



DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF REQUIREMENTS
FOR THE AWARD OF THE MASTER OF ENGINEERING DEGREE IN
ENVIRONMENTAL ENGINEERING

UNIVERSITY OF MORATUWA

පුස්තකාලය
මහරගම විශ්ව විද්‍යාලය, ශ්‍රී ලංකාව
මහරගම.

A critical appraisal of the water supply and sewage disposal
arrangements in the University of Moratuwa

40324.

628.1 (287)
S3

PERMANENT
REFERENCE
NOT TO BE
REMOVED FROM
THE LIBRARY.

624 84
628.1
628.3
95487

S.S. Sabanesan
B.Sc. (Civil Eng.)(Honours).

1984.04.27



40324

SUMMARY

A convenient supply of safe water and the sanitary disposal of human wastes are essential ingredients of a healthy, productive life. With this in view a critical appraisal of the water supply and sewage disposal arrangements in the University of Moratuwa was undertaken to explore suitable means of improving the system. Thereby a more satisfactory and efficient service for the present and the future will be ensured.

In this study consideration has been given to the suitability of the present sources in terms of location, quality, adequacy, storage facilities, etc. with regard to existing water supply system.

In assessing the sewage disposal arrangements presently prevailing attention has been focused on such aspects as location of sewers, manholes and treatment units, etc. Further a detailed investigation into the working of the existing treatment units was also undertaken in order to assess the performance of these units in terms of removal of BOD_5^{20} and SS.

Investigations revealed the inadequacy and inefficiency of the present water supply system. There is evidence of faecal contamination of groundwater.

Improper operation and maintenance of the sewage disposal system have resulted in its overall inefficiency.

Provision of a central water tower of capacity of 120,000 gallons and centralised pump house is recommended. Further, provision of a simple water treatment unit is suggested. The need for immediate repairs to unit No: 2 and the disinfection of all sewage effluent are highly favoured.

The introduction of a new central sewage treatment unit incorporating as far as possible the present sewers and manholes is recommended.

To obtain a satisfactory and efficient service a proper management of the water supply and sewage disposal arrangements is essential.

I am grateful to Mr. J. J. ... for providing the necessary facilities to carry out the Project work.

I am thankful to Prof. E. ... Consultant for his guidance and valuable suggestions in formulating the Project work.

Mr. ... as Project Supervisor enabled me to set about and carry out the Project work. I am grateful to him for extending to me invaluable guidance and moral support.

I am thankful to Mr. (Mrs.) T. A. ... Mr. L. ... Mr. B. ... of the Institute Staff of the University of ... for their advice and service.

I am grateful to Mr. E. C. ... Director of Buildings, Mr. K. ... Asst. Director of Buildings (formerly), and Mr. N. S. ... Superintending Engineer (Water Supply & Sewerage) of the Department of Buildings, for their kind assistance and consent to enable me to carry out this Project work. I place my thanks to Mr. ... and Mr. ... Engineers attached to the Water Supply & Sewerage Division of the Department of Buildings for their kind services.

I am thankful to Mr. T. B. ... Mr. ... Mr. ... of the National Water Supply & Sewerage Board, ... for their kind assistance.

My thanks are due to Messrs. D. S. ... and S. ... Engineers of the National Water Supply & Sewerage Board.

ACKNOWLEDGMENT

I am grateful to Prof. W. M. J. G. Mendis, Vice Chancellor, Prof. C. L. K. Tennakoon, Dean and Prof. B. L. Tennakoon of the University of Moratuwa, Sri Lanka for providing the necessary facilities to carry out the Project work.

I am thankful to Prof. R. Pitchai, W.H.O. Consultant for his guidance and valuable suggestions, in formulating my Project work.

Mrs. Niranjini Ratnayake, my Project Supervisor enabled me to set about and carry out the Project work. I am grateful to her for extending to me invaluable guidance and moral support.

I am thankful to Dr. (Mrs.) T. R. Marpitiyarachi, Mr. L. Ratnayake, and Mr. S. Pathinather of the Academic Staff of the University of Moratuwa for their advice and service.

I am grateful to Mr. K. C. Samarawecera, Director of Buildings, Mr. K. Maheswaran, Addl. Director of Buildings (formerly), and Mr. M. G. J. A. E. Fernando, Superintending Engineer (Water Supply & Sewerage) of the Department of Buildings, for their kind permission and consent to enable me to carry out this Project work. I sincerely thank Messrs. T. Balasubramaniam and S. Sandanam, Engineers attached to the Water Supply & Sewerage Division of the Department of Buildings for their kind services.

I am thankful to Mr. T. B. Madugalle, General Manager, Mrs. Vaidyaratne, Bacteriologist, Mrs. J. Sivabalasundram, Chief Chemist of the National Water Supply & Drainage Board, Colombo for their kind assistance.

My thanks are due to Messrs. D. N. J. Ferdinando and S. Wijegoonewardane, Engineers of the National Water Supply & Drainage Board.

I am grateful to Mrs. Hilda Mendis, Technician attached to the Environmental Engineering Laboratory of the University of Moratuwa and Mr. Herman Perera, officer attached to the Maintenance Division of the University for their kind assistance.

I extend my sincere thanks to Messrs. E. M. Perera, P. G. Arunasiri, R. G. Selvadurai, S. Thayalaseelan, V. Haridev and N. Sothilingam for their generous assistance.

I am grateful to my brother, Mr. S. Sabananthan, whose generous assistance and guidance encouraged me to carry out this Project work.

I am also thankful to Mr. Stanley Fernando of the Department of Buildings for kindly consenting to typewrite the Project work.

The services rendered by Messrs. Loku Banda, Justin, Muniandy and Subramaniam of the University of Moratuwa are also appreciated.

1.1	Introduction of Test Results	25
Part 3		
Sewage Disposal		
3.1	Present Sewage Disposal Arrangements	30
3.2	Design Codes & Assumptions	32
3.3	Sewage Flow & Characteristics	35
3.4	Proposed Testing Programme	37
3.5	Discussion of Test Results	37
Part 4		
Appendix		
4.1	Critical Appraisal of Existing water supply facilities	38
4.2	Critical Appraisal of Existing sewage disposal facilities	42
Part 5		
Conclusions		
5.1	Conclusions	48
5.2	Suggestions and Recommendations	50

CONTENTS

	Page
Summary ..	2
Acknowledgment ..	4
Contents ..	6
Notations ..	8
 Chapter 1 Introduction and Scope.	
1.1 Introduction ..	9
1.2 Scope ..	17
 Chapter 2 Water Supply.	
2.1 Present Water Supply Arrangements ..	21
2.2 Other Relevant Information ..	23
2.3 Design Guides & Assumptions ..	24
2.4 Quantity of Water Required ..	26
2.5 Proposed Testing Programme ..	27
2.6 Discussion of Test Results ..	28
 Chapter 3 Sewage Disposal.	
3.1 Present Sewage Disposal Arrangements ..	30
3.2 Design Guides & Assumptions ..	32
3.3 Sewage Flow & Characteristics ..	35
3.4 Proposed Testing Programme ..	37
3.5 Discussion of Test Results ..	37
 Chapter 4 Appraisal.	
4.1 Critical Appraisal of Existing water supply facilities ..	38
4.2 Critical Appraisal of Existing sewage disposal facilities ..	42
 Chapter 5 Conclusions.	
5.1 Conclusions ..	48
5.2 Suggestions and Recommendations ..	50

	Page
References	51
Appendix I Population	54
Appendix II Quantity of Water Required	55
Appendix III Quality of Water	57
Appendix IV (A) Quantity of Sewage Produced	60
Appendix IV (B) Quantity of Sewage Produced (Sample Population)	61
Appendix V Characteristics of Sewage	62
Appendix VI Number of Sanitary Conveniences	63
Drawing No: 1	64
Drawing No: 2	65
Drawing No: 3	66

NOTATIONS

B.O.D.	..	Biochemical Oxygen Demand.
M	..	A factor depends on the number of hours of operation of industries.
N	..	A factor depends on the population.
Q_D	..	Hourly design flow.
Q_I	..	Maximum industrial flow per day.
Q_M	..	Maximum flow (domestic) per day.
Q_N	..	Groundflow (infiltration) per day.
S.S.	..	Suspended solids.