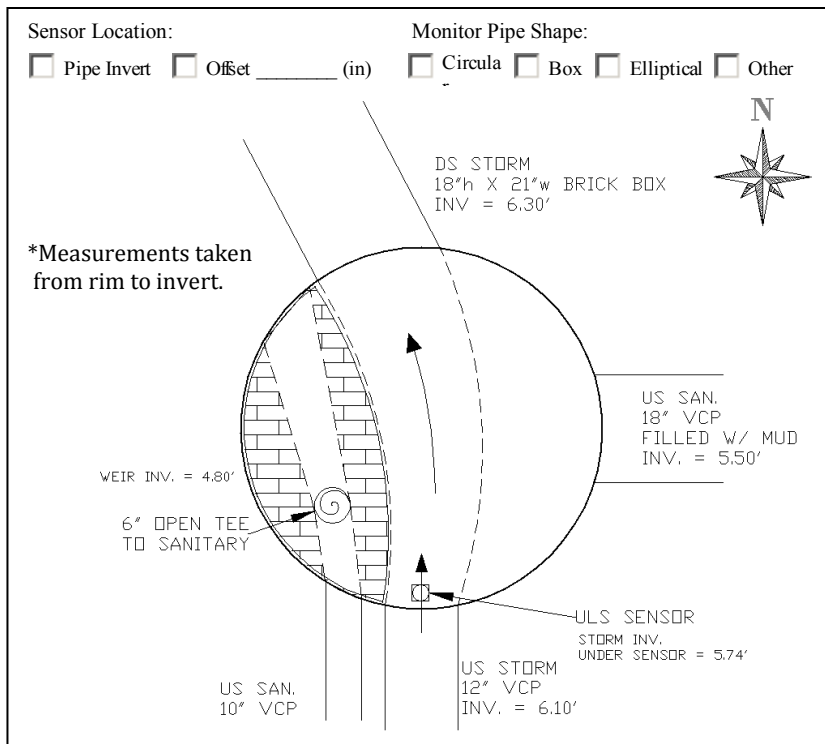
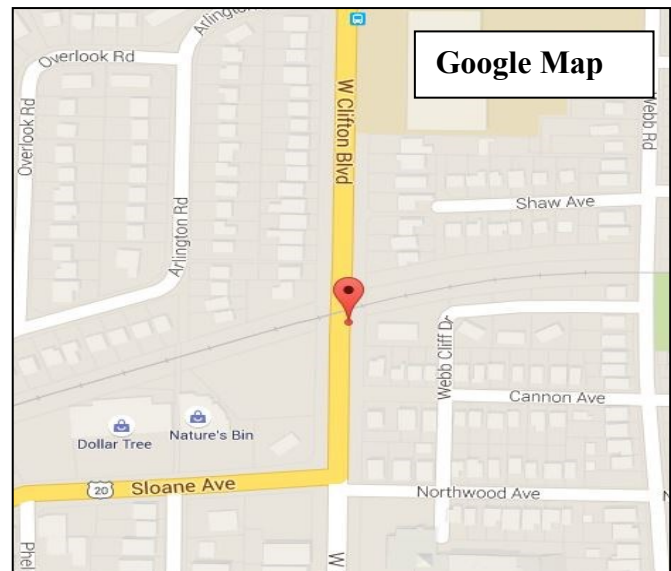




# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                                                                   |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CSO-RRES1145-P                                                                                                                                                                                                 |
| <b>Install Date/Time:</b>              | 10/26/15 @ 2:00 PM<br>Relocated on 12/11/15 @ 2:10 PM                                                                                                                                                             |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                                                       |
| <b>Latitude:</b>                       | 41° 29' 14.4312" N                                                                                                                                                                                                |
| <b>Longitude:</b>                      | 81° 49' 21.3024" W                                                                                                                                                                                                |
| <b>Address or Intersection:</b>        | 1285 West Clifton                                                                                                                                                                                                 |
| <b>Location Description:</b>           | Manhole in tree lawn just off sidewalk. 40' south of railroad overpass on east side of West Clifton.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                     |
| <b>Notable Site/MH Conditions:</b>     | Overflow happens at levels above 11.28".<br>Rim in bad shape (see photo).<br><br>Video taken on 12/11/15 suggests sensor is shooting storm and sanitary is in 10" VCP. Both lines look to be going to RRES1145-N. |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                                                     |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                                                              |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                                                               |
| <b>MH Depth (ft):</b><br>Rim to invert | 5.70'                                                                                                                                                                                                             |

|                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                                 |
| <b>Job #:</b> 14437                                                                                                                     |
| <b>Meter Owner:</b>                                                                                                                     |
| <b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other: |
| <b>Sensor type:</b><br><input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:   |
| <b>Recording Interval (min):</b> 5                                                                                                      |
| <b>Cell Service Number:</b><br>(216) 906-8368                                                                                           |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Modem Serial #: 215-J02-163<br>ULS Serial #: 215-H02-359                    |
| <b>Collection Frequency:</b> 24 hours                                                                                                   |
| <b>Lakewood Asset #:</b> 548263                                                                                                         |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-RRES1145-P |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |



Installed Plan View



Ultrasonic Meter



Box Outlet



|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-RRES1145-P |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |



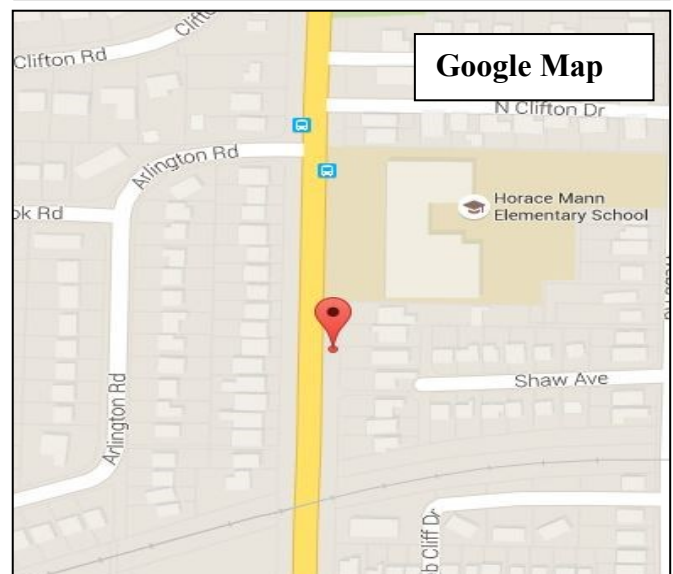
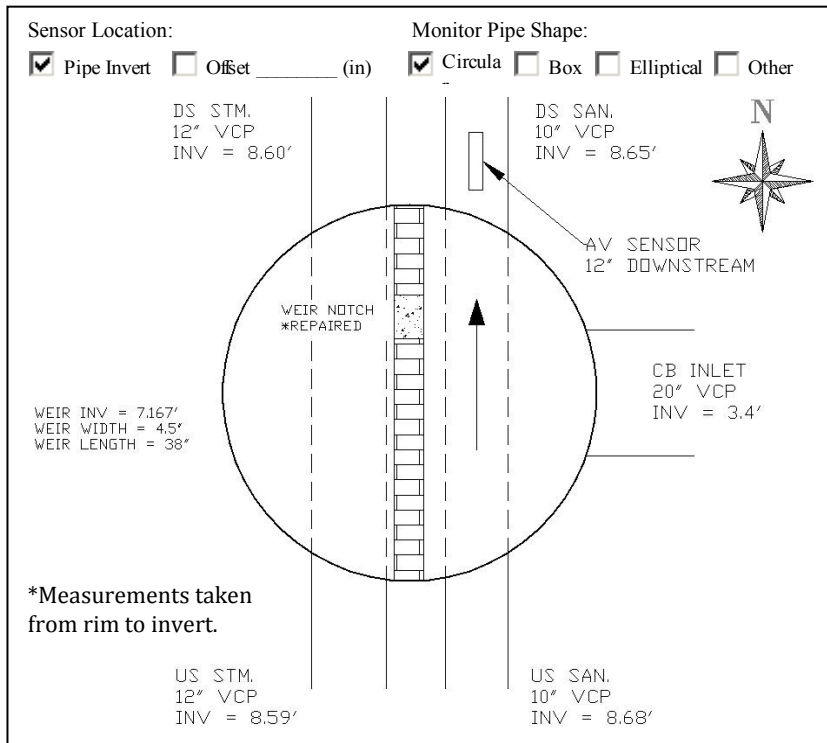


# Flow Monitor Site Installation Sheet

|                                    |                                                                                                                                                                                                                                                                                                                      |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                    | LK_CSO-RRES1145-S                                                                                                                                                                                                                                                                                                    |
| <b>Install Date/Time:</b>          | 11/6/15 @ 12:58 PM<br>Weir repairs completed on 3/4/16 by city personnel                                                                                                                                                                                                                                             |
| <b>Install Crew:</b>               | John Kelly & George Stevens                                                                                                                                                                                                                                                                                          |
| <b>Latitude:</b>                   | 41° 29' 18.1572" N                                                                                                                                                                                                                                                                                                   |
| <b>Longitude:</b>                  | 81° 49' 20.91" W                                                                                                                                                                                                                                                                                                     |
| <b>Address or Intersection:</b>    | 1253-55 West Clifton Blvd.                                                                                                                                                                                                                                                                                           |
| <b>Location Description:</b>       | Manhole in tree lawn near sidewalk on east side of road in front of 1253-55 W. Clifton Blvd.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                                                                                                |
| <b>Notable Site/MH Conditions:</b> | City has repaired a missing section of the weir and slightly raised the entire weir in the process. The AV sensor is shooting downstream in downstream sanitary pipe. Normal flows will record as negative values. Overflow begins at 17.8".<br>*Original configuration experienced overflows at depths above 13.3". |

|                                                                                                         |
|---------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                 |
| <b>Job #:</b> 14437                                                                                     |
| <b>Meter Owner:</b>                                                                                     |
| <b>Meter Type:</b>                                                                                      |
| <input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav |
| Other:                                                                                                  |
| <b>Sensor type:</b>                                                                                     |
| <input type="checkbox"/> ULS <input checked="" type="checkbox"/> AV <input type="checkbox"/> Sampler    |
| Other:                                                                                                  |
| <b>Recording Interval (min):</b> 5                                                                      |
| <b>Cell Service Number:</b> (216) 906-8436                                                              |
| <b>Collection Methods:</b>                                                                              |
| Manual/cell/etc.: Cellular                                                                              |
| Cellular Serial #: 215-J02-165                                                                          |
| Area Velocity Serial #: 215-H02-609                                                                     |
| Collection Frequency: 24 hours                                                                          |
| <b>Lakewood Asset #: 548277</b>                                                                         |

|                                        |                                                                                                                                                      |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                        |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great       |
| <b>MH Depth (ft):</b><br>Rim to invert | 8.66'                                                                                                                                                |





**Meter Name:**

LK\_CSO-RRES1145-S

Client: Lakewood

Job #: 14437

**Plan View**



**Satellite**



**AV Meter**

DESCRIPTION: 62-2000-100  
2103Ci Cellular Modem Module, CDMA  
POWER: 7 - 16.6 VDC 3.0A MAX  
FCC ID: MIVCNN0301 CELL # (216) 906-8436  
IP: 166.156.76.168 215J02165



Teledyne Isco www.isco.com  
4700 Superior St., Lincoln, NE 68504  
(402) 464-0231 USA & Canada (800) 228-4373

Description: 60-2004-007 Area Velocity 2150 Flow Meter  
POWER: 7-26 VDC 0.1A  
U.S. Patent No's: 5,567,536  
Foreign Patents Pending



215H02609

Teledyne Isco, Inc. 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com

DESCRIPTION: 60-2004-006  
2191 Battery Module

POWER CAPABILITY: 5A CONTINUOUS



215J00992

Teledyne Isco, 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com





# Flow Monitor Site Installation Sheet

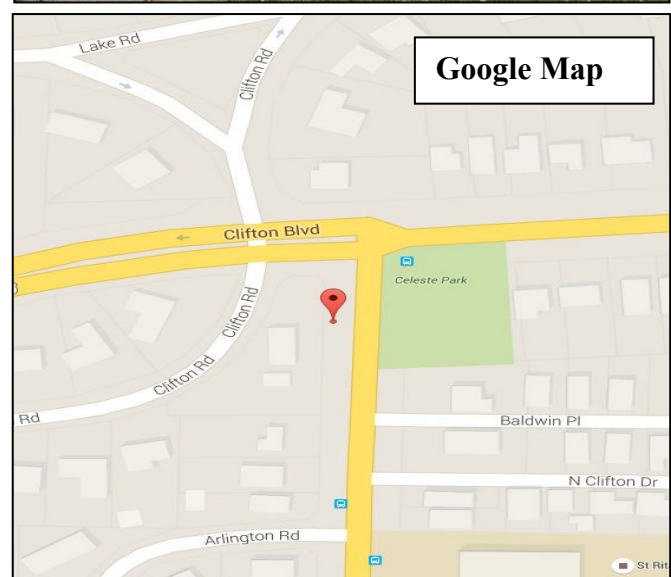
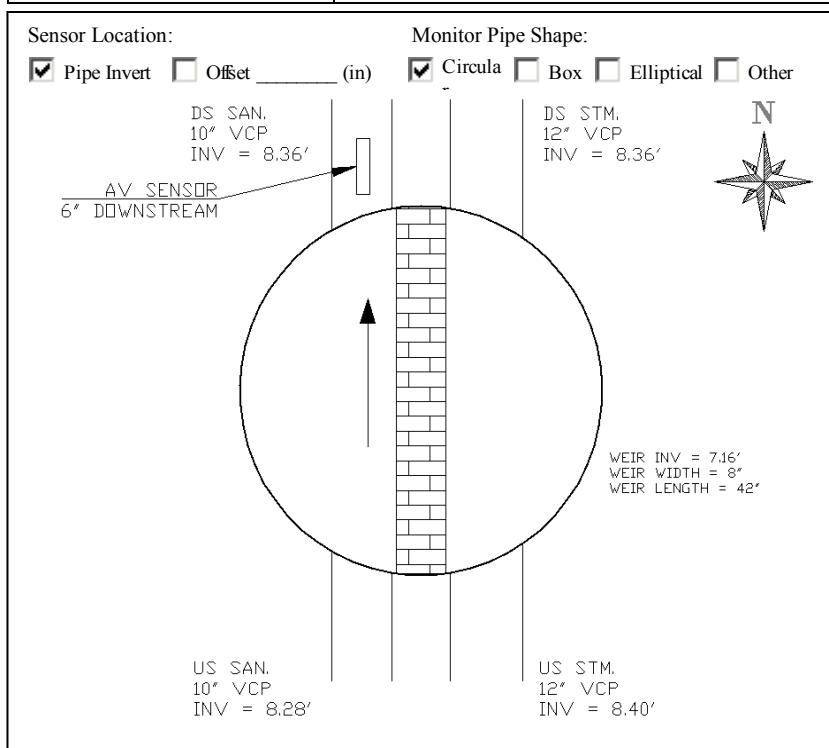
|                                    |                                                                                                                                                                                                                                   |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                    | LK_CSO-RRES1145-T                                                                                                                                                                                                                 |
| <b>Install Date/Time:</b>          | 11/5/15<br>2:30 PM                                                                                                                                                                                                                |
| <b>Install Crew:</b>               | John Kelly & George Stevens                                                                                                                                                                                                       |
| <b>Latitude:</b>                   | 41° 29' 26.3724" N                                                                                                                                                                                                                |
| <b>Longitude:</b>                  | 81° 49' 21.7596" W                                                                                                                                                                                                                |
| <b>Address or Intersection:</b>    | West Clifton Boulevard                                                                                                                                                                                                            |
| <b>Location Description:</b>       | MH in tree lawn on west side of West Clifton Blvd.<br>about 75 feet south of intersection with Clifton Blvd.<br><br>MH in ditch, MH in parking lot<br>behind SE corner of building,<br>lawn, driveway, etc.                       |
| <b>Notable Site/MH Conditions:</b> | Sensor only 6" into pipe due to sharp turn in sanitary line east towards West Clifton. Normal velocity and flow will record as negative.<br><br>Siltling depth, oil/grease, overflow, surcharge evidence, structural damage, etc. |

|                                                                                                         |
|---------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                 |
| <b>Job #:</b> 14437                                                                                     |
| <b>Meter Owner:</b>                                                                                     |
| <b>Meter Type:</b>                                                                                      |
| <input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav |
| Other:                                                                                                  |
| <b>Sensor type:</b>                                                                                     |
| <input type="checkbox"/> ULS <input checked="" type="checkbox"/> AV <input type="checkbox"/> Sampler    |
| Other:                                                                                                  |
| <b>Recording Interval (min):</b> 5                                                                      |
| <b>Cell Service Number:</b>                                                                             |
| (216) 906-8383                                                                                          |
| <b>Collection Methods:</b>                                                                              |
| Manual/cell/etc.: Cellular                                                                              |
| Cellular Serial #: 215-J02-164                                                                          |
| Area Velocity Serial #: 215-H02-608                                                                     |
| Collection Frequency: 24 hours                                                                          |
| <b>Lakewood Asset #: 548275</b>                                                                         |

|                       |                                                                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type of Sewer:</b> | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                        |
| <b>MH Material:</b>   | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place |
| <b>MH Condition:</b>  | <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Great                  |
| <b>MH Depth (ft):</b> | 8.32'                                                                                                                                                |
| Rim to invert         |                                                                                                                                                      |



Site View

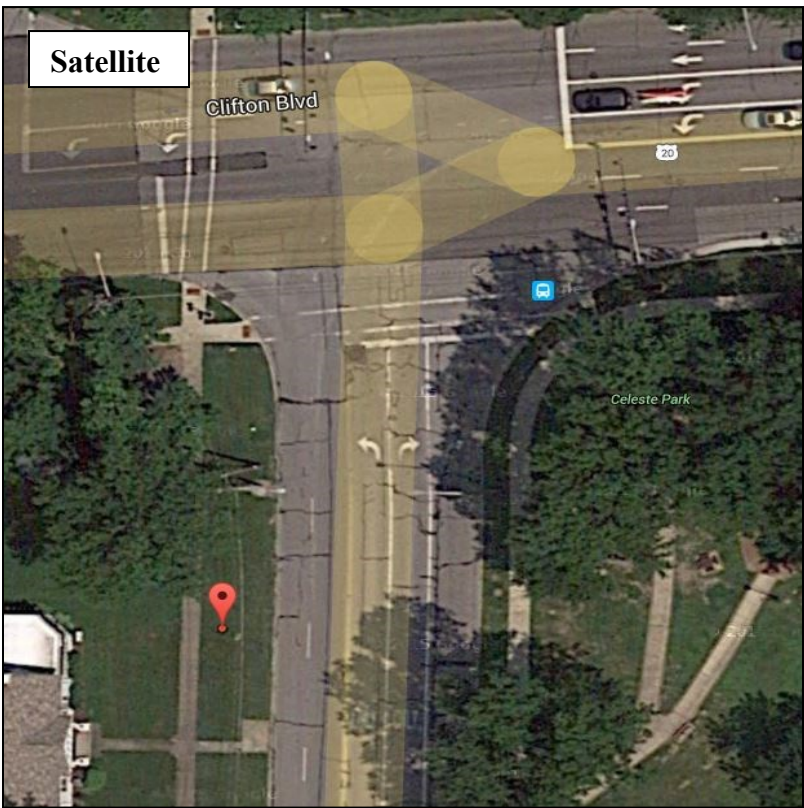


Google Map



|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-RRES1145-T |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |

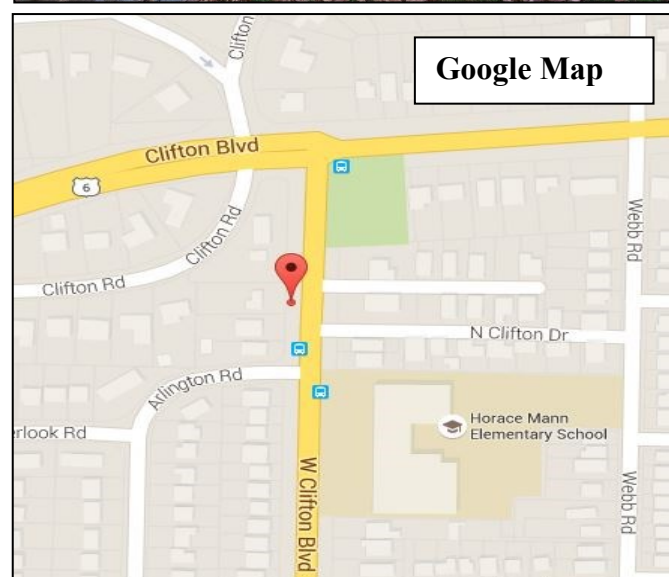
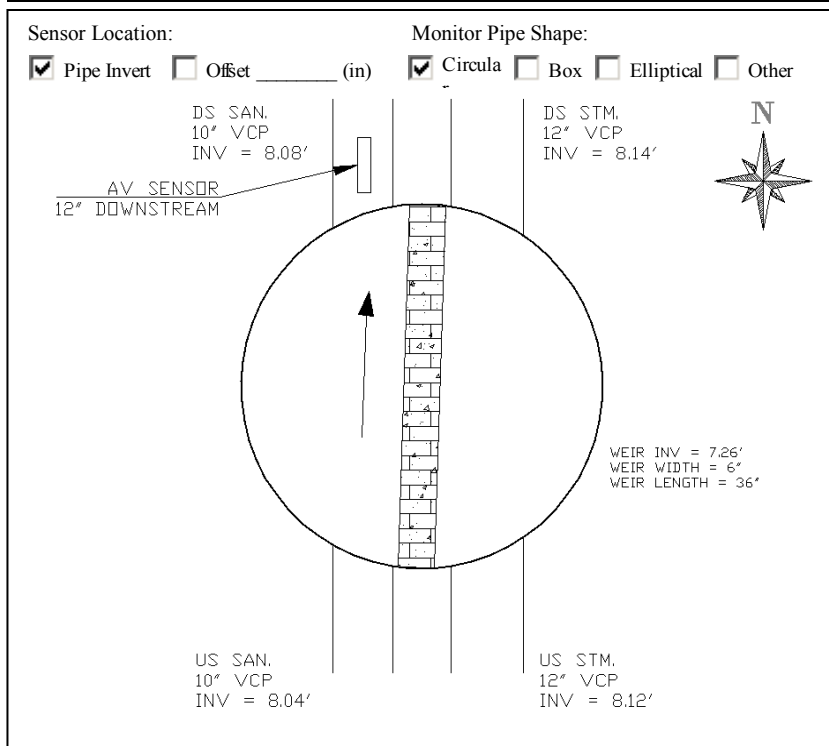




# Flow Monitor Site Installation Sheet

|                                    |                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                    | LK_CSO-RRES1145-U                                                                                                                                                                 | <b>Client:</b> Lakewood                                                                                                                                                                                                                                                                                                                       |
| <b>Install Date/Time:</b>          | 11/6/15<br>9:30 AM                                                                                                                                                                | <b>Job #:</b> 14437                                                                                                                                                                                                                                                                                                                           |
| <b>Install Crew:</b>               | John Kelly & George Stevens                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                               |
| <b>Latitude:</b>                   | 41° 29' 24.2448" N                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                               |
| <b>Longitude:</b>                  | 81° 49' 21.8352" W                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                               |
| <b>Address or Intersection:</b>    | Upper third of and on west side of West Clifton Blvd.                                                                                                                             |                                                                                                                                                                                                                                                                                                                                               |
| <b>Location Description:</b>       | MH in tree lawn in front of 1186 West Clifton<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                            | <b>Meter Owner:</b><br><b>Meter Type:</b><br><input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav<br>Other:<br><b>Sensor type:</b><br><input type="checkbox"/> ULS <input checked="" type="checkbox"/> AV <input type="checkbox"/> Sampler<br>Other:<br><b>Recording Interval (min):</b> 5 |
| <b>Notable Site/MH Conditions:</b> | Sensor about 1' into 10" downstream sanitary pipe. Normal flows will record as negative.<br><br>Siltling depth, oil/grease, overflow, surcharge evidence, structural damage, etc. | <b>Cell Service Number:</b><br>(216) 906-0669<br><b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-160<br>Area Velocity Serial #: 215-H02-607<br>Collection Frequency: 24 hours<br><br><b>Lakewood Asset #: 548276</b>                                                                                   |

|                                        |                                                                                                                                                      |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                        |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great       |
| <b>MH Depth (ft):</b><br>Rim to invert | 8.06'                                                                                                                                                |





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-RRES1145-U |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |





# Flow Monitor Site Installation Sheet

|                                    |                                                                                                                                                                                                |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                    | LK_CSO-RRES1145-V                                                                                                                                                                              |
| <b>Install Date/Time:</b>          | 11/9/15<br>9:48 AM                                                                                                                                                                             |
| <b>Install Crew:</b>               | John Kelly & George Stevens                                                                                                                                                                    |
| <b>Latitude:</b>                   | 41° 29' 21.5952" N                                                                                                                                                                             |
| <b>Longitude:</b>                  | 81° 49' 21.8172" W                                                                                                                                                                             |
| <b>Address or Intersection:</b>    | 1214 West Clifton Blvd.                                                                                                                                                                        |
| <b>Location Description:</b>       | Manhole in tree lawn on west side of road at 1214 W. Clifton across from Lakewood Junior High School.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc. |
| <b>Notable Site/MH Conditions:</b> | Install in downstream 10" sanitary.<br>Normal flows will record as negative.<br>The lip of the manhole rim is in very poor shape.                                                              |

Client: Lakewood

Job #: 14437

**Meter Owner:**

**Meter Type:**

☐ Sigma ☒ Isco ☐ FloWav

Other:

**Sensor type:**

☐ ULS ☒ AV ☐ Sampler

Other:

**Recording Interval (min):** 5

**Cell Service Number:**

(216) 906-8037

**Collection Methods:**

Manual/cell/etc.: Cellular

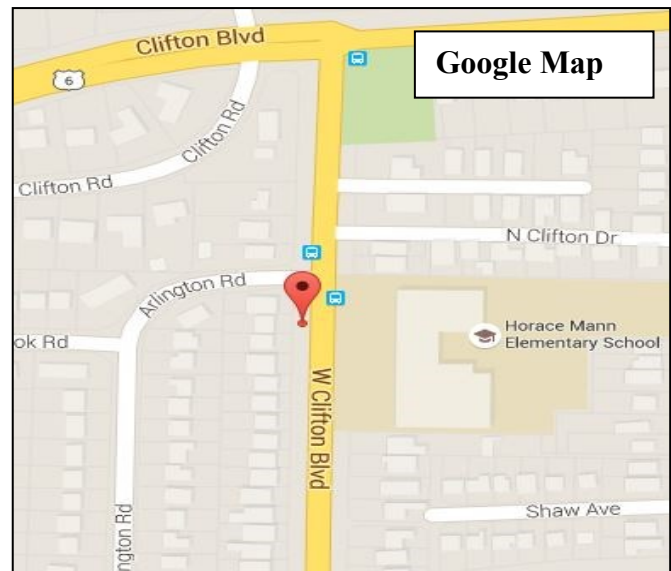
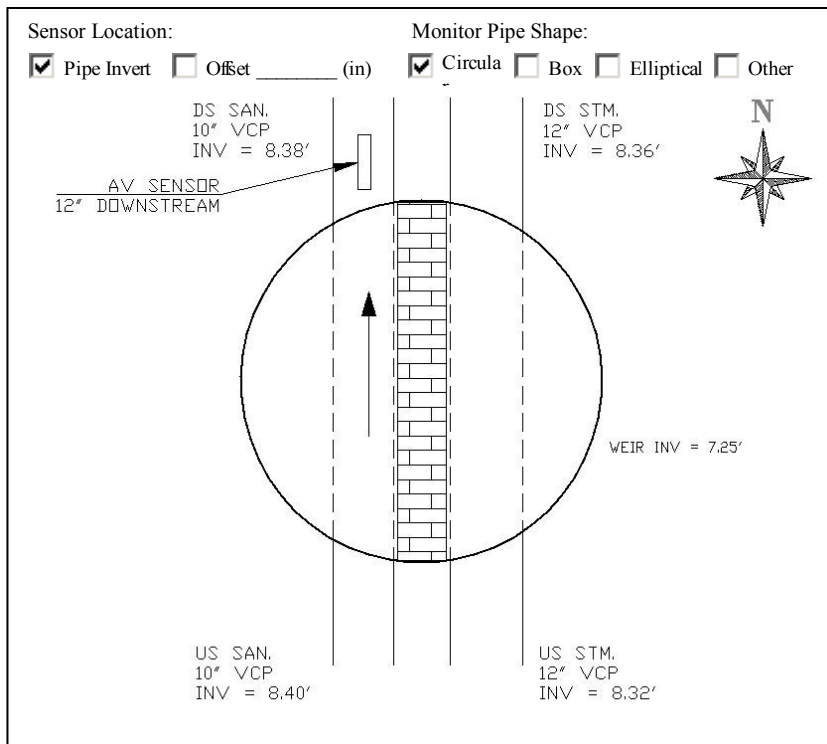
Cellular Serial #: 215-J02-161

Area Velocity Serial #: 215-H02-606

Collection Frequency: 24 hours

**Lakewood Asset #: 548274**

|                                        |                                                                                                                                                      |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                        |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Great                  |
| <b>MH Depth (ft):</b><br>Rim to invert | 8.39'                                                                                                                                                |





# Flow Monitor Site Installation Sheet

**Meter Name:**

LK\_CSO-RRES1145-V

Client: Lakewood

Job #: 14437

Plan View



Satellite



AV Meter

DESCRIPTION: 62-2000-100  
2103Ci Cellular Modem Module, CDMA  
POWER: 7 - 16.6 VDC 3.0A MAX  
FCC ID: MIVCNN0301 CELL # (216) 906-8037  
IP: 166.156.76.163 215J02161



Teledyne Isco www.isco.com  
4700 Superior St., Lincoln, NE 68504  
(402) 464-0231 USA & Canada (800) 228-4373

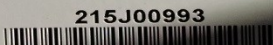
Description: 60-2004-007 Area Velocity 2150 Flow Meter  
POWER: 7-26 VDC 0.1A  
U.S. Patent No's: 5,557,536  
Foreign Patents Pending



215H02606  
Teledyne Isco, Inc. 4700 Superior St., Lincoln, NE 68504 USA  
(402)464-0231 (800)228-4373 USA & Canada www.isco.com

DESCRIPTION: 60-2004-006  
2191 Battery Module

POWER  
CAPABILITY: 5A CONTINUOUS



Teledyne Isco, 4700 Superior St., Lincoln, NE 68504 USA  
(402)464-0231 (800)228-4373 USA & Canada www.isco.com





|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO_RRES1145_V |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |



**Rim – Needs Repairs**

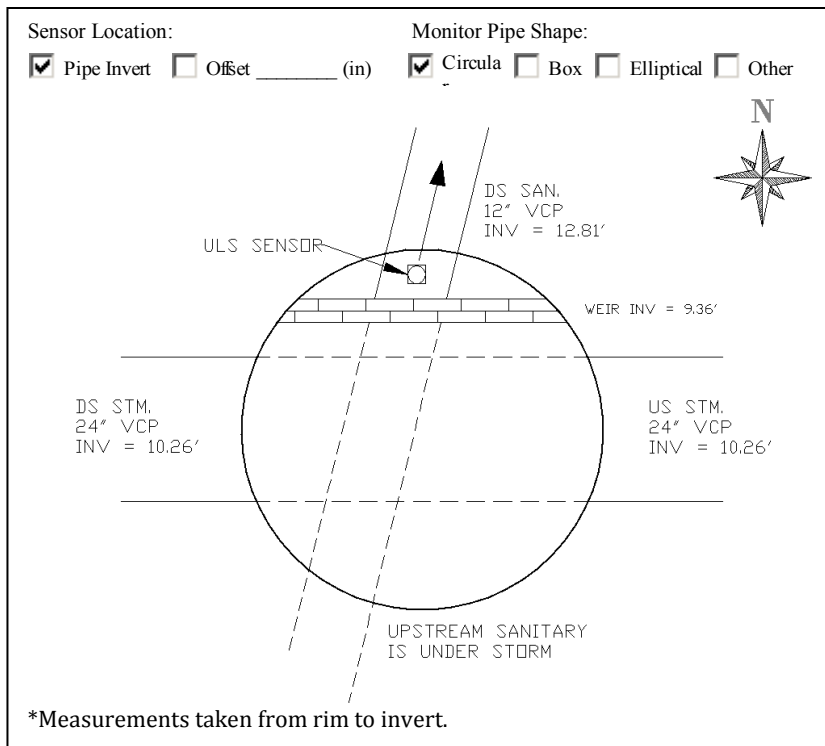
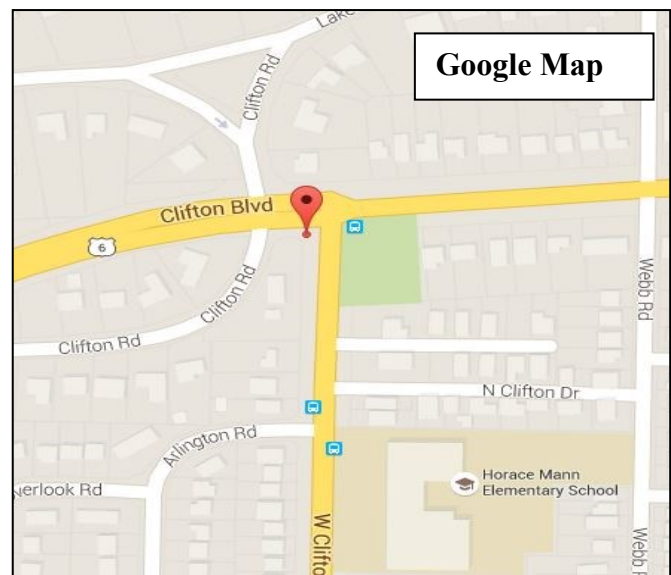




# Flow Monitor Site Installation Sheet

|                                        |                                                                                                                                                                                                                                                                      |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site ID:</b>                        | LK_CS0-RRES1145-W                                                                                                                                                                                                                                                    |
| <b>Install Date/Time:</b>              | 11/2/15 @ 11:45 AM<br>Relocated on 12/18/15 @ 10:00 AM                                                                                                                                                                                                               |
| <b>Install Crew:</b>                   | John Kelly & George Stevens                                                                                                                                                                                                                                          |
| <b>Latitude:</b>                       | 41° 29' 27.24" N                                                                                                                                                                                                                                                     |
| <b>Longitude:</b>                      | 81° 49' 21.7992" W                                                                                                                                                                                                                                                   |
| <b>Address or Intersection:</b>        | West Clifton at Clifton Blvd.                                                                                                                                                                                                                                        |
| <b>Location Description:</b>           | MH in tree lawn at corner of sidewalk intersection.<br><br>MH in ditch, MH in parking lot behind SE corner of building, lawn, driveway, etc.                                                                                                                         |
| <b>Notable Site/MH Conditions:</b>     | Shooting sanitary flow with inconsistent readings. Calibrated site to Weir Height = 0.0". Positive readings indicate overflow. May see negative readings up to -3.45' periodically. Very high humidity in manhole – maintenance to clean sensor may be needed often. |
| <b>Type of Sewer:</b>                  | <input type="checkbox"/> Storm <input type="checkbox"/> Sanitary <input checked="" type="checkbox"/> Combined                                                                                                                                                        |
| <b>MH Material:</b>                    | <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Pre-cast <input type="checkbox"/> Other<br><input type="checkbox"/> Cast-in-place                                                                                                                 |
| <b>MH Condition:</b>                   | <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Good <input type="checkbox"/> Great                                                                                                                                  |
| <b>MH Depth (ft):</b><br>Rim to invert | 10.26'                                                                                                                                                                                                                                                               |

|                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Client:</b> Lakewood                                                                                                        |
| <b>Job #:</b> 14437                                                                                                            |
| <b>Meter Owner:</b>                                                                                                            |
| <b>Meter Type:</b>                                                                                                             |
| <input type="checkbox"/> Sigma <input checked="" type="checkbox"/> Isco <input type="checkbox"/> FloWav                        |
| Other:                                                                                                                         |
| <b>Sensor type:</b>                                                                                                            |
| <input checked="" type="checkbox"/> ULS <input type="checkbox"/> AV <input type="checkbox"/> Sampler                           |
| Other:                                                                                                                         |
| <b>Recording Interval (min):</b> 5                                                                                             |
| <b>Cell Service Number:</b><br>(216) 906-8708                                                                                  |
| <b>Collection Methods:</b><br>Manual/cell/etc.: Cellular<br>Cellular Serial #: 215-J02-168<br>Ultrasonic Serial #: 215-J01-709 |
| <b>Collection Frequency:</b> 24 hours                                                                                          |
| <b>Lakewood Asset #:</b> 548261                                                                                                |



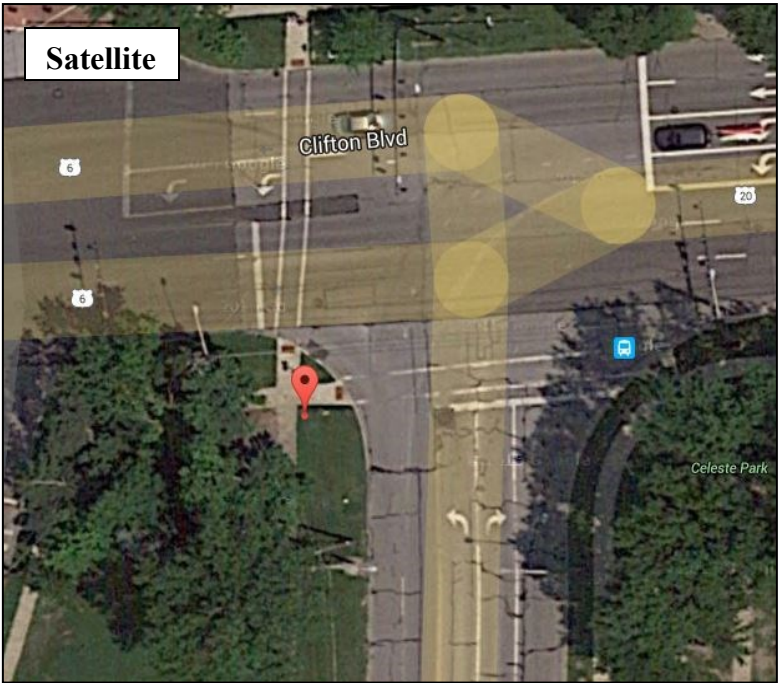


|                    |                   |
|--------------------|-------------------|
| <b>Meter Name:</b> | LK_CSO-RRES1145-W |
|--------------------|-------------------|

|         |          |
|---------|----------|
| Client: | Lakewood |
| Job #:  | 14437    |



Installed Plan View



Satellite

**ULS Meter**

DESCRIPTION: 62-2000-100  
2103Ci Cellular Modem Module, CDMA  
POWER: 7 - 16.6 VDC 3.0A MAX  
FCC ID: MIVCNN0301 CELL # (216) 906-8708  
IP: 166.156.76.171 215J02168

Teledyne Isco 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 USA & Canada (800) 228-4373

DESCRIPTION: 60-2004-400  
2110 Ultrasonic Flow Module  
POWER: 12 VDC 0.1A  
215J01709

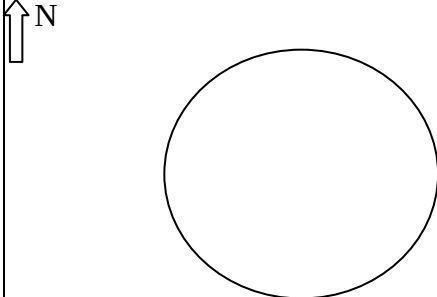
Teledyne Isco, Inc. 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com

DESCRIPTION: 60-2004-006  
2191 Battery Module  
POWER CAPABILITY: 5A CONTINUOUS  
215J00984

Teledyne Isco, Inc. 4700 Superior St., Lincoln, NE 68504 USA  
(402) 464-0231 (800) 228-4373 USA & Canada www.isco.com

# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                         |                     |              |                 |                        |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------|-----------------|------------------------|
| <b>Project Name:</b> | Lakewood Integrated Wet Weather Improvement Project                                                                                                                                     | <b>Project #</b>    | 14437        | <b>Date:</b>    | 4/12/16                |
| <b>Location:</b>     | Detroit Avenue at Elmwood Avenue                                                                                                                                                        |                     |              | <b>Weather:</b> | 44° - Clear            |
| <b>Latitude: N</b>   | 41.484985° N                                                                                                                                                                            | <b>Longitude W:</b> | 81.802388° W |                 |                        |
| <b>Manhole Type:</b> | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input type="checkbox"/> Combined <input checked="" type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |              | <b>Crew:</b>    | G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LEWS1150-C - <i>(Corrected outfall identification from LEWS1140 to LEWS1150 on 8/9/16)</i>                                                                                              |                     |              |                 |                        |

|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                         |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                         | <b>Configuration of Manhole:</b>                                                                                                                                                                        | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input checked="" type="checkbox"/> Crown <input type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input checked="" type="checkbox"/> Concentric <input type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <span style="border: 1px solid black; padding: 2px;">10.48</span> ft. |  |

| Size (in.) | Direction (N/W/E/S) | Material Type | Invert Depth (ft from Rim) | Crown Depth (ft from Rim) | Type of Flow | Lamping Observations                                                                               |
|------------|---------------------|---------------|----------------------------|---------------------------|--------------|----------------------------------------------------------------------------------------------------|
| 8          | N                   | VCP           | 10.48                      |                           | SAN          |                                                                                                    |
| 20         | N                   | VCP           | 9.02                       |                           | STM          |                                                                                                    |
| 8          | S                   | VCP           | 10.16                      |                           | SAN          |                                                                                                    |
| 15 or 16   | S                   | VCP           | 8.38                       |                           | STM          |                                                                                                    |
| 4          | E                   | VCP           | 7.90                       |                           |              | Pipe is 1 foot inside an otherwise bulk-headed 20"                                                 |
| 12 est.    | W                   | VCP           | 7.90 est.                  |                           |              | Pipe was not videoed or measured but is there. The invert matches the 20" directly across from it. |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

|                          |                                       |                                                         |                                         |
|--------------------------|---------------------------------------|---------------------------------------------------------|-----------------------------------------|
| <b>Weir Length (ft):</b> | <b>High Water Mark (ft from Rim):</b> | <b>Possibility of water falling onto sensor? (Y/N):</b> | <b>Obvious humidity concerns? (Y/N)</b> |
|                          |                                       |                                                         |                                         |

## Comments: (Additional Connections)

6" VCP pipe on west side at 9.7' invert  
 4" VCP pipes on east and west at 10.0' invert also.



1) Site View facing north:



2) Plan View facing north:

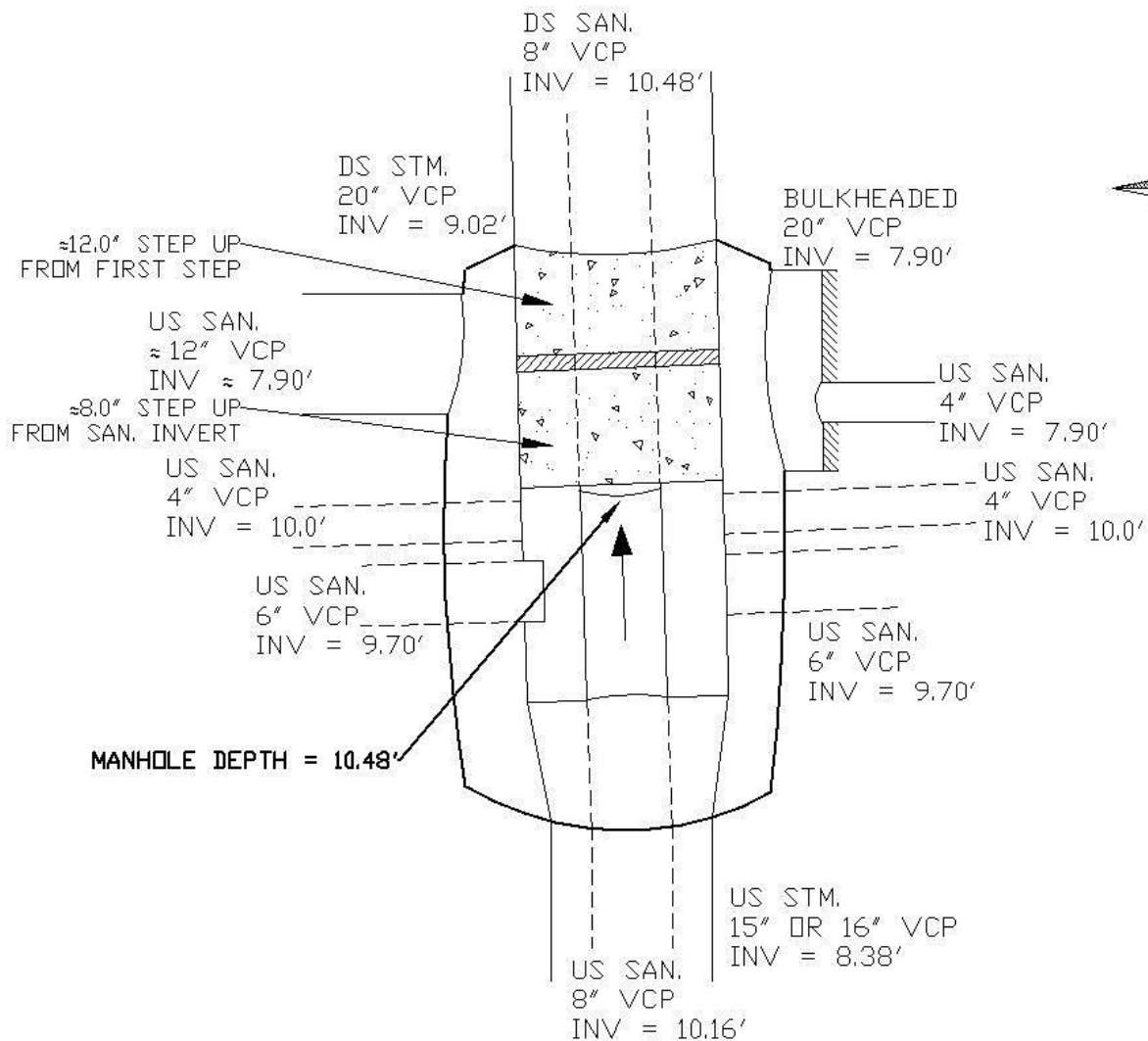




## 3) Eastern 4" Inlet inside of 20" Bulk headed pipe

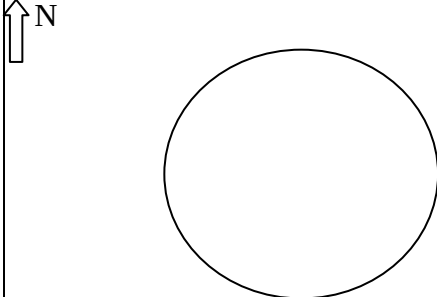


## 4) CAD Sketch:



# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                         |                     |              |                 |                        |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------|-----------------|------------------------|
| <b>Project Name:</b> | Lakewood Integrated Wet Weather Improvement Project                                                                                                                                     | <b>Project #</b>    | 14437        | <b>Date:</b>    | 4/12/16                |
| <b>Location:</b>     | Mars Avenue at Detroit Ave                                                                                                                                                              |                     |              | <b>Weather:</b> | 43° - Clear            |
| <b>Latitude: N</b>   | 41.484928° N                                                                                                                                                                            | <b>Longitude W:</b> | 81.803608° W |                 |                        |
| <b>Manhole Type:</b> | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |              | <b>Crew:</b>    | G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LEWS1150-D - <i>(Corrected outfall identification from LEWS1140 to LEWS1150 on 8/9/16)</i>                                                                                              |                     |              |                 |                        |

|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                        |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                         | <b>Configuration of Manhole:</b>                                                                                                                                       | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input checked="" type="checkbox"/> Crown <input type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input checked="" type="checkbox"/> Concentric <input type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <input type="text" value="7.48"/> ft |  |

| Size (in) | Direction (N/W/E/S) | Material Type | Invert Depth (ft from Rim) | Crown Depth (ft from Rim) | Type of Flow | Lamping Observations                                                                       |
|-----------|---------------------|---------------|----------------------------|---------------------------|--------------|--------------------------------------------------------------------------------------------|
| 6-8       | N                   | VCP           | 7.46<br>(- 1" to 3")       |                           | COMB.        | 18" Outlet is bulk-headed and reduced to a 6 to 8" pipe. 7.46' is only invert of 18" pipe. |
| 20        | N                   | VCP           | 6.84                       |                           | STM          | Storm outlet looks smaller downstream                                                      |
| 20        | S                   | VCP           | 7.50                       |                           | COMB.        |                                                                                            |
|           |                     |               |                            |                           |              |                                                                                            |
|           |                     |               |                            |                           |              |                                                                                            |
|           |                     |               |                            |                           |              |                                                                                            |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

|                          |                          |                                                                               |                                         |
|--------------------------|--------------------------|-------------------------------------------------------------------------------|-----------------------------------------|
| <b>Weir Length (ft):</b> | <b>Weir Invert (ft):</b> | <b>Notes:</b>                                                                 | <b>Obvious humidity concerns? (Y/N)</b> |
|                          | 4.90'                    | 3 small possibly blocked pipes evident on west side of weir in sanitary flow. |                                         |

## Comments:

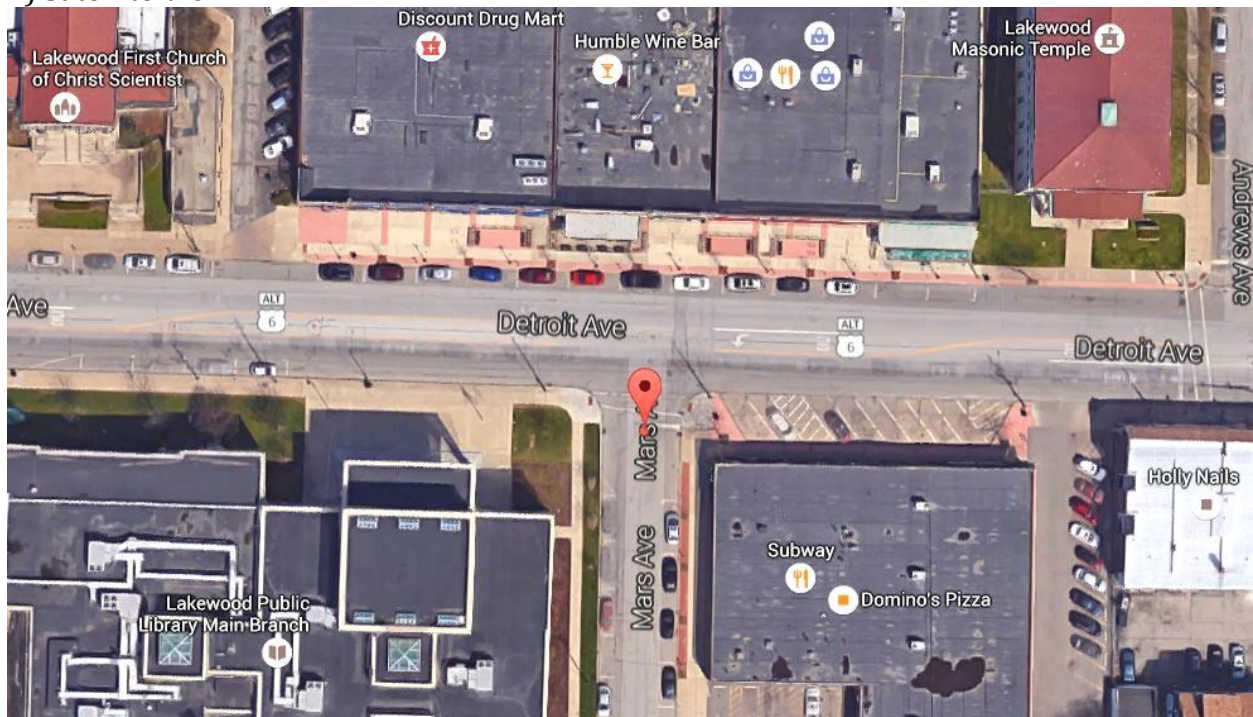
We are expecting to find a combination inlet as well as an 18" outlet and 24" overflow. Confirmation of actual configuration is required.



## 1) Site View facing north:



## 2) Satellite View:





## 3) Plan View facing north:



4) Sanitary Outlet reduced from 18" to 6-8":



5) Storm Outlet measured:





6) Storm Outlet reduced downstream:



7) 3 Pipes from Weir to Sanitary flow:



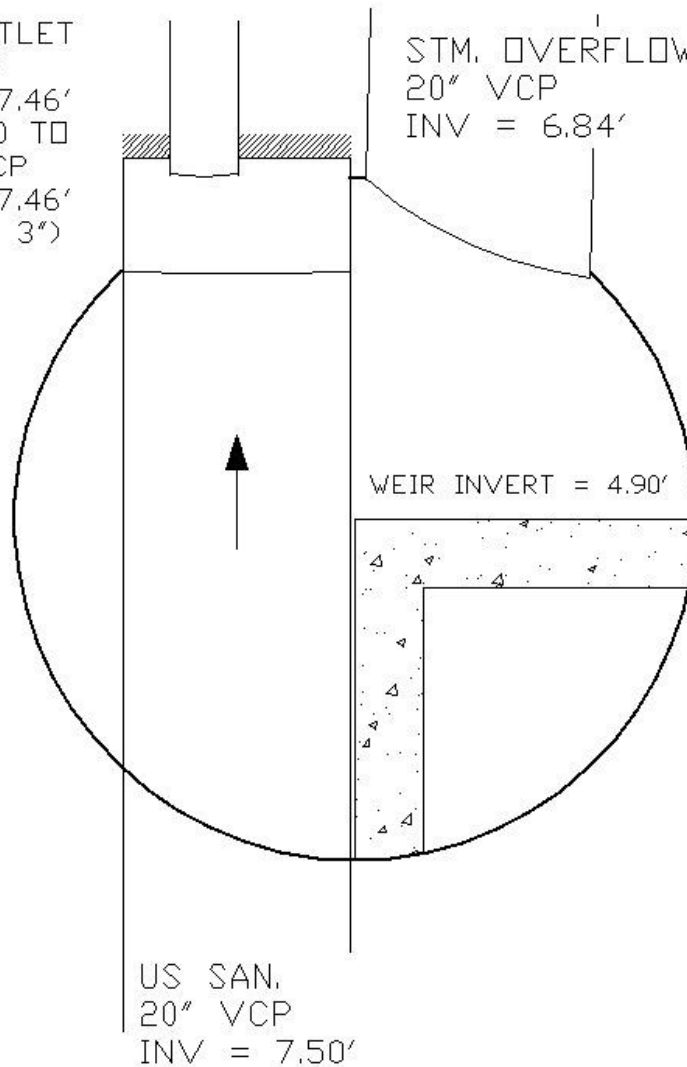
8) 3 Pipes inside weir box?:



## 9) CAD Sketch:

SAN. OUTLET  
18" VCP  
INV. = 7.46'  
REDUCED TO  
6-8" VCP  
INV. = 7.46'  
(- 1 TO 3")

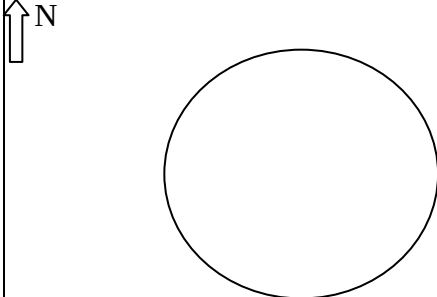
STM. OVERFLOW  
20" VCP  
INV = 6.84'





# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                         |                     |              |                 |                        |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------|-----------------|------------------------|
| <b>Project Name:</b> | Lakewood Integrated Wet Weather Improvement Project                                                                                                                                     | <b>Project #</b>    | 14437        | <b>Date:</b>    | 4/12/2016              |
| <b>Location:</b>     | Victoria Avenue at Hilliard Avenue                                                                                                                                                      |                     |              | <b>Weather:</b> | 43° Clear              |
| <b>Latitude: N</b>   | 41.481550° N                                                                                                                                                                            | <b>Longitude W:</b> | 81.800998° W |                 |                        |
| <b>Manhole Type:</b> | <input checked="" type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |              | <b>Crew:</b>    | G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LEWS1150-E - <i>(Corrected outfall identification from LEWS1140 to LEWS1150 on 8/9/16)</i>                                                                                              |                     |              |                 |                        |

|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                       |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                         | <b>Configuration of Manhole:</b>                                                                                                                                                                      | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input checked="" type="checkbox"/> Crown <input type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input checked="" type="checkbox"/> Concentric <input type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <span style="border: 1px solid black; padding: 2px;">8.31</span> ft |  |

| Size (in) | Direction (N/W/E/S) | Material Type | Invert Depth (ft from Rim) | Crown Depth (ft from Rim) | Type of Flow | Lamping Observations                                    |
|-----------|---------------------|---------------|----------------------------|---------------------------|--------------|---------------------------------------------------------|
| 26        | NW                  | VCP           | 8.63                       |                           | COMB.        | Outlet                                                  |
| 25        | W                   | VCP           | 8.64                       |                           | COMB.        | Inlet. Flow heading NW was very slow                    |
| 18        | S                   | VCP           | 8.26                       |                           | SAN.         | San. Inlet. Most of the flow continuing NW is from here |
|           |                     |               |                            |                           |              |                                                         |
|           |                     |               |                            |                           |              |                                                         |
|           |                     |               |                            |                           |              |                                                         |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

|                          |                                       |                                                         |                                         |
|--------------------------|---------------------------------------|---------------------------------------------------------|-----------------------------------------|
| <b>Weir Length (ft):</b> | <b>High Water Mark (ft from Rim):</b> | <b>Possibility of water falling onto sensor? (Y/N):</b> | <b>Obvious humidity concerns? (Y/N)</b> |
|                          |                                       |                                                         |                                         |

## Comments:

The invert plate shown in the sewer investigation form dated 8/27/09 could not be seen from above but is evidenced in our investigation video.

The upper line which could be seen had significant flow during our visit which was on a dry day. This flow had obvious signs of sanitary waste including emulsified paper debris.

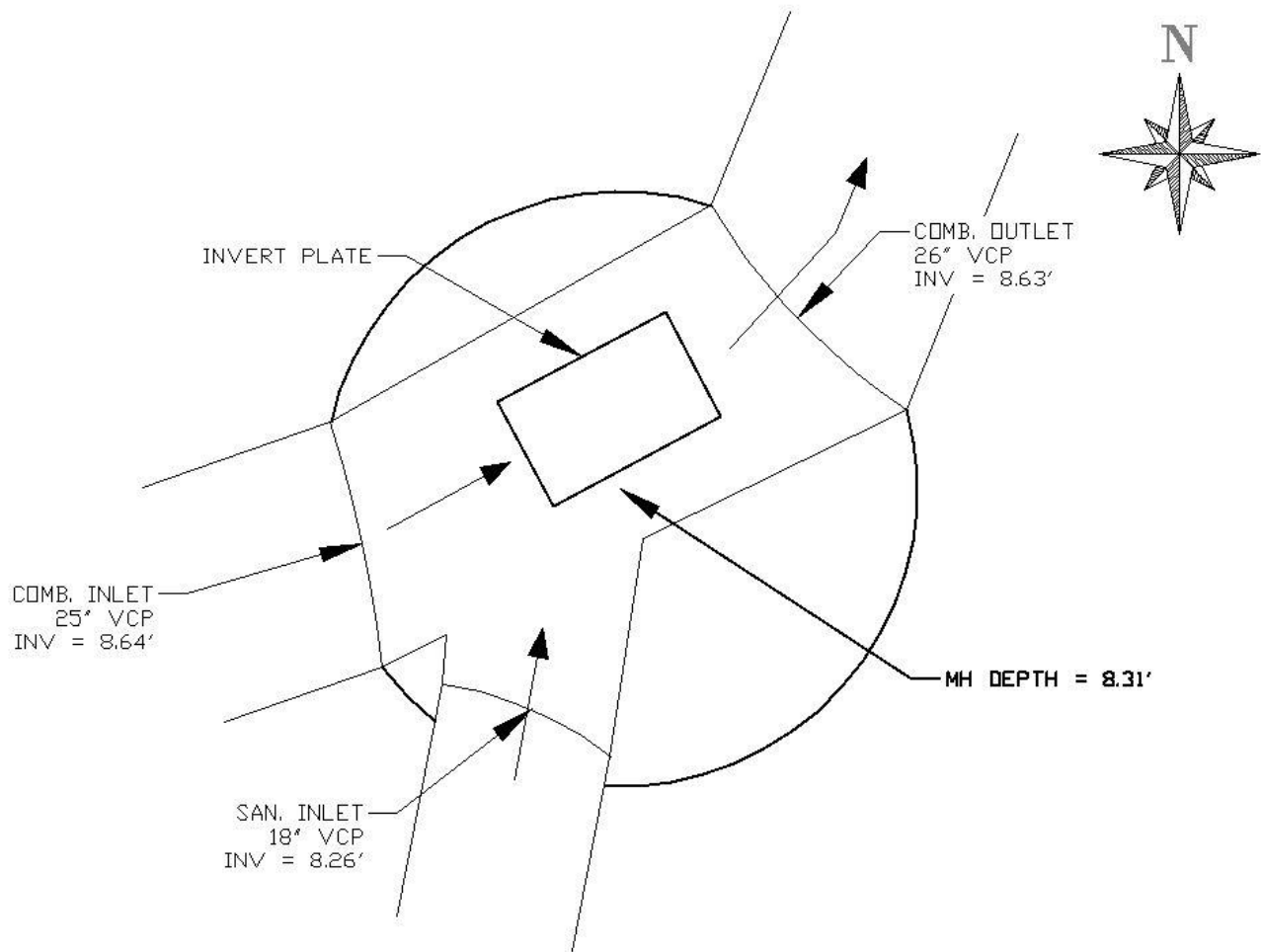
1) Site View facing north:



2) Plan View facing north:



3) CAD Sketch:





# Manhole Inspection

|               |                                                                                                                                                                                         |          |       |          |                       |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------|----------|-----------------------|
| PROJECT NAME: | Lakewood Integrated Wet Weather Improvements                                                                                                                                            | PROJECT# | 14437 | Date:    | 2/23/16               |
| LOCATION:     | Summit Avenue @ Edgewater Avenue - west side of Summit at the intersection                                                                                                              |          |       | Weather: | 37° - Sun             |
| MANHOLE TYPE: | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-Side |          |       | Crew:    | G. Stevens & J. Kelly |
| MANHOLE I.D.: | LK_CSO-LEWS1195-A                                                                                                                                                                       |          |       |          |                       |

|                                                                                                                                                                 |                                            |                                      |                                |                                     |                                               |                                |        |   |              |    |   |    |   |         |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------------|--------------------------------|-------------------------------------|-----------------------------------------------|--------------------------------|--------|---|--------------|----|---|----|---|---------|---|
| Manhole Info.                                                                                                                                                   | MANHOLE LOCATION                           |                                      |                                | CONFIGURATION OF MANHOLE            |                                               |                                |        |   |              |    |   |    |   |         |   |
|                                                                                                                                                                 | <input checked="" type="checkbox"/> Gutter | <input type="checkbox"/> Parking Lot | <input type="checkbox"/> Yard  | <input type="checkbox"/> Concentric | <input checked="" type="checkbox"/> Eccentric | <input type="checkbox"/> Other |        |   |              |    |   |    |   |         |   |
|                                                                                                                                                                 | <input type="checkbox"/> Crown             | <input type="checkbox"/> Treelawn    | <input type="checkbox"/> Field | MH Depth:                           | 22.34                                         | Ft.                            |        |   |              |    |   |    |   |         |   |
|                                                                                                                                                                 | <input type="checkbox"/> Drive             | <input type="checkbox"/> Ditch       | <input type="checkbox"/> Swale |                                     |                                               |                                |        |   |              |    |   |    |   |         |   |
| MATERIAL TYPE: <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Precast <input type="checkbox"/> Cast-in-Place <input type="checkbox"/> Other |                                            |                                      |                                |                                     |                                               |                                |        |   |              |    |   |    |   |         |   |
| GPS COORDINATES                                                                                                                                                 |                                            | LATITUDE: N                          | 41                             | °                                   | 29                                            | '                              | 41.874 | " | LONGITUDE W: | 81 | ° | 48 | ' | 25.1136 | " |

| Piping Config. | SIZE    | DIRECTION                              | MATERIAL TYPE | INVERT DEPTH | TOP OF PIPE DEPTH | TYPE OF FLOW | LAMPING OBSERVATIONS                         |
|----------------|---------|----------------------------------------|---------------|--------------|-------------------|--------------|----------------------------------------------|
|                | 8"      | <input checked="" type="checkbox"/> N  | VCP           | (18.91')     | 18.24'            | SAN          | Invert is estimated                          |
|                | 6"      | <input checked="" type="checkbox"/> S  | HDPE or PVC   | 7.19'        |                   |              |                                              |
|                | 48"-60" | <input checked="" type="checkbox"/> E  | Brick         | 22.34'       |                   | SAN          | Heavy flow east to west                      |
|                | 48"+    | <input checked="" type="checkbox"/> W  | Brick         | 22.34'       | 17.44'            | SAN          | Top of pipe depth was not measured precisely |
|                | 12-18"  | <input checked="" type="checkbox"/> NE | CMP           |              | 12.17'            | STO          | Overflow pipe. Sigma AV to be removed        |
|                |         |                                        |               |              |                   |              |                                              |
|                |         |                                        |               |              |                   |              |                                              |

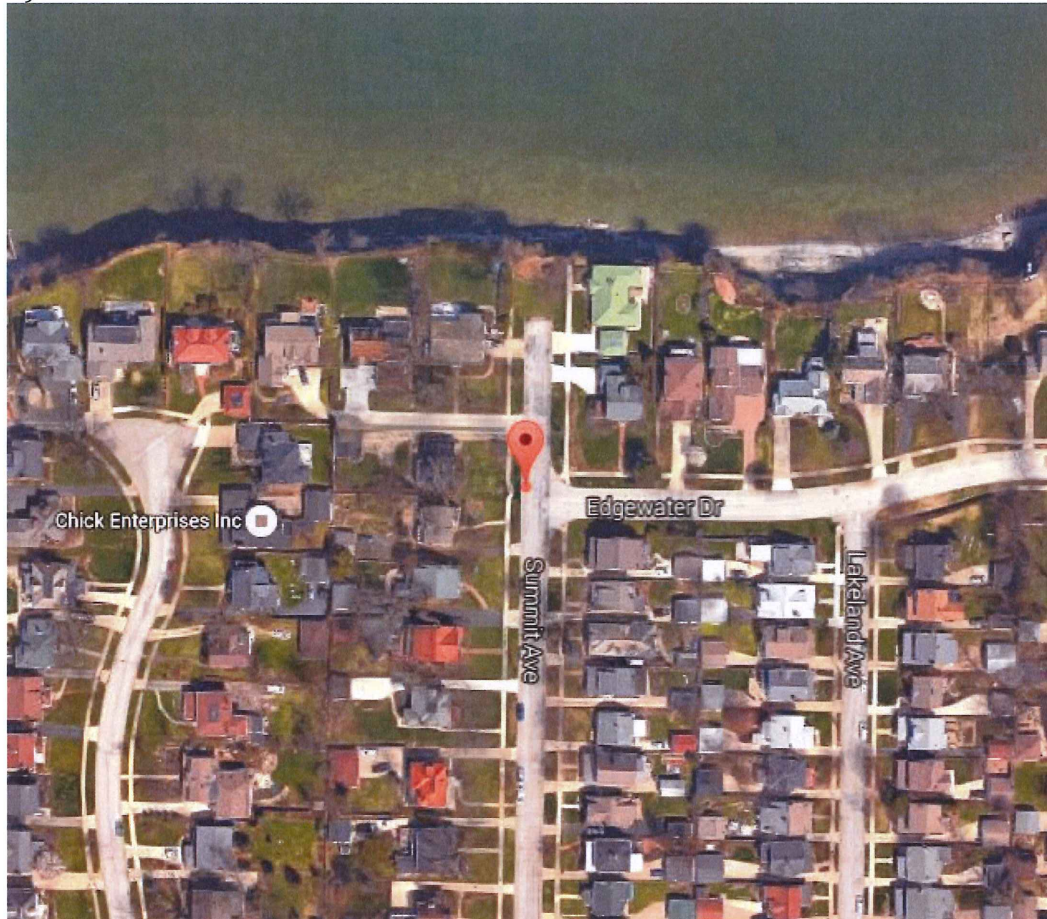
Material Types: VCP - Vitrified Clay; RCP - Reinforced Concrete; PVC - Plastic; DIP - Ductile Iron; TRS - Truss

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Comments | Northern shelf invert = 19.66' from rim.                                                                                                                                                                                                                                                                                                                                                                                               |
|          | <p>It is difficult to measure the size of the overflow pipe without CSE &amp; our records indicate multiple sizes from multiple sources. We should be able to utilize the existing Sigma banding for our ISCO install. We may need to drill new holes for the sensor in the Sigma band.</p> <p>Sensor Recommendation:</p> <p>AV install in overflow pipe is the best choice due to depth of manhole relative to the overflow pipe.</p> |

| Pictures | Picture # | Description            | Picture # | Description                        |
|----------|-----------|------------------------|-----------|------------------------------------|
|          | 1         | Satellite view         | 4         | Large crack in the brick structure |
|          | 2         | Site View facing north | 5         | CAD Sketch                         |
|          | 3         | Plan View facing north |           |                                    |



1) Satellite view:



2) Site View facing north:





3) Plan View facing north:



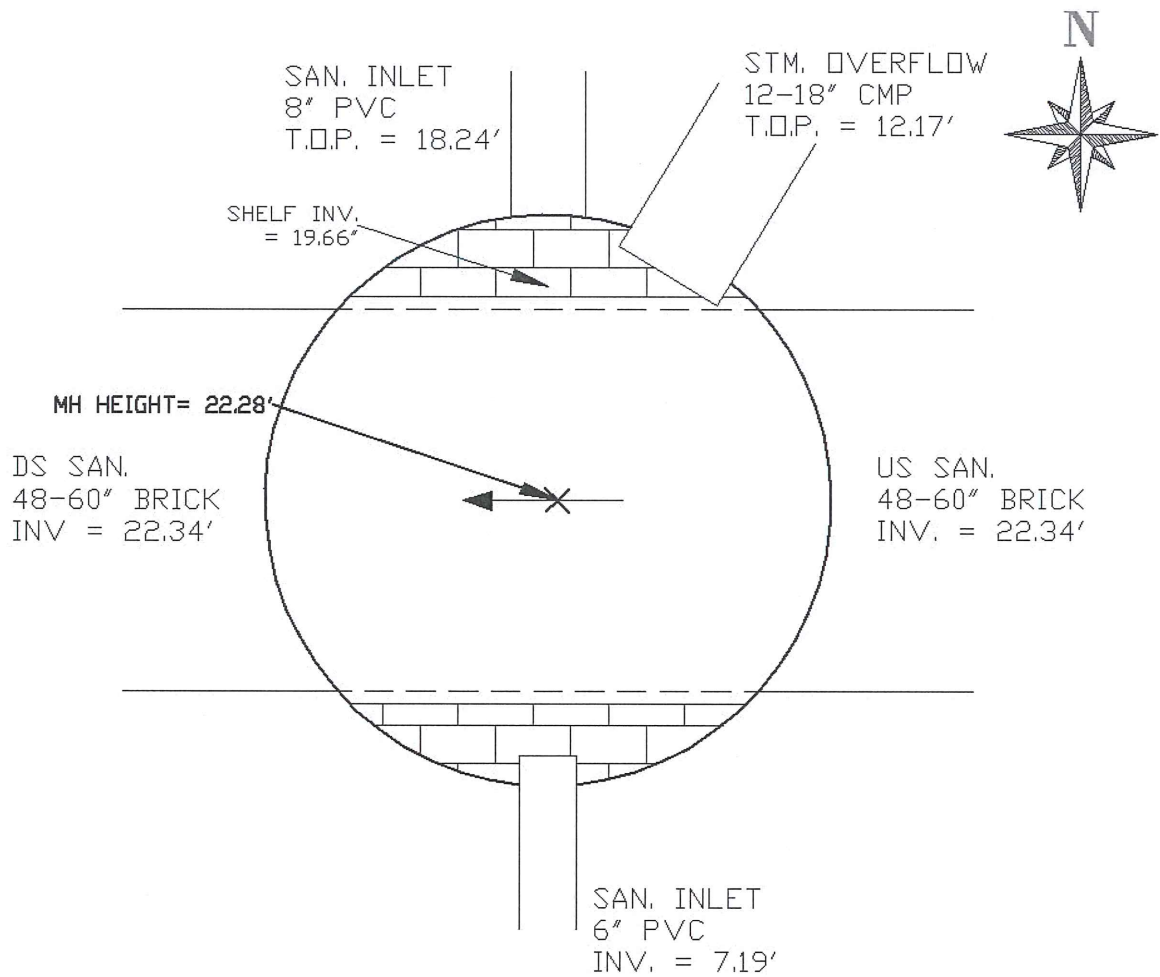
4) Large crack in brick cone near rim:





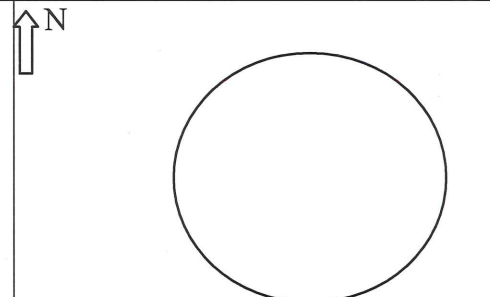
5) CAD Sketch

LEWS1195-A



# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                         |                     |             |                 |                                     |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|-----------------|-------------------------------------|
| <b>Project Name:</b> | Lakewood Integrated Wet Weather Improvements                                                                                                                                            | <b>Project #</b>    | 14437       | <b>Date:</b>    | 2/29/2016                           |
| <b>Location:</b>     | 30' NW of north end of Maple Cliff Dr. in yard @ 1052 Maple Cliff Dr.                                                                                                                   |                     |             | <b>Weather:</b> | 35° - Sunny                         |
| <b>Latitude: N</b>   | 41.495156 N                                                                                                                                                                             | <b>Longitude W:</b> | 81.811228 W |                 |                                     |
| <b>Manhole Type:</b> | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |             |                 | <b>Crew:</b> G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LK_CSO-LEWS1220-A                                                                                                                                                                       |                     |             |                 |                                     |

|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                       |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                         | <b>Configuration of Manhole:</b>                                                                                                                                                                      | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input checked="" type="checkbox"/> Yard<br><input type="checkbox"/> Crown <input type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input checked="" type="checkbox"/> Concentric <input type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <span style="border: 1px solid black; padding: 2px;">7.88</span> ft |  |

| Size (in) | Direction (N/W/E/S) | Material Type | Invert Depth (ft from Rim) | Crown Depth (ft from Rim) | Type of Flow | Lamping Observations |
|-----------|---------------------|---------------|----------------------------|---------------------------|--------------|----------------------|
| 12        | NW                  | VCP           | 8.35                       |                           | STM          | Overflow pipe        |
| 15        | E                   | VCP           | 8.02                       |                           | SAN          | Inlet                |
| 8         | SE                  | VCP           | 8.18                       |                           | SAN          | Outlet               |
| 15        | S                   | VCP           | 7.86                       |                           | SAN          | Inlet                |
|           |                     |               |                            |                           |              |                      |
|           |                     |               |                            |                           |              |                      |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

|                          |                                       |                                                         |                                                                                       |
|--------------------------|---------------------------------------|---------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>Weir Length (ft):</b> | <b>High Water Mark (ft from Rim):</b> | <b>Possibility of water falling onto sensor? (Y/N):</b> | <b>Obvious humidity concerns? (Y/N)</b>                                               |
|                          | Nothing obvious.                      | No. The manhole sides were relatively dry.              | No, but wind from outfall is possible and wind negatively affects ultrasonic signals. |

## Comments:

ULS is a poor choice due to wind interference from Lake Erie. An AV in the downstream sanitary outlet on an 8" spring band would give us dry weather data and easy identification of overflow events along with calculated estimated volumes of overflow. An AV on a 12" spring band in the storm outlet would give us definitive indication of overflow events and volumes but no dry weather data.

-Pictures to be attached on separate sheets-



1) Site View facing north:

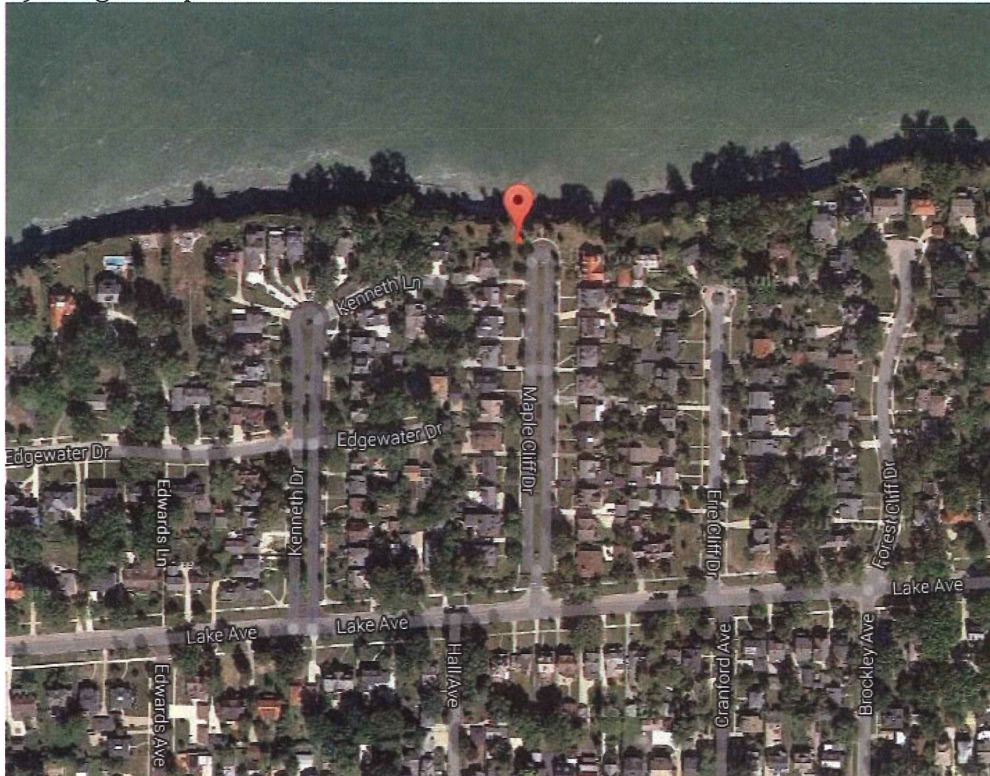


2) Plan View facing north:

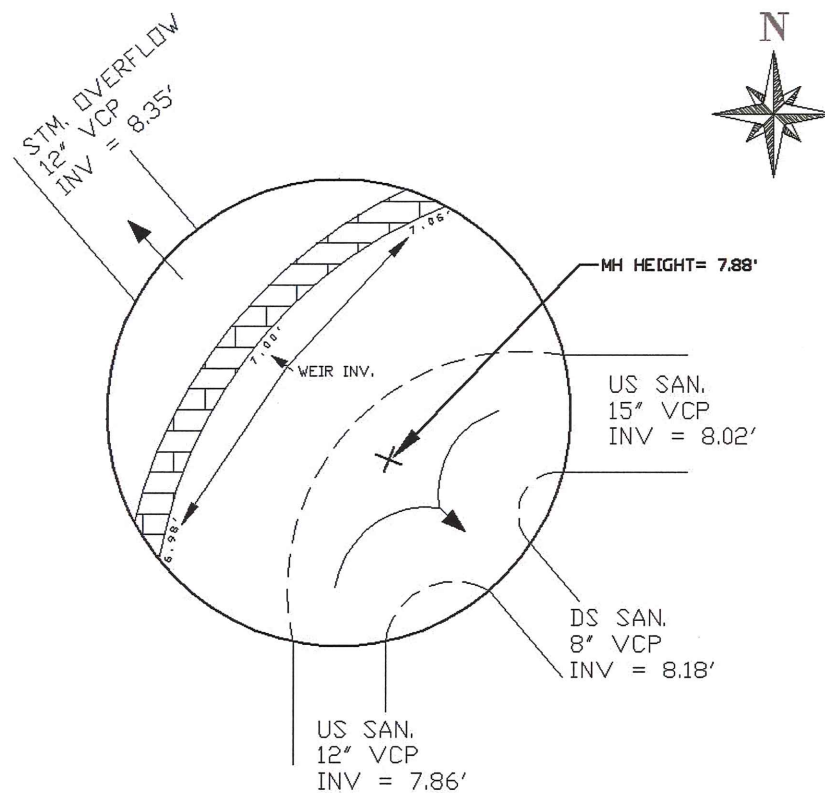




## 3) Google Map:

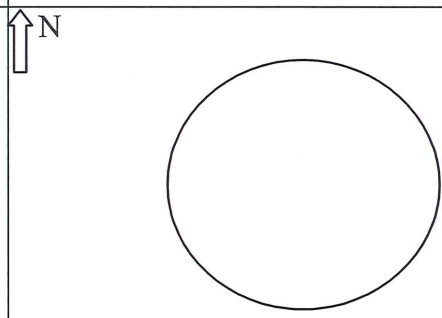


## 4) CAD Sketch



# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                         |                     |             |                 |                                     |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|-----------------|-------------------------------------|
| <b>Project Name:</b> | Lakewood Integrated Wet Weather Improvements                                                                                                                                            | <b>Project #</b>    | 14437       | <b>Date:</b>    | 2/29/2016                           |
| <b>Location:</b>     | Center manhole in X-Walk through Edwards Ave. @ Clifton Blvd.                                                                                                                           |                     |             | <b>Weather:</b> | 39° - Sunny                         |
| <b>Latitude: N</b>   | 41.491384 N                                                                                                                                                                             | <b>Longitude W:</b> | 81.814012 W |                 |                                     |
| <b>Manhole Type:</b> | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |             |                 | <b>Crew:</b> G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LK_CSO-LEWS1295-C                                                                                                                                                                       |                     |             |                 |                                     |

|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                        |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                         | <b>Configuration of Manhole:</b>                                                                                                                                                                       | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input checked="" type="checkbox"/> Crown <input type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input checked="" type="checkbox"/> Concentric <input type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <span style="border: 1px solid black; padding: 2px;">14.82</span> ft |  |

| Size (in) | Direction (N/W/E/S) | Material Type | Invert Depth (ft from Rim) | Crown Depth (ft from Rim) | Type of Flow | Lamping Observations         |
|-----------|---------------------|---------------|----------------------------|---------------------------|--------------|------------------------------|
| 24        | E                   | VCP           | 14.82                      |                           | SAN          | Looks like brick from above. |
| 8         | W                   | VCP           | 7.40                       |                           | STM          | Overflow pipe. 10" Bell      |
| 24        | W                   | VCP           | 14.98                      |                           | SAN          | Looks like brick from above. |
| 18        | S                   | VCP           | 9.68                       |                           | SAN          |                              |
|           |                     |               |                            |                           |              |                              |
|           |                     |               |                            |                           |              |                              |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

|                          |                                       |                                                         |                                         |
|--------------------------|---------------------------------------|---------------------------------------------------------|-----------------------------------------|
| <b>Weir Length (ft):</b> | <b>High Water Mark (ft from Rim):</b> | <b>Possibility of water falling onto sensor? (Y/N):</b> | <b>Obvious humidity concerns? (Y/N)</b> |
|                          |                                       | No.                                                     | No.                                     |

## Comments:

AV in overflow on 8" spring band would give indication of overflow events and volumes.

AV in downstream sanitary would give dry weather flows and indication of overflow events.

ULS above sanitary outlet and storm outlet should give dry weather levels and indication of overflow events.

The 48" pipe with a minimal flow is wide enough for the sensor to reach max height of 144". We would only need to put the sensor about 7-8' above the sanitary flow.



1) Site View facing north:

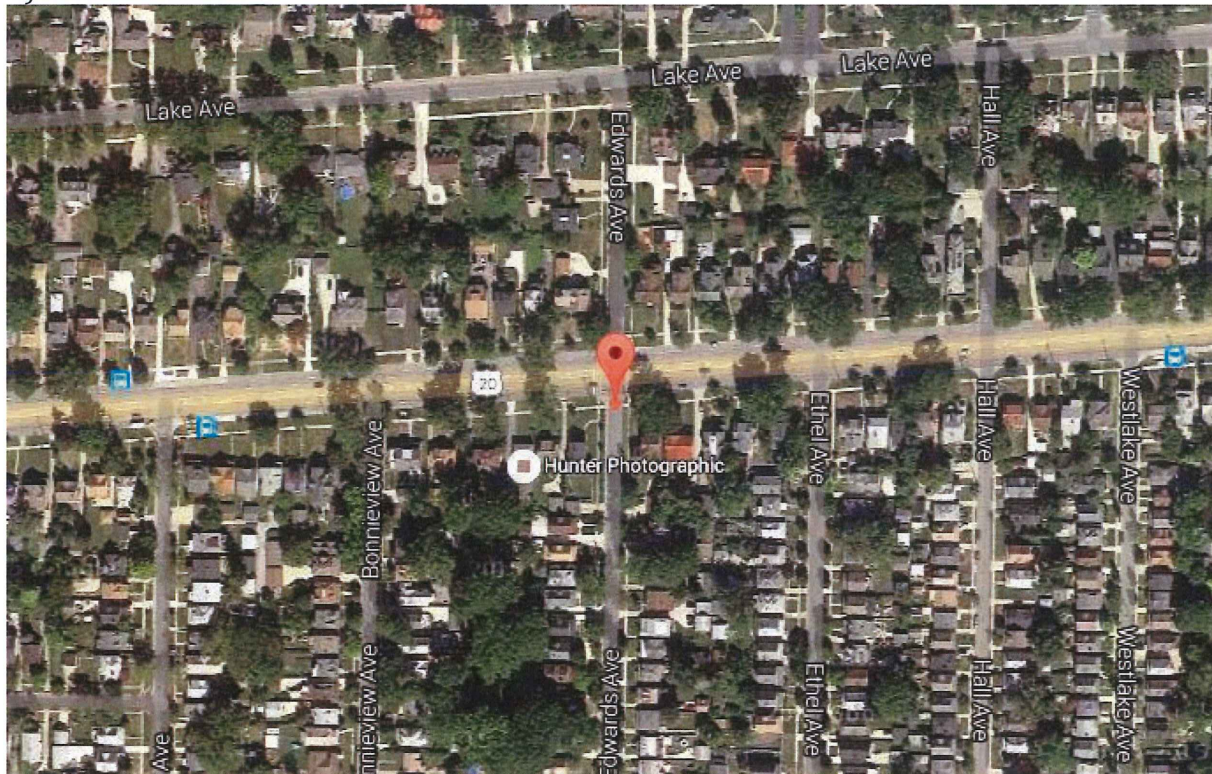


2) Plan View facing north:





## 3) Satellite View:



## 4) 8" Westerly overflow pipe:

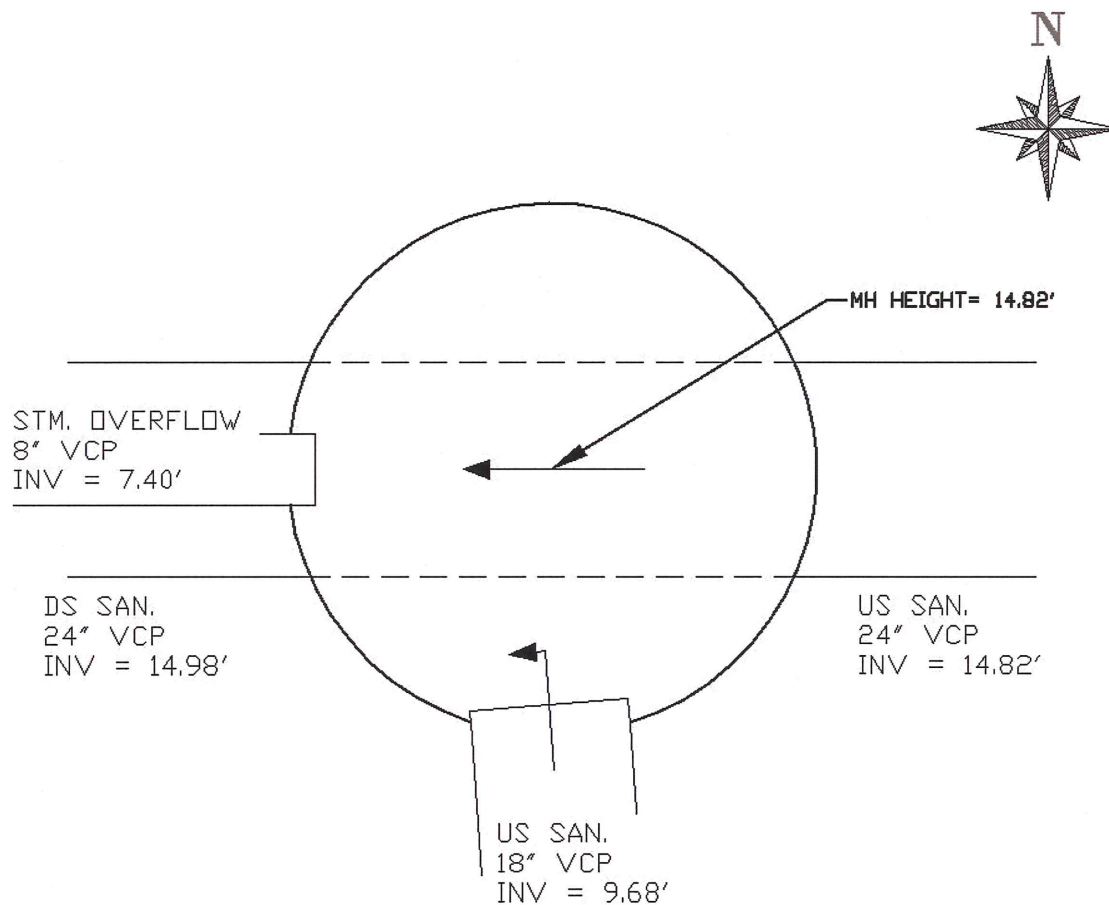




## 5) Westerly MH: Plan View facing north:

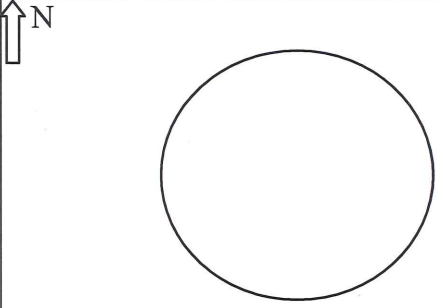


## 6) CAD Sketch:



# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                                    |                     |             |                 |                |                        |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|-----------------|----------------|------------------------|
| <b>Name:</b>         | Lakewood Integrated Wet Weather Improvements                                                                                                                                                       | <b>Project #</b>    | 14437       | <b>Date:</b>    | 2/29/2016      |                        |
| <b>Location:</b>     | Clifton Place @ Detroit. Just south of x-walk through Clifton Place.                                                                                                                               |                     |             | <b>Weather:</b> | 41° - Overcast |                        |
| <b>Latitude: N</b>   | 41.484248 N                                                                                                                                                                                        | <b>Longitude W:</b> | 81.821931 W |                 |                |                        |
| <b>Manhole Type:</b> | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input checked="" type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |             |                 | <b>Crew:</b>   | G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LK_CSO-RRES1145-I                                                                                                                                                                                  |                     |             |                 |                |                        |

|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                       |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                         | <b>Configuration of Manhole:</b>                                                                                                                                                                      | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input checked="" type="checkbox"/> Crown <input type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input checked="" type="checkbox"/> Concentric <input type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <span style="border: 1px solid black; padding: 2px;">8.15</span> ft |  |

| Size (in) | Direction (N/W/E/S) | Material Type | Invert Depth (ft from Rim) | Crown Depth (ft from Rim) | Type of Flow | Lamping Observations                                   |
|-----------|---------------------|---------------|----------------------------|---------------------------|--------------|--------------------------------------------------------|
| 24        | N                   | VCP           | 8.60                       |                           | STM          | Overflow pipe                                          |
| 10        | E                   | VCP           | 4.90                       |                           | STM          | Catch Basin                                            |
| 18        | S                   | VCP           | 8.39                       |                           | COMB         |                                                        |
| 8         | S                   | VCP           | 9.86                       |                           | SAN          | Under continues northward under plate and storm outlet |
| 10        | SE                  | VCP           | 7.25                       |                           | STM          |                                                        |
|           |                     |               |                            |                           |              |                                                        |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

|                          |                                       |                                                         |                                         |
|--------------------------|---------------------------------------|---------------------------------------------------------|-----------------------------------------|
| <b>Weir Length (ft):</b> | <b>High Water Mark (ft from Rim):</b> | <b>Possibility of water falling onto sensor? (Y/N):</b> | <b>Obvious humidity concerns? (Y/N)</b> |
| No weir                  | No obvious high water mark.           | Damp walls with minimal/no dripping water.              | Maybe, probably ok.                     |

## Comments:

We may be able to lift the plate and place an AV on a 10" spring band in the downstream sanitary outlet. This would give dry weather flows as well as overflow indication.

An AV in the storm outlet would give overflow event indication and volumes but no dry weather flow.

It would be possible to place an ultrasonic sensor above the storm outlet. It would not be in a place to measure sanitary flows, but would provide overflow indication.

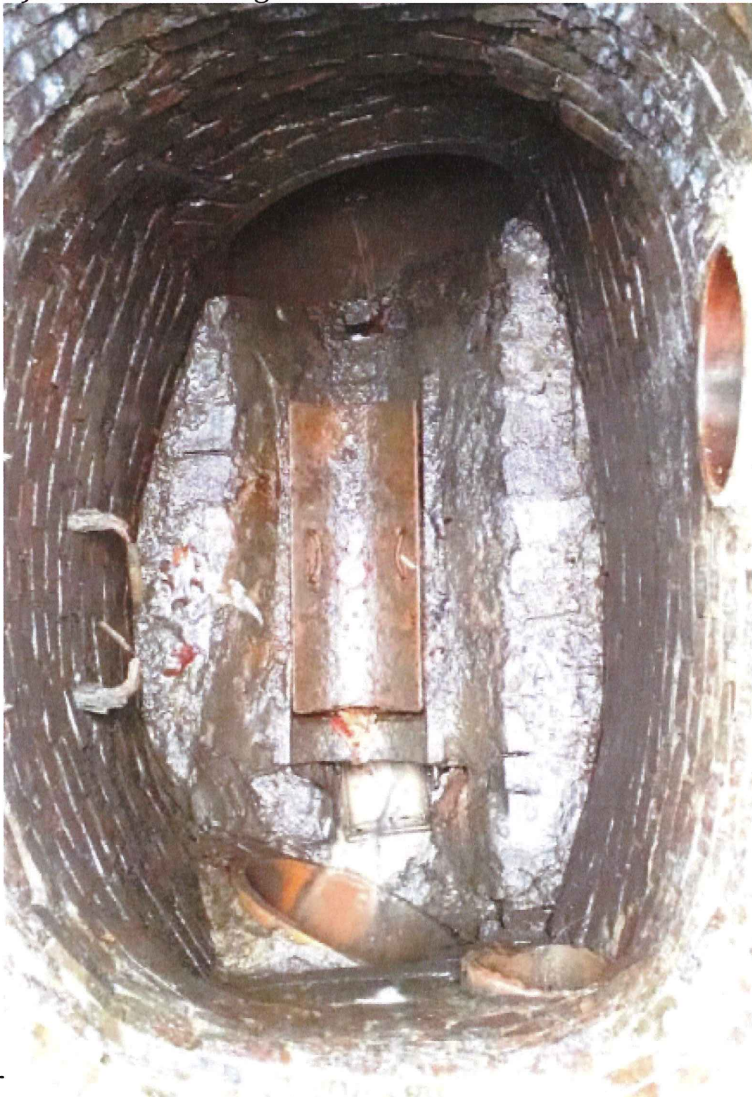
-Pictures to be attached on separate sheets-



1) Site View facing north:



2) Plan View facing north:

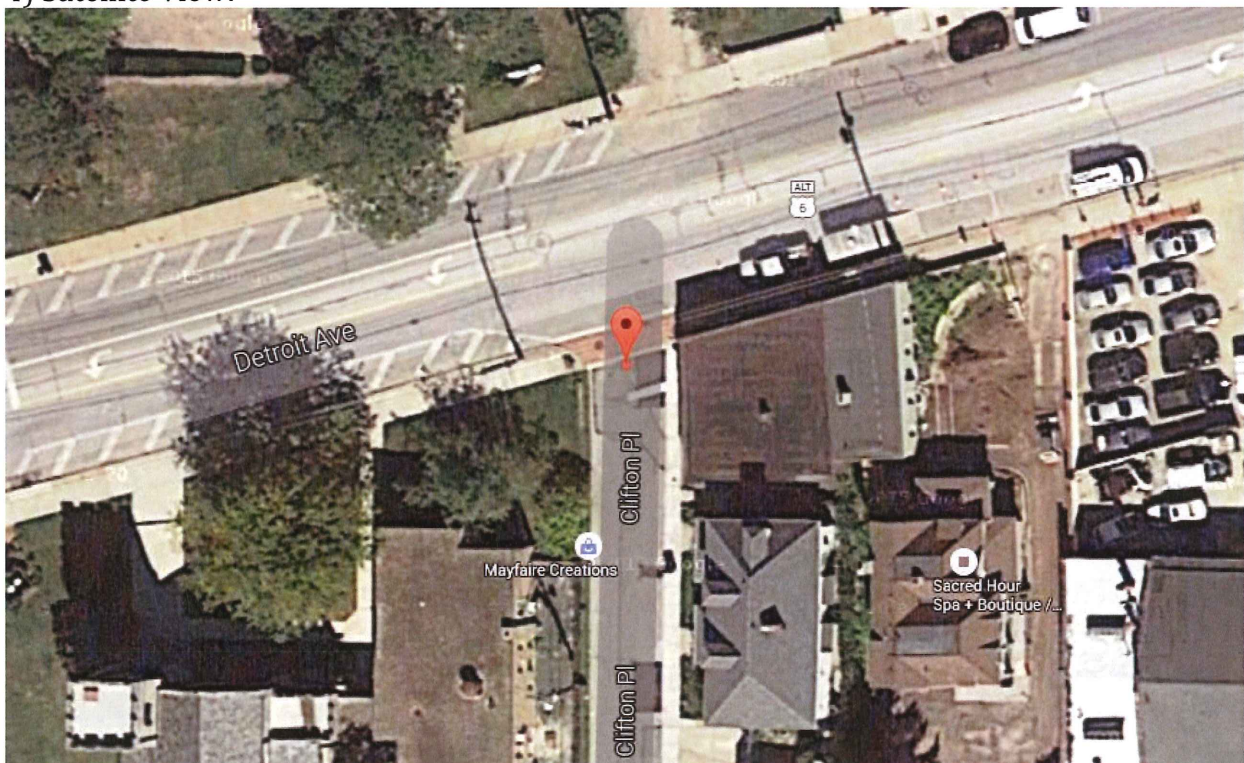




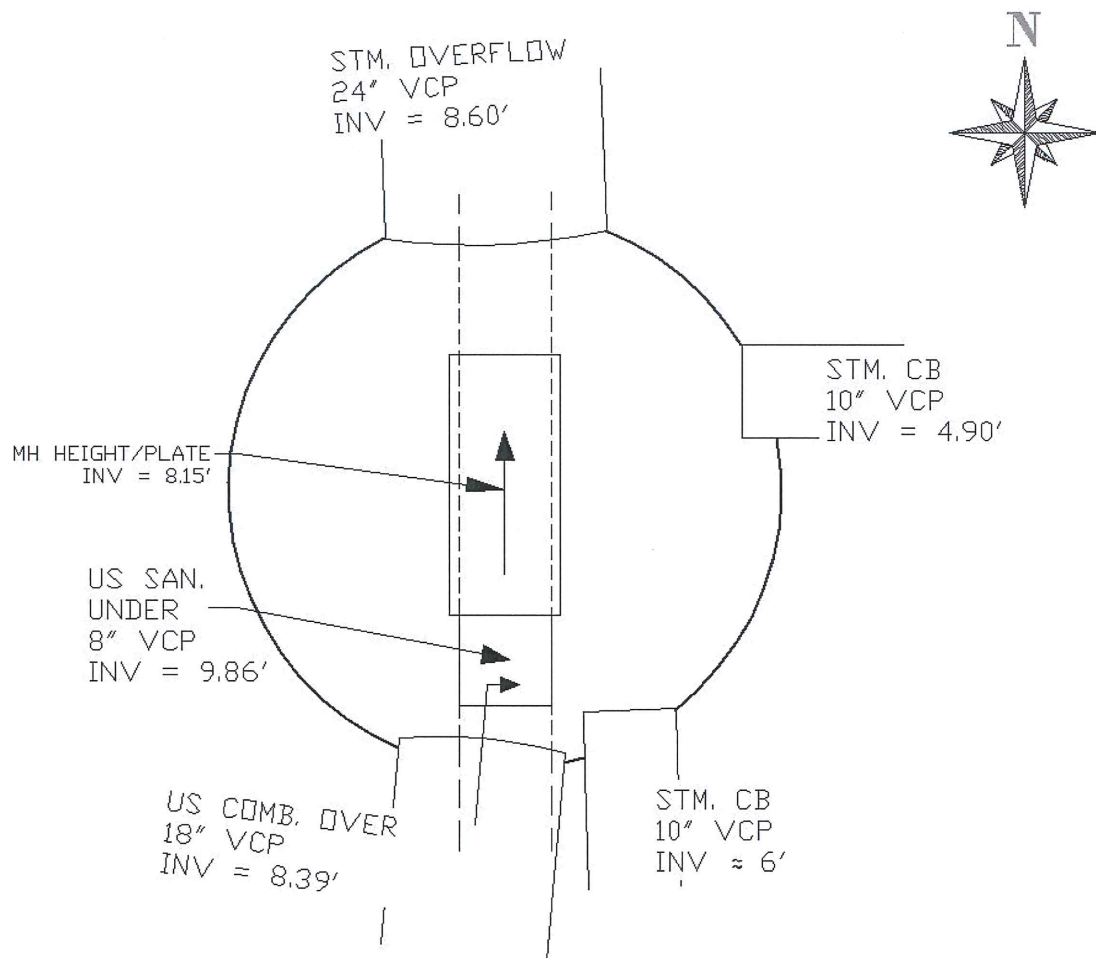
3) Northern downstream sanitary under:



4) Satellite View:



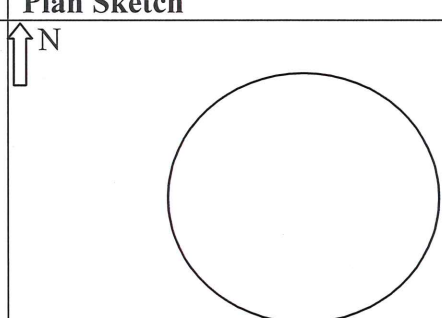
## 5) CAD Sketch:





# Manhole Inspection / Pre-Flow Monitor Install Sheet

|                      |                                                                                                                                                                                                    |                     |             |                 |                        |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|-----------------|------------------------|
| <b>Project Name:</b> | Lakewood Integrated Wet Weather Improvements                                                                                                                                                       | <b>Project #</b>    | 14437       | <b>Date:</b>    | 2/29/2016              |
| <b>Location:</b>     | In the north bound lane of Spring Garden Ave. in front of 1421 Spring Garden Ave. south of Detroit Ave.                                                                                            |                     |             | <b>Weather:</b> | 35° - Cloudy           |
| <b>Latitude: N</b>   | 41.484258 N                                                                                                                                                                                        | <b>Longitude W:</b> | 81.818563 W |                 |                        |
| <b>Manhole Type:</b> | <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm <input checked="" type="checkbox"/> Combined <input checked="" type="checkbox"/> Over/Under <input type="checkbox"/> Side-by-side |                     |             | <b>Crew:</b>    | G. Stevens<br>J. Kelly |
| <b>Manhole ID:</b>   | LK_CSO-RRES1145-K                                                                                                                                                                                  |                     |             |                 |                        |

|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                        |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Manhole Location:</b>                                                                                                                                                                                                                                                                                         | <b>Configuration of Manhole:</b>                                                                                                                                                                       | <b>Plan Sketch</b>                                                                  |
| <input type="checkbox"/> Gutter <input type="checkbox"/> Parking Lot <input type="checkbox"/> Yard<br><input checked="" type="checkbox"/> Crown <input type="checkbox"/> Treelawn <input type="checkbox"/> Field<br><input type="checkbox"/> Drive <input type="checkbox"/> Ditch <input type="checkbox"/> Swale | <input type="checkbox"/> Concentric <input checked="" type="checkbox"/> Eccentric <input type="checkbox"/> Other<br><br>MH Depth: <span style="border: 1px solid black; padding: 2px;">11.16</span> ft |  |

| Size (in) | Direction (N/W/E/S) | Material Type | Invert Depth (ft from Rim) | Crown Depth (ft from Rim) | Type of Flow | Lamping Observations                                 |
|-----------|---------------------|---------------|----------------------------|---------------------------|--------------|------------------------------------------------------|
| 10"       | N                   | VCP           | 5.92                       |                           |              | No flow due to broken pipe bottom.                   |
| 18"       | N                   | VCP           | 8.18                       |                           | COMB         | Under outlet                                         |
| 10"       | S                   | VCP           | 6.02                       |                           | SAN          | Flow drops to under.                                 |
| 18"       | S                   | VCP           | 8.20                       |                           | STM          |                                                      |
| 18"       | N                   | VCP           | 9.64                       |                           | STM          | Overflow pipe                                        |
| 8"        | N                   | VCP           | 11.24                      |                           | SAN ?        | Lots of debris in invert. Probably a 10 or 12" pipe. |

Material Types: VCP – Vitrified Clay; RCP – Reinforced Concrete; PVC – Plastic; DIP – Ductile Iron; TRS – Truss

|                          |                                        |                                                         |                                         |
|--------------------------|----------------------------------------|---------------------------------------------------------|-----------------------------------------|
| <b>Weir Length (ft):</b> | <b>High Water Mark (ft from Rim):</b>  | <b>Possibility of water falling onto sensor? (Y/N):</b> | <b>Obvious humidity concerns? (Y/N)</b> |
|                          | Paper debris on every step in manhole. | Damp mh side walls.                                     | No.                                     |

## Comments:

AV in overflow outlet on 18" spring or scissor band may be the only choice. This manhole is configured very differently than most.

-Pictures to be attached on separate sheets-

1) Site View facing north:



2) Plan View facing north:

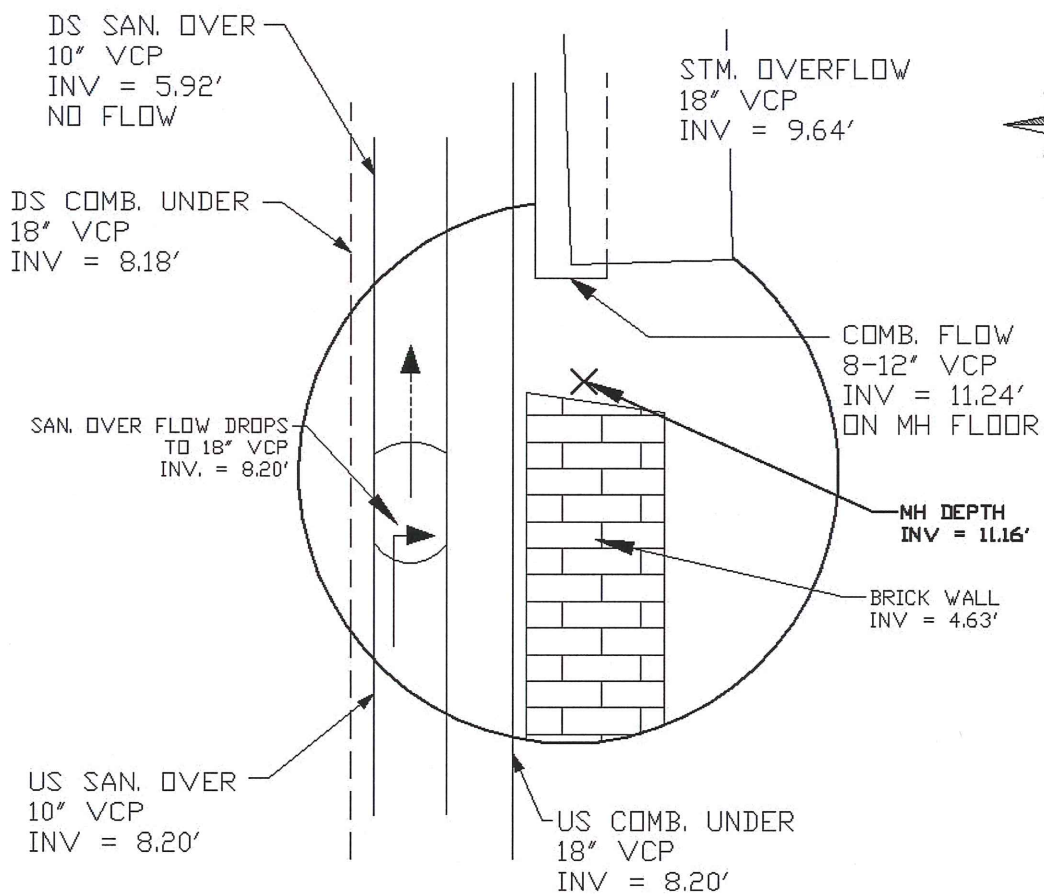




## 3) Satellite View:



## 4) CAD Sketch:



**Attachment L**  
Miscellaneous Information



| LTCP Control Technologies Evaluated                 |                                                         |                                                                          |                                 |                                                                         |                                            |
|-----------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------|-------------------------------------------------------------------------|--------------------------------------------|
| Source Control                                      |                                                         | Collection System                                                        | Storage                         | Treatment                                                               |                                            |
| <b>Best Management Practices:</b>                   | <b>Stormwater Management Practices:</b>                 | <b>Sewer System Optimization:</b>                                        | <b>In-Line Storage:</b>         | <b>Suspended Solids Control:</b>                                        | <b>Disinfection:</b>                       |
| Catch Basin Cleaning                                | Upstream Stormwater Storage                             | Remove Bottlenecks (Pipe Capacity and Connection Hydraulic Improvements) | Inflatable Dams                 | Microscreen                                                             | Chlorination                               |
| Street Cleaning                                     | Porous Pavement                                         | Sewer Cleaning and Maintenance                                           | Manual and Automatic Gates      | Gravity Sedimentation                                                   | Ozonation                                  |
| Litter Control                                      | Infiltration Trenches and Basins                        | Polymer Injection (Lining and Coating)                                   | Existing Unused Conduits        | Flocculation and Sedimentation                                          | Dechlorination                             |
| Deicer Control                                      | Erosion and Sediment Control                            |                                                                          | Static Flow Control Strategy    | Dissolved Air Flotation                                                 | Ultraviolet Disinfection                   |
| Fertilizer and Pesticide Control                    | Overland Flow Slippage and Catch Basin Restriction      | <b>Regulator Optimization:</b>                                           | Variable Flow Control Strategy  | High-Rate Filtration                                                    |                                            |
| Hazardous Material Control                          | Storm Sewer Exfiltration and Infiltration Systems       | Swirl/Helical, Plunge, and Vortex Energy Dissipaters                     | Real-Time Control Strategy      | Sand and Organic Filters                                                | <b>High-Rate End of Pipe Treatment:</b>    |
| Industrial Runoff Control                           | Water Quality Inlets                                    | Static Regulator Device Improvements                                     |                                 | High-Rate Sedimentation<br>- Swirl Concentrators<br>- Vortex Separators | Ballasted Flocculation (ActiFlo)           |
| Water Conservation                                  | Private Property Storage (Rain Harvesting)              | Bending Weir                                                             | <b>Subsurface Storage:</b>      |                                                                         | Clarification (DensaDeg 4D)                |
| Public Education                                    | Pipe Alternatives (Roadside Ditches and Grassed Swales) | Drop Structure Optimization                                              | Tunnel Storage                  | <b>Floatable and Coarse Solids Control:</b>                             |                                            |
| Sewer Use Bylaws                                    | Stormwater Permitting                                   |                                                                          | Closed Concrete Tanks           | Catch Basin Inserts and Modifications                                   | <b>CSO Treatment Facilities (CSOTF)</b>    |
| Spills Emergency Program                            | Urban Forest Structure                                  | <b>Inter-Basin Flow Balancing/Relief:</b>                                | Storage and Conveyance Conduits | Netting                                                                 | <b>Carbon Absorption</b>                   |
|                                                     |                                                         | Inter-Basin Flow Transfer                                                |                                 | Vertical and Horizontal Screens                                         | <b>High-Gradient Magnetic Separation</b>   |
| <b>Infiltration/Inflow Control:</b>                 |                                                         | Relief Sewers                                                            | <b>Surface Storage:</b>         | Regulator Underflow Baffles                                             | <b>Constructed Wetlands</b>                |
| Sewer and Manhole Rehabilitation                    |                                                         |                                                                          | Open Concrete Tanks             | Brush Screens                                                           | <b>Increase Treatment Capacity of WWTP</b> |
| Over and Under Sewer Rehabilitation (Invert Plates) |                                                         | <b>Sewer Separation:</b>                                                 | Earthen Basins                  | Containment Booms                                                       | <b>Dilution - Extend Outfall into Lake</b> |
| Roof Leader and Footing Drain Disconnection         |                                                         | Complete and Partial Separation                                          | Dunker's Flow Balancing System  | Manual and Mechanical Screens                                           | <b>Enclose Beach</b>                       |
| Cross Connection Removal                            |                                                         |                                                                          |                                 | Continuous Deflective Separation                                        |                                            |

## LTCP Technology Screening

| CSO  | Source Control |        | Collection System |        |              |        |               |        |             |        | Storage         |        |                    |        |                 |        | Treatment   |        |
|------|----------------|--------|-------------------|--------|--------------|--------|---------------|--------|-------------|--------|-----------------|--------|--------------------|--------|-----------------|--------|-------------|--------|
|      | SMP            |        | Separation        |        | Optimization |        | Regulator Mod |        | Relief      |        | In-Line Storage |        | Subsurface Storage |        | Surface Storage |        |             |        |
|      | Alternative    | Result | Alternative       | Result | Alternative  | Result | Alternative   | Result | Alternative | Result | Alternative     | Result | Alternative        | Result | Alternative     | Result | Alternative | Result |
| 002  | SMP            | NF     | SEP               | FNA    | OPT          | FNA    | REG1          | NF     | IBT         | NF     | ILS             | NF     | SBS1               | F      | SFS             | NF     | TRT1        | NF     |
|      |                |        |                   |        |              |        | REG2          | NF     |             |        |                 |        | SBS2               | F      |                 |        | TRT2        | F      |
| 052  | SMP            | NF     | SEP1              | FNA    | OPT          | FNA    | REG1          | FNA    | IBT         | FNA    | ILS             | NF     | SBS1               | F      | SFS             | F      | TRT         | NF     |
|      |                |        | SEP2              | FNA    |              |        | REG2          | FNA    |             |        |                 |        | SBS2               | F      |                 |        |             |        |
| 053  | SMP            | NF     | SEP3              | F      | OPT          | F      |               |        |             |        | ILS             | NF     | SBS3               | NF     | SFS             | F      | TRT         | F      |
|      |                |        | SEP               | F      |              |        | REG1          | NF     | IBT         | F      |                 |        | SBS1               | NF     |                 |        |             |        |
| 054  | SMP            | NF     | SEP1              | F      | OPT          | FNA    | REG1          | F      | IBT         | F      | ILS             | NF     | SBS1               | F      | SFS             | F      | TRT         | NF     |
|      |                |        | SEP2              | F      |              |        | REG2          | F      |             |        |                 |        | SBS2               | F      |                 |        |             |        |
| 055  | SMP            | NF     | SEP1              | F      | OPT          | FNA    | REG1          | FNA    | IBT         | F      | ILS             | NF     | SBS1               | FNA    | SFS             | FNA    | TRT         | NF     |
|      |                |        | SEP2              | F      |              |        | REG2          | FNA    |             |        |                 |        | SBS2               | NF     |                 |        |             |        |
| 056A | SMP            | NF     | SEP1              | FNA    | OPT          | FNA    | REG1          | NF     | IBT         | NF     | ILS             | NF     | SBS1               | NF     | SFS             | NF     | TRT         | NF     |
|      |                |        | SEP2              | F      |              |        |               |        | SBS2        | NF     |                 |        |                    |        |                 |        |             |        |
| 056B | SMP            | NF     | SEP1              | FNA    | OPT          | FNA    | REG1          | NF     | IBT         | NF     | ILS             | NF     | SBS1               | NF     | SFS             | NF     | TRT         | NF     |
|      |                |        | SEP2              | F      |              |        |               |        | SBS2        | NF     |                 |        |                    |        |                 |        |             |        |
| 057  | SMP            | NF     | SEP1              | FNA    | OPT          | FNA    | REG1          | FNA    | IBT         | FNA    | ILS             | NF     | SBS1               | F      | SFS             | F      | TRT         | F      |
|      |                |        | SEP2              | NF     |              |        | REG2          | FNA    |             |        |                 |        | SBS2               | F      |                 |        |             |        |
| 058  | SMP            | NF     | SEP               | F      | OPT          | FNA    | REG1          | FNA    | IBT         | FNA    | ILS             | NF     | SBS1               | NF     | SFS             | NF     | TRT         | NF     |
|      |                |        |                   |        |              |        | REG2          | FNA    |             |        |                 |        | SBS2               | F      |                 |        |             |        |
| 059  | SMP            | NF     | SEP               | NF     | OPT          | NF     | REG           | NF     | IBT         | NF     | ILS             | NF     | SBS1               | NF     | SFS             | NF     | TRT         | NF     |
|      |                |        |                   |        |              |        |               |        | SBS2        | NF     |                 |        |                    |        |                 |        |             |        |

### LEGEND

SMP= Stormwater Management Practice

SEP= Sewer Separation

OPT= Sewer System Optimization

Shaded= Technology evaluated in IWWIP

Outline = Technology implemented or scheduled to be implemented

REG= Regulator Optimization

IBT= Inter-Basin Flow Transfer

ILS= In-Line Storage

SBS= Subsurface Storage

SFS= Surface Storage

TRT= Treatment

F = Identified as feasible technology



Reconsidered Control Technologies from LTCP

| Source Control                                      |                                         | Collection System                                                        | Storage                    | Treatment                                  |
|-----------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------|----------------------------|--------------------------------------------|
| <b>Best Management Practices:</b>                   | <b>Stormwater Management Practices:</b> | <b>Sewer System Optimization:</b>                                        | <b>Subsurface Storage:</b> | <b>Floc Technologies:</b>                  |
| Fertilizer and Pesticide Control                    | Upstream Stormwater Storage             | Remove Bottlenecks (Pipe Capacity and Connection Hydraulic Improvements) | Closed Concrete Tanks      | Ballasted Flocculation (ActiFlo)           |
|                                                     | Porous Pavement                         | Polymer Injection (Lining and Coating)                                   |                            |                                            |
|                                                     | Infiltration Trenches and Basins        |                                                                          |                            |                                            |
| <b>Infiltration/Inflow Control:</b>                 |                                         | <b>Regulator Optimization:</b>                                           |                            | <b>Increase Treatment Capacity of WWTP</b> |
| Sewer and Manhole Rehabilitation                    |                                         | Static Regulator Device Improvements                                     |                            |                                            |
| Over and Under Sewer Rehabilitation (Invert Plates) |                                         |                                                                          |                            |                                            |
| Roof Leader and Footing Drain Disconnection         |                                         | <b>Inter-Basin Flow Balancing/Relief:</b>                                |                            |                                            |
| Cross Connection Removal                            |                                         | Inter-Basin Flow Transfer                                                |                            |                                            |
|                                                     |                                         | <b>Sewer Separation:</b>                                                 |                            |                                            |
|                                                     |                                         | Complete and Partial Separation                                          |                            |                                            |