Lakeshore Group

Lakeshore Engineering Services, Inc.

FINAL WORK PLAN

Final Work Plan

Explosive Evaluation of Sewers

December 2006

At Ravenna Army Ammunition Plant,
Ravenna, Ohio

Contract: No. W52H09-06-C-5024

Prepared for:

U.S. TACOM
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Rock Island, IL 61299

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12/17/06
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TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 GENERAL INFORMATION 1
1.1.1 Project Authorization 1
1.1.2 General Statement of Work 1
1.1.3 Objective 1
1.1.4 Technical Approach 2
1.1.5 Changes to the Work Plan 3
1.2 RVAAP LOCATION 3
1.3 RVAAP HISTORY 4
1.4 SITE TOPOGRAPHY 5
1.5 SITE CLIMATE 5
2.0 TECHNICAL MANAGEMENT PLAN 6
2.1 GENERAL INFORMATION 6
2.1.1 MEC Operational Guidance and Regulations 6
2.1.2 Chemical Warfare Materiel Discovery 7
2.1.3 Special UXO Contingencies 7
2.2 BASIS FOR INSPECTION OF SEWERS, MANHOLES AND TRAPS 7
2.3 PROJECT ORGANIZATION 8
2.3.1 Management Roles and Responsibilities 8
2.3.1.1 Vice President 8
2.3.1.2 Project Supervisor/SUXOS 8
2.3.2 Functional Relationships 9
2.4 MOBILIZATION AND SITE PREPARATION 10
2.4.1 Mobilization of Manpower and Equipment 10
2.4.1.1 Site-Specific Training 10
2.4.1.2 Equipment 11
2.4.1.3 Waste Staging Area 12
2.4.2 Field Office Set Up 12
2.4.3 Emergency Response and General Notifications 12
2.5 OPERATIONAL SEQUENCE 13
2.5.1 Field Screening and Sampling 13
2.5.2 Documentation of Results 14
2.6 OVERALL SAFETY PRECAUTIONS AND PRACTICES 15
2.7 COMPLIANCE WITH PLANS AND PROCEDURES 15
2.8 GENERAL SITE PRACTICES 15
2.9 SAFETY AND OPERATIONAL TRAINING AND BRIEFING 16
2.10 RECORDS 16
2.11 SITE QUALITY CONTROL 17
2.12 PUBLIC AFFAIRS AND COMMUNITY RELATIONS 17
2.13 DISSEMINATION OF DATA 17
2.14 WEEKLY AND MONTHLY REPORTS 17
2.15 DAILY PROGRESS REPORTS 18
2.16 FINAL REPORT 19
3.0 LOCATION SURVEY AND MAPPING PLAN 20
3.1 GENERAL 20
3.2 UXO SAFETY PROVISIONS 20
3.3 CONTROL POINTS 20
3.3.1 Accuracy 20
3.3.2 Monument Caps 20
3.3.3 Plotting 20
3.4 MAPPING 20
3.5 DIGITAL DATA AND COMPUTER REQUIREMENTS 20

3.5.1 Design File Requirements 20
3.5.2 Survey/Mapping Data 21
3.5.3 Computer Files 21
3.6 SUBMITTALS 21
4.0 ENVIRONMENTAL PROTECTION PLAN 22
4.1 INTRODUCTION 22
4.2 PRESERVATION & RECOVERY OF HISTORICAL ARCHAELOGICAL, AND CULTURAL RESOURCES 22
4.3 PROTECTION OF NATURAL RESOURCES 22
4.3.1 Work Area Limits 22
4.3.2 Protection of Landscape 22
4.3.3 Temporary Embankments 23
4.3.4 Disposal of Solid Waste 23
4.3.5 Disposal of Discarded Material 23
4.3.6 Disposal of Waste Materials 23
4.3.7 Disposal of Hazardous Waste 23
4.4 PROTECTION OF WATER RESOURCES 23
4.4.1 Spillage 23
4.5 PROTECTION OF AIR RESOURCES 24
4.5.1 Odors, Hydrocarbons, Carbon Monoxide, and Oxides of Nitrogen and Sulfur 24
4.5.2 Monitoring of Air Quality 24
4.6 PROTECTION FROM SOUND INTRUSIONS 24
4.7 POST CONSTRUCTION CLEANUP OR OBLITERATION 24
5.0 INVESTIGATION DERIVED WASTE 25
5.1 IDW STORAGE 25
5.2 IDW SAMPLING 25
6.0 SAMPLING AND ANALYSIS 26
6.1 DECONTAMINATION 26
6.2 CHEMICAL ANALYSIS METHODS 26
6.3 COORDINATION OF FIELD AND LABORATORY ACTIVITIES 26
6.4 SAMPLE LABELS 26
6.5 SAMPLE CUSTODY 27
6.6 SAMPLE SHIPMENT 27
6.7 SAMPLE CONTAINER, PRESERVATION AND MAXIMUM HOLDING TIMES 28
6.8 SAMPLE DISPOSAL 29
7.0 PROJECT SCHEDULE 30

LIST OF TABLES

Table 1 Sample Container Requirements 28

Table 2 Project Schedule.....31

LIST OF APPENDICES

Appendix A: RVAAP Plans and Figures

ACRONYMS

ACO	Area Commanding Officer
AENRB	Arson & Explosives National Repository Branch
AHA	Activity Hazard Analysis
AR	Army Regulations
BATFE	Bureau of Alcohol, Tobacco, Firearms and Explosives
BGS	Below Ground Surface
BRAC	Base Realignment and Closure Technical Support Office
CADD	Computer Aided Design and Drafting
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
COR	Contracting Officer Representative
CRZ	Contaminant Reduction Zone
CSHM	Corporate Safety & Health Manager
CWM	Chemical Warfare Materiel
DA	Department of the Army
DDESB	Department of Defense Explosives Safety Board
DHWM	Division of Hazardous Waste Management
D/I	Disassembly/Inspection
DOD	Department of Defense
DOT	Department of Transportation
DNT	Dinitrotoluene
DSW	Division of Surface Water
EB	Explosive Building
EM	Engineering Manual
EMM	Earth-Moving Machinery
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
ESS	Explosives Safety Submission
EZ	Exclusion Zone
GOCO	Government Owned, Contractor Operated
GPS	Global Positioning System
HARC	Historic, Archeological and Cultural
HD	Hazard Division
IAW	In Accordance With
LES	Lakeshore Engineering Services, Inc.
LS&M	Location Surveying And Mapping
MCE	Maximum Credible Event
MEC	Munitions and Explosives of Concern

MSD	Minimum Separation Distance
NEW	Net Explosive Weight
NGB	National Guard Bureau
NIOSH	National Institute for Occupational Safety and Health
NOTAM	Notice to Airmen
NSCMP	Non-Stockpile Chemical Materiel Project
OE	Ordnance and Explosives
OEPA	Ohio Environmental Protection Agency
OHARNG	Ohio National Guard
OSHA	Occupational Safety and Health Administration
PETN	Pentaerythritol Tetranitrate
PM	Project Manager
PO	Purchase Order
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control
QCM	Quality Control Manager
RAB	Restoration Advisory Board
RI	Remedial Investigation
RTLS	Ravenna Training and Logistics Site
RVAAP	Ravenna Army Ammunition Plant
SOP	Standard Operating Procedure
SOW	Scope of Work
SSHP	Site Safety Health Plan
SUXOS	Senior UXO Supervisor
TACOM	US Army Tank-automotive and Armaments Command
TEU	Technical Escort Unit
TNT	Trinitrotoluene
USATEU	U.S. Army Technical Escort Unit
USATHMA	U.S. Army Toxic and Hazardous Material Agency
USP&FO	U.S. Property & Fiscal Officer
UXO	Unexploded Ordnance
UXODS	UXO Demolition Supervisor
UXOT2	UXO Technician II
UXOT3	UXO Technician III
UXOQCS	UXO Quality Control Specialist
UXOSO	UXO Safety Officer
WP	Work Plan

1.0 INTRODUCTION

1.1 GENERAL INFORMATION

The United States Army Tank-Automotive and Armaments Command (TACOM has awarded a contract to Lakeshore Engineering Services, Inc. (LES) to provide the development of a method (or methods) for evaluating and decontaminating subsurface sewer pipes, potentially contaminated with explosive compounds at the Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio. This Work Plan (WP) has been developed in response to the Scope of Work (SOW) for the above mentioned area at RVAAP in Ravenna, Ohio. The plan describes the procedures, operational sequence, and resources LES will use to provide the evaluation. The work will be performed on behalf of the U.S. Army Tank-Automotive and Armaments Command (TACOM) and monitored by the Army Base Realignment and Closure Office (BRAC).

1.1.1 Project Authorization

Authorization for performance is contained in contract W52H09-06-C-5024 issued to LES by TACOM.

1.1.2 General Statement of Work

All work will be in compliance with the Occupational Safety and Health (OSHA), 29 CFR 1910, General Industry Standards.) The objective is to complete the development of a method (or methods) for evaluating and decontaminating subsurface sewer pipes, potentially contaminated with explosive compounds. LES will evaluate and recommend the most economical technologies capable of identifying the mature and extent and methods of eliminating any explosive contamination within the sewer system. The evaluation of potential remedial methods will include, but not be limited to: Inspection and Sampling; Excavation and Removal of the sewer; in place Thermal Treatment; Flush, Treat, and Discharge with water or agents; Combination of the above.

The following tasks are excluded from the SOW: no soil sampling under this scope of work. Sampling will be conducted under the Remedial Investigation phase of the RVAAP CERCLA Program.

1.1.3 Objective

The objectives of conducting the evaluation of sewer pipes at RVAAP are to: (1) provide the Army with several possible solutions or remedies for the safety hazards associated with explosive contamination in subsurface sewer pipes at Army Ammunition Plants; (2) identify and evaluate any potential threats to human health due to the disposal or release of energetic compounds or their derivatives by way of the sewers at RVAAP in order to fulfill the Army's requirements under Army Regulation (AR) 405-90 Section 2.2. AR 405-60 (10 May 1985) Section 2.2 states, "Real Property that is known to be contaminated with ammunition and explosives,

which could endanger the public, will not be released from Department of The Army (DA) custody until the most stringent efforts have been made to assure appropriate protection of the public". The property is not being released from Army ownership but the responsibility is being transferred within the Army.

All work executed must be accomplished in a manner which ensures the health and safety of the workforce and the public at large. Munitions and Explosives of Concern (MEC) is a safety hazard and may constitute an imminent and substantial endangerment to the public, environment and site personnel.

Some areas on RVAAP contain OE or explosive residue that is a safety hazard and constitutes a possible danger to site personnel. All personnel attached to the project will take all precautions outlined in the Health and Safety Plan and shall follow all guidelines detailed by the Project Supervisor. During this project, if we encounter any OE material we will contact the appropriate agencies for procedures and address the same appropriately. OE found during execution of the SOW falls under the applicable provisions of Chapter 29 Code of Federal Regulations (CFR) 1910.120.

All work will be completed IAW the SOW DDESB-approved Explosive Safety Submission (ESS) and subsequent Amendments, USACE Safety Manual (IOCP-385-1), 29 CFR1910.120, this Site-Specific Work Plan (WP) with its integral Site Safety and Health Plan (SSHP) , Engineering Pamphlet (EP) 385-1-95a, Basic Concepts and Considerations for OE Operations, and other CEHNC/USACE guidance documents.

LES will execute the project in a manner that minimizes the environmental impact to the site and its surroundings. If LES encounters any environmentally sensitive site features that could affect cost or schedule under the current SOW, LES will immediately notify the ACO Staff and Contracting Officer HQ, BRAC and await further direction. LES will use reasonable caution to avoid actions that could disturb these features.

1.1.4 TECHNICAL APPROACH

When RVAAP was operational, workers routinely washed energetic compounds off of work surfaces and into sewer for operational safety. Contamination in sewers can be divided into three (3) areas of relatively decreasing risk:

a. Sewers originating under each source building to an outside trap/manhole;

b. All sewers from a group of source buildings; and

c. Sewer lines from each group to the treatment plant.

There will be a possible trend that explosive hazards may be present in the sewers that would decrease with distance from manufacturing buildings because the sewers

at AAPs are segmented by periodic traps/manholes. These traps acted as settling points where explosive compounds would collect and were regularly pumped clean. LES will inspect the subsurface sewers at RVAAP for residual explosive contamination and evaluate various remedial technologies to address the problem. Each method will be explained in the final report describing the results of the investigation within this section and evaluated as to its cost, design, and serviceability. The unit cost of each remedial method will be estimated on a cost per foot basis and will be compared to the actual costs of excavating subsurface sewers at RVAAP.

The design of each remedy is evaluated to determine if it is likely to achieve the goal of decontaminating explosively contaminated sewer pipes. Also, the serviceability of each method is evaluated to identify whether a method is practical or can be reasonably implemented in the field. The field trials will evaluate the actual field logistics involved with the selected remedial methods and be used to develop an estimate of unit cost per foot for comparison to the cost of excavation.

1.1.5 Changes to the Work Plan

The WP is based on the information available at the time of its preparation and may require modification if unforeseen circumstances arise during the execution of this WP. Should the WP require modification, changes will be made using the following procedures:

- No change to the approved WP will be executed without prior approval of the Contracting Officer Representative (COR), LES Program Manager (PM) and BRAC.
- The LES Project Manager (PM) and Senior UXO Supervisor (SUXOS) will notify the LES PM of the required changes and the rationale for the changes.
- The LES PM will develop the changes in conjunction with the BRAC.
- Changes to this WP will be provided in writing by LES to the COR and BRAC for approval.
- Ohio EPA will be notified in the event changes in the WP have an impact on environmental issues.
- On-site implementation of changes will be initiated prior to inclusion of the formal written changes, if verbal approval is provided to LES by the COR and/or BRAC.

1.2 RVAAP LOCATION

When the RVAAP Installation Restoration Program (IRP) began in 1989, the RVAAP was identified as a 21,419 acre installation. The property boundary was resurveyed by the OHARNG over a two year period (2002 and 2003) and the actual total acreage of the property was found to be 21, 683 acres. As of February 2006, a total of 20,403 acres of the former 21,683 acre RVAAP have been transferred to the National Guard Bureau (NGB) and subsequently licensed to the OHARNG for use as a military training site. The current RVAAP consists of 1,280 acres scattered throughout the

Ravenna Training and Logistics Site (RTLS). The RTLS is in northeastern Ohio within Portage and Trumbull Counties, approximately 4.8 kilometers (3 miles) east northeast of the city of Ravenna and approximately 1.6 kilometers (1 mile) northwest of the city of Newton Falls. The RVAAP portions of the property are solely located within Portage County. The RTLS/RVAAP is a parcel of property approximately 17.7 kilometers (11 miles) long and 5.6 kilometers (3.5 miles) wide bounded by State Route 5, the Michael J. Kirwin Reservoir, and the CSX System Railroad on the south; Garret, McCormick, and Berry roads on the west; the Norfolk Southern Railroad on the north; and State Route 534 on the east. The RTLS is surrounded by several communities: Windham on the north; Garrettsville 9.6 kilometers (6 miles) to the northwest; Newton Falls 1.6 kilometers (1 mile) to the south east; Charlestown to the southwest; and Wayland 4.8 kilometers (3 miles) to the south. When RVAAP was operational the RTLS did not exist and the entire 21,683-acre parcel was a government-owned contractor operated (GOCO) industrial facility. The RVAAP IRP encompasses investigation and cleanup of past activities over the entire 21,683 acres of the former RVAAP and therefore references to the RVAAP in this document are considered to be inclusive of the historical extent of the RVAAP, which is inclusive of the combined acreages of the current RTLS and RVAAP, unless otherwise specifically stated. A regional map indicating the location of the RVAAP is presented in Appendix A.

1.3 RVAAP HISTORY

Production at the facility began in December 1941 with the primary missions of depot storage and ammunition loading. To accomplish these two missions, the installation was divided into two separate units, the Portage Ordnance Depot and the Ravenna Ordnance Plant. The Portage Ordnance Depot's primary mission was depot storage of munitions and components, while the Ravenna Ordnance Plant's mission was loading and packing major caliber artillery ammunition and the assembly of munitions initiating components that included fuses, boosters and percussion elements. In August 1943, the installation was redesignated the Ravenna Ordnance Center and again in November 1945 as the Ravenna Arsenal.

The plant was placed in standby status in 1950 and operations were limited to renovation, demilitarization and normal maintenance of equipment, along with storage of ammunition and components. The plant was reactivated during the Korean Conflict for the loading and packing of major caliber shells and components. All production ended in August 1957, and in October 1957 the installation was again placed in a standby condition. Rehabilitation work started in October 1960 to establish facilities in the ammonium nitrate line for the processing and explosive melt-out of bombs. These operations commenced in January 1961. In July 1961 the plant was again deactivated. In November 1961 the installation was divided into the Ravenna Ordnance Plant and an industrial section, with the entire installation then

being designated as the RVAAP. In May 1968, RVAAP began loading, assembling, and packing munitions on three Load Lines and two component lines in support of the Southeast Asia Conflict. These facilities were deactivated in August 1972. The demilitarization of the M71A1 90MM projectile extended from June 1973 until March 1974. Demilitarization of various munitions was conducted from October 1982 through 1992.

Up until 1999, the RVAAP was a 21,683 acre installation. A total of 19,938 acres of the former 21,683 acre RVAAP was transferred to the United States Property and Fiscal Officer (USP&FO) for Ohio in 1996 and 1999 for use by OHARNG as a military training site. The current RVAAP consists of 1,280 acres in several distinct parcels scattered throughout the confines of OHARNG RTLS. The RVAAP and RTLS are co-located on contiguous parcels of property and the RTLS perimeter fence encloses both installations. Since the IRP encompasses past activities over the entire 21,683 acres of the former RVAAP, the site description of the RVAAP includes the combined RTLS and RVAAP properties.

1.4 SITE TOPOGRAPHY

The RVAAP lies in the glaciated Allegheny Plateau section of the Appalachian Plateau Province. The western and northern portions of the plant display low hills and dendritic surface drainage pattern. The eastern and southern portions of the facility are characterized by an undulating to moderately level surface. Elevations range from 366 meters in the west to 279 meters in the east.

1.5 SITE CLIMATE

The climate of the RVAAP has an average yearly temperature of 50 degrees F, an average annual precipitation of 45 inches, an average relative humidity of 84 % and an average of 50 inches of snowfall. RVAAP is located in a continental climate characterized by warm, humid summers and cold winters. Precipitation varies widely throughout the year. The driest month is, on average, February, and the wettest month is July. This information was obtained from the RVAAP website.

2.0 TECHNICAL MANAGEMENT PLAN

2.1 GENERAL INFORMATION

2.1.1 MEC Operational Guidance and Regulations

All work executed will be accomplished in a manner which ensures the health and safety of the workforce and the public at large. Non- Intrusive Survey Operations under this SOW will be performed within the relevant requirements presented in 29 CFR 1910.120 and pertinent documents, such as IOCP 385-1, *Classification and Remediation of Explosive Contamination* and other relevant Department of the Army (DA) and DOD requirements regarding personnel, equipment, and procedures. Additionally, all work conducted under this SOW will be conducted in accordance with (IAW) RVAAP Explosive Safety Submission.

All activities for this operation will be performed in accordance with (IAW) this work plan (WP) and with information and guidelines contained within other chapters and appendices of this WP. The work performed under this plan will conform to the following regulations and directions:

1. Site Safety and Health Plan (SSHP);
2. Occupational Safety and Health Administration (OSHA), 29 CFR 1910, General Industry Standards;
3. 27 CFR Part 55, Commerce in Explosives;
4. OSHA, 29 CFR 1926, Construction Standards;
5. ATFP 5400.7, Alcohol Tobacco and Firearms (ATF) Explosives Laws and Regulations;
6. National Institute for Occupational Safety and Health (NIOSH)/OSHA/ United States Coast Guard (USCG)/Environmental Protection Agency (EPA) Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities;
7. American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Index (BEIs);
8. Applicable sections of EPA, 40 CFR Parts 260 to 299, Protection of Environment;
9. Applicable sections of DOT, 49 CFR Parts 100 to 199, Transportation;
10. USACE ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous Waste Remedial Actions;
11. Department of Defense (DoD) 6055.9-STD, DoD Ammunition and Explosives Safety Standards;
12. Department of the Army (DA) Pamphlet (PAM) 385-64, Ammunition and Explosives Safety Standards;

13. Army Regulation (AR) 385-64, Ammunition and Explosives Safety Standards;
14. AR 200-1, Environmental Protection and Enhancement;
15. AR 385-10, The Army Safety Program;
16. AR 385-16, System Safety Engineering and Management;
17. Technical Manual (TM) 9-1300-200, Ammunition General;
18. TM 9-1300-214, Military Explosives;
19. Title 128- Rules and Regulations Governing hazardous Waste Management in Ohio.
20. Federal Acquisition Regulations (FAR)
21. Ohio EPA Director's Findings and Orders
22. Ravenna Installation Wide Work Plan and Health and Safety Plan

2.1.2 Chemical Warfare Materiel Discovery

RVAAP is on the Non-stockpile Chemical Materiel Project list (NSCMP) due to the suspected Mustard Agent Burial Site. The U.S. Army Technical Escort Unit (USATEU) at Aberdeen Proving Ground, Maryland will be contacted in the event that any item is located and suspected of containing Chemical Warfare Materiel (CWM). If a suspect CWM item is located, the LES PM will notify the BRAC PM who will make a determination whether or not USATEU support is necessary. In the event that USA TEU is required, LES personnel will be stationed in a safe up-wind position to observe and secure the area until USA TEU support arrives. The BRAC PM will be responsible for contacting any local law enforcement agencies needed to secure any public roads that require blocking or to evacuate local residents.

2.1.3 Special UXO Contingencies

The 731st Ordnance Company, Wright-Patterson AFB, OH will provide explosive ordnance disposal (EOD) support if a UXO or explosive is located which cannot be identified. If a UXO or explosive is located which cannot be identified, the LES PM will contact the COR and the Facility Manager who will make the determination whether or not EOD support is necessary. LES personnel will maintain security at the site until military EOD support arrives and will provide the military EOD with support if so directed by the BRAC PM.

2.2 BASIS FOR INSPECTION OF SEWERS, MANHOLES, AND TRAPS

The risk of explosive contamination is presumed to decrease with distance from the buildings because the sewers at RVAAP are segmented by traps/manholes. These traps acted as settling points where explosive compounds would collect. The goal of inspecting and sampling sewer pipes is to provide for the development of a method or methods for evaluating and decontaminating subsurface sewer pipe potentially

contaminated with explosive compounds. If an inspection and sampling method can conclusively show a length of pipe is not an explosive safety hazard then there would be no reason to address it further prior to transfer. Also, inspection and sampling can be used to confirm that a particular remedial method was effective. The proposed inspection methods include using video, explosive vapor analyzers, passive gas collectors, and colorimetric reagents.

2.3 PROJECT ORGANIZATION

2.3.1 Management Roles and Responsibilities

In addition to LES, the project team consists of, the BRAC PM, Arlington, VA and Mr. Irving Venger, RVAAP Industrial Specialist and Contracting Officer's Representative. Below is the overall project organization showing the key LES personnel assigned to the project. All LES personnel assigned to this project meet the BRAC training and experience requirements for the positions to which they are assigned.

2.3.1.1 Vice President

Mr. Jal Guzder, Vice President is the Program Manager for this project. He is responsible for the overall implementation of the project. He has substantial technical and management experience with environmental and explosive remediation projects.

- Consult with the Project Supervisor, as required to resolve health and safety issues arising at the project site.

2.3.1.2 Project Manager/SUXOS

Mr. Brian Andrea is the Project Manager for this project. Mr. Andrea has extensive experience in the supervisory role of UXO/explosive remediation projects and will have the following responsibilities:

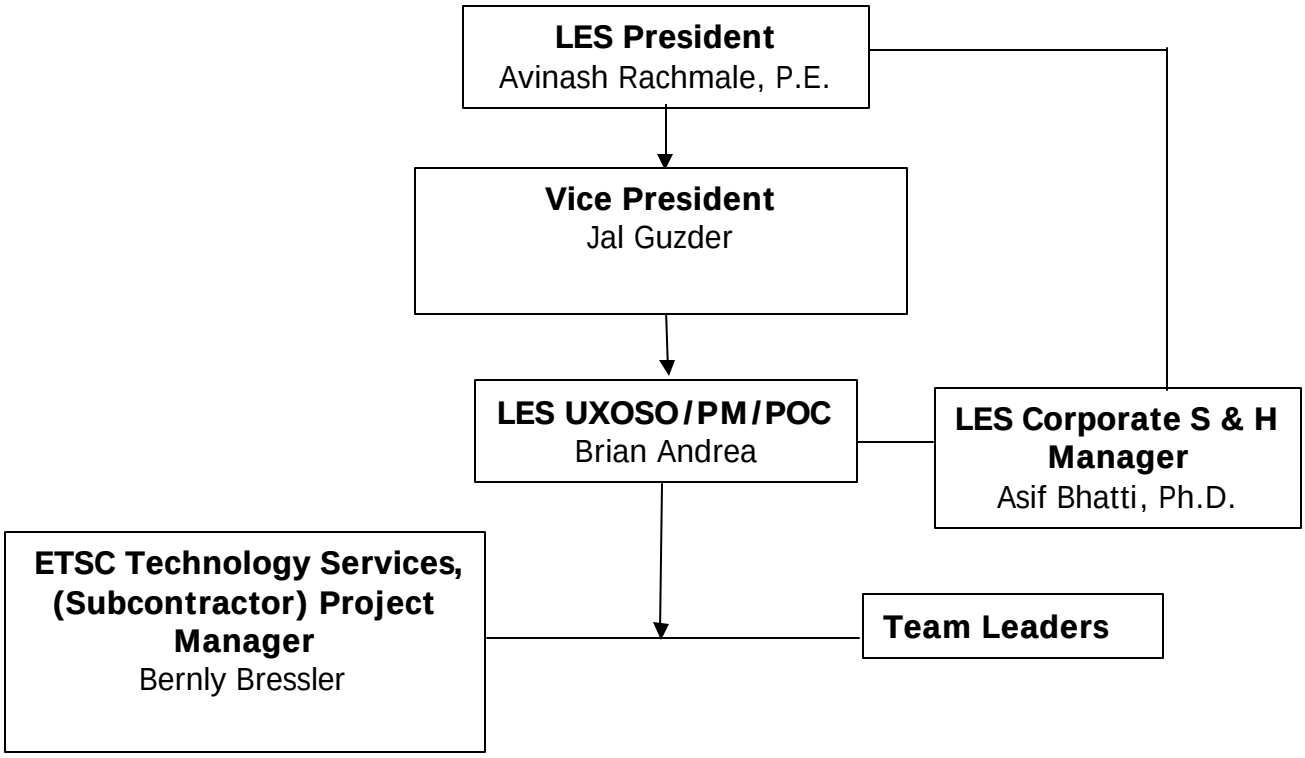
- Overseeing the overall performance of the LES individuals assigned to the project.
- Coordinating all contract and subcontract work and controlling costs and schedules.
- Responsible for overall execution of the project.
- Approve all changes of key site personnel.
- Design and manage site operations to minimize environmental, safety, and human health impacts, and provide workplaces for all employees and subcontractors that are free of recognized safety hazards.
- Responsible for the day-to-day routines of personnel and operations.
- Designates professional staff to support site safety, health, and environmental protection activities.
- Identifying any problems and coordinating with the LES Project Manager to institute corrective measures.

- Act as the lead technical consultant for all on site OE related matters.
- Ensure that all site activities comply with the relevant federal, state and local rules, laws, and regulations.

2.3.2 Functional Relationships

The LES Program Manager will interact with and report directly to the BRAC PM, for all matters concerning management and the SOW. All contract-related issues will be reported directly to TACOM Contracting Officer for consideration and/or approval. The LES PM/SUXOS will report directly to the LES Program Manager for all matters concerning site operations. The team members (UXOT2s or other field team personnel) will report directly to the SUXOS. Regarding safety issues, the UXOSO is also the Safety and Health Officer.

CONTRACT ORGANIZATION CHART



2.4 MOBILIZATION AND SITE PREPARATION

2.4.1 Mobilization of Manpower and Equipment

Explosive Evaluation of Sewers

LES will conduct work only after the final WP is approved by both the Government and LES. LES will schedule the arrival of the work force in a manner designed to facilitate immediate productivity. All LES personnel mobilized to the site will meet requirements for Occupational Safety and Health Administration (OSHA) hazardous waste operations training and medical surveillance requirements as specified in the SSHP. LES will perform operations once as per attached schedule after the WP is approved for non-intrusive site activity. The purpose of this task WP is for the LES field manager to perform a visual survey and mark manholes and other site places while the site is clear and very accessible. LES will mobilize with a crew of up to four (4) people and equipment and set up a field office for the sewer evaluation. All manholes will be marked with 1 ½" x 1 ½" x 4' wooden grade stakes. The field office will be controlled through the main office located at building 1038. Mobilization will consist of assembly of the required personnel, equipment and materials, and preparation for each of the field activities. Equipment and expendable materials will be assembled and checked (i.e., calibration and battery check) prior to being taken to the site. All field personnel will receive site-specific health and safety training and familiarization with the site during this time.

2.4.1.1 Site-Specific Training

As part of the mobilization process, LES will perform site-specific training for all on-site personnel assigned to this project. The purpose of this training is to ensure that all on-site personnel fully understand the operational procedures and methods to be used by LES at RVAAP. Individual responsibilities, safety and environmental concerns associated with operations will also be covered in the training. The PM/SUXOS will conduct the training sessions which will include the topics identified below.

- Field equipment operation, including the safety and health precautions, field inspection and maintenance procedures that will be used.
- Interpretation of relevant sections of this WP and SSHP as they relate to the tasks being performed.
- Personnel awareness of potential site and operational hazards associated with site-specific tasks and operations.
- Public relations to ensure that personnel will not make any public statements to the media without prior coordination with and approval of BRAC.
- Environmental concerns and sensitivity including endangered/threatened species and historic, archeological, and cultural (HARC) issues will be provided from the RTLS Environmental Specialist on notification to the RTLS from LES.
- Additional OSHA or BRAC required training as required by the SSHP.
- Identification features, hazards, and disposal methods of ordnance that may be encountered.

- Site workers engaged in hazardous substance removal or other activities that expose or potentially expose workers to hazardous substances and health hazards shall receive a minimum of 40 hours of instruction off the site, and a minimum of three days actual field experience.
- LES contractors and subcontractors will document their compliance to the training and medical requirements and provide such documentation to the SSO for inclusion in the site project files.
- LES will provide site-specific training to all LES employees and subcontractor personnel who will perform work on this project. At least one member of the field team will possess certification in first aid and cardiopulmonary resuscitation.

2.4.1.2 Equipment

All equipment will be inspected as it arrives to ensure it is in proper working order. Any equipment found damaged or defective will be repaired or returned to the point of origin, and a replacement will be secured. All instruments and equipment that require routine maintenance and/or calibration will be checked initially upon its arrival, at the end of the day, and then checked again prior to its use each day according to the manual issued by the manufacturer. This system of checks ensures that the equipment is functioning properly. If an equipment check indicates that any piece of equipment is not operating correctly, and field repair cannot be made, the equipment will be tagged and removed from service. Damaged equipment will either be replaced or repaired depending upon the situation. If needed, a request for replacement equipment will be placed immediately. Replacement equipment will meet the same specifications for accuracy and precision as the equipment removed from service. If mandated, work will stop during replace/repair activity as directed by the site supervisor. For the purposes of the evaluation work at RVAAP LES will keep the equipment necessary on-site to a minimum. The following equipment may be necessary for the evaluation effort:

- Skid-steer Bobcat;
- Smoke Generating Machines;
- Site Trucks;
- Hand Tools;
- DropEx or Exspray;
- Video Camera:
- Probe.

As part of the initial equipment set-up and testing, LES will also install and test its communication equipment daily that includes the following:

- Commercial telephone line: one line will be a dedicated facsimile line; (330-358-2902) and one line will be used for communications with other activities/agencies (330-358-2900).
- Cellular telephones (very high frequency band), acquired through a local cellular service, to be used as back up communications between the field office, SUXOSO, and the field teams.

Avinash Rachmale	313-215-1669
Jal Guzder	313-671-1941
Brian Andrea	610-299-2201

2.4.1.3 Waste Staging Area

During the mobilization task a waste storage area will be set up at a predetermined location to facilitate storage of non-hazardous waste materials. Building 1047 will be used to facilitate all non hazardous waste materials. Alternate areas may also be considered based on safe distances from disassembly/decontamination activities. Hazardous waste generated during this project (if any) will be staged at the RVAAP 90-day hazardous waste storage area established at Building 1047. Waste storage areas will be operated according to Federal, State and local rules, laws and regulations. Each waste stream will have its unique assigned storage area. Only uniquely numbered, leak-free, clean, labeled, and covered waste containers will be placed in the waste storage areas. No hazardous waste container will remain in the 90-day storage area for more than 90 days. The storage areas and containers will be inspected weekly. Inspection results will be recorded on the Weekly Waste Storage Inspection Record.

2.4.2 Field Office Set Up

LES will provide a mobile equipment storage shed that will be used for storage and maintenance of all site equipment.

2.4.3 Emergency Response and General Notifications:

At least one week prior to the initiation of activities, LES will contact all local emergency services to verify the availability of requisite services and to confirm the means used to summon the services. General notifications will be made to key project personnel at this time as well. LES will coordinate the notification with Irving Venger first and then notify the local newspapers and other media through a press release. This includes the following contacts:

- Air Space and Procedures Office, Cleveland Air Route Traffic Control Center (Notice to Airmen) Mark Agostinelli – (440)-774-0609/0660
- RVAAP Security Dispatcher (Post 1) – (330)-358-2017
- Ravenna City Fire Department (330) 296-5783
- Ravenna Police Dept. – (330) 297-6486
- MKM (Caretaker Contractor) – (330) 358-3005
- Hospital – Robinson Memorial Hospital (330) 297-0811
- Police –Portage County Sheriff Office (330) 296-5100
- Police –Trumbull County Sheriff Office (330) 675-2508
- Ohio State Patrol – (330) 297-1441
- BRAC Project Manager (703) 601-1560
- Irving Venger - Acting RVAAP Facility Manager and Contracting Officer Representative (330) 358-7311
- Ohio EPA - Eileen Mohr (330) 963-1221
- USEPA - Kendall Moore (312) 353-4788
- RAB Members – mailing list
- OHARNG – MAJ Ed Meade (614) 336-6560
- Air Reserve 910th Air Station – (330) 609-1070
- Local and political representatives – mailing list
- News media

2.5 OPERATIONAL SEQUENCE

2.5.1 FIELD SCREENING AND SAMPLING

Initially, LES will identify the anticipated sewer alignment and establish field survey marks to identify the limits of the excavation described in the site diagrams. Screening/sampling will begin at the source of ammunition production and move outwards. This approach allows for a proper starting point for each "group". As the investigation moves away from the group, manholes will be sampled in succession moving away from the source. As manholes test positive, LES will move out along the pipe "run" until a manhole does not test positive for explosives. A "non-positive" test will indicate an investigation stopping point for this pipe "run". The terminal point of each run (portion that contains explosives) shall be flagged and a new "run" shall be investigated. LES will not sample every manhole at RVAAP.

One or all of the following steps may be followed during inspecting and sampling manholes and drains at RVAAP:

1. The selected sewer pipe lengths may be video taped in order to get a visual record of the condition of the pipe and to see what they contain. Video inspection technology is capable of navigating, viewing, and recording the entire length of a sewer pipe and allows the operator to study the condition of the pipe and its

contents. The drawback is the video resolution is not sharp enough to differentiate smeared soils or other debris from explosive residues.

2. Colorimetric reagent testing will likely be performed inside the sewer pipes at each trap/manhole location. The physical method used to perform colorimetric testing of the manholes/sewer will be to take a swipe samples from each pipe running to the manhole and the bottom of the manhole. This will be accomplished with a twelve foot expanding painter's pole. A swipe patch will be attached to the end of the pole and rubbed on the inside surface of each pipe. If a manhole must be entered to complete sampling, the depth and construal integrity will determine if the entry will be treated as a Confined Space. Only personnel that attended Confined Space Training 29 CFR 1910.146 will enter a Confined Space. Colorimetric reagents like DropEx are capable of detecting very small amounts of explosive residues and dry particulate solids, but are unable to detect explosive vapors. This limits the uses of colorimetric reagents to drains, manholes, and traps where access to the sewers is easily obtained.

3. Passive gas collectors may be attached to the up-gradient side of the sewer pipe in each manhole in order to collect accumulating explosive vapors by the following manner:

a. Each sewer pipe would be sealed with plastic sheeting and tape to act as a vapor barrier allowing explosive vapors to accumulate over a period of days.

b. After several days, the up-gradient side of each sewer pipe would be sampled using a commercially available explosive vapor analyzer. At each location the plastic sheeting will be punctured to allow access with the instrument probe and the reading will be recorded.

c. Then the plastic sheeting would be removed and the passive soil gas cartridge will be collected and sent to the laboratory for analysis.

It is important to note that for the purposes of this work plan LES has listed all the potential options for evaluating sewers at RVAAP; however, the best results are often gained from method two (2) listed above: Colorimetric Testing.

LES will evaluate the pipes at RVAAP with Colorimetric Testing, and the other methods will not be employed unless absolutely necessary.

2.5.2 DOCUMENTATION OF RESULTS

The presence of explosive contamination will be determined in the field using colorimetric reagents such as DropEx or Exspray. The location and direction of sewer lines testing positive for explosive contamination will be recorded and plotted.

2.6 OVERALL SAFETY PRECAUTIONS AND PRACTICES

LES will conduct safety and operational briefings daily that strictly complies with the WP, SSHP, and all applicable documentation. Additionally, the SUXOS/ UXOSO may hold a safety stand-down to conduct training, at any time a deviation or degradation of safety warrants a review. The safety and operational training and briefings will be performed in accordance with the SSHP for this project as summarized below:

1. **Daily Safety Briefing:** Each day, prior to the commencement of work, a safety briefing will be conducted for all site personnel by the UXOSO/SUXOS at LES field office. A written record of this meeting will be maintained in the LES Safety Meeting Attendance Log. The briefing will focus on specific daily hazards, potential hazards and risks that may be encountered, and the safety measures that should be used to eliminate or mitigate those hazards. These briefings will provide personnel with the known or potential task-specific hazards related to the day's operation.
2. **Visitor Safety Brief:** All visitors entering the site must report to the Project Supervisor and sign the visitor's log. Visitors shall be given a safety briefing, as outlined in the SSHP, prior to entering any work area. Visitors shall be escorted at all times by a UXO-qualified individual.
3. **Environmental Concerns:** The promotion of environmental sensitivity will be an ongoing part of the daily safety and operational briefs.
4. **UXO Refresher:** All UXO personnel will be given UXO refresher training by the UXOSO/SUXOS, on the known explosives to be encountered on site. The refresher will include topics related to explosives that may be encountered on site, including the identification of the MEC, the hazards, and the disposal methods.
5. **Additional Training:** The SSHP prepared for this project details additional on-site training.

2.7 Compliance with Plans and Procedures

All personnel will adhere strictly to approved plans and established procedures. If operational parameters change and there is a corresponding requirement to change procedures or routines, careful evaluation of such changes will be conducted by on-site supervisory personnel. Any new course of action or desired change in procedures will be submitted in writing along with justification for approval. Approved written changes will be implemented in a manner that will ensure procedural uniformity and end-product quality.

2.8 General Site Practices

All operational activities at RVAAP will be performed under the supervision and direction of qualified UXO personnel. Throughout the entire project, LES personnel will adhere to the following general practices.

1. **Work Hours:** All operations will only be conducted during daylight hours which shall consist of five 8 hour days for any UXO personnel or other schedules as dictated by the amount of daylight available and daily operations by subcontractors shall be discussed during initial mobilization. At no time will more than 40 hours of work during any week be granted to UXO personnel unless authorized by the LES Project Manager.

2. **Site Access:** LES will control access to the designated work sites. Access will only be permitted to those personnel that are part of the LES team required to accomplish the operation. At no time will hazardous OE operations be conducted when non- UXO personnel or unauthorized personnel are inside the MSD.
3. **Visitor Safety:** All visitors entering the site will report to the LES field office and sign the visitor's log. All site visitors shall receive a safety briefing, as outlined in the SSHP, and visitors will be escorted at all times by UXO personnel when inside the MEC area.

2.9 Safety and Operational Training and Briefing

LES will conduct safety and operational training on a daily basis starting with the morning briefing. Daily safety training will typically be conducted by the UXOSO; however, with regards to safety, LES solicits and welcomes comments and input from all employees. The SUXOS will also conduct operational training sessions and briefings. This training will address team assignments, potential problems and their respective resolutions and productivity status.

2.10 RECORDS

The Project Supervisor will maintain a detailed account of daily activities performed and will report these activities to the Project Manager for the weekly report:

- Personnel names and amount of personnel on site.
- Any event that impacts the daily operation.
- Any completion dates.
- Any UXO encountered.
- All activities including percentages of work completed.
- Pictures.
- Contact Number, Report Number, Project Name, Report Date.
- Summary of Activities.
- Materials Shipped Off-site.
- Visitors on site.
- Health and Safety Performance; Indications of whether or not there were any lost time accidents.
- Schedule for the following week.
- Site Supervisor and Safety Officer sign off.

The SUXOSO will maintain a detailed accounting of activities performed at each site and will include, as a minimum, information pertaining to the following:

- Date and time operations began.
- Team composition and personnel names and positions.
- Date and time operations were completed.
- Any event that impacted the day's operations.
- Quantities of UXO items along with its identification, condition, disposition and location, and estimated weight recovered by building location.

2.11 SITE QUALITY CONTROL

The LES SUXOSO will ensure that teams are complying with the WP during their operations in the field. Any deviations will be resolved immediately.

2.12 PUBLIC AFFAIRS AND COMMUNITY RELATIONS

LES will not make available or publicly disclose any data generated or reviewed under this contract or any subcontract. When approached by any person or entity requesting information about the subject of this or any subcontract, LES will defer to BRAC for response.

2.13 DISSEMINATION OF DATA

Reports and data generated under this contract will become the property of the Government and distribution to any other source by LES is prohibited unless authorized by the BRAC.

2.14 WEEKLY AND MONTHLY REPORTS

LES will prepare and submit weekly reports to the BRAC Project Manager, RVAAP Facility Manager, Ohio EPA, USACE and all Stakeholders identified by the RVAAP Facility Manager. The report will be submitted via e-mail no later than the first working day of the week following the week for which the report is prepared. The weekly report will consist of the following information:

1. General Identifying Information:

a) Contract number, project location, and ending date of report.
b) Brief description of project scope and methodology.
c) Name of Contractor's Project Manager, SUXOS, and UXOSO.
d) Name of Government Safety Specialist on site (if applicable).

2. Schedule/Progress Data, including progress by task, or sub-task if appropriate, indicating level of completion and including supporting data.
3. Discussion of Issues Relating to Work Progress:

a) List/status of pertinent correspondence related to the project.
b) List/status of deliverables and dates submitted.

c) Discussion of any issue that impacts completion of project on schedule and within budget.

3. Field Information:
a) Percent of project completed.
b) Number of soil samples collected during week and to date. (If applicable)
c) Analytical results received during week and to date. (If applicable)
d) Tons or yards of soil excavated/processed.
e) Results of daily safety inspections.
f) Description of operations planned for the following week.

4. Personnel on Site:
a) List of personnel on site by name, position, and workday.
b) List of employee absences and associated explanations.
c) Summary of workers and total number of man-hours expended during week by job category.

5. Exposure Data:
a) Hours worked in direct support of the contract (by all personnel) during the reported week and cumulative for the project, excluding hours expended on Corporate personnel issues, but including hours expended by subcontract personnel in direct support of the contract services.
b) Number of lost workday accidents during the reported week and cumulative for the project.
c) Number of lost workdays due to on-the-job accidents during the reported week and cumulative for the project.
d) Number of property damage accidents (includes vehicles) in which property loss value is $2,000 or more, during the reported week and cumulative for the project.

Lakeshore Engineering Services, Inc. will prepare and submit monthly reports to the BRAC PM, RVAAP Facility Manager and All Stakeholders identified by the RVAAP Facility Manager. The report will be submitted via e-mail no later than the third working day of the month following the month for which the report is prepared. The monthly reports will contain the same information as the weekly reports, as described above.

2.15 DAILY PROGRESS REPORTS

Lakeshore Engineering Services, Inc. will prepare daily progress reports that will be maintained in the LES project office for compilation of weekly and monthly reports.

The daily report will be prepared using a form that provides for the collection of the relevant information for the project specific forms and reports

2.16 FINAL REPORT

At the conclusion of the project at the RVAAP, LES will submit a Final Report to consist of three iterations including a Preliminary Draft, Draft and Final. The Final Report will be submitted to stakeholders identified by the Army at the time of Final Report. The contents of the Final Report will include an Executive Summary of the field activities; copies of field data records; field screening and analytical sampling data; weekly reports and photo-documentation, disposal records and other project related information. A CD of the video of underground sewer line probe will be available after all work is concluded.

3.0 LOCATION SURVEY AND MAPPING PLAN

3.1 GENERAL

Field personnel will use the map(s) provided by the facility confirming and documenting the location(s) so the manholes using a hand held GPS. The locations of pipes within the manhole will be documented and given a compass bearing for use in generating maps documenting conditions of the sewers. All manholes will be marked with a stake to assist in the visual identification of the manhole at latter dates. All manholes will be marked with 1 ½" x 1 ½" x 4' wooden grade stakes painted in orange color will be used and will be removed after the completed activities.

3.2 UXO SAFETY PROVISIONS

All survey and mapping activities will be non-intrusive and there will be no special provisions for UXO. The SSHP will be followed at all times during field activities.

3.3 CONTROL POINTS

Field personnel will use hand held GPS units and will not require coordination will existing permanent monuments. No new permanent monuments will be required. The existing map(s) along with the GPS locations will provide adequate information to relocate the manholes at a latter date.

3.3.1 Accuracy

The hand held GPS units have the ability to locate points to an accuracy of three (3) meters

3.3.2 Monument Caps

N/A

3.3.3 Plotting

All control points recovered and/or established at RVAAP will be plotted at the appropriate coordinate point on a map/drawing or equivalent.

3.4 MAPPING

All final mapping of the areas being surveyed will be created using Computer-Aided Design and Drafting (CADD) or Arc View software. Mapping deliverables (two-dimensional design/drawing files) will be submitted to BRAC on CD-ROM.

3.5 DIGITAL DATA AND COMPUTER REQUIREMENTS

3.5.1 Design File Requirements

N/A

3.5.2 Survey/Mapping Data

Location survey and mapping will be performed IAW the SOW. LES will perform all location surveys and mapping as required to establishing the footprints of the sewer system.

3.5.3 Computer Files

This SOW requires copies of all tapes, floppy discs, or CD-Rom Disks. The copies will be given to all stake holders.

3.6 SUBMITTALS

Map included with the evaluation report showing the sewer system and potential locations of explosive hazards.

4.0 ENVIRONMENTAL PROTECTION PLAN

4.1 INTRODUCTION

The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract will be protected during the entire period of this contract. LES will confine its activities to areas defined by this WP. Environmental protection will be as stated in the following subsections.

LES is directly responsible for the implementation of this plan. Inspections will be made to assure field personnel's compliance with this plan. Following are several specific areas of concern that fall under environmental protection.

4.2 PRESERVATION & RECOVERY OF HISTORICAL ARCHAELOGICAL, & CULTURAL RESOURCES

Known existing historical, archaeological, and cultural resources within LES's work area will be designated by BRAC and precautions will be taken by LES to preserve all such resources as they existed at the time they were pointed out to LES. LES will install all protection for these resources and will be responsible for their preservation during this contract. LES will coordinate with the RTLS Environmental Office and BRAC for perseverance of existing historical, archaeological, and cultural resources. If LES observes unusual items that might have historical, archaeological, or cultural value, such items shall be protected in place and reported immediately to BRAC.

4.3 PROTECTION OF NATURAL RESOURCES

Prior to beginning any activities, LES will identify all land resources to be preserved within the work area. LES will not remove, cut, deface, injure or destroy land resources to be preserved including trees, shrubs, vines, grasses, topsoil, and landforms without special permission from RTLS-Environmental Office.

4.3.1 Work Area Limits

Prior to any activities, LES will indicate areas where no work is to be performed under this contract. Any monuments and markers will be protected before site operations commence. LES will convey to its personnel the purpose of marking and/or protection of all necessary objects.

4.3.2 Protection of Landscape

Trees, shrubs, vines, grasses, landforms and other landscape features to be preserved will be clearly identified. Trees or shrubs will not be removed, cut, defaced, injured, or destroyed without the permission of Ravenna Training and Logistics Site (RTLS). Any areas accessed for the purpose of transporting or transferring materials will be protected.

4.3.3 Temporary Embankments

Temporary embankments for project work areas will be controlled to protect adjacent areas from despoilment.

4.3.4 Disposal of Solid Waste

Solid wastes will be placed in appropriate containers, which will be emptied regularly. All handling and disposal will be conducted to prevent further contamination and/or contaminant migration. LES will dispose of all waste in compliance with Federal, State, and Local rule, laws, and regulations for solid waste disposal.

4.3.5 Disposal of Discarded Material

Discarded material other than those that can be included in the solid waste category (such as material that may be considered UXO) will be handled as directed by BRAC.

4.3.6 Disposal of Waste Materials

Disposal of any materials, waste, effluents, trash, garbage, unsatisfactorily decontaminated materials, oil, grease, chemicals etc., is not permitted on the facility. All wastes must be disposed of properly in accordance with all applicable regulations. If any waste material is dumped or deposited in unauthorized areas, LES will remove the material and restore the area to the condition of the adjacent undisturbed area. If necessary, ground which has been contaminated through the fault or negligence of LES will be restored to preexisting conditions, all at LES's expense. Disposal of waste, trash, and other materials off the project site will be in accordance with all applicable Federal, State, and Local rules, laws and regulations.

4.3.7 Disposal of Hazardous Waste

Hazardous waste will be removed from the installation and disposed of in accordance with applicable Federal, State, and Local rules, laws and regulations.

4.4 PROTECTION OF WATER RESOURCES

LES will follow the RTLS Plan for protection of water resources. Special management techniques as set out below shall be implemented to control water pollution by the activities.

4.4.1 Spillage

Special measures will be taken to prevent chemicals, fuels, oils, greases, bituminous materials, sawdust, waste washings, herbicides, insecticides, rubbish or sewage, and other pollutants from entering public waters. All special measures will be in accordance with RTLS Integrated Contingency Plan (ICP)

4.5 PROTECTION OF AIR RESOURCES

At present, LES does not plan on conducting demolition and/or removal activities, but if required in the future of this project, then LES will ensure all activities will be under surveillance, management, and LES control to minimize pollution of air resources. All

activities, equipment processes, and work operated or performed by LES will be in strict accordance with all Federal emission and performance laws and standards. Ambient Air Quality Standards set by the EPA will be maintained for all site operations specified in this WP. Special Management techniques as set out below shall be implemented to control air pollution by the activities, which are included in the contract.

4.5.1 Odors, Hydrocarbons, Carbon Monoxide, and Oxides of Nitrogen and Sulfur

Hydrocarbon, carbon monoxide, oxides of nitrogen and sulfur emissions are the emissions associated with heavy equipment used at the site. These emissions will be controlled through proper vehicle maintenance, use of mufflers etc. in accordance with Federal, State, and local rules, laws and regulations.

4.5.2 Monitoring of Air Quality

Monitoring of air quality for activities will be the responsibility of LES and its' subcontractor in accordance with 29 CFR 1910 as detailed in the SSHP prepared for this project.

4.6 PROTECTION FROM SOUND INTRUSIONS

LES will keep activities under surveillance and control to minimize damage to the environment by noise. Perimeter noise monitoring will be performed during the demolition operations in order to record noise levels associated with these activities.

4.7 POST CONSTRUCTION CLEANUP OR OBLITERATION

LES will obliterate all signs of temporary facilities such as haul roads, work areas, structures, fencing, stakes, or any other signs of construction within the work, storage, and access areas. All roads, including access roads, and areas disturbed as part of the work activities will be restored to the same or better condition once the project is complete. This may include appropriate grading and seeding activities. The RTLS approved seed mixture will be used. The areas will be restored to near natural conditions.

5.0 INVESTIGATION DERIVED WASTE

Investigative derived waste (IDW) encountered or generated during the Evaluation of Sewers Decontamination Methods at RVAAP is expected to consist of:

- Water generated during rain or as a product of remedial processes; and
- Bulk TNT, free-phase TNT oils and mixtures encountered during sewer water removal, and inspection and sampling of sewer pipes.

All IDW will be managed to avoid additional degradation of the environment from which they are generated. IDW will be segregated into solids versus liquids, containerized, sampled for disposal categorization, and temporarily held at RVAAP while awaiting appropriate offsite disposal. No on-site disposal of IDW will be performed.

5.1 IDW STORAGE

All IDW generated will be stored on site at a central location approved by RVAAP personnel until a proper disposal methodology can be implemented. IDW will be placed in 55-gallon UN-approved steel drums, temporary storage tanks, or soil roll-off boxes. The containers will be properly labeled with the waste source, waste type, and the date generated. The drums will be transported to an Army-approved on-site storage location and placed on pallets. IDW drums will be segregated by site-specific origin. Storage of IDW that has been determined by laboratory analysis to be hazardous will not exceed 90 days from the end of the field activities.

5.2 IDW SAMPLING

Representative composite samples will be collected from the drummed wastes utilizing sampling guidelines detailed in the USEPA EISOPQAM (USEPA, 2001). Liquid waste samples will be collected with a device able to collect a sample from the entire depth of liquid, such as a thief sampler. Solid waste samples will be collected with an appropriate coring device. Data validation will not be performed for IDW samples, as the analytical results will only be used for disposal purposes. Waste characterization will include adequate sampling and analysis of the medium to determine disposition of the material as hazardous or non-hazardous. The number of samples and the specific analyses required are based on the area of concern and the contaminants associated with the site.

6.0 SAMPLING AND ANALYSIS

6.1 DECONTAMINATION

Equipment decontamination is necessary to ensure that chemical analysis results are reflective of the actual concentrations present at the sample location. Proper decontamination minimizes the potential for cross contamination of samples and sampling sites and the transfer of contamination off-site. All equipment to be used in sampling activities shall be decontaminated prior to being brought into the field, during the sampling program, and upon completion of the project. The sampling tools shall be fully decontaminated before sampling, as necessary to have sufficient clean equipment to conduct the work, and at the completion of the sampling program. Decontamination will include the following steps:

- Laboratory detergent scrub
- Potable water or deionized water rinse
- Distilled/deionized water rinse
- Isopropanol, or methanol rinse
- Distilled/deionized water rinse
- Air dry for as long as possible (up to 24 hours)
- Wrap in aluminum foil

Water containing detergent or solvents will be captured for proper disposal. Personnel decontamination is discussed in the HASP.

6.2 CHEMICAL ANALYSIS METHODS

The laboratory chemical analysis for this project involves the integration of analytical criteria, selection of appropriate and acceptable analytical methods, coordination of field and laboratory activities, and analysis of samples in accordance with appropriate Quality Assurance/Quality Control procedures.

6.3 COORDINATION OF FIELD AND LABORATORY ACTIVITIES

The field-sampling program will be conducted in close coordination with the analytical laboratory. Sampling will be conducted in such a manner that lot sizes are maximized, and samples are analyzed within the required holding times. Any shipments of samples to the laboratory, which require late or weekend deliveries will be coordinated prior to shipment. The laboratory will be called at the time of shipment in order to prepare for arriving samples and identify early in the day if a shipment has not arrived as anticipated.

6.4 SAMPLE LABELS

Each sample collected at the site will be assigned a unique sample tracking number. Sample labels will be completed prior to sample collection and will be affixed to the sample container either before filling or immediately following collection in order to reduce the possibility of mislabeling bottles and to ensure that all information

required is completed. Sample labels will contain the following information as a minimum: site name, sample number, date, time, preservative, and requested analysis.

6.5 SAMPLE CUSTODY

Sample custody procedures are designed to provide documentation of preparation, handling, storage, and shipping of all samples collected. The Chain of Custody Form is used to create an accurate written record that can be used to retrace the possession and handling of the sample from the moment of its collection through its analysis. It also assures that the proper analytical preparations, holding times, and processing is applied to each sample received at the laboratory. The form accompanies the samples from the time they are collected until they are logged in at the laboratory. When custody of the samples is transferred, the person relinquishing possession and the person receiving will sign, date, and note the time on the Chain of Custody Form. The Chain of Custody form contains the following: site name, samplers, sample identification numbers, collection date and time, number and size of sample containers, sample preservation, requested analyses, and air bill number.

6.5.1 The forms will be filled out legibly, using waterproof ink, and will be signed by the sampler. Similar information will be provided on the sample label, which will be securely attached to the sample container. Upon receipt, the sample custodian at the laboratory signs and dates the form, and then the laboratory's internal sample custody procedures (internal logbooks and custody records to track the samples) will be followed. The Site Superintendent, or his designee, is responsible for the care and custody of the samples collected until they are delivered to the analyzing laboratory or entrusted to a carrier. Sample logs or other records will always be signed and dated. In addition to the custody forms, a logbook or sampling forms may be used to document collection, and preparation procedures. A chain-of-custody record will accompany each shipment and the original record will accompany the shipment to the laboratory. The field sampler will retain a copy. Proper documentation such as copies of the carrier air bill will be maintained for shipments by common carrier.

6.6 SAMPLE SHIPMENT

Samples not considered potentially explosive (soil, groundwater, or sediment samples or samples for which prior analytical results are available) will be packaged and shipped in accordance with the USEPA's Users Guide to the Contract Laboratory Program (Reference 7). All samples for chemical analysis will be packed in insulated coolers and kept at a temperature of 4°C with either ice or ice packs (e.g., "blue ice"). Ice will be sealed in containers to prevent leakage of water. Samples will not be frozen. The insulated container will be lined with a plastic bag. After the sample containers are placed in the cooler, additional sorbent or an inert packing material

will be used to protect the sample containers from breakage during shipment. The completed chain of custody form will be placed in a sealed plastic bag and will then be taped to the inside of the shipping container lid. Each shipping container will be sealed with strapping tape and a chain of custody seal will be placed on either side of the lid to allow the receiver to identify any tampering during transport to the laboratory. Samples will be transported from the site to the laboratory by express shipment to ensure analysis within specified holding times. All samples will be shipped within two days of collection to ensure analysis within holding times. Samples requiring shipment by common carrier will be labeled in accordance with applicable International Air Transport Authority regulations.

6.7 SAMPLE CONTAINER, PRESERVATION, AND MAXIMUM HOLDING TIMES

Requirements for sample containers, preservation, and maximum holding times, are presented in Table 1 below. The analytical laboratory will supply a sufficient number of precleaned sample containers compatible with the analytes of interest. Bottles for liquids will be shipped pre-preserved from the laboratory. Sample bottles will meet the ICHEM Series 200 cleanliness requirements or equivalent. Cleanliness certification accompanying the bottles will be retained for the project files.

TABLE-1: SAMPLE CONTAINER REQUIREMENTS

Analysis	Container	Container Size	Containers per sample	Preservation	Maximum Holding Time (per day)
Soil/Waste Samples					
Explosives	Amber Glass Bottle with Teflon-lined Cap	4 oz.	1	Cool to 4 C	14 until Extraction, 40 until Analysis
Liquid Samples					
Explosives	Amber Glass Bottle with Teflon-lined Cap	1 Liter	2	Cool to 4 C	7 until Extraction, 40 until Analysis

All samples will be immediately cooled to 4°C and stored in the dark. The time that a sample may be held between sampling and analysis is based upon the analyte(s) of interest. Holding times are intended to minimize chemical change in a sample before it is analyzed. The laboratory will ensure that all samples are analyzed within specified holding times to maintain sample viability. To permit expedient analysis and to minimize the possibility of exceeding holding times, samples will be sent to the laboratory within two days of sample collection by overnight carrier.

6.8 SAMPLE DISPOSAL

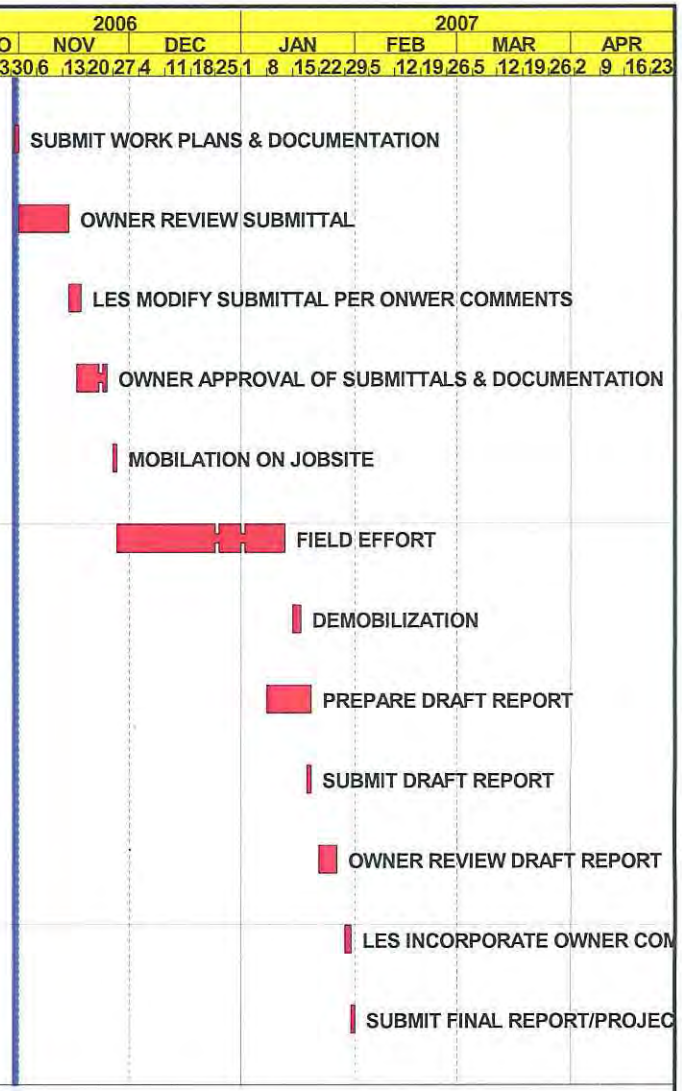
Following the successful completion of analysis and acceptance of the data, the samples will be disposed of by the laboratory in accordance with applicable state and federal regulations.

7.0 PROJECT SCHEDULE

LES has developed a proposed Project Schedule for the completion of all tasks presented in this WP. The Project Schedule is shown in Table 2. If changes in the LES personnel or changes to the SOW require a change to this project schedule, LES will immediately notify the Contracting Officer and BRAC and provide an amended project schedule.

TABLE 2: PROJECT SCHEDULE

Activity ID	Activity Description	Duration	Early Start	Early Finish
Ravenna Sewer Evaluation				
1000	SUBMIT WORK PLANS & DOCUMENTATION	1	31OCT06	31OCT06
1010	OWNER REVIEW SUBMITTAL	10	01NOV06	14NOV06
1020	LES MODIFY SUBMITTAL PER ONWER COMMENTS	3	15NOV06	17NOV06
1030	OWNER APPROVAL OF SUBMITTALS & DOCUMENTATION	5	17NOV06	24NOV06
1040	MOBILATION ON JOBSITE	1	27NOV06	27NOV06
1050	FIELD EFFORT	32	28NOV06	12JAN07
1060	DEMOBILIZATION	2	15JAN07	16JAN07
1070	PREPARE DRAFT REPORT	10	08JAN07	19JAN07
1080	SUBMIT DRAFT REPORT	1	19JAN07	19JAN07
1090	OWNER REVIEW DRAFT REPORT	5	22JAN07	26JAN07
1100	LES INCORPORATE OWNER COMMENTS	2	29JAN07	30JAN07
1110	SUBMIT FINAL REPORT/PROJECT COMPLETE	1	31JAN07	31JAN07



Start Date	31OCT06
Finish Date	31JAN07
Data Date	31OCT06
Run Date	31OCT06 13:49

Early Bar
Progress Bar
Critical Activity

4210

Sheet 1 of 1

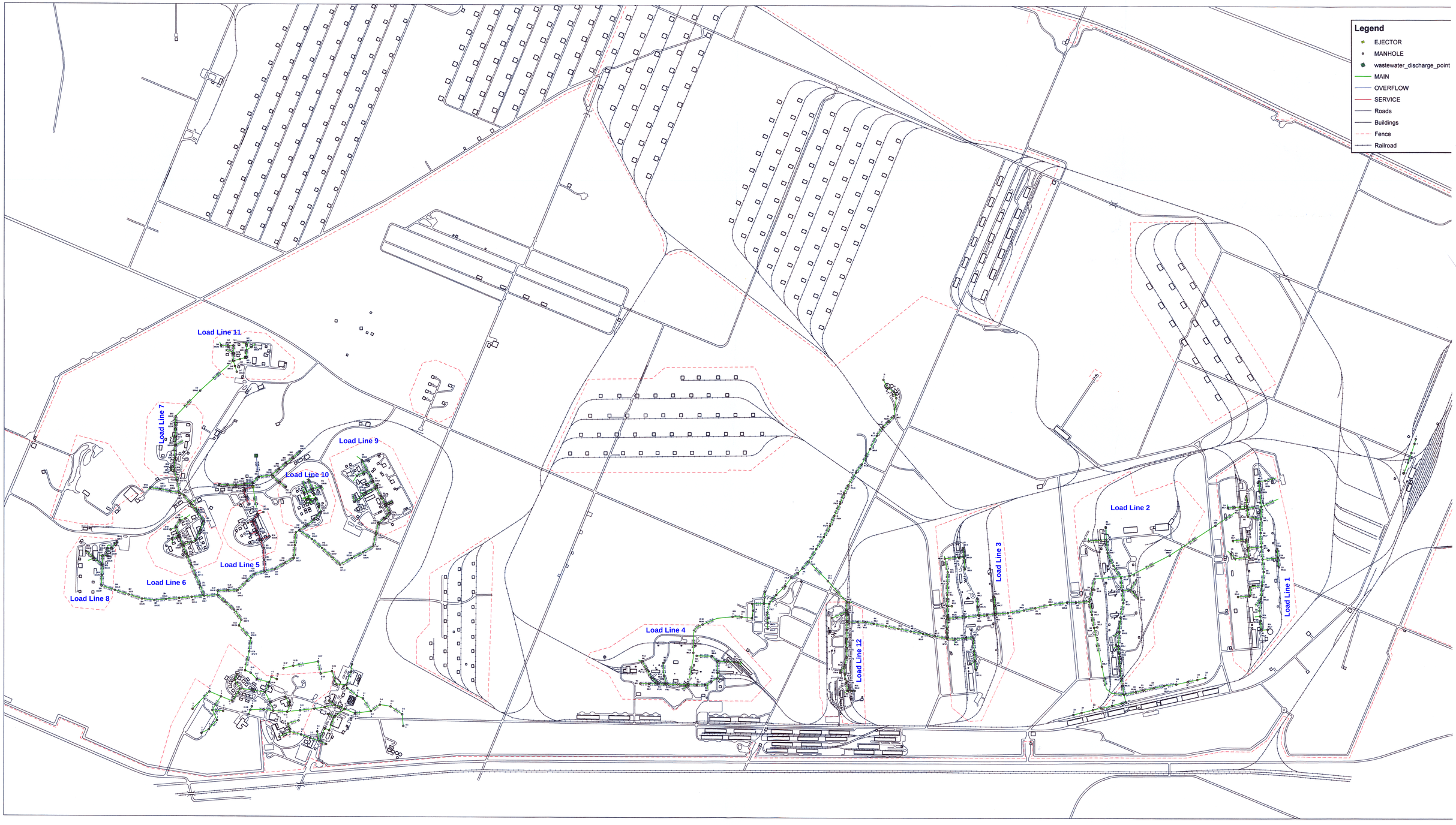
Lakeshore Group

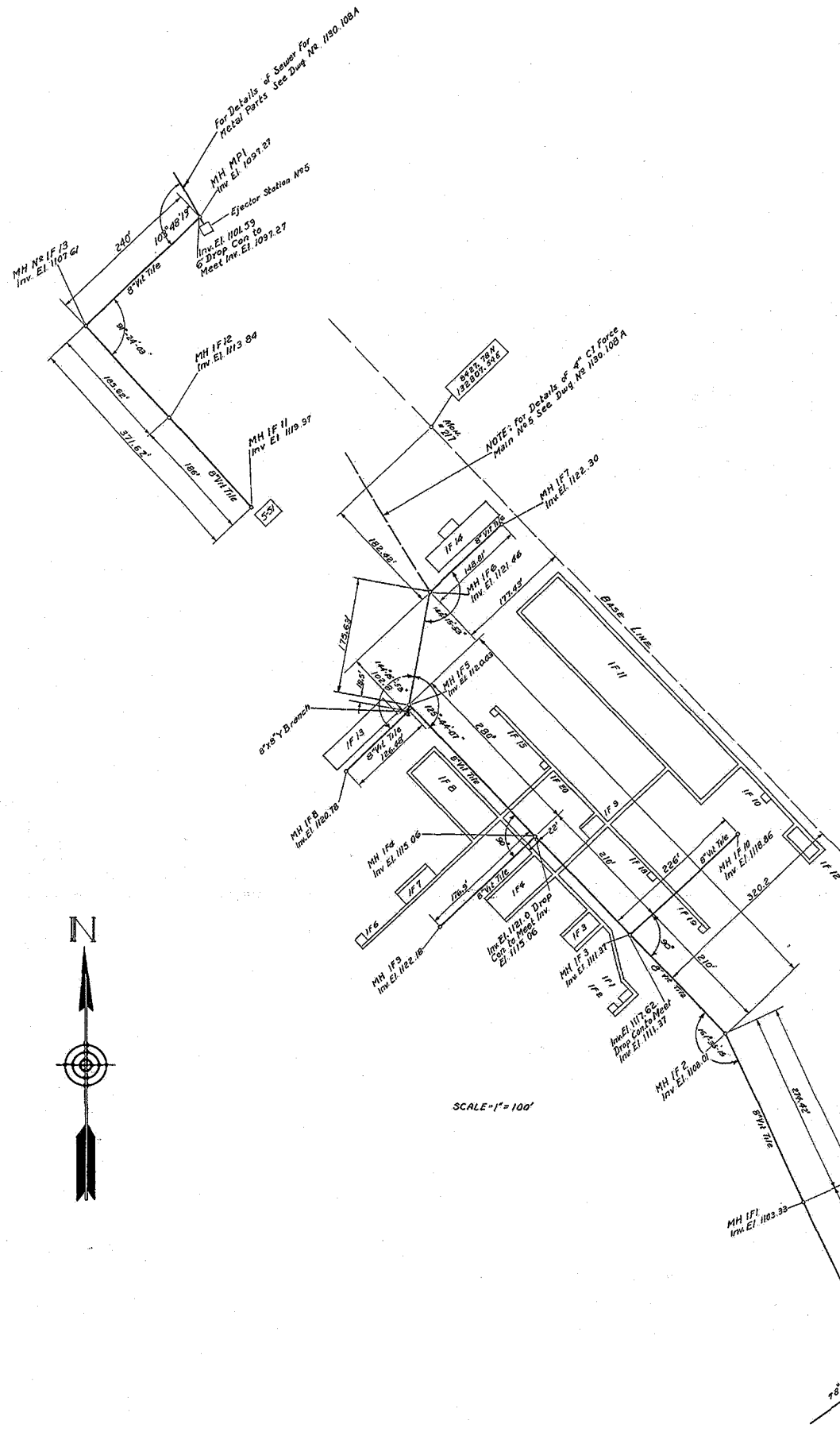
Ravenna Sewer Evaluation

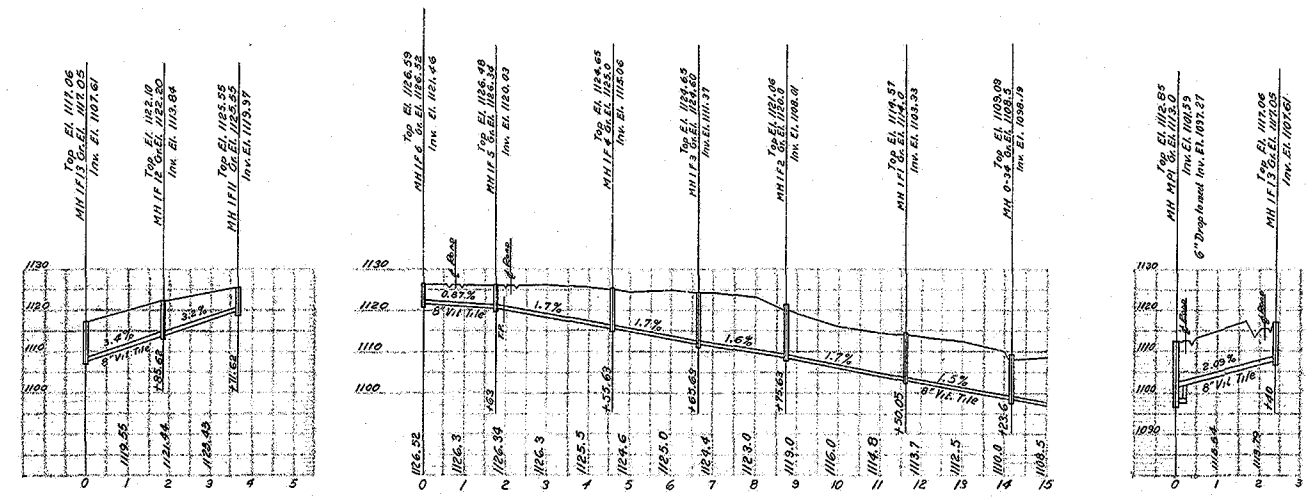
W52H09-06-C-5024

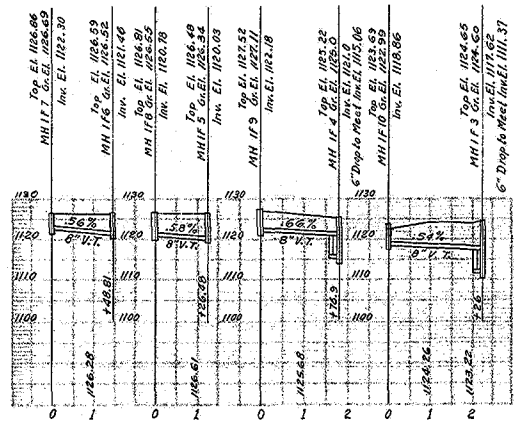
APPENDIX A

RVAAP Plans and Figures


Legend
EJECTOR
MANHOLE
wastewater_discharge_point
MAIN
OVERFLOW
SERVICE
Roads
Buildings
Fence
Railroad
Load Line 11
Load Line 7
Load Line 9
Load Line 10
Load Line 5
Load Line 6
Load Line 8
Load Line 4
Load Line 12
Load Line 3
Load Line 2
Load Line 1







SCALE : HORIZONTAL 1" = 200'
VERTICAL 1" = 20'

Note: Top Elevations Are Taken at Seat of Manhole Covers

REFERENCE DWGS
FUZE LINE NO 1 LOCATION MAP-SEWER DWG 601-3

APPROVED BY
RAVENNA ARSENAL INC

TRYGVE HOFF & ASSOCIATES
ENGINEERS
TRYGVE HOFF A.S.C.E. CLEVELAND, OHIO
OHIO REG. ENG. NO. 7785

SCALE	CONTRACT DA-11-173-ORD-65
AS SHOWN	RAVENNA ORDNANCE PLANT
REVISIONS	PLAN & PROFILE OF SEWER
	FOR FUZE LINE NO. 1

DRAWN BY	CHECKED BY	APPROVED BY	DATE
DAS	A.S.	W. L. Watts, Major, Ord.	3-22-55
TRACED BY		LT. COL., ORD. CORPS	PLAN NO.
DAS		CONT'R. OFFICER'S REP.	6934
			1130.104A

NOTE: FOR DETAILS OF SEWER FROM BOOSTER LINE No 2 SEE DWG. No 1130.103A

MH No 188 Inv El. 1111.12

MH No 187 Inv El. 1116.61

MH No WW1 Inv El. 1125.74

MH No WW2 Inv El. 1130.13

MH No WW3 Inv El. 1141.42

Inv El. 1121.49 Down to MH 187 Inv El. 1117.15

MH No 189 Inv El. 1120.11

Inv El. 1119.1 Down to MH 188 Inv El. 1115.86

MH No 186 Inv El. 1106.39

MH No 185 Inv El. 1118.79

Water Wks. No 3

Track #58

Track #56

Fuze & Booster Service Road

Base Line 2

2F22

2F36

2F14

2F11

2F12

2F16

2F13

2F8

2F9

2F7

2F6

2F4

2F3

2F18

2F19

2F17

2F21

2F31

2F5

2F1

2F2

2F15

2F10

MH No 2F9 Inv El. 1120.80

MH No 2F8 Inv El. 1120.60

MH No 2F10 Inv El. 1118.88

MH No 2F7 Inv El. 1118.68

MH No 2F5 Inv El. 1118.48

MH No 2F4 Inv El. 1118.28

MH No 2F3 Inv El. 1118.08

MH No 2F2 Inv El. 1117.88

MH No 2F1 Inv El. 1117.68

MH No 281 Inv El. 1117.48

MH No 282 Inv El. 1117.28

MH No 283 Inv El. 1117.08

MH No 284 Inv El. 1116.88

MH No 285 Inv El. 1116.68

MH No 286 Inv El. 1116.48

MH No 287 Inv El. 1116.28

MH No 288 Inv El. 1116.08

MH No 289 Inv El. 1115.88

MH No 290 Inv El. 1115.68

MH No 291 Inv El. 1115.48

MH No 292 Inv El. 1115.28

MH No 293 Inv El. 1115.08

MH No 294 Inv El. 1114.88

MH No 295 Inv El. 1114.68

MH No 296 Inv El. 1114.48

MH No 297 Inv El. 1114.28

MH No 298 Inv El. 1114.08

MH No 299 Inv El. 1113.88

MH No 2910 Inv El. 1113.68

MH No 2911 Inv El. 1113.48

MH No 2912 Inv El. 1113.28

MH No 2913 Inv El. 1113.08

MH No 2914 Inv El. 1112.88

MH No 2915 Inv El. 1112.68

MH No 2916 Inv El. 1112.48

MH No 2917 Inv El. 1112.28

MH No 2918 Inv El. 1112.08

MH No 2919 Inv El. 1111.88

MH No 2920 Inv El. 1111.68

MH No 2921 Inv El. 1111.48

MH No 2922 Inv El. 1111.28

MH No 2923 Inv El. 1111.08

MH No 2924 Inv El. 1110.88

MH No 2925 Inv El. 1110.68

MH No 2926 Inv El. 1110.48

MH No 2927 Inv El. 1110.28

MH No 2928 Inv El. 1110.08

MH No 2929 Inv El. 1109.88

MH No 2930 Inv El. 1109.68

MH No 2931 Inv El. 1109.48

MH No 2932 Inv El. 1109.28

MH No 2933 Inv El. 1109.08

MH No 2934 Inv El. 1108.88

MH No 2935 Inv El. 1108.68

MH No 2936 Inv El. 1108.48

MH No 2937 Inv El. 1108.28

MH No 2938 Inv El. 1108.08

MH No 2939 Inv El. 1107.88

MH No 2940 Inv El. 1107.68

MH No 2941 Inv El. 1107.48

MH No 2942 Inv El. 1107.28

MH No 2943 Inv El. 1107.08

MH No 2944 Inv El. 1106.88

MH No 2945 Inv El. 1106.68

MH No 2946 Inv El. 1106.48

MH No 2947 Inv El. 1106.28

MH No 2948 Inv El. 1106.08

MH No 2949 Inv El. 1105.88

MH No 2950 Inv El. 1105.68

MH No 2951 Inv El. 1105.48

MH No 2952 Inv El. 1105.28

MH No 2953 Inv El. 1105.08

MH No 2954 Inv El. 1104.88

MH No 2955 Inv El. 1104.68

MH No 2956 Inv El. 1104.48

MH No 2957 Inv El. 1104.28

MH No 2958 Inv El. 1104.08

MH No 2959 Inv El. 1103.88

MH No 2960 Inv El. 1103.68

MH No 2961 Inv El. 1103.48

MH No 2962 Inv El. 1103.28

MH No 2963 Inv El. 1103.08

MH No 2964 Inv El. 1102.88

MH No 2965 Inv El. 1102.68

MH No 2966 Inv El. 1102.48

MH No 2967 Inv El. 1102.28

MH No 2968 Inv El. 1102.08

MH No 2969 Inv El. 1101.88

MH No 2970 Inv El. 1101.68

MH No 2971 Inv El. 1101.48

MH No 2972 Inv El. 1101.28

MH No 2973 Inv El. 1101.08

MH No 2974 Inv El. 1100.88

MH No 2975 Inv El. 1100.68

MH No 2976 Inv El. 1100.48

MH No 2977 Inv El. 1100.28

MH No 2978 Inv El. 1100.08

MH No 2979 Inv El. 1099.88

MH No 2980 Inv El. 1099.68

MH No 2981 Inv El. 1099.48

MH No 2982 Inv El. 1099.28

MH No 2983 Inv El. 1099.08

MH No 2984 Inv El. 1098.88

MH No 2985 Inv El. 1098.68

MH No 2986 Inv El. 1098.48

MH No 2987 Inv El. 1098.28

MH No 2988 Inv El. 1098.08

MH No 2989 Inv El. 1097.88

MH No 2990 Inv El. 1097.68

MH No 2991 Inv El. 1097.48

MH No 2992 Inv El. 1097.28

MH No 2993 Inv El. 1097.08

MH No 2994 Inv El. 1096.88

MH No 2995 Inv El. 1096.68

MH No 2996 Inv El. 1096.48

MH No 2997 Inv El. 1096.28

MH No 2998 Inv El. 1096.08

MH No 2999 Inv El. 1095.88

MH No 29100 Inv El. 1095.68

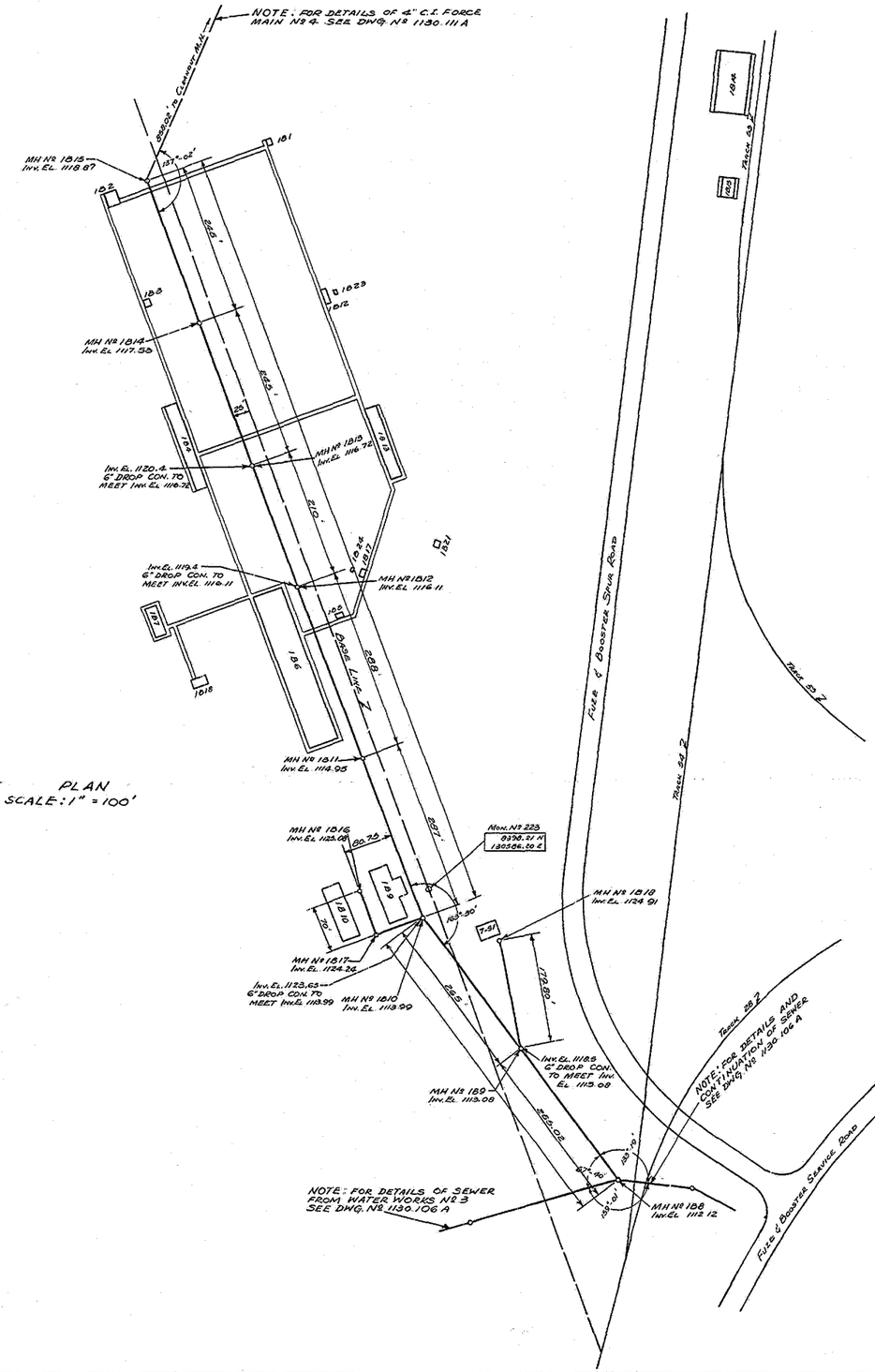
MH No 29101 Inv El. 1095.48

MH No 29102 Inv El. 1095.28

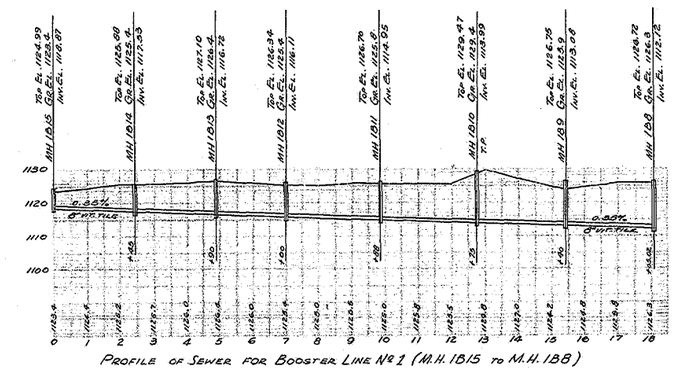
MH No 29103 Inv El. 1095.08

MH No 29104 Inv El. 1094.88

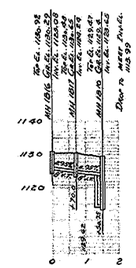
MH No 29105 Inv El.



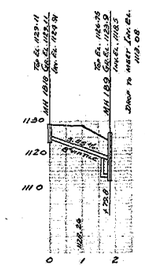
PLAN
SCALE: 1" = 100'



PROFILE OF SEWER FOR BOOSTER LINE No 1 (M.H. 1815 to M.H. 188)



PROFILE OF MH 1816 TO MH 1810



PROFILE OF MH 1818 TO MH 189

PROFILE
SCALE: HORIZONTAL 1" = 200'
VERTICAL 1" = 20'

REFERENCE DWGS.
BOOSTER LINE NO 1 - LOCATION MAP - SANITARY SEWER - DWG 603 8
GENERAL PLAN SEWERAGE SYSTEM DWG. 1130.101 A

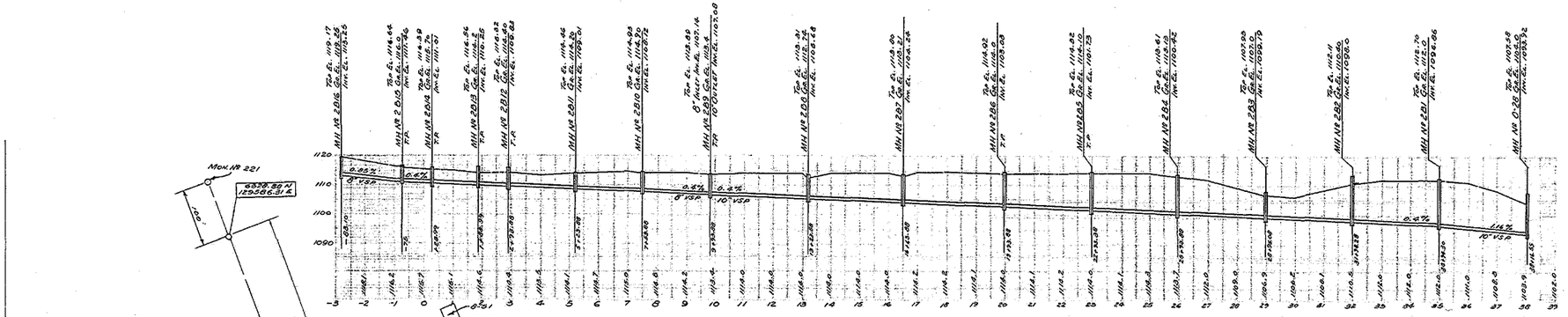
DRAWING REVISED PER FIELD SURVEY
DATE SEPTEMBER 18, 1970
RAVENNA ARMY AMMUNITION PLANT
REV. BY T.L.D.K. CHK'D BY P.L.D.

APPROVED BY
RAVENNA ARSENAL INC.

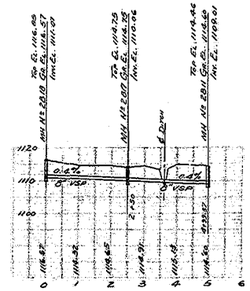
TRYGVE HOFF & ASSOCIATES
ENGINEERS
TRYGVE HOFF A.S.C.E
OHIO REG. ENG. NO. 7785
CLEVELAND, OHIO

SCALE	CONTRACT DA-11-173-ORD-65
AS SHOWN	RAVENNA ORDNANCE PLANT
REVISIONS	PLAN & PROFILE OF SEWER
	BOOSTER LINE NO. 1

DRAWN BY	CHECKED BY	APPROVED BY	DATE
A.S.	A.F.M.	MAJOR, ORD CORPS CONTR. OFFICER'S REP.	7-12-55
TRACED BY A.S.			PLAN NO. 6934
			1130.107A



PROFILE
SCALE HORIZONTAL 1" = 200'
VERTICAL 1" = 20'



NOTE: FOR DETAILS OF MAIN TRUNK LINE SEWER SEE DWG. No 1130.103A

NOTE: FOR DETAILS OF SEWER FROM FUSE LINE No 92 SEE DWG. No 1130.106A

— REFERENCE DWGS —
BOOSTER LINE No 2 - LOCATION MAP - SEWER 604.3
GENERAL PLAN SEWERAGE SYSTEM 1130.101A

APPROVED BY
RAVENNA ARSENAL INC

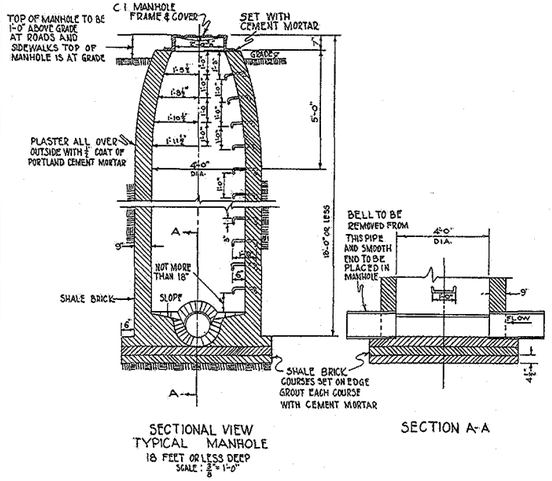
TRYGVE HOFF & ASSOCIATES
ENGINEERS
TRYGVE HOFF A.S.C.E. CLEVELAND, OHIO
OHIO REG. ENG. NO. 7785

SCALE: AS SHOWN
REVISIONS

CONTRACT DA-11-173-ORD-65

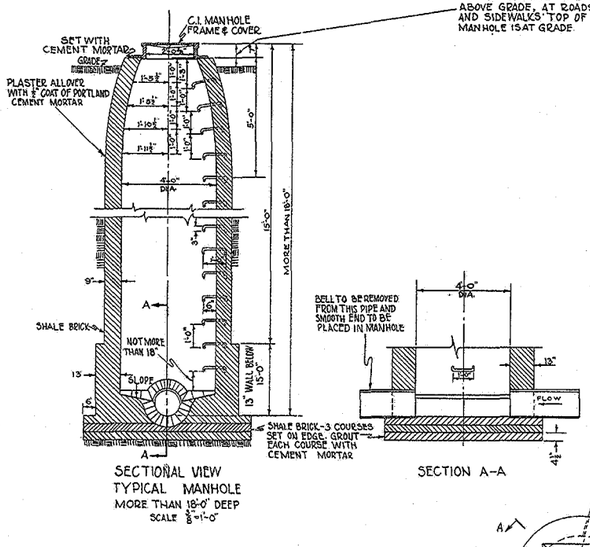
RAVENNA ORDNANCE PLANT
PLAN & PROFILE OF SEWER FOR BOOSTER LINE No 2

DRAWN BY	CHECKED BY	APPROVED BY	DATE
L.A.C.	A.S.	MAJOR, ORD CORPS CONT OFFICER'S REP	6-14-55
TRACED BY: L.A.C.			PLAN NO 6934
			1130.105A



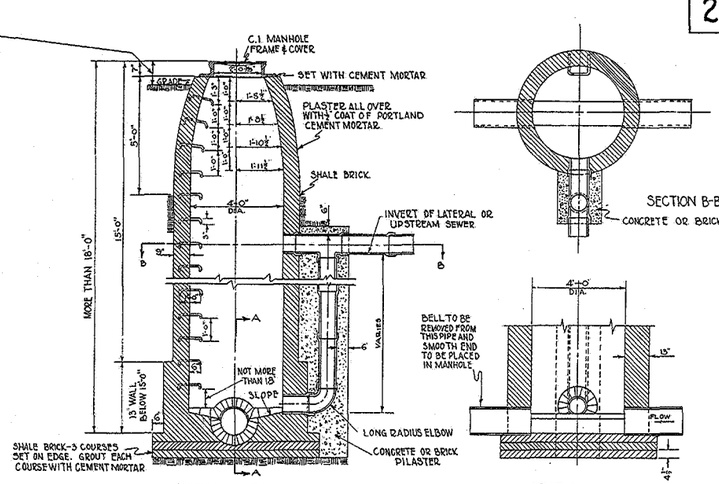
SECTIONAL VIEW
TYPICAL MANHOLE
18 FEET OR LESS DEEP
SCALE: ⅜"=1'-0"

SECTION A-A



SECTIONAL VIEW
TYPICAL MANHOLE
MORE THAN 18'-0" DEEP
SCALE ⅜"=1'-0"

SECTION A-A

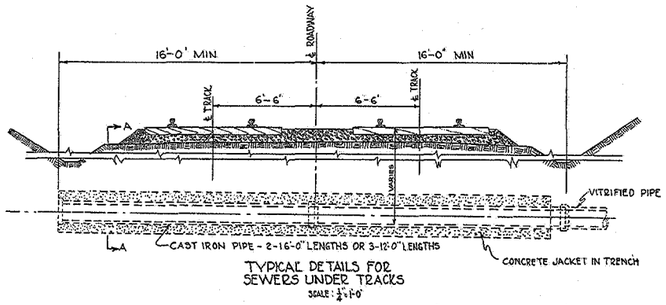


SECTIONAL VIEW
TYPICAL DROP MANHOLE
MORE THAN 18'-0" DEEP
SCALE ⅜"=1'-0"

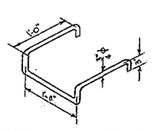
SECTION A-A

OVERFLOW MANHOLE DATA

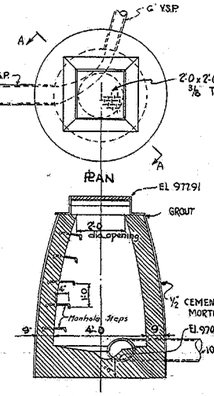
MANHOLE NO.	LOCATION	SIZE OF OVERFLOW	ELEVATION OF GROUND	INVERT ELEVATION OF OVERFLOW
210A	LOAD LINE NO.1	8"	986.22	976.72
329	LOAD LINE NO.2	8"	990.4	976.84
512	AMMONIUM NITRATE LINE	8"	976.77	970.54



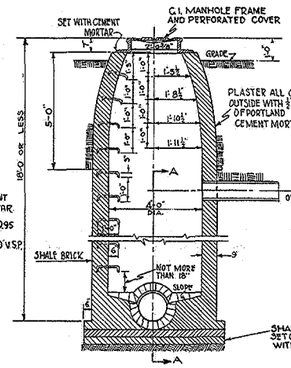
TYPICAL DETAILS FOR
SEWERS UNDER TRACKS
SCALE: ¼"=1'-0"



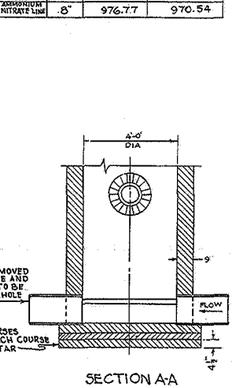
DETAIL OF MANHOLE STEP
¾" ϕ WROUGHT IRON
SCALE 1"=1'-0"



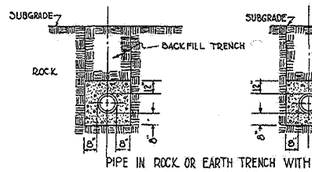
SECTION A-A
DETAIL OF BRICK MANHOLE #511A
Scale ⅜"=1'-0



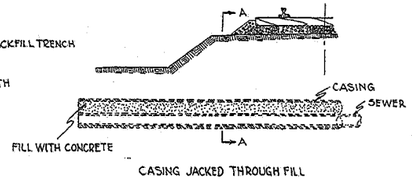
SECTIONAL VIEW
TYPICAL OVERFLOW
MANHOLE AT EJECTOR STATIONS
SCALE: ⅜"=1'-0"



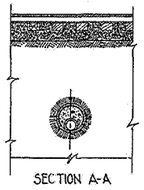
SECTION A-A



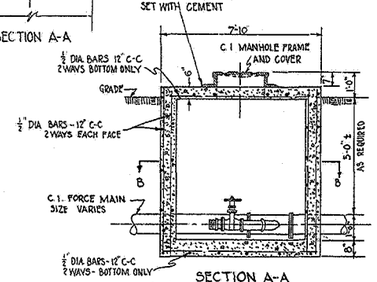
PIPE IN ROCK OR EARTH TRENCH WITH
CONCRETE JACKET
SECTION A-A



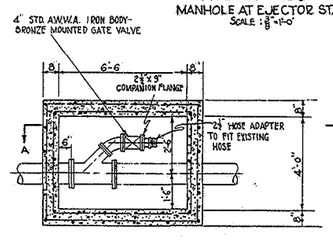
CASING JACKED THROUGH FILL



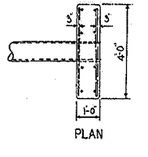
SECTION A-A



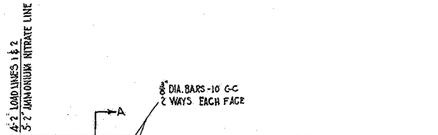
SECTION A-A
TYPICAL MANHOLE FOR FORCE MAINS
SCALE ⅜"=1'-0"



SECTION B-B
SCALE ⅜"=1'-0"



SECTION A-A
LOAD LINE 1 & 2



DETAIL OF HEADWALL
AT OUTLET OF OVERFLOW SEWERS
LOAD LINES 1 & 2 AND AMMONIUM NITRATE LINE
SCALE: ⅜"=1'-0"

SECTION A-A
AMMONIUM NITRATE LINE

APPROVED:
ATLAS POWDER COMPANY
4/18/41

DRAWING REVISED PER FIELD SURVEY
DATE 15 DECEMBER 1941
CONTRACT No. DA-11-173-ORD-69
TRYGVE HOFF & ASSOCIATES
REV. BY F.S.S. CHK'D BY A.F.M.

NOTE: FOR REF. TO DETAILED INFORMATION SEE FOLLOWING SEWER LAYOUT DRAWINGS.
L.L. No 1 DWG 3015
L.L. No 2 3025
AMMON. NYT 5004

WILBUR WATSON AND ASSOCIATES
ARCHITECTS AND ENGINEERS
Ralph L. Harding, A.S.C.E. Ohio Cert. Engineer 2252
Carl A. Nau, A.I.A. Ohio Cert. Architect 613
George E. Byrnes, Consulting Engineer
Cleveland, Ohio
Ravenna, Ohio

SCALE: AS SHOWN
REVISIONS

CONSTRUCTION DIVISION
OFFICE OF THE QUARTERMASTER GENERAL

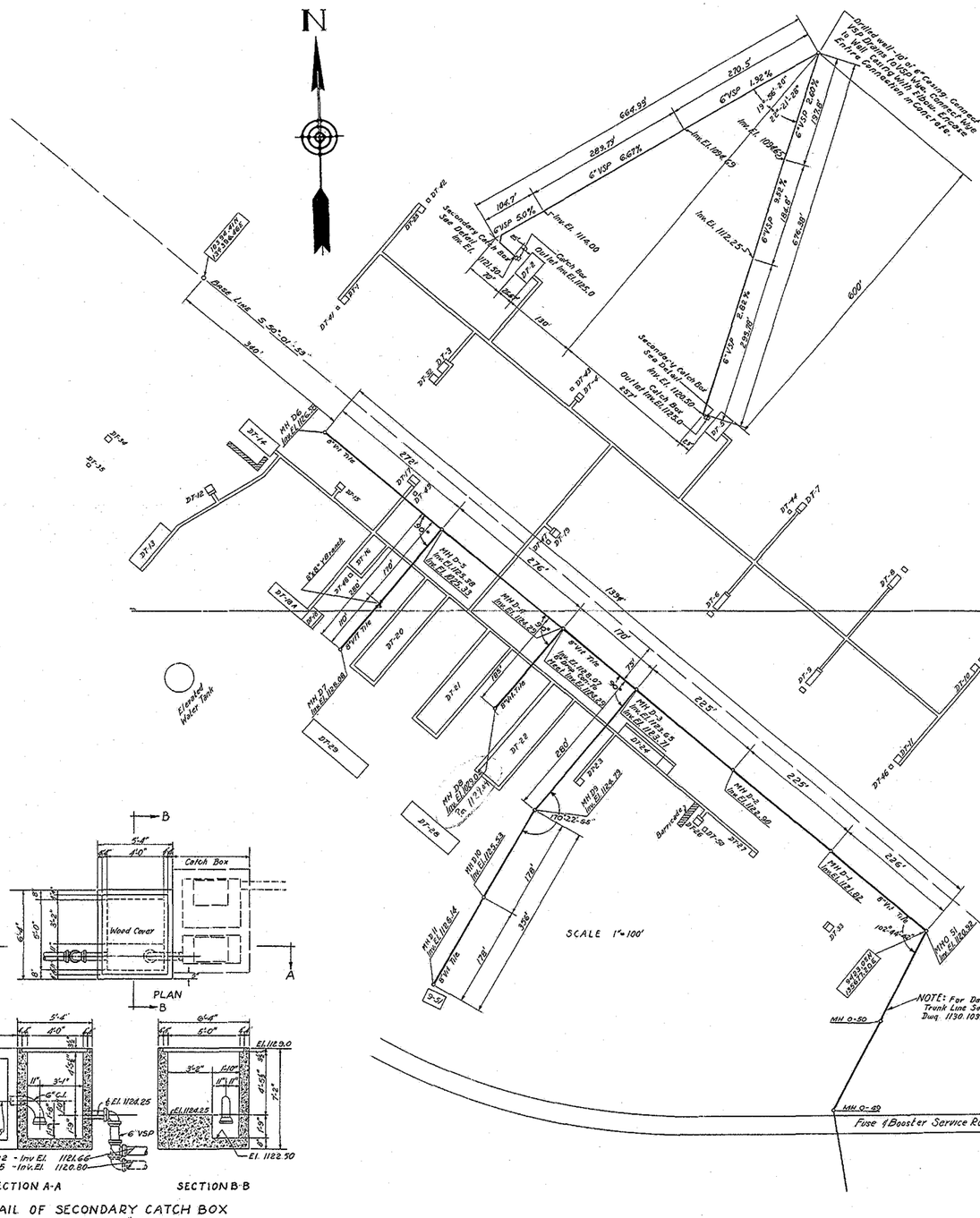
RAVENNA ORDNANCE PLANT

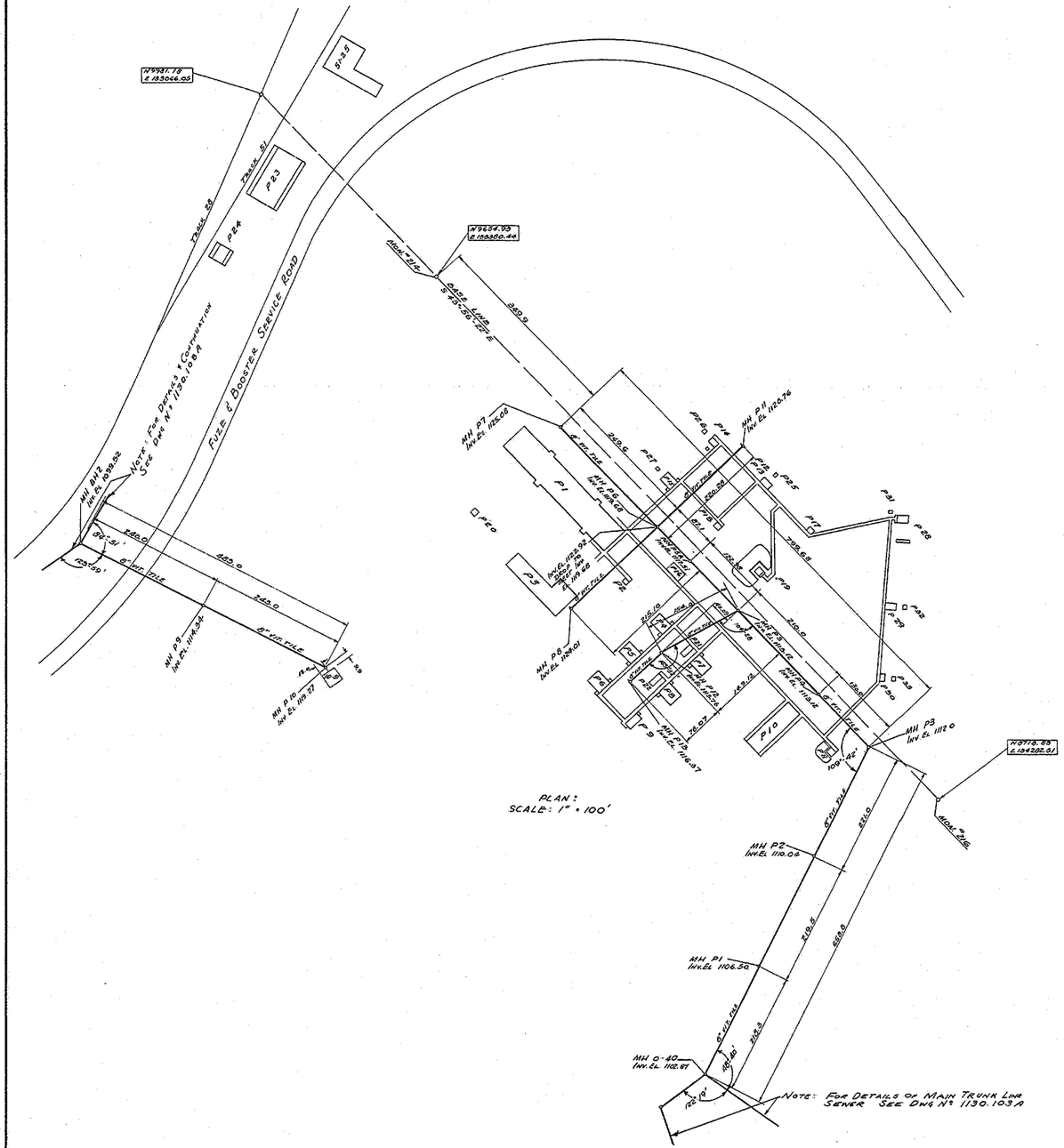
SEWERAGE SYSTEM FOR LOAD LINES AND AMMONIUM NITRATE PLANT

MANHOLES & DETAILS

DRAWN BY	CHECKED BY	APPROVED BY DIRECTION	DATE
SIMPSON	J.H.H.	R.S. Cheney	3-7-41
TRACED BY C.E.T.		LT. COL., ORD DEPT. CONSTRUCTING QUARTERMASTER	PLAN NUMBER 6934 / 1120.302

21D-20


N
Base Line S 90°-01'-59" E
360'
Drilled well - 10" ø Encasing Conduit
15 HP Deep Well Pump Control Box
Wall Mounted with Flush Enclosure
Entrance Connection in Concrete
664.93'
230.5'
289.73'
104.7'
6" VSP 6.67%
6" VSP 5.00%
6" VSP 4.52%
6" VSP 2.80%
6" VSP 5.82%
6" VSP 2.85%
6" VSP
Inv. El. 1116.00
Inv. El. 1109.63
Inv. El. 1112.25-7
Secondary Catch Box
See Detail
Inv. El. 1121.50
Catch Box
Outlet Inv. El. 1115.0
Secondary Catch Box
See Detail
Inv. El. 1120.50
Outlet Inv. El. 1115.0
MH D6
Inv. El. 1126.59
MH D5
Inv. El. 1125.88
MH D4
Inv. El. 1124.97
MH D3
Inv. El. 1125.33
MH D2
Inv. El. 1125.33
MH D1
Inv. El. 1124.83
MH D-7
Inv. El. 1126.08
MH D-8
Inv. El. 1126.08
MH D-9
Inv. El. 1126.08
MH D-10
Inv. El. 1126.08
MH D-11
Inv. El. 1126.08
MH 0-51
Inv. El. 1126.92
MH 0-50
Inv. El. 1130.92
MH 0-49
Inv. El. 1130.92
MH 51
Inv. El. 1130.92
MH 52
Inv. El. 1130.92
MH 53
Inv. El. 1130.92
MH 54
Inv. El. 1130.92
MH 55
Inv. El. 1130.92
MH 56
Inv. El. 1130.92
MH 57
Inv. El. 1130.92
MH 58
Inv. El. 1130.92
MH


N 9981.18
E 183066.05
Tract 84
Tract 85
P23
P24
S-25
Fuze & Booster Service Road
N 9624.93
E 183360.44
Chord = 281.41'
S 25° 56' 22" E
283.9
MH P7
Inv. El. 1122.08
8" VIT. PIPE
320.6
P7 to P8
P14
MH P11
Inv. El. 1120.76
P13 to P25
P12
P1
P28
P27
P26
P29
P30
P31
P32
P33
P34
P35
P36
P37
P38
P39
P40
P41
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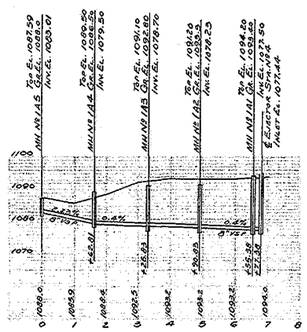
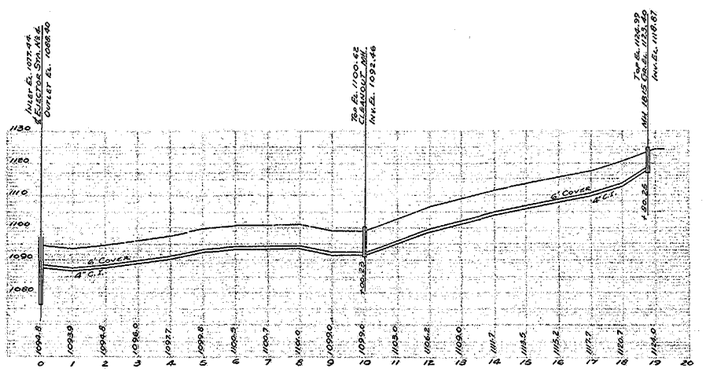
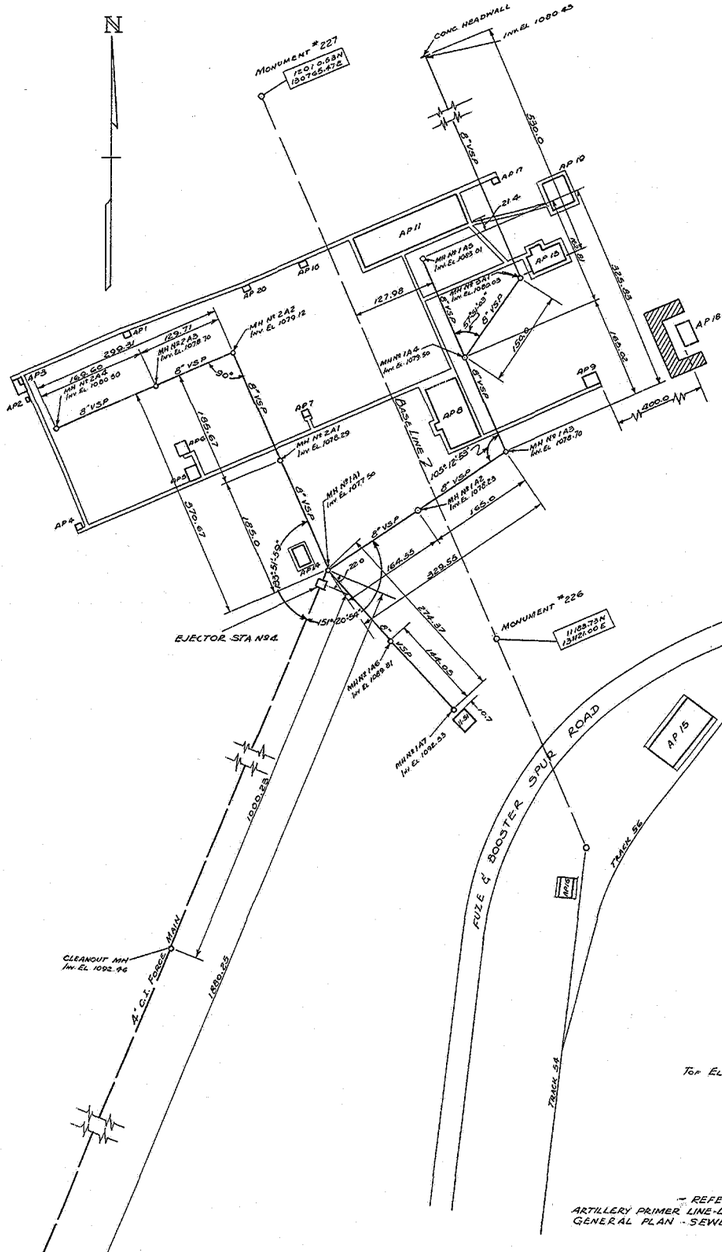
P67
P68



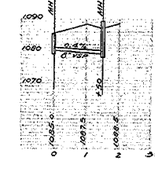
PROFILE OF SEWER FROM BLDG AP 11 TO EJECTOR STA NO 4



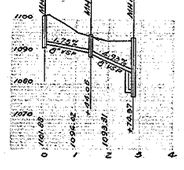
PROFILE OF SEWER FROM EJECTOR STA. NO 4 TO MH NO 1815



PROFILE OF SEWER FROM BLDG AP3 TO MH NO 1A1



PROFILE OF SEWER FROM BLDG AP 13 TO MH NO 1A4



PROFILE OF SEWER FROM BLDG 11-31 TO MH NO 1A1

SCALES

PLAN : 1" = 100'

PROFILES : HORIZONTAL 1" = 200'
VERTICAL 1" = 20'

NOTE :
TOP ELEVATION TAKEN AT EDGE OF RIM

NOTE: FOR DETAILS OF SEWER FOR BOOSTER LINE NO 1 SEE DWG NO 1130.107 A

— REFERENCE DWGS —
ARTILLERY PRIMER LINE-LOCATION MAP-SEWER 607.3
GENERAL PLAN - SEWERAGE SYSTEM - 1130.101 A

REVIEWED - NO OBJECTION
DATE July 12, 1971
RAVENNA ARMY AMMUNITION PLANT
REV. BY J.L.O'Z CHK'D BY

APPROVED BY
J.C. Dunn
RAVENNA ARSENAL INC.

TRYGVE HOFF & ASSOCIATES
ENGINEERS
TRYGVE HOFF A.S.C.E.
OHIO REG. ENG. NO. 7785
CLEVELAND, OHIO

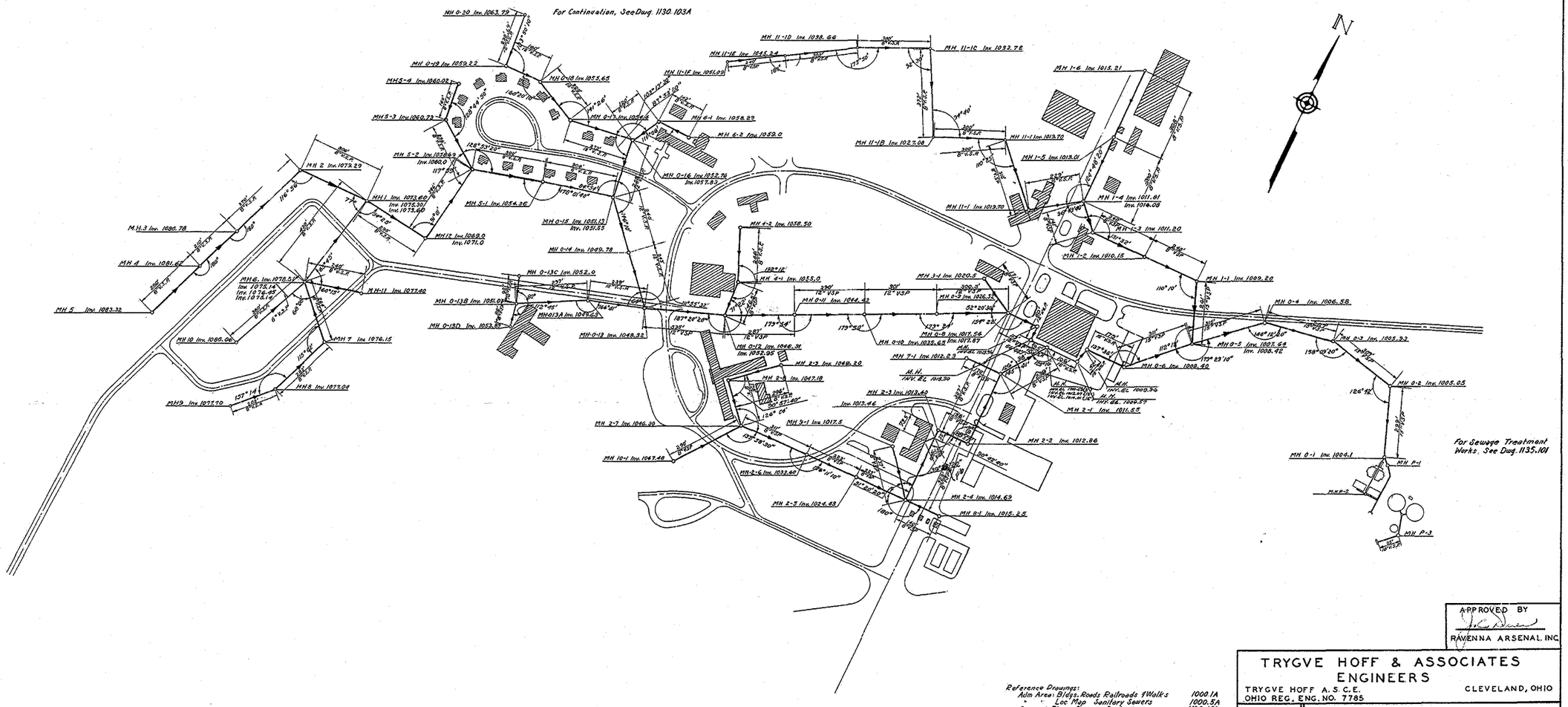
SCALE
AS SHOWN

REVISIONS

CONTRACT DA-11-173-ORD-65

RAVENNA ORDNANCE PLANT
PLAN & PROFILE OF SEWER
FOR
ARTILLERY PRIMER LINE

DRAWN BY	CHECKED BY	APPROVED BY	DATE
AS	MANNA	William L. Weeks, MAJOR ORD. CORPS, CONT'R. OFFICERS REP	6-25-55
TRACED BY AS			PLAN NO. 6934
			1130.111 A



Reference Drawings:

Adm Area: Bldgs., Roads, Railroads & Walks	1000.1A
" " Loc. Map, Sanitary Sewers	1000.5A
General Plan Sewage System	1130.101
Profile: San. Sewer. Adm. Area	1130.114

DRAWING REVISED PER FIELD SURVEY
DATE OCTOBER 11, 1951.
RAVENNA ARMY AMMUNITION PLANT
REV. BY H.V.C. CHK'D. BY D.S.

APPROVED BY
RAVENNA ARSENAL, INC.

TRYGVE HOFF & ASSOCIATES
ENGINEERS
TRYGVE HOFF A.S.C.E. CLEVELAND, OHIO
OHIO REG. ENG. NO. 7785

SCALE 1" = 200'

REVISIONS

CONTRACT DA-1H73-ORD-65

RAVENNA ORDNANCE PLANT
ADMINISTRATION AREA SEWAGE SYSTEM

PLAN OF SANITARY SEWER FOR ADMINISTRATION AREA

DRAWN BY	CHECKED BY	APPROVED BY	DATE
285	A.S.	LT. COL., ORD. CORPS CONTR. OFFICER'S REP.	12-16-54
TRACED BY 285			PLAN NO. 6939

1130.102A

15D-20

SAND CREEK

SEWAGE TREATMENT WORKS SAND CREEK
SEE UTILITIES MAP Dwg 210-K

HIGH EXPLOSIVE STORAGE

REMALIA ROAD

RANDALL ROAD

HIGH EXPLOSIVE STORAGE

SNOW RAMSDELL ROAD

ROADS & GROUNDS MAINTENANCE AREA
(FORMERLY CONSTRUCTION CAMP)
See Utilities Map Dwg. 1075.1
Sewer Plan & Profile Dwg. 1120.102A

SIZE of SEWER LINES in AREA
6" CI. Force Main from L.C.#6 to M.H. #D3
6" V.C.P. from M.H. #D3 to M.H.9
10" V.C.P. from M.H.9 to M.H.6
8" V.C.P. from M.H.6 to M.H.5
12" V.C.P. from M.H.5 to M.H.4
12" V.C.P. from M.H.1 to M.H.5
12" V.C.P. from M.H.5 to M.H.29

WATER WORKS No 2

WATER WORKS No 1

AMMONIUM NITRATE PLANT

LOAD LINE No 3

LOAD LINE No 2

LOAD LINE No 1

AREA #6 STORAGE INERT

BALTIMORE AND OHIO RAILROAD

PORTAGE COUNTY
TRUMBULL COUNTY

APPROVED:
J. K. D. Brown 3/27/41
ATLAS POWDER CO.

DRAWING REVISED PER FIELD SURVEY
DATE MAY 26, 1964
CONTRACT NO. DA-11-173-OPC-65
TRYGVE HOFF & ASSOCIATES
REV. BY SH CHK'D BY A.F.W.

WILBUR WATSON AND ASSOCIATES
ARCHITECTS AND ENGINEERS
Ralph L. Harding, A.S.C.E.
Carl A. Nau, A.I.A.
George E. Barnes
Consulting Engineer
Cleveland, Ohio
Ravenna, Ohio

SCALE 1"=500'

REVISIONS
1. Contract Modified 2-28-41
2. Revised per Ass't Secretary of War 4-26-41
3. Office Memo dated 6-6-41

CONSTRUCTION DIVISION
OFFICE OF THE QUARTERMASTER GENERAL

RAVENNA ORDNANCE PLANT

SEWERAGE SYSTEM
FOR LOAD LINES, AMMONIUM NITRATE PLANT, ROADS & GROUNDS MAINTENANCE AREA, AND SAND CREEK

DRAWN BY W.E.S. F.L.S.	CHECKED BY J.H.H.	APPROVED BY DIRECTION R.I. Chevrin LT. COL., ORD. DEPT. CONSTRUCTING QUARTERMASTER	DATE 3-7-41
TRACED BY J.D.M.			PLAN NUMBER 6924
			1120.103

5-16-41

15D-20

12