FINAL
REMEDIAL ACTION WORK PLAN

REMEDIATION OF SOILS
AT LOAD LINES 1, 2, 3 AND 4
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

US Army Corps
of Engineers ®
Louisville District

CONTRACT NO. DACA45-03-D-0026
TASK ORDER 0001

APRIL 2007

Shaw® Shaw E & I

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Submitted to:

United States Army Corps of Engineers
Louisville District

Submitted by:

Shaw Environmental, Inc.
100 Technology Center Drive
Stoughton, MA 02072

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Reviewed / Approved by:  Date: April 2007

David Cobb
Project/Program Manager

Prepared / Approved by:  Date: April 2007

David Crispo, P.E.
Technical/Regulatory Lead

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AOC	Area of Concern
AEC	Army Environmental Center
AEDBR	Army Environmental Data Base-Restoration
AHA	Activity Hazard Analysis
ASTM	American Society of Testing and Materials
BNA	Base/Neutral/Acid
BMP	Best Management Practices
BRACO	Base Realignment and Closure Office
bgs	Below ground surface
CERCLA	Comprehensive Environmental Compensation, Response and Liability Act
CIH	Certified Industrial Hygienist
COC	Chemical of Concern
DoD	Department of Defense
DOT	Department of Transportation
E&S	Erosion and Sediment
ESS	Explosive Safety Submission
FFS	Focused Feasibility Study
FPRI	Fixed Price Remediation Insurance
FSAP	Facility-Wide Sampling Analysis Plan
FSP	Field Sampling Plan
GPS	Global Positioning System
GOCO	Government-Owned Contractor-Operated
H&S	Health and Safety
HAZWOPER	Hazardous Waste Operations
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
LCG	Louisville Chemical Guidelines
LLs	Load Lines
MEC	Munitions and Explosives of Concern
MKM	MKM Engineering, Inc.
Mph	Miles per hour
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NGB	National Guard Bureau
NOI	Notice Of Intent
NPDES	National Pollution Discharge Elimination System
OAC	Ohio Administrative Code
OB/OD	Open Burning/Open Detonation
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
OSHA	Occupational Safety and Health Administration

PAH	Polyaromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCP	Project Coordination Plan
PEL	Permissible Exposure Limit
PMP	Project Management Plan
POC	Point of Contact
PPE	Personal Protective Equipment
QAMP	Quality Assurance Management Plan
QAPP	Quality Assurance Project Plan
QC	Quality Control
RAO	Remedial Action Objectives
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RDX	Cyclotrimethyltrinitramine
RI	Remedial Investigation
ROD	Record of Decision
RTLS	Ravenna Training and Logistics Site
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SB/SDB	Small Business/Small Disadvantaged Business
SERCP	Security, Emergency Response and Contingency Plan
Shaw	Shaw Environmental, Inc.
SHERP	Safety, Health and Emergency Response Plan
SOP	Standard Operating Procedure
SSHO	Site Safety and Health Officer
Sq. ft	Square feet
SWP3	Storm Water Pollution Prevention Plan
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
T&D	Transport & Disposal
TLV	Threshold Limit Value
TNT	Trinitrotoluene
TOC	Top Of Casing
TSCA	Toxic Substances Control Act
USACE	U.S. Army Corps of Engineers
VOC	Volatile Organic Compound
WMMP	Waste Management and Minimization Plan
XRF	X-Ray Fluorescence

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

Shaw Environmental, Inc. (Shaw) was contracted by the United States Army Corps of Engineers (USACE) Omaha District to perform remediation activities associated with impacted soils and dry sediments in Load Lines 1, 2, 3 and 4 (LLs 1-4) at the Ravenna Army Ammunition Plant (RVAAP) under the Fixed-Price Remediation Insured (FPRI) Indefinite Delivery/Indefinite Quantity Contract No. DACA45-03-D-0026. LLs 1-4 are cross-referenced in the Army Environmental Data Base-Restoration (AEDBR) as Area of Concern (AOC) site numbers RVAAP 08, 09, 10 and 11, respectively. Work by Shaw at the Ravenna facility in LLs 1-4 will be performed under Task Order 0001 of the above referenced contract. As part of the remediation activities, Shaw has been tasked with preparing a Remedial Action Work Plan (RAWP) under this Task Order which presents the "means and methods" for executing the cleanup of contaminated lands to an acceptable level of risk at RVAAP in accordance with the selected remedy as presented in the Final Interim Record of Decision (ROD) (Shaw, 2007) and outlines the construction methodologies for excavation approach, contamination control, and protection of the public and environment at the LLs 1-4 locations

1.2 SITE DESCRIPTION AND BACKGROUND

The RVAAP is located in northeastern Ohio within east-central Portage County and southwestern Trumbull County (**Figure 1-1**). The installation is a rectangular parcel of land approximately 11 miles long and 3.5 miles wide and consists of 21,683 acres (**Figure 1-2**). The RVAAP is bounded by State Route 534 on the east; State Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad on the south, Garrettsville and Berry roads on the west; and CONRAIL Railroad to the north.

The RVAAP is a government-owned, contractor-operated (GOCO) facility that is jointly operated by the U.S. Army Base Realignment and Closure Office (BRACO) and the National Guard Bureau (NGB). The BRACO controls environmental AOCs at the RVAAP. Land and some existing facilities in non-AOC areas at the RVAAP, known as the Ravenna Training and Logistics Site (RTLS), are used by the Ohio Army National Guard (OHARNG) for training purposes under an operating license issued by the NGB. As it is remediated, remaining acreage will be transferred from BRACO to NGB. The Ohio Environmental Protection Agency (Ohio EPA) is the lead regulatory agency for the remediation conducted by the Army under the U.S. Department of Defense (DoD) Installation Restoration Program (IRP).

Industrial operations at the RVAAP primarily consisted of 12 munitions assembly facilities referred to as "load lines". LLs 1-4 were used between 1941 and 1971 to melt and load trinitrotoluene (TNT) and Composition B, a mixture of TNT and cyclotrimethylenetrinitramine (RDX) into large-caliber shells. The operations of the primary load lines produced explosive dust, spills and vapors that collected on the floors and walls of various process buildings. Periodically, the floors and walls would be cleaned with water and steam. The resulting liquid contained TNT and Composition B and was known as "pink water" for its characteristic color.

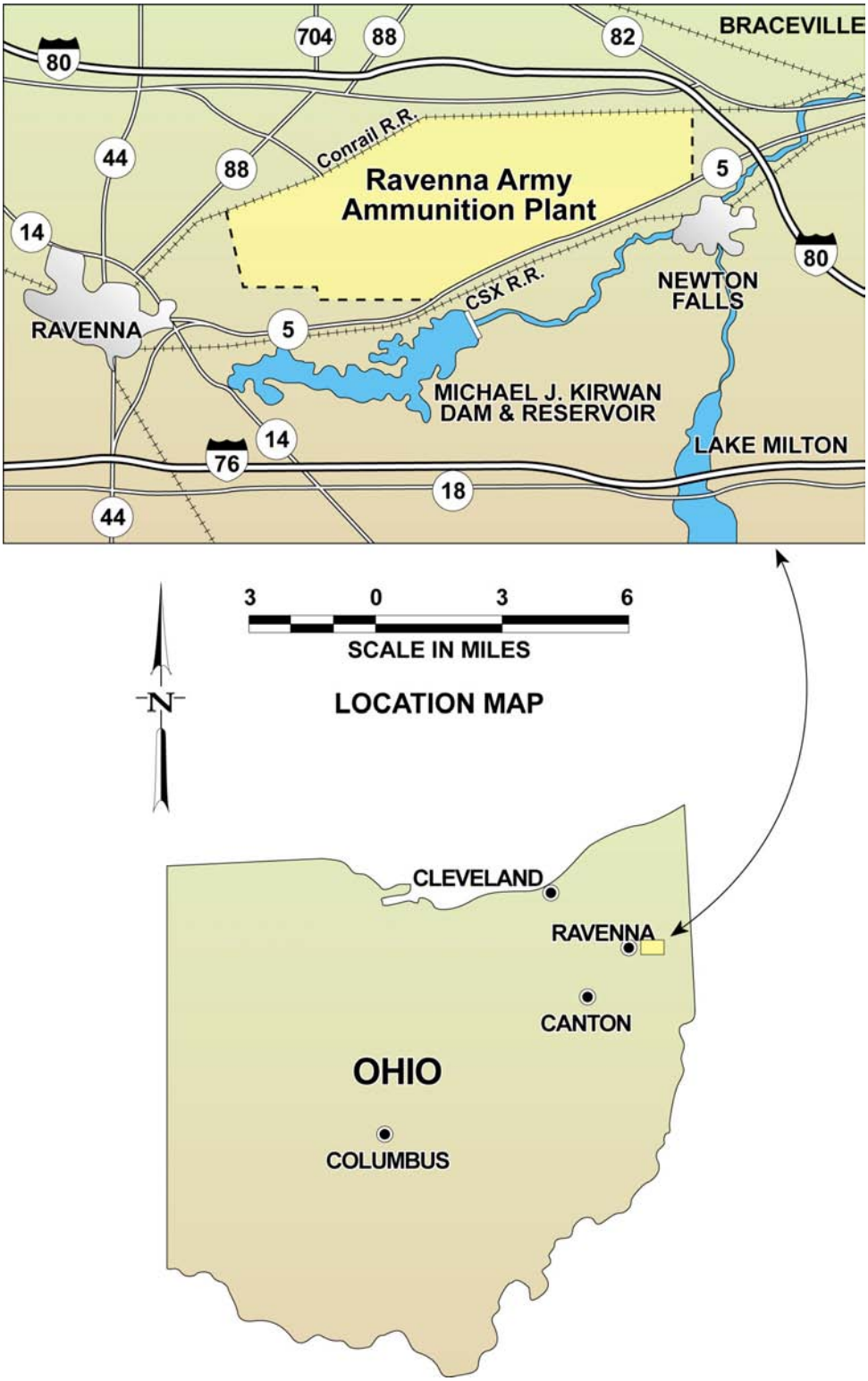

Figure 1-1
Site Locus Map

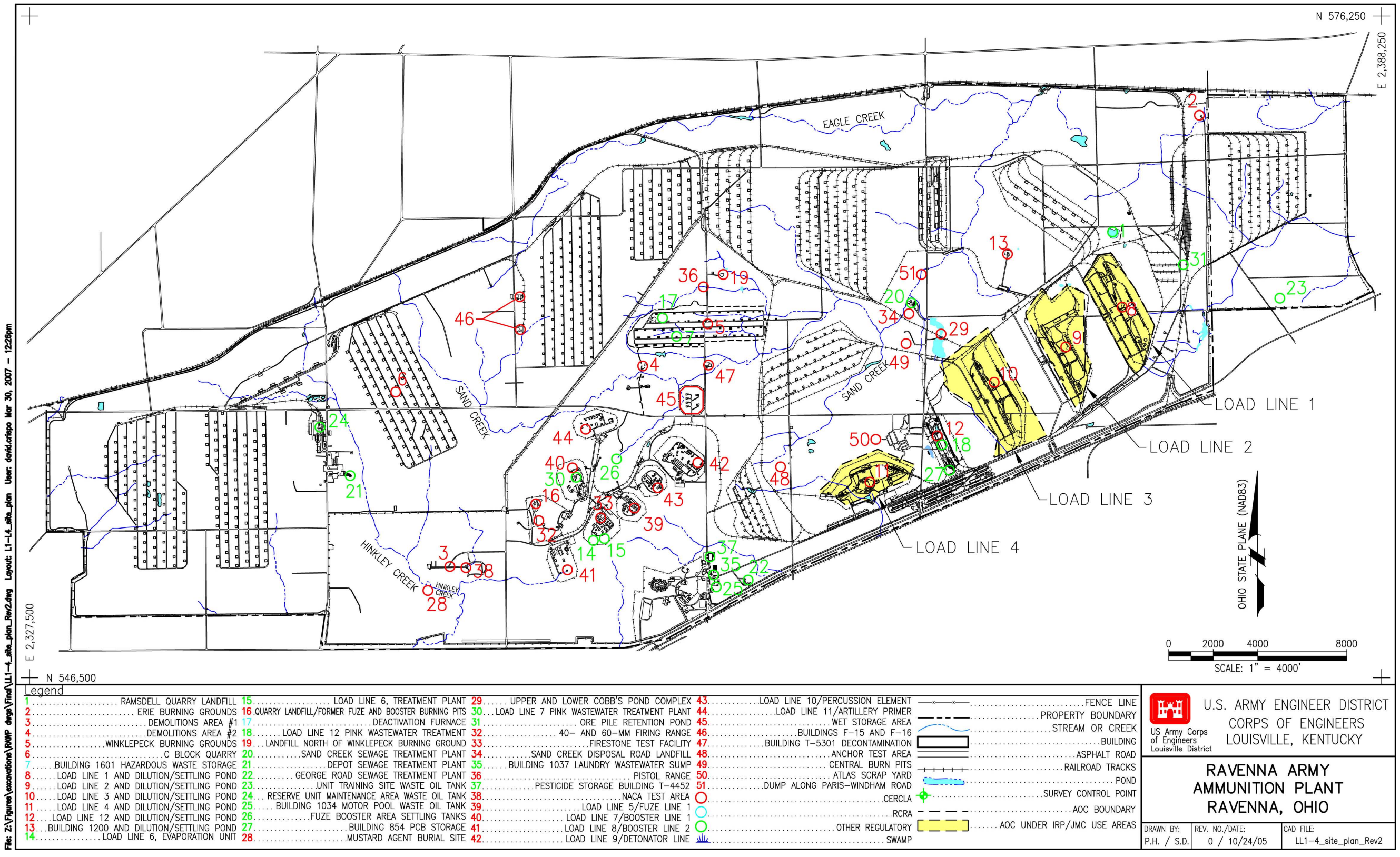

Figure 1-2
RVAAP Facility Map

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Various industrial operations associated with the munitions loading process and munitions rehabilitation activities were also conducted during the operation of LLs 1-4. As a result of these operational activities, soils, sediments and other media became contaminated with explosives.

In 1951, soils contaminated with accumulated explosives were removed from LL 1 and replaced with clean fill. No other remedial actions, except salvage and building demolition activities, have been conducted at LLs 1-4.

The RVAAP has been inactive since 1992. The only activity still being carried out from the wartime era is the infrequent demolition of munitions and explosives of concern (MEC) found at the RVAAP. The Army has completed the salvage activities and demolition at LL 1, with the exception of floor slabs and foundation, and his initiated similar activities at LLs 2-4.

1.3 NATURE AND EXTENT OF CONTAMINATION

The summary of the nature and extent of contaminated shallow soils and dry sediment for which this RAWP has been prepared is based on the Remedial Investigation (RIs) for LLs 1-4 (SAIC 2003; Shaw 2004b, 2004c, 2004d). Evaluation and data collected for LLs 1-4 during the Phase I and II RIs show that historical operations have resulted in contamination of shallow soils and dry sediment primarily in the vicinity of former production buildings and in various settling tanks and drainage ditches near those buildings. The wash water from the floors and walls that contained contaminants infiltrated into the soils around the buildings, drained into the network of storm sewers, or was directed by surface flow through channels to surface water. The constituents of concern (COCs) include inorganics, explosives, polychlorinated biphenyls (PCBs) and semivolatile organic compounds (SVOCs). Based on evaluations conducted during the RIs, explosives are mobile in water and can leach from the soils. Inorganics, PCBs and polynuclear aromatic hydrocarbons (PAHs) are not expected to readily leach from soils. Contamination varied considerably within each load line by type and frequency of contaminant detected, concentration and depth. Based on the RI data, LL1 is the most contaminated (i.e., widest variety of contaminants detected, highest frequency of COC detection, and highest COC concentrations) and LL 4 is the least contaminated of the four load lines. In addition to the COCs, MEC consisting of smokeless powder propellant nodules have been identified in surface soils at LL1.

The soil and sediment contamination detected at LLs 1-4 is generally surficial in nature, between ground surface and three (3) feet below ground surface (bgs). The likelihood of migration is minimal for inorganics, PCBs and SVOCs identified as the COCs. Explosives may leach from soils via infiltration. Areas of soil at LLs 1-4 with concentrations that exceed the applicable cleanup levels and that will require removal are shown in the figures provided in **Appendix A**. In all, the estimated quantity of soils and dry sediments to be removed is 15,000 cubic yards (Shaw 2005).

Human and environmental receptors may be exposed to the COCs in soil through inhalation, ingestion or direct contact. However, the potential for human exposure to contaminants migrating from RVAAP is mitigated by inactivity at RVAAP, the lack of permanent residents on RVAAP and the low population density on adjacent private properties.

1.4 SELECTED REMEDY

The Final Interim ROD (Shaw 2007) prepared for the LLs 1-4 at the RVAAP documents the selected remedy for surface and subsurface soils and dry sediment. The selected remedy is a final remedy for contaminated soils and dry sediment at LLs 1-4 and was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended, 42 U.S.C. t 9601-9675.

The selected remedy consists of excavation of contaminated surface and subsurface soils and dry sediment from discrete areas and permanent disposal in a Resource Conservation and Recovery Act (RCRA)-permitted landfill as a non-hazardous, hazardous or Toxic Substances Control Act (TSCA) waste depending on type and levels of contamination. Confirmatory samples will be submitted for laboratory analyses to confirm COCs exceeding the clean-up criteria have been removed. Approved fill is to be placed back into the excavated areas and the AOCs will be restored to pre-excavation topography. This alternative supports the planned future land use by the NGB for mounted training (no digging).

2.0 PROJECT TEAM

This project will be executed under the direction of the Program/Project Manager, Dave Cobb. Shaw maintains a small, focused program staff dedicated to the RVAAP that provides cost/schedule support and client invoicing services. Additionally, Shaw maintains numerous technical resource groups from which the Project Manager draws technical resources for project execution. This section identifies key members of the project staff and their respective roles in the project. Section 4.4 of the Project Management Plan (PMP) (Shaw 2004a) further defines the project-dedicated team organized to implement the activities discussed in this plan, illustrates primary "chain of command" and identifies key positions responsible for the execution of the overall project. The responsibilities listed in the PMP (Shaw 2004a) for each of the key contractor personnel are directly related to the activities discussed in this RAWP. Key project positions are identified and assigned as follows:

Project/Program Manager - The Project/Program Manager will serve as the point of contact (POC) for the USACE on all program issues, as well as Task Order-specific issues as they may arise. Mr. Cobb as the Project/Program Manager will ensure that contractual obligations are observed. He will be responsible for interactions with USACE Louisville District and will provide support with regulatory negotiations. Mr. Cobb or his designee in the field will coordinate with the BRAC contractors working in nearby areas. Additionally, Mr. Cobb will conduct a monthly review of project costs, schedule and general progress. Mr. Cobb will be responsible for the planning, execution and completion of the task order.

Technical/Regulatory Lead – The Technical/Regulatory Lead will serve as a regulatory expert to ensure compliance with all applicable Federal, State and Local regulations for the duration of the project. The Technical/Regulatory Lead will be Mr. David Crispo. Mr. Crispo will coordinate and monitor field activities and will correspond regularly with the Project Manager. Mr. Crispo will also conduct regularly scheduled inspections at the LLs 1-4 during field activities and document observations.

Transportation and Disposal Coordinator – The Transportation and Disposal (T&D) Coordinator will serve as the coordinator for disposal of all types of excavated soils to be disposed of off-site. The T&D Coordinator will be Mr. Greg Norden, a Certified Hazardous Materials Manager.

Health and Safety Officer – The Health and Safety (H&S) Officer has prepared the Safety, Health and Emergency Response Plan (SHERP) (Shaw 2004e) and associated addenda for the site and will conduct periodic site inspections to ensure compliance with the SHERP (Shaw 2004e). The H&S Officer is Mr. James Joice, a Certified Industrial Hygienist (CIH). Mr. Joice will be responsible for assigning the onsite Site Safety and Health Officer (SSHO) to perform day-to-day oversight of the remediation activities.

Contract Administrator – The Contract Administrator will be responsible for procurement, invoicing, subcontractor approval, financial reporting and subcontractor closeout. The Contract Administrator is Ms. Molly Donnellan.

Field Superintendent – The Field Superintendent will manage field work, be responsible for execution of the field activities, and responsible for implementation of the SHERP for Shaw and its subcontractors. The assigned Field Superintendent will have extensive experience with excavation and disposal, storm water management, and military site remediation and shall be named prior to mobilizing for the remedial action activities.

Subcontractors - Shaw will hire several subcontractors to execute portions of the project. Tasks to be subcontracted may include non-hazardous, hazardous and TSCA waste disposal, debris removal, implementation of structural support measures, site survey work, laboratory analysis and remediation construction activities. Shaw will solicit bids from Small Business and Small Disadvantaged Businesses (SB/SDB) firms to maximize Small Business content and meet contract goals. Selection of subcontractors will be based on most qualified for the task required as determined by Shaw and will require acceptance conditional on satisfactory performance.

3.0 DESCRIPTION OF ACTIVITIES

This section details construction tasks that will be performed during the cleanup at each of the LLs. These tasks are grouped into 15 items:

- Pre-Mobilization;
- Mobilization and Site Preparation;
- Pre-Excavation Foundation Slab Inspection;
- Excavation;
- Field Screen Sampling;
- Confirmatory Sampling;
- Material Handling and Transport;
- Decontamination;
- Site Restoration;
- Groundwater Monitoring;
- Schedule;
- Management and Meetings;
- Construction Completion Report;
- Post-Construction Maintenance and Inspection Activities; and
- Five-Year Review Support

The activities will be performed in accordance with the aforementioned referenced documents and the Final Interim ROD (Shaw 2007) to ensure specific environmental protection requirements during construction activities are met.

3.1 PREMOBILIZATION

Prior to mobilizing to the RVAAP, Shaw will acquire the required permits, plan and coordinate traffic routes, perform a pre-construction survey, identify any remaining utilities and conduct a pre-construction meeting with the RVAAP Team members. Shaw will review the Pre-Mobilization Checklist in **Appendix B** to ensure all the applicable requirements are met prior to mobilizing to the RVAAP.

3.1.1 Required Permits/Clearances

The Shaw Field Superintendent or designee will verify that all-applicable permits, notifications, and approvals have been obtained prior to mobilization. Special attention will be made to ensure activities to be performed near environmentally sensitive areas will be coordinated with OHARNG, the RVAAP Facility Manager and the Ohio EPA in accordance with Federal, State and local regulations. At a minimum, Shaw will be required to comply with the requirements of the Ohio EPA Authorization for Storm Water Discharges Associated with Construction Activity under the National Pollution Discharge Elimination System (NPDES) per the Ohio

Administrative Code (OAC) Rule 3745-38-06, as part of the permit requirements for the proposed remedial action activities.

3.1.2 Traffic Coordination and Routing

Shaw will establish transportation routes for incoming and outgoing vehicles and heavy equipment to minimize the impact to the RVAAP and surrounding community. The proposed truck routes will reflect the shortest egress from the load lines to the primary roadway (State Route 5) wherever possible. Haul routes will not be positioned to require removal of mature vegetation or encroachment on wetland areas. In order to expedite off-site transport of excavated soils, Shaw is considering utilizing Post 20 gate on LL2 Road since it is the most direct access to State Route 5 from LLs 1-4. If this gate is to be used, Shaw will coordinate the security requirements for proposed activities at the RVAAP, including operation of the Post 20 gate, with the RVAAP operating contractor, MKM Engineering, Inc. (MKM) and Post 1. It may be necessary to revise traffic routes based on unexpected site conditions. In the event alternative routing will be required, Shaw will notify the appropriate parties. The transportation routes for trucks during the load out phases of the construction activities are provided in **Figure 3-1**. Additional waste load out activities are discussed in further detail in **Section 3.7**.

3.1.3 Pre-Construction Survey

Once the notifications and community relations' requirements are in place, a preconstruction survey will be performed to document initial conditions at each of the load lines. The pre-construction survey shall include a detailed inspection of road surfaces a minimum of several weeks before operations commence. Photographs and video footage of the preconstruction site conditions will be collected as part of the pre-construction survey. The results of any follow-up surveys after operations end will be compared to the information identified during the pre-construction survey.

3.1.4 Utility Clearances

Prior to intrusive subsurface activities, the designated on-site personnel will review available subsurface geophysics details and facility plans and mark out and identify any subsurface utilities for clearance in accordance with Shaw Standard Operating Procedures (SOP) HS-308 included in **Appendix C**. All infrastructure organizations or utility related agencies, including the Ohio Utilities Protection Services, which may potentially have utilities in the vicinity of each area, will also be contacted.

3.1.5 Pre-Construction Meeting

Prior to commencing activities at RVAAP, Shaw will conduct a pre-construction meeting to include members of USACE, Ohio EPA, OHARNG, RVAAP, the Shaw project team and any contractors that will be working in the proximity of Shaw efforts. The pre-construction meeting will communicate client and contractual expectations to the project team, establish internal expectations, define and communicate all project requirements and ensure that the project/team members understand their individual roles and responsibilities. The pre-construction meeting shall be coordinated and conducted by the Shaw Project Manager or his designee and a pre-construction meeting agenda will be provided to the applicable parties in advance of the

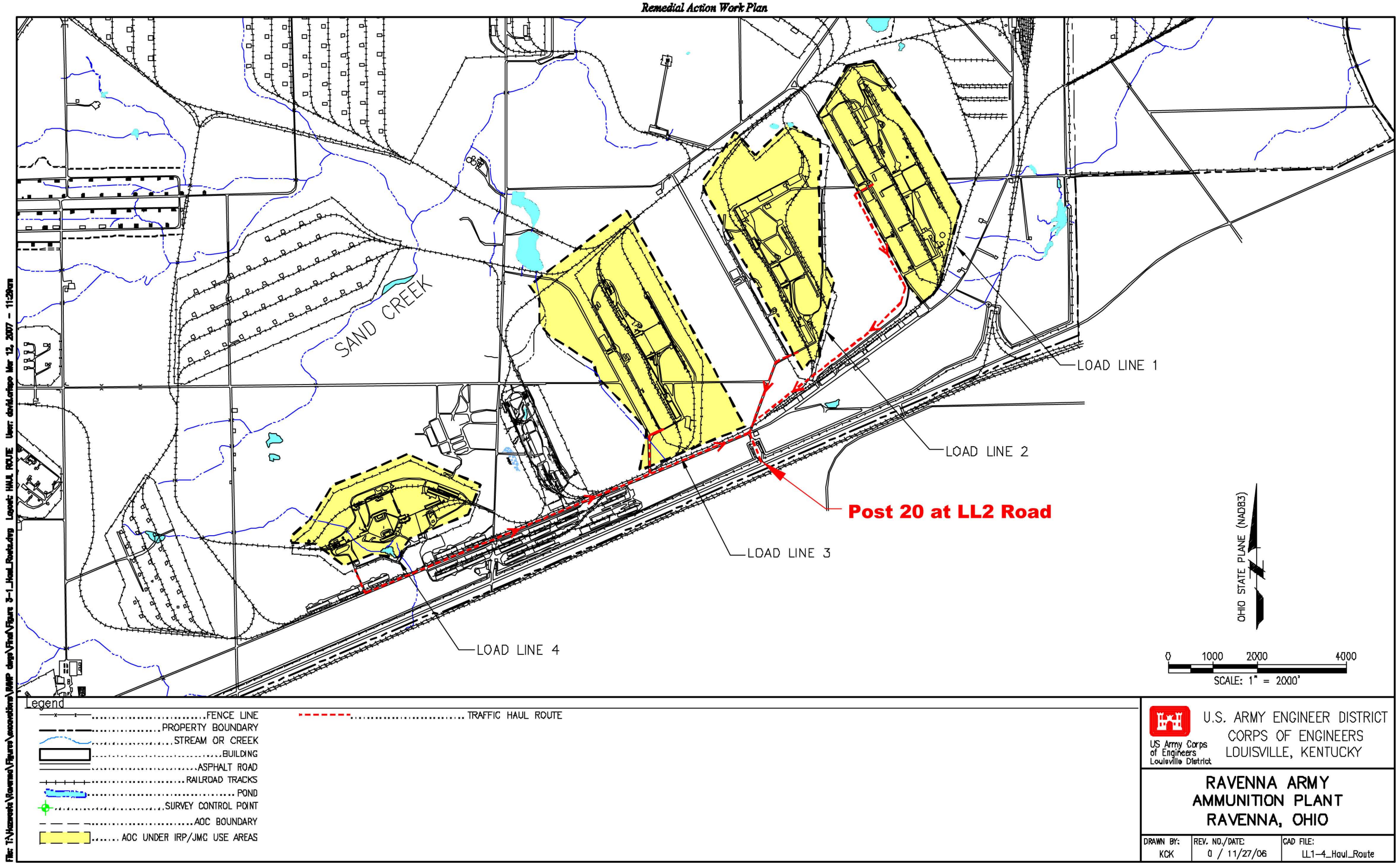

Figure 3-1
Haul Route Traffic Plan

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scheduled meeting. Following the kick-off of the pre-construction meeting, Shaw will participate in the RVAAP weekly coordination meetings during construction activities which are typically held on Mondays.

3.2 MOBILIZATION AND SITE PREPARATION

After pre-mobilization requirements are completed, equipment and personnel will be mobilized to the RVAAP areas to prepare and organize for remedial activities. During mobilization, communication protocols will be established to insure effective communication between the on-site personnel. As part of mobilization and site preparation activities, Shaw will review the Mobilization Checklist in **Appendix B** to ensure that all applicable requirements are met prior to commencing work activities.

All personnel will be trained and have all necessary certifications in accordance with the SHERP (Shaw 2004e). The tasks for mobilization and site preparation include, but are not limited to, the following:

- Verify utility layout as established during the pre-mobilization phase (see **Section 3.1.4**);
- Review the Activity Hazard Analysis (AHA) for the activities to be conducted for that day with site personnel in accordance with the SHERP (Shaw 2004e);
- Inspect and transport construction equipment to the site (see **Section 3.4.2**);
- Prepare lay down and parking areas to receive field trailers, heavy equipment, personal vehicles, and miscellaneous materials and supplies;
- Install temporary facilities and set up the multi-increment laboratory (see **Section 3.2.1**);
- Establish traffic control and post construction signs (see **Section 3.2.2**);
- Coordinate site security with Post 1 (see **Section 3.2.3**);
- Install erosion and sediment (E&S) control measures (see **Section 3.2.4** and **Section 4.0**);
- If necessary, implement support measures for damaged or deteriorated structures that may impact the work (see **Section 3.2.5**);
- Perform removal of debris piles from areas that may impact work (see **Section 3.2.6**);
- Clear and grub in and around the excavation limits, if necessary (see **Section 3.2.7**);
- Locate and establish a source of water usage or truck water on-site (see **Section 3.2.8**);
- Set up soil stockpile areas (see **Section 3.7.1.1**);
- Set up decontamination facilities for vehicles exiting controlled areas (see **Section 3.8**);
- Implement hazardous work permits in accordance with the SHERP (Shaw 2004e) and the corresponding SOPs included in the SHERP Appendices; and
- Establish air, industrial hygiene, personnel, and environmental monitoring operations in accordance with the SHERP (Shaw 2004e) (see **Section 3.2.9**).

The subsequent paragraphs provide further discussion on these items.

3.2.1 Temporary Facilities

To satisfy the requirements of this RAWP and the SHERP (Shaw 2004e), temporary facilities include, but are not limited to: office trailers, portable control access and dress out sheds, male and female sanitary facilities, hand wash stations, sufficient lighting equipment, traffic control barriers and devices, and water storage facilities. These temporary facilities will placed at locations to be designated by the RVAAP Facilities Manager. Where temporary facilities use land previously transferred to NGB, approval from the RTLS commander is required. Temporary power will also be provided to those facilities requiring power to operate. Communications will consist of handheld radios and cell phones. In addition, Shaw will establish the laboratory at a location to be determined by the RVAAP Facility Manager for the preparation of multi-increment samples.

3.2.2 Sign and Barricade Placement

Shaw will utilize signs and barricades to effectively communicate safety requirements, identify hazardous areas and to provide traffic directions to key locations at the RVAAP. Shaw will place these signs and barricades in visible locations and will update and maintain the sign and barricade placement as necessary.

3.2.2.1 Safety Signs

Safety signage is important to keep constant visual reminders of the work conditions in front of personnel. Safety signs will be placed at the entrances to the hazardous work areas and will identify the physical hazards of concern and the required personal protective equipment (PPE) and training needed to enter each area.

3.2.2.2 Traffic Control Signs

A traffic control plan for pedestrian and vehicle access to each of the load lines will be developed and shall be understood by all responsible parties before the site is occupied. Site-specific traffic control plans for each of the load lines will be developed to assure that adequate consideration is given to the safety of motorists, pedestrians, and workers during construction. All traffic control devices used on the project will conform to Department of Transportation (DOT) applicable standards. Signs will be placed along the proposed traffic routes and at each load line for vehicles and heavy equipment entering and exiting to ensure that traffic flows without impedance.

3.2.2.3 Barricading

Before beginning any work that may present potential hazards to individuals, the areas will be inspected to determine the extent of barricading and/or the type of barricade required. The Shaw SSHO must be notified if barricades on roadways impede the passage of emergency vehicles. A barricade must be placed guarding all access routes to a hazard where a person could:

- Inadvertently enter a hazardous areas;
- Be unaware of required safety equipment or permission for entry;
- Be uncertain of the safe distance of observation;
- Be working on an activity and accidentally enter into the actual hazard

Barricades must have barricade tags posted around the perimeter that identify the nature of the hazard. The tag shall have the name and phone number of the person who erected the barricade along with date. Rigid wood, metal, or plastic barricades must be used whenever there are openings in excess of 18 inches. Battery powered flashers shall be placed in roadways on all sides subject to vehicular traffic as necessary to clarify transportation routes. Barricades in dark areas must have visible warning lights. When the hazard no longer exists, the barricading material must be removed and disposed of or stored properly.

3.2.3 Site Security

Once mobilization begins, site security will be established and coordinated with the RVAAP security and RVAAP operating contractor, MKM, at Post 1 in accordance with Section 11.0 of the Shaw Project Coordination Plan (PCP) (Shaw 2006a). Site security is intended for the protection of the general public and site workers, as well as for the security of site equipment and materials.

Shaw will be required to submit a roster of all personnel and subcontractors who will be working at the RVAAP to MKM at least one week in advance. This roster must be maintained and submitted to MKM on a weekly basis. All personnel approved to enter the RVAAP must provide government issued identification (driver's license, passport, etc) in order to enter. Any person required to work within an AOC at the RVAAP will be required to provide adequate training documentation to include the following:

- 40-Hour Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations (HAZWOPER)Training; and
- Current 8-Hour annual OSHA HAZWOPER Refresher Training

In addition, at least one person working within an AOC must possess current First Aid and Cardio Pulmonary Resuscitation Training. Documentation of these training requirements must be submitted to MKM prior to entering an AOC to perform work.

Any person with a felony conviction will not be allowed to enter the RVAAP. Visitors and contractors are required to sign a roster with times of arrival and departure from the RVAAP and specify area where work will be performed at the RVAAP.

RVAAP security (MKM) must be notified 24-hours in advance for deliveries to the RVAAP. Trucks are subject to search by RVAAP security at any time. Personnel are expected to observe posted speed limits at the RVAPP or a default of 35 miles per hour (mph) during daylight hours and 25 mph at night. Shaw is exploring the option of utilizing Post 20 at LL2 Road for off-site transportation of materials since this gate is more centrally located within the proximity of LLs 1-4. If the post is used Shaw will coordinate the management and staffing with MKM.

The use of two-way radios and cell phones are permitted at the RVAAP; however, personnel should have a backup form of communication in the event service is not provided in the area of work. Shaw shall coordinate with RVAAP security to ensure that contact with Post 1 is maintained at all times.

Shaw will mark all work zones, in accordance with the Security, Emergency Response and Contingency Plan (SERCP) (Shaw 2004f), with any of the following: high-visibility fence, roping, caution tape, signage, or temporary construction fencing. Appropriate warning signs will be posted throughout the site to enhance pedestrian and driver safety in the work area and to help establish both controlled zones and site hazards as discussed in **Section 3.2.2**.

3.2.4 Erosion and Sediment Control

The E&S controls will be installed prior to activities that have the potential to disturb soils and cause erosion and will be maintained for the duration of the excavation and restoration activities. These control features will be removed only after vegetation is established and disturbed areas are stabilized. Surface water will be collected or diverted away from excavations by grading, berming, silt fence, hay bales or pumping. E&S control details are presented in **Figure 4-1** and further discussed in **Section 4.0** of this RAWP. The proposed placement of the E&S controls is presented in the load line excavation drawings in **Appendix A**.

3.2.5 Implementation of Structural Measures

If necessary, Shaw is prepared to provide structural support to stabilize structures where proposed excavation activities will be conducted. The intended extent of the structural support measures is limited and the purpose is to provide enough safety measures for personnel and equipment working in the immediate vicinity of the compromised structures to perform the necessary removal action activities. Structures to be stabilized were identified during a structural assessment of the load line buildings conducted by a Shaw structural engineer prior to mobilizing to the field and are presented in the Structural Survey Report in **Appendix D**. In addition to implementing structural measures, Shaw will remove any accessible loose and overhanging debris that represent a potential health and safety threat to personnel during remediation activities. Any inaccessible overhanging debris or structures not considered to be an immediate safety threat will be monitored during remediation activities.

3.2.6 Debris Removal

Shaw will relocate any existing debris piles within the proposed work zones to a point nearest the excavation where it will not impact the remediation activities. The debris piles will be relocated within the load line in which the debris was removed and Shaw will approve the proposed locations with USACE and the RVAAP prior relocating the debris. Debris will be removed under a separate contracting action. If potential asbestos-containing material or other hazardous material is encountered, Shaw will stop disturbance of the debris piles immediately and notify RVAAP, USACE and Ohio EPA so that determination can be made by the Army as to how they want to proceed.

3.2.7 Clearing and Grubbing

Shaw will clear and grub only vegetation that impedes or interferes with the safe and effective implementation of the design and requirements of the site work. The removed vegetation will be consolidated at each load line and will be placed at points nearest the excavation where it will not impact the remediation activities.

3.2.8 Source of Water Usage

Potable water and water for onsite construction use, including equipment decontamination water, will be supplied by Shaw. Water for on-site construction use may be brought on-site on a daily basis or stored in designated temporary on-site storage tanks. The tanks will be appropriately labeled as "WATER FOR CONSTRUCTION USE ONLY" to prevent mixing with any other liquids that may be generated or stored on-site. Suitable analytical data will be provided for each water source and approval to utilize the water source must be received from the USACE Project Manager prior to transporting the water on-site in accordance with Section 4.3.2.2.4 of the Facility-Wide Sampling and Analysis Plan (FSAP) (SAIC 2001).

3.2.9 Dust Management

Control measures are necessary to prevent airborne releases of dust during earth moving activities. Of particular concern is contaminated dust that may expose workers and the public. As excavated soils dry, the soil is more prone to wind erosion and dispersion of fine soil particles.

The primary dust control measure is the application of a water spray to exposed soils. Shaw will supply all water using a water wagon or truck to contain water for dust suppression. Water will be sprayed on temporary soil piles, excavations, and re-vegetation areas. Only potable water obtained from a public water supply will be used for dust control. A non-toxic surfactant approved for use by the Ohio EPA, USACE and RVAAP may be applied to control dust as a secondary measure. Only enough potable water or approved surfactant will be used to wet the material. No runoff or areas of standing water will be created.

Dry soils that are to be excavated will be preconditioned with water to keep them moist to a depth of at least six (6) inches. Backfilled areas will be wetted with the water immediately after backfilling. Re-vegetation of landscape will be completed as soon as practical to retain moisture and to minimize wind erosion. All soils, contaminated, uncontaminated, and clean backfill, will be covered during storage, wetted as required, and covered during transport to prevent windblown conditions.

Visual and real-time monitoring for dust and COCs will be performed in accordance with the requirements of Section 8.0 of the SHERP (Shaw 2004e). Real-time monitoring for dust will be performed using Mini-Ram® dust monitors that will be strategically placed down-wind from the areas of excavation. Time-integrated air sampling may be performed during activities when real-time instrumentation indicates that exposures to personnel are suspected to be approaching established permissible exposure limits and threshold limit values (PEL/TLV) for target compounds. It will be the responsibility of each worker to observe his or her work area for the potential and actual generation of dust. Areas that show potential release of dust will be reported to the Shaw Field Superintendent, who will ensure that the water will be sprayed on the area to eliminate the potential for dust problems. The area may also be covered to stop dispersal of dust. If necessary, the work area will be reduced or work stopped until the dust can be controlled.

3.2.10 Protection of Existing Monitoring Wells

Prior to commencing construction activities at each load line, Shaw will identify existing monitoring wells that have the potential to be impacted by its construction activities. Construction fencing will be placed around the monitoring well locations to provide a visual reminder to workers and vehicle and equipment operators to maintain a safe working distance to prevent damage to the wells. If necessary, barricades (as discussed in **Section 3.2.2.3**) will be placed around the wells to ensure adequate protection.

3.3 PRE-EXCAVATION FOUNDATION SLAB INSPECTION

Prior to excavation activities, Shaw will perform an inspection of the foundation slabs at LLs 1-4 where structures have been previously demolished and the associated debris removed from the slabs by others. The Shaw personnel will inspect for cracks and orifices in the slabs that will allow infiltration of water to the soils beneath. Shaw will capture the initial conditions and locations of the cracks using photo documentation and the identified cracks will be prepared using cold patch or other watertight bonding agent to eliminate the infiltration pathway.

Concrete slabs will be inspected on a monthly basis at each load line while Shaw is performing construction activities to ensure no additional cracks attributable to the implementation of the proposed soil remedy are created. After construction activities have been completed by Shaw, slab inspections will be performed in conjunction with the planned groundwater sampling events to be performed by Shaw as discussed further in **Section 3.10**.

Shaw personnel performing the inspections shall document any deficiencies or additional cracking in a field log book and the Field Superintendent will post the results of the weekly inspections as part of the Daily Contractor QC Report process. Future maintenance and inspection activities to be conducted by Shaw for the foundation slabs following the completion of the Shaw construction activities are discussed further in **Section 3.14**.

3.4 EXCAVATION

Approximately 15,000 cubic yards of in-situ contaminated soil will be excavated and disposed off- site at a RCRA- or TSCA-permitted facility, as appropriate, as discussed in **Section 3.7** of this RAWP. The anticipated maximum depth of excavation at any of the LLs 1-4 is three (3) feet bgs. Excavations beyond the anticipated depth or adjacent to existing structures that may present a safety concern will be re-evaluated and discussed with the RVAAP Facility Manager prior to commencing or continuing excavation activities. Safe excavation methods such as sloping will be employed in any excavations that exceed a depth greater than four feet bgs or the bottom of an existing structure foundation footing. Building slabs and foundations will remain in place during excavation and will not be disturbed during Shaw activities. The proposed limits of excavation at LLs 1-4 are included in the **Appendix A** load line excavation drawings.

3.4.1 Designation of Work Zones Boundaries

Prior to initiating excavation activities, Shaw will establish the work zone boundaries by the placement of barrier fences and the appropriate signage. Temporary facilities including vehicle and equipment decontamination and personnel wash stations will be set up at the exit to each

work zone to ensure that contaminated soils are not tracked outside of the established work areas. The work zones are living boundaries and will be regulated to mitigate the potential for impact to non-contaminated areas but will allow authorized personnel the necessary area to conduct remediation activities. The size and configuration of these work zone areas may increase or decrease based upon conditions encountered in the field.

3.4.2 Soil Excavation at all Load Lines

Before any work is started, equipment and material checks will be performed in accordance with the SHERP (Shaw 2004e), by using such forms as the Heavy Equipment Inspection Form and the Daily Vehicle Inspection Form. As excavation proceeds, daily housekeeping and maintenance will be implemented. Standard dust, noise, and E&S control measures will also be implemented in accordance with this RAWP and the facility-wide field plans and associated addenda.

Excavation of contaminated material shall typically proceed in the following sequence and methodology:

1. Survey and stake the corners of the excavation design limits identified in the **Appendix A** load line excavation drawings. Excavation surveys will be performed utilizing a Trimble ProXRS (or approved equal) Global Positioning System (GPS) with an accuracy determination capable of within one meter.
2. Identify the sample location(s) within the excavation limits with the highest COC concentrations as presented in Appendix C of the Feasibility Study (Shaw 2005).
3. From the area of the highest COC concentration(s), initially, excavate an approximate 20-foot by 20-foot area and move outward from the assumed source location. The initial excavation area may increase or decrease as excavation activities progress depending on the trend results of field screen and confirmatory sampling. Excavate to the depth(s) identified in the load line excavation drawings in **Appendix A**.
4. After reaching the design limit of contamination or removal of “hot spot” areas, field test kits and/or screening equipment for the applicable COCs will be implemented as an initial check to determine whether all contaminated soils are removed as discussed in **Section 3.5**.
5. If field tests indicate that contaminated soils still remain, continue to excavate the remaining areas of contamination in accordance with the above methodology.
6. Pending field test results, multi-increment samples will be collected from the completed excavations for off-site confirmatory laboratory analysis to verify that contaminated soil above the clean-up criteria was removed in accordance with **Section 3.6**.
7. Excavated material may be stored temporarily on-site, or if already characterized and approved for disposal, directly loaded into dump trucks for off-site disposal. The excavated material that remains on-site at the end of each workday will be covered and secured prior to leaving the site in accordance with **Section 3.7.1.1**.
8. Perform as-built survey of the excavation area following the complete removal of contaminated exposed soil or dry sediments using the aforementioned GPS in Step 1.

9. Accumulated water encountered during construction (either from groundwater or storm water infiltration) will be pumped from the excavation and stored in labeled, DOT-approved 55-gallon drums or portable polyethylene tanks for determination of disposal options as discussed in **Section 3.7.2**.

3.4.3 MEC Removal at Load Line 1

In addition to the COCs that will require excavation at LLs 1-4, MEC consisting of smokeless powder propellant nodules have been identified in surface soils at two of the areas (soils adjacent to buildings CB-13B and CB-14) to be excavated at LL 1 (**Figure LL1-A** in **Appendix A**). The MEC must be segregated and removed from the soils as best possible before the soils can be transported for off-site disposal. Shaw will provide personnel specially trained in MEC handling, removal and disposal to be onsite during the proposed excavation of these materials. In general, soil excavation will be performed in accordance with the methodology discussed in **Section 3.3.2** along with the additional requirements discussed in the section.

Prior to commencing excavation activities, Shaw MEC personnel will inspect the identified areas at LL1 for the presence of visible propellants. Areas found to have propellant on the surface will be flagged for further inspection and propellant removal either during or just prior to excavation activities.

Once excavation at LL1 commences, Shaw MEC personnel will be assigned to observe the soil removal activities. MEC personnel will be responsible for inspecting excavated soils for the presence of propellants, identifying items suspected of being propellant nodules, and instructing Shaw field crew personnel as to how excavation activities will proceed so as to ensure the propellant material can be readily segregated for disposal.

Shaw MEC personnel will be responsible for the removal, handling and disposal of propellants encountered in LL1. If propellants are encountered, direction of the excavation will be guided by the MEC personnel until it is apparent that propellant material has been adequately removed to allow the required environmental excavation to proceed. Due to the small size of the nodules which are approximately ¼-inches in diameter and range in length from approximately ¼- to 1-inch, it will not be possible to remove all propellants from the soils. Any soils that contain residual propellant materials will be transported off-site for disposal to an approved facility.

Any recovered propellants will be transported by Shaw MEC personnel to storage magazine 7C4 at the RTLS, as approved by the OHARNG. The disposal of propellant collected during the project activities will take place at open burning/open detonation (OB/OD) Area 2 at the RVAAP (**Figure 1-2**). Shaw MEC personnel will dispose of the propellants by burning and will ensure that the propellants are contained during destruction and are not placed directly on the ground. Given the nature of the propellant identified for destruction, the expected small volume of material, and minimal release of contaminants in the air through the proposed non-detonation destruction activities, follow-up soil sampling would not be required. Procedures for disposal of the propellants will conform to RVAAP disposal requirements and those found in the military "Technical Manual of EOD Procedures, TM60A-1-1-31 (NAVEODTECHDIV 1997). Shaw will notify the OHARNG a minimum of 30 days in advance of planned storage of the propellants and will issue notification to the Ohio EPA when destruction of the propellants will occur in

accordance with the Ohio EPA Notification Procedures in Attachment A of the PCP (Shaw 2006).

Shaw issued an Explosives Safety Submission (ESS) and associated work plan that detailed the planned activities for handling of the propellant material at LL1. The USACE Military Munitions Center of Expertise approved the ESS but the requirement for the submission was subsequently waived by the U.S. Army Technical Center for Explosives Safety.

3.5 FIELD SCREEN SAMPLING

As discussed in Step 4 of **Section 3.4.2**, soil samples will be collected upon reaching the design limit of contamination or removal of "hot spot" areas and will be analyzed in the field using test kits and/or screening equipment for the applicable COCs. Unlike confirmatory sampling that will consist of multi-increment sampling for the entire excavation area, field screen samples will be collected at discrete location along the excavation floors and walls and the results will be used as a screening tool only to assess its ability in guiding remediation.

3.5.1 Sample Collection

Similar to the method used during the Shaw data gap analysis and additional sampling effort in November 2004, if explosives field analysis is required, then three soil or dry sediment samples will be collected from an approximate equilateral triangle with three-foot sides and composited. Samples requiring remaining analyses (metals and PCBs) will be collected from a single sample location. All field samples will be collected from the desired depth (0 to 1 foot) and handled with a stainless steel trowel or spoon and bowl (for compositing and homogenizing samples).

3.5.2 Sample Analysis

The proposed field screening and sampling methods are listed in **Table 3-1** for the COCs identified in the soils to be removed as part of the remedial action at LLs 1-4.

Table 3-1
Field Screening Methods for Constituents of Concern

Constituent of Concern	Field Screening Method
Arsenic, Lead, Manganese	Multi-Source XRF analyzer (SW-846 Method 6200)
2,4,6 TNT and RDX	Field Colorimetric Analysis (RVAAP SOP)
PCBs	Immunoassay Test Kit (SW-846 Method 4020)

Notes:
XRF – X-Ray Fluorescence
TNT – 2,4,6 Trinitrotoluene
RDX – Hexahydro-1,3,5-trinitro-1,3,5-triazine
SOP – Standard Operating Procedure
PCBs – Polychlorinated Biphenyls

These methods have been previously utilized as part of the data gap analysis and additional sampling effort conducted by Shaw in November 2004 and the applicable field screening method protocols and SOPs are referenced in the October 2004 SAP (Shaw 2004g) that was prepared for that effort. The field colorimetric analysis method for explosives is the only proposed screening method that has been approved for use at RVAAP by the Ohio EPA. Use of the screening tools as part of the remedial action will be based on correlation of the field data to laboratory data collected as part of the Shaw data gaps analysis and additional sampling event. Sampling and analytical requirements for field screen samples are included in **Table 3-2**.

3.5.3 Field Quality Control Sampling Procedures

Field Quality Control (QC) sampling procedures for field screen samples will consist of duplicate samples at a frequency of one per 10 samples collected as presented in **Table 3-2**.

3.5.4 Decontamination Procedures

Decontamination of equipment associated with the Shaw field screen sampling activities will be conducted in the same manner as described for non-dedicated and reusable sampling equipment in Section 4.4.2.8 of the FSAP (SAIC 2001). This equipment will be decontaminated after completion of sampling activities at each field screen soil or sediment sampling location.

3.6 CONFIRMATORY SAMPLING

Confirmatory samples will be collected from each of the excavation areas for soil or sediment using multi-increment sampling in accordance with the Guidance for Multi-Increment Sampling procedures included in Appendix A of the Shaw Field Sampling and Analysis Plan, Addendum No. 1 (FSP) (Shaw 2006b).

3.6.1 Sample Collection

As indicated in **Section 3.4.2**, excavation will begin in the area of the highest COC concentration(s) previously detected and will move outward from the assumed source location. Once field screen test results identify an excavation area to be below the applicable cleanup goals for the COC(s), multi-increment sampling will be obtained from a pre-determined number of stratified random sample locations from the excavation area using a $^{7}/_{8}$-inch stainless steel step probe (or approved equal) sample collection device. The random samples shall be placed into a plastic lined bucket and combined to make a single sample. Each multi-increment sample will consist of random samples combined from the floor and sidewalls of the excavation areas. In general, 20 random samples will be collected from excavation areas less than 100 square feet (sq. ft.) and 30 random samples will be collected from excavation areas greater than 100 sq. ft. Excavation areas significantly larger than 100 sq. ft. may be divided into smaller and more manageable areas to be sampled. Determination for dividing excavation areas greater than 100 sq. ft. will be made based on field conditions. It is expected that the areas assumed to be more heavily impacted will be divided into smaller sampling areas to allow for a more accurate evaluation of residual COCs in soils. Any changes in the number of random sample points to be collected as part of multi-increment sampling will be require approval from USACE and the Ohio EPA.

Table 3-2
Soil and Sediment Sampling Analytical Requirements

Parameter	Methods	Field Screen	Multi-Increment	Disposal Characterization[a]	Borrow Source
Field TNT/RDX Screening	Field Colorimetric (RVAAP SOP)	X			
Field Metals Screening	SW-846, 6200	X			
Field PCBs Screening	SW-846, 4020	X			
VOCs, TCL	SW-846, 5030/8260B/LCG				X
SVOCs, TCL	SW-846, 3540/8270C/LCG				X
Pesticides, TCL	SW-846, 3540/8081A/LCG				X
PCBs	SW-846, 3540/8082/LCG		X		X
Explosives	SW-846, 3540/8330/LCG		X		X
Propellant/Nitro-glycerine	SW-846, 3540/8330/LCG		X		X
Propellant/Nitro-guanidine	SW-846, 3540/8330 Modified/LCG		X		X
Propellant/Nitro-cellulose	MCAWW 353.2 Modified		X		X
Metals, TAL	SW-846, 6010B/6010A/7471/LCG		X		X
TCLP VOCs	SW-846, 1311/8260			X	
TCLP BNA	SW-846, 1311/8270C			X	
TCLP Herbicides	SW-846, 1311/8151			X	
TCLP Pesticides	SW-846, 1311/8081			X	
TCLP Metals	SW-846, 1311/6010			X	
TCLP Mercury	SW-846, 1311/7470			X	
pH	SW-846, 9040/9045			X	X
Reactivity	SW-846, 7.3.3.2 SW-846, 7.3.4.1			X	
Flash Point	SW-846, 1010			X	
Quality Control Requirements					
	Field Duplicate Samples	10% (1 per 10)			
	Sampler Rinsates[b]		1 per day		
	Trip Blanks[b]		1 per cooler with VOC sample only		
	MS/MSD[b]		5% (1 per 20)		

Notes:
[a] The parameters for disposal characterization will ultimately be determined by disposal facility requirements.
[b] This type of quality control sample to be collected for samples submitted for laboratory analysis only.
TNT – 2,4,6 Trinitrotoluene
RDX – Hexahydro-1,3,5-trinitro-1,3,5-triazine
SOP – Standard Operating Procedure
PCBs – Polychlorinated Biphenyls
VOCs – Volatile Organic Compounds
TCL – Target Compound List
LCG – Louisville Chemistry Guidelines
SVOCs – Semi-Volatile Organic Compounds
MCAWW – Method for Chemical Analysis of Water and Waste
TAL – Target Analyte Compounds
TCLP – Toxicity Characterization Leachate Procedure
BNA – Base/Neutral/Acid
MS/MSD – Matrix Spike/Matrix Spike Duplicate

The plastic bag in which each multi-increment sample is collected will be secured, labeled and delivered to the RVAAP multi-increment laboratory at Building 1036 for drying and processing. Samples may also be shipped to an approved off-site laboratory for drying and processing. If an off-site laboratory is to be used, it shall require USACE and Ohio EPA approval prior to being utilized.

Once dried and processed, a multi-increment sample may be analyzed for PCBs, explosives compounds (RDX and TNT) and metals consisting of manganese, arsenic and lead. The chemical analysis for each multi-increment sample will be based on the COC(s) identified for the excavation area from which the multi-increment sample was collected. Sampling and analytical requirements for multi-increment sampling is included in **Table 3-2**.

Additional soils may be required to be removed based on the results of the multi-increment samples. The confirmatory sample process will continue until the soil to remain in place meets the applicable cleanup levels. All final excavation corners will be surveyed and documented prior to backfilling using a GPS with an accuracy determination capable of within one meter.

3.6.2 Field Quality Control Sampling Procedures

Duplicate samples will be collected during the collection of multi-increment sampling procedures. As part of the multi-increment sampling activities, Shaw will collect two types of QC samples consisting of duplicates and equipment rinsate blanks in accordance with Section 8.1 of the FSP (Shaw 2006b). Duplicate samples, will be collected at a frequency of 10% of the field samples collected per load line or a minimum of one sample per contaminant to be analyzed per load line. Matrix spike/matrix spike duplicates (MS/MSD), MS/MD in the case of metals, will be collected at a frequency of 5%. Equipment rinsate blanks will be collected at a frequency of one per day per load line. Quality Assurance (QA) samples will be collected and analyzed by the respective agencies. Field QC requirements for multi-increment sampling are included in **Table 3-2**.

3.6.3 Decontamination Procedures

Decontamination of equipment associated with the Shaw multi-increment soil sampling activities will be conducted in the same manner as described for non-dedicated and reusable sampling equipment in Section 4.4.2.8 of the FSAP (SAIC 2001). This equipment will be decontaminated after completion of sampling activities at each multi-increment soil or sediment sampling location.

3.7 MATERIAL HANDLING AND TRANSPORT

Two primary waste streams will be generated during excavation activities; solid and liquid wastes. Waste characterization will determine if a waste is hazardous or non-hazardous and will dictate the disposal option and facility where the waste will be disposed. All waste disposal and transport will be performed in accordance with sampling requirements of the FSP (Shaw 2006b) and the handling and management requirements of the Waste Minimization and Management Plan (WMMP) (Shaw 2006g) and as discussed in this section.

3.7.1 Solid Wastes

Solid wastes to be generated as part of this removal action will at a minimum consist of contaminated soils and dry sediments and expendable wastes such as PPE and sampling equipment. Demolition debris, if encountered, will be managed and stockpiled separately from excavated soils and will be removed under a separate contracting action. Contaminated material removed from small excavations will be stockpiled on-site. Contaminated material removed from large excavations may be pre-characterized and loaded out directly to the extent possible. All handling of contaminated and solid waste materials will be performed in accordance with the Shaw WMMP (Shaw 2006g).

3.7.1.1 Stockpiling at the Site

Excavated soils to be stockpiled will be stored on-site temporarily prior to transporting to an approved disposal facility. It is anticipated that excavated soils to be stockpiled will be dry and will not require potential leaching management following placement in stockpiles. Excavated soils will be stockpiled based on the anticipated COCs previously identified for each area of contamination as soils with different COCs may require alternate disposal facilities. If not already analyzed for waste disposal options, soil stockpiles are anticipated to be 1,000 cubic yards or less in order to ensure adequate waste characterization in accordance with the FSP (Shaw 2006b). The soil stockpiles may be larger if generated soil is adequately characterized from the RI (SAIC 2003; Shaw 2004b, 2004c, 2004d) data or from pre-excavation waste characterization sampling.

If possible, stockpiles will be staged on existing asphalt or concrete to minimize any potential impact to underlying natural materials. At a minimum, stockpiles will be staged on two layers of 10-mil poly liner and covered with a minimum of one-layer of 10-mil poly. The cover will be secured to prevent wind damage to the cover and stockpile.

Storm water controls for the protection of the stockpile areas will be performed in accordance with **Section 4.0** of this RAWP. Hay bales or soil berms will be placed around the perimeter of the stockpiles to prevent storm water runoff or run-on. Any storm water collected in the stockpile areas will be contained and disposed in accordance with WMMP (Shaw 2006g).

Stockpiles will be inspected daily to ensure they are properly secured and repaired or replaced in order to maintain integrity of the cover in accordance with the WMMP (Shaw 2006g). Items found to be deficient will be corrected immediately to prevent potential release of stockpiled soil. Inspections will be performed and documented in accordance with the requirements of Section 11.5 in the Quality Assurance and Management Plan (QAMP) (Shaw 2006d).

3.7.1.2 Stockpile Sampling

If not pre-characterized prior to excavation, the soil stockpiles will be sampled and analyzed for waste disposal parameters in accordance with the requirements of the FSP (Shaw 2006b) and the WMMP (Shaw 2006g). It is anticipated the soil stockpiles will be sampled at a frequency of one per 1,000 cubic yards or a minimum of one sample per stockpile if a stockpile contains less than 1,000 cubic yards. Disposal facility requirements will ultimately dictate the sample frequency

for the soil stockpiles. Sampling and analytical requirements for solid waste sampling, including QC requirements, is included in **Table 3-2**.

3.7.1.3 Load-Out to the Disposal Facility

Contaminated soils that are stockpiled awaiting off-site disposal or to be direct loaded for off-site disposal will follow similar procedures for load-out. Soil will be loaded into trucks in designated areas only with adequate spill control measures, including equipment to catch and contain spillage, and equipment necessary to recover spillage and clean the area. Dust control measures will be implemented as necessary during loading. Disposable sheeting will be placed on the ground around trucks to catch any incidental spillage during loading.

Before loading, trucks will be inspected and surveyed for damage and residual contamination by Shaw personnel. Inspections will be conducted from the ground only using a pole with mirror to inspect truck beds and other areas.

Materials will be loaded into the transport vehicle in a uniform manner and distributed over the full length of the vehicle. Once loading is complete, trucks will be inspected from the ground for loose or escaping soil or leaching water before leaving the load-out area. The load will then be covered with a tarp or other suitable covering using an automated pull-over mechanism from within the truck cab or a manual hand-crank. Only authorized personnel will perform the inspection and all truck drivers will be directed to remain in their vehicle until the vehicle has been properly decontaminated and has left the load-out area. Vehicle tires will be washed prior to leaving the load-out area to minimize tracking of soils to other areas within and outside each load line. As for similar work being conducted at the RVAAP by other contractors, trucks will be weighed at a nearby off-site truck-weighing station prior to transporting soils to their final destination. The proposed truck-weighing station is the One-Stop Truck Stop at Route 80 located approximately seven miles east of the RVAAP.

Federal DOT regulations will be followed during transport activities. The soil will be DOT classified based on direct sample results or on previously collected data. The labeling requirements outlined in the WMMP (Shaw 2006g) will be followed to meet all appropriate placards, bill of lading, and letter of approval requirements to transport contaminated soil from the RVAAP.

3.7.2 Liquid Waste

Liquid waste at a minimum will consist of precipitation accumulated in protected areas (excavation and stockpiles), decontamination fluids, field analysis test kit residuals and monitoring well development and purge liquids. Liquid wastes will be segregated by waste streams. Decontamination fluids that contain acid or methanol rinses and test kit residual liquids will be collected and disposed off-site. Precipitation and monitoring well development and purge liquids will be collected and pumped directly into labeled, DOT-approved 55-gallon drums or polyethylene tanks. Liquid wastes will be disposed off-site based on waste characterization analysis with the exception of purge and development waters from the monitoring wells and rain water that accumulates on plastic sheeting, etc. These liquids may be discharged to ground surface only after analytical results are obtained and approval is received from Ohio EPA, USACE and the RVAAP. Any ground surface discharges are subject to strict state, federal and

RVAAP-specific discharge conditions. Liquids wastes shall be generated and handled in accordance with the requirements of the Shaw WMMP (Shaw 2006g).

3.7.3 Waste Disposal

Off-site disposal facilities will be selected based on waste characterization data collected from the applicable waste stream. Based on waste characterization results, excavated contaminated soils and dry sediment and soils that contain propellants could require special handling and disposal at a RCRA Subtitle C- or TSCA-permitted hazardous waste landfill. It is anticipated that the majority of soils containing metals do not exceed Toxicity Characteristic Leaching Procedures (TCLP) limits and, therefore, will not require stabilization prior to off-site shipment. If waste characterization results determine soil to be non-hazardous, it may be disposed at a local Subtitle D landfill.

Hazardous waste will be transported off-site to an approved hazardous waste treatment, storage or disposal facility within 90 days of the accumulation start date on each container or stockpile. Shipments of waste will be coordinated through MKM, the RVAAP operating contractor. All hazardous wastes will be shipped off-site and records will be maintained in accordance with the WMMP (Shaw 2004h).

3.8 DECONTAMINATION

Upon completion of the excavation and prior to restoration activities, decontamination of small tools and equipment shall be performed at each controlled area. Heavy equipment will be thoroughly decontaminated to remove all loose soil from buckets, tracks, and undercarriage prior to leaving the controlled area. Decontamination methods to be implemented may range from wet brush washing to steam cleaning depending on the extent of residual soils on the equipment. Temporary decontamination pads capable of collecting wash water, including overspray, and loose soil shall be constructed to avoid cross-contamination of clean areas during decontamination procedures.

As discussed in **Section 3.2.8**, Shaw will provide all water for construction use, including decontamination of heavy equipment. Suitable analytical data will be provided for each water source and approval to utilize the water source must be received from the USACE Project Manager prior to transporting the water on-site in accordance with Section 4.3.2.2.4 of the FSAP (SAIC 2001). Water to be used for non-dedicated sampling equipment decontamination purposes is separate from the water for construction and decontamination use and must be American Society of Testing and Materials (ASTM) Type I per the requirements of Section 4.4.2.8 the FSAP (SAIC 2001).

3.9 SITE RESTORATION

Backfill and restoration will take place at each excavation area following the receipt (and approval by Ohio EPA) of laboratory confirmatory soil sample results indicating that material with concentrations of COCs exceeding the applicable clean-up criteria had been removed. Restoration will consist of backfilling with clean soil from on or off-site sources that has passed the chemical and physical requirements outlined in the RVAAP facility-wide plans. Shaw will collect a borrow source sample at each source prior to bringing the material to the RVAAP and

will collect additional samples for every 5,000 cubic yards of material to be utilized by Shaw from that source. Shaw will regularly inspect the condition of the soils to be brought on-site and may require additional sampling if a change in soil conditions are observed. Shaw may utilize fill material from multiple borrow sources and will collect soil samples at the frequency discussed from all sources. Sampling and analytical requirements for borrow source sampling is included in **Table 3-2**.

Site restoration will be performed to return the disturbed areas to prior conditions and will be "replace-in-kind" unless otherwise noted. A minimum of 2 inches of topsoil or mulch will be placed at areas requiring re-vegetation. There are no anticipated changes to site elevation or drainage features. Re-vegetation of disturbed areas will be conducted in accordance with the requirements of the RTLS Integrated Natural Resources Management Plan (INRMP) and as discussed in **Section 4.4.2** of this RAWP. Only native species as identified in the INRMP will be applied. At a minimum, annual rye will be placed to provide a quick temporary cover. The annual rye may be mixed with other more permanent species to provide long-term cover once the annual rye dies off. No non-natives species will be introduced. Shaw will coordinate the required seed mixes with the RTLS Environmental Supervisor prior to mobilizing.

3.10 GROUNDWATER MONITORING

Shaw will perform groundwater sampling from selected existing monitoring well locations at LLs 1-4 to ensure the remedial activities did not further impact groundwater. Prior to remediation activities, baseline groundwater samples will be collected at the selected well locations in order to determine pre-remedial conditions. Following the completion of the remedial action at the LLs, groundwater samples will be collected semi-annually for the first two years. The sample frequency, thereafter, will be reviewed by the Ohio EPA and requirements for further sampling will be based on laboratory results of the previous groundwater sample rounds. Groundwater sampling will be discontinued when concentrations of COCs meet the goals of the agreed upon exit strategy (Shaw 2005). Groundwater sampling activities shall be performed in accordance with the requirements of the FSAP (SAIC 2001) and the Shaw FSP (Shaw 2006b). Further details regarding the groundwater monitoring activities, including a description of the wells, well locations and justification for sampling is presented in **Table 3-3.** The proposed monitoring well locations are shown on the load line excavation drawings in **Appendix A**.

3.10.1 Well Redevelopment

Some of the proposed well locations are not currently included in the Facility-Wide Groundwater Monitoring Program (FWGWMP) and have not been sampled for several years; therefore, redevelopment of some of these wells may be required as part of Shaw's groundwater monitoring program. Prior to sampling, Shaw will measure the depth of sediment thickness at each well. If greater than 10% of the screen interval is measured as silted (i.e., greater than one-foot of sediment thickness for a 10-foot screen interval) then the well will require redevelopment. Any monitoring wells requiring redevelopment will be accomplished using one of the following non-dedicated devices; a bottom discharge/filling Teflon® or stainless steel bailer, a submersible pump, or a peristaltic pump as described in Section 4.3.2.3.11.1 in the FSAP (SAIC 2001).

Table 3-3
Base-Line and Post-Construction Monitoring Well Descriptions

Well	Monitoring Zone	Total Depth (ft below TOC)	Screen Length (ft)	Selection Rationale
Load Line 1				
LL1mw-067	Bedrock	25.6	10	Site-wide/LL1 D.G. well
LL1mw-078	Bedrock	41.1	10	Site-wide/LL1 D.G. well
LL1mw-081	Bedrock	41.9	10	D.G. of Bldg CB-4
LL1mw-082	Bedrock	41.8	10	D.G. of Bldg CB-4A
LL1mw-084	Bedrock	39.3	10	D.G. of Bldg CA-6A
LL1mw-085	Bedrock	44.7	10	D.G. of Bldg CB-20
Load Line 2				
LL2mw-262	Bedrock	22.6	10	LL2 D.G. well
LL2mw-263	Bedrock	22.2	10	LL2 D.G. well
LL2mw-266	Bedrock	23.1	10	Within LL2 area
LL2mw-267	Bedrock	22.9	10	Adjacent to Bldg DB-4 sump
LL2mw-269	Bedrock	31.2	10	LL2 D.G. well
Load Line 3				
LL3mw-236	Bedrock	26.2	10	D.G. of Bldg EA-6
LL3mw-238	Bedrock	23.4	10	LL3 D.G. well
LL3mw-239	Bedrock	36.8	10	LL3 D.G. well
Load Line 4				
LL4mw-196	Unconsolidated	22.0	10	LL4 D.G. Well
LL4mw-197	Unconsolidated	23.4	10	LL4 D.G. Well
LL4mw-198	Unconsolidated	23.8	10	LL4 D.G. Well

Notes:
TOC – Top of Casing
COPCs – Chemicals of Potential Concern
D.G. – Down Gradient

3.10.2 Field Measurements

Groundwater field measurements to be collected as part of Shaw's groundwater sampling activities will include determination of static water level, pH, conductivity, dissolved oxygen concentrations and temperature in accordance with Section 4.3.3 in the FSAP (SAIC 2001). Shaw shall utilize a combination meter designed to measure the aforementioned parameters. Initial head space readings will also be collected at each well location utilizing a photo-ionization detector unit. The collection of field measurements will comply with the performance requirements as specified in Table 4-3 of the FSAP (SAIC 2001).

3.10.3 Purging Methods

Monitoring well purging and groundwater sampling will be conducted using conventional well purging with a Teflon® bailer or micro-purging using a bladder or submersible pump as described in Section 4.3.4 in the FSAP (SAIC 2001). Regardless of the methodology used, purging will continue until pH, conductivity, dissolved oxygen and temperature have reached equilibrium. Equilibrium will be established by three consecutive readings, where one well casing volume is purged between each reading; however, purging will be terminated before

establishment of equilibrium if one of the following conditions is met: (1) five well volumes have been removed; or (2) the well is purged to dryness.

If a monitoring well is purged to dryness, sampling will be delayed for a time period of up to 24 hours to allow for recharge. During the delay period, the atmosphere of the well will be isolated to the greatest extent possible form the surface atmosphere. Upon sufficient recharge of groundwater into the well, a sample will be collected without additional well purging. If sufficient well recharge (i.e., 90% of initial water level within 4 hours) does not occur within 24 hours after the initial purging, USACE and Ohio EPA will be contacted for guidance.

In order to minimize the quantity of investigation-derived waste liquids generated due to the well purging activities, wells will be micro-purged where conditions permit in accordance with Ohio EPA technical guidance (Ohio EPA 1995). All development and purge groundwater will be containerized and managed as liquid wastes as discussed in **Section 3.7.2** of this RAWP. Discharge of these liquids directly to the ground surface is not allowed unless adequately characterized and approved for discharge by Ohio EPA, USACE and the RVAAP.

3.10.4 Sample Collection

Groundwater sampling at a monitoring well location will begin immediately after purging is completed unless the well is purged to dry conditions (see **Section 3.10.2** above) and will be performed in accordance with sections 4.3.5 and 4.3.6 of the FSAP (SAIC 2001). Groundwater samples will be collected for analysis of the full suite of COCs including VOCs, SVOCs, PCBs, pesticides, explosives, propellants and filtered target analyte list (TAL) metals. Bottles designated for VOC analysis will be filled first and in a manner so than no headspace remains. Immediately after collection of each sample and completion of bottle label information, each sample container will be placed in a sealed plastic bag and then will be placed in an ice-filled cooler to ensure preservation (Portage 2004). Requirements for the sample containers and preservation techniques for groundwater samples are presented in Section 4.0 Quality Assurance Project Plan (QAPP) portion of the FSAP (SAIC 2001). Sampling and analytical requirements for multi-increment sampling is included in **Table 3-4**.

When a bailer is used, the device will be lowered slowly until it contacts the groundwater surface, allowed to sink and fill with a minimum of surface disturbance, and raised slowly to the surface. The collected sample will then be slowly poured into a decontaminated sample container.

When a bladder or submersible pump is used, the device will be lowered slowly until it contacts the groundwater surface and then will be continued to be lowered until it reaches the midpoint of the well screen. The pump will be turned on and allowed to operate until a steady flow of groundwater is expelled from the Teflon® return line at the ground surface. The discharge line will not be allowed to touch any interior portion of the decontaminated sample container or the sample matrix within the container.

Table 3-4
Groundwater Sampling Analytical Requirements

Parameter	Methods
VOCs, TCL	SW-846, 8260B/LCG
SVOCs, TCL	SW-846, 3520/8270C/LCG
Pesticides, TCL	SW-846, 3520/8081A/LCG
PCBs	SW-846, 3520/8082/LCG
Explosives	SW-846, 3520/8330/LCG
Propellant/Nitro-glycerine	SW-846, 3520/8330/LCG
Propellant/Nitro-guanidine	SW-846, 3520/8330 Modified/LCG
Propellant/Nitro-cellulose	MCAWW 353.2 Modified
Filtered Metals, TAL	SW-846, 6010B/6010A/7471/LCG
Quality Control Requirements	
Field Duplicate Samples	10% (1 per 10)
Sampler Rinsates	1 per day
Trip Blanks	1 per cooler with VOC sample only
MS/MSD	5% (1 per 20)

Notes:
VOCs – Volatile Organic Compounds
TCL – Target Compound List
LCG – Louisville Chemistry Guidelines
SVOCs – Semi-Volatile Organic Compounds
PCBs – Polychlorinated Biphenyls
MCAWW – Method for Chemical Analysis of Water and Waste
TAL – Target Analyte Compounds
MS/MSD – Matrix Spike/Matrix Spike Duplicate

3.10.5 Filtration Procedures

For Shaw groundwater activities, filtered samples will only be collected for dissolved TAL metals. Filtration will be performed using a disposable 0.45-µm pore size filter assembly and filters will be replaced as they become restricted by solids buildup as well as between sample collection sites. The method used for collection of filtered groundwater samples will depend on whether a bailer or micro-purging is used for sample collection in accordance with Section 4.3.5 of the FSAP (SAIC 2001).

3.10.6 Field Quality Control Sampling Procedures

As part of the groundwater monitoring activities, Shaw will collect three types of QC samples consisting of duplicates, equipment rinsate blanks and trip blanks in accordance with Section 4.3.7 of the FSAP (SAIC 2001). Duplicate samples, will be collected at a frequency of 10% of the field samples collected per load line. This sample frequency applies to MS/MSDs as well. Equipment rinsate blanks will be collected at a frequency of 10% or one per day per field samples collected at each load line. Trip blanks will consist of a sealed container of ASTM Type I water and will be placed into each cooler used to transport field samples for VOC analysis. QA samples will be collected and analyzed by the respective agencies.

3.10.7 Decontamination Procedures

Decontamination of equipment associated with the Shaw groundwater sampling activities will be in accordance with the procedures presented in Section 4.3.8 of the FSAP (SAIC 2001).

3.11 SCHEDULE

The current project schedule (as of March 2007) is included in **Appendix E** and anticipates the completion of all field activities within 90 days of site mobilization. The schedule is presented in bar chart form and is organized sequentially by task, includes task numbers and task/subtask names, durations and identification of predecessor and successor tasks.

In order to effectively achieve the schedule, Shaw anticipates mobilizing a minimum of two crews to work on the load line areas simultaneously and all field activities will be conducted in a safe and efficient work manner. Additional crews may be added or reduced based on work load availability or to maintain cost efficiency.

The project schedule is based on an estimated excavation volume of 15,000 cubic yards with potential hazards, impedances and COCs previously identified. Changes in any of these conditions have the potential to impact the project schedule. Contingencies associated with potential schedule impacts are presented in Section 4.3 of the PMP (Shaw 2004a).

3.12 MANAGEMENT AND MEETINGS

Shaw will coordinate work at the LLs 1-4 through periodic project meetings with USACE, Ohio EPA and the RVAAP to review progress, schedule and to discuss and resolve any issues. The frequency of meetings is anticipated every two weeks throughout the duration of construction activities and may be increased or decreased depending on the level of activity.

3.13 CONSTRUCTION COMPLETION REPORT

Following the nearing of completion of remedial activities at LLs 1-4, Shaw shall work with USACE, Ohio EPA, OHARNG and the RVAAP to develop a “punch list” of all items that need correction or completion before the work can be accepted under the requirements of a final inspection. The final inspection will ensure that remediation has been performed in accordance with the RAWP and meets final cleanup goals.

Once the punch list is finalized and a final inspection has been approved by the aforementioned parties, a Remedial Action Report will be provided to USACE, OHIO EPA, RVAAP, BRAC, OHARNG, NGB and the Army Environmental Center (AEC) per CERCLA requirements. The Remedial Action Report will include as-built drawings of the remediated areas, describe the remedial activities conducted and techniques and materials used, tests and measurements performed, any significant modifications to the project as described in this RAWP and results of the final inspection.

3.14 POST-CONSTRUCTION MAINTENANCE AND INSPECTION ACTIVITIES

The existing concrete slabs and building foundations will remain in-place after building demolition by others and may be considered as environmental protection barriers as they may

provide a barrier from precipitation infiltration to impacted soils beneath the slabs. After the completion of construction activities, Shaw will perform inspections of the exposed foundation slabs at LLs 1-4 to assess their integrity until removed. Inspections will be conducted on a semi-annual basis for the two years following construction activities in conjunction with the semi-annual groundwater sampling events. After two years, inspections of the floor slabs and foundations will be performed in conjunction with the revised frequency of the groundwater sampling event to be determined by Ohio EPA.

3.15 FIVE-YEAR REVIEW SUPPORT

Five year reviews of LLs 1-4 will be required following the completion of the Shaw soil remediation activities since the proposed interim remedy will not result in unrestricted use. Shaw is not contractually responsible for conducting five-year reviews for LLs 1-4; however, Shaw will provide any pertinent related information required for the five-year review that will include the results of groundwater monitoring and foundation slab inspections.

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4.0 STORM WATER POLLUTION PREVENTION

This section specifies the E&S control requirements for Shaw to perform measures to prevent the erosion of soil and sediments and storm water runoff for the remediation activities to be performed at the LLs 1-4. As part of the RVAAP permitting requirements, Shaw will submit a Notice of Intent (NOI) application and associated fee to the Ohio EPA to obtain coverage under the Ohio EPA General Permit for Storm Water Discharges Associated with Construction Activities (Ohio EPA Permit No. OHC000002). The requirement for this General Permit is State law and mandatory for any project that disturbs one (1) or more acres of ground. This permit is separate from the industrial storm water monitoring program/permit that the RVAAP currently possesses. Shaw will prepare the NOI for BRAC signature, the agency responsible for management of environmental AOCs at the RVAAP. This section has been prepared in accordance with the requirements for a Storm Water Pollution Plan (SWP3) per Ohio EPA Permit No. OHC000002 and implements best management practices (BMPs) that are the minimum criteria for the overall control of soil and sediment erosion and storm water runoff during construction activities.

4.1 SURFACE FEATURES AND TOPOGRAPHY

Cultural surface features at the LLs 1-4 include asphalt and gravel access roads, man-made ditches, sanitary sewer lines, manholes, rail beds and buildings. The main process area at each load line is heavily vegetated with rough grass and scrub vegetation between the major structures at the load lines. Scrub vegetation and immature hardwoods characterize the non-production areas around the main process areas. Moderately mature hardwoods exist along outlying areas of the load lines (SAIC 2003; Shaw 2004b, c, d).

4.2 SOILS AND GEOLOGY

The soils and geology at the RVAAP have been previously studied with the results presented in detail in the RIs (SAIC 2003; Shaw 2004b, c, d). A general summary of the RVAAP soils and geology are presented in this section.

The regional geology at RVAAP consists of horizontal to gently dipping bedrock strata of Mississippian and Pennsylvannian age overlain by varying thickness of unconsolidated glacial deposits. Bedrock at RVAAP is overlain by deposits of Wisconsin-aged Lavery Till in the western portion of the facility and the younger Hiram Till and associated outwash deposits in the eastern portion. Unconsolidated glacial deposits vary considerably in their character and thickness across the RVAAP, with deposits absent in some of the eastern portion of the facility to an estimated 150 feet in the south-central portion.

Soils at RVAAP are generally derived from Wisconsin-aged silty clay glacial till. Much of the native soil at RVAAP was reworked or removed during construction activities in operational areas of the installation. In general, the soils at the load lines are poorly drained and consist of silty clay or clay loam formed over glacial till. Runoff is typically medium to rapid and the soil is seasonally wet.

4.3 ENVIRONMENTALLY SENSITIVE AREAS

The entire RVAAP facility is situated within the Ohio River Basin, with the West Branch of the Mahoning River representing the major surface stream in the area. This stream flows adjacent to the western end of the facility, generally from north to south, before flowing into the Michael J. Kirwan Reservoir that is located to the south of State Route 5. The West Branch flows out of the reservoir along the southern facility boundary before joining the Mahoning River east of the RVAAP.

The western and northern portions of the RVAAP are characterized by low hills and dendritic surface drainage. The eastern and southern portions are characterized by an undulating to moderately level surface, with less dissection by surface drainage. Numerous wetland areas occur on the facility. Three primary watercourses drain RVAAP; the South Fork of Eagle Creek, Sand Creek and Hinkley Creek.

Approximately 50 ponds are scattered throughout the installation. Many were built within natural drainage ways to function as settling ponds or basins for process effluent and runoff. Others may be the result of glacial or beaver activity. All water bodies at the RVAAP support an abundance of aquatic vegetation and are well stocked with fish. None of the ponds within the installation are used as water supply sources.

4.4 CONTROL METHODS

In general, erosion control will be accomplished by controlling runoff and then stabilizing soil. There are three basic methods that will be used to control soil movement at the site: runoff control, soil stabilization and sediment control. Controlling erosion shall be the first line of defense and will be implemented using runoff controls and soil stabilization. Sediment control may be necessary for larger disturbed areas at the LLs where it is harder or impractical to control erosion or where sediment particles are relatively large. Details of the proposed control methods are presented in **Figure 4-1**.

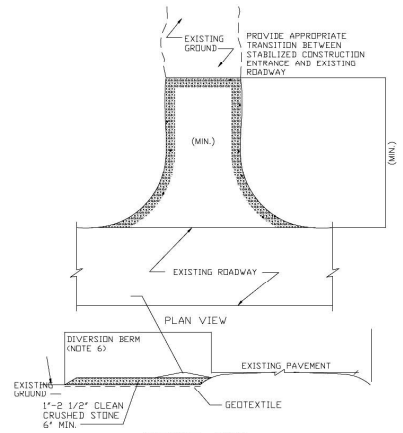
4.4.1 Runoff Control Practices

Runoff controls are necessary to prevent storm water or other overland flow sources at disturbed areas from entering or leaving a work area and to control the occurrence of gully, channel and stream erosion. In order to mitigate runoff, at each work location Shaw shall identify potential overland drainage routes. Runoff controls shall primarily consist of diversion structures and interception to enclosed drainage areas. Secondary controls may include conveyance to existing waterways and construction of stabilization outlets. Only water flow from precipitation events and not run-off from construction activities will be diverted to existing waterways. The implementation of these methods will depend on the location of the work and the potential for the release of contaminants, and requires prior approval by the Ohio EPA, USACE and the RVAAP.

4.4.1.1 Diversion Structures

Runoff that occurs in work areas shall be collected by diversion structures that are directed to enclosed drainage systems and pumped into 55-gallon drums or temporary storage tanks. The

Remedial Action Work Plan



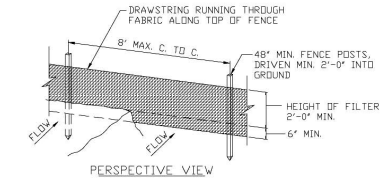
SECTIONAL VIEW

NOTES:

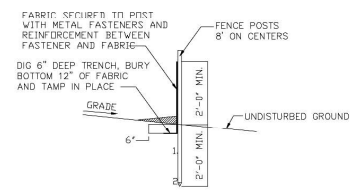
1. STONE SIZE - USE CRUSHED STONE, ASTM C-33, NO. 3 (1" - 2 1/2")
2. LENGTH - MINIMUM AS SHOWN IN DETAIL
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - MINIMUM AS SHOWN IN DETAIL
5. GEOTEXTILE - SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE MEETING A.A.S.H.T.O. M288-92
6. SURFACE WATER - ALL SURFACE WATER FLOWING TOWARD CONSTRUCTION ENTRANCES SHALL BE DIVERTED USING THE DIVERSION METHODS PRESENTED ON THIS FIGURE.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ON TO ROADS. THIS MAY REQUIRE ADDITIONAL TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ON TO ROADS MUST BE REMOVED IMMEDIATELY.
8. PERIODIC INSPECTION AND REQUIRED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.
9. REMOVE TEMPORARY STABILIZED CONSTRUCTION ENTRANCE ON COMPLETION OF WORK AND RESTORE AREA TO MATCH ORIGINAL CONDITION.

STABILIZED CONSTRUCTION ENTRANCE DETAIL

NOT TO SCALE



PERSPECTIVE VIEW



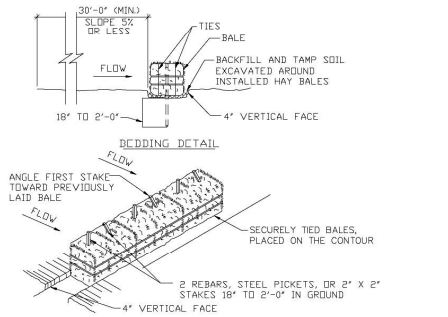
SIDE VIEW

NOT TO SCALE

NOTES:

1. SEDIMENT SHALL BE REMOVED FROM THE UPSTREAM FACE OF THE BARRIER WHEN IT HAS REACHED A DEPTH OF 1/2 THE BARRIER HEIGHT.
2. REPAIR OR REPLACE BARRIER/FABRIC, POSTS, BALES ETC.) WHEN DAMAGED.
3. BARRIERS SHALL BE INSPECTED DAILY FOR SIGNS OF DETERIORATION AND SEDIMENT REMOVAL.

SILT FENCE DETAIL



ANCHORING DETAIL

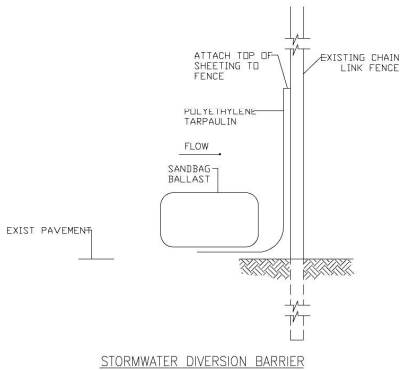
NOTES:

BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.

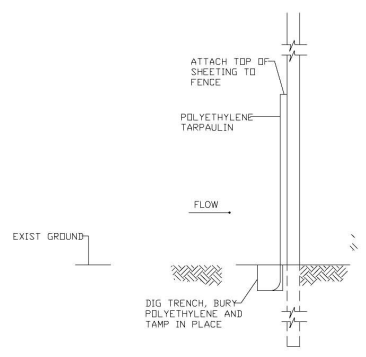
BALES SHALL BE SECURELY ANCHORED IN PLACE BY TWO STAKES OR REBARS DRIVEN THROUGH EACH BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.

HAYBALE DETAIL

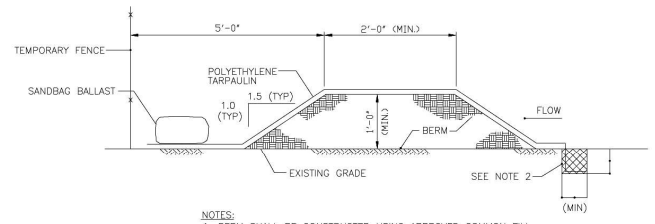
NOT TO SCALE



STORMWATER DIVERSION BARRIER TYPE 1



STORMWATER DIVERSION BARRIER TYPE 2



NOTES:

1. BERM SHALL BE CONSTRUCTED USING APPROVED COMMON FILL MATERIAL AND COMPACTED IN ACCORDANCE WITH SPECIFICATION.
2. DIG TRENCH, BURY 1' OF POLYETHYLENE, AND TAMP IN PLACE.
3. PROVIDE SANDBAG BALLAST AS DIRECTED BY THE SITE SUPERINTENDENT.

TEMPORARY EARTH DIVERSION BERM

US Army Corps of Engineers
Louisville District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE:
DCC	0 / 11/28/06	LL1-4_ES_Controls.dwg

File: T:\Hazwaste\Ravenna\Figures\excavations\RAWP dwgs\11-27-06\LL1-4_ES_Control.dwg Layout: EROSION & SEDIMENT CONTROLS User: Kevin.Kirmelewicz Dec 04, 2006 - 8:09pm

Figure 4-1
Erosion & Sediment Controls

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collected runoff will be analyzed for disposal options. If analytical results are acceptable, Shaw will discharge the collected runoff to ground surface following approval by the Ohio EPA, USACE, OHARNG and the RVAAP in accordance with the WMMP (Shaw 2006g) and subject to strict RVAAP discharge requirements.

Diversion structures consisting of temporary earth dikes and/or drainage swales shall be formed upgradient of construction areas where the volume of overland flow is such that it is necessary to divert flow around disturbed portions of the LLs. As a BMP, earthwork and other construction operations shall be conducted in a manner to prevent muddy water, eroded materials and other undesirable constituents of project construction waters being discharged through storm water runoff.

4.4.2 Soil Stabilization

Soil stabilization will be performed at disturbed areas and conveyance channels to control potential erosion of soils due to rain, sheet flow and rills. The purpose of soil stabilization is to protect surface areas and strengthen subsurface areas to minimize or prevent soil erosion. Soil stabilization methods will primarily consist of vegetative soil cover, non-vegetative cover and structural cover. The preferred method of soil stabilization is the placement of vegetative cover; however, non-vegetative and/or structural erosion control practices may be necessary when disturbed areas cannot be promptly stabilized with vegetation.

Vegetative soil cover will include the placement of temporary or permanent seed or the protection of existing vegetation from construction activities. Only non-invasive species will be used for temporary and permanent soil stabilization efforts and the type of seeding required for the various areas will be coordinated with the Ohio EPA, USACE, OHARNG and RVAAP. For non-vegetative cover, Shaw will place mulch in unprotected areas. Structural soil stabilization options will include land grading to provide erosion and runoff control.

4.4.2.1 Temporary Stabilization

Disturbed portions of each work area where the remediation activities have temporarily ceased shall be stabilized with temporary seed or mulch as presented in **Table 4-1.**

Table 4-1
Temporary Stabilization Requirements

Area Requiring Temporary Stabilization	Time Frame to Apply Erosion Controls
Any disturbed area within 50 feet of a stream and not a final grade	Within two (2) days of the most recent disturbance if the area will remain idle for more than 21 days
For all construction activities, any disturbed areas that will be dormant for more than 21 days but less than one year, and not within 50 feet of a stream	Within seven (7) days of the most recent disturbance within the area
Disturbed areas that will be idle over winter	Prior to the onset of winter weather

4.4.2.2 Permanent Stabilization

Disturbed portions of each work area where the remediation activities have permanently ceased shall be stabilized with permanent seeding or mulch as presented in **Table 4-2.**

Table 4-2
Permanent Stabilization Requirements

Area Requiring Permanent Stabilization	Time Frame to Apply Erosion Controls
Any area that will lie dormant for one year or more	Within seven (7) days of the most recent disturbance
Any areas within 50 feet of a stream and at final grade	Within two (2) days of reaching final grade
Any other areas at final grade	Within seven (7) days of reaching final grade within that area

All permanent vegetative cover shall be placed in consideration of RTLS requirements, adaptability to site conditions, aesthetics and natural resource values and maintenance requirements.

4.4.3 Sediment Control

Sediment control is necessary for the protection of areas down gradient of construction areas and off-site locations. The purpose of sediment control is to retain sediments that are generated as a result of soil erosion and storm water runoff. The primary method of sediment control to be implemented by Shaw is sediment barriers to consist of silt fence and/or hay bale dikes to be used solely or in conjunction with one another. These controls are presented in **Figure 4-1**.

To the greatest extent practicable, all soil disturbing activities at each of the LLs shall be minimized and shall proceed in a manner to reduce erosion and sedimentation. All earthwork, grading, movement of equipment, and other operations likely to cause siltation and tracking of sediments, shall be planned and performed in a sequence as to avoid pollution in adjacent waters. Clearing and grubbing activities shall be performed in a way that minimizes erosion and sedimentation.

4.4.3.1 Inlet Protection

Inlet protection will be used to filter sediment from surface water. Inlet protection will remain until the corresponding tributary area is stabilized or until permanent surfacing of the tributary drainage area is placed.

4.4.3.2 Silt Fence and Diversions

To protect nearby waterways and environmentally sensitive areas, silt fencing will be installed along the down gradient perimeter at all work areas. Silt fences may be constructed using filter fabric that shall be staked to provide a barrier to transport silts, fines and debris yet provides

passage of runoff. Selection and type of grade of fabric shall be made to allow adequate passage of water. Stakes used to construct silt fences shall be of wood with squared, butt ends and tapered driving points. Filter fabric shall be stapled or tied with jute twine to stakes. All filter fences shall be removed after their function has been fulfilled.

4.4.3.3 Stream Protection

If construction activities disturb areas adjacent to streams or nearby waterways, structural practices shall be designed and implemented to protect the streams or waterways from the impact of sediment runoff. No structural controls shall be used in the stream and Shaw shall maintain a minimum of a 25-foot buffer zone from the high-water mark of the surface water.

4.5 CONSTRUCTION SEQUENCE

The proposed sequence of construction activities and their anticipated start and end dates are included in the Schedule of Activities in **Appendix E**. It should be noted that these dates are subject to change and Shaw understands that a change in start date can cause restriction or prohibition in the use of the proposed measures that may require revisions to this plan. E&S controls will be constructed, stabilized and functional before general site disturbance within the tributary area to those controls. The construction sequence for the installation and implementation of erosion and sediment controls will generally commence, as follows:

1. If required, construct entrance road in accordance with plans and specifications. Immediately remove soil from RVAAP roadways if tracking is incurred.
2. Provide erosion control measures such as silt fence as required preventing soil erosion on roadways edges and roadside ditches.
3. Construct required diversion channels and berms to direct runoff to control structures.
4. Once control structures are functional, clear and grub upland areas and strip topsoil to stockpile areas as indicated in this RAWP. Clear and grub only areas that have downstream control structures established. Remove or dispose of debris in accordance with project specifications.
5. Stockpile excavated soil or fill material brought to the RVAAP at the soil stockpile and lay down areas shown on the plans in this RAWP.
6. Water that accumulates in open excavation(s) will be completely removed by pumping and stored in 55-gallon drums or a temporary water tight storage tank.
7. Permanently seed and stabilize slope and channels as soon as practical to prevent slope and channel erosion.
8. Maintain dewatering processes and erosion control guidelines throughout work period.
9. Place inlet protection at storm drains to be potentially impacted.
10. Once activity has ceased in disturbed areas that are to be seeded or stabilized, prepare and place appropriate seed mix, mulch, etc.
11. After final stabilization has been achieved, remaining temporary erosion and sediment pollution control facilities will be removed.

12. Should any measures contained within this plan prove incapable of adequately removing sediment from on-site flows prior to discharge or of stabilizing the surfaces involved, additional measures will be immediately implemented to eliminate such problems.

4.6 OPERATION AND MAINTENANCE OF CONTROL METHODS

E&S control measures will be monitored on a daily basis during all phases of construction to prevent soil migration. Corrective action will be taken if the operability of a control device is in question. Corrective measures will be required if inspections reveal excessive silt accumulation in storm water conveyances or along silt fences. Silt accumulation in erosion control structures will be removed. Silt fences will be inspected and any damaged silt fence will be repaired or replaced.

Sediment that is collected in the systems and removed shall be transported to soil stockpile areas and disposed as necessary. Paved streets along the load line haul route shall be maintained as required to remove any mud, dirt, rock or other materials originating from the work areas.

4.7 EROSION AND SEDIMENT CONTROL MANAGEMENT

Shaw will manage onsite E&S control activities in an effort to reduce the need for maintenance of structural controls, regrading of severely eroded areas, and reconstruction of failed controls. In conjunction with the implementation of the aforementioned E&S control methods, Shaw management activities will include the following:

- Physically mark the limits of land disturbance at the site with tape, signs or orange construction fence so that workers can see areas to be protected.
- Divert offsite runoff from highly erodible soils and steep slopes to stable areas.
- Clear only what is required for immediate construction activity.
- Initiate stabilization measures no later than 7 days after construction activity if a particular area has temporarily or permanently ceased unless activity will resume less than 21 days after activity has ceased.
- Provide and maintain stabilized entrances for construction vehicles to reduce dust emissions and soil and sediment tracking.
- Plant permanent seeding at optimal times of year (March through May and September through October). Type of seeding and seeding requirements to be coordinated with the RTLS Environmental Supervisor.
- Remove temporary sediment trapping devices only after permanent stabilization has been established on all contributory drainage areas.
- Make sure that all contractors and subcontractors understand these E&S requirements.
- Designate responsibility of the E&S requirements to one individual to be named prior to onsite mobilization.
- Establish and maintain an E&S inspection schedule that states the completion of identified repairs and maintenance items.

4.8 INSPECTIONS

Daily inspections will be performed in active work areas to ensure proper performance of run-on and run-off controls. A minimum of weekly and as-needed inspections will be made of inactive, non-vegetated, disturbed areas to ensure that the berms and sediment fences are functioning properly. Inspections will be made within 24-hours after any storm event greater than one-half inch of rain per a 24-hour period and on a daily basis during extensive periods of rainfall. Shaw shall assign only qualified inspection personnel that have knowledge and experience in the installation and maintenance of sediment and erosion controls to conduct inspections to ensure control practices are functional and to evaluate whether the SWP3 is adequate and properly implemented in accordance with the schedule or whether additional control measures are required.

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5.0 CONSTRUCTION QUALITY CONTROL

The construction quality control program outlined in the QAMP (Shaw 2006d) and associated addenda will be implemented for all activities described in this plan. The QC Program includes features of work presented in an inspection schedule that will be provided as a separate submittal. The inspection and testing processes will monitor the overall quality of work, and project controls will be instituted to assure correction of deficiencies identified during the inspections and testing. Project scheduling will be instituted to assure proper sequence and performance of work activities.

Changes to the QC program must be approved by the Ohio EPA, USACE, and RVAAP prior to implementation from an execution standpoint. Shaw will also require contractual approval from USACE prior to the implementation of any changes in the QC program.

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6.0 REFERENCES

1. Naval Explosive Ordnance Disposal Technology Division (NAVEOTECHDIV) 1997. Technical Manual of EOD Procedures, TM60A-1-1-31, Revision 1. December 31, 1997.
2. Ohio Environmental Protection Agency (Ohio EPA) 1995. Technical Guidance Manual for Hydrogeologic Investigations and Groundwater Monitoring.
3. Portage Environmental (Portage) 2004. Final Facility-Wide Groundwater Monitoring Program Plan for the Ravenna Army Ammunition Plant, Ravenna, Ohio. September 2004.
4. Science Applications International Corporation (SAIC) 2001. "Final Facility-Wide Sampling and Analysis Plan for Environmental Investigations at the Ravenna Army Ammunition Plant, Ravenna, Ohio". March 2001.
5. SAIC 2003. "Final Phase II Remedial Investigation Report for the Load Line 1 at the Ravenna Army Ammunition Plant, Ravenna, Ohio". June 2003.
6. Shaw Environmental, Inc. (Shaw) 2004a. Final Project Management Plan for the Remediation of Soils at Load Lines 1, 2, 3 and 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio. April 2004.
7. Shaw 2004b. "Final Phase II Remedial Investigation Report for Load Line 2 at the Ravenna Army Ammunition Plant, Ravenna, Ohio". July 2004.
8. Shaw 2004c. "Final Phase II Remedial Investigation Report for Load Line 3 at the Ravenna Army Ammunition Plant, Ravenna, Ohio". July 2004.
9. Shaw 2004d. "Final Phase II Remedial Investigation Report for Load Line 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio". September 2004.
10. Shaw 2004e. Final Safety Health, and Emergency Response Plan for the Remediation of Soils at Load Lines 1, 2, 3 and 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio. October 2004.
11. Shaw 2004f. Final Security, Emergency Response, and Contingency Plan for the Remediation of Soils at Load Lines 1, 2, 3 and 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio. October 2004.
12. Shaw 2004g. Final Sampling and Analysis Plan for the Data Gap Analysis and Additional Sampling in support of the Remediation of Soils at Load Lines 1, 2, 3 and 4 at the Ravenna Army Ammunition Plan, Ravenna, Ohio. October 2004.
13. Shaw 2005. Final Focused Feasibility Study for the Remediation of Soils at Load Lines 1, 2, 3 and 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio. May 2005.

14. Shaw 2006a. Final Project Coordination Plan, Structural Analyses and MEC Support at Load Lines 1, 2, 3 and 4, Ravenna Army Ammunition Plant, Ravenna, Ohio. October 2006.

15. Shaw 2006b. Final Field Sampling Plan Addendum No. 1 for the Remediation of Soils at Load Lines 1, 2, 3 and 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio. November 2006.

16. Shaw 2006c. Final Quality Assurance Project Plan for the Remediation of Soils at Load Lines 1, 2, 3 and 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio. November 2006.

17. Shaw 2006d. Final Quality Assurance and Management Plan for the Remediation of Soils at Load Lines 1, 2, 3 and 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio. November 2006.

18. Shaw 2006e. Final Data and Document Management Plan for the Remediation of Soils at Load Lines 1, 2, 3 and 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio. November 2006.

19. Shaw 2006f. Final Sampling and Analysis Plan Addendum No. 1 for the Remediation of Soils at Load Lines 1, 2, 3 and 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio. November 2006.

20. Shaw 2006g. Final Waste Management and Minimization Plan for the Remediation of Soils at Load Lines 1, 2, 3 and 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio. November 2006.

21. Shaw 2006h. Final Public Relations Plan Addendum No. 1 for the Remediation of Soils at Load Lines 1, 2, 3 and 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio. November 2006.

22. Shaw 2006i. Structural Survey Report, Structural Analyses and MEC Support for Load Lines 1-4, Ravenna Army Ammunition Plant, Ravenna, Ohio. November 2006.

23. Shaw 2007. Final Interim Record of Decision for the Remediation of Soils at Load Lines 1 through 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio. January 2007.

APPENDIX A
LOAD LINE EXCAVATION DRAWINGS

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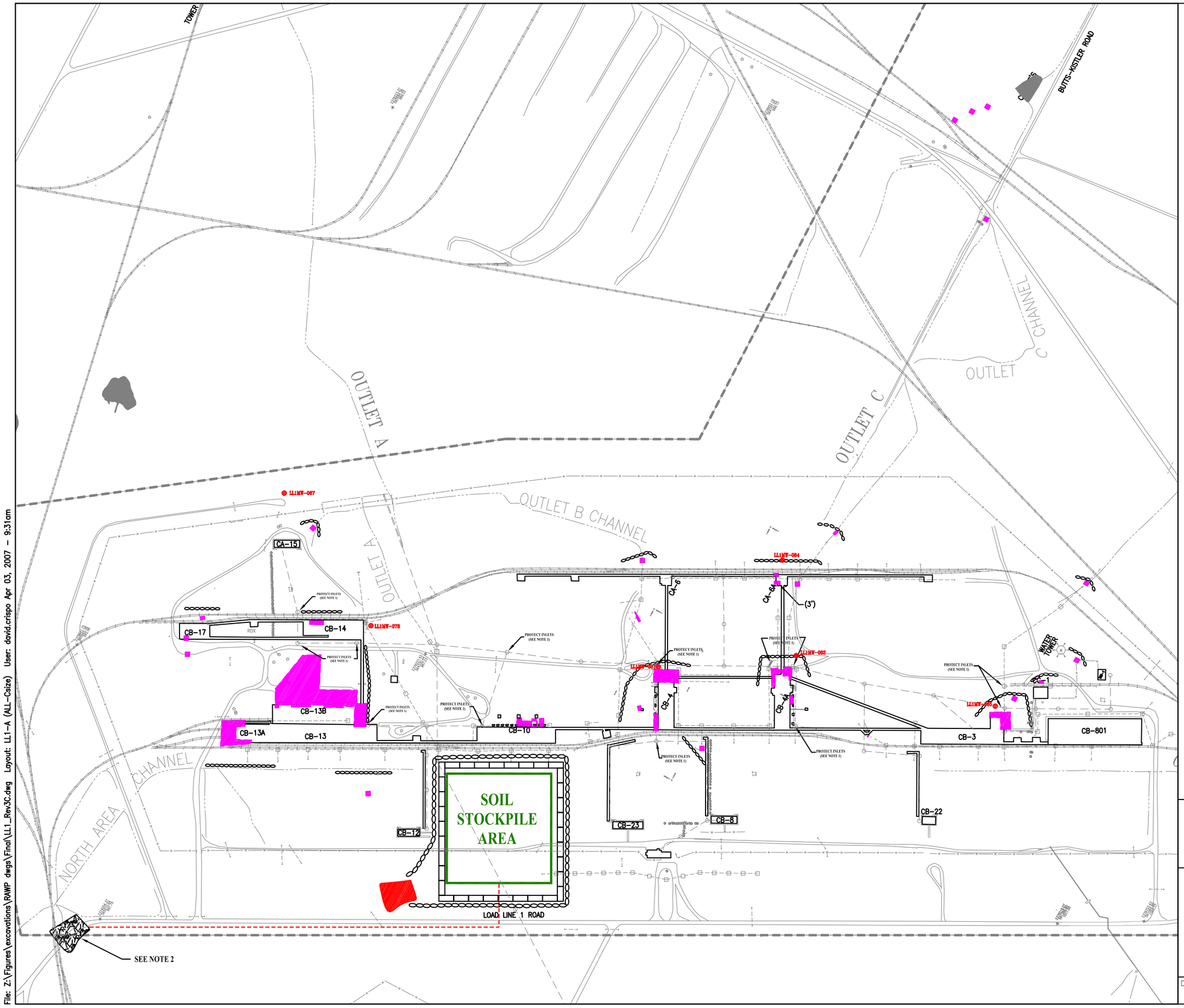

LEGEND:

- BUILDING
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- POND
- STREAM
- LOAD LINE 1 AOC BOUNDARY
- SOIL HAUL ROUTE
- AREA OF SOIL REMEDIATION
- SILT FENCE BARRIER
- HAY BALE BARRIER
- LL1MW-084 GROUNDWATER MONITORING WELL
- VEHICLE DECONTAMINATION STATION
- STABILIZED CONSTRUCTION ENTRANCE

NOTES:

1) ALL MANHOLE/CATCHBASINS INLETS WILL BE PROTECTED WITH A HAYBALE BARRIER SYSTEM.

2) EROSION AND SEDIMENT CONTROL AND CONSTRUCTION ENTRANCE DETAILS ARE INCLUDED IN FIGURE 4–1 OF THE RAWP.

3) PROPOSED EXCAVATION DEPTHS ARE TO 2 FEET BGS UNLESS OTHERWISE INDICATED IN PARENTHESIS "( )".

0 175 350 700

SCALE: 1" = 350'

US Army Corps of Engineers Louisville District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

FIGURE LL1–A (1 of 3)

APPROXIMATE AREAS OF SOIL REMOVAL AT LOAD LINE 1
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

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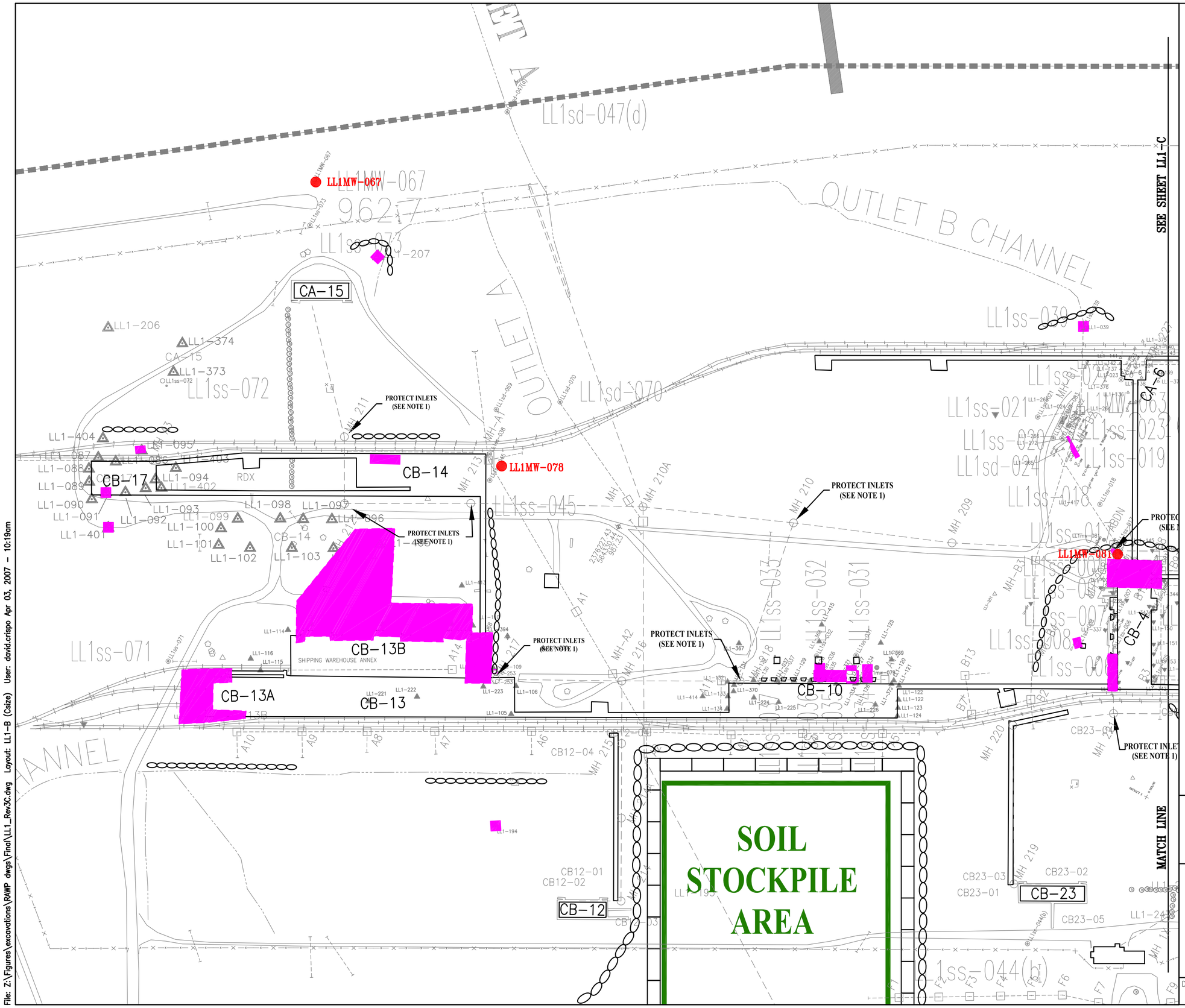

LEGEND:

- BUILDING
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- POND
- STREAM
- PHASE I RI MONITORING WELL LOCATION
- PHASE I RI SEDIMENT SAMPLE (SEE TABLE 3-1)
- LL1 PHASE II RI MONITORING WELL
- PHASE II SOIL SAMPLE
- (1-30) GRID SAMPLING LOCATIONS
- PHASE II SOIL SAMPLE - RR TRACK
- PHASE II SOIL SAMPLE - CHANGE HOUSE
- PHASE II SURFACE WATER
- PHASE II SEDIMENT SAMPLE
- PHASE II MANHOLE SEDIMENT SAMPLE
- GRID SAMPLING LOCATIONS
- LOAD LINE 1 AOC BOUNDARY
- AREA OF SOIL REMEDIATION
- SILT FENCE BARRIER
- HAY BALE BARRIER
- LL1MW-084 GROUNDWATER MONITORING WELL

NOTES:

1) ALL MANHOLE/CATCHBASINS INLETS WILL BE PROTECTED WITH A HAYBALE BARRIER SYSTEM.

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3) PROPOSED EXCAVATION DEPTHS ARE TO 2 FEET BGS UNLESS OTHERWISE INDICATED IN PARENTHESIS "( )".

0 65 130 260

SCALE: 1" = 130'

US Army Corps of Engineers Louisville District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

FIGURE LL1-B (2 of 3)

APPROXIMATE AREAS OF SOIL REMOVAL AT LOAD LINE 1
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

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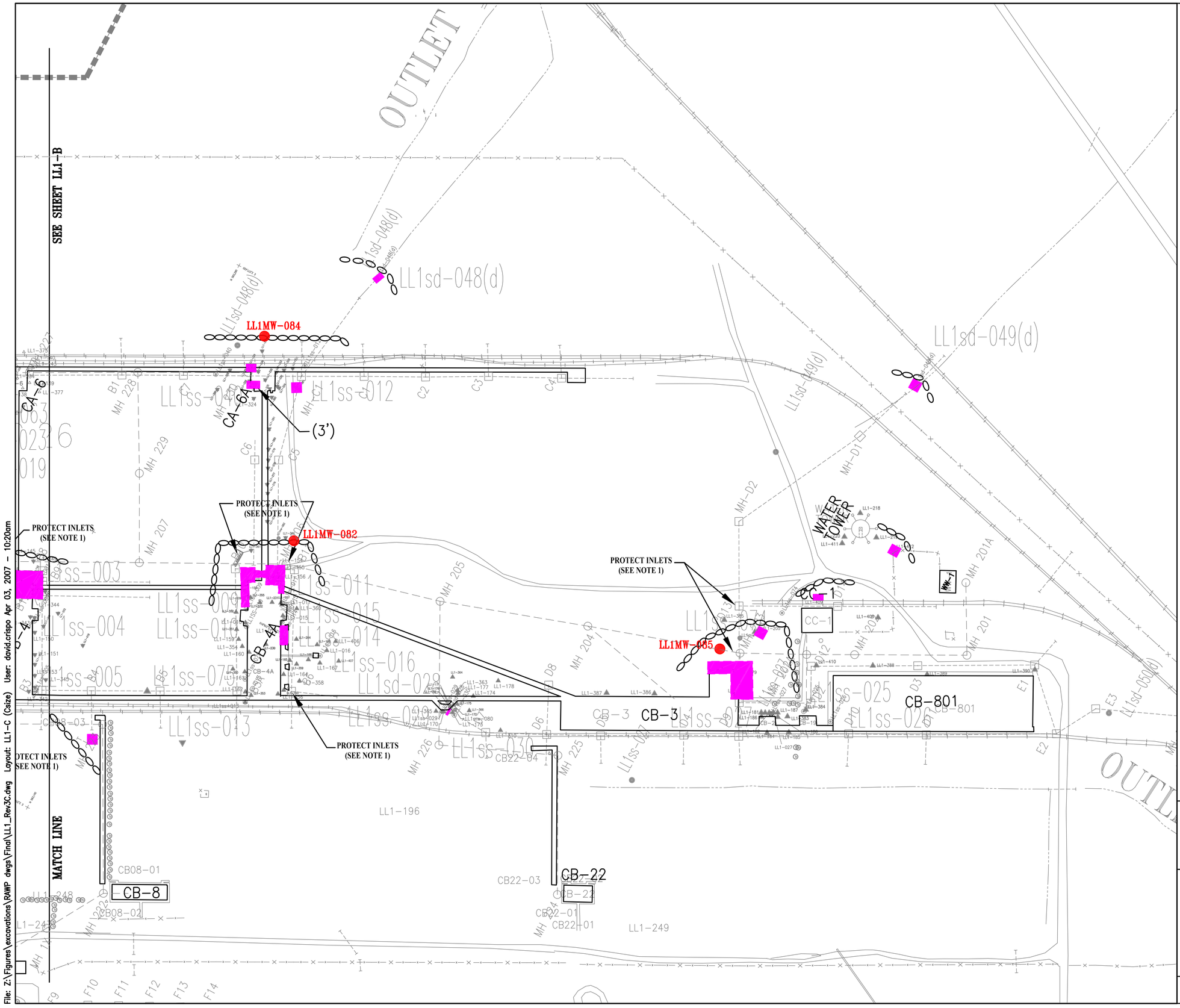

LEGEND:

- BUILDING
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- POND
- STREAM
- PHASE I RI MONITORING WELL LOCATION
- PHASE I RI SEDIMENT SAMPLE (SEE TABLE 3-1)
- LL1 PHASE II RI MONITORING WELL
- PHASE II SOIL SAMPLE
- (1-30) GRID SAMPLING LOCATIONS
- PHASE II SOIL SAMPLE - RR TRACK
- PHASE II SOIL SAMPLE - CHANGE HOUSE
- PHASE II SURFACE WATER
- PHASE II SEDIMENT SAMPLE
- PHASE II MANHOLE SEDIMENT SAMPLE
- GRID SAMPLING LOCATIONS
- LOAD LINE 1 AOC BOUNDARY
- AREA OF SOIL REMEDIATION
- SILT FENCE BARRIER
- LL1MW-084 GROUNDWATER MONITORING WELL

NOTES:
1) ALL MANHOLE/CATCHBASINS INLETS WILL BE PROTECTED WITH A HAYBALE BARRIER SYSTEM.

2) EROSION AND SEDIMENT CONTROL AND CONSTRUCTION ENTRANCE DETAILS ARE INCLUDED IN FIGURE 4-1 OF THE RAWP.

3) PROPOSED EXCAVATION DEPTHS ARE TO 2 FEET BGS UNLESS OTHERWISE INDICATED IN PARENTHESIS "( )".

0 65 130 260
SCALE: 1" = 130'

US Army Corps of Engineers Louisville District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

FIGURE LL1-C (3 of 3)

APPROXIMATE AREAS OF SOIL REMOVAL AT LOAD LINE 1
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

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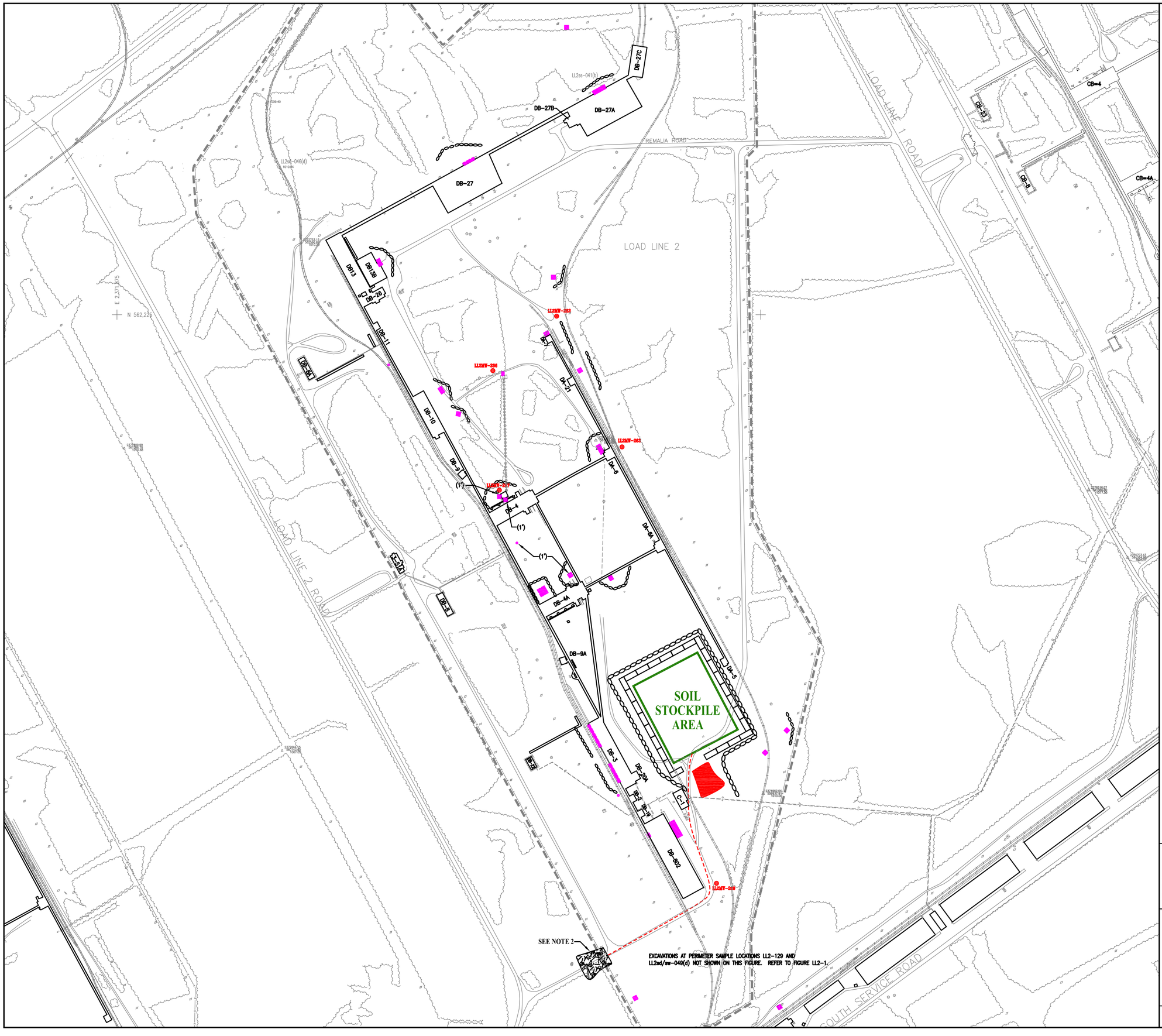

LEGEND:

- PRIMARY BUILDING
- SECONDARY BUILDING
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- TREE OR TREELINE
- LOAD LINE 2 AOC BOUNDARY
- SOIL HAUL ROUTE
- AREA OF SOIL REMEDIATION
- SILT FENCE BARRIER
- HAY BALE BARRIER
- LL1MW-084 GROUNDWATER MONITORING WELL
- VEHICLE DECONTAMINATION STATION
- STABILIZED CONSTRUCTION ENTRANCE

NOTES:

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2) EROSION AND SEDIMENT CONTROL AND CONSTRUCTION ENTRANCE DETAILS ARE INCLUDED IN FIGURE 4-1 OF THE RAWP.
3) PROPOSED EXCAVATION DEPTHS ARE TO 2 FEET BGS UNLESS OTHERWISE INDICATED IN PARENTHESIS "( )".

OHIO STATE PLANE (NAD 83)

0 150 300 600
SCALE: 1" = 300'

US Army Corps of Engineers Louisville District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

FIGURE LL2-A (1 of 3)

APPROXIMATE AREAS OF SOIL REMOVAL AT LOAD LINE 2
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

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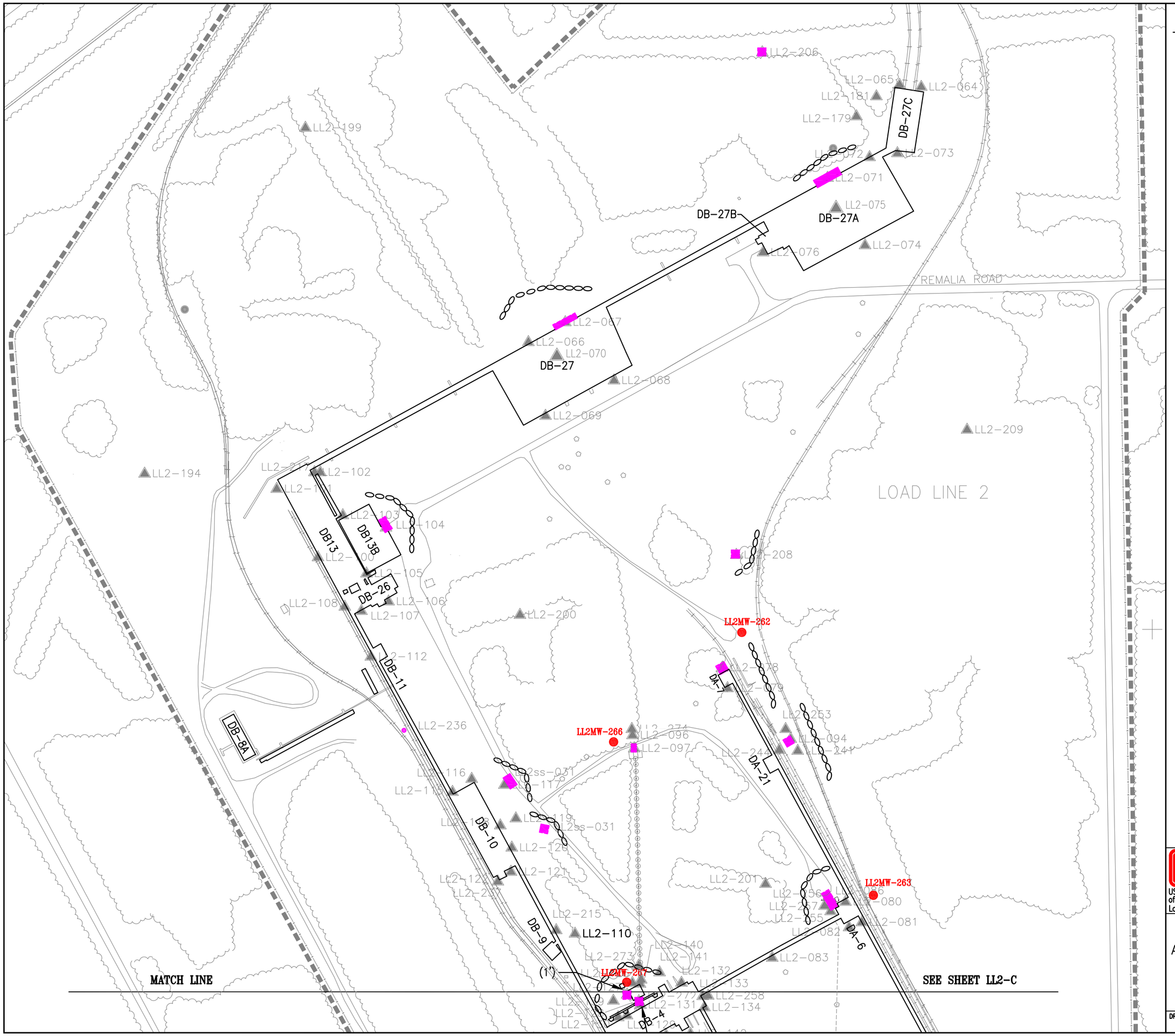

LEGEND:

- PRIMARY BUILDING
- SECONDARY BUILDING
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- TREE OR TREELINE
- LOAD LINE 2 AOC BOUNDARY
- PHASE I SOIL SAMPLE LOCATION
- PHASE II SOIL SAMPLING LOCATION
- AREA OF SOIL REMEDIATION
- SILT FENCE BARRIER
- HAY BALE BARRIER
- LL1MW-084 GROUNDWATER MONITORING WELL

NOTES:

1) ALL MANHOLE/CATCHBASINS INLETS WILL BE PROTECTED WITH A HAYBALE BARRIER SYSTEM.

2) EROSION AND SEDIMENT CONTROL AND CONSTRUCTION ENTRANCE DETAILS ARE INCLUDED IN FIGURE 4-1 OF THE RAWP.

3) PROPOSED EXCAVATION DEPTHS ARE TO 2 FEET BGS UNLESS OTHERWISE INDICATED IN PARENTHESIS "( )".

OHIO STATE PLANE (NAD 83)

0 75 150 300
SCALE: 1" = 150'

US Army Corps of Engineers Louisville District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

FIGURE LL2-B (2 of 3)

APPROXIMATE AREAS OF SOIL REMOVAL AT LOAD LINE 2
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

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MATCH LINE

SEE SHEET LL2-B

LOAD LINE 2 ROAD

(1')

LL2MW-267

DB-4

(1')

LL2-214

(1')

3-51A

DB-8

DB-4A

DB-9A

DA-6A

DA-5

SOIL STOCKPILE AREA

DB-3

DB-20A

DB-2

DB-19

DB-22

DB-802

C-1

LL2MW-269

SEE NOTE 2

EXCAVATIONS AT PERIMETER SAMPLE LOCATIONS LL2-129 AND LL2sd/sw-049(d) NOT SHOWN ON THIS FIGURE. REFER TO FIGURE LL2-1.

LEGEND:

- PRIMARY BUILDING
- SECONDARY BUILDING
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- TREE OR TREELINE
- LOAD LINE 2 AOC BOUNDARY
- PHASE I SOIL SAMPLE LOCATION
- PHASE II SOIL SAMPLING LOCATION
- AREA OF SOIL REMEDIATION
- SILT FENCE BARRIER
- HAY BALE BARRIER
- LL1MW-084 GROUNDWATER MONITORING WELL
- VEHICLE DECONTAMINATION STATION
- STABILIZED CONSTRUCTION ENTRANCE

NOTES:

1) ALL MANHOLE/CATCHBASINS INLETS WILL BE PROTECTED WITH A HAYBALE BARRIER SYSTEM.
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OHIO STATE PLANE (NAD 83)

0 75 150 300

SCALE: 1" = 150'

US Army Corps of Engineers Louisville District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

FIGURE LL2-C (3 of 3)

APPROXIMATE AREAS OF SOIL REMOVAL AT LOAD LINE 2
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

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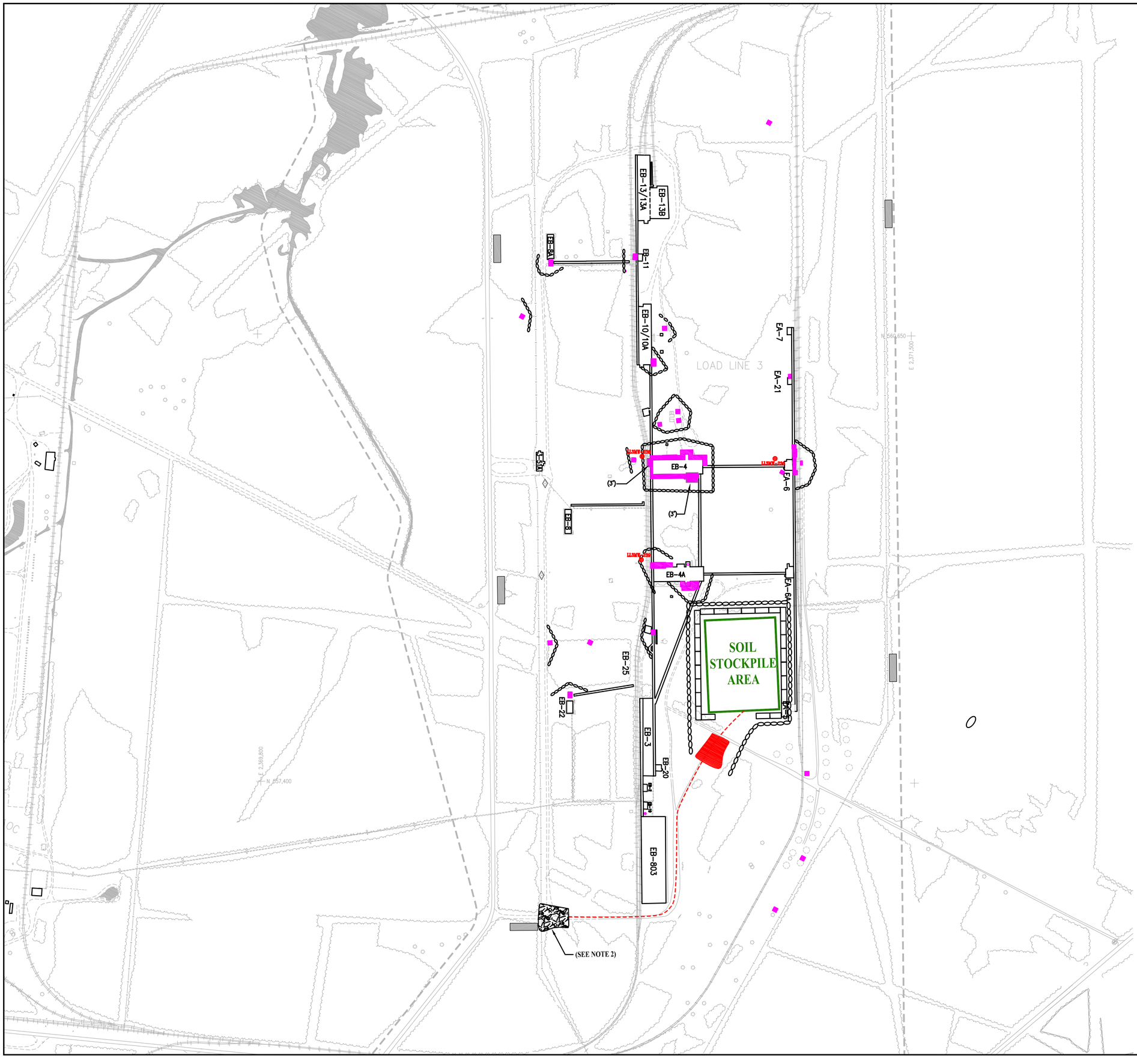

LEGEND:

- PRIMARY BUILDING
- SECONDARY BUILDING
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- STREAM
- POND
- TREE OR TREELINE
- LOAD LINE 3 AOC BOUNDARY
- FORMER DLA STORAGE TANKS
- SOIL HAUL ROUTE
- TEST PIT LOCATION
- AREA OF SOIL REMEDIATION
- SILT FENCE BARRIER
- HAY BALE BARRIER
- LL1MW-084 GROUNDWATER MONITORING WELL
- VEHICLE DECONTAMINATION STATION
- STABILIZED CONSTRUCTION ENTRANCE

NOTES:

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3) PROPOSED EXCAVATION DEPTHS ARE TO 2 FEET BGS UNLESS OTHERWISE INDICATED IN PARENTHESIS "( )".

OHIO STATE PLANE (NAD 83)

0 150 300 600

SCALE: 1" = 300'

US Army Corps of Engineers Louisville District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

FIGURE LL3-A (1 of 3)

APPROXIMATE AREAS OF SOIL REMOVAL AT LOAD LINE 3
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

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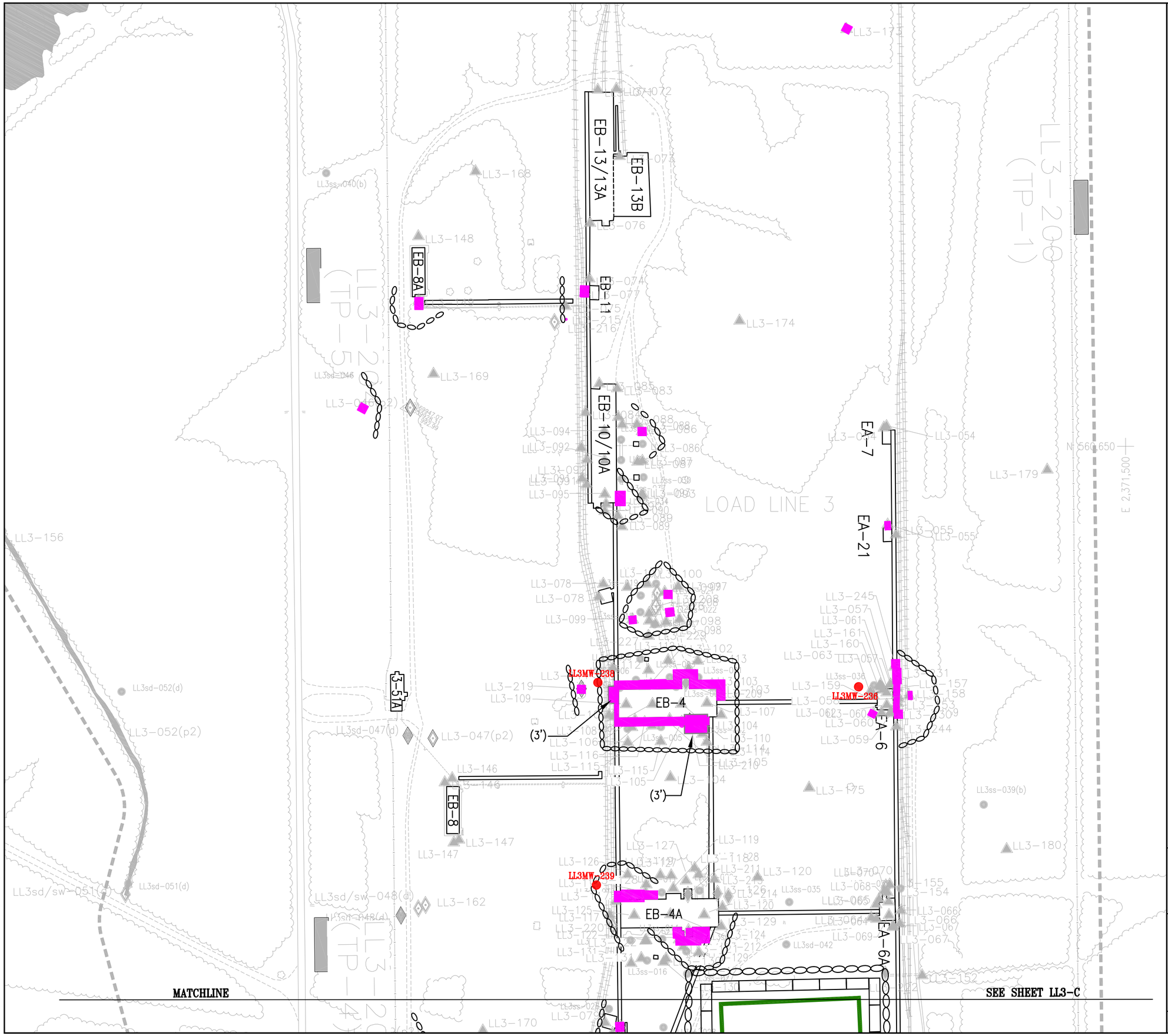

LEGEND:

- PRIMARY BUILDING
- SECONDARY BUILDING
- FORMER DLA STORAGE TANKS
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- STREAM
- POND
- TREE OR TREELINE
- LOAD LINE 3 AOC BOUNDARY
- FORMER DLA STORAGE TANKS
- PHASE I SURFACE SOIL/SEDIMENT SAMPLE LOCATION
- PHASE II SOIL SAMPLE LOCATION
- SURVEY CONTROL POINT
- PHASE II SEDIMENT SAMPLE LOCATION
- TEST PIT LOCATION
- AREA OF SOIL REMEDIATION
- SILT FENCE BARRIER
- HAY BALE BARRIER
- LL1MW-084 GROUNDWATER MONITORING WELL

NOTES:

1) ALL MANHOLE/CATCHBASINS INLETS WILL BE PROTECTED WITH A HAYBALE BARRIER SYSTEM.

2) EROSION AND SEDIMENT CONTROL and CONSTRUCTION ENTRANCE DETAILS ARE INCLUDED IN FIGURE 4-1 OF THE RAWP.

3) PROPOSED EXCAVATION DEPTHS ARE TO 2 FEET BGS UNLESS OTHERWISE INDICATED IN PARENTHESIS "( )".

OHIO STATE PLANE (NAD 83)

0 75 150 300

SCALE: 1" = 150'

US Army Corps of Engineers Louisville District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

FIGURE LL3-B (2 of 3)

APPROXIMATE AREAS OF SOIL REMOVAL AT LOAD LINE 3
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

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MATCHLINE

SEE SHEET LL3-B

SOIL STOCKPILE AREA

(SEE NOTE 2)

SOUTH SERVICE ROAD

LEGEND:

- PRIMARY BUILDING
- SECONDARY BUILDING
- FORMER DLA STORAGE TANKS
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- STREAM
- POND
- TREE OR TREELINE
- LOAD LINE 3 AOC BOUNDARY
- FORMER DLA STORAGE TANKS
- PHASE I SURFACE SOIL/SEDIMENT SAMPLE LOCATION
- PHASE II SOIL SAMPLE LOCATION
- SURVEY CONTROL POINT
- PHASE II SEDIMENT SAMPLE LOCATION
- TEST PIT LOCATION
- AREA OF SOIL REMEDIATION
- SILT FENCE BARRIER
- HAY BALE BARRIER
- LL1MW-084 GROUNDWATER MONITORING WELL
- VEHICLE DECONTAMINATION STATION
- STABILIZED CONSTRUCTION ENTRANCE

NOTES:

1) ALL MANHOLE/CATCHBASINS INLETS WILL BE PROTECTED WITH A HAYBALE BARRIER SYSTEM.

2) EROSION AND SEDIMENT CONTROL AND CONSTRUCTION ENTRANCE DETAILS ARE INCLUDED IN FIGURE 4-1 OF THE RAWP.

3) PROPOSED EXCAVATION DEPTHS ARE TO 2 FEET BGS UNLESS OTHERWISE INDICATED IN PARENTHESIS "( )".

OHIO STATE PLANE (NAD 83)

0 75 150 300

SCALE: 1" = 150'

US Army Corps of Engineers Louisville District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

FIGURE LL3-C (3 of 3)

APPROXIMATE AREAS OF SOIL REMOVAL AT LOAD LINE 3
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE:
DH\KCK	0 / 10/24/05	LL3_Rev2C

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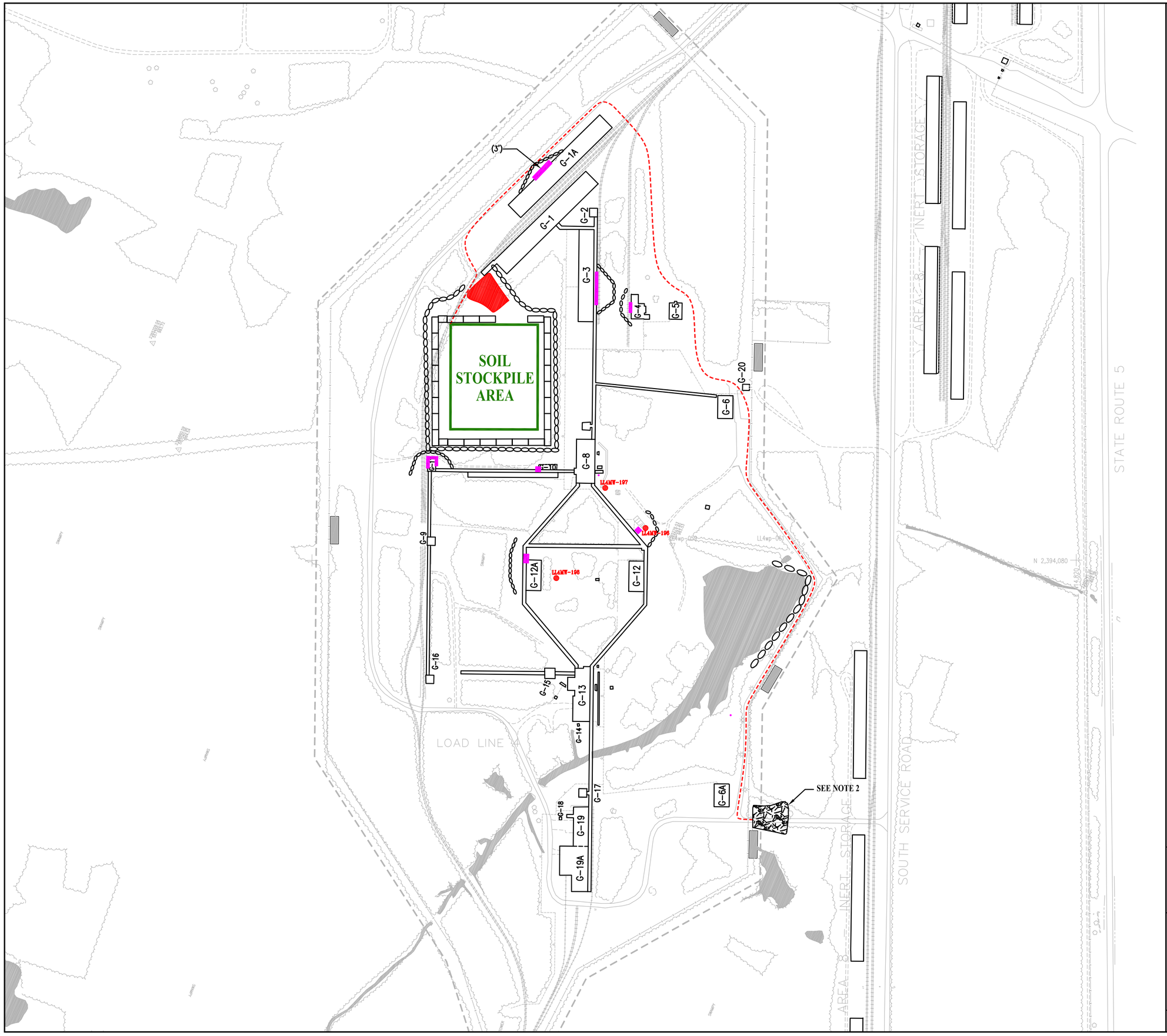

LEGEND:

- PRIMARY BUILDING
- SECONDARY BUILDING
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- STREAM
- POND
- GROUND CONTOUR (10 FT INTERVAL)
- TREE OR TREELINE
- LOAD LINE 4 AOC BOUNDARY
- SURVEY CONTROL POINT
- ELECTRICAL LIGHT POLE
- SOIL HAUL ROUTE
- TEST PIT LOCATION
- AREA OF SOIL REMEDIATION
- SILT FENCE BARRIER
- HAY BALE BARRIER
- LL1MW-084 GROUNDWATER MONITORING WELL
- VEHICLE DECONTAMINATION STATION
- STABILIZED CONSTRUCTION ENTRANCE

NOTES:

1) ALL MANHOLE/CATCHBASINS INLETS WILL BE PROTECTED WITH A HAYBALE BARRIER SYSTEM.

2) EROSION AND SEDIMENT CONTROL AND CONSTRUCTION ENTRANCE DETAILS ARE INCLUDED IN FIGURE 4-1 OF THE RAWP.

3) PROPOSED EXCAVATION DEPTHS ARE TO 2 FEET BGS UNLESS OTHERWISE INDICATED IN PARENTHESIS "( )".

OHIO STATE PLANE (NAD 83)

0 125 250 500
SCALE: 1" = 250'

US Army Corps of Engineers Louisville District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

FIGURE LL4-A (1 of 3)

APPROXIMATE AREAS OF SOIL REMOVAL AT LOAD LINE 4
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE:
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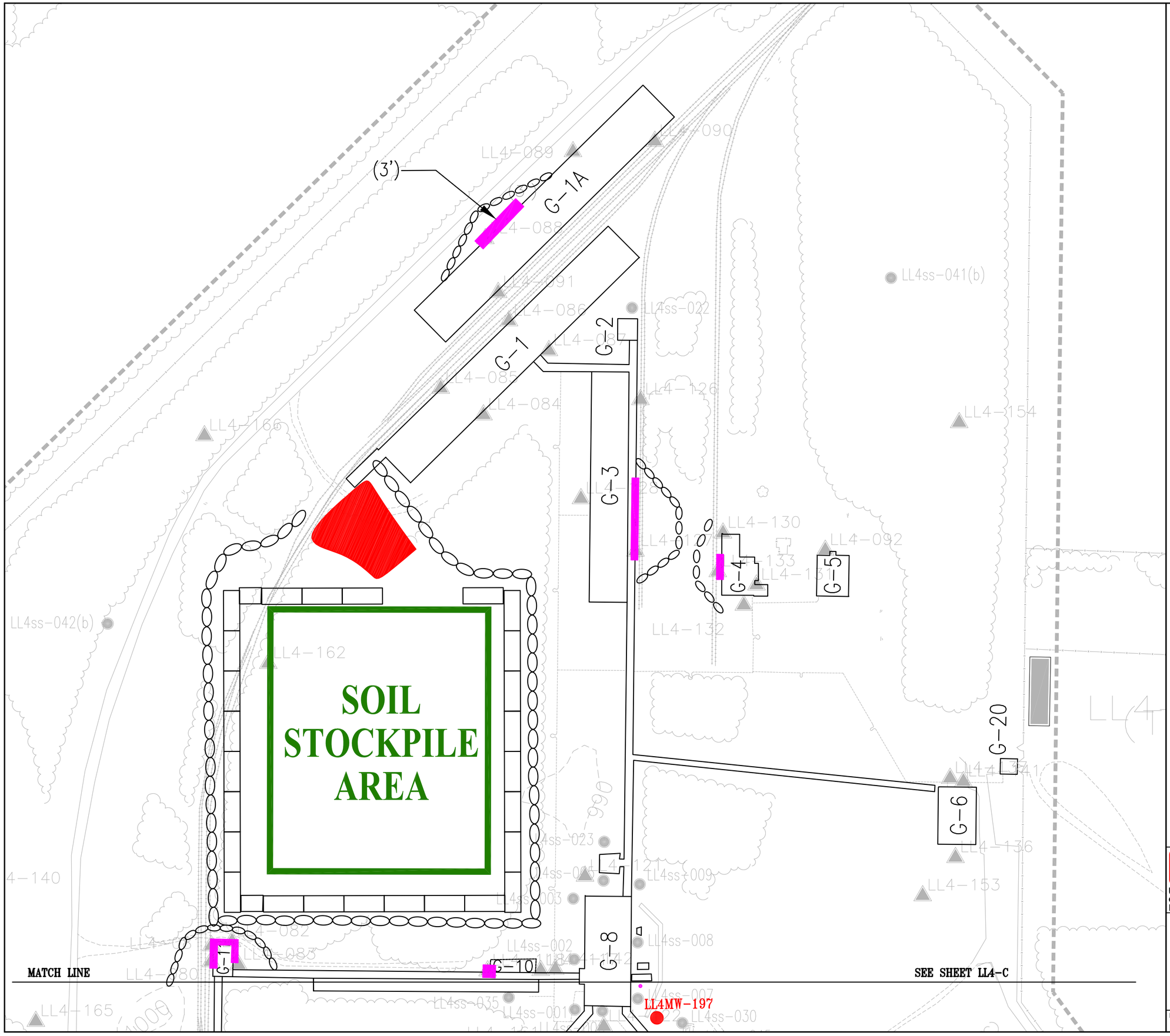

LEGEND:

- PRIMARY BUILDING
- SECONDARY BUILDING
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- STREAM
- POND
- GROUND CONTOUR (10 FT INTERVAL)
- TREE OR TREELINE
- LOAD LINE 4 AOC BOUNDARY
- PHASE I SURFACE SOIL/SEDIMENT SAMPLE LOCATION
- PHASE II SOIL SAMPLE LOCATION
- SURVEY CONTROL POINT
- ELECTRICAL LIGHT POLE
- TEST PIT LOCATION
- AREA OF SOIL REMEDIATION
- SILT FENCE BARRIER
- HAY BALE BARRIER
- LL1MW-084 GROUNDWATER MONITORING WELL
- VEHICLE DECONTAMINATION STATION

NOTES:

1) ALL MANHOLE/CATCHBASINS INLETS WILL BE PROTECTED WITH A HAYBALE BARRIER SYSTEM.

2) EROSION AND SEDIMENT CONTROL AND CONSTRUCTION ENTRANCE DETAILS ARE INCLUDED IN FIGURE 4-1 OF THE RAWP.

3) PROPOSED EXCAVATION DEPTHS ARE TO 2 FEET BGS UNLESS OTHERWISE INDICATED IN PARENTHESIS "( )".

OHIO STATE PLANE (NAD 83)

0 50 100 200
SCALE: 1" = 100'

US Army Corps of Engineers Louisville District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

FIGURE LL4-B (2 of 3)

APPROXIMATE AREAS OF SOIL REMOVAL AT LOAD LINE 4
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE:
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MATCH LINE

SEE SHEET LL4-B

LL4MW-197

LL4MW-196

LL4MW-198

G-1 G-8 G-10 G-9 G-16 G-15 G-13 G-14 G-12A G-12 G-17 G-18 G-19 G-6A

SWAMPY

LOAD LINE 4

LEGEND:

- PRIMARY BUILDING
- SECONDARY BUILDING
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- STREAM
- POND
- GROUND CONTOUR (10 FT INTERVAL)
- TREE OR TREELINE
- LOAD LINE 4 AOC BOUNDARY
- PHASE I SURFACE SOIL/SEDIMENT SAMPLE LOCATION
- PHASE II SOIL SAMPLE LOCATION
- SURVEY CONTROL POINT
- ELECTRICAL LIGHT POLE
- TEST PIT LOCATION
- AREA OF SOIL REMEDIATION
- SILT FENCE BARRIER
- HAY BALE BARRIER
- LL1MW-084 GROUNDWATER MONITORING WELL

NOTES:

1) ALL MANHOLE/CATCHBASINS INLETS WILL BE PROTECTED WITH A HAYBALE BARRIER SYSTEM.

2) EROSION AND SEDIMENT CONTROL AND CONSTRUCTION ENTRANCE DETAILS ARE INCLUDED IN FIGURE 4-1 OF THE RAWP.

3) PROPOSED EXCAVATION DEPTHS ARE TO 2 FEET BGS UNLESS OTHERWISE INDICATED IN PARENTHESIS "( )".

OHIO STATE PLANE (NAD 83)

0 50 100 200

SCALE: 1" = 100'

US Army Corps of Engineers Louisville District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

FIGURE LL4-C (3 of 3)

APPROXIMATE AREAS OF SOIL REMOVAL AT LOAD LINE 4
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE:
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APPENDIX B
CONSTRUCTION CHECKLISTS

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PRE-MOBILIZATION CHECKLIST

Answer each question by checking the appropriate column (yes, no or NA). If "no" or "NA" is checked, an explanation should be provided in the space marked "Explain" at the bottom of the checklist. This checklist is to be completed by the designated Inspector or Field Engineer and randomly verified by the CQR. Attach a copy of all supporting documents (i.e., permits, training certificates, letters of correspondence, purchase orders, etc.) once the checklist is complete.

LOAD LINE NO.: _____ EXCAVATION LOCATION: _____

STARTING DATE: _____ INSPECTOR/FIELD ENGINEER: _____

Permits:

Have the following permits been obtained?	**Yes**	**No**	**NA**	**Initials**
Has the NOI for Construction Site Storm Water General Permit (OAC 3745-38) been signed by BRAC and issued to Ohio EPA for review?	☐	☐	☐	_____
Has the SWP3 been finalized and issued to Portage County for review?	☐	☐	☐	_____
Other	☐	☐	☐	_____

Notifications / Site Access:

Have the following entities been notified of the starting date and expected duration of the proposed work?				
Notification to the RVAAP Facility Manager?	☐	☐	☐	_____
Notification to Ohio EPA?	☐	☐	☐	_____
Has the right-of-entry been received from the RVAAP?	☐	☐	☐	_____
Has the Notice to Proceed been received from USACE?	☐	☐	☐	_____

Submittals for Approval:

Have the applicable submittals been approved?	☐	☐	☐	_____
Has the Remedial Action Work Plan been approved by USACE and the OhioEPA?	☐	☐	☐	_____

Site Preparation:

Have all utilities been identified?	☐	☐	☐	_____
Has a pre-construction survey including photographic documentation been completed?	☐	☐	☐	_____
Are all health and safety equipment/supplies, signs, barricades, etc. ordered, prepared and ready for mobilization?	☐	☐	☐	_____

Subcontracts:

Have the following subcontracts been set-up in accordance with contract specifications (i.e., licensed to operate in the State of Ohio, USACE certification requirements, proof of insurance, etc.)? Attach supporting documents.				
Structural safety support and debris removal subcontractor.	☐	☐	☐	_____
Off-site laboratories for all soil and water testing	☐	☐	☐	_____
Transport and disposal contractor.	☐	☐	☐	_____
Site security	☐	☐	☐	_____

Procurement:

Have the purchase orders been processed for the following items? All subcontracts listed above? Attach copies of POs.

Structural safety support and debris removal subcontractor.	☐	☐	☐	_____
Off-site laboratories for all soil and water testing .	☐	☐	☐	_____
Transport and disposal contractor.	☐	☐	☐	_____
Site security.	☐	☐	☐	_____

Training:

Verify that all personnel scheduled to work on the property have appropriate up-to-date training as necessary? Attach copies of certificates.

40-Hour HAZWOPER.	☐	☐	☐	_____
8-Hour HAZWOPER. Refresher	☐	☐	☐	_____
MEC Training	☐	☐	☐	_____
First Aid/CPR Training	☐	☐	☐	_____
Site Orientation	☐	☐	☐	_____

Explanation:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ _____

Construction Superintendent / Field Engineer Date

MOBILIZATION CHECKLIST

Answer each question by checking the appropriate column (yes, no or NA). If "no" or "NA" is checked, an explanation should be provided in the space marked "Explain" at the bottom of the checklist. This checklist is to be completed by the designated Inspector or Field Engineer and randomly verified by the CQR. Attach a copy of all supporting documents (i.e., permits, training certificates, letters of correspondence, purchase orders, etc.) once the checklist is complete.

LOAD LINE NO.: _____ EXCAVATION LOCATION: _____

STARTING DATE: _____ INSPECTOR/FIELD ENGINEER: _____

Site Preparation:

Are temporary facilities in-place?	**Yes**	**No**	**NA**	**Initials**
Male / Female Sanitation Facilities	☐	☐	☐	_____
Office / Craft break and change trailer	☐	☐	☐	_____
Health and Safety access control points	☐	☐	☐	_____

Is the appropriate signage placed throughout the work areas and along main road within the RVAAP in accordance with the RAWP, SHERP and other project documents?				
Directions to main Shaw facilities and trailers	☐	☐	☐	_____
Traffic haul route at the RVAAP.	☐	☐	☐	_____
Hazardous Work Areas signage	☐	☐	☐	_____
Required PPE signage	☐	☐	☐	_____
Is site security established?	☐	☐	☐	_____
Are work zones established?	☐	☐	☐	_____
Have erosion and sediment control measures been established?	☐	☐	☐	_____
Are construction access points and access road in-place?	☐	☐	☐	_____
Are surface water management controls installed?	☐	☐	☐	_____
Is clearing and grubbing of the area complete?	☐	☐	☐	_____
Has debris adjacent to excavation area been cleared?	☐	☐	☐	_____
Have the required structural safety measures been implemented?	☐	☐	☐	_____
Have soil stockpile storage areas been established?	☐	☐	☐	_____

Mobilization:

Is all the necessary equipment on-site to begin work?	☐	☐	☐	_____
Are key personnel on-site and have they had the required site orientation?	☐	☐	☐	_____
Have the applicable Activity Hazard Analysis (AHAs) been completed for the planned mobilization activities?	☐	☐	☐	_____

Explanation:

Construction Superintendent / Field Engineer

Date

APPENDIX C
SHAW STANDARD OPERATING PROCEDURE HS308

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PROCEDURE

Subject: UNDERGROUND/OVERHEAD UTILITY CONTACT PREVENTION

1.0 PURPOSE AND SUMMARY

This procedure prescribes the steps to be followed in order to prevent accidents involving the contact with or damage of underground/overhead utilities. The company provides the operational and training practices required to safely execute work where underground/overhead utility hazards may exist.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Director of Health and Safety is responsible for the issuance, revision, and maintenance of this procedure. Also, see Attachment 1 for matrix of responsibilities.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Company
All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc. (Shaw E & I).

Competent Person – Drilling Oversight (CPDO) Training
When drilling activity is to take place the Shaw's Field Team Leader (FTL) must have successfully completed Shaw's in-house training pertinent to competent person drilling oversight (CPDO Training). The FTL is required not only to have successfully completed CPDO training but to have an appropriate educational background, coupled with field experience and, the authority to make changes to correct deficiencies, or to stop the job if need be.
NOTE: The CPDO training requirement will become effective September 1st 2006. This means that every FTL will have successfully completed CPDO Training prior to August 31, 2006.

Competent Person - Excavation and Trenching
A person who is capable of identifying existing and predictable hazards in the excavation/trenching work area and who has the authority to take prompt corrective measures to eliminate them. NOTE: Excavation/Trenching training is required when trenching/excavation hazards are present/anticipated (i.e. spoil piles, use of three foot (3') or larger diameter augers, or other circumstances) but only recommended when trenching/excavation hazards are not present/anticipated.

Excavation
Any manmade cut, cavity, trench or depression in an earth surface formed by earth removal.

Underground Utility
Any active or inactive subsurface or buried structure that is or was designed to service a public or private facility. These may include, but are not limited, to the following:

- Electric power lines
- Natural gas lines
- Telephone lines
- Telephone cables and fiber optic lines
- Water lines
- Steam and pneumatic lines
- Sewer lines
- Drain lines
- Underground storage tanks
- Septic tanks
- Process or product lines

Overhead Utility
Any active or inactive overhead structure that is or was designed to service a public or private facility. These may include, but are not limited, to the following:

- Overhead power lines
- Overhead telephone lines
- Overhead fiber optic lines
- Overhead cables
- Overhead supports
- Overhead piping
- Traffic lights
- Utility Bridges

One Call Center
Each state has a One Call, Dig Safe, Miss Dig, etc. dial-in number for requesting mark-out of buried public utilities, such as gas lines, electrical lines, telephone/cable lines, sewer lines, and water lines. This number is typically called a minimum of 72 hours prior to subsurface activities depending on the particular state the work will be conducted. The One Call Center will notify the local public utilities for a line location mark-out for the particular location. The individual public utilities must locate and mark-out the utilities upon request. In most cases, the markouts will not be performed on private property. A confirmation number is established and confirmation report generated and submitted to the requester.

As-Built Drawings
As-built drawings are blueprints that are usually obtained from the facility owner or client. They show original buried utilities and any modifications which have been made.

Private Utility Locating Service
A private utility locating service is a firm established to locate underground utilities using specialized locating equipment, such as ground penetrating radar location devices or radio transmitter type utility locating equipment.

Fiber Optic Service Lines
Fiber optic service lines are communication lines that are buried underground. When damaged, these lines are very expensive to replace. Fiber optic companies routinely provide on-site supervision, if requested. The company encourages this practice.

Field Team Leader (FTL)
The FTL is the person with whom the responsibility of the execution of the field work resides. This person may be the project manager, senior geologist, staff geologist, etc. This individual must have the sufficient experience, training and, field knowledge to ensure all site configuration information is collected and analyzed.

Site Survey
A site survey is an inspection of the work site to look for signs of other buried utilities that may not be indicated through as-built drawings or through utility locating services. The survey typically involves inspection of overhead electrical services, inspection of basements, utility rooms, garages, etc., for signs of old electrical conduits or fuel/water/septic lines. The FTL must contact the appropriate site representative to provide any additional information that may be marked on the as-builts.

5.0 TEXT

Underground/overhead utilities may be encountered at any job site. The guidelines established in this procedure were developed to help identify and mitigate the potential hazards associated with this type of work.

Any subsurface activity is subject to the underground utility locating regulations for the state where the work will be conducted. This procedure authorizes the use of state, local or other required practices, but requires that the practice which most limits the liability to Shaw for damaged utilities is utilized. No variance is required under these circumstances, but the project-specific Health and Safety Plan (HASP) or work plan shall fully document these more protective procedures.

.

5.1 Preliminary Requirements

The Project Manager or designee must visit the site to mark the boring/excavation locations so they can be clearly identified and then contact the One Call Center for the state in which the work is to be performed in to formally request a utility mark out at the particular work location(s).

Prior to assignment of work the Field Team Leader (FTL) will assure that all affected employees receive an overview of the hazards of encountering underground/overhead utilities. The FTL is responsible to review this procedure, the work practices to control these hazards, and the roles and responsibilities of each worker with the work crew. This procedure and other requirements that may be contained in the site specific HASP shall be reinforced during daily tailgate safety meetings.

5.2 Operating Requirements

5.2.1 Underground Utilities Requirements

Prior to conducting any project site activities, the FTL must ensure that all existing underground/overhead utilities in the work area are located per the state or local mark-out protocols. Documentation of utility mark-out must be completed using the Utility Mark-out Documentation form (Attachment 3). No boring/excavation work is to be performed until all utility mark-outs are verified.

While on-site, the FTL must conduct a site survey to search for signs of other buried or overhead utilities. This will include areas such as garages, basements, etc. The results of such surveys must be documented on the Utility Markout Documentation form (Attachment 3). The property owner, client, or facility operator must be consulted on the issue of underground utilities. All knowledge of past and present utilities must be evaluated prior to conducting work..

After all mark outs have been completed, and the boring locations have been accepted by the FTL prior to drilling, each borehole location must be hand dug to a minimum of five feet bgs.

If the investigation requires boreholes in an area not covered by a municipal one call system (on private property), then the FTL must utilize appropriate geophysical techniques, hand held utility locating devices, a private utility locating firm, or other approved method to determine the locations of underground utilities. The current accepted geophysical methods for the investigation and location of buried utilities include: Ground Penetrating Radar (GPR), Time Domain and/or Frequency Domain Electromagnetic methods, Magnetometer, and Inductive/Conductive Radio-Magnetic methods. The geophysical methods can be very useful for locating buried utility lines in areas where hand digging is not possible or practical. However, it must be noted that these methods do have limitations that are a function of soil conditions, depth of investigation, imaging resolution, or other factors.

If it is determined that a non-invasive geophysical investigation may be needed, assistance with selecting the appropriate method(s) can be obtained from the Shaw E & I Science and Technology Division, Geophysics & Mapping Group, and a variance request must be submitted and approved prior to the inception of intrusive field activity.

Should the local geology be prone to refusal or should there be any other reason the boring location cannot be cleared to a minimum of 5’ bgs then the appropriate aforementioned alternative methods should be utilized to ensure the boring location is clear of utilities 5’ bgs, and a variance request must be submitted for review.

5.2.2 Overhead Utilities Requirements

Overhead utility locations must be marked (warning tape, flags, etc.) where heavy equipment, or other equipment, has the potential for contacting overhead utilities. Conduct a site inspection on a daily basis to determine where activities will take place and the location of overhead utilities and overhead obstructions. Once they have been identified, place warning tape on poles and/or guy wires and attempt to plan the work so that no contact will be made with the overhead utilities or obstructions. Share the information with all site personnel during the tailgate safety meeting.

Maintain at least 10 feet from overhead power lines, up to 50 kV. For voltages over 50 kV, add 0.4 inches per kV to obtain the safe distance between equipment and power lines. If voltage is unknown, remain at least 20 feet from overhead power lines.

As a precaution, a spotter must be used at all times when it is possible to violate the minimum distance requirements for overhead utilities. If contact is deemed unavoidable, consult with the client and the respective health and safety representative to evaluate the area to determine if the particular overhead utility can be removed prior to engaging in the activity.

5.2.3 Other Requirements

Only hand digging is permitted within 3 feet of underground high voltage, product or gas lines. Once the line is exposed heavy equipment can be used but must remain at least 3 feet from the exposed line.

Only experienced, demonstrably proficient equipment operators will be used to operate such heavy equipment as drill rigs, backhoes, front-end loaders, cranes, etc.

Due the sensitivity and costs associated with damage to fiber optic cables the FTL must have documented verbal contact and an agreement with the fiber optic company for all work within 50' of the fiber optic cables. Subsurface investigations near fiber optic cables are more fully discussed in site specific HASP's. Contact your division Health and Safety Professional for specific information on this subject.

5.3 Training Requirements

Competent Person Drilling Oversight (CPDO) Training

The FTL (at least one onsite Shaw person will be performing the drilling oversight) will be required to have successfully completed the approved internal Competent Person Drilling Oversight (CPDO) training.

Prior to assignment of work the Field Team Leader (FTL) will assure that all affected employees receive an overview of the hazards of encountering underground/overhead utilities. The FTL is responsible to review this procedure, the work practices to control these hazards, and the roles and responsibilities of each worker with the work crew. This procedure and other requirements that may be contained in the site specific HASP shall be reinforced during daily tailgate safety meetings.

Trenching/Excavation Training

The Field Team Leader or at least one onsite Shaw employee will be required to have successfully completed Trenching/Excavation training prior to the inception of site work activity when trenching excavation hazards (i.e. spoil piles, use of 3' diameter augers, or anytime similar hazards are present) are present/anticipated. NOTE: This training is now recommended rather than required when trenching/excavation hazards are NOT anticipated/required

5.4 Incident Reporting Requirements

Employees are required to immediately report to their direct supervisor any overhead or underground utility contact incident, or near miss incidents. Any supervisor (but preferably the supervisor directly responsible for the involved employees) with first-hand knowledge of an incident is required to investigate the incident. The Project Manager and respective Health and Safety Manager or Representative shall be informed of the incident immediately.

At a minimum, the incident investigation will require completion of the incident investigation report and General Liability Property Damage and Loss Report form found in H&S Procedure HS020.

In addition, Attachment 5 provides a "Tip Sheet" to help properly assess and investigate the incident causes and recommendations or requirements.

5.5 Local Jurisdiction Requirements

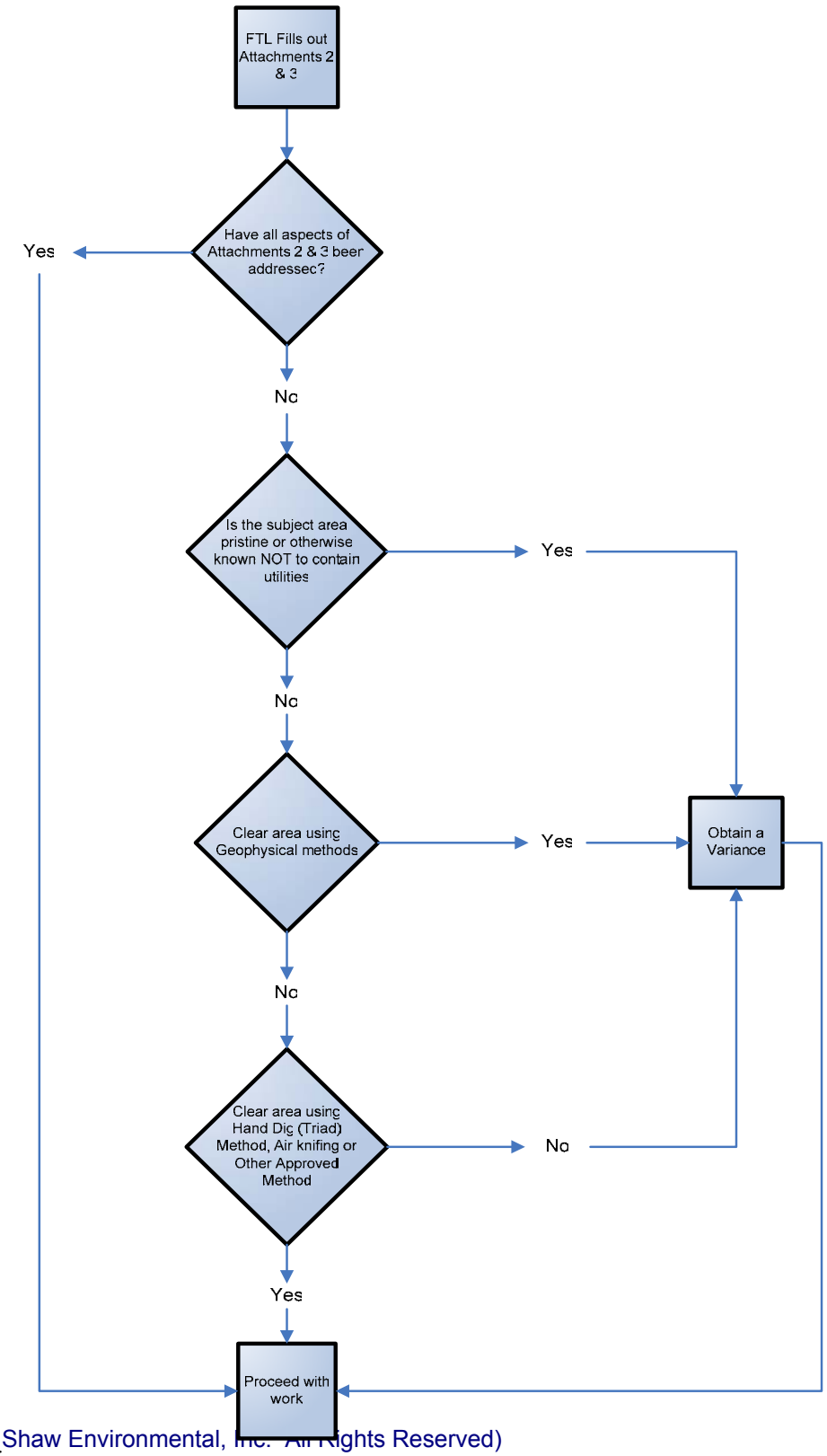
Where local jurisdictions or clients have established requirements different from those in this procedure, the practice which most limits the liability to Shaw for damaged utilities shall be utilized. No variance is required under these circumstances but the project-specific Health and Safety Plan or work plan shall fully document the alternate procedures.

6.0 EXCEPTION PROVISIONS

Anytime a minimum of a 5' clearance cannot be obtained by either hand digging or by using geophysical means, the FTL must obtain a variance from the Regional VP (or equivalent level such as Operations Director for Federal Business Line) or designee to proceed with drilling operations in that area. This would include an initial verbal variance documented in the field log followed up by a written (email) approval from either the Regional VP (or equivalent level or title) or designee. The record of communication will be noted in the field log for the project and, a record of the approval or denial will be placed in the project file.

A variance form can be obtained in HS 013. A flowchart to assist one in determining how and when a variance should be obtained can be found immediately following this section.

HS 308 Flow Chart



7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS020 Accident Prevention Program: Reporting, Investigation, and Review
HS050 Training Requirements
HS307 Excavation and Trenching

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Pre Drilling Checklist
3. Utility Markout Documentation
4. Underground Utility Hits – Tip Sheet for Incident Investigations
5. Frequently Asked Questions

ATTACHMENT 1 - UNDERGROUND/OVERHEAD UTILITY CONTACT PREVENTION
Responsibility Matrix

Action	Procedure Section	Vice President	Project Manager	Field Team Leader	HS Representative
Project-specific HASP or Work Plan shall document the practices to be used at a particular site.	1.0		X	X	X
Contact the One Call Center for mark out of utilities at the site	5.1		X		
Complete Utility Markout Documentation Form	5.2		X	X	
As-built drawings shall be reviewed	5.2			X	
Only experienced demonstrably proficient equipment operators will be used to operate such heavy equipment as backhoes, front-end loaders, cranes, etc.	5.3			X	
Provide training*	5.3				
Incident Investigation and Reporting	5.4		X	X	X
Exceptions to Procedure	6.0	X	X	X	X

*Provided by Shaw's Training Department

ATTACHMENT 2 - PRE - DRILLING/BORING/GEOPROBE Checklist

Purpose: This form is designed to help the FTL make decisions drilling/boreholing/geoprobing around underground/overhead utilities.

DATE_____ PROJECT NAME/NUMBER_____
Field Team Leader Name: _____
DURATION/SUMMARY OF WORK TO BE PERFORMED: _____
_____

Consideration	Check	Check	Explanation	Initial
Has the state one-call been contacted?	□ Yes	□ No		
Are any as-built drawings available? If so, do they show any utilities?	□ Yes	□ No		
Has a visual inspection of the work area(s) been completed?	□ Yes	□ No		
If one-call not available has a private locating service or Shaw S&T group been contacted?	□ Yes	□ No		
Were any utilities identified through private locating service? If so, indicate on site drawings.	□ Yes	□ No		
Are there any fiber optic cables within 50 feet of hole locations?	□ Yes	□ No		
If fiber optic cables are within 50 feet has an agreement with the fiber optic company been established?	□ Yes	□ No		
Can a test borehole be advanced by hand digging, probing, post hole digging, and/or air knifed to 5 feet bgs?	□ Yes	□ No		
If hand digging, probing, post hole digging, and or air knifing to 5 feet bgs is not possible, can a non-invasive geophysical investigation be conducted? If not, why?	□ Yes	□ No		
Are you comfortable with approving this authorization?	□ Yes	□ No		
Other considerations:				

ATTACHMENT 3 - UTILITY MARK-OUT DOCUMENTATION

Project Name:_____ Location:_____
FTL Name: _____ Date:_____
Utility Called:_____ Confirmation #:_____
Subcontractor:_____ Task/Activity:_____
County of work:_____ Municipality of work:_____

Before work is done on any site, contact the appropriate local utility locating service (One Call, Miss Dig, Uloco, etc.) or a local utility contractor to have sub grade utilities marked. NOTE: Boring locations to be placed not in the public right of way are typically not marked out by the public utility mark out, and a private utility locate service must be engaged. Indicate to the utility locator the nearest intersecting street for the site: _____ Confirmation No:_____.

List utility firms (public and private) and the utility they will mark.

Utility Marker Emergency Telephone Numbers Major Utilities Marked by Color Code			
Name of Utility Company	**Utility**	**Color Code**	**Emergency Telephone Number**
	Water	Blue	
	Gas	Yellow	
	Electric	Red	
	Telephone/ Cable/ Communication	Orange	
	Sewer	Green	
"ALL UNDERGROUND UTILITIES MAY NOT BE LOCATED BY THE LOCAL UTILITY SERVICE". Accordingly, you must list other known utilities in the area that the "One Call" service will not contact:			

Attach photos of the area prior to placing boreholes.
Take photos of the area indicating minimum 5' hand dig, post hole dig, probe, GPR or other:
NOTE: For any borehole, should 5' minimum clearance not be obtained, you must contact Business Line VP or equivalent (Operations Director or other on the Federal Business Line) and obtain a variance.

Completed by:_____ _____ _____
Name Signature Date

ATTACHMENT 3 – UNDERGROUND UTILITY HITS
TIP SHEET FOR INCIDENT INVESTIGATIONS

1. Location of the incident.
2. The time of day the incident occurred.
3. What type of utility was hit?
4. How deep was the line hit (in feet)?
5. Who called Designated Locator Service?
6. Note the "One Call" number on the Incident Investigation Follow-up report.
7. Attach the "One Call" record keeping documentation.
8. Were mark-outs completed by the utilities? If so, please identify.
9. Were mark-outs legible at the site?
10. Was the mark-out of the line that was hit accurate?
11. Was the mark-out misinterpreted?
12. Is there a utility damage sheet attached to the Incident Investigation Follow-up Report?
13. Have there been any faults or oversights by any 3rd party? If so, is it documented on the Incident Investigation Follow-up Report?
14. Did the FTL interview the property owner/manager prior to the incident?
15. Was pre-screened by hand digging 5 feet?
16. Were any supplemental utility locator devices used? If so, did we obtain them? If so, were they used on site?
17. Were there blueprints/as built plans available? If so, did we obtain them? If so, were they used on site?
18. Who is paying for the repairs?
19. Please define the total hours and cost estimate/impact to address the utility damage incident:

    _____ Site time in hours (not billed to the job)
    _____ PM time hours (not billed to the job)
    _____ H&S time in hours (not billed to the job)
    _____ BLM Time in hours (not billed to the job)
    _____ Rework/non-billable time (estimate)
    _____ Subcontractor rework/non-billable costs (estimate)
    _____ Repair costs to company (estimate)
    _____ Repair cost to customer (estimate)

20. Has the FTL completed Shaw's in-house CPDO training?
21. Has the FTL completed trenching/excavation training?
22. Is he/she current with the OSHA 40 hour and 8 hour refresher? If so, what are the dates of the training?
23. Who was the Site Safety Officer on the job site?
24. Does he/she have OSHA 8 hour supervisor training? If so, what are the dates of the training?
25. What was the name of the drilling subcontractor that was on site?
26. Have we researched the training background for this vendor?
27. Was a JSA performed at least once during the day that covered utility contacts and associated hazards?
28. Does this vendor have approved status?
29. Was there a tailgate safety meeting that took place?
30. Were utility mark-outs addressed at the tailgate safety meeting?
31. Were there any markings nearby the "hit" area?

ATTACHMENT 5 – Frequently Asked Questions (FAQs)

During the roll-out of this revision of HS 308 a variety of questions/comments/concerns arose. These concerns have been put in the form of most frequently asked questions (FAQs) and their respective responses. These FAQs will clear up misunderstanding pertaining to this procedure, and provide valuable information that will help our workforce have a better understanding of how this procedure should be implemented. Please review the FAQs below:

1. *No other competitor of Shaw has felt the need to do anything as extreme as this procedure to ensure minimization of utility hits. Instituting this procedure will put us out of business.*

Response: After thorough review of claims and incidents involving drilling activities and underground utilities, the committee believes that our business/client needs are best served by adopting this policy. And that the likelihood of being put out of business is much greater from continuing to do business the way we currently do it than by adopting this improved policy. The committee realized that 100% adherence to this procedure at all work sites is likely not possible. For those cases where legitimate reasons exist for non-compliance, the committee realized that an effective responsive (variance) system must be in place. The committee believes that the variance procedure, as stated in the policy, should address the exceptions as they occur.

The Committee is not aware of any specific ASTM or true "industry standard". However, the committee is aware that best practices can vary tremendously and many times are client dependent. For example one extremely large Shaw client requires that we continuously probe. On the other end of the spectrum some clients look completely to Shaw for guidance in these matters.

2. *Our clients want us to do the work but do not wish to pay the additional fees involved with this new procedure. Could we offer them a two tiered pricing, one to do it the old way, and one to do it the new way?*

Response: The committee believes that contacting an underground utility of any type, no matter who is at fault or who ultimately pays for fixing, the outcome is a "black eye" for all involved. When these events occur, even if Shaw is not at fault, the committee believes that continued good client relations, and the potential for obtaining future business lessens as utility hits/incidents occur. This procedure is designed to minimize health and safety risks to our workers AND to mitigate liability to Shaw. Receiving the necessary compensation for the precautionary measures outlined in the procedure would be expected, and should be itemized in the initial proposal including a statement as to what will specifically be done in the field to mitigate risks relative to underground utilities and WHY Shaw believes these steps are necessary. However, if the client is willing to assume the entire liability resulting from "hitting" an underground utility, the contract should be written to reflect this

and a variance would be in order. Keep in mind that Shaw cannot allow a client's desires to take on liability to affect the health and safety of workers. No matter what the client desires might be, Shaw would still expect the basic procedures to be followed for health and safety purposes. The training though yet to be finalized will provide project manager's examples of wording to be used in proposals and contracts.

3. Hand digging to 5' is impossible during frost conditions in Minnesota, Wisconsin and many northern areas. How should this be addressed?

Response: When conditions present themselves that do not allow for hand digging each borehole, other methods must be used for clearance and a variance must be obtained. The alternative methods include a range of non-invasive geophysical survey techniques designed specifically for locating buried utilities, pipelines, tank (UST), and other buried objects that can interfere with drilling. These non-invasive geophysical methods are suggested and mentioned in the procedure.

4. What if the field crew runs into refusal during hand dig clearance?

Response: If refusal occurs and moving to an alternate spot presents the same problem, hand digging may not be possible as mentioned in #2 above. When conditions present themselves that do not allow for hand digging each borehole, other methods must be used for clearance and/or a variance must be obtained. Of course, we expect that the dig safe folks to be contacted, and that a private locating service be utilized if available. Should a private locating service not be available, we can use trained internal sources.
The alternative methods include a range of non-invasive geophysical survey techniques designed specifically for locating buried utilities, pipelines, tank (UST), and other buried objects that can interfere with drilling. The current accepted geophysical methods for the investigation and location of buried utilities include: Ground Penetrating Radar (GPR), Time Domain and/or Frequency Domain Electromagnetic methods, Magnetometer, and Inductive/Conductive Radio-Magnetic methods. These non-invasive geophysical methods are suggested and discussed in the procedures. The geophysical methods can be very useful for locating buried utility lines in areas where drilling and digging are not possible or practical, but these methods do have some limitations that are a function of soil conditions, depth of investigation, and imaging resolution.
If it is determined that a non-invasive geophysical investigation may be needed, assistance with selecting the appropriate method(s) can be obtained from the Shaw E & I Science and Technology Division, Geophysics & Mapping Group. Of course, it is expected that the "dig safe" folks will be contacted, and that a private utility locating service be utilized when appropriate (utility location method is known to be feasible), and if available. Should a private locating service not be available, we can use trained internal Shaw E & I personnel resources to perform utility line location work. Finally, if the Project Manager has determined that a variance to the procedure is justified, a variance request should be submitted for review.

5. Why is trenching/excavation training required for putting in Geoprobe® boreholes? This seems like tremendous overkill.

Response: The committee believes that, in general, trenching/excavation training is a good educational tool that promotes overall health and safety awareness and provides important information/techniques for our field staff. Trenching/excavation training provides insights into fall hazards, spoil pile placement, and many other related safety issues. Many of our drilling jobs have involved oversized auger bits (3' in diameter) where a large deep borehole is created. The committee agrees that when the diameter of the borehole lessens (i.e. use of a Geoprobe®), the impact of trenching/excavation training decreases. Trenching excavation training is now a requirement only when large boreholes are created or other hazards as mentioned above are present, but only recommended training when Geoprobe ® or similar equipment is being used and the result is trenching excavation type hazards do NOT exist. NOTE: Specific training pertinent to drilling/ Geoprobing ®/boring (CPDO training) will be provided and will be mandatory. Additionally, CPDO and trenching / excavation training are both required on projects where 3' or larger diameter boreholes are to be drilled.

6. Are there any training requirements besides trenching/excavation training?

Response: The committee evaluated a need for training specific to the HS 308 policy (drilling) and solicited the assistance of the training department and certain operations employees to develop CPDO training. This CPDO training includes basic steps needed to be taken from call the dig-safe number, private utility searches, geo-physical capabilities, probing, hand augering, air knifing, water pumping/knifing, hand digging and others.

7. Hand diggings creates heat stress, tripping hazards, back injuries, and other hazards and is unnecessary.

Response: The committee did not envision using a spade and a strong back to dig various 5' holes at the field site. The committee does envision using an air knife, water knife, probe, or other method rather than a hand shovel. The committee understands that not all methods may be acceptable in all states, municipalities or to all clients. The committee was also aware that when all else fails one could consider using a l" diameter stainless steel auger placing 5' bgs hand borings in a triangular pattern where the auger bit could be placed in between these small hand borings. The committee envisions this theme and methodology to be expanded within the upcoming training. Additional information on augering techniques will be provided in the specific training (CPDO) mentioned above.

8. I need to put borings in pristine farmland next door to a contamination zone. There are no and have never been any utilities in this area. What should I do?

Response: Once you go through the proper utility locate procedure and are confident that no utilities

exist in the subject area, you need to obtain a variance. This would also hold true for pristine forest preserves, wildlife refuges, or other areas not affected by utilities.

9. Who needs to sign off on a variance?

Response: Variances are signed by the Area Vice President (or designee, which may be delegated to the BLM for each office) along with the Project/Program Manager/Director. When we know in advance that HS308 cannot be adhered to, one should make plans to get a formal variance approval and appropriate paperwork developed two weeks prior to field activity. Variances can also be obtained when field conditions arise that make adherence to HS308 impossible. The variance can be obtained via cell phone in the field with the PM and appropriate management with the outcome noted in the field logbook followed up by an appropriate e-mail. This e-mail should be kept in the project file as proof of variance approval. It is recommended that variances be obtained as soon as it is known that they will be required.

10. What constitutes a "probe"? I assume a Geoprobe® is not valid?

Response: A Geoprobe® is NOT a valid probe in that Geoprobes® have caused damage to sewer lines and other utilities. Probes are typically made of a fiberglass-like material that have a pointed end but will not damage subsurface utilities and allows for the field staff to sense if underground items are encountered.

11. Under 5.1, is a subcontractor a designee?

Response: Although a subcontractor can make arrangements to contact dig safe and more, Shaw must ensure that the sub has, in fact, done what they had agreed to do. It should be remembered that typically on drilling projects, from many of our customer's perspective, the liability remains with Shaw, and they will look to Shaw, not our subs, for resolution of any events that occur. Hence, it is incumbent on Shaw to insure that our procedures are followed by Shaw and Shaw subs.

12. Does ground surface include concrete, asphalt or other man-made coverings?

Response: A simple NO. Some of our projects include drilling through airport runways or tarmacs which can be up to 15" in depth. Manmade surfaces do NOT count in the 5' hand dig clearance specification. If we are attempting to advance boreholes below existing concrete surfaces, the geology below the concrete will be exposed by cutting the concrete and removal of the concrete. After the concrete is removed and the geology is exposed, a hand auger can then be used. Hopefully, the twelve concerns above and the responses to these comments will have helped users understand the implementation of this HS 308 policy. More importantly the committee realizes that information on this subject will be provided during the training mentioned above. It is the committee's belief that once this program has been completely rolled out the need for variances will be minimal and the interactions of the safety department with operations management with this entire process will make ensure success.

APPENDIX D
STRUCTURAL SURVEY REPORT

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FINAL

Structural Survey Report

Structural Analyses and MEC Support for Load Lines 1-4
Ravenna Army Ammunition Plant
Ravenna, Ohio

Contract Number W912QR-04-D-0027
Task Order 0001

Prepared for:

United States Army Corps of Engineers
Louisville District

Prepared by:

Shaw Environmental and Infrastructure, Inc.
100 Technology Center Drive
Stoughton, MA 02072

April 2007

STRUCTURAL SURVEY REPORT
Structural Analyses and MEC Support for Load Lines 1-4
Ravenna Army Ammunition Plant
Ravenna, Ohio

TABLE OF CONTENTS

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LIST OF ACRONYMS

ACM	Asbestos-Containing Material
FPRI	Fixed-Price Remediation with Insurance
HTRW	Hazardous, Toxic and Radiological Waste
LL	Load Line
LMARC	Louisville Multiple Award Remediation Contract
PE	Professional Engineer
PWS	Performance Work Statement
RAWP	Remedial Action Work Plan
RVAAP	Ravenna Army Ammunition Plant
Shaw	Shaw Environmental & Infrastructure, Inc.
SOW	Scope of Work
SSR	Structural Survey Report
USACE	United States Army Corps of Engineers

1.0 INTRODUCTION

1.1 Background

In September 2003, the U.S. Army Corps of Engineers (USACE) Omaha District awarded Shaw Environmental & Infrastructure, Inc. (Shaw) a Fixed-Price Remediation with Insurance (FPRI) contract (DACA45-03-R-0026, Task Order No 0001) for Load Lines 1, 2, 3 and 4 (LLs 1-4) at the Ravenna Army Ammunition Plant (RVAAP) in Ravenna, Ohio. The proposal provided by Shaw was based upon Shaw receiving LLs 1-4 with the buildings removed and only slabs remaining. In early 2006 the removal of buildings at LLs 2-4 had not occurred and USACE recognized that additional measures to facilitate Shaw's work were required to protect workers from hazards associated with the remaining buildings and to allow Shaw to safely conduct the necessary remedial action.

Shaw was subsequently contracted by the USACE Louisville District under USACE's Multiple Award Remediation Contract (LMARC; No. W912QR-04-D-0027, Task Order No. 0001) to perform a structural survey of remaining buildings, relocation and handling of existing stockpiled demolition debris within the proposed work zones, and structural support of structures and debris that could dislodge or collapse during excavation activities.

1.2 Purpose

The intent of the structural survey performed under the LMARC was to evaluate areas of concern that could pose a health and safety risk to on site workers during the excavation activities and can be addressed with minor support system implementation (relocation of debris, use of temporary support beams/tie backs, minor removal of non-structural components of buildings, etc.). This Structural Survey Report (SSR) complies with the requirements of the LMARC task order and does not include any discussion of major demolition work associated with the existing buildings. Any demolition of the existing buildings would be the responsibility of the Army outside of this task order.

This task order is contractually separate from the FPRI work, but will be performed to support the FPRI work. The SSR will reference and adhere to existing facility wide and FPRI project specific work plans, but it is not an element of the Remedial Action Work Plan (RAWP) that is forthcoming under the FPRI. However, the information and safety measures generated by the structural survey results will be referenced in the FPRI RAWP.

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2.0 SCOPE OF WORK

Shaw's performance requirements for this SSR as defined by the USACE Performance Work Statement (PWS) dated July 13, 2006, is to observe the structural condition of the existing buildings and potential safety hazards associated with these buildings that may impact the proposed remedial actions to be performed by Shaw under the existing FPRI contract. As part of the structural survey activities under this task order, Shaw has conducted the following site activities:

- A preliminary visual inspection of LLs 2-4 by a Shaw structural engineer to initially identify potential structural concerns and safety hazards that may impact remediation activities under the FPRI; and
- A follow-up structural survey by a Shaw structural engineer to further assess the structural integrity of the buildings and areas of concern identified at LLs 2-4 during the preliminary visual inspection.

This SSR summarizes the results of the aforementioned survey activities conducted by Shaw and includes a description of building structure conditions, proposes support measures for structures or partitions that can be supported, provides designs for the types of supports required and proposes procedures to implement safety measures when working around areas of structural concern. The conclusions and recommendations included in this SSR will be utilized to implement measures to alleviate the safety concerns related to structural problems during hazardous, toxic and radiological waste (HTRW) excavations activities at LLs 2-4 under the FPRI. All asbestos-containing materials (ACM) have reportedly been previously removed from the existing structures by others and Shaw did not perform any asbestos or lead surveys as part of the structural survey activities.

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3.0 STRUCTURAL SURVEY ACTIVITIES

3.1 Preliminary Visual Inspection

In April 2006, Mr. Tim Lynch, P.E., the designated Shaw structural engineer conducted a preliminary visual inspection at LLs 2-4 to observe the structural condition of the existing buildings and potential safety hazards associated with these buildings that may impact the proposed remedial actions to be performed by Shaw under the existing FPRI. Assessment of the safety hazards involved visual observation and evaluation of existing site conditions that were accessible within each building area. The Shaw structural engineer collected digital photographs to document existing conditions at the time of the preliminary visual inspection (**Appendix A**). **Table 3-1** presents a summary of findings encountered during the preliminary visual inspection.

Preliminary visual inspections of the structures at LLs 2-4 indicated a potential for falling debris or unstable building components to cause a safety hazard to onsite workers. Most of the safety concerns identified during the preliminary visual inspection can be addressed by the direct removal of loose and accessible overhead and hanging debris or monitoring of structural conditions during excavation activities as described in **Table 3-1**. However, further structural evaluation was required at several locations to assess potential safety concerns. The following areas were identified by Shaw to require further evaluation:

- Building DA-7
- Building DB-3
- Building EA-6
- Building G-1A

3.2 Structural Survey

In October 2006, Mr. Lynch, the Shaw structural engineer, returned to the RVAAP LLs 2-4 to perform a structural survey of the four areas (Buildings DA-7, DB-3, EA-6 and G-1A) identified to require further evaluation to assess the need for minor support measures that may be required to safely execute remediation activities under Shaw's existing FPRI contract. As part of the structural survey process, the Shaw structural engineer assessed the potential safety concerns associated with the structural issues. If the structural issues were deemed to be a threat to remedial work to be conducted under the FPRI, the Shaw structural engineer analyzed the structural integrity of these areas of concern and provided a recommendation if the building or partition can be supported. If the structure or partition can be adequately supported, a design will be prepared by a structural engineer for the type of support required.

Table 3-1
Summary of Preliminary Visual Inspection Observations

Building Identification	Summary of Findings	Recommended Action
Load Line 2		
Bldg DA-6	Hanging debris from deteriorated roof at northwest corner of building.	Remove loose and accessible overhanging debris and monitor roof conditions during remediation activities.
Bldg DA-7	Deteriorated lintel on equipment door opening adjacent to proposed excavation area	Provide structural support measures for lintel prior to commencing remediation activities.
Bldg DB-3	Leaning stacks on top of building.	Monitor stacks during remediation activities on southwest side of building. No work should be performed on northeast side of building below stacks unless the stacks are adequately supported or removed.
Bldg DB-13B	Overhead hanging debris associated with deteriorating roof conditions.	Remove loose and accessible overhanging debris and monitor roof conditions during remediation activities.
Load Line 3		
Bldg EB-4A	Hanging debris over excavation area at southeast corner of building.	Remove loose and accessible overhanging debris and monitor structural condition of remaining debris during remediation activities
Bldg EA-6	Unsupported brick masonry associated with missing lintel at east side of building. Hanging debris along east side of building.	Remove loose and accessible overhanging debris and monitor structural condition of unsupported masonry during remediation activities. No personnel shall stand on deck adjacent to the missing lintel area during remediation activities.
Load Line 4		
Bldg G-1A	Depth of excavation at 3 feet along north side of building may compromise the foundation and/or slab	Monitor foundation condition during excavation activities and consult structural engineer if deeper excavation is required.

3.2.1 Building DA-7

Building DA-7 in Load Line 2 is a small one-story brick tile structure that is in poor condition due to a missing roof and continuous exposure to the elements (**Appendix A**). An approximate 16-inch x 8-inch x 12-foot long wooden lintel over the equipment door opening at the northern portion of the structure is severely deteriorated and presents a likely potential for structural failure of the wall in its current condition. The proposed area of excavation is located immediately adjacent to the location of the bay door opening. Due to the shallow nature of proposed excavation activities at Building DA-7, undermining of the foundation is not expected to occur; however, vibrations and other activities associated with the proposed removal action have the potential to cause the lintel to fail and is an immediate health and safety concern that will require mitigation prior to conducting field activities.

3.2.2 Building DB-3

The roof of Building DB-3 in Load Line 2 is a large production building type structure that is in a deteriorated state. This building has four stacks on the top of the structure, several of which are leaning prominently in a northern direction (**Appendix A**). These stacks represent an overhead hazard to any personnel working beneath the structure in the direction that the stacks are leaning and vibrations associated with proposed excavation activities have the potential to impact the stacks. However, the proposed excavation activities are along the southwest side of the building and it is likely that should the stacks fall, they would continue moving in the northeast direction, away from the excavation area.

3.2.3 Building EA-6

Building EA-6 in Load Line 3 is a small one-story brick tile structure. The east side of this structure is compromised by a missing lintel over a bay door area. Structural tiles previously supported by the missing lintel are precariously situated and may be impacted by vibrations or other activities associated with the proposed removal action and represent a potential health and safety risk to on-site personnel working in the vicinity (**Appendix A**). Observations of similar type buildings at the RVAAP with the same missing lintel conditions indicate that the remaining hanging portion of the wall would drop vertically with a limited area of horizontal impact. The proposed excavation area is located adjacent to the east of the building but is separated by an approximately 10-foot wide concrete decking that should provide adequate protection to personnel and equipment should any of the brick tile fall. As a safety precaution, condition of the brick tile should be monitored during excavation activities, especially when personnel are working close to the building.

3.2.4 Building G-1A

Building G-1A is a large warehouse structure on a slab foundation situated in Load Line 4 and appears to be in overall good structural condition (**Appendix A**). An overhang exists along the entire northern portion of the structure and is supported by wood timbers on concrete piers. The proposed area of excavation is adjacent to the overhang foundation at the northwest side of the building and is one of the deeper excavation areas

to be conducted at any of the load lines at a maximum depth of three feet below ground surface. The primary concern associated with remediation activities at this location is the potential for undermining the foundation of the building. A review of the original building plans provided by USACE indicates that the proposed depth of excavation will be at or just below the foundation footing. If excavation is required to continue to a deeper elevation, the Shaw structural engineer must be consulted to assess whether a potential exists to compromise the structural integrity of the foundation.

4.0 IDENTIFICATION OF BUILDINGS REQUIRING SUPPORT MEASURES

Based on the results of the structural survey, Shaw has identified the areas of greatest structural concern that will require support measures. Most of the structural concerns can be addressed by direct removal of loose overhanging debris, relocation of stockpiles or close monitoring of structural conditions during excavation activities as identified in **Table 3-1**. The Shaw structural engineer did identify one structure (Building DA-7) where structural support measures will be required prior to remediation activities in the vicinity of the building. As discussed in **Section 3.2.2**, the lintel associated with the bay door opening is severely deteriorated and will require replacement. Shaw has prepared a design to support this portion of the building and is presented in **Appendix B** of this SSR for USACE review prior to implementation. Once approved, the support measure will be installed and Shaw's structural design engineer will inspect the system prior to the commencement of excavation activities.

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5.0 IMPLEMENTATION OF SAFETY PROCEDURES

The implementation of safety procedures for the areas of structural concern at the LLs 2-4 consist of the installation of safety structural measures for the removal of accessible debris and monitoring of structural conditions during remediation activities. The buildings identified with structural safety concern issues and the recommended actions are included in **Table 3-1**. Further detail of the recommended safety procedures are identified in this section.

5.1 Building DA-7

The deteriorated lintel on Building DA-7 represents a significant potential health and safety threat to the proposed remedial action activities and will require the implementation of structural support measures (**Appendix B**) to allow work to commence in this area. The brick tile mortar above the lintel and along the wall of concern appears to be in good condition and is suitable for the proposed support measure. Installation of the proposed support measure should be implemented prior to conducting any activities adjacent to the structure including removal of the debris piles. The recommended safety procedure for this building consists of the following methodology:

1. Install the structural support measures as presented in **Appendix B** of this SSR.
2. Monitor the reinforced wall during remedial activities for noise and cracks that may indicate a potential failure.
3. Leave the area immediately if structural conditions change or any additional safety concerns arise.

5.2 Building DB-3

The primary concern associated with Building DB-3 is the compromised stacks on top of the structure that are leaning in a northerly direction. Excavation activities around Building DB-3 are expected to only be required along the southwest side of the structure, in the opposite direction in which the stacks are leaning; therefore, removal of the stacks is not necessary. However, caution should be used when performing the proposed remediation activities. The recommended safety procedure for this building consists of the following methodology:

1. Perform excavation activities along the southwest side of the building only. No activities should be conducted along the northeast side of the building, immediately below the location of the leaning stacks.
2. Monitor the conditions and any movement of the stacks during excavation activities.
3. Do not park vehicles or equipment immediately below the stacks on either side of the building.
4. Leave the area immediately if structural conditions change or any additional safety concerns arise.

5.3 Building EA-6

The primary structural concern associated with Building EA-6 is the unsupported brick masonry that resulted from a removed lintel at the east side of the building. This building also has overhead hanging debris which is discussed further in **Section 5.1.5**. The recommended safety procedure for unsupported brick masonry at this building consists of the following methodology:

1. All personnel and equipment shall maintain a safe distance from the area of unsupported masonry which shall be considered the edge of the concrete decking in front of the damaged lintel. No personnel shall have access the concrete decking in front of the damaged lintel during the remediation activities.
2. Monitor the conditions of the unsupported masonry during work activities. Any noises or additional cracking in the mortar joints may indicate a potential failure.
3. Leave the area immediately if structural conditions change or any additional safety concerns arise.

5.4 Building G-1A

Building G-1A itself appears to be structurally sound in the vicinity of proposed excavation activities; however, the depth of excavation (3 feet) has the potential to impact the structural integrity of the nearby overhang foundation associated with the building. The recommended safety procedure for this building consists of the following methodology:

1. Ensure that excavation activities do not undermine the slab or exceed the depth of the foundation footing which is approximately 2.5 feet beneath the bottom of the slab.
2. Contact the Shaw structural engineer if excavation activities are expected to exceed the anticipated maximum depth of three (3) feet or conditions arise which may impact the structural integrity of the foundation.
3. Monitor the overhang slab and structural timbers for noise and cracks that may indicate a potential failure.
4. Do not place heavy equipment on the overhang slab adjacent to the excavation.
5. Leave the area immediately if structural conditions change or any additional safety concerns arise.

5.5 Various Buildings with Overhead Hanging Debris

Various buildings were identified by the Shaw structural engineer to have areas of overhead hanging debris associated with the deteriorated conditions of the buildings. These buildings included DB-13B, DA-6, EB-4A and EA-6. The recommended safety procedure for these buildings consists of the following methodology:

1. Remove accessible loose and overhanging debris to the extent possible without performing demolition of building. Only heavy equipment suitable for removing these items shall be utilized.

2. Maintain a minimum safe horizontal to vertical distance of 1.5:1 from area of structural concern on the building and monitor the area of structural concern continuously.
3. Leave the area immediately if structural conditions change or any additional safety concerns arise.

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ATTACHMENT A

PHOTOGRAPHS

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Building DB-3 – Stacks leaning in a northerly direction away from the proposed excavation area. Photograph taken facing towards the southwest.

Building DB-3 – Stacks leaning in a northerly direction away from the proposed excavation area. Photograph taken facing towards the southeast.

Building DB-13B – Deteriorated roof conditions with overhanging debris. Photo facing in a northwest direction.

Building DA-7 – Rotted lintel in bay door opening adjacent to excavation area. Photo facing in a south direction.

Building EA-6 – Unsupported brick masonry associated with missing lintel adjacent to excavation area. Photo facing towards the west.

Building G-1A – Overhang slab adjacent to excavation area. Photo facing in a southeast direction.

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ATTACHMENT B

STRUCTURAL SUPPORT MEASURES DESIGN FOR BUILDING DA-7

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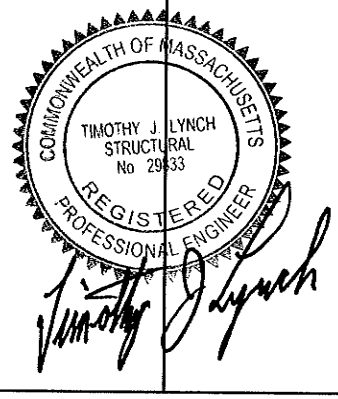
CALCULATION TITLE PAGE

Shaw® Shaw Environmental & Infrastructure, Inc.

CLIENT & PROJECT: USACE LOUISVILLE DISTRICT STRUCTURAL SURVEY REPORT RAVENNA ARMY AMMUNITION PLANT	PAGE 1 OF 4 Total Pages: 4
CALCULATION TITLE: WOOD LINTEL REPLACEMENT BUILDING DA-7	QA CATEGORY (✓) N/A

CALCULATION IDENTIFICATION NUMBER				OPTIONAL WORK PACKAGE NO.		
JOB ORDER NO.	DISCIPLINE	CURRENT CALC NO	OPTIONAL TASK CODE			
122788	**Structural**	**S-1**	**NA**	**NA**		
APPROVALS – SIGNATURE & DATE			REVISION NO. OR NEW CALCULATION NO.	SUPERSEDES CALCULATION NO. OR REVISION NO.	CONFIRMATION REQUIRED (✓)	
PREPARES(S) / DATE(S)	REVIEWER(S) / DATES(S)	INDEPENDENT REVIEWER(S) / DATE(S)			YES	NO
L. LeClerc 28 NOV 2006	S. Johnson 20 Nov 2006	**NA**	**0**	**NA**		✔



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Project Subject File	Stoughton/3				

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BLDG DA-7

CALCULATION IDENTIFICATION NUMBER				
J.O. or W.O. No.	DISCIPLINE	CALCULATION NO.	OPTIONAL TASK CODE	PAGE
122788	Structural	S-1	N/A	2

1.0 OBJECTIVE

The objective of this calculation is to design a temporary wood lintel replacement to support the existing tile blocks above the garage door opening..

2.0 CONSIDERATIONS

Weight of the existing tile blocks = 90 lbs each
Replacement wood = Southern Pine No. 1 structural grade or equivalent
The existing concrete slab is adequate to support the post loads.

3.0 METHODOLOGY

The wood lintel and post were designed using simple hand calcs following the standard allowable stress procedures as called out in Reference 5.1

4.0 SUMMARY

The wood lintel and posts are adequate to temporarily support the given tile block loadings above the garage door opening.

5.0 REFERENCES

1. Design of Wood Structures, ASD, 5th Edition
2. Hilti North America Product Technical Guide, 2002

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BLDG DA-7

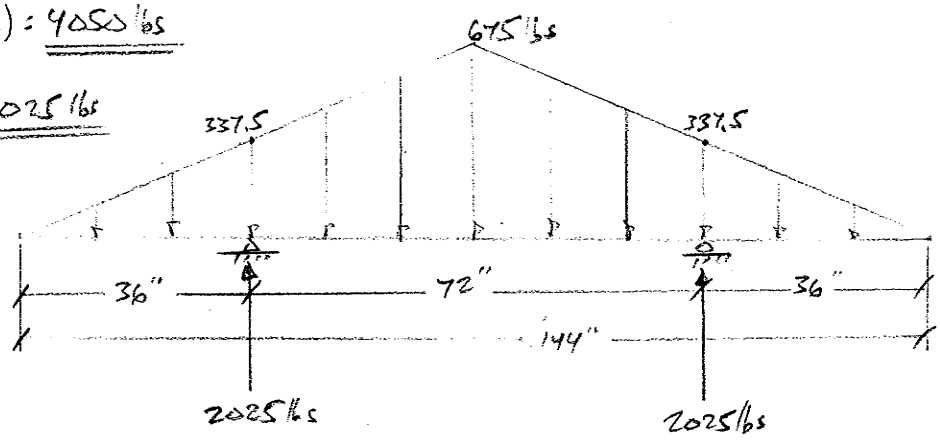
By LeClerc	Date 11/7/06	Subject Lintel Replacement	Sheet No. 3 of 4
Checked By Susan Johnson	Date 11/8/06		Project No. 122788

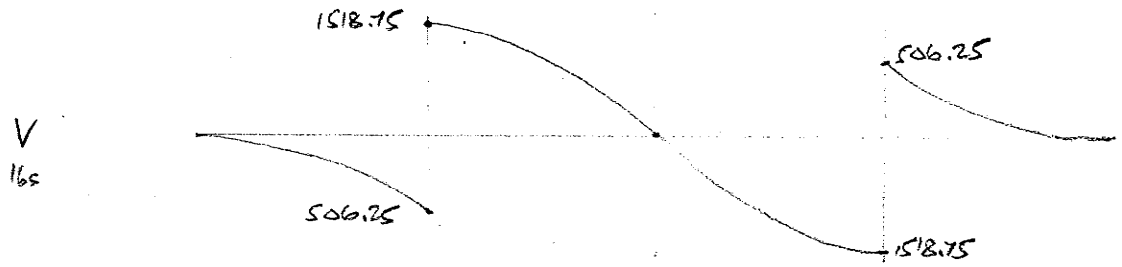
Tile blocks ≈ 90 lbs each

45 blocks (90) = 4050 lbs

$R = \frac{4050}{2} = 2025$ lbs

$W_{max} = \frac{4050}{6} = 675$ lbs

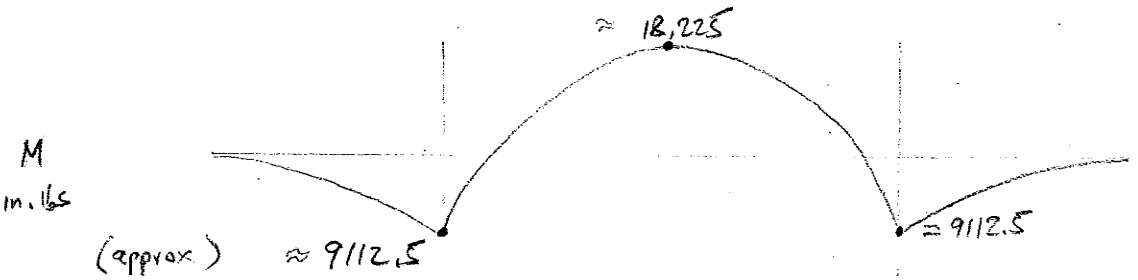




$V_{x=36"}$:

$V = \frac{337.5(3)}{2}$

$V = 506.25$ lbs



$M_{x=36"}$:

$M \approx \frac{506.25(36)}{2}$

$M \approx 9112.5$ in. lbs

$M_{x=72"}$:

$M \approx \frac{1518.75(36)}{2} - 9112.5$

$M \approx 18,225$ in. lbs

Consider: Southern Pine No. 1 Structural

2X10

$f_b \approx 1000$ psi (2005 NDS Supplement)

$S_x = 21.39$ in^3

Use 3:

2X10's 

$\frac{M}{S} = \frac{18,225}{3(21.39)} = 284$ psi < 1000 ✓

Beam: Three 2X10's
S.P. No. 1
Nail together
2 10d @ 24" O.C.

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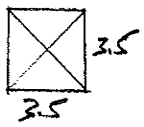
BLDG DA-7

By LeClerc	Date 11/7/06	Subject Lintel Replacement	Sheet No. 4 of 4
Checked By Susan [illegible]	Date [illegible]		Project No. 122788

Columns: consider ℓ = 12' = 144" 4 X 4 timber



load = 2025 lbs + beam weight ≈ 75 lbs = 2100 lbs

$\frac{\ell}{d} = \frac{144}{3.5} = 41.1$

Design of Wood Structures, ASD 5th Ch. 7

$K_{cE} = 0.3$, $c = 0.8$ } Visually graded lumber

S.P. No.1 $E = 1{,}500{,}000$ psi

$F_c = 1450$ psi

$f_{cE} = \frac{K_{cE} E'}{(\ell/d)^2} = \frac{0.3(1{,}500{,}000)}{(41.1)^2} = 266$ psi

$\frac{f_{cE}}{F_c} = \frac{266}{1450} = 0.183$

$\frac{1 + f_{cE}/F_c}{2c} = \frac{1 + 0.183}{2(0.8)} = 0.740$

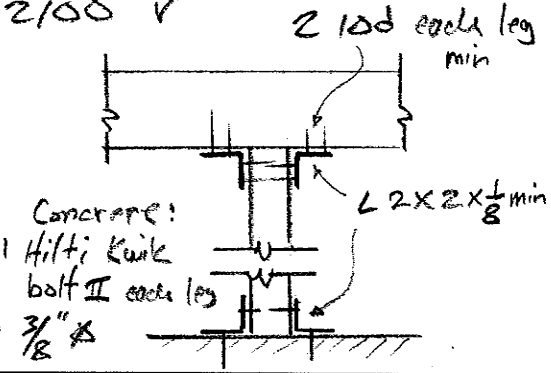
$C_p = \frac{1 + f_{cE}/F_c}{2c} - \sqrt{\left(\frac{1 + f_{cE}/F_c}{2c}\right)^2 - \frac{f_{cE}/F_c}{c}}$

$C_p = 0.740 - \sqrt{(0.740)^2 - \frac{0.183}{.8}} = 0.175$

$F'_c = F_c C_p = 1450(0.175) = 254$ psi

$P_{all} = F'_c A = 254(3.5)^2 = 3112$ lbs > 2100 ✓

USE 4X4 S.P No. 1 Timber firmly attached to beam and concrete s/o6



APPENDIX E
PROJECT SCHEDULE

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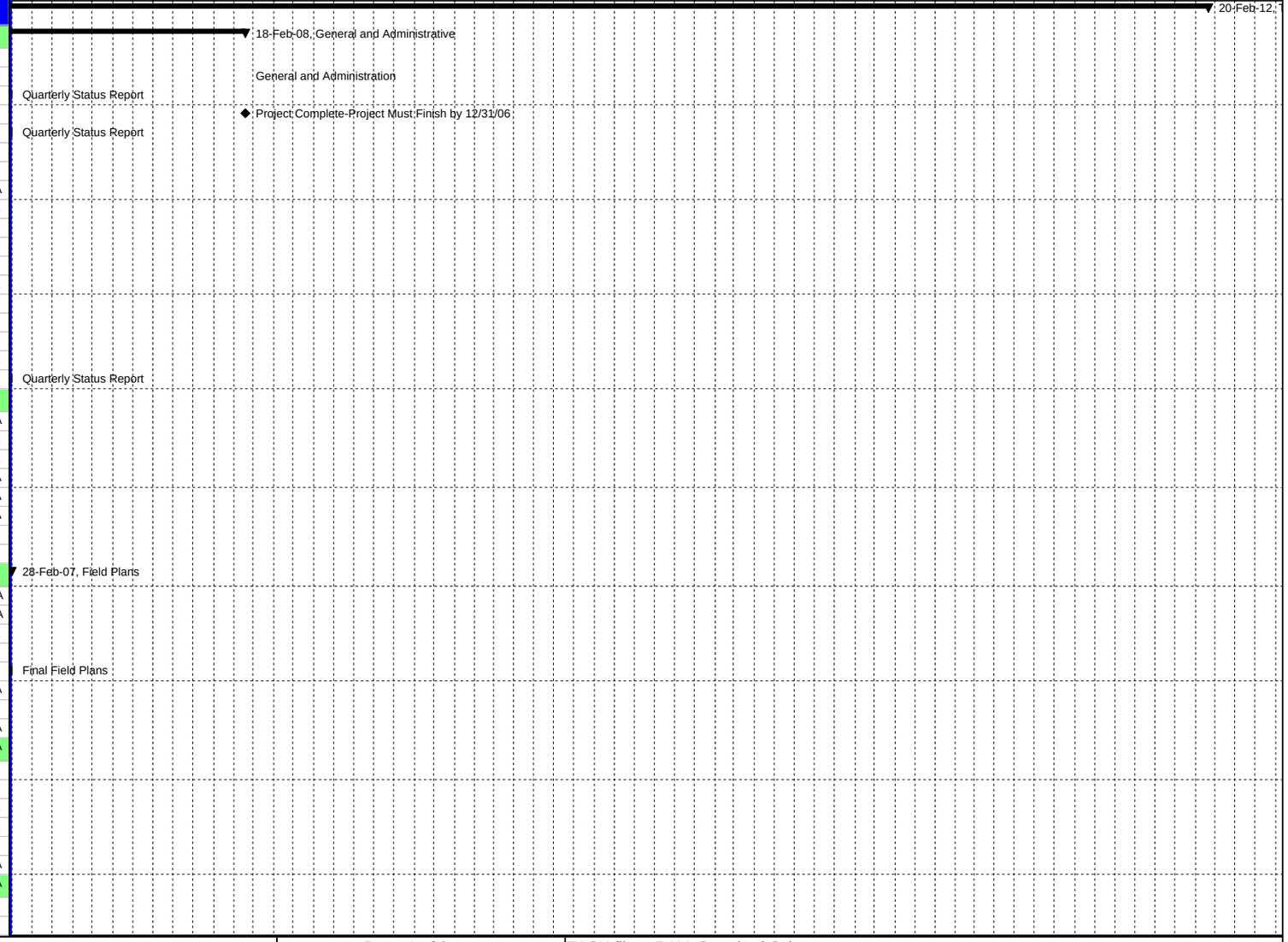
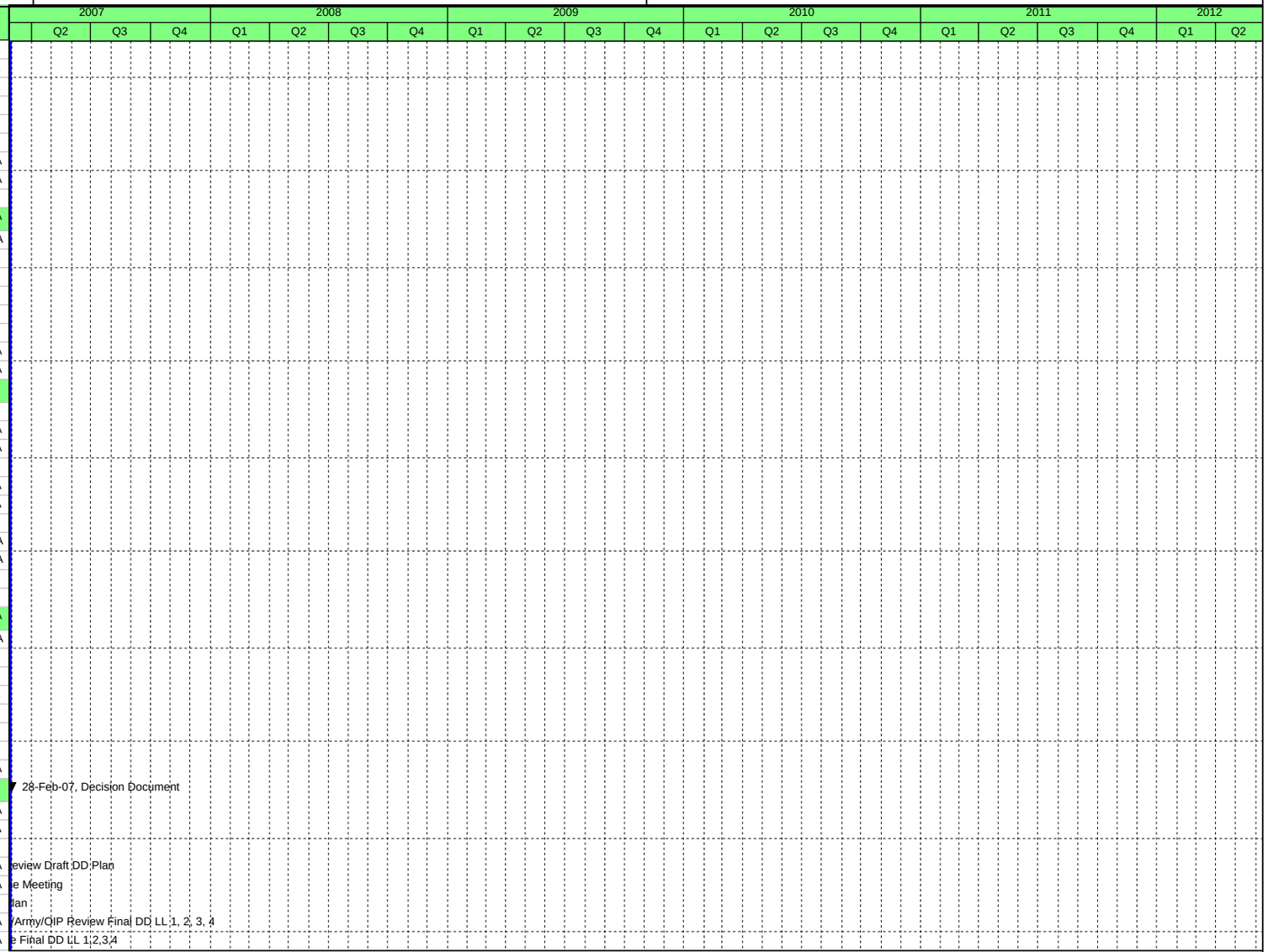
Activity ID	Activity Name	Original Duration	Start	Finish
Total		2215	25-Aug-03 A	20-Feb-12
General and Administrative		1170	25-Aug-03 A	18-Feb-08
000	Bid Submitted	0	25-Aug-03 A	
1005	General and Administration	1132	18-Nov-03 A	18-Feb-08
1006	Quarterly Status Report	1	28-Feb-07*	28-Feb-07
1007	Project Complete-Project Must Finish by 12/31/06	0		18-Feb-08
1016	Quarterly Status Report	1	28-Feb-07*	28-Feb-07
160	Notice to Proceed	0		24-Oct-03 A
161	Insurance	1	24-Oct-03 A	24-Oct-03 A
170	Kick Off Meeting	0	18-Nov-03 A	19-Nov-03 A
215	Quarterly Status Report	1	07-Jan-04 A	07-Jan-04 A
251	Quarterly Status Report	1	07-Apr-04 A	07-Apr-04 A
259	Quarterly Status Report	1	07-Jul-04 A	07-Jul-04 A
331	Quarterly Status Report	1	07-Oct-04 A	07-Oct-04 A
401	Quarterly Status Report	1	07-Jan-05 A	07-Jan-05 A
431	Quarterly Status Report	1	07-Apr-05 A	07-Apr-05 A
691	Quarterly Status Report	1	25-Jul-05 A	25-Jul-05 A
721	Quarterly Status Report	1	09-Oct-05 A	09-Oct-05 A
871	Quarterly Status Report	1	10-Jan-06 A	10-Jan-06 A
911	Quarterly Status Report	1	28-Feb-07*	28-Feb-07
Project Management Plan		154	27-Oct-03 A	29-Apr-04 A
180	Draft Base Time Line Schedule	30	27-Oct-03 A	26-Nov-03 A
190	Draft Base Coordination Plan	30	27-Oct-03 A	19-Jan-04 A
200	Draft Base Project Management Plan	30	27-Oct-03 A	19-Jan-04 A
210	Army Review of Time Line/Coordination/Mgmt Plans	16	20-Jan-04 A	02-Feb-04 A
220	Revise Base Time Line/Coordination/Mgmt Plans	10	03-Feb-04 A	13-Feb-04 A
230	OEPA/Army/OIP Review Time Line/Coord/Mgmt Pl...	45	16-Feb-04 A	04-Mar-04 A
240	Revise Base Final Time Line/Coord/Mgmt Plans	7	05-Mar-04 A	12-Apr-04 A
250	OEPA/Army/OIP Review Final Time Line/Coord/M...	45	13-Apr-04 A	29-Apr-04 A
Field Plans		556	12-Mar-04 A	28-Feb-07
252	Pre-Draft Field Plans	30	12-Mar-04 A	07-May-04 A
253	Army Review Pre-Draft Field Plans	16	07-May-04 A	24-May-04 A
254	Prep Draft Field Plans	10	24-May-04 A	24-Jun-04 A
255	OEPA/Army/OIP Review Draft Field Plans	45	30-Jun-04 A	11-Oct-04 A
256	Final Field Plans	30	03-Oct-05 A	28-Feb-07
258	RI Investigation Work	24	08-Nov-04 A	06-Dec-04 A
268	Field Sampling Plans	28	14-Sep-04 A	11-Oct-04 A
278	OEPA/OIP Review	45	12-Oct-04 A	08-Nov-04 A
Human Health/Ecological Risk		145	26-Jan-04 A	14-Aug-04 A
260	Internal Draft Human Health/Eco Risk Assess	30	26-Jan-04 A	27-Apr-04 A
260C	Prep Draft HH/ERA Plan	7	20-Apr-04 A	27-Apr-04 A
270	OEPA/Army/OIP Review Draft HH/ERA Plan	45	28-Apr-04 A	11-Jun-04 A
270A	Comment Response Meeting	0		19-Jun-04 A
280	Revise Final HH/ERA Plan	10	21-Jun-04 A	01-Jul-04 A
280A	OEPA/Army/OIP Review Final HH/ERA Plan	45	01-Jul-04 A	14-Aug-04 A
Remedial Investigation Plan		170	26-Jan-04 A	13-Sep-04 A
262	Comment Response Meeting LL 2, 3, 4	0	19-Apr-04 A	
272	Prep Draft RI LL 2, 3, 4	35	20-Apr-04 A	21-Apr-04 A



Actual Work | Critical Remaining Work | Summary | Remaining Work | Milestone

TASK filter: RAV_Standard Sch.

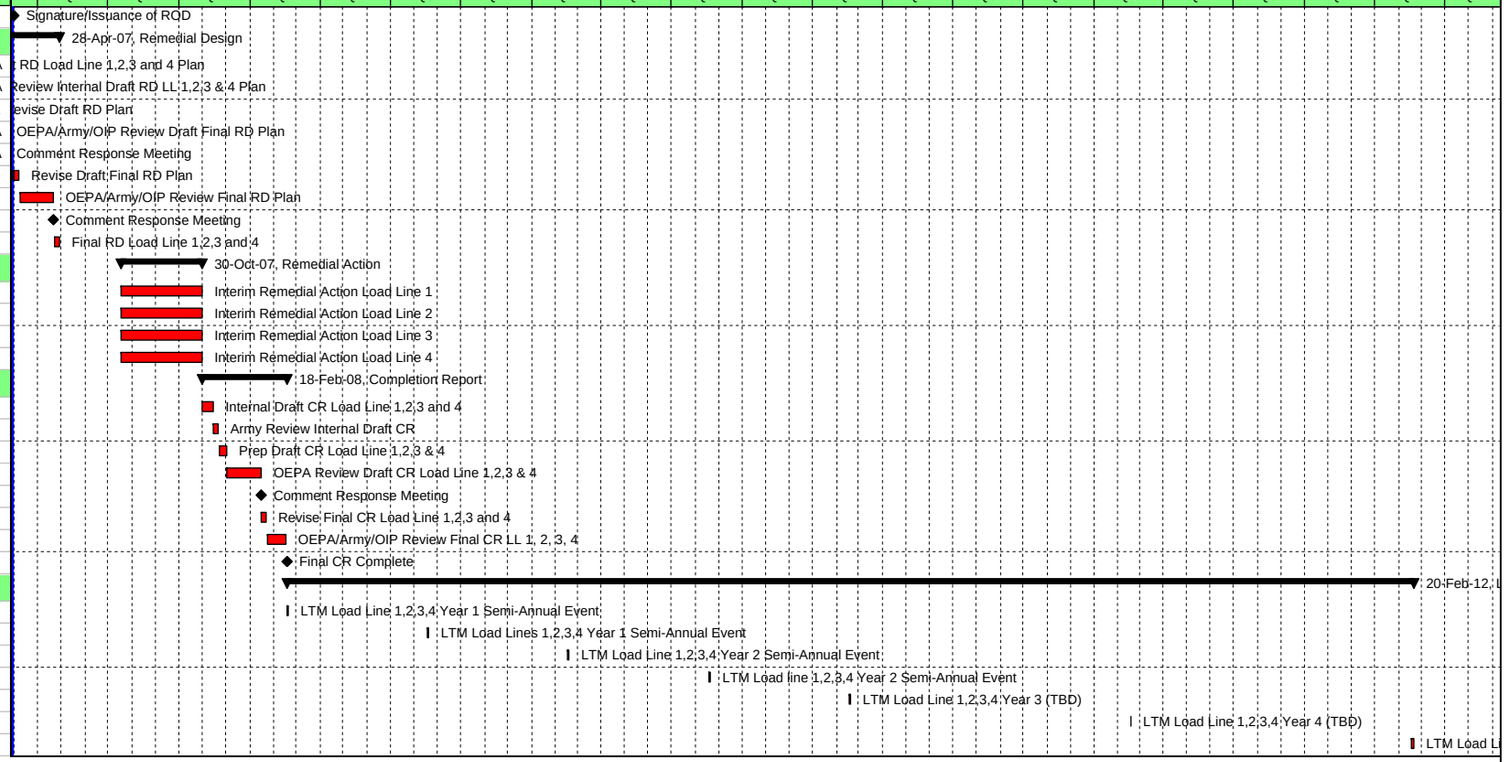
Activity ID	Activity Name	Original Duration	Start	Finish
272A	Receive LL 2	0		02-Jun-04 A
272B	Receive LL 3	0		04-Jun-04 A
272C	Receive LL 4	0		08-Jun-04 A
320	Comment Response Phase II RI Load Line 2,3 and 4	115	26-Jan-04 A	19-Apr-04 A
350	OEPA/Army/OIP Review Draft RI Plan	30	08-Jun-04 A	09-Jul-04 A
360	Revise Final RI Plan	10	01-Jul-04 A	29-Jul-04 A
360A	OEPA/Army/OIP Review Final RI Plan	45	30-Jul-04 A	13-Sep-04 A
360B	Revise Final RI	7	13-Sep-04 A	13-Sep-04 A
370	Comment Response Prep	10	12-Jul-04 A	19-Jul-04 A
RGO Document		106	17-May-04 A	22-Sep-04 A
381	RGO Meeting	1	17-May-04 A	17-May-04 A
382	RGO Prep	30	18-May-04 A	25-Jun-04 A
383	Army Review RGO	16	28-Jun-04 A	06-Jul-04 A
384	Prep Draft RGO	7	07-Jul-04 A	14-Jul-04 A
385	Army/OEPA/OIP Review RGO	0	15-Jul-04 A	22-Jul-04 A
386	Comment Response - RGO	10	22-Jul-04 A	23-Jul-04 A
396	Prep Final RGO	21	21-Sep-04 A	21-Sep-04 A
436	Submit Final RGO Document	0		22-Sep-04 A
Feasibility Study		598	18-Feb-04 A	29-Jul-05 A
380	Prep Pre-Draft FS Load Line 1,2,3,4	30	18-Feb-04 A	29-Oct-04 A
390	Army Review Pre-Draft FS Load Line 1,2,3,4	16	01-Nov-04 A	12-Nov-04 A
400	Prep Preliminary FS Load Line 1,2,3 & 4	21	29-Oct-04 A	17-Nov-04 A
410	OEPA/Army/OIP Review Prelim FS LL 1,2,3 & 4	45	18-Nov-04 A	03-Jan-05 A
410A	Comment Response Meeting	0		18-Feb-05 A
420	Prep Draft FS Load Line 1,2,3 & 4	60	04-Jan-05 A	08-Mar-05 A
430	OEPA/Army/OIP Review Draft FS LL 1,2,3 & 4	45	10-Mar-05 A	25-Apr-05 A
430A	Comment Response Meeting	0		06-May-05 A
440	Final FS Load Line 1,2,3 and 4	7	26-Apr-05 A	09-May-05 A
440A	OPEA/Army/OIP Review Final FS LL 1, 2, 3, 4	45	09-May-05 A	29-Jul-05 A
440B	Revise Final FS	7	21-Jul-05 A	29-Jul-05 A
Proposed Plan		447	15-Nov-04 A	10-Aug-05 A
500	Draft PP Load Line 1,2,3 and 4	104	15-Nov-04 A	16-May-05 A
510	Army Review Internal Draft PP	16	15-Apr-05 A	30-Apr-05 A
520	Revise Preliminary PP Load Line 1,2,3 and 4	10	15-Apr-05 A	30-Apr-05 A
530	OEPA/Army/OIP Review Draft PP	45	16-May-05 A	30-Jun-05 A
530A	Comment Response Meeting	0		01-Jul-05 A
580	Revise Final PP Load Line 1,2,3 & 4	7	01-Jul-05 A	11-Jul-05 A
580A	OEPA/Army/OIP Review Final PP LL 1, 2, 3, 4	45	12-Jul-05 A	29-Jul-05 A
580B	Revise Final PP	7	08-Aug-05 A	10-Aug-05 A
Decision Document		239	12-Jul-05 A	28-Feb-07
600	Draft DD Load Line 1,2,3 and 4	30	12-Jul-05 A	20-Sep-05 A
610	Army Review Internal Draft DD	45	21-Sep-05 A	21-Mar-06 A
620	Prep Draft Final DD Plan	10	20-Mar-06 A	24-Apr-06 A
630	OEPA/Army/OIP Review Draft DD Plan	45	25-Apr-06 A	18-Sep-06 A
630A	Comment Response Meeting	0		18-Sep-06 A
640	Prep Final DD Plan	7	19-Sep-06 A	09-Oct-06 A
640A	OEPA/Army/OIP Review Final DD LL 1, 2, 3, 4	45	10-Oct-06 A	25-Dec-06 A
640B	Revise Final DD LL 1,2,3,4	7	26-Dec-06 A	28-Dec-06 A



Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

TASK filter: RAV_Standard Sch.

Activity ID	Activity Name	Original Duration	Start	Finish
640C	Signature/Issuance of ROD	0		28-Feb-07*
Remedial Design		271	27-Sep-05 A	28-Apr-07
660	Pre-Draft RD Load Line 1,2,3 and 4 Plan	30	27-Sep-05 A	05-Dec-06 A
670	Army Review Internal Draft RD LL 1,2,3 & 4 Plan	16	06-Dec-06 A	21-Dec-06 A
680	Revise Draft RD Plan	7	27-Dec-06 A	31-Jan-07 A
690	OEPA/Army/OIP Review Draft Final RD Plan	45	31-Jan-07 A	16-Feb-07 A
690A	Comment Response Meeting	0		16-Feb-07 A
700	Revise Draft Final RD Plan	7	19-Feb-07 A	07-Mar-07
710	OEPA/Army/OIP Review Final RD Plan	45	08-Mar-07	21-Apr-07
710A	Comment Response Meeting	0		21-Apr-07
720	Final RD Load Line 1,2,3 and 4	7	22-Apr-07	28-Apr-07
Remedial Action		75	17-Jul-07	30-Oct-07
840	Interim Remedial Action Load Line 1	90	17-Jul-07*	30-Oct-07
850	Interim Remedial Action Load Line 2	90	17-Jul-07*	30-Oct-07
860	Interim Remedial Action Load Line 3	90	17-Jul-07*	30-Oct-07
870	Interim Remedial Action Load Line 4	90	17-Jul-07*	30-Oct-07
Completion Report		78	31-Oct-07	18-Feb-08
880	Internal Draft CR Load Line 1,2,3 and 4	15	31-Oct-07	14-Nov-07
890	Army Review Internal Draft CR	7	15-Nov-07	21-Nov-07
900	Prep Draft CR Load Line 1,2,3 & 4	10	22-Nov-07	01-Dec-07
910	OEPA Review Draft CR Load Line 1,2,3 & 4	45	02-Dec-07	15-Jan-08
910A	Comment Response Meeting	0		15-Jan-08
940	Revise Final CR Load Line 1,2,3 and 4	7	16-Jan-08	22-Jan-08
940A	OEPA/Army/OIP Review Final CR LL 1, 2, 3, 4	25	23-Jan-08	16-Feb-08
940B	Final CR Complete	0		18-Feb-08
Long Term Monitoring		1045	18-Feb-08	20-Feb-12
940C	LTM Load Line 1,2,3,4 Year 1 Semi-Annual Event	1	18-Feb-08	19-Feb-08
941C	LTM Load Lines 1,2,3,4 Year 1 Semi-Annual Event	1	19-Aug-08	20-Aug-08
950C	LTM Load Line 1,2,3,4 Year 2 Semi-Annual Event	1	17-Feb-09	18-Feb-09
951C	LTM Load line 1,2,3,4 Year 2 Semi-Annual Event	1	19-Aug-09	20-Aug-09
960C	LTM Load Line 1,2,3,4 Year 3 (TBD)	1	17-Feb-10	18-Feb-10
970C	LTM Load Line 1,2,3,4 Year 4 (TBD)	1	17-Feb-11	18-Feb-11
980C	LTM Load Line 1,2,3,4 Year 5 (TBD)	1	17-Feb-12	20-Feb-12



Actual Work | Critical Remaining Work | Summary | Remaining Work | Milestone

TASK filter: RAV_Standard Sch.

APPENDIX F
COMMENT RESPONSE TABLE

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COMMENT RESPONSE TABLE

Draft Final Remedial Action Work Plan, Remediation of Soils at Load Lines 1- 4, Ravenna Army Ammunition Plant, Ravenna, Ohio

Cmt.#	Page # Line #	Comment	Recommendation	Response
Ohio EPA, NEDO, DERR (Eileen T. Mohr, Rec'd 12 Feb 2007)				
1	General	Thank you for numbering the lines, as it aids in the review and comment process.	No change required.	No response required.
2	General	Be aware of the requirements of the Findings and Orders for submission of RTC tables and revised documents.	No change required.	No response required.
3	General	This version of the work plan is labeled as a "draft final." Please follow the RVAAP convention for naming documents: draft and final for work plans; preliminary-draft, draft and final for reports.	Assuming that the next version can be approved, it should be identified as the final work plan. Please adhere to naming conventions in future document submissions.	Shaw will adhere to the RVAAP naming conventions on the next version of the work plan (final) and future documents
4	General	In the event that additional text is requested to be added to the revised text, please make sure that the exact proposed verbiage is presented in the response section.	Add specific verbiage to the response column of the RTC table that is proposed for insertion into the revised work plan.	The specific verbiage that is proposed for insertion into the revised work plan will be included in the response column of the RTC table unless otherwise indicated in the response (i.e., the quantity of text is too large to insert into the response table or was not finalized prior to the issuance of this RTC table). If the text to be included in the report is not included in this response table, it will be proved for review prior to issuing the final report.
5	General	This work plan does not contain: details on the proposed number of soil samples to be taken to confirm that all contamination has been removed; proposed number of samples per square footage from excavation floors, sidewalls; tables detailing the number of proposed samples and analytes, QA/QC samples per Load Line, contingency samples, etc. These types of details were also not apparent in the November 2006 field sampling plans.	Since this is the working document for the RD/RA, this type of detail should be presented in this document.	Per the Guidance for MI Sampling in the Shaw Field Sampling Plan (FSP), Addendum No. 1, a minimum of 30 random samples will be collected for each MI sample area. The number of MI samples to be collected will be coordinated during field activities since the number of samples will be dependent on the number of excavation areas

Cmt.#	Page # Line #	Comment	Recommendation	Response
				and the COCs identified within an area of excavation from previous sample investigations. Additional details for MI sampling will be included in the final work plan that will detail the activities that will require soil and sediment sampling, the required analytical parameters, and QA/QC requirements for each load line. Shaw will provide the revised text for Ohio EPA review and approval prior to issuing the final work plan.
6	General	This work plan does not discuss in detail the groundwater sampling to be conducted to confirm that the remedy has not impacted the groundwater. There should be additional details regarding the proposed number of wells to be sampled (location and justification), monitoring well development, SWL measurements, purging and groundwater sampling, etc. These types of details were also not apparent in the November 2006 field sampling plans.	Since this is the working document for the RD/RA, this type of detail should be presented in this document.	The "Groundwater Monitoring" section will be revised to discuss details regarding the groundwater sampling to confirm that Shaw's construction activities have not negatively impacted groundwater. Shaw will provide this revised section for Ohio EPA review and approval prior to issuing the final work plan. Section 4.3.3 in the November 2006 FSP references the equipment and sampling procedures for groundwater sampling activities that are detailed in the Facility-Wide SAP. The "Groundwater Monitoring" section of the work plan will reference the relevant sections of the FSP that reference the Facility-Wide SAP and expand upon these areas for clarification.
7	General	This work plan does not contain details on the slab inspection activities that are required to be conducted. For example:	Since this is the working document for the RD/RA, this type of detail should be presented in this document.	The text will be revised to include an additional section prior to Section 3.3 Excavation

Cmt.#	Page # Line #	Comment	Recommendation	Response
		frequency of inspection, criteria for determining the integrity, potential corrective measures, etc. These types of details were also not apparent in the November 2006 field sampling plans.		titled "Foundation Slab Inspections". The text will read as follows: "Prior to excavation activities, Shaw will inspect the foundation slabs at LLs 1-4 where structures have been previously demolished and removed from the slabs. The Shaw personnel will inspect and identify cracks and orifices in the slabs that will allow infiltration of water to the soils beneath. Such cracks and orifices encountered during the inspection will be prepared and patched using cold patch or other watertight bonding agent to eliminate the infiltration pathway. Concrete slabs will be inspected on a monthly basis at each load line while Shaw is performing construction activities to ensure no additional cracks attributable to the implementation of the proposed soil remedy are created. After construction activities have been completed by Shaw, slab inspections will be conducted in conjunction with planned groundwater sampling events to be performed by Shaw." The last sentence in "Maintenance and Inspection Activities" will be revised to read: "Shaw will perform inspections of the exposed foundation slabs at LLs 1-4 to assess their integrity until removed. Inspections will be conducted on a semi-annual

Cmt.#	Page # Line #	Comment	Recommendation	Response
				basis for two years following the completion of construction activities in conjunction with the semi-annual groundwater sampling events."
8	General	The work plan cross-references the 2004 health and safety plans for this project. However, in looking at the cited document, there may not be sufficient detail for ensuring that all types of AHAs are covered (these plans were produced before a remedy was selected). For example, the October 2004 plan does not contain an AHA for excavation.	Please have your CIH go through the October 2004 plan and ensure that all potential activities conducted under this RA will be covered. Append the appropriate information/SOPs to either this work plan or the 2004 SHERP.	The SHERP (Oct 2004) discussed AHAs associated with additional sampling activities. The Nov 2006 SHERP Addendum (2006-01) was prepared for activities to be conducted for structural evaluation and MEC removal activities under Mod 1 of the FPRI. Shaw will prepare an addendum to the SHERP to include all activities to be performed as part of the remediation of soils under this RA.
9	General	The work plan does not reference the preparation of a construction completion report document, punch lists of items completed, as-builts, etc.	Please add a section to the revised text that discusses the contents of the construction completion report.	Shaw will add a section titled "Construction Completion Report" in Section 3.0 that will read as follows: Following the nearing of completion of remedial activities at LLs 1-4, Shaw shall work with USACE, Ohio EPA, OHARNG and the RVAAP to develop a "punch list" of all items that need correction or completion before the work can be accepted under the requirements of a final inspection. The final inspection will ensure that remediation has been performed in accordance with the RAWP and meets final cleanup goals. Once the punch list is finalized and a final inspection has been approved by the aforementioned parties, a

Cmt.#	Page # Line #	Comment	Recommendation	Response
				Remedial Action Report will be provided to USACE, OHIO EPA, RVAAP, BRAC, OHARNG, NGB and AEC per CERCLA requirements. The Remedial Action Report will include as-built drawings of the remediated areas, describe the remedial activities conducted and techniques and materials used, tests and measurements performed, any significant modifications to the project as described in this RAWP and results of the final inspection.
10	General	It is assumed that maps and plans showing more detail will be used as the "in the field" construction/excavation plans, as the figures provided in this work plan have little detail, the scale can result in a significant amount of error, etc.	Please provide the stakeholders with copies of larger maps with more details that show the limits of proposed excavations, cross sections, etc.	Shaw will provide full size drawings to the stakeholders in the final work plan. The excavation limits presented in the drawings are estimated based on the most recent round of data (November 2004) in conjunction with the samples collected during the RIs. These sample locations have been documented using GPS and will be resurveyed in the field prior to excavation. Most of the proposed excavations are to a maximum depth of 2. The maximum depth of excavation is 3 feet bgs and is only at several locations at the load lines. Shaw does not anticipate preparing cross sectional drawings due to the relatively small areas of the proposed excavation locations and the associated shallow depths. Areas requiring excavation beyond 2 feet will be clearly marked on the drawings in the revised work plan.

Cmt.#	Page # Line #	Comment	Recommendation	Response
11	vii	AHA acronym.	Change to Activity Hazard Analysis.	The change to Activity Hazard Analysis will be incorporated into the revised text.
12	viii	PPE acronym.	Change to Personal Protective Equipment.	The change to Personal Protective Equipment will be incorporated into the revised text.
13	viii	RTLS acronym.	Change to Ravenna Training and Logistics Site.	The change to Ravenna Training and Logistics Site will be incorporated into the revised text.
14	1-1/10	Change the date for the Final Interim Record of Decision.	The correct date is January 2007.	The date for the Final Interim ROD will be changed to January 2007.
15	1-1/15	Change the acreage.	Correct acreage is 21,683.	The correct acreage will be incorporated into the revised text.
16	1-2/74	Change the date for the Final Interim Record of Decision.	The correct date is January 2007.	The date for the Final Interim ROD will be changed to January 2007.
17	1-2/76	Text change requested.	Change text to read: "...final remedy for exposed contaminated soils and dry sediments at LL1-4..."	The text will be revised to read: "The selected remedy is a final remedy for exposed contaminated soils and dry sediment at LL 1-4 and was…"
18	3-1/159	Text change requested.	Change text to read: "...near environmentally sensitive..."	The text will be revised to read: "Special attention will be made to ensure activities to be performed near environmentally sensitive areas will be coordinated with OHARNG, RVAAP Facility Manager and the Ohio EPA…"
19	3-1/160	Text change requested.	Change text to read: "... OHARNG, RVAAP Facility Manager and the Ohio EPA..."	The text change will be incorporated. See response to comment no 18.
20	3-2/183	Text change requested.	Change text to read: "... USACE, OHARNG, Ohio EPA, RVAAP...."	The text will be revised to read: "….meeting to include members of USACE, OHARNG, Ohio EPA, RVAAP

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				and the Shaw project team."
21	3-2/198-199	Clarification requested.	This section goes back to the general SHERP question asked above; i.e., does the October 2004 SHERP have enough detail to cover all activities to be conducted during this RA?	Shaw will prepare an addendum to the SHERP to include all activities to be performed as part of the remediation of soils under this RA.
22	Fig 3-1	Confirmation requested.	Please confirm that truck traffic will be entering and exiting through this gate and not Post 1 at George Road.	Shaw proposes to utilize the Post 20 gate on LL2 Road for truck traffic and is currently coordinating with the RVAAP contracting manager, MKM, for staffing requirements. Figure 3-1 will be revised to correctly identify the gate as Post 20.
23	3-5/202-203	Clarification requested.	This section goes back to the general SHERP question asked above; i.e., does the October 2004 SHERP have enough detail to cover all activities to be conducted during this RA?	Shaw will prepare an addendum to the SHERP to include all activities to be performed as part of the remediation of soils under this RA.
24	3-5/218-219	Clarification requested.	This section goes back to the general SHERP question asked above; i.e., does the October 2004 SHERP have enough detail to cover all activities to be conducted during this RA?	Shaw will prepare an addendum to the SHERP to include all activities to be performed as part of the remediation of soils under this RA.
25	3-5/220-221	Clarification requested.	This section goes back to the general SHERP question asked above; i.e., does the October 2004 SHERP have enough detail to cover all activities to be conducted during this RA?	Shaw will prepare an addendum to the SHERP to include all activities to be performed as part of the remediation of soils under this RA.
26	3-5/223	Clarification requested.	This section goes back to the general SHERP question asked above; i.e., does the October 2004 SHERP have enough detail to cover all activities to be conducted during this RA?	Shaw will prepare an addendum to the SHERP to include all activities to be performed as part of the remediation of soils under this RA.
27	3-5/230	Text change requested.	Change "multi-incremental" to "multi-increment."	The text will be revised to read: "…for the preparation of multi-

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				increment samples."
28	3-7/After 288	Text addition requested.	Add in the sentence: "Debris will be removed under a separate contracting action."	The following sentence will be added to the text: "Debris will be removed under a separate contracting action."
29	3-8/305-306	Text revision requested.	Remove the reference to a working hydrant in this portion of the text, as there are no working hydrants at RVAAP.	The reference to a working hydrant will be removed from the text. The text will be revised to read: "There are no working hydrants at the RVAAP; therefore, a water wagon or truck will be utilized."
30	3-8/After 311	Text addition requested.	Add in: "Only enough potable water or approved surfactant will be used to wet the material, i.e., there will be no run-off or ponding created."	The following sentence will be added to the text: "Only enough potable water or approved surfactant will be used to wet the material, i.e., there will be no run-off or ponding created."
31	3-9/343	Clarification requested.	This section goes back to the general SHERP question asked above; i.e., does the October 2004 SHERP have enough detail to cover all activities to be conducted during this RA?	Shaw will prepare an addendum to the SHERP to include all activities to be performed as part of the remediation of soils under this RA.
32	3-9/358	Text revision requested.	Revise text to read: "....will be obtained from..."	A new section has been added for more detailed description of multi-increment sampling per Comment No. 5. This sentence will be moved to this section (Section 3.5.1) and will be revised to read: "Once field screen test results identify an excavation area to be below the applicable cleanup goals for the COC(s), multi-increment sampling will be obtained from 30 stratified random sample locations from the excavation area."
33	3-9/365	Correction requested.	Revise Trimbal to Trimble.	The correction from "Trimbal" to "Trimble" will be made in the

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				text.
34	3-9/374	Text revision requested.	Revise to read: "...contaminated exposed soil or dry sediments..."	The text will be revised to read: "Perform as-built survey of the excavation area following the complete removal of contaminated exposed soil or dry sediments."
35	3-10/386	Text revision requested.	Revise text to read: "... soil excavation will be performed..."	The text will be revised to read: "In general, soil excavation will be performed…"
36	3-10/422	Text addition requested.	Add in the sentence: "Debris will be removed under a separate contracting action."	The text will be revised to read the following after the first sentence in this section: "Debris will be removed under a separate contracting action".
37	3-12/477	Text revision requested.	Revise text to read: "...state, federal and RVAAP-specific discharge conditions."	The text will be revised to read: "Any ground surface discharges are subject to strict state, federal and RVAAP-specific discharge conditions."
38	3-13/500-501	Text revision requested.	Revise text to read: "...following the receipt (and approval by Ohio EPA) of laboratory confirmation soil sample results..."	The text will be revised to read: "Backfill and restoration will take place at each excavation area following the receipt (and approval by Ohio EPA) of laboratory confirmation soil sample results…"
39	3-13/518	The text references the selected wells that will be sampled.	This goes back to the general comment above regarding groundwater sampling. When will the details of the proposed sampling be presented, so that there can be discussion and review?	The "Groundwater Monitoring" section will be revised to discuss details regarding the groundwater sampling to confirm that Shaw's construction activities have not negatively impacted groundwater. Shaw will provide this revised section for Ohio EPA review and approval prior to issuing the final work plan.
40	3-13/524	Text change requested.	Change unfiltered to filtered.	The correction from "unfiltered" to "filtered" will be made in the text.

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41	3-14/ section 3.8	The text briefly discusses the maintenance and inspection activities.	This goes back to the general comment above regarding slab inspection. When will the details of the proposed maintenance and inspection activities be presented, so that there can be discussion and review?	The text will be revised to include an additional section prior to Section 3.3 Excavation titled "Foundation Slab Inspections". The text will read as follows: "Prior to excavation activities, Shaw will inspect the foundation slabs at LLs 1-4 where structures have been previously demolished and removed from the slabs. The Shaw personnel will inspect and identify cracks and orifices in the slabs that will allow infiltration of water to the soils beneath. Such cracks and orifices encountered during the inspection will be prepared and patched using cold patch or other watertight bonding agent to eliminate the infiltration pathway. Concrete slabs will be inspected on a monthly basis at each load line while Shaw is performing construction activities to ensure no additional cracks attributable to the implementation of the proposed soil remedy are created. After construction activities have been completed by Shaw, slab inspections will be conducted in conjunction with planned groundwater sampling events to be performed by Shaw." The last sentence in Section 3.8 will be revised to read: "Shaw will perform inspections of the exposed foundation slabs at LLs 1-4 to assess their integrity until removed.

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				Inspections will be conducted on a semi-annual basis for two years following the completion of construction activities in conjunction with the semi-annual groundwater sampling events."
42	3-14	Text addition requested.	Please add in a section regarding the construction completion report - the type of information that will be included in it, etc.	Shaw will add a section titled "Construction Completion Document" in Section 3.0 that will read as follows: Following the nearing of completion of remedial activities at LLs 1-4, Shaw shall work with USACE, Ohio EPA, OHARNG and the RVAAP to develop a "punch list" of all items that need correction or completion before the work can be accepted under the requirements of a final inspection. The final inspection will ensure that remediation has been performed in accordance with the RAWP and meets final cleanup goals. Once the punch list is finalized and a final inspection has been approved by the aforementioned parties, a Remedial Action Report will be provided to USACE, OHIO EPA, RVAAP, BRAC, OHARNG, NGB and AEC per CERCLA requirements. The Remedial Action Report will include as-built drawings of the remediated areas, describe the remedial activities conducted and techniques and materials used, tests and measurements performed, any significant modifications to the project as

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				described in this RAWP and results of the final inspection.
43	3-14/ section 3.9	Text addition requested.	Please provide additional details on what is included in a 5 year review.	Shaw is currently not contracted for the 5-year review and Section 3.9 will be removed from the final work plan. Details of what would be included in the 5-year review would be based on site-specific Army requirements.
44	4-1/ section 4.0	Text addition requested.	Add in details regarding the preparation of the storm water NOI.	The first paragraph in Section 4.0 will revised to include the following text after the first sentence: "As part of the RVAAP permitting requirements, Shaw will be required to submit a Notice of Intent (NOI) application and associated fee to the Ohio EPA to obtain coverage under the Ohio EPA General Permit for Storm Water Discharges Associated with Construction Activities. The requirement for this General Permit is State law and mandatory for any project that disturbs 1 or more acres of ground. This is a separate program from the industrial storm water monitoring program/permit that the RVAAP currently posses. The permit will be in the name of BRAC, the agency responsible for management of the RVAAP land."
45	4-1/ header at section 4.3	Text revision requested.	Change header to read: "Environmentally Sensitive Areas."	The header to Section 4.3 will be revised to read: "Environmentally Sensitive Areas".
46	4-2/583	Text revision requested.	Revise text to read: "Others may be the result of glacial or beaver activity."	The text will be revised to read: "Others may be the results of

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			(Good chance that it wasn't the result of glacial deposits unless there was an end moraine.)	glacial or beaver activity."
47	4-2/597-598	Confirmation requested.	Please confirm that the only material that may be diverted to existing waterways is from precipitation events and not run-off from construction activities. Indicate whether or not this information will be detailed in the SWPPP.	The following sentence will be added to the text in this section: "Only water flow from precipitation events and not run-off from construction activities will be diverted to existing waterways." The SWPPP will provide details on best management practices that will be utilized to prevent water flow other than from precipitation events from entering existing waterways.
48	4-2/605	Text revision requested.	Revise text to read: "...following approval by Ohio EPA, USACE, OHARNG, and RVAAP in accordance with the WMMP and subject to strict RVAAP-specific conditions (Shaw 2006h)."	The text will be revised to read: "…following approval by Ohio EPA, USACE, OHARNG and RVAAP in accordance with the WMMP and subject to strict RVAAP-specific conditions (Shaw 2006g)."
49	4-5/622	Text addition requested.	Add in OHARNG to the list of stakeholders on this line.	The text will be revised to read: "…will be coordinated with the OHARNG, Ohio EPA, USACE and RVAAP."
50	4-5/625	Text change requested.	Change "has" to "have."	The text will be revised to read: "…where the remediation activities have temporarily ceased…"
51	4-5/640	Text change requested.	Revise text to read: "...as to avoid pollution in..." (i.e., remove "reduce.")	The text will be revised to read: "…as to avoid pollution in…"
52	6-1/754	Text revision requested.	Change date of ROD to read 2007.	The date for the Final Interim ROD will be changed to January 2007.
53	App A	Addition to the form requested.	On page 2 of the pre-mob checklist, there should be a training spot for 8 hour refreshers.	The checklist will be revised to include "8-hour HAZWOPER refreshers".
54	App C	Clarification requested.	Was the structural survey report finalized? (Ohio EPA has no comments	The Structural Survey Report has been finalized since

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			on this engineering/structural analysis portion of the work plan.)	submittal of the Draft RAWP for Ohio EPA review. The final version will be included in the final work plan.
55	App D	The following are comments on the figures. Some of the comments are applicable to all, others are only applicable to some. Please go through all the figures and see what applies to each one.	a. Will larger maps with more detail and cross sections be prepared to show proposed excavation limits? Right now, it would be tough to go out into the field with the existing figures and start excavation activities.	Shaw will provide revised full size plans of the excavation areas in the final version of the work plan. The proposed excavation limits are estimated and based on field sampling data so it is possible that they may change as excavation progresses from hot spots outward.
			b. Please put figure #s on the maps.	The drawings will be relabeled with figure numbers.
			c. Some of the writing on the maps is not legible (lettering too small and complicated by "over-inking.")	The lettering will be re-worked to avoid illegibility.
			d. On the appropriate maps, add in the vehicle decontamination station to the legend.	The vehicle decontamination station will be added to the legend on the appropriate figures.
			e. On the appropriate maps, please add in the entrance/exit symbol to the legend.	The entrance/exit symbol will be added to the legend on the appropriate figures.
			f. There is a disconnect on several maps. On one map, the stockpiled soil is surrounded by hay bales and a silt fence, while on maps showing a portion of the same load line, the hay bales are missing from around the stock-piled soil. Rectify the disconnect by adding in the hay bales on the appropriate maps.	The disconnect between the figures will be corrected to ensure the intended erosion control measures around the soil stockpiles are shown.
			g. It is not clear on the maps how the depths of excavations are denoted. (Specifically, the parentheses can't be located on the maps.)	The parentheses described in note 3 on the figures were inadvertently removed and will be restored to adequately identify the areas of excavation that exceed 2 feet bgs.

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56	App E	The schedule on pg. 4 of 5 only indicates annual groundwater sampling.	This is not correct. At a minimum, for the first two years, there is semi-annual sampling and the frequency and analytes will be discussed and agreed-upon.	The schedule will be revised to include semi-annual groundwater sampling for the first two years.
57	App E	Addition requested.	Please add in the O+M plans.	Shaw does not anticipate any follow up activities that will require an O&M plan following the RA with the exception of the slab inspections which is discussed in this work plan.
58	App E	Addition requested.	Please add in the 5 year reviews.	Shaw is currently not contracted for the 5-year review and Section 3.9 will be removed from the final work plan. Details of what would be included in the 5-year review would be based on site-specific Army requirements.
CELRL-ED-EE (Don Casey, Rec'd 13 Feb 2007)				
59	3-1/161-165	In reference to paragraph 3.1.1, it is assumed that Construction Site Storm Water General Permit has been received. Was a notice of intent (NOI) completed by responsible party? Contractors need copy on site.		Shaw will submit a Notice of Intent (NOI) application and associated fee to the Ohio EPA to obtain coverage under the Ohio EPA General Permit for Storm Water Discharges Associated with Construction Activities a minimum of 21 days prior to commencing construction activities in accordance with OHIO EPA Permit No. OHC000002 requirements.
60	2-2/ 126-129	No field superintendent named, final acceptance by all parties on the contract team?		Shaw has numerous field personnel who are qualified to fulfill the position of field superintendent at the RVAAP once field activities commence. This person has not yet been identified."
61	2-2/ 130-	No Subcontractors named. Acceptance		This section will be revised to

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	136	conditional on satisfactory performance.		include the sentence: “Selection of subcontractors will be based on most qualified for the task required as determined by Shaw and will require acceptance conditional on satisfactory performance.”
62	3-6 / Section 3.2.3	Whom will monitor the gate used for transportation of materials?		Shaw will coordinate with the operating contractor, MKM, and Post 1 with regards to providing qualified security staffing for Post 20 at LL2 Road if it is to be used. See response to Comment No. 22 above.
63	3-8 / Section 3.2.9	Have anyone ruled out air monitoring of dust? Maybe I missed it but did not see where we’re performing it.		A SHERP addendum for remediation activities will be prepared and will reference the real-time monitoring requirements for dusts as outlined in the SHERP (Oct 2004). The beginning of the last paragraph in this section will be revised to read: “Visual and real-time monitoring for dust and COCs will be performed in accordance with the requirements of Section 8.0 of the SHERP (Shaw 2004e). Real-time monitoring for dust will be performed using Mini-Ram® dust monitors that will be strategically placed down-wind from the areas of excavation. Time-integrated air sampling may be performed during activities when real-time instrumentation indicates that exposures to personnel are suspected to be approaching established limits (PEL/TLV) for

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				target compounds."
64	3-12/453	Add "using pole with mirror to inspect bed and other areas."		The text will be revised to read: "Inspections will be conducted from the ground only using a pole with mirror to inspect truck beds and other areas."
CELRL-ED-EE (Adam Deck, Rec'd 13 Feb 2007)				
65	2-2 / 126-129	This document does not include who will fill the role(s) of field superintendent(s).	If known prior to commencement of activities, consider including in the document the person (or persons) who will fill the field superintendent position.	See response to Comment No. 60 above.
66	3-6/248	Typographical error	Edit the sentence to read,"…inspected to determine the extent of barricading and/or the type of barricade required."	The 2nd sentence in the 2nd paragraph of this section will be revised to read: "….the areas will be inspected to determine the extent of barricading and/or the type of barricade required."
67	4-5 / Section 4.4.2	The section does not extrapolate on what type of species will be used for vegetative cover.	Include a statement to reiterate that only non-invasive species will be used for temporary and permanent soil stabilization efforts.	The following text will be added after the first sentence in this section: "Only non-invasive species will be used for temporary and permanent soil stabilization efforts."
68	App C	The Structural Survey Report included in Appendix C is a draft document.		This document has since been finalized and will be revised as "Final" for the Final Work Plan
OHARNG RTLS-EN (Katie Elgin, Rec'd 13 Feb 2007)				
69	Pg. viii, Acronyms	Please change "Ravenna Logistics Training Site" to "Ravenna Training and Logistics Site".	Please change "Ravenna Logistics Training Site" to "Ravenna Training and Logistics Site".	The text will be revised to change "Ravenna Logistics Training Site" to "Ravenna Training and Logistics Site".
70	Pg. 1-1, Line 15	Please change 21,419 to 21,683. The property was resurveyed by the OHARNG.	Please change 21,419 to 21,683	The text will be revised to change "21,419" to "21,683".
71	Pg. 3-5, Line 230	Please change "multi-incremental" to "multi-increment".	Please change "multi-incremental" to "multi-increment".	The text will be revised to change "multi-incremental" to "multi-increment".
72	Pg. 3-13	"Shipments of waste will be coordinated through the RVAAP Environmental Coordinator." Who is the RVAAP	Change "Environmental Coordinator" to "Acting Facility Manger" if applicable.	The text will be revised to read: "Shipments of waste will be coordinated through MKM, the

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		Environmental Coordinator? If you mean Irv Venger, you may consider changing this to "RVAAP Acting Facility Manager."		RVAAP Operating Contractor."
73	Pg. 4-5. Line 621	"The type of seeding required for the various areas will be coordinated with Ohio EPA, USACE, and RVAAP." Please also coordinate the seeding with OHARNG.	Please also coordinate the seeding with OHARNG.	The text will be revised to read: "The type of seeding required for the various areas will be coordinated with the OHARNG, Ohio EPA, USACE and RVAAP."
74	Pg. 4-1, Section 4.0	This section mentions that is was prepared in accordance with requirements for a SWP3 and Permit Number OHC000002. Please also indicate in the section that a Notice of Intent will be submitted to Ohio EPA (as this project disturbs more than one acre). Keep in mind too that the Portage County Soil and Water Conservation District have asked to receive SWP3 plans for restoration and decon/demo projects.		The first paragraph in Section 4.0 will revised to include the following text after the first sentence: "As part of the RVAAP permitting requirements, Shaw will be required to submit a Notice of Intent (NOI) application and associated fee to the Ohio EPA to obtain coverage under the Ohio EPA General Permit for Storm Water Discharges Associated with Construction Activities. The requirement for this General Permit is State law and mandatory for any project that disturbs 1 or more acres of ground. This is a separate program from the industrial storm water monitoring program/permit that the RVAAP currently posses. The permit will be in the name of BRAC, the agency responsible for management of the RVAAP land." Shaw will issue a copy of the SWP3 plans to Portage County prior to commencing earth disturbance activities.
CELRL-ED-EE (John Jent, Rec'd 14 Feb 2007)				

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75	1-1/21-22	Since the AEC is funding this work, please delete, "and is responsible for funding their clean-up."		The requested text will be deleted and will be revised to read: "The BRACO controls environmental AOCs at the RVAAP."
76	2-2/132	Depending upon upcoming events, believe the requirements for "implementation of structural support measures" will not be needed, i.e., the buildings will be torn down.		Shaw understands that the requirements for the "implementation of structural support measures" may not be required due to recent developments at the RVAAP; however, as a precautionary measure, reference to these requirements will remain in the text.
77	3-1/ Section 3.1.2	Please list the specific gate number and briefly describe how operation of that gate will be performed, i.e., it currently is closed. Will the facility operating contractor provide additional services for operation of the gate?		The following text will be added to this section after the 3rd sentence: "In order to expedite off-site transport of excavated soils, Shaw is considering utilizing Post 20 gate on LL2 Road since it is the most direct access to State Route 5. If this gate is to be used, Shaw will coordinate the security requirements for proposed activities at the RVAAP, including operation of the Post 20 gate, with the operating contractor and Post 1."
78	Fig 3-1	Please label the gate or post number.		The "South Service Road Access/Exit" on Figure 3-1 will be revised to "Post 20 Gate"
79	3-6/ Section 3.2.3	Please provide measures for continuous communication with Gate 1, as radios, etc. There are many areas at the RVAAP where cell phone connectivity is very problematic.		The following text will be added in the "Site Security" section: "The use of two-way radios and cell phones are permitted at the RVAAP; however, personnel should have a backup form of communication in the event service is not provided in the area of work. Shaw shall

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				coordinate with RVAAP security to ensure that contact with Post 1 is maintained at all times."
80	3-7/ Section 3.2.5	See Cmt 2 above. May not need this paragraph.		Shaw understands that the requirements for the "implementation of structural support measures" may not be required due to recent developments at the RVAAP; however, as a precautionary measure, reference to these requirements will remain in the text. The text will be revised to read: "If necessary, Shaw is prepared to provide structural support…"
81	3-7/ Section 3.2.8	If potable water is to be used for any portion of the decontamination process, it must be approved, as per Para 4.3.2.2.4 of the Ravenna Facility-Wide SAP.		The text in this section will be revised to include the following: "Suitable analytical data will be provided for each water source and approval to utilize the water source must be received from the USACE Project Manager prior to transporting the water on-site in accordance with Section 4.3.2.2.4 of the FSAP (SAIC 2001)."
82	3-8	Prior to Para 3.3, please provide discussion regarding protection of existing groundwater monitoring wells.		Prior to Para 3.3, Shaw will add a subtask section titled "Protection of Existing Monitoring Wells". The text will read: "Prior to commencing construction activities at each load line, Shaw will identify existing monitoring wells that have the potential to be impacted by the proposed activities. Construction fencing will be placed around the monitoring well locations to provide a visual reminder to workers and vehicle and equipment operators to

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				maintain a safe working distance to prevent damage to the wells. If necessary, barricades will be placed around the wells to ensure adequate protection."
83	3-10/ 411-415	Please modify to document what has recently occurred; i.e., the Corps of Engineers MEC CX approved an Explosives Safety Submission, but the need for that submission was subsequently waived by the U.S. Army Technical Center for Explosives Safety. Please delete reference to the U.S. Center for Health Promotion and Preventative Medicine.		The text will be revised to read: "Shaw issued an Explosive Safety Submission (ESS) and associated work plan that detailed the planned activities for handling of the propellant material at LL1. The USACE MEC CX approved the ESS but the requirement for that submission was subsequently waived by the U.S. Army Technical Center for Explosives Safety."
84	3-11/ Section 3.4.1.1	It is recommended that MI sampling of the stockpiled materials be performed as well as a more representative and reliable measure for waste characterization.		Shaw anticipates collecting MI samples from the waste stockpiles as directed in the Shaw Field Sampling Plan Addendum No. 1 for the Remediation of Soils at LLs1-4. Shaw will reference the FSP in this section accordingly.
RVAAP (Irv Venger, Rec'd 15 Feb 2007)				
85	Title	Title does not conform to RVAAP library nomenclature. There are no draft final reports except that the final report (withal corrections and minus line numbers) may be considered a draft until it has had final review and then only the cover page and spine would be changed.	Change title of report to "Draft Remedial Design / Remedial Action (RD/RA) Work Plan	Shaw will adhere to the RVAAP naming conventions on the next version of the work plan (final) and future documents
86	New page	There is no distribution page	Insert a new page after the title page indicating what organizations & how many copies of the document were given out to include printed copies and electronic copies. RVAAP Library is to receive two of each.	The distribution page is included in the transmittal letter to USACE and a copy of this letter is attached to every report that is issued.
87	General	The removal at LL1 is for propellants.	The definition of 'MEC' is UXO (fired	Preparation of the ESS was a

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		Propellants are not MEC and should require no more than careful handling. There should be no need for an ESS as will be substantiated by USATCES in a letter.	military munitions) and DMM (unfired or Discarded Military Munitions) Propellant is not a munitions.	contract document requirement and was prepared in accordance with the PWS; however, the need for an ESS submission was recently waived by USATCES. The change will be clarified the last paragraph of Section 3.4.3 in the final work plan.
88	1-1/3	Should there be a reference here to AEDBR AOC site numbers "RVAAP 08,09,10 & 11??		Shaw will add the following text to 1-1/5: “LLs 1-4 are cross-referenced in the Army Environmental Data Base-Restoration (AEDBR) as Area of Concern (AOC) site numbers RVAAP 08, 09, 10 and 11, respectively.”
89	1-1/15	Acreage has been updated to 21683 acres	update text	The correct acreage will be incorporated into the revised text.
90	1-1/32	the word 'each' building seems to indicate that all buildings had dust, spills etc as opposed to selected process buildings	Modify text to indicate that only certain processing buildings were subject to explosives contamination.	The text will be revised to read: “The operations of the primary load lines produced explosive dust, spills and vapors that collected on the floors and walls of various process buildings”.
91	1-1/33	The last sentence does not make sense.	Either change 'containing' to 'contained' or rewrite the sentence to make sense.	The text will be revised to read: “The resulting liquid contained TNT and Composition B and was known as “pink water” for its characteristic color.”
92	1-2/40	The words 'to date' are redundant as Shaw already stated that no remedial actions have been done.	Change text.	The text will be revised to remove “to date” from the sentence.
93	1-2/43	The Army has not completed salvage (demolition) at load line 1. Floor slabs and foundations remain	update text	The text will be revised to read: “The Army has completed the salvage activities and demolition at LL1 with the exception of floors slabs and foundations, and has initiated similar activities at LLs 2-4.”

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94	1-2/64	I cannot find the word 'surficial' in an unabridged dictionary. Use common language	update text	The work 'surficial' is a commonly used term in the environmental field, particularly when discussing geology and hydrogeology, and is defined as "Of, pertaining to, or occurring on the earth's surface" (The American Heritage Dictionary, 2nd ed.)
95	2-1/100	Nothing in PM duties for coordinating with BRAC contractors working in nearby areas	add text	Sentence will be added to this section and will read: "Mr. Cobb or his designee in the field will coordinate with the BRAC contractors working in nearby areas."
96	3-2/170-172	Haul routes indicate use of Post 20 for access to Rt 5. RVAAP Security agreements require 'trained' armed guards from our contracted security company at the entrances to the facility. This gate is no exception. Armed guards will cost in excess of $30/hr.	Shaw should include all applicable security requirements for using Post 20 gate and coordinate the security requirements with the operating contractor.	The following will be added to the text after the sentence in Line 170 in Section 3.1.2: "In order to expedite off-site transport of excavated soils, Shaw is considering utilizing Post 20 Gate on LL2 Road since it is the most direct access to State Route 5. If this gate is to be used, Shaw will coordinate the security requirements for proposed activities at the RVAAP, including operation of the Post 20 gate, with the operating contractor and Post 1." Shaw has been in contact with the RVAAP operating contractor (MKM) regarding the security requirements at the Post 20 gate and will comply with the applicable processes and procedures.
97	3-2/Sect 3.1.3	Pre-Construction survey should include a detailed inspection of road surfaces before and after the operations.	insert appropriate text	The following text will be added to this section: "The pre-construction survey shall

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				include a detailed inspection of road surfaces a minimum of several weeks before operations commence. Photographs and video footage of the preconstruction site conditions will be collected as part of the pre-construction survey. The results of any follow-up surveys after operations end will be compared to the information identified during the pre-construction survey."
98	3-2/Sect 3.1.5	The Pre-construction meeting should include other contractors that will be working in proximity to the Shaw efforts.	Insert text	The text will be revised to read: "…, Shaw will conduct a pre-construction meeting to include members of USACE, Ohio EPA, OHARNG, RVAAP, the Shaw project team and any contractors that will be working in the proximity of Shaw efforts."
99	3-5/Sect 3.2.1	Some temporary facilities may be available from RVAAP. Some consideration by Shaw in lieu of rental costs for trailers may be negotiated.	No text change required	In addition to the temporary facilities available from RVAAP, Shaw may install some rental trailers in the vicinity of the load lines for convenience and job function.
100	3-5/227	Where temporary facilities use land previously transferred to the NGB, the RTLS commander approval is required.	Change text.	The text will be revised to read: "These temporary facilities will be placed at locations to be designated by the RVAAP Facilities Manager. Where temporary facilities use land previously transferred to the NGB, approval from the RTLS commander is required."
101	3-7/278	Shaw will provide structural support or they will not. Delete the word 'minor'	Change text.	The word "minor" will be deleted and the text will be revised to read: "If necessary, Shaw is prepared to provide

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				structural support to stabilize structures where proposed excavation activities will be conducted. The intended extent of the structural support measures is limited and the purpose is to provide enough safety measures for personnel and equipment working in the immediate vicinity of the compromised structures to perform the necessary removal action activities."
102	3-7/284-285	What if inaccessible debris is considered a hazard? How will that be dealt with? It seems an immediate hazard MUST be removed whether accessible or not.	Clarify text	If inaccessible debris is considered a hazard, it will be removed or supported as discussed in the Structural Survey Report in App C of the work plan. These hazards were identified by the Shaw structural engineer as part of a structural assessment. However, as stated in the text, if any inaccessible overhanging debris or structure is not considered to be an immediate safety threat, it will be monitored during remediation activities.
103	3-7/sect 3.2.6	Who will approve the new location for the debris piles? What if hazards such as asbestos (transite) are found?	insert text	As per Shaw's contract, debris piles will be relocated to the nearest point to its current location so as not to interfere with PBC excavation activities. Proposed debris relocation areas will be indicated to the Army in advance of the relocation activities. All ACM was reportedly removed from the structures prior to them being demolished

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				and ACM is not under Shaw's PWS. The text will be revised to read: "If potential ACM or other hazardous material is encountered, Shaw will stop disturbance of the debris piles immediately and notify RVAAP, USACE and Ohio EPA so that determination can be made by the Army as to how they want to proceed."
104	3-7/3.2.8	No need to discuss lack of fire hydrants. Sufficient to state that Shaw will supply potable water for construction use.	Change text.	The reference to a working hydrant will be removed from the text. The text will be revised to read: "Potable water and water for onsite construction use, including equipment decontamination water, will be supplied by Shaw."
105	3-8/306	Already determined that there are no fire hydrants	modify text to indicate that Shaw will truck in water	The reference to a working hydrant will be removed from the text. The text will be revised to read: "Shaw will supply all water using a water wagon or truck to contain water for dust suppression."
106	3-8/324	14567 is an awfully exact estimate.	Suggest you use 15000 yd^3 as an estimate	Shaw will round off the volume number where appropriate in the final work plan.
107	3-9/sect 3.3.2	How will Shaw handle the piles should it test hazardous? Involve OEPA Solid Waste (Greg Orr)		Section 3.4.3 (Waste Disposal) of the work plan describes how soils will be handled if identified as hazardous. Additional waste handling details are included in the Shaw Final Waste Minimization and Management Plan (WWMP; Nov 2006). In general, Shaw will manage all wastes in accordance with federal, state and local requirements as referenced in

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				the WWMP.
108	3-10/sect 3.3.3	There is no MEC removal scheduled for LL1. Propellants are not MEC. MEC clearance is appropriate.	Modify text to reflect actual operations and disposal methods.	Any Shaw references to MEC removal activities are in accordance with the terminology and descriptions provide to Shaw in the PWS by USACE under the LMARC task order.
		There is no magazine C47. Do you mean 7C4?		The text will be revised to read: "magazine 7C4".
		Have you made arrangements for a high security lock and 48 hour inspections by qualified personnel?		Shaw has not yet made arrangements for a high security lock and 48-hour inspections by qualified personnel; however, as requested by the OHARNG, Shaw will notify the OHARNG a minimum of 30 days in advance of planned storage of the propellants.
		No ESS should be required as there is no explosive hazard.		The last paragraph in this section has been revised to read: "Shaw shall issue an Explosives Safety Submission (ESS) and associated work plan that detailed the planned activities for handling of the propellant material at LL 1. The USACE Military Munitions Center of Expertise approved the ESS but the requirement for the submission was subsequently waived by the U.S. Army Technical Center for Explosives Safety."
		Propellants cannot be detonated as they do not detonate; they burn. There will have to be procedures to assure that any burn operations do not further contaminate the ground or water at ODA2.		Since the ESS is no longer required, the second sentence in the fourth paragraph of this section will be revised to read: "The disposal of propellant collected during the project activities will take place at

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		No doubt, EPA will require confirmation sampling of the area.		OB/OD Area 2 at the RVAAP. Procedures of disposal of the propellants will conform to RVAAP disposal requirements and those found in the military "Technical Manual of EOD Procedures, TM60A-1-1-31." Shaw will provide notification to Ohio EPA when destruction of the propellants will occur in accordance with the Ohio EPA Notification Procedures. If required, Shaw will perform confirmation sampling as necessary.
109	3-11/sect 3.4.1.2	Will the trucks require a plastic liner prior to loading??	Address if applicable.	It is expected that no plastic liners will be required in trucks prior to loading since Shaw will not load soils with free liquids and soil concentrations are not expected to exceed TCLP limits.
110	3-11/434	6 mil plastic is hardly adequate. Suggest 10 mil reinforced plastic.	Consult EPA solid waste management group	It is agreed that the soils should be staged on a more impermeable material than a single layer of 6 mil poly. The text will be revised to read: "At a minimum, stockpiles will be staged on two layers of 6-mil poly liner and covered with a minimum of one-layer of 6-mil poly."
111	3-11/441	Inspections should be documented. Preferably with photographs.	Adjust text	The text will be revised to read: "Inspections will be performed and documented in accordance with the requirements of Section 11.5 in the QAMP (Shaw 2006e)."
112	General	There is a possibility that some of the excavated dirt will test hazardous. It is critically important that ALL excavated materials be prevented from contacting the	Shaw should assure 1) there is a detailed description of how underlying soil will be protected and 2) there should be extensive photographic	Shaw will provide the necessary protection of underlying soils in accordance with federal, state and local

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		underlying soil where contamination could occur. Should this happen, it is probable that EPA will require not only confirmation sampling but a closure action that could become very expensive.	documentation of the actual operations to accomplish this.	regulations. See response to Comment No. 107.
113	General	EPA believes the best way to protect underlying soil is to load directly into roll-off containers. There is no objection to staging the soil on a protective barrier but every effort must be made to prevent ANY erosion or washing of the material onto the ground until it is fully characterized. We believe that staging in a pile risks migration even during rain events which may be frequent in the springtime.	Again, full photo documentation of all activities will be most helpful evidence should questions arise about the field procedures. We are very concerned that adequate precautions be planned to eliminate any possibility of incurring additional sampling or soil removal.	All stockpile management activities will be conducted in accordance with federal, state and local regulations. See response to Comment No. 107.
114	General	I assume that a sampling plan will be submitted with full details of what is to be done.	Suggest that MI sampling be done on a time basis (say every 15 or 30 minutes) or on a mechanical basis (say one sample every 3 or 4 scoops of the excavator). Again photo documentation is recommended.	Shaw issued its Final Sampling and Analysis Plan (SAP) Addendum to the Facility-Wide SAP for the remediation of soils at LLs 1-4 in November 2006. The proposed methodology for MI sampling is presented in Appendix B of the Field Sampling Plan portion of the Shaw SAP Addendum.