SDMS US EPA REGION V -1

SOME IMAGES WITHIN THIS DOCUMENT MAY BE ILLEGIBLE DUE TO BAD SOURCE DOCUMENTS.

CONCEPT DESIGN
CONCEPT DESIGN ANALYSIS - APPENDICES
VOLUME I OF II
HAZARDOUS WASTE CONTAINMENT/CLEANUP
OMC - WAUKEGAN HARBOR
WAUKEGAN, ILLINOIS

Contract No. DACW 45-85-C-0023

Prepared By:

Warzyn Engineering Inc.
Madison, Wisconsin

For:

U.S. Army District
Omaha Corps of Engineers
Omaha, Nebraska

March, 1985

C 11837

WARZYN
ENGINEERING INC

VOLUME 1 - Appendices

Appendix A	List of References
Appendix B	Contract
Appendix C	Design Requirements
Appendix D	Computer Analysis - Dredging Volumes
Appendix E	Computer Analysis - Fill Volumes

WARZYN
ENGINEERING INC

APPENDICIES

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WARZYN
ENGINEERING INC

APPENDIX A
LIST OF REFERENCES

WARZYN
ENGINEERING INC

ITEMS FURNISHED BY THE DEPARTMENT OF THE ARMY - OMAHA DISTRICT COE

Re: Waukegan Harbor Superfund Project

Received 8-28-84

Architect-Engineer Instruction Manual

Instructions for Preparation of Proposal

SF 1411 (3 copies)

Appendix "A" (3 copies)

Supplement to Appendix A

Contract Clauses for A-E Contract

Form ENG 2180a (3 copies)

Preliminary Design Calculations for North Ditch Bypass Drainage Alternatives as prepared by Weston Consultants, Dated February 1982

Plans and Specifications for "Dredging and Water Treatment for Removal of PCB Contamination in Waukegan Harbor" as prepared by Mason & Hanger - Silas Mason Co., Inc., dated June 5, 1981

Plan and Specifications for "Lagoon and Treatment Facility for Removal of PCV Contamination in Waukegan Harbor" as prepared by Mason & Hanger - Silas Mason Co., Inc. dated June 15, 1981

Plans for Layout of Treatment Equipment and Dewatering System on OMC Property as prepared by Weston Consultants dated December 14, 1981.

Draft ER 1110-2-246 - Appendix B - Guide for Site Specific Quality Management Plan (SSQMP)

Record of Decision - Remedial Alternative Selection

"Draft" - Conceptual Design - OMC Hazardous Waste Site - Waukegan, IL prepared by CH2M Hill - June 29, 1984

Drawing - Conceptual Site Layout - Alternatives Selected for Implementation Site Plan - OMC Hazardous Waste Site - Waukegan, IL EPA 13-5M28.0

Disposition Form - DA Form 2496 - Subject: Travel Bulletin No. 84-02 Change in High Cost Areas in the United States (Civilian Personnel)

WARZYN ENGINEERING INC

Received 9-5-84

Design Criteria Documents
Mylar Drawings Titled:
Sanitary Sewer Details
Abbreviations
Legend
Water Line Details

"Concrete Floor Slabs on Grade Subjected to Heavy Loads"
Army Document No. TM 5-809-12 - Air Force Document AFM 88-3, Chap. 15
Dated April 1977

"Technical Manual" - Seismic Design for Buildings
Army Document No. TM 5-809-10 - Navy Document No. NAVFAC P-355 -
Air Force Document No. AFM 88-3, Chap. 13 - Dated February 1982

"Load Assumpcion for Buildings" - Dept. of the Army Technical
Manual TM 5-809-1 - Dept. of the Air Force Manual AFM 88-3, Chap. 1
Dated September 1966

"Masonry Structural Design for Buildings" - Army TM5-809-3, Navy NAVFAC DM-2.9,
Air Force AFM 88-3, Chap. 3 - Dated August 1982

"Masonry Structural Design for Buildings - Change No. 1"
Dated October 15, 1983

"An Engineering Study for the Removal and Disposition of PCB Contamination
in the Waukegan Harbor and North Ditch at Waukegan, Illinois - FINAL REPORT"
Prepared by: Mason & Hanger-Silas Mason Co. - Dated January 1981

"Appendices to An Engineering Study for the Removal and Disposition of
PCB Contamination in the Waukegan Harbor and North Ditch at Waukegan
Illinois - FINAL REPORT" - Prepared by Mason & Hanger-Silas Mason Co.-
Dated January 1981

"An Engineering Study for the Removal and Disposition of PCB Contamination
in the Waukegan Harbor and North Ditch at Waukegan Illinois - ADDENDUM TO
FINAL REPORT"- Prepared by Mason & Hanger-Silas Mason Co. - Dated May 1981

"Volatilization of PCBs During Planned Waukegan Harbor Cleanup Operations -
LITERATURE REVIEW" - Prepared by Mason & Hanger-Silas Mason Co. - Dated
May 1981

"Final Estimate for Lagoon and Treatment Facility for Removal of PCB
Contamination in Waukegan Harbor, Waukegan, IL." - Prepared by Mason &
Hanger-Silas Mason Co. - Dated July 1, 1981

"Plan for Removal and Disposal of PCB Contaminated Soils and Sediments
at Waukegan, Illinois" - Prepared by Mason & Hanger-Silas Mason - Dated
September 1980 - Contract No. 68-03-2647.

Received 9-5-84 (Continued)

"An Engineering Study for the Removal and Disposition of PCB Contamination in the Waukegan Harbor and North Ditch at Waukegan, IL - SECOND ADDENDUM TO FINAL REPORT" - Prepared by Mason & Hanger -Silas Mason Co. - Dated March, 1982

"Final Estimate for Dredging and Water Treatment for Removal of PCB Contamination in Waukegan Harbor - Waukegan, IL"- Prepared by Mason & Hanger-Silas Mason Co. - Dated September 4, 1981

Deposition Exhibit - Brownell-OMC Subject: Volatilization
(3 pages of hand written information on Malcolm Pirnie calculation paper and 7 pages of typed information on Weston L.H.)

"Analysis of Sediment Samples Collected in November 1982" - US Army Corps of Engineers - Chicago District Report - Dated February 1983

"Analysis of Sediment Samples Collected in October 1981" - US Army Corps of Engineers - Chicago District Report - Dated May 1982

"The PCB Contamination Problem in Waukegan, Illinois" - Prepared by USEPA - Region V - Dated January 21, 1981

"Waukegan Harbor Map" - Prepared by Illinois State Geological Survey for Land-Planning Use (Ledger size copy)

"Interim Standard Air Monitoring Guide for Hazardous Waste Sites" - US Army Corps of Engineers - Missiori River Division - Toxic Waste and Environmental Section - June 1984

"Domestic Wastewater Treatment" - Army Document NO. TM 5-814-3, Air Force Document No. AFM 88-11, Volume 3 - Dated November 1978

"Sanitary Engineering - Sanitary and Industrial Waste Sewers" - Department of the Army Technical Manual TM 5-814-1 - Dated August 1966

"Water Supply for Fire Protection" - TM 5-813-6/AFM 88-10, Chap. 6

"Water Supply, Water Distribution" - Technical Manual No. 5-813-5 - Air Force Manual No. 88-10, Volume 5 - Interim Use Draft Date: June, 1979

"Guide Specification for Military Construction - Concrete for Building Construction" - Pattern Guide Specification - Dated March 1983 (Structural Design Guidance)

"Guide Specification for Military and Civil Works Construction - Excavation Filling, and Backfilling for Buildings" - Pattern Guide Specification - Dated (June 1984) (Structural Design Guidance)

"North Ditch Bypass - Outboard Marine Corporation - Disposal of Excess Excavated Material and Pumpage from Trench Dewatering" - Al Pope - Mason & Hanger - (3 page article)

Received 9-5-84 (Continued)

"In Progress Estimate - Waste Stabilization Lagoon - Fort Peck Dam - For Peck, Montana" - Civil Example No. CW-1 Summary Dated July, 12, 1979 (Estimating Guidance)

"Final Cost Estimate" - U.S. Army Engineer District - Omaha, NB - Serial No. CW-2 - Reference: ER 415-345-42 (Estimating Guidance)

"Guide Specification for Military Construction - Plumbing, General-Purpose" Department of the Army Corps of Engineers - Dated June 1984 (Mechanical Guidance)

SPECIFICATION DESIGN GUIDANCE DOCUMENTS

Notice to Prospective Bidders - Solicitation No. DACA45 84 B 0 (2 pgs)

Specifications (for Construction Contract) IB-1 thru IB-17 and SF-1 - SF-2 and Guide B - Price Schedule

Zero Accidents - Table of Contents (Pink Sheets) TC-1 thru TC-6

Guide Specification for Military Construction - Section 1A Special Clauses "Draft" Dated June 1984

Guide Specification for Military Construction - Section 1C Environment Protection - "Draft" Dated April 1984

Pattern Guide Specification for Military Construction - Section 1D - Special Safety Requirements - Dated April 1984

Pattern Guide Specification - Removal and Disposition of Materials and Equipment from Existing Buildings - Dated April 1984

Master List of Specification Sections (6 pages)

Pattern Guide Specification - Demolition - Dated May 1983

SOILS INVESTIGATION GUIDANCE

Typical Test Hole Data (1 page)

TMs for ARCHITECT-ENGINEER DESIGN GUIDANCE - Dated August 27, 1984

Master List of Specification Sections - OMC Waukegan Harbor Superfund (7 pages)

WARZYN ENGINEERING INC

Received 9-5-84 (Continued)

ELECTRICAL DESIGN GUIDANCE

Electrical Design Analysis Guide - Instructions to Designer - Dated April 1982

Pattern Guide Specification - Electrical Distribution System, Underground Dated March 1984

Pattern Guide Specification - Electrical Distribution System, Aerial Dated April 1984

Pattern Guide Specification - Electrical Work, Interior Dated May 1984

Guide Specification - Section ..... - Automatic Transfer [And By-Pass Isolation] Switches - Dated August 1975

Pattern Guide Specification - Fire Detection and Alarm System - Dated June 1984

Exterior Electrical Distribution Standards - Drawing No. 40-06-17 - Instructions for Use (I-75) (Booklet - not a drawing)

Lighting Fixtures - Standard Dwg. No. 40-06-04- For Use with Electrical Guide Specifications (Booklet - not a drawing)

Received Week of 9-10-84

Draft Technical Memorandum No. 6

Received Week of 10-1-84

4 copies of CONCEPTUAL DESIGN - OMC HAZARDOUS WASTE SITE - WAUKEGAN, IL EPA 13-5M28.0 - W65328.00 - September 14, 1984

Received Week of 10-22-84

Preliminary Topo's and Property Lines for OMC Site

Received 12-17-84

Safety and Occupational Health Document Requirements for Hazardous Site Remedial Actions - August 30, 1984 Regulation No. 385-1-92
DAEN-ECS. DAEN-ECE

Received Week of 1-7-85

Concrete Structural Design for Buildings - August 75 - T/M No. 5-809-2

Masonry Structural Design for Buildings - August 82 - T/M No. 5-809-3

Structural Steel, structural Aluminum Steel Joists, and Cold-Formed Steel for Buildings - Feb 83 - T/M 5-809-4

Structures Other Than Buildings - Feb 78 - T/M 5-809-6

Procedures for Foundation Design of Buildings and Other Structures (Except Hydraulic Structures) - Oct 65 - T/M 5-818-1 2 copies

Sanitary

Sewage and Industrial-Waste Pumping Stations - Aug 65 - T/M 5-814-2

Sanitary Engineering Instructions - May 59 - T/M 5-814-4

Sanitary Landfill - Oct 73 - T/M 5-814-5

Civil

Surface Drainage Facilities for Airfields - Apr 77 - T/M5-820-3

Subsurface Drainage Facilities for Airfields - Mar 79 - T/M 5-820-3

Drainage and Erosion Control Structures for Airfields and Heliport - Jan 78 - T/M 5-820-3

General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas - Apr 77 - T/M 5-822-2

Flexible Pavement Deisgn for Roads, Walks and Open Storage Areas - May 80 - T/M 5-822-5

Rigid Pavements for Roads, Streets, Walks, and Open Storage Areas - Apr 77 - T/M 5-822-6

Railroads - Army and Air Force - Jul 80 - T/M 5-850-2

Standard Practice for Concrete Pavements - Sep 75 - T/M 5-822-7

Site Planning

Master Planning Principals and Procedures - Nov 70 - T/M 5-803-1

Site Planning - General - Jul 66 - T/M 5-803-3

Installation Design - T/M 5-803-5

Section 1K - Site Specific Quality Management Plan (SSQMP)

Received Week of 1-21-85

Waukegan Harbor, Illinois Confined Dredged Disposal Facility - April 1984 - Site Selection Study - U.S. COE Chicago Dist.

Received Week of 2-18-85

Drainage for Areas Other Than Airfields - Army TM 5-820-4
Air Force AFM 88-5 Chapt. 4 - October 1983

Bituminous Pavements Standard Practice - TM 5-822-8 December 1971

Received Week of 3-4-85

Railroad Design and Construction at Army and Air Force Installations
TM 5-850-2 - AFM 88-7, Chap. 2 July 1980

Pavement Design for Seasonal Frost Conditions - TM 5-818-2 - AFM 88-6,
Chap. 4 January 1983 (Draft)

Roads, Streets, and Pavements Generally Parking for Nonorganizational
Vehicles - TM 5-822-3 - July 1965 Reprint of former EM 1110-3-295.

Construction Department of Defense Construction Criteria - Department of
the Army Circular 4.5-84-1

Design for the Phusically Handicapped - Military Construction Civil Works
EM 1110-1-103 - October 15, 1976

Conduits, Culverts and Pipes - Engineering and Design - Engineer Manual
EM 1110-2-2902 - March 3, 1969

Engineering and Design - Design Analyses - ER 1110-345-700 - April 30, 1984

U.S. Army Corps of Engineers Safety and Health Requirements Manual - EM 385-1-1
April 1981, Revised October 1984

ITEMS FURNISHED BY THE U.S. EPA - Region 5 (Chicago)

Re: Waukegan Harbor Superfund Project

Received Week of 1-7-85

Illinois Water Pollution Control Rules - #109920

Cost Estimates for Alternative Plans - #204436

Remedial Action Objectives - #204686

Cost Estimates for Alternative Plans - #204432

Optional Form 60 - Roy F. Weston, Inc.'s Cost - #204530

Cost Estimates for Alternative Plans - #204429

Proposal to Test Oozer Pump Dredging Concept at Waukegan Harbor (Preliminary Outline) - #207323

Cost Estimates for Alternative Plans - #400324

O&M Cost Estimates - Summary North Ditch Bypass - #401297

Quality Control Procedures and Analytical Methodology - #206640

NPDES Permit No. I1055905 - #108508

Drawings and Calculations - #108243

Drawings of South Oil Interceptor - #108242

Drawings of North Oil Interceptor - #108241

Drawings of South Oil Interceptor - #108239

Drawings and Charts - #108234

Quality Assurance of Instrument Operation - #206646

Handling, Waste Control & Disposal of Poly Chlorinated Biphenyls by Monsanto - #109508

PCB: A Summary of Important Environmental Characteristics by ENCOTEC - #108923

Removal and Disposal of PCB-Contaminated River Bed Material - #100415

Manual Grab Sampling Procedure for PCB Contaminated Water - #110622

Improving the Efficiency of Dredging Several Feet of Contaminated Sediment Off the Top of an Uncontaminated Sediment by T.J. Tofflemire - #100419

WARZYN ENGINEERING INC

Standard Analytical Methods for Determining Pydraul by Monsanto - #102229

Hazardous Materials Data Sheet by Monsanto - #101962

Behavior of Heavy Metals and PCB's in the Removal and Treatment Operations of Bottom Deposits by Murakami and Takeishi - #102982

PCB Spill Cleanup - Dunamish Waterway Seattle, Washington, March 1976 - #102638

North Ditch Bypass - Outboard Marine Corporation Disposal of Excess Excavated Material and Pumpage from Trench Dewatering - #207085

Quality Assurence Manual for Warzyn Engineering, Inc. - #111097

Bedford Plant Hydraulic Fluid Change Program - #105557

Manual Grab Sampling Procedure for PCB Contaminated Water - #202539

Toxicity and Safe Handling of Pydraul A-200 - #103129

Letter to Mr. T. Leslie Goddier from M. Kaye Jacobs - #100259

Price List of Pydraul Analytical Tests - #107865

Drawing of Plant #1 Oil Interceptor - #108236

Drawing of South Area Pump No. 1 - #108246

Safety Regulations & Working Conditions - #110064

Schematic Drawing of Pump by R. Self - #108184

Cost Estimates - #204640

Memorandum of Testing Fees - #400712

OMC Cleanup Activitiesand Costs - #400326

Detroit Wastewater Interceptor System PCB Sampling - #105686

Procedures for Chlorinated Hydrocarbon Analysis used in the Coastal Water Project Laboratory, Appendix A - #102721

Purchase Orders & Bills - #401044

Oil & Sludge Disposal - #109072

The "Stump" - A New Dimension in Dredging - #101086

Record of Rulemaking - Polychlorinated Biphenlys Making and Disposal Regulation by EPA - #106780

WARZYN
ENGINEERING INC

Dredging of PCB-Contaminated River Bed Materials, Upper Hudson River, New York - #37

Record of Decision, Remedial Alternative Selection Hudson River PCBs Site, Glen Fall, New York

Feasibility Study, Hudson River PCB's Site New York, Volume 1

Guidelines for Dewatering/Densifying Confined Dredged Material - #052

Dredging of PCB-Contaminated River Bed Materials, Upper Hudson River, New York, Volume 2 - #206968

Map of Johnson Motors - #108245

Estimate Prepared for Whole Harbor Dredging - #207268

Charts of Schematic Water Flow and Retention Time and Discharge Characteristics - #106442

Work Request and Report Sheet - #101977

Profile Charts and Dishcharge Characteristics - #108264

Redesign of North Ditch Bypass at Outboard Marine Corporation - #400902

Source Control Feasibility Study - OMC Hazardous Waste Site Waukegan, IL EPA 13-5M28.0 July 14, 1983 (Remedial Planning/Field Investigation Team REM/FIT Zone II Contract No. 68-01-6692 CH2M Hill Ecology & Environment

Guidelines for Dewatering/Densifiying Confined Dredged Material EM 11110-2-5007 - December 18, 1978 - Engineer Manual

Final Report on Project No. 2-800-03-218-03 - Sediment Sampling, Water Sampling, and PCB Analysis in Lake Michigan - July, 1980 - #401467

Implementation of Quality Assurance Requirements for all EPA Contacts Involving Environmental Measurements - July 22, 1981 - #401228

Monitoring Program for Waukegan Harbor Dredging - July 17, 1981 - #401222

Review of Section 01400 Testing Laboratory Services of a Preliminary Copy of Specifications for Dredging and Water Treatment for Removal of PCB Contamination in Waukegan Harbor, Waukegan, IL - Mason & Hangar - July 14, 1981 #401227

Illinois Pollution Control Board Rules and Regulations Chapter 9: Special Waste Hauling Regulations - Adopted March 15, 1979 - #401014

Lake Michigan Papers - PCB Contamination in Waukegan Harbor - Why is There Still a Problem - January 1981 - #400521

EPA List

Silt Curtain Plan & Elevations - Hauling and Loading estimates -

Additional Support Information, Waukdgen Harbor Litigation - July 16, 1982 brief history of the Upper Hudson River PCB problem and project descriptions, key design criteria and cost/benefit analysis - #401458

PCB Clean-up Works for Waukegan Harbor by Toyo's Oozer Pump Dredge - November 1978 - #400748

The PCB Contamination Problem in Waukegan, IL - U.S. EPA, Chicago, January 21, 1981 - #400736

Mason & Hanger - Plan for Removal and Disposal of PCB Contaminated Soils and Sediments at Waukgen, IL - U.S. EPA - September 1980 - #400730

Pennwalt Corporation - Sharpless Polymizer Centrifuges - #400744

Greeley and Hansen Engineers - North Ditch Bypass - December 1979 - #400746

Waukegan Harbor Dredging and Dredge Spoil Treatment Parameters Developed From Bench Scale Laboratory Treatment Tests - October 1980 - #400881

Announcement of Availibility of Draft Environmental Impact Statement Announcement of the Scheduling of a Joint Public Hearing by Corps of Engineers and U.S. Environmental Protection Agency - May 22, 1981 - #400868

PCB Spill Cleanup - Duwamish Waterway - Seattle, WA - March 1976 - #400872

Hazardous Waste Compliance and Enforcement Program Guidance - Feb 23, 1982 - #400860

Council of Environmental Quality Executive Office of the President - Regulations For Implementing the Procedural Provisions of the National Environmental Policy Act - November 29, 1978 - #400863

Authorization to Proceed with Remedial Planning and Implementation at the OMC Hazardous Waste Site in Waukegan, IL - Action Memorandum - #400732

Major Items for Dredging of Slip #3 - Preliminary - #400750

Soil Boring and Well Water Salmpling at OMC Facility in Waukdgen, IL - October 1981 - #401473

PCB Concentration Profile in the North Ditch - Figure 14 - #400751

PCB's in the North Ditch - Waukegan, IL - U.S. EPA - Cincinnati, OH - October 19, 1979 - #400747

Clark Dietz and Associates Engineers, Inc. - Memo - February 11, 1977 - Sediment Transport Calculations - North Ditch Johnson Outboards - #400749

EPA List

Plan of Study for Conduction Analyses of Waukegan Harbor Sediments - Chicago Corps of Engineers - July 31, 1981 - #401329

Mason & Hanger Silas Mason Co., Inc. - Proposal for Engineering Design and Project Manangement for a Dredging, Treatment and Storage System for PCB Contaminated Sediments - Waukegan, IL - November 7, 1980 - #401477

MUD CAT - Literature - #400864

Draft Technical Guidance for Implementation of the Double Liner System Requirements of the RCRA Amendments - Dec 20, 1984

Draft - RCRA Permit Writer's Manual Ground-water Protection 40 CFR Part 264 Subpart F - By GeoTrans, Inc. Submitted October 4, 1983

A Guide to the Selection of Materials fro Monitoring Well Construction and Groundwater Sampling - by Michael J. Barcelona, James P. Gibb and Robin A. Miller - Illinois State Water Survey - 1983

Manual of Groundwater Smapling Procedures - By Marion R. Scalf, James F. McNabb, William J. Dunlap, Roger L. Cosby, John Fryberger - NWWA/EPA Series

Illinois EPA Waste Management Facilities Design Criteria - For Class 1 Landfill Sites (Hazardous Waste)

ITEMS FURNISHED BY THE U.S. EPA - Region 5 (Chicago)

Re: Waukegan Harbor Superfund Project

CONFIDENTIAL DOCUMENTS

GC/MS Thermal Desorption Analysis of Three Section Sorbent Tubes - #401041

Record of Communicaiton to Thomas McSwiggin from E. DiDomenico - #401128

Waukegan Harbor Dredging and Dredge Soil Treatment Parameters Developed From Bench Scale Laboratory Treatment Tests (October 1980) - #401632

PCB Clean-up Work, Waukegan Harbor Utilizing Toyo's Oozer Pump Dredge #207301

Waukegan Harbor Situation from H.L. Shahabian to R.P. Brownell - #031

Waukegan Harbor PCB Problem from J.B. Mulligan to R.P. Brownell - #028

Work Plan for Engineering Design of the Bypass of the North Ditch at Outboard Marine Corporation Waukegan, Illinois - #017

Raltech Scientific Services Reports - #100747

Meeting with Monsanto to Discuss Water Pollution Control - North Ditch - #109599

DESIGN CRITERIA

I. Electrical Design Criteria

The electrical systems will be designed to conform to the following:

1. Regulatory Agencies:

   a. National Fire Protection Association NFPA-70 National Electrical Code (NEC).

   b. Local Codes and Ordinances.

2. Reference Standards:

   a. Commonwealth Edison Electric Service Rules and Regulations.

   b. Illuminating Engineering Society (IES) Lighting Handbook.

MABS/BN4

CIVIL REFERENCES

ARCHITECT-ENGINEER instruction manual for U.S. Army Corps of Engineer District, Omaha.

Department of Defense Construction Criteria Manual, DOD 4270.1-M.

ER 1110-345-700, Design Analyses, February 19, 1982.

Design and construction of sanitary and storm sewers, American Society of Civil Engineers, ASCE Manual of Practice No. 37, 1970 (WPCF Manual of Practice No. 9).

Concrete Pipe Design Manual, American Concrete Pipe Association, June 1980.

Recommended Standards for Sewage Works, Great Lakes - Upper Mississippi River, Board of State Sanitary Engineers, 1973, (10 state standards).

Hydrology for Engineers; Linsley, Kohler, Paulhus; 1975.

Recommended Standards for Water Works, Great Lakes - Upper Mississippi River, Board of State Sanitary Sewers, 1968, (10 state standards).

MABS/BN5

STRUCTURAL DESIGN REFERENCES:

1. General provisions and geometric design for roads, streets, walks, and open storage areas. TM 5-822-2.

2. Engineering and design rigid pavements for roads, streets, walks, and open storage areas. TM 5-822-6.

3. Building code requirements for reinforced concrete (ACI 318-83).

4. ACI Committee 350 report on concrete sanitary engineering structures.

5. AISC manual of steel construction.

MABS/B04

PROCESS DESIGN REFERENCES:

1. The submersible pump station will be designed in accordance with the following design criteria references:

   a. Recommended Standards for Sewage Works - Great Lakes - Upper Mississippi River Board of State Sanitary Engineers.
   b. Illinois Recommended Standards for Sewage Works - IEPA.
   c. Hydraulic Institute Standards for Centrifugal, Rotary, and Reciprocating Pumps - Hydraulic Institute.
   d. Pumping Stations for Large Submersible Pumps - Flygt Corporation.

2. The sedimentation basins will be designed in accordance with the following design criteria references:

   a. Recommended Standards for Water Works - Great Lakes - Upper Mississippi River Board of State Sanitary Engineers.
   b. Title 35 Environmental Protection, Subtitle F Public Water Supplies, Chapter 2, Environmental Protection Agency, Parts 651-654, Technical Policy Statements, July 1, 1984 - IEPA.
   c. Process Design Manual for Suspended Solids Removal - USEPA.

MABS/BO3

APPENDIX B
CONTRACT

WARZYN
ENGINEERING INC

ARCHITECT-ENGINEER CONTRACT

1. CONTRACT NO.
DACW45-85-C-0023

2. DATE OF CONTRACT
84DEC03

3A. NAME OF ARCHITECT-ENGINEER
Warzyn Engineering Inc.

3B. TELEPHONE NO. (Include Area Code)
608-257-4848

3. ADDRESS OF ARCHITECT-ENGINEER (Include ZIP Code)

PO Box 9538
Madison, WI 53715

4. DEPARTMENT OR AGENCY AND ADDRESS (Include ZIP Code)

Omaha District, Corps of Engineers, 6014 U.S.P.O. & Court House,
215 No. 17th St., Omaha, Nebraska 68102

5. PROJECT TITLE AND LOCATION

OMC Waukegan Harbor Superfund Project
Waukegan, IL

6. CONTRACT FOR (General description of services to be provided)

Services in connection with Design, Operation and Maintenance and Site Closure for the Outboard Marine Corporation (MC), Waukegan Harbor Superfund Project at Waukegan, Illinois more specifically described in Title I, Appendix "A" and Supplement to Appendix "A" attached hereto.

7. CONTRACT AMOUNT (Express in words and figures)

TITLE I: FIVE HUNDRED THIRTY ONE THOUSAND FIVE HUNDRED FORTY TWO DOLLARS $531,542, TITLE I: OPT-FIN DES: SIX HUNDRED SIXTY THREE THOUSAND EIGHT HUNDRED FORTY ONE DOLLARS $663,841

8. NEGOTIATION AUTHORITY

This contract was negotiated under and is authorized by 10 USC 2304(a)(4).

9. ADMINISTRATIVE, APPROPRIATION, AND ACCOUNTING DATA

Payment: To be paid by: Finance & Accounting Br, USAED Omaha, PO Box 547, DTS, Omaha, Nebraska 68101.

The supplies and services to be obtained by this instrument are authorized by, are for the purposes set forth in, and are chargeable to the following allotment, the available balance of which is sufficient to cover the cost of the same:

6X3122 BZ5933820000000

10. The United States of America (called the Government) represented by the Contracting Officer executing this contract and the Architect Engineer agree to perform this contract in strict accordance with the clauses and the documents identified as follows, all of which are made a part of this contract

Title I, pages 1-2

Appendix "A", pages A-1 - A-12

Supplement to Appendix "A", pages S-1 - S-15

Contract Clauses, Index page and pages 1-28

The following Clause is added to the contract as follows:

The Government will hold harmless and indemnify the Architect-Engineer against claims (including expenses of litigation or settlement) by third persons (including employees of the Architect-Engineer) for death, bodily injury, or loss of or damage to property arising out of performance of this contract, to the extent that such a claim is not compensated by insurance or otherwise and does not arise from actions that constitute gross willful negligance by the Architect-Engineer. Any such claim within deductible amounts of the Architect-Engineer's insurance will not be covered under this clause. Reimbursement for such liabilities to third persons will not cover liabilities for which the Architect-Engineer has failed to insure as required or to maintain insurance as approved by the Contracting Officer.

Reimbursement for any liabilities under this clause will not exceed "CERCLA" appropriations available (i.e. unobligated) at the time such liabilities are represented by final judgements or by settlements approved in writing by the Government. This agreement to reimburse the Architect-Engineer for certain liabilities will not be interpreted as implying that Congress will, at later date, appropriate funds sufficient to meet deficiencies.

If the parties to this contract are comprised of more than one legal entity, each entity shall be jointly and severally liable under this contract. The parties hereto have executed this contract as of the date recorded in Item 2.

	SIGNATURES	NAMES AND TITLES (Typed)
	11. ARCHITECT-ENGINEER OR OTHER PROFESSIONAL SERVICES CONTRACTOR	
A	Bruce A Weber	Bruce A. Weber, P.E., President
B		
C		
D		
	12. THE UNITED STATES OF AMERICA	
DEC 31	Roger B. Whitney	ROGER B. WHITNEY, LTC, CE Deputy District Engineer Contracting Officer

STANDARD FORM 252 BACK (REV. 10-83)

TITLE I

1. Description of Work.

The Architect-Engineer shall, upon receipt of Notice to Proceed, perform all the services required under this contract for the preparation of Concept Design with option for Final Design for Operation and Maintenance and Site Closure for the Outboard Marine Corporation (OMC) Waukegan Harbor Superfund project located at Waukegan, Illinois (hereinafter referred to as the "Project") and more specifically described in Appendix "A" which is attached hereto and made a part of.

2. Statement of Architect-Engineer Services.

The Architect-Engineer shall perform the following services:

Design and prepare Concept Design Documents with option for Final Design Documents for the Project as explained in detail in the Appendix "A".

3. Period of Service.

The Architect-Engineer shall complete all work and services under this contract as follows:

Complete and submit Concept Design Documents 90 days after receipt of Notice to Proceed.

Submit Final Design Documents for Initial Review 120 days after receipt of Notice to Proceed for optional services.

Complete Final Project Documents 15 days after approval of Final Design Documents.

4. Payment.

In consideration of the performance of his undertakings under this Title I, the Architect-Engineer shall be paid the following sums which shall constitute complete payment for all services required to be performed under this Title I and all expenditures which may be made and expenses incurred except as are otherwise expressly provided herein.

a. The Architect-Engineer shall be paid the sum of Five Hundred Thirty One Thousand Five Hundred Forty Two Dollars ($531,542.00) for Concept Design Documents.

b. The Architect-Engineer shall be paid the sum of Six Hundred Sixty Three Thousand Eight Hundred Forty One Dollars ($663,841.00) for optional Final Design Documents.

5. Requirements for Registration of Designers.

The design of architectural, structural, mechanical, electrical, civil, or other engineering features of the work shall be accomplished and reviewed and approved by architects or engineers registered to practice in the particular professional field involved in a State or possession of the United States, in Puerto Rico, or in the District of Columbia.

6. Additional Trips.

a. The Architect-Engineer as and when requested in writing by the Contracting Officer, shall furnish technically qualified Architects and/or Engineers to attend conferences, visit the project site, and/or for court appearances during design and construction. These services will include writing of Reports and/or preparation of cost estimates upon return to the Architect-Engineer office. These services will be limited to a maximum effort of 40 Manhours per individual per request. The Architect-Engineer shall be paid as follows:

(1) For professional services, at the rate of Sixty Dollars and No Cents ($60.00) per hour which includes overhead and profit for actual time spent in connection with the project. Each individual will be limited to 8 hours per day.

(2) For travel expenses, at the rate of Seventy Dollars and No Cents ($70.00) per person per calendar day spent in travel status in excess of 24 hours and at the rate of Twenty-Three Dollars and No Cents ($23.00) per person per calendar day for travel of less than 24 hours but more than 10 hours when no lodging is required. No per diem will be paid for travel of less than ten hours.

(3) For transportation, the actual cost thereof by public conveyance; plane (limited to tourist class, when applicable) or train. Fares are to be supported by transportation receipts. Use of privately-owned vehicle will be paid for at the rate of Twenty Cents (20¢) per mile; mileage based on speedometer readings certified by the Architect-Engineer and approved by the Contracting Officer.

(NOTE: In connection with subparagraphs 6a(1) and 6a(2) above, a travel itinerary shall be furnished with invoice for payment. The provisions of Contract Clause 21 will not apply to payments under subparagraph 6a above. All payments under Clause 21 will be made upon presentation of properly signed invoices therefor.)

SCOPE OF SERVICES
FOR
CONTRACT NO. DACW45-84-C-0168
OMC-WAUKEGAN HARBOR SUPERFUND SITE
WAUKEGAN, ILLINOIS
APPENDIX "A"
21 AUGUST 1984

1. Project Description. The Architect-Engineer (A-E) shall conduct all necessary travel, professional analysis and perform all work required to prepare Concept (30%) Design Documents for the removal, handling and disposal or on-site containment of polychlorinated biphenyl (PCB) contaiminated soils and harbor sediment from the property of the Outboard Marine Corporation (OMC) and within Waukegan Harbor in Waukegan, Illinois. The extent of the work shall be as defined in the Conceptual Design, OMC Hazardous Waste Site, Waukegan, Illinois, dated 29 June 1984 as prepared for the U.S. Environmental Protection Agency by CH2M-Hill Consultants, and as further clarified and directed in this Appendix "A". Upon approval of the Concept Design Documents, and at the option of the Contracting Officer, Omaha District, Corps of Engineers, the A-E shall prepare final plans and specifications for construction/cleanup activities.

2. Details of Performance. Plans and specifications shall be prepared for a construction/cleanup contract to accomplish on-site remedial action as described in the Conceptual Design reference in paragraph 1, Project Description, above. Additionally, the A-E shall prepare a Site-Specific Quality Management Plan (SSQMP), a Site-Specific Safety Plan (SSSP), and a Final Site Closure Plan. Major items for consideration are as listed below:

a. Design and related activities for the following construction/cleanup actions.

(1) Action 1. Slip No. 3 and Upper Harbor - Remove, fix and dispose off-site.

a. Construction of a single pile cofferdam in localized area.

b. Installation of a sediment disposal control device at eastern end of Slip No. 3.

c. Construction of a clay-lined curing cell and batch plant on vacant OMC property.

d. Clamshell dredging within cofferdam and adjoining areas of high concentration to remove deep contaminated sand and silt.

e. Transportation of dredged material to batch plant.

f. Fixation in curing cell by addition of a hydrating agent.

g. Transportation and disposal of fixed solids in licensed chemical waste landfill).

h. Pumping and piping for removal of water from interior of cofferdam and routing to waste water treatment plant.

(2) Action 2. Slip No. 3 and Upper Harbor - Dredge, dewater and dispose in Parking Lot Area.

a. Construction of a clay-lined dewatering lagoon on vacant OMC property.

b. Installation of a sediment dispersal control device at the south end of the Upper Harbor.

c. Hydraulic dredging of sediment from the central and eastern portions of Slip No. 3 and pumping of sediment slurry through a pipeline to the dewatering lagoon.

d. Removal of sediment from Lagoon Area 1, fixation at batch plant, curing in cells, transportation, and disposal in Parking Lot Area.

e. Routing and treatment of supernatant, rainwater and leachate from dredging and dewatering process.

(3) Action 3. North Ditch Area - Remove hot spots and dispose off-site.

a. Placement of a dewatering system in area to be excavated.

b. Construction of a braced excavation system in localized areas of Crescent Ditch/Oval Lagoon Area.

c. Removal of highly-contaminated soil by backhoe from within braced excavation areas.

d. Transportation and disposal of material in licensed chemical waste landfill.

e. Routing and treatment of water from dewatering system.

(4) Action 4. North Ditch Area - Contain and cap.

a. Construction of a runoff water bypass to divert surface water around highly-contaminated areas of Crescent

Ditch and Oval Lagoon and collect surface runoff from Parking Lot Area.

b. Placement and compaction in Parking Lot Area of soil excavated for bypass construction.

c. Construction of a containment cell around Crescent Ditch/Oval Lagoon Area including a slurry wall and clay cap.

d. Installation of groundwater monitoring wells.

e. Routing and treatment of water from dewatering system.

(5) Action 5. Parking Lot Area - Contain and cap.

a. Construction of a containment cell around Parking Lot Area including a slurry wall and clay cap.

b. Installation of groundwater monitoring wells.

b. Development of Site-Specific Quality Management Plan (SSQMP).

(1) A-E shall develop a separate plan (SSQMP) which will assure that the construction/cleanup contractor collects, analyzes, and documents chemical data in such a way that it is scientifically and legally defensible.

(2) SSQMP is to be used by the Corps of Engineers (Corps) construction personnel as a tool to manage and review contractor submittals and activities.

(3) Specific guidance is provided in the inclosed Appendix "B" from Draft ER 1110-2-246 for development of the SSQMP.

c. Development of Site-Specific Safety Plan (SSSP).

(1) A-E shall develop a separate plan (SSSP) to address on-site health and safety requirements for all personnel to be involved in the project during construction/cleanup.

(2) Specific guidance for development of this plan is presented in inclosed ER 385-1-92, Appendix "A".

d. Development of Site Closure Plan for completed construction/cleanup project.

(1) A-E shall develop a Site Closure Plan for the completed project to include applicable requirements of the Resource Conservation and Recovery Act (RCRA).

(2) Long-term monitoring, testing, and maintenance requirements shall be developed for use by responsible government agencies.

(3) Additional requirements for development of this plan shall be as listed in 40 CFR, Part 264, subparts F, G, and N.

Additional general design guidance may be provided by the Omaha District on specific details of format and organization of plans and specifications. The attached "Supplement to Appendix 'A'" includes a list of applicable design criteria and specific Engineering Instructions for this project and is made a part of this Appendix "A".

3. Cost Limitation. This project is programmed at $17,800,000. This amount includes the total estimated construction cost plus allowances for contingencies and supervision and administration. If design indicates this limitation will be exceeded, the A-E will advise the Contracting Officer with recommendations for reduction of cost.

4. Project Engineer. The A-E shall assign a member or employee who will be known as the Project Engineer or Project Manager. This individual will oversee the correlation of the entire project design, administer all instructions from this office, and answer or obtain answers to all questions from this office during and after the design work.

5. Auxiliary Requirements.

a. Name of Project. The following project title shall be included on each sheet of project drawings and on the Design Analysis:

Hazardous Waste Containment/Cleanup
OMC - Waukegan Harbor
Waukegan, Illinois

b. Drawing Numbers. Drawing numbers will be assigned by the Omaha District when requested by the A-E.

c. Construction Time & Schedule. The A-E shall indicate in the Design Analysis and the final specifications the recommended construction time for completion of this project. Additionally, the Design Analysis (both Concept and Final) should address the optimum construction scheduling to ensure timely completion of the project. A suggested construction sequencing schedule should also be included in the final specifications.

d. Price Schedule. The price schedule shall be set up on the lump sum (LS) basis, as shown in the "Estimating Guide", except when unit price bid items are required. In projects where unit price bid items are required, the A-E shall insert measurement and payment paragraphs in the appropriate

specification sections involved, and include quantitites and unit price bid items in the bid schedule.

e. Construction Contract Organization. The A-E shall determine if there is a need for multiple construction contract bid packages to better facilitate completion of all phases of ths project. This determination should be made during criteria review and initial design to avoid lost effort during project development.

6. General.

a. Travel. The A-E will perform the following travel as part of the contract requirements, and the cost thereof shall be included with the contract cost for Title I.

(1) Responsible representatives of the A-E firm from the appropriate disciplines shall attend conferences and/or make the following listed trips:

To discuss preparation of the cost estimates associated with the project, in the Omaha District Office, within one month of Notice-to-Proceed.

To inspect the site of work, in the early stages of design to verify existing conditions.

To attend Final Design Review Conference in the Omaha District Office.

To make a Plan-in-Hand Survey after final design at the project site.

(2) Additional trips (required by the Contracting Officer) to attend review conferences or provide on-site technical assistance during design, or during construction, will be paid for at the rate shown in Title I.

b. Plan-in-Hand Inspection. The A-E shall make a Plan-in-Hand field inspection of the project during the period directed by the Contracting Officer, which will be either just prior to, or immediately after advertising to determine that plans and specifications reflect true site conditions and requirements for construction. The A-E shall notify the Contracting Officer of the date the inspection will be made. The A-E shall furnish a complete report of Plan-in-Hand Inspection with a statement showing any conflicts or corrections required to be made and signed by the A-E and the Corps' representative that the inspection has been made.

c. Review of Progress and Technical Adequacy.

(1) At appropriate times, representatives of the Contracting Officer may review the progress and technical adequacy of the work. Such review will not relieve the A-E from performing all contract requirements, except as may be waived by written instruction.

(2) Upon receipt of Notice-to-Proceed, the A-E shall prepare a progress chart to show the proposed schedule for completion of design. The progress chart shall be prepared in reproducible form and submitted for approval. The actual progress shall be updated and submitted by the 15th of each month and may be included with the request for payment. Progress charts must be revised to reflect modifications and other approved changes in scheduling.

(3) The A-E, under this contract, will interpose no objection nor restriction to the Contracting Officer's designation of another A-E for the purpose of reviewing the adequacy and corrections of the work performed under this contract.

d. Review of Advertised Project Plans and Specifications. After submittal of the Final Design Docuemnts, the A-E shall completely review the advertised project plans and specifications. Any comments or corrections found in this review shall be furnished to the Contracting Officer in such form that an amendment can be issued therefrom not later than the midpoint of the advertising period. If the amendment is being prepared by the A-E, all such corrections shall be included therein.

e. Errors in Design. If, in the opinion of the Contracting Officer, an error which is clearly the fault of the A-E is encountered in the design plans during the construction stage of the project, the Contracting Officer may direct the A-E to immediately contact the Area Engineer or other Government representatives at the site of the project for the purpose of rectifying the mistake. The A-E shall perform such services in the manner directed by the Contracting Officer at no additional cost to the Government and on an expedited schedule. In the event that the A-E should dispute the Contracting Officer's decision in this regard, it shall be considered a dispute concerning a question of fact within the meaning of the Disputes Article of this contract and, pending final decision of the dispute, the A-E shall proceed diligently with the work and services in accordance with the decision of the Contracting Officer.

f. Conference Notes and Confirmation Notices.

(1) Conference Notes. The A-E will be responsible for taking notes and preparing the reports for all conferences. Conference notes will be prepared in typed form and the original furnished this office (within five days after date of conference) for concurrence and distribution to all attendees. This report shall include the following items as a minimum:

(a) The date and place the conference was held with a list of attendees. The roster of attendees shall include name, organization, and telephone number.

(b) Written comments presented by attendees shall be attached to each report with the conference action noted. Conference action shall be "A" for an Approved comment, "D" for a Disapproved comment, "W" for a comment that has been Withdrawn, and "E" for a comment that has an Exception noted.

(c) Comments made during the conference, or decisions affecting criteria changes, must be recorded in the basic conference notes. Any augmentation of written comments should be documented by the conference notes.

(2) Confirmation Notices. The A-E will be required to provide a record of all discussions, verbal directions, telephone conversations, etc., participated in by the A-E and/or his representatives on matters relative to this contract and the work, irrespective of whom the other participants may have been. These records entitled "Confirmation Notices," will be numbered sequentially and shall fully identify participating personnel, subject discussed, and any conclusions reached. The A-E shall forward to the Contracting Officer or his representative as soon as possible (not more than five work days), a reproducible copy of said confirmation notices. Distribution of said confirmation notices will be made by the Government.

g. Federal, State and Local Pollution Abatement Criteria and Environmental Permits. The A-E shall ensure that the project is in full compliance with the requirements of all Federal, state and local clean air, clean water and solid waste disposal standards and the Federal Endangered Species Act. All applicable standards and criteria shall be obtained and reviewed by the A-E. The A-E shall identify, in the Design Analysis, the following:

(1) The Permitting Authority(ies).

(2) Construction/Operating Permits Required.

(3) Time required by the permitting agency(ies) to process the application(s).

(4) Fee schedule including filing/application fees, emissions fees, certification testing, etc.

(5) Monitoring and/or compliance testing requirements.

(6) Actual agency regulations governing applications, exemptions, variances, etc.

Should permits be required, the A-E shall obtain all required application forms, complete all technical sections and provide the partially completed forms to the Omaha District. The A-E shall prepare all supporting material required for the applications including emission surveys, diagrams, pollutant load calculations, etc.

The A-E shall notify the Omaha District of any major discrepancies existing between the A-E Instructions and the pollution abatement criteria.

Copies of all correspondence from permitting agencies which either details permit requirements or indicates that no permits are necessary shall be furnished to the Omaha District by the A-E.

h. Designers and Checkers are required to put their full names on the first sheet of the Design Analysis, calculations, and estimates and initial the following sheets. The designer and checker may not be the same individual. Each sheet should be dated.

i. Mailing Design Documents. Design documents shall be mailed to all reviewers via a carrier service that will provide overnight service, such as Express Mail. A list of reviewers and addresses will be furnished by the Government.

j. Drawings. Blank sheets of paper or mylar will be furnished the A-E by the Government in sufficient quantity for all drawings.

k. Value Engineering Review. The purpose of a Value Engineering (VE) Review is to identify special high-cost items in a design that might be modified to produce a savings. The identified items can be such as to allow either an immediate adoption, or be subject to a VE study prior to a final decision. The VE study, when authorized, is separate from the review and will be subject to a separate price negotiation. Factors involved in approval of identified items for adoption or study are (1) estimated savings, (2) difficulty implementing in design, and (3) technical adequacy. The VE review will be made on the design criteria. The review shall be done by a team with representives of the engineering disciplines appropriate to the project. All must have a cost awareness in their specialty. The team leader must have demonstratable experience in Value Engineering Reviews to the satisfaction of the Contracting Officer. The team will spend sufficient time together and separately to consider components, identifying features, and systems that significantly increase costs without a proportional benefit. A report must be presented in sufficient detail to document review deliberations. The report will be submitted to the Contracting Officer three (3) weeks after the Notice to Proceed and shall include a list of:

(1) The recommended features for study of immediate adoption supported by:

Possible savings.
Possible alternative(s).
Implementation problems.

(2) The areas considered, but where no items were identified for change.

(3) The areas not covered because of review limitations.

7. Concept Design. Concept Design Documents representing approximately 30% design will be prepared for review during an On-Board Rview Conference to be held at the offices of the A-E. Concept documents will include drawings, outline specifications, design analysis, cost estimate, a Draft Site-Specific Quality Management Plan (SSQMP), a Draft Site-Specific Safety Plan (SSSP), and a Draft Site Closure Plan. The A-E will not proceed with Final Design until the Concept Design has been approved.

a. The Drawings will be sufficiently complete to permit meaningful evaluation of major design aspects. A minimum of ten (10) sets of drawings should be available for review at the On-Board Review Conference.

b. Design Analysis. The tabulation of criteria, design analysis, and outline specifications shall be assembled into one document and identified as the Concept Design Analysis. Criteria information provided by the Omaha District need not be reiterated, although it should be referenced as appropriate. A separate section shall be added listing unresolved items or criteria required to complete the Final Design. Ten (10) copies of the Concept Design Analysis and design calculations should be available for review at the On-Board Review Conference.

c. Concept Estimate. The concept estimate shall be prepared and submitted based on requirements provided in the attached Supplement to Appendix "A", the A-E Instruction Manual, Chapter XII "Estimating Guide", and additional instructions obtained from the Omaha District estimators during the required meeting early in the design process. Six (6) copies of the estimate and backup should be available for review at the On-Board Review Conference.

d. Site-Specific Quality Management Plan (SSQMP). A Draft SSQMP shall be submitted for review at the time of the On-Board Review Conference. Information shall be presented in sufficient detail to determine if all required aspects of Chemical Data Quality Management have been addressed. Two (2) copies of the draft plan should be available for review at the On-Board Review Conference.

e. Site-Specific Safety Plan (SSSP). A Draft SSSP shall be submitted for review at the time of the On-Board Concept Review Conference. Information shall be of sufficient detail to ensure that all aspects of on-site health and safety requirements during construction/cleanup have been adequately addressed. Two (2) copies of the draft plan should be available for review at the On-Board Review Conference.

f. Site Closure Plan. A Draft Site Closure Plan shall be submitted for review at the On-Board Concept Review Conference. This plan should be developed based on available design information at the concept design stage and should address all significant requirements of RCRA and 40 CFR, Part 264, subparts F, G, and N. Two (2) copies of the draft plan should be available for review at the On-Board Review Conference.

8. Optional Requirements.

a. Final Design. Final Design Documents will be submitted for review and will include final drawings, marked-up guide specifications, typed specifications, Design Analysis, and control estimate. After review, the A-E shall make the necessary corrections and submit the necessary documents with reproducibles ready for advertisement. See Document Submittal and Distribution Sheet for mailing of documents for review.

(1) Drawings. At completion of design and after all checking and coordinating have been completed by the A-E, prints shall be furnished for review purposes as shown on the Submittal and Distribution Sheet. Marked prints will be returned to the A-E for correction of tracings. After corrections have been incorporated, the A-E shall furnish three (3) sets of prints and the original tracings to the Contracting Officer. The A-E shall also return all the marked-up prints as evidence that the plans have been completely checked in accordance with the instructions contained in Chapter I of the A-E Instruction Manual.

(2) Specifications shall be prepared from guide specifications furnished by the Omaha District, where applicable, and in conformance with instructions contained in Chapter XI of the A-E Instruction Manual. The up-to-date guide specifications which are to be used for preparing the project specifications will be furnished upon design initiation. For items of work for which guide specifications are not available, the A-E will be responsible for developing technical specifications using the same format as guide specifications. A typed draft of the complete specification, consisting of specification guides marked (edited) and (4) copies of the typed specifications shall be furnished directly to the Omaha District. Additional copies for review shall be furnished as shown on the Submittal and Distribution Sheet. Reviewed and corrected drafts will be returned to the A-E for typing in final form on bond paper. The marked edited guides are to be returned with the typed specifications. Four (4) reading copies from the completely typed specifications (one loose and three (3) bound) shall be furnished with the bond copy when the completed Design Documents are submitted.

(3) Final Design Analysis shall be in accordance with Chapter X of the A-E Instruction Manual. Copies of the Final Design Analysis and the design calculations will be submitted for review as shown on the Submittal and Distribution Sheet. After

making any corrections required, reproducibles of each will be furnished when the project is awardec.

(4) Estimates.

(a) The estimate submitted at the time of the Final Design Review will be called a Final Design Estimate, and will be prepared in the format indicated in the attached "Supplement to Appendix 'A'" and the "Estimating Guide". Copies of the summary sheet(s) of the estimate and backup of the estimate will be submitted for review as shown in the Submittal and Distribution Sheet.

(b) A revised Final Design Estimate will also be required with the submittal of the checked and corrected final working drawings if there has been a significant change from the previous submittal.

(c) The Final Estimate will be based on the advertised plans and specifications including Amendment No. 1. It will include any changes made by the District during Final Design Review, and should reflect latest prices available. The Final Estimate must fit the Specification Bid Form and be submitted to arrive not later than fifteen (15) days prior to scheduled opening of bids and in the number of copies indicated in the "Estimating Guide." The Final Estimate format will be as indicated on the attached "Supplement to Appendix 'A'".

(5) Site-Specific Quality Management Plan (SSQMP). A Final SSQMP shall be submitted for reiew by appropriate Corps personnel concurrent with submittal of other Final Design Documents. The Final Plan shall have incorporated or addressed all Concept review issues and shall be in a form which will be useable by Corps construction management personnel during the construction/cleanup phase of the project. Four (4) copies of the Final SSQMP shall be provided to the Omaha District for review purposes. The A-E shall correct any discrepancies or omissions identified during final review and submit a corrected version to the Omaha District.

(6) Site-Specific Safety Plan (SSSP). A Final SSSP shall be submitted for review by appropriate Corps personnel concurrent with submittal of other Final Design Documents. The Final Plan shall have incorporated or addressed all Concept review issues and shall be in a form which will be useable by Corps construction management personnel during the construction/cleanup phase of the project. Four (4) copies of the Final SSSP shall be provided to the Omaha District for review purposes. The A-E shall correct any discrepancies or omissions identified during final review and submit a corrected version to the Omaha District.

(7) Site Closure Plan. A Final Site Closure Plan shall be submitted for review concurrent with submittal of other

Final Design Documents. The Final Plan shall have incorporated or addressed all Concept review issues and shall be in a form which will satisfy all applicable requirements under RCRA and 40 CFR, Part 264, subparts F, G, and N, and which will be useable as criteria for long-term monitoring, operation, and maintenance of the site. Six (6) copies of the Final Plan shall be provided to the Omaha District for review purposes. The A-E shall correct any discrepancies or omissions identified during final review and submit a corrected version to the Omaha District.

CONTRACT NO. DACW45-84-C-0168
OMC-WAUKEGAN HARBOR SUPERFUND SITE
WAUKEGAN, ILLINOIS
SUPPLEMENT TO APPENDIX "A"
21 AUGUST 1984

The following data and criteria are furnished the Architect-Engineer (A-E) for guidance in design. Deviation from the criteria will be permitted only when actual field conditions require such a change or other factors. Proposed deviation with justification shall be submittd to the Contracting Officer for approval.

- Preliminary design calculations for North Ditch drainage bypass prepard by Weston Consultants, dated February 1982.
- Conceptual Design - OMC Hazardous Waste Site, Waukegan, Illinois, dated 29 June 1984.
- Plans and specifications for "Dredging and Water Treatment for Removal of PCB Contamination in Waukegan Harbor", dated 5 June 1981, as prepared by Mason & Hanger-Silas Mason Co., Inc.
- Plans and specifications for "Lagoon and Treatment Facility for Removal of PCB Contamination in Waukegan Harbor", dated 15 June 1981, as prepared by Mason & Hanger-Silas Mason Co., Inc.
- Plans showing layout and design of water treatment equipment and dewatering lagoon, dated 14 December 1981, as prepared by Weston Consultants.
- Architect-Engineer Instruction Manual, dated June 1983.
- Omaha District Standard Legend Sheet.
- Abbreviations.
- Electrical Design Analysis Guide.
- Water Line Details.
- Sanitary Sewer Details.
- Technical Manuals for A-E Design Guidance, Master Checklist.
- Master List of Specifications Sections.
- Sample Civil Works Estimate No. CW-1 & CW-2.

- Technical Manuals:

TM 5-813-5	Water Distribution Systems
TM 5-813-6	Water Supply for Fire Protection
TM 5-814-1	Sanitary and Industrial Waste Sewers
TM 5-814-3	Domestic Wastewater Treatment
TM 5-809-1	Load Assumptions for Buildings
TM 5-809-3	Masonry Structural Design for Buildings
TM 5-809-10	Seismic Design for Buildings
TM 5-809-12	Concrete Floor Slabs-on-Grade Subject to Heavy Loads

- Specifications for Guidance:

OD 200.02	Removal and Disposition of Equipment and Materials from Existing Buildings
Front End & Non-Technical Specification Data	
CE-300.01	Plumbing, General Purpose
CE-303.01	Electrical Work, Interior
CE-303.20(Int)	Generating Sets, Diesel Electric, Stationary 10-99 KW, with Auxiliaries
CEGS-02110	Demolition
CEGS-02201	Excavation, Filling and Backfilling for Buildings
CEGS-03300	Concrete for Building Construction
CE-16262	Automatic Transfer Switches
CEGS-16263	Diesel-Generator Set, Stationary 100-2500 KW, with Auxiliaries
CEGS-16401	Electrical Distribution System, Aerial
CEGS-16402	Electrical Distribution System, Underground
CEGS-16721	Fire Detection and Alarm System

- Appendix "B" to Draft ER 1110-2-246, Guide for Site Specific Quality Management Plan (SSQMP).

- ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous Waste Site Remedial Actions.

- Typical Test Hole Data - Soils Investigation

Specific Design Instructions. The following specific design instructions apply to the items being designed under this contract:

1. Soils Investigation for Structural Design.

a. The subsoil investigation and geotechnical report for structural design of any required facilities is the responsibility of the A-E. The scope of work includes drilling and sampling, laboratory testing, analyses, and presentation of the subsoils information on the drawings. Prior to commencing the subsoil investigation, the A-E shall submit the proposed boring location plan and anticipated testing program for review.

b. Drilling. Generally, the explorations shall be made by machine borings capable of recovering and undisturbed samples at least three (3) inches in diameter for testing purposes. The depths and number of holes to be made shall depend on the size of the building and its structural loads. A minimum of 2 borings shall be sited within the proposed building plan and advanced to a depth of at least 20 feet below the proposed finished floor level. A minimum of 2 borings shall be sited within the proposed paved areas and along utility alignments and advanced to a nominal depth of 10 feet below proposed final grade.

c. Sampling.

1. Standard penetration tests shall be made in all borings. Standard penetration tests shall be taken every 2.5 feet for the first 10 feet, then every 5 feet for the remaining depth of the borings. No standard penetration test shall bottom within 0.5 foot of a potential undisturbed sample zone. Standard penetration tests shall be taken according to ASTM D 1586-67. A disturbed sample shall be taken from each split spoon sample. These samples shall be sealed airtight.

(a) Representative undisturbed 3-inch diameter Shelby tube samples shall be taken of each cohesive soil stratum. Standard penetration tests shall not be taken at the undisturbed sampling depths. However, if the material encountered is not conducive to undisturbed sampling then standard penetrations shall be taken. Shelby sampling shall be according to ASTM 1587-74.

(b) If refusal is encountered during drilling or sampling, an attempt shall be made to identify the material as to its type and occurrence (bedrock, boulder, etc.).

(c) Soil resistivities shall be determined at 2 locations within the proposed site. These tests shall be performed in accordance with ASTM G57-78 using the Wenner Four Electrode Array and "a" spacings of 2.5, 5 and 10 feet. The actual locations and results of the tests shall be shown on the final drawings.

(d) A complete and accurate field log for each boring shall be prepared. Each log shall include name of size and type of bit used, diameter of boring, location of each sample, standard penetration test numbers, water level information (include time-lapse between completion of drilling and measurement), and description of the materials. Soil materials shall be classified using the Unified Soil Classification System. Soil descriptions to follow ASTM D 2488-69. Rock descriptions to use nomeclature prescribed in ASTM C 294-69. Description of material shall include classification, consistency, plasticity, moisture content, color, etc.

(e) Ground-water information shall be recorded during drilling. The depth at which water is first encountered and the water level at completion of drilling shall be recorded on the drill log. All borings shall be left open for 24 hours at which time a final water level measurement shall be taken just prior to backfilling the holes. The holes shall be backfilled with approved material and the drill cuttings shall be disposed of as approved by the Base representative.

d. Testing. The disturbed samples shall be tested for moisture and classified. Classification tests shall consist of visual, mechanical analysis and Atterberg limit tests. Testing and classification of the soils shall be in accordance with the Unified Soil Classification System described in ASTM D2487-69 (R75). The undisturbed samples shall be tested for classification, moisture, unconfined compression and consolidation in sufficient detail to adequately determine the supporting capacity and foundation characteristics of the soils beneath structures. Unconfined compression and consolidation tests shall be made in accordance with ASTM Standards D2166 and D2435.

e. Geotechnical Report. The subsoil investigation shall be included verbatim in the Design Analysis prepared by the A-E. A discussion shall be included in the geotechnical report stating how the A-E arrived at the design parameters. This discussion should include any special studies such as settlement studies or shear computations which guided the A-E in his decision. Allowable soil bearing values shall be determined for each level of footings below finish grade. The laboratory test results on the disturbed or undisturbed samples, together with all results of studies mentioned above, shall be included in the geotechnical report. A draft of that portion of the Design Analysis dealing with the foundation design shall be submitted, "Attn: F&M Branch" two (2) weeks in advance of the submittal of preliminary plans for approval. This will include drawings showing the location and logs of borings. The geotechnical report shall be prepared with sections according to the following format:

1. Introduction
2. Proposed Construction
3. Drilling and Sampling
4. Lab Testing
5. Site Conditions (Geology, Soils, and Ground Water)
6. Foundation Recommendations

Appendices

f. Drawings. The A-E shall present the boring location plan, soil boring logs, and related subsurface data on the construction drawings. Included on the drawings shall be the locations and logs of borings which are representative of the expected foundation conditions beneath the buildings to be constructed. The elevation of top holes and water table, if encountered, shall be shown on the drawings. A schematic sketch

of the proposed structures shall be drawn on the boring log profile, showing the relationship of the footings to the foundation soils, thus indicating required grades, cuts or fills and stratas of soils on which footings will bear. The format for the soil borings shall be as shown on the inclosed sample.

2. Selection and Specification of Synthetic Liners.

a. References for selection and specificatiion of Synthetic Liners:

(1) U.S. Environmental Protection Agency, Lining of Waste Impoundment and Disposal Facilities, SW-870, Cincinnati, Ohio, November, 1982.

(2) Kays, William B., Construction of Linings for Reservoirs, Tanks, and Pollution Control Facilities, John Wiley & Sons, New York, New York, 1977.

(3) National Sanitation Foundation, NSF Standard for Flexible Membrane Liners (FML), National Sanitation Foundation, Ann Arbor, Michigan, April, 1983 (proposed).

b. At the present time, no Corps of Engineers standard practice, manual, or criteria is available for selecting and specifying synthetic liners. Selection and design should be based on current engineering practice and EPA guidance/research.

c. If suitable for the proposed use, more than one material should be selected and specified to encourage competition among suppliers and between materials. The selection process shall be documented in the design analysis and specific reasons for non-selection of a given material shall be included.

d. Specification of physical properties shall be based on the most recent issue of the National Sanitation Foundation proposed concensus standards.

e. Specifications shall include, as a minimum, the following items:

(1) Materials.

(a) Generic chemical composition for each material.

(b) Mil thickness.

(c) Scrim size and weight (if used).

(2) Placement.

(a) Contractor experience reequirements, both lining manufactorer and installer, if different.

(b) Subgrade preparation details.

(c) Joint and seams.

(d) Repairs.

(3) Submittals.

(a) Test results.

(b) Shop drawings.

(4) Physical Properties - use NSF Standards.

(5) Quality Control.

(a) Air-lance.

(b) Vacuum Box.

f. A guide specification for flexible membrane liners has been prepared. This must be edited for proper materials and corresponding material specific construction practices.

3. Site Planning.

a. Topographic Survey and Site Plan. Topographic surveys showing all existing structure and utilities will be furnished by the Government to the A-E. This survey shall be used to develop and prepare site design for the project.

4. Cost Estimates.

a. General. An estimate and estimate summary sheet will be required with each design submittal (30 percent, 95 percent, and final (bid) estimate). The estimate format and estimate summary sheet will be similar to that as shown in Civil Examples No. CW-1 and CW-2. One copy of the quantity takeoff sheets, including cross sections from which earthwork quantities were obtained, will be included with each estimate submittal. All work items will be broken down into labor, materials and plant.

b. Design Estimates. All unit prices in the estimate will have backup as to how the unit prices were developed as shown in Civil Examples No. CW-1 and CW-2. Major material cost items will have quotations included with the estimate. Quotations will include source, telephone number, and address. Determine where contaminated materials will be disposed at, haul distance and disposal fee. Determine where the fill will come from, haul distance, and if a royalty will have to be paid for the fill. Labor, material, and plant will be current and localized. Mechanical and electrical labor will be in manhours. If work items are subcontracted, include sub overhead and profit as a separate item. Labor burden and sales tax will be shown as a

separate item. For 60 percent and 100 percent include prime profit in the estimate. Three (3) copies of the estimate will be required. Design estimates will include profit for the prime contractor.

c. Final (Bid) Estimate. The Final (Bid) Estimate will be based on the advertised plans and specifications including Amendment No. 1. It will include any changes made by the District during Final Design Review, and should reflect current prices for labor, material, and equipment. The Final (Bid) Estimate must fit the Specification Bid Form and be submitted to arrive not later than fifteen (15) days prior to the scheduled opening of bids. In the event Amendment No. 1 cannot be included in Final (Bid) Estimate so as to arrive not later than fifteen (15) days prior to the scheduled opening bids, supplemental estimating pages showing the impact of Amendment No. 1 will be submitted to arrive not later than five (5) days prior to scheduled opening of bids. Three (3) copies of the Final (Bid) Estimate will be required. The final (Bid) Estimate will not include prime contractor profit.

5. Specifications.

a. Concept Design Analysis shall be prepared in accordance with Chapter 9 of the A-E Instruction Manual and shall contain outline specifications as required by paragraph 2., Chapter 10 of the A-E Instruction Manual.

b. Final Design Analysis shall be prepared in accordance with Chapter 9 of the A-E Instruction Manual and in general shall include:

(1) Criteria used in the design.

(2) Justification for the design selected including alternatives considered and the reasons for selecting the design shown. If there is a reason for doing something, put it in the design analysis.

(3) Exceptions to criteria documents. Explain reasons for exception.

(4) Results of any economic comparisons, studies, energy analysis, etc.

(5) Any special materials, special site conditions, etc., which require unusual designs. Explain why we are doing what is shown.

(6) Include concept review comments, conference minutes and telephone conversation records applicable to the project as inclosures.

(7) Include all pertinent correspondence relative to design as an inclosure. If this correspondence affects a design decision, reference it in the narrative.

c. Guide Specifications Furnished with A-E Instructions are for design guidance only and the designer must familiarize himself with them before proceeding with the design.

d. Specifications for Final Design shall be prepared using guide specifications requested in accordance with the A-E Instruction Manual, Chapter 10, paragraph 1.c. in order that the latest updated version be used for final editing and preparation of specifications.

e. Removals. All design data concerning removals shall be prepared using proper and uniform terminology. This applicable to all drawings, the design analysis and final specifications.

(1) Clearly indicate all removal items by notes and cross-hatching on the drawings. The limits of removals shall be clearly shown as well as showing all new construction work.

(2) A-E shall check with the Contracting Officer which, if any, removal items are to be salvaged. If items are to be salvaged, such items shall be so identified on the drawings and the salvage area shall be shown and/or specified.

f. Outline Specifications for Concept Design documents shall be prepared in accordance with Chapter 9 and 10 of the A-E Instruction Manual.

g. Specifications for Final Design Documents shall be prepared in accordance with the A-E Instruction Manual.

6. Environmental.

a. Criteria. The following design criteria applies to this project.

(1) Water Supply, Treatment, and Distribution.

TM 5-813-5 Water Distribution Systems

Recommended Standards for Water Works by the Great Lakes-Upper Mississippi River Board of State Sanitary Engineers.

Applicable State Standards.

(2) Outside Fire Protection.

Publication No. 24 National Fire Prevention Association.

TM 5-813-6 Water Supply for Fire Protection

(3) Sanitary and Industrial Sewerage System.

TM 5-814-1 Sanitary and Industrial Waste Sewers
TM 5-814-3 Domestic Wastewater Treatment

Recommended Standards for Sewage Works - Great Lakes-Upper Mississippi River Board of Sanitary Engineers.

Applicable State Standards.

(4) Depth of cover over waterlines and pressure wastewater lines shall be at least that used by local water utility or that recommended by NFPA 24, whichever is greater.

b. Special Instructions. If the above criteria violates regulatory agency requirements, local codes/ordinances, or is contrary to generally accepted local practice, notify Omaha District for resolution prior to proceeding with design.

7. Structural.

a. Unless otherwise stated herein, A-E Instruction Manual, Chapter 5 (Revised June 1983) shall govern all structural design.

b. The structural design shall be developed in accordance with instructions for Original Design in Chapter 5 of the A-E Instruction Manual.

c. TM 5-809-1, "Load Assumptions for Buildings," is furnished for floor live loads and interior partition lateral design loads only. Wind and snow load criteria has been superseded.

d. Wind and snow loads shall be determined in accordance with ANSI A58.1-82. This building shall be classified as a Category I Facility for Load Determinations.

(1) Wind load shall be determined using the following criteria:

(a) Basic wind speed 75 mph.

(b) Exposure "C".

(2) Snow load shall be determined using the following criteria:

(a) Ground snow load 25 psf.

(b) Minimum roof load of 20 psf for construction loadings.

e. Some typical masonry details may be found in TM 5-809-3, Figures 3-8 through 3-12 and Appendix H. Additional masonry details may be found in the attachments to Chapter V of the A-E Instruction Manual. Applicable details shall be used from these

typical details and incorporated into the contract drawings. Supplemental details shall be added as necessary to complete the design. All details used on final contract drawings shall be job specific.

f. The control joint details shown in the A-E Instruction Manual shall be used as required for slabs on grade not subject to heavy static or wheel loadings. Reference TM 5-809-12 for information concerning joint details for concrete floor slabs-on-grade subjected to heavy loads. The appropriate details shall be included on the final contract drawings.

g. Waukegan, Illinois, is in Seismic Zone 1. Seismic loads will be determined using TM 5-809-10.

8. Mechanical.

a. General. Mechanical Design shall be in accordance with the instructions contained herein and the A-E Instruction Manual, Chapter VI (Mechanical). In the event of any conflict in criteria referenced, these instructions will take precedence.

b. Plumbing. Plumbing design shall be in accordance with the National Plumbing Code and OCE Guide Specifications CE 300.01.

c. Heating.

(1) Heating system will be designed in accordance with ASHRAE Guide and Data Books.

(2) Design temperature outside shall be 97.5% extracted from ASHRAE Guide and Data Books.

(3) Heat loss calculations shall use actual design "U" values. Calculations shall be in accordance with the current edition of the ASHRAE Handbook of Fundamentals and/or industry accepted computer program.

9. Electrical.

a. The design shall be in conformance with the Omaha District A-E Instruction Manual and applicable Military Design and Construction Manuals.

b. Design details shall be developed following the criteria and supplemental instructions as initially furnished and as modified or revised at subsequent conferences or by written instructions from this office.

c. Electrical work must conform to the latest edition(s) of the National Electrical Code (NFPA 70-1984) and the National Electrical Safety Code (ANSI C2-1984) as applicable. All design will be based on Ampacity Tables 310-20 thru 310-30.

d. Electrical symbols are to be as shown on the Omaha District Legend Sheet (Std. Dwg. AW00-00-00). Supplemental legends should be provided where the above is not adequate.

e. Electrical plans are to be developed following Omaha District format similar to the sample drawings in the A-E Instruction Manual. Omit inapplicable features. Provide details, equipment layouts, etc., as required for a complete design. Use the standard pole, panel, light fixture schedules as applicable.

f. Electrical work must be coordinated with that to be performed by other disciplines such as mechanical, architectural, structural, and civil during all phases of the design.

g. In order to avoid extensive changes and revisions during the review stage, it is suggested that questions relative to major design features and/or requirements be discussed between the electrical design engineer and the appropriate personnel in the Omaha District Office before considerable design effort is expended.

h. If the referenced standard guide specifications are not sufficient to adequately define the electrical work, the designer shall prepare supplementary material. If the resultant supplementary provisions are not extensive, they may be inserted at appropriate locations into the standard guides; if not, as many new sections as necessary shall be developed in the format of the standard guides. If the amount of exterior work is minor, the guide specifications pertaining to aerial and underground distribution may be combined, at the designers option, into a single specification on exterior electrical work.

i. The design analysis should contain a brief description and analysis of the electrical portions of the design. Special features, unusual requirements, etc., should be noted. If it was necessary to deviate from criteria, reasons should be included also, either in the body or in an appendix. The format of the referenced "Electrical Design Analysis Guide" can be revised and the material consolidated if desired.

j. Energy conservation features must be considered in the electrical design. The extent to which such measures may have been incorporated must be addressed in the electrical portion of the design analysis.

k. A site investigation is recommended. "As-built" information pertaining to existing conditions, locations of utilities, capacities of equipment, etc., should be requested from the Facilities Engineer and verified in the field. Supplement with field sketches, notes, photos, etc., where "as-built" is incomplete or unavailable.

l. Lighting must be shown on separate floor plans from power/communications. This office will grant exceptions for

preliminary design or for applications requiring only a minimal amount of electrical work. NOTE: Contrary to paragraph 4.a.(6)(a) of the A-E Instruction Manual, self-illuminated exit signs containing radio-active materials are not acceptable.

m. The plans and specifications must clearly identify the extent of new work, modifications to existing equipment, demarcation of work that will be performed by the utility, and that to be performed by the contractor. Responsibility for coordination should be spelled out.

(a) Coordination with third parties, such as power company, telephone company, etc.

(b) Interfacing with concurrent or future projects.

(c) Coordination with work that will be performed by other parties.

(d) Restrictions on access to equipment, interruptions of power, interference with User's operations, access to site availability during normal working hours.

(e) Identification and classification of hazardous environments.

(f) Locations of electrical equipment, provisions for separate rooms, closets, and/or other dedicated space.

(g) Fire Alarm and Detection System shall comply with industry standards for Water Treatment Plants.

(h) Luminaire shall comply with industry standards for Water Treatment Plants.

n. Ventilation. Year-around ventilation will be provided for equipment cooling and personnel comfort.

10. Site-Specific Quality Management (For Chemical Data).

a. An extremely important aspect of this project is the management of the chemical data. A quality management plan must be established assuring that the contractors collect, analyze, and document chemical data that are scientifically and legally defensible. This Site-Specific Quality Management Plan (SSQMP) will be in accordance with provisions covered in Appendix "B" of Draft ER 1110-2-246 and applicable EPA and DOT regulations.

b. The A-E shall also prepare a separate section of the specifications dealing with chemical analysis to be known as Chemical Data Quality Management. As a part of this specification, the A-E shall furnish or require the Contractor to furnish, at a minimum, the following:

(1) The quality control organization (including chain-of-command) to be followed by the Construction Contractor.

(2) Qualifications of personnel to be used for this purpose.

(3) Authority, responsibilities of all quality control personnel.

(4) Schedule of inspections.

(5) Proposed analytical methods (exact references and descriptions), names and qualifications (education, training and experience) of technicians and analysts performing each method, specific instrumentation (including manufacturer, model types, accessories, calibrations) and equipment to be used, and Contractor's laboratory facilities.

(6) Proposed sample collection and sampling protocols to ensure representative sampling, handling, storage, trnasfer and recording protocols including chain-of-custody procedures (EPA and/or CoE approved).

(7) Methods of performing, documenting and enforcing quality control operations of the prime contractor and subcontractors including inspection and testing. Lists of percentages and types of internal quality control checks, external quality assurance samples and performance audits are required.

(8) Types and contents of required quality control reports.

(9) As an example, a copy of a letter of direction to the Contractor's representative responsible for quality control, outlining his duties and responsibilities to be signed by a responsible senior officer of the firm.

c. Chemical testing data required during the design phase to adequately design the remedial work required shall be accomplise by the A-E and the above requirements will also apply to this data.

11. Health and Safety.

a. The most important aspect of this project, both during design and construction, is the health and safety of the individuals who will be on-site. The A-E responsible for the design of this project shall review the project information provided and develop a Health and Safety Program sufficient to protect on-site personnel from the physical, chemical, and/or biological hazards particular to this site. If the information made available is insufficient to allow the A-E to develop suchy a program, a description of all additional information required will be prepared and submitted to the Contracting Officer.

b. The Health and Safety Program will take two forms:

(1) The A-E's Site-Specific Health and Safety Plan which will describe the procedures the A-E will utilize to protect his personnel, and the personnel of all subcontractors, from the hazards present on-site. The A-E's Health and Safety Plan shall be reviewed and approved by the Contracting Officer before any on-site activities begin.

(2) The A-E shall prepare a section of the specifications which will describe the minimum health, safety and emergency response requirements for which the Contractor will be made responsible. Where possible, the A-E shall reference the appplicable current standard(s) (e.g., sampling methods, chemical analysis, or health standards). This section of the specification shall include items such as:

(a) Contractor submittal on Health and Safety.

(b) Pertinent Corps, EPA, OSHA requirements.

(c) Reference to Basic Accident Prevention Program and Safety Planning.

(d) Personnel Protection Program, including:

(1) Medical Certification & Surveillance

(2) Industrial Hygiene Support

(3) Employee Training

(4) Level of Protection needed to protect workers from each pathway of contamination.

(5) Subdivision of site into work areas.

(6) Personnel and equipment decontamination.

(7) Emergency responses to foreseeable problems, both on-site and off-site.

(8) Cleaning and maintenance of protective equipment and clothing.

(9) Recordkeeping and reporting.

(e) Sampling and Analytical Techniques to monitor on-site personnel exposure, work area air quality and perimeter airborne contaminants as nececessary for physical, chemical, and biological hazards.

(f) The following are examples of available guidance which can be used:

(1) Part 1910 of 29 CFR revised 1 July 1982, OSHA Standards for General Industry.

(2) NIOSH (National Institute of Occupational Safety and Health) Manual of Analytical Methods, Volumes I-VII.

(3) EC 385-1-192, Safety and Occupational Health Document Requirements for Hazardous Waste Site Remedial Actions, 31 March 1983.

(4) Interim Standard Operative Safety Guides, Office of Emergency and Remedial Response, Environmental Proection Agency, September 1982.

(5) TLV's, Threshold Limit Values for Chemical Substances and Physical Agents in the Work environment with Intended Changes Adopted by ACGIH (American Conference of Governmental Industrial Hygienists), latest edition.

(6) ANSI Z88.2 - 1980, American National Standard Practices for Respiratory Protection.

(7) Civil Works Construction Guide Specification (proposed - draft in progress), "Air Monitoring of Chemical, Physical, and Biological Stressors at Hazardous Waste Sites.

(8) EM 385-1-1, U.S. Army Corps of Engineers Safety and Health Requirements Manual.

(9) Air Sampling Instructions for Evaluation of Atmospheric Contaminants, 6th Edition, 1983, American Conference of Governmental Industrial Hygienists.

(10) Fundamentals of Industrial Hygiene, 2nd Edition, 1979, National Safety Council.

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1.1 DEFINITIONS (1984 APR) (DEVIATION) FAR 52.202-1 ECI 7-070
(The following clause is applicable if the procurement instrument identification number is prefixed by the letters "DACW.")

(a) The term "head of the agency" or "Secretary" as used herein means the Secretary of the Army; and the term "his duly authorized representative" means the Chief of Engineers, Department of the Army, or an individual or board designated by him.

(b) "Contracting Officer" means a person with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the Contracting Officer acting within the limits of their authority as delegated by the Contracting Officer.#

1.2 DEFINITIONS (ALTERNATE I) (1984 APR) FAR 52.202-1
(The following clause is applicable if the procurement instrument identification number is prefixed by the letters "DACA.")

(a) Head of the agency" (also called "agency head") or "Secretary" means the Secretary (or Attorney General, Administrator, Governor, Chairperson, or other chief official, as appropriate) of the agency, including any deputy or assistant chief official of the agency, and, in the Department of Defense, the Under Secretary and any Assistant Secretary of the Departments of the Army, Navy, and Air Force and the Director and Deputy Director of Defense agencies; and the term "authorized representative" means any person, persons, or board (other than the Contracting Officer) authorized to act for the head of the agency or Secretary.

(b) "Contracting Officer" means a person with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the Contracting Officer acting within the limits of their authority as delegated by the Contracting Officer.#

2. OFFICIALS NOT TO BENEFIT (1984 APR) FAR 52.203-1
No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this contract, or to any benefit arising from it. However, this clause does not apply to this contract to the extent that this contract is made with a corporation for the corporation's general benefit.#

3. GRATUITIES (1984 APR) FAR 52.203.3
(a) The right of the Contractor to proceed may be terminated by written notice if, after notice and hearing, the agency head or a

designee determines that the Contractor, its agent, or another representative--

(1) Offered or gave a gratuity (e.g., an entertainment or gift) to an officer, official, or employee of the Government; and

(2) Intended, by the gratuity, to obtain a contract or favorable treatment under a contract.

(b) The facts supporting this determination may be reviewed by any court having lawful jurisdiction.

(c) If this contract is terminated under paragraph (a) above, the Government is entitled--

(1) To pursue the same remedies as in a breach of the contract; and

(2) In addition to any other damages provided by law, to exemplary damages of not less than three nor more than ten times the cost incurred by the Contractor in giving gratuities to the person concerned, as determined by the agency head or a designee. (This subparagraph (c)(2) is applicable only if this contract uses money appropriated to the Department of Defense.)

(d) The rights and remedies of the Government provided in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract.#

4. COVENANT AGAINST CONTINGENT FEES (1984 APR) FAR 52.203-5

(a) The Contractor warrants that no person or agency has been employed or retained to solicit or obtain this contract upon an agreement or understanding for a contingent fee, except a bona fide employee or agency. For breach or violation of this warranty, the Government shall have the right to annul this contract without liability or, in its discretion, to deduct from the contract price or consideration, or otherwise recover, the full amount of the contingent fee.

(b) "Bona fide agency," as used in this clause, means an established commercial or selling agency, maintained by a contractor for the purpose of securing business, that neither exerts nor proposes to exert improper influence to solicit or obtain Government contracts nor holds itself out as being able to obtain any Government contract or contracts through improper influence.

"Bona fide employee," as used in this clause, means a person, employed by a contractor and subject to the contractor's supervision and control as to time, place, and manner of performance, who neither exerts nor proposes to exert improper influence to solicit or obtain Government contracts nor holds out as being able to obtain any Government contract or contracts through improper influence.

"Contingent fee," as used in this clause, means any commission, percentage, brokerage, or other fee that is contingent upon the success that a person or concern has in securing a Government contract.

"Improper influence," as used in this clause, means any influence that induces or tends to induce a Government employee or officer to give consideration or to act regarding a Government contract on any basis other than the merits of the matter.#

5. SUSPENSION OF WORK (1984 APR) FAR 52.212-12

(a) The Contracting Officer may order the Contractor, in writing, to suspend, delay, or interrupt all or any part of the work

representative from the General Accounting Office has taken exception shall continue until such appeals, litigation, claims, or exceptions are disposed of.

7. AUDIT-NEGOTIATION (1984 APR) FAR 52.215-2

(The following clause is applicable if this contract was entered into by negotiation)

(a) Examination of costs. If this is a cost-reimbursement, incentive, time-and-materials, labor-hour, or price-redeterminable contract, or any combination of these, the Contractor shall maintain--and the Contracting Officer or representatives of the Contracting Officer shall have the right to examine and audit--books, records, documents, and other evidence and accounting procedures and practices, sufficient to reflect properly all costs claimed to have been incurred or anticipated to be incurred in performing this contract. This right of examination shall include inspection at all reasonable times of the Contractor's plants, or parts of them, engaged in performing the contract.

(b) Cost or pricing data. If, pursuant to law, the Contractor has been required to submit cost or pricing data in connection with pricing this contract or any modification to this contract, the Contracting Officer or representatives of the Contracting Officer who are employees of the Government shall have the right to examine and audit all books, records, documents, and other data of the Contractor (including computations and projections) related to negotiating, pricing, or performing the contract or modification, in order to evaluate the accuracy, completeness, and currency of the cost or pricing data. The right of examination shall extend to all documents necessary to permit adequate evaluation of the cost or pricing data submitted, along with the computations and projections used.

(c) Reports. If the Contractor is required to furnish cost, funding, or performance reports, the Contracting Officer or representatives of the Contracting Officer who are employees of the Government shall have the right to examine and audit books, records, other documents, and supporting materials, for the purpose of evaluating (1) the effectiveness of the Contractor's policies and procedures to produce data compatible with the objectives of these reports and (2) the data reported.

(d) Availability. The Contractor shall make available at its office at all reasonable times the materials described in paragraphs (a) and (b) above, for examination, audit, or reproduction, until 3 years after final payment under this contract, or for any shorter period specified in Subpart 4.7, Contractor Records Retention, of the Federal Acquisition Regulation, or for any longer period required by statute or by other clauses of this contract. In addition--

(1) If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement; and

(2) Records relating to appeals under the Disputes clause or to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are disposed of.

representative from the General Accounting Office has taken exception shall continue until such appeals, litigation, claims, or exceptions are disposed of.#

7. AUDIT-NEGOTIATION (1984 APR) FAR 52.215-2

(The following clause is applicable if this contract was entered into by negotiation)

(a) Examination of costs. If this is a cost-reimbursement, incentive, time-and-materials, labor-hour, or price-redeterminable contract, or any combination of these, the Contractor shall maintain--and the Contracting Officer or representatives of the Contracting Officer shall have the right to examine and audit--books, records, documents, and other evidence and accounting procedures and practices, sufficient to reflect properly all costs claimed to have been incurred or anticipated to be incurred in performing this contract. This right of examination shall include inspection at all reasonable times of the Contractor's plants, or parts of them, engaged in performing the contract.

(b) Cost or pricing data. If, pursuant to law, the Contractor has been required to submit cost or pricing data in connection with pricing this contract or any modification to this contract, the Contracting Officer or representatives of the Contracting Officer who are employees of the Government shall have the right to examine and audit all books, records, documents, and other data of the Contractor (including computations and projections) related to negotiating, pricing, or performing the contract or modification, in order to evaluate the accuracy, completeness, and currency of the cost or pricing data. The right of examination shall extend to all documents necessary to permit adequate evaluation of the cost or pricing data submitted, along with the computations and projections used.

(c) Reports. If the Contractor is required to furnish cost, funding, or performance reports, the Contracting Officer or representatives of the Contracting Officer who are employees of the Government shall have the right to examine and audit books, records, other documents, and supporting materials, for the purpose of evaluating (1) the effectiveness of the Contractor's policies and procedures to produce data compatible with the objectives of these reports and (2) the data reported.

(d) Availability. The Contractor shall make available at its office at all reasonable times the materials described in paragraphs (a) and (b) above, for examination, audit, or reproduction, until 3 years after final payment under this contract, or for any shorter period specified in Subpart 4.7, Contractor Records Retention, of the Federal Acquisition Regulation, or for any longer period required by statute or by other clauses of this contract. In addition--

(1) If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement; and

(2) Records relating to appeals under the Disputes clause or to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are disposed of.

(e) The Contractor shall insert a clause containing all the terms of this clause, including this paragraph (e), in all subcontracts over $10,000 under this contract, altering the clause only as necessary to identify properly the contracting parties and the Contracting Officer under the Government prime contract.#

8. PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA (1984 APR) FAR 52.215-22

(a) If any price, including profit or fee, negotiated in connection with this contract, or any cost reimbursable under this contract, was increased by any significant amount because (1) the Contractor or a subcontractor furnished cost or pricing data that were not complete, accurate, and current as certified in its Certificate of Current Cost or Pricing Data, (2) a subcontractor or prospective subcontractor furnished the Contractor cost or pricing data that were not complete, accurate, and current as certified in the Contractor's Certificate of Current Cost or Pricing Data, or (3) any of these parties furnished data of any description that were not accurate, the price or cost shall be reduced accordingly and the contract shall be modified to reflect the reduction.

(b) Any reduction in the contract price under paragraph (a) above due to defective data from a prospective subcontractor that was not subsequently awarded the subcontract shall be limited to the amount, plus applicable overhead and profit markup, by which (1) the actual subcontract or (2) the actual cost to the Contractor, if there was no subcontract, was less than the prospective subcontract cost estimate submitted by the Contractor; provided, that the actual subcontract price was not itself affected by defective cost or pricing data.#

9. SUBCONTRACTOR COST OR PRICING DATA (1984 APR) FAR 52.215-24

(a) Before awarding any subcontract expected to exceed $500,000 when entered into, or before pricing any subcontract modification involving a pricing adjustment expected to exceed $500,000, the Contractor shall require the subcontractor to submit cost or pricing data (actually or by specific identification in writing), unless the price is--

(1) Based on adequate price competition;

(2) Based on established catalog or market prices of commercial items sold in substantial quantities to the general public; or

(3) Set by law or regulation.

(b) The Contractor shall require the subcontractor to certify in substantially the form prescribed in Subsection 15.804-4 of the Federal Acquisition Regulation (FAR) that, to best of its knowledge and belief, the data submitted under paragraph (a) above were accurate, complete, and current as of the date of agreement on the negotiated price of the subcontract or subcontract modification.

(c) In each subcontract that exceeds $500,000 when entered into, the Contractor shall insert either--

(1) The substance of this clause, including this paragraph (c), if paragraph (a) above requires submission of cost or pricing data for the subcontract; or

(2) The substance of the clause at FAR 52.215-25, Subcontractor Cost or Pricing Data--Modifications.#

10. UTILIZATION OF SMALL BUSINESS CONCERNS AND SMALL DISADVANTAGED BUSINESS CONCERNS (1984 APR) FAR 52.219-8

(a) It is the policy of the United States that small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals shall have the maximum practicable opportunity to participate in performing contracts let by any Federal agency.

(b) The Contractor hereby agrees to carry out this policy in the awarding of subcontracts to the fullest extent consistent with efficient contract performance. The Contractor further agrees to cooperate in any studies or surveys as may be conducted by the United States Small Business Administration or the awarding agency of the United States as may be necessary to determine the extent of the Contractor's compliance with this clause.

(c) As used in this contract, the term "small business concern" shall mean a small business as defined pursuant to section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto. The term "small business concern owned and controlled by socially and economically disadvantaged individuals" shall mean a small business concern--

(1) Which is at least 51 percent owned by one or more socially and economically disadvantaged individuals; or, in the case of any publicly owned business, at least 51 per centum of the stock of which is owned by one or more socially and economically disadvantaged individuals; and

(2) Whose management and daily business operations are controlled by one or more of such individuals.

The Contractor shall presume that socially and economically disadvantaged individuals include Black Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans, Asian-Indian Americans and other minorities, or any other individual found to be disadvantaged by the Administration pursuant to section 8(a) of the Small Business Act.

(d) Contractors acting in good faith may rely on written representations by their subcontractors regarding their status as either a small business concern or a small business concern owned and controlled by socially and economically disadvantaged individuals.#

11. SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING PLAN (1984 APR) FAR 52.219-9

(The following clause is applicable if this contract (1) offers subcontracting possibilities, (2) is in excess of $500,000 and (3) includes the clause in DAR 7-104.14(a).)

(a) This clause does not apply to small business concerns.

(b) "Commercial product," as used in this clause, means a product in regular production that is sold in substantial quantities to the general public and/or industry at established catalog or market prices. It also means a product which, in the opinion of the Contracting Officer, differs only insignificantly from the Contractor's commercial product.

"Subcontract," as used in this clause, means any agreement (other than one involving an employer-employee relationship) entered into by a Federal Government prime Contractor or subcontractor calling for supplies or services required for performance of the contract or subcontract.

(c) The offeror, upon request by the Contracting Officer, shall submit and negotiate a subcontracting plan, where applicable, which addresses separately subcontracting with small business concerns and small disadvantaged business concerns and which shall be included in and made a part of the resultant contract. The subcontracting plan shall be negotiated within the time specified by the Contracting Officer. Failure to submit and negotiate the subcontracting plan shall make the offeror ineligible for award of a contract.

(d) The offeror's subcontracting plan shall include the following:

(1) Goals, expressed in terms of percentages of total planned subcontracting dollars, for the use of small business concerns and small disadvantaged business concerns as subcontractors. The offeror shall include all subcontracts that contribute to contract performance, and may include a proportionate share of products and services that are normally allocated as indirect costs.

(2) A statement of--

(i) Total dollars planned to be subcontracted;

(ii) Total dollars planned to be subcontracted to small business concerns; and

(iii) Total dollars planned to be subcontracted to small disadvantaged business concerns.

(3) A description of the principal types of supplies and services to be subcontracted, and an identification of the types planned for subcontracting to (i) small business concerns and (ii) small disadvantaged business concerns.

(4) A description of the method used to develop the subcontracting goals in (1) above.

(5) A description of the method used to identify potential sources for solicitation purposes (e.g., existing company source lists, the Procurement Automated Source System (PASS) of the Small Business Administration, the National Minority Purchasing Council Vendor Information Service, the Research and Information Division of the Minority Business Development Agency in the Department of Commerce, or small and small disadvantaged business concerns trade associations.)

(6) A statement as to whether or not the offeror included indirect costs in establishing subcontracting goals, and a description of the method used to determine the proportionate share of indirect costs to be incurred with (i) small business concerns and (ii) small disadvantaged business concerns.

(7) The name of the individual employed by the offeror who will administer the offeror's subcontracting program, and a description of the duties of the individual.

(8) A descripton of the efforts the offeror will make to assure that small business concerns and small disadvantaged business concerns have an equitable opportunity to compete for subcontracts.

(9) Assurances that the offeror will include the clause in this contract entitled "Utilization of Small Business Concerns and Small Disadvantaged Business Concerns" in all subcontracts that offer further subcontracting opportunities, and that the offeror will require all subcontractors (except small business concerns) who receive subcontracts in excess of $500,000 ($1,000,000 for

construction of any public facility), to adopt a plan similar to the plan agreed to by the offeror.

(10) Assurances that the offeror will (i) cooperate in any studies or surveys as may be required, (ii) submit periodic reports in order to allow the Government to determine the extent of compliance by the offeror with the subcontracting plan, (iii) submit Standard Form (SF) 294, Subcontracting Report for Individual Contracts, and/or SF 295, Summary Subcontract Report, in accordance with the instructions on the forms, and (iv) ensure that its subcontractors agree to submit Standard Forms 294 and 295.

(11) A recitation of the types of records the offeror will maintain to demonstrate procedures that have been adopted to comply with the requirements and goals in the plan, including establishing source lists; and a description of its efforts to locate small and small disadvantaged business concerns and award subcontracts to them. The records shall include at least the following (on a plant-wide or company-wide basis, unless otherwise indicated):

(i) Source lists, guides, and other data that identify small and small disadvantaged business concerns.

(ii) Organizations contacted in an attempt to locate sources that are small or small disadvantaged business concerns.

(iii) Records on each subcontract solicitation resulting in an award of more than $100,000, indicating (A) whether small business concerns were solicited and if not, why not, (B) whether small disadvantaged business concerns were solicited and if not, why not, and (C) if applicable, the reason award was not made to a small business concern.

(iv) Records of any outreach efforts to contact (A) trade associations, (B) business development organizations, and (C) conferences and trade fairs to locate small and small disadvantaged business sources.

(v) Records of internal guidance and encouragement provided to buyers through (A) workshops, seminars, training, etc., and (B) monitoring performance to evaluate compliance with the program's requirements.

(vi) On a contract-by-contract basis, records to support award data submitted by the offeror to the Government, including the name, address, and business size of each subcontractor. Contractors having company or division-wide annual plans need not comply with this requirement.

(e) In order to effectively implement this plan to the extent consistent with efficient contract performance, the Contractor shall perform the following functions:

(1) Assist small business and small disadvantaged business concerns by arranging solicitations, time for the preparation of bids, quantities, specifications, and delivery

schedules so as to facilitate the participation by such concerns. Where the Contractor's lists of potential small business and small disadvantaged subcontractors are excessively long, reasonable effort shall be made to give all such small business concerns an opportunity to compete over a period of time.

(2) Provide adequate and timely consideration of the potentialities of small business and small disadvantaged business concerns in all "make-or-buy" decisions.

(3) Counsel and discuss subcontracting opportunities with representatives of small and small disadvantaged business firms.

(f) A master subcontracting plan on a plant or division-wide basis which contains all the elements required by (d) above, except goals, may be incorporated by reference as a part of the subcontracting plan required of the offeror by this clause: provided, (1) the master plan has been approved, (2) the offeror provides copies of the approved master plan and evidence of its approval to the Contracting Officer, and (3) goals and any deviations from the master plan deemed necessary by the Contracting Officer to satisfy the requirements of this contract are set forth in the individual subcontracting plan.

(g) (1) If a commercial product is offered, the subcontracting plan required by this clause may relate to the offeror's production generally, for both commercial and noncommercial products, rather than solely to the Government contract. In these cases, the offeror shall, with the concurrence of the Contracting Officer, submit one company-wide or division-wide annual plan.

(2) The annual plan shall be reviewed for approval by the agency awarding the offeror its first prime contract requiring a subcontracting plan during the fiscal year, or by an agency satisfactory to the Contracting Officer.

(3) The approved plan shall remain in effect during the offeror's fiscal year for all of the offeror's commercial products.

(h) Prior compliance of the offeror with other such subcontracting plans under previous contracts will be considered by the Contracting Officer in determining the responsibility of the offeror for award of the contract.

(i) The failure of the Contractor or subcontractor to comply in good faith with (1) the clause of this contract entitled "Utilization of Small Business Concerns and Small Disadvantaged Business Concerns", or (2) an approved plan required by this clause, shall be a material breach of the contract.#

12. UTILIZATION OF WOMEN-OWNED SMALL BUSINESSES (1984 APR)
FAR 52.219-13

(a) "Women-owned small businesses," as used in this clause, means businesses that are at least 51 percent owned by women who are United States citizens and who also control and operate the business.

"Control," as used in this clause, means exercising the power to make policy decisions.

"Operate," as used in this clause, means being actively involved in the day-to-day management of the business.

(b) It is the policy of the United States that women-owned small businesses shall have the maximum practicable opportunity to participate in performing contracts awarded by any Federal agency.

(c) The Contractor agrees to use its best efforts to give women-owned small businesses the maximum practicable opportunity to participate in the subcontracts it awards to the fullest extent consistent with the efficient performance of its contract.#

13. LABOR SURPLUS AREA SUBCONTRACTING PROGRAM (1984 APR) FAR 52.220-4

(The following clause is applicable if this contract is in excess of $500,000.)

(a) See the Utilization of Labor Surplus Area Concerns clause of this contract for applicable definitions.

(b) The Contractor agrees to establish and conduct a program to encourage labor surplus area (LSA) concerns to compete for subcontracts within their capabilities when the subcontracts are consistent with the efficient performance of the contract at prices no higher than obtainable elsewhere. The Contractor shall--

(1) Designate a liaison officer who will (i) maintain liaison with authorized representatives of the Government on LSA matters, (ii) supervise compliance with the Utilization of Labor Surplus Area Concerns clause, and (iii) administer the Contractor's labor surplus area subcontracting program;

(2) Provide adequate and timely consideration of the potentialities of LSA concerns in all make-or-buy decisions;

(3) Ensure that LSA concerns have an equitable opportunity to compete for subcontracts, particularly by arranging solicitations, time for the preparation of offers, quantities, specifications, and delivery schedules so as to facilitate the participation of LSA concerns;

(4) Include the Utilization of Labor Surplus Area Concerns clause in subcontracts that offer substantial LSA subcontracting opportunities; and

(5) Maintain records showing (i) the procedures adopted and (ii) the Contractor's performance, to comply with this clause. The records will be kept available for review by the Government until the expiration of 1 year after the award of this contract, or for such longer period as may be required by any other clause of this contract or by applicable law or regulations.

(c) The Contractor further agrees to insert in any related subcontract that may exceed $500,000 and that contains the Utilization of Labor Surplus Area Concerns clause, terms that conform substantially to the language of this clause, including this paragraph (c), and to notify the Contracting Officer of the names of subcontractors.#

14. CONVICT LABOR (1984 APR) FAR 52.222-3

The Contractor agrees not to employ any person undergoing sentence of imprisonment in performing this contract except as provided by 18 U.S.C. 4082(c)(2) and Executive Order 11755, December 29, 1973.#

15. EQUAL OPPORTUNITY (1984 APR) FAR 52.222-26

(a) If, during any 12-month period (including the 12 months preceding the award of this contract), the Contractor has been or is awarded nonexempt Federal contracts and/or subcontracts that have an aggregate value in excess of $10,000, the Contractor shall comply

with subparagraphs (b)(1) through (11) below. Upon request, the Contractor shall provide information necessary to determine the applicability of this clause.

(b) During performance this contract, the Contractor agrees as follows:

(1) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.

(2) The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. This shall include, but not be limited to, (i) employment, (ii) upgrading, (iii) demotion, (iv) transfer, (v) recruitment or recruitment advertising, (vi) layoff or termination, (vii) rates of pay or other forms of compensation, and (viii) selection for training, including apprenticeship.

(3) The Contractor shall post in conspicuous places available to employees and applicants for employment the notices to be provided by the Contracting Officer that explain this clause.

(4) The Contractor shall, in all solicitations or advertisement for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(5) The Contractor shall send, to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, the notice to be provided by the Contracting Officer advising the labor union or workers' representative of the Contractor's commitments under this clause, and post copies of the notice in conspicuous places available to employees and applicants for employment.

(6) The Contractor shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.

(7) The Contractor shall furnish to the contracting agency all information required by Executive Order 11246, as amended, and by the rules, regulations, and orders of the Secretary of Labor, Standard Form 100 (EEO-1), or any successor form, is the prescribed form to be filed within 30 days following the award, unless filed within 12 months preceding the date of award.

(8) The Contractor shall permit access to its books, records, and accounts by the contracting agency or the Office of Federal Contract Compliance Programs (OFCCP) for the purposes of investigation to ascertain the Contractor's compliance with the applicable rules, regulations, and orders.

(9) If the OFCCP determines that the Contractor is not in compliance with this clause or any rule, regulation, or order of the Secretary of Labor, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts, under the procedures authorized in Executive Order 11246, as amended. In addition, sanctions may be imposed and remedies invoked against the Contractor as provided in Executive Order 11246, as amended, the rules, regulations, and orders of the Secretary of Labor, or as otherwise provided by law.

(10) The Contractor shall include the terms and conditions of subparagraph (b)(1) through (11) of this clause in every subcontract or purchase order that is not exempted by the rules, regulations, or orders of the Secretary of Labor issued under Executive Order 11246, as amended, so that these terms and conditions will be binding upon each subcontractor or vendor.

(11) The Contractor shall take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing these terms and conditions, including sanctions for noncompliance; provided, that if the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of any direction, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

(c) Notwithstanding any other clause in this contract, disputes relative to this clause will be governed by the procedures in 41 CFR 60-1.1.#

16. AFFIRMATIVE ACTION FOR SPECIAL DISABLED AND VIETNAM ERA VETERANS (1984 APR) FAR 52.222-35

(This clause is applicable pursuant to 41 C.F.R. 60-250, if this contract is for $10,000 or more.)

(a) **Definitions.** "Appropriate office of the State employment service system," as used in this clause, means the local office of the Federal-State national system of public employment offices assigned to serve the area where the employment opening is to be filled, including the District of Columbia, Guam, Puerto Rico, Virgin Islands, American Samoa, and the Trust Territory of the Pacific Islands.

"Openings that the Contractor proposes to fill from within its own organization," as used in this clause, means employment openings for which no one outside the Contractor's organization (including any affiliates, subsidiaries, and the parent companies) will be considered and includes any openings that the Contractor proposes to fill from regularly established "recall" lists.

"Openings that the Contractor proposes to fill under a customary and traditional employer-union hiring arrangement," as used in this clause, means employment openings that the Contractor proposes to fill from union halls, under their customary and traditional employer-union hiring relationship.

"Suitable employment openings," as used in this clause--

(1) Includes, but is not limited to, openings that occur in jobs categorized as--

(i) Production and nonproduction;
(ii) Plant and office;
(iii) Laborers and mechanics;
(iv) Supervisory and nonsupervisory;
(v) Technical; and
(vi) Executive, administrative, and professional positions compensated on a salary basis of less than $25,000 a year; and

(2) Includes full-time employment, temporary employment of over 3 days, and part-time employment, but not openings that the Contractor proposes to fill from within its own organization or under a customary and traditional employer-union hiring arrangement,

nor openings in an educational institution that are restricted to students of that institution.

(b) General.

(1) Regarding any position for which the employee or applicant for employment is qualified, the Contractor shall not discriminate against the individual because the individual is a special disabled or Vietnam Era veteran. The Contractor agrees to take affirmative action to employ, advance in employment, and otherwise treat qualified special disabled and Vietnam Era veterans without discrimination based upon their disability or veterans' status in all employment practices such as--

(i) Employment;
(ii) Upgrading;
(iii) Demotion or transfer;
(iv) Recruitment;
(v) Advertising;
(vi) Layoff or termination;
(vii) Rates of pay or other forms of compensation; and
(viii) Selection for training, including apprenticeship.

(2) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor (Secretary) issued under the Vietnam Era Veterans' Readjustment Assistance Act of 1972 (the Act), as amended.

(c) Listing openings.

(1) The Contractor agrees to list all suitable employment openings existing at contract award or occurring during contract performance, at an appropriate office of the State employment service system in the locality where the opening occurs. These openings include those occurring at any Contractor facility, including one not connected with performing this contract. An independent corporate affiliate is exempt from this requirement.

(2) State and local government agencies holding Federal contracts of $10,000 or more shall also list all their suitable openings with the appropriate office of the State employment service.

(3) The listing of suitable employment openings with the State employment service system is required at least concurrently with using any other recruitment source or effort and involves the obligations of placing a bona fide job order, including accepting referrals of veterans and nonveterans. This listing does not require hiring any particular job applicant or hiring from any particular group of job applicants and is not intended to relieve the Contractor from any requirements of Executive orders or regulations concerning nondiscrimination in employment.

(4) Whenever the Contractor becomes contractually bound to the listing terms of this clause, it shall advise the State employment service system, in each state where it has establishments, of the name and location of each hiring location in the State. As long as the Contractor is contractually bound to these terms and has so advised the State system, it need not advise the State system of subsequent contracts. The Contractor may advise the State system when it is no longer bound by this contract clause.

(5) Under the most compelling circumstances, an employment opening may not be suitable for listing, including situations when

(i) the Government's needs cannot reasonably be supplied,
(ii) listing would be contrary to national security, or
(iii) the requirement of listing would not serve the Government's interest.

(d) Applicability.

(1) This clause does not apply to the listing of employment openings which occur and are filled outside the 50 states, the District of Columbia, Puerto Rico, Guam, Virgin Islands, American Samoa, and the Trust Territory of the Pacific Islands.

(2) The terms of paragraph (c) above of this clause do not apply to openings that the Contractor proposes to fill from within its own organization or under a customary and traditional employer-union hiring arrangement. This exclusion does not apply to a particular opening once an employer decides to consider applicants outside of its own organization or employer-union arrangement for that opening.

(e) Postings.

(1) The Contractor agrees to post employment notices stating (i) the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified special disabled veterans and veterans of the Vietnam era, and (ii) the rights of applicants and employees.

(2) These notices shall be posted in conspicuous places that are available to employees and applicants for employment. They shall be in a form prescribed by the Director, Office of Federal Contract Compliance Programs, Department of Labor (Director), and provided by or through the Contracting Officer.

(3) The Contractor shall notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of the Act, and is committed to take affirmative action to employ, and advance in employment, qualified special disabled and Vietnam Era veterans.

(f) Noncompliance. If the Contractor does not comply with the requirements of this clause, appropriate actions may be taken under the rules, regulations, and relevant orders of the Secretary issued pursuant to the Act.

(g) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order of $10,000 or more unless exempted by rules, regulations, or orders of the Secretary. The Contractor shall act as specified by the Director to enforce the terms, including action for noncompliance.#

17. AFFIRMATIVE ACTION FOR HANDICAPPED WORKERS (1984 APR)
FAR 52.222-36

(Contracts and subcontracts are exempt from the requirements of the following clause with regard to work performed outside the United States by employees who were not recruited within the United States).

(a) General.

(1) Regarding any position for which the employee or applicant for employment is qualified, the Contractor shall not discriminate against any employee or applicant because of physical

or mental handicap. The Contractor agrees to take affirmative action to employ, advance in employment, and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices such as--

(i) Employment;
(ii) Upgrading;
(iii) Demotion or transfer;
(iv) Recruitment;
(v) Advertising;
(vi) Layoff or termination;
(vii) Rates of pay or other forms of compensation; and
(viii) Selection for training, including apprenticeship.

(2) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor (Secretary) issued under the Rehabilitation Act of 1973 (29 U.S.C. 793) (the Act), as amended.

(b) **Postings.**

(1) The Contractor agrees to post employment notices stating (i) the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified handicapped individuals and (ii) the rights of applicants and employees.

(2) These notices shall be posted in conspicuous places that are available to employees and applicants for employment. They shall be in a form prescribed by the Director, Office of Federal Contract Compliance Programs, Department of Labor (Director), and provided by or through the Contracting Officer.

(3) The Contractor shall notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of Section 503 of the Act and is committed to take affirmative action to employ, and advance in employment, qualified physically and mentally handicapped individuals.

(c) **Noncompliance.** If the Contractor does not comply with the requirements of this clause, appropriate actions may be taken under the rules, regulations and relevant orders of the Secretary issued pursuant to the Act.

(d) **Subcontracts.** The Contractor shall include the terms of this clause in every subcontract or purchase order in excess of $2,500 unless exempted by rules, regulations, or orders of the Secretary. The Contractor shall act as specified by the Director to enforce the terms, including action for noncompliance.#

18. CLEAN AIR AND WATER (1984 APR) FAR 52.223-2

(a) "Air Act," as used in this clause, means the Clean Air Act (42 U.S.C. 7401 et seq.).

"Clean air standards," as used in this clause, means--

(1) Any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions, work practices, or other requirements contained in, issued under, or otherwise adopted under the Air Act or Executive Order 11738;

(2) An applicable implementation plan as described in section 110(d) of the Air Act (42 U.S.C. 7410(d));

(3) An approved implementation procedure or plan under section 111(c) or section 111(d) of the Air Act (42 U.S.C. 7411(c) or (d)); or

(4) An approved implementation procedure under s 112(d) of the Air Act (42 U.S.C. 7412(d)).

"Clean water standards," as used in this clause, means any enforceable limitation, control, condition, prohibition, standard, or other requirement promulgated under the Water Act or contained in a permit issued to a discharger by the Environmental Protection Agency or by a State under an approved program, as authorized by section 402 of the Water Act (33 U.S.C. 1342), or by local government to ensure compliance with pretreatment regulations as required by section 307 of the Water Act (33 U.S.C. 1317).

"Compliance," as used in this clause, means compliance with--

(1) Clean air or water standards; or

(2) A schedule or plan ordered or approved by a court of competent jurisdiction, the Environmental Protection Agency, or an air or water pollution control agency under the requirements of the Air Act or Water Act and related regulations.

"Facility," as used in this clause, means any building, plant, installation, structure, mine, vessel or other floating craft, location, or site of operations, owned, leased, or supervised by a Contractor or subcontractor, used in the performance of a contract or subcontract. When a location or site of operations includes more than one building, plant, installation, or structure, the entire location or site shall be deemed a facility except when the Administrator, or a designee, of the Environmental Protection Agency, determines that independent facilities are collocated in one geographical area.

"Water Act," as used in this clause, means Clean Water Act (33 U.S.C. 1251 et seq.).

(b) (1) To comply with all the requirements of section 114 of the Clean Air Act (42 U.S.C. 7414) and section 308 of the Clean Water Act (33 U.S.C. 1318) relating to inspection, monitoring, entry, reports, and information, as well as other requirements specified in section 114 and section 308 of the Air Act and the Water Act, and all regulations and guidelines issued to implement those acts before the award of this contract;

(2) That no portion of the work required by this prime contract will be performed in a facility listed on the Environmental Protection Agency List of Violating Facilities on the date when this contract was awarded unless and until the EPA eliminates the name of the facility from the listing;

(3) To use best efforts to comply with clean air standards and clean water standards at the facility in which the contract is being performed; and

(4) To insert the substance of this clause into any nonexempt subcontract, including this subparagraph (b)(4).#

19. COST ACCOUNTING STANDARDS (1984 APR) FAR 52.230-3

(The following clause is applicable if the amount of this contract exceeds $100,000, the procurement instrument identification number is prefixed by the letters "DACA", and the contract is not exempt under the provisions of FAR Subpart 30.3)

(a) Unless the Cost Accounting Standards Board (CASB) has prescribed rules or regulations exempting the Contractor or this contract from standards, rules, and regulations promulgated pursuant to 50 U.S.C. App. 2168 (Pub. L. 91-379, August 15, 1970), the Contractor, in connection with this contract, shall--

(1) (National Defense Contracts Only) By submission of a Disclosure Statement, disclose in writing the Contractor's cost accounting practices as required by regulations of the CASB. The practices disclosed for this contract shall be the same as the practices currently disclosed and applied on all other contracts and subcontracts being performed by the Contractor and which contain a Cost Accounting Standards (CAS) clause. If the Contractor has notified the Contracting Officer that the Disclosure Statement contains trade secrets and commercial or financial information which is privileged and confidential, the Disclosure Statement shall be protected and shall not be released outside of the Government.

(2) Follow consistently the Contractor's cost accounting practices in accumulating and reporting contract performance cost data concerning this contract. If any change in cost accounting practices is made for the purposes of any contract or subcontract subject to CASB requirements, the change must be applied prospectively to this contract, and the Disclosure Statement must be amended accordingly. If the contract price or cost allowance of this contract is affected by such changes, adjustment shall be made in accordance with subparagraph (a)(4) or (a)(5) below, as appropriate.

(3) Comply with all CAS in effect on the date of award of this contract or, if the Contractor has submitted cost or pricing data, on the date of final agreement on price as shown on the Contractor's signed certificate of current cost or pricing data. The Contractor shall also comply with any CAS which hereafter becomes applicable to a contract or subcontract of the Contractor. Such compliance shall be required prospectively from the date of applicability to such contract or subcontract.

(4) (i) Agree to an equitable adjustment as provided in the Changes clause of this contract, if the contract cost is affected by a change which, pursuant to (3) above, the Contractor is required to make to the Contractor's established cost accounting practices.

(ii) Negotiate with the Contracting Officer to determine the terms and conditions under which a change may be made to a cost accounting practice, other than a change made under other provisions of this paragraph 4; provided, that no agreement may be made under this provision that will increase costs paid by the United States.

(iii) When the parties agree to a change to a cost accounting practice, other than a change under (4)(i) above, negotiate an equitable adjustment as provided in the Changes clause of this contract.

(5) Agree to an adjustment of the contract price or cost allowance, as appropriate, if the Contractor or a subcontractor

fails to comply with an applicable Cost Accounting Standard or to follow any cost accounting practice consistantly and such failure results in any increased costs paid by the United States. Such adjustment shall provide for recovery of the increased costs to the United States together with interest thereon computed at the rate determined by the Secretary of the Treasury pursuant to Pub. L. 92-41, 85 Stat. 97, or 7 percent per annum, whichever is less, from the time the payment by the United States was made to the time the adjustment is effected.

(b) If the parties fail to agree whether the Contractor or a subcontractor has complied with an applicable CAS, rule, or regulation of the CASB and as to any cost adjustment demanded by the United States, such failure to agree shall be a dispute concerning a question of fact within the meaning of the Disputes clause of this contract.

(c) The Contractor shall permit any authorized representatives of the agency head, of the CASB, or of the Comptroller General of the United States to examine and make copies of any documents, papers, or records relating to compliance with the requirements of this clause.

(d) The Contractor shall include in all negotiated subcontracts which the Contractor enters into, the substance of this clause, except paragraph (b), and shall require such inclusion in all other subcontracts, of any tier, including the obligation to comply with all CAS in effect on the subcontract's award date or if the subcontractor has submitted cost or pricing data, on the date of final agreement on price as shown on the subcontractor's signed Certificate of Current Cost or Pricing Data.This requirement shall apply only to negotiated subcontracts in excess of $100,000 where the price negotiated is not based on--

(1) Established catalog or market prices of commercial items sold in substantial quantities to the general public; or

(2) Prices set by law or regulation, and except that the requirement shall not apply to negotiated subcontracts otherwise exempt from the requirement to include a CAS clause by reason of 331.30(b) of Title 4, Code of Federal Regulations (4 CFR 331.30(b)).

Note (1): New CAS shall be applicable to both national defense and nondefense CAS-covered contracts upon award of a new national defense CAS-covered contract containing the new Standard. The award of a new nondefense CAS-covered contract shall not trigger application of new CAS.

Note (2): Subcontractors shall be required to submit their Disclosure Statements to the Contractor. However, if a subcontractor has previously submitted its Disclosure Statement to a Government Administrative Contracting Officer (ACO), it may satisfy that requirement by certifying to the Contractor the date of the Statement and the address of the ACO.

Note (3): In any case where a subcontractor determines that the Disclosure Statement information is privileged and confidential and declines to provide it to the Contractor or higher tier subcontractor, the Contractor may authorize direct submission of that subcontractor's Disclosure Statement to the same Government offices to which the Contractor was required to make submission of its Disclosure Statement. Such authorization shall in no way relieve the Contractor of liability as provided in paragraph (a)(5)

of this clause. In view of the foregoing and since the contract may be subject to adjustment under this clause by reason of any failure to comply with rules, regulations, and Standards of the CASB in connection with covered subcontracts, it is expected that the Contractor may wish to include a clause in each such subcontract requiring the subcontractor to appropriately indemnify the Contractor. However, the inclusion of such a clause and the terms thereof are matters for negotiation and agreement between the Contractor and the subcontractor, provided that they do not conflict with the duties of the Contractor under its contract with the Government. It is also expected that any subcontractor subject to such indemnification will generally require substantially similar indemnification to be submitted by its subcontractors.

Note (4): If the subcontractor is a business unit which pursuant to 4 CFR 332 is entitled to elect modified contract coverage and to follow Standards 401 and 402, the clause at 52.230-3, "Disclosure Consistency of Cost Accounting Practices", of the Federal Acquisition Regulation shall be inserted in lieu of this clause.

Note (5): The terms defined in 4 CFR 331.20 shall have the same meanings herein. As there defined, "negotiated subcontract" means any subcontract except a firm-fixed price subcontract made by the Contractor or subcontractor after receiving offers from at least two persons not associated with each other or with such Contractor or subcontractor, providing (1) the solicitation to all competitors is identical, (2) price is the only consideration in selecting the subcontractor from among the competitors solicited, and (3) the lowest offer received in compliance with the solicitation from among those solicited is accepted.#

20. ADMINISTRATION OF COST ACCOUNTING STANDARDS (1984 APR)
FAR 52.230-4

(The following clause is applicable if the amount of this contract exceeds $100,000, the procurement instrument identification number is prefixed by the letters "DACA," and the contract is not exempt under the provisions of FAR Subpart 30.3.)

For the purpose of administering the Cost Accounting Standards (CAS) requirements under this contract, the Contractor shall take the steps outlined in (a) through (f) below:

(a) Submit to the cognizant Contracting Officer a description of any accounting change, the potential impact of the change on contracts containing a CAS clause, and if not obviously immaterial, a general dollar magnitude cost impact analysis of the change which displays the potential shift of costs between CAS-covered contracts by contract type (i.e., firm-fixed-price, incentive, cost-plus-fixed-fee, etc.) and other contractor business activity. As related to CAS-covered contracts, the analysis should display the potential impact of funds of the various Agencies/Departments (i.e., Department of Energy, National Aeronautics and Space Administration, Army, Navy, Air Force, other Department of Defense, other Government) as follows:

(1) For any change in cost accounting practices required to comply with a new CAS in accordance with paragraphs (a)(3) and (a)(4)(i) of the CAS clause, within 60 days (or such other date as

may be mutually agreed to) after award of a contract requiring this change.

(2) For any change in cost accounting practices proposed in accordance with paragraph (a)(4)(ii) or (a)(4)(iii) of the clause or with paragraph (a)(3) or (a)(5) of the Disclosure Consistency of Cost Accounting Practices clause, not less than 60 days (or such other date as may be mutually agreed to) before the effective date of the proposed change.

(3) For any failure to comply with an applicable CAS or to follow a disclosed practice as contemplated by paragraph (a)(5) of the CAS clause or by paragraph (a)(4) of the Disclosure and Consistency of Cost Accounting Practices clause, within 60 days (or such other date as may be mutually agreed to) after the date of agreement of noncompliance by the Contractor.

(b) Submit a cost impact proposal in the form and manner specified by the cognizant Contracting Officer within 60 days (or such other date as may be mutually agreed to) after the date of determination of the adequacy and compliance of a change submitted pursuant to (a) above. If the above proposal is not submitted within the specified time, or any extension granted by the cognizant Contracting Officer, an amount not to exceed 10 percent of each payment made after that date may be withheld until such time as a proposal has been provided in the form and manner specified by the cognizant Contracting Officer.

(c) Agree to appropriate contract and subcontract amendments to reflect adjustments established in accordance with paragraphs (a)(4) and (a)(5) of the CAS clause or with paragraphs (a)(3), (a)(4), or (a)(5) of the Disclosure and Consistency of Cost Accounting Practices clause.

(d) For all subcontracts subject either to the CAS clause or to the Disclosure and Consistency of Cost Accounting Practices clause--

(1) So state in the body of the subcontract, in the letter of award, or in both (self-deleting clauses shall not be used); and

(2) Include the substance of this clause in all negotiated subcontracts. In addition, within 30 days after award of the subcontract, submit the following information to the Contractor's cognizant contract administration office for transmittal to the contract administration office cognizant of the subcontractor's facility:

(i) Subcontractor's name and subcontract number.
(ii) Dollar amount and date of award.
(iii) Name of Contractor making the award.
(iv) Any changes the subcontractor has made or proposes to make to accounting practices that affect prime contracts or subcontracts containing the CAS clause or Disclosure and Consistency of Cost Accounting Practices clause, unless these changes have already been reported. If award of the subcontract results in making one or more CAS effective for the first time, this fact shall also be reported.

(e) Notify the Contracting Officer in writing of any adjustments required to subcontracts under this contract and agree to an adjustment, based on them, to this contract's price or estimated cost and fee. This notice is due within 30 days after proposed subcontract adjustments are received and shall include a proposal for adjusting the higher tier subcontract or the prime contract appropriately.

(f) For subcontracts containing the CAS clause, require the subcontractor to comply with all Standards in effect on the date of award or of final agreement on price, as shown on the subcontractor's signed Certificate of Current Cost or Pricing Data, whichever is earlier.#

21. PAYMENTS UNDER FIXED-PRICE ARCHITECT-ENGINEER CONTRACTS (1984 APR) FAR 52.232-10

(a) Estimates shall be made monthly of the amount and value of the work and services performed by the Contractor under this contract. The estimates shall be prepared by the Contractor and accompanied by any supporting data required by the Contracting Officer.

(b) Upon approval of the estimate by the Contracting Officer, payment upon properly executed vouchers shall be made to the Contractor, as soon as practicable, of 90 percent of the approved amount, less all previous payments: provided, that payment may be made in full during any months in which the Contracting Officer determines that performance has been satisfactory. Also, whenever the Contracting Officer determines that the work is substantially complete and that the amount retained is in excess of the amount adequate for the protection of the Government, the Contracting Officer may release the excess amount to the Contractor.

(c) Upon satisfactory completion by the Contractor and acceptance by the Contracting Officer of the work done by the Contractor under the "Statement of Architect-Engineer Services" (Appendix A of the contract), the Contractor will be paid the unpaid balance of any money due for work under the statement, including retained percentages relating to this portion of the work. If the Government exercises the option under the Option for Supervision and Inspection Services clause, progress payments as provided for in (a) and (b) above will be made for this portion of the contract work. Upon satisfactory completion and final acceptance of the construction work, the Contractor shall be paid any unpaid balance of money due under this contract.

(d) Before final payment under the contract, or before settlement upon termination of the contract, and as a condition precedent thereto, the Contractor shall execute and deliver to the Contracting Officer a release of all claims against the Government arising under or by virtue of this contract, other than any claims that are specifically excepted by the Contractor from the operation of the release in amounts stated in the release.#

22. INTEREST (APR 1984) FAR 52.232-17

(a) Notwithstanding any other clause of this contract, all amounts that become payable by the Contractor to the Government under this contract (net of any applicable tax credit under the Internal Revenue Code (26 U.S.C. 1481)) shall bear simple interest

from the date due until paid unless paid within 30 days of becoming due. The interest rate shall be the interest rate established by the Secretary of the Treasury as provided in Section 12 of the Contract Disputes Act of 1978 (Public Law 95-563), which is applicable to the period in which the amount becomes due, as provided in paragraph (b) of this clause, and then at the rate applicable for each six-month period as fixed by the Secretary until the amount is paid.

(b) Amounts shall be due at the earliest of the following dates:

(1) The date fixed under this contract.

(2) The date of the first written demand for payment consistent with this contract, including any demand resulting from a default termination.

(3) The date the Government transmits to the Contractor a proposed supplemental agreement to confirm completed negotiations establishing the amount of debt.

(4) If this contract provides for revision of prices, the date of written notice to the Contractor stating the amount of refund payable in connection with a pricing proposal or a negotiated pricing agreement not confirmed by contract modification.

(c) The interest charge made under this clause may be reduced under the procedures prescribed in 32.614-2 of the Federal Acquisition Regulation in effect on the date of this contract.#

23. ASSIGNMENT OF CLAIMS (1984 APR) FAR 52.232-23

(a) The Contractor, under the Assignment of Claims Act, as amended, 31 U.S.C. 203, 41U.S.C. 15 (hereafter referenced to as the "the Act"), may assign its rights to be paid amounts due or to become due as a result of the performance of this contract to a bank, trust company, or other financing institution, including any Federal lending agency. The assignee under such an assignment may thereafter further assign or reassign its right under the original assignment to any type of financing institution described in the preceding sentence.

(b) Any assignment or reassignment authorized under the Act and this clause shall cover all unpaid amounts payable under this contract, and shall not be made to more than one party, except that an assignment or reassignment may be made to one party as agent or trustee for two or more paarties participating in the financing of this contract.

(c) The Contractor shall not furnish or disclose to any assignee under this contract any classified document (including this contract) or information related to work under this contract until the Contracting Officer authorizes such action in writing.#

24. DISPUTES (1984 APR) FAR 52.233-1

(a) This contract is subject to the Contract Disputes Act of 1978 (41 U.S.C. 601-613)(the Act).

(b) Except as provided in the Act, all disputes arising under or relating to this contract shall be resolved under this clause.

(c) "Claim," as used in this clause, means a written demand or written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief

arising under or relating to this contract. A claim arising under a contract, unlike a claim relating to that contract, is a claim that can be resolved under a contract clause that provides for the relief sought by the claimant. However, a written demand or written assertion by the Contractor seeking the payment of money exceeding $50,000 is not a claim under the Act until certified as required by subparagraph (d)(2) below. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim under the Act. The submission may be converted to a claim under the Act, by complying with the submission and certification requirements of this clause, if it is disputed either as to liability or amount or is not acted upon in a reasonable time.

(d) (1) A claim by the Contractor shall be made in writing and submitted to the Contracting Officer for a written decision. A claim by the Government against the Contractor shall be subject to a written decision by the Contracting Officer.

(2) For Contractor claims exceeding $50,000, the Contractor shall submit with the claim a certification that--

(i) The claim is made in good faith;

(ii) Supporting data are accurate and complete to the best of the Contractor's knowledge and belief; and

(iii) The amount requested accurately reflects the contract adjustment for which the Contractor believes the Government is liable.

(3) (i) If the Contractor is an individual, the certification shall be executed by that individual.

(ii) If the Contractor is not an individual, the certification shall be executed by--

(A) A senior company official in charge at the Contractor's plant or location involved; or

(B) An officer or general partner of the Contractor having overall responsibility for the conduct of the Contractor's affairs.

(e) For Contractor claims of $50,000 or less, the Contracting Officer must, if requested in writing by the Contractor, render a decision within 60 days of the request. For Contractor-certified claims over $50,000, the Contracting Officer must, within 60 days, decide the claim or notify the Contractor of the date by which the decision will be made.

(f) The Contracting Officer's decision shall be final unless the Contractor appeals or files a suit as provided in the Act.

(g) The Government shall pay interest on the amount found due and unpaid from (1) the date the Contracting Officer receives the claim (properly certified if required), or (2) the date payment otherwise would be due, if that date is later, until the date of payment. Simple interest on claims shall be paid at the rate, fixed by the Secretary of the Treasury as provided in the Act, which is applicable to the period during which the Contracting Officer receives the claim and then at the rate applicable for each 6-month period as fixed by the Treasury Secretary during the pendency of the claim.

(h) [illegible] of this contract, pending [illegible] resolution of any request for relief, claim, appeal, or action arising under the contract [illegible] comply with any decision of the Contracting Officer.#

25. DESIGN WITHIN FUNDING LIMITATIONS (1984 APR) FAR 52.236-22

(a) The Contractor shall [illegible] the design services [illegible] under this contract so as to permit the award of a contract, using standard Federal Acquisition Regulation procedures for the construction of the facilities designed at a price that does not exceed the estimated construction contract price set forth in paragraph (c) below. When bids or proposals for the construction contract are received that exceed the estimated price, the contractor shall perform such redesign and other services as are necessary to permit contract award within the funding limitation. These additional services shall be performed at no increase in the price of this contract. However, the Contractor shall not be required to perform such additional services at no cost to the Government if the unfavorable bids or proposals are the result of conditions beyond its reasonable control.

(b) The Contractor will promptly advise the Contracting Officer if it finds that the project being designed will exceed or is likely to exceed the funding limitations and it is unable to design a useable facility within these limitations. Upon receipt of such information, the Contracting Officer shall review the Contractor's revised estimate of construction cost. The Government may, if it determines that the estimated construction contract price set forth in this contract is so low that the award of a construction contract not in excess of such estimate is improbable, authorize a change in scope or materials as required to reduce the estimated construction cost to an amount within the estimated construction contract price set forth in paragraph (c) below, or the Government may adjust such estimated construction contract price. When bids or proposals are not solicited or are unreasonably delayed, the Government shall prepare an estimate of constructing the design submitted and such estimate shall be used in lieu of bids or proposals to determine compliance with the funding limitation.

26. RESPONSIBILITY OF THE ARCHITECT-ENGINEER CONTRACTOR (1984 APR) FAR 52.236-23

(a) The Contractor shall be responsible for the professional quality, technical accuracy, and the coordination of all designs, drawings, specifications, and other services furnished by the Contractor under [illegible] Government shall, without additional compensation, correct or revise any errors or deficiencies in [illegible] designs, drawings, specifications, and other services.

(b) Neither the Government's review, approval or acceptance of, nor payment for, the services required under this contract shall be construed to operate as a waiver of any rights under this contract or of any cause of action arising out of the performance of this contract, and the Contractor shall be and remain liable to the Government in accordance with applicable law for all damages to the

Government caused by the Contractor's negligent performance of any of the services furnished under this contract.

(c) The rights and remedies of the Government provided for under this contract are in addition to any other rights and remedies provided by law.

(d) If the Contractor is comprised of more than one legal entity, each such entity shall be jointly and severally liable hereunder.#

27. WORK OVERSIGHT IN ARCHITECT-ENGINEER CONTRACTS (1984 APR) FAR 52.236-24

The extent and character of the work to be done by the Contractor shall be subject to the general oversight, supervision, direction, control, and approval of the Contracting Officer.#

28. REQUIREMENTS FOR REGISTRATION OF DESIGNERS (1984 APR) FAR 52.236-25

The design of architectural, structural, mechanical, electrical, civil, or other engineering features of the work shall be accomplished or reviewed and approved by architects or engineers registered to practice in the particular professional field involved in a State or possession of the United States, in Puerto Rico, or in the District of Columbia.#

29. CHANGES--FIXED-PRICE (ALTERNATE III) (1984 APR) FAR 52.243-1

(a) The Contracting Officer may at any time, by written order, and without notice to the sureties, if any, make changes within the general scope of this contract in the services to be performed.

(b) If any such change causes an increase or decrease in the cost of, or the time required for, performance of any part of the work under this contract, whether or not changed by the order, the Contracting Officer shall make an equitable adjustment in the contract price, the delivery schedule, or both, and shall modify the contract.

(c) The Contractor must submit any "proposal for adjustment" (hereafter referred to as proposal) under this clause within 30 days from the date of receipt of the written order. However, if the Contracting Officer decides that the facts justify it, the Contracting Officer may receive and act upon a proposal submitted before final payment of the contract.

(d) If the Contractor's proposal includes the cost of property made obsolete or excess by the change, the Contracting Officer shall have the right to prescribe the manner of the disposition of the property.

(e) Failure to agree to any adjustment shall be a dispute under the Disputes clause. However, nothing in this clause shall excuse the Contractor from proceeding with the contract as changed.

(f) No services for which an additional cost or fee will be charged by the Contractor shall be furnished without the prior written authorization of the Contracting Officer#

30. SUBCONTRACTORS AND OUTSIDE ASSOCIATES AND CONSULTANTS (1984 APR) FAR 52.244-4

Any subcontractors and outside associates or consultants required by the Contractor in connection with the services covered

by the contract will be limited to individuals or firms that were specifically identified and agreed to during negotiations. The Contractor shall obtain the Contracting Officer's written consent before making any substitution for these subcontractors, associates, or consultants.#

31. TERMINATION (FIXED-PRICE ARCHITECT ENGINEER) (1984 APR) FAR 52.249-7

(a) The Government may terminate this contract in whole or, from time to time, in part, for the Government's convenience or because of the failure of the Contractor to fulfill the contract obligations. The Contracting Officer shall terminate by delivering to the Contractor a Notice of Termination specifying the nature, extent, and effective date of the termination. Upon receipt of the notice, the Contractor shall (1) immediately discontinue all services affected (unless the notice directs otherwise), and (2) deliver to the Contracting Officer all data, drawings, specifications, reports, estimates, summaries, and other information and materials accumulated in performing this contract, whether completed or in process.

(b) If the termination is for the convenience of the Government, the Contracting Officer shall make an equitable adjustment in the contract price but shall allow no anticipated profit on unperformed services.

(c) If the termination is for failure of the Contractor to fulfill the contract obligations, the Government may complete the work by contract or otherwise and the Contractor shall be liable for any additional costs incurred by the Government.

(d) If, after termination for failure to fulfill contract obligations, it is determined that the Contractor had not failed, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the Government.

(e) The rights and remedies of the Government provided in this clause are in addition to any other rights and remedies provided by law or under this contract.#

32. AUTHORIZED DEVIATIONS IN CLAUSES (1984 APR) FAR 52.252-6

(a) The use in this solicitation or contract of any Federal Acquisition Regulation (48 CFR Chapter 1) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the clause.#

33. PRICING OF ADJUSTMENTS (APR 1984) FAR SUPP 52.215-7000

When costs are a factor in any determination of a contract price adjustment pursuant to the Changes clause or any other clause of this contract, such costs shall be in accordance with Part 31 of the Federal Acquisition Regulation and the DOD FAR Supplement in effect on the date of this contract.#

34. CERTIFICATION OF REQUESTS FOR ADJUSTMENT OR RELIEF EXCEEDING $100,000 (FEB 1980) FAR SUPP 52.233-7000

(The following clause is applicable if this contract is expected to exceed $100,000 and the procurement instrument identification number is prefixed by the letters "DACA.")

(a) Any contract claim, request for equitable adjustment to contract terms, request for relief under Public Law 85-804, or other similar request exceeding $100,000 shall bear, at the time of submission, the following certification given by a senior company official in charge at the plant or location involved:

> I certify that the claim is made in good faith, that the supporting data are accurate and complete to the best of my knowledge and belief; and that the amount requested accurately reflects the contract adjustment for which the Contractor believes the Government is liable.
>
> _____
> (Official's Name)
>
> _____
> (Title)

(b) The certification in paragraph (a) requires full disclosure of all relevant facts, including cost and pricing data.

(c) The certification requirement in paragraph (a) does not apply to:

(1) requests for routine contract payments; for example, those for payment for accepted supplies and services, routine vouchers under cost-reimbursement type contracts, and progress payment invoices; and

(2) final adjustments under incentive provisions of contracts.

(d) In those situations where no claim certification for the purposes of Section 813 has been submitted prior to the inception of a contract dispute, a single certification, using the language prescribed by the Contract Disputes Act but signed by a senior company official in charge at the plant or location involved, will be deemed to comply with both statutes.#

35. RIGHTS IN SHOP DRAWINGS (APR 1966) FAR SUPP 52.236-7051

(a) Shop drawings for construction means drawings, submitted to the Government by the Construction Contractor, subcontractor or any lower tier subcontractor pursuant to a construction contract, showing detail (i) the proposed fabrication and assembly of structural elements and (ii) the installation (i.e., form, fit, and attachment details) of materials or equipment. The Government may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

(b) This clause, including this paragraph (b), shall be included in all subcontracts hereunder at any tier.#

36. GOVERNMENT RIGHTS (UNLIMITED) (MAR 1979)
FAR SUPP 52.236-7052(a)

The Government shall have unlimited rights, in all drawings, designs, specifications, notes and other works developed in the performance of this contract, including the right to use same on any other Government design or construction without additional compensation to the Contractor. The Contractor hereby grants to the Government a paid-up license throughout the world to all such works

to which he may assert or establish any claim under design patent or copyright laws. The Contractor for a period of three years after completion of the project agrees to furnish the original or copies of all such works on the request of the Contracting Officer.#

37. DRAWINGS AND OTHER DATA TO BECOME PROPERTY OF GOVERNMENT (MAR 1979) FAR SUPP 52.236-7052(b)

All designs, drawings, specifications, notes and other works developed in the performance of this contract shall become the sole property of the Government and may be used on any other design or construction without additional compensation to the Contractor. The Government shall be considered the "person for whom the work was prepared" for the purpose of authorship in any copyrightable work under Section 201(b) of Title 17, United States Code. With respect thereto, the Contractor agrees not to assert or authorize others to assert any rights nor establish any claim under the design patent or copyright laws. The Contractor for a period of three years after completion of the project agrees to furnish all retained works on the request of the Contracting Officer. Unless otherwise provided in this contract, the Contractor shall have the right to retain copies of all works beyond such period.#

APPENDIX C
DESIGN REQUIREMENT

WARZYN
ENGINEERING INC

Resume of Negotiations
Contract No. DACA45-85-C-0023

By Procurement & Supply Division letter dated August 27, 1984, the Architect-Engineer (Warzyn Engineering, Inc.) was informed that his firm had been selected to enter into negotiations for services in connection with the preparation of Concept and Final Design of the OMC Waukegan Harbor Superfund Project, Waukegan, Illinois. He was also advised of the scope of work required under the proposed contract, and requested to submit his proposed fee for accomplishing the work involved.

A prenegotiation meeting was held in the Omaha District Office on August 30, 1984 for the purpose of clarifying the scope of work as defined in the Appendix "A" & Supplement thereto.

Based upon Warzyn Engrg, Inc. representatives' interpretation of the Scope & Work & the prenegotiation meeting they submited their proposal in the total amount of $1,842,551 by letter dated September 1984. A copy of this proposal, current cost or pricing data, and SF Form 1411 was furnished the Omaha Resident Audit Office and an audit was requested.

By telephone call on September 13, 1984, Mr. Weber (President of Warzyn Engrg., Inc.) was requested to furnish the following information to assist the Government employee's in evaluating the proposal.

a. Breakdown and/or backup for all subcontractors proposals.
b. Breakdown of overall manhours per task and discipline.
c. Breakdown of reproduction, travel, material costs, etc.

Also discussed and clarified during this telephone call were the Design Assumptions furnished with Warzyn's proposal.

Audit Report MRDAO-85-01 dated October 1, 1984 was furnished.

After review of the proposal, requested breakdowns and the audit report, Chuck Stoll of Warzyn Engrg., Inc. was contacted and informed of the following on October 9, 1984.

a. Audited Overhead on Direct Costs was 36.41% in lieu of 40.65% and General & Administrative costs was 110.64% in lieu of 115.76% as proposed.

b. Fixed Fee (Profit) proposed mix of 9.06% Concepts and 9.81% was developed as 14% on Direct Labor, 8% on Other Costs, and 5% on Subcontractors. Audit noted that Warzyn has no previous experience of developing a tier approach to profit setting. Mr. Stoll was informed that this approach would be acceptable, however a mix of 12%, 5%, & 5% was suggested. Also noted for his negotiations with their subcontractor Donohue & Assoc. was their 15% profit factor.

c. Overall manhours of differences as follows were also pointed out.

Warzyn Engrg. Inc.

Concepts	Excessive Hours	
Civil/Struc	600	
Geotechnical	500	
Specifications	180	(no specs. in concepts)
Clerical	750	
Drafting	2,000	
Finals		
Civil	1,000	
Structural	1,500	
Electrical	200	
Estimating	300	
Clerical	1,500	
Drafting	7,000	

Donohue Assoc. (Subcontractor)
Combined Concepts & Finals
Action 1c - Structural 300 hours excessive
Actions 1h & 2e - Bulk of difference in Process Engineering & P.M. (1,500-2,000 hours)

Mr. Stoll was requested to discuss these differences & determinations with appropriate personnel for possible adjustments prior to the negotiation meeting set for October 17-18, 1984.

A conference for negotiations was held in the office of the District Engineer, US Army Engineer District, Omaha, 215 North 17th Street, Omaha, NE, on 17 & 18 October 1984. The Architect-Engineer and the Government were represented by the following:

a. Architect-Engineer: Warzyn Engineering, Inc.
   Bruce Weber - President
   Thomas Lynch - Project Manager
b. Subcontractor: Donohue & Associates
   Thomas Leonhardt - Sr. Vice President
c. US Government: US Army Corps of Engineers, Omaha District
   Donald Daubman - Chief, Contracts Branch/Negotiator
   Robert Smart - Project Manager

The Architect-Engineer's representatives were advised of the following:

a. Any estimates of construction cost prepared by the Architect-Engineer for the project should be treated in a confidential manner.

b. All data and/or correspondence marked "FOR OFFICIAL USE ONLY" shall be protected as required.

c. The Architect-Engineer will not be permitted or authorized to make any public announcements or releases pertaining to the project without prior approval of the Authorized Representative of the Contracting Officer.

A revised proposal based upon the preceding telephone discussions was furnished by Mr. Weber. This proposal was in the amounts of $532,139 Concepts and $763,778 Finals for a total of $1,295,917. This proposal was prepared using the audited overhead and G/A costs of 36.41% & 110.64% and an adjustment in the mixed profit factor of 14%, 5%, & 5%.

The proposal of $1,295,917 was used as a starting point of negotiations. Items such as Off-Site Exploration of Clay Borrow Sites, Special Investigation of Bulkhead, Miscellaneous On-Site Investigation as well as Laboratory Testing Associates with Off-Site Exploration weredeleted in this revised proposal.

Number of drawings proposed were considered excessive and were discussed along with the cost associated with reproduction of plans & specifications. The number of copies for reivew were reduced significantly to reflect the number required in the Appendix "A" of the contract.

Specialized Laboratory Testing proposed as a lump sum of $35,000 was was questioned and discussed. These services will be required to a lesser extent than originally expected and will be accomplished by Donohue & Assoc. and included within their revised proposal.

Travel costs, number of trips, and number of appropriate disciplines involved therein were discussed & agreed upon and reductions will be made in revised proposal.

Prior to discussing the overall manhours in this proposal a break was called for the purpose of allowing Warzyn's representatives time to define their manhours of effort as associated with each task as was done by their subcontractor Donohue & Associates.

Upon reconvening, each Task was discussed as to extent of work (manhours of effort associated thereto for Warzyn and/or Donohue) and the differences questioned by the Government representatives were as follows:

a. Value engineering manhours in final design phase. VE should be accomplished primarily in the Concept phase.

b. Permit Coordination (Environmental Engineer) Warzyn estimate 14 permits at an average of 2 weeks per permit. The number of permits & the 2 weeks per permit were considered excessive. Mr. Smart felt that the number of permits would be approximately 7 and the 2 weeks per permit was excessive.

c. Task - Action 1c, Total manhours proposed by Warzyn & Donohue were considered excessive (approx. 600 hrs.) to evaluate materials & identify fixation of Batch Plant. More effort should be for design.

d. Task - Action 1h & 2e, Waste Water Treatment Plant and routing, etc. Proposed manhours (Donohue, over 4,700 hrs. were considered approximately 2,000 hrs. too high.

e. Task- Action 1i, Water Intake. Manhours proposed by Donohue were considered slightly high (Approx. 80-100 hrs.).

f. Task - Action 3b, Warzyn's overall manhours proposed appeared to be about 200 hrs. excessive.

g. Task - Action 4e, Donhue's proposed manhours appeared 150 hrs. excessive.

h. General items - Preparation Base Map, Field Investigation, Meetings, etc. Overall manhours proposed for these items appeared to be about 300 hrs. in excess.

Warzyn & Donohue representatives were requested to recalculate their proposal taking into account the foregoing discussions & indicated manhour differences and the meeting was adjourned for the day.

Negotiations reconvened on October 18, 1984, at which time Mr. Weber furnished revised manhours of effort and adjustments in Laboratory Testing, Travel, & Reproduction costs. The resultant revised proposal was $531,542 Concepts and $663,841 Finals for a total of $1,195,383.

The Scope of Work to be attached to the contract formed the basis of final agreement reached in the negotiations, and the Architect-Engineer's representatives advised the Government's representatives that the Scope of Work was understood, as well as the extent of the services to be performed by the firm.

All factual data submitted by the Architect-Engineer during the negotiations and the Audit Report were relied on by the Government. The Architect-Engineer's representatives were advised that, upon receipt of the revised proposal, it would be recommended for approval. Negotiations were completed on October 18, 1984.

Donald A. Daubman
Donald Daubman
Chief, Contracts Branch

Bruce A Weber
Bruce Weber
President

Robert J. Smart
Robert Smart
Project Manager

Thomas J Lynch 11-6-84
Thomas Lynch
Project Manager

The final negotiated fee took into account the attached Design Assumptions furnished by Warzyn Engineering, Inc.

OMC-WAUKEGAN HARBOR SUPERFUND PROJECT
DESIGN ASSUMPTIONS

A. General

The design fee is based on "Conceptual design-OMC Hazardous Waste Site" dated September 14, 1984, "Instructions for Preparatrion of Proposal" dated April, 1984, and "Scope of Services, Appendix A", dated August 21, 1984.

B. Corps of Engineers Responsibilities

1. Corps of Engineers will furnish the following data with a notice to proceed:

   a. Reproducible mylars of topographic site information at a scale of 1" = 50', or greater;

   b. Negatives of aerial photography suitable for reproduction;

   c. All pertinent underground and overhead utility information;

   d. Foundation plans for all structures that may be affected by construction excavations with the exception of the sheet pile wall in Slip No. 3;

   e. Drawings of the boat hoist, floating docks and other structures to be relocated;

   f. A summary of preliminary laboratory tests to determine fixation of the dredged spoil;

   g. Three (3) copies of the final concept report by CH_2M Hill; and

   h. Adequate supply of drafting paper for use on the project.

2. Corps of Engineers will handle all verbal and written communications, including submission of data, with USEPA, IEPA, CH_2M Hill and other interested parties, except as required in the normal conduct of our work.

3. Corps of Engineers will provide access to the site of observation and investigations within one week (7 days) of Warzyn's verbal request.

4. Corps of Engineers will provide and deliver to Donohue in Sheboygan samples of dredge materials. These samples will be tested for methods of reducing moisture content before fixation to control volume of material to be disposed.

5. The Corps of Engineers will be responsible for obtaining all permits and permit fees based upon information supplied by Warzyn.

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C. Design Details

1. Following hydraulic dredging, the 1,500 gpm water treatment plant will be partially dismantled to produce a 200 gpm plant for treatment of supernatant, rainwater and leachate. A second 200 gpm treatment plant will be designed for the north side to treat water from the dewatering operation.

2. All three treatment systems will be operated only during warm weather, no freeze protection will be designed into facilities.

3. The 1,500 gpm treatment plant sedimentation basin will not have a sludge collection mechanism.

4. Design criteria will be established by Warzyn on the basis of the estimated life of structures and facilities and may deviate from Corps of Engineers standards.

5. Minimal relocation of the water intake in Slip No. 3 will be designed to avoid the proposed cofferdam, only.

6. Warzyn will identify the probable need for temporary support or relocation of buildings, water tanks, and boat launching/docking facilities, but design of such structures will be the responsibility of the successful contractor.

D. Limitations

1. Scope includes VE assessment of desireability of operation of treatment plants in freezing weather but does not include detailed design for that condition.

2. Testing to establish the potential effect of PCB's on slurry wall performance in not included in the work scope.

3. Warzyn and it's subconsultants assume no liability for design concepts prepared by others and not specifically evaluated as part of the work scope.

4. Environmental assessments and/or statements are not included in the work scope.

5. Attendance at public hearings or meetings, except as specifically defined, are not included in the work scope.

6. The Value Egineering study indentified in the work scope will focus on design criteria not alternative concepts. The concepts in CH_2M Hill's "Conceptual Design, OMC Hazardous Waste Site, Waukegan, Illinois" dated September 14, 1984, are the basis for design.

7. No Operation and Maintenance manuals are to be prepared for equipment or processes, only for site closure activities.

8. Any legal appearances, depositions, etc. are not included in this work scope.

9. No special studies or design effort are included regarding possible contamination behind sheet piles at the north ditch.

10. It is assumed that underground utilities are as indicated in the CH_2M Hill report.

11. Investigation and/or evaluation of the existing bulkhead stability in Slip No. 3 and Upper Harbor is not included in the work scope.

12. Site specific investigation of off-site borrow sources is not included in the work scope.

13. Warzyn and their subconsultant, Donohue, will send one estimator each to meetings in Omaha and one technical representative each to briefings in Springfield. A maximum of four Warzyn staff and two Donohue staff will attend 90% review conference in Omaha.

BAW/TJL/las
[las-23-5]

WARZYN
ENGINEERING INC

November 6, 1984

DIARY NOTE

Re: Precontract Negotiations
OMC Superfund Project

This morning, I received a phone call from Bob Smart of the Corps of Engineers, Omaha District. Bob had apparently just spoken with Jack Braun and Pam Rekar of EPA, Region 5, regarding our list of design assumptions, which form the basis for a contract. They expressed the following concerns to Bob:

B.1.b. They will be unable to provide negatives of the areal photography, but will provide photographs at whatever scale we desire.

B.1.c. All underground information may not be available when we receive the notice to proceed.

B.1.d. They are not sure that they will be able to acquire foundation information, but are currently searching record data.

B.1.e. They do not believe that any drawings exist on the boat hoist; they would like us to talk with Larsen Marine to find out what they want to have done with the hoist.

B.3. Pam is not sure that she will be able to gain access in seven days, but recognizes the concern if long delays are encountered; she preferred to have some more flexibility.

B.4. EPA is concerned as to the need for additional testing and would like us to provide some documentation to the file for why this is necessary. (Smart told them that it is probably necessary to establish final mix designs.) EPA also wanted to be sure we would be responsible for the samples once they are obtained. Smart feels we may need to do some coordinating of this effort.

C.5. EPA now has some concerns that the water intake may have to be relocated out of Slip No. 3. Smart recognizes that this is what we proposed to the Corps, but was deleted from the contract. Therefore, he suggested that we may have to relook at this situation during design, and it may necessitate a contract modification. EPA also suggested that we look at hooking OMC to a public water supply.

D.8. EPA is concerned that we may have to make some legal appearances simply to gain site access. I concurred with Smart that this would not present a problem, if paid out of the trips clause.

It does not appear that any of EPA's concerns should adversely affect the commencement of work on the project. Therefore, Smart and I agreed that we would not attempt to modify the paperwork at the present time. However, some of these matters will have to be closely reviewed and their impacts analyzed, once design begins.

Bruce A. Weber

BAW/dkp
[dkp-217-25]

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1400 EMIL STREET, P.O. BOX 9538, MADISON, WIS. 53715 · TEL. (608) 257-4848 WIS. TOLL FREE NO. 800-362-5005

October 23, 1984
MS 941

U.S. Army Engineer District
Omaha Corps of Engineers
6014 U.S. Post Office and Courthouse
Omaha, NE 68102

Attention: Mr. Donald Daubman

Re: Operation, Maintenance, Site Closure
Outboard Marine Corporation
Waukegan Harbor Superfund Project
Proposed Contract No. DACW 45-85-C-0023

Gentlemen:

In accordance with our discussion on October 18, we are submitting the following:

1. Revised Work Scope for Geotechnical Investigation
2. Revised Summary of Design Assumptions
3. Contract Pricing Proposal Cover Sheet
4. Estimate Format - Title 1 Summary
5. Cost Estimates for:
   a. Geotechnical Investigation
   b. Travel Costs
   c. Printing and Reproduction
6. Contractor Data Sheet
7. Certificate of Current Cost or Pricing Data
8. Summary of Manhours and Costs for Subconsultant, Donohue and Associates

We trust that this information is sufficient for your present requirements. If you have any questions or require additional information, please contact me.

We eagerly await your notice to proceed.

Respectfully submitted,

WARZYN ENGINEERING INC.

Bruce A. Weber, P.E.
President

BAW:pjs
Attachments: As Stated

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REVISED WORK SCOPE
GEOTECHNICAL INVESTIGATION
OMC-WAUKEGAN HARBOR SUPERFUND PROJECT

A. On-Site Exploration

1. Test Borings

• Upper Harbor and Slip No. 3 Bulkhead	5
• Treatment Plant	4
• Batch Plant	2
• Containment Areas	8
• Lagoons/Curing Cells	12
	31 Borings w/Estimated Average Depth of 35'

All borings land-based.

2. Laboratory Testing

• Water Content	122
• Atterberg Limits	31
• Loss on Ignition	31
• Washed Sieve	62
• Washed Sieve and Hydrometer	31
• Unconfined Compression	31
• Consolidation	3
• Triaxial	
- C-U	2
- U-U	3

[dkp-210-11]

WARZYN ENGINEERING INC

C-12

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January 17, 1985
C 11837
WC-4

Mr. Robert Smart
Omaha Corps of Engineers
6014 Post Office and Courthouse
Omaha, NE 68102

Re: Design Criteria and Assumptions

Dear Mr. Smart:

Our review of the design criteria and assumptions, as presented in the CH_2M Hill Concept and in Appendix A of the contract, has disclosed several matters which we believe need clarification now, rather than waiting for the 30% review.

The attached notes present these items and represent our interpretation of the project requirements and our basis for design.

Your review of and comment on these notes would be appreciated.

Very truly yours,

WARZYN ENGINEERING INC.

Thomas J. Lynch, P.E.
Project Manager

TJL/las
[las-40-1]

cc: Mr. Dave Froh - WO-7
Mr. Bruce Weber
Mr. Dave Horsefield
Mr. Richard H. Weber
Mr. Doug J. Dahlberg
Mr. Robert A. Jones
Mr. Kenneth A. Nickels

January 17, 1985
C 11837

OMC - WAUKEGAN SUPERFUND PROJECT
DESIGN CRITERIA AND ASSUMPTIONS

ACTION 1: SLIP NO. 3 AND UPPER HARBOR - Remove, fix and dispose off-site.

A. Construction of a single pile cofferdam in localized area.

1. The intent is to excavate a circular area about 85 feet in diameter, centered so as to include the deep contamination near the old OMC outfall. This will include space on both the land and the water side of the existing bulkhead.

2. The depth of excavation will be about 5 feet into the underlying silty clay, glacial till.

3. The resulting excavation will be filled with imported granular material approximately to the existing top-of-sand level.

4. The removed section of bulkhead will be replaced either along its existing alignment or at a new location chosen by Larson Marina.

5. Sediments within the cofferdam area may be removed by hydraulic dredging prior to cofferdam construction in order to avoid the need for clam shell dredging of these materials.

6. The diameter of the sheet pile cofferdam may have to be larger than the 85-foot excavation diameter to compensate for the inability to drive sheet piles sufficiently into the glacial till. Its shape may not be circular.

7. EPA will provide construction easements on Larson Marina property.

B. Installation of a sediment dispersal control device at eastern end of Slip No. 3.

1. Boat traffic in Slip 3 will be prohibited while this device is in place. There will be no provision for passage of boats.

2. The device will be designed to restrict passage of suspended particulate matter under quiet water conditions.

3. The device will be designed to allow passage of water under storm or surge conditions.

C. Construction of a clay-lined curing cell and batch plant on vacant OMC property.

1. The batch plant may be set up on Larson Marina property.

2. Need for soil-cement liner in curing cells will be further assessed.

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D. Clam shell dredging within cofferdam and adjoining areas of high contamination to remove deep contaminated sand and silt.

1. Sediments may be removed by hydraulic dredging prior to cofferdam construction.

2. Deep excavation (i.e. below surface of sand) will only be within the cofferdam.

3. Water brought up with clam shell dredged material will be routed to treatment plant.

E. Transportation of dredged materials to batch plant.

1. Batch plant may be located so that clam shell dredged materials can be delivered directly to batch plant hopper.

2. If truck transport is necessary, a decontamination area will be provided. Wash water will be routed to treatment plant.

F. Fixation in curing cell by addition of a hydrating agent.

1. Mixes will be established, subject to field adjustment, for sediments (muck), sand and till for varying amounts of PCB contamination.

G. Transportation and disposal of fixed solids in licensed chemical waste landfill.

1. EPA will establish identity of landfill.

2. No special provisions will be made for increased street traffic, noise or street damage.

H. Pumping and piping for removal of water from interior of cofferdam and routing to wastewater treatment plant.

1. This piping will be routed across Larson Marina property and may have an impact on their operation. Routing will be worked out with Larson Marina. EPA will arrange necessary construction easement.

I. Move existing water intake.

1. Design contract provides for moving sufficient to clear cofferdam.

2. This is insufficient since it would result in taking contaminated water from Slip 3 while hydraulic dredging is proceeding.

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3. One solution would be to extend the intake pipe to beyond dredging limits. This would be expensive and would require additional design effort.

4. Another solution would be to temporarily use City water. This will be investigated and evaluated.

5. Solution of this problem may require a design contract change order.

ACTION 2: SLIP NO. 3 AND UPPER HARBOR - Dredge, dewater and dispose in Parking Lot Area.

A. Construction of a clay-lined, dewatering lagoon on vacant OMC property.

1. Soil-cement liner seems unnecessary. A road gravel layer for protection of the clay liner will be adequate.

B. Installation of a sediment dispersal control device at the south end of the Upper Harbor.

1. Small boat traffic will be accommodated while this device is in place. There may be moveable sections in each of the two barriers so that they may be opened, one at a time, for passage of boats, or there may be a labyrinth created by offset openings in the two barriers.

2. The device will be designed to restrict passage of suspended particulate matter under quiet water conditions.

3. The device will be designed to allow passage of water under storm or surge conditions.

C. Hydraulic dredging of sediment (muck) from the central and eastern portions of Slip No. 3 and pumping of sediment slurry through a pipeline to the dewatering lagoon.

1. This activity will comprise two separate dredging activities - one in Slip 3 delivering materials to Lagoon No. 1, and one in the Upper Harbor delivering materials to Lagoon No. 2.

2. The dredge pipe from Slip 3 will be routed across Larson Marine property and will have an impact on their operation. EPA will arrange necessary construction easement.

3. The dredge pipe from the upper harbor will be routed across the harbor directly to Lagoon No. 2.

4. The sediment control device at the east end of Slip No. 3 will be kept in place during dredging in Slip No. 3 and will be removed when work in Slip No. 3 is completed.

5. The sediment control device at the south end of the Upper Harbor will be installed prior to dredging in the Upper Harbor and will be removed when work in the Upper Harbor is completed.

6. Outside the cofferdam, the sediment to be removed will include only the muck which will be removed by hydraulic dredging.

7. Removal of the muck is assumed not to affect the stability of the existing bulkhead walls.

D. Removal of sediment from Lagoon Area 1, fixation at batch plant; curing in cells, transportation, disposal in Parking Lot Area.

1. Operating procedures will be established for drying of material in Lagoon Nos. 1 and 2.

2. Batch plant will be located adjacent to Lagoon No. 1 to minimize transport between them.

3. Decontamination areas will be provided for trucks and equipment at the batch plant and at the parking lot.

4. Operating procedures will be established for the removal of materials from Lagoon No. 1 and delivery to the batch plant.

5. Operating procedures will be established for removal of materials from Lagoon No. 2 and delivery directly to Parking Lot.

E. Routing and treatment of supernatant, rain water and leachate from dredging and dewatering process.

1. All contaminated water, or water which may be contaminated, will be treated. This includes wash water or condensate from decontamination stations and rain water from any potentially contaminated areas.

2. Effluent from the treatment plants will be discharged to the Upper Harbor.

ACTION 3: NORTH DITCH AREA - Remove hot spots and dispose off site.

A. Placement of a dewatering system in area to be excavated.

1. Separate dewatering systems will be provided for:

   a. Deep excavation in Crescent Ditch;

   b. Shallow excavation in Oval Lagoon; and

   c. Increments of excavation along east-west part of North Ditch.

2. Dewatering systems will be designed by the Contractor based on criteria established by Waryzn.

B. Construction of a braced excavation system in localized areas of Crescent Ditch/Oval Lagoon Area.

1. A braced cofferdam will be provided for area of known deep contamination in Crescent Ditch.

2. Highly contaminated material in the Oval Lagoon will be removed to about 6 feet in depth without shoring.

C. Removal of highly contaminated soil by backhoe from within braced excavation areas.

1. Material from within the cofferdam will be removed to about 5 feet into the underlying silty clay glacial till.

D. Transportation and disposal of material in licensed chemical waste landfill.

1. EPA will identify landfill.

2. It will be assumed that material, as excavated, will be dry enough for direct shipment.

E. Routing and treatment of water from dewatering system.

1. Surface runoff from contaminated areas will also be treated.

ACTION 4: NORTH DITCH AREA - Contain and cap.

A. Construction of a runoff water by-pass to divert surface water around highly contaminated areas of Crescent Ditch and Oval Lagoon and collect surface runoff from Parking Lot Area.

1. Area to be included in containment cell will be considered contaminated. During construction, runoff from this area will be collected and treated.

2. By-pass will be placed in east-west section of North Ditch.

B. Placement and compaction in Parking Lot Area of soil excavated for by-pass construction.

1. Excavation from clean areas will be used for general backfill. Contaminated excavation will be used to backfill Crescent Ditch and Oval Lagoon, all within containment.

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2. East-west portion of North Ditch will be excavated only as requried for by-pass construction. Excavation will be backfilled with clean materials. Balance of east-west ditch will be filled with clean materials and covered with clay cap.

C. Construction of a containment cell around Crescent Ditch/Oval Lagoon area, including a slurry wall and clay cap.

1. Containment cell will be defined to include areas of known contamination.

2. Containment cap will include synthetic membrane and asphalt pavement. No underdrain system will be included.

3. Clay cap will be specified to have 10^{-7} cm/sec permeability rather than 10^{-8}.

4. Finish surface will be approximately at existing grade and designed for use as a parking lot.

5. The bentonite slurry wall will be assumed to be suitable and compatible with the contained PCB's.

D. Installation of groundwater monitoring wells.

1. Monitoring wells will be provided on all sides and at least two depths. Interior monitoring will be included with provision for pumping.

E. Routing and treatment of water from dewatering system.

1. Surface water runoff from contaminated areas will also be treated during construction.

2. Effluent from treatment plant will be discharged to new by-pass sewer.

ACTION 5: PARKING LOT AREA - Contain and cap.

A. Construction of containment cell around Parking Lot Area including a slurry wall and clay cap.

1. Containment cell will be defined to include areas of known contamination.

2. Containment cap will include synthetic membrane and asphalt pavement. No underdrain system will be included.

3. Clay cap will be specified to have 10^{-7} cm/sec permeability rather than 10^{-8}.

4. Finish surface will be about 14 feet above existing grade and will be designed for use as a parking lot.

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5. Sideslopes will be protected by revetments against wave action from a 100-year storm event.

B. Installation of groundwater monitoring wells.

1. Monitoring wells will be provided on all sides and at least two depths. Interior monitoring will be included with provision for pumping.

APPENDIX D
COMPUTER ANALYSIS - DREDGING VOLUMES

WARZYN
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```
   !DIG/EARTH1
   PRINTER IS 1
   ! BY TJ 4/16/84  PROTECT CODE IS 'TJ'
!********************  VARIABLE LISTING  ******************************
!
! A$( = DIGITIZER STRING
! AREA(= AREA OF SECTION
! CONTOUREL= CURRENT CONTOUR ELEVATION
! CONTOURINT= CURRENT CONTOUR INTERVAL
! CUMVOL= CUMULATIVE VOLUME IN VOLUMESUB
! DA$= DATE
! DISTANCE(= DISTANCE FROM REFERENCE POINT
! DSCALE= DRAWING SCALE IN FT/INCH
! DUMMY$= DUMMY VARIABLE
! INDICATOR$= FIRST VALUE OF DIGITIZER STRING
! INTERVOL= VOLUME BETWEEN STATIONS
! LA,LB,LC,LD= MIN/MAX VALUES OF POINTEL AND DISTANCE FOR SECTIONPLOT SUB
! N= STATION COUNTER
! NEWVAL= HOLDING VARIABLE FOR EDITED CURENT VALUES
! NN= POINT COUNTER
! NN$= USER NAME
! PN$= PROJECT NAME
! POINTEL(= POINT ELEVATION
! POSITION1= 1ST ',' IN DIGITIZER STRING
! POSITION2= 2ND ',' IN DIGITIZER STRING
! PR$= PROJECT NUMBER
! SPOTEL= CURRENT SPOT ELEVATION
! STADIST= DISTANCE BETWEEN STATIONS
! STATION(= STATION VALUE
! VOLTYPE$= TYPE OF VOLUME BEING COMPUTED
! VX(= X COORDINATE FROM DIGITIZER STRING
! VY(= Y COORDINATE FROM DIGITIZER STRING
! X= DUMMY COUNTER
!
!
!>>>>>>>>>>>>>>>>>>> SUBROUTINES <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
!
! AREASUB: COMPUTES AREA OF CROSS SECTION
! COORDINATES: COMPUTES COORDINATES FROM TEXT STRING
! DISTANCESUB: COMPUTES DISTANCES FROM REFERENCE POINT USING COORDS.
! EDITSUB: EDITS CURRENT VALUES OF STATION, COUNTOUREL, CONTOURINT,SPOTEL
! SECTIONPLOT: PLOTS CURRENT SECTION ON SCREEN
! TITLEPRINT: PRINTS TITLE FOR EACH PRINTED PAGE
! VOLUMESUB: COMPUTES AND PRINTS VOLUMES
!
!
!************************************************************************
!DIMENSION COORDINATES AND STRINGS
 DIM A$(100)[40],Area(25),Da$[10],Distance(100),Nn$[15],Pn$[15],Pointel(100)
,Pr$[15],Station(25),Vx(100),Vy(100),Voltype$[40]
!START HERE FOR PROGRAM RESTART
!RESET VARIABLES TO 0 OR NULL
 Dummy$=""
!RESET SECTION AND POINT COUNTERS
N=0
Nn=0
!BEGIN INSTRUCTIONS
OUTPUT 2 USING "#,B";255,75
PRINT CHR$(129)
```

```
2200 PRINT TABXY(27,2),"DIGITIZER EARTHWORK"
2700 PRINT CHR$(128)
2 00 INPUT "ENTER 'I' FOR INSTRUCTIONS OR PRESS ENTER TO CONTINUE",Dummy$
2500 IF Dummy$<>"I" THEN 2900
2505 OUTPUT 2 USING "#,B";255,75
2510 PRINT CHR$(129)
2700 PRINT TABXY(30,2),"INSTRUCTIONS"
2710 PRINT CHR$(128)
2800 PRINT
2810 PRINT "THIS PROGRAM COMPUTES VOLUMES BY THE AVERAGE END AREA METHOD. FROM P
LANVIEW"
2820 PRINT "DRAWINGS USING THE NUMONICS 2300 DIGITIZER. USING USER SPECIFIED STA
TIONING, THE"
2830 PRINT "DIGITIZER IS USED TO DETERMINE POINT ELEVATIONS AND LOCATIONS DIRECT
LY FROM THE"
2840 PRINT "DRAWING."
2850 PRINT "                              THINGS TO REMEMBER"
2860 PRINT
2870 PRINT "1)ONLY OPEN FIGURES REPRESENTING ALL CUT OR ALL FILL CAN BE ENTERED.
"
2880 PRINT "2)ALL AREAS ARE AVERAGED WITHOUT ANY CORRECTION FACTORS, SO SELECT Y
OUR SECTIONS  WISELY."
2890 PRINT "3)ZERO AREA SECTIONS ARE PERMITTED ANYWHERE IN THE COMPUTATIONS, SO
MINIMIZE      DISTANCES TO ADJACENT SECTIONS TO REDUCE ERROR."
2891 PRINT "4)STATIONING MUST INCREASE IN VALUE. THE FIRST POINT ENTERED MUST BE
 THE LEFT"
2892 PRINT "  MOST POINT ON THE SECTION, AND SHOULD NOT BE REENTERED AS THE LAST
 POINT."
2894 PRINT "5)THE POINT LOCATIONS ARE ONLY AS GOOD AS THE DRAWING GRID, SO USE V
ACUUM PRINTS  OR ORIGINALS WHEN VERY HIGH ACCURACY IS REQUIRED."
2900 INPUT "PRESS ENTER TO CONTINUE",Dummy$
3000! INPUT PROJECT INFORMATION
3100 OUTPUT 2 USING "#,B";255,75
3200 PRINT CHR$(129)
3300 PRINT TABXY(22,2),"DIGITIZER EARTHWORK"
3400 PRINT CHR$(128)
3500 INPUT "USER INITIALS? ",Nn$
3600 PRINT TABXY(10,4),"USER INITIALS: ",Nn$
3700 INPUT "DATE? ",Da$
3800 PRINT TABXY(10,6),"DATE: ",Da$
3900 INPUT "PROJECT NAME? ",Pn$
4000 PRINT TABXY(10,8),"PROJECT NAME: ",Pn$
4100 INPUT "PROJECT NUMBER? ",Pr$
4200 PRINT TABXY(10,10),"PROJECT NUMBER: ",Pr$
4300 INPUT "DRAWING SCALE (FT/INCH)? ",Dscale
4310 PRINT TABXY(10,12),"DRAWING SCALE (FT/INCH): ",Dscale
4320 INPUT "VOLUME TYPE? ",Voltype$
4400!BEGIN STATION LOOP HERE
4700!BEGIN SECTION DATA INPUT
4800 !TEST FOR 1ST OR 2ND SECTION
4900 IF N=0 OR N=1 THEN GOTO 5411
5000 !TEST FOR LAST SECTION
5 00 OUTPUT 2 USING "#,B";255,75
5 0 Dummy$=""
5200 INPUT "ENTER 'A' FOR ANOTHER SECTION; 'V' TO COMPUTE VOLUMES",Dummy$
5300 IF Dummy$<>"A" AND Dummy$<>"V" THEN GOTO 5200
5310 IF Dummy$="A" THEN GOTO 5411
5400 IF Dummy$="V" THEN GOSUB Volumesub
5401 !TEST FOR ANOTHER RUN
5403 Dummy$=""
```

```
5404 INPUT "ENTER 'A' FOR ANOTHER RUN; '0' TO QUIT PROGRAM",Dummy$
5405 IF Dummy$<>"A" AND Dummy$<>"0" THEN GOTO 5401
5407 IF Dummy$="A" THEN GOTO 1600
5408 DISP "DON'T FORGET TO LOG IN YOUR TIME!!!  ---------------->BYE"
5409 GOTO 25250
5411 !ADD 1 TO SECTION COUNTER
5500 N=N+1
5600 OUTPUT 2 USING "#,B";255,75
5700 PRINT CHR$(129)
5800 PRINT TABXY(31,1),"SECTION DATA INPUT"
5900 PRINT CHR$(128)
6000 PRINT TABXY(33,3),"CURRENT VALUES"
6010 !RESET STATION(,CONTOUREL,CONTOURINT, AND AREA( TO ZERO
6020 Station(N)=0
6030 Contourel=0
6040 Contourint=0
6050 Spotel=0
6060 Area(N)=0
6100 INPUT "STATION?",Station(N)
6200 PRINT TABXY(20,4),"1)CURRENT STATION: ",Station(N)
6210 !CHECK FOR ZERO AREA STATION
6220 Dummy$=""
6230 INPUT "ENTER '0' FOR ZERO AREA FOR THIS STATION; OR PRESS ENTER TO CONTINUE
",Dummy$
6240 IF Dummy$<>"0" AND Dummy$<>"" THEN GOTO 6210
6250 IF Dummy$="0" THEN GOTO 12600
6300 INPUT "STARTING CONTOUR ELEVATION?",Contourel
6400 PRINT TABXY(20,5),"2)CURRENT CONTOUR ELEVATION: ",Contourel
6500 INPUT "STARTING CONTOUR INTERVAL?",Contourint
6600 PRINT TABXY(20,6),"3)CURRENT CONTOUR INTERVAL: ",Contourint
6700 INPUT "STARTING SPOT ELEVATION?",Spotel
6800 PRINT TABXY(20,7),"4)CURRENT SPOT ELEVATION: ",Spotel
6900 PRINT CHR$(129)
7000 PRINT TABXY(1,9),"POSITION CURSOR OVER POINT AND PRESS FOLLOWING KEYS ON CU
RSOR TO ENTER ELEVATION"
7100 PRINT CHR$(128)
7200 PRINT TABXY(10,10),"'8' TO GO UP ONE CONTOUR INTERVAL"
7300 PRINT TABXY(10,11),"'5' TO ENTER CURRENT CONTOUR ELEVATION"
7400 PRINT TABXY(10,12),"'2' TO GO DOWN ONE CONTOUR INTERVAL"
7500 PRINT TABXY(10,13),"'7' TO ENTER CURRENT SPOT ELEVATION"
7600 PRINT CHR$(129)
7700 PRINT TABXY(15,15),"PRESS THESE KEYS ON CURSOR FOR THE FOLLOWING ITEMS"
7800 PRINT CHR$(128)
7900 PRINT TABXY(10,16),"'4' TO CHANGE CURRENT STATION,ELEVATION, INTERVAL, OR S
POT ELEVATION"
8000 PRINT TABXY(10,17),"'1' TO DELETE LAST POINT ENTRY"
8100 PRINT TABXY(10,18),"'-' WHEN POINT ENTRY IS COMPLETE"
8200 !BEGIN POINT DATA ENTRY LOOP
8600 Nn=Nn+1
8700 !READ COORDINATE STRING
8710 A$(Nn)=""
8800 SEND 7;CMD 64+7
8900 ENTER 707;A$(Nn)
9000 SEND 7;UNT
9100 BEEP
9200!DETERMINE FIRST ',' LOCATION
9300 Position1=POS(A$(Nn),",")
9400!CHECK FOR SELECTION INDICATOR
9500 Indicator$=(A$(Nn)[1,Position1-1])
9600!TEST SELECTION INDICATOR
```

```
9610 IF Indicator$="8" OR Indicator$="5" OR Indicator$="2" THEN GOTO 9700
9620 IF Indicator$="7" OR Indicator$="4" OR Indicator$="-" THEN GOTO 9700
9621 IF Indicator$="1" THEN GOTO 9700
9630 BEEP
9640 BEEP
9650 BEEP
9660 INPUT "ILLEGAL CURSOR ENTRY!!!  PRESS 'ENTER ON KEYBOARD TO REENTER LAST PO
INT",Dummy$
9670 GOTO 8700
9700 !ASSIGN ELEVATION TO POINTEL
9800 IF Indicator$="8" THEN Pointel(Nn)=Contourel+Contourint
9900 IF Indicator$="5" THEN Pointel(Nn)=Contourel
10000 IF Indicator$="2" THEN Pointel(Nn)=Contourel-Contourint
10100!RESET CURRENT CONTOUR ELEVATION WHEN UP OR DOWN INTERVAL
10200 IF Indicator$="8" THEN Contourel=Contourel+Contourint
10300 IF Indicator$="2" THEN Contourel=Contourel-Contourint
10400!REPRINT COUNTOUREL IF INCREMENT UP OR DOWN
10500 IF Indicator$="8" OR Indicator$="2" THEN PRINT TABXY(49,5),"
      "
10600 IF Indicator$="8" OR Indicator$="2" THEN PRINT TABXY(49,5),Contourel
10700 IF Indicator$="7" THEN Pointel(Nn)=Spotel
10800 IF Indicator$="4" THEN GOSUB Editsub
11000!TEST FOR END OF SECTION
11100 IF Indicator$="-" THEN GOTO 11500
11110 !BYPASS AND/OR RESET POINT COUNTER IF EDIT OR REENTER INDICATOR
11120 IF Indicator$="1" THEN Nn=Nn-1
11200 IF Indicator$="4" OR Indicator$="1" THEN GOTO 8700
11300! GO TO TOP OF LOOP FOR NEXT POINT
11400 GOTO 8200
11500 !BEGIN COMPUTATIONS FOR PLOTTING
11600 OUTPUT 2 USING "#,B";255,75
11700 PRINT CHR$(129)
11800 PRINT TABXY(26,10),"PLEASE WAIT WHILE COMPUTING"
11900 PRINT CHR$(128)
12000!RESET COUNTER FOR LAST VALID POINT NUMBER
12100 Nn=Nn-1
12200!COMPUTE COORDINATES FOR EACH POINT
12300 GOSUB Coordinates
12400 !COMPUTE DISTANCES FROM FIRST POINT
12500 GOSUB Distancesub
12501 !COMPUTE AREA OF SECTION
12502 GOSUB Areasub
12600!PLOT SECTION
12700 GOSUB Sectionplot
12704 !RESET POINT COUNTER TO ZERO
12705 Nn=0
12710 GOTO 4400
12800 !>>>>>>>>>>>>>>>>> END OF MAIN PROGRAM <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
12900 !
13000 !>>>>>>>>>>>>>>>> BEGINNING OF SUBROUTINES <<<<<<<<<<<<<<<<<<<<<<<<<<<<
13100 !
13200!*****************************************************************************
13300 Coordinates: !
13400!DETERMINE X AND Y COORDINATE FOR EACH POINT
13500 FOR X=1 TO Nn
13600! CHECK POSITION OF FIRST ','
13700 Position1=POS(A$(X),",")
13800! CHECK POSITION OF SECOND ','
13900 Position2=POS(A$(X)[Position1+1,40],",")
13910 Position2=Position1+Position2
```

```
14000 Vx(X)=VAL(A$(X)[Position1+1,Position2-1])
14100 Vy(X)=VAL(A$(X)[Position2+1,40])
14200 NEXT X
14300 RETURN
14400!*************************************************************************
14500 Distancesub: !
14600!COMPUTES DISTANCE OF EACH POINT FROM FIRST POINT ON SECTION
14700 Distance(1)=0
14800 FOR X=2 TO Nn
14900 Distance(X)=(((Vx(X)-Vx(1))^2)+((Vy(X)-Vy(1))^2))^.5
15000 Distance(X)=ABS(Distance(X)*Dscale)
15100 NEXT X
15200 RETURN
15300!*************************************************************************
15400 Areasub: !
15500!AREA COMPUTATION SUBROUTINE
15600!COMPUTE AREA AT LIMITS
15700 Area(N)=.5*((Distance(1)*(Pointel(Nn)-Pointel(2)))+(Distance(Nn)*(Pointel(
Nn-1)-Pointel(1))))
15800!AREA COMPUTATION LOOP FOR REMAINDER OF COORDINATES
15900 FOR X=2 TO (Nn-1)
16000 Area(N)=Area(N)+(.5*(Distance(X)*(Pointel(X-1)-Pointel(X+1))))
16100 NEXT X
16200!AREA LOOP COMPLETED, ROUND AREA
16300 Area(N)=ABS((INT((Area(N)+.005)*100))/100)
16400 RETURN
16500 !*************************************************************************
16600 Titleprint: !
16700!TITLE PRINTING SUBROUTINE
16800 DISP "          PLEASE WAIT UNTIL PRINTING IS COMPLETE"
16900 PRINTER IS 701
16906 PRINT
16911 PRINT TAB(60),"PAGE: ",N
17000 PRINT CHR$(27)&"(s5hu1P"
17100 PRINT "          EARTHWORK COMPUTATIONS"
17200 PRINT "          WARZYN ENGINEERING INC."
17300 PRINT CHR$(27)&"(s10hubP"
17310 PRINT
17400 PRINT "USER INITIALS: ",Nn$,TAB(60),"DATE: ",Da$
17500 PRINT
17600 PRINT "*PROJECT INFORMATION*",TAB(45),"*INITIALIZATION DATA*"
17700 PRINT "PROJECT NAME: ",Pn$,TAB(45),"DRAWING SCALE(FT/IN): ",Dscale
17800 PRINT "PROJECT NUMBER: ",Pr$
17801 PRINT "VOLUME TYPE: ",Voltype$
17810 PRINT
17820 PRINT
17830 PRINT
17900 PRINTER IS 1
18000 RETURN
18100!*************************************************************************
18200 Sectionplot: !
18300 !SECTION PLOTTING SUBROUTINE
18310 !TEST FOR ZERO AREA
18320 IF Area(N)=0 THEN GOTO 21600
18400 ALPHA OFF
18500 PRINTER IS 1
18600 PRINT CHR$(12)
18700 GINIT
18800 GRAPHICS ON
18900 LINE TYPE 4
```

```
18910 La=-10000000
18920 Lb=-10000000
18930 Ld=10000000
19100 Lc=10000000
19200 FOR X=1 TO Nn
19300 IF La<Pointel(X) THEN La=Pointel(X)
19400 IF Lb<Distance(X) THEN Lb=Distance(X)
19500 IF Lc>Pointel(X) THEN Lc=Pointel(X)
19600 IF Ld>Distance(X) THEN Ld=Distance(X)
19700 NEXT X
19800 LINE TYPE 1
19900 PEN 1
20000 VIEWPORT 10,125,10,95
20100 WINDOW Ld-10,Lb+10,Lc-5,La
20200 AXES 100,10,Ld-10,Lc-5
20300 MOVE Distance(1),Pointel(1)
20400 PEN 2
20500 FOR X=2 TO Nn
20600 DRAW Distance(X),Pointel(X)
20610 NEXT X
20620 DRAW Distance(1),Pointel(1)
20700 VIEWPORT 0,133,0,100
20800 WINDOW 0,133,0,100
20900 MOVE 20,0
21000 PEN 4
21100 LABEL "DISTANCE IN 100 FT"
21110 MOVE 5,20
21200 DEG
21300 LDIR 90
21400 LABEL "ELEVATION IN 10 FT"
21500 PEN 0
21501 !BYPASS ZERO AREA PRINT
21510 GOTO 21610
21600 OUTPUT 2 USING "#,B";255,75
21601 PRINT TABXY(20,4),"STATION: ",Station(N)
21602 PRINT TABXY(20,6),"AREA(SF):",Area(N)
21610 !TEST IF SECTION IS CORRECT
21620 Dummy$=""
21630 INPUT "       ENTER 'P' TO ACCEPT AND PRINT SECTION; 'R' TO REENTER SAME
ECTION",Dummy$
21640 IF Dummy$<>"P" AND Dummy$<>"R" THEN GOTO 21610
21650 IF Dummy$="R" THEN GOTO 21761
21660 GOSUB Titleprint
21661 !BYPASS PLOT FOR ZERO AREA
21662 IF Area(N)=0 THEN GOTO 21690
21670 DUMP DEVICE IS 701
21680 DUMP GRAPHICS
21681 GCLEAR
21690 PRINTER IS 701
21700 PRINT
21710 PRINT
21720 PRINT CHR$(27)&"(s5hu1P"
21730 PRINT TAB(10),"STATION ",Station(N)
21740 PRINT CHR$(27)&"(s10hubP"
21741 PRINT TAB(25),"AREA (SF)=",Area(N)
21742 PRINT CHR$(12)
21750 PRINTER IS 1
21760 RETURN
21761 !RESET SECTION COUNTER FOR REENTERING THE SECTION
21770 N=N-1
```

```
21800 GCLEAR
21900 RETURN
22000 !*************************************************************************
22010 Editsub: !
22020 INPUT "CURRENT VALUE TO CHANGE?(1,2,3, OR 4)",Dummy$
22030 IF Dummy$="1" OR Dummy$="2" THEN GOTO 22060
22040 IF Dummy$="3" OR Dummy$="4" THEN GOTO 22060
22050 GOTO 22020
22060 INPUT "WHAT IS NEW VALUE?",Newval
22061 !REASSIGN NEW VALUE TO CURRENT ITEM SELECTED
22070 IF Dummy$="1" THEN Station(N)=Newval
22080 IF Dummy$="2" THEN Contourel=Newval
22090 IF Dummy$="3" THEN Contourint=Newval
22100 IF Dummy$="4" THEN Spotel=Newval
22110 !REPRINT CURRENT VALUES
22120 PRINT TABXY(39,4),"                    "
22130 PRINT TABXY(39,4),Station(N)
22140 PRINT TABXY(49,5),"                    "
22150 PRINT TABXY(49,5),Contourel
22155 PRINT TABXY(48,6),"                    "
22160 PRINT TABXY(48,6),Contourint
22180 PRINT TABXY(46,7),"                    "
22190 PRINT TABXY(46,7),Spotel
22200 !TEST FOR ANOTHER VALUE TO EDIT
22210 INPUT "DO YOU WANT TO EDIT ANOTHER VALUE?(Y/N)",Dummy$
22220 IF Dummy$<>"Y" AND Dummy$<>"N" THEN GOTO 22210
22230 IF Dummy$="Y" THEN GOTO 22020
22240 IF Dummy$="N" THEN RETURN
22241 RETURN
22251 !*************************************************************************
22261 Volumesub: !
22271 !VOLUME COMPUTATION AND PRINTING SUBROUTINE
22282 !ADD 1 TO SECTION COUNTER FOR SUMMARY PAGE NUMBER
22284 N=N+1
22285 !PRINT TITLE HEADING
22286 GOSUB Titleprint
22287 !RESET N TO LAST SECTION FOR VOLUME COMPS
22288 N=N-1
22290 PRINTER IS 701
22291 !RESET CUMULATIVE VOLUME VARIABLE TO ZERO
22292 Cumvol=0
22311 PRINT "     STATION          AREA(SF)          DISTANCE(FT)          VOLUM
E(CY)"
22321 PRINT "-------------------------------------------------------------------
------"
22325 FOR X=1 TO N
22331 PRINT USING "1X,8D.DD,8X,6D.DD";Station(X),Area(X)
22341 IF X=N THEN GOTO 22392
22351 Stadist=ABS((INT(((Station(X+1)-Station(X))+.005)*100))/100)
22361 Intervol=ABS(INT(((((Area(X)+Area(X+1))/2)*Stadist)/27)+.5))
22371 Cumvol=Cumvol+Intervol
22381 PRINT USING "40X,8D.DD,11X,10D";Stadist,Intervol
22391 NEXT X
22392 !PRINT CUMULATIVE VOLUME
22401 PRINT TAB(40),"TOTAL VOLUME(CY)= ";
22402 PRINT USING "10D";Cumvol
22404 PRINT CHR$(12)
22411 PRINTER IS 1
22421 RETURN
25250 END
```

AREAS A & B

WARZYN

WARZYN ENGINEERING, INC.
MADISON, WISCONSIN

BY LAB DATE 2-6-85 SUBJECT DNC SHEET NO. ____ OF ____
CHKD. BY DJM DATE 3-7-85 DREDGED SEDIMENT VOLUME JOB NO. 1837
AREAS A & B

DREDGED SED. VOL FOR AREAS A & B EXCLUDING DEEP CONTAMINATED VOL FROM AREA A WITHIN COFFERDAM

TOTAL VOL (A & B) = 2,419 cy

VOLUME AREA A = 1441 cy ✓

VOLUME AREA B = 978 cy ✓

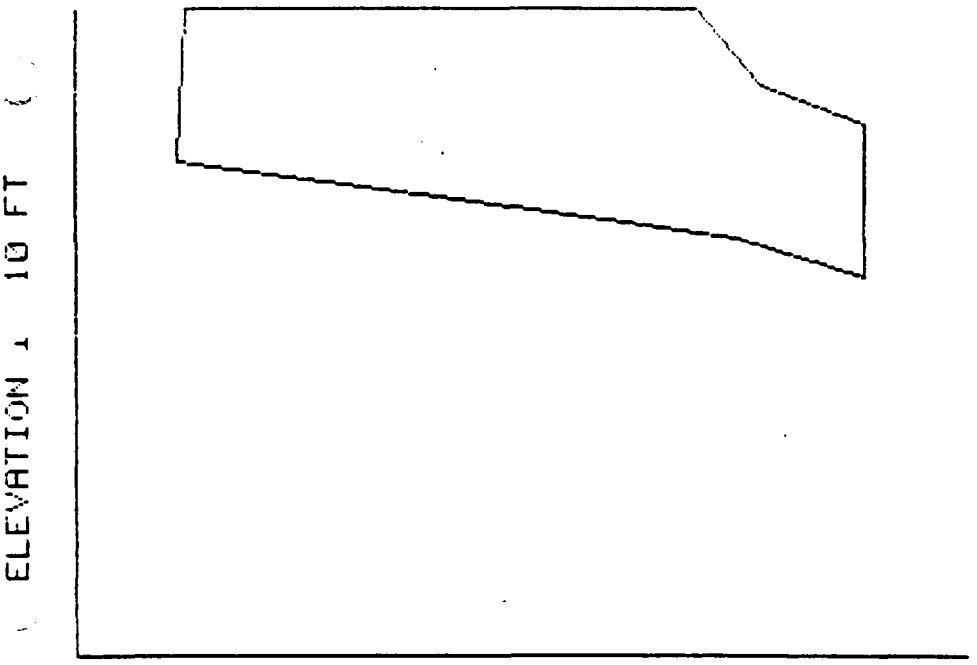
REFERENCE: COMPUTER SHEETS ATTACHED. PROGRAM "DIGIEARTH 1" CALCULATES VOLUMES USING THE AVERAGE-END FORMULAS WITH CONTOURS TAKEN FROM ATTACHED DRAWING USING SECTIONS AS SHOWN AND THE DIGITIZER.

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB / DJD CHECKED 3-7-85 DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA A & B

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 0

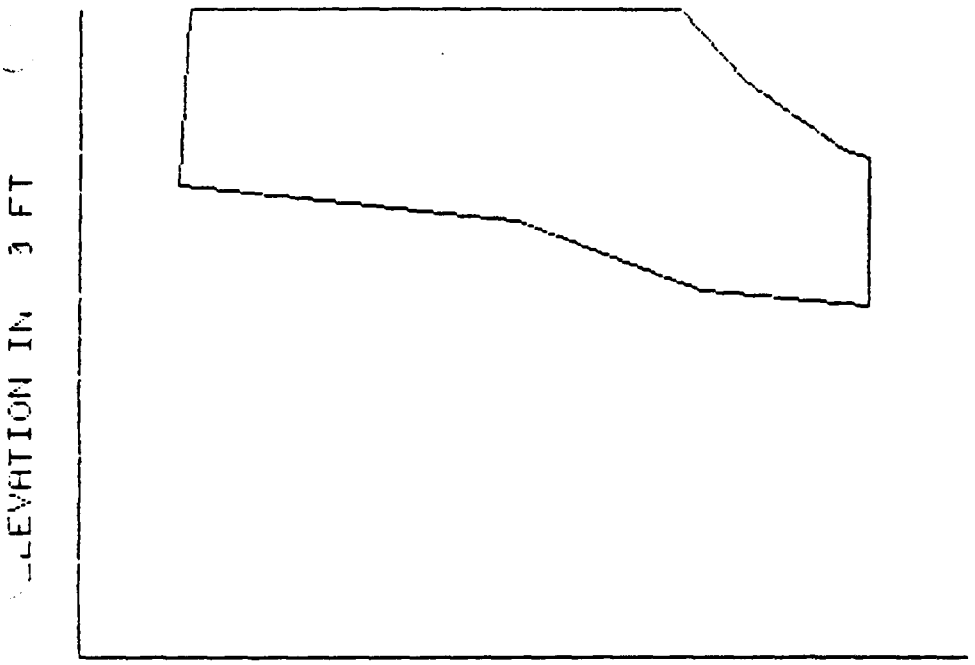
AREA (SF)= 161.04

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA A & B

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 10

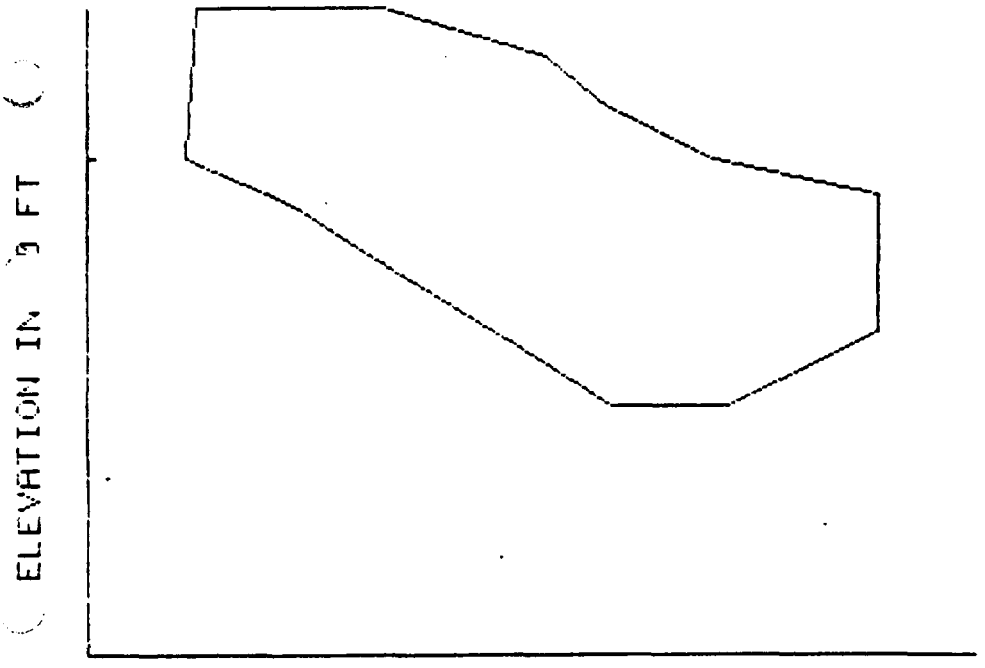
AREA (SF)= 202.84

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA A & B

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 36

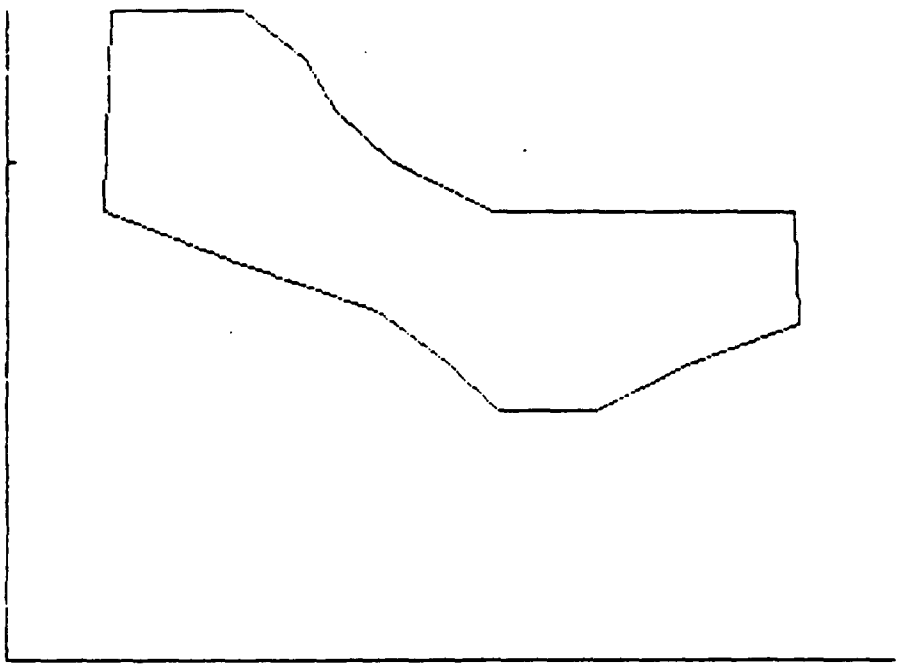
AREA (SF)= 339.02

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA A & B

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 66

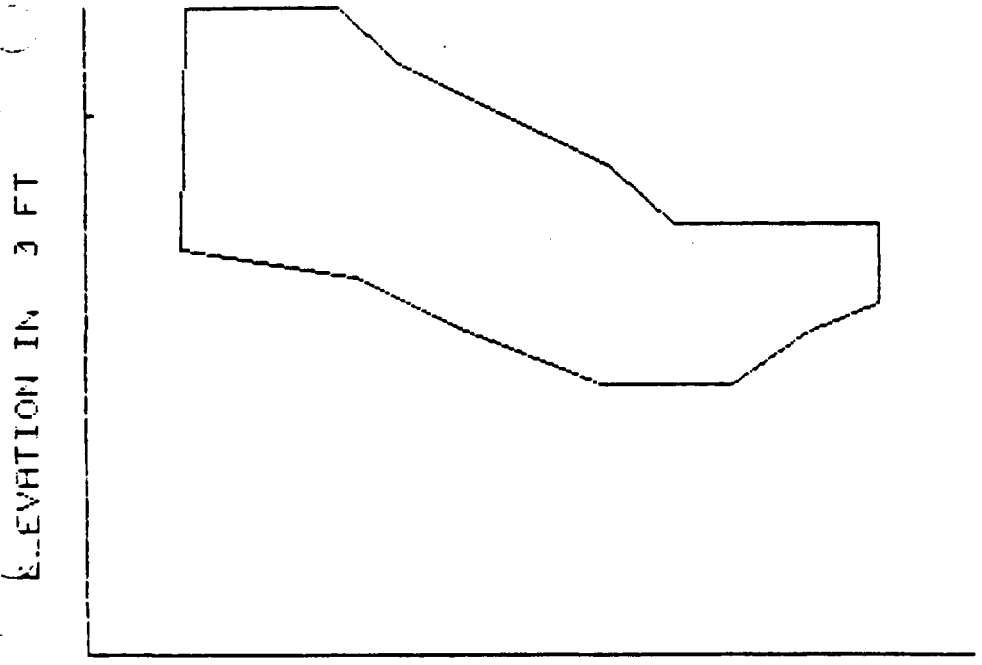
AREA (SF)= 271.82

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA A & B

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 111

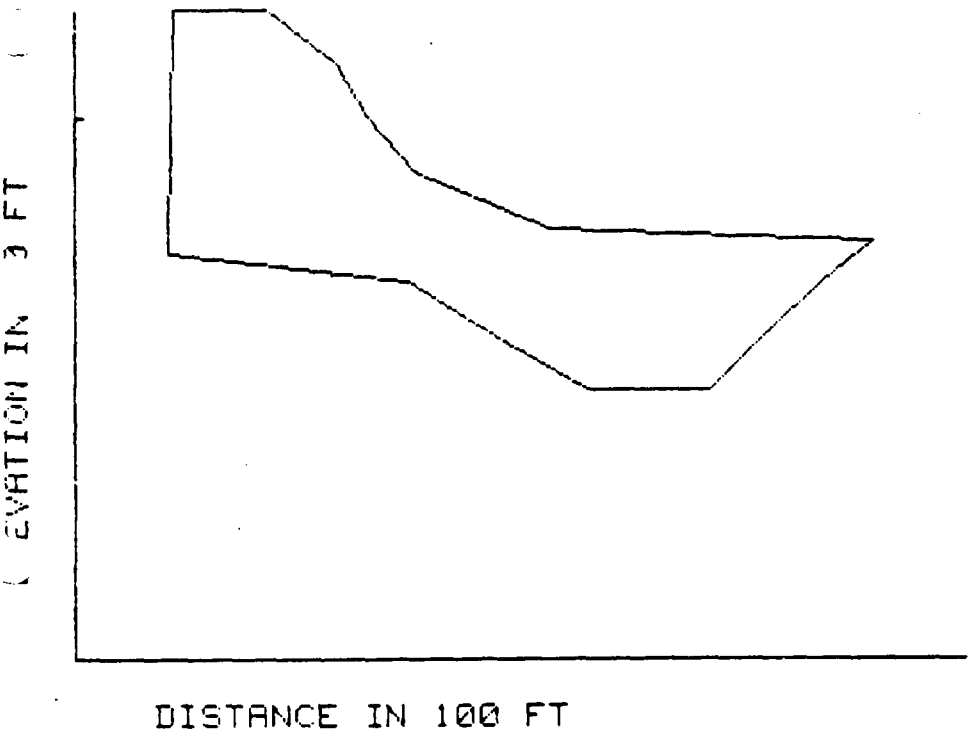
AREA (SF)= 276.61

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA A & B

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 146

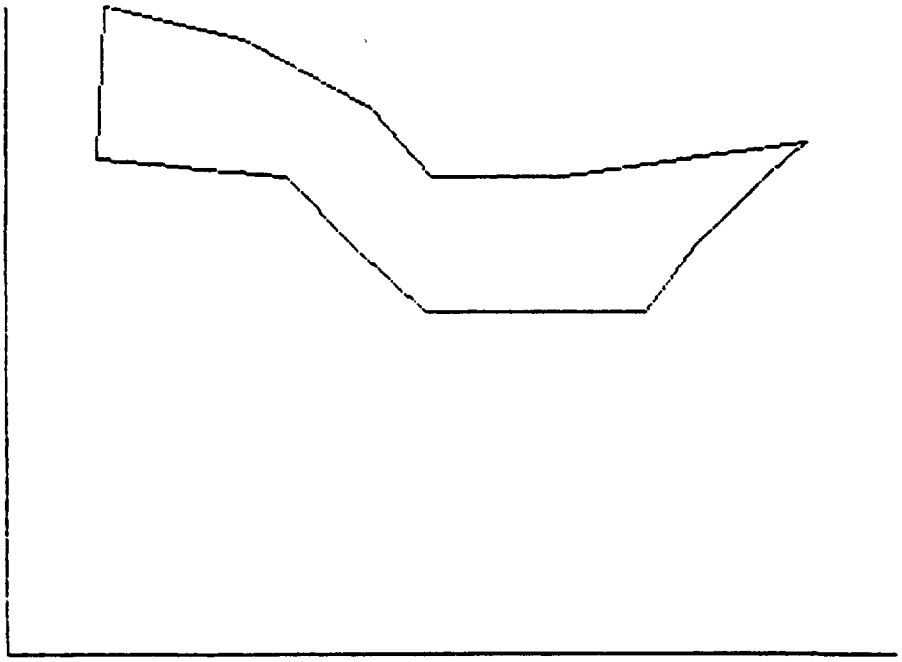
AREA (SF)= 212.93

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA A & B

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 198

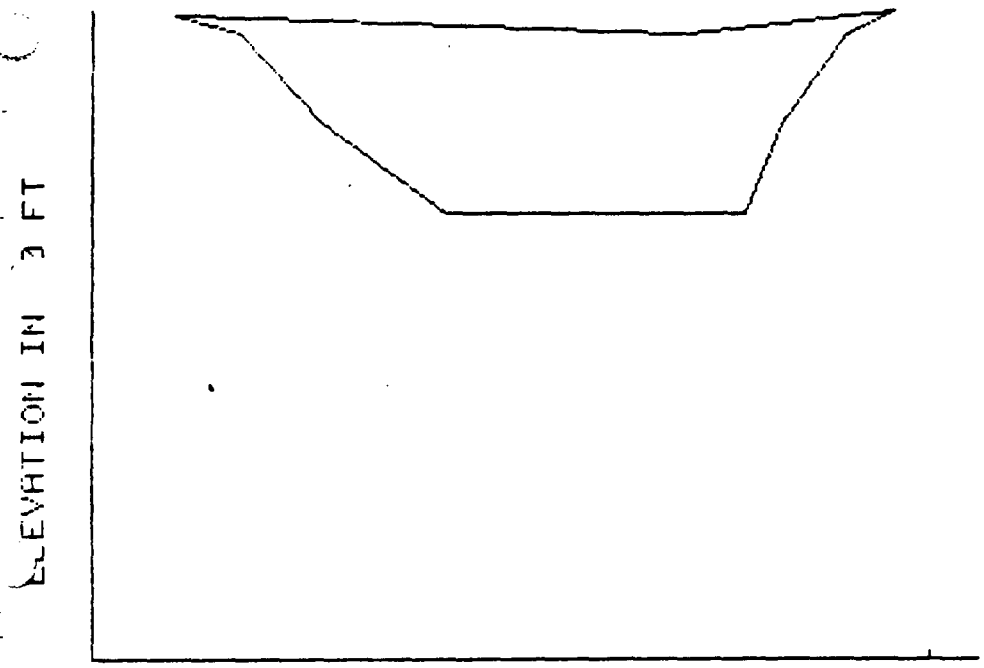
AREA (SF)= 140.36

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA A & B

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 252

AREA (SF)= 116.31

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB

DATE: 2-6-85

PROJECT INFORMATION

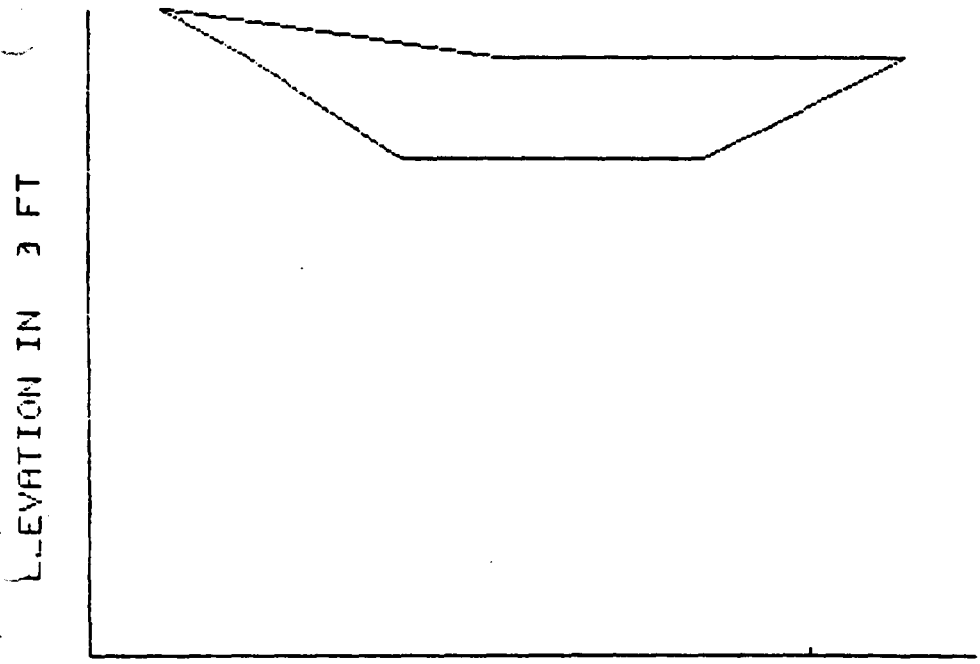
PROJECT NAME: OMC

PROJECT NUMBER: 11837

VOLUME TYPE: SEDIMENT DREDGED AREA A & B

INITIALIZATION DATA

DRAWING SCALE(FT/IN): 40



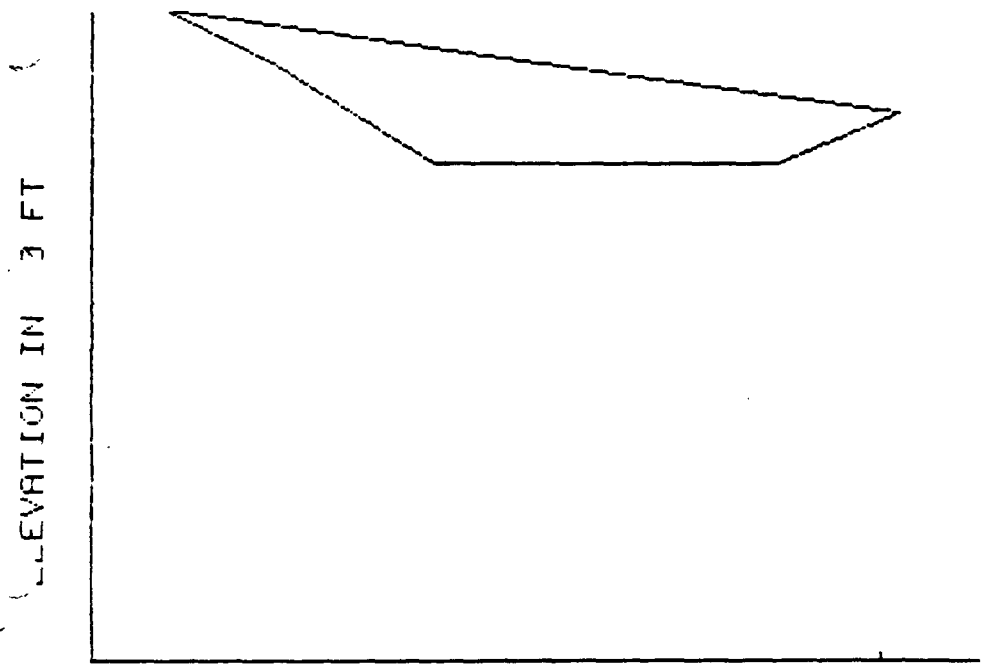
STATION 320

AREA (SF)= 75.51

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION		*INITIALIZATION DATA*	
PROJECT NAME:	OMC	DRAWING SCALE(FT/IN):	40
PROJECT NUMBER:	11837		
VOLUME TYPE:	SEDIMENT DREDGED AREA A & B		



STATION 327

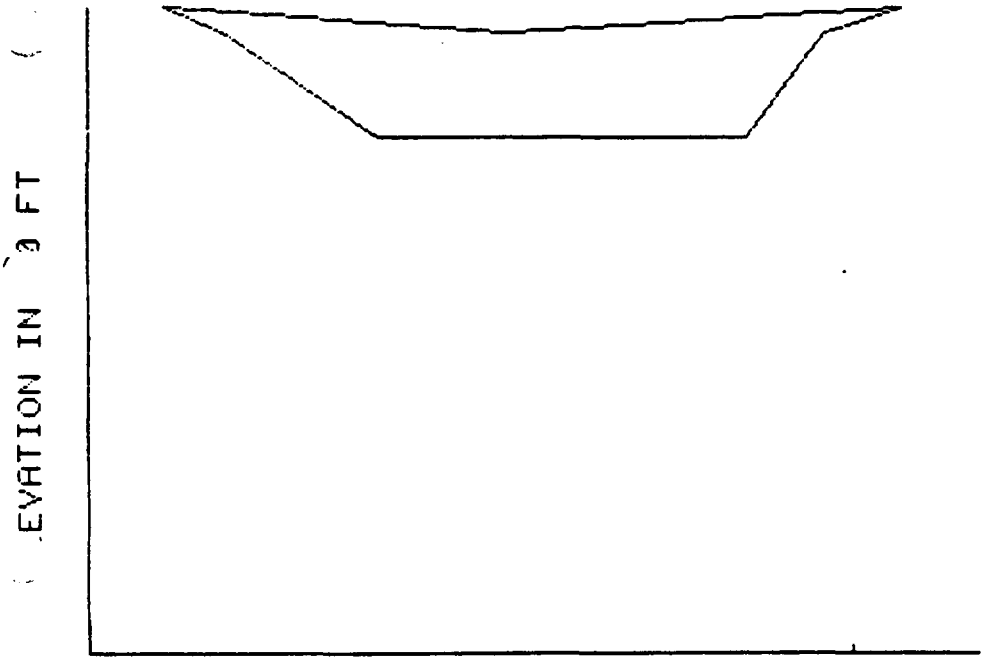
AREA (SF)= 62.46

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA A & B

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 345

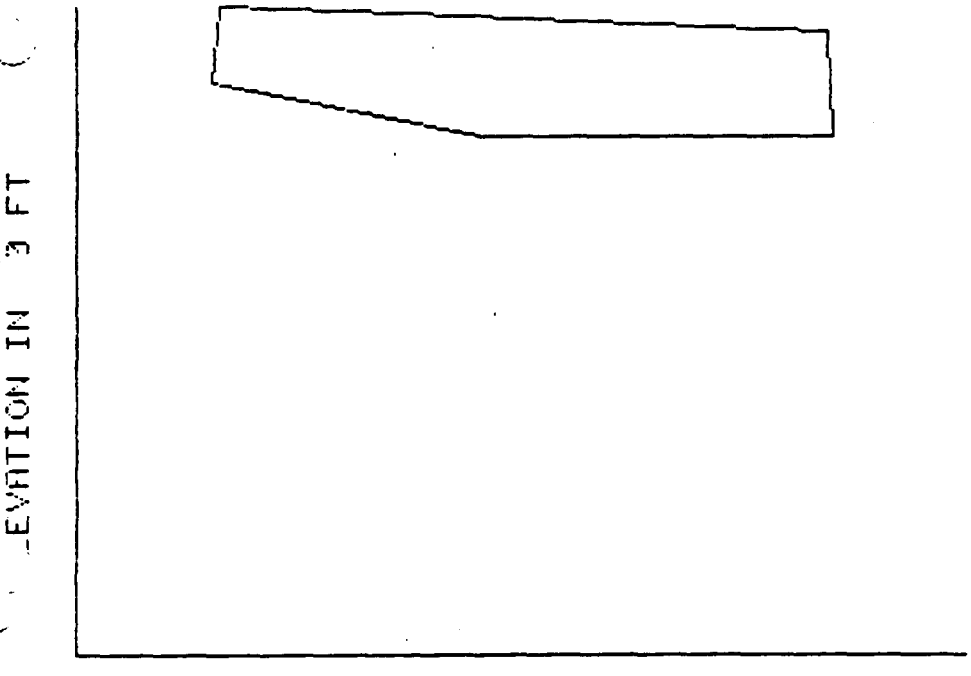
AREA (SF)= 73.26

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA A & B

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 370

AREA (SF)= 46.43

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA A & B

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40

STATION 394

AREA (SF)= 0

PAGE: 14

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB CHECKED DJO 3-7-85 DATE: 2-6-85

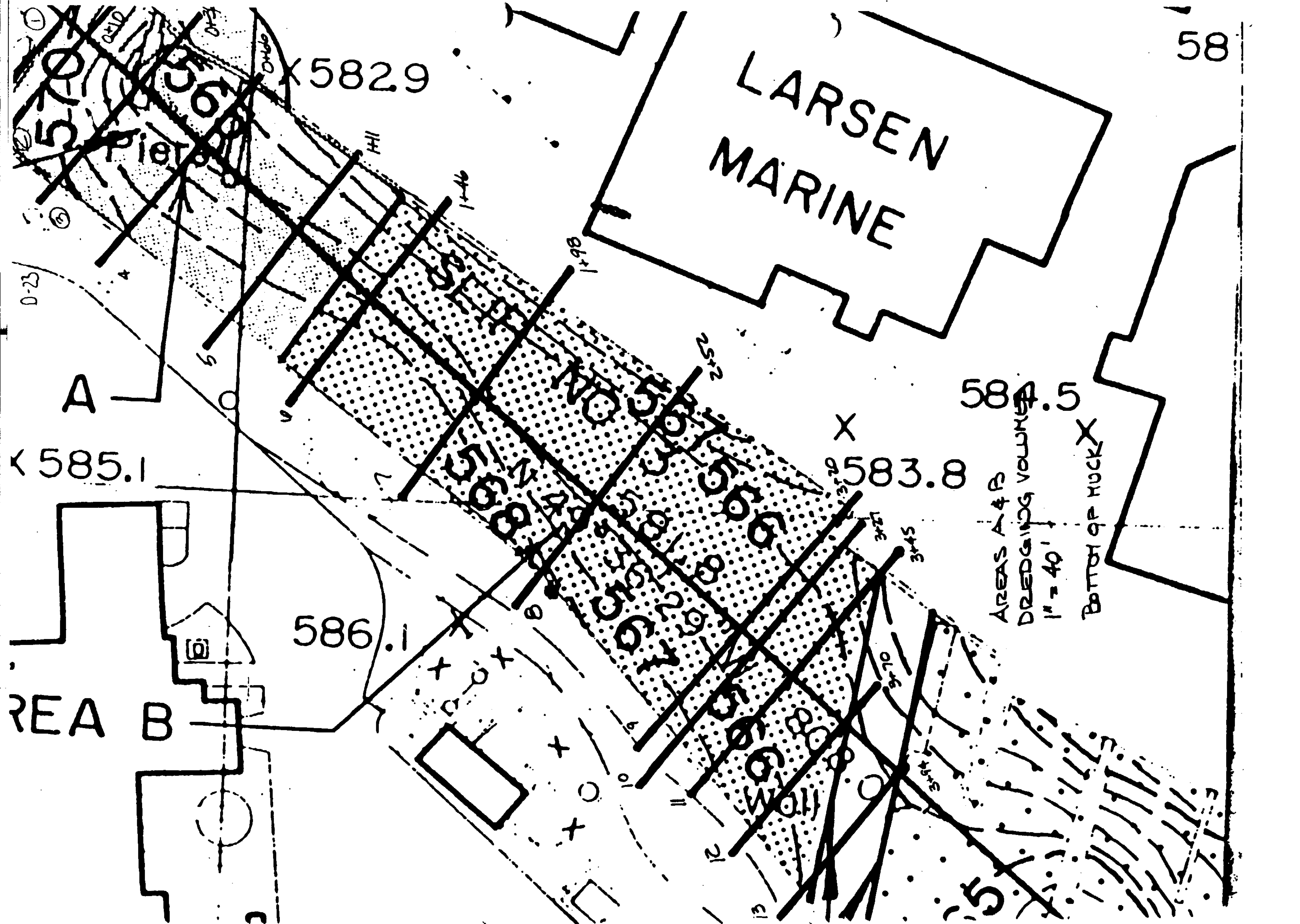
PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA A & B

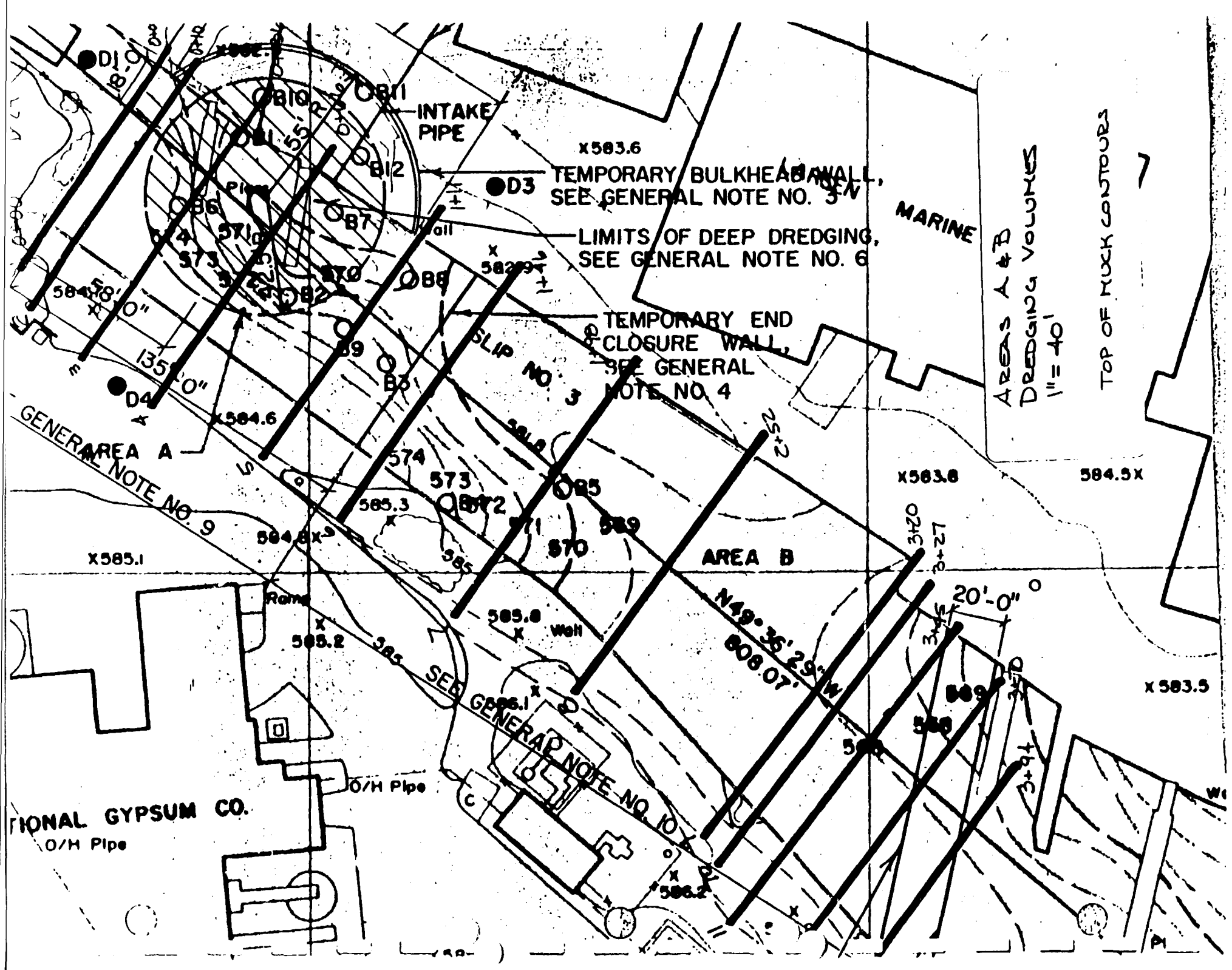
INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40

STATION	AREA(SF)	DISTANCE(FT)	VOLUME(CY)	
0.00	161.04			
		10.00	67	
10.00	202.84			
		26.00	261	
36.00	339.02			
		30.00	339	
66.00	271.82			
		45.00	457	
111.00	276.61			
		35.00	317	
146.00	212.93			1441.0 c
		52.00	340	
198.00	140.36			
		54.00	257	
252.00	116.31			
		68.00	242	
320.00	75.51			
		7.00	18	
327.00	62.46			
		18.00	45	
345.00	73.26			
		25.00	55	
370.00	46.43			
		24.00	21	
394.00	0.00			978 c
		TOTAL VOLUME(CY)=	2419	

AREA A

AREA


LARSEN
MARINE
X5829
584.5
583.8
X585.1
586.1
A
REA B
Pier
58
AREAS A & B
DREDGING VOLUMES
1" = 40'
BOTTOM OF MUCK


INTAKE PIPE
TEMPORARY BULKHEAD WALL, SEE GENERAL NOTE NO. 3
LIMITS OF DEEP DREDGING, SEE GENERAL NOTE NO. 6
TEMPORARY END CLOSURE WALL, SEE GENERAL NOTE NO. 4
MARINE
AREAS A & B DREDGING VOLUMES 1" = 40'
TOP OF ROCK CONTOURS
SLIP NO. 3
AREA A
AREA B
GENERAL NOTE NO. 9
SEE GENERAL NOTE NO. 10
N49°-36'-29"W
608.07'
135'-0"
58'-0"
20'-0"
D1
D2
D3
D4
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B11
B12
O/H Pipe
IONAL GYPSUM CO.

AREA C

WARZYN

WARZYN ENGINEERING, INC.
MADISON, WISCONSIN

BY LRR DATE 2-6-85 SUBJECT DMC SHEET NO. 1 OF 1
CHKD. BY DJD DATE 3-7-85 DREDGED SEDIMENT VOLUME JOB NO. 1187
AREA C

AREA WAS SPLIT AS SHOWN ON ATTACHED DRAWING FOR EASE OF COMPUTING.

① DREDGED SEDIMENT VOLUME (AREA C) = 26,809 CY
② " " " " = 9,382 CY

TOTAL DREDGED SED (AREA C) = 36,191 CY

REFERENCE: COMPUTER SHEETS ATTACHED. PROGRAM "DIGIEARTH1" CALCULATES VOLUMES USING THE AVERAGE-END AREA FORMULA WITH CONTOURS TAKEN FROM THE ATTACHED DRAWING USING SECTIONS INDICATED AND THE DIGITIZER

ERROR DISCOVERED IN CALCULATIONS

PREVIOUS VOLUME USED = 38,313 CY

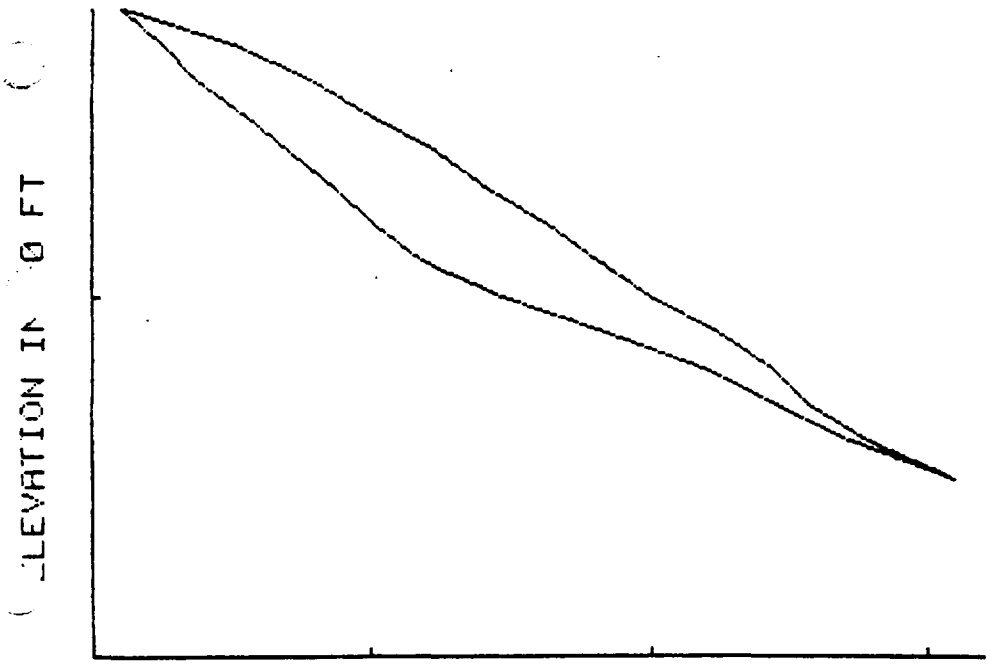
MODIFICATIONS WILL OCCUR IN FINAL DESIGN

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB / CHECKED OJD 3-7-85 DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C (2)

INITIALIZATION DATA
DRAWING SCALE(FT/IN): / 100



STATION 0

AREA (SF)= 480.95

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100

STATION ~~34~~ 80

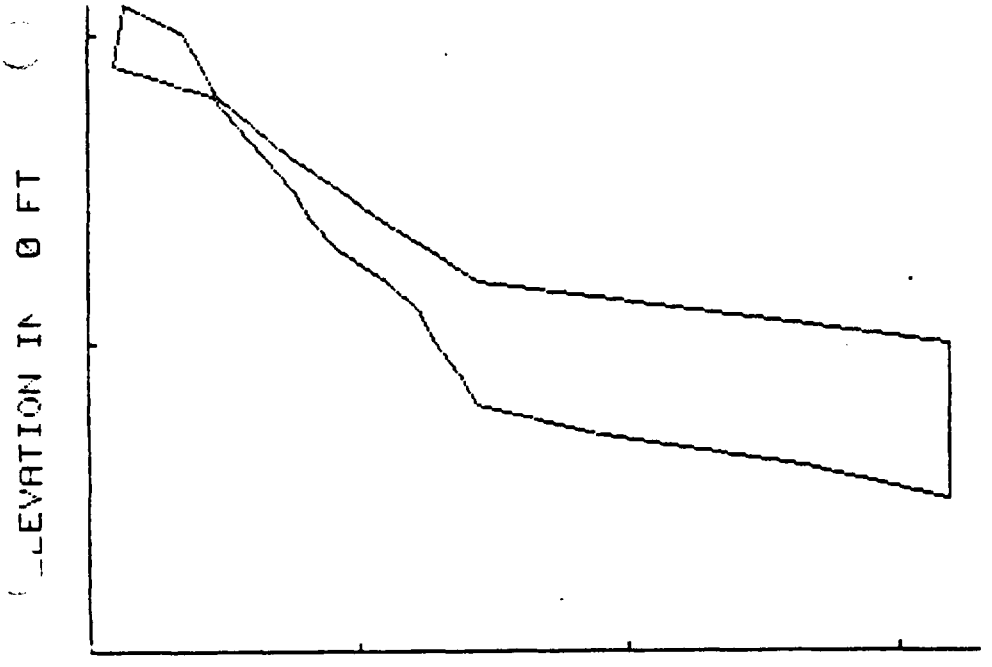
AREA (SF)= 959.21

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100



STATION ~~44~~ 110

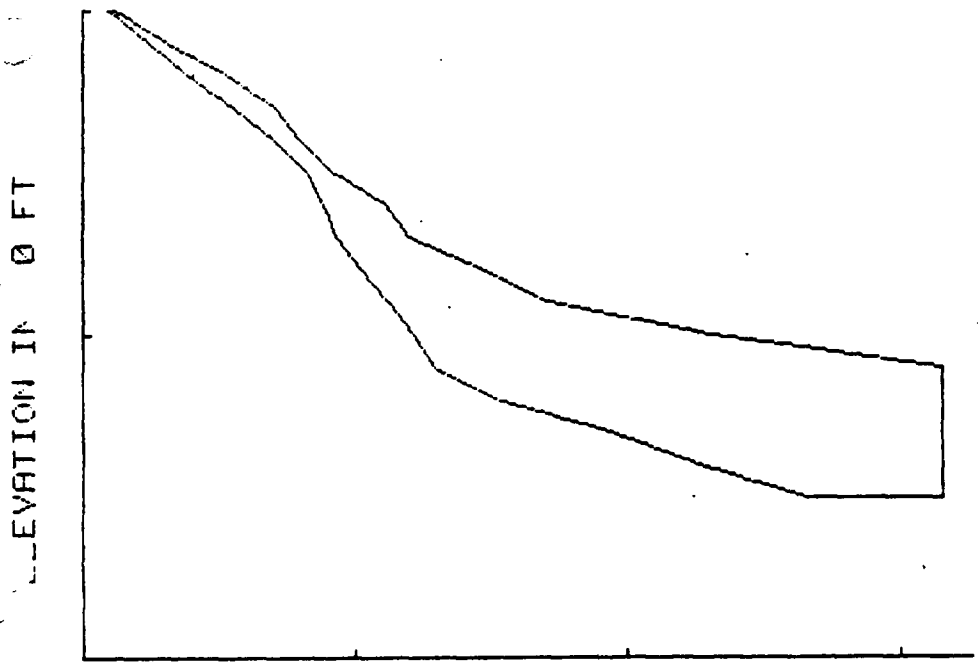
AREA (SF)= 1027.45

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100



STATION 67 170

AREA (SF)= 910.41

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100

STATION ~~95~~ 230

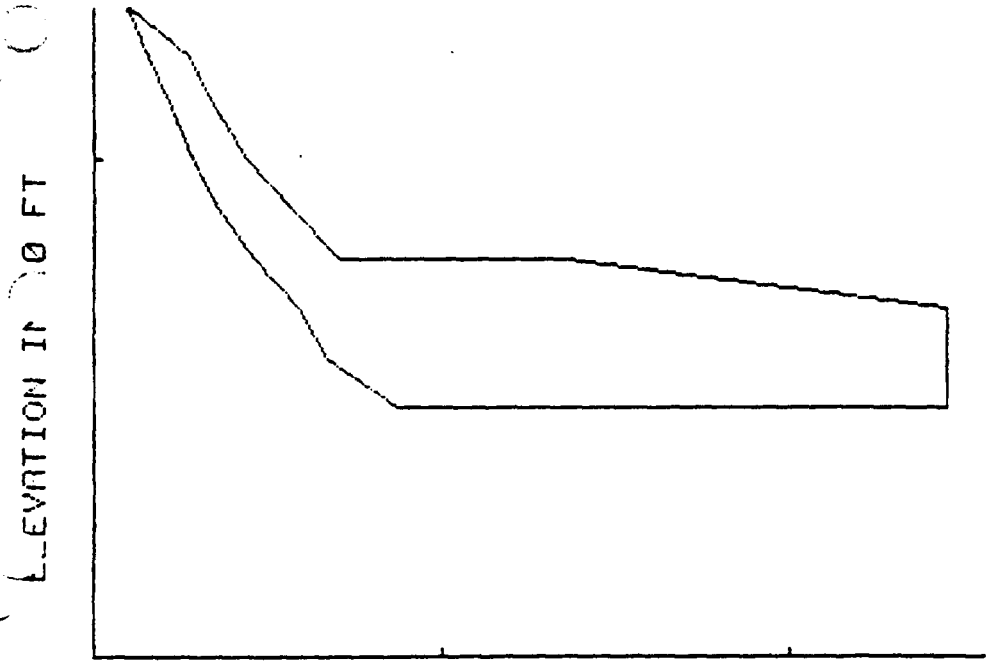
AREA (SF)= 923.2

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100



STATION ~~108~~ 270

AREA (SF)= 565.07

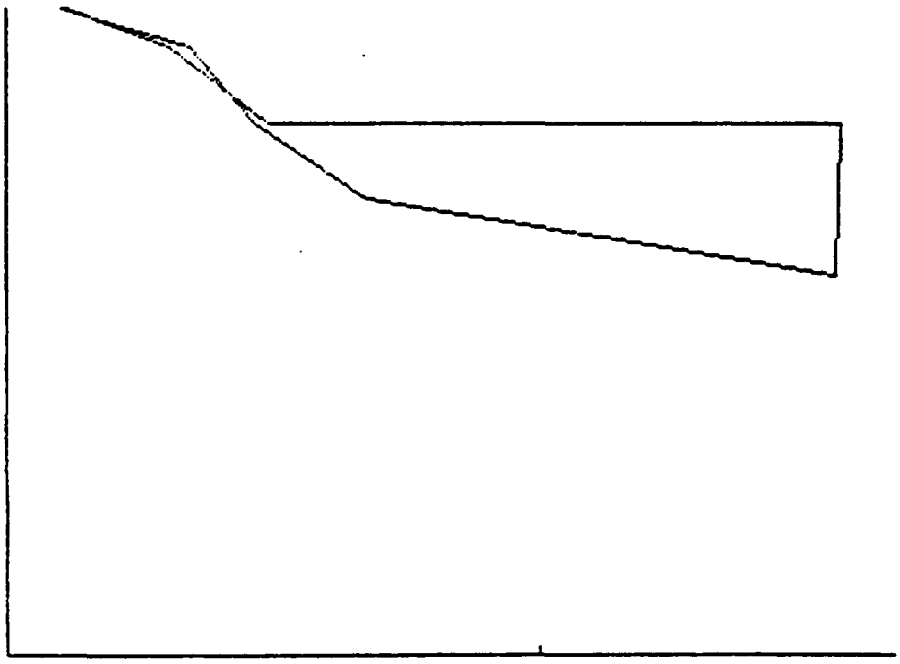
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB

DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100



DISTANCE IN 100 FT

STATION ~~153~~ 335

AREA (SF)= 142.64

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100

COMPUTATIONS FOR: HARBOR AREA C2

AREA OF SECTION 1 = 480.95 S.F.
STATION OF SECTION 1 IS 0

AREA OF SECTION 2 = 959.21 S.F.
STATION OF SECTION 2 IS 60

AREA OF SECTION 3 = 1027.45 S.F.
STATION OF SECTION 3 IS 110

AREA OF SECTION 4 = 910.41 S.F.
STATION OF SECTION 4 IS 170

AREA OF SECTION 5 = 923.2 S.F.
STATION OF SECTION 5 IS 230

AREA OF SECTION 6 = 565.87 S.F.
STATION OF SECTION 6 IS 270

AREA OF SECTION 7 = 142.64 S.F.
STATION OF SECTION 7 IS 335

THE VOLUME OF SECTIONS 1 THROUGH 7 IS 9382.000 CUBIC YARDS

LAB
2.6.85

FIGURE USED IN SUBSEQUENT → 11504 CY
CALCULATIONS

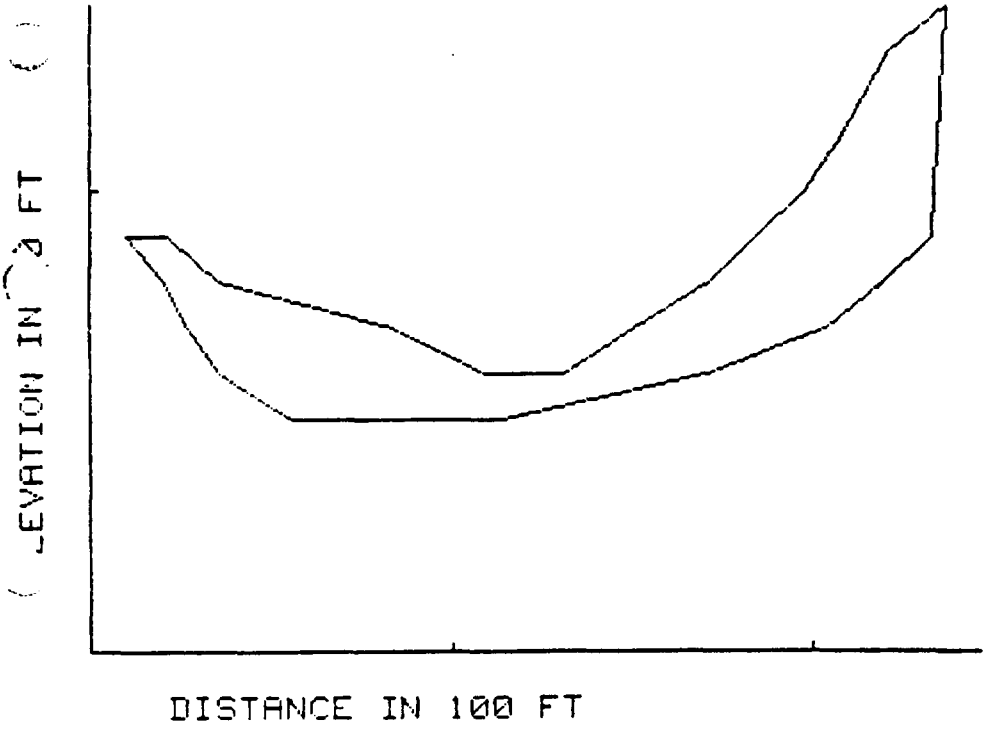
ERROR DISCOVERED - WILL BE MODIFIED
FOR FINAL DESIGN. DJO 3-7-84

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB / CHECKED DJD 3-7-85 DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C -(1)

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100 /



STATION 0 /

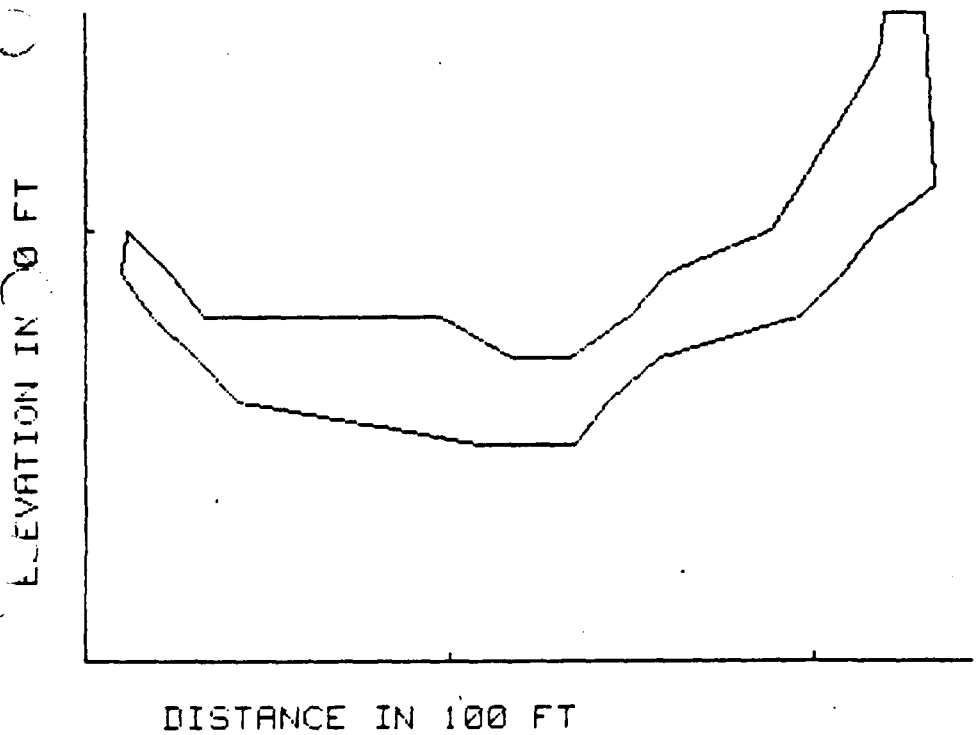
AREA (SF)= 480.8 /

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100



STATION ~~31~~ 80

AREA (SF)= 524.64

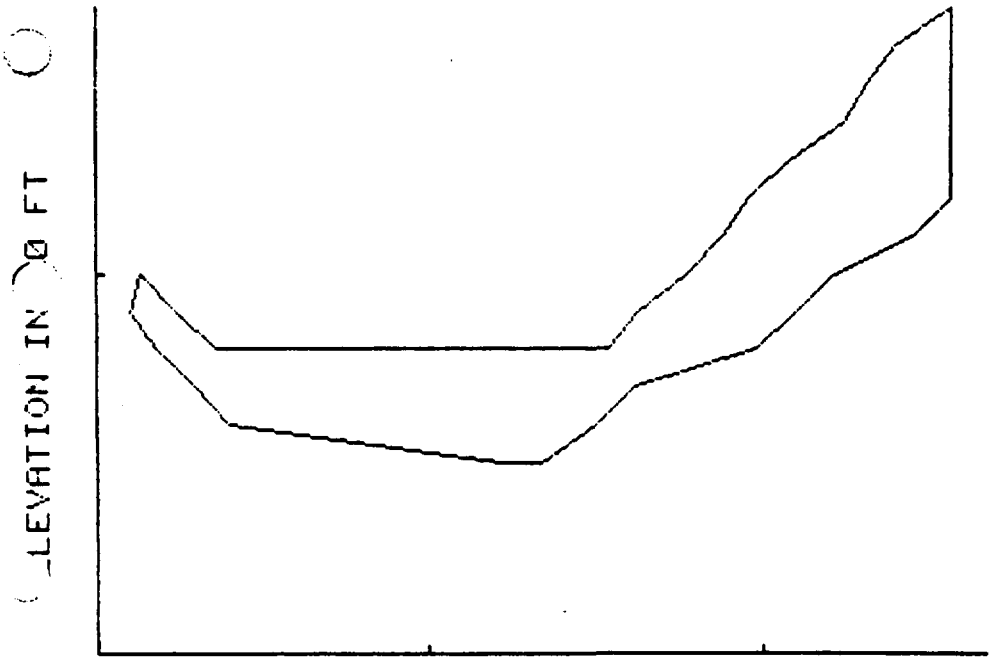
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB

DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100



STATION ~~50~~ 130

AREA (SF)= 720.71

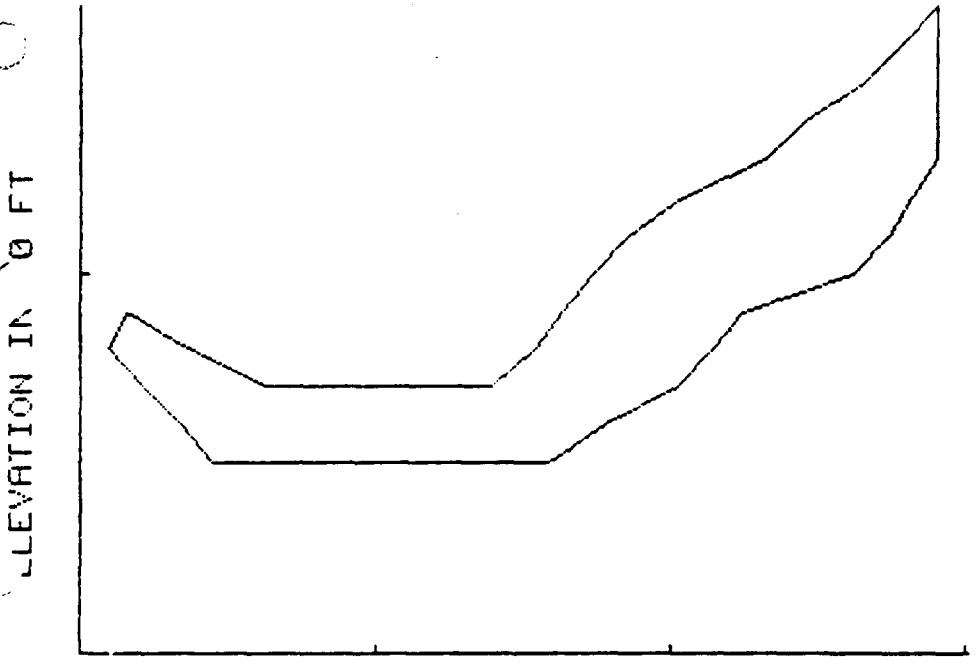
PAGE: 4

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100



STATION ~~75~~ 185

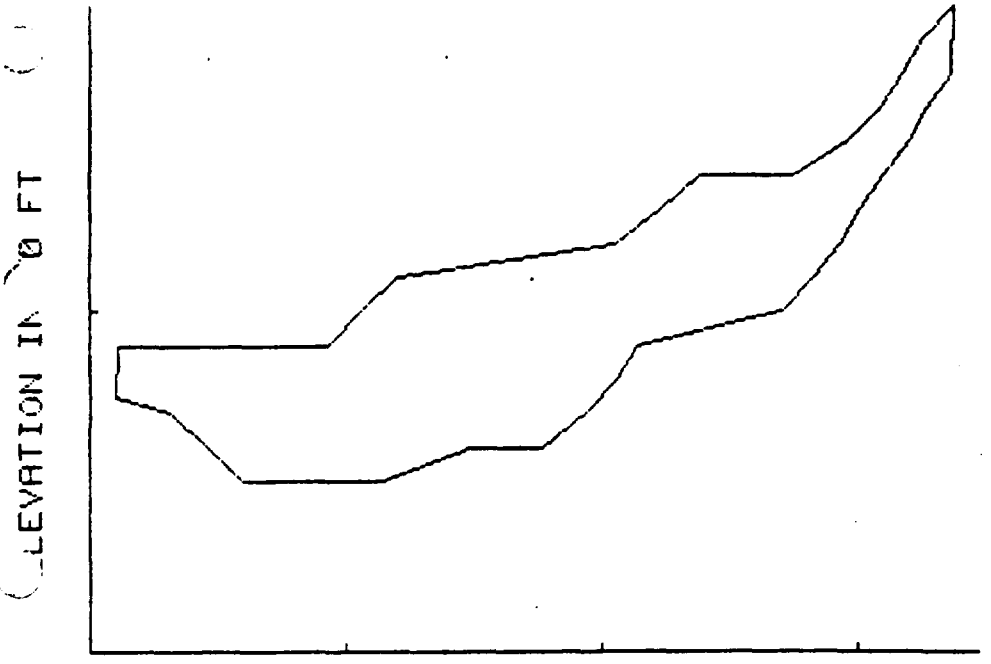
AREA (SF)= 888.72

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100



STATION ~~132~~ 330

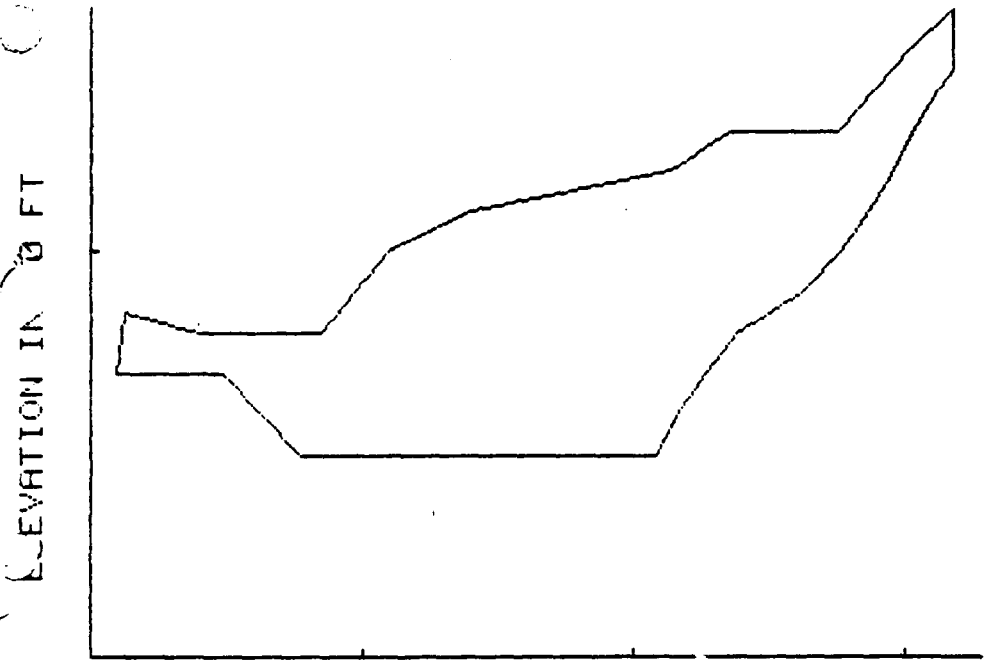
AREA (SF)= 1291.92

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100



STATION ~~161~~ 405

AREA (SF)= 1258.83

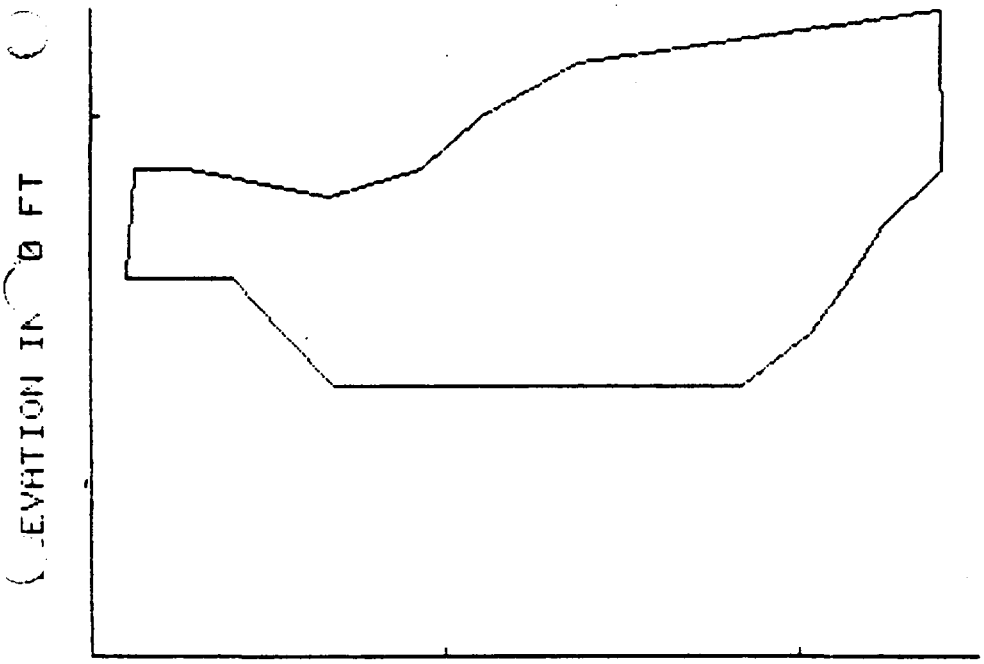
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB

DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100



STATION ~~197~~ 470

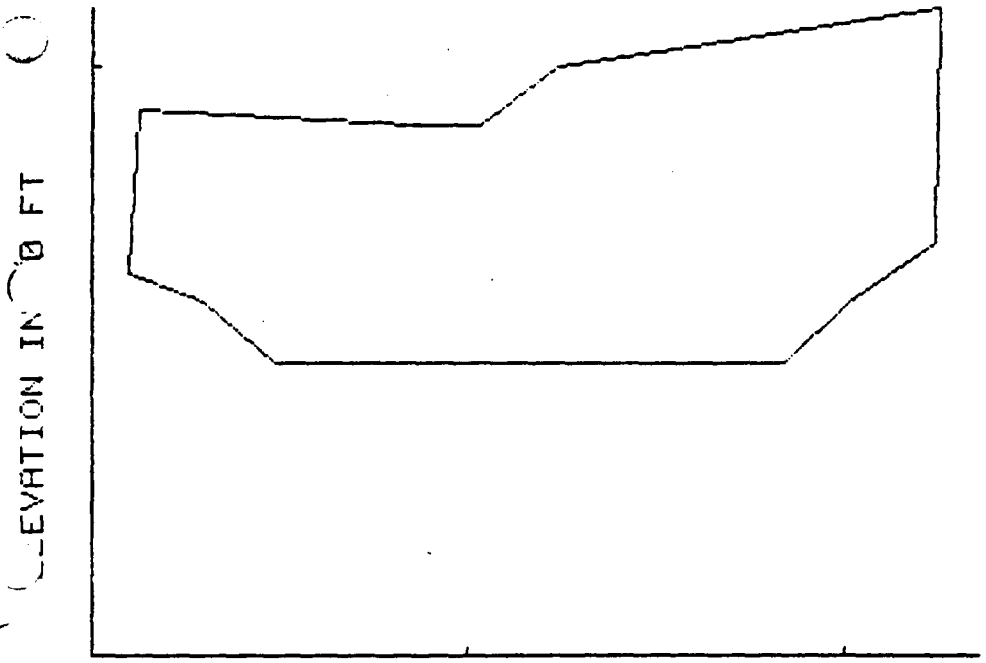
AREA (SF)= 1015.94

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100



STATION ~~220~~ 580

AREA (SF)= 950.67

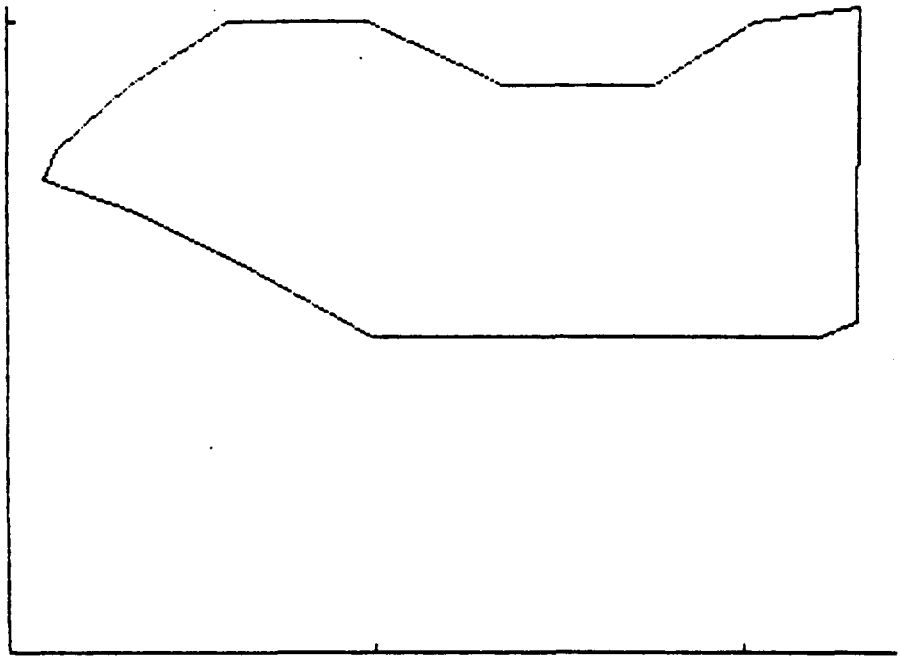
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB

DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME.TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100



STATION ~~276~~ 695

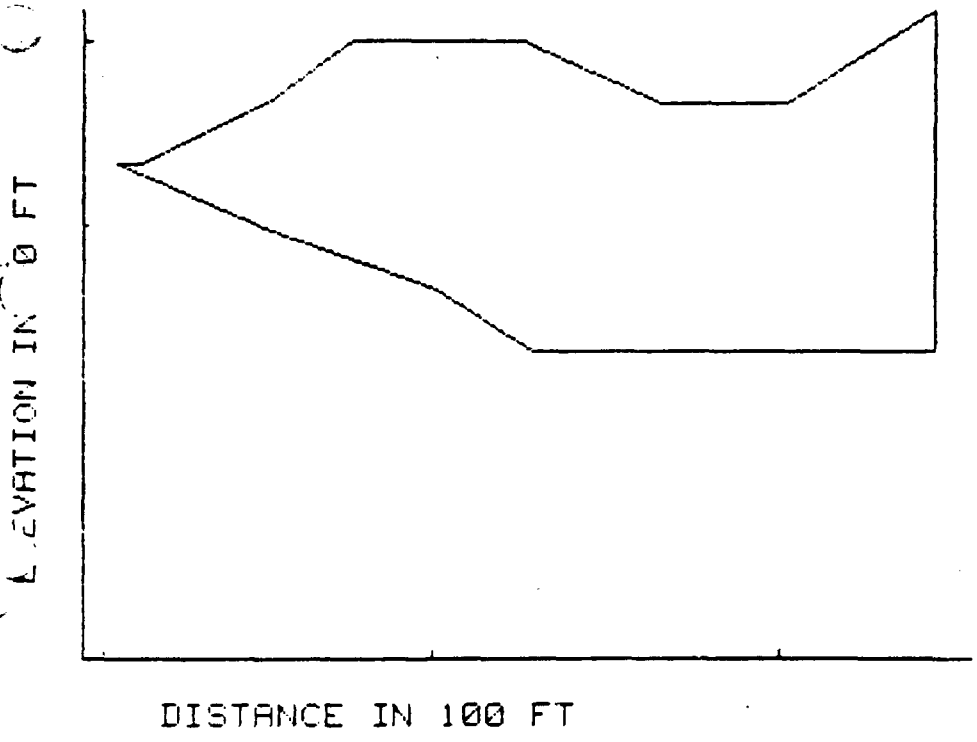
AREA (SF)= 864.81

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100



STATION ~~307~~ 775

AREA (SF)= 835.44

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-6-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: SEDIMENT DREDGED AREA C

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 100

(1)

PROJECT: OMC
CONTRACT NO.: 11937
DATE: 03/07/85
BY: DJD

COMPUTATIONS FOR: HARBOR AREA C1

AREA OF SECTION 1 = 480.8 S.F.
STATION OF SECTION 1 IS 0

AREA OF SECTION 2 = 524.64 S.F.
STATION OF SECTION 2 IS 80

AREA OF SECTION 3 = 720.71 S.F.
STATION OF SECTION 3 IS 130

AREA OF SECTION 4 = 888.72 S.F.
STATION OF SECTION 4 IS 185

AREA OF SECTION 5 = 1291.92 S.F.
STATION OF SECTION 5 IS 330

AREA OF SECTION 6 = 1258.83 S.F.
STATION OF SECTION 6 IS 405

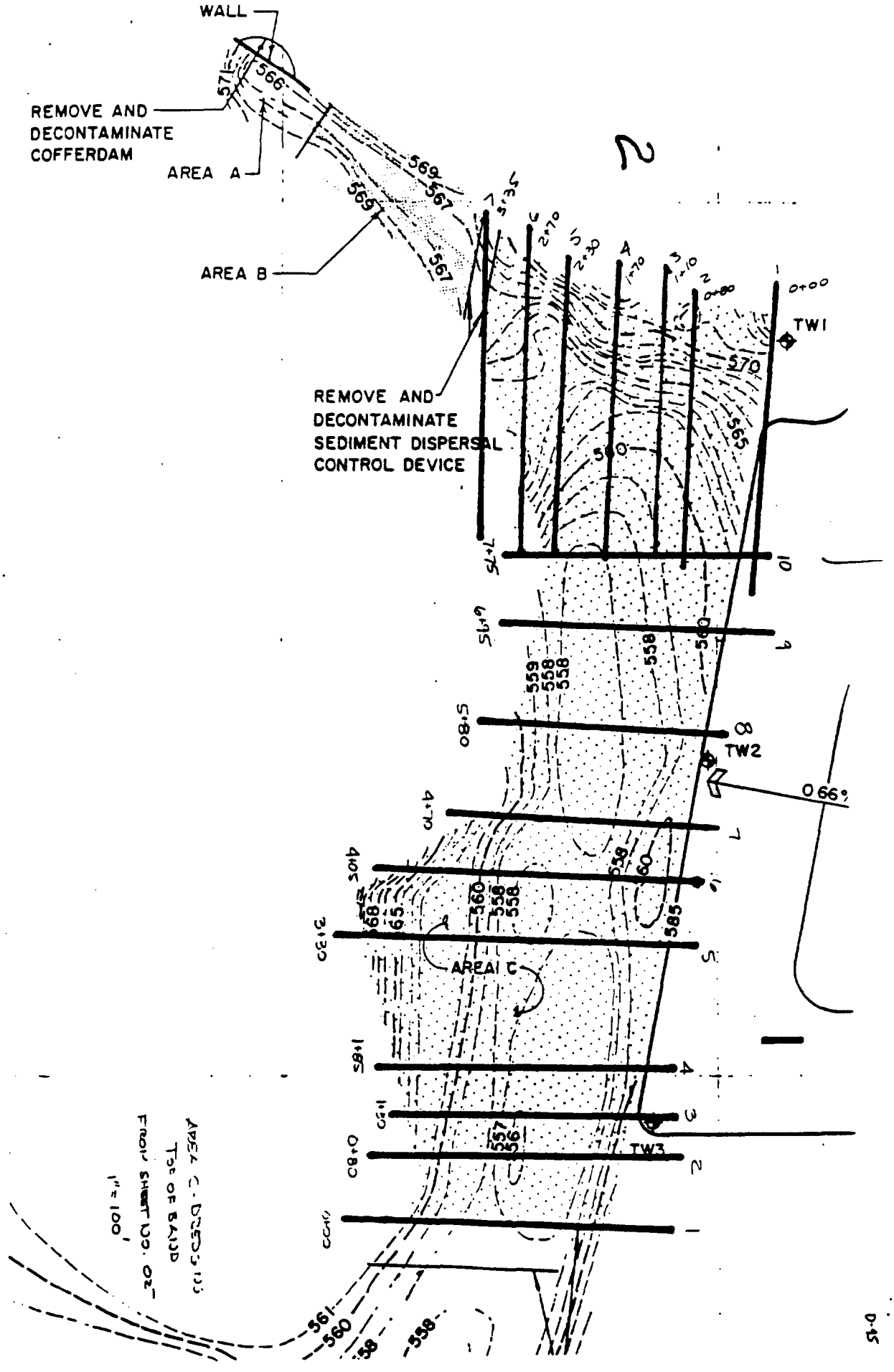
AREA OF SECTION 7 = 1015.94 S.F.
STATION OF SECTION 7 IS 470

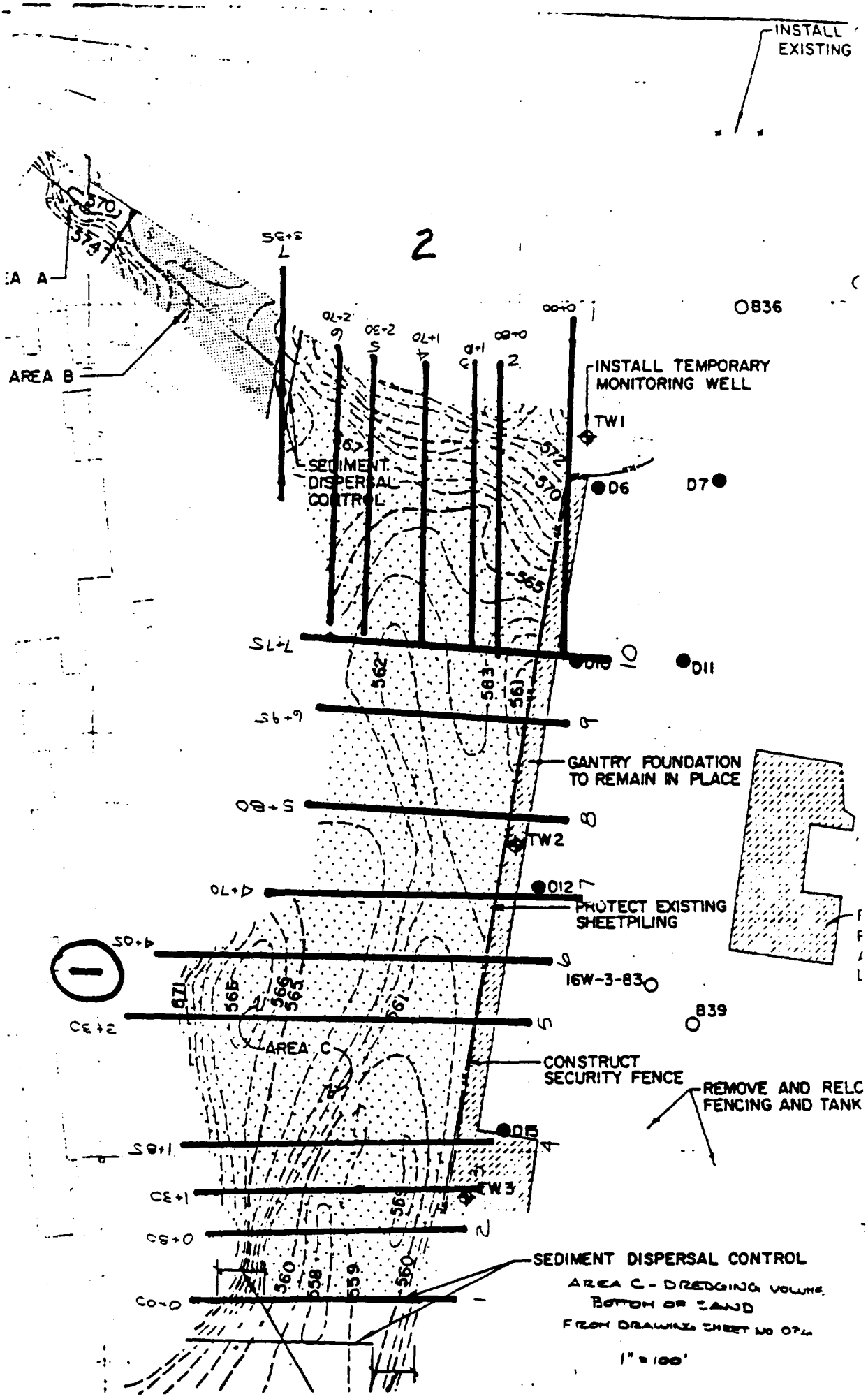
AREA OF SECTION 8 = 958.67 S.F.
STATION OF SECTION 8 IS 580

AREA OF SECTION 9 = 864.81 S.F.
STATION OF SECTION 9 IS 695

AREA OF SECTION 10 = 835.44 S.F.
STATION OF SECTION 10 IS 775

THE VOLUME OF SECTIONS 1 THROUGH 10 IS 24809.4 CUBIC YARDS


WALL
REMOVE AND DECONTAMINATE COFFERDAM
AREA A
AREA B
REMOVE AND DECONTAMINATE SEDIMENT DISPERSAL CONTROL DEVICE
TW1
TW2
TW3
AREA C
566
571
569
567
565
560
559
558
557
561
0+00
0+80
1+10
1+70
2+30
2+70
3+35
7+75
6+95
5+80
4+70
4+05
3+30
2+80
1+85
1+25
0+80
0.66%


INSTALL EXISTING
AREA A
AREA B
INSTALL TEMPORARY MONITORING WELL
TW1
SEDIMENT DISPERSAL CONTROL
D6
D7
D10
D11
GANTRY FOUNDATION TO REMAIN IN PLACE
TW2
D12
PROTECT EXISTING SHEETPILING
16W-3-83
839
AREA C
CONSTRUCT SECURITY FENCE
REMOVE AND RELC FENCING AND TANK
D15
TW3
SEDIMENT DISPERSAL CONTROL
AREA C - DREDGING VOLUME
BOTTOM OF SAND
FROM DRAWING SHEET NO 07/4
1" = 100'

APPENDIX E
COMPUTER ANALYSIS - FILL VOLUMES

WARZYN
ENGINEERING INC

CRESCENT DITCH/OVAL LAGOON
CONTAINMENT CELL

WARZYN

WARZYN ENGINEERING, INC.
MADISON, WISCONSIN

BY LAP DATE 2-14-85 SUBJECT OMC - DESIGN ANALYSIS SHEET NO. 1 OF 1
CHKD. BY DJD DATE 3-7-85 CONCEPT SUBMITTAL JOB NO. 0837
CRESCENT DITCH/OVAL LAGOON

VOLUME - TOTAL AIR SPACE - CRESCENT DITCH/OVAL LAGOON CONTAINMENT CELL

DONE IN TWO PARTS SEPARATED BY RR

PART 1 : CRESCENT DITCH AREA (SOUTH OF RR)
SECTIONS 1-13 AS SHOWN ON ATTACHED DRAWING

V = 3,124 CY ✓

PART 2 : OVAL LAGOON AREA (NORTH OF RR)
SECTIONS 6-18 SEE ATTACHED DRAWING

V = 16,849 CY ✓

TOTAL AIR SPACE = 19,973 CY ≈ 20,000 CY ✓

REFERENCE: Computer sheets attached. Program "DIGIEARTH 1" Calculates volumes using the Average-End Area Formulas with contours taken from attached drawing using sections as shown and the digitizer

TOTAL AIR SPACE		20,000 CY ✓
- CLAY	(2')	10,700 ✓
- SAND	(6")	2,700 ✓
- AGGREGATE	(8")	3,600 ✓
- BITUMINOUS	(4")	1,800 ✓
NET AIR SPACE		1,200 CY ✓

* VOLUMES CALCULATED BASED ON FINAL COVER AREA DETERMINED IN APPENDIX F.

V= 3124 cy

E-3

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CRESCENT DITCH CONTAINMENT AREA
Sections 1 - 13

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40

AREA SOUTH WEST OF RAILROAD DIVISION

STATION 0

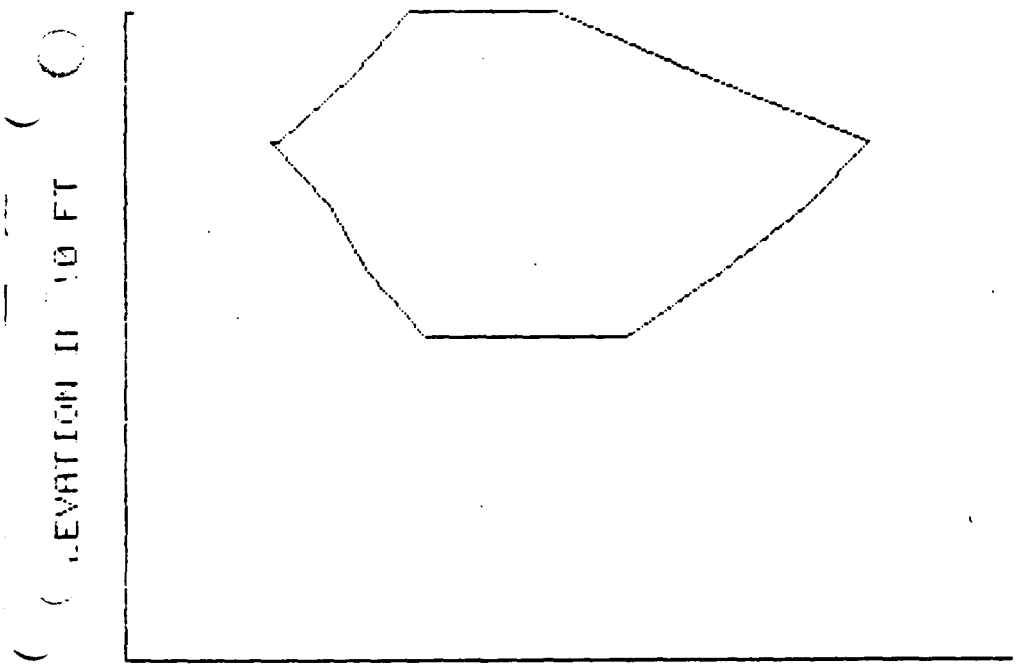
AREA (SF) = 0

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: DMC
PROJECT NUMBER: 11837
VOLUME TYPE: CRESCENT DITCH CONTAINMENT AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



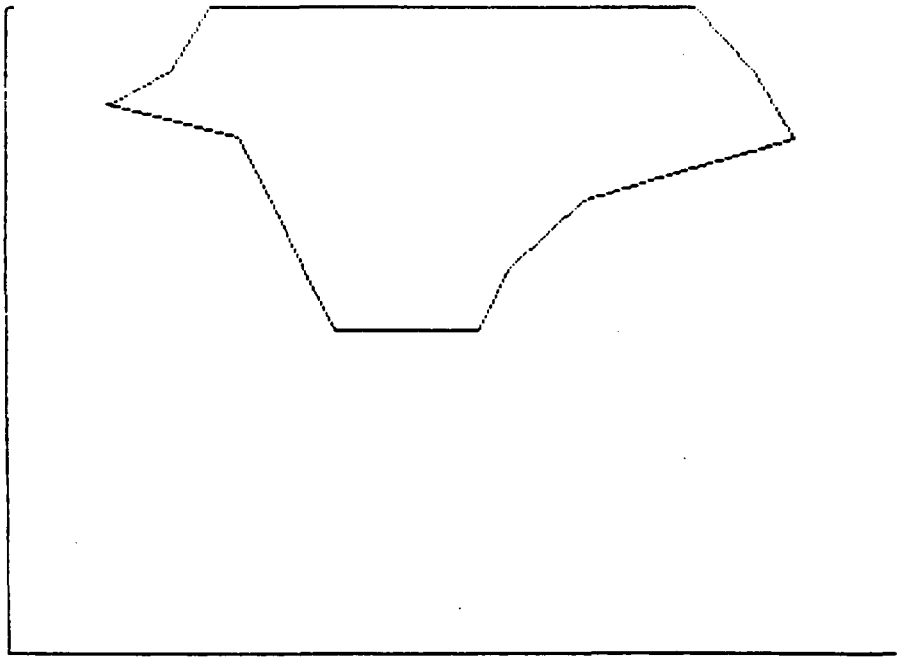
STATION 10 /

AREA (SF)= 135.85

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION *INITIALIZATION DATA*
PROJECT NAME: OMC DRAWING SCALE(FT/IN): 40
PROJECT NUMBER: 11837
VOLUME TYPE: CRESCENT DITCH CONTAINMENT AREA



STATION 30

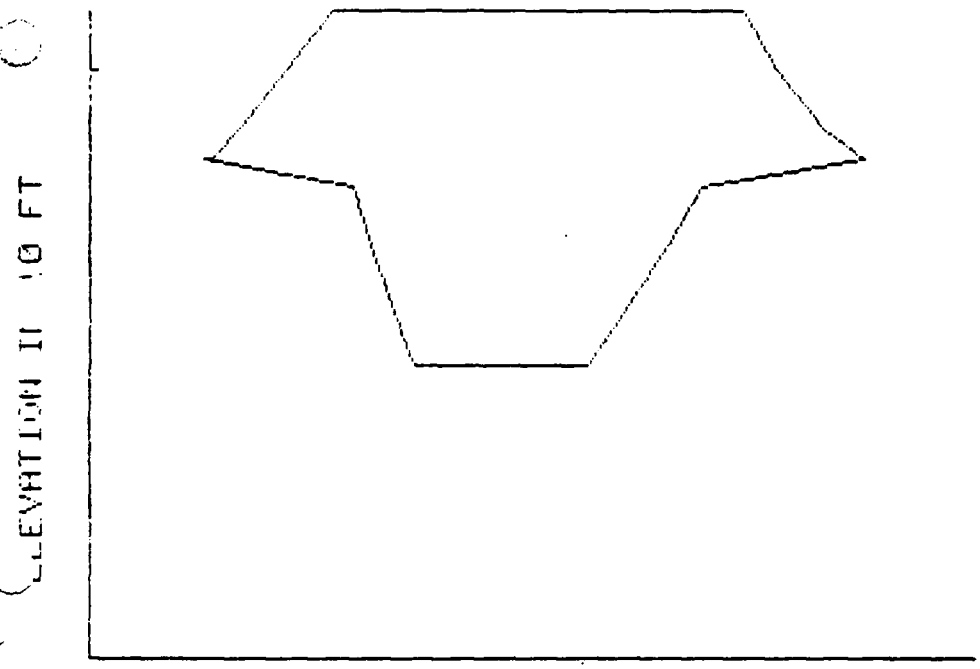
AREA (SF)= 201.32

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CRESCENT DITCH CONTAINMENT AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 68

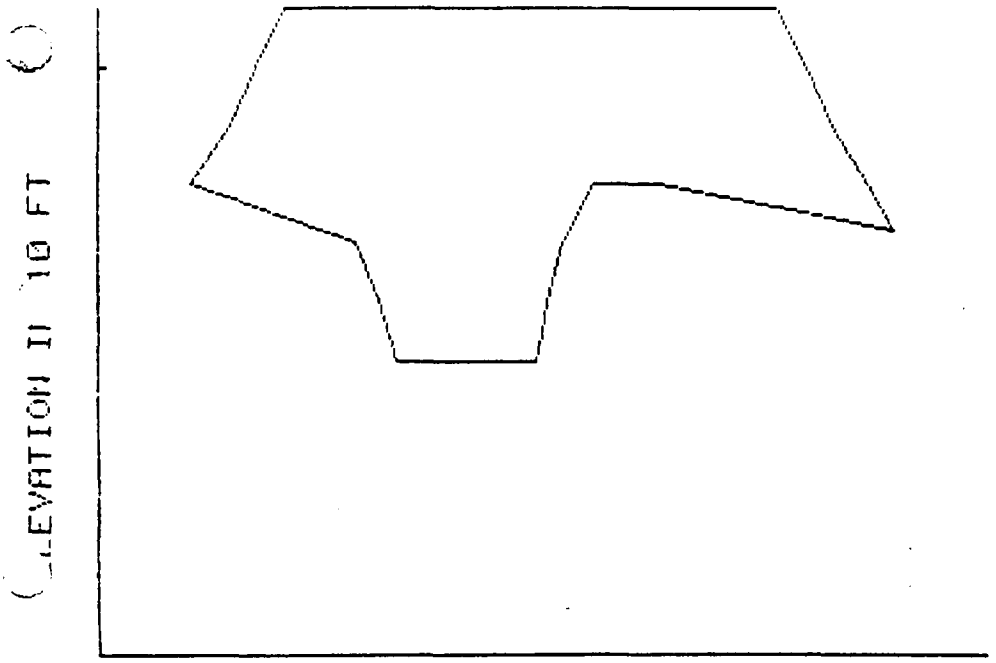
AREA (SF)= 206.83

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CRESCENT DITCH CONTAINMENT AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 140

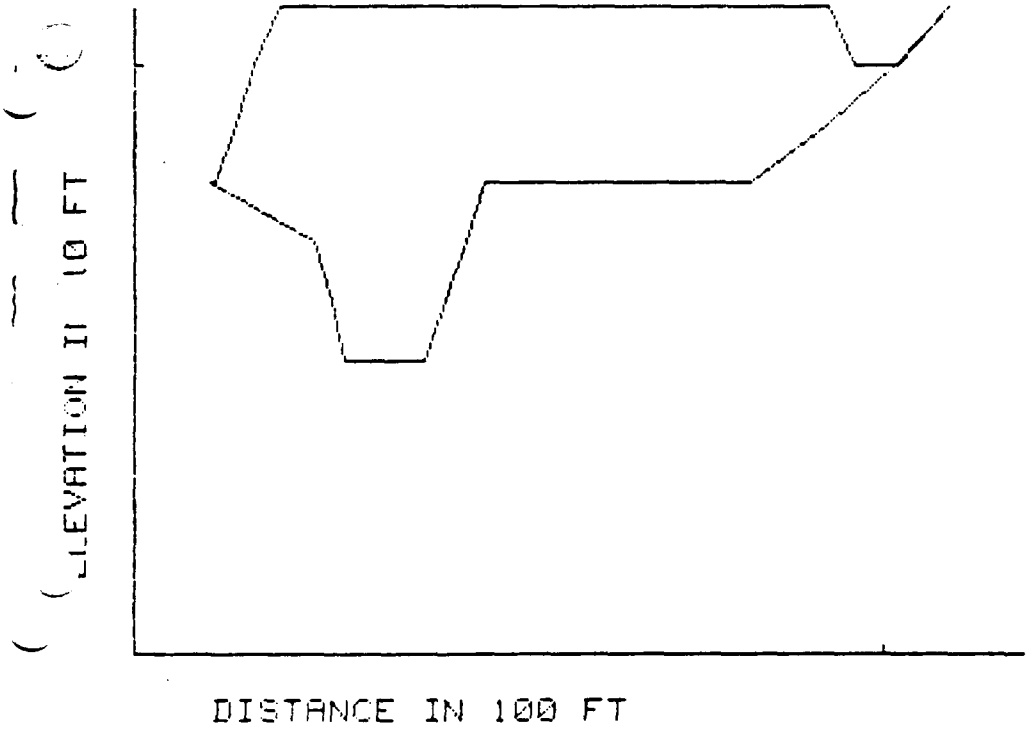
AREA (SF)= 266.6

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CRESCENT DITCH CONTAINMENT AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 200

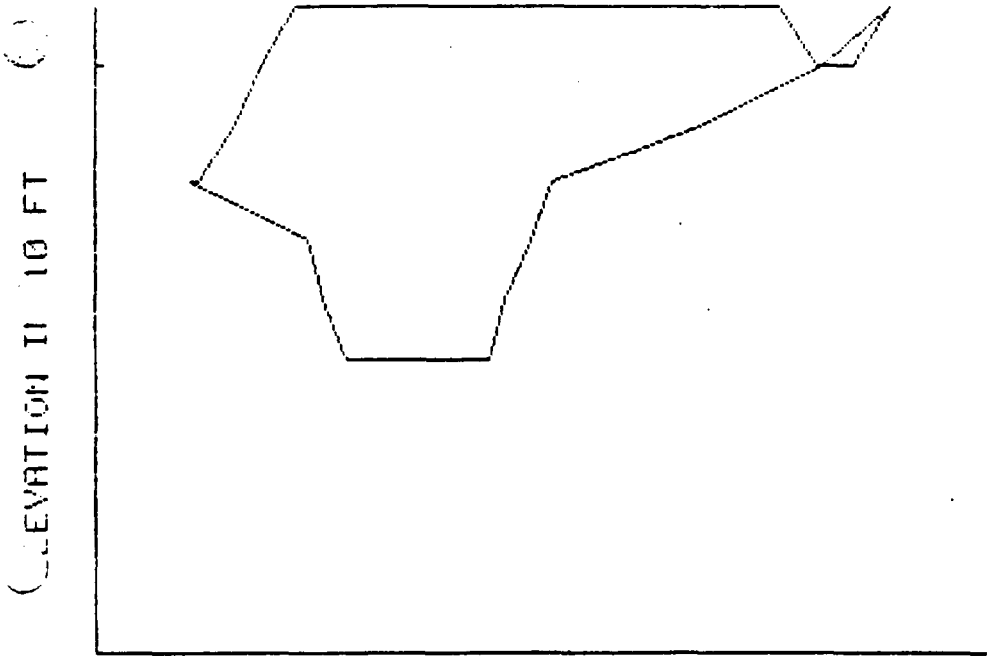
AREA (SF)= 293.86

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: CMC
PROJECT NUMBER: 11837
VOLUME TYPE: CRESCENT DITCH CONTAINMENT AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 237

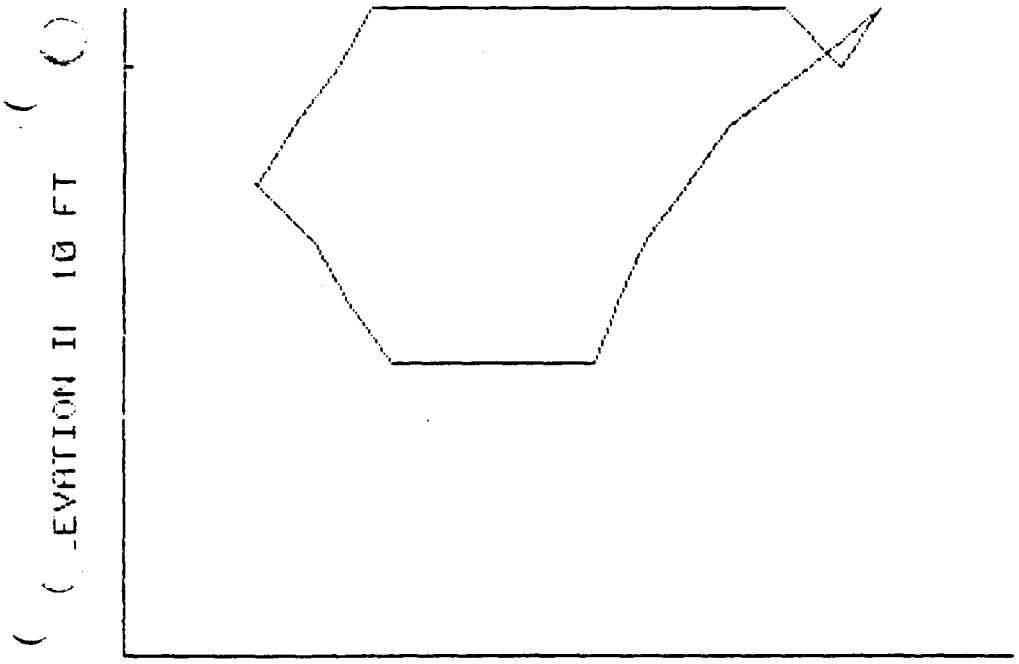
AREA (SF)= 215.58

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CRESCENT DITCH CONTAINMENT AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 278

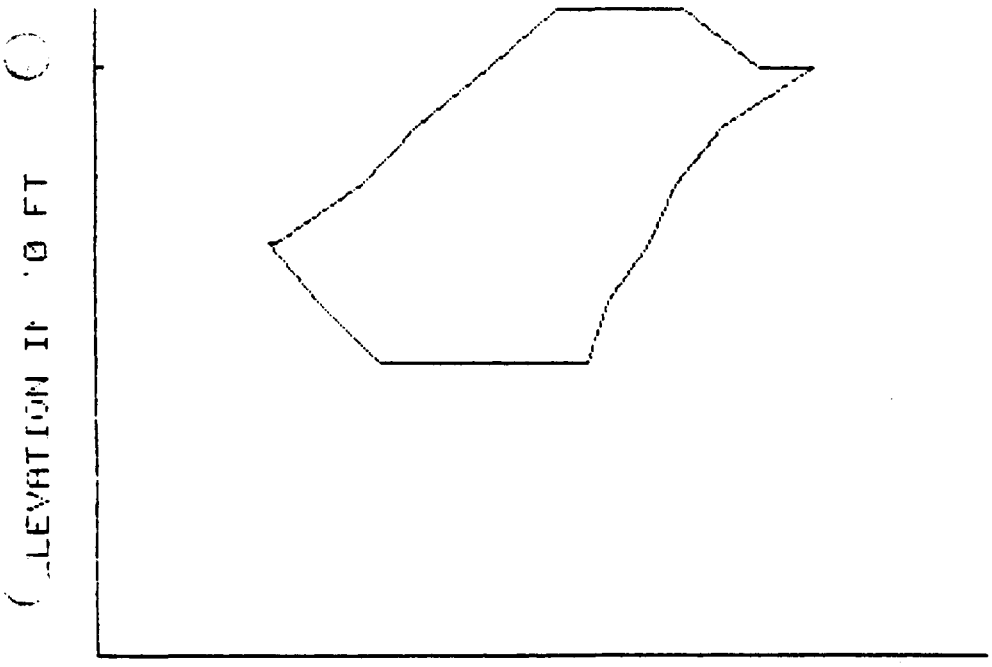
AREA (SF)= 168.2

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CRESCENT DITCH CONTAINMENT AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 327

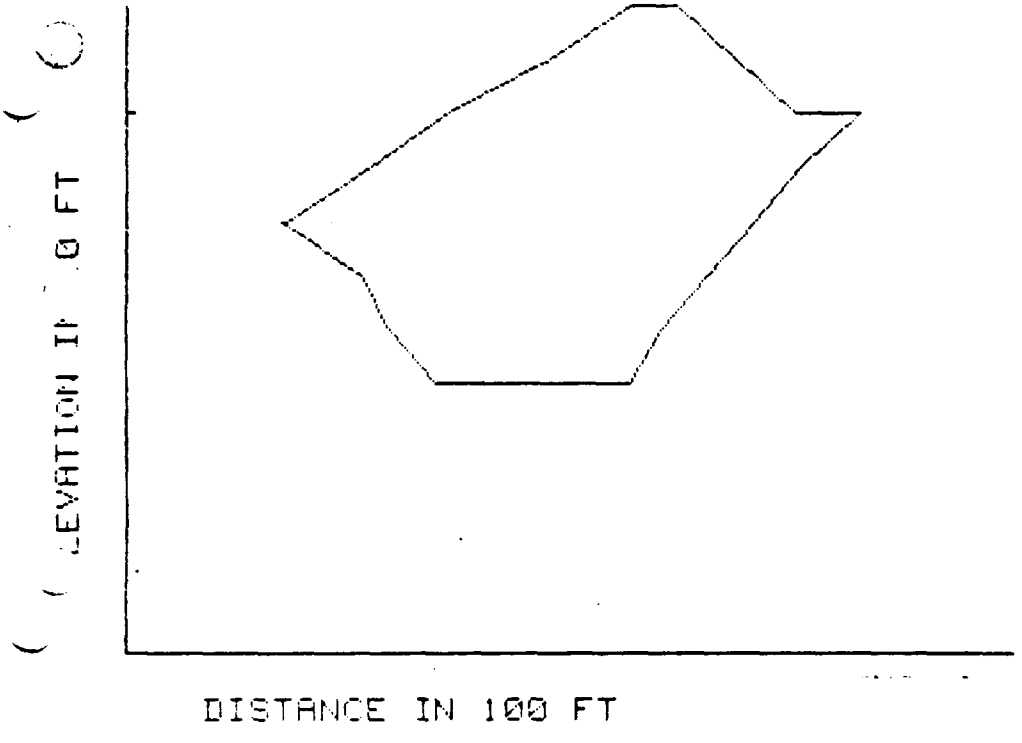
AREA (SF)= 101.16

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CRESCENT DITCH CONTAINMENT AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 388

AREA (SF)= 142.93

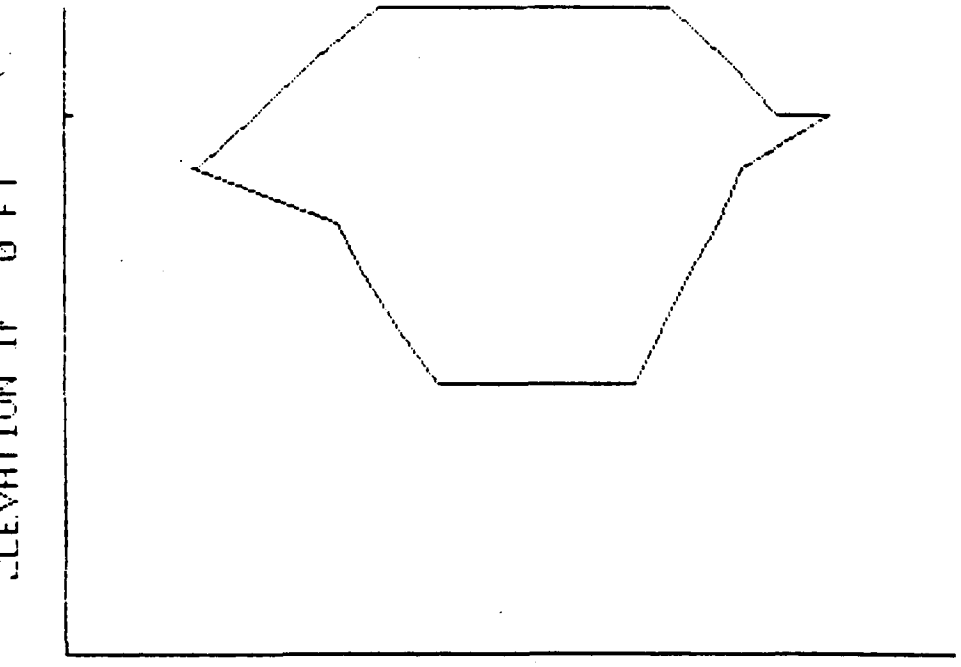
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB

DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CRESCENT DITCH CONTAINMENT AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 420

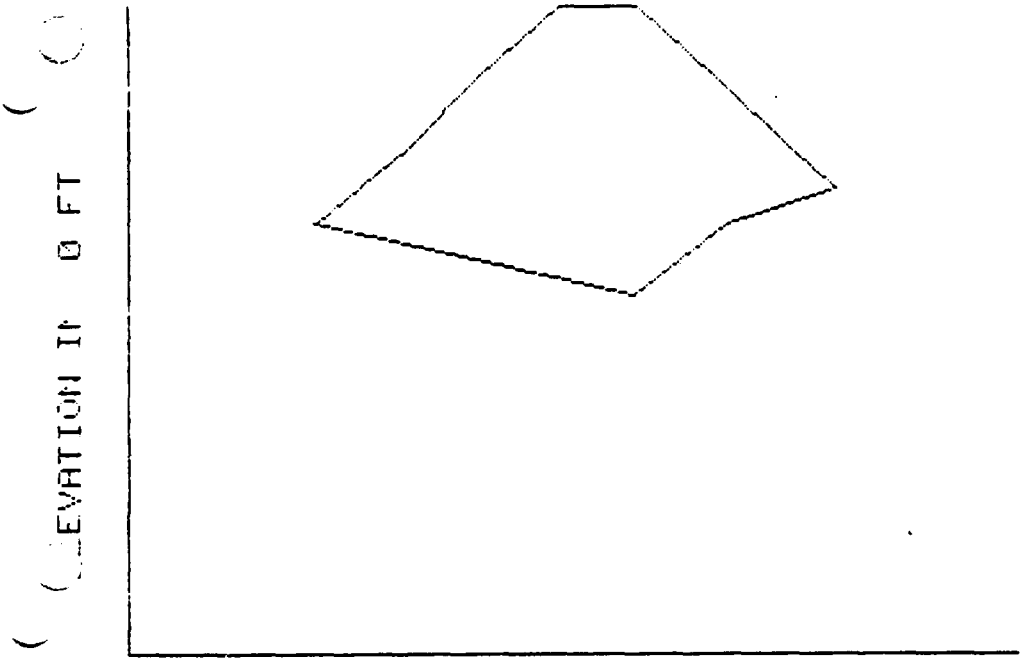
AREA (SF)= 213.88

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CRESCENT DITCH CONTAINMENT AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 410

AREA (SF)= 60.82

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME. OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CRESCENT DITCH CONTAINMENT AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40

STATION 420

AREA (SF)= 0

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

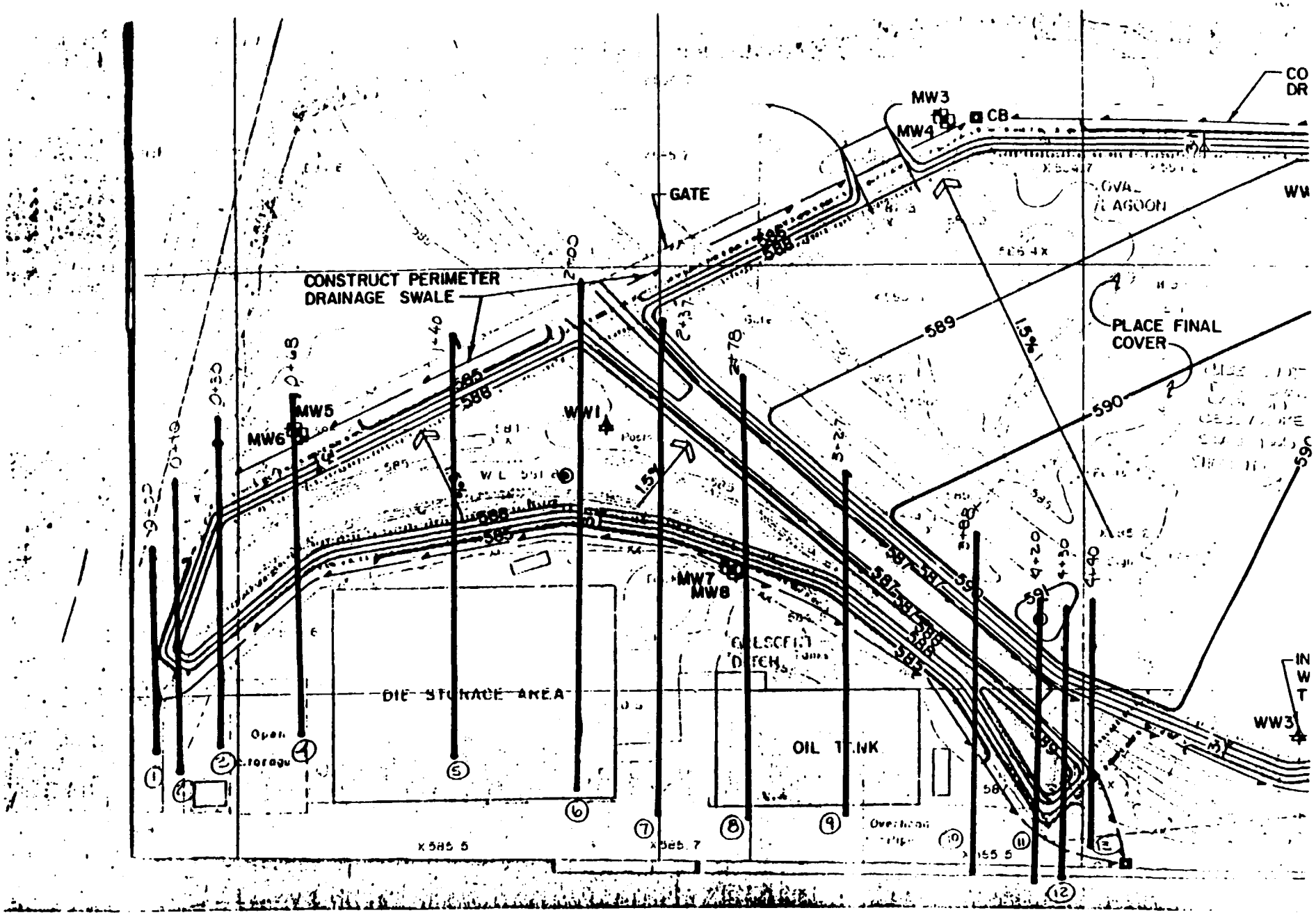
USER INITIALS: LAB / DJD CHECKED 3-7-85 DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CRESCENT DITCH CONTAINMENT AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40

STATION	AREA(SF)	DISTANCE(FT)	VOLUME(CY)
0.00	0.00		
		10.00	25
10.00	135.85		
		20.00	125
30.00	201.32		
		38.00	287
68.00	206.83		
		72.00	631
140.00	266.60		
		60.00	623
200.00	293.86		
		37.00	349
237.00	215.58		
		41.00	291
278.00	168.20		
		49.00	244
327.00	101.16		
		61.00	276
388.00	142.93		
		32.00	211
420.00	213.88		
~~410.00~~ 410	60.82	10.00	51
		10.00	11
~~420.00~~ 410	0.00		
		TOTAL VOLUME(CY) =	3124

ERROR IN STATIONING WILL NOT AFFECT VOLUME BECAUSE STATION DIFFERENCE IS CORRECT.


MW3
MW4
CB
GATE
CONSTRUCT PERIMETER
DRAINAGE SWALE
PLACE FINAL
COVER
589
590
MW5
MW6
WW1
MW7
MW8
DIE STORAGE AREA
OIL TANK
WW3
1.5%
15%

V = 16,849 cy
E-17

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB / CHECKED DATE: 2-14-85

PROJECT INFORMATION DJO *INITIALIZATION DATA*
PROJECT NAME: OMC 3-7-85 DRAWING SCALE(FT/IN): 40 /
PROJECT NUMBER: 11837
VOLUME TYPE: CONTAINMENT CELL OVAL LAGOON AIR SPACE
SECTIONS 6 - 18

NORTH EAST OF RAILROAD DIVISION

STATION 200 /

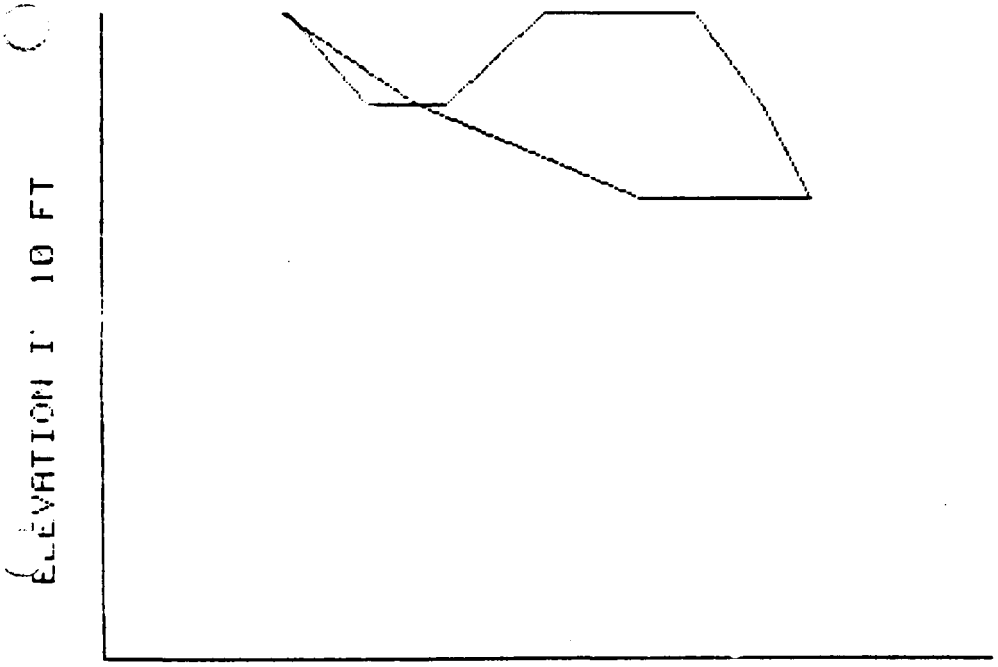
AREA (SF)= 0 /

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CONTAINMENT CELL OVAL LAGOON AIR SPACE

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 237

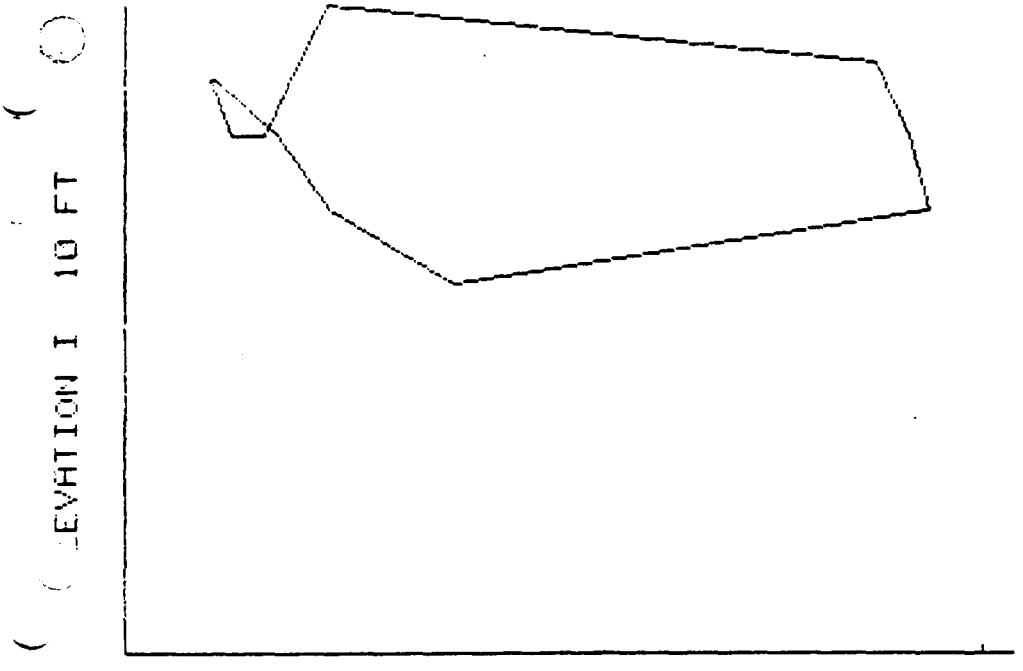
AREA (SF)= 25.95

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CONTAINMENT CELL OVAL LAGOON AIR SPACE

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 278

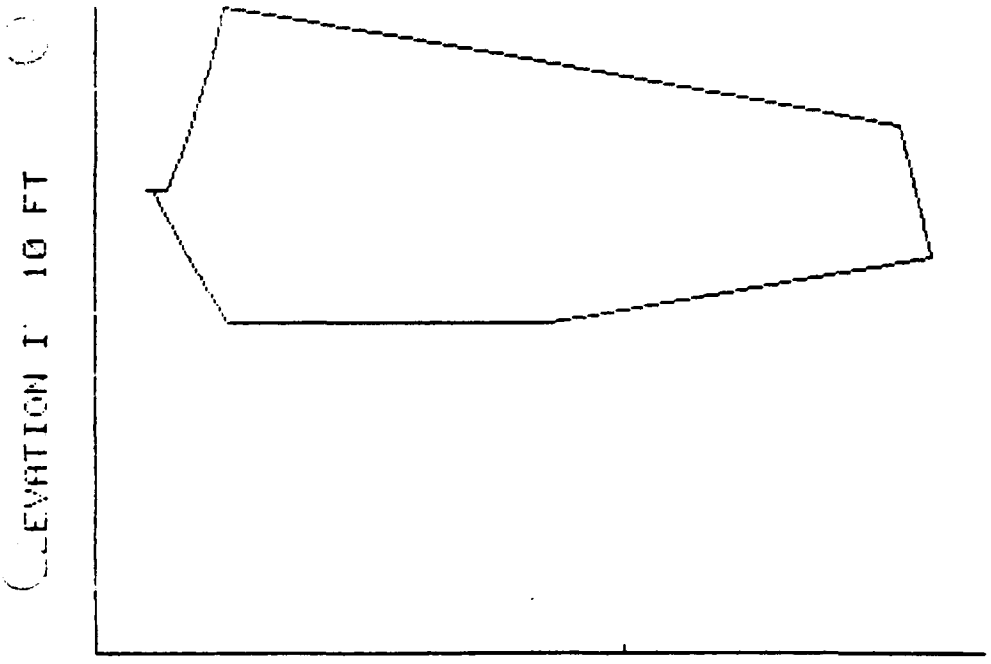
AREA (SF)= 200.62

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CONTAINMENT CELL OVAL LAGOON AIR SPACE

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 327

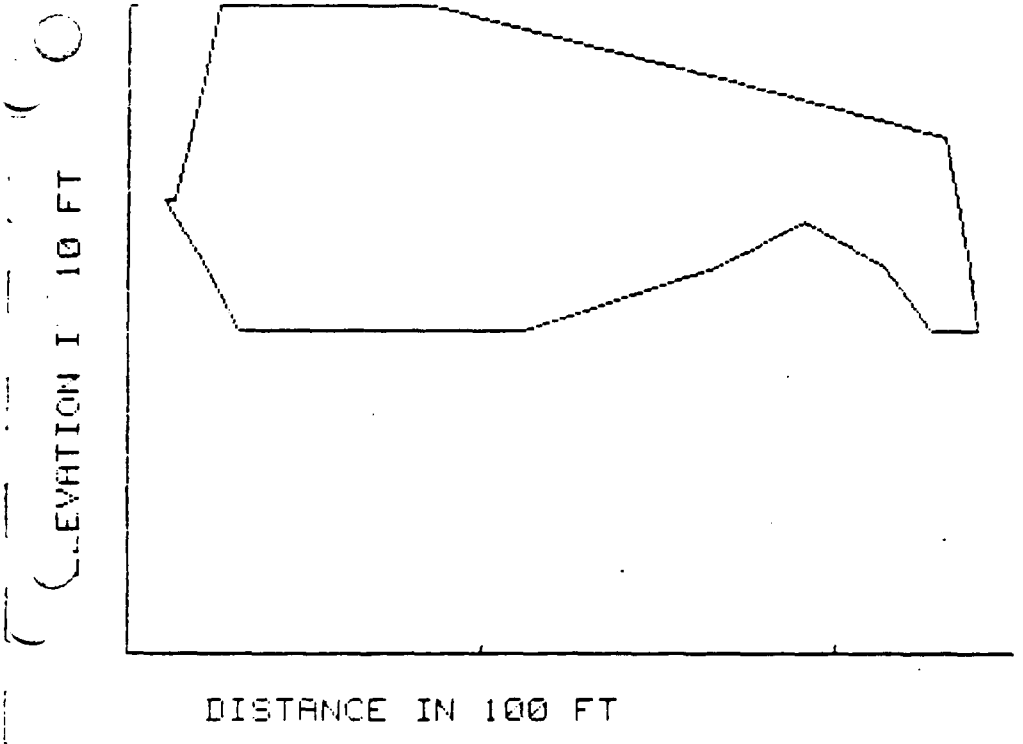
AREA (SF)= 496.82

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CONTAINMENT CELL OVAL LAGOON AIR SPACE

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 388

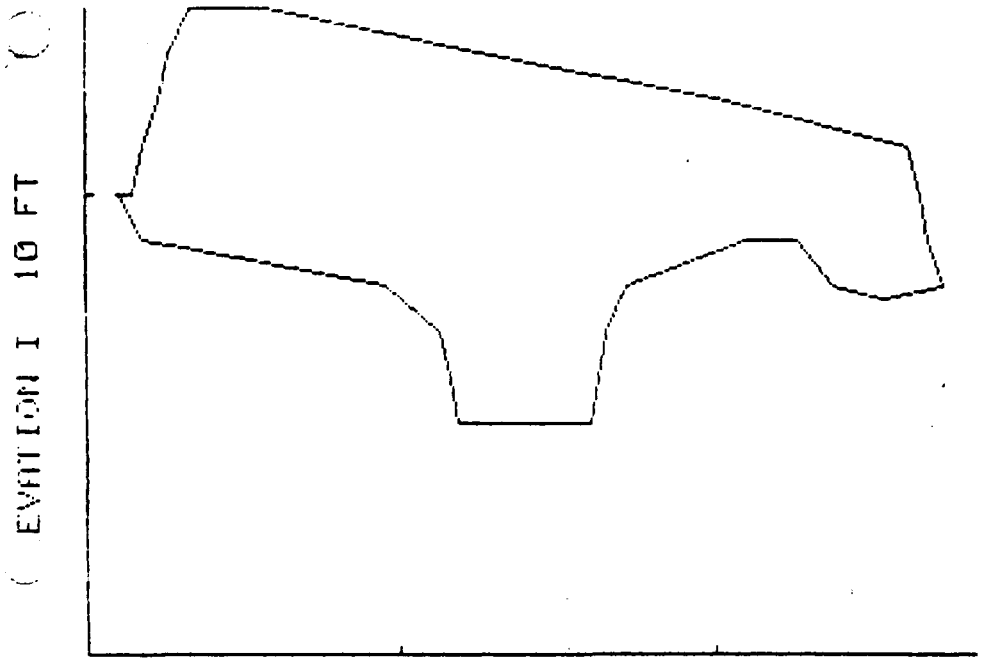
AREA (SF)= 827.49

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CONTAINMENT CELL OVAL LAGOON AIR SPACE

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 420

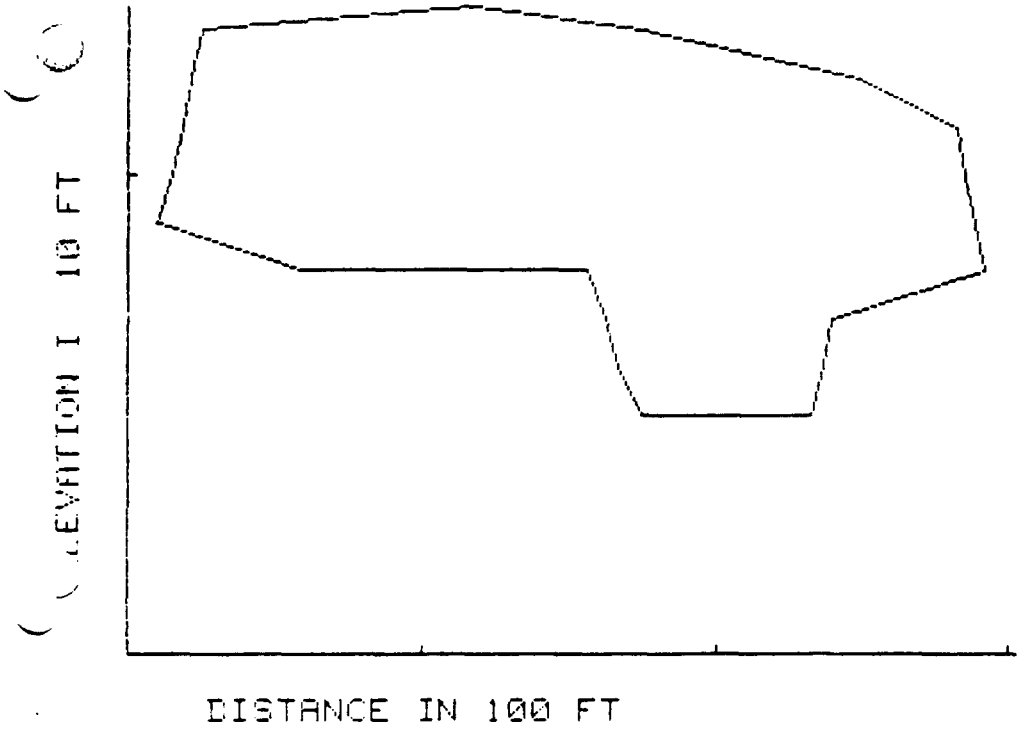
AREA (SF)= 1255.98

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CONTAINMENT CELL OVAL LAGOON AIR SPACE

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 470

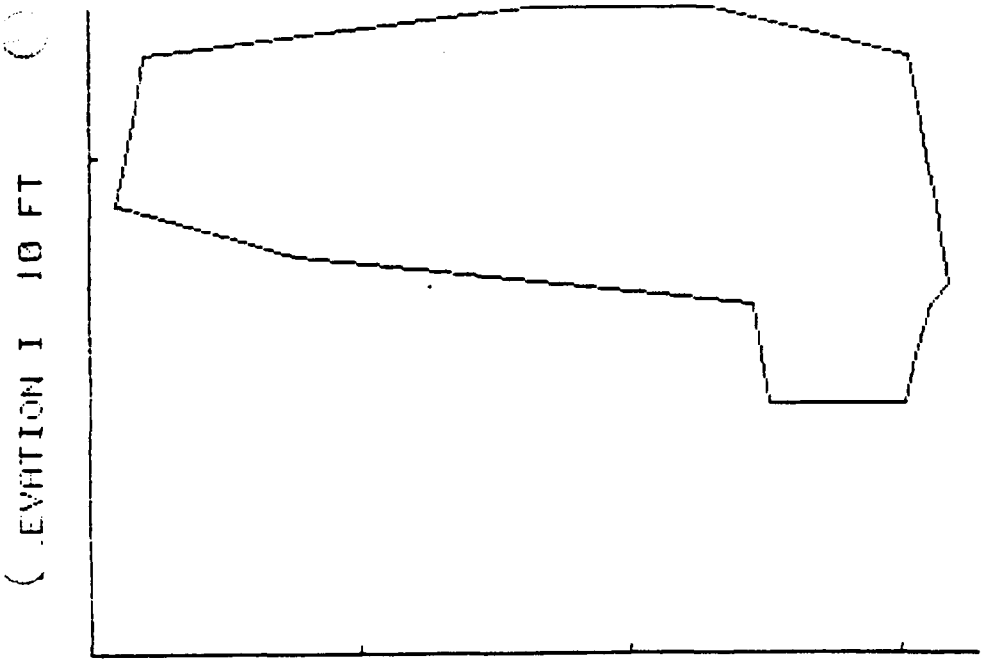
AREA (SF)= 1515.52

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CONTAINMENT CELL OVAL LAGOON AIR SPACE

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



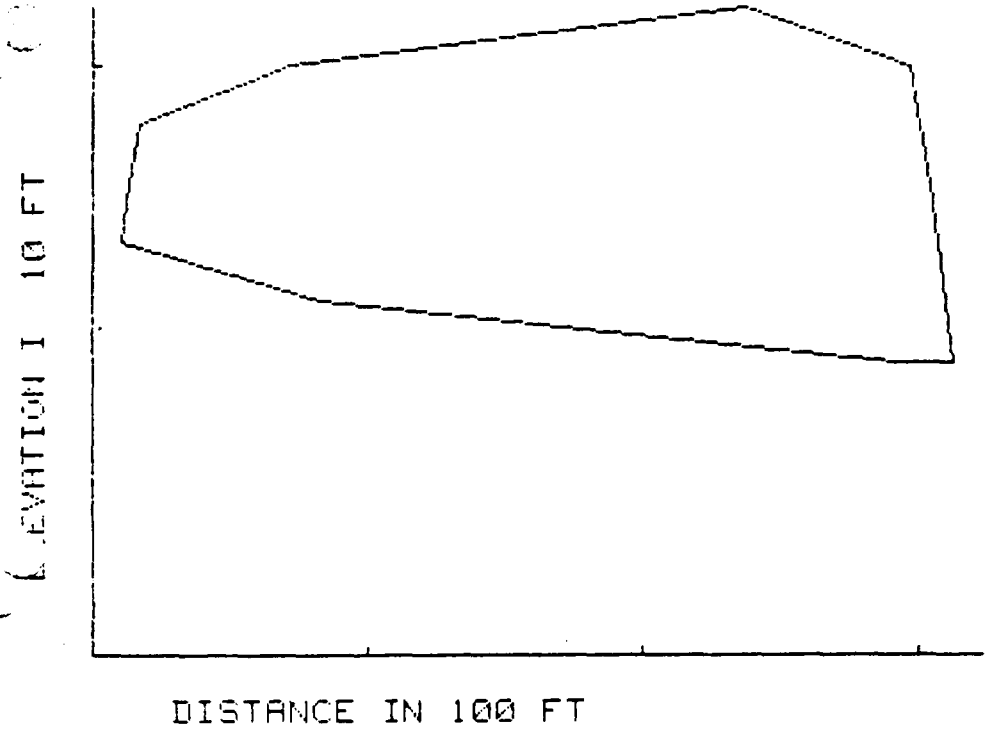
STATION 537

AREA (SF)= 1593.01

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION *INITIALIZATION DATA*
PROJECT NAME: OMC DRAWING SCALE(FT/IN): 40
PROJECT NUMBER: 11837
VOLUME TYPE: CONTAINMENT CELL OVAL LAGOON AIR SPACE



STATION 570

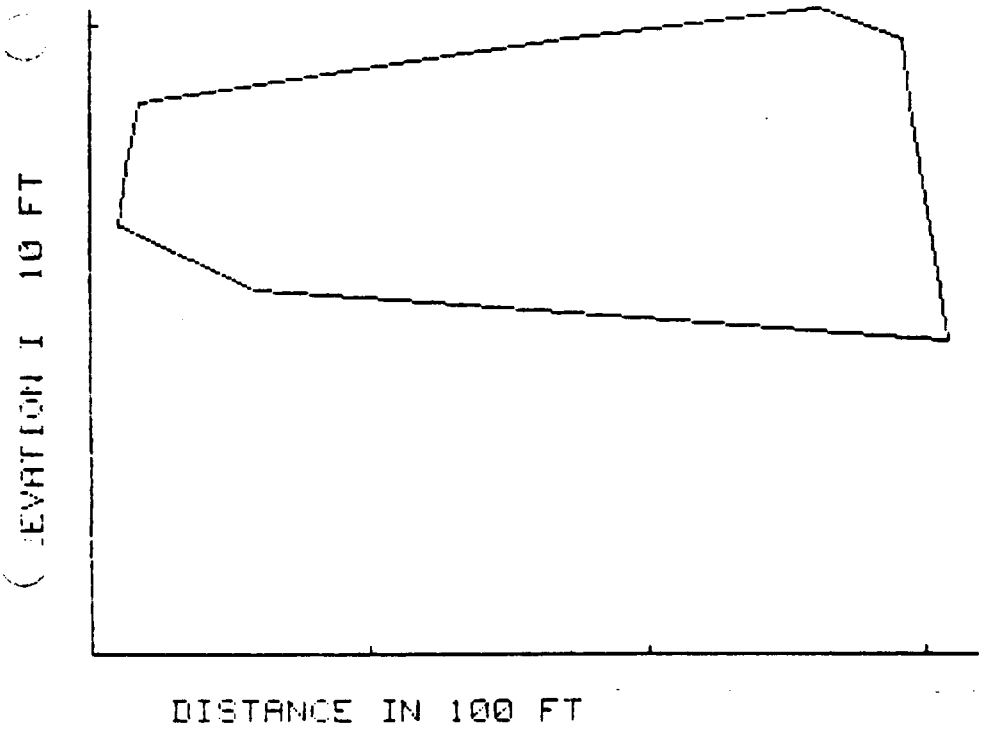
AREA (SF)= 1337.49

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CONTAINMENT CELL OVAL LAGOON AIR SPACE

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 620

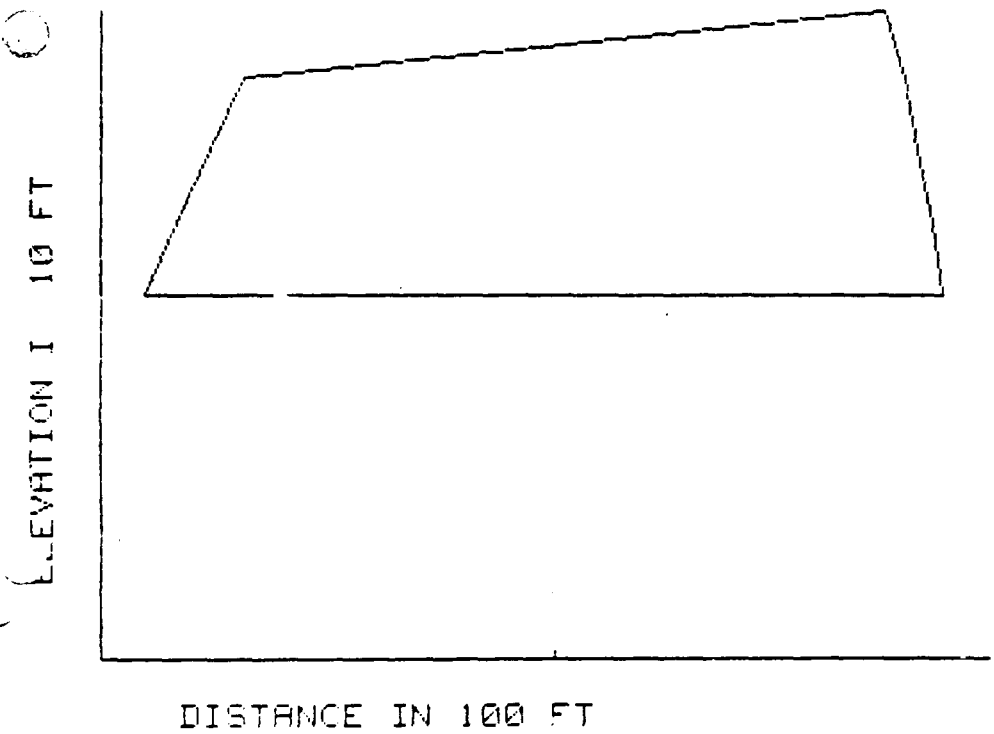
AREA (SF)= 1163.38

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CONTAINMENT CELL OVAL LAGOON AIR SPACE

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 680

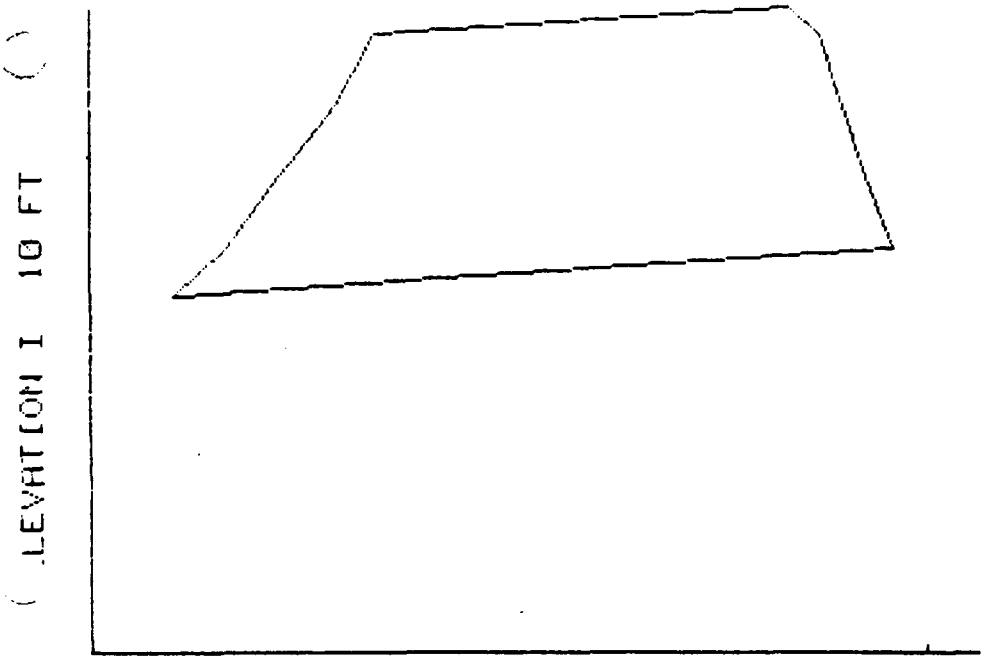
AREA (SF)= 551.26

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CONTAINMENT CELL OVAL LAGOON AIR SPACE

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 728

AREA (SF) = 235.67

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CONTAINMENT CELL OVAL LAGOON AIR SPACE

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40

STATION 765

AREA (SF)= 0

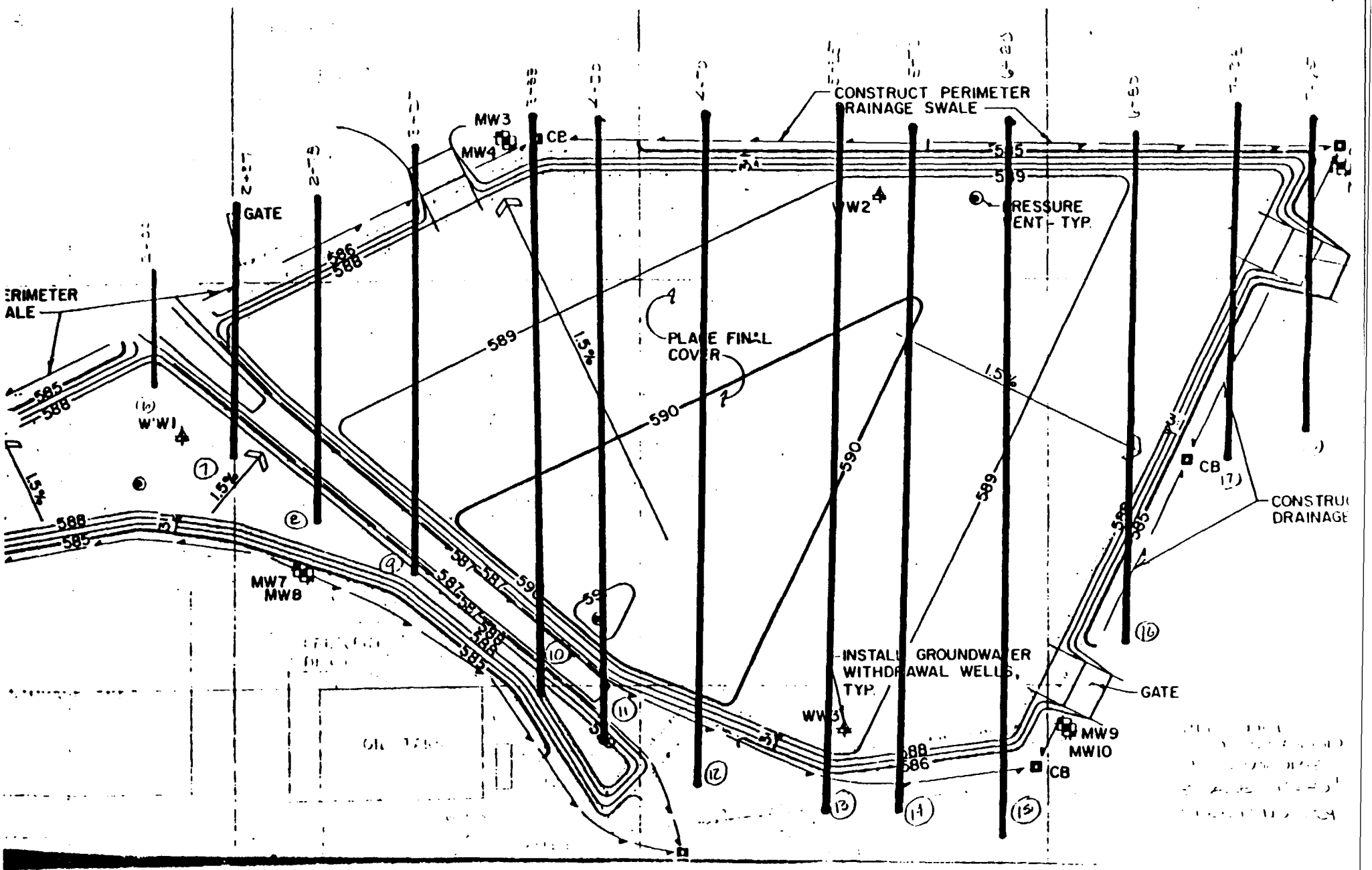
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB / CHECKED DJA 3-7-85 DATE: 2-14-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: CONTAINMENT CELL OVAL LAGOON AIR SPACE

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40

STATION	AREA(SF)	DISTANCE(FT)	VOLUME(CY)
200.00	0.00		
		37.00	18
237.00	25.95		
		41.00	172
278.00	200.62		
		49.00	633
327.00	496.82		
		61.00	1496
388.00	827.49		
		32.00	1235
420.00	1255.98		
		50.00	2566
470.00	1515.52		
		67.00	3857
537.00	1593.01		
		33.00	1791
570.00	1337.49		
		50.00	2316
620.00	1163.38		
		60.00	1905
680.00	551.26		
		48.00	699
728.00	235.67		
		37.00	161
765.00	0.00		
		TOTAL VOLUME(CY)=	16849


CONSTRUCT PERIMETER DRAINAGE SWALE
MW3
MW4
CB
GATE
MW2
PRESSURE VENT - TYP.
PERIMETER SWALE
PLACE FINAL COVER
MW1
MW7
MW8
INSTALL GROUNDWATER WITHDRAWAL WELLS, TYP.
WW3
MW9
MW10
CB
GATE
CONSTRUC DRAINAGE
585
586
587
588
589
590
1.5%

EAST-WEST PORTION OF
THE NORTH DITCH

WARZYN

WARZYN ENGINEERING, INC.
MADISON, WISCONSIN

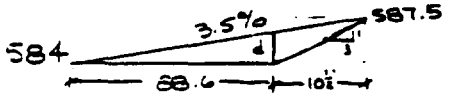
BY LAB DATE 3-6-85 SUBJECT OMC DESIGN ANALYSIS SHEET NO. 1 OF 1
CHKD BY DJD DATE 3-7-85 EAST-WEST PORTION OF THE NORTH DITCH JOB NO. 1182
EXCAVATION / BACKFILL

EAST-WEST PORTION OF NORTH DITCH

Donohue did excavation volumes, bedding volumes, and backfill volumes to elevation approximately 584'.

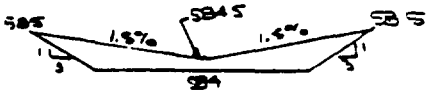
Warzyn portion consists then of backfill quantities from 584' to Final grade and within that - final cover of 2' of clay and 6" of topsoil.

FROM GRID 638,330 E TO GRID 639,260 E, Final grade slopes at 3.5% from the north down to grade.



d = 587.1 - 584 = 3.1'
A = 3.1' × 99.1' ÷ 2 = 153.6 sf
L = 930'
V = 930' × 153.6 sf ÷ 27 = 5,300 cy
(in addition to clay volume done by Donohue)

FROM GRID 639,260 E TO 640,140 E, Final grade slopes at 1.5% to pipe from either side
A = (.75' × 65') = 49 sf
L = 880'
V = 880' × 49 ÷ 27 = 1,600 cy
6" will be topsoil



VOLUME TOTAL = 6,900 cy
- 2,380 cy Topsoil (from Final grade section B of Site Restoration)
* = VOL. CLAY IN ADDITION TO DONOHUE 4,520 cy

PARKING LOT CONTAINMENT CELL

WARZYN

WARZYN ENGINEERING, INC.
MADISON, WISCONSIN

BY LAB DATE 2-19-85 SUBJECT QHC - DESIGN ANALYSIS SHEET NO. 1 OF 1
CHKD. BY DJL DATE 3-8-85 CONCEPT SUBMITTAL JOB NO. 1183T
PARKING LOT CONTAINMENT CELL

TOTAL AIR SPACE 143,522 CY

REFERENCE: COMPUTER SHEETS ATTACHED. PROGRAM "DIGIEARTH 1" CALCULATES VOLUMES USING THE AVERAGE-END AREA FORMULA WITH CONTOURS TAKEN FROM ATTACHED DRAWING USING SECTIONS SHOWN AND DIGITIZER.

NET AIR SPACE = TOTAL AIR SPACE - FINAL COVER

TOTAL AIR SPACE		143,522 CY
- CLAY	(2')	13,300
- SAND	(6")	3,300
- AGG	(8")	4,400
- BITUM	(4")	2,200
- CLAY	(2')	8,000
- RIPRAP (fine - 1' layer)		4,000
- RIPRAP (large - 18" - shoreline)		2,000
NET AIR SPACE		112,300 CY

PARKING LOT SEE FINAL COVER CALCS

SIDESLOPES

rip deducted from total air space

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB / DJD 3-8-85 DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40 /

STATION 0 /

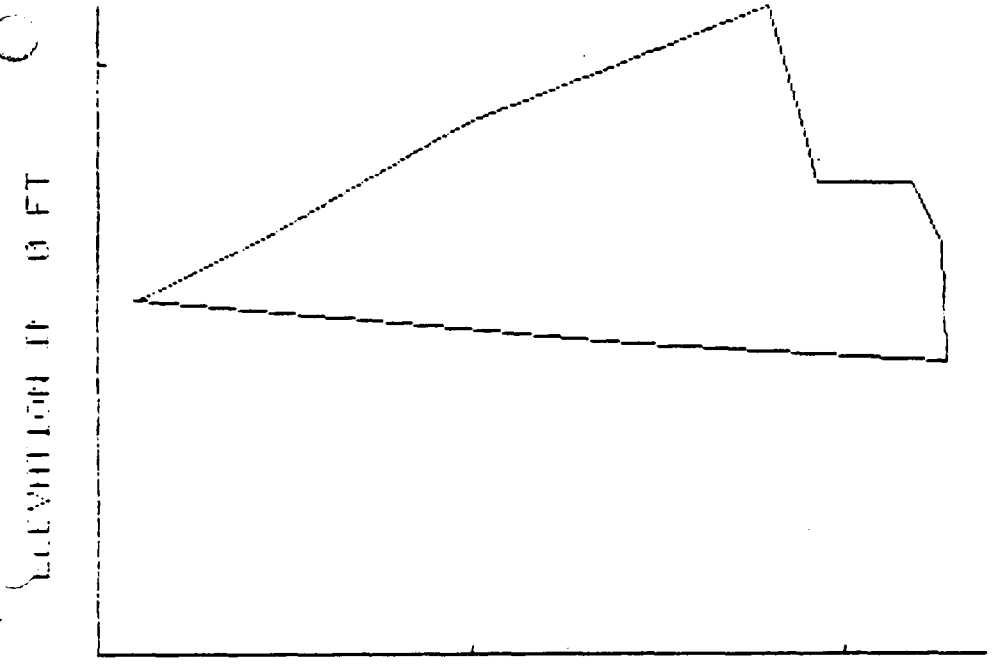
AREA (SF) = 0 /

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 16

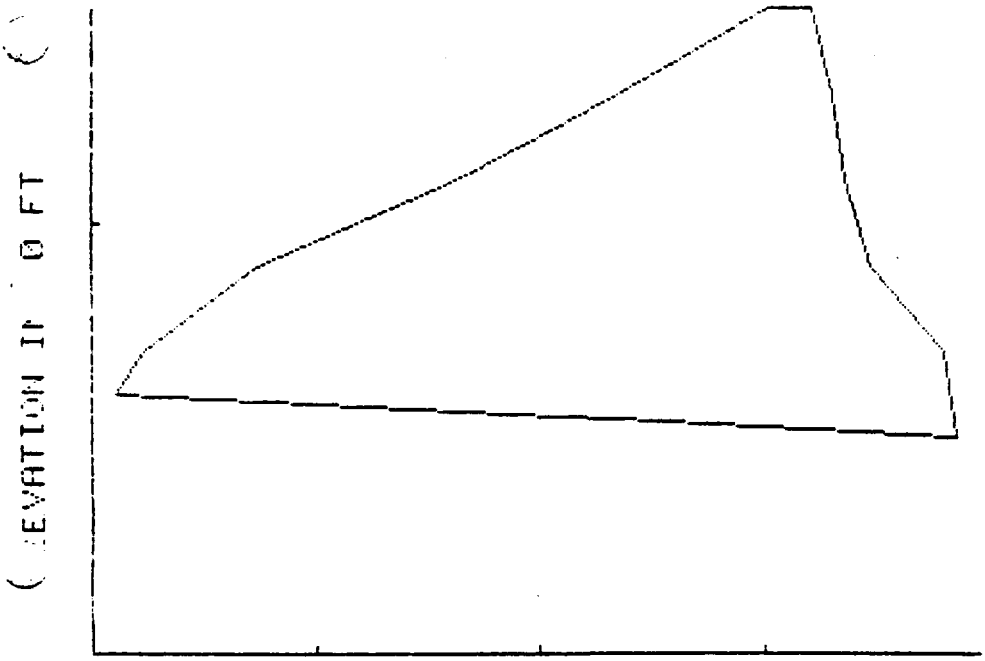
AREA (SF)= 682.23

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 29

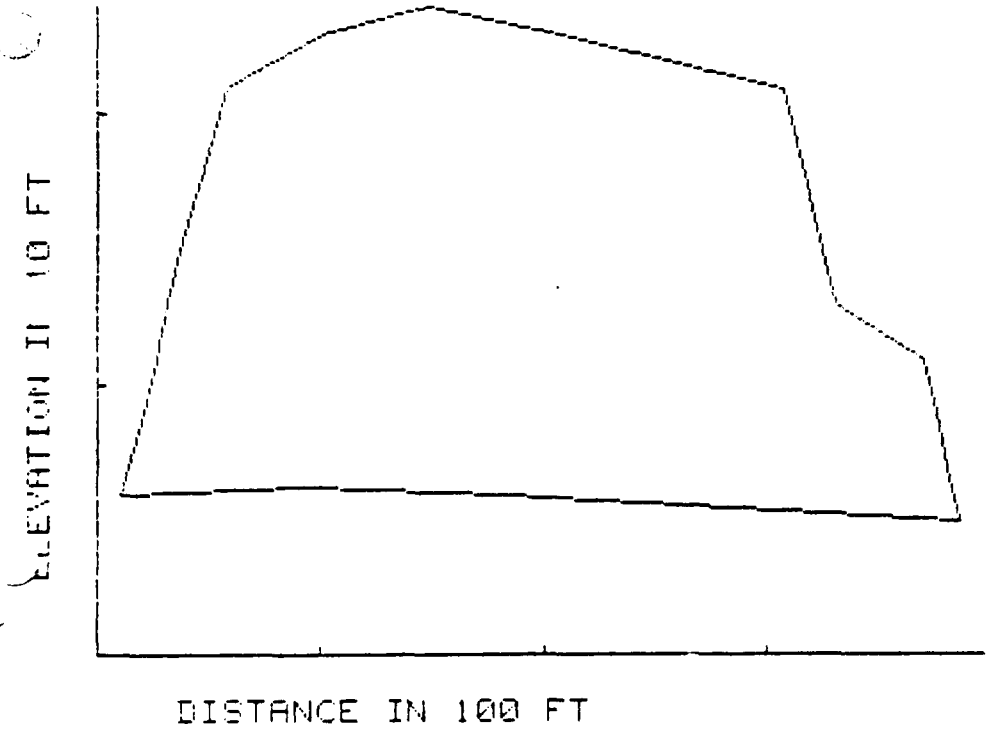
AREA (SF)= 2015.54

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-17-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 72

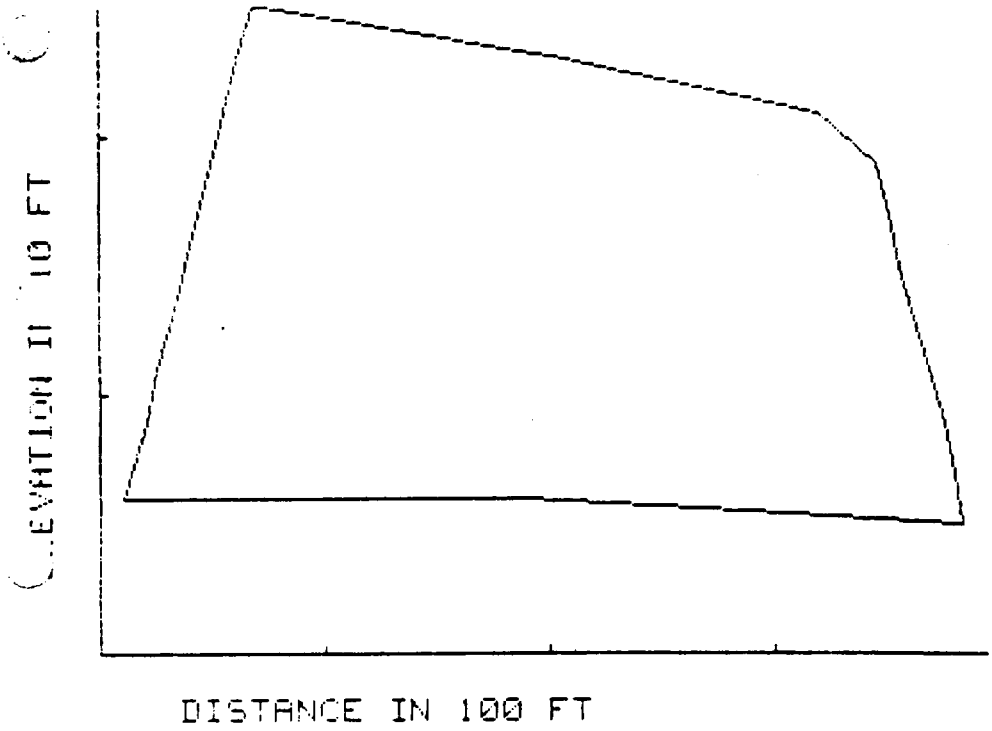
AREA (SF)= 5141.6

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-19-35

PROJECT INFORMATION
PROJECT NAME: GMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 195

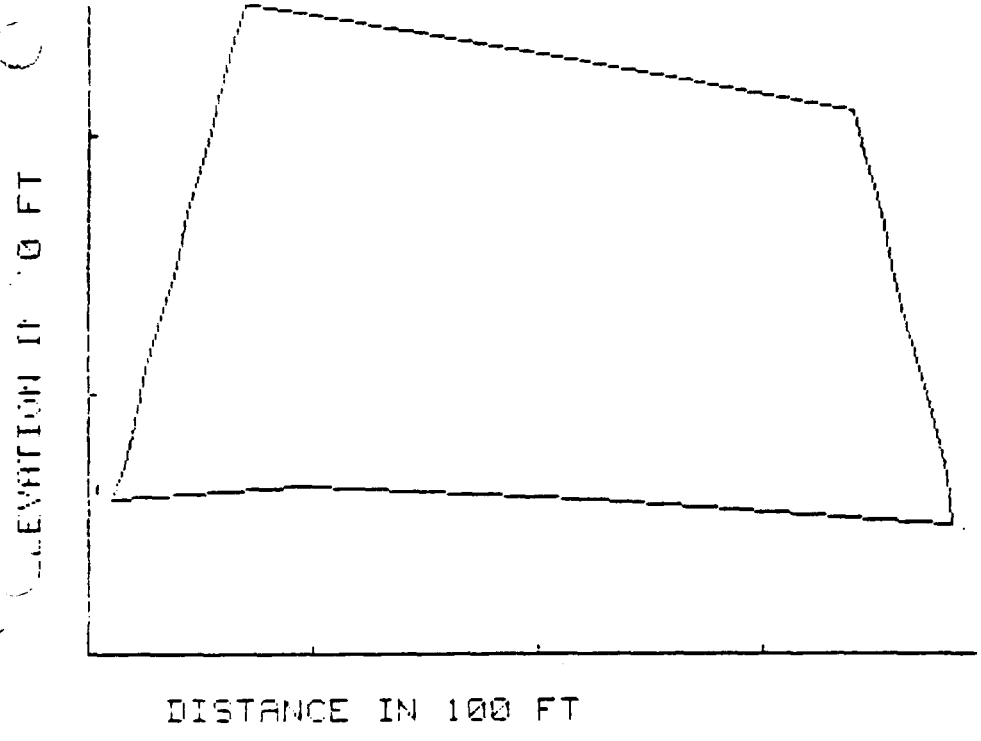
AREA (SF)= 5565.48

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 292

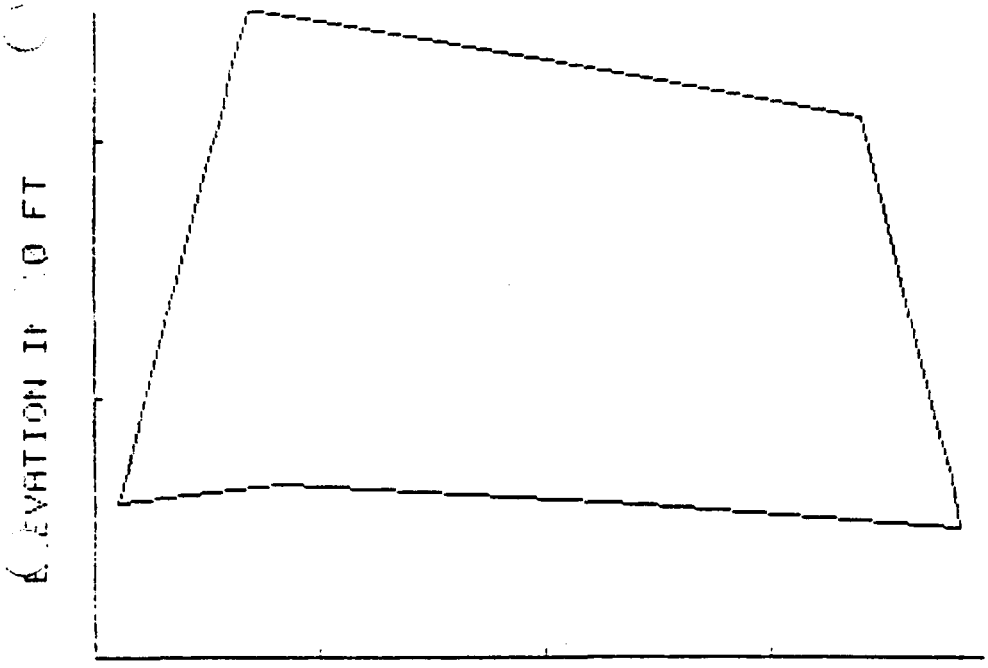
AREA (SF)= 5538.73

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 394

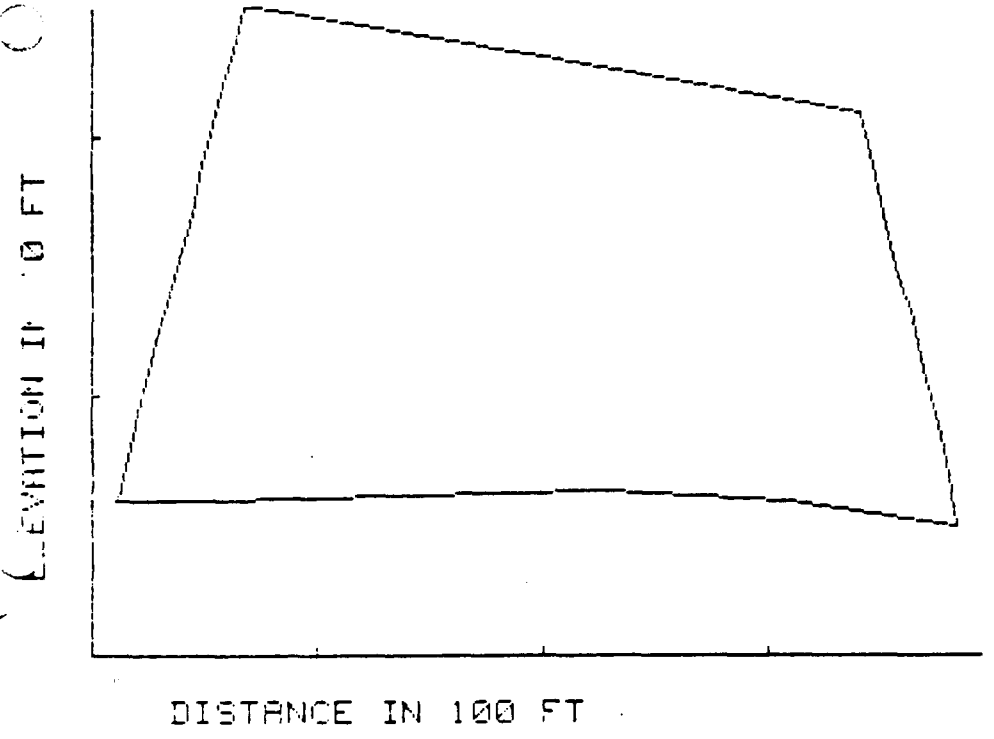
AREA (SF)= 5514.7

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 444

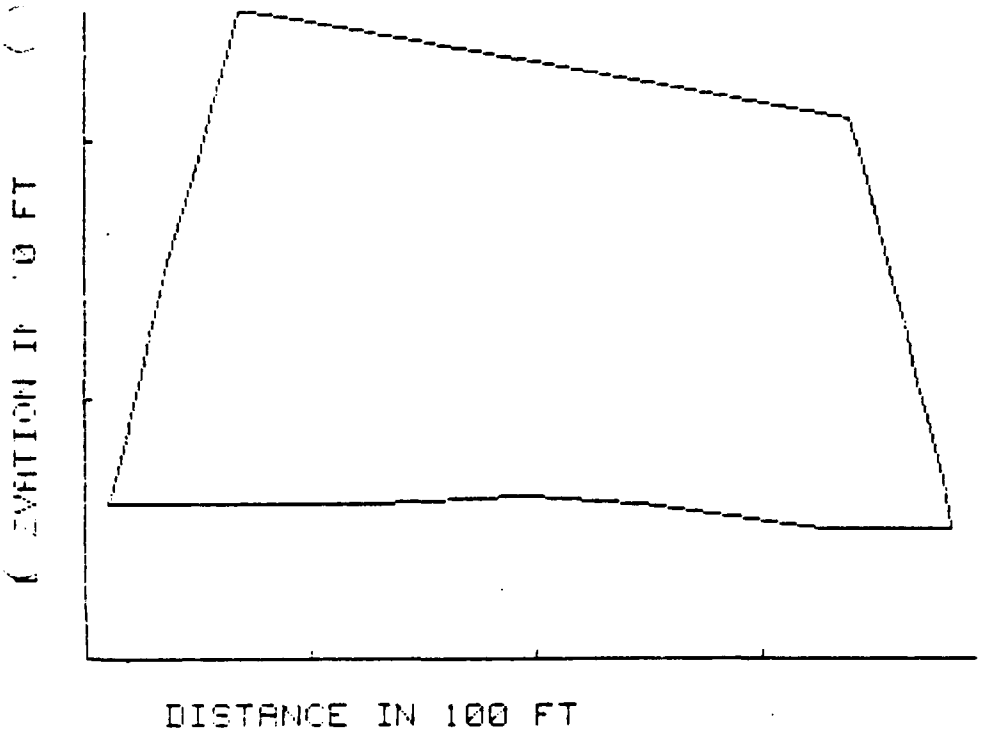
AREA (SF)= 5500.77

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 497

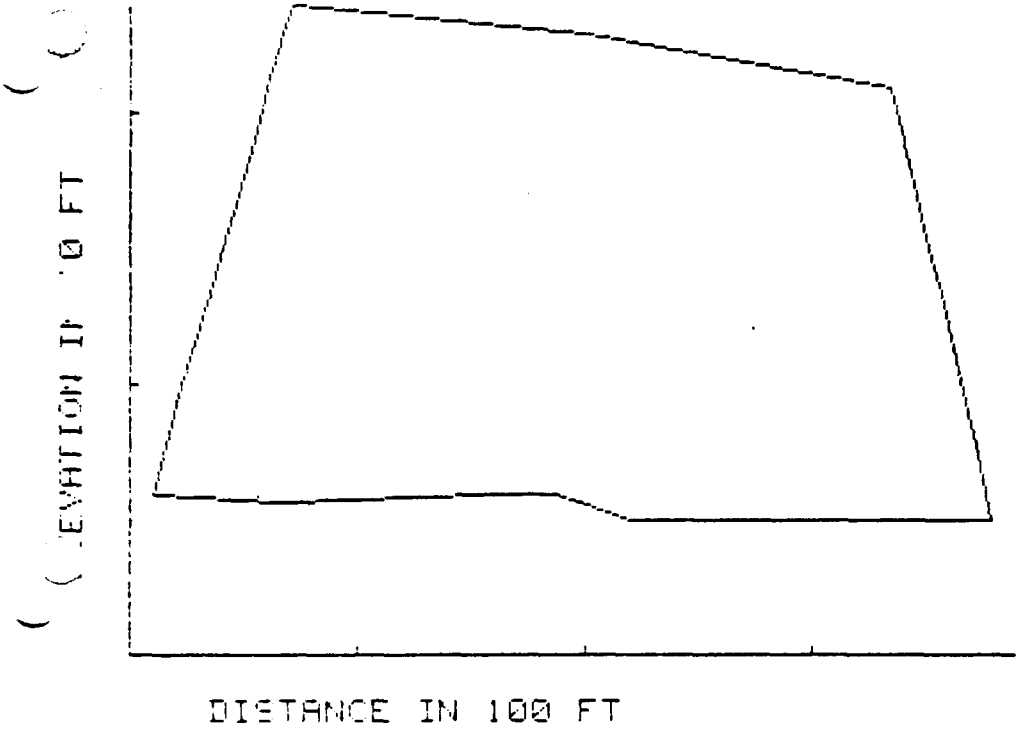
AREA (SF)= 5604.33

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 572

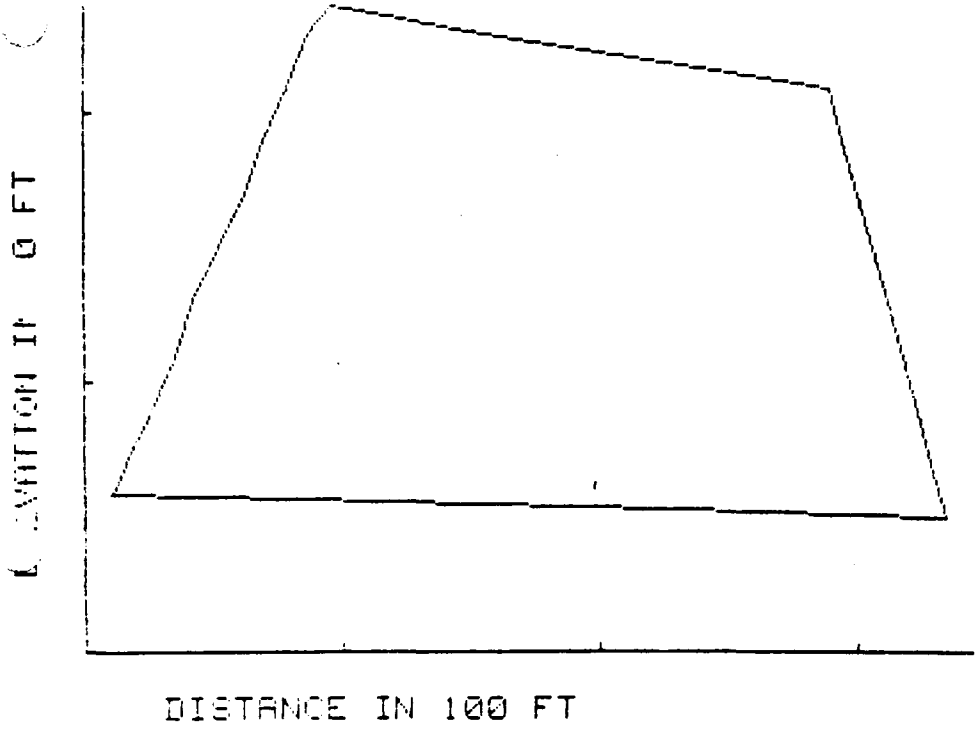
AREA (SF) = 5487.16

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 636

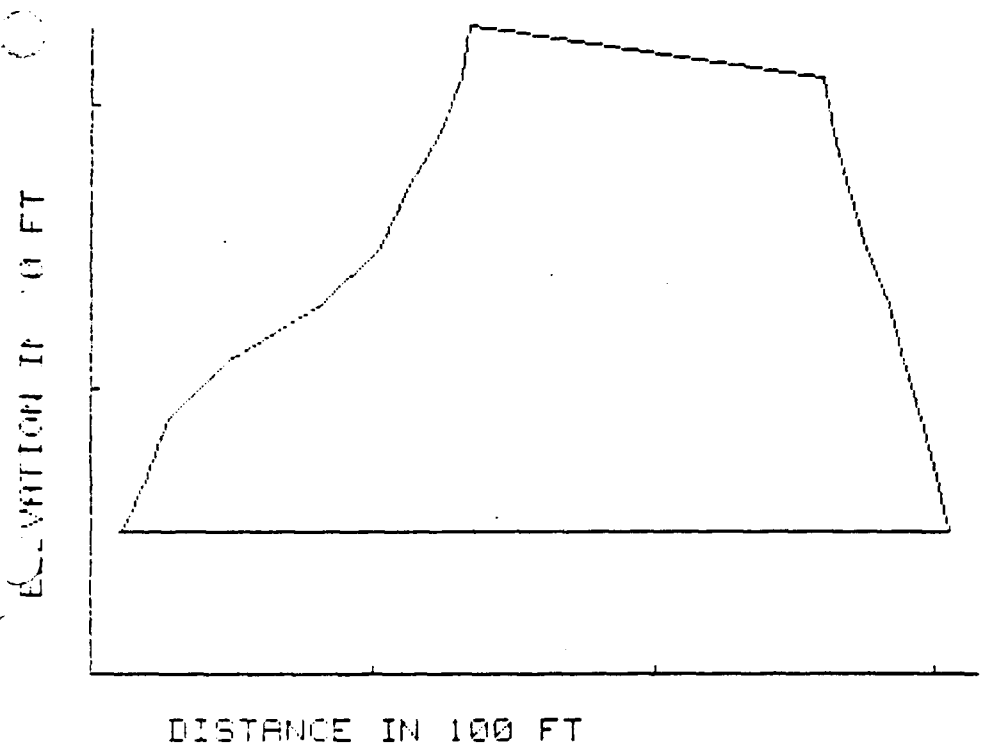
AREA (SF)= 4465.15

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 710

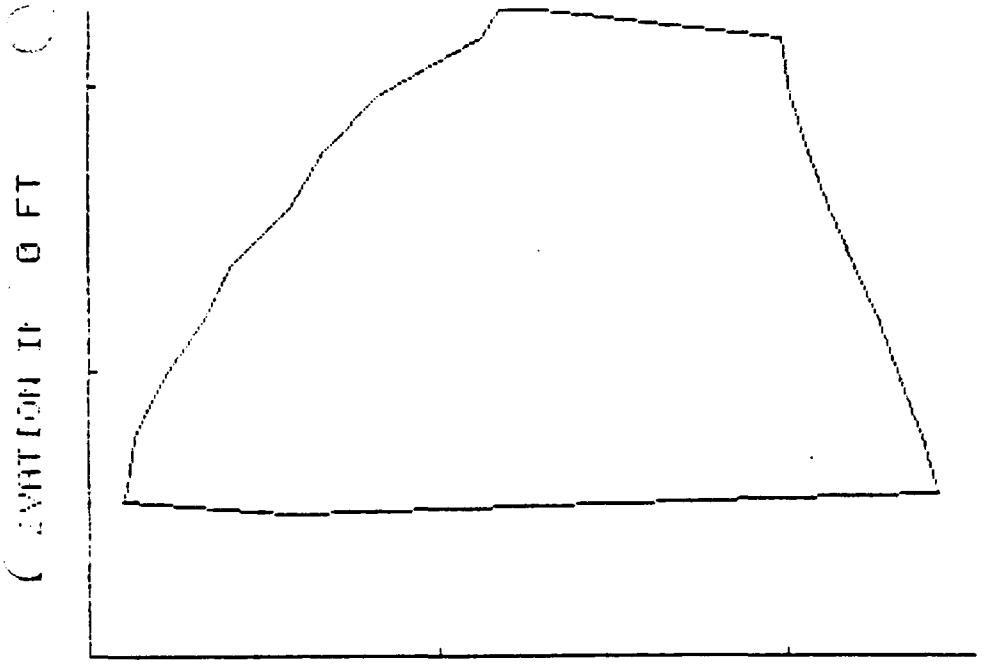
AREA (SF)= 3451.72

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 770

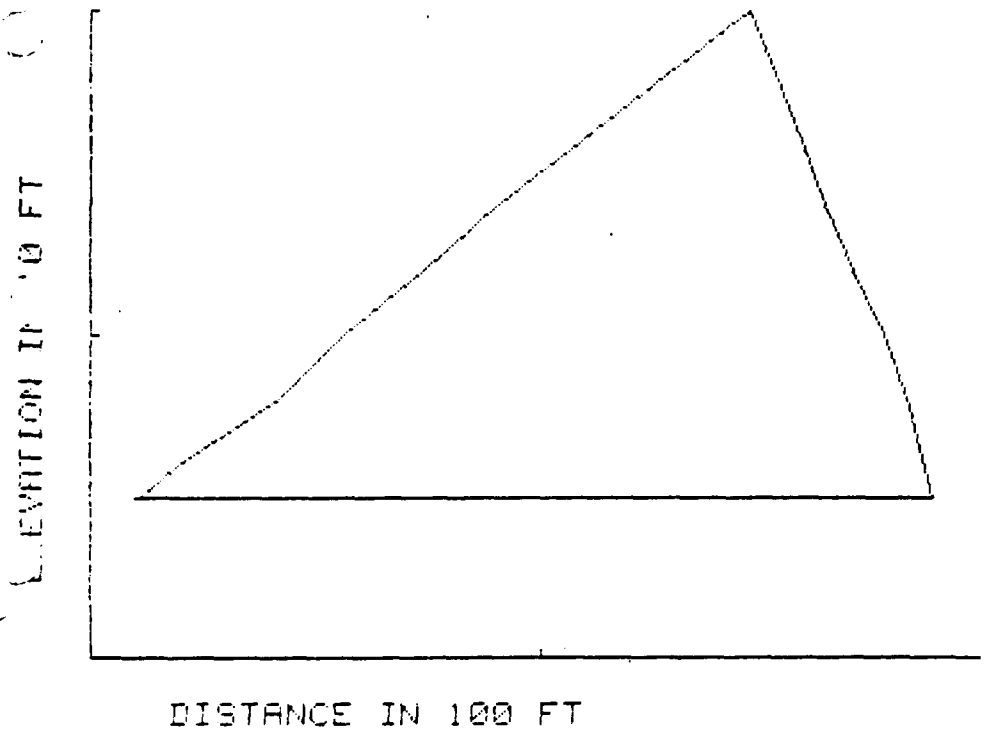
AREA (SF)= 2892.88

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 827

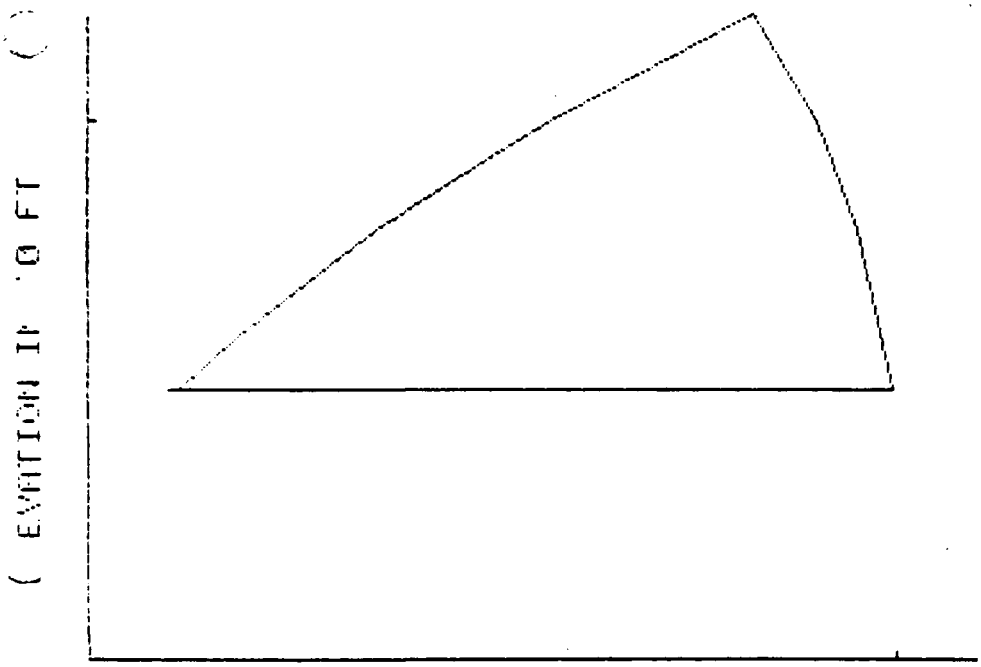
AREA (SF)= 1335.78

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40



STATION 857

AREA (SF)= 348.33

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40

STATION 882

AREA (SF)= 0

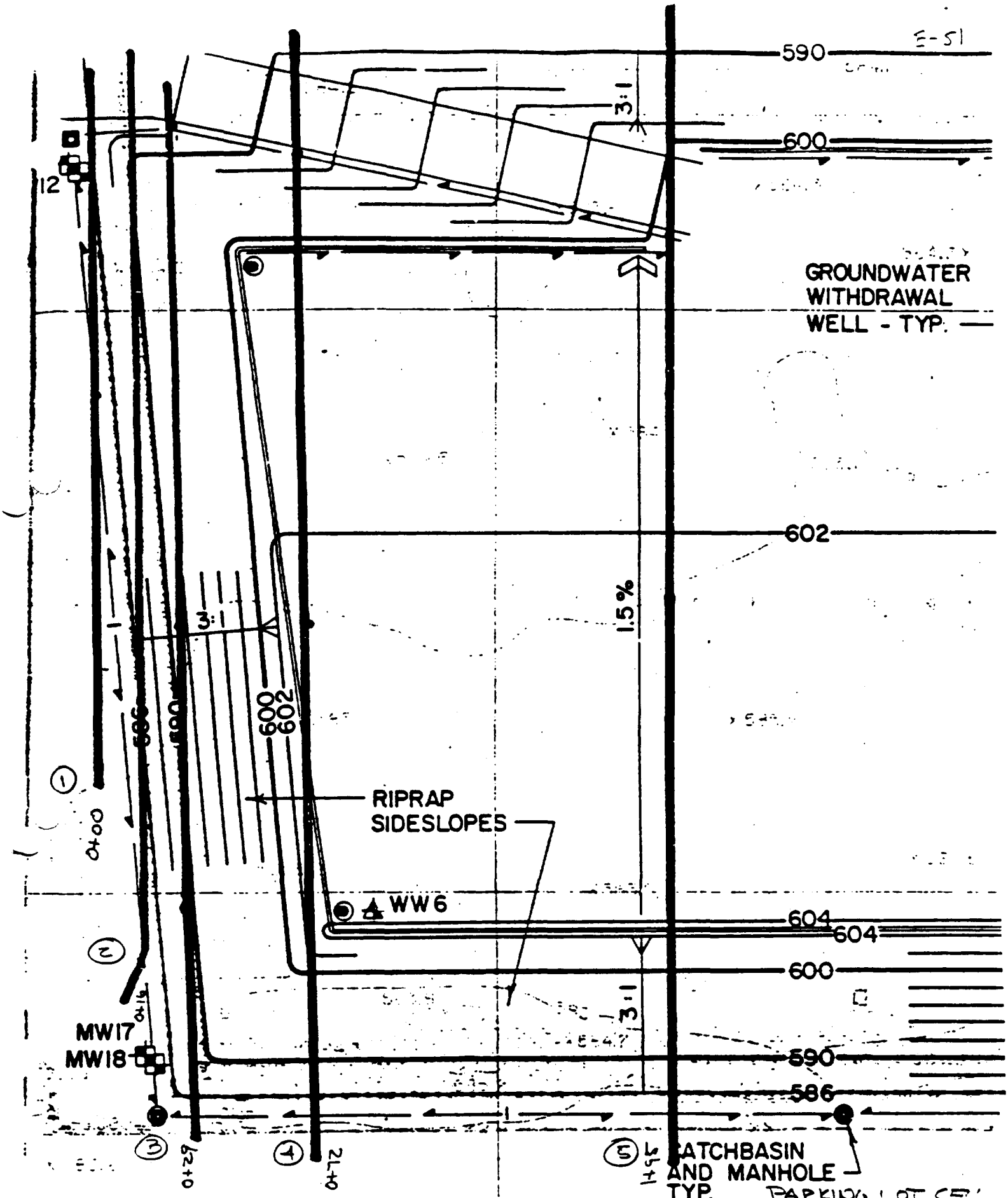
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: LAB / DJD 3-8-85 DATE: 2-19-85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR SPACE PARKING AREA

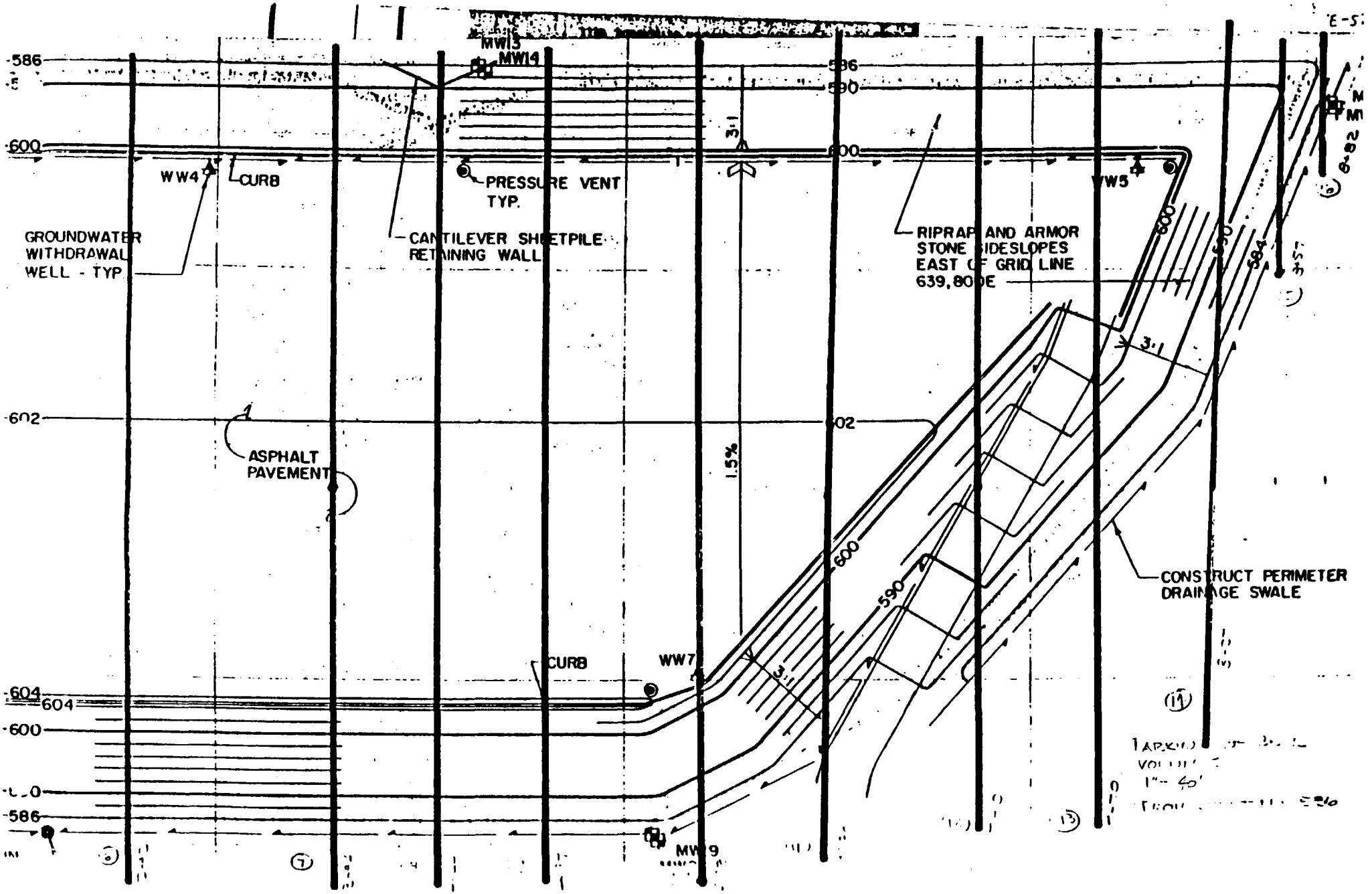
INITIALIZATION DATA
DRAWING SCALE(FT/IN): 40

STATION	AREA(SF)	DISTANCE(FT)	VOLUME(CY)
0.00	0.00		
		16.00	202
16.00	682.23		
		13.00	649
29.00	2015.54		
		43.00	5699
72.00	5141.60		
		123.00	24388
195.00	5565.48		
		97.00	19946
292.00	5538.73		
		102.00	20879
394.00	5514.70		
		50.00	10200
444.00	5500.77		
		53.00	10899
497.00	5604.33		
		75.00	15405
572.00	5487.16		
		64.00	11795
636.00	4465.15		
		74.00	10849
710.00	3451.72		
		60.00	7050
770.00	2892.88		
		57.00	4464
827.00	1335.78		
		30.00	936
857.00	348.33		
		25.00	161
882.00	0.00		
		TOTAL VOLUME(CY)=	143522 /



PARKING LOT CELL VOLUMES
1"=40'

SHEET NO. 536


MW13
MW14
586
600
WW4
CURB
PRESSURE VENT
TYP.
3:1
GROUNDWATER
WITHDRAWAL
WELL - TYP
CANTILEVER SHEETPILE
RETAINING WALL
RIPRAP AND ARMOR
STONE SIDESLOPES
EAST OF GRID LINE
639,800E
WW5
602
ASPHALT
PAVEMENT
1.5%
CONSTRUCT PERIMETER
DRAINAGE SWALE
CURB
WW7
604
MW9

TREATMENT AREAS

WARZYN

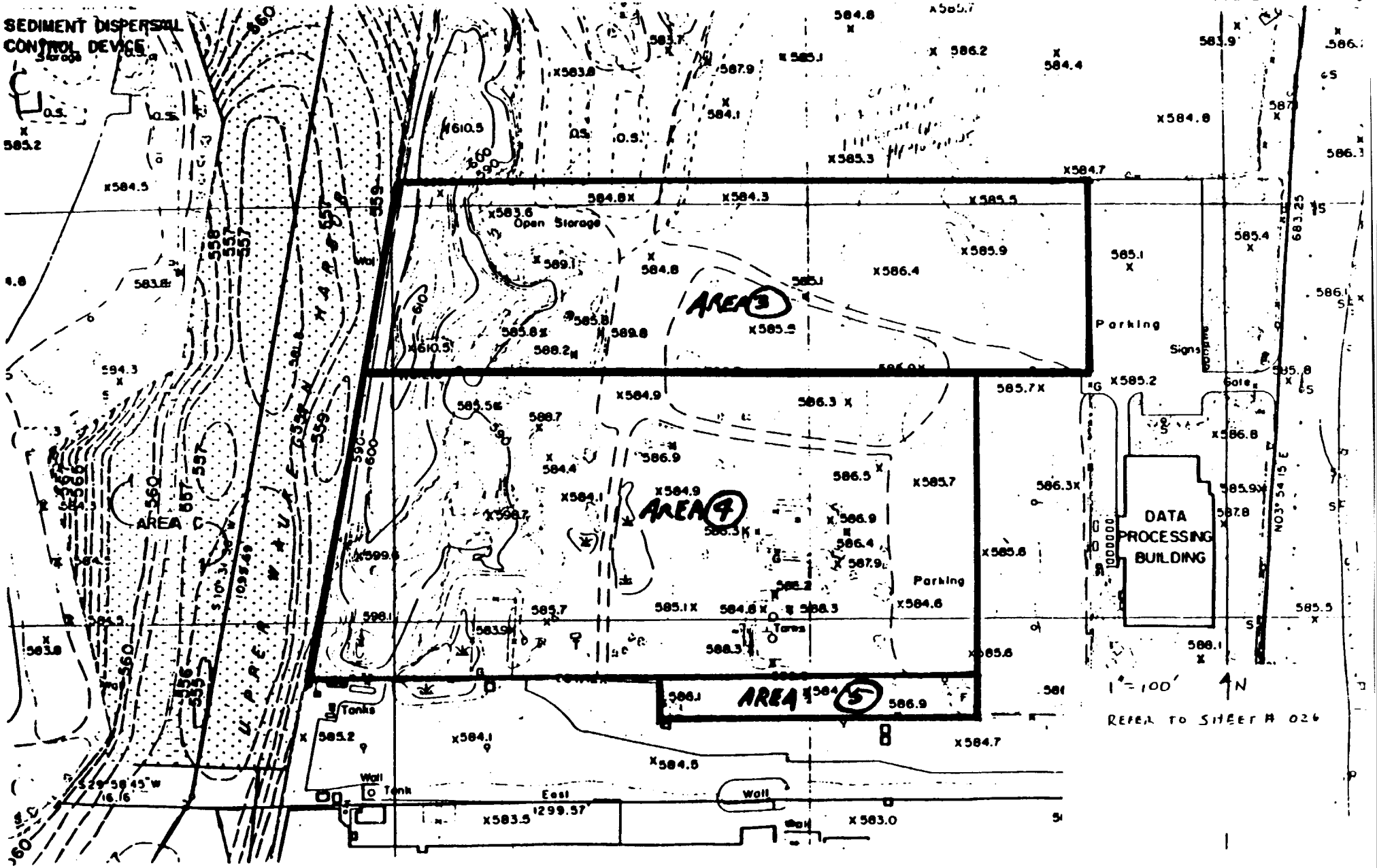
WARZYN ENGINEERING, INC.
MADISON, WISCONSIN

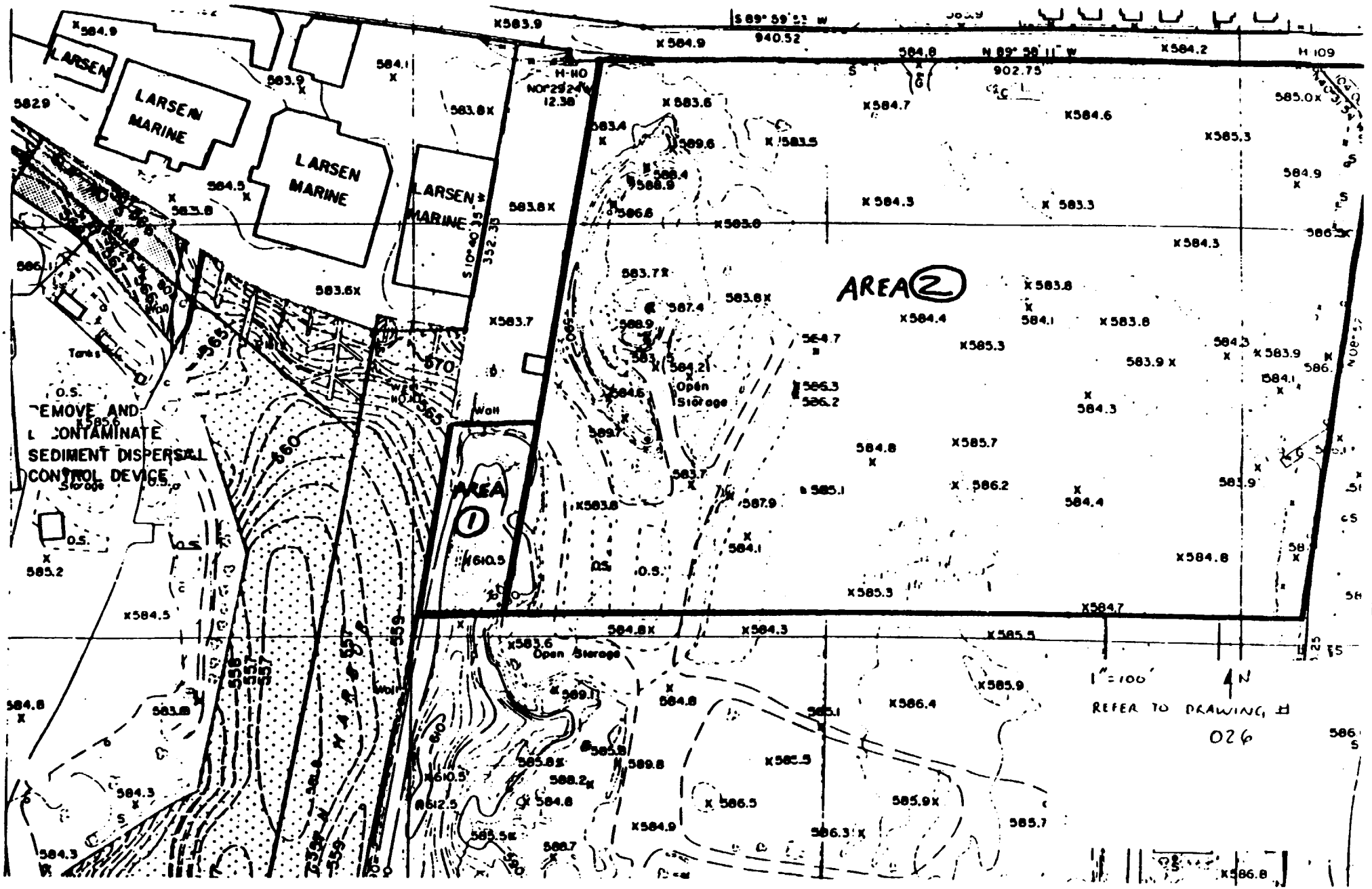
BY DJD DATE 2-4-85 SUBJECT EMC DESIGN ANALYSIS SHEET NO. 1 OF 1
CHKD. BY T.J. Lynch DATE 3-4-85 LAGOON AREA - SITE PREPARATION JOB NO. 11837

DETERMINE GRADING AREA REQUIREMENTS FOR ENTIRE TREATMENT AREA

AREA 1	230' x 100'	=	23,000 Ft.²
AREA 2	660' x 950'	=	627,000 Ft.²
AREA 3	850' x 240'	=	204,000 Ft.²
AREA 4	770' x 360'	=	277200 Ft.²
AREA 5	380' x 50'	=	19,000 Ft.²
			1,150,200 Ft.² = 127,800 SQ YDS

REFER TO THE FOLLOWING PHOTO COPIES FOR AREA IDENTIFICATION.


SEDIMENT DISPERSAL CONTROL DEVICE
AREA 3
AREA 4
AREA 5
AREA C
DATA PROCESSING BUILDING
Parking
Open Storage
Tanks
Wall
East
1299.57
1" = 100'
N
REFER TO SHEET A 026


LARSEN MARINE
LARSEN MARINE
LARSEN MARINE
AREA 2
AREA 1
REMOVE AND
CONTAMINATE
SEDIMENT DISPERSAL
CONTROL DEVICE
Open Storage
Wall
1"=100'
N
REFER TO DRAWING H
026

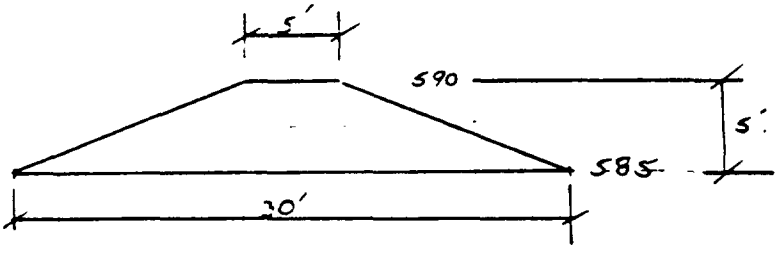
WARZYN ENGINEERING, INC.
MADISON WISCONSIN

BY DJS DATE 2-19-85 SUBJECT OMC SHEET NO. 1 OF 1
CHKD. BY TJK DATE 3-6-85 CONSERVA PARK JOB NO. 1185
WAUKEGAN, ILLINOIS

ESTIMATE VOLUME IN MATERIAL PILES (EXISTING) IN TREATMENT AREA - INCLUDING DREDGED SPOILS AND SNOWMOBILE TRACK BANK

1) TRACK BANK

TYPICAL CROSS-SECTIONS ABOVE 585 CONTOUR
REFER TO DRAWING 202



x 120' LONG

$(5'\times5'+5'\times15')\frac{120'}{27} = 440\,CY$

PLUS SAME CROSS SECTION @ 4' TALL x 320' LONG

$(5'\times4'+4'\times15')\frac{320'}{27} = 950\,CY$

SUB TOTAL 1390 CY

2) DREDGED SPOILS PILE

VOLUME DETERMINED USING AVERAGE END AREA METHOD AND COMPUTER ANALYSIS CROSS SECTIONS PROGRAM "DIGI EARTH 1"

SUBTOTAL 49750

SPREAD PLACE AND COMPACT TOTAL 51140 CY

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/19/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60

STATION 0

AREA (SF)= 0

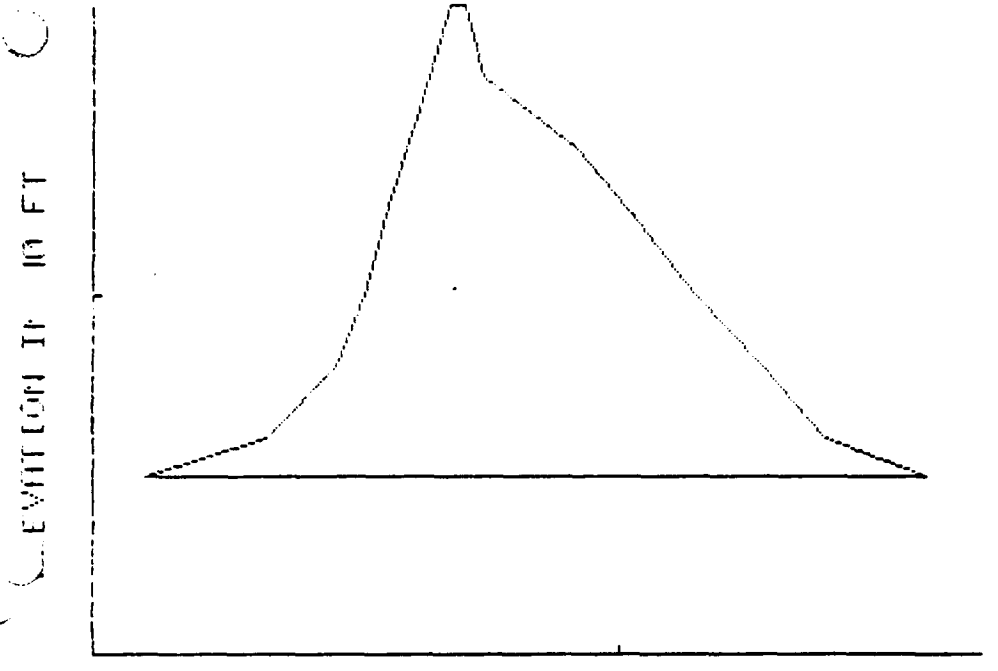
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/19/85

PROJECT INFORMATION
PROJECT NAME: CMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 48

AREA (SF)= 708.58

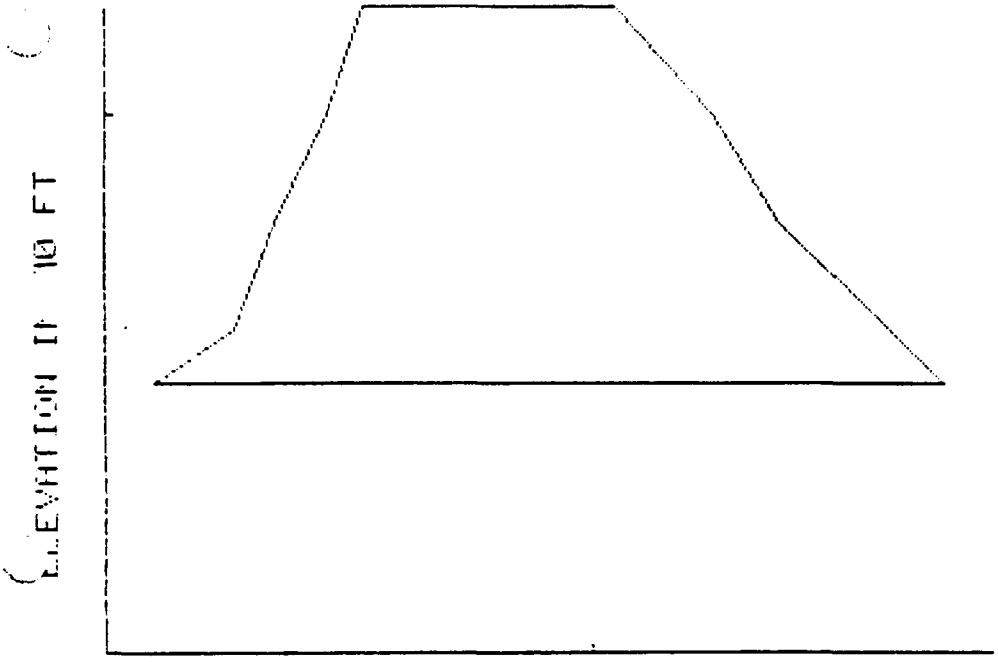
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/19/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 94

AREA (SF)= 699.51

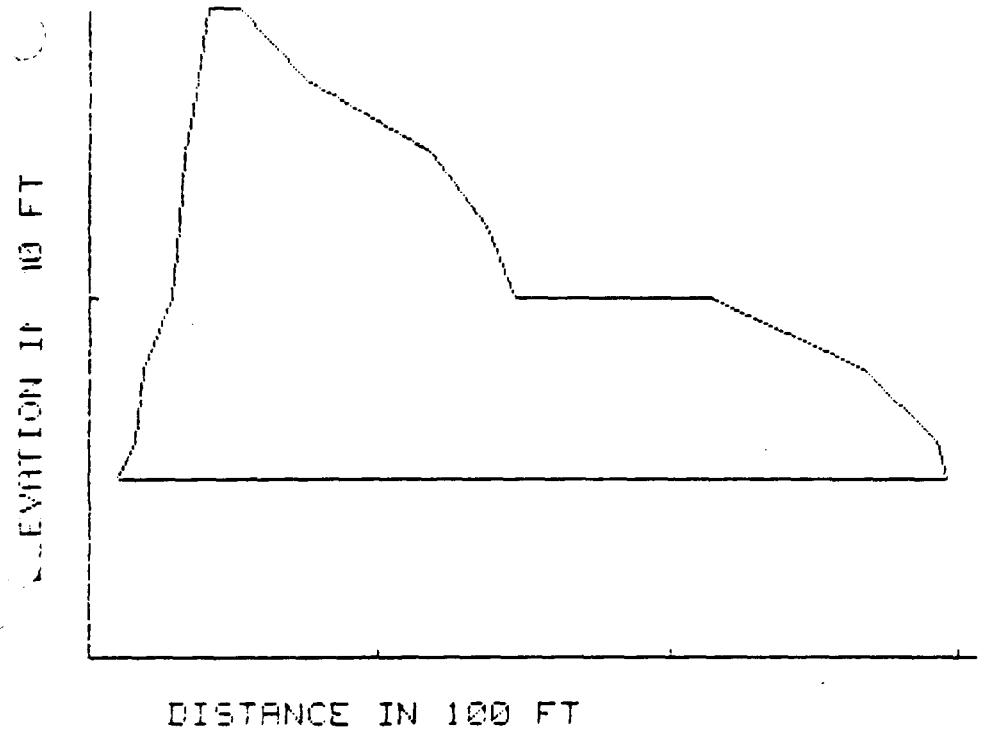
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/19/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 155

AREA (SF)= 1825.18

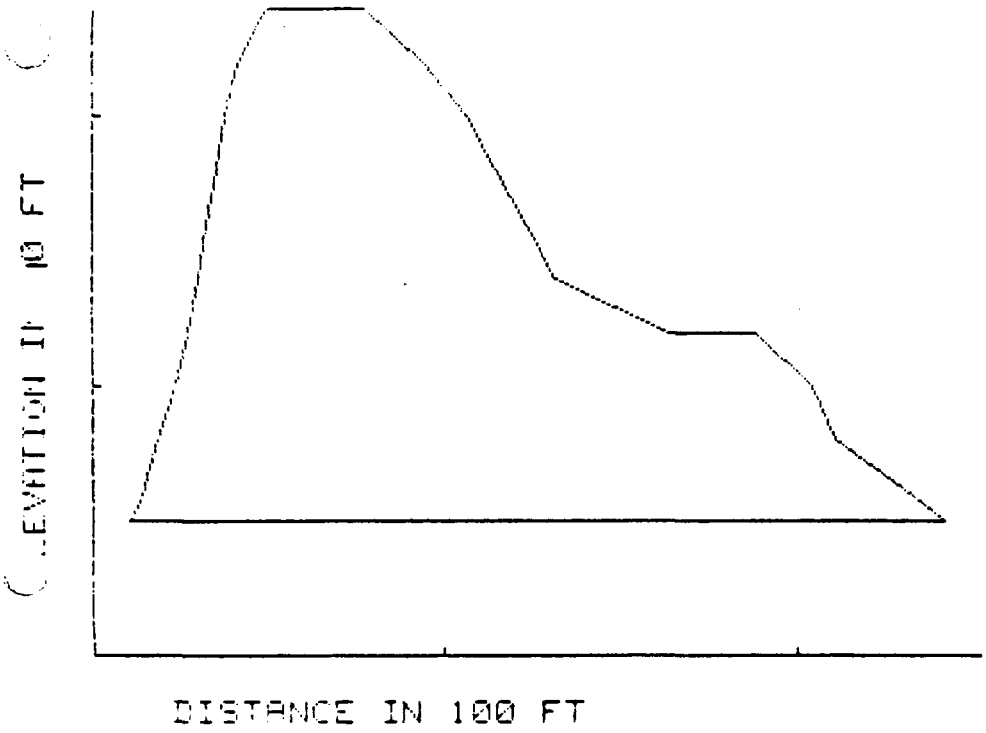
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/19/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 272

AREA (SF)= 2308.34

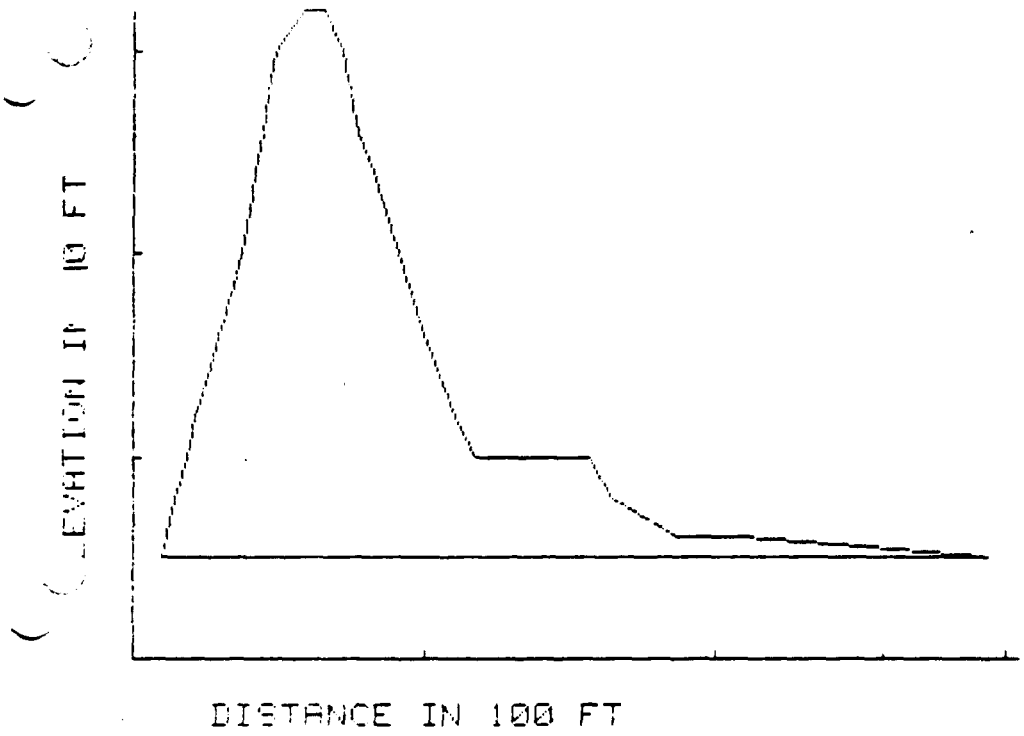
PAGE: 1

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/19/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 370

AREA (SF)= 2014.37

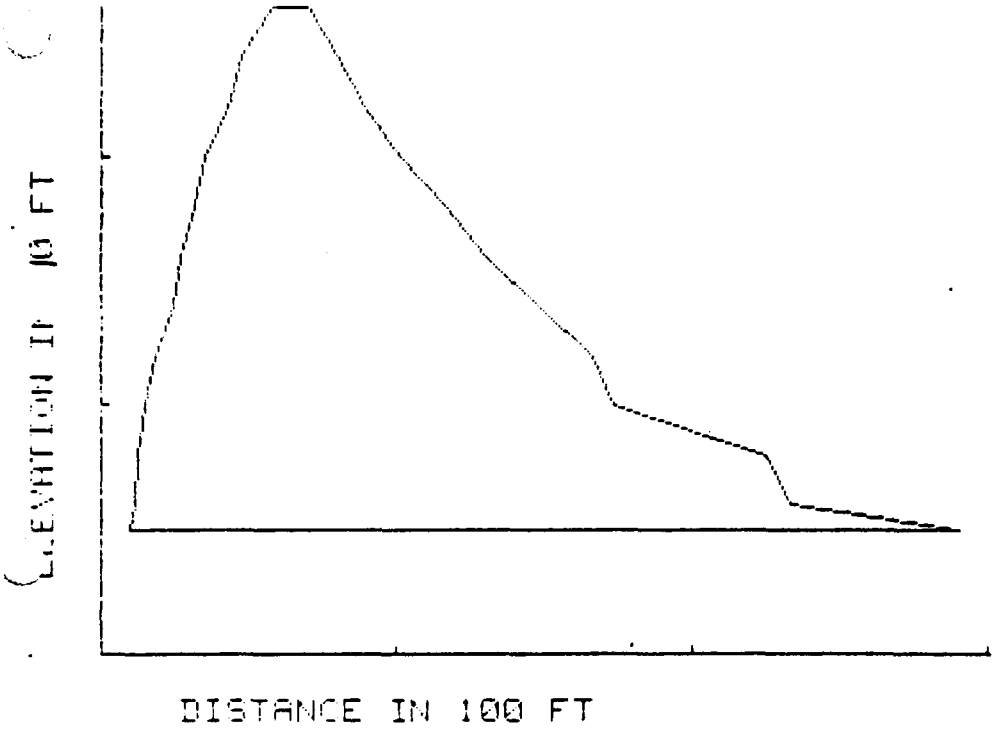
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/19/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 470

AREA (SF)= 2438.55

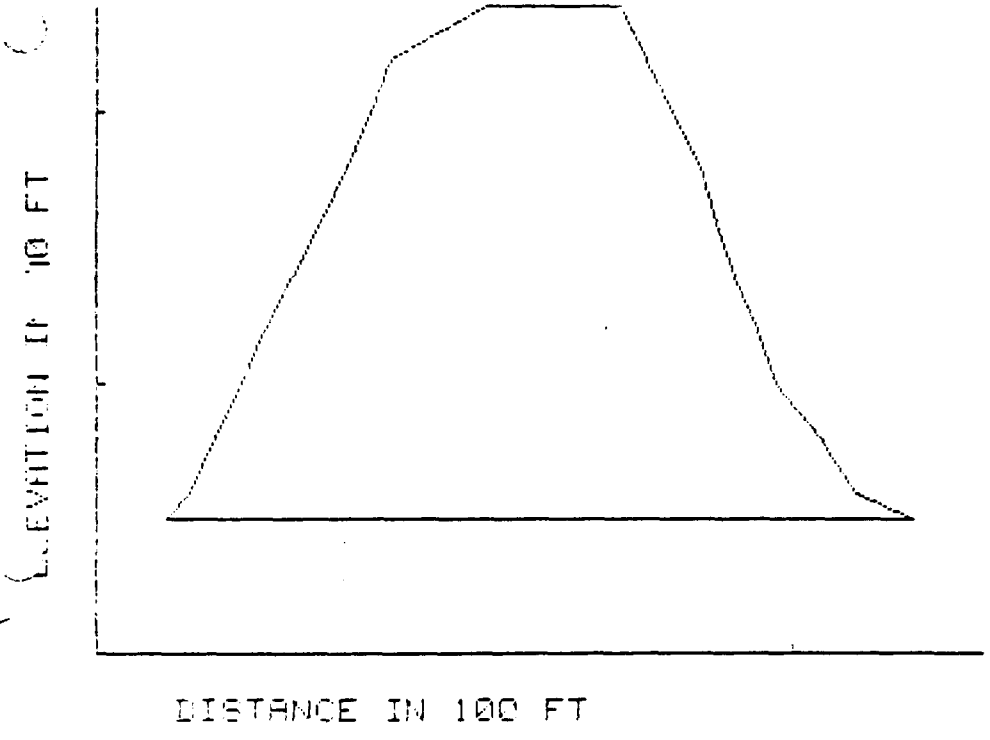
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/19/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 590

AREA (SF)= 1190.97

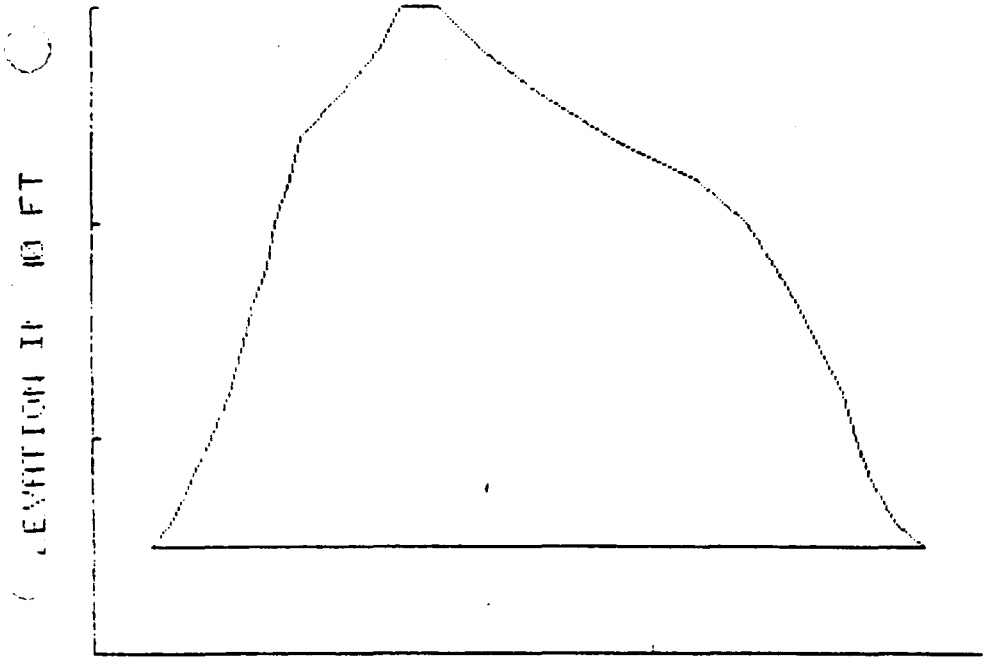
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/19/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 665

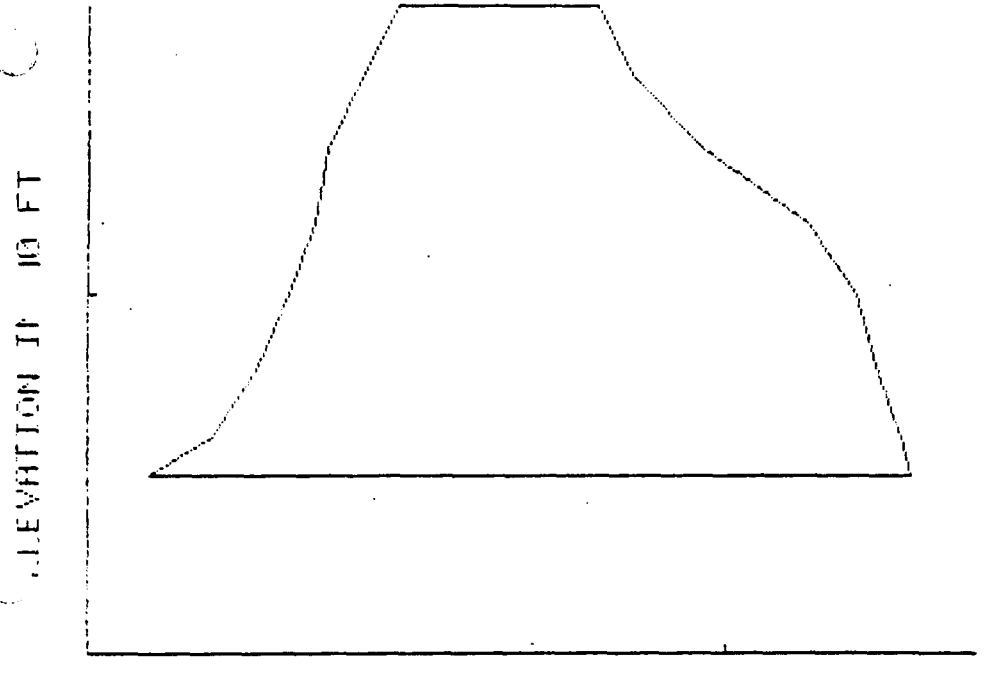
AREA (SF)= 2073.96

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/19/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 780

AREA (SF)= 984.28

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/19/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60

STATION 830

AREA (SF)= 0

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/19/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL AIR

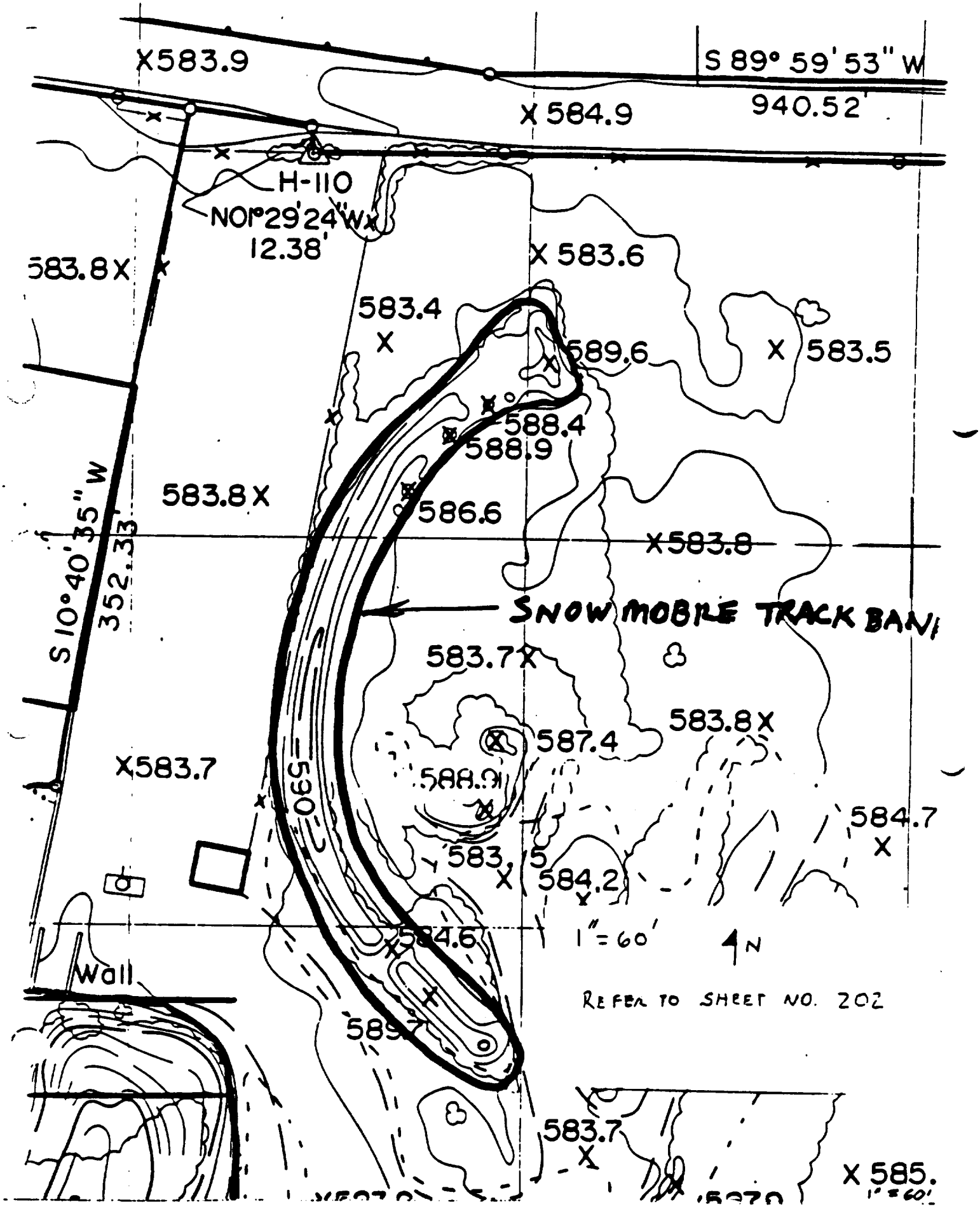
INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60

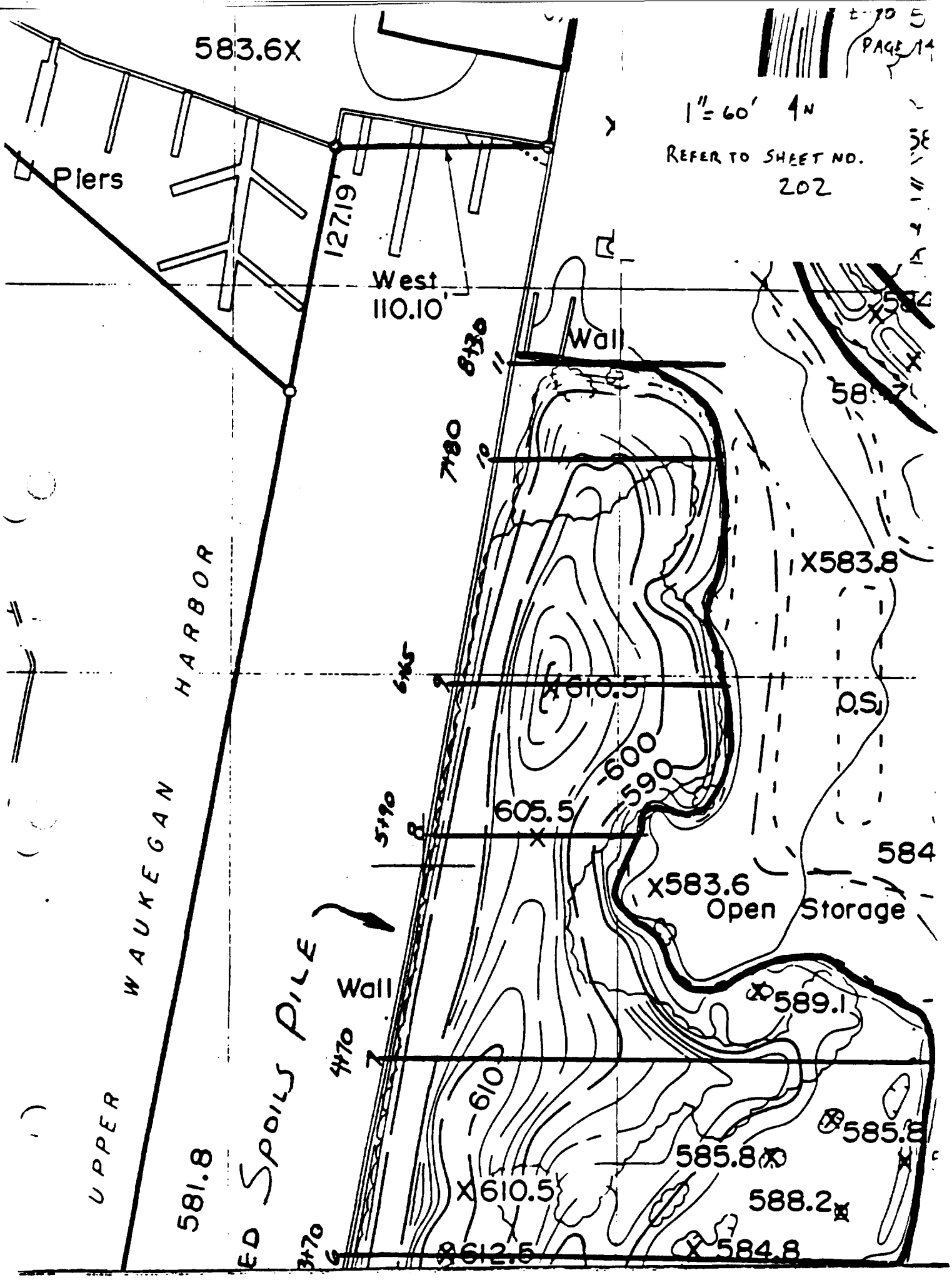
STATION	AREA(SF)	DISTANCE(FT)	VOLUME(CY)
0.00	0.00		
		48.00	630
48.00	708.58		
		46.00	1199
94.00	699.51		
		61.00	2852
155.00	1825.18		
		117.00	8956
272.00	2308.34		
		98.00	7845
370.00	2014.37		
		100.00	8246
470.00	2438.55		
		120.00	8066
590.00	1190.97		
		75.00	4535
665.00	2073.96		
		115.00	6513
780.00	984.29		
		50.00	911
830.00	0.00		
		TOTAL VOLUME(CY)=	49753

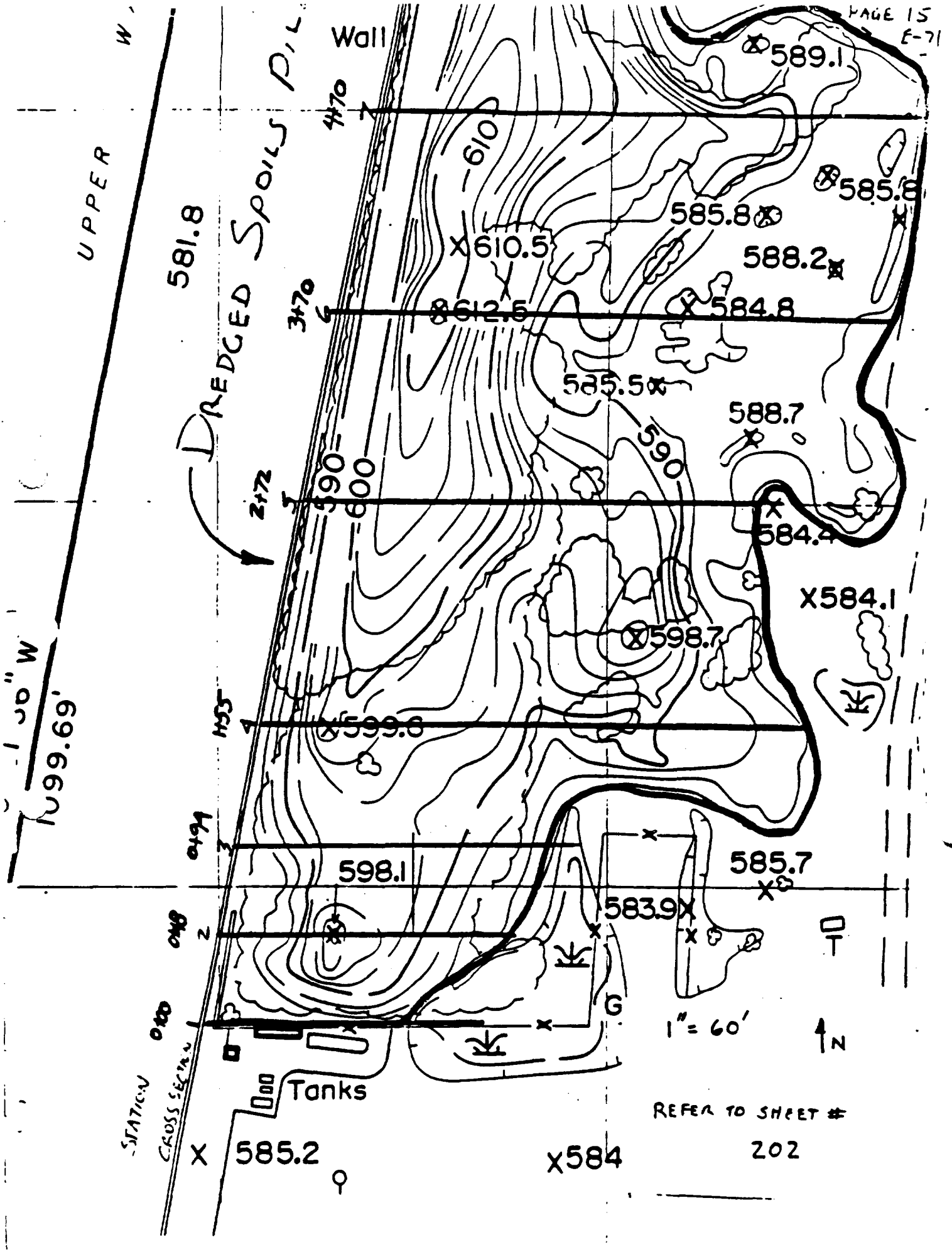
THE FOLLOWING PHOTO COPIES IDENTIFY CROSS SECTION LOCATIONS FOR THESE VOLUME CALCULATIONS.

REFER TO DRAWING 202 FOR COMPLETE AREA.

1" = 60'


X583.9
S 89° 59' 53" W
940.52'
X 584.9
H-110
N01°29'24"W
12.38'
583.8X
X 583.6
583.4
X
589.6
X 583.5
588.4
588.9
583.8X
586.6
X583.8
S 10°40'35" W
352.33'
SNOW MOBILE TRACK BAN
583.7X
583.8X
587.4
X583.7
588.9
584.7
X
583.5
X
584.2
584.6
1"=60'
N
Wall
REFER TO SHEET NO. 202
583.7
X
X 585.


583.6X
1"=60' 4N
REFER TO SHEET NO.
202
Piers
127.19'
West
110.10'
Wall
8+30
7+80
1+0
X583.8
X610.5
O.S.
600
590
605.5
5+90
584
X583.6
Open Storage
Wall
589.1
4+70
7
610
585.8
585.8
X610.5
588.2
581.8
UPPER WAUKEGAN HARBOR
ED SPOILS PILE
3+70
X612.6
X584.8


PAGE 15
E-71
Wall
589.1
585.8
585.8
588.2
584.8
585.5
588.7
584.4
584.1
598.7
599.8
598.1
585.7
583.9
610.5
612.6
581.8
DREDGED SPOILS
UPPER
N99.69'
1"= 60'
N
Tanks
585.2
584
REFER TO SHEET #
202

WARZYN ENGINEERING, INC.
MADISON, WISCONSIN

BY DJD DATE 2-21-85 SUBJECT OMC CONCEPT DESIGN SHEET NO. 1 OF 2
CHKD. BY TJL DATE 3-6-85 ANALYSIS - TREATMENT AREA JOB NO. LL837
QUANTITIES

DETERMINE AREA REQUIREMENTS FOR LAGOON/ACCESS CONSTRUCTION - FROM DRAWING 202

1. GRAVEL ACCESS 500'×25'
+ 120'×120'
= 26,900 FT²
= 2990 SQ YD

2. PAVING + 320'×150' + 160'×24' = 4800 FT²
+ 130'×230' + 55'×520'
= 121,640 FT²
= 13516 SQ YD

3. SEED FERTILIZE & MULCH
45' × 4000'
+ 640' × 40'
= 213600 FT²
= 23733 SQ YD

DETERMINE STORAGE VOLUMES FOR LAGOONS AND CURING CELLS

1. LAGOON 1 - 24300 CY

2. LAGOON 2 89,300 CY

3. CURING CELLS 7,500 CY

VOLUMES DETERMINED BY AREA/DEPTH METHOD.
REFER TO COMPUTER ANALYSIS IN APPENDIX.

WARZYN ENGINEERING, INC.
MADISON, WISCONSIN

BY DJD DATE 3-4-85 SUBJECT CMC - DESIGN ANALYSIS SHEET NO. 2 OF 2
CHKD. BY ____ DATE 3-6-85 VOLUME CALCULATIONS JOB NO. 4837
LAGOONS/CURING CELLS/BATCH PLANT

SUMMARY OF QUANTITIES

TOTAL VOLUME OF FILL		266,959 CY
LAGOON 1	- SOIL CEMENT	2,519 CY
	- CLAY	5,036 CY
	- GRAVEL	5,036 CY
	- CLAY	5,036 CY
LAGOON 2	- SOIL CEMENT	7,960 CY
	- CLAY	15,930 CY
	- GRAVEL	15,930 CY
	- CLAY	15,930 CY
CURING CELLS	- SOIL CEMENT	1385 CY
	- CLAY	2,768 CY
	- GRAVEL	2768 CY
	- CLAY	2,768 CY
BATCH AREA	- SOIL CEMENT	1391 CY
	- CLAY	2775 CY
	- GRAVEL	2775 CY
	- CLAY	2775 CY

REFERENCE: COMPUTER SHEETS ATTACHED. PROGRAM "DIGIEARTH" CALCULATES VOLUMES USING THE AVERAGE END AREA METHOD FROM COORDINATES OF CONTOUR/CROSS SECTION INTERSECTIONS.

AREA/VOLUMES WERE CALCULATED USING PROGRAM "AREAVOLUME" BY COORDINATE-AREA BY THICKNESS METHOD.

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60

STATION 0

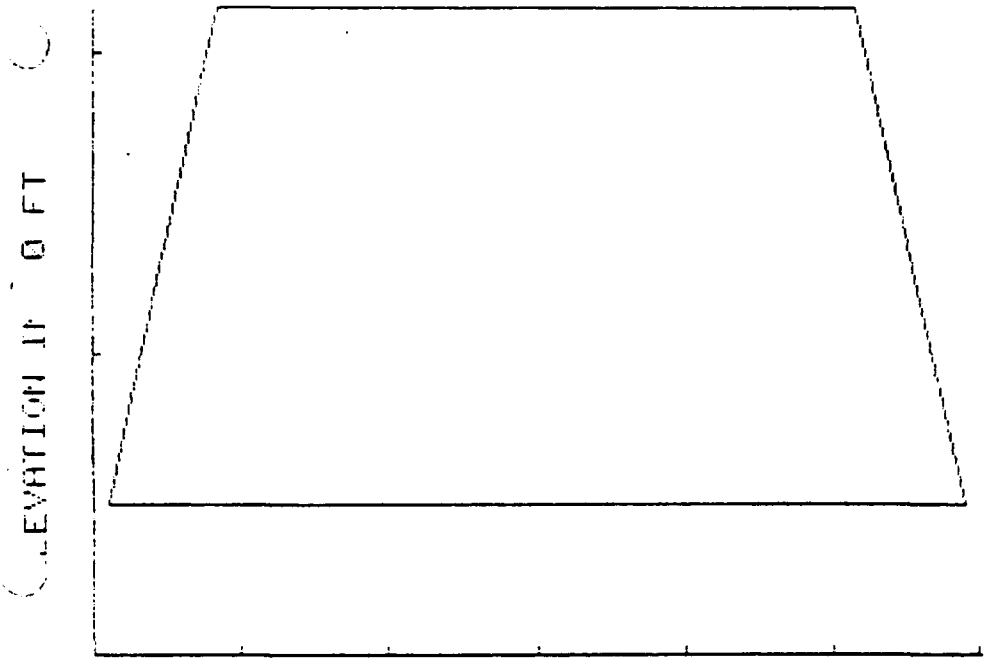
AREA (SF)= 0

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 45

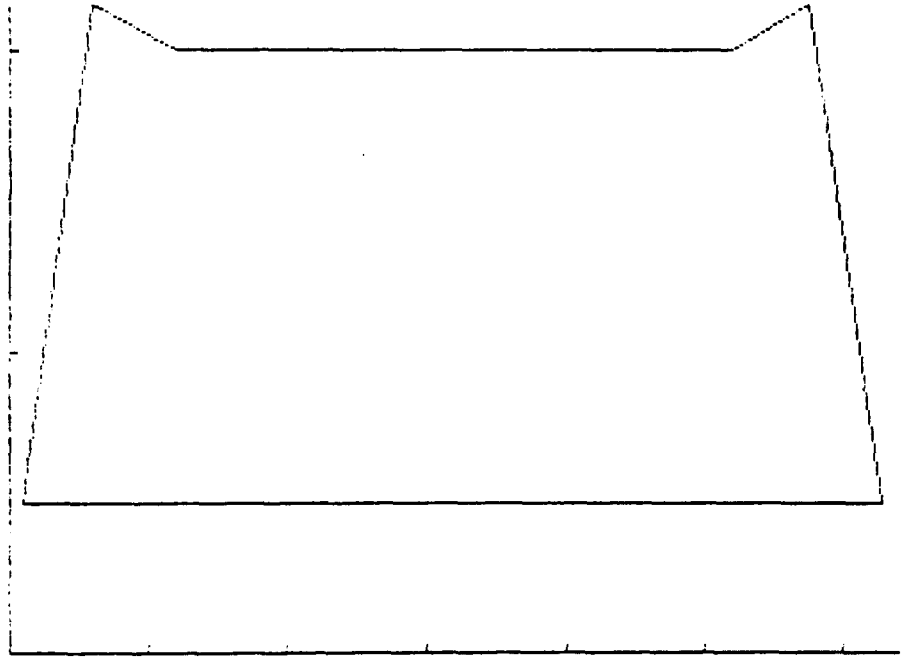
AREA (SF) = 8338.34

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 80

AREA (SF)= 8682.3

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 50

STATION 115

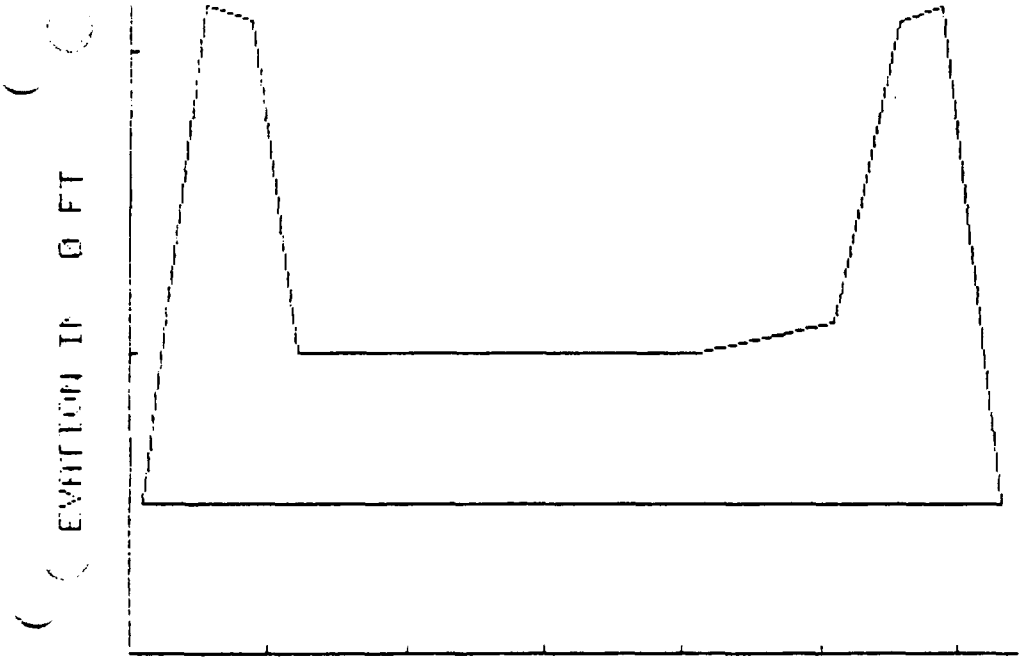
AREA (SF)= 4395.15

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 160

AREA (SF)= 4666.59

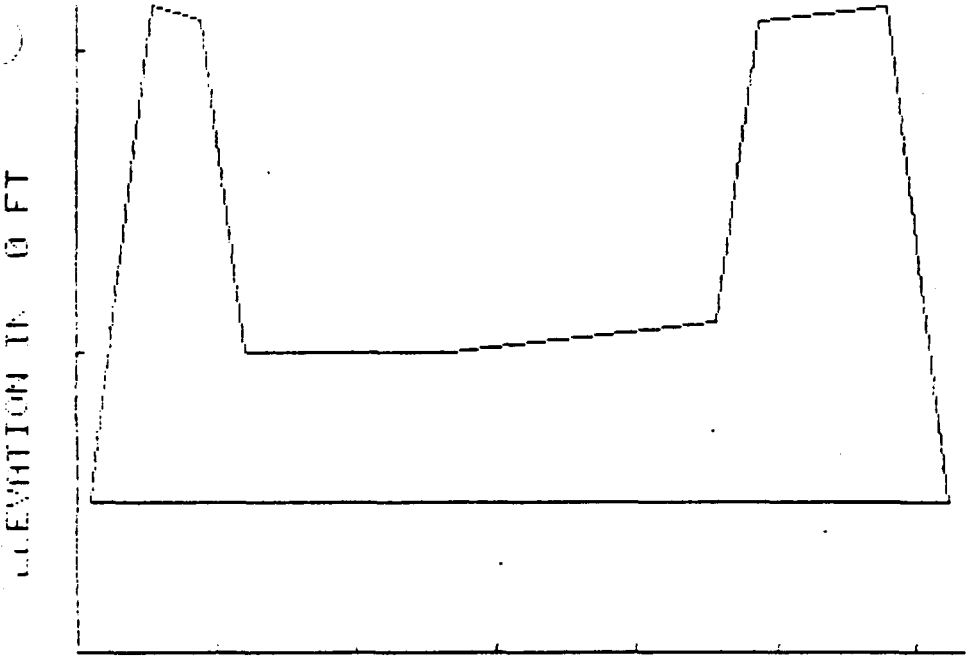
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 245

AREA (SF)= 5251.61

PAGE:

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60

STATION 330

AREA (SF)= 4880.99

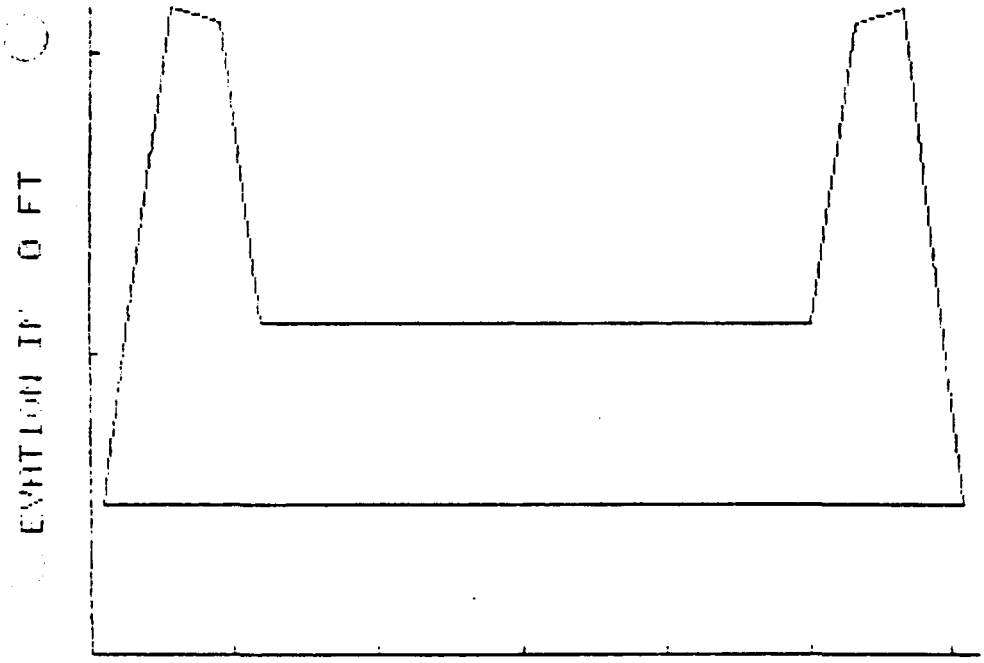
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 460

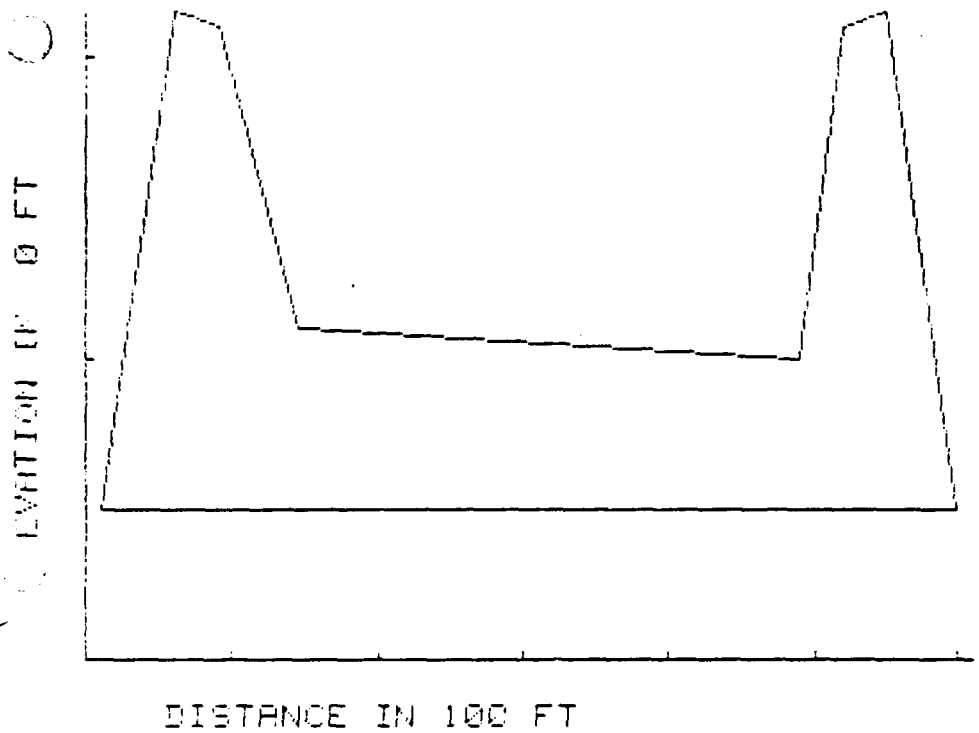
AREA (SF)= 4791.02

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: CMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 595

AREA (SF)= 4626.4

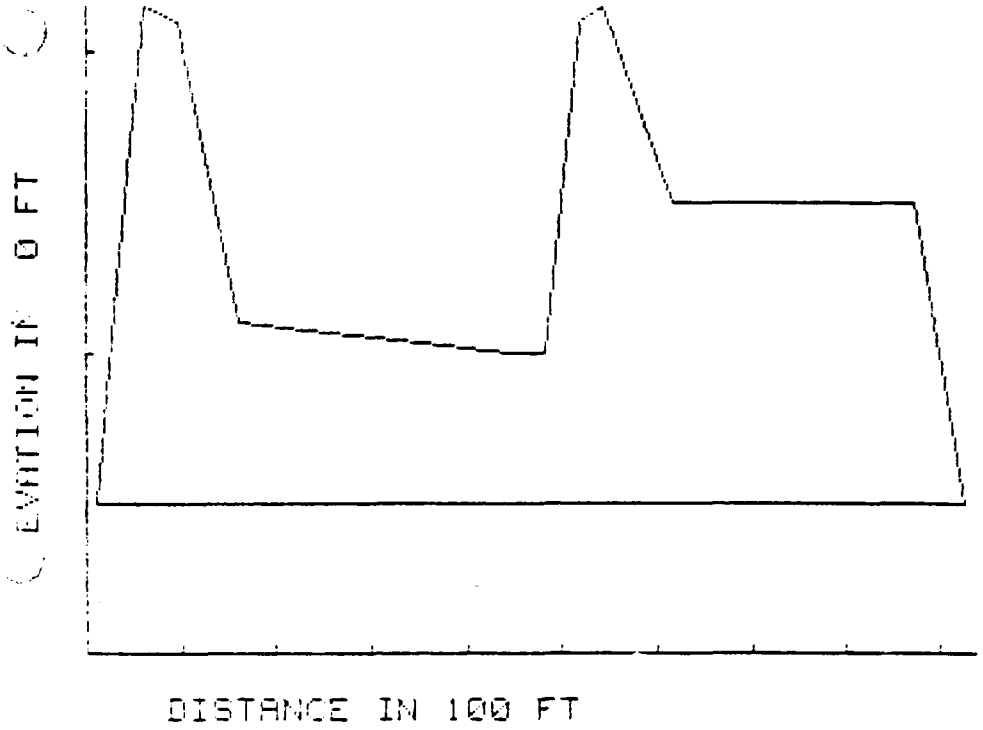
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 630

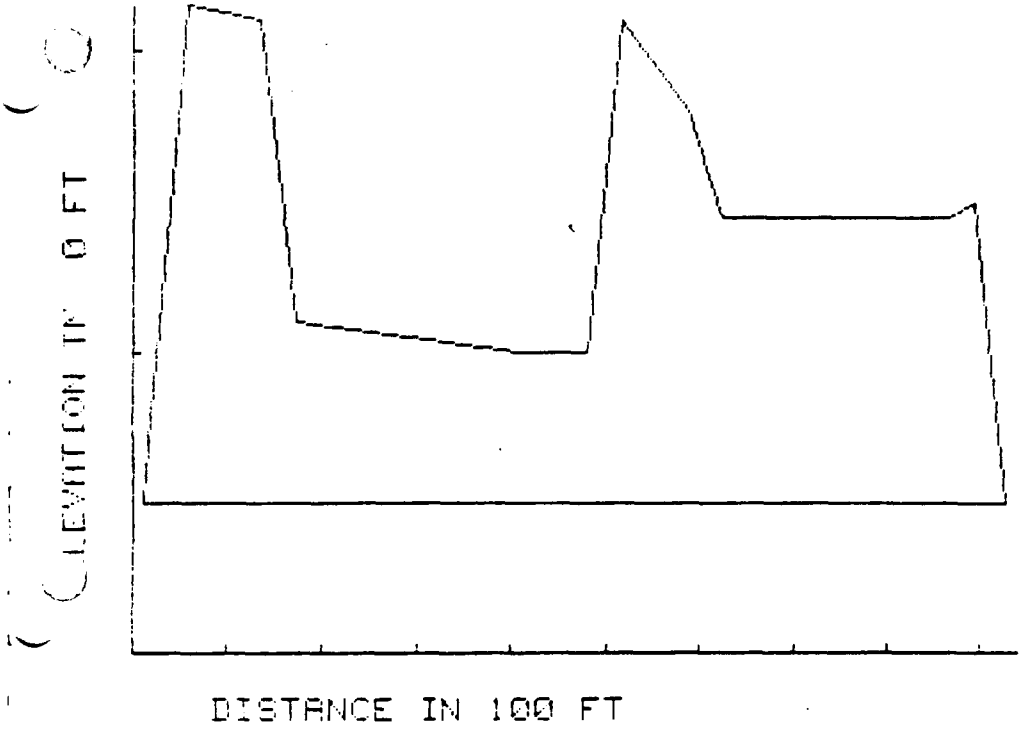
AREA (SF)= 8061.46

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 650

AREA (SF) = 8289.22

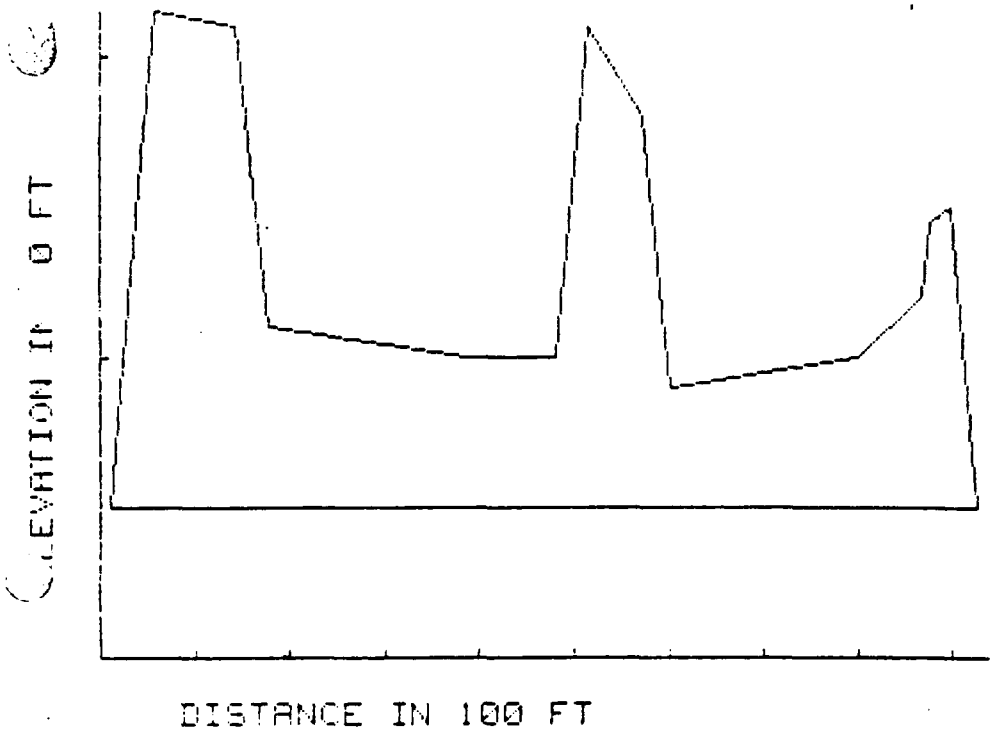
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 665

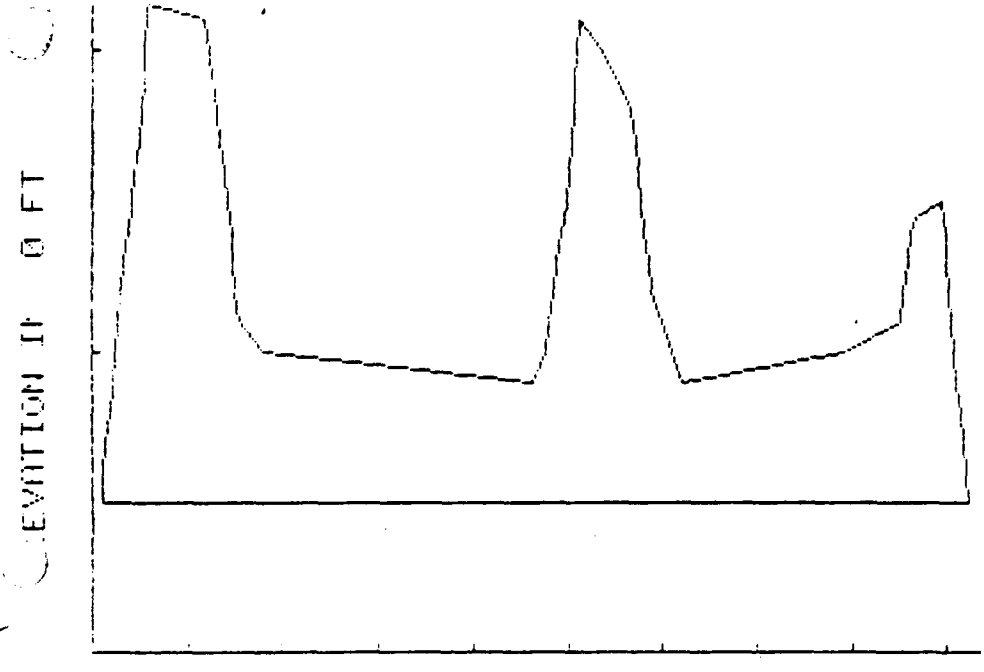
AREA (SF)= 6945.89

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 790

AREA (SF)= 6427.68

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60

STATION 810

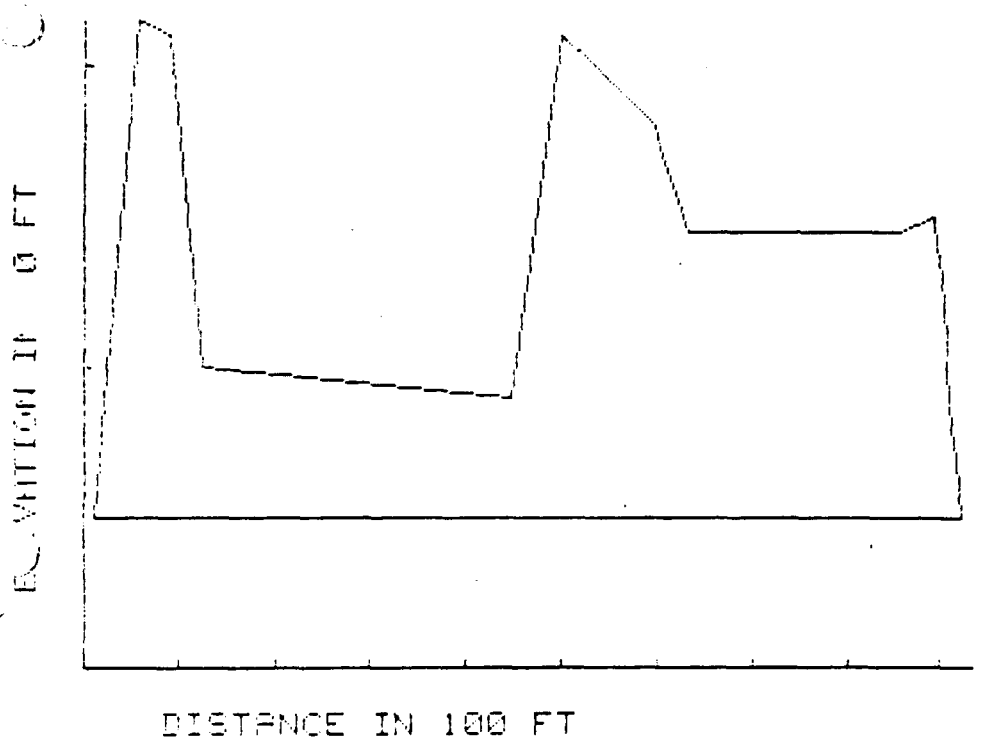
AREA (SF)= 7623.69

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/95

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 850

AREA (SF) = 7703.44

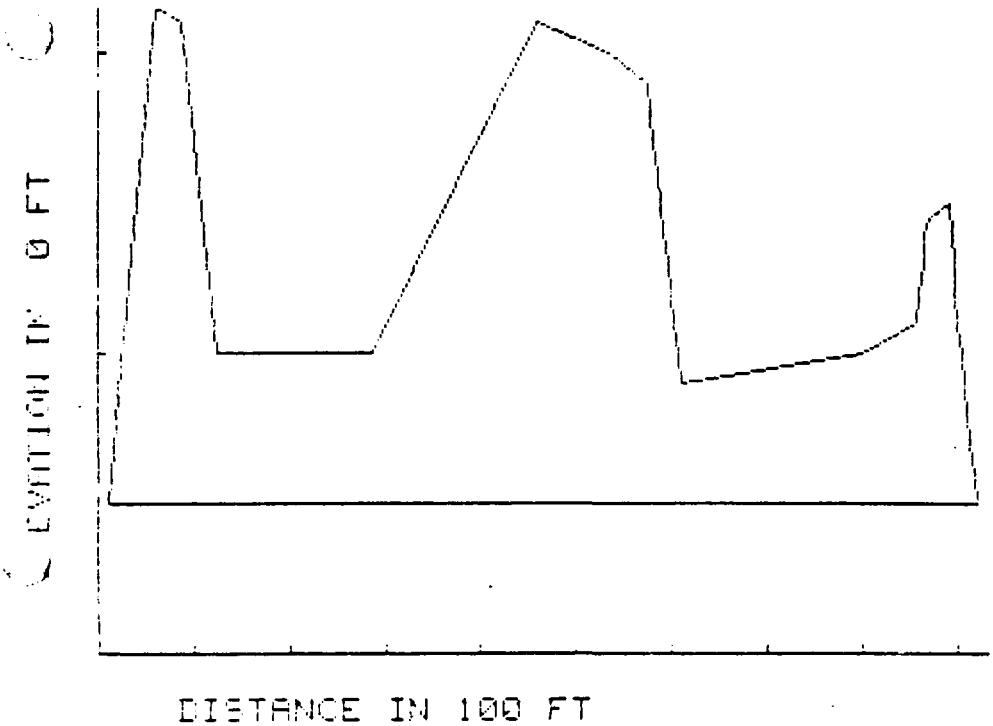
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 880

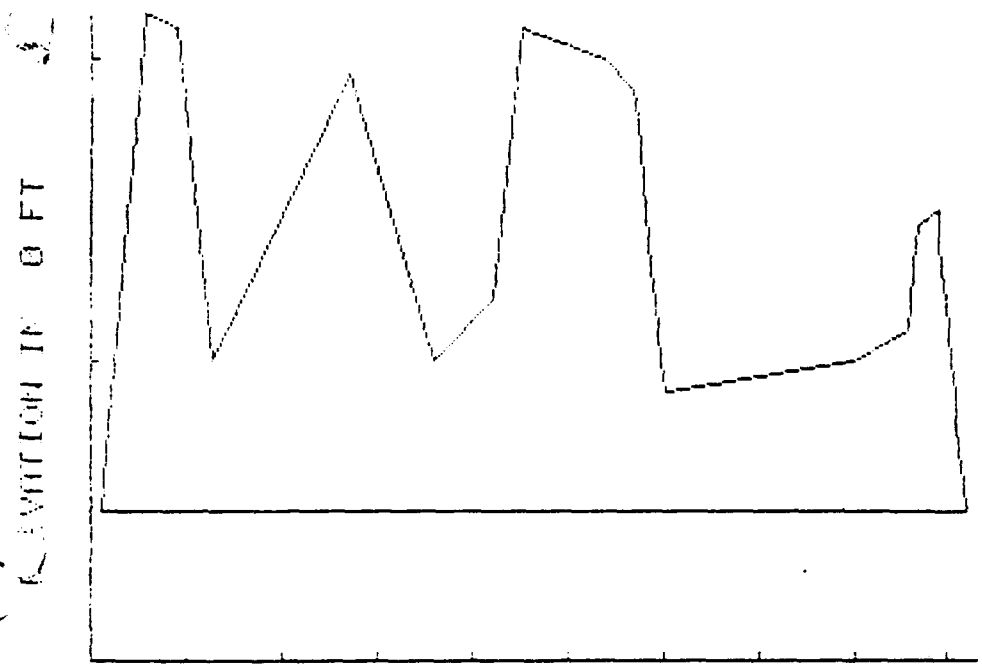
AREA (SF)= 7573.86

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 900

AREA (SF)= 8019.5

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60

STATION 940

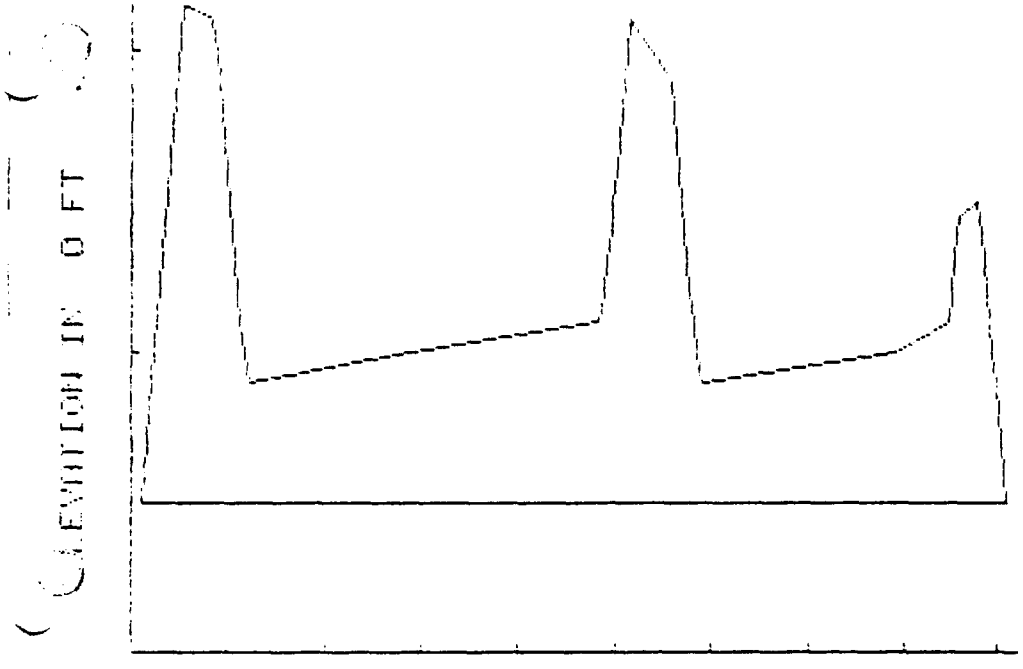
AREA (SF)= 6587.2

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 1020

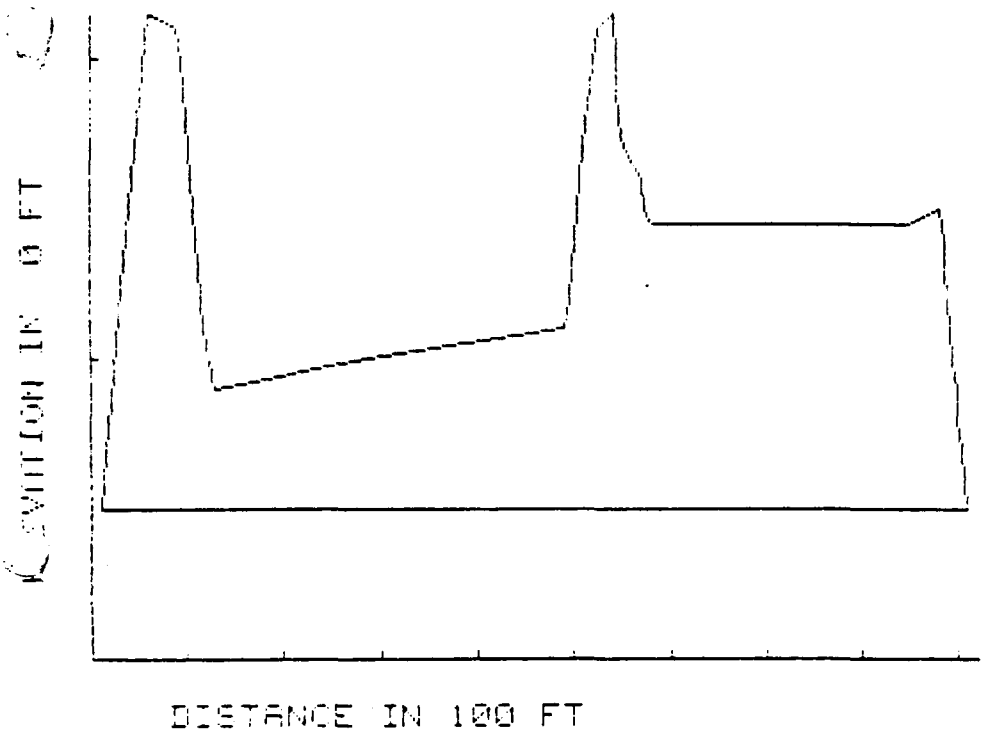
AREA (SF)= 5957.13

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 1040

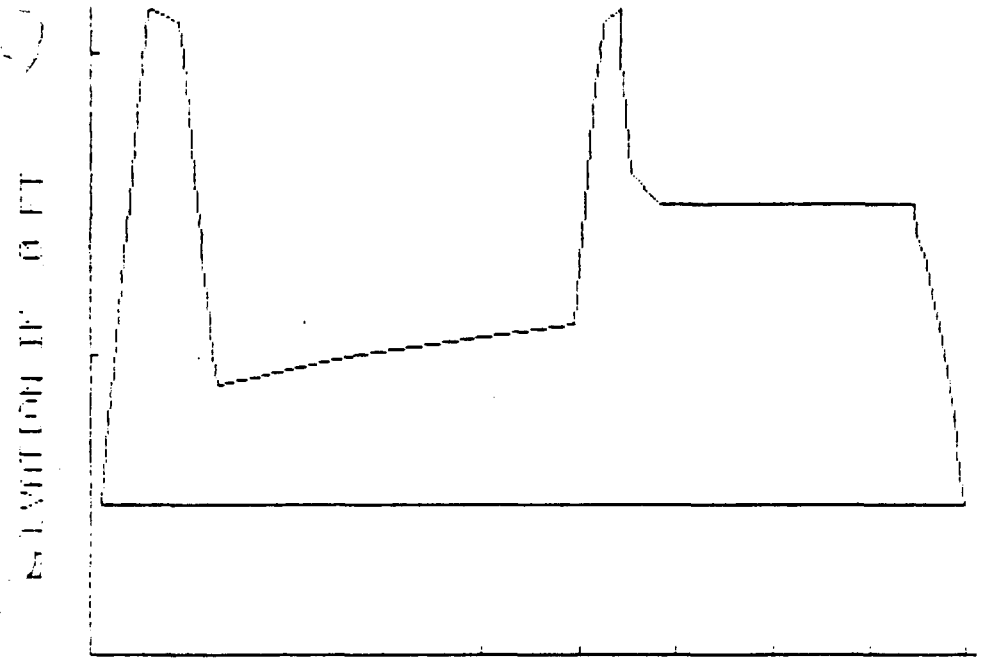
AREA (SF) = 7248.65

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 1060

AREA (SF)= 7199.23

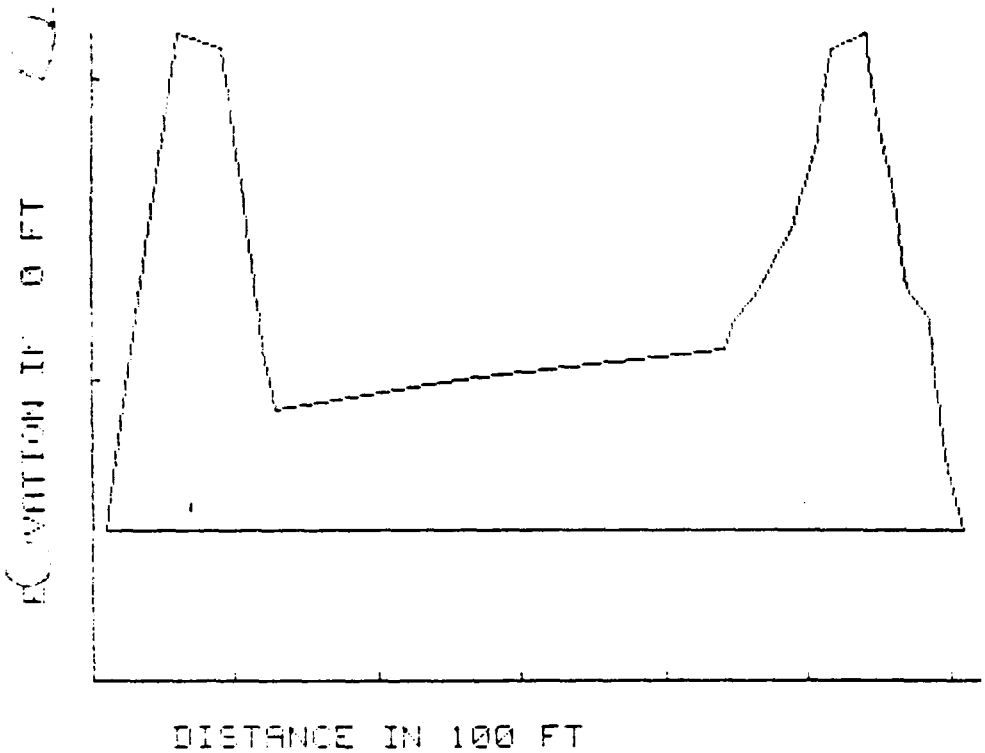
PAGE: 22

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: CMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 1095

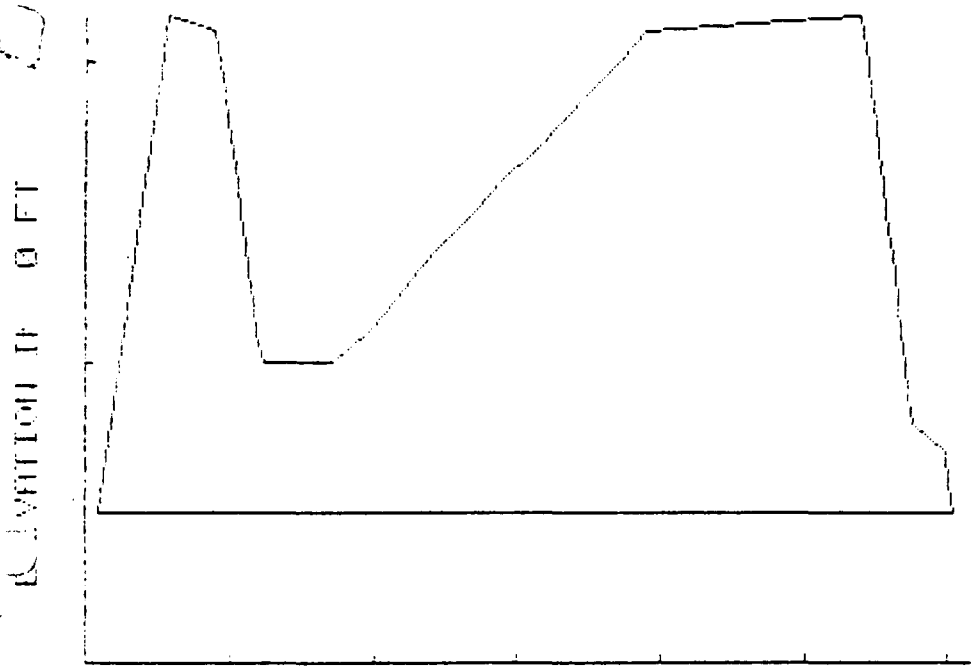
AREA (SF) = 4547.05

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 1125

AREA (SF)= 6651.37

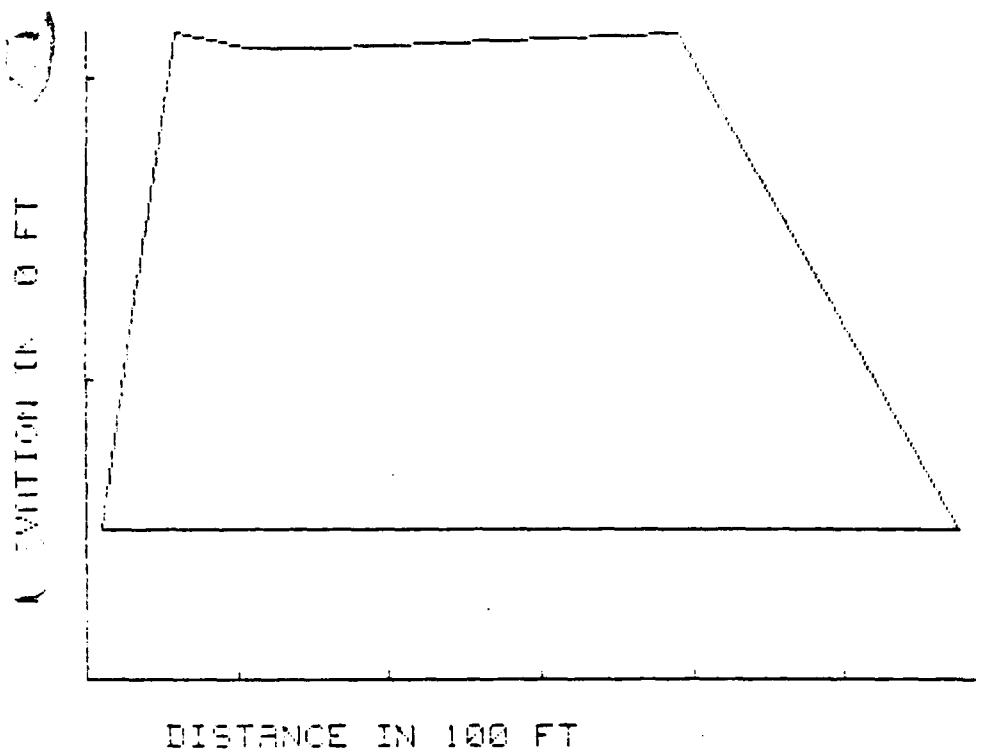
EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD

DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 1160

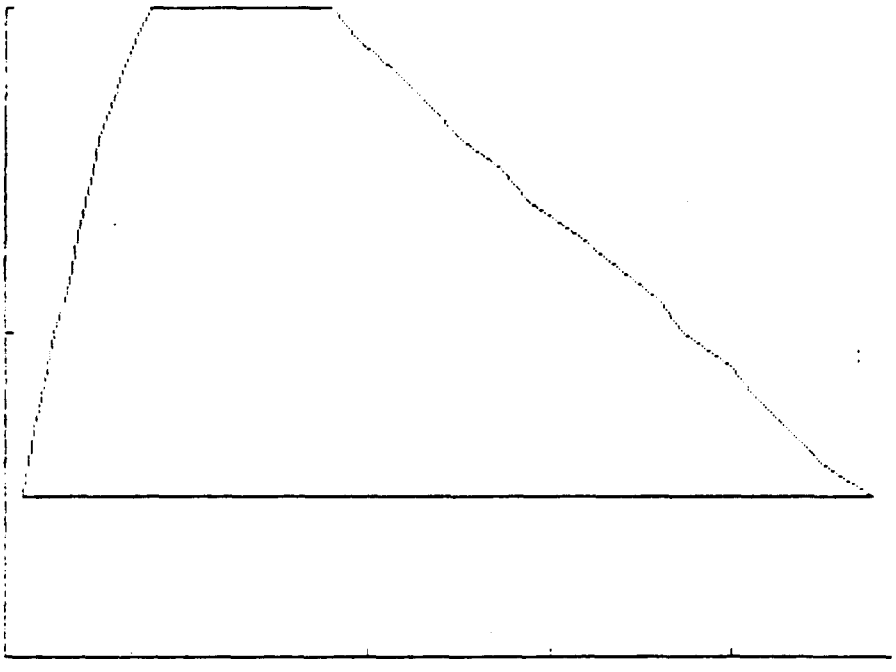
AREA (SF)= 7295.36

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60



STATION 1200

AREA (SF)= 4294.83

EARTHWORK COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: OMC
PROJECT NUMBER: 11837
VOLUME TYPE: TOTAL BERM VOLUME

INITIALIZATION DATA
DRAWING SCALE(FT/IN): 60

STATION 1240

AREA (SF) = 0

PROJECT: OMC
CONTRACT NO.: 11937
DATE: 02/21/85
BY: DJD

COMPUTATIONS FOR: TOTAL BERM VOLUME

AREA OF SECTION 1 = 0 S.F.
STATION OF SECTION 1 IS 0

AREA OF SECTION 2 = 9338.34 S.F.
STATION OF SECTION 2 IS 45

AREA OF SECTION 3 = 8682.3 S.F.
STATION OF SECTION 3 IS 80

AREA OF SECTION 4 = 4395.15 S.F.
STATION OF SECTION 4 IS 115

AREA OF SECTION 5 = 4666.59 S.F.
STATION OF SECTION 5 IS 160

AREA OF SECTION 6 = 5251.61 S.F.
STATION OF SECTION 6 IS 245

AREA OF SECTION 7 = 4880.99 S.F.
STATION OF SECTION 7 IS 330

AREA OF SECTION 8 = 4791.02 S.F.
STATION OF SECTION 8 IS 460

AREA OF SECTION 9 = 4626.4 S.F.
STATION OF SECTION 9 IS 595

AREA OF SECTION 10 = 8061.46 S.F.
STATION OF SECTION 10 IS 630

AREA OF SECTION 11 = 8289.22 S.F.
STATION OF SECTION 11 IS 650

AREA OF SECTION 12 = 6945.89 S.F.
STATION OF SECTION 12 IS 665

AREA OF SECTION 13 = 6427.68 S.F.
STATION OF SECTION 13 IS 790

AREA OF SECTION 14 = 7623.69 S.F.
STATION OF SECTION 14 IS 810

AREA OF SECTION 15 = 7703.44 S.F.
STATION OF SECTION 15 IS 850

AREA OF SECTION 16 = 7573.98 S.F.
STATION OF SECTION 16 IS 880

AREA OF SECTION 17 = 8019.5 S.F.
STATION OF SECTION 17 IS 900

AREA OF SECTION 18 = 6587.1 S.F.
STATION OF SECTION 18 IS 940

AREA OF SECTION 19 = 5937.13 S.F.
STATION OF SECTION 19 IS 1020

AREA OF SECTION 20 = 7248.65 S.F.
STATION OF SECTION 20 IS 1040

AREA OF SECTION 21 = 7199.23 S.F.
STATION OF SECTION 21 IS 1060

AREA OF SECTION 22 = 4547.05 S.F.
STATION OF SECTION 22 IS 1095

AREA OF SECTION 23 = 6651.37 S.F.
STATION OF SECTION 23 IS 1135

AREA OF SECTION 24 = 7295.36 S.F.
STATION OF SECTION 24 IS 1160

AREA OF SECTION 25 = 4284.83 S.F.
STATION OF SECTION 25 IS 1200

AREA OF SECTION 26 = 0 S.F.
STATION OF SECTION 26 IS 1240

THE VOLUME OF SECTIONS 1 THROUGH 26 IS 266958.8 CUBIC YARDS

AREA AND VOLUME COMPUTATIONS
WARZYN ENGINEERING INC.

USER INITIALS: DJD DATE: 02/20/85

PROJECT INFORMATION
PROJECT NAME: CMC
PROJECT NUMBER: 11837

INITIALIZATION DATA
HORZ. SCALE(FT/IN): 60
VERT. SCALE(FT/IN): 60
PRECISION(%): 95

AREA ID.: LAGOON 1
VOLUME TYPE: SOIL CEMENT
AVERAGE DEPTH(FT)= .5
AREA(SI)= 37.7165
AREA(SF)= 135779
AREA(SY)= 15087
AREA(ACRES)= 3.117
VOLUME(CY)= 2514

AREA ID.: LAGOON 1
VOLUME TYPE: TOP CLAY LINER
AVERAGE DEPTH(FT)= 1
AREA(SI)= 37.7667
AREA(SF)= 135960
AREA(SY)= 15107
AREA(ACRES)= 3.121
VOLUME(CY)= 5036

AREA ID.: LAGOON 2
VOLUME TYPE: SOIL CEMENT
AVERAGE DEPTH(FT)= .5
AREA(SI)= 119.3985
AREA(SF)= 429827
AREA(SY)= 47759
AREA(ACRES)= 9.867
VOLUME(CY)= 7960

AREA ID.: LAGOON 2
VOLUME TYPE: TOP CLAY LINER
AVERAGE DEPTH(FT)= 1
AREA(SI)= 119.4746
AREA(SF)= 430109
AREA(SY)= 47790
AREA(ACRES)= 9.874
VOLUME(CY)= 15930

AREA ID.: CURING CELLS
VOLUME TYPE: SOIL CEMENT
AVERAGE DEPTH(FT)= .5
AREA(SI)= 29.7756
AREA(SF)= 74792
AREA(SY)= 8310
AREA(ACRES)= 1.717

VOLUME(CY)= 1705

AREA ID.: CURING CELLS
VOLUME TYPE: TOP CLAY LINER
AVERAGE DEPTH(FT)= 1
AREA(SI)= 20.759
AREA(SF)= 74732
AREA(SY)= 8304
AREA(ACRES)= 1.716
VOLUME(CY)= 2768

AREA ID.: BATCH PLANT
VOLUME TYPE: SOIL CEMENT
AVERAGE DEPTH(FT)= .5
AREA(SI)= 20.8601
AREA(SF)= 75096
AREA(SY)= 8344
AREA(ACRES)= 1.724
VOLUME(CY)= 1391

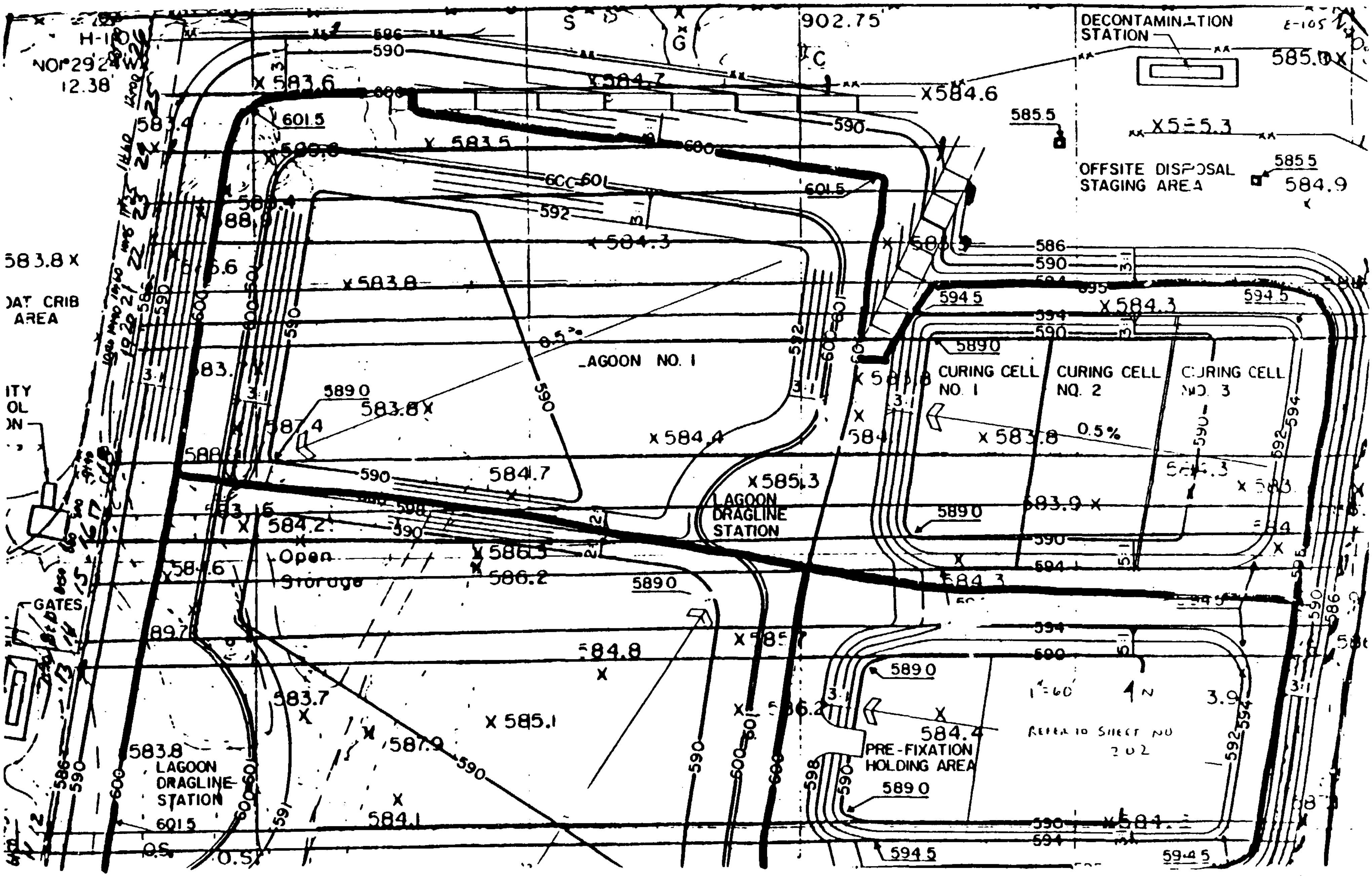
AREA ID.: BATCH PLANT
VOLUME TYPE: TOP CLAY LINER
AVERAGE DEPTH(FT)= 1
AREA(SI)= 20.8123
AREA(SF)= 74924
AREA(SY)= 8325
AREA(ACRES)= 1.72
VOLUME(CY)= 2775

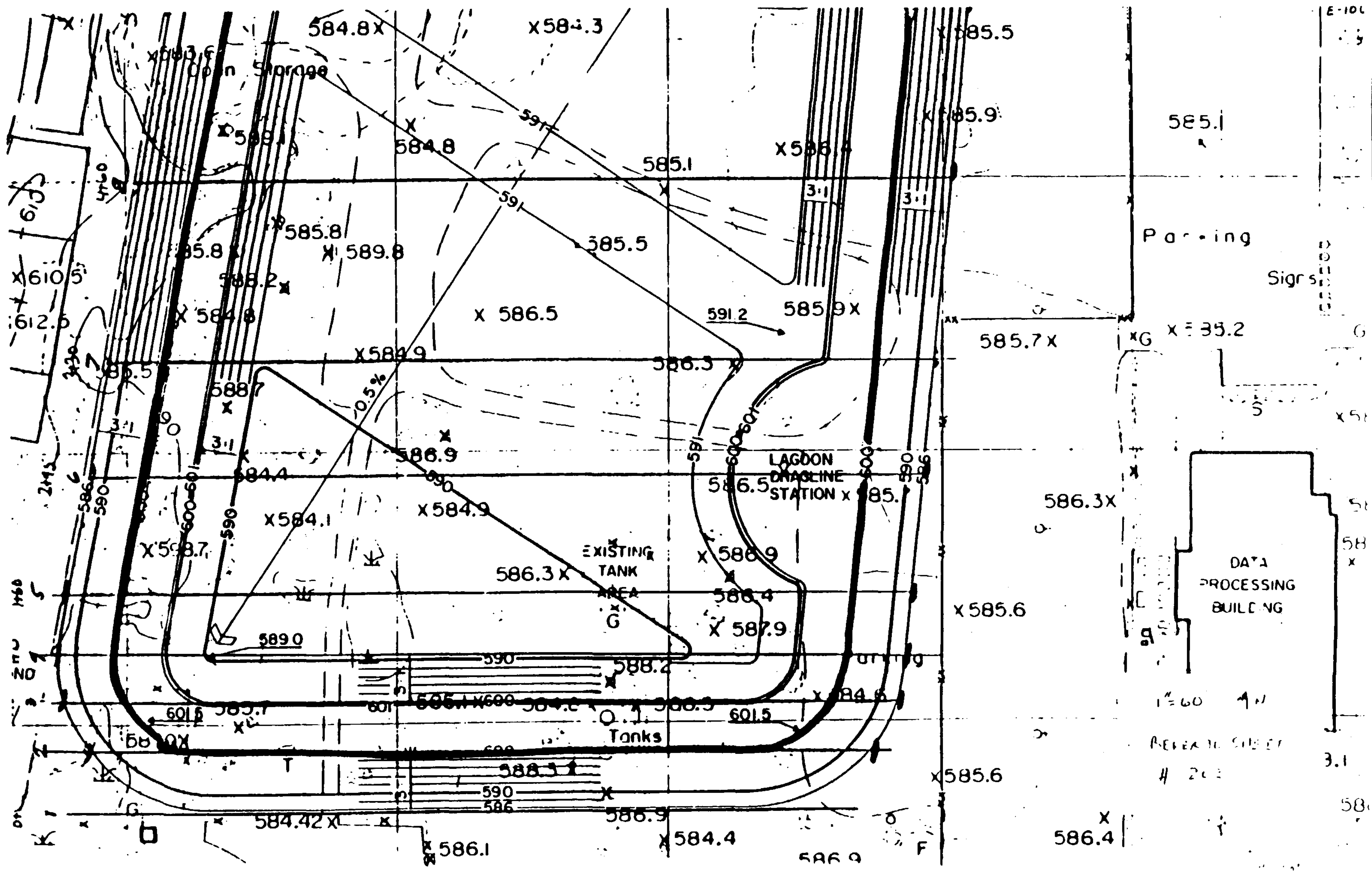
AREA ID.: LAGOON 1
VOLUME TYPE: STORAGE VOLUME
AVERAGE DEPTH(FT)= 8
AREA(SI)= 22.7921
AREA(SF)= 82052
AREA(SY)= 9117
AREA(ACRES)= 1.884
VOLUME(CY)= 24312

AREA ID.: LAGOON 2
VOLUME TYPE: STORAGE VOLUME
AVERAGE DEPTH(FT)= 8
AREA(SI)= 83.736
AREA(SF)= 301450
AREA(SY)= 33494
AREA(ACRES)= 6.92
VOLUME(CY)= 89319

AREA ID.: CURING CELLS
VOLUME TYPE: STORAGE VOLUME
AVERAGE DEPTH(FT)= 4
AREA(SI)= 14.0176
AREA(SF)= 50463
AREA(SY)= 5607
AREA(ACRES)= 1.158

VOLUME [illegible] = 7478


DECONTAMINATION STATION
OFFSITE DISPOSAL STAGING AREA
902.75
LAGOON NO. 1
CURING CELL NO. 1
CURING CELL NO. 2
CURING CELL NO. 3
LAGOON DRAGLINE STATION
Open Storage
LAGOON DRAGLINE STATION
PRE-FIXATION HOLDING AREA
GATES
0.5%


Open Storage
LAGOON
DRAGLINE
STATION
EXISTING
TANK
AREA
Tanks
DATA
PROCESSING
BUILDING
Parking
Signs
584.8
585.1
585.5
586.5
586.9
584.1
584.9
586.3
589.8
585.8
588.2
589.0
591.2
585.9
585.7
586.3
585.6
586.4
584.4
586.1
584.42
588.5
601.5
0.5%