June 2019

# 2018 Sanitary Sewer Evaluation Survey

Prepared for the

## Village of Wilmette, Illinois

## Final Report

RJN Project No:
11-3035-02

Prepared by
**RJN Group, Inc.**
200 W. Front Street
Wheaton, Illinois 60187

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Ms. Brigitte Berger-Raish, P.E.
Director of Engineering and Public Works
Village of Wilmette
711 Laramie Avenue
Wilmette, Illinois 60091

**SUBJECT:** **VILLAGE OF WILMETTE – PRINCETON BASIN**
**2018 SANITARY SEWER EVALUATION SURVEY - DYED WATER FLOODING**
**FINAL REPORT**

Dear Ms. Brigitte Berger-Raish,

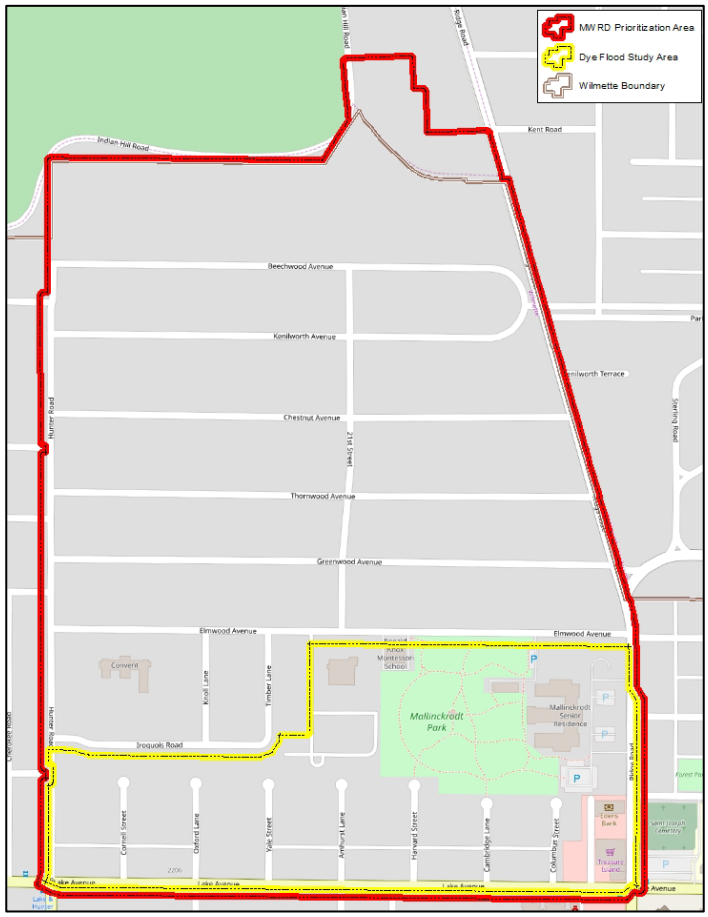
RJN Group, Inc. (RJN) is pleased to submit this summary of results and recommendations regarding the dyed water flooding completed for the Village of Wilmette (Village) High Priority Area as part of their 2018 Sanitary Sewer Evaluation Survey (SSES) program.

## PROJECT BACKGROUND

The Village is in the middle of a multi-year effort to identify and mitigate extraneous storm water that inundates the sanitary system, known as Inflow and Infiltration (I/I). As the first step of this program, flow and rainfall monitoring and analysis was completed in 2012 throughout the Village separate sanitary sewer system, followed by $25 million in capacity, storage, and I/I investigation and removal projects between 2013 and the present.

Additionally, the Village is subject to the Metropolitan Water Reclamation District of Greater Chicago (MWRD) 2015 Infiltration and Inflow Control Program (IICP) Short Term Requirements, which included the establishment of a High Priority Area (HPA) to complete a sanitary sewer condition assessment. The HPA is located within the Village Princeton Basin. Investigations and rehabilitation within most of the Village HPA has been completed in previous years.

Figure 1 – Study Area



As part of the 2018 SSES and to satisfy the MWRD IICP Short Term Requirements, RJN conducted dyed water flooding for a selected area within the HPA, bounded by Lake Ave to the south and Hunter Rd to the west. The dyed water flooding was completed as a follow-up to smoking storm structures identified during 2017 smoke testing. Figure 1 displays the Village HPA and the selected area within (study area), which had investigations completed for the 2018 SSES.

# FIELD INVESTIGATIONS

Dyed water flooding is typically performed as a follow-up to smoke testing. Smoking storm structures can be indications of cross-connections, which are storm to sanitary system water migrations that occur when two defective systems are close to each other. Dyed water flooding of the storm sewer, performed in conjunction with Closed-Circuit Television (CCTV) inspection of the adjacent sanitary sewer, is used to identify locations within the mainline sewer, service laterals, and manholes where the cross-connection is occurring. Each location where dyed water flooding is performed is referred to as a set-up.

## FIELD DATA COLLECTION

Figure 2 – Pipe Plug Set-Up

Procedures for dyed water flooding include plugging the storm sewer with a pneumatic plug at each set-up and then filling the storm sewer with water and brightly colored fluorescent dye. Plugs are used to conserve water and to isolate the specific storm sewer segment being tested. Flow depth and velocity measurements are taken in the adjacent downstream sanitary sewer manhole before flooding and then again at peak flood conditions to quantify the additional flow in the sanitary sewer coming from the cross-connection. During testing, photos of each set-up are taken, and manholes are checked frequently for the appearance of dye. A sketch of the dyed water flooding set-up is recorded for future reference.

At peak flooding conditions, a CCTV camera is inserted into the adjacent sanitary sewer and is used to televise the locations where the dyed water is observed flowing into the sanitary sewer. Any noticeable instance of dyed water infiltrating the sanitary sewer is recorded, and an estimated flow is assigned to each defect. Manholes adjacent to the flooded storm sewer are also inspected from the surface for signs of dye, typically, from wall joints and pipe seals. Results of dyed water flooding can be significant, especially if many storm structures smoked with high or medium intensity.

Figure 3 – Dyed Water Flood Set-Up

Flow measurements taken are a good indicator of the peak I/I that could be entering into the sanitary sewer collection system from the storm sewer. At each location, dyed water flooding set-ups differ due to unique sewer configurations and other site characteristics, such as soil saturation, groundwater levels, soil porosity, rate of water discharge from fire hydrant, hydrostatic forces, etc. Based on these factors and the varying levels of flooding at each site, specific

storm intensities cannot be assigned to each dyed water flood set-up. It can, however, be inferred that at each individual location, a peak rainfall event was reproduced which allowed storm water to leak out of the storm water system and enter into the sanitary sewer collection system, where it was pinpointed and quantified. The flow rates observed indicate the maximum amount of clear water which could infiltrate into the sanitary sewer during a peak storm event which would entirely flood the adjacent storm sewer system.

## DYED WATER FLOOD SET-UPS

Dyed water flooding was performed, in conjunction with Village staff, on November 19th and 20th of 2018. RJN crews were responsible for planning each set-up, installing the pneumatic plugs, and data collection. Village personnel provided water from Village fire hydrants and assisted with traffic control. The RJN subcontractor, Michels, operated the CCTV camera and truck.

Initially, nine (9) dyed water flooding set-ups were planned to encompass the fourteen (14) smoking storm structures identified in the HPA. Table 1 summarizes the completion status of the dyed water flooding set-ups. There were two (2) additional set-ups completed, due to dye being observed in the sanitary sewer segments upstream or downstream of the flooded storm sewer segment. These additional set-ups are numbered 3a and 6a.

Set-up numbers 4 and 8 were not completed. Set-up number 4 was not necessary, as in the field it was determined that the storm defect identified for the set-up was an unmapped sanitary manhole and not a storm manhole. The sanitary manhole identified had an open pick-hole cover defect. Set-up number 8 could not be completed due to a cross-bore, as displayed in Figure 4, that was located through the channel of the storm manhole with the smoke defect. The storm manhole could not be plugged.

Figure 4 – Cross-Bore in Storm Manhole

In total, nine (9) dyed water flood set-ups were completed. The overall location of each set-up is provided Exhibit 1 in Appendix A.

Table 1 – Dyed Water Flood Set-Ups

| Set-Up # | USMH | DSMH | Street Name | Status |
|---|---|---|---|---|
| 1 | 2-16 | 2-14 | Cornell Street | Completed |
| 2 | 2-22 | 2-21 | Oxford Lane | Completed |
| 3 | 2-32 | 2-30 | Yale Street | Completed |
| 3a | 2-33 | 2-32 | Iroquois Road | Additional Completed |
| 4 | 2-34 | 2-29 | Lake Avenue | No set-up necessary |
| 5 | 2-39 | 2-34 | Lake Avenue | Completed |
| 6 | 2-38 | 2-37 | Amherst Lane | Completed |
| 6a | 2-37 | 2-34 | Amherst Lane | Additional Completed |
| 7 | 2-200 | 2-199 | Harvard Lane | Completed |
| 8 | 2-202 | 2-201 | Lake Avenue | Obstruction - Could not complete |
| 9 | 2-205 | 2-204 | Cambridge Lane | Completed |

# RESULTS

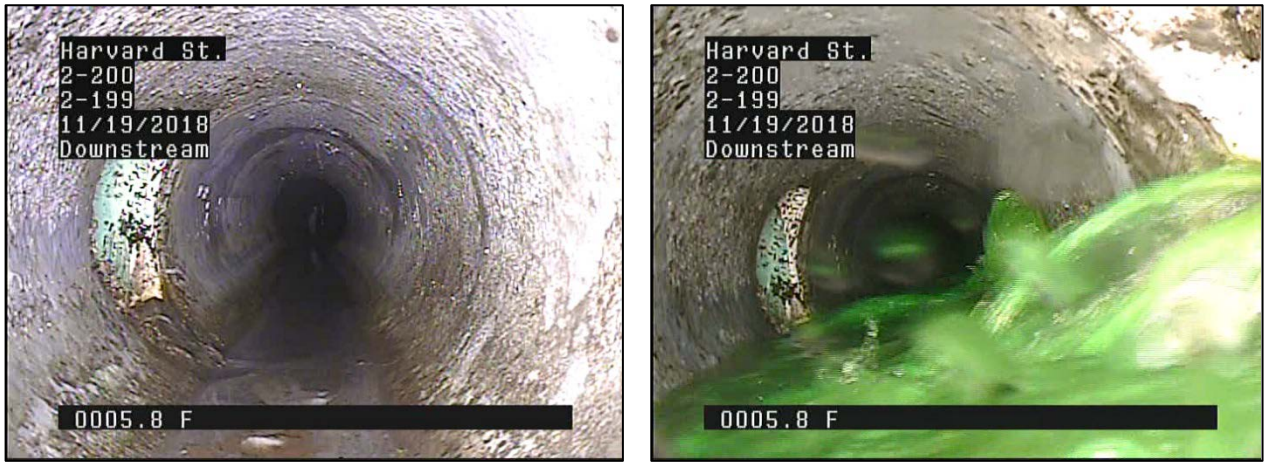
The summary of the dyed water flooding results is shown in Table 2. The table displays overall defect quantities and the estimated increase in flow for each defect type. It is important to note that dyed water flooding simulates a rain storm for which the storm sewer system is completely inundated. Therefore, the increased flow observed in the sanitary sewer is an indication of flow that would occur during an extreme rain event for which the storm sewer system is completely surcharged. The flow values cannot be directly compared to a typical 1-year, 60-minute rain event. The locations and results of the dyed water flooding set-ups are detailed in Appendix B and displayed in Exhibits 2 through 12 in Appendix A. The exhibits depict the storm sewer segment that was flooded, the sanitary sewer segment televised, and the location and description of each identified defect.

Table 2 – Summary of Dyed Water Flooding Results

| Defect Type | Defect Count | Total Flow Increase (gpm) |
|---|---|---|
| Lateral | 17 | 109.5 |
| Direct Connection | 1 | 13 |
| Lateral Connection | 3 | 2.5 |
| **Total:** | **21** | **125** |

Evidence of water leaking from the storm sewer into the sanitary sewer system was observed at eight (8) of the nine (9) set-ups completed. Defects within the sanitary sewer mainline were seen with the CCTV camera, where each defect was assigned an estimated gallon per minute (gpm) flow rate. However, during a couple dyed water flood set-ups, the quantity of inflow and infiltration entering the sanitary sewer was large enough to fill the pipe over 80%. At these locations of high flow, there were portions of the pipe segment which were not able to be fully visualized because the CCTV camera was completely under water. For these set-ups, a jetter was used to help reduce the flow just downstream of the camera, but in many instances, it was still difficult to see all defects. However, while some individual defects may not have been seen, the total increase of flow was still able to be calculated for the segment. Figure 5 displays a comparison of the sanitary sewer flow conditions prior to flooding and post-flooding for set-up number 7.

Figure 5 – Comparison of Dye Flood Flows Observed



Most of the defects found in the study area were laterals or lateral connections. In addition, all sanitary manholes appeared to be recently rehabbed or in great condition and no manhole defects were found. No mainline joint defects were identified because the sanitary sewers for eight (8) of the nine (9) set-ups were lined and in great condition. Set-up 5 included one (1) direct connection from a storm inlet on a vitrified clay (VCP) sanitary segment along Lake Avenue (shown in Figure 9).

Significant sources such as leaking laterals and leaking lateral connections identified during the televising are shown in Figure 6, Figure 7, and Figure 8. Lateral defects were identified in seven (7) set-ups. Set-ups 3 and 6 show couple of lateral connection defects that exhibited flow migration between the liner and the host pipe (interstitial flow), for set-ups 3 and 6. The total identified contribution of I/I from laterals and lateral connections is estimated at 112 gpm or 161,280 gallons per day (gpd), which is approximately 90% of the total flow identified.

Dyed water flood set-up number 6, located along Amherst Lane, identified the most leaking laterals. It was estimated that the lateral defects contribute 51.5 gpm of flow.

Figure 6 – Leaking Lateral

Figure 7 – Leaking Lateral Connection

Figure 8 – Leaking Lateral in Manhole 2-205

One (1) direct connection from a storm inlet was identified in set-up number 5, located along Lake Avenue. In the field, it was difficult to determine the storm system configuration, as the storm inlet which smoked was unmapped. The field crew concluded to directly flood the storm inlet, without plugging. From the observations, it was determined that the storm inlet discharged directly into the sanitary mainline. Televising the sanitary segment confirmed the location of dye inflow into the sanitary sewer. Figure 9 depicts the observation identified during television, and 13 gpm or 18,720 gpd of flow was observed.

Figure 9 – Direct Connection

# CONCLUSIONS AND RECOMMENDATIONS

Based on the 2017 smoke testing, the Village of Wilmette 2018 SSES included follow-up dyed water flooding within the high priority areas to further locate sources of I/I. Set-ups locations were adjusted for field conditions.

## CONCLUSIONS

Significant I/I flows were found from the nine (9) DWF set-ups estimated at 125 gpm from 21 defects including 1 direct connection along Lake Avenue. Ninety percent (90%) of the estimated flows resulted from leaking laterals and leaking lateral connections. The largest leaks from laterals, 51.5 gpm of flow, was seen in set-up number 6 along Amherst Lane.

## RECOMMENDATIONS

Recommendations for reducing sources of I/I are based on the findings of this study and the MWRD IICP requirements. Reducing non-sanitary flows in the sanitary system will reduce the severity and frequency of sewer backups. For each of the defects identified during dyed water flooding, a recommended rehabilitation technique was assigned. The recommendations for all defects in each set-up are listed in Appendix B. The following recommendations are separated by primary recommendations to satisfy the MWRD IICP Short Term Requirements and secondary recommendations that can be completed as part of the long-term plan.

### Primary recommendations

The MWRD IICP Short-Term Requirements for rehabilitation priority of High Priority Deficiencies (HPDs) fall into two categories:

- 1-Year Requirements – Direct cross-connections with the storm sewer, downspout connections, and missing/broken cleanout caps.

- 3-Year Requirements – High priority manhole and mainline defects based on NASSCO classifications.

For High Priority Deficiencies that cannot be rehabilitated and/or addressed through the 1-Year and 3-Year Short Term Requirements, the Village must prepare a Capital Improvement Plan (CIP) to detail the schedule for the long-term correction of the High Priority Deficiencies.

**1-Year Requirements**

First confirm direct connection of inlet along Lake Avenue (see Figure 9) by televising the break-in lateral. This direct connection, which falls under the MWRD IICP 1-Year Requirements, must be disconnected and sealed or replace connection location in sanitary sewer mainline. The method and cost of the removal is dependent on the depth and configuration of the structures and sewers in the area.

**3-Year Requirements**

It is recommended that the open pick hole cover on the unmapped sanitary manhole, which was identified during set-up number 4 and was not necessary, have the cover replace with a concealed cover. This will prevent further inflow from entering the sanitary system through the open pick hole. An open pick hole cover (also known as a vented cover) falls under the MWRD IICP 3-Year Requirements

### Secondary Recommendations

Full length T-liners are recommended for leaking service laterals in the mainline, or lateral liners for those located in manholes. Shorty (3-feet) T-liners are recommended for lateral connection defects which also exhibited interstitial flow. Grouting of the lateral connection to the mainline is recommended for lateral connection defects.

For set-up number 8, which was also not completed, it is recommended that the cross-bore in the storm manhole be relocated. The method and cost of the relocation is dependent on the configuration and depth of all underground infrastructure. Once the cross-bore is relocated, it is recommended that an evaluation of the adjacent sanitary sewer and laterals be completed, as the storm to sanitary cross-connection may be resolved through rehabilitation of the sanitary sewer and laterals.

The Village has had a sewer televising and lining program for many years. We recommend that this program continue with the following improvements (if not used already):

1. Add the lateral locations from the televising to the Village GIS. Use this to identify potential dead laterals that can be sealed.
2. Use end seals at the ends of each lined segment to prevent interstitial flow from entering the manholes.
3. Install shorty T-liners or grout each lateral connection to prevent interstitial flow and flow entering at the connection itself.

The service laterals within the Village of Wilmette are considered private and are the maintenance responsibility of the property owner to the connection with the Village sewer. Therefore, it would be the property owner's responsibility for rehabilitation of defective laterals.

It is our recommendation that the Village consider various financial options to accelerate lateral repairs, such as cost sharing, loans, etc. to correct the service connection defects found during dye flooding. The cost for a shorty T-liner is typically $3,000 to $4,000 each and grouting a service connection is typically $600-$700 each, and both rehabilitation types require sufficient quantity for a contractor to provide competitive pricing. Grouting of the connection can be done at the time of lining and would seal the connections from further infiltration. Shorty T-liners can be installed post-lining.

Due to the quantity of lateral defects in a relatively small area and the associated high excess flow during a rain event indicates, we recommend that the Village evaluate options to address these lateral defects. As a first step in the process, it is our recommendation that the Village select a pilot area for televising service laterals, ideally within the High Priority Area. The Village should consider including dyed water flooding of the grass surface above the lateral to provide a better indication of the lateral condition. This would provide the Village a better understanding of the extent of the lateral defect issue.

There are many options for a lateral program. The most effective programs have an annual amount spent on lateral rehabilitation that is similar to mainline lining programs. Although the direct funding source for a program can be the Village, the property owner or some combination, the ultimate funding source is still the Village residents. As in any program, the benefits of the program have to be evaluated compared to the costs. Due to the high excess flows from laterals found during this project and previous projects, it is our opinion that there is enough benefit to warrant such an evaluation.

Findings of the 2017 smoke testing had found 101 smoking storm structures at high and medium intensity which can be investigated with 65 dyed water flood set-ups. This study only covered 9 set-ups within the high priority area. It is recommended the Village plan DWF of the other areas. Given most of the leaks were from laterals, Village should consider developing a lateral investigation program, including lateral televising and installing T-liners as part of a mainline lining program.

The Village my also want to consider televising storm sewers to locate defects in the storm system.

It has been a pleasure working with the Village of Wilmette on this project. We look forward to continuing to support the Village with underground infrastructure solutions. Please contact us if you have any questions or require further clarification.

Sincerely,

RJN Group, Inc.

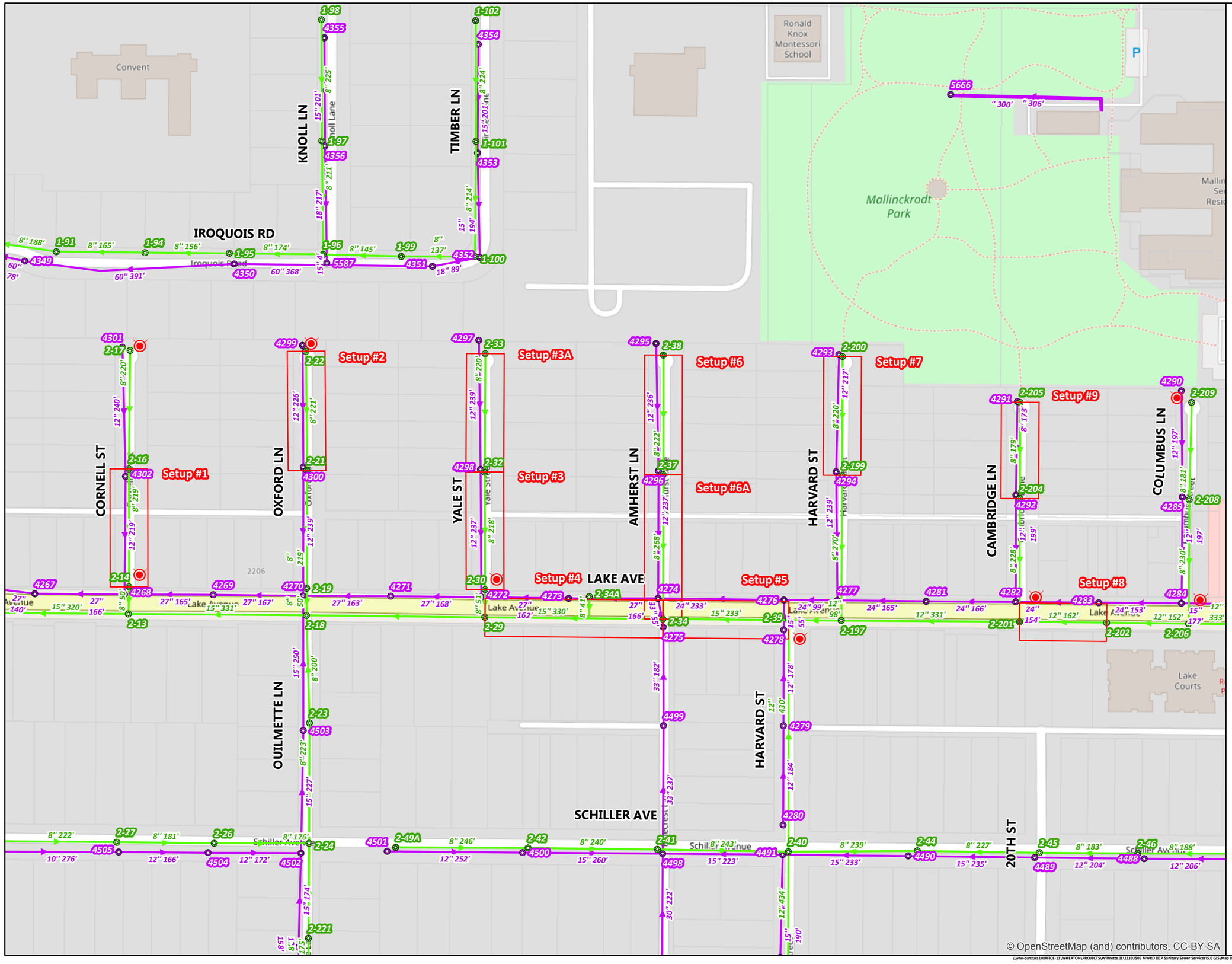
Michael N. Young

Marissa Villafuerte

Michael N. Young. P.E.
Principal

Marissa Villafuerte
Project Engineer

# APPENDIX A - EXHIBITS




## Village of Wilmette, IL
## Dyed Water Flooding
## Legend

- Dye Flood Setups
- Sanitary Manhole
- Sanitary Sewer
- Storm Manhole
- Storm Sewer

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**Village of Wilmette, IL**
**Dyed Water Observations**
**Ex 1 - Dye Flood Setups Overall**
**January 2019**

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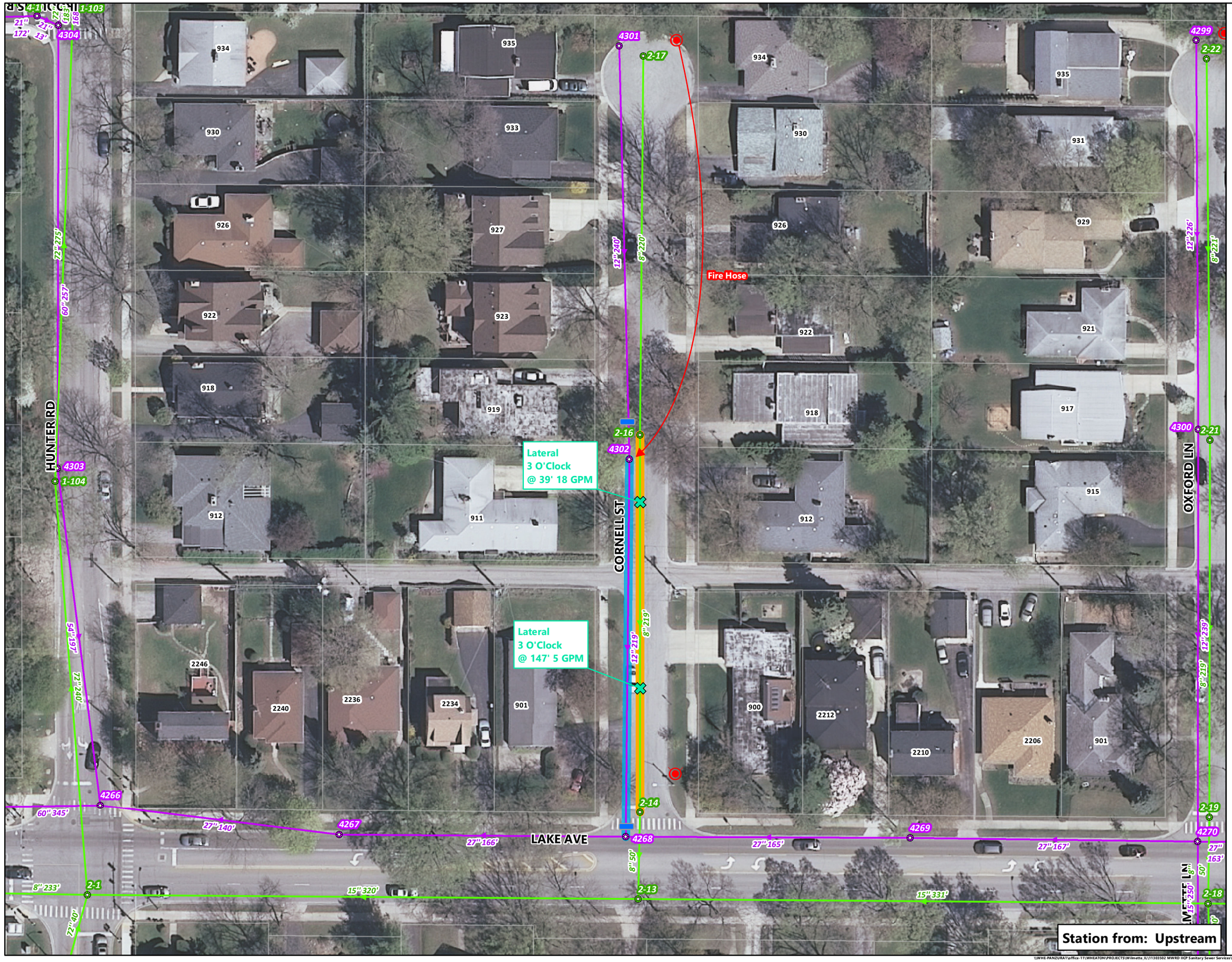


Station from: Upstream

# Village of Wilmette, IL
# Dyed Water Flooding
# Legend

**Setup 1 (23 GPM)**

N
W E
S

## Dye Flood Defects

- Direct Connection
- Lateral
- Lateral Connection

- Fire Hydrant
- Plug
- Storm Line Flooded With Dye
- Sewer Televising

- Sanitary Manhole
- Sanitary Sewer
- Storm Manhole
- Storm Sewer

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**Village of Wilmette, IL**
**Dyed Water Observations**
**Ex 2 - Setup 1: 2-16 to 2-14**
**January 2019**

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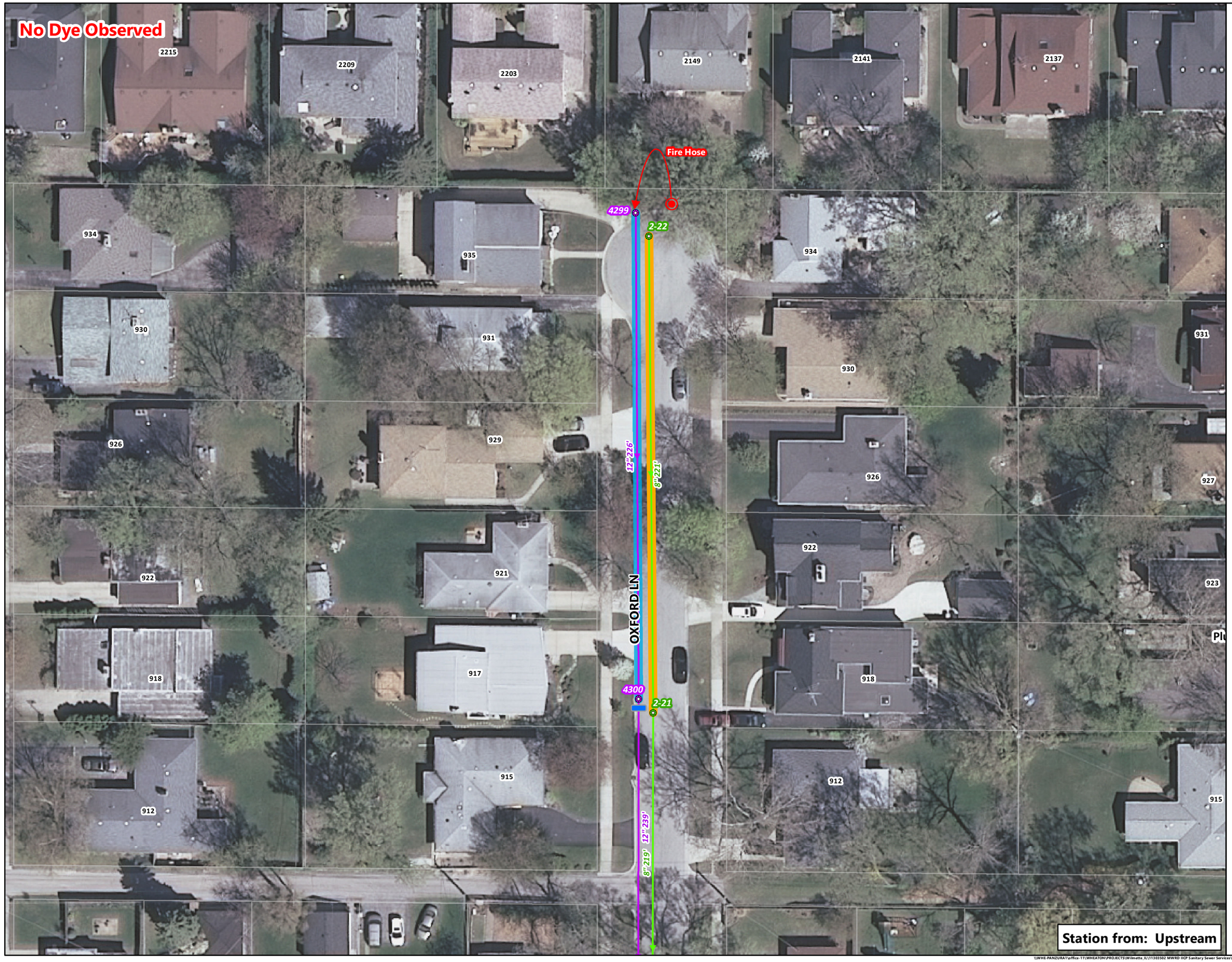


# Village of Wilmette, IL
# Dyed Water Flooding
# Legend

**Setup 2 (0 GPM)**

N
W E
S

## Dye Flood Defects

- Direct Connection
- Lateral
- Lateral Connection

- Fire Hydrant
- Plug
- Storm Line Flooded With Dye
- Sewer Televising

- Sanitary Manhole
- Sanitary Sewer
- Storm Manhole
- Storm Sewer

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**Village of Wilmette, IL**
**Dyed Water Observations**
**Ex 3 - Setup 2: 2-22 to 2-21**
**January 2019**

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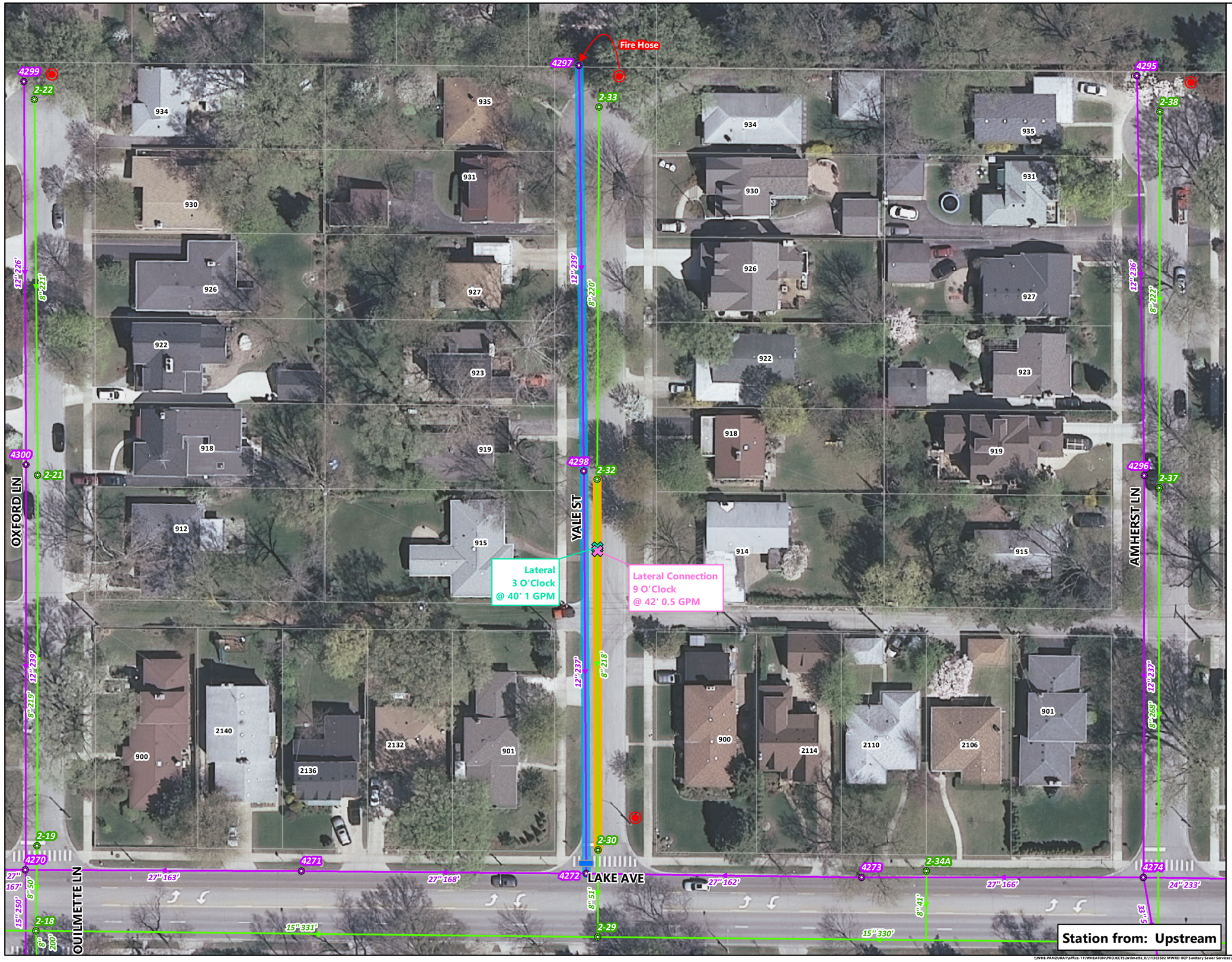


# Village of Wilmette, IL
# Dyed Water Flooding
# Legend

**Setup 3 (1.5 GPM)**

N
W E
S

## Dye Flood Defects

- Direct Connection
- Lateral
- Lateral Connection

- Fire Hydrant
- Plug
- Storm Line Flooded With Dye
- Sewer Televising

- Sanitary Manhole
- Sanitary Sewer
- Storm Manhole
- Storm Sewer

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**Village of Wilmette, IL**
**Dyed Water Observations**
**Ex 4 - Setup 3: 2-32 to 2-30**
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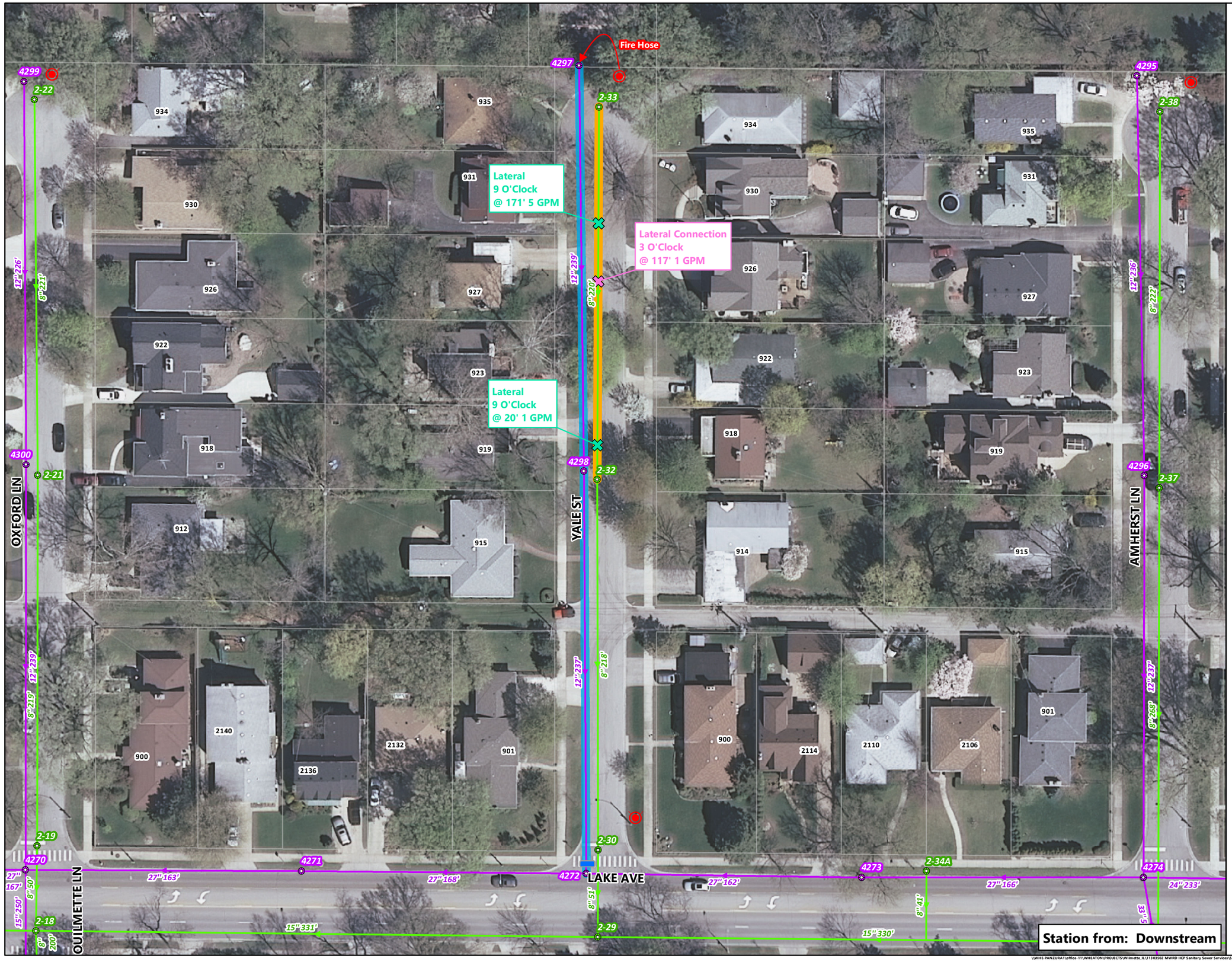


# Village of Wilmette, IL
# Dyed Water Flooding
# Legend

**Setup 3A (7 GPM)**

N
W E
S

## Dye Flood Defects

- Direct Connection
- Lateral
- Lateral Connection

- Fire Hydrant
- Plug
- Storm Line Flooded With Dye
- Sewer Televising

- Sanitary Manhole
- Sanitary Sewer
- Storm Manhole
- Storm Sewer

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**Village of Wilmette, IL**
**Dyed Water Observations**
**Ex 5 - Setup 3A: 2-33 to 2-32**
**January 2019**

**Station from: Downstream**

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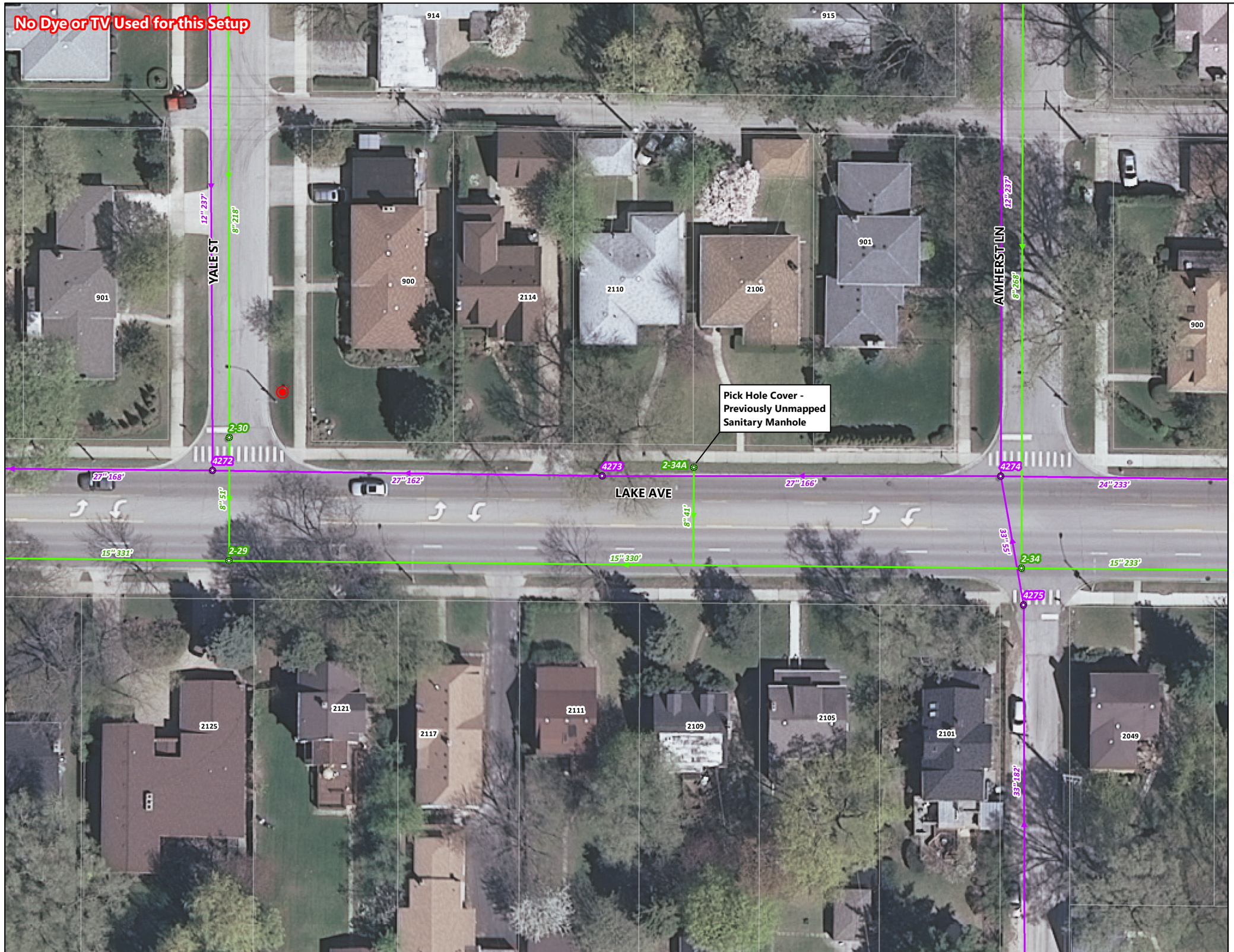


# Village of Wilmette, IL
# Dyed Water Flooding Legend

**Setup 4 (0 GPM)**

N
W E
S

## Dye Flood Defects

- Direct Connection
- Lateral
- Lateral Connection

- Fire Hydrant
- Plug
- Storm Line Flooded With Dye
- Sewer Televising

- Sanitary Manhole
- Sanitary Sewer
- Storm Manhole
- Storm Sewer

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**Village of Wilmette, IL**
**Dyed Water Observations**
**Ex 6 - Setup 4: 2-34 to 2-29**
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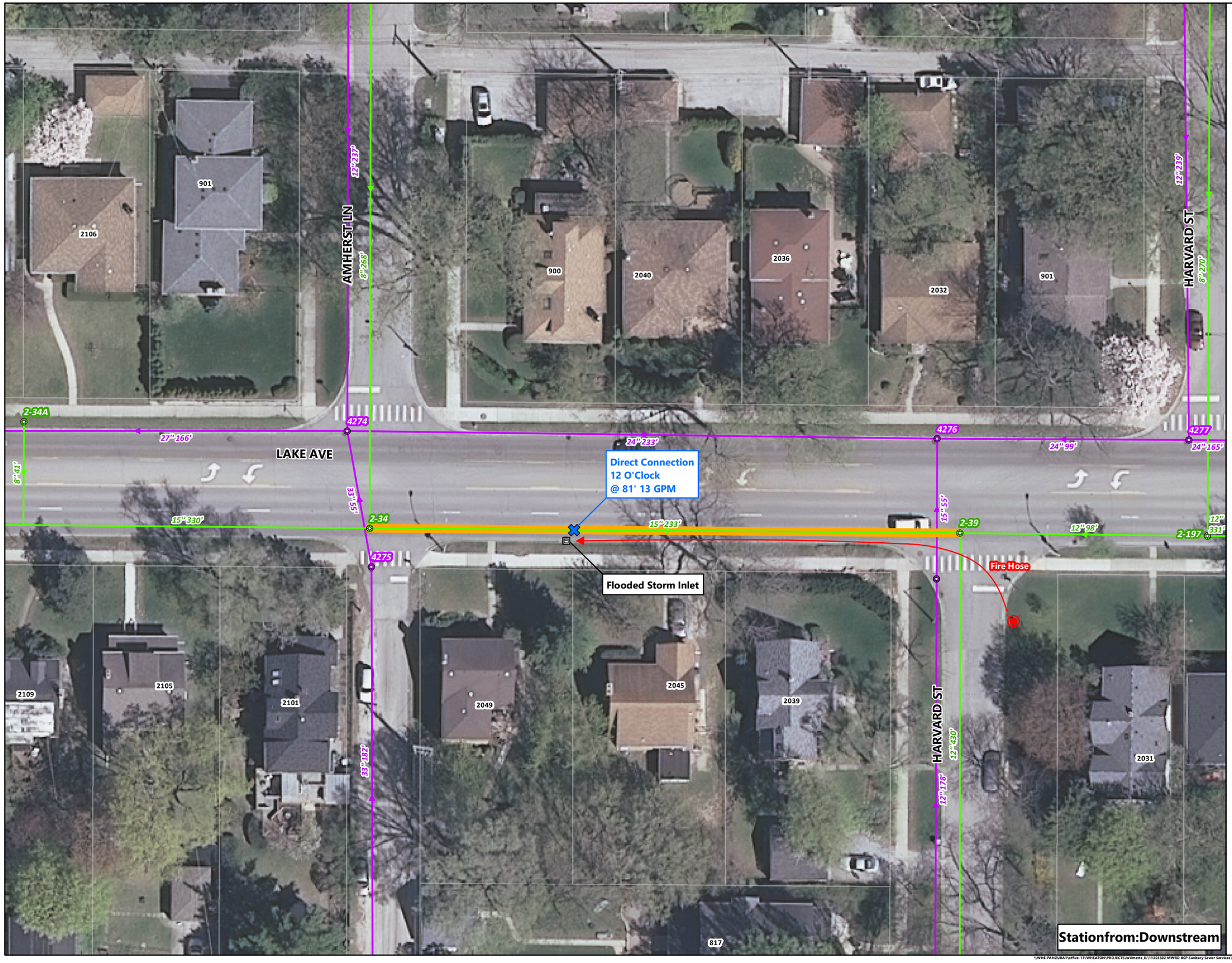


# Village of Wilmette, IL
# Dyed Water Flooding
# Legend

**Setup 5 (13 GPM)**

N
W E
S

**Note: Only storm inlet was flooded to confirm direct-connection. Full storm line flooding was not necessary.**

## Dye Flood Defects

- Direct Connection
- Lateral
- Lateral Connection

- Fire Hydrant
- Plug
- Storm Line Flooded With Dye
- Sewer Televising

- Sanitary Manhole
- Sanitary Sewer
- Storm Manhole
- Storm Sewer

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**Village of Wilmette, IL**
**Dyed Water Observations**
**Ex 7 - Setup 5: 2-39 to 2-34**
**January 2019**

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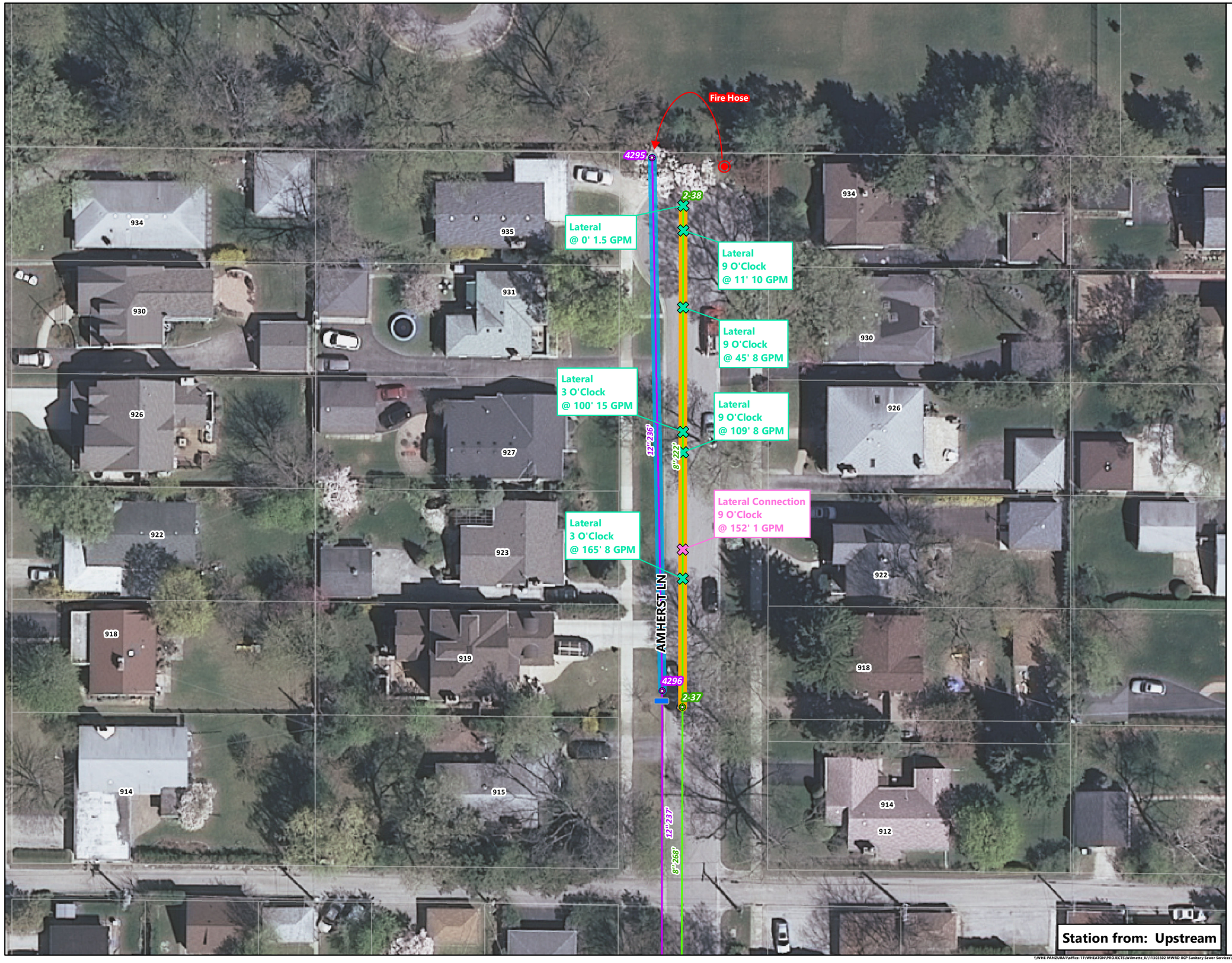


# Village of Wilmette, IL
# Dyed Water Flooding
# Legend

**Setup 6 (51.5 GPM)**

N
W E
S

## Dye Flood Defects

- Direct Connection
- Lateral
- Lateral Connection

- Fire Hydrant
- Plug
- Storm Line Flooded With Dye
- Sewer Televising

- Sanitary Manhole
- Sanitary Sewer
- Storm Manhole
- Storm Sewer

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**Village of Wilmette, IL**
**Dyed Water Observations**
**Ex 8 - Setup 6: 2-38 to 2-37**
**January 2019**

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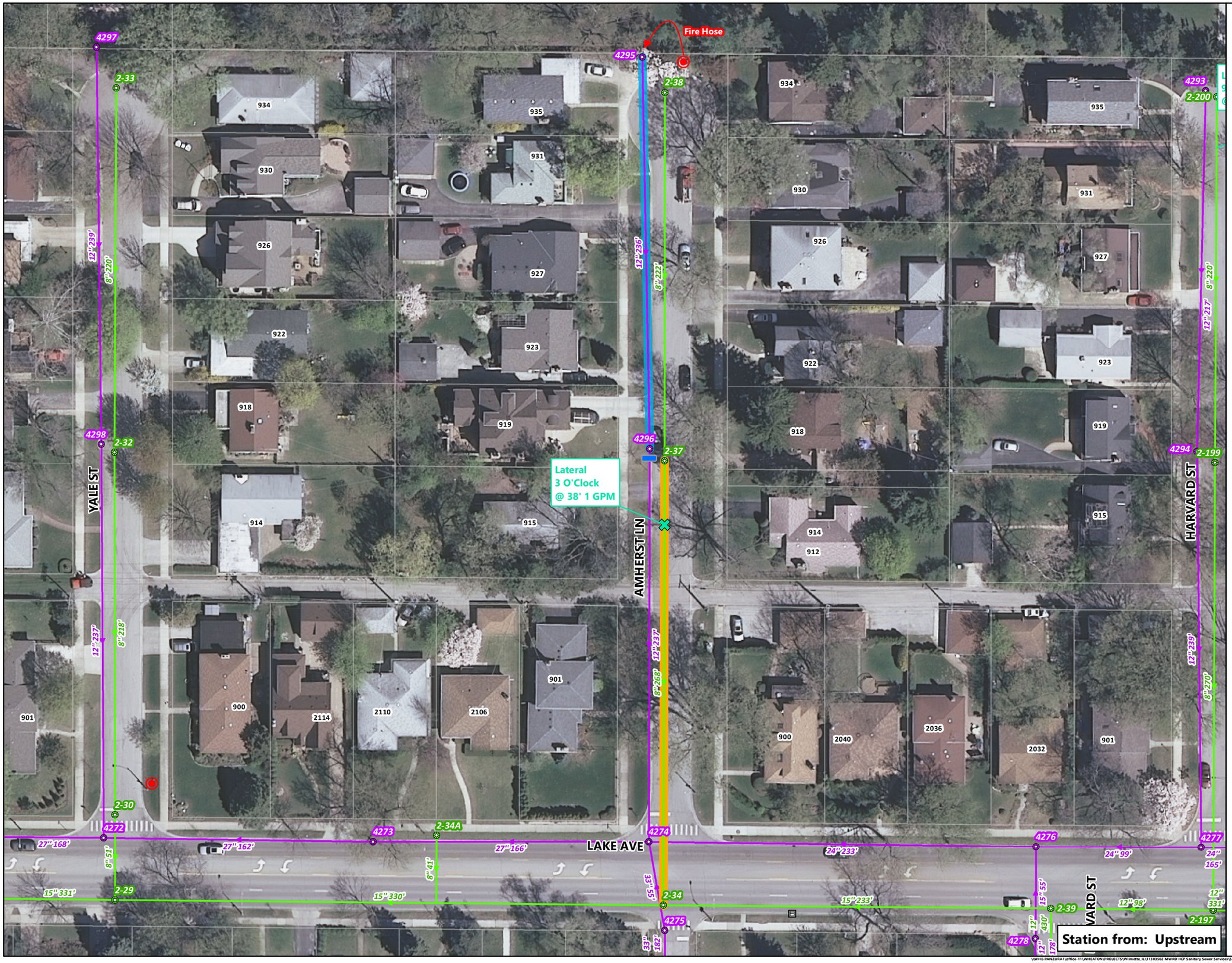


# Village of Wilmette, IL
# Dyed Water Flooding
# Legend

**Setup 6A (1 GPM)**

N
W E
S

## Dye Flood Defects

- Direct Connection
- Lateral
- Lateral Connection

- Fire Hydrant
- Plug
- Storm Line Flooded With Dye
- Sewer Televising

- Sanitary Manhole
- Sanitary Sewer
- Storm Manhole
- Storm Sewer

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**Village of Wilmette, IL**
**Dyed Water Observations**
**Ex 9 - Setup 6A: 2-37 to 2-34**
**January 2019**

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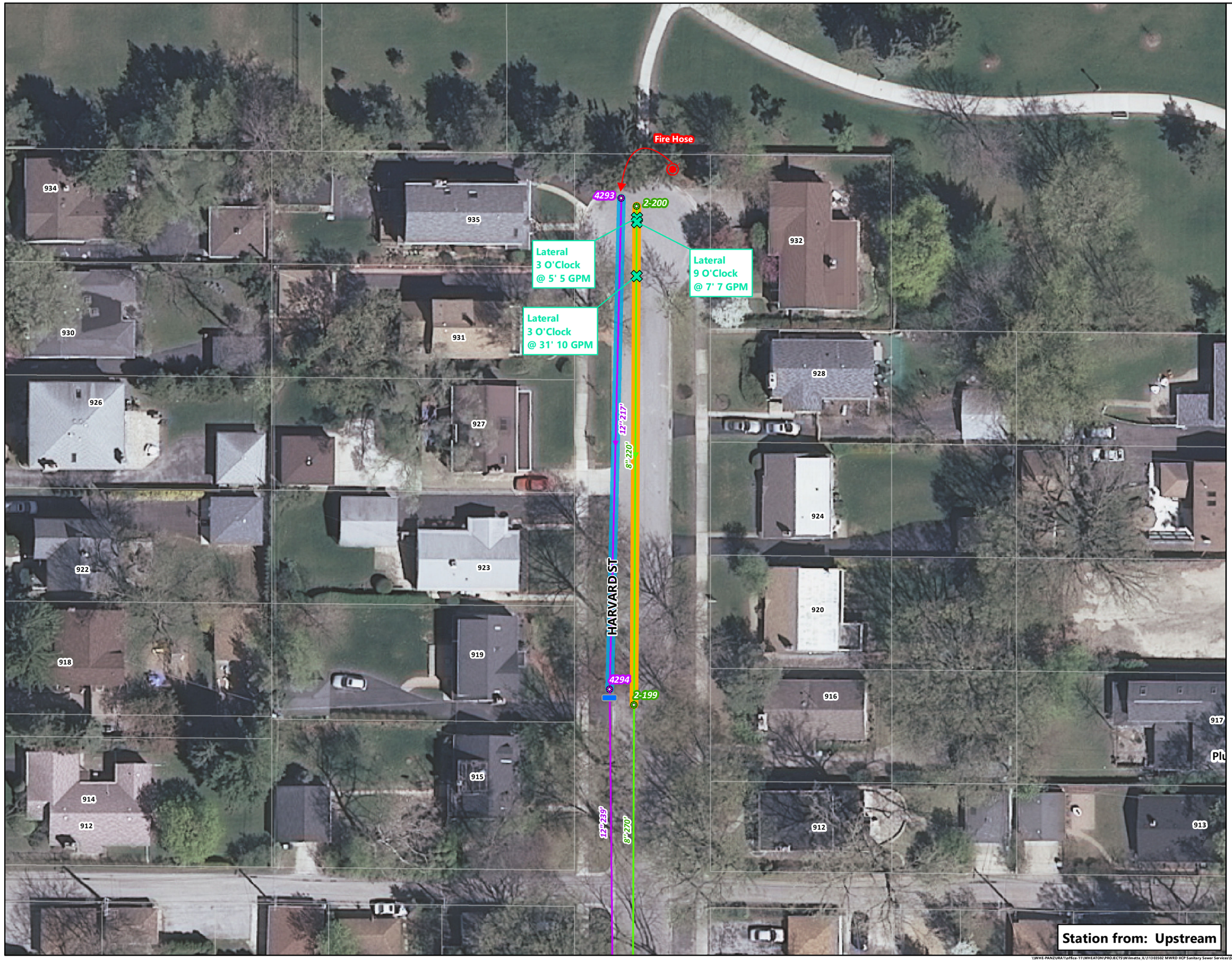


# Village of Wilmette, IL
# Dyed Water Flooding
# Legend

**Setup 7 (22 GPM)**

N
W E
S

## Dye Flood Defects

- Direct Connection
- Lateral
- Lateral Connection

- Fire Hydrant
- Plug
- Storm Line Flooded With Dye
- Sewer Televising

- Sanitary Manhole
- Sanitary Sewer
- Storm Manhole
- Storm Sewer

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**Village of Wilmette, IL**
**Dyed Water Observations**
**Ex 10 - Setup 7: 2-200 to 2-199**
**January 2019**

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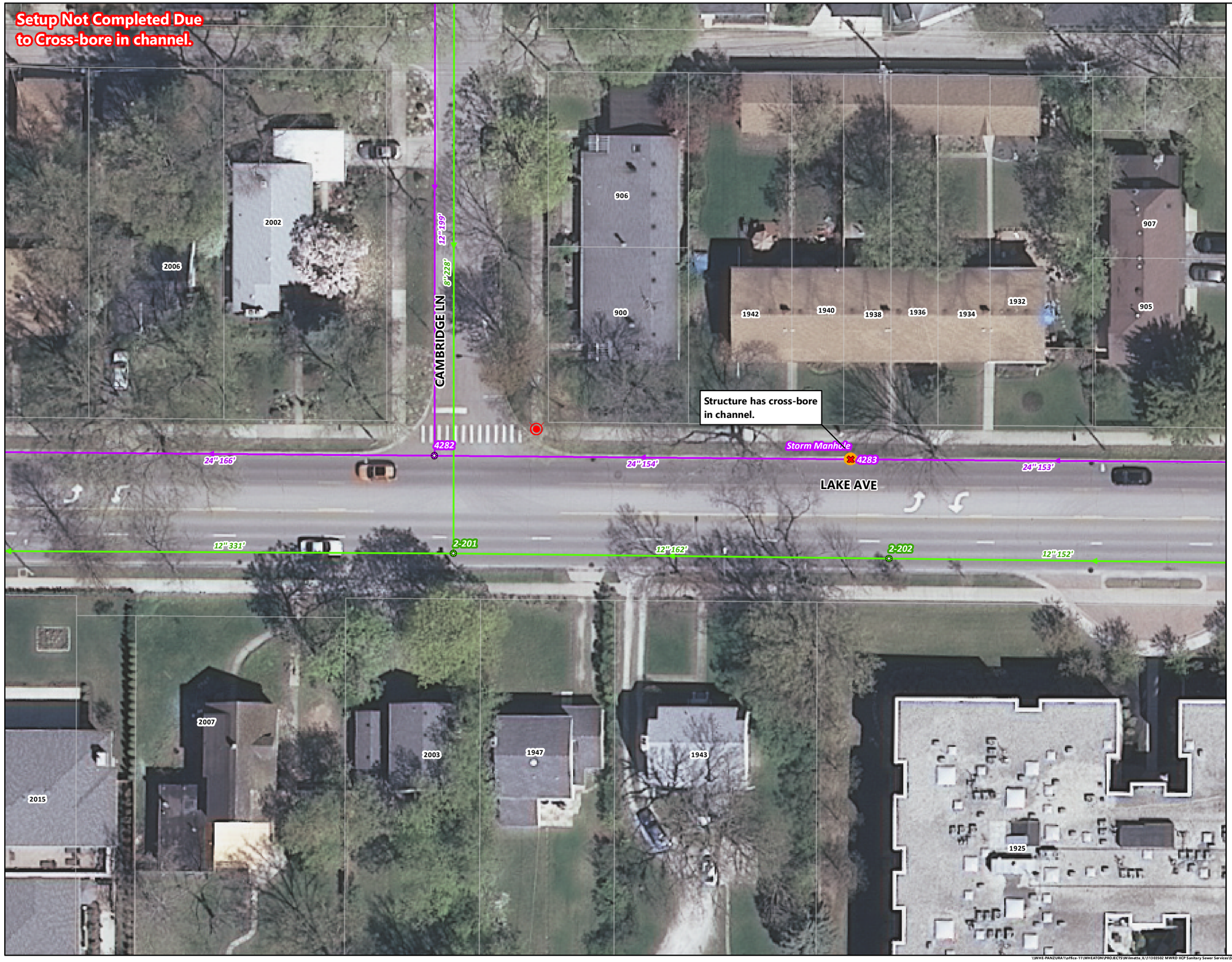


# Village of Wilmette, IL
# Dyed Water Flooding
# Legend

**Setup 8 (0 GPM)**

N
W E
S

## Dye Flood Defects

- Direct Connection
- Lateral
- Lateral Connection

- Fire Hydrant
- Plug
- Storm Line Flooded With Dye
- Sewer Televising

- Sanitary Manhole
- Sanitary Sewer
- Storm Manhole
- Storm Sewer

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**Village of Wilmette, IL**
**Dyed Water Observations**
**Ex 11 - Setup 8: 2-202 to 2-201**
**January 2019**

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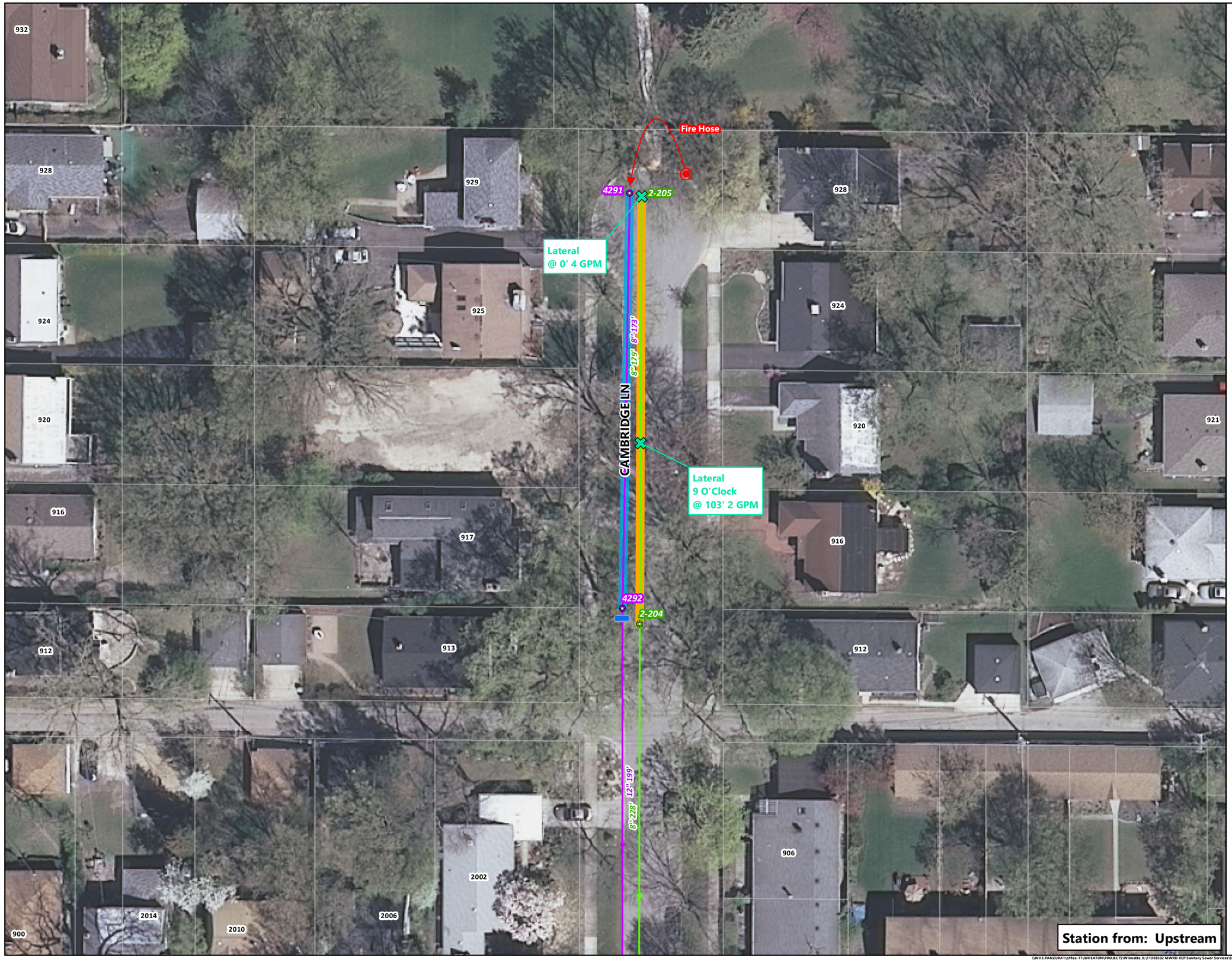


# Village of Wilmette, IL
# Dyed Water Flooding
# Legend

**Setup 9 (6 GPM)**

N
W E
S

## Dye Flood Defects

- Direct Connection
- Lateral
- Lateral Connection

- Fire Hydrant
- Plug
- Storm Line Flooded With Dye
- Sewer Televising

- Sanitary Manhole
- Sanitary Sewer
- Storm Manhole
- Storm Sewer

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**Station from: Upstream**

**Village of Wilmette, IL**
**Dyed Water Observations**
**Ex 12 - Setup 9: 2-205 to 2-204**
**January 2019**

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# APPENDIX B - RESULTS AND RECOMMENDATIONS

**VILLAGE OF WILMETTE**

**DYED WATER FLOODING DEFECTS & REHABILITATION RECOMMENDATIONS**

| Set-Up No. | Upstream Manhole | Downstream Manhole | Street Name | Sanitary Diameter (in) | Sanitary Material | Sanitary Length (ft) | Segment Flow Increase (gpm) | Segment Flow Increase (gpd) | Station (ft) | Station From | Clock Position | Defect Type | Estimated Flow at Defect (gpm) | Estimated Flow at Defect (gpd) | Recommendation | Estimated Cost | MWRD High Priority Deficiency | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2-16 | 2-14 | Cornell Street | 8 | CIPP | 217 | 23 | 33,120 | 39 | Upstream | 3 | Lateral | 18 | 25,920 | T-Liner | $ 8,000 | - | |
| | | | | | | | | | 147 | Upstream | 3 | Lateral | 5 | 7,200 | T-Liner | $ 8,000 | - | |
| 2 | 2-22 | 2-21 | Oxford Lane | 8 | CIPP | 220 | 0 | 0 | No defects observed | | | | | | - | - | - | |
| 3 | 2-32 | 2-30 | Yale Street | 8 | CIPP | 216 | 1.5 | 2,160 | 40 | Upstream | 3 | Lateral | 1 | 1,440 | T-Liner | $ 8,000 | - | |
| | | | | | | | | | 42 | Upstream | 9 | Lateral Connection | 0.5 | 720 | Shorty T-Liner (3 ft) | $ 3,500 | - | Interstitial flow |
| 3a | 2-33 | 2-32 | Iroquois Road | 8 | CIPP | 219 | 7 | 10,080 | 20 | Downstream | 9 | Lateral | 1 | 1,440 | T-Liner | $ 8,000 | - | This set-up was completed supplemental to set-up 3. |
| | | | | | | | | | 117 | Downstream | 3 | Lateral Connection | 1 | 1,440 | Grout Connection | $ 800 | - | |
| | | | | | | | | | 171 | Downstream | 9 | Lateral | 5 | 7,200 | T-Liner | $ 8,000 | - | |
| 4 | 2-34 | 2-29 | Lake Avenue | No Set-Up Completed. This is a previously unmapped sanitary manhole that T's into the sanitary mainline. Not set-up was necessary. Update the sanitary layer to include this manhole. Replace open pick hole cover with a concealed cover. | | | | | | | | | | | Replace Cover, New MH | $ 400 | Vented Cover | |
| 5 | 2-39 | 2-34 | Lake Avenue | 12 | VCP | 233 | 13 | 18,720 | 81 | Downstream | 12 | Direct Connection | 13 | 18,720 | Plug/Remove Lateral Re-Route Storm Inlet | - | Direct Cross-Connection | This is a 12 o'clock that lateral may be connected directly to the storm inlet/catch basin. Cost of plugging and re-routing inlet dependent on depth and configuration of sewers. |
| 6 | 2-38 | 2-37 | Amherst Lane | 8 | CIPP | 221 | 51.5 | 74,160 | 0 | Upstream | 9 | Lateral | 1.5 | 2,160 | Lateral Liner | $ 7,000 | - | |
| | | | | | | | | | 11 | Upstream | 9 | Lateral | 10 | 14,400 | T-Liner | $ 8,000 | - | |
| | | | | | | | | | 45 | Upstream | 9 | Lateral | 8 | 11,520 | T-Liner | $ 8,000 | - | |
| | | | | | | | | | 100 | Upstream | 3 | Lateral | 15 | 21,600 | T-Liner | $ 8,000 | - | |
| | | | | | | | | | 109 | Upstream | 9 | Lateral | 8 | 11,520 | T-Liner | $ 8,000 | - | |
| | | | | | | | | | 152 | Upstream | 9 | Lateral Connection | 1 | 1,440 | Shorty T-Liner (3 ft) | $ 3,500 | - | Interstitial flow |
| | | | | | | | | | 165 | Upstream | 3 | Lateral | 8 | 11,520 | T-Liner | $ 8,000 | - | |
| 6a | 2-37 | 2-34 | Amherst Lane | 8 | CIPP | 268 | 1 | 1,440 | 38 | Upstream | 3 | Lateral | 1 | 1,440 | T-Liner | $ 8,000 | - | This set-up was completed suplemental to set-up 6. |
| 7 | 2-200 | 2-199 | Harvard Lane | 8 | CIPP | 220 | 22 | 31,680 | 5 | Upstream | 3 | Lateral | 5 | 7,200 | T-Liner | $ 8,000 | - | |
| | | | | | | | | | 7 | Upstream | 9 | Lateral | 7 | 10,080 | T-Liner | $ 8,000 | - | |
| | | | | | | | | | 31 | Upstream | 3 | Lateral | 10 | 14,400 | T-Liner | $ 8,000 | - | |
| 8 | 2-202 | 2-201 | Lake Avenue | No Set-Up Completed. The storm manhole could not be plugged due to a cross-bore running through the channel. The cross-bore should be relocated prior to completing this dyed water flood set-up. | | | | | | | | | | | Re-Route Cross-Bore | - | - | Cost of cross-bore relocation is dependent on many factors (i.e. depth, configuration of infrastructure) |
| 9 | 2-205 | 2-204 | Cambridge Lane | 8 | CIPP | 179 | 6 | 8,640 | 0 | Upstream | 10 | Lateral | 4 | 5,760 | Lateral Liner | $ 7,000 | - | Dye from NE lateral in upstream manhole |
| | | | | | | | | | 103 | Upstream | 9 | Lateral | 2 | 2,880 | T-Liner | $ 8,000 | - | |
| | | | | | | **Total:** | **125** | **180,000** | | | | | | | | **$ 142,200** | | |

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200 W. Front Street

Wheaton, Illinois  60187