

624.16

TM 74

2000

**INVESTIGATION AND IMPROVEMENT OF SEWERAGE SYSTEM  
IN CAVITE STATE UNIVERSITY (PHASE IV)**

**JESSIE OLOTEO MONASTRIAL**

*College of Engineering*  
**CAVITE STATE UNIVERSITY**  
*Indang, Cavite*

*March 2000*



**INVESTIGATION AND IMPROVEMENT OF SEWERAGE SYSTEM IN  
CAVITE STATE UNIVERSITY (PHASE IV)**

**An Undergraduate Design Project  
Submitted to the Faculty of the  
Cavite State University  
Indang, Cavite**

**In partial fulfillment  
of the requirements for the degree of  
Bachelor of Science in Civil Engineering**



*Investigation and improvement of sewerage  
system in Cavite State University (Phase  
624.16 M74 2000  
DP-20*

**JESSIE O. MONASTRIAL  
MARCH 2000**

## ABSTRACT

MONASTRIAL, JESSIE OLOTEO, Cavite State University, Indang, Cavite. March 2000. " INVESTIGATION AND IMPROVEMENT OF SEWERAGE SYSTEM IN CAVITE STATE UNIVERSITY (PHASE IV) " . Design project Adviser Eng'r. Cene Masigla Bago.

The project " Investigation and Improvement of Sewerage System in Cavite state University (phase IV) was conducted and evaluated at the Department of Civil Engineering, Cavite State University, Indang, Cavite in March 2000, to know the present condition of sewerage system at Cavite State University and to lay out the storm and sanitary sewer line. The study also aimed to identify, recommend or suggest solutions to sewerage system problems.

The result of the study showed the lay out of storm sewer and sanitary sewer according to the elevation of the ground. In addition, manholes were also designed based from the design guidelines and criteria. After the conduct of the study, it was found out that Cavite State University needs an improvement for the collection of effluent. Also, collection tank and treatment plant are needed for collecting, transporting and treating of the effluent before it will be discharged.

## TABLE OF CONTENTS

	Page
BIOGRAPHICAL SKETCH.....	iii
ACKNOWLEDGMENT.....	iv
LIST OF TABLES.....	x
LIST OF FIGURES.....	xi
LIST OF APPENDIX TABLES.....	xii
LIST OF APPENDICES.....	xiii
ABSTRACT.....	xiv
INTRODUCTION.....	1
Objectives of the study.....	2
Scope and limitations of the study.....	2
Time and place of the study.....	3
Importance of the study.....	3
REVIEW OF RELATED LITERATURE.....	4
History of sewerage.....	4
Sewerage and sewage disposal.....	4
Sewer, sewage and sewerage.....	4
Sanitary sewerage and liquid wastes.....	6
Types of sewer system.....	7
Sewage characteristics.....	9
Quantity of sewage.....	9
Sanitary sewer design.....	10

Quantity of storm water.....	11
Design of sewer system.....	12
Design of storm sewer system.....	12
Location of street inlets.....	12
Drainage areas.....	12
Sewer pipeline.....	15
Locating the pipes.....	15
Sewer outflow line installation.....	15
METHODOLOGY.....	17
Design guidelines.....	17
Design procedures.....	18
RESULT AND DISCUSSION.....	20
Field data.....	20
Design computation of storm sewer.....	29
Layout of sanitary sewer line.....	35
Computation of storm sewage quantity.....	43
Computation of sanitary sewer.....	45
Cost analysis.....	47
SUMMARY, CONCLUSION AND	
RECOMMENDATION.....	48
Summary.....	48
Conclusion.....	49
Recommendation.....	50

BIBLIOGRAPHY.....	51
APPENDICES.....	52

## LIST OF TABLES

Table	Page
1. Computation of elevation.....	21
2. Design computation of storm sewer line.....	30
3. Total length of pipe.....	32

## LIST OF FIGURES

Figure	Page
1. Storm sewer layout.....	34
2. Sanitary sewer layout.....	36
3. Typical drainage layout.....	37
4. Detail of pipe trench.....	38
5. Manhole plan.....	39
6. Detail of curve inlet.....	40
7. Detail of manhole.....	41
8. Detail of concrete cover and bottom slab.....	42



## LIST OF APPENDIX TABLES

Table	Page
1. Value of "c" for use in rational formula.....	53
2. Value of manning's roughness coefficient "n".....	54
3. Suggested size of septic tanks (m).....	55
4. Trench width dimension.....	56
5. Schedule of manhole dimension.....	57
6. Schedule of concrete cover.....	58
7. Bottom slab reinforcement.....	59
8. Specification.....	60
9. Physical property of pipe.....	61
10. Applicable chemical solution.....	62
11. Average waste water from residential.....	63
12. Average wastewater sources flows from.....	64
Institutional.....	65
13. Average wastewater sources flows from recreational.....	66
14. Per capita wastewater flow from conventional	
Domestic devices.....	67

## LIST OF APPENDICES

	Page
1. Atlanta spiral pipe specification.....	67
2. Revise effluent regulations of 1990, revising And amending the effluent regulations of 1992.....	70
3. Specification.....	73
4. Detailed estimate.....	84

# INVESTIGATION AND IMPROVEMENT OF SEWERAGE SYSTEM IN CAVITE STATE UNIVERSITY

JESSIE OLOTEO MONASTRIAL

---

<sup>1/</sup>An undergraduate design project presented to the faculty of the Department of Civil Engineering, College of Engineering, Cavite State University, Indang, Cavite. In partial fulfillment of the requirements for the degree of Bachelor of Science in Civil Engineering. Prepared under the supervision of Eng'r. Cenc Bago. Contribution No. CE-99-2000-338-07

---

## INTRODUCTION

Sewerage is a structure, device, equipment, and appurtenance intended for the collection, transportation, and pumping of sewage and other liquid wastes, but excluding works for the treatment of sewage. It is also a plan or idea for the collection of the removal of sewage from the community.

The latest sewerage system constructed or built at the Cavite State University especially in areas where ladies Dormitory Building, Related Science High school Building, Marcos Building, CED, New Administration Building, Grandstand, Quadrangle, Granary – IIRM Building, CDC, were located need investigation to improve its performance. Proposed buildings like the University Mall, Alumni House, comfort Rooms near Marcos type buildings will also be included in the investigation and improvement of sewerage system.