DMJM H&N | AECOM

13568.264.STDY.001, Rev. A

Engineering Study

TA-63 Parking Lot

LANL Project ID: 101492

90 % Review Deliverable

Rev. A, June 30, 2005

Los Alamos NATIONAL LABORATORY

ENGINEERING STUDY

FOR

TA-63 PARKING LOT

LANL PROJECT ID: 101492

AT THE

LOS ALAMOS NATIONAL LABORATORY

Prepared by
DMJM H&N
for
University of California
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

June 30, 2005

Submitted by:

Signature completed at 100%

Jeffery Sims, Project Manager
DMJM H&N

Recommended by:

Signature completed at 100%

Ken Towery
LANL University Technical Representative

HISTORY OF REVISIONS

Revision No.	Effective Date	Reason For Revision
A	June 30, 2005	Issue for 90% Review

CONTRIBUTORS

The team responsible for the development of this document:

Jeffery Sims	A/E Project Manager
Karen Rose	Assistant Project Manager
David Larrow	Civil Engineer, PE
Manuel Tarin	Civil Engineer, EIT
Jeanne Donhiser	Electrical Engineer, PE

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EXECUTIVE SUMMARY

The purpose of this study is to provide a preliminary design and cost for a major parking lot expansion at TA-63. The basis for the layouts was two sketches provided by LANL for Phase 1 and Phase 2. The study addresses site conditions, topography, utilities, and environmental/cultural aspects of the proposed site.

During the study the boundaries for Phase 1 and Phase 2 were changed to those shown on the Site Key Plan drawing. The change was prompted by the fact that Puye Road would not be the principal access point to the parking lot due to its low level of service. Based on these new boundaries, the maximum number of parking spaces can be expanded to 451 from 380 for Phase 1 and to 880 for Phase 2 from the 600 spaces desired. Other decisions made during the study were to include lighting and landscaping in the project scope.

A detention pond will be required for the parking lot. It will be located south of the parking lot as shown on the drawings. It is recommended to build the detention pond in Phase 1. The storm drain and drop inlets can be staged between Phase 1 and Phase 2.

A cost estimate has been provided under separate cover.

LIST OF ACRONYMS AND ABBREVIATIONS

DOE	Department of Energy
CFR	Code of Federal Register
ESM	Engineering Standards Manual (LANL)
GC	General Contractor
LANL	Los Alamos National Laboratory
ML	Management Level
NEPA	National Environmental Protection Association
NPDES	National Pollutant Discharge Elimination System

1.0 GENERAL DESIGN PARAMETERS

1.1 Objective/Justification

1.1.1 This study addresses site conditions, topography, utilities, and environmental/cultural aspects of the proposed site.

1.1.2 This study examines the proposed Phase 1 and Phase 2 development sketches provided by LANL.

1.1.3 Phase 1 will include parking for 300-380 parking spaces. Phase 2 will be shown as a future condition for up to 600 spaces. The study will also include a pedestrian walkway and shuttle bus termination.

1.2 Design Standards and References

1.2.1 LANL Engineering Standards Manual

1.2.2 DOE Order 420.1, Facility Safety

1.2.3 DOE Standard 1021, Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems and Components

1.2.4 10 CFR 830.120, Quality Assurance Requirements

1.3 Environmental, Safety, and Health

1.3.1 Asbestos: No asbestos has been identified in the project area.

1.3.2 Radioactive Contamination: No radioactive contamination has been identified in the project area.

1.3.3 Demolition/Removal: Old pavement will be demolished and removed.

1.3.4 Environmental Concerns: There are no cultural or historical resource issues of concern. A biological assessment will be required because some core or buffer area will be removed. A NEPA review will be required.

1.4 Security

1.4.1 There are no changes to the LANL security system (BRASS) that will be undertaken as part of the project.

1.4.2 For unescorted access to the site an active LANL badge is required.

1.5 Seismic Design

Not applicable.

1.6 National Pollutant Discharge Elimination System (NPDES)

This section will apply during Title III.

1.7 Radiation Shielding

No radiation shielding requirements have been identified in the project area.

1.8 Graded Fire Hazard Analysis

No fire hazards analysis is required for this study.

1.9 Quality Assurance

The assigned Management Level is ML-3 per LANL Memo PMDS/MCP/01-010, dated February 27, 2001. This assignment indicates the extent and complexity of quality assurance requirements for the project. The design shall apply appropriate industry codes and standards, procedure control, verification activities and documentation consistent with recognized industry practice. The Contractor shall implement its own LANL-approved Quality Assurance Plan that meets NQA-1 1994 requirements and addresses the ten criteria of 10 CFR 830.120, Quality Assurance Requirements.

1.10 Method of Accomplishment

This project will be completed as a design-bid project. A General Contractor (GC) will be contracted to perform all construction activities. At LANL's option, the procurement and installation of the mechanical equipment will be the responsibility of the GC. The Architect-Engineering company utilized for Title II design may be retained to perform Title III services for this project including submittal review, construction observation and preparation of as-built drawings.

2.0 STATEMENT OF ENGINEERING

2.1 Introduction

This section identifies the general civil design requirements for the project.

2.1.1 Site Conditions

The upper areas of the site contain 200 existing parking spaces on weathered asphalt pavement and two office trailers with a parking area. There is a parking area under construction south of the two trailers. The area south of the new parking area is undeveloped.

2.1.2 Existing Utilities

Two overhead power lines cross the site. The pole structures will be left in place and parking improvements will be designed around them. There is an existing force main that passes through the site. The force main should not be affected by construction.

2.1.3 Project Phasing

The project has been divided into two phases. These are shown on the Site Phasing Key Plan. Phase 1 will provide a minimum 300-380 parking spaces with a pedestrian walkway from TA-63 to TA-55, and a shuttle bus pick up and drop off area. Phase 2 will provide a minimum future development of 600 spaces. If there is a Phase 3 needed, it will be a parking structure over the surface parking.

Using the sketches provided by LANL for the Phase 1 and Phase 2 parking, the preliminary layouts include 451 parking spaces for Phase 1, 203 parking spaces for the upper portion of Phase 2, and 677 parking spaces for the lower portion of Phase 2. Parking space dimensions used were 9 ft. wide by 20 ft. long. 3-5 percent of the parking spaces will be handicap type spaces.

2.1.4 Stormwater Design

The parking lot will require a detention pond as shown on the drawings. Preliminary calculations, based on both Phase 1 and Phase 2, indicate a detention pond volume of 0.616 acre-ft will be required.

The storm frequency for sizing the pond is 25 years in accordance with the LANL ESM. The area of the pond will be approximately 126 feet by 78 feet. The pond depth will be approximately 5 feet. Preliminary design calculation 13568.264.CCAL.001 is attached. The discharge pipe will be a 36-inch culvert. Storm drain pipe and inlets will convey the parking lot runoff to the pond. The detention pond and upper storm drain system will be included in Phase 1.

2.1.5 Pavement Design

The parking lot pavement design will consist of 4 inches of asphalt concrete over a 8-inch aggregate base course per LANL Standard Detail Drawing ST-G2010-1.

2.1.6 Earthwork Grading

The Phase 1 and upper portion of Phase 2 will require minor grading. The maximum permissible grade is 5.0 percent and the existing grade varies between 3.80 and 5.0 percent. The lower Phase 2 area has existing grades that vary between 4 and 10 percent, so extensive grading will be required. Retaining walls will be required in Phase 2 as shown on the drawings.

2.1.7 Demolition

Pavement demolition will be required in the parking are south of Puye Drive. Two existing office trailers will require removed from the Phase 1 parking area. There will be other areas requiring minor demolition.

2.1.8 Landscaping

Landscaping will follow the LANL Site Architectural Design Principles. Generally one tree will be provided per planter within the parking lot with ground cover to fill the planter. Rows of trees will be provide along the long islands and outer edges of the parking lot.

2.1.9 Parking Lot Access

Puye Road will not be the main access road to the parking area. The first road south of Puye Road, as shown on the site plan, will be the access for Phase 1. A second future access road will be provided on the south side of the lower Phase 2 parking area.

2.1.10 Lighting

The parking lot lighting design, for the Engineering Study, was completed in accordance with the New Mexico Night Sky Protection Act, the LANL ESM, and the Illuminating Engineering Society of North America Lighting Handbook, 9th Edition.

A point by point lighting calculation was prepared for the parking lot areas (Phase 1 and Phase 2). The calculation shows a minimum of 0.5 footcandles throughout the parking areas. The luminaires are 400 Watt High Pressure Sodium with cutoff reflectors. Eleven single headed luminaires are used on the perimeter of the area and 25 double headed luminaires are used for the interior of the parking area. Luminaires shall be mounted on 30 foot poles.

3.0 CALCULATIONS

Calculation No.	Description
13568.264.CCAL.001	Detention Pond Calculation
13568.264.ECAL.001	Lighting Calculation

DMJMH+N

CALCULATION COVER SHEET

Date: 06/27/05

Calculation No: 13568.264.CCAL.001
Calculation Title: Detention Pond Calculation
Project No. & Title: PARKING LOT STUDY
Design Verification Required: ☐ Yes ☒ No
Calculation Type: ☐ Scoping ☒ Preliminary ☐ Final
☐ Superseded by Calculation No: _____ ☐ Voided

ORIGINAL AND REVISED CALCULATION/ANALYSIS APPROVAL

	Rev. A Printed Name/ Sign/Initials/Date	Rev. Printed Name/ Sign/Initials/Date	Rev. Printed Name/ Sign/Initials/Date	Rev. Printed Name/ Sign/Initials/Date
Originator:	Manuel Tarin 6/27/05			
Checked By:	David Larrow 6/27/05			
Approved By:	David Larrow 6/27/05			

AFFECTED DOCUMENTS

Document Number	Document Title	Rev. Number	Responsible Discipline Lead Initials

RECORD OF REVISION

Rev.	Reason for Revision
A	First issue of calculation

ATTACHMENTS

Att.	Description	Total Pages (not incl cover sheets)
A	Hydraflow "Hydrographs 2004" Output Sheet	10

TOTAL CALCULATION PAGE COUNT: 3

CALCULATION SHEET

Calculation No. 13568.264.CCAL.001	**ORIGINATOR:** Manuel Tarin **DATE** 06/27/05
Rev. No. A	**CHECKER:** David Larrow **DATE** 06/27/05
Calculation Title Detention Pond Calculations	

1.0 INTRODUCTION

1.1 Purpose

This detention pond calculation will provide data on the size of the detention pond for the TA-63 parking lot.

1.2 Scope

The scope of this calculation is limited to the parking lot areas for both Phase 1 and Phase 2.

2.0 Basis

2.1 Design Inputs

2.1.1 Civil drawings, C-0002, for the project were used to determine the drainage area of the parking lot. The drainage areas were computed as follows: Phase 1 = 11.01 acres, Phase 2 = 6.40 + 14.35 = 20.75 acres.

2.2 Criteria

- As required by the ESM, Section G20 Site Improvements Hydrologic Analysis shall use the methodologies outlined in Section 309 of the New Mexico DOT Design Manual and the USDA Natural Resources Conservation Service publication, "Urban Hydrology For Small Watersheds".

2.3 Assumptions

2.3.1

3.0 References

3.1 Los Alamos National Laboratory

3.1.1 LANL Engineering Standards Manual (ESM), 2002.

4.0 Methods

The model for the detention pond was created using the software program "Hydrographs 2004" by Intelisolve.

CALCULATION SHEET

Calculation No. 13568.264.CCAL.001	**ORIGINATOR:** Mary Tarin (Manuel Tarin) **DATE** 06/27/05
Rev. No. A	**CHECKER:** David J Larrow (David Larrow) **DATE** 06/27/05
Calculation Title Detention Pond Calculations	

5.0 Results and Conclusions

Attachment A contains the output for the detention pond calculations.

- The peak discharge from the pond will be 54.37 cfs.
- The maximum storage is 0.616 acre-feet.

6.0 Calculations and Analyses

The calculation was performed in Hydroflow "Hydrographs 2004" by Intelisolve. Results of calculations are shown in Attachment A.

DMJMH+N

Project Number: 60001415

CALCULATION SHEET

Calculation No. 13568.264.CCAL.001 **Rev. No.** A **Calculation Title** Detention Pond Calculations	**ORIGINATOR:** Manny Tarin (Manuel Tarin) **DATE** 06/27/05 **CHECKER:** David Larrow **DATE** 06/27/05

Calculation 13568-264-CCAL-001, Rev. A

Attachment A

Total Number of Pages (Not including this Attachment Cover Sheet) 10

Originator's Signature and Date Manny Tarin 06.27.05

Checker's Signature and Date David J Larrow 06.27.05

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Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Mod. Rational	-------	-------	33.80	-------	-------	58.65	70.79	-------	90.43	Phase I
2	Mod. Rational	-------	-------	19.65	-------	-------	34.09	41.15	-------	52.57	Phase II - North Lot
3	Mod. Rational	-------	-------	44.06	-------	-------	76.44	92.26	-------	117.87	Phase II - South Lot
4	Mod. Rational	-------	-------	4.48	-------	-------	7.77	9.37	-------	11.97	Phase I - Existing Cond.
5	Reservoir	1	-------	6.62	-------	-------	9.00	9.87	-------	11.03	Det. Basin for Phase I
6	Combine	1, 2,	-------	53.45	-------	-------	92.75	111.93	-------	143.00	North lot plus phase I
7	Combine	3, 6	-------	97.51	-------	-------	169.19	204.20	-------	260.87	Total area
8	Mod. Rational	-------	-------	6.40	-------	-------	11.10	13.40	-------	17.12	South Lot existing
9	Mod. Rational	-------	-------	24.16	-------	-------	41.92	50.60	-------	64.64	North Lot existing
10	Combine	4, 8, 9	-------	25.25	-------	-------	43.81	52.87	-------	67.55	Existing conditions total area
11	Reservoir	7	-------	29.48	-------	-------	48.03	54.37	-------	62.89	Det. Basin total area

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Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	Mod. Rational	70.79	1	3	0.293	----	------	------	Phase I
2	Mod. Rational	41.15	1	3	0.170	----	------	------	Phase II - North Lot
3	Mod. Rational	92.26	1	3	0.381	----	------	------	Phase II - South Lot
4	Mod. Rational	9.37	1	30	0.387	----	------	------	Phase I - Existing Cond.
5	Reservoir	9.87	1	6	0.292	1	7163.42	0.243	Det. Basin for Phase I
6	Combine	111.93	1	3	0.463	1, 2,	------	------	North lot plus phase I
7	Combine	204.20	1	3	0.844	3, 6	------	------	Total area
8	Mod. Rational	13.40	1	30	0.554	----	------	------	South Lot existing
9	Mod. Rational	50.60	1	3	0.209	----	------	------	North Lot existing
10	Combine	52.87	1	3	1.150	4, 8, 9	------	------	Existing conditions total area
11	Reservoir	54.37	1	5	0.843	7	7164.05	0.616	Det. Basin total area

PARKING LOT STUDY
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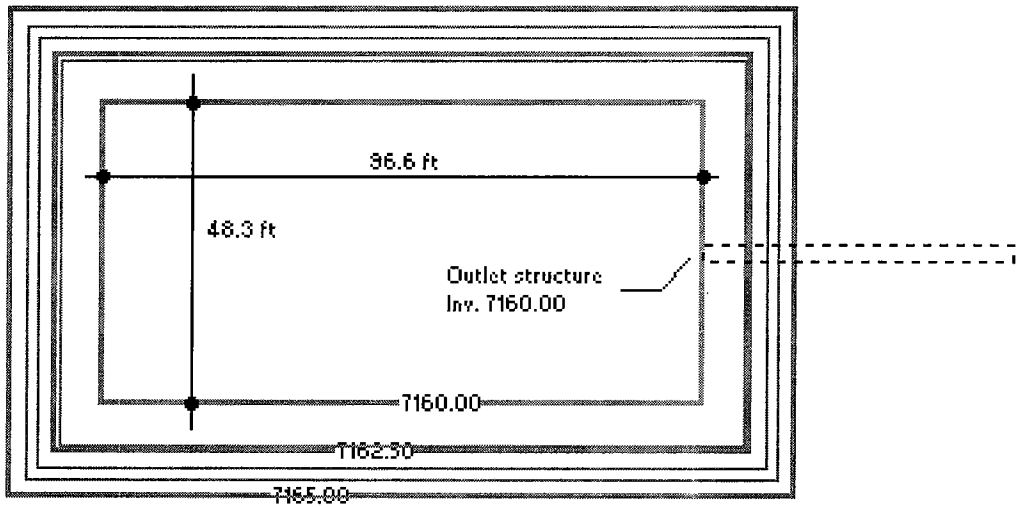
Det. Basin for Phase I



Plan View

NTS

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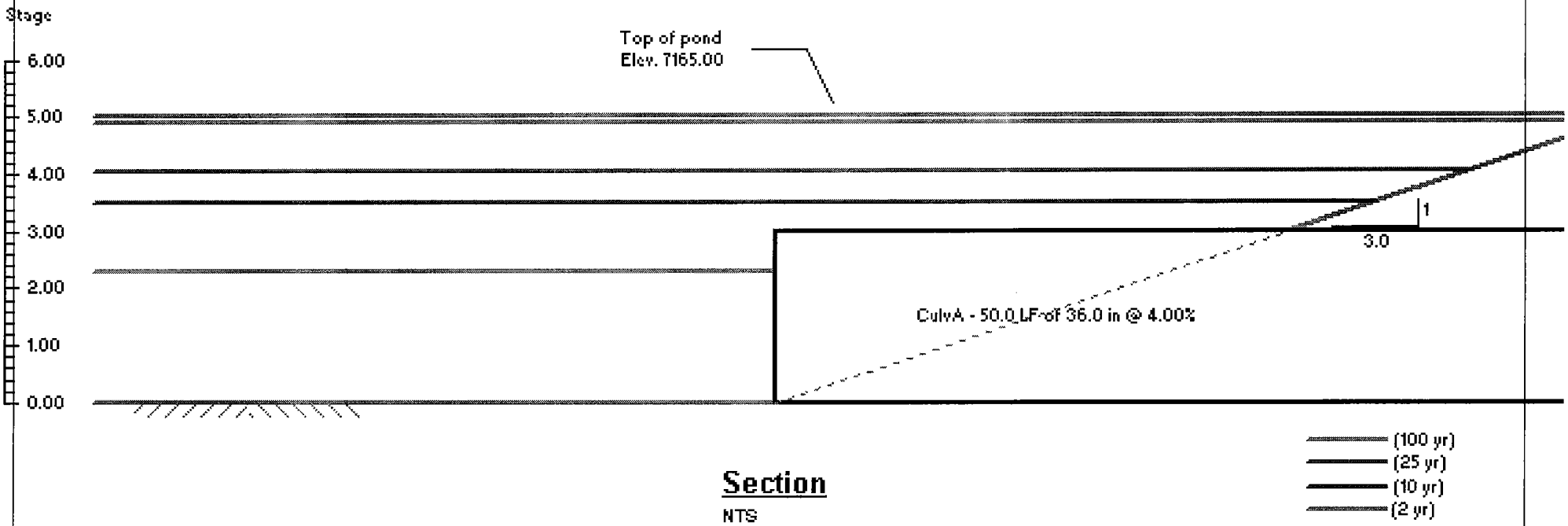
Schematic only. Not for construction.

Det. Basin for Phase I



Section

NTS

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Schematic only. Not for construction.

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Jun 24 2005, 12:44 PM

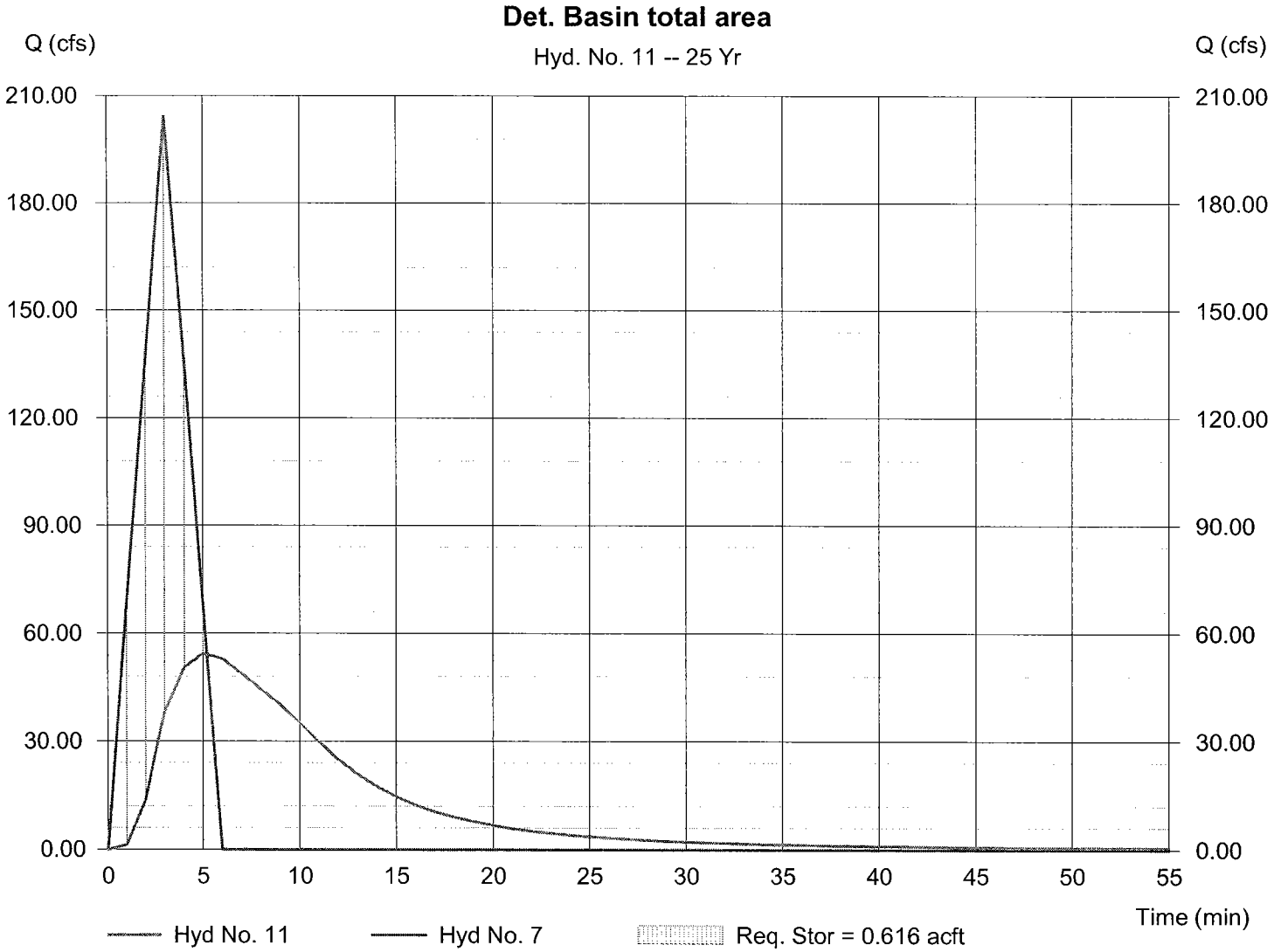
Hyd. No. 11

Det. Basin total area

Hydrograph type	= Reservoir	Peak discharge	= 54.37 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 7	Max. Elevation	= 7164.05 ft
Reservoir name	= Det. Basin for Phase I	Max. Storage	= 0.616 acft

Storage Indication method used.

Hydrograph Volume = 0.843 acft



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POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

New Mexico 35.811 N 106.399 W 7713 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 3
G.M. Bonnin, D. Todd, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2003

Extracted: Fri Jun 24 2005

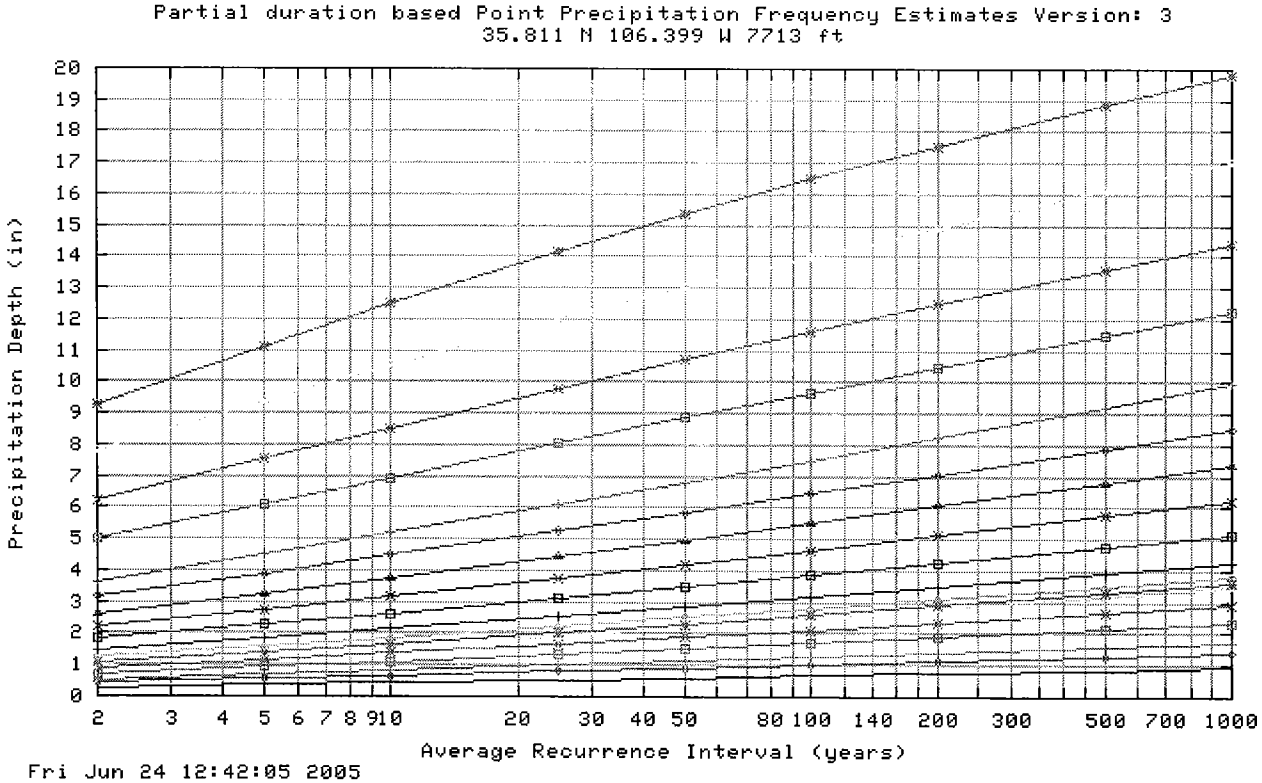
Confidence Limits | Seasonality | Location Maps | Other Info. | Grids | Maps | Help | Docs | U.S. Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.27	0.42	0.52	0.69	0.86	1.01	1.09	1.25	1.48	1.81	2.19	2.62	3.16	3.64	4.99	6.20	7.80	9.26
5	0.37	0.56	0.69	0.93	1.15	1.33	1.42	1.60	1.86	2.26	2.73	3.25	3.90	4.50	6.10	7.53	9.38	11.14
10	0.44	0.66	0.82	1.11	1.37	1.58	1.67	1.87	2.16	2.62	3.16	3.76	4.48	5.18	6.95	8.53	10.54	12.50
25	0.53	0.80	1.00	1.34	1.66	1.93	2.03	2.23	2.57	3.10	3.75	4.44	5.26	6.10	8.05	9.81	11.98	14.17
50	0.60	0.91	1.13	1.52	1.88	2.20	2.31	2.52	2.87	3.47	4.20	4.97	5.86	6.80	8.87	10.73	13.01	15.35
100	0.67	1.02	1.26	1.70	2.11	2.48	2.60	2.81	3.19	3.85	4.66	5.51	6.47	7.52	9.68	11.63	14.00	16.48
200	0.74	1.13	1.40	1.89	2.34	2.77	2.90	3.10	3.50	4.23	5.12	6.06	7.08	8.25	10.46	12.51	14.94	17.55
500	0.84	1.28	1.59	2.14	2.65	3.16	3.30	3.48	3.91	4.74	5.75	6.80	7.89	9.22	11.48	13.62	16.13	18.86
1000	0.92	1.40	1.74	2.34	2.90	3.47	3.62	3.78	4.22	5.14	6.25	7.38	8.52	9.96	12.24	14.42	16.99	19.82

Text version of table

*These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval. Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.



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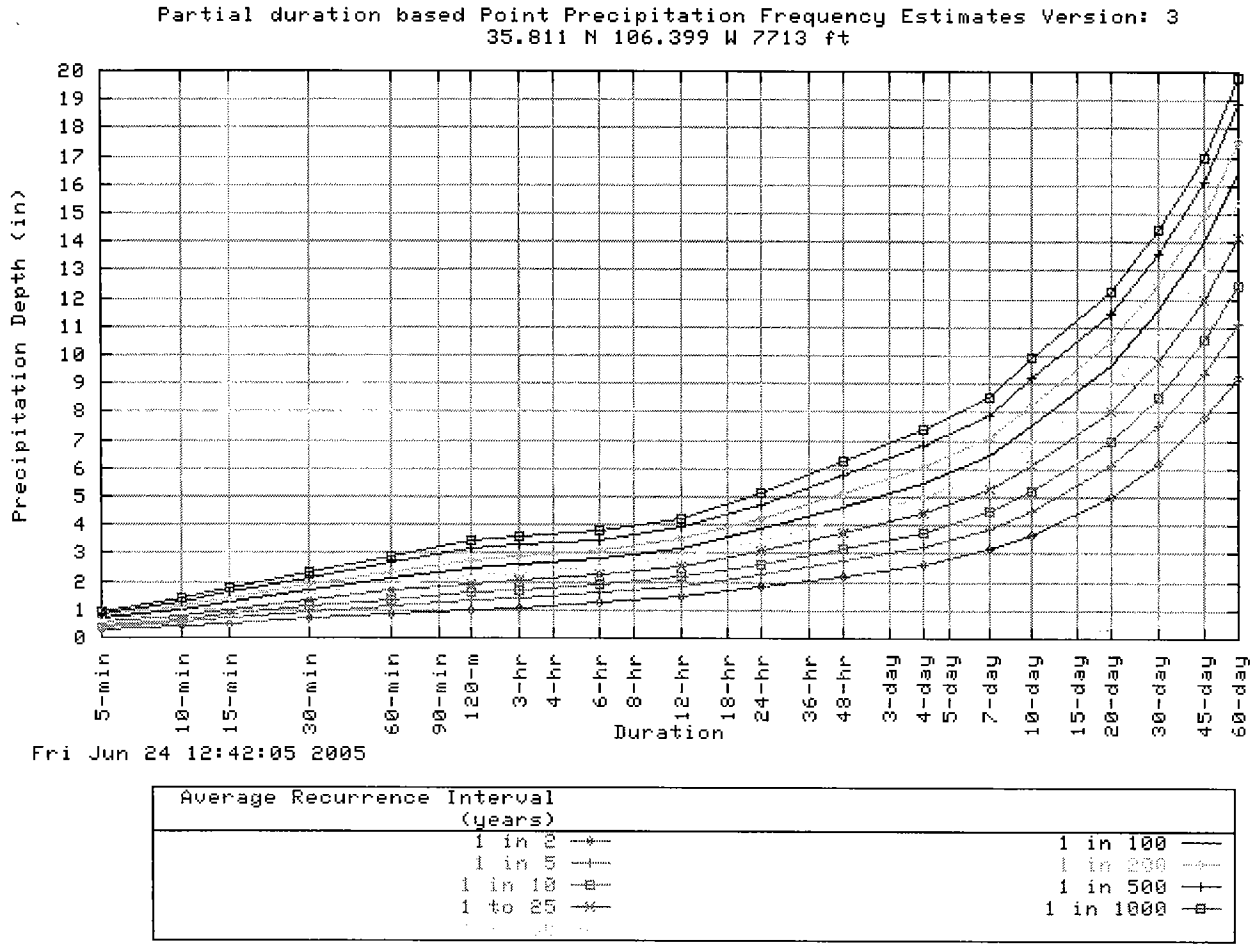

Confidence Limits -

*** Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)**

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.32	0.48	0.59	0.80	0.99	1.19	1.27	1.45	1.68	1.99	2.39	2.85	3.41	3.94	5.43	6.71	8.39	9.99
5	0.42	0.64	0.79	1.07	1.32	1.57	1.65	1.84	2.11	2.47	2.97	3.53	4.21	4.87	6.65	8.15	10.09	12.01
10	0.50	0.76	0.94	1.27	1.57	1.86	1.96	2.15	2.45	2.86	3.45	4.08	4.84	5.60	7.57	9.22	11.33	13.47
25	0.61	0.92	1.15	1.54	1.91	2.27	2.37	2.57	2.91	3.38	4.08	4.82	5.68	6.59	8.77	10.59	12.89	15.29
50	0.69	1.05	1.30	1.75	2.16	2.58	2.70	2.90	3.25	3.78	4.56	5.39	6.33	7.35	9.65	11.60	14.00	16.57
100	0.77	1.17	1.45	1.95	2.41	2.91	3.04	3.23	3.61	4.20	5.06	5.98	7.00	8.13	10.54	12.58	15.09	17.81
200	0.85	1.30	1.61	2.17	2.69	3.24	3.38	3.56	3.97	4.62	5.57	6.59	7.66	8.93	11.41	13.53	16.11	18.98
500	0.97	1.48	1.83	2.47	3.05	3.71	3.85	4.00	4.44	5.19	6.28	7.40	8.56	9.99	12.53	14.75	17.43	20.45
1000	1.06	1.62	2.01	2.71	3.35	4.09	4.24	4.35	4.81	5.64	6.83	8.05	9.27	10.82	13.38	15.65	18.40	21.51

* The **upper** bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are **greater** than.
** These precipitation frequency estimates are based on a partial duration series. **ARI** is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

*** Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)**

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.24	0.36	0.45	0.61	0.75	0.86	0.94	1.10	1.31	1.67	2.02	2.42	2.93	3.37	4.60	5.72	7.29	8.57

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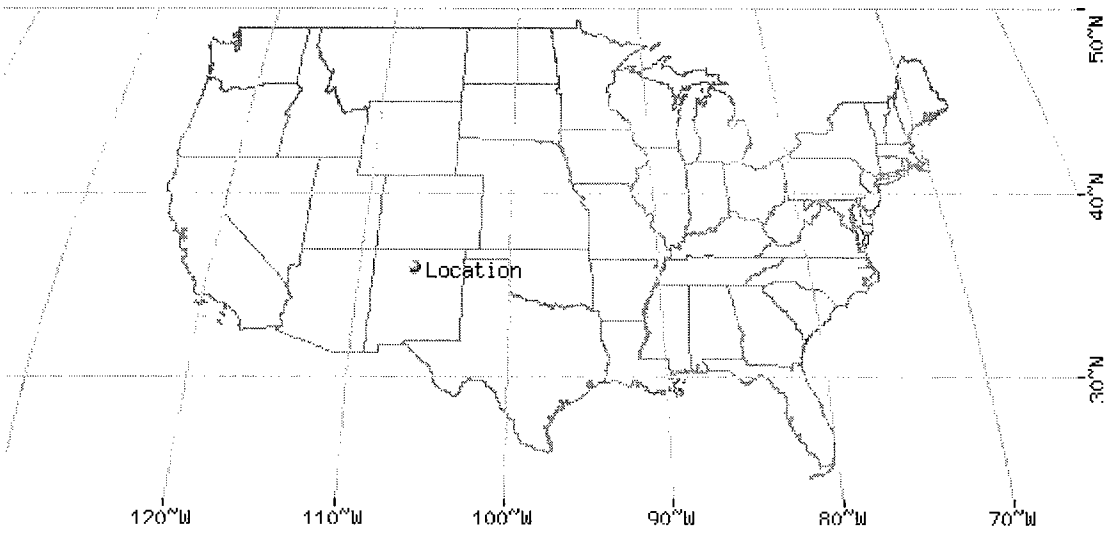
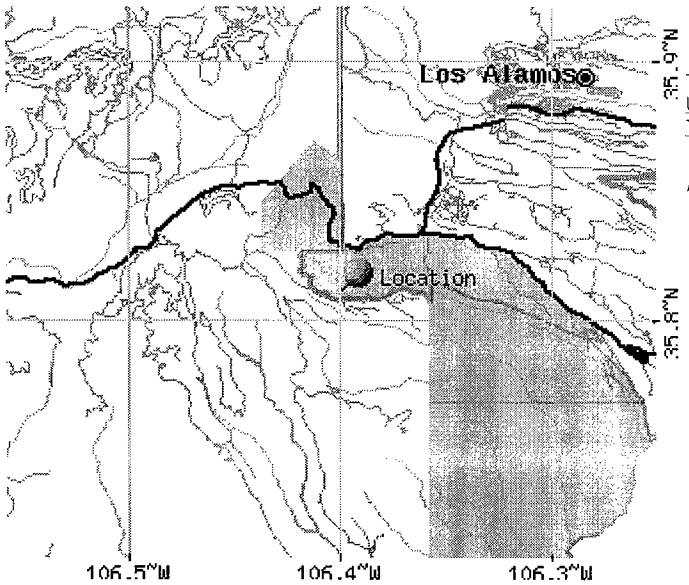
5	0.32	0.49	0.60	0.81	1.00	1.14	1.22	1.40	1.65	2.08	2.51	2.99	3.61	4.17	5.62	6.95	8.75	10.31
10	0.38	0.58	0.72	0.97	1.20	1.35	1.44	1.62	1.91	2.40	2.90	3.45	4.14	4.79	6.38	7.86	9.82	11.55
25	0.46	0.70	0.87	1.17	1.44	1.64	1.73	1.92	2.25	2.82	3.42	4.06	4.84	5.62	7.37	9.01	11.14	13.09
50	0.52	0.79	0.98	1.31	1.63	1.85	1.96	2.16	2.50	3.15	3.82	4.52	5.37	6.25	8.10	9.84	12.07	14.15
100	0.58	0.88	1.09	1.47	1.81	2.07	2.19	2.39	2.76	3.49	4.21	5.00	5.91	6.88	8.81	10.64	12.96	15.16
200	0.64	0.97	1.20	1.61	2.00	2.30	2.42	2.63	3.01	3.82	4.61	5.47	6.43	7.50	9.50	11.41	13.80	16.09
500	0.71	1.08	1.34	1.81	2.24	2.59	2.72	2.92	3.33	4.25	5.14	6.10	7.13	8.31	10.36	12.36	14.83	17.23
1000	0.77	1.17	1.46	1.96	2.42	2.82	2.96	3.15	3.57	4.59	5.55	6.57	7.65	8.94	10.99	13.05	15.54	18.04

* The **lower** bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are **less** than.
** These precipitation frequency estimates are based on a partial duration maxima series. **ARI** is the Average Recurrence Interval.

Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

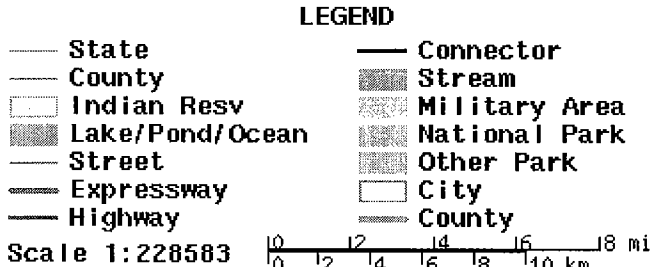
Maps -





These maps were produced using a direct map request from the U.S. Census Bureau Mapping and Cartographic Resources Tiger Map Server.

Please read disclaimer for more information.



PARKING LOT STUDY
13568.264.CCAL.001
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Other Maps/Photographs -

View USGS digital orthophoto quadrangle (DOQ) covering this location from TerraServer; **USGS Aerial Photograph** may also be available from this site. A DOQ is a computer-generated image of an aerial photograph in which image displacement caused by terrain relief and camera tilts has been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. Visit the USGS for more information.

Watershed/Stream Flow Information -

Find the Watershed for this location using the U.S. Environmental Protection Agency's site.

Climate Data Sources -

Precipitation frequency results are based on data from a variety of sources, but largely NCDC. The following links provide general information about observing sites in the area, regardless of if their data was used in this study. For detailed information about the stations used in this study, please refer to our documentation.

Using the **National Climatic Data Center's (NCDC)** station search engine, locate other climate stations within:

+/-30 minutes ...OR... +/-1 degree of this location (35.811/-106.399). Digital ASCII data can be obtained directly from **NCDC**.

Find Natural Resources Conservation Service (NRCS) SNOTEL (SNOwpack TELemetry) stations by visiting the **Western Regional Climate Center's state-specific SNOTEL station maps**.

Hydrometeorological Design Studies Center
DOC/NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910

(301) 713-1669
Questions?: HDSC.Questions@noaa.gov

Disclaimer

PARKING LOT STUDY
13568.264.CCAL.001
SHEET 10 of 10

DMJMH+N

CALCULATION COVER SHEET

Date: 06/30/05

Calculation No: 13568.264.ECAL.001
Calculation Title: Lighting Calculation
Project No. & Title: PARKING LOT STUDY
Design Verification Required: ☐ Yes ☒ No
Calculation Type: ☒ Scoping ☐ Preliminary ☐ Final
☐ Superseded by Calculation No: ____ ☐ Voided

ORIGINAL AND REVISED CALCULATION/ANALYSIS APPROVAL

	Rev. A Printed Name/ Sign/Initials/Date	Rev. Printed Name/ Sign/Initials/Date	Rev. Printed Name/ Sign/Initials/Date	Rev. Printed Name/ Sign/Initials/Date
Originator:	Mark Thomas 6/30/05			
Checked By:	Don Crawford 6/30/05			
Approved By:	Jeanne Donhiser . 6/30/05			

AFFECTED DOCUMENTS

Document Number	Document Title	Rev. Number	Responsible Discipline Lead Initials

RECORD OF REVISION

Rev.	Reason for Revision
A	First issue of calculation

ATTACHMENTS

Att.	Description	Total Pages (not incl cover sheets)
A	Visual 2.2 Professional Lighting Calculation Output Sheets – Normal Lighting	2

TOTAL CALCULATION PAGE COUNT: 7

CALCULATION SHEET

Calculation No. 13568.264.ECAL.001	**ORIGINATOR:** Mark Thomas **DATE** 06/24/05
Rev. No. A	**CHECKER:** Don Crawford **DATE** 06/24/05
Calculation Title Lighting Calculation	

1.0 INTRODUCTION

1.1 Purpose

This lighting calculation will provide data on the number and location of luminaires for the parking lot, around TA-63 that are in the scope of this project.

1.2 Scope

The scope of this calculation is limited to the parking lot areas for both Phase 1 and Phase 2.

2.0 Basis

2.1 Design Inputs

2.1.1 Civil drawings, C-0002, for the project were used to determine the geometry of the parking lot.

2.1.2 IES-NA guidelines were used to determine an appropriate level of illuminance for each visual task.

- **Normal Lighting**
  - Typical Parking Lot – (Phase 1 and Phase 2)
    - Visual Task: *IESNA Lighting Design Guide*, Figure 22-21 (Recommended Maintained Illuminance Values for Parking Lots).
      - Mimimum Horizontal Illuminance: Basic .2 fc
      - Maximum/Minimum Ratio: 20:1

2.2 Criteria

- As required by ESM (Section D5020, §7.1 D), illuminance levels are to be based on the IESNA Lighting Design Guide.
  - Design calculations should show that illuminance values are within 10 percent.
- Per the ESM (Section D5020 §7.2 G and H), luminaires are selected as follows:
  - Lamp – High Pressure Sodium, 400W
  - Complies with State of New Mexico "Night Sky Protection Act".
  - Pole Height – 30'-0"

CALCULATION SHEET

Calculation No. 13568.264.ECAL.001	**ORIGINATOR:** Mark Thomas **DATE** 06/24/05
Rev. No. A	**CHECKER:** Don Crawford **DATE** 06/24/05
Calculation Title Lighting Calculation	

2.3 Assumptions

2.3.1 Light Loss Factors, a lamp dirt depreciation factor (LDD) of .76 for High Pressure Sodium (HPS) lamps.

3.0 References

3.1 Illuminating Engineering Society of North America (IESNA)

3.1.1 "Lighting Handbook, IESNA Lighting Design Guide," 9th edition, 2000.

3.2 Los Alamos National Laboratory

3.2.1 LANL Engineering Standards Manual (ESM), 2002.

4.0 Methods

Models of the spaces affected by this project were created in the Visual 2.4 Professional software package. This program uses a point-by-point method to calculate the workplane illuminance levels.

5.0 Results and Conclusions

The proposed lighting system has been shown to comply with IESNA Standard 90.1 uniform level of illumination requirements.

Attachment A contains the output of the lighting calculations.

- Lighting exceeds IESNA standards.
- Luminaries are mounted on a 30'-0" pole. With either a single arm or double arm connection to the pole.
- Luminaries comply with the State of New Mexico "Night Sky Protection Act".

CALCULATION SHEET

Calculation No. 13568.264.ECAL.001	**ORIGINATOR:** Mark Thomas **DATE** 06/24/05
Rev. No. A	**CHECKER:** Don Crawford **DATE** 06/24/05
Calculation Title Lighting Calculation	

6.0 Calculations and Analyses

The calculation was performed in Visual 2.4 Professional. Results of calculations are shown in Attachment A.

DMJMH+N

Project Number: 60001415

CALCULATION SHEET

Calculation No. 13568.264.ECAL.001	**ORIGINATOR:** Mark Thomas **DATE** 06/30/05
Rev. No. A	**CHECKER:** Don Crawford **DATE** 06/30/05
Calculation Title Lighting Calculation	

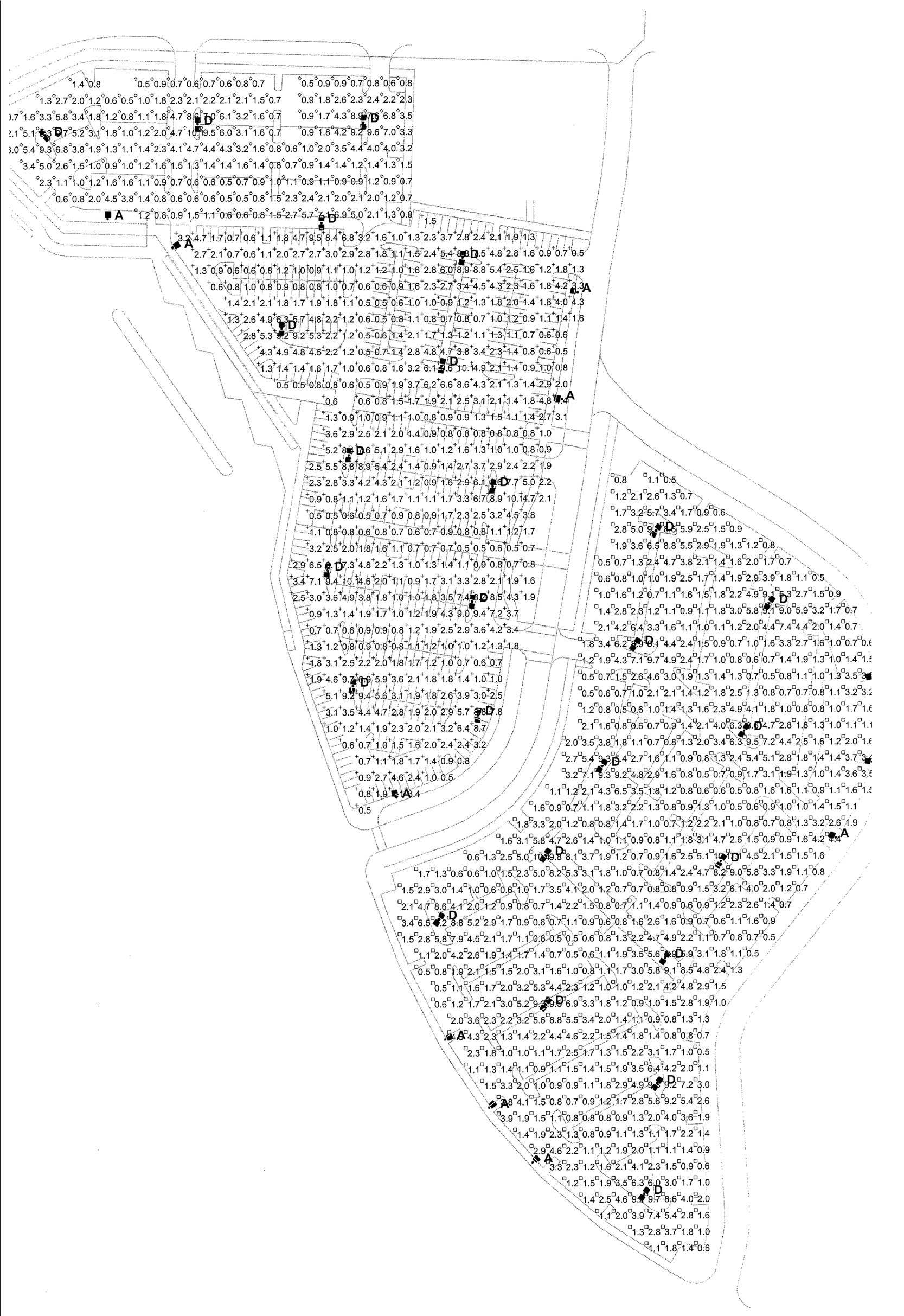
Calculation 13568-264-ECAL-001, Rev. A

Attachment A

Total Number of Pages (**Not** including this Attachment Cover Sheet) 2

Originator's Signature and Date 6/27/05

Checker's Signature and Date Don Crawford 6/27/05



Plan View
Scale 1" = 100'

PARKING LOT STUDY
13568.264.ECAL.001
SHHET 1 OF 2

LUMINAIRE SCHEDULE

Symbol	Label	Qty	Catalog Number	Description	Lamp	Lumens	LLF	Watts
■	A	11	KSF2 400S R4SC	ARE LIGHT WITH TYPE 4 , CUTOFF REFLECTOR, FLAT GLASS LENS.	ONE 400-WATT CLEAR ET-18 HIGH PRESSURE SODIUM, HORIZONTAL POSITION.	50000	0.76	468
■ ■	D	25	KSF2 400S R3	AREA LIGHT WITH TYPE 3, SHORT, CUTOFF REFLECTOR, FLAT GLASS LENS.	ONE 400-WATT CLEAR ET-18 HIGH PRESSURE SODIUM, HORIZONTAL POSITION.	50000	0.76	936

STATISTICS

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
PHASE 2 - NORTH	◇	2.4 fc	10.1 fc	0.5 fc	20.2:1	4.7:1
PHASE 2 - SOUTH	□	2.4 fc	10.4 fc	0.5 fc	20.8:1	4.8:1
PHASE 1	+	2.5 fc	10.1 fc	0.5 fc	20.2:1	4.9:1

4.0 DRAWINGS

Drawing No.	Description
C-0001	Legend
C-0002	Site Phase Key Plan
C-1000	Site Plan
C-1001	Grading Plan
C-1002	Utility Plan
E-1000	Site Lighting Plan
E-1001	Site Lighting Plan

CIVIL LEGEND

(NOT ALL SYMBOLS WILL APPLY TO THIS PROJECT)

SYMBOL	DESCRIPTION
	PROPERTY LINE INDICATOR
	SURFACE DRAINAGE
EL	EXISTING CONTOUR
EL	FINISHED CONTOUR
	UNDISTURBED EARTH OR TUFF
	SELECT COMPACT FILL
	ROCK
	COURSE POROUS FILL
	FINE POROUS FILL
	TOP OF SLOPE
	TOE OF SLOPE
BM	BENCHMARK INDICATOR
EL	CONTROL ELEVATION INDICATOR
NO EL	MONUMENT NO=SEQUENTIAL DESIGNATION EL=ELEVATION
NO EL	BORING INDICATOR NO=SEQUENTIAL DESIGNATION EL=ELEVATION
EL	EXISTING ELEVATION INDICATOR
EL	FINISH ELEVATION INDICATOR
SC	STEAM/COMMUNICATIONS MANHOLE
	STORM DRAIN GRATE
X	C – PRECAST CONCRETE, COMMUNICATION VAULT E – PRECAST CONCRETE, ELECTRICAL VAULT F – PRECAST CONCRETE, FUEL OIL VAULT G – PRECAST CONCRETE, NATURAL GAS VAULT T – PRECAST CONCRETE, TELEPHONE VAULT
	THRUST BLOCK
	TEE FITTING
	VALVE
X	G – UTILITY, METER, NATURAL GAS S – UTILITY, METER, SANITARY W – UTILITY, METER, WATER
	CULVERT/END SECTION
	DRAINAGE ARROW

SYMBOL	DESCRIPTION
X	C – COMMUNICATION MANHOLE D – STORM DRAIN MANHOLE E – ELECTRICAL MANHOLE G – NATURAL GAS MANHOLE S – SEWER MANHOLE T – TELEPHONE MANHOLE W – WATER MANHOLE
	FIRE HYDRANT
W	UTILITY–WATER REGULATOR VALVE
TM	PRECAST CONCRETE, MANHOLE, TRANSFORMER VAULT
PB	PULL BOX
TP	TURNING POINT
℄	CENTERLINE
ℙ	PROPERTY LINE
FL	FLOW LINE
	HANDICAP DESIGNATION
25	INTERSTATE ROUTE
66	U.S. ROUTE
50	STATE ROUTE
	EXISTING PROPERTY CORNER INDICATOR
	NEW PROPERTY CORNER INDICATOR
MATERIAL	VAULT
CO	CLEANOUT
CO	DOUBLE CLEANOUT
CB	CATCH BASIN

SITE UTILITIES

	PIPING
PW	POTABLE WATER
C	CONDENSATE
S	STEAM
G	NATURAL GAS HIGH PRESSURE (>5 PSI)
SS	SANITARY SEWER
STS	STORM SEWER
F	FIRE PROTECTION WATER
SWTE	SANITARY WASTEWATER TREATED EFFLUENT
E	ELECTRICAL
T	TELECOMMUNICATION

90% REVIEW
"NOT FOR CONSTRUCTION"

DMJM H&N | AECOM

PARKING LOT STUDY

LEGEND

C–0001

BLDG. TA–63

Los Alamos NATIONAL LABORATORY
P.O. Box 1663
Los Alamos, New Mexico 87545

DATE:

SHEET 01

SITE PHASING KEY PLAN
SCALE: 1" = 100'
0 100' 200'
1"=100'-0"

LEGEND

PHASE 1 CONSTRUCTION

PHASE 2 CONSTRUCTION

90% REVIEW
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PARKING LOT STUDY

SITE PHASING KEY PLAN

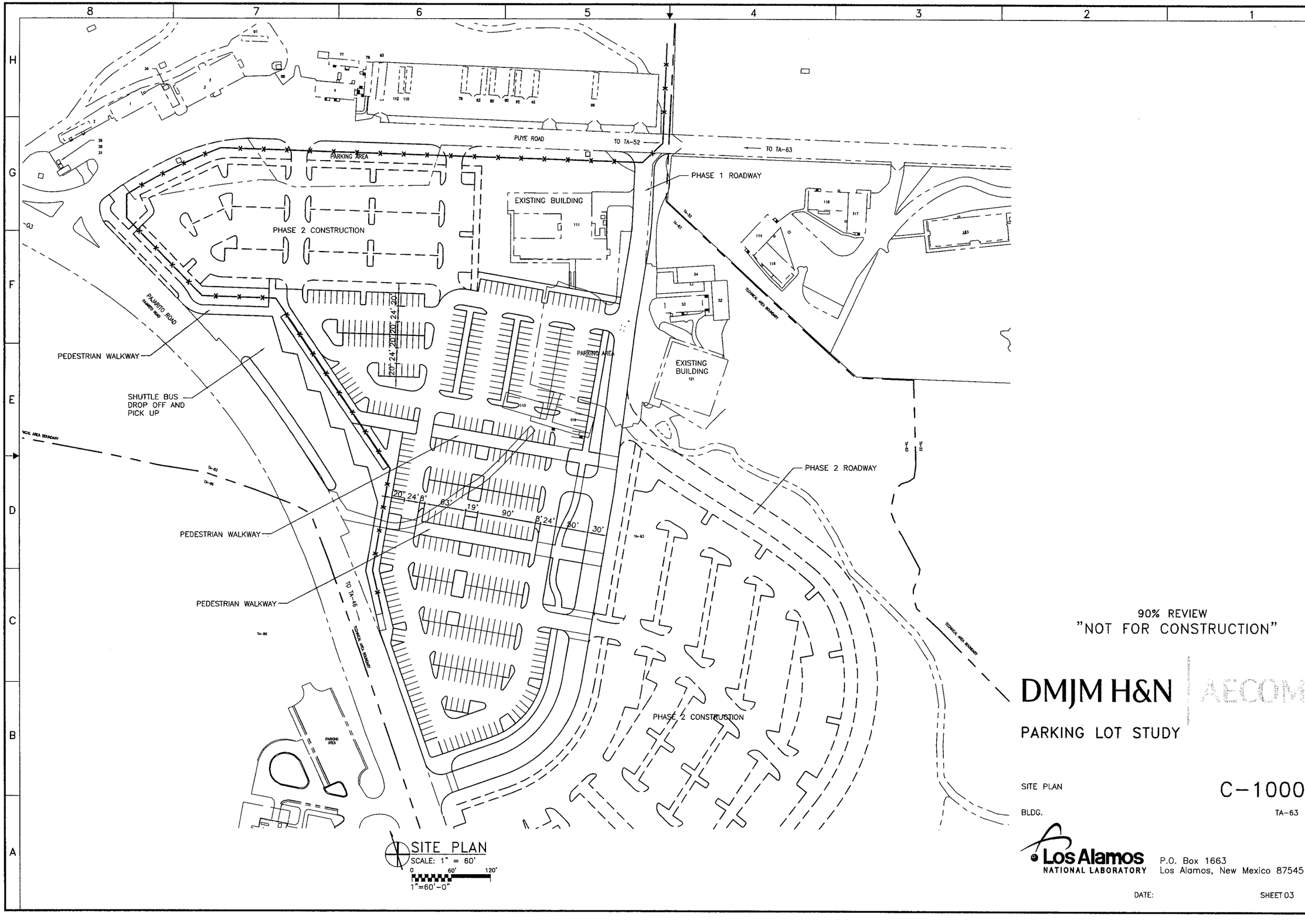
C-0002

BLDG. TA-63

Los Alamos NATIONAL LABORATORY
P.O. Box 1663
Los Alamos, New Mexico 87545

DATE:

SHEET 02



90% REVIEW
"NOT FOR CONSTRUCTION"

DMJM H&N | AECOM

PARKING LOT STUDY

SITE PLAN

C-1000

BLDG. TA-63

Los Alamos NATIONAL LABORATORY
P.O. Box 1663
Los Alamos, New Mexico 87545

DATE:

SHEET 03

8 7 6 5 4 3 2 1

H G F E D C B A

PUYE ROAD

TO TA-52

TO TA-63

PUYE ROAD

TO TA-61

PARKING AREA

PARKING AREA

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TO TA-61 7230

PUYE ROAD

TO TA-52

TO TA-63

PUYE ROAD

PARKING AREA

PARKING AREA

5' TO 10' RETAINING WALL

24" RCP

24" RCP

36" RCP

30" RCP

5' TO 10' RETAINING WALL

36" OUTLET PIPE

DROP INLETS, TYR

PHASE 1 & 2 GRADING PLAN

SCALE: 1" = 80'

0 80' 160'

1"=80'-0"

90% REVIEW
"NOT FOR CONSTRUCTION"

DMJM H&N | AECOM

PARKING LOT STUDY

PHASE 1 & 2 GRADING PLAN

C-1001

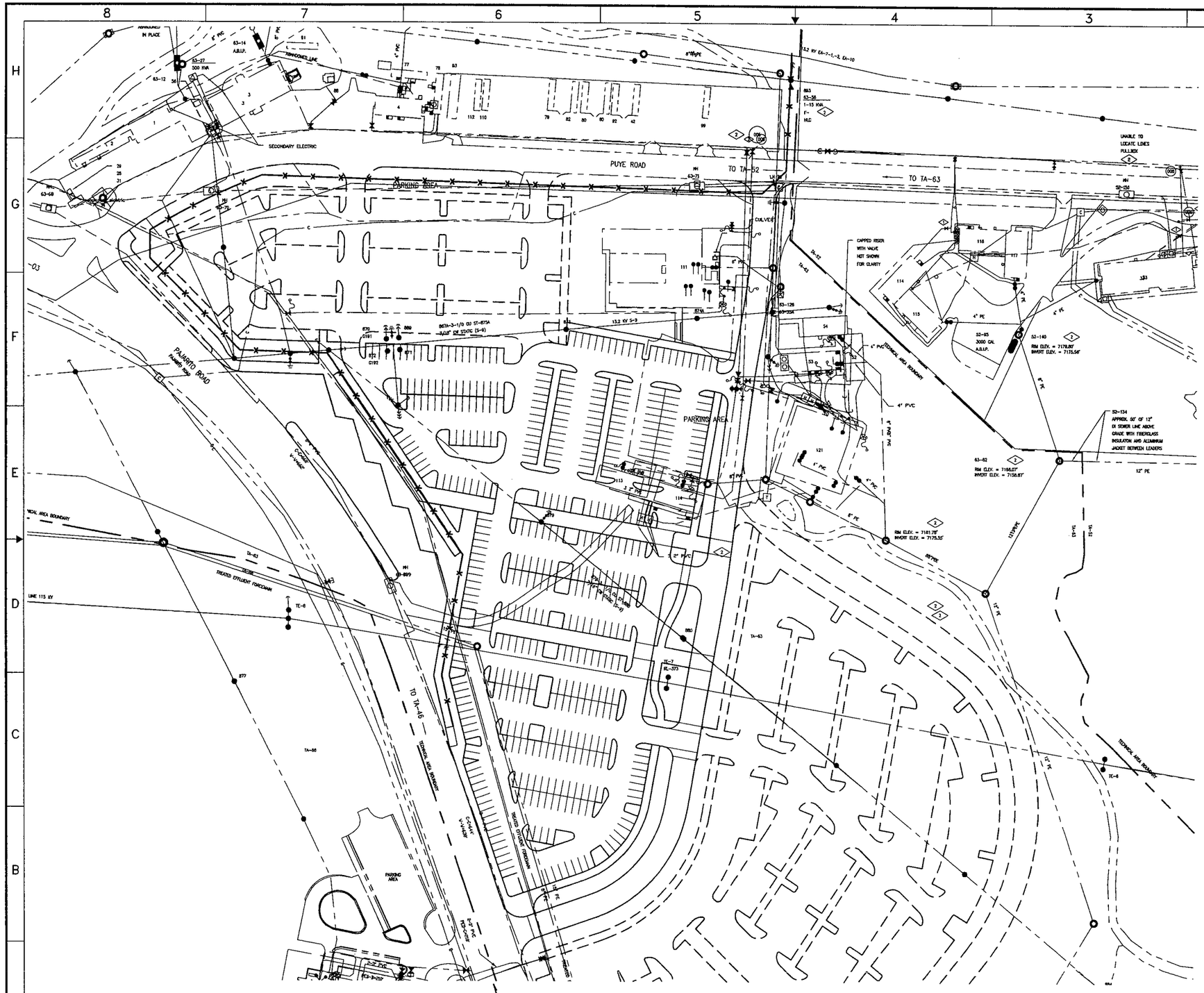
BLDG. TA-63

Los Alamos NATIONAL LABORATORY

P.O. Box 1663
Los Alamos, New Mexico 87545

DATE:

SHEET 04



90% REVIEW
"NOT FOR CONSTRUCTION"

DMJM H&N | AECOM

PARKING LOT STUDY

UTILITY PLAN

BLDG.

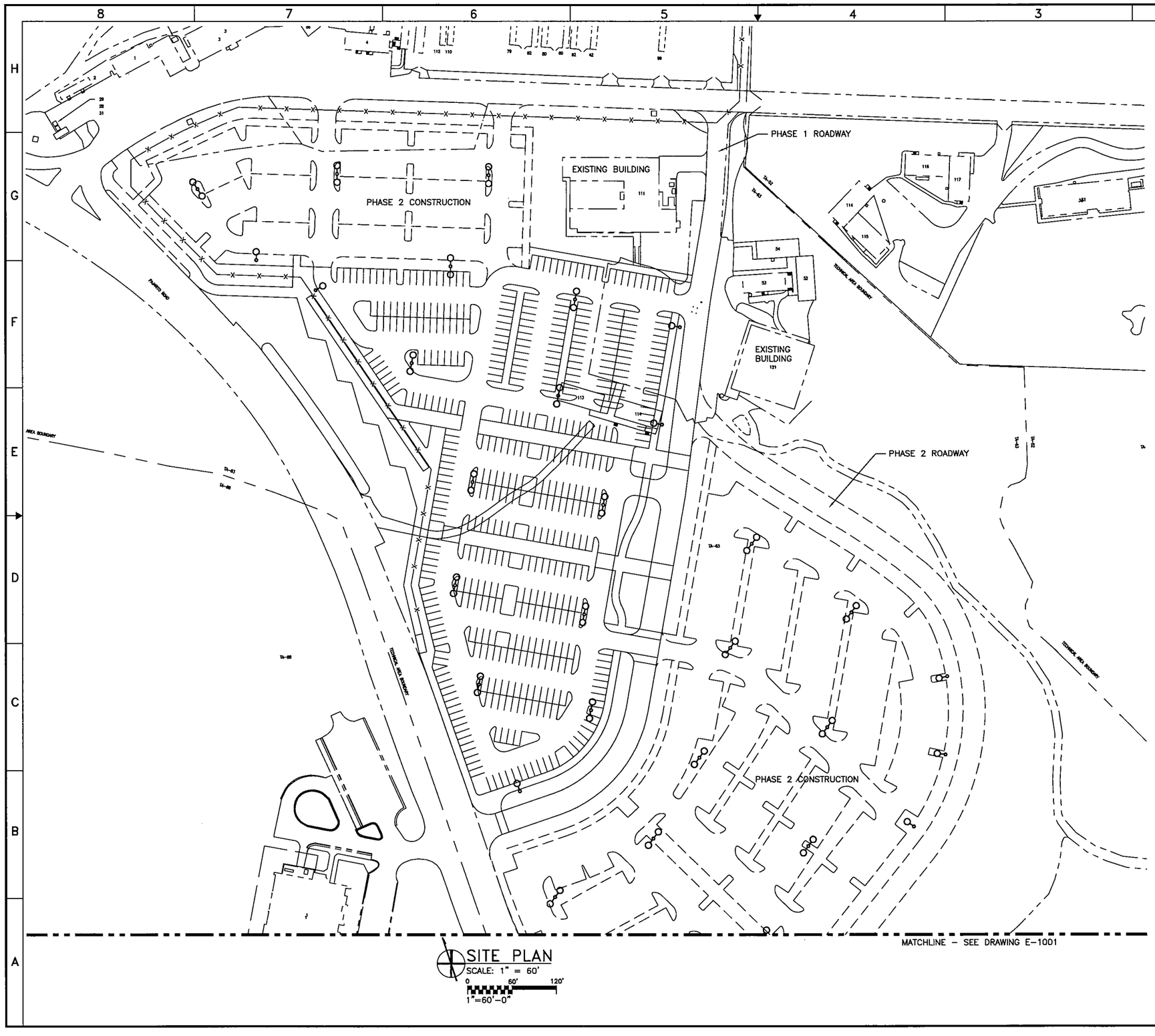
C-1002

TA-63

Los Alamos NATIONAL LABORATORY
P.O. Box 1663
Los Alamos, New Mexico 87545

DATE:

SHEET 05



SITE PLAN
SCALE: 1" = 60'
0 60' 120'
1"=60'-0"

LEGEND

- LIGHT FIXTURE. DOUBLE ARM, 400W HPS LAMP, TYPE 3 ON 30'-0" POLE.
- LIGHT FIXTURE. SINGLE ARM, 400W HPS LAMP, TYPE 4 ON 30'-0" POLE.

90% REVIEW
"NOT FOR CONSTRUCTION"

DMJM H&N | AECOM

PARKING LOT STUDY

SITE LIGHTING PLAN

E-1000

BLDG. TA-63

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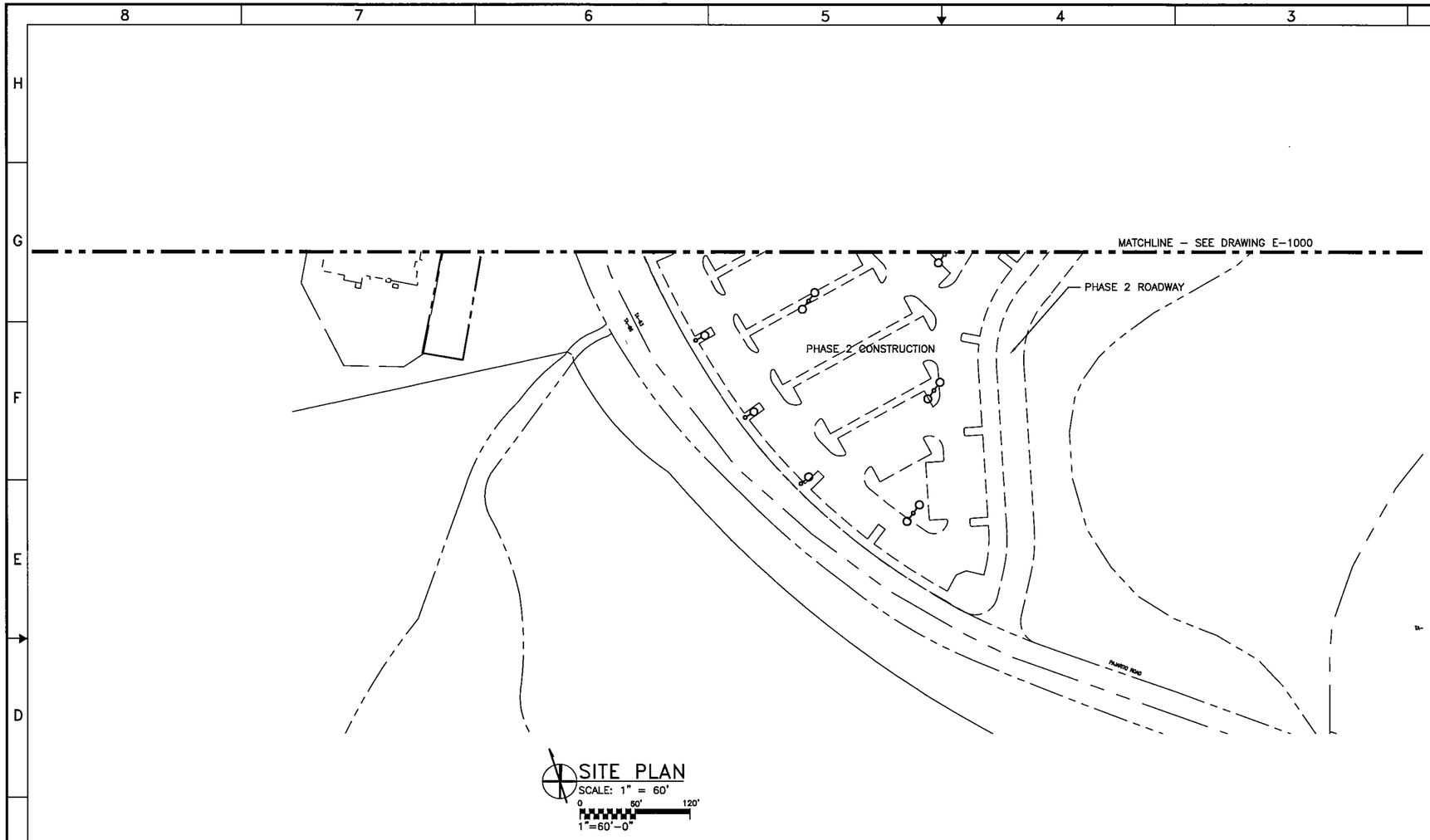
P.O. Box 1663
Los Alamos, New Mexico 87545

DATE: SHEET



SITE PLAN
SCALE: 1" = 60'
0 60' 120'
1"=60'-0"

LEGEND

- LIGHT FIXTURE. DOUBLE ARM, 400W HPS LAMP, TYPE 3 ON 30'-0" POLE.
- LIGHT FIXTURE. SINGLE ARM, 400W HPS LAMP, TYPE 4 ON 30'-0" POLE.

90% REVIEW
"NOT FOR CONSTRUCTION"

DMJM H&N | AECOM

PARKING LOT STUDY

SITE LIGHTING PLAN

E-1001

BLDG. TA-63

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DATE: SHEET