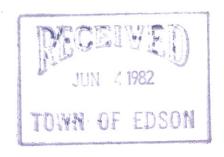


THE TOWN OF EDSON

General Engineering Study

1982





TOWN OF EDSON

GENERAL ENGINEERING STUDY

1982

as prepared by

STANLEY ASSOCIATES ENGINEERING LTD.



Stanley Associates Engineering Ltd.

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

22 April 1982 File: 52-661-95-1-1

Town of Edson Box 1388 Edson, Alberta TOE OPO

Attention:

Mr. P. Serdiak, Town Manager

Dear Sir:

Reference: Edson - General Engineering Study 1982

Attached please find the final report of the General Engineering Study 1982.

This Study examined the water, sanitary sewer, storm sewer and roadway systems required to ultimately service a total Study Area of 20.7 sq. km. surrounding Edson (includes the existing Town). The existing systems were first examined and recommendations made for their expansion to serve the complete Study Area based on population and land use projections developed by Makale and Kyllo Planning Associates.

It should be noted that the Study concentrates on the ultimate infrastructure systems needed to serve the Study Area at full development. The Study Area will however be developed in stages and in order to determine the optimum phasing of developments each proposed expansion should be assessed keeping in mind that it must become part of the ultimate system.

We would be pleased to meet with Council to discuss any aspect of this Study and any questions that might come up.

Yours truly,

STANLEY ASSOCIATES ENGINEERING LTD.

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

GDM/dac

TABLE OF CONTENTS

			Page
TABLE OF LIST OF T LIST OF A CONVERS ACKNOWN	F CONTABLE TIGUR ABBRE TION F LEDG	ES LES EVIATIONS FACTORS	i ii v vii viii ix x SC-J
SECTION		INTRODUCTION INTRODUCTION AND STUDY PROGRAM AUTHORIZATION AND TERMS OF REFERENCE	1.1 1.2
SECTION	2.1 2.2 2.3		2.1 2.1 2.1 2.2 2.3
SECTION	3 3.1 3.2	3.1.1 General 3.1.2 Background Studies DESIGN CRITERIA 3.2.1 Definition of Water Demands 3.2.2 Per Capita Water Demands 3.2.3 Demand Ratio Determination 3.2.3.1 Water Records 3.2.3.2 Demand Ratios 3.2.4 Fire Flow Requirements 3.2.5 Summary of Water Demands 3.2.6 Water Storage Requirements 3.2.7 Water Distribution Piping 3.2.7.1 Pipe Material Commonly Used 3.2.7.2 Inside Diameters of Common Types	3.1 3.1 3.3 3.3 3.5 3.5 3.5 3.6 3.9 3.9 3.12 3.13
	3.3	and Classes of Pipe 3.2.7.3 Roughness Coefficients (Hazen-Williams) WATER SUPPLY AND PUMPING FACILITIES 3.3.1 Groundwater Supply 3.3.2 Groundwater Quality	3.13 3.15 3.17 3.17 3.18
	3.4	3.3.3 Well Pumps 3.3.4 Future Supply Considerations RESERVOIR STORAGE 3.4.1 Existing Storage Facilities	3.18 3.21 3.23 3.23

			Page
	2.5	3.4.2 Quantity of Storage Required ASSESSMENT OF SYSTEM COMPONENTS (PRESENT	3.24
	3.5	AND ULTIMATE)	3.29
		3.5.1 General	3.29
		3.5.2 Existing System	3.29
		3.5.2.1 System Model Description	3.29
		3.5.2.2 Results of the Computer Analysis	3.29
		3.5.3 Ultimate System	3.31 3.31
		3.5.3.1 System Model Description3.5.3.2 Results of the Computer Analysis	3.34
		3.5.3.3 Glenwood Distribution Pumping Facilities	3.35
		3.5.3.4 Summary	3.39
	3.6	COST ESTIMATES	3.39
		CONCLUSINS	3.39
	3.8	RECOMMENDATIONS	3.40
SECTION	4	SANITARY SEWERAGE AND TREATMENT SYSTEM	
		INTRODUCTION	4.1
	4.2	SEWAGE TREATMENT FACILITIES	4.1
		4.2.1 General	4.1 4.1
		4.2.2 Design Criteria 4.2.2.1 Flows	4.1
		4.2.2.2 Wastewater Quality	4.3
		4.2.3 Existing Wastewater Treatment Facility	4.4
		4.2.4 Future Wastewater Treatment Facilities	4.4
		4.2.5 Cost Estimates	4.6
	4.3	COLLECTION SYSTEM	4.7
		4.3.1 Design Criteria	4.7 4.7
		4.3.1.1 Flows 4.3.1.2 Peaking Factor	4.8
		4.3.1.3 Pipe Sizing	4.8
		4.3.2 Existing System	4.8
		4.3.3 Future System	4.11
		4.3.3.1 Development Areas	4.11
		4.3.3.2 Gravity System Alternate	4.11
		4.3.3.3 Combined Forcemain and Gravity System	1, 12
		Alternate 4.3.4 Cost Estimates	4.13 4.15
		4.3.5 Discussions	4.16
	4.4		4.18
	4.5	RECOMMENDATIONS	4.19
SECTION	5	STORMWATER MANAGEMENT	
32011014	5.1	INTRODUCTION	5.1
		5.1.1 General	5.1
		5.1.2 Study Procedure	5.1
	5.2		5.2
	5.3		5.4
		5.3.1 General	5.4

			Page		
	5.4	5.4.1 Existing Drainage System	5.5 5.5 5.12 5.12		
	5.5	5.4.2 Future Drainage System STORMWATER MANAGEMENT CONCEPT 5.5.1 Bench Creek 5.5.2 Wase Creek to Poplar Creek Confluence 5.5.3 Poplar Creek	5.12 5.14 5.14 5.14 5.15		
	5.6 5.7 5.8	COST ESTIMATES CONCLUSIONS	5.18 5.20 5.20		
SECTION	6 6.1	TRANSPORTATION INTRODUCTION 6.1.1 General	6.1 6.1		
	6.2	6.2.1 Arterial Roadways 6.2.2 Collector Roadways	6.2 6.3 6.4 6.7		
	6.3	6.2.3 Local Roadways RECOMMENDED FUTURE ROADWAY NETWORK 6.3.1 General	6.8 6.9 6.9		
	6.4	6.3.2 Conceptual Future Roadway Network ROADWAY CONSTRUCTION 6.4.1 Estimates Arterial Roadway Construction Costs 6.4.2 Roadway Staging	6.10 6.10 6.10 6.11		
	6.5	IMPLEMENTATION 6.5.1 Monitoring Growth 6.5.2 Roadway Right-of-Way Requirements 6.5.3 Roadway Alignments and Construction Staging 6.5.4 Recommended Routes for Hazardous Goods and Large Trucks	6.16 6.16 6.16 6.18		
SECTION	7 7.1 7.2	SOLID WASTES INTRODUCTION ASSESSMENT OF PROPOSED WASTE MANAGEMENT	7.1		
	7.3	SCHEME CONCLUSIONS	7.1 7.5		
CORPORA	CORPORATE AUTHORIZATION				
APPENDIX	ΚA				

ADDENDUM - UNDER SEPARATE COVER

LIST OF TABLES

			Page
TABLE	3.1	HISTORIC AND PROJECTED POPULATION AND PER CAPITA WATER DEMAND FOR EDSON	3.7
TABLE	3.2	WATER DEMAND RATIOS FOR EDSON	3.8
TABLE	3.3	FIRE FLOW REQUIREMENTS (TYPICAL)	3.10
TABLE	3.4	PRESENT AND PROJECTED WATER DEMANDS FOR EDSON	3.11
TABLE	3.5	INSIDE DIAMETERS FOR VARIOUS TYPES OF PIPE	3.14
TABLE	3.6	PIPE TYPES AND THEIR ROUGHNESS COEFFICIENTS	3.16
TABLE	3.7	LOCATIONS WHERE SPECIAL ATTENTION IS REQUIRED WHEN IMPLEMENTING THE ULTIMATE SYSTEM	3.19
TABLE	3.8	GROUNDWATER WELL PUMP DATA	3.20
TABLE	3.9	REQUIREMENTS FOR FUTURE GROUNDWATER SUPPLY	3.25
TABLE	3.10	GLENWOOD RESERVOIR/PUMPHOUSE CONFIGURATION	3.28
TABLE	3.11	PRESENT AND PROJECTED WATER STORAGE REQUIREMENTS	3.36
TABLE	3.12	PROJECTED STORAGE REQUIREMENTS FOR EACH PRESSURE ZONE	3.37
TABLE	3.13	ESTIMATED COST BREAKDOWN FOR WATER STORAGE REQUIREMENTS	3.41
TABLE	4.1	WASTEWATER FLOW PROJECTIONS - AVERAGE DAY SEWAGE FLOWS	4.2
TABLE	4.2	RAW WASTEWATER CHARACTERISTICS	4.3
TABLE	4.3	EXISTING SEWAGE TREATMENT FACILITY DETENTION TIMES	4.4

			Page
TABLE	4.4	FUTURE SEWAGE TREATMENT FACILITY DETENTION TIMES	4.6
TABLE	4.5	ESTIMATED COSTS FOR SEWAGE TREATMENT FACILITY EXPANSION	4.6
TABLE	4.6	EXISTING TRUNK MAIN SPARE CAPACITY	4.10
TABLE	4.7	ESTIMATED COLLECTION SYSTEM COSTS	4.16
TABLE	4.8	SUMMARY OF SEWAGE COSTS PER DEVELOPMENT AREA BASED ON GRAVITY ALTERNATIVE	4.17
TABLE	4.9	PRESENT WORTH OF OPERATING COSTS FOR LIFT STATIONS 1 & 2	4.18
TABLE	5.1	HYMO PARAMETERS	5.7
TABLE	5.2	HYMO ANALYSIS RESULTS	5.8
TABLE	5.3	SWMM PARAMETERS	5.9
TABLE	5.4	SWMM ANALYSIS	5.10
TABLE	5.5	COMPARISON OF PRE-DEVELOPMENT AND POST- DEVELOPMENT PEAK RUNOFF	5.11
TABLE	5.6	CROSSING INVENTORY	5.13
TABLE	5.7	STORMWATER POND REQUIREMENTS	5.17
TABLE	5.8	STORM DRAINAGE COMPONENTS - ESTIMATED COST	5.19
TABLE	6.1	TYPICAL CHARACTERISTICS OF VARIOUS ROADWAY TYPES	6.5
TABLE	6.2	GENERALIZED CONSTRUCTION COSTS FOR ARTERIAL ROADWAYS	6.12
TABLE	6.3	SUMMARY OF ARTERIAL ROADWAY CONSTRUCTION COSTS	6.13
TABLE	6.4	DESIRABLE ROADWAY STAGING PROGRAM	6.15
TABLE	7.1	EXCERPT TABLE 13 DILLON REPORT	7.2

LIST OF FIGURES

			Following Page
FIGURE	2.1 2.2 2.3	POPULATION PROJECTIONS	2.1 2.2 2.2
FIGURE	3.1 3.2 3.3		3.5 3.26
	3.4	DEMAND PRESSURE CONTOURS FOR INDUSTRIAL FIRE FLOW	3.30
	2.4	FIRE IN ULTIMATE SYSTEM	3.32
FIGURE	4.1 4.2 4.3	SEWAGE TREATMENT LOCATION PLAN SEWAGE TREATMENT SITE PLAN EXISTING SANITARY SEWER MAINS ULTIMATE SANITARY SEWER COLLECTION	4.5 4.5 4.9
	4.4	SYSTEM GRAVITY ALTERNATE	4.12
	4.5	ULTIMATE SANITARY SEWER COLLECTION SYSTEM COMBINED ALTERNATE	4.14
FIGURE	5.1 5.2 5.3 5.4	WATER SHED AREAS	5.3 5.6 5.13 5.17
FIGURE	6 . l	RECOMMENDED URBAN ARTERIAL ROADWAY STANDARDS	6.6
	6.2	RECOMMENDED RURAL ARTERIAL ROADWAY STANDARDS	6.6
	6.3	RECOMMENDED COLLECTOR ROADWAY STANDARDS	6.7
	6.4	RECOMMENDED LOCAL ROADWAY STANDARDS	6.8
	6.5	CONCEPTUAL ROADWAY PLAN - INTER-	
	6.6	MEDIATE LEVEL (11 500 POPULATION) CONCEPTUAL ROADWAY PLAN - ULTIMATE LEVEL (20 000 POPULATION)	6.10

LIST OF ABBREVIATIONS

CBD Central Business District cfs cubic feet per second CNR Canadian National Railway **CSP** Corrugated Steel Pipe dBA L_{dn} unit of noise measurement **GSC** Geodetic Survey of Canada ha hectare HGL Hydraulic Grade Line Hp Horsepower IAO Insurer's Advisory Organization km kilometre kPa kilopascal kW kilowatt 1 litre lphd litre per hectare per day lpcd litre per capita per day lpd litre per day l/s litre per second MI Mega litre m metre m³ cubic metre m^3/s cubic metre per second m^3/d cubic metre per day m/s metre per second

NTS National Topographic System
PF Peak Factor

mm

psi pounds per square inch

millimetre

SAEL Stanley Association Engineering Ltd.

TDH Total Dymanic Head vpd vehicles per day

CONVERSION FACTORS

I hectare

1 kilometre

1 kilopascal

l litre

1 litre per hectare day

l litre per capita day

1 litre per day

1 litre per second

1 Mega litre

metre

cubic metre

cubic metre

cubic metre per day

metre per second

milimetre

tonne

tonne

= 2.471 acres

= 0.621 miles

= 0.145 pounds per square inch

= 0.220 imperial gallons

= 0.089 imperial gallons per acre day

= 0.220 imperial gallons per capita day

= 0.220 imperial gallons per day

= 13.198 imperial gallons per minute

= 219 million imperial gallons

= 3.280 feet

= 35.315 cubic feet

= 219.977 imperial gallons

= 219.977 imperial gallons per day

= 3.280 feet per second

= 0.039 inches

= 1.102 tones

= 2204 pounds

ACKNOWLEDGEMENTS

We would like to thank Mr. P. Serdiak, Town Manager and Mr. C. Ward, Town Superintendant for their assistance in the preparation of this report.

STANLEY ASSOCIATES ENGINEERING LTD.

STUDY TEAM

- D. McRae
- E. Shillington
- D. Burgess
- J. Hodgson
- K. Collicott
- P. Yeung
- P. Grubb
- N. Nuttall