March 29, 2016

Mr. John J. Ingram
Infrastructure Maintenance Director
Village of Orland Park
15655 Ravinia Avenue
Orland Park, Illinois 60462

SUBJECT: PROPOSAL FOR PROFESSIONAL ENGINEERING SERVICES FOR FLOW MONITORING AS A PART OF THE COMPREHENSIVE SANITARY SEWER EVALUATION PROJECT FOR THE VILLAGE OF ORLAND PARK

Dear Mr. Ingram:

RJN Group, Inc. (RJN) is pleased to submit this proposal to the Village of Orland Park (Village) for a sanitary sewer flow monitoring Village's sanitary sewer system.

RJN was recently selected by the Village for the Comprehensive Sanitary Sewer Evaluation Project to, "Provide assistance in developing and implementing a Village-wide comprehensive sanitary sewer system and evaluation & repair program." This proposal is for engineering services pertaining to the Village's Sanitary Sewer Inflow and Infiltration (I/I) Capital Improvement Program (CIP).

RJN, founded and headquartered in Wheaton, Illinois has completed numerous flow and rainfall monitoring and analysis projects of various sizes throughout the country, including dozens of projects within the greater Chicagoland area. We own and maintain an inventory of over 450 flow meters, have a data group dedicated data analysts, and provide all of the field and office services required to complete flow monitoring work in-house.

PROJECT UNDERSTANDING

Following a number of meetings and discussions with Village staff, it has been determined that a Village-wide flow monitoring program will be beneficial to help guide the City's Sanitary Sewer I/I CIP. Following clean-up and a detailed review of the City's sanitary sewer GIS atlas, we have recommended 13 locations for flow monitoring along with four lift stations. These locations are shown on the attached map.

Flow monitoring is a valuable tool that can be used to study a variety of problem areas and to gather data for a number of reasons. Because of this, the Village has decided that it is in their best interests to begin purchasing meters to build a Village fleet of meters. This proposal will include an allowance for the assistance with and purchase of three flow meters for the Village. These three flow meters, along with ten rental meters (from RJN) will be used in this project.

Flow monitoring in the Village is important for three reasons. The primary purpose for the flow monitoring project is to provide the Village with a comprehensive and comparative assessment of the vast majority of the sewers within the Village. Using the data from the 13 meter sites and four lift stations, over 80% of the sewers within the Village are included in the assessment. This data will help drive future long term operations and maintenance programs for the Village by comparing each basin against the other and identifying areas with the highest inflow and infiltration as well as understanding their effects upon each other and the effects of downstream sewers, including MWRD interceptors on Village sewers.

Secondly, the 151st Street lift station (LS 4 on map) along with meters 6 and 7 are important as they will provide a baseline flow assessment of the Village's sewer system in the Short-Term Priority Area identified and submitted to the Metropolitan Water Reclamation District of Greater Chicago (MWRD) for the new Inflow and Infiltration Control Program (IICP). Having baseline data for this area will be beneficial so that future inspections required under the MWRD IICP can be quantitatively analyzed for flow reduction, and flow reduction efforts can be quantified following sewer rehabilitation activities in the area.

Finally, flow metering at meter locations 9, 10, 12, and 13, as shown on the attached map, are of particular importance as they are all related to potential growth areas within the Village. Data from these meters will be useful in determining capacity of sewers at MWRD connection points and could be used in the future to calibrate a hydraulic model out to growth areas to determine future capacity.

RJN will be responsible for completing all flow metering and data analysis for the project. Key components of the project are:

- Assist with the selection and purchasing of three flow meters for the Village.
- Begin metering as soon as practical. Leave rental meters in for three months. Leave Village-owned meters in for one year.
- Analyze meter data develop a summary report and action items for follow-up inspections, studies, and rehabilitation.

PROJECT APPROACH

Following a review of the Village's sanitary sewer GIS atlas, we have determined that 13 flow meters will be required to properly subdivide the study area in to appropriately sized basins. A map showing the recommended flow meter locations and basin boundaries is attached.

When selecting the flow meter basins, a number of factors are taken into consideration, including:

- Basin size – consistency between basins and an average sewer length of 40,000 to 80,000 (when practical) is best for a macro-scale metering project such as this;
- Discrete basins whenever possible – the more basins selected that do not have basins upstream of them, the better; and
- Consistency within basin – keeping residential, commercial, and industrial as separate as possible is ideal.

The proposed metering sites generally meet these standards and provide a good division of flow for a representative sample and comparison for the Village.

Meter Purchase

RJN has working relationships with all three of the major flow meter manufacturers in the industry, including ADS, Hach, and Isco. We will meet with the Village to discuss the technology options available from the individual manufacturers and assist with the selection of meters. Following selection, RJN will procure the meters on behalf of the Village and prepare them for installation.

Installation and Calibration

The RJN rental meters are proposed to be installed for three months. It is expected that Meter 7 will be a Village-owned meter and will remain in place for one year. The two other City-owned meters will be either left in-place at to-be-determined locations or moved to a new location for the remaining nine months, for a total of one-year of installation.

RJN field technicians will make an initial site evaluation visit to the targeted meter locations. Meter site investigations are necessary to evaluate hydraulic flow characteristics and sensor application to ensure that conditions are suitable for measuring flow rates accurately. The field crew will also review each site for access, traffic control, and overall site safety considerations. Site investigation results can then be used to determine the optimal location and appropriate flow metering technology for each meter site.

RJN field crews will also visit the Village's six rain gauge locations to perform site inspections and tipping tests.

Site investigation reports containing the site information and digital photographs will be prepared for Village's approval prior to the installation of the metering equipment.

RJN's field crews are certified in confined space entry procedures and will complete confined space entry reports before each site visit through the duration of the project.

At the time of installation, manual depth and velocity readings are taken by the field technicians to confirm that the meter is reading accurately and to the manufacturer's operating standards. In addition to the initial calibration, RJN will return within two weeks of installation and at least once more during the flow-monitoring period to obtain a sufficient number of manual level and velocity readings for calibrations and for comparison to the meter collected data. A final set of measurements for calibration will be taken prior to meter removal.

Data Maintenance & Handling

RJN will maintain the data link required for remotely uploading the data from the installed meters. Experienced data analysts will collect, consolidate, process, and perform a cursory review for data continuity and quality throughout the project. Data will be corrected and adjusted according to calibrations and flow balances among connecting sites. The data will be made available online to the Village for viewing.

RJN will utilize a host software support application program for remote wireless flow meter data collection. On a daily basis, all data recorded and stored in the meter will be collected by the host system. RJN will install, operate, and maintain the telemetry for this system. RJN Group will use a system employing client/server architecture to store all project flow data. On a daily basis, flow meter measurements, battery voltages, and other data entities will be forwarded to the server and immediately posted to the website for viewing by authorized parties.

The web module software will allow any networked computer (with appropriate authentication) access to the data stored using a common web browser (i.e. Microsoft Internet Explorer). The web module will enable the user to view the data and download the data in Microsoft Excel format. Web module users will not have access to modify the database or any operational system configurations.

Lift Station Data

RJN will work with the Village to obtain the time-synchronized lift station data from the four lift stations identified. Two of these lift stations (131st Street and 151st Street) have magmeters on the force main discharges, and this data will be used. The other two lift stations do not have magmeters, so RJN will work with the Village to get capacity analysis of the lift stations and runtime logs to use for the analysis. Experienced data analysts will process and perform a cursory review for data continuity and quality. Data will be corrected and adjusted according as appropriate. The analysis of the data includes the identification of data gaps and hydraulic anomalies. The data will be processed and edited to produce final data sets for each site. The data will be evaluated and finalized for use in developing the I/I analyses.

Data Analysis

RJN will review the flow monitoring data at least twice a week during the "settling in" period and then once per week thereafter, and rainfall data after receipt. During the "settling in" period, crews will obtain necessary calibrations and make efforts to prevent sensor failure, minimize equipment maintenance issues, avoid excessive siltation, and configure the monitoring equipment to capture hydraulic variations or anomalies. The analysis of the data includes the identification of data gaps, hydraulic anomalies, and overall meter performance.

Any equipment service needs will be conveyed to RJN field service crews from our data analysis team. The data will be processed and edited in accordance with field confirmations to produce final data sets for each site. The final data will be posted when completed.

After the flow-monitoring period is complete, the data will be evaluated and used in developing an I/I analysis for the Village. In addition to addressing the results of the flow monitoring, the report will also include recommendations for reducing excess flows. The recommended study plan will help to identify areas of high I/I and provide guidance on determining future long term planning O&M programs for the MWRD IICP.

Recommendations on scheduling and budgeting further studies, including smoke testing, manhole inspections, dyed water flooding, and televising inspection will be included. Relative capacities of meters on lines with growth potential will be provided for use by the Village Development Services Department.

PROPOSED SCOPE OF SERVICES

Our proposed scope of services is outlined as follows:

1. Meet with the Village to discuss meter technologies and purchase options. Based on Village decision, procure three flow meters for the Village with expedited delivery.

2. Provide the rental of ten flow meter units with dual depth and velocity sensors for the duration of the project.

3. Visit the Village's six rain gauges and perform site inspections and tipping tests. Coordinate with Village for periodic data delivery from the rain gauges.

4. Investigate targeted sites for flow meter installation. Determine the meter sites that are hydraulically suitable for flow monitoring. Prepare Site Investigation Reports for approval by Village.

5. Prepare flow meters for installation. Install the 13 flow meters at approved locations.

6. During installation, calibrate each flow meter by taking manual depth and velocity measurements and comparing with meter readings.

7. Provide standard traffic control measures (portable signs and cones) at each site in or near a roadway. If a higher level of traffic control is required, RJN crews will contact Village staff and request traffic control assistance.

8. Prepare the host system for handling the flow data and posting the data for viewing and access by Village staff. Review the data at least twice per week during the "settling in" period, once per week thereafter, and report any equipment service needs to the field crews.

9. Take calibration measurements on meters a second time within two weeks of installation. Utilize the calibrations to adjust the data and prepare final data sets.

10. Provide flow meter maintenance as necessary to keep equipment in proper operation for the duration of the monitoring period. Calibrate each meter at least one additional time within the flow monitoring period.

11. Procure spare parts and replacement equipment, such as batteries and desiccants, as needed to keep flow meters working and within operating standards.

12. Perform final calibration measurements at each site and remove the flow meters.

13. Compile lift station data provided by the Village. Process the provided raw data and perform a cursory review for data continuity and quality. Correct and adjust the data as appropriate.

14. Process the collected raw data. Analyze the processed data for wet- and dry-weather flow patterns. Create hydrographs for each meter and determine wet-weather peaking factors at standard storm recurrence and durations for each basin.

15. Perform an inflow and infiltration analysis, including:
    a. Inflow peaking factors;
    b. Regression analysis for peaking factor prediction;
    c. Scattergraphs and hydrographs; and
    d. Capacity analysis including downstream control and surcharging assessment.

16. Provide the following information for the summary report:
    a. Details on each flow meter and rain gauge location;
    b. Summary of the flow and rainfall data collected;
    c. Conclusions from the flow metering, including evidence of downstream control, hydraulic bottlenecks, and levels of infiltration and inflow (I/I);
    d. Adequacy of the existing system to handle existing flows; and
    e. Recommendations for the MWRD IICP high-priority area and other high priority areas as part of long term O&M program.

17. Consolidate information and prepare and submit three copies of a draft report to Village outlining results and recommendations.

18. Incorporate Village's comments and submit up to three copies of the final report to Village. Provide a pdf of the final report and a flash drive containing all digital documents and processed flow-monitoring data.

19. Provide project management services for the duration of the project. Attend up to two meetings with Village staff.

ITEMS REQUESTED FROM VILLAGE

We request the following items from Village:

1. Access to the Village's six rain gauges for inspection and tipping tests, and periodic data deliveries from Village for each rain gauge, at 15-minute interval data, at a minimum. Village will remain responsible for rain gauge maintenance and data collection.

2. Assistance with traffic control where needed in high traffic locations.

3. Water consumption data from major users within the service area, as available. This may include prior year data and/or actual usage data during the flow monitoring period.

SCHEDULE

Flow meters are typically installed in April. It is our goal to have all meters installed within four weeks of project approval.

The key schedule parameters for this project are as follows:

- Meet with Village to discuss flow meter purchase options; order meters within one week of a notice to proceed.
- The site investigations will begin within two weeks of a notice to proceed.
- Flow meters will be installed within two weeks of site investigations, based on purchased meter delivery.
- The flow monitoring period will begin after the last meter is successfully installed.
- The draft report will be submitted to Village within three months of the end of the short-term flow-monitoring period.
- The final report will be submitted within two weeks of receipt of Village comments on the draft report.

PROPOSED FEE

This scope of services will be invoiced on a unit price basis per the following fee schedule.

Task #	Task	Quantity	Unit	$/Unit	Total
1001	Site Investigations (13 meters)	13	met.	$ 450	$ 5,850
1002	Meter Preparation and Installation	13	met.	$ 900	$ 11,700
1003	Short-Term Meter Maint., Cals, & Review (10 met., 3 mos)	30	met.-mo.	$ 1,075	$ 32,250
1004	Long-Term Meter Maint., Cals, & Review (3 met., 12 mos)	36	met.-mo.	$ 750	$ 27,000
1005	Meter Rental (10 Meters, 3 months)	30	met.-mo.	$ 650	$ 19,500
1006	Rain Gauge Site Investigations & Calibration (6 gauges)	6	gauge	$ 170	$ 1,020
1007	Lift Station Data Analysis	1	LS	$ 7,000	$ 7,000
1008	I/I Analysis, Draft/Final Report	1	LS	$ 11,000	$ 11,000
1009	Project Management and Meetings	1	LS	$ 3,500	$ 3,500
1010	Meter Purchase*	1	Cost+5%	$ 28,500	$ 28,500
				TOTAL :	**$ 147,320**

* For purchase of 3 meters including 5% markup for purchase coordination

The total cost for the recommended program is **$147,320**. This cost does not include moving and installing Village-owned meters at new locations.

It is our pleasure to submit this proposal to the Village of Orland Park. Please feel free to contact Zach at (630) 682-4700 x310 if you would like to discuss this proposal in detail. We are looking forward to the opportunity to continue working with Village on this important program.

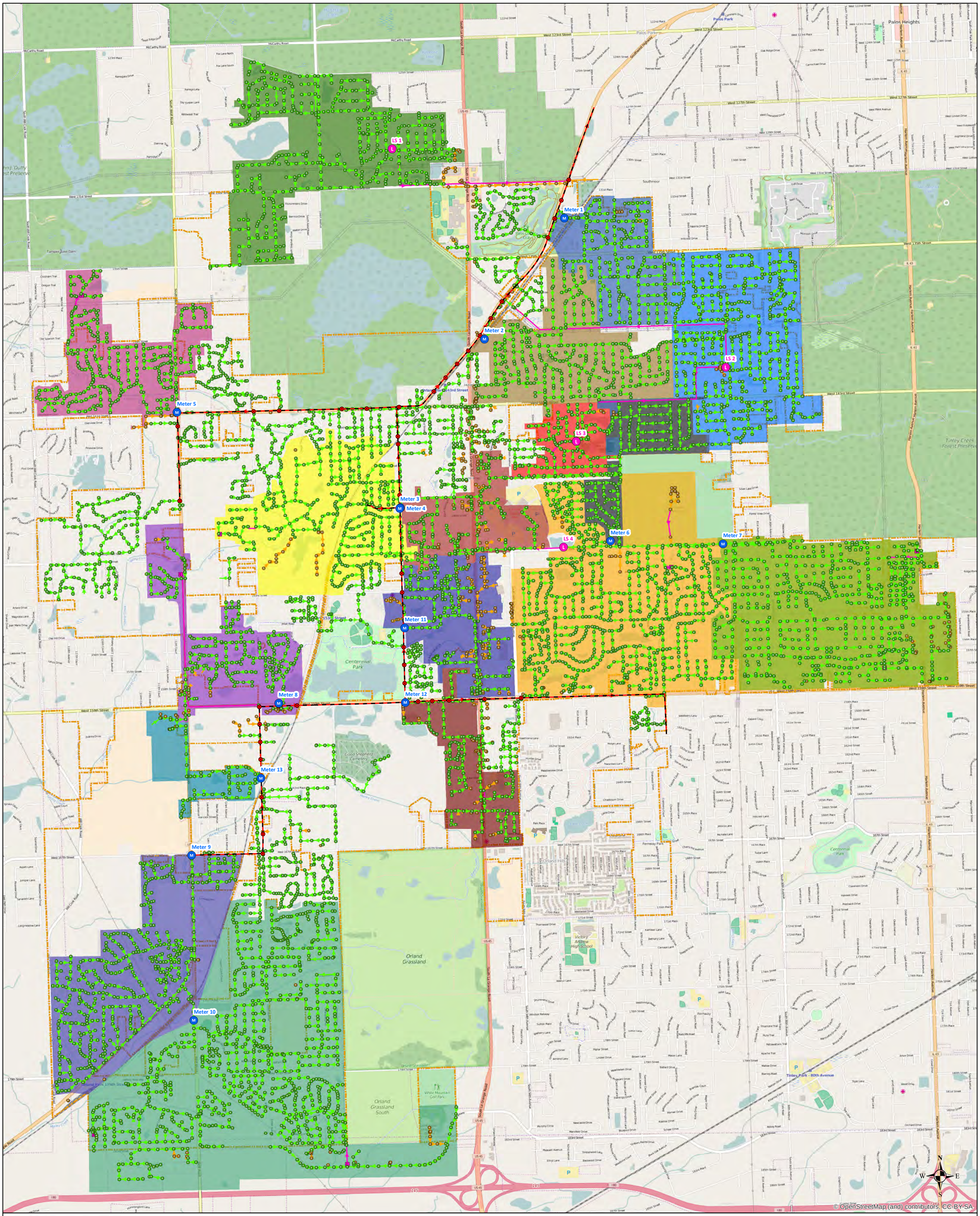
Sincerely,

RJN Group, Inc.

Joseph M. Sullivan
Project Manager

Zachary J. Matyja, P.E.
Client Manager

Enclosure



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The Choice for Collection System Solutions

Meter | Lift Station | Sanitary Manholes | Lift Stations | Sanitary Sewer | Force Main | MWRD Manholes | MWRD Sewers | Private Manholes | Private Sewers | Orland Park Village Boundary

Village of Orland Park, IL
Sanitary System
Proposed Lift Station and Flow Meter Sites and Basins
March 2016

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