TRUNK SANITARY SEWER & WATERMAIN ANALYSIS

for the City of

THE LITTLE CITY ON THE CROW

Hanover

WSB & Associates, Inc.

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INFRASTRUCTURE - ENGINEERS - PLANNERS

March 2007

TRUNK FEE ANALYSIS

Sanitary Sewer and Water System

For the
City of Hanover, MN

March 6, 2007

Prepared by

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March 6, 2007

Honorable Mayor and City Council
City of Hanover
11250 5th Street NE
Hanover, MN 55341

Re: Trunk Fee Analysis
Sanitary Sewer and Water System
for the City of Hanover, MN
WSB Project No. 01272-24

Dear Mayor and Council Members:

Thank you for the opportunity to prepare the enclosed Trunk Sanitary Sewer and Water Main Analysis. We have developed a trunk fee scenario that corresponds with the projected City growth and establishes a trunk area charge for the Sanitary Sewer and Water System for the City of Hanover.

We would be happy to discuss this report with you at your convenience. Please don't hesitate to contact me at (320) 252-4900 if you have any questions regarding this report.

Sincerely,
WSB & Associates, Inc.

Michael J. Nielson, PE
City Engineer

Enclosure

Certification

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision, and that I am a duly licensed professional engineer under the laws of the State of Minnesota.

Michael J. Nielson, PE

Date: March 6, 2007 Lic. No. 23623

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I. Introduction

A. Description

The City of Hanover has recently annexed approximately 300 acres of land adjacent to the southwest portion of the City. In addition, the City is contemplating annexing more land and has been engaged with Rockford Township in an effort to reach agreement on orderly annexation. In an effort to provide municipal services, including sanitary sewer and a domestic water supply, the City Council has authorized WSB & Associates, Inc. to prepare a trunk sewer and water plan.

As development occurs within the newly annexed areas of the City of Hanover, utilities will be constructed to serve these areas. In most instances, portions of the utility improvements need to be large enough to serve extensive areas outside of the immediate development. These utilities are called trunk improvements and are paid for through trunk fees. Trunk fees can be collected on a gross acre or net acre of development basis and are uniform across the service area.

This study has examined the trunk fees and future improvements for the proposed annexation area southwest of the current Hanover City limits and makes recommendations regarding the funding of the trunk improvements for the City of Hanover. The recommended trunk fees are determined based on net developable acres. The net developable area will include all area for public right-of-way, ponding, park land and other open space.

B. Scope

The scope of this report is limited to establishing a preliminary trunk sewer and water plan and trunk area charge for the sanitary sewer and water system based on development within the proposed City of Hanover annexation area, ***Figure 4***. We have made preliminary assumptions as to future sanitary sewer and water improvement needs based on information provided by staff and the draft comprehensive plan. We also examined the cost of the improvements and the financial ramifications of various funding mechanisms. Included in the assumptions for future sanitary sewer and water main improvement costs are estimated legal, engineering, administrative and finance fees. Additional costs to obtain permanent utility easements if necessary are not included in the estimated construction cost for trunk sanitary and water service. In addition, costs for water supply such as towers and wells are not included in the cost estimates. Water supply, elevated storage and treatment will be funded through WAC fees. It is assumed that the requirements for well capacity and storage needs will be met by Joint Powers Water Board which serves Hanover, Albertville and St. Michael. It is anticipated that the Board will increase user fees to fund necessary well and tower improvements.

C. Trunk Fee Policy

The underlying trunk fee philosophy is that new development should fund system expansions required to accommodate the new growth. However, an individual development or parcel should not be solely responsible for improvements that benefit an entire region of the City. This philosophy, as related to the sanitary sewer and water main, is instituted by requiring a developer to pay for the construction of the minimum pipe size required for the development and requiring the City to pay for the differential or over sizing cost to increase the pipe size to what is needed by the region and fund the cost to extend the system to the individual properties. It is for this reason that the equivalent cost of an eight-inch sanitary or water main pipe has been subtracted from the cost estimates. It is assumed that the developer will pay for the construction those minimum pipe costs to serve their proposed development. The City then collects a trunk fee from all properties within the region to pay for the over sizing cost. Sanitary sewer lift stations and utility appurtenances are also considered as trunk improvements.

The trunk fee program can either be based on the gross acreage or net developable acreage available, and is set at a rate to pay for the anticipated trunk improvements necessary within the City. The city of Hanover chose to establish a trunk fee based on net acreage. The net acreage is determined by removing land that is unsuitable for development such as lakes or wetlands. Once established, the trunk fee should be reviewed annually to determine if modifications are necessary.

From a financial viewpoint, trunk fees are deposited in a sanitary sewer or water main fund, as appropriate. The funds will pay for improvements or for debt service payments, depending upon the cost of a given year's improvements. To perform a cash flow analysis, the proposed improvements will be funded with the use of ten (10) and twenty (20) year bonds at an interest rate of four and one-half percent (4.5%).

The cash flow analysis assumes debt service payments including interest for the improvements discussed herein. As is common with trunk fee funds, due to the improvements being completed in advance of the development of available property, for a number of years, the fund will run at a deficit, which will need to be made up for through other funds. When the trunk funds have a positive cash flow, these monies are returned to those funds. It was assumed that the sanitary sewer trunk fund would begin with a balance of $500,000 and the water main trunk fund at a balance of $150,000 to ease the deficit and annual debt transfer. The fore mentioned assumptions are approximately half the amount that is actually available in the funds, however, a conservative assumption was made in order to leave a balance in the funds should it be necessary to use the funds for other unforeseen improvements.

II. Future Conditions

A. Orderly Annexation

Once an orderly annexation agreement has been reached, promoting growth within the annexation area will help spread out the cost associated with trunk improvements as they happen throughout the City. Developers may want to develop areas outside of the orderly annexation area before it is filled out; this is called "leapfrog development." If this happens, additional trunk charges should be charged to the developers to recover the costs associated with extending service farther out sooner then expected.

B. Ultimate Service Area

The ultimate service area includes approximately 3,700 acres of developable land within the proposed annexation area and is shown in ***Figure 4.*** In addition to the annexation are, approximately 1,911 acres of developable land exist within the current city limits, of which 480 acres have been developed. The land that is not considered developable, such as lakes and wetlands, have been removed from the gross area. This is referred to as the net area and is an estimate of the land that could be developed into residential, commercial and industrial properties.

C. Ultimate Service Area Population

To estimate the future population, the study assumed a five percent population increase each year. To determine the number of acres needed for the projected population, it was assumed that there were 3.08 people per house and 1.5 homes per acre. The following table summarizes the projected population. Under the current agreement, the St. Michael Wastewater Treatment Plant will service a Hanover population of 15,000 persons. That population will be reached in approximately the year 2049. The estimated total build out population, including current corporate limits and the proposed annexation area is 26,073 and will be reached approximately between 2055 and 2056.

Year	*Population*
2010	2890
2015	3688
2020	4707
2025	6007
2030	7667
2035	9785
2040	12488
2045	15939
2050	20342
2055	25962

A more detailed projection of the number of housing starts per year and the cumulative acres needed to produce the cash flow analyzed can be seen in ***Table 1***.

D. Ultimate Service Area Projected Wastewater Flow

The projection of future wastewater needs in a growing community is important for determining ultimate trunk sewer sizing, lift station capacities and wastewater treatment needs. To reach the projected build out population, proper planning of these systems is imperative for servicing the entire area in a manner that is cost effective for future growth, yet not a financial burden on the existing community.

The city of Hanover has a contract with the St. Michael Wastewater Treatment Plant to provide wastewater treatment to a population of 15,000 residents. The flow of sanitary waste is further controlled by an existing 24-inch sanitary sewer line located at the intersection of 15th Street North and River Road. Currently, all of Hanover's wastewater flows through this 24-inch pipe north to the City of St. Michael for treatment. To determine design flows, the Recommended Standards for Wastewater Facilities, commonly referred to as "Ten States Standards", recommends an average day design value of 100 gpcd for new residential growth. Typical peaking factor developed for various flow rates will be used to determine peak flows. ***Table 2*** shows the serviceable areas associated with pipe sizes at minimum grade, assuming a peaking factor of 2.7 as recommended by the "Ten State Standards" for a population of 15,000.

Assuming 1.5 housing units per acre as recommended by the City of Hanover Planning Commission and 3.08 persons per unit as outlined in the Hanover Comprehensive Plan 2002, this 24-inch pipe can serve a population of 15,000 persons or a flow of 2,871 gallons per minute (gpm). Using the above outlined assumptions, this is approximately 3,247 acres.

The existing development currently served by sewer and water within the corporate limits is approximately 480 acres and generates a peak hour flow of approximately 416 gpm. To ensure that all areas within the corporate limits can be served with the 24" sanitary sewer line, assumption were made as to areas of future development (sanitary and water service). The assumed areas are shown in ***Figure 3*** and total approximately 1,431 acres and generate and additional flow of 1,240 gpm, leaving a capacity of 1,215 gpm in the existing 24-inch sanitary sewer line to serve a portion of the proposed annexation area. The area that can be served within the annexation area with that remaining capacity is again estimated using the above mentioned assumptions and totals approximately 1,403 acres.

The 24-inch sanitary sewer line receives flow from two sanitary service lines in Hanover, the 15-inch gravity line which runs north on River Road NE and the 12-inch force main from the lift station located on C.S.A.H. 34. Though the 24-inch sanitary sewer line can serve Hanover at the above outlined flows, the 15-inch sanitary sewer is limited to a 1,123 gpm capacity or an approximate service area of 1,296 acres. It is estimated using the above mentioned criteria, that the areas proposed for future development within the corporate limits which would be served by the 15-inch gravity sewer would use the remaining capacity of the 15-inch.

It is therefore recommended that the portion of the annexation area that will be served by the remaining 1,215 gpm capacity of the existing 24-inch pipe be routed through the C.S.A.H. 34 lift station and 12-inch force main to reserve the remaining capacity in the 15-inch gravity sewer future development within the south and east sides of Hanover's current city limits.

The C.S.A.H. 34 lift station has a required minimum flow of 940 gpm and at the current capacity can serve approximately 1,085 acres. As development occurs the lift station would eventually need to be upgraded to an ultimate capacity of 1,850 gpm. The 12-inch force main that routes the flow north along C.S.A.H. 19 and east along 15th Street to the 24-inch pipe is anticipated to have sufficient capacity for the increasing flows.

For the purpose of the study, Hanover's Annexation Area is divided into serviceable areas or "systems" to determine trunk sewer and lift station locations. The sewer flows by gravity to a common collection point, a lift station or trunk sanitary sewer line. The gravity sewer system within each area is governed by topography of the land. ***Figure 5*** illustrates the potential future sewer "systems" and trunk sanitary sewer layout within the annexation area.

System 1 consists of 1,442 buildable acres and will generate an ultimate peak hour flow of 1,249 gpm. System 1 will be served by the existing Hanover sanitary sewer system under the limit of service to a population of 15,000 persons.

Directly to the west of System 1 are proposed System 2 and System 3, which consist of 908 and 1,382 buildable acres and generate an ultimate peak hour flow of 787 and 1,197 gpm respectively. System 2 consists of one lift station. The sewer would be pumped north to future district sanitary sewer lines planned by the City of St. Michael. System 3 is proposed to be served completely by gravity sewer and would also flow north to future district sanitary sewer lines. The locations of the future district sanitary sewer lines are depicted as proposed in St. Michael's Comprehensive Sanitary Sewer Plan and are shown in ***Figure 5***.

As the population of Hanover continues to grow, trunk sanitary sewer extensions will continue to the west as depicted in ***Figures 7, 8 & 9***. The sanitary sewer improvements in the annexation area will eventually serve a total of 3,732 acres of single family, low-density residential and commercial/industrial development through a series of trunk sanitary sewer extension projects.

E. Ultimate Service Area Projected Water Use

The per capita water use based on total system consumption including industrial and commercial, was estimated at 150 gallons per capita per day (gpcd). To determine an upper estimate of water system demands, the build-out population of 26,075 is multiplied by a water consumption of 150 gpcd. The build out average day water consumption is approximately 3.91 million gallons per day (mgd). Using an average peak day to average day system demand ration of 2.75, an upper end non-event peak day water system demand of approximately 10.8 mgd can be projected. ***Table 3*** indicates the projected water supply and storage needs over the next 60 years based upon the anticipated growth projection.

The area near County Road 20 and County Road 144, which is proposed for development in the near future, along with a major portion of the entire System 1 area, could be provided water by extension of the trunk water main that currently serves Hanover and St. Michael. This trunk watermain would need to be extended west and southwest along County Road 20.

It will be necessary to provide a detailed evaluation, including modeling, of the existing water system to determine the need for significant expansion of the water system to serve future development within the current Hanover Corporate boundaries and the proposed annexation area. Assumptions were made as to probable water main pipe sizes for the purpose of estimating costs, however, it is recommended that detailed modeling of water service to the area be performed.

A portion of the area within System 1 and most of the areas within System 2 and 3 are at higher elevations than the areas in Hanover served by the current water system. It will be necessary to operate these higher elevation areas on a separate, higher, pressure zone. Connection of this higher pressure zone to the existing pressure zone would need to be made through combination pressure reducing valves and booster pump stations. A potential site for water supply, storage and possibly treatment should be considered in the annexation area that would supplement the capacity of the existing water system

Due to the general nature of estimating trunk fees and the variability of development that may occur, higher water system demand values will be used in projecting trunk system improvements. The actual system needs will be determined as the City develops.

III. Sanitary Sewer Fund

A. Description

A Sanitary Sewer Fund can receive money from a number of sources including basic and waste water treatment plant (WWTP) connection charges, trunk area charges and lift station connection charges. We have not examined the connection charges and have assumed that they are appropriately charged to meet the needs of the treatment system. In other cities, expenditures from this type of fund are typically used for capital outlay and trunk improvements. Sometimes these funds are used for maintenance and vehicle purchases in order to keep the user fees as low as possible.

The trunk area charges should pay for the sanitary sewer over sizing costs including the lift stations within the system. The user rates should pay for the combined operation and maintenance costs of the sanitary sewer system and the wastewater treatment facility. The sanitary access charge (SAC) should be used to pay for future wastewater/water treatment expansions.

B. Improvements

The sanitary sewer trunk system improvements need to serve the anticipated development to build-out the City. It should be noted that the project dates are only approximate and are based on the anticipated needs for each sewer system. It is important to remember that the trunk fee analysis only looks at the broad picture of servicing the entire ultimate service area; it does not analyze the feasibility of various options for each individual trunk system improvement. The goal is to provide a reasonable basis for establishing a trunk fee to recover the costs of actual future trunk improvements that will be further studied as development occurs. City staff will continue to look for short term solutions that will minimize large expenditures while building the trunk fund balance through trunk area charges. Large expenditures will be proposed at the appropriate time. It is important for the City to place emphasis on their orderly annexation plan, allowing development beyond the orderly area too soon will cause a larger up front debt service. The date at which improvements happen will affect the trunk fee charge, as well as the fund balance.

The preliminary project costs are in 2006 construction dollars and they include construction, engineering, legal and administrative costs. Changes in construction costs will generally be tied to the Engineering News Record Construction Cost Index. The construction cost index has averaged around 2% during the last decade. A slightly more conservative value of 3.0% will be used as part of the cash flow analysis to estimate the future cost for each potential improvement. It is important to note that the timing of these improvements is flexible and will be directly dependent on the development patterns that occur.

The trunk sewer improvements indicated in this report are based on the existing treatment plant location; if that is changed, the trunk system can be redirected and analyzed in the future as development is further defined.

C. Cost Analysis

The development of the trunk fee for 2007 and into the future is influenced by the fund balance. It is anticipated that the fees will be increased on an annual basis to keep up with inflation. Due to large up front capital expenditures to provide services to new areas prior to the development occurring, it is difficult to keep the fund balance positive while still keeping the trunk fee affordable for new development. As the growth begins to increase and more development occurs, the growth catches up with the capital expenditure needs, thereby creating a surplus in the fund balance during the later years. To help balance the fund throughout the entire period a tiered approach to the annual fee multiplier will be looked at as well. Increasing the fees at a higher rate for the first few years allows for a smaller starting trunk fee, and reducing the multiplier later reduces the fund surplus at the end. The established trunk fee depends largely on how far and how long the city is willing to let the fund go into a negative balance during the early years. The corresponding trunk fee recommendation is listed below:

Sanitary Sewer System

Fund	Annual Fee Multiplier (Years 1 – 10)	Annual Fee Multiplier (Years 11 – 60)	2007 Trunk Fee
Sanitary Sewer System	5%	3%	$2,600.00

These fees are in addition to the existing SAC fees currently being charged.

IV. Water System Fund

A. Description

The Water System Fund can be funded from a number of sources including connection charges and trunk area charges. Expenditures from this fund are used for capital improvements such as trunk water main, water towers and water supply wells. As with the Sanitary Sewer Fund, we do not recommend using this fund for items such as operation and maintenance, equipment replacement, line repair and vehicles. The same reasoning applies to the Water System Fund that was mentioned for the Sanitary Sewer System Fund.

B. Improvements

The water system improvements are based on the proposed development build out of the City and fall into two categories. The first category is trunk water main improvements. The second category is water supply improvements, which include towers, wells, pump houses and storage.

The water main trunk fee was established based on the trunk improvement only and does not include funds for water supply improvements. The water supply system improvements are based on the firm capacity of the wells and the volume of elevated storage available. These are compared with several design criteria including maximum probable fire demand, maximum day demand and nighttime tower filling. The water supply and storage needs are outlined in ***Table 3***. Hanover is supplied with water through Joint Powers Water Board. It is assumed that the cost associated with water supply improvements will be funded through increases in user fees charged by Joint Powers Water Board.

The total amount of water storage needed by 2065 is approximately 4.7 million gallons. The water storage needs are determined by taking the required fire fighting storage plus additional equalization storage. The required fire fighting storage is based upon a peak flow rate of 3,500 gpm for a duration of three hours. The additional equalization storage is approximately 30 percent of the maximum day water demand.

The trunk watermain improvements developed are outlined in the cash flow analysis in ***Appendix A*** and include construction, engineering, legal and administrative costs.

C. Cost Analysis

Changes in construction costs will generally be tied to the Engineering News Record Construction Cost Index. As indicated under the sanitary sewer fund, a value of 3.0% will be used as part of the cash flow analysis to estimate the future cost for each project. It is important to note that the timing of these improvements is flexible and will depend on the expected development.

It is anticipated that the fees will be increased on an annual basis to keep up with inflation. To help balance the fund throughout the entire period a tiered approach to the annual fee multiplier will be looked at as well. The recommended trunk fee is listed below:

Water System

Fund	Annual Fee Multiplier (Years 1 – 10)	Annual Fee Multiplier (Years 11 – 60)	2007 Trunk Fee
Water System	5%	3%	$2,200.00

V. Summary and Recommendations

- The table below summarizes the proposed projects and includes the proposed year of constructing and engineer's opinion of probable cost in 2006 construction dollars.

Project Year	Project Summary	Project Cost (2006 Dollars)
2007	Construct a 1300 gpm ultimate L.S. near the intersection of C.S.A.H 20 & CR 144 and dual 8-inch force main to the C.S.A.H. 34 L.S. Extend 15-inch trunk sanitary sewer to Cheswick Development – Extend 16-inch water main along CSAH 20 to the Cheswick Development.	$1,687,091 (S) $1,171,415 (W)
2009	Extend 15-inch sewer west 500-feet – Extend 16-inch water main and loop with 12-inch watermain.	$59,194 (S) $167,989 (W)
2013	Construct a 200 gpm lift station near the northwest corner of the phase 1 annexation area – Extend and loop 12 and 16-inch water main.	$327,456 (S) $840,637 (W)
2017	Construct a 600 gpm ultimate L.S. near the southeast corner of the annexation area and install an 8-inch force main and 12-inch gravity line – Extend and loop water main	$783,681 (S) $332,137 (W)
2022	Construct an 800 gpm ultimate L.S. and install a 10-inch force main. Install a 12-inch gravity sewer north to serve proposed development – Extend and loop water main	$923,931 (S) $533,525 (W)
2027	Upgrade the C.S.A.H. 34 lift station – Extend and loop water main	$481,250 (S) $331,347 (W)
2032	Extend 10-inch sanitary sewer west to serve future development – Extend and loop water main	$151,766 (S) $620,999 (W)
2037	No trunk sanitary sewer project – Extend and loop water main	$0 (S) $337,765 (W)
2042	Extend 18-inch sanitary sewer south from the proposed St. Michael District sanitary sewer lines to serve proposed development – Extend and loop water main	$387,475 (S) $618,058 (W)
2047	Extend 15-inch sanitary sewer east and a 12-inch sanitary sewer south to serve proposed development – Extend and loop water main	$330447 (S) $635,680 (W)
2052	Extend 10-inch sanitary sewer south to serve proposed development – Extend and loop water main	$101,784 (S) $643,985 (W)

- Trunk fees need to be set at an appropriate rate to pay for the trunk improvements required for development.

- Trunk fees should be deposited in Sanitary Sewer and Water System Funds.

- The trunk funds should be evaluated at least every couple of years to determine if the rates are adequate to meet the current construction demands. As projects are pushed up on the schedule, or if they are delayed, the trunk fund balances will be impacted.

- In addition to the sanitary sewer trunk improvements there will be a need for additional wastewater treatment as the community grows. While not looked at in detail for this report, it may be necessary to raise the SAC fee as well. Certainly the SAC fee should also be raised on an annual basis in the same manner that the trunk funds are.

- In addition to the watermain trunk improvements, there will be a need for additional water supply and storage as the community grows. While not looked at in detail for this report, it may be necessary to raise the WAC fee as well for use to improve water towers and wells. The WAC fee should also be raised on an annual basis in the same manner that the trunk funds are.

- The funds could run at a deficit for a number of years, but would be repaid during surplus years until the funds balance. The City should look at their overall total debt service to determine the impact of running a deficit in these funds. If the deficit is too much for the City to handle at any given time, consideration should be made for an adjustment of the trunk fees as well as the WAC and SAC charges to generate additional cash flow to pay for the capital expenditures.

- It was assumed that the sanitary sewer trunk fund would begin with a balance of $500,000 and the water main trunk fund at a balance of $150,000 to ease the deficit and annual debt transfer.

- The City should encourage development in an orderly fashion to help spread out the costs associated with trunk improvements as they happen throughout the City. As a policy, the City should require that any developer or landowner requesting to develop property outside the normal development pattern would be required to pay all additional costs associated with extending the utilities to the property.

- The trunk fee distributes the estimated cost to provide trunk service to platted land per **net** acre or developable acre. The net acreage will include road right-of-way, parks and open space.

- The items included in the opinion of probable cost are for sanitary sewer and water systems only. All costs associated with roadway construction will be funded through assessments or other means and should not be directly related to the trunk fee.

- The cost to obtain permanent utility easements for future trunk sewer and water main lines was not added to the overall cost.

- The following table summarizes the trunk fees based on 2006 dollars.

Fund	Annual Fee Multiplier (Years 1 – 10)	Annual Fee Multiplier (Years 11 – 60)	2007 Trunk Fee
Sanitary Sewer	5%	3%	$2,600.00
Water System	5%	3%	$2,200.00

- The fees are scheduled to increase at 5% per year for years 1 through 10 and at 3% per year for years 11-60.

- The Trunk Fee Analysis should be considered a working document and the layouts and size of pipe may vary as more information regarding the development patterns and land use becomes available.

Tables

Table 1: Population Growth						
Year	Population		Population Increase	New Connections @	Acres Needed	Cumulative Acres Needed
	5% Growth			3.08 persons/unit	1.5 units/acre	
2005	2264					
2006	2377		113	37	25	25
2007	2496		119	39	26	50
2008	2621		125	41	27	77
2009	2752		131	43	28	106
2010	2890		138	45	30	135
2011	3034		144	47	31	167
2012	3186		152	49	33	199
2013	3345		159	52	34	234
2014	3512		167	54	36	270
2015	3688		176	57	38	308
2016	3872		184	60	40	348
2017	4066		194	63	42	390
2018	4269		203	66	44	434
2019	4483		213	69	46	480
2020	4707		224	73	49	529
2021	4942		235	76	51	580
2022	5189		247	80	53	633
2023	5449		259	84	56	689
2024	5721		272	88	59	748
2025	6007		286	93	62	810
2026	6307		300	98	65	875
2027	6623		315	102	68	943
2028	6954		331	108	72	1015
2029	7302		348	113	75	1090
2030	7667		365	119	79	1169
2031	8050		383	124	83	1252
2032	8453		403	131	87	1340
2033	8875		423	137	91	1431
2034	9319		444	144	96	1527
2035	9785		466	151	101	1628
2036	10274		489	159	106	1734
2037	10788		514	167	111	1845
2038	11327		539	175	117	1962
2039	11894		566	184	123	2084
2040	12488		595	193	129	2213
2041	13113		624	203	135	2348

2042	13768		656	213	142	2490
2043	14457		688	224	149	2639
2044	15180		723	235	156	2796
2045	15939		759	246	164	2960
2046	16735		797	259	172	3132
2047	17572		837	272	181	3313
2048	18451		879	285	190	3504
2049	19373	*	923	300	200	3703
2050	20342		969	315	210	3913
2051	21359		1017	330	220	4133
2052	22427		1068	347	231	4364
2053	23548		1121	364	243	4607
2054	24726		1177	382	255	4862
2055	25962	**	1236	401	268	5129
2056	27260		1298	421	281	5410

* Population 15,000 – Current sewer capacity reached under present agreement with St. Michael's wastewater treatment plant

** Population 26,073 – 5,643 acres – 1,911 acres in current corporate limits + 3,732 acres in the annexation area equals total build-out

Table 2: Pipe Capacity - Full Pipe at Minimum Grade					
Size of Pipe	**Size of Pipe**	**Slope**	**Manning's Equation**	**Serviceable Acres**	**gallons per minute (Peak Flow)**
inches	**feet**		**cf/s**	**acres**	**gpm**
8	0.67	0.0040	0.76	396	343
10	0.83	0.0028	1.16	600	520
12	1.00	0.0022	1.67	865	750
15	1.25	0.0015	2.50	1296	1123
18	1.50	0.0012	3.64	1885	1633
21	1.75	0.0010	5.01	2595	2248
24	2.00	0.0008	6.40	3314	2871
27	2.25	0.00067	8.01	4152	3597
30	2.50	0.00058	9.87	5116	4432
33	2.75	0.00052	12.06	6246	5411
36	3.00	0.00046	14.30	7409	6418
42	3.50	0.00037	19.35	10023	8683

Assumptions:

1.5	units/acre
3.08	persons/home
100	gallons/person/day
2.7	Peak

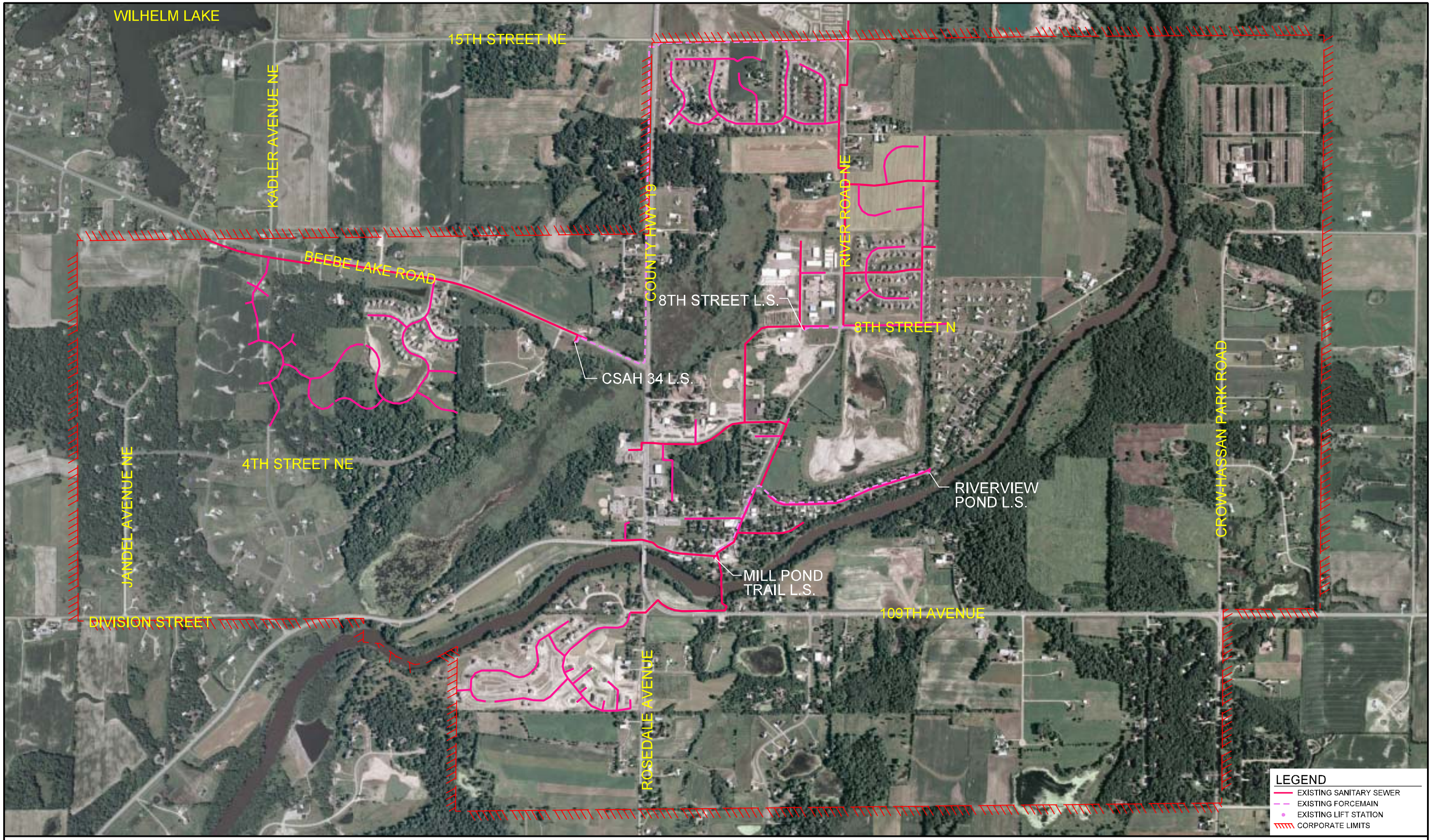
Full Pipe Flow @ Minimum Grades
(cf/s*646272)/(2*3.08*100*2.7)

Table 3: Projected Water Supply and Storage Needs

Design Year	2007	2009	2013	2017	2020	2025	2030	2035	2040	2045	2050	2055	2060	2065	2067	2070
Estimated Population Served	1,919	2,116	2,572	3,127	3,619	4,619	5,896	7,525	9,603	12,257	15,643	19,965	25,481	32,520	35,854	41,505
Equivalent Per Capita Use (gpcd)	150	150	150	150	150	150	150	150	150	150	150	150	150	150	151	150
Average Day Water Use (gpd)	287,918	317,429	385,837	468,988	542,912	692,909	884,347	1,128,675	1,440,507	1,838,493	2,346,435	2,994,711	3,822,095	4,878,069	5,413,925	6,225,790
Max/Avg. Day Multiplier	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
Maximum Daily Water Use (gpd)	791,774	872,931	1,061,053	1,289,717	1,493,008	1,905,499	2,431,953	3,103,857	3,961,395	5,055,856	6,452,696	8,235,456	10,510,761	13,414,691	14,888,295	17,120,923
Maximum Daily Water Use (gpm)	550	606	737	896	1,037	1,323	1,689	2,155	2,751	3,511	4,481	5,719	7,299	9,316	10,339	11,890
Required Well Firm Capacity (gpm)	550	606	737	896	1,037	1,323	1,689	2,155	2,751	3,511	4,481	5,719	7,299	9,316	10,339	11,890
Required Fire Fighting Demand (gpm	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
Required Fire Fighting Duration (hou	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Total Coincident Demand (gpm)	4,050	4,106	4,237	4,396	4,537	4,823	5,189	5,655	6,251	7,011	7,981	9,219	10,799	12,816	13,839	15,390
Required Draft from Storage (gpm)	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
Required Fire Fighting Storage (gpm)	630,000	630,000	630,000	630,000	630,000	630,000	630,000	630,000	630,000	630,000	630,000	630,000	630,000	630,000	630,000	630,000
Equalization Storage (gal)	237,532	261,879	318,316	386,915	447,902	571,650	729,586	931,157	1,188,419	1,516,757	1,935,809	2,470,637	3,153,228	4,024,407	4,466,488	5,136,277
Total Storage Need (gal)	867,532	891,879	948,316	1,016,915	1,077,902	1,201,650	1,359,586	1,561,157	1,818,419	2,146,757	2,565,809	3,100,637	3,783,228	4,654,407	5,096,488	5,766,277

Note: The requirements for Well Firm Capacity and Storage Needs are met by Joint Powers Water Board which serves Hanover, Albertville, & St. Michael. It is anticipated that the Board will increase user fees to fund necessary well and tower improvements

Figures



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CITY OF HANOVER

FIGURE: 1

CURRENT SANITARY SEWER SYSTEM

N

0 600 ft 1200 ft

THE LITTLE CITY ON THE CROW
Hanover

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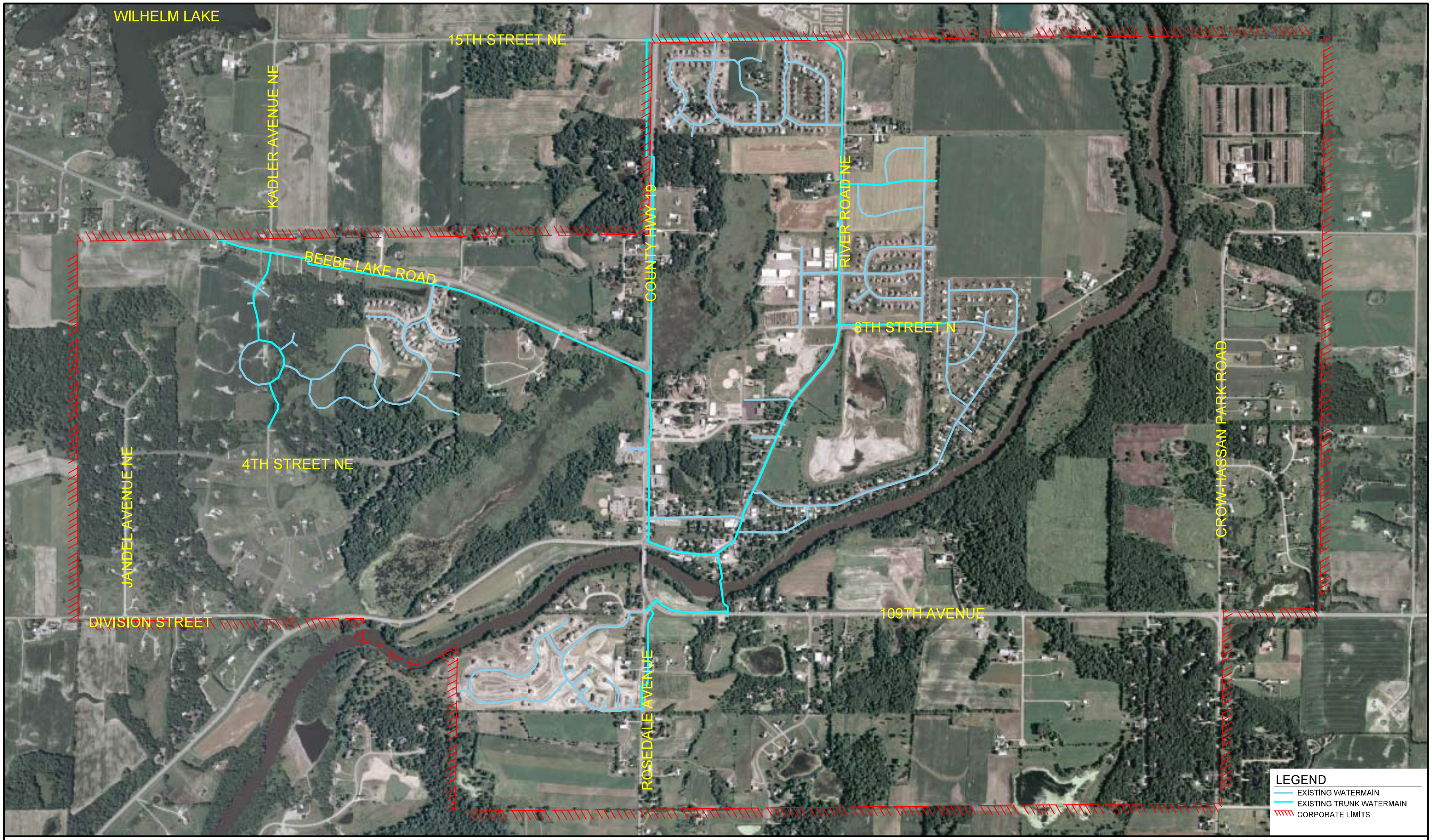

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FIGURE: 2

CURRENT WATERMAIN SYSTEM

N

0 600 ft 1200 ft

THE LITTLE CITY ON THE CROW
Hanover

F:\01272-24\CAD\Layout\REPORT\fig_02.dgn

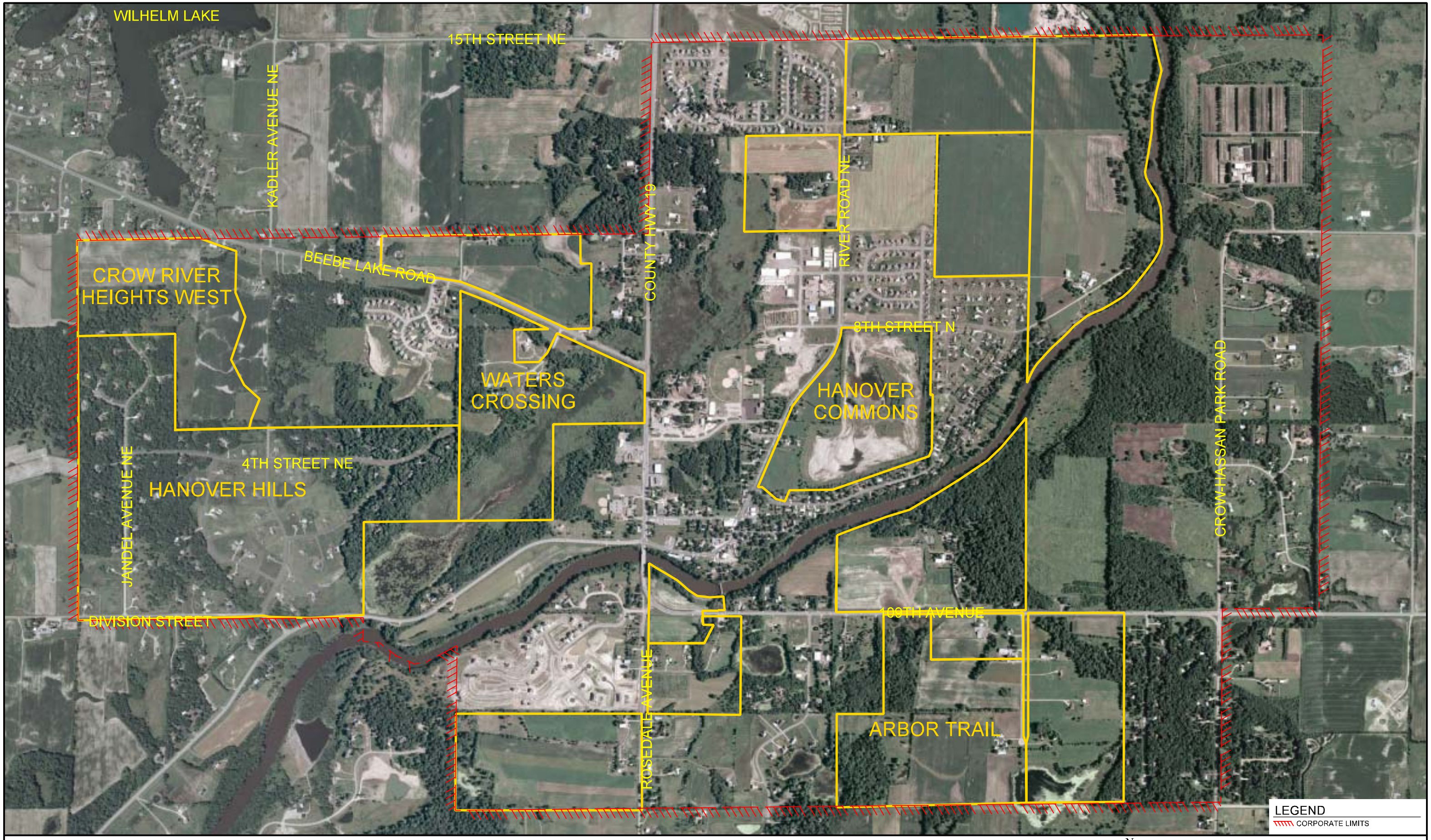

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FIGURE: 3

PROPOSED DEVELOPMENT WITHIN CORPORATE LIMITS

N

0 600 ft 1200 ft

THE LITTLE CITY ON THE CROW
Hanover

F:\01272-24\CAD\Layout\REPORT\fig_03.dgn

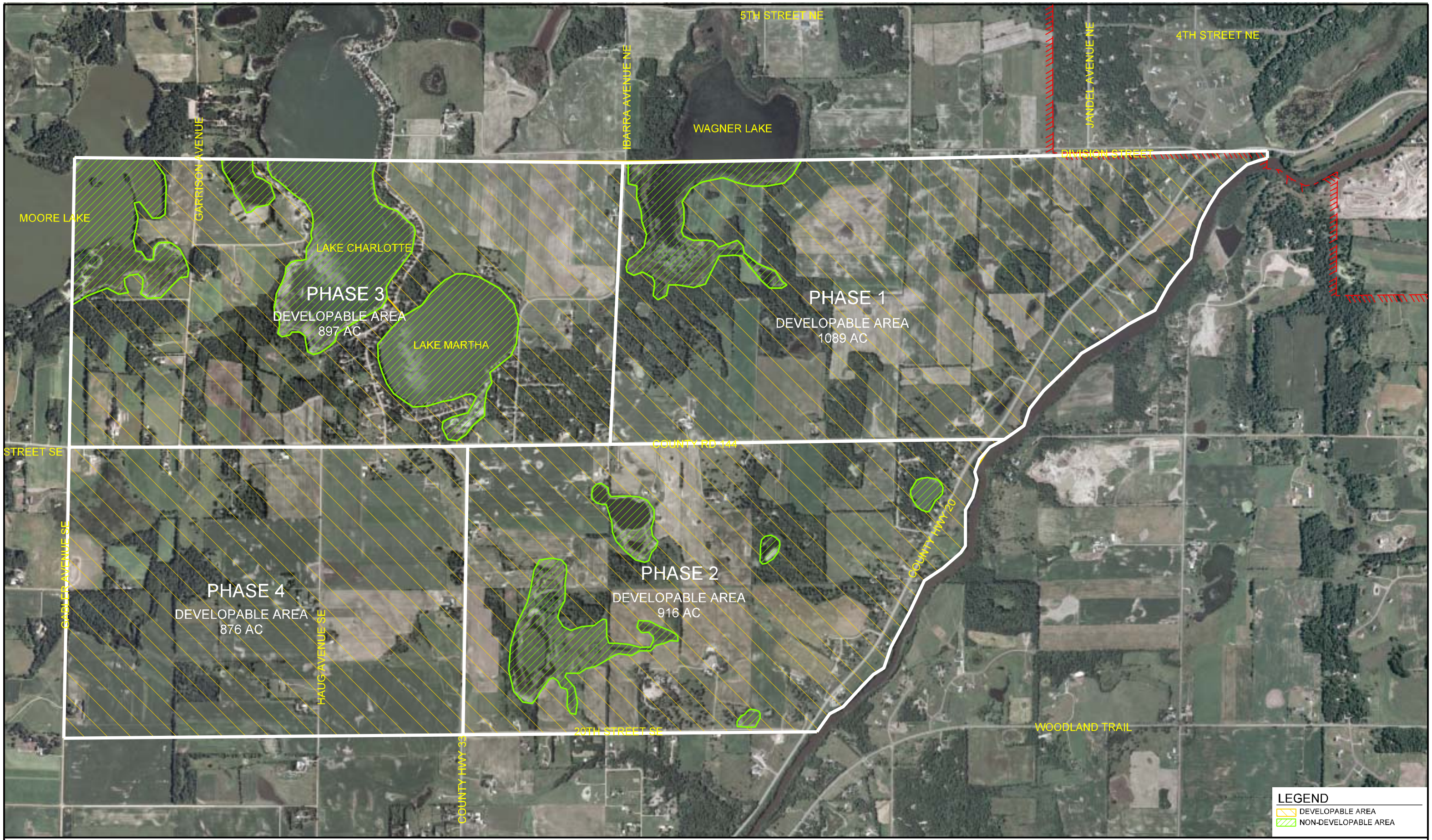

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FIGURE: 4
ANNEXATION AREA

N

0 800 ft 1600 ft

THE LITTLE CITY ON THE CROW
Hanover

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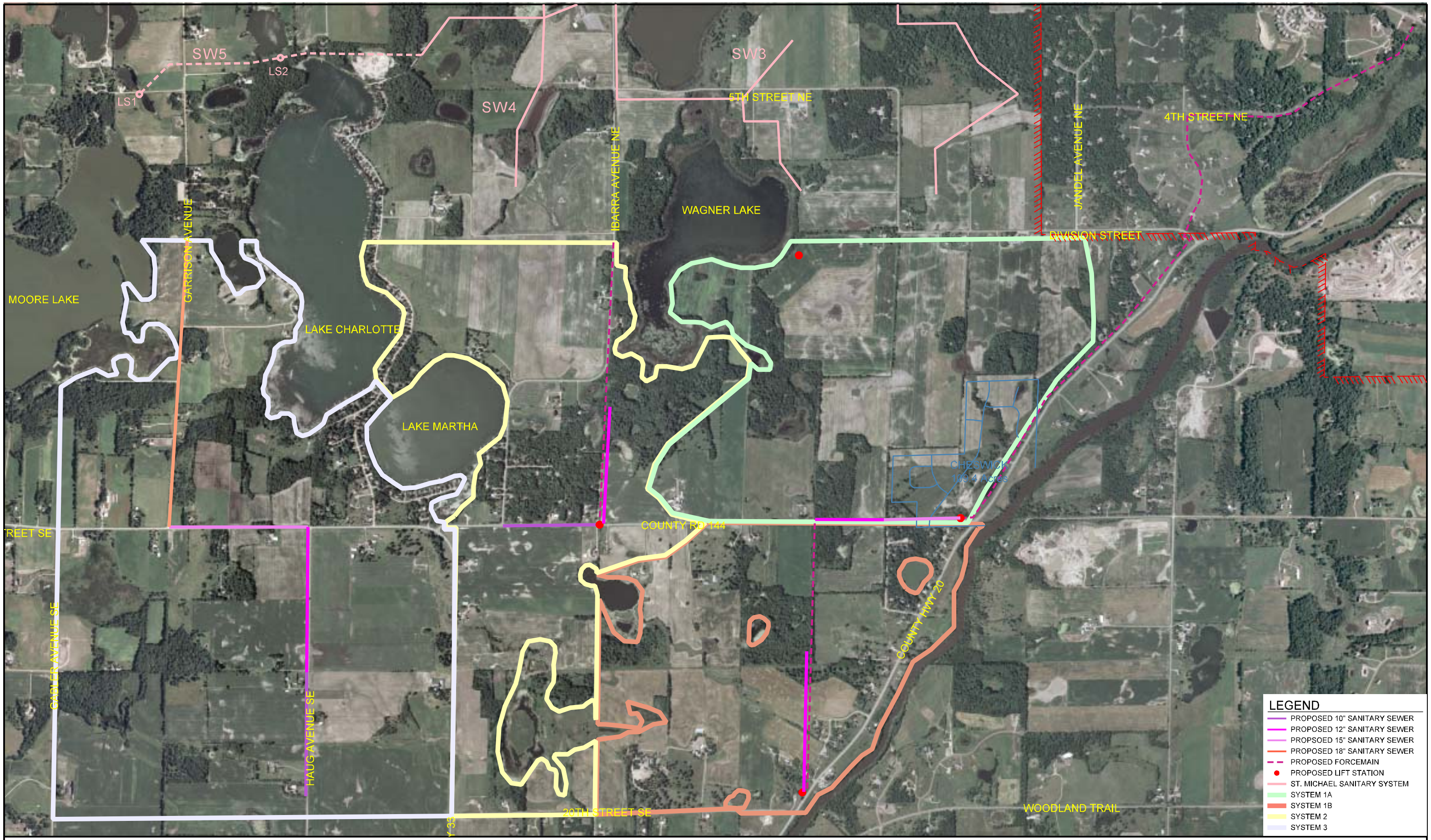

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FIGURE: 5

POTENTIAL TRUNK SANITARY SEWER SYSTEM - ANNEXATION AREA

N

0 800 ft 1600 ft

THE LITTLE CITY ON THE CROW
Hanover

F:\01272-24\CAD\Layout\REPORT\fig_05.dgn

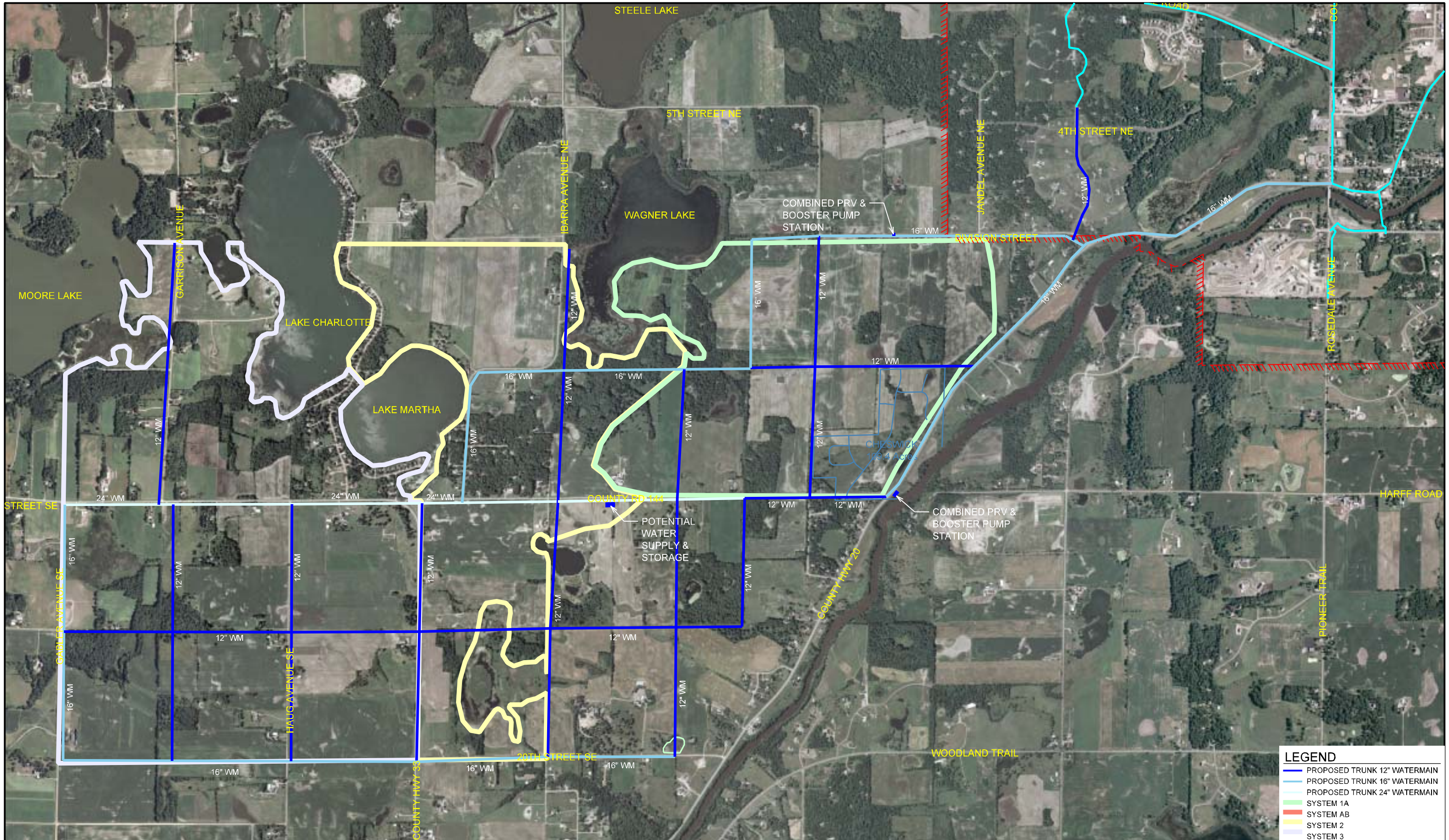

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FIGURE: 6

POTENTIAL TRUNK WATER SYSTEM - ANNEXATION AREA

N

0 900 ft 1800 ft

THE LITTLE CITY ON THE CROW
Hanover

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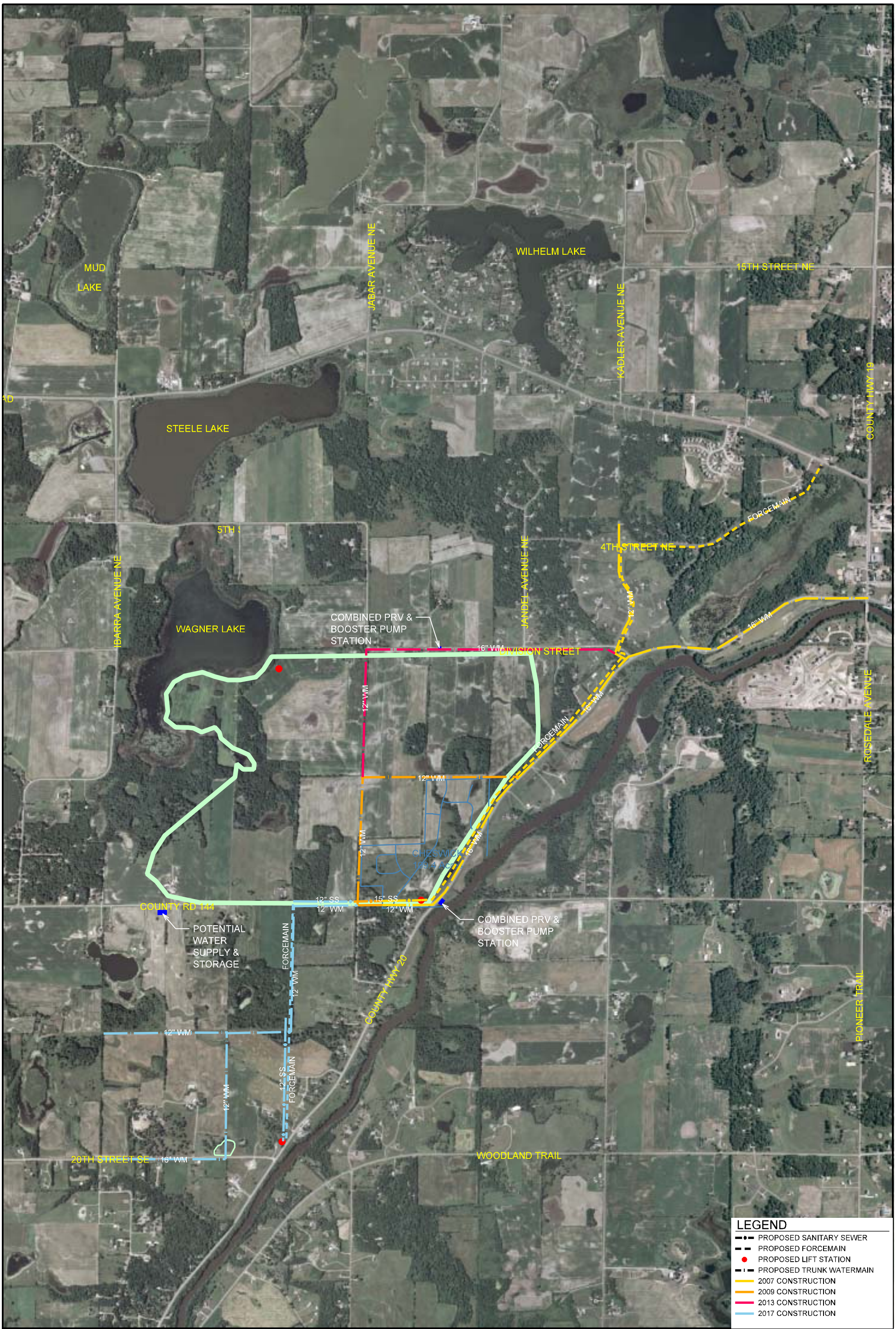

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FIGURE: 7

POTENTIAL TRUNK SANITARY SEWER & WATERMAIN SYSTEM - ANNEXATION AREA
TRUNK SANITARY SEWER & WATERMAIN SYSTEM 1

0 900 ft 1800 ft

N

THE LITTLE CITY ON THE CROW
Hanover

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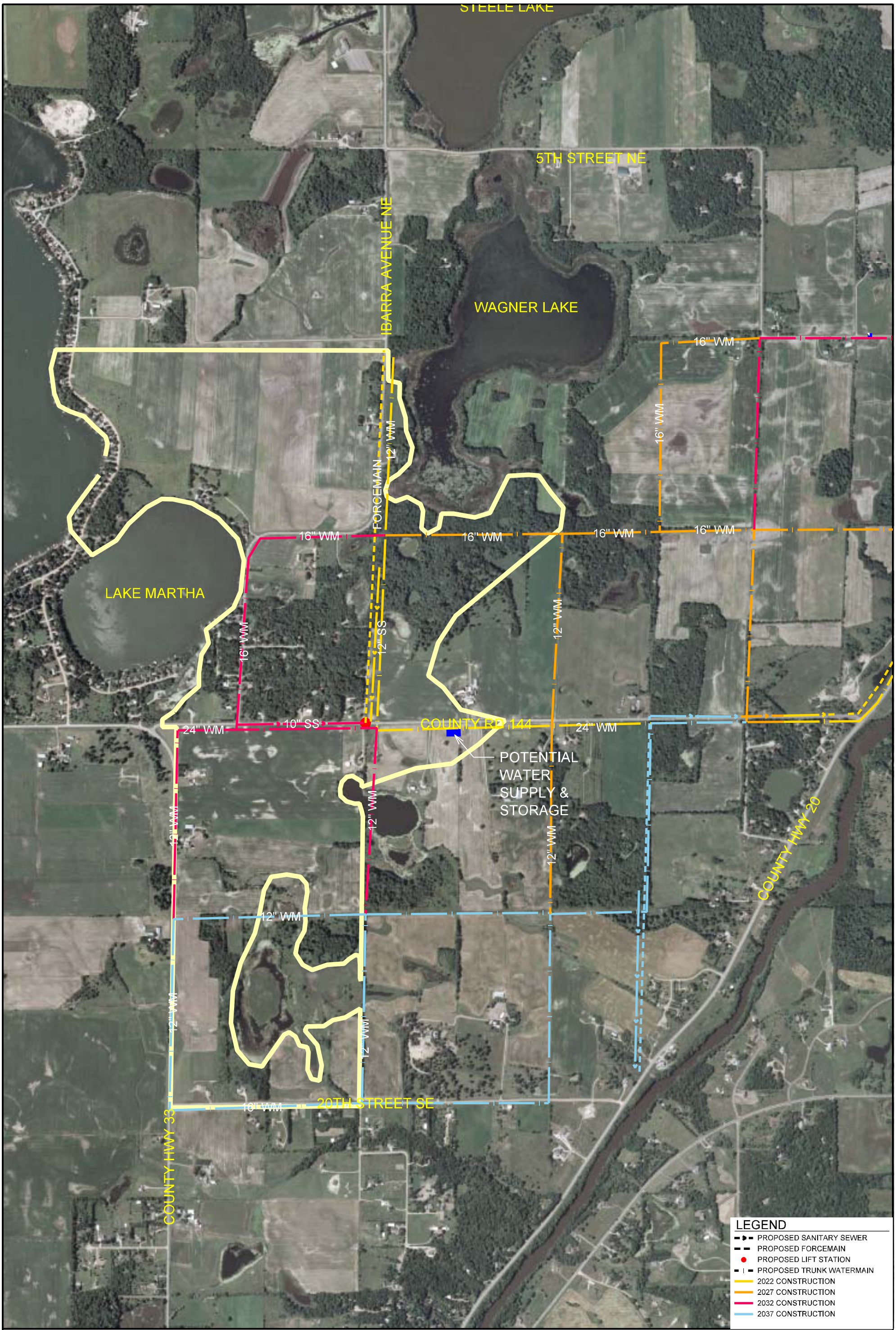

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CITY OF HANOVER

FIGURE: 8

POTENTIAL TRUNK SANITARY SEWER & WATERMAIN SYSTEM - ANNEXATION AREA

TRUNK SANITARY SEWER & WATERMAIN SYSTEM 2

0 600 ft 1200 ft

N

THE LITTLE CITY ON THE CROW
Hanover

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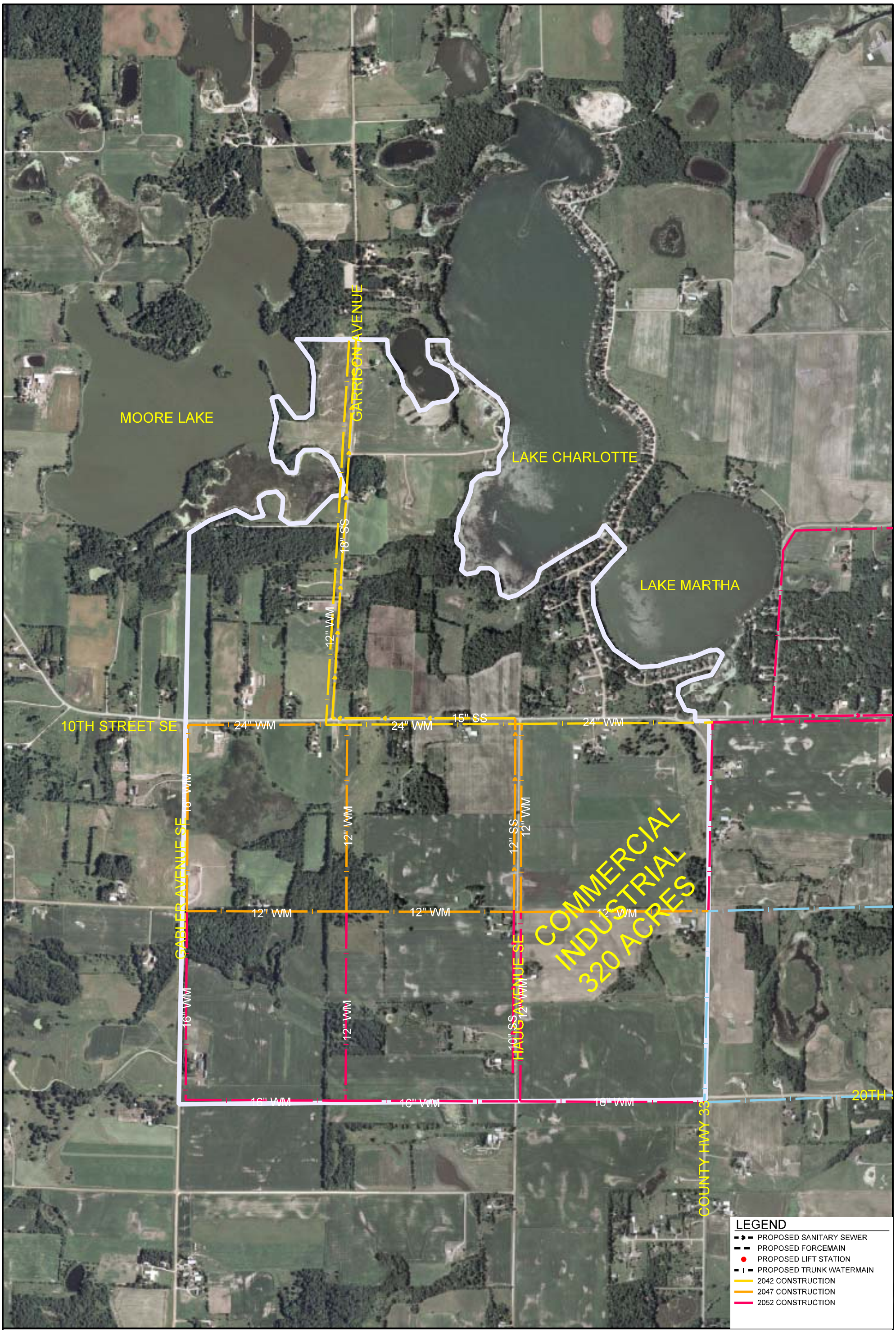

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CITY OF HANOVER

FIGURE: 9

POTENTIAL TRUNK SANITARY SEWER &
WATERMAIN SYSTEM - ANNEXATION AREA
TRUNK SANITARY SEWER & WATERMAIN SYSTEM 3

0 600 ft 1200 ft

N

THE LITTLE CITY ON THE CROW
Hanover

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Appendix A

Estimated Trunk Fees
Future Sanitary Sewer
Density - 1.5 Units/Acre

Inflation 3%
Base Year 2006
Buildable Acres 3732

Project Year	2006 Dollars Trunk Sewer	Future Year Dollars Trunk Sewer
2006	$ -	$ -
2007	$ 1,687,091	$ 1,737,703
2008	$ -	$ -
2009	$ 59,194	$ 64,683
2010	$ -	$ -
2011	$ -	$ -
2012	$ -	$ -
2013	$ 327,456	$ 402,730
2014	$ -	$ -
2015	$ -	$ -
2016	$ -	$ -
2017	$ 783,681	$ 1,084,798
2018	$ -	$ -
2019	$ -	$ -
2020	$ -	$ -
2021	$ -	$ -
2022	$ 923,931	$ 1,482,638
2023	$ -	$ -
2024	$ -	$ -
2025	$ -	$ -
2026	$ -	$ -
2027	$ 481,250	$ 895,267
2028	$ -	$ -
2029	$ -	$ -
2030	$ -	$ -
2031	$ -	$ -
2032	$ 151,766	$ 327,296
2033	$ -	$ -
2034	$ -	$ -
2035	$ -	$ -
2036	$ -	$ -
2037	$ -	$ -
2038	$ -	$ -
2039	$ -	$ -
2040	$ -	$ -
2041	$ -	$ -
2042	$ 387,475	$ 1,123,010
2043	$ -	$ -
2044	$ -	$ -
2045	$ -	$ -
2046	$ -	$ -
2047	$ 330,447	$ 1,110,268
2048	$ -	$ -
2049	$ -	$ -
2050	$ -	$ -
2051	$ -	$ -
2052	$ 101,784	$ 396,455
2053	$ -	$ -
2054	$ -	$ -
2055	$ -	$ -
2056	$ -	$ -
2057	$ -	$ -
2058	$ -	$ -
2059	$ -	$ -
2060	$ -	$ -
2061	$ -	$ -
2062	$ -	$ -
2063	$ -	$ -
Total Cost=	$ 5,234,075	$ 8,624,849
ESTIMATED TRUNK FEE=	$ 1,402	$ 2,311

Cash Flow Analysis
Sanitary Sewer Trunk Fee

City of Hanover
WSB Project No. 01272-24

Beginning Balance	$500,000	
Expenditure Inflation Rate	3.00%	
Proposed Trunk Fee	$2,600	per acre
Annual Fee Multiplier (Year 1 - 10)	5.00%	
Annual Fee Multiplier (Year 11 -60)	3.00%	

	Sanitary Trunk Fund - Density 1.5 Units/Acre							
Year	Description	Expenditures	Debt Service	Trunk Fee	Balance	Annual Debt Transfer	Total Acreage @ 5% growth	Adjusted Trunk Fee
	Beginning Balance				$500,000	$0		
2007	20 year bond @ 4.5%	$1,737,703	$0	$66,891	$566,891	$66,891	26	$2,600
2008			$126,331	$73,747	$514,307	($52,584)	27	$2,730
2009	10 year bond @ 4.5%	$64,683	$126,331	$81,306	$469,282	($45,025)	28	$2,867
2010			$134,229	$94,122	$429,176	($40,107)	31	$3,010
2011			$134,229	$103,770	$398,717	($30,459)	33	$3,160
2012			$134,229	$114,406	$378,894	($19,823)	34	$3,318
2013	10 year bond @ 4.5%	$402,730	$134,229	$126,133	$370,798	($8,096)	36	$3,484
2014			$183,402	$146,014	$333,411	($37,388)	40	$3,658
2015			$183,402	$160,981	$310,989	($22,421)	42	$3,841
2016			$183,402	$177,481	$305,069	($5,921)	44	$4,033
2017	20 year bond @ 4.5%	$1,084,798	$183,402	$195,673	$317,340	$12,271	46	$4,235
2018			$262,267	$222,202	$277,275	($40,065)	51	$4,362
2019			$262,267	$240,311	$255,319	($21,956)	53	$4,493
2020			$254,369	$259,897	$260,847	$5,527	56	$4,628
2021			$254,369	$281,078	$287,556	$26,709	59	$4,767
2022	20 year bond @ 4.5%	$1,482,638	$254,369	$303,986	$337,172	$49,617	62	$4,910
2023			$362,157	$380,582	$355,597	$18,425	75	$5,057
2024			$312,984	$355,555	$398,168	$42,571	68	$5,209
2025			$312,984	$384,533	$469,717	$71,549	72	$5,365
2026			$312,984	$415,872	$572,606	$102,888	75	$5,526
2027	20 year bond @ 4.5%	$895,267	$312,984	$449,766	$709,388	$136,782	79	$5,692
2028			$251,739	$486,421	$944,071	$234,683	83	$5,862
2029			$251,739	$526,065	$1,218,397	$274,326	87	$6,038
2030			$251,739	$568,939	$1,535,597	$317,201	91	$6,219
2031			$251,739	$615,308	$1,899,166	$363,569	96	$6,406
2032	10 year bond @ 4.5%	$327,296	$251,739	$665,455	$2,312,883	$413,717	101	$6,598
2033			$291,701	$719,690	$2,740,872	$427,988	106	$6,796
2034			$291,701	$778,345	$3,227,515	$486,643	111	$7,000
2035			$291,701	$841,780	$3,777,593	$550,078	117	$7,210
2036			$291,701	$910,385	$4,396,276	$618,683	123	$7,426
2037			$291,701	$984,581	$5,089,156	$692,880	129	$7,649
2038			$212,837	$1,064,824	$5,941,143	$851,988	135	$7,879
2039			$212,837	$1,151,608	$6,879,914	$938,771	142	$8,115
2040			$212,837	$1,245,464	$7,912,541	$1,032,627	149	$8,358
2041			$212,837	$1,346,969	$9,046,674	$1,134,132	156	$8,609
2042	10 year bond @ 4.5%	$1,123,010	$212,837	$1,456,747	$10,290,584	$1,243,910	164	$8,867
2043			$202,205	$1,575,472	$11,663,850	$1,373,266	172	$9,133
2044			$202,205	$1,703,873	$13,165,517	$1,501,667	181	$9,407
2045			$202,205	$1,842,738	$14,806,050	$1,640,533	190	$9,690
2046			$202,205	$1,992,921	$16,596,766	$1,790,716	200	$9,980
2047	10 year bond @ 4.5%	$1,110,268	$202,205	$2,155,344	$18,549,905	$1,953,139	210	$10,280
2048			$272,683	$2,331,005	$20,608,227	$2,058,322	220	$10,588
2049			$272,683	$2,520,982	$22,856,525	$2,248,299	231	$10,906
2050			$272,683	$2,726,442	$25,310,284	$2,453,759	243	$11,233
2051			$272,683	$2,948,647	$27,986,248	$2,675,964	255	$11,570
2052	10 year bond @ 4.5%	$396,455	$272,683	$3,188,962	$30,902,526	$2,916,278	268	$11,917
2053			$183,971	$3,448,862	$34,167,417	$3,264,891	281	$12,275
2054			$183,971	$3,729,944	$37,713,391	$3,545,974	295	$12,643
2055			$183,971	$4,033,935	$41,563,355	$3,849,964	310	$13,022
2056			$183,971	$4,362,701	$45,742,085	$4,178,730	325	$13,413

Estimated Trunk Fees
Future Trunk Watermain
Density - 1.5 Units/Acre

Inflation 3%
Base Year 2006
Buildable Acres 3732

Project Year	2006 Dollars Trunk Watermain	Future Year Dollars Trunk Watermain
2006	$ -	$ -
2007	$ 1,171,415	$ 1,206,558
2008	$ -	$ -
2009	$ 167,989	$ 183,567
2010	$ -	$ -
2011	$ -	$ -
2012	$ -	$ -
2013	$ 840,637	$ 1,033,878
2014	$ -	$ -
2015	$ -	$ -
2016	$ -	$ -
2017	$ 332,137	$ 459,755
2018	$ -	$ -
2019	$ -	$ -
2020	$ -	$ -
2021	$ -	$ -
2022	$ 533,525	$ 856,150
2023	$ -	$ -
2024	$ -	$ -
2025	$ -	$ -
2026	$ -	$ -
2027	$ 535,033	$ 995,319
2028	$ -	$ -
2029	$ -	$ -
2030	$ -	$ -
2031	$ -	$ -
2032	$ 620,999	$ 1,339,240
2033	$ -	$ -
2034	$ -	$ -
2035	$ -	$ -
2036	$ -	$ -
2037	$ 337,765	$ 844,439
2038	$ -	$ -
2039	$ -	$ -
2040	$ -	$ -
2041	$ -	$ -
2042	$ 618,058	$ 1,791,304
2043	$ -	$ -
2044	$ -	$ -
2045	$ -	$ -
2046	$ -	$ -
2047	$ 635,680	$ 2,135,819
2048	$ -	$ -
2049	$ -	$ -
2050	$ -	$ -
2051	$ -	$ -
2052	$ 643,985	$ 2,508,349
2053	$ -	$ -
2054	$ -	$ -
2055	$ -	$ -
2056	$ -	$ -
2057	$ -	$ -
2058	$ -	$ -
2059	$ -	$ -
2060	$ -	$ -
2061	$ -	$ -
2062	$ -	$ -
2063	$ -	$ -
Total Cost=	$ 6,437,222	$ 13,354,377
ESTIMATED TRUNK FEE=	$ 1,725	$ 3,578

Cash Flow Analysis
Watermain Trunk Fee

City of Hanover
WSB Project No. 01272-24

Beginning Balance	$150,000	
Expenditure Inflation Rate	3.00%	
Proposed Trunk Fee	$2,200	per acre
Annual Fee Multiplier (Year 1 - 10)	5.00%	
Annual Fee Multiplier (Year 11 -60)	3.00%	

	Watermain Fund - Density 1.5 Units/Acre							
Year	Description	Expenditures	Debt Service	Trunk Fee	Balance	Annual Debt Transfer	Total Acreage @ 5% growth	Adjusted Trunk Fee
	Beginning Balance				$150,000	$0		
2007	20 year bond @ 4.5%	$1,206,558	$0	$56,600	$206,600	$56,600	26	$2,200
2008			$87,717	$62,401	$181,285	($25,315)	27	$2,310
2009	10 year bond @ 4.5%	$183,567	$87,717	$68,798	$162,366	($18,919)	28	$2,426
2010			$110,130	$75,849	$128,085	($34,281)	30	$2,547
2011			$110,130	$83,624	$101,579	($26,506)	31	$2,674
2012			$110,130	$92,195	$83,644	($17,935)	33	$2,808
2013	20 year bond @ 4.5%	$1,033,878	$110,130	$101,645	$75,159	($8,485)	34	$2,948
2014			$185,293	$112,064	$1,930	($73,229)	36	$3,096
2015			$185,293	$123,551	($59,812)	($61,742)	38	$3,250
2016			$185,293	$136,215	($108,891)	($49,078)	40	$3,413
2017	20 year bond @ 4.5%	$459,755	$185,293	$150,177	($144,007)	($35,116)	42	$3,584
2018			$218,717	$162,416	($200,309)	($56,301)	44	$3,691
2019			$218,717	$175,653	($243,373)	($43,064)	46	$3,802
2020			$196,304	$189,969	($249,708)	($6,335)	49	$3,916
2021			$196,304	$205,451	($240,561)	$9,147	51	$4,033
2022	20 year bond @ 4.5%	$856,150	$196,304	$222,195	($214,669)	$25,892	53	$4,154
2023			$258,546	$278,182	($195,033)	$19,636	65	$4,279
2024			$258,546	$300,854	($152,725)	$42,308	68	$4,407
2025			$258,546	$325,374	($85,897)	$66,828	72	$4,540
2026			$258,546	$351,892	$7,448	$93,346	75	$4,676
2027	20 year bond @ 4.5%	$995,319	$258,546	$380,571	$129,473	$122,025	79	$4,816
2028			$243,189	$411,587	$297,872	$168,398	83	$4,960
2029			$243,189	$445,132	$499,815	$201,943	87	$5,109
2030			$243,189	$481,410	$738,036	$238,221	91	$5,263
2031			$243,189	$520,645	$1,015,492	$277,456	96	$5,420
2032	20 year bond @ 4.5%	$1,339,240	$243,189	$563,077	$1,335,380	$319,889	101	$5,583
2033			$340,552	$608,968	$1,603,797	$268,417	106	$5,751
2034			$265,389	$658,599	$1,997,007	$393,210	111	$5,923
2035			$265,389	$712,275	$2,443,894	$446,886	117	$6,101
2036			$265,389	$770,325	$2,948,830	$504,937	123	$6,284
2037	20 year bond @ 4.5%	$844,439	$265,389	$833,107	$3,516,548	$567,718	129	$6,472
2038			$293,355	$901,005	$4,124,198	$607,650	135	$6,666
2039			$293,355	$974,437	$4,805,280	$681,082	142	$6,866
2040			$293,355	$1,053,854	$5,565,779	$760,498	149	$7,072
2041			$293,355	$1,139,743	$6,412,166	$846,388	156	$7,285
2042	10 year bond @ 4.5%	$1,791,304	$293,355	$1,232,632	$7,351,443	$939,277	164	$7,503
2043			$252,985	$1,333,091	$8,431,549	$1,080,106	172	$7,728
2044			$252,985	$1,441,738	$9,620,303	$1,188,753	181	$7,960
2045			$252,985	$1,559,240	$10,926,558	$1,306,255	190	$8,199
2046			$252,985	$1,686,318	$12,359,891	$1,433,333	200	$8,445
2047	10 year bond @ 4.5%	$2,135,819	$252,985	$1,823,753	$13,930,659	$1,570,768	210	$8,698
2048			$441,409	$1,972,389	$15,461,639	$1,530,980	220	$8,959
2049			$441,409	$2,133,139	$17,153,369	$1,691,730	231	$9,228
2050			$441,409	$2,306,989	$19,018,949	$1,865,581	243	$9,505
2051			$441,409	$2,495,009	$21,072,549	$2,053,600	255	$9,790
2052	10 year bond @ 4.5%	$2,508,349	$441,409	$2,698,352	$23,329,493	$2,256,943	268	$10,084
2053			$628,444	$2,918,268	$25,619,317	$2,289,824	281	$10,386
2054			$628,444	$3,156,107	$28,146,980	$2,527,663	295	$10,698
2055			$628,444	$3,413,329	$30,931,866	$2,784,886	310	$11,019

ENGINEERS OPINION OF PROBABLE COST

WSB Project: TRUNK SANITARY SEWER & WATER MAIN EXTENSION
Project Location: HANOVER, MN
SYSTEM 1
WSB Project No: 01272-24

Line No.	TRUNK SANITARY SEWER EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Total Project Quantity Estimated Cost
1	MOBILIZATION	LUMP SUM	$120,000.00	1	$120,000.00
2	DEWATERING	LUMP SUM	$55,000.00	1	$55,000.00
3	EQ 8" PVC PIPE SEWER - DEPTH 15-20 FEET	LIN FT	$50.00	-5250	-$262,500.00
4	10" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$65.00	0	$0.00
5	12" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$70.00	3840	$268,800.00
6	15" PVC PIPE SEWER - DEPTH 20-25 FEET	LIN FT	$75.00	1410	$105,750.00
7	18" PVC PIPE SEWER - DEPTH 20-25 FEET	LIN FT	$80.00	0	$0.00
8	INTERNAL SANITARY MANHOLE FRAME/CHIMNEY SEAL	EACH	$300.00	40	$11,850.00
9	CONSTRUCT SANITARY MANHOLE - DEPTH 20-30 FEET	EACH	$5,000.00	15	$75,000.00
10	8" PVC FORCEMAIN	LIN FT	$25.00	33590	$839,750.00
11	10" PVC FORCEMAIN	LIN FT	$30.00	0	$0.00
12	CASTING ASSEMBLY	EACH	$350.00	49	$16,975.00
13	AIR RELIEF MANHOLE	EACH	$5,000.00	25	$122,500.00
14	LIFT STATION	EACH	varies	3	$725,000.00
					$2,078,125.00

10% Contingency =	$207,812.50
Sub-Total =	$2,285,937.50
25% LEAF =	$571,484.38
TOTAL SANITARY SEWER SYSTEM 1 COST =	**$2,857,421.88**
System 1 Buildable Area (Acres) =	**1,442**
Total Sanitary Sewer System 1 Cost/Buildable Acre =	**$1,982**

Line No.	TRUNK WATERMAIN EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Total Project Quantity Estimated Cost
1	MOBILIZATION	LUMP SUM	$90,000.00	1	$90,000.00
2	DEWATERING	LUMP SUM	$45,000.00	1	$45,000.00
3	EQ 8" PVC WATERMAIN	LIN FT	$30.00	-38075	-$1,142,250.00
4	12" PVC WATERMAIN	LIN FT	$36.00	20660	$743,760.00
5	16" PVC WATERMAIN	LIN FT	$55.00	17415	$957,825.00
6	24" PVC WATERMAIN	LIN FT	$80.00	0	$0.00
7	12" BF VALVE AND BOX	EACH	$800.00	24	$19,200.00
8	16" BF VALVE AND BOX	EACH	$1,200.00	11	$13,200.00
9	24" BF VALVE AND BOX	EACH	$2,000.00	0	$0.00
10	FITTINGS	LBS	$3.00	59400	$178,200.00
11	HYDRANT ASSEMBLY	EACH	$3,500.00	63	$222,104.17
12	PRV/BOOSTER PUMP STATION	EACH	$350,000.00	2	$700,000.00
					$1,827,039.17

10% Contingency =	$182,703.92
Sub-Total =	$2,009,743.09
25% LEAF =	$502,435.77
TOTAL WATERMAIN SYSTEM 1 COST =	**$2,512,178.86**
System 1 Buildable Area (Acres) =	**1,442**
Total Watermain System 1 Cost/Buildable Acre =	**$1,742**

ENGINEERS OPINION OF PROBABLE COST

WSB Project: TRUNK SANITARY SEWER & WATER MAIN EXTENSION
Project Location: HANOVER, MN
SYSTEM 1 - 2007
WSB Project No: 01272-24

Line No.	TRUNK SANITARY SEWER EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$50,000.00	1	$50,000.00
2	DEWATERING	LUMP SUM	$25,000.00	1	$25,000.00
3	EQ 8" PVC PIPE SEWER - DEPTH 15-20 FEET	LIN FT	$50.00	-940	-$47,000.00
4	10" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$65.00	0	$0.00
5	12" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$70.00	0	$0.00
6	15" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$75.00	940	$70,500.00
7	18" PVC PIPE SEWER - DEPTH 20-25 FEET	LIN FT	$80.00	0	$0.00
8	INTERNAL SANITARY MANHOLE FRAME/CHIMNEY SEAL	EACH	$300.00	27	$7,950.00
9	CONSTRUCT SANITARY MANHOLE - DEPTH 20-30 FEET	EACH	$5,000.00	3	$15,000.00
10	8" PVC FORCEMAIN - DUAL	LIN FT	$25.00	28150	$703,750.00
11	10" PVC FORCEMAIN	LIN FT	$30.00	0	$0.00
12	CASTING ASSEMBLY	EACH	$350.00	27	$9,275.00
13	AIR RELIEF MANHOLE	EACH	$5,000.00	24	$117,500.00
14	LIFT STATION 1 - ULT 1300 GPM	EACH	$275,000.00	1	$275,000.00
					$1,226,975.00

10% Contingency =	$122,697.50
Sub-Total =	$1,349,672.50
25% LEAF =	$337,418.13
TOTAL SANITARY SEWER SYSTEM 1 COST =	**$1,687,090.63**

Line No.	TRUNK WATERMAIN EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$30,000.00	1	$30,000.00
2	DEWATERING	LUMP SUM	$15,000.00	1	$15,000.00
3	EQ 8"PVC WATERMAIN	LIN FT	$30.00	-13090	-$392,700.00
4	12" PVC WATERMAIN	LIN FT	$36.00	1130	$40,680.00
5	16" PVC WATERMAIN	LIN FT	$55.00	11960	$657,800.00
6	24" PVC WATERMAIN	LIN FT	$80.00	0	$0.00
7	12" BF VALVE AND BOX	EACH	$800.00	2	$1,600.00
8	16" BF VALVE AND BOX	EACH	$1,200.00	9	$10,800.00
9	24" BF VALVE AND BOX	EACH	$2,000.00	0	$0.00
10	FITTINGS	LBS	$3.00	20800	$62,400.00
11	HYDRANT ASSEMBLY	EACH	$3,500.00	22	$76,358.33
12	PRV/BOOSTER PUMP STATION	EACH	$350,000.00	1	$350,000.00
					$851,938.33

10% Contingency =	$85,193.83
Sub-Total =	$937,132.16
25% LEAF =	$234,283.04
TOTAL WATERMAIN SYSTEM 1 COST =	**$1,171,415.20**

ENGINEERS OPINION OF PROBABLE COST

WSB Project: TRUNK SANITARY SEWER & WATER MAIN EXTENSION
Project Location: HANOVER, MN
SYSTEM 1 - 2009
WSB Project No: 01272-24

Line No.	TRUNK SANITARY SEWER EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$15,000.00	1	$15,000.00
2	DEWATERING	LUMP SUM	$5,000.00	1	$5,000.00
3	EQ 8" PVC PIPE SEWER - DEPTH 15-20 FEET	LIN FT	$50.00	-470	-$23,500.00
4	10" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$65.00	0	$0.00
5	12" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$70.00	0	$0.00
6	15" PVC PIPE SEWER - DEPTH 20-25 FEET	LIN FT	$75.00	470	$35,250.00
7	18" PVC PIPE SEWER - DEPTH 20-25 FEET	LIN FT	$80.00	0	$0.00
8	INTERNAL SANITARY MANHOLE FRAME/CHIMNEY SEAL	EACH	$300.00	2	$600.00
9	CONSTRUCT SANITARY MANHOLE - DEPTH 20-30 FEET	EACH	$5,000.00	2	$10,000.00
10	8" PVC FORCEMAIN	LIN FT	$25.00	0	$0.00
11	10" PVC FORCEMAIN	LIN FT	$30.00	0	$0.00
12	CASTING ASSEMBLY	EACH	$350.00	2	$700.00
13	AIR RELIEF MANHOLE	EACH	$5,000.00	0	$0.00
14	LIFT STATION	EACH	$0.00	0	$0.00
					$43,050.00

10% Contingency =	$4,305.00
Sub-Total =	$47,355.00
25% LEAF =	$11,838.75
TOTAL SANITARY SEWER SYSTEM 1 COST =	**$59,193.75**

Line No.	TRUNK WATERMAIN EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$10,000.00	1	$10,000.00
2	DEWATERING	LUMP SUM	$5,000.00	1	$5,000.00
3	EQ 8" PVC WATERMAIN	LIN FT	$30.00	-6395	-$191,850.00
4	12" PVC WATERMAIN	LIN FT	$36.00	6395	$230,220.00
5	16" PVC WATERMAIN	LIN FT	$55.00	0	$0.00
6	24" PVC WATERMAIN	LIN FT	$80.00	0	$0.00
7	12" BF VALVE AND BOX	EACH	$800.00	6	$4,800.00
8	16" BF VALVE AND BOX	EACH	$1,200.00	0	$0.00
9	24" BF VALVE AND BOX	EACH	$2,000.00	0	$0.00
10	FITTINGS	LBS	$3.00	8900	$26,700.00
11	HYDRANT ASSEMBLY	EACH	$3,500.00	11	$37,304.17
					$122,174.17

10% Contingency =	$12,217.42
Sub-Total =	$134,391.59
25% LEAF =	$33,597.90
TOTAL WATERMAIN SYSTEM 1 COST =	**$167,989.48**

ENGINEERS OPINION OF PROBABLE COST

WSB Project: TRUNK SANITARY SEWER & WATER MAIN EXTENSION
Project Location: HANOVER, MN
SYSTEM 1 - 2013
WSB Project No: 01272-24

Line No.	TRUNK SANITARY SEWER EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$15,000.00	1	$15,000.00
2	DEWATERING	LUMP SUM	$5,000.00	1	$5,000.00
3	EQ 8" PVC PIPE SEWER - DEPTH 15-20 FEET	LIN FT	$50.00	0	$0.00
4	10" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$65.00	0	$0.00
5	12" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$70.00	0	$0.00
6	15" PVC PIPE SEWER - DEPTH 20-25 FEET	LIN FT	$75.00	0	$0.00
7	18" PVC PIPE SEWER - DEPTH 20-25 FEET	LIN FT	$80.00	0	$0.00
8	INTERNAL SANITARY MANHOLE FRAME/CHIMNEY SEAL	EACH	$300.00	1	$300.00
9	CONSTRUCT SANITARY MANHOLE - DEPTH 20-30 FEET	EACH	$5,000.00	0	$0.00
10	8" PVC FORCEMAIN	LIN FT	$25.00	500	$12,500.00
11	10" PVC FORCEMAIN	LIN FT	$30.00	0	$0.00
12.	CASTING ASSEMBLY	EACH	$350.00	1	$350.00
13	AIR RELIEF MANHOLE	EACH	$5,000.00	1	$5,000.00
14	LIFT STATION	EACH	$200,000.00	1	$200,000.00
					$238,150.00

10% Contingency =	$23,815.00
Sub-Total =	$261,965.00
25% LEAF =	$65,491.25
TOTAL SANITARY SEWER SYSTEM 1 COST =	**$327,456.25**

Line No.	TRUNK WATERMAIN EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$20,000.00	1	$20,000.00
2	DEWATERING	LUMP SUM	$10,000.00	1	$10,000.00
3	EQ 8" PVC WATERMAIN	LIN FT	$30.00	-8115	-$243,450.00
4	12" PVC WATERMAIN	LIN FT	$36.00	2660	$95,760.00
5	16" PVC WATERMAIN	LIN FT	$55.00	5455	$300,025.00
6	24" PVC WATERMAIN	LIN FT	$80.00	0	$0.00
7	12" BF VALVE AND BOX	EACH	$800.00	1	$800.00
8	16" BF VALVE AND BOX	EACH	$1,200.00	2	$2,400.00
9	24" BF VALVE AND BOX	EACH	$2,000.00	0	$0.00
10	FITTINGS	LBS	$3.00	9500	$28,500.00
11	HYDRANT ASSEMBLY	EACH	$3,500.00	14	$47,337.50
12	PRV/BOOSTER PUMP STATION	EACH	$350,000.00	1	$350,000.00
					$611,372.50

10% Contingency =	$61,137.25
Sub-Total =	$672,509.75
25% LEAF =	$168,127.44
TOTAL WATERMAIN SYSTEM 1 COST =	**$840,637.19**

ENGINEERS OPINION OF PROBABLE COST

WSB Project: TRUNK SANITARY SEWER & WATER MAIN EXTENSION
Project Location: HANOVER, MN
SYSTEM 1 - 2017
WSB Project No: 01272-24

Line No.	TRUNK SANITARY SEWER EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$40,000.00	1	$40,000.00
2	DEWATERING	LUMP SUM	$20,000.00	1	$20,000.00
3	EQ 8" PVC PIPE SEWER - DEPTH 15-20 FEET	LIN FT	$50.00	-3840	-$192,000.00
4	10" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$65.00	0	$0.00
5	12" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$70.00	3840	$268,800.00
6	15" PVC PIPE SEWER - DEPTH 20-25 FEET	LIN FT	$75.00	0	$0.00
7	18" PVC PIPE SEWER - DEPTH 20-25 FEET	LIN FT	$80.00	0	$0.00
8	INTERNAL SANITARY MANHOLE FRAME/CHIMNEY SEAL	EACH	$300.00	10	$3,000.00
9	CONSTRUCT SANITARY MANHOLE - DEPTH 20-30 FEET	EACH	$5,000.00	10	$50,000.00
10	8" PVC FORCEMAIN	LIN FT	$25.00	4940	$123,500.00
11	10" PVC FORCEMAIN	LIN FT	$30.00	0	$0.00
12	CASTING ASSEMBLY	EACH	$350.00	19	$6,650.00
13	AIR RELIEF MANHOLE	EACH	$5,000.00	0	$0.00
14	LIFT STATION ULT 600 GPM	EACH	$250,000.00	1	$250,000.00
					$569,950.00

10% Contingency =	$56,995.00
Sub-Total =	$626,945.00
25% LEAF =	$156,736.25
TOTAL SANITARY SEWER SYSTEM 1 COST =	**$783,681.25**

Line No.	TRUNK WATERMAIN EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$30,000.00	1	$30,000.00
2	DEWATERING	LUMP SUM	$15,000.00	1	$15,000.00
3	EQ 8" PVC WATERMAIN	LIN FT	$30.00	-10475	-$314,250.00
4	12" PVC WATERMAIN	LIN FT	$36.00	10475	$377,100.00
5	16" PVC WATERMAIN	LIN FT	$55.00	0	$0.00
6	24" PVC WATERMAIN	LIN FT	$80.00	0	$0.00
7	12" BF VALVE AND BOX	EACH	$800.00	15	$12,000.00
8	16" BF VALVE AND BOX	EACH	$1,200.00	0	$0.00
9	24" BF VALVE AND BOX	EACH	$2,000.00	0	$0.00
10	FITTINGS	LBS	$3.00	20200	$60,600.00
11	HYDRANT ASSEMBLY	EACH	$3,500.00	17	$61,104.17
					$241,554.17

10% Contingency =	$24,155.42
Sub-Total =	$265,709.59
25% LEAF =	$66,427.40
TOTAL WATERMAIN SYSTEM 1 COST =	**$332,136.98**

ENGINEERS OPINION OF PROBABLE COST

WSB Project: TRUNK SANITARY SEWER & WATER MAIN EXTENSION
Project Location: HANOVER, MN
SYSTEM 2
WSB Project No: 01272-25

Line No.	TRUNK SANITARY SEWER EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$70,000.00	1	$70,000.00
2	DEWATERING	LUMP SUM	$40,000.00	1	$40,000.00
3	EQ 8" PVE PIPE SEWER - DEPTH 15-20 FEET	LIN FT	$30.00	-3945	-$118,350.00
4	10" PVC PIPE SEWER - DEPTH 30-35 FEET	LIN FT	$65.00	1775	$115,375.00
5	12" PVC PIPE SEWER - DEPTH 30-35 FEET	LIN FT	$70.00	0	$0.00
6	15" PVC PIPE SEWER - DEPTH 20-30 FEET	LIN FT	$75.00	0	$0.00
7	15" PVC PIPE SEWER - DEPTH 30-40 FEET	LIN FT	$80.00	2170	$173,600.00
8	INTERNAL SANITARY MANHOLE FRAME/CHIMNEY SEAL	EACH	$300.00	11	$3,300.00
9	CONSTRUCT SANITARY MANHOLE - DEPTH 20-30 FEET	EACH	$3,000.00	0	$0.00
10	CONSTRUCT SANITARY MANHOLE - DEPTH 30-40 FEET	EACH	$6,000.00	11	$66,000.00
11	8" PVC FORCEMAIN	LIN FT	$25.00	0	$0.00
12	10" PVC FORCEMAIN	LIN FT	$30.00	5180	$155,400.00
13	CASTING ASSEMBLY	EACH	$350.00	20	$7,000.00
14	AIR RELIEF MANHOLE	EACH	$5,000.00	9	$45,000.00
15	LIFT STATION 3	EACH	varies	2	$575,000.00
					$1,132,325.00

10% Contingency =	$113,232.50
Sub-Total =	$1,245,557.50
25% LEAF =	$311,389.38
TOTAL SANITARY SEWER SYSTEM 2 COST =	**$1,556,946.88**
System 2 Buildable Area (Acres) =	908
Total Sanitary Sewer System 2 Cost/Buildable Acre =	**$1,714.70**

Line No.	TRUNK WATERMAIN EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$64,000.00	1	$64,000.00
2	DEWATERING	LUMP SUM	$32,000.00	1	$32,000.00
3	EQ 8" PVC WATERMAIN	LIN FT	$30.00	-47759	-$1,432,770.00
4	12" PVC WATERMAIN	LIN FT	$36.00	25916	$932,976.00
5	16" PVC WATERMAIN	LIN FT	$55.00	15008	$825,440.00
6	24" PVC WATERMAIN	LIN FT	$80.00	6835	$546,800.00
7	12" BF VALVE AND BOX	EACH	$800.00	19	$15,200.00
8	16" BF VALVE AND BOX	EACH	$1,200.00	9	$10,800.00
9	24" BF VALVE AND BOX	EACH	$2,000.00	6	$12,000.00
10	FITTINGS	LBS	$3.00	63125	$189,375.00
11	HYDRANT ASSEMBLY	EACH	$3,500.00	80	$278,594.17
					$1,474,415.17

10% Contingency =	$147,441.52
Sub-Total =	$1,621,856.69
25% LEAF =	$405,464.17
TOTAL WATERMAIN SYSTEM 2 COST =	**$2,027,320.86**
System 2 Buildable Area (Acres) =	908
Total Watermain System 2 Cost/Buildable Acre =	**$2,232.73**

ENGINEERS OPINION OF PROBABLE COST

WSB Project: TRUNK SANITARY SEWER & WATER MAIN EXTENSION
Project Location: HANOVER, MN
SYSTEM 2 - 2022
WSB Project No: 01272-25

Line No.	TRUNK SANITARY SEWER EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$30,000.00	1	$30,000.00
2	DEWATERING	LUMP SUM	$15,000.00	1	$15,000.00
3	EQ 8" PVE PIPE SEWER - DEPTH 15-20 FEET	LIN FT	$30.00	-2170	-$65,100.00
4	10" PVC PIPE SEWER - DEPTH 30-35 FEET	LIN FT	$65.00	0	$0.00
5	12" PVC PIPE SEWER - DEPTH 30-35 FEET	LIN FT	$70.00	0	$0.00
6	15" PVC PIPE SEWER - DEPTH 20-30 FEET	LIN FT	$75.00	0	$0.00
7	15" PVC PIPE SEWER - DEPTH 30-40 FEET	LIN FT	$80.00	2170	$173,600.00
8	INTERNAL SANITARY MANHOLE FRAME/CHIMNEY SEAL	EACH	$300.00	6	$1,800.00
9	CONSTRUCT SANITARY MANHOLE - DEPTH 20-30 FEET	EACH	$3,000.00	0	$0.00
10	CONSTRUCT SANITARY MANHOLE - DEPTH 30-40 FEET	EACH	$6,000.00	6	$36,000.00
11	8" PVC FORCEMAIN	LIN FT	$25.00	0	$0.00
12	10" PVC FORCEMAIN	LIN FT	$30.00	5180	$155,400.00
13	CASTING ASSEMBLY	EACH	$350.00	15	$5,250.00
14	AIR RELIEF MANHOLE	EACH	$5,000.00	9	$45,000.00
15	LIFT STATION 3 - ULT 800 GPM	EACH	$275,000.00	1	$275,000.00
					$671,950.00

10% Contingency =	$67,195.00
Sub-Total =	$739,145.00
25% LEAF =	$184,786.25
TOTAL SANITARY SEWER SYSTEM 2 COST =	**$923,931.25**

Line No.	TRUNK WATERMAIN EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$20,000.00	1	$20,000.00
2	DEWATERING	LUMP SUM	$10,000.00	1	$10,000.00
3	EQ 8" PVC WATERMAIN	LIN FT	$30.00	-9517	-$285,510.00
4	12" PVC WATERMAIN	LIN FT	$36.00	5417	$195,012.00
5	16" PVC WATERMAIN	LIN FT	$55.00	0	$0.00
6	24" PVC WATERMAIN	LIN FT	$80.00	4100	$328,000.00
7	12" BF VALVE AND BOX	EACH	$800.00	6	$4,800.00
8	16" BF VALVE AND BOX	EACH	$1,200.00	2	$2,400.00
9	24" BF VALVE AND BOX	EACH	$2,000.00	4	$8,000.00
10	FITTINGS	LBS	$3.00	16600	$49,800.00
7	HYDRANT ASSEMBLY	EACH	$3,500.00	16	$55,515.83
					$388,017.83

10% Contingency =	$38,801.78
Sub-Total =	$426,819.61
25% LEAF =	$106,704.90
TOTAL WATERMAIN SYSTEM 2 COST =	**$533,524.52**

ENGINEERS OPINION OF PROBABLE COST

WSB Project: TRUNK SANITARY SEWER & WATER MAIN EXTENSION
Project Location: HANOVER, MN
SYSTEM 2 - 2027
WSB Project No: 01272-25

Line No.	TRUNK SANITARY SEWER EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$30,000.00	1	$30,000.00
2	DEWATERING	LUMP SUM	$20,000.00	1	$20,000.00
3	EQ 8" PVE PIPE SEWER - DEPTH 15-20 FEET	LIN FT	$30.00	0	$0.00
4	10" PVC PIPE SEWER - DEPTH 30-35 FEET	LIN FT	$65.00	0	$0.00
5	12" PVC PIPE SEWER - DEPTH 30-35 FEET	LIN FT	$70.00	0	$0.00
6	15" PVC PIPE SEWER - DEPTH 20-30 FEET	LIN FT	$75.00	0	$0.00
7	15" PVC PIPE SEWER - DEPTH 30-40 FEET	LIN FT	$80.00	0	$0.00
8	INTERNAL SANITARY MANHOLE FRAME/CHIMNEY SEAL	EACH	$300.00	0	$0.00
9	CONSTRUCT SANITARY MANHOLE - DEPTH 20-30 FEET	EACH	$3,000.00	0	$0.00
10	CONSTRUCT SANITARY MANHOLE - DEPTH 30-40 FEET	EACH	$6,000.00	0	$0.00
11	8" PVC FORCEMAIN	LIN FT	$25.00	0	$0.00
12	10" PVC FORCEMAIN	LIN FT	$30.00	0	$0.00
13	CASTING ASSEMBLY	EACH	$350.00	0	$0.00
14	AIR RELIEF MANHOLE	EACH	$5,000.00	0	$0.00
15	LIFT STATION - UPGRADE CSAH 34 LS	EACH	$300,000.00	1	$300,000.00
					$350,000.00

10% Contingency =	$35,000.00
Sub-Total =	$385,000.00
25% LEAF =	$96,250.00
TOTAL SANITARY SEWER SYSTEM 2 COST =	**$481,250.00**

Line No.	TRUNK WATERMAIN EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$12,000.00	1	$12,000.00
2	DEWATERING	LUMP SUM	$6,000.00	1	$6,000.00
3	EQ 8" PVC WATERMAIN	LIN FT	$30.00	-14460	-$433,800.00
4	12" PVC WATERMAIN	LIN FT	$36.00	6765	$243,540.00
5	16" PVC WATERMAIN	LIN FT	$55.00	7695	$423,225.00
6	24" PVC WATERMAIN	LIN FT	$80.00	0	$0.00
7	12" BF VALVE AND BOX	EACH	$800.00	2	$1,600.00
8	16" BF VALVE AND BOX	EACH	$1,200.00	4	$4,800.00
9	24" BF VALVE AND BOX	EACH	$2,000.00	0	$0.00
10	FITTINGS	LBS	$3.00	15800	$47,400.00
11	HYDRANT ASSEMBLY	EACH	$3,500.00	24	$84,350.00
					$389,115.00

10% Contingency =	$38,911.50
Sub-Total =	$428,026.50
25% LEAF =	$107,006.63
TOTAL WATERMAIN SYSTEM 2 COST =	**$535,033.13**

ENGINEERS OPINION OF PROBABLE COST

WSB Project: TRUNK SANITARY SEWER & WATER MAIN EXTENSION
Project Location: HANOVER, MN
SYSTEM 2 - 2032
WSB Project No: 01272-25

Line No.	TRUNK SANITARY SEWER EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$10,000.00	1	$10,000.00
2	DEWATERING	LUMP SUM	$5,000.00	1	$5,000.00
3	EQ 8" PVE PIPE SEWER - DEPTH 15-20 FEET	LIN FT	$30.00	-1775	-$53,250.00
4	10" PVC PIPE SEWER - DEPTH 30-35 FEET	LIN FT	$65.00	1775	$115,375.00
5	12" PVC PIPE SEWER - DEPTH 30-35 FEET	LIN FT	$70.00	0	$0.00
6	15" PVC PIPE SEWER - DEPTH 20-30 FEET	LIN FT	$75.00	0	$0.00
7	15" PVC PIPE SEWER - DEPTH 30-40 FEET	LIN FT	$80.00	0	$0.00
8	INTERNAL SANITARY MANHOLE FRAME/CHIMNEY SEAL	EACH	$300.00	5	$1,500.00
9	CONSTRUCT SANITARY MANHOLE - DEPTH 20-30 FEET	EACH	$3,000.00	0	$0.00
10	CONSTRUCT SANITARY MANHOLE - DEPTH 30-40 FEET	EACH	$6,000.00	5	$30,000.00
11	8" PVC FORCEMAIN	LIN FT	$25.00	0	$0.00
12	10" PVC FORCEMAIN	LIN FT	$30.00	0	$0.00
13	CASTING ASSEMBLY	EACH	$350.00	5	$1,750.00
14	AIR RELIEF MANHOLE	EACH	$5,000.00	0	$0.00
15	LIFT STATION	EACH	$0.00	0	$0.00
					$110,375.00

10% Contingency =	$11,037.50
Sub-Total =	$121,412.50
25% LEAF =	$30,353.13
TOTAL SANITARY SEWER SYSTEM 2 COST =	**$151,765.63**

Line No.	TRUNK WATERMAIN EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$12,000.00	1	$12,000.00
2	DEWATERING	LUMP SUM	$6,000.00	1	$6,000.00
3	EQ 8" PVC WATERMAIN	LIN FT	$30.00	-12730	-$381,900.00
4	12" PVC WATERMAIN	LIN FT	$36.00	5417	$195,012.00
5	16" PVC WATERMAIN	LIN FT	$55.00	4578	$251,790.00
6	24" PVC WATERMAIN	LIN FT	$80.00	2735	$218,800.00
7	12" BF VALVE AND BOX	EACH	$800.00	10	$8,000.00
8	16" BF VALVE AND BOX	EACH	$1,200.00	1	$1,200.00
9	24" BF VALVE AND BOX	EACH	$2,000.00	2	$4,000.00
10	FITTINGS	LBS	$3.00	20825	$62,475.00
7	HYDRANT ASSEMBLY	EACH	$3,500.00	21	$74,258.33
					$451,635.33

10% Contingency =	$45,163.53
Sub-Total =	$496,798.86
25% LEAF =	$124,199.72
TOTAL WATERMAIN SYSTEM 2 COST =	**$620,998.58**

ENGINEERS OPINION OF PROBABLE COST

WSB Project: TRUNK SANITARY SEWER & WATER MAIN EXTENSION
Project Location: HANOVER, MN
SYSTEM 2 - 2037
WSB Project No: 01272-25

Line No.	TRUNK SANITARY SEWER EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$0.00	0	$0.00
2	DEWATERING	LUMP SUM	$0.00	0	$0.00
3	EQ 8" PVE PIPE SEWER - DEPTH 15-20 FEET	LIN FT	$30.00	0	$0.00
4	10" PVC PIPE SEWER - DEPTH 30-35 FEET	LIN FT	$65.00	0	$0.00
5	12" PVC PIPE SEWER - DEPTH 30-35 FEET	LIN FT	$70.00	0	$0.00
6	15" PVC PIPE SEWER - DEPTH 20-30 FEET	LIN FT	$75.00	0	$0.00
7	15" PVC PIPE SEWER - DEPTH 30-40 FEET	LIN FT	$80.00	0	$0.00
8	INTERNAL SANITARY MANHOLE FRAME/CHIMNEY SEAL	EACH	$300.00	0	$0.00
9	CONSTRUCT SANITARY MANHOLE - DEPTH 20-30 FEET	EACH	$3,000.00	0	$0.00
10	CONSTRUCT SANITARY MANHOLE - DEPTH 30-40 FEET	EACH	$6,000.00	0	$0.00
11	8" PVC FORCEMAIN	LIN FT	$25.00	0	$0.00
12	10" PVC FORCEMAIN	LIN FT	$30.00	0	$0.00
13	CASTING ASSEMBLY	EACH	$350.00	0	$0.00
14	AIR RELIEF MANHOLE	EACH	$5,000.00	0	$0.00
15	LIFT STATION	EACH	$0.00	0	$0.00
					$0.00

10% Contingency =	$0.00
Sub-Total =	$0.00
25% LEAF =	$0.00
TOTAL SANITARY SEWER SYSTEM 2 COST =	**$0.00**

Line No.	TRUNK WATERMAIN EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$20,000.00	1	$20,000.00
2	DEWATERING	LUMP SUM	$10,000.00	1	$10,000.00
3	EQ 8" PVC WATERMAIN	LIN FT	$30.00	-11052	-$331,560.00
4	12" PVC WATERMAIN	LIN FT	$36.00	8317	$299,412.00
5	16" PVC WATERMAIN	LIN FT	$55.00	2735	$150,425.00
6	24" PVC WATERMAIN	LIN FT	$80.00	0	$0.00
7	12" BF VALVE AND BOX	EACH	$800.00	1	$800.00
8	16" BF VALVE AND BOX	EACH	$1,200.00	2	$2,400.00
9	24" BF VALVE AND BOX	EACH	$2,000.00	0	$0.00
10	FITTINGS	LBS	$3.00	9900	$29,700.00
11	HYDRANT ASSEMBLY	EACH	$3,500.00	18	$64,470.00
					$245,647.00

10% Contingency =	$24,564.70
Sub-Total =	$270,211.70
25% LEAF =	$67,552.93
TOTAL WATERMAIN SYSTEM 2 COST =	**$337,764.63**

ENGINEERS OPINION OF PROBABLE COST

WSB Project: TRUNK SANITARY SEWER & WATER MAIN EXTENSION
Project Location: HANOVER, MN
SYSTEM 3
WSB Project No: 01272-25

Line No.	TRUNK SANITARY SEWER EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$52,000.00	1	$52,000.00
2	DEWATERING	LUMP SUM	$26,000.00	1	$26,000.00
3	EQ 8" PVC PIPE SEWER - DEPTH 15-20 FEET	LIN FT	$50.00	-12780	-$639,000.00
4	12" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$65.00	2275	$147,875.00
5	15" PVC PIPE SEWER - DEPTH 30-35 FEET	LIN FT	$70.00	2630	$184,100.00
6	15" PVC PIPE SEWER - DEPTH 35-40 FEET	LIN FT	$75.00	2585	$193,875.00
7	18" PVC PIPE SEWER - DEPTH 35-40 FEET	LIN FT	$80.00	5290	$423,200.00
8	INTERNAL SANITARY MANHOLE FRAME/CHIMNEY SEAL	EACH	$300.00	34	$10,200.00
9	CONSTRUCT SANITARY MANHOLE - DEPTH 20-30 FEET	EACH	$3,000.00	6	$18,000.00
10	CONSTRUCT SANITARY MANHOLE - DEPTH 30-40 FEET	EACH	$6,000.00	28	$168,000.00
11	CASTING ASSEMBLY	EACH	$350.00	34	$11,900.00
					$596,150.00

10% Contingency =	$59,615.00
Sub-Total =	$655,765.00
25% LEAF =	$163,941.25
TOTAL SANITARY SEWER SYSTEM 3 COST =	**$819,706.25**

System 3 Buildable Area (Acres) =	**1,382**
Total Sanitary Sewer System 3 Cost/Buildable Acre =	**$593.13**

Line No.	TRUNK WATERMAIN EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$70,000.00	1	$70,000.00
2	DEWATERING	LUMP SUM	$35,000.00	1	$35,000.00
3	EQ 8" PVC WATERMAIN	LIN FT	$30.00	-44210	-$1,326,300.00
4	12" PVC WATERMAIN	LIN FT	$36.00	24045	$865,620.00
5	16" PVC WATERMAIN	LIN FT	$55.00	12840	$706,200.00
6	24" PVC WATERMAIN	LIN FT	$80.00	7325	$586,000.00
7	12" BF VALVE AND BOX	EACH	$800.00	14	$11,200.00
8	16" BF VALVE AND BOX	EACH	$1,200.00	7	$8,400.00
9	24" BF VALVE AND BOX	EACH	$2,000.00	5	$10,000.00
10	FITTINGS	LBS	$3.00	56050	$168,150.00
11	HYDRANT ASSEMBLY	EACH	$3,500.00	74	$257,891.67
					$1,392,161.67

10% Contingency =	$139,216.17
Sub-Total =	$1,531,377.84
25% LEAF =	$382,844.46
TOTAL WATERMAIN SYSTEM 3 COST =	**$1,914,222.30**

System 3 Buildable Area (Acres) =	**1,382**
Total Watermain System 3 Cost/Buildable Acre =	**$1,385.11**

ENGINEERS OPINION OF PROBABLE COST

WSB Project: TRUNK SANITARY SEWER & WATER MAIN EXTENSION
Project Location: HANOVER, MN
SYSTEM 3 - 2042
WSB Project No: 01272-25

Line No.	TRUNK SANITARY SEWER EXTENSION Description	Unit	Unit Price	Total Project Quantity: Estimated Quantity	Total Project Quantity: Estimated Cost
1	MOBILIZATION	LUMP SUM	$20,000.00	1	$20,000.00
2	DEWATERING	LUMP SUM	$10,000.00	1	$10,000.00
3	EQ 8" PVC PIPE SEWER - DEPTH 15-20 FEET	LIN FT	$50.00	-5290	-$264,500.00
4	12" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$65.00	0	$0.00
5	15" PVC PIPE SEWER - DEPTH 30-35 FEET	LIN FT	$70.00	0	$0.00
6	15" PVC PIPE SEWER - DEPTH 35-40 FEET	LIN FT	$75.00	0	$0.00
7	18" PVC PIPE SEWER - DEPTH 35-40 FEET	LIN FT	$80.00	5290	$423,200.00
8	INTERNAL SANITARY MANHOLE FRAME/CHIMNEY SEAL	EACH	$300.00	14	$4,200.00
9	CONSTRUCT SANITARY MANHOLE - DEPTH 20-30 FEET	EACH	$3,000.00	0	$0.00
10	CONSTRUCT SANITARY MANHOLE - DEPTH 30-40 FEET	EACH	$6,000.00	14	$84,000.00
11	CASTING ASSEMBLY	EACH	$350.00	14	$4,900.00
					$281,800.00

10% Contingency =	$28,180.00
Sub-Total =	$309,980.00
25% LEAF =	$77,495.00
TOTAL SANITARY SEWER SYSTEM 3 COST =	**$387,475.00**

Line No.	TRUNK WATERMAIN EXTENSION Description	Unit	Unit Price	Total Project Quantity: Estimated Quantity	Total Project Quantity: Estimated Cost
1	MOBILIZATION	LUMP SUM	$12,000.00	1	$12,000.00
2	DEWATERING	LUMP SUM	$6,000.00	1	$6,000.00
3	EQ 8" PVC WATERMAIN	LIN FT	$30.00	-10820	-$324,600.00
4	12" PVC WATERMAIN	LIN FT	$36.00	5480	$197,280.00
5	16" PVC WATERMAIN	LIN FT	$55.00	0	$0.00
6	24" PVC WATERMAIN	LIN FT	$80.00	5340	$427,200.00
7	12" BF VALVE AND BOX	EACH	$800.00	3	$2,400.00
8	16" BF VALVE AND BOX	EACH	$1,200.00	0	$0.00
9	24" BF VALVE AND BOX	EACH	$2,000.00	5	$10,000.00
10	FITTINGS	LBS	$3.00	18700	$56,100.00
11	HYDRANT ASSEMBLY	EACH	$3,500.00	18	$63,116.67
					$449,496.67

10% Contingency =	$44,949.67
Sub-Total =	$494,446.34
25% LEAF =	$123,611.58
TOTAL WATERMAIN SYSTEM 3 COST =	**$618,057.92**

ENGINEERS OPINION OF PROBABLE COST

WSB Project: TRUNK SANITARY SEWER & WATER MAIN EXTENSION
Project Location: HANOVER, MN
SYSTEM 3 - 2047
WSB Project No: 01272-25

Line No.	TRUNK SANITARY SEWER EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$20,000.00	1	$20,000.00
2	DEWATERING	LUMP SUM	$10,000.00	1	$10,000.00
3	EQ 8" PVC PIPE SEWER - DEPTH 15-20 FEET	LIN FT	$50.00	-5215	-$260,750.00
4	12" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$65.00	0	$0.00
5	15" PVC PIPE SEWER - DEPTH 30-35 FEET	LIN FT	$70.00	2630	$184,100.00
6	15" PVC PIPE SEWER - DEPTH 35-40 FEET	LIN FT	$75.00	2585	$193,875.00
7	18" PVC PIPE SEWER - DEPTH 35-40 FEET	LIN FT	$80.00	0	$0.00
8	INTERNAL SANITARY MANHOLE FRAME/CHIMNEY SEAL	EACH	$300.00	14	$4,200.00
9	CONSTRUCT SANITARY MANHOLE - DEPTH 20-30 FEET	EACH	$3,000.00	0	$0.00
10	CONSTRUCT SANITARY MANHOLE - DEPTH 30-40 FEET	EACH	$6,000.00	14	$84,000.00
11	CASTING ASSEMBLY	EACH	$350.00	14	$4,900.00
					$240,325.00

10% Contingency =	$24,032.50
Sub-Total =	$264,357.50
25% LEAF =	$66,089.38
TOTAL SANITARY SEWER SYSTEM 3 COST =	**$330,446.88**

Line No.	TRUNK WATERMAIN EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$30,000.00	1	$30,000.00
2	DEWATERING	LUMP SUM	$15,000.00	1	$15,000.00
3	EQ 8" PVC WATERMAIN	LIN FT	$30.00	-17805	-$534,150.00
4	12" PVC WATERMAIN	LIN FT	$36.00	13150	$473,400.00
5	16" PVC WATERMAIN	LIN FT	$55.00	2670	$146,850.00
6	24" PVC WATERMAIN	LIN FT	$80.00	1985	$158,800.00
7	12" BF VALVE AND BOX	EACH	$800.00	9	$7,200.00
8	16" BF VALVE AND BOX	EACH	$1,200.00	3	$3,600.00
9	24" BF VALVE AND BOX	EACH	$2,000.00	0	$0.00
10	FITTINGS	LBS	$3.00	19250	$57,750.00
11	HYDRANT ASSEMBLY	EACH	$3,500.00	30	$103,862.50
					$462,312.50

10% Contingency =	$46,231.25
Sub-Total =	$508,543.75
25% LEAF =	$127,135.94
TOTAL WATERMAIN SYSTEM 3 COST =	**$635,679.69**

ENGINEERS OPINION OF PROBABLE COST

WSB Project: TRUNK SANITARY SEWER & WATER MAIN EXTENSION
Project Location: HANOVER, MN
SYSTEM 3 - 2052
WSB Project No: 01272-25

Line No.	TRUNK SANITARY SEWER EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$12,000.00	1	$12,000.00
2	DEWATERING	LUMP SUM	$6,000.00	1	$6,000.00
3	EQ 8" PVC PIPE SEWER - DEPTH 15-20 FEET	LIN FT	$50.00	-2275	-$113,750.00
4	12" PVC PIPE SEWER - DEPTH 25-30 FEET	LIN FT	$65.00	2275	$147,875.00
5	15" PVC PIPE SEWER - DEPTH 30-35 FEET	LIN FT	$70.00	0	$0.00
6	15" PVC PIPE SEWER - DEPTH 35-40 FEET	LIN FT	$75.00	0	$0.00
7	18" PVC PIPE SEWER - DEPTH 35-40 FEET	LIN FT	$80.00	0	$0.00
8	INTERNAL SANITARY MANHOLE FRAME/CHIMNEY SEAL	EACH	$300.00	6	$1,800.00
9	CONSTRUCT SANITARY MANHOLE - DEPTH 20-30 FEET	EACH	$3,000.00	6	$18,000.00
10	CONSTRUCT SANITARY MANHOLE - DEPTH 30-40 FEET	EACH	$6,000.00	0	$0.00
11	CASTING ASSEMBLY	EACH	$350.00	6	$2,100.00
					$74,025.00

10% Contingency =	$7,402.50
Sub-Total =	$81,427.50
25% LEAF =	$20,356.88
TOTAL SANITARY SEWER SYSTEM 3 COST =	**$101,784.38**

Line No.	TRUNK WATERMAIN EXTENSION Description	Unit	Unit Price	Total Project Quantity Estimated Quantity	Estimated Cost
1	MOBILIZATION	LUMP SUM	$20,000.00	1	$20,000.00
2	DEWATERING	LUMP SUM	$10,000.00	1	$10,000.00
3	EQ 8" PVC WATERMAIN	LIN FT	$30.00	-15585	-$467,550.00
4	12" PVC WATERMAIN	LIN FT	$36.00	5415	$194,940.00
5	16" PVC WATERMAIN	LIN FT	$55.00	10170	$559,350.00
6	24" PVC WATERMAIN	LIN FT	$80.00	0	$0.00
7	12" BF VALVE AND BOX	EACH	$800.00	2	$1,600.00
8	16" BF VALVE AND BOX	EACH	$1,200.00	4	$4,800.00
9	24" BF VALVE AND BOX	EACH	$2,000.00	0	$0.00
10	FITTINGS	LBS	$3.00	18100	$54,300.00
7	HYDRANT ASSEMBLY	EACH	$3,500.00	26	$90,912.50
					$468,352.50

10% Contingency =	$46,835.25
Sub-Total =	$515,187.75
25% LEAF =	$128,796.94
TOTAL WATERMAIN SYSTEM 3 COST =	**$643,984.69**

Appendix B

Assumptions:

1.5	units/acre	Hanover City Council Recommendation
3.08	persons/home	Hanover Comprehensive Plan
100	gallons/person/day	Recommended Standards for Wastewater Facilities - 10 State Standards
2.7	Peak	Recommended Standards for Wastewater Facilities - 10 State Standards

Lift Station	Service Acres	Units	Persons	gal/day	peak flow gal/min		forcemain
1	1442	2163	6662	666204	1249	1300	dual 8"
2	160	240	739	73920	139	200	8"
3	660	990	3049	304920	572	600	8"
4	908	1362	4195	419496	787	800	10"

Existing Lift Station Data						
Lift Station	Forcemain Size	Required Minimum Flow	Required Minimum Flow	Current Flow	Current Flow	Total Head,TDH
	inches	*gpm*	*MGD*	*MGD*	*gpm*	*H*
C.S.A.H. 34	12	940	1.354			65.0
Mill Pond Trail	8	300	0.432			38.7
Riverview Pond	6	200	0.288			36.2
8th Street	8	500	0.720	0.085	59	29.4

8th Street Lift Station Current Flow - From Joint Powers Data						
Lift Station	gallons/month Aug '06	Current Flow		Population		
	gallons	*MGD*	*gal/day*	*persons*	*units*	*acres*
8th Street	2,635,733	0.085	85,024	850	276	184

Controling Factors:

24" Sanitary Sewer Pipe at minimum grade	2871 gpm
Population	15000 persons
	3247 acres
15" Sanitary Sewer Pipe at minimum grade	1123 gpm
	1296 acres

Assumptions:

1.5	units/acre	Hanover City Council Recommendation
3.08	persons/unit	Hanover Comprehensive Plan
100	gallons/person/day	Recommended Standards for Wastewater Facilities - 10 State Standards
2.7	Peak	Recommended Standards for Wastewater Facilities - 10 State Standards

Proposed Service Areas with in Hanover Corporate Limits

	Acres	Single Family Units	Multi Family Units	Density	Min. Lot Area
				units/acre	sq feet
Direct 15" - Current					
Rolling Oak/Easterly Oak/Spruce Tree	74	157			
Schendel's Field/Quail Pass	75	150			
	149				
Direct 15" - Proposed					
Hanover Commons	47	67	46		12000
School	39				
Phesant Run	35				
Other Developable	331				
	453				
8th Street L.S. - Current					
Joint Powers - Data	*184*				
	184				
8th Street L.S. - Proposed					
Arbor Trail	43	71		0.63	15000
Maverick Construction	16				
Riverview Road NE	34				
Other Developable	311				
	404				
CSAH 34 L.S. - Current					
Crow River Heights East	147				
	147				
CSAH 34 L.S. - Proposed					
Crow River Heights West	135				
Waters Crossing	113	81		0.58	20000
Hanover Hills/Etc.	273				
North of CSAH 34	54				
	575				

480	Currently Developed Acres	1911	Total Acres-Coorporate Limits
480 Acres		1911 Acres	
221729 gpd		883076 gpd	

416 gpm	1656 gpm	Peak Flow - Into 24" at full City Limit Buildout
720 units	2867 units	
2217 persons	8831 persons	
962 Acres	2871 gpm	Max into 24" at population of 15000
444475 gpd	1215 gpm	Remaining Cap in 24" to serve annexation through CSAH 34 L.S.
833 gpm	6481 persons	Population served in annexation area
3326 units	2104 units	Units served in annexation area
10244 persons	1403 acres	
	3732 acres	Total Annexed - Developable Area
	14936 person	Total Annexed - Build Out Population
	1403 acres	**Current System Capacity for Annexed Area**
	2329 acres	Area to be served via new system
	5643 acres	Total Develoable acerage (Coorporate + Annexation area)
	26073 persons	Build out Population

Points of Discussion:

Current-Purposed Development Served by 15"

1189 acres	Note: At Capacity for 15 " at Minimum Grade
1784 units	
5495 persons	
1030 gpm	

Current-Proposed-Annex Development served by CSAH 34 L.S.

2125 acres	
3187 units	
9817 persons	
1841 gpm	
940 gpm	Current Required Minimum Flow
5013 persons	**Note: CSAH 34 L.S. upgrade would be required to obtain 24"**
1628 units	**capacity - However, the 12" FM will be sufficient**
1085 acres	

system 1	**system 2**	**system 3**	**Total**
1442 Acres	908 Acres	1382 Acres	**3732**
666204 gpd	419496 gpd	638484 gpd	**1724184**
0.666 MGD	0.419 MGD	0.638 MGD	**1.724**
1249 gpm	787 gpm	1197 gpm	**3233**
1874 units	1180 units	1796 units	**4849**
5771 persons	3634 persons	5531 persons	**14936**