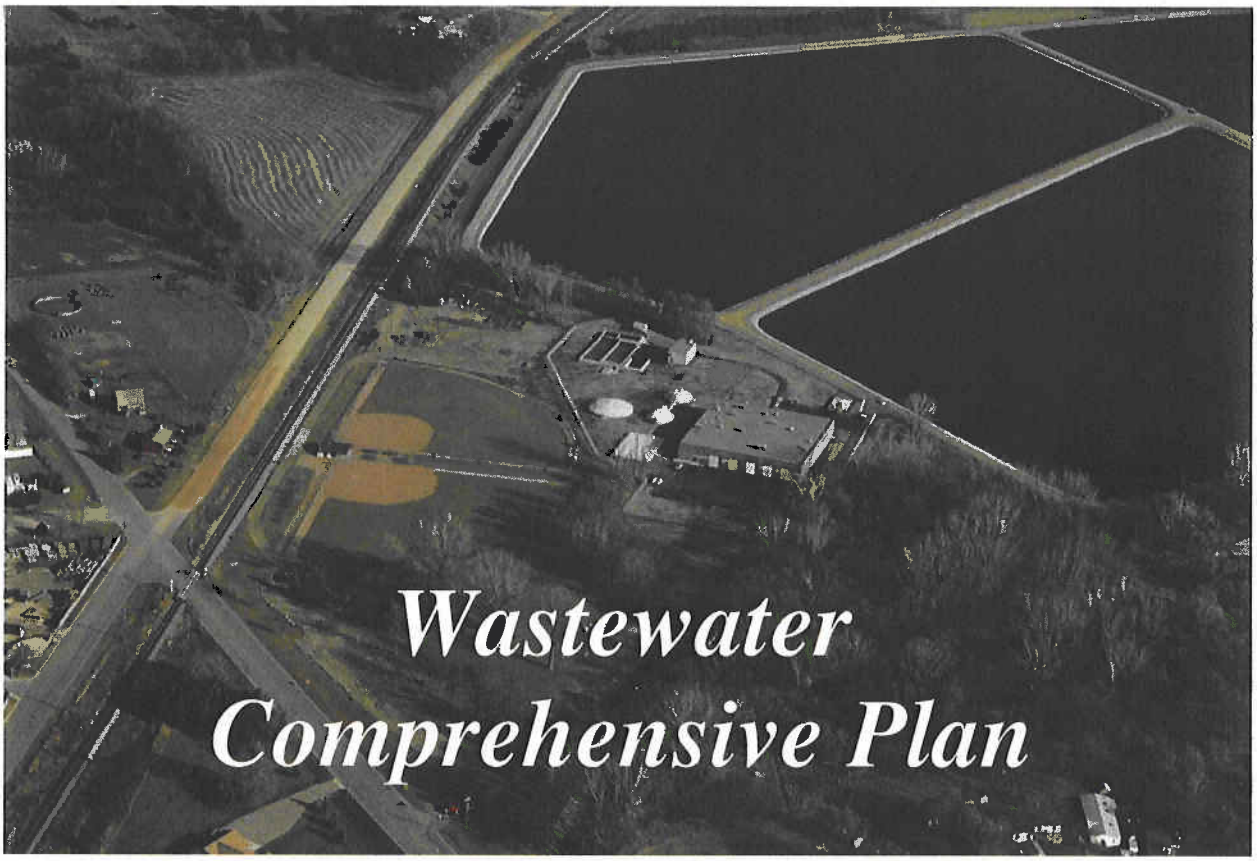
CITY OF JORDAN

Revised February 2008



BOLTON & MENK, INC.
Consulting Engineers & Surveyors

January 2008

Wastewater Comprehensive Plan

Jordan, Minnesota

Project Number T17.21486

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.

By: _____
Carol J. Caron, P.E.
License No. 25554

Date: _____

BOLTON & MENK, INC.
CONSULTING ENGINEERS & SURVEYORS
Mankato - Fairmont - Sleepy Eye - Burnsville - Willmar – Chaska - Ramsey, MN
Ames, IA

TABLE OF CONTENTS

ITEMS IN THE APPENDIX

- Many Figures use an 'A' / 'B' designation. Generally, the 'A' figures have full color of the individual wastewater districts shown. The 'B' Figures cover the same limits with the color turned off to better highlight the actual pipe corridors, lift stations, etc.
- The key to the colors of the Districts and Sub-districts is shown on Figure 3 and is included as the first page of the Appendix
- These colors **DO NOT apply** to Figures 4 or 4A.

Figure No.	Description
	Exhibit A - Color Key for District Identification
1	Inflow & Infiltration Analysis
2	Existing Interceptor Sewer Service Areas
3	Year 2030 Planning Boundary and Ultimate Tributary Area Limits
4	**City of Jordan, Land Use Plan – 2007 Update**
4A	Jordan Area Anticipated Density Plan
5A &5B	Northeast Service Area Collector Routes
6A	195th Street Service Area
6B	W/SW Interceptor Route
7A & 7B	Upper Sand Creek (Creek Lane) Contributing Service Areas
8A & 8B	Valleyview and Mn River Service Areas
9	Syndicate Street Service Area
10A & 10B	West Collector Route
11A & 11B	West Collector Route - Detailed
12A & 12B	North Delaware & Park Boulevard Service Area
13A & 13B	Lower Sand Creek Corridor

ITEMS CONTAINED IN THE TEXT OF THE DOCUMENT

EXECUTIVE SUMMARY

A. The growth pressures of Twin City development have forced surrounding communities to conduct long range planning studies in a number of service areas. Therefore, in 2003 the City of Jordan adopted the Wastewater Collection System Study. The 2003 Study was used as the basis for this Wastewater Comprehensive Plan. The Study was updated and expanded to include additional growth areas within the 2030 growth boundary as directed by City Council. Subsequently in 2007, the Study was updated and the base growth area remained the 2030 boundary but the Ultimate Growth Boundary was extended approximately 1 mile to the east and south, and 2+ miles to the west.

B. To help manage the existing and anticipated growth in Jordan, the City intends to amend its "Undesignated Metropolitan Urban Service Area Reserve" agreement with the Metropolitan Council. The agreement provides the opportunity to designate the acreage, types and density of land uses, and local/regional service levels for each five-year stage to the year 2030, with the exact location of each stage unspecified. As a part of this staging option, an undesignated MUSA reserve Boundary is mapped, but the timing of when and where a parcel is considered developable is driven by the ability to respond to market forces in a controlled manner; not by a fixed staging area. By not designating the specific developable parcels by stage in advance, the community may reduce the problems associated with landowners withholding development on land designated for urban services, thereby driving up land prices.

C. The City of Jordan developed its 2030 undesignated MUSA reserve boundary by:

1. Reviewing the approximate land area requirements necessary to accommodate the negotiated households to the year 2030 with the planned overages included to provide flexibility needed to variable market conditions

2. Analysis of the City's ability to extend sanitary and storm sewer utilities, as determined in the City's Facility Plans

D. The required sanitary sewer capacities were guided from the household forecasts contained in the Comprehensive Plan prepared by the Municipal Development Group, Inc. (MDG), however in some sub-districts, the density of development will be controlled more by elements of the topography. The density projections that are followed by MDG are illustrated in **Figure 4**. The acreage required to meet the budgeted household forecasts was determined by applying an average density to the number of budgeted households units to be built during each 5-year stage to the year 2030. The average density was based on the build-out of the "Urban Expansion Area Land Use Plan" within the 2030 undesignated MUSA Boundary.

E. Table 5.2 in the Comprehensive Plan document prepared by MDG illustrates the projected development type (based on the "Urban Expansion Area Land Use Plan") for the land area within the undesignated MUSA reserve boundary. Table 2.18 in the MDG Plan identifies the projected

population and household forecasts to the year 2030. Table 2.27 in the MDG Plan provides the cumulative employment forecasts to the year 2030.

F. A part of the implementation phase of this Plan will include the City updating its zoning and subdivision ordinances to be consistent with the Plan.

G. Although these planning practices are appropriate for surface improvements which can be conveniently expanded as growth fills-in, gravity utilities such as sanitary and storm sewers must consider a broader timeline and anticipate full build-out even though some legs will not be constructed by the year 2030.

H. In addition, development subsequent to the 2030 boundary line will require transporting wastewater through the existing city to the wastewater treatment plant (WWTP). In order not to face the same problems that are present today, the City must provide access, if not infrastructure, for the wastewater to reach the WWTP. Therefore, an "Ultimate Service Area", was considered in developing wastewater flow corridors. These corridors are analyzed using urban assumptions of land use, housing density, per capita water use, and persons per household for the entire potentially tributary area as shown in **Figure 4A**.

I. The ultimate service area is divided into fifteen districts with six of the districts tributary through the existing Lower Sand Creek / Valley View Drive / North Syndicate Street Interceptor sewers. The areas shown on **Figure 3** include:

1. Syndicate Street (**Figures 2 & 9A**) – This existing district is mostly developed with limited growth potential.

2. Creek Lane (**Figures 2, 7A, 7B, 10A & 10B**) - Significant current development in the portion downstream from Sawmill Road is already completed. Newer developments to the southwest, including Bridle Creek are now filling in portions of the tributary area.

3. Valley View Drive (**Figures 2, 13A & 13B**) - This area is heavily subdivided and is serviced by the Valley View Drive portion of the Creek Lane Interceptor, however, the current density is relatively low. Other service areas in this study surround the area therefore no expansion is anticipated.

4. Upper Sand Creek (**Figures 7A & 7B**) – The Ultimate Service Area in this district expanded greatly with the shift in the 2007 extension. Ultimately, this area will be served through the construction of a new major lift station on Sawmill Road. The lift station will discharge to the West/Southwest interceptor listed below. In the interim, limited extensions of sanitary sewer service can be made with the flow directed into the Creek Lane interceptor.

5. West / Southwest (W/SW) – (**Figure 10A & 10B**) - Currently, an unsewered area requiring a new interceptor sewer that will tie directly into the WWTP.

6. 195th Street (**Figures 13A, 13B & 14A**) - Currently, an unsewered area requiring new collector sewer that will tie into the portion of the Creek Lane Interceptor in Valley View Drive or the new W/SW interceptor.

7. Minnesota River Area (**Figures 8A & 8B**) - Significant portions of this area have been developed as unsewered hobby farms. For long term planning, it should be acknowledged that future redevelopment and lot splits may occur and the density could increase. However, the ultimate density will always be relatively light.

8. Northeast (**Figure 5**) - Currently, an unsewered area requiring a new interceptor sewer route to wastewater treatment plant (WWTP). This area has also seen significant changes in service area with the 2007 update; the most significant of which is that it is not directly tributary to the districts in the previous Study. It may require a direct extension along U.S. 169 from the WWTP or the adjacent district.

9. Park Boulevard (**Figure 12A & 12B**) – This area is also on the backslope toward the Minnesota River but further upstream than that discussed above. Development in this area will require construction of a lift station that will pump wastewater to the south. It will discharge through Delaware Avenue into the West/Southwest interceptor at US 169 and Delaware Ave.

10. West US 169 (**Figures 15A & 15B**) - The extension one mile to the west has added several new service areas. The topography along US 169 dictates that a lift station will be required on the south side of the highway west of Suzette's Restaurant. It will serve both sides of the highway with a gravity sewer to the north and will discharge into a gravity sewer near Suzette's Restaurant.

11. Delaware Avenue North (**Figures 11A & 11B**) – A proposed interchange at Delaware Avenue and U.S. 169 is expected to attract commercial and industrial businesses to the vicinity. The area north of US 169 along Delaware can be served by gravity sewers discharging to the W/SW interceptor in US 169. The Park Boulevard lift station will discharge through this area.

12. Delaware Avenue South (**Figures 12A & 12B**)- The area south of US 169 can also be served by gravity sewers discharging to the W/SW interceptor in US 169. The West US 169 lift station and the 220th Street Service Area will discharge through this area.

13. 220th Street (**Figures 12A & 12B**)- The area on the north side of 220th Street against the ultimate boundary will be served by a lift station that discharges to the service area to the east. The ultimate discharge will flow easterly under Delaware Avenue and down the ravine to US 169.

14. Far West Service Area, South of US 169 – This area includes the area between US 169 and Galena Township Road/ 228th Street West and extending to near the intersection

of Old 169 and US 169. In general, it has ample topography that is tributary to US 169 and contains approximately 1,235 acres.

15. Far West Service Area, North of US 169 - This area lies between US 169 and the top of slope down to the Minnesota River and is extremely flat, It may require several lift stations to adequately serve the area. Ultimately, it will discharge through the west/southwest interceptor adjacent to US 169.

16. West / Southwest (W/SW) – (**Figure 10A & 10B**) - Currently, this is an unsewered area requiring a new interceptor sewer that will tie directly into the WWTP. The lower portion of this interceptor is being considered for construction during the 2008-9 seasons. The area tributary to this corridor was also expanded greatly to the south as was the area being serviced by the Upper Sand Creek Lift Station which is also tributary to this corridor. These updates resulted in modifications in pipe sizes and grades from the 2003 Study.

The high initial capital investment in this interceptor could be postponed somewhat with the construction of another major lift station and forcemain east of Delaware Avenue near the US 169 corridor to service the area in the early years, Eventually, the pump capacity could be increased and another forcemain (larger) installed or a large gravity interceptor could be installed to the WWTP. A detailed feasibility study will be required to determine which method is appropriate.

J. Major collector sewers will also be necessary in each of the individual service areas. Given restoration of the current surface improvements, the total estimated cost identified in this plan to serve the projected ultimate service area is $26,210,000.

K. Some areas are beyond the limits of gravity sewers to directly serve the individual properties. Therefore, three principal options exist to provide wastewater treatment service to these areas:

1. The conventional lift station / forcemain approach to carry the wastewater to the gravity system.

2. Pressurized sewers can be installed with clustered and/or individual lift stations, every few properties. Typically, these discharge to the gravity sewer system for final transport to the WWTP.

3. Permit on-site disposal with individual or area-wide treatment systems. These should be monitored and possibly operated by the City to assure appropriate treatment and maintenance.

L. The approximate new area served with the proposed improvements is approximately 4,781 acres within the 2030 planning boundary line.

M. Development of the Syndicate Street growth areas will present no problem to the collection system. The potential growth can be served within the minimum sanitary sewer requirement of the City (8 inch @ 0.40% grade).

Some development in the existing service areas that are directly tributary to Creek Lane can continue without fear of over taxing the system, however, there is insufficient capacity available to serve more than a modest increase in service area. Currently, the City is monitoring flow in the Creek Lane interceptor. When flows begin to exceed approximately ¾ of the sewer's capacity, the Sawmill Road lift station must be completed with the forcemain in Old 169 to redirect the wastewater to the W/SW interceptor.

1. BACKGROUND

A. Flow Characteristics - A conceptual understanding of the flow characteristics of sanitary sewers is necessary to appropriately interpret the information in this plan.

1. The vast majority of the time, sanitary sewers are virtually unused and the sewer is barely flowing.

2. However, given the normal patterns of human habitation, there is a consistency in the total volume of water used per person that is focused during a limited number of hours in the day.

3. Sanitary sewers must be designed to accommodate the maximum peak rate of flow which occurs during that focused period each day, in order not to cause back-ups into homes.

4. Earlier operation of sanitary sewers permitted the "tapping" into the sanitary sewer to allow flow of storm and ground water. In addition, the materials and methods used did not permit a tight seal of joints. These contributions of clear water flow to the wastewater stream are referred to as inflow & infiltration (I&I). These materials and practices are no longer permitted or used.

5. Analysis of the wastewater, water distribution, and rainfall and stream flow data since the early 1990's indicates a high degree of success by the City in eliminating I&I, as shown in Figure 1. Therefore, although some I & I contribution may still exist, and efforts to eliminate it should continue. This study does not include any provisions for I&I to enter the wastewater stream other than included in the standard methodology prescribed in *Ten States Standards*.

B. US 169

1. The key to the city's growth is the accessibility to the metropolitan area. The Minnesota Department of Transportation (MN/DOT) has established transportation goals for the Mankato / Twin Cities corridor, which it is actively implementing. These goals include eliminating restrictions to traffic flow while increasing average speed and safety. A natural consequence of this implementation is opening the Jordan area to the residential, commercial and industrial market of the Twin Cities.

C. Previous Studies

1. Previous studies were examined and utilized in the preparation of this report. They include:

2. The Northwest Quadrant Growth Study. [1]

3. The City's Comprehensive Transportation Plan. [2]

4. The Preliminary Engineering Report - 2000 Improvement Project. [3]

---

[1] Loose, Timothy O., P.E., April 23, 1997.

[2] Chromy, Christopher S., P.E., September 11, 2000.

[3] Caron, Carol J., P.E., December 16, 2002.

5. The Scott County Comprehensive Plan.

6. Tentative alignment concepts for interchanges with US 169. [3]

7. Record drawings showing the invert and grades of the existing sanitary sewers.

D. Topography of the Area

1. The City of Jordan is located near the confluence of two major glacial outwashes in the Minnesota River basin, which offer a wealth of topographic assets to the community. As such, a series of ravines define a series of rather steep escarpments, which meander through the area and divides the land into a series of irregularly shaped parcels. The term "escarpment" refers to the hillsides of the valleys cut into a relatively flat or rolling plain. All the property "on top" is roughly the same elevation.

2. The irregular shapes and varied ownership of these parcels have placed significant limitations on the pattern of land development. The use of curvilinear streets backed up to the escarpments seem to be the most acceptable development pattern.

3. In summary, Jordan is presented a series of obstacles to inexpensive development:

a) Ravines - too steep and narrow to permit development.

b) Bluffs – with slopes greater than 30% (30feet in 100 feet).

c) Flood plains – with special rules that apply to the construction of any buildings.

d) Wetland areas – where the rule of "Avoid, Minimize, Mitigate" is applied (at increased cost).

4. The more inexpensive property for development is open and gently rolling with access to municipal water and sewer. Although this topography is available above the escarpments, the parcels are isolated from one another by the obstacles listed above.

5. For these reasons, the early development of the city focused on the comparatively, level flood plain areas and only required limited utilities. The result is that developed portions of the city further obstruct the efficient extension of utilities across town from their treatment source. This is especially true for utilities that operate by gravity (storm and sanitary sewers) and therefore, have a very limited choice of routes.

6. This topography in Jordan presents major challenges to servicing the area with sanitary sewer. Innovative uses of newer technologies offer possible alternatives to servicing some of the individual sub-districts. Traditionally, sewer organization follows a tree structure, drawing individual wastewater flow toward major branches and eventually to the central trunk sewer (interceptor).

7. The topography in city of Jordan defines many major 'branches', which can serve as corridors for sewer lines. However, a number these major branches are not connected to a central trunk that is directed toward the WWTP. Therefore, major improvements will be necessary to connect these branches.

8. The topography presents a second challenge at the crest of the tributary area where the next tributary area starts. The downstream flow pattern in the next service area may extend far beyond the anticipated growth area for the City of Jordan. The difficulties

multiply when the area is severely broken up into small tracts that lend themselves to larger, less uniform lot shapes. A newer technology called "low pressure sewer systems" create a network of one-way forcemains driven by individual or cluster pump stations located near each lot.

9. These pressure sewers can be easily bored in existing neighborhoods or trenched in new developments. As an example, a single two-inch line can serve up to 20 homes.

10. The capacities of existing individual collector sewers were determined and compared to the design capacity required to serve the tributary area. This comparison is illustrated graphically, in the following discussion. The green bar charts in the following graphs depict the actual capacity of the individual reach of each pipe, while the red line shows the capacity required (design) to serve the tributary area if it is developed, as predicted.

E. Existing Facilities

1. Collection System - The existing wastewater collection system in the City of Jordan consists of sewers ranging in size from 8 inches to 24 inches. No investigation or assessment of the materials or condition of these sewer lines was included in this study.

2. Treatment Facilities - Previously, the City depended on wastewater treatment ponds to dispose of sewage. A new mechanical treatment plant was constructed and placed in operation in 2001. A portion of the pond system has been maintained to serve as a storage queue for wastewater when the mechanical plant is affected by I&I.

3. Lift Station - The existing lift station pumps wastewater from the collection system to the new treatment facility.

4. Inverted Siphons – The collection system utilizes several inverted siphons to transfer wastewater flow under Sand Creek to the opposite side. These are specially designed devices installed beneath the bottom of creek crossings. On occasion in the past when they have been damaged, large amounts of creek water has directly entered the wastewater treatment system.

5. The capacities of existing individual collector sewers were determined and compared to the design capacity required to serve the tributary area. This comparison is illustrated graphically, in the following discussion. The green bar charts in the following graphs depict the actual capacity of the individual reach of each pipe based on size and slope, while the red line shows the capacity required (design) to serve all the developable tributary area if it is developed, as predicted.

2. INTRODUCTION TO THIS STUDY

A. General

1. Previously, in 2003, the City of Jordan prepared and later in 2003 adopted a Comprehensive Wastewater Collection System Plan. This plan was revised in 2005 to reflect new developments and improvements to the system.

a) The partial construction of a major lift station structure at Sand Creek and Sawmill Road will pump wastewater from the Upper Sand Creek service area along Old US 169, west to discharge into the new West / Southwest interceptor was completed. The physical structure is installed but the pumps are yet to be installed and the west/southwest inceptor yet to be constructed. (At this time, they are not needed but the structure was convenient to construct with the extension of the Creek Lane Interceptor.)

b) The City has prepared a new 2030 Land Use Plan that calls for increases in density of some residential areas. It also increases the volume of commercial / industrial property in the vicinity of CR 59.

2. In the past, the City of Jordan has been a remote bedroom community to the Twin City metropolitan area that also served the needs of the neighboring agricultural community. Today, its role is changing to that of an active suburb to the Twin Cities with significant commercial and industrial growth potential of its own.

3. These changes not only place new demands on the infrastructure and public services, they also accelerate those demands. This places a significant burden on the City to plan, monitor and implement infrastructure improvements to accommodate the capacity for all public services.

4. These services fall into three broad categories:

a) Services that require little or no infrastructure (police, human services, etc.).

b) Services whose infrastructure capacity can promptly be increased (some water distribution improvements, fire stations, parks, etc.).

c) Services whose infrastructure capacity requires extensive advanced planning and construction, or major renovation when the required capacity exceeds the actual capacity of the system (streets, water supply / treatment, storm and sanitary sewer systems, wastewater treatment, etc.).

B. Purpose of this Study

1. The purpose of this study is to examine the third category of necessary services, above, as it relates to the wastewater collection system for the city. The speed and nature of development in the area requires that all previous planning efforts be reviewed and updated more frequently, than in the past.

2. The age and condition of individual elements in the collection system were not a part of this study. In addition, conclusions and recommended priorities may have to be

adjusted in the future, if failures in the existing system occur. Comprehensive televising, rating and performing preventative maintenance of the sewers in the existing system could lessen the impact of these unexpected events.

C. Growth in Wastewater Collection Need - During the 1990's the City experienced a growth rate of 31.8% to a population of 3,833.[4]

D. Growth Patterns - The focus of this report is on those system improvements necessary to serve the 2030 Land Use pattern as defined in the updated City of Jordan Comprehensive Plan Draft. On page 52 of this Plan, three methods were used to project population to the year 2030. The highest population projection was 17,606 for the year 2030.

E. Later, on page 88, the report estimates the land use distribution in the 2030 Boundary were provided. The report then concludes that,

> "*The net Acreage available* [SIC – within the 2030 boundary] *is more than adequate to meet the projected Total 2005-20030 land consumption* [SIC – to serve the population projection]... "

This indicates that **if all property within the 2030 boundary** were developed at the projected densities, the population would exceed the population estimate of 17,606. This is consistent with the pattern that not every parcel will be developed, nor every lot sold according to an exacting timeline. Some owners may not choose not to develop, lots will remain unsold, certain utilities may not be available soon enough, the market may just not be there, etc.

F. Although these planning practices are appropriate for surface improvements which can be conveniently expanded as growth fills-in, gravity utilities such as sanitary and storm sewers must consider a broader timeline and anticipate full build-out even though some legs will not be constructed by the year 2030.

G. In addition, development subsequent to and beyond the 2030 boundary line will require transporting wastewater through the existing city to the wastewater treatment plant (WWTP). In order not to face the same problems that are present today, the City must provide access, if not infrastructure, for the wastewater to reach the WWTP. Therefore, an "Ultimate Service Area" was considered in developing wastewater flow corridors. These corridors are analyzed using urban assumptions of land use, housing density, per capita water use, and persons per household for the entire potentially tributary area.

[4] U.S. Census Bureau, 1990 and 2000 Decennial Census, as published on the Internet.

3. CONDUCT OF THIS STUDY

A. Standards

1. The Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers have developed a standard for wastewater facilities which is commonly referred to as "Ten States Standards". The development of this Plan followed these standards.

B. Scope of Plan

1. This Plan examines the topographic ability of the wastewater collection system, to serve the needs of the City of Jordan and its potential growth areas, as extended in 2005 and further in 2007. It then includes recommendations for the extension and enhancement of the collection system.

C. Study Area

1. For wastewater collection purposes, Jordan and the area surrounding it can also be categorized in the following ways:

a) Areas that are currently serviced by the existing wastewater collection system. (See **Figure 2**). The existing system is adequate to accept the currently developed areas.

b) Areas immediately adjacent to the existing service area that can be serviced with simple extensions of existing lines. The difficulty can be that more properties fit the definition of 'adjacent', than the existing system can accommodate.

c) Areas that can be served through the existing system but as development continues should be re-routed to a new interceptor sewer to the wastewater treatment plant (WWTP).

d) Areas that can only be served by establishing new routes for wastewater flow to the WWTP.

2. The first step was to identify those areas where development is prohibited or not practical. These include the hillsides, flood plains, wetlands, etc.

3. Step number two was to identify areas that are fully developed and the Land Use Plan densities and uses are already inplace.

4. All area within the ultimate tributary area was then divided into a series of tracts that exhibited similar topographic, accessibility, zoning and developability characteristics shown in **Figure 3**. These were designated as "QQ-N-a" where:

a) QQ – represents the general quadrant of the city (NE, SE, etc.)

b) N – designated a sub area

c) a – further depicts smaller tracts within the N designation

D. 2030 Undesignated Metropolitan Urban Service Area (MUSA) Reserve Forecasts

1. To help manage the existing and anticipated growth in Jordan, the City has adopted an "Undesignated Metropolitan Urban Service Area Reserve" agreement with the Metropolitan Council. The agreement provides the opportunity to designate the acreage, types and density of land uses, and local/regional service levels for each five-year stage to the year 2030, with the exact location of each stage unspecified. As a part of this staging option, an undesignated MUSA reserve Boundary is mapped, but the timing of when and where a parcel is considered developable is driven by the ability to respond to market forces in a controlled manner; not by a fixed staging area. By not designating the specific developable parcels by stage in advance, the community may reduce the problems associated with landowners withholding development on land designated for urban services, thereby driving up land prices.

2. The City of Jordan developed its 2030 undesignated MUSA reserve boundary by:

   a) Reviewing the approximate land area requirements necessary to accommodate the negotiated households to the year 2030 with the planned overages included to provide flexibility needed to variable market conditions

   b) Analysis of the City's ability to extend sanitary and storm sewer utilities, as determined in the City's Facility Plans

3. The required sanitary sewer capacities were guided from the household forecasts contained in the Comprehensive Plan prepared by MDG, however in some sub-districts the density of development will be controlled more by elements of the topography. These density projections are shown in Figure 4A and in paragraph E.4 below. The acreage required to meet the budgeted household forecasts was determined by applying an average density to the number of budgeted households units to be built during each 5-year stage to the year 2030. The average density was based on the build-out of the "Urban Expansion Area Land Use Plan" within the 2030 undesignated MUSA Boundary.

Table 5.2 in the Comprehensive Plan document prepared by MDG illustrates the projected development type (based on the "Urban Expansion Area Land Use Plan") for the land area within the undesignated MUSA reserve boundary. The MDG Report identifies the projected population and household forecasts to the year 2030.

Year	Met Council Revised System Statement Population Projection	Met Council Household Projection	City's Projections	City's Projected House-holds
2000	3,833	1,349	3,833	1,349
2005	5,517	1,803	5,048	1,803
2010	7,200	2,700	7,200	2,571
2015	7,750		9,150	3,327
2020	8,300	3,200	11,100	4,111
2025	9,900		13,050	5,019
2030	11,500	4,600	15,000	6,000

4. A part of the implementation phase of this Plan will include the City updating its zoning and subdivision ordinances to be consistent with the Plan.

E. Methods Employed

1. Two features determine the potential extension of an existing sewer.

a) The Elevation of the Existing Sewers Versus the Topography - Given the required slope for the sewer, there is established a gravity service area boundary. Properties beyond this boundary cannot be directly served with gravity sewers.

b) The Size and Grade of the Existing Sewers - These determine a maximum flow that the existing system can carry.

2. Sanitary sewer service to areas beyond this gravity service boundary, can only be serviced by either:

a) Constructing new interceptor sewers.

b) Constructing lift stations and forcemains to pump the sewage.

c) Constructing pressure sewer systems to transport the wastewater.

3. Existing Capacities

a) The driving energy of flow in a sanitary sewer is gravity. Therefore, the pipes must be laid on a grade (or slope) to force the flow. Slopes are expressed in percentage (%) and represent the number of feet of fall in 100 feet of length. i.e., a grade of 1.00% is one foot of fall in 100 feet.

b) The slope together with the diameter and material type are used to calculate the actual volume of flow that a full pipe can carry. Typically, this volume is expressed in cubic feet per second (cfs) or gallons per minute (gpm). This rate of flow is the actual capacity of the sewer line.

4. Required Capacities

a) Using the various planning reports for the City and Scott County, all areas were identified with an anticipated density of land use. Slight variations on those densities are shown in **Figure 4**. Actual lot counts were used for areas that are already developed. For undeveloped areas, a "unit per acre" lot count was predicted based on zoning, topography, etc. See **Figures 4 & 4A**. For example:

1) High density residential - 12 units per acre.

2) Medium density residential – 8 units per acre.

3) Single family on relatively flat areas - 3 units per acre.

4) Single family on areas with significant topographic changes - 2 units per acre.

5) Commercially and industrially zoned areas - 1,500 gallons per acre per day. This is much more difficult to predict, since the character and size of specific occupants is unknown at this time. Further, the water use

patterns of commercial and industrial property can easily change. Much larger water users can replace warehouses and any temptation to lessen the design standards could prove to be ill advised. See **Figure 4A**.

6) Institutional use was predicted at the same rate as commercial.

7) Recreational areas, cemeteries, ravines, escarpments, flood plain, wetland and the right of way for US 169 were not considered to contribute wastewater flow.

b) Calculations of the predicted sanitary sewer flows were made and accumulated along each reach of sewer corridor or route. Given full development, at the predicted density and land use for the entire potentially tributary area, this is the design capacity for a gravity sewer to serve the tributary areas.

c) Since development beyond the 2030 boundary will require sanitary sewer extensions, these areas are included in estimates of flow generated for each corridor and pipe sizing.

4. FINDINGS

A. CORRIDOR LAYOUTS AND SIZING WITHIN 2030 BOUNDARY

1. In addition to the Syndicate Street, Valley View and Creek Lane interceptors, several new wastewater drainage corridors have been identified that are necessary to provide the backbone of the collection system to accommodate development within the 2030 Boundary.

a) West / Southwest (W/SW) Interceptor extending from the WWTP to the west in Valley View Drive and then along US 169 to Delaware Avenue as shown in **Figure 6.B**. This will have three major branch collectors to serve the 2030 area:

1) West along 195th

2) South across US 169 and up the two ravines east of Delaware

b) Upper Sand Creek –West Side – This interceptor extends upstream to the south, on the west side of Sand Creek from Sawmill Road. It will only extend to approximately the golf course.

c) Upper and Creek – East Side – This interceptor mirrors the West Side but will be extended significantly further to accommodate the Ultimate Boundary Area.

d) Valley View Drive / Minnesota River Interceptor will extend northward from the WWTP along Valley View Drive and then to the west around the 'nose' of the hillside to serve the hillside overlooking the Minnesota River.

B. 2030 DEVELOPMENT PLAN

1. Development within the 2030 Boundary as shown in **Figure 4** will occur in stages over the 22-year period. For the purposes of this report, no individual areas have been predicted to develop in specific 5 year increments, however development will be based on:

a) The scheduled availability of sanitary sewer service

b) Development requests and inquiries received by the City

c) The predicted schedule for the improvement of the US 169 intersection with MTH 282

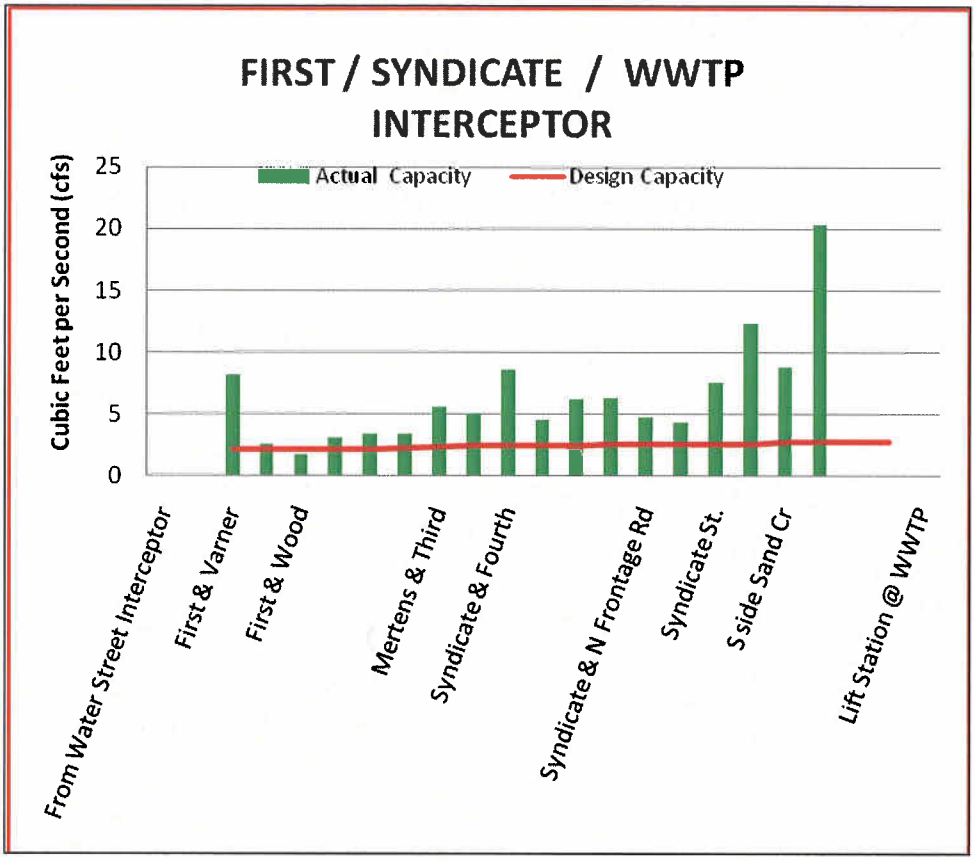
d) The location of specific attractions such as the golf course and along some of the bluffs

2. Syndicate Street Service Area (Existing Service Area)

a) The Syndicate Street Interceptor's current service areas in green and future areas shown in light green in Figure 9 are completely within the 2030 Planning Boundary. As shown, this district includes the older parts of the city. The sewers were extended to serve the bluff areas to the west and the area south of TH 282, to the east. The potential service area to the east, shown on **Figure 9** could be included in the Creek Lane interceptor but is included here to

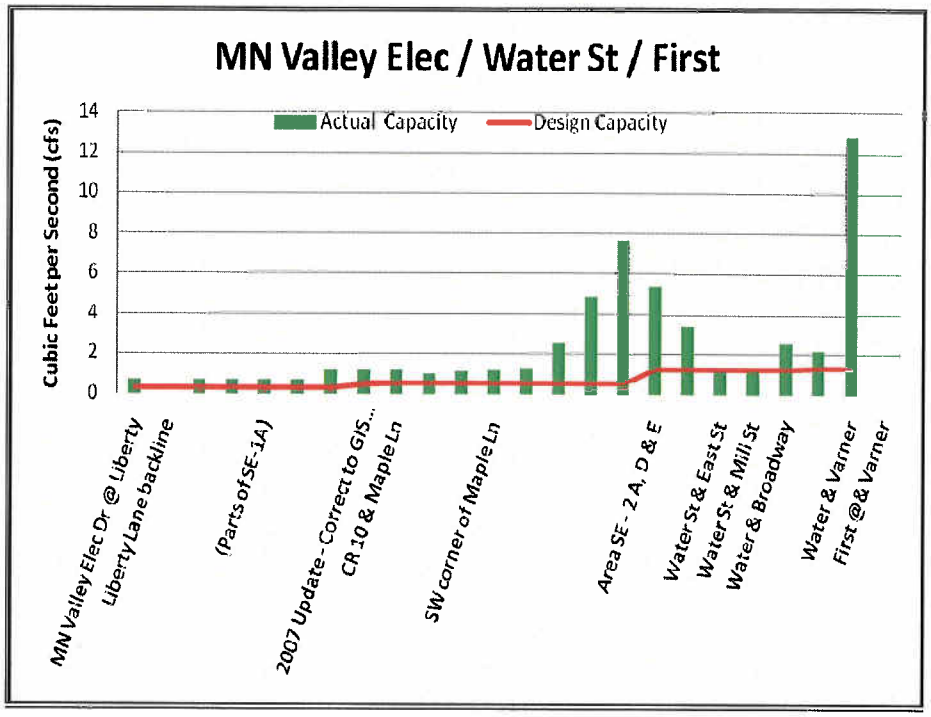
maximize utilization of the capacity available in the Syndicate Street sewer rather than waiting for the northeast quadrant to develop or taxing the Creek Lane interceptor. It also permits development of a portion of the Ames property sooner, than would otherwise be anticipated.

1) The Syndicate Street district has a gravity sewer service boundary that includes limited growth areas near the top of the bluff. The existing interceptor sewer does have adequate capacity to accept flow from these areas with the extension of 8" sanitary sewers. See **Figure 9**.



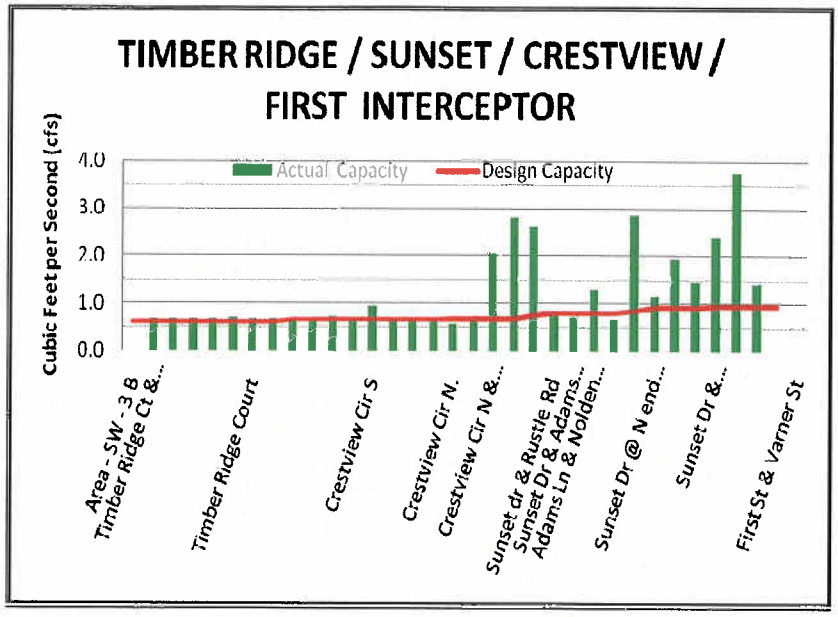
b) This district will continue to discharge into the Lower Sand Creek corridor near the intersection of Syndicate Street and Sand Creek, discussed above.

c) First / Syndicate - From WWTP to the intersection of First & Varner - This is the major interceptor which accepts flow from the other trunk lines in this district. The graph above includes full development of the tributary areas and the actual capacities generally exceed the necessary capacities, represented by the red line.



d) MN Valley Elec. - From First & Varner to MN Valley Elec. - This sub-district of First and Syndicate collects the flow from the east leg of the Syndicate Street interceptor, along the south side of TH 282. The large 'actual' capacities are caused by the sewers that have increased slopes along the side of the escarpment. This sewer is already extended to its maximum gravity service area and its design and actual capacities are shown in the graph above.

e) Timber Ridge - From First & Varner to Aberdeen & Sunset - This collector runs around the north end of Mill Pond to serve the bluff area south of US 169. The previous analysis illustrated some excess capacity; however, the predicted density for SW-3B has been revised to 50 acres at 3 units per acre and 35 acres at 8 units per acre. Therefore, attempts to develop SW-3B at a higher density or add pump stations to serve more area may cause overloading the reaches of the downstream portion of this collector. In addition, the topography prevents gravity collection further than is already included here.



f) The Syndicate Street interceptor, as shown, is at its maximum service area.. The Creek Lane district to the south prohibits any further expansion in that direction and the valley to the north makes expansion in that direction unnecessary. The conclusion is that the Syndicate Street interceptor is adequate to accommodate its district boundaries shown and development to "in-fill" the district at the designated densities can be permitted with little or no risk of overtaxing the collection system.

3. Creek Lane Service Area (Existing Service Area)

a) Creek Lane Interceptor - The current, direct service area is shown in YELLOW in **Figure 2**. In the time since the 2005 Update the City has approved or committed several areas to the southwest and southeast to be served with this interceptor. The City also constructed the wet well and diversion chamber for the recommended pump station near where Sawmill Road crosses Sand Creek but it was not necessary at that time to install the pumps or construct the forcemain the west/southwest interceptor.

b) Three major and one minor interceptor are tributary to Creek Lane, in addition to local connections. They are:

1) Bridle Cr / Hillside Dr / Hope Ave Interceptor

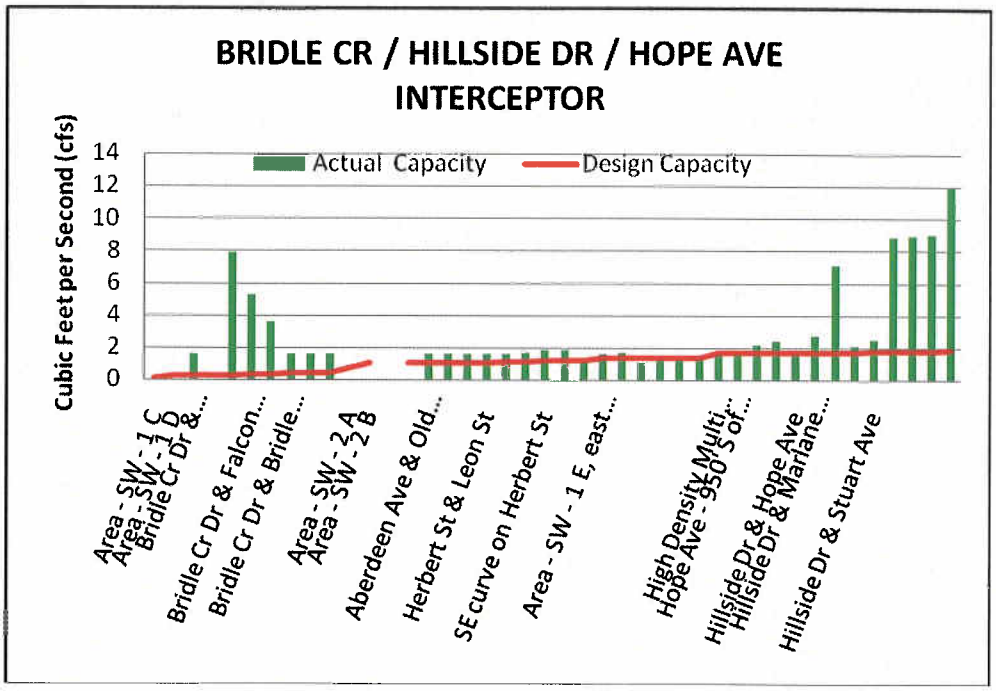
2) Broadway Interceptor – South (minor)

3) Upper Sand Creek – West Side

4) Upper Sand Creek - East Side – This includes an extensive area south and east of the city that will be served through a ravine to Sand Creek.

c) The areas to the southwest are tributary through the Bridle Creek Interceptor from Park Dr & Hillside to Aberdeen & Old 169. The graph below

shows the capacity situation of the Hillside Drive interceptor once full development would be attained, with all the newly approved and committed developments.



d) The unused capacities on the ends of the graph represent regions where the sewer is going downhill at steep slopes, which increases the capacity. However, the sewers between Herbert Street and Hope Avenue may require upsizing to avoid backups. Given the improvements in the surrounding area, the cost could be significant.

e) A second option exists. The 48-acre tributary area (SW-3A) at the northwest corner of Aberdeen and Old 169 is not yet developed or committed. The Timber Ridge interceptor cannot accept any additional area but if this area was held from development at this time and directed to the west/southwest interceptor when constructed, it would alleviate the problem between Herbert Street and Hope Avenue. This could require a small pump station to serve the 48 acres.

f) One flow logger should be installed in this interceptor to serve as an alarm. When the actual flow in this interceptor approaches 2/3's of the design capacity, the City must install the pumps in the upper Sand Creek Pump Station and begin diverting the wastewater west through old 169 to the new West/Southwest interceptor.

g) The Creek Lane Interceptor's extension to the site of the Upper Sand Creek Pump Station has greatly expanded immediate availability of sanitary sewer service to areas on both sides of Upper Sand Creek. However, the

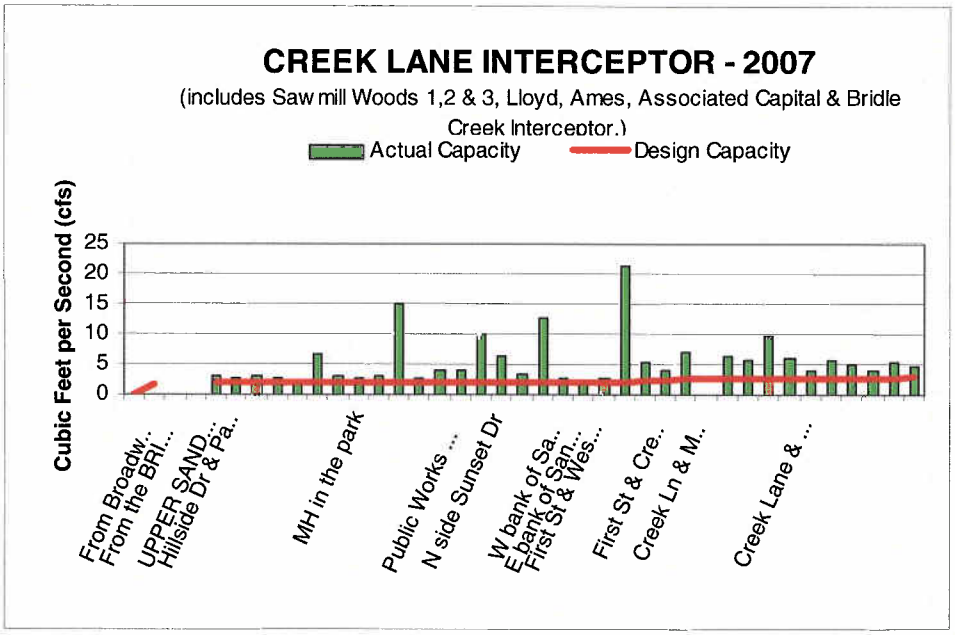
transportation system modifications are not scheduled to serve the areas east of Sand Creek until after 2030.

4. 4. Creek Lane Service Area (Future Service Areas)

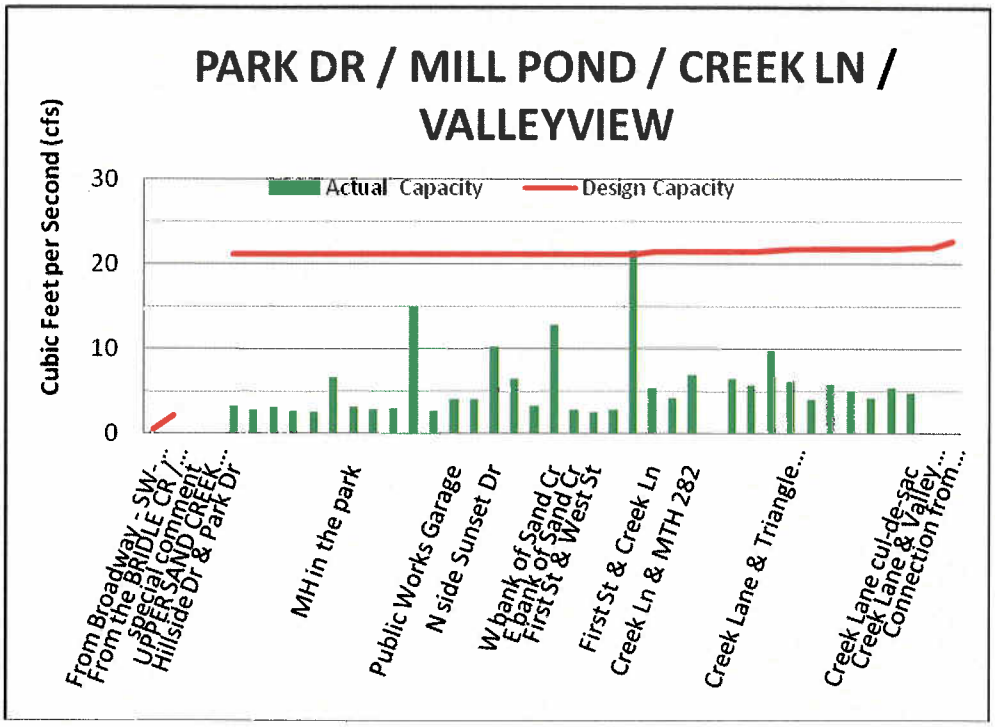
a) Construction has started that will serve the entire area between the city and beyond the golf course for approximately 1 mile. An extension of interceptor sewers along Sand Creek and Broadway, as shown in **Figures 7A & 7B** could help in developing the area.

b) Lower Sand Creek - The Creek Lane Interceptor extends from the WWTP to the intersection of Park Drive and Hillside Drive. This major interceptor accepts flow from the other collector lines in this district including, the flow from the Bridle Creek Interceptor, discussed above, and discharges to Syndicate Street at the WWTP. However, the vast majority of the tributary area is in the Upper Sand Creek area.

c) In the period 2005 through 2007, the City committed to provide sanitary sewer service to Sawmill Woods 1, 2, & 3, Lloyd, Ames and Associated Capital properties through plats or concept plans. The interceptor in Sawmill Woods, on the west side of Sand Creek, can serve these areas without installing the pumps in the new lift station structure, the forcemain or the west/southwest interceptor. As shown in the graph below, all the capacity in the Creek Lane Interceptor will be used.



However, any extensions further up Sand Creek, up Old 169 or up Hillside Drive, beyond those listed may result in back-ups in the park area and on First Street in downtown as shown on the graph below for service to the entire tributary area. The difficulty in determining precisely how much area can be added without over burdening the existing sewer is significant.



Therefore, the City's flow loggers were installed to monitoring sewer flow and preliminary measurements have been taken in this sewer. They revealed that current flow levels do not approach either the actual or design capacities but this can be misleading. There are many reasons for this; including

1) Open areas that have not yet been developed

2) Current, personal water use volumes for the population may not be as estimated

3) The timing of water use during this period may not be as predicted in the *Ten States Standards* peaking factor

d) These loggers will continue to monitor flows at strategic locations throughout the city. When they reveal that capacity utilization of the Creek Lane Interceptor is approaching 70%, the City should perform appropriate designs and:

1) Populate the pump station with pumps

2) Construct the forcemains in Old 169 to the west

3) Construct the West/southwest Interceptor

5. <u>Upper Sand Creek Service Area</u> (Upstream from Sawmill Road) -

a) The extension of the West Side of Sand Creek Interceptor has been started with the development of Sawmill Woods. The construction of the pump station structure was included but the equipment and the forcemain to the west/southwest interceptor are in the future.

b) From the previous study, the alternative to construct two interceptors in the Sand Creek valley was chosen. Individual collector sewers will be constructed up each ravine to serve tributary properties away from Sand Creek and the ravines.

c) This involves constructing individual interceptor lines on either side of Sand Creek, near the toe of slope. By crowding the toe of slope and keeping the invert above the flood plain, the sewers could then have a higher elevation, which may not require rock excavation. One or two inverted siphons may still be required to cross the Creek, especially in the more upstream area.

d) **Figure 7** illustrates the collector sewers that bring wastewater to the Sand Creek Interceptors. These will follow the ravine topography in the area.

e) However, the southern most portion of this service area is more tributary to County Road 8. The north frontage east of TH 21 is the Ridges at Sand Creek Golf Club with limited potential for the generation of wastewater. Therefore, the most likely way to service the SE-10B and SW-6C districts will be to construct another pump station near TH 21 and County Road 8. A forcemain along TH 21 would carry the wastewater flow northward to near the northwest corner of the Golf Club where it can discharge into the SW-9B collector.

f) Since the properties along Golfview Drive are already developed, the area may best be served with a pressurized sewer system.

g) Although the existing Creek Lane Interceptor has adequate capacity to transport wastewater from <u>the existing committed and developed areas</u> to the WWTP, there is insufficient capacity to service <u>all areas</u> that are tributary to the Creek Lane interceptor route.

h) Current Status

1) Flow monitors have been installed at strategic locations in the wastewater system to monitor the growth in flow as home construction proceeds to fill in the developing subdivisions. To date, adequate capacity is available for continued home construction <u>but virtually all capacity has been allocated to previously approved developments</u>.

2) The Sawmill Road sewer and the first leg of the Upper Sand Creek interceptor sewer are constructed. One element of that project was the construction of the diversion chamber in anticipation of the lift station. In the distant future, the design of the chamber will permit maximum utilization of the capacity in the Creek Lane interceptor and thus

minimize lift station operation. As long as it can, Creek Lane interceptor to accept all tributary flow.

3) Once the pump station is populated with pumps, the diversion gate will be closed; thus forcing all flow into the pump station. The flow will be pumped westerly on Old 160 to the west/southwest interceptor.

4) Eventually, when the flow is sufficient, an automatic gate can be set to monitor the flow in the Creek Lane interceptor. It would permit some flow to continue down the interceptor when the direct tributary flow permits. This will lessen the electric usage of the station as well as the wear.

6. <u>West/Southwest Interceptor (W/SW) Service Area</u>

a) Currently, this is an unsewered area requiring a new interceptor sewer. The City is currently considering a feasibility report to extend a primary interceptor along the railroad from the WWTP to the intersection of Delaware Avenue (CR 59). Eventually, this will also serve the Upper Sand Creek Area through the lift station to be constructed on Sawmill Road and the forcemains to be installed in Old Highway 169. Together, these improvements will greatly expand immediate availability of sanitary sewer service to all areas west and south.

1) One of the priority routes for a major collector discharging to this sewer is up the first ravine west of the city that comes from the south; out of the bluff south of US 169. Any new subdivisions near the bluff line that use pump stations may be able to redirect the wastewater to this interceptor and the pump stations decommissioned. The surrounding area will then be immediately available for development, as shown in **Figures 10A and 10B**. Until then, development is limited by the capacity of the Creek Lane Interceptor,

2) This collector will also be receiving the flow from the Upper Sand Creek Pump Station (discussed earlier) when it is commissioned. Currently, flow coming to this pump station location is directed to the Creek Lane Interceptor. Creek Lane does have sufficient uncommitted capacity at this time, however the ultimate build-out of the tributary area will require commissioning the station and constructing the necessary dual forcemain along Old US 169 to west of Aberdeen. The dual forcemain is necessary to accommodate the lower flows during its first years of operation, but eventually it will be necessary to add another, larger forcemain to meet the demand of final build-out.

3) Portions of this W/SW interceptor corridor that have convenient vehicular access, as shown in **Figures 11A through 12B**, are anticipated in the 2008-2012 stage of growth.

b) An approximate routing and sizing for the interceptor and collector sewers to serve this area is shown on **Figure 11**.

c) The target invert elevation of the interceptor at the intersection of US 169 and Delaware Avenue is 749 MSL and the surface elevation along the highway in this area is 760. The eleven-foot depth will be capable of serving the business area immediately adjacent to the future interchange at Delaware Avenue. Extension of trunk sewers to the north, and south, in Delaware will provide service to those areas away from US 169.

d) Most of this interceptor will be 42-inch diameter and laid at a 0.16% grade in order to accommodate the ultimate service area. Initially, this could present problems, such as the following:

1) Sewers must reach a certain minimum flow (cfs) in order to keep solids suspended in the flow. This is referred to as the "scour velocity" which is 2 feet per second. A flow of 1.82 cfs at a depth of ½ feet will achieve this.

2) Because of the relatively long run at potentially minimum flows, there should be an expectation that hydrogen sulfide gas will be released from the decomposition of the waste in transit. This gas attacks concrete and can lead to complete deterioration of concrete pipe material. It is recommended that pipe materials other than concrete be considered for construction of this interceptor or a protective coating can be applied to concrete materials. The manholes should also be coated with a protective coating.

e) The downstream portion of this interceptor (W/SW) could follow the alignment of Valley View Drive since right-of-way is already available. However, the added depth may warrant the acquisition of right-of-way or an alternate alignment.

f) The sewer would be extended to the foot of the ravines coming out of the bluff to the south. Trunk collector sewers may then be extended up the ravines to serve future development in the area.

g) Although development of this area will take many years, a detailed design should be considered in the relatively near future to allow coordinated construction with Mn/DOT's reconstruction of US 169. Crossings of US 169 and the proposed intersection at CR 59 could then be installed in advance of the main interceptor.

h) The option selected for extending service to the Upper Sand Creek area through the construction of the lift station and forcemain to the west is reflected in the capacity of the pipes recommended for the W/SW Interceptor.

i) The City may also wish to include additional capacity to service the areas beyond the ultimate development boundary shown but the need for that capacity will be decades off. The City could acknowledge the situation by securing additional right-of-way.

7. **<u>195th Street Service Area</u>**

Currently, an unsewered area requiring anew collector sewer that will tie into the portion of the Creek Lane Interceptor in Valley View Drive or the W/SW

Interceptor. The Union Pacific Railroad, Creek Lane, Township Road 57 and the limits of the tributary area that bound this area. Land uses are projected to be a combination of commercial / industrial and residential as shown on the land use drawing. See **Figures 4 & 8A**. The connection to the Valley View Drive system will be made near the intersection of Valley View Drive and Creek Lane. Although this is designated as an individual service area, the wastewater flow will likely be divided three ways as shown on **Figure 6C**:

a) Directly to the West/Southwest Interceptor upstream (southwest) from 195th Street or at the intersection of Delaware Avenue.

b) Directly to a collector to be constructed in 195th Street which will discharge to the Valley View Drive interceptor.

c) Directly to the West/Southwest Interceptor downstream (northeast) from 195th Street.

d) The ultimate flow pattern will depend on the final route and connections chosen for the W/SW interceptor. See **Figures 10A, 10B, 13A & 13B**. The main interceptor would service both the 195th Street Service Area and the West / Southwest Service Area.

8. **Valley View Drive Service Area** -

This area is heavily subdivided, as shown in **Figures 13A through 14**, is currently serviced through the CSAH 9-collector sewer. The current density is relatively low and the area is surrounded by other service areas in this study therefore it will not be expanded. Valley View Drive is the primary access route to the WWTP using existing public rights-of-way. Currently, it receives the flow from its own direct service area (rather limited), the Creek Lane interceptor and the CSAH 9 interceptor. In the future, the Minnesota River service area will be connected.

a) In addition, a feasibility study for the West/Southwest interceptor could conclude that it is advantageous to utilize this same route since the right-of-way is already available.

b) Continued development within this area enjoys direct connection to the Valley View Drive Interceptor and should be allowed to continue. No new major collector or interceptor sewers are required to reach the property. See **Figure 14A**.

9. **Northeast Service Area**- (Beyond the 2030 Boundary)

Currently, an unsewered area requiring a new interceptor sewer route to wastewater treatment plant (WWTP) to the ravine at the southeast corner of TH 21 and US 169. From that point, trunk collector sewers may be extended up the various ravines as shown on **Figures 16A & 16B**. These extensions will be capable of directly serving the gravity service portion of the area.

Development in the northeast sub-districts (NE – 3, NE – 4, and NE – 5) is more difficult to be served directly by the gravity collection system without constructing another interceptor in US 169 or installing another pump station

with forcemain. Properties located in this area may be best served with pressurized sewers.

The areas to the north and east from the former study limit represent part of the area added by extending the Ultimate Boundary Area.

10. **Minnesota River Service Areas** - (Easterly end is within the 2030 potential) This area lies on the side-slope of the Minnesota River, north of the city and will be served in two directions.

a) In previous reports, the Sioux Vista area and areas downstream (NE) were discussed as requiring construction of a new interceptor sewer from near the intersection of Valley View Drive and Syndicate Street. This was presented in the Northwest Quadrant Growth Study Report and shown in **Figures 8A & 8B**. Near this intersection, the new interceptor will discharge into the Creek Lane Sewer or the West / Southwest Interceptor and flow south in Syndicate Street to the WWTP.

b) Significant portions of Sioux Vista have been developed as unsewered hobby farms. For long term planning, it should be acknowledged that future redevelopment and lot splits may occur and the density could increase. However, the ultimate density will always be relatively light.

c) The 740 MSL contour generally defines the limit of areas within Sioux Vista that can be serviced directly by gravity flow to the WWTP. The properties located between the 740 contour and the flood plain boundary of the Minnesota River must be serviced with on-site systems, pressurized sewers or a small lift station.

d) The area to the west and further upstream from Sioux Vista along Park Boulevard will be served by the construction of an approximately 1,427-gpm lift station as shown in **Figure 12A & 12B**.

e) The Sioux Vista area itself could be served in either of these directions depending on timing and detailed design of the system.

11. **West 169 Service Area** (Beyond the 2030 Boundary)

a) The area on either side of US 169 from ½ mile to 1 mile west of Delaware Avenue will require the installation of a 3,200-gpm lift station on the south side of US 169 as shown in **Figures 11A & 11B**. The lift station will serve everything in the west and southwest portions of the Ultimate Service Area. The 220th and 228th Street service areas will discharge through the ravine east of Delaware and flow north to 169 where they can connect to the 169 Intecptor.

b) The forcemain from the lift station will discharge to the gravity sewer installed to serve the frontage road businesses. The discharge manhole should be near Suzette's Restaurant.

12. **Delaware Avenue North Service Area** (Beyond the 2030 Boundary)

a) As shown in **Figures 12A & 12B**, a trunk sewer will be extended northward in Delaware Avenue from US 169 to serve this area. This trunk will

also receive the flow from the Park Boulevard lift station, which serves the upstream (westerly) portion of the Minnesota River service area.

13. **Delaware Avenue South Service Area** (Beyond the 2030 Boundary)

    a) Service to the bluffs on the south side of US 169 will be provided by the extension of a trunk sewer south in Delaware Avenue from US 169, as shown in **Figures 11A & 11B**. Generally, it will be constructed near the bottom of the bluff and individual collectors will be extended up the ravines to the south.

14. **220th Street Service Areas** (Beyond the 2030 Boundary)

    a) The area on the north side of 220th Street W is broken into two service areas, as shown in **Figures 11A & 11B**. The westerly portion (SW-7C&D) will be served by a 346 gpm lift station.

    b) The forcemain will extend easterly, as shown, and discharge into the second service area (SW-7B).

    c) Ultimately, the flow from the 220th Street W service areas will flow across Delaware Avenue to the northeast and down the ravine to the north. Eventually, it will connect to the West / Southwest interceptor along US 169.

15. **South of 220th Street** (Beyond the 2030 Boundary)

    a) On the most western portion of this area, gravel mining is being performed on\some specific sites. Therefore, it is recognized that the topography will be changing.

    b) The northwesterly portion of the area can be served with straight forward connections across 220th Street. The southwest corner will require a pump station to accommodate the 316 acres in SW – 5J. The flow from this area will be to the east to the first ravine east of Delaware and then north to US 169.

16. **228th Street, west of Delaware Street**

    a) In the very southwest corner of the Ultimate Service Area is a comparatively small district that must be served by its own 600 gpm lift station. The discharge will be to the east in District SW-5I and flow into the collector in the first ravine east of Delaware.

17. **Properties Beyond Municipal Service Boundary**

    a) It is acknowledged that there are specific properties within the Ultimate Service Area For which a gravity connection or even pressurized sewers to the municipal treatment system is physically impractical or impossible.

    b) On-site and clustered treatment systems should be considered as viable alternatives but historically the operation and maintenance of these systems has frequently been neglected.

    c) Therefore, at some point in the future it may be necessary for the City to expand its wastewater department to include the operation, monitoring and maintenance of such systems as a part of the utility operation.

5. WASTEWATER TREATMENT FACILITY

A. General

1. This section will describe the wastewater treatment facility process components and evaluates each process for operational ability as the City of Jordan continues to grow and increase the volume of flow and organic loading to the wastewater treatment facility.

B. Existing Wastewater Treatment Facility

1. A new mechanical treatment facility was placed on-line in October 2001. The mechanical facility consists of: flow equalization, pretreatment, extended aeration activated sludge with biological phosphorous removal, final clarification, disinfection, aerobic digestion and biosolids storage.

2. The wastewater treatment facility continues to use two of the stabilization ponds from the earlier facility for flow equalization. The treatment facility is designed to treat an average wet weather flow of 1.289 million gallons per day (mgd) with a 5-day biochemical oxygen demand (BOD) of 1,045 pounds per day. The treatment facility discharges on a continuous basis to Sand Creek with the following limits: 15 mg/l – Biochemical Oxygen Demand (BOD); 30 mg/l – Total Suspended Solids (TSS); 1.0 to 7.7 mg/l – Ammonia, Nitrogen (limit changes seasonally); and 1 mg/l – Total Phosphorous.

3. Currently the treatment facility is meeting all limits and treating approximately 0.400 mgd.

C. Population and Flow Projections

1. The population projections in the table below are derived from State Demographer and City estimates through 2040. The following population estimates are the same as found in the Water Comprehensive Plan. In order to project the adequacy of the various wastewater treatment processes the average and peak day water usage is required. It is typically common to assume that each person produces 100 gallons per day of wastewater, which is how the average flows were determined. A peaking factor of 2.25 was used to determine the peak flows. The population projections and average and peak flow projections are presented in Table X.1.

Table X.1
Population and Flow Projections

Year	Population	Average Flow (mgd)	Peak Flow (mgd)
2005	5,160	0.516	1.161
2010	6,693	0.669	1.506
2015	8,805	0.880	1.981
2020	10,916	1.092	2.456
2025	13,928	1.393	3.134
2030	16,940	1.634	3.676
2035	20,295	2.029	4.566
2040	24,314	2.431	5.470

D. Evaluation of Treatment Facilities

1. General

a) The wastewater treatment facility processes were evaluated using the criteria from the "Recommended Standards for Wastewater Facilities" or more commonly called "Ten State Standards". Using these standards and the population and flow estimates from above, each process was evaluated on when its capacity might be exceeded.

b) Mechanical wastewater treatment facilities include two separate processes combined to form an integrated treatment system. The processes are commonly referred to the "liquid stream" and the "solids stream". The liquid stream combines various treatment components to convert the wastewater into natural byproducts of biological stabilization and the capabilities of the liquid stream determine the quality of the effluent produced by the facility. The solids stream combines treatment components to stabilize, thicken and store the solids byproducts produced by the liquid stream for eventual incorporation into the soil. Some processes are evaluated on average wastewater flows whereas others are evaluated on peak flows. Results are tabulated in the following tables along with a brief description.

2. Pretreatment

a) Pretreatment facilities are provided to remove sticks, rags, grit and other materials to insure that they do not interfere with subsequent wastewater processes. The pretreatment process consists of a mechanical fine screen, back-up manual screen and a grit removal system.

Table X.2
Pretreatment Facilities

Equipment	Capacity, Peak (mgd)	Capacity (Year/Population)
Fine Screen	2.0	2015/8,805
Grit Removal	2.5	2020/10,916

b) As noted above, the pretreatment facilities were evaluated on peak flows and the fine screen is the limiting factor and additional pretreatment facilities would be required in 2015.

3. Aeration Basins

a) The City of Jordan operates an extended aeration activated sludge process. The major benefit of operating this type of process is the long retention times that allows for effective and efficient operation even when flows and strengths vary widely. Additionally, the activated sludge system is designed for biological phosphorous removal that occurs in two basins preceding the aeration basins. The City has two, 27-foot wide by 90-foot long and 16-feet deep aeration basins and an anaerobic and anoxic basin prior to the aeration

basins for phosphorous removal. As shown below in Table X.3, organic loading is the limiting factor for the activated sludge process with additional capacity required in 2013.

Table X.3 Activated Sludge Process – Aeration Basins		
Description	**Design Requirement**	**Capacity (Year/Population)**
Hydraulic Retention Time	18 Hours	2017/9,700
Organic Loading Rate	15 lb BOD/day	2013/7,953

4. Final Clarifiers

a) Activated sludge final clarifiers are designed to meet thickening as well as solids separation requirements. Scum collection and removal facilities are provided as well. The City of Jordan has two, 35-foot diameter clarifiers that operate at a 14-foot water level. Two clarifiers are required to meet the Ten State Standard criteria; however, in determining the Surface Overflow Rate, only one clarifier is used. As shown below in Table X.4, the surface overflow rate governs with new clarifier(s) required in 2014.

Table X.4 Final Clarifiers		
Description	**Design Requirement**	**Capacity (Year/Population)**
Surface Overflow Rate	900 gpd/sq. ft.	2014*/8,658
Solids Loading Rate	35 lb/day/sq. ft.	2023/12,890
Weir Loading Rate	30,000 gpd/lin. Ft.	>2040/29,220
* Calculation based on one clarifier		

5. Disinfection

a) A disinfection system is required to disinfect the treated wastewater prior to entering the receiving stream. As per the City's NPDES permit, they must disinfect and dechlorinate the treated wastewater for the months of April through October. The City of Jordan uses sodium hypochlorite to disinfect and sodium bisulfite to dechlorinate. The disinfection basin is a rectangular basin with interior walls to create a serpentine flow pattern and provide the proper detention time. According to *Ten State Standards*, disinfection systems must be designed to handle the peak flows, however, since the Jordan wastewater facility is designed for flow equalization, the average flows will be used for evaluation.

Table X.5		
Description	**Design Requirement**	**Capacity (Year/Population)**
Disinfection	15 minutes	2026/14,530

Table X.5		
Description	**Design Requirement**	**Capacity (Year/Population)**
Dechlorination	0.5 minutes	2027/15,133

b) As shown in Table X.5, the disinfection system has adequate capacity until 2026.

6. Biosolids Processing

a) Wastewater biosolids consists of solids from raw wastewater and biological solids generated in the treatment process. The City of Jordan treats biosolids using an aerobic digester and then stores the treated biosolids in a storage tank. The City contracts with a biosolids contractor to land apply the biosolids on a semi-annual basis. The biosolids system was designed to hold and treat the biosolids for 180-days at the original design population of 5,803 persons. The system can treat the biosolids for an approximate population of 6,000 persons. Once this threshold is met, the City would need to evaluate various options such as adding storage, additional treatment processes or a regional treatment solution.

E. Summary of Existing Treatment Facilities

1. Based upon the above discussion, the treatment facility liquid portion is limited by the aeration basins and will require upgrading in approximately 2013 or a population of nearly 8,000 persons. The final clarifiers and pretreatment facility will require upgrading in 2014 and 2015 respectively.

2. The solids portion, or biosolids treatment, will be at capacity in approximately 2008. Several options were discussed for upgrading and the City is currently investigating a regional treatment option for their biosolids with another municipality.

3. Since many of the liquid processes will be at capacity at nearly the same time, it is recommended to upgrade the pretreatment, activated sludge process and final clarification at the same time. The treatment facility was originally designed to add on additional aeration basins and final clarifiers, which will facilitate the integration of the new processes. Additional pretreatment facilities could be added adjacent to the existing pretreatment facility. Any upgrade would also require additional piping, blowers, pumps, mechanical, and electrical systems. By adding additional processes, the operation and maintenance costs would also increase.

F. Cost Implications

1. The range of costs for upgrading the liquid stream portion (additional pretreatment facilities, activated sludge facilities, final clarifiers, and other necessary equipment) is estimated between $ 4.5 to $ 7 million dollars. The cost for upgrading will be dependent upon the type of processes required and any potential changes in the City's effluent limits.

2. The operation and maintenance costs will increase due to additional power usage, chemical usage and additional maintenance requirements.

6. ESTIMATED COSTS & RECOMMENDATIONS

A. Basis of Cost Analysis - For the purpose of estimating cost, it is assumed that there will be no easement or right-of-way costs involved with any of the proposed improvements.

B. Upper Sand Creek Lift Station / Force Main - See **Figures 7A & 7B**.

1. This will require a dual forcemain (14" & 10") to reach the West / Southwest Interceptor. Initially, there will be insufficient flow to operate a large diameter main; therefore the smaller one is required. But in the future, as the area develops a single smaller diameter forcemain would be inadequate to carry the flow.

2. The City has constructed the lift station diversion chamber with the Sawmill Road project. The design of the diversion chamber allows the installation of control gates in the future. By automatic monitoring the flow in the downstream Creek Lane interceptor, the gates will be capable of allowing gravity flow into Creek Lane when it is capable of accepting it. This will permit limiting operation of the lift station to times that the flow demands it.

3. The interceptor and arterial sewers within the West / Southwest service area will require over sizing to accept the capacity of the pump station.

C. Service Area Collector Sewers

1. Other, less critical, interceptor and trunk collectors are necessary throughout the study area to deliver the wastewater to the WWTP. Specific reaches of these sewer routes may extend through areas in which the sewer can directly service neighboring properties; however, for the purposes of this study, it was assumed that no portion of the cost would be directly assessable.

2. The approximate routes and sizes are shown on individual figures for each of the service areas:

Service Areas Within the 2030 Planning Boundary		**New Area Served - Acres**	
	Fig. No.	Residential	Commercial
Syndicate Street Service Area Extension	9	277	30
Southeast 10 Collector (C.R. 8 extended westerly)	7	278	28
Southeast 9-b Collector	7	232	0
Southeast 9-a Collector	7	358	0
Upper Sand Creek - West Side (Directly Tributary)	7	86	0
Broadway Interceptor - South - Se-6 Taken to Sand Creek	7	30	0
Bridle Cr / Hillside Dr / Hope Ave Interceptor	10	344	0

Service Areas Within the 2030 Planning Boundary		**New Area Served - Acres**	
	Fig. No.	Residential	Commercial
West And Southwest Interceptor	6	1776	283
195th Street Collector	13 & 14	0	172
Valley View Service Area	8 & 13	30	0
MN River Interceptor	8 & 13	857	0
Approximate New Acreage Served Within the 2030 Planning Boundary		4268	513

Service Areas Between the 2030 Planning Boundary and the Ultimate Service Area		**New Area Served - Acres**	
	Fig. No.	Residential	Commercial
Northeast Growth Area - TH 282 Interceptor	5	992	107
Northeast Growth Area - US 169 Interceptor	5	369	0
Upper Sand Creek - East Side (Directly Tributary)	7	399	0
Southeast 2 – Sawmill Rd., Ames	7	109	0
Southeast 7 Collector		861	0
Southeast 8 Collector	7	337	0
Park Boulevard Service Area	11	627	27
Delaware Avenue North Service Area	11	82	396
West US 169 Service Area	12	238	91
Delaware Avenue South Service Area	12	259	113
220th Street Service Areas	12	378	0
Approximate New Acreage Served **Between the 2030 Planning Boundary and the Ultimate Service Area**		4651	734

In summary, the cost of extending sewer service to each of these service areas, as shown, is:

Estimated Cost Summary	
Service Area	Estimated Cost
Northeast Service Area - TH 282 Interceptor & Collectors – Includes US 169 Crossing	$2,325,000
Northeast Service Area - US 169 Interceptor & Collectors	$1.330,000
Syndicate Street - May be served without over sizing.	$0
Southeast 7 Collector	$2,003,000
Southeast 8 Collector – Includes all the SE corner	$3,850,000
Southeast 9-a Collector	$787,200
Southeast 9-b Collector (Includes Lift Station to Serve the SE-10 Service Area)	$951,900
Sand Creek - East Side Interceptor	$2,959,200
Sand Creek - West Side Interceptor	$305,500
West/southwest & Northwest Interceptor	$5,991,586
195th Street Collector	$173,090
MN River Collector	$1,757,532
Park Boulevard Service Area (Lift Station)	$1,917,308
Delaware Avenue North Service Area	$665,732
West US 169 Service Area (Lift Station)	$1,118,429
Delaware Avenue South Service Area	$379,467
220th Street Service Area (Lift Station Area – West)	
220th Street Service Area (Gravity Portion – East)	$0
Total Estimated Cost ===	$26,210,000
* Acreage included in individual tributary service areas.	

3. Cost Analysis

a) Assuming the City pursues these recommendations, the estimated total cost of the collection system is $ 26,210,000. Given the approximate new area served, the City's current fee of $2,601 per unit is appropriate to cover the

City's participation for the construction, right-of-way acquisition, financing, etc. included in this study.

b) Attempts were made in this study to limit the tributary area calculations to developable property and omitting the escarpments, flood plains, ravines, etc. If the gross areas were included in the design, the capacities of the sewers would have been inflated which would have inflated the cost projections.

c) The current City policy applies the Sewer Area / Capital Charge to the gross area of each property. As development expands into less efficient topographic areas, the City may want to consider limiting charges to the "net" area of a development. This could only exclude areas prohibited from development by existing ordinances, i.e., the escarpments, flood plains, wetlands, etc.

7. TIMING

A. The improvements to the wastewater collection system identified in this report will permit the City to serve the surrounding properties to the ultimate planning boundary. However, if development precedes the availability of sanitary sewer, the eventual cost to extend service to and through existing developments will be considerably greater than those estimated here.

B. Some development in the service area directly tributary to Creek Lane and Syndicate Street can continue without fear of over taxing the system.

C. The flow loggers previously purchased will continue report the actual flow patterns of the system and when peak flows approach ¾ of the interceptor capacity, the City must authorize the installation of pumps and forcemain in the Sawmill lift station or cease permitting new connections.

D. Encourage or require any future development beyond the current service limits to install neighborhood treatment systems with sewers capable of being attached to the municipal system in the future.

E. Authorize a feasibility study to select the specific route and prepare the preliminary design of the west/southwest interceptor to the area of the US 169 / CR 59 interchange and the alternate of constructing a pump station and forcemain to the WWTP.

F. This will permit coordinated construction with MNDOT and allow potential developers to conduct their site investigations.

G. Development pressure to provide wastewater services to the more remote areas will most likely leap-frog the extension of the necessary wastewater infrastructure.

H. The City may wish to consider targeting certain areas, which have more eminent potential for development and extend the required sewers in advance. If this is done, it would be most desirable to terminate the extension at the limits of developable property so the individual developer could integrate further extensions within the lot layout. Examples to be considered are:

1. The west side Upper Sand Creek Interceptor

2. The MN River Interceptor in Valley View Drive. Once Valley View Drive is improved, the cost to install the sewer will increase.

3. The West/Southwest Interceptor or pump station / forcemain to CR 59.

Appendix

Exhibit A – Color Key for District Identification

Figures

Detailed Spreadsheet

LEGEND

- CURRENT CITY LIMITS
- ULTIMATE SERVICE AREA

USE FOR ALL FIGURES NUMBERED 5 THRU 14 :

- UNSHADED AREAS ARE NOT AVAILABLE FOR DEVELOPMENT
- SYNDICATE STREET SERVICE AREA
- NORTHEAST SERVICE AREA
- CREEK LANE SERVICE AREA (/// UPPER SAND CREEK)
- WEST/SOUTHWEST SERVICE AREA
- 195TH STREET SERVICE AREA
- VALLEY VIEW ROAD SERVICE AREA
- MINNESOTA RIVER NORTH SERVICE AREA
- 220TH STREET SERVICE AREA
- /// 220TH STREET LIFT STATION AREA
- /// US 169 LIFT STATION AREA
- DELAWARE AVE SOUTH SERVICE AREA
- DELAWARE AVE NORTH SERVICE AREA
- /// PARK BLVD LIFT STATION AREA

BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

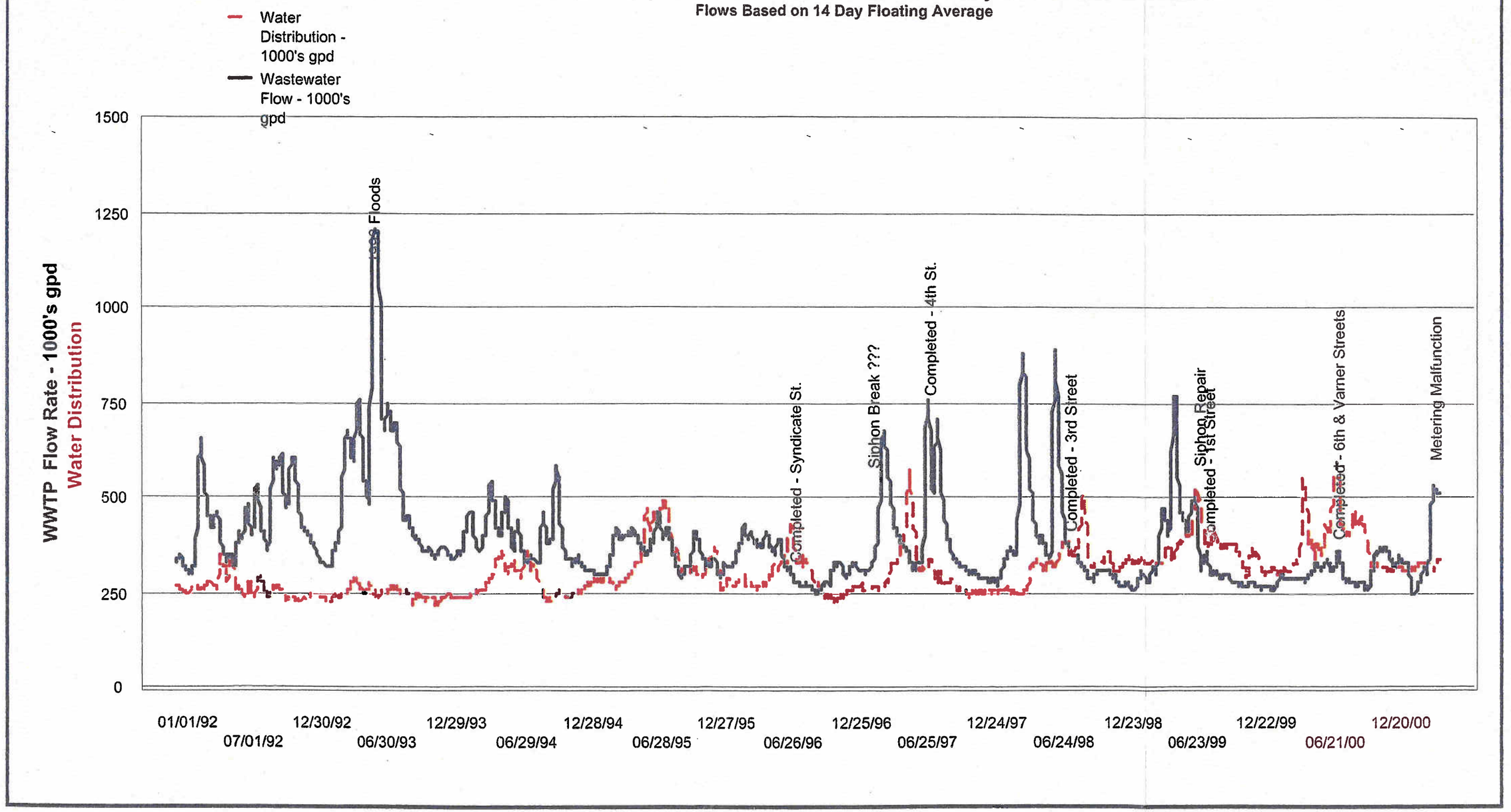
H:\JORD\T1721486\Cad\21486F0-1.dwg 2/6/08

CITY OF JORDAN
SANITARY COMPREHENSIVE PLAN
COLOR LEGEND

FEBRUARY, 2008 EXHIBIT A

FIGURE 1 - City of Jordan - Inflow & Infiltration Analysis 1/01/1992 to 4/30/2001

Flows Based on 14 Day Floating Average



MINNESOTA RIVER

US HIGHWAY 169

US HIGHWAY 169

CURRENT CITY LIMITS

SAND CREEK

US HIGHWAY 21

2030 BOUNDARY

SYNDICATE ST. SERVICE AREA

CREEK LANE SERVICE AREA

VALLEY VEIW SERVICE AREA

0 2500 5000

SCALE FEET

BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-2.dwg 2/6/08

CITY OF JORDAN, MINNESOTA
EXISTING INTERCEPTOR SERVICE AREAS

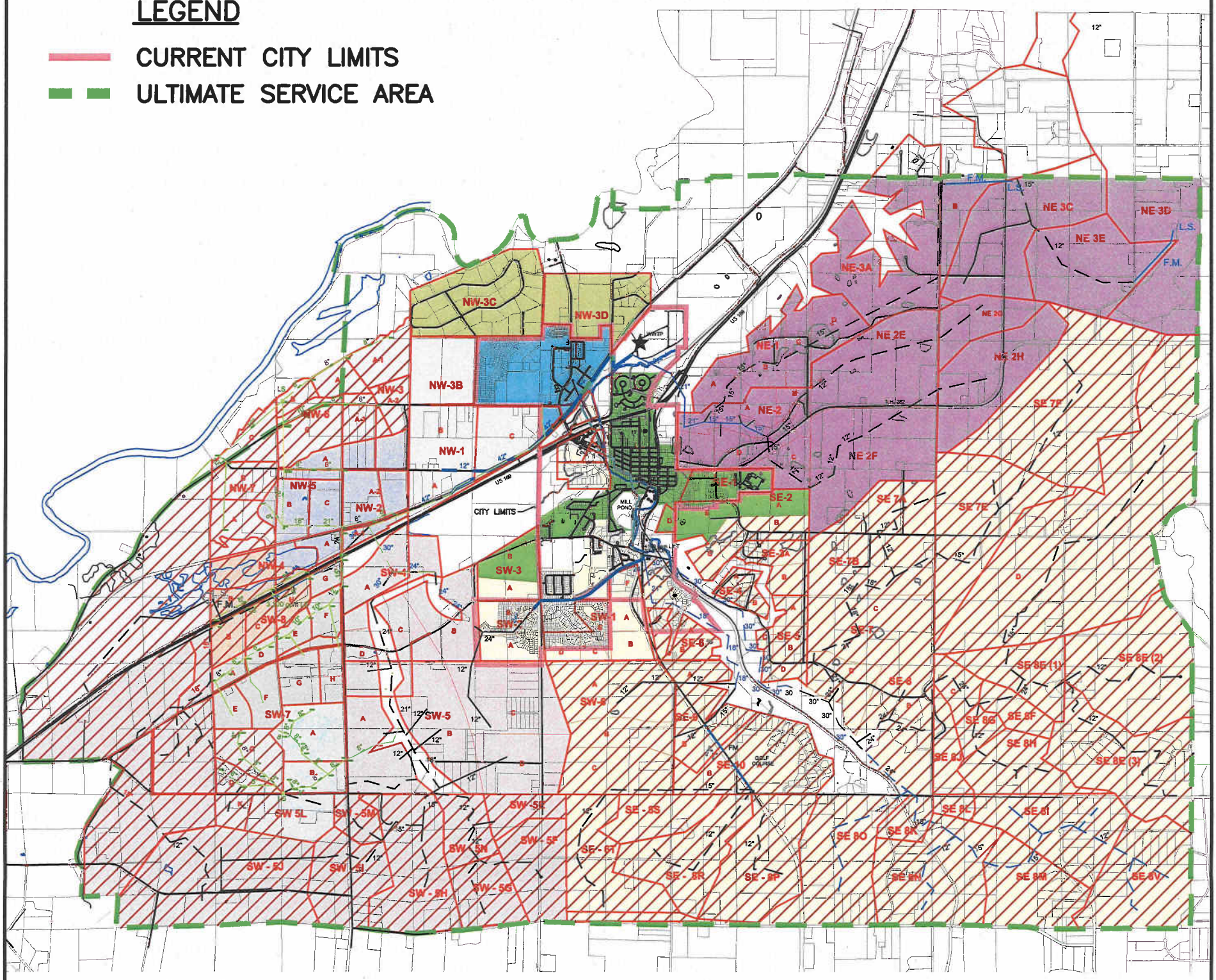
FEBRUARY, 2008

FIGURE NO. 2

LEGEND

CURRENT CITY LIMITS

ULTIMATE SERVICE AREA



UNSHADED AREAS ARE NOT AVAILABLE FOR DEVELOPMENT

SYNDICATE STREET SERVICE AREA

NORTHEAST SERVICE AREA

CREEK LANE SERVICE AREA (/// UPPER SAND CREEK)

WEST/SOUTHWEST SERVICE AREA

195TH STREET SERVICE AREA

VALLEY VIEW ROAD SERVICE AREA

MINNESOTA RIVER NORTH SERVICE AREA

220TH STREET SERVICE AREA

/// 220TH STREET LIFT STATION AREA

/// US 169 LIFT STATION AREA

DELAWARE AVE SOUTH SERVICE AREA

DELAWARE AVE NORTH SERVICE AREA

/// PARK BLVD LIFT STATION AREA

N

0 5000 10000

SCALE FEET

BOLTON & MENK, INC.
Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-3.dwg 2/6/08

CITY OF JORDAN, MINNESOTA
WASTEWATER SERVICE AREAS

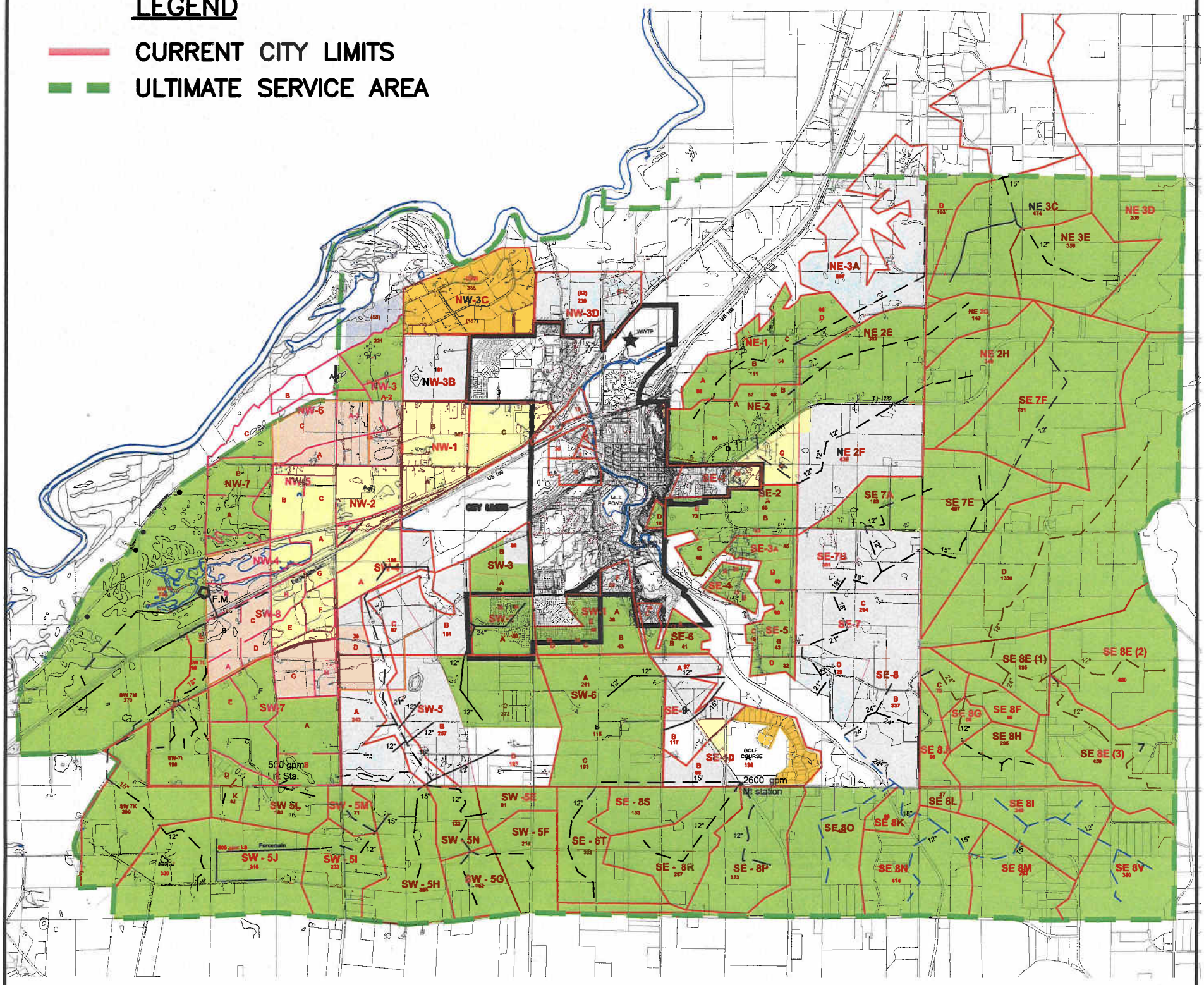
FEBRUARY, 2008

FIGURE NO. 3

LEGEND

CURRENT CITY LIMITS

ULTIMATE SERVICE AREA



12 LOTS/ACRE

8 LOTS/ACRE

3 LOTS/ACRE

2.5 LOTS/ACRE

2 LOTS/ACRE

1 LOT/ACRE

2+ ACRES/LOT

INDUSTRIAL/COMMERCIAL

0 5000 10000

SCALE FEET

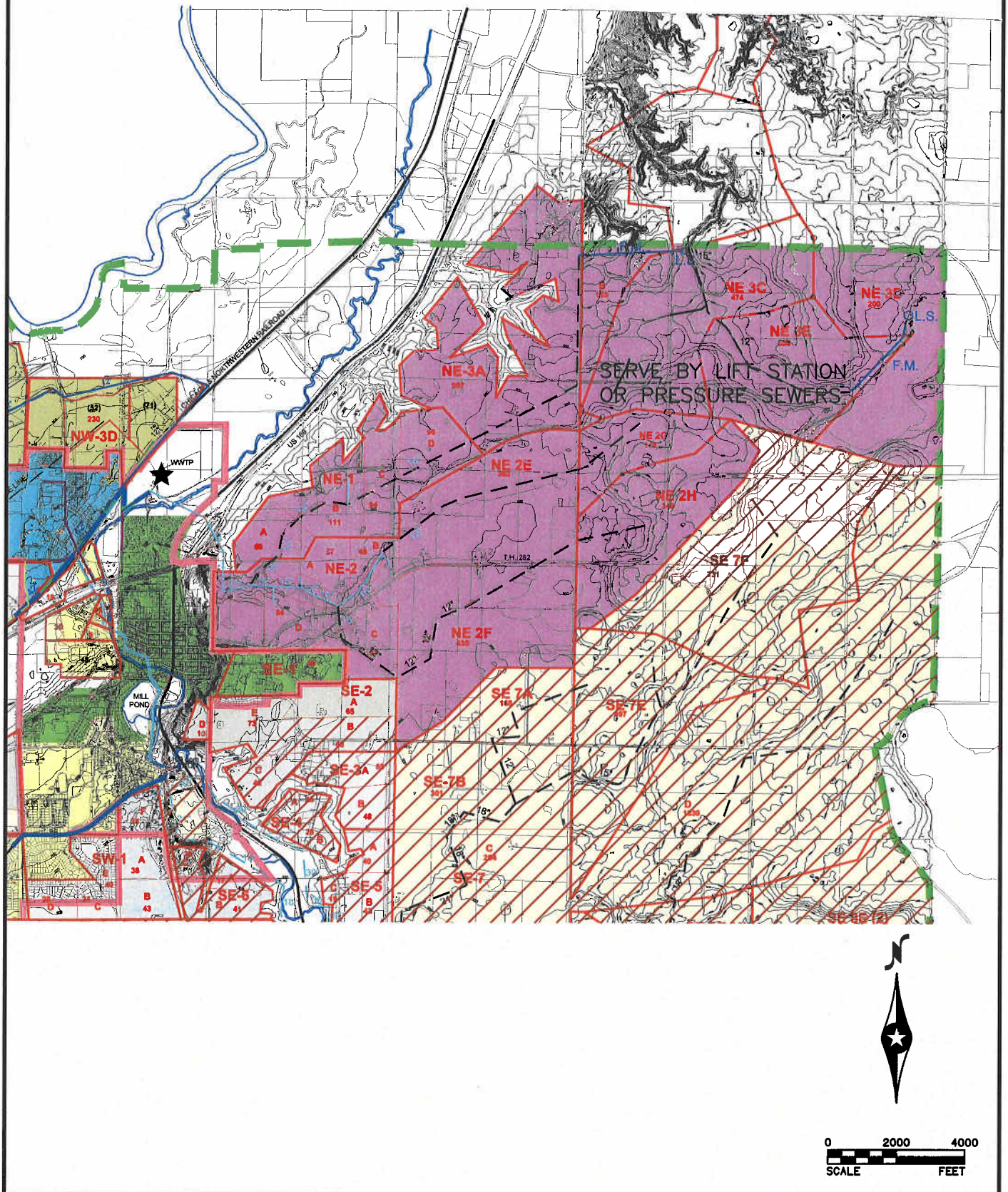
BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-4A.dwg 2/6/08

CITY OF JORDAN, MINNESOTA
ANTICIPATED DENSITY PLAN

FEBRUARY, 2008

FIGURE NO. 4A



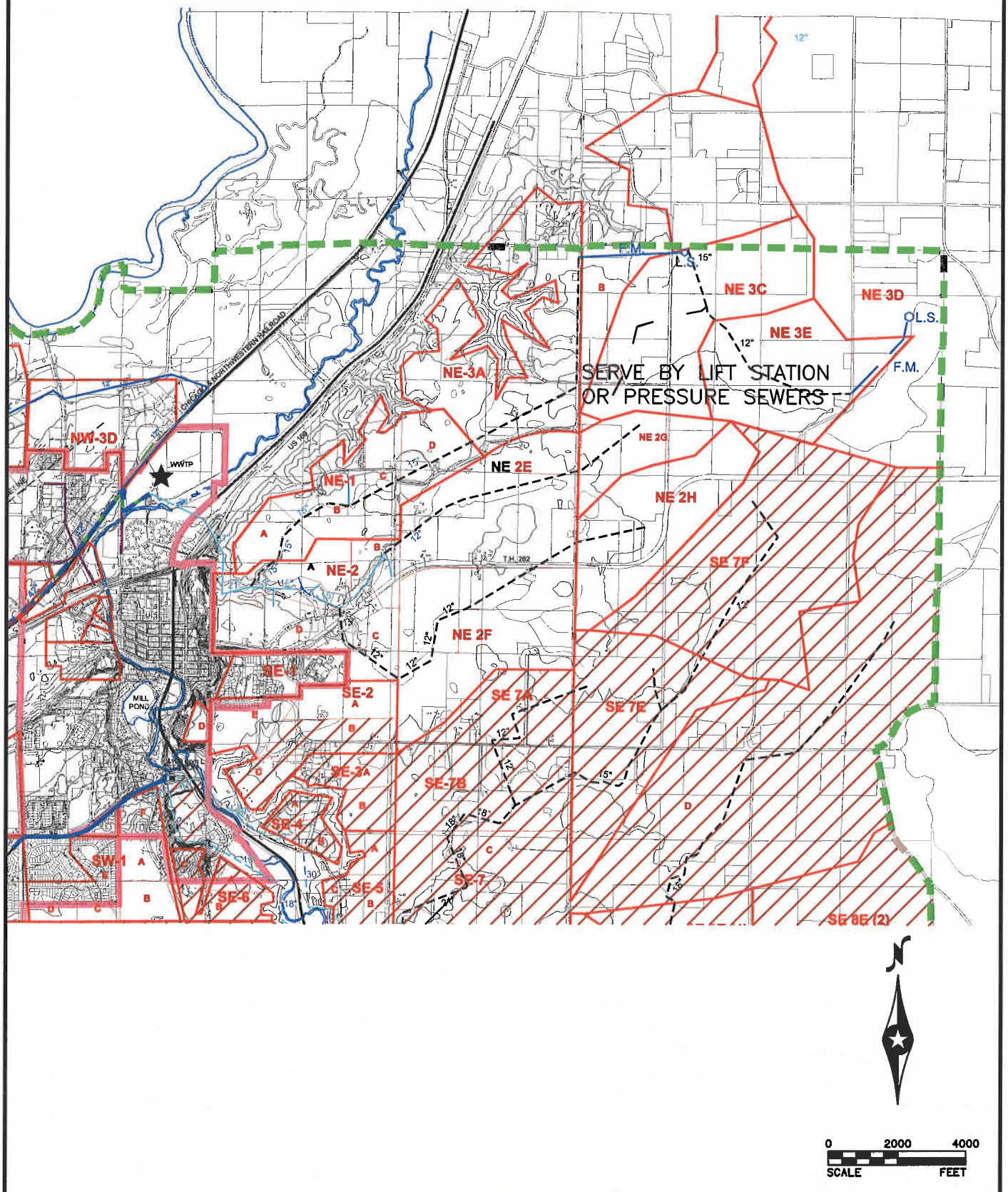
BOLTON & MENK, INC.
Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-5A.dwg 2/6/08

CITY OF JORDAN
NORTHEAST SERVICE AREA COLLECTOR ROUTES

FEBRUARY, 2008 FIGURE NO. 5A



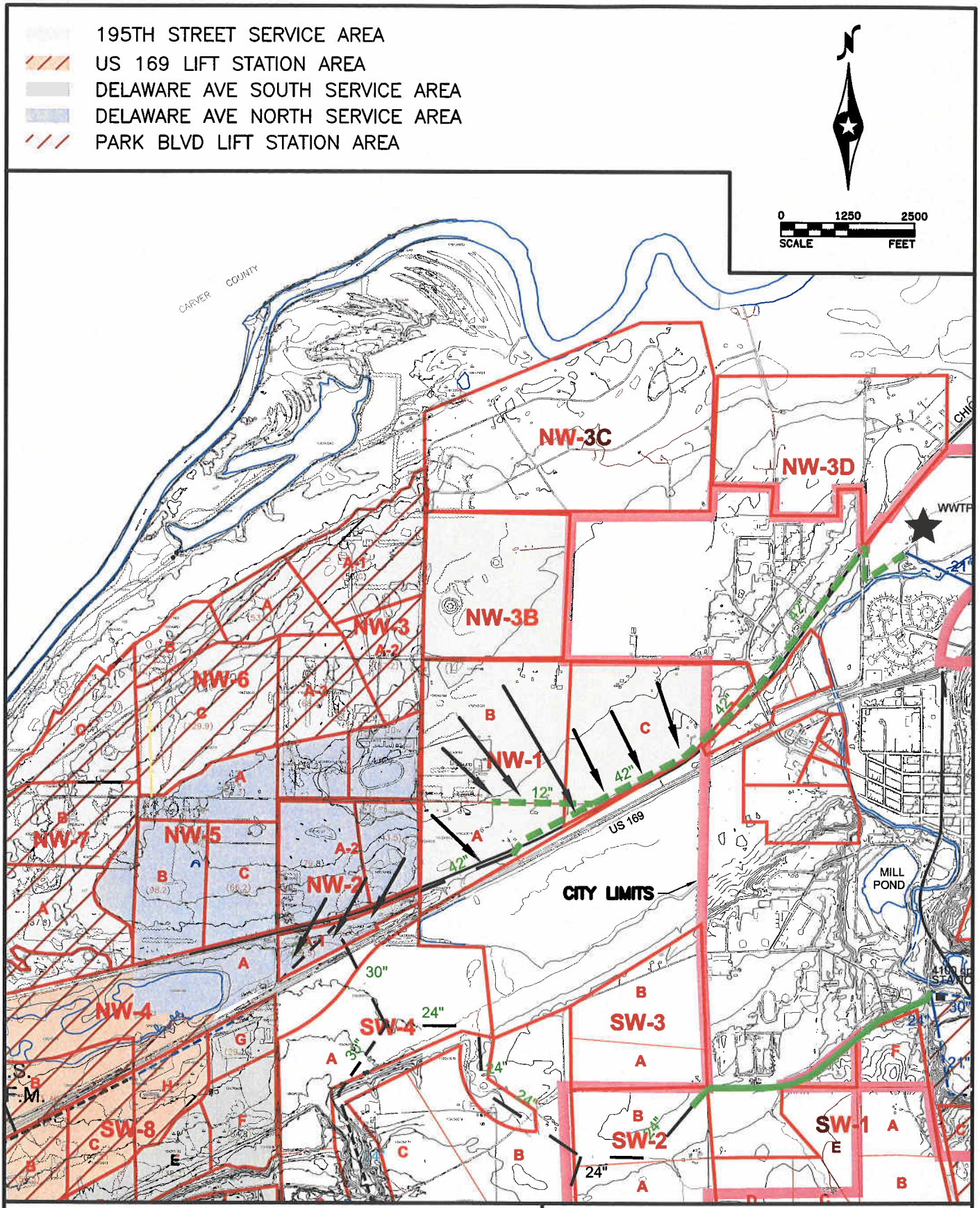
BOLTON & MENK, INC.
Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-5B.dwg 2/6/08

CITY OF JORDAN
NORTHEAST SERVICE AREA COLLECTOR ROUTES

FEBRUARY, 2008 FIGURE NO. 5B



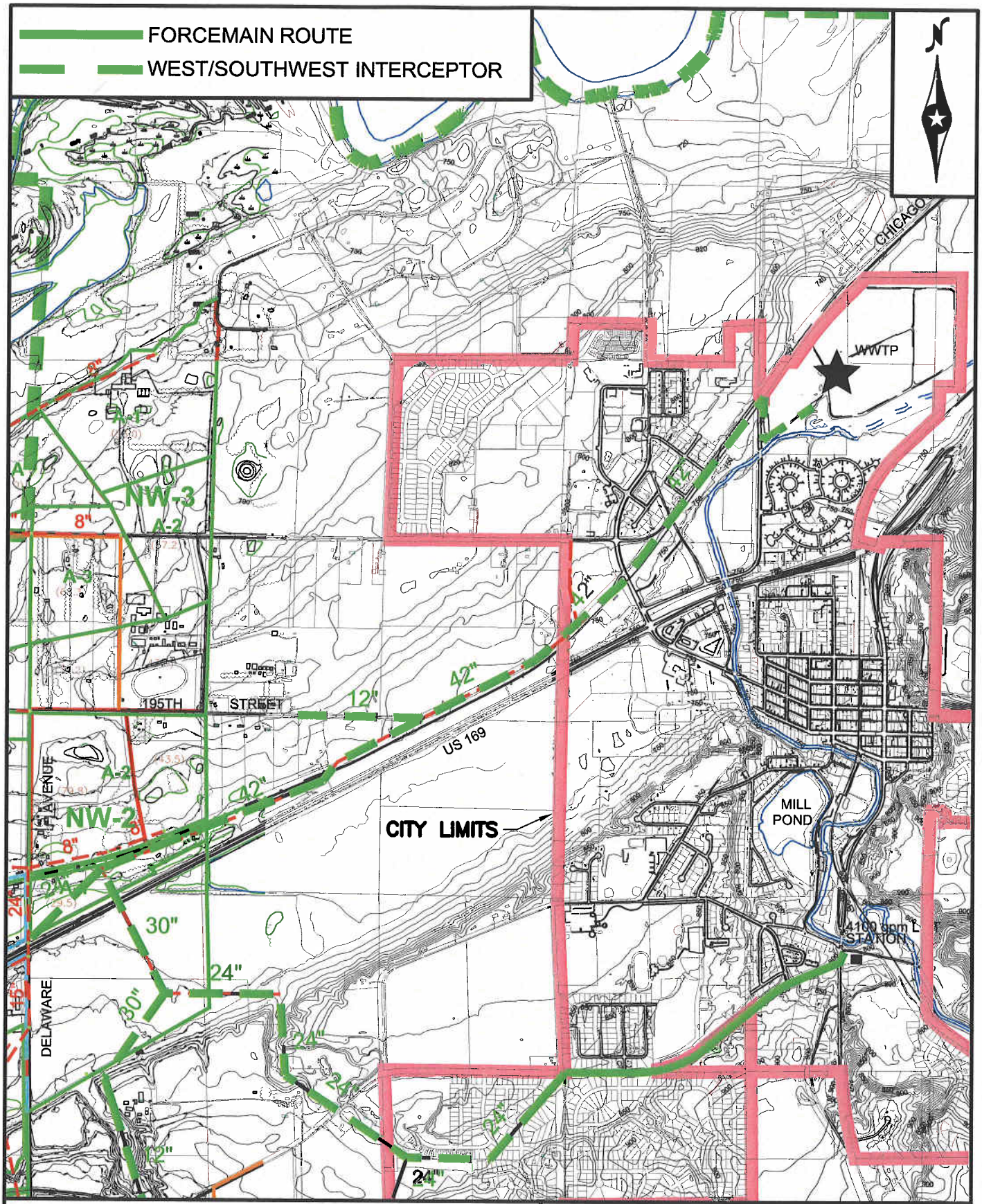
BOLTON & MENK, INC.
Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-6A.dwg 2/6/08

CITY OF JORDAN
195TH STREET SERVICE AREA FLOW PATTERN

FEBRUARY, 2008 FIGURE NO. 6A



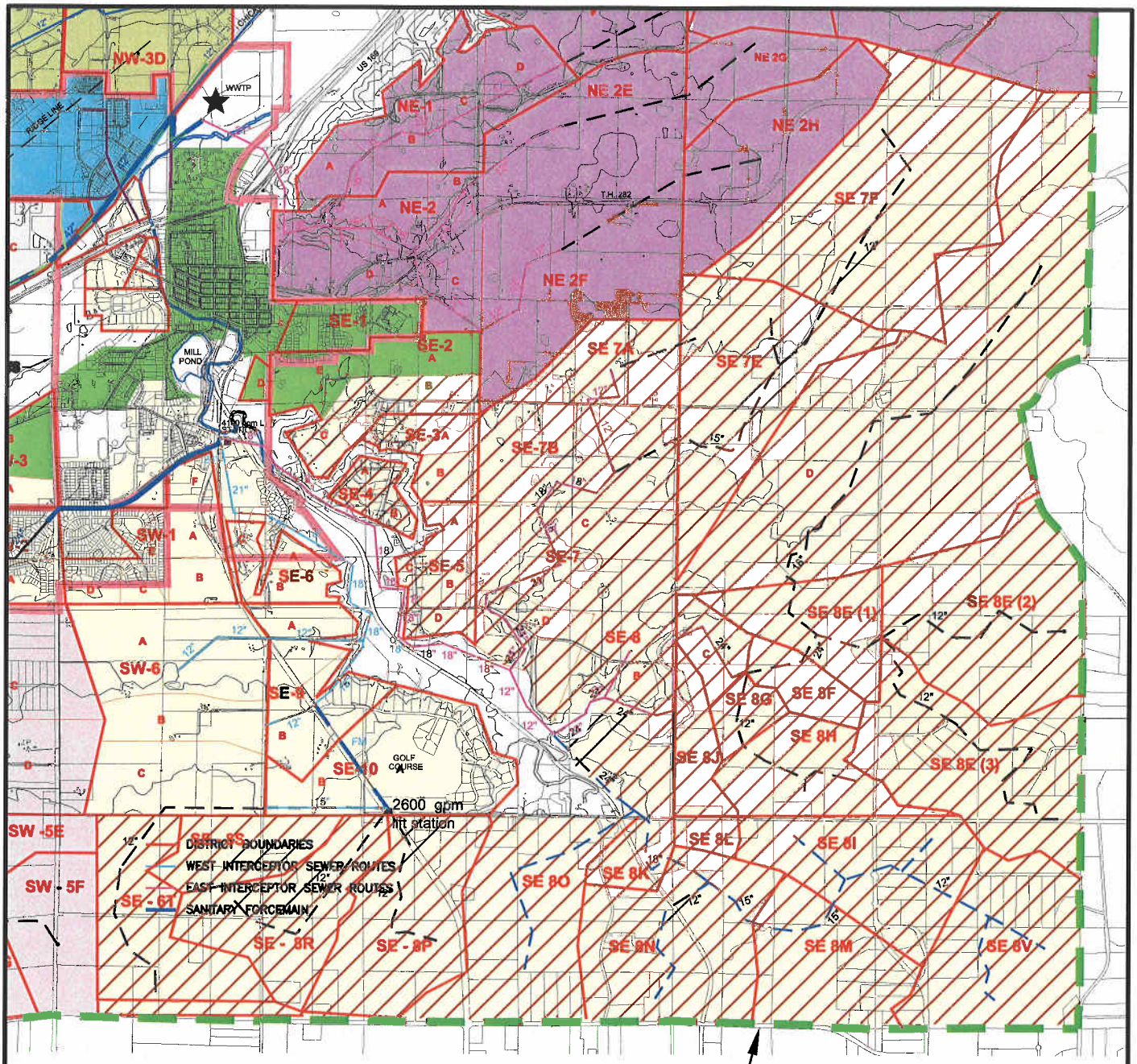
BOLTON & MENK, INC.
Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-6B.dwg 2/6/08

CITY OF JORDAN
W/SW INTERCEPTOR ROUTE

FEBRUARY, 2008 FIGURE NO. 6B

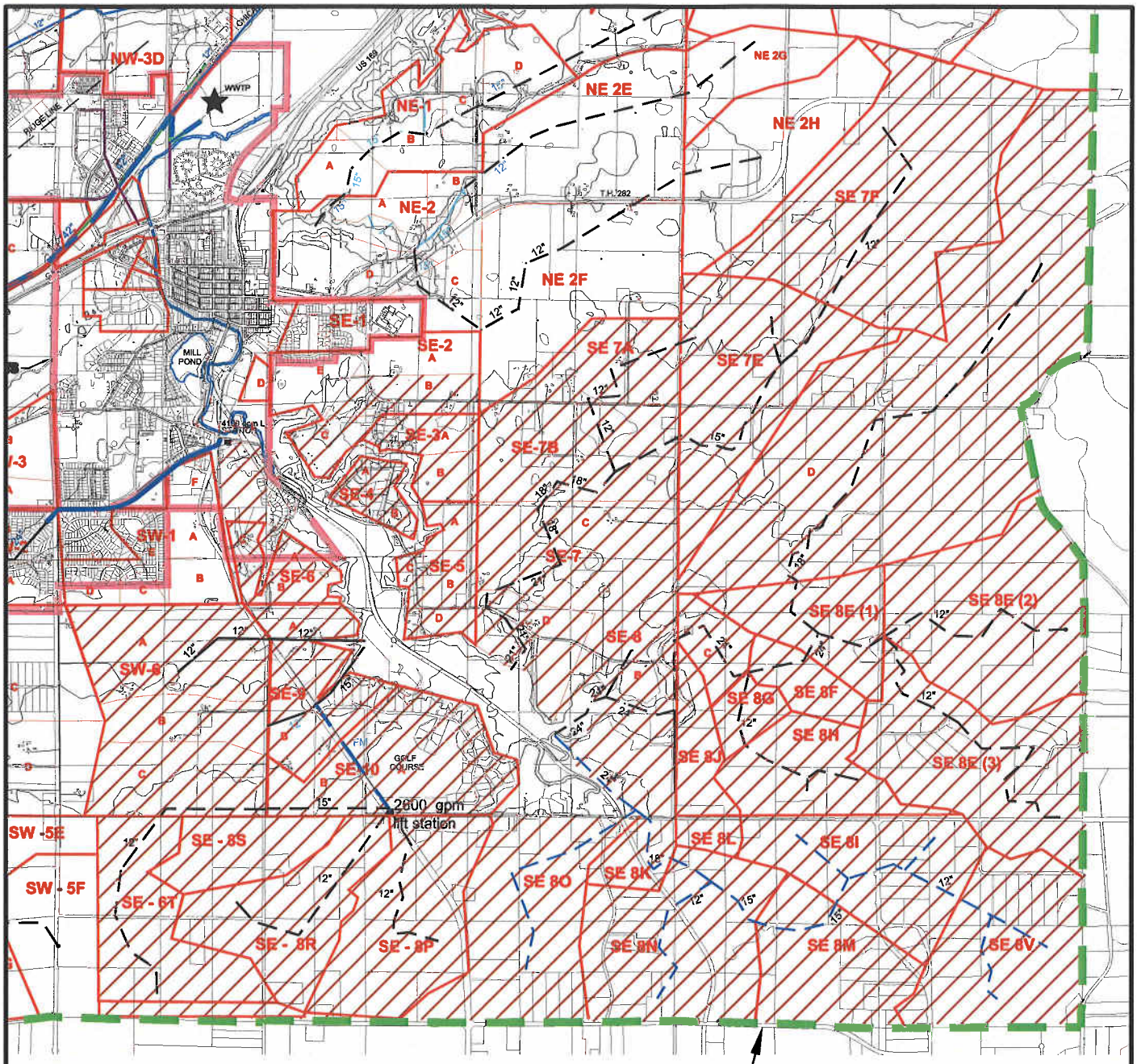


BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-7A.dwg 2/6/08

CITY OF JORDAN
UPPER SAND CREEK SRVC AREA COLLECTOR ROUTES

FEBRUARY, 2008 FIGURE NO. 7A



ULTIMATE BOUNDARY

DISTRICT BOUNDARIES

WEST INTERCEPTOR SEWER ROUTES

EAST INTERCEPTOR SEWER ROUTES

SANITARY FORCEMAIN

0 1000 2000

SCALE FEET

BOLTON & MENK, INC.

Consulting Engineers & Surveyors

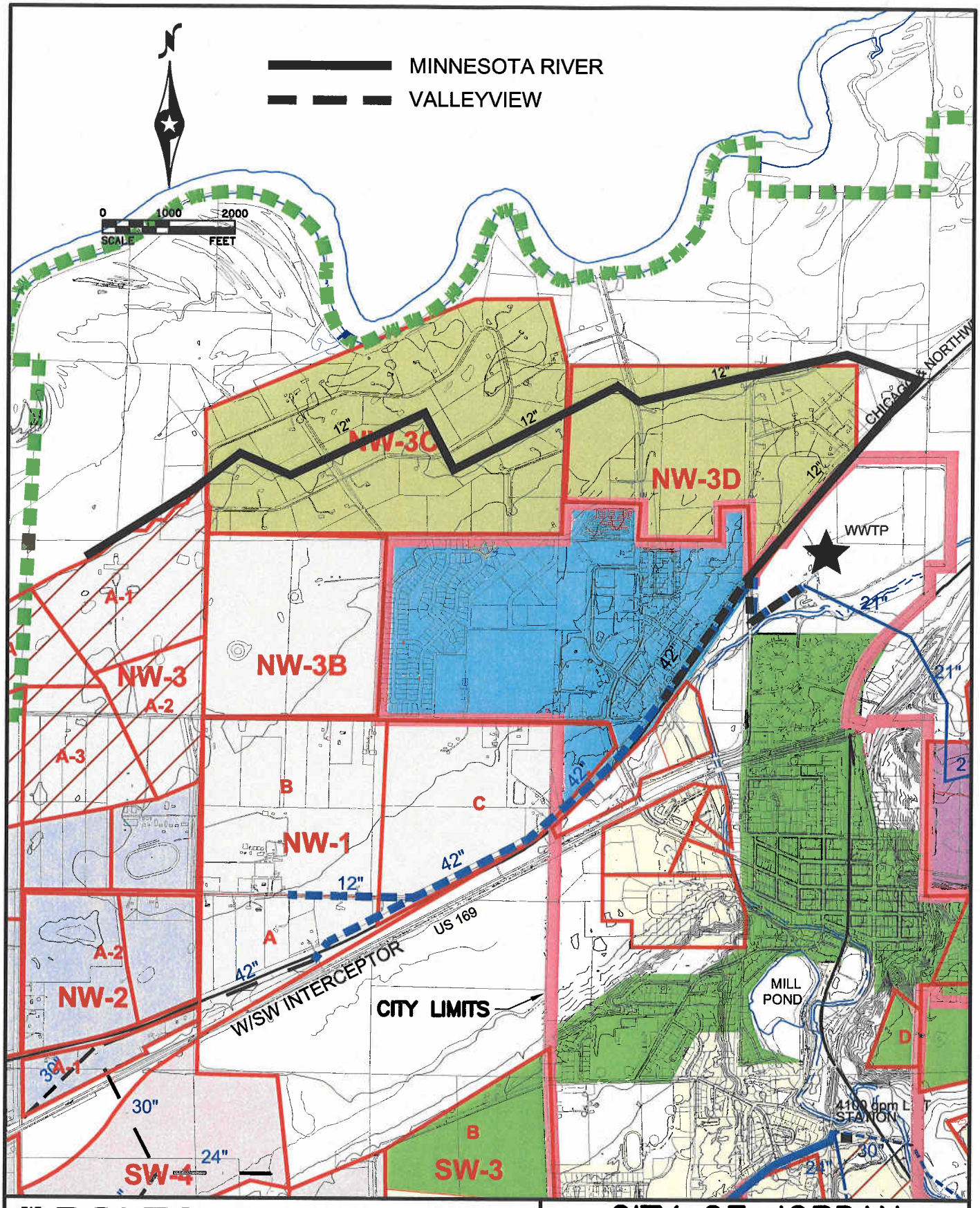
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-7B.dwg 2/6/08

CITY OF JORDAN

UPPER SAND CREEK SRVC AREA COLLECTOR ROUTES

FEBRUARY, 2008 FIGURE NO. 7B



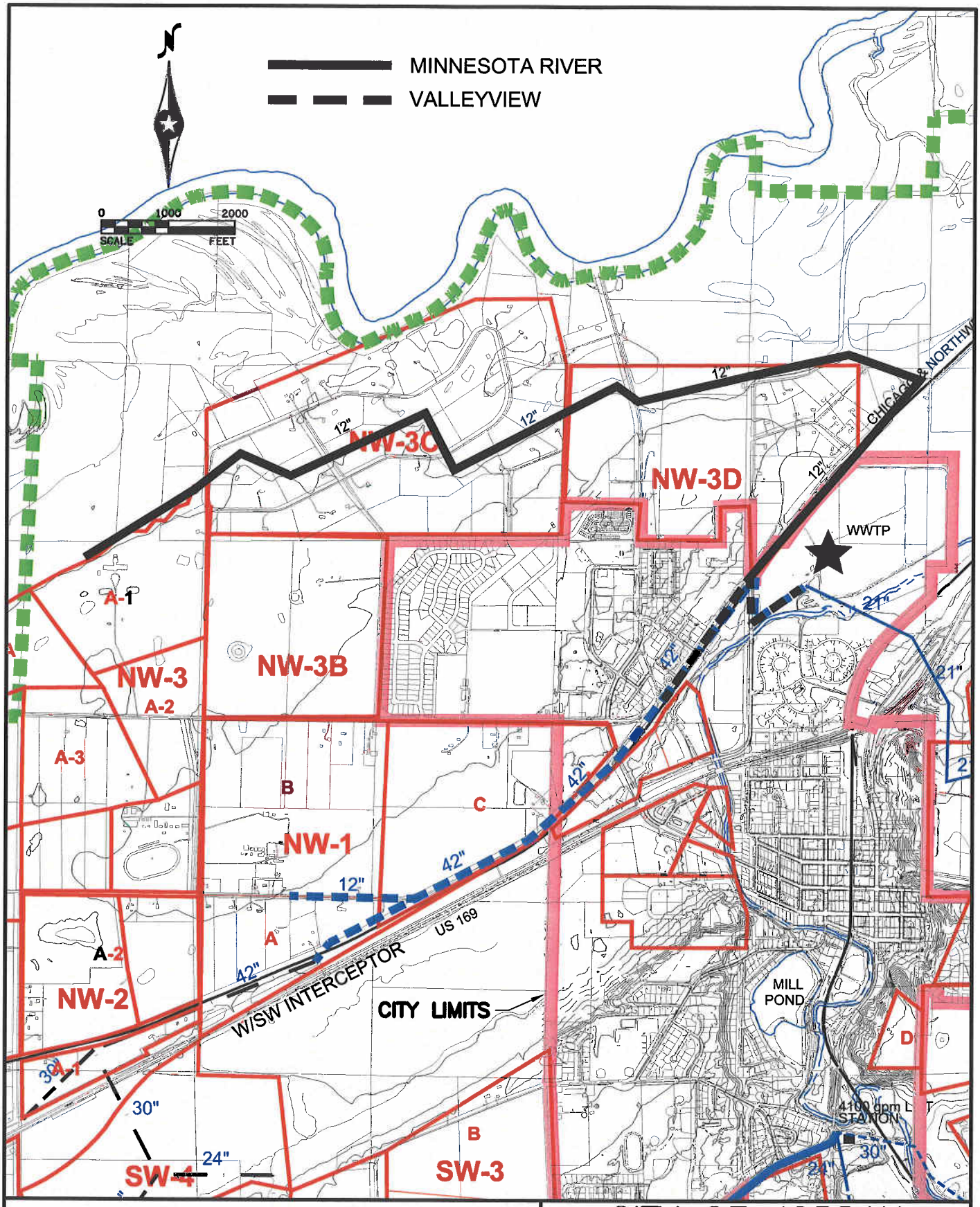
BOLTON & MENK, INC.
Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-8A.dwg 2/6/08

CITY OF JORDAN
VALLEYVIEW & MN RIVER COLLECTOR ROUTES

FEBRUARY, 2008 FIGURE NO. 8A



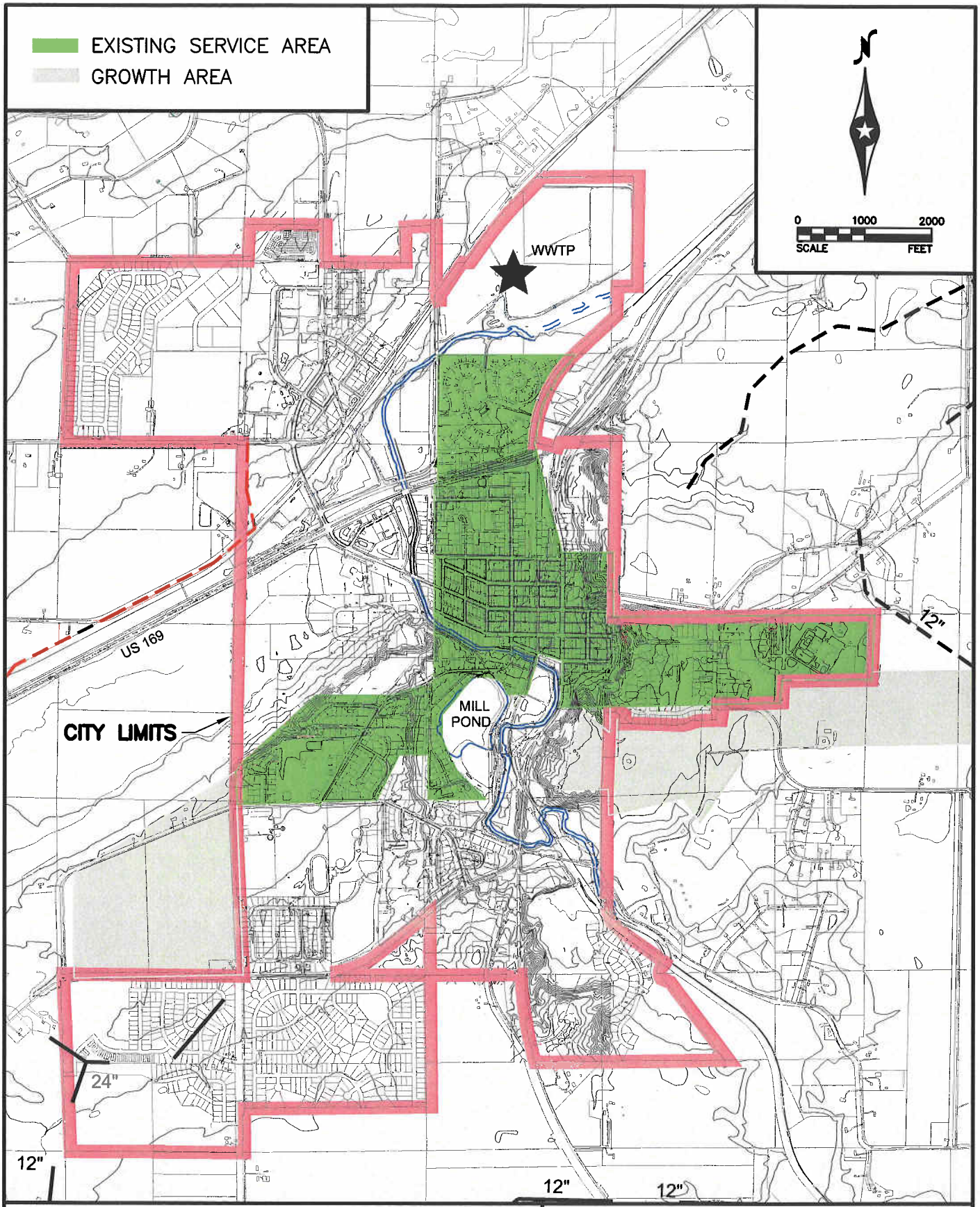
BOLTON & MENK, INC.
Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-8B.dwg 2/6/08

CITY OF JORDAN
VALLEYVIEW & MN RIVER COLLECTOR ROUTES

FEBRUARY, 2008 FIGURE NO. 8B



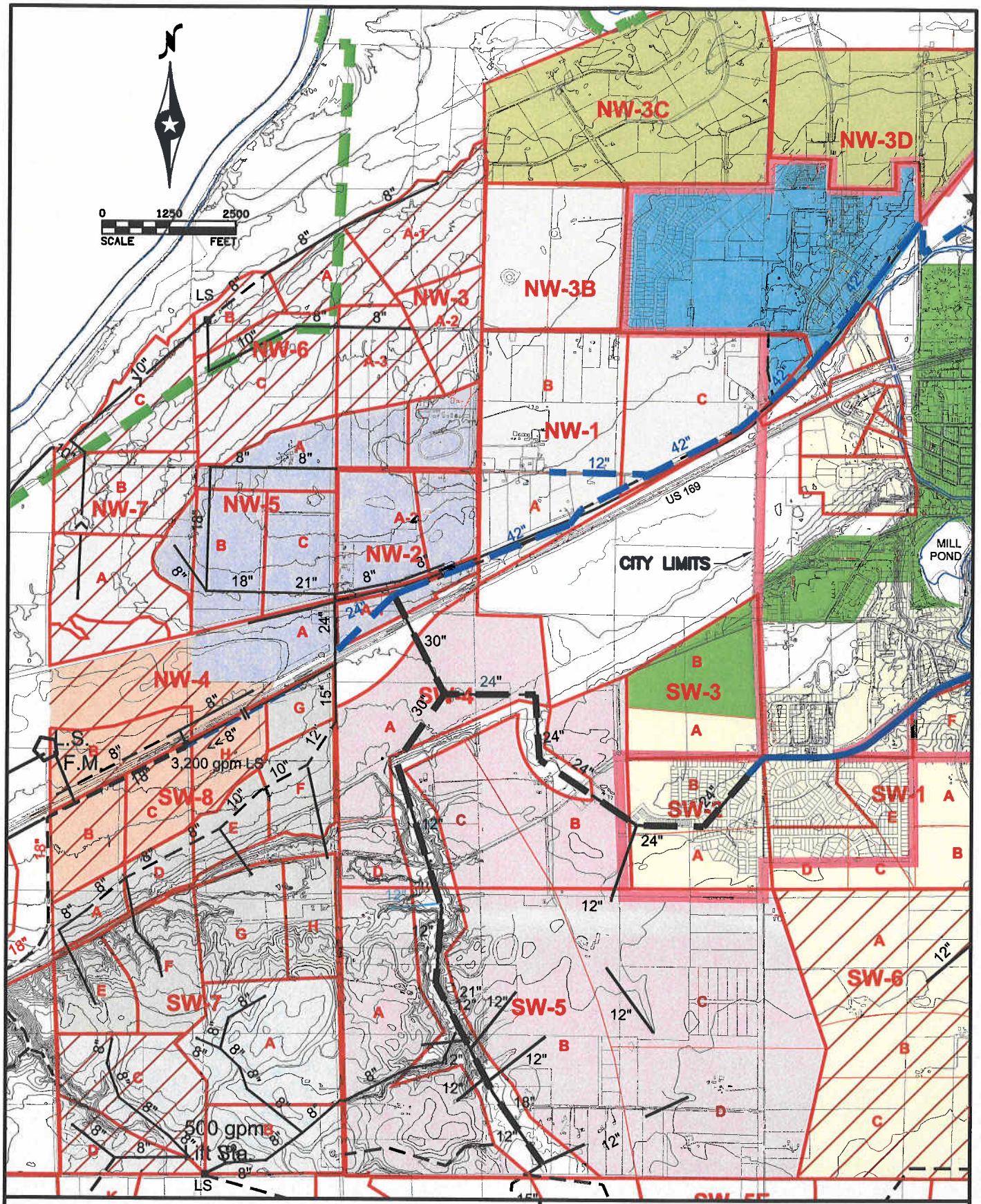
BOLTON & MENK, INC.
Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-9A.dwg 2/6/08

CITY OF JORDAN
SERVICE AREAS
SYNDICATE ST. SERVICE AREA

FEBRUARY, 2008 FIGURE NO. 9A

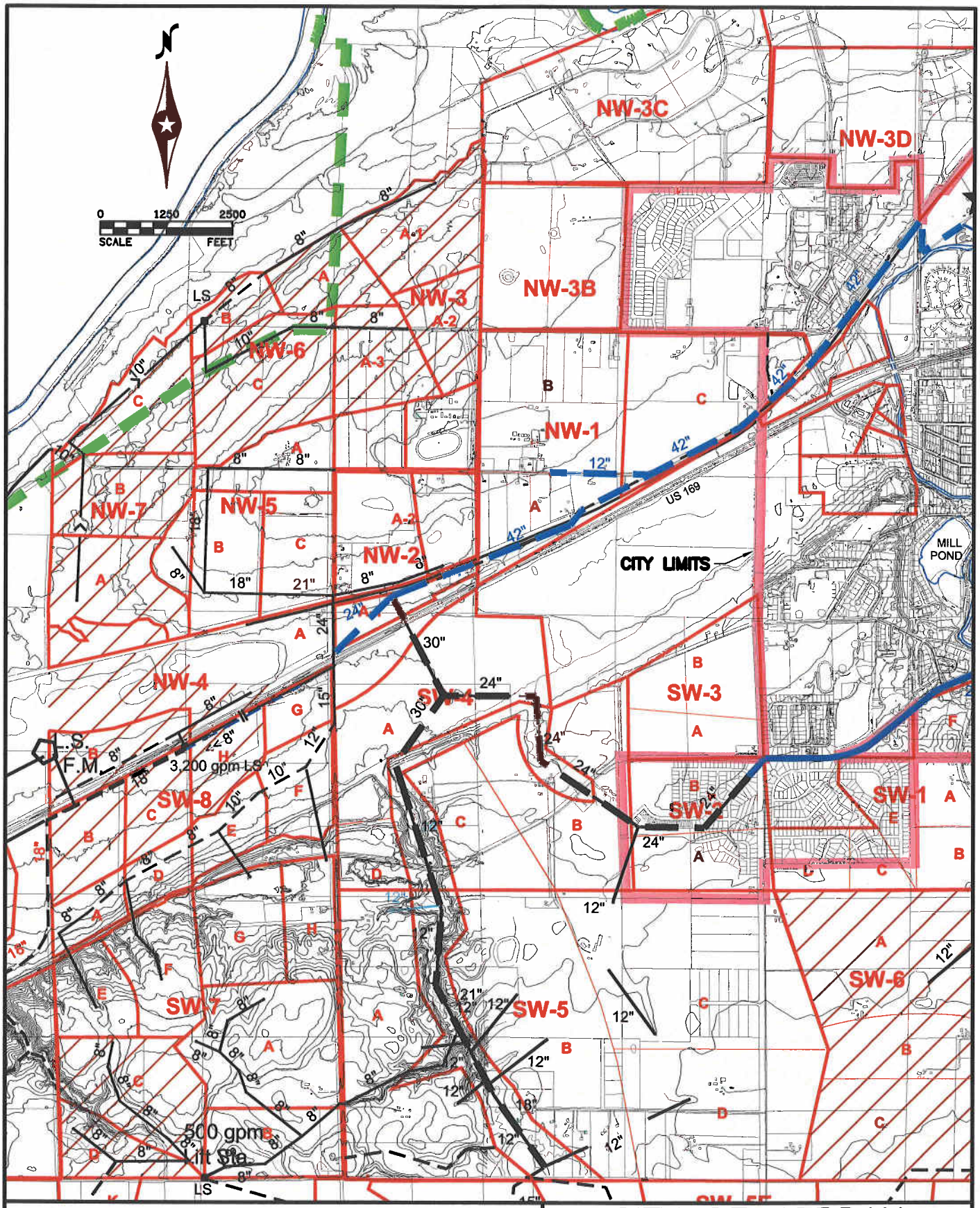


BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-10A.dwg 2/6/08

CITY OF JORDAN
WEST GROWTH AREAS
COLLECTOR ROUTES

FEBRUARY, 2008 FIGURE NO. 10A



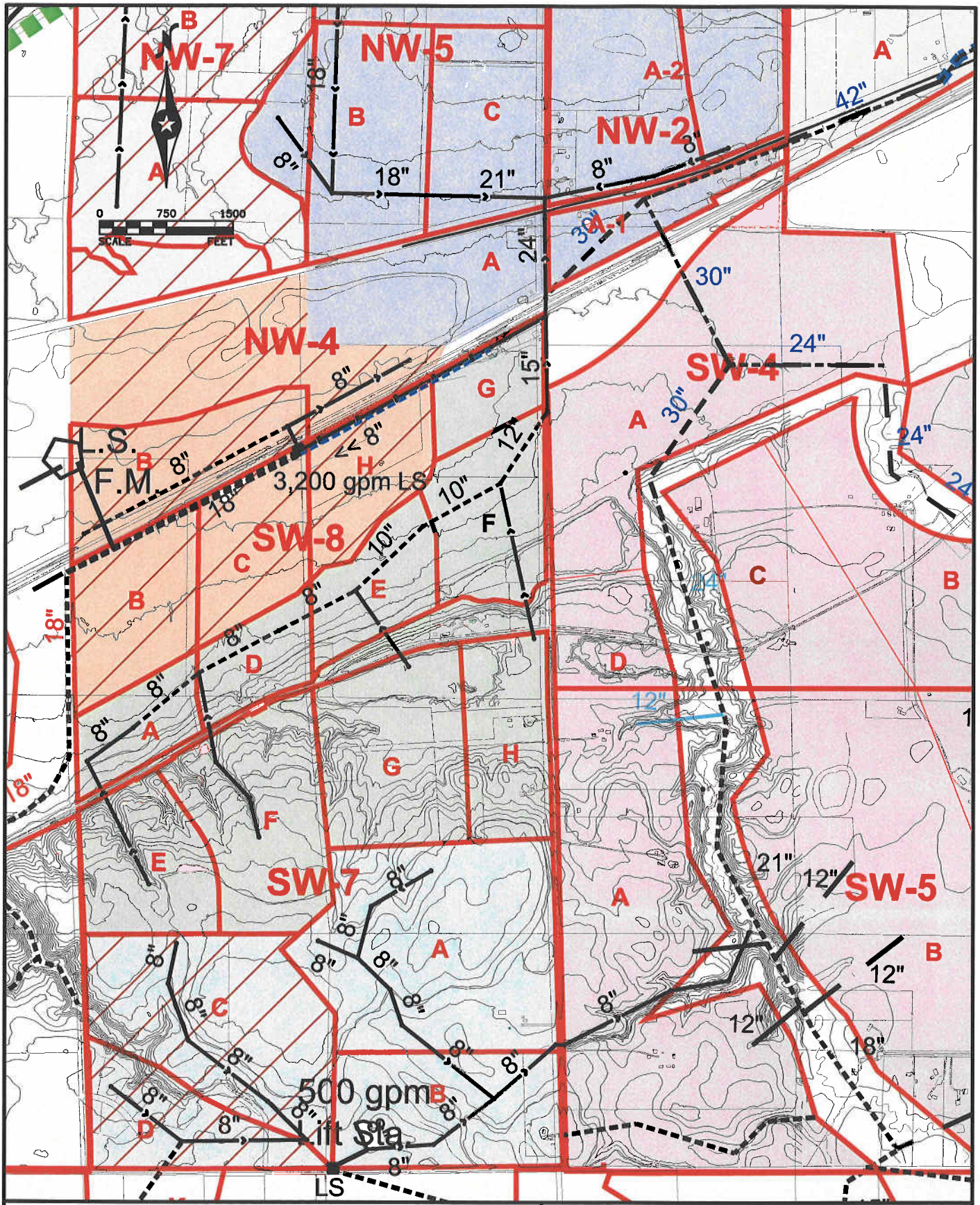
BOLTON & MENK, INC.
Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-10B.dwg 2/6/08

CITY OF JORDAN
WEST GROWTH AREAS
COLLECTOR ROUTES

FEBRUARY, 2008 FIGURE NO. 10B



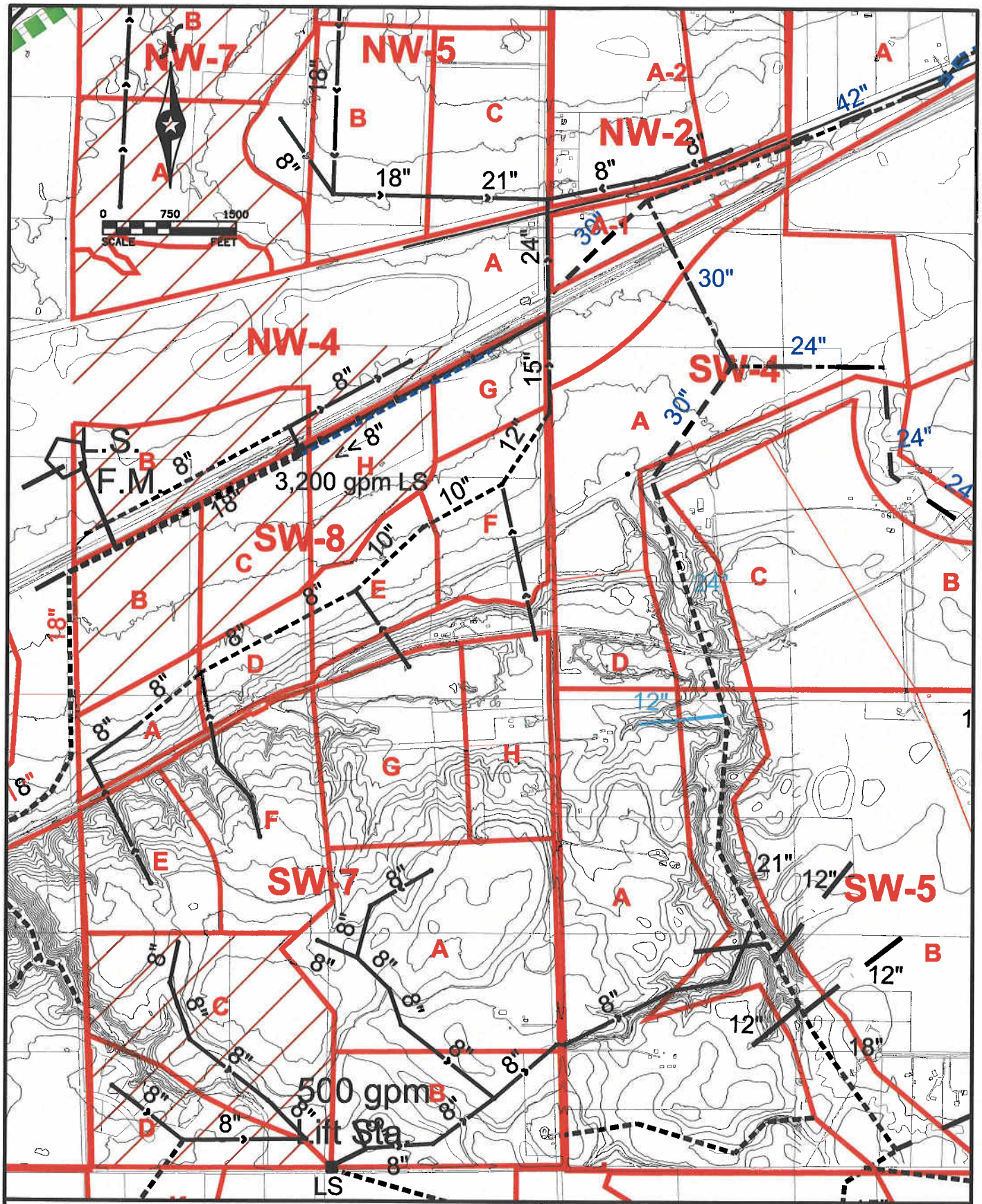
BOLTON & MENK, INC.
Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-11A.dwg 2/6/08

CITY OF JORDAN
WEST GROWTH AREAS
COLLECTOR ROUTES

FEBRUARY, 2008 FIGURE NO. 11A



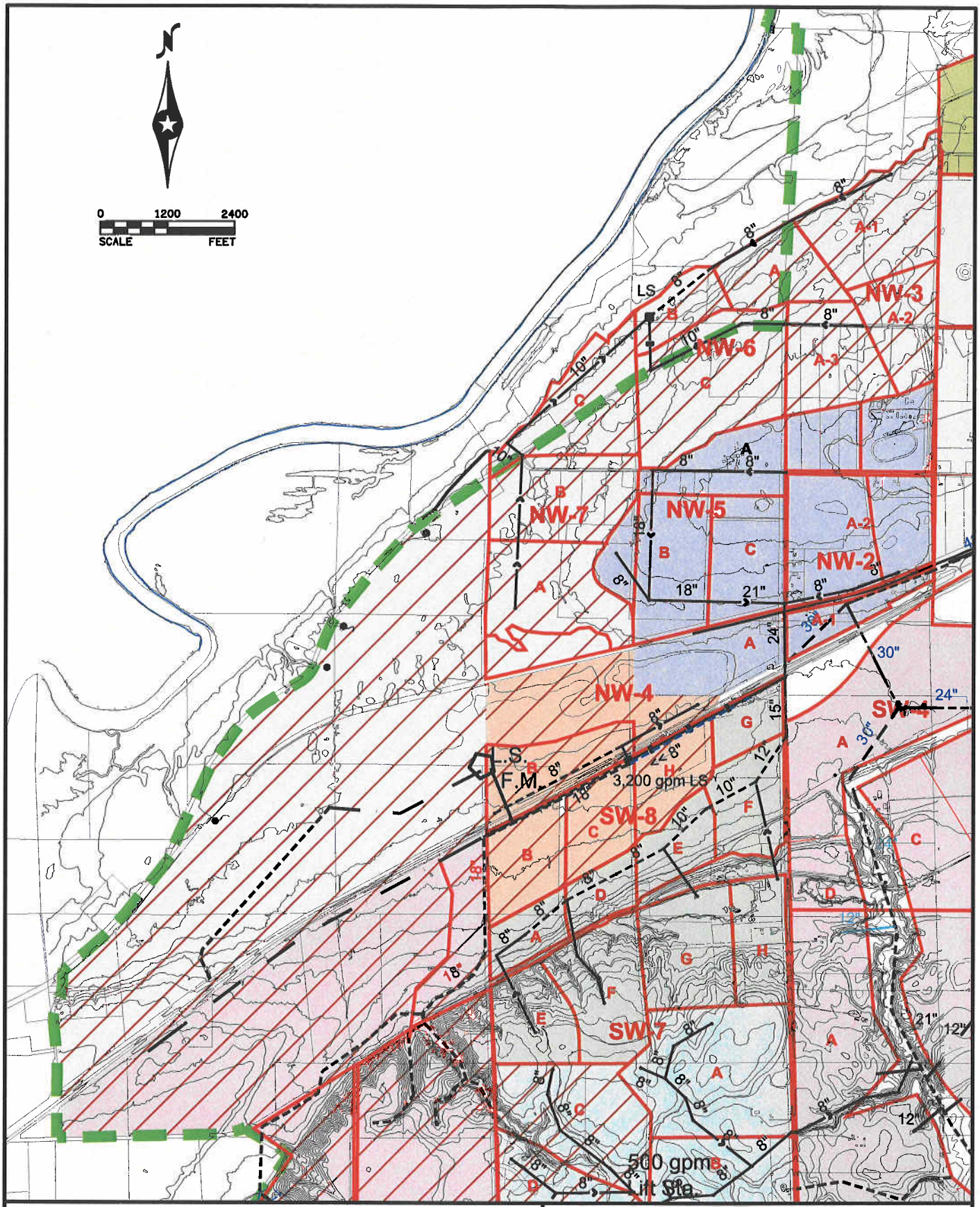
BOLTON & MENK, INC.
Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-11B.dwg 2/6/08

CITY OF JORDAN
WEST GROWTH AREAS COLLECTOR ROUTES

FEBRUARY, 2008 FIGURE NO. 11B

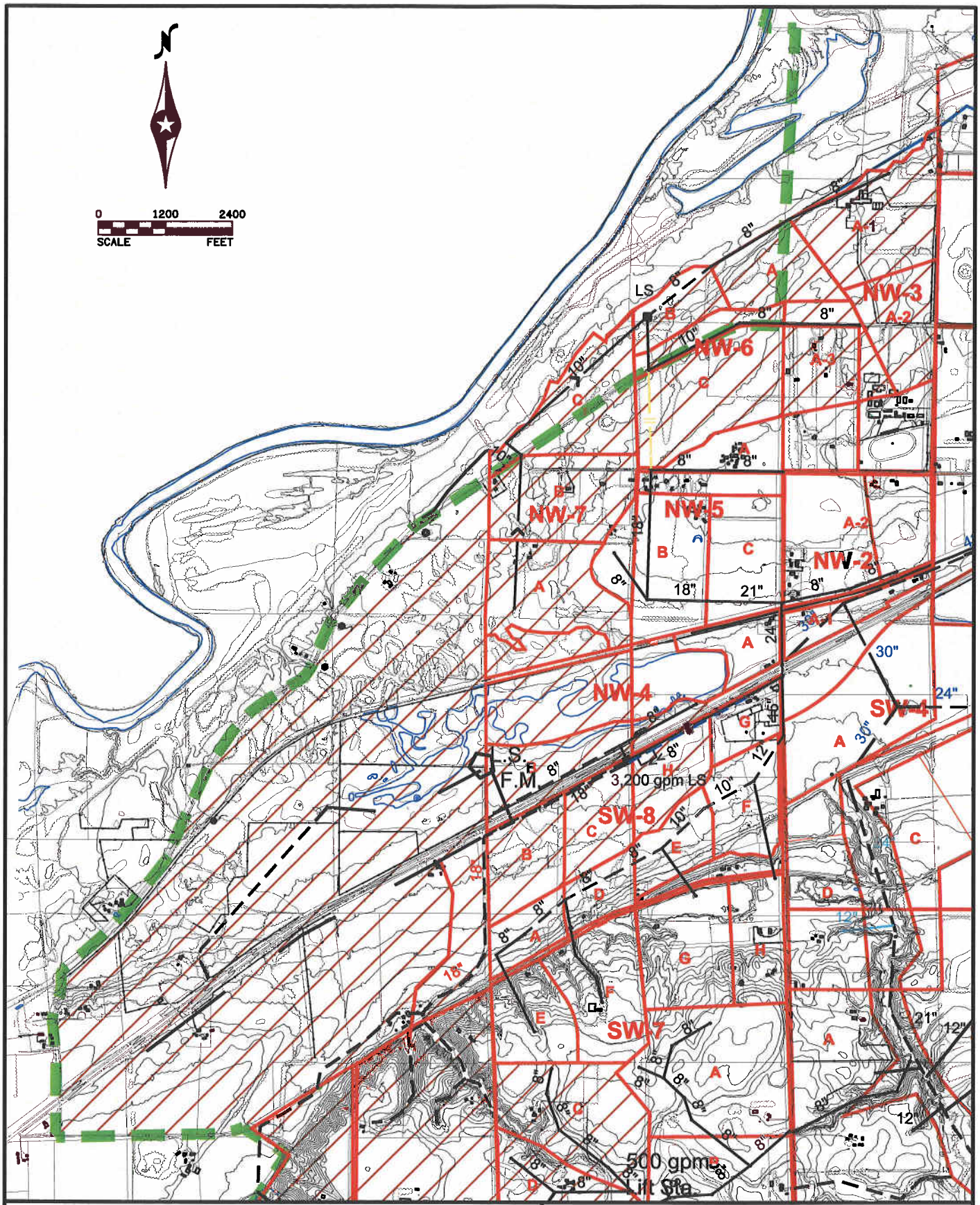


BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-12A.dwg 2/6/08

CITY OF JORDAN
N. DELAWARE & PARK BLVD. COLLECTOR ROUTES

FEBRUARY, 2008 FIGURE NO. 12A



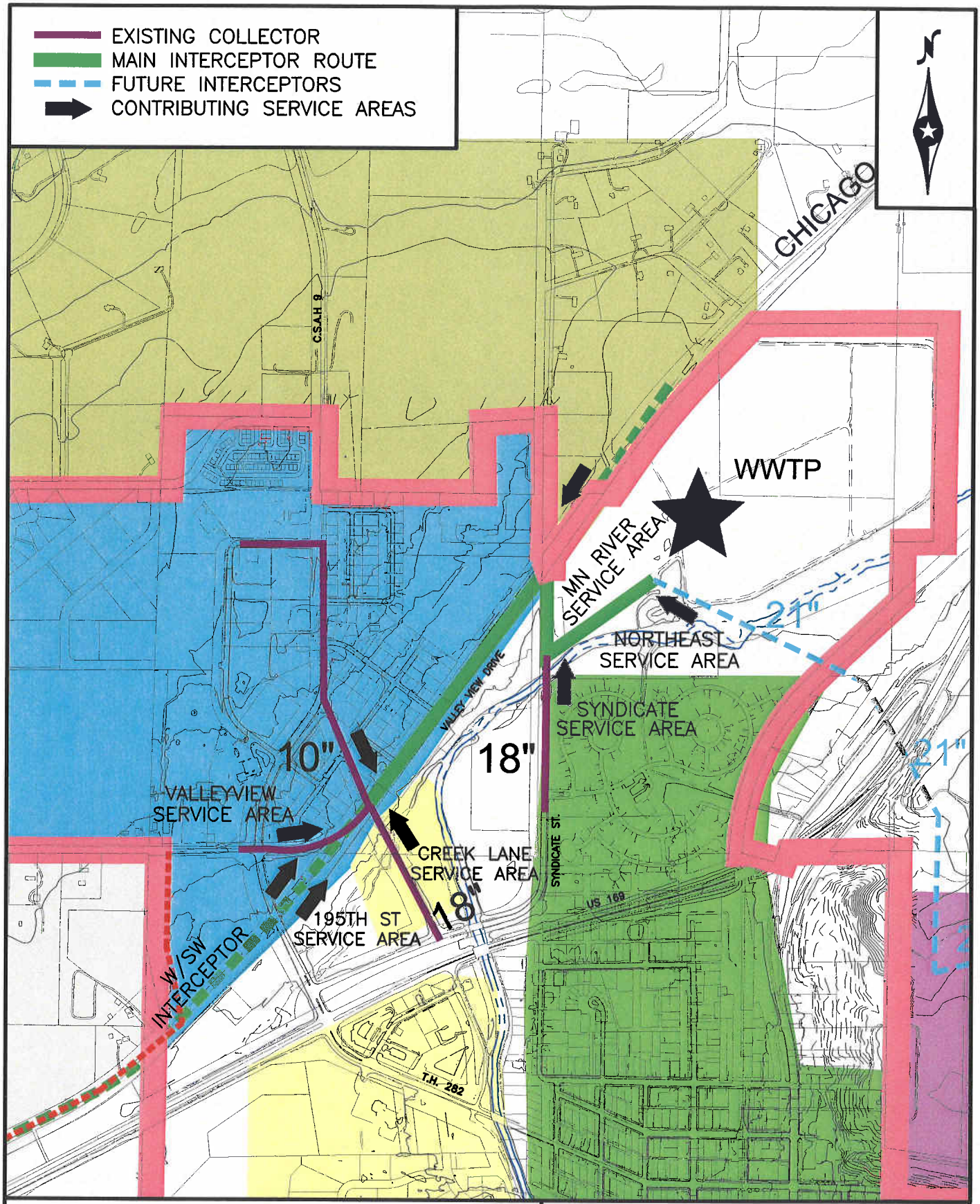
BOLTON & MENK, INC.
Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-12B.dwg 2/6/08

CITY OF JORDAN
N. DELAWARE & PARK BLVD. COLLECTOR ROUTES

FEBRUARY, 2008 FIGURE NO. 12B

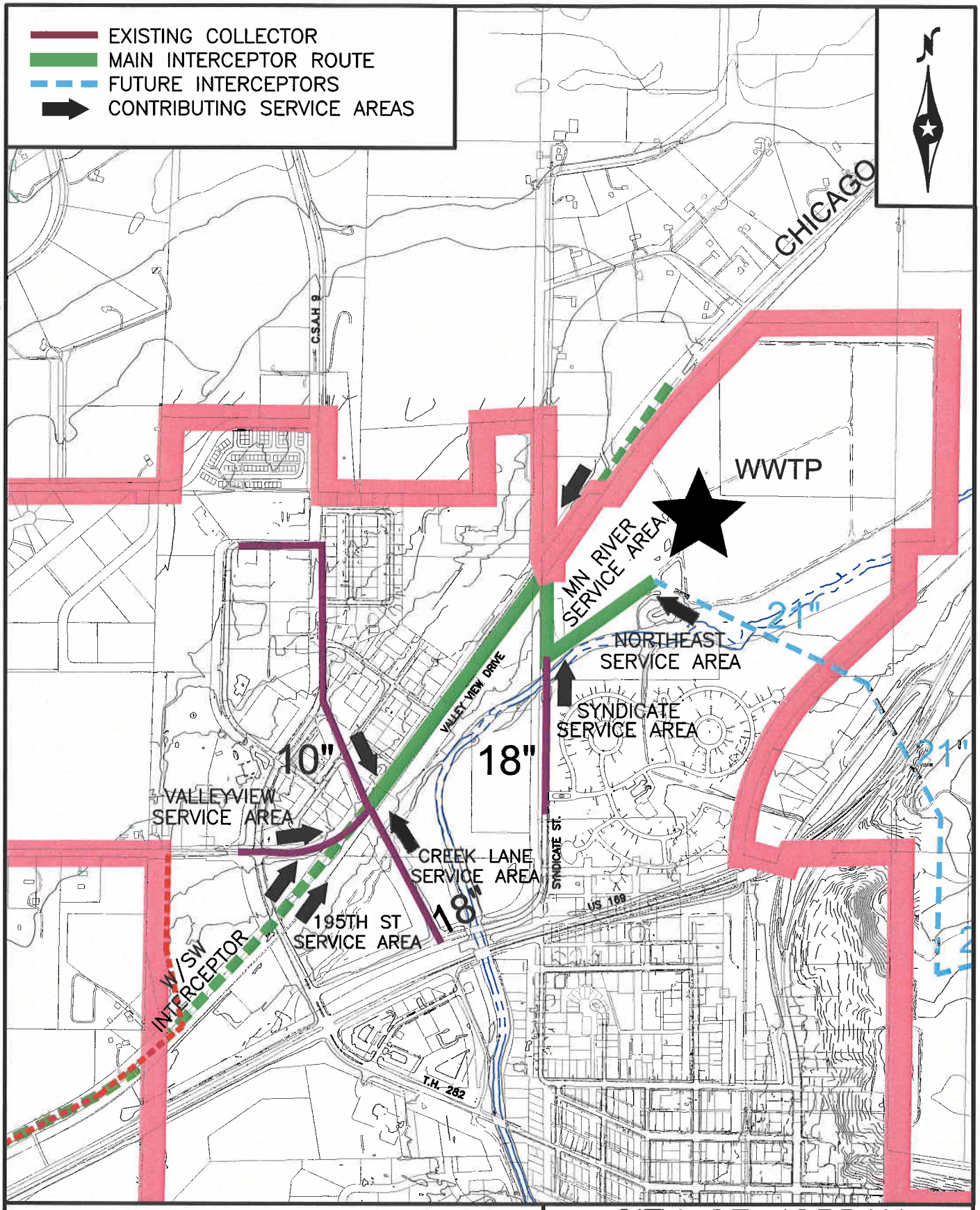


BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-13A.dwg 2/6/08

CITY OF JORDAN
LOWER SAND CREEK CORRIDOR
CONTRIBUTING JUNCTIONS

FEBRUARY, 2008 FIGURE NO. 13A



BOLTON & MENK, INC.
Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN RAMSEY, MN AMES, IA

H:\JORD\T1721486\Cad\21486F0-13B.dwg 2/6/08

CITY OF JORDAN
LOWER SAND CREEK CORRIDOR CONTRIBUTING JUNCTIONS

FEBRUARY, 2008 FIGURE NO. 13B

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota
T17.21486
Updated 10/12/2005, 3/22/2007

Indicates lines significantly overloaded
Indicates where separate service areas tie together

MANNING'S N FACTOR	0.013
PEOPLE PER DWELLING UNIT	2.5
AVE PER CAPITA FLOW	100
INDUSTRIAL FLOW PER ACRE DAY	1,500
COMMERCIAL FLOW PER ACRE DAY	1,500

PEAKING FACTOR IN SANITARY SEWERS

Population Ratio	
0	4.4
100	4.3
150	4.2
200	4.1
250	4.0
500	3.9
700	3.8
1,000	3.7
2,000	3.6
3,000	3.5
4,000	3.4
5,000	3.3
6,500	3.2
8,500	3.1
11,000	3.0
15,000	2.8
20,000	2.7
30,000	2.6
40,000	2.4
55,000	2.3
70,000	2.2
85,000	2.1
100,000	2.0

Recommended Standards for Wastewater Facilities, 1997, pg 10-5
Great Lakes - Upper Mississippi River Board of State and Provencial Public Health and EnvironmentaL Managers

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust	Cumulative Residential	Peaking	Design Capacity	Invert	Pipe	Slope	Actual Capacity
			2	3	8	12	gpm	Comm.	Indust.	gpd	Pop. Equivalent	Population	Factor	cfs		Size	%	cfs
NORTHEAST GROWTH AREA - MTH 282 INTERCEPTOR																		
NORTHEAST GROWTH AREA - US 169 INTERCEPTOR - NE 1 & NE 3																		

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota
T17.21486

Indicates lines significantly overloaded
Indicates where separate service areas tie together

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
Add 207 a	Area - NE - 3 (507 ac @ 2 * 08% operating @ 12 gpm pressure system)						1,200			0	0	0	4.4	2.67		15	0.20	2.79
	Area - NE - 1 D			95			1,200			0	0	713	3.8	3.09		15	0.30	3.43
	Area - NE - 1 C			88			1,200			0	0	1,373	3.7	3.46		15	0.30	3.43
	Area - NE - 1 B			108			1,200			0	0	2,183	3.6	3.89		15	0.40	3.97
	Area - NE - 1 A			68			1,200			0	0	2,693	3.6	4.17		12	2.00	4.82
	Connect from NE - 2						1,200			171,000	1,710	14,267	2.8	9.60				
							1,200			171,000	1,710	14,267	2.8	9.60				
	SE of MTH 21 Ramp to US 169						1,200			171,000	1,710	14,267	2.8	9.60		21	0.60	12.23
	crossing valley						1,200					14,267				21	0.28	8.33
The following routing represents attempting to tie these areas to the Syndicate Street Interceptor.							1,200					14,267						
							1,200			171,000	1,710	14,267	2.8	9.60				
	Fourth St & Mill St						1,200			171,000	1,710	14,267	2.8	9.60	789.43	8	12.71	3.95
	Fourth St & Broadway						1,200			171,000	1,710	14,267	2.8	9.60	757.97	8	3.91	2.19
	Fourth east of RR						1,200			171,000	1,710	14,267	2.8	9.60	748.19	8	0.39	0.69
	Fourth west of RR						1,200			171,000	1,710	14,267	2.8	9.60	747.34	8	0.46	0.75
	Fourth St & Varner						1,200			171,000	1,710	14,267	2.8	9.60	745.85	8	0.40	0.70
							1,200			171,000	1,710	14,267	2.8	9.60	744.70		0.31	
	Tie to Syndicate interceptor at Mertens									171,000	1,710	14,267	2.8	6.92	746.16	8	0.59	0.85
	New Area Served	359								171,000	1,710	15,165	2.8	7.31	744.70	10	0.63	1.63

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota
T17.21486

Indicates lines significantly overloaded
Indicates where separate service areas tie together

NORTHEAST GROWTH AREA - NE Side of MTH 282 INTERCEPTOR - NE 2 - Includes 169 X-ing

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	NE - 2 H			350			0			0		2,625	3.6	1.46		12	0.20	1.51
	Area - NE - 2 F			435			0	10	30	60,000	600	5,888	3.3	3.31		15	0.30	3.43
	Area - NE - 2 C						0		74	171,000	1,710	5,888	3.2	3.76		15	0.50	4.44
	Area - NE - 2 B(48 ac) & NE -2E (382 ac)			428			0			171,000	1,710	9,098	3.1	5.18		15	1.28	7.12
	NE - 2G (149 AC)			149			0			171,000		10,216	3.1	5.72		15	1.28	7.12
	Area - NE - 2 A			57			0			171,000	1,710	10,644	3.0	5.73		15	1.28	7.12
	Area - NE - 2 D			124			0			171,000	1,710	11,574	3.0	6.17		15	0.84	5.76
	Tie to NE - 1									171,000		11,574						
	New Area Served	2066																

SE-1, WATER STREET / MN VALLEY ELECTRIC INTERCEPTOR

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	MN Valley Elec Dr @ Liberty						0		30	45,000	450	0	4.0	0.28	914.85	8	0.40	0.70
	Liberty Lane backline						0			45,000	450	0	4.0	0.28		8		
		13					0			45,000	450	33	4.0	0.30	904.53	8	0.37	0.67
							0			45,000	450	33	4.0	0.30	903.70	8	0.43	0.72
	(Parts of SE-1A)						0			45,000	450	33	4.0	0.30	903.15	8	0.40	0.70
							0			45,000	450	33	4.0	0.30	902.70	8	0.42	0.71
							0			45,000	450	33	4.0	0.30	901.74	10	0.31	1.14
	2007 Update - Correct to GIS Mapping for 95 acres in SE-1			33			0			45,000	450	281	3.8	0.43	900.80	10	0.32	1.16
	CR 10 & Maple Ln	12	19				0			45,000	450	406	3.8	0.50	899.90	10	0.31	1.14
							0			45,000	450	406	3.8	0.50	898.84	10	0.24	1.00
							0			45,000	450	406	3.8	0.50	897.88	10	0.28	1.08
	SW corner of Maple Ln		10				0			45,000	450	456	3.8	0.53	897.10	10	0.36	1.23
							0			45,000	450	456	3.8	0.53	896.47	10	0.37	1.25
							0			45,000	450	456	3.8	0.53	895.75	8	5.19	2.52
							0			45,000	450	456	3.8	0.53	891.75	8	18.80	4.80
							0			45,000	450	456	3.8	0.53	883.63	8	47.80	7.66
	Area SE - 2 A, D & E				159		0			45,000	450	1,649	3.6	1.17	833.93	8	23.30	5.35
							0			45,000	450	1,649	3.6	1.17	786.45	8	9.29	3.38
	Water St & East St	7					0			45,000	450	1,667	3.6	1.18	771.77	8	1.04	1.13
A153	Water St & Mill St	18					0			45,000	450	1,712	3.6	1.20	769.68	8	1.39	1.30
A152	Water & Broadway	13					0			45,000	450	1,745	3.6	1.22	764.23	10	1.55	2.56
		11					0			45,000	450	1,773	3.6	1.24	757.09	10	1.06	2.12
A150	Water & Varner	11					0			45,000	450	1,801	3.6	1.25	753.19	15	4.10	12.76
A17	First @& Varner						0			45,000		1,801						
	New Area Served	251																

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota — Indicates lines significantly overloaded

T17.21486 — Indicates where separate service areas tie together

TIMBER RIDGE / SUNSET / CRESTVIEW / FIRST INTERCEPTOR

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	Area - SW - 3 B			50	35		0			0	0	1,075	3.7	0.62				
	Timber Ridge Ct & Sunset Dr						0			0	0	1,075	3.7	0.62	848.11	8	0.40	0.70
							0			0	0	1,075	3.7	0.62	847.39	8	0.40	0.70
							0			0	0	1,075	3.7	0.62	846.39	8	0.40	0.70
							0			0	0	1,075	3.7	0.62	846.09	8	0.40	0.70
							0			0	0	1,075	3.7	0.62	845.69	8	0.41	0.71
	Timber Ridge Court						0			0	0	1,075	3.7	0.62	845.23	8	0.40	0.70
							0			0	0	1,075	3.7	0.62	844.83	8	0.40	0.70
		28					0			0	0	1,145	3.7	0.66	844.31	8	0.40	0.70
							0			0	0	1,145	3.7	0.66	843.43	8	0.40	0.70
							0			0	0	1,145	3.7	0.66	842.55	8	0.45	0.74
							0			0	0	1,145	3.7	0.66	841.21	8	0.40	0.70
	Crestview Cir S						0			0	0	1,145	3.7	0.66	840.41	8	0.73	0.94
							0			0	0	1,145	3.7	0.66	839.95	8	0.40	0.70
							0			0	0	1,145	3.7	0.66	839.58	8	0.31	0.61
							0			0	0	1,145	3.7	0.66	839.22	8	0.40	0.70
	Crestview Cir N.	26					0			0	0	1,210	3.7	0.69	838.26	8	0.27	0.57
							0			0	0	1,210	3.7	0.69	836.78	8	0.41	0.71
	Crestview Cir N & Sunset Dr	7					0			0	0	1,228	3.7	0.70	835.48	8	3.46	2.06
							0			0	0	1,228	3.7	0.70	832.15	8	6.44	2.81
		42					0			0	0	1,333	3.7	0.76	805.21	8	5.58	2.62
	Sunset dr & Rustle Rd		14.0				0			0	0	1,403	3.7	0.80	786.49	8	0.50	0.78
	Sunset Dr & Adams Ln						0			0	0	1,403	3.7	0.80	785.10	8	0.44	0.73
	Adams Ln & Nolden Ln						0			0	0	1,403	3.7	0.80	784.27	8	1.38	1.30
							0			0	0	1,403	3.7	0.80	777.96	8	0.39	0.69
		31					0			0	0	1,481	3.7	0.85	777.29	8	6.62	2.85
	Sunset Dr @ N end Mill Pond	52					0			0	0	1,611	3.7	0.92	767.88	8	1.11	1.16
							0			0	0	1,611	3.7	0.92	766.32	8	3.12	1.96
							0			0	0	1,611	3.7	0.92	760.08	8	1.74	1.46
	Sunset Dr & Riverside Ln	18					0			0	0	1,656	3.7	0.95	758.04	8	4.71	2.40
							0			0	0	1,656	3.7	0.95	753.33	8	11.60	3.77
A22							0			0	0	1,656	3.7	0.95	750.08	10	0.48	1.42
							0			0	0	1,656	3.7	0.95	749.54	10	0.08	
A17	First St & Varner St						0			0		1,656			749.58			
	New Area Served	99																

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota
T17.21486

Indicates lines significantly overloaded
Indicates where separate service areas tie together

FIRST / SYNDICATE / WWTP INTERCEPTOR

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	From Water Street Interceptor						0			45,000		1,801						
	From Timber Ridge / Sunset Interceptor						0			45,000		3,457						
A17	First & Varner						0			45,000	450	3,457	3.5	2.12	749.58	15	1.70	8.21
A16	First & West	10					0			45,000	450	3,482	3.5	2.13	743.51	15	0.17	2.57
A15	First & Wood	10					0			45,000	450	3,507	3.5	2.14	743.18	15	0.08	1.74
A14	First & Mertens	14					0			45,000	450	3,542	3.5	2.16	742.46	15	0.24	3.07
							0			45,000	450	3,542	3.5	2.16	741.74	15	0.30	3.43
A13	Mertens & Second	78					0			45,000	450	3,737	3.4	2.20	741.53	15	0.29	3.37
A12	Mertens & Third	77					0			45,000	450	3,930	3.4	2.30	740.43	18	0.29	5.56
A11	Mertens & Fourth	87					0			45,000	450	4,148	3.4	2.42	740.12	18	0.24	5.06
A10	Syndicate & Fourth						0			45,000	450	4,148	3.4	2.42	739.94	18	0.69	8.61
	Syndicate & Fourth						0			45,000	450	4,148	3.4	2.42	739.61	18	0.20	4.61
A9							0			45,000	450	4,148	3.4	2.42	738.87	18	0.36	6.20
A8	Syndicate & Sixth	92					0			45,000	450	4,378	3.4	2.54	737.30	18	0.37	6.29
	Syndicate & N Frontage Rd						0			45,000	450	4,378	3.4	2.54	735.55	18	0.21	4.72
	Syndicate						0			45,000	450	4,378	3.4	2.54	734.58	18	0.18	4.37
	Syndicate St.						0			45,000	450	4,378	3.4	2.54	733.68	18	0.54	7.61
	Syndicate						0			45,000	450	4,378	3.4	2.54	730.89	18	1.41	12.32
	S side Sand Cr	233					0			45,000	450	4,961	3.3	2.76	728.12	18	0.73	8.86
	N side Sand Cr						0			45,000	450	4,961	3.3	2.76	727.00	21	1.66	20.37
							0			45,000	450	4,961	3.3	2.76				
	WWTP						0			45,000	450	4,961	3.3	2.76				
	Lift Station @ WWTP						0			45,000		4,961						
	New Area Served	0																

BROADWAY INTERCEPTOR - SOUTH

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	Area - SW - 1 B			45			0			0	0	338	4.0	0.21				
	Area - SW - 1 A			42			0			0	0	653	3.9	0.39				
	Area - SW -1 F		36				0			0	0	833	3.8	0.49				
	Hillside Dr & Park Dr						0			0		833						
	New Area Served	123																

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota

T17.21486

Indicates lines significantly overloaded

Indicates where separate service areas tie together

BRIDLE CR / HILLSIDE DR / HOPE AVE INTERCEPTOR

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	SW-3A - Deleted from Bridle Cr interceptor to allow committed properties in with out upsizing between Herbert Street and Hope Avenue. Just made it TEXT.																	
	Area - SW - 1 C			24			0			0	0	180	4.2	0.12				
	Area - SW - 1 D			39			0			0	0	473	4.0	0.29				
	Bridle Cr Dr & Prospect Pointe						0			0	0	473	4.0	0.29	858.00	12	0.22	1.59
							0			**0**	**0**	**473**	**4.0**	**0.29**				
		16					0			0	0	513	3.9	0.31	857.60	12	5.31	7.85
	Bridle Cr Dr & Falcon Way	15					0			0	0	551	3.9	0.33	838.40	12	2.40	5.28
		3					0			0	0	559	3.9	0.34	833.00	12	1.09	3.55
	Bridle Cr Dr & Bridle Cr Bay	62					0			0	0	714	3.8	0.42	830.52	12	0.22	1.59
		7					0			0	0	732	3.8	0.43	830.09	12	0.22	1.59
							0			0	0	732	3.8	0.43		12	0.22	1.59
	Area - SW - 2 A			66			0			0	0	1,227	3.7	0.70				
	Area - SW - 2 B			82			0			0	0	1,842	3.7	1.05				
							0			0		1,842						
				48			0			0	0	1,842	3.7	1.05				
	Aberdeen Ave & Old Hwy 169 Blvd						0			0	0	1,842	3.7	1.05	829.64	12	0.22	1.59
							0			0	0	1,842	3.7	1.05	829.28	12	0.22	1.59
							0			0	0	1,842	3.7	1.05	828.86	12	0.22	1.59
	Herbert St & Leon St						0			0	0	1,842	3.7	1.05	828.24	12	0.22	1.59
		56					0			0	0	1,982	3.7	1.13	827.49	12	0.22	1.59
							0			0	0	1,982	3.7	1.13	826.94	12	0.24	1.66
	SE curve on Herbert St	55					0			0	0	2,120	3.6	1.18	826.82	12	0.28	1.79
							0			0	0	2,120	3.6	1.18	826.70	12	0.29	1.82
							0			0	0	2,120	3.6	1.18	826.16	12	0.16	1.35
	Area - SW - 1 E, east of Bridle Cr			46			0			0	0	2,465	3.6	1.37	825.84	12	0.23	1.62
							0			0	0	2,465	3.6	1.37	825.14	12	0.24	1.66
							0			0	0	2,465	3.6	1.37	824.68	12	0.11	1.11
							0			0	0	2,465	3.6	1.37	824.42	12	0.17	1.39
							0			0	0	2,465	3.6	1.37	823.98	12	0.15	1.30
							0			0	0	2,465	3.6	1.37	823.63	12	0.17	1.39
	High Density Multi family				20.0		0			0	0	3,065	3.5	1.66	822.15	12	0.23	1.62
	Hope Ave - 950' S of Hillside Dr						0			0	0	3,065	3.5	1.66	821.57	12	0.22	1.59
							0			0	0	3,065	3.5	1.66	821.77	12	0.39	2.12
							0			0	0	3,065	3.5	1.66	820.27	12	0.49	2.38
	Hillside Dr & Hope Ave		16.3				0			0	0	3,147	3.5	1.70	818.85	12	0.22	1.59
	Hillside Dr & Marlane Cir						0			0	0	3,147	3.5	1.70	818.17	12	0.63	2.70
							0			0	0	3,147	3.5	1.70	817.20	12	4.31	7.08
							0			0	0	3,147	3.5	1.70	809.10	12	0.37	2.06
	Hillside Dr & Stuart Ave		11.0				0			0	0	3,202	3.5	1.73	808.20	12	0.53	2.47
							0			0	0	3,202	3.5	1.73	806.80	12	6.66	8.80
							0			0	0	3,202	3.5	1.73	799.34	12	6.86	8.93
							0			0	0	3,202	3.5	1.73	792.00	12	6.96	8.99
		66					0			0	0	3,367	3.5	1.82	785.31	12	12.30	11.96
	Hillside Dr & Park Dr						0			0		3,367			781.00			
	New Area Served	304																

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota

T17.21486

Indicates lines significantly overloaded

Indicates where separate service areas tie together

PARK DR / MILL POND / CREEK LN / VALLEYVIEW INTERCEPTOR

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust Pop. Equivalent	Cumulative Residential	Peaking	Design Capacity	Invert	Pipe	Slope	Actual Capacity
			2	3	8	12	gpm	Comm.	Indust.	gpd	Population	Equivalent	Factor	cfs		Size	%	cfs
	From Broadway - SW-1A, SW-1B, SW-1F						0	0	0	0	0	833	3.8	0.49				
	From the BRIDLE CR / HILLSIDE DR / HOPE AVE INTERCEPTOR						0			0		4,200	3.4	2.21				
	special comment						0			0		4,200						
	UPPER SAND CREEK INCEPTORS						7,100			0		11,300						
	Hillside Dr & Park Dr						7,100			0	0	11,300	3.0	21.06	776.06	15	0.25	3.13
		7					7,100			0	0	11,318	3.0	21.07	775.80	15	0.20	2.79
							7,100			0	0	11,318	3.0	21.07	775.60	15	0.23	3.00
							7,100			0	0	11,318	3.0	21.07	775.00	15	0.17	2.57
							7,100			0	0	11,318	3.0	21.07	774.90	15	0.16	2.49
							7,100			0	0	11,318	3.0	21.07	774.70	15	1.09	6.57
	MH in the park						7,100			0	0	11,318	3.0	21.07	773.90	15	0.23	3.00
							7,100			0	0	11,318	3.0	21.07	773.09	15	0.20	2.79
							7,100			0	0	11,318	3.0	21.07	772.61	15	0.21	2.86
							7,100			0	0	11,318	3.0	21.07	770.41	15	5.60	14.91
							7,100			0	0	11,318	3.0	21.07	768.45	15	0.18	2.65
	Public Works Garage						7,100			0	0	11,318	3.0	21.07	767.65	15	0.40	3.97
							7,100			0	0	11,318	3.0	21.07	766.51	15	0.40	3.97
	N side Sunset Dr						7,100			0	0	11,318	3.0	21.07	765.20	15	2.56	10.08
A70							7,100			0	0	11,318	3.0	21.07	761.50	15	1.02	6.35
A69							7,100			0	0	11,318	3.0	21.07	754.36	15	0.27	3.25
A68	W bank of Sand Cr						7,100			0	0	11,318	3.0	21.07	754.00	15	4.04	12.66
A67	E bank of Sand Cr						7,100			0	0	11,318	3.0	21.07	750.00	15	0.20	2.79
A66	First St & West St						7,100			0	0	11,318	3.0	21.07	749.60	15	0.15	2.41
A65							7,100			0	0	11,318	3.0	21.07	748.80	15	0.20	2.79
							7,100			0	0	11,318	3.0	21.07	747.90	18	4.28	21.48
	First St & Creek Ln						7,100	48		72,000	720	11,318	3.0	21.41	743.62	18	0.26	5.26
							7,100			72,000	720	11,318	3.0	21.41	742.92	18	0.16	4.11
	Creek Ln & MTH 282						7,100	8		84,000	840	11,318	3.0	21.46	742.60	18	0.44	6.87
							7,100			84,000	840	11,318	3.0	21.46		18		
							7,100			84,000	840	11,318	3.0	21.46	742.30	18	0.38	6.38
							7,100			84,000	840	11,318	3.0	21.46	741.50	18	0.30	5.66
							7,100	6		93,000	930	11,318	3.0	21.50	741.10	18	0.87	9.67
	Creek Lane & Triangle Lane						7,100	30		138,000	1,380	11,318	3.0	21.71	737.80	18	0.34	6.03
							7,100			138,000	1,380	11,318	3.0	21.71	737.50	18	0.15	3.98
							7,100			138,000	1,380	11,318	3.0	21.71	736.90	18	0.31	5.75
							7,100			138,000	1,380	11,318	3.0	21.71	736.56	18	0.23	4.95
							7,100			138,000	1,380	11,318	3.0	21.71	735.92	18	0.16	4.11
							7,100			138,000	1,380	11,318	3.0	21.71	735.50	18	0.27	5.37
	Creek Lane cul-de-sac						7,100	15		160,500	1,605	11,318	3.0	21.82	735.00	18	0.21	4.72
	Creek Lane & Valley View Dr						7,100			160,500	1,605	11,318	3.0	21.82	733.94			
	Connection from Creek Lane N	232					7,100	74		271,500	2,715	11,898	3.0	22.60	733.94			
							7,100			271,500	2,715	11,898	3.0	22.60		42	0.16	41.01
							7,100			271,500	2,715	11,898	3.0	22.60	733.49	42	0.16	41.01
	Valley View Dr & Nineth St	100					7,100			271,500	2,715	12,148	3.0	22.72	732.91	42	0.16	41.01
							7,100			271,500	2,715	12,148	3.0	22.72	732.45	42	0.16	41.01
							7,100			271,500	2,715	12,148	3.0	22.72	732.18	42	0.16	41.01
							7,100			271,500	2,715	12,148	3.0	22.72	731.83	42	0.16	41.01
	Valley View Dr & RR						7,100	26		310,500	3,105	12,148	2.8	22.43	731.48	42	0.16	41.01
							7,100			310,500		12,148			731.48	42	0.16	41.01
	Tie from MN River Inteceptor						7,500			310,500	3,105	12,148	2.8	23.32	731.48	42	0.16	41.01
							7,500			310,500	3,105	12,148	2.8	23.32	731.35	42	0.18	43.52
	Syndicate @ Sand Cr						7,500			310,500	3,105	12,148	2.8	23.32	730.36	42	0.18	43.52
	W side of Sand Creek						7,500			310,500	3,105	12,148	2.8	23.32	730.25	42	0.18	43.52
	Tie from Syndicate Street Interceptor						7,500			355,500	3,555	17,109	2.7	25.34	729.54	42	0.18	43.52
							7,500			355,500	3,555	17,109	2.7	25.34		42	0.18	43.52
	WWTP Pump Station																	
	New Area Served	207																

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota
T17.21486

Indicates lines significantly overloaded
Indicates where separate service areas tie together

CSAH 9 Interceptor

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust Pop. Equivalent	Cumulative Residential	Peaking	Design Capacity	Invert	Pipe	Slope	Actual Capacity
			2	3	8	12	gpm	Comm.	Indust.	gpd		Population	Factor	cfs		Size	%	cfs
	185th & Chatum Ln					10				0	0	300	4.0	0.19	804.1	8	0.4	0.70
	Chatum & Bradbury	6								0	0	315	4.0	0.19				
	From the west	11								0	0	343	4.0	0.21	803.32	8	0.4	0.70
		11								0	0	371	4.0	0.23	802.75	8	0.4	0.70
	Dover & Bradbury	11								0	0	399	4.0	0.25	802.18	8	0.4	0.70
	CSAH 9 & Bradbury N					20				0	0	999	3.8	0.59	801.78	8	0.4	0.70
	CSAH 9 & Bradbury S extended	62								0	0	1,154	3.7	0.66	80.91	8	0.4	0.70
	Ervin Industrial Dr									0	0	1,154	3.7	0.66	798.91	8	0.4	0.70
	New Area Served	30																

MN RIVER INTERCEPTOR North of city

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust Pop. Equivalent	Cumulative Residential	Peaking	Design Capacity	Invert	Pipe	Slope	Actual Capacity
			2	3	8	12	gpm	Comm.	Indust.	gpd		Population	Factor	cfs		Size	%	cfs
	Already developed area between NW-3B	289					0			0	0	723	3.8	0.43		8	0.4	0.70
	NW-3B		85	85			0			0	0	1,786	3.7	1.02		12	0.2	1.51
	NW-3C (2 acre lots) (Sioux Vista)	178					400			0	0	2,231	3.6	2.13		12	0.4	2.15
	NW-3D		232				400			0	0	3,391	3.5	2.73		12	0.6	2.63
	Tie ti Creek Lane @ RR on Valley View						400			0	0	3,391	3.5	2.73				#DIV/0!
	New Area Served	402																

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota
T17.21486

Indicates lines significantly overloaded
Indicates where separate service areas tie together

UPPER SAND CREEK - EAST SIDE

SOUTHEAST 8 COLLECTOR

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity	Invert	Pipe Size	Slope %	Actual Capacity
			2	3	8	12	gpm	Comm.	Indust.	gpd				cfs				cfs
	SE- 8 A - tributary beyond the 2040 boundary						0			0	0	0	4.4	0.00				
	SE- 8 B		177	160			0			0	0	2,085	3.6	1.16		12	0.20	1.51
	New Area Served	337								0		663						

SOUTHEAST 7 (EAST) COLLECTOR

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity	Invert	Pipe Size	Slope %	Actual Capacity
				0			gpm	Comm.	Indust.	gpd				cfs				cfs
	SE - 7F			472			0			0	0	3,540	3.5	1.92		12	0.40	2.15
	SE - 7E			497			0			0	0	7,268	3.2	3.60		15	0.36	3.76
	Tie to Southeast 7 Collector @ SE - 7 B						0			0	0	7,268	3.2	3.60		15	0.36	3.76
	New Area Served	969																

SOUTHEAST 7 COLLECTOR

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity	Invert	Pipe Size	Slope %	Actual Capacity
			2	3	8	12	gpm	Comm.	Indust.	gpd				cfs				cfs
	SE- 7 A			168			0			0	0	1,260	3.7	0.72		12	0.20	1.51
	Tie from SE - 7 E and F			0			0			0	0	8,528	3.1	4.09		18	0.20	4.61
	SE - 7 B			301			0			0	0	10,786	3.1	5.17		18	0.40	6.54
	SE - 7 C			284			0			0	0	12,916	3.0	6.00		21	0.24	7.70
	SE - 7 D			129			0			0	0	13,884	3.0	6.44		21	0.32	8.91
	New Area Served	882								0		#REF!						

SOUTHEAST 8 COLLECTOR

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity	Invert	Pipe Size	Slope %	Actual Capacity
			2	3	8	12	gpm	Comm.	Indust.	gpd				cfs				cfs
	SE - 8D			1,330			0			0	0	9,975	3.1	4.78		18	0.24	5.06
	SE - 8E (1), (2), & (3)			1,125			0			0	0	18,413	2.8	7.98		24	0.20	10.11
	SE - 8F			90			0			0	0	19,088	2.8	8.27		24	0.20	10.11
	SE - 8G and 8H			261			0			0	0	21,046	2.7	8.79		24	0.20	10.11
	SE - 8C			78			0			0	0	21,631	2.7	9.04		24	0.20	10.11
	SE - 8J			98			0			0	0	22,366	2.7	9.34		24	0.20	10.11
	SE - 8B			337			0			0	0	24,894	2.7	10.40		24	0.32	12.82
	Tie to East Sand Creek Interceptor						0			0	0	24,894	2.7	10.40		24	0.32	12.82
	New Area Served	3319																
	spot sizer			261			0			0	0	1,958	3.7	1.12		12	0.20	1.51

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota
T17.21486

Indicates lines significantly overloaded
Indicates where separate service areas tie together

											0			4.4	0.00									
EAST SAND CREEK INTERCEPTOR																									
SE 8V		380				0				0	0	2,850		3.6	1.59				12		0.32		1.92		
SE 8I		340				0				0	0	5,400		3.3	2.76				15		0.20		2.79		
SE - 8M		263				0				0	0	7,373		3.2	3.65				15		0.40		3.97		
SE - 8N		414				0				0	0	10,478		3.1	5.03				18		0.24		5.06		
SE - 8L		37				0				0	0	10,756		3.1	5.16				18		0.28		5.47		
SE - 8K		99				0				0	0	11,499		3.0	5.34				21		0.16		6.27		
SE - 8O		422				0				0	0	14,664		3.0	6.81				21		0.20		7.02		
						0				0	0	14,664		3.0	6.81										
SOUTHEAST 8 COLLECTOR						0				0	0	24,894		2.7	10.40				24		0.24		11.08		
						0				0	0	24,894		2.7	10.40				24		0.24		11.08		
SOUTHEAST 7 COLLECTOR						0				0	0	38,778		2.6	15.60				30		0.2		18.52		
Area - SE - 5 D		30				0				0	0	39,003		2.6	15.69										
Area - SE - 5 B		47				0				0	0	39,356		2.6	15.83										
Area - SE - 5 C		18				0				0	0	39,491		2.6	15.89										
Area - SE - 5 A		37				0				0	0	39,769		2.6	16.00										
Area - SE - 4 B		33				0				0	0	40,017		2.4	14.86										
Area - SE - 3 A		62				0				0	0	40,482		2.4	15.03										
Area - SE - 3 B		46				0				0	0	40,827		2.4	15.16										
Area - SE - 4 A		27				0				0	0	41,030		2.4	15.24										
Areas SE-2B & SE-2C		134				0	0	0		0	0	42,035		2.4	15.61				30		0.2		18.52		
Tie to Creek Lane Intercceptor or Pump Station or Sawnill Road Interceptor	434					0				0		43,120		2.4	16.01				30		0.2		18.52		
New Area Served	1669																								

SOUTHEAST - 2, SAWMILL ROAD / AMES PROPERTY COLLECTOR

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust Pop. Equivalent	Cumulative Residential	Peaking	Design Capacity	Invert	Pipe	Slope	Actual Capacity
			2	3	8	12	gpm	Comm.	Indust.	gpd		Population	Factor	cfs		Size	%	cfs
SE - 2 B				86			0			0	0	645	3.9	0.39				
SE - 2 C				47			0			0	0	998	3.8	0.59				
Hillside Dr & MTH 21		7					0			0	0	663	3.9	0.40	776.72	12	0.14	1.26
Hillside Dr & Park Dr							0			0	0	663	3.9	0.40	776.06			
	New Area Served	133											4.4	0.00				

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota

T17.21486

Indicates lines significantly overloaded

Indicates where separate service areas tie together

BROADWAY INTERCEPTOR - SOUTH

SOUTHEAST 10 COLLECTOR (S line of Golf Course - 2040 boundary)

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	SE - 6T			325			0			0	0	2,438	3.6	1.36		12	0.40	2.15
	SW - 6 C & SE - 8S			193			0			0	0	3,886	3.5	2.10		12	0.40	2.15
	SE - 10 B			153	88		0	8		12,000	120	6,794	3.2	3.42		15	0.30	3.43
	SE - 10 A - Golf Course (196 acres)				5		0	20		42,000	420	6,894	3.2	3.62		15	0.40	3.97
	SE - 8P & SE - 8R (direct to LS)			660			0	20		72,000	720	11,844	3.0	5.83				
	PUMP STATION TO SE-9B COLLECTOR -											**CAPACITY REQUIRED**		**2600**	**GPM**			
	New Area Served	1472																

SOUTHEAST 9-A COLLECTOR

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	SW - 6 A			261			0			0	0	1,958	3.7	1.12		12	0.20	1.51
	SE - 9 A		45	52			0			0	0	2,573	3.6	1.43		12	2.00	4.82
	New Area Served	358																

SOUTHEAST 9-B COLLECTOR

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	SW - 6 B			115			0			0	0	863	3.8	0.51		8	0.40	0.70
	SE - 9 B				80	41	0			0	0	3,693	3.5	2.00		8	1.40	1.31
	SE - 10 Pump Station						2,600			0	0	3,693	3.5	7.79		15	2.20	9.34
	New Area Served	195																

WEST SIDE INTERCEPTOR

	SOUTHEAST 9-B COLLECTOR						2,600			0		3,693	3.5	7.79		21	0.28	8.33
	SOUTHEAST 9-A COLLECTOR						2,600			0	0	6,266	3.3	8.99		21	0.32	8.91
	Area SE-6B - committed in 2007			39			2,600			0	0	6,559	3.2	9.04		18	0.28	5.47
	Area SE-6A - committted in 2007			21			2,600			0	0	6,717	3.2	9.12		18	0.28	5.47
	Area SE-6C -= committed in 2007		31				2,600			0	0	6,872	3.2	9.20		18	0.28	5.47
	New Area Served	91					2,600			0	0	7,100	3.2	9.31		18	0.28	5.47
	CELL REFERENCES BEFORE REVISIONS !!! Tie from Sand Creek East side interceptor REQUIRES adding in N402 from the east side interceptor in cell N 447						2,600			0	0	7,100	3.2	9.31		18	0.28	5.47
	Entire UPPER SAND CREEK Tie to Creek Lane Intercceptor or Pump Station or Sawnill Road Interceptor						2,600			0		7,100	3.2	9.31		21	0.4	9.97
	CAPACITY REQUIRED													**4200**	**GPM**			#DIV/0!
	New Area Served	91																

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota
T17.21486

Indicates lines significantly overloaded
Indicates where separate service areas tie together

WEST AND SOUTHWEST INTERCEPTOR

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust Pop. Equivalent	Cumulative Residential	Peaking	Design Capacity	Invert	Pipe	Slope	Actual Capacity
			2	3	8	12	gpm	Comm.	Indust.	gpd		Population	Factor	cfs		Size	%	cfs
Leg up ravine toward Bridle Creek																		
	SW-5C			276			0	10		15,000	150	2,070	3.6	1.24		12	0.2	1.51
	SW-2A			66			0			15,000	150	2,565	3.6	1.51		12	0.3	1.86
	SW-2B			82			0			15,000	150	3,180	3.5	1.80				
	Receive pump station flow from Sand Creek LS						4,200			15,000	150	3,180	3.5	11.16		24	0.3	12.41
	SW-4B		163				4,200			15,000	150	3,995	3.4	11.54		24	0.3	12.41
	SW-4A Corner at toe of bluff						4,200			15,000	150	3,995	3.4	11.54		24	0.3	12.41
Leg up Ravine near Delaware																		
	SW - 5F			210			0			0	0	1,575	3.7	0.90		10	0.4	1.30
	SW-5G			152			0			0	0	2,715	3.6	1.51		12	0.32	1.92
	SW-5E			91			0			0	0	3,398	3.5	1.84		12	0.4	2.15
	SW-5N			122			0			0	0	4,313	3.4	2.27		15	0.3	3.43
	From Ravine to west - SW-5 etc.						0			0	0	4,313	3.4	2.27		18	0.4	6.54
	From Ravine to west - SW-7 (220th Street)						1,200			0		4,313						
	SW-5D		75	123			1,200			0	0	5,611	3.3	5.54		21	0.6	12.23
	SW-5B		128	129			1,200			0	0	7,219	3.2	6.25		24	0.28	11.98
	SW-5A			60	182		1,200			.0	0	11,309	3.0	7.92		21	0.48	10.93
	Flow from 220 Street Area						2,400			0		13,507	3.0	11.62		24	0.4	14.34
	SW-4D						2,400	36		54,000	540	13,507	3.0	11.87		24	0.48	15.72
	SW-4C				87		2,400			54,000	540	15,247	2.8	12.19		27	0.24	15.26
	SW-4A						2,400	187		334,500		15,247	2.8	13.40		27	0.32	17.65
	includes collector from line toward Bridle Creek						6,600			349,500	3,495		3.5	16.60		30	0.2	18.52
	Crosses US 169						6,600			349,500	3,495	0	3.5	16.60		30	0.2	18.52
WEST INTERCEPTOR																		
	Far west extension of Ultimate boundary in 2007 will add 904 acres from north of 169 and 1,235 acres from south of 169. The terrain demands that wastewater be pumped to the intersection of 169 and Delaware. No routing predicted at this time (11/16/																	
	These pipes may be sequential or separated into flows from different directions, but in any event the volume delivered will reflect 6.95 cfs.																	
	SW 8A - North of 169 - Far west growth area.			740			0			0	0	5,550	3.3	2.83		18	0.16	4.11
	SW-7M - South of 169 - Far west growth area.			1,235			0			0	0	9,263	3.1	4.44		21	0.2	7.02
	Wetland Area -- Non Developable			-110			0			0		8,438	3.2	4.18		21	0.2	7.02
	Intersection of Delaware & 169									0	0	0	4.4	0.00	749.00			
	Line from the South in Delaware (LS from former elec CO-OP)						3,200			190,500	1,905	5,030	3.2	10.56				
	Line From the North in Delaware - LS from Park Blvd						5,020			784,500	7,845	6,670	3.0	17.92				
							5,020			784,500	7,845	6,670	3.0	17.92		30	0.24	20.31
	Line from SW-4 - Carries Sawmill Rd.& 220th St. LS's						11,620			1,134,000	11,340	6,670	2.8	33.69	745.00	42	0.16	41.01
							11,620			1,134,000	11,340	6,670	2.8	33.69		42	0.16	41.01
							11,620			1,134,000	11,340	6,670	2.8	33.69		42	0.16	41.01
	NW-1A (portion in triangle S of 195th)						11,620	82		1,257,000	12,570	6,670	2.8	34.22	741.16	42	0.16	41.01

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota
T17.21486

Indicates lines significantly overloaded
Indicates where separate service areas tie together

195th street collector			11,620		1,507,500	15,075	6,670	2.7	34.97	737.78	42	0.16	41.01
NW-1C (portion in trapozoid NE of 195th)			11,620	157	1,743,000	17,430	6,670	2.7	35.96		42	0.16	41.01
Creek Lane @ Velley View			11,620		1,743,000	17,430	6,670	2.7	35.96	733.94	42	0.14	38.33
Acres served	4283												

195th STREET COLLECTOR

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust Pop. Equivalent	Cumulative Residential	Peaking	Design Capacity	Invert	Pipe	Slope	Actual Capacity
			2	3	8	12	gpm	Comm.	Indust.	gpd		Population	Factor	cfs		Size	%	cfs
							0			0	0	0	4.4	0.00		8	0.4	0.70
NW-1B							0		167	250,500	2,505	0	3.6	1.40		10	1	2.06
Tie to the W/SW interceptor							0			250,500		0						
Acres served		167																

PARK BOULEVARD AREA - WEST PORTION

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust Pop. Equivalent	Cumulative Residential	Peaking	Design Capacity	Invert	Pipe	Slope	Actual Capacity
			2	3	8	12	gpm	Comm.	Indust.	gpd		Population	Factor	cfs		Size	%	cfs
NW-7A				88			0			0	0	659	3.9	0.40	738.60	8	0.4	0.70
NW-7B @ Park Boulevard				87			0			0	0	1,311	3.7	0.75	727.40	10	0.4	1.30
NW-7C discharge to LS				85			0			0	0	1,952	3.7	1.12	726.20	10	0.4	1.30
Acres served		260																

PARK BOULEVARD AREA - EAST TOWARD SIOUX VISTA

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust Pop. Equivalent	Cumulative Residential	Peaking	Design Capacity	Invert	Pipe	Slope	Actual Capacity
			2	3	8	12	gpm	Comm.	Indust.	gpd		Population	Factor	cfs		Size	%	cfs
															738.00			
NW-3A-1				98			0			0	0	735	3.8	0.43	730.00	8	0.4	0.70
NW-6A				53			0			0	0	1,133	3.7	0.65	723.60	8	0.4	0.70
NW-6B				34			0			0	0	1,388	3.7	0.79	717.60	8	0.52	0.80
Discharge to LIFT STATION							0			0	0	3,340	3.5	1.81				
							0			0	0	3,340	3.5	1.81				
Acres served		185																

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota
T17.21486

Indicates lines significantly overloaded
Indicates where separate service areas tie together

PARK BOULEVARD AREA - FROM FAIRVIEW LANE

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	NW-3A-2			58			0	27		40,500	405	435	3.8	0.49	758.30	8	0.4	0.70
	NW-3A-3				71		0			40,500	405	1,855	3.6	1.26	753.10	10	0.6	1.59
							0			40,500	405	1,855	3.6	1.26	747.70	10	0.6	1.59
	NW-6C				130		0			40,500	405	4,455	3.4	2.56	736.90	12	0.6	2.63
	LIFT STATION from east toward Sioux Vista						0			40,500	405	7,795	3.2	4.06		15	0.52	4.53
	CAPACITY REQUIRED													**1820**	**GPM**			#DIV/0!
	Acres served	286																

DELAWARE AVE - N OF 169

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	195th and Delaware - NW-2B East Portion						0	43		64,500	645	0	3.9	0.39	778.00	8	0.68	0.91
	195th - half way Delaware to Park-West Portion				34		0			64,500	645	680	3.7	0.76	772.80	10	0.4	1.30
	Park Blvd - Lift Station						1,820			64,500	645	680	3.7	4.81	768.40	18	0.32	5.85
	NW-5A				27		1,820	30		109,500	1,095	1,220	3.6	5.34	760.40	18	0.32	5.85
	NW-5B				21		1,820	77		225,000	2,250	1,640	3.5	6.16	755.70	18	0.42	6.71
	Delaware @ RR - NW-5C						1,820	57		310,500	3,105	1,640	3.4	6.55		21	0.2	7.02
	NW-2A-2 from east						1,820			496,500	4,965	1,640	3.2	7.33		24	0.2	10.11
	NW-2A-1 - Between RR & 169						1,820	29		540,000	5,400	1,640	3.2	7.54	751.20	24	0.24	11.08
	NW-4A						1,820	36		594,000	5,940	1,640	3.2	7.81				#DIV/0!
	US-169						1,820			594,000	5,940	1,640	3.2	7.81	749.00			#DIV/0!
	New Area Served	354																

NE CORNER OF DELAWARE & RR - NW 2A

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	E 1/2 NW-2A-2						0	44		66,000	660	0	3.9	0.40	759.20	8	0.4	0.70
	W 1/2 NW-2A-2						0	80		186,000	1,860	0	3.7	1.06	755.20	10	0.4	1.30
	Delaware @ RR									186,000		0			751.20			
	Acres served	124																

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota
T17.21486

Indicates lines significantly overloaded
Indicates where separate service areas tie together

HWY 169 WEST DISTRICT

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust Pop. Equivalent	Cumulative Residential	Peaking	Design Capacity	Invert	Pipe	Slope	Actual Capacity
			2	3	8	12	gpm	Comm.	Indust.	gpd		Population	Factor	cfs		Size	%	cfs
	SW-7J			300						0		2,250	3.6	1.25		12	0.5	2.40
	SW-7K			390			0			0		5,175	3.3	2.64		15	0.32	3.55
	SW 7I			190			0			0		6,600	3.2	3.27	755.20	8	0.5	0.78
	SW 7 L & SW 7M			430			0			0		9,825	3.1	4.71	755.20	15	0.4	3.97
	SW-8B				55		0			0	0	10,925	3.1	5.24		15	0.32	3.55
	SW-8C				47		0			0	0	11,865	3.0	5.51	745.00	15	0.4	3.97
	ADDITIONAL TRIBUTARY AREAS						0			0	0	11,865	3.0	5.51		15	0.32	3.55
	SW-8H						0	45		67,500	675	11,865	3.0	5.82		18	0.28	5.47
	NW-4B & NW-4A				140		0	61		159,000	1,590	14,665	2.8	7.04		18	0.28	5.47
	Lift station discharge to mh @ Suzette's						0			159,000	1,590	14,665	2.8	7.04		18	0.28	5.47
	CAPACITY REQUIRED													**3200**	**GPM**			
	New Area Served	1658																

220th STREET LIFT STATION

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre				Lift Station	Trib. Area Acres		Daily Flow Comm Indust	Comm / Indust Pop. Equivalent	Cumulative Residential	Peaking	Design Capacity	Invert	Pipe	Slope	Actual Capacity
			2	3	8	12	gpm	Comm.	Indust.	gpd		Population	Factor	cfs		Size	%	cfs
							0			0	0	0	4.4	0.00	940.00			#DIV/0!
							0			0	0	0	4.4	0.00	928.00	8	2.4	1.71
	SW - 5L			183			0			0	0	1,373	3.7	0.79	925.40	8	0.52	0.80
	SW-7C			110			0			0	0	2,198	3.6	1.22	920.60	8	1.7	1.44
	WEST BRANCH FROM 220TH LIFT STATION in SW-7B						700			0	0	2,198	3.6	2.78	910.40			
							700			0	0	2,198	3.6	2.78				
	VOLUME DISCHARGED TO SW CORNER PARCEL 109350011						700			0	0	2,198	3.6	**1200**	**GPM**			
	New Area Served	293																

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota
T17.21486

Indicates lines significantly overloaded
Indicates where separate service areas tie together

WEST BRANCH FROM 220TH LIFT STATION in SW-7B

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
							0			0		0						
	NW- 7C			110			0			0		825						
	SW-7D			49			0			0	0	1,193	3.7	0.68	920.00	8	0.4	0.70
	SW -5K & SW-5L			225			0			0	0	2,881	3.6	1.60	916.00	10	0.52	1.48
	DISCHARGE TO THE 220TH ST LIFT STATION in SW-7B													**700**	**GPM**			
	New Area Served	384																

N of 228th STREET LIFT STATION

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	SW - 5J			316			0			0	0	2,370	3.6	1.32	940.00			#DIV/0!
	DISCHARGE TO PIPE IN SW - 5I													**592**	**GPM**	8	2.4	1.71
	New Area Served	316																

228th & DELAWARE

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	RECEIVE PUMP STATION n of 228th						592			0	0	0	4.4	1.32	942.00	12	0.4	2.15
	SW - 5L			232			592			0	0	1,740	3.7	2.32	938.80	15	0.3	3.43
	SW - 5M			71			592			0	0	2,273	3.6	2.59	936.40	15	0.3	3.43
	SW - 5H			365			592			0	0	5,011	3.3	3.88	934.40	15	0.4	3.97
	Leg up Ravine near Delaware						592			0		5,011						
	New Area Served	668																

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota
T17.21486

Indicates lines significantly overloaded
Indicates where separate service areas tie together

220th & DELAWARE

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	SW-7A - Parcel 109350061						0			0	0	0	4.4	0.00	942.00	8	0.4	0.70
				50			0			0	0	375	4.0	0.23	938.80	8	0.4	0.70
							0			0	0	375	4.0	0.23	936.40	8	0.4	0.70
				50			0			0	0	750	3.8	0.44	934.40	8	0.4	0.70
				43			0			0		1,073						
	SW-7B merges						1,200			0	0	1,548	3.7	3.56	925.00	8	2.35	1.70
	DELAWARE STREET CROSSING						1,200			0	0	1,548	3.7	3.56	919.60	10	0.8	1.84
	New Area Served	143					1,200			0	0	1,906	3.7	3.76				#DIV/0!
							1,200			0	0	1,906	3.7	3.76				#DIV/0!
							1,200			0	0	1,906	3.7	3.76				#DIV/0!
							1,200			0	0	1,906	3.7	3.76				#DIV/0!

SW CORNER OF PARCEL 109350011

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	220th STREET LIFT STATION						1,200			0	0	0	4.4	2.67	930.00	8	1.2	1.21
	SW-7B		38	38			1,200			0	0	475	4.0	2.97	926.20	10	0.4	1.30
							1,200			0	0	475	4.0	2.97	926.20	10	0.4	1.30
	New Area Served	76											4.4	0.00				

WASTEWATER COLLECTION SYSTEM - COMPREHENSIVE PLAN

City of Jordan, Minnesota
T17.21486

Indicates lines significantly overloaded
Indicates where separate service areas tie together

SOUTH TOE OF SLOPE-WEST OF DELAWARE

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	SW-7E		23	30			0			0	0	340	4.0	0.21	776.20	8	0.4	0.70
	SW-8A				30		0			0	0	940	3.8	0.55	773.80	8	0.4	0.70
	SW-7F		40	40			0			0	0	1,440	3.7	0.82	769.80	8	0.52	0.80
	SW-8-D				29		0			0	0	2,020	3.6	1.13	764.60	10	0.4	1.30
	SW-7G				23	55	0			0	0	4,130	3.4	2.17	760.60	12	0.42	2.20
	SW-8E						0	38		57,000	570	4,130	3.4	2.47	756.40	15	0.28	3.31
	SW-7H + SW 8I				45		0	5		64,500	645	5,030	3.3	2.90	753.60	15	0.28	3.31
	SW-8F						0	55		147,000	1,470	5,030	3.2	3.22	750.80	18	0.12	3.55
	SW-8G						0	29		190,500		5,030						
	CO-OP LIFT STATION						3,200			190,500	1,905	5,030	3.2	10.56	749.60	21	0.2	7.02
	DISCHARGE TO W/SW INTERCEPTOR						3,200			190,500	1,905	5,030	3.2	10.56	749.00	21	0.2	7.02
	New Area Served	442																

Estimate of Bridle Creek & Stonebridge Lift Station

Structure	Location	Developed Lots	Residential Tributary Area at ___ Units per Acre 2	3	8	12	Lift Station gpm	Trib. Area Acres Comm.	Indust.	Daily Flow Comm Indust gpd	Comm / Indust Pop. Equivalent	Cumulative Residential Population	Peaking Factor	Design Capacity cfs	Invert	Pipe Size	Slope %	Actual Capacity cfs
	Area west of break			120			0			0	0	900	3.8	0.53		8	0.4	0.70