Elks Country Estates Lift Station

PRELIMINARY

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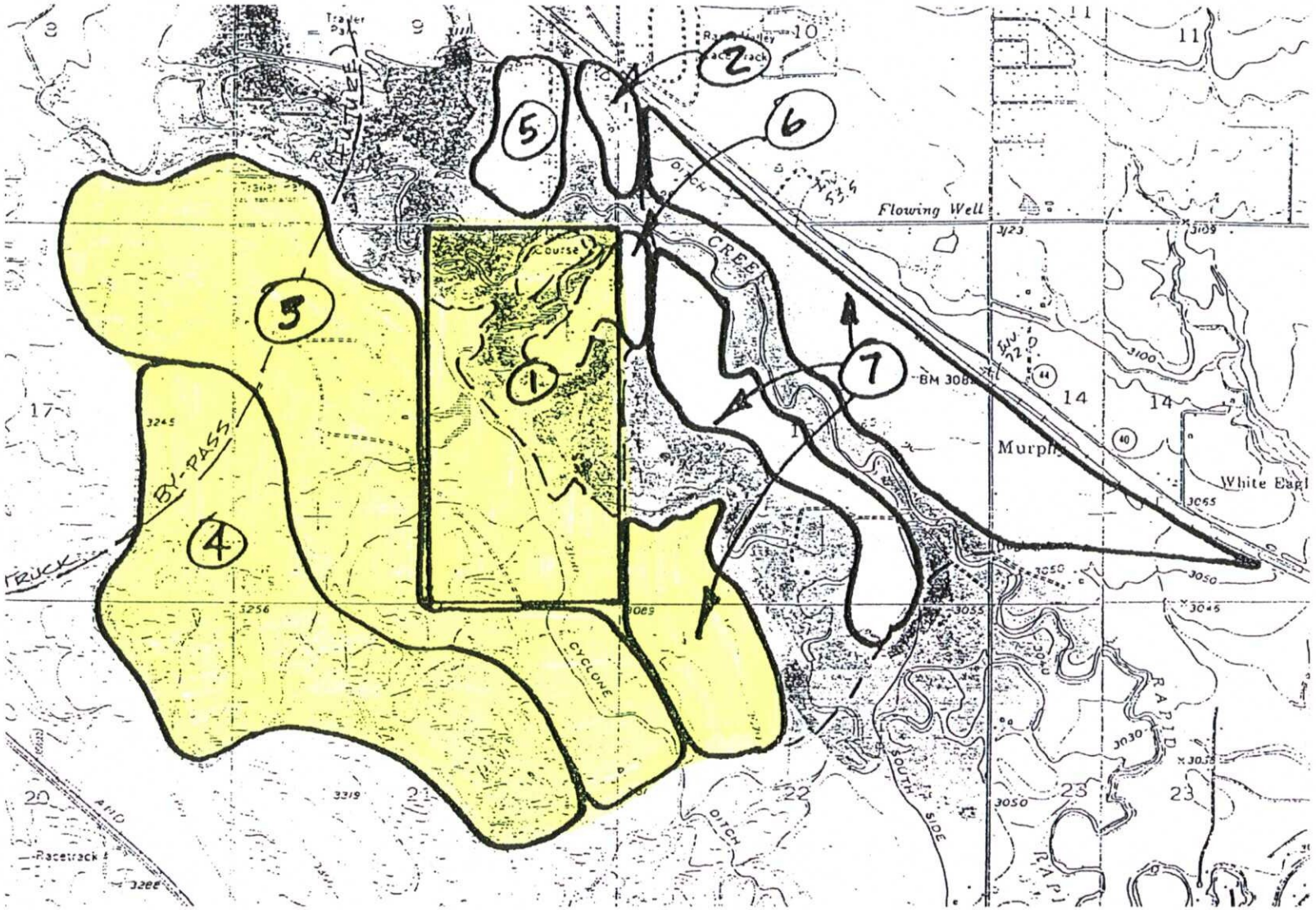
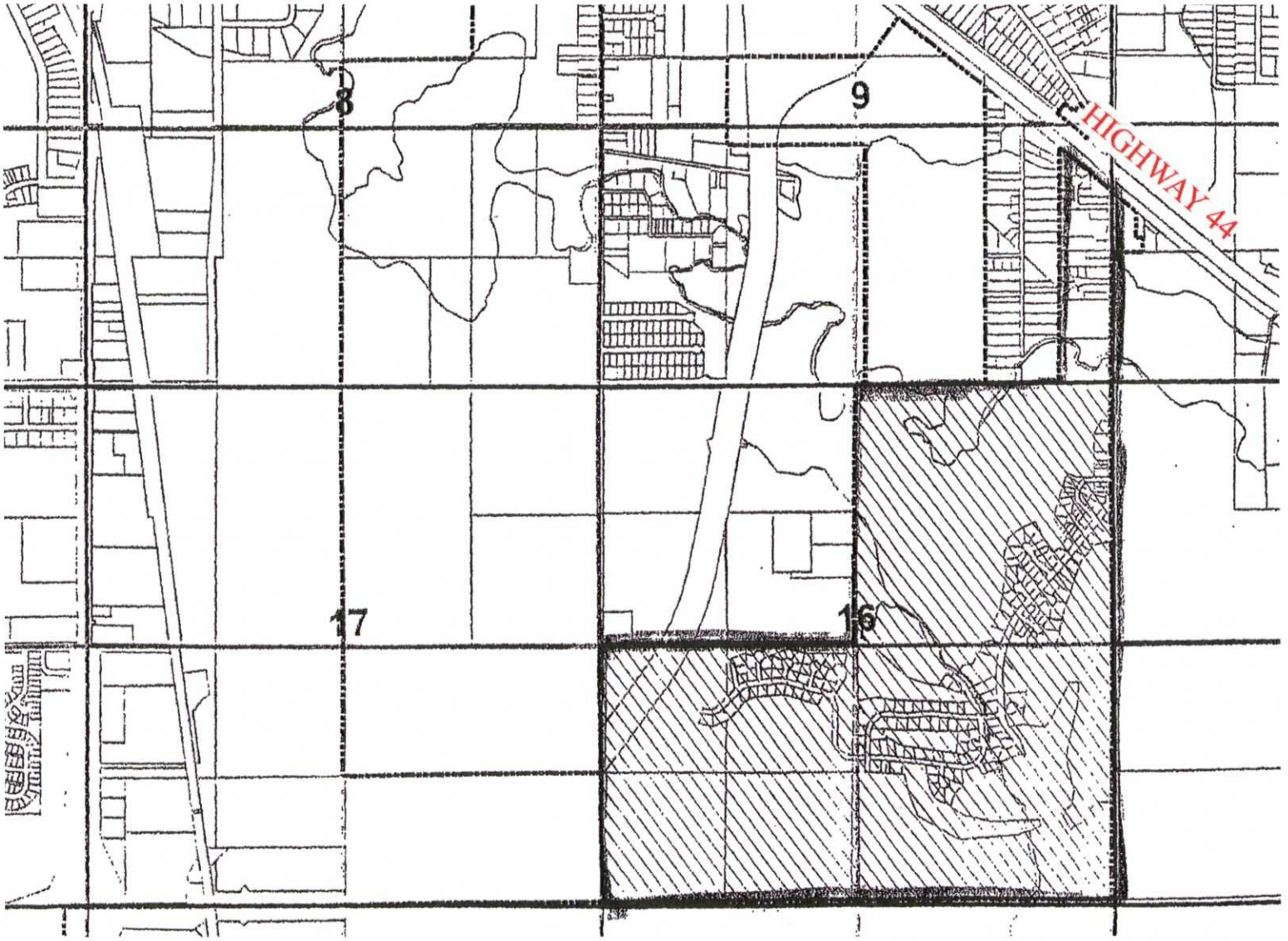
Potential Wastewater Service Area



Summary of Design Concepts 1 through 4 for Elks Club Wastewater Service Area

Design Concept	Principal Components	Gravity Service Area	Design Flow	Discussion/Comment
1.	10,500' - 15" PVC sewer 5,500' - 8" PVC sewer	1800 Ac.	1750 gpm (15") 210 gpm (8")	Provides gravity service for entire Elks service area. No pumping required now or in future. Would allow existing Pioneer Drive lift station to be abandoned if gravity main extended.
2.	6,050' - 8" PVC sewer 6,250' - 6" PVC force main Lift Station - duplex submersible, 20' deep, 6' dia.	360 Ac.	430 gpm (lift station) 210 gpm (8")	Serves Service Zones 1, 2 and 6 only. Assumes lift station upgrading or conversion to gravity system (Design Concept 1) for service to Zones 3, 4, 5 and 7.
3.	3,800' - 8" PVC sewer 4,000' - 6" PVC force main Lift Station - duplex submersible, 20' deep, 6' dia.	330 Ac.	430 gpm (lift station) 210 gpm (8")	Serves Service Zones 2 & 6 & part of Zone 1 (Elks property). About 30 to 40 acres of Elks development area at southeast corner is not serviceable by gravity. An additional lift station & force main will be required (assumed at Elks expense.
4.	1,900' - 8" PVC sewer 1,000' - 10" PVC sewer 2,100' - 6" PVC force main Lift Station - duplex submersible, 20' deep, 6' dia.	40 Ac.	430 gpm (lift station) 350 gpm (10") 80 gpm (8")	Serves Zone 2 & parts of Zones 1 & 6 by gravity. The Elks clubhouse area would be serviced by gravity under this concept, but the majority of the proposed new development would require another pumping station & force main, probably at the location of the lift station shown in Design Concept 2. The gravity sewer on the south side of Rapid Creek would flow north to the lift station, thus this segment would need to be reconstructed in the future if the gravity interceptor is ultimately constructed.

Existing Wastewater District



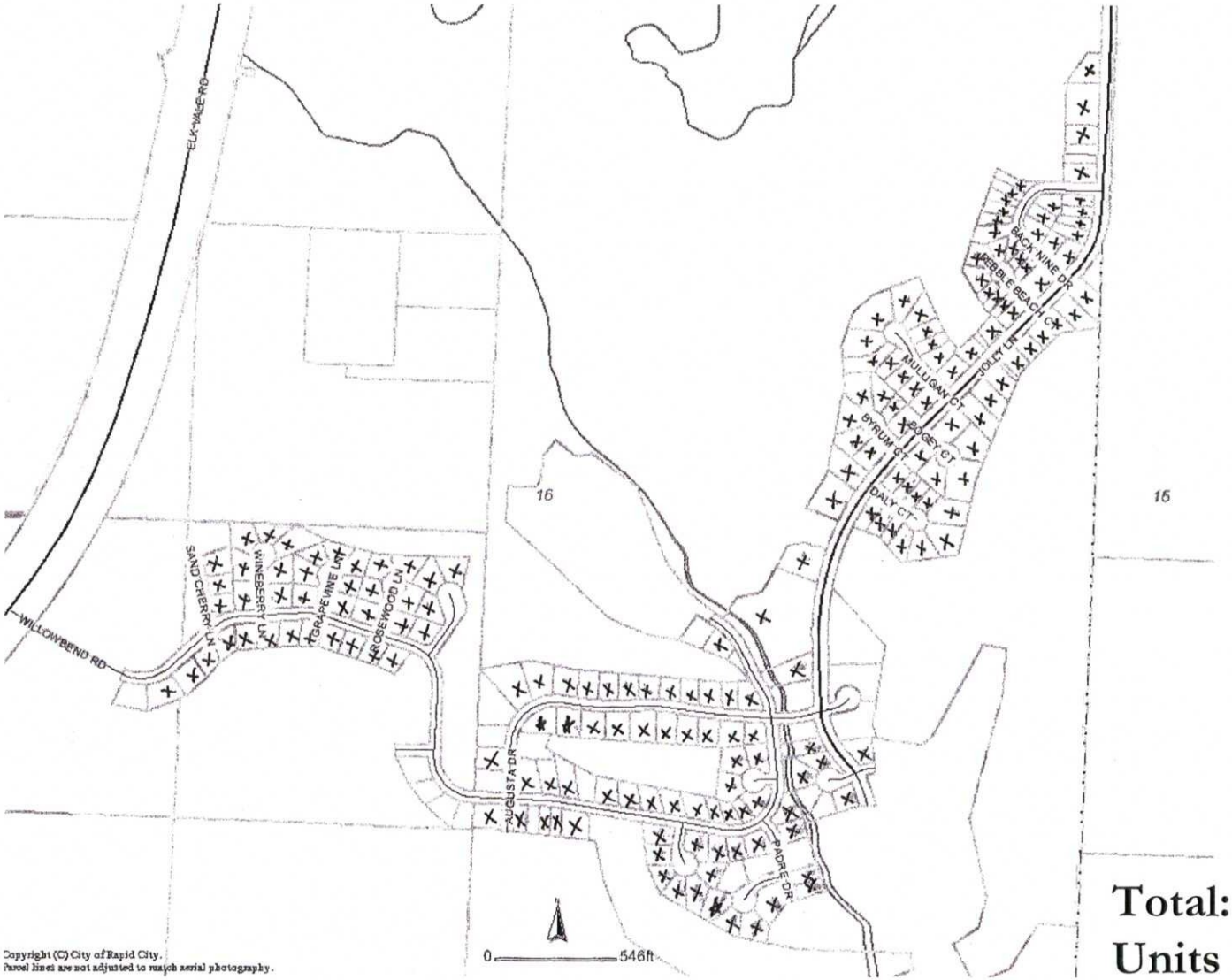
Elks Meadows Sewer Design

Date	Design Milestones
August 15, 2005	Layout Plat Approved
May 18, 2006	DDI requests Sanitary Sewer Reports for Elks Country Estates and Lift Station pump capacity, wet well size, run time logs, and discharge pipe diameter from the City.
May, 2006	DDI receives Clark Report and Memorandum from Stacey Titus. Lift Station information not received.
June 9, 2006	DDI submits preliminary Sewer and Water Calculations
July 31, 2006	Steve Zandstra submits request for water and sewer reallocation from Elks Country Estates to Elks Meadows.
September 1, 2006	DDI submits additional calculations for sewer reallocation.
September 5, 2006	DDI submits signed and sealed calculations for sewer reallocation at meeting with City.
September 5, 2006	DDI receives Lift Station information.
September 13, 2006	DDI submits preliminary calculations for Lift Station capacity based on 9-5-06 information.
September 18, 2006	DDI and City meet to discuss Lift Station capacity. City provides information collected 9-15-06 and pump records. DDI and City determine Lift Station pumps are undersized.
September 18, 2006	DDI requests City Council to continue until 10-02-06.
September 18, 2006	DDI requests meeting later in week with City including Council Members to address options and costs concerning undersized pumps.
September 20, 2006	DDI makes second request for meeting with City.

Existing Conditions

- **190 Homes Built in Elks Country Estates Including the Elks Club and Plum Creek, Phase I**
- **59 Additional Lot Preliminary Plat Approved**

Existing Sewer to Lift Station



Total: 190 Dwelling Units

Elks Lift Station

	Lift Station Pump Capacity	Force Main Velocity	Allowable Dwelling Units
Original Clark Report Design Concept #2	430 gpm	4.88 fps	462 Homes
Existing Conditions	135 gpm	1.53 fps	190 Homes
Proposed Conditions	500 gpm	5.70 fps	772 Homes

Number of Existing Homes = 190
Force Main Maximum Capacity = 529 gpm
Force Main Minimum Velocity = 2.0 fps
Force Main Maximum Velocity = 6.0 fps

Lift Station Upgrade Alternative 1

a) Utilize existing wet well
b) Remove existing pumps, motors, rails, valves and piping in wet well
c) Install two 500-gpm pumps w/motors, new rails, piping and valves – the two 500-gpm pump assemblies will fit in the existing 78-inch diameter wet well
d) Replace control panels (if necessary)
e) Replace hatch/wet well lid, as necessary

Pro: Lowest construction cost of the 500-gpm alternative solutions. Quick resolution to problem.

Con: Because of the limited available operating volume in the existing wet well, the recommended/required operating volume for larger capacity pumps will back-up into the 10-inch gravity inflow sewer line immediately prior to each pump operation cycle. Although it is unlikely that there would be any adverse impact to any service line, it is possible that solids may settle in the gravity line, thereby requiring more frequent pipe maintenance. This is a concern because it appears that the 10-inch gravity sewer line was installed at a slope flatter than the minimum recommended slope of 0.28-percent; the pipe may not be self-cleansing.

<u>Probable Construction Cost</u>

$120,000 - $150,000

Lift Station Upgrade Alternative 2

a) Utilize existing wet well
b) Remove existing pumps, motors, rails, valves and piping in wet well
c) Install two 500-gpm pumps w/motors, new rails, piping and valves – the two 500-gpm pump assemblies will fit in the existing 78-inch diameter wet well
d) Replace control panels (if necessary)
e) Replace hatch/wet well lid, as necessary
f) Install auxiliary self-draining wet well/storage tank next to the existing wet well. The tank should be sized to allow the required operating volume and pump operating switches to be properly situated relative to the existing gravity inflow line in the existing wet well.

Pro: The additional well/tank would provide additional operating volume capacity and storage volume; a significant emergency storage volume could be provided in the auxiliary tank, supplementing the emergency storage volume in the existing wet well. Quick resolution to problem but slightly longer than Alternative 1.

Con: Additional material and installation cost of the auxiliary well/tank (when compared to Alternative 1)

<u>Probable Construction Cost</u>

$200,000 - $250,000

Lift Station Upgrade Alternative 3

a) Remove existing pumps, motors, rails, valves and piping in wet well
b) Remove existing wet well
c) Install new wet well
d) Install two 500-gpm pumps w/motors, new rails, piping and valves
e) Replace control panels (if necessary)

Pro: Provides what can be considered a new lift station; allows the flexibility to provide a design that will satisfy the City's current criteria.

Con: Probably the highest construction cost and longest construction time of the lift station alternatives.

<u>Probable Construction Cost</u>

$250,000 - $300,000

Lift Station Upgrade Alternate 4

a) Utilize existing wet well
b) Remove existing pumps, motors, rails, valves and piping in wet well
c) Install two 400-gpm pumps w/motors, new rails, piping and valves
d) Replace control panels (if necessary)
e) Replace hatch/wet well lid, as necessary

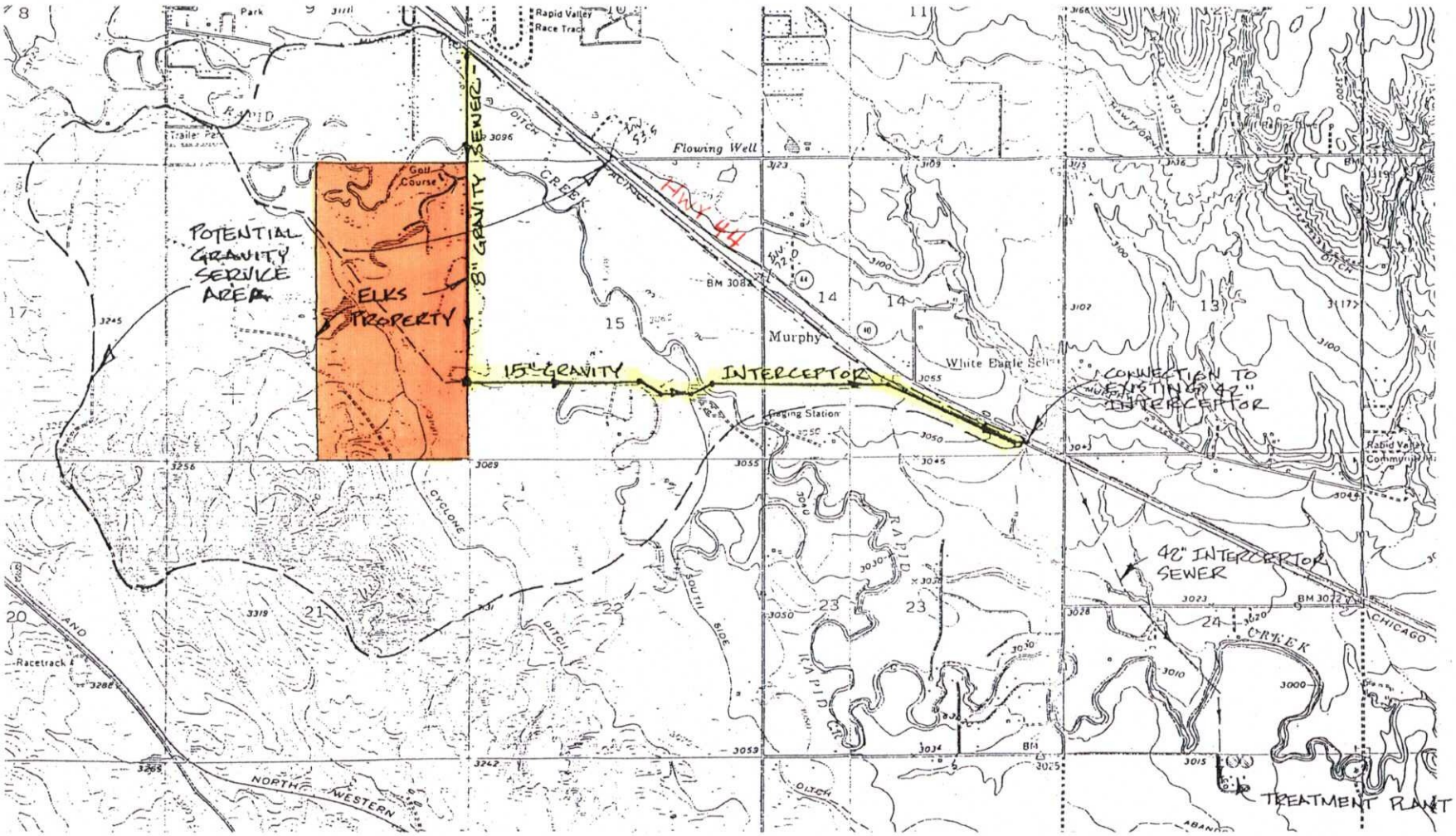
Pro: Lowest construction cost of the alternative solutions. The construction cost will be only slightly less than Alternative 1; the savings will likely be in material costs for the smaller motors. This alternative should not routinely impact the performance of the incoming 10-inch gravity sewer main. Quick resolution to problem.

Con: Does not maximize the capacity of the existing 6-inch forcemain, thereby restricting the number of homes that the lift station could conceivably serve.

<u>Probable Construction Cost</u>

$110,000 - $140,000

Gravity Interceptor Sewer Alternative



Gravity Interceptor Sewer Alternative

a) Remove existing lift station

b) Install new 15" PVC Gravity to the Existing 42" Interceptor Sewer

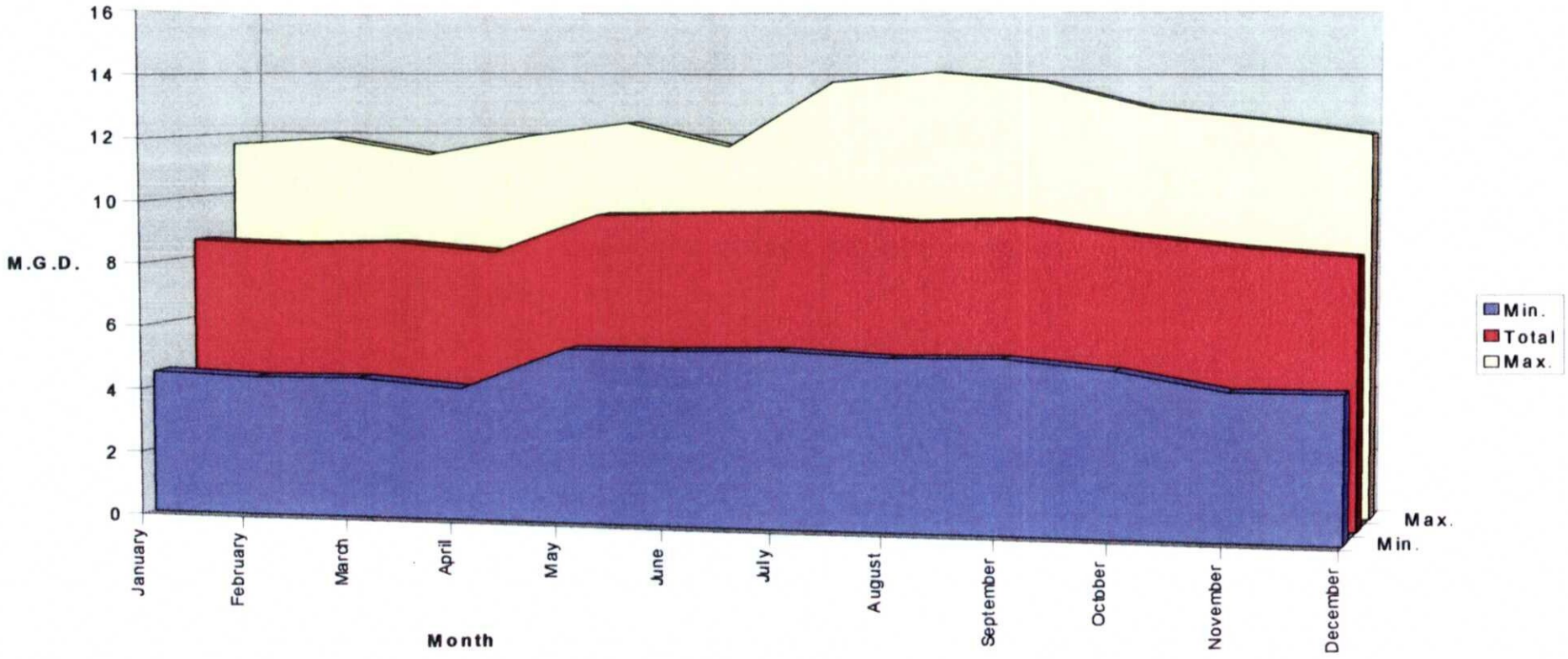
Pro: Complies with 1989 Clark Report and would serve significantly more area.

Con: The highest construction cost of all alternatives. Design, easement acquisition, and construction would take a minimum of 3 years.

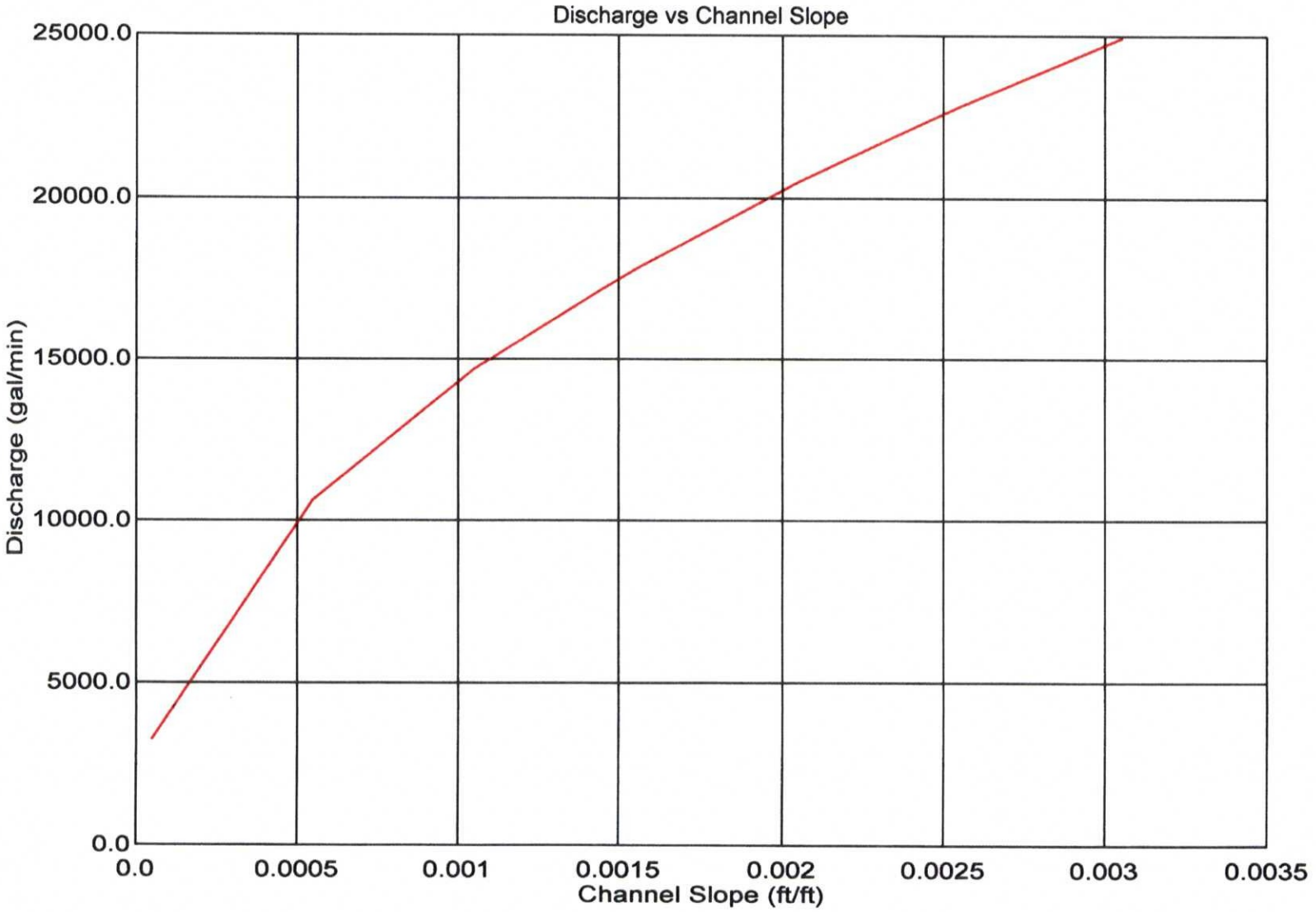
Probable Construction Cost

$1,400,000 - $1,500,000

Water Reclaimation



42” Gravity Interceptor Sewer



Proposed Development

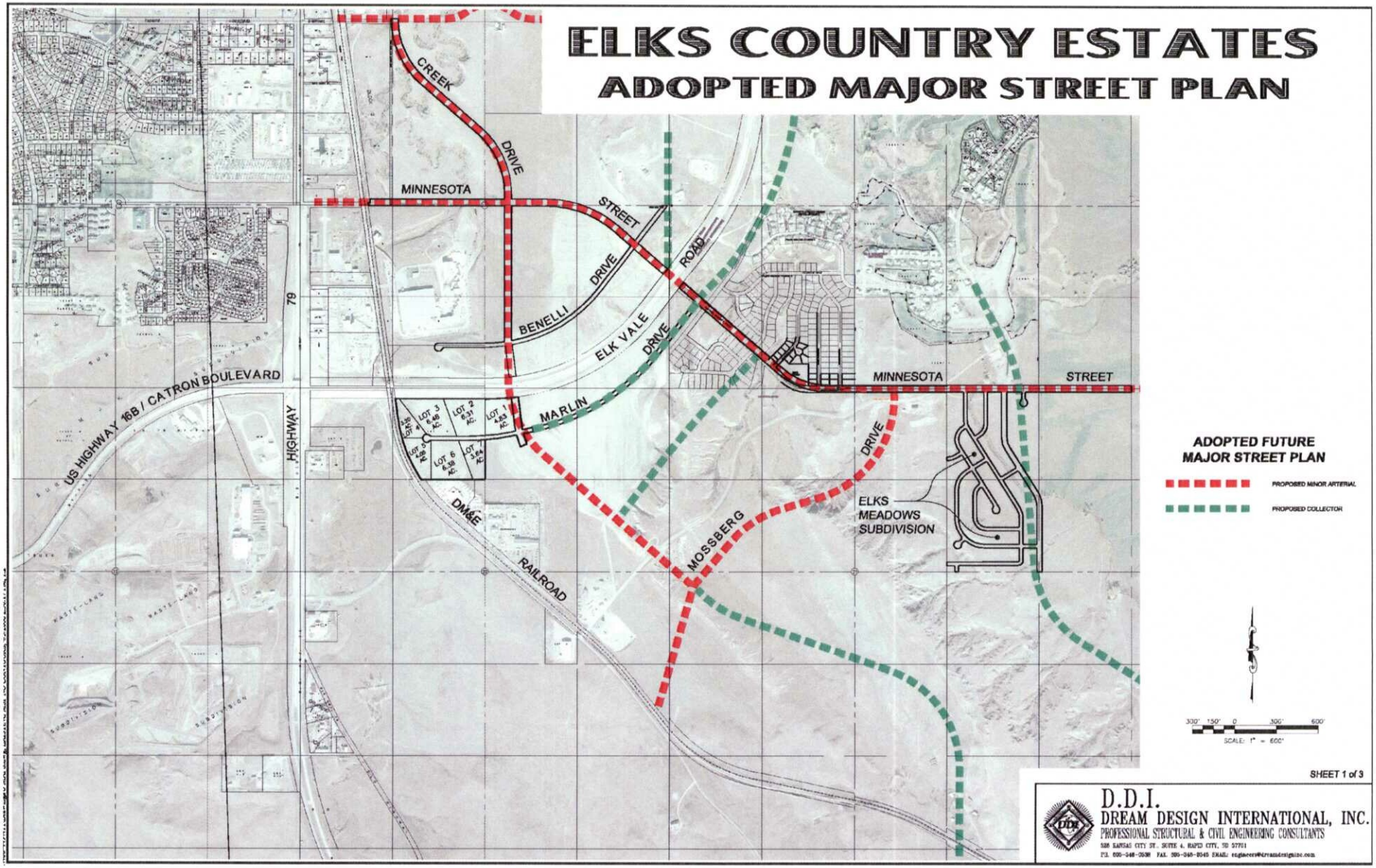
- **459 Additional Planned Residential Development Lots (Elks Country Estates)**
  Approved by City Council in 1992

- **107 Additional Preliminary Plat Lots (Elks Meadows, Phase I)**
  Approved by Planning Commission September 7, 2006
  October 16, 2006 City Council

- **158 Additional Lots with Layout Plat (Elks Meadows, Phase II)**
  Approved by City Council August 15, 2005

- **108 Additional Lots Submitted for Layout Plat Approval (Plum Creek, Phase II)**
  Approved by Planning Commission September 5, 2006

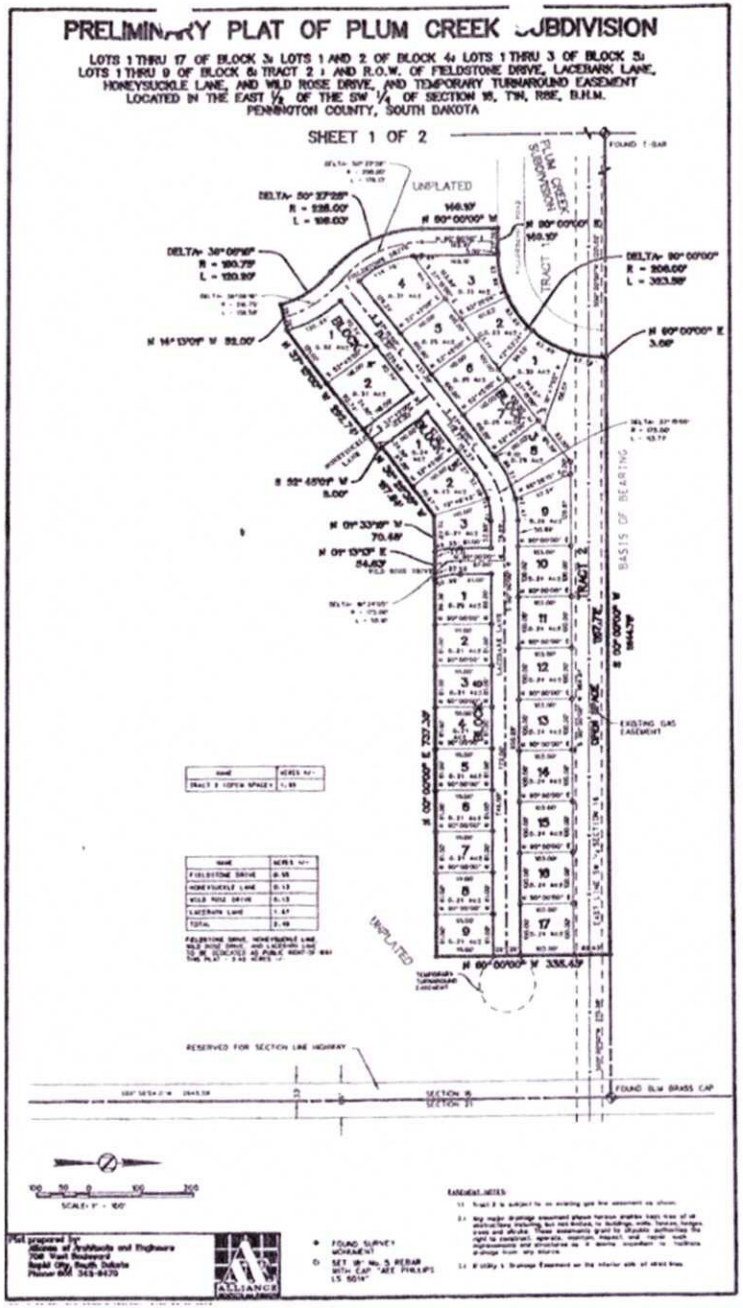
Adopted Major Street Plan



Plum Creek Subdivision Layout Plat

02PL081

from Staff Report dated August 22, 2002



Plum Creek Subdivision Layout Plat

05PL020

From Staff Report dated February 24, 2005