SECTION 4

SANITARY SEWERAGE AND TREATMENT SYSTEM

4.1 INTRODUCTION

This section of the report reviews the existing sanitary sewerage system and its capabilities and outlines the requirements for expansion of the system in order to serve the areas within the Study Area as outlined in Section 2.

4.2 SEWAGE TREATMENT

4.2.1 General

Sewage Treatment Facilities to serve the expansion of Edson to the forecasted population level of 25,000 people must be evaluated to ensure that proper planning of the system is undertaken.

4.2.2 Design Criteria

4.2.2.1 Flows

The planned development of any wastewater treatment facility or collection system requires an understanding of the wastewater flows to be treated.

Although the development of flows is essential for proper planning, the effect of either an under estimation or over estimation will not significantly affect the validity of the overall recommendations as set out in this report, but it will affect the staging of the expansion.

Available flow data has been evaluated but there is insufficient to determine trends in future flows. There are however, excellent water records which have been evaluated in Section 3 of this report. The available 1981 sewage flow data, when compared to the corresponding water consumption records indicates the two flows follow similar trends.

Based on this data and our experience in other communities we have assumed that future composite sewage flows will be equivalent to future composite water consumption. In addition to the composite sewage flow, infiltration of groundwater into the sewer system must be accounted for. Based on available flow data, the infiltration rate was considered to be 20 percent of the flow rate. This is a valid approach in macro-scale planning because the length of the sewer is related to the area served which in turn is related to population, so estimating inflow and infiltration as a fraction of population generated average flow is logical. Based on this criteria, the future overall average per capita contribution will be 540 lpcd.

On the basis of the population per capita sewage contribution, the estimated sewage flows are shown in Table 4.1.

TABLE 4.1

WASTEWATER FLOW PROJECTIONS
AVERAGE DAILY SEWAGE FLOW

Population	Flow (Composite & Infiltration) (m^3/d)
7,000	3,780
8,100	4,400
9,200	5,000
11,500	6,250
Ultimate Development 25,000	13,620

4.2.2.2 Wastewater Quality

Based on the data supplied by the Town of Edson to Alberta Environment the wastewater can be classified as typical "domestic" sewage having an average 5-day Biochemical Oxygen Demand (BOD_5) of 213 mg/l and a Suspended Solids (SS) concentration of 227 mg/l (refer to Table 4.2). It must be noted that sewage treatment standards can change with time and therefore prior to any expansion of the treatment facilities a consultation with Alberta Environment must be undertaken. The treatment expansions as discussed in this report are based 1981 treatment standards with a final effluent average concentration of 25 mg/l of BOD_5 and 25 mg/l of S.S.

TABLE 4.2

RAW WASTEWATER CHARACTERISTICS

	BOD_5 (mg/l)	SS Nitrogen (mg/l)
1980 - October	182	201
- November	188	257
- December	171	235
1981 - January	191	199
- February	282	219
- March	266	245
- April	206	275
- May	215	219
- June	165	235
- July	204	287
- August	271	261
- September	215	247
Mean	213	227
Std. Deviation	39.6	36.1

4.2.3 Existing Wastewater Treatment Facility

The existing treatment process is a aerated lagoon system comprised of anerobic lagoons, aerated lagoons, a settlement pond and an outfall line.

The sewage treatment facilities are located immediately east of the Town of Edson, (refer to Figure 4.1) adjacent to the proposed expansion area. The existing facilities are designed for an average flow of 4,860 m^3/d (1.07 MIGD). At design flow the the lagoon cells have detention times as shown in Table 4.3:

TABLE 4.3

EXISTING SEWAGE TREATMENT FACILITY DETENTION TIMES

Item	Cell Volume		Detention Time at Design Flow of 4,860 m^3/d
4-Cells anaerobic	5832 m^3/cell		1.2 days each
Aerated Cell No. 1	46.2 Ml	46200 m^3 4812.5	9.5 days
Aerated Cell No. 2	82.6 Ml	82600 m^3 4858.2	17.0 days
Settlement Pond	131.2 Ml	131,200 m^3 4859.2	27.0 days

4.2.4 Future Wastewater Treatment Facilities

To treat sewage flows for the ultimate design population several applicable treatment processes are available. They are listed below:

1) Aerated Lagoons
2) Conventional activated sludge
3) High-rate activated sludge
4) Extended aeration
5) Contact Stabilization
6) Rotating biological contactor (RBC)

Stanley Associates Engineering Ltd.
Mayfield Business Centre
10512 - 169 Street
Edmonton, Alberta T5P 3X6
Telephone (403) 483-4777 Telex 037 414 32

15 April 1982
File: 52-661-95-2-1

Nobbs Enterprises Ltd.
#214 - 4104A - 97 Street
Edmonton, Alberta
T6E 5Y6

Attention: Mr. R. Nobbs

Dear Sir:

Reference: Edson - General Engineering Study - Addendum

Attached please find our summary of additional costs, over those outlined in the General Engineering Study, to expand and serve the proposed new western development area 14.

The cost for stormwater control facilities is not yet available.

If you have any further questions please feel free to contact the undersigned.

Yours truly,

STANLEY ASSOCIATES ENGINEERING LTD.

G.D. McRae, P.Eng.
Project Manager

GDM/dac

c.c. Town of Edson

WATER SYSTEM

1. From the assumed source of supply at the Glenwood Reservoir to the Edson Drive Booster Station, an additional $744,000 in watermains would be required

2. From the Edson Drive Booster Station to the new proposed reservoir at the Microwave Tower Site, and additional $528,000 in watermains would be required.

3. From the new reservoir at the microwave tower site to the west edge of development area 11 an additional $532,000 in watermains is required.

4. The major trunk mains only, needed to serve the western expansion area are estimated to cost approximately $5,445,000.

5. The Edson Drive Booster Station will need expansion at an additional cost of $250,000.

6. An additional reservoir is required at the microwave tower site at a cost of $845,000.

7. A new booster station is required to serve the west end of the new western areas estimated at $325,000.

SANITARY SEWER

1. New trunk sewers needed to serve the western area are estimated at $2,603,000.

2. Additional costs to expand the size of the new south trunk sewer is estimated at $1,215,000.

Stanley Associates Engineering Ltd.
Mayfield Business Centre
10512 - 169 Street
Edmonton, Alberta T5P 3X6
Telephone (403) 483-4777 Telex 037 414 32

15 March 1982
File: 52-661-95-1-1

Nobbs Enterprises
214 - 4104A - 97 Street
Edmonton, Alberta
T6E 5Y6

Attention: R. Nobbs

Dear Sir:

Reference: Edson - General Engineering Study

As per our previous discussions please find the following additional cost data related to our study.

Glenwood Roads

In order to install asphalt, curb, gutter and sidewalk on the streets of Glenwood as shown on the attached plan it would cost $1,463,000 based on November 1981 costs.

Associated with the road work, an underground storm sewer system should also be installed to replace the current system of surface drainage and ditches. The storm sewer system is estimated at $1,372,000.

Water Booster Station (Operating Costs)

Annual Power costs are estimated at $10,756 at current rates. Annual Labour costs are estimated at $5,000 at current rates. Pumps should be budgetted for replacement every ten years at a cost of $30,000 at current rates.

North Sanitary Trunk

Table 4.7 on page 4.17 of the Draft Report outlines the costs of the two sanitary sewer trunk systems. If the north gravity trunk sewer were sized larger as in the "Combined Alternate" and then in later stages the south gravity trunk sewer was installed as per the Gravity Alternate, the cost of the Gravity System Alternate would increase in cost by approximately $206,000 to $4,979,000.

Stanley

Mr. R. Nobbs
Nobbs Enterprises

15 March 1982
File: 52-661-95-1-1

Sewage Treatment Phasing

We examined the layout of the aerated lagoon system proposed for Edson in the draft report and it appears that the most convenient phasing of the project would be to split the proposed expansion in half. Much of facilities needed to serve the 25,000 population level would still be required to serve the intermediate 17,000 population level. The estimated cost of the intermediate expansion is $2,844,000. The final stage of expansion to the 25,000 population level would involve increasing the areation system, providing additional blowers and some miscellaneous piping. Estimates are based on November 1981 dollars.

We trust this additional data will assist you in your analysis.

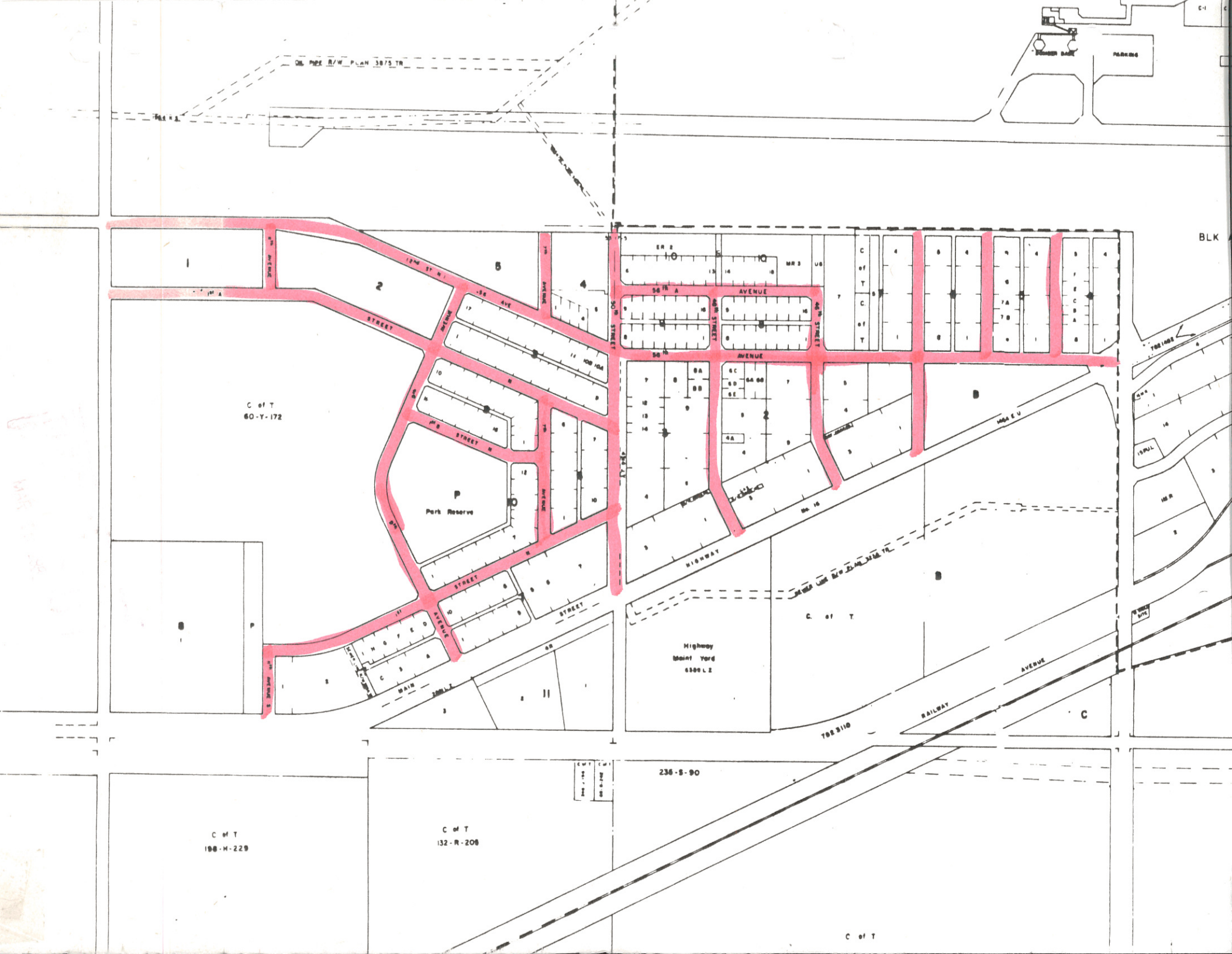
Yours truly,

STANLEY ASSOCIATES ENGINEERING LTD.

G.D. McRae, P.Eng.
Project Manager

GDM/dac

c.c. Town of Edson


OIL PIPE R/W PLAN 3875 TR
BLK A
C of T
60-Y-172
Park Reserve
Highway
Maint Yard
6589 L Z
HIGHWAY
RAILWAY
AVENUE
STREET
MAIN
238-S-90
C of T
198-H-229
C of T
132-R-208
C of T

A cursory analysis of these processes was carried out and based on present day effluent quality criteria the process best suited for the ultimate population is the areated lagoons. The reasons are listed below;

- the capital cost is less than any of the other alternatives
- it has the least annual operating and maintenance cost.
- the land is available for this process for the ultimate population
- the aerated process is an expansion of the existing process with which the operating personnel are familar.

Expansion of this aerated lagoon system would be accomodated within the existing treatment site (refer to Figure 4.2). Since the existing facility is capable of handling 4,860 m^3/day, this expansion would have to be sized for the remaining 8,760 m^3/day in order to treat the ultimate capacity of 13,620 m^3/day. The ultimate system would be developed by stages. For example, the anaerobic pond capacity can be extended initially by operating two cells in series with two parallel trains. This would extend the design life of the anaerobic ponds to 9,720 m^3/d. The other units could be similarly staged.

The additional components needed for the sewage treatment facility to handle the additional design flow of 8,760 m^3/day, would be as shown in Table 4.4. The detention times in the anaerobic and aerated cells are equivalent to those in the existing system. Additional settling pond capacity has not been provided, so that at the design ultimate flow, the detention time in the existing settling cell will be reduced to approximately 10 days. This is considered adequate but approval from Alberta Environment will be necessary and they may require some additional capacity.

TOWN OF EDSON
General Engineering Study
1982

NORTH

0 250 500 1000 m

Dump

Radio Tower 100'

Radio Tower 170'

Oil Tanks

Oil Wells

Pipeline

Sawmill

3100

2921

2900

40

39

R

STUDY AREA BOUNDARY

Microwave Tower 200'

Control Valve

Tank

Trailer Park

3050

3000

2955

EXISTING SEWAGE LAGOONS

OUTFALL SEWER LINE

RIVER

38

Water Tank

Edson

Campsite

CANADIAN

Hospital

Radio 200'

16

Oil Tanks

Oil Wells

2850

Golf Course

37

Edson Airfield

Trailer Park

Motel

McLEOD

2900

Lumber Yard

36

Oil Wells

Dump

Stanley
STANLEY ASSOCIATES ENGINEERING LTD.

Figure 4.1

SEWAGE TREATMENT LOCATION PLAN

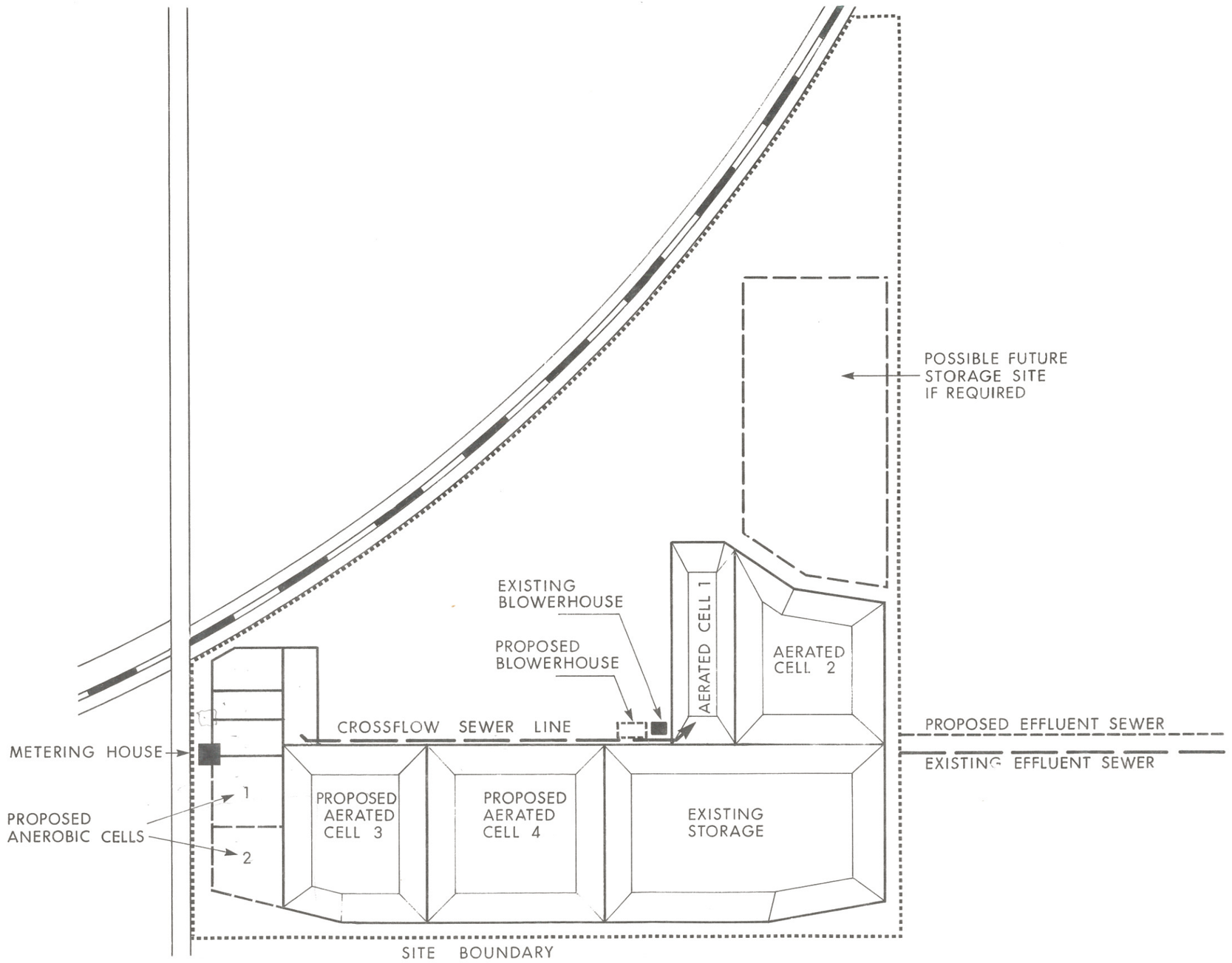


Figure 4.2
SEWAGE TREATMENT
SITE PLAN

TABLE 4.4

FUTURE SEWAGE TREATMENT FACILITY DETENTION TIMES

Item	Detention Time
2-anaerobic Cells	1.5 days each
Aerated Cell No. 3	10 days
Aerated Cell No. 4	15 days

A drawback in this system is that it will be located adjacent to the future industrial area, however, during the planning of this area a buffer zone should be identified to limit encroachment around the lagoons.

Expansion of the treatment facilities will not be required for a few years, and then a detailed design report must be done to ensure that Alberta Environment requirements at that time are met.

4.2.5 Cost Estimates

An order of magnitude cost estimate was prepared using 1981 dollars, for the additions to the sewage treatment system. This is shown in Table 4.5.

TABLE 4.5

ESTIMATED COSTS FOR SEWAGE TREATMENT FACILITY EXPANSION

i)	anaerobic lagoons (2 cells)		120,000
ii)	aerated lagoons (2 cells)		2,000,000
iii)	Blower house		600,000
iv)	metering house		100,000
v)	effluent line		600,000
		Sub Total	$3,420,000
	30% Eng. and Cont.		1,026,000
		Total	$4,446,000

These expenditures will probably be made in stages and it is beyond the scope of this Study to identify the staging.

4.3 COLLECTION SYSTEM

4.3.1 Design Criteria

4.3.1.1 Flows

The ultimate average flows used in evaluation of the existing line sizes and the sizing of the proposed sewer trunk lines are as follows:

1. Residential

Population Density	- 40 persons/hectare (16 persons/arce)
Average Sewage Flow	- 450 litres/capita/day
Peak Sewage Flow	- $1 + \frac{14}{4 + P}$ x Average Sewage Flow
	where P is the square root of the population in thousands
Infiltration	- 5,600 litres/hectare/day

2. Commercial

Average Sewage Flow	- 13,500 litres/hectare/day
Peak Flow	- 3.0 x Average Sewage Flow
Infiltration	- 5,600 litres/hectare/day

3. Light Industrial

Average Sewage Flow	- 6,750 litres/hectare/day
Peak Flow	- 3.0 Average Sewage Flow
Infiltration	- 5,600 litres/hectare/day

The flows from each area are based on the current and projected land uses as shown on Figure 2.3.

4.3.1.2 Peaking Factor

The peaking factor applied to the average day sewage flows in order to estimate the peak flows in the previous section is based on the Harmon Formula:

$$P.F. = 1 + \frac{14}{4 + P^*}$$

where P* is the square root of the population in thousands.

The peaking factor is only applied to the sewage flows and not to the infiltration flows.

4.4.1.3 Pipe Sizing

Pipe capacities have been determined using Mannings Formula with a roughness coefficient of n = 0.013. Velocities of flow are maintained above a minimum of 0.6 m/sec to provide self cleansing action within the mains.

4.3.2 Existing System

Existing trunk mains run south through Edson and east from Glenwood as shown on Figure 4.3 and feed into the two major trunk mains which flow east on First and Second Avenues. These existing trunks were analyzed for their hydraulic capacity and the problem areas defined.

The spare capacities associated with the existing flows in the various trunk mains are listed in Table 4.6. These figures are based on complete infilling of the areas being currently served. Where the trunk mains will ultimately be loaded above their capacities, upgrading will be required. It is not recommended that flows from future

development areas be connected into the existing system as the unused capacity at ultimate flows is generally small.

The potential problem areas in the existing system are the trunk mains on 56 Street, on 1 Avenue, and in the Outfall Sewer.

The portion of 250 mm main on 56 Street south of 10 Avenue creates a bottleneck. This problem can be corrected by upgrading that section to 300 mm size.

The First Avenue trunk main has been overloaded by the redirection of flows down 52 Street from the 2nd Avenue trunk main, which itself was initially overloaded. Correction of this problem can ultimately be accomplished by redirecting flows from either the trunk main on 56 Street or from Glenwood into one of the future trunk mains or by diverting a portion of the 48 Street trunk main flow into the 2nd Avenue trunk. Diversion of the flows either from 56 Street or Glenwood into a future trunk main would, however, be preferred as it would relieve the overloading of both the First Avenue trunk main and the Outfall Sewer.

Diversion of the 48 Street flows can be accomplished by plugging the main at the manhole on 2nd Avenue. An overflow from the manhole connecting to a main draining to the First Avenue trunk would also be required to aid in the handling of peak flows. This modification will reduce both the unused capacity in the 2nd Avenue trunk and the overloading of the First Avenue trunk.

Overloading of the outfall sewer in the future can be corrected by diverting a portion of the flows into one of the future trunk mains. This could be accomplished by diverting the flows coming from either 56 Street or Glenwood. Diversion of the 56 Street flows would reduce the peak flow in the outfall sewer by 55 l/sec while diverting the Glenwood flows would reduce the peak by 61 l/sec.

Interim Use by Proposed Developments

At present, the per capita sewage flow rate has not reached the ultimate design flow rate and complete infiling is not yet complete. Spare capacity is therefore available

TOWN OF EDSON
General Engineering Study
1982

Legend:

- Study Area
- Existing Town Boundary
- Existing Mains

Figure 4.3
EXISTING SANITARY SEWER MAINS

Stanley
STANLEY ASSOCIATES ENGINEERING LTD.

in the trunk mains until such time as the flow rate increases. This temporary spare capacity can be used by selected new developments on an interim basis before new trunk mains are required around the existing system. Specific details of interim usages will be further discussed in Section 4.3.3.

TABLE 4.6

EXISTING TRUNK MAIN CAPACITIES

Location	Peak flows at Full Development *l/sec	Excess Capacity l/sec
41 Street to 2nd Avenue	6	19
42 Street to 2nd Avenue	27	22
48 Street to 1st Avenue	39	3
50 Street to 2nd Avenue	13	14
52 Street to 1st Avenue	42	0
56 Street to 1st Avenue	64	(11)
Glenwood to 54 Street	61	0
2nd Avenue	56	27
1st Avenue	156	(35)
Outfall Sewer	221	(37)

* Peak flows include infilling of presently undeveloped sites within the area being served by the particular trunk main.

( ) Indicates amount of overloading.

4.3.3 Future System

4.3.3.1 Development Areas

The proposed land use of the future development areas looked at for this report are those which have been identified by Makale and Kyllo Planning Associates in their General Plan Update of 1982. No development is projected for the area on the south side of the C.N. tracks with the exception of the east end where 40 ha, between the tracks and the highway, have been allocated for industrial usage.

Two alternative servicing schemes were investigated. They consist of a total gravity system and a combined forcemain and gravity system as shown on Figures 4.4 and 4.5 respectively.

4.3.3.2 Gravity System Alternative

Two major trunks are required for this system. The first trunk main will extend from Development Area 10, running east across the north edge of town collecting flows from each Development Area as it passes and transports the sewage to the treatment facility. The other trunk main collects the flows from Development Areas 11, 9 and 8a, transmitting them south along 56 and 54 Streets and across the tracks to where flows from Glenwood are picked up. Flows are then transported east along the southern boundary of the CNR property, through Industrial Development Area 1 and then to the treatment facility.

Glenwood

The existing sanitary lines from Glenwood will be utilized to their capacity once infilling is complete. A new trunk main is therefore required to service Development Areas 12 and 13 which will tie into the proposed new trunk running down 54 Street.

In order to service both these areas entirely by gravity, the trunk main must be run south across the tracks and then east along the south boundary of the CNR property to connect at 54 Street.

Development Area 8a

To avoid unnecessarily deep sewer lines leading from this area, flows should be discharged down 56 Street to tie into the proposed new trunk main at 9th Avenue. The existing 200 dia pipe running down 56 Street to 10th Avenue has spare capacity and can be used to convey this flow. The portion of line between 10th Avenue and 9th Avenue, however, must be upgraded to a 300 diameter size from its existing 250 diameter. In addition to accommodating the flows, from Area 8a this upgrading is required to accommodate overloading of the existing trunk main which will occur when infilling of the existing serviced areas is complete.

Diversion of the 56 Street flows into the proposed new trunk main at 9th Avenue will eliminate the need for the upgrading of the 250 mm dia pipe to 300 mm dia, as recommended in Section 4.3.2, south of 9th Avenue. Overloading of the First Avenue trunk and the outfall may also be eliminated in this manner.

Development Area 2a

As Area 2a is located below the approximate geodetic contour of 902.5, it will be difficult to service by gravity by the new trunk main. The flows from this area, however, are expected to be low and therefore could be connected into the existing Outfall Sewer.

Development Area 6 - Block Y

Ultimately, the flows from the south half of Block Y can be directed through the 42 Street main into the Outfall Sewer while the flows from the north half should be directed into the new trunk main running across the northern side of the town.

As development of this area is proposed for the near future, an interim connection to the existing system will be required. Spare capacity is available in the 42 Street trunk for the total flows from Block Y and the Outfall Sewer will have sufficient capacity at ultimate development if the 56 Street flows are diverted into the new trunk main.

TOWN OF EDSON
General Engineering Study
1982

NORTH

0 500 750 1000 m

GRANDE PRAIRIE TRAIL

GLENWOOD

HIGHWAY No. 748

HIGHWAY No. 16

HIGHWAY No. 1

RUNWAY

STATION GROUNDS

C.N.R.

SEWAGE TREATMENT FACILITY SITE

block Y

Legend:

- Study Area
- Existing Town Boundary
- Gravity System
- Future Residential
- Future Industrial
- Area Number (8a)

Figure 4.4

ULTIMATE SANITARY SEWER COLLECTION SYSTEM - GRAVITY ALTERNATE

Stanley
STANLEY ASSOCIATES ENGINEERING LTD.

Development Area 9

As development of Area 9 is also proposed for the near future, an interim connection to the existing system is required until further development and increased flows warrant the construction of the new trunk main. An interim connection can be made into the 56 Street trunk main until the new trunk main is constructed. As this section of line to 56 Street will become part of the new trunk main system it should probably be sized for the ultimate flows from both Development Area 9 and 11 (ie. 450 mm).

Alberta Energy and Natural Resources Site

Being probably the earliest development to proceed with construction, on the west side of Edson, the ultimate and interim servicing of this site has been discussed in the December 1981 report titled "Alberta Energy and Natural Resources Site Servicing Study" as prepared by SAEL.

A 450 mm sewer trunk will flow east along the future Road C (see Fig. 6.6) to Alberta Street and then continue east along the south boundary of the West Haven Subdivision to 56 Street where a connection will be made.

4.3.3.3 Combined Forcemain and Gravity System Alternative

This system as shown on Figure 4.5 consists of the flows from development areas 8a, 9, 11, 12, and 13 being collected as shown on Figure 4.5 and pumped north to Development Area 8. At Development Area 8, the forcemain will discharge into the gravity line from Development Areas 10 and 8 which then runs across the northern side of Edson to the treatment facility picking up Development Areas 7, 6, 5, 4, 3, and 2 on the way. Lift Station #1 should be sized for 170 l/sec.

Glenwood

In this system with the existing lines being utilized to their capacity, the flows from Development Areas 12 and 13 must be collected and pumped to the gravity line in Development Area 11. The flows will be collected at Lift Station #2 at the southern

tip of Industrial Development Area 13. This pumping station should be sized for 34 l/sec.

Development Area 8a

Servicing of Area 8a will be the same as in the Gravity System Alternative with the exception that the sewage will have to flow west from 56 Street on 9th Avenue to the pumping station. This portion of line may become the governing factor in determining the required depth of the pumping station.

Development Area 2a

Servicing of Development Area 2a will probably be achieved by connection to the existing outfall sewer Gravity System Alternative.

Developing Area 6 - Block Y

Servicing of Block Y can be accommodated by connection to the existing trunk sewer or 42 Street from that required in the Gravity System Alternative.

Development Area 9

Servicing of Development Area 9 will only be different from that proposed for the Gravity System Alternative in that the portion of line to 56 Street needed for an interim connection can be reduced in size since ultimate flows will be directed into Lift Station #1.

Alberta Energy and Natural Resources Site

Servicing this area in the Combined System will be altered for the interim period as discussed in the "Alberta Energy and Natural Resources Site Servicing Study". An interm 200 mm sewer line will be layed east along the south boundary of the West Haven Subdivision to 56 Street until Lift Station #1 is built.

4.3.4 Cost Estimates

Construction cost estimates have been prepared for both Alternatives and are contained in Table 4.7 breakdown by development areas for the gravity system only is shown in Table 4.8.

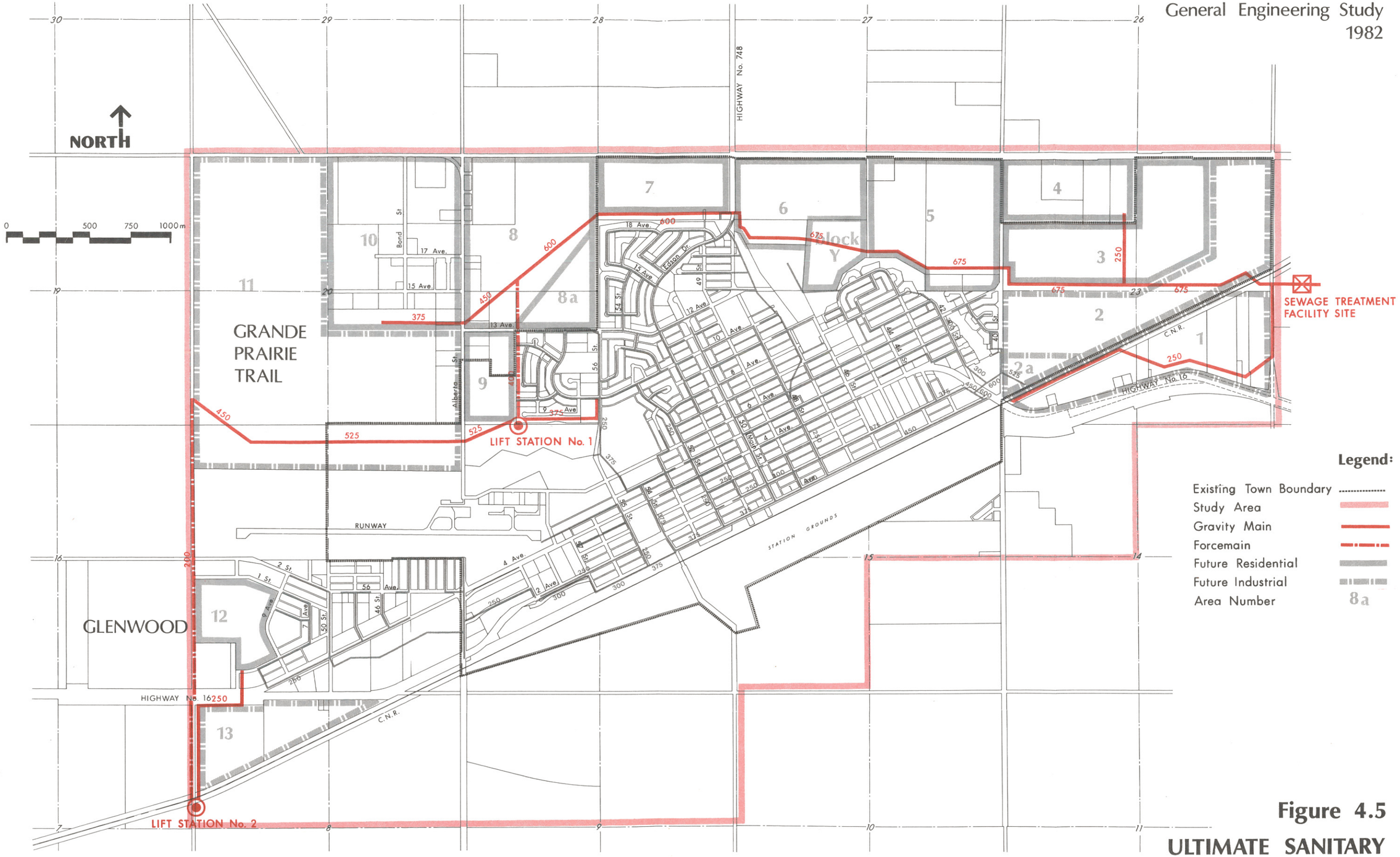
All costs are based on 1981 prices and an allowance of 30% is made for engineering and contingency. Land costs are not included.

4.3.5 Discussions

The capital cost for the Gravity Alternative is estimated at $5,239,000 as compared to $5,086,000 for the Combined Alternative. The difference is not significant considering the precision of these estimates and therefore the two alternatives can be considered equivalent with respect to capital costs.

The operating costs for the Combined Alternative with its two Lift Stations should also be considered as they will be significantly higher than those for the Gravity Alternative. To assist in this comparison we have estimated the present worth of the operating costs for the two lift stations at $839,000 as presented in Table 4.9. This must be added to the capital cost of the combined system, which makes the Gravity Alternative significantly lower in cost.

TOWN OF EDSON
General Engineering Study
1982



Legend:

- Existing Town Boundary .....
- Study Area
- Gravity Main
- Forcemain
- Future Residential
- Future Industrial
- Area Number 8a

Figure 4.5

ULTIMATE SANITARY SEWER COLLECTION SYSTEM ~ COMBINED ALTERNATE

Stanley
STANLEY ASSOCIATES ENGINEERING LTD.

TABLE 4.7

ESTIMATED COLLECTION SYSTEM CAPITAL COSTS

A. GRAVITY SYSTEM ALTERNATIVE

1.	Supply & Install Trunk Mains	
	250 mm	194,000
	300	461,000
	375	264,000
	450	879,000
	525	1,125,000
	600	211,000
	675	452,000
2.	Manholes	444,000
	Sub Total	4,030,000
	30% Engineering & Contingencies	1,209,000
	TOTAL	$5,239,000

B. COMBINED SYSTEM ALTERNATIVE

1.	Supply & Install Trunk Mains	
	200 mm (forcemain)	298,000
	250	486,000
	375	122,000
	400 (forcemain)	244,000
	450	235,000
	525	244,000
	600	333,000
	675	925,000
2.	Manholes	275,000
3.	Lift Station #1	500,000
4.	List Station #2	250,000
	Sub Total	3,912,000
	30% Engineering & Contingencies	1,174,000
	TOTAL	$5,086,000

Note: 1. Manhole every 120 m at a depth of 4 metres.

2. Costs based on 1981 dollars.

TABLE 4.8

SUMMARY OF ESTIMATED COSTS FOR SEWAGE TRUNK MAIN PER DEVELOPMENT AREA FOR GRAVITY ALTERNATIVE

Development Area	Costs
1	640,000
2	337,000
3	304,000
4	95,000
5	302,000
6	272,000
7	217,000
8	276,000
9	1,192,000
10	185,000
11	526,000
12	199,000
13	694,000
TOTAL	5,239,000

Notes:

1. Estimates are based on 1981 costs plus Engineering & Contingency of 30%.

TABLE 4.9
PRESENT WORTH OF OPERATING COSTS
OF LIFT STATIONS 1 & 2

1.	Power Costs (at 1981 rates) $31,400 per year for 20 years Present Worth at 3%/10 years (3% discount rate)	$467,000
2.	Labour & Maintenance Costs $20,000 per year for 20 years at 1981 rates, Present Worth at 3%/10 years (3% discount rate)	$298,000
3.	Pump replacement after 10 years $100,000 Present Worth at 3%/10 years	$ 74,000
	Total Present Worth of Operation & Maintenance Costs	$839,000

4.4 CONCLUSIONS

1. The treatment system is generally adequate to a population equivalent of 10,500 based on an average composite flow of 450 Lpcd.

2. If the same treatment process is used the system can be expanded on the same site to accommodate an ultimate population of 25,000.

3. The present Collection System and Outfall Line will be operating at design capacity once infilling in areas already serviced is completed.

4. A new trunk collection system is needed to serve all new areas.

4.5 RECOMMENDATIONS

1. Adopt in principle the overall servicing plan using the Gravity Flow Alternative as presented in Section 4.3.3.

2. New trunk mains should be constructed on an as required basis as new areas are developed.

3. When the new south trunk is completed the flows in the 56 Street trunk should be connected into it in order to relieve the 1st and 2nd Avenue trunk lines.

4. When the new north trunk is completed the north half of the Block Y subdivision should be connected into it.

5. When the Town's population nears the 9,000 mark a study should be undertaken to determine the best staging and timing to follow in order to expand the sewage treatment facilities.

6. With the exception of Block Y and Area 9, both slated for early development, the sequence of development of future areas should take into account the advantages of staging construction of the Trunk Sewers.