



TA 73

**DEPARTMENT OF ENERGY**  
National Nuclear Security Administration  
Los Alamos Site Office  
Los Alamos, New Mexico 87544

APR 21 2006



Mr. James Bearzi, Chief  
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New Mexico Environment Department  
2905 Rodeo Park Drive East, Building 1  
Santa Fe, NM 87505-6303

Dear Mr. Bearzi:

We have received the "Notice of Approval with Modifications for the Remedy Design Work Plan (RDWP) for the Airport Landfills." Attached are two hard copies and one disk copy of a redline/strikeout of the RDWP, incorporating all of the changes agreed to in the Department of Energy (DOE)'s Notice of Disapproval (NOD) Response, Response Revisions, and any subsequent communications. The revisions have also been tabulated in a table that stipulates page number or drawing number, Review Comment, Resolution, Revision, and work-plan location incorporated.

Design drawings do not contain redline/strikeout, but final designs contain the changes agreed to in our NOD Response, Response Revisions, or subsequent communications, and design changes are tracked in the attached revisions table. Per the New Mexico Environment Department NMED Approval with Modifications, the attached RDWP does not include the Construction Quality Control Plan for the MatCon cover, Operation and Maintenance Plan for the MatCon cover, final design for the MatCon cover, final design for the retaining walls, and final design for the hangar pads. These plans and final design drawings will be supplied to NMED within 45 days of awarding the construction contract.

Sincerely,

*for Leonard A. Trujillo*  
David R. Gregory, P.E.  
Federal Project Director

ES: 2BE-015

Attachments

cc w/o attachments:  
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NW-ID-2004-031  
Revision ~~1~~2

# REMEDY DESIGN WORK PLAN FOR THE LOS ALAMOS SITE OFFICE TA-73 AIRPORT LANDFILL

~~June 2005~~ April 2006

Prepared for:

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**DOCUMENT APPROVAL PAGE**

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Document Title: Remedy Design Work Plan for the Los Alamos Site Office TA-73 Airport Landfill

**Approval Signatures**

Name	Signature	Date	Title
Doug Jorgensen	Original signature on file	05/24/05	North Wind Inc. Project Manager
Robert Enz	Original signature on file	05/24/05	U.S. Department of Energy, LASO

**Revision Log**

Revision	Date	Reason for Revision
Draft	03/30/04	Not applicable; first draft of document
Revision 0	04/15/04	Document revised to incorporate DOE/LASO comments of 04/05/04.
Revision 1	5/31/05	Document revised to reflect scope change per DOE revised Statement of Work. Primary revisions include addition of design history and reference to the change in design.
<u>Revision 2</u>	<u>04/21/06</u>	<u>Document revised to incorporate resolutions to NMED comments on Revision 1.</u>

Remedy Design Work Plan

Task	Start Date	End Date	Responsible Party
Finalize Remedial Investigation Report	04/01/06	04/30/06	URS
Finalize Feasibility Study	04/01/06	04/30/06	URS
Finalize Remedial Action Plan	04/01/06	04/30/06	URS
Finalize Design	04/01/06	04/30/06	URS
Finalize Construction	04/01/06	04/30/06	URS
Finalize Monitoring	04/01/06	04/30/06	URS
Finalize Evaluation	04/01/06	04/30/06	URS

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**ATTACHMENTS**

Attachment A—Final Design Package (Design Calculations for Wall No. 1 provided seperately)

Attachment B—Construction Plan for the LASO TA-73 Airport Landfill

Attachment C—Construction Quality Control Plan for the LASO TA-73 Airport Landfill

Attachment D—Waste Management Plan for the LASO TA-73 Airport Landfill

Attachment E—Post-closure Care and Monitoring Plan for the LASO TA-73 Airport Landfill

## 1.0 INTRODUCTION

This Remedy Design Work Plan (RDWP) describes the final remedy that the U.S. Department of Energy (DOE) will implement at the Los Alamos Site Office (LASO) Technical Area (TA)-73 Airport Landfill and Debris Disposal Area (DDA) project, henceforth referred to as the Airport Landfill project. This revision of the Remedy Design Work Plan RDWP (Revision 1) was prepared to address stakeholder requests that the original design (Revision 0) be modified to better accommodate aircraft parking. The revised project scope includes a Modified Asphalt Technology for Waste Containment (MatCon™) asphalt surface over the flat portion of the landfill, a gas venting layer under the MatCon™ surface, and a retaining wall along the base of the east slope. In addition, airport improvements will be made to the west end of the main landfill, including hangar pads and aircraft tie-downs. All requirements for the final remedy identified by the New Mexico Environment Department (NMED), as well as other applicable requirements and stakeholder requests, are met by this design. The design of the DDA cover was not affected by the revised scope.

This document is in compliance with specific guidance in Sections III.M, VI.K, and VII.E of the Compliance Order on Consent (NMED 2005).

### 1.1 Contents of Remedy Design Work Plan

The contents of the Remedy Design Work Plan RDWP are prescribed in the NMED conditional approval letter of the Voluntary Corrective Measure (VCM) Plan (NMED 2003). The conditional approval letter is referenced by Section VI.L of the NMED Order of November 26, 2002 (NMED 2002). The conditional approval letter prescribes the following elements of the Remedy Design Work Plan RDWP:

- Detailed engineering design (Section 2.0),
- Construction or implementation details (Section 3.0),
- Vapor monitoring system design and plan (Section 5.0),
- Demonstration of cover performance over the life of the cover (Section 6.0),
- Schedule for cover maintenance (Section 7.0),
- Closure and post-closure care for the landfill once construction of the cover is complete (Section 8.0), and
- Explanation as to why certain ground water monitoring data referenced in the VCM Plan were not reported (Section 9.0).

This Remedy Design Work Plan RDWP is organized by sections corresponding to the above elements (corresponding sections in parentheses). For some elements, North Wind Inc. (NWI) has prepared a plan that addresses the specific element, and that plan is referenced in the appropriate section and as an attachment. For the remaining elements, descriptive text is provided to address the particular element.

### 1.2 Scope of Document

The Remedy Design Work Plan RDWP applies to the construction and post-closure care and monitoring of the landfill cover at the Airport Landfill project. The construction phase is defined as the time period from mobilization to demobilization. The post-closure phase is defined as 30 years after closure (i.e., completion of construction of the landfill cover).

### 1.3 Site Description and Background

A detailed site description and operational history are documented in the Los Alamos National Laboratory (LANL) VCM Plan (LANL 2002). The Airport Landfill project consists of two solid waste management units (SWMUs), 73-001(a) and 73-001(d). SWMU 73-001(a), main landfill, and SWMU 73-001(d), DDA, are inactive units and both are listed in Table A within Module VIII of LANL's Hazardous Waste Facility Permit (LANL 1996). Both SWMUs are located within TA-73 on DOE property, as shown in Figure 1.3-1 (see Section 13). The main landfill is east of the existing airport hangars and the DDA is east of the end of the runway. Figure 1.3-2 (see Section 13) shows the location of the SWMUs in TA-73.

In 1943, the DOE began using the hanging valley north of the airport runway as the main landfill. Garbage was collected twice a week from the LANL and town site and burned on the edge of the hanging valley. Heavy equipment was then used to push the burned residues and ash into whichever landfill disposal area was being used at the time. This intentional burning ceased in 1965 when Los Alamos County (LAC) assumed operation of the landfill. The county continued to operate the landfill until June 30, 1973.

The DDA was used from 1984 to 1986 to bury debris excavated from the western portion of the main landfill. This material was excavated and replaced with clean fill to prepare the western portion of the landfill for the construction of airplane hangars and tie-down areas. Since the wastes placed in the DDA came from the main landfill, both areas contained similar types of debris. In 1986, the DDA landfill was covered with soil and hydroseeded.

## 2.0 DETAILED ENGINEERING DESIGN

This section describes the TA-73 closure requirements, the basis for the revision of the Remedy Design Work Plan RDWP, and summarizes the significant features of the revised design.

### 2.1 Closure Requirements

The preferred final TA-73 Airport Landfill remedy was described by NMED in the VCM Plan Conditional Approval Letter (NMED 2003) as:

"...an engineered alternative earthen cover (cap) or RCRA Subtitle C equivalent cover, as long as the cover construction will perform equivalent to or better than a standard RCRA Subtitle C prescriptive cover outlined in 40 CFR 265 Subpart N, incorporated by 20.4.1.600 NMAC".

The functional requirements cited in 40 *Code of Federal Regulations* (CFR) 265.310(a)(1-5) include:

1. Provide long-term minimization of migration of liquids through the closed landfill,
2. Function with minimum maintenance,
3. Promote drainage and minimize erosion or abrasion of the cover,
4. Accommodate settling and subsidence so that the cover's integrity is maintained, and
5. Have a permeability less than or equal to the permeability of any bottom liner or natural subsoils present.

In accordance with DOE Order 5480.4, "Environmental Protection, Safety, and Health Protection Standards" (DOE 1993), other federal, State of New Mexico, and LAC regulations were reviewed to identify the mandatory environmental protection, safety, and health requirements. Table 2.2-1 (see Section 12) lists the regulatory requirements applicable to the design and closure of the landfill and the DDA, including the 40 CFR 265.310 requirements.

## 2.2 Basis for Revised Design

The Phase II Work Plan, Revision 0 (North Wind 2004), proposed a vegetated earthen cover that met the *Resource Conservation and Recovery Act* (RCRA) Subtitle C functional requirements identified in 40 CFR 265.310 for the unlined TA-73 Airport Landfill. NMED approved the design with stipulations in September 2004 (NMED 2004). Following submittal of the Phase II Work Plan (Revision 0), LAC officially notified DOE of their concerns with the proposed remediation on the airport landfill (September 16, 2004). The primary issue of concern was that the submitted design did not account for or accommodate airport expansion plans.

On October 7, 2004, DOE requested from NMED an extension for response to comments on the Phase II Work Plan. NMED granted this extension on October 20, 2004, with a due date of December 31, 2004 for receipt of comment response.

Alternatives to the Revision 0 design for the main landfill were tentatively evaluated and costed during the remaining calendar year of 2004. On December 20, 2004, DOE requested a second extension for response to comments and to prepare an Environmental Assessment (EA) on reasonable alternatives for remediation of the airport landfill and to perform impact analysis. NMED granted this second extension with a new due date for response to comments scheduled for June 30, 2005. The preparation of the EA was initiated at this time.

The EA for the remediation of the LAC Airport Landfill was completed on March 29, 2005 (DOE 2005a) and released for public comment on April 4, 2005. The EA provided interested parties several alternatives to remediation of the landfill and provided sufficient evidence and analysis for determining the significance of impacts from the corrective measures alternatives. The federal decision to be made in the EA process was to determine whether to prepare an Environmental Impact Statement (EIS) based on the significance of the environmental impacts. This process also provides a vehicle for stakeholders to share their ideas concerning the proposed corrective measures alternatives with DOE officials.

Stakeholder comments were received from the Federal Aviation Administration (FAA), NMED, Aircraft Owners and Pilots Association, and San Ildefonso Pueblo. The comments consisted of statements and questions concerning duration of the corrective measures, environmental justice, administrative authority language, incorrect names, and a request for removal of a cumulative impact section sentence. Additions, deletions, and appropriate changes were made to the draft EA in response to these comments. Based on stakeholder input and evaluation results of the EA, a Finding of No Significant Impact (FONSI) for this site was prepared and signed by DOE officials in May 2005 (DOE 2005b).

Based on stakeholder input and future use considerations of the main landfill area, Alternative 1 (as described in the EA) was determined to be the preferred alternative for design and construction. Alternative 1 involves leaving waste in place at the main landfill, relocating waste from the east slope to the main landfill surface, installing a gas collection system below a MatCon™ cover (proprietary formulation of asphalt) over the landfill, constructing a retaining wall at the base of the east slope, and covering the DDA as previously described in the original design. The remaining east slope and north slopes will-would have infiltration barriers and rock armor finishes. In addition, airport improvements will would be made to the west end of the main landfill, including hanger pads and aircraft tie-downs. This alternative meets 40 CFR 265.310 functional requirements for the TA-73 Airport Landfill closure and is was the preferred alternative of stakeholders. This alternative is-was the basis for design for Revision 1 of the Remedy-Design-Work-PlanRDWP.

Landfill cover requirements cited in 40 CFR 265.310 are assessed, with respect to the MatCon™ cover, in Table 2.2-2 (see Section 12). MatCon™ paving was evaluated by the EPA SITE Program and was determined to be able to achieve as-built hydraulic conductivities of less than 1E-08 cm/sec, "which exceeds the requirement of less than 1E-07 cm/sec established for RCRA Subtitle C hazardous waste landfill covers..." (EPA 2003). The referenced Subtitle C permeability requirement is for lined landfills, based on requirements that a) the landfill cover "...have a permeability less than or equal to the permeability of any bottom liner or natural subsoils present" (40 CFR 265.310(1)(5); and b) the lower component of the landfill liner "...must be constructed of at least 3 ft of compacted soil material with a hydraulic conductivity of no more than 1E-07 cm/sec (40 CFR 264.301(c)(1)(i))."

NMED (2006) issued a Notice of Disapproval of the RDWP Revision 1 and requested that DOE-LASO demonstrate equivalency of the final cover to a RCRA Subtitle C "prescriptive" cover with respect to water flux through the cover, using the Hydrologic Evaluation of Landfill Performance (HELP) code. In response, DOE-LASO compared infiltration through the RDWP Revision 1 cover and a RCRA Subtitle C Minimum Technology Guidance (MTG) cover.

The EPA's technology guidance for RCRA Subtitle C closure cover design is presented in EPA (1989). The cover profile shown in Figure 1 of EPA (1989) was used to represent a RCRA Subtitle C MTG cover. The EPA's HELP model Version 3.07 (Shroeder et al., 1994) was used to evaluate the hydrologic performance of the RCRA cover and the alternative covers. Table 2.2-3 summarizes the input parameters and comparative results of the HELP model simulations of the cover alternatives. The HELP model is a quasi-two-dimensional model developed for conducting water balance analyses of landfill cover designs (Shroeder et al., 1994). The model simulates the climatic conditions of a site and the resulting soil-water processes of runoff, evapotranspiration, infiltration, lateral drainage and deep percolation. Weather data for the five wettest consecutive years of observations at LANL were used for the comparison.

The primary purpose of the HELP model is to assist in the comparison of design alternatives. While the HELP model is useful for comparative purposes, it is important to note that:

- a) a) The model imposes limits on the configuration of the cap. Most significantly for this comparison, a barrier layer cannot be used at the surface. This forced incorporation of a 0.01-in thick sand surface layer in the modeled MatCon™ cap.
- b) b) The results are inexact. For example, the model tends to underestimate runoff (Shroeder et al., 1994), which tends to lead to overestimates of percolation (Benson and Pliska, 1996).

HELP modeling results, as reported in Table 2.2-1 for the RDWP Revision 1, and RCRA designs show more infiltration for both the 2% (MatCon™) and 25% (rock armor over soil) slope areas, than for the RCRA MTG cover on equivalent slopes. As noted above, HELP was designed to calculate the differences between variations in RCRA cover designs, and does not accept an impermeable barrier as a surface layer that violates the model's rules. A pseudo-infiltration layer was used at the surface to allow the code to model the MatCon™ surface. The effects of adding this pseudo-layer on modeled percolation through the cover are unknown.

The differences between the current design and the RCRA cover for the 2% slopes are very small in the context of the average annual precipitation. Average annual precipitation is about 24 inches using the very conservative weather data set discussed previously. The RDWP Revision 1 design allowed infiltration of about 0.2% more of the average annual precipitation, or about 0.06 inches. Given the requirement to add a surface pseudo-layer to force the model to run the MatCon™ cap configuration, this is not viewed as a significant difference. The RDWP Revision 1 MatCon™ surface remains as the main landfill cover design.

A MatCon™ test pad will be constructed, cored and tested for saturated hydraulic conductivity prior to construction of the final cover. Construction of the MatCon™ landfill cover surface will not proceed until the specified saturated hydraulic conductivity of 1E-08 cm/sec is achieved. The hot mix formulation and construction procedures will be modified as needed to achieve the requirement. The Construction Quality Control Plan (CQCP) for the MatCon™ cover, to be prepared by the vendor upon contract award, will describe procedures for coring and testing. The Operation and Maintenance Plan for the MatCon™ surfaces will be provided by the vendor upon contract award.

Total settlement of the main landfill surface, calculated using conservative assumptions and reported in Appendix A, "Differential Settlement Evaluation", was estimated at less than 2 ft, most of which would occur during construction. Differential settlement was calculated assuming that the stress imposed by the MatCon™ pavement and the concrete hanger pads was approximately equal. Only private light aircraft, e.g. single-engine Piper- and Cessna-type aircraft, currently park at the airport. Live loads generated by aircraft and light trucks would be insignificant with respect to differential settlement. The total weight of a

vehicle (aircraft or truck) is anticipated to be less than 10,000 lb. The load will be transferred to the ground surface through the wheels of the vehicles. Aircraft and truck wheels have limited footprint (contact area) and so the load will be concentrated over a very small area, which means the stress will be attenuated in the shallow subsurface. The shallow subsurface will not be prone to consolidate as it will be comprised of compacted materials.

Assuming each hanger will house 10 aircraft and that each plane weights 5,000 lb, the added stress over the hanger footprint (203 ft x 62 ft) would only be about 4 psf. This is an insignificant increase in stress that would result in added settlement less than 0.1 inches.

Elastic settlement that may occur during placement and compaction of fill materials would be addressed by increasing the thickness of the materials as required to meet the specified lines and grades for each fill layer. Elastic settlement is not anticipated after placement of MatCon.

The differences between the RDWP Revision 1 current design and the RCRA cover for the 25% slopes are greater more significant. The RDWP Rev 1 design allows about 461.7% more infiltration of the average annual precipitation or about 3-80.43 inches.

Several conceptual designs were modeled to in order to try to match RCRA cover performance for the 25% and 33% sloped areas, a design Alternative Cover 2 was modeled. The preferred conceptual design for the slopes Top to bottom, Alternative Cover 2 includes consists of, top to bottom:

- 6-in of rip-rap geocellular slope protection with a vegetated surface,
- 12-in infiltration layer soil,
- 0.2-in geosynthetic drainage layer,
- 20-mil FML
- 6-in infiltration layer soil, and
- 6-in grading fill

This design allows less infiltration than the RCRA Subtitle C cover. The geosynthetic drainage layer and FML were placed in the infiltration layer soil profile to avoid having to place rip-rap directly on the geosynthetics, while not increasing the cover thickness and, -thereby maintaining the RDWP Rev 1 slopes and grades and not requiring off-site waste shipment. This design allows less infiltration than the RCRA Subtitle C cover This design was selected over other options, including addition of a flexible membrane liner (FML) in the cover profile, for the following reasons:

- Geocellular slope protection with a vegetated surface promotes runoff better than rip-rap and thereby less infiltration.
- Geocellular slope protection with a vegetated surface provides more ET than rip-rap and thereby less infiltration.
- Geocellular slope protection with a vegetated surface is easier to install than rip-rap at this site.
- Welding of FML panels is not required.
- Rigorous QA for installing an FML is not required.
- Produces a more stable slope—an FML would reduce the slope stability due to the interface friction angle.
- Not subject to shear failure at liner/soil interface due to potential added loadings from snow removed from paved surfaces at airport.

- Not subject to failure at liner/soil interface due to release of water from melting snow.
- No rip-rap required and thereby less haul truck traffic on access roads.
- No gas collection required on slopes-addition of an FML would require extending gas collection piping underneath.

Adding geocellular slope protection with a vegetated surface a geosynthetic drainage layer and an FML to the 25% and 33% slopes, and a geosynthetic drainage net in the cover profile, would be constructable using the described configuration, and would significantly improve performance, as well as increase cost. Provision for gas venting under the FML would likely have to be added. The stakeholder requirements to maintain the slopes and elevations in the current design, with no waste shipped off-site, would be met.

Biointrusion by burrowing animals and exhumation of waste are not considered to impair final cover performance on the main landfill. The planned remedy will remove vegetation from about 80% of the main landfill surface, cover the waste with resistant surfaces, and eliminate habitat that would attract wildlife. Burrowing animals could potentially penetrate the geocell and vegetation on the slopes, however intrusion beyond the geosynthetic drainage net into waste would be unlikely. Additionally the expanded airport operations on the MatCon™ capped area will further discourage use by wildlife. This remedy will therefore greatly reduce or eliminate the potential for biointrusion.

An infiltration layer soil test pad will be constructed, cored, and tested for saturated hydraulic conductivity. Construction of the infiltration layer will not proceed until the specified saturated hydraulic conductivity of 1E-05 cm/sec is achieved. The construction procedures will be modified as needed to achieve the requirement. The attached Construction Plan (Attachment B) and CQCP (Attachment C) describe construction and testing of the infiltration layer soil test pad.

The is-final cover configuration described above for the main landfill surface and slopes, and for the DDA, meets all regulatory and stakeholder requirements and is the basis for Revision 2this revision of the final design.

### **2.3 Final Design**

The final design package, which includes specifications, drawings, and engineering calculations, is included as Attachment A. The final design specifications and drawings will incorporate NMED review comments of the draft final design package and represents the final specifications directing construction of the landfill cover.

### **3.0 CONSTRUCTION OR IMPLEMENTATION DETAILS**

The Construction Plan for the LASO TA-73 Airport Landfill (North Wind 2005a) is included as Attachment B and describes methods and protocols that NWI will use to manage construction activities at the Airport Landfill project. The Construction Plan summarizes planned construction activities and shows how specific construction activities will be completed in accordance with final design specifications and drawings.

The Construction Plan provides construction management protocol, including key personnel responsibilities, reporting requirements, and a detailed construction schedule. The Construction Plan also provides a detailed description of construction activities, which include:

- Procurement of materials and services;
- Mobilization activities, which include assembling construction documents, conducting a construction readiness assessment, building access roads, installing temporary field trailers, initial surveying of the DDA and main landfill, mobilizing heavy equipment to the site, and locating underground utilities;

- Site preparation activities, which include installing perimeter fencing, installing storm water run-off and erosion controls, abandoning existing monitoring wells within the footprint of the main landfill, and abandoning and/or relocating existing utilities;
- Construction of the DDA, which includes a pre-construction survey, rough regrading, adding topsoil (as needed) to bring final topsoil to 12 in. over the entire DDA footprint, and surveying the final grade;
- Construction of the east and north slopes of the main landfill, which includes salvaging existing soil for use as subgrade, a pre-excavation survey, relocating existing municipal landfill waste, establishing the subgrade, adding the infiltration layer, adding geosynthetic drainage net, adding geocellular slope protection with a vegetated surface geotextile and rock armor (riprap) over on the slope surfaces, adding a retaining wall at the toe of the east slope, and a survey of the final grade;
- Construction of the approved cover over the main landfill, which also includes stripping and stockpiling soil cover, relocating waste, backfilling soil, compaction and contouring of area, placement of gas collection layer aggregate and piping, and placement of MatCon™ asphalt surface. Construction will additionally include installation of hanger pads and aircraft tie-downs on the MatCon™ surface;
- Revegetation of the DDA;
- DOE inspection and acceptance; and
- Demobilization.

The Construction Plan also provides meetings and inspections criteria; quality controls; health and safety controls; operation, maintenance, and monitoring requirements; and training and certification requirements.

Quality control (QC) of constructed landfill components is an important element of the Airport Landfill project. The ~~Construction Quality Control Plan (CQCP)~~ for the TA-73 Airport Landfill (North Wind 2005b) provides QC requirements for construction activities, including testing, in progress inspections, and hold points critical between phases of the construction. The CQCP is included as Attachment C.

#### 4.0 WASTE MANAGEMENT PLAN

The Waste Management Plan (WMP) for the LASO TA-73 Airport Landfill (North Wind 2005c) describes methods that NWI will use to manage waste generated during execution of the Airport Landfill project. The WMP, included as Attachment D, describes waste management goals, pollution prevention and waste minimization techniques, methods for managing nonhazardous waste streams and petroleum-contaminated soil, training requirements, and spill notification and reporting protocols.

#### 5.0 VAPOR MONITORING SYSTEM DESIGN AND PLAN

Based on the proposed design and construction of the MatCon™ surface over the main landfill surface and the future construction of airplane hangers on the MatCon™, a gas collection system with surface venting will be ~~a~~ installed ~~as a component of the design~~ to ensure that combustible gas levels do not exceed 25% of the lower explosive limit (LEL) in any enclosed structure, or 100% of the LEL at the north edge of the cap, mitigation of any possible methane gas generation within the hanger structures, and to prevent exceedences of 25% of the lower explosive limit (LEL) at the property boundary. Vapor monitoring is not required and will not be performed.

The gas collection system is included in the design package and includes specifications for a minimum of 6 in. of coarse base aggregate overlying woven geotextile, perforated piping within the aggregate, and gas vent locations to the surface. The system will initially be operated passively and monitored. If combustible gas levels exceed the limits described above, the system will be connected to blowers and vented actively until the limits are attained. The PCMP provides a monitoring schedule and procedures.

## 6.0 DEMONSTRATION OF COVER PERFORMANCE

The Post-closure Care and Monitoring Plan (PCMP) for the TA-73 Airport Landfill (North Wind 2005d) is included as Attachment E and identifies post-closure care and monitoring requirements for the landfill and describes activities to meet those requirements. The PCMP applies to operation and maintenance of the cover integrity.

The PCMP identifies regulatory requirements for post-closure care and monitoring; post-closure monitoring and maintenance methods for the cover system, storm water control system, survey benchmarks, gas collection system and access roads; record-keeping and reporting requirements; and describes an inspection schedule for years one through five of the post-closure period.

Additional demonstration of cover performance is provided in the HELP modeling performed for the final cover design, as discussed in Section 2. Further demonstration will be provided by constructing and testing test pads for the MatCon™ and infiltration layer soil layer, as described in the Construction Plan and the CQCPs; and in the Operation and Maintenance Plan for the MatCon™ surfaces, to be provided after contract award.

## 7.0 SCHEDULE FOR COVER MAINTENANCE

The schedule for cover maintenance is provided in the PCMP (Attachment E). All main landfill and DDA cover system components shall be inspected initially after the first significant rainfall following the installation of the final cover, and annually after the end of the spring thaw. Inspections for years one through five of the post-closure period are tentatively scheduled for the first 2 weeks of June each year so that the condition of vegetation in on the DDA and on the main landfill slopes can be inspected and corrected, as needed, early in the growing season. All other deficiencies should be corrected at the earliest opportunity and before the end of the calendar year in order to be completed during the reporting period.

## 8.0 CLOSURE AND POST-CLOSURE CARE

Methods for closure and post-closure care are provided in the PCMP (Attachment D). Monitoring for cover integrity will include inspections of the cover and maintenance and repair of deficiencies. No frequency is specified in the requirements; however, annual inspections are specified in this plan. An inspection report will be completed for each inspection. The following subsections describe inspection and maintenance tasks.

### 8.1 Cover System

Annual cover inspections at the DDA and main landfill will include site walkovers looking for and documenting erosional damage and cracks, gaps at seals between asphalt and concrete, animal burrows, subsidences, and condition of vegetation. The PCMP provides an inspection schedule and methods for repairing these conditions, if warranted. The vendor will provide an operation and maintenance plan for the MatCon™ surfaces upon contract award.

### 8.2 Storm Water Control System

Annual storm water control system inspections will include all areas of the site, as described for post-construction in the Storm Water Pollution Prevention Plan (SWPPP) for the TA-73 Airport Landfill (North Wind 2005e). Inspectors will look for evidence of, or the potential for, pollutants entering the storm water conveyance system. Discharge locations identified in the site plans will be inspected to determine whether erosion controls are effective in preventing significant impact to Pueblo Canyon.

### 8.3 Survey Benchmarks

Annual inspections will include locating and documenting the condition of permanent survey benchmarks. Benchmarks will be maintained in a clearly visible condition.

### **8.4 Retaining Walls**

Visual inspections will be performed for both the concrete and mechanically stabilized earth (MSE) walls. The PCMP provides an inspection schedule.

### **8.5 Landfill Gas Collection System**

Enclosed spaces overlying or adjacent to the closed landfill, and the cap perimeter nearest the property boundary, will be monitored for combustible gas. The PCMP provides an inspection schedule and procedures.

## **9.0 VOLUNTARY CORRECTIVE MEASURE PLAN GROUND WATER MONITORING DATA**

In the VCM Plan conditional approval letter (NMED 2003), NMED inquired as to why certain monitoring well sampling data were collected and results not reported. The comment was in regard to Section 2.3.2.1, "Monitoring Well Sampling" of the VCM Plan (LANL 2002), which states:

"...therefore, the data are of little or no use when evaluating the effectiveness of the run-on controls, and the monitoring well sampling results are not presented in this plan."

LANL's response to the inquiry was that the above referenced data will be provided to NMED in the ~~Remedy Design Work Plan~~RDWP. The following information (Rust 2004), provided by NWI, responds to NMED's inquiry and is included to satisfy LANL's commitment that the explanation will be included in the ~~Remedy Design Work Plan~~RDWP:

"The pore water sampling from the existing monitoring wells that was attempted during the supplemental sampling campaign executed in 2001 failed to generate meaningful data. All wells were sampled in an attempt to collect pore water to verify the effectiveness of run on controls and to assess the moisture content within the landfill after 2 years of storm water diversion. Unfortunately, inadequate pore water was collected from any of the monitoring wells for meaningful analysis. It is believed that this is due to the ongoing drought conditions, which has resulted in inadequate landfill moisture to sustain water in the subsurface, coupled with the installation of the aforementioned storm water controls to divert runoff that formerly drained onto the landfill."

## **10.0 SUPPORTING PROJECT DOCUMENTS**

As discussed previously, this ~~Remedy Design Work Plan~~RDWP is the primary scoping document for the Airport Landfill project. However, other plans and procedures have been prepared to direct and manage activities for both the planning and construction phases of the project. The following subsections provide a brief overview of these documents.

### **10.1 Project Quality Plan**

The Project Quality Plan (PQP) for the LASO TA-73 Airport Landfill (North Wind 2005f) describes how NWI will implement a quality assurance (QA) program for the Airport Landfill project that complies with the applicable requirements of DOE Order 414.1A, "Quality Assurance" (DOE 2001) and 10 CFR 830.120, Subpart A, "Quality Assurance Requirements."

The PQP conforms to the 10 QA criteria, as stated in DOE Order 414.1A, which include (1) program description, (2) personnel training and qualification, (3) quality improvement, (4) documents and records, (5) work processes, (6) design, (7) procurement, (8) inspection and acceptance testing, (9) management assessment, and (10) independent assessment.

## **10.2 Health and Safety Plan**

The Health and Safety Plan (HASP) for the LASO TA-73 Airport Landfill (North Wind 2005g) establishes the procedures and requirements that will be used to eliminate or minimize health and safety hazards to personnel conducting construction tasks at the Airport Landfill project. The objective of the HASP is to meet the regulatory requirements of the Occupational Safety and Health Administration standard, 29 CFR 1926.65, "Hazardous Waste Operations and Emergency Response." The HASP governs all work at the project sites that is performed by NWI, subcontractors, and any other personnel who enter the project site.

The HASP identifies anticipated site hazards and appropriate mitigation measures, exposure monitoring and sampling protocol, accident and exposure prevention, personal protective equipment, required personnel training, site control and security measures, occupational medical surveillance, key site personnel responsibilities, emergency response plan, decontamination procedures, and record-keeping requirements.

## **10.3 Project Management Plan**

The Project Management Plan (PMP) for the LASO TA-73 Airport Landfill (North Wind 2005h) describes the management structure and processes that NWI will use to manage the Airport Landfill project. The PMP identifies key positions and associated responsibilities, availability and allocation of resources, management controls, contract administration, reporting protocol, project deliverables, a summary of the corporate QA program, and training and certification requirements. The project baseline schedule and work breakdown structure are also found in the PMP.

## **10.4 Storm Water Pollution Prevention Plan**

The SWPPP (North Wind 2005e) has been prepared for the construction and post-construction phases of the final design remedy cover at the Airport Landfill project. The SWPPP complies with the terms of the "Final National Pollutant Discharge Elimination System General Permit for Storm Water Discharges from Construction Activities" (FR 2003). The SWPPP also complies with applicable DOE and State of New Mexico regulations.

The primary purpose of the SWPPP is to provide a framework for reducing soil erosion and minimizing pollutants in storm water during construction of the final design remedy cover at the Airport Landfill.

## **10.5 Implementing Procedures**

As described in the PQP (North Wind 2005f), NWI corporate QA procedures will be implemented during the Airport Landfill project. In addition, several project-specific Project Work Instructions (PWIs) have been developed. The PWIs include:

- PWI-4201-001, Project Files,
- PWI-4201-002, Field Activities Documentation,
- PWI-4201-004, Readiness Assessment, and
- PWI-4201-005, Field Change.

## **11.0 PROGRESS REPORTS**

Progress reports for the Airport Landfill project shall be submitted to NMED on a monthly basis, during construction of the landfill covers. Reports shall include work completed during the reporting period, a summary of issues or delays and actions taken to mitigate issues or delays, work planned to be completed in the next reporting period, and copies of any sampling results or waste disposal records generated. Reports shall be submitted at the end of each month following receipt of a construction notice to proceed.

## 12.0 TABLES

Table 2.2-1. Regulatory Requirements for Airport Landfill Closure Design

Disposal Facility Component	Federal		State of New Mexico or Los Alamos County		Stakeholder Requests		Minimum Applicable Technical Requirement	Additional Design Basis
	Technical Requirement	Citation	Technical Requirement	Citation			Citation	
Final Cover System Geometry	Regrading requires a maximum 7-foot horizontal: 1-foot vertical (7:1) slope beyond 125-foot setback from runway centerline	14 CFR 77.25	None Identified	None Identified	- Provide paved surface for parking aircraft - 0.5-2% slopes - Tie (grade) into existing tarmac	DOE/EA-1515	14 CFR 77.25 DOE/EA-1515	Slope stability calculations; hangar foundation and tie-down design
Final Cover Requirements and Construction	Notice of Construction near airport	14 CFR 77.11	Obtain written approval from Los Alamos County Building Inspector and Airport Manager prior to construction "in or about" existing hangar or building	LAC 4-149 (Ord. No. 85-238)	None Identified	None Identified	14 CFR 77.11 LAC 4-149	None Identified
			Submit form 7460-1, "Notice of Proposed Construction or Alteration"	14 CFR 77	None Identified	None Identified	14 CFR 77	None Identified
			Obtain permit from Los Alamos County Engineer to excavate in public place	LAC 34-32	None Identified	None Identified	LAC 34-32	None Identified
			Excavation may take place during the hours 7:00 a.m. and 6:00 p.m. only	LAC 34-54	None Identified	None Identified	LAC 34-54	None Identified
			Noise must not exceed 65 dBA, unless apply for special permit	LAC 18-73	None Identified	None Identified	LAC 18-73	Evaluate equipment to determine need for special permit
	Required Construction Quality Assurance Program	40 CFR 265.19	None Identified	None Identified	None Identified	None Identified	40 CFR 265.19	Required by Scope of Work
	Must provide minimization of liquids	40 CFR 265.310	40 CFR 265 requirements incorporated by reference	NMAC 20.4.1.600	None Identified	None Identified	40 CFR 265.310 (NMAC 20.4.1.600)	None Identified
	Minimum maintenance	40 CFR 265.310	40 CFR 265 requirements incorporated by reference	NMAC 20.4.1.600	None Identified	None Identified	40 CFR 265.310 (NMAC 20.4.1.600)	None Identified

Table 2.2-1. (continued).

Disposal Facility Component	Federal		State of New Mexico or Los Alamos County		Stakeholder Requests		Minimum Applicable Technical Requirement	Additional Design Basis
	Technical Requirement	Citation	Technical Requirement	Citation			Citation	
Final Cover Requirements and Construction (cont.)	Promote drainage and minimize erosion	40 CFR 265.310	40 CFR 265 requirements incorporated by reference	NMAC 20.4.1.600	None Identified	None Identified	40 CFR 265.310 (NMAC 20.4.1.600)	None Identified
	Accommodate settling and subsidence	40 CFR 265.310	40 CFR 265 requirements incorporated by reference	NMAC 20.4.1.600	- Meet all strength requirements of Los Alamos Airport	DOE/EA-1515	40 CFR 265.310 (NMAC 20.4.1.600)	Slope stability and settlement calculations
	Permeability less than natural subsoils or bottom liner	40 CFR 265.310	40 CFR 265 requirements incorporated by reference	NMAC 20.4.1.600	None Identified	None Identified	40 CFR 265.310 (NMAC 20.4.1.600)	None Identified
	- Preventing 25 year storm flow - Collect and control 24-hour/25-year volume BMPs in Stormwater Control Plan	40 CFR 122 40 CFR 265.301	40 CFR 265 requirements incorporated by reference	NMAC 20.4.1.600	Collect and control 6-hour/100-year volume	Kyle Zimmerman, L.A. Engineer, personal communication with North Wind, 2005.	40 CFR 122 40 CFR 265.301 (NMAC 20.4.1.600) Kyle Zimmerman, L.A. Engineer, personal communication with North Wind, 2005.	- Applies during construction - Applies to relocated waste and/or period during closure when interim cover is removed - Applies to airport improvements
Gas Collection System	Exempt from emission requirements for MSW landfills because not active after Nov. 8, 1987	40 CFR 51, 52, and 60	Exempt from emission requirements for MSW landfills because not active after Nov. 8, 1987	NMAC 20.2.64.7A	Collect and vent landfill gas under sealed surface to prevent exceedences at property boundary and/or prevent accumulation in structures	DOE/EA-1515	DOE/EA-1515	None Identified
Facility Surface Water Drainage and Sediment Control	- Designed to minimize water contact with waste - Surface features direct surface water drainage away from facility to not result in erosion	40 CFR 122	None Identified	None Identified	None Identified	None Identified	40 CFR 122	- Owner/operator will apply for NPDES permit for post-closure use -Applies to both landfill and DDA during construction

Table 2.2-1. (continued).

Disposal Facility Component	Federal		State of New Mexico or Los Alamos County		Stakeholder Requests		Minimum Applicable Technical Requirement	Additional Design Basis
	Technical Requirement	Citation	Technical Requirement	Citation			Citation	
Facility Surface Water Drainage and Sediment Control (cont.)	- Meet NPDES requirements Storm Water Pollution Prevention Plan - Prevent 25-year storm flow	40 CFR 122	None Identified	None Identified	Kyle Zimmerman, L.A. Engineer, personal communication with North Wind, 2005.	Kyle Zimmerman, L.A. Engineer, personal communication with North Wind, 2005.	40 CFR 122 Kyle Zimmerman, L.A. Engineer, personal communication with North Wind, 2005.	- Owner/operator will apply for NPDES permit for post-closure use - Applies only to relocated waste and/or period during closure when interim cover is removed - Applies to airport improvements
Disposal Facility Releases	Cover or manage to control wind dispersal of particulate matter	40 CFR 265.301	Excavated material must be maintained to minimize disruption of traffic and to keep dirt or dust from spreading or flying  40 CFR 265 requirements incorporated by reference	LAC 34-46 NMAC 20.4.600	None Identified	None Identified	40 CFR 265.301 LAC 34-46 NMAC 20.4.600	Applies only to relocated waste and/or period during closure when interim cover is removed; ensure windblown material does not interfere with flight line
Support Facilities								
Borrow Facilities	- BMPs in Stormwater Control Plan - Minimal clearing for grading - Detain run-off and trap sediment - Surface features direct surface water drainage away from facility	40 CFR 122	None Identified	None Identified	None Identified	None Identified	40 CFR 122	Assume that borrow material will be purchased from vendor; therefore, requirements will be responsibility of vendor
	- Comply with truck height and weight restrictions during hauling - Comply with Motor Carrier Safety	23 CFR 658 49 CFR 40, 325, 350, 355-399	Comply with height and weight of vehicles and loads	NMAC 18.19.8 LAC 38-688 to 673	None Identified	None Identified	23 CFR 658 49 CFR 40, 325, 350, 355-399 NMAC 18.19.8 LAC 38-668 to 673	None Identified

Table 2.2-1. (continued).

Disposal Facility Component	Federal		State of New Mexico or Los Alamos County		Stakeholder Requests		Minimum Applicable Technical Requirement	Additional Design Basis
	Technical Requirement	Citation	Technical Requirement	Citation			Citation	
Safety and Security								
Sanitary Sewer	Provide toilet and hand washing facilities for workers	29 CFR 1926	None Identified	None Identified	None Identified	None Identified	29 CFR 1926	Assume temporary facilities
Fencing	None Identified	None Identified	Have worksites fenced or maintained in a manner to safeguard property and public	LAC 10-75	None Identified	None Identified	LAC 10-75	None Identified
	Cover or manage to control wind dispersal of particulate matter	40 CFR 265.301	40 CFR requirements incorporated by reference	NMAC 20.4.1.600	None Identified	None Identified	40 CFR 265.301 NMAC 20.4.1.600	Applies only to relocated waste and/or period during closure when interim cover is removed ; ensure windblown material does not interfere with flight line
Post Closure Monitoring	- Begin after closure for 30 yrs - Maintain effectiveness of final cover, including run-on/run-off controls	40 CFR 265, 117 40 CFR 265, 310	40 CFR requirements incorporated by reference	NMAC 20.4.1.600	None Identified	None Identified	40 CFR 265.117 40 CFR 265.310 NMAC 20.4.1.600	No post-closure air or GW monitoring required
	Closure and post-closure plans are required	40 CFR 265.112, 118	40 CFR requirements incorporated by reference	NMAC 20.4.1.600	None Identified	None Identified	40 CFR 265.112, 118 NMAC 20.4.1.600	None Identified
	Certification of closure report within 60 days of closure	40 CFR 265.115	None Identified	None Identified	None Identified	None Identified	40 CFR 265.115 NMAC 20.4.1.600	None Identified
	Complete closure activities within 180 days	40 CFR 265.113	40 CFR requirements incorporated by reference	NMAC 20.4.1.600	None Identified	None Identified	40 CFR 265.311 (NMAC 20.4.1.600)	None Identified
	GW must be protected GW monitoring program Evaluate vegetation	40 CFR 265.92 - 99	40 CFR requirements incorporated by reference	NMAC 20.4.1.600	None Identified	None Identified	40 CFR 265.92-99 (NMAC 20.4.1.600)	No GW monitoring required. Per DOE Scope of Work

Table 2.2-1. (continued).

Disposal Facility Component	Federal		State of New Mexico or Los Alamos County		Stakeholder Requests	Minimum Applicable Technical Requirement	Additional Design Basis
	Technical Requirement	Citation	Technical Requirement	Citation		Citation	
<p><b>NOTE:</b> DOE Order 5480.4 (DOE 1993) is incorporated by reference. Order 5480.4 requirements include (1) specify and provide requirements for the application of the mandatory ES&amp;H standards applicable to all DOE and DOE contractor operations, (2) provide listing of reference ES&amp;H standards, and (3) identify the sources of the mandatory and reference ES&amp;H standards.</p> <p>BMP = Best management practice                      CFR = Code of Federal Regulations                      cm/sec = Centimeters per second                      dBA = Decibel Adjusted                      DDA = Debris Disposal Area                      DOE = U.S. Department of Energy                      EA = Environmental Assessment</p> <p>ES&amp;H = Environmental safety and health                      GW = Groundwater                      LAC = Los Alamos County Code                      MSW = Municipal solid waste                      NMAC = New Mexico Administrative Code                      NPDES = National Pollutant Discharge Elimination System</p>							

Table 2.2-2. Comparison of proposed MatCon™ cover performance to RCRA Subtitle C requirements (40 CFR 265.310a).

Number	RCRA Subtitle C Closure Cover Requirement	Extent to Which the Proposed Cover Does or Does Not Meet the Requirement
1	Provide long-term minimization of migration of liquids through the closed landfill	<i>Meets the requirement.</i> As-built permeability of less than 1E-07 cm/sec effectively minimizes migration of precipitation.
2	Function with minimum maintenance	<i>Meets the requirement.</i> Asphalt surface is easily inspected and repaired and is compatible with end use as airport parking.
3	Promote drainage and minimize erosion or abrasion of the cover	<i>Meets the requirement.</i> Paved surface is sloped at 2% nominal to promote drainage and minimize erosion/abrasion.
4	Accommodate settling and subsidence so that the cover's integrity is maintained	<i>Meets the requirement.</i> MatCon™ can tolerate three times more deflection without cracking than standard asphalt and can bridge voids without failing.
5	Have a permeability less than or equal to the permeability of any bottom liner or natural subsoils present	<i>Meets the requirement.</i> The landfill is not lined and is entirely underlain by the Bandelier Tuff. Demonstrated as-built permeability of MatCon™ is less than 1E-08 cm/sec, which is lower than required for RCRA Subtitle C covers over lined landfills; and is much less than the permeability of the underlying Bandelier tuff, which ranges from 1E-03 to 1E-05 cm/sec (D.B. Stephens & Associates, Inc., 1993; Rogers and Gallaher 1995).

Table 2.2-3. Input parameters and results for HELP modeling.

Parameters	EPA Subtitle C Cover (3% slope)	EPA Subtitle C Cover (25% slope)	RDWP Rev 1 Design (2% slope)	RDWP Rev 1 Design (25% slope)	Alternative Cover (25% slope)	Alternative Cover (33% slope)
Layer 1	6-in topsoil layer (Type 9 (silty loam); permeability = $1.9 \times 10^{-4}$ cm/sec)	6-in rip rap (Type 1, override w/permeability = 20 cm/sec)	"Dummy layer" (HELP does not allow a Type 4 layer (membrane) to be on the top). Modeled as 0.01 inches of Type 1 (sand).	6-in rip rap (Type 1, override w/permeability = 20 cm/sec)6-in rip rap (Type 1, override w/permeability = 20 cm/sec)	6 inches silty loam topsoil (Type 9; permeability = $1.9 \times 10^{-4}$ cm/sec)6-in rip rap (Type 1, override w/permeability = 20 cm/sec)	6 inches silty loam topsoil (Type 9; permeability = $1.9 \times 10^{-4}$ cm/sec)6-in rip rap (Type 1, override w/permeability = 20 cm/sec)
Layer 2	18-in soil layer (Type 12 (silty clay); permeability = $4.2 \times 10^{-5}$ cm/sec)	18-in soil layer (Type 12 (silty clay); permeability = $4.2 \times 10^{-5}$ cm/sec)	4-in Matcon™ Layer (modeled as bentonite mat (Type 17); override perm. = $1 \times 10^{-8}$ cm/sec); placement quality = 0 pinhole/acre, 0 defects per acre, perfect placement	12-in sand (Type 1, override w/permeability = 10 cm/sec)12-in sand (Type 1, override w/permeability = 10 cm/sec)	12-in compacted fill (Type 22 (compacted loam); override w/permeability = $1.0 \times 10^{-5}$ cm/sec)12-in compacted fill (Type 22 (compacted loam); permeability = $1.9 \times 10^{-5}$ cm/sec)	12-in compacted fill (Type 22 (compacted loam); override w/permeability = $1.0 \times 10^{-5}$ cm/sec)12-in compacted fill (Type 22 (compacted loam); permeability = $1.9 \times 10^{-5}$ cm/sec)
Layer 3	12-in coarse sand drainage layer (Type 1; permeability = 0.01 cm/sec)	12-in coarse sand drainage layer (Type 1; permeability = 0.01 cm/sec)	6-in coarse sand gas filtration layer (Type 1; permeability = 0.01 cm/sec)	18-in compacted fill (Type 22 (compacted loam); override w/permeability = $1.0 \times 10^{-5}$ cm/sec)18-in compacted fill (Type 22 (compacted loam); permeability = $1.9 \times 10^{-5}$ cm/sec)	0.2-in Geosynthetic Drainage Layer (Type 20; permeability = 10 cm/sec)0.2-in Geosynthetic Drainage Layer (Type 20; permeability = 10 cm/sec)	0.2-in Geosynthetic Drainage Layer (Type 20; permeability = 10 cm/sec)0.2-in Geosynthetic Drainage Layer (Type 20; permeability = 10 cm/sec)
Layer 4	20 mil FML (Type 35; permeability = $2.00 \times 10^{-13}$ cm/sec); placement quality = 5 pinhole/acre, 4 defects per acre, good placement	20 mil FML (Type 35; permeability = $2.00 \times 10^{-13}$ cm/sec); placement quality = 5 pinhole/acre, 4 defects per acre, good placement	12-in compacted fill (Type 22 (compacted loam); permeability = $1.9 \times 10^{-5}$ cm/sec)	n/a/n/a	6-in compacted fill (Type 22 (compacted loam); override w/permeability = $1.0 \times 10^{-5}$ cm/sec)20-mil FML (Type 35; permeability = $2.00 \times 10^{-13}$ cm/sec); placement quality = 5 pinhole/acre, 4 defects per acre, good placement	6-in compacted fill (Type 22 (compacted loam); override w/permeability = $1.0 \times 10^{-5}$ cm/sec)20-mil FML (Type 35; permeability = $2.00 \times 10^{-13}$ cm/sec); placement quality = 5 pinhole/acre, 4 defects per acre, good placement

Layer 5	24-in soil barrier layer (Type 16; permeability = $1 \times 10^{-7}$ cm/sec)	24-in soil barrier layer (Type 16; permeability = $1 \times 10^{-7}$ cm/sec)	n/a	n/a/n/a	n/a6-in compacted fill (Type 22 (compacted loam); permeability = $1.9 \times 10^{-5}$ cm/sec)	n/a6-in compacted fill (Type 22 (compacted loam); permeability = $1.9 \times 10^{-5}$ cm/sec)
Topslope	3%	25%	2%	25%25%	25%25%	33%33%
Average annual percolation through barrier, inches of water	0.0002"	0.00004"	0.056"	0.427"3.84"	0.00000"0.00004"	0.00000"0.00004"

13.0 FIGURES

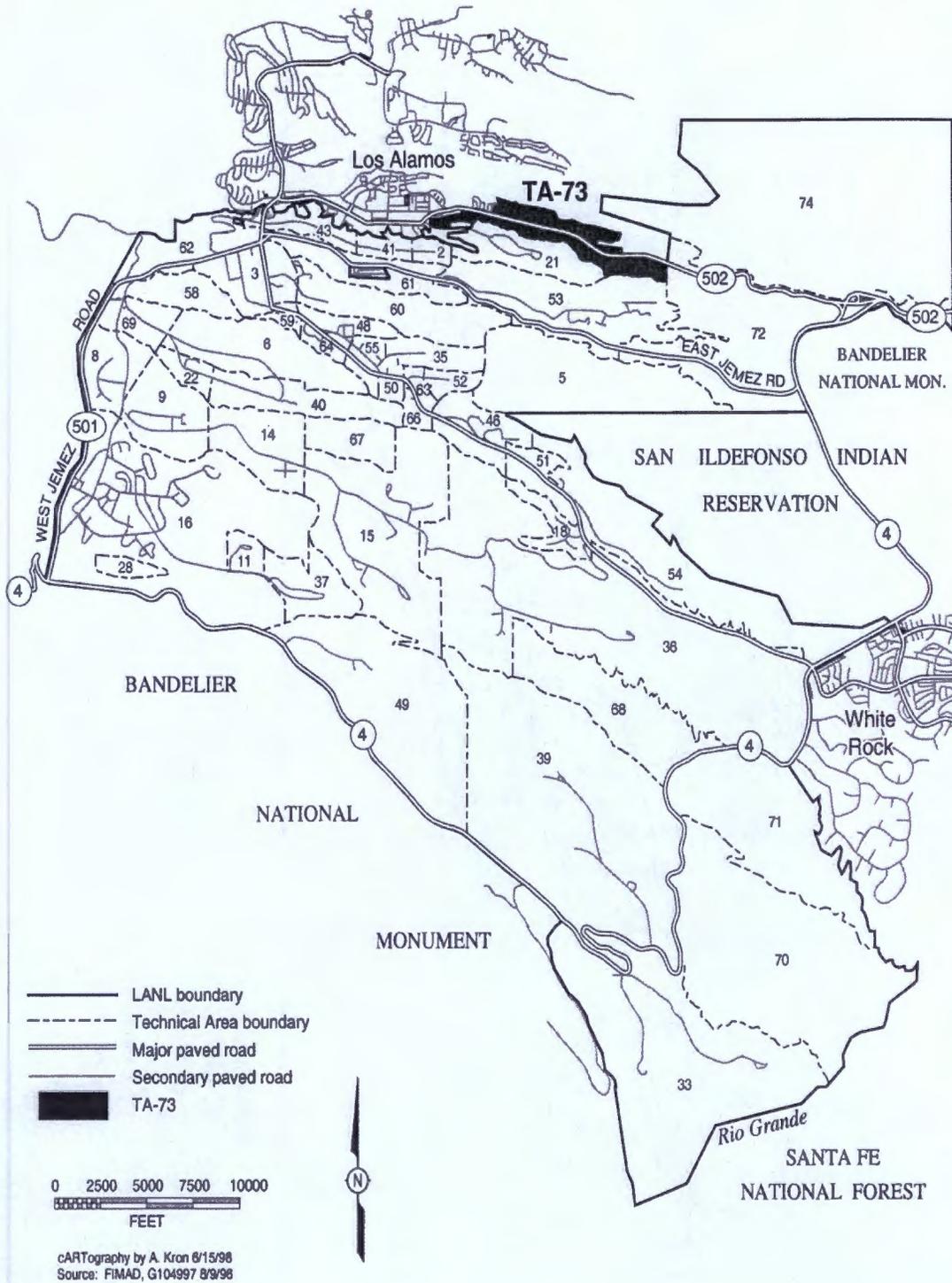


Figure 1.3-1. Location of TA-73

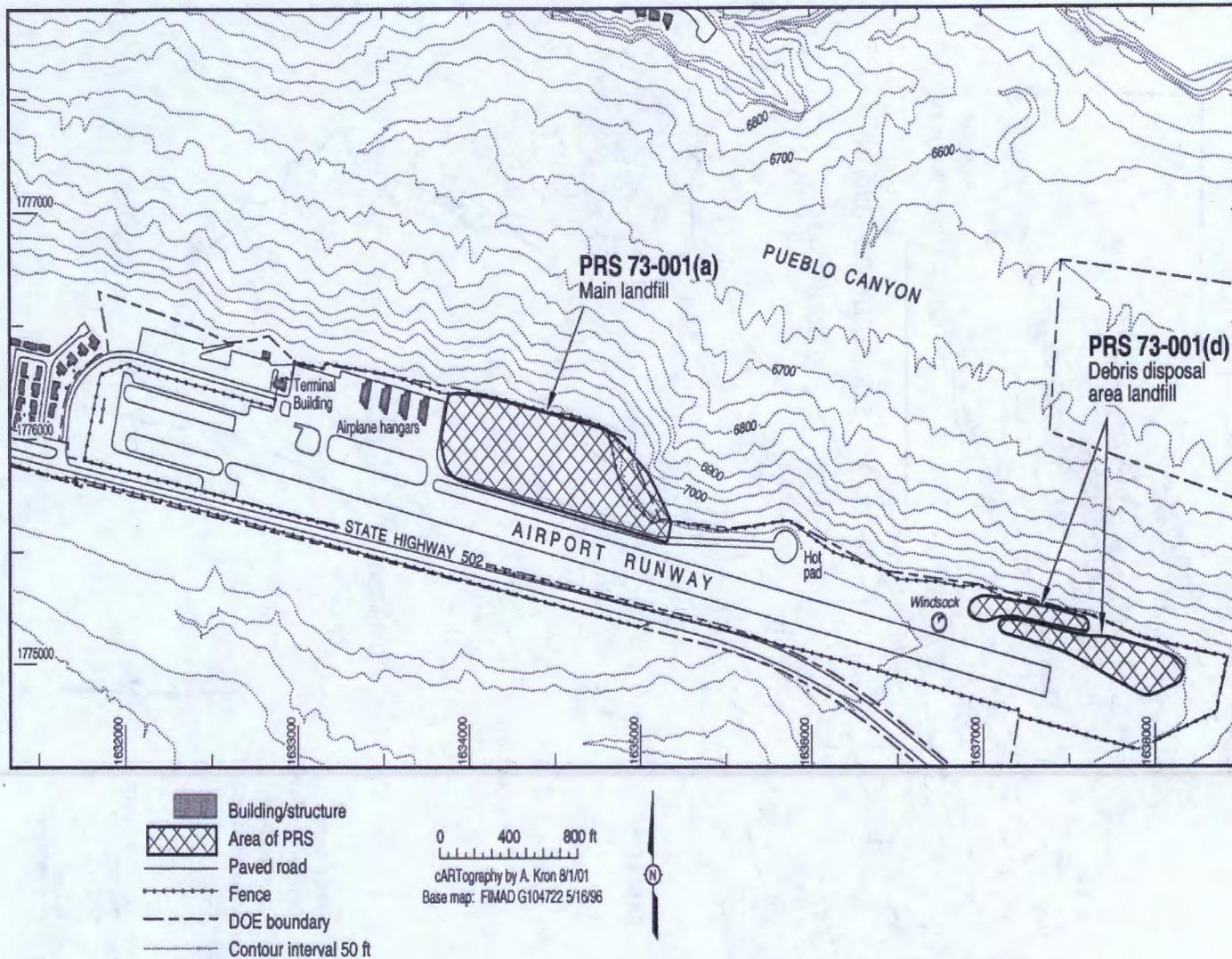


Figure 1.3-2. Location of the main landfill and debris disposal area at TA-73 (LANL 2002)  
 Note: "PRS" has changed to "SWMU"

## 14.0 REFERENCES

10 CFR 830, 2003, Title 10, "Energy," Subpart A, 830.120, "Quality Assurance Requirements," *Code of Federal Regulations* (CFR), U.S. Government Printing Office, Washington D.C.

29 CFR 1926.65, 2003, Title 29, "Labor," Part 1926.65, "Hazardous Waste Operations and Emergency Response," *Code of Federal Regulations* (CFR), U.S. Government Printing Office, Washington, D.C.

40 CFR 264.301, 2002, Title 40, "Protection of Environment," Part 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," Section 264.301, "Design and Operating Requirements," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR 265.310, 2002, Title 40, "Protection of Environment," Part 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," Section 265.310, "Closure and post-closure care," *Code of Federal Regulations*, Office of the Federal Register.

D.B. Stephens & Associates, Inc. 1993, "Preliminary Geologic and Hydrologic Conceptual Model of the TA-73 Area, Los Alamos, New Mexico," January 1993.

DOE, 1993, "DOE Order 5480.4, Change 4, Environmental Protection, Safety, and Health Protection Standards," U.S. Department of Energy, Office of Environment, Safety and Health, Washington, D.C., January 7, 1993.

DOE, 2001, "DOE Order 414.1A, Quality Assurance," U.S. Department of Energy, Office of Environment, Safety and Health, Washington, D.C.

DOE, 2005a, "National Nuclear Security Administration Los Alamos Site Office Environmental Assessment for Proposed Closure of the Airport Landfills Within Technical Area 73 at Los Alamos National Laboratory, Los Alamos, New Mexico," DOE/EA-1515, U.S. Department of Energy, May 2005.

DOE, 2005b, "Finding of No Significant Impact (FONSI) for the Proposed Action to Implement Corrective Measures to the Landfills within Los Alamos National Laboratory's Technical Area 73." U.S. Department of Energy, May 22, 2005.

[EPA 1989, "Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments", U.S. Environmental Protection Agency, EPA/530-SW-89-047, July 1989.](#)

EPA 2003, "Site Technology Capsule, MatCon™ Modified Asphalt for Waste Containment", U. S. EPA, EPA/540/R-03/505a, June 2003.

FR, 2003, Part 68 FR 39087, "Final National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges From Construction Activities," Volume 68, Number 126, pages 39087-39091, *Federal Register*, Government Printing Office, Washington D.C., July 1, 2003.

LANL, 1996, "LANL HSWA Module VIII Permit, 1996 Revision (guidance)," Los Alamos National Laboratory, Los Alamos, New Mexico (57486), January 1996.

LANL, 2002, "Voluntary Corrective Measure Plan for Potential Release Sites 73-001(a)-99 and 73-001(b)-99," Los Alamos National Laboratory document LA-UR-02-4433, Los Alamos National Laboratory, Los Alamos, New Mexico (74007.2), October 2002.

NMAC, 2003, New Mexico Administrative Code 20.4.1.600, "Adoption of 40 CFR Part 265," published by the Commission of Public Records, Administrative Law Division, *New Mexico Administrative Code*, Santa Fe, New Mexico, October 1, 2003.

NMED, 2002, Los Alamos National Laboratory Order of November 26, 2002, entitled "State of New Mexico Environment Department in the Matter of: The United States Department of Energy and the

University of California; Los Alamos National Laboratory Los Alamos County, New Mexico, Respondents. Order Proceeding under the New Mexico Hazardous Waste Act §§ 74-4-10.1 and 74-4-13," New Mexico Environment Department, Santa Fe, New Mexico, November 26, 2002.

NMED, 2003, Letter from Ms. Vickie Maranville (New Mexico Environment Department) to Mr. G. Pete Nanos (Los Alamos National Laboratory) and Mr. Everett Trollinger (U.S. Department of Energy, Los Alamos Site Office), "Conditional Approval of Voluntary Corrective Measures (VCM) Plan for Potential Release Sites (PRSs) 73-001(a)-99 and 73-001(b)-99," Los Alamos National Laboratory EPA ID# NM0890010515 HWB-Facility-02-020, New Mexico Environment Department, Santa Fe, New Mexico, April 1, 2003.

NMED, 2004, Letter from Nick Schiavo (New Mexico Environment Department) to David Gregory (Department of Energy) and G. Pete Nanos (Los Alamos National Laboratory), "Notice of Approval with Modifications of Phase II Work Plan for Los Alamos Site Office TA-73 Airport Landfill SWMU-73-001 (a-d), September 2, 2004.

NMED, 2005, "Compliance Order on Consent Proceeding under the New Mexico Hazardous Waste Act § 74-4-10 and the New Mexico Solid Waste Act § 74-9-36(D)," issued by the New Mexico Environment Department Hazardous Waste Bureau, New Mexico Environment Department, Santa Fe, New Mexico, March 1, 2005.

NMED 2006, "Notice of Disapproval, Remedy Design Work Plan for the Los Alamos Site Office TA-73 Airport Landfill, Revision 1, Los Alamos National Laboratory, NM0890010515, HWB-LANL-05-015, January 4, 2006.

North Wind, 2004, "Phase II Work Plan for the Los Alamos Site Office TA-73 Airport Landfill", Final Revision 0, NW-ID-2004-031, North Wind, Inc., April 2004.

North Wind, 2005a, "Construction Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 2, NW-ID-2004-001, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005b, "Construction Quality Control Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 2, NW-ID-2004-016, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005c, "Waste Management Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2004-006, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005d, "Post-closure Care and Monitoring Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2004-027, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005e, "Storm Water Pollution and Prevention Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 2, NW-ID-2004-005, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005f, "Project Quality Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 2, NW-ID-2003-071, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005g, "Health and Safety Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2004-017, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005h, "Project Management Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 2, NW-ID-2003-073, North Wind Inc., Idaho Falls, Idaho, June 2005.

Rogers, D., and B. Gallaher, 1995, "The Unsaturated Hydraulic Characteristics of the Bandelier Tuff", LA-12968-MS, Los Alamos, New Mexico, September 1995.

Rust, T, E-mail from Terry Rust, Los Alamos National Laboratory, to John Davis, North Wind Inc., "Ground water Monitoring Data," Idaho Falls, Idaho, March 16, 2004.

The following are NWI quality documents that are controlled in accordance with QAP-10-171, Records Control. The latest revision applies.

PWI-4201-001, Project Files

PWI-4201-002, Field Activities Documentation

PWI-4201-004, Readiness Assessment

PWI-4201-005, Field Change



**15.0 ACRONYMS**

BMP	Best Management Practice
CFR	<i>Code of Federal Regulations</i>
CQCP	Construction Quality Control Plan
DDA	Debris Disposal Area
DOE	U.S. Department of Energy
EA	Environmental Assessment
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration
<u>FML</u>	<u>Flexible Membrane Liner</u>
FONSI	Finding of No Significant Impact
HASP	Health and Safety Plan
<u>HELP</u>	<u>Hydrologic Evaluation of Landfill Performance</u>
LAC	Los Alamos County
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
LEL	Lower explosive limit
MatCon™	Modified Asphalt Technology for Waste Containment
<u>MSE</u>	<u>Mechanically Stabilized Earth</u>
<u>MTG</u>	<u>Minimum Technology Guidance</u>
NMED	New Mexico Environment Department
NWI	North Wind Inc.
PCMP	Post-closure Care and Monitoring Plan
PMP	Project Management Plan
PQP	Project Quality Plan
PWI	Project Work Instruction

QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
<u>RDWP</u>	<u>Remedy Design Work Plan</u>
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution and Prevention Plan
TA	Technical Area
VCM	Voluntary Corrective Measure
WMP	Waste Management Plan

**Attachment A**  
**Final Design Package**  
**(Specifications, Drawings, and Calculations)**



Revision 2

**CONSTRUCTION DRAWINGS  
FOR THE LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILL**

April 2006

Prepared for:

U. S. Department of Energy, National Nuclear Security Administration  
Los Alamos Site Office  
528 35<sup>th</sup> Street  
Los Alamos, New Mexico 87544

Prepared by:

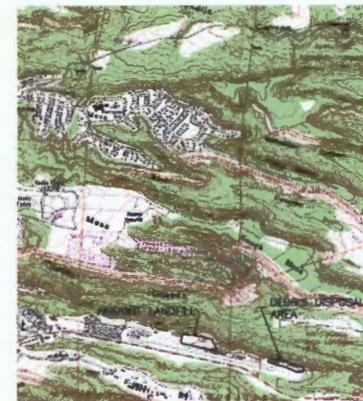
North Wind Inc.  
1425 Higham Street  
Idaho Falls, Idaho 83402

U.S. DEPARTMENT OF ENERGY  
LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
FINAL CLOSURE DESIGN, REV. A

LIST OF DRAWINGS:

DRAWING NO.	TITLE
COVER	COVER SHEET/INDEX OF DRAWINGS
1000	GENERAL NOTES, UTILITY LIST & LEGEND
2000	SITE DEVELOPMENT PLAN
2001	LANDFILL - EXCAVATION TICK PLAN
2002	LANDFILL - TOP OF CAP GRADING PLAN
2003	LANDFILL - STORM SEWER PLAN AND PROFILE
2004	GENERAL SITE DETAILS
2005	CAPPING SYSTEM DETAILS SHEET 1 OF 2
2006	WALL PLAN AND WALL SECTIONS, SHEET 1 OF 3
2007	WALL SECTIONS, SHEET 2 OF 3
2008	WALL SECTIONS, SHEET 3 OF 3
2009	WALL ELEVATIONS
2010	LANDFILL - GAS COLLECTION SYSTEM PLAN
2011	LANDFILL - GAS COLLECTION SYSTEM DETAILS
2012	LANDFILL CROSS-SECTIONS B, C, AND D, SHEET 1 OF 2
2013	LANDFILL CROSS-SECTION F, SHEET 2 OF 2
2014	DEBRIS DISPOSAL AREA - FILL PLAN
2015	DEBRIS DISPOSAL AREA - TOP OF CAP GRADING PLAN
2016	DEBRIS AREA CROSS-SECTIONS C, D, E, AND F, SHEET 1 OF 2
2017	DEBRIS AREA CROSS-SECTIONS C, D, E, AND F, SHEET 2 OF 2
2018	EROSION AND SEDIMENTATION CONTROL PLAN - LANDFILL AREA
2019	EROSION AND SEDIMENTATION CONTROL PLAN - DEBRIS DISPOSAL AREA
2020	EROSION AND SEDIMENTATION CONTROL NOTES
2021	STORMWATER CONTROL DETAILS, SHEET 1 OF 2
2022	STORMWATER CONTROL DETAILS, SHEET 2 OF 2
2023	EROSION AND SEDIMENTATION CONTROL DETAILS
2024	HANGER PLAN
2025	CAPPING SYSTEM DETAILS SHEET 2 OF 2
3000	STRUCTURAL WALL 1 PLAN AND ELEVATIONS
3001	STRUCTURAL WALL 1 SECTIONS
3002	STRUCTURAL WALL 1 DETAILS

LOS ALAMOS COUNTY, NM  
W.O. NO. 13104.002.001.7000



LOCATION MAP  
1"=2,000'



APPROVED FOR CONSTRUCTION

**GENERAL NOTES**

- BASE MAP OBTAINED FROM:  
GISLAB  
MAP NO. M200001  
FEBRUARY 26, 2002
- DEBRIS DISPOSAL AREA GROUND SURVEY BY:  
ALBUQUERQUE SURVEYING COMPANY INC.  
FEBRUARY 2004
- HORIZONTAL DATUM: STATE PLANE COORDINATE SYSTEM NAD83  
(SOUTH ZONE) US SURVEY UNITS  
VERTICAL DATUM: NAVD88 US SURVEY FOOT UNITS
- UNDERGROUND UTILITIES
  - ALL APPROPRIATE UTILITIES WILL BE NOTIFIED OF THE WORK SCHEDULE PRIOR TO THE START OF CONSTRUCTION. EACH UTILITY OWNER SHALL VERIFY AND MARK THE LOCATION OF THEIR RESPECTIVE MAIN AND SERVICE LINES IN THE FIELD BEFORE THE START OF WORK.
  - THE LOCATIONS OF EXISTING UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE BASED ON THE BEST AVAILABLE INFORMATION AND DATA PROVIDED BY ALBUQUERQUE SURVEYING COMPANY INC. THE ACCURACY OF LOCATIONS FOR EXISTING SUBSURFACE UTILITY STRUCTURES SHOWN ON THE DRAWINGS IS NOT GUARANTEED. ALL EXISTING SURFACE OR SUBSURFACE UTILITIES MAY NOT BE SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE PRESENCE AND LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
  - NECESSARY PRECAUTIONS WILL BE TAKEN TO MAINTAIN EXISTING UTILITIES SERVICE. ALL UTILITY MAINS, LATERALS AND SERVICE UTILITY LINES EXPOSED DURING CONSTRUCTION SHALL BE SECURED AND PROTECTED THROUGHOUT ALL OPERATIONS. IN THE EVENT THAT ANY EXISTING UTILITY LINE IS DAMAGED, THE CONTRACTOR WILL NOTIFY THE UTILITY OWNER IMMEDIATELY. ALL REPAIRS SHALL BE DIRECTED BY THE UTILITY OWNER.
- FIELD MEASUREMENTS OF THE HORIZONTAL AND VERTICAL AS-BUILT LOCATIONS SHALL BE MAINTAINED AND SHALL BE RECORDED ON THE DRAWINGS FOR THE DEVELOPMENT OF FINAL RECORD PLANS.
- ACCESS TO WORK AREAS WILL FOLLOW THE ROUTES SHOWN ON THE SITE DEVELOPMENT PLAN. THERE WILL BE NO DEVIATION FROM THE ROUTE, UNLESS APPROVED BY THE ENGINEER.
- ALL CONSTRUCTION EQUIPMENT AND VEHICLES WILL ADHERE TO FAA CIRCULARS FOR SIGNAGE.
- NORTHWIND\WESTON TEAM SHALL HEREAFTER BE REFERRED TO AS THE CONTRACTOR.

**LIST OF UNDERGROUND USERS**

ONE CALL SYSTEM TELEPHONE NO. 1-505-260-1990  
nmonecall.org (REFERENCE COMPANY CODE 645)

USER'S NAME	TELEPHONE
LOS ALAMOS COUNTY	505-260-1990
LOS ALAMOS CABLE	800-826-1954
PNM GAS	800-464-7462
USWEST COMMUNICATIONS	800-573-1311
COMCAST	505-260-1990
QWEST COMMUNICATIONS	800-321-2537

IN CASE OF EMERGENCY CALL 1-866-DIG-NWOC (1-866-344-6662)  
DURING REGULAR BUSINESS HOURS.

**AIRPORT MONUMENTS**

DESCRIPTION	SPC	GEODETIC	ELEVATION
R/W 27	1774918.731 1637374.111	35° 52' 41.413" N 106° 15' 36.974" W	7087.890
R/W 9	1776111.273 1631956.007	35° 52' 53.197" N 106° 16' 42.822" W	7170.640
MONUMENT A0001 "AIRPORT"	1775240.121 1634333.458	35° 52' 44.586" N 106° 16' 13.927" W	7136.000

**NOTES:**

- RUNWAY END MONUMENTS ARE ALUMINUM CAPS MARKED LS 8670.
- MONUMENT A0001 IS BRASS CAP MARKED LIMBAUGH "AIRPORT".
- LAT/LONG, SPC, AND ELEVATION DATA SHOWN ABOVE IS FROM CONTROL SURVEY MAP PERFORMED BY JIM BOTSFORD, NMPS #5211, OCTOBER 2002.
- ELEVATION IS MSL IN FEET.

**LEGEND**

-----	PROPERTY LINE	△	CONTROL POINT
- - - - -	FENCE	✕ <sup>71+5.55</sup>	SPOT ELEVATION
- · - · -	SEWER		
- · - · -	WATER		
7200	EXISTING CONTOUR		
7200	PROPOSED CONTOUR		

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
NEW MEXICO



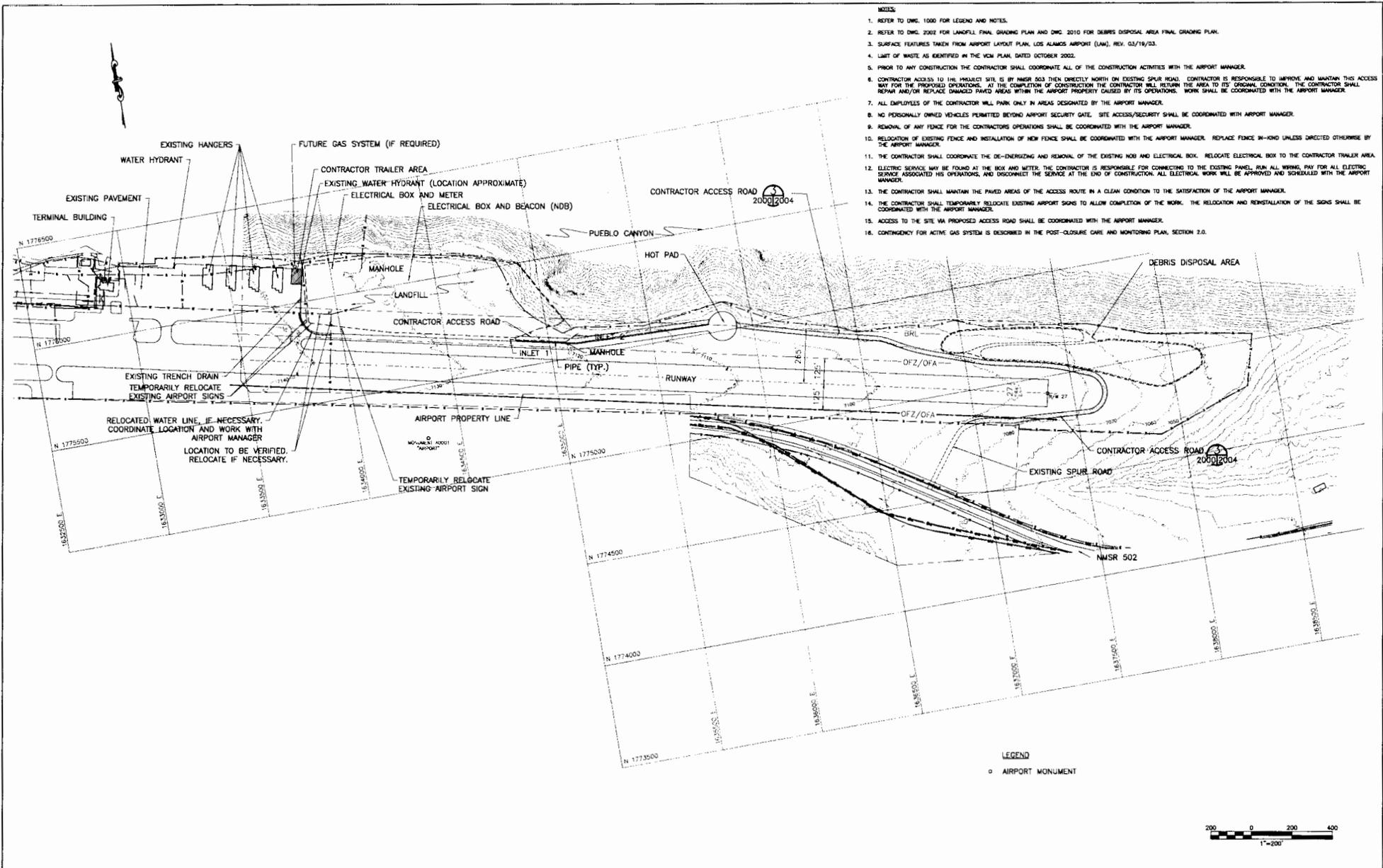
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REV. DATE	AH		5/22/05		
PROJ. MGR.	AH		6/22/05		
APPROVED	BK		6/22/05		
APP'D	BK		5/22/05		



**GENERAL NOTES, UTILITY LIST & LEGEND**

OWNER	GDM	DATE	02/06/04	DRAW. NO.	1000	REV. NO.	A
SCALE	N.T.S.	P.L. NO.	13104.002.001	SHEET		OF	

G:\CAD\PROJ\13104.002.001\LANDFILL\1000.DWG



- NOTES:**
- REFER TO DWG. 1000 FOR LEGEND AND NOTES.
  - REFER TO DWG. 2002 FOR LANDFILL FINAL GRADING PLAN AND DWG. 2010 FOR DEBRIS DISPOSAL AREA FINAL GRADING PLAN.
  - SURFACE FEATURES TAKEN FROM AIRPORT LAYOUT PLAN, LOS ALAMOS AIRPORT (LAP), REV. 03/19/03.
  - LIMIT OF WASTE AS IDENTIFIED IN THE VCM PLAN, DATED OCTOBER 2002.
  - PRIOR TO ANY CONSTRUCTION THE CONTRACTOR SHALL COORDINATE ALL OF THE CONSTRUCTION ACTIVITIES WITH THE AIRPORT MANAGER.
  - CONTRACTOR ACCESS TO THE PROJECT SITE IS BY NWSR 502 THEN DIRECTLY NORTH ON EXISTING SPUR ROAD. CONTRACTOR IS RESPONSIBLE TO IMPROVE AND MAINTAIN THIS ACCESS WAY FOR THE PROPOSED OPERATIONS. AT THE COMPLETION OF CONSTRUCTION THE CONTRACTOR WILL RETURN THE AREA TO ITS ORIGINAL CONDITION. THE CONTRACTOR SHALL REPAIR AND/OR REPLACE DAMAGED PAVED AREAS WITHIN THE AIRPORT PROPERTY CAUSED BY ITS OPERATIONS. WORK SHALL BE COORDINATED WITH THE AIRPORT MANAGER.
  - ALL EMPLOYEES OF THE CONTRACTOR WILL PARK ONLY IN AREAS DESIGNATED BY THE AIRPORT MANAGER.
  - NO PERSONALLY OWNED VEHICLES PERMITTED BEYOND AIRPORT SECURITY GATE. SITE ACCESS/SECURITY SHALL BE COORDINATED WITH AIRPORT MANAGER.
  - REMOVAL OF ANY FENCE FOR THE CONTRACTORS OPERATIONS SHALL BE COORDINATED WITH THE AIRPORT MANAGER.
  - RELOCATION OF EXISTING FENCE AND INSTALLATION OF NEW FENCE SHALL BE COORDINATED WITH THE AIRPORT MANAGER. REPLACE FENCE IN-ROAD UNLESS DIRECTED OTHERWISE BY THE AIRPORT MANAGER.
  - THE CONTRACTOR SHALL COORDINATE THE DE-ENERGIZING AND REMOVAL OF THE EXISTING HOB AND ELECTRICAL BOX. RELOCATE ELECTRICAL BOX TO THE CONTRACTOR TRAILER AREA.
  - ELECTRIC SERVICES MAY BE FOUND AT THE BOX AND METER. THE CONTRACTOR IS RESPONSIBLE FOR CONNECTING TO THE EXISTING PANEL. RUN ALL WIRING, PAY FOR ALL ELECTRIC SERVICE ASSOCIATED HIS OPERATIONS AND DISCONNECT THE SERVICE AT THE END OF CONSTRUCTION. ALL ELECTRICAL WORK WILL BE APPROVED AND SCHEDULED WITH THE AIRPORT MANAGER.
  - THE CONTRACTOR SHALL MAINTAIN THE PAVED AREAS OF THE ACCESS ROUTE IN A CLEAN CONDITION TO THE SATISFACTION OF THE AIRPORT MANAGER.
  - THE CONTRACTOR SHALL TEMPORARILY RELOCATE EXISTING AIRPORT SIGNS TO ALLOW COMPLETION OF THE WORK. THE RELOCATION AND REINSTALLATION OF THE SIGNS SHALL BE COORDINATED WITH THE AIRPORT MANAGER.
  - ACCESS TO THE SITE VIA PROPOSED ACCESS ROAD SHALL BE COORDINATED WITH THE AIRPORT MANAGER.
  - CONTINGENCY FOR ACTIVE GAS SYSTEM IS DESCRIBED IN THE POST-CLOSURE CARE AND MONITORING PLAN, SECTION 2.0.

**LEGEND**  
 ○ AIRPORT MONUMENT

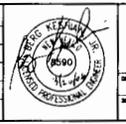


NO.	DATE	APP.	REVISION
1	6/22/05	AK	ISSUED FOR CONSTRUCTION
2	6/22/05	AK	REVISED PER NMD COMMENTS
3	6/22/05	AK	FINAL ISSUED TO NMD FOR PERMIT REVIEW
4	6/22/05	AK	ROE ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE  
 TA-73 AIRPORT LANDFILLS  
 LOS ALAMOS NEW MEXICO

**North Wind WESTON TEAM**

DESIGNED	DATE	CHECK APPROVAL	DATE
RW/M	6/22/05		
DRG. ENR.	AK	6/22/05	
PRJ. ENR.	AK	6/22/05	
PRJ. MGR.	AK	6/22/05	
APPROVED	AK	6/22/05	



**SITE DEVELOPMENT PLAN**

CDM DATE: 02/06/04 DRAWING NO.: 2000  
 SCALE: 1"=200' N.A. NO.: 13104.002.001

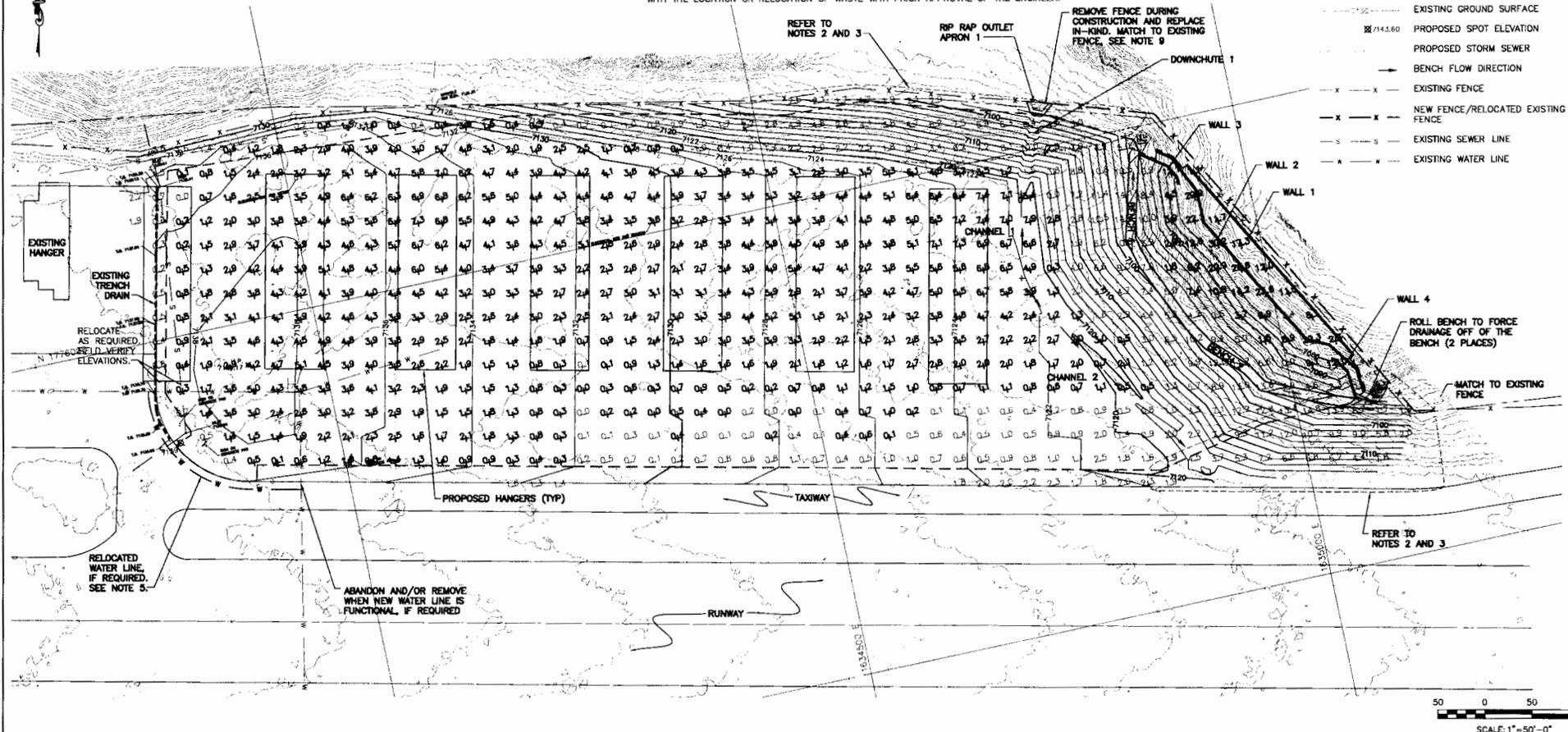
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**NOTES:**

- CONTRACTOR ACCESS TO THE PROJECT SITE IS FROM ROUTE NMSR 502.
- THE NATURAL GRADES OF THE ORIGINAL HANGING VALLEY, PRIOR TO BEGINNING OF WASTE DISPOSAL, ARE NOT SHOWN ON THIS DRAWING. THE GRADING PLAN SHOWN FOR THE EAST SLOPE WILL BE REVISED AS NEEDED IF NATIVE GROUND IS ENCOUNTERED DURING EXCAVATION. SLOPES ON WASTE WILL BE CONSTRUCTED AS SHOWN, HOWEVER SLOPES ON NATIVE GROUND, IF ENCOUNTERED, WILL BE ASSESSED BY THE ENGINEER AND MAY BE STEEPER THAN SHOWN. NATIVE ROCK WILL NOT BE EXTENSIVELY EXCAVATED. ALL REVISED GRADES WILL BE REVIEWED BY THE ENGINEER.
- THE CONTRACTOR SHALL FURNISH AN INTERIM SURVEY OF THE SURFACE OF NATIVE SOIL EXPOSED AS A RESULT OF WASTE EXCAVATION FROM THE EAST SLOPE FOR REVIEW BY THE ENGINEER. THE SURVEY SHALL INCLUDE THE EXPOSED NATIVE SOIL SURFACE, THE EXCAVATED WASTE SURFACE, AND THE UNDISTURBED NATIVE SOIL ACROSS THE EAST SLOPE OF THE LANDFILL.
- THE CONTRACTOR SHALL NOT ORDER/PURCHASE STORMWATER INLETS 1 TO 13 AND MANHOLE 1 AND ASSOCIATED PIPE UNTIL WASTE HAS BEEN EXCAVATED FROM THE SOUTH EAST CORNER OF THE LANDFILL, AND THE ENGINEER HAS REVIEWED THE TOPOGRAPHIC SURVEY OF THE EXCAVATED SURFACE. THE CONTRACTOR MUST RECEIVE APPROVAL FROM THE ENGINEER PRIOR TO ORDERING/PURCHASING THIS MATERIAL.
- CONTRACTOR TO FIELD VERIFY PRESENCE/LOCATION EXISTING WATERLINE AND COORDINATE RELOCATION WITH ENGINEER AND AIRPORT MANAGER.
- TICK PLAN BELOW DEPICTS EXCAVATION OR FILL REQUIRED FROM EXISTING GRADES TO THE ELEVATIONS OF THE BOTTOM OF CAP WHICH IS THE TOP OF THE EXISTING/RELOCATED INTERIM COVER MATERIAL.
- THE CONTRACTOR SHALL REMOVE ALL WASTE IN THE AREA WEST OF THE LANDFILL CAP BETWEEN THE EDGE OF CAP AND EDGE OF PAVEMENT AND RELOCATE IT WITHIN THE LIMIT OF THE FINAL COVER SYSTEM. ALL WASTE SHALL BE RELOCATED SUCH THAT THE LIMIT OF WASTE SHALL BE OFF-SET INSIDE THE LIMIT OF FINAL COVER SYSTEM A MINIMUM DISTANCE OF 1-FOOT. THIS AREA SHALL BE BACKFILLED WITH EXISTING/RELOCATED INTERIM FILL. THE CONTRACTOR SHALL PROTECT THE EXISTING PAVEMENT, TRENCH DRAIN AND STORM SEWER DURING THIS ACTIVITY.
- THE CONTRACTOR SHALL ENSURE THAT ALL WASTE LOCATED OUTSIDE OF THE FINAL COVER SYSTEM INCLUDING THE AREA ALONG THE SOUTH SIDE OF THE LANDFILL IS RELOCATED WITHIN THE LIMIT OF FINAL COVER SYSTEM. ALL WASTE SHALL BE RELOCATED SUCH THAT THE LIMIT OF WASTE SHALL BE OFF-SET INSIDE THE LIMIT OF FINAL COVER SYSTEM A MINIMUM DISTANCE OF 1-FOOT. ANY EXCAVATIONS BEYOND THE EDGE OF CAP SHALL BE BACKFILLED WITH EXISTING/RELOCATED INTERIM FILL.
- THE CONTRACTOR SHALL DETERMINE THE EXTENT OF FENCE RELOCATION/REPLACEMENT REQUIRED. WORK SHALL BE COORDINATED WITH THE AIRPORT MANAGER.
- THE CONTRACTOR SHALL CONTINUOUSLY MONITOR WASTE EXCAVATION AND WASTE PLACEMENT. WASTE PLACEMENT SHALL BE SEQUENCED IN A MANNER THAT WILL ASSURE THE MINIMUM REQUIRED SLOPES INDICATED ON THIS DRAWING ARE ACHIEVED. BECAUSE THE VOLUME OF WASTE TO BE RELOCATED CANNOT BE ACCURATELY QUANTIFIED AND BECAUSE SETTLEMENT IS ANTICIPATED TO OCCUR DURING CONSTRUCTION, THE ELEVATIONS SHOWN ON THIS DRAWING MAY HAVE TO BE ADJUSTED. THE LIMIT OF THE FINAL COVER SYSTEM MAY BE ADJUSTED IN THE FIELD CONSISTENT WITH THE LOCATION OR RELOCATION OF WASTE WITH PRIOR APPROVAL OF THE ENGINEER.
- FOR STORM SEWER PLAN AND PROFILE, SEE DRAWING 2003.
- FOR GAS COLLECTION SYSTEM PLAN, SEE DRAWING 2010.
- FOR HANGER LAYOUT PLAN, SEE DRAWING 2024.

**LEGEND**

QB	FILL (IN FEET)
0.4	CUT (IN FEET)
---	PROPERTY BOUNDARY
---	LIMIT OF LANDFILL FINAL COVER SYSTEM
---	71.30 TOP OF PREPARATORY SURFACE
---	EXISTING GROUND SURFACE
---	PROPOSED SPOT ELEVATION
---	PROPOSED STORM SEWER
---	BENCH FLOW DIRECTION
-x-x-	EXISTING FENCE
-x-x-	NEW FENCE/RELOCATED EXISTING FENCE
-s-s-	EXISTING SEWER LINE
-x-x-	EXISTING WATER LINE

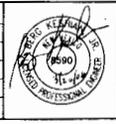


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NO.	DATE	APP.	REVISION
1	02/06/04	GDW	ISSUED FOR CONSTRUCTION
2	02/22/05	SW	REVISED PER NMD COMMENTS
3	02/22/05	SW	FINAL ISSUED TO NMD FOR PERMIT REVIEW
4	02/22/05	SW	BOE ISSUED TO DOE FOR REVIEW

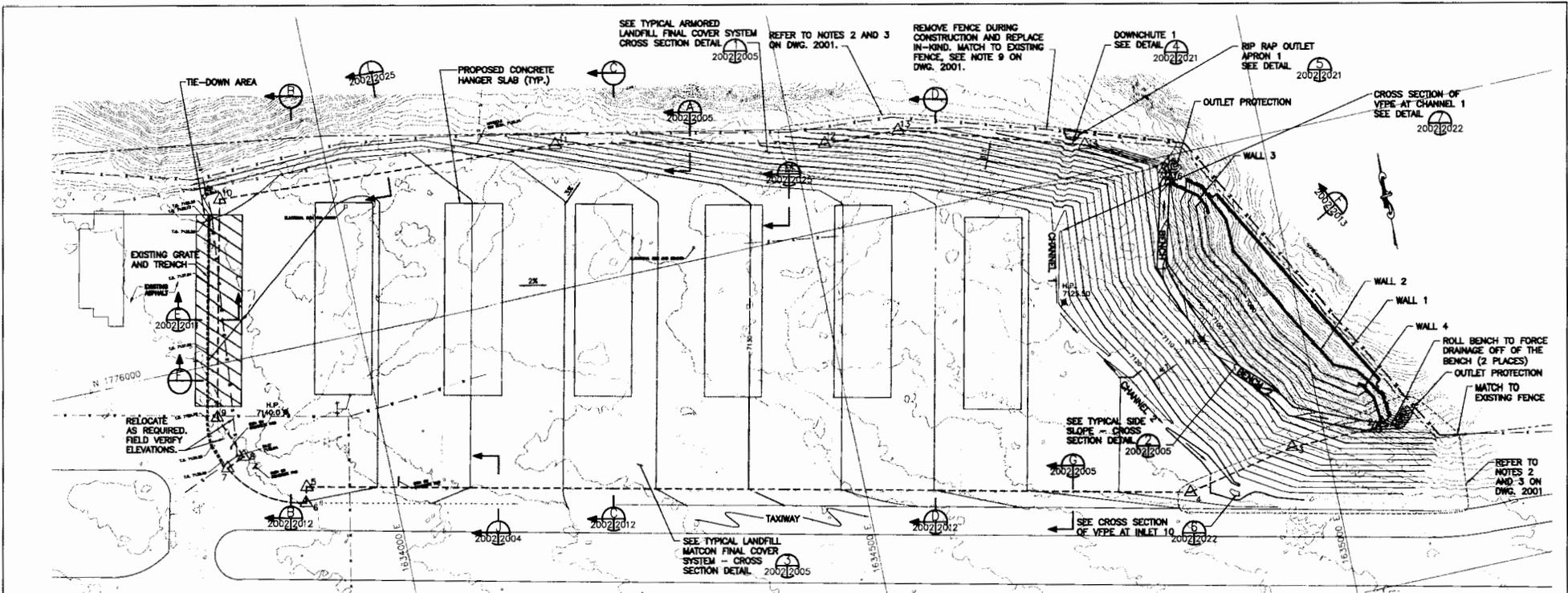
LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
NEW MEXICO

DESIGNED	DATE	CHECKED	DATE
RWM	5/22/05	SW	8/22/05
SW	8/22/05	SW	8/22/05
SW	8/22/05	SW	8/22/05
SW	8/22/05	SW	8/22/05



**LANDFILL EXCAVATION TICK PLAN**

OWNER	DATE	SCALE	PROJECT NO.	REV. NO.
GDW	02/06/04	AS SHOWN	13104.002.001	2001

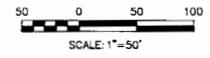


PLAN  
1"=50'

- NOTES:
- FOR STORM SEWER PLAN AND PROFILE, SEE DRAWING 2003.
  - FOR GAS COLLECTION SYSTEM PLAN, SEE DRAWING 2010.
  - FOR HANGER LAYOUT PLAN, SEE DRAWING 2024.
  - THE LIMIT OF THE FINAL COVER SYSTEM MAY BE ADJUSTED IN THE FIELD CONSISTENT WITH THE LOCATION OR RELOCATION OF WASTE WITH PRIOR APPROVAL OF THE ENGINEER.
  - ALL WASTE SHALL BE RELOCATED SUCH THAT THE LIMIT OF WASTE SHALL BE OFF-SET INSIDE THE LIMIT OF THE FINAL COVER SYSTEM A MINIMUM DISTANCE OF 1-FOOT.

TOP OF CAP CONTROL POINTS		
NO.	NORTHING	EASTING
1	1775673.657	1635063.617
2	1775669.858	1635056.092
3	1775668.462	1634962.619
4	1775644.003	1634844.563
5	1775850.716	1633907.199
6	1775833.912	1633902.975
7	1775886.377	1633827.472
8	1775896.792	1633847.191
9	1775944.609	1633827.924
10	1776170.955	1633878.790
11	1776151.145	1634246.793
12	1776090.652	1634533.180
13	1776087.664	1634614.125
14	1776030.101	1634809.330
15	1775986.716	1634888.951
16	1775973.170	1634892.218

- LEGEND
- PROPERTY BOUNDARY
  - LIMIT OF LANDFILL FINAL COVER SYSTEM
  - 71.30--- TOP OF CAP ELEVATION
  - 71.30--- EXISTING GROUND SURFACE
  - 7143.50 CONTROL POINT
  - BENCH FLOW DIRECTION
  - - - - - EXISTING FENCE
  - - - - - NEW FENCE/RELOCATED EXISTING FENCE
  - - - - - EXISTING SEWER LINE
  - - - - - EXISTING WATER LINE
  - PAVED AREA
  - CONCRETE HANGER PAD
  - PROPOSED STORM SEWER PIPE



NO.	DATE	APP.	REVISION	REV.	DATE	APP.	REVISION
1	02/06/04	DK	ISSUED FOR CONSTRUCTION				
2	02/06/04	DK	REVISED PER NAMED COMMENTS				
3	02/06/04	DK	FINAL ISSUED TO NAMED FOR PERMIT REVIEW				
4	02/06/04	DK	BOE ISSUED TO DOE FOR REVIEW				

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
NEW MEXICO

North Wind WESTON TEAM

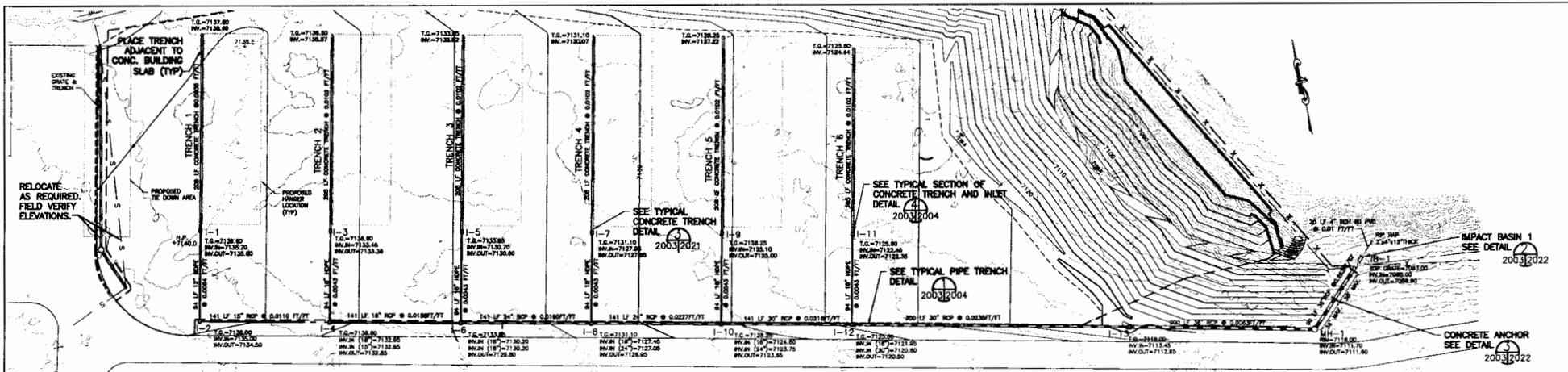
DESIGNED	DATE	CHECKED	DATE
R.W.M.	8/22/05		
S.W.	6/22/05		
A.H.	6/22/05		
B.K.	6/22/05		
B.K.	6/22/05		



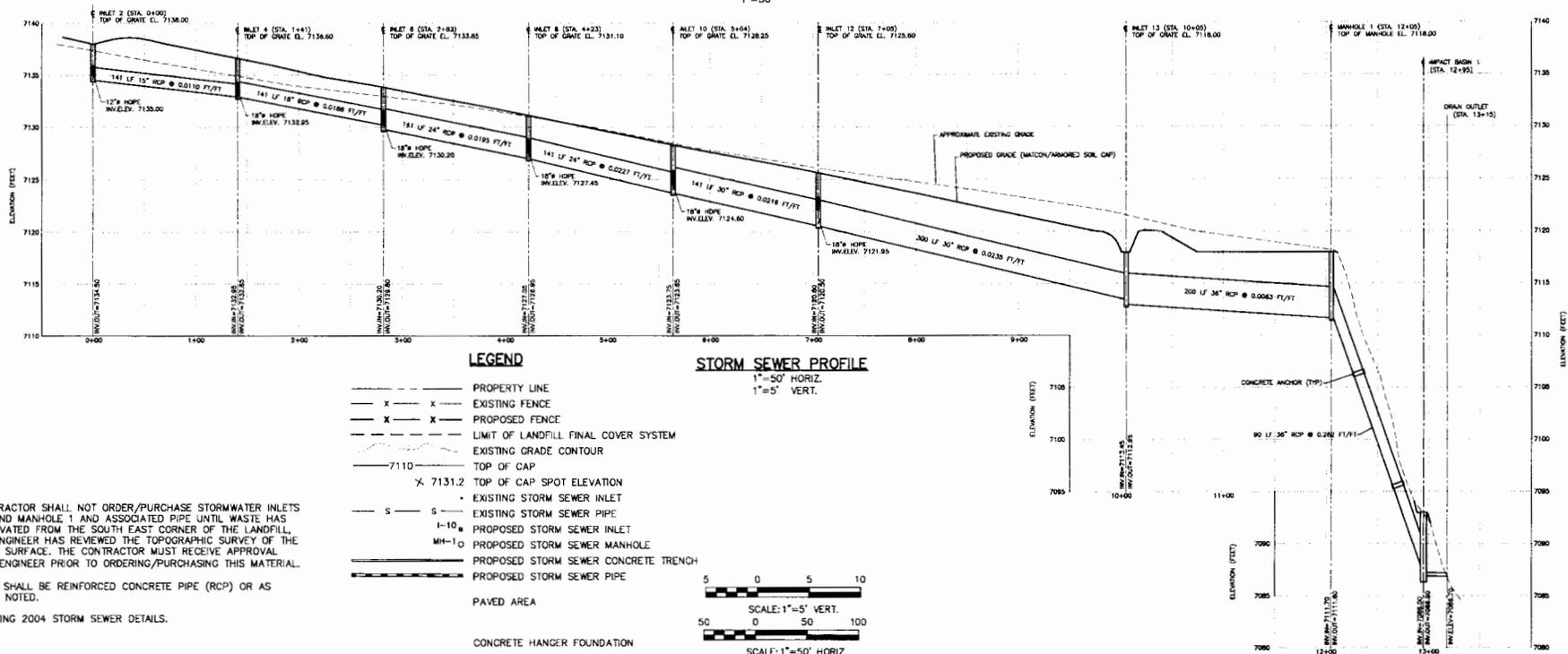
LANDFILL  
TOP OF CAP GRADING PLAN

DATE: 02/06/04  
SCALE: 1"=50'  
SHEET NO.: 1.3104.002.001  
PROJECT NO.: 2002  
REV. NO.: A

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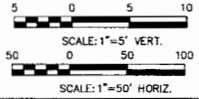
PLAN  
1"=50'



STORM SEWER PROFILE  
1"=50' HORIZ.  
1"=5' VERT.

LEGEND

- PROPERTY LINE
- X - X - EXISTING FENCE
- X - X - PROPOSED FENCE
- - - LIMIT OF LANDFILL FINAL COVER SYSTEM
- - - EXISTING GRADE CONTOUR
- 7110 - TOP OF CAP
- X 7131.2 - TOP OF CAP SPOT ELEVATION
- S - S - EXISTING STORM SEWER INLET
- I-10 - PROPOSED STORM SEWER INLET
- MH-10 - PROPOSED STORM SEWER MANHOLE
- - - PROPOSED STORM SEWER CONCRETE TRENCH
- - - PROPOSED STORM SEWER PIPE
- - - PAVED AREA
- - - CONCRETE HANGER FOUNDATION



NOTES:

1. THE CONTRACTOR SHALL NOT ORDER/PURCHASE STORMWATER INLETS 1 TO 13, AND MANHOLE 1 AND ASSOCIATED PIPE UNTIL WASTE HAS BEEN EXCAVATED FROM THE SOUTH EAST CORNER OF THE LANDFILL, AND THE ENGINEER HAS REVIEWED THE TOPOGRAPHIC SURVEY OF THE EXCAVATED SURFACE. THE CONTRACTOR MUST RECEIVE APPROVAL FROM THE ENGINEER PRIOR TO ORDERING/PURCHASING THIS MATERIAL.
2. ALL PIPE SHALL BE REINFORCED CONCRETE PIPE (RCP) OR AS OTHERWISE NOTED.
3. SEE DRAWING 2004 STORM SEWER DETAILS.

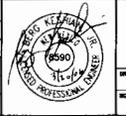
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REV.	DATE	APP.	REVISION	REV.	DATE	APP.	REVISION
A	6/22/05	BK	ISSUED FOR CONSTRUCTION				
2	6/22/05	BK	REVISED PER NAMED COMMENTS				
1	6/22/05	BK	FINAL ISSUED TO NAMED FOR PERMIT REVIEW				
0	6/22/05	AH	90% ISSUED TO DOE FOR REVIEW				

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
NEW MEXICO

North Wind WESTON TEAM SOLUTIONS

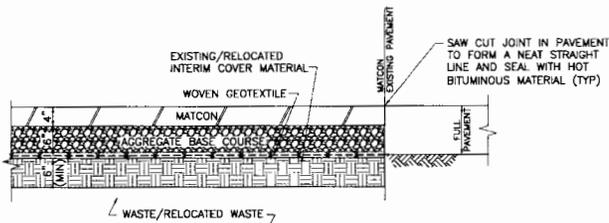
CREATED	BY	DATE	CLIENT APPROVALS	DATE
DESIGN	RVM	6/22/05		
CHECK	SW	6/22/05		
APPROVED	AH	6/22/05		
APPROVED	BK	6/22/05		
APPROVED	BK	6/22/05		



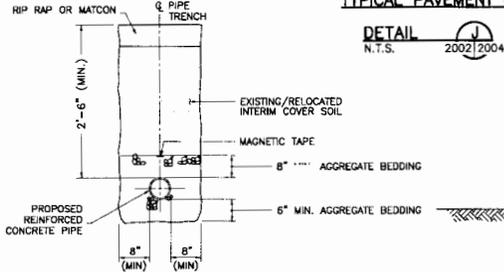
LANDFILL  
STORM SEWER PLAN AND PROFILE

PROJECT: GPL  
DATE: 02/06/04  
SCALE: 1"=50'

DRAWING NO.: 13104.002.001  
REV. NO.: 2003  
REV. BY: A

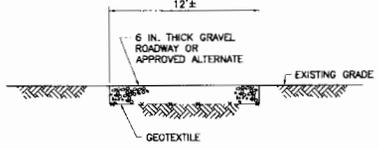


**TYPICAL PAVEMENT JOINT**

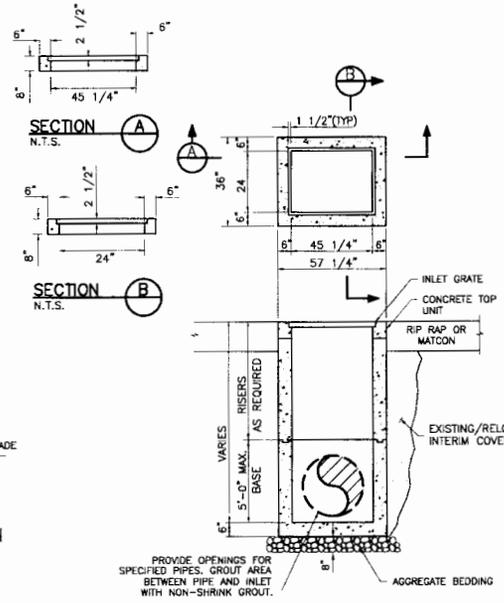


**TYPICAL PIPE TRENCH**

**DETAIL 2**  
N.T.S. 2002/2004

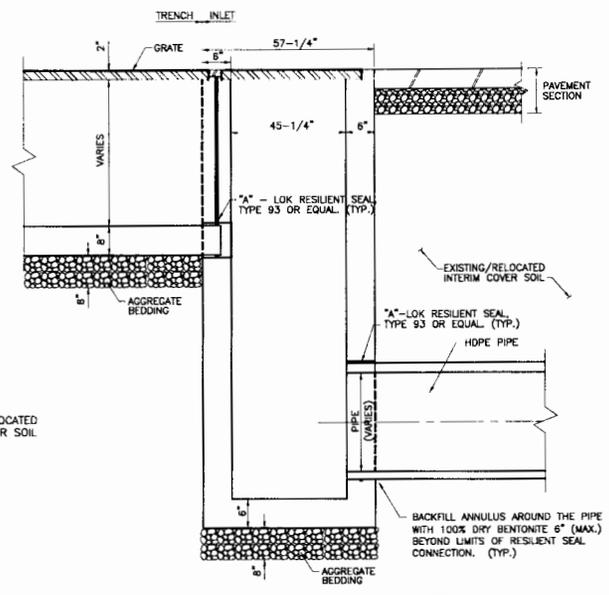


**CONTRACTOR ACCESS ROAD CROSS-SECTION**



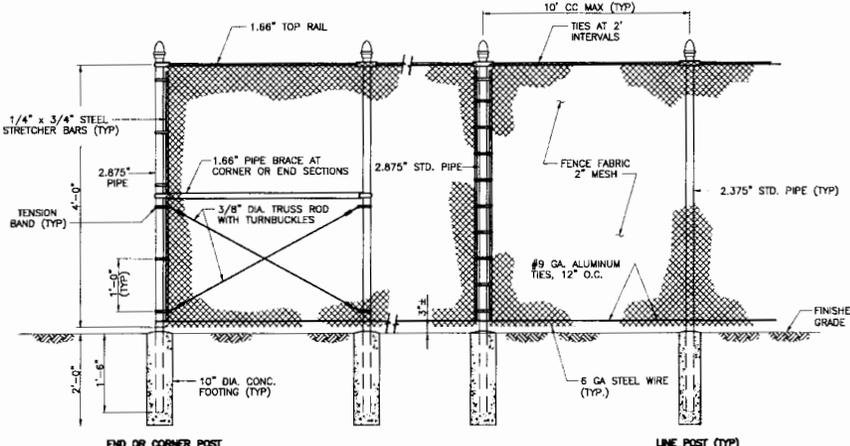
**STORMWATER INLETS 1 TO 13**

- NOTES:  
 1. STRUCTURES MUST MEET AASHTO HS-20 LOADING.  
 2. CONCRETE COMPRESSIVE STRENGTH SHALL BE 4,000 PSI.  
 3. REINFORCEMENT STEEL SHALL MEET ASTM A-185.



**TYPICAL SECTION OF CONCRETE TRENCH & INLET**

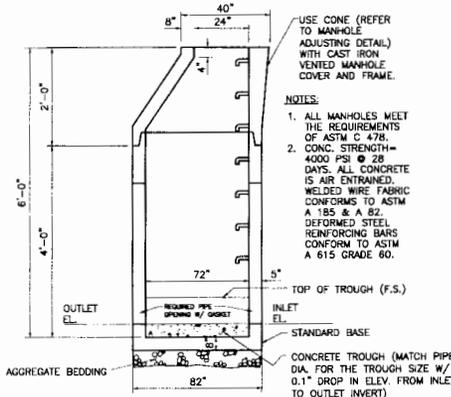
**DETAIL 3**  
N.T.S. 2003/2004



**CHAIN LINK FENCE**

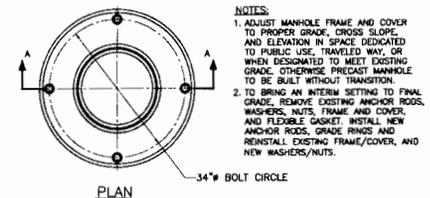
**DETAIL 2**  
N.T.S. 2006/2004  
2006

- NOTES:  
 1. FENCE DETAIL APPLIES TO RETAINING WALLS ONLY.  
 2. BITUMASTIC PROTECTIVE COATING SHALL BE APPLIED TO BOTTOM 18\"/>

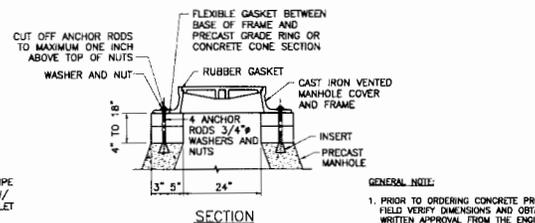


**72\"/>**

- NOTES:  
 1. ALL MANHOLES MEET THE REQUIREMENTS OF ASTM C 478.  
 2. CONC. STRENGTH= 4000 PSI @ 28 DAYS. ALL CONCRETE IS AIR ENTRAINED.  
 WELDED WIRE FABRIC CONFORMS TO ASTM A 185 & A 82.  
 DEFORMED STEEL REINFORCING BARS CONFORM TO ASTM A 615 GRADE 60.



**PLAN**



**SECTION**  
**MANHOLE ADJUSTING DETAIL**  
N.T.S.

- NOTES:  
 1. ADJUST MANHOLE FRAME AND COVER TO PROPER GRADE, CROSS SLOPE, AND ELEVATION IN SPACE DEDICATED TO PUBLIC USE, TRAVELED WAY, OR WHEN DESIGNATED TO MEET EXISTING GRADE. OTHERWISE PRECAST MANHOLE TO BE BUILT WITHOUT TRANSITION.  
 2. TO BRING AN INTERIM SETTING TO FINAL GRADE, REMOVE EXISTING ANCHOR RODS, WASHERS, NUTS, FRAME AND COVER, AND FLEXIBLE GASKET. INSTALL NEW ANCHOR RODS, GRADE RINGS AND REINSTALL EXISTING FRAME/COVER, AND NEW WASHERS/NUTS.

- GENERAL NOTE:  
 1. PRIOR TO ORDERING CONCRETE PRODUCTS, FIELD VERIFY DIMENSIONS AND OBTAIN WRITTEN APPROVAL FROM THE ENGINEER.

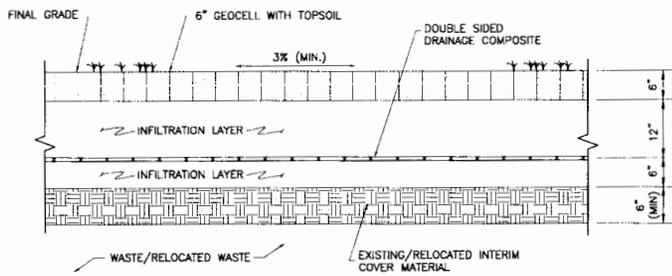
C:\WORK\PROJ\13104.002\DWG\FINAL\2004.DWG

NO.	DATE	APP.	REVISION
1	02/22/05	RWM	ISSUED FOR CONSTRUCTION
2	02/22/05	SW	REVISED PER NAMED COMMENTS
1	02/22/05	AK	FINAL ISSUED TO NAME FOR PERMIT REVIEW
0	02/22/05	AK	BOOK ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE TA-73 AIRPORT LANDFILLS NEW MEXICO		DESIGNED: RWM 6/22/05 DRAWN: SW 8/22/05 PROJECT: AK 6/22/05 CHECKED: BK 6/22/05 APPROVED: BK 8/22/05	DATE: 02/06/04 SCALE: N.T.S. SHEET NO.: 13104.002.001	PROJECT NO.: 2004 DRAWING NO.: A
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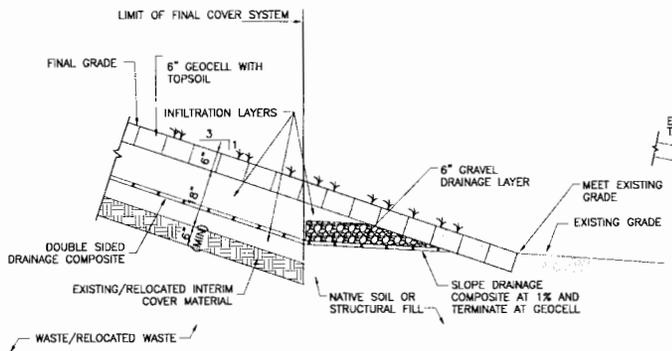


GENERAL SITE DETAILS



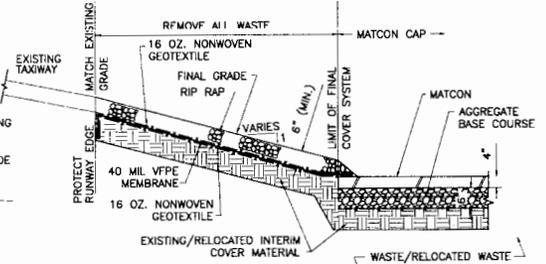
TYPICAL ARMORED LANDFILL FINAL COVER SYSTEM

DETAIL 1  
N.T.S. 2002/2005



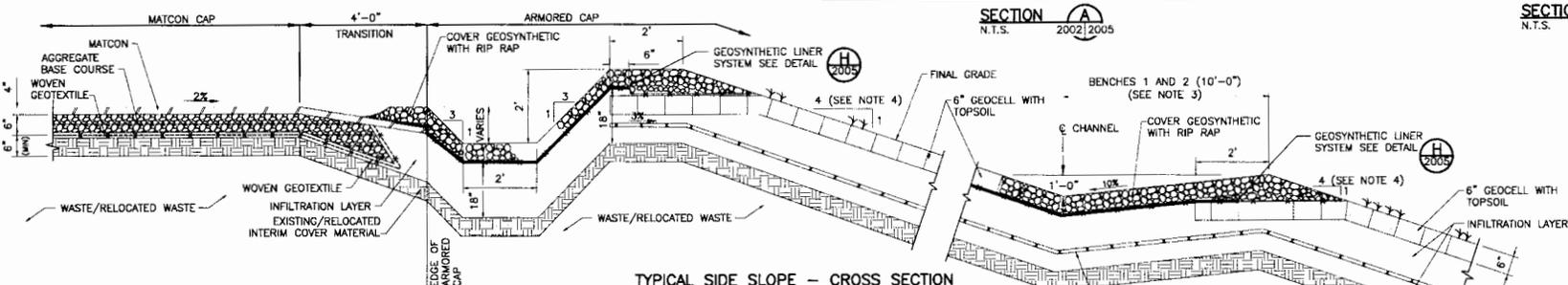
TYPICAL NORTH FACE TOE OF SLOPE - CROSS SECTION

SECTION A  
N.T.S. 2002/2005



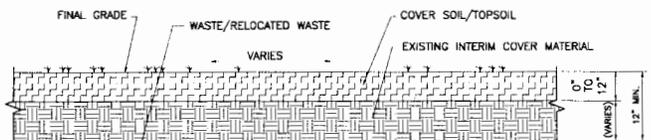
TYPICAL TAXIWAY SIDE SLOPE

SECTION G  
N.T.S. 2002/2005



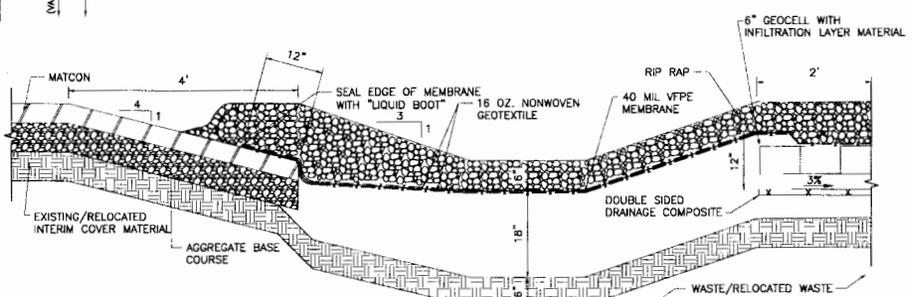
TYPICAL SIDE SLOPE - CROSS SECTION

DETAIL 2  
N.T.S. 2002/2005



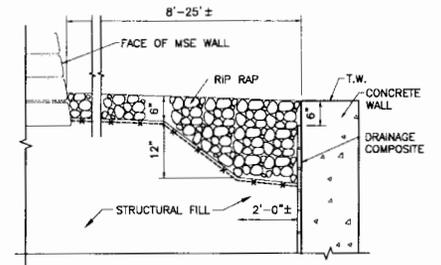
TYPICAL DDA FINAL COVER SYSTEM - CROSS SECTION

DETAIL 4  
N.T.S. 2015/2005



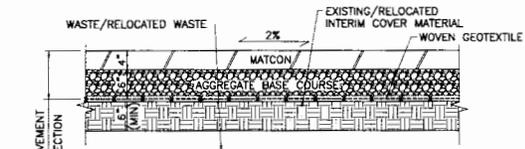
TYPICAL GEOSYNTHETIC LINER SYSTEM - CROSS SECTION

DETAIL H  
N.T.S. 2005



TYPICAL - ARMORED CAP AT CONCRETE WALL CROSS SECTION

DETAIL 5  
N.T.S. 2008/2005/2007



TYPICAL LANDFILL MATCON FINAL COVER SYSTEM CROSS SECTION

DETAIL 3  
N.T.S. 2002/2005

- GENERAL NOTES:
- FINAL GRADE DETAILS ARE SHOWN AT 4H:1V SLOPE FOR INFORMATIONAL PURPOSES ONLY. ACTUAL GRADES SHALL BE AS INDICATED ON DRAWING 2002 AND 2015.
  - REFER TO DRAWING 2021 FOR STORMWATER CONTROL DETAILS PERTAINING TO THE SWALE DETAILS.
  - PLACE CONCRETE INFILL ON BENCHES 1 AND 2. ALL OTHER SIDESLOPES SHALL RECEIVE 6" GEOCELL WITH TOPSOIL.
  - NORTH SLOPE IS A 3H:1V SLOPE.
  - ALL WASTE ENCOUNTERED OUTSIDE OF FINAL COVER SYSTEM LIMITS DURING CONSTRUCTION SHALL BE RELOCATED SUCH THAT THE LIMIT OF WASTE SHALL BE OFF-SET INSIDE THE LIMIT OF THE FINAL COVER SYSTEM A MINIMUM DISTANCE OF 1-FOOT.

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NO.	DATE	APP.	REVISION	NO.	DATE	APP.	REVISION
1	6/22/05	AK	ISSUED FOR CONSTRUCTION				
2	6/22/05	AK	REVISED PER NHD COMMENTS				
3	6/22/05	AK	FINAL ISSUED TO NHD FOR PERMIT REVIEW				
4	6/22/05	AK	BOX ISSUED TO DOE FOR REVIEW				

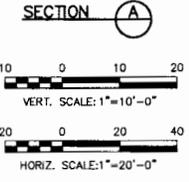
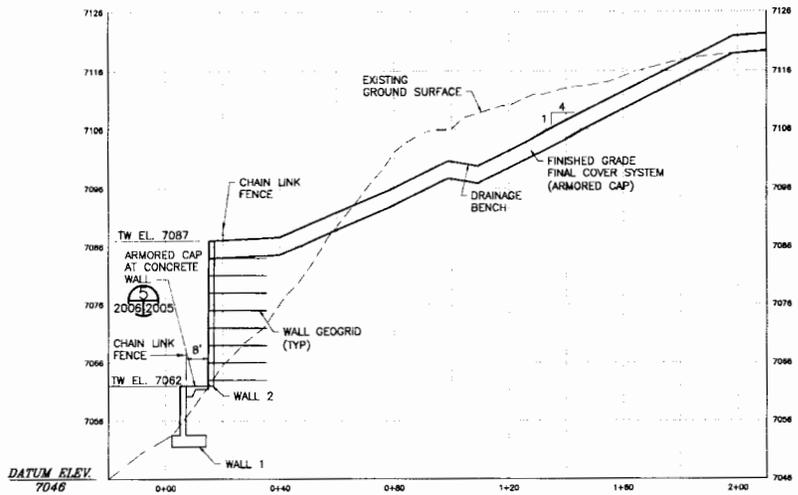
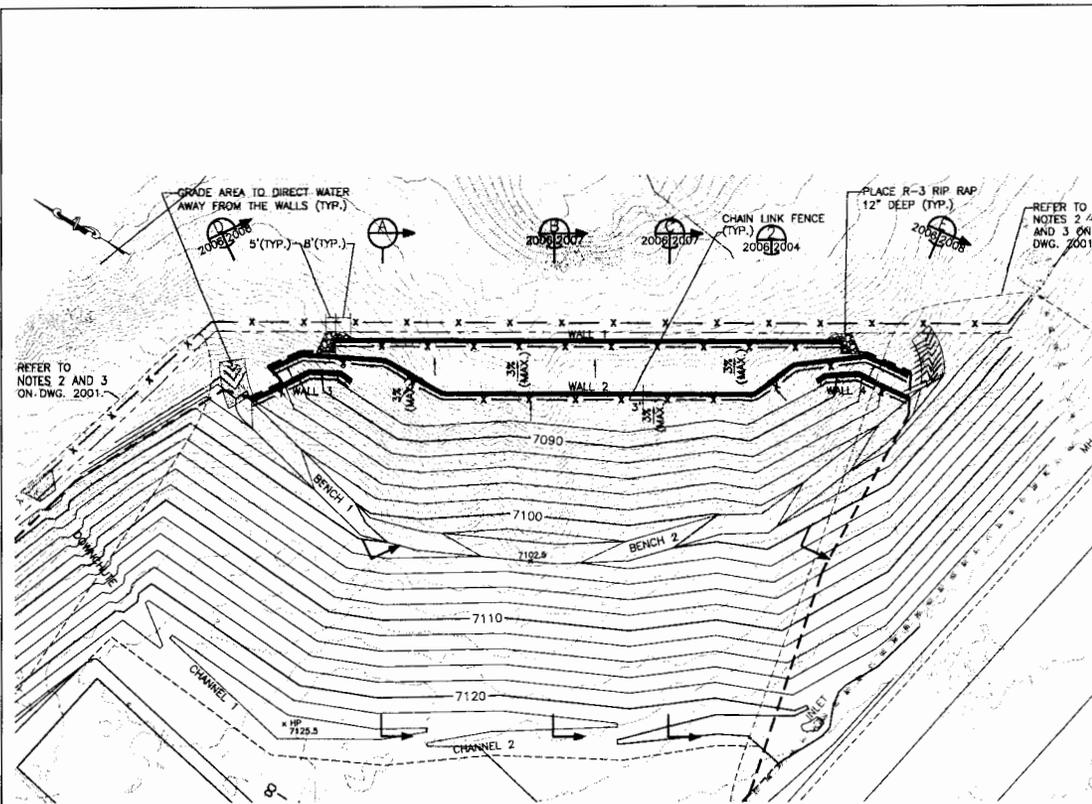
LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
NEW MEXICO

North Wind WESTON TEAM

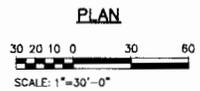
DESIGNED	RYM	DATE	CHECK APPROVAL	DATE
DES. ENG.	AH	6/22/05		
PRJ. ENR.	AH	6/22/05		
PRJ. MGR.	AK	6/22/05		
APPROVED	AK	6/22/05		

CAPPING SYSTEM DETAILS  
SHEET 1 OF 2

DATE: 02/06/04  
JOB NO.: 13104.002.001  
DRAWING NO.: 2005  
REV. NO.: A



NOTE:  
1. FOR WALL ELEVATION DRAWINGS, SEE DRAWING 2009.



- LEGEND**
- PROPERTY LINE
  - - - EXISTING FENCE
  - - - PROPOSED FENCE
  - - - LIMIT OF LANDFILL FINAL COVER SYSTEM
  - - - EXISTING GRADE CONTOUR
  - 7110 — TOP OF CAP
  - X 7131.2 TOP OF CAP SPOT ELEVATION
  - - - PROPOSED STORM SEWER INLET
  - - - PROPOSED STORM SEWER MANHOLE
  - - - PROPOSED STORM SEWER CONCRETE TRENCH
  - - - PROPOSED STORM SEWER PIPE
  - PAVED AREA

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REV.	DATE	APP.	REVISION
1	02/06/04	EAD	ISSUED FOR CONSTRUCTION
2	02/06/04	EAD	FINAL ISSUED TO NMD FOR PERMIT REVIEW
3	02/06/04	AH	NOTE ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
NEW MEXICO

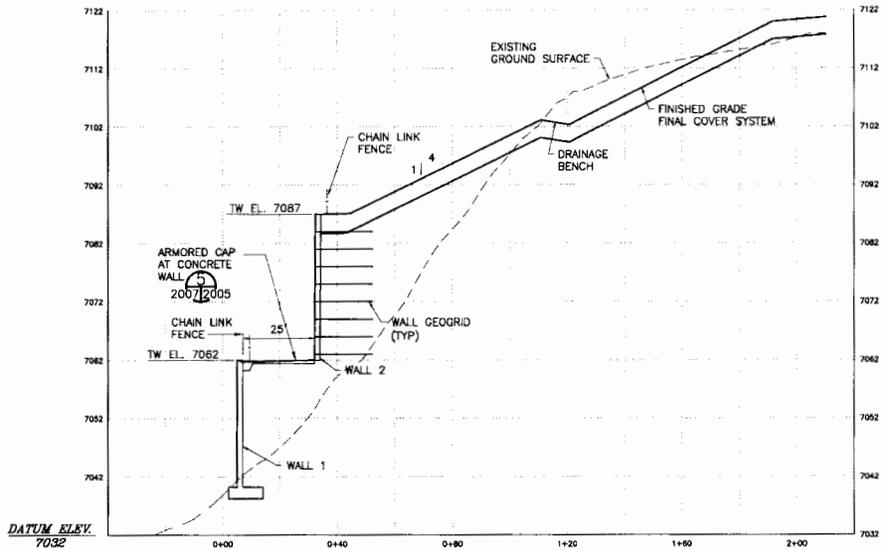
LOS ALAMOS

DESIGN	CHK	DATE	CHECK APPROVAL	DATE
SEL. ENG.	RWM	6/22/05		
PRJ. ENG.	PSM	6/22/05		
PRJ. MGR.	AH	6/22/05		
APPROVED	EK	6/22/05		
APPROVED	EK	6/22/05		



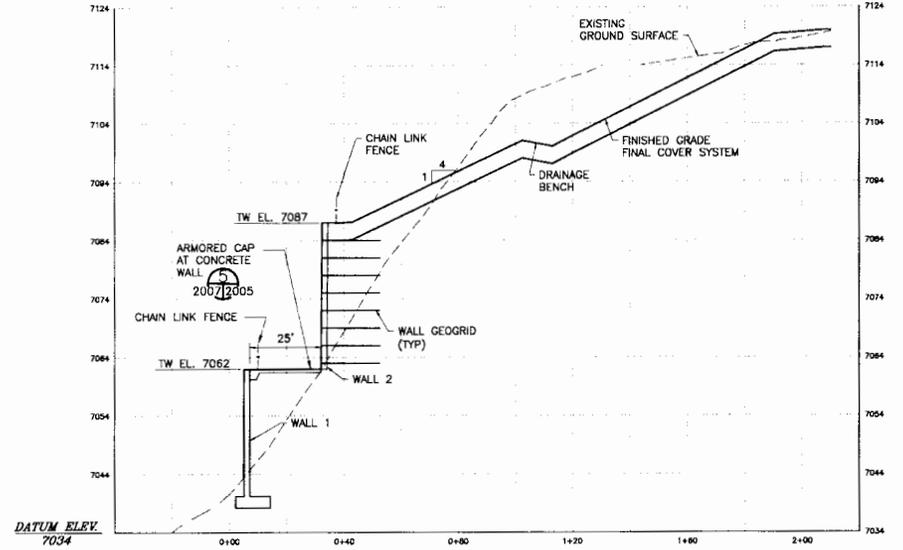
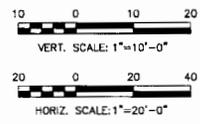
**WALL PLAN AND WALL SECTIONS**  
SHEET 1 OF 3

OWNER	EAD	DATE	02/06/04	DRW. NO.	2006	REV. NO.	A
SCALE	AS SHOWN	S.D. NO.	13104.002.001	DATE			



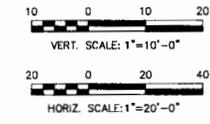
DATUM ELEV. 7032

SECTION B  
2006 | 2007



DATUM ELEV. 7034

SECTION C  
2006 | 2007



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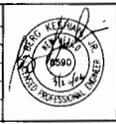
NO.	DATE	APP.	REVISION

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
LOS ALAMOS NEW MEXICO

**WESTON TEAM**  
PROFESSIONALS

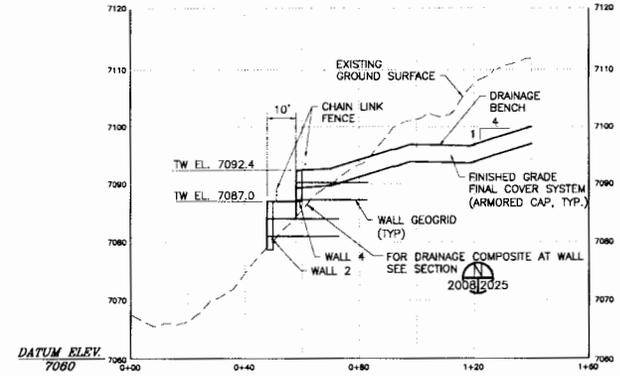
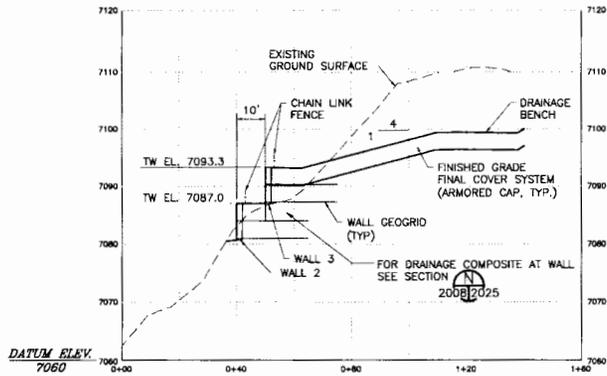
North Wind

CHECKED	DATE	DATE	DATE
RWM	6/22/05		
PSM	6/22/05		
AH	6/22/05		
BK	6/22/05		
BK	6/22/05		



WALL SECTIONS  
SHEET 2 OF 3

DATE	02/06/04	DATE	2007
SCALE	AS SHOWN	NO. NO.	13104.002.001



SECTION **D**  
2008/2025



SECTION **E**  
2008/2025



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NO.	DATE	APP.	REVISION
0	02/06/04	EAH	ISSUED FOR REVIEW
1	02/06/04	EAH	FINAL ISSUED TO NMED FOR PERMIT REVIEW
2	02/06/04	EAH	REVISED PER NMED COMMENTS
3	02/06/04	EAH	ISSUED FOR CONSTRUCTION

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
NEW MEXICO

LOS ALAMOS NEW MEXICO

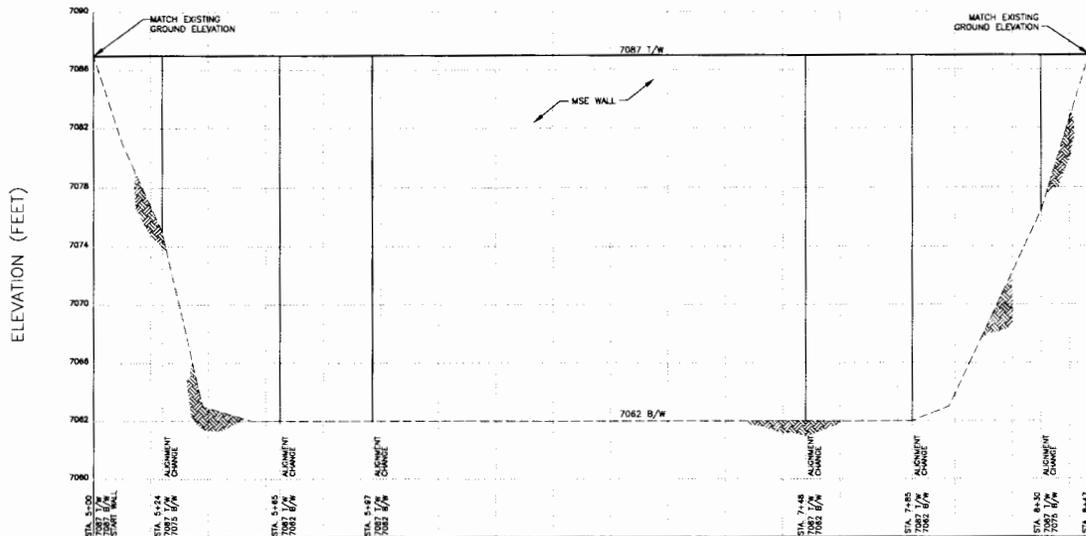
**North Wind** **WESTON TEAM**

DESIGNED	DATE	CHECKED	DATE
RWM	6/22/05		
PSM	6/22/05		
AH	6/22/05		
EK	6/22/05		
EK	6/22/05		



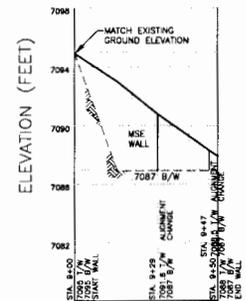
**WALL SECTIONS  
SHEET 3 OF 3**

DATE	02/06/04	DATE	2008	REV. NO.	A
SCALE	AS SHOWN	DWG. NO.	13104.002.001		



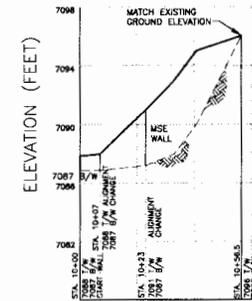
**WALL 2 ELEVATION**

VERT: 1"=4'  
HORIZ: 1"=20'



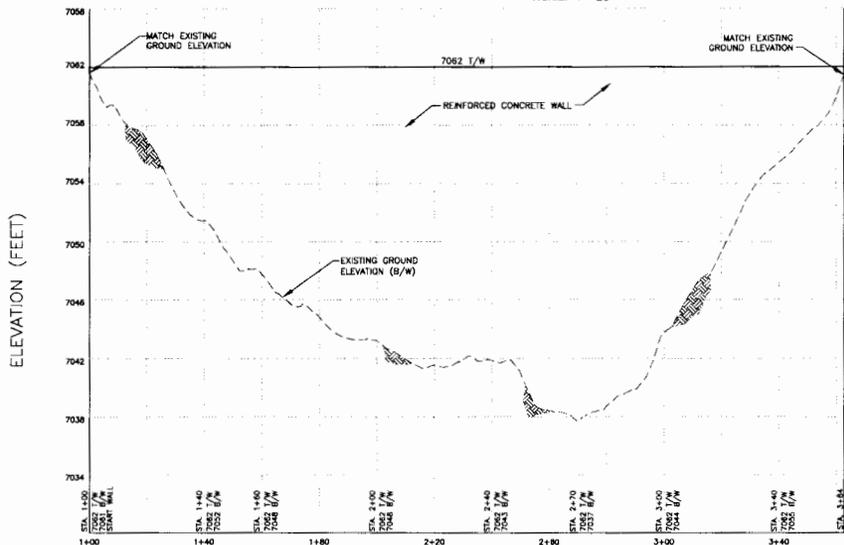
**WALL 4 ELEVATION**

VERT: 1"=4'  
HORIZ: 1"=20'



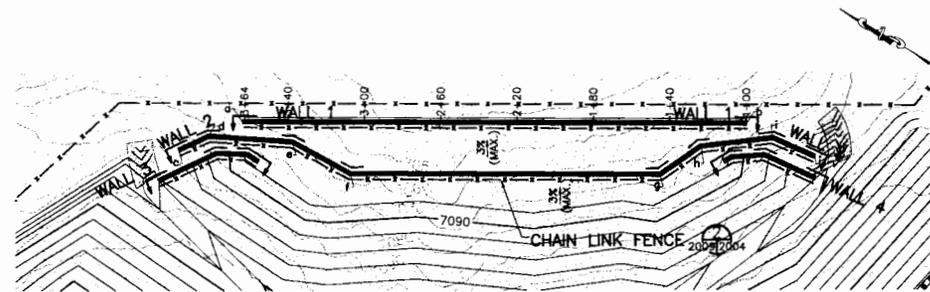
**WALL 3 ELEVATION**

VERT: 1"=4'  
HORIZ: 1"=20'



**WALL 1 ELEVATION**

VERT: 1"=4'  
HORIZ: 1"=20'



**WALL ELEVATIONS LOCATION PLAN**

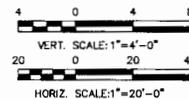
SCALE: 1"=30'

**NOTES:**

- SEE DRAWING 2006 FOR LEGEND.
- WALL LOCATIONS SHALL BE FIELD VERIFIED PRIOR TO CONSTRUCTION.

**WALL LOCATION CENTERLINE COORDINATES**

PT	NORTHING	EASTING
a	1775948.5503	1634939.7400
b	1775719.2784	1635070.6231
c	1775970.1500	1634910.3633
d	1775960.0642	1634924.5297
e	1775920.6528	1634943.8292
f	1775886.3125	1634944.7675
g	1775745.2416	1635025.3356
h	1775734.2780	1635048.3005
i	1775703.5077	1635070.9805
j	1775679.7532	1635073.5780



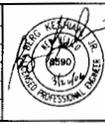
D:\ACAD\DWG\13104.002.001\PLAN\WALL 2006.DWG

NO.	DATE	APP.	REVISION
A	6/22/05	BK	ISSUED FOR CONSTRUCTION
I	6/22/05	BK	FINAL ISSUED TO NMED FOR PERMIT REVIEW
O	6/22/05	AH	30% ISSUED TO DOE FOR REVIEW

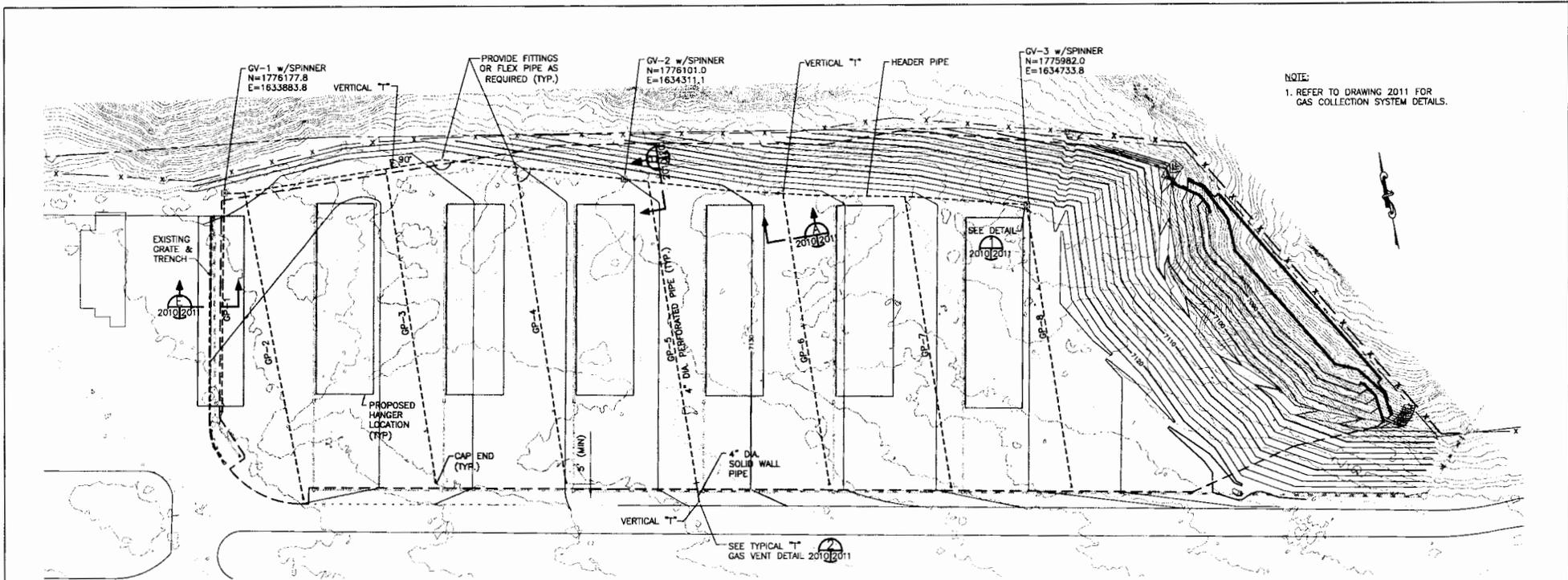
LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
NEW MEXICO

LOS ALAMOS

DESIGNED	DATE	CHECK APPROVAL	DATE
R/W/M	6/22/05		
DES. ENG.	PS/M	6/22/05	
PRJ. ENG.	AH	6/22/05	
PRJ. MGR.	BK	6/22/05	
APPROVED	BK	6/22/05	



WALL ELEVATIONS			
OWNER	DATE	DRAWING NO.	SCALE
CDM	02/06/04	2009	AS SHOWN
SHEET NO.	1.3104.002.001	TOTAL SHEETS	A

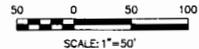


NOTE:  
1. REFER TO DRAWING 2011 FOR GAS COLLECTION SYSTEM DETAILS.

PLAN  
1"=50'

LEGEND

- PROPERTY LINE
- x - x - EXISTING FENCE
- x - x - PROPOSED FENCE
- - - - - LIMIT OF LANDFILL FINAL COVER SYSTEM
- EXISTING GRADE CONTOUR
- 7110 --- PROPOSED FINAL GRADE CONTOUR
- PAVED AREA
- s - s - EXISTING STORM SEWER INLET
- s - s - EXISTING STORM SEWER PIPE
- - - - - PROPOSED STORM SEWER INLET
- - - - - PROPOSED STORM SEWER CONCRETE TRENCH
- - - - - PROPOSED STORM SEWER PIPE
- - - - - CONCRETE HANGER FOUNDATION
- GV-1 GAS VENT LOCATION
- GP-1 GAS COLLECTION PIPE



LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
LOS ALAMOS NEW MEXICO

**North Wind WESTON TEAM**

DESIGNED	DATE	CHECKED	DATE
JRW	6/22/05		
DESIGNED <th>DATE</th> <th>CHECKED</th> <th>DATE</th>	DATE	CHECKED	DATE
SW	6/22/05		
APPROVED <th>DATE</th> <th>CHECKED</th> <th>DATE</th>	DATE	CHECKED	DATE
AK	6/22/05		
APPROVED <th>DATE</th> <th>CHECKED</th> <th>DATE</th>	DATE	CHECKED	DATE
BK	6/22/05		

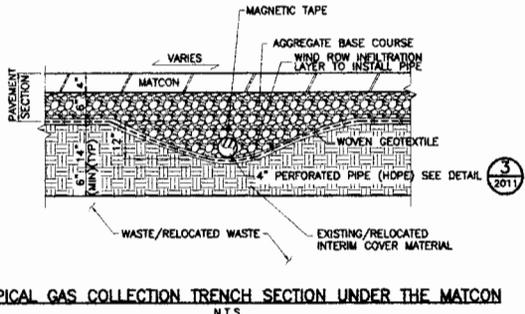


LANDFILL  
GAS COLLECTION SYSTEM PLAN

DATE: 02/06/04  
SCALE: 1"=50'  
SHEET NO.: 2010  
REV. NO.: A

G:\ADDP\3104.002.001\FINAL\2010.DWG

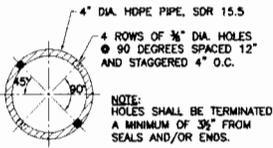
NO.	DATE	APP.	REVISION
1	02/06/04	BK	ISSUED FOR CONSTRUCTION
2	02/06/04	BK	REVISED PER NAMED COMMENTS
1	02/06/04	BK	FINAL ISSUED TO NAMED FOR PERMIT REVIEW
0	02/06/04	AH	BOE ISSUED TO DOE FOR REVIEW



TYPICAL GAS COLLECTION TRENCH SECTION UNDER THE MATCON  
N.T.S.

SECTION A  
N.T.S. 2010/2011

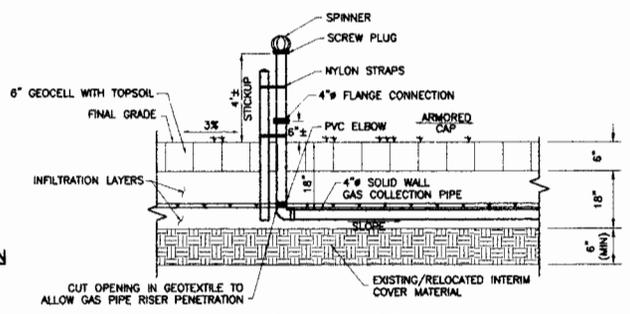
NOTE:  
PLACE PIPE ON 115' CENTER  
TO CENTER SPACING (MAX.)



SECTION 3

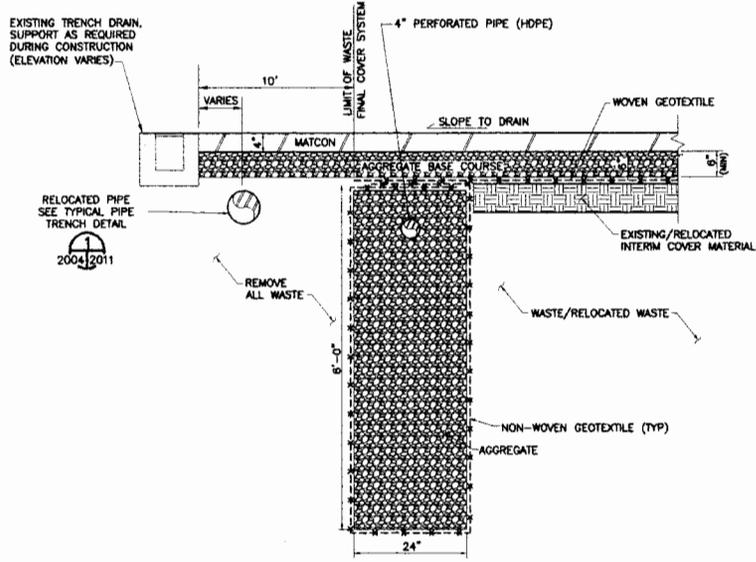
GAS COLLECTION PIPE PERFORATION

DETAIL 3  
N.T.S. 2011



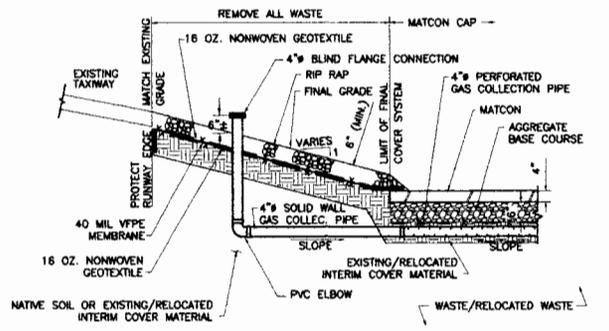
TYPICAL GAS VENT

DETAIL 1  
2010/2011



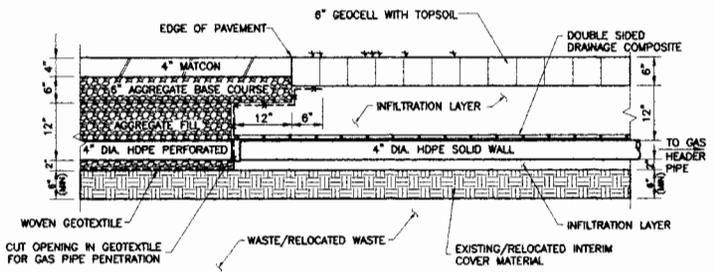
GAS COLLECTION TRENCH SECTION AT TRENCH DRAIN

SECTION E  
N.T.S. 2002/2011  
2010



TYPICAL T GAS VENT

DETAIL 2  
N.T.S. 2010/2011



TYPICAL SECTION FOR GAS COLLECTION PIPE AT MATCON EDGE

SECTION B  
SCALE:  
1"=10' HORIZ.  
1"=1' VERT.  
2010/2011

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NO.	DATE	BY	CHKD.	DESCRIPTION	NO.	DATE	BY	CHKD.	DESCRIPTION
1	02/06/04	AS SHOWN		ISSUED FOR CONSTRUCTION					
2	02/22/05	AS SHOWN		REVISED PER HMD COMMENTS					
3	02/22/05	AS SHOWN		FINAL ISSUED TO HMD FOR PERMIT REVIEW					
4	02/22/05	AS SHOWN		DOE ISSUED TO DOE FOR REVIEW					

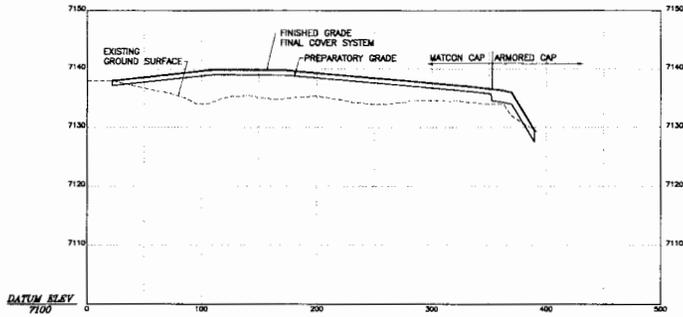
LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
LOS ALAMOS NEW MEXICO

**WESTON TEAM**

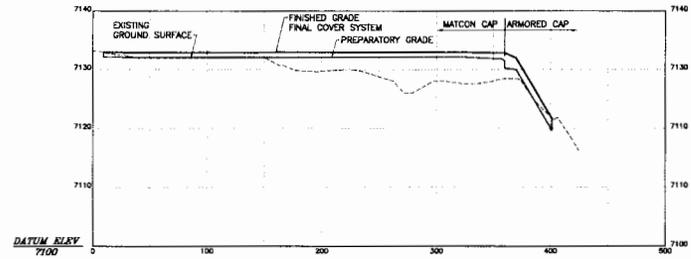
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REV. 01	AM	9/22/05			
REV. 02	AM	9/22/05			
REV. 03	BK	9/22/05			
REV. 04	BK	9/22/05			

LANDFILL  
GAS COLLECTION SYSTEM DETAILS

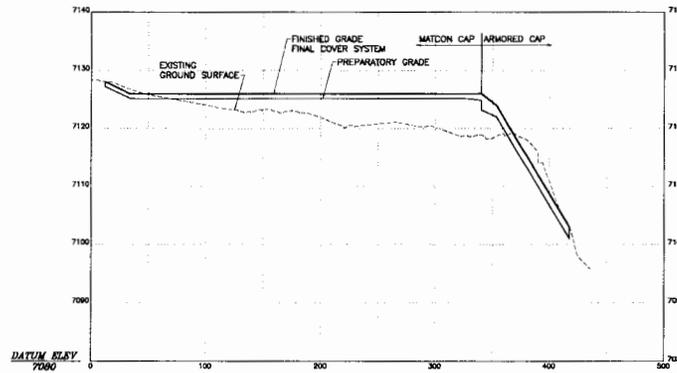
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SCALE: AS SHOWN  
PROJECT: 13104.002.001  
YEAR: 2011  
SHEET: A



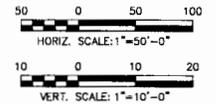
SECTION **B**  
2002 | 2012



SECTION **C**  
2002 | 2012



SECTION **D**  
2002 | 2012



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NO.	DATE	APPR.	REVISION
1	02/06/04	DP	ISSUED FOR CONSTRUCTION
2	02/06/04	BK	REVISED PER NAMED COMMENTS
3	02/06/04	BK	FINAL ISSUED TO NAMED FOR PERMIT REVIEW
4	02/06/04	AH	BOX ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
NEW MEXICO

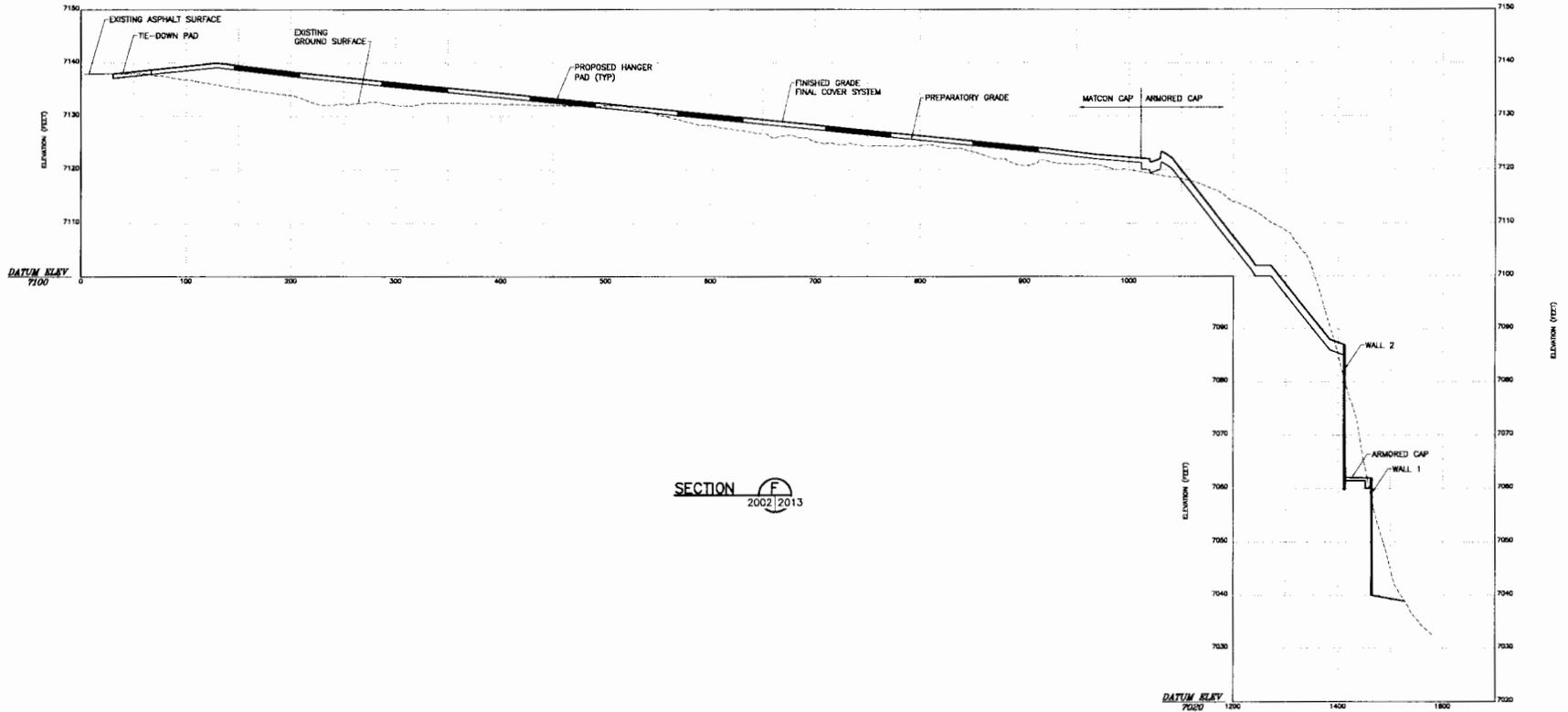
**North Wind** | **WESTON** TEAM

DESIGNED	CHKD.	DATE	APPROVED	DATE
RWM	SW	6/22/05		
PREP. DES.	AH	8/22/05		
PROJ. MGR.	BK	8/22/05		
APPROVED	BK	6/22/05		

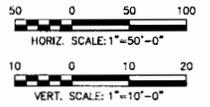


LANDFILL CROSS-SECTIONS B, C, D  
SHEET 1 OF 2

OWNER	DP	DATE	02/06/04	DRAWN BY	2012	REV. NO.	A
SCALE	AS SHOWN	DWG. NO.	1.3104.002.001	SHEET	1	OF	2



SECTION **F**  
2002 | 2013



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NO.	DATE	APPV.	REVISION
1	02/06/04	DP	ISSUED FOR CONSTRUCTION
2	02/06/04	BK	REVISED PER NMD COMMENTS
1	02/06/04	BK	FINAL ISSUED TO NMD FOR PERMIT REVIEW
0	02/06/04	AH	BOX ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
NEW MEXICO

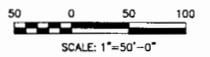
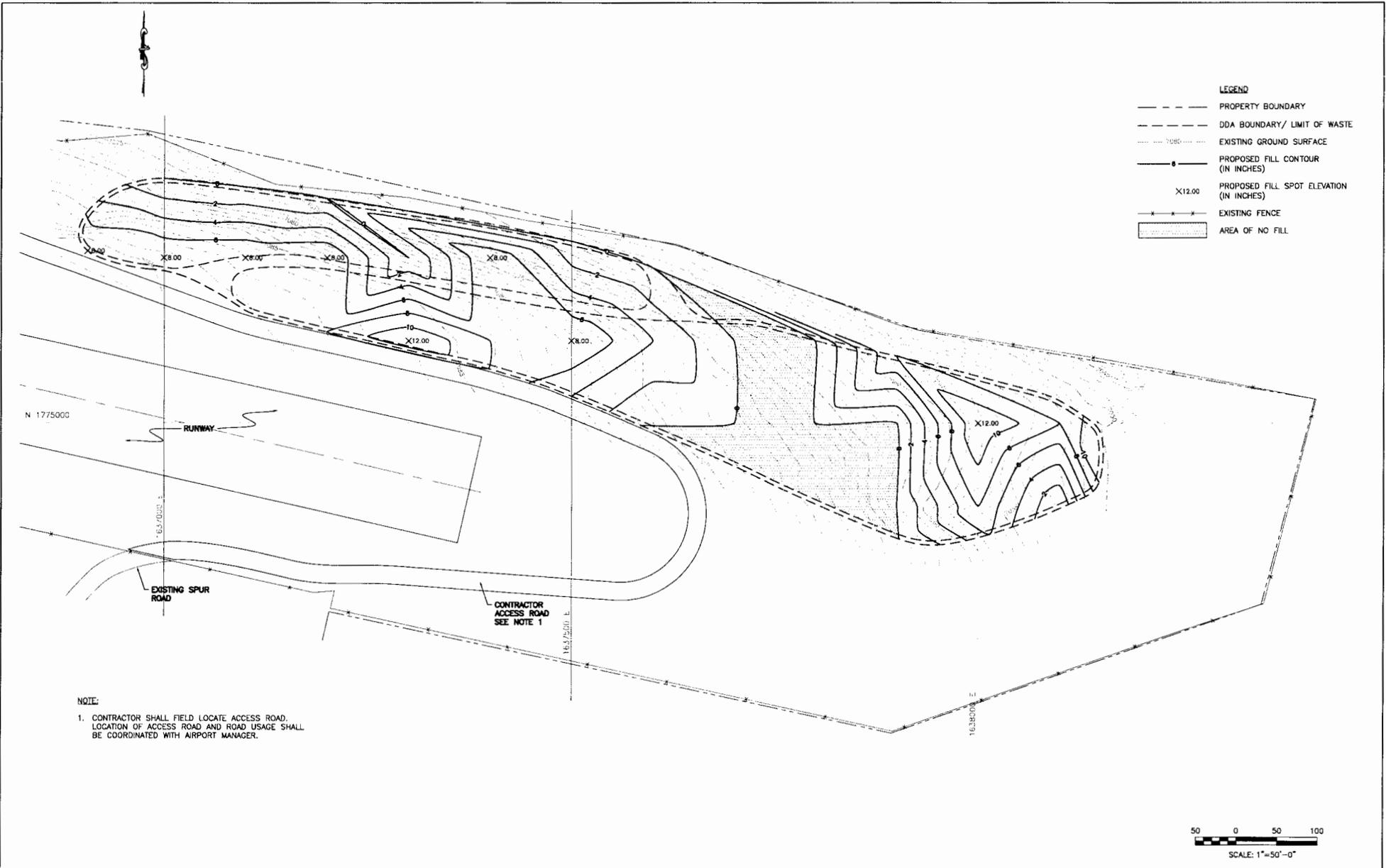
**North Wind** **WESTON TEAM**

CHECKED	DATE	CLIENT APPROVAL	DATE
RWM	6/22/05		
SW	6/22/05		
AH	6/22/05		
BK	6/22/05		
BK	6/22/05		



LANDFILL CROSS-SECTION F  
SHEET 2 OF 2

OWNER	DP	DATE	02/06/04	REV. NO.	2013	REV. BY	A
SCALE	AS SHOWN	S.A. NO.	13104.002.001				



A	1/2/04	BK	ISSUED FOR CONSTRUCTION
T	1/2/04	BK	FINAL ISSUED TO NMD FOR PERMIT REVIEW
D	1/2/04	AH	BCS ISSUED TO DOE FOR REVIEW
REV.	DATE	APP.	REVISION

LOS ALAMOS SITE OFFICE  
 TA-73 AIRPORT LANDFILLS  
 LOS ALAMOS NEW MEXICO

**North Wind** **WESTON TEAM**

DESIGNED	DRAWN	DATE	CHECK APPROVALS	DATE
DEL. ENG.	SW	6/22/05		
PRIN. ENG.	AH	6/22/05		
APPROVED	BK	6/22/05		
APPROVED	BK	6/22/05		



**DEBRIS DISPOSAL AREA  
 FILL PLAN**

DRAWN	GDM	DATE	02/06/04	DATE	2014	REV. NO.	A
SCALE	AS SHOWN	NO. NO.	13104.002.001	REV.		OF	

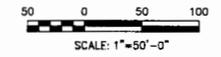
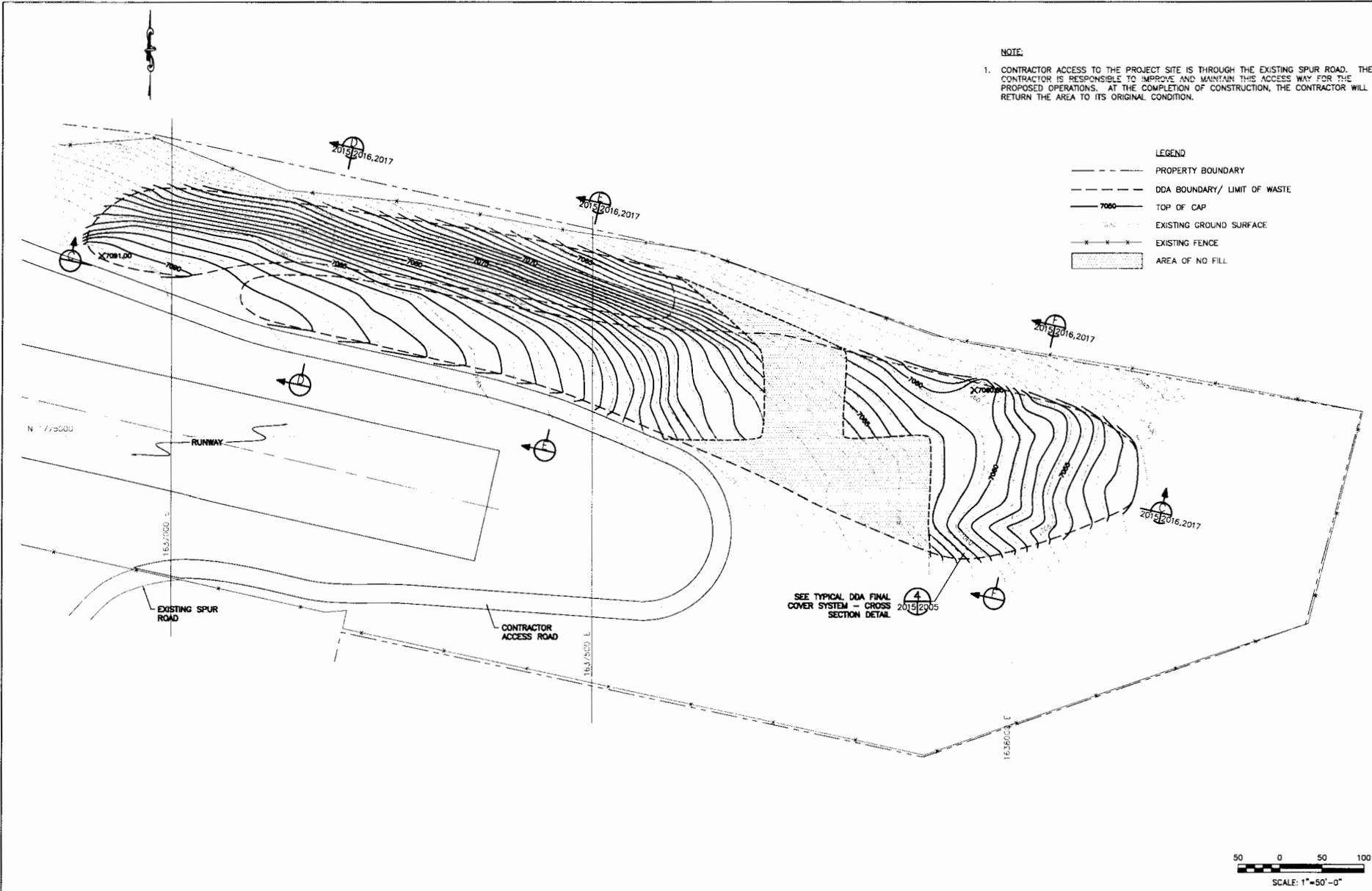
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**NOTE:**

- CONTRACTOR ACCESS TO THE PROJECT SITE IS THROUGH THE EXISTING SPUR ROAD. THE CONTRACTOR IS RESPONSIBLE TO IMPROVE AND MAINTAIN THIS ACCESS WAY FOR THE PROPOSED OPERATIONS. AT THE COMPLETION OF CONSTRUCTION, THE CONTRACTOR WILL RETURN THE AREA TO ITS ORIGINAL CONDITION.

**LEGEND**

- PROPERTY BOUNDARY
- - - DDA BOUNDARY/ LIMIT OF WASTE
- 7000 — TOP OF CAP
- · · · · EXISTING GROUND SURFACE
- \* \* \* \* — EXISTING FENCE
- ▨ AREA OF NO FILL



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NO.	DATE	APPV.	REVISION
A	01/21/05	BK	ISSUED FOR CONSTRUCTION
1	01/21/05	BK	FINAL ISSUED TO NMD FOR PERMIT REVIEW
0	01/21/05	AL	BOX ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
LOS ALAMOS NEW MEXICO

**North Wind** **WESTON TEAM**

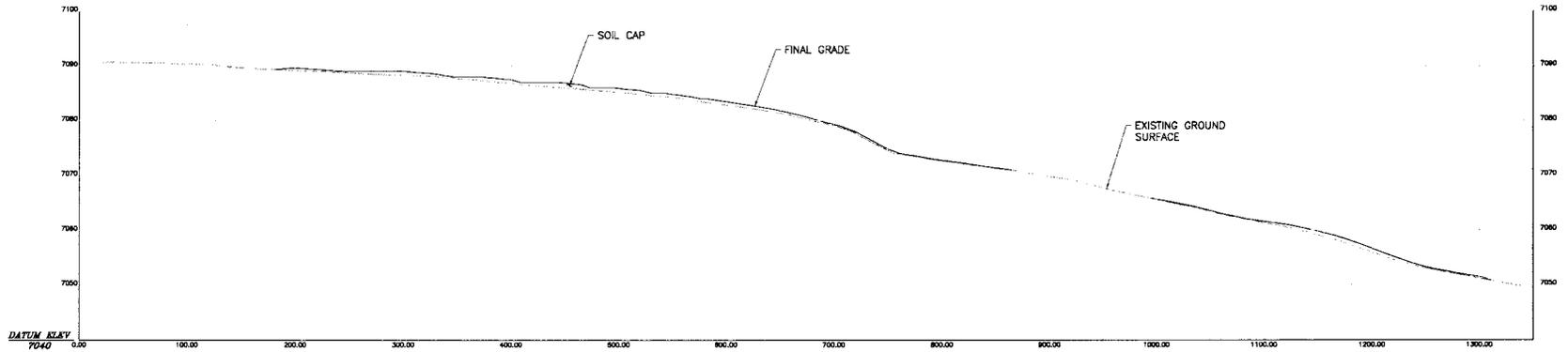
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IRWM	5/22/05		
DES. ENG.	SW	5/22/05	
PRJ. ENR.	AY	6/22/05	
PRJ. MGR.	BK	6/22/05	
APPROVED	BK	6/22/05	
APPROVED	BK	6/22/05	



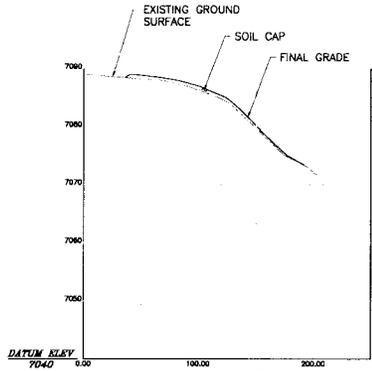
**DEBRIS DISPOSAL AREA  
TOP OF CAP GRADING PLAN**

OWNER	DATE	CON. NO.	REV. NO.
GDM	02/06/04	2015	A

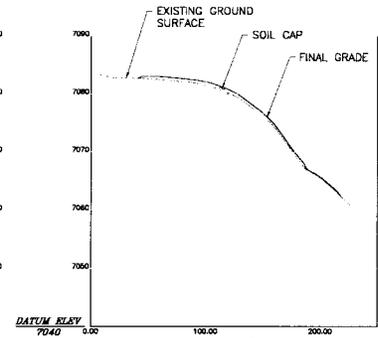
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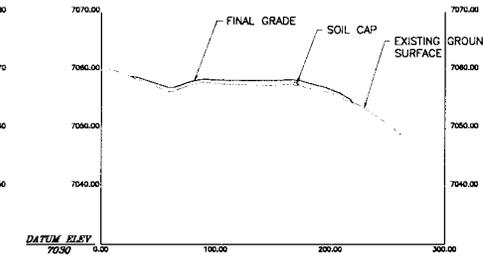
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SH:TV 2015/2016



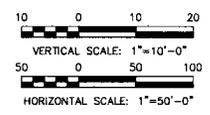
SECTION D  
SH:TV 2015/2016



SECTION E  
SH:TV 2015/2016



SECTION F  
SH:TV 2015/2016



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NO.	DATE	APP.	REVISION
A	1/1/11	BK	ISSUED FOR CONSTRUCTION
1	1/1/11	BK	FINAL ISSUED TO NMED FOR PERMIT REVIEW
0	1/1/11	AH	90% ISSUED TO DOE FOR REVIEW

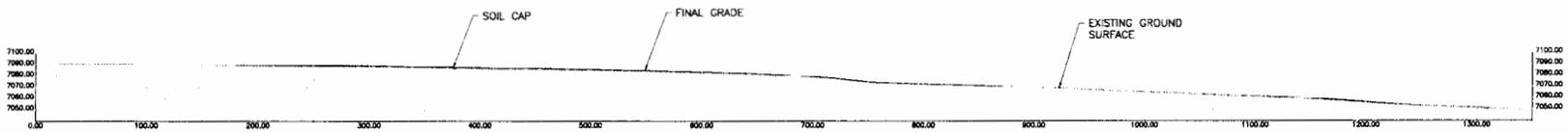
LOS ALAMOS TA-73 AIRPORT LANDFILLS NEW MEXICO

North Wind WESTON TEAM SOLUTIONS

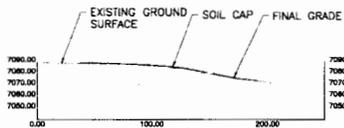
DESIGNED	DATE	CHECKED	DATE
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SW	6/22/05		
AH	6/22/05		
BK	6/22/05		
BK	6/22/05		



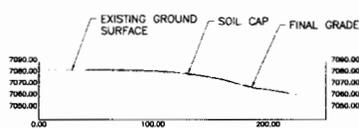
DEBRIS AREA CROSS-SECTIONS C, D, E AND F SHEET 1 OF 2			
DATE	02/06/04	DATE	2016
SCALE	AS SHOWN	PROJECT NO.	13104.002.001



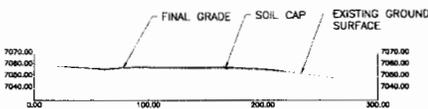
SECTION C  
1H:1V 2015/2017



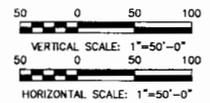
SECTION D  
1H:1V 2015/2017



SECTION E  
1H:1V 2015/2017



SECTION F  
1H:1V 2015/2017



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NO.	DATE	APP.	REVISION
A	6/22/05	BK	ISSUED FOR CONSTRUCTION
1	6/22/05	BK	FINAL ISSUED TO NMED FOR PERMIT REVIEW
0	6/22/05	AH	BOX ISSUED TO DOE FOR REVIEW

LOS ALAMOS TA-73 AIRPORT LANDFILLS NEW MEXICO

**TEAM**

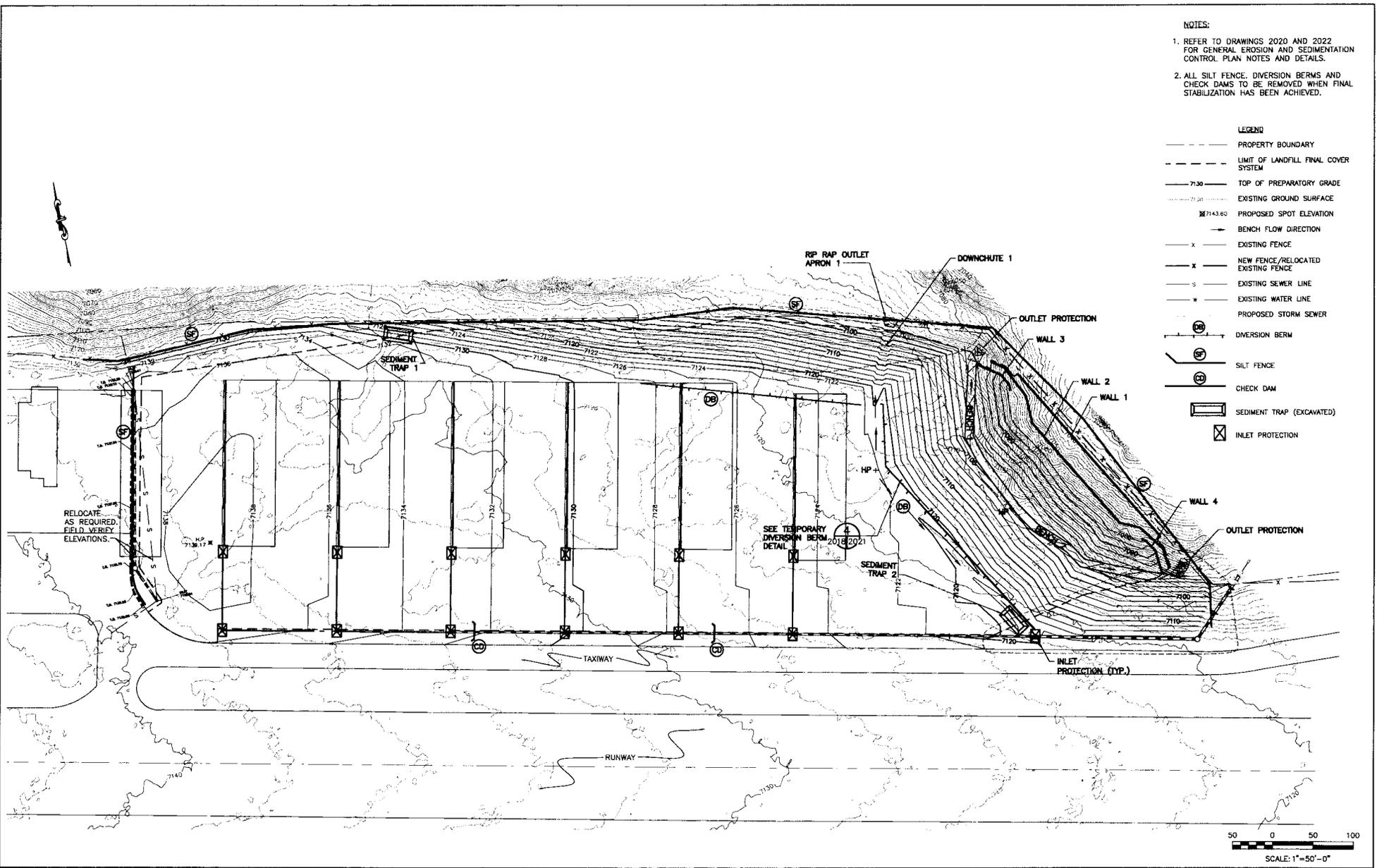
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RWM	6/22/05		
SW	6/22/05		
AVI	6/22/05		
BK	6/22/05		
BK	6/22/05		



DEBRIS AREA CROSS-SECTIONS C, D, E AND F SHEET 2 OF 2			
OWNER	GDM	DATE	02/06/04
SCALE	AS SHOWN	SHEET NO.	13104.002.001
REV. NO.		DATE	2017
REV. BY		REV. NO.	A

- NOTES:**
- REFER TO DRAWINGS 2020 AND 2022 FOR GENERAL EROSION AND SEDIMENTATION CONTROL PLAN NOTES AND DETAILS.
  - ALL SILT FENCE, DIVERSION BERMS AND CHECK DAMS TO BE REMOVED WHEN FINAL STABILIZATION HAS BEEN ACHIEVED.

- LEGEND**
- PROPERTY BOUNDARY
  - - - - - LIMIT OF LANDFILL FINAL COVER SYSTEM
  - 71.30 — TOP OF PREPARATORY GRADE
  - ..... 71.00 ..... EXISTING GROUND SURFACE
  - ⊠ 7143.60 PROPOSED SPOT ELEVATION
  - BENCH FLOW DIRECTION
  - x — EXISTING FENCE
  - x — NEW FENCE/RELOCATED EXISTING FENCE
  - s — EXISTING SEWER LINE
  - w — EXISTING WATER LINE
  - — — PROPOSED STORM SEWER
  - ⊙ DIVERSION BERM
  - ⊙ SILT FENCE
  - ⊙ CHECK DAM
  - ⊠ SEDIMENT TRAP (EXCAVATED)
  - ⊠ INLET PROTECTION



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NO.	DATE	APP.	REVISION
A	11/11/18	BK	ISSUED FOR CONSTRUCTION
2	11/11/18	BK	REVISED PER NAMED COMMENTS
1	11/11/18	BK	FINAL ISSUED TO NMD FOR PERMIT REVIEW
0	11/11/18	AH	BOOK ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
LOS ALAMOS NEW MEXICO

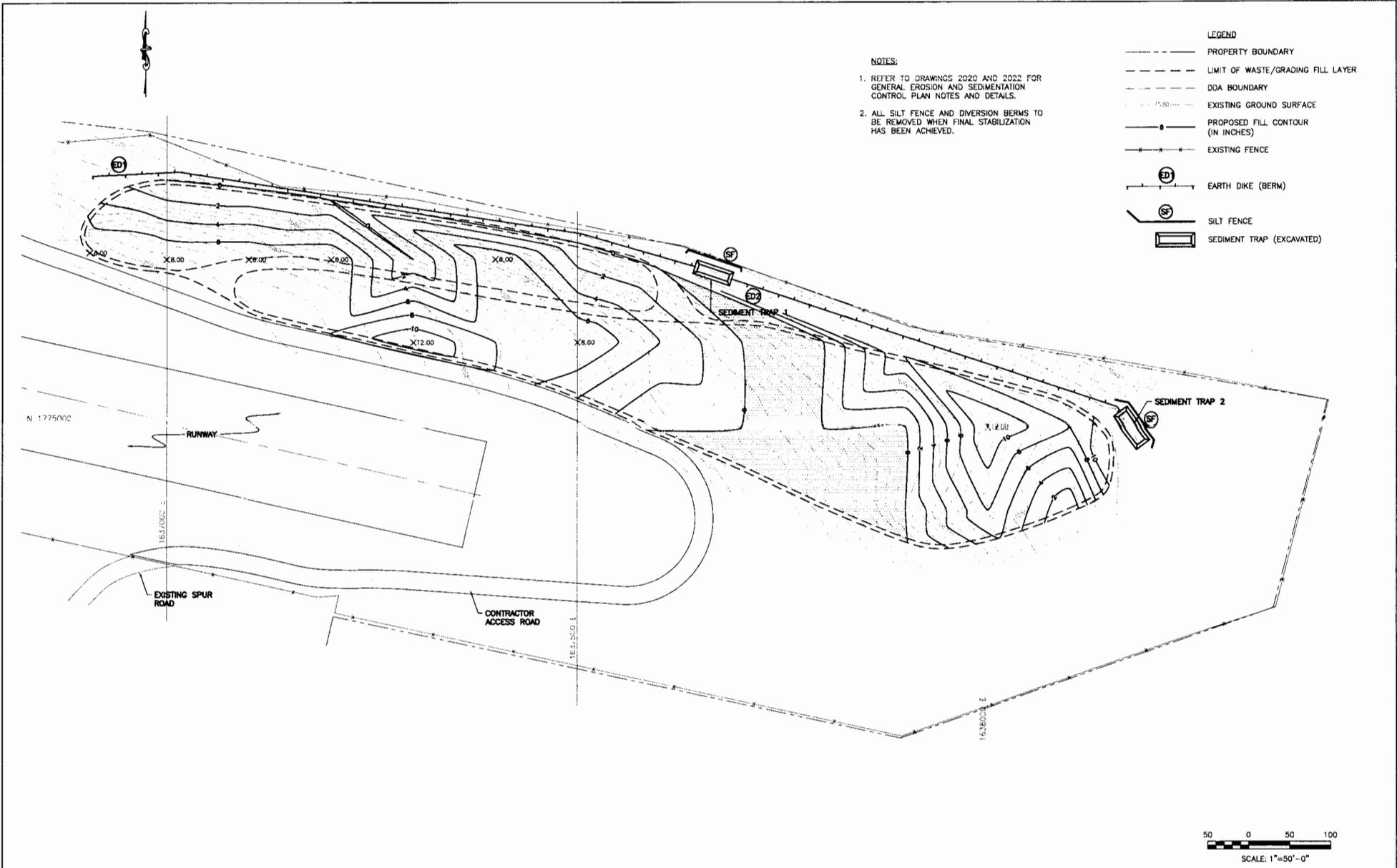
**North Wind** **WESTON** TEAM

DESIGNED	DATE	DATE	CLIENT APPROVALS	DATE
DJW	6/22/05			
DES. CHK.	SW	6/22/05		
PRJ. MGR.	AH	6/22/05		
APPROVED	BK	6/22/05		



**EROSION AND SEDIMENTATION CONTROL PLAN LANDFILL AREA**

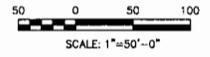
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SCALE	AS SHOWN	SHEET NO.	13104.002.001	TOTAL SHEETS	1		



**NOTES:**

1. REFER TO DRAWINGS 2020 AND 2022 FOR GENERAL EROSION AND SEDIMENTATION CONTROL PLAN NOTES AND DETAILS.
2. ALL SILT FENCE AND DIVERSION BERMS TO BE REMOVED WHEN FINAL STABILIZATION HAS BEEN ACHIEVED.

- LEGEND**
- PROPERTY BOUNDARY
  - - - - - LIMIT OF WASTE/GRADING FILL LAYER
  - - - - - DDA BOUNDARY
  - EXISTING GROUND SURFACE
  - PROPOSED FILL CONTOUR (IN INCHES)
  - EXISTING FENCE
  - ED EARTH DIKE (BERM)
  - SF SILT FENCE
  - ▭ SEDIMENT TRAP (EXCAVATED)

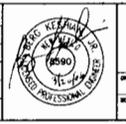


NO.	DATE	APPV.	REVISION
A	6/22/05	BK	ISSUED FOR CONSTRUCTION
1	6/22/05	BK	FINAL ISSUED TO NMED FOR PERMIT REVIEW
D	6/22/05	AH	BOX ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
LOS ALAMOS NEW MEXICO

**North Wind** **WESTON TEAM**

DESIGNED	DATE	CHECK APPROVALS	DATE
RWM	6/22/05		
SW	6/22/05		
AH	6/22/05		
BK	6/22/05		
BK	6/22/05		



**EROSION AND SEDIMENTATION CONTROL PLAN DEBRIS DISPOSAL AREA**

OWNER	GDM	DATE	02/05/04	DATE	2019	REV.	A
SCALE	AS SHOWN	S.S. NO.	1.3104.002.001	DATE			

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**SOIL EROSION AND SEDIMENTATION CONTROL PLAN**

THE CONTRACTOR WILL FULLY COMPLY WITH ALL THE APPLICABLE FEDERAL AND STATE OF NEW MEXICO REGULATIONS AND STANDARDS.

**EROSION CONTROL MEASURES**

**TEMPORARY**

TEMPORARY CONTROL MEASURES INCLUDE CONSTRUCTION ENTRANCES, SILT FENCES, CHECK DAMS, INLET FILTERS AND MAINTENANCE OF EROSION AND SEDIMENT CONTROLS. THE CONSTRUCTION ENTRANCE IS A STONE APRON OVER WHICH ALL VEHICLES WILL PASS. SILT FENCE WILL BE USED TO INTERCEPT SHEET RUNOFF. CHECK DAMS WILL REDUCE FLOW VELOCITY IN DIVERSION CHANNELS. MAINTENANCE IS THE REGULAR AND ROUTINE INSPECTION OF THE SEDIMENT AND EROSION CONTROLS, AND THE REPAIR OF THOSE CONTROLS TO PREVENT SEDIMENT FROM LEAVING THE SITE.

**PERMANENT**

ALL AREAS OF EARTH DISTURBED BY CONSTRUCTION WILL BE SEEDED AND MULCHED IMMEDIATELY AFTER COMPLETION OF CONSTRUCTION. IN THE EVENT THAT SEEDING CANNOT TAKE PLACE IMMEDIATELY DUE TO WEATHER CONDITIONS, MULCH OR HEAVY JUTE MATS WILL BE SPREAD OVER THE DISTURBED AREAS UNTIL SEEDING MAY BE PROPERLY COMPLETED.

**MAINTENANCE PROGRAM FOR SEDIMENT AND EROSION CONTROLS**

THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL EROSION CONTROL FACILITIES INCLUDING SEDIMENT REMOVAL DURING CONSTRUCTION, AND DURING THE SURCHARGE AND EMBANKMENT CONSOLIDATION PERIOD. ALL DAMAGED FACILITIES WILL BE REPAIRED WITHIN 24 HOURS. WHEN SILT HAS ACCUMULATED TO A DEPTH OF SIX INCHES AGAINST OR AROUND ANY CONTROL FACILITY THE SILT WILL BE REMOVED IMMEDIATELY AND RETURNED TO THE SITE.

THE CONTRACTOR WILL NOT REMOVE ANY CONTROL FACILITY UNTIL DIRECTED BY THE ENGINEER. MATERIALS USED FOR EROSION CONTROL WILL BE DISPOSED OF OFF-SITE WHEN REMOVED. SUCH MATERIALS ARE CONSIDERED PROPERTY OF THE CONTRACTOR.

**CONSTRUCTION ENTRANCE**

THE STRUCTURE'S THICKNESS WILL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE OF ROCK MATERIAL WILL BE MAINTAINED ON THE SITE FOR THIS PURPOSE.

AT THE END OF EACH CONSTRUCTION DAY, ALL SEDIMENT DEPOSITED ON PUBLIC ROADWAYS WILL BE REMOVED BY USE OF A ROAD SWEEPER, WATER, VACUUM OR BROOM AND RETURNED TO THE CONSTRUCTION SITE.

**SILT FENCE**

THE FENCE INSTALLATION SHALL BE INSPECTED AFTER EVERY PRECIPITATION EVENT. ANY NECESSARY REPAIRS WILL BE MADE IMMEDIATELY.

ACCUMULATED SEDIMENTS WILL BE REMOVED AS REQUIRED TO KEEP THE FENCE FUNCTIONAL. IN ALL CASES REMOVE DEPOSITS WHERE ACCUMULATIONS REACH 1/3 OF THE ABOVE GROUND HEIGHT OF THE FENCE.

ALL UNDERCUTTING OR EROSION OF THE TOE ANCHOR WILL BE REPAIRED IMMEDIATELY WITH COMPACTED BACKFILL MATERIALS.

ADHERE TO ANY MANUFACTURER'S RECOMMENDATION FOR REPLACING SILT FENCE DUE TO WEATHERING.

**VEGETATIVE SURFACE STABILIZATION AND SEEDING**

ALL SEEDING AND FERTILIZER AND MULCH APPLICATION SHALL BE PER THE TECHNICAL SPECIFICATION, SECTION 02932.

ALL AREAS OF THE LANDFILL NOT COVERED BY THE ARMORED SOIL CAP WILL BE COVERED WITH AN EROSION CONTROL BLANKET, OR MULCH.

FOLLOWING INITIAL SOIL DISTURBANCE OR REDISTURBANCE, PERMANENT OR TEMPORARY STABILIZATION SHALL BE COMPLETED IN ACCORDING WITH:

- A. 7 CALENDAR DAYS AS TO THE SURFACE OF ALL PERIMETER CONTROLS, DIKES, SWALES, DITCHES, PERIMETER SLOPES, STOCKPILES, AND ALL SLOPES GREATER THAN 2 HORIZONTAL TO 1 VERTICAL (2:1)
- B. 14 DAYS AS TO ALL OTHER DISTURBED OR GRADED AREAS ON THE PROJECT SITE. THE IN-PLACE SEDIMENT CONTROL MEASURES WILL BE MAINTAINED ON A CONTINUING BASIS UNTIL THE SITE IS PERMANENTLY STABILIZED AND ALL PERMIT REQUIREMENTS ARE MET.

SEDIMENT TRAPS, DIVERSION CHANNELS OR BERMS, AND STOCKPILES MUST BE SEEDED AND MULCHED IMMEDIATELY.

**COMPLIANCE WITH STATE AND LOCAL REQUIREMENTS**

THE EROSION & SEDIMENT POLLUTION CONTROL REPORT, APPLICATION DOCUMENTS, NARRATIVE(S), CONTRACT PLANS AND SPECIFICATIONS ARE ALL INCLUDED HEREWITH BY REFERENCE AS AN INTEGRAL PART OF THIS CONTRACT. ANY QUESTIONS, COMMENTS, APPROVAL CONDITIONS OR PERMIT REQUIREMENTS CONTAINED WITHIN A REGULATORY REVIEW LETTER FOR THIS PROJECT ARE HEREBY INCLUDED AS AN INTEGRAL PART OF THIS CONTRACT, AND THE CONTRACTOR SHALL FULLY COMPLY WITH ANY APPROVAL CONDITIONS OR PERMIT REQUIREMENTS AS IF THEY WERE INCLUDED HEREWITH IN THEIR FULL TEXT. COPIES OF ALL STATE AND LOCAL REGULATORY AGENCY REVIEWS, COMMENTS, APPROVAL CONDITIONS OR PERMIT REQUIREMENTS MAY BE OBTAINED THROUGH THE LOCAL CONSERVATION DISTRICT OFFICE.

**DUST CONTROL**

THE CONTRACTOR WILL EMPLOY CONSTRUCTION METHODS AND MEANS THAT WILL KEEP DUST TO THE MINIMUM. THE CONTRACTOR WILL PROVIDE FOR THE SPRAYING OF WATER ON THE PROJECT AREA (INCLUDING STOCKPILES), AND ON ROADS, STREETS AND OTHER AREAS IMMEDIATELY ADJACENT TO THE PROJECT LIMITS, WHEREVER TRAFFIC, OR BUILDINGS THAT ARE OCCUPIED OR IN USE, ARE AFFECTED BY SUCH DUST CAUSED BY HAULING OR OTHER OPERATIONS. THE MATERIALS AND METHODS USED FOR WATER SPRAYING SHALL BE SUBJECT TO THE APPROVAL OF THE OWNER. THE CONTRACTOR SHALL PROVIDE FOR PROMPT REMOVAL FROM EXISTING PAVING ALL DIRT AND OTHER MATERIAL THAT HAVE BEEN SPILLED, WASHED UPON, TRACKED UPON OR OTHERWISE DEPOSITED THEREON BY HIS HAULING AND OTHER OPERATIONS WHENEVER THE ACCUMULATION IS SUFFICIENT TO CAUSE THE FORMATION OF DUST, MUD, INTERFERE WITH DRAINAGE, DAMAGE PAVEMENTS OR CREATE A TRAFFIC HAZARD.

**STANDARD EROSION AND SEDIMENTATION CONTROL PLAN NOTES**

ONLY LIMITED DISTURBANCE WILL BE PERMITTED TO PROVIDE ACCESS TO SEDIMENT BASINS ((IF REQUIRED)), INTERCEPTOR CHANNELS, SILT FENCE AND ROCK FILTERS AS INDICATED ON THE PLANS, FOR GRADING AND ACQUIRING BORROW TO CONSTRUCT THESE CONTROLS.

EROSION AND SEDIMENTATION CONTROLS MUST BE CONSTRUCTED, STABILIZED, AND FUNCTIONAL BEFORE GENERAL SITE DISTURBANCE WITHIN THE TRIBUTARY AREAS OF THOSE CONTROLS.

AFTER FINAL SITE STABILIZATION HAS BEEN ACHIEVED, TEMPORARY EROSION AND SEDIMENTATION CONTROL MUST BE REMOVED. AREAS DISTURBED DURING REMOVAL OF THE CONTROLS MUST BE STABILIZED.

STOCKPILE HEIGHTS MUST NOT EXCEED 35 FEET OR VIOLATE AIRPORT CONICAL SURFACES. STOCKPILE MUST BE 2:1 OR FLATTER.

UNTIL FINAL STABILIZATION HAS BEEN ACHIEVED, ALL EROSION AND SEDIMENTATION CONTROLS MUST BE MAINTAINED PROPERLY. MAINTENANCE MUST INCLUDE INSPECTION OF ALL EROSION AND SEDIMENTATION CONTROLS AT LEAST ONCE EVERY 14 CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM EVENT OF 0.5 INCHES PRECIPITATION OR GREATER. THE INSPECTION FREQUENCY MAY BE REDUCED TO AT LEAST ONCE EVERY MONTH AFTER ALL EARTH DISTURBING ACTIVITIES HAVE BEEN COMPLETED AND CERTAIN CRITERIA, AS DEFINED IN SECTION 8.1 OF THE SWPPP, ARE MET. ALL PREVENTIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEAN OUT, REPAIR, REPLACEMENT, REGRADING, RESEEDING, REMULCHING, AND RENETTING, MUST BE PERFORMED AS SOON AS POSSIBLE AND BEFORE THE NEXT STORM EVENT. IF MAINTENANCE BEFORE THE NEXT STORM EVENT IS IMPRACTICABLE, MAINTENANCE MUST BE COMPLETED AS SOON AS POSSIBLE.

FINAL STABILIZATION HAS BEEN ACHIEVED WHEN ALL SOIL-DISTURBING ACTIVITIES HAVE BEEN COMPLETED AND A UNIFORM VEGETATIVE COVER WITH A DENSITY OF 70 PERCENT OF THE NATIVE BACKGROUND VEGETATIVE COVER FOR THE AREA HAS BEEN ESTABLISHED ON ALL UNPAVED AREAS AND AREAS NOT COVERED BY PERMANENT STRUCTURES. FINAL STABILIZATION OF AREAS WHERE A ROCK ARMOR HAS BEEN INSTALLED WILL BE ACHIEVED IMMEDIATELY UPON PLACEMENT OF THE ROCK ARMOR.

ALL ROADS AND UTILITIES WILL BE CONSTRUCTED AND STABILIZED BEFORE BEGINNING CONSTRUCTION OF ANY ONSITE STRUCTURES.

THE CONTRACTOR WILL BE RESPONSIBLE FOR THE PROPER CONSTRUCTION, STABILIZATION, AND MAINTENANCE OF ALL EROSION AND SEDIMENTATION CONTROLS AND RELATED ITEMS INCLUDED WITHIN THESE PLANS.

SHOULD ANY MEASURES CONTAINED WITHIN THIS PLAN PROVE INCAPABLE OF ADEQUATELY REMOVING SEDIMENT FROM ONSITE FLOWS PRIOR TO DISCHARGE OR OF STABILIZING THE SURFACES INVOLVED, ADDITIONAL MEASURES MUST BE IMMEDIATELY IMPLEMENTED BY THE CONTRACTOR TO ELIMINATE ALL SUCH PROBLEMS.

PROTECTION (I.E., RIP RAP) FOR DIVERSION CHANNELS, SWALES, OUTLET APRONS AND DESIGNATED SLOPES, SHALL BE IMMEDIATELY INSTALLED UPON CONSTRUCTION OF THE SAME.

SHOULD CONDITIONS ARISE IN THE FIELD WHICH RENDER THE E & S CONTROLS FOR THIS PROJECT INAPPROPRIATE OR INADEQUATE, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER. ADDITIONAL DRAWINGS OF MODIFICATIONS TO EXISTING DRAWINGS REQUIRED WILL BE FURNISHED BY THE CONTRACTOR. THESE REVISIONS SHALL BECOME A PART OF AND A CONDITION OF THE E & S CONTROL PLAN.

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NO.	DATE	APP.	REVISION
1	02/06/04	DK	ISSUED FOR CONSTRUCTION
2	02/22/05	DK	FINAL ISSUED TO NMD FOR PERMIT REVIEW
3	02/22/05	DK	BOE ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
NEW MEXICO

LOS ALAMOS



CHGNO.	BY	DATE	CLASS	APPROVAL	DATE
001	RWM	6/22/05			
002	SW	8/22/05			
003	AK	6/22/05			
004	DK	6/22/05			
005	DK	6/22/05			



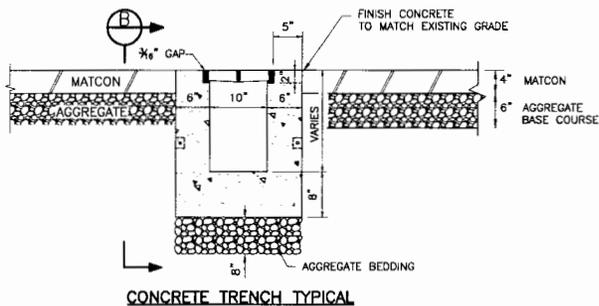
EROSION AND SEDIMENTATION CONTROL NOTES			
OWNER	GDM	DATE	02/06/04
SCALE	N.T.S.	DWG. NO.	2020
		S.A. NO.	13104.002.001
		REV.	A

TABLE 1: CHANNEL CHARACTERISTICS

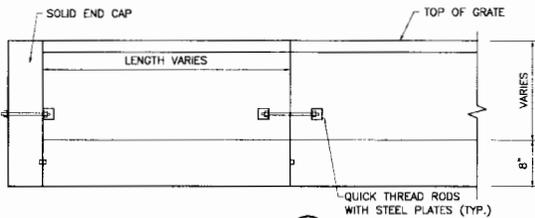
CHANNEL	DESIGN FLOW (CFS)	CHANNEL DIMENSIONS					FLOW CHARACTERISTICS				CHANNEL BED PROTECTION
		BED SLOPE (X)	T (FT)	D (FT)	B (FT)	Z1	Z2	Q (FT)	V (FT)	VELOCITY (FPS)	
CHANNEL 1	5.87	2.00	VARIES	VARIES	2	3	3	0.54	VARIES	3.03	R-3 RIP RAP
CHANNEL 2	11.73	2.00	VARIES	VARIES	2	3	3	0.75	VARIES	3.65	R-3 RIP RAP
BENCH 1	2.93	4.00	14	1	N/A	4	10	0.39	0.61	2.81	R-3 RIP RAP
BENCH 2	3.91	4.00	14	1	N/A	4	10	0.43	0.57	3.02	R-3 RIP RAP
DOWNCHUTE	5.87	33.33	12	1	6	3	3	0.12	0.88	7.62	RENO MATRESS

TABLE 2: SEDIMENT TRAPS SIZING

RUNOFF AREA	REQUIRED STORAGE	STORAGE DEPTH	TOTAL DEPTH (INCL. 1' FREEBOARD)	APPROXIMATE BOTTOM DIMENSIONS		SEDIMENT STORAGE
				WIDTH	LENGTH	
Ac	CF	FT	FT	FT	FT	CF
1	2000	2	3	19.2	38.4	700
2	4000	2	3	28.5	57.0	1400
3	6000	2	3	35.6	71.3	2100
4	8000	2	3	41.6	83.3	2800
5	10000	2	3	46.9	93.9	3500

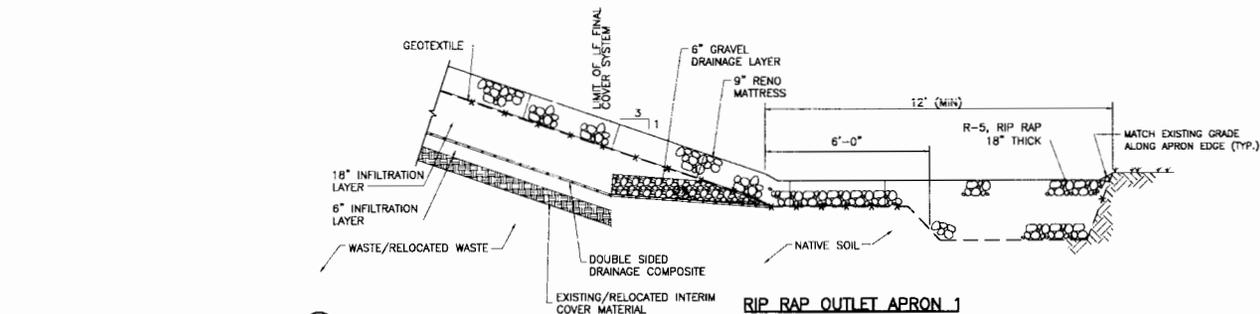


DETAIL 3  
N.T.S. 2003/2021

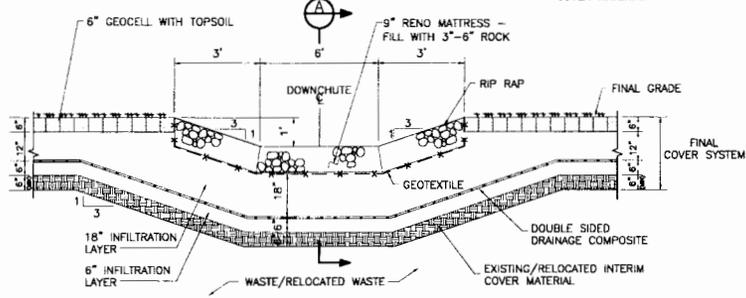


SECTION B  
N.T.S.

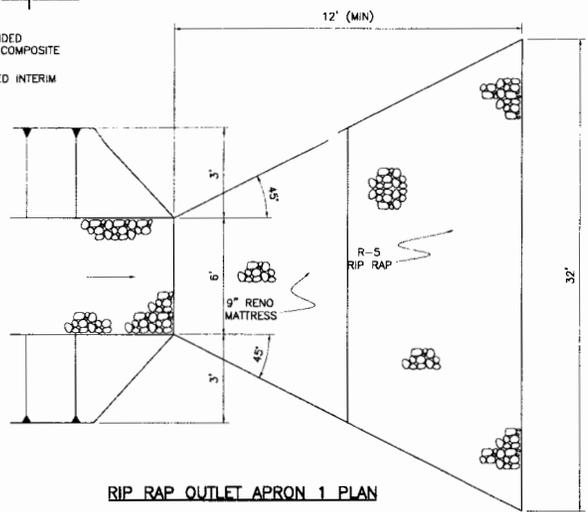
- NOTES:
1. REFER TO MANUFACTURER'S INSTRUCTIONS FOR DETAILS AND INSTALLATION INSTRUCTIONS.
  2. GRATES SHALL BE BOLTED TO FRAMES.
  3. USE TYPE A GRATE OPENING.
  4. SECTIONS CONNECTED TOGETHER WITH 3/4" QUICK THREAD RODS AND STEEL PLATES.



RIP RAP OUTLET APRON 1  
SECTION A  
N.T.S.

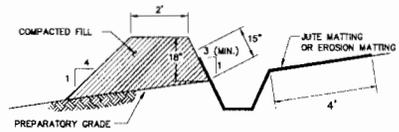


DOWNCHUTE - SECTION  
DETAIL 4  
N.T.S. 2002/2021



RIP RAP OUTLET APRON 1 PLAN  
DETAIL 5  
N.T.S. 2002/2021

- NOTES:
1. REFER TO DRAWING 2002 FOR DOWNCHUTE SECTION LOCATIONS.
  2. FINAL GRADE DETAILS ARE SHOWN AT 3H:1V SLOPE FOR INFORMATIONAL PURPOSES ONLY. ACTUAL GRADES SHALL BE AS INDICATED ON DRAWING 2002 AND 2010.



TEMPORARY DIVERSION BERM  
DETAIL 4  
N.T.S. 2018/2021

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NO.	DATE	APP.	REVISION
1	02/05/04	GDM	ISSUED FOR CONSTRUCTION
2	02/05/04	BK	REVISED PER NAMED COMMENTS
3	02/05/04	BK	FINAL ISSUED TO NAMED FOR PERMIT REVIEW
4	02/05/04	AH	BOX ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
LOS ALAMOS NEW MEXICO

**WESTON TEAM**  
North Wind

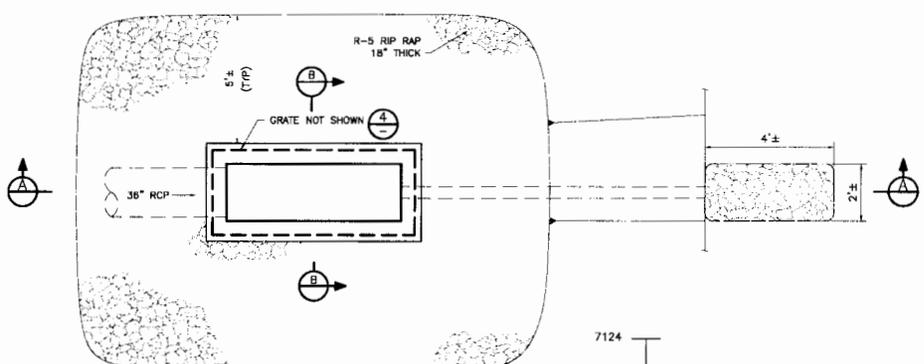
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SW	6/22/05		
AH	6/22/05		
BK	6/22/05		
BK	6/22/05		



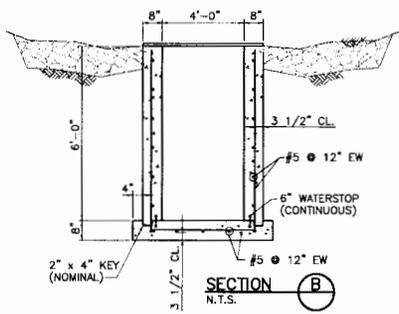
STORMWATER CONTROL DETAILS  
SHEET 1 OF 2

OWNER: GDM  
DATE: 02/05/04  
SCALE: N.T.S.

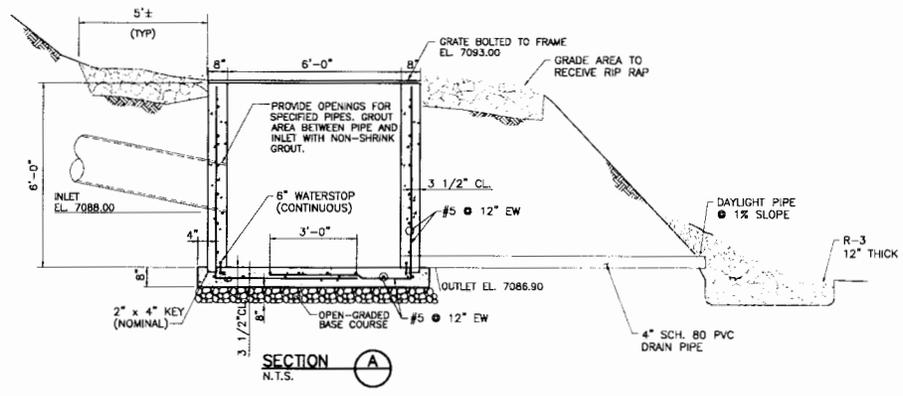
PROJECT NO.: 13104.002.001  
SHEET NO.: 2021  
REV. NO.: A



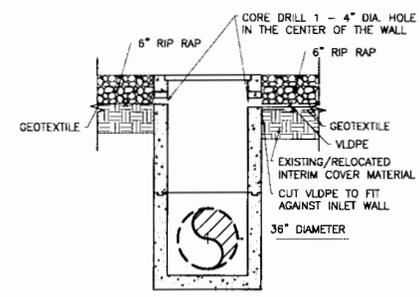
**PLAN**  
**IMPACT BASIN 1**  
N.T.S. 2003/2022



**SECTION B**  
N.T.S.

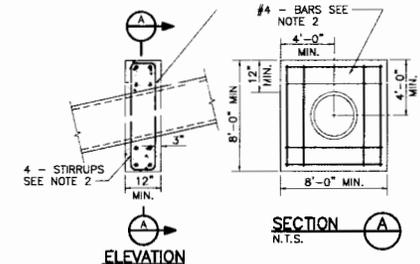


**SECTION A**  
N.T.S.



**CROSS SECTION OF VLDPE AT INLET 10**

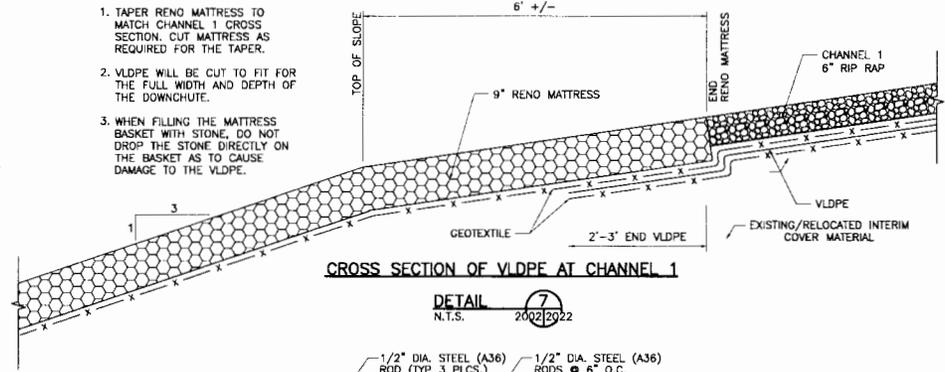
**DETAIL 6**  
N.T.S. 2002/2022



**CONCRETE ANCHOR 3**  
N.T.S. 2003/2022

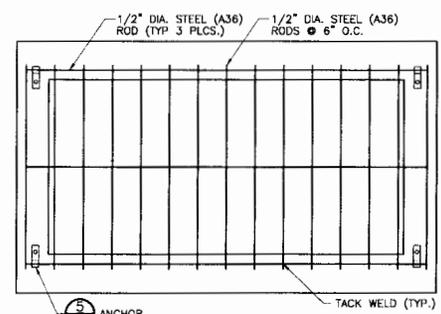
- NOTES:**
- 1' = 3750 PSI @ 28 DAYS.
  - ALL REINFORCING STEEL TO BE ASTM A-615 GRADE 60.
  - CARRY ALL BEARING SURFACES TO FIRM SUBGRADE. PLACE CONCRETE ANCHOR AGAINST DOWNGRADE SIDE OF BELL.
  - PLACE ANCHORS AT 36" CC MAX.

- NOTES:**
1. TAPER RENO MATTRESS TO MATCH CHANNEL 1 CROSS SECTION. CUT MATTRESS AS REQUIRED FOR THE TAPER.
  2. VLDPE WILL BE CUT TO FIT FOR THE FULL WIDTH AND DEPTH OF THE DOWNCHUTE.
  3. WHEN FILLING THE MATTRESS BASKET WITH STONE, DO NOT DROP THE STONE DIRECTLY ON THE BASKET AS TO CAUSE DAMAGE TO THE VLDPE.



**CROSS SECTION OF VLDPE AT CHANNEL 1**

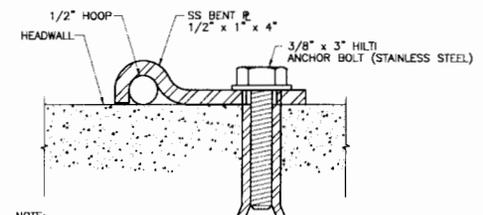
**DETAIL 7**  
N.T.S. 2002/2022



**IMPACT BASIN GRATE**

**DETAIL 4**  
N.T.S.

**NOTE:**  
CONTRACTOR MAY PROPOSE ALTERNATE GRATE DESIGN SUBJECT TO THE APPROVAL OF THE OWNER.



- NOTE:**
1. TACK WELD ALL BARS TO ONE ANOTHER. COAT ALL BARS WITH BITUMINOUS MATERIAL CONFORMING TO ASHTO SPECIFICATION M-243 IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

**TYPICAL GRATE**  
**DETAIL 5**  
N.T.S.

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NO.	DATE	APP.	REVISION
A	06/04	BK	ISSUED FOR CONSTRUCTION
1	06/04	BK	FINAL ISSUED TO NMD FOR PERMIT REVIEW
0	06/04	AH	BOX ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
LOS ALAMOS NEW MEXICO

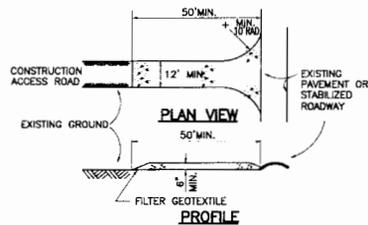
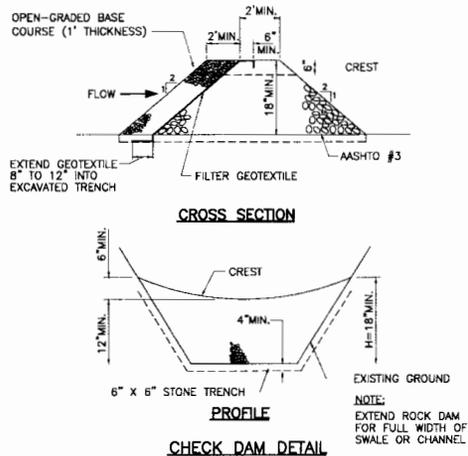
**North Wind** **WESTON** TEAM

DESIGNED	DATE	CHECK APPROVALS	DATE
RHW	6/22/05		
SW	6/22/05		
AH	6/22/05		
BK	6/22/05		
BK	6/22/05		

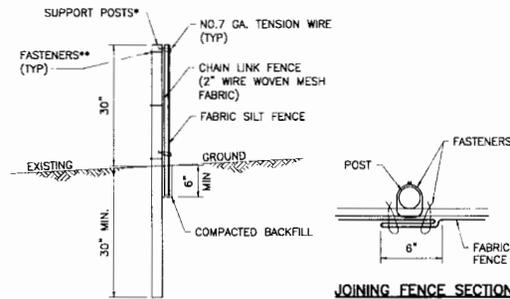
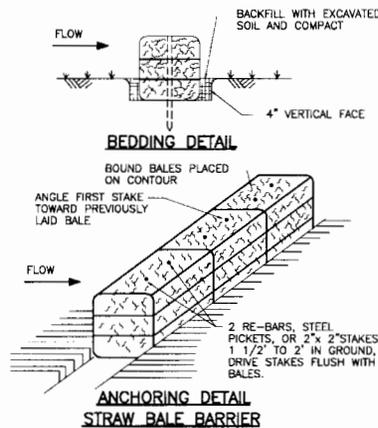


**STORMWATER CONTROL DETAILS**  
**SHEET 2 OF 2**

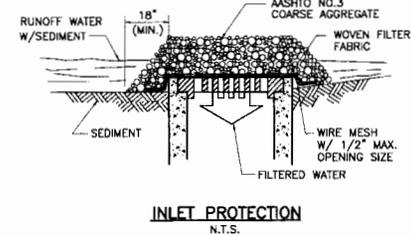
OWNER	DATE	DRAWING NO.	REV. NO.
GPL	02/06/04	2022	A
SCALE	AS SHOWN	13104.002.001	



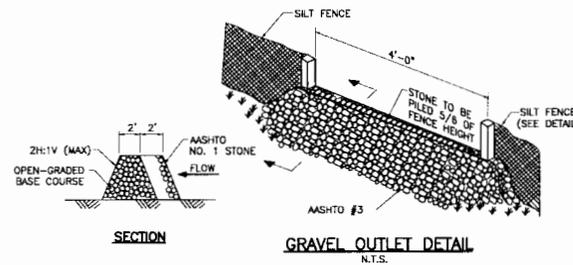
- CONSTRUCTION SPECIFICATIONS**
1. STONE SIZE - AASHTO #3 OR RECYCLED CONCRETE EQUIVALENT
  2. LENGTH - NOT LESS THAN 50 FT.
  3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
  4. WIDTH - TWELVE (12) FT. MIN., BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
  5. FILTER GEOTEXTILE - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
  6. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY AND INCORPORATED WITHIN THE FILL OPERATIONS.
  7. WASHING - WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY.
  8. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.



- SILT FENCE (SUPER SILT FENCE)**  
N.T.S.
- \* POSTS SPACED @ 10' MAX. USE 2"x2" WOOD POSTS OR 2 1/2" DIA. GALVANIZED OR ALUMINUM POSTS.
  - \*\* CHAIN LINK TO POST FASTENERS SPACED @ 14" MAX. USE NO. 6 GA. ALUMINUM WIRE OR NO. 9 GALVANIZED STEEL PRE-FORMED CLIPS. CHAIN LINK TO TENSION WIRE FASTENERS SPACED @ 60" MAX. USE NO. 10 GA. GALVANIZED STEEL WIRE. FABRIC TO CHAIN FASTENERS SPACED @ 24" MAX. C TO C.
- NO. 7 GA. TENSION WIRE INSTALLED HORIZONTALLY AT TOP AND BOTTOM OF CHAIN-LINK FENCE.
- FILTER FABRIC FENCE MUST BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER MUST BE EXTENDED AT LEAST 8 FEET UPSLOPE AT 45° TO MAIN BARRIER ALIGNMENT.
- SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FENCE.
- SILT FENCE MAY BE ATTACHED TO THE EXISTING OR RELOCATED/NEW CHAIN LINK FENCE PROVIDING THE REQUIRED EMBEDMENT DEPTH IS ACHIEVED.



- NOTES:**
1. WIRE MESH SHALL BE LAID OVER THE INLET SO THAT THE WIRE EXTENDS TO A MINIMUM OF 1 FOOT BEYOND EACH SIDE OF THE INLET STRUCTURE. HARDWARE CLOTH OR COMPARABLE WIRE MESH WITH MAXIMUM 1/2" OPENINGS SHALL BE USED. IF MORE THAN ONE STRIP OF MESH IS NECESSARY, THE STRIPS SHALL BE OVERLAPPED 3 INCHES (MIN.).
  2. AASHTO NO. 3 COARSE AGGREGATE SHALL BE PLACED OVER THE WIRE MESH AS SHOWN. THE DEPTH OF STONE SHALL BE AT LEAST 12" OVER THE ENTIRE INLET OPENING. THE STONE SHALL EXTEND BEYOND THE INLET OPENING AT LEAST 18" ON ALL SIDES.
  3. IF THE STONE FILTER BECOMES CLOGGED WITH SEDIMENT SO THAT IT NO LONGER ADEQUATELY PERFORMS ITS FUNCTION, THE STONES MUST BE PULLED AWAY FROM THE INLET, CLEANED AND REPLACED.
  4. WOVEN FILTER FABRIC SHALL MEET THE REQUIREMENTS OF FILTER CLOTH FOR SILT FENCE.
  5. IN UNPAVED AREAS, SILT FENCE OR STRAW BALES MAY BE INSTALLED AROUND THE INLET PER THE DETAILS IN LIEU OF THE GRAVEL AND WIRE MESH SEDIMENT FILTER.

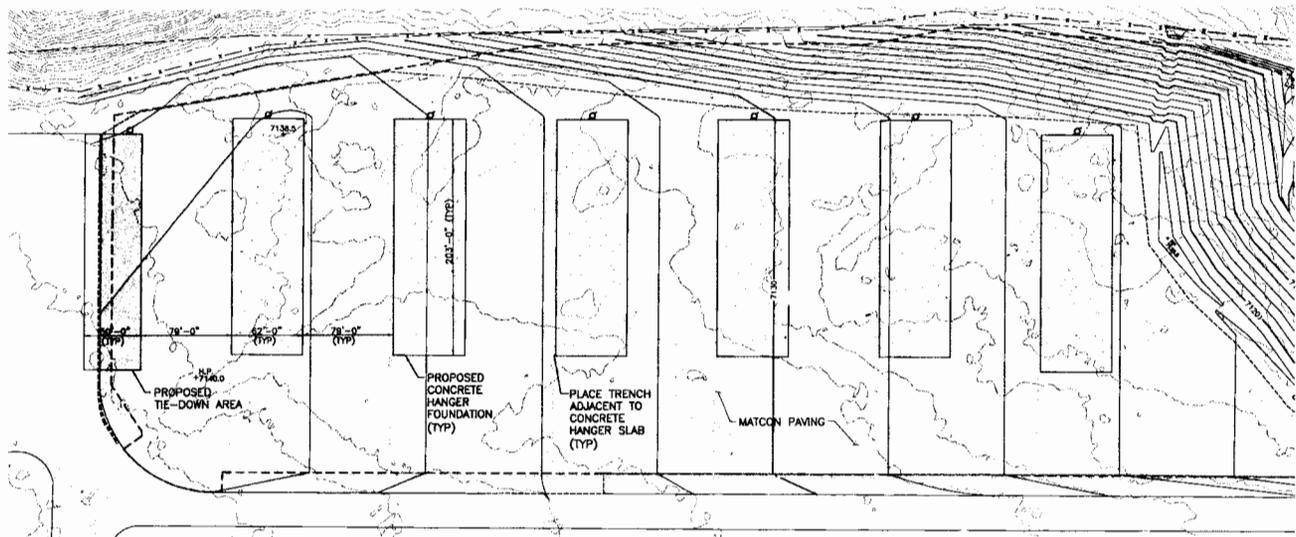


- NOTES:**
1. GRAVEL OUTLETS TO BE PROVIDED AT ALL EXISTING OR GRADED LOW POINTS, EVERY 250 FEET, (UNLESS OTHERWISE NOTED) AND ALL AREAS OF POTENTIAL CONCENTRATED FLOWS.
  2. IF INSPECTION OF SILT FENCE REVEALS UNDERMINING OR OVERTOPPING OF THE FENCE, REMOVE PORTION OF SILT FENCE AND REPLACE WITH A GRAVEL OUTLET.
  3. ACCUMULATED SEDIMENTS WILL BE REMOVED WHEN ACCUMULATION REACH 1/3 THE ABOVE GROUND HEIGHT OF THE FENCE.

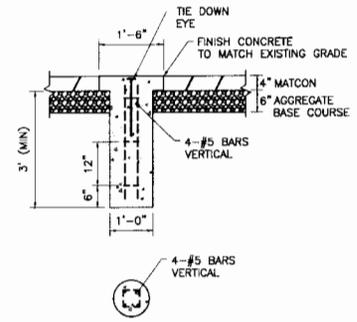
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				LOS ALAMOS SITE OFFICE TA-73 AIRPORT LANDFILLS				NEW MEXICO				EROSION AND SEDIMENTATION CONTROL DETAILS			
LOS ALAMOS				NEW MEXICO				DRAFTER: RWV DATE: 6/22/05 CHECK APPROVALS: SW DATE: 6/22/05 PERM. ENR: AH DATE: 8/22/05 PERM. ENR: BK DATE: 5/22/05 APPROVED: BK DATE: 5/22/05							
A 12/01/05 BK ISSUED FOR CONSTRUCTION 1 02/01/06 BK FINAL ISSUED TO NAME FOR PERMIT REVIEW 0 02/01/06 AH BOX ISSUED TO DOE FOR REVIEW				2 RE-BARS, STEEL PICKETS, OR 2" x 2" STAKES 1 1/2" TO 2" IN GROUND, DRIVE STAKES FLUSH WITH BALES.				GDM DATE: 02/06/04 PER. NO.: 2023 N.T.S. 13104.002.001							





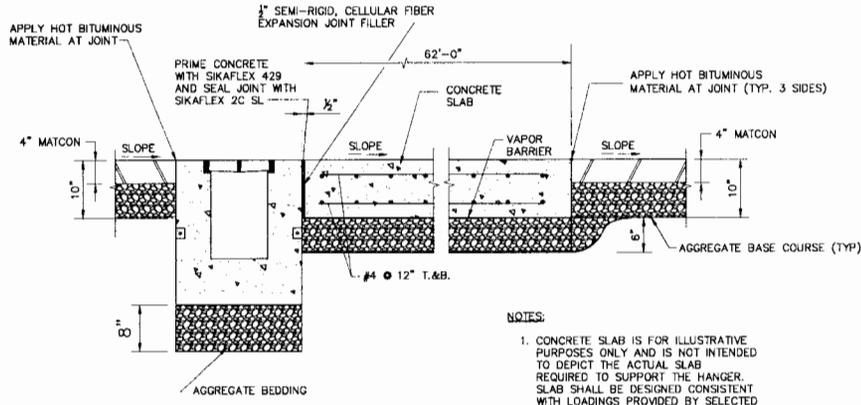
**PLAN**  
1"=50'



**TYPICAL TIE-DOWN DETAIL**  
N.T.S.

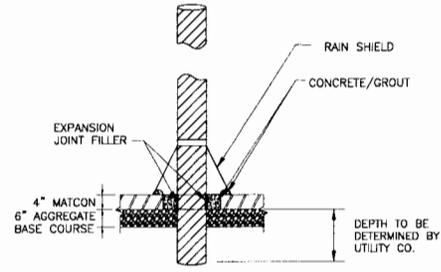
- NOTES:**
- CORE DRILL AN 18" DIAMETER HOLE IN THE MATCON TO FULL DEPTH OF PAVEMENT.
  - DRILL A 12" DIAMETER HOLE TO THE BOTTOM OF THE CONCRETE PIER.
  - PLACE REINFORCEMENT AND TIE-DOWN EYE IN THE HOLE AND BACKFILL WITH 3,000 PSI CONCRETE.

- GENERAL NOTES:**
- INSTALL UTILITY POLES AT NORTH END OF HANGERS FOR FUTURE USE.
  - GUTTERS AND DOWNSPOUTS SHALL BE PROVIDED ON ALL HANGERS. DOWNSPOUTS ON THE WEST SIDE SHALL DISCHARGE INTO THE TRENCH DRAINS. LEADERS SHALL BE INSTALLED ON THE EAST SIDE AND SHALL DISCHARGE BEYOND THE CONCRETE/MATCON INTERFACE.
  - APPROXIMATELY 27 TIE-DOWN ANCHORS WILL BE INSTALLED. LOCATIONS WILL BE DETERMINED IN THE FIELD.



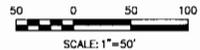
**TYPICAL HANGER SLAB**  
N.T.S.

- NOTES:**
- CONCRETE SLAB IS FOR ILLUSTRATIVE PURPOSES ONLY AND IS NOT INTENDED TO DEPICT THE ACTUAL SLAB REQUIRED TO SUPPORT THE HANGER. SLAB SHALL BE DESIGNED CONSISTENT WITH LOADINGS PROVIDED BY SELECTED HANGER MANUFACTURER.



**UTILITY POLE PENETRATION DETAIL**  
N.T.S.

- LEGEND**
- PROPERTY LINE
  - - - - - EXISTING FENCE
  - - - - - PROPOSED FENCE
  - - - - - LIMIT OF LANDFILL FINAL COVER SYSTEM
  - ~ ~ ~ ~ ~ EXISTING GRADE CONTOUR
  - 7130 — PROPOSED FINAL GRADE CONTOUR
  - I-10 PROPOSED STORM SEWER INLET
  - MH-1 PROPOSED STORM SEWER MANHOLE
  - - - - - PROPOSED STORM SEWER CONCRETE TRENCH
  - - - - - PROPOSED STORM SEWER PIPE
  - PAVED AREA
  - CONCRETE HANGER FOUNDATION
  - ⊙ UTILITY POLE



**NOT FOR CONSTRUCTION**

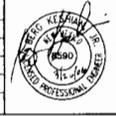
NO.	DATE	APPV.	REVISION
1	02/06/04	BK	ISSUED FOR CONSTRUCTION
2	02/06/04	BK	REVISED PER NAMED COMMENTS
1	02/06/04	BK	FINAL ISSUED TO NAMED FOR PERMIT REVIEW
0	02/06/04	AH	BOOK ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
NEW MEXICO

LOS ALAMOS

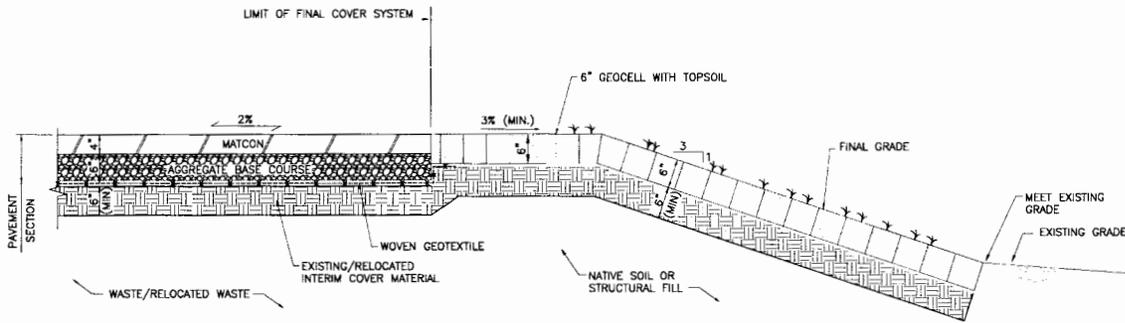
**North Wind** **WESTON TEAM**

CHANGED	BY	DATE	DESCRIPTION
DESIGN	RMM	6/22/05	
FIELD	AH	6/22/05	
FIELD	AI	6/22/05	
APPROVED	BK	6/22/05	
APPROVED	BK	6/22/05	



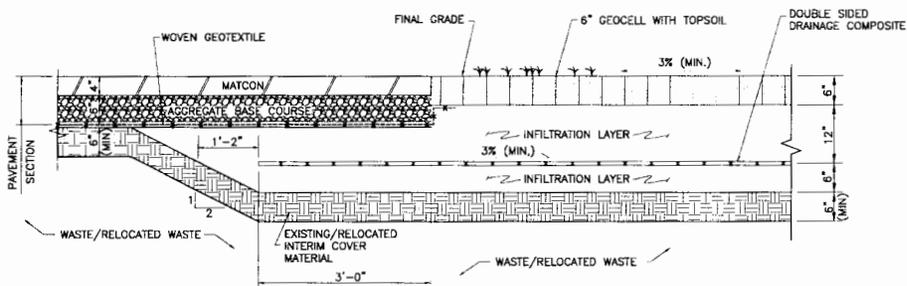
HANGER PLAN			
DATE	SCALE	PROJECT NO.	REV. NO.
02/06/04	1"=50'	13104.002.001	2024 A

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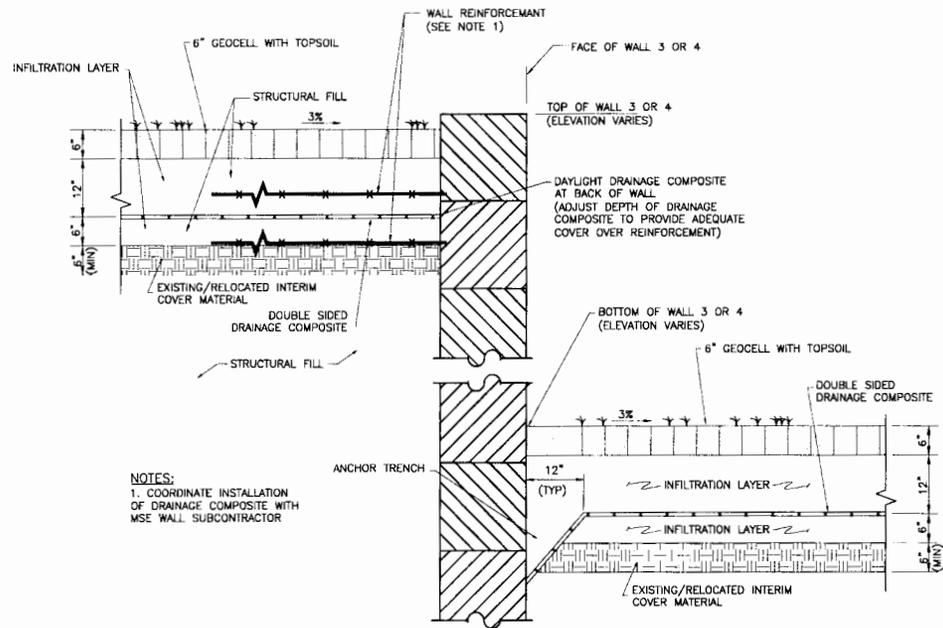
TYPICAL EDGE OF MATCON/EGDE OF CAP ALONG NORTH SLOPE CROSS-SECTION

SECTION **L**  
N.T.S. 2002|2005



TYPICAL INTERFACE BETWEEN MATCON AND ARMORED CAP

SECTION **M**  
N.T.S. 2002|2025



NOTES:  
1. COORDINATE INSTALLATION OF DRAINAGE COMPOSITE WITH MSE WALL SUBCONTRACTOR

TYPICAL DRAINAGE COMPOSITE PLACEMENT AT WALLS 3 AND 4

SECTION **N**  
N.T.S. 2008|2025

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NO.	DATE	APP.	REVISION	NO.	DATE	APP.	REVISION
1	02/06/04	AK	ISSUED FOR CONSTRUCTION				
2	02/06/04	AK	REVISED PER NAMED COMMENTS				
3	02/06/04	AK	FINAL ISSUED TO NAMED FOR PERMIT REVIEW				
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LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
LOS ALAMOS NEW MEXICO

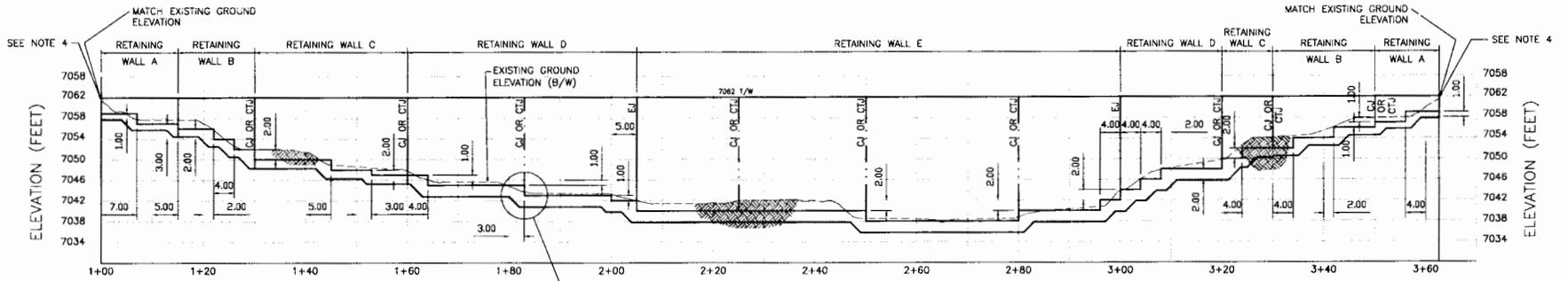
**North Wind** **WESTON** TEAM

CHECKED	DATE	DATE	DATE
RWM	6/22/05		
AH	6/22/05		
AH	6/22/05		
BK	6/22/05		
BK	6/22/05		

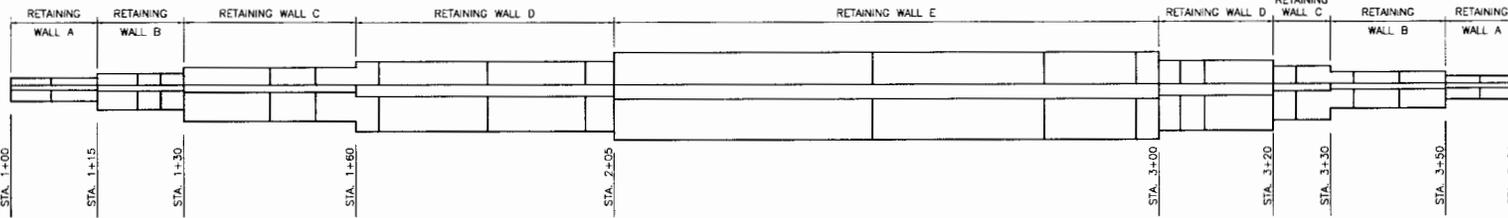


CAPPING SYSTEM DETAILS  
SHEET 2 OF 2

OWNER	EAD	DATE	02/06/04	DRAWING NO.	2025	REV. NO.	A
SCALE	N.T.S.	SHEET NO.	13104.002.001	DATE			



**WALL 1 ELEVATION**  
(LOOKING WEST)  
SCALE: 1"=10'



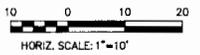
**WALL 1 PLAN**  
SCALE: 1"=10'

NOTE:  
FOR DETAILS OF RETAINING WALLS SEE  
DWG. 3001 & 3002

**NOTES:**

1. SEE DRAWING 2002 FOR SITE GRADES.
2. SEE DRAWING 2007 AND 2008 FOR GENERAL WALL ELEVATIONS AND SECTIONS.
3. SEE DRAWING 3002 FOR JOINT SYMBOLS AND DETAILS.
4. ADJUST WALL HEIGHT AND KEY INTO NATIVE GROUND/BEDROCK.
5. THE BOTTOM OF FOUNDATIONS SHALL BE CARRIED A MINIMUM OF 2 FEET INTO COMPETENT BEDROCK. IF OVER-EXCAVATION IS REQUIRED TO ACHIEVE 2 FEET EMBEDMENT INTO COMPETENT BEDROCK A LEAN CONCRETE MIX MAY BE PLACED BELOW THE DESIGN FOUNDATION BEARING LEVEL. REINFORCING BARS SHALL BE INSTALLED TO TIE THE LEAN MIX TO THE FOUNDATION AS DIRECTED BY THE ENGINEER.

ALTERNATIVELY, IF OVER-EXCAVATION IS REQUIRED TO ACHIEVE 2 FEET EMBEDMENT INTO COMPETENT BEDROCK THE WALL HEIGHT MAY BE INCREASED AND THE APPROPRIATE WALL SECTION CONSTRUCTED AT THAT LOCATION. THE MAXIMUM WALL HEIGHT SHALL NOT EXCEED 24'-0".



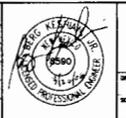
NO.	DATE	APP.	REVISION
A	12/08	EK	ISSUED FOR CONSTRUCTION
1	6/22/05	EK	FINAL ISSUED TO NMD FOR PERMIT REVIEW
0	6/20/04	AH	BOOK ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
NEW MEXICO

LOS ALAMOS NEW MEXICO

North Wind WESTON TEAM SOLUTIONS

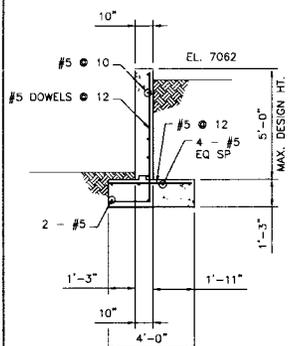
DRAWN	J.F.	DATE	6/22/05	CHECK APPROVALS	DATE
REV. ENG.	J.F.	DATE	8/22/05		
PROJ. ENG.	AH	DATE	6/22/05		
PROJ. MGR.	EK	DATE	6/22/05		
APPROVED	EK	DATE	6/22/05		



**STRUCTURAL WALL 1 PLAN AND ELEVATIONS**

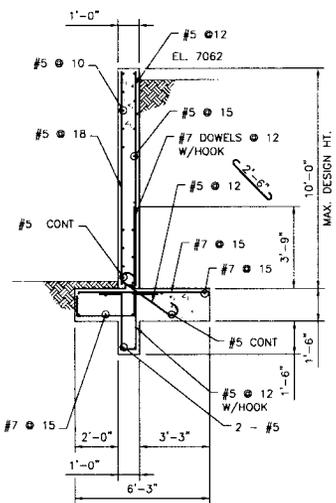
DRAWN	JAS	DATE	02/06/04	DWG. NO.	3000	REV. NO.	A
SCALE	AS NOTED	FILE NO.	1.31.04.002.001	DATE			

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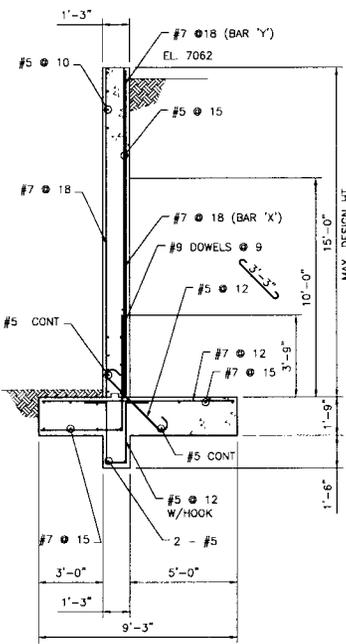
**RETAINING WALL A**

SCALE: 3/8"=1'-0"  
SEE DWG. 3002 FOR KEY AND JOINT DETAILS



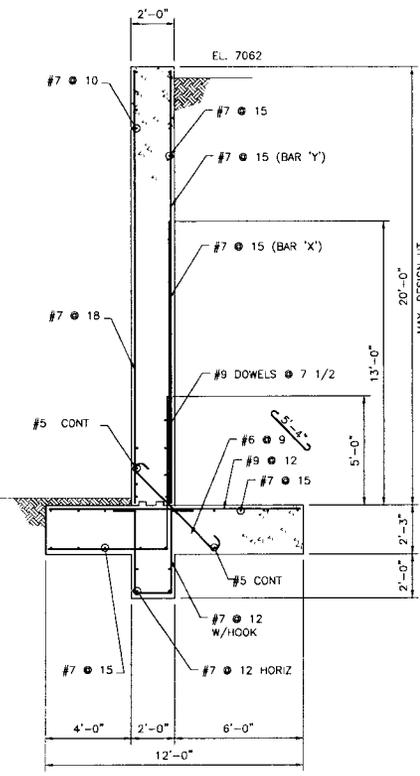
**RETAINING WALL B**

SCALE: 3/8"=1'-0"  
SEE DWG. 3002 FOR KEY AND JOINT DETAILS



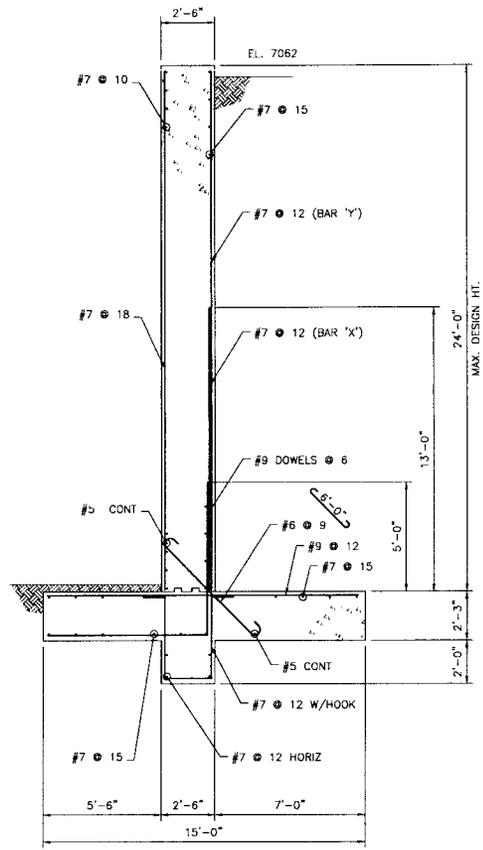
**RETAINING WALL C**

SCALE: 3/8"=1'-0"  
SEE DWG. 3002 FOR KEY AND JOINT DETAILS



**RETAINING WALL D**

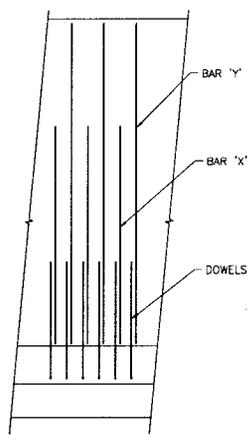
SCALE: 3/8"=1'-0"  
SEE DWG. 3002 FOR KEY AND JOINT DETAILS



**RETAINING WALL E**

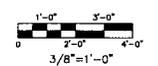
SCALE: 3/8"=1'-0"  
SEE DWG. 3002 FOR KEY AND JOINT DETAILS

NOTE:  
FOR ADDITIONAL RETAINING WALL DETAILS,  
SEE TYPICAL RETAINING WALL DETAIL,  
DWG. 3002.



**ELEVATION BACK FACE RETAINING WALL  
VERTICAL REBAR ARRANGEMENT**

SCALE: NONE



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NO.	DATE	APPV.	REVISION
A	1/20/05	BK	ISSUED FOR CONSTRUCTION
1	1/20/05	BK	FINAL ISSUED TO NMD FOR PERMIT REVIEW
0	1/20/05	AH	BOOK ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
NEW MEXICO

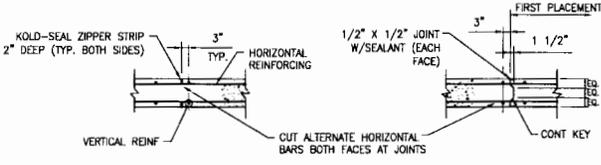
LOS ALAMOS

**WESTON TEAM**  
North Wind

DESIGNED	DATE	CHECKED	APPROVED	DATE
J.F.	6/22/05			
J.F.	6/22/05			
AH	6/22/05			
BK	6/22/05			
BK	6/22/05			



STRUCTURAL WALL 1 SECTIONS			
OWNER	JAS	DATE	02/06/04
SCALE	AS NOTED	DWG. NO.	3001
		REV. NO.	A



CONSTRUCTION JOINT (CJ)

CONSTRUCTION JOINT (CJ)

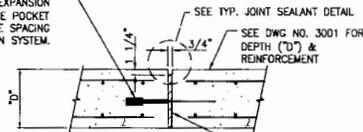
**VERTICAL JOINT DETAIL - CONCRETE WALL**

SCALE: NONE

**NOTES:**

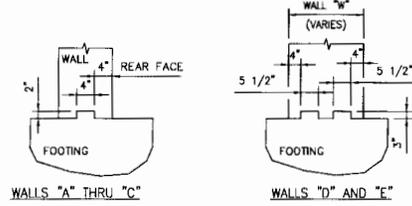
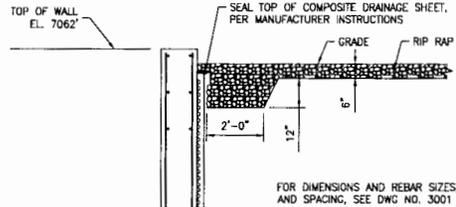
1. PRIOR TO SECOND PLACEMENT OF WALL AT CONSTRUCTION JOINTS, ABRASIVE BLAST OR CHIP FIRST PLACEMENT FACE JOINT TO REMOVE LATANCE, HONEY COMBING, ETC. CLEAN WITH WATER AND STIFF BRUSH WITH "WELD CRETE" OR EPOXY BONDING AGENT.

1" x 1'-0" LG. LOAD TRANSFER DOWELS @ 1'-0" O.C. EPOXY COATED. COAT EXPANSION JOINT END WITH GRAPHITE LUBRICANT. EXPANSION CAP TO HAVE 1" MIN. CLEARANCE POCKET ASSURED BY MEANS OF A POSITIVE SPACING DEVICE. SUBMIT SHOP DRAWINGS ON SYSTEM.



**WALL CONTROL EXPANSION JOINT DETAIL (EJ)**

SCALE: NONE

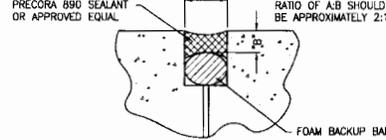


**TYPICAL WALL - FOOTING CONSTRUCTION KEYS**

SCALE: NONE

**NOTES:**

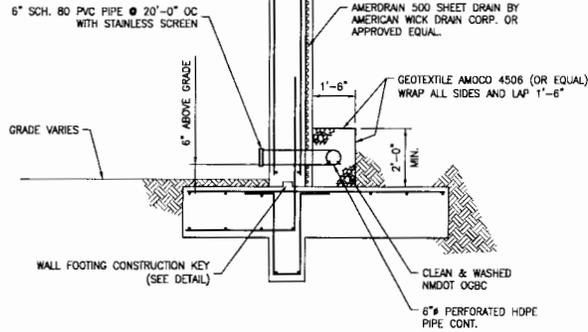
1. PRIOR TO SECOND PLACEMENT OF WALL AT CONSTRUCTION JOINTS, ABRASIVE BLAST OR CHIP FIRST PLACEMENT FACE JOINT TO REMOVE LATANCE, HONEY COMBING, ETC. CLEAN WITH WATER AND STIFF BRUSH WITH "WELD CRETE" OR EPOXY BONDING AGENT.



**JOINT SEALANT DETAIL**

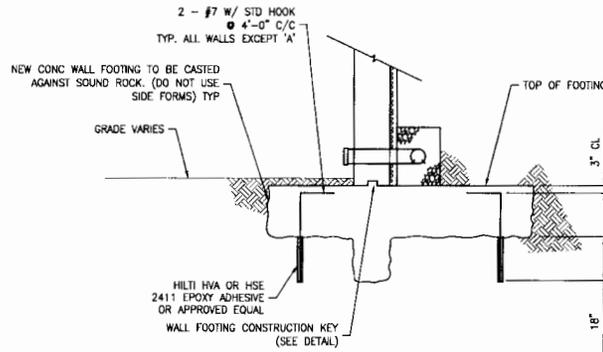
SCALE: NONE

REBAR LAP LENGTHS		
BAR SIZE	LAP LENGTH (HORIZONTAL)	LAP LENGTH (VERTICAL)
#5	3'-3"	3'-0"
#7	4'-3"	3'-9"
#9	5'-6"	4'-9"



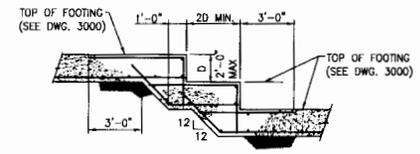
**TYPICAL RETAINING WALL DETAIL**

SCALE: NONE



**TYPICAL FOOTING ROCK EMBEDMENT AND ANCHOR DETAIL**

SCALE: NONE



**VERTICAL JOINT DETAIL CONCRETE WALL**

SCALE: NONE

**NOTES:**

**DESIGN CRITERIA:**

- 1.0 THE RETAINING WALL WAS DESIGN IN ACCORDANCE WITH IBC 2003, ASCE 7-02, AND ACI 318-02.

**2.0 SEISMIC DESIGN CRITERIA:**

- 2.1 SEISMIC USE GROUP: I
- 2.2 SEISMIC DESIGN CATEGORY: C
- 2.3 SDS = 0.40 (SHORT PERIOD)
- 2.4 SD1 = 0.12 (1 SEC PERIOD)
- 2.5 SOIL SITE CLASS: B

**CONCRETE NOTES:**

- 1.0 CONCRETE & REINFORCEMENT STEEL
- 1.1 CONSTRUCTION SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE (ACI) CODE 318-02.
- 1.2 CONCRETE STRENGTH SHALL BE A MINIMUM OF 3,000 P.S.I. (28 DAY COMPRESSIVE STRENGTH).
- 1.2.1 MAXIMUM WATER CEMENT RATIO 0.46 (lbs/lbs)
- 1.2.2 CEMENT FACTOR (GAS/CY) MIN. 7.00
- 1.2.3 SLUMP RANGE (INCHES) 1-3
- 1.2.4 ALL CONCRETE SHALL BE AIR ENTRAINED, AND SHALL HAVE AN AIR CONTENT OF 8% +/- 1%.
- 1.3 ALL EXPOSED CONCRETE SHALL HAVE AN "EARTH TONE" COLOR. SUBMIT SAMPLES FOR APPROVAL.
- 2.0 REINFORCEMENT SHALL BE NEW DEFORMED STEEL BARS HAVING A MINIMUM YIELD STRESS OF 60,000 P.S.I., IN ACCORDANCE WITH LATEST ASTM SPECIFICATION A615, GRADE 60, AND SUPPLEMENT 5-1.
- 3.0 CONCRETE PROTECTION (COVER) FOR REINFORCEMENT SHALL BE AS FOLLOWS:
  - 3.1.1 CAST AGAINST EARTH : 3 INCHES
  - 3.1.2 FORMED SURFACE TO BE EXPOSED TO FLUID OR IN CONTACT WITH EARTH: 2 INCHES

- 4.0 AT SPLICES, BARS ARE TO BE LAPPED IN ACCORDANCE WITH ACI 318-02 AND THE TABLE SHOWN ON THIS DRAWING.
- 5.0 CONCRETE SHALL BE WET CURED FOR A MINIMUM OF SEVEN (7) DAYS. (THE USE OF AN APPROVED LIQUID MEMBRANE-FORMING CURING COMPOUND IS PERMITTED).
- 6.0 THE PROTECTION OF CONCRETE DURING PLACEMENT IN EITHER COOL AND COLD WEATHER, OR HOT WEATHER SHALL MEET THE MINIMUM REQUIREMENTS OF ACI 318-02.
- 7.0 DO NOT BACKFILL UNTIL CONCRETE HAS CURED A MINIMUM OF SEVEN (7) DAYS. CONFIRM CONCRETE STRENGTH BY BREAK TEST.

**GEOTECHNICAL NOTES:**

- 1.0 ALL EXCAVATIONS SHALL BE COMPLETED IN COMPLIANCE WITH OSHA REQUIREMENTS FOR EXCAVATION (29 CFR PART 1926 SUBPART B).
- 2.0 THE BOTTOM OF FOUNDATIONS SHALL BE CARRIED A MINIMUM OF 2'-0" INTO COMPETENT ROCK.
- 3.0 BACKFILL SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIFICATION SECTION 02200.

**TOPOGRAPHICAL NOTES:**

- 1.0 ALL DIMENSIONS AND GRADES SHOWN ON THE DRAWINGS SHALL BE FIELD VERIFIED PRIOR TO START OF CONSTRUCTION.

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NO.	DATE	APPV.	REVISION
1	8/22/05	JK	ISSUED FOR CONSTRUCTION
2	8/22/05	JK	REVISED PER NAMED COMMENTS
3	8/22/05	JK	FINAL ISSUED TO NAMED FOR PERMIT REVIEW
4	8/22/05	AH	BOOK ISSUED TO DOE FOR REVIEW

LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILLS  
LOS ALAMOS NEW MEXICO

**North Wind WESTON TEAM SOLUTIONS**

ORDERED	DATE	DESIGN APPROVALS	DATE
JK	8/22/05		
JK	8/22/05		
AH	8/22/05		
JK	8/22/05		
JK	8/22/05		



STRUCTURAL WALL I DETAILS			
DATE	SCALE	SHEET NO.	TOTAL SHEETS
JAS	02/06/04	3002	A
AS NOTED	13104.002.001		

# ***North Wind***

## **CONSTRUCTION SPECIFICATIONS FOR THE LOS ALAMOS SITE OFFICE TA-73 AIRPORT LANDFILL**

April 2006

Prepared for:

U. S. Department of Energy, National Nuclear Security Administration  
Los Alamos Site Office  
528 35<sup>th</sup> Street  
Los Alamos, New Mexico 87544

Prepared by:

North Wind Inc.  
1425 Higham Street  
Idaho Falls, Idaho 83402

# **CONSTRUCTION SPECIFICATIONS FOR THE LOS ALAMOS SITE OFFICE TA-73 AIRPORT LANDFILL**

**100% Design Submittal Final**

April 2006

Prepared for:

U. S. Department of Energy, National Nuclear Security Administration  
Los Alamos Site Office  
528 35<sup>th</sup> Street  
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Prepared by:

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Geotextiles	Section 06020
Drainage Composite	Section 06030

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**DIVISION 1**

**GENERAL REQUIREMENTS**

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## SECTION 01010

### SUMMARY OF WORK

#### PART 1 GENERAL

##### 1.01 DESCRIPTION OF WORK

- A. This Project is located at the Los Alamos County Airport, located in Los Alamos, NM. North Wind, Inc. has been contracted by the U.S. Department of Energy (DOE) Los Alamos Site Office (LASO) to design and construct a cover system for the Technical Area (TA)-73 Airport Landfill that is compliant with New Mexico Solid Waste Management Regulations (20 *New Mexico Administrative Code* [NMAC] 9.1). On April 1, 2003, the New Mexico Environment Department (NMED) granted conditional approval of the Voluntary Corrective Measures (VCM) Plan for an engineered alternative earthen final cover (NMED 2003).
- B. Potential release sites (PRSs) 73-001(a)-99 Airport Landfill (main landfill) and 73-001(b)-99 Debris Disposal Area (DDA) are inactive PRSs and are listed in Table A within Module VIII of Los Alamos National Laboratory (LANL) Hazardous Waste Facility Permit (LANL 1996, 57486.1). Both landfill areas are located within TA-73 on DOE property, immediately north of the Los Alamos County Airport runway, between the runway and the edge of the mesa. The airport is currently operating under the management of Los Alamos County under lease from the DOE.
- C. The main landfill area consists of a natural hanging valley into which municipal and LANL sanitary waste was disposed of for approximately 30 years. The west and south sides of the main landfill coincide approximately with the edges of the asphalt tie-down area and the asphalt taxiway to the hot pad, respectively. The north side extends approximately to the chain link security fence along the north side of the airport. To the east, the landfill extends to the end of the hanging valley.
- D. The DDA lies east of the main landfill and consists of two roughly parallel trenches excavated to a maximum depth of approximately 35 feet (ft). To the west, the trenches extend to within approximately 150 ft of the windsock. To the east, the trenches extend approximately 800 ft beyond the end of the runway.
- E. The main landfill covers a surface area of approximately 11.5 acres (AC). The DDA covers a surface area of approximately 5 AC.
- F. Access to PRSs 73-001(a)-99 and 73-001(b)-99 is controlled by a perimeter fence around the entire airport. Access to the tarmac is limited to private airplane owners, operators, passengers, and other individuals with legitimate reasons to be there.
- G. The work generally consists of the construction of a cap or cover over the existing 11.5-AC landfill. Waste from the east slope will be pulled back and relocated in order to reduce the excessively steep sideslope and to construct retaining walls. Waste will be excavated from the north slope to achieve an effective inclination of no steeper than 3H:1V. Waste will be excavated from the east slope to achieve an effective inclination of no steeper than 4H:1V except that steeper temporary slopes will be excavated to facilitate the construction of the retaining walls. The proposed cover configuration is an 18-inch (in.) infiltration layer and a 6-in. rock layer on the north and east sideslopes and an asphalt cap (MatCon™) over the flattop area. The purpose of the cover is to minimize moisture percolation through the landfill refuse and to prevent or reduce leaching and downward migration of contaminants. The work at the DDA consists of recontouring to provide a uniform cover thickness and reseeding. Both sites shall be graded to facilitate drainage and minimize erosion.

- H. The work to be performed as described in this section is for the Contractor's general information only and is not intended to be a complete list of the work for this project. It is the Contractor's responsibility to determine the full scope of work required to complete this project on time, within budget, and in compliance with the Contract Documents. The scope of work is indicated by the requirements of each Specification.
- I. The work includes, but is not limited to:
  - 1. Construction of facilities and access roads as required for access to the sites.
  - 2. Construction of erosion and sedimentation controls necessary for construction and post-construction.
  - 3. Excavation and relocation of waste material from the north and east slopes of the main landfill and establishment of final grades.
  - 4. Installation of a rock armor or other suitable material over the east and north slopes of the main landfill.
  - 5. Construction of retaining walls at the toe of and on the east slope.
  - 6. Construction of the MatCon™ cap on the flat portion of the main landfill.
  - 7. Regrade the DDA to eliminate low spots and establish proper drainage.
  - 8. Add topsoil to the DDA as needed to bring the topsoil thickness over the entire footprint to 12 in.
  - 9. Revegetate denuded and/or disturbed areas at the main landfill and DDA.
- J. The Contractor shall use the design documents, to include but not be limited to these Specifications and the Construction Drawings, to construct closure covers at the airport landfills.
- K. The Contractor will coordinate work to minimize impacts to airport operations.
- L. The Contractor is responsible for operating and maintaining all equipment, materials, systems, structures, and other physical features located within the designated construction boundary in a neat, safe, functional, and protected condition for the duration of the project. This responsibility pertains to all items located on the project site prior to start of the work, items brought onto the site by the Contractor, and items under construction.

1.02 DEFINITIONS

- A. The Owner shall mean DOE.
- B. The Contractor shall mean North Wind, Inc. Contractor responsibilities are specified in the North Wind, Inc. Project Management Plan for the LASO TA-73 Airport Landfill (PMP), Document number NW-ID-2003-073. Contractor personnel include Project Manager, Construction Manager, and Site Superintendent (SS).
- C. The Engineer shall mean the Engineer of Record from Weston Solutions, Inc. The Engineer of Record shall be a Professional Engineer registered in the State of New Mexico in civil engineering. The Engineer of Record may designate someone to act on his behalf (including a North Wind employee), under his supervision. Weston Solutions, Inc. responsibilities are specified in the PMP.
- D. The Subcontractor shall mean any individual or company contracted by the Contractor to provide services or perform work associated with the project.

- E. The term "airport landfills" refers to both the inactive landfill and the DDA.
- F. Where "as shown," "as detailed," "as noted," "as indicated," or words of like meaning are used in the Contractor documents, it shall be understood that reference is being made to the drawings unless otherwise noted.

PART 2 MATERIALS

Not Applicable

PART 3 EXECUTION

3.01 SPECIFICATIONS

The priority of Contract Documents is Specifications to Drawings to Project Scoping Plans. This flow-down means that the Specifications take precedence over the Drawings which take precedence over the ancillary Project Scoping Plans.

3.02 DRAWINGS

- A. An index of Project drawings is shown on the Drawings.
- B. Dimensions shown on the Drawings take precedence over scaled dimensions. Large-scale details have precedence over smaller scale.

REFERENCES

Los Alamos National Laboratory (LANL), January 1996. "LANL HSWA Module VIII Permit, 1996 Revision (guidance)," Los Alamos, New Mexico. (LANL 1996, 57486)

Los Alamos National Laboratory (LANL), October 2002. "Voluntary Corrective Measure Plan for Potential Release Sites 73-001(a)-99 and 73-001(b)-99," Los Alamos National Laboratory document LA-UR-02-4433, Los Alamos, New Mexico. (LANL 2002, ER2002-0359).

New Mexico Environment Department (NMED), April 2003, "Conditional Approval of Voluntary Corrective Measures (VCM) Plan for Potential Release Sites (PRSs) 73-001(a)-99 and 73-001(b)-99," letter from Vickie Maranville, NMED HWB, to Pete Nanos, Director and Everett Trollinger, Project Manager. (NMED 2003)

END OF SECTION

**SECTION 01015**

**GENERAL CONDUCT OF WORK**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Coordination of Work.
- B. Handling and Storage.
- C. Referenced Standards.

**1.02 RELATED SECTIONS AND REQUIREMENTS**

- A. Division 1 - General Requirements
- B. Waste Management Plan for LASO TA-73 Airport Landfill (WMP), March, 2004
- C. Construction Plan for LASO TA-73 Airport Landfill, March, 2004

**1.03 COORDINATION OF WORK**

- A. The Contractor shall be responsible for the coordination of all work so that the Project can be completed within the time stipulated in the Contract. It is the Contractor's responsibility to review coordination of all work in detail with the Engineer and his other Contractors as necessary to avoid any misunderstanding.
- B. The Contractor's Project Manager will serve as the point of contact for all communication.
- C. The Contractor shall supervise and direct all work required under this Contract. The Contractor shall be solely responsible for the construction methodology, controls, techniques, sequences, procedures, or construction safety, except as required in Contract documents or in cases where written direction to the Contractor overrides the Contractor's choice. Major changes to the engineering design must be approved by the Engineer and the Owner.
- D. The Contractor will restrict/control access to the site for construction personnel, equipment, and materials to the access-control points at the site.

**1.04 HANDLING AND STORAGE**

- A. The Contractor shall, at the Contractor's expense, handle, haul, and distribute all materials and all surplus supplies on the different portions of the Work as necessary. Contractor shall provide suitable and adequate storage room for materials and equipment during the progress of the Work and be responsible for loss of, or damage to, materials and equipment furnished by the Contractor, until the final acceptance of the Work.
- B. All excavated materials, construction equipment, materials and equipment to be incorporated in the Work shall be placed so as not to contaminate, damage, or delay the Work and so that free access can be had at all times to this project, and any other project, and to all installations in the vicinity of the Work.

1.05 REFERENCED STANDARDS

- A. Referenced standards used throughout the Contract Documents to specify the quality of materials or workmanship shall refer to the latest edition of such standards that is accepted by the authority having jurisdiction, except where a specific edition is indicated in the Contract Documents.

1.06 WASTE MANAGEMENT

- A. It is anticipated that the Contractor will encounter contamination while performing the work. Refer to the WMP for additional information and requirements.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

**SECTION 01090**

**ABBREVIATIONS**

PART 1 GENERAL

1.01 ABBREVIATIONS

- A. Abbreviations used in these Contract Documents shall refer to and designate the following, as applicable:

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
AOS	Apparent opening size
ASTM	American Society for Testing and Materials
BFM	Bonded Fiber Matrix
CA	Construction area
C <sub>c</sub>	Coefficient of Gradation
CFR	<i>Code of Federal Regulations</i>
CLFMI	Chain Link Fence Manufacturers Institute
COR	Contracting Office Representative
CQCP	Construction Quality Control Plan
C <sub>u</sub>	Uniformity Coefficient
CWA	Controlled Work Area
DDA	Debris Disposal Area
DOE	United States Department of Energy
EPA	United States Environmental Protection Agency
FAA	Federal Aviation Administration
FOD	Foreign objects debris
FS	Federal Specifications
GTL	Geotechnical testing laboratory
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
MatCon™	asphalt capping material
MARV	minimum average roll value
NMAC	<i>New Mexico Administrative Code</i>
NMDOT	New Mexico Department of Transportation
NMED	New Mexico Environment Department
NSA	National Stone Association
OFZ	Obstacle-free zone
OGBC	Open graded base course
OSHA	Occupational Safety and Health Act
PLS	Pure live seed
PMP	Project Management Plan
PPE	Personal protective equipment
PQAP	Project Quality Assurance Plan
PRS	Potential release site
PVC	Polyvinyl chloride
QA	Quality assurance
QC	quality control
RA	Restricted area
SS	Site Superintendent
SSO	Site Safety Officer
SWPPP	Storm Water Pollution Prevention Plan

TA	Technical Area
USCS	Unified Soil Classification System
USDA	United States Department of Agriculture
UV	Ultraviolet
WMP	Waste Management Plan
VCM	Voluntary Corrective Measure

UNITS OF MEASURE

AC	Acre
cm/sec	Centimeters per second
CY	Cubic yard(s)
dBA	Decibel A-weighted
F	Fahrenheit
ft	Foot (feet)
in.	Inch(es)
lb	Pound(s)
mph	Miles per hour
pcf	Pounds per cubic foot
psi	Pounds per square inch
ft <sup>2</sup>	Square foot (feet)

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

**SECTION 01200**

**PROJECT MEETINGS**

**PART 1 GENERAL**

**1.01 WEEKLY MEETINGS**

- A. Weekly job meetings shall be conducted with the Engineer, Contractor and other designated parties to evaluate progress on the project to date. These meetings shall be held at Site Trailer at a scheduled time convenient to all parties.
- B. It may periodically become necessary to have special meetings to resolve project conflicts in which all parties shall be required to attend.
- C. Other items to be reviewed during weekly job meetings are:
  - 1. Health and safety Issues.
  - 2. Project schedule.
  - 3. Coordinate construction activities with operational personnel.
  - 4. Manpower requirements, etc.
  - 5. Coordinate projected progress with other Prime Contractors, as applicable.
  - 6. Review submittal schedules, expedite as required to maintain schedule.
  - 7. Maintaining of quality and work standards.
  - 8. Review any changes for:
    - a. Effect on Construction Schedule.
    - b. Cost Reductions.
  - 9. Review next week's work items.

**PART 2 PRODUCTS**

Not Used.

**PART 3 EXECUTION**

Not Used.

END OF SECTION

**SECTION 01310**  
**CONSTRUCTION SCHEDULES**

**PART 1        GENERAL**

**1.01        SECTION INCLUDES**

- A.    General Requirements.
- B.    Form of Schedules.
- C.    Content of Schedules.
- D.    Updating.
- E.    Submittals.
- F.    Distribution.
- G.    Coordination.

**1.02        RELATED SECTIONS AND REQUIREMENTS**

- A.    Division 1 - General Requirements.
- B.    Construction Plan for LASO TA-73 Airport Landfill, June 2005

**1.03        GENERAL REQUIREMENTS**

- A.    The construction schedule for the entire work is provided in the Contractor's Construction Plan for LASO TA-73 Airport Landfill. The construction schedule shall be revised monthly, or more frequently if directed by Engineer. based on the progress of work.

**1.04        FORM OF SCHEDULES**

- A.    Contractor will prepare manually or in computer generated format, a Work Breakdown Structure and Gantt schedule analysis. Exact format to be approved by the Engineer in accordance with 1.07 of this section.
- B.    Reproducible sheets at 11-in. x 17-in. shall be provided to the Engineer.

**1.05        CONTENT OF SCHEDULES**

- A.    Complete sequence of construction by activity.
  - 1.    Shop Drawings, Sealants, Concrete Mix Designs, Asphalt Mix Designs, Product Data, Samples and Guarantees.
  - 2.    Selection of finishes.
  - 3.    Product fabrication and delivery dates.
  - 4.    Dates for beginning, and completion of, each construction activity, specifically:

- a. Mobilization
  - b. Site preparation
  - c. Waste Relocation and rough regrade
  - d. Retaining wall construction
  - e. Landfill cover installation
  - e. Acceptance Testing
  - f. Revegetation
  - g. Demobilization
5. Date(s) for final inspection and acceptance.
- B. Identify Work of separate stages, or separate phases, or other logically grouped activities.
- C. Projected percentage of completion for each item of Work as of first week of each month.
- D. Provide subschedules as necessary to define critical portions of entire schedule.
- E. Assign to each scheduled major activity a sum of money, the total of which shall equal the approved contract price.

1.06 UPDATING

- A. Show all changes occurring since previous submission of updated schedule.
- B. Indicate progress of each activity, show completion dates.
- C. Include:
- 1. Major changes in scope.
  - 2. Activities modified since previous updating.
  - 3. Revised projections due to changes.
  - 4. Other identifiable changes.
- D. Provide narrative report, if necessary, to include:
- 1. Discussion of problem areas, including current and anticipated delay factors and their impact.
  - 2. Corrective action taken, or proposed, and its effect.
  - 3. Effect of change in schedules of other contractors.
  - 4. Description of revisions:
    - a. Effect on schedule due to change of scope.

- b. Revisions in duration of activities.
- c. Other changes that may affect schedule.

1.07 SUBMITTALS

- A. Submit initial schedules within ten (10) days after the date of contract execution.
  - 1. The Engineer will review schedules and return review copy within ten (10) days after receipt.
  - 2. If required, resubmit within seven (7) days after return of review copy.
- B. Submit monthly updated schedule accurately depicting progress to first week of each month.

1.08 COORDINATION

- A. Schedules of subcontractors will be available for inspection at the Engineer's request.
- B. Contractor shall coordinate schedules with schedules of subcontractors.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

**SECTION 01330**

**SURVEY DATA**

**PART 1 GENERAL**

**1.01 LINES, GRADES, AND MEASUREMENTS**

- A. The Contractor shall make all measurements and check all dimensions necessary for the proper construction of the Work called for by the Drawings and Specifications. During the execution of the Work, the Contractor shall make all necessary measurements to prevent misfitting in said work, and shall be responsible therefore and for the accurate construction of the Work.

**1.02 DIMENSIONS OF EXISTING FEATURES**

- A. The dimensions and locations of existing structures, topography, and drainage swales are of critical importance in the installation or connection of new work, the Contractor shall verify such dimensions and locations in the field before the construction or fabrication of any structure, material or equipment.

**PART 2 PRODUCTS**

Not Used.

**PART 3 EXECUTION**

Not Used.

END OF SECTION

**SECTION 01340**

**SHOP DRAWINGS, SAMPLES, AS-BUILTS,  
AND OTHER SUBMITTALS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General Instruction.
- B. Samples.
- C. Shop Drawings.
- D. Product Data.

**1.02 RELATED SECTIONS AND REQUIREMENTS**

- A. Division 1 - General Requirements.
- B. Construction Plan for LASO TA-73 Airport Landfill, June 2005.
- C. Health and Safety Plan for LASO TA-73 Airport Landfill (HASP), June 2005

**1.03 GENERAL INSTRUCTIONS**

- A. Within ten working days after the formal execution of the contract, the Contractor shall submit a Submittal Schedule to the Engineer. The Submittal Schedule shall be a sub-schedule to the Construction Schedule required under Section 01310 Subpart 1.05D, and shall include dates for submittal, approval, fabrication as appropriate, and delivery of the Work. This schedule shall also list samples and other submittals as planned by the Contractor and as required by the Contract Documents. The Engineer will review the schedule in accordance with the provisions of Section 01310 and return either approved or modified copies to the Contractor. Once accepted by the Engineer, the schedule shall be followed throughout the project unless superseded by a new schedule accepted by the parties involved. The Engineer will require ten working days to properly review this schedule. The Engineer will add or delete submittals required for review.
- B. Information submitted as a separate submittal or as part of another submittal that has not been listed on the schedule as a required submittal will be scanned briefly by the Engineer. Such extraneous and unrequired information will be marked as "NO ACTION TAKEN" and returned.
- C. When Shop Drawings are required by the various technical specification sections or elsewhere in the Contract Documents, the names and addresses of the proposed manufacturers (if different from those listed in the Contract Documents) shall be submitted prior to the submittal of the Shop Drawings so that the Engineer may consider and approve or disapprove the manufacturer and/or the supplier as to his or their ability to furnish a product meeting the requirements of the Contract Documents. This preliminary submittal is subject to final approval of the particular material or equipment. As requested, the Contractor or equipment supplier shall also submit data relating to the materials and equipment he proposes to incorporate into the work, in sufficient detail to enable the Engineer to identify the particular product in question and to form an opinion as to its conformity to the contract requirements. Such data shall be submitted in a manner similar to that specified for Shop Drawings.

- D. The normal time allowed for review of Shop Drawings, and other submittals, is two calendar weeks after receipt of the submittal by the Engineer, or other party responsible for the review. Requirements for shorter review periods must be presented in writing by the Contractor.
- E. Submittals shall be approved by the Contractor, as shown by the Contractor's approval marked on each copy. Submittals shall not be accepted from subcontractors, suppliers, manufacturers, or representatives. Submittals shall be identified by reference to Contract document number, drawing number, equipment number and specification section number, equipment or material schedule, or room numbers, as appropriate. Submittals shall be numbered consecutively by the Contractor, or equipment supplier, as appropriate. Resubmissions shall use the same number with a suffix added to identify each resubmission (i.e., "A" shall identify the first resubmission).
- F. Minimum sheet size: 8-1/2-in. x 11-in.
- G. Number of submittals required:
  - 1. Shop Drawings: Submit the number of opaque reproductions, which the Contractor requires, plus four copies which will be retained.
  - 2. As-Built Drawings: Submit one electronic version in AutoCAD 2004 or more recent version and one hard copy suitable for reproduction.
  - 3. Product Data: Submit the number of copies which the Contractor requires, plus four copies which will be retained.
  - 4. Samples: Submit the number stated in each specification section.
  - 5. Certificates: Submit three copies which will be retained.
- H. Submittals shall contain:
  - 1. The date of submission and the dates of any previous submissions.
  - 2. The Project title and number.
  - 3. Contract identification.
  - 4. The names of:
    - a. Contractor.
    - b. Supplier.
    - c. Manufacturer.
  - 5. Identification of the product, with the specification section number and other appropriate information.
  - 6. Field dimensions, clearly identified as such.
  - 7. Relation to adjacent or critical features of the work or materials.
  - 8. Applicable standards, such as American Society for Testing and Materials (ASTM) or Federal Specification (FS) numbers.
  - 9. Identification of deviations from Contract Documents.

10. Identification of revisions on resubmittals.
11. 8 in. x 3 in. blank spaces for Contractor and the Engineer's review stamps.
12. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the work and of Contract Documents.

1.04 SCHEDULE OF VALUES

- A. For all lump sum work, the Contractor shall submit a Schedule of Values.
- B. The Schedule of Values shall be submitted to the Engineer within five (5) days after the Notice-to-Proceed.
- C. The Schedule of Values shall be subject to the review and approval of the Engineer.
- D. The Schedule of Values shall identify all the major elements of the work and the cost of each element. The total scheduled cost shall equal the contract price.
- E. The Schedule of Values shall identify costs for all: mobilization, demobilization, and site preparation; establishment, maintenance and removal of erosion and sedimentation control; construction schedule preparation and updating; as-built documents, as well as: construction activities, generally broken down by structure, location, and specific location.
- F. The approved Schedule of Values will form the basis for the values assigned to scheduled activities established in Section 01310.

1.05 SAMPLES

- A. If the Engineer so requires, either prior to beginning or during the progress of the work, the Contractor or equipment supplier shall submit samples of materials for such special tests as may be necessary to demonstrate that they conform to the Specifications. Such samples, including concrete test cylinders, shall be furnished, taken, stored, packed, and shipped as directed, at the expense of the Contractor. Except as otherwise specified, the Contractor shall make arrangements for, and pay for, the actual tests.
- B. All samples shall be packed so as to reach their destination in good condition, and shall be labeled to indicate the material represented, the name of the building or work and location for which the material is intended, and the name of the Contractor or equipment supplier submitting the sample.
- C. To ensure consideration of samples, the Contractor or equipment supplier shall notify the Engineer in writing that the samples have been shipped and shall properly describe the samples in the letter. In no case shall the letter of notification be enclosed with the samples.
- D. The Contractor or equipment supplier shall submit data and samples, or place his orders, sufficiently early to permit consideration, inspection, testing, and approval before the materials and equipment are needed for incorporation in the work.
- E. When required, the Contractor or equipment supplier shall furnish to the Engineer triplicate copies of manufacturer's attesting to the accuracy of shop or Mill tests (or reports from independent testing laboratories) relative to materials, equipment performance ratings, and concrete data.

- F. The materials and equipment used on the Work shall correspond with the samples submitted.

1.06 SHOP DRAWINGS

- A. The Contractor or equipment supplier, as appropriate, shall submit for approval at least four (4) print copies (plus any additional copies required by the Contractor or subcontractors or equipment suppliers) of Shop Drawings of materials fabricated especially for this contract, and of equipment and materials for which such drawings are specifically requested in the Contract Documents. One copy, plus any additional copies provided, will be reviewed, stamped, and returned to the Contractor.
- B. Such drawings shall show the principal dimensions, weights, structural and operating features, performance characteristics and capacities, wiring and piping diagrams, space required, clearances required, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawings. Show location, size, dimensions and embedment depth for anchor bolts. List special tools required to operate, and maintain equipment. Describe tool's purpose. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for this contract.
- C. The Contractor or equipment supplier shall be responsible for the prompt submission of all Shop Drawings in accordance with the Shop Drawing Schedule so that there shall be no delay to the work due to the absence or lateness of such drawings.
- D. No material shall be purchased or fabricated especially for this Contract until the required Shop Drawings have been submitted and reviewed as conforming to the Contract requirements. All materials and work involved in the construction shall then be as represented by said drawings.
- E. Only Shop Drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by the Contractor's subcontractors and vendors. Prior to submitting Shop Drawings to the Engineer, the Contractor shall check thoroughly all such drawings so that the subject matter thereof conforms to the Drawings and Specifications in all respects. Shop Drawings which are correct shall be marked with the date, checker's name and indication of the Contractor's approval, and then shall be submitted to the Engineer; other drawings shall be returned to the fabricator or subcontractor for correction.
- F. The Engineer review of Shop Drawings will follow a general check made to ascertain conformance with the design concept and functional results of the Project and compliance with the information given in the Contract Documents. The Contractor shall be responsible for dimensions to be confirmed and correlated at the job site and for coordination of the work of all trades. The Contractor, or equipment supplier if appropriate, shall also be responsible for information that pertains solely to the fabrication processes or to techniques of construction.
- G. The Engineer classifications are as follows:

APPROVED	<input type="checkbox"/>
APPROVED AS CORRECTED	<input type="checkbox"/>
REVISE AND RESUBMIT	<input type="checkbox"/>
REJECTED	<input type="checkbox"/>
NO ACTION TAKEN	<input type="checkbox"/>

- H. The Contractor or equipment supplier shall make any corrections required by the Engineer and shall return the required number of corrected copies of Shop Drawings until approved.
- I. At the time of each submission or resubmission, the Contractor or equipment supplier shall direct specific attention, in writing, to deviations that the Shop Drawings or samples may have from the requirements of the Contract Documents or corrections required by the Engineer on previous submissions.
- J. The Contractor's stamp of approval on Shop Drawings and samples shall constitute a representation to the Engineer that the Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers and similar data (or he assumes full responsibility for doing so) and that the Contractor has reviewed or coordinated each Shop Drawing and sample with the requirements of the Contract Documents. Submittals received without this information will be returned without being reviewed by the Engineer.
- K. The approval of Shop Drawings and samples shall not relieve the Contractor or equipment supplier from responsibility for any deviations from the requirements of the Contract Documents, unless the Engineer has been notified, in writing, and has given written approval to such deviation, nor shall any approval by the Engineer relieve the Contractor or equipment supplier from responsibility for errors and omissions in Shop Drawings.

1.07 PRODUCT DATA

- A. Product data may be submitted instead of Shop Drawings when the information required for Shop Drawings is contained in Manufacturer's standard literature.
- B. Manufacturer's standard catalog data, schematic drawings and diagrams:
  - 1. Mark each copy to identify pertinent products or models.
  - 2. Modify drawings and diagrams to delete information which is not applicable to the work.
  - 3. Supplement standard information to provide information specifically applicable to the work.

1.08 CERTIFICATES

- A. Types of certificates required are specified in respective Specification Sections.
- B. Shop tests: Provide Manufacturer's sworn reports for actual product to be incorporated in the work.
- C. Laboratory tests: Provide independent testing laboratory reports for actual product to be incorporated in the work.
- D. Certificates of compliance: Provide Manufacturer's sworn statement or independent testing laboratory's report for products similar to those to be incorporated in the work with information indicating compliance with specifications. Test used to show compliance shall have been made within one year of the date of submission, unless approved otherwise by the Engineer.
- E. Certified drawings: Provide certified drawings from the manufacturer as required in each specification section.

- F. Refer to Section 01400 for certification requirements relative to an alternative to on-site sampling and testing.

1.09 AS-BUILT DOCUMENTS

- A. The Site Superintendent will keep a record of all changes approved by the owner and all field changes, including changes to lines and grades.
- B. The Contractor shall maintain one current record hard copy of all Specifications, Drawings, Addenda, Change Orders and Shop Drawings at the site. The documents shall be kept current, in good order, an annotated to show all changes made during the construction process and be clearly marked "AS-BUILT Documents." These As-Built documents shall be available for review by the Engineer during all normal working hours.
- C. The Contractor shall submit to the Engineer, within 10 days after the completion of contract, one set of the above "AS-BUILT" documents containing all changes, additions or deviations from the original set of Documents that have been incorporated into the Work. The Contractor is responsible for the accuracy of these AS-BUILT documents.
- D. The Engineer, within 15 days after receipt of the As-Built documents will produce a final electronic version of the As-Built documents provided by the contractor. The electronic version will be in AutoCAD 2004 or more recent version.
- E. The Contractor shall include As-Built Documents in the submitted Schedule of Values.

1.10 PROGRESS PHOTOGRAPHS

- A. The Contractor shall take progress photographs throughout the duration of the contract. Photographs shall be taken at weekly intervals or as may be specifically directed by the Owner.
- B. Digital photographs shall be taken of each process to document status, progress, and quality. Selected color prints (4 per 8.5 x 11 page) shall be provided with monthly progress reports. Additional color prints shall be provided to the Engineer upon request.
- C. Each digital photograph shall contain the date taken and formatted on an electronic file to contain a description, indicating the location, direction, and what is shown.

1.11 HASP

- A. Refer to the HASP for requirements regarding environmental health and safety.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

**SECTION 01400**

**QUALITY CONTROL**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. The Contractor is responsible for quality control and shall establish and maintain an effective Project Quality Assurance Plan for LASO TA-73 Airport Landfill (PQAP).
- B. The Construction Quality Control Plan for LASO TA-73 Airport Landfill (CQCP) shall cover all construction operations, both on site and off site and shall be keyed to the proposed construction sequence.

**1.02 RELATED SECTIONS AND REQUIREMENTS**

- A. PQAP, November 2003.
- B. CQCP, June 2005.

**1.03 MATERIALS CERTIFICATION**

- A. For certain products, assemblies, and materials, in lieu of on-site sampling and testing procedures, the Engineer will accept from the Contractor the manufacturer's certification, with respect to the product(s) involved, upon the conditions set forth in the following paragraphs:
  - 1. Certification shall state that the named product conforms to the Specifications and that representative samples have been sampled and tested as specified.
  - 2. Certification shall be accompanied with a certified copy of the test results.
  - 3. The certification shall give name and address of the manufacturer and the testing agency, the date of test, and shall set forth the means of identification which will permit field determination of the products delivered to the project as being one product covered by the certification.
  - 4. The certification shall be duplicated with one (1) copy sent with shipment of the covered product to the Contractor and one (1) copy sent to the Engineer.
  - 5. The Contractor shall be responsible for any additional costs for certification and for any costs of sampling and testing.
  - 6. The Engineer reserves the right to require samples and test products to assure compliance with pertinent requirements with respect to fire certification of the products by the manufacturer thereof.

**PART 2 PRODUCTS**

Not Used.

PART 3 EXECUTION

- A. The Contractor's approved PQAP and CQCP defines the minimum construction requirements to be implemented to ensure that the approved design requirements are met or exceeded. The quality assurance (QA) team will report to the Contractor's Project Manager on behalf of the Owner.

END OF SECTION

**SECTION 01500**

**TEMPORARY FACILITIES**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. This section covers the installation, maintenance, and operation of all temporary facilities and controls at the site necessary to support the Contractor operations during the course of the Contract. These temporary facilities and controls will be removed at Contract completion, and include, but are not limited to, office trailers, haul roads, drain facilities, decontamination pads, staging areas, access controls, lighting, utilities, and janitorial services.

**1.02 PROJECT SIGNS**

- A. The Contractor shall erect a Project sign board near the Highway 502 entrance to the site. The information on the sign board shall be protected from the weather elements and the information shall be legible at all times. The sign shall be installed at a location approved by the Engineer..

1. The Project sign shall be constructed of sturdy and moisture-resistant material.
2. The following information shall be displayed in painted black lettering, clearly visible from 100 ft:

**U.S. DEPARTMENT OF ENERGY  
LOS ALAMOS SITE OFFICE  
TA-73 AIRPORT LANDFILL CLOSURE**

- B. The Contractor shall construct and install a Project Information Board at the entrance to the Temporary Facilities Area.

1. The Project sign shall be constructed of sturdy and moisture-resistant material.
2. The following information shall be displayed in painted black lettering,
  - a. Caution: Construction Area.
  - b. A list containing the following telephone numbers:
    - (1) 911 or other local emergency telephone numbers.
    - (2) Location of nearest telephone.
    - (3) DOE-LASO Security telephone number.
    - (4) DOE Contracting Office Representative (COR) name and telephone number.
    - (5) Contractor Project Manager name and telephone number.
  - c. Primary and alternative site evacuation routes.
  - d. Hospital/emergency route map with written instructions and the route highlighted.
  - e. DOE "Whistle Blower Protection Notification" with applicable DOE name and telephone number (provided by DOE).
  - f. Davis-Bacon wages for Los Alamos County, NM.
  - g. Map showing site contamination.
  - h. Equal Employment Opportunity poster.
  - i. Occupational Safety and Health Administration (OSHA) poster.
  - j. DOE Poster—Contractor Employee Occupational or Health Complaint form (provided by DOE).

1.03 PRECAUTIONS AGAINST WEATHER

- A. During adverse weather conditions and against the possibility thereof, the Contractor shall take all necessary precautions so that the Work shall be properly done and be satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building paper shelters, or other approved means.
- B. During cold weather (below 40° degrees Fahrenheit [F]), materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by approved means which shall result in a moist or dry atmosphere according to the particular requirements of the work being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture shall be warm throughout when used.

1.04 TEMPORARY HEAT

- A. If temporary heat is required for the protection of the Work, the Contractor shall provide and install heating apparatus, shall provide adequate and proper fuel, and shall maintain fires as required. Temporary heating apparatus shall be installed and operated in such manner that the finished work will not be damaged thereby. Temporary heating apparatus shall be of the types approved by local codes and ordinances governing the Work.

1.05 WATER SUPPLY

- A. Water necessary for operations and fire protection will be obtained from the hydrant shown on the Drawings. The Contractor shall make all arrangements necessary to obtain water.

1.06 ELECTRICAL ENERGY

- A. Suitable electrical power necessary to perform the work shall be obtained from sources at the airport, by the Contractor.
- B. There shall be sufficient electric lighting, provided by the Contractor, so that all work may be properly conducted when there is not sufficient daylight in the work area.
- C. The Contractor shall assume all risks of loss or damage of any kind to any vehicles, machinery, equipment, materials or supplies which it shall provide in doing the work.

1.07 SANITARY FACILITIES

- A. The Contractor shall provide adequate sanitary conveniences meeting governing local and state codes and regulations for the use of those employed on the work site. Such conveniences shall be made available when the first employees arrive on the work site and shall be constructed and maintained in suitable numbers and at such points and in such manner as may be required or approved.
- B. The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. The Contractor shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the Government, or on adjacent property.

1.08 ACCESS/CONTAMINATION CONTROL

- A. As construction progresses, the Contractor shall maintain contamination control boundaries between clean areas and areas of contamination.

- B. Install access-control fencing to restrict, reduce, or eliminate access by the public. Fence type(s) shall be as indicated on the drawings.
- C. Contamination-control fencing around contaminated areas shall be, at a minimum, colored, plastic, safety fencing or approved equal 4-ft high. Posts and fabric shall be secure and tight at all times.
- D. The Contractor shall maintain site perimeter fences, gates and signs to prevent intrusion by the general public. Maintenance includes keeping fences taut, performing all minor repairs that do not require additional materials, and placement of signs.
- E. If the Contractor uncovers any archaeological or historical artifacts or bones of unknown origins during the term of the Contract, the Contractor shall immediately halt operations in the vicinity of such a discovery and immediately notify the Owner. Further work in these areas shall not resume without written authorization from the Owner.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

**SECTION 01560**  
**TEMPORARY CONTROLS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Safety and Protection.
- B. Protection of the Public.
- C. Site Control and Security.
- D. Maintenance of Existing Operations.
- E. Maintenance of Traffic.
- F. Protection of Natural Water Courses.
- G. Removal of Debris During Construction.
- H. Final Cleaning.
- I. Dust Control.
- J. Noise Control.
- K. Environmental Control.

**1.02 RELATED SECTIONS AND REQUIREMENTS**

- A. Division 1 - General Requirements.
- B. WMP.
- C. HASP.
- D. Storm Water Pollution Prevention Plan for LASO TA-73 Airport Landfill (SWPPP), June 2005.
- E. Construction Plan for LASO TA-73 Airport Landfill.

**1.03 SAFETY AND PROTECTION**

- A. Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work. The Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
  - 1. All employees on the work and other persons who may be affected thereby. Refer to the HASP for site safety and health procedures.

2. All the work and all materials or equipment to be incorporated therein, and any adjacent materials, equipment, or facilities, including that in storage on or off the site.
- B. The Contractor shall notify owners of adjacent utilities when implementation of the work may affect them. All damage, injury or loss to any property referred to in paragraph 1.03 A.2 above caused, directly or indirectly, in whole or in part, by Contractor, any subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, shall be remedied by the Contractor at the Contractor's expense.
- C. The Contractor shall not load or permit any part of any structure to be loaded with a weight that would endanger its safety.
- D. The Contractor shall provide protection of the work from freezing and other elements, which would be harmful to it. The Contractor shall furnish heat or protective shelters or temporary buildings as required for the protection of the work.
- E. The Contractor shall take all necessary precautions for the safety of employees on the work, and shall comply with all applicable provisions of Federal, state, and local safety laws and building codes, and Project requirements in order to prevent accidents or injury to persons on, about, or adjacent to the premises where the work is being performed. The Contractor shall erect and properly maintain at all times, as required by the Project and by the conditions and progress of the work, all necessary safeguards and barricades for the protection of employees on the work and the safety of others employed near the work and the public, and shall post danger signs and warning lights warning against the hazards created by dangerous features of the construction including, but not limited to, protruding nails, excavations, scaffolding, stairways, and falling materials.
- F. The Contractor shall designate a responsible member of its organization on the work whose duty shall be the prevention of accidents. The name and position of the person so designated shall be reported in writing to the Owner.
- G. The Contractor shall immediately report in writing to the Owner, giving full details, all serious accidents which arise out of or in connection with the performance of the work, whether on or adjacent to the site, which cause death, personal injury, or property damage. In addition, if death or serious injury or substantial property damage is caused, the accident shall be reported immediately by telephone or messenger to the Owner. If a claim is made or suit is filed by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Owner, giving full details of the claim.
- H. The Contractor shall assume all risks of loss or damage of any kind to any vehicles, machinery, equipment, materials, or supplies which it shall provide in doing the work.
- I. The Contractor shall take all precautions to prevent damage to the work by the elements, storms, or by water entering the site of the work directly or through the ground. In case of damage by the elements, storm, or water, the Contractor shall make repairs or replacements or rebuild such parts of the work as the Engineer may require in order that the work may be completed by the Contract Documents. If Contractor believes that additional work done by the Contractor, which arose from causes beyond the Contractor's control, entitles him to an increase in the Contract Price or an extension of the Contract Time, he may make a claim thereof as provided herein.
- J. The Contractor shall comply with all insurance requirements stated in the Contract Documents.

- K. It is anticipated that the Contractor may encounter contamination while performing the work; refer to the WMP and the HASP for additional information and requirements.

1.04 PROTECTION OF THE PUBLIC

- A. The Contractor shall conduct work so as to interfere as little as possible with the operating personnel of the site or those persons that may have business at the site. Wherever necessary or required, and at the Contractor's own expense, the Contractor shall maintain fences, furnish full-time or part-time watchmen, guards, and like protective personnel, maintain lights, and take such additional precautions as may be necessary to protect life and property.

1.05 SITE CONTROL AND SECURITY

- A. Site control and security will be maintained at the airport project site during all activities to prevent unauthorized personnel from entering the work area and to maintain airport perimeter security requirements. Entry into and exit out of the airport and construction areas (CA) will be controlled through the appropriate use of barriers, signs, and other measures in accordance with *Code of Federal Regulations (CFR) 29 CFR 1910.144, "Safety Color Code for Marking Physical Hazards"* (CFR 2003e) and 29 CFR 1910.145, "Specifications for Accident Prevention Signs and Tags" (CFR 2003f).
- B. Signs that are routinely lost because of high winds and will be replaced as soon as possible the next working day following discovery.
- C. Three types of site control designations (areas) will be used to meet Hazardous Waste Operations and Emergency Response (HAZWOPER), construction, and Federal Aviation Administration (FAA) site control requirements. These areas based on the potential hazards, complexity of work tasks, duration of project tasks, location and number of non-project personnel near the project area, and to prevent entry of personnel and equipment into the obstacle-free zone (OFZ). Radiologically controlled areas are not anticipated but could be established if radioactive materials or article are encountered. The three areas are
- CAs (general CA boundary)
  - Controlled work area (CWA) (established for higher hazard tasks within the CA)
  - Restricted area (RA) (OFZ and other areas where entry is not permitted)
- D. The existing airport perimeter fence and gates provide general security and access control. This fence will be maintained during all construction activities and access to the project CA will be controlled. Only authorized project personnel and authorized visitors (visitors must have official business on site, receive HASP orientation briefing, and have proper personal protective equipment [PPE] for the area they will access) will be allowed access to the CA. Project construction and administrative areas (field trailer) will be delineated and posted to prevent inadvertent entry by persons conducting normal airport operations or maintenance tasks.
- E. All personnel are required to sign in and out of the site access log located in the field trailer.
- F. Where warranted, designated traffic routes may also be established. These areas also will be posted to prevent inadvertent entry by unauthorized personnel. Project personnel will also be prohibited from entering airport operational areas (not turned over for construction activities) to minimize the impact on airport operations and to reduce the likelihood of distributing foreign objects debris (FOD) on the tarmac and taxiway.
- G. The CAs at the site will be the primary activity locations (main landfill and DDA). The CA boundary will be delineated using the existing airport perimeter fence and other temporary construction fencing where deemed appropriate. All areas beyond the construction field trailer will be considered a CA for site control purposes (whether delineated and posted or

not) and all training, badging, and PPE requirements apply. The primary access points to the CA will be clearly posted with "Construction Area" or similar caution signs. Only authorized personnel may enter the CA.

- H. CWAs will be established to alert personnel within the CA of tasks or activities with increased hazards and to limit the number of workers and equipment in these areas. CWAs will also be used when there is a potential for exposure to site contaminants beyond the immediate work area. CWAs will control the flow of equipment and personnel through the use of established entry/exit points and traffic lanes. The boundary of the CWA may be marked with a combination of stanchions or posts and delineated with rope or ribbon and include warning signs or other demarcation. Only the minimum number of personnel required to safely perform the project tasks will be allowed into the CWA. All personnel who enter the CWA will have adequate training and wear the appropriate level of PPE for the degree and type of hazards present.
- I. RAs will be established to prevent access to certain areas during the course of the project. Examples of RAs include the OFZ around the active runway, the area within 6 ft of the unprotected edge of the east slope above the Pueblo Canyon wall, and other areas designated throughout the course of the project. Entry into RAs is prohibited without authorization from the Site Safety Officer (SSO), SS, and Construction Manager. Entry will not be authorized without a compelling reason and only after other options not requiring entry have been considered and deemed not feasible by the SSO, SS and Construction Manager. If the OFZ must be entered, then coordination with airport operations personnel prior to entry is also required.
- J. Additional PPE, communications equipment, and materials may be required for entry into RAs. A separate personnel control log will be maintained by the SS for entry into RAs and access will be limited to only essential personnel. Name of individuals entering along with time of entry and exit will be documented. The two-person rule (buddy system) will be required for all RA with the second person positioned immediately outside the RA and entering only when required.

1.06 MAINTENANCE OF THE EXISTING OPERATIONS

- A. Airport surfaces shall be swept and washed as needed.
- B. The Contractor must plan and implement construction activities to ensure daily airport operations are not impacted. Operation of the other facilities cannot be interrupted, stopped, or rerouted, unless approved by the Los Alamos County Airport Manager.
- C. Failure of the Contractor to comply with the requirements of this Paragraph 1.05 will be considered a sufficient cause for the Owner to shut down the work. The Contractor will not be entitled to any extra compensation resulting from such a shutdown.

1.07 MAINTENANCE OF TRAFFIC

- A. The Contractor shall carry on all work so that other site traffic will have access to all existing gravel roads, driveways, and facilities.

1.08 PROTECTION OF NATURAL WATERCOURSES

- A. The Contractor shall use all care possible to prevent sedimentation and other pollution of waters during construction. Prohibited practices include, but are not limited to:
  - 1. Dumping of soil material into streams or on stream.
  - 2. Operating of equipment in streams.

3. Pumping of silt-laden water from trenches, containment sumps, or other excavations into streams.
  4. Disposing of debris in streams and surrounding areas.
- B. All erosion and sediment control work shall comply with Section 02930 of these Specifications, the Contractor's approved SWPPP and all applicable requirements of governing authorities having jurisdiction. The Contractor shall provide the necessary strawbales, silt sacks, silt fence, and/or other temporary erosion-control measures to contain all work activities. The Engineer may require additional erosion control measures should conditions warrant.
  - C. Erosion control measures shall be established at the beginning of construction and maintained during the entire period of construction. On-site areas that are subject to severe erosion, and off-site areas that are especially vulnerable to damage from erosion and/or sedimentation are to be identified by the Contractor and will receive special attention.
  - D. All land-disturbing activities are to be planned and conducted so as to minimize the size of the area to be exposed at any one time and to minimize the length of the time of exposure.
  - E. Surface water runoff originating upgrade of exposed areas should be controlled to reduce erosion and sediment loss during the period of exposure.
  - F. All land-disturbing activities are to be planned and conducted so as to minimize off-site sedimentation damage.

#### 1.09 REMOVAL OF DEBRIS DURING CONSTRUCTION

- A. During its progress, the work and the adjacent areas affected thereby, shall be kept clean and all rubbish, surplus materials, and unneeded construction equipment shall be properly removed and all damage repaired at the expense of the Contractor.
- B. Airport taxiways and runways shall be kept free of debris. They will be swept or washed free of debris, as needed.
- C. Where materials or debris has washed or flowed into or has been placed in watercourses, ditches, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations, such material or debris shall be entirely removed and properly disposed of during progress of the work, and the watercourses, ditches, gutters, drains, catch basins, and other facilities kept in neat, clean and functioning conditions.

#### 1.10 FINAL CLEANING

- A. On or before the completion of the work, the Contractor shall, unless otherwise directed in writing by the Owner, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic material and material containing organic matter in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by the Contractor's operations in a neat and satisfactory condition.
- B. The Contractor shall restore or replace, subject to the approval of the Owner, any property damaged by the Contractor's work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. Suitable materials, equipment,

and methods shall be used for such restoration as approved by the Owner, or as required elsewhere in the Contract Documents.

1.11 DUST CONTROL

- A. During the progress of the work, the Contractor shall conduct operations and maintain the area of activities so as to minimize the creation and dispersion of dust.
- B. The Contractor shall control dust within the construction boundaries shown on the Drawings. Dust suppression shall include all roadways, stockpiles, and other areas.
- C. Dust suppression activities shall be conducted as necessary.
- D. The Contractor shall take necessary measures to eliminate dust. Visible dust is not allowed. The Contractor may use techniques that include, but are not limited to the use of a water truck and other methods described in the Contractor's Construction Plan to control dust on excavations and access roads.
- E. Water for dust control sprinkling shall be clean, free of salt, oil, and other injurious materials.

1.12 NOISE CONTROL

- A. Noise may not exceed 65 decibel A-weighted (dBA) at the site boundary during construction.
- B. All work that would generate noise that could affect adjacent facilities is to be conducted during hours as designated by the Owner.
- C. The Contractor is to review any excessively noisy activities with the Owner in sufficient time to permit a complete evaluation of the effects of such noise on the operations at the site and on adjacent facilities before the work is started.

1.13 ENVIRONMENTAL CONTROL

- A. The Contractor is responsible for controlling all emissions into the environment in order to comply with all regulatory requirements.
- B. Any accidental emissions must be reported in accordance with the WMP.

1.14 CONTAMINATED MATERIAL SPILLS

- A. To avoid fuel spills during refueling, an assigned individual will always be present during refueling, and will be aware of the location and operation of the shut-off valve of the fuel tanker. Small equipment such as generators or pumps will be placed over bermed heavy mil plastic. If refueling spills or leaks occur, the bermed plastic will contain the pollutants until proper cleanup and disposal. Drip pans may also be used for refueling, or for placement under equipment that is leaking or has the potential to leak.
- B. A spill kit containing a first aid kit, airhorn, PPE for cleanup activities, shovel, leather gloves, and appropriate absorbents (e.g., pillows, tubes, sand or vermiculite, pads, paper towels, etc.) will be readily available to control and contain spills. Site personnel will be trained in the use of the spill kit and in spill notification procedures.
- C. Spills of non-petroleum products (e.g., fertilizers) will be minimized by proper handling of containers. To the extent possible, transfer of material from large storage containers to small application containers will occur at the materials storage area.

D. The SS shall report all spills or unauthorized discharges, regardless of amount, to the Contractor's Project Manager, the Contractor's Construction Manager, and the LANL Office of Emergency Management Response (S-8). Refer to the WMP for notification phone numbers. This notification will occur as soon as possible after the discharge, but in no event more than 24 hours after the discharge. The following information will be reported:

- The name, address, and telephone number of the person or persons in charge of the facility, as well as the owner or operator of the facility
- The name and address of the facility
- The date, time, location, and duration of the discharge
- The source and cause of discharge
- A description of the discharge, including its chemical composition
- The estimated volume of the discharge
- Actions taken to mitigate immediate damage from the discharge

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

**SECTION 01600**

**MATERIALS AND EQUIPMENT, PRODUCT OPTIONS,  
AND SUBSTITUTIONS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General Material and Equipment Requirements.
- B. Procedures for Substitutions.

**1.02 RELATED SECTIONS AND REQUIREMENTS**

- A. Division 1 - General Requirements.

**1.03 GENERAL MATERIAL AND EQUIPMENT REQUIREMENTS**

- A. Unless otherwise indicated on the Drawings or Specifications, only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor, or equipment supplier as appropriate, to be incorporated in the work shall be subject to the inspection and approval of the Engineer. No material shall be processed for, fabricated for, or delivered to the work without prior approval of the Engineer.
- B. For the purpose of indicating the standards of type, quality, design, and performance of materials and equipment to be provided under this contract, various materials and equipment are named in the Contract Documents, as commercial brands or equal.
- C. The manufacturer(s) named are listed as the approved vendor, or equipment supplier if appropriate, in preparing the Bid. The list is based on the Engineer's knowledge of or experience with the various manufacturers and does not represent that the manufacturers listed will meet the detailed requirements of the Specification. It is the responsibility of the Contractor, or equipment supplier if appropriate, in preparing the Bid to inform and be satisfied that the manufacturer selected for each item of equipment or material will meet the detailed requirements of the Contract Documents, whether the manufacturer selected is one of the named manufacturers or not.

**1.04 PRODUCT OPTIONS AND SUBSTITUTIONS**

- A. The Contract Documents have been prepared using particular items of equipment and material in order to provide a complete set of plans and specifications. These are the materials and manufacturer that will not be substituted unless approved by the Engineer. As-Built drawings shall be maintained by the installing contractor showing the materials actually installed.
- B. The following procedures will be followed relative to substitutions:
  - 1. The General Contractor as part of the Bid shall submit a list of requested and approved substitutions which shall be accompanied by the following information:
    - a. Catalog cuts of the proposed equipment.

- b. Other drawings and manufacturer's information as necessary to fully describe the equipment or material as intended for its specific use in this project.
  - c. For major equipment that is an integral part of the process, the submittal shall include a letter from the manufacturer certifying that the recommended substitution will meet the performance requirements for that piece of equipment.
  - d. Identification of changes required in the installation of the substituted equipment or material compared to the information presented in the Contract Documents.
2. The Engineer shall briefly review the requested substitution and determine the acceptability of the substituted equipment or material. This brief review will not relieve the Contractor of the responsibility for the proper functioning of the equipment or material. The Engineer will retain the right of final decision as to the acceptability of the substitution.
  3. Substitutions cannot be made after the contract has been awarded without approval of the Engineer.
  4. The Contractor will maintain accurate "As-Built" drawings showing the equipment or materials as actually installed.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

**SECTION 01700**  
**CONTRACT CLOSEOUT**

- PART 1        GENERAL
- 1.01        SECTION INCLUDES
- A.        Closeout Procedures.
  - B.        Final Cleaning.
  - C.        Project Record Documents.
  - D.        Warranties.
- 1.02        RELATED SECTIONS
- A.        Division 1 - General Requirements.
  - B.        PMP.
- 1.03        CLOSEOUT PROCEDURES
- A.        Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for inspection by the Owner.
  - B.        Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- 1.04        FINAL CLEANING
- A.        Execute final cleaning prior to final inspection.
  - B.        Clean interior and exterior surfaces exposed to view.
  - C.        Clean site, sweep paved areas, rake clean landscaped surfaces.
  - D.        Remove waste and surplus materials, rubbish, and construction facilities from the site.
- 1.05        PROJECT RECORD DOCUMENTS
- A.        Maintain on-site, one set of the following record documents; record actual revisions to the Work:
    - 1.        Contract Drawings.
    - 2.        Specifications.
    - 3.        Written or verbal instructions.
    - 4.        Modifications to the Contract.
    - 5.        Reviewed shop drawings, product data, and samples.

- B. Store Record Documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and Modifications.
- E. Record Documents, As-Built Drawings, and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 2. Field changes of dimension and detail.
  - 3. Details not on original Contract Drawings.
- F. Submit documents to the Owner with claim for final Application for Payment.

1.06

WARRANTIES

- A. Provide notarized copies.
- B. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.
- C. Provide Table of Contents and assemble in a ring binder with durable plastic cover.
- D. Submit prior to final Application for Payment.
- E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

PART 2

PRODUCTS

Not Used.

PART 3

EXECUTION

Not Used.

END OF SECTION

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**DIVISION 2**

**SITE WORK**

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**SECTION 02005**

**SURVEYING**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. The work to be performed under this section shall include:
1. Project as-built surveys as required herein and elsewhere in the Technical Specification.
  2. Surveys during the life of the project as directed by the Engineer, and surveys required to measure the quantities of completed work for determining the value of partial payments as described in other sections of these Specifications.
  3. Pre-construction and construction topographic surveys.
- B. The survey work shall be performed under the direction of a Land Surveyor registered in the State of New Mexico who shall be subcontracted by the Contractor for the life of the Contract to perform the QA survey work to be performed under this item. The Contractor's QA Surveyor shall be independent from the Contractor and approved by the Engineer. Topographic, cross-sectional, and grade verification surveys will include the development by the QA Surveyor of topographic drawings for the use by the Engineer in verifying field conditions, measurement of quantities, and adjusting the design as necessary.

**1.02 RELATED SECTIONS AND REQUIREMENTS**

- A. CQCP.
- B. Construction Plan for LASO TA-73 Airport Landfill.

**1.03 SUBMITTALS**

- A. Prior to commencement of work under this item, the Contractor shall submit the name, address, and telephone number of the QA Surveyor that will perform this work on the Project.
- B. The Contractor shall organize the placement of the components of the landfill cover systems into manageable areas of work. The Contractor shall submit to the Engineer the pre-construction surveys before commencing excavation, fill placement, or cover system work. Additional topographic surveys of the completed work shall be submitted with each payment request and shall be a condition precedent to the Engineer's approval of the Contractor's request for partial payment. Topographic surveys and as-built surveys to be developed include the following:
1. Pre-construction topographic survey plan shall depict the existing conditions within the limits of work prior to earth disturbance at both the DDA and main landfill.
  2. The Contractor, at a minimum, shall also prepare construction topographic and as-built surveys for each of the following surfaces as shown on the Contract Drawings and described in the Technical Specifications.
    - (a) Existing topography of the main landfill, including locations and elevations of any existing structure on the landfill.

- (b) Subgrade surface after removal of existing interim cover material (main landfill).
  - (c) Subgrade surface on east slope of landfill clearly showing the areal extent of resistant material (bedrock). To be submitted immediately upon removal of waste from the slope.
  - (d) The top surface of the relocated interim cover material (main landfill).
  - (e) The top surface of the infiltration layer (main landfill)
  - (f) Top surface of the aggregate base course.
  - (g) The final grade surface (main landfill and DDA).
  - (h) Horizontal alignment and top and bottom of all retaining walls.
3. The Contractor shall, at a minimum, prepare construction topographic surveys for other areas within the limit of work (but beyond the landfill surface) for each of the following surfaces as shown on the Drawings and described in the Technical Specifications:
    - (a) The final grades of all permanent stormwater management structures (to include all related pipe locations, sizes, and invert elevations).
  4. The coordinate system requirements for deliverables are North American Datum 83 and North American Vertical Datum 088.
  5. All topographic survey plans shall be prepared at a scale of 1 in. = 30 ft with a 2- ft contour interval applying National Map Standards, unless otherwise directed by the Engineer.
- D. The Contractor shall compile all topographic surveys performed for work during the course of the Contract into composite plans for the respective surfaces of each area surveyed. The composite plans shall be prepared at a scale of 1 in. = 30 ft with 2-ft contour intervals (with spot elevations at all tops and toes of slopes) and shall be submitted to the Engineer no later than 15 working days after the scheduled completion date for the Construction.
  - E. For all work under this item, the Contractor shall submit disk copies of the topographic survey plans in AutoCAD 2004 (or latest version) format with executable files along with two (2) prints for each survey plan required.
  - F. The Engineer reserves the right to require the submittal of copies of any or all survey field notes from the Contractor.
  - G. Tolerance on construction shall be  $\pm 0.15$  ft every 100 ft with no compounding of tolerance except for asphalt and concrete surface which shall have a tolerance of  $\pm 0.10$  ft every 100 ft with no compounding of tolerance . All minimum and maximum slopes shall be maintained.

PART 2 MATERIALS  
Not Applicable.

PART 3 EXECUTION

3.01 SURVEYING

- A. The Contractor shall locate, protect, and verify survey control points established from local elevation and coordinate datum prior to starting site work and preserve these points during construction. These controls will be permanent monuments used throughout construction and post-construction for any needed topographic, radial stakeout, and benchmark elevations. The Contractor shall promptly report to the Engineer lost, relocated or destroyed control points. The Contractor shall maintain complete and accurate field notes for all control points and survey points as work progresses.
- B. The Contractor shall perform and update the as-built surveys throughout the life of the Contract as necessary and at the end of the project.
- C. For all survey work, survey points shall be obtained using a 50-ft grid. Additional points shall be surveyed at toe and top of slopes and as necessary to provide accurate topography in areas where slopes vary between the above noted grid points. All point elevations shall be accurate to a tenth of a foot. All pipe invert elevations shall be accurate to a hundredth of a foot.
- D. Initial Staking will include angle points for fence relocation at the northeast end of the main landfill and centerline cut and fills for proposed access routes.
- E. Upon completion of survey work the Contractor shall submit to the Engineer the deliverables (including plans, drawings, electronic disks, and survey notes), in accordance with subsection 1.02.
- F. All deliverables under this item shall be signed and sealed by the QA Surveyor.

END OF SECTION

**SECTION 02100**

**CLEARING AND STRIPPING**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. The work to be performed under this Section includes all requirements for the clearing and stripping of all areas within the Contract Limit of Work in accordance with the Documents.

**1.02 DEFINITIONS**

- A. Clearing is the removal from the ground surface and disposal, within the contract limit of disturbance, of brush, shrubs, other vegetation, rubbish, and debris (natural and man-made).
- B. Stripping is the removal and stockpiling, within the contract limit of disturbance or as provided for by the Engineer, of all topsoils and cover soils that are above the limits of waste including matted roots, and organic materials.

**PART 2 MATERIALS**

Not Applicable.

**PART 3 EXECUTION**

**3.01 GENERAL**

- A. Do not start earthwork operations in areas where clearing and stripping is not complete. Comply with erosion, sediment control, and storm management measures specified in the SWPPP and Section 02930 (Erosion and Sediment Control).

**3.02 CLEARING**

- A. Clear all items to the limits necessary to perform construction activities and shred all cleared and grubbed material for use in topsoil applications. The Contractor is responsible to dispose of cleared and grubbed materials in accordance with State and Federal guidelines.
- B. Burning of any material shall not be permitted on the Site.

**3.03 STRIPPING**

- A. Cut existing vegetation on the main landfill as close to the existing ground surface as possible. Remove material from the ground surface and use it as mulch for temporary stabilization.
- B. Disk the first 6 to 8 in. of cover soils, including stubble vegetation. Thoroughly mix the soils with the vegetative matter.
- C. Remove the completed disked material and stockpile as topsoil.
- D. Do not over excavate the topsoil material.
- E. Assure the topsoil is segregated from the waste and cover soils.

END OF SECTION

## SECTION 02200

### EARTHWORK

#### PART 1 GENERAL

##### 1.01 DESCRIPTION OF WORK

- A. The work to be performed under this section includes requirements for excavation; subgrade preparation; placement and compaction of structural fill and other soil or aggregate materials, including low-permeability soil; grading; items associated with the backfilling of pipe/utility trenches; filling for roads, channels, etc. as required; and performing laboratory and field testing of earthwork materials, as shown on the Drawings or as directed by the Engineer. The work shall also include completing up to 5 geotechnical test borings along the alignment of Wall No.1.

##### 1.02 RELATED SECTIONS AND REFERENCES

- A. Section 02100 – Clearing and Stripping
- B. Section 02270 – Channel Protection
- C. Section 02750 – Stormwater Management and Discharge
- D. Section 02930 – Erosion and Sediment Control
- E. SWPPP, June 2005<sup>[WS11]</sup>.
- F. CQCP, June 2005<sup>[WS12]</sup>.
- G. Construction Plan for LASO TA-73 Airport Landfill, June 2005<sup>[WS13]</sup>.
- H. New Mexico Department of Transportation (NMDOT) Specifications for Highway and Bridge Construction, 2000 Edition.

##### 1.03 DEFINITIONS

- A. Definitions pertinent to the earthwork requirements of this project include:
1. Existing/Relocated Interim Cover Material – on-site soil suitable for backfilling pipe trenches and associated in-line structures and for use in backfilling areas from which waste was removed.
  2. Structural fill – suitable imported soil/aggregate used for wall backfill.
  3. Common borrow – suitable soils meeting the material requirements specified herein and provided from locations within the limits of the site property. Common borrow, to the greatest extent practicable, within the limits of construction methods, engineering judgment and design and in accordance with these Specifications shall be used for site construction.
  4. Foreign borrow – suitable material meeting the material requirements specified herein and provided from sources outside the limits of the site property. Foreign borrow will be used to supplement common borrow material as needed.

5. Infiltration layer soils – defined as foreign borrow, suitable material meeting the requirements specified herein, and infiltration layer soil for use within the main landfill cover system shall be common borrow, environmentally-clean and free of organic material, frozen material, wood, or foreign trash, or other objectionable materials which may be decomposable, compressible, or which cannot be properly compacted, shall not contain recycled materials.
6. Topsoil – suitable material meeting the material requirements specified herein; and provided from sources within or outside the limits of the site property.
7. Unsuitable material – unsuitable material not meeting the requirements set forth herein for fill materials or as otherwise determined by the Engineer to be inappropriate and/or unacceptable for use. Unsuitable material shall be disposed of by the Contractor in the main landfill.
8. Environmentally-clean – soil purchased from commercially available sources shall be certified to be free of chemical contaminants by the seller. The Engineer reserves the right to require additional chemical testing by the Contractor, at no cost to the Engineer, of proposed foreign borrow material to verify its environmental cleanliness should the borrow site history suggest the possible presence of contamination. The Engineer also reserves the right to inspect the foreign borrow site at any time prior to or during construction activities.
9. Noncalcareous – soil or aggregate that, when tested in accordance with ASTM D3042 for soils and ASTM D4373 for aggregates, possesses no more than a 5% loss of weight (dry basis) for aggregates or a maximum carbonate content of 15%.
10. Subgrade – excavation bottom or existing grade, as specified herein, prepared to receive soil fill or aggregate materials.

#### 1.04 QUALITY CONTROL

##### A. General

1. Unless otherwise indicated, all laboratory and field testing shall be performed by an independent geotechnical testing laboratory (GTL) employed by the Contractor, with test materials furnished by the Contractor under the direction of the Engineer. The GTL proposed by the Contractor shall be reviewed and approved by the Engineer. The laboratory shall, at a minimum, be in compliance with ASTM D3740 Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rocks as Used in Engineering Design and Construction.
2. The Contractor shall test materials as set forth in the applicable referenced sections and as required herein.

##### B. Preconstruction Material Testing Requirements

1. The Contractor shall arrange for an inspection by the Engineer of each proposed foreign and common borrow source prior to the commencement of earthwork operations. During said inspection, the Contractor shall provide any equipment necessary to excavate test pits throughout the limits of the proposed source so as to provide the Engineer with a thorough inspection of the type(s) and uniformity of material(s) throughout the proposed source. Upon the Engineer's visual inspection and preliminary acceptance of a proposed borrow source, the Contractor shall collect representative samples of the borrow soils for subsequent geotechnical testing in accordance with Table 02200-1 and as directed by the Engineer.
2. The Contractor is required to submit representative samples of each proposed foreign and common borrow material to the GTL at the minimum frequencies specified in Table 02200-1. The physical property tests shall be completed for each sample and the material approved prior to use of the material at the site. The Contractor shall complete all testing on infiltration layer materials prior to delivery to the site at the frequency specified in Table 02200-1. Infiltration layer material must be pre-approved prior to delivery to the site. Additional quality control testing will be performed on samples of delivered material. If, during the course of construction, an alternative borrow source is used, the material must be pre-approved by the Engineer in accordance with the requirements of this Specification prior to delivery to the site.
3. When a material is approved for use as infiltration layer soil, additional testing shall be performed in accordance with Table 02200-1 to correlate acceptable in-place compactive effort and moisture content to required permeability properties. The resulting lab data shall be used to develop a window within which the degree of compaction and moisture content of the tested in-place soil should fall. By doing so, a reasonable level of assurance can be expected that permeability of the in-place soil will meet the regulatory requirements for hydraulic conductivity.
4. The results of this preconstruction testing program shall be submitted to the Engineer for approval at least two (2) weeks before use of these soils at the site. These test results may be applied toward the test frequency requirements. Physical specimens of all proposed foreign borrow materials shall also be submitted to the Engineer, if requested. The Engineer shall have the authority to reject any and all soils that are believed to be inappropriate for earthwork construction.
5. The frequency of conformance testing of each approved soil material shall be in accordance with Table 02200-1 or at anytime that a significant change in physical properties of the proposed fill materials is observed by the GTL or the Engineer. The results of this on-going conformance testing shall be reviewed and approved by the Engineer prior to use of that material for which the testing was completed.

Table 02200-1  
 Material Quality Control  
 \*Minimum Preconstruction Testing Requirements

Property	Test Method	Fill Materials <sup>3</sup> Frequency	Infiltration Layer Frequency	Topsoil Frequency
Particle Size Analysis w/Hydrometer <sup>1</sup>	ASTM D421/D422	10,000CY	5,000CY	5,000 CY
Atterberg Limits	ASTM D4318	10,000 CY	5,000CY	-----
Organic Content	ASTM D2974	10,000 CY	-----	5,000 CY
Moisture Content	ASTM D2216	10,000 CY	5,000CY	5,000 CY
Standard Proctor Compaction	ASTM D698	10,000 CY	5,000CY	-----
Permeability <sup>2</sup>	ASTM D5084	-----	5,000CY	-----
pH	ASTM D4972	-----	-----	5,000 CY
Nitrogen (TKN)	EPA 351.3	-----	-----	5,000 CY
Phosphorus, Orthophosphate (as P)	EPA 9056A	-----	-----	5,000 CY

<sup>1</sup>Provide USCS designations for Structural Fill/Common Borrow/Foreign Borrow and Infiltration Layer samples and USDA classification for topsoil samples.

<sup>2</sup>Permeability tests for infiltration layer soil shall be conducted on remolded samples compacted to 95% degree of compaction as determined from ASTM D698 within -1% to +2% of optimum moisture content. The permeability test shall be performed under a confining stress of between 0.5 and 2.0 psi, with the lowest value being preferred and a hydraulic gradient of 1.0.

<sup>3</sup>Fill materials include Structural Fill, Common Borrow and Foreign Borrow.

<sup>4</sup>Testing frequency requirements for imported materials obtained from a NMDOT certified source may be reduced by the Engineer based on review of historical records for material produced by the source.

Preconstruction  
 Minimum Testing Acceptance Criteria

Property	Test Method	Fill Materials <sup>1</sup>	Infiltration Layer	Topsoil
Particle Size Analysis w/Hydrometer	ASTM D421/D422	See 2.01.A.2.e	-----	-----
Atterberg Limits	ASTM D4318	LL ≤ 40; PI ≤ 12	-----	-----
Organic Content	ASTM D2974	≤ 6%	-----	> 5%
Standard Proctor Compaction	ASTM D698	Dry density <sup>2</sup> ≥ 105 pcf	-----	-----
Permeability	ASTM D5084	-----	K ≤ 1x10 <sup>-5</sup> cm/s	-----
pH	ASTM D4972	-----	-----	5.5 – 7.6
USDA Classification	Via ASTM D421/D422	-----	-----	Sandy loam, loam, silty loam, sandy clay loam
Nitrogen (TKN)	EPA 351.3	-----	-----	None; used to guide amendment
Phosphorus, Orthophosphate (as P)	EPA 9056A	-----	-----	None; used to guide amendment

<sup>1</sup>Fill materials include Structural Fill, Common Borrow and Foreign Borrow.

<sup>2</sup>Maximum dry density for structural fill used behind retaining walls shall be at least 110 pcf.

C. Field Quality Control Testing Requirements

1. The Contractor shall provide all horizontal and vertical controls necessary for all earthworks as well as associated grid layout and staking using benchmarks and monuments, if any, shown on the Drawings and required by these Specifications.
2. Placing soil material and performing earthworks will be subject to periodic QA inspection by the Engineer. The GTL shall provide continuous quality control (QC) inspection including field moisture and density tests during the compaction of each lift of soil in accordance with Table 02200-2. The Contractor shall also provide labor and equipment to prepare smooth surface spot locations as designated by the independent GTL or the Engineer on which to perform field tests.

Table 02200-2  
Field Quality Control  
Minimum Testing Requirements

Property	Test Method	Fill Materials <sup>1</sup> Frequency	Infiltration Layer Frequency
Field Dry Density	ASTM D2922	10,000 SF	2/Ac/Lift
Field Moisture Content	ASTM D3017	10,000 SF	2/Ac/Lift
Particle Size Analysis (Sieve only)	ASTM D421/422	-----	2500 CY
Standard Proctor	ASTM D698	-----	5000 CY

<sup>1</sup>Fill materials include Structural Fill, Common Borrow and Foreign Borrow.

Field Quality Control  
Minimum Testing Acceptance Criteria

Property	Test Method	Fill Materials <sup>1</sup>	Infiltration Layer <sup>2</sup>
Field Dry Density	ASTM D2922	98% Standard Proctor	95% Standard Proctor
Field Moisture Content	ASTM D3017	± 3% Optimum	-1 to +2% Optimum
Particle Size Analysis (Sieve Only)	ASTM D421/422	-----	Range to be determined

<sup>1</sup>Fill materials include Structural Fill, Common Borrow and Foreign Borrow.

<sup>2</sup>Acceptable values and ranges will be established upon completion of preconstruction testing.

3. Following the placement and compaction of each lift of soil, said lift shall be tested to determine the in-place compacted dry density and moisture content of the in-place soils, and to determine conformance of these data with the project specifications, before subsequent lifts are placed. The testing results from the infiltration layer shall also show that in-place density and moisture content fall within the permeability window determined for the infiltration layer soils as described in Subsection 1.04.B.3. Tests outside of the window shall be considered failing unless otherwise approved by the Engineer. Deficient areas shall be recompacted in accordance with approved techniques as stated herein.

The GTL shall perform in-place field density and moisture tests of each compacted lift in accordance with the following approved methods:

- a. ASTM D2922 and D3017 (Moisture Content and Density of Soil and Soil-Aggregate in Place by Nuclear Methods). The direct transmission method shall be used unless otherwise directed by the Engineer.
4. For each placed lift, one field moisture-density test shall be performed by the GTL for each 100 lineal ft of trench backfill and narrow above-grade fills, for every 10,000 square feet (ft<sup>2</sup>) of structural fill/common fill soil and 2 every AC of infiltration layer soil placed and compacted. The field moisture-density testing frequency shall be increased, if deemed necessary by the Engineer.
5. Any test resulting in penetration of the infiltration soil layer shall be repaired using granular or powdered bentonite.

#### 1.05 SUBMITTALS

##### A. Delivery Tickets

1. Delivery tickets showing the following information with each load of foreign borrow fill material used shall be submitted to the SS:
  - a. Location of borrow source.
  - b. Name and location of supplier.
  - c. Type and amount of material delivered.

##### B. Certified Test Reports

1. The Contractor shall submit to the Engineer the source, estimated quantity, and testing results of all soil material to be used. Acceptance of the soil material from any location shall not be construed as approval of an entire location, but only insofar as the soil material continues to meet the Specification requirements.
2. The Contractor shall submit two (2) certified copies of each report of laboratory test results to the Engineer at least two (2) weeks before use of any soil materials.
3. The Contractor shall submit Certificates of Compliance in accordance with Section 01340 for soil and aggregate materials stating that the materials are environmentally-clean and satisfy all material requirements of these Specifications.

PART 2 MATERIALS

2.01 SOIL MATERIALS

A. Existing/Relocated Interim Cover Material

1. Existing/Relocated Interim Cover Material shall be approved common or foreign borrow material consisting of soil having a uniform mixture of durable natural materials. Common borrow generated by site excavation activities required to achieve design subgrade elevations shall be used as fill to the maximum extent possible.
2. Fill soil generated from site excavation activities shall be environmentally-clean, and free of frozen material, wood, trash, or other objectionable materials which may be decomposable, compressible or which cannot be properly compacted, shall not contain any recycled materials, and:
  - a. Shall classify as SC, SM, SW, ML, CL, or CL-ML according to the Unified Soil Classification System (USCS), unless otherwise specified herein or approved by the Engineer for use to construct a specific work element. Fill shall not be gap-graded or uniformly graded, as determined by the Engineer.
  - b. Liquid limit shall not exceed 40 and plasticity index shall not exceed 12.
  - c. Material shall have a uniformity coefficient, ( $C_u$ ) greater than 6.
  - d. Material shall have a coefficient of gradation, ( $C_g$ ) between 1 and 3.
  - e. Material shall not contain particles larger than:
    - 2 in. for trench backfill.
    - 1 in. for the 12-in. lift of fill soil adjacent to any geosynthetic materials.
    - 4 in. for fill used in embankment or other fills.
  - f. Material shall have a maximum dry density of not less than 105 pounds per cubic foot (pcf) as determined by ASTM D698.
3. Common borrow shall be screened and otherwise processed by the Contractor as required to achieve the maximum particle size specified.
4. Fill shall have physical properties which permit its ready spreading and compacting and minimize particle segregation.
5. Snow, ice, and frozen soil shall be strictly excluded from structural fill materials.
6. The moisture content of soils being placed as fill shall be near optimum conditions so as to provide the specified compaction and ensure a stable embankment.
7. Recycled materials shall be unacceptable for use as fill.

8. Foreign borrow may be used to augment common borrow providing the requirements specified herein are satisfied.

B. Infiltration Layer

1. Infiltration Layer soil for use within the main landfill cover system shall be foreign borrow, environmentally-clean and free of organic material, frozen material, wood, or foreign trash, or other objectionable materials which may be decomposable, compressible, or which cannot be properly compacted, shall not contain recycled materials, and shall satisfy the following:
  - a. Maximum particle size of 1.5 in.
  - b. Maximum permeability of  $1 \times 10^{-5}$  centimeters per second (cm/sec) when compacted to at least 95% of its maximum dry density (ASTM D698) at a moisture content between -1% and +2% wet of its optimum moisture content under a confining stress of 2 psi, unless otherwise approved by the Engineer. (Permeability testing shall be completed under the lowest normal stress that can be reliability maintained by the laboratory test apparatus.)

C. Topsoil

1. Topsoil shall be sandy loam, silty loam, or sandy clay loam as classified by the United States Department of Agriculture (USDA). Gradation analysis (sieve and hydrometer; ASTM D421/422) shall be completed to allow proper USDA classification of the material. Topsoil shall be fertile and friable surface soil of good and uniform quality. Topsoil shall not contain subsoil materials. Topsoil shall be free of refuse, hard clods, woody vegetation, stiff clay, construction debris, boulders, stones larger than 2 in., hydrocarbons, petroleum materials or chemicals toxic to plants, other miscellaneous or otherwise unstable or undesirable materials, and other deleterious inclusions. Testing of topsoil shall be at the frequencies shown on Table 02200-1.
2. Topsoil shall have a minimum organic content of 1% by weight. The organic content of soils shall be determined by the Engineer-approved laboratory utilizing the method described in the ASTM D2974.
3. Topsoil shall have a pH value within a range of 5.5 to 7.6.
4. Apply slow release fertilizers to minimize deficiencies in topsoil, based on prequalification testing results. Organic fertilizers such as Biosol Mix, Biosol, Osmocote, composted manure or other products approved by the Engineer or his designee may be used. If composted manure is to be applied, test the nutrient content and interpret before it is used. If wood chips are used, chips shall have a relatively large surface area to volume ratio to be more easily broken down in the soil. Incorporate wood chips at low rates (0.5 ton/ AC) in order to assure the Carbon to Nitrogen ratio in soil is at favorable conditions for plant germination and growth. If higher rates are used, add nitrogen fertilizer to assure nutrient availability to plants.

## 2.02 BEDDING MATERIALS

- A. Aggregate Bedding for gas collection pipes located within the limit of waste and below the paved surface shall meet the requirements for Aggregate Base Course.
- B. Bedding for gas collection pipes located within the limit of waste but beyond the paved surface shall meet the requirements for Infiltration Layer material.
- C. Aggregate Bedding for storm drain pipes and precast and cast-in-place concrete structures shall be noncalcareous aggregate meeting the requirements of NMDOT Section 304.21 for Class OGBC (open-graded base course) unless otherwise recommended by the manufacturer. Slag will not be permitted.

## 2.03 AGGREGATE BASE COURSE

- A. Aggregate base course shall be noncalcareous aggregate meeting the requirements of NMDOT Section 304.21 for Class I Base Course or as otherwise may be required to satisfy the design requirements for the support of the MatCon™ pavement.

## 2.04 STRUCTURAL FILL

- A. Structural Fill used as backfill for the reinforced concrete wall (Wall No.1) shall be noncalcareous aggregate meeting the requirements of NMDOT Section 304.21 for Class I Base Course.
- B. Structural Fill used as backfill for the mechanically stabilized earth retaining wall (Wall Nos. 2, 3 and 4) shall be noncalcareous aggregate meeting the requirements of NMDOT Section 304.21 for Class I Base Course unless otherwise specified by the wall design or reinforcement material manufacturer.

## PART 3 EXECUTION

### 3.01 EXCAVATION

- A. General
  - 1. Excavations shall be completed to the lines and grades indicated on the Drawings and as required in these Specifications. It shall be the Contractor's responsibility to separate and protect excavated material that is suitable for reuse (i.e., common borrow) from contamination by unsuitable excavated material or other sources. Determination of suitable material shall be preliminarily based on visual observations by the Contractor with concurrence by the Engineer. Final determination of suitable material shall be based on the results of the specified testing program and/or the professional judgment of the Engineer. The Contractor shall make his own determinations relative to subsurface conditions within the vicinity of the landfill and any areas that may yield suitable common borrow materials.
  - 2. The Contractor shall maintain all excavation and fill operations free of water by ditching, sumps, pumping, or other methods approved by the Engineer. Each layer of fill material shall be placed so that the surface is free-draining. Runoff and other water shall be conveyed in ditches and channels to the site perimeter stormwater management system as specified herein.

B. Removal and Placement of Excess and Unsuitable Soil Materials

1. Excess soil materials generated by site excavations, and materials deemed unsuitable by the Engineer which are encountered either beneath, contiguous to or within the proposed limits of excavation or fill placement, shall be removed, transported to, and placed at a stockpile area and kept separate from other soil materials. Unsuitable materials shall be placed within the landfill.
2. Excess (but otherwise suitable) soil materials shall be segregated from and not contaminated with unsuitable soil materials.
3. Excavated boulders and other inert oversized material shall be handled as specified in Section 02266.

C. Unauthorized Excavation

1. Where unauthorized excavations are made below indicated elevations under channels, footings, pipes, structures, or outside trench limits, restore the area to proper elevations with structural fill materials that are placed and compacted, as specified herein, at no additional cost to the Engineer.

D. Sheeting, Shoring, And Bracing

1. Method, design and adequacy of all temporary sheeting, shoring, and bracing systems, when applicable, shall meet the requirements of OSHA 29 CFR Part 1926 and are the responsibility of the Contractor. All damage related to or caused by improperly designed or constructed retention systems shall be repaired by the Contractor. The design and method of the sheeting, shoring, and bracing shall provide means for its removal as backfill progresses, unless otherwise indicated on the Drawings or directed by the Engineer.
2. Provide sheeting and shoring or other appropriate retention measures as required to ensure safe working conditions; maintain required excavation dimensions for proper construction; and to prevent accidents, cave-ins, and damage to adjacent structures, facilities, and surfaces.
3. Sheeting, shoring, and bracing shall be placed so as not to interfere with the construction and shall be entirely independent of all footings, pipes, and structures.
4. Remove sheeting, shoring, bracing, and all forms concurrently with backfilling operations. Such removal shall be accomplished in a manner that precludes settlement of the backfill, cave-in of the excavation sides, and prevents damage to adjacent surfaces. Voids left or caused by the removal shall be promptly filled.

E. Trench Excavation

1. Excavate trenches, when required, to the width and depth dimensions indicated on the Drawings. Provide uniform, continuous support for pipe or structure on required bedding. Remove rock, when encountered, to a minimum depth of 6 in. below the pipe and to the same depth below the bell. In general, the trench bottom shall be excavated to conform to the shape and dimensions of the proposed pipe or structure. If the shape of the

trench cannot be preserved or the trench varies from the shape of the structures, the space between the desired trench dimensions and the bottom of the excavation, as made, shall be filled with compacted aggregate backfill. Allowance shall be made for the placement of granular bedding, where specified. Materials at the bottom of the trench deemed unsuitable by the Engineer shall be removed and replaced with compacted aggregate backfill. Depth and width of removal shall be as directed by the Engineer. Damage caused to existing facilities by the Contractor's operations shall be repaired or replaced at no expense to the Engineer.

2. Unless otherwise specified herein or authorized by the Engineer, trench excavation shall proceed no more than 300 ft in advance of the placing of backfill. The Engineer may require backfilling and subsequent re-excavation of trenches left open for an unreasonable amount of time in advance of pipe installation. Trenches left open overnight, or during periods when the Contractor's forces are not present, shall be so protected or enclosed and appropriately marked as to cause no danger to the public or others.
3. Sides of trenches from a point 1 ft above the top of the pipe to the bottom of the trench shall be practically plumb. Bell holes, if required, shall be excavated in the bottom of the trench wherever necessary to permit the proper assembling of joints.

E. Excavation for Cast-in-Place Reinforced Concrete Wall

1. Excavation for the cast-in-place reinforced concrete wall shall be to the lines and grades shown on the Drawings. All over-burden soils, waste material and miscellaneous debris shall be removed from within the limits of the excavation. The excavation shall be extended to depths such that the bottom of the wall footing bears at least 2 feet below the surface of competent bedrock. If the excavation must be extended to greater depths to achieve 2 feet embedment into competent bedrock, the over-excavated portion of the trench shall be backfilled with lean concrete. The lean concrete shall be tied to the bedrock and to the wall footing with appropriately sized and spaced reinforcing bars.
2. Excavation into bedrock shall be stepped as necessary to achieve the minimum required embedment depth.
3. The use of hydraulic hammers may be required to complete rock excavation. Blasting is not permitted.

3.02 FILL AND BACKFILL CONSTRUCTION

A General

1. Excavations shall be backfilled with Existing/Relocated Interim Cover Material, other Common Borrow approved for use by the Engineer, or Aggregate Base Course

2. Backfill around a structure or pipe shall be brought up evenly on all sides so that no unbalanced pressure shall be imposed on the structure or pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of all pipes. Extra attention shall be paid to the compaction of fill under the haunches when entering and exiting manholes. After the bedding material has been placed and compacted, the remainder of the excavation shall be backfilled with suitable Existing/Interim Cover Material.
3. Do not place, spread, or compact fill material or backfill material while it is frozen or thawing; or place upon frozen or thawing ground; or during unfavorable weather conditions. When the Work is interrupted by rain, fill operations shall not be resumed until field tests indicate that the water content and density of the exposed fill are within the limits specified. A compacted layer that has been rained on or frozen shall be removed, reworked, or recompactd by a method approved by the Engineer before the next layer is placed thereon.
4. Thoroughly mix each lift before compaction to ensure uniform distribution of water content. Distribute particles of permissible sizes throughout the fill material.
5. Placement of soil materials on underlying geosynthetics shall not proceed at an ambient temperature below 32°F or above 104°F, unless otherwise specified or approved by the Engineer. Equipment used for placing soil shall not be driven directly on the underlying geosynthetics. A minimum thickness of 12 in. of soil material is required between tracked equipment with a maximum ground pressure of 15 pounds per square inch (psi) and the underlying geosynthetics, unless otherwise specified. A minimum thickness of 3 ft of soil material is required between rubber-tired vehicles and the underlying geosynthetics.
6. Soils used at the site shall be continuously visually inspected by the Contractor's quality control personnel during construction to check that it is consistent with the soil previously used at the site. If changes in material or source occur, the quality control personnel shall inform the Engineer immediately and reject any work performed by the Contractor using the new material until the pre-construction QA/QC procedures (as outlined in the CQCP) are executed and approved by the Engineer at the expense of the Contractor.
7. The Contractor shall be responsible to repair any desiccation or other damage to soil between testing and acceptance by wetting, drying and reworking the material.
8. The finished surface of the structural fill layer component of the liner system shall be free of debris, roots, sticks, or any other foreign matter so as to provide for an acceptable bearing surface for the overlying geosynthetics, where applicable.

**B. Subgrade Preparation**

1. Areas where fill material is to be placed shall have all vegetation, root matter, and topsoil removed. Following this activity, the subgrade within the limits of fill material placement shall be proofrolled on-grade using a heavy-duty roller (preferably sheepsfoot) with a minimum weight of 10 tons.

A minimum of four passes of the roller shall be completed over the entire area. Proof-rolling in this manner shall be completed over the entire landfill area to provide for a stable and uniform subgrade surface, unless otherwise approved by the Engineer. Additional proof-rolling of the surface may be required within the hanger footprints as directed by the Engineer. To the extent practical, the north and east slopes of the landfill shall be compacted with construction equipment.

2. Following completion of proof-rolling, the entire area will be visually inspected by the Engineer. Should any loose or otherwise unstable zones be detected by the visual inspection, these areas shall be recompacted using a roller with as many passes as are necessary to densify these materials to the satisfaction of the Engineer. If these materials cannot be densified sufficiently by the additional proofrolling, they shall be undercut and replaced with one or more lifts of large (6 to 12-inch diameter) aggregate. The aggregate shall be pushed into the soft subgrade until the area is stabilized.
3. For undercuts, the exposed subgrade shall be proofrolled on-grade until sufficiently stable, as determined by the Engineer. (If the undercut zones are of minimal areal extent, hand-operated compaction equipment may be used to densify these areas.) Unsuitable materials undercut during subgrade preparation activities shall be transported to and placed at the stockpile area under the direction of the Engineer and disposed of in the landfill.
4. The exposed subgrade and structural fill on which the mechanically stabilized earth walls will be constructed shall be thoroughly compacted. The use of vibratory compaction equipment shall be monitored closely so as to minimize the potential for waste material to be displaced from the face of the temporary slope.

C. Material Storage

1. Deposit excess excavated material at the materials on-site stockpile areas. Stockpile(s) shall be graded in such a manner so as to prevent erosion and sedimentation.

D. Placing Fill Materials

1. Prior to placing fill material, all soils to be used for construction shall be tested by the GTL approved by the Engineer, as specified in Subsection 1.04.C. Materials must be approved by the Engineer prior to their use.
2. Where structural fill or common fill is to be placed, the surface shall be scarified before placing fill. Place fill material in uniform, horizontal lifts of not more than 12 in. in loose (uncompacted) thickness. Spread each layer uniformly and evenly. Perform compaction using equipment and methods approved by the Engineer. The Contractor shall use equipment appropriate for obtaining the compaction criteria specified herein.
3. Unless otherwise indicated in these Specifications or approved by the Engineer, the fill shall be placed in a uniform, uncompacted lift thickness not exceeding 12 in. Each lift shall be spread evenly and compacted to the specified in-place dry density.

4. Prior to commencing compaction, infiltration layer fills shall be brought to within an acceptable range of their specified optimum moisture content per ASTM D698 by either aerating the material if it is too wet or spraying the material with water if it is too dry. Acceptable moisture contents shall be as specified in Table 02200-2, unless otherwise approved by the Engineer, and shall be controlled by the Contractor in order to meet the compaction requirements specified herein. Each placed lift of infiltration layer fill used to achieve prepared subgrade elevations and in berms and embankments shall be compacted to no less than 95% of the maximum dry density as determined by the Standard Proctor compaction test (ASTM D698) regardless of the results of the preconstruction testing, unless otherwise approved by the Engineer. That is, if the results of the preconstruction testing indicate a degree of compaction less than 95% is acceptable to achieve the required permeability, the material shall nonetheless be compacted to a degree of compaction of at least 95%.
5. Continue all filling operations until the fill has been brought up to the finished slopes and grades shown on the Drawings, making proper allowances for thickness of topsoil, channel lining, roadway aggregate, etc.
6. Place all fill materials so that surfaces shall be sloped to drain at all times so as to prevent excessive moisture accumulation from rainwater.
7. Compaction by large rollers or heavy equipment shall not be permitted within 5 ft of structures. Accordingly, compaction in these areas shall be performed using hand-operated vibratory-plate or small walk-behind compactors. Fill materials compacted using this equipment shall be placed in maximum 6-in. loose lifts, unless otherwise specified herein.

E. Placing Infiltration Layer Soil

1. Where infiltration layer fill is to be placed, the surface shall be scarified before placing fill. Place fill material in uniform lifts of not more than 12 in. in loose (uncompacted) thickness, to achieve a compacted thickness of 6 in. per lift. Spread each layer uniformly and evenly. Perform compaction using equipment and methods approved by the Engineer. The Contractor shall use equipment appropriate for obtaining the compaction criteria specified herein.
2. Unless otherwise indicated in these Specifications or approved by the Engineer, the fill shall be placed in a uniform, uncompacted lift thickness not exceeding 12 in. Each lift shall be spread evenly and compacted to the specified in-place dry density.
3. Prior to commencing compaction, infiltration layer fills shall be brought to within an acceptable range of their specified optimum moisture content per ASTM D698 by either aerating the material if it is too wet or spraying the material with water if it is too dry. Acceptable moisture contents shall be as specified in Table 02200-2, unless otherwise approved by the Engineer, and shall be controlled by the Contractor in order to meet the compaction requirements specified herein. Each placed lift of infiltration layer fill shall be compacted to at least 95% of the maximum dry density as determined by the Standard Proctor compaction test (ASTM D698), unless otherwise approved by the Engineer.

4. Following compaction, in-place moisture and density testing will be performed at a frequency as specified in Table 02200-2. The Engineer may elect to reduce the test frequency if it has been demonstrated that the required density can consistently be achieved. In no case will the test frequency be reduced to less than one test per 40,000 ft<sup>2</sup> per lift.
5. Equipment operation shall be as required in Subsection 3.02.A.5.
6. The surface of each lift shall be scarified prior to placement of the next lift.

F. Placing Trench Backfill

1. Unless otherwise noted or directed by the Engineer, placing trench backfill shall conform to requirements specified above for placing and compacting structural fill, except as modified below:
  - a. Place and compact granular bedding in accordance with the Drawings. Place and compact granular bedding to a minimum thickness of 6 in. under precast and cast-in-place structures.
  - b. For all other pipes, compact approved trench backfill materials to a minimum of 1 ft above the top of pipe with manual tampers. Place backfill in thin horizontal lifts not exceeding a loose thickness of 6 in. In lieu of this, the Contractor may elect to continue the granular bedding to 1 ft above the top of the pipe.
  - c. Utilize such compaction equipment that will not damage the pipe and pipe joints. Pipe and pipe joints damaged by the Contractor's operations shall be removed and replaced at no cost to the Engineer.
  - d. Trench backfill shall be placed in uniform lifts of not more than 6 in. in loose thickness. After the structure has been properly bedded, selected material from the excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along sides of the structure in layers not exceeding the specified lift thickness. The backfill shall be brought up evenly on all sides for the full height of the structure. Care shall be taken not to over-compact the backfill and cause damage to the pipe or structure.

G. Elastic Settlement

1. Elastic settlement or immediate settlement is the immediate change in shape or distortion of soil caused by the applied stress and is calculated using the theory of elasticity. For the landfill, the concern for elastic settlement is focused on the loading of the airplane hangers and parking of a plane, in addition to the loading that occurs due to the placement of new fill. The following calculations have been done to evaluate elastic settlement and the settlement has been accounted for in the establishment of the lines and grades for the preceding layers for the concrete pads and the Matcon pavement:

- The settlement associated with the construction of the concrete foundation and pad for the hangers, including the weight of the hangers
- The elastic settlement that could occur from parking a twin engine plane of the appropriate size for the area, on the Matcon for a period of time

Additionally, there will be some elastic settlement during placement and compaction of fill. This settlement will be compensated for by adding and compacting additional material as required to meet the specified lines and grades for each fill layer.

### 3.03 TOPSOIL

- A. Topsoil shall be placed at thicknesses required on the DDA to achieve a total in-place cover soil thickness of at least 12-in. and other disturbed areas of the site as designated on the Drawings. The spreading shall be performed in such a manner that seeding can proceed with little additional soil preparation or tillage. Irregularities in the surface resulting from topsoil placement or other operations shall be corrected so as to prevent the formation of depressions where water will pond. Topsoil shall not be placed when the subgrade surface is frozen, excessively wet, extremely dry, or in a condition otherwise detrimental to the proposed seeding program. Topsoil should not be overly compacted either deliberately or inadvertently.
- B. The Contractor shall provide the necessary temporary erosion and sediment control, drainage, dust control, and safety measures during construction at no additional cost.
- C. Stockpiled topsoil materials shall be placed in approved areas. The stockpiled materials shall be placed and graded for proper drainage and shall not be placed near the edge of side slopes.
- D. Mud, snow, ice, or frozen earth shall not be incorporated in the topsoil.
- E. After topsoil placement and finish grading, no heavy equipment, trucks, etc. shall be permitted to travel on these completed areas. The Contractor shall, through mechanical raking, and hand grading with rakes and shovels, grade all areas around fences, pipes, and other structures in preparation for final seeding. Only low ground pressure equipment may be used for seeding. Seeding will be performed in accordance with Section 02932.
- F. The Contractor shall pay all costs, fees, etc. to rectify any deficiencies in placement of the topsoil layer, to the acceptance of the Construction Manager, including those deficiencies resulting from weather, erosion, etc., during the time period between placement of the topsoil layer and proper development of the vegetative cover.

3.04 FINISH GRADING

- A. Perform grading operations so that the fill areas are well-drained at all times. Maintain drainage ditches and keep them open and free from soil, debris, and leaves until final acceptance of the Work. Finish all grading on neat, regular lines conforming to the lines, grades, and contours shown on the Drawings, or if not shown, in accordance with the criteria set forth herein. Perform grading work in proper sequence with all other associated operations.
- B. Grade all areas disturbed during the Work of the Contract. At trench locations, excavated and filled areas, and adjacent transition areas, grade so that finished surfaces are at the proposed grade or are approximately at the grades existing prior to being disturbed. Adjust as required to provide positive drainage.
- C. Finished grades of all surfaces shall be constructed within the tolerances specified. As-built surveys completed by the Contractor shall document that the approved finished surface does not deviate from the design by more than the allowable tolerance.
- D. As-built surveys shall be completed by the Contractor as required in Section 02005.
- E. All specified minimum thicknesses and slopes shall be achieved for the respective earthen material of the landfill cover system.

3.05 INFILTRATION LAYER MAINTENANCE AND REPAIR

- A. Fine-grained, low-permeability soils are susceptible to desiccation and subsequent cracking in warm weather conditions. The Contractor shall be responsible for maintaining optimum moisture (or slightly above) conditions within installed protective cover soil throughout the entire construction. Should the soil crack or separate, the Contractor shall add the necessary moisture to the material in order to properly scarify, recompact, and retest what might have once been an acceptable lift of material. Prior to placement of additional lifts of soil or geosynthetics, the surface will be inspected and approved by the Engineer immediately before placement.
- B. The Contractor shall repair all erosion scars on any compacted lift of soil due to excessive rainfall.
- C. The Contractor shall backfill any holes within the compacted lifts during the construction with granular or powdered bentonite (i.e., moisture/density test holes, Shelby tube holes, grade stakes, etc.).
- D. If a defective area is discovered in the low-permeability soil layer, the Engineer will immediately determine the extent and nature of the defect. If the defect is indicated by an unsatisfactory test result, the Engineer will determine the extent of the defective area by additional tests, observations, a review of records, or other appropriate means. If the defect is related to adverse site conditions, such as overly wet soils or surface desiccation, the Engineer shall define the limits and nature of the defect. The Contractor shall correct the deficiency to the satisfaction of the Engineer, at no cost to the Engineer. All retests, as required by the Engineer, must verify that the defect has been corrected prior to additional work in this area.

### 3.06 DEWATERING AND DRAINAGE

- A. To preclude surface water ponding in excavations, provide and maintain dewatering systems of sufficient capacity to remove water while each excavation is performed. Sediment-laden water shall be directed to a diversion channel and/or sediment trap as described in the Contractor's SWPPP. The Contractor is responsible for compliance with all required United States Environmental Protection Agency (EPA), DOE, and NMED stipulations as stated in other section of these Specifications and the SWPPP.
- B. Methods of dewatering excavations shall be at the Contractor's discretion. Continuous investigations and checks shall be made by the Contractor to ensure that the dewatering system employed is functioning properly and is not causing damage or settlement to adjacent surfaces or structures. The system shall be modified as required, and any damage caused by the system shall be the responsibility of the Contractor to repair or restore.
- C. Provide necessary temporary surface drainage and keep same operating to the satisfaction of the Engineer until permanent drainage or finish grading has been completed. Do not allow damming or ponding of water in gutters or storm drains.

### 3.07 GEOTECHNICAL TEST BORINGS

- A. The Contractor shall complete up to 5 but no less than 3 geotechnical testing borings along the proposed alignment of Wall No.1 to verify the location and competency of the bedrock. Over-burden soils shall be sampled in accordance with ASTM D1586. Each boring shall be extended a minimum depth of 10 feet into bedrock using a core barrel. The Contractor shall report blow counts, rock quality designation (RQD) and percent recovery. A boring log shall be prepared for each test boring. The location (horizontal and vertical) of each boring shall be recorded and shown on a site plan. All bore holes shall be backfilled with grout.

END OF SECTION

**SECTION 02260**

**ON-SITE WASTE EXCAVATION AND TRANSPORT**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. This section includes the requirements for the on-site transport of excavated materials from one area of the airport landfill to another area of the same landfill. This section is not applicable to the DDA.

**1.02 RELATED SECTIONS AND REFERENCES**

- A. Section 02100 – Clearing and Stripping.
- B. Section 02200 – Earthwork.
- C. SWPPP, June 2005.
- D. CQCP, June 2005.
- E. Construction Plan for LASO TA-73 Airport Landfill, June 2005.

**PART 2 MATERIALS**

**2.01 GENERAL**

- A. The Contractor shall provide all materials and equipment required for the excavation, transport and handling of waste and soil materials within the boundaries of the site.

**PART 3 EXECUTION**

**3.01 EXCAVATION**

- A. The Contractor shall complete excavation of site materials as shown on the Drawings.
- B. Contour maps are provided to the Contractor for his use in determining the "cuts" necessary to minimize over-excavation of the waste and mixture of cover soils into the waste. It is suggested that the Contractor stake the cut excavations in the field and perform "test pitting" as necessary to verify the thickness designated on the contour maps.
- C. Prior to the excavation of any waste materials, test pits shall be excavated to determine the horizontal limits of waste. Pits shall be spaced at 100 ft on center on the north, south and west sides of the landfill and the delineated edge of waste marked in the field and surveyed for inclusion on the project as-builts. All relocated waste shall be placed within these limits to ensure coverage by the final cover system.
- D. Excavation for wall construction shall be limited to the minimum amount of material necessary to construct the concrete wall and the mechanically stabilized earth retaining walls. All excavations in waste required to facilitate wall construction shall be cut back to a safe working slope of between 1H:1V and 1.5H:1V or flatter if dictated by the density

and composition of the materials encountered. All waste shall be excavated to a distance of between approximately 3 and 8 ft from the rear face of the concrete retaining wall to permit installation of the wall footing(s). The waste shall be cut from the base level of Wall No. 1 at a slope of no steeper than 1.25H:1V to the base elevation of the Wall No. 2. From the base elevation of Wall No. 2 the waste slope shall be cut at an inclination of no steeper than 1.5H:1V. This slope inclination shall extend to the point at which the temporary slope intersects the 4H:1V permanent slope. These excavation requirements may be modified based on the actual conditions encountered in the field with the approval of the Engineer.

The exposed face of the excavated waste shall be closely monitored during excavation and for the period up until backfill is placed. If movement of the waste is observed or if tension cracks are observed on or near the top of the slope, measures shall be taken to stabilize the slope. These measures may include removal of additional waste material to create a flatter slope.

Excavated slope shall be protected from extreme precipitation and surface water runoff by the use of temporary covers (soil or plastic), berms, ditches, etc.

- E. If embedded debris is encountered while excavating waste from the slopes the Contractor shall cut off such debris flush with the final excavated slope face so as not to cause a potential collapse or instability of the slope. The Engineer may permit excavation of embedded debris based on size, location and composition of the embedded debris and surrounding materials.

### 3.02 TRANSPORTATION

- A. The Contractor shall transport the waste materials to the fill areas shown on the Drawings. Vehicles shall be operated in a safe and controlled manner. Vehicles shall not be operated on airport roadway or taxiways without prior authorization of the airport manager.

### 3.03 MATERIAL PLACEMENT

- A. The Contractor shall place excavated waste from the site in the fill areas as shown on the Drawings and in accordance with Section 02266 specifications.

### 3.04 CONTROL OF DUST, ODORS, AND SPILLS

- A. The Contractor shall implement measures to strictly control dust, odors, and spills during the on-site transport of excavated materials. The gates of hauling vehicles shall be sealed tightly to prevent the release of materials during transport and vehicles will not be overloaded so that the waste material rolls off the tops of loaded vehicles. The Contractor shall use covers/tarps to prevent the release of dusts and odors from trucks, scrapers, etc., as necessary. Dust control measures shall be implemented as necessary to prevent hazardous conditions for aircraft operations.

END OF SECTION

**SECTION 02266**

**LANDFILL WASTE PLACEMENT PROCEDURES**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. Capping of the airport landfill includes the relocation of waste from the north and east slopes and from areas on top of the landfill and consolidation of this waste on the flat portion of the landfill within the limit of the landfill final cover system shown on the Drawings.
- B. The toe of the east slope will be relocated approximately 10 ft westward (as defined on the Drawings) to allow the inclusion of the landfill cap (concrete wall) while maintaining a buffer zone between the edge of the cap and the canyon wall. The east slope will be backfilled with free-draining structural fill to allow this area to be tied into the native soil/bedrock/waste and to provide a stable foundation for the mechanically stabilized earth retaining walls.
- C. This section includes requirements for the main landfill only.

**1.02 RELATED WORK**

- A. Section 02200 – Earthwork.
- B. Section 02930 – Erosion and Sediment Control.
- C. SWPPP, June 2005.
- D. CQCP, June 2005.
- E. Construction Plan for LASO TA-73 Airport Landfill, June 2005.

**1.03 SUBMITTALS**

- A. Topographic survey as described in subsection 1.04.A. Survey shall be prepared and submitted with Contractor's application for payment of waste relocation.

**1.04 MEASUREMENT**

- A. Contractor shall perform a topographic survey of the finished surface of relocated waste for use in calculating the volume of waste moved. The survey shall be compared to the pre-construction survey required by Section 02005.

**PART 2 MATERIALS**

**2.01 GENERAL**

- A. The Contractor shall provide all materials and equipment to place, spread, and compact the waste and soil materials within the landfill.
- B. Relocated waste shall not be used as backfill against any wall or around any pipe or structure.

PART 3 EXECUTION

3.01 GENERAL

- A. All relocated waste shall be placed within the limits shown on the Drawings or as otherwise defined by the Engineer based on the findings of test pit excavations.

3.02 PLACEMENT AND COMPACTION

- A. The excavated material shall be spread with dozers or similar earthmoving equipment under controlled lift and compaction construction.
- B. Large pieces shall be isolated and filled around with soil or other smaller wastes in order to minimize voids.
- C. Large, flat pieces shall be placed flat and filled around on all sides with soil/waste. Enough horizontal space between slabs in the same lift shall be maintained for compaction equipment to operate.
- D. At least 1 foot of waste/soil shall separate large, flat pieces. No direct stacking will be permitted.
- E. Waste shall be compacted until they are visually observed to be dense, stable and unyielding, or as directed by the Construction Manager. The Contractor shall complete as many passes as necessary of the compaction equipment to achieve a satisfactory condition.
- F. Special care shall be taken when excavating waste, or soil approximately 10 ft east of the existing storm drain (trench drain) located along the western edge of the landfill. Any damage to existing structures designated to remain in place shall be repaired by the Contractor at no additional cost to the Owner.
- G. The subgrade exposed after removal of waste from the east slope on which the MSE wall (Wall No. 2) is to be constructed shall be thoroughly compacted. A relatively smooth and level subgrade shall be provided for construction of the MSE wall.
- H. The Contractor shall use extreme care when compacting waste on and around the east and north slopes. Operation of equipment in static mode may be necessary to ensure stability of excavated slopes. If equipment cannot be operated in vibratory mode heavier compaction equipment may be required to sufficiently densify the waste.

3.03 CONDITION AREAS

- A. Should excavated waste material that is saturated be placed within the landfill, the Contractor shall set aside an area to dry said wastes.
- B. The area to dry these soils shall not be within 5 ft of the final grades for the cover system or within 50 horizontal ft of the final side slope grades.
- C. The Contractor shall spread the saturated material in thin lifts and dry the material by racking, tilling, liming, mixing in dry soil, or other approved methods.
- D. Areas used to dry saturated material will not be stacked upon each other for more than two consecutive loose lifts.

3.04 PREPARATORY GRADE

- A. An allowance for the dimensions of the cover system shall be incorporated into the grading.
- B. Landfill outslopes will be stabilized with riprap as shown on the Drawings.

END OF SECTION

**SECTION 02270**

**CHANNEL PROTECTION**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. The work to be performed under this section includes furnishing all labor, materials, tools, and equipment necessary for providing protection for slopes, ditches, channels, and riprap outlet protection to the configuration and extents indicated in accordance with the Contract Documents.

**1.02 SUBMITTALS**

- A. In accordance with Section 01340, submit a Certificate of Compliance before delivery of materials for the items listed below:
  - 1. Stone.
  - 2. Geotextiles and fasteners.
  - 3. Erosion control blankets.
  - 4. Erosion control mats.

**PART 2 PRODUCTS**

**2.01 STONE FOR OUTLET AND CHANNEL PROTECTION**

- A. Stone shall meet the requirements of NMDOT Section 602.221.
- B. Stone for riprap shall be composed of a well-graded mixture of stone size such that the material size, based on a gradation analysis, is consistent with Table 02270-1 .
- C. Riprap shall be reasonably well-graded from the smallest to the largest size specified and shall be controlled by visual inspection.
- D. No broken concrete shall be used on this project.
- E. Riprap shall be National Crushed Stone Association (NCSA) Class Size R3 and R5.

**2.02 EROSION CONTROL MATTING**

- A. Channel beds and newly graded sideslope protection shall utilize synthetic erosion control mats as required.
- B. Temporary grass stabilization seed mixture shall meet the requirements of Section 02932.

Table 02270-1

## Riprap Gradation

Rock Size (in.)	Class, Size No. (NCSA) (percent passing)	
	R5	R3
18	100*	
9	15 – 50	
6		100*
4	0 – 15	
3		15 – 50
2		0 – 15
Nominal Placement Thickness (in.)	18	12

\* Maximum allowable rock size.

## 2.03 RENO MATTRESSES

- A. Reno mattresses shall be manufactured by Maccaferri, Terra Aqua Gabions, Inc. or Engineer-approved equal. Reno mattresses shall be a minimum thickness of 9 inches. In-fill material shall be 3 to 6 in. crushed stone or as otherwise required by the reno mattress manufacturer. Crushed stone shall have an aggregate index (AI) of 35 or less as defined by NMDOT Division 900.

## PART 3 EXECUTION

## 3.01 RIPRAP

- A. Place geotextile loosely over the prepared subgrade. Overlap the geotextile panels a minimum of 18 in. Place and shingle panels parallel to the flow and slope. Anchor panels with securing pins inserted through the geotextile, along, but not closer than 2 in. to each edge and at distances required to prevent displacement before or during construction. Stagger overlaps perpendicular to the flow a minimum of 5 ft. Geotextiles damaged or displaced before, during, or after placement shall be replaced or repaired by the Contractor at no cost to the Engineer.
- B. Place riprap on subgrade or geotextile material to its full specified thickness and to the extent shown on the Drawings. Placement shall be in one operation in such a manner as to not disturb underlying material. End dumping of rock upon the geotextile shall not be permitted.
- C. The larger stones shall be well distributed and compact. Hand placing or rearranging of individual stones by mechanical equipment may be required to secure the required results.
- D. Riprap shall be placed starting at the toe of slope and proceeding upslope.
- E. Equipment operations shall meet the requirements of 02200 Part 3.02A.5.

## 3.02 EROSION CONTROL MATS

- A. Erosion control mats for channel protection, where indicated on the Drawings or ordered by the Engineer, shall be installed in strict accordance with the manufacturer's recommendations.

3.03 RENO MATTRESSES

- A. Reno mattresses, where indicated on the Drawings or ordered by the Engineer, shall be installed in strict accordance with the manufacturer's recommendations.

END OF SECTION

**SECTION 02273**

**MECHANICALLY STABILIZED EARTH RETAINING WALL**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. This section includes requirements for the design, construction, quality control and assurance and all related items necessary to install a mechanical stabilized earth (MSE) retaining walls on the east slope of the landfill at the locations shown on the Drawings.
- B. The Retaining Wall Subcontractor (Subcontractor) shall complete a detailed design of the proposed retaining walls to determine all required wall dimensions, materials and details, and all other material components to provide for stable wall construction and long-term performance in accordance with the requirements of local building codes, the International Building Code (IBC), standard engineering design practice and this Specification. If a conflict should exist between any of the above-referenced requirements the more stringent requirements shall govern.
- C. The design shall be completed under the direct supervision of a licensed Professional Engineer registered in the State of New Mexico and submitted as a shop drawing for review and approval by the Engineer.
- D. The Subcontractor shall provide a construction quality assurance plan for the installation of the walls.
- E. Upon approval of the shop drawing (detailed design) by the Engineer and Owner, the Subcontractor shall complete the retaining wall construction in accordance with the approved design and as specified herein.
- F. The Subcontractor shall afford the Engineer the opportunity to verify and confirm the stability of the east slope of the landfill and the Subcontractor shall modify the MSE wall design as required based on the results of the analyses completed by the Engineer.

**1.02 QUALITY ASSURANCE**

- A. Upon acceptance by the Engineer and Owner of the retaining wall design, the Subcontractor shall construct the retaining wall in accordance with the quality control and assurance requirements of this and all other applicable Specifications.
- B. The Subcontractor shall provide all quality control data provided by manufacturers of all elements used in the construction of the wall to the Engineer. The Engineer reserves the right to require additional testing of any and all materials.
- C. The Subcontractor shall follow the recommended handling, storage and installation guidelines and recommendations provided by the manufacturers of the wall components.

**1.03 SUBMITTALS**

- A. Design
  - 1. The Subcontractor shall submit a conceptual design describing the proposed wall materials including facing units, geosynthetic reinforcement and earth/rock anchors to the Engineer and Owner for approval prior to commencing detailed design.

2. The Subcontractor shall complete a detailed design that fully addresses all dimensions, construction materials (including subgrade preparation and backfilling), wall reinforcement and drainage, and installation requirements necessary to demonstrate stable wall construction and long-term performance. The design shall be such that changes in wall length and alignment can be accommodated and implemented in the field.
3. The Subcontractor shall design an anchorage system that can be installed in the event there is insufficient space to install the required length of geosynthetic reinforcement. This anchorage system shall consist of earth/rock anchors installed in pre-drilled holes and connected to the geosynthetic reinforcement via a round structural member. A typical detail of such a system is shown in Appendix A.
4. The Subcontractor shall complete any and all site and subsurface investigations it deems necessary to complete a proper wall design. All investigation activities shall be coordinated with the Owner.
5. The wall design shall be prepared under the direction of and sealed by a Professional Engineer registered in the State of New Mexico. All supporting calculations, drawings, and specifications shall be submitted for approval by the Engineer. Upon approval, the Subcontractor shall procure all materials and mobilize all labor and equipment necessary to complete the construction in accordance with the approved design and these Specifications.

B. Installation Drawings

1. Upon approval of the wall design, the Contractor shall prepare and submit detailed drawings which fully describe the construction of the retaining walls, including plan and elevation views, profiles, cross-sections, and details. Details shall include fence post installation details, termination details into the rock face, termination details into soil/armored slope, details at alignment changes, etc.

C. Materials

1. The Subcontractor shall prepare and submit for approval information and test data for all materials proposed for use in the construction of the walls. The information shall include a description of the facing units, (e.g., dimensions, color, durability, material of construction, strength, etc.). In addition, geosynthetic test data shall be provided. This data shall include, at a minimum, polymer type and test results, wide width tensile strength, elongation, creep behavior, roll dimensions, etc. If applicable, connection strength data shall be provided for the proposed geosynthetic reinforcement and the proposed facing unit.

D. Certificates of Compliance

1. The Subcontractor shall submit to the Engineer for approval Certificates of Compliance prior to delivery of materials that will be used in the construction of the retaining walls. Certificates for each material shall include job location; the Contractor's name; a copy of the manufacturer's certified test reports; types, classes, and strengths of materials (as applicable); and the manufacturer's name, address, and telephone number.

E. Certified Test Reports

1. Certified test reports within the requirements of standards and testing methods specified shall be submitted to the Engineer for approval prior to material delivery. The manufacturer and Subcontractor must satisfy the Engineer that the material that it offers to furnish and install will meet in every aspect the requirements set forth in these Specifications. The Subcontractor shall transmit to the Engineer all information supplied to him by the manufacturer or supplier prior to approval for furnishing and installing any such material.

F. Installation and Repair Recommendations

1. The Subcontractor shall submit to the Engineer the manufacturer's recommended installation and repair procedures, as applicable, for materials associated with the retaining wall construction.
2. A maintenance/inspection plan addressing long term inspection and maintenance of the retaining walls.

G. Delivery, Storage, and Handling

1. Delivery of materials shall be coordinated with installation of the materials; unloaded with proper equipment at the site and as close as possible to the final placement; and secured in place. Materials shall be stored away from work areas and traffic in a reasonable level area, well drained, away from brush, poison oak or ivy and in an area accessible for inspection. Individual pieces or bundles shall be stored within safe walking distance between to allow for full view for inspection purposes. Excavated materials or stockpiled materials shall not be placed over or against stored materials.

1.04 DESIGN REQUIREMENTS

A. International Building Code (2003)

1. The wall shall be designed in accordance with the requirements of the International Building Code (IBC) 2003, or most recent version. These requirements include the following:
  - a) Minimum factor-of-safety against overturning and sliding (static) = 1.5 (Section 1806)
  - b) Minimum factor-of-safety against overturning and sliding (dynamic) = 1.1
  - c) Site Class D for seismic design (Section 1615)
  - d) 0.2 second spectral response acceleration (5% of critical damping) for Site Class B  $S_s = 0.3385g$  (Figure 1615(1))
  - e) 1 second spectral response acceleration (5% of critical damping) for Site Class B  $S_1 = 0.0976g$  (Figure 1615(2))
  - f) Site coefficient  $F_a = 1.529$  (Table 1615.1.2(1))
  - g) Site coefficient  $F_v = 2.4$  (Table 1615.1.2(2))
  - h)  $K_H = 0.345g$  (or other appropriate load with approval of the Engineer)
  - i)  $K_V = 0$
2. The global slope stability of the MSE walls and slopes shall be evaluated.
3. An equipment surcharge load of appropriate magnitude and size shall be incorporated in the design.
4. The walls shall be designed with batters and to heights that facilitate the construction of 4H:1V back slopes as shown on the Drawings.

B. Standard Engineering Design Practice

1. The walls shall also be designed in accordance with accepted engineering practice for MSE wall systems. Appropriate partial and global factor-of-safety values shall be applied to the strength of the reinforcing material(s).
2. The reinforcing length shall be minimized to the greatest extent permitted by design. The length of reinforcing may be governed by global slope stability in which case the reinforcing length will be increased to satisfy global slope stability.

C. Earth/Rock Anchorage System

1. If an earth/rock anchorage system is required, the system shall be designed with adequate and appropriate factor-of-safety values. A minimum factor-of-safety of 1.5 should be applied to the calculated tension load in the anchor. The design shall include a construction quality control program, which shall include a requirement to test each anchor to confirm its load carry capacity.

PART 2 MATERIALS

2.01 GENERAL

- A. The Subcontractor shall provide materials in accordance with the approved design for the construction of MSE retaining walls.
- B. The Subcontractor shall provide reinforcing materials that meet the requirements of the design.
- C. The facing units/façade/veneer of the MSE wall shall be concrete block, natural stone, or other material approved by the Engineer and Owner. The facing units/façade/veneer shall be durable and earth tone (natural) in color. Crushed tuff is not an acceptable facing unit.
- D. Earth/rock anchorage system as required to compensate for reduced length of geosynthetic reinforcement.

PART 3 EXECUTION

3.01 GENERAL

- A. The Subcontractor shall coordinate all work with the Contractor. The Subcontractor shall be responsible for the handling of all materials associated with the construction of the walls including the placement and compaction of the backfill material. The Contractor will furnish and supply backfill material to a location close to the wall but will not spread, place or compact the material. The Subcontractor shall be responsible for the installation of the wall facing units.
- B. The Subcontractor shall provide all labor, equipment and materials required to complete the construction of the approved wall design.
- C. The Subcontractor shall maintain the geosynthetic reinforcement in the correct alignment during backfill placement.

3.02 EXCAVATION

- A. Excavation of any materials required to complete the installation of the walls shall be completed by the Contractor. The Contractor shall complete excavation activities in accordance with the Specification and Drawings and as otherwise may be required to satisfy the MSE wall design requirements except that intact bedrock will not be excavated. The Subcontractor shall schedule all work so as not to interfere with excavation activities or other site work.

3.03 SURVEYS

- A. The Contractor shall provide the necessary surveying services to establish the approved wall locations (alignments) and elevations. The Subcontractor shall be responsible for maintaining the correct horizontal and vertical alignment of the walls. The Contractor shall provide as-built surveys

of the completed walls. The Subcontractor shall correct any and all deficiencies identified in any survey completed by the Contractor.

3.04 RETAINING WALL INSTALLATION

- A. The Subcontractor shall be responsible for constructing the retaining walls to the lines and grades shown on the Drawings, and in accordance with the approved design.
- B. Wall No. 2 will not be constructed until the backfill for Wall No.1 has been placed, compacted and approved by the Engineer.

3.05 RESISTANT MATERIAL

- A. If, during the excavation of the waste by the Contractor, resistant material, i.e., bedrock is encountered, the Contractor shall remove as much bedrock as is deemed practicable. That is, the Contractor shall remove weathered material. If upon removal of this weathered material there is not sufficient space to permit the installation of the required length of geosynthetic reinforcement, the Subcontractor shall install earth/rock anchors as required to provide equivalent reinforcement capacity. The Subcontractor shall be responsible for designing, furnishing and installing earth/rock anchors and associated materials. It should be assumed that rock drilling/coring will be required to permit the installation of the anchors. All anchors shall be tested. Testing protocols shall be agreed upon by the Engineer, Contractor and Subcontractor prior to the installation of any anchors. Test results shall be documented.

3.06 ALIGNMENT

- A. If, during the excavation of the waste by the Contractor, resistant material, i.e., bedrock is encountered at locations which will not permit the installation of any wall at the alignment and to the extents shown on the Drawings, the Engineer will modify the wall alignment and extent accordingly to accommodate the conditions encountered. The Subcontractor shall install the wall(s) to the revised alignment and extents and shall complete any necessary additional design calculations. Design revisions shall be submitted to the Engineer for review and approval prior to installation.
- B. The front face of the Wall No. 2 shall be off-set from the rear face of Wall No. 1 a minimum distance as shown in Table 02273-1. The wall alignment shown on Drawing 2009 shall be constructed except that the setback distance shall never be less than shown in Table 02273-1.

3.07 BACKFILLING

- A. The Subcontractor shall place and compact all backfill materials and shall ensure that the geosynthetic reinforcement is installed in accordance with the design requirements and the manufacturer's recommendations. The Subcontractor shall ensure that all slack is removed from the geosynthetic reinforcement prior to and during backfilling operations. The Subcontractor shall confirm that the proposed backfill satisfies both the design and manufacturer's requirements.

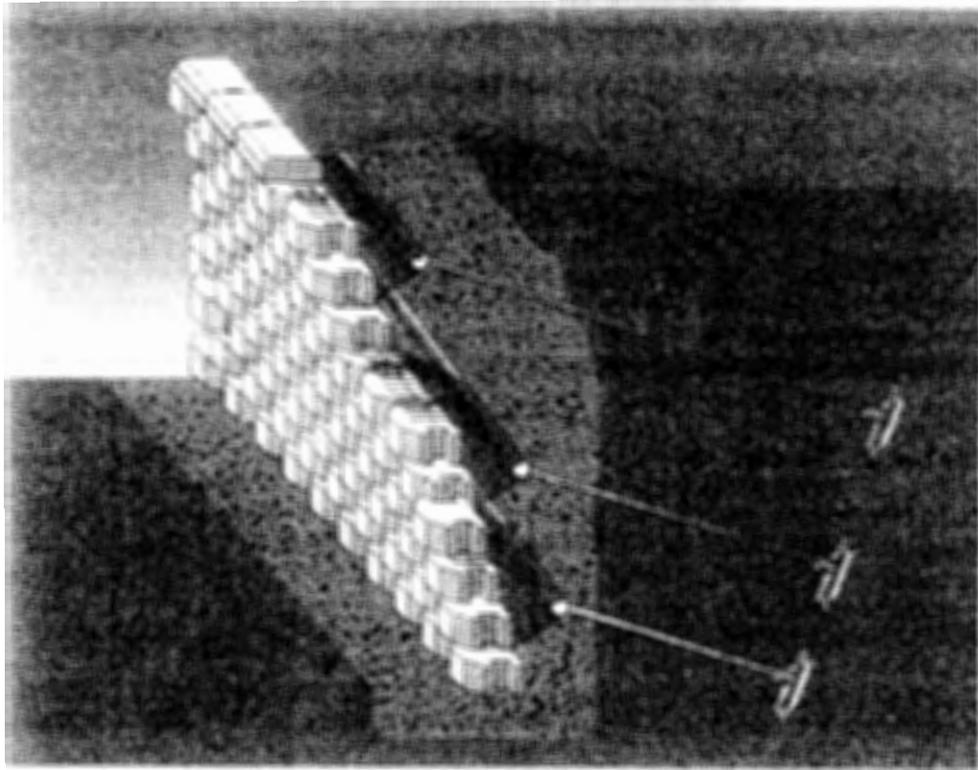
Table 02273-1  
MSE Wall Minimum Required Setback Distance

Starting Station	Required Setback from rear face to front face (ft)
3+56	4.63
3+50	5.90
3+42	8.04
3+34	9.31
3+30	10.59
3+24	12.50
3+20	13.77
3+08	16.37
3+04	17.64
3+00	18.92
2+96	21.20
2+80	22.47
2+50	23.75
2+05	22.47
2+00	20.20
1+83	19.56
1+64	18.28
1+60	17.01
1+53	15.69
1+45	15.05
1+30	13.77
1+26	10.59
1+22	9.31
1+15	8.04
1+07	5.90
1+00	4.63

END OF SECTION

**APPENDIX A**

**Typical Earth/Rock Anchor System**



**SECTION 02340**  
**SOIL STABILIZATION SYSTEM**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. This section includes requirements for the design, construction, quality control and assurance and all related items necessary to install a cellular confinement system on the north and east slopes of the landfill at the locations shown on the Drawings to retain the topsoil on the slopes.
- B. The Soil Stabilization System Subcontractor (Subcontractor) shall complete a detailed design of the proposed stabilization system to determine all required dimensions, materials and details, and all other material components to provide for stable slope construction and long-term performance in accordance with standard engineering practice.
- C. The design shall be completed under the direct supervision of a licensed Professional Engineer registered in the State of New Mexico and submitted as a shop drawing for review and approval by the Engineer.
- D. The Subcontractor shall provide a construction quality assurance plan for the installation of the stabilization system.
- E. Upon approval of the shop drawing (detailed design) by the Engineer and Owner, the Subcontractor shall complete the slope stabilization construction in accordance with the approved design and as specified herein.
- F. The design is subject to review and approval by New Mexico Environmental Department.

**1.02 RELATED SECTIONS**

- A. Section 02200 - Earthwork.
- B. Section 02930 - Erosion and Sediment Control.

**1.03 QUALITY ASSURANCE**

- A. Upon acceptance by the Engineer and Owner of the slope stabilization system design, the Subcontractor shall construct the system in accordance with the quality control and assurance requirements of this and all other applicable Specifications.
- B. The Subcontractor shall provide all quality control data provided by manufacturers of all elements used in the construction of the system to the Engineer. The Engineer reserves the right to require additional testing of any and all materials.
- C. The Subcontractor shall follow the recommended handling, storage and installation guidelines and recommendations provided by the manufacturers of the system components.
- D. Installers Qualifications:
  - 1. Experienced in the installation of the specified products or
  - 2. Employs persons trained in the installation of the specified products or

3. Employs persons experienced in general site work and construction and has a qualified manufacturer's field representative onsite during construction to provide direction and oversight.

E. Manufacturer's Field Representative Qualifications:

1. Experienced in the handling and installation of the specified products.

1.04 SUBMITTALS

A. Design

1. The Subcontractor shall submit a conceptual design describing the proposed materials including the type of geocell, anchor materials, layout drawings and anchor method(s) to the Engineer and Owner for approval prior to commencing detailed design.
2. The Subcontractor shall complete a detailed design that fully addresses all dimensions, construction materials (including subgrade preparation and backfilling), anchorage and installation requirements necessary to demonstrate stable construction and long-term performance. The design shall be such that changes in the layout can be accommodated and implemented in the field.
3. The stabilization system design shall be prepared under the direction of and sealed by a Professional Engineer registered in the State of New Mexico. All supporting calculations, drawings, and specifications shall be submitted for approval by the Engineer. Upon approval, the Subcontractor shall procure all materials and mobilize all labor and equipment necessary to complete the construction in accordance with the approved design and these Specifications.

B. Installation Drawings

1. Upon approval of the stabilization system design, the Contractor shall prepare and submit detailed drawings which fully describe the construction of the system, including panel layout drawings, anchor location plan, and details. Details shall include joining details, termination details into the rock face, walls and slope, etc..

C. Materials

1. The Subcontractor shall prepare and submit for approval information and test data for all materials proposed for use in the construction of the stabilization system. The information shall include a description of the materials, (e.g., dimensions, color, durability, material of construction, strength, etc.).

D. Samples

1. The Subcontractor shall submit to the Engineer for approval samples of all materials proposed for use in the construction of the stabilization system.

E. Certificates of Compliance

1. The Subcontractor shall submit to the Engineer for approval Certificates of Compliance prior to delivery of materials that will be used in the construction of the stabilization system. Certificates for each material shall include job location; the Contractor's name; a copy of the manufacturer's certified test reports; types, classes, and strengths of materials (as applicable); and the manufacturer's name, address, and telephone number.

F. Certified Test Reports

1. Certified test reports within the requirements of standards and testing methods specified shall be submitted to the Engineer for approval prior to material delivery. The manufacturer and Subcontractor must satisfy the Engineer that the material that it offers to furnish and install will meet in every aspect the requirements set forth in these Specifications. The Subcontractor shall transmit to the Engineer all information supplied to him by the manufacturer or supplier prior to approval for furnishing and installing any such material.

G. Installation and Repair Recommendations

1. The Subcontractor shall submit to the Engineer the manufacturer's recommended installation and repair procedures, as applicable, for materials associated with the stabilization system construction.
2. A maintenance/inspection plan addressing long term inspection and maintenance of the stabilization system.

H. Delivery, Storage, and Handling

1. Delivery of materials shall be coordinated with installation of the materials; unloaded with proper equipment at the site and as close as possible to the final placement; and secured in place. Materials shall be stored away from work areas and traffic in a reasonable level area, well drained, away from brush, poison oak or ivy and in an area accessible for inspection. Individual pieces or bundles shall be stored within safe walking distance between to allow for full view for inspection purposes. Excavated materials or stockpiled materials shall not be placed over or against stored materials.

1.05 DESIGN REQUIREMENTS

A. Standard Engineering Design Practice

1. The stabilization system shall be designed in accordance with accepted engineering practice for slope stabilization systems. Appropriate partial and global factor-of-safety values shall be applied to the strength of the reinforcing material(s) and slope stability.

**PART 2 MATERIALS**

2.01 GENERAL

- A. The Subcontractor shall provide materials in accordance with the approved design for the construction of soil stabilization system.
- B. The Subcontractor shall provide anchoring materials that meet the requirements of the design.

2.02 GEOCELL

- A. The geocell shall be constructed from polyethylene stabilized with carbon black with a density of  $0.935\text{g/cm}^3$ .
- B. Carbon black content shall be 1 to 2% by weight.
- C. The walls of the geocell shall be perforated.
- D. The dimensions of the individual cells shall be as recommended by the Subcontractor for the stated application and in accordance with the design requirements.

- E. The Subcontractor shall provide anchoring materials that meet the requirements of the design.

#### 2.03 TENDONS

- A. Tendons shall be in conformance with the design requirements and compatible with the geocell.

#### 2.04 ANCHORING COMPONENTS

- A. Anchoring components shall be in conformance with the design requirements and compatible with the geocell.
- B. The Subcontractor shall provide appropriate devices to transfer load from the geocell and/or tendons to the anchor pins.
- C. The use of wooden stakes as permanent anchors is prohibited.

#### 2.05 GEOCELL INFILL MATERIALS

- A. Geocell infill material shall be Topsoil or gravel (Aggregate Bedding) in accordance with Section 02200.

#### 2.06 SURFACE TREATMENT

- A. Surface treatment (stabilization and restoration) shall be in accordance with Section 02930 and as shown on the Drawings.

### **PART 3 EXECUTION**

#### 3.01 INSPECTION

- A. Verify site conditions are as indicated on the drawings. Notify the Engineer if site conditions are not acceptable. Do not begin preparation or installation until unacceptable conditions have been corrected.
- B. Verify layout of structure is as indicated on the drawings. Notify the Engineer if layout of structure is not acceptable. Do not begin preparation or installation until unacceptable conditions have been corrected.

#### 3.2 INSTALLATION OF SLOPE PROTECTION SYSTEM

- A. Install geocell in accordance with manufacturer's instructions.
- B. Subgrade Preparation:
  - 1. The subgrade shall be prepared in accordance with the project specifications or as otherwise required by the manufacturer, whichever is more stringent.
  - 2. Prepare subgrade such that installed geocell is flush with or slightly lower than adjacent final grade.
- C. Placement and Anchoring:

1. Anchor geocell sections at crest of slope as shown on the drawings or as otherwise recommended by the manufacturer.
2. Expand geocell sections down slope. Confirm each geocell section is expanded uniformly to required dimensions and outer cells of each layer are correctly aligned. Interleaf or overlap edges of adjacent sections in each layer, according to which side wall profiles abut. Ensure upper surfaces of adjoining geocell sections are flush at joint and adjoining cells are fully anchored. Anchor with specified anchors in a prescribed pattern throughout slope surface.

D. Placement and Anchoring of Tendon Geocell Sections:

1. Feed precut lengths of tendon material through aligned holes in cell walls of geocell section before expanding individual sections into position. Tie off end of tendons with a knot that cannot pass through hole in cell walls. Tie knots to provide full tendon strength and not slip under tensioning of tendon.
2. Anchor tendons and geocell section at slope crest and expand down slope surface.
3. Anchor tendon geocell sections with specified anchors in prescribed pattern throughout slope surface. At each anchor location, form a loop in tendon, insert anchor, and drive into subgrade.

E. Placement of Infill:

1. Place topsoil over all areas except within 3 feet (nominal) of the interface with vertical or near vertical surfaces. Within 3 feet of said interfaces or in areas which may receive concentrated surface runoff place gravel infill.
2. Place infill in expanded cells with suitable material handling equipment, such as a backhoe, front-end loader, conveyor, or crane-mounted skip. Limit drop height to a maximum of 3 feet. Avoid displacement of geocell sections by infilling from crest to toe of slope. Overfill and compact infill in accordance with consistency of material and cell depth as follows:
  - a. Overfill topsoil between ½ to 2 inches and lightly tamp or roll to leave soil flush with top edge of cell walls.
  - b. Overfill loose granular materials approximately 1 inch and compact with a plate tamper or backhoe bucket. Remove loose surface material so infill is flush with top edges of cells.

F. Restoration

1. Place seed and erosion control mat to stabilize the area in accordance with Section 02930.

END OF SECTION

**SECTION 02500**

**GRAVEL ROADS**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. The work to be performed under this section includes requirements for constructing gravel roads where indicated, including the provision of subgrade as required, in accordance with Contract Documents. Access roads will be constructed to the DDA and main landfill, as shown on the Drawings.

**1.02 SUBMITTALS**

- A. The Contractor shall submit a Certificate of Compliance in accordance with Section 01340 certifying the materials meet the material requirements of this Section as specified herein, before delivery of the materials.
- B. For gravel road construction, the Contractor shall submit a certified report from a geotechnical testing laboratory. This report shall include the following data:
1. Material source and vendor.
  2. Laboratory and date of testing.
  3. A certificate of material compliance.
  4. Particle size analysis.

**PART 2 MATERIALS**

**2.01 GRAVEL**

- A. Gravel for road construction shall be crushed stone that is clean, durable, angular, noncalcareous fragments of rock. No slag will be accepted. Recycled concrete may be used.
- B. Noncalcareous aggregates are those materials that, when tested in accordance with ASTM D3042 possesses no more than 5% loss of weight (dry basis).

**PART 3 EXECUTION**

**3.01 TEMPORARY GRAVEL ROADS**

- A. When temporary roads are required, materials and placement shall be as specified herein. Contractor shall be responsible to maintain the temporary road in a condition acceptable to the Engineer until permanent surface(s) are placed. Should temporary roads become defective and create an emergency, the Contractor shall commence repair to rectify the situation within 1 hour after notification by the Engineer, or the Engineer may arrange to have the work performed by others and deduct the costs thereof from monies owed the Contractor.

Temporary driveways and pads for Contractor trailers shall be at a minimum thickness of 6 in., and compacted with the surface of the completed replacement at the same grade as the surrounding surface.

### 3.02 PERMANENT GRAVEL ROADS

- A. Perform grading operations so that the excavation and/or structural fill will be well drained at all times. Maintain drainage ditches and keep them open and free from soil, debris, and leaves until final acceptance of the work. Finish all grading on neat, regular lines conforming to the sections, lines, grades, and contours shown on the Drawings; if not shown, perform in accordance with the criteria set forth herein. Perform grading work in proper sequence with all other associated operations.
- B. Prepare the subgrade in accordance with Section 02200. Bring the entire subgrade to the proper elevation prior to installation of any permanent roadways. Provide necessary temporary surface drainage and keep the same operating to the satisfaction of the Engineer until permanent drainage or finish grading has been completed. Do not allow damming or ponding of water.
- C. After subgrade elevations are achieved, install woven geotextile in accordance with Section 06020 and the manufacturer's recommendations. In general, unroll fabric in the direction of construction traffic. Do not end dump aggregate or drive any equipment directly on the geotextile. Spread the aggregate with a lightweight, less than 8 psi contact pressure, tracked bulldozer. The bulldozer should blade into the load with a slightly upward motion. Compact aggregate with two to three passes of a 10-ton smooth drum vibratory roller.
- D. In areas where bituminous pavement is being replaced, coordinate construction activities.

### 3.03 PAVED ROADS AND RAMPS

- A. The Contractor shall be responsible for the maintenance, repair and potential replacement of paved roads, airport tarmac, and ramps damaged as a result of its operations.

END OF SECTION

**SECTION 02511**

**HOT MIX ASPHALT  
MODIFIED ASPHALT TECHNOLOGY FOR WASTE CONTAINMENT  
MatCon™**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. The work to be performed under this section includes requirements for the design, supply, placement, and inspection of hot mix asphalt (HMA) to be installed on top of an aggregate subbase on the flat top of area of the landfill as shown on the Drawings. All aspects of the work shall be completed in conformance with the standards and procedures established by Wilder Construction Company (WCC) for the design, placement and inspection of MatCon™.

**1.02 RELATED SECTIONS AND REFERENCES**

- A. Section 02200 – Earthwork

**1.03 DEFINITIONS**

- A. Definitions pertinent to the earthwork requirements of this project include:
1. MatCon™ - a hot mix asphalt mix that combines a proprietary binder and strictly specified aggregates.
  2. Wilder Construction Company – holder of the patent on the binder and the party responsible for designing the asphalt mix and for ensure the quality of the material and workmanship associated with the installation of MatCon™. WCC is responsible for evaluating and approving materials (aggregates) and for training and certifying asphalt manufacturing plants and installation contractors.
  3. Certified Installation Contractor - a contractor certified by WCC to install MatCon™.

**1.04 QUALITY CONTROL**

A. General

1. WCC shall provide a quality control document that shall address inspection and testing of aggregate materials, inspection of asphalt manufacturing plants, training of installation contractors, certification of manufacturing plants and installation contractors, inspection and testing of the completed product. The quality control document shall also address repair and/or replacement procedures.

**1.05 SUBMITTALS**

A. Delivery Tickets

1. Delivery tickets showing the following information with each load of HMA delivered to the site shall be submitted to the SS:
  - a. Name and location of supplier.



3.04 TOLERANCES

- A. The MatCon™ shall be placed to the limits shown on the Drawings. The tolerance on the constructed surface shall be  $\pm 0.1$ -foot for every 100 feet with no compounding of tolerances. All minimum and maximum slopes shall be maintained.

END OF SECTION

**SECTION 02720**  
**STORM DRAIN SYSTEM**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. The work to be performed under this section includes requirements to construct a storm drain system completed in place to the limits indicated in accordance with the Contract Documents.

**1.02 QUALITY CONTROL**

- A. Test materials as set forth in the applicable referenced Specifications and as required herein.
- B. Requirements for inspection and testing of concrete inlets, culverts, manholes, and trenches, as required, are specified in Section 03400.
- C. As part of the QA effort, the Engineer may inspect and test all pipe, fittings, and joint material upon delivery to the site or at the factory. The Engineer may perform, on a continual basis, plant certification and in-process inspections at no cost to the Contractor.

**1.03 SUBMITTALS**

**A. Certificates of Compliance**

- 1. Submit Certificates of Compliance and shop drawings before delivery of materials in accordance with Section 01340 for pipe, precast concrete (manholes, inlets, etc.), and fittings furnished by the Contractor under this section. Certificates shall include the Engineer's name; job location; the Contractor's name, types, classes, and strengths of pipe; and the pipe manufacturer's name. Certificates of Compliance for concrete and masonry materials are specified in Section 03400.

**B. Invoices**

- 1. A packing list or invoice shall accompany every shipment and shall contain the following information: Engineer's name, type and class of pipe, length, and other pertinent information.

**C. Installation and Repair Recommendations**

- 1. Submit manufacturer's recommended installation and repair methods and procedures for pipe and structures. Repairs shall be performed by the manufacture using specifically trained personnel and shall proceed only after approval of the Engineer and in his presence.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery of pipe shall be coordinated with installation or shall be unloaded with proper equipment along the line of work, outside trench limits near as practicable to point of final placement, facing in proper direction, and properly wedged secure. It shall be stored away from brush and in an accessible area for inspection.

- B. Pipe and appurtenances shall be unloaded and handled with a crane or backhoe of adequate capacity equipped with appropriate slings to protect the material from damage. If damage occurs and is deemed repairable, it shall be repaired as directed by the Engineer in accordance with the manufacturer's recommendations. If damage is not repairable in the opinion of the Engineer, such pipe will be rejected and shall be removed and replaced at the Contractor's expense.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

- A. Pipe product shall conform to NMDOT Section 570.

Pipe between structures or between the structure and terminus shall be of the same size and material and shall be furnished by the same manufacturer. Each pipe length and fitting shall be clearly marked with the manufacturer's name or trademark and pipe type or strength.

2.02 JOINTING MATERIAL (CONCRETE PIPE)

- A. Mortar for pipe joints shall conform to NMDOT Section 570.322.

2.03 JOINT MATERIAL (CONCRETE TRENCH)

- A. Joint gasket materials shall be Concrete Sealants Inc., type CS-440, rope gasket having a diameter of 1.5 inches.
- B. Concrete Adhesive shall be Concrete Sealants Inc., type CS-75.
- C. Joint Sealant shall be SIKA 1A..

2.04 HIGH DENISTY POLYETHYENE (HDPE) PIPE

- A. HDPE pipe shall be tested prior to shipment to the site to ensure that the physical properties are in accordance with ASTM D-3350. Only newly manufactured pipe, specifically for this project will be accepted. The pipe shall be manufactured in accordance with ASTM F-714 and ASTM D-3261.
- B. The HDPE piping shall have a wall thickness classification specified on the Drawings. The pipe shall be manufactured in accordance with ASTM F-714 and ASTM D-3261. The pipe material properties shall meet or exceed the characteristics of a Type III, Class C, Category 5, Grade P34 as defined by ASTM D-1248. The material cell classification shall be 345434C as defined by ASTM D-3350.
- C. Joints for HDPE pipe shall be electro-fusion butt welded, to provide a joint that, as a minimum, has the physical properties of the pipe. All welding shall be performed by a trained individual according to the pipe manufacturer's recommendations.

2.05 GRANULAR BEDDING MATERIAL

- A. Granular bedding material for pipe and structures is specified in Section 02200. Detail for bedding the pipe is shown on the Drawings.

2.06 CONCRETE INLETS

- A. Concrete precast units shall meet the requirements of NMDOT Section 623.
- B. Concrete strengths for inlets are specified in Section 03400.

2.07 CONCRETE INLETS FRAMES, GRATES, AND COVERS

- A. Frames, grates, and covers shall meet the requirements of ASTM A48-83, Gray Iron, Class 35.
- B. Design wheel loading shall be HS-20 for all grating.
- C. Grating will be heavy duty type and bolted down type.
- D. Grating shall be an "opened type", such as Neenah Foundary Company, Type A or Type P, or an approved equal.

2.08 MANHOLES AND TRENCHES

- A. Concrete manholes and trenches are specified in Section 03400.

PART 3 EXECUTION

3.01 INSTALLATION OF STORM DRAIN

- A. Inspection of Delivered Materials
  - 1. Pipe, fittings, inlets, manholes, trenches delivered to the work site will be inspected prior to installation. Nonaccepted and damaged materials shall not be installed, but shall be removed or repaired, if repairable, as directed by the Engineer.
- B. Handling of Pipe and Fittings
  - 1. Pipe and appurtenances shall be handled with a crane or backhoe of proper capacity, equipped with appropriate slings to protect the exterior of the pipe.
  - 2. Foreign matter shall be cleaned and removed from each pipe, fitting, and appurtenances before placing in the trench. Should foreign matter be observed in previously installed pipe, fittings, or appurtenances, cease work until foreign matter is removed. Open ends of pipes and fittings shall be closed with a cap or plug when work is not proceeding.
- C. Excavation of Pipe and Fittings
  - 1. Trench excavation and backfill shall be performed as specified in Section 02200. Pipe between structures or between structure and terminus shall be of the same size and material and shall be furnished by the same manufacturer. Before pipe installation, excavate sufficient trench in advance so that reasonable changes in line and grade can be made where the location of existing structures vary from that shown and then to ensure that no unforeseeable obstructions exist. Work required by failure to take such precautions shall be performed at no cost to the Engineer.

D. Bedding of Pipe and Fittings

1. Provide granular bedding in accordance with the Drawings and Section 02200. Provide encasement and/or concrete cradle where indicated. The entire length of each pipe shall be placed on firm bedding.

E. Placement of Pipe and Fittings

1. Prior to pipe installation, bring bedding material to grade along the entire length of pipe to be installed. Install pipe to a true uniform line and grade as indicated with continuous bearing of barrel on bedding material.
2. Install pipe upgrade with the bell or groove (for concrete pipe) pointing in the direction of upstream. Place each section of pipe in such a manner as to form a close concentric joint with the adjoining section and to prevent sudden offsets in the flow lines. Unless otherwise specified, opening of joints more than half the depth for concrete pipe will not be permitted.
3. Place sufficient backfill on each section of pipe as it is installed to hold it firmly in place.

3.02 JOINTS

For reinforced concrete pipe, clean joint surfaces immediately before jointing. Joints on PVC shall be gasket collar type, constructed of the same material as the pipe, and installed according to the manufacturer's recommendations.

A. Mortar Joints

1. Assemble mortar joints to ensure complete filling of the joint all around. Mortar shall be used within 1 hour after addition of water. All joints of pipe to concrete structures shall be mortared closed.
2. Joints for HDPE pipe shall be electro-fusion butt welded.

3.03 CONCRETE MANHOLES, TRENCHES, AND INLETS

A. Excavation

1. Perform excavation to the line and grade shown on the drawings and as specified in Section 02200.
2. Location and depth as shown on the Drawings, or as directed by the Engineer.

B. Installation

1. Manholes, trenches, and inlets shall be furnished and installed at the location and in accordance with the details shown on the Drawings.
2. All structures shall be set on a crushed stone base, at least 6 in. deep, in accordance with Section 02200, to proper grade and properly leveled and aligned.
3. All lifting holes shall be sealed tight with rubber plugs and cement mortar.
4. A mechanical, flexible, tight gasket shall be provided for pipe connections at manholes and inlets that meet the requirements of ASTM C923.

5. All structures shall be painted outside with a coal tar epoxy or approved equal.
6. All structures shall be free of visible leakage. Each manhole will be visually inspected and any leaks found shall be repaired in a satisfactory manner as approved by the Engineer.

3.04 FRAMES, GRATES, AND COVER

- A. Install in accordance with manufacturer's recommendations.
- B. All frames and grates shall be bolted down securely to prevent any movement of the grate(s).
- C. Install cast iron frame and cover on each structure, as detailed on the Drawings. Adjust the frame and cover to proper grade by using precast concrete grade rings or brick masonry when the structure is in a space dedicated for public use, a traveled way, or when designated to meet existing grade. Transition shall be a minimum of 4 in. and a maximum of 18 in. high. Otherwise, the structure shall be built without transition. Frames shall be adjusted to within 0.5 ft of final graded area.
- D. Provide precast concrete grade rings, 3 in. through 6 in. thick. If required to meet proper grade, one split grade ring 2 in. thick may be used provided that this does not exceed the maximum transition heights. Precast concrete grade rings shall be set in full beds of mortar not less than 0.25 in. or more than 1.25 in. thick. Horizontal circumferential and vertical mortar joints, inside and outside, shall be pointed the full width. Depth of pointing shall not exceed 0.375 in. The mortar shall be cured a minimum of 6 hours prior to the backfilling and setting of the manhole frame. Place manhole frame and cover in a bed of mortar not less than 1 in. thick.
- E. Concrete sections shall be protected from damage while in storage at the plant, while in transit, and at the contract site. They shall be handled with the proper size equipment, using only appropriate lifting holes or eyes. Joint ends of the sections shall be kept clean and placed on wooden blocks, pallets, or other appropriate material, but never on the ground. If damage is evident, it shall be repaired or the section rejected, as directed by the Owner. Thoroughly clean joint surfaces, remove all debris and foreign matter, and keep joint surfaces clean during assembly.
- F. For concrete trenches; concrete section shall be installed in accordance with the manufacturer's written assembly instructions.
- G. Where the gasket material (CS-440- 1.5 diameter rope size) is to be placed on the end of the concrete trench, paint area CS-75 adhesive. Place the gasket material on the painted area in the center of the concrete trench on all three (3) sides. Install materials in accordance with manufactures recommendations.
- H. After the alignment and grade of the trenches has been checked and joint sealer is in place, tighten the trenches together using the quick thread rods. Tighten quick thread rods until the trenches are firmly fix against the sealer. Paint inside joints with Sika 1A.
- I. Install Concrete Sealant and Sika 1A products in accordance with the manufactures requirements.

3.02 BACKFILLING

- A. Backfilling around pipes and structures shall be completed in accordance with Section 02200.

END OF SECTION

**SECTION 02730**  
**GAS COLLECTION SYSTEM**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. This Section includes requirements for the construction of a Gas Collection System in accordance with the Contract Documents. The Work includes furnishing all materials, tools, equipment, labor and supervision necessary to complete the work.

**1.02 QUALITY CONTROL TESTING**

- A. Material Testing

As part of the Quality Assurance effort, the Engineer may inspect and test all pipe, fittings, and joint material upon delivery to the site. The Engineer may perform, on an intermittent or continual basis, plant certification and in-process inspections.

**1.03 SUBMITTALS**

- A. Installation Drawings

The Contractor shall submit installation drawings for gas collection piping in accordance with Section 01300. Furnish laying schedules that specify all fittings (including sizes) and pipe lengths.

- B. Certificate of Compliance

The Contractor shall submit to the Engineer for approval Certificates of Compliance before delivery of materials for pipe and fittings furnished by the Contractor under this Section. Certificates shall include a copy of the manufacturer's certified test reports; job location; the Contractor's name; types, classes, and strengths of pipe; and the pipe manufacturer's name.

- C. Certified Test Reports

Certified test reports within the requirements of standards and testing methods specified herein shall be submitted to the Engineer for approval prior to pipe delivery. The pipe manufacturer and Contractor must satisfy the Engineer that the material that he offers to furnish and install will meet in every aspect the requirements set forth in these Specifications. The Contractor shall transmit to the Engineer all information supplied to him by the manufacturer or supplier prior to approval for furnishing and installing any such material.

**PART 2 MATERIALS**

**2.01 PIPE MATERIALS**

- A. Gas piping shall be high density polyethylene (HDPE) with a wall thickness classification specified on the Drawings or herein. The pipe shall be manufactured in accordance with ASTM F-714 and ASTM D-3261. The pipe material properties shall meet or exceed the characteristics of a Type III, Class C, Category 5, Grade P34 as defined by ASTM D-1248. The material cell classification shall be 345434C as defined by ASTM D-3350. Joints for HDPE pipe shall be electro-fusion butt welded, to provide a joint that, as a minimum, has the physical properties of the pipe. All welding shall be performed by a trained individual according to the pipe manufacturer's recommendations.

- B. Vertical gas piping shall be Schedule 80 PVC pipe. Joints shall be solvent welded.
- C. Fittings shall be of similar material(s) as the pipe

### PART 3 EXECUTION

#### 3.01 GENERAL

- A. Pipe and fittings delivered to the work site shall be inspected by the Contractor and the Engineer prior to installation. Nonaccepted and damaged pipe and fittings shall be marked by the Engineer and shall be removed or repaired as directed by the Engineer.
- B. All pipe and fittings shall be unloaded and handled with proper equipment avoiding severe impact blows, especially during cold weather. Pipe and appurtenances shall be unloaded and handled with a crane or backhoe of proper capacity equipped with appropriate slings to protect the exterior of the pipe. Pipe will be inspected before installation. If damage occurs during handling and placement and is deemed repairable, it shall be repaired as directed by the Engineer in accordance with approved manufacturer's recommendation. If damage is not repairable in the opinion of the Engineer, such pipe shall be rejected, removed, and replaced at the Contractor's expense.

#### 3.02 INSTALLATION OF GAS PIPE

- A. Prior to pipe installation, bring the bedding material to the grade along the entire length of pipe to be installed and install geotextile. Install pipe to a true uniform line and grade as indicated, with continuous bearing of the pipe barrel on the bedding material. Lateral pipes shall be installed sloping away from the header pipe.
- B. Foreign matter shall be cleaned and removed from each pipe, fitting, and other appurtenance before placing in the trench. Should foreign matter be observed in previously placed pipe, fitting, or appurtenance, cease work until foreign matter is removed. Open ends of pipe and fittings shall be closed with a watertight cap or plug when work is not proceeding.
- C. Clean joint surfaces immediately before joining, square (face) end of each pipe to be fused, then butt (weld) pipe together according to the manufacturer's recommendations. Allow welds sufficient time to cool before working with the pipe.
- D. Cap closed all open ends of pipe with end caps.

#### 3.03 FIELD TESTING

- A. No field testing is required for gas piping.

#### 3.04 BACKFILLING

- A. Backfilling shall be in accordance with Section 02200.

END OF SECTION

**SECTION 02750**

**STORMWATER MANAGEMENT AND DISCHARGE**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. This section includes the requirements for the management and discharge of waters collected during and post construction activities.

**1.02 RELATED SECTIONS**

- A. SWPPP, June 2005.
- B. Section 02930 – Erosion and Sediment Control.

**PART 2 MATERIALS**

Not Applicable

**PART 3 EXECUTION**

**3.01 STORMWATER MANAGEMENT**

- A. Controls to be used by the Contractor shall conform to the approved details stated in the Contractor's SWPPP.

**END OF SECTION**

**SECTION 02930**

**EROSION AND SEDIMENT CONTROL**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. The work to be performed under this section includes furnishing all labor, materials, tools, and equipment needed to install, operate, and maintain erosion and sediment controls as shown on the Drawings and specified herein.

**1.02 RELATED SECTIONS**

- A. SWPPP, June 2005.
- B. Construction Plan for LASO TA-73 Airport Landfill, June 2005.

**1.03 STORMWATER POLLUTION PREVENTION**

- A. Prior to initiating earth-moving activities, implement the soil erosion and sedimentation controls as shown on the Drawings and detailed in the Contractor's SWPPP.
- B. Fines and related costs resulting from failure to provide adequate protection against soil erosion and sedimentation are the obligation of the Contractor.

- 1. Silt, sediment, and mud leaving the site will be construed as damage to neighboring property and evidence of negligence on the part of the Contractor.
- 2. Damages to any property outside of the project limits due to negligence by the Contractor shall be rectified and/or restitution shall be paid by the Contractor.

- C. Erosion and sedimentation control measures employed will be subject to approval and inspection by governing agencies having jurisdiction over such work.

The temporary control provisions proposed shall be coordinated with the project schedule, sequence of construction, and temporary and permanent site facilities to assure economical, effective and continuous erosion control throughout the construction and post construction period with no violation of the federal, state, and local regulations. The drainage area to sediment traps shown on the Design Calculations shall not be exceeded.

- D. The Engineer may limit the active area of earthwork operations in progress commensurate with the Contractor's capability in controlling erosion and sediment-laden runoff.

**1.04 SUBMITTALS**

- A. Samples: Submit samples of materials being used when requested by the Engineer including names, sources, and descriptions.

**1.05 QUALITY CONTROL**

- A. All erosion and sediment control work shall comply with applicable requirements of governing authorities having jurisdiction. The Specifications and Drawings are not comprehensive, but rather convey the intent to provide complete slope protection and erosion control for both the Engineer and adjacent property.

- B. Erosion control measures shall be established at the beginning of construction and maintained during the entire period of construction. On-site areas that are subject to severe erosion, and off-site areas that are especially vulnerable to damage from erosion and/or sedimentation are to be identified and receive special attention.
- C. All land-disturbing activities are to be planned and conducted to minimize the size of the area to be exposed at any one time and the length of the time of exposure.
- D. Surface water runoff originating upgradient of exposed areas should be controlled to reduce erosion and sediment loss during the period of exposure.
- E. All land-disturbing activities are to be planned and conducted so as to minimize off-site sedimentation damage.

PART 2 MATERIALS

2.01 STRAW BALES

- A. Straw bales, if used, shall be either wire-bound or string-tied with bindings around sides rather than over and under.

2.02 CRUSHED STONE

- A. Crushed stone for stabilized construction entrance(s) shall be American Association of State Highway and Transportation Officials (AASHTO) #3.

2.03 SILT FENCE

- A. Prefabricated silt fence shall meet the following requirements:
  1. Silt fences shall be prefabricated.
  2. The geotextile for the fencing shall meet the following requirements:

Property	Test Value <sup>(1)</sup>	Test Method
Grab Tensile Strength	90 lbs	ASTM D4632
Burst Strength	190 psi	ASTM D3786
Puncture Resistance	40 lbs	ASTM D4833
Permittivity	>0.1 sec <sup>-1</sup>	ASTM D4491
AOS	>30 US sieve	ASTM D4751
UV Resistance (500 hr.)	70%	ASTM D4355

<sup>1</sup>Minimum average roll values (MARV)

3. Posts shall be metal or hard wood.
4. The geotextile height shall be a minimum of 3 ft and shall be provided with a tensioning cord.

2.04 GEOTEXTILES

- A. Filter geotextile shall meet the requirements for geotextiles contained in Section 06020.

2.05 EROSION CONTROL MATS

- A. Erosion control mats shall be American Excelsior Co., type Hi-velocity Curlex Blanket; PPS Packaging Co. type Super Duty Blanket; or approved equal.

2.06 EROSION CONTROL BLANKET

- A. Erosion control blanket material shall be XCELL type regular blanket (0.98 #/sy), Curlex blanket type (0.97 #/sy), or approved equal.

PART 3 EXECUTION

3.01 STRAW BALE BARRIERS

- A. Excavation shall be to the width of the bale and the length of the proposed barrier to a minimum depth of 4 in.
- B. Bales shall be placed in a single row, lengthwise on proposed line, with ends of adjacent bales tightly abutting one another. In swales and ditches, the barrier shall extend to such a length that the bottoms of the end bales are higher in elevation than the top of the lower middle bale.
- C. Staking shall be accomplished to securely anchor bales by driving at least two stakes or rebars through each bale.
- D. The gaps between bales shall be filled by wedging straw in the gaps to prevent water from escaping between the bales.
- E. Any straw bales which become clogged or otherwise deteriorate shall be properly maintained or replaced as necessary at no additional cost to the Engineer.

3.02 STABILIZED CONSTRUCTION ENTRANCE

- A. Specifications include:
  - 1. Stone Size: AASHTO #3.
  - 2. Length: As effective, but not less than 50 ft.
  - 3. Thickness: Not less than 6 in. in dry areas and 12 in. in wet areas.
  - 4. Width: Not less than full width at all points of ingress or egress, but not less than 20 ft.
  - 5. Washing: When necessary, wheels shall be cleaned to remove sediment prior to entrance onto public right-of-way or landfill entrance road. When washing is required, it shall be done on any area stabilized with crushed stone which drains into an approved sediment trap or sediment basin. All sediment shall be prevented from entering any storm drain, ditch, or watercourse through use of sand bags, gravel, boards, or other approved methods.
  - 6. Maintenance: The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto the landfill entrance road or public right-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout or any measures used to trap sediment. All sediment

spilled, dropped, washed, or tracked onto the transfer station access road or public right-of-way must be removed immediately by the Contractor at no cost to the Engineer.

3.03 SILT FENCING

- A. A 6-in. by 6-in. trench shall be excavated along the alignment of the silt fence. Excavated material shall be stockpiled on the upside of the trench.
- B. Fence posts shall be positioned on the downstream side of the fence and driven into the ground. Fence posts shall be spaced no more than ten (10) ft apart.
- C. The fabric flap shall be laid in the trench and backfilled with material stockpiled from excavation. The backfill shall be tamped into place.
- D. The Contractor shall join fence sections together as recommended by the manufacturer and as approved by the Engineer to prevent silt from escaping through the adjoining sections.
- E. The Contractor shall maintain silt fences (removing and disposing of silt, repairing fence which falls down, and replacing damaged fence, etc.) throughout the duration of the Contract at no additional cost to the Engineer. Silt shall be disposed of in such a manner that it will not erode from the site and shall be placed within the stockpile.

3.04 DUST CONTROL

- A. Dust generated from the Contractor's performance of work, either inside or outside the limits of work, shall be controlled by the Contractor by applying water, calcium chloride, or other materials with the approval of the Engineer.
- B. The Engineer has the right to stop construction activity, if in his opinion; the excavations are generating excessive amounts of dust.

3.05 SOIL STABILIZATION

- A. Following initial soil disturbance or redisturbance, permanent or temporary stabilization shall be completed in accordance with: a) 7 calendar days as to the surface of all perimeter controls, dikes, swales, ditches, perimeter slopes, stockpiles, and all slopes greater than 2 horizontal to 1 vertical (2:1) and b) 14 days as to all other disturbed or graded areas on the project site. The in-place sediment control measures will be maintained on a continuing basis until the site is permanently stabilized and all permit requirements are met.

3.06 CHANNELS (Temporary), SLOPES (Temporary), AND STOCKPILES

- A. All channels, swales, ditches, stockpiles, etc. shall be stabilized with permanent or temporary seeding, in accordance with Section 02932 immediately upon reaching an interim grade.
- B. The channel beds shall be covered with an erosion control mat. The erosion control mat shall be installed as recommended by the manufacturer of the blanket.
- C. Where slopes require temporary stabilization, the Contractor shall install erosion control blankets, as directed by the Engineer.

3.07 MAINTENANCE

A. Inspection

1. Erosion and sediment control will be inspected by the Contractor the next working day after rainfall events in excess of 0.5 in. and prior to forecasted storms.
2. At a minimum, the Contractor will perform inspections of the erosion and sediment control system once every 14 calendar days and following storm events of 0.5 in. to assure the integrity of the system.

B. Repair

1. All erosion swales and gullies in excess of 6 in. deep will be filled and compacted to their original condition and reseeded as required.
2. Erosion and sediment control structures (i.e., silt fencing) will be replaced as required to assure the integrity of the system.

3.08 SEDIMENT TRAPS

- A. The Contractor is solely responsible to construct and maintain the proposed sediment traps and their effluent upon commencing any earth disturbance activity.
- B. The Engineer reserves the right to require upgrades to existing traps or installation of additional structures should any discharge released not meet quality standards.

END OF SECTION

**SECTION 02932**

**SEEDING, MULCHING, AND RESTORATION**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. The work to be performed under this section shall include furnishing and installing all seed, fertilizer, mulch, mulch binder, erosion mats, and initial watering of seeded areas wherever existing site surface soils will be placed as topsoil shown on the Drawings or as directed by the Engineer. This work shall also include maintaining seeded areas as shown on the Drawings until accepted by the Engineer.
- B. The areas to be seeded under this item shall include all areas designated by the Engineer and as described on the Drawings.. All areas outside of specified limits where the vegetative growth has been injuriously disturbed or destroyed by the Contractor shall be restored and seeded in accordance with these specifications by the Contractor at his own expense.

**1.02 RELATED SECTIONS**

- A. LANL Master Construction Specification, Section 02936, Seeding.

**1.03 SUBMITTALS**

- A. The Contractor shall submit the following items:
  - 1. Catalog data, including sources of supply for amendments, mulch, tackifier, fertilizer, and erosion control blankets.
  - 2. Certification substantiating that material complies with specified requirements. Submit certified seed bag tags and copies of seed invoices identified by project name.
  - 3. Installation instructions, including proposed seeding schedule. Coordinate with specified maintenance periods to provide maintenance from date of final acceptance. Once schedule is accepted, revise dates only with Engineer approval after documentation of delays.

**1.04 QUALITY ASSURANCE**

- A. Contractor Qualifications:
  - 1. Perform work by a single firm experienced with the type and scale of work required and having equipment and personnel adequate to perform the work satisfactorily.
- B. Material Quality Control:
  - 1. Provide seed mixture in containers showing species percentages in seed mix; test information including, purity, germination and noxious and restricted weeds; net weight; date of packaging; and location of packaging.
  - 2. Furnish seed labeled in accordance with the requirements of federal and New Mexico statutes and regulations governing seed labeling. Such resulting

requirements include but are not necessarily limited to: Federal Seed Act and Amendments, rules and regulations established by the USDA; the New Mexico Seed Law; and all resulting regulations or restrictions established by New Mexico State University or other authorized entity.

3. In addition, ensure seed mix and its application comply with the requirements of all other federal and New Mexico statutes and regulations governing seeds, plants, and weeds. These requirements include but are not necessarily limited to: the Noxious Weed Control Act and all rules, regulations, or control measures by a noxious weed control district embracing Los Alamos County, New Mexico; and the Harmful Plant Act.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver packaged materials in sealed containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery and while stored at site. Opened or wet seed shall be rejected and returned to the responsible party.

PART 2 MATERIALS

2.01 SEED

- A. Obtain native grass seed from sources whose origin would ensure site adaptability. Plant sources from New Mexico or surrounding states are preferred.
- B. Obtain shrub and wildflower seed from sources whose origin would ensure site adaptability. Plant sources from New Mexico or surrounding states are preferred.
- C. Cover crops (e.g., annual barley, oats, winter rye, etc.) may be used only as a temporary stabilization measure and shall not be used in conjunction with a perennial seed mix.
- D. Furnish certification, showing origin of seed and pure live seed (PLS) content as determined by a certified authority. Provide bags of seed that are tagged and sealed in accordance with the State Department of Agriculture or other local certification authority within the state of origin. The tag or label shall indicate analysis of seed and date of analysis, which shall not be more than 9 months prior to delivery date. Seed may be premixed by the seed dealer and appropriate data indicated on the bag label for each variety.
- E. Seed mixture shall be:  
Develop seed mixture from the following guidelines. Choose a minimum of five grass species from the list. Should wildflowers be included in the mix, use a ratio of 80 to 90% grasses and 10 to 20% wildflowers. Choose 3 to 5 species from the forb and wildflowers list. These species are applicable for both undeveloped and urban-interface areas.

**NATIVE PERENNIAL MIX**

<b>Common Name</b>	<b>Scientific Name</b>	<b>% of Mix</b>
<b>Grasses</b>		
Blue grama*	<i>Bouteloua gracilis</i>	5 – 10%
Galleta grass*	<i>Hilaria jamesii</i>	5- 10%
Mutton grass	<i>Poa fendleriana</i>	10-15%
Sideoats grama*	<i>Bouteloua curtipendula</i>	10-15%
Arizona fescue <sup>†</sup>	<i>Festuca arizonica</i>	10 – 15%
Prairie junegrass <sup>†</sup>	<i>Koeleria macrantha</i>	5 – 10%
Bottlebrush squirreltail*	<i>Elymus elymoides</i>	15 – 20%
Little bluestem <sup>†</sup>	<i>Schizachyrium scoparium</i>	10 – 15%
Indian ricegrass*	<i>Oryzopsis hymenoides</i>	10 – 15%
Mountain brome <sup>†</sup>	<i>Bromus marginatus</i>	10 – 15%
Sand dropseed*	<i>Sporobolus cryptandrus</i>	1 - 8%
Thickspike wheatgrass	<i>Agropyron dasystachyum</i>	20 – 25%
Needle and Thread grass*	<i>Stipa comata</i>	5 – 10%
New Mexico needlegrass*	<i>Stipa neomexicana</i>	10 - 15%
Sheep fescue	<i>Festuca ovina</i>	10 – 15%
<b>Forbs/ Wildflowers</b>		1%
Firewheel	<i>Gaillardia pulchella</i>	2%
Evening primrose	<i>Oenothera caespitosa</i>	1%
Gooseberry leaf Globemallow	<i>Sphaeralcea grossulariaefolia</i>	1.5%
Scarlet gilia	<i>Ipomopsis aggregata</i>	1%
Plains aster	<i>Aster bigelovii</i>	1%
Western yarrow	<i>Achillea millefolium</i>	½%
Fringed sage	<i>Artemisia frigida</i>	1%
<b>Forbs/Wildflowers</b>		
Blue flax	<i>Linum perenne lewisii</i>	4%
Scarlet bugler	<i>Penstemon barbatus</i>	2%
Palmer penstemon	<i>Penstemon palmeri</i>	2%
Prairie coneflower	<i>Ratibida columnifera</i>	1%
Showy golden-eye	<i>Heliomeris multiflora</i>	1%
Purple geranium	<i>Geranium caespitosum</i>	5%

\*Species particularly suited for especially dry sites.

<sup>†</sup>Species particularly suited for higher elevations (above 7000 ft).

## 2.02

## STRAW MULCH

- A. Straw shall be stalks from oats, wheat, rye, barley, or rice that are free from noxious weeds, mold, or other objectionable material. At least 65% of the herbage by weight of

each bale of straw shall be 10 in. in length or longer. Rotted, brittle, or molded straw is not acceptable. Straw from introduced grasses is acceptable if cut prior to seed formation. If possible, provide marsh grass composed of mid to tall native grasses (usually tough and wiry grass and grass-like plants found in the lowland areas within the Rocky Mountain Region).

2.03 HYDRAULIC MULCH/TACKIFIER

- A. Provide mulch material consisting of 100% virgin wood fibers manufactured expressly from whole wood chips, such as Eco-Fibre, Conwed, etc. Process chips in such a manner as to contain no growth or germination inhibiting factors. Do not produce fiber from recycled material such as sawdust, paper, cardboard, or residue from pulp and paper plants. Provide materials free from contaminants such as lead paint, varnish, or other metal contaminants. Hydraulic mulch shall contain non-toxic dye to assist in visually determining even distribution. Mulch material shall meet the following specifications:

<u>Parameter</u>	<u>Value</u>
pH at 3% consistency	4.5 +/- 0.5
Ash content	0.8% +/- 0.2%
Moisture holding capacity	1250 (grams water/100 grams oven dry fiber)
Moisture content	12% +/- 3% (Wet weight basis)

- B. Combine mulch with an organic plantago-based tackifier, such as M-binder, etc., that has no growth or germination inhibiting factors and is nontoxic. Apply the uniform mixture to the seeded area.
- C. Bagged mulch/tackifier mix that is homogenous within the unit package may also be used. Tackifier shall adhere to the fibers during manufacturing to prevent separation during shipment and to avoid chemical agglomeration during mixing in the hydraulic mulching equipment.

2.04 EROSION CONTROL BLANKET

- A. Provide erosion control blankets of a uniform web of interlocking excelsior wood fibers, weed-free straw, or a combination of straw and coir fibers.  
Use an appropriate blanket chosen for the site conditions and functionality for the desired growing seasons.

1. 3:1 slopes or gentler use single netted blankets - A machine-produced erosion control blanket using 100% straw or excelsior fibers sewn into a medium weight photodegradable bottom net. Minimum weight of blanket 0.5 lbs/ square yard, such as Greenfix America WS05, etc.
2. 3:1 – 2:1 slopes use double netted blankets - A machine-produced erosion control blanket using 100% straw or excelsior fibers sewn into a medium weight photodegradable top net and a light weight photo degradable bottom net. Minimum weight of blanket 0.7 lbs/ square yard, such as Greenfix America WS072, etc.
3. 2:1 slopes and steeper and/or 2 growing seasons of protection use straw/coir blend blankets - A machine-produced straw /coir fiber erosion control blanket using 70% straw /30% coir fibers sewn into a heavy weight photodegradable top

net and a medium weight photo degradable bottom net. Minimum weight of blanket 0.7 lbs/square yard, such as Greenfix America CFS072R, etc.

- B. Staples: U-shaped, 11 gauge or heavier steel wire, minimum leg length of 8 in. after bending, with a throat approximately 2 in. wide.
- C. Wood Stakes: Use 2-in. x 2-in. x 12-in. pine or fir stakes, beveled at one end, in place of wire staples in tuff locations.

2.05 BONDED FIBER MATRIX

- A. Provide Bonded Fiber Matrix (BFM) composed of natural color, long-strand wood fiber, produced by therm-mechanical defibration of wood chips and joined together by a high-strength non-toxic adhesive, such as Eco-Ageis, etc. The product shall be composed of 90% wood fiber, 9% blended hydrocolloid-based binder, and 1% mineral activators, all by total weight. The BFM shall be 100% biodegradable and non-toxic to fish and wildlife, and it shall not contain any synthetic fibers.

2.06 AMENDMENTS / SOIL ADDITIONS

- A. Fertilizer: Apply slow-release organic fertilizers such as Biosol Mix, Biosol, Osmocote, composted manure, or approved equal to minimize deficiencies of the topsoil. If composted manure is to be applied, test the nutrient content and interpret before it is used.
- B. Water: Clean, fresh, and free of substances or matter that could inhibit vigorous growth.
- C. Sand: Clean, washed, and free of toxic materials.
- D. Wood chips: Wood chips shall have a relatively large surface area to volume ratio to be more easily broken down in the soil. Incorporate wood chips at low rates (0.5 ton/ AC) in order to assure the carbon to nitrogen ratio in soil is at favorable conditions for plant germination and growth. If higher rates are used, add nitrogen fertilizer to assure nutrient availability to plants.

PART 3 EXECUTION

3.01 PREPARATION

- A. Preparation of the Seed bed.
  - 1. Prepare seedbed to a maximum depth of 4 in. by tilling with a disc harrow or chiseling tool. Uproot all competitive vegetation during seedbed preparation and work soil uniformly, leaving surface rough to reduce surface erosion. Remove large clods and stones, or other foreign material that would interfere with seeding equipment.
  - 2. Do not till on ground that is already loose to a depth of 2 in. or more that has undergone regrading and fill.

3. Do not do work when moisture content of soil is unfavorable or ground is otherwise in a non-tillable condition. To minimize dust problems for adjoining areas, do not till when wind speeds exceed 10 miles per hour (mph).
  4. The extent of seedbed preparation shall not exceed the area on which the entire seeding operation can be accomplished within a 24-hour period.
- B. Soil Amendments/Additions
1. Uniformly apply slow-release organic fertilizer to prepared seedbed in accordance with manufacturer recommended rates.
- C. Prepare seedbed again if prior to seeding, the Engineer determines that rain or some other factor has affected prepared surfaces and that it may prevent seeding to proper depth.
- D. On excessively steep slopes (steeper than 2:1), hydraulic/broadcast seeding may be appropriate. If seeding in this fashion, multiply application rate of seed by a factor of 2.
- E. If cover crop has been established in area to be seeded, mow cover crop early in growing season before cover crop is ready to drop seeds.

3.02 APPLICATION OF SEED

- A. Do not seed during windy weather, or when topsoil is dry, saturated, or frozen.
- B. Equip seed boxes used for drill and broadcast seeding with an agitator.
- C. To prevent stratification of seed mix, do not run seed box agitators while seeding is not being performed.
- D. If seed mix is transported to site in a seed box or other equipment that subjects mix to shaking or similar movement that has the potential to cause stratification, remix seed prior to application.
- E. Calibrate seeding equipment in presence of the Construction Manager to determine that equipment setting is appropriate to distribute seed at the specified rates.
- F. Unless otherwise shown on Drawings, seed areas disturbed by or denuded by construction operations or erosion.
- G. Use markers to ensure that no gaps will exist between passes of seeding equipment.
- H. If cover crop has been established, mow the crop and drill seed perennial seed mix into the crop stubble.
- I. When drill seeding, plant seed mix at a rate of 20 to 25 PLS lb/AC. Uniformly apply prescribed mix over area to be seeded as follows:
  1. Accomplish seeding operations, where practical, by drilling in a direction across slope.

2. Plant seeds approximately 1/4 in. deep.
  3. Do not exceed 4 in. distance between drilled furrows. If furrow openers on drill exceed 4 in., drill area twice to obtain a 4-in. distance between furrows.
  4. Seed with grass wheels, rate control attachments, seed boxes with agitators, and separate boxes for small seed.
- J. When broadcast seeding, plant seed mix at a rate of 32 to 37 PLS lbs/AC.
1. Where it is not practical to accomplish seeding by drilling, mechanically broadcast seed by use of a hydraulic mulch slurry blower, rotary spreader, or a seeder box with a gear feed mechanism. If seeding is done with a slurry blower, use highest pressure and smallest nozzle opening that will accommodate the seed.
  2. Immediately following seeding operation, lightly rake seedbed or loosen with a chain harrow to provide approximately 1/4 in. of soil cover over most of the seed.
  3. If hydraulically applying mulch as part of the broadcast seeding process, use a two-step process. Apply seed with a tracer (200 to 300 lb/AC) amount of mulch across entire seeded area. Once seed is applied, apply full complement of mulch (to equal 2,000 lb/AC). This shall allow seed to be in good contact with soil surface and not suspended in mulch matrix.
  4. Prohibit vehicles and other equipment from traveling over the seeded areas.

### 3.03 STRAW MULCH

- A. For locations that have not been hydraulically mulched, immediately following raking/chaining operation, add straw mulch to seeded areas.
1. Apply straw mulch at a minimum rate of 1.5 tons per AC of air-dry material. Spread straw mulch uniformly over area either by hand or with a mechanical mulch spreader to achieve 80% ground cover. When spread by hand, tear bales of straw apart and fluff before spreading. Depth of applied straw mulch shall not exceed 3 in. Do not mulch when wind velocity exceeds 10 mph.
  2. Wherever use of crimping equipment is practical, place mulch in manner noted above and anchor it into the soil to a minimum depth of 2 in.. Use a crimper or heavy disc such as a mulch tiller, with flat serrated discs at least 1/4-in. in thickness, having dull edges, and spaced no more than 9 in. apart. Provide discs of sufficient diameter to prevent frame of equipment from dragging the mulch. Where practical, perform crimping in two (opposite) directions. Do not use Sheep's Foot Rollers, heavy equipment tracks, and standard disc cultivators for crimping.
  3. If straw mulched areas cannot be anchored by crimping, use hydraulic mulch wood fibers with tackifier. Mix slurry in a tank with an agitation system and spray under pressure uniformly over the soil surface. Keep all materials in uniform suspension throughout the mixing and suspension cycle when using hydraulic

mulching equipment. Mix 100 lb of wood fiber with 150 lb of tackifier to anchor straw mulch. Apply mixture at a rate of 250 lb/AC.

4. Use both horizontal and vertical movements in the applicator to achieve an even application of the slurry material.

#### 3.04 HYDRAULIC MULCHING/TACKIFIER

- A. Immediately following raking/chaining operation, apply hydraulic mulch fibers with tackifier to seeded areas. Mix slurry in a tank with an agitation system and spray, under pressure, uniformly over soil surface. Apply mulch evenly across landscape at a rate of 2,000 lb/AC.

Use both horizontal and vertical movements in applicator to achieve an even application of slurry material. Keep all materials in uniform suspension throughout mixing and suspension cycle when using hydraulic mulching equipment.

When using plantago based tackifier as mulch, apply tackifier at a rate of 100 lb/AC. When applied alone for dust control, apply tackifier at a rate of 150 lb/AC.

Prohibit foot/vehicle traffic from hydraulically mulched areas.

#### 3.05 EROSION CONTROL BLANKET

- A. Place blankets over native grass seeding immediately following the raking/chaining operation.
- B. When using single netted products for 3:1 or flatter slopes, place blanket with netting on top and the wood/ straw fibers in contact with soil over entire seeded area.
- C. For slope installations, the following guidelines or manufactures recommendations shall be used:
  1. Begin at top of slope and anchor its blanket in a 6 in. deep by 6-in. wide trench. Backfill trench and tamp earth firmly.
  2. Unroll blanket downslope in direction of water flow.
  3. Overlap edges of adjacent parallel rolls 2 to 3 in. and staple every 3 ft.
  4. When blankets are spliced, place blankets end over end (shingle style) with 6-in. overlap. Staple through overlapped area, approximately 12 in. apart.
  5. Lay blankets loosely and maintain direct contact with soil – do not stretch.
  6. Staple blankets sufficiently to anchor blanket and maintain contact with soil. Place staples down the center and staggered with the staples placed along the edges. Moderate slopes (2:1 – 3:1) require 1 to 2 staples per square yard. Gentle slopes require 1 staple per square yard. Use a common row of staples on adjoining blankets.
- D. Use wood stakes on tuff slopes, in place of wire staples. Use same installation rate as for staples. Drive stakes in perpendicular to slope and leave 2 in. exposed above soil grade.

3.06 BONDED FIBER MATRIX

- A. Hydraulically apply BFM over seeded area (or apply seed with a tracer amount, 200 to 300 lb/AC) immediately following raking/chaining operations and in accordance with manufacturer's specified procedures. Hydraulically apply BFM as a viscous mixture. Upon drying, it shall form a continuous, porous, and erosion-resistant mat. Upon drying, matrix shall not inhibit germination and growth of plants in and beneath the layer. Matrix shall retain its form despite re-wetting.
- B. Apply matrix uniformly across area and apply in multiple directions to ensure a 100% soil surface coverage.
- C. Apply at a rate of approximately 3,500 lb/AC in a manner that achieves uniform coverage of all exposed soils.
- D. Prohibit vehicle traffic on hydraulic BFM applications.

3.07 WATERING

- A. Where temporary watering is required for seeded areas, provide temporary water system which may be a sprinkler system, or a water truck with a spray boom or any other method satisfactory to distribute a uniform coverage of clean water (free of oil, acid, salt, or other substances harmful to plants) to previously seeded and mulched areas.
- B. If a temporary sprinkler system is used, keep all pipe connections tight to avoid leakage and loss of water, and to prevent washing or erosion of growing areas. Maintain sprinklers in proper working order during watering.
- C. Do not drive trucks with spray systems on seeded areas and ensure water force does not cause movement of mulch or seed on the ground.
- D. Water revegetated areas.
- E. Apply water at a maximum of 0.5 in. per hour for 2 hours. Additional applications of water may be made as designated by the Engineer. Water source will be approved by the SS, prior to use.

3.08 MAINTENANCE

- A. Begin maintenance immediately after planting.
- B. Maintain seeded areas for not less than 60 days after final acceptance of work and longer as required to achieve final stabilization as described in Section 3.10 ACCEPTANCE.
- C. Reseed void areas greater than 6 ft<sup>2</sup> or repetitive voids greater than 2 ft<sup>2</sup> amounting to more than 10% of any area that appears the growing season following installation.
- D. Keep revegetated areas free of noxious weeds until acceptance by the Engineer. Contact the Engineer prior to application of any control measure.

3.09 CLEANUP AND PROTECTION

- A. After completion of work, clear site of excess soil, waste material, debris, and objects that may hinder maintenance and detract from neat appearance of site.
- B. Protect work and materials from damage due to seeding operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged work as directed.

3.10 ACCEPTANCE

- A. Seeded areas will be reviewed for acceptance by the Engineer when final stabilization has been achieved. Final stabilization is defined as "All soil-disturbing activities at the site have been completed and a uniform (e.g., evenly distributed, without large bare areas) perennial vegetative cover with a density of 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures (such as the use of riprap or geotextiles) have been employed."
- B. In the event that all other work required by the Contract is completed before final stabilization is achieved or because seasonal limitations prevent seeding, partial acceptance of the work shall be made with final acceptance delayed until satisfactory vegetative growth has been established.

END OF SECTION

**SECTION 02980**

**CHAIN LINK FENCE**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. This section shall consist of furnishing and erecting permanent and temporary construction fence in accordance with these specifications and the details, lines and grades shown on the plans or as established by the Engineer.
- B. Existing fence can be relocated and reused in its entirety as construction fencing as shown on the plans, and described herein.

**1.02 QUALITY ASSURANCE**

- A. The Airport perimeter fencing height will comply with the FAA Landing and Taxiway obstruction requirements. The final site fencing requirements will be coordinated with the Los Alamos County Airport Manager and the Owner.
- B. Fencing installed on top of retaining walls will be a minimum height of 4 feet.
- C. The work and material under this section shall conform to the recommended practice outlined in the following standard and as required by this specification.
  - 1. American National Standards Institute (ANSI)/ASTM A123 – Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
  - 2. ANSI/ASTM F567 – Installation of Chain-Link Fence.
  - 3. ASTM A116 – Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.
  - 4. ASTM A120 – Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless, or Ordinary Uses.
  - 5. ASTM A121 – Zinc-Coated (Galvanized) Steel Barbed Wire.
  - 6. ASTM A153 – Zinc-Coating (Hot-Dip) on Iron and Steel Hardware.
  - 7. ASTM A392 – Zinc-Coated Steel Chain-Link Fence Fabric.
  - 8. ASTM A428 – Weight of Coating on Aluminum-Coated Iron or Steel Articles.
  - 9. ASTM A491 – Aluminum-Coated Steel Chain Link Fence Fabric.
  - 10. ASTM A569 – Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial Quality.
  - 11. ASTM A585 – Aluminum Coated Steel Barbed Wire.
  - 12. ASTM C94 – Ready-Mixed Concrete.
  - 13. ASTM F573 – Residential Zinc-Coated Steel Chain Link Fence Fabric.

14. ASTM F668 –PVC Coated Steel Chain Link Fence Fabric.
15. Chain Link Fence Manufacturers Institute (CLFMI) – Product Manual.
16. FS RR-F-191 – Fencing, Wire and Post Metal (and Gates, Chain Link Fence Fabric, and Accessories).

1.03 SUBMITTALS

- A. Submit copies of the manufacturer's latest published literature and data on fabric, posts, accessories, fittings, and hardware for chain link fence.
- B. Submit shop drawings showing details of each element. Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.
- C. Submit two samples of fence fabric, illustrating construction and finish for chain link fence.
- D. Each roll of fabric shall carry a tag showing the kind of base metal, or plastic, the kind of coating, the gauge of the wire, the length of fencing or fabric in the roll, and the name of the manufacturer. Posts, wire, and other fittings shall be identified as to manufacturer, kind of base metal, and kind of coating.

PART 2 MATERIALS

2.01 WIRE (Fabric)

- A. New fabric wire shall be of a similar height and material to the existing fence and shall have a base metal of steel with a tensile strength of 75,000 lbs per square in. and galvanized in conformance with the requirements of ASTM A392, Class II. Wire will be of 9-gauge and have a nominal diameter of 0.148 in. being woven in a 2-in. mesh. Fence for Airport perimeter to be coated to match existing fencing and fence for walls shall be galvanized.

2.02 POSTS, RAILS, GATES, AND BRACES

- A. Posts, rails, gate(s), and braces shall be of galvanized steel conforming to the requirements of ASTM F1083 and shall also conform to the requirements listed in Table 02980-1. Braces shall be provided for each gate, corner, pull, and end post and shall consist of a brace extending to each adjacent line post at midheight of the fabric and a rod not less than 3/8-in. in normal diameter, or equivalent, from line post back to gate, pull or end post, with a turnbuckle or equivalent, for adjustment as shown on plans.
- B. Top rails shall be lengths not less than 10 ft and shall be fitted with expansion couplings for connecting the lengths into a continuous run. Couplings shall be not less than 6 in. long, shall allow for expansion and contraction of the rail, and shall be approved by the Engineer.

TABLE 02980-1

POSTS AND RAIL SIZES AND WEIGHTS

Use and Section	O.D. In.	Weight/Lb/Ft.
Gate Posts	4.00	9.11
Corner Posts	2.875	5.79
End Posts, Pull Posts	2.875	5.79
Intermediate Posts	2.375	3.65
Top Rail and Postbrace	1.660	2.27
Gate Rails (Frame)	1.90	2.72

2.03 WIRE TIES AND TENSION WIRE

- A. All wire fabric ties, wire ties, hog rings, and tension wire shall be zinc-coated steel core wire. Tension wire shall have a minimum tensile strength of 80,000 psi. Zinc coating shall be .30 oz. per square foot. Tension wire shall be 6-gauge.

2.04 MISCELLANEOUS FITTINGS AND HARDWARE

- A. Miscellaneous fittings and hardware shall be zinc-coated steel, wrought iron, malleable iron, or pressed steel and shall be equal to materials specified in FS RR-F-191/4B.

2.05 GATES

- A. Structural members of gates shall be fully welded on all sides and faces of joints at exposed edges. Surplus welding material shall be removed. Gates shall be swing gates or sliding gate as indicated on plans and specifications. Gates shall include all hardware and appurtenances including latches, plunger pins, etc.
- B. Hinges for gate(s) shall be the pin type and shall be heavy-duty, malleable iron. Shop drawings will be required with the hinges being subject to the Engineer's approval.

2.06 CONCRETE

- A. Concrete for setting posts shall have a minimum compressive strength of 3,000 psi and conform to NMDOT standards.

PART 3 EXECUTION

3.01 CLEARING FENCE LINE

- A. The site of the fence shall be sufficiently cleared of obstructions, and surface irregularities shall be graded so that the fence will conform to the general contour of the ground. All holes shall be filled with common borrow or excavated material at the direction of the Engineer. When required, the Contractor shall grade the ground surface so that the fence elevation shall conform to existing or future structures. The fence line shall be cleared to a minimum width of 10 ft on each side of the centerline of the fence. This clearing shall consist of the removal of all stumps, brush, rocks, trees, or other obstructions which will interfere with proper construction of the fence. Stumps to be removed shall be grubbed or excavated. All holes remaining after the clearing and grubbing operations shall be refilled with suitable soil, gravel, or other material acceptable to the Construction Manager and shall be compacted properly with tampers.

Disturbed areas shall be seeded and mulched as directed by the Engineer and as specified in Section 02932.

3.02 CONSTRUCTION FENCE

- A. Construction fence shall consist of new fence, as specified, and may be existing fence labeled as "to be removed" or "to be relocated." The existing fence may be reused and installed as construction fence to the lines and grades shown on the plans.
1. Line posts shall be spaced not more than 10 ft on centers in the line of fence. End or pull posts shall have a 500-ft maximum spacing.
  2. End posts shall be installed in concrete foundations as shown on drawings. Line posts shall be installed in earth foundations. Concrete foundations shall extend one (1) in. above the ground at the posts, with a slope to match existing grade at the foundation's edge. All posts shall be set vertical, true to alignment, and securely embedded in earth or concrete foundations as required.
  3. After the concrete has been allowed to cure for 2 days, for the end posts, fabric, braces, and rails shall be attached. The fabric shall be attached to the posts and rails at a sufficient number of points to ensure a firm, rigid, and unyielding attachment, and shall be a maximum of two (2) in. clear of the pavement or ground surface. The fabric shall be stretched between posts so that no bends or loose places in fabric will result. Lengths of fabric shall be spliced by bringing the fabric ends close together and weaving in a picket in such a way that it engages each individual mesh of the fabric ends. Brace rails and truss rods shall be provided at all fence corners and ends.
  4. The bottom of the fence shall be placed a uniform distance above the finished ground surface except where allowance is made for the irregularities in the ground contour.

3.03 GROUNDING

- A. With the exception of the fence atop the retaining walls, all fence shall have at least one ground for every 500 ft of fence, at end posts, and on each side of gates. The ground shall consist of a 5/8-in. diameter copper-clad rod driven a minimum of 8 ft into the earth and attached to the fence by a copper wire and grounding clips to obtain a maximum resistance of 25 ohms and in accordance with the plans and as approved by the Engineer.

3.04 CLEANING UP

- A. The Contractor shall remove from the vicinity of the completed work all tools and equipment belonging to him or used during construction. All piles of soil shall be leveled and all brush or debris of any nature shall be removed from the site.

END OF SECTION

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**DIVISION 3**

**CONCRETE**

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work to be performed shall include the construction of Wall No. 1, aircraft hanger slabs and tie-down anchors. The work may also include the construction of trench drains, manholes and other drainage structures if precast structures are not utilized. Mix design, sampling, testing and inspection of concrete are also included.

1.02 QUALITY ASSURANCE

- A. Perform cast-in-place concrete work in accordance with ACI 301 unless specified otherwise.
- B. Maintain copy of ACI 301 in field office for duration of project.

1.03 TESTS

- A. Testing of concrete mix will be performed by independent testing laboratory appointed by the Contractor. The Contractor shall include costs for all testing. Copies of test results will be furnished by Contractor to the Engineer. Contractor shall submit name of testing laboratory to Engineer for approval.
- B. Prior to start of concrete work:
  - 1. Submit concrete mix design for each classification of strength, slump and air entrainment.
  - 2. Mix sample batches of each concrete mix design specified.
  - 3. Take three test cylinders for each sample batch for compression test at seven and twenty-eight days.
  - 4. Cylinders will be cured and tested to determine criteria for judging quality of concrete placed during construction.
- C. Sample concrete in accordance with ASTM C172.
- D. Make slump test in accordance with ASTM C143 for each ten cubic yards or per truck load of delivered concrete. Furnish material and assistance required to make tests.
- E. Test air content in accordance with ASTM C231.
- F. Cure test cylinders in accordance with ASTM C192.
- G. Make one set of three cylinders for each classification of concrete placed in one day, and for every 100 cubic yards of concrete placed. Make and test additional cylinders when deemed necessary by the Engineer. Lab cure two of the three cylinder specimens and field cure the remaining one. Make tests in accordance with ASTM C39.
- H. Compression tests of test cylinders will be made in accordance with ASTM C31 at 28 days. Seven-day tests may be used provided that the relation between seven and 28-day

strengths of the concrete has been established by earlier testing.

- I. Furnish cylinder molds, materials, and assistance required for preparation of test cylinders. Single use 6 inch by 12 inch paper cylinder molds may be used if they comply with ASTM C470.
- J. Do not remove forms from or apply loads to concrete structures for which strength tests have not been made and results of which have not equaled or exceeded minimum requirements.
- K. In cases where average cylinder strengths are below minimum required values, the Engineer shall have the right to require conditions of temperature and/or moisture necessary to secure the required strength and may require load or core tests to be made on affected portions of the Work.

1.04 RELATED SECTIONS

- A. SWPPP, June 2005
- B. CQCP, June 2005
- C. Construction Plan for LASO TA-73 Airport Landfill, June 2005

1.05 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Structural Concrete for Buildings.
- B. ACI 305 – Hot Weather Concreting.
- C. ACI 306 – Cold Weather Concreting.

1.06 SHOP DRAWINGS AND SUBMISSIONS

- A. Submit shop drawings and product data for all products under the provisions of Section 01340.
- B. Submit shop drawings of reinforcing steel.
- C. Shop Drawings for reinforcement, for fabrication, bending and placement of concrete reinforcement shall comply with ACI SP-66 (04), "ACI Detailing Manual," ACI 315-99 and ACI 315R-04, showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Indicate bar sizes, spacing, locations and quantities of reinforcing steel, and wire fabric, bending and cutting schedules, and supporting and spacing devices.
- D. Submit Steel producer's certificates of mill analysis, tensile tests and bend tests.
- E. Submit test results.
- F. Submit color samples.
- G. Submit written procedures for protection of concrete construction in accordance with ACI 301, ACI 305 for Hot Weather Construction, and ACI 306 for Cold Weather Construction.

PART 2 PRODUCTS

2.01 CEMENT (ACI 301 2.1)

- A. Use one brand and type of cement throughout project unless otherwise specified.
- B. Cement: Air entraining-type 1A. ASTM C150.

2.02 ADMIXTURES

- A. Type and dosage of admixture: conform to manufacturer's instructions for temperature conditions.
- B. Air entraining admixtures: conform to ASTM C260, and contain no chlorides. Maximum air content shall be six percent, plus or minus one percent of volume of concrete when tested in accordance with ASTM C173. Use air-entraining admixtures in concrete exposed to weathering and at other concrete work at Contractor's option.
- C. Water reducing admixtures: hydroxylated carboxylic acid type conforming to ASTM C494, Type D with one exception that:
  - 1. Maximum shrinkage: maximum 100 percent of control mix.
  - 2. Relative durability factor: minimum 100 percent of control mix.
  - 3. Use only as approved by Engineer.
- D. Do not use calcium chloride in concrete containing aluminum items.
- E. Color admixture for retaining wall shall produce an earth tone concrete subject to the approval of the Engineer.

2.03 MIX DESIGN (ACI 301 3.2)

- A. Provide 28-day compressive strength as follows:

Location	Min. 28-Day Compressive Strength (psi)	Water-Cement Ratio by Weight
Retaining Wall	3,000	0.59 Air entrained
Hanger Slab	4,000	0.35 Air entrained

- B. Provide over design factor for concrete mix of 1.15.

2.04 SLUMP

- A. Slump for consolidation by vibration: 4 inches. Slump for consolidation other than by vibration: 5 inches.

2.05 PROPORTIONS (ACI 301 3.8)

- A. Selection of proportions for normal weight concrete: Method 1.

2.06 REINFORCING STEEL (ACI 301 5.2)

- A. Reinforcing Steel: 60 yield grade; deformed billet steel bars, ASTM A615; plain finish.

2.07 EXPANSION JOINTS (ACI 301 6.2)

- A. Premolded Expansion Joint Filler: type required shown on Drawings, conforming to ASTM D1751. or ASTM D1752, Type III "Self-Expanding Cork," where indicated. The thickness and profile to match joint design.

2.08 ACCESSORIES

- A. Bonding Agent: two component modified epoxy resin; Sikadur Hi-Mod manufactured by Sika Chemical Co. or Epoxite Binder Code 2385 manufactured by W.R. Grace & Co. Polyvinyl bonding Agent shall be "Weld-Crete" manufactured by Larsen Products Corp., or approved equal.
- B. Non-Shrink Grout: Grout shall be a premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing a minimum compressive strength of 2,400 PSI in two days; 7,000 PSI in 28 days.

PART 3 EXECUTION

3.01 GENERAL

- A. Install concrete work in accordance with ACI 301 except as amended by this Section.
- B. Notify the Engineer a minimum 24 hours prior to placement of any concrete.
- C. Transport concrete from mixer to place of final deposit in a continuous manner to prevent separation or loss of material and as rapidly as practicable until the unit of operations is complete. Do not use concrete which has reached an initial set or has contained water for more than one hour.
- D. Deposit concrete as nearly as practicable to final position to prevent segregation from rehandling. In walls, place concrete in horizontal layers with first batches placed at ends and progress toward the center.
- E. Compact concrete immediately after placing by thoroughly agitating the mass to force out air pockets and work the mixture into corners, around reinforcement and inserts, and prevent formation of voids. Do not use vibrators to move concrete horizontally.
- F. Concrete trucks will not be permitted on existing foundations.
- G. Do not deposit concrete in or under water without the permission of the Engineer.
- H. Fresh concrete shall not be placed on concrete which has hardened sufficiently to cause formation of cold joints or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located at points as provided for on the Drawings or as approved by the Engineer. When work is resumed, concrete previously placed shall be thoroughly cleansed of foreign materials and laitance, using a stiff wire brush or other tools, and a stream of water if necessary, and then slushed with grout consisting of one part Portland Cement and two parts sand.

- I. Free drop of concrete for more than five feet will not be allowed. Where greater drops are required, a tremie shall be employed. Discharge of the tremie shall be controlled such that the concrete may be effectively compacted into horizontal layers not exceeding twelve inch in thickness with a minimum of lateral movement.
  - J. Hot weather placement of concrete shall be in strict accordance with Hot Weather Concreting, ACI 305R-91. Subgrades shall be kept moist in hot weather to prevent extraction of water from the concrete.
  - K. Cold weather placement of concrete shall be in strict accordance with Cold Weather Concreting, ACI 306R-88
- 3.02 FORMWORK (ACI 301 4.2)
- A. Obtain the authorization of the Engineer for use of earth forms. When using earth forms, hand-trim sides and bottoms, and remove loose dirt prior to placing concrete.
  - B. Chamfer exposed edges: 3/4 in x 3/4 in unless otherwise noted on the drawings.
  - C. Tape or seal joints and seams to provide a smooth surface.
  - D. Make and erect forms so finished concrete will conform to shapes, lines, grades and dimensions shown on Drawings and to produce plumb, even, true concrete surfaces. Form all exposed concrete surfaces.
  - E. Tie forms together with spreader-ties. Brace and shore forms as required. Design forms to remain in correct position during and after placement of concrete and not to deflect under weight of wet concrete.
    - 1. Make forms tight to prevent mortar leakage.
- 3.03 FORM SURFACES PREPARATION (ACI 301 4.4)
- A. Apply form release agent on formwork in accordance with manufacturer's recommendations. Apply prior to placing reinforcing steel, anchoring devices and embedded parts. Do not apply form release agent where concrete surfaces will receive applied coverings which are affected by agent.
- 3.04 FINISHING FORMED SURFACES (ACI 301.10.4)
- A. Formed Surface Finishes: Provide rough form finish at surfaces not exposed to view. Provide smooth form finish at surfaces exposed to view.
  - B. Finish concrete surfaces shall meet the requirements of ACI 117-90.
- 3.05 FINISHING HORIZONTAL SURFACES
- A. Horizontal surfaces which will be exposed after completion, i.e., hanger slabs shall receive a broom finish.

3.06 REMOVAL OF FORMS (ACI 301 4.5)

- A. Do not remove forms and bracing until concrete has gained sufficient strength to carry its own weight, construction loads, and design loads which are liable to be imposed upon it. Verify strength of concrete by compressive test results.

3.07 RESHORING (ACI 301 4.6)

- A. Remove load supporting forms only when concrete has attained 75 percent of required 28-day compressive strength, provided construction is reshored.

3.08 WELDING (ACI 5.3)

- A. Welding Reinforcing Steel is not permitted without the express approval of the Owner.

3.09 CONSTRUCTION JOINTS (ACI 301 6.1)

- A. Install construction joints where shown on Drawings.

3.10 INSERTS, EMBEDDED PARTS AND OPENINGS

- A. Provide formed openings where required for pipes, conduits, sleeves and other work to be embedded in and passing through concrete members.
- B. Coordinate work involved in forming and setting openings, slots, recesses, sleeves, bolts, anchors or other inserts.

3.11 REPAIR OF SURFACE DEFECTS (ACI 301 9.1)

- A. Allow the Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Modify or replace concrete not conforming to required lines, detail and elevations.
- C. Repair or replace concrete not properly placed resulting in excessive honeycombing and other defects. Do not patch, repair or replace exposed concrete except upon express direction of the Engineer.

3.12 CURING AND PROTECTION

- A. Curing shall be in accordance with recommended practice for curing concrete ACI 308-92.
  - 1. Apply specified curing and sealing compound to concrete surfaces as soon as final finishing operations are complete (within two hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

END OF SECTION

**SECTION 03400**

**PRECAST CONCRETE**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. This section includes requirements for providing precast concrete structures including storm drain structures, manholes, and other specified miscellaneous structures to the size, shape, and extent in accordance with the contract documents.

**1.02 QUALITY CONTROL**

- A. Precast concrete shall be supplied by a qualified firm with a minimum of 2 years of continuous operation experience.
- B. Contractor shall not place the order for precast structures until order is reviewed and approved by Owner's engineer.
- C. The manufacturer or supplier shall provide the Owner, prior to delivery of precast structures for an order, a Certificate of Compliance with the Contractor's name, section sizes, footage, or number of pieces required to fill the order.
- D. The Owner reserves the right to inspect and test all precast structures, fittings, and joint material after delivery to the site or at the factory. The manufacturer or supplier shall furnish materials for the tests and labor as required to assist the Owner with the tests.
- E. Only approved precast concrete structures shall be shipped to the contract site.

**1.03 SUBMITTALS**

- A. Contractor's drawings.
- B. Submit the following Contractor's drawings in accordance with Section 01340:
  - 1. Shop drawings showing complete details, pertinent calculations, design loads, materials, strengths, sizes and thicknesses, joint and connection design, and details for all precast structures.
- C. Installation methods for precast sections:
  - 1. This submittal may be waived when the manufacturer has his recommended methods on file with the Owner.
- D. Test reports:
  - 1. Submit manufacturer's certified test reports.

**1.04 DELIVERY, STORAGE AND HANDLING**

- A. Precast structures are considered suitable for handling to transport to the contract site after the concrete has cured to minimum strength of 80% of the design strength.

- B. Delivery of precast structures shall be coordinated with installation or shall be unloaded with proper equipment along the line of work, outside work limits as near as practicable to point of final placement. They shall be stored off the ground on wood blocks, pallets, or other appropriate means away from brush, poison oak or ivy, and in an accessible area for inspection. Excavated material shall not be placed over or against the stored precast structures.
- C. Precast structures and appurtenances shall be unloaded and handled with a crane, backhoe, or equipment of adequate capacity, equipped with appropriate slings and lifting devices to protect the material from damage.
- D. If damage occurs and is deemed repairable, it shall be repaired as directed by the Owner in accordance with approved manufacturer's recommendations. If damage is not repairable in the opinion of the Owner, such items of material will be rejected and shall be removed and replaced at the Contractor's expense.

PART 2 MATERIALS

2.01 PRECAST CONCRETE MANHOLE(S), INLETS, AND TRENCHES

A. General

1. Precast concrete shall meet requirements of ASTM C478 and be designed to withstand an HS-20 loading. In addition, the minimum compressive strength of the concrete shall be 4,000 psi and shall have a minimum compression cylinder test of 4,000 psi, any variance being in accordance with ASTM C478; and with joints meeting requirements of ASTM C443. Cement will be Portland, Type II with an Air Content of 5% to 7% as determined in accordance with ASTM C 231. Concrete shall be comprised of cementitious material, water, fine and course aggregate, and add mixtures. The cementitious material shall be Portland or blended hydraulic cement and pozzolan where appropriate.
2. Precast concrete sections shall conform to NMDOT Section 662.2. Furnish in lengths of 1-ft minimum, except not more than one 1-ft section shall be used in a manhole. Precast manhole cone section shall have bolt inserts provided. Inserts shall be embedded a minimum of 3 in., accommodate 9.75-in.-diameter bolts. Inserts shall be provided with plugs for transporting from plant to contract site.
3. Each concrete section shall be clearly marked on the inside near the top with the following information where applicable: ASTM Specification designation, manhole setting number (bases only), date of manufacture, and name or trademark of manufacturer. Markings may be engraved or stenciled with waterproof paint or ink in minimum 1-in.-high letters.
4. Precast concrete grade rings shall meet requirements of ASTM C478, except the minimum strength of the concrete shall be 5,000 psi using Type II cement. Rings shall be drilled with holes 1.5 to 2-in.-diameter to accommodate frame anchor bolts. Grade rings with cracks or fractures passing through the height of the ring and any continuous crack extending for a length of 3 in. or more will be rejected. Planes of the surfaces of the ring shall be within the limits of plus or minus 0.25-in. of horizontal and vertical.
5. Steps shall be a minimum 1-ft wide with a 1-ft center to center spacing, drop front type, and meet the requirements of ASTM C478.

6. Precast concrete materials for trench sections shall conform to NMDOT Section 662.2. Furnish in lengths to minimize number of joints. Supply a closed end on each trench. Sections to be supplied  $\frac{3}{4}$ " quick thread rods and steel plate.

B. Gasket Connectors

1. Each manhole precast section shall be fitted with an "O" ring type gasket that conforms to NMDOT Section 662.25.
2. Each joint of the precast trench section will be joined with a Concrete Sealants Inc., sealer type CS-440. The interior of the trench will be painted with a Sika Corporation type Sikaflex 1A material.

2.02 BITUMINOUS COATING

- A. All exterior surfaces of precast structures shall be coated with bitumastic material.
- B. The bituminous coating shall conform to NMDOT Section 662.26.

2.03 GRATE AND FRAME

- A. Manhole covers shall conform to NMDOT Section 662.27.
- B. Castings shall be suitable for AASHTO HS-20 loading.
- C. Trench grate and frame will be ductile iron, 80-55-06.

PART 3 EXECUTION

3.01 GENERAL

- A. Completion of the work shall be in accordance with Section 02720, Storm Drain System

3.02 BACKFILLING

- A. Backfilling shall be completed in accordance with Section 02200, Earthwork.

END OF SECTION

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**DIVISION 6**

**GEOSYNTHETICS**

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**SECTION 06005**

**VERY FLEXIBLE POLYETHYLENE GEOMEMBRANE**

**PART 1 GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. The Work includes the manufacture, supply, delivery, testing, and installation of smooth very flexible polyethylene (VFPE) geomembrane for channel lining. The work includes furnishing all materials, labor, supervision, tools, equipment that may be necessary to construct the work in accordance with the Contract Documents. The requirements of this specification have been reduced compared to a typical specification in light of the intended use and in consideration of the limited quantity of material required.

**1.02 QUALITY ASSURANCE**

**A. Manufacturer Qualifications**

1. The VFPE manufacturer(s) shall be a specialist in the manufacturing of VFPE geomembrane, and shall have produced and supplied at least 5 million ft<sup>2</sup> of said material that were used in successful applications.

**B. Contractor's Geosynthetics Installer Qualifications**

1. The Contractor's Geosynthetics Installer (Installer) shall meet the requirements of this Section. The Installer shall be responsible for the performance of the Installer and the installed geosynthetics.
2. The Installer shall be experienced in all aspects of VFPE geomembrane handling, storage, and installation. The Installer shall have successfully installed at least 5 million ft<sup>2</sup> of polyethylene geomembrane within the last 5 years, and be trained and approved by the manufacturer to install the geomembrane materials.
3. The Installer shall employ a field supervisor experienced in the installation of polyethylene geomembrane. This individual shall have installed or supervised the installation of a minimum of 2,000,000 ft<sup>2</sup> of polyethylene geomembrane on a minimum of five (5) different projects.
4. Each welder is required to have a minimum of 1 year of experience welding polyethylene geomembrane, except that the master welder shall have a minimum of three (3) years experience welding polyethylene geomembrane.

**C. Geosynthetics Testing Laboratory Qualifications**

1. Independent testing of the material is not required. However, the Engineer reserves the right to require testing of the material at an independent testing laboratory. The testing laboratory, if required, shall be accredited by the Geosynthetic Institute to perform the tests required in these Specifications.

**D. Materials Testing**

1. Material testing shall be completed by the manufacturer in accordance with its Quality Control/Quality Assurance Plan.

1.03 SUBMITTALS

A. General

1. The Contractor shall submit to the Engineer for review and approval the following information:
  - a. Name of Manufacturer.
  - b. Manufacturer's quality control test results – certified test results.
  - c. A Certificate of Compliance along with QC test results from the manufacturer stating that the polymer (raw material) used to manufacture the geomembrane and the geomembrane to be delivered to the site meets all of the physical property requirements presented in Tables 06005-1 and 06005-3, respectively.
  - d. Manufacturer's warranty for the installed geomembrane (example).
  - e. Proposed installation panel layout drawings, including panel and seam identification, panel orientation, seaming details, and penetration details. Engineer or Owner approval of these drawings does not relieve the Installer of the responsibility to properly install/lay out the geomembrane. The proposed panel layout drawing is tentative and may be modified by the Engineer.
  - f. Manufacturer's recommended product defect repair and construction repair procedures.
  - g. Manufacturer's recommended field seaming procedures and techniques, including: methods, overlap, personnel identification, QA/QC of seaming operations, temperatures, and preparation of materials.
  - h. Manufacturer's nondestructive and destructive seam testing procedures, including: type(s) of tests, a list of equipment required, frequency of tests with locations, methods, qualifications of personnel that perform the tests, and acceptance/rejection criteria for tested seams.
  - i. Installer's daily quality control (QC) log and Report of Welds format to be used during geomembrane installation.

Table 06005-1

Polyethylene Polymer(s) for Geomembranes and Extrudate

Property	Test Method	Required Minimum Value	Unit
Density (compounded resin)	ASTM D1505 or D792	0.91	g/cc
Melt Flow Index	ASTM D1238 (Condition E)	<1.0	g/10 min.

Test Frequency: One per shipping container compartment.

Table 06005-2

Conformance and "Fingerprinting" Testing Requirements for Geomembrane Liners

Property	Test Method
Thickness	ASTM D5199
Tensile Properties	ASTM D638 Type IV
Tear Resistance	ASTM D1004
Puncture Resistance	ASTM D4833
Carbon Black Content	ASTM D1603
Carbon Black Dispersion	ASTM D3015 or D5596
Density	ASTM D1505
Melt Flow Index	ASTM D1238

Table 06005-3

Physical Properties of LDPE/FPPE Geomembrane Liners  
(Minimum Average Roll Values)

Property	Test Method	Units	Required Minimum Value
Gauge Thickness (nominal)	ASTM D5199	mils	40
Sheet Density	ASTM D1505	g/cm <sup>3</sup>	0.92
Tensile Properties – Tensile strength at break – Elongation at break	ASTM D638 Type IV	lb/in %	150 700
Dimensional Stability <sup>a</sup>	ASTM D1204	%	+2
Puncture Resistance	ASTM D4833	lbs	55
Tear Resistance	ASTM D1004	lbs	22
Coefficient of Linear Thermal Expansion <sup>a</sup>	ASTM D696	cm/cm°C	$\leq 2 \times 10^{-4}$
Low Temperature Brittleness <sup>a</sup>	ASTM D746B	°C	<-70°
Carbon Black Content	ASTM D1603	%	2-3
Carbon Black Dispersion	ASTM D5596	score	1 or 2 or A1 or A2
Melt Flow Index	ASTM D1238 condition E	g/10 min	$\leq 1$
ESCR <sup>a</sup>	ASTM D5397	hrs	>200

<sup>a</sup> Certification by manufacturer is adequate.

- j. Method of construction procedures for preparation of earthen subgrade and placement of earthen material above the geosynthetics including method of placement, equipment, and personnel.
- k. The Installer shall provide a Certificate of Compliance from the manufacturer stating that the resin used to produce the geomembrane to be used on this project has an environmental stress crack resistance of greater than 200 hours as tested in conformance with ASTM D5397.
- l. Copies of quality control certificates issued by the resin supplier used to manufacture the geomembrane to be used on this project. These certificates, at a minimum, shall include reports of tests conducted to verify the material quality, including specific gravity, and melt flow index.
- m. Documentation shall be submitted to demonstrate chemical compatibility of the geomembrane with any municipal solid waste leachate. The chemical compatibility testing shall be performed using the EPA 9090 testing method with all test results submitted for approval to the Engineer.
- n. The Installer shall provide a certificate from the manufacturer stating that the geomembrane to be used on this project will have been produced within one year of receipt of material at the site.

B. Certified Test Reports

- 1. Certified test reports within the requirements of standards and testing methods specified herein shall be submitted to the Engineer for review and approval prior to delivery. The geomembrane manufacturer and Installer must satisfy the Engineer that the material they offer to furnish and install shall meet in every aspect the requirements set forth in these Specifications. The Installer shall transmit to the Engineer all information given to them by the manufacturer or supplier prior to approval for furnishing and installing any such material.
- 2. If the manufacturer uses test methods other than those specified, an explanation of the alternate test method shall be provided.

C. Installer's Qualifications

- 1. At least three (3) weeks prior to commencement of geomembrane installation, the Installer shall submit written notification to the Engineer of the field supervisor and individual welders' work experience relative to polyethylene geomembrane installation and welding. No geomembrane welding shall begin until the Engineer has received the notifications and has approved the field supervisor and the individual welder qualifications.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be delivered to the site only after the required submittals have been furnished and approved by the Engineer. Storage and handling of the materials shall conform to the manufacturer's recommendations and shall be done in such a manner as to prevent damage to any part of the Work. The Installer shall provide labor and equipment to properly unload material upon arrival at the site. Storage shall be in an area

reasonably free of dirt, dust, direct sunlight, extreme heat, and disturbance. The material shall be stored in a reasonably-level area that is well-drained, away from oils/fuels, brush, poison oak or ivy, in an accessible area for inspection, and on a smooth surface so that the material is well-supported and not resting on sharp objects that could damage it. Geomembrane roll goods shall be underlain by a bedding geotextile and not stacked more than three rolls high. Individual pieces or bundles shall be stored with safe walking space and clearance between them to allow full view for inspection purposes. The protective covers used to wrap each roll of geomembrane, if used by the manufacturer, shall not be removed until immediately before the material is to be installed in the field.

- B. Each roll delivered shall have a tag attached that identifies the following:
  - 1. Manufacturer.
  - 2. Product type and thickness.
  - 3. Manufacturer batch code.
  - 4. Manufacturer date.
  - 5. Roll number.
  - 6. Physical dimensions.

## PART 2 MATERIALS

### 2.01 RAW MATERIAL (RESIN)

- A. Raw material for the VFPE geomembrane shall be tested for density and melt index. At a minimum, one sample shall be obtained from each shipping container (typically a railcar) compartment. One (1) test for each of the properties in Table 06005-1 shall be performed on each compartment sample. The material shall be accepted for production use if all test results conform to the material requirements listed in Table 06005-1 and are comparable within the various shipment compartments.

### 2.02 SHEET GEOMEMBRANE

- A. The geomembrane shall be smooth VFPE containing no fillers or extenders.
- B. The VFPE geomembrane shall be tested prior to shipment to ensure that the physical and chemical properties of the finished product are in conformance with the Specifications. The required conformance testing of geomembranes are presented in Table 06005-2, with the exception of ASTM D5321. The Contractor shall perform three tests of ASTM D5321 for each of the required interfaces prior to shipment of the geosynthetic materials to the job site. Test frequency shall be one of each test per every 50,000 ft<sup>2</sup> of geomembrane produced or as noted. In addition, one 50 ft<sup>2</sup> (minimum) coupon of geomembrane per every 100,000 ft<sup>2</sup> of geomembrane produced shall be retained intact by the manufacturer until construction of the lining system, for which the geomembrane is used, is complete. These coupons shall be submitted to the Engineer upon request.

2.03 EXTRUDATE RESIN (WELDING ROD)

- A. Resin used for extrusion welding adjacent sheets and pipe penetrations shall be VFPE produced from the same resin as the sheet geomembrane. Physical properties of the extrudate shall be in conformance with Table 06005-1. The resin shall be supplied in black.

PART 3 EXECUTION

3.01 SUBBASE ACCEPTANCE BY THE CONTRACTOR

- A. Prior to installation of the geomembrane, the Installer shall verify the conditions of the installed earthen material surface to ensure that this surface represents a smooth, stable surface reasonably free of stones, organic matter, irregularities, protrusions, loose soil, and any abrupt changes in grade. The Installer shall notify the Engineer in writing of acceptance of the prepared earthen surface prior to installation of the geomembrane. This notification shall be consistent with the requirements of the geomembrane supplier for the bedding layer surface in order to preserve the warranty for the geomembrane.

3.02 INSPECTION OF SHEET GEOMEMBRANE AT JOB SITE

- A. The Installer shall be responsible for the inspection of the geomembrane rolls upon their arrival at the job site. Should rolls show damage from transit, they shall be so identified by the Installer and set aside for either return to the manufacturer or repaired in accordance with the manufacturer's recommendations.
- B. During unrolling of the geomembrane, the Installer shall carry out visual inspection of the geomembrane surface. Any faulty areas shall be repaired by the Installer using the preapproved techniques. Such repairs shall be recorded on the as-built drawings and reported to the Engineer by means of a daily QC log (see Subsection 3.06). At any point in the Work, if the daily QC log has not been submitted, the Engineer has the right to stop Work at the cost of the Installer until the daily QC log is submitted.
- C. During installation of the geomembrane, the Engineer has the option to perform thickness measures at locations along the edges of the geomembrane panel. Any panel deployed having insufficient thickness shall be removed from the site by the Installer at no additional cost to the Owner.

3.03 INSTALLATION

- A. General
  - 1. The limits of geomembrane installation shall be as shown on the Drawings. The geomembrane shall be laid out and installed by the approved Installer in accordance with the applicable panel installation drawings approved by the Engineer.
  - 2. All geomembrane shall be installed in a down gradient manner to minimize the potential of surface water flowing beneath placed geomembrane.
  - 3. The Installer shall at all times maintain a clean work area to protect the geomembrane from incidental damage. This activity shall be done on an ongoing

basis throughout the work. There shall be no smoking, glass bottles, or metal cans allowed in an area where geosynthetics are being installed.

4. When placing materials upon any geomembrane(s) or geotextile(s) the Installer shall stage his operations to minimize/eliminate any wrinkles associated with that operation. Furthermore, the Engineer shall notify the Installer when such wrinkling and associated problems are present. It shall be the responsibility of the Installer to modify his operations to minimize/eliminate this problem at no additional cost to the Owner.

B. Field Panel Placement

1. Adjacent geomembrane panels shall be overlapped a minimum of 6 inches prior to hot wedge seaming, unless the Engineer approves a lesser overlap due to limitations of the Installer's welding equipment. In no case shall an overlap of less than 3 inches be approved. The required minimum geomembrane overlap for extrusion welding shall be no less than 3 inches. If excess overlap exists, the bottom sheet shall be field cut. Areas cut to remove wrinkles or fishmouths in excess of six (6) inches shall be cut along the ridge of the wrinkle and seamed.

C. Seam Preparation

1. Prior to seaming, the seam area shall be clean and free of moisture, dust, dirt, debris of any kind, and foreign material. No seaming of the VFPE geomembrane shall be conducted when the material is exposed to moisture from either dew or precipitation. Seams shall be aligned to create the fewest possible number of wrinkles and fishmouths. All seam interfaces shall be visually examined for scratches, blemishes, flaws, and texture.
2. Trimming of seams and patches shall be accomplished using a shielded blade or hook-knife and performed such that all corners are rounded. Whenever possible, the cutting of the geomembrane shall be from the underside, in an upward motion. Any trimming of test strips or patch pieces on the geomembrane shall be performed with a scrub sheet between the geomembrane and the cutting operation. All trimming of seams shall be completed at least 50 ft ahead of seaming operations.
3. For extrusion-welded seams, a small hand-held electric rotary grinder with circular disc grit grinding paper shall be used to remove oxidation at the seam locations. The grinding plate shall be approximately 4 inches in diameter, and No. 80 or No. 100 grit paper shall be used. The depth of the grinding shall be no greater than 10% of the sheet thickness, and in general should only be approximately 5% of the sheet thickness. The grinding shall extend beneath the full width of the extrudate and no greater than 0.25 inch beyond the limit of extrudate after it is placed. Grinding shall precede welding by approximately 15 minutes, and shall be oriented perpendicular to the seam direction rather than parallel to it.

D. Seaming

1. General
  - a. The approved seaming techniques for the Work are hot-wedge and extrusion fillet welding.

- b. Welding of VFPE shall not take place when ambient temperatures are less than 41°F (5°C) or exceed 104°F (40°C), when measured 1 ft above the geomembrane. Weather conditions shall have no precipitation, dew or fog, nor shall winds be in excess of 20 mph during welding.

2. Hot-Wedge Seaming

- a. The operator shall keep constant visual contact with the temperature controls, as well as with the completed seam coming out of the machine. Occasional adjustments of the temperature or speed may be necessary to maintain a consistent weld.
- b. If an excessive amount of squeeze-out is observed, reduce the temperature and/or pressure to correct the situation. Nip/drive roller marks shall be able to be observed visually, but just barely evident to the touch.
- c. Cleaning of the hot-wedge welder shall be performed at least daily.
- d. A smooth-insulating plate or heat-insulating fabric shall be placed beneath the hot-welding apparatus after usage.
- e. Seams exhibiting burnout due to excessive heat or roller slippage shall be repaired in accordance with Subsection 3.04 as directed by the Engineer.

3. Extrusion Fillet Seaming

- a. Grinding of the sheets shall be completed in accordance with Subsection 3.03.C.3. A hot-air welder may be used to tack weld sheets together in order to hold them in proper position for extrusion welding.
- b. The extrusion welder is to be purged of all heat-degraded extrudate in the barrel prior to beginning a seam. This shall be done every time the extruder is restarted after a 2-minute or longer downtime. The purged extrudate shall be properly disposed of.
- c. Extrudate in the form of a molten, viscous bead shall be deposited over the overlapped seam. The center of the extrudate shall be directly over the edge of the upper sheet.
- d. The extrudate thickness shall be approximately two times the specified sheet thickness measured from the top of the bottom sheet to the top or crown of the extrudate. Excessive squeeze-out (or flashing) is acceptable as long as it is equal on both sides and does not interfere with subsequent vacuum box testing. Excessive extrudate build-ups shall be removed, and a patch shall be placed in accordance with Subsection 3.04 if so directed by the Engineer.

- e. After seaming, visual inspection of the extrudate bead shall be made, particularly for straight-line alignment, height, and uniformity of surface texture. There shall be no bubbles or pockmarks in the extrudate. Grind marks shall only be visible for no more than 0.25 inch beyond the extrudate. They shall be extremely faint and shall never appear as heavy gouge marks. A patch shall be placed in accordance with Subsection 3.04 over the entire seam where the excessive grinding is observed.
- f. Seam weld runs shall terminate at a panel end or tail off gradually. Where extrusion fillet welds are temporarily terminated long enough to cool, they shall be ground prior to applying new extrudate over the existing seam. This restart procedure shall be followed on patches, pipes, fittings, appurtenances, and "T" or "Y" seams.

4. Trial Seams

- a. Trial seams shall be made at the beginning of each seaming period (start of day, midday and at the conclusion of the day's seaming) for each welding apparatus and operator of said apparatus. Trial seams shall be made at least every five hours and every time the seaming equipment or operator is changed. Trial seams shall be made under the same conditions as actual seams (i.e., welding apparatus, electrical cord length, operator, and ambient temperature). The Installer shall make additional trial seams if ambient temperatures vary more than 10°F (0.5°C) from initial trial seam conditions or as directed by the Engineer.

The trial seam sample shall be at least 3 ft long by 2 ft wide (after seaming) with the seam centered lengthwise. Seam overlap shall be nominally 4 inches, with a 3-inch minimum.

- b. Six adjoining coupon specimens, each 1-inch wide, shall be cut from the trial seam sample by the Installer using a die cutter to ensure precise 1-inch wide coupons. The coupons shall be tested in peel (outside and inside track) and shear using an electronic readout field tensiometer, at a strain rate of 2 in./min, and they shall not fail in the seam (i.e., Film Tear Bond (FTB), failure in the parent sheet material, is required). The specimen shall not fail at a stress less than 25% of the break strength of the parent material in peel or no less than 30% of the break strength in shear.

Ideally, samples shall be conditioned at  $23 \pm 2^\circ\text{C}$  at a relative humidity of  $50 \pm 5\%$  for two hours prior to testing. If test conditions vary from these conditions, a 1-inch wide coupon of the parent geomembrane material (no weld) shall be tested in the same manner as the seam specimens to determine the break strength at this condition.

- c. If a coupon specimen fails, the entire operation shall be repeated. If the additional coupon specimen fails, the seaming apparatus and seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful trial seams are achieved. All welded seams installed by the seaming apparatus/operator between the period of time when an acceptable

coupon specimen and a deficient coupon specimen were obtained shall be evaluated. The evaluation shall consist of cutting three 12-inch wide by 12-inch long samples from the suspect deficient seam. The samples shall be taken at locations directed by the Engineer. The samples shall be field tested by the Installer in shear and peel. If any of the three samples fail the shear and peel criteria, the entire length of deficient welding shall be repaired in accordance with Subsection 3.04.

- d. The test weld samples shall be classified according to NSF 54 standards, marked with the date, roll/seam number, operator, ambient temperature, welding machine number, temperature and load at failure. A copy of this information shall be attached to each coupon specimen, which will be retained by the Engineer.

5. Nondestructive Seam Continuity Testing

- a. The Installer shall nondestructively test all field seams over their full length using a vacuum test unit, air pressure testing, or other approved method. Continuity testing shall be carried out as the seaming work progresses in accordance with the following procedures unless otherwise recommended by the geomembrane manufacturer:

- b. Vacuum Testing

- i. A non-detergent soapy solution shall be applied to the surface of the geomembrane immediately prior to testing the seam.
- ii. Test shall be performed with a tank pressure of approximately 5 psi (10 inches of Hg) gauge.
- iii. Examine the geomembrane seam through the viewing window for 10 seconds.
- iv. The next adjoining area shall overlap the previously tested area by a minimum of 3 inches (75 mm).
- v. All areas indicating leaks shall be repaired in accordance with Subsection 3.04.
- vi. Vacuum-tested seams shall be recorded on the daily QC log (Subsection 3.06) including location, date, test unit number, name of tester, and results of test.

- c. Air Pressure Testing

- i. Sustain a pressure of 24 to 30 psi of the air channel for approximately 5 minutes.
- ii. If the loss of pressure exceeds 3 psi over a five minute period or does not stabilize, locate the faulty area and repair in accordance with Subsection 3.04.

- iii. Verify that the length of the tested channel is unobstructed by cutting the air channel at the end opposite the pressure gauge.
- iv. Seal test holes with extrudate.
- v. Air pressure tested seams shall be recorded on the daily QC log (Subsection 3.06), including location, date, test unit number, name of tester, and results of test.

### 3.04 DEFECTS AND REPAIRS

#### A. Identification

1. All seams and nonseam areas of the geomembrane shall be evaluated by the Engineer for identification of defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. Because light reflected by the geomembrane aids in the detection of defects, the surface of the geomembrane shall be clean at the time of inspection. The geomembrane surface shall be broomed or washed by the Installer if the amount of dust or mud inhibits inspection.

#### B. Evaluation

1. Each suspect location, both in seams and in nonseam areas, shall be nondestructively tested using the methods described in Subsection 3.03.D, as appropriate. Each location that fails the nondestructive testing shall be marked by the Engineer and repaired by the Installer. Scratches, abrasions, or other imperfections in the geomembrane and welds that are deemed significant by the Engineer shall be repaired.

#### C. Repair Procedures

1. Repair procedures shall be agreed upon between the Installer and the Engineer prior to geomembrane installation.
2. Defective seams shall be repaired by reconstruction. Seam reconstruction for the fusion welding process shall be achieved by welding a replacement strip (cap) over the failed seam. The replacement strip shall extend at least 12 inches beyond the faulty seam at all locations and shall be extrusion welded completely around its perimeter. A reconstructed seam shall not consist of extrusion welding the outside edge (flap) of the existing weld.
3. Tears or pinholes or other imperfections shall be repaired by seaming or patching. Patches shall be round or oval in shape, made of the same material as the geomembrane, and extend a minimum of 6 inches beyond all edges of the defect.
4. Each repair shall be numbered and logged in the Installer's daily QC log.

D. Verification of Repairs

1. Each repair shall be nondestructively tested using the methods described in Subsection 3.03.D, as appropriate. Repairs that pass the nondestructive test shall be taken as an indication of an adequate repair. Repairs that fail shall be redone and retested until a passing test results. The Engineer shall observe all nondestructive testing of repairs, and record the number of each patch, date, name of patcher, and test outcome.
2. Seam reconstruction areas resulting from failures in destructive sampling shall also have one destructive test performed within the repair area in accordance with Subsection 3.03.D.6.

3.05 DAILY QUALITY CONTROL LOG

A. The Installer shall maintain a daily quality control (QC) log during all phases of geomembrane installation. This log shall document the daily progression of the geomembrane installation from delivery to final acceptance. The daily QC log shall designate those construction activities that influence the integrity of the geomembrane during installation. The log, at a minimum, shall include entries and detailed documentation of the following:

1. Weather (temperature, winds, precipitation).
2. Preparation activities, including removal of water, sediment, geomembrane cleaning, or subbase smoothing and repair.
3. Document that the roll number and sheet lot number are placed in the required panel locations.
4. Maps or sketches indicating material installed during that day, and material installed previously. Maps or sketches shall indicate the amount of material installed that day, the amount installed previously and the total amount installed to date.
5. Repairs and replacements.
6. Document seaming activities, including name of welder(s) for each seam and any leakage detected in testing of that seam.
7. Results and locations of destructive and nondestructive testing performed as part of geomembrane installation, including corrective action taken.
8. Equipment used to place the geomembrane.
9. Calibration dates for each piece of seaming equipment and seam test equipment.
10. Time periods, locations, and procedures administered when tents are used for geomembrane installation during periods of low temperature.

B. Prior to performing the work, the Installer shall submit the daily QC log format for approval by the Engineer.

END OF SECTION

## SECTION 06020

### GEOTEXTILES

#### PART 1 GENERAL

##### 1.01 DESCRIPTION OF WORK

- A. The Work includes the manufacture, supply, delivery, testing, storage, and installation of woven and nonwoven geotextiles to be used for filtering and separation media within the drainage and cover systems as indicated on the Contract Drawings. The Contractor shall supply all equipment, tools, labor, supervision, materials, and quality control required to complete the Work in accordance with the Contract Documents.

##### 1.02 QUALITY CONTROL

###### A. Manufacturer Qualifications

- 1. The geotextile manufacturer(s) shall be specialist(s) in the manufacturing of polyester, polyethylene, and/or polypropylene geotextile (as applicable), and shall have produced and manufactured a minimum of 5 million ft<sup>2</sup> of said geotextiles that were used in successful installations.

###### B. Materials Testing

- 1. Quality control testing of materials shall be as set forth in the applicable referenced Specifications and as required herein. Testing of the geotextiles shall be in accordance with Subsection 2.01.B.

###### C. Laboratory Testing

- 1. Unless otherwise indicated, testing shall be performed by the manufacturer.

###### D. Visual Inspection During Installation

- 1. During placement of the geotextiles, the Contractor shall carry out visual inspections of the material surface. Any faulty areas relating to material integrity, uniformity, rips or tears, sewing incompleteness, and seam overlap shall be repaired by the Contractor using pre-approved techniques and in accordance with manufacturer recommendations. Such repairs shall be reported to the Owner by means of a daily QC log. At any point in the Work, if the daily QC log has not been submitted, the Owner has the right to stop work at the expense of the Contractor until the daily QC log is submitted.

##### 1.03 SUBMITTALS

###### A. Certified Test Reports

- 1. Certified test reports for a minimum of two (2) samples tested in accordance with the standards and testing methods specified herein shall be submitted to the Owner for approval for each geotextile proposed for this project prior to material delivery. The material manufacturer and Contractor must satisfy the Owner that the materials they offer to furnish and install shall meet every aspect of the requirements listed in Table 06020-1 and as stated in PART 2, MATERIALS. The Contractor shall transmit to the Owner all information given to them by the manufacturer or supplier prior to approval for furnishing and installing any such material.

Table 06020-1

Physical and Mechanical Properties of Geotextiles

Property	Test Method	Required Value <sup>1</sup>	
		Nonwoven (Drainage Composite)	Woven
Visual Inspection	--	Packaging, visible defects	Packaging, visible defects
Mass per Unit Area <sup>(2)</sup>	ASTM D5261	6 oz/yd <sup>2</sup>	---
Puncture Strength	ASTM D4833	85 lbs	90 lbs
Apparent Opening Size	ASTM D4751	≤ No. 70 Sieve	---
Grab Tensile Strength	ASTM D4632	160 lbs	200 lbs
Grab Elongation	ASTM D4632	> 50 %	15 %
Tear Strength	ASTM D4533	60 lbs	90 lbs
Permittivity	ASTM D4491	≥ 1.5 sec <sup>2</sup>	---
UV Resistance <sup>3</sup> (@500 Hours)	ASTM D4355	> 70 % strength retained	---

<sup>1</sup> MARV.

<sup>2</sup> For information only, not a required property.

<sup>3</sup> Manufacturer's certification required which states product exceeds required value for typical roll values.

2. The Contractor or manufacturer shall complete interface friction testing (direct shear) in accordance with ASTM D5321 under confining pressures of 2, 4 and 6 psi. The drainage composite shall be in direct contact with infiltration soil which is compacted to 90% DOC within 1% +/- of its optimum moisture content. The interfaces shall be wetted (soaked) prior to initiating the tests. Two series of interface friction testing shall be performed for each soil type or each combination of soil types in direct contact with the drainage composite. The physical properties of each soil type used in the testing shall be reported including USCS designation, Atterberg Limits, natural moisture content and degree of compaction.

The minimum required interface friction angle shall be 26 degrees.

B. Installation And Repair Recommendations

1. Within three (3) weeks after award of the Contract, submit manufacturer's recommended installation procedures for the sewing of the geotextiles and procedures for repair. All sewing shall be performed by trained personnel of the Contractor or their subcontractors; the geotextile installer must be approved by the Owner. The Contractor may also be requested to submit training or experience records of the installer personnel to the Owner for approval.

- C. The Contractor shall submit to the Owner for approval within three (3) weeks after award of the Contract the following information:

1. Contractor's daily QC log format to be used during geotextile installation. This log shall document the daily progression of geotextile installation from delivery to final acceptance. The daily log shall designate these construction activities that influence the integrity of the geotextile during installation. The log, at a minimum, shall include entries and detailed documentation of the following:
  - a. Weather (temperature, winds, precipitation).
  - b. Repairs and replacements.
  - c. Document the roll number and location of each roll when placed.
  - d. Quantity of material installed that day; quantity installed to date.
- D. Laboratory test results shall be submitted as the Work progresses.
- E. Sewing equipment information, stitch type, and density proposed for use at the project shall be submitted to the Owner for review prior to placement of geotextile in the field.

#### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be delivered to the site only after the required submittals have been approved by the Owner. Storage and handling of the materials shall conform to the manufacturer's recommendations and shall be done in such a manner as to prevent damage to any part of the Work. The Contractor shall provide labor and equipment to properly unload material upon arrival at the site. The material shall be stored in a reasonably level, smooth, and well-drained area that is away from sharp objects or rocks that may puncture the material, away from brush, oil, grease, or fuels, and in an accessible area for inspection. Individual rolls shall be stored with safe walking space and clearance between them to allow full view for inspection purposes. To prevent ultraviolet degradation of the material, the protective wrapper on each geotextile roll shall not be removed until the material is ready for use. Any rolls that are delivered without protective wrappers shall be rejected by the Owner at no cost to the Owner. Any rolls of geotextile that will not be installed within 21 days following delivery to the site shall be covered with tarps to protect the rolls from the elements.

### PART 2 MATERIALS

#### 2.01 GEOTEXTILES

- A. Geotextiles shall be provided to meet the minimum physical and mechanical properties outlined in Table 06020-1 and as designated on the Drawings. The properties shown represent the MARV for the installed materials, unless otherwise indicated.
- B. Geotextiles shall be tested by the manufacturer prior to shipment to ensure that the physical and mechanical properties of the finished product are in accordance with these Specifications. The required material properties, test methods, values, and units are presented in Table 06020-1. Test frequencies shall be one (1) of each test for every 100,000 ft<sup>2</sup> of geotextile produced for this project or as noted in Table 06020-1.

PART 3 EXECUTION

3.01 INSTALLATION RESPONSIBILITY

- A. The Contractor shall be responsible for installing the geotextiles and all components and details associated with these materials.

3.02 GEOTEXTILE PLACEMENT

- A. Geotextiles shall be placed by the Contractor at the locations and to the limits shown on the Drawings. All seams placed on slopes of 4H:1V or greater shall be overlapped a minimum of eight (12) in.. All other seams shall be overlapped a minimum of eight (8) in. Seams on slopes shall be oriented with the slope. End-of-roll seams shall be offset a minimum of 5 ft between adjacent roll ends. Cross-slope seams shall be avoided as much as possible.
- B. A minimum of 12 in. of the aggregate/soil shall be placed onto the geotextiles and spread in advance of construction equipment not exceeding 10 psi contact pressure. When contact pressures exceed 10 psi, construction equipment shall be limited to operating on 36 in. of aggregate/soil above geosynthetics. The material shall be spread in the same direction as the fabric is seamed. Extreme care shall be required by the Contractor so that the equipment operator pushes the soil materials ahead without damage to the geotextile. At no time shall construction equipment be permitted to track directly on the geotextile. Any damage to the fabric or other geosynthetics shall be repaired by the Contractor (using approved methods) at no expense to the Owner.
- C. During periods of high winds, sandbags, or other methods approved by the manufacturer(s) shall be used by the Contractor to temporarily secure any exposed geotextile in place.

3.04 COVERING GEOTEXTILES

- A. All geotextiles shall be covered within 21 calendar days, following removal of their protective wrapping and their placement in the field, to protect them from ultraviolet (UV) degradation. The Contractor shall stage construction activities to accomplish the schedule. Any geotextile left exposed longer than the 21 calendar days shall, at the Owner's direction, be removed and replaced at no cost to the Owner.

END OF SECTION

## SECTION 06030

### DRAINAGE COMPOSITE

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. The Work includes the supply, delivery, testing, storage, and installation of drainage composite to be used in the construction of the cover system. The work includes furnishing all materials, labor, supervision, tools, equipment, construction machinery and quality control that may be necessary.

##### 1.02 QUALITY CONTROL

###### A. Manufacturer Qualifications

1. The drainage net and drainage composite manufacturer(s) shall be specialist(s) in the manufacturing of drainage net and drainage composite and shall have produced and manufactured a minimum of 5 million ft<sup>2</sup> of said materials that were used in successful installations.

###### B. Material Testing

1. Quality control testing of materials shall be as set forth in the applicable referenced Specifications and as required herein. Testing of the drainage net and drainage composite shall be in accordance with Subsections 2.01.C and 2.02.B.
2. Samples of delivered drainage media to be used on this project shall be obtained by the Contractor for testing at the Geosynthetic Testing Laboratory at a frequency of one (1) sample (at least 6 ft by 3 ft) for every 100,000 ft<sup>2</sup> of material to be installed at the site. Drainage media samples shall be tested according to the methods listed in Table 06030-1. The samples selected shall have the roll and lot numbers, and manufacturer clearly marked on or attached to the sample. All samples not required for testing shall be submitted to the Engineer.
3. The manufacturer or Contractor shall retain one 50 ft<sup>2</sup> coupon of drainage composite for every 100,000 ft<sup>2</sup> produced for this project. Each sample shall have the roll, lot number and manufacturer clearly marked.

###### C. Laboratory Testing

1. Unless otherwise indicated, testing shall be performed by the manufacturer or an Engineer-approved independent geosynthetics testing laboratory with materials furnished by the Contractor and at the expense of the Contractor.

###### D. Visual Inspection During Installation

1. During placement of the drainage media, the Contractor shall carry out visual inspections of the material surface. Any faulty areas relating to net integrity, continuity, overlapping/joining technique, and panel placement/orientation shall be repaired by the Contractor using preapproved techniques. Such repairs shall be reported to the Engineer by means of a daily quality control (QC) log. At any point in the Work, if the daily QC log has not been submitted, the Engineer has the right to stop Work at the expense of the Contractor until the daily QC log is submitted.

1.03 SUBMITTALS

A. Certified Test Reports

1. Certified test reports for a minimum of two (2) samples tested in accordance with the standards and testing methods specified herein shall be submitted to the Engineer for approval prior to material delivery. Results of at least one (1) transmissivity test performed under similar conditions described in Table 06030-1 shall also be provided to the Engineer for approval prior to delivery of the first shipment of material. The material manufacturer and Contractor must satisfy the Engineer that the material they offer to furnish and install shall meet in every aspect the requirements set forth in these Specifications and the requirements of Table 06030-1 and as stated in PART 2, MATERIALS. The Contractor shall transmit to the Engineer all information given to them by the manufacturer or supplier prior to approval for furnishing and installing any such material.

B. Samples

1. The Contractor shall obtain from the drainage media suppliers and submit to the Engineer for approval, within 3 weeks after award of the contract, samples of the proposed synthetic drainage media materials.

C. Installation And Repair Recommendations

1. The Contractor shall submit to the Engineer for approval, within 3 weeks after award of the Contract, full and complete installation shop drawings showing at a minimum: layout of the synthetic drainage media system, details of joining the panels, and details for anchorage of this material. The Contractor shall also submit the manufacturer's recommended installation procedures, including placement and joining.

D. Laboratory test results shall be submitted as the Work progresses.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be delivered to the site only after the required submittals have been approved by the Engineer. Storage and handling of the materials shall conform to the manufacturer's recommendations and shall be done in such a manner as to prevent damage to any part of the Work or the material itself. The Contractor shall provide labor and equipment to properly unload material upon arrival at site. The material shall be stored in a reasonably level, well-drained, smooth area that is away from brush, poison oak or ivy, oil, grease, or fuels, and in an accessible area for inspection. Individual pieces or bundles shall be stored with safe walking space and clearance between them to allow full view for inspection purposes. To prevent ultraviolet degradation of the drainage composite geotextile, the protective wrapper on each drainage composite roll shall not be removed until the material is ready for installation.

**PART 2 MATERIALS****2.01 DRAINAGE NET**

- A. The drainage net component of the drainage composite shall consist of high-density polyethylene and have the minimum physical properties specified in Table 06030-1.
- B. Drainage net shall be tested by the manufacturer prior to shipment to ensure that the physical and mechanical properties of the finished product are in accordance with these Specifications. Properties tested, test methods, and required values for drainage net are presented in Table 06030-1. Test frequency shall be one of each test in Table 06030-1 for every 40,000 ft<sup>2</sup> of drainage net produced for this project or as noted. Planar transmissivity shall be tested twice on actual material produced for this project under the conditions described in Table 06030-1 and the results submitted to the Engineer for review and approval prior to material installation. Results of each test shall include a plot of transmissivity versus confining pressure.

Table 06030-1

Physical Properties of Drainage Net<sup>1</sup>

Property	Test Method	Required Minimum Value	Unit
Density (with Carbon Black)	ASTM D1505	0.935	g/cc
Carbon Black Content	ASTM D1603	2.0	%
Thickness	ASTM D5199	160	mils
Melt Index	ASTM D1238	<1.0	g/10 min
Tensile Strength (Machine Direction)	ASTM D5034/5035	25	lb/in
Tensile Strength (Trans. Direction)	ASTM D5034/5035	15	lbs/in
Transmissivity (Tests as Outlined Below shall be Performed) <sup>4</sup>	ASTM D4716	$5.08 \times 10^{-4}$ ( $i = 0.27 @ 500, 1,000,$ and 2,000 psf)	m <sup>3</sup> /sec-m
Ply Adhesion <sup>5</sup>	ASTM D751	1	lb

<sup>1</sup> Required Values are Minimum Average Roll Values.

<sup>2</sup> No foaming agents shall be used in the manufacturing process of the drainage nets.

<sup>3</sup> Drainage composites shall be composed of a geonet meeting the requirements of this Specification, and overlain and underlain by a nonwoven needlepunched geotextile. The nonwoven geotextiles will be heat-bonded to the geonet. The physical property requirements of the filtration geotextiles are provided in Section 06020.

<sup>4</sup> Tests to be performed for  $i=0.27$  shall include: a single layer of drainage composite sandwiched between two layers of infiltration layer soil compacted to 95% DOC.

<sup>5</sup> Drainage composite only.

2.02 DRAINAGE COMPOSITE

- A. The drainage composite shall be fabricated of three (3) layers, utilizing 6 oz/yd<sup>2</sup> nonwoven geotextile (min.) as the top and bottom layer of the drainage net. The layers shall be heat-bonded or laminated together to form one material. All edges of the drainage net shall be enveloped by the geotextiles to preclude the potential for intrusion of foreign material into the net. The drainage net shall conform to Subsection 2.01.
- B. The nonwoven geotextiles used for drainage composite manufacture shall conform to Section 06020 of these Specifications. Properties tested, test methods, required values and test frequency shall be as set forth in Section 06020. The ply adhesion of the geotextiles to the drainage net shall be evaluated (both sides) in accordance with ASTM D751 at a frequency of 1 test for every 40,000 ft<sup>2</sup> of drainage composite produced for this project. A minimum of 1-pound per inch is required for ply adhesion of the geotextiles to the drainage net.

2.03 DRAINAGE COMPOSITE TIES

- A. The drainage composite ties shall be heavy-duty, high-strength polymer (nylon) braid ties. They shall be brightly-colored (in contrasting color to the drainage media) for easy inspection.

**PART 3 EXECUTION**

3.01 INSTALLATION RESPONSIBILITY

- A. The Contractor shall be responsible for installing the drainage media and all components and details associated with these materials.

3.02 DRAINAGE MEDIA PLACEMENT

- A. The drainage media shall be laid out and installed by trained technicians in accordance with the applicable shop drawings approved by the Engineer. The Engineer's approval of the shop drawings does not relieve the Contractor of their responsibility to properly install the drainage media materials. Drainage media shall be installed by trained personnel of the Contractor or their subcontractors. The Contractor and/or their subcontractors shall be certified by the drainage media manufacturers as accepted material installers.
- B. The drainage media within the cover system shall be installed to the limits shown on the Drawings after the underlying subgrade material has been installed and accepted. The drainage media shall be anchored as indicated on the Drawings and rolled down slope (machine direction parallel to slope). Rolling of drainage media across slopes shall not be permitted.
- C. Adjacent panels shall be overlapped a minimum of 4 inches and securely fastened together with ties at a maximum of 10-ft intervals. Drainage composite geotextiles shall be overlapped a minimum of 6 inches and seamed. Seaming shall be by sewing, or other Engineer-approved means. Cross-slope seams or end-of-panel seams shall be overlapped a minimum of 6 inches and offset a minimum of 5 ft between adjacent roll ends and securely fastened together with ties at a maximum of 2-ft intervals.

3.03 COVER SOIL PLACEMENT

- A. Infiltration layer soil shall be placed from the toe of the slope moving in a generally upward direction. Because of site restraints it may not be possible in some locations to move up slope. In such locations soil may be placed across the slope in an upwardly moving direction. Soil should not be pushed in a downward direction.

END OF SECTION

**Attachment B**  
**Construction Plan for the LASO TA-73 Airport Landfill**



NW-ID-2004-001  
Revision 23

# **CONSTRUCTION PLAN FOR THE LOS ALAMOS SITE OFFICE TA-73 AIRPORT LANDFILL**

~~June 2005~~ April 2006

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**DOCUMENT APPROVAL PAGE**Document Number: NW-ID-2004-001Revision: 32Document Title: Construction Plan for the Los Alamos Site Office TA-73 Airport Landfill**Approval Signatures**

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## 1.0 INTRODUCTION

This Construction Plan describes methods and protocols that North Wind Inc. (NWI) will use to manage construction activities at the U.S. Department of Energy (DOE) Los Alamos Site Office (LASO) Technical Area (TA)-73 Airport Landfill, henceforth referred to as the Airport Landfill project. The Construction Plan provides background information and a summary of planned construction activities. The plan also describes operation, maintenance, and monitoring requirements during the construction and post-construction phases, and the training and certification requirements.

## 2.0 SITE DESCRIPTION AND OPERATIONAL HISTORY

The site description and operational history are documented in the Los Alamos National Laboratory (LANL) Voluntary Corrective Measure Plan (LANL 2002).

The Airport Landfill consists of two solid waste management units (SWMUs), 73-001(a) and 73-001(d). SWMU 73-001(a) is an inactive municipal landfill, hereinafter referred to as the main landfill. SWMU 73-001(d) is an inactive debris disposal area (DDA), hereinafter referred to as the DDA. Both SWMUs are inactive and are located within TA-73 on DOE property adjacent to the Los Alamos Airport, as shown in Figure 2.1-1 (see Section 12). The main landfill is east of the existing airport hangars and the DDA is north and east of the end of the runway. Figure 2.1-2 (see Section 12) shows the location of the SWMUs in TA-73.

In 1943, DOE began using the hanging valley north of the airport runway as the main landfill. Garbage was collected twice a week from LANL and Los Alamos and burned on the edge of the hanging valley. Heavy equipment was then used to push the burned residues and ash into whichever landfill disposal area was being used at the time. This intentional burning ceased in 1965 when Los Alamos County (LAC) assumed operation of the landfill. The county continued to operate the landfill until June 30, 1973.

The DDA was used from 1984 to 1986 to bury debris excavated from the western portion of the main landfill. This material was excavated and replaced with clean fill to prepare the western portion of the landfill for the construction of airplane hangars and tie-down areas. Since the wastes placed in the DDA came from the main landfill, both areas contained similar types of debris. In 1986, the DDA was covered with soil and hydroseeded.

## 3.0 SCOPE OF WORK

The project consists of designing and constructing an appropriate cover over the main landfill and repairing the existing soil cover over the DDA. Construction activities on the main landfill are complicated by the steep embankments on the north and east sides of the debris area and its proximity to the active county airport. Construction activities will include redistribution of waste; building retaining walls at the base of the east slope; installation of a gas collection system below a Modified Asphalt Technology for Waste Containment (MatCon™) asphalt surface, which includes fill and grading to accommodate future airport expansion; and construction of high strength concrete pads to serve as foundations for future airport hangars and aircraft tie-downs. Final design drawings and specifications for both the main landfill and DDA are provided in the Remedy Design Work Plan for LASO TA-73 Airport Landfill (North Wind 2005a).

## 4.0 CONSTRUCTION MANAGEMENT

This section describes construction management protocols that will be employed to ensure that activities described in the Work Plan are completed safely, within budget, and on schedule. Additional project management information is provided in the Project Management Plan (PMP) for the LASO TA-73 Airport Landfill (North Wind 2005b).

#### **4.1 Project Organization**

NWI is the prime contractor for this project. Weston Solutions, Inc. (WESTON), a NWI subcontractor, is a significant partner on the project providing design and field quality control (QC) support. Although not subcontracted to NWI, a number of specialty vendors will be contracted by DOE and will be overseen by NWI to ensure that their components are installed according to the approved design (e.g., it is assumed that Wilder Construction Company will install the proprietary low permeability MatCon™ cover). The DOE-LASO Environmental Management Program is the customer for the project. Further details regarding the project organization are provided in the PMP (North Wind 2005b).

#### **4.2 Training and Certification**

Training and certification of key personnel will be commensurate with assigned tasks. In general, training will be conducted according to the PMP (North Wind 2005b), Project Quality Plan (PQP) for the LASO TA-73 Airport Landfill (North Wind 2005c), and the Health and Safety Plan (HASP) for the LASO TA-73 Airport Landfill (North Wind 2005d). At a minimum, project personnel completing construction activities will be required to read and understand the project documents, including the Work Plan and related documents, and will comply with training requirements of the HASP.

During construction, the Project Manager (PM) may identify additional training and/or certification necessary for the successful completion of the project. This training may take the form of on-the-job training, additional required reading, documented classroom learning, or hands-on demonstration of required skills.

All required training will be documented and tracked as provided in Quality Assurance Procedure (QAP)-10-021, Indoctrination and Training. The following subsections describe training and certifications necessary to perform key functional activities.

##### **4.2.1. Site Access**

All personnel entering the site are required to receive DOE "Get Employee Trained" training.

##### **4.2.2. Heavy Equipment Operation**

Personnel operating heavy equipment will have demonstrated ability in the operation of the particular equipment and will demonstrate proficiency to the satisfaction of the Construction Manager (CM). Truck drivers transporting landfill material (e.g., borrow soil) will have a Commercial Driver's License.

##### **4.2.3. Health and Safety**

The NWI Corporate Health and Safety Director will be a Certified Industrial Hygienist. Site health and safety officer(s), managers, and site workers will be trained and certified commensurate with activities and associated hazards. Health and safety training and certifications will be specified in the HASP (North Wind 2005d).

##### **4.2.4. Measuring and Test Equipment**

NWI personnel who use measuring and test equipment (M&TE) will comply with QAP-10-121, Control of Measuring and Test Equipment, and will be trained to use the particular device. This may be formal classroom training or may consist of documented on-the-job training. M&TE users will ensure that equipment is calibrated to nationally recognized standards (e.g., National Institute for Standards and Technology) and that calibration is current. If no nationally recognized standards exist, the basis for calibration will be documented. M&TE users also ensure equipment is of the proper type, range, accuracy, and that it is uniquely identified and traceable to its calibration date. Geotechnical laboratory personnel will comply with requirements of their company quality program.

#### **4.2.5. Surveyors and Engineers**

Surveyors and engineers will be licensed in the State of New Mexico. The Construction Quality Control Plan (CQCP) for the LASO TA-73 Airport Landfill (North Wind 2005e) provides additional details.

#### **4.2.6. Auditing**

NWI personnel conducting internal audits or field surveillances will be trained in accordance with QAP-10-022, Certification of Personnel, and QAP-10-181, Quality Audits.

#### **4.3 Reporting**

The CM will provide weekly updates on construction progress to the PM using progress reports from the Site Superintendent (SS). The update will detail construction progress and activities for the week, description of any nonconformances, weekly crew size, possible health or safety concerns, and other significant work tasks during the week. The PM will forward this information to the DOE-LASO Contracting Office Representative (COR) following receipt of the update. Additional reporting details are found in the PMP (North Wind 2005b) and the CQCP (North Wind 2005e).

#### **4.4 Schedule**

The construction schedule is provided in Appendix B.

### **5.0 CONSTRUCTION ACTIVITIES**

The following subsections describe construction activities at the main landfill and DDA. This narrative provides a description of how the final remedy will be implemented at the Airport Landfill. Detailed requirements of the work are defined in the specifications and drawings of the Work Plan (North Wind 2005a). In the case of any discrepancies, the drawings take precedence over the specifications, and specifications take precedence over the project documents. The only exception is the HASP (North Wind 2005d). Requirements of the HASP shall be implemented without modification regardless of information provided in specifications, drawings, or other documents.

#### **5.1 Procurement**

General methods for procurement of materials and services are addressed in the PQP (North Wind 2005c), including methods for procuring quality-affecting materials and services. Purchase order documents and subcontracts will be prepared for each vendor supplying materials and for subcontractors supplying services, with the terms of the purchase clearly defined. Delivery of materials and services will be scheduled based on project sequence to minimize storage and risk of loss or damage.

Materials to be purchased include, but are not limited to, riprap, aggregates, concrete, low permeability soils, geosynthetics and geotextiles. Material specifications and QC requirements are provided in the CQCP (North Wind 2005e) and the Construction Specifications for LASO TA-73 Airport Landfill (North Wind 2005f).

Services to be subcontracted by NWI include design and field QC services to be provided by WESTON and geotechnical testing services to be provided by a local laboratory. Local suppliers will also be retained (as necessary) for equipment rentals, surveying, electrical and plumbing work, equipment maintenance, fencing, hydroseeding, construction waste disposal, and other miscellaneous services.

#### **5.2 Mobilization**

Mobilization activities include transporting required equipment and personnel, construction of access roads, installation of field trailers, locating underground utilities, and taking delivery of initial materials.

### 5.2.1. Assemble Construction Documents

A complete set of project documents, including the Work Plan and related documents, will be kept in the office trailer for planning and scheduling. Another set will be provided to the SS for his working use. A set of final construction drawings will be located in the office trailer so that changes can be readily red-lined to facilitate development of as-built drawings. The project schedule will be displayed on the wall for quick reference and weekly progress tracking. Project documents will be controlled in accordance with NWI QAP-10-061, Document Control. Forms and records generated during the course of the project will be completed, filed, and managed as described in the QAP-16, Control of Quality Records.

### 5.2.2. Conduct Construction Readiness Assessment

A construction readiness assessment will be conducted in accordance with Project Work Instruction (PWI)-4201-004, Readiness Assessment and the CQCP (North Wind 2005e). A readiness checklist will be completed that provides formal documentation that the project is ready to start, and may be modified to account for the final design requirements. At a minimum, the checklist will include:

- Safety basis documented,
- Notice to Proceed (NTP) issued,
- Plans and procedures prepared, issued, and available onsite,
- Training conducted and documented,
- Equipment procured, inspected, and approved for use,
- Permits obtained,
- Underground utility survey completed and utilities marked,
- Support facilities installed and useable,
- All stakeholders notified, including LAC Airport,
- Security measures (including signage) implemented,
- Subcontractors procured and available, as required,
- Storm Water Pollution and Prevention Plan (SWPPP) for LASO TA-73 Airport Landfill (~~SWPPP~~) (North Wind 2005g) implemented, including filing of Notice of Intent with the U.S. Environmental Protection Agency (EPA),
- Material storage area developed,
- Project record keeping system in place,
- Initial site photographs taken, and
- Required wage and employment signage posted.

### 5.2.3. Conduct Pre-construction Meeting

Prior to the start of construction activities, a meeting will be conducted with site workers to review the project objectives and requirements, workmanship standards, and site-specific safety requirements.

Non-routine workers such as truck drivers and day laborers will not attend this pre-construction meeting. Instead, they will be provided with a safety briefing to address potential hazards that they may be exposed to as described in the HASP (North Wind 2005d). At a minimum, the pre-construction meeting will address the following topics:

- Introduction of project team,
- Organization chart and lines of authority and communication,
- Project scope and objectives,
- Identification of subcontractors and suppliers,
- Use of equipment and facilities,
- Project schedule and work hours,
- Reporting and record keeping requirements,
- Correspondence, including oral versus written protocol,
- Project plans and specifications, and location of documents,
- Workmanship standards,
- Site access and security procedures, particularly regarding Los Alamos Airport,
- Job safety and health, including required training,
- Quality assurance/quality control (QA/QC) procedures,
- Equipment maintenance and daily checks,
- Material handling, delivery, and storage, and
- Temporary utilities, communications, and housekeeping.

#### **5.2.4. Construct Access Roads**

Access roads will be constructed according to Specification 02500, "Gravel Roads" (North Wind 2005f). Primary haul routes to the DDA and main landfill will be established by improving the spur road off of NM 502, as shown in final design drawings. The spur road is accessed through an existing gate at the east end of the runway. This access road will be improved (as necessary) by clearing brush and vegetation to native soils (as required) and adding appropriate road base. After the base course is finished, a gravel surface will be applied. This road will be built with one lane but will include turn-outs for two-way traffic. The access road will be left in place after landfill construction activities for airport use and future maintenance work. Traffic control associated with use of the access road for delivery of borrow material is discussed in Section 11.9.

#### **5.2.5. Install Temporary Field Trailers**

Two temporary field trailers and a tool van will be installed at the project staging area located at the northwest corner of the site near the east hangar. One trailer will be designated as the field office and will have adequate desk space for three people. This trailer will also be used to file project documents, including records. The second trailer will be designated as a lunch/break room and will be used for safety and progress meetings with the crew. The tool van will be used for storage of hand tools, safety equipment, and other miscellaneous equipment.

Temporary electrical utilities will be run to both trailers and phone line(s) will be installed to the office trailer. Drinking water and potable hand washing water will be available in both trailers.

### **5.2.6. Survey DDA and Main Landfill**

A New Mexico licensed surveyor will be subcontracted for all surveying. Control points will be established from local elevation and coordinate datum. These controls will be permanent monuments used throughout construction and post-construction for any needed topographic, radial stakeout, and benchmark elevations. Monuments will be protected against damage, defacing, or loss. All surveying will be conducted per Specification 02005, "Surveying."

A topographic map will be developed prior to construction. Baseline cross-sections identified on the grading plan will be marked on a 50-ft grid interval. Cut/fill and finished grade stakes will be placed and referenced to the grid. Intermediate grade checks between grid points may be performed, as needed. Initial staking will include angle points for fence relocation at the northeast end of the main landfill and centerline cut and fills for proposed access routes.

### **5.2.7. Mobilize Heavy Equipment to Site**

Equipment will be unloaded in the staging area, east of the hangars and asphalt tarmac. Off-road equipment will be delivered to the site by transport, and U.S. Department of Transportation (DOT)-compliant equipment will be driven to the site. At a minimum, the following equipment is expected to be used during construction activities:

- D-7 or D-8 dozer (2 units),
- 4,000-gal water truck,
- 5- to 7-cubic yard (cy) front-end loader,
- 65,000-lb tracked excavator,
- Grader,
- Roller Compactor,
- 10-ton smooth drum vibratory roller, and
- Harrow rake or disk.

When in use, heavy equipment will be inspected initially and then on a daily basis thereafter.

### **5.2.8. Identify Underground Utilities**

Underground utilities will be located by contacting New Mexico One Call Systems Inc. at 1-800-321-2537 at least five (5) days prior to excavation. The utility survey area will include proposed excavation areas with a 200-ft buffer, and will be marked on the ground with white paint or stakes. Utilities identified within the survey area will be marked on the ground with the colors noted below, as recommended by One Call Systems. Utilities will then be exposed at 100-ft intervals throughout the survey area by potholing with hand shovels or a hydraulic unit. To avoid confusion and misidentification, the following colors are reserved and are not to be used for other activities (i.e., surveying):

- Blue – water,
- Green – sewer,
- Orange – communications,
- Red – electric, and
- Yellow – gas.

The location of identified utilities will be transferred to a site base map and utility markings will be repainted as necessary. These measures will protect against the need for re-surveying if the initial markings are obliterated during construction.

### **5.3 Site Preparation**

The following sections identify activities that will be performed before excavation activities commence at the main landfill or DDA.

#### **5.3.1. Install Fencing**

A new section of perimeter chain link fence will be installed along and outside the toe of the east slope and along a portion of the north side of the main landfill, as described in the project drawings. Fencing will be installed by a subcontractor, as specified in Specification 02980, "Chain Link Fence."

After the new fence is installed, the existing fence through the middle of the east slope will be removed. Any fencing in the construction area temporarily opened will be closed and secured at the end of the workday. These measures will ensure site security and help control access to the airport at all times. The removed fencing material will be recycled or sold for salvage, if possible.

#### **5.3.2. Install Storm Water Controls**

Prior to earth-disturbing activities at the DDA or main landfill, erosion and runoff controls identified in the SWPPP (North Wind 2005g) and final design documents will be installed. This will include, as necessary, installation of silt fences, drainage channels and check dams, sediment traps, inlet filters, culverts, and berms. All storm water controls will be installed according to Specification 02930, "Erosion and Sediment Control."

Silt fences will be installed by anchoring the bottom of the silt fence in a trench dug with a small trencher and then backfilling the trench. Drainage channels will be constructed with a dozer or grader blade and compacted with the wheeled loader. Check dams and sediment traps will be installed with a small backhoe excavator. An excavator will dig inlet filter and culvert beds to grade and the components will be installed by heavy equipment. Berms will be constructed using imported gravel material and compacted by wheel rolling or tamping.

#### **5.3.3. Abandon Monitoring Wells**

Some of the existing soil gas monitoring wells in the main landfill will be abandoned. Well casings will be stripped of any readily removable instrumentation and tubing prior to closure. If any stainless steel vapor port tubing must be abandoned, the tubing will be cut off 3 to 4 ft below grade and the top few inches bent over to pinch the tubing closed. Casings will be sounded with a tag line (assuming that no instrumentation remains in the well) and the amount of bentonite required for backfill will be estimated based on well diameter and depth. Well casings will be backfilled with bentonite powder or chips to displace any methane that may be present. As the well is backfilled, the depth of the well will be continually sounded with the tag line to verify that bridging is not occurring. If bridging becomes an issue, a tremie pipe may be used.

After backfilling, the casing will be cut off approximately 3 to 4 ft below final grade. Approximately 1 ft of bentonite will be placed over the cut-off casing and the remaining excavation will be backfilled with soil.

Appropriate health and safety monitoring will be conducted during abandonment to detect the presence of possibly flammable gases (e.g., methane). If such gases are present, they will be allowed to fully vent before cutting off the casing. A hot work permit will be obtained prior to using gas cutting torches.

#### **5.3.4. Abandon/Relocate Utilities**

It may be necessary to abandon or relocate some existing utilities. The utility owner will be contacted and details will be discussed for the desired relocation or abandonment. Procedures to abandon or relocate the utility will be defined and approved prior to performing the work. A formal request will be made for the utility to be shut down before excavation.

The relocated utility will be replaced according to the utility owner's installation specifications, as appropriate. The HASP (North Wind 2005d) provides health and safety precautions if an unidentified utility is cut or ruptured.

#### **5.4 Construction of DDA**

The DDA will be constructed to include a minimum of 12 in. of topsoil over existing waste, a final grade of about 3% for promote runoff, and vegetation with native plants. Previously completed penetration testing identified the depth to waste and amount of cover soil required to meet the 12-in. minimum. This approach minimized disturbance to portions of the DDA with adequate soil cover, and will minimize costs for imported soil and preserve existing vegetation.

##### **5.4.1. Pre-Construction Survey**

Based on results of penetration testing, grade control and final fill elevations at the DDA will be laid out on 50-ft grids or smaller based on the size of the area requiring topsoil. Intermittent grade checks may be performed, as necessary. Surveying will be conducted per Specification 02005, "Surveying."

##### **5.4.2. Rough Regrade**

Brush or trees will be grubbed only from those areas requiring additional topsoil and will be chipped onsite and stockpiled for mixing with topsoil. A dozer will be used to shape portions of the DDA to achieve the required slope. Shaping will be limited to filling depressions and voids and establishing a surface that can be driven on by belly dump trucks delivering topsoil.

##### **5.4.3. Add Topsoil**

Topsoil for the DDA final cover will be delivered on site by truck, and the topsoil will be dumped where needed. To the extent possible, trucks will not be driven on exposed waste or on undisturbed areas of the DDA. Topsoil will be watered and leveled by a dozer to the required elevation. The final contour will be graded with a dozer or motor patrol, filling voids and feathering edges of material to match existing contours.

##### **5.4.4. Revegetation**

Revegetation of the DDA will proceed per Specification 02932, "Seeding, Mulching, and Restoration." Hydroseeding is preferred because of the short duration of the project and the large area to be revegetated. Temporary erosion controls will be implemented so that the seed, fertilizer, and mulch can be applied to the DDA under one mobilization. Compacted or tracked topsoil will be loosened before hydroseeding. All areas of the project are accessible to typical hydroseeding equipment capable of spraying over 100 ft from the truck and through the use of hoses to access any remote locations. Completely covering the disturbed areas with a tackifier and hydroseed will help with dust control until vegetation has been established. A temporary sprinkling system or watering by truck may be required until vegetation has been established.

##### **5.4.5. Survey Final Grade**

Final DDA grades will be surveyed to confirm that the final elevation matches design specifications and to provide measurements for as-built records. All surveying will be conducted per Specification 02005, "Surveying."

#### **5.5 Construction of East and North Slope of Main Landfill**

Construction of the east and north slopes of the main landfill generally consists of salvaging existing soil cover, excavating existing landfill waste to establish a nominal 3H:1V to 4H:1V grade, constructing retaining walls on the east slope, installing a low permeability soil layer, installing geotextile/geosynthetic drainage composite, and applying a riprap armor cover/Geoweb surface layer with vegetated topsoil completion.

### **5.5.1. Pre-Excavation Survey**

The east and north slopes of the main landfill will be slope-staked to delineate the limits of earthwork and breakpoints for the toe, benches, and top of cuts. Reference stakes will be set to allow the operators to monitor and control the grades during excavation. All surveying will be conducted per Specification 02005, "Surveying."

### **5.5.2. Salvage Soil**

Existing soil will be salvaged to the extent possible from the main landfill slopes as well as the central portion of the landfill. Cover soil from the northern half of the main landfill and the east slope will be removed by dozing into an elongated pile or windrow extending east to west, approximately in the center of the landfill. Once the northern half is brought to grade with the relocated waste, the salvaged soil can be readily dozed over the debris and incorporated into the final cover. A similar process will be used on the southern half of the main landfill.

### **5.5.3. Relocate Waste**

Excavation at the main landfill will be conducted in accordance with Part 3.01 of Specification 02200, "Earthwork," and Specification 02266, "Landfill Waste Placement Procedures." The excavation and relocation of landfill waste will be completed with a combination of dozers, loaders, and excavators. Dozers will excavate in layers and establish the proper slope. A berm will always result on the outside face of the slope, which will act as a catch for rolling debris or rock. As waste is excavated, it will be pushed to the lip of the slope(s). From there, another dozer will push the waste to its final destination. The exception is waste destined for the western portions of the landfill (i.e., more than about 300 ft from the top cuts of the slopes), which will be shuttled with a loader.

An excavator will be used to excavate the lowest portions of the east slope to establish grades for the retaining wall construction. Limited portions of the north slope may also require use of the excavator. The excavated debris will be lifted up the slope as far as possible with the excavator and then dozers will move the material to the top of the landfill and set it aside for other equipment to take to the fill locations.

Waste will be relocated first to the northern half of the main landfill, where it will be covered with salvaged soil. After the northern half is filled and covered, existing cover soil will be salvaged from the southern half of the main landfill and the process repeated.

During waste excavation and relocation, dust control will be provided continuously with the water truck. Portions of the slope that cannot be reached by the water truck will be sprayed manually with a hose from the truck. Some types of relocated municipal solid waste (e.g., paper products, loose plastic, and ash) may be an airborne nuisance during windy conditions. Other waste may be considered hazardous to the general public. These materials will be contained by covering them with soil, rock, matting, or other suitable means (i.e., salvaged chain link fence). The CM will determine when and if these controls are necessary.

### **5.5.4. Construct Retaining Walls**

The retaining walls will be constructed according to Specification 03300, "Cast-in-Place Concrete" and Specification 02273, "Mechanically Stabilized Earth Retaining Walls." An access ramp will be constructed to provide access to the toe area of the slope for the excavator. The excavator will then be used to create the subgrades for construction of retaining wall number one (concrete gravity wall).

Once retaining wall number one has been poured, forms removed, and the concrete has cured to specification, the area up-slope from the retaining wall will be backfilled with select fill and compacted with a small roller or manual compactor. This area then serves as the bench upon which the number two retaining wall will be constructed.

Once retaining wall number two has been constructed, the area behind the top of retaining wall number two will serve as a bench for the construction of retaining walls numbers three and four. Retaining walls numbers three and four are much shorter in length and will be constructed above the north and south ends, respectively, of retaining wall number two.

#### **5.5.5. Establish Subgrade and Survey**

The subgrade will be prepared in accordance with Part 3.02.B of Specification 02200, "Earthwork." Subgrading will be completed with the dozer to create the rough template for the two proposed benches and to better define the required 4H:1V slope, as detailed in the design drawings. Salvage soil or other material will be added to provide a subgrade suitable for installation of the cover layers.

Once debris is excavated from the east and north slopes, surveys of the slope faces will be completed for as-built records and to support eventual cover depth. Elevation and the limits of the debris will be documented by the surveyor.

#### **5.5.6. Construct Infiltration Layer Test Pad**

A test pad for the infiltration layer (soil cover) will be constructed to determine the acceptability of the imported cover material, processing of the imported cover material, placement, and compaction methods to produce a low permeability soil cover that meets requirements stated in Specification 02200.

The test pad will consist of a nominal 18 in of low permeability soil installed in ~~two 9 in~~ three nominal 6-in lifts (compacted thickness) in accordance with Specification 02200, "Earthwork". All construction activities related to the test pad will be carried out as described in Section 5.5.76 (Install Infiltration Layer).

The test pad will be constructed so that it is at least four times wider than the widest piece of construction equipment to be used for the full-scale cover construction, typically 30 to 50 ft. This is required to ensure a sufficient representative area for testing. The test pad will be long enough for compaction equipment to reach normal operating speed within the test area, typically 50 to 100 ft.

The test pad will be constructed within the limits of the Airport Landfill in an area representative, to the extent feasible, of the conditions to be encountered on the north and east sides of the landfill. The test pad will be constructed on a slope approximating the planned finished slope (4H:1V). The pad will be located in a well drained area to prevent surface water intrusion or saturation of the test pad soil. The test pad location will be cleared and grubbed, and the subgrade will be compacted in the same manner as planned for construction of the soil landfill cover in accordance with Specification 02200, "Earthwork".

Construction of the test pad will validate the following:

- The compaction equipment type, configuration, and weight.
- The method used to break down clods before compaction and maximum resulting clod size.
- The method used to control and adjust moisture content, including equilibration time.
- The optimum speed of compaction equipment traveling over the test pad.
- Record weather conditions including ambient temperature, humidity, wind speed, and wind direction.
- Moisture content of soil at time of compaction
- Lift thicknesses (compacted), compaction procedures, and number of passes for proposed compaction equipment.
- Dry unit weight achieved and measured by field density testing.
- Permeability of compacted test fill material using ASTM D6391 or ASTM D5093.

Construction methods will be modified as needed to meet the required compaction. After all testing has been completed and approved, the material in the test pad can be used by the Contractor for cover construction provided that the material satisfies the requirements of Specification 02200. Any test pad area that does not meet the requirements of Specification 02200 will be removed.

#### **5.5.6.5.5.7. Install Infiltration Layer**

The infiltration layer will be applied to the north and east slopes of the landfill. The infiltration layer consists of a nominal 18 in. of low permeability soil. The infiltration layer will be constructed in ~~two-three~~ nominal 6-in lifts (compacted thickness) in accordance with Specification 02200, "Earthwork." Material for the first lift will be ~~delivered and dumped at the top of the slopes and a dozer will push it downward onto the slopes. Once~~ roughed into place over the entire slopes and, compaction will be obtained compacted with a sheepsfoot roller pulled behind a dozer. Water will be applied with a hose and nozzle capable of spraying from the top of the slopes to the toe.

The flexible membrane liner (FML) and geosynthetic drainage composite layer will be installed over the first soil lift as described below. The next two 6-in soil lifts will be installed over the geosynthetic drainage composite layer and compacted.

After compaction, each lifts will be scarified to a depth of several inches, with an appropriate attachment (e.g., harrow rake or disk) pulled by a dozer. Scarification provides a good binding surface between lifts and also provides a good binding surface for the geotextile.

#### **5.5.8. Install Drainage Composite Layer**

After the first 6 inches of the infiltration layer have been installed and properly compacted, a drainage composite will be installed. The drainage composite layer will serve to direct infiltrating water down slope and off of the landfill.

The compacted surface will be inspected to ensure that it is free of sharp objects or debris of any kind which could potentially damage the drainage composite. Rolls of drainage composite will be deployed as described in Specification 06030, "Drainage Composite". Drainage composite rolls will be deployed in the general direction of the maximum slope. Deployment equipment will be operated so as not to damage the underlying infiltration layer subgrade. The upper end of the drainage net will be placed in an anchor trench as per drawings and specifications. Sufficient sandbags will be placed on leading edges of the panels to prevent wind from lifting and moving the panels. An extra layer of drainage composite may be required at the intersection of any two side slopes to cover the area where the panels are staggered.

Drainage composite panels shall be overlapped and fastened together as per Specification 06030. Roll ends shall be tied every 6 inches as per Specification 06030.

The drainage composite will be covered with two six inch lifts of properly compacted infiltration layer soil. Heavy equipment shall not be driven onto the installed drainage composite until it has been covered with soil. The drainage composite will be covered as soon as possible, in a manner that does not damage the drainage composite.

#### **5.5.9. Install Geoweb**

A layer of six inch Geoweb will be installed over the top course of the compacted infiltration layer to prevent topsoil erosion and to encourage plant growth. Each section of Geoweb will be installed by expanding the section and staking it down according to Specification 02340, "Soil Stabilization System". Stakes from 18 to 24 in. in length may be used. Stakes may penetrate the underlying drainage composite layer without affecting the function of the drainage composite.

The Geoweb will be trimmed to fit around outcrops according to specification 02340. Where bedrock outcrops may contribute to rapid runoff rip-rap will be placed adjacent to outcrops to control erosion as required.

Geoweb sections, with or without tendons, will be anchored in accordance with specification 02340. Top soil will be placed in the Geoweb according to Specification 02340. Vegetative cover will be installed in the Geoweb in accordance with Specification 02932, "Seeding, Mulching, and Restoration."

#### **5.5.7. Add Geotextile and Riprap**

Geotextile will be installed over the infiltration layer as a protective liner between the infiltration layer and riprap per Specification 06020, "Geotextiles." After the geotextile is placed, riprap will be installed in accordance with Parts 2.01 and 3.01 of Specification 02270, "Channel Protection." Riprap will be placed starting at the top of the MSE retaining wall and proceeding upslope to the interface of the MatCon™ cover. The riprap will be lightly compacted with dozer tracks. It is anticipated that minimal dust control will be required for the riprap placement.

#### **5.5.8.5.5.10. Survey Final Grade**

Final grades will be surveyed to confirm that final east and north slope elevations match the design specifications and provide measurements for as-built records. All surveying will be conducted per Specification 02005, "Surveying."

### **5.6 Construction of Main Landfill Cover**

The main landfill cover will consist of compacted structural fill, an aggregate base course, gas collection system, and MatCon™ pavement. The following subsections provide details regarding the main landfill cover construction.

#### **5.6.1. Establish Subgrade and Survey**

Prior to placing any structural fill, the subgrade will be prepared in accordance with Part 3.02.B of Specification 02200, "Earthwork." Vegetation, root matter, and interim cover soil topsoil will be removed and all areas will be proof-rolled on-grade using a heavy-duty roller. If needed, additional salvage soil or other suitable material will be added over the top of the main landfill to provide a subgrade suitable for installation of the structural fill. Subgrading will be completed with the dozer to create the rough template for the variable top slope, as detailed in the design drawings.

After the subgrade is established, surveys of the main landfill will be completed for as-built records and to support eventual cover depth. Elevation and the limits of the debris will be documented by the surveyor. Grade hubs will be placed on a 50-ft grid pattern to achieve lift elevation.

#### **5.6.2. Relocate waste within extent of final cap**

Excavation at the main landfill to relocate waste within the final cap extent will be conducted in accordance with Part 3.01 of Specification 02200, "Earthwork," 02260, "On-Site Waste Excavation and Transport", and Specification 02266, "Landfill Waste Placement Procedures." All waste in the south and west perimeter areas west of the landfill cap between the edge of the cap, as shown on Drawings 2001 and 2002, and the edge of the existing pavement will be relocated within the limit of the final cover. All waste will be relocated such that the limit of waste will be offset within the final cover a minimum distance of 1-ft. Test pits shall be excavated to determine the horizontal limits of waste as described in Specification 02260.3.01.C.

Excavated areas will be backfilled with existing/relocated interim fill in accordance with Specification 02200. The existing pavement, trench drain and storm sewer will be protected during this activity. The excavation and relocation of landfill waste will be completed with a combination of dozers, loaders, and excavators. During waste excavation and relocation, dust control will be provided continuously with the water truck. Some types of relocated municipal solid waste (e.g., paper products, loose plastic, and ash) may be an airborne nuisance during windy conditions. Other waste may be considered hazardous to the general public. These materials will be contained by covering them with soil, rock, matting, or other suitable means (i.e., salvaged chain link fence). The CM will determine when and if these controls are necessary.

**5.6.2.5.6.3. Install Structural Fill Layer**

Structural fill material will be placed on the subgrade on the slopes and top of the main landfill as necessary to support construction of the cover systems. Placement shall be in accordance with Part D of Specification 02200, "Earthwork."

The structural fill will initially be placed at the east end of the landfill and pushed onto the landfill with a dozer, working the material to the west. The structural fill layer will be constructed with multiple lifts to accomplish required density. As the materials are being placed and compacted to the west, the trucks will also continue to move west with each delivery. This procedure will keep the trucks on clean compacted structural fill at all times. In general, after the first lift is placed, the procedure will be reversed and the material will be worked from west to east using the procedure described above.

As the material is being worked, water will be added by the water truck to control dust and achieve required moisture before compaction. Compaction will be obtained with a vibratory roller. Moisture conditioning and compaction testing will be an ongoing process during each lift. Elastic settlement that may occur during placement and compaction of fill materials will be addressed by increasing the thickness of the materials as required to meet the specified lines and grades for each fill layer.

**5.6.3.5.6.4. Install Aggregate Layer and Off-Gas Collection System**

Following acceptance testing of the structural fill layer, a woven geotextile fabric will be placed on the compacted structural fill. A 6-in. thick (nominal) aggregate base course will then be placed on the geotextile. The off-gas collection system will be constructed within the aggregate base course. The off-gas collection system will consist of a series of 4-in. perforated high-density polyethylene (HDPE) pipes. The perforated piping will run north-south and will connect to a manifold on the north side of the top of the landfill. The manifold then vents to the surface in the northeast corner of the landfill. Installation of the off-gas collection system will be performed in accordance with Specification 02730, "Gas Collection System."

**5.6.4.5.6.5. Install Storm Drain System**

Prior to placement of the interim cover (salvage topsoil), the concrete storm drain system (Specification 02720, "Storm Drain System") will be installed. The series of concrete inlets, manholes, pipes, and cover will be installed utilizing precast materials to the extent possible. Field conditions will be verified prior to ordering precast elements. An excavator and loader will be used for trench excavation, granular material bedding placement, concrete material placement, and backfill. The manholes and pipe will be handled with appropriate attachments and sling devices to prevent damage to the precast material while lifting and setting. Pipe grades and location of associated structures will be checked prior to backfill.

Trench excavation and backfill will be completed as specified in Section 02200, "Earthwork," with trench walls conforming to OSHA trenching standards. Trench shoring or side sloping will be implemented, as appropriate, with field verified grade lines. Manhole structures will be placed on a firm crushed rock base, as referenced in Section 02200.

Construction of the storm drain system will occur after the site surface water controls are in place. As the drain system is built, adjustments and/or tie-ins to the site runoff controls will be made so as not to jeopardize the effectiveness of site runoff controls. Silt screens will be placed around new inlets to avoid excess sediment into the new piping. The system outlets will be placed on competent rock to minimize erosion, as referenced in the design drawings, Sheet 2003 (North Wind 2005a, Attachment A).

**5.6.5.5.6.6. Construct Aircraft Hanger Pad**

To support operations at the Los Alamos Airport, an approximately 190 ft × 48 ft concrete hangar pad will be constructed on the western portion of the new landfill cover. The pad will consist of a steel, reinforced concrete slab poured in place on the off-gas collection layer as subgrade. The slab will have two (2) layers of reinforcing in consideration of the potential for differential settlement. The hangar pad will be constructed and installed in accordance with Specification 03300, "Cast-in-Place Concrete."

Typical aircraft tie-downs to be constructed are shown in Drawing 2024, Hanger Layout, as shown in Attachment A of the Remedy Design Work Plan (North Wind 2005a).

#### **5.6.7. Construct MatCon™ Test Pad**

A test pad for the MatCon™ surface will be constructed to determine the acceptability of the aggregate-binder mix, placement, and compaction methods to produce a low permeability cover that meets requirements stated in Specification 02511, "Hot Mix Asphalt". The test pad will consist of one 4-in lift of MatCon™. All construction activities related to the test pad will be carried out as described in Section 5.6.7 (Install MatCon™ Cover), and in the vendor's construction plan and construction quality control plan.

The test pad will be constructed so that it is at least four times wider than the widest piece of construction equipment to be used for the full-scale cover construction (typically 30 to 50 ft). This is required to ensure a representative area for testing. The test pad will be long enough for compaction equipment to reach normal operating speed within the test area (typically 50 to 100 ft).

The test pad will be constructed within the limits of the Airport Landfill in an area representative (to the extent feasible) of the conditions to be encountered on the upper 2% slope area. The pad will be located in a well drained area to prevent surface water intrusion or saturation of the test pad soil. The test pad location will be cleared and grubbed, and the subgrade will be compacted in the same manner as planned for the construction of the subgrade in accordance with Specification 02200, "Earthwork".

Construction methods will be modified as needed to meet the required compaction. After all testing has been completed and approved, the material in the test pad can be used by the Contractor for cover construction provided that the material satisfies the requirements of Specification 02511. Any test pad area that does not meet the requirements of Specification 02511 will be removed.

#### **5.6.6.5.6.8. Install MatCon™ Cover**

The MatCon™ system is an advanced modified asphalt technology that combines a proprietary binder with specified aggregates. The MatCon™ cover provides a durable surface that is usable by the Los Alamos Airport and still meets permeability requirements for the remedy. Standard asphalt paving techniques are used to install the cover. The MatCon™ cover will be installed in accordance with Specification 02511, "Hot Mix Asphalt," and the vendor's construction quality control plan CQCP and construction plan.

## **6.0 ACCEPTANCE TESTS**

Acceptance testing prior to, during, and after construction of each feature of work is described in the CQCP (North Wind 2005e). A dedicated Quality Control Field Engineer (QCFE) will inspect all aspects of the construction to ensure conformance with approved drawings and specifications. The QCFE will also oversee quantitative testing to be performed by a subcontracted geotechnical laboratory. Preliminary real-time test results will be provided to the SS before proceeding to the next activity to minimize the need for rework.

Critical tests include density measurements of the earthen layers per Specification 02200, "Earthwork;" standard concrete tests for the aircraft hanger per Specification 03300, "Cast-in-Place Concrete;" and compaction, thickness, and permeability of the MatCon™ cover per Specification 02511, "Hot Mix Asphalt."

At the completion of construction, DOE will perform the final inspection and acceptance of the project. NWI will submit a written document stating that the work was performed to project specifications and is ready for a final inspection. Following the inspection, any nonconforming or variant items will be promptly remedied and the final acceptance will then be requested.

## 7.0 DEMOBILIZATION

Demobilization consists of removing temporary facilities and utilities. Equipment will be transported offsite and the staging area will be dismantled. All trash and construction debris will be disposed of. Temporary fencing, cones, lighting, or other controls will be removed.

## 8.0 MEETINGS AND INSPECTIONS

A weekly job site meeting will be scheduled at a recurring day and time so all those involved can schedule accordingly. The meeting will update the past week's progress, planned events for the current week, current issues, health and safety issues, and overall schedule status. Attendees will vary depending on ongoing activities but will generally include a DOE representative, CM, Superintendent, and subcontractor personnel. Meeting minutes will be recorded and distributed. This meeting may be part of planned construction quality control meetings described in the CQCP (North Wind 2005e).

Site inspections may be initiated by DOE, QA/QC needs, HASP (North Wind 2005d) enforcement, or other conditions. Inspections will occur on a random schedule or may occur at decision or hold points. Requirements for site access by non-project personnel (i.e., independent inspectors) are described in the HASP. At a minimum, inspectors and site visitors will be logged in by the SS, briefed on health and safety issues and protocol (e.g., daily tailgate safety briefing), and will be issued appropriate safety gear, as required.

Installed items that may potentially be suspect/counterfeit items (S/CI) will be inspected in accordance with the PQP (North Wind 2005c) and DOE Guide 440.1-6, "Implementation Guide for Use with Suspect/Counterfeit Items Requirements of DOE O 440.1, Worker Protection Management; 10 Code of Federal Regulations (CFR) 830.120; the CQCP (North Wind 2005e) and DOE 5700.6c, Quality Assurance" (DOE 1997). In addition, items used during construction activities that may cause injury or fatalities if failure occurs (e.g., ratchet straps/tie down assemblies, fasteners, bridal slings, or hoisting slings) will also be inspected on a regular basis in accordance with the PQP, the CQCP (North Wind 2005e) and DOE Guide 440.1-6.

## 9.0 QUALITY CONTROLS

Quality controls specific to construction activities are addressed in the CQCP (North Wind 2005e). The PQP (North Wind 2005c) provides overall project QA methods.

## 10.0 HEALTH AND SAFETY CONTROLS

Health and safety controls and emergency procedures are addressed in the HASP (North Wind 2005d).

## 11.0 OPERATION, MAINTENANCE, AND MONITORING REQUIREMENTS

This section addresses operation, maintenance, and monitoring (OMM) activities to be performed during construction and/or post-construction phases. The construction phase, which is the time period from mobilization of construction equipment to demobilization, will last approximately 6 months. The post-construction phase is the time period from demobilization to final stabilization. For this project, final stabilization is defined as placement of the riprap slope on the east and north edge of the main landfill, completion of the MatCon™ installation on the main landfill, and the point of time at which the DDA and main landfill slopes have achieved at least 70% vegetation.

Upon final stabilization, a Notice of Termination (NOT) will be filed with the EPA. This phase, while uncertain due to inability to forecast 70% vegetation, is expected to last 6 to 12 months. After final stabilization has occurred, this contract is considered complete and post-closure care and monitoring will be the responsibility of DOE. OMM during post-closure is addressed in the Post-closure Care and Monitoring Plan (PCMP) for the LASO TA-73 Airport Landfill (North Wind 2005h). The post-closure period begins at filing of the NOT and lasts for up to 30 years.

Overall project requirements, including requirements for OMM during construction and post-construction phases, are defined in the Design Basis Document for LASO TA-73 Airport Landfill (North Wind 2004). In order to meet those requirements during construction and post-construction phases, some OMM activities have been addressed in the following documents:

- The CQCP (North Wind 2005e) for inspection and testing of construction materials and procedures,
- The SWPPP (North Wind 2005g) for runoff controls, maintenance of the vegetated cover, and protection of archaeological resources,
- The ancillary National Environmental Policy Act of 1969 (NEPA) documentation for protection of protected species, and
- The HASP (North Wind 2005d) for protection of human health and monitoring of soil gas releases during construction, including methane.

Additional OMM requirements not specified in the above documents that apply to the construction and post-construction phases have been identified. These requirements, including citations for regulatory requirements, are listed below.

### **11.1 Fire Prevention**

“Provide adequate means to prevent and extinguish fires (*New Mexico Administrative Code* [NMAC] 20.9.1.400.B.7).”

All vehicles working on the construction site will be required to have fire extinguishers in the cab or elsewhere on the vehicle.

### **11.2 Sanitary Facilities**

“Provide toilet and hand washing facilities for workers (29 CFR 1926).”

Facilities will be provided in the staging area, located near the office trailer at the northwest corner of the main landfill.

### **11.3 Access Roads**

“Maintain access roads (NMAC 20.9.1.400.B.9).”

All access roads required for OMM will be maintained as needed.

### **11.4 Noise Levels**

“Noise may not exceed 65 dBA during construction (LAC 18-73).”

Noise levels at the landfill during construction will be lower than for airport operations, based on published noise levels for planned construction equipment and aircraft using the airport. Noise will be mitigated to the extent feasible by minimizing operational duration of high-noise level equipment. Noise levels will be addressed in an environmental assessment conducted by DOE.

### **11.5 Work Hours**

“Excavation may take place only during the hours from 7 AM to 6 PM (LAC-34-54).”

Excavation of waste will be limited to these hours.

### **11.6 Dust Control**

“Excavated material must be maintained to minimize disruption of traffic and to keep dirt or dust from spreading or flying (LAC-34-46).”

Dust will be continually monitored (visually) during earth moving activities. Monitoring locations will include a background location upwind of the site and at several locations downwind of areas that could potentially be a source of excessive dust. If visual obscurity exceeds 25% above background levels, as measured by a Ringelmann Smoke Chart or equivalent method, dust-creating activities will be suspended until visual obscurity falls below 25% above background levels. In general, dust-creating activities will not recommence until at least 2 hours have passed, in which visibility has not been obscured by 25%. However, if the cause of the dust is clearly identified and mitigated, activities may recommence within this 2-hour window at the discretion of the SS. An example would be excessive dust caused by a malfunctioning water truck. Upon the repair of the water truck and successful resumption of watering, activities could recommence.

Dust will be controlled by frequent watering and/or tacking compounds. Dirt access roads, disturbed areas, and material stockpiles will be watered at a frequency determined by the SS, dependent on weather conditions, area of disturbance, traffic patterns, and nature of soil. Water will be applied to maintain air quality such that the soil is wet but not saturated or muddy. At a minimum, watering will occur whenever dust and suspended sediment exceeds the action level described above, threatens air quality, or becomes a public nuisance. Prior to clearing and grubbing, portions of the landfill and DDA may also be watered to prevent generating excess dust.

Airborne ash may be a particular concern due to aesthetics and potential for contamination. In addition to the water controls described above, tacking agent(s) will be readily available to apply as needed to control blowing ash.

During construction, a water truck will be used to control dust on excavations and access roads and to condition fill material before compaction. The truck will be equipped to apply a front spray, back spray, and/or a pumped hose and nozzle spray. Water is available from a hydrant at the northwest corner of the hangar facilities. The hydrant will be fitted with a metering device to measure volume used. Access roads will be gravel surfaced and sprayed as necessary to prevent visible dust. During the peak of soil delivery, the supplier may be required to assist with dust control of the haul routes.

### **11.7 Site Security**

"Prevent unauthorized entry by 24-hour surveillance system, fencing, or signage during construction (NMAC 20.9.1.400.B.4; 40 CFR 265.14); have worksites fenced or maintained in a manner to safeguard property and the public (LAC 10-75)."

Fencing and signage will be maintained during construction. Temporary fences will be used in areas where permanent fences must be removed to complete construction. Any area where fencing and signage must be removed will be guarded until replaced. All personnel entering the site are required to receive DOE "Get Employee Trained" training.

A gate across the DDA access spur from State Highway 502 will be staffed by a laborer for security when trucks are hauling materials to the site. The monitor will open the gate and notify site workers of incoming loads for logistical and safety purposes.

Additional site security information is provided in the HASP (North Wind 2005d).

### **11.8 Airport Coordination**

Construction activities will be conducted inside the fence line of the Los Alamos Airport, which has an active runway and taxiway, storage of aircraft on the tarmac, and in hangars. Construction activities will be coordinated with airport operations personnel and any operations that may effect runway operations, reduce the tarmac footprint for aircraft storage, or remove or open fence areas or gates will be communicated during the pre-job briefing with airport personnel. The SS will continue to provide updates to the airport operations personnel during the course of the project.

Although the construction plans for activities in the DDA and main landfill areas are not anticipated to impact active runway operations, the following practices will be followed to reduce hazards to aircraft and construction personnel:

- A construction fence or high visibility rope and barricades will be used to delineate construction work zones and as temporary fencing.
- Airport boundary security fence and gates will be maintained. Temporary gates will be equipped with hardware that will allow them to be locked and secured during nonworking hours.
- Vehicle and equipment operators will be briefed during the pre-job briefing on established traffic routes, prohibited driving areas of the airport, and other relevant airport safety information. This information will be updated and communicated at the daily construction briefing when changes to established routes or other pertinent information need to be communicated to project personnel.
- Radio communication between the SS and airport operations personnel will be established (as required airport operations), if necessary, as directed by airport personnel. All site activities shall be suspended to accommodate air traffic.
- Vehicle and equipment operators will be monitored by the Site Safety Officer (SSO) and SS to ensure compliance with established vehicle traffic routes and requirements.

Other applicable requirements from the DOT and Federal Aviation Administration (FAA), Advisor Circular, AC No. 150/5370-2E, "Operational Safety on Airports during Construction" (FAA 2003) will be complied with site documents. Additional information is provided in the HASP (North Wind 2005d).

### **11.9 Construction Traffic Control**

Traffic control will be established prior to start of construction. Elements of the traffic control will include the following:

- A Traffic Control Plan will be prepared,
- A Traffic Permit will be prepared for approval by the LAC and the New Mexico DOT,
- Flagger and signs will be in place along State Highway 502. This work will be subcontracted to qualified companies that provide such services,
- Inspection records for delivery truck brakes will be requested from the borrow source supplier, and
- Truck routes will be approved as part of the Traffic Permit.

Large commercial vehicles (i.e., industrial haul and water trucks) and equipment will be used for hauling of fill materials and other supplies. Designated traffic lanes and routes will be established for this equipment when operating on the project site. Established vehicle traffic lanes and routes will be clearly communicated to all personnel and drivers during the pre-job briefing and will be marked and delineated where feasible to prevent inadvertent entry or crossing by personnel or other equipment.

Entry to and exit from the airport landfill site will be controlled. Only established and approved gates will be used. A spur from the State Highway 502 gate adjacent to the DDA area will be used to facilitate fill material delivery. The spur will be marked, required signs posted, and flagger control used in accordance with the "Manual on Uniform Traffic Control Devices" (DOT 2003) and LAC requirements.

Highway signs will be erected on State Highway 502 at the ingress/egress to the main landfill and DDA, in accordance with Traffic Control Devices Manual (DOT 2003). The signs will warn approaching traffic of construction activities. A minimum of two flagmen will be posted at the DDA ingress/egress to control

traffic. The need for flagmen at the main landfill will be assessed in consultation with airport personnel. The flagmen will have two-way radio contact (or alternate electronic devices) with the SS.

Heavy truck traffic delivering borrow source material will be limited to the hours of 9 a.m. through 3 p.m. Monday through Friday. If congestion on State Highway 502 becomes a problem during the week, truck deliveries may be scheduled for the weekend. Trucks will arrive in a convoy of about ten (10) trucks, and the lead truck will radio the SS ahead of arrival to ensure flagmen are on the scene.

Additional information is provided in the HASP (North Wind 2005d).

### **11.10 Housekeeping**

"Control litter, disease vectors and odors (NMAC 20.9.1.400.B.12)."

Wind dispersal and odors will be controlled through dust control measures described in Section 9.6. Disease vectors (e.g., birds and rodents) will be controlled if needed; however, due to the relatively brief duration of waste excavation and relocation, this will likely not be needed.

In general, litter on the site will be controlled by minimizing exposed debris that may become airborne. This will be accomplished by placing an interim soil cover on emplaced debris immediately after compaction, and by covering debris exposed on the working face of excavations with a woven geotextile or a plastic mesh material, as necessary, to prevent airborne litter from leaving the site.

If wind velocities exceed sustained 35 miles per hour (mph), as measured by a handheld monitor or similar instrument, any litter-handling or litter-exposing operations will cease. This does not apply to litter that is too heavy to become airborne (e.g., concrete, scrap metal, or wood). Operations may resume when wind velocity decreases below sustained 35 mph. This work will not resume under any circumstances if airborne litter is observed leaving the site. If this occurs, the litter control methods discussed above will be initiated to cover exposed waste that may become airborne.

Good housekeeping at the construction site will be practiced at all times to prevent accumulation of litter. Paper products, lunch trash, rubbish, construction solid waste, and other nonhazardous materials will be placed in a closed dumpster or rolloff box and will be emptied as needed by a local contractor. The SS will inspect the site daily for litter. Loose incidental trash will be picked up and thrown away. Any exposed waste with the potential to become airborne will be covered at the end of each work day.

12.0 FIGURES

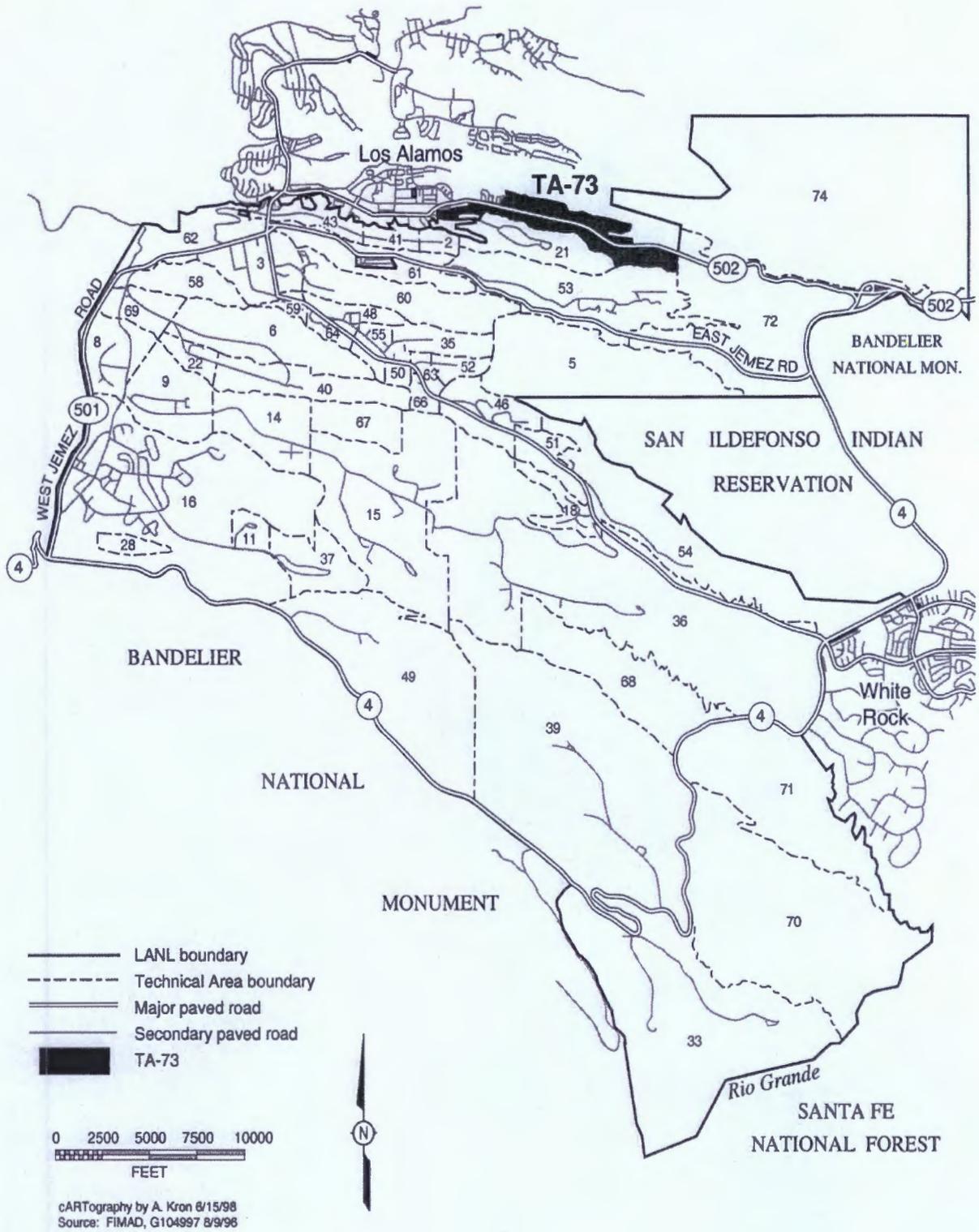


Figure 2.1-1. Location of TA-73

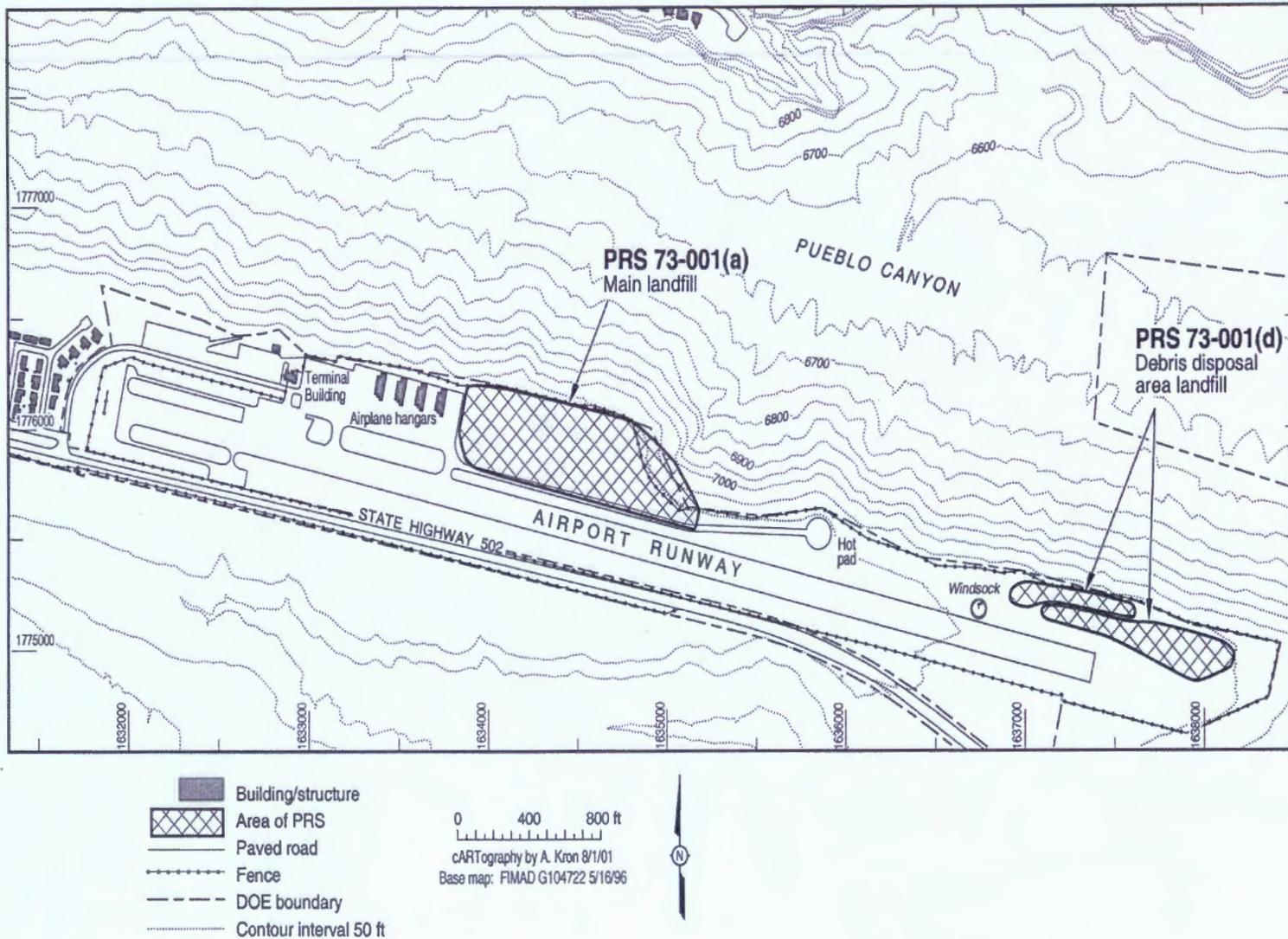


Figure 2.1-2. Location of the main landfill and debris disposal area (LANL 2002)

**Note:** "PRS" has changed to "SWMU"

### 13.0 REFERENCES

10 CFR 830.120, 2002, Title 10, "Energy," Part 830, "Nuclear Safety Management," Section .120, "Scope," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1926, 2002, Title 29, "Labor," Part 1926, "Safety and Health Regulations for Construction," *Code of Federal Regulations*, Office of the Federal Register, April 15, 2002.

40 CFR 265.14, 2002, Title 40, "Protection of Environment," Part 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," Section 265.14, "Security," *Code of Federal Regulations*, Office of the Federal Register.

DOE, 1997. "Implementation Guide for Use with Suspect/Counterfeit Item Requirements of DOE O 440.1, Worker Protection Management, 10 CFR 830.120; and DOE 5700.6C, Quality Assurance," U.S. Department of Energy Guide 440.1-6, prepared by the Office of Environment Safety and Health, U.S. Department of Energy, U.S. Government Printing Office, Washington, D.C., June 1997.

DOE, 2003. "National Nuclear Security Administration Los Alamos Site Office Statement of Work for the 'Airport Landfill'," ER2003-0177, Savannah River Operations Office, Aiken, South Carolina. U.S. Department of Energy, December 2003.

DOT, 2003. "Manual on Uniform Traffic Control Devices," U.S. Government Printing Office, U.S. Department of Transportation, Washington, D.C.

FAA, 2003. "Operational Safety on Airports during Construction," Federal Aviation Administration Advisor Circular, AC No. 150/5370-2E, Federal Aviation Administration, U.S. Government Printing Office, Washington, D.C., January 17, 2003.

LAC 10-75, "Site Security," Los Alamos County Code, Los Alamos, New Mexico.

LAC 18-73, "Noise Levels," Los Alamos County Code, Los Alamos, New Mexico.

LAC 34-46, "Dust Control," Los Alamos County Code, Los Alamos, New Mexico.

LAC 34-54, "Work Hours," Los Alamos County Code, Los Alamos, New Mexico.

LANL, 1996, "LANL HSWA Module VIII Permit, 1996 Revision (guidance)," Los Alamos National Laboratory, Los Alamos, New Mexico (57486), January 1996.

LANL, 2002, "Voluntary Corrective Measure Plan for Potential Release Sites 73-001(a)-99 and 73-001(b)-99," Los Alamos National Laboratory document LA-UR-02-4433, Los Alamos National Laboratory, Los Alamos, New Mexico (74007.2), October 2002.

NMAC 20.9.1.400.B.4, 2001, "Solid Waste Facility Operation Requirements," Section B.4, "Prevent unauthorized access by the public and entry by large animals to the active portion of the landfill through the use of fences, gates, locks, or other means that attain equal protection," *New Mexico Administrative Code*, published by the Commission of Public Records, Administrative Law Division, Santa Fe, New Mexico, December 4, 2001.

NMAC 20.9.1.400.B.7, 2001, "Solid Waste Facility Operation Requirements," Section B.7, "Provide adequate means to prevent and extinguish fires," *New Mexico Administrative Code*, published by the Commission of Public Records, Administrative Law Division, Santa Fe, New Mexico, December 4, 2001.

NMAC 20.9.1.400.B.9, 2001, "Solid Waste Facility Operation Requirements," Section B.9, "Provide and maintain access roads at the facility site, such that traffic can enter and exit the site safely, flow smoothly, and will not be interrupted by inclement weather," *New Mexico Administrative Code*, published by the Commission of Public Records, Administrative Law Division, Santa Fe, New Mexico, December 4, 2001.

NMAC 20.9.1.400.B.12, 2001, "Solid Waste Facility Operation Requirements," Section B.12, "Control litter, disease vectors, and odors.," *New Mexico Administrative Code*, published by the Commission of Public Records, Administrative Law Division, Santa Fe, New Mexico, December 4, 2001.

North Wind, 2004, "Design Basis Document for Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2004-042, North Wind Inc., Idaho Falls, Idaho, April 2004.

North Wind, 2005a, "Remedy Design Work Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2004-031, North Wind, Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005b, "Project Management Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 2, NW-ID-2003-073, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005c, "Project Quality Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 2, NW-ID-2003-071, North Wind, Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005d, "Health and Safety Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2004-017, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005e, "Construction Quality Control Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 2, NW-ID-2004-016, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005f, "Construction Specifications for Los Alamos Site Office TA 73 Airport Landfill, 906 Design Submittal," Draft Final, NW-ID-2004-039, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005g, "Storm Water Pollution and Prevention Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2004-005, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005h, "Post-closure Care and Monitoring Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2004-027, North Wind Inc., Idaho Falls, Idaho, June 2005.

The following are NWI quality documents that are controlled in accordance with QAP-10-171, Records Control. The latest revision applies:

PWI-4201-004, Readiness Assessment

QAP-10-021, Indoctrination and Training

QAP-10-022, Certification of Personnel

QAP-10-061, Document Control

QAP-10-121, Control of Measuring and Test Equipment

QAP-10-181, Quality Audits

QAP-16, Control of Quality Records

# Appendix A

## Acronyms

## Appendix A

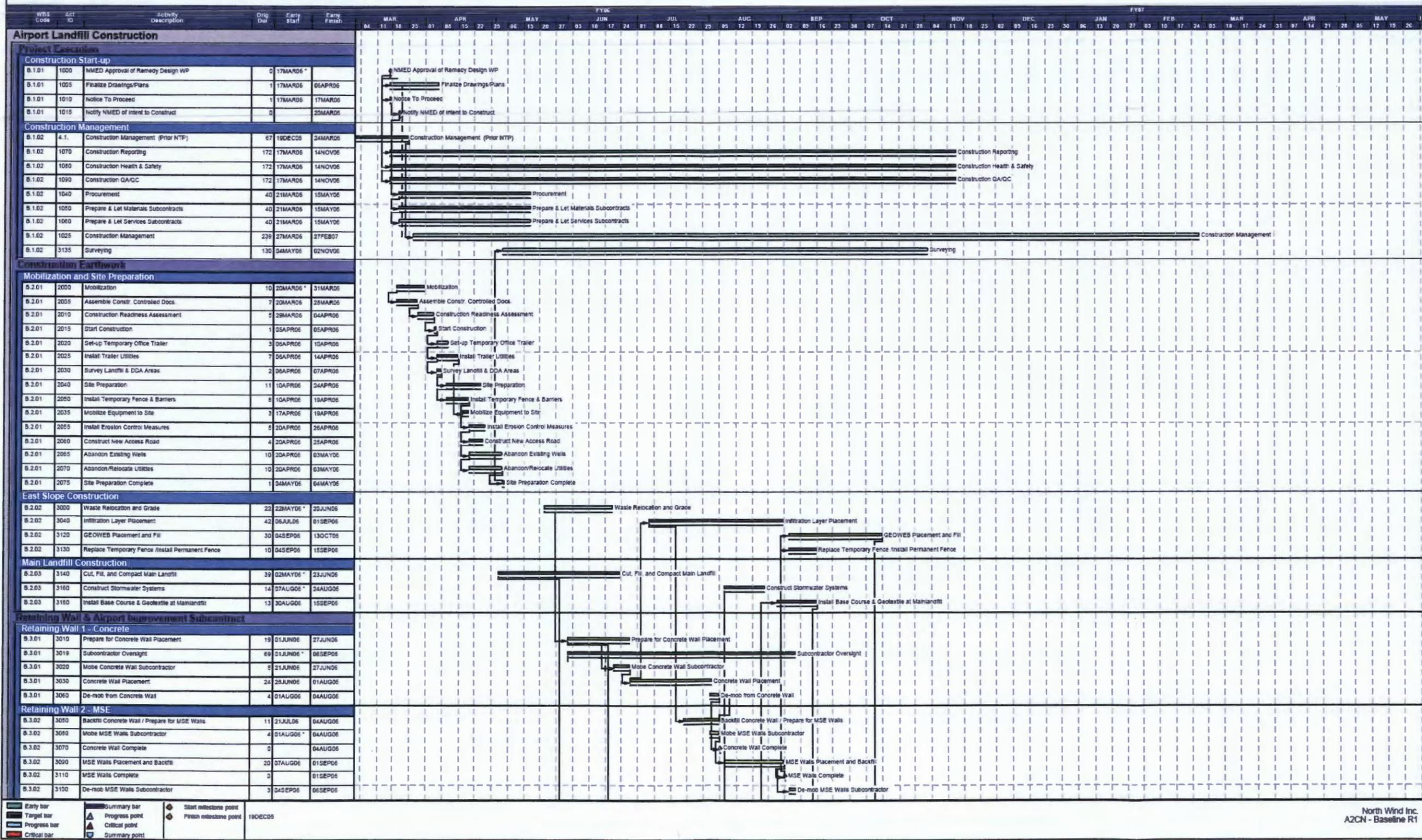
### Acronyms

CFR	<i>Code of Federal Regulations</i>
CM	Construction Manager
<del>CO</del>	<del>Contracting Officer</del>
COR	Contracting Office Representative
CQCP	Construction Quality Control Plan
cy	Cubic <del>y</del> ard(s)
DDA	Debris Disposal Area
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
HASP	Health and Safety Plan
HDPE	High-Density Polyethylene
<del>ISM</del>	<del>Integrated Safety Management</del>
LAC	Los Alamos County
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
M&TE	Measuring and test equipment
MatCon™	Modified Asphalt Technology for Waste Containment
mph	Miles Per Hour
NEPA	National Environmental Policy Act of 1969
NMAC	<i>New Mexico Administrative Code</i>
NWI	North Wind Inc.
NOT	Notice of Termination
NTP	Notice to Proceed

OMM	Operation, Maintenance, <del>A</del> and Monitoring
PCMP	Post-closure Care and Monitoring Plan
PM	Project Manager
PMP	Project Management Plan
PQP	Project Quality Plan
PWI	Project Work Instruction
<del>QA</del>	<del>Quality assurance</del>
QAP	Quality Assurance Procedure
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
QCFE	Quality Control Field Engineer
S/CI	Suspect/Counterfeit Item
<del>SOW</del>	<del>Statement of Work</del>
SS	Site Superintendent
SSO	Site Safety Officer
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan
TA	Technical Area
WESTON	Weston Solutions, Inc.

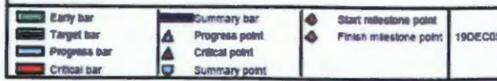
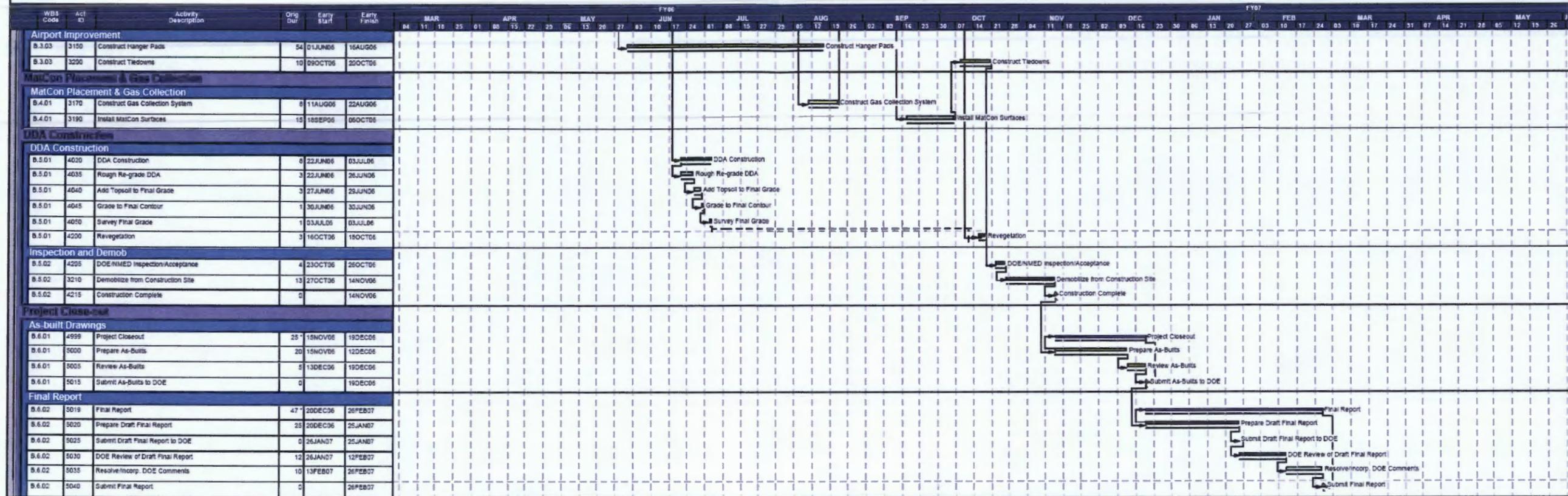
**Appendix B**  
**Construction Schedule**

Los Alamos Site Office  
TA-73 Airport Landfill Project - Construction Schedule



North Wind Inc.  
A2CN - Baseline R1

Los Alamos Site Office  
TA-73 Airport Landfill Project - Construction Schedule



North Wind Inc.  
A2CN - Baseline R1

**Attachment C**  
**Construction Quality Control Plan**  
**for the LASO TA-73 Airport Landfill**



NW-ID-2004-016  
Revision ~~3~~4

# CONSTRUCTION QUALITY CONTROL PLAN FOR THE LOS ALAMOS SITE OFFICE TA-73 AIRPORT LANDFILL

~~February~~ April 2006

Prepared for:

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**DOCUMENT APPROVAL PAGE**

Document Number: NW-ID-2004-016 Revision: 34

Document Title: Construction Quality Control Plan for the Los Alamos Site Office TA-73 Airport Landfill

**Approval Signatures**

Name	Signature	Date	Title
Doug Jorgensen	Original signature on file	02/17/06	Project Manager
Leslie Diggins	Original signature on file	02/17/06	Corporate Quality Assurance Manager

**Revision Log**

Revision	Date	Reason for Revision
Draft	02/12/04	Not applicable; first draft of document
Revision 0	03/15/04	Document revised to ensure consistency with final construction specifications. DOE-LASO had no comment on the draft of this document.
Revision 1	04/06/04	Document revised to correct minor formatting errors and add discussion of identification and mitigation of potential suspect/counterfeit items (Section 7.0)
Revision 2	05/31/05	Document revised to reflect scope change per DOE revised SOW. Primary revisions include rewrite of Section 5, Landfill Cover Construction to reflect new design elements.
Revision 3	2/20/06	Document revised substantially to adopt USACE three-phase quality control process.
<u>Revision 4</u>	<u>04/21/06</u>	<u>Document revised to incorporate resolutions to NMED comments on Revision 3.</u>

Activity	Frequency	Responsible Party
Inspect for leaks	Weekly	Environmental Services
Inspect for leaks	Weekly	Environmental Services
Inspect for leaks	Weekly	Environmental Services
Inspect for leaks	Weekly	Environmental Services
Inspect for leaks	Weekly	Environmental Services
Inspect for leaks	Weekly	Environmental Services
Inspect for leaks	Weekly	Environmental Services
Inspect for leaks	Weekly	Environmental Services
Inspect for leaks	Weekly	Environmental Services
Inspect for leaks	Weekly	Environmental Services

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## 1.0 INTRODUCTION

This Construction Quality Control Plan (CQCP) establishes the Contractor Quality Control (QC) program for environmental remediation work to be conducted at the U.S. Department of Energy (DOE) Los Alamos Site Office (LASO) Technical Area (TA)-73 Airport Landfill, henceforth referred to as "the project."

As directed by DOE, the U.S. Army Corps of Engineers (USACE) three-phase construction QC program will be implemented on this project as applicable. Therefore, this document has been prepared in accordance with guidance provided in Engineer Pamphlet (EP) 715-1-2 (USACE 1990). Department of Defense Unified Facilities Guide Specifications Sections 01450N, "Quality Control" and 01451A, "Contractor Quality Control" are not contract requirements for this project as they apply to military services; however, functional requirements from both documents have been incorporated herein.

The project-specific QC activities described in this document are a subset of the North Wind, Inc. (NWI) quality program. The NWI quality program is comprised of [NWI-QAM-01-001, North Wind, Inc. Quality Assurance Manual](#), corporate-level quality procedures, and project-level plans such as this CQCP. Throughout this document, references are made to NWI corporate quality procedures. Controlled versions of all company procedures are available to NWI employees online (hyperlinks are included in the electronic version of this document). Copies of corporate procedures will be provided to clients or other reviewers upon request.

## 2.0 DOCUMENT SCOPE

This CQCP provides instructions to project personnel to ensure the subject work is accomplished according to contract specifications. This document applies to NWI employees and subcontractors who are supporting the project.

## 3.0 DOCUMENT INTERFACES

The Remedy Design Work Plan (North Wind 2005a) is the primary scoping document for the project. The Remedy Design Work Plan includes by reference or incorporation:

- Final construction specifications and drawings (North Wind 2005b),
- Engineering calculations (North Wind 2005b),
- Construction Plan for the LASO TA-73 Airport Landfill (North Wind 2005c),
- This CQCP,
- Waste Management Plan (WMP) for the LASO TA-73 Airport Landfill (North Wind 2005d), and
- Post-closure Care and Monitoring Plan (PCMP) for the LASO TA-73 Airport Landfill (North Wind 2005e).

Reference shall be by the specification section number and title (e.g., Specification 01010, "Summary of Work"), as discussed in Construction Specifications for LASO TA-73 Airport Landfill (North Wind 2005b). Construction specifications take precedence over construction drawings, which in turn take precedence over project scoping plans. This CQCP does not alter or add technical requirements above those specified in design documents.

In addition to the Remedy Design Work Plan, the following documents also establish work control requirements for this project:

- Project Quality Plan (PQP)—Overall project quality assurance (QA) is managed according to the PQP for the LASO TA-73 Airport Landfill (North Wind 2005f). The PQP establishes an audit schedule, defines methods to qualify subcontractor QA programs, and discusses the protocol for nonconformance reporting and resolution.
- Project Management Plan (PMP)—The PMP for LASO TA-73 Airport Landfill (North Wind 2005g) describes the overall management structure and methods for the project. The PMP defines meeting and reporting protocols, provides overall organizational structure, and defines methods for procurement of materials and services.
- Storm Water Pollution Prevention Plan (SWPPP)—The SWPPP for LASO TA-73 Airport Landfill (North Wind 2005h) describes storm water runoff and erosion controls that will be implemented.
- Health and Safety Plan (HASP)—The HASP for the LASO TA-73 Airport Landfill (North Wind 2005i) provides a hazard analysis and establishes controls for worker protection.

#### **4.0 QUALITY CONTROL ROLES AND RESPONSIBILITIES**

The project organization structure and responsibilities are described in the PQP (North Wind 2005f). Specific roles and responsibilities for personnel involved directly in the QC process are described below.

##### **4.1 Engineer of Record**

The Engineer of Record (ER) shall be a Professional Engineer, registered in the State of New Mexico. The ER has ultimate approval authority on engineering submittals and will be available to resolve any difficulties that may be encountered during implementation of the work plan specifications and drawings. The ER may designate an alternate Professional Engineer registered in New Mexico to act on his behalf under his supervision.

##### **4.2 Construction Manager**

The Construction Manager (CM) has overall responsibility for implementing the QC program. The CM has the authority to direct and manage personnel and equipment to accomplish this task. The CM will have sufficient educational, technical, and administrative experience to fulfill this role. The CM will be cognizant of specific construction practices relating to construction, observation, testing procedures, documentation procedures, and construction-level specifications, permit requirements, and regulations applicable to the Airport Landfill project. The CM will support the Site Supervisor (SS) and QC system manager in implementing the CQCP. The CM reports to the Project Manager (PM) and directs the Site Supervisor.

##### **4.3 Site Supervisor**

The project SS is responsible for the quality of work on the job and is subject to removal by the government for non-compliance with the quality requirements specified in this plan. The SS, in this context, shall be the highest-level manager responsible for the overall construction activities at the site, including quality and production. The SS or his designee shall maintain a physical presence at the site at all times during active construction, and shall be responsible for all construction and construction related activities at the site.

The SS is responsible for daily work activities and directly manages field construction crews and support staff. This is a full-time, onsite position. The primary responsibility of the SS is to ensure that all aspects of the project are conducted in accordance with the final construction specifications, construction drawings, and project scoping documents, using necessary and industry-accepted construction procedures. Additional QC responsibilities tasked to the SS include:

- Ensuring adequate quantities of required materials are available and scheduling the delivery of these materials,
- Ensuring equipment (e.g., heavy equipment and onsite testing devices) are available and functional to obtain required results and meet project specifications,
- Visually inspecting delivered offsite borrow source material for undesired elements (i.e., large rocks or debris),
- Obtaining material certifications (e.g., seed tags, geotextile, and fencing certifications) and providing these certifications to the Quality Control System Manager (QCSM),
- Inspecting construction activities, including installation of landfill cover components, to verify they are performed in compliance with specifications,
- Ensuring soil layers are not placed, spread, or compacted during unfavorable weather conditions,
- Performing or overseeing intermittent grade checks, by visual means or survey, to control cut and fill operations,
- Checking survey data for consistency, completeness, and accuracy (to the extent possible),
- Working with the QCSM and CM to resolve nonconformances,
- Inspecting subgrade for loose or unstable areas,
- Managing and maintaining project documents and records in accordance with Section 8.0, and
- Supporting the QCSM in implementing the CQCP, as detailed herein.

The SS reports to the CM and directs field personnel and subcontractors. The SS interfaces with the QCSM and provides access, equipment, materials, and other support as needed to enable the QCSM to complete required tasks.

#### **4.4 Quality Control System Manager**

The QCSM is accountable for the quality of the fieldwork and reports directly to the NWI QA Manager. Responsibilities of the QCSM include:

- Monitoring the methods used to meet the level of quality, as defined in this document,
- Maintaining acceptable records of the QC activities, including daily QC reports, at the site at all times,
- Communicating and coordinating any corrective actions taken with the DOE and/or USACE on-site representative,
- Verifying that work performed is in compliance with approved work plans,
- Ensuring that field documentation is complete and accurate,
- Ensuring that there are no uncorrected deviations from approved procedures, and
- Ensuring that corrective actions are taken.

The QCSM, or alternate, will be on-site at all times when definable features of work (DFWs) are being performed. The QCSM is authorized to stop work if the work does not comply with the requirements of the contract.

Names, resumes, and appointment letters for the QCSM and alternate QCSM(s) will be submitted for DOE approval prior to the start of field work. When it is necessary to make changes to QCSM personnel, NWI shall notify the government in writing and provide evidence of personnel qualifications and appointments. The government retains the right to reject proposed QCSM personnel on the basis of qualifications and experience.

#### 4.5 Project Personnel

Project personnel are the critical component in any QC program. Project personnel supporting this project are responsible to:

- Obtain and possess appropriate qualification, training, and proficiency,
- Ensure compliance with applicable requirements, standards, plans, and procedures, and
- Report quality deficiencies and opportunities for improvement.

**NOTE:** *Every NWI employee is responsible for the quality of their work and must work efficiently and safely in accordance with current plans, procedures, and work instructions. Project personnel are involved in work process design and process evaluation and are encouraged to provide suggestions for improving work processes.*

#### 4.6 Geotechnical Testing Laboratory

A geotechnical testing laboratory will be subcontracted to perform on-site and off-site material testing services. The name and certifications of the specific laboratory(ies) to be used on this project will be submitted for government approval prior to the start of field work. The laboratory shall meet criteria detailed in ASTM D 3740 (2004), "Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction" and ASTM E 329 (2003), "Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction."

#### 4.7 Design and Engineering Contractor

Weston Solutions, Inc. (Weston) serves as a subcontractor to NWI on this project and is responsible primarily for design engineering work. Weston developed the primary design elements provided in the Remedy Design Work Plan (North Wind 2005a), including specifications, drawings, and calculations.

#### 4.8 Stop Work Authority and Responsibility

All personnel are responsible and obliged to personally stop any work they determine unsafe. Project personnel are also responsible for identifying practices or conditions that are or may be adverse to quality and for recommending cessation of work to a Line Manager, PM, or the QA Manager. In addition to the QCSM, Line Managers and PMs are responsible for assessing conditions potentially adverse to quality and for taking appropriate action, including stopping work. In all cases, these responsibilities override planning and scheduling considerations.

## 5.0 QUALITY CONTROL PROCEDURES

The objective of this QC program is to create a plan-execute-check system to ensure that activities are performed in accordance with project requirements and in conformance to the approved project guidance documents. The following sections describe specific QC procedures to be implemented on this project.

### 5.1 On-Site Control

The QC program consists of a three-phase control program. The control program is implemented prior to initiating each DFW and will remain in effect throughout its duration. The three-phase control program includes:

1. A preparatory phase,
2. An initial phase, and
3. A follow-up phase.

The QC process encompasses a review of project activities by a dedicated QCSM at each distinct phase. The QCSM will perform these duties whether a government representative is present or not.

#### 5.1.1 Preparatory Phase

The preparatory phase activities are required to be completed prior to the start of each DFW. There are three components to the preparatory phase: (1) a kickoff meeting with the government, (2) a pre-job briefing with the project team, and (3) an inspection of preparatory items.

The kickoff meeting is an important component of the QC process whereby contractor and government personnel discuss and agree on the requirements of the job and the government/contractor interrelationship. The scope that needs to be accomplished, including any quality specifications, must be understood and agreed to by all parties up front to minimize redirection and delays during fieldwork. Appendix B includes an example of [NWI-CQCF-001.3, Preparatory Phase Meeting Minutes](#), which is used to document the kickoff meeting. The government shall be notified at least 24 hours in advance of beginning the preparatory control phase.

The preparatory phase pre-job briefing is similar to the kickoff meeting but is held internally with the contractor team. Before beginning work, the QCSM will conduct the pre-job briefing with all personnel who will be involved in the fieldwork. The workers will be instructed regarding task expectations. This preparatory phase meeting may need to be repeated with the arrival of new field team members.

The preparatory phase inspection will be completed by the QCSM prior to the start of each DFW. Appendix B includes the preparatory phase inspection form, [NWI-CQCF-001.4, Preparatory Phase Checklist](#). The following checks are required at a minimum:

1. Review the HASP to ensure that identified work activities and associated hazards are consistent with actual field conditions and planned work.
2. Verify that required safety equipment are available and in good condition.
3. Review each paragraph for applicable specifications, reference codes, and standards, as identified in the design drawings, specifications, and plans. (Copies of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field shall be available in the field during the preparatory phase inspection.)

4. Check to assure that all materials and/or equipment are on hand and have been tested, submitted, and approved as required.
5. Physically examine required materials, equipment, and sample work to assure that they are on hand, conform to approved drawings or submitted data, and are properly stored.
6. Check that provisions have been made to provide required QC testing.
7. Verify that the necessary subcontractors and suppliers are under contract and scheduled to provide the necessary on-site services.
8. Examine work area to verify that all preliminary work has been accomplished in accordance with the work plan drawings and specifications.

### **5.1.2 Initial Phase**

The initial inspections are performed when a representative portion of a task has been completed (e.g. after the first one or two days of task). The purpose of the initial phase is to ensure that tasks are being executed according to the approved project guidance documents. Appendix B includes an example of [NWI-CQCF-001.2, Initial Phase Checklist](#). The following tasks will be completed during this phase:

1. Review the HASP and activity hazard analysis as the work progresses to identify new hazards or changing conditions that could impact the HASP.
2. Check planned QC approach for the specific work feature to ensure that the QC approach is in full compliance with drawings, specifications, and plans and is compatible with the construction approach.
3. Review minutes of the preparatory meeting.
4. Verify that required control inspection and testing, as identified in the design drawings, specifications, and plans, can be implemented using available equipment and personnel.
5. Review initial control testing results to ensure work methods are adequate to achieve design parameters.
6. Check preliminary work for compliance with applicable specifications. Establish level of workmanship required and verify that available equipment and personnel can achieve requirements of the work plan drawings and specifications.
7. Compare delivered materials with required material samples (e.g., geosynthetic samples), as required in the work plan drawings and specifications.
8. Verify that defective or damaged materials are not being reused.
9. Conduct a general check of dimensional requirements.
10. Check for omissions and resolve any differences of interpretation with government representative.

### **5.1.3 Follow-Up Phase**

The contractor will perform follow-up phase inspections on a daily basis to ensure continued compliance with contract requirements until completion of that particular feature of work. General procedures and documentation are periodically checked to ensure they are complete, accurate, and consistently executed throughout the duration of the project. The QCSM will review control testing results daily. The QCSM will also determine whether quality issues identified during initial phase inspections have been corrected.

Daily inspection results will be documented according to [NWI-CQCF-001.1, Daily Quality Control Report](#) (Appendix B). Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work, which may be affected by the deficient work. The contractor shall not build upon nor conceal non-conforming work.

#### **5.1.4 Additional Preparatory and Initial Phases**

Additional preparatory and initial phases shall be conducted on the same DFWs if the quality of on-going work is unacceptable; if there are changes in the applicable construction QC staff, onsite production supervision, or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

#### **5.2 Off-Site Control**

Facilities of off-site suppliers will be inspected, as necessary, to ensure that product specifications can be met. The QCSM will determine whether each supplier has the facilities, materials, equipment, and programs necessary to deliver a quality product. The results of each inspection will be made available to the government. The fabricator or supplier will be notified of any deficiencies and will be required to submit a report of the corrective actions taken. The QCSM will notify the government of all off-site inspections.

#### **5.3 Materials Certification**

Copies of all purchase orders or subcontracts requiring inspection will be provided to the QCSM for receiving and record keeping purposes. When the purchase order/subcontract requires vendor certification of materials, equipment, or supplies, such certification shall be verified as to accuracy and conformance and may be used in lieu of a test for those properties covered by the certification. Copies of all certifications received will be maintained by the QCSM and will be submitted to the government as described in Section 11, Submittals.

#### **5.4 Materials Receipt**

The QCSM will inspect permanent construction materials received. Visual inspection will be made for:

1. Identification,
2. Damage,
3. Completeness,
4. Evidence of compliance with approvals, and
5. Proper documentation.

#### **5.5 Suspect/Counterfeit Items**

Installed items that may potentially be suspect/counterfeit items will be inspected in accordance with [PQP-4201-001, Project Quality Plan for Los Alamos Site Office TA-73 Airport Landfill](#); [QAP-10-081, Product Identification and Traceability](#); [QAP-10-101, Inspection](#); [QAP-10-111, Test Control](#); and DOE Guide 440.1-6, Implementation Guide for Use with Suspect/Counterfeit Items Requirements of DOE O 440.1, Worker Protection Management; 10 CFR 830.120, Nuclear Safety Management; and DOE 5700.6c, Quality Assurance (DOE 1997). In addition, items used during construction activities that may cause injury or fatalities if failure occurs (e.g., ratchet straps/tie down assemblies, fasteners, bridal slings, or hoisting slings) will also be inspected on a regular basis in accordance with the above documents.

## 5.6 Equipment Calibration

The geotechnical laboratory will perform on-site compaction testing using a nuclear densitometer, as described in Section 7, Testing. The QCSM will review initial equipment calibration records supplied by the laboratory to confirm that they meet applicable American Society for Testing and Materials (ASTM) standards and manufacturer's recommendations for frequency of calibration. These records will be maintained on site by the QCSM throughout the duration of testing activities. In addition, the QCSM will ensure that the equipment will be operated only by qualified personnel and that any equipment dropped, damaged, or believed to be inaccurate is promptly removed from service.

## 5.7 Graded Approach

NWI uses a graded approach to select the controls to be applied to items and activities consistent with the importance of safety, quality, and success of the project. Items and activities that impact quality have additional controls, as described in NWI-QAM-01-001 and referenced quality assurance procedures (QAPs). Based on the importance to safety, quality, and impact on the success of the project, the PM ensures that project plans and implementing procedures reflect the degree of rigor required and that they are communicated to project personnel.

## 5.8 Field Changes

Field changes to project documents may be required based on actual site conditions, unforeseeable circumstances, or client-initiated change control. Field changes will be identified and documented in accordance with [PWI-4201-005, Field Change](#).

## 6.0 DEFINABLE FEATURES OF WORK

DFWs for this project are described in the sections below. Table 1 provides a summary of the DFWs. Cross references to activity identifiers will be available after the construction schedule is developed.

Table 1. Features of work corresponding to the construction schedule.

DFW #	Definable Feature of Work
01	Repair debris disposal area cover
02	Excavate at main landfill
03	Subgrade preparation
04	Construction of retaining wall
05	Placement of structural fill
06	Installation of infiltration layer
07	Installation of Geocellular slope protection
08	Installation of vegetative cover
09	Installation of gas venting system
10	Construction of hangar pad
11	Installation of MatCon™ cover

### 6.1 Repair Debris Disposal Area Cover

The existing soil cover at the Debris Disposal Area (DDA) will be repaired to ensure that there is a minimum 12 in. of soil cover over existing waste, an average final grade of approximately 3% to promote runoff, and re-vegetation with native plants. Cover restoration will proceed as specified in Specification 02932, "Seeding, Mulching, and Restoration."

### 6.2 Excavate at Main Landfill

This activity consists of relocating existing landfill waste from the east and north slopes to obtain an approximate grade of 4:1 horizontal to vertical. Bedrock will not be excavated. The excavated waste will be relocated to fill areas on the flat portion (top cap) of the landfill. Waste will be placed in fill areas at the direction of the SS (no required lift thickness) and will be compacted by dozer tracking only. Excavation at the main landfill will be conducted in accordance with Part 3.01 of Specification 02200, "Earthwork" and Specification 02266, "Landfill Waste Placement Procedures."

### 6.3 Subgrade Preparation

Prior to placing any structural fill, the subgrade will be prepared in accordance with Part 3.02.B of Specification 02200, "Earthwork." Vegetation, root matter, and topsoil will be removed and all areas will be proof-rolled on-grade using a heavy-duty roller. Areas of the subgrade that cannot be sufficiently compacted will be undercut and proof-rolled until sufficiently stable.

### 6.4 Construction of Retaining Wall

Retaining walls will be constructed on the northeast face of the landfill in accordance with Specification 03300, "Cast-in-Place Concrete" and Specification 02273, "Mechanically Stabilized Earth Retaining Walls." Prefabricated components of the retaining walls (e.g., footings, concrete pads, and soil anchors) will be certified by the manufacturer(s) prior to shipment to verify compliance with design specifications.

### 6.5 Placement of Structural Fill

Structural fill material will be placed on the subgrade on the slopes and top of the main landfill as necessary to support construction of the cover systems. Placement shall be in accordance with Part D of Specification 02200, "Earthwork." Control tests will be performed in accordance with the specifications (as described in Section 7, Testing) to ensure that placement procedures achieve adequate density.

### 6.6 Installation of Infiltration Layer

An infiltration layer, consisting of imported low-permeability soil with a geosynthetic drainage composite layer, will be applied to the north and east slopes of the landfill. The infiltration layer will be constructed with two-three nominal 69-in. lifts and compacted in accordance with Specification 02200, "Earthwork." The geosynthetic drainage composite will be placed on the first 6-in lift after compaction. Required manufacturer's material testing and contractor's visual inspection during placement are identified in Specification 06030. Compacted material-soil will be tested to verify placement procedures achieve the moisture-density requirements of Section 3.02.E of Specification 02200, "Earthwork." Prior to delivery of infiltration soil material to the site, the soil material shall be tested (as described in Section 7) to verify that it meets or exceeds specifications. In addition, an infiltration layer test pad will be constructed prior to construction of the actual infiltration layer to verify that the material, properties, placement of geosynthetic drainage layer, and compaction methods meet the requirements of Specification 02200, "Earthwork" for infiltration layer soils.

## 6.7 Installation of Geocellular Slope Protection

A perforated Geoweb® system will be installed according to manufacturer's instructions to provide long-term erosion control.

Geoweb® will be added over the entire surfaces of the slope faces. Prior to delivery of the Geoweb® to the site, product specifications will be obtained from the supplier and reviewed to verify that the material meets requirements of the specification document.

## 6.8 Installation of Vegetative Cover

Vegetative cover will be installed in accordance with Specification 02932, "Seeding, Mulching, and Restoration." The vegetative cover materials shall be visually inspected as they are being placed to ensure that the materials comply with the construction specifications.

## 6.9 Installation of Gas Venting System

A gas venting system will be installed in accordance with Specification 02730, "Gas Collection System." Perforated piping will be installed in a bed of coarse aggregate, as specified.

## 6.10 Construction of Hanger Pad

To support operations at the Los Alamos Airport, concrete hanger pads will be constructed on the western portion of the new landfill cover. The pads will consist of a steel reinforced concrete slab poured in place on the off-gas collection layer as subgrade. QC activities associated with construction of the pad are critical to meet not only the needs of the airport but also to ensure that objectives of the remedial action are accomplished. The hanger pad will be constructed and installed in accordance with Specification 03300, "Cast-in-Place Concrete."

## 6.11 Installation of Modified Asphalt Technology for Waste Containment™ Cover

The MatCon™ system is an advanced modified asphalt technology that combines a proprietary binder with specified aggregates. The MatCon™ cover provides a durable surface that is usable by the Los Alamos Airport and still meets permeability requirements for the remedy. The MatCon™ cover will be installed in accordance with Specification 02511, "Hot Mix Asphalt" and the MatCon™ Quality Control plan to be provided by the vendor.

The materials used in the MatCon™ product are subject to strict QC requirements to ensure long-term performance of the cover. Vendor submittals for pre-construction testing of the aggregate-binder mix will be managed as described in Section 11.

The MatCon™ cover will be tested during construction by the vendor to document achieved compaction and thickness parameters. Test pads will be constructed and tested as described in the vendor's QC Plan. These data will be reviewed to ensure compliance with design specifications. In addition, geotechnical laboratory personnel shall conduct nuclear density tests during construction to verify compliance with specifications.

## 7.0 TESTING

Specific tests, as identified in the project specifications, are required to verify that control procedures are adequate. All soil, aggregate, and concrete materials are required to be tested and approved for use prior to placement. These materials may be obtained from onsite or offsite sources.

Prior to the start of field work, NWI shall contract with a qualified geotechnical testing laboratory, as described in Section 4.6, Geotechnical Testing Laboratory. The laboratory shall meet criteria detailed in ASTM D 3740 (2004), "Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction" and ASTM E 329 (2003), "Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction."

The geotechnical laboratory will test representative samples of all materials prior to use to verify acceptance criteria. Prior to use, the QCSM will review applicable test data to ensure material is acceptable for use and properly documented. To ensure all required testing is properly performed, the QCSM shall perform the following activities and record the following data:

- Verify that testing procedures comply with project specifications,
- Verify that facilities and testing equipment are available and comply with testing standards,
- Check test instrument calibration data against certified standards (see Section, 5.6, Equipment Calibration),
- Verify that recording forms and test identification control number systems, including all of the test documentation requirements, have been prepared, and
- Record all test results, both passing and failing tests. (Note location where tests were performed and sequential control number identifying each test.)

The Landfill Cover Construction Inspection Plan (Appendix C) provides details for each specific test, the material being tested, test method, specification section and acceptance criteria requiring the test, feature of work when test is completed, test frequency and instructions, and person responsible for each test. Part 1.03 of Specification 01400, "Quality Control," provides additional guidance for certification of materials.

## **8.0 FIELD DOCUMENTATION**

The QCSM shall maintain current records providing factual evidence that required QC activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and indicate a description of trades working on the project, the number of personnel working, weather conditions encountered, and any delays encountered. These records shall cover both conforming and deficient features and shall include statements that equipment and materials incorporated in the work and workmanship comply with the contract.

The original, along with one copy of these records in report form, shall be furnished to the government daily within 12 hours after the date covered by the report. Reports need not be submitted for days on which no work is performed. At a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the QCSM. The reports may also include attached copies of test reports, subcontractor provided information, or other documentation, as appropriate.

Specific forms of documentation required on this project include Daily Quality Control Reports (DQCRs), Preparatory Phase Inspection Reports (PPIRs), Initial Phase Inspection Reports (IPIRs), and field logbooks. Each report type is described below.

### 8.1 Daily Quality Control Reports

DQCRs will be prepared by the QCSM with input from the SS, as required. An example of the DQCR is provided in Appendix B. At a minimum, the daily report will include the following information (as applicable):

- Contractor/subcontractor and their area of responsibility.
- Operating plant/equipment with hours worked, idle, or down for repair.
- Work performed each day, giving location, description, and by whom.
- Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase shall be identified (i.e., Preparatory, Initial, and Follow-up) and the list deficiencies noted, along with the corrective action.
- Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- Submittals and deliverables reviewed with contract reference, by whom, and action taken.
- Offsite surveillance activities, including actions taken.
- Job safety evaluations stating what was checked, the results, and instructions or corrective actions.
- Instructions given/received and conflicts in plans and/or specifications.
- Contractor's verification statement.

### 8.2 Preparatory Phase Inspection Reports

PPIRs will be prepared by the QCSM with input from the SS, as required. An example of the PPIR checklist is provided in Appendix B. At a minimum, the PPIR will include the following information (as applicable):

- Personnel participating in inspection, position and affiliation.
- Identification of new or changed job site activities and hazards or conditions that are not covered in health and safety documentation.
- Identification of missing or unapproved submittals.
- Identification of any preliminary work that has not been completed or does not meet requirements of work plan drawings and specifications.
- Identification of control inspection and testing required for feature of work.
- Verification that required certifications for equipment, personnel, testing facilities, etc. are available.
- Review of planned work procedures and clarification (as needed) of any specifications or drawings.

### 8.3 Initial Phase Inspection Reports

IPIRs will be prepared by the QCSM with input from the SS, as required. An example of the IPIR checklist is provided in Appendix B. At a minimum, the IPIR will include the following information (as applicable):

- Personnel participating in inspection, along with position and affiliation.
- Identification of new or changed job site activities, hazards or conditions that were not covered in health and safety documentation, and mitigative actions taken.
- Identification of workmanship that does not comply with work plan specifications and drawings.
- Identification of testing that has been completed or is in progress.

### 8.4 Preparatory Phase Meeting Minutes

The preparatory phase meeting between the government and the contractor will be documented by the QCSM on Form [NWI-CQCF-001.3, Preparatory Phase Meeting Minutes](#) (Appendix B).

### 8.5 Field Logbooks

The SS and QCSM will maintain separate field logbooks in accordance with [PWI-4201-002, Field Activities Documentation](#).

## 9.0 ASSESSMENT AND OVERSIGHT

A common misunderstanding is that inspections are an effective means to control work quality, when in fact, a properly implemented QC program generates quality products that meet specification with little or no rework resulting from inspections. Inspections cannot be relied upon to ensure the quality of the work. Only through detailed planning, use of knowledgeable and experienced personnel, and careful and deliberate work execution can quality products be consistently produced. Inspections are performed to verify that the QC program is functioning properly. Inspections also serve to document whether the requirements of the contract are being met. In addition to the routine on-site and off-site inspections, as described in Section 5, Quality Control Procedures, the following completion inspections will be performed.

### 9.1 Punch-Out Inspection

Near the end of the fieldwork, the QCSM and the SS shall conduct an inspection of the work. A punch list of items that do not conform to the approved drawings and specifications shall be prepared and included in the QC documentation.

The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The QCSM shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the PM shall notify the government that the facility is ready for the government pre-final inspection.

### 9.2 Pre-Final Inspection

The government will perform the pre-final inspection to verify that the project is complete. A government pre-final punch list may be developed as a result of this inspection. The QCSM shall ensure that all items on this list have been corrected before notifying the government so that a final inspection with the customer can be scheduled. Any items noted on the pre-final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections shall be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

### 9.3 Final Acceptance Inspection

The QCSM, SS, and the government representative shall be in attendance at the final acceptance inspection. Notice shall be given to the government at least 14 days prior to the final acceptance inspection and shall include the contractor's assurance that all specific items previously identified to the contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection.

## 10.0 QUALITY IMPROVEMENT

### 10.1 Identifying, Reporting, and Resolving Construction Deficiencies

All construction deficiencies in quality, workmanship, materials, equipment, supplies, and/or unauthorized deviations from engineering requirements or specifications shall be clearly identified, reported, and resolved in a manner as to not impact the overall quality of the construction work. The following procedure will be implemented for identifying, tracking, and resolving construction deficiencies:

- Upon discovery of a construction deficiency, the QCSM will discuss the issue with the SS and CM, as necessary. If the deficiency cannot be corrected by the end of that work day, then the QCSM will initiate a Construction Deficiency Report (CDR) (Appendix B).
- The CDR will include (at a minimum) a unique identification number, a description of the deficiency, the date identified, the feature of work, and reference drawings, codes, or specifications. Backup documentation (i.e., test results, photographs, etc.) may also be attached as applicable.
- The SS and CM (as necessary) shall review the CDR and note the recommended corrective action and planned completion date on the CDR.

**NOTE:** *If, in their opinion, any part of the rejected item can be reworked to a usable condition, the CDR will be so noted. However, if the item cannot be reworked, either from a practical or economic standpoint, then the item shall be scrapped and an entry made on the CDR to that effect.*

- Upon completion of corrective action, the SS shall notify the QCSM and allow sufficient time for re-inspection.
- After re-inspecting the item, the QCSM will enter the final status of the item on the CDR. If the item is found to meet the applicable requirements, the CDR will be considered closed and the item will be handled in the normal manner. If, however, the item still does not meet requirements, it will be rejected again and a new CDR will be prepared.

**NOTE:** *The process of evaluation, rework, and re-inspection will be repeated until the deficiency is corrected.*

- The QCSM shall maintain documentation of all construction deficiencies from identification through closure. The CDRs should be kept in a binder in the field trailer. It is good practice to keep open and closed CDRs in separate sections and to maintain a tracking log of all CDRs. Example CDRs and tracking logs are provided in Appendix B. Deficiencies shall also be noted by the QCSM in the DQCRs,

**NOTE:** *Should a discrepancy not be resolved in a timely manner, or should rework activities fail to produce an acceptable item, then the nonconformance process shall be initiated.*

## 10.2 Management of Nonconformances

Should a construction deficiency or discrepancy develop that cannot be repaired or replaced to the satisfaction of the QCSM, then such a deficiency will be considered a nonconformance. A nonconformance is a deficiency in characteristics, documentation, or procedures that renders the quality of an item or activity unacceptable or indeterminate.

During the course of construction, site personnel (particularly the QCSM and SS) may identify nonconformances. Government representatives may also identify nonconformances. Nonconformances will be documented according to [QAP-10-161, Corrective, Preventive, and Improvement Actions](#); [QAP-10-151, Control of Nonconforming Items](#); and [PQP-4201-001, Project Quality Plan for Los Alamos Site Office TA-73 Airport Landfill](#). Nonconforming items will be reported to the PM and the Corporate QA Manager who will work cooperatively to prepare a Nonconformance Report (NCR). The NCR will document the nonconformance, the root cause, and corrective actions taken (or to be taken) to prevent reoccurrence of the nonconformance.

[QAP-10-161, Corrective, Preventive, and Improvement Actions](#) establishes a Quality Board to evaluate nonconformance reports on a case-by-case basis. The PM and Corporate QA Manager comprise the Quality Board. Depending on the nature of the quality problem, other technical experts may also be included on the Quality Board. The Quality Board will disposition the quality problem by evaluating the significance of the problem, determining the cause(s) of the problem, and developing a proposed resolution consisting of corrective and preventive actions. This disposition will be documented on the NCR in accordance with [QAP-10-151, Control of Nonconforming Items](#).

The QA Manager tracks quality problems and corrective and preventive actions from identification through resolution using the Corrective and Preventive Action System in accordance with [QAP-10-161, Corrective, Preventive, and Improvement Actions](#). The QA Manager verifies completion of the corrective and preventive actions and closes the NCR.

## 10.3 Analysis of Quality Problems

In addition to the case-by-case evaluations of NCRs, the Corporate QA Manager and the Management Advisory Board shall periodically review quality problems and evaluate the effectiveness of corrective and preventive actions, identify items/processes needing improvement, and analyze failure costs for unfavorable trends in accordance with [QAP-01-004, Management Planning and Review](#).

## 11.0 SUBMITTALS

Submittals to the contractor and/or to the government during construction may include:

- Preconstruction submittals,
- Shop drawings,
- Product data,
- Samples,
- Design data,
- Test reports,
- Certificates,

- Manufacturer's instructions,
- Manufacturer's field reports,
- Operation and maintenance data, and
- Closeout submittals.

After the construction schedule has been finalized, the CM shall develop a submittal schedule. The submittal schedule shall be a sub-schedule to the overall construction schedule and shall include dates for delivery of the items mentioned above. After approval, the submittal schedule will be followed throughout the project unless it is superseded by a new schedule with the appropriate approvals.

The QCSM, or designee, shall track submittals as directed in the applicable specifications for each feature of work. The QCSM, or designee, shall keep the submittal register (NWI-CQCF-001.5) current at all times and available for inspection by DOE-LASO and their representatives.

Submittals or copies thereof shall be provided to the government as identified in the contract, in the specifications, in this QC Plan, or upon request. The number of submittals and general format of the documents will be as specified in Specification 01340, "Shop Drawings, Sample Product Data, and Other Submittals". The submittal register (Appendix D) identifies what submittals are required and to whom they must be submitted for various actions.

**NOTE:** *Copies of all submittals will be maintained on site and made available for inspection by the Government. Only those submittals that are identified as "Government Approved" will be formally transmitted to the Government.*

All submittals will be provided by NWI. No submittals shall be submitted directly to the government from any subcontractors, suppliers, manufacturers, or representatives. Submittals shall be identified by reference to contract number, drawing number, and specification section number, as appropriate. Each submittal shall be numbered consecutively with resubmissions using the same number with a suffix added to identify each revision (i.e., "A" shall identify the first revision).

Submittals requiring approval by the ER and/or the government will be reviewed and returned with one of the following classifications:

- APPROVED (\_\_\_)
- APPROVED AS CORRECTED (\_\_\_)
- REVISE AND RESUBMIT (\_\_\_)
- REJECTED (\_\_\_)
- NO ACTION TAKEN (\_\_\_).

The NWI project team (SS, CM, or PM, as appropriate) will then make any corrections required by the ER or by the government and resubmit the revised submittal, if needed, until the proper approval is obtained. The SS will keep a record of all approved changes and all field changes, including changes to lines and grades.

As-built specifications, drawings, change orders, and shop drawings will be maintained at the site at all times. At the completion of the contract, the contractor will submit the as-built specifications to the government along with an electronic version of all updated as-built documents.

## 12.0 REFERENCES

ASTM, 2004, *Test Method D3740*, "Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction," American Society for Testing and Materials, Conshohocken, Pennsylvania.

ASTM, 2003, *Test Method E329*, "Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction," American Society for Testing and Materials, Conshohocken, Pennsylvania.

DOE, 1997, Implementation Guide for Use with Suspect/Counterfeit Item Requirements of DOE O 440.1, Worker Protection Management, 10 CFR 830.120; and DOE 5700.6C, Quality Assurance. U.S. Department of Energy Guide 440.1-6, prepared by the Office of Environment Safety and Health, U.S. Government Printing Office, Washington, D.C. June.

North Wind, 2005a, "Remedy Design Work Plan for Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2004-031, North Wind, Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005b, "Construction Specifications for Los Alamos Site Office TA 73 Airport Landfill, 906 Design Submittal," Draft Final, NW-ID-2004-039, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005c, "Construction Plan for the Los Alamos Site Office TA-73 Airport Landfill, Revision 2, NW-ID-2004-001, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005d, "Waste Management Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2004-006, North Wind, Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005e, "Post-closure Care and Monitoring Plan for Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2004-027, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind 2005f, "Project Quality Plan for the Los Alamos Site Office TA-73 Airport Landfill, Revision 2, NW-ID-2003-071, North Wind, Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005g, "Project Management Plan for Los Alamos Site Office TA-73 Airport Landfill," Revision 2, NW-ID-2003-073, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005h, "Storm Water Pollution and Prevention Plan for Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2004-005, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005i, "Health and Safety Plan for Los Alamos Site Office TA-73 Airport Landfill," Revision 0, NW-ID-2004-017, North Wind Inc., Idaho Falls, Idaho, June 2005.

USACE, 1990, A Guide to Effective Contractor Quality Control (CQC), EP 715-1-2, United States Army Corps of Engineers.

The following are NWI quality documents that are controlled in accordance with QAP-10-171, Records Control. The latest revision applies:

NWI-QAM-01-001, North Wind, Inc., Quality Assurance Manual

QAP-01-004, Management Planning and Review

QAP-10-081, Product Identification and Traceability

QAP-10-101, Inspection

QAP-10-111, Test Control

QAP-10-151, Control of Nonconforming Items

QAP-10-161, Corrective, Preventive, and Improvement Actions

PQP-4201-001, Project Quality Plan for Los Alamos Site Office TA-73 Airport Landfill

PWI-4201-002, Field Activities Documentation

PWI-4201-005, Field Change

# Appendix A

## Acronyms

Appendix A  
Appendix B

## Appendix A

### Acronyms

ASTM	American Society for Testing and Materials
CDR	Construction Deficiency Report
CM	Construction Manager
CQCP	Construction Quality Control Plan
DDA	Debris Disposal Area
DFW	Definable Feature of Work
DOE	U.S. Department of Energy
DQCR	Daily Quality Control Report
ER	Engineer of Record
HASP	Health and Safety Plan
IPIR	Initial Phase Inspection Report
LASO	Los Alamos Site Office
MatCon™	Modified Asphalt Technology for Waste Containment
NAS	Network Analysis
NCR	Nonconformance Report
NWI	North Wind, Inc.
PCMP	Post-closure Care and Monitoring Plan
PM	Project Manager
PMP	Project Management Plan
PPIR	Preparatory Phase Inspection Report
PQP	Project Quality Plan
PWI	Project Work Instruction
QA	Quality Assurance
QAP	Quality Assurance Procedure
QC	Quality Control
QCSCM	Quality Control System Manager

SS	Site Supervisor
SWPPP	Storm Water Pollution Prevention Plan
TA	Technical Area
USACE	United States Army Corps of Engineers
WESTON	Weston Solutions, Inc.
WMP	Waste Management Plan

## **Appendix B**

### **Example Project Forms**

Appendix B  
Example Project Form

# Daily Quality Control Report

Contract Number / Task Order Number	Contractor	Project Title / NWI Project No.	
CQC Report Number	Date or Time Period	Location and Team	
<b>I. Weather Conditions:</b>			
Temp Low _____ Temp High _____ Cloudy <input type="checkbox"/> Partly Cloudy <input type="checkbox"/> Clear <input type="checkbox"/>			
Wind Speed _____ Precipitation <input type="checkbox"/> No <input type="checkbox"/> Yes _____ Inches			
<b>II. Quality Control Inspections Performed This Date</b> (Include inspections, results, deficiencies observed, and corrective action)			
Preparatory <input type="checkbox"/> see attached checklist			
Initial <input type="checkbox"/> see attached checklist			
Follow-Up <input type="checkbox"/>			
Was the construction deficiency tracking list updated this date? Yes <input type="checkbox"/> No <input type="checkbox"/>			
<b>III. Was Field Sampling and Testing Performed This Date?</b> Yes <input type="checkbox"/> No <input type="checkbox"/>			
If yes, then complete the following:			
	Type of test	Method/Matrix	Results
1.			
2.			
3.			
Have Data Quality Objectives been achieved? Yes <input type="checkbox"/> No <input type="checkbox"/>			
<b>IV. Have Samples Been Collected for Laboratory Analysis?</b> Yes <input type="checkbox"/> No <input type="checkbox"/>			
If yes, then complete the following:			
	Type of Test	EPA Test Method/Matrix	Quantity of Samples
1.			
2.			
3.			
Have required amount of QC trip blanks and rinsates been achieved? Yes <input type="checkbox"/> No <input type="checkbox"/>			
Have appropriate QC laboratory tests been ordered? (matrix spikes, method blanks, surrogates, reference standards, etc.) Yes <input type="checkbox"/> No <input type="checkbox"/>			
Have QA and QC samples been collected in the specified quantity? Yes <input type="checkbox"/> No <input type="checkbox"/>			
Have samples been properly labeled and packaged? Yes <input type="checkbox"/> No <input type="checkbox"/>			
<b>V. Health and Safety.</b>			
Worker protection levels this date: Level A <input type="checkbox"/> Level B <input type="checkbox"/> Level C <input type="checkbox"/> Level D <input type="checkbox"/>			
Was any work activity conducted within a confined space? Yes <input type="checkbox"/> No <input type="checkbox"/>			
Was any work activity conducted within an area determined to be immediately dangerous to life and health? Yes <input type="checkbox"/> No <input type="checkbox"/>			
Were approved decontamination procedures used on workers and equipments as required? Yes <input type="checkbox"/> No <input type="checkbox"/>			
Was a Job Safety Meeting held this date? Yes <input type="checkbox"/> No <input type="checkbox"/>			
Were there any lost time accidents this date? (If YES, attach copy of completed accident report) Yes <input type="checkbox"/> No <input type="checkbox"/>			
Was hazardous waste/material released into the environment? Yes <input type="checkbox"/> No <input type="checkbox"/>			
Safety comments: (Include any infractions of approved safety plan, and include instructions from Government personnel. Specify corrective action taken.)			

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## Daily Quality Control Report

<b>VI. Work Activities Performed This Date.</b>						
	Reference (DFW #/Tech Spec #)	Activity & Location	Quantity	Subcontractor		
1.						
2.						
3.						
4.						
5.						
<b>VII. Labor &amp; Manpower.</b>						
	Classification	Number	Employer	Hours		
1.						
2.						
3.						
4.						
5.						
Total Hours						
<b>VIII. Equipment.</b>						
	No. of Units	Plant/Equipment	Date of Safety Check	Hours Used	Hours Idle	Hours Repair
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
Total Hours						
<b>IX. Material Received to be Incorporated into Job.</b>						
						None <input type="checkbox"/>
	Acceptability	Stored Where?	Reference Plans/Drawings			
1.						
2.						
3.						
<b>X. Submittals Reviewed.</b>						
						None <input type="checkbox"/>
	Submittal No.	Spec/Plan Reference	By Whom	Action Taken		
1.						
2.						
3.						
<b>XI. Offsite Surveillance Activities. (include action taken)</b>						
						None <input type="checkbox"/>

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## Daily Quality Control Report

<b>XII.</b>	<b>Instructions Given by the Government to the Contractor.</b> (Include names, reactions, and remarks)	Verbal <input type="checkbox"/>	Written <input type="checkbox"/>	None <input type="checkbox"/>
<hr/> <hr/> <hr/>				
<b>XIII.</b>	<b>Work Progress.</b>			
1.	Are there any Contractor caused delays?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
2.	Are there any Contractor-potential findings of fact?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
3.	Are there any Government caused delays or potential finding of fact?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
4.	Are there any Government-potential findings of fact?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
5.	Are there any unforeseeable or weather related delays?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
<b>XIV.</b>	<b>Deficiency List.</b>			
Tracking No.	Deficiencies Identified (Not corrected by COB)	Tracking No.	Deficiencies Corrected (From Deficiency Tracking List)	
<b>XV.</b>	<b>Remarks.</b> (Include any visitors to project and miscellaneous remarks pertinent to work.)			
<hr/> <hr/> <hr/>				
<p>The above report is complete and correct, and all work reported is believed, to the best of my knowledge, to be in compliance with contract plans and specifications, except as noted above.</p>				
CQC System Manager Signature _____		Date _____		
<b>XVI.</b>	<b>Government Quality Assurance Comments.</b> (if applicable)			
Concurs with the QC report?			Yes <input type="checkbox"/>	No <input type="checkbox"/>
Additional comments or exceptions:				
QAR Signature _____		Date _____		
Supervisor's Initial _____		Date _____		

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## Initial Phase Checklist

Project Name: _____		Date: _____			
Project Number: _____					
Definable Feature of work: _____					
QA Rep. Notified (24 Hrs. in advance): <input type="checkbox"/> Yes <input type="checkbox"/> No      Date/Time: _____					
<b>I. Personnel Present.</b>					
	Name	Position	Company/Government		
1.					
2.					
3.					
4.					
5.					
<b>II. Safety.</b> Review current job site activities, hazards and conditions, compare to those described in the Job Safety Analysis / Site Safety and Health Plan and list new or changed conditions and action taken: _____ _____ _____					
<b>III. Workmanship.</b> Inspect workmanship for this feature; verify compliance with contract specifications, plans, and submittals. Identify any non-conforming items:					
	Items/Activities Inspected	In Spec?			
1.					
2.					
3.					
4.					
5.					
Is a sample panel required? <input type="checkbox"/> Yes <input type="checkbox"/> No					
Will the initial work be considered as a sample panel? <input type="checkbox"/> Yes <input type="checkbox"/> No					
<b>IV. Preliminary Work.</b> Was preliminary work and permits complete and correct. If not, what rework was needed? _____ _____ _____					
<b>V. Testing.</b> Identify testing completed and/or in progress.					
	Test	Location	Date	Tester	Per Test Plan?
1.					
2.					
3.					
4.					
5.					
CQC System Manager					

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**Effective: 04/10/05**

## Preparatory Phase Meeting Minutes

Project Name: \_\_\_\_\_  
 Contract No. / D.O. No. \_\_\_\_\_  
 NWI Project Number: \_\_\_\_\_ Meeting Date: \_\_\_\_\_

**Agenda:**

- |                                     |                            |
|-------------------------------------|----------------------------|
| 1. Review of contract, work plan    | 7. Safety Hazards List     |
| 2. Definable Features of Work (DFW) | 8. Equipment Certification |
| 3. Location of Site Affected        | 9. Permits Required        |
| 4. Relationship to other DFW        | 10. Testing Requirements   |
| 5. Sequence of Work                 | 11. Review of Submittals   |
| 6. Personnel/Other Certification    | 12. Other                  |

**Names of those present:**

Name	Affiliation	Name	Affiliation
1. _____	_____	7. _____	_____
2. _____	_____	8. _____	_____
3. _____	_____	9. _____	_____
4. _____	_____	10. _____	_____
5. _____	_____	11. _____	_____
6. _____	_____	12. _____	_____

**Points of Discussion:**

**Review Signatures:**

QC System Manager: \_\_\_\_\_ Date: \_\_\_\_\_  
 Site Supervisor: \_\_\_\_\_ Date: \_\_\_\_\_  
 Site Safety and Health Officer: \_\_\_\_\_ Date: \_\_\_\_\_

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**Effective: 04/10/05**

## Preparatory Phase Checklist

Project Name: _____		Date: _____	
Project Number: _____			
Definable Feature of Work: _____			
QA Rep. Notified (24 hrs in advance):		<input type="checkbox"/> Yes	<input type="checkbox"/> No
		Date/Time: _____	
<b>I. Personnel Present.</b>			
	Name	Position	Company/Government
1.			
2.			
3.			
4.			
5.			
<i>List additional personnel on reverse side.</i>			
<b>II. Safety.</b> Review planned job site activities, hazards and conditions compare to those described in the Job Safety Analysis/Site Safety and Health Plan. Document new or changed conditions:			
_____			
_____			
_____			
_____			
<b>III. Submittals.</b> Review submittals and/or submittal log. List missing or unapproved submittals:			
	Submittal	Missing or Unapproved?	
1.			
2.			
3.			
4.			
5.			
<b>IV. Materials.</b> Ensure all necessary materials are on hand. List missing or unapproved materials:			
	Item	Available?	In Spec?
	Properly Stored?	Comments/Deficiencies	
1.			
2.			
3.			
4.			
5.			
Check approved submittals against delivered material. Identify any discrepancies:			
_____			
_____			
_____			
_____			

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## Preparatory Phase Checklist

<b>V.</b>	<b>Preliminary Work.</b>	Examine work area to ensure preliminary work is complete. Ensure permits are complete and correct. Document discrepancy items:
<hr/> <hr/> <hr/> <hr/>		
<b>VI.</b>	<b>Specifications.</b>	Review all specifications for feature of work. Discuss procedure for accomplishing the work. Clarify any differences:
<hr/> <hr/> <hr/>		
<b>VII.</b>	<b>Testing.</b>	Review required control inspection and testing procedures and document below:
	Test	Location
	Date	Tester
	Ref. Test Plan	
1.		
2.		
3.		
4.		
5.		
<b>VIII.</b>	<b>Certifications.</b>	Review certifications for equipment, personnel, testing facilities, etc.
	Item	Company
		Certified?
1.		
2.		
3.		
4.		
5.		
<b>IX.</b>	<b>Specifications.</b>	Review contract specifications and compare to planned work procedures. Clarify any differences:
<hr/> <hr/> <hr/>		
<b>X.</b>	<b>Review Signature.</b>	Use this form as an agenda for the Preparatory Phase Meeting. Discuss all discrepancies and action items at the meeting and document on the Preparatory Phase Meeting Minutes form.
<hr style="width: 20%; margin-left: auto;"/> CQC System Manager		

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**Appendix C**  
**Construction Inspection Plan**

Appendix C  
Construction Inspection Plan

## Construction Inspection Plan

Activity/Project Description: LANL Landfill Cover

Project No. 4212	Project Manager: D. Jorgensen	Quality Engineer: A. Armstrong	Revision: A
Originator: G. Mecham	Date:	IP No.	
Reviewer	Date:		
Approval:	Date:		

Item No.	Process/Item/ Material or Equipment	Acceptance Criteria Reference	Method / Procedure Reference	Instructions	Feature of Work*	Person Responsible	Complete Initial/Date
1	Earthwork	Section 02200-1.04B	ASTM D421/D422	Independent Geotechnical Laboratory Testing	1	QCSM	
	Borrow Soils	Table 02200-1	ASTM D4318	Testing required for every 10,000 CY of material.	3		
	Fill Materials	Section 02200-2.01A	ASTM D2974	Provide certified test results prior to delivery of materials to site.	5		
		Appl design dwgs	ASTM D2216		8		
			ASTM D 698		10		
2	Earthwork	Section 02200-1.04B	ASTM D421/D422	Independent Geotechnical Laboratory Testing	6	QCSM	
	Borrow Soils	Section 02200-2.01B	ASTM D4318	Testing required for every 5,000 CY of material.			
	Infiltration Layer	Table 02200-1	ASTM D2216	Provide certified test results prior to delivery to the site. Must obtain approval to bring on-site.			
			ASTM D698	Conduct Permeability Testing.			
			ASTM D5084				

Item No.	Process/Item/ Material or Equipment	Acceptance Criteria Reference	Method / Procedure Reference	Instructions	Feature of Work*	Person Responsible	Complete Initial/Date
3	Earthwork Infiltration Layer Test Pad	Remedy Design Work Plan Section 02200-1.04B.3 Table 02200-1	ASTM D6391 ASTM D5093 ASTM D5084	Independent Geotechnical Laboratory Testing Test demonstration pad materials for hydraulic conductivity, infiltration rate, and permeability Complete testing, as specified in the Remedy Design Work Plan	6	QCSM	
4	Earthwork Borrow Materials Top Soils	Section 02200-1.04 Table 02200-1 Section 02200-2.01C	ASTM D421/D422 ASTM D2974 ASTM D2216 ASTM D4972 EPA 351.3 EPA 9056A	Independent Geotechnical Laboratory Testing Testing required for every 5,000 CY of material. Provide certified test results prior to delivery of materials to the site.	1 8	QCSM	
5	Earthwork Soil Placement Horizontal and Vertical Controls	Section 02200-1.04C Appl design dwgs	None	On-site verification and visual inspection of specified features and characteristics.	1 3 5 6	QCSM Engr	
6	Earthwork Soil Placement Fill Material	Section 02200-1.04C Table 02200-2 Section 02200-2.01A Appl design dwgs	ASTM D2922 ASTM D3017	On-site verification and visual inspection of specified features and characteristics. Geotechnical testing laboratory field moisture and density tests during compaction of each lift of soil. Tests performed every 10,000 square feet.	1 3 5 10	QCSM	

Item No.	Process/Item/ Material or Equipment	Acceptance Criteria Reference	Method / Procedure Reference	Instructions	Feature of Work*	Person Responsible	Complete Initial/Date
7	Earthwork Soil Placement Infiltration layer	Section 02200-1.04C Section 02200-2.01B Appl design dwgs	ASTM D2922 ASTM D3017 ASTM D421/D422 ASTM D698	On-site verification and visual inspection of specified features and characteristics. Geotechnical testing laboratory field tests: Density and Moisture Content – 2 samples/AC/Lift Particle Size – every 2,500 CY Standard Proctor – every 5,000 CY	6	QCSM Engr	
8	Earthwork Bedding Material Aggregate Base Course Standard Fill	Section 02200-2.02 Section 02200-2.03 Section 02200-2.04 Appl design dwgs	NM DOT Section 304.21	On-site verification and visual inspection of specified features and characteristics.	8 10	Engr	
9	Earthwork Geotechnical Test Borings	Section 02200-3.07 Appl design dwgs	ASTM D1586	On-site verification and visual inspection of specified features and characteristics. <b>3 to 5 geotechnical test borings shall be taken along the proposed alignment of Wall No. 1. Associated overburden shall also be sampled and analyzed.</b>	4	QCSM Engr	
10	Channel Protection Stone for outlet and channel protection	Section 02270-2.01 Table 02270-1 Appl design dwgs	NM DOT Section 602.221	On-site verification and visual inspection of specified features and characteristics.	8	SS	
11	Channel Protection Reno Mattress	Section 02270-2.03 Appl design dwgs	NM DOT Division 900	On-site verification and visual inspection of specified features and characteristics.	7	Engr	
12	Retaining Wall Anchor Testing	Section 02273-1.04C Appl design dwgs	TBD	On-site verification and visual inspection of specified features and characteristics. Independent Laboratory testing for anchor capacity.	4	QCSM Engr	

Item No.	Process/Item/ Material or Equipment	Acceptance Criteria Reference	Method / Procedure Reference	Instructions	Feature of Work*	Person Responsible	Complete Initial/Date
13	Road Materials	Section 02500-2.01 Appl design dwgs	ASTM D3042 ASTM D421/D422	Independent Geotechnical Laboratory Testing Testing of source material prior to delivery of materials to the site.	2	QCSM SS	
14	Hot Mix Asphalt Subgrade	Section 02511-3.01A	Per WCC Requirements	On-site verification and visual inspection of specified features and characteristics by the WCC Certified installation subcontractor.	11	WCC	
15	Hot Mix Asphalt	Section 02511-3.03	Per WCC Requirements	Testing and inspection of MatCon will be implemented in accordance with the established WCC Requirements	11	WCC	
16	Stormwater Pipe Fitting Structures	Section 02720-1.02 NM DOT Section 570 NM DOT Section 623 ASTM A48-83 ASTM C923	None	On-site verification and visual inspection of specified features and characteristics. Materials shall be inspected prior to installation. Each manhole shall be visually inspected for leaks.	10	SS	
17	Gas Collection System	Section 02730 Appl design dwgs	None	On-site verification, visual inspection and material testing of specified features and characteristics for listed items. All materials shall be inspected prior to installation.	9	QCSM SS	
18	Erosion and Sediment Control	Section 02930 ASTM D4632 ASTM D3786 ASTM D4833 ASTM D4491 ASTM D4751 ASTMD4355 AASHTO Appl design dwgs	SWPPP	On-site verification and visual inspection of specified features and characteristics. All erosion and sediment controls shall be inspected the next morning after rainfall events in excess of 0.5 inches and prior to forecasted storms. Inspections shall be performed at a minimum of every 2 weeks.	1 2 3 6 7 8 9 10	SS	

Item No.	Process/Item/ Material or Equipment	Acceptance Criteria Reference	Method / Procedure Reference	Instructions	Feature of Work*	Person Responsible	Complete Initial/Date
19	Seeding Mulching and Revegetation	Section 02932-1.04 Federal Seed Act NM Seed Law NM/Los Alamos Co. Noxious Weed Control Act Harmful Plant Act	As applicable	On-site verification and visual inspection of specified features and characteristics. Inspect all seed mixture containers, specifications and labels.	1	QCSM SS	
20	Seeding Mulching and Revegetation	Section 02932-3.10	None	Seeded areas will be inspected for final acceptance and stabilization.	1	QCSM Engr	
21	Chain Link Fence	Section 02980 Part 2 ANSI/ASTM F567 ASTM C94 Appl design dwgs	Section 02980 Table 02980-1	On-site verification and visual inspection of specified features and characteristics.	4	SS	
22	Chain Link Fence Grounding	Section 02980-3.03 Appl design dwgs	None	Inspect grounding components and measure ground resistivity.	4	QCSM Engr	
23	Cast in Place Concrete Mix Design	Section 03300 ACI 301	ASTM C172 ASTM C192 ASTM C31	Concrete mix testing shall be completed by an independent testing laboratory. (3 test cylinders for each mix design) Compression test breaks completed at 7 and 28 days.	10	QCSM Engr	
24	Cast in Place Concrete Design Verification	Section 03300 ACI 301	ASTM C143	Perform slump tests for each ten cubic yards or per truck load of delivered concrete.	10	QCSM Engr	
25	Cast in Place Concrete Design Verification	Section 03300 ACI 301	ASTM C231 ASTM C173	Test each design mix for air content.	10	QCSM	

Item No.	Process/Item/ Material or Equipment	Acceptance Criteria Reference	Method / Procedure Reference	Instructions	Feature of Work*	Person Responsible	Complete Initial/Date
26	Cast in Place Concrete Concrete Placement	Section 03300 ACI 301 Appl design dwgs	ASTM C39 ASTM C31	One set of three cylinders shall be taken for each classification of concrete placed in any given day, and for every 100 cubic yards of concrete placed.  Two cylinders shall be lab cured.  One cylinder shall be field cured.	10	QCSM SS	
27	Cast in Place Concrete Concrete Placement	Section 03300 ACI 301 Appl design dwgs	None	On-site verification and visual inspection of specified features and characteristics.  Inspect all forms prior to placement of concrete.	10	QCSM SS	
28	Pre-cast Concrete	Section 03400	None	On-site verification and visual inspection of specified features and characteristics.	10	SS	
29	Geosynthetics	Section 06005	None	Inspect and monitor example fabric seaming procedures.	7	Engr	
30	Geosynthetics	Section 06005 Appl design dwgs	None	On-site verification and visual inspection of specified features and characteristics	7	SS	
31	Geosynthetics	Section 06005-3.02		Perform receipt inspection on all materials.  Perform a visual inspection as product is installed.  Complete trial seams as specified.  Complete non-destructive seam continuity testing.	7	Installer	
32	Geotextiles Placement	Section 06020 Appl design dwgs	None	On-site verification and visual inspection of specified features and characteristics.  Perform material receipt inspections  Visually inspect materials as product is installed.	7	Installer	

Item No.	Process/Item/ Material or Equipment	Acceptance Criteria Reference	Method / Procedure Reference	Instructions	Feature of Work*	Person Responsible	Complete Initial/Date
33	<u>Drainage composite</u>	<u>Section 06030</u> <u>Appl design dwgs</u>	<u>ASTM D1505</u> <u>ASTM D1603</u> <u>ASTM D5199</u> <u>ASTM D1238</u> <u>ASTM D5034/5035</u> <u>ASTM D5034/5035</u> <u>ASTM D4716</u> <u>ASTM D751</u>	<u>Perform receipt inspection on all materials for required tests.</u> <u>Perform visual inspection as product is installed for faulty areas relating to net integrity, continuity, overlapping/joining technique, and panel placement/orientation.</u>	<u>6</u>	<u>QCSM</u> <u>SS</u> <u>Installer</u>	
34	<u>Geocellular Slope Protection</u>	<u>Section 02340</u> <u>Appl design dwgs</u>	<u>As per vendor specifications</u>	<u>Perform receipt inspection on all materials for required tests as per vendor specifications.</u> <u>Perform visual inspection as product is installed</u>	<u>7</u>	<u>QCSM</u> <u>SS</u> <u>Installer</u>	

\* Activity identifiers from construction schedule (see Section 6, Table 1, of this CQCP).

QCSM = Quality Control System Manager  
 SS = Site Supervisor  
 WCC = Wilder Construction Company



**Appendix D**  
**Submittal Register**

Appendix B  
Construction Register



CONTRACT NUMBER																										
TITLE AND LOCATION:				PROJECT NAME											CONTRACTOR						SPECIFICATION SECTION					
				Los Alamos Site Office TA-73 Airport Landfill											North Wind, Inc.											
ACTIVITY NUMBER	TRANSMITTAL NUMBER	ITEM NUMBER	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEMS SUBMITTED	TYPE OF SUBMITTAL										CLASSIFICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOV'T ACTION		REMARKS
					DATA	DRAWING	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATIONS	SAMPLES	RECORDS	O & M MANUAL	INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE	DATE	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
		1	01310-1.03	Initial Construction Schedule				X								X		10 days after award	10 days							
		2	01310-1.03	Construction Schedule				X							X			Monthly								
		3	01340-1.03	Submittal Schedule				X								X		10 days after award	10 Days							
		4	1340	Schedule of Values					X							X		5 days after award								
		5	01340-1.09	As-Built Drawings		X										X		10 days after const comp								
		6	1340-1.09	As-Built Drawings - Electronic Files		X										X		15 days after redlines complete								
		7	01400-1.01	Project Quality Assurance Plan	X											X		5 days PTC	PTC							
		8	02005-1.03A	Quality Assurance Supervisor Notice					X							X		5 days PTC	PTC							
		9	02005-1.03B	Pre Constuction Survey Plan	X											ER		PTC								
		10	02005-1.03B	Pre Constuction Survey	X									X		ER		2 days after complete								
		11	02005-1.03B	Subgrade Surface Survey	X									X		ER		2 days after complete								

ER = Engineer of Record  
PTC = prior to construction start



CONTRACT NUMBER																											
TITLE AND LOCATION:				PROJECT NAME Los Alamos Site Office TA-73 Airport Landfill														CONTRACTOR North Wind, Inc.						SPECIFICATION SECTION			
ACTIVITY NUMBER	TRANSMITTAL NUMBER	ITEM NUMBER	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEMS SUBMITTED	TYPE OF SUBMITTAL										CLASSIFICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVT ACTION		REMARKS	
					DATA	DRAWING	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATIONS	SAMPLES	RECORDS	O & M MANUAL	INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE	DATE		
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa	
		12	02005-1.03B 02266-1.04A	Subgrade Surface Survey - East Slope	X									X		ER		2 days after complete									
		13	02005-1.03B	Top Surface of Interim Cover Survey	X									X		ER		2 days after complete									
		14	02005-1.03B	Top Surface of Infiltration Layer Survey	X									X		ER		2 days after complete									
		15	02005-1.03B	Top surface of Aggregate Base Course Survey	X									X		ER		2 days after complete									
		16	02005-1.03B	Final Grade Surface Survey	X									X		ER		2 days after complete									
		17	02005-1.03B 02273-3.03	Horizontal Alignment / Top and Bottom of Retaining Walls	X									X		ER		2 days after complete									
		18	02005-1.03B	Final Grade of Stormwater Management Structures Survey	X									X		ER		2 days after complete									
		19	02200-1.04	Certified Soil Test Report												ER		2 wks PTU									
		20	02200-1.04	Laboratory Test Report												ER		PTD									
		21	02200-1.04	Certificate of Compliance Soil Borrow Source										X		ER		PTS									
		22	02200-1.05A	Delivery Tickets - Soil										X		ER		As Delivered									

ER = Engineer of Record  
 PTD = prior to delivery  
 PTS = prior to shipment  
 PTU = prior to use



CONTRACT NUMBER																																				
TITLE AND LOCATION:				PROJECT NAME Los Alamos Site Office TA-73 Airport Landfill														CONTRACTOR North Wind, Inc.						SPECIFICATION SECTION												
ACTIVITY NUMBER a	TRANSMITTAL NUMBER b	ITEM NUMBER c	SPECIFICATION PARAGRAPH NUMBER d	DESCRIPTION OF ITEMS SUBMITTED e	TYPE OF SUBMITTAL											CLASSIFICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVT ACTION		REMARKS aa									
					DATA f	DRAWING g	INSTRUCTIONS h	SCHEDULES i	STATEMENTS j	REPORTS k	CERTIFICATIONS l	SAMPLES m	RECORDS n	O & M MANUAL o	INFORMATION ONLY p	GOVERNMENT APPROVED q	REVIEWER r	SUBMIT s	APPROVAL NEEDED BY t	MATERIAL NEEDED BY u	CODE v	DATE w	SUBMIT TO GOVERNMENT x	CODE y	DATE z											
		23	02200-1.05A	Getotechnical Test Boring Log and Site Plan			X										ER			PTC Wall #1																
		24	2270	Certificate of Compliance - Stone, Geotextiles and Fasteners, Erosion Control Blankets, Erosion Control Mats													ER			PTC																
		25	02270-2.03	Product Data - Reno Mattress, Geotextile Materials	X												ER			PTP																
		26	02270-2.03	Installation Instructions			X													PTC																
		27	02273-1.01D	Retaining Wall Construction Quality Assurance Plan	X		X											X		2 wks PTC	PTC															
		28	02273-1.03A	Retaining Wall Conceptual Design			X											X		2 wks after award	10 days															
		29	02273-1.03A 02273-1.04	Retaining Wall Detail Design			X										ER	X		2 wks after concept app	5 days															
		30	02273-1.03B	Retaining Wall Installation Drawings			X										ER			PTP																
		31	02273.1.03B	Product Data - Retaining Wall Materials	X												ER			PTP																
		32	02273-1.03D	Retaining Wall Materials Certificate of Conformance													ER			PTS																
		33	02273-1.03E	Retaining Wall Materials Certified Test Reports																PTS																

ER = Engineer of Record  
 PTC = prior to construction start  
 PTD = prior to delivery  
 PTS = prior to shipment

CONTRACT NUMBER																											
TITLE AND LOCATION:				PROJECT NAME														CONTRACTOR						SPECIFICATION SECTION			
				Los Alamos Site Office TA-73 Airport Landfill														North Wind, Inc.									
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					DATA	DRAWING	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATIONS	SAMPLES	RECORDS	O & M MANUAL	INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE	DATE		
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa	
		34	02273-1.03F	Retaining Wall Component Installation and Repair Procedures			X								ER			PTC									
		35	02273-1.03F	Retain Wall Inspection and Maintenance Plan										X	ER			After const complete									
		36	02273-3.05	Retain Wall Anchor Test Reports						X					ER			PTI									
		37	02500-1.02	Road Material Certificate of Conformance							X				ER			PTD									
		38	02500-1.02	Road Material Certified Test Report						X					ER			PTD									
		39	02511-1.04	MatCon Quality Control Document	X		X									X		2 weeks PTC	PTC								
		40	02511-1.05B	HMA Mix Design	X										ER			2 weeks PTC									
		41	02511-1.05A	HMA Delivery Tickets									X		SS			TS									
		42	02511-3.03	HMA Test Report						X					ER			After const complete									
		43	02720-	Storm Drain System Shop Drawings			X								ER			PTC									
		44	02720-2.04	Certificate of Compliance - Storm Drain Piping & Structures							X				ER			PTC									

ER = Engineer of Record  
HMA = hot mix asphalt  
PTC = prior to construction start  
PTD = prior to delivery  
PTI = prior to installation  
SS = Site Supervisor  
TS = time of shipment

CONTRACT NUMBER																											
TITLE AND LOCATION:				PROJECT NAME Los Alamos Site Office TA-73 Airport Landfill														CONTRACTOR North Wind, Inc.						SPECIFICATION SECTION			
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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa	
		45	02720-1.03B	Piping Material Invoices									X		ER			TS									
		46	02720-1.03C	Pipe / Structure Installation & Repair Procedures			X								ER			PTI									
		47		HDPE Welder Qualifications							X				ER			PTI									
		48	02730-1.03	Gas Collection System Installation Drawings		X										X		2 wks PTC	PTC								
		49	02730-1.03	Certificate of Compliance - Gas Collection System Components							X				ER			PTS									
		50	02730-1.03	Certified Test Reports						X					ER			PTS									
		51	02930-1.04	Samples - Erosion Control Mat, Erosion Control Blanket								X			ER			PTS									
		52	02930-1.05	Product Data - Erosion control components	X										ER			PTP									
		53	02932-1.07 02932-2.03 02932-2.04	Product Data / Catlog Sheets - Seeding, Mulching, etc Materials	X										ER			PTP									
		54	02932-2.01E	Seed Mixture	X										ER			PTP									
		55	02932-1.03	Certificate of Compliance - Origin of Seed							X				ER			PTS									

ER = Engineer of Record  
 PTC = prior to construction start  
 PTI = prior to installation  
 PTP = prior to purchase  
 PTS = prior to shipment  
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					DATA f	DRAWING g	INSTRUCTIONS h	SCHEDULES i	STATEMENTS j	REPORTS k	CERTIFICATIONS l	SAMPLES m	RECORDS n	O & M MANUAL o	INFORMATION ONLY p	GOVERNMENT APPROVED q	REVIEWER r	SUBMIT s	APPROVAL NEEDED BY t	MATERIAL NEEDED BY u	CODE v	DATE w	SUBMIT TO GOVERN-MENT x	CODE y	DATE z			
		56	02932-1.03	Seeding Mulch Installation Instructions			X									ER			PTI									
		57	02980-1.03 Part 2	Product Data - Fence fabric, posts, accessories, fittings & hardware	X											ER			PTI									
		58	02980-1.03B	Shop Drawings - Fence		X										ER			PTP									
		59	02980-1.03C	Samples - Fence								X				ER			PTP									
		60	02980-1.03D	Fabric Roll Identifier Tags									X			ER			TS									
		61	03300-1.03B Part 2	Concrete Mix Design	X											ER			PTP									
		62	03300-1.03B Part 2	Concrete Samples								X				ER			30 days PTP									
		63	03300-	Slump Test Results										X		ER			TS									
		64	03300-1.06	Shop Drawings - Cast in Place Concrete, Reinforced Steel		X											X		2 wks PTP	PTP								
		65	03300-1.06	Concrete Test Results												ER			PTP									
		66	03300-1.06	Steel Certificates of mill analysis, tensile tests and bend tests												ER			PTS									

ER = Engineer of Record  
 PTI = prior to installation  
 PTP = prior to purchase  
 PTS = prior to shipment  
 TS = time of shipment

CONTRACT NUMBER																											
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					DATA	DRAWING	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATIONS	SAMPLES	RECORDS	O & M MANUAL	INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE	DATE		
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa	
		67	03300-1.06G	Concrete Construction Procedures			X								ER			PTC									
		68	03300-2.02E	Color Samples - Concrete Ad Mixture								X			ER			PTC									
		69	03300-2.07 03300-2.08	Product Data - Expansion Joint Filler Material & Accessories	X										ER			PTC									
		70	03400-1.02C	Certificate of Compliance - Precast Concrete							X				ER			PTS									
		71	03400-1.03B	Shop Drawings - Precast Concrete Installations		X									ER			PTS									
		72	03400-1.03C	Precast Concrete Installation Procedures			X								ER			PTI									
		73	03400-2.01	Certified Test Reports - Precast Concrete Components						X					ER			PTS									
		74	03400-Part 2	Product Data - Gaskets, Sealants, Bituminous Coatings Grates/Frame	X										ER			PTP									
		75	06005-1.03A	Product Data - Polyethylene Geomembrane	X										ER			PTP									
		76	06005-1.03A, C K & N	Certificate of Compliance - Manufacturing Materials							X				ER			PTS									
		77	06005-1.03A	Geomembrane Manufactureres Warrenty								X			ER			AC									

AC = at completion  
ER = Engineer of Record  
PTC = prior to construction start  
PTI = prior to installation  
PTP = prior to purchase  
PTS = prior to shipment



CONTRACT NUMBER																										
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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
		78	06005-1.03B	Geomembrane Panel Layout Drawings		X									ER			PTI								
		79	06005-1.03F	Geomembrane Manufacturers Repair & Install Procedure			X								ER			PTI								
		80	06005-1.03G	Geomembrane Manufacturers Field Seaming Procedure			X								ER			PTI								
		81	06005-1.03H	Geomembrane Manufacturers Seam Testing Procedure			X								ER			PTI								
		82	06005-1.03A, I 06005-3.05	Installer Quality Control Log and Weld Reports						X			X		ER			Daily								
		83	06005-1.03A.1	Resin Supplier Quality Control Certificates							X				ER			PTS								
		84	06005-1.03A	Chemical Compatibility Test Report							X				ER			PTS								
		85	06005-1.03B 06005-2.01	Certified Test Reports - Geomembrane - Raw Materials						X					ER			PTS								
		86	06005-1.02B	Installer Qualifications									X			X		3 wks PTI	PTI							
		87	06020-1.03C	Manufacturers Product Data / Qualifications	X										ER			PTP								
		88	06020-1.03C	Installer QC Log Format								X			ER			3 wks after award								

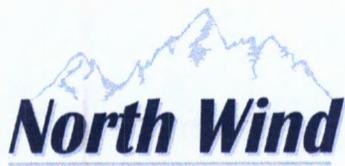
ER = Engineer of Record  
 PTI = prior to installation  
 PTP = prior to purchase  
 PTS = prior to shipment



CONTRACT NUMBER																										
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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
		89	06020-1.03C	Installer QC Logs									X		ER			Daily								
		90	06020-1.03A & D Table 06020-1	Certified Test Reports - Geotextiles						X					ER			PTS								
		91	06020-1.03B & E	Geotextile Installation and Repair Procedures			X								ER			3 wks after award								
		92	06020-1.03B	Geotextile Installer Qualifications									X		ER			2 wks after award								

ER = Engineer of Record  
PTS = prior to shipment

**Attachment D**  
**Waste Management Plan**  
**for the LASO TA-73 Airport Landfill**



NW-ID-2004-006  
Revision 2

# **WASTE MANAGEMENT PLAN FOR THE LOS ALAMOS SITE OFFICE TA-73 AIRPORT LANDFILL**

April 2006

Prepared for:

U. S. Department of Energy, National Nuclear Security Administration  
Los Alamos Site Office  
528 35<sup>th</sup> Street  
Los Alamos, New Mexico 87544

Prepared by:

North Wind Inc.  
1425 Higham Street  
Idaho Falls, Idaho 83402

**DOCUMENT APPROVAL PAGE**

Document Number: NW-ID-2004-006 Revision: 2

Document Title: Waste Management Plan for the Los Alamos Site Office TA-73 Airport Landfill

**Approval Signatures**

<b>Name</b>	<b>Signature</b>	<b>Date</b>	<b>Title</b>
Doug Jorgensen	Original signature on file	05/24/05	North Wind Project Manager
Robert Enz	Original signature on file	05/24/05	U.S. Department of Energy, LASO

**Revision Log**

<b>Revision</b>	<b>Date</b>	<b>Reason for Revision</b>
Draft	02/07/04	Not applicable; first draft of document
Revision 0	03/15/04	Document revised to incorporate DOE/LASO comments of 02/26/04.
Revision 1	05/31/05	Document revised to reflect scope change per DOE revised SOW.

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**APPENDICES**

Appendix A—Acronyms..... A-1

## 1.0 INTRODUCTION

This Waste Management Plan (WMP) describes methods that North Wind Inc. (NWI) will use to manage investigation-derived waste (IDW) generated during execution of the U.S. Department of Energy (DOE) Los Alamos Site Office (LASO) Technical Area (TA)-73 Airport Landfill and Debris Disposal Area (DDA) project, henceforth referred to as the Airport Landfill project.

As described in the DOE Savannah River Operations Office Statement of Work (SOW) for the Airport Landfill (DOE 2003), the Airport Landfill project mission consists of designing and constructing an earthen evapotranspiration cover over Solid Waste Management Unit (SWMU) 73-001(a) and recontouring and reseeding SWMU 73-001(d). SWMU 73-001(a) is an inactive municipal landfill, hereinafter referred to as the main landfill. SWMU 73-001(d) is an inactive debris disposal area, hereinafter referred to as the DDA. Due to stakeholder concerns, DOE has revised the scope for the main landfill. This scope revision calls for a Modified Asphalt Technology for Waste Containment (MatCon™) asphalt surface over the flat portion of the landfill, a gas venting layer under the MatCon™ surface, and a retaining wall along the base of the east slope. In addition, certain airport improvements will be made along the west end of the main landfill, which may include hangar footings and aircraft tie-downs. The design of the DDA cover was not affected by the revised scope.

The site description and operational history are documented in the Los Alamos National Laboratory (LANL) Voluntary Corrective Measure (VCM) Plan (LANL 2002).

### 1.1 Document Contents

Section 1.0 is an introduction and discusses supporting documents, site description and background, and the scope of the WMP. Section 2.0 presents the waste management goals of the project. Section 3.0 provides methods for pollution prevention and waste minimization. Section 4.0 describes management of nonhazardous waste streams and Section 5.0 describes management of petroleum-contaminated soil (PCS). Section 6.0 discusses training objectives and methods, and Section 7.0 provides references cited in this plan.

### 1.2 Document Interfaces

This WMP implements and interfaces with the following project documents, as described below:

- Project Quality Plan (PQP) for the LASO TA-73 Airport Landfill (North Wind 2005a),
- Project Management Plan (PMP) for the LASO TA-73 Airport Landfill (North Wind 2005b),
- Storm Water Pollution Prevention Plan (SWPPP) for the LASO TA-73 Airport Landfill (North Wind 2005c),
- Construction Plan for the LASO TA-73 Airport Landfill (North Wind 2005d), and
- Health and Safety Plan (HASP) for the LASO TA-73 Airport Landfill (North Wind 2005e).

#### 1.2.1 Project Quality Plan

The PQP (North Wind 2005a) describes how NWI will implement a quality assurance (QA) program that complies with applicable DOE and federal regulations.

### **1.2.2. Project Management Plan**

The PMP (North Wind 2005b) describes the management structure and processes that NWI will use to manage the project.

### **1.2.3. Storm Water Pollution Prevention Plan**

The SWPPP (North Wind 2005c) addresses storm water discharges associated with construction and post-construction activities and describes how the project will comply with the terms and conditions of the "National Pollutant Discharge Elimination System General Permit for Storm Water Discharges from Construction Activities" (FR 2003).

### **1.2.4. Construction Plan**

The Construction Plan (North Wind 2005d) directs, schedules, and controls construction-related activities. The Construction Plan identifies the work force, materials, hardware, other resource requirements, and subcontractor requirements.

### **1.2.5. Health and Safety Plan**

The HASP (North Wind 2005e) addresses construction activities as they relate to the DOE integrated safety management system, safe work practices, hazard identification and mitigation, occurrence reporting methods, and required training. The HASP was prepared in accordance with applicable safety standards and regulations.

## **1.3 Site Description and Background**

The Airport Landfill consists of two SWMUs: 73-001(a), main landfill, and 73-001(d), DDA. Both are inactive SWMUs and are listed in Table A within Module VIII of LANL's Hazardous Waste Facility Permit (LANL 1996). Both SWMUs are located within TA-73 on DOE property, as shown in Figure 1.3-1 (see Section 7). The main landfill is east of the existing airport hangars and the DDA is east of the end of the runway. Figure 1.3-2 (see Section 7) shows the location of the SWMUs in TA-73.

In 1943, the DOE began using the hanging valley north of the airport runway as the main landfill. Garbage was collected twice a week from the LANL and town site and burned on the edge of the hanging valley. Heavy equipment was then used to push the burned residues and ash into whichever landfill disposal area was being used at the time. This intentional burning ceased in 1965 when Los Alamos County assumed operation of the landfill. The county continued to operate the landfill until June 30, 1973.

The DDA was used from 1984 to 1986 to bury debris excavated from the western portion of the main landfill. This material was excavated and replaced with clean fill to prepare the western portion of the landfill for the construction of airplane hangars and tie-down areas. Since the wastes placed in the DDA came from the main landfill, both areas contain similar types of debris. In 1986, the DDA landfill was covered with soil and hydroseeded.

## **1.4 Scope of Waste Management Plan**

This WMP describes methods to manage IDW and does not pertain to existing landfill waste that may be potentially contaminated or hazardous. Specifically, the WMP addresses management of nonhazardous waste streams and management of PCS, which may be generated as the result of leaks from heavy equipment or fuel spills during refueling activities.

The design for construction of the cover over the main landfill involves exposing and relocating landfill waste from the north and east slopes to obtain an acceptable grade for slope stability. A cover will then be constructed over the main landfill. The site background and process knowledge presented in the RCRA Facility Investigation (RFI) Report for Potential Release Sites 73-001(a,b,c,d) and 73-004(d), Airport Landfill Areas (LANL 1998) strongly indicate that only municipal landfill waste (i.e., nonhazardous waste) was disposed of at the main landfill. Thus, contaminated or hazardous waste is not expected to be encountered during waste relocation activities.

Certain waste streams (i.e., personal protective equipment [PPE] and wash fluids) would be considered potentially contaminated waste only by virtue of contact with potentially contaminated media (i.e., relocated landfill waste). In the unlikely event that hazardous waste is exposed during relocation, best management practices (BMPs) will be used to avoid contact. These BMPs are identified in the HASP (North Wind 2005e) and may include identification criteria, waste segregation, access controls, and immediate covering with soil. Implementing these BMPs will eliminate the potential to contaminate IDW and create a hazardous waste stream.

## **2.0 WASTE MANAGEMENT GOALS**

The two primary waste management goals for the Airport Landfill project are as follows:

1. Minimize, substitute, or eliminate IDW as much as possible, then;
2. Collect, store, and dispose of any remaining IDW in a manner protective of human health and the environment.

These goals will be accomplished by using pollution prevention and waste minimization practices to the greatest extent possible. Remaining IDW will be managed consistent with the final remedy and by assessing the risk posed by managing the waste onsite based on site access controls and anticipated contaminant concentrations.

## **3.0 POLLUTION PREVENTION AND WASTE MINIMIZATION**

This section describes pollution prevention techniques and methods to minimize generation of IDW. These practices will reduce the need for special storage or disposal requirements that may result in substantial additional costs yet provide little or no reduction in risk to human health and the environment. Additional information is provided in the SWPPP (North Wind 2005c).

### **3.1 Material Handling**

A designated materials storage area will be established to prevent storm water from coming into contact with potential pollutants and reduce material loss from blowing wind. Construction materials (i.e., seed or fertilizer) will be stored in closed bins or placed on pallets and covered with heavy mil plastic or tarpaulins. Petroleum products will be stored in an approved cabinet or container. Materials will be stacked according to directions to avoid damage and possible spillage. Transfer of material from its original container to a secondary container will be avoided to the extent possible to minimize spillage.

### **3.2 Equipment Inspection and Maintenance**

Vehicles and heavy equipment will be monitored daily before use for proper operation and to detect leaking fluids. If fluid leaks or conditions conducive to fluid leaks are detected, the vehicle will either be removed from the site, parked over heavy mil plastic, or a drip pan will be placed under the vehicle. The leak will be corrected before the vehicle is placed back into service. When not in use, heavy equipment will be parked at the construction parking lot. Regular maintenance of heavy equipment will minimize the potential for spills or leaks. A service truck will be used to maintain and service heavy equipment. This activity will occur at a designated area.

Drip pans will be the primary tool for containing leaks. Drip pans will be placed under leaking vehicles until the vehicle can be removed from the site or repaired. Drip pans will be emptied into a composite container, either at the end of each day or as needed. The Construction Manager (CM) (or designee) will ensure drip pans are emptied at a frequency sufficient to eliminate the possibility of spillage. The frequency of emptying the pan will depend on the volume of the leak and the potential for the drip pan to lose its contents by inadvertent tipping, high winds, or other means.

Disposition of any collected liquids may be assigned to the waste management subcontractor or, if properly segregated and documented, may be disposed of at an appropriately licensed facility.

### **3.3 Spill Prevention**

To avoid fuel spills during refueling, an assigned individual will always be present during refueling and will be aware of the location and operation of the shut-off valve of the fuel tanker. Small equipment (i.e., generators or pumps) will be placed over bermed heavy mil plastic. If refueling spills or leaks occur, the bermed plastic will contain the pollutants until proper cleanup and disposal. Drip pans may also be used for refueling or for placement under equipment that is leaking or has the potential to leak. If used, drip pans will be managed as described in Section 3.2.

A spill kit containing a first aid kit, airhorn, PPE for cleanup activities, shovel, leather gloves, and appropriate absorbents (e.g., pillows, tubes, sand or vermiculite, pads, and paper towels) will be readily available to control and contain spills. Site personnel will be trained in the use of the spill kit and in spill notification procedures.

### **3.4 Product Substitution**

To the extent possible, potentially hazardous materials will be substituted for less hazardous or non-hazardous products.

### **3.5 Recycling**

A recycling station will be established onsite that may include recycling of aluminum cans, office paper products, packaging material (e.g., shrink-wrap and corrugated cardboard), plastic containers (e.g., 5-gal containers for motor oil or hydraulic fluid), and glass. The final selection of materials to be recycled will be made based on information from local recyclers or Los Alamos County. Since "curbside" recycling is not anticipated, the CM, or designee, will ensure that collected material will be transported to the recycling center.

### **3.6 Salvage**

Salvage opportunities for this project include:

- Chippings – cleared and grubbed vegetation from the DDA will be chipped and tilled into the topsoil prior to revegetation of this area. Cleared and grubbed vegetation from the main landfill will be chipped and disposed of in a suitable off-site landfill or used to augment topsoils in the DDA.
- Wood pallets – wood pallets used for storage of delivered materials will be reused during the project to the extent possible. After construction is complete, wood pallets may be returned to their source, if possible, or may be disposed of as construction debris.
- Straw bales – straw bales used for storm water management controls will be broken apart and spread over the revegetated portions of the DDA as mulch.

- Chain link fence – a portion of the existing perimeter chain link fence along the east slope of the main landfill will be removed to allow construction access. To the extent possible, dictated by the construction schedule and cost constraints, undamaged fencing will be re-used at the toe of the east slope where new fencing is required. Fencing that cannot be re-used will be recycled or sold for salvage.

#### **4.0 NONHAZARDOUS WASTE STREAM MANAGEMENT**

Management of IDW will be based on field observations, process knowledge, and BMPs. Management of IDW will be consistent with the final remedy (landfill caps) for the site, thus avoiding the need for separate treatment and/or disposal arrangements. Pollution prevention and waste minimization practices will be used to the greatest extent possible to reduce the amount of nonhazardous IDW generated during the course of the Airport Landfill project.

##### **4.1 Nonhazardous Waste Streams**

Nonhazardous IDW generated during construction activities will include the following:

- PPE,
- Wash fluids,
- Construction debris, and
- Sanitary waste.

###### **4.1.1. Personal Protective Equipment**

PPE consists of over-garment coveralls (e.g., Tyvek or cotton coveralls), nitrile gloves, and respirator cartridges. Levels of PPE usage are addressed in the HASP (North Wind 2005e). Used PPE will be containerized in clear plastic bags, securely sealed, and labeled with the date of generation, the location (e.g., DDA or main landfill), generator contact information, and the words "Used PPE." The bags will be disposed of daily in the site dumpster or rolloff box and a local contractor will be used to empty the dumpster on a regular basis.

###### **4.1.2. Wash Fluids**

Wash fluids consist of water only (no soap) used to wash dirt and mud from heavy equipment and project vehicles. Washing will occur at the wash station, which will be constructed over gravel at a flat area. Wash fluids will be allowed to evaporate or infiltrate into the ground (i.e., return to the source). If considerable amounts of wash fluid are generated, it may be desirable to pump and containerize the water for secondary use as dust control.

###### **4.1.3. Construction Debris**

Construction debris includes excess or damaged wood, matting, geotextiles, fencing, empty material containers, or other construction supplies. To the extent possible, this debris will be recycled or salvaged. Remaining debris will be containerized in a rolloff box or similar device as soon as practicable after accumulation and will be regularly removed by a local contractor.

###### **4.1.4. Sanitary Waste**

Sanitary waste for this project includes paper products, lunch trash, and used office supplies. Sanitary waste will be generated mostly at the field trailers, and good housekeeping will be practiced such that sanitary waste does not accumulate or is left uncovered. Sanitary waste will be containerized in plastic bags and will be frequently disposed of in the site dumpster.

## 4.2 Recordkeeping

It is not necessary to record disposition of nonhazardous IDW destined for disposal at the county municipal landfill (e.g., construction debris, PPE, and sanitary waste). General waste management activities will be documented in the field logbook in accordance with Project Work Instruction (PWI)-4201-002, Field Activities Documentation.

## 5.0 MANAGEMENT OF PETROLEUM-CONTAMINATED SOIL

Based on process knowledge of site conditions and BMPs described in the HASP and scope of this Waste Management Plan, PCS may be generated as a waste stream during construction activities at the Airport Landfill project as the result of a fuel spill or leaking heavy equipment. This waste stream would consist of soil contaminated by leaking or spilled diesel fuel, gasoline, and/or hydraulic fluid during refueling or operation and maintenance of heavy equipment.

Methods for contaminated soil containment and cleanup, reporting, recordkeeping, and disposition are provided in the following subsections.

### 5.1 Cleanup and Containerizing Petroleum-Contaminated Soil

The source of the leak or spill will be corrected, if it can be performed safely. The leak or spill will then be contained using pillows or tubes, temporary earth berms, or other methods. The contaminated soil and residual petroleum hydrocarbon fluids will be cleaned up, preferably with heavy equipment, to avoid site worker exposure and possible contamination of PPE. If this is not possible, shovels or scoops will be used. Excess fluid will be removed from absorbents, pillows, tubes, and other solid material used during cleanup.

The following items will be available onsite for cleanup activities:

- Several unused open-top 55-gal drums, with ring sealers,
- Clear, heavy mil plastic bags, preferably drum liners,
- Wooden pallets for drum storage, and
- Toolkit containing drum wrenches, drum web, grease pencils for drum marking, and tamper-indicating devices.

Used absorbents will be containerized in clear plastic bags labeled with the date, location (i.e., main landfill or DDA), and contents and will be placed in the site dumpster for ultimate disposal at an off-site landfill. The contaminated soil will be containerized in unused 55-gal drum(s) lined with drum liners. The drum(s) will be labeled with the following information: (This information can be written directly on the drum with a grease pencil or can be written on a large adhesive label in thick indelible ink.)

- Date of containment,
- Drum number (sequential beginning with "1"),
- The words "Hydrocarbon Waste," and
- The name and phone number of the project CM or Project Manager (PM).

The drum(s) will be sealed with tamper-indicating devices and placed on wooden pallets at or near the project staging area or at a location where they are not likely to be damaged or disturbed.

## 5.2 Disposition of Petroleum-Contaminated Soil

A turnkey waste management subcontractor will be retained for final disposition of PCS. The waste management subcontractor will be contacted as soon as possible after the soil has been containerized but no later than 45 days after cleanup. The subcontractor will perform required sampling and analysis and will remove the soil for remediation or disposal, as dictated by sampling results. Multiple spills shall not be co-mingled.

A waste manifest and waste profile will be prepared to meet the specifications of the waste management subcontractor. Material safety data sheets (MSDS) will be used to provide information on the chemical and physical properties of the contaminated media.

## 5.3 Recordkeeping of Petroleum-Contaminated Soil Cleanup

Containment and cleanup activities will be documented in the field logbook, according to PWI-4201-002, Field Activities Documentation, by the person performing the activity or a person with firsthand knowledge of the event. A detailed description of the spill will be documented to include (at a minimum) the information presented in Section 5.4. If notification is required, the logbook will also contain the name and phone number of the person contacted and the date and time of notification.

## 5.4 Notification of Spills or Unauthorized Discharges

The Site Supervisor (SS) shall report all spills or unauthorized discharges, regardless of amount, to the following entities:

- North Wind PM: (208) 557-7864  
(208) 520-1097 (alternate phone number)
- North Wind CM: (208) 783-1069  
(208) 818-1713 (alternate phone number)
- LANL Office of Emergency Management Response: (505) 667-6211.

This notification will occur as soon as possible after the discharge but in no event more than 24 hours after the discharge. The following information will be reported:

- The name, address, and telephone number of the person or persons in charge of the facility, as well as the owner or operator of the facility,
- The name and address of the facility,
- The date, time, location, and duration of the discharge,
- The source and cause of discharge,
- A description of the discharge, including its chemical composition,
- The estimated volume of the discharge, and
- Actions taken to mitigate immediate damage from the discharge.

## 6.0 TRAINING

Training requirements are specified in the HASP (North Wind 2005e). Specific to waste management activities, site personnel will be trained in waste containment and cleanup procedures, use of the spill kit, emergency notification, and BMPs for avoiding contact with potentially hazardous waste. Training will be provided initially and then at specified refresher intervals, as determined by the CM.

7.0 FIGURES

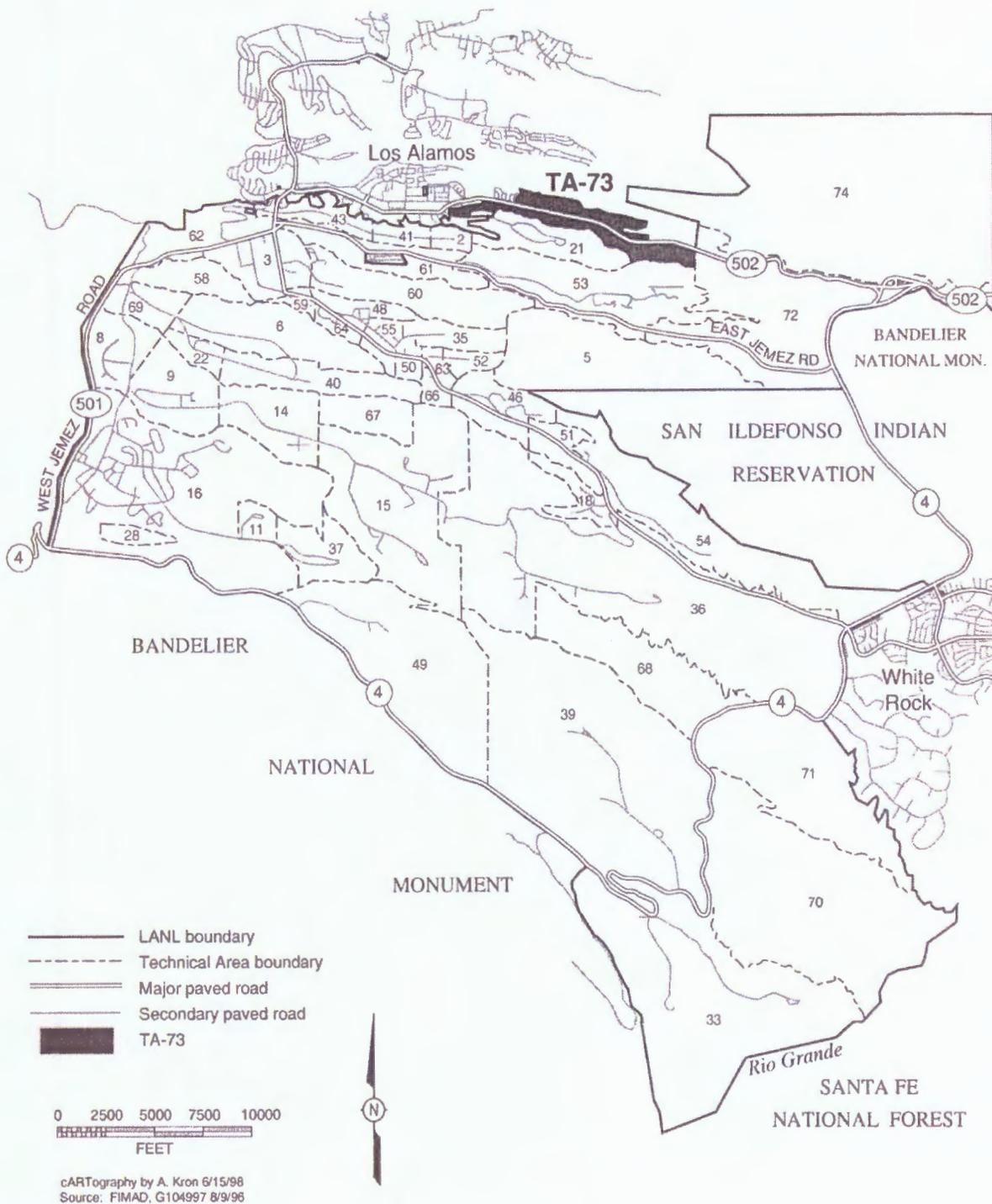


Figure 1.3-1. Location of TA-73 at Los Alamos National Laboratory

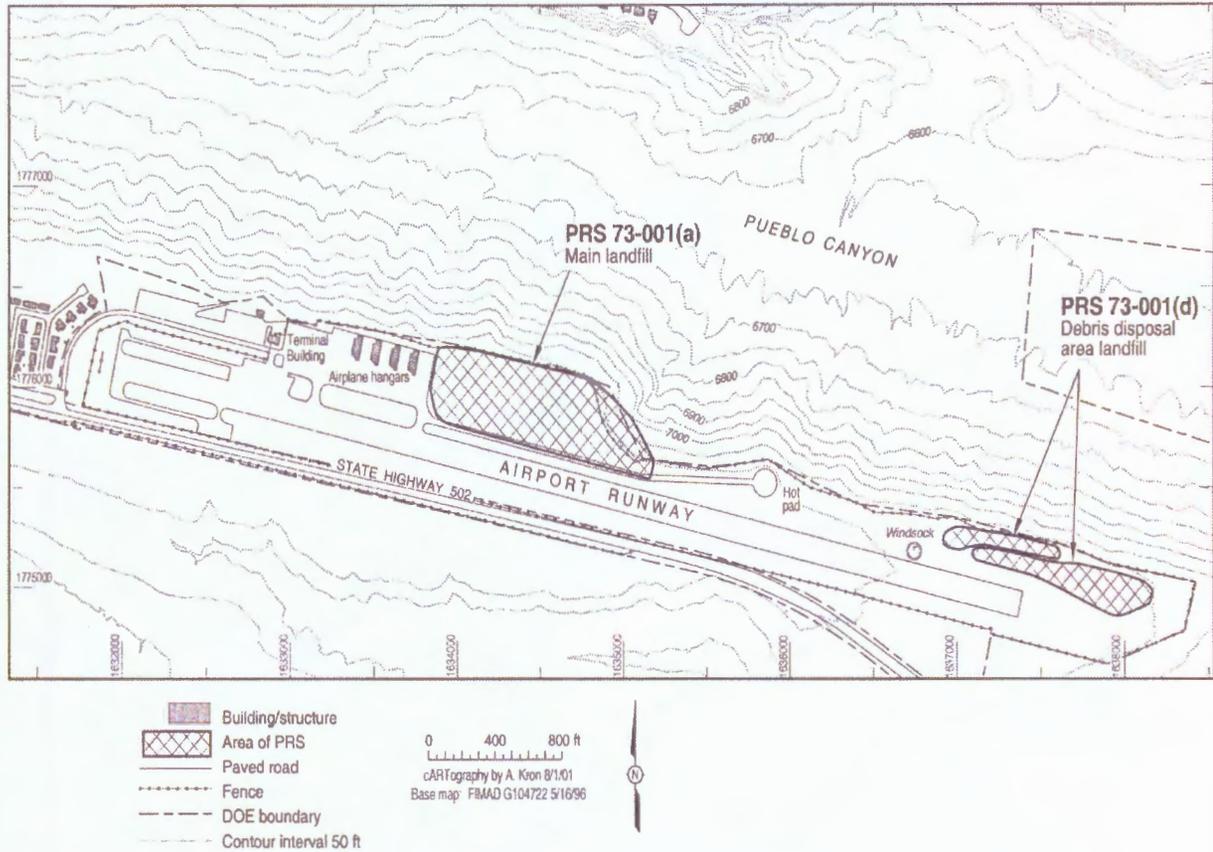


Figure 1.3-2. Location of Potential Release Sites at TA-73 (LANL 2002)

**Note:** "PRS" has changed to "SWMU"

## 8.0 REFERENCES

DOE, 2003, "National Nuclear Security Administration Los Alamos Site Office Statement of Work for the 'Airport Landfill'," Savannah River Operations Office, U.S. Department of Energy, Aiken, South Carolina, November 2003.

FR, 2003, Part 68 FR 39087, "Final National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges From Construction Activities," Volume 68, Number 126, pages 39087-39091, *Federal Register*, Government Printing Office, Washington D.C., July 1, 2003.

LANL, 1996, "LANL HSWA Module VIII Permit, 1996 Revision (guidance)," Los Alamos National Laboratory, Los Alamos, New Mexico (57486), January 1996.

LANL, 1998, "RFI Report for Potential Release Sites 73-001(a,b,c,d) and 73-004(d), Airport Landfill Areas," Vol. 1, 2, and 3, Los Alamos National Laboratory report LA-UR-98-3824, Los Alamos National Laboratory, Los Alamos, New Mexico (63070), November 1, 1998.

LANL, 2002, "Voluntary Corrective Measure Plan for Potential Release Sites 73-001(a)-99 and 73-001(b)-99," Los Alamos National Laboratory document LA-UR-02-4433, Los Alamos National Laboratory, Los Alamos, New Mexico (74007.2), October 2002.

North Wind, 2005a, "Project Quality Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2003-071, North Wind, Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005b, "Project Management Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2003-073, North Wind Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005c, "Storm Water Pollution Prevention Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2004-005, North Wind, Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005d, "Construction Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 2, NW-ID-2004-001, North Wind, Inc., Idaho Falls, Idaho, June 2005.

North Wind, 2005e, "Health and Safety Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NW-ID-2004-017, North Wind, Inc., Idaho Falls, Idaho, June 2005.

The following are NWI quality documents that are controlled in accordance with QAP-10-171, Records Control. The latest revision applies.

PWI-4201-002, Field Activities Documentation

**Appendix A**  
**Acronyms**

## Appendix A

### Acronyms

BMP	Best management practice
CM	Construction Manager
DDA	Debris Disposal Area
DOE	U.S. Department of Energy
HASP	Health and Safety Plan
IDW	Investigation-derived waste
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
MatCon™	Modified Asphalt Technology for Waste Containment
MSDS	Material Safety Data Sheets
NWI	North Wind Inc.
PCS	Petroleum-contaminated soil
PM	Project Manager
PMP	Project Management Plan
PPE	Personal protective equipment
PQP	Project Quality Plan
PWI	Project Work Instruction
QA	Quality assurance
RFI	RCRA Facility Investigation
SOW	Statement of Work
SS	Site Supervisor
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan
TA	Technical Area
VCM	Voluntary Corrective Measure
WMP	Waste Management Plan

**Attachment E**  
**Post-closure Care and Monitoring Plan**  
**for the LASO TA-73 Airport Landfill**



NW-ID-2004-027  
Revision 24

# POST-CLOSURE CARE AND MONITORING PLAN FOR THE LOS ALAMOS SITE OFFICE TA-73 AIRPORT LANDFILL

~~June 2005~~ April 2006

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**DOCUMENT APPROVAL PAGE**

Document Number: NW-ID-2004-027 Revision: 24

Document Title: Post-closure Care and Monitoring Plan for the Los Alamos Site Office  
TA-73 Airport Landfill

**Approval Signatures**

Name	Signature	Date	Title
Doug Jorgensen	Original signature on file	05/24/05	North Wind Inc. Project Manager
Robert Enz	Original signature on file	05/24/05	U.S. Department of Energy, LASO

**Revision Log**

Revision	Date	Reason for Revision
Draft	03/30/04	Not applicable; first draft of document
Revision 0	04/15/04	Document revised to incorporate DOE/LASO comments of 04/05/04.
Revision 1	05/31/05	Document revised to reflect scope change per DOE revised SOW. Primary revisions made to Section 2.
<u>Revision 2</u>	<u>04/06</u>	<u>Document revised to incorporate resolutions to NMED comments on Revision 1.</u>

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## APPENDICES

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## 1.0 INTRODUCTION

This Post-closure Care and Monitoring Plan (PCMP) addresses post-closure care and monitoring for the U.S. Department of Energy (DOE) Los Alamos Site Office (LASO) Technical Area (TA)-73 Airport Landfill, hereinafter referred to as the Airport Landfill project. This PCMP identifies post-closure care and monitoring requirements for the landfill and describes activities to meet those requirements. A tentative inspection and reporting schedule is also identified.

Background information for the Airport Landfill project is provided in the Los Alamos National Laboratory (LANL) *Resource Conservation and Recovery Act* (RCRA) facility investigation (RFI) Report for Potential Release Sites 73-001(a,b,c,d) and 73-004(d), Airport Landfill Areas (LANL 1998). The closure cover design and supporting information are provided in the Remedy Design Work Plan for the LASO TA-73 Airport Landfill (North Wind 2005a).

## 2.0 REQUIREMENTS

The Airport Landfill project consists of designing and constructing an RCRA Subtitle ~~C-equivalent~~ cover over the main landfill and re-contouring and reseeded of the Debris Disposal Area (DDA). The design history and regulatory requirements for this project are outlined in the Remedy Design Work Plan.

As described in the Remedy Design Work Plan, and previously in the Environmental Assessment (DOE 2005) for this project, the final remedy involves leaving waste in place at the main landfill; installing a gas collection system below a Modified Asphalt Technology for Waste Containment (MatCon™) (proprietary formulation of asphalt) surface over the landfill; and constructing a retaining wall at the toe of the east slope. The remaining slopes will ~~contain infiltration barriers with riprap completions~~ consist of geocellular slope protection with vegetated surfaces, overlying soil infiltration barriers. In addition, certain airport improvements will be made along the west end of the main landfill, including hanger pads and aircraft tie-downs. The cover for the DDA will consist of re-grading the DDA surface with a uniform 12 in. of native soil cover, followed by revegetation of the disturbed surfaces.

Details of the landfill design can be located in the construction drawings, specifications, and calculations included as Attachment A of the Remedy Design Work Plan.

The PCMP requirements identified in the Design Basis Document for LASO TA-73 Airport Landfill (North Wind 2004) are summarized in Table 2.0-1 (see Section 6) and discussed in this section.

~~NMAC 20.9.1.500.B states that the owner/operator must:~~

~~"...submit a PCMP which shall include, but not be limited to, maintenance of cover integrity, maintenance, and operation of the leachate collection system and operation of the methane and ground water monitoring systems."~~

~~NMAC 20.9.1.500.B.2.b states that:~~

~~"Reports of monitoring performance and data collected shall be submitted to the 'NMED' Secretary within 45 days from the end of each calendar year."~~

~~Post-closure monitoring, to establish compliance with the 1E-05 cm/sec performance standard, is not required under RCRA regulations.~~ As discussed in the Construction Quality Control Plan (CQCP) for the LASO TA-73 Airport Landfill (North Wind 2005b), quality control testing and inspections will be performed on the various landfill cover components, ~~particularly the low permeability infiltration layer,~~ to assure that the infiltration layer is installed and compacted to meet the 1E-05 cm/sec performance standards specifications are met. In addition, samples will be collected from the infiltration layer material at

the offsite borrow source and analyzed to ensure the material meets the performance standard before delivery to the site.

The Post-closure Plan, prepared under 40 *Code of Federal Regulations* (CFR) 265.118, "Post-closure Plan; Amendment of Plan," must include:

- A description of planned groundwater monitoring activities,
- A description of planned maintenance activities, and
- The name, address, and telephone numbers of the person(s) or office to contact during the post-closure period.

The scope of the activities addressed under the RCRA Subtitle C Post-closure Care Plan for an interim status unpermitted landfill are defined in 40 CFR 265.310, "Closure and Post-closure Care," which states that after closure, the owner or operator must:

- Maintain the integrity and effectiveness of the final cover, including making repairs to the cover (as necessary) to correct the effects of settling, subsidence, erosion, or other events,
- Maintain and monitor the leak detection system,
- Maintain and monitor the groundwater monitoring system,
- Prevent run-on and run-off from eroding or otherwise damaging the final cover, and
- Protect and maintain surveyed benchmarks used in complying with §265.309.

The TA-73 landfill does not include a ~~leachate collection~~ leak detection system; therefore, ~~the~~ is requirement to monitor and maintain that component (NMAC 20.9.1.500.B) does not apply.

The TA-73 landfill does not have dedicated groundwater monitoring wells because the depth to groundwater is over 1,200 ft; therefore, ~~the~~ is requirement to monitor and maintain that component does not apply.

~~The requirement for methane monitoring (NMAC 20.9.1.500.B) does not apply because (1) the landfill was not active after November 8, 1987; and (2) engineering calculations, prepared by North Wind Inc. (NWI), indicate that gas concentrations will not exceed 25% of the lower explosive limit (LEL) for methane at the property boundary. Vapor monitoring is therefore not required. However, a landfill gas monitoring, methane collection and venting system will be implemented to ensure that combustible gas levels remain below 25% of the LEL in enclosed aircraft hangers, and below 100% of the LEL at the property boundary boundary. allow aAny methane that is present will be collected and to escape vented to the atmosphere and to ensure no methane generation is experienced in enclosed aircraft hangers.~~

### 3.0 POST-CLOSURE MONITORING AND MAINTENANCE

Post-closure monitoring for cover integrity will include inspections of the cover and maintenance and repair of deficiencies. Frequency requirements are specified in this plan. An inspection report, which will be completed for each inspection, will contain (at a minimum) the following information:

- Name of inspector and inspection date and time,
- Weather information at the time of the inspection,

- Condition of the cover system (including MatCon™ asphalt surface, ~~riprap surface, and DDA vegetated~~ soil surface) s on main landfill slopes and the DDA, retaining walls, storm water control features, and survey benchmarks,
- Incidents of noncompliance with the "Final National Pollutant Discharge Elimination System General Permit for Storm Water Discharges from Construction Activities" (FR 2003) or the Storm Water Pollution Prevention Plan (SWPPP) for the LASO TA-73 Airport Landfill (North Wind 2005c); noncompliances, if any, will be identified during the inspections mandated by the SWPPP,
- Location(s) of discharges of sediment or other pollutants from the site,
- Corrective actions required, and
- Signature of inspector.

Inspection records and documentation of corrective actions will be retained in the project file and provided with the annual report. Inspection and maintenance tasks are described below.

### 3.1 Cover System

Cover system inspections will include site walkovers to investigate and document the existing conditions and any deficiencies that are present. All main landfill and DDA cover system components shall be inspected initially after the first significant rainfall following the installation of the final cover, and annually after the end of the spring thaw. Inspection scheduling and specific deficiency remedies will be conducted as described below. Areas other than the MatCon™ asphalt surface and the retaining walls shall be inspected at least annually and Specific areas may be inspected more frequently, as directed by the Contractor Professional Engineer (PE) registered in the State of New Mexico, ~~if substantial deficiencies exist~~. MatCon™ asphalt surface and retaining walls shall be inspected as directed in Sections 3.1.5 and 3.4. Inspection records and documentation of corrective actions will be retained in the project file and provided with the annual report. Inspection of cover system elements and correction of specific deficiencies are discussed below.

#### 3.1.1.3.1.1 Erosional Damage and Cracks

Rill erosion and/or cracking in the DDA cover could result in loss of topsoil from the cover and potential damage to the underlying low-permeability soil layer. The inspector will look for run-off rills on the DDA cover system. Cracks and/or rills deeper than approximately four (4) in. will be filled and compacted using topsoil and equipment appropriate to the scale of the erosional features and as per construction Specification 02200, "Earthwork" (North Wind 2005d). Excessive compaction shall not be used ~~unless repair of the underlying low-permeability soil layer is required.~~

#### 3.1.2.3.1.2 Animal Burrows

Animal burrows can breach the cover, allowing exposure of waste and possibly preferential flow pathways through the cover to develop, resulting in increased infiltration. All animal burrows on the DDA greater than approximately four (4) in. in depth shall be filled and compacted using topsoil and equipment appropriate to the scale of the erosional features and as per construction Specification 02200, "Earthwork." Excessive compaction will not be used ~~unless repair of the underlying low-permeability soil layer is required.~~

Animal burrows in the geocellular slope protection rock armor cover on the main landfill slopes are not expected, however if encountered the damage to the rip rap and underlying soil will be repaired using low permeability topsoil or soil or bentonite infiltration layer soil as appropriate depending on the depth of the burrow, and appropriate rip rap as identified per in Specification 02200. Any geocellular panels removed or cut to repair animal burrows shall be replaced as per vendor procedures.

### **3.1.3.3.1.3 Subsidence**

Subsidence of underlying waste can result in depressions in the surface cover, allowing for ponding and increased infiltration of water. All subsidence within the DDA cover system greater than approximately one (1) ft in depth, relative to the surrounding grade, shall be filled and compacted (as per construction Specification 02200, "Earthwork") using topsoil and equipment appropriate to the scale of the subsidence feature. Additionally, all subsidence within the riprap cover system greater than one (1) ft in depth, relative to the surrounding grade, shall be filled using riprap and equipment appropriate to the scale of the subsidence feature. Excessive compaction will not be used unless repair of the underlying low permeability soil layer is required. Subsidence in the MatCon cover will be repaired as specified in the MatCon O&M plan.

### **3.1.4.3.1.4 Condition of Vegetation**

The condition of surficial vegetation on the main landfill slopes and on the DDA shall be noted. Areas greater than approximately 10,000 ft<sup>2</sup> lacking vegetation shall be reseeded, fertilized, and/or watered as needed to reestablish vegetation, as per construction Specification 02932, "Seeding, Mulching and Restoration" (North Wind 2005d).

### **3.1.5.3.1.5 MatCon™ Asphalt Surface**

The MatCon™ asphalt surface shall be inspected and evaluated in accordance with the MatCon™ Operation and Maintenance Plan prepared by the MatCon™ subcontractor. In general, the MatCon™ subcontractor representatives will make annual inspections and evaluations for the first five (5) years as part of the warranty. During the construction process, MatCon™ subcontractor representatives will instruct the owner/operator on the proper inspection techniques and documentation. The owner/operator will be required to make monthly inspections and submit the results to the MatCon™ subcontractor and to the PE for the first five years after closure. During the construction process, MatCon™ subcontractor representatives will instruct the owner/operator on the proper inspection techniques and documentation.

Monthly MatCon cover inspections by the owner/operator shall continue for the 30-year post-closure period. Results of monthly inspections shall be provided to NMED in the annual report.

### **3.1.6 Concrete Hangar Pads**

Concrete hangar pads including seals between the concrete slabs and adjacent MatCon asphalt shall be inspected at least twice annually monthly for the 30-year post-closure period. Results of the monthly inspections shall be provided to NMED in the annual report. Federal Aviation Administration (FAA) Advisory Circular 150/5380-6A (FAA 2003) may be used, as applicable, to identify deficiencies and recommended repairs. Inspection records and documentation of corrective actions will be retained in the project file and provided with the annual report. The Owner or Operator shall implement airport operating procedures to prevent damage to the concrete slabs and perimeter seals by snow removal equipment or other means.

### 3.2 Storm Water Control System

Annual storm water control system inspections will include all areas of the site, as described in the SWPPP (North Wind 2005c). Inspectors will look for evidence of, or the potential for, pollutants entering the storm water conveyance system. Discharge locations identified in the site plans will be inspected to determine whether erosion controls are effective in preventing significant impact to Pueblo Canyon.

Qualified personnel knowledgeable in the principles and practice of erosion and sediment controls will perform inspections and maintenance for the following:

- **Condition of sediment basins**—inspect for fill height of sediments, presence of vegetation or debris, condition of berms and outlets, etc. The basins and outlets will be maintained by removing excess sediment and/or debris as needed to maintain proper function. Berms will be repaired as needed to maintain storage capacity of the basin.
- **Condition of outlet chutes, perimeter drains/berms, terrace drains, culverts, and drop inlets**—inspect for presence of sediments, breaches in berms, presence of vegetation or debris, etc. Sediments, vegetation, or debris retarding storm water runoff will be removed as needed. Breaches in berms or chutes will be repaired using the appropriate materials.

Inspection records and documentation of corrective actions will be retained in the project file and provided with the annual report.

### 3.3 Survey Benchmarks

Annual inspections will include locating and documenting the condition of the permanent survey benchmark. Benchmarks will be maintained in a clearly visible condition.

### 3.4 Retaining Walls

Visual inspections will be performed for both the concrete and mechanically stabilized earth (MSE) walls.

The monitoring schedule for the retaining walls during the post-closure period shall be as follows:

- Initially after the first significant rainfall following the installation of the final cover, and annually after the end of the spring thaw
- Every six (6) months for the first two (2) years after construction of the walls, and
- At the end of the two (2)-year period, the need for any additional inspections and their frequency will be determined by the PE based on the results and conclusions of the inspections.

The inspector shall perform the following tasks:

- Investigate for any cracks that may have developed in the concrete wall. Digital photos shall be taken to illustrate the extent of the crack(s). Measurements of the location and depth of the crack(s) shall be determined and documented.
- Investigate for any separation, rotation, or other movement of the MSE walls. Document location and take digital photo of extent of movement.
- Document any soil erosion or other evidence of water damage in the vicinity of retaining walls.

### 3.5 Methane Venting Landfill Gas Collection System

3.5.1 Annual inspections of the above-ground portion of the methane venting system will include looking for and documenting any deficiencies that would limit or prevent the system from functioning in accordance with the design. Landfill Gas Monitoring

Enclosed spaces overlying or adjacent to the closed landfill, and the cap perimeter nearest the property boundary, will be monitored for combustible gas. All locations will be monitored quarterly for the first two years after completion of construction. The locations to be monitored include:

- Inside hangars at locations ranging from within 4-inches of ground surface to 4-ft above ground surface.
- Inside trench drains.
- Inside drainage culverts.
- Inside buried utility conduits, and
- At the north perimeter of the rock armor cover within 4-in of ground surface.

If measured gas concentrations do not exceed 25% of the LEL at any monitoring location for two years, the locations will be monitored twice the third year. If measured concentrations do not exceed 25% of the lower explosive limit (LEL) the third year, monitoring will be discontinued.

If combustible gas levels exceed 25% of the LEL in any enclosed structure, or 100% of the LEL at the north edge of the cap, the owner or operator shall:

- Immediately take all necessary steps to ensure protection of public health, welfare and the environment and notify the NMED;
- Within seven days of detection, record the methane gas levels detected and a description of the steps taken to protect public health, welfare and the environment and report them to NMED; and
- Within 60 days of detection, implement active gas collection using one or more blowers, and notify the Secretary that active gas collection has been implemented. The notification shall describe the nature and extent of the problem and the remedy.
- Gas measurements shall be collected and recorded quarterly during operation of the active gas collection system. If all quarterly measurements for a consecutive period of at least one year remain below 25% of the LEL, the active gas collection system shall be shut off and quarterly monitoring continued. If measured gas concentrations do not exceed 25% of the LEL at any monitoring location for two years, the locations will be monitored twice the third year. If measured concentrations do not exceed 25% of the LEL the third year, monitoring will be discontinued.

#### 3.5.1.1 Equipment and Procedures

Combustible gas levels shall be measured using an intrinsically safe combustible gas indicator with an output scale reading 0-100% LEL. The instrument shall be calibrated to a mixture of methane in air equal to 25% to 100% LEL.

### **3.5.1.2 Reporting**

The Owner or Operator shall record the location, date, time, barometric pressure (airport terminal has this), calibration procedure, and combustible gas reading as % LEL in the field logbook. Logbooks shall be retained in the project file and copies of logbook pages provided with the annual report.

### **3.5.2 Inspection and Maintenance**

The above-ground components of the gas collection system, i.e. vent risers and stub-outs, shall be inspected at least annually for damage or accumulation of debris. Any damage shall be repaired to restore the system to it's as-built condition. Any debris in the vent risers shall be removed or discarded.

If active gas collection is implemented, the blower shall be inspected and maintained as per the vendors operating manual. Inspection and maintenance records and documentation of corrective actions will be retained in the project file and provided with the annual report.

## **4.0 RECORD-KEEPING AND REPORTING**

A project file containing records of all inspections and maintenance performed will be maintained by DOE-LASO. An annual report, including inspection and maintenance records for the preceding year, will be prepared and provided to the New Mexico Environmental Department (NMED) Secretary within 45 days from the end of each calendar year.

The name, address, and telephone number for the individual to contact during the post-closure period is as follows:

Robert Enz  
DOE-LASO Project Manager  
528 35<sup>th</sup> Street  
Los Alamos, NM 87544  
(505) 667-7640

## **5.0 SCHEDULE**

All cover system deficiencies should be inspected (according to this plan) and corrected at the earliest opportunity, and before the end of the calendar year, in order to be completed during the reporting period.

~~The inspection and evaluation schedule~~ for the MatCon™ asphalt surface shall be in accordance with the MatCon™ Operation and Maintenance Plan, to be prepared by the MatCon™ subcontractor. **Monthly MatCon™ cover and concrete hangar pad inspections shall continue for the 30-year post-closure period. Results of monthly inspections shall be provided to NMED in the annual report.**

6.0 TABLES

Table 2.0-1. Summary of Post-closure Care and Monitoring Requirements

Citation	Requirement	Method of Compliance
<del>NMAC 20.9.1.500</del> NMAC 20.4.1.600 (40 CFR 265.118)	PCMP	PCMP
<del>NMAC 20.9.1.500</del> NMAC 20.4.1.600 (40 CFR 265.310)	Maintain cover integrity	Inspection and maintenance of cover system in accordance with this plan
<del>NMAC 20.9.1.500</del> NMAC 20.4.1.600 (40 CFR 265.310)	Maintain and operate leachate collection system	Leachate collection system not required
<del>NMAC 20.9.1.500</del> <del>NMAC 20.4.1.600</del> <del>(40 CFR 265.310)</del>	<del>Maintain and operate methane collection/monitoring system</del>	<del>Implementation of methane collection and monitoring system not required</del>
<del>NMAC</del> <del>20.4.1.600</del> <del>NMAC 20</del> <del>9.1.500</del>	Groundwater monitoring	Groundwater monitoring not required
<del>NMAC</del> <del>20.4.1.600</del> <del>NMAC 20</del> <del>9.1.500</del>	Reporting	Annual monitoring report
NMAC 20.4.1.600 (40 CFR 265.310)	Prevent run-on and run-off from eroding or otherwise damaging the final cover	Inspection and maintenance of surface water controls as per this plan
NMAC 20.4.1.600 (40 CFR 265.310)	Protect and maintain surveyed benchmarks	Annual inspection and maintenance of survey benchmarks
DOE-LASO and Los Alamos County requirements	Maintain access roads to main landfill and Debris Disposal Area	No permanent access roads are needed to meet applicable landfill closure requirements; therefore, access roads are not included in the PCMP

CFR = Code of Federal Regulations  
 NMAC = New Mexico Administrative Code  
 PCMP = Post-closure Care and Monitoring Plan

## 7.0 REFERENCES

40 CFR 265.118, 2003, "Post-closure Plan; Amendment of Plan," *Code of Federal Regulations*, published by the U.S. Government Printing Office, Washington, D.C., January 1, 2003.

40 CFR 265.309, 2003, "Surveying and Recordkeeping," *Code of Federal Regulations*, published by the U.S. Government Printing Office, Washington, D.C., January 1, 2003.

40 CFR 265.310, 2003, "Closure and Post-closure Care," *Code of Federal Regulations*, published by the U.S. Government Printing Office, Washington, D.C., January 1, 2003.

DOE, 2005, "National Nuclear Security Administration Los Alamos Site Office Environmental Assessment for Proposed Closure of the Airport Landfills Within Technical Area 73 at Los Alamos National Laboratory, Los Alamos, New Mexico," DOE/EA-1515, U.S. Department of Energy, May 2005.

FAA 2003, U.S. Department of Transportation Federal Aviation Administration, "Guidelines and Procedures for Maintenance of Airport Pavements", Advisory Circular 150/5380-6A, September 14 2003.

FR, 2003, FR-39087, Part 68, "Final National Pollutant Discharge Elimination System General Permit for Storm Water Discharges from Construction Activities," *Federal Register*, Vol. 68, Number 126, pp. 39087– 39091, published by the U.S. Government Printing Office, Washington, D.C., July 1, 2003.

LANL, 1998, "RFI Report for Potential Release Sites 73-001(a,b,c,d) and 73-004(d), Airport Landfill Areas," Vol. 1, 2, and 3, Los Alamos National Laboratory (LANL) report LA-UR-98-3824, 63070, Los Alamos, New Mexico, November 1, 1998.

NMAC 20.9.1.500, 2001, "Closure and Post-closure Requirements," *New Mexico Administrative Code*, published by the Commission of Public Records, Administrative Law Division, Santa Fe, New Mexico, November 27, 2001.

NMAC 20.4.1.600, 2003, "Adoption of 40 CFR Part 265," *New Mexico Administrative Code*, published by the Commission of Public Records, Administrative Law Division, Santa Fe, New Mexico, October 1, 2003.

North Wind, 2004, "Design Basis Document for Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NWI-ID-2004-042, North Wind Inc., Idaho Falls, ID, April 2004.

North Wind, 2005a, "Remedy Design Work Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 1, NWI-ID-2004-031, North Wind Inc., Idaho Falls, ID, June 2005.

North Wind, 2005b, "Construction Quality Control Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 2, NWI-ID-2004-016, North Wind Inc., Idaho Falls, ID, June 2005.

North Wind, 2005c, "Storm Water Pollution Prevention Plan for the Los Alamos Site Office TA-73 Airport Landfill," Revision 2, NWI-ID-2004-005, North Wind Inc., Idaho Falls, ID, June 2005.

North Wind, 2005d, "Construction Specifications for Los Alamos Site Office TA 73 Airport Landfill, 906 Design Submittal," Draft Final, NW-ID-2004-039, North Wind Inc., Idaho Falls, Idaho, June 2005.

# Appendix A

## Acronyms

## Appendix A

### Acronyms

CFR	<i>Code of Federal Regulations</i>
CQCP	Construction Quality Control Plan
DDA	Debris Disposal Area
DOE	U.S. Department of Energy
<del>FAA</del>	<del>Federal Aviation Administration</del>
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
LEL	Lower explosive limit
MatCon™	Modified Asphalt Technology for Waste Containment
MSE	Mechanically Stabilized Earth
NMAC	<i>New Mexico Administrative Code</i>
NMED	New Mexico Environmental Department
<del>NWI</del>	<del>North Wind Inc.</del>
PCMP	Post-closure Care and Monitoring Plan
PE	Professional Engineer
RCRA	<i>Resource Conservation and Recovery Act</i>
RFI	RCRA facility investigation
SWPPP	Storm Water Pollution Prevention Plan
TA	Technical Area