MORRISON KNUDSEN CORPORATION
MK-FERGUSON GROUP
2420 MALL DRIVE
CORPORATE SQUARE ONE, SUITE 211
N. CHARLESTON, SC 29406

Transmittal Letter

Project Name: SOUTHDIV ERAC CONTRACT N62467-93-D-1106	Transmittal No. 94-4324-1883 / Work Order No. 4324
	Date: August 12, 1997
To: Robert J. Meddick, Contracting Officer Department of the Navy Southern Division Naval Facilities Engineering Command 2155 Eagle Drive P. O. Box 190010 N. Charleston, SC 29419-9010	REFERENCES Item: NSWC Crane - Work Plan Equipment No. Purchase Order No. Vendor Order No.

TRANSMITTED HEREWITH	FOR STATUS NOTED
For: ☐ Review and comment ☐ Approval ☐ Record ☐ Information	Reviewed A Reviewed as Noted - Resubmit B Not Reviewed - Resubmit C For Information D

QUANTITY	ITEM	TITLE/DESCRIPTION

DO 0009 SOW 007 - NSWC Crane, IN

The following document is attached for approval by the US Naval Authority and the NSWC Crane Public Works Officer:

Work Plan for Soils Bioremediation Facility, NSWC Crane, Crane, Indiana, Revision 3, June 30, 1997

Also attached is a letter containing Carol-Witt Smith's comments.

By: [signature]
Name: Robert E. Hlavacek
Title: Program Manager
NAVFAC-SOUTHDIV

Attachments
File 11-2.9
11-10 T/L Only

Distribution	**Copies Sent**
Chris Freeman Department of the Navy Environmental Code 095 NSWC Crane Crane, IN 47522-4423	**2** **Forwarded to Dave Beall for distribution**
Brent Robertson ROICC Office NSWC Crane - B-2516 300 Highway 361 Crane, IN 47522-5082 (812) 854-3318	**1** **Forwarded to Dave Beall for distribution**
Carol Witt-Smith US Environmental Protection Agency, Region V Waste Management Division (HRP-8J) 77 West Jackson Blvd. Chicago, IL 60604	**3** **Forwarded to Tom Brent for distribution**
Bill Murphy US Army Corps of Engineers, WES 3909 Halls Ferry Rd (GG-YH) PO Box 631 Vicksburg, MS 38190	**2**
John Manley Indiana Dept. of Environmental Management Defense Environmental Restoration Program 100 N. Senate PO Box 6015 Indianapolis, IN 46206-6015 (317) 308-3132	**1** **Forwarded to Tom Brent for distribution**
SOUTHDIV	
Robert Meddick	**T/L Only**
Jimmy Jones	**T/L Only**
Adrienne Wilson	**2**
Caryl Hickel	**1**
MORRISON KNUDSEN CORPORATION	
Scott Newman	**T/L Only**
Greg Jones	**T/L Only**
Willy Piispanen	**1**
Elise Allen	**1**
Don Miller	**1**
Dave Beall	**2**
File 11-2.9	**1 Library**
File 11-10	**T/L Only**

WORK PLAN
For
Soils Bioremediation Facility

NSWC CRANE
Crane, Indiana

CONTRACT #N62467-93-D-1106
DELIVERY ORDER #0009
STATEMENT OF WORK #007

~~May 2, 1997~~
~~Revision 2~~

June 30, 1997
Revision 3

Prepared For:

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
P. O. Box 190010
2155 Eagle Drive
North Charleston, South Carolina 29419-9010

Prepared By:

MORRISON KNUDSEN CORPORATION
2420 Mall Drive
Corporate Square 1 - Suite 211
North Charleston, South Carolina 29406

WORK PLAN
FOR
SOILS BIOREMEDIATION FACILITY

INTERIM MEASURES CLEANUP
AT
NSWC CRANE
Crane, Indiana

~~Revision 2~~
~~May 2, 1997~~

Revision 3
June 30, 1997

CONTRACT N62467-93-D-1106
DELIVERY ORDER #0009
STATEMENT OF WORK #007

Prepared by:

MORRISON KNUDSEN CORPORATION
2420 Mall Drive
Corporate Square 1 - Suite 211
North Charleston, South Carolina 29406

PREPARED/APPROVED BY:

Don J. Miller — 8/8/97
Don J. Miller — Date
MK Project Engineer

APPROVALS:

Robert E. Hlavacek — 8/11/97
Robert E. Hlavacek — Date
MK Program Manager

CLIENT ACCEPTANCE:

U. S. Navy Responsible Authority — 8/25/97
Date

NSWC Crane Public Works Officer — 9/5/97
Date

U.S. EPA ACCEPTANCE:

U.S. EPA Region 5 Project Coordinator — 6/30/97
Date

TABLE OF CONTENTS

SECTION		PAGE
1.0	INTRODUCTION	1-1
	1.1 PURPOSE	1-1
	1.2 OBJECTIVES	1-2
2.0	ENVIRONMENTAL COMPLIANCE	1-6
	2.1 CONTAMINATED MEDIA CLASSIFICATION	1-6
	2.2 STORM WATER DISCHARGE	1-7
	2.3 LANDFILL PERMITTING	1-7
	2.4 EXCAVATION PERMITTING	1-7
	2.5 NOTIFICATIONS	1-7
	2.6 SPECIFICATIONS, CODES, AND STANDARDS	1-8
3.0	PROJECT ORGANIZATION	3-1
4.0	SCHEDULE	4-1
5.0	WORK EXECUTION	5-1
	5.1 WORK SCOPE	5-1
	5.2 SITE ASSESSMENT	5-1
	5.3 MOBILIZATION	5-1
	5.4 BIOREMEDIATION FACILITY	5-2
	5.4.1 Compost Building Area	5-2
	5.4.2 Amendment Storage/Work Area	5-3
	5.4.3 Amendment Haul Road Area	5-3
	5.4.4 Equipment and Personnel Decontamination Area	5-4
	5.4.5 Office and Laboratory Trailer Area	5-4
	5.4.6 Storm Water Diversion and Retention Controls	5-5
	5.4.7 Truck Scale Facility	5-5
	5.5 AS-BUILT DOCUMENTATION	5-6
6.0	QUALITY CONTROL	6-1
7.0	SAFETY AND HEALTH	7-1
8.0	WASTE MANAGEMENT	8-1
9.0	ENVIRONMENTAL PROTECTION	9-1
10.0	REFERENCES	10-1

LIST OF TABLES

TABLE **PAGE**

3-1 PROJECT RESPONSIBILITIES 3-3

LIST OF FIGURES

FIGURE **PAGE**

1-1 VICINITY MAP OF NSWC CRANE, INDIANA 1-4
1-2 LOCATION OF SOILS BIOREMEDIATION FACILITY 1-5
3-1 ORGANIZATION CHART 3-2
4-1 BIOREMEDIATION FACILITY CONSTRUCTION SCHEDULE 4-2

LIST OF APPENDICES

APPENDIX

A TASK-SPECIFIC SITE SAFETY AND HEALTH PLAN A-1
B TECHNICAL SPECIFICATIONS B-1
C DRAWINGS C-1
D IN-PROCESS FIELD CLARIFICATION REQUESTS D-1
E INSPECTION ITEMS E-1

1.0
INTRODUCTION

The Naval Surface Warfare Center (NSWC) Crane is located in southwestern Indiana, as shown in Figure 1-1, and provides support for equipment, shipboard weapons systems, and ordnance. In addition, NSWC supports the Crane Army Ammunition Activity (CAAA) including production and renovation of conventional ammunition, storage, shipment, and demilitarization and disposal of conventional ammunition.

This work plan has been prepared by Morrison Knudsen (MK) for the Naval Facilities Engineering Command (NAVFACENGCOM), Southern Division pursuant to the scope of work defined in Delivery Order #0009, Statement of Work #007, under Contract #N62467-93-D-1106. This work plan describes the design and construction criteria to be used to construct a Solid Waste Bioremediation Facility for performing composting of explosives contaminated soil. A complete description of the bioremediation process and operational requirements is fully described in the Pilot Scale Operational Plan. The Quality Assurance, data collection, and sampling and analytical requirements are described in the Pilot Scale Quality Assurance Project Plan. Both documents are issued under separate cover.

The *Soils Bioremediation Facility* will be constructed to treat explosives-contaminated soil. It will be located near the NSWC landfill, south of the Burns City Gate as shown in Figure 1-2. The Facility will treat the contaminated soil in three pre-engineered open-ended buildings using an amendment mix based on bench-scale testing of Crane soils, results from the Umatilla Army Depot composting activities, as well as results from other amendment composting tests.

1.1 PURPOSE

The purpose of this work plan is to provide construction guidance, technical specifications and drawings, quality control and safety considerations for the construction of a Bioremediation Facility for use in composting of contaminated soil. This plan may be modified, amended, or revised, with the approval of the United States (U.S.) Navy and the U.S. EPA, to optimize the facility design in order to improve performance throughout the pilot scale program. The following documents are provided for the Soils Bioremediation Project and will be used in conjunction with each other:

1. The approved *Work Plan For Soils Bioremediation Facility*, which addresses the construction of the Bioremediation Facility for composting of explosives-contaminated soils.

2. The approved *Task-Specific Site Safety and Health Plan* (SSHP), which is Appendix A to the Work Plan For Soils Bioremediation Facility and

addresses the life cycle safety and health management, emergency preparedness and prevention, contingency planning, and emergency procedures.

3. The approved *Quality Assurance Project Plan (QAPP) For Pilot Scale Operations at the Soils Bioremediation Facility*, which addresses the quality assurance, sampling and analytical requirements of the bioremediation pilot scale operation.

4. The approved *Pilot Scale Operational Plan For Soils Bioremediation Facility*, which addresses the descriptions and requirements for operating the pilot scale bioremediation facility.

5. The approved *Pilot Scale Site Safety and Health Plan*, which is Appendix A to the Pilot Scale Operational Plan For Soils Bioremediation Facility and addresses the life cycle safety and health management, emergency preparedness and prevention, contingency planning, and emergency procedures, and

6. The approved *Soil Erosion Control Plan for Bioremediation Facility,* which addresses the erosion and sediment control measures for the Bioremediation Facility construction.

1.2 OBJECTIVES

The Department of Defense (DOD) has utilized bioremediation, or composting, to treat explosives-contaminated soil since 1982. Additionally, bioremediation has proven to be successful at other sites having explosives-contaminated materials (Weston, 1993). Explosive-contaminants that have been successfully broken-down by composting include: TNT, RDX, HMX, Tetryl, and nitrocellulose in soils and sludges (U.S. EPA, 1993a, 1993b). The preferred treatment alternative for explosives-contaminated soils from the ABG, Rockeye, Mine Fill A, and Mine Fill B Solid Waste Management Units at NSWC Crane is on-site bioremediation. Bioremediation is the preferred soil treatment alternative because of its ability to treat on-site with limited transportation, lower costs, and high treatment efficiency.

The objective of the bioremediation or composting facility is to reduce the explosive contaminant levels to the levels established in the Pilot Scale Operation utilizing a batch composting system. Each batch composting system is projected to take approximately 28 days to achieve explosives-contaminated soil cleanup levels.

MK's goal is to cost-effectively and efficiently execute the work in accordance with the Delivery Order requirements, while meeting or exceeding all site-specific, local, state, and federal requirements. The primary MK work objectives are to:

- Perform all work in a manner that maximizes worker safety and minimizes environmental impacts.

- Construct the Bioremediation Facility as per the approved plans in a manner which is cost effective and complies with site-specific, local, state, and federal requirements for a contaminated media treatment facility.

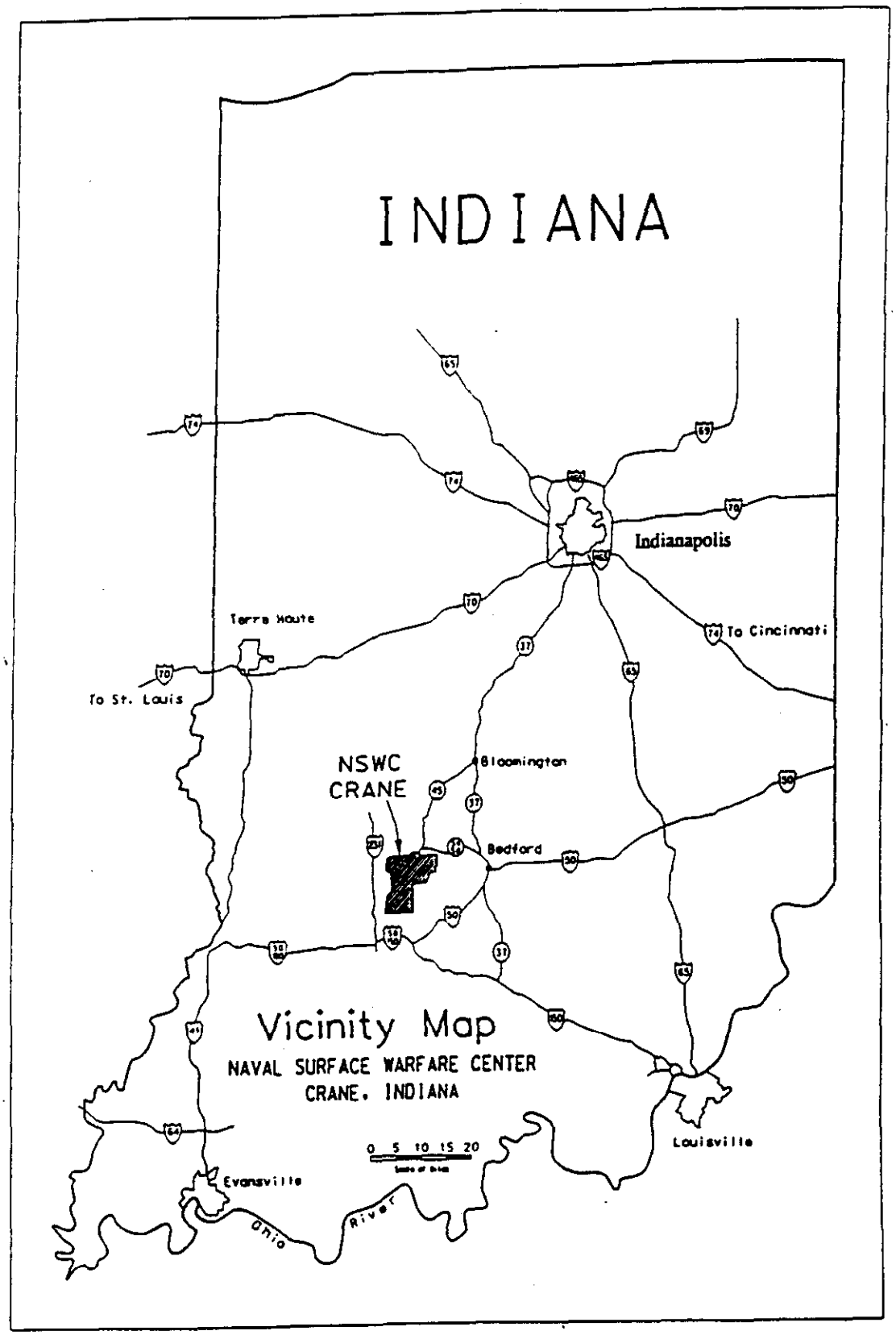


FIGURE 1-1
VICINITY MAP OF NSWC CRANE, INDIANA

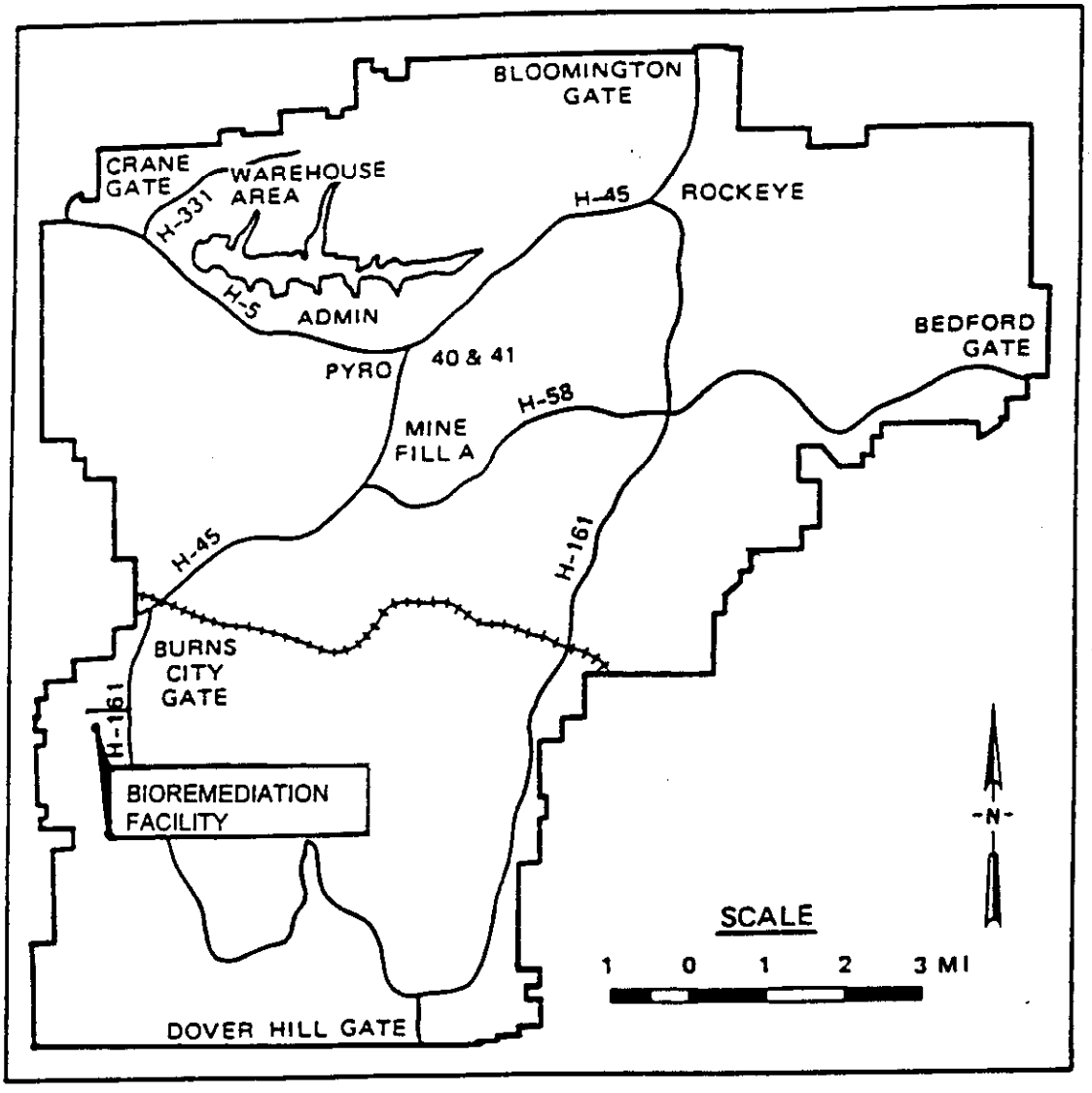


FIGURE 1-2
LOCATION OF SOILS BIOREMEDIATION FACILITY

2.0
ENVIRONMENTAL COMPLIANCE

Promulgation of the Environmental Protection Agency's (EPA's) regulatory program under the Resource Conservation and Recovery Act (RCRA) provided the impetus to identify and control environmental contamination from past practices at NSWC Crane. On December 23, 1989 the U.S. EPA issued the federal portion of the final RCRA permit for NSWC Crane to the U.S. Navy and issued the permit renewal for a period of five years on July 31, 1995. This permit contains both the Federal permit conditions and State permit conditions, which were issued separately by the State of Indiana RCRA program. It established the Hazardous and Solid Waste Amendment (HSWA) Corrective Action Requirements and Compliance Schedules obligating the U.S. Navy to perform Remedial Field Investigations (RFIs) at 30 SWMUs, to conduct Corrective Measures Studies, and to implement corrective measures if needed.

2.1 CONTAMINATED MEDIA CLASSIFICATION

On-site bio-treatment of contaminated media must comply with all relevant permitting and reporting requirements of the Resource Conservation and Recovery Act (1976 *et seq.*).

Data obtained from *in situ* samples of the Mine Fill A excavation areas indicate that the contaminated media does not contain 40 CFR 261 Appendix VIII hazardous constituents above the characteristic reactivity threshold as determined in 40 CFR 261.23. Kristoff (1987) evaluated contaminated media which contain reactive nitrated aromatics, and indicated that reactivity was not observable if the reactive constituents were present below 10 % (100,000 mg/kg) concentrations.

It is expected from in-situ soil analysis that once the soil is excavated and mixed within the truck, prior to treatment, the soil will be non-reactive and a non-hazardous waste. Upon treatment at the bioremediation facility, the hazardous constituents will be treated from the soil, and the material handled will be a contaminated media. Therefore, at treatment completion, it is anticipated that the material will be considered a soil again. If at any point during the remediation activity the generation of hazardous waste is anticipated, the activities will stop in that area being excavated and permits will be sought for the treatment of hazardous waste.

Based on this classification of the soil to be treated, the Bioremediation Facility and buildings have been designed and approved as a solid waste and contaminated media treatment facility meeting the applicable codes and standards.

2.2 STORM WATER DISCHARGE

The NSWC Crane personnel have obtained a storm water discharge permit, (NSWC, 1997) under 327 IAC 15; NPDES General Permit Rule Program, which amends the existing permit to include discharge levels for the Bioremediation Facility storm water collection system. MK will conduct operations in compliance with the permit specifications. The storm water diversion and retention controls for the Bioremediation Facility are described in Sections 5.6 and 7.3.3 of this plan. Additional details on sampling procedures and analytical methodologies for storm water discharge are provided in the Pilot Scale Biofacility QAPP, Section 4.3.

2.3 LANDFILL PERMITTING

A NSWC Crane Landfill Permit Modification is required to be prepared and approved by IDEM for the deletion of the property, allocated for the Bioremediation Facility, from the landfill permit boundaries. This permit modification has been prepared, submitted and approved by IDEM.

2.4 EXCAVATION PERMITTING

An Excavation and Trenching Permit is required for soil excavation in the Bioremediation Facility area and will include a statement of clearance for safe access based on the removal or absence of unexploded ordnance in the work zone. This permit will be obtained from the Public Works Officer and is valid for thirty days. Additional details on excavation permitting is provided in Section **6.2** of this plan.

An Erosion Control Plan is required to be prepared and approved by IDEM for all areas affected by construction activities greater than five acres. The Bioremediation Facility is estimated to affect a total of 5.85 acres. A Soils Erosion Control Plan for Bioremediation Facility, dated March 8, 1996 has been submitted and approved by IDEM through the Martin County Soil and Water Conservation District.

2.5 NOTIFICATIONS

All federal, state, and local agency notifications will be performed by the NSWC Crane Site Representative. The PM will notify the NSWC Crane Environmental Protection Department of all interim measures construction and cleanup activities. These notifications include, but are not limited to:

- Clearing and grubbing.
- Trenching and excavation.
- Backfilling and compaction.
- Storage and handling of hazardous materials.
- Inspection, manifesting, and shipping of hazardous materials.

- Construction activities.

During interim measures cleanup activities, as described in this Work Plan, emergency notifications will be required in case of fire, explosion, or spills. Notifications shall be made according to the Emergency Response Plan as described in the Task-Specific Site Safety and Health Plan (SSHP) for this Work Plan.

2.6 SPECIFICATIONS, CODES, AND STANDARDS

Compliance in the design, material, examination, testing, inspection, certification, and documentation shall include, but not be limited to, the applicable portions of the specifications, codes, and standards listed below. References to codes, specifications, and standards shall be to the latest edition, complete with all addenda and revisions applicable on the date of the construction specification and approval of the Pilot Scale Operational Plan and QAPP.

- U.S. Navy or NSWC Crane guidance

- U.S. Occupational Safety and Health Administration
  29 CFR 1910, Occupational Safety and Health Standards
  29 CFR 1926, Safety and Health Regulations for Construction

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

- U.S. Environmental Protection Agency
  40 CFR 257, Criteria for Classification of Solid Waste Disposal Facilities and Practices
  40 CFR 261, Identification and Listing of Hazardous Waste
  40 CFR 262, Standards Applicable To Generators Of Hazardous Waste
  40 CFR 264, Subpart S Corrective Action
  40 CFR 300, National Oil and Hazardous Substance Contingency Plan

- U. S. Department of Transportation
  49 CFR 172, Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements. This part describes requirements for completing shipping papers; marking, labeling, and placarding; training; and emergency response.

  49 CFR 173, General Requirements for Shipments and Packaging. This part describes classification and packaging of hazardous materials.

- Indiana Department of Environmental Management
  327 IAC 15, NPDES General Permit Rule Program
  329 IAC 2, Solid Waste Management
  329 IAC 3.1, Hazardous Waste Management Permit Program And Related Hazardous Waste Management.

- Department of Defense Environmental Safety Board explosive safety standard for construction equipment.

- Industry Construction Standards

3.0
PROJECT ORGANIZATION

The project team organization for this remedial action is shown in Figure 3-1. The responsibilities of each team member are listed in Table 3-1.

The team is structured to provide the necessary operations personnel and scientific oversight in the execution of this work.

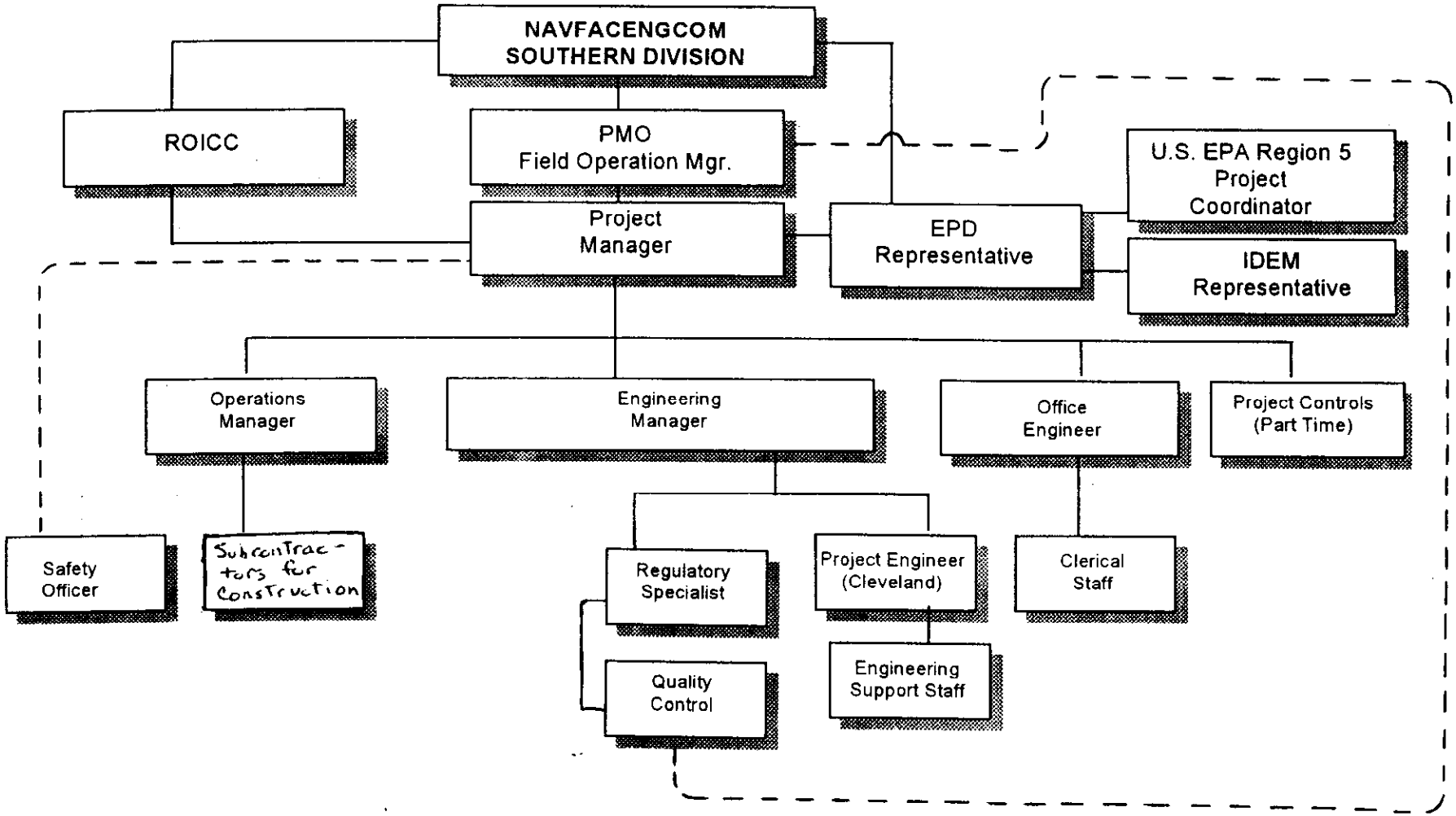


FIGURE 3-1
ORGANIZATION CHART

TABLE 3-1 PROJECT RESPONSIBILITIES	
TEAM MEMBERS	**RESPONSIBILITIES**
NAVFACENGCOM Southern Division Restoration Project Manager (RPM)	Overview of project execution and coordination between Contractor, NSWC Crane, U.S. EPA, and other agencies.
Program Management Office (PMO)	Overall responsibility for all cleanup measures at all sites in the Southern Division of the Naval Facilities Engineering Command under Contract No. N62467-93-D-1106. The Field Operations Manager resides in PMO and is responsible for all Delivery Order Field activities. The PMO is the point of contact for Southern Division.
U.S. EPA Region 5 Project Coordinator (RPC)	Responsible for overview of all site activities to assure compliance with RCRA. RPC shall review and approve all phases of remedial activities including work plans, construction design, equipment, analytical results, etc..
NSWC Environmental Protection Department (EPD) Environmental Construction Representative (ECR)	Responsible for monitoring contractor performance for compliance with RCRA, the RCRA Corrective Action Part B Permit, and other environmental regulations as they apply to the approved Interim Measures Work Plans. In absence of NTR and in an environmental emergency, the ECR shall provide direction to Contractor and provide notification to appropriate parties.
NSWC Resident Officer In Charge of Construction (ROICC)	Southern Division's on-site representative and is the liaison between NSWC officials, the U.S. EPA, and the Project Manager for the SWMUs at NSWC Crane.
Project Manager (PM)	Reports to the Field Operations Manager from the PMO. Overall responsibility for implementing this Work Plan and all other project activities. The PM will control all on-site forces to ensure completion of project tasks. • Single point of contact for U.S. Navy and U.S. EPA liaison. • Coordinates the project resources to ensure compliance with the appropriate plans, procedures, and regulatory requirements. • Oversees all personnel on-site and coordinates with the PMO. • Overall responsibility for cost, schedule control, safety, and quality.
Site Superintendent - Operations Manager (OM)	Reports to the PM and has primary responsibility for the coordination and control of all field activities to ensure that all tasks included in this Operational Plan are completed. • Coordinates the activities of all field operations personnel. • Provides daily reports to the PM on the status of field operation activities. • Responsible for equipment maintenance, procurement of amendments, and miscellaneous equipment rental. ~~• Primary responsibility for production of the Bioremediation Facility and direct supervision of operators, drivers, laborers, and the ES.~~
Engineering Manager (EM)	Reports to the PM and has primary responsibility for finalizing the operations plans, provides construction support, and oversight of engineering ~~and scientific~~ activities. • Acts as the MK representative at the RAB presentations, • Acts as the MK site communications officer, • Provides technical direction to the engineering ~~and science~~ staff, • Provides oversight and coordination of the preparation of technical documents.

TABLE 3-1 PROJECT RESPONSIBILITIES	
TEAM MEMBERS	**RESPONSIBILITIES**
~~Science Manager (SM)~~	~~Reports to the EM and has primary responsibility for oversight of the science activities on site including regulatory support, data collection and analysis, and data reporting.~~ ~~• Provides scientific analysis of data,~~ ~~• Provides technical direction to the ES and Technicians,~~ ~~• Provides technical direction to the OM.~~
~~Environmental Specialist (ES)~~	~~Reports to the OM and will receive technical direction from the SM. Specific responsibilities include:~~ ~~• Supervises the activities of the technical staff relative to data collection, sampling, and process control.~~ ~~• Coordinates with the Site Superintendent to ensure that activities are properly coordinated for facility operation.~~ ~~• Coordinates the activities of the support staff and provides project status reports to the SM.~~ ~~• Maintains project records of all monitoring and analysis and prepares technical reports presenting the results of the monitoring, analysis, and facility operational performance.~~ ~~• Responsible for sample collection, field screening analysis, and preparation of samples for shipment.~~
Project Controls	Reports to the PM with primary responsibilities of tracking of all cost and scheduling for the NSWC Crane Project. • Responsible for cost collection and reporting • Responsible for schedule development, maintenance, and reporting.
Project Engineer (PE) (Cleveland)	Reports to the EM with primary responsibilities of coordinating the engineering effort in support of field activities. • Assign Cleveland based resources as required for the completion of all project plans and documents. • Provide engineering support for field activities as required.

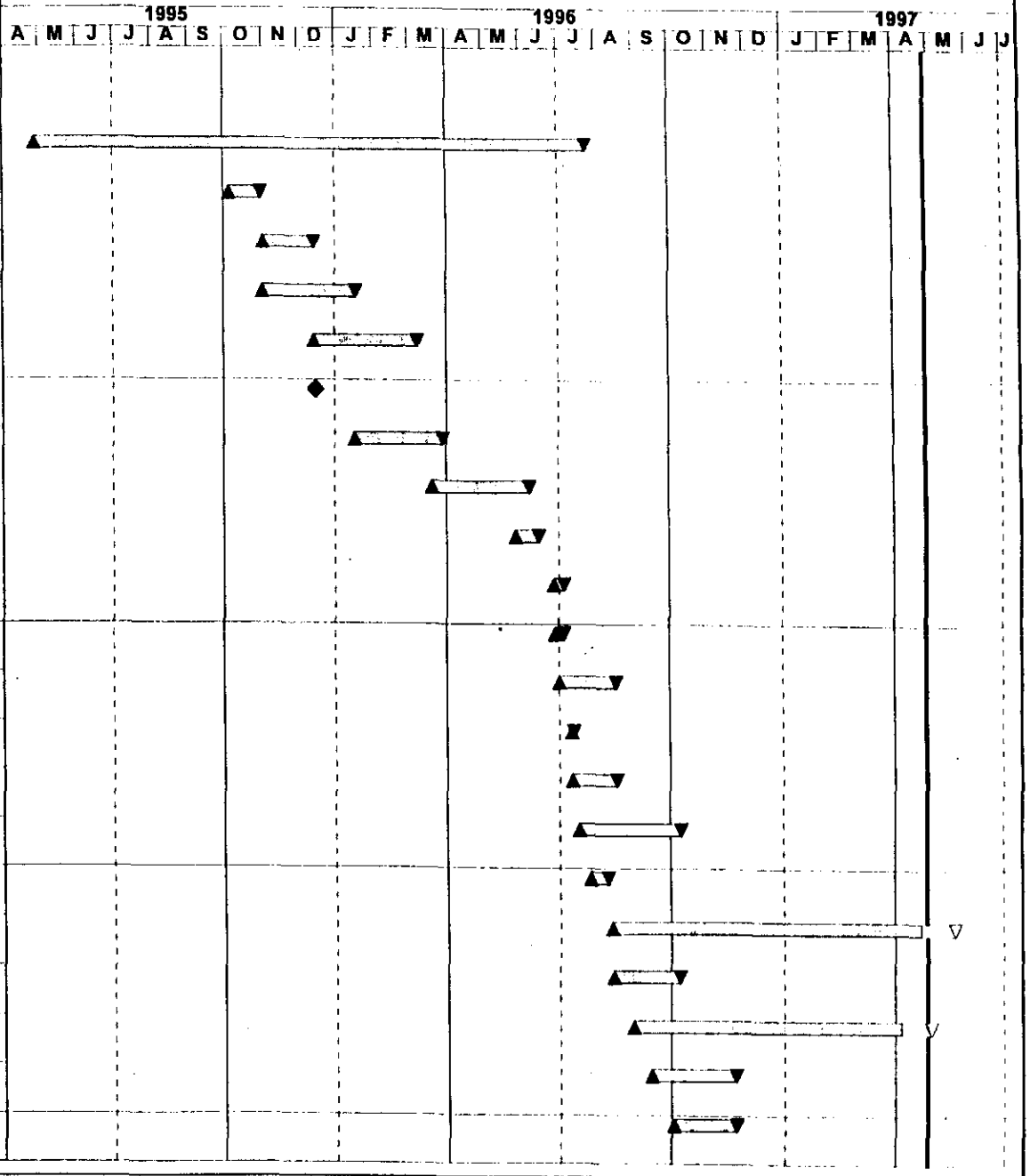
TABLE 3-1 PROJECT RESPONSIBILITIES	
TEAM MEMBERS	**RESPONSIBILITIES**
Site Safety and Health Officer (SSHO)	Reports to the PMO with field reporting to the OM. Implements and ensures compliance with the Task-Specific Site Safety and Health Plan (SSHP). Tracks and reports on safety-related matters. • Responsible for the control and elimination of existing and potential industrial hazards. • Implements and executes personnel surveillance program to ensure proper monitoring of internal and external exposures. • Provides site-specific training to personnel as required by the SSHP. • Tracks all personnel training requirements for heavy and light equipment operation, survey data, certifications, and records to ensure compliance with plans and regulations. • Assists in developing and implementing the SSHP. • Conducts audits as appropriate to ensure compliance. • Reviews and approves work permits for appropriate industrial hygiene and safety controls. • Provides monitoring to ensure the protection of project personnel, the public, and the environment. • Maintains an inventory of industrial hygiene and safety supplies as appropriate. • Maintains monitoring equipment and calibration records. • Stops work when necessary to ensure the safety of personnel and to prevent damage to the environment. • Collects air quality samples, records results, and prepares monitoring reports presenting the air quality results to the U.S. Navy.
Site Quality Control Officer (SQCO)	Reports to the PMO and with field reporting to the SM. The SQCO has primary responsibility for verifying a consistently high level of quality for the project. • Reviews and checks all documents, reports, and testing results. • Coordinates with the PM, ES, and OM on all facility operations. • Provides surveillance of all field operation activities to ensure compliance with this ~~Operational Plan and the QAPP~~ **Work Plan** and completes Field Inspection Checklists. • Keeps minutes of the periodic quality meetings. • Implements the three phases of quality control by conducting preparatory meetings prior to beginning a new feature of work, performing surveillance and audits during the implementation phase and finally performing follow-up inspections to verify work was completed in accordance with all associated plans and procedures. • Ensures tracking and resolution of nonconformance/rework items.
Office Engineer	Reports to the PM with primary responsibilities to support all subcontract administration for the project. • Iniciates change orders and change order negotiations, • order and expedite all field purchased items.
Secretary	Reports to Office Engineer and is responsible for receiving in-coming telephone calls and correspondence, maintaining project files, and general clerical duties.

TABLE 3-1 PROJECT RESPONSIBILITIES	
TEAM MEMBERS	**RESPONSIBILITIES**
~~Environmental Technician~~	~~Reports to the Environmental Specialist and is responsible for assisting the ES in the collection of samples and data.~~ ~~• Assists in maintaining project records of all monitoring and analysis and prepares technical reports presenting the results of the monitoring, analysis, and facility operational performance.~~ ~~• Responsible for data and sample collection, field screening analysis, and preparation of samples for shipment.~~ ~~• Operates process instrumentation such as temperature/oxygen probe and data logger, pH analyzer, etc..~~ ~~• Performs calculations for moisture content analysis, volume and weight conversions, averages, and standard deviations.~~
~~Backhoe Operator~~	~~Reports to the OM and is responsible for operation of the backhoe/loader for excavation of contaminated material to be processed, placement of backfill, and on occasion will operate the windrow turner and tractor/loader.~~
~~Center-Pivot Loader/Tractor/ Skid Steer Loader Operators~~	~~Reports to the OM and is responsible for operation of the center-pivot loader, farm tractor and the skid steer loader for;~~ ~~• Loading operations of the amendment grinder-mixer,~~ ~~• Cleanup and windrow forming during loading and windrow turning operations,~~ ~~• Assist in loading finished compost into the live-bottom trailers,~~ ~~• Operate the windrow turner machine as required.~~ ~~• Loading operations of the amendment grinder-mixer.~~
~~Truck Driver~~	~~Reports to the OM and is responsible for operating the tractor/trailer rigs to deliver contaminated soil to the Bioremediation Facility and deliver finished compost material to the NSWC landfill.~~
~~Laborers~~	~~Reports to the OM or the designated operator/foreman and is responsible for;~~ ~~• Decontamination of equipment at the excavation site.~~ ~~• Segregation of reject materials from screener, i.e., rocks, metal, wood, etc..~~ ~~• Operation of the vehicle decontamination facility at the Biofacility.~~ ~~• General site cleanup and maintenance of Biofacility area, sumps, and ponds.~~
Subcontractors	**Subcontractors shall be responsible for construction of the facility.**
Note: See Section 3.0 of the Task-Specific Site Safety and Health Plan for names and contact.	

4.0
SCHEDULE

Figure 4-1 shows the proposed schedule for loading multiple piles for the various mixtures to be processed during the pilot scale operation. The quantities and time periods may be altered slightly during the pilot phase based on the optimization of amendment selections and mixture ratios. The schedule is presented with activity bars which will show progress once the program begins. The schedule also shows a target bar for establishing the original schedule target milestones. This allows for progress against the original target dates to be observed at a glance.

Activity ID	Activity Description	Orig Dur	%	Early Start	Early Finish
DO#0009 NSWC CRANE, INDIANA					
SOW#007, Phase 30					
WP #005 - BIOREMEDIATION FACILITY					
BV5000	Biofacility Construction Work Plan	319	100	28APR95A	24JUL96A
BV5010	Biofacility Design Activities (Structural)	18	100	05OCT95A	30OCT95A
BV5015	Biofacility Bid Phase (Structural)	33	100	01NOV95A	14DEC95A
BV5105	Biofacility Design Activities (Civil/Mech/Elect)	54	100	01NOV95A	17JAN96A
BV5020	US Tech Biofacility Structural Design/Submittals	32	100	14DEC95A	07MAR96A
BV5018	Subcontractor Award - Bio	0	100		15DEC95A
BV5110	Biofacility Bid Phase (Civil/Mech/Elect)	40	100	17JAN96A	28MAR96A
BV5005	Landfill (Minor) Permit Modification	61	100	20MAR96A	07JUN96A
BV5025	US Tech Biofacilities Structural Fabrication	15	100	27MAY96A	14JUN96A
BV5120	Smith Bio Civ/Mech/Elec Mobilization	2	100	27JUN96A	05JUL96A
BV5040	US Tech Clearing & Grubbing for Building Slabs	15	100	29JUN96A	05JUL96A
BV5045	US Tech Cut & Fill Grading for Buildings	25	100	02JUL96A	16AUG96A
BV5125	Smith Abandon Sewer Lines	205	100	12JUL96A	12JUL96A
BV5130	Smith Clear & Grade Area #1	10	100	12JUL96A	16AUG96A
BV5135	Smith Construct Haul Road	4	100	18JUL96A	08OCT96A
BV5030	US Tech Structural Steel Delivered	5	100	26JUL96A	09AUG96A
BV5165	Smith Construct Operator Parking Area	9	90	13AUG96A	20MAY97
BV5155	Smith Clear & Grade Area #2	9	100	15AUG96A	07OCT96A
BV5140	Smith Install Sewer System	7	90	30AUG96A	29APR97
BV5060	Bldg #3 Foundation & Floor Slab	19	100	15SEP96A	22NOV96A
BV5055	Bldg #2 Foundation & Floor Slab	20	100	02OCT96A	21NOV96A



Project Start 01MAR95
Project Finish 18FEB99
Data Date 28APR97
Plot Date 01MAY97

Early Bar
Progress Bar
Critical Activity

© Primavera Systems, Inc.

4324.SWMU

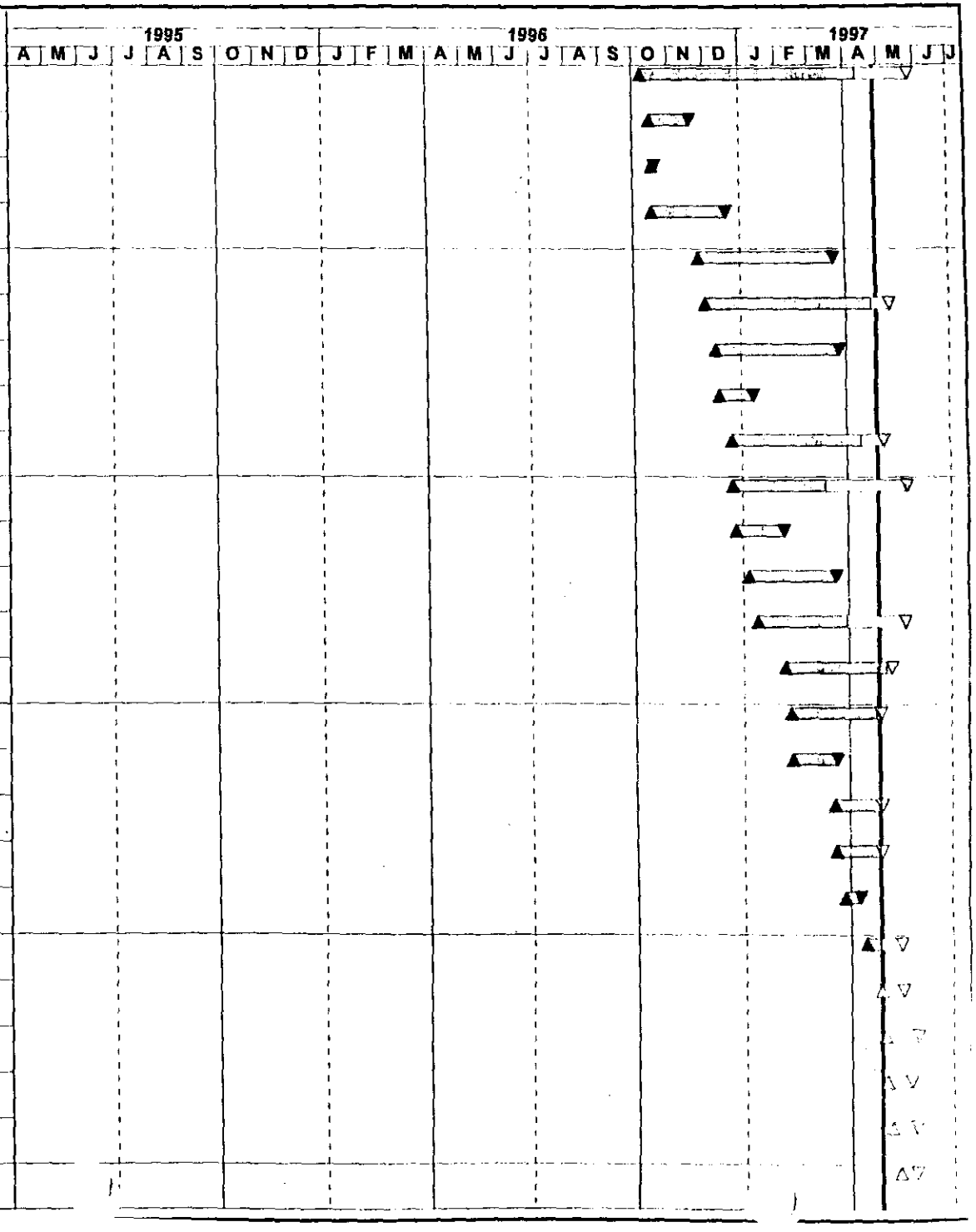
Sheet 1 of 3

SOUTHDIV ERAC PROGRAM - WO# 4324
BIOREMEDIATION FACILITY CONSTRUCTION
FIGURE 4-1

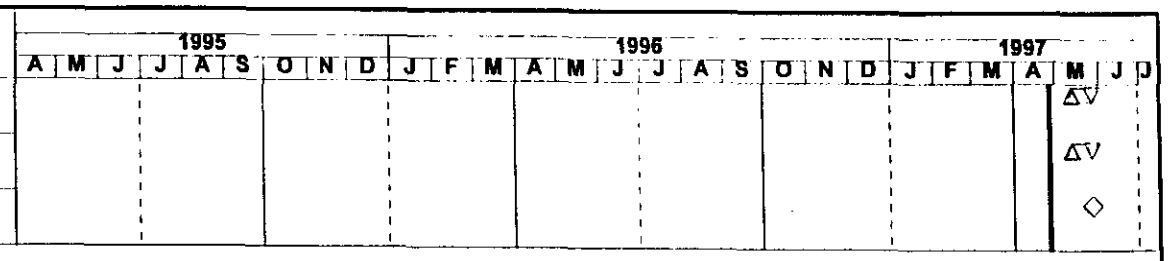
MORRISON KNUDSEN CORPORATION

Date	Revision	Checked	Approved

Activity ID	Activity Description	Orig Dur	%	Early Start	Early Finish
BV5175	Smith Install Site Electrical Services	25	80	08OCT96A	27MAY97
BV5050	Bldg #1 Foundation & Floor Slab	17	100	15OCT96A	19NOV96A
BV5180	Smith Asphalt Paving	60	100	17OCT96A	19OCT96A
BV5085	Bldg #3 Steel Erection	10	100	17OCT96A	20DEC96A
BV5061	Bldg #3 Ramps and Curbs	1	100	25NOV96A	21MAR97A
BV5056	Bldg #2 Ramps and Curbs	1	90	02DEC96A	08MAY97
BV5051	Bldg #1 Ramps and Curbs	20	100	10DEC96A	25MAR97A
BV5075	Bldg #2 Steel Erection	20	100	13DEC96A	10JAN97A
BV5150	Smith Construct Decon Building	33	85	23DEC96A	02MAY97
BV5160	Smith Pond Liner Installation	15	53	23DEC96A	22MAY97
BV5065	Bldg #1 Steel Erection	20	100	27DEC96A	05FEB97A
BV5086	Bldg #3 Roof Installation	16	100	06JAN97A	21MAR97A
BV5145	Smith Install Plumbing	8	60	13JAN97A	20MAY97
BV5076	Bldg #2 Roof Installation	10	95	05FEB97A	08MAY97
BV5066	Bldg #1 Roof Installation	10	95	10FEB97A	28APR97
BV5090	Bldg #3 Install Siding	17	100	12FEB97A	20MAR97A
BV5070	Bldg #1 Install Siding	17	95	19MAR97A	28APR97
BV5062	Bldg #3 Joint Sealers and Epoxy Sumps	16	95	20MAR97A	28APR97
BV5080	Bldg #2 Install Siding	28	100	28MAR97A	09APR97A
BV5181	Smith Asphalt Paving (balance)	31	40	14APR97A	14MAY97
BV5052	Bldg #1 Joint Sealers and Epoxy Sumps	15	0	28APR97	16MAY97
BV5182	Rogers Truck Scales Access	20	0	01MAY97*	29MAY97
BV5057	Bldg #2 Joint Sealers and Epoxy Sumps	16	0	02MAY97	23MAY97
BV5170	Smith Relocate Office Trailers & Misc. Equip.	15	0	06MAY97	27MAY97
BV5162	Smith Install 10 ft Fencing Around Yards	10	0	13MAY97	27MAY97



Activity ID	Activity Description	Orig Dur	%	Early Start	Early Finish
BV5185	Smith Site Restoration	13	0	13MAY97	27MAY97
BV5187	Smith Install Perimeter Fence	10	0	13MAY97	27MAY97
BV5519	Complete Facility Construction - Bio	0	0		27MAY97



5.0
WORK EXECUTION

This section details the execution of work for the Soils Bioremediation Facility covered by this Work Plan. Complete operation and process procedures are provided in the *Pilot Scale Operational Plan For Soils Bioremediation Facility* issued under separate cover. Complete sampling and analytical procedures are provided in the *Pilot Scale Quality Assurance Project Plan* also issued under separate cover.

Unexploded Ordnance (UXO) clearances, excavation permits, hot work permits, and other required approvals will be obtained before performance of any field work beyond visual survey and walk-arounds. All activities will also be coordinated with operations activities near the work areas. These clearances, permits, and approvals will be obtained from the NSWC Site Representative.

5.1 WORK SCOPE

The scope of work includes all necessary work required to construct a Bioremediation Facility for the purpose of composting of explosives contaminated soil. The following descriptions are supported by design drawings and technical specifications provided in Appendix B and C. In process field clarification request (FCR) information is included in Appendix D.

The Bioremediation Facility is shown on drawing C-100, provided in Appendix C, and consists of the following basic design elements:

- Three 70 feet wide by 300 feet long composting buildings,
- Amendments storage area,
- Amendment haul road area,
- Equipment and personnel decontamination areas,
- Office and laboratory trailer area
- Storm water diversion and retention controls, and
- Basic services and utilities including a water supply source for dust suppression and compost moisture additions.

5.2 SITE ASSESSMENT

A topographic survey has been conducted to record site conditions prior to construction. Soil samples have also been collected and analyzed to establish background conditions prior to facility construction.

5.3 MOBILIZATION

The first step in mobilization will be to define the work area configuration. Since this area is a non-potentially contaminated area (virgin soil), defining the exclusion, contamination reduction and support boundaries will not be necessary, however, the work area boundary, site grading benchmarks, and control points will be established.

After the work area configuration is defined, the access routes will be established. Tools, equipment, and supplies will be delivered to the site and the personnel mobilized.

The general condition of the equipment will be inspected and tested to ensure that all safety systems and alarms are functional. The performance of the equipment will be tested to determine if the equipment can perform the required tasks.

5.4 BIOREMEDIATION FACILITY

This Plan describes the construction of a Bioremediation Facility. The design layout and details for the facility are shown on Drawings C-100 through C-112, S-100 through S-104, E-100 through E-109, F-1, F-2, and A-1 through A-3. The facility will be located south of the Burns City Gate near the NSWC Crane landfill as shown in Figure 1-2.

5.4.1 Compost Building Area

The Compost Building Area is located in the south central and western portions of the Bioremediation Facility as shown on drawing C-100. The compost structures (Drawing C-102) shall consist of three 70 feet by 300 feet pre-engineered buildings which are used to shelter the composting operations. The compost structures will consist of a metal structural frame with a light-weight roof designed to accommodate both local climatological conditions and the height of equipment selected for composting operations. The compost building side walls will be constructed of eight-inch thick concrete to a height of four to five feet with metal siding extending to the roof line. The entrance/exit ends of the buildings will be open with six-inch high entrance/exit ramps to prevent run-on or run-off conditions. The floors of the compost structures will be concrete, over six inches compacted #2 limestone, sloped to an epoxy paint-coated fluid collection sump. Maintenance of compost moisture within the covered treatment area is expected to generate little or no leachate fluids. However, each of the three structures will be equipped with a sump for contingency purposes. Sump water will be recycled back into the composting process as moisture control. Ventilation within the buildings is provided for via the open ends as well as five 10 feet long roof ridge vents spaced 20 feet apart in the center of each building.

A one and one-half inch underground water line (100 psi supply pressure) and valve will be provided to one location of each compost building as shown on drawing C-100. An emergency eye wash station will be provided for each building with a water supply line connection. The eye wash station will have freeze protection, galvanized steel piping construction, water supply isolation valve, water supply regulator/reducing valve, hinged dust covers and push handle, catch basin, and meets ANSI Z358.1-1990 requirements.

The area surrounding the compost buildings will be surfaced with sealed asphalt paving over compacted limestone base and subbase. The entire area will be stripped of all vegetation, proof rolled to detect and correct soft spots, and brought to proper grades. The subbase will be six inches of compacted #2 limestone and the base surface will be six inches of #53 compacted limestone. The paving surface will consist of a 2½ inch asphalt binder course and a 1½ inch asphalt wearing course coated with an approved

sealant to prevent contaminant migration. The outer perimeter of the paving surface will have a six inch high asphalt curb for run-on/run-off control. The paving will slope to the southwest corner of this area where a storage/retention pond will be located. The storage retention ponds are discussed in detail in Section 5.4.6. A continuous ten foot high chain link fence with a man way gate shall be provided around the retention pond. Details are provided on Drawings C-112 in Appendix C.

5.4.2 Amendment Storage/Work Area

The amendment storage area will be located in the southeast section of the Bioremediation Facility as shown on drawing C-100 and used to store bulking agents and manure amendments. The amendment storage/work area will be provided with a subbase of six inches of compacted #2 limestone and a base of six inches of #53 compacted limestone. The paving surface will consist of a 2½ inch asphalt binder course and a 1½ inch asphalt wearing course coated with an approved sealant to prevent contaminant migration. The outer perimeter of the paved surface will have a six inch high asphalt curb for run-on and run-off control. The amendment storage/work area paved surface will slope to the southern edge of this area where a second storm water storage/retention pond shall be located.

The amendment storage area will have multiple bins for storing the amendment materials used in the composting operation. The bin side walls will be constructed of precast concrete interlocking blocks which can be adjusted as required to accommodate different storage configurations. The southeast wall of the amendment storage area will be constructed of 12 inch reinforced concrete, and acts as a retaining wall for the elevation drop from the amendment haul road to the storage area.

A 500 gallon capacity diesel fuel storage tank and containment pad will be located on the north central edge of the amendment storage/work area. The containment pad will be cast concrete with eight inch CMU block walls two courses high. The pad and walls will be coated with an epoxy paint and provided with a two inch drain pipe and a lockable valve for storm water discharge.

5.4.3 Amendment Haul Road Area

The amendment haul road area will be located in the southeast portion of the Bioremediation Facility as shown on drawings C-100 and C-104. The amendment haul road will be constructed of 12 inches of compacted limestone. The area will be provided with drainage swales on both sides of the haul road to maintain proper drainage and a corrugated steel culvert at the northwest end of the haul road. Anchored parking logs will be provided in the truck unloading area at the edge of the retaining wall. Traffic bollards will be provided along the northeast side of the retention/storage pond. A protective retaining wall will be installed around the existing monitoring well located at the north end of the haul road.

5.4.4 Equipment and Personnel Decontamination Area

The Bioremediation Facility will be provided with a Truck Wash Facility which includes , a covered vehicle wash area, a fluid collection and storage sump, a toilet facility and an equipment room and a personnel decontamination area consisting of a shower/locker room trailer with change room area, lockers, lavatory, toilets and showers

5.4.4.1 Equipment Decontamination Facility

As shown on Drawing S-100, the vehicle wash area will be an eight inch curbed concrete slab with entrance ramps at each end and an eight inch CMU wall on both sides to contain the decon spray. The flooring will slope to the center of the wash area where a collection trench with grating will provide drainage of the fluid to the collection sump. All necessary equipment and controls for operation of a hand wand spray wash system will be provided as described in the technical specifications and drawings. The decontamination area and collection sump subject to wash fluid exposure will be epoxy-paint coated for protection.

As shown on Drawing S-100, the fluid collection and storage sump will be 4000 gallons capacity and constructed of concrete, coated with epoxy paint for protection. The sump will have checkered floor plate covers to prevent rain water collection and a small section of steel grating at the north end to serve as a boot wash area. The checkered plate will have a small removable section located over the sump low point for access to allow fluid and sediment removal with a vacuum hose.

As shown on Drawing S-101, the toilet facility and equipment room will be constructed of eight inch CMU with steel roof joists. The toilet room will be provided with a toilet, lavatory, urinal and a floor drain. The equipment room will house the high pressure wash system and water heater and also have a floor drain. This building will be heated and cooled with a window type heat pump unit having a heating capacity of 10,000 BTU and a cooling capacity of 6,000 BTU. Utility water will be provided by extending a one and one-half inch supply line from the existing storage shed supply tie-in point. The sanitary sewer line from the toilet room will be routed to the pump/lift station in the office/laboratory area.

5.4.4.2 Personnel Decontamination Facility

The personnel decontamination area consist of a shower/locker room trailer with change room area, lockers, lavatory, toilets and showers. The northern end of the trailer will serve as a lunch/conference room. The sanitary sewer line is routed to the pump/lift station in the office/laboratory area.

5.4.5 Office and Laboratory Trailer Area

The office and on-site laboratory trailers will be located north of the compost building area as shown on drawing C-100. They will be provided with a compacted limestone parking area with parking logs for 24 vehicle capacity. Sanitary sewer service will be provided by way of a grinder pump/lift station with the discharge routed to the existing

sanitary sewer force main located north of the landfill access road. The existing roadside drainage swales will be regraded to provide proper drainage.

The on-site laboratory trailer will contain the necessary equipment and supplies to support the required monitoring and on-site sample screening requirements as described in the Pilot Scale Operational Plan.

5.4.6 Storm Water Diversion and Retention Controls

The facility will utilize both the existing topography and site drainage controls to control storm water run-off and run-on as shown on drawing C-100. Two lined storm water retention basins sized to store rainfall from a 10-year, 24-hour storm will be constructed inside the Bioremediation Facility. They will allow for controlled on-site storm water storage/retention and off-site storm water discharge. Water collected in the retention basin will be sampled following a storm to determine whether the water meets off-site discharge requirements. Water not meeting off-site discharge requirements will either be recycled in the soil treatment area for compost moisture addition or transported to one of the water treatment facilities located at Mine Field A and Rockeye. Enough retention capacity will be maintained to allow for unexpected rainfall events. Evaporation will be the preferred method of decreasing retention pond volumes, but analyses of retained water shall be kept current so that water may be discharged when needed. A storm water discharge permit will be obtained for discharge to the local drainage swales.

The storage/retention ponds will consist of a 60 mil HDPE liner over a 12 ounce geotextile cushion and gunite lining with a low point sump to allow for pond drainage by way of a lockable four inch CPVC valve and outfall pipe or by way of a vacuum truck. Details of the storage/retention ponds are provided on Drawings C-105, C-106, and C-112.

5.4.7 Truck Scale Facility

A Tennessee Scale Works Weigh-Tronix model FCTS7010-100T truck scale will be used to weigh amendments and soil at the site. The truck scale facility will be constructed along the west side of H-161 near the entrance to the Bioremediation Facility/Landfill access road as shown on Drawing C-107. It will have an approach and exit ramp constructed of #2 limestone subbase followed by #53 limestone base with an asphalt surface. The ashphalt surface will be 3 inches of a #5 asphalt base course followed by 2 inches of #9 asphalt binder course and 1½ inches of #11 asphalt wearing course. The truck scale unit will be constructed on a reinforced concrete foundation for stability.

Electronic power will be supplied to the truck scale by using direct burial cable that will be placed a minimum of 30 inches below grade and will follow along side the existing Bioremediation Facility access road. A 30 amp electrical service will be provided for the truck scale power supply and instrumentation.

5.5 AS-BUILT DOCUMENTATION

As-built records shall be maintained at the job site which will include but not be limited to, full size contract drawings and technical specifications for the facility construction, documentation of approved changes, and deviations from the work plan, photographs of construction progess, construction interface documents (CIDs), field clarification requests (FCRs), daily logs, and quality inspection reports. Examples of various in-progress FCRs and vendor/subcontractor information have been included in Appendix D.

6.0
QUALITY CONTROL

As prime contractor, MK will implement and retain full authority of the Quality Control Plan (QCP) for this project. The QCP is bound under separate cover and is to be used in conjunction with this Work Plan. MK will manage all matters involving Quality Control performed in the execution of NAVFAC Delivery Orders. This approach provides the Navy with a quality management system having clear lines of authority and responsibility, and a consistent approach and application of quality requirements.

The QCP identifies quality testing and inspection requirements for the scope of work to be performed. To supplement the information contained therein, Appendix E of this Work Plan provides Field Inspection Checklists for general and specific items when performing inspections.

7.0
SAFETY AND HEALTH

The Task-Specific Site Safety and Health Plan (SSHP) for this Work Plan is specific to construction activities for the Soils Bioremediation Facility. The SSHP is found in Appendix A of this Work Plan. All details in the SSHP are to be strictly followed during the execution of the work.

8.0
WASTE MANAGEMENT

Waste management, including disposal functions, will be conducted in accordance with the project's Waste Management Plan (WMP) and all applicable regulations as specified in this Work Plan. The WMP is bound under separate cover and is to be used in conjunction with this Work Plan. However, NSWC Crane retains ownership of all wastes generated and is responsible for signing all waste manifests prepared for this project.

During field activities, various wastes will be generated including noncontaminated ground and rain water, construction, and inert wastes. Construction activities for the Soils Bioremediation Facility will be performed in an area which is a non-potentially contaminated area (virgin soil), and therefore, will not generate any contaminated wastes.

9.0
ENVIRONMENTAL PROTECTION

During site work, MK will employ measures to ensure protection of the environment. All site work will be performed in a manner that will minimize pollution of the air, water, and land. Environmental protection activities executed at the site will follow the Environmental Protection Plan and all applicable regulatory requirements. The EPP is bound under separate cover and is to be used in conjunction with this Work Plan. Care will be exercised to minimize the areas to be disturbed. In addition, a Soil Erosion Control Plan has been submitted per 327 IAC 15-5 and approved on April 3, 1996 by IDEM for the construction of the Bioremediation Facility. This plan shall be fully implemented and requires the maintenance of erosion control structures throughout the construction activities.

10.0
REFERENCES

Halliburton, 1992. *Final RCRA Facility Investigation Phase I, Environmental Monitoring Reports; Solid Waste Management Units #19/00, #08/17, #12/14, #13/14; Naval Surface Warfare Center, Crane Division, Crane, Indiana.* Halliburton NUS Environmental Corporation. August.

Indiana Department of Environmental Management, 1994. *Hazardous Waste Management Unit Closure Guidance.* Indiana Department of Environmental Management, Office of Solid and Hazardous Waste Management. March.

Kristoff, F.T., Ewing, T.W., and Johnson, D.E., 1987, *Testing to Determine Relationship Between Explosive Contaminated Sludge Components and Reactivity.* U.S. Army Toxic and Hazardous materials Agency, Aberdeen, MD. January 1987.

Morrison Knudsen Corporation (MK), 1994. *Site Meeting Minutes of August 16-17, 1994.* R. Centinaro, Morrison Knudsen Corp. August.

NSWC Crane, 1994. *Application for Corrective Action Management Unit Permit.* NSWC Crane. September 24.

Naval Surface Warfare Center, 1997. Storm Water Permit for Industrial Activities General Permit #INR00C083 11/9/94, amended 1997.

U.S. Army Corps of Engineers (ACOE), 1994. *Memorandum; Revised Estimate of Volume of Contaminated Soil at ABG.* W.L. Murphy, Department of the Army, Waterways Experiment Station. August 26.

U.S. Army Corps of Engineers, 1992a. *Draft Part I RCRA Facility Investigation Phase III Soils Report for: Ammunition Burning Ground, SWMU #03/10 Naval Surface Warfare Center, Crane, Indiana.* U.S. Army Corps of Engineers, Waterways Experiment Station. November.

U.S. Army Corps of Engineers, 1992b. *Draft RCRA Facility Investigation Phase II Soils Report For: Rockeye, SWMU #10/15, Naval Surface Warfare Center, Crane, Indiana.* U.S. Army Corps of Engineers, Waterways Experiment Station. July.

U.S. Army Corps of Engineers, 1995. *Internal Draft Part 2 RFI Phase III Soils Report: Ammunition Burning Ground, SWMU #03/10 Naval Surface Warfare Center, Crane, Indiana.* U.S. Army Corps of Engineers, Waterways Experiment Station. September.

U.S. Army Environment Center, 1993. *Technology Application Analysis, Windrow Composting of Explosives Contaminated Soil at Umatilla Army Depot Activity, Hermiston, Oregon, Report No CET-HA-TD-5.* September.

U.S. Environmental Protection Agency (U.S. EPA), 1993a. *Seminar on Technologies for Remediation Sites Contaminated with Explosive and Radioactive Wastes, EPA/625/K-93/001*. June.

U.S. Environmental Protection Agency, 1993b. *Approaches for the Remediation of Federal Facility Sites Contaminated with Explosive or Radioactive Wastes, EPA/625/R-93/013*. September.

U.S. Environmental Protection Agency, Region III, 1994. *Risk Based Concentration Table, Fourth Quarter 1994*. Roy L. Smith, Senior Toxicologist(3hw13), U.S. EPA Region III.

Weston, 1993. *Windrow Composting Demonstration for Explosives-Contaminated Soils at the Umatilla Deport Activity Hermiston, Oregon, Report No CETHA-TS-93043*. Roy F. Weston, Inc. August.

APPENDIX A
TASK-SPECIFIC SITE SAFETY AND HEALTH PLAN, REV ~~2~~ 3

TABLE OF CONTENTS

SECTION		PAGE
1.0	INTRODUCTION	A-7
1.1	WORK TASK SUMMARY	A-7
1.2	CONTAMINANT CHARACTERISTICS	A-7
1.3	REFERENCES	A-7
2.0	SAFETY AND HEALTH HAZARDS SUMMARY	A-9
2.1	OVERVIEW	A-9
2.2	ACTIVITY HAZARD ANALYSES	A-9
2.3	CHEMICAL HAZARDS	A-9
2.4	BIOLOGICAL HAZARDS	A-9
2.5	CONSTRUCTION SAFETY HAZARDS	A-9
2.5.1	Physical Hazards	A-9
2.5.2	Noise	A-10
2.5.3	Adverse Weather Stress	A-10
2.5.4	Excavations	A-11
2.5.5	Hazardous Energy Control (Lockout/Tagout)	A-11
2.5.6	Fire and Explosion	A-12
2.5.7	General Motor Vehicle, Hand and Power Equipment Safety	A-12
2.5.8	Vehicular Traffic and Work-Site Control Hazards	A-13
2.5.9	Clearing and Grubbing	A-13
2.5.10	Access and Haul Roads	A-13
3.0	RESPONSIBILITIES AND AUTHORITIES SUMMARY	A-14
3.1	MK PROJECT MANAGER (PM)	A-14
3.2	MK GENERAL SUPERINTENDENT AND SUBCONTRACTOR JOB SUPERVISORS	A-14
3.3	MK CERTIFIED INDUSTRIAL HYGIENIST (CIH)	A-15
3.4	MK SITE SAFETY AND HEALTH OFFICER (SSHO)	A-15
3.5	SUBCONTRACTOR DESIGNATED COMPETENT SAFETY PERSON	A-15
3.6	SUBCONTRACTOR PERSONNEL	A-15
3.7	NEAREST EMERGENCY MEDICAL FACILITY	A-16
4.0	TRAINING REQUIREMENTS SUMMARY	A-17
4.1	HAZARDOUS WASTE OPERATIONS TRAINING	A-17
4.2	SITE SPECIFIC TRAINING	A-17
4.3	CONFINED SPACE ENTRY TRAINING	A-17
4.4	RESPIRATORY PROTECTION TRAINING	A-18
4.5	HAZARD COMMUNICATION TRAINING	A-18
4.6	CPR/FIRST AID AND BLOOD BORNE PATHOGENS	A-19

TABLE OF CONTENTS

Section		Page
4.7	DEPARTMENT OF TRANSPORTATION (DOT) HAZARDOUS MATERIALS	A-19
4.8	SAFETY MEETINGS	A-19
4.9	PLAN OF THE DAY (POD) MEETINGS	A-19
4.10	QUALITY CONTROL PREPARATORY PHASE INSPECTION MEETING	A-20
4.11	RECORDKEEPING	A-20
5.0	MEDICAL SURVEILLANCE PROGRAM REQUIREMENTS	A-21
5.1	SUMMARY	A-21
5.2	DRUG ABUSE PREVENTION PROGRAM	A-21
5.3	RECORDKEEPING	A-21
6.0	PERSONAL PROTECTIVE EQUIPMENT	A-22
7.0	MONITORING AND SAMPLING	A-24
7.1	GENERAL	A-24
7.2	MONITORING	A-24
7.2.1	Volatile Organic Compounds	A-24
7.2.2	Airborne Dust	A-25
7.2.3	Confined Space Monitoring	A-25
7.2.4	Perimeter Monitoring	A-26
7.2.5	Noise Monitoring	A-26
7.2.6	Heat Stress and Cold Stress Monitoring	A-26
7.3	AIR SAMPLING	A-27
7.4	AIR MONITORING AND SAMPLING REQUIREMENTS	A-27
7.5	RECORDKEEPING AND CHAIN OF CUSTODY	A-27
8.0	GENERAL SAFETY RULES AND PROCEDURES	A-28
8.1	GENERAL	A-28
8.2	RULES AND PROCEDURES	A-28
9.0	WORK ZONES	A-31
9.1	EXCLUSION ZONE (EZ)	A-31
9.2	CONTAMINATION REDUCTION ZONE (CRZ)	A-31
9.3	SUPPORT ZONE (SZ)	A-31
9.4	CONSTRUCTION ZONE	A-31
9.5	WORK ZONE CONTROLS	A-31

TABLE OF CONTENTS

Section		Page
10.0	PERSONNEL AND EQUIPMENT DECONTAMINATION AND HYGIENE PROCEDURES	A-33
10.1	EQUIPMENT DECONTAMINATION	A-33
10.2	WASHING FACILITIES	A-33
10.3	DECONTAMINATION WASH WATER	A-33
10.4	SANITATION AND PERSONAL HYGIENE	A-33
11.0	ON-SITE FIRST AID AND EQUIPMENT	A-34
11.1	FIRST-AID AND MEDICAL FACILITIES REQUIREMENTS	A-34
11.2	REPORT OF FIRST AID CASES	A-34
12.0	EMERGENCY RESPONSE PLAN AND CONTINGENCY PROCEDURES	A-35
12.1	PRE-EMERGENCY PLANNING	A-35
12.2	RESPONSIBILITIES	A-36
12.2.1	Project Personnel	A-36
12.2.2	Project Manager	A-36
12.2.3	MK Certified Industrial Hygienist (CIH)	A-36
12.2.4	MK Site Safety and Health Officer (SSHO)	A-36
12.2.5	Subcontractors	A-37
12.3	EMERGENCY RECOGNITION AND PREVENTION	A-37
12.4	SAFETY ZONES	A-37
12.5	SITE SECURITY AND CONTROL	A-37
12.6	EVACUATION ROUTES	A-37
12.7	EMERGENCY MEDICAL TREATMENT AND FIRST AID	A-37
12.8	COMMUNICATIONS	A-38
12.9	CRITIQUE OF RESPONSE AND FOLLOW-UP	A-38
12.10	INITIAL REPORTING AND MANAGEMENT OF INCIDENTS	A-38
13.0	LOGS, REPORTS, AND RECORDKEEPING	A-41
13.1	SAFETY AND HEALTH LOGBOOK	A-41
13.2	REPORTS	A-41
13.3	FIELD MASTER COPY OF SSHP	A-41
13.4	RECORDKEEPING	A-41
13.5	SAFETY AND HEALTH PROJECT COMPLETION REPORT	A-42
14.0	ON-SITE WORK PLANS	A-43
15.0	COMMUNICATION PROCEDURES	A-44
15.1	RADIO COMMUNICATION, TELEPHONE, ALARMS AND DRILLS/EXERCISES	A-44

TABLE OF CONTENTS

Section		Page
16.0	SPILL CONTAINMENT PLAN	A-45
16.1	GENERAL	A-45
16.2	PREPLANNING FOR SPILL CONTROL	A-45
16.3	SPILL AND FIRE CONTROL MATERIALS AND EQUIPMENT	A-46
16.4	SPILL CONTROL MEASURES	A-46
16.5	DRUM, CONTAINER, AND TANK HANDLING AND MOVING PROCEDURES	A-46
16.6	INITIAL REPORTING AND MANAGEMENT OF INCIDENTS	A-47
17.0	CONFINED SPACES	A-50

LIST OF TABLES

TABLE		PAGE
A-1	Personnel Names and Telephone Numbers	A-52
A-2	Selection of Personal Protective Equipment	A-54
A-3	Minimum Personal Protective Equipment Requirements by Task	A-55
A-4	Airborne Contaminant Response Criteria	A-56
A-5	Frequency of Physiological Monitoring for Fit and Acclimatized Workers	A-58
A-6	Monitoring and Sampling Requirements	A-59

LIST OF FIGURES

FIGURE		PAGE
A-1	Directions to Nearest Emergency Medical Facilities	A-61
A-2	Safety Meeting Report	A-62
A-3	SSHO Daily Logbook Report	A-63
A-4	SSHP Weekly Inspection Checklist	A-64

ATTACHMENTS

ATTACHMENT		PAGE
A	ACTIVITY HAZARDS ANALYSIS (AHA)	A-67

1.0
INTRODUCTION

This Task-Specific Site Safety and Health Plan (SSHP) describes safety and health requirements for construction of the Soils Bioremediation Facility. This SSHP is consistent with requirements of the Occupational Safety and Health Administration's (OSHA) Hazardous Waste Site Regulations; 29 CFR 1910.120 and 29 CFR 1926.65; and the U.S. Army Corps of Engineers (ACOE) *Safety and Health Requirements Manual* EM 385-1-1, dated September, 1996. This SSHP is applicable to all personnel who enter work areas described in this SSHP and who are under the control of Morrison Knudsen Corporation (MK) or MK's Subcontractors.

1.1 WORK TASK SUMMARY

Soils Bioremediation Facility - Facility to be constructed ~~east of Bunker 828 which is located on H-280 just off H-54.~~ **east of the Solid Waste Landfill.** Explosives contaminated soils will be received at this facility from on-site SWMUs. The contaminated soil will be processed by mixing with amendments and composting in covered structures. Support subsystems include decontamination facilities; storm water diversion and retention controls; and office and laboratory trailers.

Construction activities will include site preparation; installation of a sloped compost pad with collection sumps; construction of three ~~temporary~~ pre-engineered buildings on the pad with necessary utilities; temporary office facilities and work areas; decontamination facility; installation of soil processing equipment.

1.2 CONTAMINANT CHARACTERISTICS

No contaminants are expected to be encountered. Chemicals used in support of construction activities will be organized into a separate binder, commonly called the "MSDS Binder." These binders will be available to all personnel, at anytime, and will be at appropriate on-site locations such as the MK job-site trailer, NSWC Medical Building, and each active work area.

1.3 REFERENCES

American Conference of Governmental Industrial Hygienists (ACGIH), 1996-1997. *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Indices.*

Morrison Knudsen Corporation (MK), 1995. *Safety Procedures and Guidelines Manual.* November.

MK, EC&E Group, 1994a. *Industrial Hygiene Procedures Manual.* Rev. 0. April.

MK, 1996b. *Accident Prevention Plan For Naval Facilities Engineering Command Southern Division,* Prepared by Morrison Knudsen under contract N62467-93-D-1 106. Rev. 1.

MK, 1994c. *Safety and Health Program Description for Hazardous Waste Operations.* Rev. 1. September.

MK, 1995d. NAVFAC SouthDiv Project Procedures:
PHSP 01.1, Hazardous Energy Control (Lockout/Tagout), 3/15/96.
PHSP 02.1, Emergency Response, 3/15/96.
PHSP 03.1, Spill Response, 3/15/96.
PHSP 04.1, Incident Reporting, 3/15/96.
PHSP 05.1, Excavations, 5/21/96.

NIOSH/OSHA/USCG/EPA, 1985. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.* DHHS (NIOSH) Publication No. 85-115. October.

NIOSH, 1994. *Pocket Guide to Chemical Hazards.*

OSHA, 1994. *Limits for Air Contaminants*, Title 29 CFR Part 1910 Section 1000, Table Z-1, July 1, 1996.

2.0
SAFETY AND HEALTH HAZARDS SUMMARY

2.1 OVERVIEW

Hazards at this site include construction safety hazards associated with heavy equipment; soil excavation and penetrations, energy control (electrical and other kinetic energy sources) or other utility lines; site restoration including backfilling and compaction; eye/head/feet physical hazards; and heat and cold stress.

2.2 ACTIVITY HAZARD ANALYSES

AHA have been prepared for each anticipated task in accordance with EM 385-1-1, October 1996 (ACOE, 1996). These hazard analyses are in the form of worksheets contained in Attachment A of this SSHP. Each site activity shall be reviewed by field supervision, namely the MK Site Safety and Health Office (SSHO), MK General Superintendent and Subcontractor Job Supervisors(s) prior to starting work to determine if the prepared AHA adequately addresses the planned activity. If the prepared AHA requires revision or a new task is identified, additional hazard analysis will be prepared as needed. A new AHA worksheet shall be field prepared by the Subcontractor Job Supervisor and the MK SSHO before the activity takes place. The Pre-Entry Briefing meeting is utilized to review the AHA and is conducted with all affected workers by the Subcontractor Job Supervisor.

2.3 CHEMICAL HAZARDS

None anticipated.

2.4 BIOLOGICAL HAZARDS

Use caution and assess work areas for insect, snake and biohazard plant life. The MK SSHO shall meet with Base representatives and medical personnel to discuss potential concerns at the SWMU locations during mobilization.

2.5 CONSTRUCTION SAFETY HAZARDS

2.5.1 Physical Hazards

Physical hazards on this project include the use of heavy equipment such as dump trucks, backhoes and excavators and process equipments; and tripping and slipping from walking and working surfaces. Project personnel will receive site-specific and safety training, discussed later, to orient them to these potential hazards.

2.5.2 Noise

Operations may generate noise levels that exceed allowable limits. Hearing protection shall be provided for all field personnel, and its use is required when noise levels exceed 85 decibels A weighted network {dB(A)} steady state or 140 dB(A) impulse, regardless of the duration of exposure. Hearing protection will be provided to all field personnel. A comprehensive Hearing Conservation Program will be implemented when noise levels equal or exceed 85 dBA on an 8-hour time weighted average. Exposure assessments will be conducted by the MK SSHO throughout the work campaign.

2.5.3 Adverse Weather Stress

All employees are to be alert to the signs and symptoms of heat stress. Should extreme fatigue, cramps, dizziness, headache, nausea, profuse sweating, rapid pulse, or pale clammy skin occur, the employee is to immediately leave the work area, rest, cool off, and drink plenty of cool water. If the symptoms do not subside after a reasonable rest period, the employee shall notify the supervisor, who in turn will notify the MK SSHO and seek medical assistance. The MK SSHO and the site supervisor will be alert to signs of heat stress in site personnel and increase the frequency of breaks and fluid consumption as necessary.

Cold injury is classified as either localized, as in frostbite, frost nip or chilblain, or generalized, as hypothermia. In judging the cold hazard, both air temperature and wind chill factor must be considered. The first symptoms of hypothermia are uncontrolled shivering, the sensation of being cold; the heartbeat slows and sometimes becomes irregular; the pulse weakens and blood pressure changes. Severe shaking or rigid muscles caused by bursts of energy change the body chemistry. Vague or slowed speech occurs; memory lapses, incoherence and drowsiness then occur. As core temperature continues to drop, listlessness, confusion and little attempt to keep warm commences. Pain in the extremities is felt. As exhaustion sets in, the body's ability to contract blood vessels is diminished, and rapid loss of heat and cooling begins.

Frostbite can occur without hypothermia when the extremities do not receive sufficient heat from central body stores. This can occur because of inadequate circulation and/or insulation. This condition results in damage to and loss of tissue. The most vulnerable parts of the body are the nose, cheeks, ears, fingers and toes. Damage from frostbite can affect the outer layer of skin only, or it can include the tissue beneath the outer layer. Damage from frostbite can be serious; scarring, tissue death and amputation are all possibilities. The symptoms of frostbite include: 1) The skin changes color to white or grayish-yellow, progresses to reddish-violet and turns black as tissue dies; 2) Pain may be felt at first, but subsides; 3) Blisters may appear; 4) The affected part is cold and numb; and 5) The skin has a waxy appearance.

To prevent cold stress, proper clothing must be worn. It is important to preserve the air space between the body and the outer layer of clothing to retain body heat. Refer to Section 7.2.6 for more guidance on heat and cold stress management.

2.5.4 Excavations

Open excavations and trenches present a hazard from falling into the excavation and/or side wall collapse while personnel are near or inside the excavation. To minimize exposure risk, the excavation work site will be barricaded with orange snow fence and signs posted. Refer to MK Project Procedure PHSP 05.1 for specific excavation requirements. The deepest excavation on this project may approach eight feet but the majority of excavations should be approximately 5 feet. OSHA 1926.650 Subpart P - Excavations and Corps of Engineers requirements (EM 385-1-1, Section 25) requirements for sloping or shoring will apply.

Positive identification of underground utilities and services is required at least 24 hours prior to any excavation, trenching or penetrations. An Excavation and Trenching Permit application must be submitted at least seven days prior to any excavation activities. The MK Project Manager (PM) will be responsible for obtaining this permit through the NSWC Crane Public Works Department (PWD). Regardless of the size of the trench, the Subcontractor shall designate a competent person who will evaluate all excavations and trenches on a daily basis regardless of whether personnel will enter. Inspection shall be recorded in a log book.

2.5.5 Hazardous Energy Control (Lockout/Tagout)

Ground Fault Circuit Interrupters (GFCIs) will be installed on all portable electrical equipment and installations in accordance with EM 385-1-1 Section 11.C.05. All extension cords shall have GFCI protection and shall be inspected and determined to be free of cracks or frays.

Any system where the potential exists for unexpected energizing, start-up, or release of kinetic or stored energy during servicing and maintenance resulting in injury or damage shall be energy isolated in accordance with EM 385-1-1 Section 12, 29 CFR 1910.147, and PHSP 01.1. The MK Site Superintendent shall be responsible for verifying adequacy of all lockout/tagout installations and notifying all affected personnel. The MK Site Superintendent and the Subcontractor Supervisor have the responsibility for implementing energy control measures. The PWD will provide energy control services which will be coordinated by MK Site Superintendent. The Subcontractor will initiate all energy control requests to MK three working days in advance of anticipated work commencement.

In addition, energy controls apply to motorized heavy equipment and process equipments and the following requirement applies. At a minimum, during service and

maintenance of motorized equipment, the key shall be removed and in possession of the service or maintenance person and a "Do Not Operate" tag signed by this person shall be displayed near the start-up controls. Pre-operational checks and maintenance requirements on process equipments, including energy control will be incorporated into checklists.

2.5.6 Fire and Explosion

No hot work or open flames will be allowed in the work area without a Hot Work Permit obtained through the MK SSHO. Hot Work Permitting will be coordinated through the base Fire Department. Flammable and combustible fuels for heavy equipment shall be stored and dispensed in accordance with NFPA 30, the Flammable and Combustible Liquids Code. At least two 20 lb or equivalent "ABC" multi purpose fire extinguisher shall be maintained for fire response in the construction zones. All mobile heavy equipment must be fitted with a minimum 10 lb "ABC" fire extinguisher. Any temporary trailers or structures must have fire extinguishers installed in accordance with NFPA 10. Depending on the fire loading, in most cases a 5 lb "ABC" is sufficient in each office trailer. This extinguisher must be mounted at least four feet from the floor next to a egress door. The MK SSHO is responsible for completing monthly checks on the fire extinguishers and recording appropriately. Use of any tool that can be considered an ignition hazard where fire and explosion hazards may exist is strictly prohibited. Portable power tools shall be explosion proof in accordance with NFPA 70B and 70E, Class 1, Division 1, Group D or otherwise approved for use in potentially explosive atmospheres.

2.5.7 General Motor Vehicle, Hand and Power Equipment Safety

The following traffic rules will apply to all motorized vehicles and equipment while on site:

- Equipment carrying waste shall <u>always</u> have the right-of-way within the Work Zones.
- The speed limit is <u>10 mph</u>, or as posted. Exceeding the speed limit is cause for disciplinary action, including removal from the site.
- Personnel shall <u>not</u> ride equipment that has not been specifically designed for the transport of personnel.
- Seatbelts shall be worn at all times when operating any motorized equipment or vehicle.
- All motor vehicles and equipment including hand and power tools shall be subject to an incoming safety inspection by the MK SSHO. The MK SSHO

reserves the right to reject any subcontractor equipment. A "DO NOT USE" or "DEFECTIVE" tag will be placed on the equipment and documented in the MK SSHO Logbook. Corrective action will be pursued with the Subcontractor Supervisor.

- Daily safety checklists shall be completed by heavy equipment operators and delivered to the MK Site Project Office on a daily basis. The checklist should be based on the equipment manufacturers recommended guidelines for daily checks using a format established and prepared by the Subcontractor (if applicable) and approved by the MK SSHO.

2.5.8 Vehicular Traffic and Work-Site Control Hazards

Potential hazards from vehicular traffic around work areas including the Soils Bioremediation Facility will be controlled by using traffic control items such as traffic cones, flagging, barricades, and signs. Types and placement of traffic control items will be in accordance with EM 385-1-1, Section 8 and 29 CFR 1926.201 and 202. Workers required to work in active traffic areas or roadways will be required to wear high visibility reflective vests.

2.5.9 Clearing and Grubbing

Clearing and grubbing of any work site shall be completed in accordance with the requirements of EM 385-1-1 Section 31. All tree and shrub removal equipment, either hand or power tool shall be inspected on a daily basis by the Subcontractor Job Supervisor. The correct equipment shall be chosen for the job, all operators shall be trained in safe operation, and the correct PPE selected.

2.5.10 Access and Haul Roads

If special access and haul roads are required and constructed for this project, they will be constructed in accordance with EM 385-1-1 Section 21.I.

3.0
RESPONSIBILITIES AND AUTHORITIES SUMMARY

This section describes the roles and responsibilities of project personnel with regard to safety and health. Ultimately, responsibility for the safety and health lies with the individual. All personnel must be cognizant of the hazards and the methods of reducing the risk of injury and illness. All personnel will comply with the rules and procedures set forth in this plan and will make project management aware of any conditions which may jeopardize the welfare of project workers and/or the general public. The specific personnel names and telephone numbers of responsible persons are presented in Table A-1. Figure A-1 is the route map to the nearest medical facilities which also shows the NSWC Base layout.

3.1 MK PROJECT MANAGER (PM)

The PM is responsible for the management of all aspects of the project, including safety and health. The PM is responsible for ensuring that all project tasks receive appropriate safety and health review before commencement of field activities and that the necessary equipment and facilities are available to implement the SSHP.

3.2 MK GENERAL SUPERINTENDENT AND SUBCONTRACTOR JOB SUPERVISORS

The MK General Superintendent and the Subcontractor Job Supervisor(s) are responsible for ensuring that the safety and health aspects for their particular task are addressed. They are responsible for the implementation of the SSHP in the field and for ensuring that all project personnel comply with provisions of the plan. The MK General Superintendent and Subcontractor Job Supervisor(s) are also responsible for notifying the MK SSHO of any changes in work conditions which may affect the safety and health aspects of the task. The MK General Superintendent is responsible for conducting Plan of the Day (POD) meetings. The Subcontractor Job Supervisor(s) are responsible for conducting Pre-Entry Briefings and Post Entry Briefings when required.

The Subcontractor Job Supervisor(s) must notify the MK SSHO and MK General Superintendent of all accidents and incidents as soon as possible. The Subcontractor Job Supervisor(s) shall conduct an accident investigation and record the results of the investigation on a Supervisor Accident Investigation Report form or equivalent form. The initial investigation report shall be formally transmitted to the MK Project Manager within four hours after critical management of the incident is complete. The MK Project Manager shall follow the reporting requirements described in PHSP 04.1. The MK General Superintendent shall conduct a critique of the incident with selected MK and Subcontractor personnel as soon as possible after critical management of the incident is complete. Lessons learned will then be developed by the MK General

Superintendent and Subcontractor Job Supervisor(s) and communicated to all affected personnel.

3.3 MK CERTIFIED INDUSTRIAL HYGIENIST (CIH)

The MK CIH who is the MK Project Management Office (PMO) Health and Safety Manager is responsible for preparation of the SSHP. The CIH is responsible for making modifications to the plans and recommending changes to the work tasks if they affect safety and health. The CIH is responsible for ensuring that all required sampling/monitoring is performed and that all required safety and health documentation is maintained. The CIH may assign specific tasks to the MK SSHO for implementation.

3.4 MK SITE SAFETY AND HEALTH OFFICER (SSHO)

The MK SSHO is responsible for the day-to-day implementation of the SSHP, and verification of compliance with the SSHP and all applicable occupational safety and health rules and regulations. The SSHO has the authority to suspend work at any time if there is an imminent threat to the health and safety of project workers or the general public. The SSHO shall assure the Navy's designated authority at the site is notified immediately of any accident including spills. The SSHO shall assist in the accident investigation effort and shall have final approval authority for accident reports. The MK Work Plan document describes in detail the role and responsibilities of the SSHO on this project.

3.5 SUBCONTRACTOR DESIGNATED COMPETENT SAFETY PERSON

Each Subcontractor shall designate a competent and qualified person, subject to the approval of the MK SSHO and the MK Site Project Engineer, responsible for the implementation of this SSHP and their Company's safety and health program. This designated person shall be referred to as the Subcontractor SSHO. The Subcontractor SSHO shall provide a daily site safety report and shall coordinate his efforts with the MK SSHO.

3.6 SUBCONTRACTOR PERSONNEL

All Subcontractors are required to have a qualified designated competent safety person who will assure and abide by the requirements of this SSHP as stated above. They are also required to comply with all applicable and appropriate federal, state, and local laws, standards, and regulations. Subcontractors must notify the MK SSHO and MK General Superintendent of all accidents as soon as possible. Subcontractors must maintain records of all first aid rendered and recordable, and lost time injuries. Subcontractors must notify the MK SSHO of any changes in work conditions which may affect the safety and health aspects of the task.

3.7 NEAREST EMERGENCY MEDICAL FACILITY

Directions to the On-Site NSWC Medical Department:

The NSWC Fire Department coordinates the on-site ambulance service. The Medical Department is located in Building 12, off of road H-2, just north of H-5.

Directions to Bedford Medical Center:

From the Bedford Gate, head east on Highway 158 to the city of Bedford, 158 turns left onto 16th Street. The distance to hospital is approximately 20 miles.

Directions to Bloomington Hospital:

Exit NSWC on road H5-45 through the Bloomington Gate, then follow Highway 45 North to Bloomington. At the intersection of Highway 45 and Highway 37, continue straight ahead and follow Bloomfield Road north until it becomes 2nd Street. Continue on 2nd Street; the hospital will be on right-hand side of the road.

4.0
TRAINING REQUIREMENTS SUMMARY

This section summarizes training requirements for project personnel.

4.1 HAZARDOUS WASTE OPERATIONS TRAINING

Not applicable for clean construction work.

4.2 SITE SPECIFIC TRAINING

All personnel shall receive site-specific safety and health training prior to entering the site or commencement of work. All site employees and subcontractors, including those working in the support zone, shall receive this training. The Subcontractor Job Supervisor(s) are responsible for identifying personnel requiring this training and coordinated with the MK SSHO regarding scheduling of this training. The MK SSHO or designated alternate will conduct the training. Site visitors shall receive site-specific training prior to entering an exclusion zone. An abbreviated version of this training will be given to site visitors not entering an exclusion zone but whose business will be conducted unescorted in the near vicinity of the Work Zones. The format and content will be left up to the discretion of the MK SSHO. This training will cover the SSHP, but not necessarily be limited to, the following topics:

- Names of site safety and health personnel.
- Safety and health hazards present on the site and anticipated during the work campaign.
- Hazard Communication.
- PPE requirements.
- Safe work practices including drum handling.
- Engineering controls.
- Medical surveillance requirements, including recognition or symptoms and signs which might indicate overexposure to hazards.
- Decontamination procedures.
- Emergency procedures.
- Spill containment plan.
- Confined Space Entry.
- Energy Control.
- All other requirements of this SSHP.

4.3 CONFINED SPACE ENTRY TRAINING

If excavations greater than 5 foot deep are to be entered, the excavation shall be treated initiated as a permit confined space until authorized to be downgraded to non

permit confined space in accordance with MK Industrial Hygiene (IH) Procedure Number 9 and 29 CFR 1910.146. These initial precautions are established because of the potential for organic vapor accumulation in the excavation. Downgrading is based on initial and periodic air monitoring to insure the breathing atmosphere is safe or can be maintained safe by ventilation equipment, and engineering controls in place to safeguard the excavation from collapse.

If permit required confined space designations are made, then personnel involved with confined space entry work shall be required to have certified documented training in confined space entry procedures in accordance with the requirements of 29 CFR 1910.146. Copies of certificates must be presented to the MK SSHO prior to commencing work. Confined space entry procedures shall be implemented by the MK SSHO in accordance with MK IH Procedure 9. An MK Confined Space Entry Permit shall be posted at each work site during permit confined space entry activities. The Base Fire Department shall be notified of the location of confined space entries and expected duration at least two hours in advance of entry by the MK SSHO.

4.4 RESPIRATORY PROTECTION TRAINING

All MK personnel and Subcontractors required to use respiratory protection shall have certified training in respirator use, care and maintenance pursuant to 29 CFR 1926.103 and 29 CFR 1910.134. Each individual shall be medically qualified to wear a respiratory device and have documented evidence of successfully completing respiratory training and fit testing.

4.5 HAZARD COMMUNICATION TRAINING

All personnel shall complete hazard communication training pursuant to 29 CFR 1910.1200 and 29 CFR 1926.59 regarding all potentially hazardous chemicals to which they may be exposed. In the event that the OSHA regulations regarding other contaminants or hazards become applicable, substance-specific training pursuant to the subject regulation will be performed for the affected project personnel.

Each subcontractor shall have a written Hazard Communication Program in accordance with OSHA's Hazard Communication Standard, 29 CFR 1910.1200 and applicable State Department of Health Regulations. Material Safety Data Sheets (MSDS) for all hazardous materials in the work area shall be readily available for employees to review. MSDSs and/or NIOSH Pocket Guides for the contaminants suspected to be in the various work sites will be placed in a site MSDS Right-To-Know Binder. Copies will be maintained at each work site or some location convenient for employees to review plus a copy will be kept at the MK Project Office and the Subcontractor(s) Project Office.

Hazard Communication training will be included as part of the Site-Specific Training required in Section 4.2. When new chemicals are brought onto the work site or new

chemical contaminants are identified, an MSDS and/or NIOSH Pocket Guide will be added to the MSDS Right-To-Know Binder(s) with a corresponding review by the MK SSHO and Subcontractor Job Supervisor(s) and if necessary, training shall be conducted with affected individuals. The MK SSHO has overall responsibility for maintenance of the MSDS database. Subcontractors are responsible for notifying the MK SSHO of new chemicals or substances being used in the work place. Subcontractor Job Supervisor(s) are responsible for reviewing the MSDS, identifying training needs for affected workers and transmitting a copy of the MSDS to the MK SSHO.

4.6 CPR/FIRST AID AND BLOOD BORNE PATHOGENS

At least two employees on each shift shall be qualified to administer First Aid and CPR. At the minimum, the MK SSHO and each Subcontractor shall have at least one person First Aid/CPR qualified. These personnel are also required to be trained to 29 CFR 1910.1030 (BLOOD BORNE Pathogens). Trained First Aid and CPR personnel shall be identified by hard hat stickers or other means of identification.

4.7 DEPARTMENT OF TRANSPORTATION (DOT) HAZARDOUS MATERIALS TRAINING

All personnel required to classify, mark, select packaging, inspect, load and transport hazardous materials must be trained to 49 CFR 172 Subpart H. This includes personnel responsible for packaging of samples to be sent to off site laboratories for analysis. Also included are personnel responsible for completing a hazardous waste or hazardous material manifest and insuring the hazardous waste/material is properly prepared for off site shipment.

4.8 SAFETY MEETINGS

Safety meetings for all MK employees and subcontractors personnel shall be conducted on a weekly basis. This is a group meeting intended to be a self assessment of safety performance and a chance to review any lessons learned as a group, plus an opportunity to introduce specialized training topics. The meeting shall be chaired by the MK General Superintendent and Subcontractor Supervisor(s) with assistance by the MK SSHO and/or Subcontractor designated competent safety person. This safety meeting can also be used to describe any changes in the Site Specific Training described in Section 4.4. Safety Meetings are documented using Figure A-2 from this plan or equivalent.

4.9 PLAN OF THE DAY (POD) MEETINGS

Plan Of The Day (POD) Meetings shall be held at the beginning of each shift to review the planned work of the day as well as any safety and quality concerns. The meeting is

chaired by the MK General Superintendent or MK PM. The attendee's include the Subcontractor(s) Job Supervisor, the MK Quality Control representative, the MK SSHO and other selected personnel. The date, time, personnel attending and meeting minutes shall be documented using Figure A-2 or equivalent.

4.10 QUALITY CONTROL PREPARATORY PHASE INSPECTION MEETING

The MK SSHO shall attend all Quality Control Preparatory Phase Inspection Meetings to discuss any safety and health concerns requiring special attention and to review anticipated safety requirements for a specific definable feature of work, and to review specific air monitoring required.

4.11 RECORDKEEPING

Written records of all required training and meetings shall be maintained on site by the MK SSHO. These records shall be made available to U.S. Navy personnel upon request. Subcontractors to MK shall provide copies of training certifications along with proof of medical surveillance physical and respirator certification to the MK Project Manager or MK SSHO prior to personnel working on site.

5.0
MEDICAL SURVEILLANCE PROGRAM REQUIREMENTS

5.1 SUMMARY

No medical surveillance program is necessary for clean construction work. If respiratory protection is required, personnel shall be under medical surveillance and approved for respirator use.

5.2 DRUG ABUSE PREVENTION PROGRAM

Morrison Knudsen Corporation is committed to the establishment and maintenance of a safe and efficient work environment for all employees free from the effects of alcohol, illegal drugs, other controlled substances, and prohibited items.

5.3 RECORDKEEPING

MK will manage medical surveillance records for MK employee's only. The statements by the examining physician(s) attesting to the medical qualification of individual workers shall be maintained at the project site for both MK and the Subcontractor and will remain a part of the project files. The Subcontractor's are responsible for all medical records management for their direct hire employees in accordance with OSHA 1910.120 and 1926.65.

6.0
PERSONAL PROTECTIVE EQUIPMENT

In addition to engineering controls and administrative controls (e.g. work practices), if necessary, Personal Protective Equipment (PPE) (a.k.a. Chemical Protective Clothing) shall be used to protect personnel from exposure to contaminants which may be encountered during activities on site as warranted. The following guidelines will be followed:

- Respirators and other PPE necessary to protect the health of employees shall be provided by their employer.
- Only NIOSH/MSHA-approved respirators and cartridges shall be used.
- The respirator user's medical status shall be verified by the MK SSHO before work is performed requiring respirator use.
- MK IH Procedure 14.0 shall serve as the written standard operating procedure governing the use of respirators at the job site. Section 10 from MK Safety and Health Program Description for Hazardous Waste Operations shall serve as the written standard operating procedure governing the use of PPE at the job site. Safe Work Practice (SWP) 4.0, found in Section 17 of the MK Safety and Health Program Description shall serve as guidance in chemical protective clothing selection and donning/doffing procedures.
- Respirators will be assigned to individual employees for their exclusive use and marked to indicate to whom it was assigned, for the duration of this project.

Table A-2 presents the basic levels (Level B, C, Modified D, and D) of PPE.

Table A-3 lists the minimum PPE level required for each task or operation. If air sampling/monitoring indicates that modification to the levels of protection are warranted, the MK SSHO is empowered with the authority to authorize the modification based on the guidance provided in **Table A-4**, Airborne Contaminant Response Criteria.

The PPE has been selected based on what is known or anticipated about the site specific hazards. If conditions change, PPE selection and use shall be reviewed by the MK SSHO and the General Superintendent and upgraded or downgraded per their assessment. The MK SSHO shall record the rationale for the modification as a log book entry. Personnel will be trained if necessary on the use and limitations of specific pieces of PPE prior to initiation of work by their designated Supervisors during the Pre-

TLRDWGCL MORRISON-KNUDSEN CORP. EC&E GROUP Drawing Bulletin

4715 HEMLOCK SEMICONDUCTOR PHARO III PHASE II
Area 73 S-73 AIR COOLER,HOST REACTOR MODULE/6TH HO
partment 55 PROCESS

Work Order 4715
Bulletin 98
Issue Date 07/22

Client Ferguson	Drawing # Drawing #	New Issue	Titles	Previous Bulletin	Client Comments
CPY-13544	73-55-2-544	C	PHARO III - S-73 HOST REACTOR VENT ANALYZER SYSTEM MANUFACTURING		

1 Drawing in this Bulletin Letter

Entry Briefs with assistance when necessary from the MK SSHO or General Superintendent.

PPE will be maintained and stored in accordance with the manufacturer's recommendation and good industrial hygiene practices. Personnel will inspect PPE prior to each use to assure the PPE is clean and good working order. Training will be provided to personnel concerning PPE inspection criteria by their supervisors with assistance when necessary from the MK SSHO. The MK SSHO shall conduct evaluations of effectiveness and useability of PPE. Logbook entries are sufficient but the data should be readily transferable to the safety and health project completion report (see Section 13.5).

7.0
MONITORING AND SAMPLING

Air monitoring refers to direct real time reading of airborne concentrations and air sampling refers to time integrated air sampling, either personal or area samples. The MK SSHO will maintain one photo ionizing detector (PID) with 10.2 or 10.6 eV lamp, a supply of colormetric indicator tubes and handpump, and one combustible gas indicator (CGI)/ Oxygen (O_2) meter as described in subsections 7.2.1 and 7.2.3. In addition, the MK SSHO will maintain a sound level meter and dust aerosol meter plus all time integrated air sampling equipment. Execution of real time air monitoring will be coordinated by the MK SSHO in accordance with the requirements for air monitoring depicted in Table A-9. Time integrated air sampling will be completed by the MK SSHO.

7.1 GENERAL

This section describes the air sampling and air monitoring program performed to evaluate project worker exposure to potentially hazardous airborne materials and to evaluate off-site impacts. The air sampling/monitoring results will be used to:

- Assess worker exposure to potentially hazardous materials with respect to the Permissible Exposure Limit (PEL) for Air Contaminants (Title 29 Code of Federal Regulations, Part 1910.1000) or other published exposure levels.
- Assess the adequacy of engineering controls and respiratory protection.
- Delineate areas where controls or respiratory protection is needed.
- Establish work control zones.

7.2 MONITORING

7.2.1 Volatile Organic Compounds

A direct-reading, real-time photo-ionization or flame-ionization detection instrument capable of detecting volatile organic compounds (VOCs) will be used whenever excavation and penetration occurs. Readings will be taken at locations that reflect approximate concentrations of organic vapors and gases in the breathing zone of excavation personnel. Results of the organic vapor and gas monitoring will be documented. If necessary, the level of PPE used by personnel will be modified. The direct-reading real-time organic vapor and gas monitoring equipment will be "response checked" according to the manufacturer's instructions before use each day, and

calibrated yearly by the manufacturer or other qualified personnel. Records of the response check, maintenance, and annual calibration will be maintained on-site.

Colorimetric indicator tubes (e.g., Dräeger tubes) shall be used at the MK SSHO's discretion whenever the PID instrument measures breathing zone concentrations of organic gases or vapors exceeding 5 parts per million (ppm) PID equivalents greater than background concentrations for time period greater than five minutes or as deemed necessary by the MK SSHO. Colorimetric Tubes are used to further characterize the potential exposure. Generally, the frequency of sampling with indicator tubes is driven on the monitoring results of the PID/FID. The following compounds may be measured by colormetric indicator tubes: benzene, toluene, xylene, ethylbenzene, and petroleum hydrocarbons (n-Octane).

7.2.2 Airborne Dust

A direct-reading, real-time instrument capable of detecting airborne dust (such as MIE Miniram) may be used, based on visible observations of excessive dust. Readings will be taken at locations that reflect approximate concentrations of airborne dust in the breathing zone of project personnel. Results of the airborne dust monitoring will be documented. If necessary, the level of PPE used by personnel will be modified or engineering controls enhanced. The direct-reading, real-time monitoring equipment will be "response checked" according to the manufacturer's instructions before use each day, and calibrated by the manufacturer or other qualified personnel yearly. Records of the response check, maintenance, and annual calibration will be maintained on-site. When such monitoring is conducted and the results are greater than 10 mg/m^3 total dust concentrations, immediate steps will be taken to determine the cause modify site operations.

7.2.3 Confined Space Monitoring

Entry into open excavations greater than 5 foot depth shall be considered permit-required confined spaces until monitoring for toxic and physical hazards has determined that the space can be entered without a permit. The logic of classification of confined spaces shall follow the requirements established in 29 CFR 1910.146 Appendix A. Monitoring and hazard evaluation shall be completed by the MK SSHO on either a MK "Non-Permit Required Confined Space Work Form" (Attachment IV, Procedure 9 of IH Procedures Manual) or on a "Confined Space Entry Form" (Attachment VI, Procedure 9 of IH Procedures Manual).

Monitoring must be conducted for (1) oxygen content to demonstrate that available oxygen is greater than 19.5 % and less than 23.5 %, (2) flammable/explosive atmospheres must be less than 10 % of the lower flammable limit (LFL) of potential explosive/flammable gases or dusts that may be present, and (3) toxic gases must be less than either the OSHA PEL or the ACGIH TLV whichever is less or required by law.

Only personnel suitably trained to conduct hazard evaluations of confined spaces will be authorized to conduct monitoring and testing of atmospheres.

7.2.4 Perimeter Monitoring

Perimeter monitoring to evaluate emissions of airborne dust will be performed periodically during soil excavation, as warranted. When such monitoring is conducted and results are greater than 1.0 mg/m^3, immediate steps will be taken to determine the cause, modify site operations, evacuate unprotected personnel and the public if necessary, and notify agency contact personnel.

7.2.5 Noise Monitoring

Noise monitoring will be performed, as warranted, at the initiation of each task or operation to determine the sound levels associated with the particular task or operation. Sound levels will be determined at locations that best approximate the sound levels at the ear of potentially affected personnel. Noise monitoring equipment will be "response checked" according to the manufacturer's instructions prior to use each day, and calibrated by the manufacturer or other qualified personnel yearly. Records of the response check, maintenance, and annual calibration will be maintained on-site.

7.2.6 Heat Stress and Cold Stress Monitoring

When temperatures at the site are above 65°F, the wet bulb globe temperature (WBGT) may be used to monitor the potential for heat stress. Work/rest periods will be adjusted according to the guidelines stated in the current edition of *ACGIH Threshold Limit Values for Chemical Substances and Physical Agents*. When the clothing worn differs from the ACGIH standard ensemble such as in the case of workers wearing semipermeable or impermeable clothing, guidelines established in the NIOSH/OSHA/USCG/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, Section 8 should be consulted. The following is a summary from that document.

When employees are required to wear impermeable chemical protective clothing in temperatures exceeding 70°F, employees shall use the "buddy system" to monitor each other's pulse rate at the start of each rest period. If the pulse rate exceeds 110 beats per minute, the next work period shall be shortened by one-third without shortening the rest period. The pulse rate shall be monitored again at the beginning of the next rest period and if the pulse rate exceeds 110 beats per minute, the work period shall again be shortened by one-third. No employee shall be permitted to continue working in PPE if his or her pulse rate exceeds 110 beats per minute continuously. Table A-5 can be used to establish work/rest periods and the frequency of monitoring pulse rates.

Guidelines for the prevention of cold stress and cold stress TLVs shall follow the guidelines stated in EM-381-1-1 Section 06.J and the current edition of *ACGIH Threshold Limit Values for Chemical Substances and Physical Agents*. At air temperatures below 50°F, the air temperature and wind speed shall be monitored by the MK SSHO qualitative assessment of cold stress risk shall be made by comparing wind speed and actual temperature to the assigned equivalent chill temperature depicted on Table A-2 in the Cold Stress section of the ACGIH booklet. Unless there are unusual or extenuating circumstances, cold injury to other than the hands, feet, and head is not likely to occur without the development of the initial signs of hypothermia. These symptoms are described in Section 2.5.3. The use of extra insulating clothing and/or reduction of the exposure period are among the special precautions which should be considered.

Cold weather clothing requirements shall follow the guidance listed in Section 06.J.09 of EM-385-1-1. If work is performed continuously in the cold at an equivalent chill temperature or below 20 °F, heated warming shelters shall be made available nearby the work area and the workers encouraged to use these shelters at regular intervals. A cold weather work/warm-up regimen shall be established when outside ambient temperature is less than a -15 °F in accordance with Table A-3 of the ACGIH booklet in the Cold Stress section.

7.3 AIR SAMPLING

Non anticipated as necessary for construction activities.

7.4 AIR MONITORING AND SAMPLING REQUIREMENTS

Air monitoring and sampling requirements are shown in Table A-6.

7.5 RECORDKEEPING AND CHAIN OF CUSTODY

Written records of all monitoring will be maintained on site and affected employees will be notified of monitoring results representative of their exposure. For industrial hygiene sampling requiring collection and shipment of a sample to an approved analytical laboratory, Chain-of-Custody forms will be properly completed and accompany all collected samples in accordance with MK Industrial Hygiene Procedures Manual, Procedure 7.0, titled Analytical Laboratory Procedures.

8.0
GENERAL SAFETY RULES AND PROCEDURES

8.1 GENERAL

Operations shall be conducted in a safe manner consistent with the policies and procedures outlined in this SSHP. All project and subcontractor personnel assigned to this project are responsible for following this SSHP unless modified in the subcontracting special conditions document, for using safe practices, and for wearing the PPE specified by the MK SSHO. Project personnel shall report hazards and unsafe conditions and practices to the MK SSHO. All federal, state and local occupational health and safety regulations must be complied with by project personnel. Violations of project procedures may include disciplinary measures up to and including termination.

8.2 RULES AND PROCEDURES

- The Subcontractor shall have available two 20-lb rated ABC multipurpose dry chemical fire extinguishers; first aid kit including CPR kit (Pocket Mask) and biohazards control kit; emergency eyewash; and spill response equipment (where necessary) available at every controlled work location.

- Avoid driving over dry grass that is higher than the ground clearance of the vehicle. Catalytic converters on the undercarriage of vehicles are sufficiently hot to ignite dry prairie grass. Never allow a vehicle with a warm undercarriage to sit in a stationary location over dry grass or other combustible materials.

- Do not eat, drink, smoke, take medications, chew gum or tobacco, or put objects in mouth while working in a potentially contaminated area, when working with hazardous materials or when handling samples.

- After handling samples, thoroughly wash hands and, if necessary, face, before eating or putting anything in mouth (i.e., avoid hand-to-mouth contamination).

- At a minimum, wear hard hats, safety glasses and steel-toed boots when inside the work boundaries.

- Remain a safe distance from the excavation equipment when not involved in operation or monitoring activities.

- Do not under any circumstances enter or ride in or on any backhoe/excavator bucket, materials hoist or any other device not specifically designed for carrying human passengers.

- Remain aware of your own and other's positions with regard to rotating equipment and be extremely careful when assembling, lifting and carrying items that may cause pinch point injuries and collisions.

- Be alert to the symptoms of fatigue, heat stress and cold stress and their effect on the normal caution and judgment of personnel.

- Use explosion proof sampling equipment and tools if conditions dictate.

- Use ground fault circuit interrupters (GFCI) with all electrical tools and equipment.

- Stand clear of trenches during excavation. Always approach the excavation from upwind.

- Stand upwind, whenever possible, of excavations and other sites where the soil has been disturbed.

- Be alert to potentially changing exposure conditions as evidenced by perceptible odors, unusual appearance of excavated soils, oily sheen on water, or other evidence of possible contamination.

- Do not enter any excavation or trench greater than five feet in depth unless authorized by the MK SSHO.

- Keep hand tools off the ground and centrally located on a plastic cover or area of no contamination whenever possible to avoid tripping hazards and the spread of contamination.

- Use the buddy system at all times while working at the site in controlled work zones.

- Minimize truck tire disturbance of all stabilized sites and areas beyond the work area boundaries.

- Cease all work operations on the site at sunset unless the control zone is adequately illuminated with artificial lighting.

- Subcontractor Job Supervisors shall attend the POD meeting prior to the start of the work and conduct pre and post entry briefs with all affected workers. All personnel shall sign and record the time in and out of all Exclusion Zones.

- Avoid direct contact with contaminated materials unless necessary for sample collection or required observation. PPE shall be worn at all times, as required.

- Remove disposable clothing and follow decontamination procedures.

- Always use an appropriate level of personal protection as assigned in this SSHP. Lesser levels of protection can result in otherwise preventable exposure.
- Establish prearranged hand signals or other means of emergency communication when wearing respiratory equipment, since this equipment impairs speech communication.

- Wear hearing protection if you have to shout to communicate at a distance of three feet in steady-state (continuous) noise or when you expect loud impact noise from certain activities. The MK SSHO will assess potential noise exposure and provide recommendations on correct hearing protection devices.

9.0
WORK ZONES

Where a potential for worker exposure to potentially hazardous substances and physical hazards, work zones will be established and the flow of personnel and equipment will be controlled. The establishment of work zones will ensure that personnel are properly protected against hazards present in the work area, work activities and contamination are confined to the appropriate areas, and personnel can be located and evacuated in an emergency.

The first step in mobilization will be to define the work area configuration. Since this area is a non-potentially contaminated area (virgin soil), defining the exclusion, contamination reduction and support boundaries will not be necessary, however, the work area boundary, site grading benchmarks, and control points will be established. After the work area configuration is defined, the access routes will be established. The list of emergency phone numbers and route map to the hospital shall be posted within the construction area near access to the field office telephone.

9.1 EXCLUSION ZONE (EZ)

None anticipated as necessary.

9.2 CONTAMINATION REDUCTION ZONE (CRZ)

None anticipated as necessary.

9.3 SUPPORT ZONE (SZ)

No designation necessary for clean construction work.

9.4 CONSTRUCTION ZONE

The Bioremediation Facility construction zone consists of all areas within the immediate construction area of the Bioremediation Facility. This area represents all new clean construction work prior to start-up operations.

9.5 WORK ZONE CONTROLS

Before site operations begin, the MK site office and Subcontractor offices shall be identified with signs identifying as such.

Entrances to the Bioremediation Facility Construction Zone will be conspicuously posted with signs by the Construction Subcontractor stating the following:

CONSTRUCTION AREA KEEP OUT
DANGER
AUTHORIZED PERSONNEL ONLY

10.0
PERSONNEL AND EQUIPMENT DECONTAMINATION AND HYGIENE PROCEDURES

All personnel, clothing and equipment suspected of being contaminated shall be inspected and, if necessary, decontaminated to remove any potentially harmful substances that may have adhered to them. Some equipment/clothing may be disposed of rather than decontaminated. In this case, the used PPE and/or equipment (e.g. disposable sampling equipment) will be stored in properly marked, plastic lined 55-gallon drums.

10.1 EQUIPMENT DECONTAMINATION

All equipment/tools used in the construction zone will be inspected for contamination prior to removal from the site. Any equipment/tools with visible contamination will be cleaned prior to removal from the site. A water and detergent solution will be used for highly contaminated equipment, followed by a high-pressure water rinse if necessary. All water used during decontamination will be contained for disposal.

10.2 WASHING FACILITIES

A hand and face washing facility shall be made available in the work area consisting of water, towels and soap for personnel.

10.3 DECONTAMINATION WASH WATER

Equipment and personnel decontamination areas will be designed to allow for collection of all wash/rinse waters into 55-gallon drums or a larger temporary storage container.

10.4 SANITATION AND PERSONAL HYGIENE

Adequate toilet, hand washing and lunchroom facilities free of contaminants shall be made available by the MK.

11.0
ON-SITE FIRST AID AND EQUIPMENT

11.1 FIRST-AID AND MEDICAL FACILITIES REQUIREMENTS

At a minimum, 16-unit first aid kits shall be maintained by MK in their office trailer and each of the Subcontractors shall maintain a first aid kit at their office trailer and have sufficient supply of kits for each of the work sites. The location of the first aid kit shall be communicated to project personnel as part of the site-specific and pre-entry brief training. Included with the first aid kit shall be a CPR Pocket Mask and a biohazards control kit (universal precautions and clean up kit). The MK SSHO can require upgrades to the first aid equipment requirements as deemed necessary for this job (e.g. insect repellants and sunscreen).

11.2 REPORT OF FIRST AID CASES

All first aid cases, accidents and incidents shall be promptly reported to the MK SSHO. The MK SSHO shall immediately notify the Navy Technical Representative (NTR) or the Navy Resident Engineer in Charge of Construction (REICC) of all injuries even if preliminary information is available. The MK SSHO and MK PM shall follow the guidance presented in Program Procedure PHSP-04.1. The MK Charleston Project Management Office (PMO) should be notified shortly after notification to the Navy's designated authority. If an on-site official cannot be reached, the MK Charleston PMO still should be promptly notified at (803) 554-0100.

A written report of the injury must be provided to the ROICC or REICC and MK Charleston PMO within 24 hours of the incident via memo form. This report is to include as attachments:

a. Employer's First Report of Injury (Workman's Comp Insurance Form)
b. Supervisor's Accident Investigation Report (MK Form CAS 24/77)
c. Accident Data Report (MK Form 6783/91)
d. Any records provided by the Medical Service Provider such as 1) Hospital Emergency room Report, 2) Examining Physician's designation of work restriction, and 3) Examining Physician's Work Release.

12.0
EMERGENCY RESPONSE PLAN AND CONTINGENCY PROCEDURES

This section describes a contingency plan to be implemented in the event of injuries, illnesses, accidents, and fires. The contingency plan provides guidelines for the proper response to emergency situations, however the actual response will depend on the situation.

In the event of an emergency, the MK SSHO, MK General Superintendent and/or Subcontractor Job Supervisors will direct all personnel to take appropriate action which could include any or all of the following:

- Evacuate all personnel involved to a safe place of refuge.
- Notify emergency services using phone numbers identified in Table A-1.
- Initiate emergency response action.

12.1 PRE-EMERGENCY PLANNING

During mobilization activities for this project, the MK Project Manager, MK General Superintendent and the MK SSHO shall review the Program Procedure PHSP 02.1 and execute the steps necessary to assure effective emergency response requirements and resources are established for this project.

In addition to the guidance provided in this document and the preconstruction meeting, all safety meetings and pre-entry briefs shall include emergency response preplanning specific to each task and work site as a topic area. This training will include:

- Assembly Points. If the work activity may result in a release of hazardous substances, more than one assembly point will be specified to ensure that at least one upwind assembly point is accessible. This also pertains to fires and sites subjected to adverse weather conditions.

- Emergency Response Coordinator. The MK SSHO, as the onsite emergency response coordinator, will contact the emergency response providers, account for individuals at the assembly point, and plan the appropriate response.

- Evacuation Routes. Routes will be specified as needed.

- Means of Evacuation. The number of personnel that may be evacuated from the work site by various routes will be evaluated by the MK SSHO.

- Means of Communication. This will include the means of alerting personnel to an emergency at all points in the work site and should consider the sound -

screening potential of hearing protection, distance and noisy equipment when specifying the use of alarms, horns and sirens. The means of communication with emergency response providers will be considered.

- Designation of a location for first aid services, fire extinguisher(s) and spill control equipment.

- Procedures to be followed by employees who remain to manage critical operations to insure safe shutdown.

12.2 RESPONSIBILITIES

The following is a description of personnel roles, lines of authority, and the emergency response communication/notification responsibilities for site personnel.

12.2.1 Project Personnel

It is the responsibility of all project personnel to recognize conditions that have the potential for resulting in a personal injury or damage to property, and to report the condition immediately to their supervisor or the MK SSHO.

12.2.2 Project Manager

The Project Manager is responsible for assuring adherence to the administrative elements and implementation of the Emergency Response Plan (this section of the SSHP). He will evaluate the site's preparedness for emergency responses and identify special conditions which may require additional preparations. He will ensure that necessary equipment and facilities are provided to support this plan.

12.2.3 MK Certified Industrial Hygienist (CIH)

The CIH is responsible for preparing the Emergency Response Plan (this section of the SSHP). The CIH will develop and review the Emergency Response Plan, evacuation plans, and oversee implementation at the site. The CIH will ensure that supervisors and employees meet the training requirements of the plan and approve the equipment used in the plan. The CIH may designate duties on site to the MK SSHO.

12.2.4 MK Site Safety and Health Officer (SSHO)

The MK SSHO is responsible for directing response actions to emergency situations. He will coordinate with project management to ensure the availability of response equipment and supplies, and initiate drills. Emergency response plans will be evaluated over the course of the project by the MK SSHO to keep them up-to-date and to ensure that they are applicable and relevant to emergency response organizations.

12.2.5 Subcontractors

All MK and Subcontractor personnel will comply with the provisions of this plan and participate in training as required to implement response procedures. All personnel will be cognizant of their work areas and notify their supervisors and the MK SSHO of hazards at the site.

12.3 EMERGENCY RECOGNITION AND PREVENTION

Site personnel shall be apprised of hazards and life-threatening emergency situations during site-specific training to include the project kickoff site specific training, safety meetings and briefs. Means to control hazards and mitigate emergency situations will be addressed at that time.

12.4 SAFETY ZONES

Suitable assembly points will be established at the start of the project for each work site. These assembly points will provide a safe point of refuge for site personnel. Additional information will be provided in the site briefing concerning other hazards that may arise at the site.

12.5 SITE SECURITY AND CONTROL

At all times, site personnel working in an area in the near vicinity of an emergency situation shall be apprised of the emergency as soon as possible. Only authorized personnel shall be allowed into the emergency area. As necessary, the emergency area may be cordoned off and access restricted by MK and the Subcontractors.

12.6 EVACUATION ROUTES

Evacuation routes will be established based on scope of work, location of work and atmospheric conditions. Evacuation routes shall be posted in various locations on the site if necessary. All site personnel will be made aware of evacuation procedures during site-specific training especially pre entry briefings. Topography, layout and prevailing wind conditions shall be considered in establishing evacuations routes and assembly points.

12.7 EMERGENCY MEDICAL TREATMENT AND FIRST AID

See Section 11.

12.8 COMMUNICATIONS

The MK SSHO, the MK General Superintendent and the Subcontractor Job Supervisor(s) at each work site area shall be equipped with two-way radios for communications on site as warranted. Emergency Communications equipment will be provided by MK. Additional communications with outside emergency services will be accomplished through the use of cellular telephones if necessary. Both two way radios and cellular phones are to be used for emergency's only. In the radios will be used for standard field construction communication, then the MK SSHO shall establish strict protocols for radio communication and insure all personnel who carry radios understand the protocols.

12.9 CRITIQUE OF RESPONSE AND FOLLOW-UP

All actual emergencies shall be critiqued and follow-up corrective actions shall be implemented as needed. Drills and exercises if completed shall also be critiqued. The critique will be conducted as part of a safety meeting first by supervisory personnel and second with all MK and Subcontractor personnel.

12.10 INITIAL REPORTING AND MANAGEMENT OF INCIDENTS

All emergencies will be promptly reported to the Emergency Response Number x3300, the Environmental Department (x1132, x3114, or x6160), and to the MK SSHO at 812-854-6941 or portable radio Unit 0004. The MK SSHO will assure that the Navy designated authority is notified promptly and directing initial emergency response actions until the arrival of the NSWC Crane designated authority. The designated authority can include the resident officer in charge of security, fire department and/or ambulance services or the Environmental Protection Department Manager.

The following contains the initial response actions to be taken by MK personnel and subcontractors at the work site for the type of incident incurred.

A. Incident Type: Fires in Vehicles and Mobile Equipment, Process Equipment, and Support Structures.

Response Actions:

1. Notify the NSWC Crane Security Desk at extension 3300, and provide the following information:

    a. The name and phone number of the person making the call.
    b. The location of incident.
    c. The type of incident.
    d. Injured or trapped personnel and any potential material release.

2. MK SSHO or Supervisor designates one person to meet the emergency response units at the nearest road where the units will be approaching.

3. MK SSHO or Supervisor assumes initial command of the situation and directs personnel to do one of the following:

   a. Emergency shutdown of process equipment or mobile equipment, evacuate the work zone or immediate area to a safe place of refuge, meet the incoming response units and provide all available information.

   b. Initiate first fire attack and knockdown using available fire extinguishing equipment followed by evacuating the work zone or immediate area.

B. Incident Type: Preparation for Adverse Weather Condition to Include High Winds, Tornado, Heavy Rains, Snow and Ice Conditions.

Response Actions:

1. MK SSHO or Supervisor notifies the NSWC Crane Security Desk at extension 3300 and provides the following information:

   a. The name and phone number of the person making the call.
   b. The location of the work site(s).
   c. Preparation for adverse weather condition has begun.
   d. Permanent structure location where personnel will be relocating to on Base.

2. MK SSHO or Supervisor will direct personnel to shutdown operations, secure loose materials, and park and secure mobile equipment. Personnel shall be directed to report to a permanent building after completing decontamination procedures.

3. MK SSHO or Supervisor will complete accountability and await clearance from Base Security to resume operations or other action.

C. Incident Type: Medical and Rescue Emergencies.

Response Actions:

1. Notify the NSWC Crane Security Desk at extension 3300 and provide the following information:

   a. The name and phone number of the person making the call.
   b. The location of incident.
   c. The type of incident.

d. Injured or trapped personnel and any exposure to hazardous material.

2. MK SSHO or Supervisor designates one person to meet the emergency response units at the nearest road where the units will be approaching.

3. MK SSHO or Supervisor assumes initial command of the situation and completes or directs personnel to do one or both of the following:

   a. Emergency shutdown of process equipment or mobile equipment and any other necessary action to mitigate or control the incident.

   b. Initiate emergency first aid actions until arrival of emergency units.

13.0
LOGS, REPORTS, AND RECORDKEEPING

13.1 SAFETY AND HEALTH LOGBOOK

The MK SSHO shall maintain a Project Safety and Health Logbook for the duration of work activities at the site. Entries in the logbook shall be time sequenced. The entries must be written in ink and the bottom of each page must be signed. The logbook shall be hard bound. No pages will be removed from the log book. Corrections must be lined out and initialed. The logbook will contain specific information recorded on a daily basis utilizing the Form shown in Figure A-3. The logbook will contain specific information on safety and health activities and to further describe or clarify information recorded on Figure A-3.

A separate file folder shall be maintained for Figure A-3. Separate file folders shall be established for this SSHP; calibration data sheets if not attached to Figure A-3; safety and IH instrument serial numbers and shipping papers; field specific safety and health procedures; all safety and health related permits; and weekly safety inspections. Records of training and site orientations; briefings including pre entry briefs; and Subcontractor prepared equipment inspection sheets shall also be maintained in file folders by the MK SSHO. In addition, the MK SSHO shall copy and file all receipts for MK equipment rentals and consumables upon delivery to the site and the inventory shall be verified as acceptable.

13.2 REPORTS

A weekly site safety and health inspection report shall be prepared by the SSHO. This report shall identify work activities, safety and health-related deficiencies, and corrective measures. As a minimum, the checklist shown in Figure A-4 shall be completed by the MK SSHO. All near miss incidents and incidents that result in property damage, personnel injuries or illness will be investigated and notification/reporting requirements shall be followed in accordance with PHSP 04.1.

13.3 FIELD MASTER COPY OF SSHP

The MK SSHO shall maintain a field master copy of this SSHP document to include all redlines changes and FCRs. This copy shall be properly filed with project records at the completion of the project to be sent to MK PMO office in Charleston.

13.4 RECORDKEEPING

The MK SSHO shall maintain records of all injuries and illnesses for MK employees only incidental to the work in accordance with 29 CFR 1904, including copies of the

Worker's Compensation First Report of Injury. Accidents and Incidents data reporting requirements shall be managed in accordance with Program Procedure PHSP-04.1 for both MK and Subcontractor personnel as stated in Section 11.3.

The MK SSHO shall receive copies of all records for injuries and illnesses of Subcontractors incidental to the work, including copies of the Worker's Compensation First Report of Injury. These records will be maintained on the Subcontractors OSHA 200 Log. Per the contract General Conditions (GC) 13(c), the Subcontractor shall provide a monthly project safety review form and attach with it a copy of its OSHA 200 Log specific to this project. The MK SSHO shall insure that information on Subcontractor exposure hours is provided to the MK SouthDiv Health and Safety Manager on a monthly basis. A record of all first aid treatments not otherwise recordable shall be maintained and furnished to MK or the Navy's designated authority upon request. Monitoring and sampling results shall be managed as stated in Section 7.5 of this plan.

13.5 SAFETY AND HEALTH PROJECT COMPLETION REPORT

The MK SSHO shall complete a safety and health project completion report at the conclusion of the field work. The purpose of the report is to a self assessment summarizing effectiveness of the safety and health program implemented in the field; lessons learned and suggestions for program improvement; accident and incidents; air monitoring and sampling results including ratings on instrument useability; and how well the original prepared AHA worksheets reflected field conditions. The report shall be directed to the MK SouthDiv Program Health and Safety Manager within ten working days after project demobilization.

14.0
ON-SITE WORK PLANS

A Site-Specific Work Plan of which this document is designated Appendix A was developed to define the work tasks and identify the work objectives. The means and personnel required to complete the task is identified along with consideration for methods, logistics, quality control/assurance and resources.

15.0
COMMUNICATION PROCEDURES

15.1 RADIO COMMUNICATION, TELEPHONE, ALARMS AND DRILLS/EXERCISES

Refer to Section 12.10 of this Plan. Cellular telephones shall be selected as a secondary choice of emergency communication. An emergency alarm, such as an air horn, shall be available if necessary at each major work site to warn personnel of an emergency. Personnel shall be trained on what actions they are to take if the alarm is sounded to include evacuation routes and assembly points. Drills and exercises shall be conducted to ensure that communication methods are adequate. The MK SSHO will test the two way communication for confirmation of emergency communication using NSWC Crane protocols.

16.0
SPILL CONTAINMENT PLAN

16.1 GENERAL

Spill and release accident scenarios during remediation could occur and involve residue process material and reinstates from decontamination activities. The following information will be used by project personnel to respond to and mitigate any releases on the project site.

In the event of a spill or release, the MK SSHO, MK General Superintendent and/or Subcontractor Job Supervisors will direct all personnel to take appropriate action which could include any one or all of the following:

- Initiate spill response action and notify emergency services.
- Notify emergency services as identified in Table A-1.
- Evacuate the work zone to a safe place of refuge.

16.2 PREPLANNING FOR SPILL CONTROL

Remedial construction activities will be reviewed for release potential and the capability of on-site personnel to adequately respond. Base personnel will be contacted to determine their capability to respond to various releases. All aspects of the Emergency Response Plan as described in Section 12, will be reviewed by site personnel to ensure adequacy and that resources are available.

During mobilization activities for this project, the MK Project Manager, MK SSHO, MK General Superintendent shall review the Program Procedure PHSP 03.1 and the Base Oil and Hazardous Substances Spill Contingency Plan. After review, they shall execute the steps necessary to assure effective spill response planning requirements and resources are established for this project.

MK will cooperate with the base; other site contractors; and federal, state and local directors of emergency preparedness and response to ensure a coordinated effort in preparing for a spill emergency, with response plans that are compatible and integrated. Prior to the start of work, MK will review PHSP 03.1 and meet with site representatives on spill control and assure the SSHP is consistent with site requirements for spill control. Specific roles and responsibilities will be reviewed for MK and Navy personnel. The Base Fire Department will be notified of any spills classified above incidental and will assist in spill containment. The Base Response Team (SRT) will provide overall command and control of the clean-up activity for spills classified above incidental until relieved by a higher authority.

16.3 SPILL AND FIRE CONTROL MATERIALS AND EQUIPMENT

When planning to move or handle drums (or other containers) containing hazardous or special waste materials, the following shall be kept available in areas where spills, leaks or ruptures may occur: 1) salvage drums or containers (approved by the U.S. Department of Transportation); 2) suitable quantities of proper absorbent materials; 3) portable containing material; 4) neutralizing agents; and 5) fire extinguisher(s).

Drums and containers used during a clean-up will be appropriate to the hazardous substances they are meant to contain, and will meet the regulations promulgated by DOT, 49 CFR Parts 171-179, OSHA, 29 CFR 1910.120, and EPA 40 CFR 262. Drums and containers will be inspected for defects and their integrity assured prior to being filled with any non-solid hazardous or special waste substance.

A spill of material can be contained with porous or absorbent barriers. Absorbent materials can take several configurations (pillows, sheets, booms, loose chips, particle beads, and fibers) that may be set in place, or scattered by hand. Preferred sorbents are inert nonreactive clay minerals (neutralizing agents may be added), or specific formulations which provide automatic neutralization or vapor control.

16.4 SPILL CONTROL MEASURES

Stopping the leak or spill at its source may involve turning off pumps or closing valves. Returning a container to an upright position, transferring wastes to other containers, or moving containers to less dangerous locations may, in some circumstances, be possible, but should not be attempted if the identification of the substance is not known unless Level A PPE Protection is worn and decontamination stations have been established. Similarly, the patching of an active leak is not advised until an initial "Size-Up" of the situation is made and guidance established in Section 16.6 has been followed.

16.5 DRUM, CONTAINER, AND TANK HANDLING AND MOVING PROCEDURES

Drums, containers, and/or tanks of hazardous or special waste substances will not be moved until the requirements for preparations described in a task work plan and SSHP have been completed (i.e., all required equipment and materials are at the work site ready for use, and the employees have been familiarized with their responsibilities, the emergency response procedures, and the potential hazards associated with the contents of the drums and containers).

Work site operations will be organized to minimize the amount of drum or container movement. Each drum or container will be inspected before it is moved to ensure that it can be handled without suffering a rupture or puncture, and relocated without having the contents spill or leak.

Unlabeled or unmarked drums and containers will be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled. Drums and containers under pressure, as evidenced by bulging or swelling, will not be moved until such time as the cause for excess pressure is determined and appropriate containment procedures have been implemented to protect employees from explosion.

Equipment used to handle the drums and containers will be selected, positioned, operated, and maintained to minimize any contact that could rupture, puncture, dent, or drop drums and containers holding hazardous or special waste substances, and the potential for equipment ignition sources to ignite vapors released from ruptured drums or containers shall be controlled.

Drums and containers that cannot be moved without rupture, leakage or spillage will be transferred to a sound container using a device specified for the material being transferred. During liquid transfer of flammable or combustible liquids, bonding and grounding equipment shall be utilized.

16.6 INITIAL REPORTING AND MANAGEMENT OF INCIDENTS

All spill emergencies classified above incidental shall be promptly reported to the Emergency Response Number x3300, the Environmental Department (x1132, x3114, or x6160), and to the MK SSHO at 812-854-6941 or portable radio Unit 0004. The MK SSHO will assure that the Navy's Technical Representative (NTR) or ROICC is notified promptly.

Incidental Release (defined) - a release of hazardous material where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area, or by maintenance personnel. In addition, the quantity of released material does not exceed EPA Reportable Quantities.

The MK SSHO, the MK General Superintendent and the Subcontractor Job Supervisor(s) are responsible for directing initial emergency response actions until the arrival of the NSWC Crane designated authority. The designated authority can include the officer in charge of security, fire department and/or ambulance services.

The following contains the initial response actions to be taken by MK personnel and Subcontractors at the work site for spill and release emergencies:

Response Actions:

1. Classify spill as Incidental or an Emergency.

2. If Incidental (as defined above): 1) notify immediate supervisor; 2) assess hazard potential, establish precautions and PPE requirements; 3) begin clean-up of spill.

3. If Emergency, initiate response action in accordance with the following steps:

   A. Quickly assess probability of safely stopping spill. If physical, chemical, or biological health hazards exist, immediate evacuate the area to a safe distance upwind and upgrade from the spill.

   B. Notify the **Crane Security Desk at X 3300** and provide the following information:
      1. Name and phone number of person calling;
      2. Location of incident;
      3. Type of incident;
      4. If anyone is injured or trapped and the estimated volume of material released.

   C. MK SSHO, MK PM or Subcontractor Job Supervisor(s) designates one person to meet the emergency response units at the nearest road where the units will be approaching.

   D. MK SSHO, MK PM or Subcontractor Job Supervisor(s) assumes initial command of the situation and directs personnel to do one of the following:

      1. Emergency shutdown of process equipment or mobile equipment, evacuate the work zone or immediate area to a safe place of refuge and meet the incoming response units and provide all available information.

      2. Initiate initial spill response using available spill response equipment only for small emergency spill events where personnel are trained to mitigate. Evacuate the work zone or immediate area if there are any health threats or risks to personnel.

3. MK's PM or designee shall immediately notify the Navy's Designated Authority and the MK PMO. The Navy's Designated Authority is the ROICC assigned to this project.

17.0
CONFINED SPACES

Permit-required confined space entry is not anticipated on this project. If entry is required in an excavation that is greater than 5 feet in depth, the excavation must be treated initially as a permit-required confined space. Atmospheric monitoring must be completed before the excavation can be downgraded to nonpermit-required confined space. Engineering controls must be in place to safeguard the excavation from collapse. Any confined space entry must follow MK Procedure 9.0 found in the Industrial Hygiene Procedures Manual (MK 1994a).

TABLES

Table A-1 Personnel Names and Telephone Numbers

Contact	Person or Agency	Telephone
Fire Department	**NSWC Fire Department (Base)**	**3300 emergency** **(812) 854-1235**
Ambulance Service	**NSWC Ambulance (Base)**	**3300 emergency** **(812) 854-1100**
Law Enforcement	**NSWC Security (Base)**	**(812) 854-3318**
Robert Hlavacek	MK Program Manager (MK PMO)	(803) 554-9367
Martin Wilson	MK Field Operations Manager	(803) 554-6003
Steve Downey/**Dave Beall**	MK Site Project Manager	Office: (812) 854-6941
Wally Metcalf	MK Site Superintendent	Office: (812) 854-6941
Richard Spurgeon	MK Site Safety and Health Officer	Cellular: (812) 639-8356 Unit 0004 radio
Don Miller	MK Project Engineer	Office:(216) 523-2121
Randy Smith/**Lois Bigley**	MK Site Quality Assurance/Quality Control Supervisor	Office: (812) 854-6941
William Piispanen	MK Health and Safety Program Manager	(208) 386-5930
Cmdr. Fred Smith	NSWC Crane PWD/Eng. Dept	(812) 854-1834
Capt. J.M. Carney	NSWC Base Commander	(812) 854-1210
Jim Hunsicker or ~~Tom Brent~~ **Chris Freeman**	NSWC Environmental Protection Services	~~(812) 854-6160~~ **(812) 854-4423**
Adrienne Townsel-Wilson	SOUTHNAVFACENGCOM	(803) 743-0582
Brent Robertson	ROICC(NTR)	(812) 854-3318
Lt. Dale Eads	NSWC E.O.D. (Base)	(812) 854-3456
Dale Groh	NSWC Safety Directory	(812) 854-3601
Poison Control Center	Poison Control Center	(800) 942-5969
National Response Center	National Response Center	(800) 424-8802
Regional USEPA	USEPA (Region 5) Emergency State of Indiana Emergency	(312) 353-2318 (317) 233-7745

Table A-1 Personnel Names and Numbers (continued)

Contact	Person or Agency	Telephone
Hospital	NSWC Base Medical Facility Head Nurse (Mary Muessig)	(812) 854-1220 (812) 854-4319
Hospital	Bedford Medical Center 2900 West 16 th Street Bedford, IN 47432	(812) 275-1200
Hospital	Bloomington Hospital 601 West Second Street Bloomington, IN	(812) 336-9515
Utility Locator Service	Public Works Dept.	(812) 854-1834

Directions to NSWC Medical Department On-site:

The NSWC Fire Department coordinates the on-site ambulance service. The Medical Department is located in Building 12, off of H-2 just north of H-5.

Directions to Bedford Medical Center:

From Main Gate, head east on Highway 58 to the city of Bedford, then turn left onto 16th Street. Distance to hospital is approximately 20 miles. From Bedford Gate, head east on 158 to the City of Bedford. 158 turns into 16th Street.

Directions to Bloomington Hospital:

Exit NSWC Crane on H5-45 through the Bloomington Gate, then follow Highway 45 North to Bloomington. At the intersection of Highway 45 and Highway 37, continue straight ahead over the bypass (Bloomfield Road), and follow Bloomfield Road north until it becomes 2nd Street. Continue on 2nd Street and the hospital will be on right-hand side of the road.

Note: MK SSHO is to ensure this Table and Figure A-1 are included with the Soil Excavation Maps posted at the job site. In addition, the Table and Figure must be posted at each office location.

Notify the MK SSHO of any changes in work conditions which may affect the health and safety aspects of the task. The Superintendents or designated supervisors are responsible for conducting Plan-of-the-Day meetings, Pre-Entry and Post-Entry Briefings were necessary, weekly safety meetings, and conducting or ensuring that other training is completed.

Table A-2 Selection of Personal Protective Equipment				
PPE	Level D	Modified Level D	Level C	Level B
Coveralls or other approved working apparel	Yes	Optional	Optional	Optional
Chemical-resistant clothing (coveralls; hooded, one- or two-piece chemical-resistant coveralls)		Yes		
Chemical-resistant clothing (coveralls; hooded one- or two-piece chemical splash suit; chemical-resistant hood and apron; disposal chemical-resistant coveralls)			Yes	
Chemical-resistant clothing (coveralls and long-sleeved jacket; one- or two-piece chemical splash suit; disposal chemical-resistant one-piece suit)				Yes
Boots, leather or chemical resistant, protective toe and steel shank meeting ANSI Z41.1 (29 CFR 1926.28(a).	Yes			
Boots (inner), chemical resistant, protective toe and shank meeting ANSI Z41.1 (29 CFR 1926.28(a)).		Yes	Yes	Yes
Boot covers (outer), chemical resistant (disposable)		Optional	Optional	Optional
Safety glasses or chemical splash goggles, meeting ANSI Z87.1-1979 for "Industrial Safety Glasses"	Yes	Yes	Yes	
Face shield	Optional	Optional	Optional	Optional
Gloves (cotton/leather)	Optional			
Gloves (inner), chemical resistant or liners		Optional	Yes	Yes
Gloves (outer), chemical resistant		Yes	Yes	Yes
Long underwear		Optional	Optional	Optional
Hardhat	Yes	Yes	Yes	Yes
Positive pressure, full-facepiece with nose cup, self-contained breathing apparatus (SCBA) or positive pressure, supplied-air respirator with escape SCBA (MSHA or NIOSH approved) (Note: escape SCBA may not be required)				Yes
Air-purifying respirator, half-face or full face with suitable cartridge (MSHA or NIOSH approved)			Yes	

Note: Optional requirements to be determined by the MK SSHO based on additional evaluation of site conditions and hazards analysis. Note: safety glasses not required when wearing full-face APR.

Table A-3 Minimum Personal Protective Equipment Requirements by Task		
Site	Activity	PPE
Construction of Bioremediation Facility	1. Site preparation, construction and **installation** of equipment	1. Level D, modified where necessary by the MK SSHO dependent on construction task.

Table A-4
Airborne Contaminant Response Criteria

Contaminant	Level	PPE	Monitoring Frequency	Actions Taken
Volatile organic compounds. Both direct reading and time integrated samples will be obtained. Time integrated samples will be obtained at the compost facilities. Level C PPE will be used at excavation sites and the composting facility. APR's selected are HEPA but can be modified to include organic cartridges also depending on VOC levels. Frequency of monitoring is subjected to change as field experience is obtained.	No more than 5 ppm above background, no benzene detected	Level D or modified Level D	Prior to each shift and reentry following 30 minute vacancy or as warranted	Continue periodic monitoring
	Greater than 5 ppm above background but less than 10 ppm above background. No benzene detected, no Action Level for any organic exceeded.	Level D or Modified Level D	At least once every hour, when change in operation occurs, or when requested by workers	Monitor for benzene or other organics. Continue periodic monitoring
	Greater than 10 ppm above background or benzene detected or Action Level exceeded for any organic.	To be determined by SSHO	To be determined by SSHO	Stop work and notify SSHO

Table A-4
Airborne Contaminant Response Criteria

Contaminant	Level	PPE	Monitoring Frequency	Actions Taken
Oxygen	Less than 19.5%	To be determined by SSHO	To be determined by SSHO	Stop work, exit area and immediately notify SSHO
% LEL	Equal to or greater than 10%.	To be determined by SSHO	To be determined by SSHO	Stop work, shut off equipment, remove ignition sources if safe to do so; notify SSHO

Table A-5

Frequency of Physiological Monitoring for Fit and Acclimatized Workers[1]

ADJUSTED TEMPERATURE[2]	IMPERMEABLE ENSEMBLE
90°F (32.2°C) or above	After each 15 minutes of work
87.5°-90°F (30.8°-32.2°C)	After each 30 minutes of work
82.5°-87.5°F (28.1°-30.8°C)	After each 60 minutes of work
77.5°-82.5°F (25.3°-28.1°C)	After each 90 minutes of work
72.5°-77.5°F (22.5°-25.3°C)	After each 120 minutes of work

[1]For work levels of 250 kilocalories/hour.

[2]Calculate the adjusted air temperature (ta adj) by using this equation:

ta adj of = ta°F + (13 x % sunshine).

Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow.

(100 percent sunshine = no cloud cover and a sharp, distinct shadow: 0 percent sunshine = no shadows.)

Note: Reprinted from *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (1985).

Table A-6
Monitoring and Sampling Requirements

Site	Activity	Monitor						Sample		
		VOC	Dust	Oxygen and % LEL	Perimeter (VOCs /Dust)	Noise	Heat Stress	VOC	Metals	Explosives
Construction of Bioremediation Facility	1. Site preparation, construction, and install all equipment	O	Y	O	O	Y	O	O	N	N

Y = Yes, O = Optional at discretion of SSHO, N = Not required

[1] = When obtaining soil samples in excavations deeper than 5 feet, treat the excavation as permit-required confined space until it has been assessed by atmospheric monitoring that the atmosphere is safe and it can be downgraded to nonpermit-required confined space. Engineering controls must be in place to safeguard excavation from collapse.

FIGURES

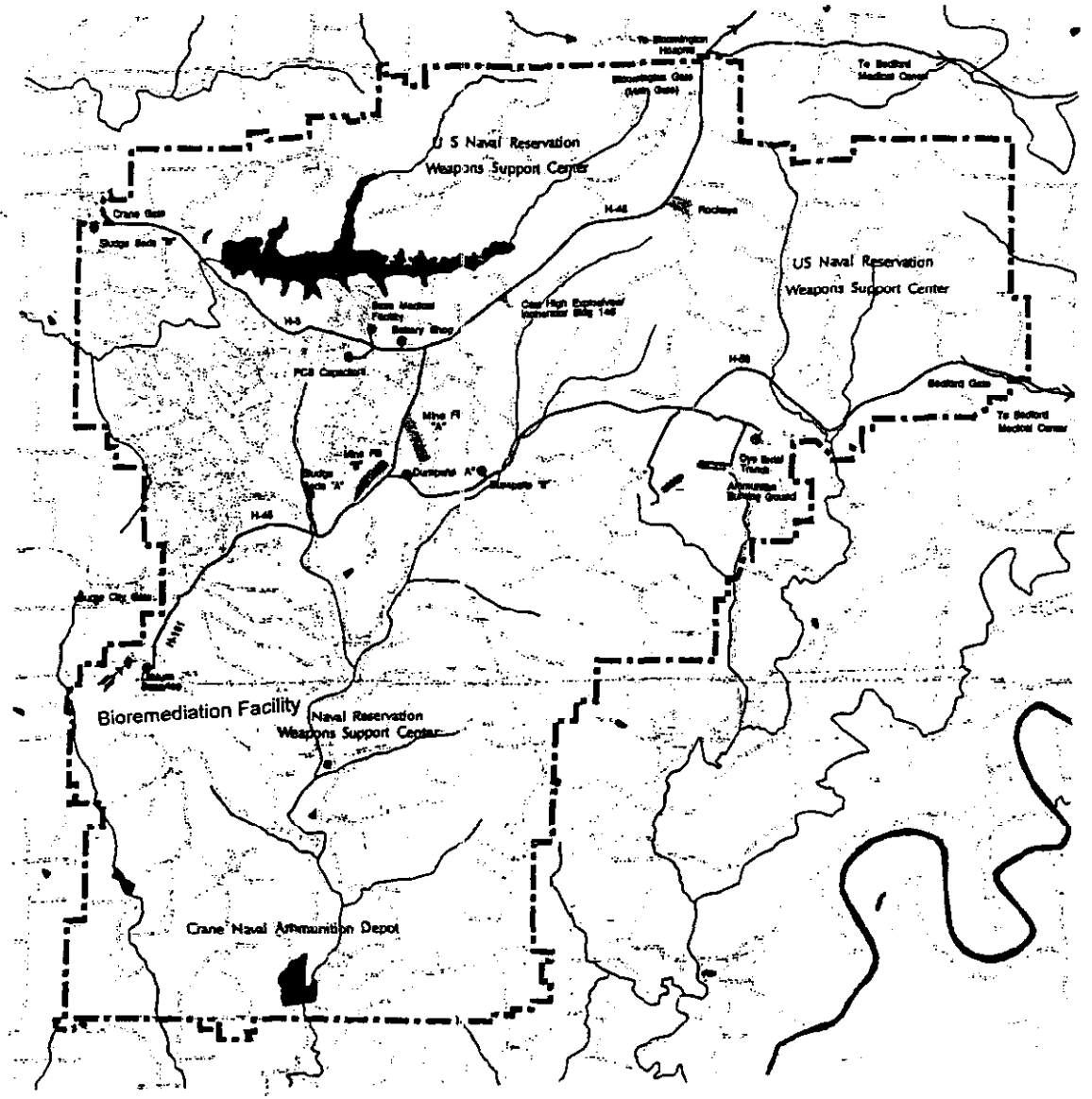


Figure A-1

Directions to the Nearest Medical Facility

Legend

Primary Route

Naval Reservation Boundary

Directions to NSWC Medical Department on site:

The NSWC Medical Department manages and coordinates on-site ambulance service. Located in Building 12 off of H-2 just north of H-5.

Directions to Bedford Medical Center:

From the Bedford Gate, head east on 158 to the city of Bedfo 158 turns into 16th Street. Gate open M-F only 6-8 AM and

From Bedford Gate, head east on 158 to the city of Bedfo 158 turns into 16th street.

Directions to Bloomington Hospital:

Exit Base on H5-45 through the Bloomington Gate, follow Highway 45 North to Bloomington. At Highway 45 and Hig 37, continue going straight over the bypass (Bloomfield Roa follow Bloomfield road north which turns into 2nd Street. Follow 2nd Street and hospital is on your right.

1 inch = 1.5 miles

MORRISON KNUDSEN CORPORATI
Engineering, Construction
& Environmental Group

Figure A-2 Safety Meeting Report

Type of Meeting:_____.

Topic:_____.

The following personnel were present for meeting conducted at _____ (time) on _____ (date) at _____ (location).

NAME	SIGNATURE	ORGANIZATION

_____

Printed Name of Meeting Chairman Signature Date

Figure A-3 SSHO Daily Logbook Report

Page ___ of ___

Date _____ Report Number _____

Location(s) Work Activity and # Employees: _____

Weather: Wind speed _____ Wind direction _____

Temp. & Pressure _____ Precipitation _____

Amount sun _____

Monitoring conducted:

Location	Sampled for	Instrument used	Results	Sampled By/Time

Levels of Protection: _____

Problems or Unusual Situations: _____

Correspondence: _____

Other Comments: _____

MK SSHO Printed Name: _____ Signature _____ Date _____

Figure A-4 SSHP Weekly Inspection Checklist

Surveillance No. _____

SURVEILLANCE NO:	ACTIVITY:		PROJECT NO:
DATE:	LOCATION:		SURVEYED ORGANIZATION: PRIME: SUBTIER:
	SITE/AREA CONTACT:	RESPONSIBLE MANAGER:	

ITEM NO.	DESCRIPTION OF SURVEYED ITEMS	N/A SAT UNSAT	DESCRIPTION OF DISCREPANCY/ NON-COMPLIANCE	ACT OR COND	CAT	REQUIRED ABATEMENT DATE	CORRECTIVE ACTION TAKEN AND DATE ABATEMENT COMPLETED
	Section 1						
1	Scope of work and site contaminants accurately described?						
	Section 2						
2	Activity hazard analysis prepared for each major work phase? (EM 385-1-1, Section 01.A.09)						
3	All hazards including chemical/biological and physical adequately described?						
	Section 3						
4	Roles and responsibilities described and personnel roster up-to-date?						
	Section 4						
5	All site personnel completed required training?						
6	Training documented and records on site?						
	Section 5						
7	All site personnel completed initial medial qualification?						
	Section 6						
8	PPE available and in good condition?						
9	PPE work per SSHP and/or SSHO direction?						
10	Personnel trained in proper use, limitations, and inspection of PPE?						

FIGURE A-4 SSHP Weekly Inspection Checklist (continued)

Surveillance No. _____

ITEM NO.	DESCRIPTION OF SURVEYED ITEMS	N/A SAT UNSAT	DESCRIPTION OF DISCREPANCY/ NON-COMPLIANCE	ACT OR COND	CAT	REQUIRED ABATEMENT DATE	CORRECTIVE ACTION TAKEN AND DATE ABATEMENT COMPLETED
11	PPE inspected per SSHP?						
12	PPE donning/doffing procedures in place?						
13	Written SOP available describing respirator selection and use?						
	Section 7						
14	Air monitoring conducted per SSHP?						
15	Monitoring equipment properly maintained and calibrated?						
16	Employees notified of monitoring results?						
17	Chain of custody prepared and maintained for all samples?						
	Section 4 and 8						
18	Weekly safety meeting held?						
19	Pre entry briefs held? and signature sheet completed?						
20	Haz Com programs in place?						
21	Competent person evaluates excavation?						
22	Personnel responsible for work maintains control of area and general safety requirements are being followed ?						
	Section 9						
23	Work zone maps prepared and updated?						
24	Maps posted near work area and stored in field master SSHP?						
25	Traffic patterns established and rules observed?						
	Section 10						
26	Inspections performed of all personnel, clothing and equipment leaving exclusion zone?						
27	All materials decontaminated prior to existing contamination reduction zone?						

FIGURE A-4 SSHP Weekly Inspection Checklist (continued)

Surveillance No. _____

ITEM NO.	DESCRIPTION OF SURVEYED ITEMS	N/A SAT UNSAT	DESCRIPTION OF DISCREPANCY/ NON-COMPLIANCE	ACT OR COND	CAT	REQUIRED ABATEMENT DATE	CORRECTIVE ACTION TAKEN AND DATE ABATEMENT COMPLETED
28	Decon stations properly established?						
29	Proper personal hygiene practices observed?						
30	Decon solutions collected and properly disposed of?						
	Section 11						
31	At least two employees on each shift trained in CPR and first aid and BLOOD BORNE pathogens?						
32	First aid kit at each work site?						
33	All first aid and medical cases promptly reported to MK SSHO?						
	Section 12						
34	All personnel trained on Emergency Response Plan and Contingency Procedures?						
35	Emergency pre-planning addressed in safety meeting?						
36	List of emergency services/contact is up to date and posted?						
37	Assembly points identified and communicated to employees?						
38	Evacuation routes established and communicated to employees?						
39	Communication methods are adequate						
40	All drills, exercises, and emergencies critiqued?						
41	All emergencies promptly reported to MK SSHO?						
	Section 13						
42	MK SSHO maintains project log book?						
43	Daily reports completed by MK SSHO?						
44	Daily inspections completed by MK SSHO?						
45	Weekly reports prepared by MK SSHO?						

FIGURE A-4 SSHP Weekly Inspection Checklist (continued)

Surveillance No. _____

ITEM NO.	DESCRIPTION OF SURVEYED ITEMS	N/A SAT UNSAT	DESCRIPTION OF DISCREPANCY/ NON-COMPLIANCE	ACT OR COND	CAT	REQUIRED ABATEMENT DATE	CORRECTIVE ACTION TAKEN AND DATE ABATEMENT COMPLETED
46	Records of all injuries and illnesses maintained by MK SSHO?						
	Section 14						
47	Work plans/Operational Plans available and up to date?						
48	SOPS developed as needed?						
48A	Equipment operational checklists developed as needed?						
48B	Maintenance SOPs include safety and health aspects?						
	Section 15						
49	Two-way radios available per SSHP?						
50	Cellular telephone available as needed?						
51	Emergency alarms available and personnel trained on what actions to take?						
52	Drills and exercises conducted to test communication methods?						
	Section 16						
53	Spill response measures reviewed with personnel?						
54	Suitable quantities of spill supplies available?						
55	Spills promptly reported to MK SSHO?						
56	Operations arranged to minimize spills?						
	Section 17						
57	Confined space requirements of 385-1-1, Section 06.0.01 followed? Personnel trained?						

Inspection Performed By: _____ Date: _____

Abatement Accepted By: _____ Date: _____

ATTACHMENT A

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS			
Activity: Construction of Facility.		Analyzed By/Date: Frank J. Petrik 4/30/97	Reviewed By/Date:
1.0 Principal Steps	Potential Hazards	Recommended Controls	
1.1 Foundation work, structural, component installation, piping, instrumentation, electrical and other ancillary subsystems. Excavations and Hot Work where necessary.	1.1a. Physical hazards including material handling (struck by, struck against, pinch points, and falls), electrical energy, contact with chemicals used in component installation, combustion sources causing fires, confined spaces, noise, and mechanical energy. 1.1b Excavations 1.1c. Natural phenomenon hazards	1.1a. Level D PPE modified were necessary depending on job task per MK SSHO direction. Weekly safety meetings. MK SSHO to review MK Supervisory Safety Manual, MK Safety Manual, MK IH Manual and EM385-1-1 to plan and implement engineering, administrative and PPE controls. Required programs include but not limited to fire prevention; housekeeping; rigging and lifting; energy control; electrical safety (GFCI on all installations); full fall protection; hearing conservation; hazard communication and emergency preparedness. 1.1b. Excavation Permit required. 1.1c. Components and structures braced for anticipated loading (wind, snow, earthquake, tornadic) during construction. Final construction must be to local Building Codes, NFPA Fire and Life Safety Code. Note: all process piping and equipment must be labeled per ANSI and OSHA. This includes informational and Cautions and Warnings.	
1.3 Equipment to be Used	Inspection Requirements	Training Requirements	
1.4 Heavy equipment; welding and fastening equipment; electrical and pipe fitting equipment; material handling equipment including crane and cherry picker; manlift; handtools; and hand power equipment.	Before use per manufacturers recommendation. GFCIs quarterly. Cranes daily.	Site Safety and Health Plan (Project Kickoff), POD, Weekly Safety Meetings and OSHA Hazard Communication (as needed)	

APPENDIX B
TECHNICAL SPECIFICATIONS

LIST OF TECHNICAL SPECIFICATIONS

SECTION	REV	DESCRIPTION
02100	1	SITE CLEARING
02200	1	STRUCTURE EXCAVATION AND BACKFILLING
02249	1	GEOTEXTILES
02275	2	MEMBRANE LINING SYSTEM
02513	1	ASPHALT CONCRETE PAVING
02936	1	SEEDING
03200	1	CONCRETE REINFORCEMENT
03300	1	CAST-IN-PLACE CONCRETE
13121	1	PRE-ENGINEERED BUILDINGS
15100	1	CPVC UNDERGROUND PIPE
16400	0	INSTALLATION OF ELECTRICAL UTILITIES

SECTION 02100
SPECIFICATION FOR SITE CLEARING

PART 1 GENERAL

1.1 Section Included

A. Remove surface debris.

B. Remove paving, curbs.

C. Clear site of plant life and grass.

D. Remove trees and shrubs.

E. Remove root system of trees and shrubs.

F. Relocate existing underground pipe.

G. Erosion control.

1.2 Related Sections

Section 02200	Structure Excavation and Backfilling
Section 15100	CPVC Underground Pipe

1.3 Regulatory Requirements

A. Conform to applicable Federal, State, and Local codes for disposal of debris.

B. Coordinate clearing work with utility companies.

PART 2 MATERIAL

2-1/2" diameter C.P.V.C Pipe shall be per Section 15100.

PART 3 EXECUTION

3.1 Preparation

A. Verify that existing plant life and features designated to remain are tagged or identified.

3.2 Protection

A. Protect utilities that remain, from damage.

B. Protect trees, plant growth, and features designated to remain as final landscaping.

C. Protect bench marks and existing structures from damage or displacement.

3.3 Clearing

A. Clear areas required for access to site and execution of work.

B. Remove paving and curbs.

C. Remove trees and shrubs within marked areas. Remove stumps and root systems to a depth of 18 inches or as otherwise shown on the drawings.

D. Clear undergrowth and deadwood without disturbing subsoil.

E. Apply herbicide to remaining stumps to inhibit growth.

3.4 Removal

A. Remove debris, rock, and extracted plant life from site & dispose per owner's instructions.

B. No burning of removed debris or plant life is permitted.

3.5 Relocation

Relocate two existing, underground, P.V.C. Force Mains as shown on the Civil - Plot Plan (Dwg. No. C-001). Minimum depth below finished grade shall be 2'-6".

3.6 Erosion Control

Submit proposed methods and details for erosion control procedures to the Contractor for approval before beginning excavation and clearing operations.

END SECTION 02100

SECTION 02200
STRUCTURE EXCAVATION AND BACKFILLING

PART 1 GENERAL

1.1 Section Includes

A. Excavation for building foundations.

B. Excavation for slabs-on-grade and paving.

C. Excavation for site structures.

D. Building perimeter and site structure backfilling to subgrade elevations.

E. Site filling and backfilling.

F. Fill under slabs-on-grade and paving. Consolidation and compaction.

G. Fill for over-excavation.

1.2 Related Sections

Section 03300 Cast-in-Place Concrete

1.3 Reference Standards (Latest Edition)

A.	ASTM D422:	Particle Size Analysis of Soils
B.	ASTM D424:	Test for Plastic Limit and Plasticity Index of Soils
C.	ASTM D698:	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3 (600kN-m/m3))
D.	ASTM D1556:	Test Method for Density of Soil In-Place by the Sand-Cone Method
E.	ASTM D1557:	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft^3 (2,700kN-m/m3))
F.	ASTM D2167:	Test for Density of Soil In-Place by the Rubber-Balloon Method
G.	ASTM D2487:	Classification of Soils for Engineering Purposes
H.	ASTM D2922:	Test for Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth)

I. ASTM D4253: Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table

J. ASTM D4254: Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

1.4 Submittals

A. Dewatering

Submit proposed methods and details for dewatering procedures to the Contractor for approval before beginning excavation operations.

B. Samples

Submit representative samples of borrow soils two weeks prior to borrow source use.

C. Test Results

1. Contractor shall be responsible for the testing of representative samples of borrow that the Subcontractor intends to use as fill or backfill.

2. Tests shall consist of:

a. Gradation
b. Relative Density of Cohesionless Soils
c. Moisture Density Curves per ASTM D698
d. Soil Classification

3. All data to be submitted for approval.

D. Source

Submit source of supply for all material used in filling and backfilling for approval.

E. Field Density Tests

Field density test results shall be verbally reported to the Contractor as soon as they are available. Subsequent to verbal notification, formal documentation of the results shall be submitted to the Contractor within ten working days.

PART 2 PRODUCTS

2.1 Materials

A. Suitable Borrow Material

1. Suitable borrow materials shall include material classified using the Unified Soil Classification System as GW, GP, SW, SP, GM, GC, SM, SC, CL, CH, or as approved by the Engineer as per ASTM D422, D424 and D2487.

2. Suitable borrow material shall be free of chemical contamination, debris, organic material, large stones and excess moisture that will prevent proper compaction.

3. Obtain suitable borrow material from offsite sources.

B. Select Borrow Material

1. Select borrow material shall be soils of low expansion potential having a liquid limit of less than 40 and plasticity index below 15, as tested in accordance with ASTM D424. At least 12% of the material should pass a No. 200 sieve.

2. Select borrow material shall be free of chemical contamination, debris, organic material, large stones and excess moisture that will prevent proper compaction.

3. Obtain select borrow material from offsite sources.

C. Unsuitable Material

1. Unsatisfactory materials include materials classified using the Unified Soil Classification System as PT, OH, OL and materials of any classification that are determined by the Engineer as too wet for use in the backfilling operations.

2. Salt, sulfur, hydrocarbon or other chemically impregnated soils shall be considered unsuitable for reuse.

D. Borrow Clay

1. Suitable borrow clay shall include material classified using the Unified Soil Classification System as CL, CH or any mixture of these per ASTM D422, D424 and D2487.

2. Suitable borrow clay shall be free of chemical contamination, debris, organic material, large stones and excess moisture that will prevent proper compaction.

E. Borrow Sand

1. Borrow sand for sandfill and backfill shall be sound, hard, durable, angular material meeting the following gradation requirements:

SIEVE (U. S. Standard)	PERCENT PASSING (by Weight)
3/8"	100
#4	95-100
#40	12-60
#200	0-12

F. Borrow Limestone

1. Borrow limestone for structural backfill, shall be sound, hard, durable, angular particles meeting the following gradation requirements:

SIEVE (U. S. Standard)	PERCENT PASSING (by Weight)
2"	100
1"	60-90
3/8"	35-70
#4	25-60
#10	20-50
#30	10-50
#60	8-40
#200	5-10

2. The percent passing the No. 200 sieve shall be based on the weight of the sample passing the No. 4 sieve.

3. Borrow limestone for structural fill, levees and dikes, shall be sound, hard, durable, angular particles meeting the following gradation requirements:

SIEVE (U. S. Standard)	PERCENT PASSING (by Weight)
1-1/2"	95-100
3/4"	65-95
#4	0-15

PART 3 EXECUTION

3.1 Preparation

A. Identify required lines, levels, contours and datum.

B. Identify known underground, above ground and aerial utilities. Stake and flag locations.

C. Notify Contractor for removal and relocation of any utilities.

D. Protect above and below grade utilities which are to remain.

E. Protect plant life, lawns and other features remaining as a portion of final landscaping.

F. Protect bench marks, existing structures, fences, sidewalks, paving and curbs from excavation equipment and vehicular traffic.

G. Generally, compact subgrade to density requirements for subsequent backfill materials.

H. Cut out soft areas of subgrade not capable of in-situ compaction. Backfill and compact to density equal to or greater than requirements for subsequent backfill materials.

I. Prior to placement of aggregate base/subbase course material at paved areas, compact subsoil to 95 percent of its maximum dry density in accordance with ASTM D698.

3.2 Examination

A. Verify fill materials to be reused are acceptable.

B. Verify foundation perimeter drainage installation has been inspected.

3.3 Excavation

A. All excavations shall be protected and guarded against danger to life and property and shall conform to OSHA "Construction Standard for Excavations" (29 CFR Part 1926.650-.652, Subpart P and EM 385-1-1). Permanent excavations or fill shall have retaining walls sufficient in strength to retain the embankment, together with any surcharge loads, unless the sides slope sufficiently for this retention.

B. Excavate subsoil required to accommodate building foundations, paving and site structures and construction operations.

C. Machine slope banks to angle of repose or less, until shored.

D. Excavation cut not to interfere with normal 45° bearing splay of foundation.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation. Any water that does accumulate in an excavation during working hours shall be removed continuously or as a significant accumulation occurs. Overnight accumulation shall be removed immediately at the beginning of the work day. The Subcontractor shall provide temporary pumping facilities to drain the water to the nearest catch basin or drainage ditch.

F. Hand trim excavation. Remove loose matter.

G. Remove lumped subsoil, boulders and rock.

H. Hand excavation shall be required around any below grade piping or other utilities. Support piping and other utilities which could be damaged by excavation work. Any piping or pipe coating that is damaged shall be repaired at the Subcontractor's expense.

I. If underground obstructions, piping or other utility services are encountered which are not indicated on the drawings or in the specifications, instructions shall be obtained from the Contractor before proceeding.

J. Notify Contractor of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

K. Correct unauthorized excavation at no extra cost to Contractor.

L. Correct areas over-excavated by error by placing lean concrete or compacted approved backfill in the excavation to the correct elevation.

M. Stockpile excavated material in area designated onsite and remove excess material not being reused from site.

3.4 Backfilling

A. Backfill areas to contours and elevations with unfrozen materials.

B. Systematically backfill to allow maximum time for natural settlement or proper compaction activities. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

C. Granular Soils Fill

Place and compact materials in continuous layers not exceeding six inches compacted depth.

D. Compact granular backfill to at least 95 percent of the Modified Proctor maximum density determined in accordance with ASTM D1557.

E. Cohesive Soils Fill

Place and compact material in continuous layers not exceeding 8 inches compacted depth.

F. Clayey sands and cohesive soils shall be placed and compacted to at least 95 percent of the Modified Proctor maximum density determined in accordance with ASTM D1557. Moisture content of the fill shall be controlled within ± 3 percent of optimum moisture.

G. Upon placement and compaction of each lift of cohesive material, the surface shall be scarified to a depth of two inches prior to the placement of subsequent lift.

H. Employ a placement method that does not disturb or damage foundations, perimeter drainage, foundation waterproofing and protective cover on utilities in trenches.

I. Maintain optimum moisture content of backfill materials to attain required compaction density.

J. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.

K. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.

L. Slope grade away from building minimum two inches in 10 feet, unless noted otherwise.

M. Make grade changes gradual. Blend slope into level areas.

N. Remove surplus backfill materials from site.

O. Leave fill material stockpile areas completely free of excess fill materials.

3.5 Tolerances

A. Top Surface of Backfilling

Plus or minus one inch from required elevations.

3.6 Field Quality Control

A. The Subcontractor shall conduct field density tests during backfill and fill placement. The tests shall be performed by qualified Soil Technicians working under the direction of a Soils Engineer registered in the state where the project is located.

B. Field density tests shall be performed in accordance with ASTM D2922, D1556 or D2167.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Contractor.

D. Frequency of Tests

1. Every 50 cubic yards of fill or backfill in trenches or around structures.

2. Every 200 cubic yards for embankment, dike or other mass earthwork.

3. At least one test shall be made for every full day of compaction operations on mass earthwork.

4. One test whenever there is a definite change in the quality of moisture control or effectiveness of compaction.

E. Proof roll compacted fill surfaces under slabs-on-grade paving.

3.7 Protection of Finished Work

A. Recompact fills subjected to vehicular traffic, erosion,or other fill surface disruptive activities.

B. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

C. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION 02200

SECTION 02249

GEOTEXTILES

NSWC CRANE
DYE BURIAL CAP

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section includes the requirements for selection and installation of geotextiles. The term "geotextiles," as used in this section, is synonymous with geotextile layer, geotextile fabric, and geotextile cushion.

1.2 RELATED SECTIONS

A. Section 02100 - Site Clearing

B. Section 02200 - Structural Excavation And Backfilling

C. Section 02250 - Geomembrane

1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. Use the latest revision date available at the time of contract issuance.

B. American Society for Testing and Materials (ASTM)

ASTM D1777, Method for Measuring Thickness of Textile Materials.

ASTM D3776, Test Methods for Mass Per Unit Area (Weight) of Woven Fabric.

ASTM D3786, Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics - Diaphragm Bursting Strength Tester Method.

ASTM D4355, Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).

ASTM D4533, Test Method for Trapezoid Tearing Strength of Geotextiles.

ASTM D4632, Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).

ASTM D4833, Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

1.4 SUBMITTALS

A. Pre-installation: Submit the following to Morrison Knudsen for approval, prior to geotextile deployment.
   1. Origin (resin supplier's name and resin production plant) and identification (brand name and number) of resin used to manufacture the geotextile.
   2. Copies of quality control certificates issued by resin supplier.
   3. Results of tests conducted by geotextile manufacturer to verify that quality of resin used to manufacture geotextile meets manufacturer's resin specifications.
   4. Statement indicating that reclaimed polymer added to the resin during manufacturing was done with appropriate cleanliness.
   5. List of materials which comprise the geotextile, expressed in the following categories as percent by weight: base polymer, carbon black, other additives.
   6. Manufacturer's specification for the geotextile which includes properties contained in Tables 1 and 2.
   7. Written certification that the minimum average roll values given in the manufacturer's specification are guaranteed by the geotextile manufacturer.
   8. Written certification that geotextile manufacturer has continuously inspected geotextile for the presence of needles and found geotextile to be needle-free.
   9. Quality control certificates signed by a responsible entity employed by the geotextile manufacturer. Each quality control certificate shall include roll identification numbers, testing procedures, and results of quality control tests. At a minimum, results shall be given for tests and corresponding methods specified in Article 1.3 of this Section.
   10. Scaled panel layout plan(s), including details required for installation. Drawings shall be fully dimensioned.

B. Installation: Submit the following as installation proceeds: Subgrade surface acceptance, signed by the Installer for each area that will be covered directly by geotextile.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:
   1. Geotextiles shall be supplied in rolls wrapped in relatively impermeable and opaque protective covers.
   2. Geotextile rolls shall be marked or tagged with the following information:
      a. Manufacturer's name
      b. Product identification
      c. Unit weight
      d. Roll number
      e. Roll dimensions (length and width)

B. Storage and Protection:
   1. The Contractor will desidnate an open on-site storage area for geotextile rolls from time of delivery until installed.
   2. Subcontractor shall mobilization, store and protect geotextile from dirt, water, ultraviolet light exposure, and other sources of damage and preserve integrity and readability of geotextile roll labels.

PART 2 PRODUCTS

2.1 MATERIALS

A. Furnish materials whose "minimum average roll values," as defined by Federal Highway Administration (FHWA), meet or exceed geotextile property values specified in Tables 1 and 2.

B. Geotextiles shall be stock products, i.e., except when specifically authorized in writing by the Contractor, supplier shall not furnish products specifically manufactured to meet specifications in Tables 1 and 2.

C. Geotextile shall be comprised of polymeric yards, or fibers, oriented into a stable network which retains its structure during handling and placement.

D. Geotextile shall be thermally treated on one side.

2.2 SOURCE QUALITY CONTROL

A. The geotextile manufacturer must demonstrate that all requirements of this Section are met.

B. Tests, Inspection:
   1. Geotextiles shall be tested by geotextile manufacturer to evaluate

characteristics for quality control. Samples not satisfying specifications in Tables 1 and 2 and manufacturer's specifications shall result in rejection of applicable rolls. At a minimum, the following tests shall be performed by the geotextile manufacturer in accordance with test methods specified in Tables 1 and 2.

a. Mass per unit area
b. Grab strength
c. Trapezoidal tear strength
d. Burst strength
e. Puncture strength
f. Thickness

2. At a minimum, quality control tests shall be performed by the geotextile manufacturer for every 100,000 ft^2 (10,000 m^3) of geotextile produced
3. At geotextile manufacturer's discretion and expense, additional testing of individual rolls may be required by the Contractor to more closely identify noncomplying rolls and to qualify individual rolls.

Table 1
Geotextile Fabric Type 1

Property	Qualifier[2]	Unit	Value	Test Method
Thickness	Minimum	mils	75	ASTM D1777[1]
Weight	Minimum	oz/sq.yd	6	ASTM D3776
AOS	Minimum	U.S. std. sieve size no.	70	ASTM D4751
Grab strength	Minimum	lb	180	ASTM D4632
Trapezoidal tear	Minimum	lb	70	ASTM D4533
Puncture resistance	Minimum	lb	80	ASTM D4833
Burst strength	Minimum	psi	290	ASTM D3786
U.V. resistance	Minimum	%[4]	70	ASTM D4355[3]

Notes:

[1]4 psf (0.2 kPa).
[2]All properties are "minimum average roll values" as defined by FHWA.
[3]Fabric conditioned per ASTM D4355.
[4]Percent of minimum grab strength by ASTM D4632 after conditioning.

Table 2
Geotextile cushion Type 2

Property	Qualifier[2]	Unit	Value	Test Method
Thickness	Minimum	mils	120	ASTM D1777[1]
Weight	Minimum	oz/sq.yd	12	ASTM D3776
AOS	Minimum	U.S. std. sieve size no.	70	ASTM D4751
Grab strength	Minimum	lb	275	ASTM D4632
Trapezoidal tear	Minimum	lb	110	ASTM D4533
Puncture resistance	Minimum	lb	135	ASTM D4833
Burst strength	Minimum	psi	400	ASTM D3786
U.V. resistance	Minimum	%[4]	70	ASTM D4355[3]

Notes:

[1]4 psf (0.2 kPa).
[2]All properties are "minimum average roll values" as defined by FHWA.
[3]Fabric conditioned per ASTM D4355.
[4]Percent of minimum grab strength by ASTM D4632 after conditioning.

PART 3 EXECUTION

3.1 EXAMINATION

A. Subcontractor shall provide Certified Material Test Reports from the material supplier for specification conformance.

3.2 INSTALLATION

A. Install geotextile according to the construction drawings and specifications.

B. The supporting soil subgrade to support the Type 2 cushion geotextile shall be smooth and free of all rocks larger than ½ inch, and all roots, sharp objects, or debris of any description. The supporting soil shall provide a firm, measurable foundation for the materials, with no abrupt changes or breaks in grade. No standing water or excess moisture will be permitted. No geotextiles shall be placed prior to subgrade approval by the Contractor.

C. Geotextile Deployment: Handle geotextiles in a manner to ensure they are not damaged. The following special handling requirements shall be adhered to:
   1. On slopes, anchor geotextile securely and deploy it down the slope in a controlled manner to continually keep geotextile in tension and prevent folds and wrinkles.
   2. Weight geotextile with sandbags or equivalent in the presence of wind. Do not remove weight until replaced with cover material.
   3. Cut geotextiles with a geotextile cutter (hook blade). Protect adjacent materials from potential damage due to cutting of geotextile.
   4. Prevent damage to underlying layers during placement of geotextile.
   5. During geotextile deployment, do not entrap in or beneath geotextile, stones, debris, or moisture that could damage geomembrane or hamper subsequent seaming.
   6. Visually examine entire geotextile surface before seaming. Ensure no potentially harmful foreign objects, are present. Remove foreign objects encountered or replace geotextile.

D. Seam And Overlap Procedures:
   1. 12 ounce non-woven geotextiles will be continuously seamed by thermal bonding. In general, no horizontal seams or splices are allowed on side slopes (i.e., seams shall be downslope, not across, the slope), except as part of a patch. A splice is defined as a seam connecting the ends of two rolls.
   2. Overlap geotextile a minimum of four inches or the minimum recommended by the manufacturer (which ever is greater) prior to seaming.
   3. Visually examine all seams after completion.

E. Thermal Bonding Procedures:
   1. Connect thermal bonding apparatus to power source.
   2. Upon commencing thermal bonding process, workers are to place protective gloves on each hand one at a time.
   3. Adjust panels for proper seam overlap of at a minimum of four inches and a miximum of six inches.
   4. Adjust the thermal bonding apparatus to the proper setting to provide adequate interface bond between adjacent overlapping panels.
   5. While heating interface, place downward pressure with hand on the overlapping dege to fuse the seam.
   6. Repeat above procedure while progressing along the entire length of seam.

F. Defects and Repairs: Any and all holes or tears in geotextile shall be repaired as follows:
   1. On slopes, a patch made from the same 12 ounce geotextile shall be

seamed into place using the above procedures. Should any tear exceed 10% of the width of the roll, that particular roll of 12 ounce geotextile shall be removed from the slope and replaced.

2. Horizontal areas, a patch made from the same 12 ounce geotextile shall be spot seamed in plac using the above procedure. The patch shall have a minimum of 12 inches overlap in all directions.
3. Remove any soil or other material that may have penetrated the torn geotextile.

G. Cleaning and Drying of Geotextiles:

Twelve ounce geotextiles are designed to be placed on earthen structures thherefore, they will accumulate some dirt and moisture. There is no justifiable procedue for cleaning and drying of the geotextiles. If 12 ounce geotextile does become wet, allow to air dry. If excessively wet or dirty, clean with a wet/dry vacuum.

H. Completed geotextile installation is subject to Contractor's approval prior to placement of subsequent layers.

3.3 INTERFACE WITH FILLING OPERATIONS

A. Ensure the following when deploying soil materials located on top of a geotextile.
   1. Geotextile and underlying materials are not damaged.
   2. Minimal slippage of geotextile on underlying layers occurs.
   3. No excess tensile stresses occur in geotextile.

END OF SECTION

SECTION 02275
MEMBRANE LINING SYSTEM

PART 1 GENERAL

1.1 Work Included

This specification section covers the minimum requirements for the standards, materials, installation, testing, acceptance and warranty for the HDPE (High Density Polyetheylene) and non-woven geotextile membrane lining system. The Installation Contractor shall provide all the materials, labor, supervision, tools, equipment, plant and testing for performance of all work to furnish, install and test the HDPE membrane lining system in accordance with the contract documents and as specified herein.

1.2 Definitions

A. The term Owner and/or Engineer shall mean the Department of the Navy, Navy Surface Weapons Center, Crane, IN and its authorized Contracting Officer, agent and/or representative.

B. The term Contractor and/or Construction Manager shall mean Morrison Knudsen Corporation and MK Corporation-Environmental Services.

C. The term Subcontractor, Fabricator, Manufacturer, Vendor, Supplier, and/or Seller shall mean the party or parties providing and selling the materials, goods and/or services to the Contractor.

1.3 Related Sections

Section 02200	Structure Excavation and Backfilling
Section 02223	Backfilling
Section 03300	Cast-In-Place Concrete
Section 15100	CPVC Underground Pipe

1.4 Reference Standards

The following publications listed below form a part of this specification to the extent indicated by the reference thereto. Publications listed refer to the latest edition as of the issue date of this specification. The references are referred to in the text thereafter by basic designation only:

A. American Society for Testing and Materials (ASTM):

1.	D 374	Thickness of Solid Electrical Insulation
2.	D 413	Rubber Property-Adhesion to Flexible Substrate
3.	D 570	Water Absorption of Plastics
4.	D 638	Tensile Properties of Plastics
5.	D 696	Coefficient of Linear Thermal Expansion of Plastics
6.	D 698	Test Method for Laboratory Compaction of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3)
7.	D 746	Brittleness Temperature of Plastics and Elastomers by Impact
8.	D 751	Coated Fabrics
9.	D 790	Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
10.	D 792	Specific Gravity (Relative Density) and Density of Plastics by Displacement
11.	D 882	Tensile Properties of Thin Plastic Sheeting
12.	D 1004	Initial Tear Resistance of Plastic Sheeting
13.	D 1149	Rubber Deterioration-Surface Ozone Cracking in a Chamber
14.	D 1203	Volatile Loss from Plastics Using Activated Carbon Method
15.	D 1204	Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperatures
16.	D 1238	Flow Rates of Thermoplastics by Extrusion Plastometer
17.	D 1505	Density of Plastics by the Density-Gravity Technique
18.	D 1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3) (2,700 kN-m/m^3)
19.	D 1593	Nonrigid Vinyl Chloride Plastic Sheeting
20.	D 1603	Carbon Black in Olefin Plastics
21.	D 1693	Environmental Stress-Cracking of Ethylene Plastics
22.	D 1777	Measuring Thickness of Textile Materials
23.	D 1822	Tensile-Impact Energy to Break Plastics and Electrical Insulating Materials

24.	D 2663	Standard Test Methods for Carbon Black Dispersion in Rubber
25.	D 2837	Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials
26.	D 3015	Microscopical Examination of Pigment Dispersion in Plastic Compounds
27.	D 3083	Flexible Poly (Vinyl Chloride) plastic Sheeting for Pond, Canal, and Reservoir Lining
28.	D 3776	Mass Per Unit Area (Weight) of Woven Fabric
29.	D 3786	Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics-Diaphragm Bursting Strength Test Method
30.	D 3787	Bursting Strength of Knitted Goods - Constant-Rate-of-Transverse (CRT) Ball Burst Test
31.	D 3895	Oxidative Induction Time of Polyolefins by Thermal Analysis

B. National Sanitation Foundation (NSF):

1. Std 54 Flexible Membrane Liners

1.5 Submittals

A. Manufacturer's Submittals:

The manufacturer shall submit and provide the following information for review and acceptance by the Contractor and the Engineer before commencement of the work:

1. Products must comply with the Buy America Act.

2. General manufacturing and production facility information and location(s).

3. Material properties and sample liner materials.

4. Manufacturer's QA/QC Manual.

5. Documentation list of not less than 20 retention ponds with secondary containment liner facilities supplied by the HDPE geomembrane lining manufacturer. Installation list shall have the following minimum information:

   - Client names and locations

   - Purpose of the facility and installation date

- Client Contact (facilities engineer, project manager, project engineer, design engineer, plant manager) and the current phone number

- The geomembrane mil thickness and the total square footage installed

6. Installer Submittals:

The installer shall submit and provide the following information for review and acceptance by the Contractor and the Engineer before commencement of the work:

7. Brief company background and capabilities

8. Insurance coverage and certificates

9. Field installation Supervisor and Master Seamer personnel resumes

10. Installation, testing, repair and quality control procedures manual(s)

11. Installers QA/QC Manual

12. Documentation list of not less than 20 retention pond secondary containment liner facilities installed by the HDPE geomembrane lining installation Subcontractor. Installation list shall have the following minimum information:

- Client names and locations

- Purpose of the facility and installation date

- Client Contact (facilities engineer, project manager, project engineer, design engineer, plant manager) and the current phone number

- The geomembrane mil thickness and the total square footage installed

- Copy of the HDPE geomembrane lining manufacturer license to the installation contractor/subcontractor showing license date and expiration date

B. Certifications:

Submit certification letter(s) from the manufacturer by an Officer of the Corporation or independent ASTM certified testing laboratory report(s) stating that the raw materials and the production products meet or

exceed the National Sanitation Foundation, Standard 54 for secondary containment of hydrocarbons. Certifications shall include applicable roll alpha-numeric identification that is traceable to the material(s) and the test result report(s).

1.6 Quality Control Reports

Quality Control Reports for Quality Control Certificate and Field Welding Quality Control Reporting shall be submitted. Report Forms are provided as the minimum report information format. Other standard reports can be used if all the minimum information is provided in said standard report. Subcontractor shall submit copies of his standard reports with his proposal for evaluation and/or acceptance.

A. Recording of Results

Daily documentation of all non-destructive and destructive testing shall be provided to the Inspector by the Installer. This documentation shall identify all seams that initially failed the test and include evidence that these seams were repaired an successfully retested.

B. Report Forms

Copies of the forms are provided in the 6.0 Appendix.

1. Form 1 Certificate of Acceptance of Soil Subgrade
2. Form 2 Panel Placement Log
3. Form 3 Geomembrane Field Trial Seam Log
4. Form 4 Geomembrane Seaming Record
5. Form 5 Geomembrane Seam Air Pressure Test Log
6. Form 6 Repair Log
7. Form 7 Geomembrane Seam Destructive Sample Log

1.7 Manufacturer and Installer Recommendations

The minimum requirements are indicated on the contract drawings and these specifications. If these minimum requirements are inadequate or deficient for the intended use of the geomembrane lining system, the Manufacturer and the Installation Subcontractor shall notify the Contractor in writing before purchase and/or installation begin. Said inadequacies or deficiencies shall be reviewed with the Owner and Contractor and a resolution agreed upon before commencement of the work.

1.8 Containment Characterization

The military operations have resulted in soils being contaminated with munitions residues. These soils are designated as hazardous waste.

A. Explosives Contaminants

1.	TNT	2,4,6-Trinitroluene
2.	RDX	1,3,5-Hexahydro - 1,3,5-Trinitrohydrazine
3.	HMX	1,3,5,7-Hexahydro - 1,3,5,7-Tetranitrotriazine
4.	Tetryl	N,2,4,6-Tetranitro - N-Methylaniline

B. Degradation By-Products

1.	4ADNT	4-Amino - 2,6-Dinitrotoluene
2.	2ADNT	2-Amino - 4,6-Dinitrotoluene
3.	2,4DNT	2,4-Dinitrotoluene
4.	2,6DNT	2,6-Dinitrotoluene
5.	1,3,5TNB	1,3,5-Trinitrobenzene
6.	DNB	1,3-Dinitrobenzene

PART 2 PRODUCTS

2.1 Established Standards

The products are specified herein by manufacturer and trade name to establish standards of quality and performance. Products of other manufacturers may be substituted for the specified products, provided such substitutions meet the specified requirements, and are reviewed and accepted in writing by the Engineer. The following materials shall conform to the respective specifications and other requirements stipulated below:

A. HDPE Geomembrane

The geomembrane shall be HDPE compound resin with carbon black for ultra-violet resistance as manufactured by Poly-Flex Inc., Gundle Lining Systems, Inc., National Seal, Inc. and/or equivalent product(s). The geomembrane surfaces shall be free of striations, roughness, pinholes, holes, bubbles, blisters, undispersed raw materials, or any contamination

by debris or foreign matter. Labels shall identify the mil thickness, dimensions, batch, roll numbers, and manufacturer. The nominal minimum mil thickness is indicated on the contract drawings.

B. HDPE Sheeting

The sheeting shall be HDPE resin with carbon black for Ultra-violet resistance. Sheeting thickness shall be indicated on the drawings.

C. Drainage Net

Drainage net shall be an HDPE compound net-like product of overlapping polyethylene strands that permit transmission of fluids to the non-woven geotextile composite material. The net shall be Gundle Gundnet XL-14 or an equivalent product.

D. Neoprene Gaskets

Gasket materials shall be neoprene, closed cell, 1/4" thick, with single sided pre-applied adhesive as manufactured by Poly-Flex Inc. or and equal product.

E. Banding Clamps

Metal banding clamps and hardware shall be 304 stainless steel minimum.

F. Flashing Cement

Mastic cement shall be Poly-Flex Neoprene Cement by Poly-Flex Inc. or an equal product.

G. RTV Sealant

Sealant shall be General Electric Silicone RTV 103, or an equal product.

H. Anchorage

Anchorage shall be Gundlock or an equivalent product of HDPE extruded shape, designed to provide a mechanical anchor attachment of the HDPE membrane lining system.

2.2 Properties

A. HDPE Geomembrane Properties

The high density polyethylene geomembranes shall meet or exceed the National Sanitation Foundation (NSF) Standard 54 specifications properties. The minimum specified properties are as follows:

Subcontractor shall submit properties of proposed Geomembrane materials with his proposal. Values listed in the table should meet most HDPE supplier specifications.

PROPERTY	TEST METHOD	MINIMUM VALUES 80 mil (2.0mm)	60 mil (1.5mm)
Thickness, mils, minimum	ASTM D 1593	72	57
Density (g/cc), minimum	ASTM D 1505	.94	.94
Melt Index (g/10 minutes), maximum	ASTM D 1238	0.40	0.50
Carbon Black content (%)	ASTM D 1603	2-3	2-3
Carbon Black Dispersion	ASTM D 3015	A1/A2	A1/A2
Tensile Properties	ASTM D 638		
1. Tensile Strength @ Yield (pounds/inch specimen)	Type IV Dumb-bell, 2" gauge length, 2-in/min.	184	132
2. Tensile Strength @ Break (pounds/inch width)		320	228
3. Elongation at Yield (%)		13	13
4. Elongation at Break (%)		600	700
5. Modulus of Elasticity		80,000	80,000
Tear Strength (pounds)	ASTM D 1004 Die C	65	45
Puncture Resistance (lbs)	FMTS 101 B, Method 2065	105	108
Hydrostatic Resistance (pounds/square inch)	ASTM D 751	500	450
Low Temp. Brittleness	ASTM D 746	<-94°F	<-94°F
Dimensional Stability (% change maximum)	ASTM D 1204 (212°F, 15 min.)	±2	±2
volatile Loss (%)	ASTM D 1203	0.4	0.1
Resistance to Soil Burial (% change maxi. in orig. value)	ASTM D 3083 Type IV specimen		
A. Tensile Strength @ 2-in./minute and break		10	10

B. Elongation @ Yield & Ozone Resistance (7 days, 100 pphm, 104°F, bent loop)	ASTM D 1149	no cracks	no cracks
Environmental Stress Crack (hours)	ASTM D 1693	1500	1500
Water Absorption (% change max. in original weight)	ASTM D 570	<0.1	<0.1
Coefficient of Linear Thermal Exp. (cm/cm°C) x 10	ASTM D 696	1.2	1.2
Moisture Vapor Transmission Rate (gal/100 sq.-in per day)	ASTM E 96	0.0005	0.00015

B. HDPE Drainage Net

PROPERTY	TEST METHOD	MINIMUM VALUES
Thickness, mils, minimum)	ASTM D 1593	200
Density, g/cc	ASTM D 1505	0.94
Melt Flow Index, g/10 min.	ASTM D 1238	0.3 max.
Tensile Strength @ Break	ASTM D 751	
Machine Direction	ppi	25 min.
Cross Direction	ppi	15 min.

2.3 Life Cycle

The life cycle for the geomembrane lining system shall be fifteen (15) years.

2.4 Qualifications

The manufacturer of the HDPE geomembrane materials and the installation contractor/subcontractor of these materials shall satisfy specific qualifications before commencement of the work.

A. Manufacturer

The HDPE geomembrane materials manufacturer shall be listed by the National Sanitation Foundation as an acceptable producer of HDPE geomembrane Flexible Membrane Liners per NSF Standard 54. The manufacturer shall have at least five (5) years continuous manufacturing experience producing more than 20,000,000 square feet of HDPE geomembrane materials. The Owner and/or his representative shall be permitted to visit the manufacturing facilities.

B. Installation Subcontractor

The installation Subcontractor shall be the HDPE geomembrane manufacturer or an approved, trained and licensed installer of the geomembrane manufacturer with more than two (2) years continuous installation experience. The installation shall be under the constant direction of a single Field Installation Supervisor. The Field Installation Supervisor shall remain on site and be responsible for the installation, layout, seaming, patching, testing, repairs, review and acceptance, and all other required and necessary activities. This Field Installation Supervisor shall have supervised the installation of more than 2,000,000 square feet of HDPE geomembrane lining systems. Seam work shall be under the direction of a Master Seamer who can also be the Field Installation Supervisor.

PART 3 EXECUTION

3.1 Sitework and Foundation Work

Subcontractor shall define minimum retention pond storage and installation requirements for the geomembrane liner system. As a minimum, the following guidelines shall be adhered to during field installation. The Geotechnical Engineer or his representative shall supervise all subgrade and the Engineer the above grade foundation work and/or foundation preparation work. All surfaces to be lined shall be smooth, free of all foreign and organic material(s), sharp objects, or debris of any kind. The subgrade shall provide a firm, unyielding surface without sharp changes or abrupt breaks in the grade. Stone and rocks larger than 3/8" in diameter shall not be present in the upper 6" of soil directly beneath the geomembrane lining system. The installer shall provide daily written certification(s) that the foundation surface(s) for the geomembrane lining system are acceptable.

3.2 Delivery

Off loading and storage of the materials shall be the responsibility of the Installer. Contractor shall have a designated material storage area for the Installer. The Installer shall be responsible for replacing any damaged or unacceptable materials at no additional cost to the Owner or Contractor. No off-loading shall be done without the presence of the Installer and/or his designated representative or his inspector.

3.3 Storage

The materials shall be stored in accordance with the manufacturer's recommendations and instructions. The HDPE geomembrane shall be protected from puncture, dirt, grease, water, moisture, mud, abrasion, excessive heat and other damage. The HDPE geomembrane rolls shall be stored on a prepared surface and shall not be stacked more than two (2) rolls high. Wooden pallets are not acceptable.

3.4 Placement

Adequate loading, sand bags or similar items that will not damage the geomembrane lining system shall be positioned such that wind uplift is prevented at the perimeter and at panel sections. Care shall be taken to prevent crimps or scratches to the geomembrane lining during placement. Protect the geomembrane lining from heat damage, workmen tools and shoes, or any activities that can damage the geomembrane. Direct contact with the HDPE geomembrane shall be protected with geotextiles, extra geomembrane lining or other suitable protective materials.

3.5 Weather Conditions

Geomembrane lining system shall be installed between 40°F and 100°F temperature. Geomembrane placement and seaming shall not be performed during any precipitation, that is rain, fog, dew, frost, snow, ice formation or conditions causing condensation formation. Installation operations shall be halted during excessive wind conditions, as determined by the Installer and/or the Inspector.

3.6 Sharp Bends

Planer direction changes shall be rounded or cant filler stripping provided to avoid sharp bends that can cause damage to the geomembrane lining system. Every effort shall be made to prevent brittle fracture and stress failure of the geomembrane liner system and components.

3.7 Seaming Orientation

Seams shall be orientated parallel to the line of maximum slope, directed down slope and not across the slope when the slope is greater than 1" on 12". Field seams shall be minimized in corners and odd polygon shape locations. Seams shall be aligned with the minimum number of wrinkles.

3.8 Seam Overlap

Panels of geomembrane lining shall have a six (6) inch overlap such that performance testing can be conducted.

3.9 Solvents or Adhesives

Solvents and adhesives can not be used unless written approval has been obtained from the geomembrane lining manufacture and written review and acceptance has been obtained from the Engineer.

3.10 Manufacturer's Installation Procedures

The geomembrane lining system manufacturer's installation procedures manuals shall be provided to the Contractor and his inspection representative. These installation procedures manuals shall be submitted three (3) weeks before the installation work can begin.

3.11 Field Seams

All field seams shall comply with ASTM D 413, D 638, D 3083, and/or D 4437. Approved field seaming processes are hot shoe fusion welding and extrusion welding. Welding rods or beads used for extrusion welding shall be HDPE with the same physical properties as the resin used in the manufacture of the HDPE geomembrane lining materials.

3.12 Anchorage

The anchorage system shall have rounded corners so as to avoid sharp edges and bends in the geomembrane lining system. Anchorage shall be Gundlock or an equivalent product of HDPE extruded shape designed to provide a mechanical anchor attachment for the HDPE membrane lining system. Anchorage system can be cast in place or embedded in precast concrete components. Follow manufacturer's fabrication and installation instructions. If a tail anchorage system is used, provide two (2) feet of tail in accordance with the manufacturers requirements.

PART 4 QUALITY CONTROL

4.1 General

Quality control shall involve testing, verification, review and acceptance, repair and records. Base pricing for this work shall include, as a minimum, the following quality verification and testing methods, evaluation and acceptance criteria, repair requirements, and records of the results as specified herein.

4.2 Factory Seam Quality Verification

The Contractor or his Inspector shall require the Installation Subcontractor to have twenty (20%) percent of factory fusion welds tested using non-destructive air pressure tests and/or vacuum tests. Additional testing may be required at the Installation Subcontractor's expense. Failed test seams shall be retested after repair.

4.3 Field Seam Quality Verification

Geomembrane lining system field seams shall be tested using non-destructive and destructive testing. Field test seams shall be taken at each seaming apparatus used each day, at the end of each four (4) hour period and at the Engineer's and/or Contractor's discretion or his Inspector's discretion.

All test seams shall be made at a location selected by the Inspector in the area of the seaming and in contact with the subgrade. The test seam samples shall be 10 feet long for hot shoe welding and 3 feet long for extrusion welding with the seam centered lengthwise. Specimens 1 inch wide shall be cut perpendicular to seam from each opposite end of the test seam by the Inspector. The Inspector shall use a tensionmeter to test these specimens for shear and peel strength. If a test seam

fails to meet field seam specifications, the seaming apparatus and/or seamer shall

not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful full test seams are achieved.

4.4 Non-Destructive Seam Testing

The Installer shall non-destructively test all field seams over their full length. Testing will be carried out as the seaming progresses, not at the completion of the job. All test equipment, including, but not limited to, the following, shall be furnished by the Installer:

A. Vacuum Box Testing

The minimum equipment for testing single wedge fusion seams and extrusion seams shall be comprised of the following:

1. A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft rubber gasket attached to the bottom, port hole or valve assembly, and a vacuum gauge.

2. A steel vacuum tank and pump assembly equipped with a pressure controller and pipe connections.

3. A rubber pressure/vacuum hose with fittings and connections.

4. A plastic bucket and wide brush, mop or spray assembly.

5. A soapy solution.

B. Non-Destructive Testing Procedures

The following non-destructive procedures shall be followed by the Installer:

1. Excess sheet overlap shall be trimmed away

2. Clean the window, gasket surfaces and check for leaks

3. Energize the vacuum pump and reduce the tank pressure to approximately 5 psi

4. Wet a strip of geomembrane approximately 12 inches by 48 inches (length of box) with the soapy solution

5. Place the box over the wetted area and compress

6. Close the bleed valve and open the vacuum valve

7. Ensure that a leak tight seal is created

8. For a period of approximately 5-10 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles

9. If no bubbles appear after 15-30 seconds, close the vacuum valve

and open the bleed valve, move the box over the next adjoining area with a minimum 3 inches overlap and repeat the process

10. All areas where soap bubbles appear shall be marked and repaired and then retested.

C. Destructive Testing Procedures

The following destructive procedures shall apply to locations where seams cannot be non-destructively tested, as determined by the Inspector:

1. If the seam is accessible to testing equipment prior to final installation, the seam shall be non-destructively tested prior to final installation.

2. If the seam cannot be tested prior to final installation, the seaming operations shall be observed by the Inspector for uniformity and completeness.

D. Air Pressure Testing (For Double Fusion Seam Only)

The following procedures are applicable to those processes which produce a double seam with an enclosed space:

1. Equipment for testing double fusion seams shall be comprised of the following:

E. An air pump equipped with pressure gauge capable of generating and sustaining a pressure between 25 and 30 psi and mounted on a cushion to protect the geomembrane.

F. A manometer equipped with a sharp hollow needle, or other approved pressure feed device.

1. The following procedures shall be followed by the Installer:

a. Seal one end of the seam to be tested.

b. Insert needle or other approved pressure feed device through the sealed end of the channel created by the double wedge fusion weld.

G. Energize the air pump to verify the unobstructed passage of air through the channel.

H. Seal the other end of the channel.

I. Energize the air pump to a pressure between 25 and 30 psi, close valve, and sustain pressure for approximately 5 minutes.

J. If loss of pressure exceeds 4 psi, or pressure does not stabilize, locate faulty area, repair and retest.

K. Remove needle or other approved pressure feed device, deflate the entire length of the seam and seal.

L. Destructive Seam Testing

The Installer shall provide the Inspector with a minimum of one destructive test sample per 500 feet of seam length from a location specified by the Inspector. The Installer shall not be informed in advance of the sample location.

1. Sampling Procedure

In order to obtain test results prior to completion of liner installation, samples shall be cut by the Installer as the seaming progresses. Sampling times and locations shall be determined by the Inspector. The Inspector shall witness the collection of all field test samples and the Installer shall mark all samples with their location, roll and seam number. The Installer shall also record in written form, the date, time, location, roll, seam number, ambient temperatures, and pass or fail description. A copy of the information must be attached to each sample portion. All holes in the geomembrane resulting from obtaining the seam samples shall be immediately repaired. All patches shall be vacuum tested.

2. Size and Disposition of Samples

The samples shall be 12 inches wide by 24 inches long with the seam centered lengthwise. The sample shall be cut into two equal length pieces, half to be given to the Inspector and the other half to be given to the Owner's Representative. If the Installer desires a sample the size should be increased to 12 inches wide by 36 inches long.

3. Field Laboratory Testing

Five test specimens shall be tested per retention pond. The Inspector shall cut ten, one inch wide, test specimens from his sample and these shall be tested by the Inspector. The Inspector shall have five specimens tested for seam strength and five for peel strength. To be acceptable, four out of the five test specimens must pass. Any specimen that fails through the weld or by adhesion at the weldsheet interface and shall be considered a failure.

4. Independent Laboratory Testing

The Inspector will package and shop five (5) seam samples per retention pond, basin and/or foundation from the Installer to a Laboratory for the determination of shear and peel strengths. The test method and procedures to be used by the Independent Laboratory shall be the same used in field testing, where seam samples are 1 inch wide, and the grip separation rate is 2 ipm. Four of five test specimens per sample shall pass.

5. Procedures for Destructive Testing

The Inspector will document all actions taken in conjunction with destructive testing. The following minimum procedures shall apply whenever a sample fails the destructive testing procedures:

a. The Installer shall cap strip the seam between the failed location and any passed test location.

b. The Installer shall retrace the welding path to an intermediate location a minimum of 10 feet from the location of the failed test, at the Inspector's discretion, and take a small sample for an additional field test. If this test passes, the seam shall be cap stripped between that location and the original failed location. If the test fails, then the process is repeated.

c. Over the length of seam failure, the Installer shall either cut out the old seam, reposition the panel and reseam, or add a cap strip, and as required by the Inspector.

d. After reseaming or placement of the cap strip, additional destructive field test(s) shall be taken within the reseamed area. The reseamed sample shall be acceptable if four (4) out of the five (5) test specimens pass. If test results are not acceptable, this process shall be repeated until the reseamed length passes and judged satisfactory by the Inspector.

4.5 Alternate Quality Control

Alternate quality control methods and testing can be submitted for review and/or acceptance by the Engineer. The geomembrane lining manufacturer and his certified or accepted Installer shall submit his quality control methods, procedures and requirements for both factory and field operations. As a minimum, these documents shall cover the following:

A. Factory Seam Quality Verification

B. Field Seam Quality Verification

C. Liner quality Verification

D. Non-destructive Seam Testing

E. Destructive Seam Testing

F. Defects and Repairs

G. Record Keeping

4.6 Defects and Repairs

All seams and non-seam areas of the geomembrane shall be inspected by the Installer and the Inspector for defects, holes, blisters, undispersed raw materials,

and any sign of contamination by foreign matter. Light reflection from the geomembrane helps to detect defects. The surface of the geomembrane shall be clean at the time of inspection. The geomembrane surface(s) shall be brushed, blown, or washed by the Installer if the amount of dust or mud inhibits inspection. The Inspector shall decide if additional cleaning of the geomembrane is needed to facilitate inspection.

A. Evaluation

Each suspect defect location in seam and non-seam areas shall be non-destructively tested as appropriate in the presence of the Inspector. Each location that fails the non-destructive testing shall be marked by the Inspector, and repaired accordingly.

B. Repair Procedures

1. Defective seams shall be restarted/reseamed as described in these specifications.

2. Small holes shall be repaired by extrusion cap welding. If the hole is larger than 1/4 inch, it shall be patched.

3. Tears shall be repaired by patching. Where the tear is on a slope or an area of stress and has a sharp end it must be rounded prior to patching.

4. Blisters, large cuts and holes, undispersed raw materials, and contamination by foreign matter shall be repaired by patches and/or replacement.

5. Surfaces of HDPE which are to be patched shall be abraded and cleaned no more than 15 minutes prior to the repair. No more than 10% of the thickness shall be removed.

C. Patches

Patches shall be round or oval in shape, made of the same geomembrane material, and extend a minimum of six (6) inches beyond the edge of defects. All patches shall be of the same compound and thickness as the geomembrane specified. All patches shall have their top edge beveled with an angle grinder prior to placement on the geomembrane. Patches shall be applied using approved methods only in accordance with the manufacturer's installation procedures manual.

D. Restart/Reseaming Procedures

The welding process shall restart by grinding the existing seam and rewelding a new seam. Welding shall begin where the grinding started and must overlap the previous seam by at least two (2) inches. Reseaming over an existing seam without regrinding shall not be permitted.

E. Verification of Repairs

Each repair shall be non-destructively tested, except when the Inspector requires a destructive seam sample obtained from a repaired seam. Repairs that pass the non-destructive test shall be taken as an indication of an adequate repair. Failed tests indicate that the repair shall be repeated and retested until passing test results are achieved.

4.7 Acceptance

The Installer (Installation Subcontractor) shall retain responsibility for the geomembrane lining system until acceptance has been received by the Owner or his representative. Acceptance shall have the following conditions met:

A. The installation has been completed, tested and inspected.

B. Documentation and verification has been completed of all field seams and repairs with the required testing conducted.

C. The documentation records have been transferred to the Owner or his representatives and the Contractor has provided written notification.

4.8 Warranty

The geomembrane lining system manufacturer and the Installation Contractor/Subcontractor shall each warrant their respective materials and work for the life cycle of the retention pond(s) system. Both warranties shall cover the materials and workmanship for the life cycle. The warranties shall apply to normal use and service by the Owner and shall exclude mechanical abuse, puncture by equipment or people, exposure to harmful chemical(s), heat, explosions, flooding or tornadoes. These warranties shall have provisions for the repair or replacement of the defect(s) or defective area(s) upon written notification and demonstration by the Owner of specific non-conformance of the geomembrane lining system and/or installation. Repair and/or replacement shall be completed at no additional cost to the Owner.

PART 5 MEASUREMENT AND PAYMENT

NOT USED

END OF SECTION 02275

SECTION 02513
ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.1 Description

This specification along with the drawings covers the furnishing of all materials, products, accessories, tools, equipment, services, transportation, labor, and supervision required for installation of a complete waterproof in-place asphaltic concrete paving system.

Work Included:

A. Final preparation of subgrade

B. Furnish and place subbase course

C. Furnish and place base course

D. Furnish and place asphaltic concrete paving

E. Asphaltic concrete walks and curbs

1.2 Related Sections

Section 02100	Site Clearing
Section 02200	Structure Excavation and Backfilling

1.3 Quality Assurance

A. Contractor Qualifications

For actual placing and finishing of the asphaltic concrete surfaces and operation of the required equipment, use only personnel who are thoroughly trained and experienced in the skills required.

B. Standards

Specific sections of the Indiana State Highway Department Standard Specification for Road Construction that most nearly meet the requirements of this specification as to gradation of aggregates, asphalt content, and method of construction may be used in lieu of this specification. These are the mixes that local asphalt mixing plants are experienced and prepared to furnish and are setup to meet state and local requirements.

1.4 Reference Standards

The following publications listed below form a part of this specification to the extent indicated by the reference thereto. Publications listed refer to the latest edition as of the issue date of this specification. The references are referred to in the text thereafter by basic designation only.

A. American Society for Testing and Materials (ASTM):

1.	D 242	Standard Specification for Mineral Filler for Bituminous Paving Mixture
2.	D 692	Standard Specification for Course Aggregate for Bituminous Paving Mixtures
3.	D 946	Standard Specification for Penetration - Graded Asphalt Cement for Use in Pavement Construction
4.	D 1073	Standard Specification for Fine Aggregate for Bituminous Paving Mixtures
5.	D 1557	Test Methods for Laboratory Compaction Characteristic of Soil Using Modified Effort (56,000 ft. lbf/ft^3 (2,200 kN-m/m^3))
6.	D 2027	Standard Specification for Cut Back Asphalt (Medium-curing Type)
7.	D 2028	Standard Specification for Cut Back Asphalt (Rapid-curing Type)

PART 2 PRODUCTS

2.1 Materials

A. Subbase Material

The material shall consist of two inch granular, free-draining material such as limestone, crushed limestone, clinker, gravel, shale, or quarry spalls. The material shall be free from vegetable matter and other unsuitable material. The subbase material shall meet ASTM C 33 specifications and approved by the Indiana Department of Transportation.

B. Base Course Material

The material shall be #53 crushed limestone, crushed or uncrushed gravel, blastFurnace slag, or reef shells conforming to the following gradation:

Sieve Size	Percentage by Weight
1 -1/2"	100
1"	90-100
3/4"	50-85
½"	35-65
No. 4	30-45
No. 8	25-35
No. 30	10-25
No. 200	2-9

C. Asphalt Cement

Asphalt cement shall be a petroleum asphalt, 85-10 penetration grade, conforming to ASTM D 946. For curb work, 60-70 penetration grade, asphalt cement shall be used.

D. Aggregate

1. Coarse aggregate shall consist of crushed stone and/or crushed gravel conforming to ASTM D 692.

2. Fine aggregate shall consist of natural sand, sand prepared from stone, or a mixture of both conforming to ASTM D 1073.

3. Mineral Filler shall consist of limestone dust or Portland cement conforming to ASTM D 242.

E. Tack Coat

Tack coat material shall be RC-70 conforming to ASTM D 2028.

F. Prime Coat

Prime coat material shall be MC-70 conforming to ASTM D 2027.

G. General Composition of Mixture for Paving and Walks

1. The materials forming the asphaltic concrete mixture shall be combined in accordance with the following limits of aggregate gradation and asphalt content:

	Wearing Course % Passing By Weight	Binder Course % Passing By Weight
1"	100	-
3/4"	90-100	-
½"	65-80	100
3/8"	30-55	85-100
No. 4	30-40	50-60
No. 10	25-35	36-44
No. 20	16-24	25-32
No. 40	7-12	15-23
No. 80	3-6	5-12
No. 200	1-4	2-6
Asphalt Cement,	-	-
Weight percent of Total Mix	**4.2-5.0**	**5.5-6.0**

2. A job-mix formula shall be established in accordance with the accepted procedures of the Indiana Highway Department. The job-mix formula shall be submitted to the Contractor for review and acceptance. After the job-mix is established, all mixtures for the project shall conform thereto within the following ranges of tolerances:

Passing No. 4 & larger sieves	± 7.0 percent
Passing No. 10 sieve	± 5.0 percent
Passing No. 40 sieve	± 4.0 percent
Passing No. 80 sieve	± 4.0 percent
Passing No. 200 sieve	± 2.0 percent
Asphalt Content	± 0.4 percent
Temperature of Mixture	± 25°F

The mixture, however, shall have a temperature between 290°F and 320° when it leaves the asphalt plant.

H. General Composition of Mixture for Curbs

1. Aggregate gradation and asphalt content limits shall be as follows:

Sieve Size	& Passing By Weight
3/4"	100
½"	85-100
No. 4	65-80
No. 8	0-65
No. 50	18-30
No. 200	5-15
Asphalt Cement, Weight Percent of Total Mix	6.0-9.0

Other gradings may be used if they have a history of satisfactory performance and have been approved by the Contractor.

2. The job-mix formula shall be determined in the laboratory or by field trial. Adjustments shall be made as necessary to provide sufficient workability during placing and to ensure a finished curb of adequate stability, desired surface texture, and relatively low (3-8 percent) air void content.

PART 3 EXECUTION

3.1 Subgrade Preparation

The rough graded subgrade shall be shaped and prepared to the line, grade, and cross section shown on the drawings and per technical specification Section 02200.

3.2 Placing Subbase Material

A. Spreading

The subbase material shall be deposited and spread upon the completed and approved subgrade in uniform, nearly horizontal layers, without segregation of size, to such loose depth that, when compacted, the total course will have the required thickness.

B. Compaction

After each lift of subbase course material is spread and shaped, the material shall be compacted to a minimum of 95% of maximum dry density as determined in accordance with ASTM D 1557. An approved vibrating roller shall be used. Compaction may be supplemented by a 10-ton, three-wheel tandem roller. The contractor shall use such construction procedures, including sufficient wetting and number of passes of the vibrating roller, to ensure that the above density is attained.

3.3 Placing Base Course Material

A. Spreading

If required thickness of the well graded granular base course material exceeds 7 inches, the material shall be placed in two or more layers. If spreading devices such as spreader boxes are used which will ensure proper depth and alignment, forms will not be required. Segregation shall be avoided regardless of the method used.

B. Compaction

After each lift of base course material is spread and shaped, the material shall be compacted to a minimum of 95% of maximum dry density as determined in accordance with ASTM D 1557. An approved vibrating roller shall be used. Compaction may be supplemented by a 10-ton, three-wheel tandem, or pneumatic-tired roller. The contractor shall use such construction procedures, including sufficient wetting and number of passes of the vibrating roller, to ensure that the above density is attained.

3.4 Placement of Asphaltic Concrete Paving

A. Receipt of Material

1. Asphaltic concrete shall be covered with tarpaulins until loaded. Temperature should be at least 280°F when placed.

2. Asphaltic concrete shall not be placed when ambient temperature is below 50°F, nor during fog, rain, snow or other unsuitable conditions.

3. No mixture shall be dispatched from the plant so late in the day that it cannot be spread and compacted during the daylight hours of that same day.

B. Spreading

1. The base course surface on which the asphaltic concrete mixture is to be spread, shall be free from objectionable or foreign material at the time of spreading. Spreading shall be done using a self-propelled asphalt paving machine capable of maintaining line, grade, crown and minimum surface thickness shown on the drawings. The equipment shall also be provided with means for heating the screed members so as to prevent the accumulation of bituminous material.

2. At locations where it is impractical to use conventional mechanical methods, acceptable hand methods may be used for placing and spreading. Lutes shall be used for spreading. The use of rakes will not be permitted.

3. Contact surfaces of curbing, gutters, manholes, etc., shall be painted with a uniform tack coat of hot asphalt cement before material is placed against them.

C. Compaction

1. After spreading, the compaction, unless otherwise directed, shall be performed with a three-wheel or tandem self-propelled roller having a minimum weight of ten tons. Steel wheel rollers shall be equipped with adjustable scrapers to keep rollers clean and with sufficient means of keeping wheels wet to prevent asphalt from sticking to the rollers.

2. The rolling should be completed within 30 minutes of the time the material was spread. Compaction, however, must be completed before the temperature of the asphaltic concrete mixture has dropped below 180°F.

3. Hand held vibrators or small (PUB) roller shall be used in areas not accessible to self-propelled rollers.

4. Roll surfaces in two directions if possible and until no roller marks are visible.

5. The asphaltic concrete material shall be compacted to obtain a density of not less than 95% of the density obtained by laboratory compaction for the surface course, and a density of not less than 90% of the density obtained by laboratory compaction for the binder course. Laboratory compaction is the average density of the material being placed, obtained by the Standard Marshall Method (50 blows top and bottom face).

6. The surface of the mixture after compaction shall be smooth and true to the established crown and grade within the tolerances specified.

7. Finished surfaces shall be free of birdbaths, and shall have no variation greater than 1/8 inch when checked with a 10 foot straight edge, unless otherwise indicated on the drawings.

D. Asphalt Applications.

1. Prime Coat. An asphalt prime coat shall be used on untreated granular base materials. Spray apply under pressure a low-viscosity asphalt on the prepared base surfaces at the rate of 0.2 to 0.5 gal/yd^2. The asphalt should be fully absorbed by the base material and allowed to set and cure before placing the asphaltic paving surfacing.

2. Tack Coat. An asphalt tack coat shall be applied over an existing asphalt surfaces and on surface courses as a binder course to insure bond between the superimposed material and the existing

surface. The tack coat must be very thin and uniformly cover the areas to be paved. Spray apply the tack coat asphalt on the prepared asphaltic concrete surfaces at the rate of 0.05 to 0.15 gal/yd^2.

3. Asphalt Seal Coat. A thin asphalt seal coat surface treatment shall be applied as a waterproofing coat.

3.5 Joints

Joints shall be formed by cutting to obtain a vertical face for the full depth of the course. Paint or spray the face of the joint with RC-70 immediately prior to paving. Joints must present the same texture, density, and smoothness as the other sections of the course.

3.6 Asphaltic Concrete Walks

A. Preparation of Subgrade

The subgrade shall be constructed to the required elevations as shown on the drawings. The subgrade shall be thoroughly compacted and finished to a firm, smooth surface.

B. Forming

In cut areas, the soil shall be boxed out at edges of the walk and forms will not be necessary. In fill areas, the walks shall be formed with 2" x 6" treated or untreated lumber which shall be left in place.

C. The asphaltic base material conforming to paragraph 2.1.7, (General Composition of Mixture for Paving) shall be deposited on dry subgrade, spread uniformly, and compacted.

D. The asphaltic surface course conforming to paragraph 2.1.7, (General Composition of Mixture for Paving) shall be placed and compacted using a weight of roller not to exceed 5 tons.

E. Backfilling and Finishing

All walks shall be neatly finished and graded to the required cross section.

3.7 Asphaltic Curbs

A. Hot plant-mixed asphaltic concrete curbs shall be machine laid and constructed to the lines, grades and typical cross sections shown on the drawings. Exact cross sections of curbs may vary according to steel screeds locally available.

B. Asphalt curbs shall be placed on existing pavement surfaces. Unless otherwise specified, a light tack coat shall be applied before placing the curb. Immediately prior to application of the asphalt tack coat, all loose and

foreign material shall be removed. For proper support on pavement edges, the back of curb shall be at least 2 inches in from the pavement edge.

C. No forms shall be required for machine-placed curbs. Machine laid work usually shall require no additional compaction, but in areas where it is evident that compaction is inadequate, the mix shall be adjusted, forward movement of the machine retarded by braking, or other measures taken to provide adequate compaction.

D. Joints

Asphalt curb construction shall be a continuous operation in one direction to eliminate curb joints. Where conditions exist that this is not practicable, the joints between successive days' work shall be made carefully in a manner that will ensure a continuous bond between old and new sections of the curb.

E. Curing

Curbs shall be protected from traffic by a barricade or other suitable method until the heat of the asphalt mixture has dissipated and the mixture has attained its proper degree of hardness.

3.8 Finish Tolerances

A. Finish all surfaces to the following tolerances:

1. Subgrade and Base Course - Plus 0.00 feet to minus 0.10 feet from line and grade shown on the drawings.

2. Asphaltic Concrete - Plus or minus 0.05 feet at any point from line and grade shown on the drawings.

3.9 Protection

A. No vehicular traffic of any kind shall be permitted on any course for 24 hours.

B. All foreign materials which may have accumulated on the surface of any course shall be removed before the course is rolled or before subsequent courses are placed thereon.

END OF SECTION 02513

SECTION 02936
SEEDING
BIOREMEDIATION FACILITY CIVIL/UTILITIES WORK

PART 1 GENERAL

Provide seed bed preparation, top soiling, fertilizing, seeding, and mulching of all newly graded finished earth surfaces unless indicated otherwise and all areas inside or outside the limits of construction that are disturbed by the subcontractor's operations.

1.1 Section Includes

A. Preparation of subsoil.

B. Placing topsoil.

C. Seeding, mulching and fertilizing.

D. Maintenance.

1.2 Related Sections

A. Section 01010 - Statement of Work

B. Section 02200 - Excavation and Backfilling.

C. Quality Control Plan.

1.3 Definitions

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

B. Stand or turf: 95 percent ground cover of the established species.

C. Topsoil: Fertile, agricultural soil, typical for this locality, capable of sustaining vigorous plant growth, pH and organically adjusted to be compatible with seed mixture specified.

1.4 Submittals

A. Maintenance Data: Include maintenance instructions including: cutting method and maximum grass height, types, application frequency, and recommended coverage of fertilizer.

B. Documentation of seed mixture and composition, fertilizer chemical composition, manufacturer's name and indication of conformance to state and federal laws.

1.5 Regulatory Requirements

A. Comply with regulatory agencies for fertilizer and herbicide composition.

B. Federal Seed Act Rules and Regulations of the Secretary of Agriculture, January 1985 (DOA FSA).

1.6 Delivery, Storage, and Protection

A. Protect seed from drying out and from contamination during delivery, on-site storage, and handling.

B. Deliver grass seed mixture in sealed packages, bearing the producer's guaranteed analysis for percentages of mixtures, purity, germination, weed seed content, and inert material. The seed shall be labeled in conformance with the Department of Agriculture FSA and applicable state seed laws. Seed in damaged packaging is not acceptable. Wet, moldy, or otherwise damaged seed will be rejected.

C. Deliver fertilizer to the site in original, unopened containers bearing the manufacturer's chemical analysis, name, trade name, trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer and lime may be furnished in bulk with a certificate indicating the above information.

All containers shall be properly marked and labeled in accordance with 29 CFR 1910.1200. Material Safety Data Sheets (MSDS) shall accompany the chemical compounds and be reviewed in accordance with the Special Conditions.

D. Store seed, lime, and fertilizer in a cool dry location away from contaminants.

E. Do not drop or dump materials from vehicles.

1.7 Maintenance Service

A. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition for two cuttings.

PART 2 PRODUCTS

2.1 Seed Suppliers

Not Used

2.2 Seed

A. Classification

The seed shall be State approved consisting of the latest season's crop. Field mixes will be acceptable when the field mix is performed on site in the presence of the Contracting Officer.

B. Composition

The seed shall consist of a mixture of the following grasses: Kentucky 31 Fescue, Perennial rye, and Kentucky Bluegrass. The mixture shall consist of 50 lb./ac. Kentucky 31 Fescue, 35 lb./ac. Perennial Rye, and 25 lb./ac. Kentucky Bluegrass for a total of 110 lb. of seed per acre.

C. Components

The pure seed comprising the seed mixture shall have following properties:

Seed	Minimum percent pure seed	Minimum percent germination and hard seed	Maximum percent weed seed
Kentucky 31 Fescue	98	85	0.75
Perennial Rye	95	90	0.5
Kentucky Bluegrass	85	80	0.5

2.3 Top Soil

Top soil shall be obtained from an off-site source free of chemical contaminants. It shall contain from 5 to 20 percent organic matter as determined by the topsoil composition tests of the Organic Carbon, 6A, Chemical Analysis described in DOA SSIR.

Maximum particle size, 3/4 inch, with maximum 3 percent retained on a 1/4 inch screen. Other components shall be within the following ranges:

Silt	25% to 50%
Clay	10% to 30%
Sand	20% to 35%
pH	5 to 7.6
Soluble salts	600 ppm maximum

2.4 Accessories

Fertilizer: FS O-F-241, Type I, Class 2, free flowing, uniform in composition with nitrogen-phosphorus potash ratio of 12 percent Nitrogen, 12 percent phosphorus, and 12 percent soluble potash.

Water shall be suitable for irrigation and free of substances or matter that could inhibit vigorous growth of grass.

Mulch: Mulch shall consist of marsh hay for lawn areas. The hay shall be of an air dry condition and of proper consistency for placing with commercial mulch blowing equipment. Mulch shall be free from noxious weeds, mold, and other deleterious materials.

Erosion Control Materials: The following materials are acceptable for erosion control: Net, fiber or excelsior blanket, chemicals, or vegetable based gels. The net may include heavy twisted jute mesh, plastic net, biodegradable paper fabric with knitted yarns, or standard weave burlap. Chemicals may include petroleum oils and resins in solution or high polymer synthetic resin dispersion. The vegetable based gels may include physiologically harmless, without phytotoxic or crop damaging properties, naturally occurring powder hydrophilic additives formulated to provide gels that will form membrane networks of water insoluble polymers within four hours after application.

PART 3 EXECUTION

3.1 Subgrade Preparation

Verify that the areas required to be turfed have been brought to the required subgrade. Thoroughly till to minimum depth of 6 inches by scarifying, dicing, harrowing, or other approved methods. Remove debris and stones larger than one inch in any dimension remaining on the surface after tillage.

3.2 Placing Topsoil

Immediately before placing topsoil, scarify subgrade to a 2-inch depth for bonding of topsoil with subsoil. If the topsoil is placed immediately after subgrade preparation additional scarifying is not necessary. Spread topsoil evenly to a minimum depth of 4 inches. Do not spread topsoil when frozen, excessively wet, or dry. Correct irregularities in finished surfaces to eliminate depressions. Protect finished topsoil areas from damage by vehicular or pedestrian traffic.

3.3 Fertilizing and Ph Adjustments

A. Apply fertilizer and pH adjuster according to manufacturers' instructions based on type of seed used.

B. Incorporate fertilizer, and pH adjuster into the soil to a minimum depth of two inches.

C. Do not apply fertilizer at same time or with the same machine as will be used to apply seed.

D. Mix thoroughly into upper two inches of topsoil.

E. Lightly water to aid the dissipation of fertilizer.

3.4 Seeding

Note: some surfaces are extreme angles and may require hydroseeding and covering with a mesh fiber to ensure proper germination of the seed.

A. Immediately before seeding, restore soil to the proper grade. Do not seed when the ground is muddy, frozen, snow covered, or in an unsatisfactory condition for seeding. Do not apply seed in excessive winds. If special conditions exist that may warrant a variance in the above seeding conditions, submit a written request to the Contracting Officer stating the special conditions and a proposed variance.

B. Apply seed within 24 hours after seed bed preparation. Apply at a rate of 110 pounds per acre evenly in two intersecting directions. Sow one-half the seed in one direction, and sow the remainder at a right angle to the first sowing. Cover the seed to an average depth of one-half inch by means of spike-tooth harrow, cultipacker, or other approved device.

C. Do not seed areas more than that which can be mulched on same day.

D. Planting Season: Sow seeds from February 1 to May 1 for spring planting and from August 5 to November 30 for fall planting. Sow seeds from May 1 to August 5 for summer planting per Contractors directions.

E. Roll seeded area with a roller not exceeding 90 pounds for each foot of roller width. If seeding is done with a culipack-type seeder or by hydroseeding, rolling may be eliminated.

F. Immediately following seeding and compacting, apply the mulch evenly at a rate of two tons per acre. Anchor by crimping mulch with a serrated disc, or by spraying asphalt emulsion on the mulched surface at 0.02 gallons per square yard. Take precautionary measures to prevent asphalt materials from marking or defacing structures, pavements, utilities, or plants.

G. Apply water with a fine spray immediately after each area has been mulched.

3.5 Seed Protection

A. Identify seeded areas with stakes and string around the area periphery. Set string height to approximately 36 inches and space stakes at approximately 72 inches apart.

B. Subcontractor shall implement erosion control methods for topsoil and seeded areas such as hay bales and storm water runoff diversion. Subcontractor shall provide maintenance of erosion control measures until growth of grasses is sufficient to prevent future erosion.

PART 4 QUALITY CONTROL

4.1 Quality Assurance

A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

B. Provide fertilizer in containers showing manufactures name, type, grade, nutrient proportions, year of production, net weight, date and location of packaging.

C. Turf establishment period will be in effect until turf has been mowed three times. Mow turfed area to an average height of one and one-half inches when the average height of the grass becomes approximately two and one-quarter inches.

D. Final inspection will be made upon written request from the subcontractor at least ten days before the last day of the turf establishment period. Final acceptance will be based upon a satisfactory stand of turf. Areas that do not have a satisfactory stand of turf shall be replanted at the subcontractor's expense.

E. Contractor shall provide Quality Control field inspections as documented in the Quality Control Plan.

PART 5 MEASUREMENT AND PAYMENT

NOT USED

END OF SECTION 02936

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 Description

A. This section describes the requirements for concrete reinforcement in concrete structures and foundations, as shown on the Drawings.

1.2 Related Sections

Section 03300 Cast-In-Place Concrete

1.3 Reference Standards (Latest Edition)

A. ACI 318: Building Code Requirements for Reinforced Concrete

B. ANSI/ASTM A 185: Specifications for Welded Steel Wire Fabric for Concrete Reinforcement

C. ASTM A 615: Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

1.4 Submittals

A. Shop Drawings: Indicate bar sizes, spacing, locations, and quantities of reinforcing steel, bending, and cutting schedules and supporting and spacing devices.

1.5 Quality Assurance

A. Perform work in accordance with ACI 318.

PART 2 PRODUCTS

A. Reinforcing steel shall be made from deformed new billet stock and shall conform to ASTM A 615, Grade 60.

B. Reinforcement chairs shall be non-corrosive.

C. All reinforcement shall be free from oil, mill scale and excessive rust or other coatings that will destroy or reduce bond.

D. Welded Steel Wire Fabric: ASTM A 185 gages, spacing, and dimensions as shown on the Drawings.

E. Tie Wire: Minimum 16 gage annealed type.

F. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions (including load bearing pad on bottom to prevent vapor barrier puncture).

G. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: (Plastic coated steel) type; size and shape as required.

PART 3 EXECUTION

3.1 Installation

A. Accurately form reinforcement to the dimensions indicated.

B. Bend all bars cold. Do not straighten in a manner which will injure the material.

C. Space and position bars as shown on the Drawings.

D. Provide the following concrete minimum protective covering for main reinforcement, unless noted:

1. 3" for all concrete deposited directly against the ground, and for all concrete in liquid retaining structures.

2. 2" for all formed concrete exposed to weather or in contact with the ground or water.

3. 3/4" for concrete slabs and walls and 1-1/2" for beams and girders not exposed to weather nor in contact with the ground.

4. 2" for columns in all cases (protective covering for spirals or ties shall be not less than 1-1/2" nor less than 1-1/2 times the maximum size of coarse aggregate).

5. Concrete protection shall always be at least equal to the diameter of the bars.

E. Splice and tie reinforcement in accordance with the requirements of ACI 318, and shown on the Drawings.

F. No welding of reinforcing steel will be allowed.

END OF SECTION 03200

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 Description

This section describes the requirements to furnish all labor, material, tools, equipment, and supervision necessary for the construction of all plain and reinforced concrete work as called for on the project drawings and as specified herein.

1.2 Related Sections

Section 03200 Concrete Reinforcement

1.3 Reference Standards (Latest Edition)

A.	ACI 211:	Recommended Practice for Selecting Proportions for Normal Weight Concrete
B.	ACI 301:	Structural Concrete for Buildings
C.	ACI 302:	Guide for Concrete Floor and Slab Construction
D.	ACI 304:	Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete
E.	ACI 305R:	Recommended Practice for Hot Weather Concreting
F.	ACI 306R:	Recommended Practice for Cold Weather Concreting
G.	ACI 308:	Standard Practice for Curing Concrete
H.	ACI 347R:	Guide for Formwork for Concrete
I.	ACI 350:	Concrete Sanitary Engineering Structures
J.	ACI 504R:	Guide to Sealing Joints in Concrete Structures
K.	ASTM C 31:	Standard Method of Making and Curing Concrete Test Specimens in the Field
L.	ASTM C 33:	Specification for Concrete Aggregates

M.	ASTM C 39:	Test for Compressive Strength of Cylindrical Concrete Specimens
N.	ASTM C 94:	Specification for Ready-Mixed Concrete
O.	ASTM C 150:	Specification for Portland Cement
P.	ASTM C 172:	Sampling Fresh Concrete
Q.	ASTM C 260:	Standard Specification for Air-Entraining Admixtures for Concrete
R.	ASTM C 330:	Specification for Lightweight Aggregate for Structural Concrete
S.	ASTM C 494:	Specification for Chemical Admixtures for Concrete
T.	ASTM C 948:	Test Method for Dry and Wet Bulk Density, Water Absorption and Apparent Porosity of Thin Sections of Glass Fiber Reinforced Concrete
U.	ASTM D 1751:	Specification for Pre-Formed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types)
V.	ASTM D 1752:	Standard Specification for Pre-Formed Sponge Rubber and Cork Expansion Joint Filler for Concrete Paving and Structural Construction
W.	ASTM D 2103:	Specification for Polyethylene Film and Sheeting
X.	CRD C 572:	Corps of Engineers Specification for Poly (Vinyl Chloride) Water Stops

1.4 Submittals

A. Design Mixes

1. Submit design mixes and laboratory test reports indicating that the concrete ingredients and proportions will result in concrete mixes meeting requirements specified.

B. Hot and Cold Weather Concreting

1. Submit proposed methods for compliance with hot and cold weather requirements.

C. Certificates

1. Submit certificate stating that each admixture used is identical in composition to the sample used for acceptance testing and is compatible with all other materials in the design mix.

D. Batch Tickets

1. Submit delivery ticket from the concrete supplier with each batch delivered to the site, setting forth the following information:

a. Name and supplier

b. Name of batching plant and location

c. Date

d. Serial number of ticket

e. Truck number and batch number

f. Contract number and location

g. Volume of concrete (cubic yards)

h. Class of concrete (2500 psi, 3000 psi, or 4000 psi)

i. Time loaded and amount of water added

j. Type and brand of cement

k. Weight of cement

l. Maximum size of aggregate

m. Weights of fine and coarse aggregates

n. Types and amounts of admixtures

E. Working Drawings

1. Show details of form types, form ties, expansion joints, and construction joints.

1.5 Quality Assurance

A. Perform work in accordance with ACI 301.

B. Maintain one copy of all referenced standard documents on site.

C. Acquire cement and aggregate from same source for all work.

D. Conform to ACI 305R when concreting during hot weather.

E. Conform to ACI 306R when concreting during cold weather.

F. Conform to ACI 504R when installing joint sealer.

G. Conform to ACI 302 when constructing floor slab.

1.6 Supplementary Requirements

This specification shall be supplemented by the following:

A. Design drawings, which shall take precedence over this specification.

B. Applicable technical standards as noted on the design drawings.

C. Local building code requirements.

PART 2. PRODUCTS

2.1 Concrete Materials

A. Cement

Cement shall be Type I Portland Cement, conform to ASTM C150, unless otherwise specified.

B. Fine and Coarse Aggregate

1. Coarse aggregate shall be gravel or crushed stone, well graded from fine to coarse within prescribed limits, meeting the requirements of ASTM C33. Maximum nominal coarse aggregate shall be 1", except for mass or foundation concrete, maximum size shall be 1-1/2".

2. Fine aggregate shall be sand, clean, and sharp.

C. Water

Water used in mixing concrete shall be potable and free of injurious amounts of oils, acids, alkali, sulfates, and other deleterious substances.

D. Aggregate for Lightweight Concrete

Where lightweight concrete is specified on the drawings, the aggregate shall conform to ASTM C 330.

2.2 Admixtures

Approval of the Contractor is required prior to use of admixtures.

A.	Air Entrainment:	ASTM C260
B.	Chemical:	ASTM C494
C.	Fly Ash:	ASTM C618, Class C

2.3 Accessories

A. Bonding Agent

1. Two component epoxy resin "Sonobond" as manufactured by Soneborn Building Products.

2. Two component liquid epoxy or paste "Concresive" as manufactured by Master Builders.

2.4 Joint Devices and Filler Materials

A. Joint Filler (For Interior or Exterior use)

Type "A": ASTM D 1751 asphalt impregnated fiberboard or felt, ½ inch thick, tongue and groove profile.

B. Joint Filler (For Interior use only)

Type "C": ASTM D 1752 premolded sponge rubber fully compressible with recovery rate of 95 percent.

C. Sealant

1. Polysulfide or Epoxy, chemical resistant sealer with minimum range of expansion - contraction of 25 percent

2. Joint primer, backer rod and bond breaker tape, as specified by sealant manufacturer.

2.5 Concrete Mix

A. Concrete for equipment foundations, paving and structural slabs shall have a minimum compressive strength of 3,000 psi in 28 days, unless design requirements warrant use of concrete with higher strength whereas the contract drawings will indicate minimum compressive strength requirements. The concrete shall be normal weight and proportioned in accordance with ACI 211.

B. Concrete for liquid retaining structures shall have a minimum compressive strength of 4,000 psi in 28 days. The concrete shall be proportioned in accordance with ACI 211, subject to the following special requirements:

1. Maximum Water-Cement Ratio: 0.45.

2. Minimum Cement Content: 564 lbs. per cubic yard, unless otherwise specified.

3. Air Content: 6 + 1 percent.

4. Slump: 1" minimum, 3" maximum for footing, 4" maximum for beams, slabs, and walls.

C. Design mixes shall be based on the required over-design factor in ASTM C94, assuming a coefficient of variation equal to 15.

D. Use accelerating admixtures in cold weather only when approved by Contractor. Use of admixtures will not relax cold weather placement requirements.

E. Use of calcium chloride will not be permitted.

F. Use set retarding admixtures during hot weather only when approved by Contractor.

G. Add air entraining agent to normal weight concrete mix for work exposed to exterior.

H. Concrete shall be placed at slumps in accordance with ACI 301, with the exception of concrete placed with super elasticizer.

I. Concrete for electrical duct banks shall have a minimum 9 pounds of red oxide coloring agent added per cubic yard of concrete.

2.6 Formwork

A. The design and construction of the formwork shall be in accordance with the recommendation of ACI 347R.

B. Provide forms for all concrete. Do not use earth cuts for vertical surfaces except when indicated.

C. External corners of structures and foundations above grade shall be formed with one inch chamfer, unless otherwise noted.

D. Forms for beam and girder sides, column and similar vertical structural members may be removed after 24 hours, provided the concrete is sufficiently hard.

E. Supporting forms or shoring shall not be removed until structural members have acquired sufficient strength to safely support their own weight and any construction load, but in no case shall they be removed in less than 7 days.

PART 3 EXECUTION

3.1 Examination

A. Verify site conditions.

B. Verify requirements for concrete cover over reinforcement.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete, are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.2 Preparation

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels, and pack solid with non-shrink grout or epoxy grout as shown on the drawing per manufacturer instruction.

3.3 Placing Concrete

A. Conform to the requirements of ACI 304, Chapter 6, except concrete for liquid retaining structures shall be placed according to the requirements of ACI 350, Chapter 4.

B. Concrete sections more than 3 feet in the least dimension are termed mass concrete and shall conform to the special provision of ACI 301, Chapter 14, in addition to all applicable provisions specified.

C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, and anchor bolts are not disturbed during concrete placement.

D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

E. Do not interrupt successive placement; do not permit cold joints to occur.

3.4 Concrete Finishing

A. Finish concrete surfaces in accordance with ACI 301.

B. Steel trowel surfaces which are scheduled to be exposed.

3.5 Curing and Protection

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Cure concrete in accordance with ACI 308.

3.6 Field Quality Control

A. Field inspection and testing will be performed in accordance with ACI 301.

B. Provide free access to work and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to an inspection and testing firm for review prior to commencement of work.

D. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.

E. Three concrete test cylinders will be taken for every 75 cubic yards or less of each class of concrete placed in one day.

F. One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.

G. One slump test will be taken for each set of test cylinders taken.

3.7 Patching

A. Allow Contractor to inspect concrete surfaces immediately upon removal of forms.

B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Contractor upon discovery.

C. Patch imperfections as directed in accordance with ACI 301.

3.8 Defective Concrete

A. Defective concrete is that which does not conform to required lines, details, dimensions, tolerances, or specified requirements.

B. Repair or replacement of defective concrete will be determined by the Contractor.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Contractor for each individual area.

END OF SECTION 03300

SECTION 13121
SPECIFICATION FOR PRE-ENGINEERED BUILDING

PART 1 GENERAL

1.1 Description

A. This Section describes the design, manufacture and erection of the pre-engineered building and its foundation as shown on the Drawings.

B. The building size and general configuration shall be as shown on the drawings. End walls shall be designed for future expansion.

1.2 References (Latest Edition)

A.	AISC	Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
B.	ASTM A36	Structural Steel
C.	ASTM A153	Zinc Coating (Hot Dip) on Iron and Steel Hardware
D.	ASTM A307	Carbon Steel Externally Threaded Standard Fasteners
E.	ASTM A325	High Strength Bolts for Structural Steel Joints
F.	ASTM A386	Zinc-coating (Hot-Dip) on assembled Steel Products
G.	UBC	Uniform Building Code, 1991 edition.
H.	ASTM D2244	Instrumental Evaluation of Color Differences of Opaque Materials.
I.	ASTM A446	Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (physical) Quality.
J.	ASTM A490	Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints.
K.	ASTM A500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
L.	ASTM A501	Hot Formed Welded and Seamless Carbon Steel Structural Tubing.

M.	ASTM A525	Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.
N.	ASTM A529	Structural Steel with 42,000 psi (290 MPa) Minimum Yield Point.
O.	ASTM A572	High Strength Low Alloy Columbium-Vanadium Steel of Structural Quality.
P.	AWS A2.0	Standard Welding Symbols
Q.	AWS D1.1	Structural Welding Code
R.	FS HH-I-558	Insulation, Blocks, Boards, Blankets, Felts, Sleeving (Pipe and Tube Covering), and Pipe Fitting Covering, Thermal (Mineral Fiber, Industrial Type)
S.	SSPC	Steel Structures Painting Council

1.3 System Description

A. Rigid frame and gable roof, clear span with no interior columns.

B. Site location - The Southwest quadrant of the Crane NSWC, near Crane, Indiana

C. Subcontractor shall design, fabricate, and erect the three buildings and their foundations at the site location as specified above.

D. Each building shall have a mesh fabric installed on the sides and one end to provide shielding from wind and help contain fugitive dust. The mesh shall be attached at ground level. Provisions shall be made for easily opening the mesh on the end. Provisions shall be made for the use of mesh on the front of the building, also, if required in the future.

E. The design of the buildings shall allow for the addition of standard metal walls on the sides and sliding doors on both ends to completely enclose the buildings at some time in the future.

1.4 Design Requirements

A. General

Completed buildings shall be fabricated to provide completed structures free of excessive noise from wind-induced vibrations under ordinary weather conditions, and in accordance with requirements of the Metal Building Manufacturers Associated "Recommended Design Practices Manual," current issue, excepting the following qualifications:

1. Structural Steel: Structural steel shall be designed in

accordance with the latest edition of AISC "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings," and with the latest edition of AISI "Specification for Design of Cold-Formed Steel Structural Members."

2. Loadings: Building shall be designed for the dead load, the specific live loads, and the combinations of these loads as specified in UBC, 1991, with Indiana Amendments. Reduction of load due to tributary loaded area will not be permitted. In addition to dead load, the following loads shall be included:

Live Load:	Roof live load 20 pounds per square foot on horizontal projection.
Wind Load:	Per UBC, 1991, with Indiana Amendment
Snow Load:	Per UBC, 1991, with Indiana Amendment
Auxiliary Loads:	Include uniform load of 10 psf to allow "For Weight of future Mechanical and Electrical Equipment."

3. Framed Openings: Framed openings shall be designed to replace structurally the covering and framing displaced. Include door openings for all doors specified hereinafter.

4. Welding of Steel: Welding shall be in accordance with AWS D1.1.

5. Deflections: Maximum live load deflection of roof sheets shall not exceed 1/180th span between supports. Maximum deflections shall be based on sheets continuous across two or more supports with sheets fastened and fully free to deflect. Roof purlins shall have a depth not less than 1/40 span. Roof purlins shall have maximum live load deflection not greater than 1/180 span.

6. Foundations: Designed per UBC, 1991, with Indiana Amendments and ACI-318, latest revision.

1.5 Submittals

A. Shop Drawings

For all metal building designs, the shop drawings shall be accompanied by engineering design calculations for structural and covering components, signed by a registered professional engineer licensed to practice in the state where the project is located. For computer programmed designs, shop drawings shall be accompanied by stress values and a certificate, signed by a registered professional engineer

licensed to practice in the state of Indiana, stating design criteria and procedures used, listing input-output descriptions, and attesting to the adequacy and accuracy of the design. The shop drawings shall have the following minimum information:

1. Indicate wall and roof system dimensions, panel layout, general construction details, anchorage, method of anchorage, and method of installation.

2. Indicate framing anchor bolt settings, sizes, and locations from datum and foundation loads.

3. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.

4. Product Data: Provide data on profiles, components dimensions and fasteners.

5. Manufacturer's standard range for each roof and wall profile.

6. Manufacturer's Installation Instructions: Indicate preparation requirements and assembly sequence.

B. Foundations: The foundation drawings shall be accompanied by engineering design calculations signed by a registered professional engineer licensed to practice in the state where the project is located.

1.6 Quality Assurance

A. Fabricate structural steel members in accordance with AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

1.7 Qualifications

A. Manufacturer: Company specializing in manufacturing the products specified in this specification shall have a minimum of five years documented experience.

B. Design work and structural components under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the state where the Project is located.

1.8 Regulatory Requirements

A. Subcontractor shall conform to applicable Uniform Building Code requirements for submission of design calculations, review of shop drawings, and Life, Safety Code requirements for acquiring permit.

B. Subcontractor shall cooperate with regulatory agency or authority and provide data as requested.

1.9 Warranty

A. Building Warranty

All buildings shall be guaranteed against water leaks arising out of or caused by ordinary wear and tear by the elements for a period of five years. Leaks caused by hurricane, lightning, tornado, gale, hail storm or other unusual phenomena shall not be deemed to be ordinary wear and tear by the elements.

B. Finish

The finish on exterior exposed surfaces of roof and wall sheets and the accessories shall be guaranteed for a period of 20 years against blistering, peeling, cracking, flaking, chalking, and chipping and that the color will not change in excess of 5 N.B.S. units as determined in accordance with ASTM D 2244.

PART 2 PRODUCTS

2.1 Materials - Framing

A. Structural Steel Members: ASTM A572, Grade 50.

B. Structural Tubing: ASTM A500, Grade B

C. Plate or Bar Stock: ASTM A529.

D. Anchor Bolts: ASTM A307, galvanized to ASTM A386, Class B.

E. Bolts, Nuts, and Washers: ASTM A325, galvanized to ASTM A153.

F. Welding Materials: AWS D1.1; type required for materials being welded.

G. Primer: SSPC 15, Type 1, Red Oxide.

H. Grout: Non-shrink type, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, capable of developing minimum compressive strength of 2400 psi in two days and 7000 psi in 28 days.

I. Concrete: Per Section 03300.

J. Concrete Reinforcement: Per Section 03200.

2.2 Materials - Wall and Roof System

A. Sheet Steel Stock: ASTM A446, Grade A with a galvanized coating conforming to ASTM A525, Grade 90 designation.

B. Joint Seal Gaskets: Manufacturer's standard.

C. Fasteners: Manufacturer's standard type, galvanized to ASTM A386 1.25 oz/sq ft finish to match adjacent surfaces when exterior exposed.

D. Sealant: Manufacturer's standard, non-staining, elastomeric.

2.3 Fabrication - Wall and Roof Systems

A. Siding: shall be 24 gauge minimum metal thickness, with configurations for interlocking ribs for securing adjacent sheets.

B. Roofing: shall be 24 gauge minimum metal thickness, standing seam configuration. Depth of configuration shall be the building manufacturer's standard provided all design criteria are met.

C. Soffit Panels: shall be 24 gauge minimum metal thickness, V crimped profile, perforated for ventilation.

D. Girts/Purlins: Rolled formed structural shape to receive siding, roofing and liner sheet.

E. Internal & External Corners: Same material thickness and finish as adjacent material, profile (brake formed) shop cut and factory metered to required angles. Back brace metered internal corners with 22 gauge thick sheet.

F. Expansion Joints: Same material and finish as adjacent material where exposed, 22 gauge thick, (manufacturer's standard brake formed) (infill) type, of profile to suit system.

G. Flashing, Closure Pieces, Facia, Infills and Caps: Same material and finish as adjacent material, profile to suit system.

H. Fasteners: To maintain load requirements, and weathertight installation, same finish as cladding, non-corrosive finish.

I. Ventilator: Gravity type, low profile complete with base, bird screen, hood and flashing.

2.4 Finishes

A. Framing Members: clean, prepare, and galvanize to ASTM A386, Class B.

B. Exterior Surfaces of Wall and Roof Components and Accessories: Precoated enamel on steel of modified silicone finish, color as selected from manufacturer's standard range.

C. Interior Surfaces of Wall and Roof Component and Accessories: Precoated enamel on steel of modified silicone finish, color as selected from manufacturer's standard range.

PART 3 EXECUTION

3.1 Examination

A. Verify site conditions.

B. Verify that mechanical and electrical utilities are in correct position.

3.2 Construction - Foundation

A. Construct building foundation, backfill and compact as specified.

B. Verify anchor bolt size, location and projection are per drawings.

3.3 Erection - Framing

A. Erect framing in accordance with AISC Specification.

B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.

C. Set column base plates with non-shrink grout to full plate bearing.

D. Do not field cut or alter structural members without approval of Architect/Engineer.

E. After erection, prime welds, abrasions, and surfaces not galvanized.

3.4 Erection - Wall and Roofing Systems

A. Install in accordance with manufacturer's instructions.

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

C. Fasten cladding system to structural supports, aligned level and plumb.

D. Locate end laps over supports. End laps minimum two inches. Place sidelaps over bearing.

E. Provide expansion joints where indicated.

F. Use fasteners per manufacturer's recommendations.

G. Install sealant and gaskets to prevent weather penetration.

H. System: Free of rattles, noise due to thermal movement and wind whistles.

3.5 Installation - Accessories

Seal wall and roof accessories watertight and weather tight with sealant in accordance with manufacturer's recommendation.

3.6 Tolerances

A. Framing Members: ¼ inch from level; 1/8 inch from plumb.

B. Siding and Roofing: 1/8 inch from true position.

END SECTION 13121

SECTION 15100
CPVC UNDERGROUND STORAGE TANK

PART 1 GENERAL

1.1 Work Included

A. This section covers the labor, materials and equipment necessary for the Subcontractor design, purchase and installation of below ground CPVC piping and fittings.

B. Provide new CPVC thermoplastic piping systems, complete and ready for operation. Piping systems including manufacturer's products shall be in accordance with the standards and codes mentioned in this specification and any applicable local codes and laws having jurisdiction.

1.2 References

The publications listed below form a part of this specification to the extent referenced. Specifications listed refer to the latest edition. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME/ANSI B16.5a	Pipe Flanges and Flanged Fittings
ASME/ANSI B16.21	Nonmetallic Flat Gaskets for Pipe Flange
ASME B31.3	Chemical Plant and Petroleum Refinery Piping

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 193	Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service
ASTM A 194	Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service
ASTM C177	Test Method for Steady State Heat flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus.
ASTM D 256	Test Method for Impact Resistance of Plastics and Electrical Insulating Materials
ASTM D 570	Test Method for Water Absorption of Plastics

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
(Continued)

ASTM D 635	Test Method for Rate of Burning and/or Extent and Time of Burning of Self Supporting Plastics in a Horizontal Position.
ASTM D 638	Test Method for Tensile Properties of Plastics
ASTM D 648	Test Method for Deflection Temperature of Plastics Under Flexural Load.
ASTM D 695	Test Method for Compressive Properties of Rigid Plastics
ASTM D 696	Test Method for Coefficient of Linear Thermal Expansion of Plastics
ASTM D 290	Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM D 292	Test Methods for Specific Gravity (Relative Density) and Density of Plastics by Displacement
ASTM D 1784	Rigid Poly (Vinyl Chloride (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D 2321	Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications
ASTM D 2863	Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)
ASTM F 439	Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
ASTM F 441	Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
ASTM F 493	Solvents Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings

1.3 Submittals

Submit the following information for approval by Contractor:

A. Manufacturer's Catalog Data

1. Pipe and fittings

2. Valves

B. Material Safety Data Sheets for materials and solvents.

PART 2 PRODUCTS

2.1 Pipe and Fittings

A. Design

The pipe and fittings supplied under this specification shall be designed in accordance with ASME B 31.3 and all applicable ASTMs referenced herein.

1. Pipe shall have a schedule 80 wall thickness per ASTM F441 and plain ends.

2. Fittings shall have a schedule 80 wall thickness and socket ends per ASTM F439.

B. Materials

1. The pipe and fittings supplied under this specification shall be chlorinated poly vinyl chloride (CPVC) material conforming to ASTM D 1784 with a class designation of 23447-B.

2. Properties

TABLE 1

(CPVC) CHLORINATED POLYVINYL CHLORIDE

Specific Gravity		ASTM - D792	1.55
Water Absorption	%/24 hrs. @ 73◦ F.	ASTM - D570	.05
Tensile Strength	psi @ 73◦F.	ASTM - D638	8,400
Modules of Elasticity in Tension	psi @ 73◦F x 105	ASTM - D638 "E"	4.2
Flexural Strength	psi	ASTM - D790	15,600
Izod Impact	78◦ft. lbs/in. notched	ASTM - D256	3.0
Compressive Strength	psi	ASTM - D695 "o"	9,000 - 22,000

TABLE 2

(CPVC) CHLORINATED POLYVINYL CHLORIDE

Poison's Ration "v"			.35 - .38
Working Stress	@ 73◦F psi "S"	2,000	
Coefficient of Liner Expansion	in/in ◦F x 105	ASTM - D696 "e"	3.8
Thermal Expansion	inches per 10◦F	change per 100' of pipe	½"
Resistance to Heat	◦F Continuous		210◦F
Heat Distortion Temp	66 psi	ASTM - D648	238
Heat Distortion Temp	◦F @ 264 psi	ASTM - D648	221
Thermal Conductivity	BTU/hr/sq. ft/◦F/in.	ASTM - C177 "k"	.95
Burning Rate		ASTM - D635	Self Extinguishing
Limiting Oxygen	Index (%)	ASTM - D2863-70	60

TABLE 3

MAXIMUM OPERATING PRESSURES (PSI) AT 73°F AMBIENT

	CPVC SCHEDULE 80	
Nominal Size	Solvent Weld	Threaded
1/4	1130	-
3/8	920	-
½	850	420
3/4	690	340
1	630	320
1-1/4	520	260
1-1/2	471	240
2	400	200
2-1/2	425	210**
3	375	190**
4	324	160**
6	280	N/R
8	250	N/R
10	230	N/R
12	230	N/R

** For threaded joint properly backweld with solvent weld.

TABLE 4

TEMPERATURE CORRECTION FACTORS

Operating Temperatures °F	CPVC
73	1.00
80	.94
90	.86
100	.78
110	.71
120	.64
130	.57
140	.50
150	.43
160	.37
180	.25
200	.18
210	.16

TABLE 5

MAXIMUM OPERATING PRESSURE (PSI) FOR FLANGED SYSTEMS

Operating Temperatures °F	CPVC
100	150
110	145
120	135
130	125
140	110
150	100
160	90
170	80
180	70
190	60
200	50
210	40

C. Workmanship, Dimensions and Markings

1. The pipe supplied under this specification shall have the workmanship, dimensions and markings stated in ASTM F441.

2. The fittings supplied under this specification shall have the workmanship, dimensions and markings stated in ASTM F439.

D. Solvent Cements

The solvent cements for chlorinated poly (vinyl chloride) (CPVC) plastic pipe and fittings shall be in accordance with ASTM F493.

E. Government/Military Procurement

Responsibility for inspection, packaging and marking for US Government Procurement shall be in accordance with the applicable supplementary requirements stated in ASTM F441 and ASTM F439.

2.2 Valving

A. Ball valves, ball check valves and plug valves shall be used.

B. Valve bodies and bonnets shall be CPVC (ASTM D1784) with viton seats/o-rings or ductile iron bodies with PTFE liner.*

C. Pressure temperature rating for 150 psig valves and dimensions shall be manufacturer's standard.

* Annular spacer rings are required when mating raised faced PTFE/PFA lined valves to flat faced CPVC flanges. These rings shall be made from PTFE material with dimensions (thickness, inside and outside dimensions) obtained from the valve manufacturer.

2.3 Miscellaneous Piping Components

A. Flanges - Class 150

1. Facing dimensions for flanges shall be per ASME/ANSI B16.5.

B. Gaskets

1. Gaskets shall be 1/8" thick, class 150, full faced, EPDM material per ANSI B16.21.

C. Bolting

1. Bolting shall be ASTM A 193 Gr. B7 stud bolts, each with two heavy hex nuts, ASTM A 194 Gr. 2H and two SAE stainless steel flat washers.

2.4 Transitions

All transitions from CPVC piping and components to metallic piping and components shall be made with flat faced flanges. Threaded adapters shall be utilized only where absolutely necessary.

PART 3 EXECUTION

3.1 Unloading and Handling

Unless otherwise stated, all pipe and fittings shall be unloaded at the point of delivery, moved to the site designated by the Contractor, and distributed as required by the Subcontractor. Unloading of pipe and fittings shall be handled

with reasonable care and effort. A palletized load of pipe shall never be pushed or dragged from a truck bed. Pipe shall not come into severe contact with sharp objects such as corners of truck beds, loading docks and buildings, forks or forklift trucks, and rocks or other obstacles on the ground.

3.2 Storage

Pipe shall be stored in a flat dry location to avoid bending and contamination. Palletized pipe should be stacked with wooden pallet bracings touching each other. Fittings shall be stored in their original packaging. The pipe fittings shall be stored in a dry indoor location.

3.3 Installation Recommendations

A. Handling

B. Because of lower impact resistance than steel, CPVC pipe and fittings shall be handled with care and shall be protected accordingly in high impact areas.

C. Solvent Cement Welding

The method of joining CPVC pipe and components shall be in accordance with the manufacturer's recommended basic steps. These manufacturer's procedures for preparation, insertion and curing shall be followed. The applicable specification for solvent welding is ASTM F493.

D. Trench Preparation

Trench excavation, minimum trench width and cover installation guidelines and other key considerations in the underground installation of thermoplastic pipe, shall meet the minimum requirements and guidelines shown in standard practice ASTM D-2321 and final details to be approved by the Contractor.

E. Allowance for Underground Contraction

Installation and operating temperatures for underground pipelines frequently vary. Allowance for thermal expansion and contraction shall be made by snaking the pipe in the trench. When installation temperature is lower than the operating temperature, the pipe shall be installed in straight alignment and brought up to operating temperature after the joints are cured but before backfilling.

When installation temperature is higher than the operating temperature, the pipe shall be installed by "snaking" in the trench.

ALLOWANCE FOR UNDERGROUND CONTRACTION

Loop Length (feet)	Max. Temp. Variation °F Between Installation and Final Operation									
	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°
	Loop Offset From Trench Centerline (Inches)									
20	3.0	3.5	4.5	5.0	6.0	6.5	7.0	7.0	8.0	8.0
50	7.0	9.0	11.0	13.0	14.0	15.5	17.0	18.0	19.0	20.0
100	13.0	18.0	22.0	26.0	29.0	35.0	35.0	37.0	40.0	42.0

3.4 Bedding, Compacting and Backfilling

A. General

1. The backfilling shall be carried out in accordance with one of the four following sub-sections, or otherwise specified by the Contractor.

2. Unless otherwise specified by the Contractor, the haunching and initial backfill shall be compacted before the leakage test, and the remainder of the backfill placed and compacted following a satisfactory test. In all cases the haunching and initial backfill material shall be placed and compacted to provide support as specified by the Contractor.

B. Class I and II Materials

The material used for bedding (if required), haunching, and initial backfill shall be graded crushed stone, gravel, or sand containing a maximum particle size of 1-1/2 inches, granular and non-cohesive. It shall be placed in six (6) inch layers and compacted as specified by the Contractor. Care shall be taken to ensure that the haunching is well-placed under the pipe and that the pipe is not moved in the process. These materials need not be used for final backfilling. Unless otherwise specified, the final backfill to finished grade may be the excavated material or other soil, not frozen, and free from voids, lumps of clay, stones, construction debris and boulders over eight (8) inches in their longest dimension, or other unsuitable substances.

C. Class III Materials

Class III materials, fine sand, and sandy clay or gravel-clay mixtures shall be used the same as Classes I and II except that the standard proctor density required shall be 80% or more as specified by the Contractor and as determined by the ASTM D698-58T test for compaction and density of soil. This may normally be obtained by walking on soil placed in six (6) inch layers or by hand-tamping same with wooden tampers.

D. Backfill Under Roads

Trenches in the right-of-way of a road shall be backfilled to finished grade with an approved granular material to a compaction density of 95% of the maximum standard proctor density or as specified by the Contractor. The road surface shall be patched to meet existing thickness and grade.

E. Backfill Under Dikes

Trenches through dikes, where shown on the applicable drawings shall be backfilled to return the dike to its original condition.

3.5 Boring and Jacking

A. Road crossings, railroad crossings, and crossings of containment dikes may be accomplished by boring and jacking.

B. Subcontractor shall be responsible for maintaining line and grade of all bored pipelines to within tolerances allowed by industry standards.

C. Boring equipment pits shall be backfilled to match the original condition of surrounding features.

PART 4 QUALITY CONTROL

4.1 General

These piping systems including fixtures, equipment, materials, installation, and workmanship shall be in accordance with the ASME B 31.3 Piping Code except as modified herein.

4.2 Inspection, Examination and Testing

Inspection, examination and testing of chlorinated poly vinyl chloride (CPVC) piping system shall be in accordance with ASME B31.3, Chapter VII, Part 10.

A. Subcontractor shall inspect and examine all of the CPVC piping system. All testing of this piping system shall be witnessed by the Contractor.

END OF SECTION 15100

SECTION 16400
INSTALLATION OF ELECTRICAL UTILITIES

1.0 SCOPE

1.1 General

This specification covers the general requirements for the installation of the electrical materials and equipment for the Bioremediation Facility at the Naval Surface Warfare Center, Crane, Indiana.

1.2 Control Documents

The scope and extent of work shall be as defined by these specifications and Morrison Knudsen/Jacobs Engineering Group drawings numbered E-100 through E-109, inclusive.

1.3 Contractor

For the purposes of these specifications, the term "Contractor" shall mean Morrison Knudsen Environmental Group.

2.0 CODES

All electrical facilities shall comply with the latest edition of applicable codes and regulations in effect at the Bioremediation Facility in Crane, Indiana. Applicable codes shall include, but not be limited to:

NFPA 70, National Electrical Code
National Electrical Safety Code
OSHA Regulations

3.0 RECOGNIZED LABORATORY COMPLIANCE; ACCEPTABLE EQUIPMENT AND MATERIALS

3.1 All electrical materials and equipment shall be labeled or listed by a Nationally Recognized Testing Laboratory (NRTL). Equipment and materials not available with an NRTL label or listing shall, insofar as practical, be assembled from components having an NRTL label or listing

3.2 Equipment and materials not having an NRTL label or listing shall be built in accordance with published UL standards and shall be approved by the Contractor prior to installation.

3.3 All electrical equipment and materials shall have the approval of the authority having jurisdiction.

3.4 Electrical equipment and materials shall be the manufacturer's make and model where specified on the drawings unless specifically approved by the Contractor.

4.0 DRAWINGS

4.1 The construction drawings shall be accurately followed. In the case of a discrepancy, the matter shall be reported immediately to the Contractor for resolution.

4.2 Underground conduit and cable routings are shown on the drawings diagramatically; exact routing shall be as determined by the Contractor and Electrical Subcontractor in the field.

4.3 One complete set of "as-built" drawing prints shall be maintained exclusively for record purposes. All changes, modifications and additions shall be shown and noted thereon. This set of "as-built" prints shall be given the Contractor upon completion of the electrical work prior to acceptance.

5.0 SHIPMENT, STORAGE AND PROTECTION OF EQUIPMENT

5.1 All electrical equipment and materials shall be properly stored and protected from damage at all times. Storage, protection and security shall be at the Electrical Subcontractor's expense and risk. Storage and protection shall be in compliance with manufacturer's recommendations unless stated otherwise by the Contractor in writing.

5.2 Storage shall be inside a clean, dry building or enclosed shelter, unless material can be stored outdoors without suffering damage (e.g.: RGS conduit, copper ground cable, etc.).

5.3 All protective finishes that have sustained damage during storage or installation shall be properly repaired. The material used and the method of application shall be compatible with the original equipment manufacturer's finish and shall be approved after completion of the repair by the Contractor.

6.0 CONSTRUCTION POWER

6.1 Temporary construction power shall be furnished by the Electrical Subcontractor as required.

6.2 All single phase construction receptacles shall be Ground Fault Current Interrupter type and shall be supplied, installed and maintained by the Electrical Subcontractor.

7.0 CONDUIT INSTALLATION

7.1 All conduit shall be Rigid Galvanized Steel (RGS), with the exception of protected, non-load-bearing indoor circuits (e.g.: receptacle circuits in the Compost

Buildings), which may be Electrical Metallic Tubing (EMT).

7.2 All conduits shall be sized as per the drawings. Where no conduit sizes are given, the electrical Subcontractor shall size the conduit in accordance with the 1996 edition of the National Electrical Code (NFPA 70). In no case may the conduit be sized less than 3/4 inch.

7.3 Conduit shall be cold cut square. Field made threads shall be cut clean and true with sharp, unworn dies. The threads shall be cut to the proper length and depth for standard 3/4 inch taper per foot threads. Thread cutting lubricant shall be used. All threaded ends and cut ends shall be reamed after threading to remove burrs and rough edges.

7.4 All conduit runs shall be installed with a minimum number of bends and offsets. Generally, a run of conduit shall have a maximum pulling distance of 300 feet and contain no more than three and one-half quarter bends (315 degrees total), including offsets. Should an individual conduit run exceed these requirements, approval of the Contractor shall be required.

7.5 All underground bends shall be "long-radius" bends. The radius for conduit bends containing 15 KV cable shall be a minimum of 30 inches. For 600 V cables, the minimum radius shall be six times the diameter of the conduit.

7.6 All RGS conduit connections shall be threaded. The threads of all fittings, including cover screws and bolts, shall be coated with a conductive thread lubricant prior to installation to protect against corrosion. All EMT conduit connections shall be the compression type.

7.7 Conduit unions shall be installed at removable devices, such that the devices can be easily and independently removed. All HID lighting fixtures located in the Compost Buildings shall have a union installed between the fixture and the swivel (for the center row of fixtures) or between the fixture and the tee (for the outside rows of fixtures).

7.8 Couplings or other fittings shall not be installed in the curved portion of bends.

7.9 Not all fittings required for a complete conduit system are shown on the drawings. It shall be the electrical Subcontractor's responsibility to install the number, size, and type of fittings required for a complete system which complies with all applicable codes and standards as well as industry-accepted practices.

7.10 Pull fittings, including 90 degree ell fittings, shall be adequately sized so that cables can be installed without bending on a radius less than NEC requirements.

8.0 UNDERGROUND CONDUIT REQUIREMENTS

8.1 All underground conduit shall be RGS.

8.2 All underground conduit shall be encased in minimum 2000 psi concrete for a minimum of three inches on each side and four inches on the top. At least the top four inches of concrete shall be colored red throughout (approximately 10 pounds of iron oxide per cubic yard of concrete).

8.3 The top of the concrete encasing underground conduit runs shall be installed a minimum of 36 inches below grade. Conduit stub-ups shall be encased all-around in 2000 psi minimum red concrete. The concrete encasement shall be a minimum of four inches thick at every point.

9.0 WIRE AND CABLE INSTALLATION

9.1 All conductors shall be stranded copper and shall be sized as per the drawings. Where wires are not sized on the drawings, it shall be the electrical Subcontractor's responsibility to size the wires as per the 1996 edition of the National Electrical Code. In no case may wires smaller than #12 AWG be used.

9.2 All 600 V wire shall be thermoplastic-insulated wire (THWN) unless noted otherwise on the drawings.

9.3 All medium voltage wire 5 KV through 15 KV shall be 133% ethylene propylene rubber (EPR) insulated power cable with a PVC jacket and a copper tape shield. Medium voltage cable shall be rated at 90° C continuous with 250° C short circuit rating.

9.4 All wire and cable shall be kept on reels or in shipping boxes at the feeding end of the wire pull. No wire or cable which has damaged insulation or jackets may be installed. All wires and cables shall be wiped clean at a point just before entry into the conduit system. Cable lubricants shall be used on every cable pull. Such lubricants shall be approved by the cable manufacturer and shall be compatible with the cable jacket and insulation.

9.5 Pulling tensions on medium voltage cables shall be continuously observed when they cannot be easily pulled by hand. A written report of such pulling tensions shall be furnished to the Contractor prior to acceptance.

9.6 Splices shall not be permitted in medium voltage cables. Medium voltage terminations shall be 3M cold-shrink or Contractor-approved equal.

9.7 All medium voltage cables shall be HIPOTed to the cable manufacturer's recommended levels after installation and application of the medium voltage termination and prior to connection. The electrical Subcontractor shall give the Contractor seven days notice prior to testing the cable. The Contractor reserves the right to witness the HIPOT testing.

9.8 Where practical, wire shall be continuous from power source to equipment. Wire splices and taps (600V) shall be made with solderless connectors and taped with three layers of half-lapped Scotch No. 33 electrical tape.

9.9 All 600 V wire shall be meggered at greater than 20 megohms after installation and prior to connection to the equipment. The electrical Subcontractor shall give the Contractor seven days notice prior to testing the cable. The Contractor reserves the right to witness the meggering of the cable.

10.0 LIGHT FIXTURES

10.1 All lighting fixtures shall be installed in accordance with the applicable drawings. All fixtures shall be aligned with the surrounding members to present a symmetrical, finished installation. Wires used to connect the fixtures shall conform to the heat range listed on the device.

10.2 The location and height of the fixtures shall be as designated on the drawings and may only be modified with the approval of the Contractor.

10.3 Rows of fixtures shall be installed accurately and in a straight line. Supports shall be rigidly mounted so they are not damaged during routine maintenance.

11.0 DISTRIBUTION PANELBOARDS AND RECEPTACLES

11.1 Panelboards shall be the of the manufacturer and model shown on the drawings unless approved otherwise by the Contractor.

11.2 Panelboards shall be provided with a circuit directory sheet that correctly lists the circuit associated with each circuit breaker.

11.3 All outdoor and compost building receptacles shown on the drawings shall be of the weatherproof style with spring-loaded covers.

11.4 All receptacles shall be mounted a minimum of 24 inches above the finished floor or finished grade, unless otherwise indicated on the drawings.

12.0 GROUNDING INSTALLATION

12.1 A reliable, low-resistance grounding system shall be provided to ground transformer neutrals, noncurrent-carrying metal parts of al electrical apparatus, metallic conduit, steel structures and fences around electrical equipment. It shall be the electrical Subcontractors responsibility to adequately ground all the above named metallic components whether specifically detailed on the drawings or not.

12.2 The resistance of the completed ground system before connection to the conduit system or building structures shall be less than one ohm.

12.3 All grounding conductors shall be made of soft-drawn, stranded copper wire. All exposed grounding conductors shall be adequately protected from mechanical

injury.

12.4 All ground rods shall be copperweld, 3/4 inch by 10 feet long minimum size. Maximum resistance between individual ground rods and earth shall be 5 ohms. Additional rods shall be installed in parallel or the rod shall be extended and driven deeper if required to obtain 5 ohms.

12.5 All ground grid connections shall be by the exothermic process, Cadweld or Contractor-approved equal.

13.0 SITE CLEAN-UP

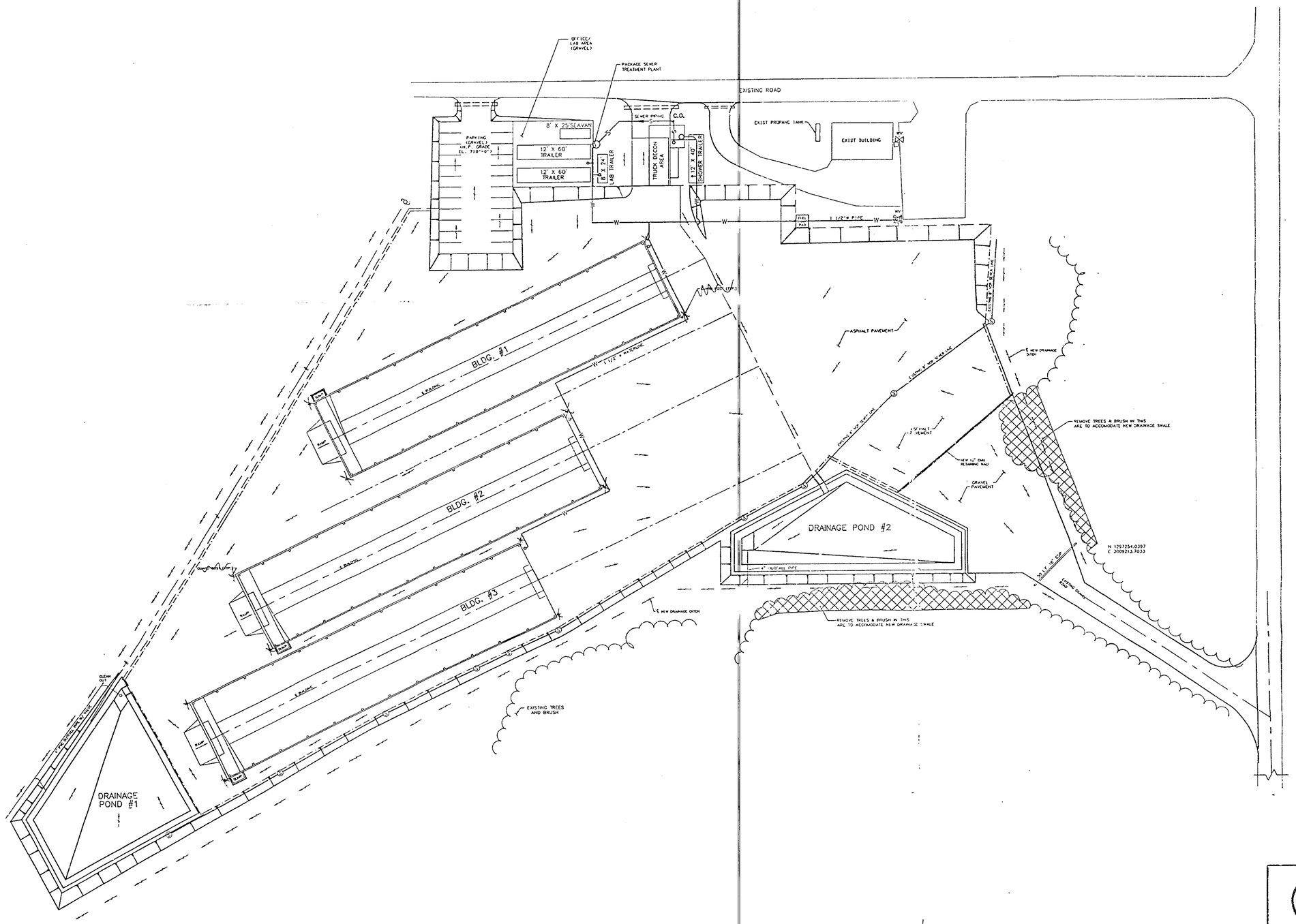
13.1 At the completion of the work, the electrical Subcontractor shall ensure that the work area is clean and orderly before leaving.

END OF SECTION 16400

APPENDIX C
DRAWINGS

LIST OF DRAWINGS

C-100	Master Site/Drainage Plan
C-101	Work Area Paving Layout
C-102	Compost Building Paving Layout
C-103	Office/Lab Area Layout
C-104	Haul Road Layout & Paving Sections
C-105	Work Area Drainage Plan
C-106	Compost Building Area Drainage Plan
C-107	Office/Lab Area Drainage Plan
C-108	South Haul Road - Profile
C-109	Cross Sections - Sheet 1
C-110	Cross Sections - Sheet 2
C-111	Cross Sections - Sheet 3
C-112	Miscellaneous Details
S-100	Decon Area Concrete Plan & Sections
S-101	Decon Area Con Sections & Elevations
S-102	Decon Area Concrete Sections & Details
S-103	Miscellaneous Details
~~S-104~~	~~Miscellaneous Details~~
E-100	Electrical - Key Plan
E-101	Electrical - Power Plan
E-102	Electrical - Grounding Plan
E-103	Electrical - Power Details
E-104	Electrical - Lighting Fixture Schedule, B.O.M. & Legend
E-105	Electrical - Typ. Lighting for Bldgs. #1, #2 & #3
E-106	Electrical - Power Details
E-107	Electrical - Schematics & Lighting Details
E-108	Electrical - Typical Grounding Details
E-109	Electrical - Panel Schedules
S-1	Site Plan
F-1	Foundation Plan
F-2	Foundation Sections
F-3	Ramp and Sump Sections
A-1	Architectural Elevations
A-2	Sump Details
E-1	Roof Framing Plan
E-2	Sidewall Framing Plan
E-3	Endwall Framing Plan
E-4	Endwall Sheeting Plan
E-5	Details
~~E-6~~	Bolt Setting Plan
F-1	



Delete guardpost @ buildings 1, 2 & 3.

LEGEND

- DENOTES DRAINAGE FLOW
- DENOTES NEW ASPHALT BERM
- DENOTES EXISTING POWER POLE
- DENOTES EXISTING SANITARY SEWER MANHOLE
- DENOTES NEW WATER LINE (INSTALL 3' BELOW GRADE)

FOR CONSTRUCTION

MORRISON KNUDSEN ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	C-100	0	1"=40'

DWG. TITLE: BIOREMEDIATION FACILITY
CRANE N.S.W.C.
MASTER SITE/DRAINAGE PLAN

REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE

MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	GL	GL	RR	1/96

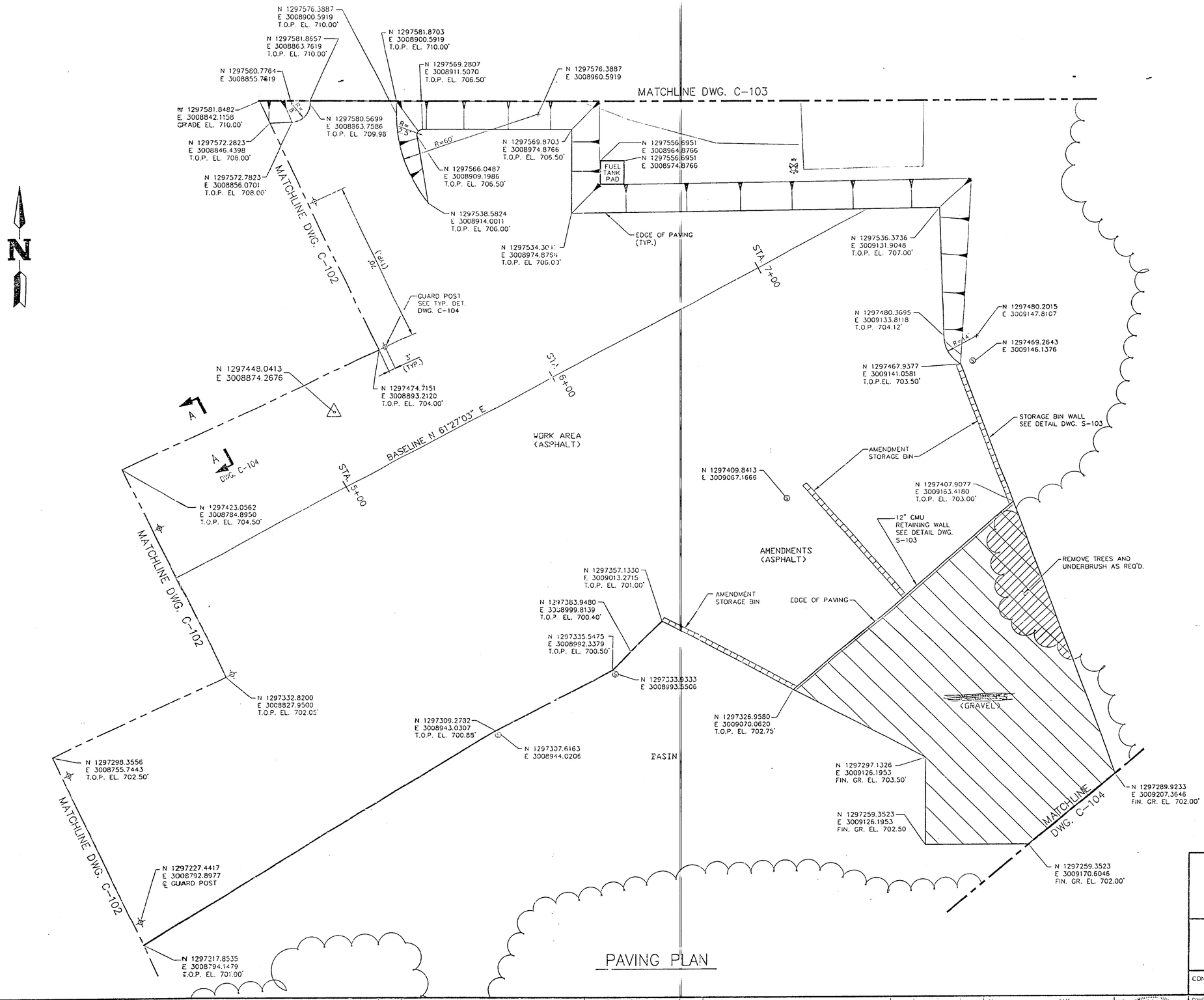
DRAWN: FRM DATE: 11-16-95
CHECKED: GWL 1/96
APPROVED: RR 1/96
APPROVED:

SEAL: STATE OF LOUISIANA — RICHARD W. LUNDEEN — CIVIL ENGINEERING

BLOCK NAME = DSIZE VER.03/08/89

JOB# 07J93900 FILE: C-100 DATE: 01/25/96 <09:20> OPER: FMILES

DIR# _____ DWG# _____



FOR CONSTRUCTION

PAVING PLAN

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	C-101	0	1"=20'

DWG. TITLE
BIOREMEDIATION FACILITY
CRANE N.S.W.C.
OK as is.
→ ~~WORK~~ AREA PAVING LAYOUT

REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	CW	GL	RR	12/06

MK	REVISION	BY	CHK	APP	DATE

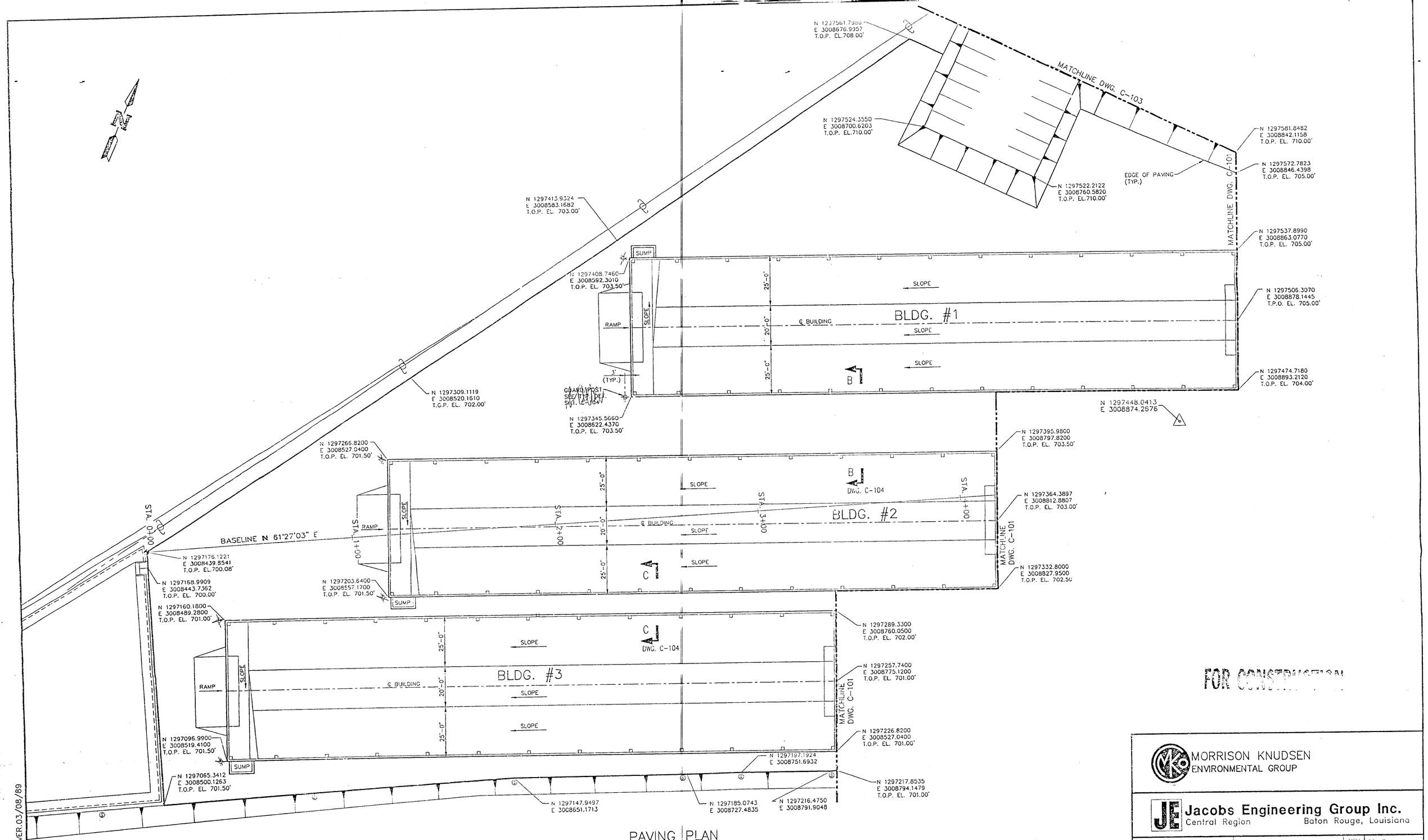
DRAWN C. WILLIS DATE 12/06/95
CHECKED GWL 12/06/95
APPROVED: RR 12/06/95
APPROVED:

SEAL: STATE OF LOUISIANA — GERALD W. LAZELLE, JR. 21101 REGISTERED PROFESSIONAL ENGINEER — CIVIL ENGINEERING

BLOCK NAME = DSIZE VER.03/08/89

B# 07J93900 FILE: C-101 DATE: 01/25/96 <09:23> OPER: FMILES

DIR= DWG=



PAVING PLAN

FOR CONSTRUCTION

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	C-102	0	1"=20'

DWG. TITLE

BIOREMEDIATION FACILITY
CRANE N.S.W.C.
COMPOST BUILDING PAVING LAYOUT

DRAWN: C. WILLIS	DATE: 12-6-95
CHECKED: GWL	12-6-95
APPROVED: RR	12-6-95
APPROVED:	

SEAL: STATE OF LOUISIANA — GERALD W. LASCHES, # 17001, REGISTERED PROFESSIONAL ENGINEER

REFERENCE DRAWINGS

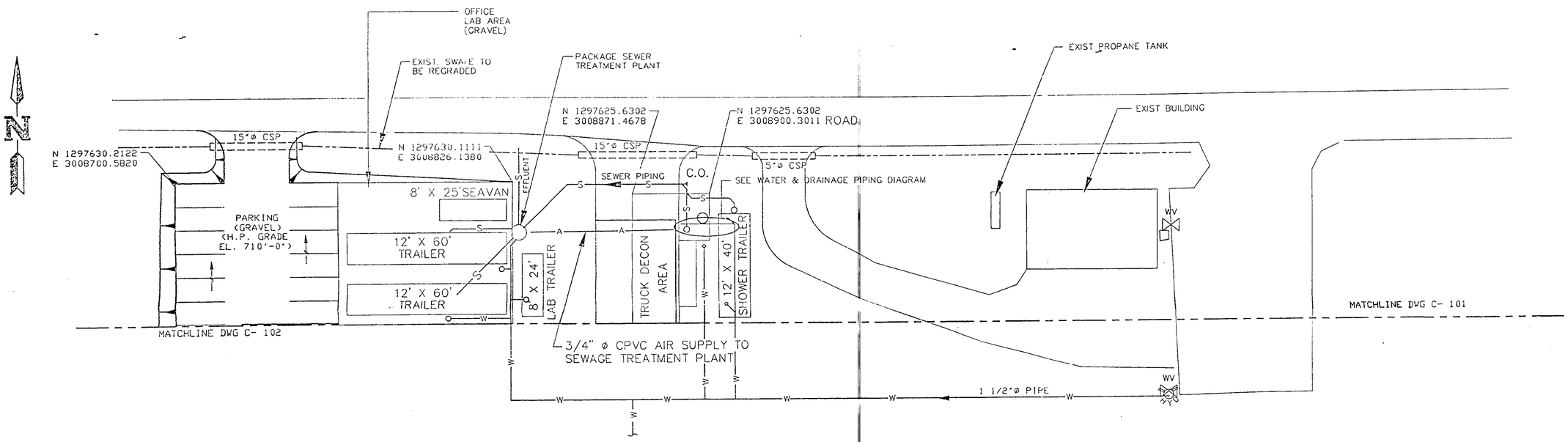
DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	CW	GL	RR	12/06

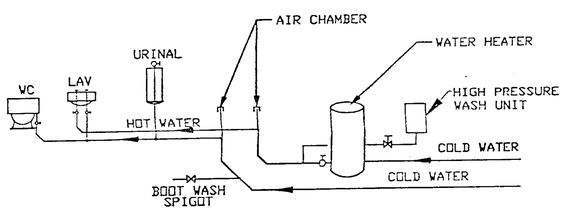
DIR= _____ DWG#= _____

BLOCK NAME = DSIZE VER.03/08/89

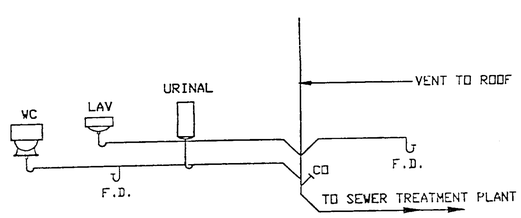
JOB# 07993900 FILE: C-102 DATE: 01/25/96 <09:26> OPER: FMILES



PLAN



WATER PIPING DIAGRAM



DRAINAGE PIPING DIAGRAM

NOTES

1. ALL PLUMBING SHALL CONFORM TO THE NATIONAL PLUMBING CODE AND ALL STATE AND LOCAL REQUIREMENTS FOR INSTALLATION OF PLUMBING SYSTEMS
2. HIGH PRESSURE WASH SYSTEM SHALL BE A DELUXE PUMPING STATION WITH ADJUSTABLE PRESSURE REGULATOR AS MANUFACTURED BY "A-OK EQUIPMENT AND SUPPLY CO. INC." OR AN APPROVED EQUAL.
3. SEWAGE TREATMENT PLANT SHALL BE A 500gpd PACKAGE UNIT AS MANUFACTURED BY "WHITEWATER MECHANICAL SEWAGE TREATMENT SYSTEM" MODEL DF 50-FF OR AN APPROVED EQUAL.

LEGEND

—W— INDICATES NEW WATER LINE

—S— INDICATES NEW SANITARY SEWER LINE

—A— INDICATES NEW AIR LINE

FOR CONSTRUCTION

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	C-103	0	1"=20'

DWG. TITLE

BIOREMEDIATION FACILITY
CRANE N.S.W.C.
OFFICE/LAB AREA LAYOUT

REFERENCE DRAWINGS			
DWG. NO.	TITLE	DWG. NO	TITLE

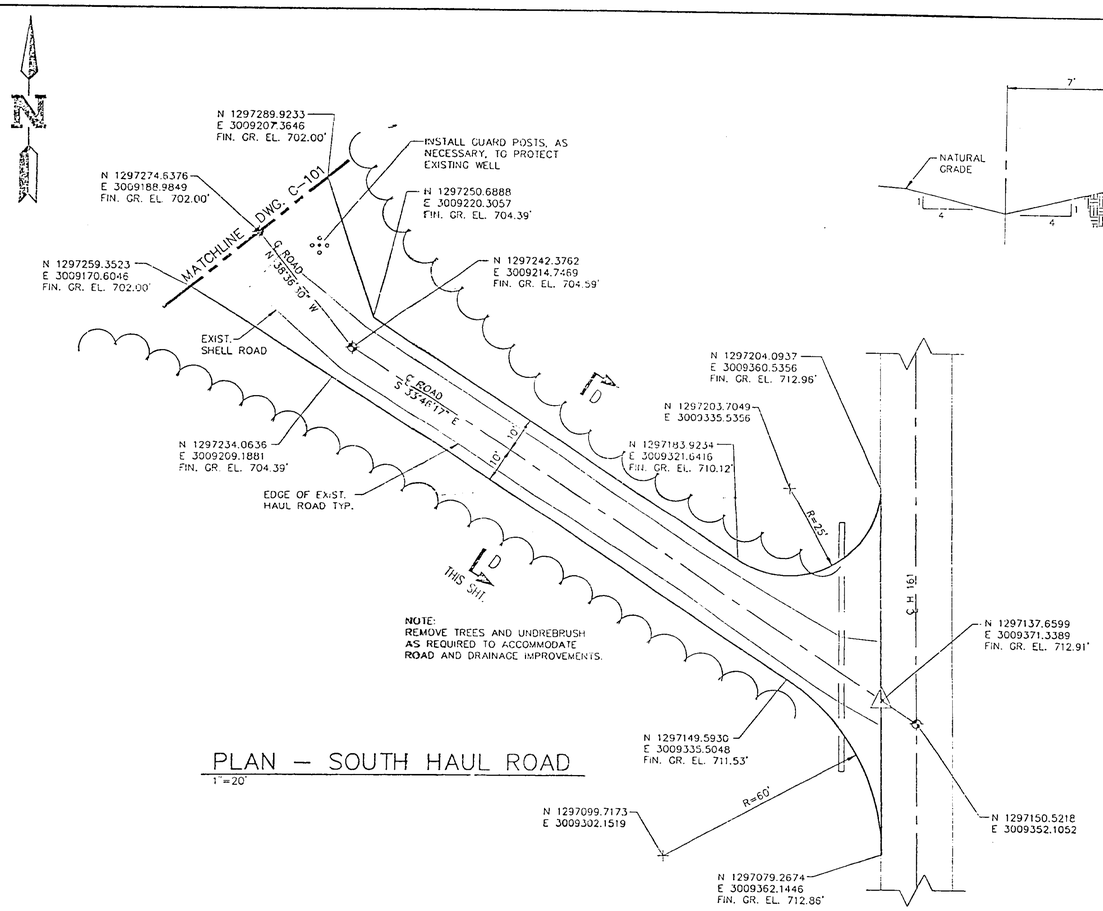
MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	FRM	GL	RR	1/96

DRAWN: RNR	DATE: 11/29/95	
CHECKED: GWL	1/96	
APPROVED: RR	1/96	
APPROVED:		

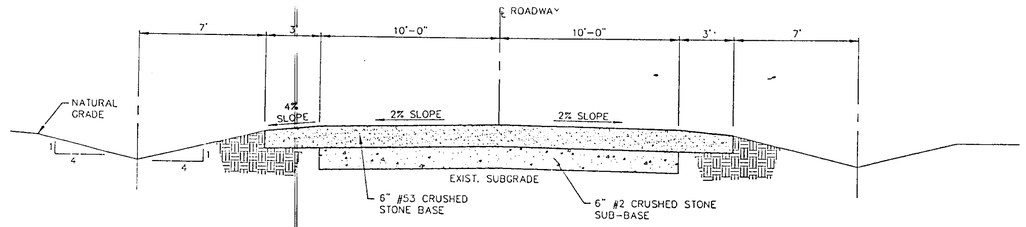
SEAL: STATE OF LOUISIANA — REGISTERED PROFESSIONAL ENGINEER — CIVIL ENGINEERING

BLOCK NAME = DSIZE VER.03/08/89

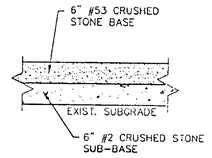
07/03/2000 FILE: C-103 DATE: 01/25/95 <09:31> OPER: FMILES



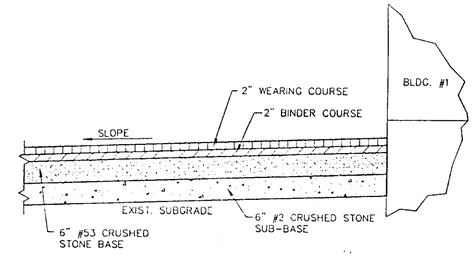
PLAN – SOUTH HAUL ROAD
1"=20'



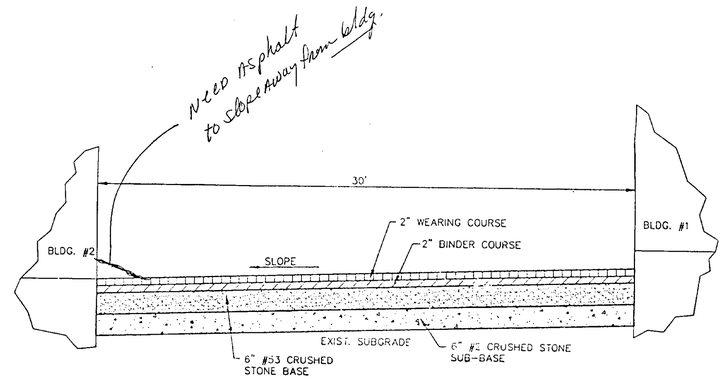
SECT. D–D
N.T.S.



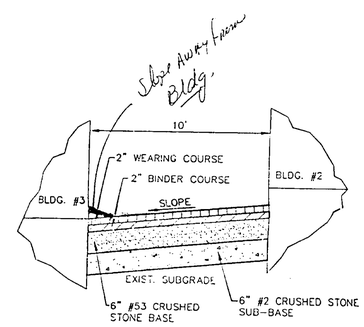
SECTION THRU AMENDMENT HAUL AREA
N.T.S.



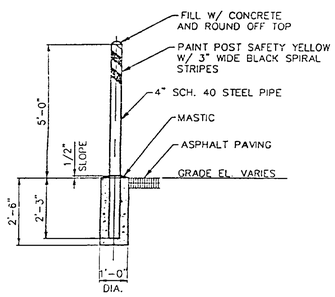
SECT. A–A
RE: DWG. C-101 N.T.S.



SECT. B–B
RE: DWG. C-102 N.T.S.



SECT. C–C
RE: DWG. C-102 N.T.S.



TYP. GUARD POST DETAIL
RE: DWG. C-101 1/2"=1'-0"

FOR CONSTRUCTION

MORRISON KNUDSEN ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region Baton Rouge, Louisiana

CONTRACT NO.	DWG NO.	REV.	SCALE
10G175-21	C-104	0	1"=20'

DWG. TITLE
BIOREMEDIATION FACILITY
CRANE N.S.W.C.
HAUL ROAD LAYOUT & PAVING SECTIONS

REFERENCE DRAWINGS

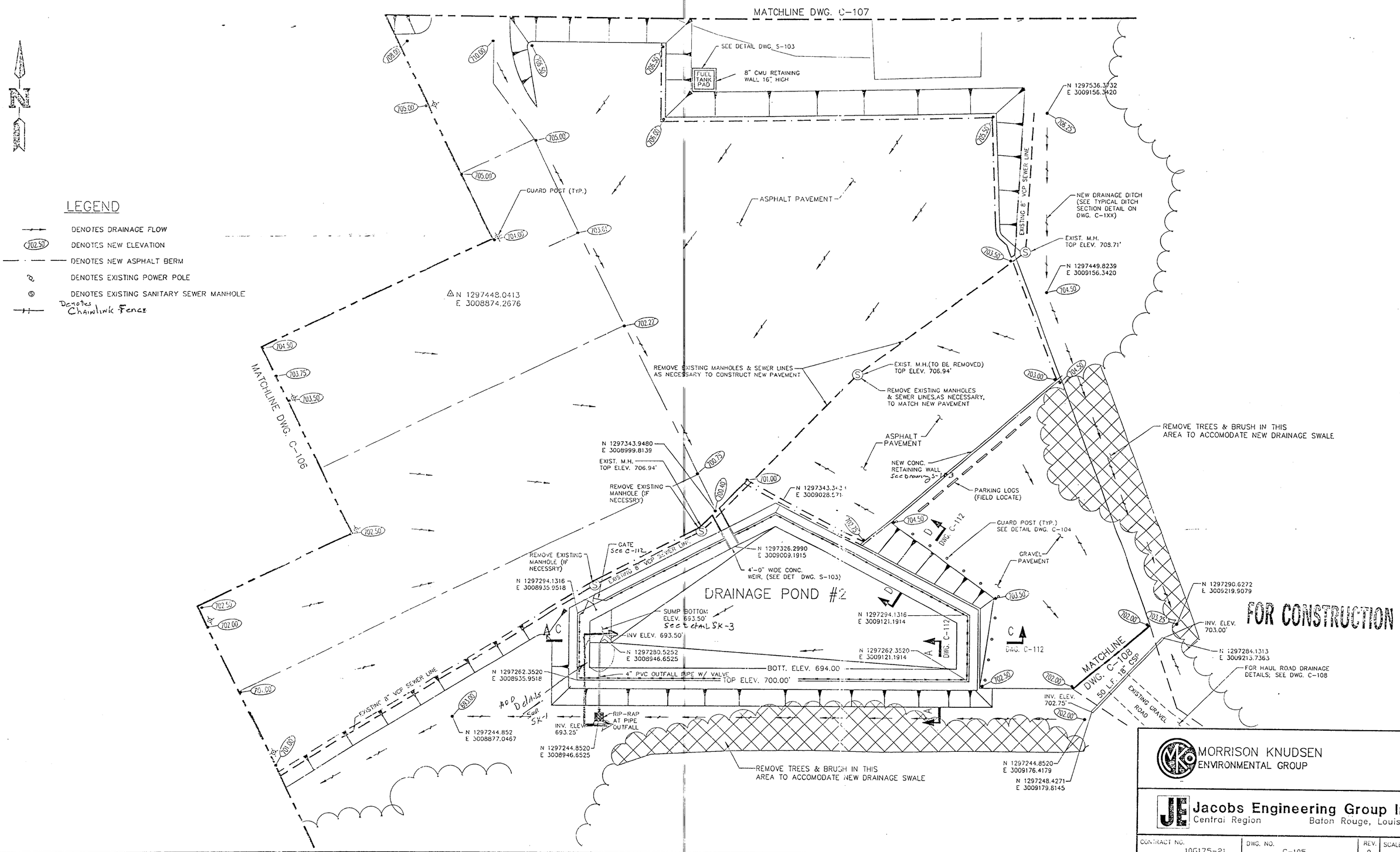
DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	CW	GL	RR	12/06

DRAWN	C. WILLIS	DATE 12/06/95
CHECKED	GWL	12/06/95
APPROVED	RR	12/06/95
APPROVED:		

SEAL: STATE OF LOUISIANA — GERARD W. LANGLOIS — REGISTERED PROFESSIONAL ENGINEER — CIVIL ENGINEERING

7J93900 FILE: C-104 DATE: 01/25/96 <09:33> OPER: FMILES



MORRISON KNUDSEN ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	C-105	0	1"=20'

DWG. TITLE

BIOREMEDIATION FACILITY
CRANE NSWC
WORK AREA DRAINAGE PLAN

DRAWN FRM DATE 12-05-95
CHECKED GWL 1/96
APPROVED: RR 1/96
APPROVED:

SEAL: STATE OF LOUISIANA — GERARD W. LUCAS — 21320 — REGISTERED PROFESSIONAL ENGINEER — CIVIL ENGINEERING

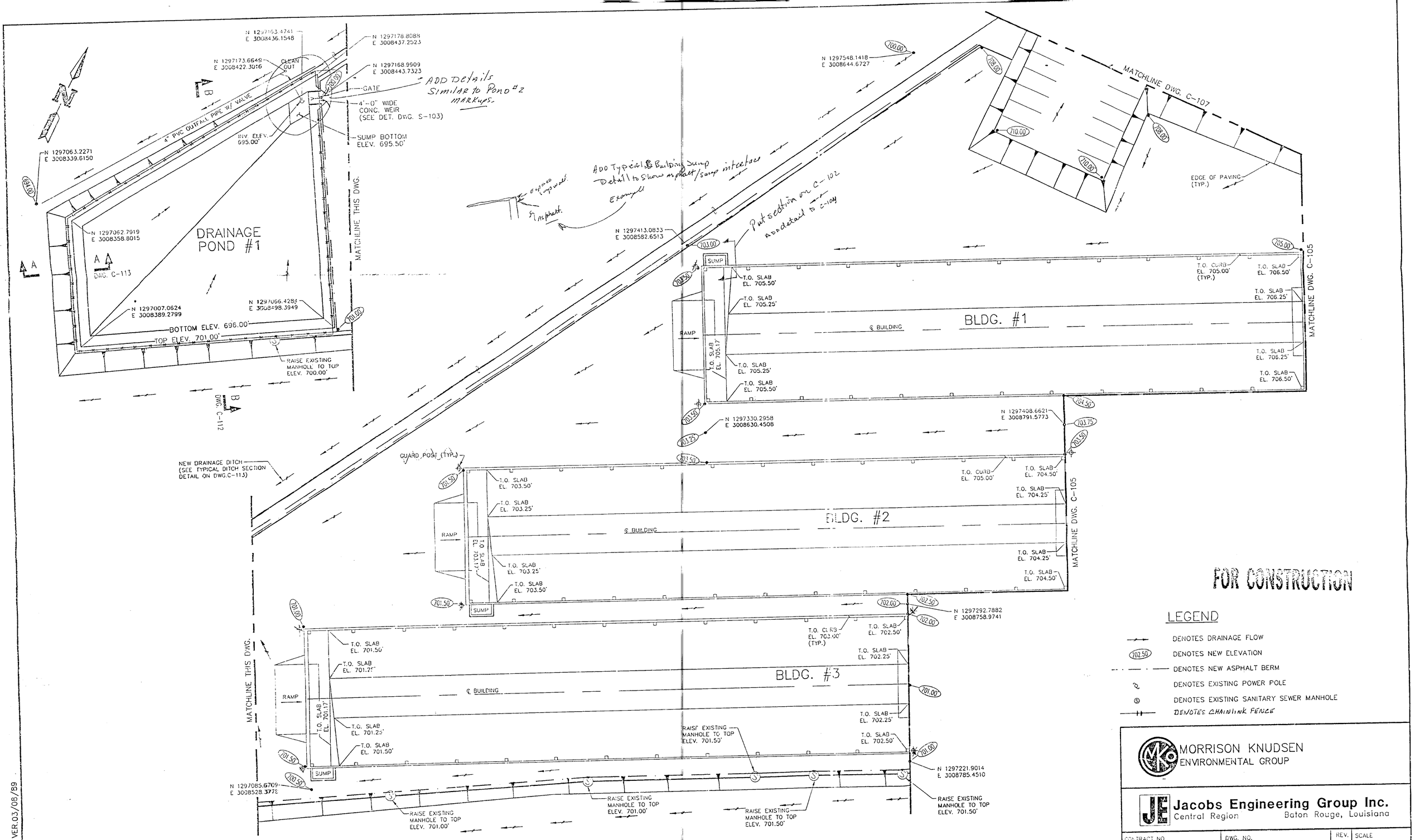
REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	FRM	GL	RR	1/96

BLOCK NAME = DSIZE VER.03/08/89

JOB# 07J93900 FILE: C-105 DATE: 01/25/96 <09:35> OPER: FMILES



FOR CONSTRUCTION

LEGEND

- DENOTES DRAINAGE FLOW
- (702.50) DENOTES NEW ELEVATION
- DENOTES NEW ASPHALT BERM
- DENOTES EXISTING POWER POLE
- DENOTES EXISTING SANITARY SEWER MANHOLE
- DENOTES CHAINLINK FENCE

MORRISON KNUDSEN ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	C-106	0	1"=20'

DWG. TITLE

BIOREMEDIATION FACILITY
CRANE NSWC
COMPOST BUILDING AREA DRAINAGE PLAN

FRM	12-03-95	
CHECKED GWL	1/96	
APPROVED: RR	1/96	
APPROVED:		

STATE OF LOUISIANA — GERARD W. LANDRY II — REGISTERED PROFESSIONAL ENGINEER — CIVIL

REFERENCE DRAWINGS

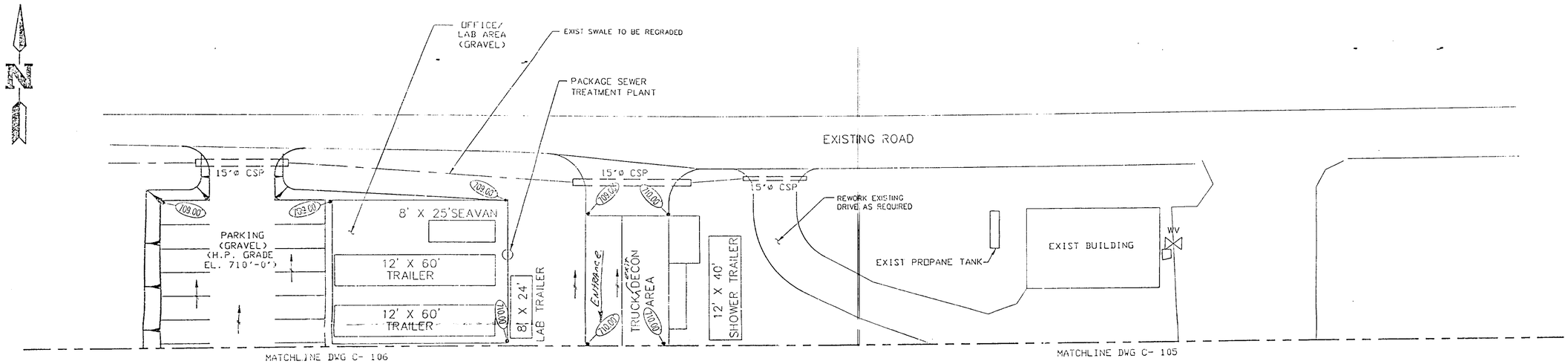
DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	FRM	GL	RR	1/96

BLOCK NAME = DSIZE VER.03/08/89

JOB# 07J03900 FILE: C-106 DATE: 01/25/96 <09:40> OPER: FMILES

DIR= DWG=



FOR CONSTRUCTION

LEGEND

- DENOTES DRAINAGE FLOW
- (702.50) DENOTES NEW ELEVATION
- DENOTES NEW ASPHALT BERM
- DENOTES EXISTING POWER POLE
- DENOTES EXISTING SANITARY SEWER MANHOLE

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	C-107	0	1"=20'

DWG. TITLE

BIOREMEDIATION FACILITY
CRANE N.S.W.C.
OFFICE/LAB AREA DRAINAGE PLAN

REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	FRM	GL	RR	1/96

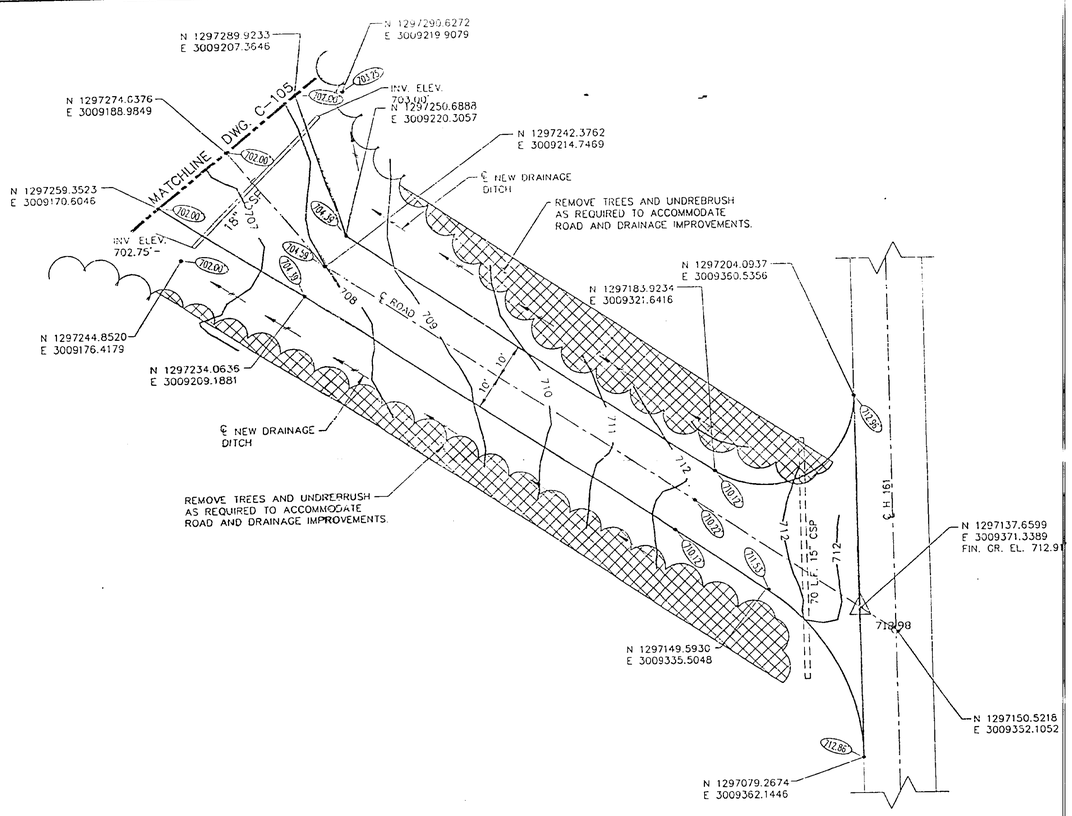
DRAWN: FRM	DATE: 11/29/95	
CHECKED: GWL	1/96	
APPROVED: RR	1/96	
APPROVED:		

SEAL: STATE OF LOUISIANA, GERARD W. LANGLOS, # 17420, REGISTERED PROFESSIONAL ENGINEER, CIVIL ENGINEERING

BLOCK NAME = DSIZE VER.03/06/89

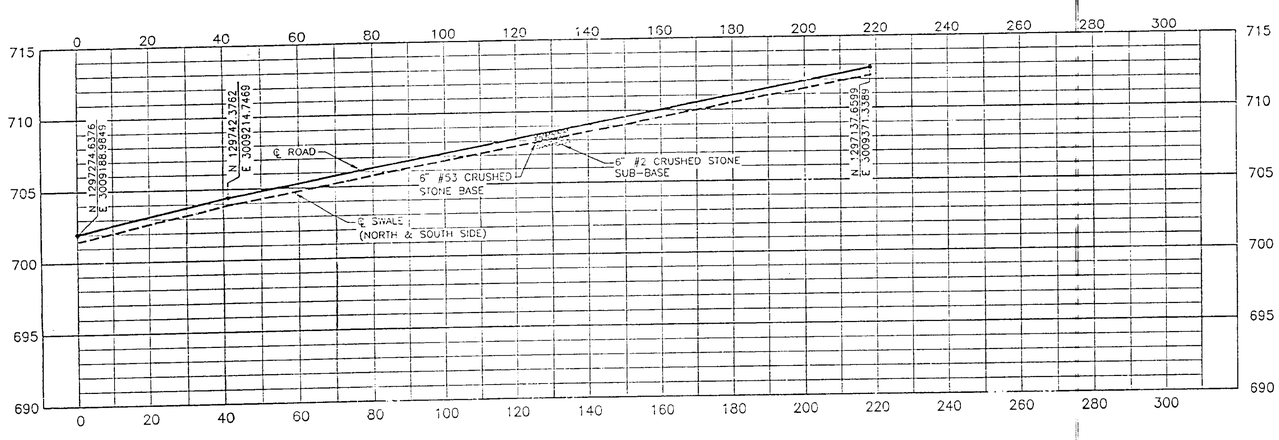
DIR= DWG=

07J93900 FILE: C-107 DATE: 01/25/96 <09:48> OPER: FMILES



DRAINAGE PLAN – SOUTH HAUL ROAD

1"=20'



PROFILE – SOUTH HAUL ROAD

HORIZ. 1"=20'
VERT. 1"=5'

FOR CONSTRUCTION

MORRISON KNUDSEN ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	C-108	0	NOTED

DWG. TITLE: BIOREMEDIATION FACILITY
CRANE N.S.W.C.
SOUTH HAUL ROAD – PROFILE

REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	FRM	GL	RR	1/96

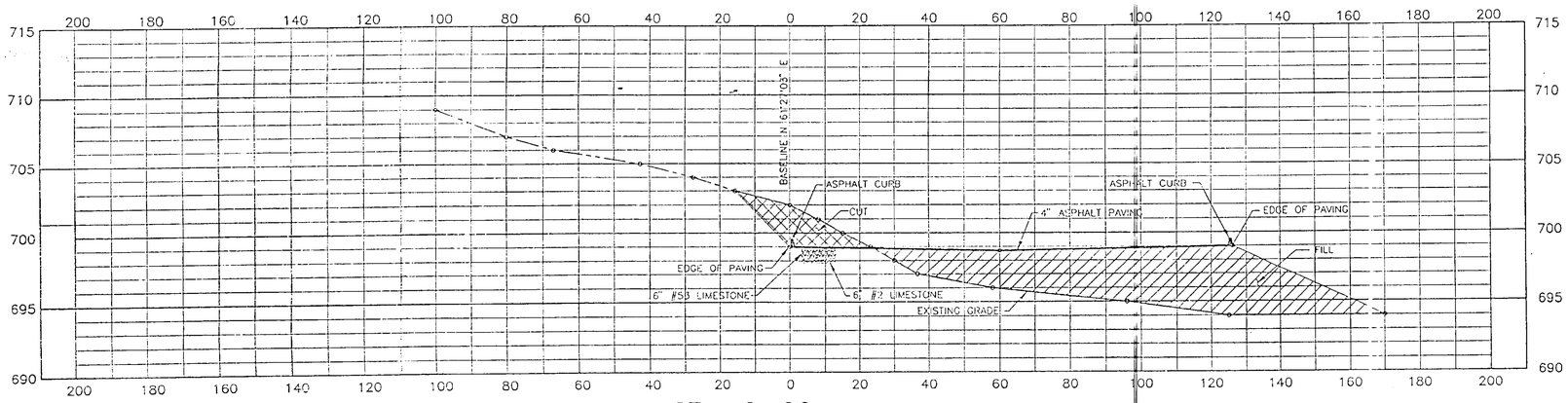
DRAWN: C. WILLIS DATE: 1/96
CHECKED: GWL 1/96
APPROVED: RR 1/96
APPROVED:

SEAL: STATE OF LOUISIANA — GERARD W. LANDRY — REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

DIR= _____ DWG= _____

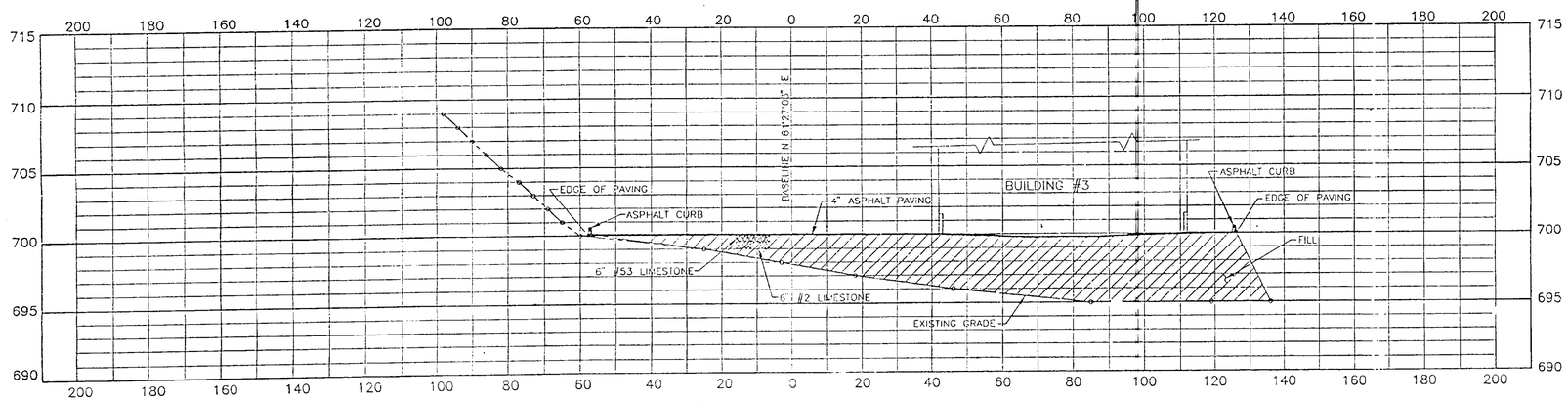
BLOCK NAME = DSIZE VER.03/08/89

JOB# 07J93900 FILE: C-108 DATE: 01/25/96 <09:56> OPER: FMILES



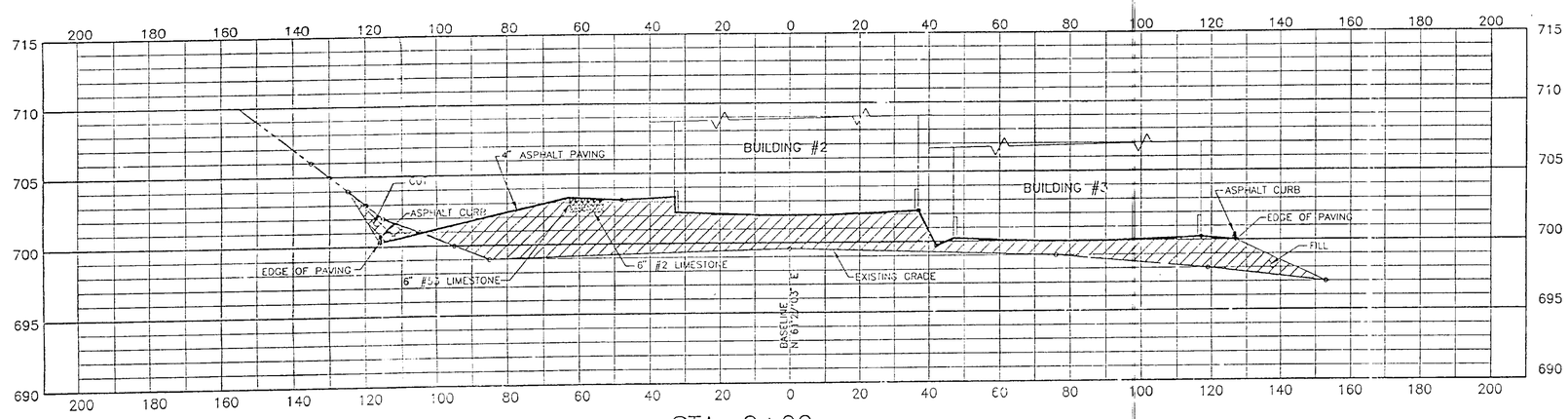
STA. 0+00

HORIZ. 1" = 20'
VERT. 1" = 5'



STA. 1+00

HORIZ. 1" = 20'
VERT. 1" = 5'



STA. 2+00

HORIZ. 1" = 20'
VERT. 1" = 5'

LEGEND

- FILL SOIL
- SOIL TO BE REMOVED

FOR CONSTRUCTION

MORRISON KNUDSEN ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	C-109	0	NOTED

DWG. TITLE: BIOREMEDIATION FACILITY
CRANE N.S.W.C.
CROSS SECTIONS – SHT.1

DRAWN: C. WILLIS DATE: 1/96
CHECKED: GWL 1/96
APPROVED: RR 1/96
APPROVED:

SEAL: STATE OF LOUISIANA — GERARD W. LANDERS, #17001, REGISTERED PROFESSIONAL ENGINEER — CIVIL ENGINEERING

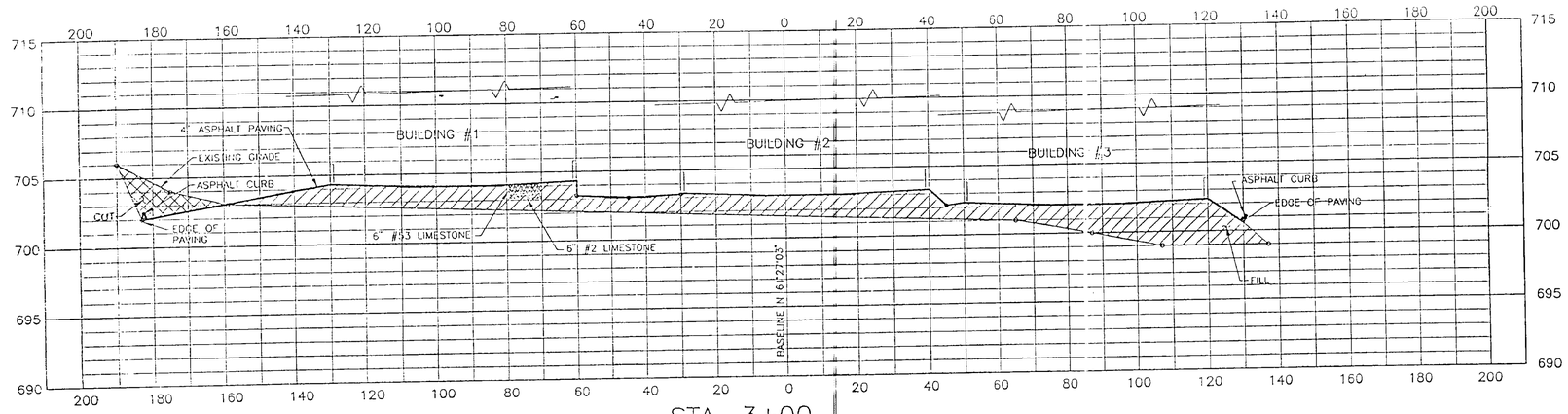
REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	FRM	GL	RR	1/96

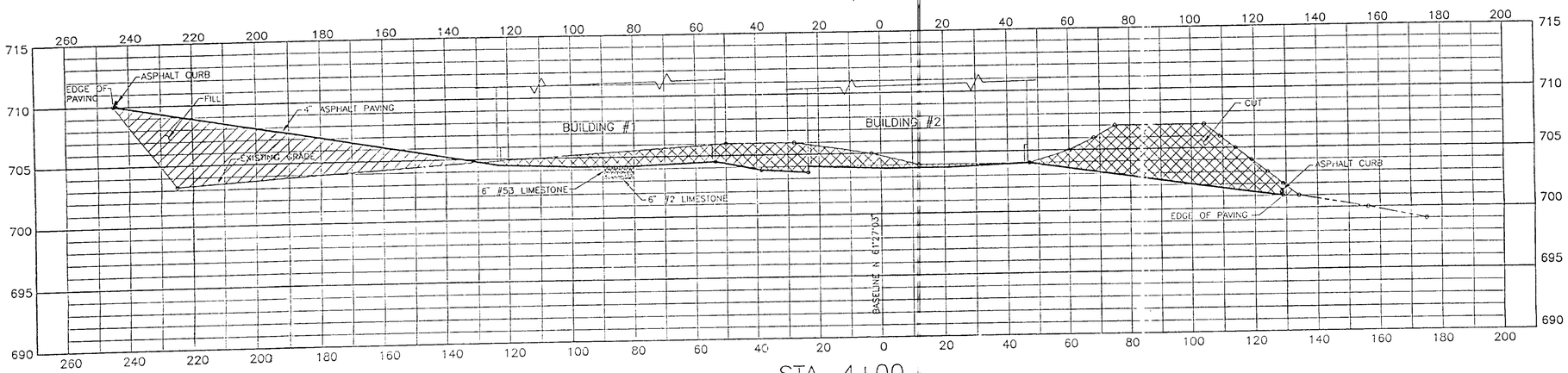
DIR= DWG=

JOB# 07J93900 FILE: C-109 DATE: 01/25/96 <10:06> OPER: FMILES



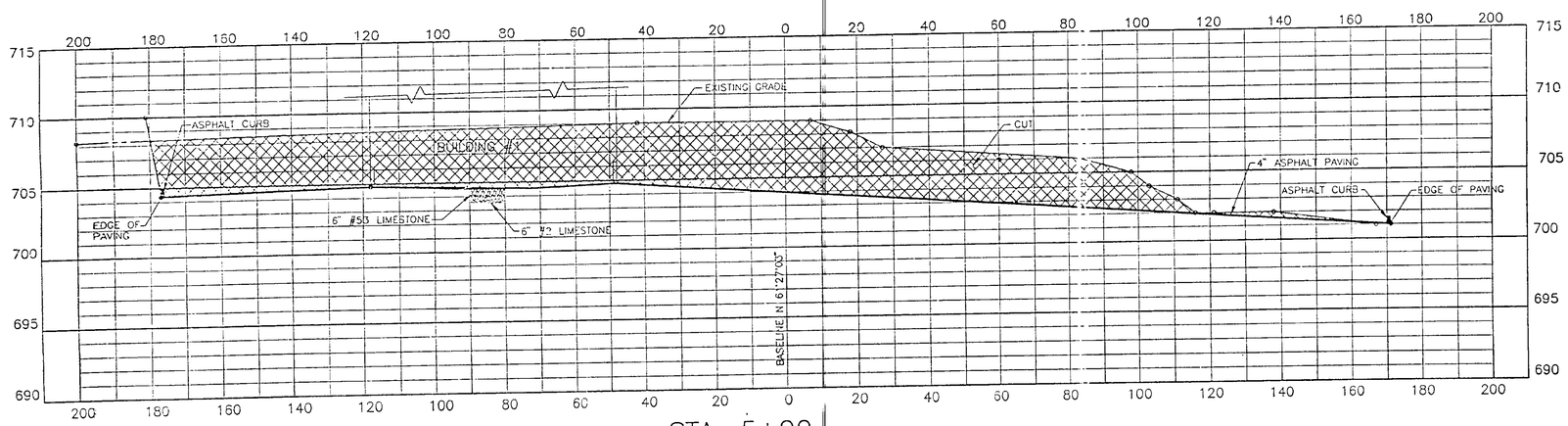
STA. 3+00

HORIZ. 1" = 20'
VERT. 1" = 5'



STA. 4+00

HORIZ. 1" = 20'
VERT. 1" = 5'



STA. 5+00

HORIZ. 1" = 20'
VERT. 1" = 5'

LEGEND

- FILL SOIL
- SOIL TO BE REMOVED

FOR CONSTRUCTION

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	C-110	0	NOTED

DWG. TITLE

BIOREMEDIATION FACILITY
CRANE N.S.W.C.
CROSS SECTIONS – SHT.2

DRAWN: C. WILLIS	DATE: 1/96		
CHECKED: GWL	1/96		
APPROVED: RR	1/96		
APPROVED:			

SEAL: STATE OF LOUISIANA — GEORGE W. LANDRY # 17001 — REGISTERED PROFESSIONAL ENGINEER — CIVIL ENGINEERING

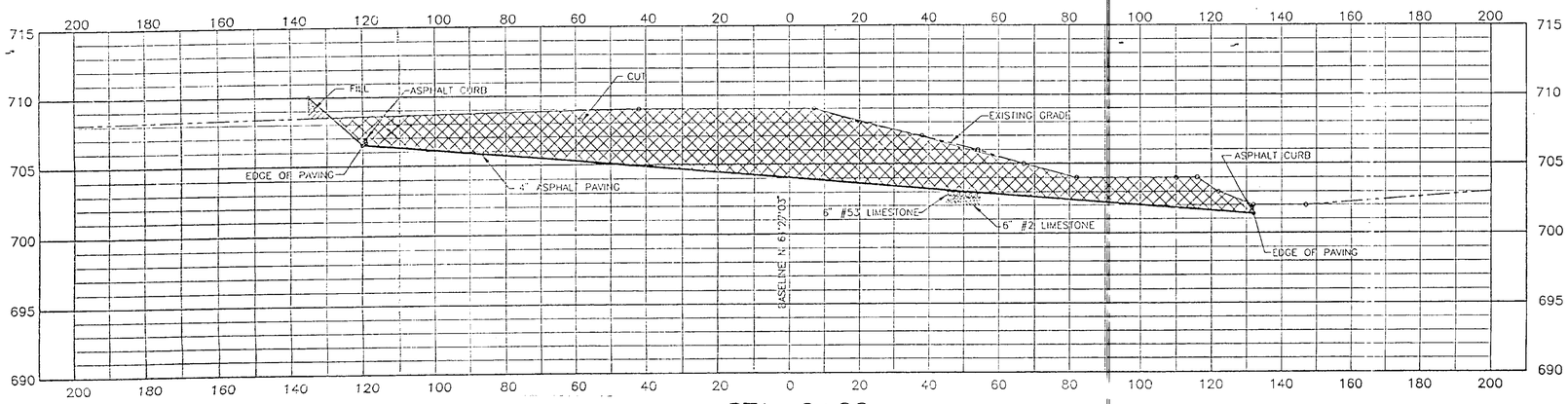
REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	FRM	GL	RR	1/96

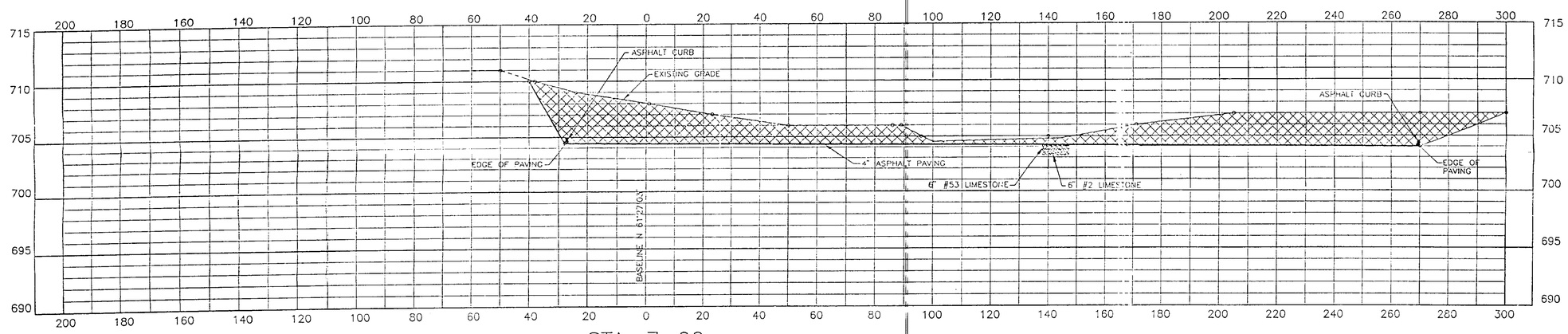
BLOCK NAME = DSIZE VER.03/08/99

DIR= _____ DWG= _____



STA. 6+00

HORIZ. 1" = 20'
VERT. 1" = 5'



STA. 7+00

HORIZ. 1" = 20'
VERT. 1" = 5'

LEGEND

- FILL SOIL
- SOIL TO BE REMOVED

FOR CONSTRUCTION

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	C-111	0	NOTED

DWG. TITLE

BIOREMEDIATION FACILITY
CRANE N.S.W.C.
CROSS SECTIONS – SHT.3

DRAWN: C. WILLIS DATE: 1/96
CHECKED: GWL 1/96
APPROVED: RR 1/96
APPROVED:

SEAL: STATE OF LOUISIANA — GERALD W. LANGLOIS — REGISTERED PROFESSIONAL ENGINEER — CIVIL ENGINEERING

REFERENCE DRAWINGS

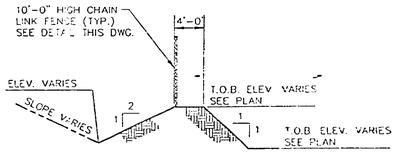
DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	FRM	GL	RR	1/96

BLOCK NAME = DSIZE VER.03/08/89

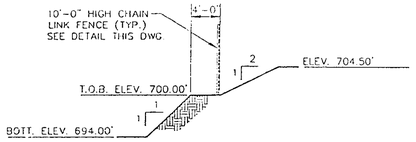
JOB# 07J93900 FILE: C-111 DATE: 01/25/96 <10:14> OPER: FMILES

DIR = _____ DWG = _____



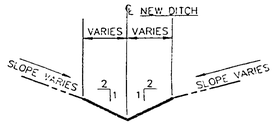
SECTION "A–A"

SCALE: 1"=10'-0"



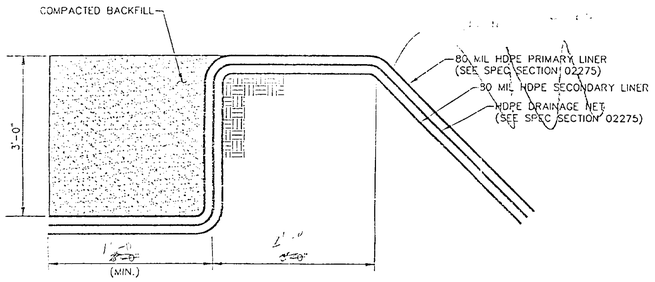
SECTION "D–D"

SCALE: 1"=10'-0"



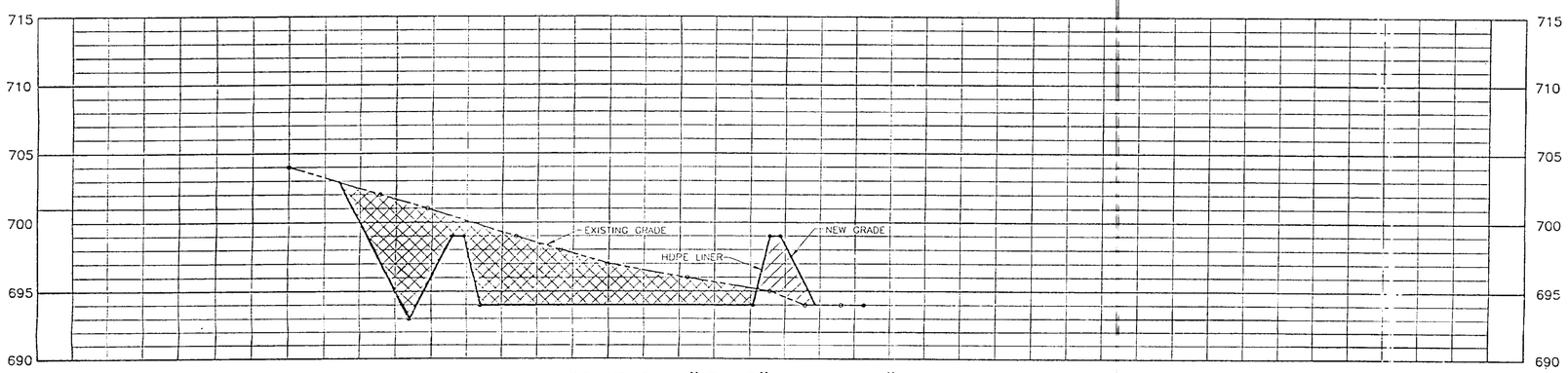
TYPICAL DITCH SECTION

SCALE: 1"=10'-0"



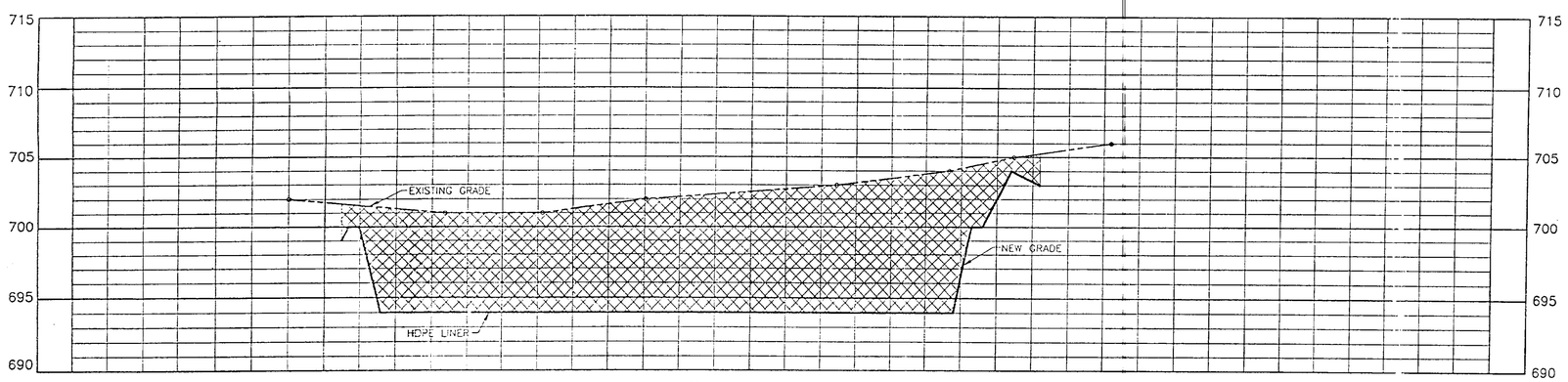
MULTIPLE LAYER ANCHOR TRENCH

1/2"=1'-0"



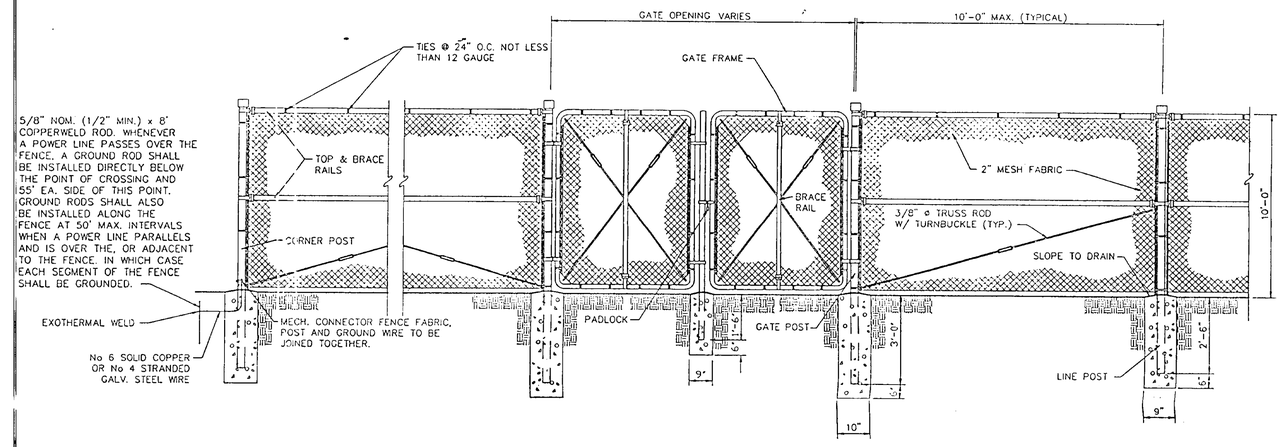
SECTION "B–B" POND #1

HORIZ. 1"=20'
VERT. 1"=5'



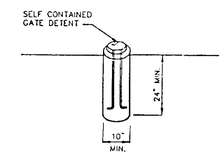
SECTION "C–C" POND #2

HORIZ. 1"=20'
VERT. 1"=5'

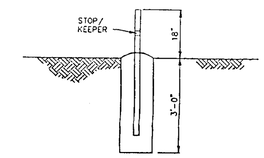


CHAIN LINK FENCE DETAIL

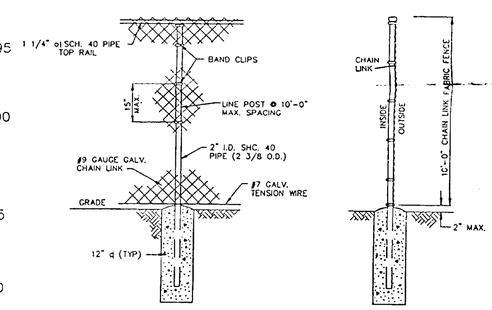
N.T.S.



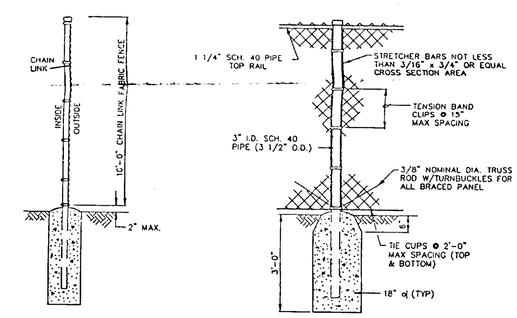
GATE DETENT DETAIL



GATE STOP DETAIL



TYPICAL LINE POST



TYPICAL CORNER POST

MISC. FENCE DETAILS

N.T.S.

FOR CONSTRUCTION

LEGEND

FILL SOIL

SOIL TO BE REMOVED

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	C-112	0	NOTED

DWG. TITLE: BIOREMEDIATION FACILITY
CRANE N.S.W.C.
MISCELLANEOUS DETAILS

REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE

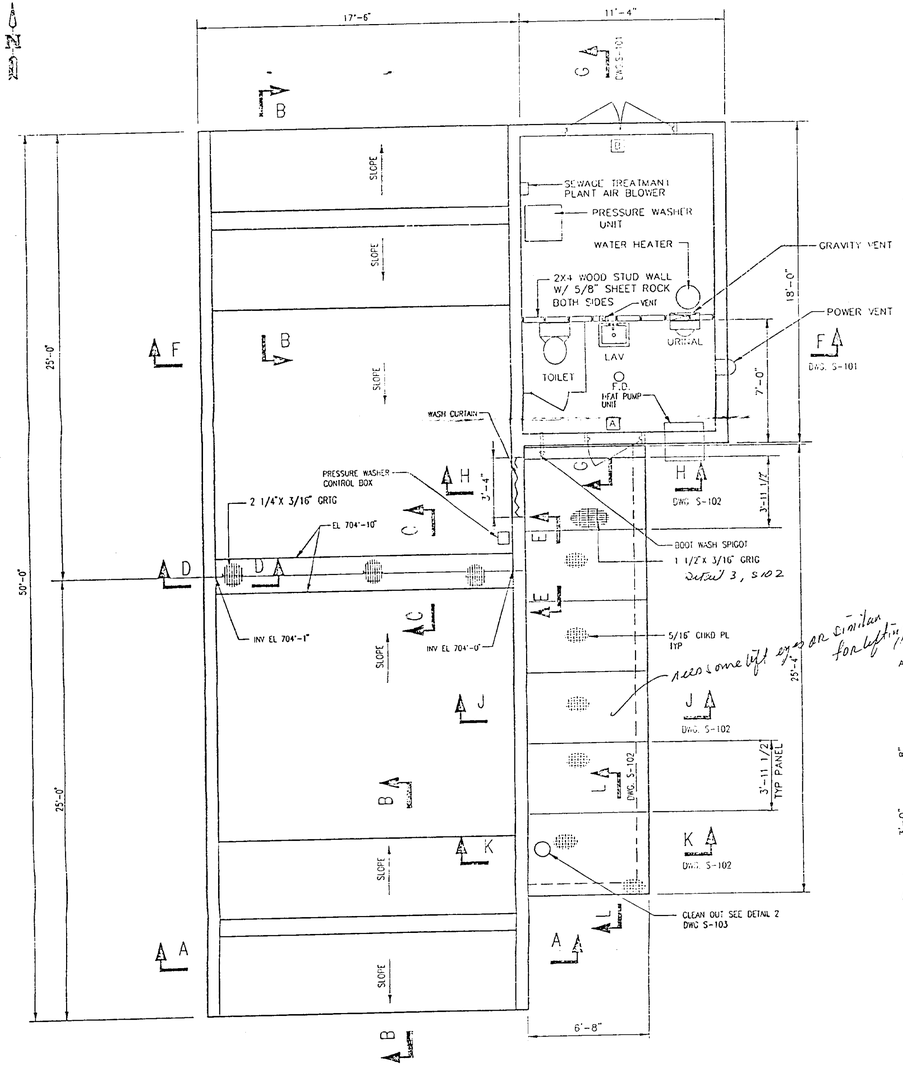
MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	FRM	GL	RR	1/96

DRAWN: FRM DATE: 12/15/95
CHECKED: GWL 1/96
APPROVED: RR 1/96
APPROVED:

SEAL: STATE OF LOUISIANA — GERARD W. LANDRY, II — REGISTERED PROFESSIONAL ENGINEER — CIVIL ENGINEERING

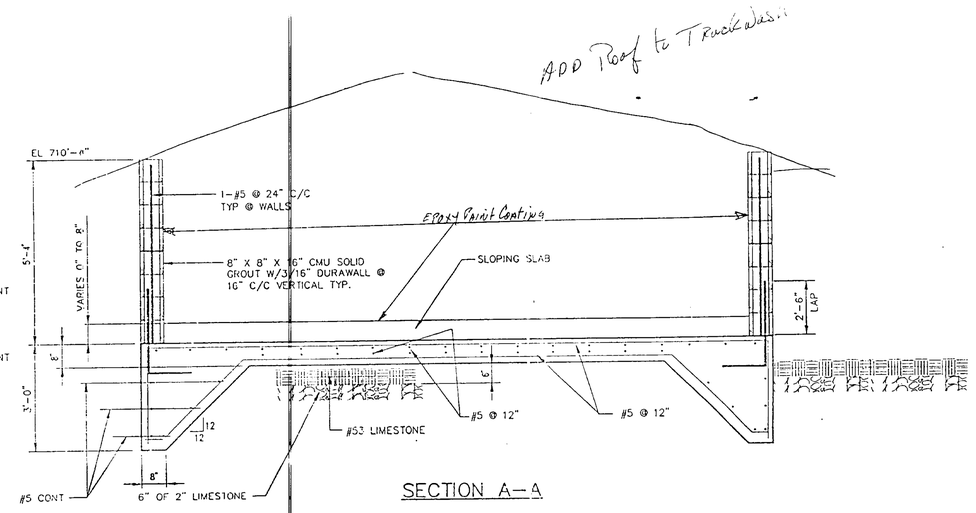
BLOCK NAME = DSIZE VER.03/08/89

JOB# 07J93900 FILE: C-112 DATE: 01/25/96 <10:20> OPER: FMILES



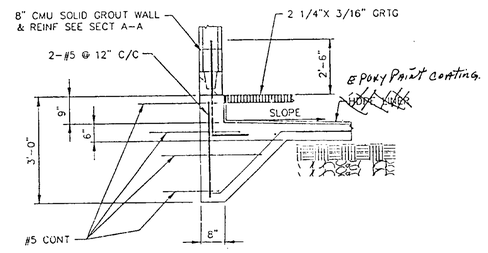
PLAN

1/4"=1'-0"



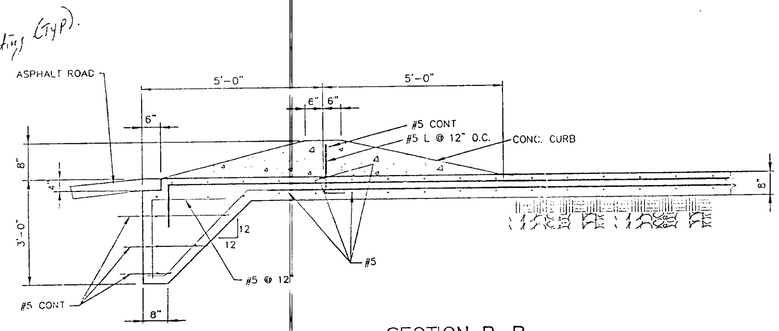
SECTION A–A

1/2"=1'-0"



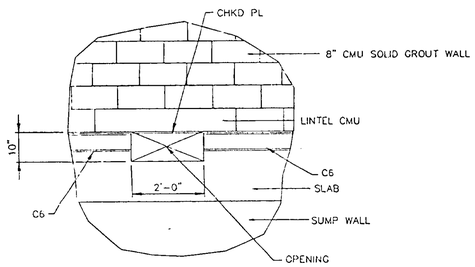
SECTION D–D

1/2"=1'-0"



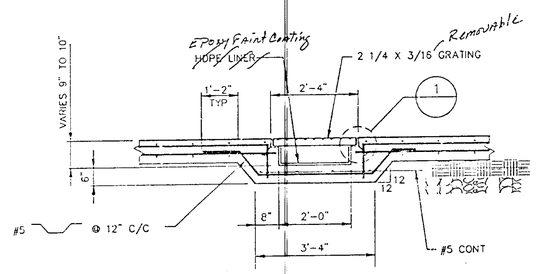
SECTION B–B

1/2"=1'-0"



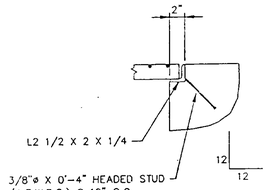
SECTION E–E

1/2"=1'-0"



SECTION C–C

1/2"=1'-0"



DETAIL 1

1"=1'-0"

FOR CONSTRUCTION

NOTES:

FOR GENERAL NOTES SEE DWG. S-102.

PLUMBING SCHEDULE	
ITEM	DESCRIPTION
TOILET	AMERICAN STANDARD SIPHON JET MODEL #232.012 WHITE OR AN APPROVED EQUAL.
LAVATORY	AMERICAN STANDARD MODEL # 4300.117 WHITE OR AN APPROVED EQUAL.
SHOWER	FIBERGLASS SELF ENCLOSED WITH AMERICAN STANDARD SHOWER VALVE & HEAD MODEL #1200.310 OR EQUAL
WATER HEATER	50 GALLON ELECTRIC RHEEM OR AN APPROVED EQUAL.

DOOR SCHEDULE		
MARK	SIZE	DESCRIPTION
A	3'-0"X 7'-0" X 1 3/4" THICK	STEEL DOOR AND FRAME
B	(2) 3'-0"X 7'-0" X 1 3/4" THICK	STEEL DOOR AND FRAME

HEAT PUMP UNIT:
10,000 BTU HEAT
6,200 BTU COOLING

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	S-100	0	AS NOTED

DWG. TITLE

BIOREMEDIATION FACILITY
CRANE NSWC
DECON AREA CONCRETE PLAN & SECTIONS

REFERENCE DRAWINGS			
DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	FRM	GL	RR	11/95

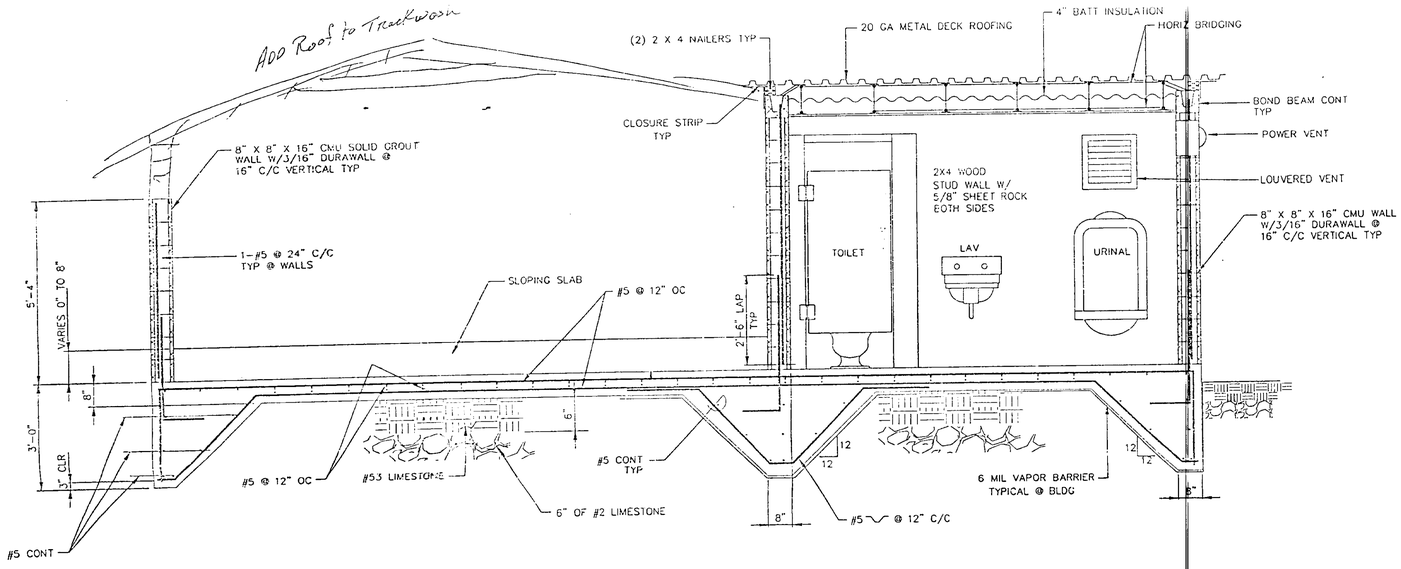
DRAWN: RNR	DATE 11-15-95	
CHECKED: GWL		1/96
APPROVED: RR		1/96
APPROVED:		

STATE OF LOUISIANA — REYNARD W. LANGLOIS II — REGISTERED PROFESSIONAL ENGINEER — CIVIL ENGINEERING

DIR= _____ DWG#= _____

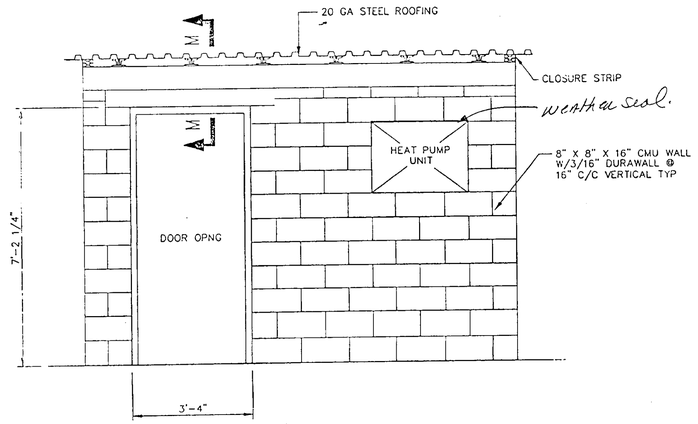
BLOCK NAME = DSIZE VER.03/08/89

10/19/95 14:25 JPEREZ 1095A2.dwg SCALE:1/8"=1'-0"
JOB# 10G17521 FILE: S-100 DATE: 01/25/96 <17:00> OPER: FMILES

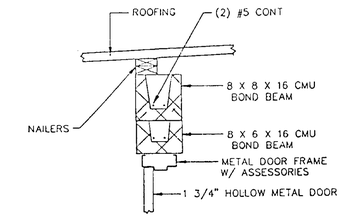


SECTION F-F

REF: DWG S-100

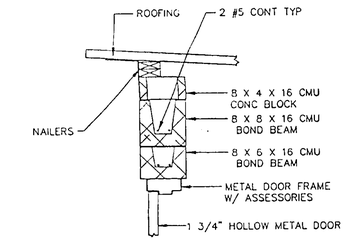


SOUTH WALL ELEVATION



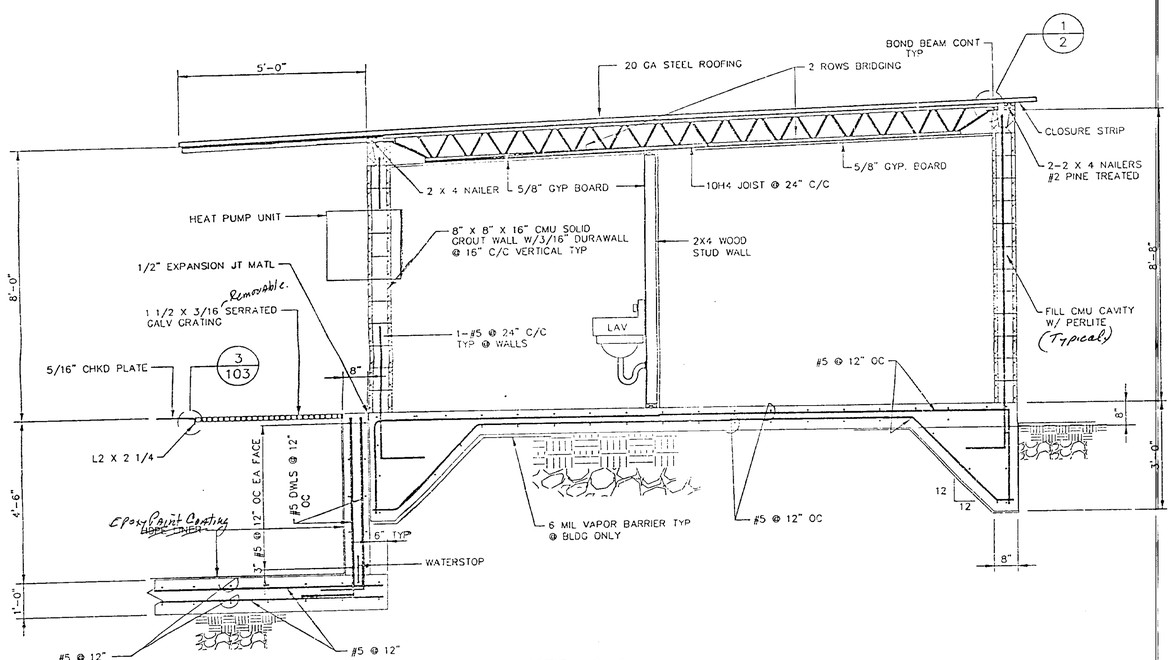
SECTION M-M

1" = 1'



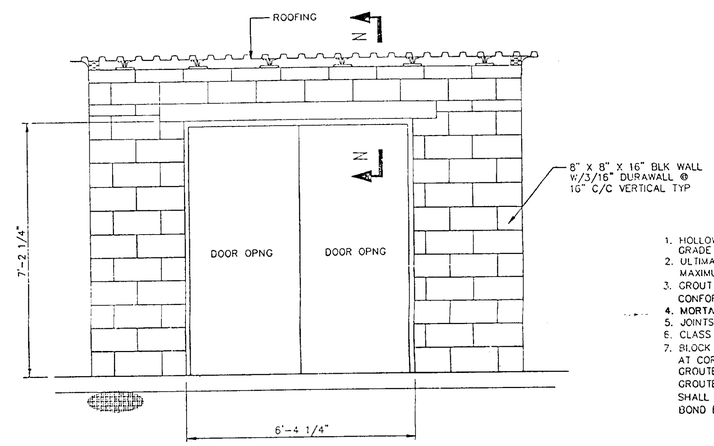
SECTION N-N

1" = 1'



SECTION G-G

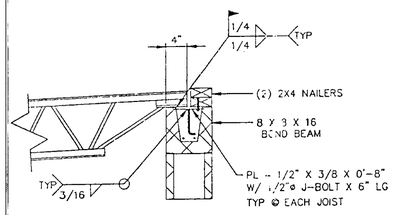
REF: DWG S-100



NORTH WALL ELEVATION

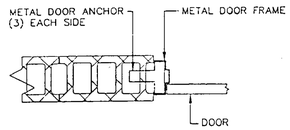
MASONRY NOTES:

1. HOLLOW LOAD BEARING CONCRETE BLOCKS SHALL BE NORMAL WEIGHT, GRADE N, TYPE 1 CONFORMING TO ASTM C 90.
2. ULTIMATE COMPRESSIVE STRENGTH, F m, EQUALS 1500 PSI WITH 1/2" MAXIMUM AGGREGATE SIZE.
3. GROUT COMPRESSIVE STRENGTH, F c, EQUALS 3000 PSI AND SHALL CONFORM TO ASTM C 476.
4. MORTAR SHALL BE TYPE M (2500 PSI) CONFORMING TO ASTM C 270.
5. JOINTS SHALL BE 3/8" NOMINAL.
6. CLASS B LAP SPLICES SHALL BE REQD FOR BOND BEAM REINFORCING.
7. BLOCK CELLS SHALL BE FULLY GROUTED AT EVERY DOWEL LOCATION. AT CORNERS OF BLDG 2 CELLS IN EACH DIRECTION SHALL BE FULLY GROUTED. ALL CELLS OF FREE STANDING WALLS SHALL BE FULLY GROUTED, AS NOTED ON DRAWINGS. CELLS ADJACENT TO DOOR OPENINGS SHALL BE GROUTED SOLID FROM FLOOR TO BOTTOM OF LINTEL OR BOND BEAM.



DETAIL 1

1" = 1'



TYP JAMB DETAIL

FOR CONSTRUCTION

MORRISON KNUDSEN ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	S-101	0	1/2"=1'-0"

DWG. TITLE

BIOREMEDIATION FACILITY
CRANE NSWC
DECON AREA CONC SECTIONS & ELEVATIONS

DRAWN: RNR	DATE: 12/1/95	
CHECKED: CWL	1/96	
APPROVED: RR	1/96	
APPROVED:		

SEAL: STATE OF LOUISIANA — GERSHON LANGLEY — CIVIL ENGINEERING

REFERENCE DRAWINGS

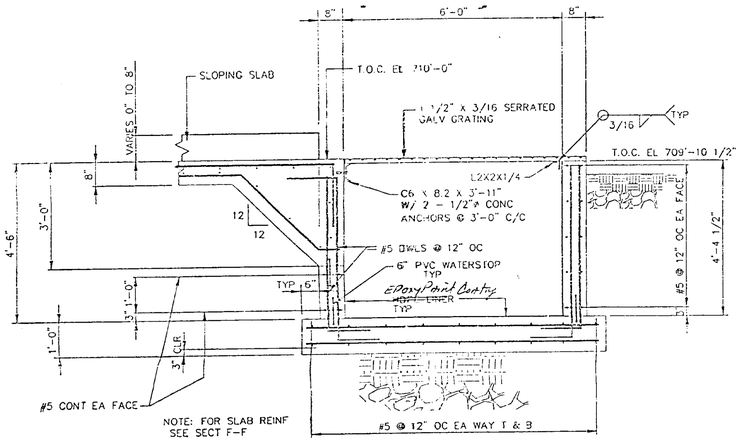
DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	FRM	GL	RR	1/96

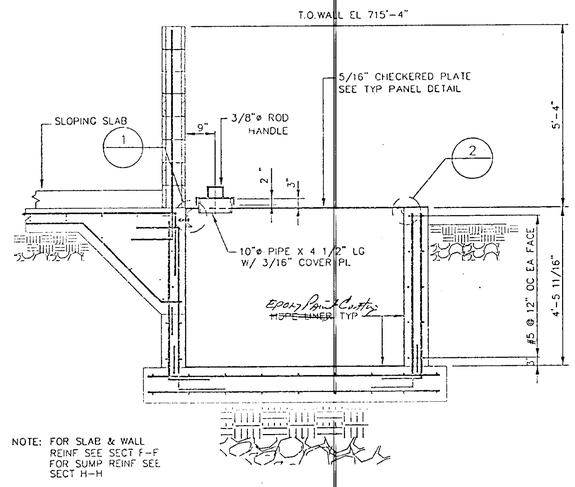
BLOCK NAME = DSIZE VER.03/08/89

JOB# 07J93900 FILE: S-101 DATE: 01/25/96 <10:36> OPER: FMILES

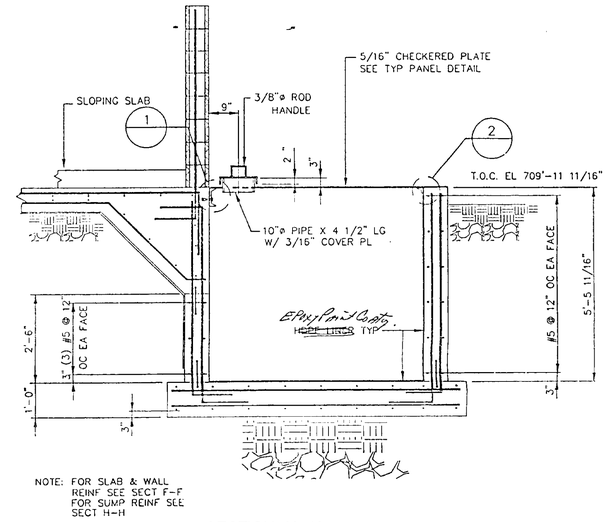
DIR= DWG=



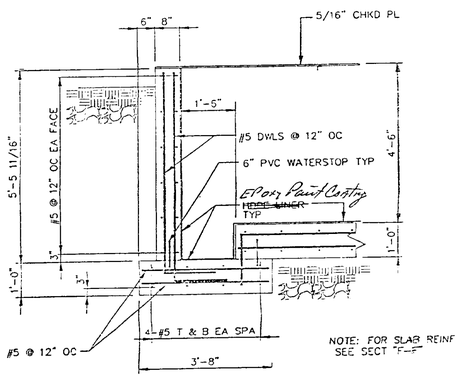
SECTION H-H



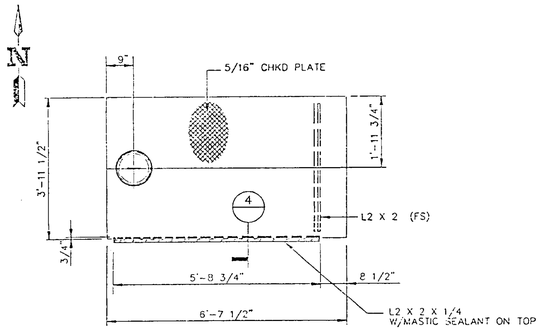
SECTION J-J



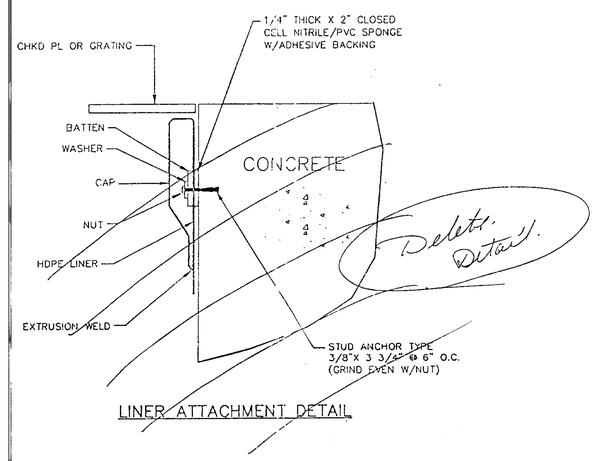
SECTION K-K



SECTION L-L



TYP PLATE PANEL DETAIL
SOUTH END PANEL SIMILAR

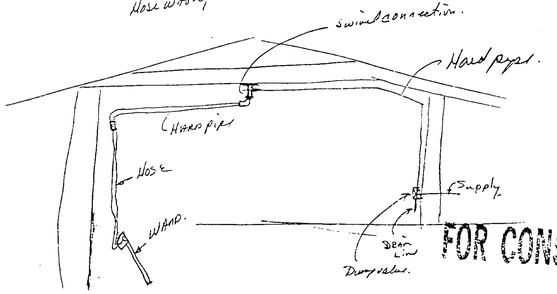


LINER ATTACHMENT DETAIL

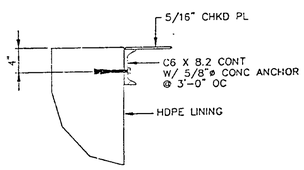
GENERAL NOTES

1. DESIGN, MATERIAL AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH ACI "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" LATEST EDITION AND ALL LOCAL GOVERNING BUILDING CODES.
2. CEMENT SHALL BE TYPE 1 PORTLAND CEMENT CONCRETE WATER/CEMENT RATIO W/C, SHALL BE 0.45 MAX. CONCRETE COMPRESSIVE STRENGTH ,f C, SHALL BE 3000 PSI @ 28 DAYS.
3. REINFORCIMG STEEL SHALL CONFORM TO ASTM A615 GR, 60.
4. FIELD BENDING OF REINFORCING SHALL BE DONE COLD. HEATING OF BARS IS NOT PERMITTED.
5. JOINT FILLER FOR EXPANSION JOINTS AND ISOLATION JOINTS SHALL BE 1/2" THICK PREFORMED STRIPS OF NON-EXTRUDING RESILIENT TYPE CONFORMING TO ASTM D 1751 OR D 1752.
6. CONCRETE SLAB WITHIN BUILDING EXTERIOR WALLS SHALL RECIEVE A SINGLE PASS STEEL TROWEL FINISH. SLAB AT TRUCK WASHING AREA SHALL RECIEVE A BROOM FINISH. SLABS AT SUMP SHALL RECIEVE A SMOOTH FLOAT FINISH.
7. JOIST SHALL CONFORM TO SJI SPECIFICATIONS LATEST REVISION.
8. MISCELLANEOUS STEEL SHALL BE A 36 & SHALL BE HOT DIPPED GALVANIZED (HOT DIPPED GALVANIZED SHALL INCLUDE IMBEDS).
9. HEAT PUMP UNIT REQUIRE 10,000 BTU HEATING, 6000 BTU COOLING AND 220V AC.

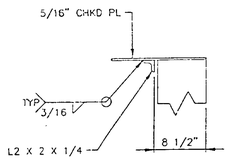
ADD Detail for Hose wash, swivel & supply line w/ dump valve.



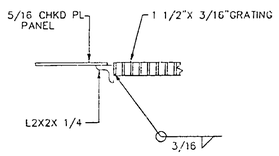
FOR CONSTRUCTION



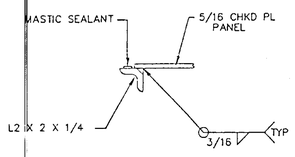
DETAIL 1
1"=1'-0"



DETAIL 2
1"=1'-0"



DETAIL 3
1 1/2"=1'-0"
100



DETAIL 4
NTS

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	S-102	0	1/2"=1'-0"

DWG TITLE
BIOREMEDIATION FACILITY
CRANE NSWC
DECON AREA CONCRETE SECTIONS & DETAILS

REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE

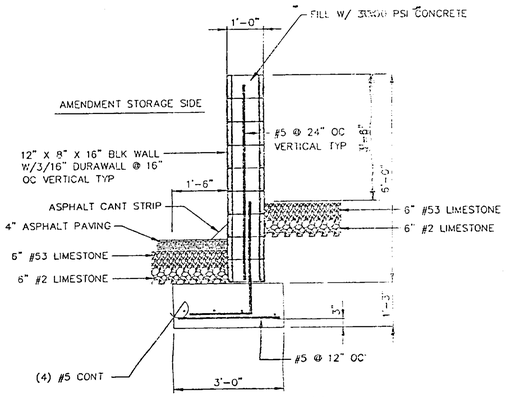
MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	FRM	GL	RR	1/96

DRAWN: RNR DATE: 12/95
CHECKED: GWL 1/96
APPROVED: RR 1/96
APPROVED:

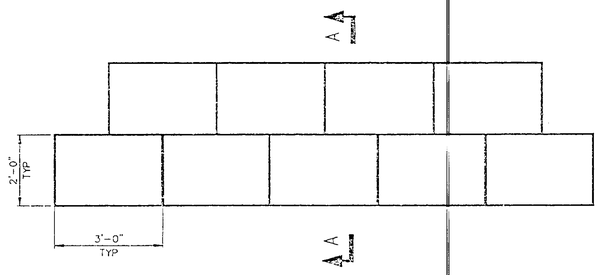
SEAL: STATE OF LOUISIANA — GERARD W. LANDRY, 17201, REGISTERED PROFESSIONAL ENGINEER

BLOCK NAME = DSIZE VER.03/08/89

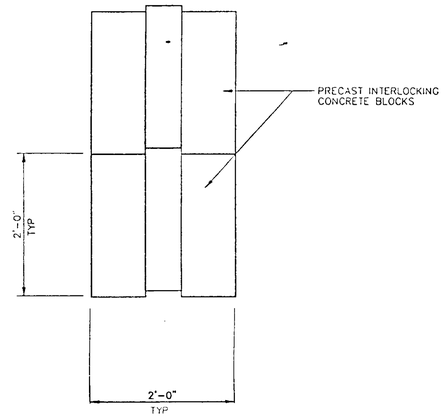
DIR= DWG=



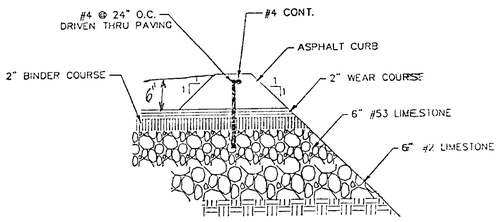
RETAINING WALL
@ AMENDMENTS AREA



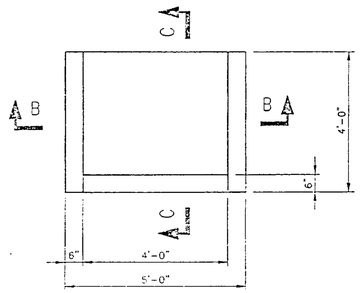
BIN BLOCK DETAIL



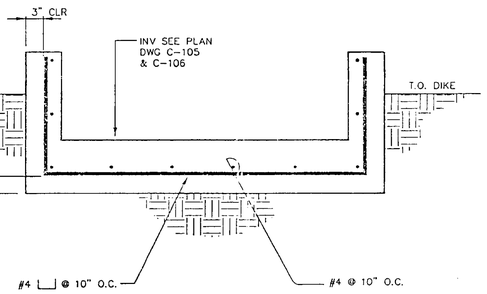
SECTION A–A



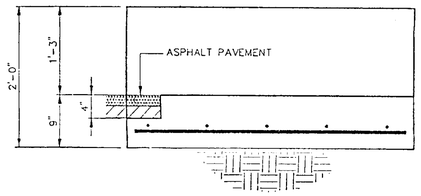
TYPICAL ASPHALT CURB DETAIL



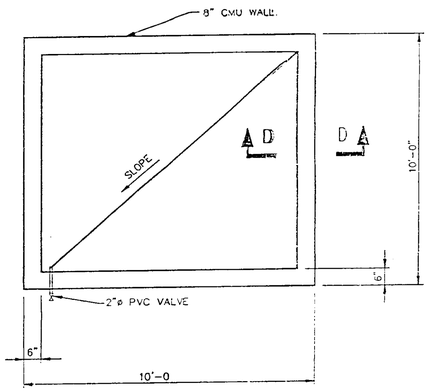
PLAN CONCRETE WEIR @ POND



SECTION B–B

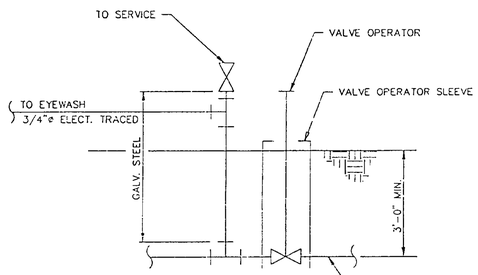


SECTION C–C



FUEL TANK CONTAINMENT

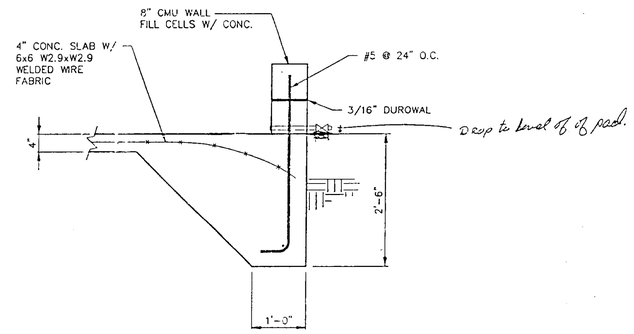
N.T.S.



Typical WATER PIPING At Buildings.

N.T.S.

Need to be more clear. Detail is confusing. What part enters building? Where does the drawing end & start?



SECTION D–D

FOR CONSTRUCTION

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Baton Rouge, Louisiana

CONTRACT NO.	DWG. NO.	REV.	SCALE
10G175-21	S-103	0	1/2"=1'-0"

DWG. TITLE

BIOREMEDIATION FACILITY
CRANE NSWC
MISCELLANEOUS DETAILS

REFERENCE DRAWINGS

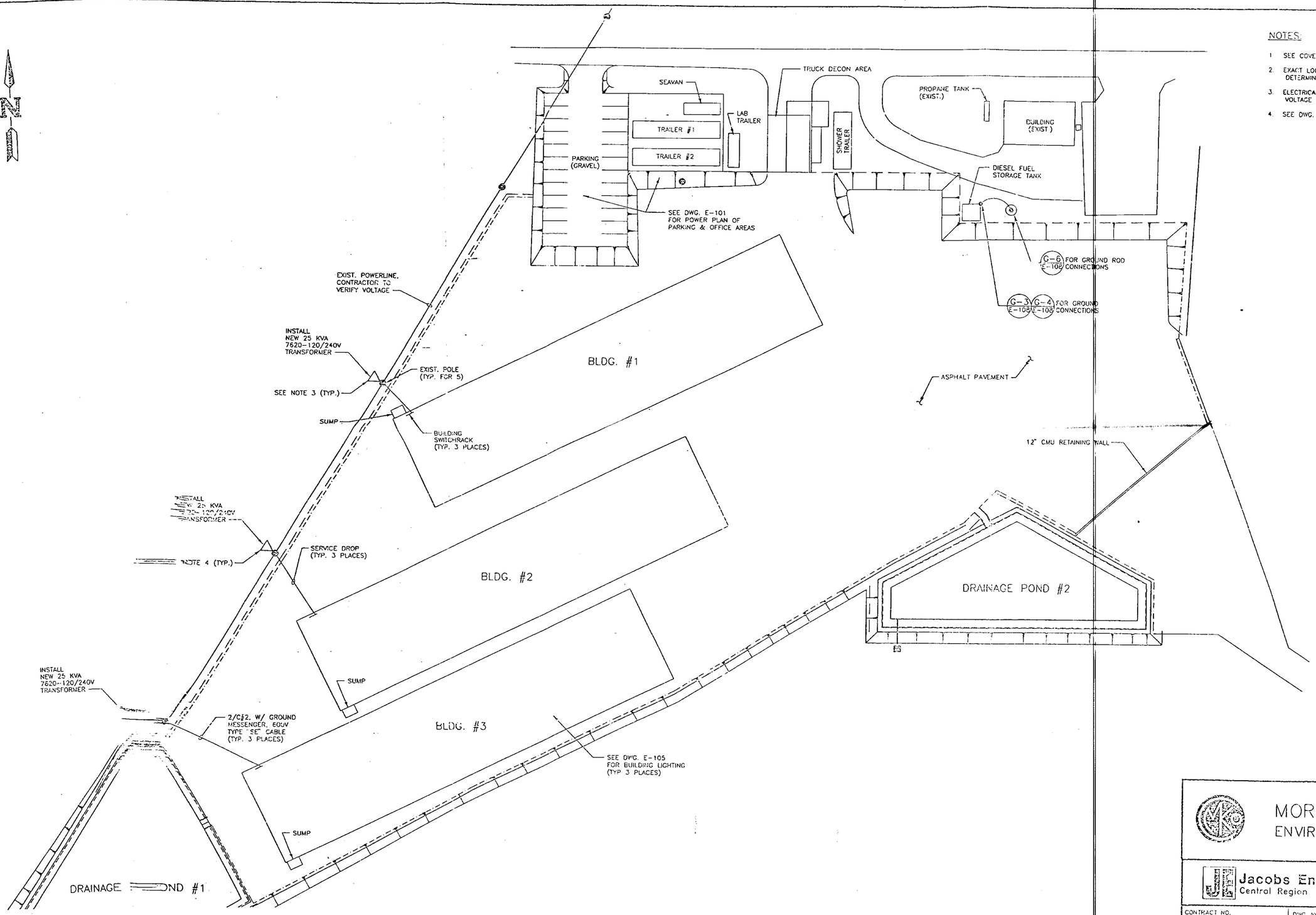
DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE
0	ISSUED FOR CONSTRUCTION	FRM	GL	RR	1/96

DRAWN: RNR DATE: 12-19-95
CHECKED: GWL 1/96
APPROVED: RR 1/96
APPROVED:

STATE OF LOUISIANA — GERARD W. LANGLOIS — REGISTERED PROFESSIONAL ENGINEER — CIVIL ENGINEERING

BLOCK NAME = DSIZE VER.03/08/89



NOTES:

1. SEE COVER SHEET FOR CIVIL & ELECTRICAL DWG. LIST.
2. EXACT LOCATIONS OF ALL ELECTRICAL EQUIPMENT TO BE DETERMINED IN THE FIELD.
3. ELECTRICAL SUB-CONTRACTOR SHALL VERIFY SUPPLY VOLTAGE BEFORE PURCHASING TRANSFORMERS.
4. SEE DWG. E-104 FOR LEGEND.

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Houston, Texas

REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE

MK	REVISION	BY	CHK	APP	DATE
1	ISSUED FOR CONSTRUCTION	P.H.			2/96
0	ISSUED FOR CONSTRUCTION	RLN			1/96

DRAWN: R. NELSON DATE: 12-07-95
CHECKED:
APPROVED:
APPROVED:
SEAL:

CONTRACT NO.	DWG. NO.	REV.	SCALE
10-G175-31	E-100	1	1"=30'-0"

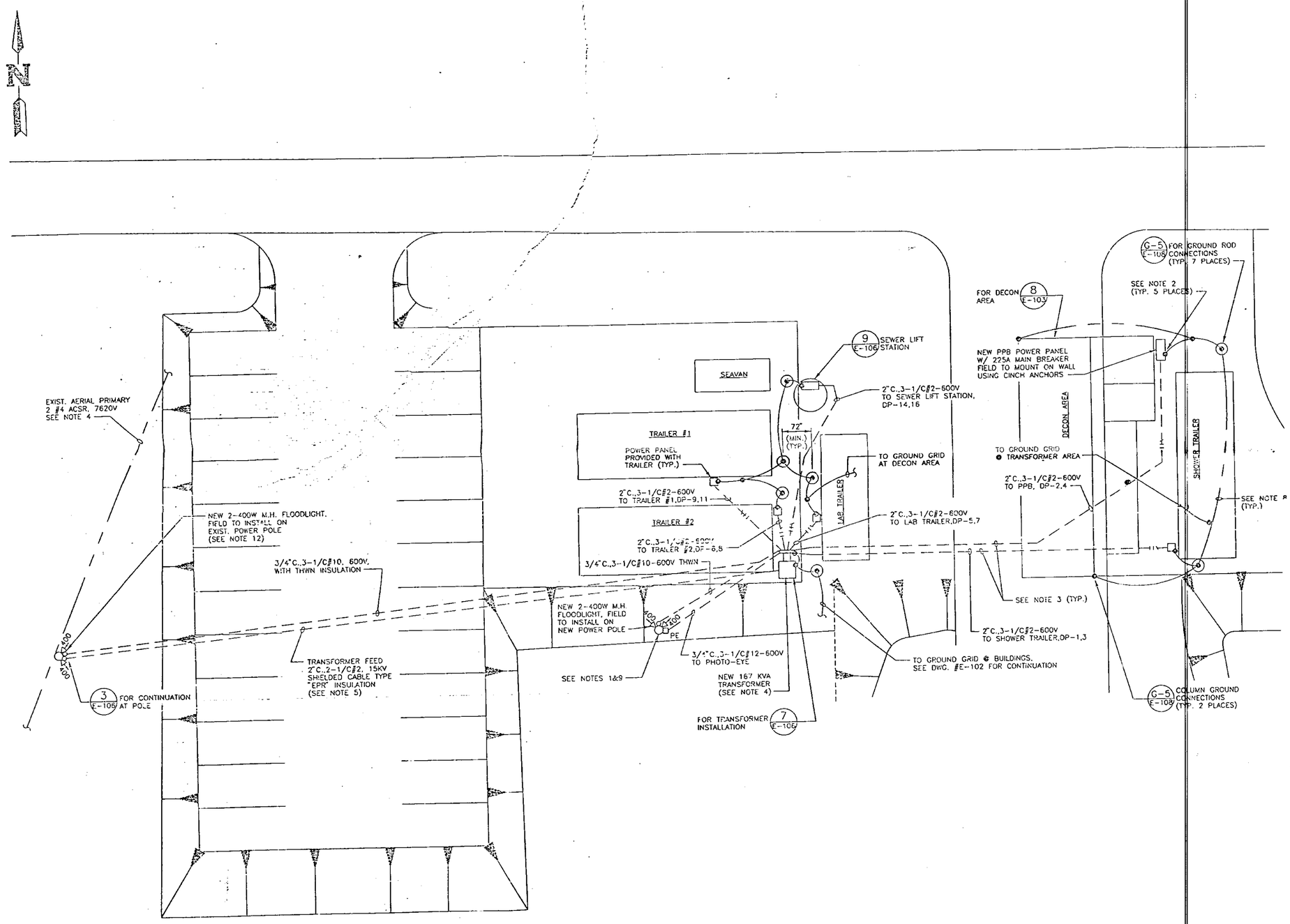
DWG. TITLE
BIOREMEDIATION FACILITY
CRANE NSWC
ELECTRICAL - KEY PLAN

DIR= DWG=

BLOCK NAME = DSIZE VER.03/08/99

CRANE NSWC
ELECTRICAL - POWER P

DIR= DWG=



NOTES

1. FIELD TO INSTALL NEW POLE (35'-0" POLE, CL-2, 6'-0" DEEP IN UNDISTURBED EARTH) AND FIELD TO INSTALL 2-400 WATT METAL HALIDE FLOODLIGHTS.
2. GROUND CONDUCTOR SHALL BE TERMINATED AT ALL POWER & LIGHTING PANELS
3. ALL CONDUCTORS SHALL BE #2 AWG, 600V, WITH THWN INSUALTION UNLESS OTHERWISE NOTED.
4. ELECTRICAL SUB-CONTRACTOR TO VERIFY SUPPLY VOLTAGE BEFORE PURCHASING TRANSFORMER.
5. ALL CONDUIT RUNS ARE SHOWN DIAGRAMMATICALLY. ELECTRICAL SUB-CONTRACTOR SHALL DETERMINE EXACT ROUTE & SUPPORT.
6. ALL UNDERGROUND CONDUITS SHALL BE ENCASED IN A RED CONCRETE DUCTBANK. MINIMUM CONCRETE COVERAGE OF CONDUITS SHALL BE 3" ALL AROUND ON OUTSIDE OF DUCTBANK & 2" BETWEEN CONDUIT O.D.'S IN INTERIOR OF DUCTBANK.
7. ALL 120/240V CONDUITS MUST BE ROUTED A MINIMUM OF 18" BELOW GRADE. ALL 7.6 KV CONDUITS MUST BE ROUTED A MINIMUM OF 36" BELOW GRADE.
8. ALL GROUND RODS SHALL BE BONDED TOGETHER WITH A #2/0 BARE COPPER BONDING CONDUCTOR.
9. ELECTRICAL SUB-CONTRACTOR SHALL INSTALL #6 BARE COPPER GROUND CONDUCTOR ALONG LENGTH OF POLE & WRAP WIRE AROUND BUTT OF POLE SEVERAL TIMES BEFORE INSTALLING POLE IN GROUND.
10. ELECTRICAL SUB-CONTRACTOR SHALL LABEL MAIN BREAKERS AS "SERVICE DISCONNECT."
11. SEE DWG. #E-104 FOR LEGEND.
12. FLOODLIGHTS SHALL BE INSTALLED A MINIMUM OF 5'-0" FROM BARE OVERHEAD ENERGIZED CONDUCTORS.

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region
Houston, Texas

CONTRACT NO.	DWG. NO.	REV.	SCALE
10-G175-31	E-101	1	1"=10'-0"

DWG. TITLE
BIOREMEDIATION FACILITY
CRANE NSWC
ELECTRICAL - POWER PLAN

DRAWN R. NELSON DATE 12-27-95
CHECKED:
APPROVED:
APPROVED:

SEAL:

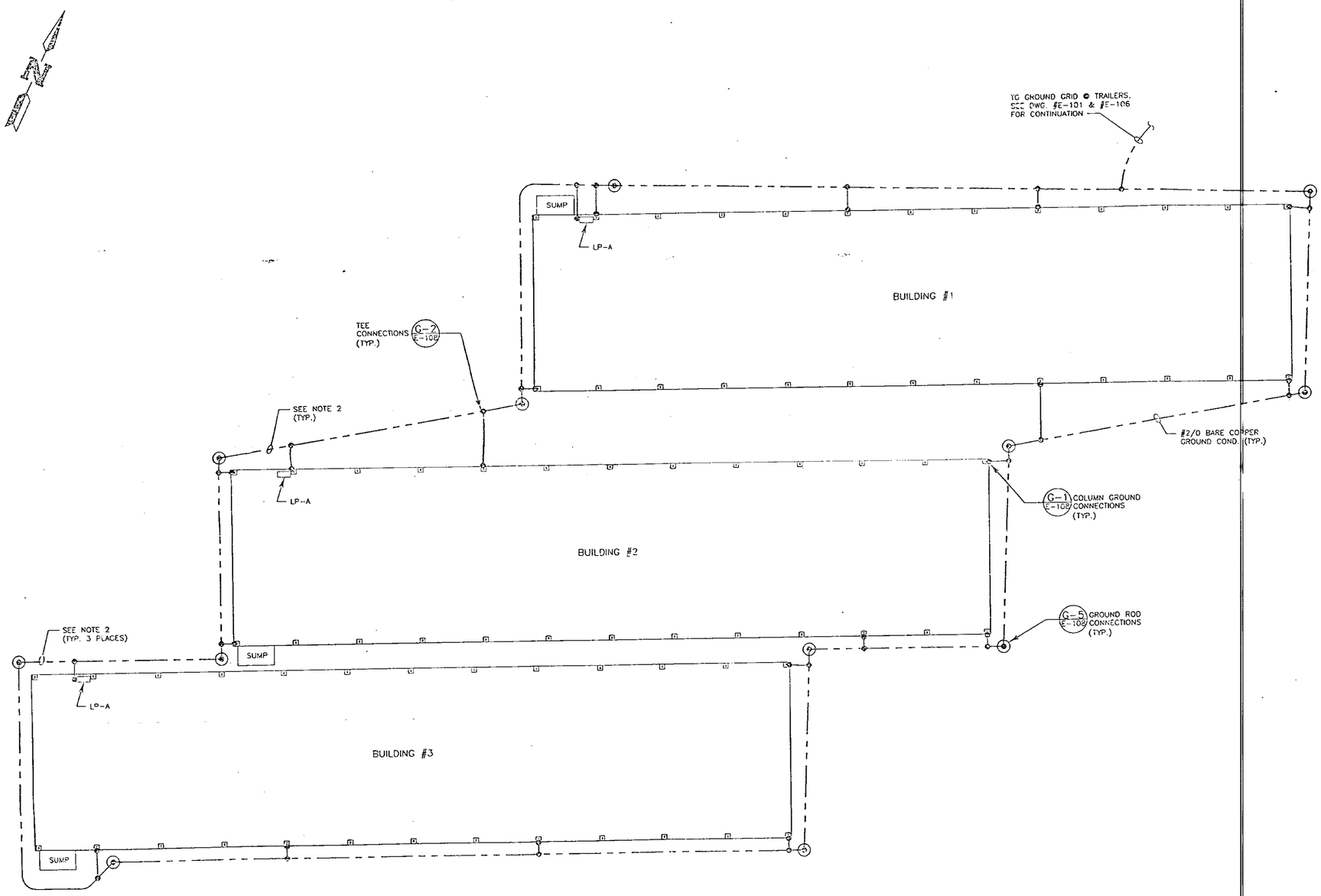
REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE
E-100	ELECTRICAL KEY PLAN		

MK	REVISION	BY	CHK	APP	DATE
1	ISSUED FOR CONSTRUCTION	P.H.			2/96
0	ISSUED FOR CONSTRUCTION	RLN			1/96

DIR= DWG=

BLOCK NAME = DSIZE VER.03/08/89



NOTES

1. GROUND CONDUCTOR SHALL BE CONNECTED TO PANELBOARD FRAME WHICH IS PERMANENTLY BONDED TO PANELBOARD GROUND BAR.
2. GROUND CONDUCTOR SHALL BE BARE, #2/0 COPPER WIRE.
3. SEE DWG. #E-104 FOR LEGEND.

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region
Houston, Texas

CONTRACT NO.	DWG. NO.	REV.	SCALE
10-G175-31	E-102	1	1"=20'

DWG. TITLE
BIOREMEDIATION FACILITY
CRANE N.S.W.C.
ELECTRICAL - GROUNDING PLAN

DRAWN: R. NELSON DATE: 12-07-95
CHECKED:
APPROVED:
APPROVED:
SEAL:

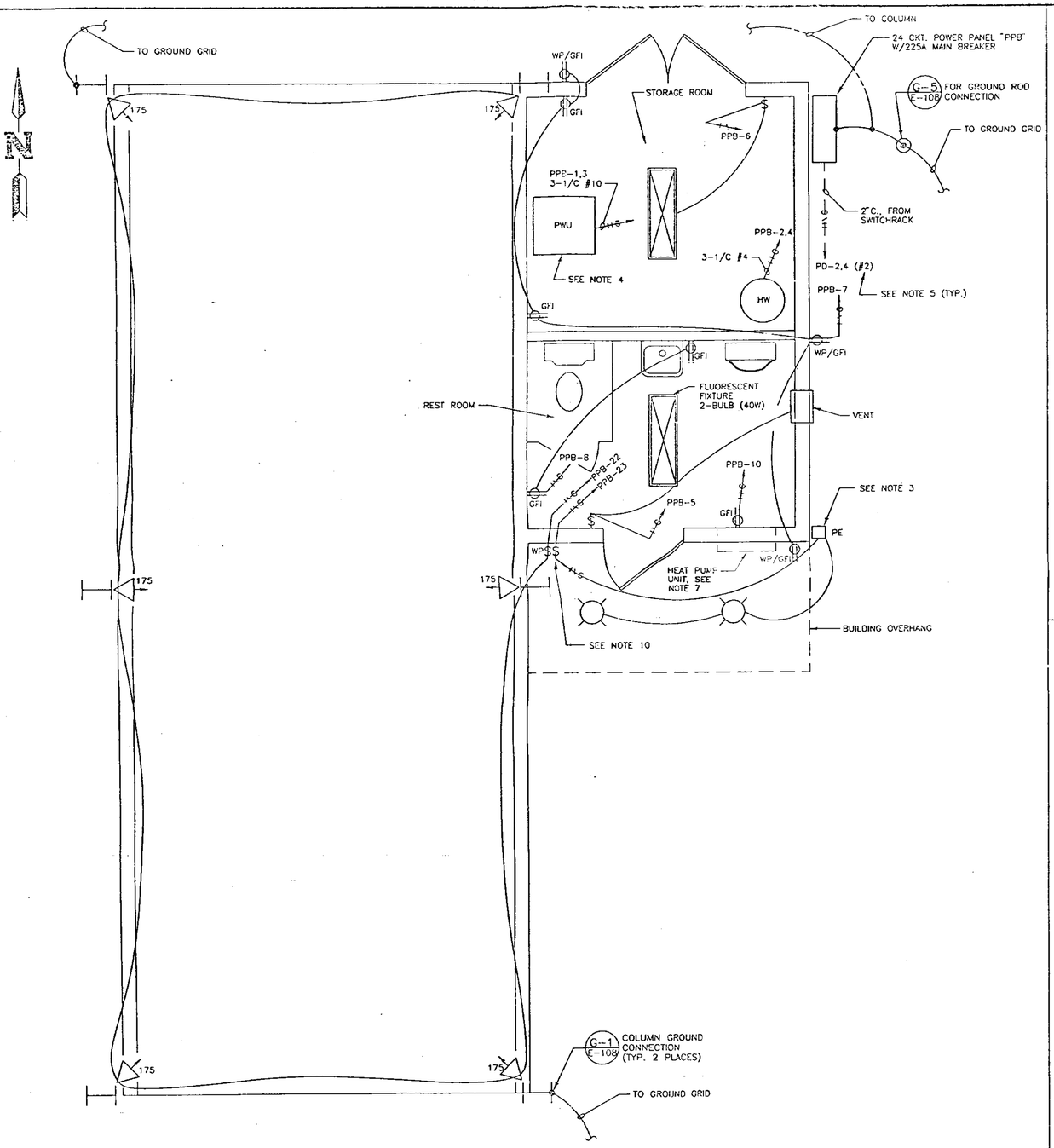
REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE
E-100	ELECTRICAL KEY PLAN		

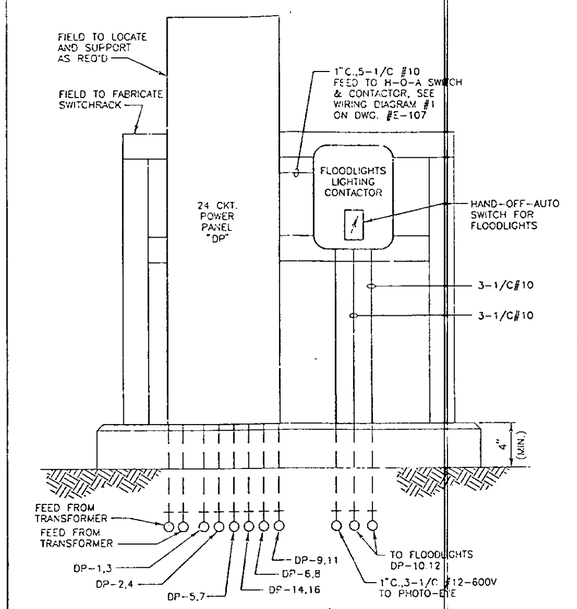
MK	REVISION	BY	CHK	APP	DATE
1	ISSUED FOR CONSTRUCTION	P.H.			2/96
0	ISSUED FOR CONSTRUCTION	RLN			1/96

DIR= _____ DWG= _____

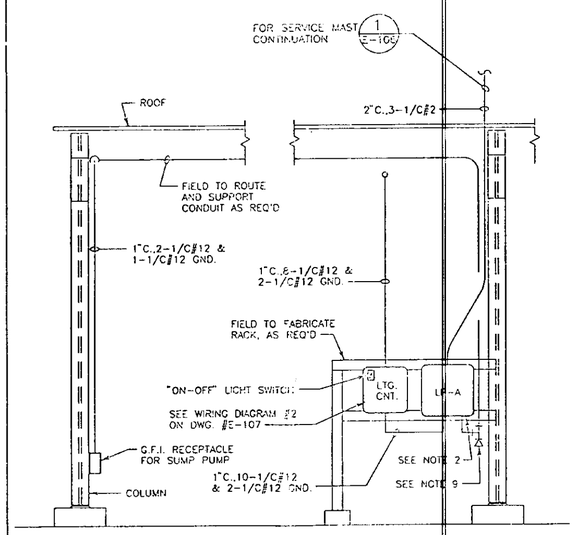
BLOCK NAME = DSIZE VER.03/08/89



DET. 8
DECON AREA
N.T.S.



DET. 4
SWITCHRACK DETAIL
N.T.S.



DET. 5
TYP. SWITCHRACK (3 BLDG'S)
N.T.S.

NOTES

1. CONDUIT ROUTINGS ARE SHOWN DIAGRAMMATICALLY. ACTUAL ROUTINGS SHALL BE DETERMINED BY THE FIELD.
2. 100 AMP MAIN BREAKER LOCATED IN LP-A SHALL BE USED FOR SERVICE DISCONNECTING MEANS.
3. FIELD TO INSTALL PHOTO-ELECTRIC-EYE IN SUCH A MANNER AS TO INSURE THAT IT WILL FUNCTION PROPERLY.
4. INSTALLATION & CONTROLS OF PRESSURE WASHER UNIT SHALL BE BY WASHER VENDOR. SUB-CONTRACTOR SHALL VERIFY SIZE OF CIRCUIT BREAKER & WIRE AS ADEQUATE FOR PRESSURE WASHER UNIT.
5. ALL CONDUCTORS SHALL BE #12 AWG WITH THWN INSULATION UNLESS OTHERWISE NOTED.
6. ALL 120/240V CONDUIT MUST BE ROUTED A MINIMUM OF 18" BELOW GRADE. 7.6KV CONDUIT SHALL BE ROUTED A MINIMUM OF 36" BELOW GRADE.
7. ELECTRICAL SUB-CONTRACTOR SHALL VERIFY SIZE OF CIRCUIT BREAKER & WIRE AS ADEQUATE FOR HEAT PUMP UNIT.
8. ALL UNDERGROUND CONDUITS SHALL BE ENCASED IN A RED CONCRETE DUCTBANK. MINIMUM CONCRETE COVERAGE OF CONDUITS SHALL BE 3" ALL AROUND ON OUTSIDE OF DUCTBANK & 2" BETWEEN CONDUIT O.D.'S IN INTERIOR OF DUCTBANK.
9. ELECTRICAL SUB-CONTRACTOR SHALL INSTALL DRAINS AT LOW POINT OF ALL CONDUIT RUNS.
10. INSTALL A HAND-OFF-AUTOMATIC SWITCH 4'-6" ABOVE GRADE TO CONTROL LIGHT FIXTURES AND TO BY-PASS PHOTO-ELECTRIC-EYE WHEN REQUIRED. SEE FIXTURE SCHEDULE ON DWG. E-104 FOR A COMPLETE DESCRIPTION OF SWITCH.
11. SEE DWG. #E-104 FOR LEGEND.

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region · Houston, Texas

REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE
E-100	ELECTRICAL KEY PLAN		

MK	REVISION	BY	CHK	APP	DATE
1	ISSUED FOR CONSTRUCTION	P.H.			2/96
0	ISSUED FOR CONSTRUCTION	RLN			1/96

DRAWN: R. NELSON DATE: 12-27-95
CHECKED:
APPROVED:
APPROVED:
SEAL:

CONTRACT NO. 10-G175-31 | DWG. NO. E-103 | REV. 1 | SCALE AS NOTED

DWG. TITLE
BIOREMEDIATION FACILITY
CRANE NSWC
ELECTRICAL - POWER DETAILS

DIR= _____ DWG= _____

BLOCK NAME = DSIZE VER.03/08/89

FIXTURE SCHEDULE

TYPE	QTY.	DESCRIPTION
	2	LIGHTING FIXTURE, 200 WATT, INCANDESCENT, 120V, W/ GUARD, CEILING MOUNT W/ GLOBE & GUARD
MH	72	LIGHTING FIXTURE, 250 WATT, METAL HALIDE, 240V, W/ GUARD, ENCLOSED & GASKETED, SUITABLE FOR WET LOCATIONS,, NEMA 4X, HAZLUX 2 CAT. #VH025C040-TCL-P3
MH F	36	LIGHTING FIXTURE, 250 WATT, METAL HALIDE, 240V, ENCLOSED & GASKETED, SUITABLE FOR WET LOCATIONS, NEMA 4X, HAZLUX 2 CAT. #VH025C040-TCL-F2
	2	LIGHTING FIXTURE, 40 WATT, FLUORESCENT, 120V, 4'-0" LONG, 2 BULB, WITH DIFFUSER COVER WITH EMERGENCY PACK, EMERGI-LITE CAT. #FPSI
WP/GFI	5	GROUND FAULT RECEPTACLE, 20A, 125V, SUITABLE FOR WET LOCATIONS, 2 POLE, 3 WIRE, HUBBELL CAT. #GF5352 MOUNTED IN FS SINGLE GANG BOX WITH WEATHER PROOF COVER HUBBELL CAT. #WPFS26
(HEAT PUMP)	1	RECEPTACLE, 20A, 250V, 2 POLE, 3 WIRE, HUBBELL CAT. #5452 MOUNTED IN SINGLE GANG BOX (SEE NOTE 2)
400	4	FLOOD LIGHTING FIXTURE, 400 WATT, METAL HALIDE, 240V ENCLOSED & GASKETED, SUITABLE FOR WET LOCATIONS, HAZLUX CAT. #FH-671H-4MT WITH WOOD POLE MOUNTING BRACKET
175	6	FLOOD LIGHTING FIXTURE, 175 WATT, METAL HALIDE, 120V ENCLOSED & GASKETED, SUITABLE FOR WET LOCATIONS, HAZLUX CAT. #FH-371H-4MT (ULSSS MARINE LISTED) WITH CLAMP MTG. BRACKET FSR-3
GFI	4	GROUND FAULT INTERRUPT RECEPTACLE 125V-20A (INDOOR) HUBBELL CAT. #GF5352
	2	LIGHT SWITCH, HUBBELL CAT. #1221-I W/ WALL PLATE CAT. #PI
WP	1	CROUSE-HINDS CAT. #EDSC TYPE BOX WITH A TWO POSITION SELECTOR SWITCH, ROCKER ARM CROUSE-HINDS CAT. #DS0933 AND A 3 POSITION SELECTOR SWITCH, HOA SWITCH, CROUSE-HINDS CAT. #DS0926

BILL OF MATERIALS

ITEM NO.	QTY.	DESCRIPTION	VENDOR/CAT. NO.
1	3	25 KVA POLE MOUNTED TRANSFORMER, SINGLE ø 7620 PRI./120-240V SEC.	VANTRAN
2	1	167 KVA PAD MOUNTED TRANSFORMER, SINGLE ø 7620 PRI./120-240V SEC.	VANTRAN
3	20	COPPER CLAD GROUND ROD 8'-0" LONG x 3/4" DIA.	AMERICAN ELECTRIC-BLACKBURN CAT. #7508
4	3	LIGHTING PANEL "LPA" - 24 CKT. 100 AMP MAIN BREAKER	CUTLER HAMMER/WESTINGHOUSE POW-R-LINE 1, NEMA 3R PANEL BOARD SEE DWG. #E-109 FOR REQUIREMENTS
5	1	POWER PANEL "PPB" - 24 CKT. 100 AMP MAIN BREAKER	CUTLER HAMMER/WESTINGHOUSE POW-R-LINE 1, NEMA 3R PANEL BOARD SEE DWG. #E-109 FOR REQUIREMENTS
6	1	POWER DISTRIBUTION PANEL "DP" - 28(X) SPACE 600 AMP MAIN BREAKER	CUTLER HAMMER/WESTINGHOUSE POW-R-LINE 4-NEMA 3R PANEL BOARD SEE DWG. #E-109 FOR REQUIREMENTS
7	4	HIGH VOLTAGE TYPE "C" CUT-OUTS POLE MOUNTED (SEE NOTE 3)	A. B. CHANCE CAT. #C710-112PB
8	3	HEAVY DUTY DEAD END CLEVIS	A. B. CHANCE CAT. #0344 W/ SPOOL #C909-1035
9	4	COMPRESSION STIRRUPS (FIELD TO VERIFY)	AMERICAN ELECTRIC-BLACKBURN CAT. #SCO 02
10	2	TERMINATION CONNECTORS	C & W ELECTRIC CO. CAT. #E72KPOAB
11	2	PHOTO-ELECTRIC EYE	FISHER-PIERCE MODEL #6601A
12	3	LIGHTING CONTACTOR - MULTIPOLE (BUILDINGS #1, #2 & #3)	SQUARE D CAT. #8903-LW1200-V03-C6F4
13	1	LIGHTING CONTACTOR - MULTIPOLE (FLOODLIGHTING)	SQUARE D CAT. #8903-LWR0-V03-CF4G101
14	1	DISCONNECT SWITCH	CROUSE-HINDS CAT. #EFSC2125

NOTES

1. ALL MATERIAL SPECIFIED IN THE BILL OF MATERIALS & FIXTURE SCHEDULE MAY BE SUBSTITUTED WITH CLIENT APPROVED EQUALS.
2. ELECTRICAL SUB-CONTRACTOR SHALL PURCHASE & INSTALL RECEPTACLE SUITABLE FOR PLUG PROVIDED WITH HEAT PUMP.
3. ELECTRICAL SUB-CONTRACTOR SHALL ALSO PURCHASE & INSTALL 5 AMP FUSES IN FUSE HOLDER FOR THREE 25 KVA TRANSFORMERS & A 30 AMP FUSE FOR THE 167 KVA TRANSFORMER.
4. SEE DWG. #E-104 FOR LEGEND.

LEGEND

- MH — LIGHTING FIXTURE, 250 WATT, METAL HALIDE, PENDANT MOUNT
- MH F — LIGHTING FIXTURE, 250 WATT, METAL HALIDE, FLEXIBLE PENDANT MOUNT
- LIGHTING FIXTURE, 200 WATT, INCANDESCENT
- $ — LIGHT SWITCH
- WP$ — LIGHT SWITCH, WEATHER PROOF
- RECEPTACLE (250V) WITH GFI CIRCUIT BREAKER IN PANEL
- WP/GFI — GROUND FAULT RECEPTACLE (125V), WEATHER PROOF
- GFI — GROUND FAULT RECEPTACLE (125V)
- 400 — LIGHTING FIXTURE, FLOODLIGHT, METAL HALIDE 400 WATT AND 175 WATT (AS SPECIFIED ON THE DRAWINGS)
- PE — PHOTO ELECTRIC EYE
- 25 KVA, POLE MOUNTED, 7620V-120/240V SINGLE PHASE TRANSFORMER
- PPB — POWER PANEL 3 LOCATED AT RESTROOM
- DP — DISTRIBUTION POWER PANEL FOR TRAILER FEEDS
- POWER PANELS PROVIDED WITH TRAILERS
- GROUND ROD
- HW — 50 GAL. HOT WATER HEATER
- PWU — PRESSURE WASH UNIT
- LIGHTING FIXTURE, 40 WATT, FLUORESCENT, 2 BULB WITH EMERGENCY PACK
- LPA — LIGHTING PANEL IN BUILDINGS #1, #2 & #3
- CIRCUIT DESIGN SHOWING HOT (VERT.), NEUTRAL (SLANTED) & GROUND (G)
- ELECTRICAL CONNECTION POINT

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Houston, Texas

CONTRACT NO.	DWG. NO.	REV.	SCALE
10-G175-31	E-104	1	NONE

DWG. TITLE

BIOREMEDIATION FACILITY
CRANE NSWC
ELECTRICAL - LTG. FIXTURE SCHED., B. O. M. & LEGEND

DRAWN: R. NELSON DATE: 12-28-95
CHECKED:
APPROVED:
APPROVED:
SEAL:

DIR= _____ DWG= _____

REFERENCE DRAWINGS

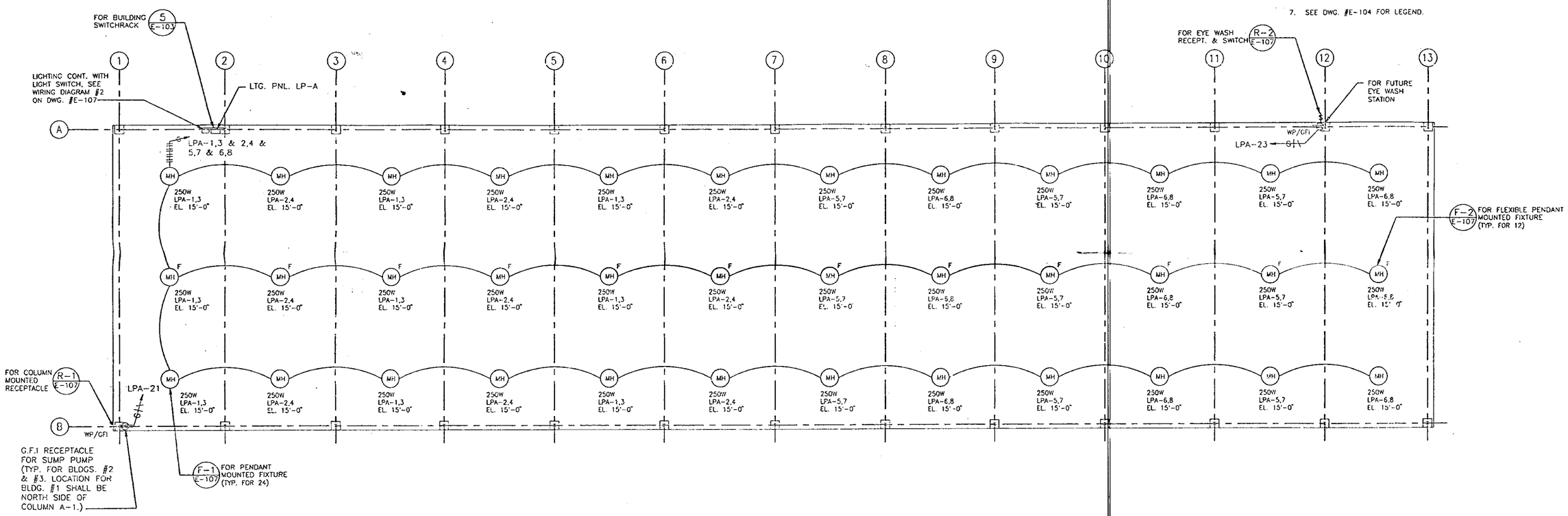
DWG. NO.	TITLE	DWG. NO.	TITLE
E-100	ELECTRICAL KEY PLAN		

MK	REVISION	BY	CHK	APP	DATE
1	ISSUED FOR CONSTRUCTION	P.H.			2/96
0	ISSUED FOR CONSTRUCTION	RLN			1/96

BLOCK NAME = DSIZE VER.03/08/89

NOTES:

1. FIELD TO INSTALL & SUPPORT CONDUIT AS REQ'D.
2. ALL CONDUCTORS SHALL BE #12 AWG, 600V, WITH THWN INSULATION UNLESS OTHERWISE NOTED.
3. CONDUIT RUNS FOR LIGHTING SHALL BE RIGID GALVANIZED STEEL FOR FIXTURE SUPPORT. ELECTRICAL SUB-CONTRACTOR MAY SUBSTITUTE EMT CONDUIT FOR RGS IN OTHER INSTANCES WHERE CONDUIT WILL NOT BE SUBJECTED TO SEVERE PHYSICAL DAMAGE, PROTECTED FROM CORROSION SOLELY BY ENAMEL, IN CINDER CONCRETE OR IN ANY HAZARDOUS (CLASSIFIED) LOCATION.
4. SEE DETAIL T-1 ON DWG. #E-107 FOR SIZING OF TEE FITTINGS.
5. SUB-CONTRACTOR SHALL INSTALL DRAINS AT LOW POINT OF CONDUIT RUNS.
6. ELECTRICAL SUB-CONTRACTOR SHALL VERIFY SIZE OF CIRCUIT BREAKER & WIRE AS ADEQUATE FOR SUMP PUMP.
7. SEE DWG. #E-104 FOR LEGEND.



LIGHTING PLAN

(TYPICAL FOR BUILDINGS #1, #2 & #3)

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Houston, Texas

CONTRACT NO.	DWG. NO.	REV.	SCALE
10-G175-31	E-105	1	3/32"=1'-0"

REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE
E-100	ELECTRICAL KEY PLAN		

MK	REVISION	BY	CHK	APP	DATE
1	ISSUED FOR CONSTRUCTION	P.H.			2/96
0	ISSUED FOR CONSTRUCTION	RLN			1/95

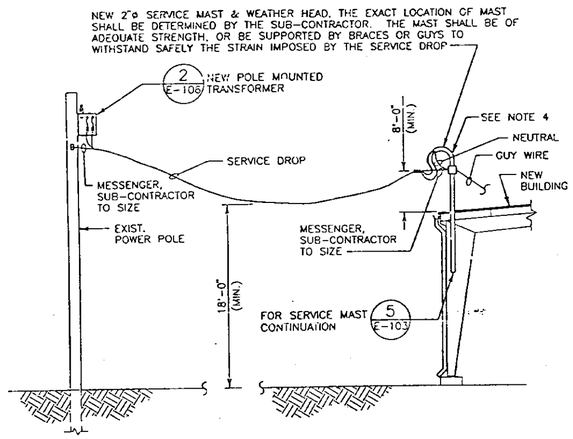
DRAWN: R. NELSON DATE: 12-07-95
CHECKED:
APPROVED:
APPROVED:

SEAL:

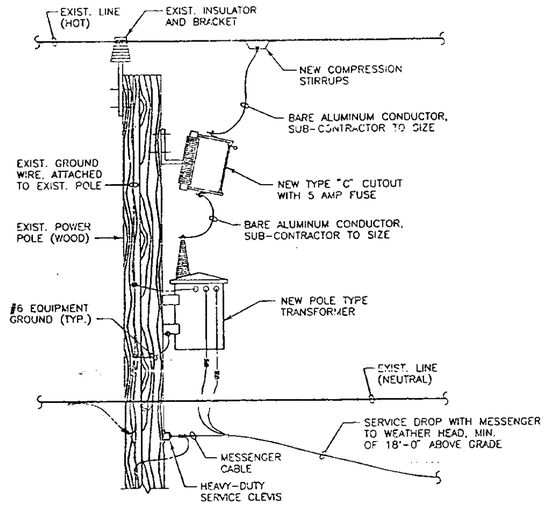
DWG. TITLE
BIOREMEDIATION FACILITY
CRANE NSWC
ELECTRICAL - TYP. LIGHTING FOR BLDGS. #1, #2 & #3

BLOCK NAME = DSIZE VER.03/08/89

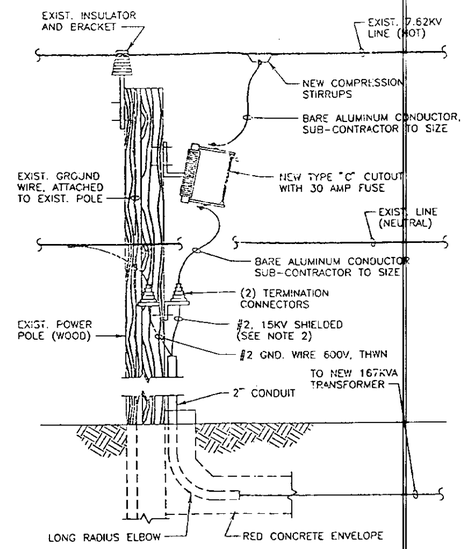
DIR= DWG=



DET. 1
SERVICE DROP ELEVATION
N.T.S.



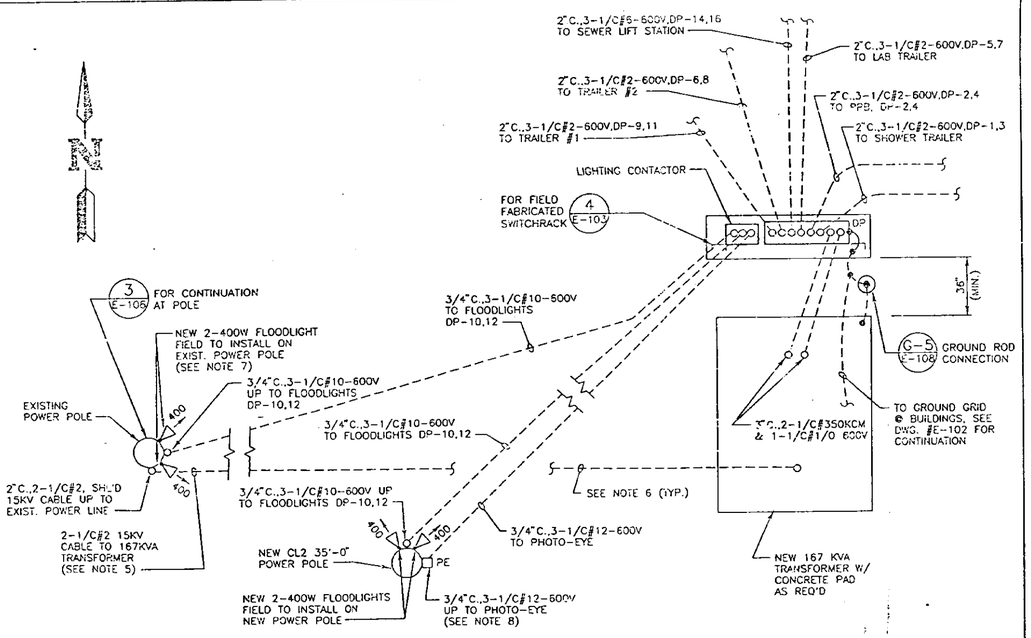
DET. 2
TYP. POLE MOUNTED TRANSFORMER
N.T.S.



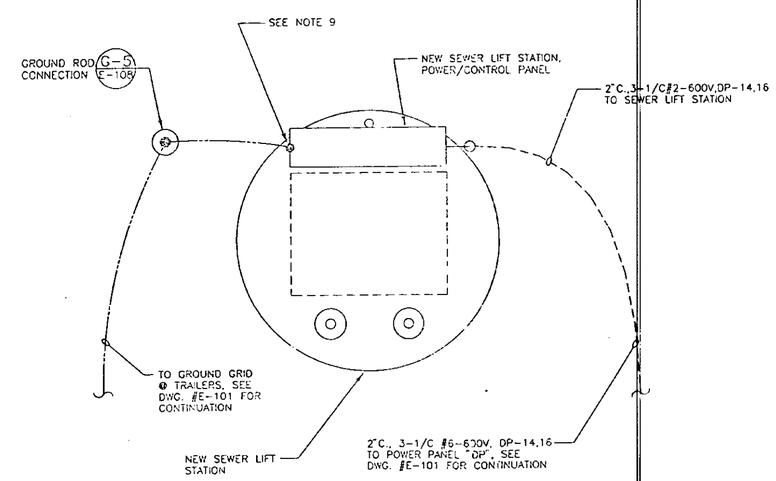
DET. 3
167KVA TRANSFORMER FEED DETAIL
N.T.S.

NOTES

1. CONDUIT ROUTINGS ARE SHOWN DIAGRAMMATICALLY, ACTUAL ROUTINGS SHALL BE DETERMINED BY THE FIELD.
2. ELECTRICAL SUB-CONTRACTOR SHALL TERMINATE 15KV CABLE WITH APPROVED TERMINATION KIT.
3. SEE DWG. #E-104 FOR LEGEND.
4. ALL SERVICE MAST FITTINGS SHALL BE IDENTIFIED FOR USE WITH SERVICE CONDUCTORS & ONLY POWER SERVICE DROP CONDUCTORS SHALL BE ATTACHED TO SERVICE MAST.
5. ALL 120/240V CONDUIT MUST BE ROUTED A MINIMUM OF 18" BELOW GRADE. 7.6KV CONDUIT SHALL BE ROUTED A MINIMUM OF 36" BELOW GRADE.
6. ALL UNDERGROUND CONDUITS SHALL BE ENCASED IN A RED CONCRETE DUCTBANK. MINIMUM CONCRETE COVERAGE OF CONDUITS SHALL BE 3" ALL AROUND ON OUTSIDE OF DUCTBANK & 2" BETWEEN CONDUIT O.D.'S IN INTERIOR OF DUCTBANK.
7. FLOODLIGHTS SHALL BE INSTALLED A MINIMUM OF 5'-0" FROM BARE OVERHEAD ENERGIZED CONDUCTORS.
8. FIELD TO INSTALL PHOTO-ELECTRIC-EYE IN SUCH A MANNER AS TO INSURE THAT IT WILL FUNCTION PROPER.
9. GROUND LUG AT BOTTOM OF POWER/CONTROL PANEL SHALL BE CONNECTED TO GROUND CONDUCTOR FROM GROUND ROD.



DET. 7
CONDUIT ROUTING AT TRANSFORMER
N.T.S.



DET. 9
SEWER LIFT STATION
N.T.S.

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Houston, Texas

CONTRACT NO.	DWG. NO.	REV.	SCALE
10-G175-31	E-106	1	AS NOTED

DWG. TITLE
BIOREMEDIATION FACILITY
CRANE NSWC
ELECTRICAL – POWER DETAILS

DRAWN: R. NELSON DATE: 2-27-95
CHECKED:
APPROVED:
APPROVED:
SEAL:

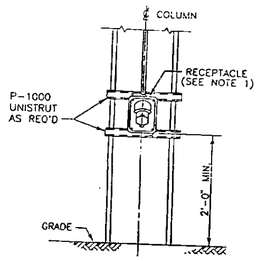
REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE
E-100	ELECTRICAL KEY PLAN		

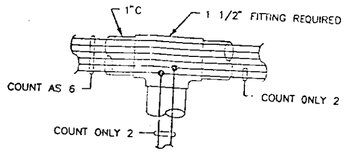
MK	REVISION	BY	CHK	APP	DATE
1	ISSUED FOR CONSTRUCTION	P.H.			2/96
0	ISSUED FOR CONSTRUCTION	RLN			1/96

BLOCK NAME = DSIZE VER.03/08/89

DIR= DWG=

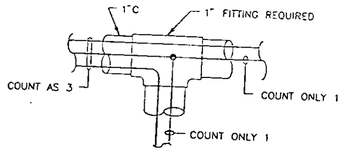


DET. R-1
COLUMN MOUNTED RECEPTACLE



6 #10 WITH 2 SPLICES MUST BE COUNTED AS 10 #10. 25 CU. IN. REQ'D.

EXAMPLE #1



3 #10 WITH 1 SPLICE COUNT ONLY AS 5 #10 FOR A TOTAL OF 12.5 CU. IN. REQ'D.

EXAMPLE #2

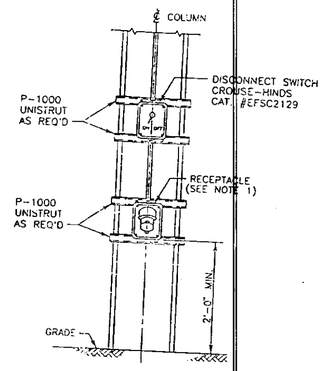
TABLE

COUNT	AWG	"T" FITTING	CU. IN.
2 THRU 4	#12	3/4"	9
5 OR 6	#12	1"	14.5
7 THRU 11	#12	1 1/2"	26
12 THRU 20	#12	2"	46
2 THRU 5	#10	1"	14.5
6 THRU 10	#10	1 1/2"	26
11 THRU 18	#10	2"	46
19 THRU 37	#10	2 1/2"	94

DETAIL "T-1" NOTES

1. EACH CONDUCTOR THAT TERMINATES OR SPLICES IN FITTING COUNT AS ONE (1). EACH CONDUCTOR THAT PASSES THROUGH COUNT AS ONE (1).
2. SPLICES ALLOWED IN "T" FITTING ONLY.
3. FIELD TO VERIFY "T" FITTING SIZE IF REQUIRED USING ABOVE TABLE.
4. "T" FITTING SIZES SHOWN IN TABLE ARE BASED ON CROUSE-HINDS FORM 7 "T" FITTINGS.
5. VOLUME REQUIRED PER CONDUCTOR IS BASED ON 1996 N.E.C., TABLE 370-16(b).
6. FIELD TO INSTALL CORRECTLY SIZED REDUCERS WHERE REQUIRED TO INSURE PROPER TRANSITION FROM "T" FITTING TO CONDUIT.

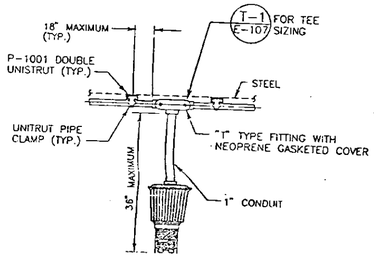
DET. T-1
EXAMPLES TO DETERMINE "T" FITTING SIZE



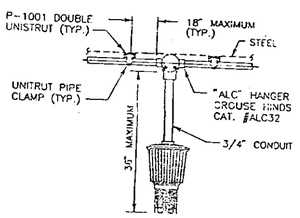
DET. R-2
COLUMN MOUNTED RECEPTACLE FOR EYE WASH STATION

NOTES

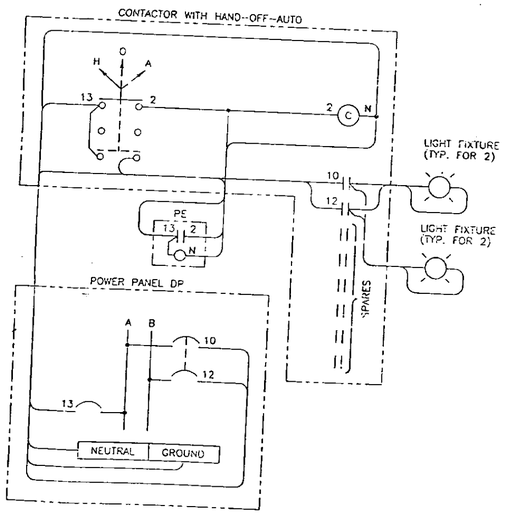
1. FIXTURE AND RECEPTACLES ARE INDICATED IN DETAILS TO SHOW MOUNTINGS ONLY. SIZE AND TYPE ARE SPECIFIED ON RESPECTIVE ELECTRICAL LAYOUT DRAWINGS.
2. MATERIAL REQUIRED FOR DETAILS SHOWN ON THIS DRAWING ARE SPECIFIED ON THE LIST OF ELECTRICAL MATERIAL FOR THE RESPECTIVE ELECTRICAL LAYOUT DRAWINGS.
3. INSTALL COMBINATION BREATHER/DRAIN FITTING AT LOWEST POINT IN ALL CONDUIT RUNS.
4. SEE DWG. #E-104 FOR LEGEND.



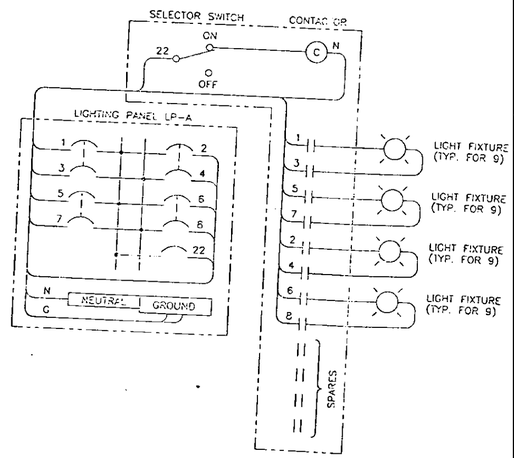
DET. F-1
PENDANT MOUNTED LIGHT FIXTURE



DET. F-2
FLEXIBLE PENDANT MOUNTED LIGHT FIXTURE



WIRING DIAGRAM #1



WIRING DIAGRAM #2

REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE
E-100	ELECTRICAL KEY PLAN		

MK	REVISION	BY	CHK	APP	DATE
1	ISSUED FOR CONSTRUCTION	P.H.			2/96
0	ISSUED FOR CONSTRUCTION	RLN			1/96

DRAWN: R. NELSON DATE: 12-11-95
CHECKED:
APPROVED:
APPROVED:
SEAL:

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

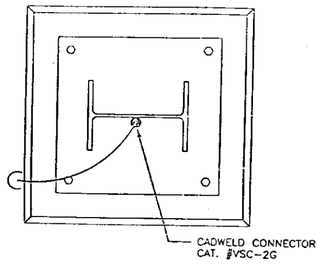
Jacobs Engineering Group Inc.
Central Region
Houston, Texas

CONTRACT NO. 10-G175-31 | DWG. NO. E-107 | REV. 1 | SCALE NONE

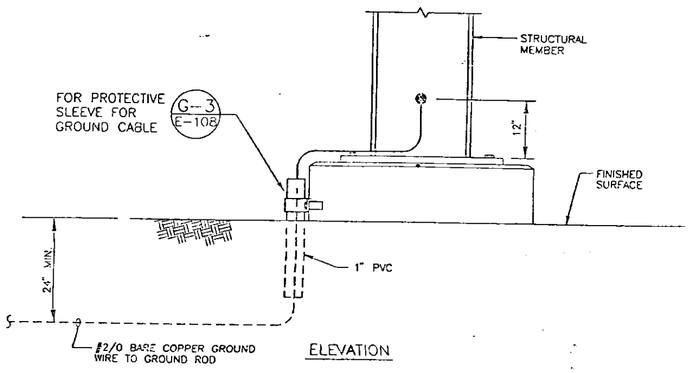
DWG TITLE
BIOREMEDIATION FACILITY
CRANE NSWC
ELECTRICAL - SCHEMATICS & LIGHTING DETAILS

DIR= DWG=

BLOCK NAME = DSIZE VER.03/08/89

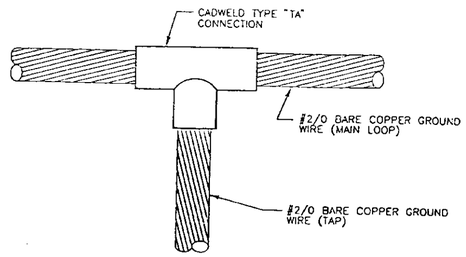


PLAN

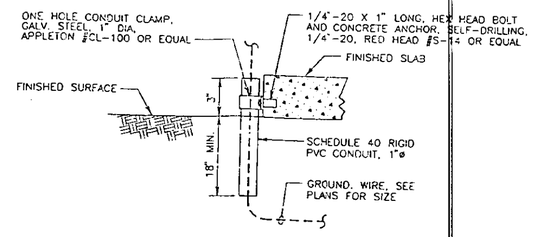


ELEVATION

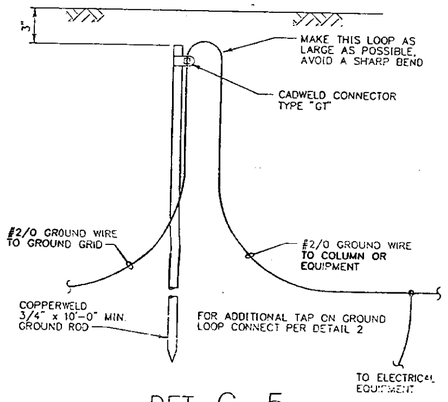
DET. G-1
STEEL COLUMN GROUND



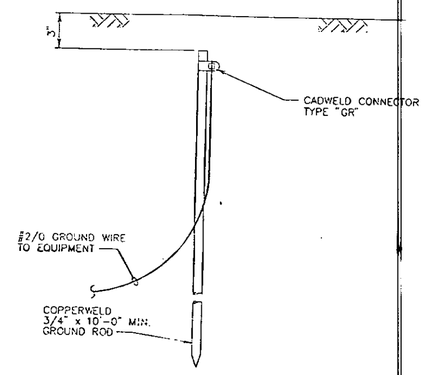
DET. G-2
TEE CONNECTION
MAIN GRID TO TAP



DET. G-3
PROTECTIVE SLEEVE
FOR GROUND CABLE

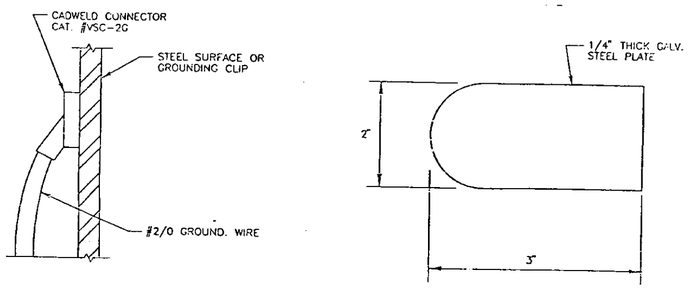


DET. G-5
GROUND ROD CONNECTION



DET. G-6
GROUND TAP TO EQUIPMENT

NOTE:
WELD PLATE TO STEEL SUPPORT OR EQUIPMENT AS REQUIRED WHEN NOT FURNISHED BY EQUIPMENT SUPPLIER. FIELD TO TOUCH UP AREA WITH GALV-O-WELD WHEN PLATE IS ADDED.



DET. G-4
EQUIPMENT GROUND CONNECTION

NOTES

1. SEE DWG. #E-104 FOR LEGEND.

REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE
E-100	ELECTRICAL KEY PLAN		

MK	REVISION	BY	CHK	APP	DATE
1	ISSUED FOR CONSTRUCTION	P.H.			2/95
0	ISSUED FOR CONSTRUCTION	RLN			1/95

DRAWN: R. NELSON DATE: 12-07-95
CHECKED:
APPROVED:
APPROVED:
SEAL

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region
Houston, Texas

CONTRACT NO.	DWG. NO.	REV.	SCALE
10-G175-31	E-108	1	NONE

DWG. TITLE
BIOREMEDIATION FACILITY
CRANE NSWC
ELECTRICAL - TYPICAL GROUNDING DETAILS

DIR= _____ DWG= _____

BLOCK NAME = DSIZE VER:03/08/89

TYPICAL FOR 3 PANELS

PANEL NO. LP-A — 120/240 VOLTS

CKT NO.	DESCRIPTION	CB AMPS	A B	CB AMPS	DESCRIPTION	CKT NO.
1	AREA LIGHTING	20		20	AREA LIGHTING	2
3						4
5	AREA LIGHTING	20		20	AREA LIGHTING	6
7						8
9	SPARE	20		20	SPARE	10
11						12
13	SPARE	20		20	SPARE	14
15						16
17	SPARE	20		20	SPARE	18
19						20
21	RECEPTACLES	20		20	LIGHTING CONTACTOR	22
23	EYEWASH RECEPTACLE	20		20	SPARE	24

FEEDER ENTRY	MAINS			ISC = 10 KA
TOP ☒	BKR: 100	LUGS:	BUS: 100A	ENCLOSURE NEMA 4X
BOTTOM ☐	NEUTRAL ☒,	INSULATED ☐,	TOP ☐, BOT ☒	MTG FLUSH ☐ SURF ☒

PANELBOARD TO BE 120/240V, 1ø, 3 WIRE WITH 100 AMP, 2 POLE MAIN BREAKER, 10-2 POLE 20 AMP BREAKERS & 4-1 POLE 20 AMP BREAKERS, NEMA 4X, WITH SOLID NEUTRAL, 100 AMP MAIN BREAKER SHALL BE FULLY RATED.

PANEL NO. PPB — 120/240 VOLTS

CKT NO.	DESCRIPTION	CB AMPS	A B	CB AMPS	DESCRIPTION	CKT NO.
1	PRESSURE WASH. UNIT	30		70	HOT WATER HEATER	2
3						4
5	BATH LIGHT & VENT	20		20	FLUORESCENT LIGHT (STORAGE)	6
7	RECEPTACLES	20		20	BATHROOM RECEPTACLES	8
9	SPARE	20		20	HEAT PUMP RECEPTACLE (SEE NOTE 1)	10
11						12
13	SPARE	20		20	SPARE	14
15						16
17	SPARE	20		20	SPARE	18
19						20
21	SPARE	20		20	FLOODLIGHTS (COVERED AREA)	22
23	OUTSIDE LIGHTS	20		20	SPARE	24

FEEDER ENTRY	MAINS			ISC = 10 KA
TOP ☐	BKR: 100A	LUGS:	BUS: 100A	ENCLOSURE NEMA 3R
BOTTOM ☒	NEUTRAL ☒,	INSULATED ☐,	TOP ☐, BOT ☒	MTG FLUSH ☐ SURF ☒

PANELBOARD TO BE 120/240V, 1ø, 3 WIRE WITH 225 AMP, 2 POLE MAIN BREAKER, 5-2 POLE 20 AMP BREAKERS & 8-1 POLE 20 AMP BREAKERS & 1-2 POLE 70 AMP BREAKER, 1-2 POLE 30 AMP BREAKER & 1-2 POLE 20 AMP GFI BREAKER, NEMA 3R, WITH SOLID NEUTRAL, 225 AMP MAIN BREAKER SHALL BE FULLY RATED

PANEL NO. DP — 120/240 VOLTS

CKT NO.	DESCRIPTION	CB AMPS	A B	CB AMPS	DESCRIPTION	CKT NO.
1	FEED TO SHOWER TRAILER	100		100	PPB	2
3						4
5	FEED TO LAB TRAILER	100		100	FEED TO TRAILER #2	6
7						8
9	FEED TO TRAILER #1	100		20	FEED TO FLOODLIGHTS	10
11						12
13	FEED TO FLOODLIGHT CONTROL	20		100	FEED TO SEWER LIFT STATION	14
15	SPARE	20				16
17	SPARE	20		20	SPARE	18
19	SPARE	20		20	SPARE	20
21	SPARE	20		20	SPARE	22
23	SPARE	20		20	SPARE	24

FEEDER ENTRY	MAINS			ISC = 65 KA (BRANCH BREAKERS)
TOP ☐	BKR: 600A	LUGS:	BUS: 600A	ENCLOSURE NEMA 3R
BOTTOM ☒	NEUTRAL ☒,	INSULATED ☐,	TOP ☐, BOT ☒	MTG FLUSH ☐ SURF ☒

PANELBOARD TO BE 120/240V, 1ø, 3 WIRE WITH 600 AMP, 2 POLE MAIN BREAKER, 5-2 POLE 100 AMP BREAKERS, 10-1 POLE 20 AMP BREAKERS, 1-2 POLE 20 AMP BREAKER & 1-2 POLE 100 AMP BREAKER WITH SOLID NEUTRAL BAR, 100 AMP BRANCH BREAKERS SHALL HAVE 65 KA INTERRUPTING RATING, TYPE FD, 20 AMP BRANCH BREAKERS SHALL HAVE 65 INTERRUPTING RATING, TYPE GB & 600 AMP MAIN BREAKER SHALL HAVE 200 KA INTERRUPTING RATING, TYPE CLDC (FULLY RATED), NEMA 3R.

NOTES

1. CIRCUIT BREAKER FOR FEED TO POWER WASHER UNIT SHALL BE GROUND FAULT INTERRUPTING TYPE.
2. ELECTRICAL SUB-CONTRACTOR SHALL LABEL MAIN BREAKERS AS "SERVICE DISCONNECT."
3. SEE DWG. #E-104 FOR LEGEND.

REFERENCE DRAWINGS

DWG. NO.	TITLE	DWG. NO.	TITLE
E-100	ELECTRICAL KEY PLAN		

MK	REVISION	BY	CHK	APP	DATE
1	ISSUED FOR CONSTRUCTION	P.H.			2/96
0	ISSUED FOR CONSTRUCTION	RLN			1/96

DRAWN R. NELSON DATE 12-20-95
CHECKED:
APPROVED:
APPROVED:
SEAL

MORRISON KNUDSEN
ENVIRONMENTAL GROUP

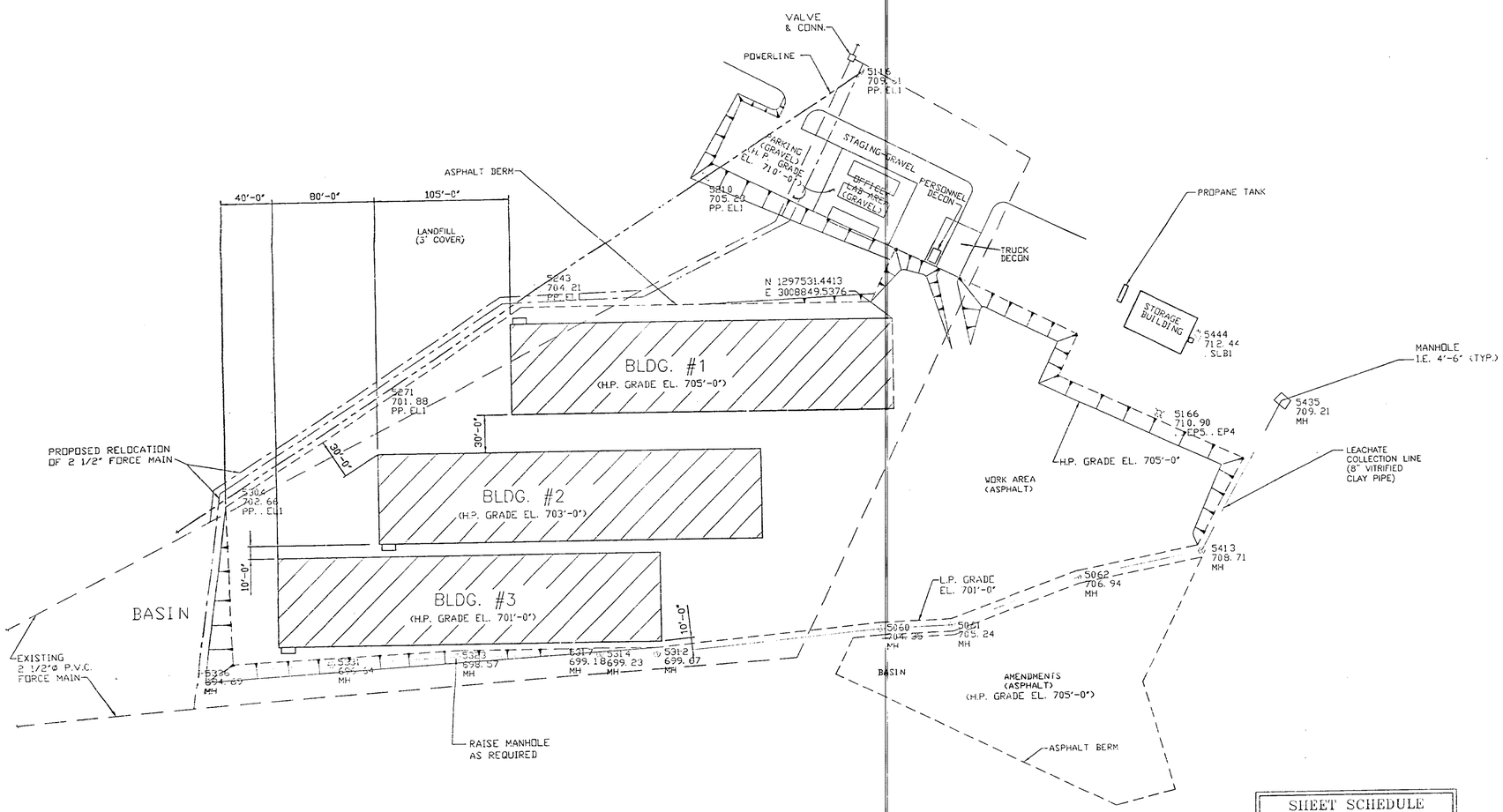
Jacobs Engineering Group Inc.
Central Region — Houston, Texas

CONTRACT NO.	DWG. NO.	REV.	SCALE
10-G175-31	E-109	1	NONE

DWG. TITLE
BIOREMEDIATION FACILITY
CRANE NSWC
ELECTRICAL - PANEL SCHEDULES

DIR= DWG=

BLOCK NAME = DSIZE VER.03/03/89



SITE PLAN

SCALE: 1"=50'-0"

1. FOR INFORMATION CALL JON H. MARQUIS TELEPHONE: (812) 477 0091

SHEET SCHEDULE		
S1	–	SITE PLAN
F1	–	FOUNDATION PLAN
F2	–	FOUNDATION SECTIONS
F3	–	RAMP & SUMP SECTIONS
A1	–	ELEVATIONS
A2	–	SUMP DETAILS

REVISIONS
1
2
3
4
5
6
7
8

SWI, INC.
DESIGN · ENGINEERING · CONSTRUCTION MANAGEMENT
2326 KOTTER AVENUE, SUITE 305
EVANSVILLE, INDIANA 47715

SITE PLAN

PROJECT
PROPOSED BUILDING FOR
CRANE NAVAL BASE
CRANE, IN

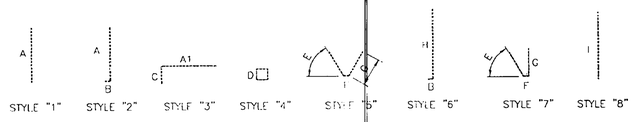
DRAWN BY ERN	DATE 2-1-96
CHECKED BY	DATE
JOB NUMBER 96002	
SHEET NUMBER S-1	

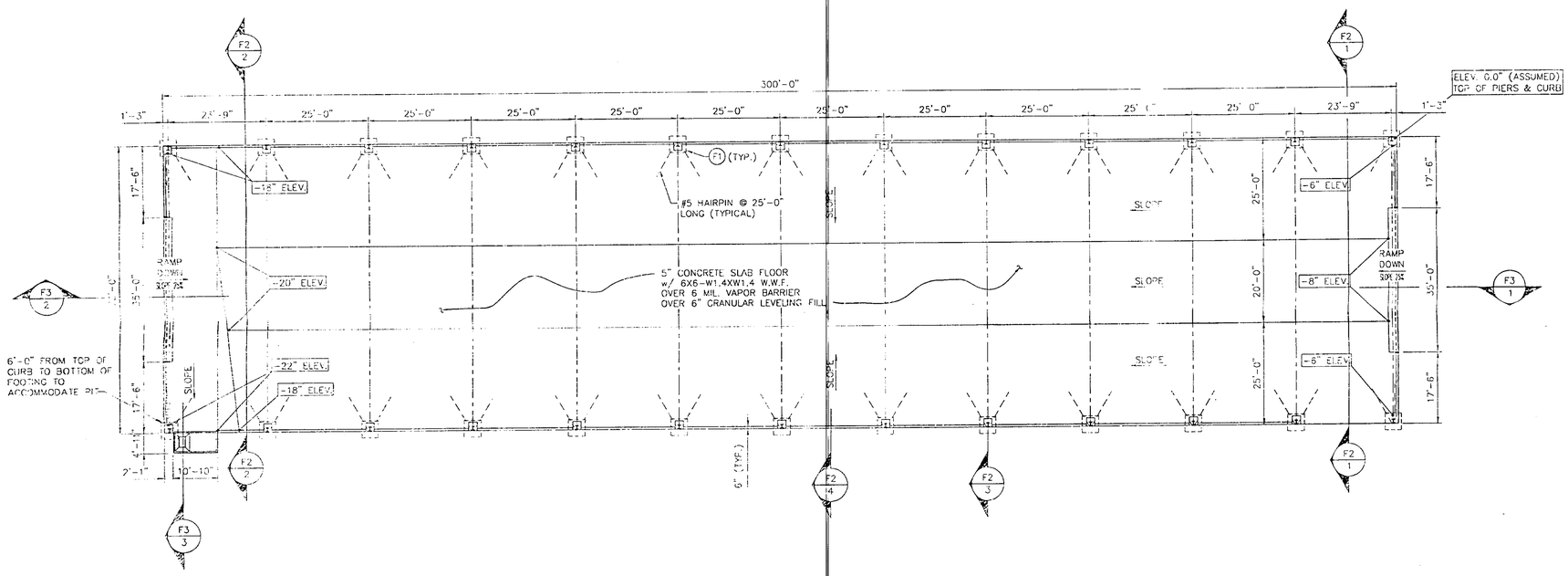
1 of 6

RECEIVED
FEB 06 1996
MK-CRANE

REBAR SCHEDULE

STYLE	QUANTITY	TYPE	"A"	"A1"	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"I"
1	1110	#5	24" TO 36"									
2	624	#5	24" TO 36"		8"							
3	1110	#5		36"		20"						
4	210	#3					18"					
5	66	#5						60	10"	9'-7"		
6	24	#5			8"						8'-0"	
7	12	#5			8"			60	10"	9'-7"		
8	780	#5										44"





FOUNDATION PLAN

SCALE: [illegible]

[illegible] THIS SIZE [illegible] REQUIRED BA[illegible] MINIMUM [illegible]
CAPACITY OF [illegible] PSF [illegible] SOIL [illegible] FRAMING [illegible]
[illegible] BEAM [illegible] [illegible] AND [illegible]
DIAMETER IMP[illegible]
[illegible] ANCHOR [illegible] BOLTS AND [illegible]
[illegible] LOING MAE[illegible] ANCHOR BOLT [illegible]
BUILDING SYS[illegible] INC. (MASTER [illegible]
[illegible] DIMENSIONS [illegible] NEW FOR ALL 3 BUILDINGS.
[illegible] ON [illegible] SIDE FOR BUILDING #1.
[illegible] ON [illegible] SIDE OF BUILDINGS #2 & [illegible]

FOOTING SCHEDULE

F-1	4'-0"x4'-0"x12" CONCRETE FOOTING WITH 5-#5 REBAR EACH WAY AND 8-#5 REBAR VERTICALLY

WARNING

THIS PLAN IS THE EXPRESS PROPERTY OF SWI, INC. ANY REPRODUCTION, EITHER PARTIAL OR FULL SHALL NOT BE MADE WITHOUT EXPRESS WRITTEN CONSENT OF AN AUTHORIZED REPRESENTATIVE OF SWI, INC. ANY DEVIATION IN WORD OR OMISSION FROM LATEST CODE REQUIREMENTS IS NOT INTENTIONAL AND SHALL BE THE OWNER CONTRACTOR'S RESPONSIBILITY TO UPHOLD SAID REQUIREMENTS. THIS PLAN IS NOT A PART OF ANY CONTRACT UNLESS SPECIFICALLY NAMED IN SAID CONTRACT

RECEIVED
FEB 06 1996
MK-CRANE

REVISIONS
1
2
3
4
5
6
7
8

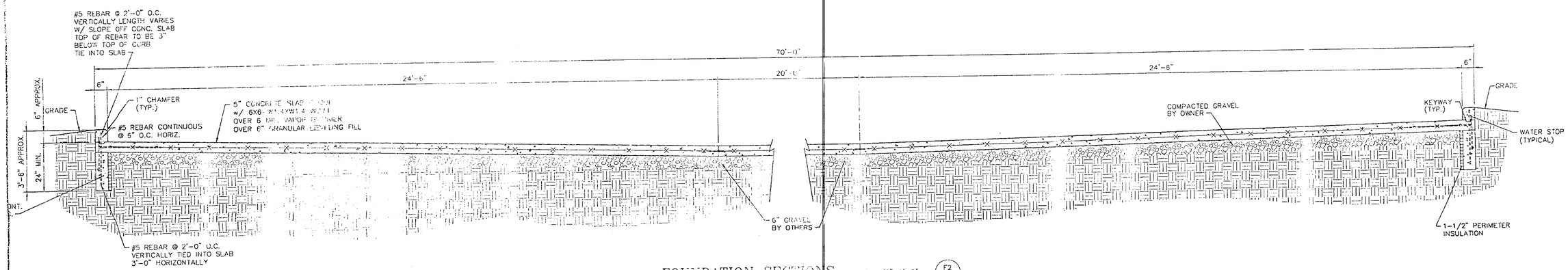
2626 KOTTER AVENUE, SUITE 805
EVANSVILLE, INDIANA 47715
SWI, INC.
DESIGN · ENGINEERING · CONSTRUCTION MANAGEMENT

FOUNDATION PLAN

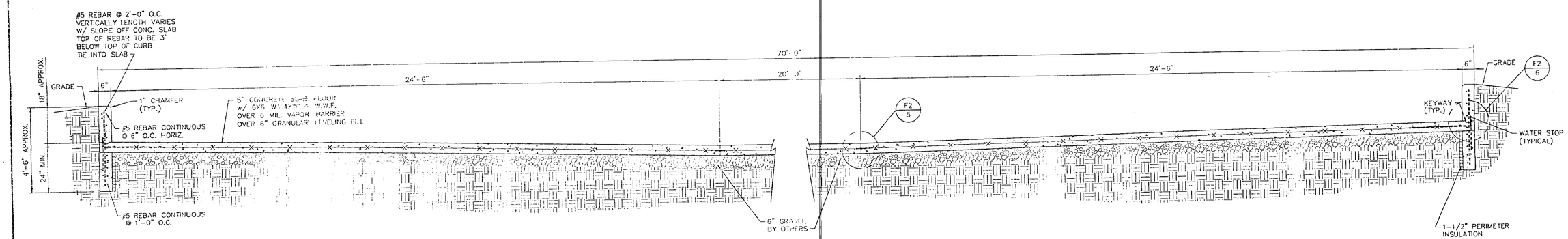
PROJECT
PROPOSED BUILDING FOR
CRANE NAVAL BASE
CRANE, IN

DRAWN BY: ERN	DATE: 2-1-96
CHECKED BY:	DATE:
JOB NUMBER: 96002	
SHEET NUMBER: F-1	

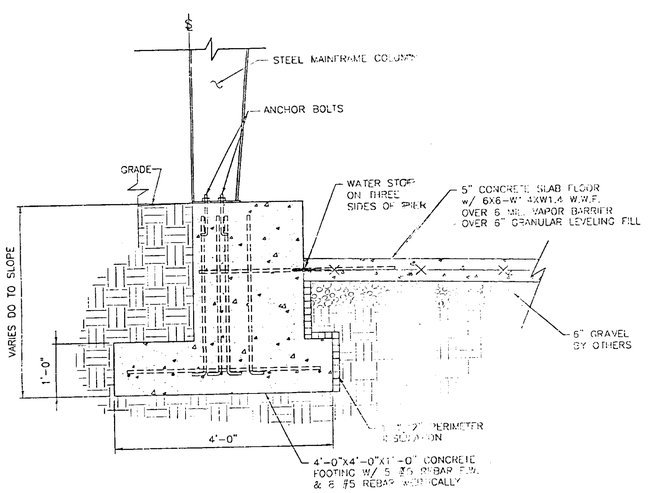
2 of 6



FOUNDATION SECTIONS SCALE: 1/2"=1'-0" (F2 / 1)

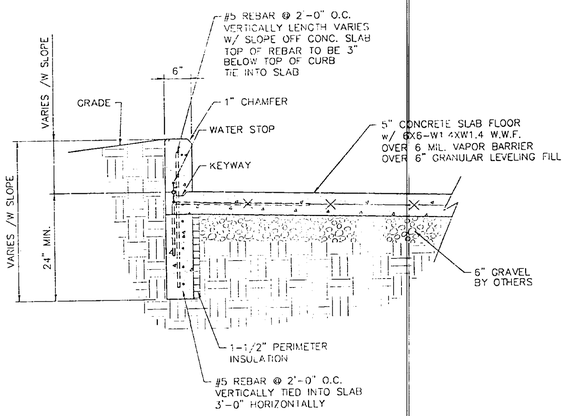


FOUNDATION SECTIONS SCALE: 1/2"=1'-0" (F2 / 2)



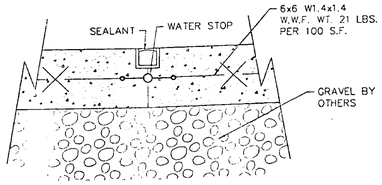
FOOTING DETAIL SCALE: 1/2"=1'-0" ( )

1. FOR FOOTING DEPTH REFER TO PLAN AT

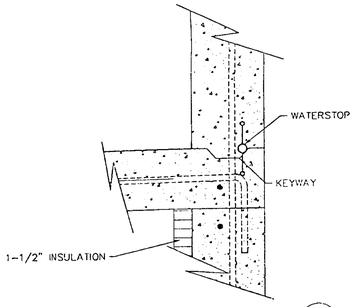


FOOTING DETAIL SCALE: 1/2"=1'-0" ( )

1. FOOTING NOT THE SAME AT



JOINT DETAIL SCALE: 2"=1'-0" (F2 / 5)



JOINT DETAIL SCALE: 2"=1'-0" (F2 / 6)

WARNING

THIS PLAN, IN ITS ENTIRETY, IS THE EXPLICIT PROPERTY OF SWI, INC. ANY REPRODUCTION WHETHER PARTIAL OR FULL SHALL NOT BE MADE WITHOUT EXPRESS WRITTEN CONSENT OF AN AUTHORIZED REPRESENTATIVE OF SWI, INC. ANY DEVIATION IN WORD OR UNDER FROM LATEST CODE REQUIREMENTS IS NOT INTENTIONAL AND SHALL NOT ALLEVIATE CONTRACTOR'S RESPONSIBILITY TO UPHOLD SAID REQUIREMENTS. THIS PLAN IS NOT A PART OF ANY CONTRACT UNLESS SPECIFICALLY NOTED IN SAID CONTRACT.

RECEIVED
FEB 06 1996
MK-CRANE

REVISIONS	
1	
2	
3	
4	
5	
6	
7	
8	

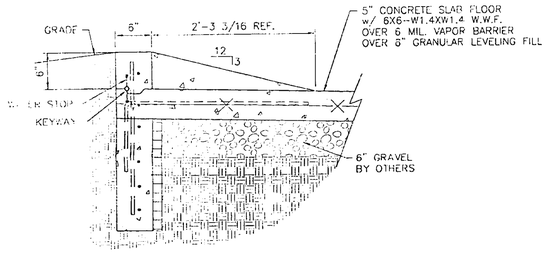
2626 KOTTER AVENUE, SUITE 305
EVANSVILLE INDIANA 47715
SWI, INC.
DESIGN · ENGINEERING · CONSTRUCTION MANAGEMENT

FOUNDATION SECTIONS

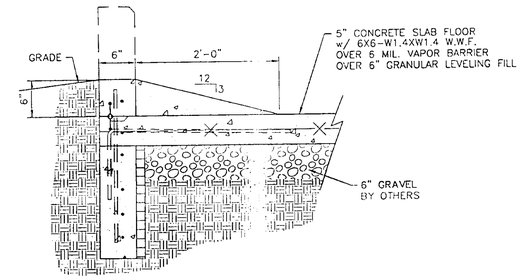
PROJECT
PROPOSED BUILDING FOR
CRANE NAVAL BASE
CRANE, IN

DRAWN BY	DATE
ERN	2-1-96
CHECKED BY	DATE
JOB NUMBER	
96002	
SHEET NUMBER	
F-2	

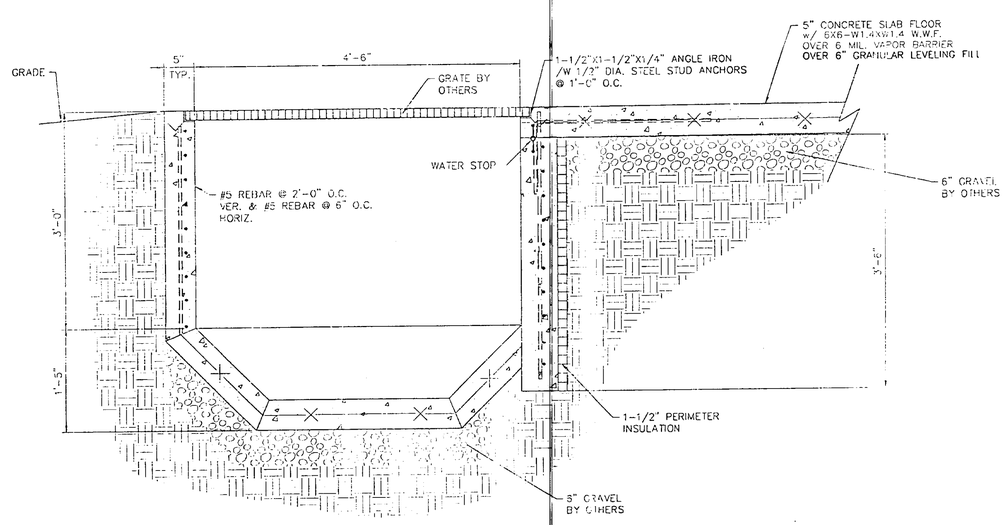
3 of 6



RAMP SECTION SCALE: 1" = 1'-0" (F3/1)



RAMP SECTION SCALE: 1" = 1'-0" (F3/2)



SUMP SECTION SCALE: 1" = 1'-0" (F3/3)

WARNING

THIS PLAN IN ITS ENTIRETY IS THE EXPLICIT PROPERTY OF SWI, INC. ANY REPRODUCTION WHETHER PARTIAL OR FULL SHALL NOT BE MADE WITHOUT EXPRESS WRITTEN CONSENT OF AN AUTHORIZED REPRESENTATIVE OF SWI, INC. ANY DEVIATION IN WORD OR OMISSION FROM LATEST CODE REQUIREMENTS IS NOT INTENTIONAL AND SHALL NOT ALLEVIATE CONTRACTOR'S RESPONSIBILITY TO UPHOLD SAID REQUIREMENTS. THIS PLAN IS NOT A PART OF ANY CONTRACT UNLESS SPECIFICALLY NOTED IN SAID CONTRACT.

RECEIVED
FEB 06 1996
MK-CRANE

REVISION NO.
1
2
3
4
5
6
7
8

SWI, INC.
2626 KOSTER AVENUE, SUITE 305
EVANSVILLE, INDIANA 47715
DESIGN • ENGINEERING • CONSTRUCTION MANAGEMENT

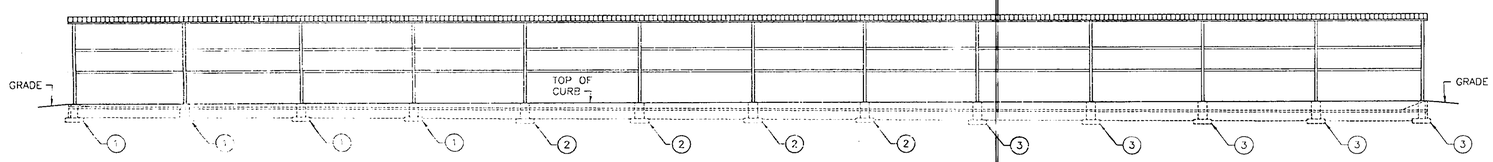
RAMP & SUMP SECTIONS

PROJECT
PROPOSED BUILDING FOR
CRANE NAVAL BASE
CRANE, IN.

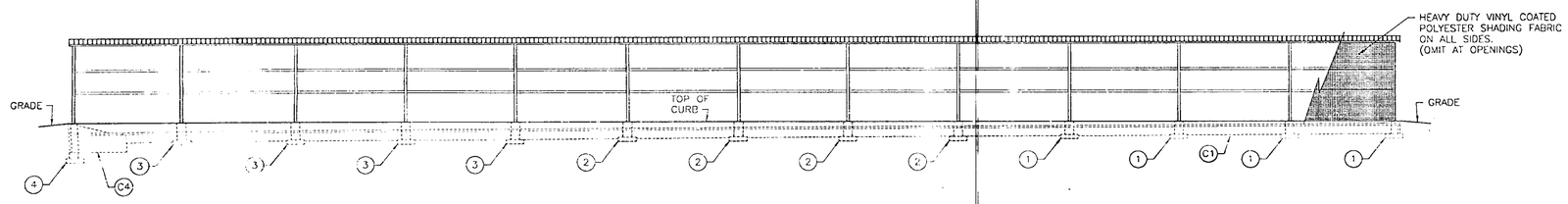
DRAWN BY	DATE
ERN	2-1-96
CHECKED BY	DATE

JOB NUMBER
96002

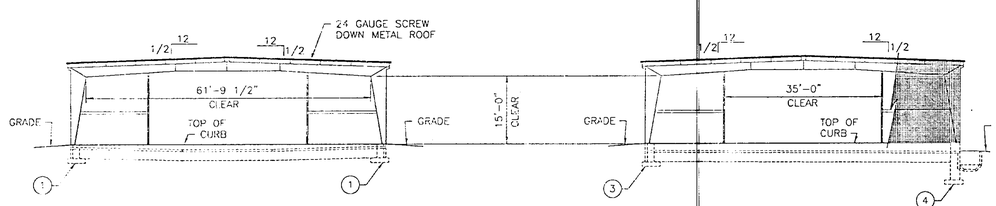
SHEET NUMBER
F-3



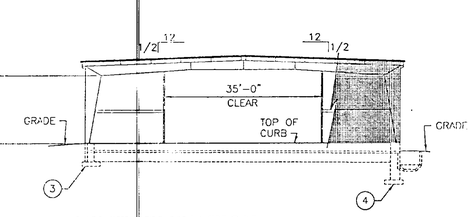
NORTH ELEVATION SCALE: 1/16" = 1'-0"



SOUTH ELEVATION SCALE: 1/16" = 1'-0"



EAST ELEVATION SCALE: 1/16" = 1'-0"



WEST ELEVATION SCALE: 1/16" = 1'-0"

PIER SCHEDULE

PIER	SIZE	VERTICAL	HORIZ.
1	2'x2'	8-#5	#3 @ 12"
2	2'x2'	8-#5	#3 @ 12"
3	2'x2'	8-#5	#3 @ 12"
4	2'x2'	8-#5	#3 @ 12"

	TOP OF CURB TO BOTTOM OF FOOTING
1	3'-6"
2	4'-0"
3	4'-6"
4	9'-0"

NOTE:
1. ALL DIMENSIONS ARE THE SAME FOR ALL BUILDINGS.

WARNING

THIS PLAN IN ITS ENTIRETY IS THE EXPLICIT PROPERTY OF SWI, INC. ANY REPRODUCTION WHETHER PARTIAL OR FULL SHALL NOT BE MADE WITHOUT EXPRESS WRITTEN CONSENT OF AN AUTHORIZED REPRESENTATIVE OF SWI, INC. ANY DEVIATION IN WORD OR OMISSION FROM LATEST CODE REQUIREMENTS IS NOT INTENTIONAL AND SHALL NOT ALLEVIATE CONTRACTOR'S RESPONSIBILITY TO UPHOLD SAID REQUIREMENTS. THIS PLAN IS NOT A PART OF ANY CONTRACT UNLESS SPECIFICALLY NOTED IN SAID CONTRACT.

RECEIVED
FEB 06 1996
MK-CRANE

SWI, INC.
DESIGN · ENGINEERING · CONSTRUCTION MANAGEMENT
2525 KOTTER AVENUE, SUITE 305
EVANSVILLE, INDIANA 47715

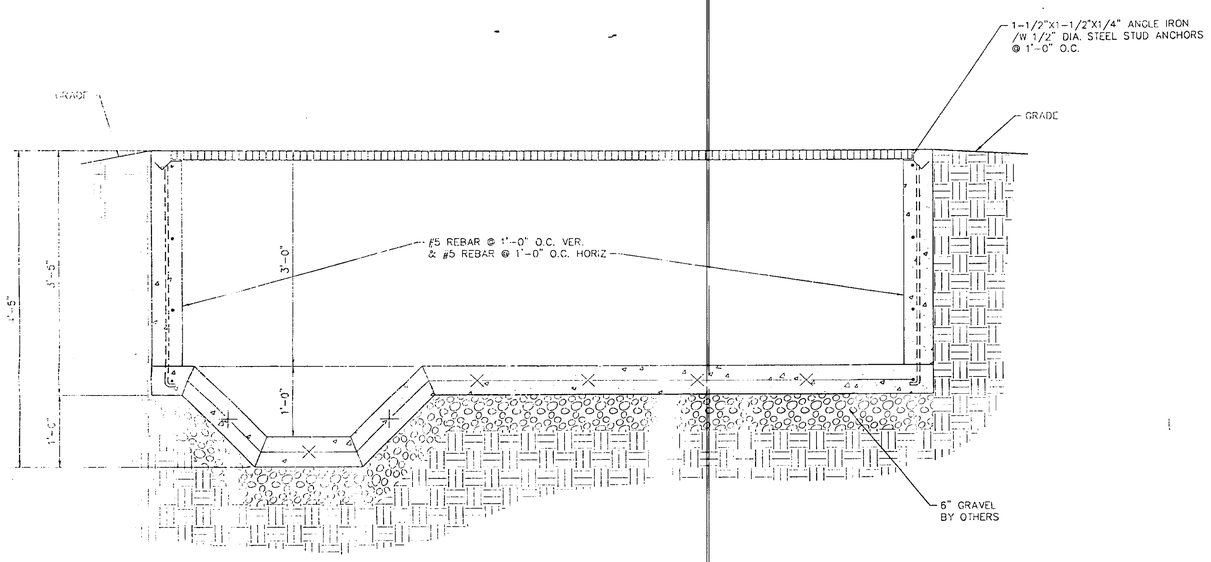
ELEVATIONS

PROJECT
PROPOSED BUILDING FOR
CRANE NAVAL BASE
CRANE, IN

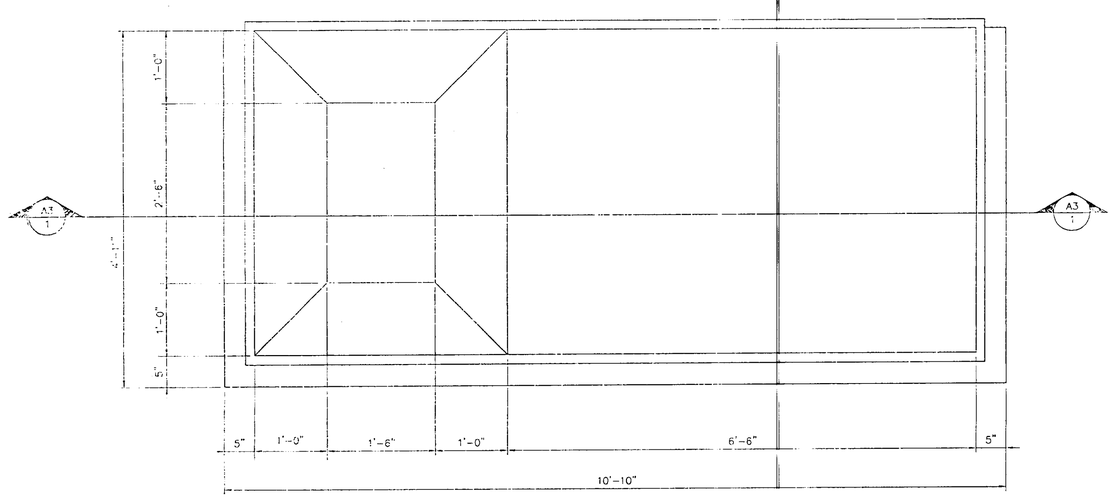
DRAWN BY	DATE
ERN	2-1-96
CHECKED BY	DATE

JOB NUMBER
95002

SHEET NUMBER
A-1



SUMP SECTION SCALE: 1/2"=1'-0"



SUMP FLOOR PLAN SCALE: 1/2"=1'-0"

WARNING

THIS DRAWING IS ENTIRELY THE EXPLICIT PROPERTY OF SWI, INC. ANY REPRODUCTION WHETHER PARTIAL OR FULL SHALL NOT BE MADE WITHOUT EXPRESS WRITTEN CONSENT OF AN AUTHORIZED REPRESENTATIVE OF SWI, INC. ANY DEVIATION IN WORD OR SUBSTANCE FROM LATEST CODE REQUIREMENTS IS NOT INTENTIONAL AND SHALL NOT ALLEVIATE CONTRACTOR'S RESPONSIBILITY TO UPHOLD SAID REQUIREMENTS. THIS PLAN IS NOT A PART OF ANY CONTRACT UNLESS SPECIFICALLY NOTED IN SAID CONTRACT.

RECEIVED
FEB 06 1996
MK-CRANE

REVISIONS

SWI, INC.
2626 KOTTER AVENUE SUITE 305
EVANSVILLE, INDIANA 47715
DESIGN · ENGINEERING · CONSTRUCTION MANAGEMENT

SUMP DETAILS

PROJECT
PROPOSED BUILDING FOR
CRANE NAVAL BASE
CRANE, IN

DRAWN BY	DATE
TRH	2 1 96
CHECKED BY	DATE

JOB NUMBER
96002

SHEET NUMBER
A-2

6 of 6

DEPARTMENT OF THE NAVY

CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA
BIOREMEDIATION FACILITY

DRAWING INDEX

DWG. NO.	CIVIL DRAWING LIST
C-100	MASTER SITE/DRAINAGE PLAN
C-101	WORK AREA PAVING LAYOUT
C-102	COMPOST BUILDING PAVING LAYOUT
C-103	OFFICE/LAB AREA LAYOUT
C-104	HAUL ROAD LAYOUT & PAVING SECTIONS
C-105	WORK AREA DRAINAGE PLAN
C-106	COMPOST BUILDING DRAINAGE PLAN
C-107	OFFICE/LAB AREA DRAINAGE PLAN
C-108	HAUL ROAD DRAINAGE PLAN & DETAILS
C-109	CROSS SECTIONS - SHT. 1
C-110	CROSS SECTIONS - SHT. 2
C-111	CROSS SECTIONS - SHT. 3
C-112	MISCELLANEOUS DETAILS
S-100	DECON AREA CONCRETE PLAN & SECTIONS
S-101	DECON AREA SECTIONS & ELEVATIONS
S-102	DECON AREA SECTIONS & MISCELLANEOUS DETAILS
S-103	MISCELLANEOUS DETAILS

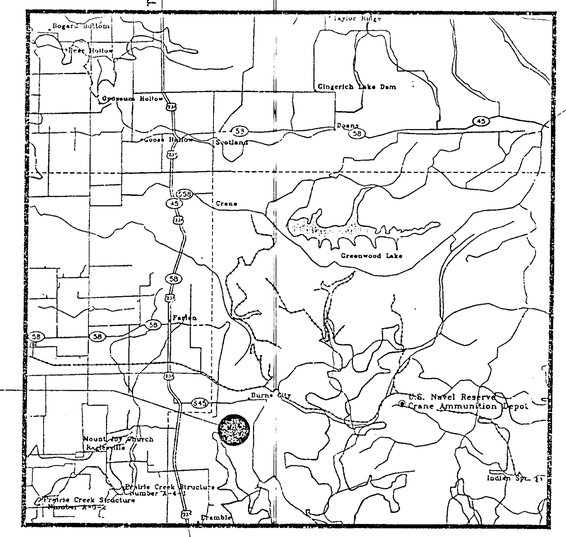
DWG. NO.	ELECTRICAL DRAWING LIST
E-100	KEYPLAN
E-101	POWER PLAN
E-102	GROUNDING PLAN
E-103	POWER DETAILS
E-104	LIGHTING FIX. SCHEDULE, B.O.M. & LEGEND
E-105	TYP. LIGHTING FOR BLDG'S. #1, #2 & #3
E-106	POWER DETAILS
E-107	SCHEMATICS & LIGHTING DETAILS
E-108	TYPICAL GROUNDING DETAILS
E-109	PANEL SCHEDULES

SPECIFICATION INDEX

SECTION	DESCRIPTION
02100	SITE CLEARING
03200	CONCRETE REINFORCEMENT
03300	CAST-IN-PLACE CONCRETE
02275	MEMBRANE LINING SYSTEMS
15100	CPVC UNDERGROUND PIPE
02513	ASPHALTIC CONCRETE PAVING

VICINITY MAP

TO BLOOMFIELD



HWY 45
TO BLOOMINGTON
22 miles

PROJECT LOCATION

TO LOOGOOTEE

Scale 1:100,000 (at center)

2 Miles

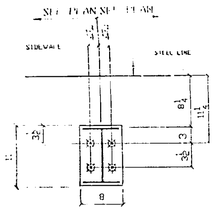
2KM

FOR CONSTRUCTION

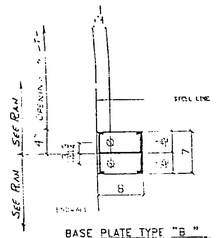
MORRISON KNUDSEN ENVIRONMENTAL GROUP

Jacobs Engineering Group Inc.
Central Region — Baton Rouge Louisiana

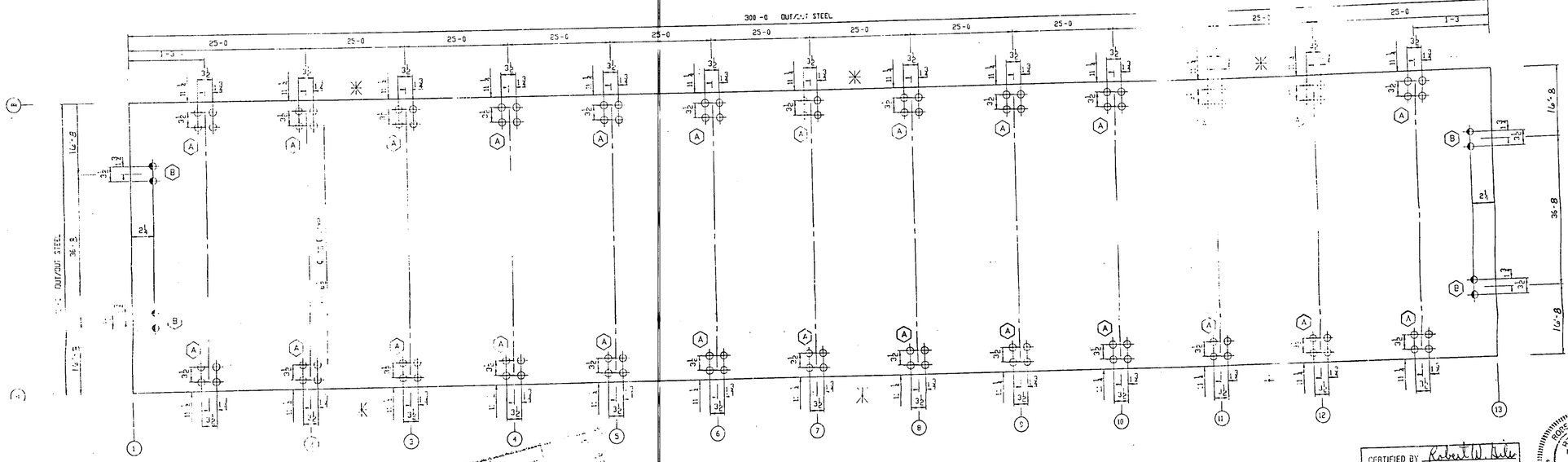
JEG JOB NO. 10G175-21



BASE PLATE TYPE "A"
$\frac{3}{4}$" ANCHOR BOLT



BASE PLATE TYPE "B"
$\frac{5}{8}$" ANCHOR BOLT



ANCHOR BOLT PLAN
(ONE BLDG. SHOWN) (3 BLDGS. REQ'D.)

		DL	LL	WL
LEFT COL	HOR	8.2	12.1	-7.3
LEFT COL	VER	12.6	17.5	-8.2
RIGT COL	HOR	-8.2	-12.1	7.3
RIGT COL	VER	12.6	17.5	-8.2

LEFT C

RIGT C

SIGN CONVENTION
HORIZONTAL: POSITIVE IS TO THE RIGHT
VERTICAL: [illegible]
MOMENT: [illegible] TO RIGHT HAND RULE

NOTE:
THE FOLLOWING LOAD COMBINATION CASES WERE USED IN DESIGNING THE BUILDING.

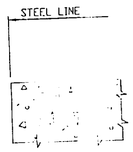
CASE 1 : DL + LL
CASE 2 : DL + WL
CASE 3 : DL + LL/2 + WL
CASE 4 : DL + LL + WL/2

THE FOUNDATION DESIGNER SHOULD FACTOR AND COMBINE THE REACTIONS AS REQUIRED

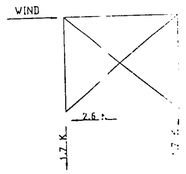
REFERENCE NOTES:

1. ANCHOR BOLTS, NUTS, AND FLAT WASHERS ARE NOT BY A & S BUILDING SYSTEMS.
2. ANCHOR BOLT DIAMETERS SHOWN ARE BASED ON A307 STEEL UNLESS NOTED AND ASSUME THAT FOUNDATION AND ITS REINFORCEMENT WILL FULLY DEVELOPE THE ANCHOR BOLT FOR THE REACTIONS GIVEN. EMBEDMENT AND END ANCHORAGE BY FOUNDATION DESIGNER.
3. THE BUILDING MANUFACTURER ASSUMES NO RESPONSIBILITY OR LIABILITY FOR FOUNDATION, FLOOR, OR SLAB DESIGN OR CONSTRUCTION.
4. THE FOUNDATION DESIGN SHOULD BE DONE WITH DUE REGARD TO THE SPECIFIC SOIL CONDITIONS PRESENT AT THE ACTUAL JOB SITE.
5. CONCRETE CONTRACTOR IS TO CLEAN CONCRETE FROM THREADS OF ALL ANCHOR BOLTS.
6. BASE PLATES MAY HAVE MORE HOLES THAN ANCHOR BOLTS SHOWN, DUE TO USE OF STANDARD BASE PLATES. BOLTS ARE REQUIRED ONLY AS SHOWN ON ANCHOR BOLT PLAN.

LIVE LOAD (ROOF)	20.00 PSF
LIVE LOAD (FRAME)	20.00 PSF
WIND LOAD	90.00 MPH
SNOW LOAD	20.00 PSF
DEAD LOAD	STRUCTURAL ONLY
COLLATERAL LOAD	5.00 PSF
BUILDING CODE	1991 UBC
EXPOSURE	B
IMPORTANCE	1.00
SEISMIC ZONE	2A



TYPICAL SECTION THRU BASE



WIND BRACING REACTION
(✕ INDICATES BRACED BAY)

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION
CONSTRUCTION DRAWINGS WILL BE ISSUED AFTER APPROVAL IS RECEIVED
BY
DATE
A & S BUILDING SYSTEMS
CONSTRUCTION DRAWINGS
DO NOT REPRODUCE

CERTIFIED BY Robert W. Giles
P.E. NO. 19319 1-29-96
FOR METAL BUILDING ONLY

ROBERT W. GILES
REGISTERED
No. 19319
STATE OF
PROFESSIONAL ENGINEER

NOTE:
A & S WILL ASSUME ALL UNCHANGED DIMENSIONS ON APPROVAL DRAWINGS ARE VERIFIED AS IS.

IN ORDER TO HOLD THE CURRENT DELIVERY SCHEDULE A SIGNED SET OF APPROVAL DRAWING MUST BE IN THE A & S OFFICE ON _____

RECEIVED
FEB 06 1996
MK-CRANE

REV	DATE	DESCRIPTION	BY	CKD.

Note: Anchor Bolt Quantities Shown Are For (3) Buildings

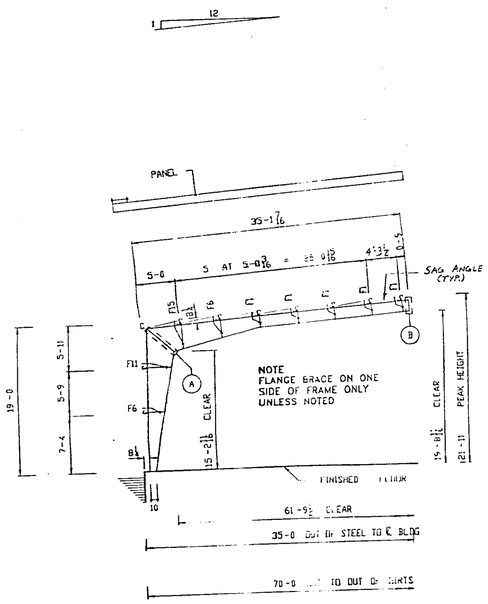
ANCHOR BOLT SCHEDULE		BOLTS BY OTHERS	
SYMB.	QUANTITY	SIZE	REQ.
A	24	3/4" ø	
B	312	3/4" ø	

NOTICE TO BUILDING OFFICIAL:
APPLICATION OF SEAL IS FOR METAL BUILDING ONLY AND DOES NOT REPRESENT THE PROFESSIONAL OF RECORD.

A&S BUILDING SYSTEMS
CARYVILLE, TENNESSEE

DESCRIPTION	ANCHOR BOLT SETTING PLAN
SIZE	REFERENCE DRAWINGS
SUBJECT TO	S21 BLDG SYSTEM CRANE NAVAL BASE
LOCATION	CRANE, IN

DRAWN BY	CHECKED BY	DATE	SCALE	ENGINEER	JOB NO	DWG NO.	ISSUE
	SB	1/26/96	NONE		206-035	F1 OF 1	A



CROSS SECTION

COLUMN LINES 1-13

SPLICE BOLT TABLE		
SPLICE	NO SIZE	DEPTH
A	18 - 0 3/4 X 2	3-3
B	12 - 0 3/4 X 2 1/4	1-6

APPROVAL DRAWING
THIS DRAWING MUST BE RETURNED APPROVED BEFORE SHOP DETAILS AND FABRICATION CAN START
☐ APPROVED
☐ APPROVED AS NOTED
☐ DISAPPROVED MAKE CHANGES NOTED AND RESUBMIT
BY
DATE

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION
CONSTRUCTION DRAWINGS WILL BE ISSUED AFTER APPROVAL IS RECEIVED

CERTIFIED Robert W. Fite
P.E. NO. 19719 1-29-96
FOR STRUCTURAL PURPOSES ONLY

RECEIVED
FEB 06 1996
MK-CRANE

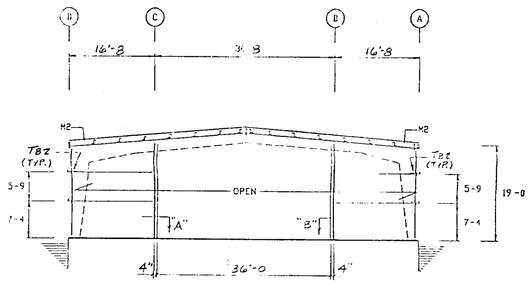
REV	DATE	DESCRIPTION	BY	CKD.

NOTICE TO BUILDING OFFICIAL: APPLICATION OF SEAL IS FOR METAL BUILDING ONLY AND DOES NOT REPRESENT THE PROFESSIONAL OF RECORD

A&S BUILDING SYSTEMS
CARYVILLE, TENNESSEE

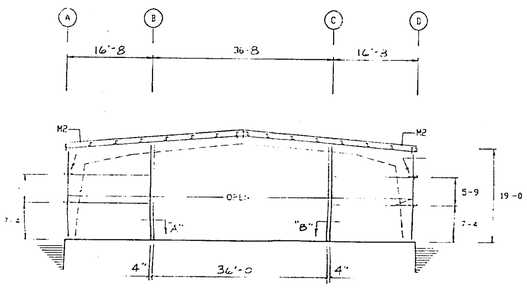
DESCRIPTION	ENDWALL SHEETING ELEVATION
SIZE	REFERENCE DRAWINGS
CUSTOMER	SWI BLDG. SYST./ CRANE NAVAL BASE
LOCATION	CRANE, IN

DRAWN BY	CHECKED BY	DATE	SCALE	ENGINEER	JOB NO.	DWG NO	ISSUE
SB		1/26/96	NONE		296-035	L4 OF 5	A



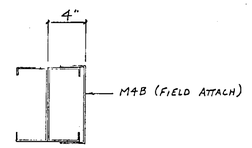
USE (4) 5/8 X 1 1/2" H.T. BOLTS W/ M4D AT ALL E.W. COLUMN TO RAFTER CONN. (TYP. U.N.)

ENDWALL FRAMING ELEV AT COL. LINE "1"



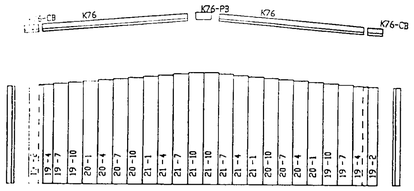
USE (4) 5/8 X [illegible] H.T. BOLTS W/ M4D AT ALL E.W. COLUMN TO RAFTER CONN. (TYP. U.N.)

ENDWALL FRAMING ELEV AT COL. LINE "13"

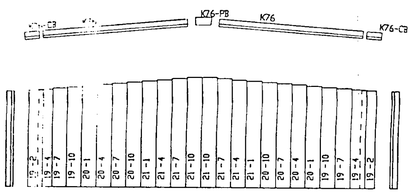


SECTION "A" (AS SHOWN)

SECTION "B" (OPP. HAND)



ENDWALL SHEETING ELEV AT COL. LINE "1"



ENDWALL SHEETING ELEV AT COL. LINE "13"

APPROVAL DRAWING
THIS DRAWING MUST BE RETURNED AND APPROVED BEFORE SHOP DETAILS AND FABRICATION CAN START
☐ APPROVED AS NOTED
☐ APPROVED MAKE CHANGES NOTED AND RESUBMIT
☐ DISAPPROVED
BY
DATE
THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION
CONSTRUCTION DRAWINGS WILL BE ISSUED AFTER APPROVAL IS RECEIVED

CERTIFIED BY Robert W. Giles
P.E. NO. 19319 1-29-96
FOR METAL BUILDING ONLY

ROBERT W. GILES
REGISTERED
No. 19319
STATE OF INDIANA
PROFESSIONAL ENGINEER

RECEIVED
FEB 06 1996
MK-CRANE

ERECTION NOTE:
1. INSTALLATION OF TEMPORARY ERECTION BRACING IS THE RESPONSIBILITY OF THE ERECTOR AND IS NOT PROVIDED BY THE BUILDING MANUFACTURER.

REV	DATE	DESCRIPTION	BY	CKD.

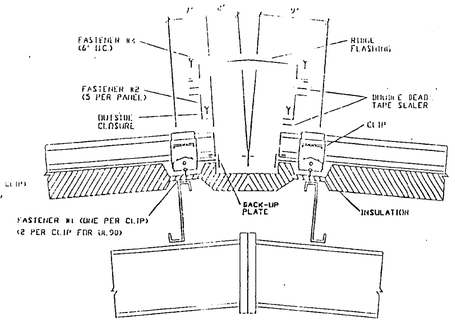
NOTICE TO BUILDING OFFICIAL:
APPLICATION OF SEAL IS FOR METAL BUILDING ONLY AND DOES NOT REPRESENT THE PROFESSIONAL OF RECORD.

A&S BUILDING SYSTEMS
CARYVILLE, TENNESSEE

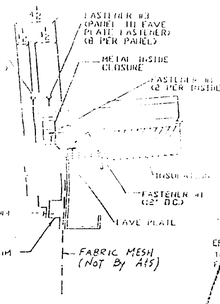
DESCRIPTION	ENDWALL FRAMING ELEVATION
SIZE	REFERENCE DRAWINGS
CUSTOMER	SWF BLDG. SYSTS / CRANE NAVAL BASE
LOCATION	CRANE, IN

DRAWN BY	CHECKED BY	DATE	SCALE	ENGINEER	JOB NO.	DWG NO.	ISSUE
SB		1/26/96	NONE		296-035	E3 OF 5	A

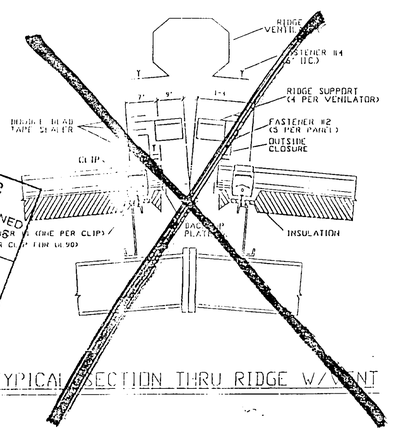
TYPICAL SECTION THRU EAVE W/ GUTTER



TYPICAL SECTION THRU RIDGE



TYPICAL SECTION THRU LOW EAVE



TYPICAL SECTION THRU RIDGE W/ VENT

APPROVAL DRAWING

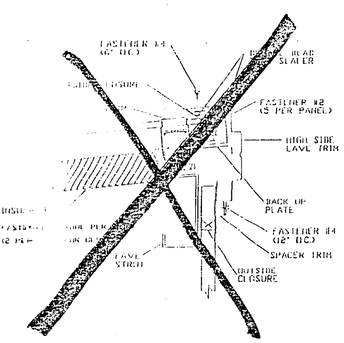
THIS DRAWING MUST BE RETURNED APPROVED BEFORE SHOP DETAILING AND FABRICATION CAN START.

☐ APPROVED
☐ APPROVED AS NOTED
☐ DISAPPROVED MAKE CHANGES NOTED AND RESUBMIT

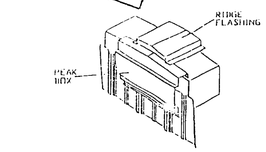
BY _____
DATE _____

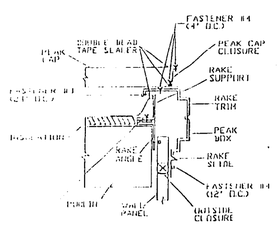
THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION

CONSTRUCTION DRAWINGS WILL BE ISSUED AFTER APPROVAL IS RECEIVED.

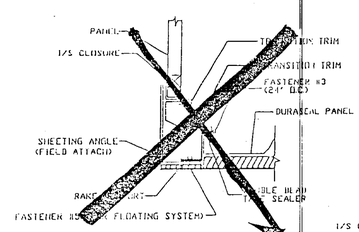


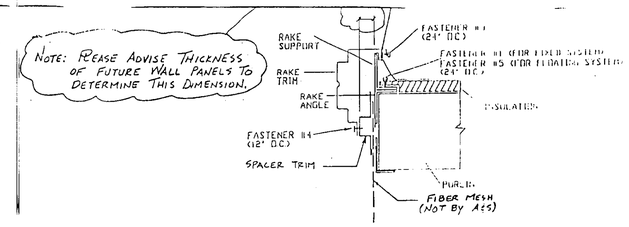
TYPICAL SECTION THRU HIGH EAVE





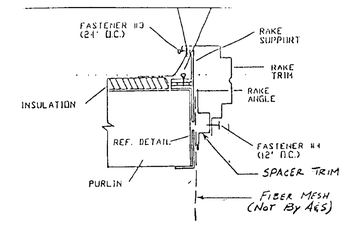
TYPICAL SECTION THRU PEAK BOX





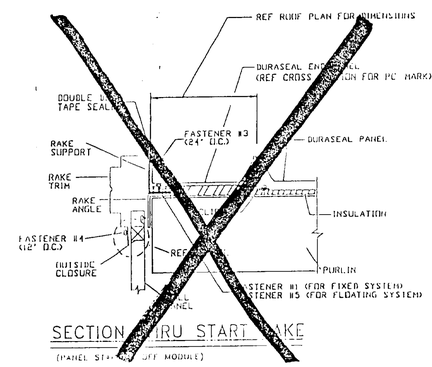
SECTION THRU START RAKE

(PANEL STARTING ON MODULE)



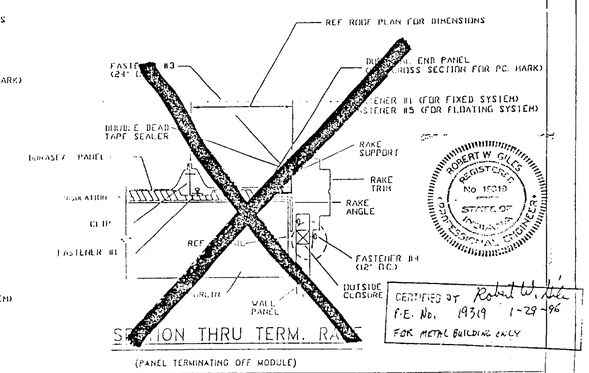
SECTION THRU TERM. RAKE

(PANEL TERMINATING ON MODULE)



SECTION THRU START RAKE

(PANEL STARTING OFF MODULE)



SECTION THRU TERM. RAKE

(PANEL TERMINATING OFF MODULE)

ROBERT W. GILES REGISTERED No 15319 STATE OF INDIANA PROFESSIONAL ENGINEER

CERTIFIED BY Robert W. Giles
P.E. No. 15319 1-29-96
FOR METAL BUILDING ONLY

FOR ADDITIONAL ERECTION DETAILS - REF. THE DURASEAL ERECTION MANUAL.

FASTENER SELECTION TABLE

FASTENER #1 1/4-14X1" HEX 3/8 HEX WASHER HEAD WITH 5/8 O.D. WASHER • CLIP TO PURLIN • EAVE PLATE TO EAVE STRUT • INSIDE CLOSURE TO EAVE STRUT • RAKE SUPPORT TO PURLIN (FIXED SYSTEM ONLY)	FASTENER #2 1/4-14X1" TYPE AB 3/8 HEX WASHER HEAD WITH 5/8 O.D. WASHER (LONG LIFE EXTERIOR FASTENER) • ENDLAP • OUTSIDE CLOSURE-FLAT
FASTENER #2A 17X1" TYPE AB 3/8 HEX W.SHER HEAD W/ SEALING WASHER(LONG LIFE EXTERIOR FASTENER) • USE IN PLACE OF FASTENERS #1, #2, #3 AND #4 AT ALL STRIPOUTS	FASTENER #3 1/4-14X1 1/4 SELF DRILLER 3/8 HEX WASHER HEAD WITH SEALING WASHER (LONG LIFE EXTERIOR FASTENER) • PANEL TO EAVE • STIFFENER PLATE TO UL90 SKYLIGHT • RAKE TRIM TO ROOF PANEL • RIDGE SUPPORT TO ROOF PANEL • OUTSIDE CLOSURE-TRAPEZOID
FASTENER #4 14X7/8 LAP TEK SELF DRILLER, 3/8 HEX WASHER HEAD WITH SEALING WASHER(LONG LIFE EXTERIOR FASTENER) • RIDGE AND OTHER FLASHING TO OUTSIDE CLOSURE • GUTTER TO PANEL • GUTTER TO STRAP • TRIM TO TRIM CONNECTIONS	FASTENER #5 1/4-14X1 1/4 SHOULDER TEK 2 3/8 HEX WASHER HEAD, NO WASHER • RAKE SUPPORT TO PURLIN(FLOATING SYSTEM ONLY)
FASTENER #6 12-24X1 1/4 DPAX-45 3/8 HEX WASHER HEAD WITH 5/8 O.D. WASHER • CLIP TO JOIST • EAVE PLATE TO BEAM • RAKE SUPPORT TO JOIST (FIXED SYSTEM ONLY)	FASTENER #7 14-20X1 1/4 SHOULDER TEK 5/16 HEX WASHER HEAD • RAKE SUPPORT TO JOIST (FLOATING SYSTEM ONLY)

RECEIVED
FEB 06 1996
MK-CRANE

REV	DATE	DESCRIPTION	BY	CKD.

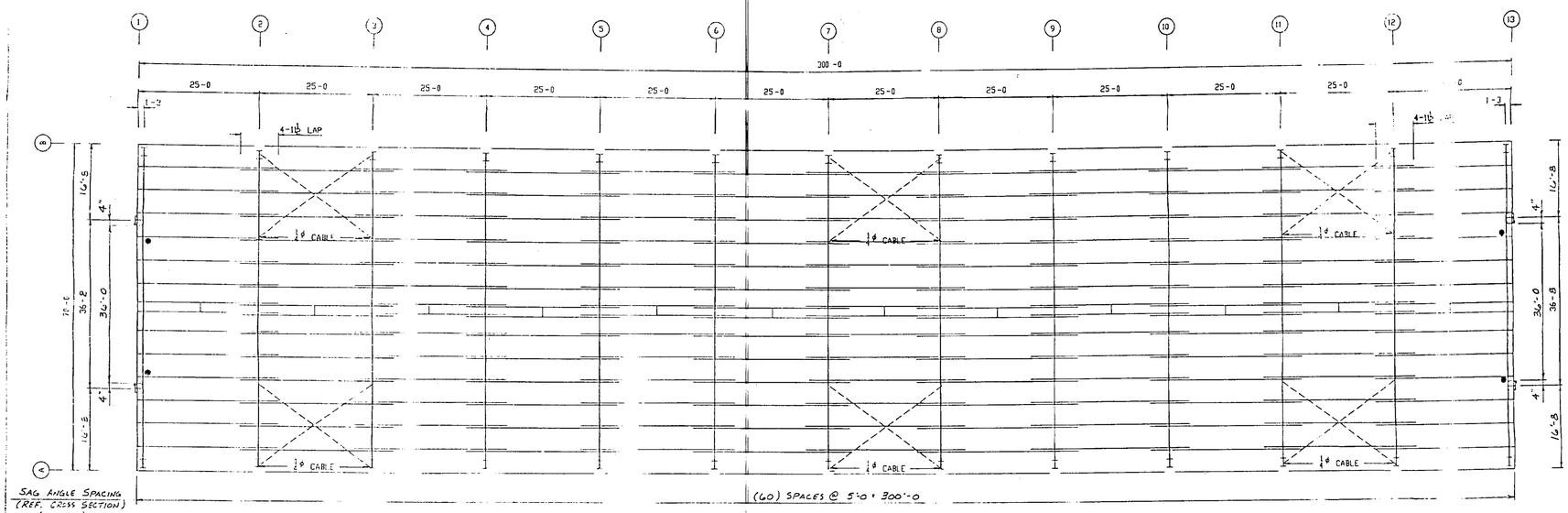
DURASEAL — A&S BUILDING SYSTEMS, CARTYVILLE, TENNESSEE

DESCRIPTION: ERECTION DRAWING (TYPE II TRIM)
SITE: (REF. SHEET E1)
CUSTOMER:
LOCATION:

DRAWN BY	CHECKED BY	DATE	SCALE	ENGINEER	JOB NO.	DWG NO.	ISSUE
SB		1/26/96	NONE		296-035	E5 OF 5	A

TYPICAL SECTION THRU HI-LO

(FOR FIXED ROOF SYSTEMS)



SAG ANGLE SPACING
(REF. CROSS SECTION)
(SHT. E4)

ROOF FRAMING PLAN

ERECTION NOTE:

12 X 1 ¼ SELF-DRILLING SCREWS ARE TO BE USED FOR PANEL TO SUB-STEEL (RED IRON) CONNECTIONS. #14 X 7/8" SELF DRILLING LAPTEK SCREWS ARE TO BE USED FOR PANEL TO PANEL AND TRIM TO PANEL CONNECTIONS.

NOTE: (ONE BLDG. SHOWN) (3 BLDGS. REQ'D.)

APPROVAL DRAWINGS
THIS DRAWING MUST BE RETURNED APPROVED BEFORE BUILDING DETAILS AND FABRICATION CAN START
☐ ☐ APPROVED AS NOTED
☐ ☐ DISAPPROVED MAKE CHANGES NOTED AND RESUBMIT
BY
DATE
THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION
CONSTRUCTION DRAWINGS WILL BE ISSUED AFTER APPROVAL IS RECEIVED

NOTE: USE (4)-1/2 X 1 C.P.M.B. AT PURLIN CLIP W/(2)-1/2 X 1 C.P.M.B. AT EACH END OF ALL PURLIN LAPS.

● - USE (4)-1/2 X 1 C.P.M.B. AT PURLIN CLIP.

CERTIFIED BY Robert W. Tyler
P.E. NO. 19319 1-29-96
FOR METAL BUILDING ONLY

STATE OF INDIANA
PROFESSIONAL ENGINEER

NOTE:
WALL PANEL BY OTHERS MUST HAVE EQUIVALENT OR GREATER STRENGTH PROPERTIES AS THOSE OF A & S BUILDING SYSTEMS' VISTASHEEN (FY=50 ksi) PANEL

NOTE:
A & S WILL ASSUME ALL UNCHANGED DIMENSIONS ON APPROVAL DRAWINGS ARE VERIFIED AS IS.

RECEIVED
FEB 06 1996
MK-CRANE

ERECTION NOTE:
1. INSTALLATION OF TEMPORARY ERECTION BRACING IS THE RESPONSIBILITY OF THE ERECTOR AND IS NOT PROVIDED BY THE BUILDING MANUFACTURER.

REV	DATE	DESCRIPTION	BY	CK

DESIGN LOADS		SHEETING			SWING DOOR		FRAME OPENINGS					WINDOWS & LOUVERS		SKYLITES & VENTS		OTHER ACCESSORIES
LIVE (ROOF): 20 PSF			(NOT BY A&S)	VALLS	NO.	DESCRIPTION	NO.	WIDTH	HEIGHT	DESCRIPTION	NO.	WINDOWS	NO.	SKYLITES - VALLITES		THICK FIBERGLASS INSUL. W/
LIVE (FRAME) 20 PSF		24 GA.	DURASEAL (UL-90)	ROOF								3030 STD. ALUM. SASH CLEAR GLASS		SIZE (3' X 11') COLOR WHITE		BACKING FOR ROOF & WALLS (NOT BY A&S)
WIND 70 MPH		COLOR	N/A	VALLS								6030 STD. ALUM. SASH CLEAR GLASS				
DEAD	STRUCTURAL ONLY	COLOR	GALVALUME	ROOF									NO.			ROOF: AS REQ'D. FOR DURASEAL
SNOW	20 PSF		TRIM											THROAT X 10' VENT W/B.S. & DAMPER		VALLS: MEMBER #12 X 1¼ STITCH #14 X 7/8 LAPTEK S.D.S.
COLLATERAL	10 PSF													THROAT STAT. VENT W/B.S. & DAMPER		
BLDG CODE	UBC	ROOF LINE	PLEASE ADVISE COLOR		NO.	OVERHEAD DOOR					NO.	LOUVERS				
INT.	RF	WALL LINE	N/A			(NOT BY A&S)						WIDE X HIGH W/SCREEN				
END/END	RF/RF	WALL E.D.S.	N/A													

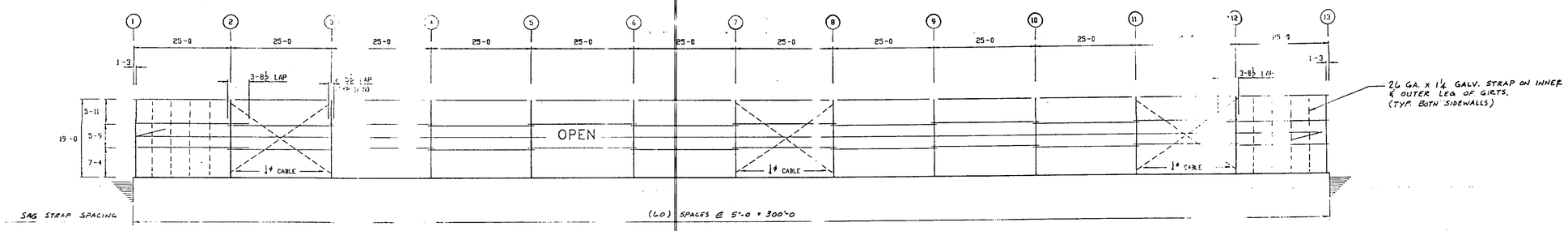
NOTICE TO BUILDING OFFICIAL:
APPLICATION OF SEAL IS FOR METAL BUILDING ONLY AND DOES NOT REPRESENT THE PROFESSIONAL OF RECORD.

A&S BUILDING SYSTEMS
CARYVILLE, TENNESSEE

DESCRIPTION	ROOF FRAMING PLAN
SIZE	REFERENCE DRAWINGS
CUSTOMER	SVI BLDG. SYST./ CRANE NAVAL BASE
LOCATION	CRANE, IN

DRAWN BY	CHECKED BY	DATE	SCALE	ENGINEER	JOB NO.	DWG NO.	ISSUE
SB		1/26/96	NONE		296-035	E1 OF 5	A

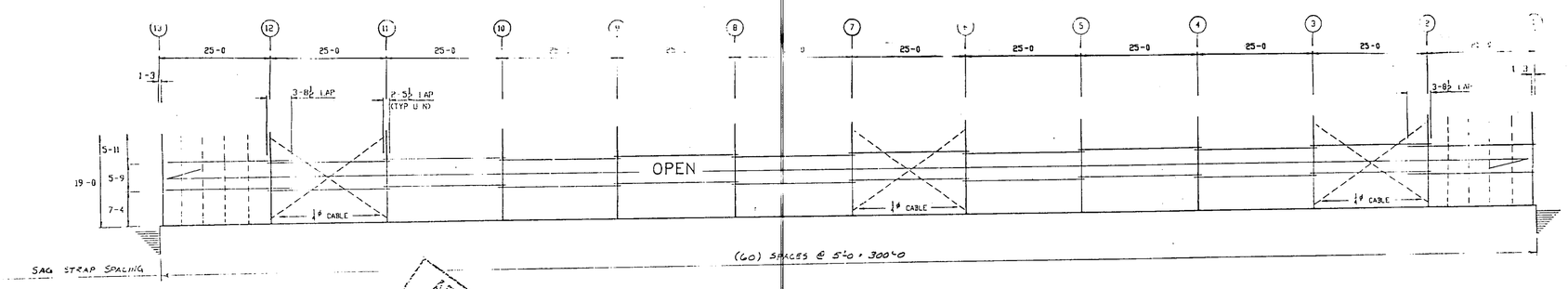
USE 1/2 "X 1 1/4 H.T.B. AT ALL EAVE STRUT CONNECTIONS UNLESS NOTED.



SIDEWALL FRAMING ELEV AT COL. LINE "A"

NOTE: FIELD ATTACH FABRIC MESH TO BASE ANGLE, GIRTS, AND EAVE STRUT OR RAKE ANGLE.

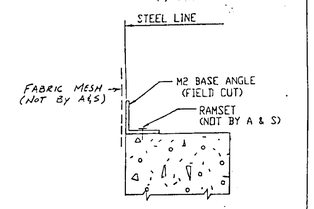
USE 1/2 "X 1 1/4 H.T.B. AT ALL EAVE STRUT CONNECTIONS UNLESS NOTED.



SIDEWALL FRAMING ELEV AT COL. LINE "B"

CERTIFIED BY Robert W. Giles
P.E. NO. 19319 1-29-96
FOR METAL BUILDING ONLY

ROBERT W. GILES REGISTERED No 19319 STATE OF INDIANA PROFESSIONAL ENGINEER



TYPICAL SECTION THRU BASE

RECEIVED
FEB 06 1996
MK-CRANE

ERECTION NOTE:
1. INSTALLATION OF TEMPORARY ERECTION BRACING IS THE RESPONSIBILITY OF THE ERECTOR AND IS NOT PROVIDED BY THE BUILDING MANUFACTURER.

REV	DATE	DESCRIPTION	BY	CKD.

APPROVAL DRAWING
THIS DRAWING MUST BE RETURNED APPROVED BEFORE SHOP DETAILS OR FABRICATION CAN START.
☐ APPROVED AS NOTED
☐ DISAPPROVED MAKE CHANGES NOTED AND RESUBMIT
BY
DATE
THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION
CONSTRUCTION DRAWINGS WILL BE ISSUED AFTER APPROVAL IS RECEIVED

NOTICE TO BUILDING OFFICIAL: APPLICATION OF SEAL IS FOR METAL BUILDING ONLY AND DOES NOT REPRESENT THE PROFESSIONAL OF RECORD.

A&S BUILDING SYSTEMS
CARYVILLE, TENNESSEE

DESCRIPTION	SIDEWALL FRAMING ELEVATION
SIZE	REFERENCE DRAWINGS
CUSTOMER	SVI BLDG. SYST./ CRANE NAVAL BASE
LOCATION	CRANE, IN

DRAWN BY	CHECKED BY	DATE	SCALE	ENGINEER	JOB NO.	DWG NO.	ISSUE
SB		1/26/96	NONE		296-035	E2 OF 5	A

APPENDIX D
IN-PROCESS FIELD CLARIFICATION REQUESTS

LIST OF FCR INFORMATION

FCR NO.	Description	
001	Metal Siding and Roof Vents	(6 Pages)
003	Delete Concrete Barricades, Add Concrete Wall	(2 Pages)
008, Rev. 1	Add Geotextile Cushion to Pond Lining	(7 Pages)
009	Foam Sealant For Building Opening	(11 Pages)
014	Add Utility Pole Guy Wires and Anchors	(2 Pages)
018	Add Building Sump Cover Supports	(1 Page)
023	Add Spacer curb to Building Sump	(2 Pages)
026	Add Corner Trim to Open Ends of Buildings	(2 Pages)
030	Add Closure Strips to Roof Sheeting and Eaves Trim	(1 Page)

DR NO.	Description	
9-027	Drill & Epoxy Rebar Dowels for Curb/Wall	(6 Pages)

ORIGINAL TO DEQ SIGNED
BY REGULATOR AND RETURNED

COPY

NAVFAC Southern Division / Morrison Knudsen Corporation	District II RAC

FIELD CLARIFICATION REQUEST (FCR)

Delivery Order No.: 4324-0009-07	Subcontract No.:	FCR No.:4324-0009-FCR-001
		Page 1 of 1

Reference Documents (Affected Document No., Revision No., Title):

Jacobs Engineering Design Drawings for the Biotreatment facility and A&S Design Drawings of the Buildings.

Problem / Change Description:

Change was made from screen siding to metal siding. This change requires that additional work be performed to procure and place the metal siding. Also the buildings will require vents to aid in air-flow through the buildings. Additional closure strips will also be required to keep rain from entering the building at the top of the metal siding. This metal siding will be placed along the sides of the buildings only leaving the ends open.

This change was made due to the six week lead time for procuring the fabric screen siding which would have significantly impacted the completion schedule. Therefore the decision was made to procure and install metal siding.

INITIATED BY	Signature:	Organization: MK	Date: 13MAR97

Resolution:

The metal siding, additional closure strips, ridge vents, and associated materials will be procured by MK. The labor for installation of these materials will be performed by MK's Subcontractors.

Five ridge vents 10 feet long will be place over the center bays of each building to facilitate air-flow through the buildings. The vents will be 100% vented without mechanical closures to ensure sufficient ventilation of the buildings.

See attached vendor data cut sheets for the type of siding and ridge vents being used.

If this FCR affects a subcontract, indicate CID number: _____

APPROVAL BY MK PE	Signature:	Date: 13MAR97	APPROVAL BY ROICC/NTR or RPM	Signature:	Date: 3/13/97
APPROVAL BY MK PjM	Signature:	Date: 3/14/97	Additional Reviews: By / Date		
APPROVAL BY MK QC	Signature:	Date: 3/14/97			
APPROVAL BY MK REG. SPECIALIST	Signature:	Date:			

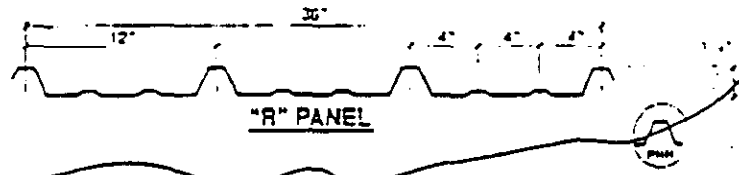
Regulator Approval/Notification Recommended:

Yes ☒ No ☐

2/4/97

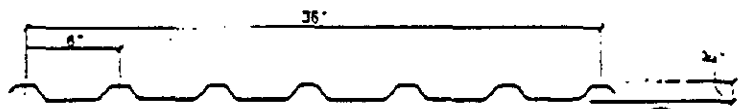
PANEL PROFILES

26 GAGE METAL SIDING TO BE USED ON BUILDINGS

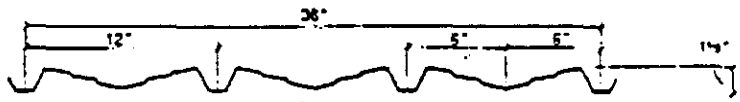


"R" PANEL

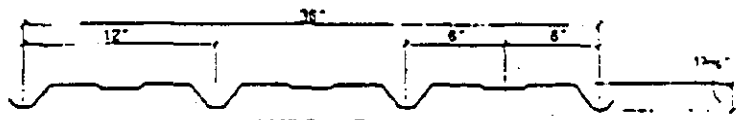
"HR" PANEL



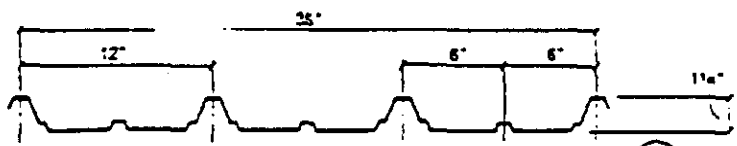
"U" PANEL



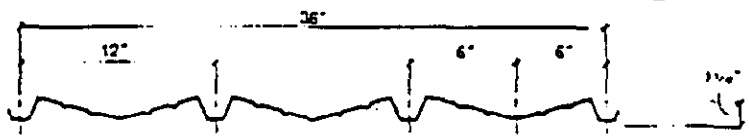
"A" PANEL



"AM" PANEL



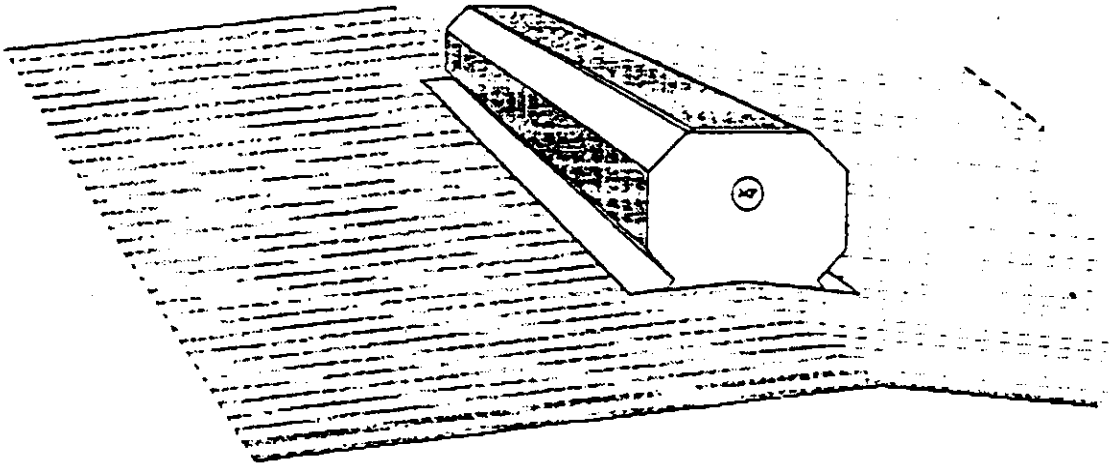
"VISTASHEEN" PANEL



"VISTASHADOW" PANEL

RIDGE VENTS USED FOR EACH BUILDING. FIVE RIDGE VENTS WILL BE EVENLY SPACED OVER THE CENTER 190 FEET OF EACH BUILDING. MECHANICAL CLOSURES NOT INCLUDED FOR 100% VENTILATION.

RIDGE VENTILATORS ...



...used on metal roofing systems roofs conform to MP's high standards and specifications which have been developed, tested and proven over many years. They provide an excellent value for the user.

Standard Size
9" throat and 12" throat— 10 foot sections. Other sizes available upon request. Low profile design can be used for single unit or continuous run installation with no disassembly.

Integral Dampers
Easy-moving damper opens to any degree from fully open to completely closed.

Design
Aerodynamically proportioned to exclude weather — protects air passages and full outlet area.

Bird Screen
Fully protected by 4 x 4 mesh galvanized hardware cloth.

Construction
Durable 26 gauge exterior combined with internal components of 24, 20 and 18 gauge die formed sheet metal and machined parts for long service life.

Finish
Pre-painted or galvalume is standard. Other materials and finishes available upon request.

Drainage Area
Continuous slot — bottom of both sides of windbands.

BUILDINGS MUST BREATHE!

Ridge ventilators manufactured by Metallic Products Corporation are in accordance with the highest design requirements and specifications. 25 years plus of experience in furnishing stationary, gravity-flow, continuous ridge ventilators has proven their efficient performance and lasting quality.

A properly engineered ventilation system using continuous ridge ventilators will control the movement of fresh air through the building removing hot, stale air and air contaminated by manufacturing or production processes. Summer heat is released naturally through gravity ridge ventilators. During winter proper moisture problems, such as rust and deterioration of insulation or the damage to stored products.

The Metallic Products Corporation's ridge ventilator is a low-profile design manufactured in 10-foot lengths which can be installed as individual units or in continuous runs. Vents may be furnished with or without dampers to control the flow of air. Operation of dampers is standard by pull chains (Please specify when ordering), multiple damper operation is available for up to 5 or more units.

Ventilators are shipped with a 1:12 end cap and can be field

9" VENTILATOR SPECIFICATIONS

Ventilators are of low profile design to provide gravity type ventilation. Birdscreen is provided to prevent nesting and each unit contains flashing for either single unit or continuous-run installation.

Each unit is 9" x 10' with a base ventilating capacity of 2700 CFM at 20° temperature differential with a 25' stack height.

Exterior parts are 26GA. G90 galvanized, painted galvanized or galvalume. ASTM-A446.

Interior parts are all of G90 galvanized steel.

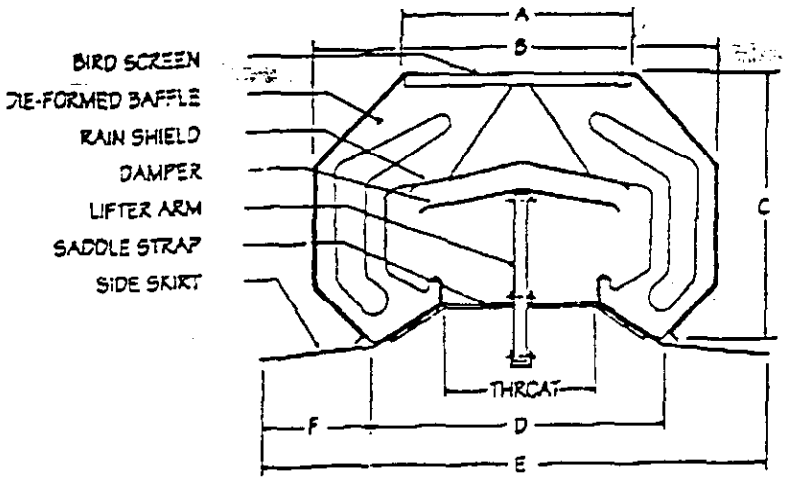
Substructure consists of 10GA. saddle straps with interior baffles of 24GA. Pull bars and pivot brackets are of 20GA. Lifter arms and damper slides are of 18GA.

Manual operation is through activation of pull bar, which is attached to bell-cranked type lifter arms connected to damper with teflon coated pins through damper slides.

Dampers are spring loaded to remain in open position until pull bar is operated and locked in the closed position. Dampers operate in vertical manor.

Birdscreen is 4x4 mesh galvanized hardware cloth.

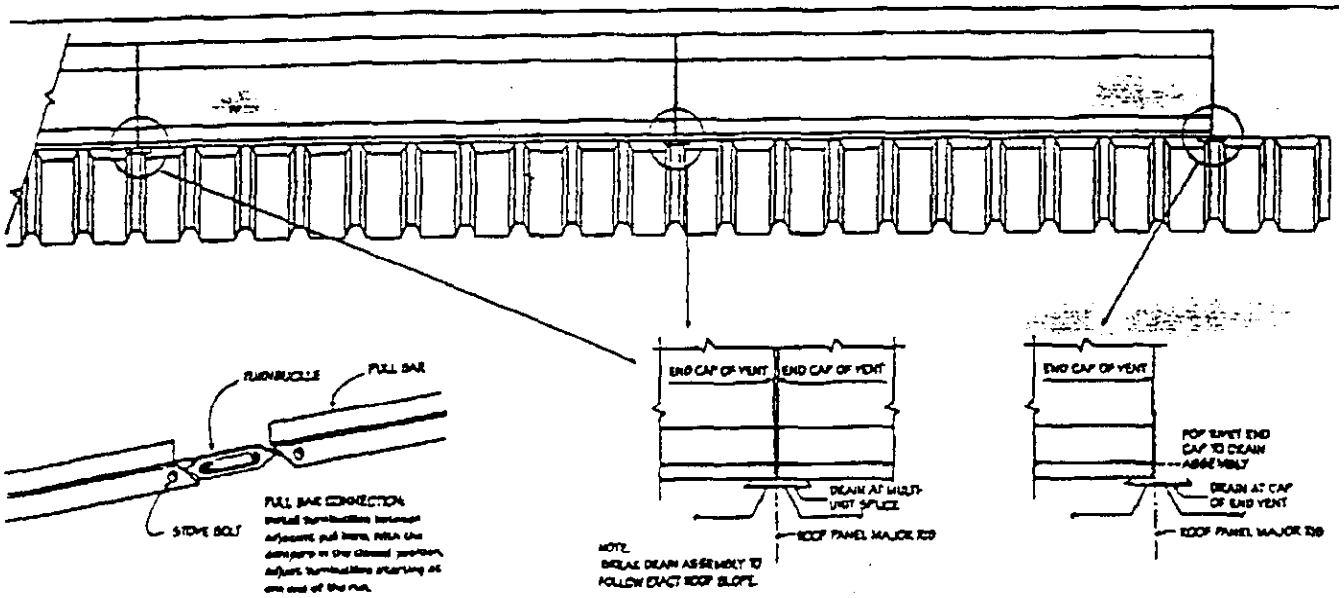
DIMENSIONS AND TECHNICAL DATA

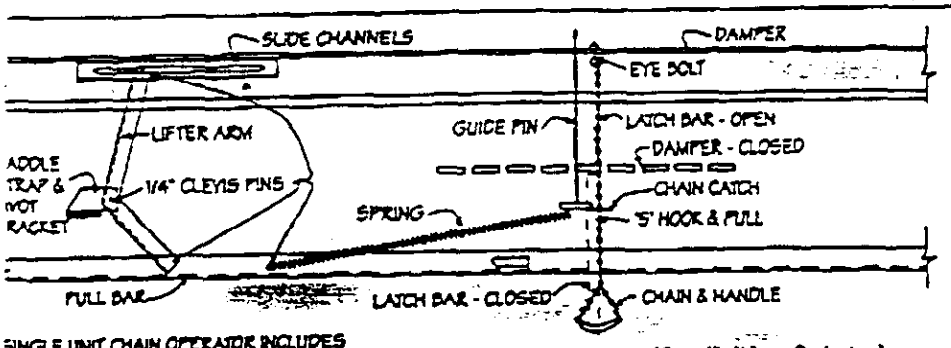


DIMENSIONS (In Inches)					
Throat*	A	B	C	D	E
9	13	21¼	14½	18	28
12	17	28½	18	22	33

SHIPPING WEIGHTS			
Size	Uncrated	Standard Crated	Pkg. Size
9"	95 lbs	179 lbs	123½" X 19¼" X 30"
12"	108 lbs	201 lbs	123½" X 22½" X 35"

* Other sizes available upon request.





SINGLE UNIT CHAIN OPERATOR INCLUDES 10' CHAIN, HANDLE AND LOCKING DEVICE.

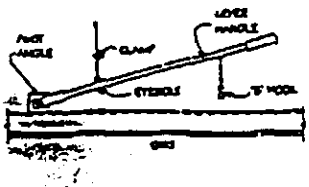
STANDARD OPERATOR (Specify When Ordering)

Chain-operated damper utilizes a rugged sash chain through chain locking device. Damper is spring-loaded to open and can be adjusted to any opening from fully open to fully closed. Optional operator packages for multiple units or wall operation are available. (See below.)

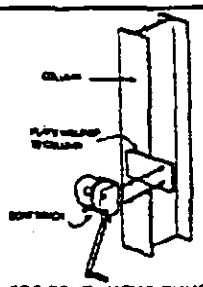
PERFORMANCE DATA

Throat Size	Vent Above Ground	CFM
9"	10'	1572
	20'	2085
	30'	2775
	40'	3248
12"	10'	2810
	20'	3240
	30'	3590
	40'	3860

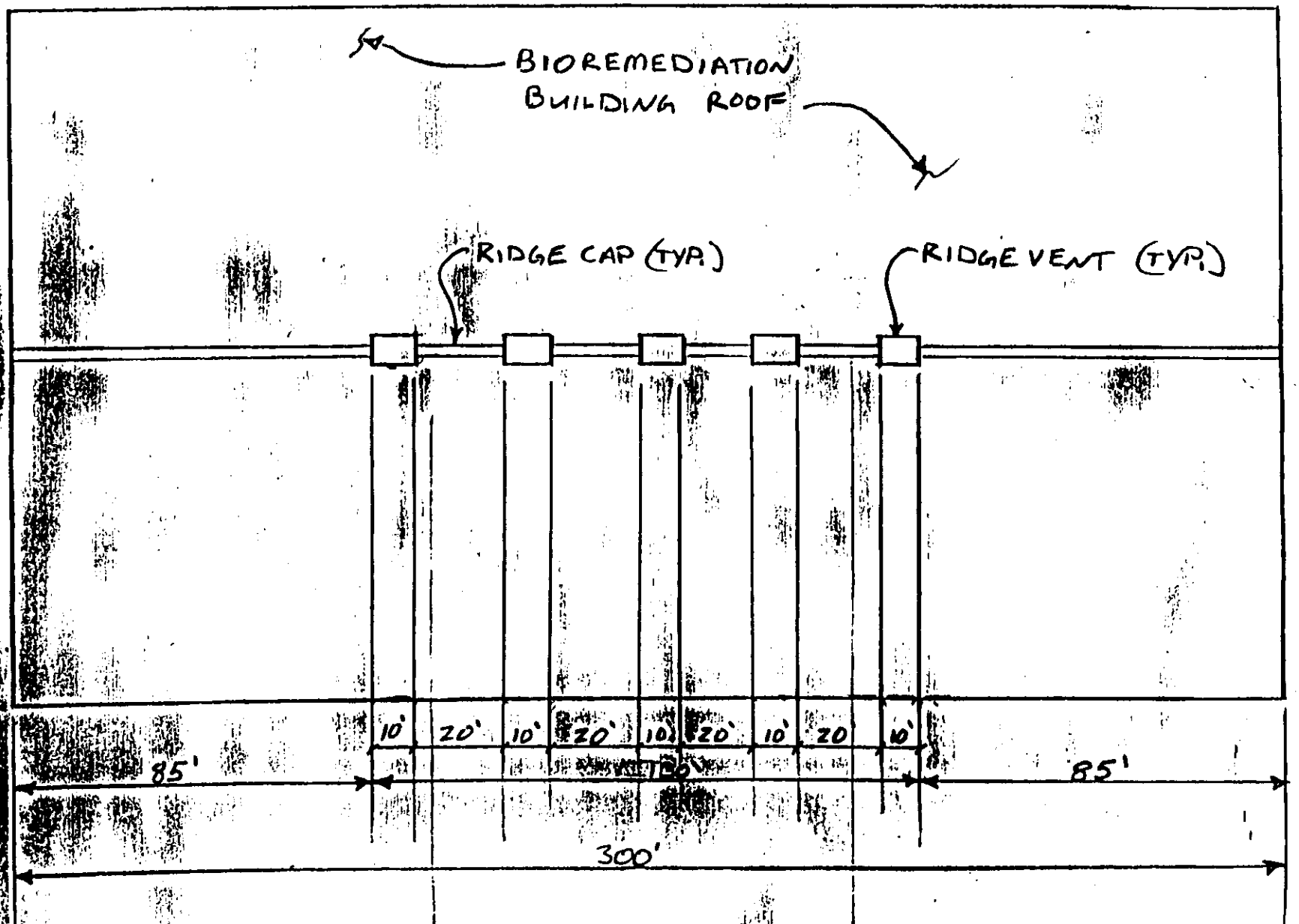
Assumes 10° Temperature differential and 5 mph wind speed



FOR CONTINUOUS RUNS UP TO 5 UNITS



FOR CONTINUOUS RUNS UP TO 10 UNITS



RIDGE VENT LAYOUT PLAN

NTS

MORRISON KNUDSEN
07MAR97

ORIGINAL TO BE SIGNED BY REGULATOR AND RETURNED

COPY

NAVFAC Southern Division / Morrison Knudsen Corporation	District II RAC

FIELD CLARIFICATION REQUEST (FCR)

Delivery Order No.: 4324-0009-07	Subcontract No.:	FCR No.:4324-0009-FCR-003
		Page 1 of 1

Reference Documents (Affected Document No., Revision No., Title):

Jacobs Engineering Design Drawings for the Biotreatment facility.

Problem / Change Description:

Change was made from placing concrete barricades along the sides of the biofacility buildings to placing 8 inch thick reinforced concrete curb walls.

The curb walls will provide additional floor space that may be required to operate the equipment in the buildings. They will also allow easier access to the eye-wash station and electrical panel and will not trap misc. material behind them like the barricades. This will allow a more efficient wash down and cleaning of the buildings between stockpiling and operation.

INITIATED BY	Signature:	Organization: MK	Date: 07MAR97

Resolution:

Reinforced concrete curb walls 8 inches thick will be placed along the edge of the buildings as shown on the attached drawing. This change was initiated by the subcontractor (Smith) at no additional cost to MK or the Navy.

If this FCR affects a subcontract, indicate CID number: _____

APPROVAL BY MK PE	Signature:	Date: 07MAR97	APPROVAL BY ROICC/NTR or RPM	Signature:	Date: 3/13/97
APPROVAL BY MK PJM	Signature:	Date: 3/7/97	Additional Reviews: By / Date		
APPROVAL BY MK QC	Signature:	Date: 07 MAR 97			
APPROVAL BY MK REG. SPECIALIST	Signature:	Date:			

Regulator Approval/Notification Recommended:

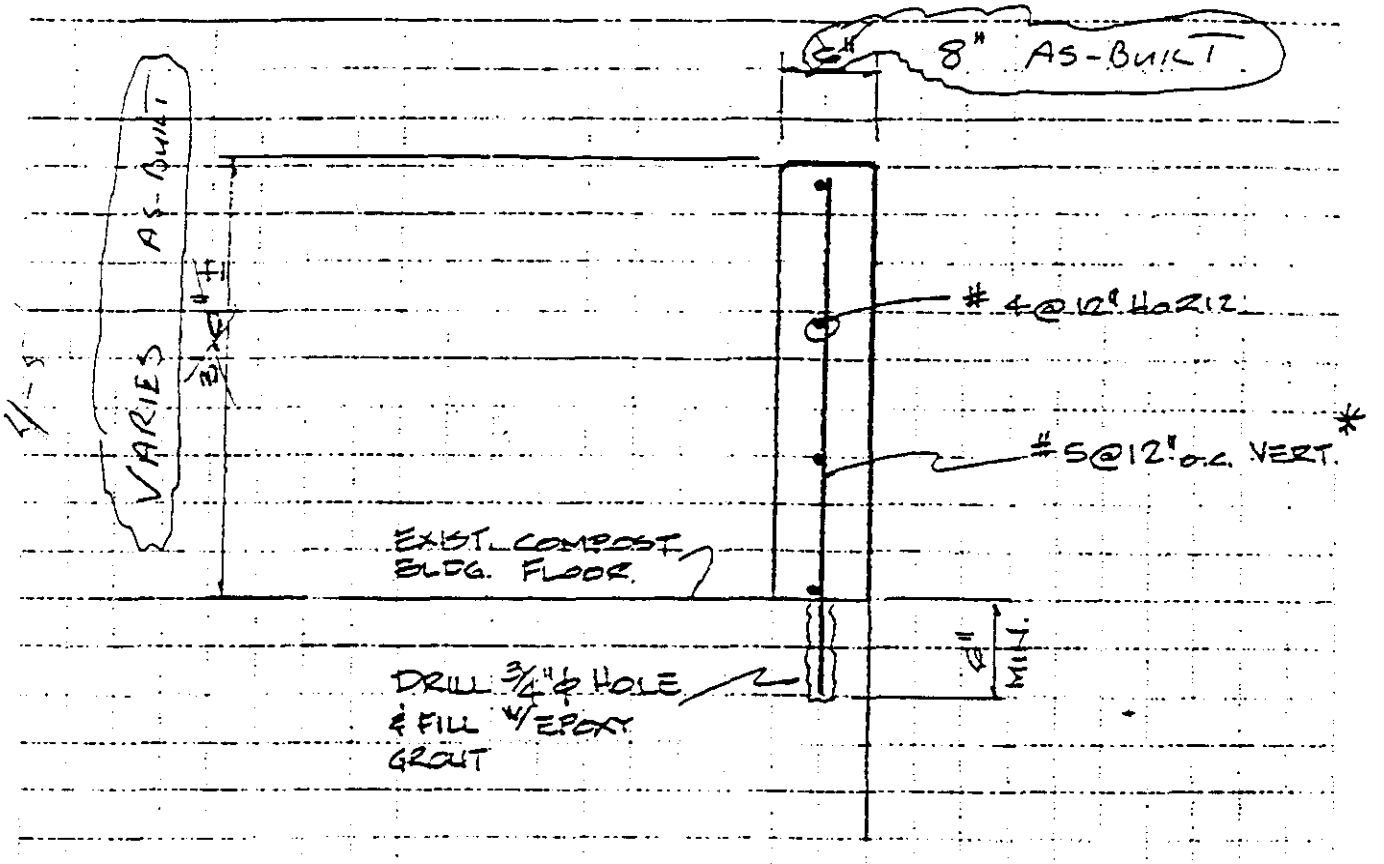
Yes ☒ No ☐

JACOBS ENGINEERING GROUP INC.
BATON ROUGE, LOUISIANA

CALCULATIONS — SKETCHES

CLIENT & LOCATION MORRISON KNUDSEN
UNIT NSWC CRANE, IN.
ITEM _____ REFERENCE _____

JOB NO. 05617521
DOCUMENT NO. _____
REV. _____
PAGE 1 OF 1
BY G. LANGLOIS DATE 9 JAN 97
CHECKED _____ DATE _____



* IF EXIST #5 VERT USE 15" MIN SPLICE

COMPOST BUILDING CURB WALL

RECEIVED
JAN 09 1997
MK-CRANE

NAVFAC Southern Division / Morrison Knudsen Corporation	District II RAC

FIELD CLARIFICATION REQUEST (FCR)

Delivery Order No.: 4324-0009-07	Subcontract No.: 049	FCR No.:4324-0009-FCR-008, REV. 1
		Page 1 of 1

Reference Documents (Affected Document No., Revision No., Title):

Jacobs Engineering Design Drawings for the Biotreatment facility.

Problem / Change Description:

Due to the irregular surface of the gunite lining on the bottom and sides of the retention ponds, the liner installer recommends placement of a geotextile fabric to protect the HDPE liner. The geotextile will act as a protective cushion for the HDPE liner material without compromising the liner stability.

INITIATED BY	Signature:	Organization: MK	Date: 4-17-97

Resolution:

MK concurs with subcontractors recommendation for placement of the geotextile fabric as a protective barrier for the HDPE liner. Also due to the condition of the geotextile fabric placed earlier, MK will have their subcontractor remove the old geotextile and replace it with new 12 ounce non-woven geotextile fabric. Both ponds will be dewatered and cleaned to remove silts and debris prior to installation of the geotextile material.

Attached is MK's specification section 02249 for geotextiles, SOLMAX specification section 6 for geotextiles, manufacturers certification sheet on the geotextile fabric to be used, and a typical detail of the anchor trench for review and approval. Also attached is Jacobs specification for the HDPE liner, certification cut sheets, and a panel layout for review and approval.

If this FCR affects a subcontract, indicate CID number: _____

APPROVAL BY MK PE	Signature:	Date: 4-17-97	APPROVAL BY ROICC/NTR or RPM	Signature:	Date:
APPROVAL BY MK PjM	Signature: Steven T Dorey	Date: 4/17/97	Additional Reviews: By / Date		
APPROVAL BY MK QC	Signature:	Date: 4/17/97			
APPROVAL BY MK REG. SPECIALIST	Signature: Steven Cory	Date: 4-17-97			

Regulator Approval/Notification Recommended:

Yes ☒ No ☐

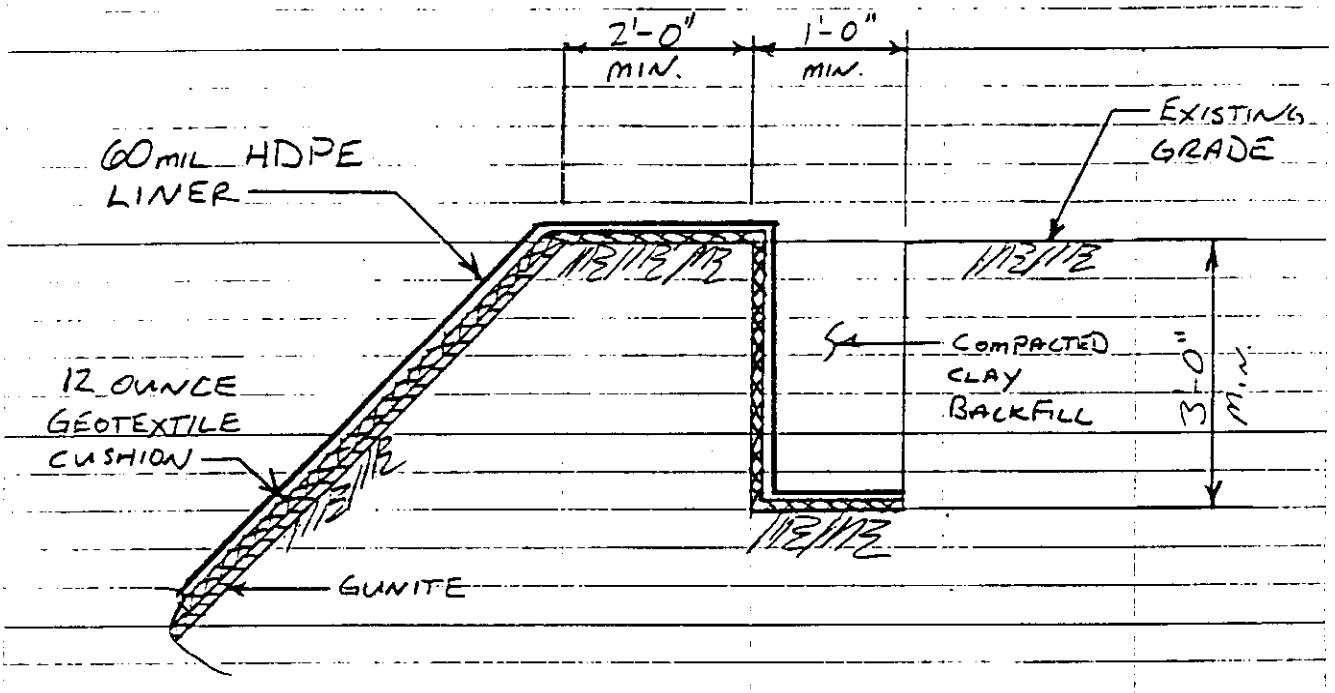
MORRISON KNUDSE.. ORPORATION

Sheet 1

Project NSWC CRANE
Feature BIOREMEDIATION FACILITY
Item ANCHOR TRENCH FOR PONDS.

Contract No. 4324
Designed CG
Checked

File No.
Date 4-16-97
Date



ANCHOR TRENCH DETAIL

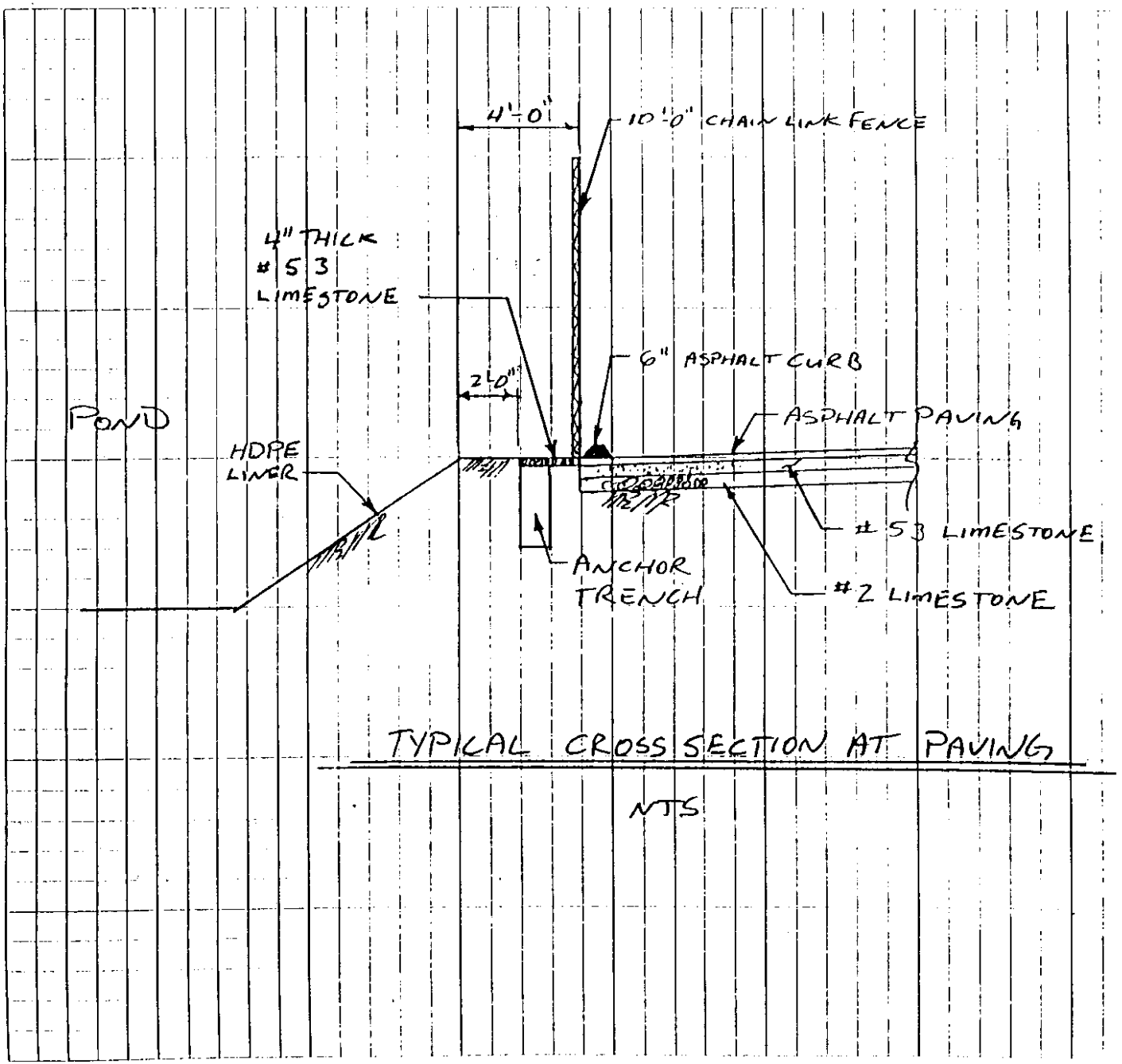
NTS

MORRISON KNUDSE JRPORATION

Project NSWC CRANE
Feature BIOREMEDIATION FACILITY
Item POND CROSS SECTION AT PAVING

Contract No. 4324
Designed
Checked

Sheet 1
File No.
Date 4-17-97
Date



TYPICAL CROSS SECTION AT PAVING

NTS

SYNTHETIC INDUSTRIES
CONSTRUCTION PRODUCTS DIVISION
"Smart Solutions in Synthetics"

1201 Nonwoven Geotextile

1201 is a polypropylene, staple fiber, needlepunched nonwoven geotextile manufactured at one of Synthetic Industries' facilities that has achieved ISO-9002 certification for its systematic approach to quality. The fibers are needled to form a staple network that retain dimensional stability relative to each other. The geotextile is resistant to ultraviolet degradation and to biological and chemical environments normally found in soils. Synthetic Industries 1201 conforms to the property values listed below:

PROPERTY	TEST METHOD	MINIMUM AVERAGE ROLL VALUES[1]	
Mechanical		English	Metric
Grab Tensile Strength	ASTM D4632	300 lbs	1335 N
Grab Elongation	ASTM D4632	50 %	50 %
Puncture Strength	ASTM D4833	180 lbs	800 N
Mullen Burst	ASTM D3786	600 psi	4130 kPa
Trapezoidal Tear	ASTM D4533	115 lbs	510 N
Hydraulic			
Apparent Opening Size (AOS)	ASTM D4751	100 US Std. Sieve	0.150 mm
Permittivity, Ψ	ASTM D4491	1.00 sec^{-1}	1.00 sec^{-1}
Permeability, $k = \Psi \cdot t$	ASTM D4491	0.29 cm/sec	0.29 cm/sec
Water Flow Rate	ASTM D4491	75 gpm/ft^2	3055 $l/min/m^2$
Endurance			
UV Resistance (% retained @ 500 hours)	ASTM D4355	70 %	70 %

Notes:

1 Values shown are in weaker principal direction. Minimum average roll values represent a 95 percent confidence level, calculated as the mean minus two standard deviations.

Standard Roll Size: 15.0' x 300' = 500 sq. yds.

Seller makes no warranty, express or implied, concerning the product furnished hereunder other than it shall be of the quality and specifications stated herein. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED AND TO THE EXTENT THAT IT IS CONTRARY TO THE FORESOING SENTENCE, ANY IMPLIED WARRANTY OR MERCHANTABILITY IS EXPRESSLY EXCLUDED. Any recommendations made by Seller concerning uses or applications of said product are believed reliable and Seller makes no warranty of results to obtained.
This Data Sheet supersedes all previous Data Sheets for this style and is subject to change without notice.

NW1201-4-4.24.95

4019 Industry Drive • Chattanooga, TN 37416 • 615/899-0444 FAX 615/899-7619 Toll Free 800/621-0444

HDPE GEOMEMBRANE
QUALITY CONTROL SPECIFICATIONS

60 mil

National Seal Company's High Density Polyethylene (HDPE) Geomembranes are produced from virgin, first quality, high molecular weight resins and are manufactured specifically for containment in hydraulic structures. NSC HDPE geomembranes have been formulated to be chemically resistant, free of leachable additives and resistant to ultraviolet degradation.

The following properties are tested as a part of NSC's quality control program. Certified test results for properties on this page are available upon request. *Refer to NSC's Quality Control Manual for exact test methods and frequencies.*

All properties meet or exceed NSF Standard Number 54.

RESIN PROPERTIES	METHOD	UNITS	MINIMUM[1]	TYPICAL
Melt Flow Index[2]	ASTM D 1238	g/10 min	0.50	0.25
Oxidative Induction Time	ASTM D 3895, Al pan, 200°C, 1 atm O_2	minutes	100	120

SHEET PROPERTIES	METHOD	UNITS	MINIMUM[1]	TYPICAL
Thickness	ASTM D 751, NSF mod.			
Average		mils	60.0	61.5
Individual		mils	57.0	59.7
Density	ASTM D 1505	g/cm³	0.940	0.948
Carbon Black Content	ASTM D 1603	percent	2.0-3.0	2.35
Carbon Black Dispersion	ASTM D 3015, NSF mod.	rating	A1, A2, B1	A1
Tensile Properties	ASTM D 638			
Stress at Yield		psi	2200	2550
		ppi	132	157
Stress at Break		psi	3800	4850
		ppi	228	298
Strain at Yield	1.3" gage length (NSF)	percent	13.0	16.9
Strain at Break	2.0" gage or extensometer	percent	700	890
	2.5" gage length (NSF)	percent	560	710
Dimensional Stability[2]	ASTM D 1204, NSF mod.	percent	1.5	0.4
Tear Resistance	ASTM D 1004	ppi	750	860
		lbs	45	53
Puncture Resistance	ASTM D 4833	ppi	1800	2130
		lbs	108	131
Constant Load ESCR, Single Point	GRI, GM-5a	hours	200	>400

[1] This value represents the minimum acceptable test value for a roll as tested according to NSC's Manufacturing Quality Control Manual. Individual test specimen values are not addressed in this specification except thickness.

[2] Indicates Maximum Value

NATIONAL SEAL COMPANY
1245 Corporate Blvd. • Suite 300

HDPE GEOMEMBRANE
PHYSICAL PROPERTIES

60 mil

The properties on this page are not part of NSC's Manufacturing Quality Control program and are not included on the material certifications. Seam testing is the responsibility of the installer and/or CQA personnel.

PROPERTIES	METHOD	UNITS	MINIMUM[1]	TYPICAL
Multi-Axial Tensile Elongation	GRI, GM-4	percent	20.0	28.0
Critical Cone Height	GRI, GM-3, NSC mod.	cm	1.0	1.5
Wide Width Tensile	ASTM D 4885			
Stress at Yield		psi	2000	2110
Strain at Yield		%	15.0	20.0
Brittleness Temp. by Impact[2]	ASTM D 746	°C	-75	< -90
Coef. of Linear Thermal Exp.[2]	ASTM D 696	$°C^{-1}$	1.5×10^{-4}	1.2×10^{-4}
ESCR, Bent Strip	ASTM D 1693	hours	1500	> 10,000
Hydrostatic Resistance	ASTM D 751	psi	450	510
Modulus of Elasticity	ASTM D 638	psi	80,000	135,000
Ozone Resistance	ASTM D 1149, 168 hrs	P/F	P	P
Permeability[2]	ASTM E 96	cm/sec · Pa	2.3×10^{-14}	8.1×10^{-15}
Puncture Resistance	FTMS 101, method 2065	ppi	1300	1700
		lbs	78	105
Soil Burial Resistance[2]	ASTM D 3083, NSF mod.	% change	10	0
Tensile Impact	ASTM D 1822	ft lbs/in²	250	420
Volatile Loss[2]	ASTM D 1203, A	percent	0.10	0.06
Water Absorption[2]	ASTM D 570, 23°C	percent	0.10	0.04
Water Vapor Transmission[2]	ASTM E 96	g/day · m²	0.024	0.009

SEAM PROPERTIES	METHOD	UNITS	MINIMUM[1]	TYPICAL
Shear Strength	ASTM D 4437, NSF mod.	psi	2000	2700
		ppi	120	166
Peel Strength	ASTM D 4437, NSF mod.	psi	1500	1870
(hot wedge fusion)		ppi	90	115
Peel Strength	ASTM D 4437, NSF mod.	psi	1300	1590
(fillet extrusion)		ppi	78	98

STANDARD ROLL DIMENSIONS

Length	1110 feet	Area	16,650 ft²
Width	15 feet	Weight	5,000 lbs

This information contained herein has been compiled by National Seal Company and is, to the best of our knowledge, true and accurate. All suggestions and recommendations are offered without guarantee. Final determination of suitability for use based on any information provided, is the sole responsibility of the user. There is no implied or expressed warranty of merchantability of fitness of the product for the contemplated use.

NSC reserves the right to update the information contained herein in accordance with technological advances in the material properties.

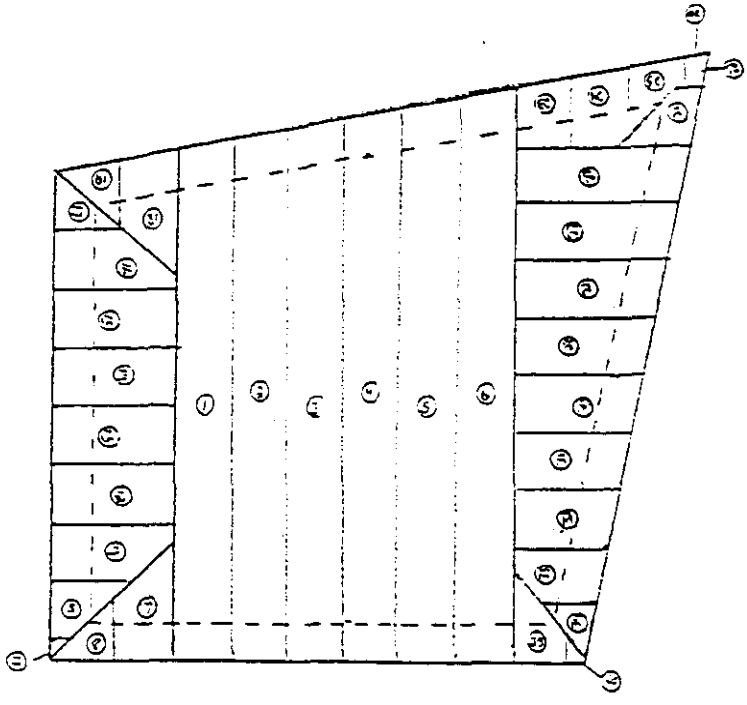
6H-0893

NATIONAL SEAL COMPANY
1245 Corporate Blvd. • Suite 300

NSWC-CRANE, IN
F/MORRISON KNUDSEN

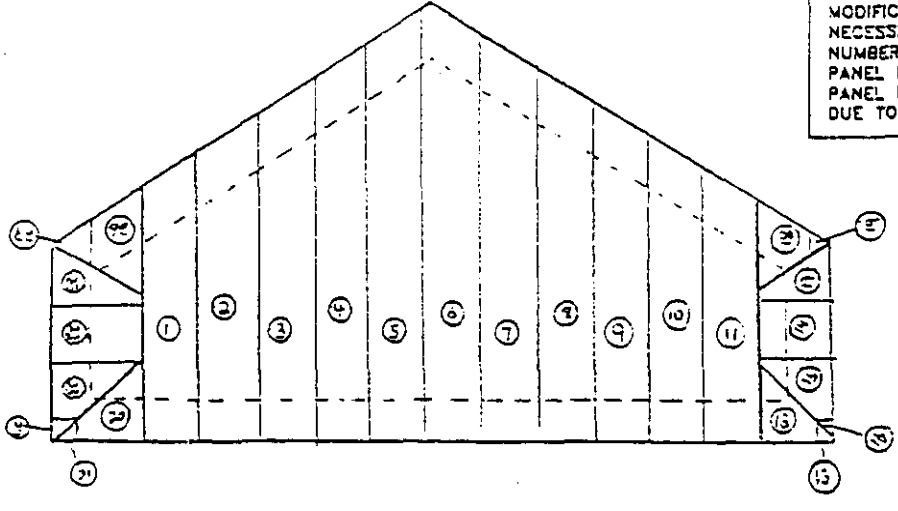
SOLMAX
GEOSYNTHETICS

HDPE PANEL LAYOUT



Pond 1

NOTE:
THIS PROPOSED PANEL LAYOUT IS BEING SUBMITTED FOR INFORMATION PURPOSES ONLY.
MODIFICATIONS TO THIS INTENDED PLAN MAY BE NECESSITATED BY SITE SPECIFICS.
NUMBERING SEQUENCES INDICATE INTENDED LINER PANEL DEPLOYMENT
PANEL DEPLOYMENT SEQUENCES MAY ALSO CHANGE DUE TO SITE SPECIFICS.



Pond 2

ORIGINAL

NAVFAC Southern Division / Morrison Knudsen Corporation	District II RAC

FIELD CLARIFICATION REQUEST (FCR)

Delivery Order No.: 4324-0009-07	Subcontract No.: 049	FCR No.:4324-0009-FCR-009
		Page 1 of 1

Reference Documents (Affected Document No., Revision No., Title):

Jacobs Engineering Design Drawings for the Biotreatment facility.

Problem / Change Description:

Small openings are present where the siding and the roof panels meet. These openings will allow rain to enter the buildings and run down the inside of the siding. A change is required to plug these openings so that additional water will not enter the buildings. If openings are not closed, the potential exists for additional leachate to collect within the buildings.

INITIATED BY	Signature:	Organization: MK	Date: 4-16-97

Resolution:

MK recommends placing expanding polyurethane foam sealant in the openings to close them off. Once the foam has cured, the excess will be trimmed off and the surface will be painted to match the color of the building. See attached submittal on the foam sealant recommended.

If this FCR affects a subcontract, indicate CID number: _____

APPROVAL BY MK PE	Signature:	Date: 4-16-97	APPROVAL BY ROICC/NTR or RPM	Signature:	Date: 4/22/97
APPROVAL BY MK PjM	Signature:	Date: 4/16/97	Additional Reviews: By / Date Christine D. Freeman 4/22/97 Will it withstand humidity + ammonia gases?		
APPROVAL BY MK QC	Signature:	Date: 4-16-97			
APPROVAL BY MK REG. SPECIALIST	Signature: Steven Corey	Date: 4-16-97			

Regulator Approval/Notification Recommended:

Yes ☒ No ☒

SMITH
ENVIRONMENTAL TECHNOLOGIES CORPORATION

From the Desk Of:
Joe Skelton
Project Superintendent, Houston District
NSWC Field Office: P.O. Box 98
Crane Village, IN 47522
Office: (812) 881-7571
Fax: (812) 854-6944

DATE: APRIL 10, 1997

To: Steve Downey
Morrison Knudsen Corporation
NSWC Crane, Indiana

Correspondence #
MKC/SET- 166
Biofacility

RE: Subcontract No. 4324-049

Smith Environmental Technologies Corp. (Smith) presents the following information for your review.

Submittal Item No.	Description	Action
52	Manufacturers Catalog and Data	Smith Submits MFG. Info on 3 E GREAT STUFF Insta-Foam
53	MSDS	Smith Submits MSDS sheets on GREAT STUFF Insta-Foam.

[illegible] in compliance [illegible] not yet installed in the [illegible]

Certified by Submittal Reviewer [illegible] Date 4-16-97
(signature when applicable)

Certified by QC Manager _____ Date _____
(signature)

If you have any questions or comments please feel free to contact me.

Sincerely,

Joe Skelton

Joe Skelton
Project Superintendent

RECEIVED
APR 11 1997
MK-CRANF

ORIGINAL

SMITH
ENVIRONMENTAL TECHNOLOGIES CORPORATION

SPEED MEMO: 017

NSWC - Crane, Biofacility (Project #11341.01)
NSWC Field Office: P.O. Box 98
Crane Village, IN 47522
Office: (812) 854-3810
Fax: (812) 854-3813

DATE: APRIL 10, 1997

TO: Wally Medcalf
Construction Manager
Morrison Knudsen
NSWC - Crane, Indiana

FROM: Joe Skelton JS
Project Superintendent
Smith Technology Corporation
NSWC - Crane, Indiana

RECEIPT SIGNATURE: _____
(Please sign above and return a copy)

- [ ] SENT BY FAX, FAX NUMBER: _____
- [ ] SENT BY MAIL
- [x] PERSONALLY DELIVERED BY: JOE SKELTON
- [ ] ATTACHMENTS, NUMBER OF PAGES INCLUDING THIS PAGE: 10

SUBJECT: GREAT STUFF - Insta-Foam for Roof Edge openings

MEMO:

This material is not available in Black, but After Curing can Be Painted Etc. Please Review and Inform ASAP, possibly we can accomplish this Task at the Same time we are Installing Roof Vents.

Submittal material Included

ATTENTION TO THIS MATTER IS CRITICAL DUE TO THE FOLLOWING:
- [ ] *POTENTIAL SCHEDULE IMPACT*
- [ ] *POTENTIAL COST IMPACT*
- [ ] *OTHER:* _____

CC: _____

NSWC - CRANE 4324-0009			
PROJECT MEMBER	ACT	INFO	INIT
PROJECT MANAGER			
PROJECT ENGINEER	X		R
GNL SUPT	X		R
SAFETY AND HEALTH			
QA/QC SUPERVISOR	X		R
PROJECT CONTROLS			
FIELD ENGINEERING			
FMO-CHARLESTON			
FILE:			
FILE:			

GREAT STUFF – AMERICA'S BEST SELLING FOAM SEALANT

Great Stuff® is an all-purpose, minimal expanding polyurethane foam sealant that insulates and air-seals cracks and holes around window and door frames, plumbing and wiring penetrations, cracks in walls and air/heating ducts, etc. Air sealing your house with Great Stuff prevents loss of cool air in the summer and heat in the winter. It also minimizes condensation, reduces noise, controls dust and pollen, and seals out pests. The end result is a more comfortable home with year round savings in heating and air-conditioning costs.

• Cross-section—Foam expands and seals cavity around pipe penetration.

Great Stuff is the best material available for air-sealing. It outperforms other sealing materials including caulk. Great Stuff offers:

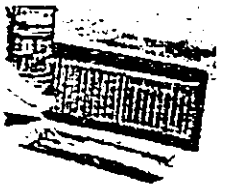
• ***Greater expansion properties.*** Unlike caulks, Great Stuff expands to fill the gap or hole. When cured, the foam assumes the shape of the cavity. It will not shrink and will retain its sealing properties permanently.

• ***Superior adhesion.*** Great Stuff sticks to most surfaces including wood, metal, masonry, glass, most plastics, and is compatible with polystyrene and polyurethane foam insulation board.

• ***Higher insulation value.*** Caulk has no insulating properties whereas Great Stuff provides both insulation (1 inch = R5) and sealant benefits.

• ***Superior Economy.*** Great Stuff is much more economical than caulk. One 12 oz. can of Great Stuff yields about 4 gallons of cured foam. This is equivalent to about 20 tubes (11 oz.) of caulk or about 1/10 the cost of caulk.

SO MANY



Seal air/heating vents.

Insulate exposed ducts.

Seal around window frames.

Seal around door frames

Seal around pipes and plumbing fixtures.

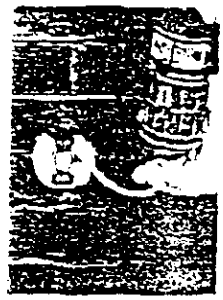
Seal where basement wall meets wood plate

ISES...ONE GREAT STUFF.

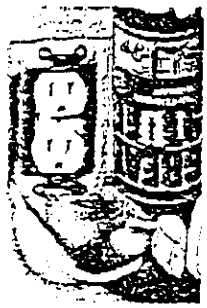
Seal off gaps behind fixture box.

Seal under edge of siding.

Fill holes in tree to stop insect damage.

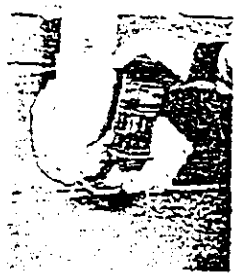


Seal around outside water faucet.



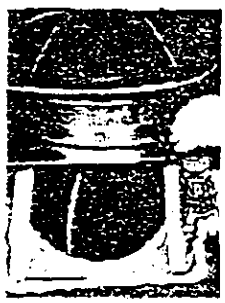
Seal behind and around electrical boxes.

Seal off electrical wiring penetrations.



Stop pipes from rattling.

Seal behind and around exterior wall light box.



Seal between frame & roof sheathing (roof ventilator).

Seal gaps between baseboard and floor.

Seal off pathway where pests can enter.

Seal behind and around ceiling light box.

MORE WAYS TO USE GREAT STUFF

- Seal leaking roof.
- Fill rotted woodwork.
- Seal around window air-conditioner unit.
- Use foam to set doors, bath tubs and shower stalls
- Seal sole plate (where basement masonry wall meets the wood plate.)
- Seal attic top plate, vents, pipes, and access hatch perimeter.
- Seal between corner T-joint and corner joint of studs.
- Seal between eaves, sheathing boards, sills, and seams.
- Seal around exterior dryer and exhaust vents.
- Seal chimney flashings. (Do not use on hot exhaust pipes, flue construction or fireplaces.)
- Seal around frame and roof sheathing of sky light assemblies.
- Seal between drywall and studs for interior wall heating vents.
- Seal between garage wall and inning space to minimize auto exhaust odor and chemical fumes.
- Fill behind and around electrical boxes in walls. (Do not fill inside box where foam may come in contact with exposed live wires.)

APPLICATION TIPS

- Always wear gloves, protective eyewear and old long sleeve clothing when applying foam. Use only with adequate ventilation
- Protect work area with a drop cloth or newspaper.
- Always dispense Great Stuff with can upside down. Propellant will escape if used in upright position.
- Practice applying foam on newspaper. Bead size varies with can movement speed and amount of pressure applied on trigger.
- Release trigger about 5 seconds before you want the foam to stop. Foam will continue to flow for several seconds after trigger is released. Put can on newspaper or drop cloth.
- Cut straw in half for greater dispensing control.
- Fill cavity 40% full. Foam will expand to fill the rest of the cavity. Inspect the foamed area 45 minutes after application to determine whether a second application is required to completely fill area.
- To speed up the curing process in enclosed areas, mist surface lightly with water before applying foam.
- Wipe off excess foam from straw if not in use for more than 5 *minutes. To store can for later use, plug straw one of the way with a* 2" nail or screw. Clear cured foam in straw with a straightened paper clip or simply cut off clogged portion of straw. For best results, use the entire contents within 24 hours.
- *Clean uncured foam IMMEDIATELY with paint thinner, acetone or* nail polish remover. Cured foam cannot be removed with solvents. If foam hardens on skin, soak affected area in warm soapy water, then apply petroleum jelly. Foam will wear off in time.

INSTA-FOAM
IF-0399
Insta-Foam Products, Inc. A Division of Flexible Products Co.
1500 Cedarwood Drive • Joliet, Illinois 60435
1-800-800-FOAM • Internet E-Mail: fpcioam@aol.com
© 1995 Insta-Foam Products, Inc. Made in the U.S.A. 3/95

HOW TO FINISH

1. Apply foam. Let it cure completely (about 6 hours).

2. Trim excess cured foam with a sharp knife.

3. Finish by sanding, staining or painting foam surface.

WHY YOU SHOULD AIR SEAL YOUR HOME

• Air leakage through cracks, gaps and holes in buildings is the single biggest cause of residential heating and cooling loss. It accounts for *approximately 30% to 50% of the energy used in* most homes. This is true even in houses that are well insulated (fiberglass insulation) but not *air-sealed. (U.S. Department of Energy)*

• The average home has a multitude of hidden cracks and holes around window and door frames, electrical outlets, under siding, etc. Add them up and it's the same as having a FOUR SQUARE FOOT OPENING letting air leak in and out of your house.

Major Sources of Energy Loss Through Air-Infiltration

Sole/Sill Plate	*25%*	*Recessed Spotlight*	*5%*
Wall Outlets	*20%*	*Exterior Doors*	*4.5%*
Air Duct System	*13%*	*Sliding Door*	*2%*
Exterior Windows	*12.5%*	*Dryer Vent*	*3%*
Vent Hood	*6%*	*Bath Vent*	*1.5%*
Fireplace	*5.5%*	*Other*	*2%*

• Stuffing fiberglass insulation around window and door frames is ineffective against *air infiltration* because fiberglass is porous and does not have any sealing qualities. In fact, fiberglass is the *worst air-sealing material* available. Great Stuff should be used in conjunction with fiberglass and other insulating materials for a well *insulated* and *AIR-SEALED* home.

Fiberglass stuffing around window & door frames is ineffective in controlling air leakage.

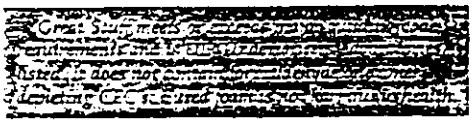
• *Reduce energy cost.* When a house is well sealed, you can lower your thermostat and save energy without decreasing comfort. The following table shows how much you can save by

reducing the air leakage rate from one air change per hour to half an air change per hour:

Climate zone	Annual savings from 1/2 air change reduction per hour
Atlanta, GA	$127
Washington, DC	$204
Philadelphia, PA	$209
Denver, CO	$252
Seattle, WA	$200
Chicago, IL	$268
Boston, MA	$209
Minneapolis, MN	$262

Source: Insulation Contractors Association of America. Actual savings vary depending on insulation, climate, energy cost, climate and other variables.

- *Conserve energy.* The U.S. Department of Energy estimates that a national reduction of air infiltration in houses by 25% would reduce peak power requirements by 10-15 million kilowatts. This translates to an investment avoidance (new power plants) of $10-$15 billion which would otherwise be passed on to the consumer. This additional power required to supply leaky, energy hungry homes will contribute to an increase in air pollution. In addition, it will also substantially increase the production of ozone depleting chemicals and greenhouse gases.
- *Enhance your comfort.* An air-sealed home is a comfortable home. Keeping cold air out results in fewer drafts and cold wall surfaces and in the winter, will help to maintain a comfortable humidity level.
- *Keep pests outside.* Great Stuff is excellent in sealing off pathways where pests can enter.
- *Control dust.* Sealing cracks and holes not only reduces drafts, but reduces dust from getting inside the house.
- *Minimize allergy irritants.* Air sealing your home can minimize allergy problems by keeping out pollen and other airborne particles.
- *Decrease noise pollution.* An air-sealed house will shut out noise—outside noises enter through the same leaks and cracks as infiltrating air. It will also reduce sound transmission from lobby pipes, duct work and between rooms and levels.
- *Reduce condensation.* Air-sealing your home will result in reduced condensation on windows. Moisture penetration into the walls and wood is reduced, preventing structural damage due to wood decay (dry rot, mildew, fungi growth and insect infestation.)



MORE ECONOMICAL THAN CAULK

(One 12 oz. can = 20 tubes of caulk)

Common Uses

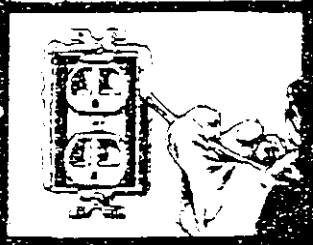
Here's why Great Stuff minimal expanding foam sealant is the only stuff your customers ask for.

Stop drafts.

Great Stuff fills, seals and insulates.

Insulate around outlets.

Great Stuff is "UL" listed.



Lower energy costs.

Great Stuff saves valuable energy dollars.

Seal around plumbing.

Great Stuff features smooth, controlled dispensing.

Weatherproof.

Use Great Stuff inside or out.

Seal out pests.

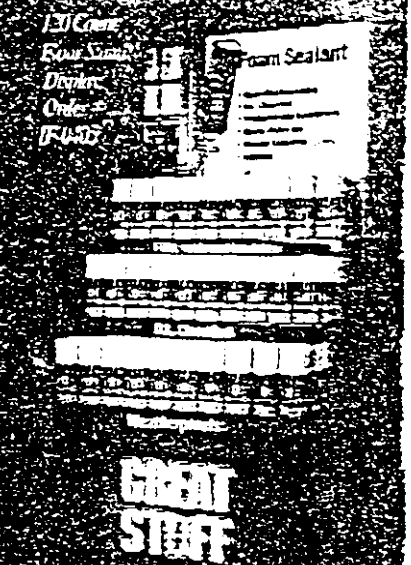
Great Stuff blocks rodent pathways.

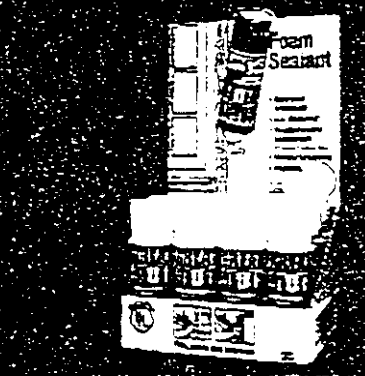
P.O.P. Merchandisers

Available on request

Pallet Rack Dispeller, Order #IF-0501

12 Count Foam Sealant Dispeller, Order #IF-0505

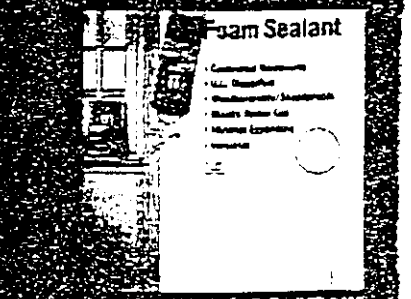




Give Header, Order #IF-0440

How to Header, Order #IF-0430

Magnetic Header, Order #IF-0502

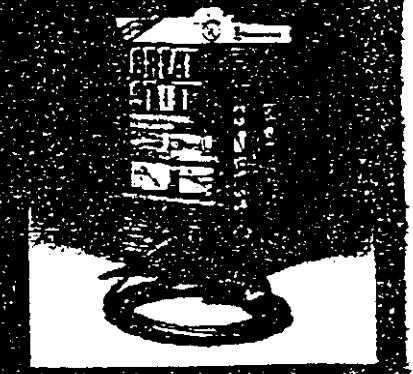


Foil Cap Header, Order #IF-0410

TOLL FREE: 1-800-800-FOAM (3626)
FAX: 1-815-741-6822

12 and 20 Ounce Sizes

10-Pound Contractor Size



© 1994 Insta-Foam Products, Inc.
All rights reserved. Printed in U.S.A.
IF-0[illegible]-Sheet.SAC

74985 90308 5

3E COMPANY
4920 Carroll Canyon Road
San Diego, CA 92121
Ph: 619-677-0150
Fax: 619-677-0270

Material Safety Data Sheet Transmittal Form

10-Apr-97

Total # of Pages: 3
Request #: 120090
Processed By: Ron Soukhaseum

Recipient:

ATTN: JOE SKELTON

812-854-3813

Requester:

DIANA SPARENBERG

Lowes Home Center Inc. 0215
Lowes Home Center Inc.

Thank you for using 3E's MSDS Paperless Compliance™ service. This service may eliminate the requirement to maintain MSDS on site. Enclosed/attached are the MSDS you requested. Please verify that the MSDS sheet(s) enclosed/attached match what you have ordered. If you have any questions regarding the MSDS, or you would like further information on the paperless compliance program, please call the 3E Company at (619) 677-0150.

3E COMPANY does not develop, prepare, or review the contents of the attached MSDS; the MSDS is prepared by the manufacturer. The statements, technical information and recommendations contained herein are transmitted without warranty or guarantee of any kind, expressed or implied, by 3E COMPANY. Furthermore, 3E COMPANY assumes no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use.

If you have any questions regarding the enclosed/attached MSDS or if we can be of any further assistance, please contact 3E COMPANY at (619) 677-0150.

3E Index #	Manufacturer ORDERED/Actual	Brand Name ORDERED	Product Name ORDERED/Actual	UPC #	Item #
R	The MSDS is attached for the following product(s).				
INST-00-0001.03	Insta Foam Products Company		GREAT SUFF INSTA-FOAM		
	Insta Foam Products Company		Great Stuff		

END OF ORDER DETAIL - Request # 120090

To ensure that the documented (material) labeled above and marked in the Submittal is not proposed to be incorporated into Contract Number 2607-93-D-1103, is in compliance with the contract drawings and specification, can be installed in the allocated spaces and is [illegible]

Certified by Submittal Review (signature when applicable) Robert [illegible] Date 4/15/97

Certified by QC Manager (signature) [illegible] Date 4/15/97

3E COMPANY

3E is North America's leader in hazardous materials compliance services. 3E simplifies compliance for over 60,000 business locations worldwide. For more information call (800) 360-3220. * MSDS on Demand * Chemical Spill/Information Hotline * Exposure/Poison Control Hotline * Transportation Services * Government Disclosure * Hazardous Waste Management * Emergency Response Hotline * Site-Specific Inventory Tracking and customized reports * Employee Training *

Insta Foam Products Company
1500 Cedarwood Drive
Joliet, Illinois 60435

Tel (815)741-6800 Fax. (815)741-6822
For Emergency: Chemtrec (800)424-9300

MATERIAL SAFETY DATA SHEET

1 PRODUCT Great Stuff

2 COMPOSITION

CHEMICAL	CAS#	CONCENTRATION	REGULATED[1]
4,4-Diphenylmethane-diisocyanate (MDI)	101-68-8	10-30%	Yes
Polymeric MDI	9016-87-9	10-30%	No
Polyether Poly Blend	Mixture[2]	15-40%	No
Liquified Petroleum Gas	Mixture[2]	10-30%	Yes

(1-see regulatory section for more information)

(2-different raw material sources)

Appearance: Off white sticky material with a mild odor

3 HAZARDS IDENTIFICATION

HMIS H F R PPE
2 4 * B

CAUTION! EXTREMELY FLAMMABLE
Contents under pressure.

Irritancy of Product: Irritating to eyes, skin and respiratory tract.

Sensitizing Properties: May cause sensitization by skin contact and inhalation. Exposure to individuals with asthma, eczema and or allergies may aggrevate existing conditions. Symptoms may include: coughing, wheezing and shortness of breath.

Routes of Entry: Eye and skin contact, inhalation, ingestion

4 FIRST AID MEASURES

EYE: flush with clean, low pressure water for 15 minutes while holding eyelids open.

SKIN: remove contaminated clothing; wash skin with soap and water.

INHALATION: remove to fresh air.

INGESTION: in case of excessive ingestion, give large amount of liquids. Do not induce vomiting.

In all cases, seek additional medical attention.

5 FIRE-FIGHTING MEASURES

Flash Point: -156°F (-104°C) (estimated)

Extinguishing Media: Carbon Dioxide, Dry Chemical, Foam, Water

Special Protective Equipment: Self Contained Breathing Apparatus

Hazardous Decomposition Products: During combustion, Carbon Monoxide and Carbon Dioxide, Nitrogen Oxides, Ammonia and trace amounts of Hydrogen Cyanide are given off.

6 ACCIDENTAL RELEASE MEASURES

Provide adequate ventilation.
Wear suitable personal protective clothing and equipment.
Scrape up the bulk of the spill and put into a suitable waste receptacle. Avoid spreading the spill to other surfaces.

7 HANDLING AND STORAGE

Protect containers from physical abuse.
Avoid direct sunlight.
Storage temperature: 32°F-90°F (0°-32°C)
DO NOT incinerate aerosol can.

Insta Foam Products Company
1500 Cedarwood Drive
Joliet, Illinois 60435

Tel (815)741-5800 Fax (815)741-6822
For Emergency Chemtrec (800)424-9300

MATERIAL SAFETY DATA SHEET

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE wear safety goggles
SKIN wear protective clothing
RESPIRATORY use only in well-ventilated areas. With insufficient ventilation, or in situations where the potential exists for exceeding the TLV, wear Self Contained Breathing Apparatus

9 PHYSICAL AND CHEMICAL PROPERTIES

Vapor Pres (21°C/70°F) 4210 mmHG
Specific Gravity 1.1
VOC Content (g/L) 161.4 grams/Litre

10 STABILITY AND REACTIVITY

Stable under normal handling and use. Avoid water contamination, open flames, alcohols, strong bases acids and ammonia. Reaction may be violent at elevated temperatures

11 TOXICOLOGICAL INFORMATION

Concentrations of components (Sec. 2) must be considered to determine effects of this mixture
MDI LD_{50} 15gm/kg (rat) ingestion

CAUTION! Contents under pressure

Irritancy of Product: Irritating to eyes, skin and respiratory tract.
Sensitizing Properties (Acute and Chronic): May cause sensitization by skin contact and inhalation. Exposure to individuals with asthma, eczema and or allergies may aggrevate existing conditions. Symptoms may include: coughing, wheezing and shortness of breath
Routes of Entry: Eye and skin contact, inhalation, ingestion

12 ECOLOGICAL INFORMATION

Unknown

13 DISPOSAL INFORMATION

Do not puncture or incinerate.
Relieve all pressure prior to disposal.
Dispose of according to federal and state regulations.

14 TRANSPORTATION INFORMATION

Consumer Commodity ORM-D
TDG (Canada): Compressed Gases, Flammable N.O.S. (Propane, Isobutane), 2.1 UN1954

15 REGULATORY INFORMATION

EXPOSURE LIMITS	TWA (8 hour), mg/m³	SHORT TERM(10 mins), mg/m³
4,4-Dipenylmethane-diisocyanate (MDI)	0.05 (0.005ppm)	0.2 (0.02ppm) ceiling
Propane	1800(1000ppm)	

REGULATED CHEMICAL	APPLICABLE REGULATIONS
4,4-Diphenylmethane-diisocyanate (MDI)	SARA 311/312/313 CAA 1990 Toxic Air Pollutant
Propane	MA, NJ, PA
Isobutane	MA, NJ, PA
Dimethyl Ether	MA, NJ, PA

16 OTHER INFORMATION

N/A

Prepared by S. Jones / M. Ortega
File Name CSM-002

Reference No. Great Stuff
Date of Issue 7/22/94

NAVFAC Southern Division / Morrison Knudsen Corporation	District II RAC

FIELD CLARIFICATION REQUEST (FCR)

Delivery Order No.: 4324-00090	Subcontract No.: 4324-049	FCR No.: 014
		Page 1 of 1

Reference Documents (Affected Document No., Revision No., Title):

Problem / Change Description: Due to necessity of Transformers being installed for power lines to buildings on Existing power poles, poles need to be guide wired. G. Langlois addressed this prior to leaving, would like to have diagram of installing guides and anchoring into Land-Fill Cap. This was not originally planned and will be a change order.

INITIATED BY	Signature: Joe Skelton	Organization: Smith Env. Tech	Date: 12-19-96

Resolution:

SEE ATTACHED SKETCH FOR POLE GUY DETAIL.

If this FCR effects a subcontract, indicate CID number: _____

APPROVAL BY IBK PE	Signature:	Date: 9 JAN 97	APPROVAL BY KOCCRTR or RPM	Signature:	Date:
APPROVAL BY IBK PM	Signature:	Date:	Additional Reviews: By / Date:		
APPROVAL BY IBK QC	Signature:	Date:			
APPROVAL BY IBK REG. SPECIALIST	Signature:	Date:			

Regulator Approval/Notification Recommended:

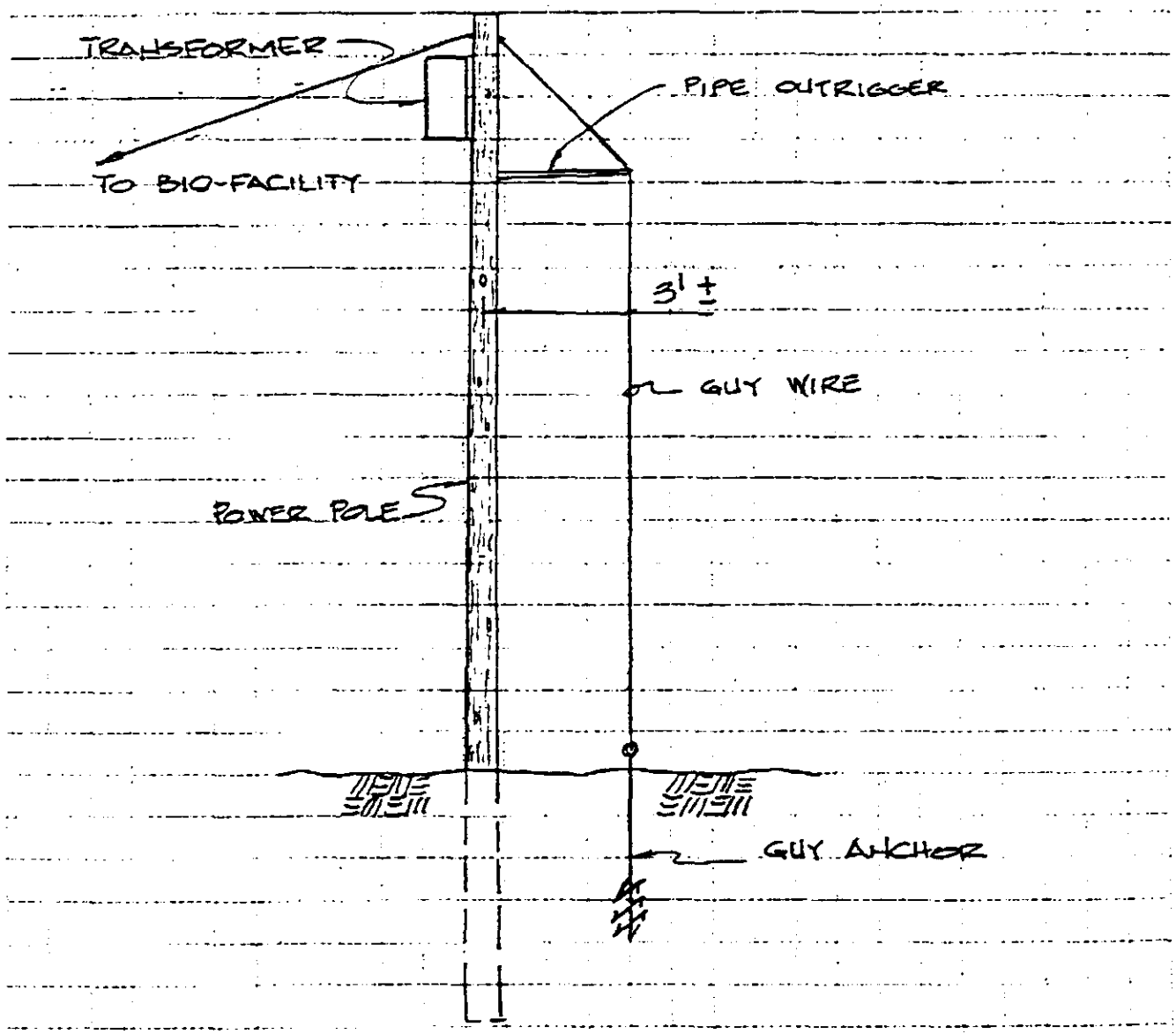
Yes ☐ No ☐

JACOBS ENGINEERING GROUP INC.
BATON ROUGE, LOUISIANA

CALCULATIONS — SKETCHES

CLIENT & LOCATION MORRISON KNUDSEN
UNIT NSWC CRANE, IN.
ITEM _____ REFERENCE _____

JOB NO. 05G17521
DOCUMENT NO. _____
REV. _____
PAGE 1 OF 1
BY G. LANGLOIS DATE 9 JAN 97
CHECKED _____ DATE _____



POWER POLE GUY DETAIL

ORIGINAL

NAVFAC Southern Division / Morrison Knudsen Corporation	District II RAC 21.1005

FIELD CLARIFICATION REQUEST (FCR)

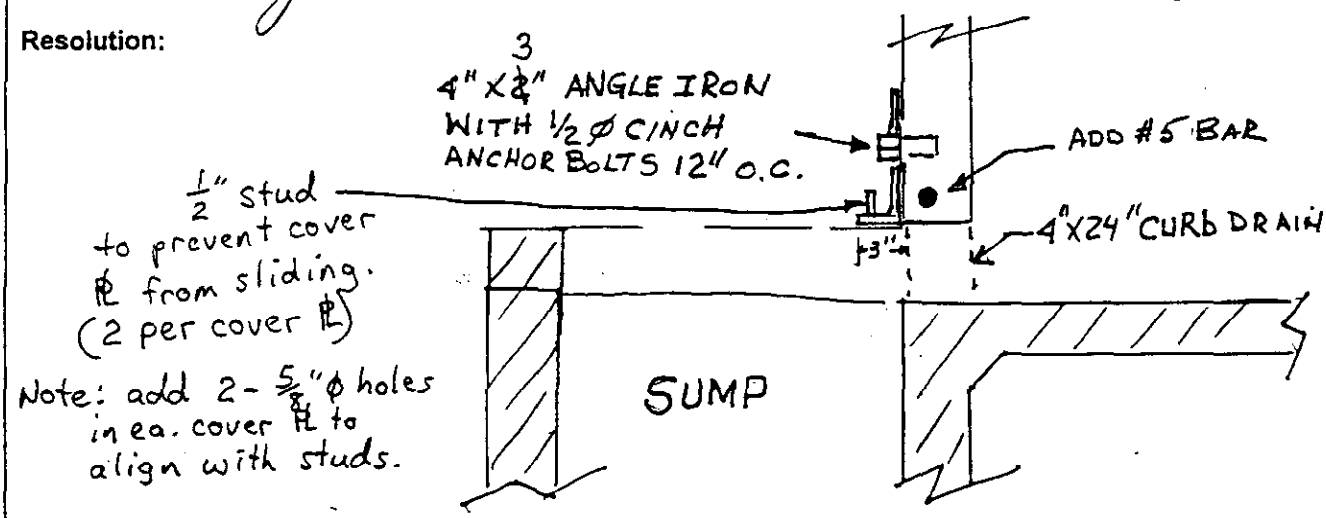
Delivery Order No.: 4324-0009	Subcontract No.: 4324-080	FCR No.: 018
		Page 1 of 1

Reference Documents (Affected Document No., Revision No., Title): SWI DRWG A.2 Sump Section

Problem / Change Description: ANGLE Iron needed to support sump covers on Containment Sumps and How to fasten same.

INITIATED BY	Signature: Joel Shelton	Organization: Smith Technologies	Date: 1-7-97

Resolution:



If this FCR affects a subcontract, indicate CID number: _____

APPROVAL BY MK PE	Signature: Steve Young	Date: 1-17-97	APPROVAL BY ROICC/NTR or RPM	Signature:	Date:
APPROVAL BY MK PjM	Signature: Steve Young	Date: 1-17-97	Additional Reviews: By / Date		
APPROVAL BY MK QC	Signature: [illegible]	Date: 1-17-97			
APPROVAL BY MK REG. SPECIALIST	Signature:	Date:			

Regulator Approval/Notification Recommended:

Yes ☐ No ☐

ORIGINAL

NAVFAC Southern Division / Morrison Knudsen Corporation	District II RAC

FIELD CLARIFICATION REQUEST (FCR)

Delivery Order No.: 4324-00090	Subcontract No.: 4324-049	FCR No.: 23
		Page 1 of 1

Reference Documents (Affected Document No., Revision No., Title):

N/A

Problem / Change Description: Sump area in Bldg #2 - Due to previous Sub-Contractor not Following Building Line Sump pit is off-set of Building line 4" to the South on out-side wall.

INITIATED BY	Signature: Jacs Klfn	Organization: Smith Env. Technologies	Date: 1-30-97

Resolution: Weddle Proposes to Thicken the wall 4" in the Sump area creating approx 12" wall in this area This change will be a cost Factor Attributed to previous Sub-Contractor.

- SUBCONTRACTOR SHALL PLACE SPACER CURB AS SHOWN ON ATTACHED DRAWING AND SHALL PROVIDE AND PLACE ANGLE FOR PLATE STEEL SUPPORT. IF A TWO INCH CONCRETE LEDGE CAN BE MAINTAINED FOR PLATE STEEL SUPPORT, OMIT ANGLE.

NOTE: QC TO ANNOTATE CHANGE ON AS-BUILTS.

If this FCR affects a subcontract, indicate CID number: _____

APPROVAL BY MK PE	Signature:	Date: 12 FEB 97	APPROVAL BY ROICC/NTR or RPM	Signature:	Date:
APPROVAL BY MK PJM	Signature:	Date: 2/24/97	Additional Reviews: By / Date		
APPROVAL BY MK QC	Signature:	Date: 2/24/97			
APPROVAL BY MK REG. SPECIALIST	Signature:	Date:			

Regulator Approval/Notification Recommended:

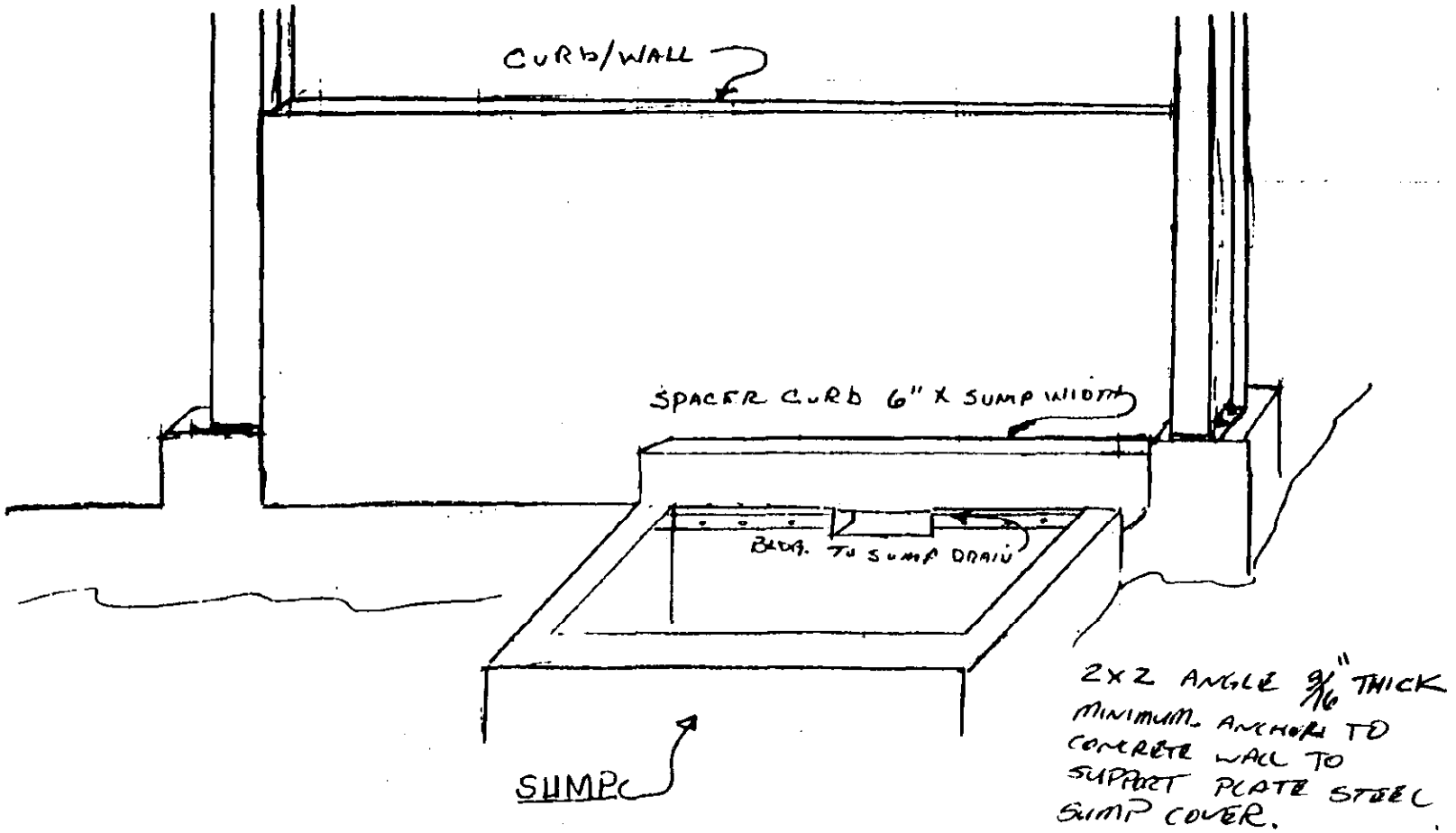
Yes ☐ No ☐

MORRISON KNUDSEN CORPORATION

Project
Feature
Item

Contract No.
Designed
Checked

Sheet
File No.
Date
Date



N. T. S.

ENG 373/81

ORIGINAL

RECEIVED
FEB 04 1997
MK-CRANE

NAVFAC Southern Division / Morrison Knudsen Corporation	District II RAC

FIELD CLARIFICATION REQUEST (FCR)

Delivery Order No.: 4324-00090	Subcontract No.: 4324-049	FCR No.: 26
		Page 1 of 1

Reference Documents (Affected Document No., Revision No., Title): N/A

Problem / Change Description: Enclosure on ends of Bldgs - please propose how you would like to accomplish this and provide us with a diagram so that we may cost accordingly. weddle feels this should be by your design.

INITIATED BY	Signature: Joe Skelton	Organization: Smith	Date: 2-4-97

Resolution:
MK to supply corner trim as per ATTACHED A&S Bldg detail sheet. Corner trim to run full length at corners. END WALL will be addressed at LATER DATE.

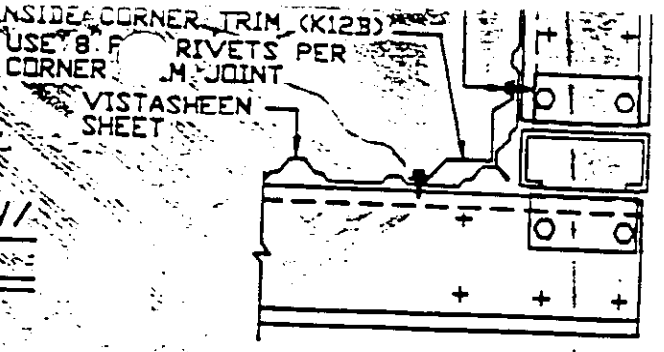
If this FCR affects a subcontract, indicate CID number: _____

APPROVAL BY MK PE	Signature: Stan Toomy	Date: 2/6/97	APPROVAL BY ROICC/NTR or RPM	Signature:	Date:
APPROVAL BY MK PjM	Signature: Stan Toomy	Date: 2/6/97	Additional Reviews: By / Date		
APPROVAL BY MK QC	Signature: [illegible]	Date: 2/6/97			
APPROVAL BY MK REG. SPECIALIST	Signature:	Date:			

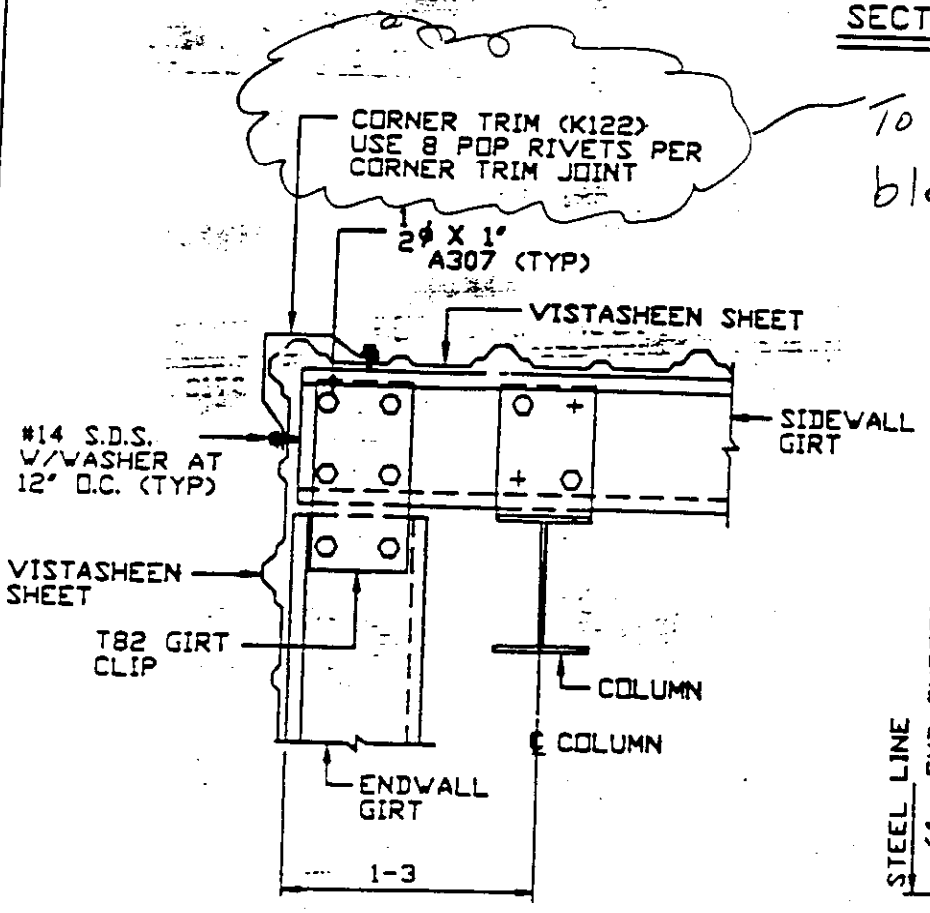
Regulator Approval/Notification Recommended:

Yes ☐ No ☐

SECTION THRU OUTSIDE CORNER W/
T.B. & L.T. SERIES END FRAME



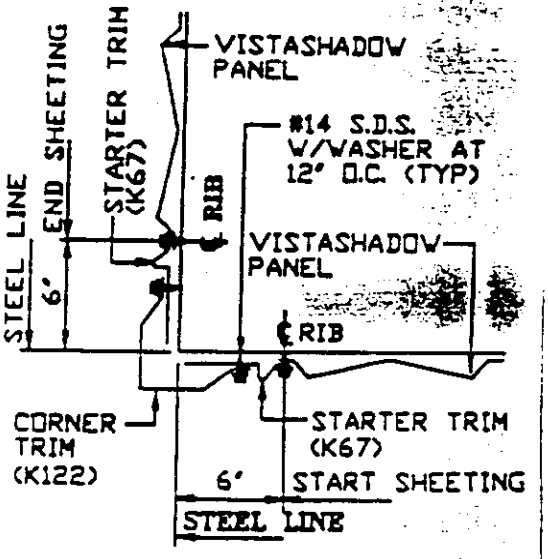
SECTION THRU INSIDE CORNER



To be installed on bldg. corners.
2/6/97

SECTION THRU OUTSIDE CORNER W/
R.F. & R.F.C. SERIES END FRAME

NOTE:
INSTALLATION OF PANELS MUST BE STARTED 6' FROM CORNER (STEEL LINE) AS SHOWN.



OUTSIDE CORNER TRIM

A & S BUILDING SYSTEMS, INC.	WALL CORNER TRIM DETAILS	PAGE 26

THIS PRINT SUBJECT TO CHANGE WITHOUT NOTICE FOR BUILDING ERECTION ALWAYS USE PRINTS RECEIVED WITH THE BUILDING SHIPMENT.

21-0005

ORIGINAL

RECEIVED
FEB 20 1997
MK-CRANE

NAVFAC Southern Division / Morrison Knudsen Corporation	District II RAC

FIELD CLARIFICATION REQUEST (FCR)

Delivery Order No.: 4324-00090	Subcontract No.: 4324-049	FCR No.: 30
		Page 1 of 1

Reference Documents (Affected Document No., Revision No., Title): N/A

Problem / Change Description: Ribs on siding at top leave Approx 1½" opening which will allow Rain water to enter Bldg. Please propose solution for same.

INITIATED BY	Signature: Joe Smith	Organization: Smith Technology	Date: 2-15-97

Resolution: SUBCONTRACTOR SHALL INSTALL I.S. CLOSURE STRIPS AND DOUBLE SIDED TAPE BETWEEN ROOF SHEETING AND EAVE TRIM ON ALL BUILDINGS.

If this FCR affects a subcontract, indicate CID number: _____

APPROVAL BY MK PE	Signature:	Date: 21 Feb 97	APPROVAL BY ROICC/NTR or RPM	Signature:	Date:
APPROVAL BY MK PJM	Signature:	Date: 2/24/97	Additional Reviews: By / Date		
APPROVAL BY MK QC	Signature:	Date: 2/24/97			
APPROVAL BY MK REG. SPECIALIST	Signature:	Date:			

Regulator Approval/Notification Recommended:

Yes ☐ No ☐

ORIGINAL

NAVFAC Southern Division / Morrison Knudsen Corporation	District II RAC

FIELD CLARIFICATION REQUEST (FCR)

Delivery Order No.: 4324-0009	Subcontract No.: 4324-049	FCR No.: ———
		Page ____ of ____

Reference Documents (Affected Document No., Revision No., Title):
DEFICIENCY REPORT - BIOREMEDIATION FACILITY
S/C 4324-080 AREA # 33/00 DR # 9-027

Problem / Change Description:
REBAR & WATERSTOP WILL NOT BE IN CURB/WALL

INITIATED BY	Signature: Dennis E. Weddle	Organization: WEDDLE BROS. CONST.	Date: 1/28/97

Resolution:

DRILL & EPOXY REBAR DOWELS IN A LOCATION THAT WILL ALLOW IN TO BE IN THE CURB/WALL.

WE PROPOSE TO USE A VULCAN CLAY TYPE WATERSTOP @ THESE LOCATIONS. SEE ATTACHED SPEC. SHEETS

If this FCR affects a subcontract, indicate CID number: _____

APPROVAL BY MK PE	Signature: G. LANGLOIS (SEE ATTACHED)	Date: 7/FEB/97	APPROVAL BY ROICC/NTR or RPM	Signature:	Date:
APPROVAL BY MK PJM	Signature: [illegible]	Date: 2/7/97	Additional Reviews: By / Date		
APPROVAL BY MK QC	Signature: [illegible]	Date: 2/7/97			
APPROVAL BY MK REG. SPECIALIST	Signature:	Date:			

Regulator Approval/Notification Recommended:
Yes ☐ No ☐

NOTE: SEE D.R. 9-027 FOR DETAILED LOCATIONS. [illegible] 2-7-97

NAVFAC Southern Division / Morrison Knudsen Corporation	District II RAC

FIELD CLARIFICATION REQUEST (FCR)

Delivery Order No.:	Subcontract No.:	FCR No.:
		Page ____ of ____

Reference Documents: (Affected Document No., Revision No., Title):
DEFICIENCY REPORT - BIOREMEDIATION FACILITY
S/C 4324-080 AREA # 33/00 DR # 9-027

Problem / Change Description:
REBAR & WATERSTOP WILL NOT BE IN CURB/WALL

INITIATED BY	Signature: Timothy Weddle	Organization: WEDDLE BROS. CORP.	Date: 7/28/97

Resolution:

DRILL & EPOXY REBAR DOWELS IN A LOCATION THAT WILL ALLOW IN TO BE IN THE CURB/WALL.

WE PROPOSE TO USE A VULCAN CLAY TYPE WATERSTOP @ THESE LOCATIONS. SEE ATTACHED SPEC. SHEETS

If this FCR affects a subcontract, indicate CID number: _____

APPROVAL BY MK PE	Signature:	Date: 7 FEB 97	APPROVAL BY ROICCNTR or RPM	Signature:	Date:
APPROVAL BY MK PM	Signature:	Date:	Additional Reviews: By / Date		
APPROVAL BY MK QC	Signature:	Date:			
APPROVAL BY MK REG. SPECIALIST	Signature:	Date:			

Regulator Approval/Notification Recommended:

Yes ☐ No ☐

SPEC DATA®

This Spec-Data sheet conforms to editorial style prescribed by The Construction Specifications Institute. The manufacturer is responsible for technical accuracy.

1. PRODUCT NAME

Volclay WATERSTOP-RX Preformed Bentonite Waterstop System

2. MANUFACTURER

Colloid Environmental Technologies Company (CETCO)
Building Materials Division
1350 West Shure Drive
Arlington Heights, IL 60004
Phone: (708) 392-5800
Fax: (708) 506-6195

3. PRODUCT DESCRIPTION

Basic Use: WATERSTOP-RX is a flexible strip concrete construction joint sealant that provides a permanent watertight seal by expanding upon contact with water. WATERSTOP-RX is an active bentonite/butyl rubber-based waterstop that is designed to replace conventional passive PVC dumbbell waterstops, thus eliminating the requirement of split-forming and product seam welding.

Applications include both vertical and horizontal concrete construction joints, new to existing construction, irregular surfaces and around through-wall penetrations, such as plumbing and electrical conduit. Waterstop-RX is designed for both hydrostatic and non-hydrostatic conditions. However, WATERSTOP-RX is not designed, nor intended to function as an expansion joint sealant. Contact manufacturer for precast concrete applications, technical information and approval.

The key to WATERSTOP-RX is its sodium bentonite base. Bentonite swells when in contact with water, forming an impermeable barrier. This swelling property allows WATERSTOP-RX to form a permanent pressure seal within the concrete joint, thus eliminating water migration over or along the waterstop. In addition to forming a positive pressure seal, the product's expansion properties allow it to seal small cracks and void areas, even cracks caused later from concrete settling. WATERSTOP-RX has been successfully tested by independent testing firms to over 150 Feet (50 meters) of hydrostatic water pressure, under both continuous water emersion and wet/dry cycling.

WATERSTOP-RX is manufactured in light weight, flexible coils that can be installed in both hot and cold weather. The product is adhered to concrete, steel, and PVC (Pipes) with Volclay WB-ADHESIVE at or exceeding the required minimum distance from the exterior concrete surface. Coil ends are butted together – not overlapped – to form a continuous waterstop. In most applications WATERSTOP-RX is installed to the interior side of the outer row of steel reinforcement to allow for sufficient concrete coverage. WATERSTOP-RX should only be used in applications where the product is completely encapsulated within the concrete.

WATERSTOP-RX is extruded in three sizes and shapes (See Table 1). Each product is also produced in a Rapid Hydration (RH) formula. Rapid Hydration products are designed for high saline conditions, chemical contaminated areas, and hydrostatic pressures above 40 Feet (12 Meters). Consult manufacturer for chemical compatibility and for additional applications. WATERSTOP-RX's standard hydration rate allows for temporary protection from inclement weather prior to concrete placement.

WATERSTOP-RX 101 and WATERSTOP-RX 101RH are extruded in a rectangular shape measuring 1" x 3/4" x 16'8" (25mm x 19mm x 5.03m). WATERSTOP-RX 101T and WATERSTOP-RX 101TRH are extruded in a trapezoidal shape measuring 1-1/4" x 1/2" x 16' 8" (31mm x 12mm x 5.03m) with a reinforcing plastic srcim embedded in the top surface for high tensile strength. The trapezoidal shape (Patent Pending) distributes the expansive force over a greater area and allows the concrete to flow more readily over the product during placement. WATERSTOP-RX 102 and WATERSTOP-RX 102RH are extruded in half-circle (Cresent) shape measuring 3/4" x 3/8" x 25' (19mm x 9mm x 7.62m).

WATERSTOP-RX products are designed for structural concrete with a minimum of 3000 psi. WATERSTOP-RX 101 and WATERSTOP-RX 101T, including the RH formula of each, require a minimum of 3" (75mm) of concrete coverage. WATERSTOP-RX 102 and WATERSTOP-RX 102RH require a minimum concrete coverage of 2" (50mm).

RX 101 and RX 101T products are designed for vertical and horizontal reinforced concrete 8" (200mm) thick or greater with two rows of reinforcing steel. RX 102 products are designed for vertical reinforced concrete 5" (125mm) thick or greater; and horizontal reinforced concrete no less than 4" (100mm) thick. RX 102 products shall be used in concrete with one row of reinforcement, concrete curbs, planter walls, and light

TABLE 1

Product	Size	Shape	Hydration Type	Ln/Ft. Carton	Carton Weight
RX101	1" x 3/4" x 16' 8"	Rectangle	Standard	100	53lbs
RX101RH	1" x 3/4" x 16' 8"	Rectangle	Rapid	100	53lbs
RX101T	1-1/4" x 1/2" x16' 8"	Trapezoid with Poly Reinforcement	Standard	100	36lbs
RX101TRH	1-1/4" x 1/2" x16' 8"	Trapezoid with Poly Reinforcement	Rapid	100	36lbs
RX102	3/4 x 3/8 x 25'	Half Circle	Standard	150	25lbs
RX102RH	3/4 x 3/8 x 25'	Half Circle	Rapid	150	25lbs

The ten-point Spec-Data format has been reproduced from publications copyrighted by CSI, 1964, 1965, 1966, 1967, and used by permission of The Construction Specifications Institute, Alexandria, VA 22314.

weight concrete.

WATERSTOP-RX is not a self-adhering product. Volclay WB-ADHESIVE is required to secure WATERSTOP-RX to concrete, metal, or PVC (Pipe) surfaces. Mechanical fasteners should not be used to secure waterstop alone, but may be used in conjunction with WB-ADHESIVE.

Volclay WB-ADHESIVE is a gray, non-flammable latex, water based adhesive. WB-ADHESIVE is formulated for easy use and high performance. Upon application, WB-ADHESIVE changes color while curing from gray to black. Install WATERSTOP-RX to cured, black adhesive within six (6) hours of turning black.

Limitations: WATERSTOP-RX is not designed, nor intended to function as an expansion joint sealant. RX-101 and RX 101T require a 3" (75mm) minimum concrete cover to the exterior concrete surface. RX 102 requires a 2" (50mm) minimum concrete cover to the exterior concrete surface.

WATERSTOP-RX should not be prehydrated by being subjected to submersion or remain in contact with water prior to concrete pour. If the product exhibits considerable swell prior to confinement in the joint, it must be replaced with new material.

In conditions where severe ground water chemical contamination is expected, consult manufacturer for compatibility information and approval.

WATERSTOP-RX is not a self-adhering product. Use Volclay WB-ADHESIVE to adhere the product. Do not use WB-ADHESIVE with concrete curing compounds that contain oil or wax. Maximum storage life – 1 year. Keep cans sealed at all times when not in use. Keep from freezing in a warm, dry storage area.

Composition and Materials: WATERSTOP-RX-Physical Properties: Dark Gray/Black color, odorless, non-polluting, non-toxic, non-flammable.

Volclay WB-ADHESIVE - Physical Properties: Color – Wet (Gray); Dry (Black); Viscosity 5,500-6,500 cps. Meets all current and anticipated volatile organic compound (VOC) regulations.

Packaging: WATERSTOP-RX is available in corrugated cartons, palletized 24 cartons per pallet. Carton labels are color coded for easy product identification.

WB-ADHESIVE is available in cartons containing four (4) one-gallon cans or eight (8) one-quart cans.

4. TECHNICAL INFORMATION

Refer to Table 2 below for physical properties for WATERSTOP-RX and WB-ADHESIVE.

TABLE 2

WATERSTOP-RX

Property	Test	Results
Specific Gravity	ASTM D-71	1.57
Flash Point	ASTM D93-97	365°F
Penetration	ASTM D-217	
	150 GTL	58
	300 GTL	85

WB-ADHESIVE

Property	Results
Adhesion	10.4 PSI
Viscosity	5,500-6,500 cps
Solids	46% by Weight
	45% by Volume
Lbs./Gal:	8.5
Service Temperature	33°F-120°F

5. INSTALLATION

Surface preparation: Surfaces should be clean and dry. Remove all dirt, rocks, rust or other debris. Do not install WATERSTOP-RX in standing water.

Application: Roller or brush apply WB-ADHESIVE a minimum of 5 mils thick, by the width of WATERSTOP-RX over the entire surface length to receive WATERSTOP-RX. Allow adhesive to dry 10-15 minutes or until black (Temperatures below 55°F, or in damp conditions allow longer period to dry). Application rate is 400-600 linear feet (120 meters) per gallon – 100 linear feet (30 meters) per quart.

After allowing adhesive to dry black, remove release paper then firmly press the entire length of WATERSTOP-RX onto the dried adhesive. Press firmly a minimum of 15 seconds - especially at the highest coil end on vertical applications. For best results apply WATERSTOP-RX within two hours of adhesive turning black. Areas not receiving waterstop within six (6) hours shall be recoated. WB-ADHESIVE may be applied to damp surfaces, but not in free standing water.

Tightly butt coil ends together to form continuous waterstop. (Do not overlap coil ends.) Place in maximum practicable lengths to minimize coil end joints. Where required, cut coils with sharp knife or utility blade to fit coil ends together. Pour concrete.

6. AVAILABILITY AND COST

Availability: WATERSTOP-RX and WB-ADHESIVE are available throughout the United States, and internationally through a network of CETCO distributors. Contact the manufacturer for the nearest distributors location.

Costs: Applied costs are dependent upon local labor rates, freight rates, currency conversions, jobsite conditions, and other relative costs. Costs are competitive with conventional waterstop materials.

7. WARRANTY

Specifications and other information contained herein supersedes all previously printed matter and are subject to change without notice.

All goods sold by seller are warranted to be free from defects in material and workmanship.

The foregoing warranty is in lieu of and excludes all other warranties not expressly set forth herein, whether express or implied by operation of law or otherwise, including but not limited to any implied warranties of merchantability or fitness.

Seller shall not be liable for incidental or consequential losses, damages or expenses, directly or indirectly arising from the sale, handling or use of goods, or form any other cause relating thereto, and seller's liability hereunder in any case is expressly limited to the replacement (in the form originally shipped) of goods not complying with this agreement or at seller's election, to the repayment of, or crediting buyer with, an amount equal to the purchase price of such goods, whether such claims are for breach of warranty or negligence.

Any claim by buyer with reference to the goods sold hereunder for any cause shall be deemed waived by buyer unless submitted to seller in writing within thirty (30) days from the date buyer discovered or should of discovered, any claimed breach.

Materials should be inspected and tested by purchaser prior to their use if product quality is subject to verification after shipment. Performance guarantees are normally supplied by the applicator.

WATERSTOP-RX is not an expansion joint material nor should it be used as such. Expansion joints are the responsibility of others.

8. MAINTENANCE

WATERSTOP-RX - None required
WB-ADHESIVE - Keep from Freezing

9. TECHNICAL SERVICES

Complete technical services are available upon request to the manufacturer. These services include water and chemical analysis to determine product compatibility, and review of details and specifications. Modifications may be recommended when required to accommodate special conditions. The manufacturer and distributors also work with the contractor through the initial stages to assure proper installation procedures. A fee for specialized services may be negotiated with the contractor.

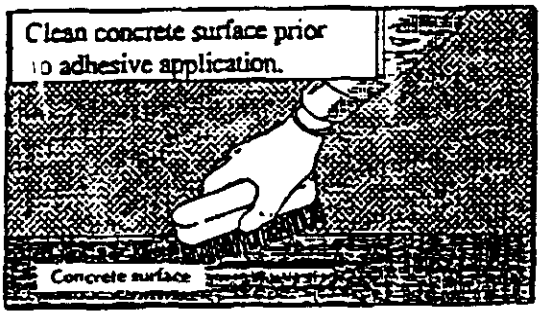
Consult manufacturer for current data, additional installation instructions, technical information, and comments on design conditions not covered herein.

10. FILING SYSTEMS

Electronic SPEC-DATA
SPEC-DATA II
Sweet's Architectural File
Sweet's Industrial Construction File
Sweet's International Construction File
Literature available upon request from the manufacturer.

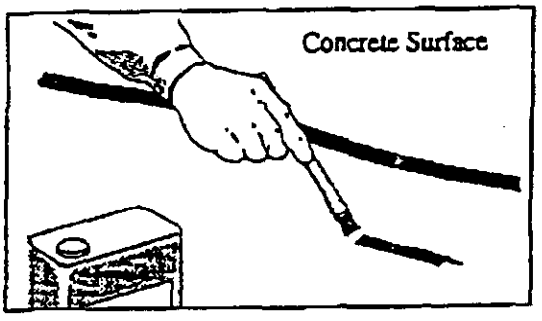
METHOD OF INSTALLATION

5 EASY STEPS



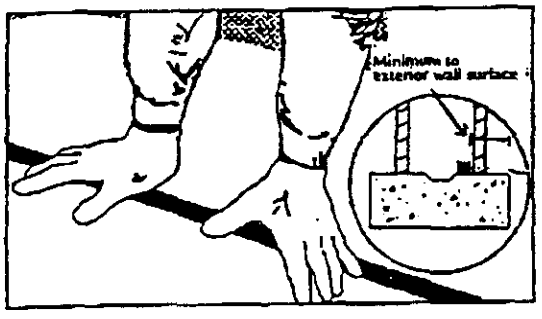
1. CLEAN

BRUSH CLEAN ALL DEBRIS, DIRT, AND ROCKS FROM DRY CONCRETE SURFACE.



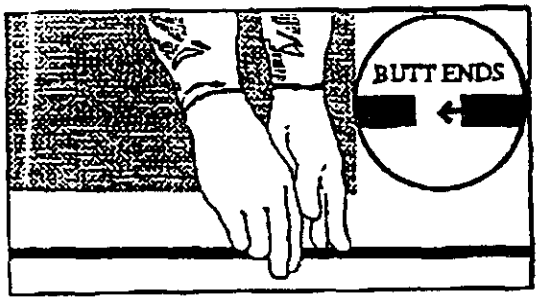
2. PRIME

APPLY A COATING OF VOLCLAY WB-ADHESIVE TO BOTH VERTICAL & HORIZONTAL SURFACES. ALLOW TO DRY BLACK.



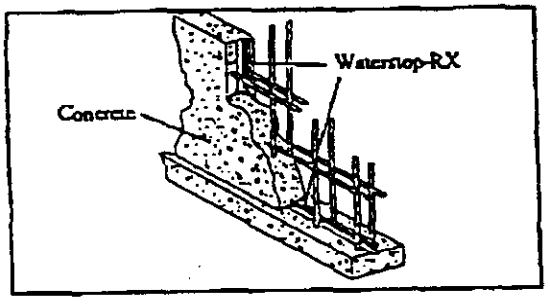
3. PLACE

REMOVE RELEASE PAPER, THEN PRESS FIRMLY AGAINST BLACK PRIMED SURFACE. A MINIMUM CONCRETE COVERAGE MUST BE MAINTAINED – 3" FOR RX101 & RX101T, 2" FOR RX102.



4. BUTT ENDS

TIGHTLY BUTT COIL ENDS TOGETHER TO FORM A CONTINUOUS WATERSTOP. DO NOT OVERLAP COIL ENDS.



5. POUR

POUR AND VIBRATE CONCRETE. DO NOT ALLOW VIBRATOR TO COME IN DIRECT CONTACT WITH WATERSTOP-RX.

WATERSTOP-RX APPLICATIONS & SECTION DETAILS

Product Applications

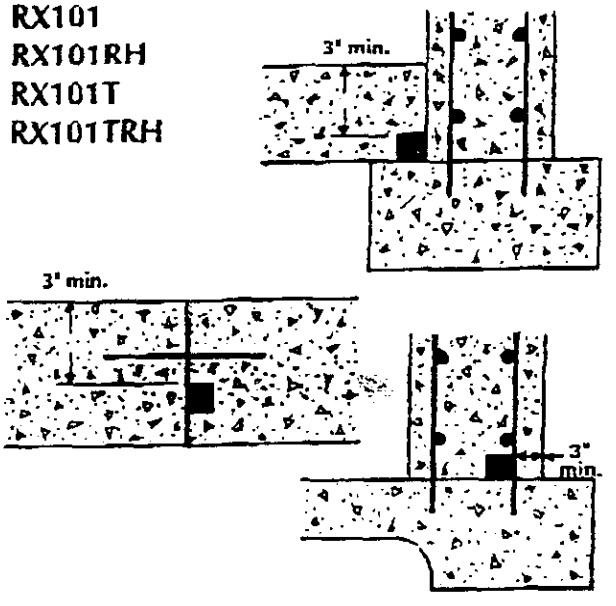
RX101, RX101RH, RX101T, RX101TRH

- Vertical and horizontal concrete 8" (200mm) thick or greater.
- Concrete with two rows of reinforcement
- High hydrostatic pressures
- Tie-back plates and penetrations

RX102, RX102RH

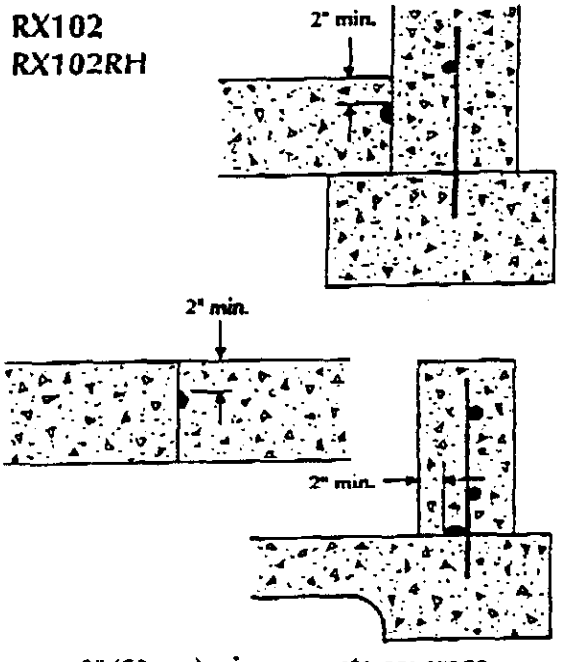
- Vertical concrete 5" (125mm) thick or greater. Horizontal concrete 4" (100mm) thick or greater
- Concrete with one row of rebar
- Slabs containing only wire mesh
- Fountains/Planter box /Curbs.

RX101
RX101RH
RX101T
RX101TRH



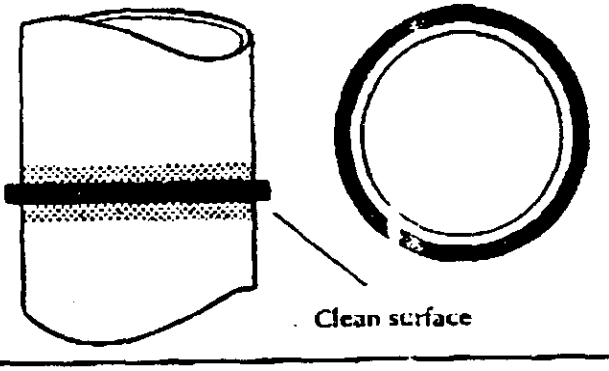
3" (75mm) min. concrete coverage

RX102
RX102RH



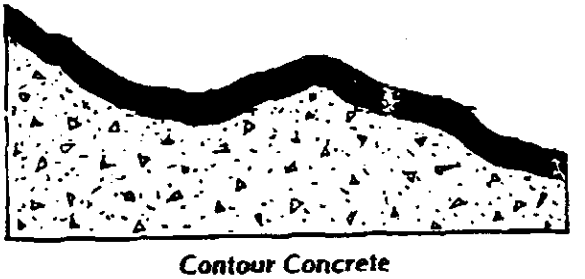
2" (50mm) min. concrete coverage

PENETRATIONS

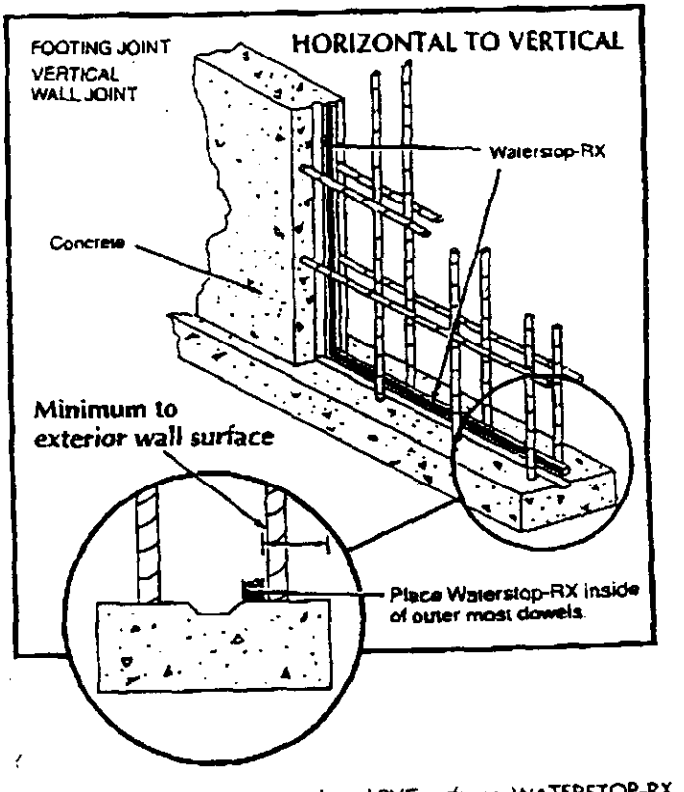


Clean surface

IRREGULAR CONCRETE



Contour Concrete



WATERSTOP-RX is not a self adhering product. Volclay WB-ADHESIVE is required to secure RX to concrete, steel, and PVC surfaces. WATERSTOP-RX [illegible] expansion joint sealant. Expansion joints are the responsibility of others.

APPENDIX E
INSPECTION ITEMS

LIST OF INSPECTION CHECKLISTS

CHKLST. NO.	REV.	DESCRIPTION
TP&L	2	TESTING PLAN AND LOG
SP-01	2	SITE PREPARATORY WORK
EX-02	2	EXCAVATION
BF-01	1	BACKFILL PLACEMENT
SR-01	1	SITE RESTORATION

TESTING PLAN AND LOG

CONTRACT NO./TITLE:
DELIVERY ORDER NO:

Definable Feature of Work	Inspection Checklist	Three Phases of Control (Enter Dates that Inspections are Performed)			Test or Inspection Results	Comments
		Preparatory	Initial	Follow-up		
Site Preparatory Work	SP-01					
Excavation	EX-02					
Backfill Placement	BF-01					
Site Restoration	SR-01					

Note: This Testing Plan and Log may be superseeded by the Field Generated Testing Plan and log as approved by the Site Quality Control Supervisor and Project Manager. Inspection checklists may be modified as required based on specific field conditions as approved by the Site Quality Control Supervisor and Project Manager.

MORRISON KNUDSEN CORPORATION

ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

ecklist Title	Checklist No.	Revision	Checklist
Site Preparatory Work	SP-01	Rev. 2	Page 1 of 2

References: Specifications; 02100 -Site Preparation; 02200 - Structural Excavation and Backfilling; 02936 - Seeding

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1	Verify that the Navy has been notified, within ten days, of the area of planed excavation.			
2	Perform preparatory phase meeting prior to initiating work items for site clearing.			
3	Verify Work Zone is clearly delineated.			
4	Verify excavation permits have been obtained.			
5	Ensure that a Stockpiling Plan has been developed and approved by the Project Manager.			
6	Ensure that a Erosion Control Plan has been developed and approved by the IDEM.			
7	Verify completion of any initial surveys.			
8	Verify that a review of safety requirements is performed as part of the preparatory inspection. (Briefing by Site Safety & Health Officer).			
9	Ensure that a housekeeping and maintenance requirements are understood.			
10				
	Initial Inspections			
1	Confirm work areas have been located within the limits of established stakes, lines or monuments.			
2	Conduct an examination of areas to be cleared and identify items to remain or existing features, including plant life, that is not to be disturbed. Resolve discrepancies prior to continuance of work.			

Specific Item Identification or Location, as applicable:

MK Project	Delivery Order Number	Checklist Title	
Crane, Indiana	0009, 007	Site Preparatory Work SP-01	Page 1 of ____

MORRISON KNUDSEN CORPORATION

ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

ecklist Title	Checklist No.	Revision	Checklist
Site Preparatory Work	SP-01	Rev. 2	Page 2

References: Specifications; 02100 -Site Preparation; 02200 - Structural Excavation and Backfilling; 02936 - Seeding

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Initial Inspections			
3	Verify that protection of items not to be removed or disturbed has been provided, as necessary.			
4	Ensure compliance with the plans identified in the Preparatory Phase.			
5	Verify that dust control measures are available and effective.			
6	Verify that storm water and erosion control measures have been implemented to control run-on, run-off per the approved Erosion Control Plan.			
7	Verify that filter fence for surface water and erosion is in place.			
	Follow-Up Inspections			
1	Ensure removal of ground surface vegetation from the construction areas.			
2	Verify removal from the construction area of stumps, roots, debris and other deleterious materials not suitable for subsequent grading or reuse and compaction.			
3	Verify final removal and disposal of cleared and grubbed wastes in an approved manner.			
4	Verify continuing compliance with the approved plans identified during the Preparatory Phase Inspection.			
5	Topsoil materials are stockpiled, shaped and managed according to the specifications to promote drainage and for measurement purposes.			
6	Verify that storm water and erosion control measures have been implemented to control run-on, run-off.			

Additional Notes or comments: Use Additional Sheets as necessary

Specific Item Identification or Location, as applicable:

MK Project	Delivery Order Number	Checklist Title	
Crane, Indiana	0009, 007	Site Preparatory Work SP-01	Page 2 of ____

MORRISON KNUDSEN CORPORATION

ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

.list Title	Checklist No.	Revision	Checklist
Excavation	EX-02	Rev. 2	Page 1 of 3

References: Specification 02210 - Excavation

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1	Perform preparatory phase meeting prior to initiating work on soil excavation.			
2	Review specification and drawings to understand scope of excavation.			
3	Verify that excavation permits have been obtained.			
4	Verify that underground utilities have been identified and marked.			
5	Verify that the Work Zone is clearly delineated.			
6	Verify that a Stockpiling Plan has been developed and approved by the Project Manager.			
7	Verify Soil Erosion Controls are in place.			
8	Ensure than an Air Monitoring Plan has been developed and approved by the Project Manager.			
9	Ensure that an Equipment Plan has been developed and approved by the Project Manager.			
10	Locate a suitable borrow material from an offsite location.			
11	Verify that procedures and equipment for line breaks under pressure are in place			
12	Verify that shoring requirements are understood and reviewed.			
13	Identify existing improvements and items that are to remain and verify arrangements to protect these items from damage.			
14	Verify that a review of safety requirements is performed (Briefing by the Site Safety & Health Officer)			
15	Verify that all regulatory notifications have been completed with the NSWC Crane personnel.			

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION

ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Che[illegible] Page 3
Excavation	EX-02	Rev. 2	

References: *Specification 02210 - Excavation*

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Preparatory Inspection			
16	Review the requirements for Lockout/Tagout at the Preparatory phase inspection. (Briefing by the Site Safety & Health Officer.			
	Initial Inspections			
1	Ensure that locations of underground utilities have been marked.			
2	Ensure that work is proceeding according to the plans discussed in the preparatory phase.			
3	Verify that screening and classification of excavated soils is performed according to the Technical Specification.			
4	Verify that topsoil is stripped and stored for reuse.			
5	Verify protection of items that are to remain.			
6	Verify that soil excavation is performed in accordance with specification and within established bounds.			
	Follow-up Inspections			
1	Ensure that excavated soil is stockpiled, shaped, and managed according to the Stockpiling Plan.			
2	Verify that excavation progresses as described in the Technical Specification.			
3	Verify that debris and large vegetative matter, such as roots and stumps, are properly disposed of.			
4	Monitor excavation work to ensure compliance to the Technical Specification.			
5	Verify that excavation stops for required sampling.			

Specific Item Identification or Location, as applicable:

MK Project	Delivery Order Number	Checklist Title	
Crane, Indiana	0009, 007	Excavation EX-02	Page 2 of ___

MORRISON KNUDSEN CORPORATION

ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

ck list Title	Checklist No.	Revision	Checklist
Excavation	EX-02	Rev. 2	Page 3 of 3

References: Specification 02210 - Excavation

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Follow-up Inspections			
6	Verify that excavation stops if groundwater is encountered until Contractor approval to proceed.			
7	Verify that any over-excavation has MK approval.			
8	Verify that shoring is in accordance with approved plans and drawings.			
9	Verify dust control measures are being performed			
10	Verify that erosion control measures are being maintained per the approved Erosion Control Plan.			
11	Verify Photographs documenting excavation progress have been taken.			

Additional Notes or comments: Use Additional Sheets as necessary

Specific Item Identification or Location, as applicable:

MK Project	Delivery Order Number	Checklist Title	
ıe, Indiana	0009, 007	Excavation EX-02	Page 3 of _____

MORRISON KNUDSEN CORPORATION

ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Checklist
Backfill Placement	BF-01	Rev. 1	Page 1 of 2

References: Specification 02200-Excavation and Backfilling

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1	Perform a preparatory phase meeting prior to initiating backfill operations to ensure that backfill placement requirements are understood by all parties.			
2	Ensure that the services of a material testing laboratory are available and the laboratory has been approved.			
3	Verify that compaction densities are identified and understood.			
4	Verify that backfill equipment is present and suitable for the effort, i.e. vibratory compaction equipment, smooth drum rollers, etc.			
5	Verify that proposed fill material complies with the technical specifications, including approved test results.			
6	Verify that shoring has been approved, as required, and that provisions have been made for safety barricades.			
7	Verify that required samples from excavation have been analyzed and the results are acceptable prior to backfill.			
	Initial Inspections			
1	Verify that excavation is performed in accordance with the Work Plan and within established bounds.			
2	Verify that sub-standard materials (tree roots, etc.) Are removed.			
3	Verify that subsoil irregularities such as soft spots are removed.			
4	Confirm that drainage, de-watering, etc., conform with design/specs.			
5	Ensure that materials, compaction, and work are performed, inspected, and tested in accordance with the Work Plan and specifications.			
6	Verify the performance of ASTM D1557 Proctor Tests for each soil type. Ensure receipt of test report by MK.			

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION

ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

cklist Title	Checklist No.	Revision	Check
Backfill Placement	BF-01	Rev. 1	Page 2

References: Specification 02200-Excavation and Backfilling

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Follow-Up Inspections			
1	Verify that backfill materials comply with specifications (moisture, density, gradation).			
2	Verify that backfill materials are compacted in lift thicknesses that do not exceed specification. Compaction testing of lifts shall also be confirmed.			
3	Verify performance of Field Density Testsper ASTM D2922, D1556 or D2167 and documentation of results.			
4	Ensure that final grade of the backfill is to required elevations +/- one inch.			
5	See that corrective action measures have been performed where required, verified, and documented. Ensure clearance of items identified on the Rework Items List.			
6	Ensure that the required density testing is performed and test results are provided.			

Additional Notes or comments: Use Additional Sheets as necessary

Specific Item Identification or Location, as applicable:

MK Project	Delivery Order Number	Checklist Title	Page 2 of ____
Crane, Indiana	0009, 007	Backfill Placement BF-01	

MORRISON KNUDSEN CORPORATION

ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

cklist Title	Checklist No.	Revision	Checklist
Site Restoration	SR-01	Rev. 1	Page 1 of 1

References: Specifications; 2936 -Seeding

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1	Verify that the subcontractor provides a Site Restoration Plan (SRP) in accordance with the specifications. Ensure that the SRP is reviewed and approved by the PM.			
	Initial Inspections			
1	Verify inventory of existing conditions and surface features that will affect site restoration.			
	Follow-Up Inspections			
1	Verify that the site is restored in accordance to the specification and the Work Plan.			
2	Verify continued maintenance of erosion controls, grass and plant life. Replace or replenish, if required.			
3	Perform final walk-through with the Navy Resident Officer in Charge of Construction to confirm final site restoration.			
4	Compile a punchlist of any items identified as deficient or incomplete, and submit to the subcontractor for resolution.			
5	*Document final acceptance of the work site.*			

Additional Notes or comments: Use Additional Sheets as necessary

Specific Item Identification or Location, as applicable:

MK Project	Delivery Order Number	Checklist Title	
Crane, Indiana	0009, 007	Site Restoration SR-01	Page 1 of ____