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City of Farmer City

WATER AND SANITARY SEWER MASTER PLAN

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Appendices

1. Executive Summary

This five-year master plan for the City of Farmer City was developed by Prairie Engineers to provide a strategic plan for capital investments in the City's water and sanitary sewer infrastructure. This plan identifies current asset inventory and condition rating, anticipated revenues, other potential funding, and establishes a list of project improvements. These improvements are deemed necessary to enhance and maintain the City's water and sanitary sewer systems at acceptable levels. This master plan begins with Fiscal year 2024 and should be updated annually.

1.1 Master Plan Goals

The primary goal of this plan is to provide a guideline for current and future capital investments in the City's water and sanitary sewer systems. The projects recommended by this plan may vary as the plan is updated due to changes in funding and priorities. This plan is intended to allow the citizens and elected officials of the community to review various water, sanitary sewer and associated projects planned for the next five years. It will serve as the basis of a discussion which shapes the City's future investments in water and sanitary sewer infrastructure.

As infrastructure systems deteriorate over time, maintenance costs increase dramatically. Timely maintenance can significantly postpone the need for more costly rehabilitation and reconstruction measures. This document is also meant to serve as a guide for the efficient management of the City's water and sanitary sewer networks. It will assist in making better decisions regarding where to apply the City's funds to best manage the City's maintenance, rehabilitation, and reconstruction programs for its water and sanitary sewer systems.

2. Asset Inventory

An inventory for the City's water and sanitary sewer systems was developed during the summer/fall of 2021 in conjunction with the master plan process. The primary goal of the inventory was to develop an asset inventory of water and sanitary sewer elements to aid in the identification and evaluation of potential maintenance, rehabilitation, and reconstruction projects as part of the larger Master Plan. Efficient management of water and sewer assets requires proactive maintenance, rehabilitation, and quality assurance of materials. Inventory of assets and their condition is the first step to establishing water and sewer infrastructure management programs.

The Public Works department currently uses outdated water and sewer system maps for daily operations. Inventory data will supplement the existing maps and will provide the city with a GIS geodatabase. This geodatabase can be used as a more detailed reference for these systems and for future project planning, if maintained. The geodatabase can also be used to develop updated mapping by City planning personnel, or possible as a future project, if the city were so inclined. Future data may include a more detailed (interior) condition assessment of manholes, a condition assessment of pipes determined by televising, detailed pipe material, size, and age, construction dates and contractors, etc. This information can be used to prioritize and plan system improvements in an efficient and cost-effective manner.

During inventory collection, the existing water and sewer maps were verified and utilized to minimize the amount of inventory collection required. The inventory and subsequent analysis were used to the develop the Water & Sanitary Sewer Master Plan.

2.1 Data Format

All field data collected was compiled in ESRI GIS (.shp) file format. Attributes for the rating factors collected were associated with point features representing locations of water and sanitary sewer elements. Lines were digitized to represent the water and sanitary sewer pipes connecting the observed system elements. Attributes from the point features, observed at the system elements in the field, were assigned to the associated pipe features (lines). The best reconciliation of existing mapping and observed conditions was used to represent the water and sanitary sewer systems as currently constructed.

2.2 Water System Inventory

Water system inventory is comprised of the location of all visible surface features of the water system; this includes water valves, water meters, fire hydrants, curb cocks, and other water structures. Water features that have been added or modified since the creation of the existing maps were fully inventoried to supplement the existing map data. Prairie staff worked with city personnel to determine the location and line size of new underground water mains in order to supplement the existing mapping.

2.3 Sanitary Sewer Inventory

Sanitary sewer inventory included the collection of location and rim elevations on all structures, systemwide; this includes manholes, inlets, catch basins, pumping and lift stations, and outfalls. Approximately 10% of the existing mapped system was accessed and reviewed for verification of existing mapping. Structures that have been added or modified since the creation of the existing maps were fully inventoried to supplement the existing map data. Information collected during the inventory includes structure lid type, pipe size, pipe invert elevation(s), pipe material, pipe flow direction(s), connection(s) to other sewer structures, and the condition of sewer structures. No sanitary sewers were televised during the inventory collection process. The remaining 90% of structures that were located were mapped with a DGPS unit to provide horizontal location of the structure; vertical information contained on the City's existing mapping was verified at these locations.

2.3.1 Sanitary Sewer Data Contents

The sanitary sewer data includes ratings for frame condition and structure condition, structure depth, horizontal location, rim elevation, pipe material, pipe diameter, pipe invert, flow direction, and notes on other condition observations. All sanitary sewer structures included in this inventory have been located in the field and surveyed or mapped with a GPS unit.

2.3.2 Sanitary Sewer Data Maps

Exhibits showing the condition of sewer frames and structures and associated pipes under City jurisdiction are included in the Appendices of this report. In additional to exhibits displaying the overall sewer infrastructure, additional exhibits were developed to display several inventoried attributes associated with sewer structures and pipes.

2.3.3 Combined Sewers

~~Once the structures were inventoried, the structure data was overlaid on the City's existing mapping. The field observations, the existing mapping, and best judgment were used to digitize sewer pipe lines that could be confirmed from field observations. Pipe type determination was based primarily from the existing mapping unless field observation differed. In some cases, sewer pipes were labeled as combined sewer in the inventory where sewers labeled as sanitary or storm sewer on the existing mapping appeared to not be exclusive of the other. The vast majority of sewer lines were drawn and labeled as mapped.~~

2.3.4 Summary of Sewers by Type, Diameter and Material

~~The field inventory, supplemented by the existing mapping, located structures serving nearly 97,500 linear feet of sanitary, storm, and combined sewer pipe. Roughly 32,000 linear feet of sanitary sewer and 33,000 linear feet of storm sewer are located in Farmer City. An additional 31,500 linear feet, or 32% of all sewer pipe in Ward 1, is combined sewer.~~

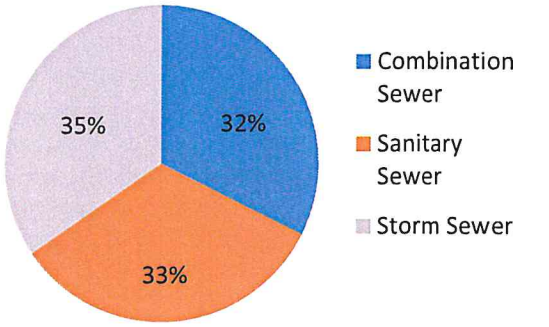


Figure 2.1.1 Summary of Sewer Type (Percent by Length)

~~Sewer pipes in Farmer City are predominately one of three common sizes: 8-inch, 12-inch, and 15-inch diameter pipe. Taken together, these three pipe sizes account for about 70% of all sewer pipe in the Ward. In addition, there are more than 6,100 feet of 24-inch pipe. Of the larger pipe sizes, there are approximately 3,500 feet of 36-inch pipe and approximately 2,200 feet of 54-inch pipe. The entire total length of 54-inch pipe is storm sewer, whereas the total lengths of the 24- and 36-inch pipes include storm sewer and combination sewer pipes.~~

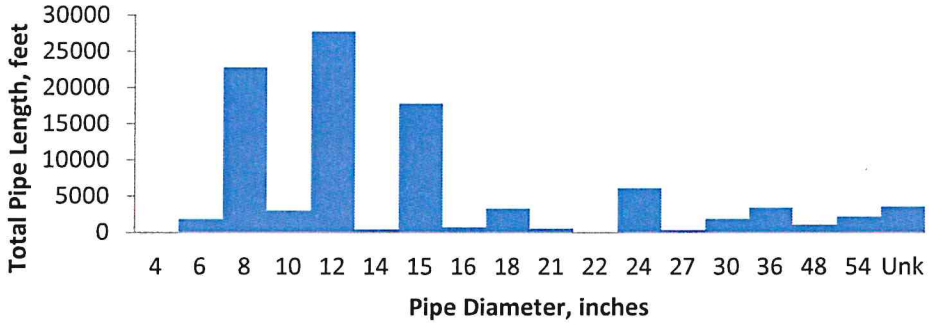


Figure 2.1.2 Total Pipe Lengths, by Diameter

Existing City sewer mapping does not include data on individual pipe materials. Field surveys of sewer structures provided the opportunity to inspect pipe material at the junction with the structure. In some cases, it was possible to determine with reasonable certainty the material of a full length of pipe located between two structures. In other cases, the ends of a pipe inspected at corresponding manholes or stormwater inlets were not the same material. These instances suggest that junctions exist between manholes that are not present in the existing mapping. It is important to note that pipe material can only be considered an assumption without televising each individual sewer line. It is possible that even if both ends of a pipe are of the same size and material, the sewer in between may not be.

~~Common sewer pipe materials in Farmer City include reinforced concrete pipe (RCP), vitrified clay pipe (VCP), polyvinyl chloride (PVC) pipe, and ductile iron (DI) pipe. All of these pipe materials are used in all three sewer types: storm, sanitary, and combined sewer. In addition,~~

~~PVC TRUSS pipe was found in four instances: three 8-inch and one 10-inch storm sewers. Corrugated metal pipe (CMP) was found at two storm sewer outlets to Brainard's Branch.~~

~~Where pipe material was found to be the same at each corresponding end of a pipe, the entire pipe was assigned a material (n=42). Of those 42 pipes, about 80% are RCP, 14% are VCP, and about 5% are TRUSS pipe. There were 278 pipes where the pipe material was only observed at one end of the pipe. Figure 1.4 provides a summary of the observed frequency of those materials.~~

~~Of the remaining pipes where observations of pipe material were made at either end of the pipe, 12 pipes had differing material at each end of the pipe. The observed "mixed" pipe materials were DI-PVC, DI-VCP, RCP-CMP, and RCP-VCP (n=7; 58%).~~

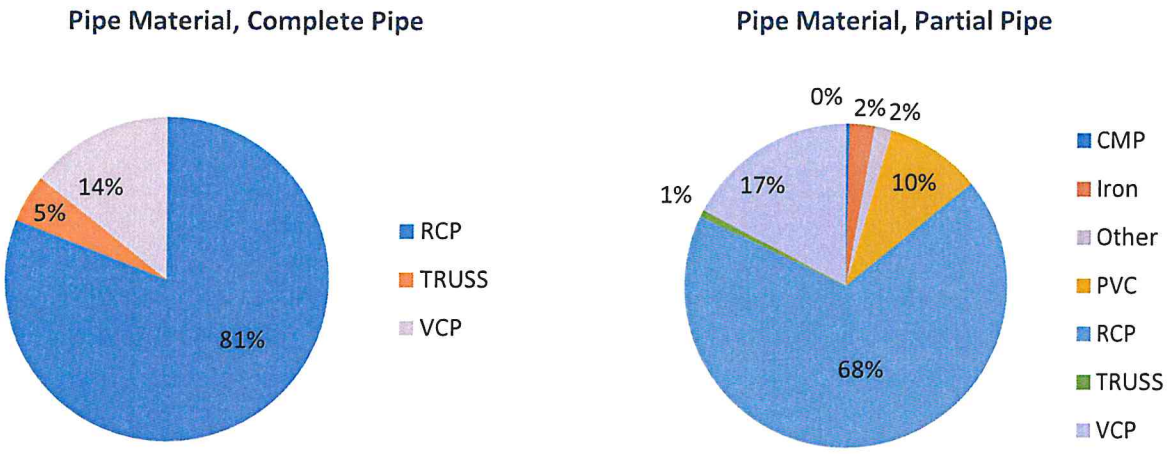


Figure 2.1.2 Total Pipe Lengths, by Diameter

2.3.5 Rating System

Visual inspection of sewer structures provided the opportunity to qualitatively assess the overall condition of the structure and the structure frame. Ratings are provided on a scale of 1 to 5, with a rating of 1 being poor condition and a rating of 5 being "like-new" condition. A more detailed summary of the condition specifications for each rating category is provided below.

2.3.5.1 Overall Sewer Structure Condition Rating

Overall structure condition was assessed visually, with a focus on the aesthetic and apparent structural quality of the asset. Structures with obvious structural defects, missing bricks or concrete, received the lowest rating (1) and are considered to be in poor condition. Structures appearing "like-new," lacking any apparent defect, were given the highest rating (5). Gradations in quality were rated as Excellent (5), Good (4), Fair (3), Poor (2), and Failed (1).

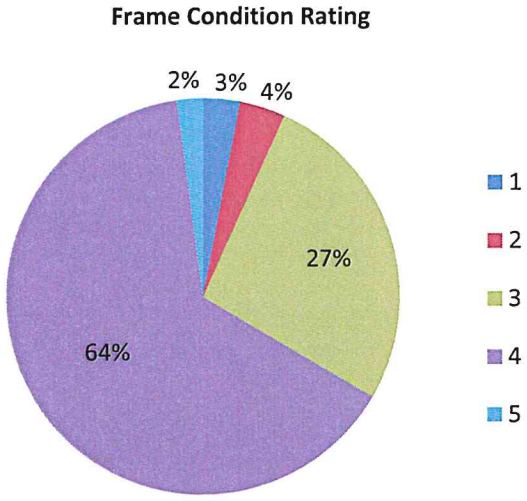
2.3.5.2 Frame Condition Rating

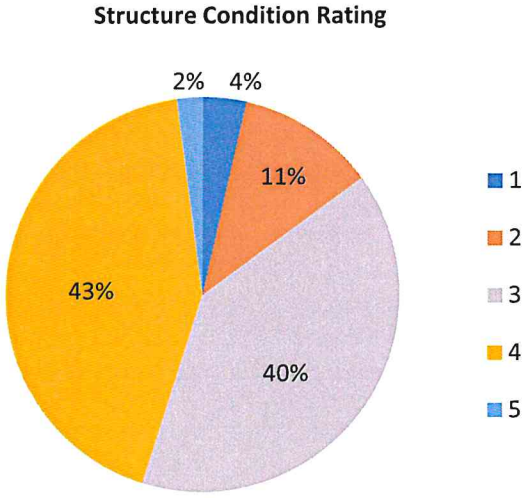
Similarly, frame condition was assessed visually, with a primary focus on the structural integrity and aesthetic quality of structure frame and lid (or grate, if the structure was an inlet). Broken or clearly damaged frames, lids or grates were assigned the lowest rating (1). Constructed sewer features, which appeared undamaged or otherwise "like-new," were assigned the highest rating (5). Gradations in quality were rated as Excellent (5), Good (4), Fair (3), Poor (2), and Failed (1).

2.3.6 Condition Summary of Sanitary Sewer Structures

~~A total of 757 sewer structures (inlets and manholes) were located during the sanitary sewer field survey. About 50% of these structures (n=368) were inventoried in the field, including rating the condition of the frame of the structure and the structure overall. Ratings ranged from 1 to 5, with 1 being the poorest condition, and 5 being the best condition. Ratings were based on visual inspections from the surface. Structures were not entered for detailed inspections as part of this project. Generally, frame condition is above average, with about 64% of structures frames receiving a rating of 4. In addition, about 27% of structure frames are rated at 3. Only about 2% of inventoried structure frames received the "like-new" rating of 5. Somewhat more structure frames (3%) are in poor condition (Rating 1), and 4% are in fair condition (Rating 2)~~

~~Overall structure condition is average to above average, with 43% of structures receiving a rating of 4 and 40% of structures receiving a rating of 3. Approximately 11% of structures were in fair condition (Rating 2). Very few structures are in "like-new" condition (n=8; 2%) or poor condition (n=13; 3.5%).~~





3. Anticipated Revenues

Water and wastewater rates had not been adjusted in Farmer City for decades. The City recent instituted a series of water and wastewater rate increases over the past few years. These rate increases vary between 10-20%, per year. The increased revenue from the rate increases will be used to fund capital improvement projects and begin annual water and wastewater replacement programs. According to the 2020/2021 municipal budget, the city is contemplating another 10% water rate increase for this fiscal year. However, expenditures in this master plan are based upon a budgetary assumption of minimal or no growth in revenues for either fund, over the next five years.

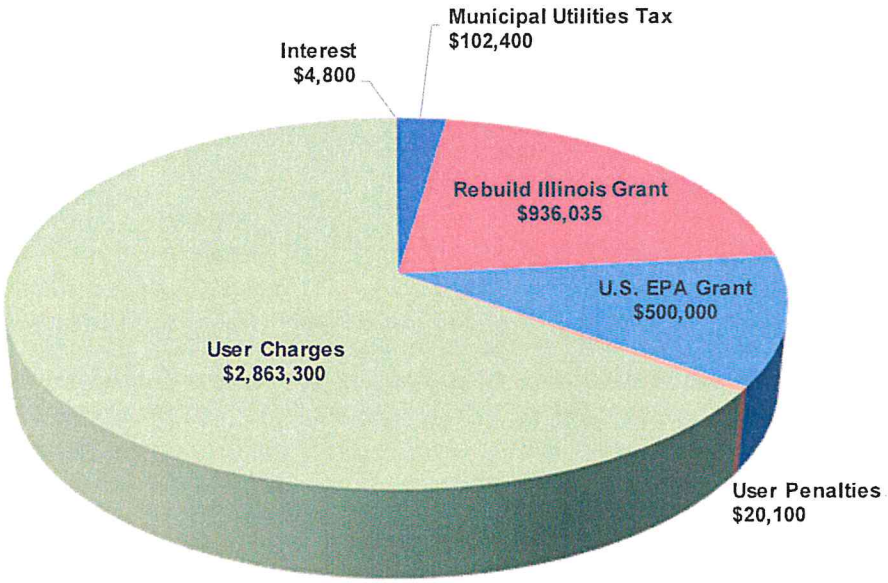
This plan also includes potential projects that are currently unfunded in the five-year term. Funding for these projects may come from federal or state grants, additional allotments in existing federal and state funding, greater than anticipated revenue growth in existing funding sources, or private investment.

3.1 Anticipated Water Revenues

The City's water system is funded from various sources. Primary funding sources for water system capital improvements include municipal utilities tax, connection fees, user charges and penalties, and various public grants.

The City's FY 2022 municipal budget projected a Water Fund beginning balance of $1.3 million and revenue yield of approximately $465,000.

3.1.1 Water Funding Sources Summary – Through FY 2028

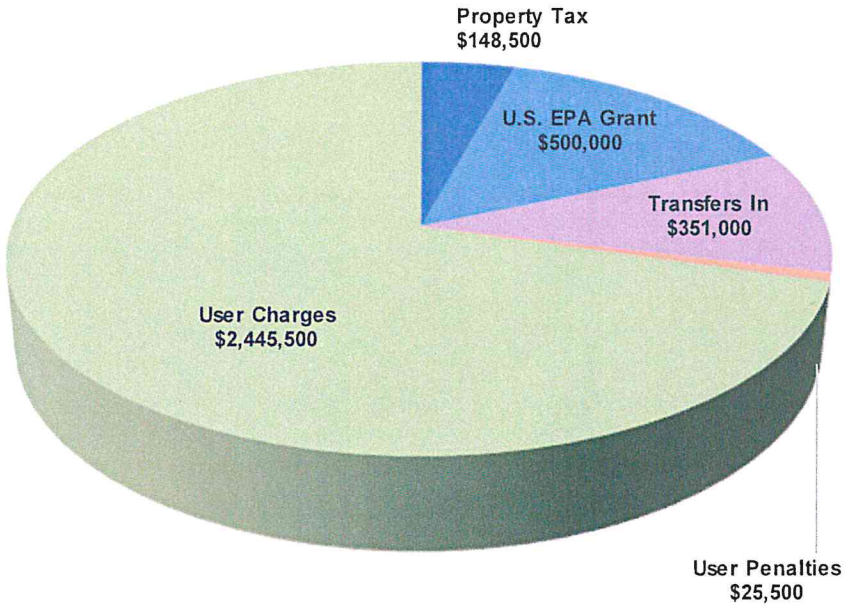


3.2 Anticipated Sewer Revenues

The City's wastewater system is also funded from various sources. Primary funding sources for sewer system capital improvements include property tax, connection fees, user charges and penalties, transfers and various public grants.

The City's 2020/2021 municipal budget projected a Sewer Fund beginning balance of $16,500 and revenue yield of approximately $435,000.

3.2.1 Sanitary Sewer Funding Sources Summary – Through FY 2028



3.3 Estimated Individual Project Costs

Most of the project costs contained in this document are conceptual level estimates. They are intended to provide the City with a sufficient level of detail to make funding decisions regarding the size of the yearly program and the feasibility of specific projects and programs. The actual costs of individual projects may vary as the project progresses and more detailed cost estimates are developed.

3.3.1 Water Program Individual Project Costs

The figures below summarize the water program for each of the five planning years. More detailed information is available in Sections 4 and 5 of this Plan.

3.3.1.1 Water Program (FY 2024)
3.3.1.2 Water Program (FY 2025)
3.3.1.3 Water Program (FY 2026)
3.3.1.4 Water Program (FY 2027)
3.3.1.5 Water Program (FY 2028)

3.3.2 Sewer Program Individual Project Costs

The figures below summarize the wastewater program for each of the five planning years. More detailed information is available in Sections 4 and 5 of this Plan.

3.3.2.1 Sanitary Sewer Program (FY 2024)
3.3.2.2 Sanitary Sewer Program (FY 2025)
3.3.2.3 Sanitary Sewer Program (FY 2026)
3.3.2.4 Sanitary Sewer Program (FY 2027)
3.3.2.5 Sanitary Sewer Program (FY 2028)

3.4 Master Plan Scope

This document is intended only to plan for water related expenditures paid for from the water fund and/or for sanitary sewer related expenditures paid for from the sewer fund. Anticipated capital expenditures which are related to the City's water or sewer networks, but which have not been incorporated into this document include:

<list capital expenditures related to City's water/sewer that have not been incorporated into this master plan>

4. Proposed Improvement Projects and Programs

The water and sanitary sewer programs and projects proposed in this master plan were primarily developed using the Asset Inventory as prepared by Prairie Engineers in Section 2. The proposed programs and projects have been prioritized to maximize the return on investment in the City's infrastructure and to rehabilitate or reconstruct the majority of those features that are in poor or failed condition.

Maps depicting the locations of various maintenance and construction segments are contained in the Appendix and further described below.

4.1 Annual Watermain Replacement Program

The City of Farmer City has recognized the need for critical improvements to their water infrastructure and have created an annual watermain replacement program to update their aging water system. This program was created during the fiscal year 2020/21 budgetary planning. Recurring watermain replacement can delay the necessity of very costly emergency

repairs and is by far the best investment that can be made in a city's water infrastructure. An annual watermain replacement program of $110,000 is included in this master plan.

4.2 Individual Water Reconstruction Projects

In addition to the program detailed above, several individual water system improvement projects are programmed as follows:

Water Main Replacement, Market Street, Main Street, James Street, High Street & West Street - $1,117,043

This project includes the total replacement of water main along Market Street from Harrison Street to James Street, James Street from Market Street to East High Street, High Street from James Street to West Street and Main Street from Market Street to IL 54 (Clinton Avenue). Existing 4" water main will be abandoned and replaced with 6" PVC water main. This project is funded with 80% Rebuild Illinois grant funds and 20% City match. The city's 20% share of the project is in the amount of $234,009.

4.3 Annual Sanitary Sewer Main Replacement Program

Similar to the annual watermain replacement program, the City of Farmer City recognized the need for critical improvements to their wastewater infrastructure and created an annual sewer main replacement/lining program during their FY 2020/21 budgetary planning. This program will help to improve the City's sewer infrastructure and prevent costly emergency repairs.

4.4 Individual Sanitary Sewer Reconstruction Projects

In addition to the program detailed above, several individual sidewalk reconstruction projects are programmed as follows:

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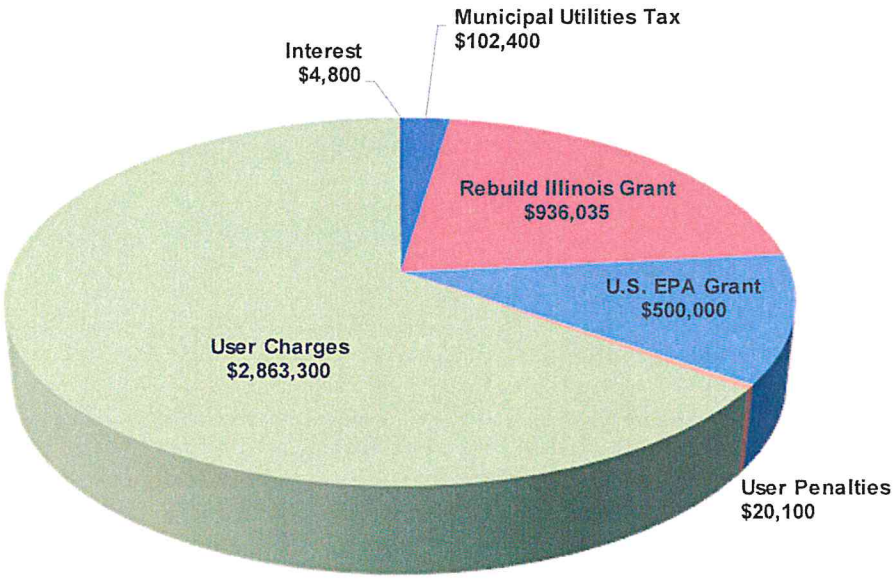
5. Five Year Master Plan (FY 2024 – FY 2028)

5.1 Projected Water Fund Revenues by Fiscal Year

	Estimated FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028
Beginning Fund Balance	$ 1,009,655.00	$ 888,855.00	$ 1,467,881.37	$ 1,342,981.37	$ 1,716,281.37	$ 1,586,981.37
Muncipal Utilities Tax	$ 16,300.00	$ 16,600.00	$ 16,900.00	$ 17,200.00	$ 17,500.00	$ 17,900.00
User Charges	$ 453,900.00	$ 463,000.00	$ 472,300.00	$ 481,700.00	$ 491,300.00	$ 501,100.00
User Penalties	$ 3,100.00	$ 3,200.00	$ 3,300.00	$ 3,400.00	$ 3,500.00	$ 3,600.00
Miscellaneous	$ -	$ -	$ -	$ -	$ -	$ -
Rebuild Illinois Public Infrastructure Grant	$ -	$ 936,035.00	$ -	$ -	$ -	$ -
US EPA Grant	$ -	$ -	$ -	$ 500,000.00	$ -	$ -
Fund Interest	$ 800.00	$ 800.00	$ 800.00	$ 800.00	$ 800.00	$ 800.00
Total Funds	$ 474,100.00	$ 1,419,635.00	$ 493,300.00	$ 1,003,100.00	$ 513,100.00	$ 523,400.00
Obligations	$ (594,900.00)	$ (840,608.63)	$ (618,200.00)	$ (629,800.00)	$ (642,400.00)	$ (655,000.00)
Total Funds Available	**$ 888,855.00**	**$ 1,467,881.37**	**$ 1,342,981.37**	**$ 1,716,281.37**	**$ 1,586,981.37**	**$ 1,455,381.37**

5.2 Total Water Funding Required

Total water funding required is $4,426,635.

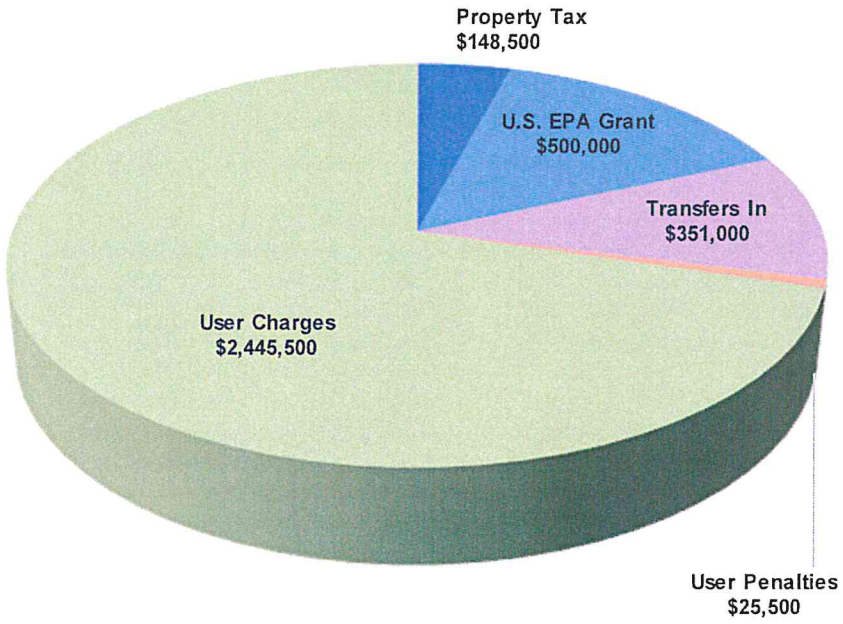


5.3 Projected Sewer Fund Revenues by Fiscal Year

	Estimated FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028
Beginning Fund Balance	**$ 108,819.00**	**$ 136,119.00**	**$ 164,119.00**	**$ 192,619.00**	**$ 221,619.00**	**$ 751,019.00**
Property Tax	$ 23,500.00	$ 24,000.00	$ 24,500.00	$ 25,000.00	$ 25,500.00	$ 26,000.00
User Charges	$ 387,500.00	$ 395,500.00	$ 403,500.00	$ 411,500.00	$ 419,500.00	$ 428,000.00
User Penalties	$ 4,000.00	$ 4,100.00	$ 4,200.00	$ 4,300.00	$ 4,400.00	$ 4,500.00
Transfers In	$ 56,000.00	$ 57,000.00	$ 58,000.00	$ 59,000.00	$ 60,000.00	$ 61,000.00
US EPA Grant	$ -	$ -	$ -	$ -	$ 500,000.00	$ -
Total Funds	$ 471,000.00	$ 480,600.00	$ 490,200.00	$ 499,800.00	$ 1,009,400.00	$ 519,500.00
Obligations	$ (443,700.00)	$ (452,600.00)	$ (461,700.00)	$ (470,800.00)	$ (480,000.00)	$ (489,200.00)
Total Funds Available	$ 136,119.00	$ 164,119.00	$ 192,619.00	$ 221,619.00	$ 751,019.00	$ 781,319.00

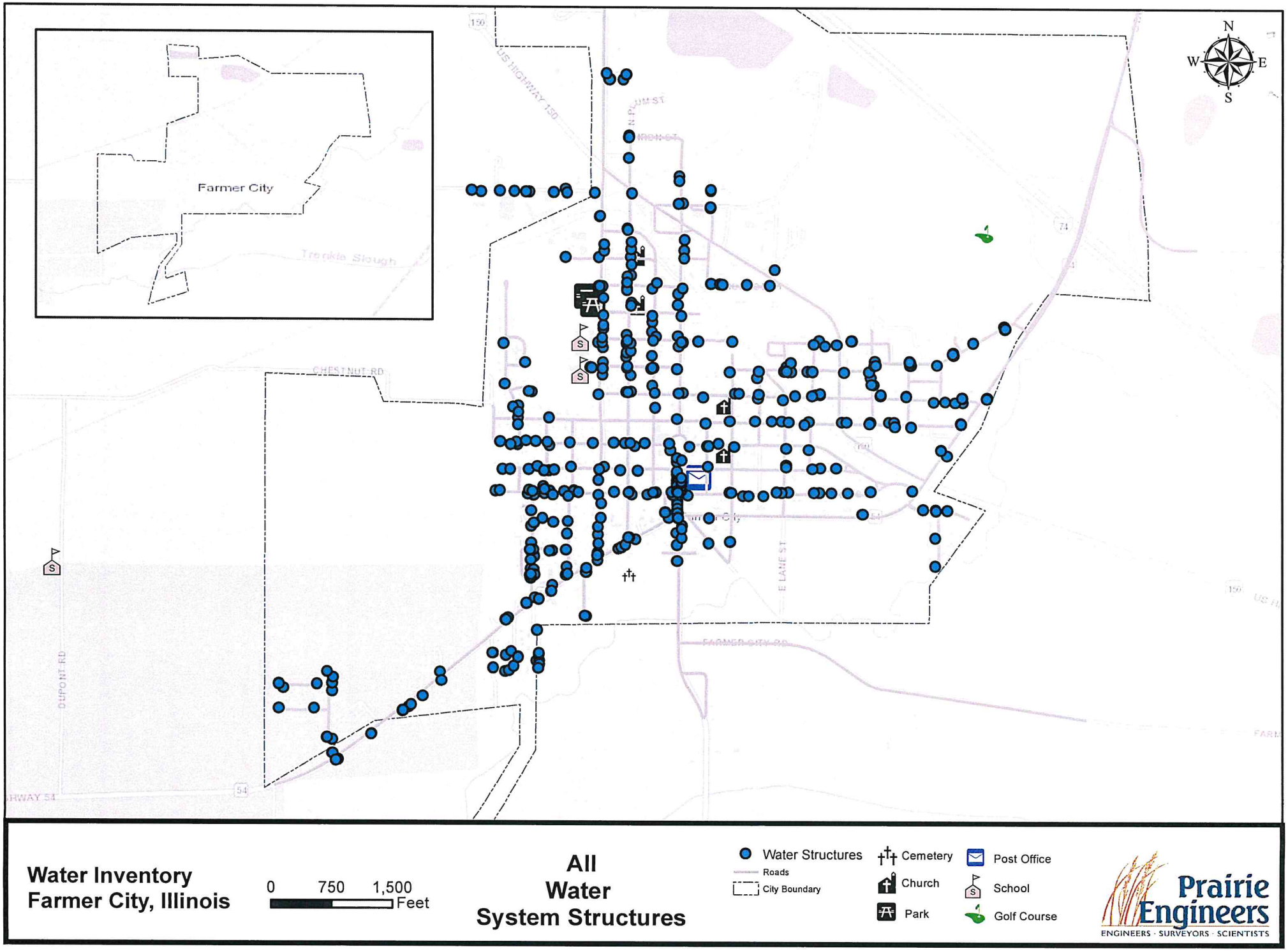
5.4 Total Sewer Funding Required

Total sewer funding required is $3,470,500.



Appendix A

Water Inventory – All Water Structures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Water
System Structures
Water Structures
Roads
City Boundary
Cemetery
Church
Park
Post Office
School
Golf Course
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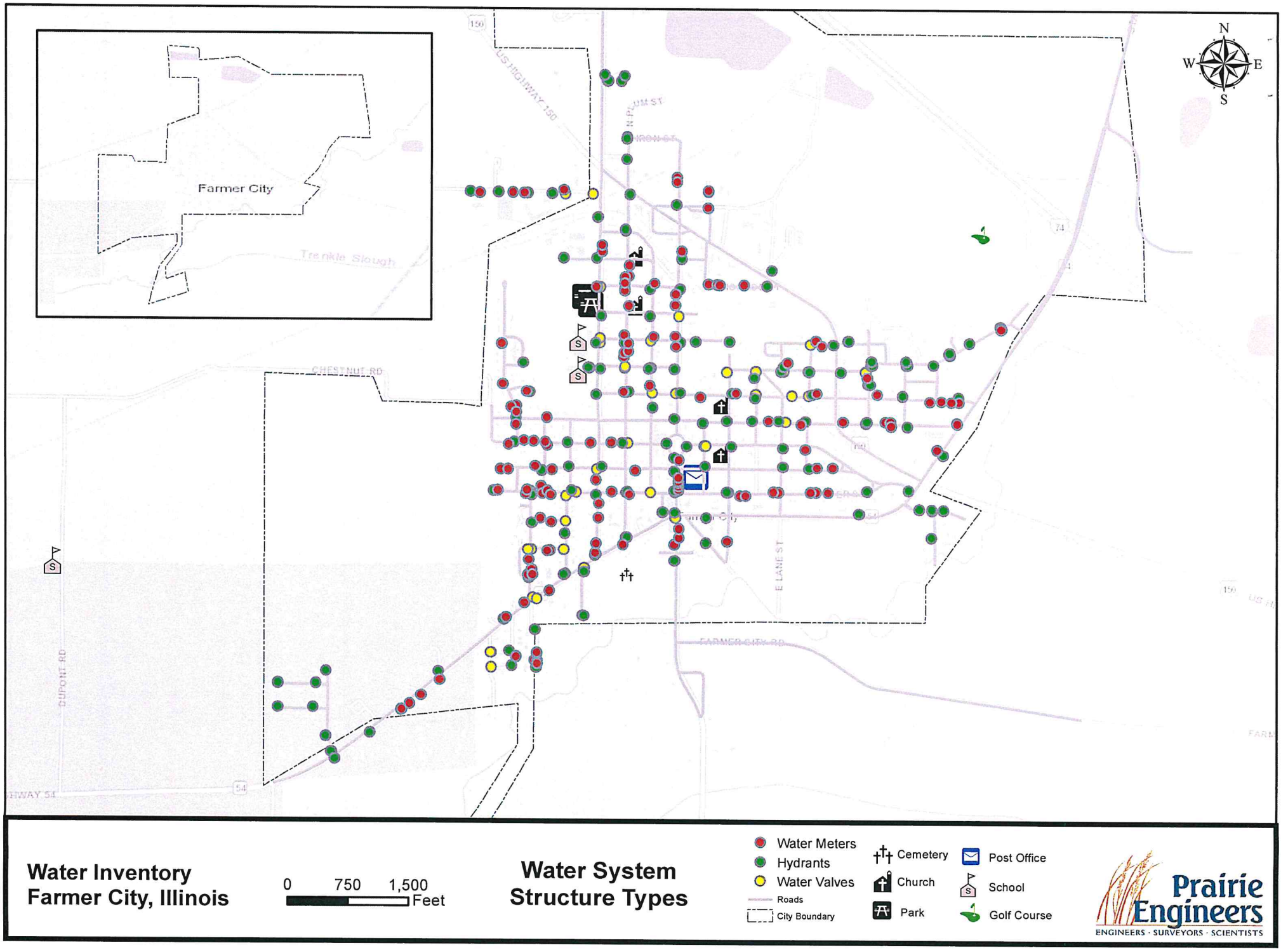
Appendix B

Water Inventory – Water Structure Types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CHESTNUT RD
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DUPONT RD
HWAY 54
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Water System
Structure Types
Water Meters
Hydrants
Water Valves
Roads
City Boundary
Cemetery
Church
Park
Post Office
School
Golf Course
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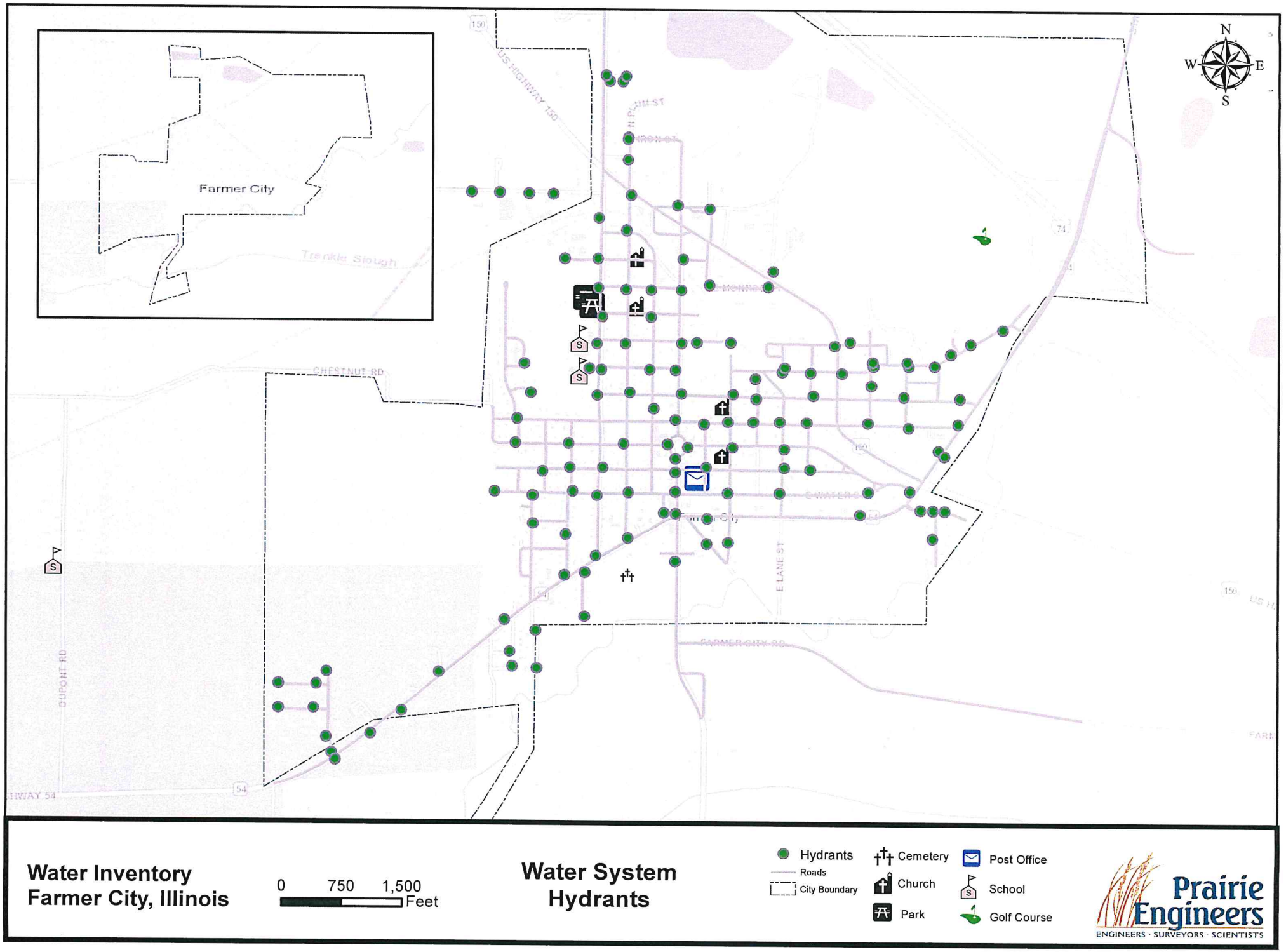
Appendix C

Water Inventory – Fire Hydrants


Farmer City
Trenkle Slough
US HIGHWAY 150
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IRON ST
MONROE
CHESTNUT RD
E WATER ST
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FARMER CITY RD
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Feet
Water System
Hydrants
Hydrants
Roads
City Boundary
Cemetery
Church
Park
Post Office
School
Golf Course
Prairie Engineers
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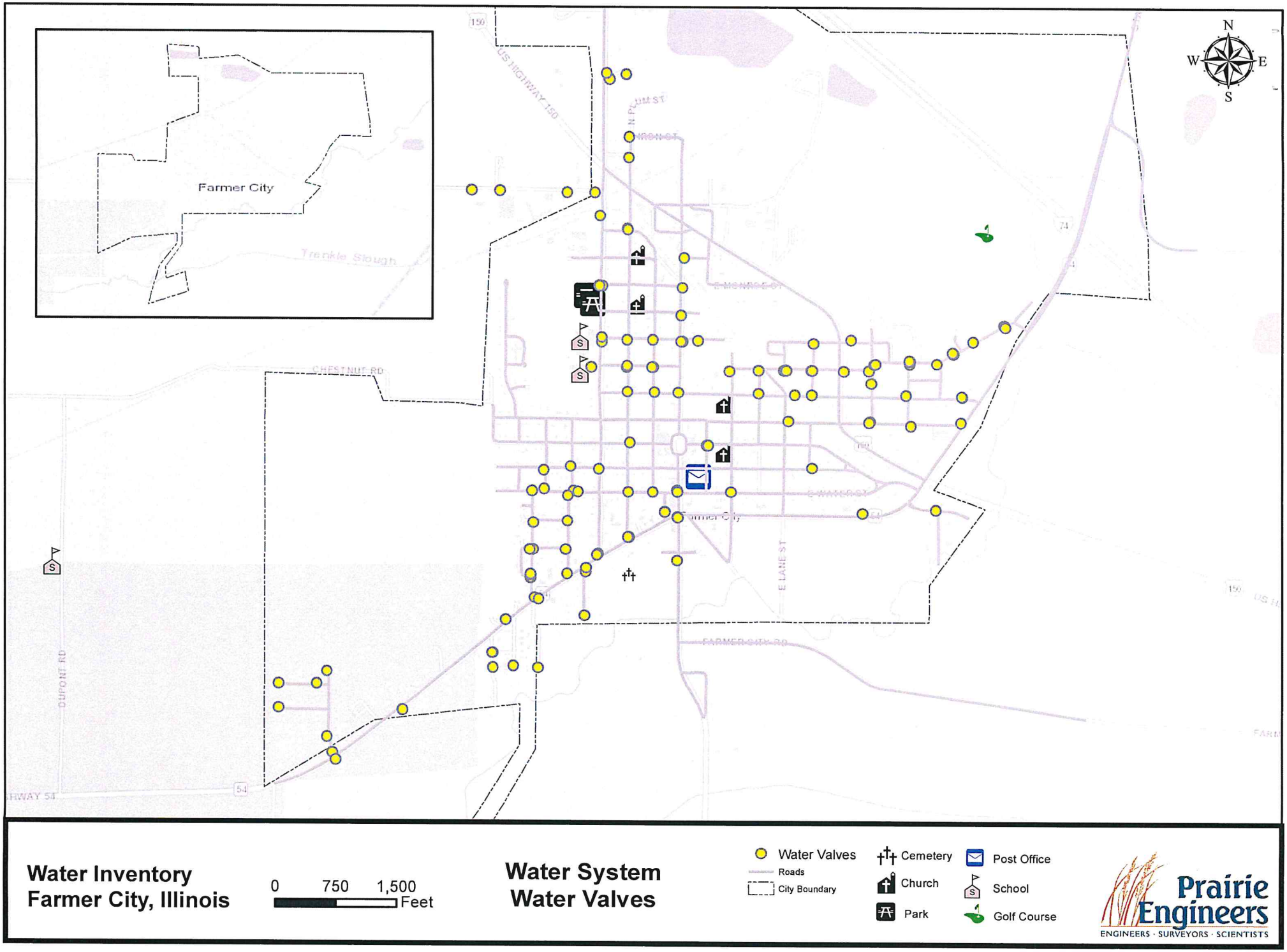
Appendix D

Water Inventory – Water Valves


Farmer City
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CHESTNUT RD
DUPONT RD
FARMER CITY RD
Water Inventory
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Water System
Water Valves
Water Valves
Roads
City Boundary
Cemetery
Church
Park
Post Office
School
Golf Course
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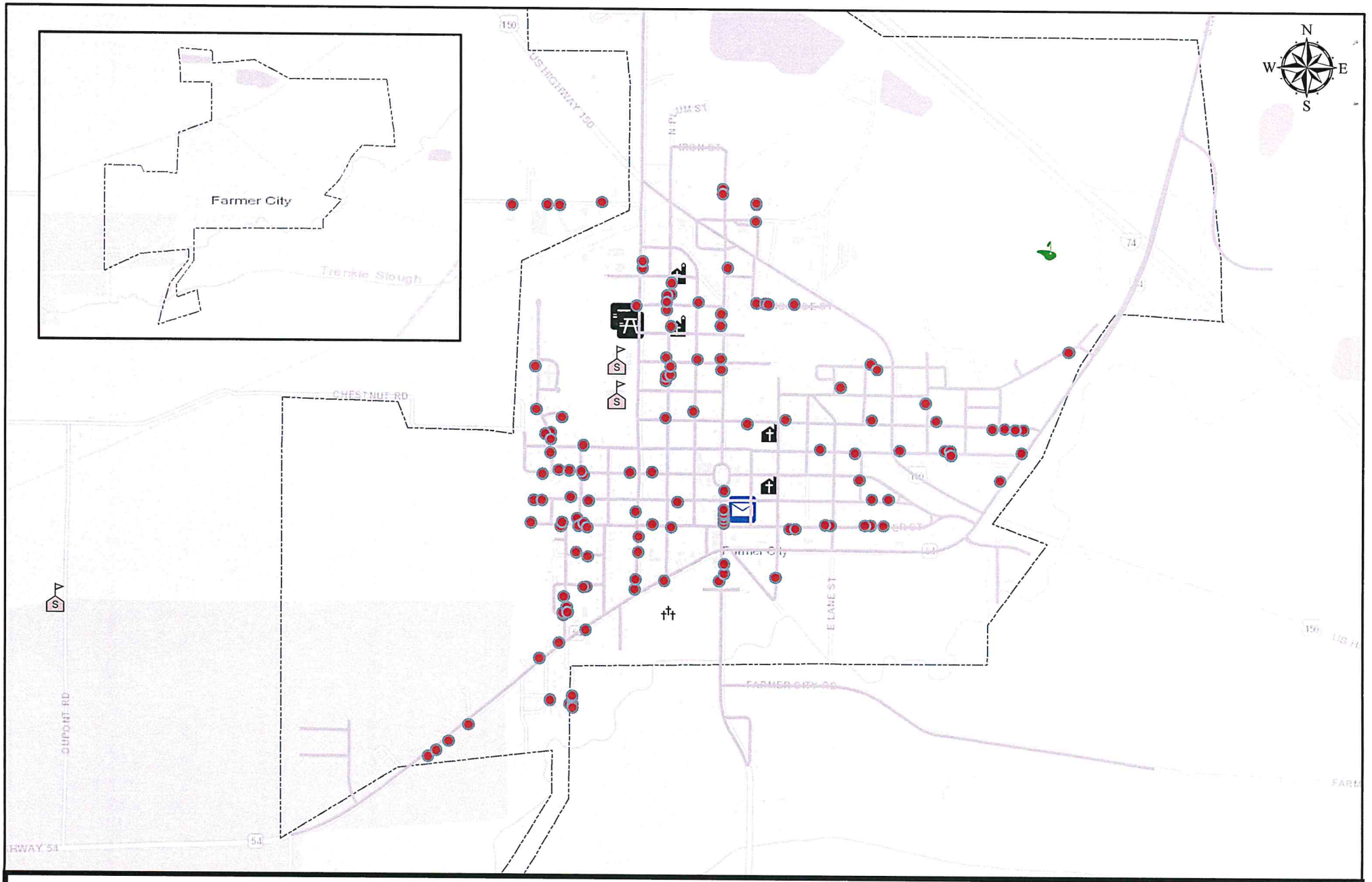
Appendix E

Water Inventory – Water Meters



Water Inventory
Farmer City, Illinois

0 750 1,500 Feet

Water System
Water Meters

Water Meters
Roads
City Boundary
Cemetery
Church
Park
Post Office
School
Golf Course

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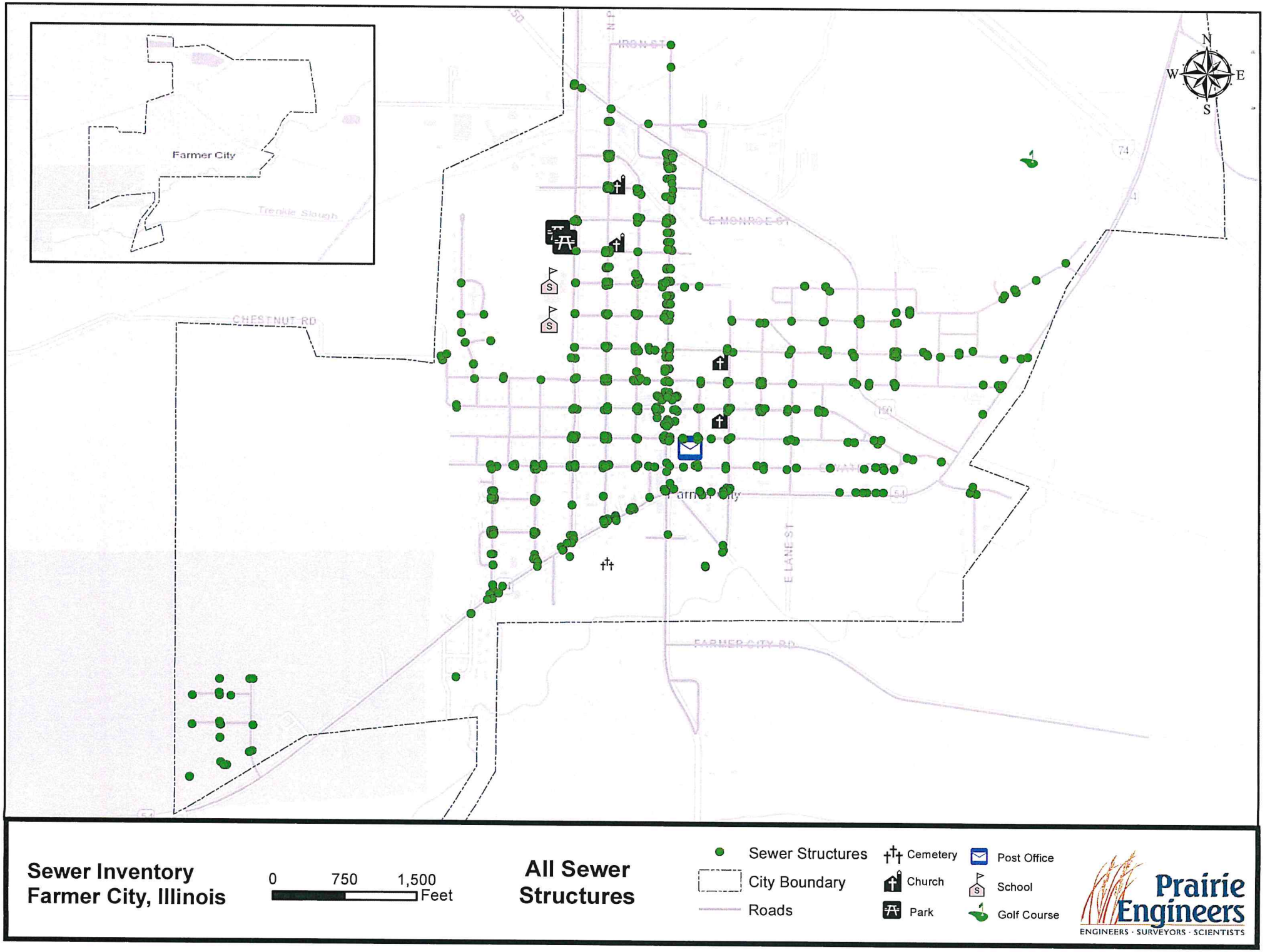
Appendix F

Sewer Inventory – All Sewer Structures



Sewer Inventory
Farmer City, Illinois

0 750 1,500 Feet

All Sewer Structures

Sewer Structures
City Boundary
Roads
Cemetery
Church
Park
Post Office
School
Golf Course

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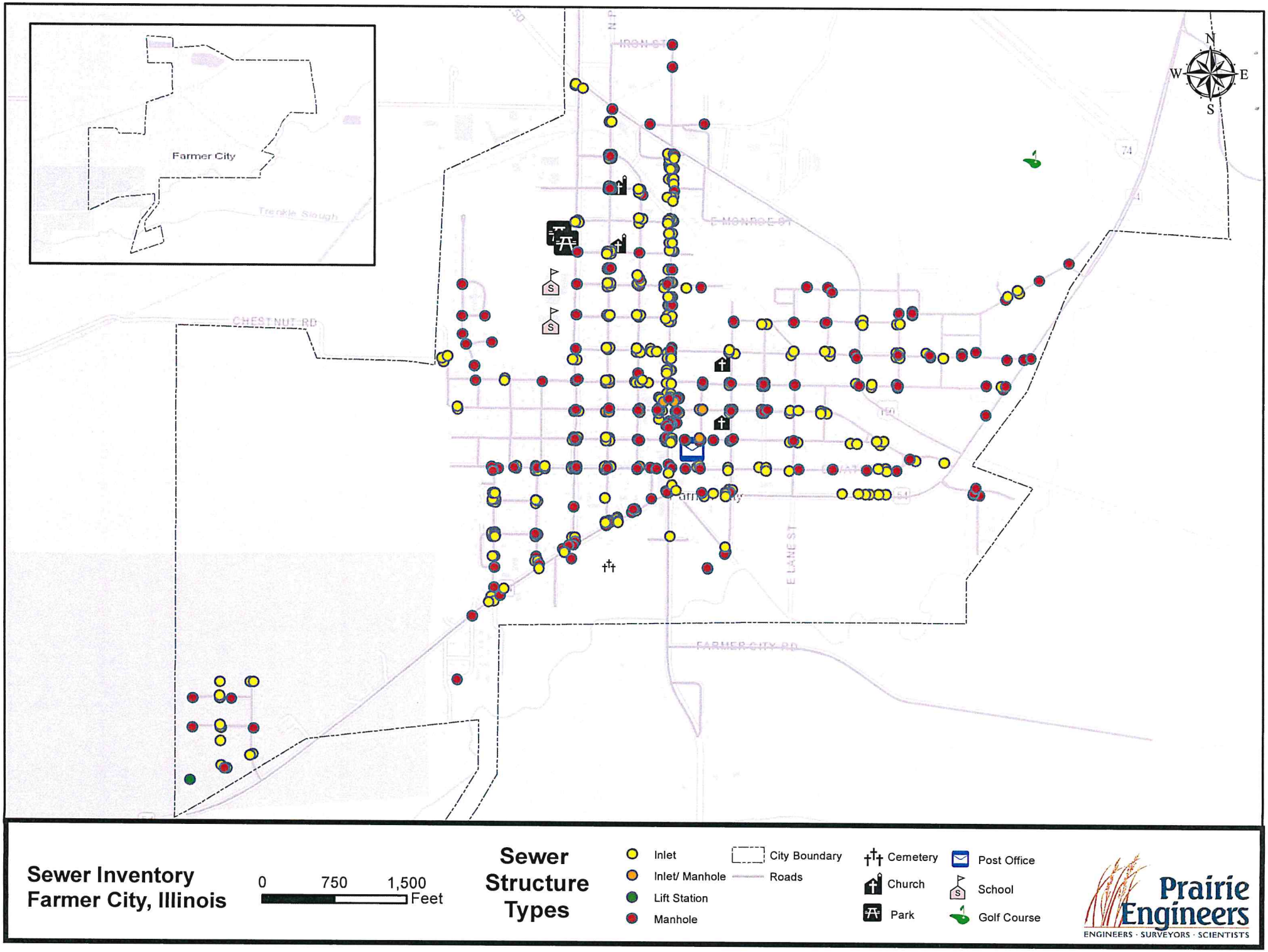
Appendix G

Water Inventory – Sewer Structure Types



Sewer Inventory
Farmer City, Illinois

0 750 1,500 Feet

Sewer Structure Types

- Inlet
- Inlet/ Manhole
- Lift Station
- Manhole
- City Boundary
- Roads
- Cemetery
- Church
- Park
- Post Office
- School
- Golf Course

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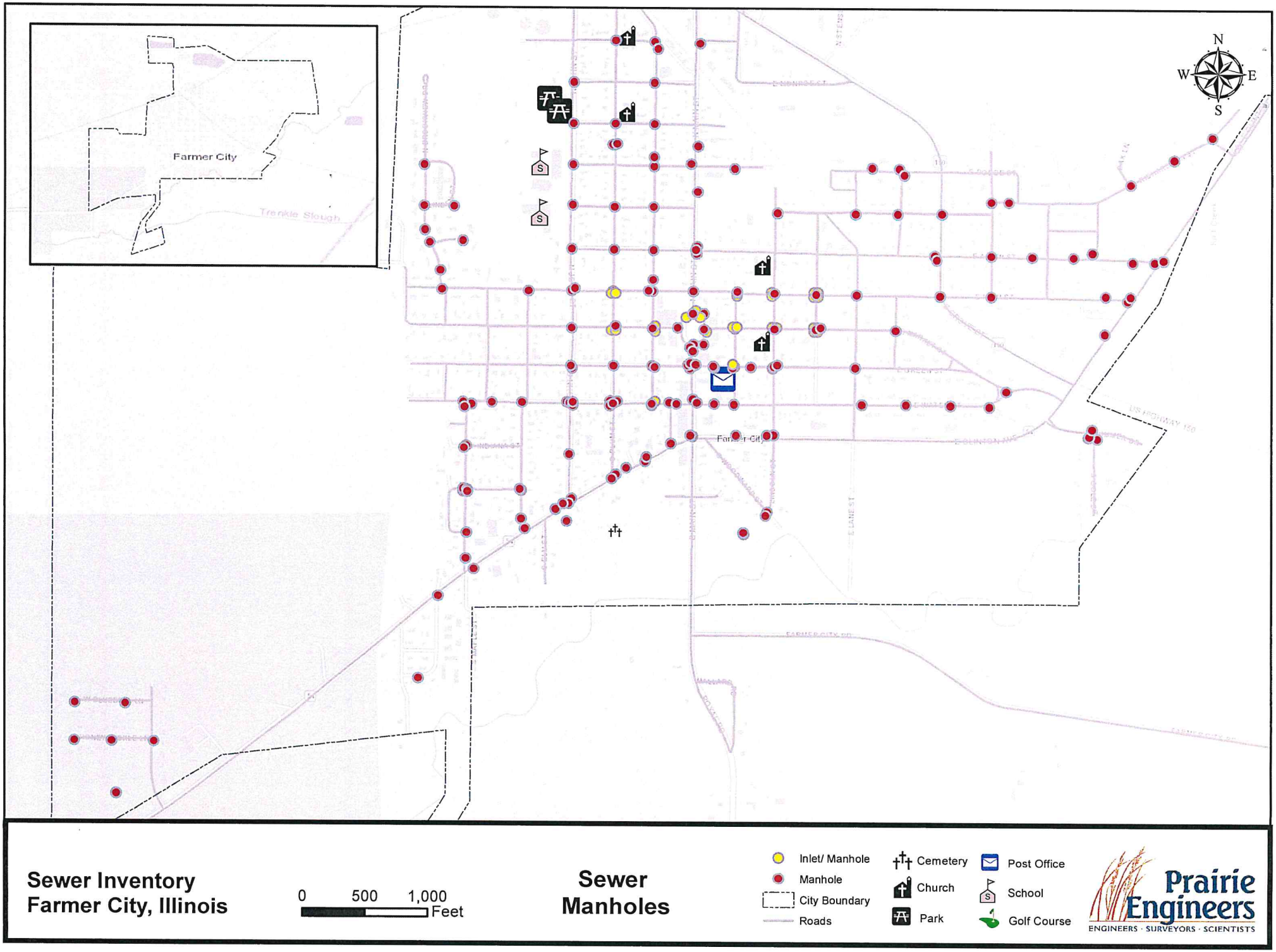
Appendix H

Sewer Inventory – Manholes


Farmer City
Trenkle Slough
N
W
E
S
Farmer City
US HIGHWAY 150
Sewer Inventory
Farmer City, Illinois
0
500
1,000
Feet
Sewer
Manholes
Inlet/ Manhole
Manhole
City Boundary
Roads
Cemetery
Church
Park
Post Office
School
Golf Course
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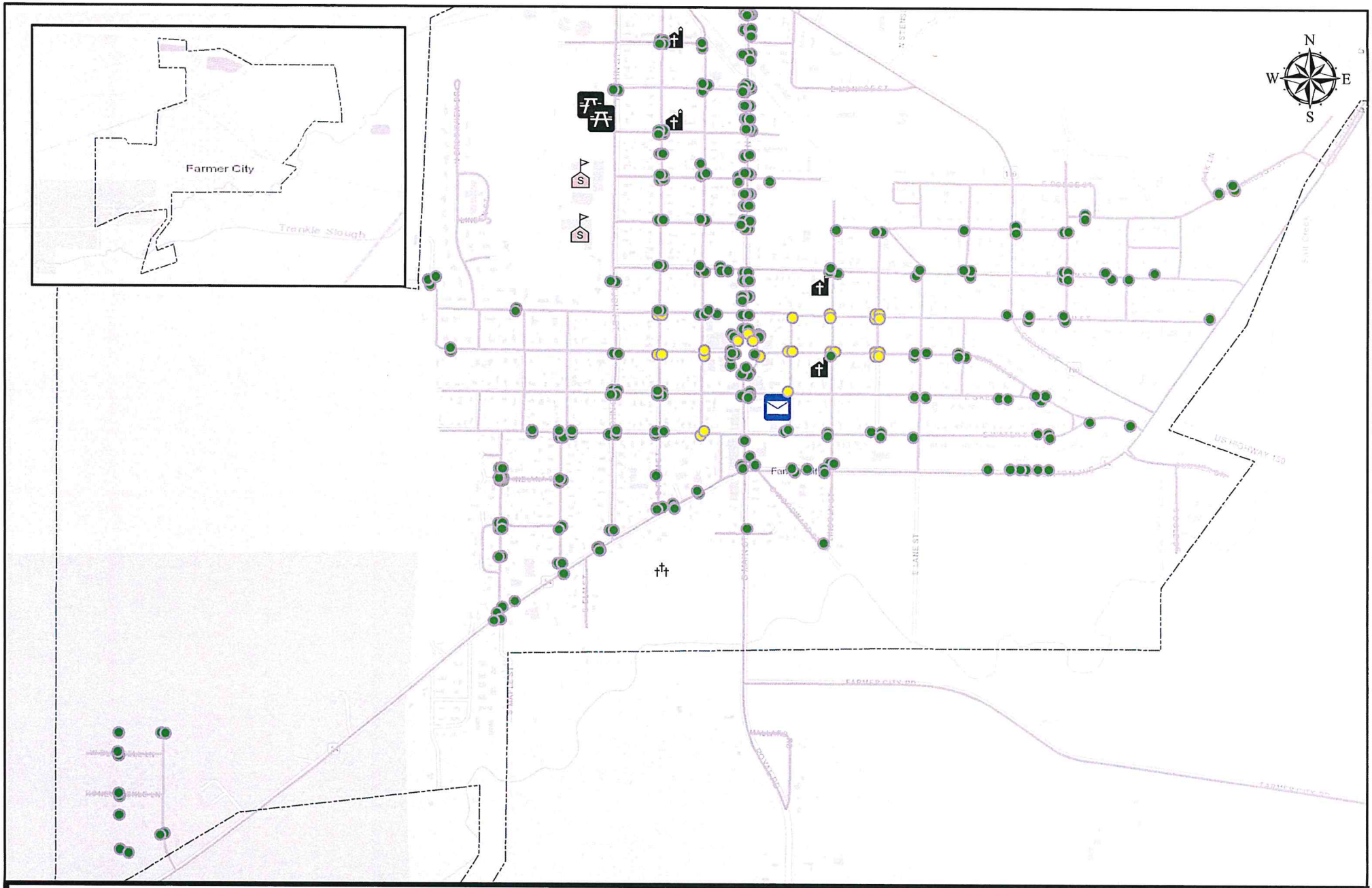
Appendix I

Sewer Inventory – Inlets



Sewer Inventory
Farmer City, Illinois

Sewer Inlets

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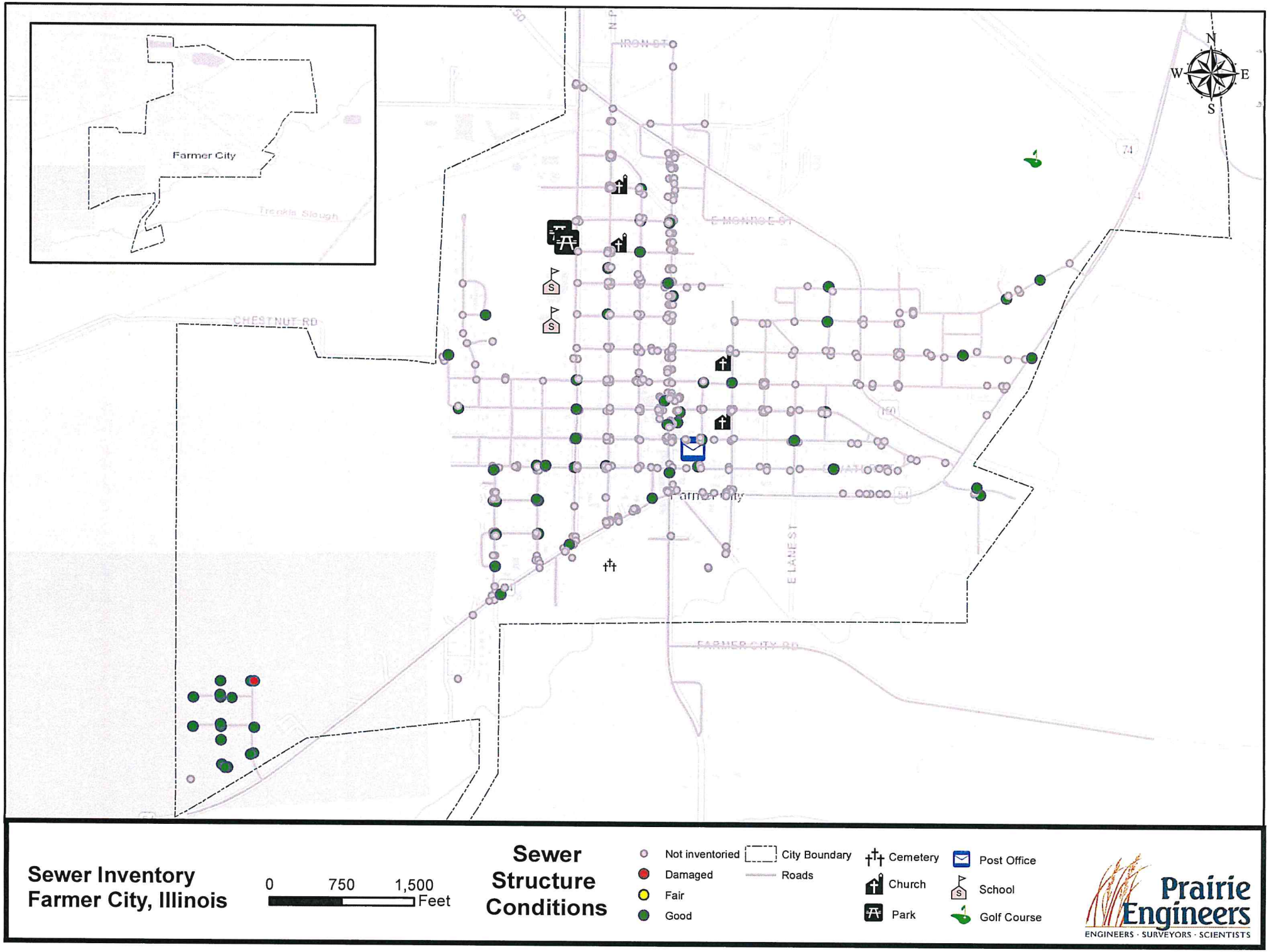
Appendix J

Sewer Inventory – Sewer Structure Condition



Sewer Inventory
Farmer City, Illinois

0 750 1,500 Feet

Sewer Structure Conditions

- Not inventoried
- Damaged
- Fair
- Good
- City Boundary
- Roads
- Cemetery
- Church
- Park
- Post Office
- School
- Golf Course

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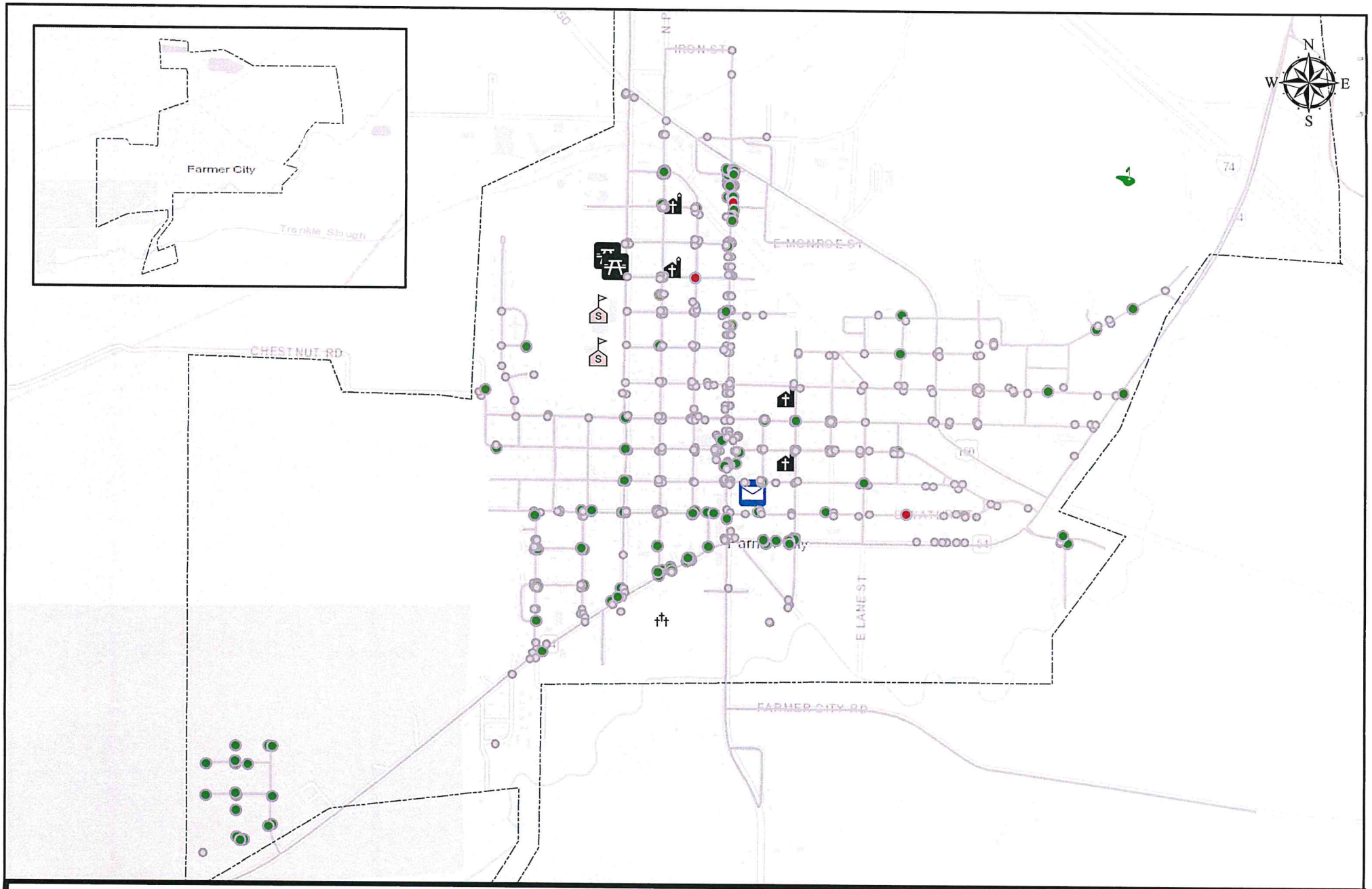
Appendix K

Sewer Inventory – Sewer Frame Condition



Sewer Inventory
Farmer City, Illinois

0 750 1,500 Feet

Sewer Frame Conditions

- Not inventoried
- Good
- Overlaid
- City Boundary
- Roads
- Cemetery
- Church
- Park
- Post Office
- School
- Golf Course

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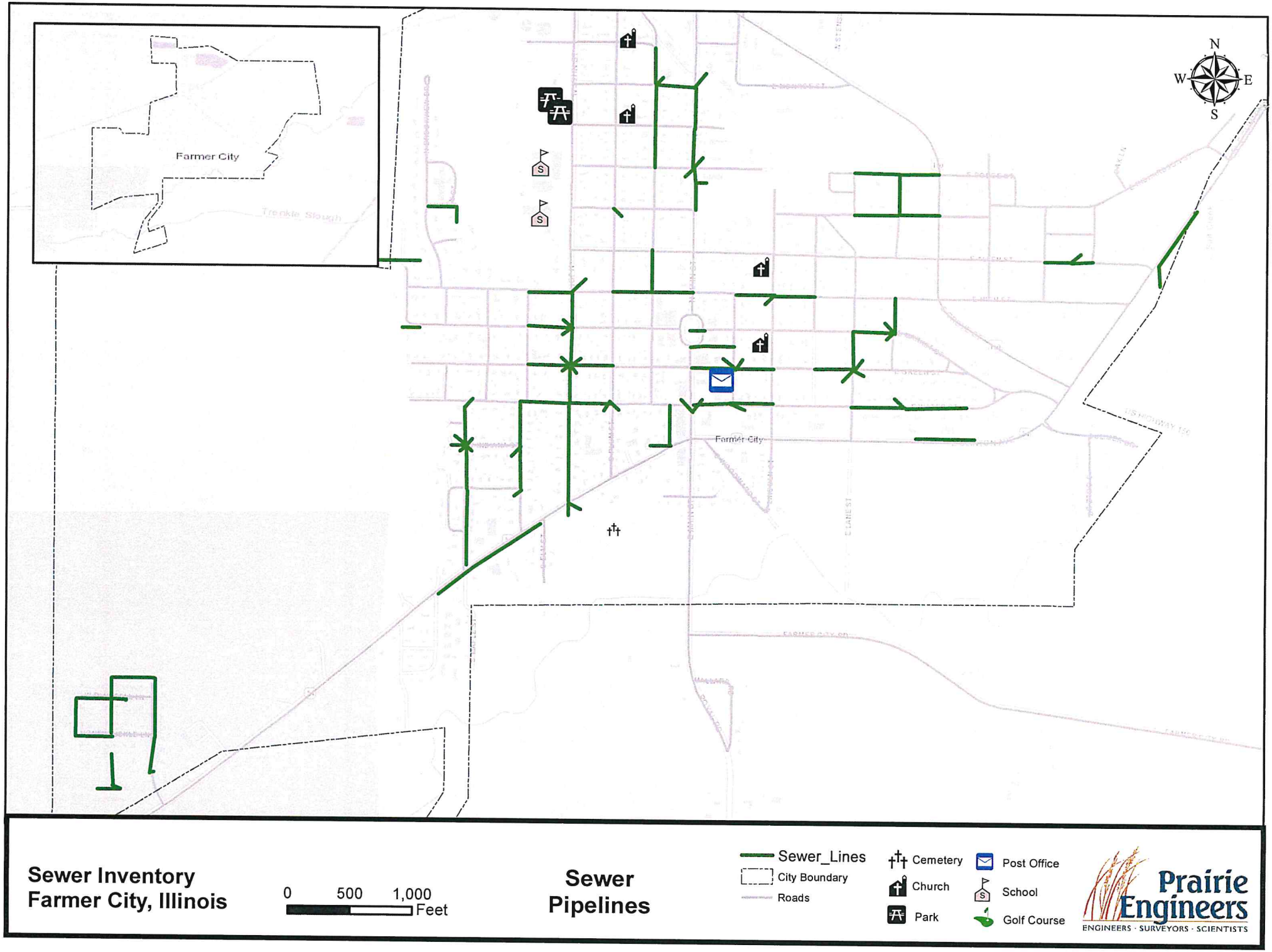
Appendix L

Sewer Inventory – Sewer Pipes


Farmer City
Trenkle Slough
N
W
E
S
Farmer City
Sewer Inventory
Farmer City, Illinois
0
500
1,000
Feet
Sewer
Pipelines
Sewer_Lines
City Boundary
Roads
Cemetery
Church
Park
Post Office
School
Golf Course
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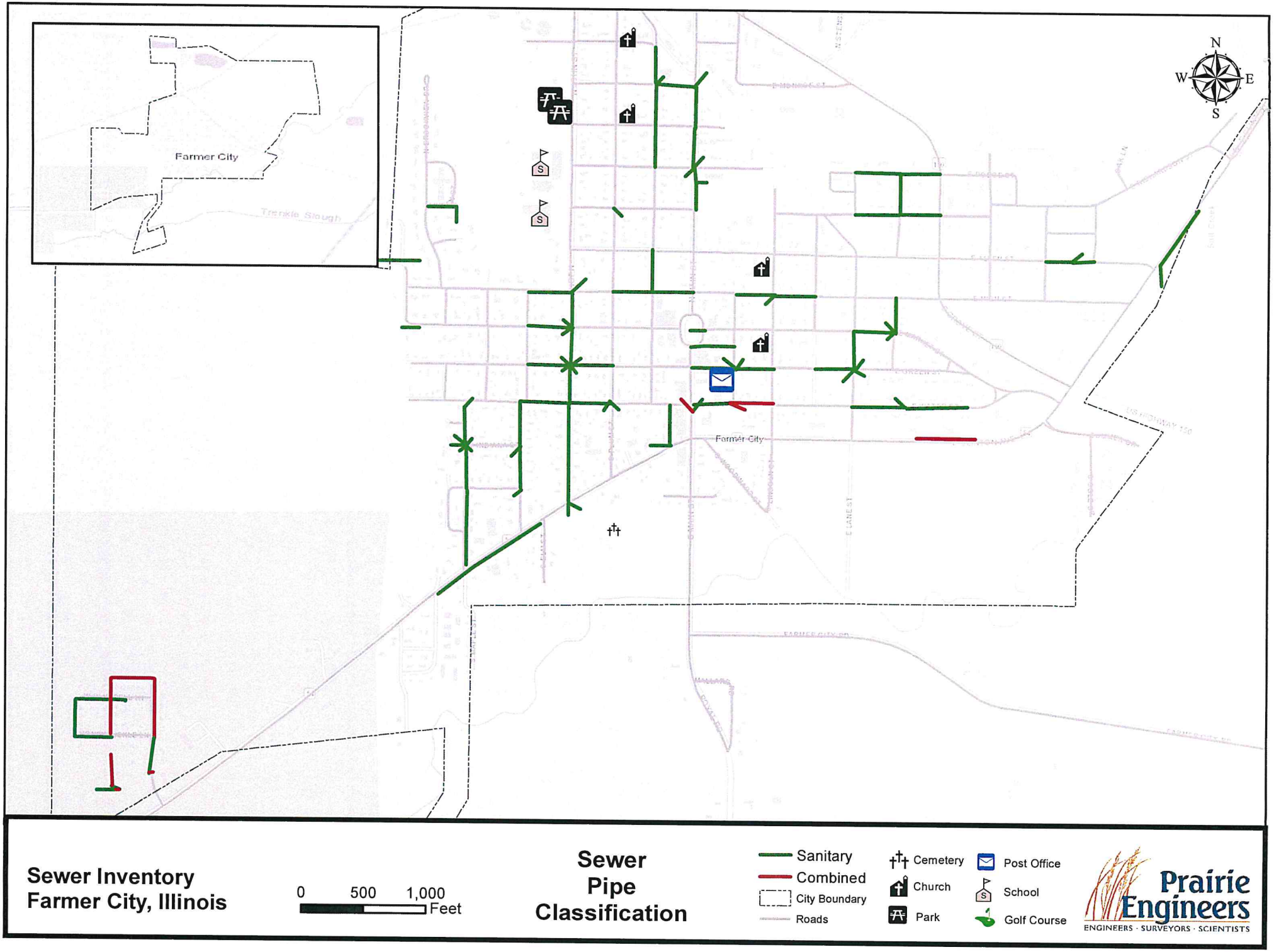
Appendix M

Sewer Inventory – Sewer Classification


Farmer City
Trenkle Slough
N
W
E
S
Farmer City
Sewer Inventory
Farmer City, Illinois
0
500
1,000
Feet
Sewer
Pipe
Classification
Sanitary
Combined
City Boundary
Roads
Cemetery
Church
Park
Post Office
School
Golf Course
Prairie Engineers
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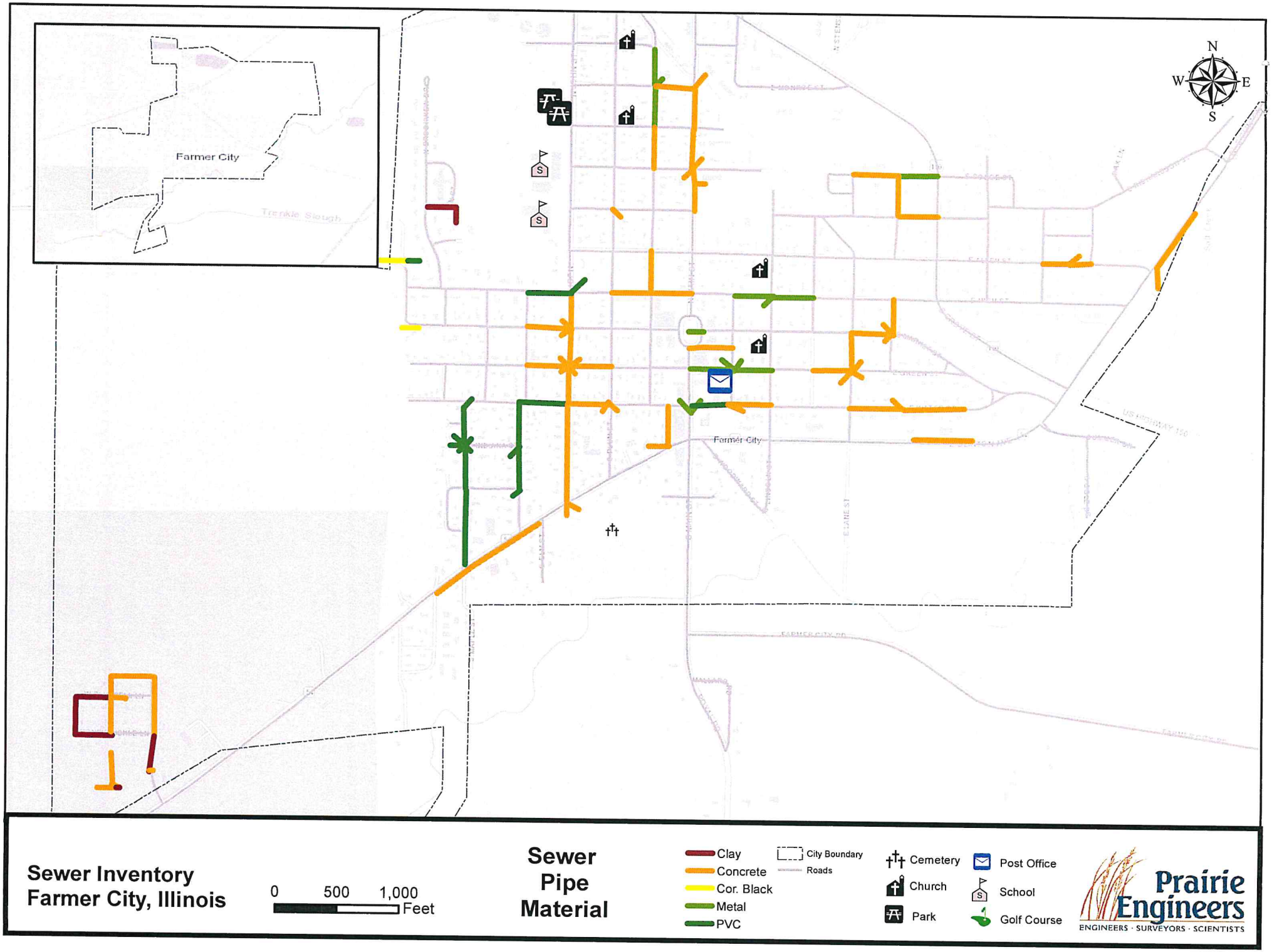
Appendix N

Sewer Inventory – Sewer Pipe Materials


Farmer City
Trenkle Slough
N
W
E
S
Farmer City
Sewer Inventory
Farmer City, Illinois
0
500
1,000
Feet
Sewer
Pipe
Material
Clay
Concrete
Cor. Black
Metal
PVC
City Boundary
Roads
Cemetery
Church
Park
Post Office
School
Golf Course
Prairie Engineers
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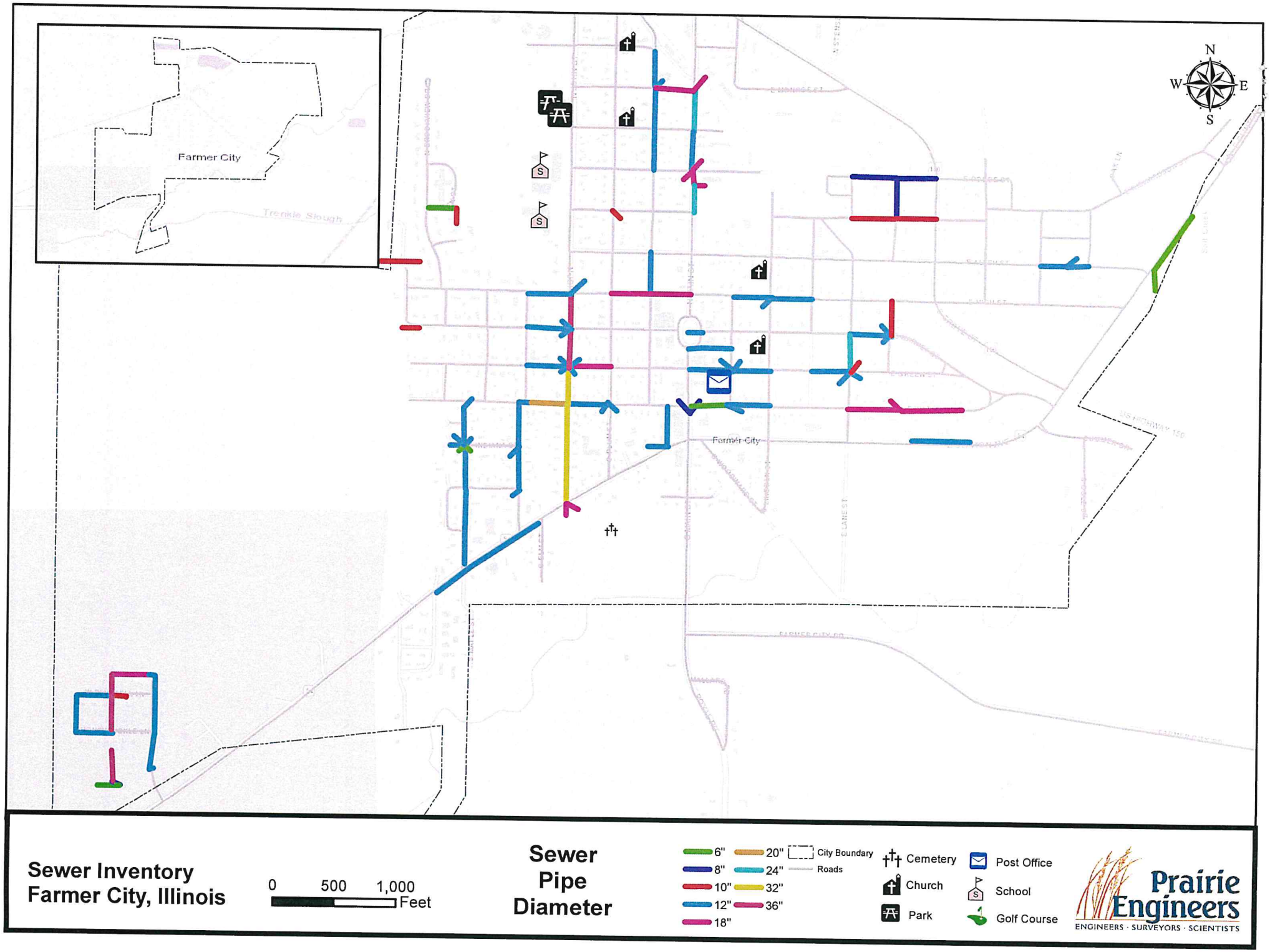
Appendix O

Sewer Inventory – Sewer Pipe Diameter


Farmer City
Trenkle Slough
N
W
E
S
Farmer City
US HIGHWAY 150
Sewer Inventory
Farmer City, Illinois
0
500
1,000
Feet
Sewer
Pipe
Diameter
6"
8"
10"
12"
18"
20"
24"
32"
36"
City Boundary
Roads
Cemetery
Church
Park
Post Office
School
Golf Course
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