
**NORTHEAST SALT CREEK BASIN
COLLECTION SYSTEM STUDY**

TECHNICAL MEMORANDUM

**For the
Lincoln Wastewater System
City of Lincoln, Nebraska**

**Prepared By
Kirkham Michael & Associates
Lincoln, Nebraska**

January 19, 2004

**Technical Memorandum
Northeast Salt Creek Basin Collection System Study**

To: Gary Brandt
Roger Krull
Lincoln Wastewater System

Prepared By: Kirkham Michael Consulting Engineers
Lincoln, NE

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EXECUTIVE SUMMARY

The purpose of this Technical Memorandum is to review the service area for the Northeast Salt Creek Basin sanitary sewer collection system and to determine the feasible short term and long term facilities required to serve the area.

Financing and construction of the initial portion of the facilities to serve the entire N-1 through N-5 service areas would result in substantial over-sizing of the facilities and result in increased maintenance of the facilities. Facilities to serve the N-1 area only will serve the needs of the initial proposed development as well as provide the infrastructure to adequately serve the entire N-1 area for the near future. As proposed developments are approved by the City in the N-1 planning area, adequate right-of-way provisions can be included to reserve the corridors for the future parallel facilities necessary to serve the long term needs of the N-2, N-3, N-4, and N-5 service areas.

The limiting section of the 60-inch Deadman's Run Trunk is the portion of sewer from 70th Street to the Treatment Plant. Total current contributing area to this portion of the Trunk sewer is 9,696 acres (4,471 acres from the Havelock Basin and 5,225 acres from the Deadman's Trunk Basin). The existing 60-inch Deadman's Run Trunk has sufficient current capacity at 70th Street to accommodate a service area of approximately 9,655 acres. This portion of the 60-inch Trunk Sewer is therefore currently at capacity for the service area.

The City is currently planning to divert approximately 1,070 acres from the Havelock HV1 and HV10 sub-basins to the future Stevens Creek Trunk Basin. If this transfer of flow occurs as planned then a comparable capacity in the Deadman's Run Trunk at 70th Street will be available for development in the Northeast Salt Creek Basin. If the proposed transfer to the Stevens Creek Basin does not occur, then there will not be available capacity in the Deadman's Run Trunk for development in the Northeast Salt Creek Basin.

The City has also identified the Mahoney Golf Course and park area (280 acres) and the University of Nebraska East Campus (120 acres) that are not part of the service area. The 400 acres removed from the current service area calculations will therefore be available for development in the Northeast Salt Creek Basin.

The 70th Street corridor at the crossing of Salt Creek is currently congested with existing water, sewer, sludge, and electrical facilities and the future plans for a 4-lane roadway section and bridge will only make it more difficult to locate the sanitary facilities in this corridor. For this reason, the proposed crossing should be located approximately ¼-mile west of 70th Street, at approximately 67th Street, as shown on the proposed alignments.

1.0 INTRODUCTION

Interest in development by property owners north of Salt Creek in the vicinity of North 56th Street started in the late 1990's. Continued development pressure has led to discussions with a group of property owners organized as the Star City Combine for extension of water and sewer utilities to the portion of the service area bounded by 70th Street on the east, Salt Creek on the south, Interstate 80 on the north and approximately 46th Street on the west.

2.0 BACKGROUND

The Lincoln Wastewater Facilities Plan Update dated April 2003 identifies the Utility Planning Zones Figure 3-1 and includes Zone Numbers N-1, N-2, and N-4 in the Deadman's Run service area.

Figure 3-2 of the Facilities Update identifies drainage basins within the Lincoln Planning Area.

Figure 3-3 of the Facilities Plan Update identifies the Tier 1 Priority A and B needs and also identifies the Zone N-1, N-2, N-3, N-4, and N-5 areas within the Deadman's Run drainage area along with the associated acreage within each zone.

The existing Deadman's Run Interceptor Sewer was designed and constructed in 1977 to serve the development in the northeast part of the City and to direct flows to the Northeast WWTF located east of 70th Street and south of Salt Creek. The interceptor has a 60-inch diameter in the portion of the alignment between 56th Street and the WWTF east of 70th Street. The 60-inch diameter sewer between 56th Street and 70th Street has a slope of 0.00045 ft/ft and based on the City's Sanitary Sewer Design Standards has a capacity of 51.0 cfs to serve an area of approximately 8,793 acres. The 60-inch diameter sewer in 70th Street and east to the treatment plant has a slope of 0.00055 ft/ft and based on the City's Sanitary Sewer Design Standards has a capacity of 56.0 cfs to serve an area of approximately 9,655 acres.

Tables 8-2 and 8-3 of the Facilities Plan Update identify the drainage basin acres served by the trunk lines for the Tier I and Tier II areas, respectively. In order to verify the current area served by the existing Deadman's Run Trunk Line and the available capacity in the existing 60-inch sewer, City staff reviewed the information presented in the Tables 8-2 and 8-3. Several corrections were made to Table 8-2 and Table 8-3 as shown in the attached copies of the Tables. The corrections include:

- Existing service area that should be included in the East Campus Basin was included in the Little Salt Creek Basin. Service areas are corrected as shown.
- The East Campus basin does not discharge to the Deadman's Run Trunk Line.
- The Little Salt Creek basin does not discharge to the Deadman's Run Trunk Line.

- The Deadman's Run Trunk service area has been expanded since the Facilities Plan Update was completed. The revised existing service area has increased from 4,536 acres to 5,225 acres as shown.
- The Facilities Plan Update makes the assumption that up to 1,070 acres of the Havelock Basin service area is diverted to the Stevens Creek basin in the future. This diversion has not taken place to date.

The following table identifies the area of service to the Deadman's Run Trunk at the 70th Street and Holland Road location

Basin	Service Area	Trunk Capacity
Deadman's Trunk Basin	5,225 acres	
Havelock Basin	4,471 acres	
Total	9,696 acres	9,655 acres
- Divert Portion of HV1 and HV10 sub-basins to Stevens Creek Trunk	(1,070) acres	
- Removed Mahoney Golf Course & Park Area	(280) acres	
- Removed U of N East Campus Area	(120) acres	
Remaining Service Area	8,226 acres	

With the above diversions, there would be additional capacity available east of 70th Street in the 60-inch Deadman's Trunk for approximately 1,429 acres (9,696 – 8,226).

Total service area within the Havelock drainage basin is estimated to be 4,471 acres. Approximately 1,070 acres is planned to be diverted from the HV1 and HV10 sub-basins to the Stevens Creek Basin. The remaining 550 acres of the Havelock HV1 and HV10 sub-basins will connect to the Deadman's Run Trunk at 70th Street and Holland Road. The remaining 2,851 acres of the Havelock Basin will connect to the Deadman's Run Trunk upstream of the start of the 60-inch diameter sewer at 56th and Holland Road.

Chapter 8 of the Facilities Plan Update indicates improvements necessary to serve the Deadman's Run Trunk service area to the north. The Tier I conditions recommend construction of a separate 27-inch diameter sewer from the WWTF west to serve the 56th Street area (1,434 acres), with a capacity to handle initial flows of 10.3 cfs. Tier II conditions include service to an additional 1,261 acres for a total Tier I and II capacity requirement of 17.7 cfs. To accommodate the Tier II conditions with 2,695 total acres and 17.7 cfs, the Facilities Plan Update proposed an interceptor size of 33-inch to 36-inch diameter to serve this area.

The Facilities Plan Update includes the following projected flow rates to the Northeast WWTF.

	Northeast WWTF Wastewater Flow Projections (cfs)			
	2000*	2010	2025	2050
Annual Average (ADF)	10.5	12.3	15.5	23.3
Peak Day (PDF)	16.3	19.0	23.3	35.7
Peak Hour (PHF)	20.7	23.9	29.5	43.4
Peak Wet Weather Flow (PWWF)	48.5	55.8	71.3	107.0

* Actual

3.0 DESIGN CRITERIA

Per Figure 3-3 of the Facilities Plan Update, the potential service area in the Northeast Salt Creek Basin includes the following zones and areas:

TABLE 1

Zone N-1	2,080 acres
Zone N-2	2,500 acres
Zone N-3	3,250 acres
Zone N-4	4,240 acres
Zone N-5	2,150 acres
TOTAL	14,220 acres

The areas in Table 1 are assumed to be gross area within each zone, with no reduction for property that is not developable due to restrictions from floodways or other environmental restrictions.

Table 1 of the Chapter 2.00 SANITARY SEWER DESIGN STANDARDS will be used to determine the capacity requirements of the proposed sanitary sewer facilities within the proposed service area.

4.0 ALTERNATIVE DEVELOPMENT

The following table identifies the required sewer capacity to serve the following combinations of service zones in the drainage basin, based on the acres per the Facilities Plan Update.

TABLE 2

ZONES	CUMULATIVE ACRES *	FLOW PER UNIT AREA **	CAPACITY REQ'D (cfs) **
N-1	2,080	0.00674 cfs/acre	14.0
N-1, N-2, and N-4	8,820	0.00580 cfs/acre	51.2
N-1, N-2, N-3, N-4, and N-5	14,220	0.00560 cfs/acre	79.6

* Acres based on areas included in the Facilities Plan Update

** Flow based on Table 1 of the City of Lincoln Design Standards

Assumptions for development of alternatives are as follows:

1. The existing 60-inch diameter Deadman's Run Trunk capacities and existing flows are as summarized in Section 2 above.
2. Zones N-1 through N-5 include areas that are not developable due to slope, environmental, and flood plain issues.
3. The 70th Street roadway corridor is anticipated to include a 4-lane roadway at some future date.
4. Due to existing utilities located in the 70th Street corridor and close proximity of other structures, a crossing of Salt Creek is being considered ¼-mile to the west along a property line at approximately 67th Street.
5. There is need to consider some sewer service to the area north of the Abbott Complex east of 70th Street.
6. Standard depths of cover for the sanitary sewers need to be maintained, per the Standard Sewer Design Standards.
7. Since the service area of Zone N-1 has an area larger than the area that can be accommodated by the existing 60-inch Deadman's Run Trunk, all alternatives include ultimate extension of a new sewer interceptor all the way to the treatment plant influent.
8. The construction of a parallel trunk sewer east of 70th Street will be deferred until the capacity of the existing 60-inch trunk sewer is exceeded.

The following alternatives are considered for different levels of service to the Northeast Salt Creek drainage basin.

ALTERNATIVE NO. 1 – 30-Inch Diameter Interceptor

Alternative No. 1 consists of providing service to Zone N-1 only. Although the Facilities Plan Update indicates the service area is 2,080 acres, the buildable area appears to be approximately 1,460 acres. This area is bounded by Salt Creek on the south and west, I-80 on the north and 70th Street on the east, except there is a 250 acre area north of I-80 immediately west of 56th Street that is included in the service area.

Required sewer capacity would be as follows:

Point	Location	Acres Served	Flow (cfs)
A	35 th Street & Salt Creek	260	2.0
B	42 nd Street & Salt Creek	500	3.9
C	49 th Street and Alvo Road	630	4.9
D	56 th Street and Alvo Road	1040	7.6
E	63 rd Street & Salt Creek	1460	10.7

This service area could be served by a new interceptor sewer connecting to the 60-inch Deadman's Run Interceptor at the treatment plant. The 30-inch sewer would start with an invert elevation of 1112.50-feet and a slope of 0.06% and will extend 4,850-feet to the outlet of a 500-foot long siphon under Salt Creek. The siphon crossing of Salt Creek will include an estimated 3-foot head loss. The inlet invert elevation to the siphon on the north side of Salt Creek at approximately 67th Street will be approximately 1118.5. A 27-inch sanitary sewer will extend 1,320-feet from 67th Street to approximately 63rd Street. A 27-inch sanitary sewer will extend approximately 2,620-feet from 63rd Street to 56th Street. A 21-inch sanitary sewer will extend approximately 2,900-feet from 56th Street to 49th Street. An 18-inch sanitary sewer will extend approximately 2,800-feet from 49th Street to 42nd Street. A 15-inch sanitary sewer will extend approximately 1,850-feet from 42nd Street to 38th Street and a 12-inch sanitary sewer will extend approximately 1,600-feet to a terminus point.

ALTERNATIVE NO. 2 – 42-Inch Diameter Interceptor

Alternative No. 2 consists of providing service to Zone N-1 and an allowance of 2,000 acres from Zones N-2 and N-4.

Required sewer capacity would be as follows:

Point	Location	Acres Served	Flow (cfs)
O	27 th Street & Salt Creek	2,000	13.5
A	35 th Street & Salt Creek	2260	15.3
B	42 nd Street & Salt Creek	2500	16.9
C	49 th Street and Alvo Road	2630	17.8
D	56 th Street and Alvo Road	3040	19.2
E	63 rd Street & Salt Creek	3460	21.8

This service area could be served by a new interceptor sewer connecting to the 60-inch Deadman's Run Interceptor at the treatment plant. The 42-inch sewer would start with an invert elevation of 1111.50-feet and a slope of 0.04% and will extend 4,850-feet to the outlet of a 500-foot long siphon under Salt Creek. The siphon crossing of Salt Creek will include an estimated 3-foot head loss. The inlet invert elevation to the siphon on the north side of Salt Creek at approximately 67th Street will be approximately 1116.5. The 42-inch sanitary sewer will extend 1,320-feet from 67th Street to approximately 63rd Street. A 42-inch sanitary sewer will extend approximately 2,620-feet from 63rd Street to

56th Street. A 42-inch sanitary sewer will extend approximately 2,900-feet from 56th Street to 49th Street. A 36-inch sanitary sewer will extend approximately 2,800-feet from 49th Street to 42nd Street. A 36-inch sanitary sewer will extend approximately 1,850-feet from 42nd Street to 38th Street and a 30-inch sanitary sewer will extend approximately 4,300-feet to the outlet of a siphon crossing of Salt Creek and 27th Street. The siphon crossing of Salt Creek will include an estimated 3-feet head loss. The inlet invert elevation to the siphon on the west side of Salt Creek will be approximately 1130.0.

ALTERNATIVE NO. 3 – 54-Inch Diameter Interceptor

Alternative No. 3 consists of providing service to Zones N-1, N-2 and N-4.

Required sewer capacity would be as follows:

Point	Location	Acres Served	Flow (cfs)
O	27 th Street & Salt Creek	6,740	40.5
A	35 th Street & Salt Creek	7,000	42.0
B	42 nd Street & Salt Creek	7,240	43.5
C	49 th Street and Alvo Road	7,370	44.3
D	56 th Street and Alvo Road	7,780	45.2
E	63 rd Street & Salt Creek	8,200	47.6

This service area could be served by a new interceptor sewer connecting to the 60-inch Deadman’s Run Interceptor at the treatment plant. The 54-inch sewer would start with an invert elevation of 1110.50-feet and a slope of 0.055% and will extend 4,850-feet to the outlet of a 500-feet long siphon under Salt Creek. The siphon crossing of Salt Creek will include an estimated 3-feet head loss. The inlet invert elevation to the siphon on the north side of Salt Creek at approximately 67th Street will be approximately 1116.2. The 54-inch sanitary sewer will extend 1,320-feet from 67th Street to approximately 63rd Street. A 54-inch sanitary sewer will extend approximately 2,620-feet from 63rd Street to 56th Street. A 54-inch sanitary sewer will extend approximately 2,900-feet from 56th Street to 49th Street. A 54-inch sanitary sewer will extend approximately 2,800-feet from 49th Street to 42nd Street. A 54-inch sanitary sewer will extend approximately 1,850-feet from 42nd Street to 38th Street and a 54-inch sanitary sewer will extend approximately 4,300-feet to the outlet of a siphon crossing of Salt Creek and 27th Street. The siphon crossing of Salt Creek will include an estimated 3-feet head loss. The inlet invert elevation to the siphon on the west side of Salt Creek will be approximately 1126.8.

ALTERNATIVE NO. 4 – 66-Inch Diameter Interceptor

Alternative No. 4 consists of providing service to Zones N-1, N-2, N-3, N-4, and N-5.

Required sewer capacity would be as follows:

Point	Location	Acres Served	Flow (cfs)
O	27 th Street & Salt Creek	12,140	68.0
A	35 th Street & Salt Creek	12,400	69.5
B	42 nd Street & Salt Creek	12,640	70.8
C	49 th Street and Alvo Road	12,770	71.5
D	56 th Street and Alvo Road	13,180	73.8
E	63 rd Street & Salt Creek	13,600	76.2

This service area could be served by a new interceptor sewer connecting to the 60-inch Deadman's Run Interceptor at the treatment plant. The 66-inch sewer would start with an invert elevation of 1110.00-feet and a slope of 0.045% and will extend 4,850-feet to the outlet of a 500-foot long siphon under Salt Creek. The siphon crossing of Salt Creek will include an estimated 3-foot head loss. The inlet invert elevation to the siphon on the north side of Salt Creek at approximately 67th Street will be approximately 1115.2. The 66-inch sanitary sewer will extend 1,320-feet from 67th Street to approximately 63rd Street. A 66-inch sanitary sewer will extend approximately 2,620-feet from 63rd Street to 56th Street. A 66-inch sanitary sewer will extend approximately 2,900-feet from 56th Street to 49th Street. A 66-inch sanitary sewer will extend approximately 2,800-feet from 49th Street to 42nd Street. A 66-inch sanitary sewer will extend approximately 1,850-feet from 42nd Street to 38th Street and a 66-inch sanitary sewer will extend approximately 4,300-feet to the outlet of a siphon crossing of Salt Creek and 27th Street. The siphon crossing of Salt Creek will include an estimated 3-foot head loss. The inlet invert elevation to the siphon on the west side of Salt Creek will be approximately 1125.1.

DEVELOPER'S PROPOSED SEWER SYSTEM ALTERNATIVES

The Developer's Engineer has submitted several layouts for the proposed sewer to serve the Star City Combine properties.

Layout No. 1 Dated October 2001

This layout included sanitary sewers to serve the entire Star City Combine area extending to 70th Street. Sanitary sewer flows were directed to a lift station located on the east side of 56th Street near Alvo Road. In order to provide adequate cover over the sanitary sewers near 70th Street, the invert elevation of the 21-inch sewer near the lift station at 56th Street was elevation 1113.0. This elevation is approximately the same as the invert of the existing 60-inch Deadman's Run Trunk Line located at 56th and Holland Road. There is therefore no opportunity for an inverted siphon with this layout.

This layout does not provide for future accommodation of flows from areas outside the Star City Combine area, and the depth of the sewers at 56th Street do not accommodate connection to a future gravity interceptor extended from the treatment plant. The lift station and force main located along 56th would be a permanent facility. The proposed pumping station peak capacity was projected to be 1,200 gpm (2.7 cfs) for the proposed initial development and up to 3,900 gpm (8.7 cfs) for the full development of the Star

City Combine service area. The force main to the 60-inch Deadman's Run Trunk Line would initially require an 8-inch diameter with an ultimate 10-inch diameter parallel force main when the pump station capacity is expanded.

Layout No. 2 Dated November 3, 2003

This layout is shown as Exhibit B – Initial Sewer Plan Area and Exhibit C – Ultimate Sewer Area Plan prepared by Olsson Associates. This alternative includes the construction of sanitary sewers to collect the flows in the N-1 area and direct them to a pumping station located at 56th Street and Alvo Road. Flows would be pumped via force main to the existing 60-inch Deadman's Run sewer on the east side of 56th Street at Holland Road.

Provisions are shown in Exhibit C for a future 60-inch interceptor to extend east from the pumping station to 70th Street and connecting to the existing 60-inch Deadman's Run sewer at 70th Street. A crossing of Salt Creek would be via a siphon structure.

The developer west of 56th Street has provided a 100-foot wide easement south of Alvo Road and an 80-foot wide easement along the north side of Alvo Road to accommodate the extension of the 60-inch sewer west to serve additional development in the drainage basin.

The 24-inch sanitary sewer at 56th and Alvo Road has an invert elevation of approximately 1121.8. With the invert elevation this high, it is not possible to properly provide gravity sewer service to the Star City Combine areas east toward 70th Street. The sewers will not have adequate cover to meet the City Design Standards and Exhibit B shows sewers that are only 3 feet deep toward the east end of the service area.

The lift station and force main are assumed to be sized consistent with Layout 1. This submittal included a plan and section of the proposed wetwell/drywell pumping station.

Layout No. 3 Provided late November or Early December, 2003

The developer provided this layout which provides service to the N-1 area. A 27-inch sewer would extend east from 56th Street for ¾-mile to approximately 67th Street. A temporary pumping station is proposed at this location to pump south across Salt Creek via force main to the 60-inch interceptor at 70th Street.

Future service to the N-2 through N-5 areas would be accommodated via a new parallel trunk sewer. The pumping station would be eliminated when the new 60-inch interceptor is installed and a siphon constructed under Salt Creek.

An 18-inch sewer is provided west of 56th Street to the west edge of the proposed development.

Estimated costs of the facilities, per the developer's engineer, for this layout are as follows:

	Estimated Cost
Temporary Pumping Station	\$ 1,500,000
3,850-feet 27-inch Sanitary Sewer	700,000
3,050-feet 18-inch Sanitary Sewer	250,000
2,300-feet Temporary Force Main	250,000
Total Estimated Construction Cost	\$ 2,700,000

5.0 ALTERNATIVE ANALYSIS

Alternatives 1 through 4 include interceptors of varying sizes to accommodate the future growth in the entire service area. Lower initial flows through the interceptor will not result in velocities high enough to flush the solids through the system, without additional maintenance. The following table illustrates the pipe capacity and the flows required at the anticipated design slopes to achieve a flushing velocity of 2 feet per second.

ALTERNATIVE NO.	PIPE SIZE (inches)	DESIGN SLOPE (% slope)	DESIGN CAPACITY (cfs)	FLOW REQ'D FOR VEL. OF 2 FPS (cfs)
1	30	0.06	11.5	3.88
	27	0.07	9.5	3.1
	21	0.10	6.0	1.8
2	42	0.04	22.5	6.7
3	54	0.055	50.0	5.0
	54	0.05	48.0	5.3
4	66	0.045	79.0	6.9
	66	0.04	73.0	8.5

Advantages and disadvantages of the alternatives are as follows:

ALTERNATIVE NO. 1 – 30-Inch Diameter Interceptor

<u>ADVANTAGES</u>	<u>DISADVANTAGES</u>
Sewer sizes serve the N-1 Area	Sewer not sized for flows from other areas.
Reduced sewer size.	Need easement for future sewer to serve additional upstream areas.
Reduced initial sewer cost.	
Initial flows could be connected to existing 60-inch sewer at 70 th Street.	
Siphon crossing of Salt Creek	

ALTERNATIVE NO. 2 – 42-Inch Diameter Interceptor

<u>ADVANTAGES</u>	<u>DISADVANTAGES</u>
Provides capacity for additional area in the 27 th Street corridor.	Sewer not sized for flows from other areas.
Initial flows could be connected to existing 60-inch sewer at 70 th Street.	Need easement for future sewer to serve additional upstream areas.
Siphon crossing of Salt Creek	Low initial flows in larger pipe will increase maintenance costs.
	Higher initial cost of construction.

ALTERNATIVE NO. 3 – 54-Inch Diameter Interceptor

<u>ADVANTAGES</u>	<u>DISADVANTAGES</u>
Provides capacity for zones N-1, N-2, and N-4 identified in the Utility Planning Zone of the Facilities Plan Update	Sewer not sized for flows from Zones N-3 and N-5
Initial flows could be connected to existing 60-inch sewer at 70 th Street.	Need easement for future sewer to serve additional upstream areas.
Siphon crossing of Salt Creek	Low initial flows in larger pipe will increase maintenance costs.
	Higher initial cost of construction.

ALTERNATIVE NO. 4 – 66-Inch Diameter Interceptor

ADVANTAGES	DISADVANTAGES
Provides capacity for all Zones N-1, N-2, N-3, N-4, and N-5 identified in the drainage basin.	Low initial flows in larger pipe will increase maintenance costs.
No need for easement for future sewer.	Higher initial cost of construction.
Siphon crossing of Salt Creek	

**DEVELOPER'S PROPOSED ALTERNATIVE
Layout No. 1 Dated October 2001**

ADVANTAGES	DISADVANTAGES
Reduced initial cost of facilities for the Developer.	Sewers not sized for flows other than Zone N-1.
Smaller diameter sewers have better flow characteristics.	Easements not provided from all properties for future interceptor.
	City must operate and maintain a pumping station.
	Due to depths of sewers to serve areas east of 56 th Street, a siphon structure at 56 th Street is not feasible.
	Ultimate capacity overloads 60-inch sewer at 70 th Street
	Increased future cost of facilities to be constructed and financed by the City to serve the area.

DEVELOPER'S PROPOSED ALTERNATIVE
Layout No. 2 Dated November 3, 2003

<u>ADVANTAGES</u>	<u>DISADVANTAGES</u>
Reduced initial cost of facilities for the Developer.	Sewers not sized for flows other than Zone N-1.
Easement provided for future interceptor in proposed development area.	Easements not provided from all properties for future interceptor.
Smaller diameter sewers have better flow characteristics.	City must operate and maintain a pumping station.
	Ultimate capacity overloads 60-inch sewer at 70 th Street.
	Sewers to serve the areas between 56 th Street and 70 th Street do not meet the depth of cover requirements of the Design Standards.
	Increased future cost of facilities to be constructed and financed by the City to serve the area.
	Future 60-inch sewer extension connection will overload the existing Deadman's Run Trunk.
	Requires additional costs associated with the abandonment of the pumping station and force main.

DEVELOPER'S PROPOSED ALTERNATIVE
Layout No. 3 Provided late November or Early December, 2003

<u>ADVANTAGES</u>	<u>DISADVANTAGES</u>
Reduced initial cost of facilities for the Developer.	Sewers not sized for flows other than Zone N-1.
Easement provided for future large diameter sewer in proposed development area.	Ultimate capacity overloads 60-inch sewer at 70 th Street.
Smaller diameter sewers have better flow characteristics.	City must operate and maintain a pumping station.
Gravity sewers to serve areas between 56 th and 70 th Streets will be able to meet Design Standards.	Increased future cost of facilities to be constructed and financed by the City to serve the area.
	Requires additional costs associated with the abandonment of the pumping station and force main.

CONSTRUCTION COST ESTIMATES

Construction cost estimates for the alternatives were prepared and are attached at the end of this technical memorandum. These estimates include the construction costs for the major ultimate facilities required to be constructed in Phase 1 as shown on the attached figures from the Northeast Wastewater Treatment Plant to the west edge of the proposed Star City Combine / Northbank Junction Development at approximately 49th Street. These costs do not include the costs for the secondary sewers to serve the adjacent properties.

These comparative costs are based on the following:

ALTERNATIVES 1, 2, 3, AND 4

- Costs of the new interceptor pipe and appurtenances from the connection to the influent at the treatment plant to a point at 49th Street south of Alvo Road.
- Costs for a siphon crossing of Salt Creek in lieu of a pumping station and force main.
- Cased crossing of 56th Street.

DEVELOPER ALTERNATIVE

Layout No. 1 Dated October 2001 and
Layout No. 2 Dated November 3, 2003

- Costs of the new interceptor pipe and appurtenances from 56th Street and Alvo Road to a point at 49th Street south of Alvo Road.
- Costs for a new interim pumping station at 56th Street and Alvo Road.
- Costs for the force main and Salt Creek crossing along 56th Street to the existing 60-inch interceptor at Holland Road.
- Cased crossing of 56th Street.

DEVELOPER ALTERNATIVE

Layout No. 3 Provided late November or Early December, 2003

- Costs of the new 18-inch diameter interceptor pipe and appurtenances from 56th Street and Alvo Road to a point at 49th Street south of Alvo Road.
- Costs for the new 27-inch diameter interceptor pipe from 56th Street east to the Salt Creek Crossing at approximately 67th Street
- Costs for a new interim pumping station at 67th Street.
- Costs for the force main and Salt Creek crossing at 67th Street to the existing 60-inch interceptor at 70th Street.
- Cased crossing of 56th Street.

The costs for the alternatives are summarized as follows:

DEVELOPER ALTERNATIVE LAYOUT NO. 1 **	\$ 3,265,800
DEVELOPER ALTERNATIVE LAYOUT NO. 2 **	\$ 3,265,800
DEVELOPER ALTERNATIVE LAYOUT NO. 3 **	\$ 4,242,600
ALTERNATIVE NO. 1	\$ 4,319,700
ALTERNATIVE NO. 2	\$ 7,138,500
ALTERNATIVE NO. 3	\$ 9,142,900
ALTERNATIVE NO. 4	\$10,905,300
ALTERNATIVE NO. 1A	\$3,605,400

** Cost of the pumping station estimated by the Developer's Engineer.

These alternatives cannot be directly compared because they do not provide the same level of service and do not meet the same design criteria. For instance, the developer's Plan L-2 for service to the area between 56th Street and 70th Street does not meet the City's Design Standards in providing the depth of cover over the proposed sanitary sewers in this area. By attempting to provide sanitary service back to the lift station on 56th Street, the developer does not have sufficient cover. Service is not provided to the area north of the Abbott Sports Complex in the developer's alternative. The developer's plans do not address the costs associated with upsizing the 60-inch Deadman's Run Trunk east from 70th Street to accommodate the ultimate flows.

The developer's alternatives L-1 and L-2 provide for the discharge of the pumped flows to the existing interceptor at 56th Street. However, when the Deadman's Run Trunk reaches capacity then the City will be required to build the interceptor from 70th Street to the treatment plant at the City's cost.

6.0 RECOMMENDATION

If the 1,070 acres located in the Havelock basin are diverted to the Stevens Creek Basin as planned, then the existing 60-inch diameter Deadman's Run Trunk on 70th Street and into the treatment plant will have available capacity to serve an additional 1,429 acres of development based on the City's Design Standards. The proposed Star City Combine includes an initial proposed development west of 56th Street totaling 665 acres. The full development of this proposed area will be accomplished over many years, during which time sanitary flows will gradually increase. The sanitary sewer facilities could therefore include a phased development to minimize the initial costs to the developer and the City, while still providing the facilities to meet the long term needs of the area.

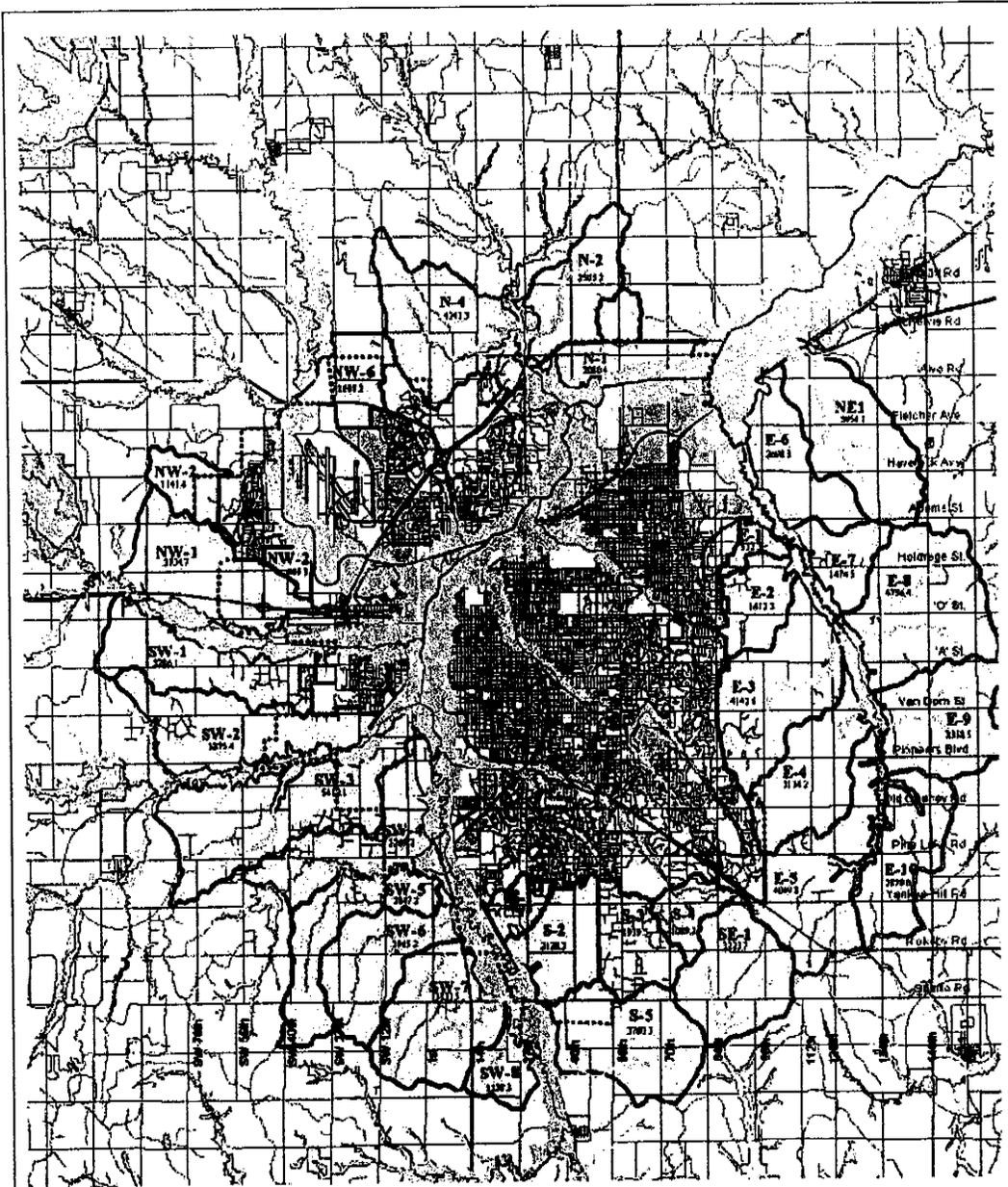
To construct the initial facilities to serve the needs of the entire N-1, N-2, N-3, N-4, and N-5 areas would be cost prohibitive at this time. In addition, increased maintenance would be required due to the lower flows being discharged to the oversized facilities. As development occurs in the initial areas, the platting of the developments should include the right-of-way reservations for the construction of the future parallel facilities necessary

to serve the entire service area. The proposed initial development has included these right-of-way reservations.

We therefore recommend the construction of the Alternative No. 1A facilities. The 30-inch diameter interceptor would be constructed initially discharging to the existing 60-inch Deadman's Run Trunk at 70th Street. The construction of the 30-inch sewer east to the treatment plant would be deferred until development of the N-1 service area causes flows to exceed the capacity of the existing 60-inch trunk line to the treatment plant. Alternative No. 1A provides the gravity sewer infrastructure necessary to serve the entire N-1 area. The area between 56th Street and 70th Street north of Salt Creek can be fully developed with gravity sewer service designed per the City's standards. This will also provide for service to the areas north of the Abbott Sports Complex.

Constructing an interim pumping station and force main at the 56th Street location is not recommended based on the cost of the facilities and the inability of this system to meet the long term needs of the N-1 area. The construction of the pumping station at the approximate 67th Street location is also not recommended due to the high cost of the pumping station and the continued long term operation and maintenance costs of the facilities. The capital cost associated with the construction of the pumping station would be better spent on the construction of the gravity sewer system and inverted siphon system. While increased maintenance costs for the inverted siphon will be incurred until the flows increase in volume, these costs will be substantially less than the costs associated with the operation and maintenance of the developer proposed pumping station. The cost of the Alternative 1A facilities are estimated to be \$3,605,400 and are included in this report for reference.

Attachments: Figure 3-1 Utility Planning Zones from Facilities Plan
Figure 3-2 Drainage Basins Planning Areas from Facilities Plan
Figure 3-3 Tier 1 Priority A and B Needs from Facilities Plan
Alternative No. 1 Construction Cost Estimate
Alternative No. 2 Construction Cost Estimate
Alternative No. 3 Construction Cost Estimate
Alternative No. 4 Construction Cost Estimate
Developer Alternative L-1 Construction Cost Estimate
Developer Alternative L-2 Construction Cost Estimate
Developer Alternative L-3 Construction Cost Estimate
Alternative No. 1A Construction Cost Estimate
Drainage Basin Sheet 1
Alternative No. 1 System Layout
Alternative No. 2 System Layout
Alternative No. 3 System Layout
Alternative No. 4 System Layout
Alternative No. 1A System Layout
Developer Exhibit B
Developer Exhibit C



Utility Planning Zones

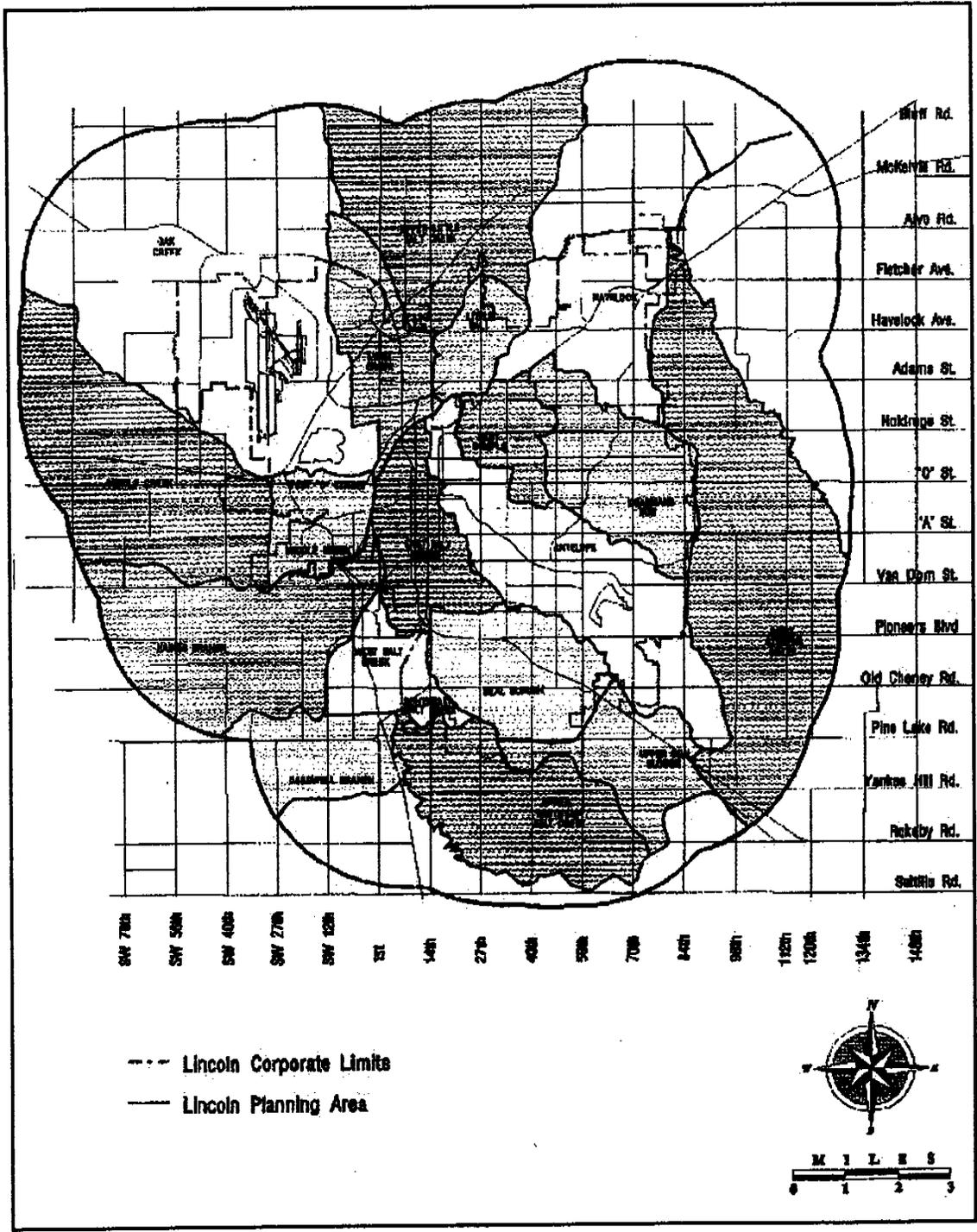
NOTE:
 This figure is to facilitate long term water and sewer master plans and does not represent the approved future service limit, nor does it indicate or imply any intent to provide city services to these areas.
 November 29, 2001

- Future Service Limit
- Paths
- Streams
- Urban Planning Zone
- N-1 Zone Number & Acres
- Flood Plain



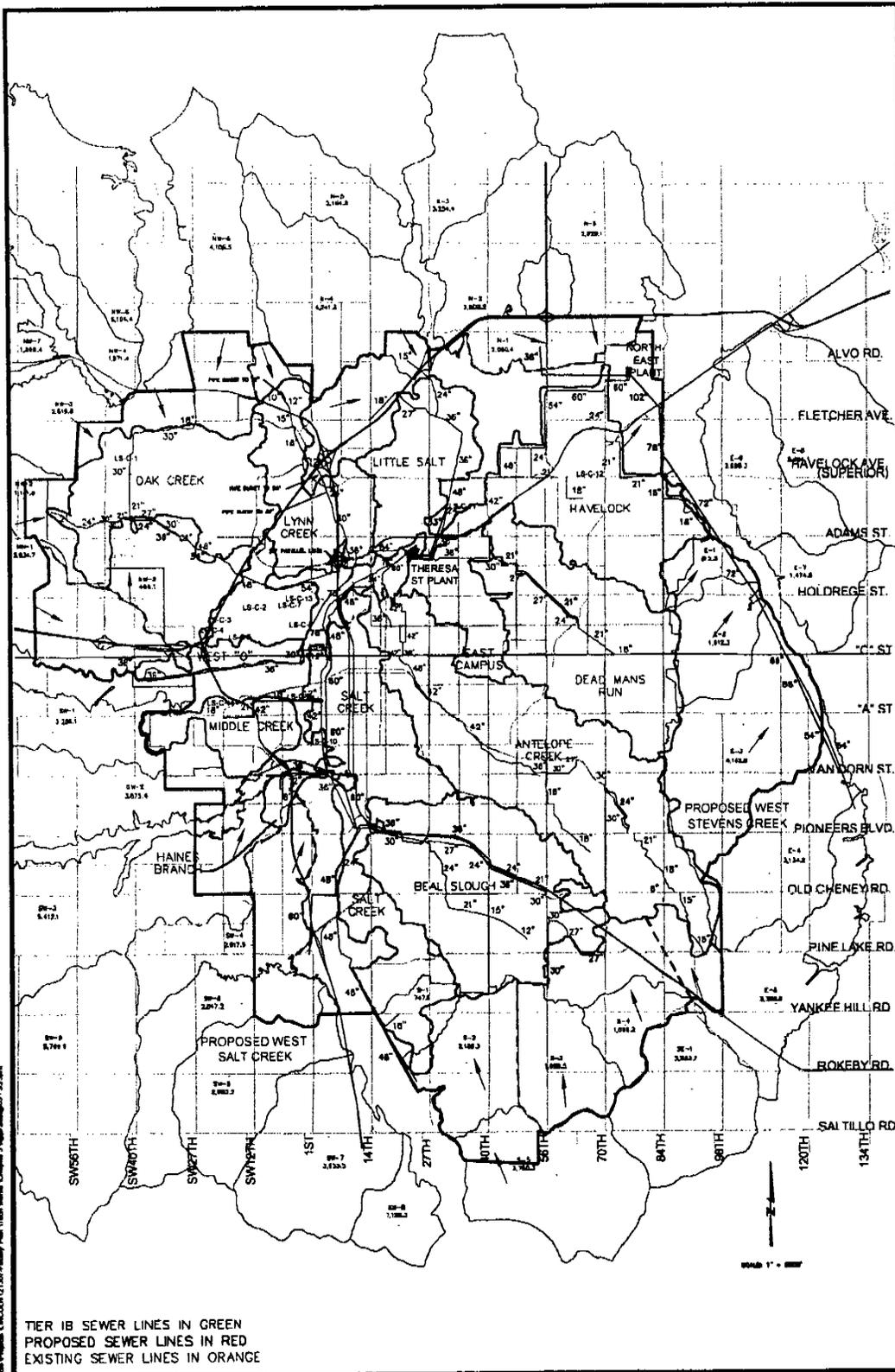
Lincoln Wastewater System
 Facilities Plan Update
 CITY OF LINCOLN

Figure 3-1
 Study Area



Lincoln Wastewater System
 Facilities Plan Update
 CITY OF LINCOLN

Figure 3-2
 Drainage Basins



Lincoln Wastewater System Facilities Plan Update - Tier 1B Sanitary Sewer Basins - 1/15/2017



Lincoln Wastewater System Facilities Plan Update
 CITY OF LINCOLN
 SANITARY SEWER BASINS

Figure 3-3
 TIER 1 PRIORITY A AND B NEEDS

Table 8-2. Lincoln Future Wastewater Collection System Acreages Served (25 Year - Tier I) REVISED 12/2003

Basin	Antelope Creek	Beals Slough	Deadmans Trunk	East Campus	Haines Branch	Havelock	Lynn Creek	Little Salt Creek	Middle Creek	Oak Creek	Salt Creek	West "O" Street	West Stevens Creek	West Salt Creek	Total
Existing acreage served	7,199	5,370	5,225	1,585	283	4,471	2,314	1,597	1,456	3,661	4,370	1,042	-	-	38,573
Additional acreage served 25- yrs - Tier I	665	4,411	1,434	-	816	-	354	1,661	704	2,961	2,766	1,897	7,520	2,955	28,144
Total	7,864	9,781	6,659	1,585	1,099	4,471	2,668	3,258	2,160	6,622	7,136	2,939	7,520	2,955	66,717
Trunk Line	Antelope Creek Trunk	Beals Slough	Deadmans Trunk	East Campus Trunk	Salt Valley Trunk	Deadmans Trunk	Oak Creek Trunk	Little Salt Creek Trunk	Salt Valley Trunk	Oak Creek Trunk	Salt Valley Trunk	Salt Valley Trunk	West Stevens Trunk	Salt Valley Trunk	

Tier 1 acreages served by each trunk line

	Antelope Creek Trunk	Beals Slough Trunk	Deadmans Trunk	Oak Creek Trunk	Salt Valley Trunk	West Stevens Trunk	East Campus Trunk	Little Salt Creek Trunk	Total
Existing	7,199	5,370	9,696	5,975	7,151	-	1,585	1,597	38,573
Ultimate	7,864	9,781	11,130	9,290	16,289	7,520	1,585	3,258	66,717

- Note:
1. Havelock Basin Acreage includes 1,070 acres that are planned to be diverted to the Stevens Creek Basin at some future date.
 2. The Deadman's Trunk acreage includes 280 acres in the Mahoney Golf Course and Park that have been diverted from the Deadman's Trunk.
 3. The Deadman's Trunk acreage includes 120 acres in the University of Nebraska East Campus that have been diverted from the Deadman's Trunk.

Table 8-3. Lincoln Future Wastewater Collection System Acreages Served (50 Year - Tier II) REVISED 12/2003

Basin	Antelope Creek	Beals Slough	Deadmans Trunk	East Campus	Haines Branch	Havelock	Lynn Creek	Little Salt Creek	Middle Creek	Oak Creek	Salt Creek	West "O" Street	West Stevens Creek	West Salt Creek	Total
Existing acreage served	7,199	5,370	5,225	1,585	283	4,471	2,314	1,597	1,456	3,661	4,370	1,042	-	-	38,573
Additional acreage served 50- yrs - Tier II	665	4,411	2,695	-	3,992	-	354	2,678	4,472	2,961	5,900	1,897	19,948	8,539	58,512
Total	7,864	9,781	7,920	1,585	4,275	4,471	2,668	4,275	5,928	6,622	10,270	2,939	19,948	8,539	97,085
Trunk Line	Antelope Creek Trunk	Beals Slough	Deadmans Trunk	East Campus Trunk	Salt Valley Trunk	Deadmans Trunk	Oak Creek Trunk	Little Salt Creek Trunk	Salt Valley Trunk	Oak Creek Trunk	Salt Valley Trunk	Salt Valley Trunk	West Stevens Trunk	Salt Valley Trunk	

	Antelope Creek Trunk	Beals Slough Trunk	Deadmans Trunk	Oak Creek Trunk	Salt Valley Trunk	West Stevens Trunk	East Campus Trunk	Little Salt Creek Trunk	Total
Existing	7,199	5,370	9,696	5,975	7,151	-	1,585	1,597	38,573
Ultimate	7,864	9,781	12,391	9,290	31,951	19,948	1,585	4,275	97,085

Tier 2 acreages served by each trunk line

- Note:
1. Havelock Basin Acreage includes 1,070 acres that are planned to be diverted to the Stevens Creek Basin at some future date.
 2. The Deadman's Trunk acreage includes 280 acres in the Mahoney Golf Course and Park that have been diverted from the Deadman's Trunk.
 3. The Deadman's Trunk acreage includes 120 acres in the University of Nebraska East Campus that have been diverted from the Deadman's Trunk.

NORTHEAST SALT CREEK BASIN SEWER COLLECTION SYSTEM STUDY
 CONSTRUCTION COST ESTIMATE
 LINCOLN, NEBRASKA
 309250

ALTERNATIVE NO. 1
 30-Inch Diameter Interceptor

STATEMENT OF PROBABLE CONSTRUCTION COST

Item No.	Description	Estimated Quantity	Unit Price	Amount
1	Clearing and Grubbing	23 Acre	\$ 1,000	\$ 23,000
2	Connect to Treatment Plant Influent	1 EA	\$ 15,000	\$ 15,000
3	66" Dia. Sanitary Sewer-In-Place	- LF	\$ 600	\$ -
4	54" Dia. Sanitary Sewer-In-Place	- LF	\$ 500	\$ -
5	42" Dia. Sanitary Sewer-In-Place	- LF	\$ 380	\$ -
6	30" Dia. Sanitary Sewer-In-Place	4,850 LF	\$ 240	\$ 1,164,000
7	27" Dia. Sanitary Sewer-In-Place	3,940 LF	\$ 180	\$ 709,200
8	21" Dia. Sanitary Sewer-In-Place	2,900 LF	\$ 190	\$ 551,000
9	18" Dia. Sanitary Sewer-In-Place	- LF	\$ 160	\$ -
10	Siphon Outlet Structure	1 EA	\$ 80,000	\$ 80,000
11	Siphon Inlet Structure	1 EA	\$ 80,000	\$ 80,000
12	Three Barrel Siphon	1 LS	\$ 300,000	\$ 300,000
13	Four Barrel Siphon	- LS	\$ 500,000	\$ -
14	70th Street Crossing	1 EA	\$ 10,000	\$ 10,000
15	56th Street Crossing - Tunneled	150 LF	\$ 400	\$ 60,000
16	66-inch Tee Based Manholes	- EA	\$ -	\$ -
17	54-inch Tee Based Manholes	- EA	\$ 5,000	\$ -
18	96" Diameter MH	- EA	\$ 10,000	\$ -
19	84" Diameter MH	16 EA	\$ 8,000	\$ 128,000
20	72" Diameter MH	6 EA	\$ 7,500	\$ 45,000
21	60" diameter MH	- EA	\$ 7,000	\$ -
22	54" Diameter MH	- EA	\$ 6,000	\$ -
23	Seeding and Mulching	23 Acre	\$ 1,500	\$ 34,500
24	Lift Station	- LS	\$ 200,000	\$ -
25	8-Inch Dia. Force Main and Salt Creek Crossing	- LS	\$ 150,000	\$ -
26		-	\$ -	\$ -
Construction Subtotal				\$ 3,199,700
Mobilization, Bonds and Insurance @ 5%				\$ 160,000
Engineering, Legal, & Administrative @ 15%				\$ 480,000
Construction Contingencies @ 15%				\$ 480,000
TOTAL ESTIMATED PROJECT COSTS				\$ 4,319,700

Note: This cost estimate includes the estimated cost of facilities from the Northeast Wastewater Treatment Plant to the west edge of the proposed Star City Combine / Northbank Junction Development at approximately 49th Street.

NORTHEAST SALT CREEK BASIN SEWER COLLECTION SYSTEM STUDY
 CONSTRUCTION COST ESTIMATE
 LINCOLN, NEBRASKA
 309250

ALTERNATIVE NO. 2
 42-Inch Diameter Interceptor

STATEMENT OF PROBABLE CONSTRUCTION COST

Item. No.	Description	Estimated Quantity	Unit Price	Amount
1	Clearing and Grubbing	23 Acre	\$ 1,000	\$ 23,000
2	Connect to Treatment Plant Influent	1 EA	\$ 15,000	\$ 15,000
3	66" Dia. Sanitary Sewer-In-Place	- LF	\$ 600	\$ -
4	54" Dia. Sanitary Sewer-In-Place	- LF	\$ 500	\$ -
5	42" Dia. Sanitary Sewer-In-Place	11,690 LF	\$ 380	\$ 4,442,200
6	30" Dia. Sanitary Sewer-In-Place	- LF	\$ 240	\$ -
7	27" Dia. Sanitary Sewer-In-Place	- LF	\$ 180	\$ -
8	21" Dia. Sanitary Sewer-In-Place	- LF	\$ 190	\$ -
9	18" Dia. Sanitary Sewer-In-Place	- LF	\$ 160	\$ -
10	Siphon Outlet Structure	1 EA	\$ 80,000	\$ 80,000
11	Siphon Inlet Structure	1 EA	\$ 80,000	\$ 80,000
12	Three Barrel Siphon	1 LS	\$ 350,000	\$ 350,000
13	Four Barrel Siphon	- LS	\$ 500,000	\$ -
14	70th Street Crossing	1 EA	\$ 12,000	\$ 12,000
15	56th Street Crossing - Tunneled	150 LF	\$ 500	\$ 75,000
16	66-inch Tee Based Manholes	- EA	\$ -	\$ -
17	54-inch Tee Based Manholes	- EA	\$ 5,000	\$ -
18	96" Diameter MH	- EA	\$ 10,000	\$ -
19	84" Diameter MH	22 EA	\$ 8,000	\$ 176,000
20	72" Diameter MH	- EA	\$ 7,500	\$ -
21	60" diameter MH	- EA	\$ 7,000	\$ -
22	54" Diameter MH	- EA	\$ 6,000	\$ -
23	Seeding and Mulching	23 Acre	\$ 1,500	\$ 34,500
24	Lift Station	- LS	\$ 200,000	\$ -
25	8-Inch Dia. Force Main and Salt Creek Crossing	- LS	\$ 150,000	\$ -
26		-	\$ -	\$ -
Construction Subtotal				\$ 5,287,700
Mobilization, Bonds and Insurance @ 5%				\$ 264,400
Engineering, Legal, & Administrative @ 15%				\$ 793,200
Construction Contingencies @ 15%				\$ 793,200
TOTAL ESTIMATED PROJECT COSTS				\$ 7,138,500

Note: This cost estimate includes the estimated cost of facilities from the Northeast Wastewater Treatment Plant to the west edge of the proposed Star City Combine / Northbank Junction Development at approximately 49th Street.

NORTHEAST SALT CREEK BASIN SEWER COLLECTION SYSTEM STUDY
 CONSTRUCTION COST ESTIMATE
 LINCOLN, NEBRASKA
 309250

ALTERNATIVE NO. 3
 54-Inch Diameter Interceptor

STATEMENT OF PROBABLE CONSTRUCTION COST

Item No.	Description	Estimated Quantity	Unit Price	Amount
1	Clearing and Grubbing	23 Acre	\$ 1,000	\$ 23,000
2	Connect to Treatment Plant Influent	1 EA	\$ 40,000	\$ 40,000
3	66" Dia. Sanitary Sewer-In-Place	- LF	\$ 600	\$ -
4	54" Dia. Sanitary Sewer-In-Place	11,690 LF	\$ 500	\$ 5,845,000
5	42" Dia. Sanitary Sewer-In-Place	- LF	\$ 380	\$ -
6	30" Dia. Sanitary Sewer-In-Place	- LF	\$ 240	\$ -
7	27" Dia. Sanitary Sewer-In-Place	- LF	\$ 180	\$ -
8	21" Dia. Sanitary Sewer-In-Place	- LF	\$ 190	\$ -
9	18" Dia. Sanitary Sewer-In-Place	- LF	\$ 160	\$ -
10	Siphon Outlet Structure	1 EA	\$ 80,000	\$ 80,000
11	Siphon Inlet Structure	1 EA	\$ 80,000	\$ 80,000
12	Three Barrel Siphon	- LS	\$ 350,000	\$ -
13	Four Barrel Siphon	1 LS	\$ 400,000	\$ 400,000
14	70th Street Crossing	1 EA	\$ 15,000	\$ 15,000
15	56th Street Crossing - Tunneled	150 LF	\$ 600	\$ 90,000
16	66-inch Tee Based Manholes	- EA	\$ 11,000	\$ -
17	54-inch Tee Based Manholes	22 EA	\$ 7,500	\$ 165,000
18	96" Diameter MH	- EA	\$ 10,000	\$ -
19	84" Diameter MH	- EA	\$ 8,000	\$ -
20	72" Diameter MH	- EA	\$ 7,500	\$ -
21	60" diameter MH	- EA	\$ 7,000	\$ -
22	54" Diameter MH	- EA	\$ 6,000	\$ -
23	Seeding and Mulching	23 Acre	\$ 1,500	\$ 34,500
24	Lift Station	- LS	\$ 200,000	\$ -
25	8-Inch Dia. Force Main and Salt Creek Crossing	- LS	\$ 150,000	\$ -
26		-	\$ -	\$ -
Construction Subtotal				\$ 6,772,500
Mobilization, Bonds and Insurance @ 5%				\$ 338,600
Engineering, Legal, & Administrative @ 15%				\$ 1,015,900
Construction Contingencies @ 15%				\$ 1,015,900
TOTAL ESTIMATED PROJECT COSTS				\$ 9,142,900

Note: This cost estimate includes the estimated cost of facilities from the Northeast Wastewater Treatment Plant to the west edge of the proposed Star City Combine / Northbank Junction Development at approximately 49th Street.

NORTHEAST SALT CREEK BASIN SEWER COLLECTION SYSTEM STUDY
 CONSTRUCTION COST ESTIMATE
 LINCOLN, NEBRASKA
 309250

ALTERNATIVE NO. 4
 66-Inch Diameter Interceptor

STATEMENT OF PROBABLE CONSTRUCTION COST

Item No.	Description	Estimated Quantity	Unit Price	Amount
1	Clearing and Grubbing	28 Acre	\$ 1,000	\$ 28,000
2	Connect to Treatment Plant Influent	1 EA	\$ 50,000	\$ 50,000
3	66" Dia. Sanitary Sewer-In-Place	11,690 LF	\$ 600	\$ 7,014,000
4	54" Dia. Sanitary Sewer-In-Place	- LF	\$ 500	\$ -
5	42" Dia. Sanitary Sewer-In-Place	- LF	\$ 380	\$ -
6	30" Dia. Sanitary Sewer-In-Place	- LF	\$ 240	\$ -
7	27" Dia. Sanitary Sewer-In-Place	- LF	\$ 180	\$ -
8	21" Dia. Sanitary Sewer-In-Place	- LF	\$ 190	\$ -
9	18" Dia. Sanitary Sewer-In-Place	- LF	\$ 160	\$ -
10	Siphon Outlet Structure	1 EA	\$ 80,000	\$ 80,000
11	Siphon Inlet Structure	1 EA	\$ 80,000	\$ 80,000
12	Three Barrel Siphon	- LS	\$ 350,000	\$ -
13	Four Barrel Siphon	1 LS	\$ 450,000	\$ 450,000
14	70th Street Crossing	1 EA	\$ 20,000	\$ 20,000
15	56th Street Crossing - Tunneled	150 LF	\$ 700	\$ 105,000
16	66-inch Tee Based Manholes	19 EA	\$ 11,000	\$ 209,000
17	54-inch Tee Based Manholes	- EA	\$ 7,500	\$ -
18	96" Diameter MH	- EA	\$ 10,000	\$ -
19	84" Diameter MH	- EA	\$ 8,000	\$ -
20	72" Diameter MH	- EA	\$ 7,500	\$ -
21	60" diameter MH	- EA	\$ 7,000	\$ -
22	54" Diameter MH	- EA	\$ 6,000	\$ -
23	Seeding and Mulching	28 Acre	\$ 1,500	\$ 42,000
24	Lift Station	- LS	\$ 200,000	\$ -
25	8-Inch Dia. Force Main and Salt Creek Crossing	- LS	\$ 150,000	\$ -
26		-	\$ -	\$ -
Construction Subtotal				\$ 8,078,000
Mobilization, Bonds and Insurance @ 5%				\$ 403,900
Engineering, Legal, & Administrative @ 15%				\$ 1,211,700
Construction Contingencies @ 15%				\$ 1,211,700
TOTAL ESTIMATED PROJECT COSTS				\$ 10,905,300

Note: This cost estimate includes the estimated cost of facilities from the Northeast Wastewater Treatment Plant to the west edge of the proposed Star City Combine / Northbank Junction Development at approximately 49th Street.

NORTHEAST SALT CREEK BASIN SEWER COLLECTION SYSTEM STUDY
 CONSTRUCTION COST ESTIMATE
 LINCOLN, NEBRASKA
 309250

DEVELOPER ALTERNATIVE
 NO. L-1

STATEMENT OF PROBABLE CONSTRUCTION COST

Item No.	Description	Estimated Quantity	Unit Price	Amount
1	Clearing and Grubbing	14 Acre	\$ 1,000	\$ 14,000
2	Connect to Existing 60-Inch Sewer Manhole	1 EA	\$ 10,000	\$ 10,000
3	66" Dia. Sanitary Sewer-In-Place	- LF	\$ 600	\$ -
4	54" Dia. Sanitary Sewer-In-Place	- LF	\$ 500	\$ -
5	42" Dia. Sanitary Sewer-In-Place	- LF	\$ 380	\$ -
6	30" Dia. Sanitary Sewer-In-Place	- LF	\$ 240	\$ -
7	27" Dia. Sanitary Sewer-In-Place	- LF	\$ 180	\$ -
8	21" Dia. Sanitary Sewer-In-Place	- LF	\$ 190	\$ -
9	18" Dia. Sanitary Sewer-In-Place	2,900 LF	\$ 160	\$ 464,000
10	Siphon Outlet Structure	- EA	\$ 80,000	\$ -
11	Siphon Inlet Structure	- EA	\$ 80,000	\$ -
12	Three Barrel Siphon	- LS	\$ 350,000	\$ -
13	Four Barrel Siphon	- LS	\$ 450,000	\$ -
14	70th Street Crossing	- EA	\$ 20,000	\$ -
15	56th Street Crossing - Tunneled	150 LF	\$ 400	\$ 60,000
16	66-inch Tee Based Manholes	- EA	\$ 11,000	\$ -
17	54-inch Tee Based Manholes	- EA	\$ 7,500	\$ -
18	96" Diameter MH	- EA	\$ 10,000	\$ -
19	84" Diameter MH	1 EA	\$ 8,000	\$ 8,000
20	72" Diameter MH	- EA	\$ 7,500	\$ -
21	60" diameter MH	- EA	\$ 7,000	\$ -
22	54" Diameter MH	7 EA	\$ 6,000	\$ 42,000
23	Seeding and Mulching	14 Acre	\$ 1,500	\$ 21,000
24	Lift Station	1 LS	\$ 1,500,000	\$ 1,500,000
25	8-Inch Dia. Force Main and Salt Creek Crossing	1 LS	\$ 300,000	\$ 300,000
26		-	\$ -	\$ -
Construction Subtotal				\$ 2,419,000
Mobilization, Bonds and Insurance @ 5%				\$ 121,000
Engineering, Legal, & Administrative @ 15%				\$ 362,900
Construction Contingencies @ 15%				\$ 362,900
TOTAL ESTIMATED PROJECT COSTS				\$ 3,265,800

NORTHEAST SALT CREEK BASIN SEWER COLLECTION SYSTEM STUDY
 CONSTRUCTION COST ESTIMATE
 LINCOLN, NEBRASKA
 309250

DEVELOPER ALTERNATIVE
 NO. L-2

STATEMENT OF PROBABLE CONSTRUCTION COST

Item No.	Description	Estimated Quantity	Unit Price	Amount
1	Clearing and Grubbing	14 Acre	\$ 1,000	\$ 14,000
2	Connect to Existing 60-Inch Sewer Manhole	1 EA	\$ 10,000	\$ 10,000
3	66" Dia. Sanitary Sewer-In-Place	- LF	\$ 600	\$ -
4	54" Dia. Sanitary Sewer-In-Place	- LF	\$ 500	\$ -
5	42" Dia. Sanitary Sewer-In-Place	- LF	\$ 380	\$ -
6	30" Dia. Sanitary Sewer-In-Place	- LF	\$ 240	\$ -
7	27" Dia. Sanitary Sewer-In-Place	- LF	\$ 180	\$ -
8	21" Dia. Sanitary Sewer-In-Place	- LF	\$ 190	\$ -
9	18" Dia. Sanitary Sewer-In-Place	2,900 LF	\$ 160	\$ 464,000
10	Siphon Outlet Structure	- EA	\$ 80,000	\$ -
11	Siphon Inlet Structure	- EA	\$ 80,000	\$ -
12	Three Barrel Siphon	- LS	\$ 350,000	\$ -
13	Four Barrel Siphon	- LS	\$ 450,000	\$ -
14	70th Street Crossing	- EA	\$ 20,000	\$ -
15	56th Street Crossing - Tunneled	150 LF	\$ 400	\$ 60,000
16	66-inch Tee Based Manholes	- EA	\$ 11,000	\$ -
17	54-inch Tee Based Manholes	- EA	\$ 7,500	\$ -
18	96" Diameter MH	- EA	\$ 10,000	\$ -
19	84" Diameter MH	1 EA	\$ 8,000	\$ 8,000
20	72" Diameter MH	- EA	\$ 7,500	\$ -
21	60" diameter MH	- EA	\$ 7,000	\$ -
22	54" Diameter MH	7 EA	\$ 6,000	\$ 42,000
23	Seeding and Mulching	14 Acre	\$ 1,500	\$ 21,000
24	Lift Station	1 LS	\$ 1,500,000	\$ 1,500,000
25	8-Inch Dia. Force Main and Salt Creek Crossing	1 LS	\$ 300,000	\$ 300,000
26		-	\$ -	\$ -
Construction Subtotal				\$ 2,419,000
Mobilization, Bonds and Insurance @ 5%				\$ 121,000
Engineering, Legal, & Administrative @ 15%				\$ 362,900
Construction Contingencies @ 15%				\$ 362,900
TOTAL ESTIMATED PROJECT COSTS				\$ 3,265,800

NORTHEAST SALT CREEK BASIN SEWER COLLECTION SYSTEM STUDY
 CONSTRUCTION COST ESTIMATE
 LINCOLN, NEBRASKA
 309250

DEVELOPER ALTERNATIVE
 NO. L-3

STATEMENT OF PROBABLE CONSTRUCTION COST

Item No.	Description	Estimated Quantity	Unit Price	Amount
1	Clearing and Grubbing	23 Acre	\$ 1,000	\$ 23,000
2	Connect to Existing 60-Inch Sewer Manhole	1 EA	\$ 10,000	\$ 10,000
3	66" Dia. Sanitary Sewer-In-Place	- LF	\$ 600	\$ -
4	54" Dia. Sanitary Sewer-In-Place	- LF	\$ 500	\$ -
5	42" Dia. Sanitary Sewer-In-Place	- LF	\$ 380	\$ -
6	30" Dia. Sanitary Sewer-In-Place	- LF	\$ 240	\$ -
7	27" Dia. Sanitary Sewer-In-Place	3,940 LF	\$ 180	\$ 709,200
8	21" Dia. Sanitary Sewer-In-Place	- LF	\$ 190	\$ -
9	18" Dia. Sanitary Sewer-In-Place	2,900 LF	\$ 160	\$ 464,000
10	Siphon Outlet Structure	- EA	\$ 80,000	\$ -
11	Siphon Inlet Structure	- EA	\$ 80,000	\$ -
12	Three Barrel Siphon	- LS	\$ 350,000	\$ -
13	Four Barrel Siphon	- LS	\$ 450,000	\$ -
14	70th Street Crossing	1 EA	\$ 10,000	\$ 10,000
15	56th Street Crossing - Tunneled	150 LF	\$ 400	\$ 60,000
16	66-inch Tee Based Manholes	- EA	\$ 11,000	\$ -
17	54-inch Tee Based Manholes	- EA	\$ 7,500	\$ -
18	96" Diameter MH	- EA	\$ 10,000	\$ -
19	84" Diameter MH	5 EA	\$ 8,000	\$ 40,000
20	72" Diameter MH	- EA	\$ 7,500	\$ -
21	60" diameter MH	- EA	\$ 7,000	\$ -
22	54" Diameter MH	7 EA	\$ 6,000	\$ 42,000
23	Seeding and Mulching	23 Acre	\$ 1,500	\$ 34,500
24	Lift Station	1 LS	\$ 1,500,000	\$ 1,500,000
25	8-Inch Dia. Force Main and Salt Creek Crossing	1 LS	\$ 250,000	\$ 250,000
26		-	\$ -	\$ -
Construction Subtotal				\$ 3,142,700
Mobilization, Bonds and Insurance @ 5%				\$ 157,100
Engineering, Legal, & Administrative @ 15%				\$ 471,400
Construction Contingencies @ 15%				\$ 471,400
TOTAL ESTIMATED PROJECT COSTS				\$ 4,242,600

Note: This cost estimate includes the estimated cost of facilities from the Northeast Wastewater Treatment Plant to the west edge of the proposed Star City Combine / Northbank Junction Development at approximately 49th Street.

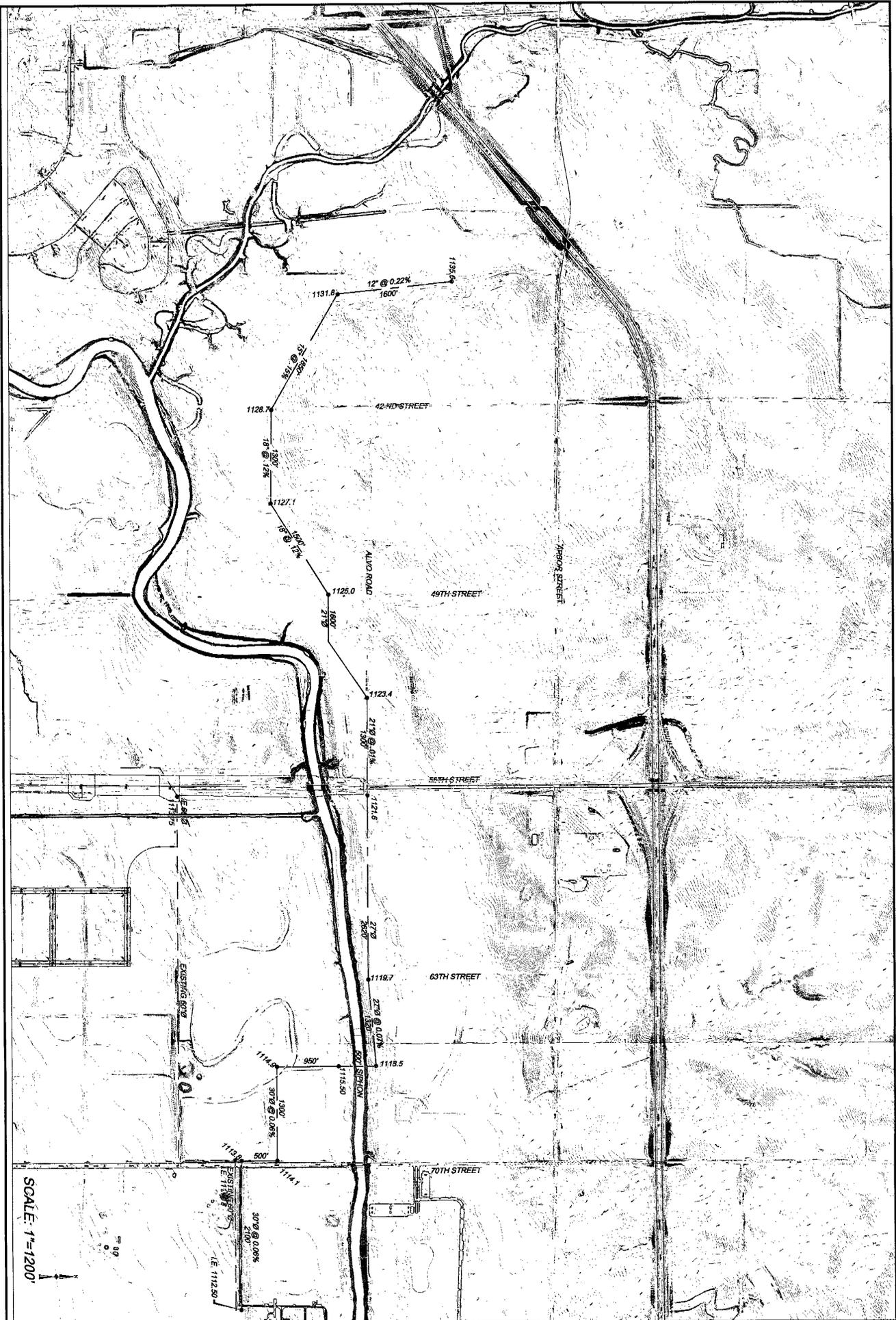
NORTHEAST SALT CREEK BASIN SEWER COLLECTION SYSTEM STUDY
 CONSTRUCTION COST ESTIMATE
 LINCOLN, NEBRASKA
 309250

ALTERNATIVE NO. 1A
 Connection to Existing 60-inch
 at 70th Street

STATEMENT OF PROBABLE CONSTRUCTION COST

Item. No.	Description	Estimated Quantity	Unit Price	Amount
1	Clearing and Grubbing	23 Acre	\$ 1,000	\$ 23,000
2	Connect to 60-Inch Sewer at 70th Street	1 EA	\$ 10,000	\$ 10,000
3	66" Dia. Sanitary Sewer-In-Place	- LF	\$ 600	\$ -
4	54" Dia. Sanitary Sewer-In-Place	- LF	\$ 500	\$ -
5	42" Dia. Sanitary Sewer-In-Place	- LF	\$ 380	\$ -
6	30" Dia. Sanitary Sewer-In-Place	2,800 LF	\$ 240	\$ 672,000
7	27" Dia. Sanitary Sewer-In-Place	3,940 LF	\$ 180	\$ 709,200
8	21" Dia. Sanitary Sewer-In-Place	2,900 LF	\$ 190	\$ 551,000
9	18" Dia. Sanitary Sewer-In-Place	- LF	\$ 160	\$ -
10	Siphon Outlet Structure	1 EA	\$ 80,000	\$ 80,000
11	Siphon Inlet Structure	1 EA	\$ 80,000	\$ 80,000
12	Three Barrel Siphon	1 LS	\$ 300,000	\$ 300,000
13	Four Barrel Siphon	- LS	\$ 500,000	\$ -
14	70th Street Crossing	1 EA	\$ 10,000	\$ 10,000
15	56th Street Crossing - Tunneled	150 LF	\$ 400	\$ 60,000
16	66-inch Tee Based Manholes	- EA	\$ -	\$ -
17	54-inch Tee Based Manholes	- EA	\$ 5,000	\$ -
18	96" Diameter MH	- EA	\$ 10,000	\$ -
19	84" Diameter MH	12 EA	\$ 8,000	\$ 96,000
20	72" Diameter MH	6 EA	\$ 7,500	\$ 45,000
21	60" diameter MH	- EA	\$ 7,000	\$ -
22	54" Diameter MH	- EA	\$ 6,000	\$ -
23	Seeding and Mulching	23 Acre	\$ 1,500	\$ 34,500
24	Lift Station	- LS	\$ -	\$ -
25	10-Inch Dia. Force Main and Salt Creek Crossing	- LF	\$ 60	\$ -
26	Salt Creek Crossing	- LS	\$ -	\$ -
Construction Subtotal				\$ 2,670,700
Mobilization, Bonds and Insurance @ 5%				\$ 133,500
Engineering, Legal, & Administrative @ 15%				\$ 400,600
Construction Contingencies @ 15%				\$ 400,600
TOTAL ESTIMATED PROJECT COSTS				\$ 3,605,400

Note: This cost estimate includes the estimated cost of facilities from the Northeast Wastewater Treatment Plant to the west edge of the proposed Star City Combine / Northbank Junction Development at approximately 49th Street.



SCALE: 1"=1200'

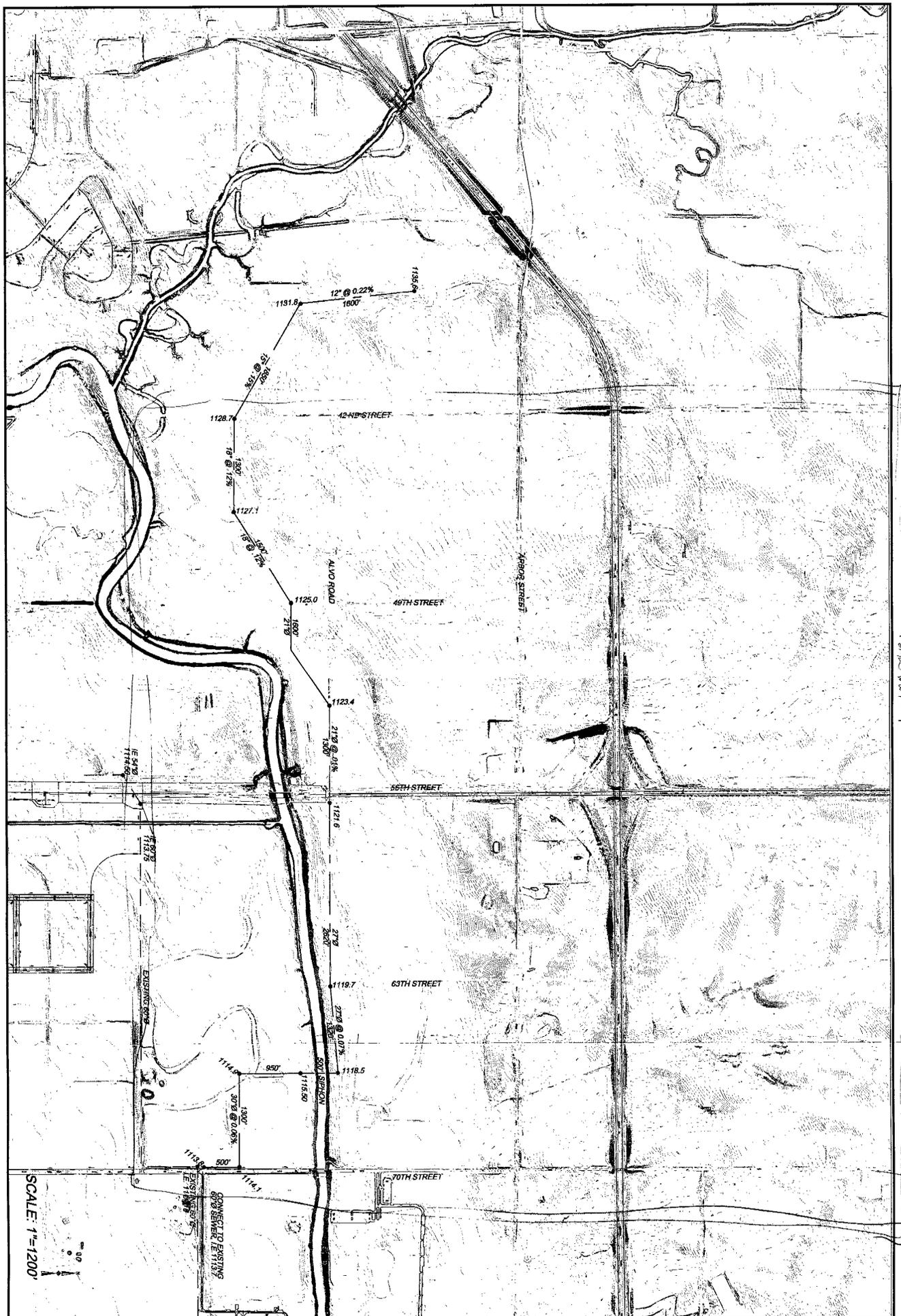
SHEET	1	date	12/03
		designed	RLC
		checked	RLC
		in file	0309250

ALTERNATE ONE
 ZONE N-1 ONLY

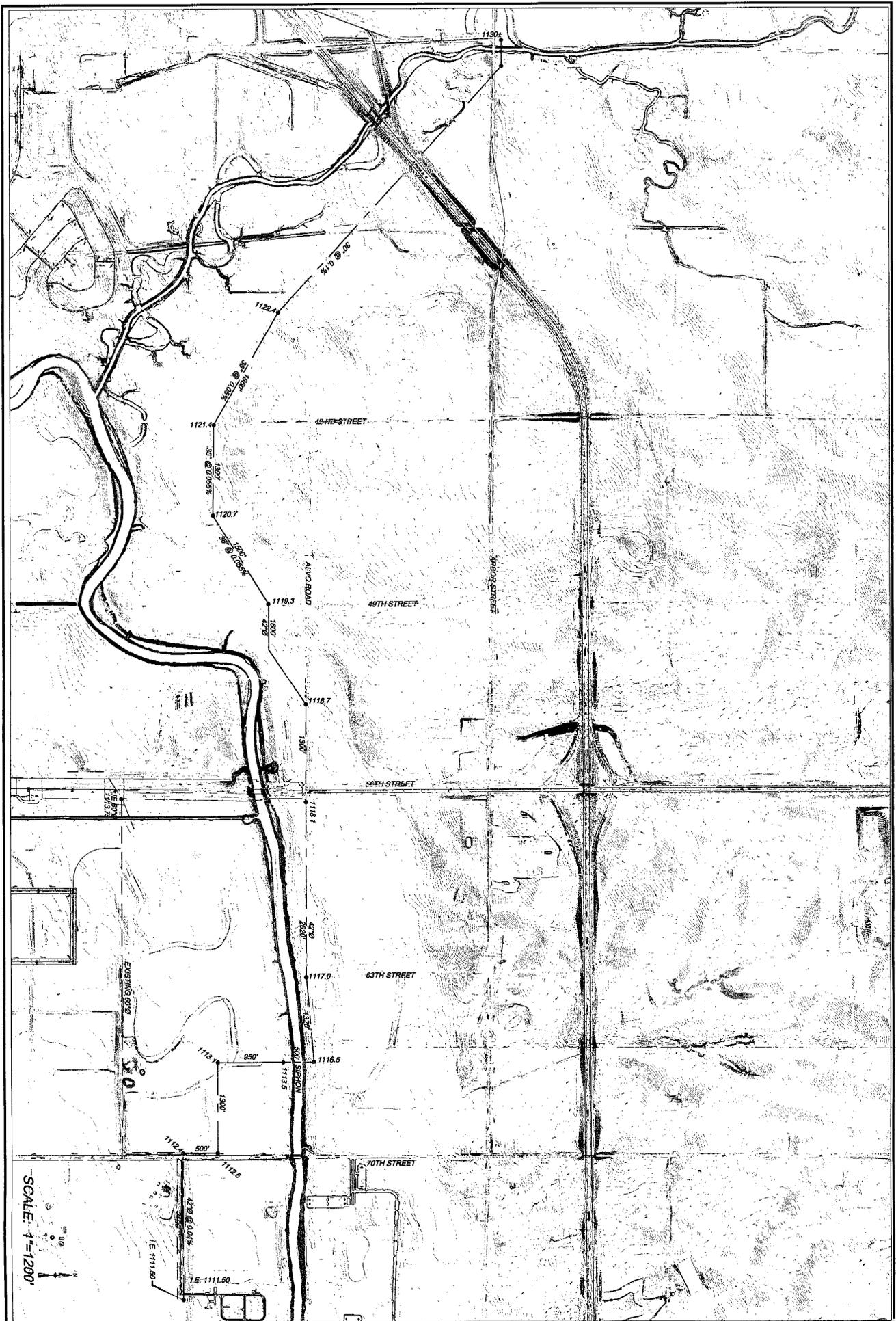
LINCOLN DEADMAN'S RUN
 SEWER STUDY

revisions





15042004



SCALE: 1"=1200'

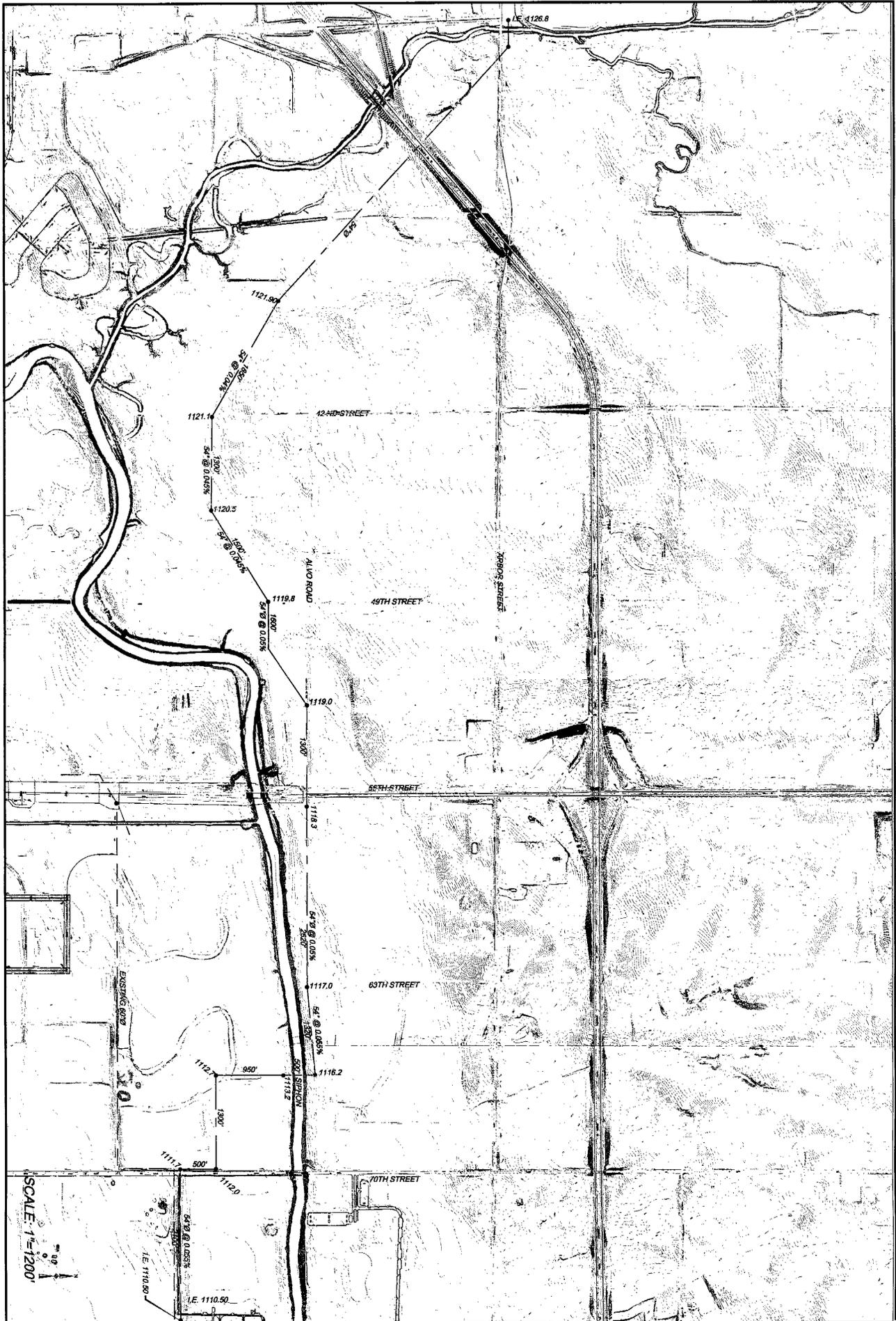
SHEET 2
 date 12/03
 designed RLC
 checked RLC
 in RLC
 0309250

ALTERNATE NO. 2
 ZONE N1 AND 2000 ACRES IN
 IN N2 AND N4

LINCOLN DEADMAN'S RUN
 SEWER STUDY

revisions
 LINCOLN NEBRASKA





SCALE: 1"=1200'

SHEET
3

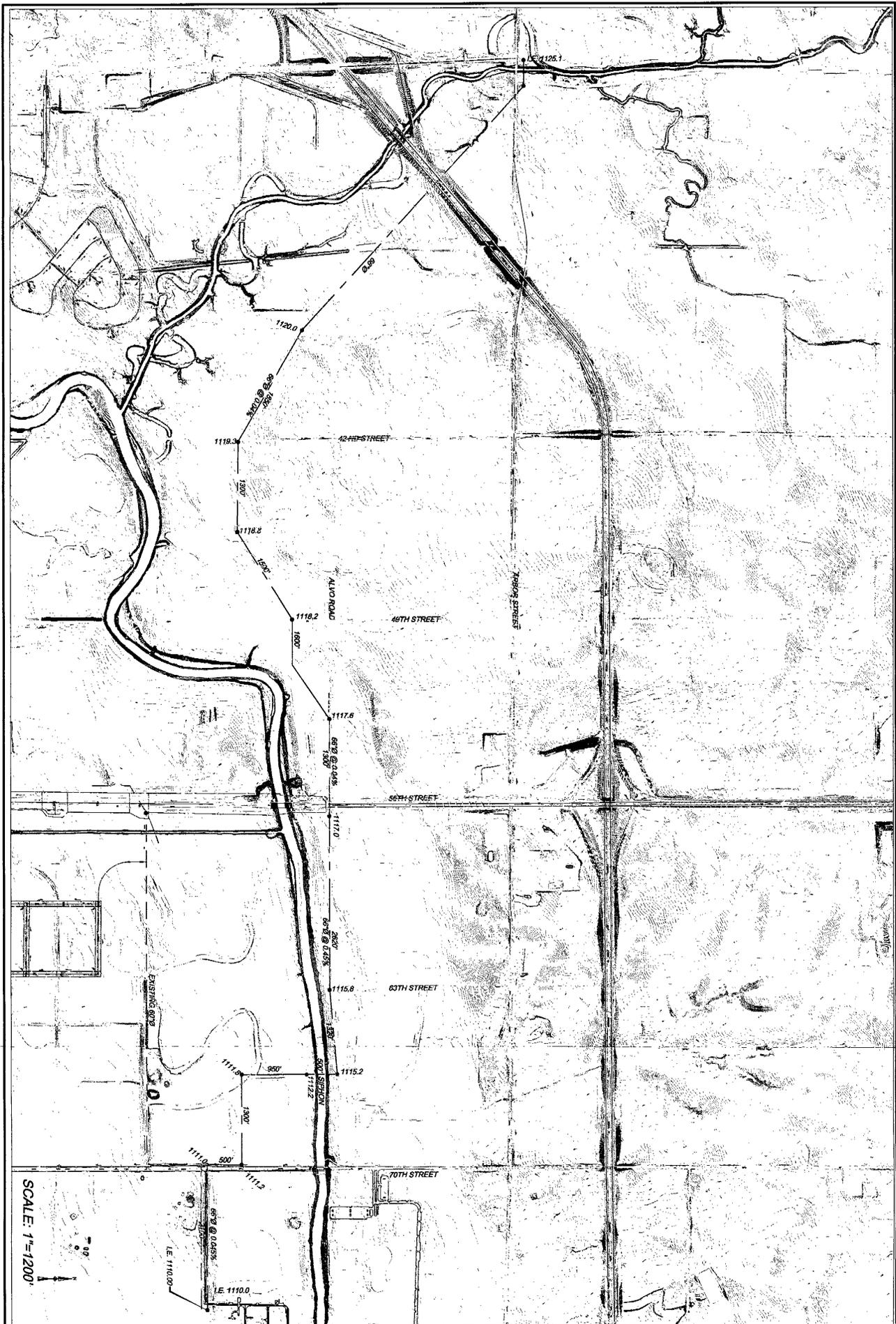
ALTERNATE NO. 3
ZONE N1, N2 AND N4

LINCOLN DEADMAN'S RUN
SEWER STUDY
LINCOLN NEBRASKA

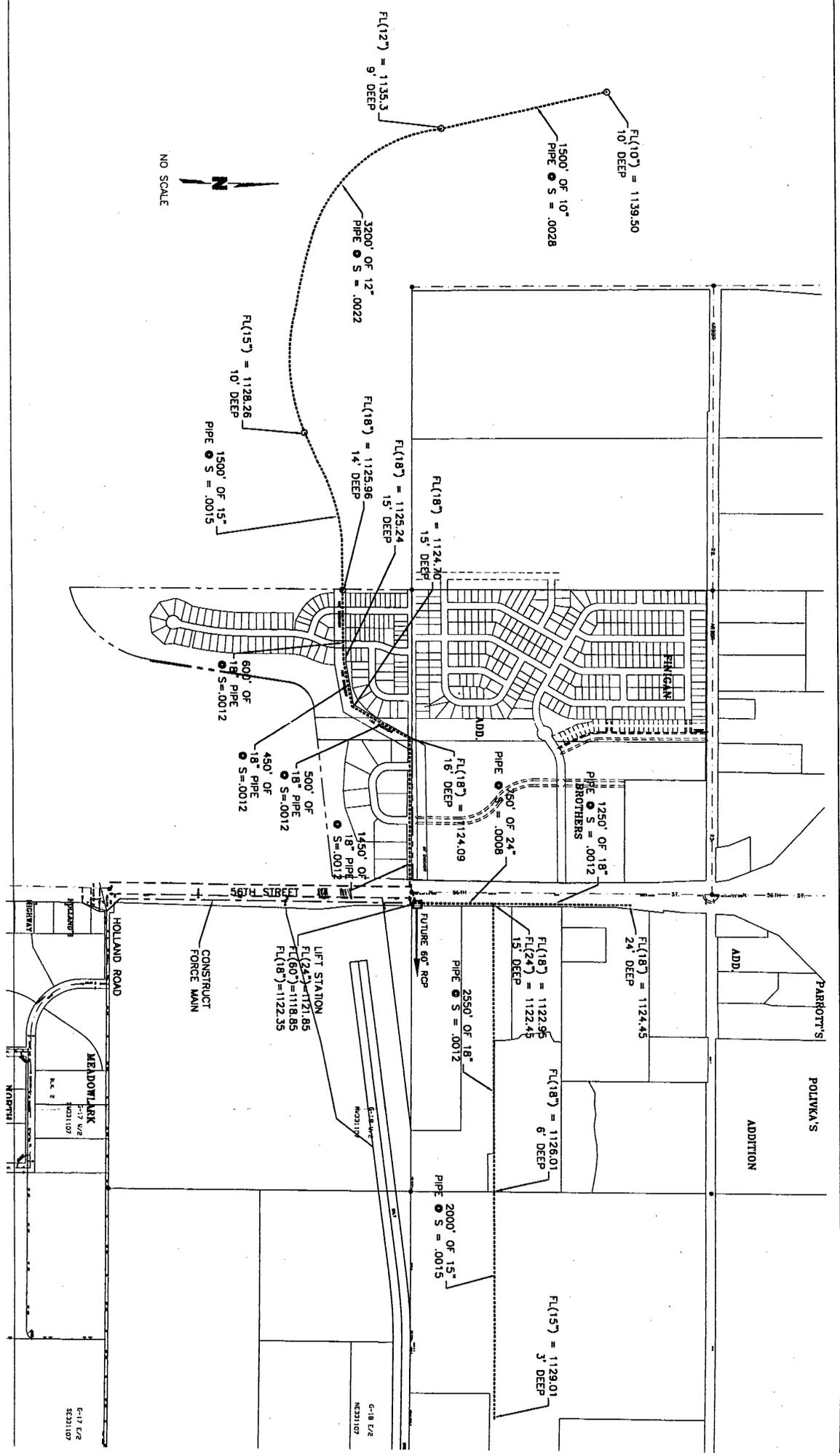
revisions



DATE: 12/03
DRAWN BY: RLC
CHECKED BY: RLC
PROJECT NO: 0309250



STAR CITY COMBINE/NORTHBANK JUNCTION
EXHIBIT "B" - INITIAL SEWER AREA PLAN

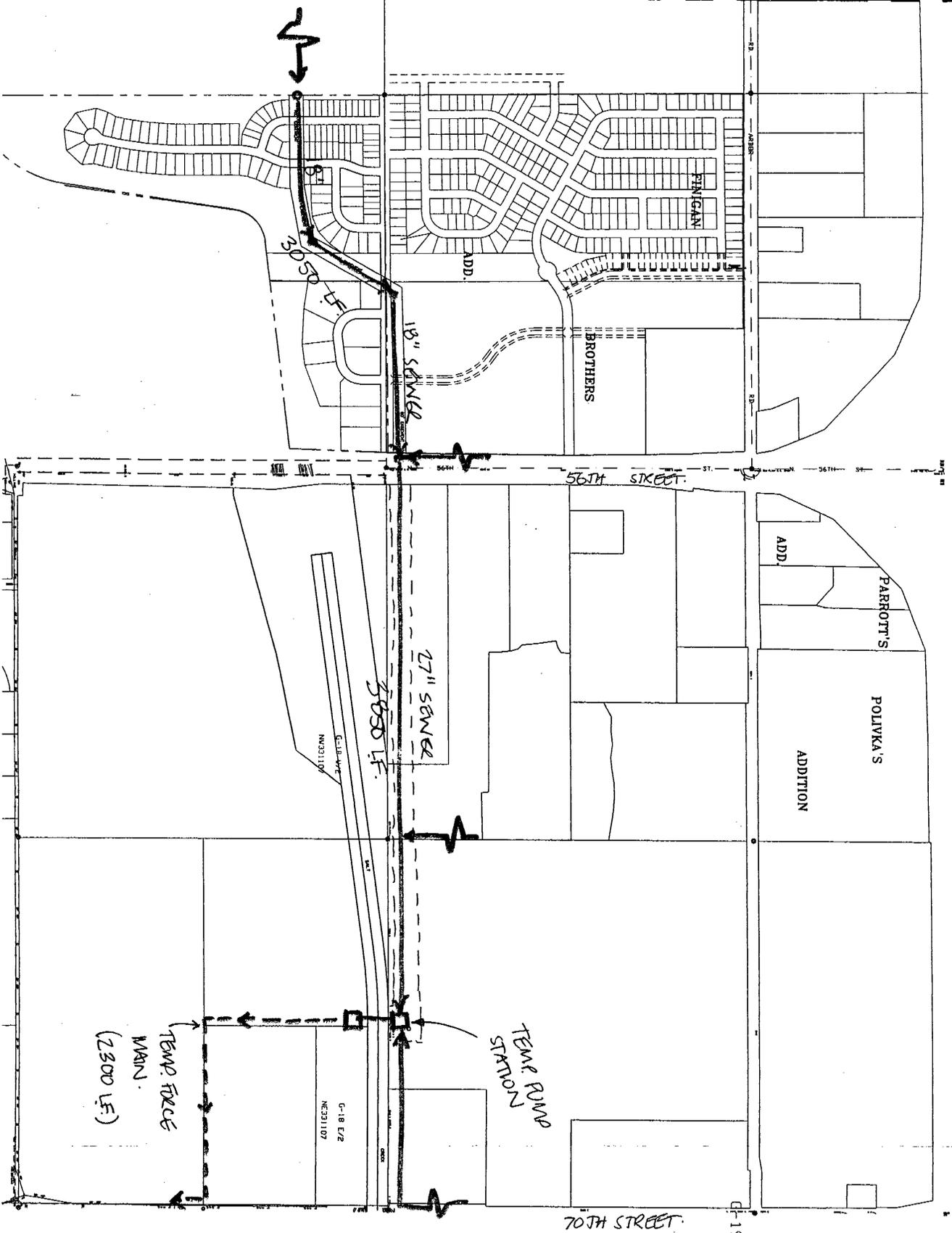


OLSSON ASSOCIATES
CONSULTING ENGINEERS
1111 Lincoln Mall, P.O. Box 84608, Lincoln, NE 68501

DATE: 11/03/03

G-17 E/R
SECTION 107

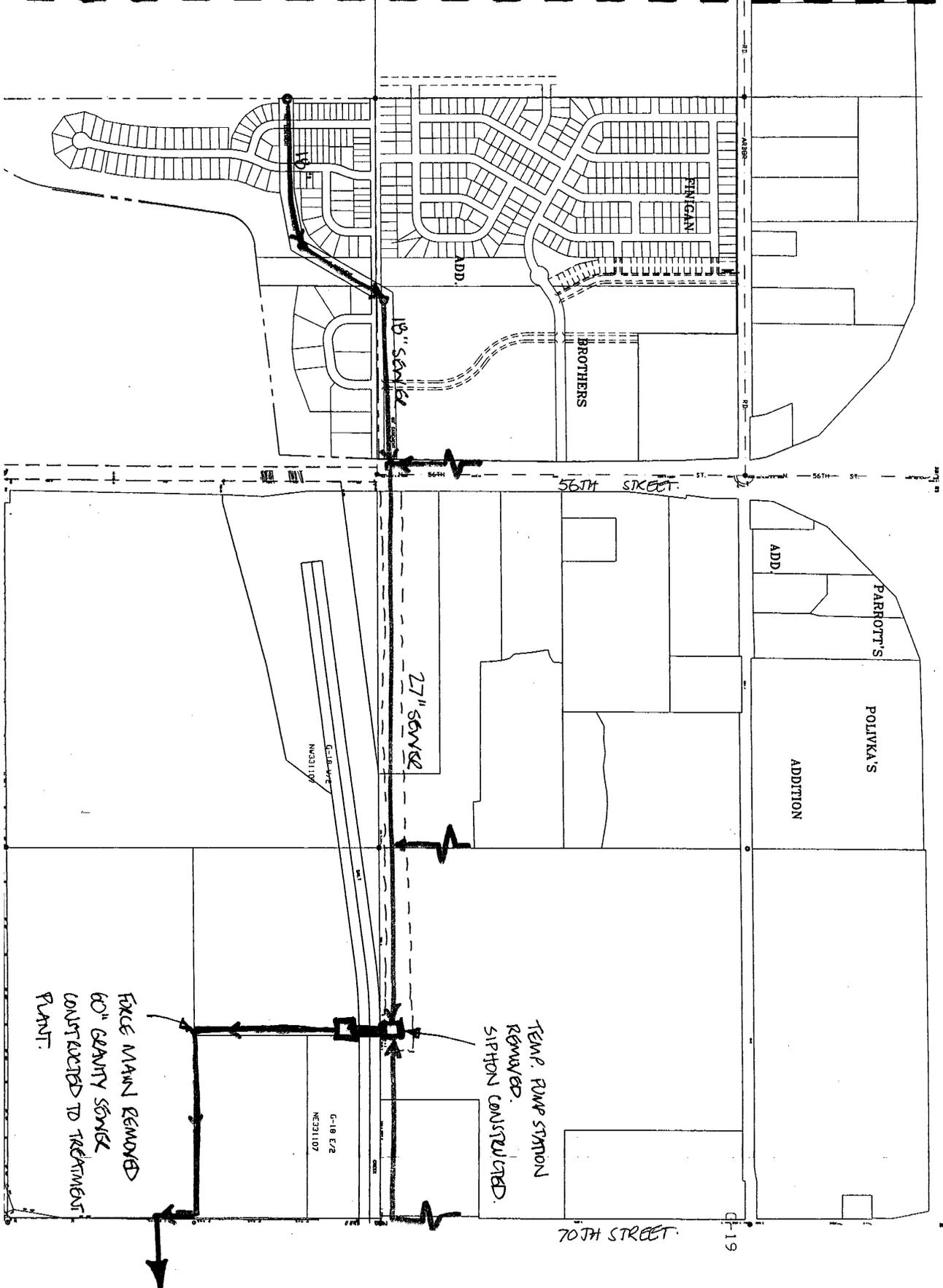
G-18 E/R
SECTION 107



APPROXIMATE COSTS:

TEMP RAMP STATION	\$1.5 M
27" SEWER	\$0.7 M
18" SEWER	\$0.25 M
FORCE MAIN	\$0.25 M
TOTAL	\$2.7 M.

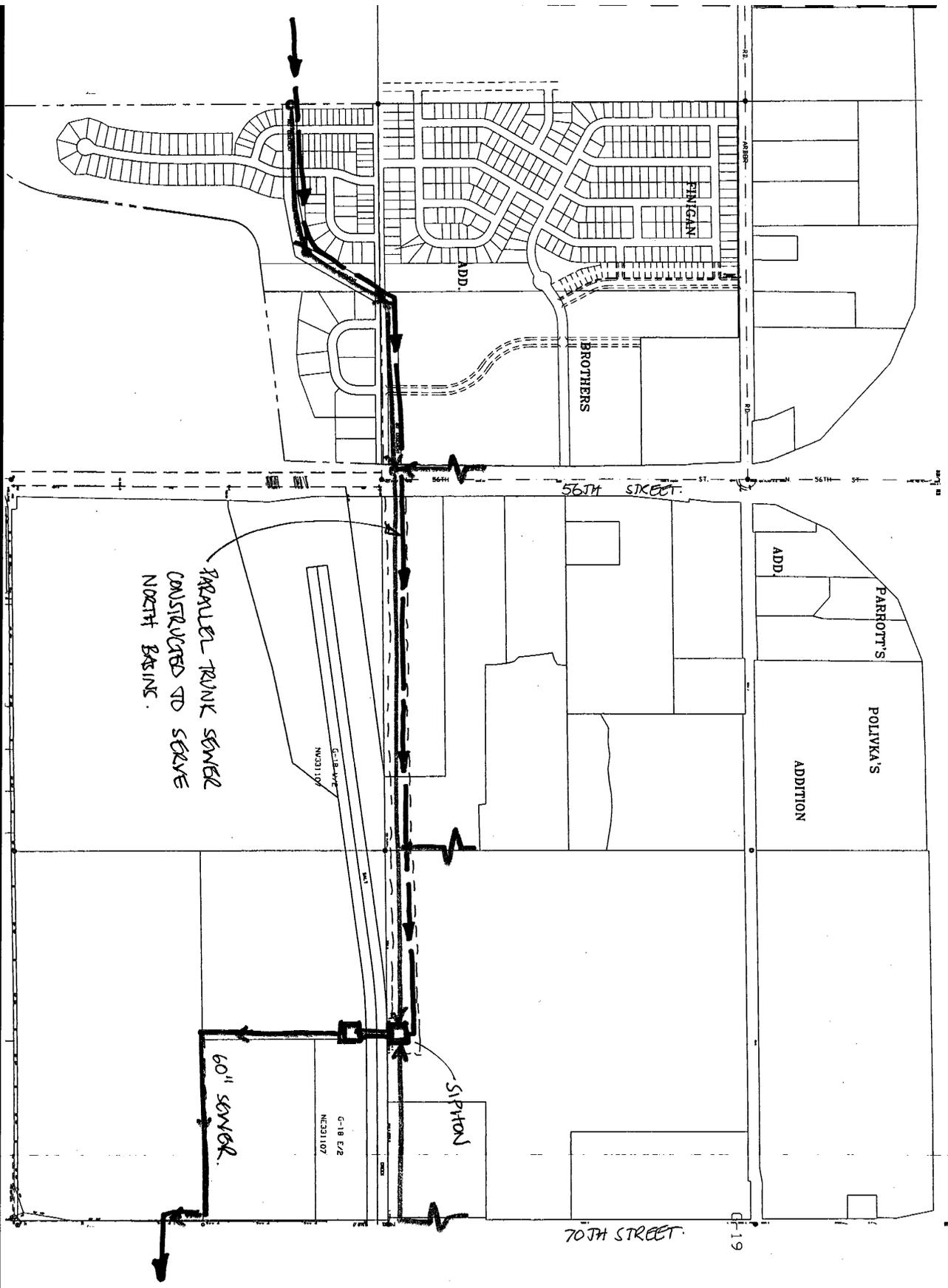
INITIAL
INFRASTRUCTURES.



TEMP. RAMP STATION
 REMOVED.
 SIPHON CONSTRUCTED.

FORCE MAIN REMOVED
 60" CANVY SEWER
 CONSTRUCTED TO TREATMENT
 PLANT.

PHASE 1
 IMPROVEMENTS



ULTIMATE IMPROVEMENTS