U.S. DEPARTMENT OF ENERGY

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YUCCA MOUNTAIN

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

CONSOLIDATED SAMPLING IN THE EXPLORATORY STUDIES FACILITY

INFORMATION COPY

REV. 2

TEST PLANNING PACKAGE 92-14

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AUGUST 1994

UNITED STATES DEPARTMENT OF ENERGY

TEST PLANNING PACKAGE 92-14
CONSOLIDATED SAMPLING IN THE EXPLORATORY STUDIES FACILITY

CONTENTS

1.0 LIST OF STUDY PLANS OR SCIENTIFIC INVESTIGATION PLANS USED IN SCIENTIFIC INVESTIGATION . . . 3

2.0 WORK SCOPE . . . 3

3.0 INVESTIGATION CONTROLS . . . 4
- 3.1 Interference . . . 5
- 3.2 Impacts to Waste Isolation . . . 5
- 3.3 Environmental Impacts . . . 5
- 3.4 Consolidated Performance Criteria and Constraints . . . 5
- 3.5 Safety Analysis . . . 5

4.0 OTHER INSTRUCTIONS . . . 5
- 4.1 Sequencing Recommended for Performing Multiple investigations . . . 5
- 4.2 Data Submittals (YAP-SIII.3Q) . . . 5
- 4.3 Sample Collection . . . 6
- 4.4 Computer Software . . . 6

5.0 DESCRIPTION OF OPEN SITE CHARACTERIZATION PLAN COMMENTS (YAP-30.3) . . . 6

6.0 REFERENCES TO DESIGN REQUIREMENTS . . . 6

7.0 COST AND SCHEDULE DATA . . . 7

8.0 QA PREPARATION . . . 8
- 8.1 Closure of QA Concerns . . . 8
- 8.2 Q-List Items/Activities . . . 8

9.0 READINESS REVIEW . . . 9

ATTACHMENT 1: TEST-SPECIFIC PERFORMANCE CRITERIA AND CONSTRAINTS . . . 10
ATTACHMENT 2: CONSOLIDATED SAMPLING TEST PLANNING PACKAGE SCHEDULE . . . 25

1.0 LIST OF STUDY PLANS OR SCIENTIFIC INVESTIGATION PLANS USED IN SCIENTIFIC INVESTIGATION

The following study plans are controlled Yucca Mountain Site Characterization Project (YMP) documents that describe plans for consolidated sampling activities which will be implemented in the Exploratory Studies Facility (ESF): 8.3.4.2.4.4.2, "Engineered Barrier System Field Tests," 8.3.1.2.2.2, "Water Movement Tests," 8.3.1.3.2.1, "Mineralogy, Petrology, and Chemistry Transport Pathways," 8.3.1.3.2.2, "History of Mineralogic and Geochemical Alteration of YM," 8.3.1.9.2.1, "Natural Resource Assessment of Yucca Mountain, Nye County, Nevada," and 8.3.1.5.2.1, "Characterization of Yucca Mountain Quaternary Regional Hydrology," 8.3.1.3.4.2, "Biological Sorption and Transport," 8.3.1.2.2.3, "Characterization of the Percolation in the Unsaturated Zone-Surface-Based Study," 8.3.1.15.1.8, "In-Situ Design Verification," 8.3.1.15.1.1, "Laboratory Thermal Properties," 8.3.1.15.1.2, "Laboratory Thermal Expansion Testing," 8.3.1.15.1.3, "Laboratory Determination of the Mechanical Properties of Intact Rock," 8.3.1.15.1.4, "Laboratory Determination of Mechanical Properties of Fractures, and 8.3.1.2.2.7.2, "Aqueous-Phase Chemical Investigations Unsaturated Zone Hydrochemistry."

2.0 WORK SCOPE

Section 2.0 References:

R2.1 "Exploratory Studies Facility Design Requirements, "Appendix B, Sections B-2.2.1, "Chloride and Chlorine-36 Measurements of Percolation at Yucca Mountain," B-2.2.2, "Matrix Hydrologic Properties Testing," B-2.2.17, "History of Mineralogic and Geochemical Alteration of Yucca Mountain," B-2.2.15, "Mineral Distributions Between Host Rock and Accessible Environment," B-2.2.16, "Fracture Mineralogy," B-2.2.14, "Petrologic Stratigraphy of the Topopah Spring Member," B-2.2.19, "Biological Sorption and Transport," and B-2.2.42, "Repository Horizon Rock-Water Interaction," B-2.2.22, "Tests (Thermal & Mechanical) Using Samples Obtained from the Exploratory Studies Facility," YMP/CM-0019, 7/2/92.

R2.2 Memorandum: Mitchell to Elkins, "Transmittal of Supplemental Design and Test-Related Information for the ESFDR D&TRI (Los Alamos Tests in the ESF North Ramp Starter Tunnel)," TWS-INC-03-93-13, dated March 22, 1993.

R2.3 Letter: Edwards to Boak, "Design and Construction-Related Information for U.S. Geological Survey Sample Collection Activities in the Exploratory Studies Facility North Ramp (SCPB: 8.3.1.2.2.3.1, 8.3.1.9.2.1.1, and 8.3.1.5.2.1.5)," dated August 5, 1994.

R2.4 Facsimile: Blink to Boak, dated July 11, 1994.

R2.5 Letter: Mitchell to Elkins, "Transmittal of Supplemental Design and Test-Related Information for the ESFDR (D&TRI) Los Alamos Tests in the ESF North Ramp and Test Alcoves," LA-EES-13-LV-07-94-022, dated July 12, 1994.

R2.6 Letter: Shephard to Boak, "Request for Planning for Consolidated Sampling in the ESF North Ramp (Test Planning Package 92-14, R1)," dated July 6, 1994.

R2.7 Letter: Edwards to Boak, "Sampling in the ESF to Support Hydrochemical Characterization of the Unsaturated Zone," dated August 9, 1994.

Tests implemented under this test planning package are discussed in the following sections of the Site Characterization Program Baseline (SCPB):

	Test Title	SCPB Section
1.	Chloride & Chlorine-36 Measurements of Percolation at YM	8.3.1.2.2.2.1
2.	Matrix Hydrologic Properties Testing	8.3.1.2.2.3.1
3.	Petrologic Stratigraphy of the Topopah Spring Member	8.3.1.3.2.1.1
4.	Mineral Distributions Between Host Rock And Accessible Environment	8.3.1.3.2.1.2
5.	Fracture Mineralogy	8.3.1.3.2.1.3
6.	History of Mineralogic and Geochemical Alteration of YM	8.3.1.3.2.2.1
7.	Biological Sorption and Transport	8.3.1.3.4.2
8.	Studies of Calcite and Opaline Silica Vein Deposits	8.3.1.5.2.1.5
9.	Geochemical Assessment of Yucca Mountain in Relation to the Potential for Mineralization	8.3.1.9.2.1.1
10.	Repository Horizon Rock-Water Interaction	8.3.4.2.4.4.2
11.	In-Situ Design Verification	8.3.1.15.1.8.4
12.	Laboratory Thermal Properties	8.3.1.15.1.1
13.	Laboratory Thermal Expansion Testing	8.3.1.15.1.2
14.	Laboratory Determination of Mechanical Properties of Intact Rock	8.3.1.15.1.3
15.	Laboratory Determination of Mechanical Properties of Fractures	8.3.1.15.1.4
16.	Aqueous-Phase Chemical Investigations Unsaturated Zone Hydrochemistry	

The purpose of the tests is to collect samples in the ESF for a variety of hydrologic, and geologic, mechanical, and chemical tests.

3.0 INVESTIGATION CONTROLS

R3.1 "Exploratory Studies Facility Design Requirements, "YMP/CM-0019, Rev. 0.

R3.2 Letter: Statton to Oliver, "Waste Isolation and Test Interference Evaluations for the ESF Starter Tunnel Construction - JP 92-20, and Planned Tests," LV.SC.BWD.3/93-074, dated March 24, 1993.

R3.3 Memorandum: Dyer to File, "Approval of Lithium Bromide and Related Controls for Use as the Tracer in Underground Construction Water at the Exploratory Studies Facility (ESF)," RSED:JRD-3560, dated April 1, 1993.

R3.4 Letter: Oliver to Elkins, "Submitted Test Interference Evaluation Acceptance for Exploratory Studies Facility Ramps, Main Drift, and Alcoves (SCPB: N/A)" LA-EES-13-LV-07-94-007, dated July 6, 1994.

R3.5 Letter: Boak to Elkins, "Waste Isolation Evaluation for Exploratory Studies Facility North Ramp and Test Alcoves (SCPB: N/A)" LA-EES-13-LV-07-94-019, dated July 12, 1994.

The following controls are based on section references, including evaluations to address potential test interference and waste isolation impacts (including planned use of tracers, fluids, and materials) and information from principal investigators (PIs). These controls may supplement or amend performance criteria and constraints found in YMP/CM-0019, 7/2/92.

3.1 Interference

See Attachment 1.

3.2 Impacts to Waste Isolation

See Attachment 1.

3.3 Environmental Impacts

Controls are specified in Reference R3.1

3.4 Consolidated Performance Criteria and Constraints

See Attachment 1 for a list of consolidated test-specific performance criteria and constraints. Supplemental performance criteria and constraints are identified by italicized text.

3.5 Safety Analysis

Potential safety concerns regarding the interactions between the test activities and construction activities are included in the administrative work plan (WP) as a safety analyses attachment. WP safety analyses are administrative documents that may be revised to address changes in scope of work to be performed or changes to construction efforts. Safety issues specific to ongoing testing activities after construction will be addressed, as necessary with revisions to the WP and safety analysis specific to that test.

There are no radiologic safety issues associated with these activities.

4.0 OTHER INSTRUCTIONS

4.1 Sequencing Recommended for Performing Multiple Investigations

See Attachment 1.

4.2 Data Submittals (YAP-SIII.3Q)

Participants are responsible for collection, management, submittal of data, and for compliance with Project and participant plans and procedures as described in applicable study plans.

All transfers of data between YMP participants, submittal of data to the YMP database, or transfer of data to outside parties shall be conducted in accordance with YAP-SIII.3Q and other applicable plans and procedures.

Key data to be obtained are described in the referenced study plans; this includes, but is not limited to, bulk rock and water samples for site characterization analyses and supporting construction-related tracers, fluids and materials samples. Any instrument installation associated with sampling will be documented.

4.3 Sample Collection

All samples shall be collected, handled, and transferred in a manner that assures traceability. As practicable, all sample locations will be surveyed and photographed. See Attachment 1 for test-specific sample collection requirements.

4.4 Computer Software

No software (other than that which is an integral part of measuring and test equipment) that uses numerical methods for complex scientific, engineering, or mathematical calculations will be used in the field.

5.0 DESCRIPTION OF OPEN SITE CHARACTERIZATION PLAN COMMENTS (YAP-30.3)

Section 5.0 References:

R5.1 Letter: Statton to Oliver, "Waste Isolation and Test Interference Evaluations for the ESF Starter Tunnel Construction - JP 92-20, and Planned Tests," LV.SC.BWD.3/93-074, dated March 24, 1993.

R5.2 Letter: Leonard to Distel, "Review of Exploratory Studies Facility (ESF) Test Planning Study Plans," dated May 18, 1994.

No open constraints or commitments associated with the Site Characterization Plan (SCP) have been identified for this activity.

6.0 REFERENCES TO DESIGN REQUIREMENTS

Section 6.0 References:

R6.1 "Exploratory Studies Facility Design Requirements, "Appendix B, Sections B-2.2.1, "Chloride and Chlorine-36 Measurements of Percolation at Yucca Mountain," B-2.2.2, "Matrix Hydrologic Properties Testing," B-2.2.17, "History of Mineralogic and Geochemical Alteration of Yucca Mountain," B-2.2.15, "Mineral Distributions Between Host Rock and Accessible Environment," B-2.2.16, "Fracture Mineralogy," B-2.2.14, "Petrologic Stratigraphy of the Topopah Spring Member," B-2.2.19, "Biological Sorption and Transport," and B-2.2.42, "Repository Horizon Rock-Water Interaction," B-2.2.22, "Tests (Thermal & Mechanical) Using Samples Obtained from the Exploratory Studies Facility," YMP/CM-0019, 7/2/92.

R6.2 "Exploratory Studies Facility Design Requirements," Sections 3.2.1 through 3.3.1, YMP/CM-0019, Rev. 0.

R6.3 Letter: Oliver to Elkins, "Submitted Test Interference Evaluation Acceptance for Exploratory Studies Facility Ramps, Main Drift, and Alcoves (SCPB: N/A)" LA-EES-13-LV-07-94-007, dated July 6, 1994.

R6.4 Letter: Boak to Elkins, "Waste Isolation Evaluation for Exploratory Studies Facility North Ramp and Test Alcoves (SCPB: N/A)" LA-EES-13-LV-07-94-019, dated July 12, 1994.

R6.5 Letter: Edwards to Boak, "Design and Construction-Related Information for U.S. Geological Survey Sample Collection Activities in the Exploratory Studies Facility North Ramp (SCPB: 8.3.1.2.2.3.1, 8.3.1.9.2.1.1, and 8.3.1.5.2.1.5)," dated August 5, 1994.

R6.6 Letter: Edwards to Boak, "Sampling in the ESF to Support Hydrochemical Characterization of the Unsaturated Zone," dated August 9, 1994.

Functional requirements in Section 3.2.1 through 3.3.1 of YMP/CM-0019, R0 provide the basis and control for the common facility design and its interfaces with ESF testing. Requirements are implemented under the formal ESF Title II design and fielded for this phase of construction under JP 92-20, JP 94-16, or the current JP implementing ESF construction. In addition, requirements for underground test support are provided in Section 3.2.1.6.

YMP/CM-0019, 7/2/92 establishes the common facility design basis; consolidated performance criteria and constraints (Attachment 1) are consistent with, and do not require any alteration of the current ESF design.

Development of test-specific construction specifications and drawings is not required for this activity.

7.0 COST AND SCHEDULE DATA

Section 7.0 References:

R7.1 Letter: Burke to Oliver, "Response to Requests for Support," LV.BMS.RAS.3/93.027, dated March 19, 1993.

R7.2 Memorandum: Rainey to Kinter, "Request for Supplemental PACs Information," dated July 7, 1994.

Participant	WBS	P&S Account
LANL	1.2.3.2.1.1.2	OA32112
LANL	1.2.3.3.1.2.2	OA33112
LANL	1.2.3.2.1.1.1	OA32111
LLNL	1.2.3.12.4	OL3C4
LLNL	1.2.3.12.5	OL3C4
USGS	1.2.3.3.1.2.3	OG33123

USGS	1.2.3.6.2.2.1	OG36221
USGS	1.2.3.7.2.1	OG33721
USGS	1.2.3.2.2.1.2	OG32212
USGS	1.2.3.3.1.2.7	OG33127
SNL	1.2.3.2.7.1.1	OS32711
SNL	1.2.3.2.7.1.2	OS32712
SNL	1.2.3.2.7.1.3	OS32713
SNL	1.2.3.2.7.1.4	OS32714
SNL	1.2.4.2.1.1.4	OS42114
SNL	1.2.4.6.2	OS462

See Attachment 2 for further detail on the schedule planning basis. The task dates and estimated durations are based on current design and construction strategies. These tasks, dates, and durations are subject to change. Changes will be controlled through the Project planning basis and reflected in applicable job packages or approved Project schedules.

8.0 QA PREPARATION

8.1 Closure of QA Concerns

No applicable QA concerns have been identified.

8.2 Q-List Items/Activities

General guidance for application of the Quality Assurance Requirements and Description (QARD, DOE/RW/0333P) to site characterization activities is provided by the USGS in conjunction with the Project Office YMP/90-55 Q-List. The quality affecting elements for this activity are limited to data and samples collected in support of Study Plans listed in section 1.0.

The following quality assurance grading reports (QAGR) associated with the testing activities have been approved:

Participant	QAGR	WBS	Subject
LANL	1	1.2.3.2	Geology (Mineralogy, Petrology & Pathways)
LANL	10	1.2.3.3.1	Geohydrology
LLNL	TBD	1.2.3.12.4	TBD
LLNL	TBD	1.2.3.12.5	TBD
USGS	G1233123	1.2.3.3.1.2.3	Characterization of Percolation in the Unsaturated Zone–Surface-Based Study
USGS	G123721	1.2.3.7.2.1	Natural Resource Assessment of Yucca Mountain, Nye County, Nevada
USGS	G12362321	1.2.3.6.2.2.1	Characterization of the Yucca Mountain Quaternary Regional Hydrology
USGS	G1233121		Characterization of Structural Features in the Site Area

USGS	G1233127		Hydrochemical Characterization of the Unsaturated Zone
SNL	007	1.2.3.2.7.1.1	Laboratory Thermal Properties
SNL	006	1.2.3.2.7.1.2	Laboratory Thermal Expansion Testing
SNL	023	1.2.3.2.7.1.3	Laboratory Determination of Mechanical Properties of Intact Rock
SNL	024	1.2.3.2.7.1.4	Laboratory Determination of Mechanical Properties of Fractures
SNL	001	1.2.4.2.1.1.4	In Situ Design Verification
SNL	053	1.2.4.6.2	Sealing Testing

9.0 READINESS REVIEW

The Assistant Manager for Scientific Programs has determined that a readiness review is not required.

TEST-SPECIFIC PERFORMANCE CRITERIA AND CONSTRAINTS FOR CONSOLIDATED SAMPLING IN THE EXPLORATORY STUDIES FACILITY

Attachment 1 References:

A.1 "Exploratory Studies Facility Design Requirements, "Appendix B, Sections B-2.2.1, "Chloride and Chlorine-36 Measurements of Percolation at Yucca Mountain," B-2.2.2, "Matrix Hydrologic Properties Testing," B-2.2.17, "History of Mineralogic and Geochemical Alteration of Yucca Mountain," B-2.2.15, "Mineral Distributions Between Host Rock and Accessible Environment," B-2.2.16, "Fracture Mineralogy," B-2.2.14, "Petrologic Stratigraphy of the Topopah Spring Member," B-2.2.19, "Biological Sorption and Transport," and B-2.2.42, "Repository Horizon Rock-Water Interaction," B-2.2.22, "Tests (Thermal & Mechanical) Using Samples Obtained from the Exploratory Studies Facility,"YMP/CM-0019, 7/2/92.

A.2 "Preliminary Test Planning Package for Support of Pre-Title II Design Studies; Planned Exploratory Studies Facility Tests," YMP/TPP 91-5, Rev. 0.

A.3 Letter: Statton to Oliver, "Waste Isolation and Test Interference Evaluations for the ESF Starter Tunnel Construction - JP 92-20, and Planned Tests," LV.SC.BWD.3/93-074, dated March 24, 1994.

A.4 Memorandum: Dyer to File, "Approval of Lithium Bromide and Related Controls for Use as the Tracer in Underground Construction Water at the Exploratory Studies Facility (ESF)," RSED:JRD-3560, dated April 1, 1993.

A.5 Memorandum: Mitchell to Elkins, "Transmittal of Supplemental Design and Test-Related Information for the ESFDR D&TRI (Los Alamos Tests in the ESF North Ramp Starter Tunnel)," TWS-INC-03-93-13, dated March 22, 1993.

A.6 Letter: Edwards to Boak, "Design and Construction-Related Information for U.S. Geological Survey Sample Collection Activities in the Exploratory Studies Facility North Ramp (SCPB: 8.3.1.2.2.3.1, 8.3.1.9.2.1.1, and 8.3.1.5.2.1.5)," dated August 5, 1994.

A.7 Facsimile: Blink to Boak, dated July 11, 1994.

A.8 Letter: Mitchell to Elkins, "Transmittal of Supplemental Design and Test-Related Information for the ESFDR (D&TRI) Los Alamos Tests in the ESF North Ramp and Test Alcoves," LA-EES-13-LV-07-94-022, dated July 12, 1994.

A.9 Letter: Shephard to Boak, dated July 6, 1994.

A.10 Letter: Oliver to Elkins, "Submitted Test Interference Evaluation Acceptance for Exploratory Studies Facility Ramps, Main Drift, and Alcoves (SCPB: N/A)" LA-EES-13-LV-07-94-007, dated July 6, 1994.

A.11 Letter: Boak to Elkins, "Waste Isolation Evaluation for Exploratory Studies Facility North Ramp and Test Alcoves (SCPB: N/A)" LA-EES-13-LV-07-94-019, dated July 12, 1994.

A.12 Letter: Edwards to Boak, "Sampling in the ESF to Support Hydrochemical Characterization of the Unsaturated Zone," dated August 9, 1994.

A consolidated list of performance criteria and constraints, derived from section references and focused on specific testing needs for this phase of the activity, is found below. Appendix B of the ESFDR provided a verbatim statement of applicable performance criteria and constraints for this ESF testing activity. Test Planning Package 91-5 provided the controlled basis for testing activities planning based on the selected Alternatives Study ESF facility configuration. Reference A.3 provided the basis for constraints to address potential impacts to waste isolation and test interference. References A.4 and A.5 along with a review of the study plan by the Los Alamos National Laboratory Test Coordination Office (TCO), provided the basis for additional design and test-related information. Note: performance criteria and constraints follow the format established in YMP/CM-0019.

The following performance criteria and constraints represent the controlled requirements basis for tests to be conducted in the Exploratory Studies Facility. Not all portions of these tests will be conducted at all locations; however all tests will be conducted in a manner consistent with these requirements. Test requirements will be implemented through job packages and referenced design specifications and drawings, controlled procedures. Compliance with test requirements will be demonstrated through records submissions and reporting requirements.

Supplemental planning information, other reference information, and a review of the reference information by the ESF TCO was used as indicated to modify, add, supplement, or otherwise amend performance criteria and constraints; this information is fully consistent with the section references and ESF Title II design and are identified by italicized text. Changes to performance criteria or constraints which represent a general change to the testing program will be submitted, as appropriate, as proposed changes to the current version of the ESFDR, Appendix B to assure consistency with higher level requirements.

A. General Consolidated Sampling Program

Performance Criteria

1a. Ability to collect bulk rock samples; short (less than 1-m [3.3 ft]) core; and samples of tracers, fluids, and materials from all ramps, drifts, and alcoves.

1b. Ability to access any given sample location for resampling, if judged necessary, must be maintained.

1c. Ability to access Standard ESF utilities, including power, lighting, water, compressed air, communications, and ventilation.

Constraints

A. Each bulk rock and short (less than 1-m [3.3 ft]) core sample location shall be surveyed and photographed.

B. Sampling from documented locations will generally follow completion of geologic mapping activities.

C. *Sampling will be coordinated with other testing and construction activities and generally can be conducted during facility construction without impact to construction activities.*

D. *No water shall be used in the immediate vicinity of any sampling location (zone of potential interference to be determined) without approval of the PI.*

1. *Exempted from this requirement is misted water in compressed air used to clean tunnel surfaces prior to geologic mapping and chemically tagged water used for construction purposes.*

E. *No tracer shall be used in the vicinity of any sampling location without approval of the PI.*

1. *Exempted from this requirement is tracer use in construction water. For water applied underground in dust suppression; blasthole drilling; in grout, mortar, concrete and shotcrete; wall washing (blowdown) prior to mapping; and other construction applications, addition of a universal tracer is required. Lithium bromide shall be the only tracer (universal) required and acceptable from the standpoint of ESF testing. The concentration of lithium bromide tracer in construction water should be 20 ppm (as bromide) with an acceptable tolerance of ± 10% and a maximum range of 10 ppm to 30 ppm. Tracer system verification should include an automated volumetric analyzer (electrode) and periodic sampling for laboratory analysis.*

2. *Use of tracers, fluids, and materials in constructions, especially in proximity to sample locations shall be documented and samples will be provided to PIs upon request.*

F. *Any drilling necessary to obtain samples shall be done dry unless otherwise indicated by the PI for a specific test.*

G. *Sample orientation should be described and recorded and, unless doing so would potentially alter sample analyses, orientation should be marked on the sample.*

A.1 CHLORIDE & CHLORINE-36 MEASUREMENTS OF PERCOLATION AT YUCCA MOUNTAIN (Reference A.1, Section B-2.2.1, and Reference A.8)

Performance Criteria

1a. *Ability to collect samples of approximately 100 kg (220 pounds) in quantity (never less than 20 kg) from each approximately 100 m (380 ft) maximum of excavation into the ESF North Ramp and alcoves.*

i. *Collection of paired samples ranging from approximately 20-40 kg (45-90 lb) quantities from approximately each 15 m (50 ft) of excavation should be provided.*

ii. *Each sample location should be surveyed and photographed.*

iii. *Samples should not be taken in close proximity to spills.*

1b. Ability to access any given sample location for resampling, if judged necessary, must be maintained.

1c. Provide the ability to take samples concurrently with construction, either by core, as rubble from drill and blast, or as chips from mechanical excavators. Individual fragments of any given sample must be chip size or larger, (i.e.), not rock flour.

1d. Provide the ability to collect several samples from each geologic unit identified by the Geologic Mappers encountered in the ESF north ramp and alcoves along with samples collected from breccia zones, lithologic contacts, and wet zones.

i. At selected lithologic contacts, a minimum of two samples should be collected, and an additional sample collected from within 5 cm (2 in) of each side of the contact.

ii. In each alcove, a minimum of one sample per 10 m (33 ft) of excavation should be collected. Samples should be collected from dry drilled boreholes or other dry sampling techniques from the rock matrix adjacent to the fault zone within 2 m (7 ft).

1e. Provide the ability to collect samples from selected fracture zones, fault and breccia zones, lithologic contacts, and wet zones.

i. In major fracture and fault zones that are less than 1 m (3 ft) in thickness, samples should be collected centered on the fracture as close as possible from the unfractured matrix, and within 2 m (7 ft) of the fracture zone.

ii. In major fracture and fault zones that are more than 1 m (3 ft) in thickness, representative samples should be collected, if practicable, every 2 m (7 ft) within the fault zone, more or less equally spaced, with a minimum of two samples collected. Additional samples should be collected within 2 m (7 ft) from the unfractured matrix on either side of the fault zone.

1f. If coring is required to collect samples, coring must be conducted dry. Any use of tracer must be approved by the principal investigator prior to use.

i. Exempted from this requirement is lithium bromide used to chemically tag underground water use.

1g. If coring is required to collect samples, the depth of the core should be sufficient to ensure pristine samples and to avoid interference from contaminants which may be introduced by excavation or other activities. Contaminants of concern include water, chloride, and bromide or materials containing any of these constituents.

i. Core samples will be drilled dry to minimize contamination and use of chloride, bromide, and water will be controlled in coring operations.

1h. Standard ESF utilities, including power, lighting, water, compressed air, communications, and ventilation are required.

1i. If sample requirements for perched-water tests are met, additional samples will be sent to the USGS for hydrochemistry tests (activity 8.3.1.2.2.4.8 in Study Plan 8.3.1.2.2.4). If samples are available in excess of that required for hydrochemistry tests, they will be sent to LANL for analyses specified in Study Plan 8.3.1.2.2.2 (Water Movement).

1j. Key data to be collected are rubble and wall rock samples for laboratory analyses of chlorine-36, chloride, and bromide.

Constraints

A. Sampling from documented locations will follow completion of geologic mapping activities.

B. The timing of this test will vary according to the construction method used in the ESF. In general, sampling can be conducted during facility construction without impact to construction activities. In some instances, samples may have to be deferred until completion of some construction activities to avoid interference with the construction schedule. However, wet zones and perched water require immediate sampling in order to protect the integrity of these samples.

C. Sampling of wet zones and occurrences of perched water must be coordinated with the Perched Water Test.

D. No water shall be used in the immediate vicinity of any sampling location (zone of potential interference to be determined).

   1. *Exempted from this requirement is misted water in compressed air used to clean tunnel surfaces prior to geologic mapping and chemically tagged water used for construction purposes.*

E. No tracer shall be used in the vicinity of any sampling location without approval from the principal investigator of this activity (zone of potential interference to be determined).

   1. *Tracer use in construction water. For water applied underground in dust suppression; blasthole drilling; in grout, mortar, concrete and shotcrete; wall washing (blowdown) prior to mapping; and other construction applications, addition of a universal tracer is required. Lithium bromide shall be the only tracer (universal) required and acceptable from the standpoint of ESF testing. The concentration of lithium bromide tracer in construction water should be 20 ppm (as bromide) with an acceptable tolerance of ± 10% and a maximum range of 10 ppm to 30 ppm. Tracer system verification should include an automated volumetric analyzer (electrode) and periodic sampling for laboratory analysis.*

   2. *Use of tracers, fluids, and materials in proximity to sample locations shall be recorded and submitted as described in applicable JPs.*

F. Any drilling necessary to obtain samples shall be done dry.

A.2 Matrix Hydrologic Properties Testing (Reference A.1, Section B-2.2.2)

Performance Criteria

1a. Samples will be required from all lithologic units penetrated by the ESF. Samples adjacent to lithologic contacts and from bedded intervals are of particular importance. Small alcoves, large enough for a core rig, may be required if boreholes are drilled specifically to collect samples for this test. If possible, core samples will be collected from boreholes drilled for other testing purposes (other PIs boreholes), provided that dry-drilling techniques are employed. Additional sampling may be required, either boreholes or block samples, to provide samples from all the lithologic units penetrated by the ESF.

1b. Boreholes cored specifically for this test should be HQ3-sized boreholes, deep enough to retrieve natural-state samples, oriented approximately horizontal (this is not critical), and drilled dry (air as the circulating fluid).

1c. There are currently no plans to instrument boreholes drilled specifically to collect samples for this test. No data collection equipment will be needed in the ESF.

1d. The placement of matrix hydrologic properties boreholes is flexible where thick, homogeneous units are being sampled. At lithologic contacts and in bedded units, there may be less sample flexibility. Orientation of the boreholes is flexible, to be determined by the type of units being sampled.

1e. Standard ESF utilities are required for this test.

1f. Ramp and drift walls may need to be sampled as soon as they are excavated. The samples would be block samples or small core plugs, preferably taken by the USGS or designated representatives. Long-term access to drill boreholes and sample ramp and drift walls from 6 months to possibly years may be required.

1g. Key data to be collected are core and wall rock samples for laboratory analyses of matrix hydrologic properties.

Constraints

A. The matrix hydrologic properties testing will provide data on *in situ* hydrologic conditions to other PIs; providing background information for boreholes that are to be instrumented for monitoring changes in the rock surrounding the ESF. In some cases, the data provided from this test will be needed before instruments are placed in the monitoring boreholes.

B. Where practicable, core samples for this test shall be collected from boreholes drilled for other ESF tests, provided that the boreholes are drilled dry.

C. No IDS requirements are foreseen at this time.

D. This test requires *in situ* samples. The PI or his designated representative will determine where the samples should be collected from to minimize the impact caused by any wet-

drilling operation. This will ensure uncontaminated samples. No interference envelope is required.

E. Dry drilling is required for this test. Block samples, created by drill-and-blast methods, should be collected prior to significant use of water for dust control. Minimal water may be used in drilling the blast holes.

F. If sample collection methods require the use of water, collection of samples for the Matrix Hydrologic Properties test will be sequenced to follow collection of potentially sensitive samples for other nearby tests.

A.3 HISTORY OF MINERALOGIC AND GEOCHEMICAL ALTERATION OF YUCCA MOUNTAIN (Reference A.1, Section B-2.2.17, and Reference A.8)

Performance Criteria

1a. Wall-rock samples will be collected by the Alteration History PI (or designee) from the north and south ramps, from the Main Topopah Spring Test Level (MTL), from the drifts in the tuff of Calico Hills, and from any other drifts. A safe method of collecting and transporting samples to the surface will be provided.

i. Each sample collected should be surveyed and photographed.

ii. Sample orientation shall be provided with an arrow indicating the "up" direction, or more complete documentation along with sample photograph information shall be provided by the sample collector, (this does not include gel samples).

iii. In addition to the samples collected by the PI, approximately 15 to 25 samples per 60 m (197 ft) of excavated tunnel should be collected throughout the ESF.

1b. Small-scale hand drilling may be required to collect samples; no other drilling will be required.

1c. For the most part, this test can be conducted during facility construction without impact to construction activities. The activity will be conducted in two phases. An early phase of sampling and spot-detail mapping during construction will be followed by more sampling as needed. Accessibility for sampling on a long-term basis is desired. Gels must be sampled as soon as possible after exposure by excavation. If fault zones or other features requiring surface treatment for stabilization (e.g., shotcrete) are encountered during excavation, then the ability to examine them before they are covered is desired, provided that safety considerations permit.

1d. Standard requirements for power, lighting, water, ventilation, compressed air, and communications, provide an adequate environment in which to conduct this test.

1e. Key data to be obtained are samples of alteration features, such as samples from lithophysae, cooling cracks, or breccia zones and samples of natural gels.

Constraints

A. Sample collection for this test will generally follow the geologic mapping test.

B. There are no standoff requirements expected for this test because wallrock sampling can be accomplished before most other tests begin. Sampling activities for this test are not expected to interfere with other tests.

C. Procedures for sample collection and control will be developed by the PI.

D. The gel-collection part of this test requires integration with the perched-water test and the geologic mapping test.

   1. Gel samples must be collected promptly prior to installation of ground support or wall washing, if practicable.

   2. The PI for this activity must be notified as soon as possible once the samples are collected prior to sample distribution.

E. Sampling should not be done in locations where chemicals have already been deliberately or accidentally applied to rock surfaces during other tests.

   1. Exempted from this requirement is lithium bromide used to chemically tag underground water use.

F. Samples will generally be 1 to 5kg (2.2-11 lbs) and will be separated from the excavation walls by hammer and chisel if possible.

   1. If an alternative sampling method (such as a hydraulic splitter) is utilized, the method should be identified in the sample description in case the sample might become altered.

A.4 MINERAL DISTRIBUTIONS BETWEEN HOST ROCK AND ACCESSIBLE ENVIRONMENT (Reference A.1, Section B-2.2.15, and Reference A.8)

Performance Criteria

1a. Samples will be collected from the rock exposures created by underground workings.

1b. It may be necessary to revisit and resample mapped workings after completion of excavation and construction.

1c. Any drilled sample will require hand-held drills only.

1d. Oriented samples may be required.

i. Sample orientation should be provided with an arrow on the sample, indicating the "up" direction.

1e. Standard ESF power, lighting, water, ventilation, compressed air, and communications provide an adequate environment in which to conduct this test.

1f. Key data to be obtained are samples of minerals, including clay segregations, macroscopic fossil root forms, calcite, and opal.

Constraints

A. Geologic mapping should be completed prior to sample collection, or sample collection may be done concurrently with geologic mapping.

B. Because of the small scale of sampling, this activity can proceed without impacting construction.

A.5 FRACTURE MINERALOGY (Reference A.1, Section B-2.2.16, and Reference A.8)

Performance Criteria

1a. Samples will be collected from the rock exposures created by underground workings.

i. Hand samples with fracture surface areas totaling approximately 10-15 cm^2 (4 to 6 $inches^2$) will be required along selected fractures and fault zones throughout the ESF north ramp and north ramp alcoves. Cores of up to 30 cm (12 inches) in length may be required in fault zones.

ii. Each sample location shall be surveyed and photographed.

1b. It may be necessary to revisit and resample mapped workings after completion of excavation and construction.

i. Additional sampling (hand samples and/or short cores) of fractures or faults exposed in the walls or roof of accesses, drifts and alcoves may be required after construction and mapping are completed. This may be some years after completion of excavation and may require temporary removal of small areas of mesh.

1c. Any drilled sample will require hand-held drills only.

1d. Oriented samples may be required.

i. Sample orientation should be provided with an arrow indicating the "up" direction". Additional sample description information shall include fracture orientation, fracture roughness, fracture aperture (to the nearest mm) and offset, if any.

1e. Standard ESF power, lighting, water, ventilation, compressed air, and communications are adequate.

1f. *Key data to be obtained are samples of fracture filling or coating minerals.*

Constraints

A. *Sampling will be done during or after geologic mapping.*

B. Because of the small scale of sampling, this activity can proceed without impacting construction.

C. *Samples must be free of hydrochloric acid (HCl). Exposure of fracture to other materials that could be deposited on fracture surface should be minimized.*

1. *Exempted from this requirement is lithium bromide used to tag underground water use.*

A.6 PETROLOGIC STRATIGRAPHY OF THE TOPOPAH SPRING MEMBER (Reference A.1, Section B-2.2.14, and Reference A.8)

Performance Criteria

1a. Samples will be collected from the rock exposures created by underground workings.

1b. It may be necessary to revisit and resample mapped workings after completion of excavation and construction.

1c. Any drilled sample will require hand-held drills only.

1d. Oriented samples may be required.

1e. Standard ESF power, lighting, water, ventilation, compressed air, and communications are adequate.

1f. Key data to be collected include collection of bulk rock samples to determine the petrologic variability within the devitrified Topopah Spring Member at Yucca Mountain, and to define the stratigraphic and lateral distribution of this variability.

Constraints

A. *Sample collection should be coordinated with geologic mapping.*

B. Because of the small scale of sampling, this activity can proceed without impacting construction.

A.7 BIOLOGICAL SORPTION AND TRANSPORT (Reference A.1, Section B-2.2.18, and Reference A.8)

Performance Criteria

1a. Ability to aseptically collect a minimum of 1.0 kg (2.2 lbs) sample.

1b. Ability to collect samples in line with construction, either by core, as rubble from drill and blast, or small scale hand drilling.

1c. Ability to collect samples throughout the facility within all units and at contacts.

1d. If coring is required to collect samples, coring must be conducted dry.

1e. If coring is required to collect samples, the depth of the core should be sufficient to ensure pristine samples, and to avoid interference from contaminants which may be introduced by excavation or other activities. Contaminants of concern include air, water and drilling fluids.

1f. Provision of standard ESF utilities (power, lighting, water, compressed air, communication, ventilation, etc.) will be adequate.

1g. Because sample integrity is the utmost requirement, samples should be collected as soon as practicable after excavation.

i. Samples should be collected as soon as practicable from the area on or around the mapping gantry station.

1h. Long-term access will be required.

1i. Samples should be collected from an area beyond the zone of TBM-induced mechanical alteration.

1j. Key data to be collected include collection of bulk rock samples for determining the effects of microorganisms on the transport (either positive or negative) of radionuclides to the accessible environment and determining the numbers, types, and metabolic activities of microorganisms present in Yucca Mountain for laboratory analysis.

Constraints

A. Sampling from selected locations will follow completion of geologic mapping activities.

B. Samples will be collected under the supervision of the Principal Investigator (PI) or designee and a split of all samples will be hand carried offsite by the PI or designee for immediate processing.

C. No water will be used in the immediate vicinity of any sampling location. Exempted from this requirement is water used for dust control and for cleaning of rock surfaces prior to geologic mapping.

D. Any drilling used to obtain samples will be done dry.

E. All samples will be taken either by the principal investigator (PI) or by a personnel trained by the PI.

F. No IDS interface is required.

A.8 REPOSITORY HORIZON ROCK-WATER INTERACTION (Reference A.1, Section B-2.2.42 and Reference A.7)

Performance Criteria

1a. There is no space requirement; no alcove is needed. The locations of sampling include the North and South Ramps and the Main Test Level; sampling will emphasize the lithophysal zone of Topopah Spring Tuff, the contact of Paintbrush Tuff nonwelded unit and Topopah Spring, basal vitrophyre of Topopah Spring, and the top of the zeolitic tuff of the Calico Hills unit.

1b. A dry-drilled borehole, up to 20.32 cm (8 in) in diameter and a few meters deep, may be required for sample collection. Block samples may be obtained by mechanical means from drift surfaces although slotting or line drilling to obtain samples away from the immediate drift surface may be required.

1c. All sample analysis will be performed in the laboratory by LLNL personnel.

1d. The timing of sample collection is flexible. They can be taken after excavation and construction phases of ramps, drifts, or alcoves.

1e. Normal power, compressed air, lighting, water, and ventilation for the Ramps and the Main Test Level will be adequate except as specifically requested for drilling.

1f. No special access is needed after initial sampling.

Constraints

A. There is no particular sequential constraint of test.

B. The tests should be started as early as possible so that adequate information can be provided for the license application date.

C. No IDS or data collection required.

D. No interference with other activities.

E. Dry drilling may be required to obtain samples.

F. Sample locations must be approved by the responsible PI prior to the sampling activity.

A.9 ENGINEERED BARRIER SYSTEM FIELD TESTS (MAN-MADE MATERIALS) (Reference A.7)

Performance Criteria

1a. Ability to collect bulk samples of construction materials used in the ESF, along with bulk samples (and possibly short cores) of ramp and drift walls at selected locations to examine the effects of construction materials on natural conditions.

1b. Ability to emplace artificial materials at PI-selected locations and later retrieve these materials for laboratory analyses.

1c. Standard ESF utilities are required for this test.

1d. Key data to be collected are wall rock samples (and possibly short core samples) and samples of construction materials for laboratory analyses.

Constraints

A. Long-term access for periodic resampling of ramp and drift walls on a yearly or bi-yearly basis may be required.

B. No IDS requirements are foreseen at this time.

C. The PI or designated representative will select sample collection and emplacement locations.

D. For any cored samples, dry drilling will be required.

A.10 STUDIES OF CALCITE AND OPALINE SILICA VEIN DEPOSITS (Reference A.6)

Performance Criteria

1a. Hand samples approximately 15 x 15 x 15 cm (6 x 6 x 6 in) in size (or large enough to include much of the thicker portions of the secondary mineralization) will be required along selected fractures and fault zones throughout the ESF (accesses, drifts, and available alcoves).

1b. Samples orientation should be described and recorded.

1c. Standard ESF power, lighting, water, ventilation, compressed air, and communications will be adequate to perform sampling.

1d. Key data to be obtained are samples of secondary mineralization containing calcite or opaline silica in faults and fractures, along with adjacent wall rock.

Constraints

A. Sampling will be done during or after geologic mapping.

B. No IDS requirements are foreseen at this time.

A.11 GEOCHEMICAL ASSESSMENT OF YUCCA MOUNTAIN IN RELATION TO THE POTENTIAL FOR MINERALIZATION (Reference A.6)

Performance Criteria

1a. Hand samples will be required along selected fractures and fault zones throughout the ESF (accesses, drifts, and available alcoves).

1b. Samples orientation should be described and recorded.

1c. Standard ESF power, lighting, water, ventilation, compressed air, and communications will be adequate to perform sampling.

1d. Key data to be obtained are samples of potential natural resources, especially compounds concentrated by primary magmatic processes, secondary weathering, or hydrothermal alteration. There is special interest in precious metals and pathfinder elements, including gold, silver, copper, lead, zinc, mercury, thorium, uranium, antimony, fluorine, barium, arsenic, and yttrium.

Constraints

A. Sampling will be done during or after geologic mapping.

B. No IDS requirements are foreseen at this time.

C. This test requires in situ samples. The PI or a designated representative will determine where the samples should be collected from to minimize the impact caused by construction or other tests. No interference envelope is required.

A.12 HYDROCHEMICAL CHARACTERIZATION OF THE UNSATURATED ZONE (Reference A.6)

Performance Criteria

1a. Hand samples weighing approximately 10 grams (.3 oz) will be required along selected fractures and fault zones throughout the ESF (accesses, drifts, and available alcoves).

1b. Samples orientation should be described and recorded.

1c. Standard ESF power, lighting, water, ventilation, compressed air, and communication will be adequate to perform sampling.

1d. Key data to be obtained are samples of secondary mineralization containing calcite.

Constraints

A. Sampling will be done during or after geologic mapping.

B. No IDS requirements are foreseen at this time.

A.13 TESTS (THERMAL & MECHANICAL) USING SAMPLES OBTAINED FROM THE EXPLORATORY STUDIES FACILITY (Reference A.1, Section B-2.2.22 and Reference A.9)

Performance Criteria

1a. No special room or alcove is required. The tests entail sampling throughout the ESF, in each of the thermomechanical units encountered, with an emphasis in the TSw2.

i. Samples will also be taken of the TCW and other thermomechanical units.

1b. No need for data collection by the Integrated Data system has been identified.

1c. No flexibility requirements for test location or orientation have yet been identified.

1d. Standard underground facilities for water, air, and electricity for drilling will be used for this test. Capability should exist to collect bulk samples of various sizes (up to 25 by 25 by 25 cm [10 by 10 by 10 in]) and to transport them to the surface for shipment to laboratories.

1e. Access to locations throughout the ESF will be required in order to take samples.

Constraints

A. This test can be scheduled independently of the scheduling of the other tests.

B. Test preparation can be performed at any time after the test location is exposed. The use of underground resources (men and equipment) will be based on scheduled availability and preferably coincide with scheduled TBM shut down. Slow down of excavation progress will be avoided. Construction progress impact (far behind face) will be limited to minor interference with support forces (maintenance crews, ramp transportation vehicles, priority testing support, etc.)

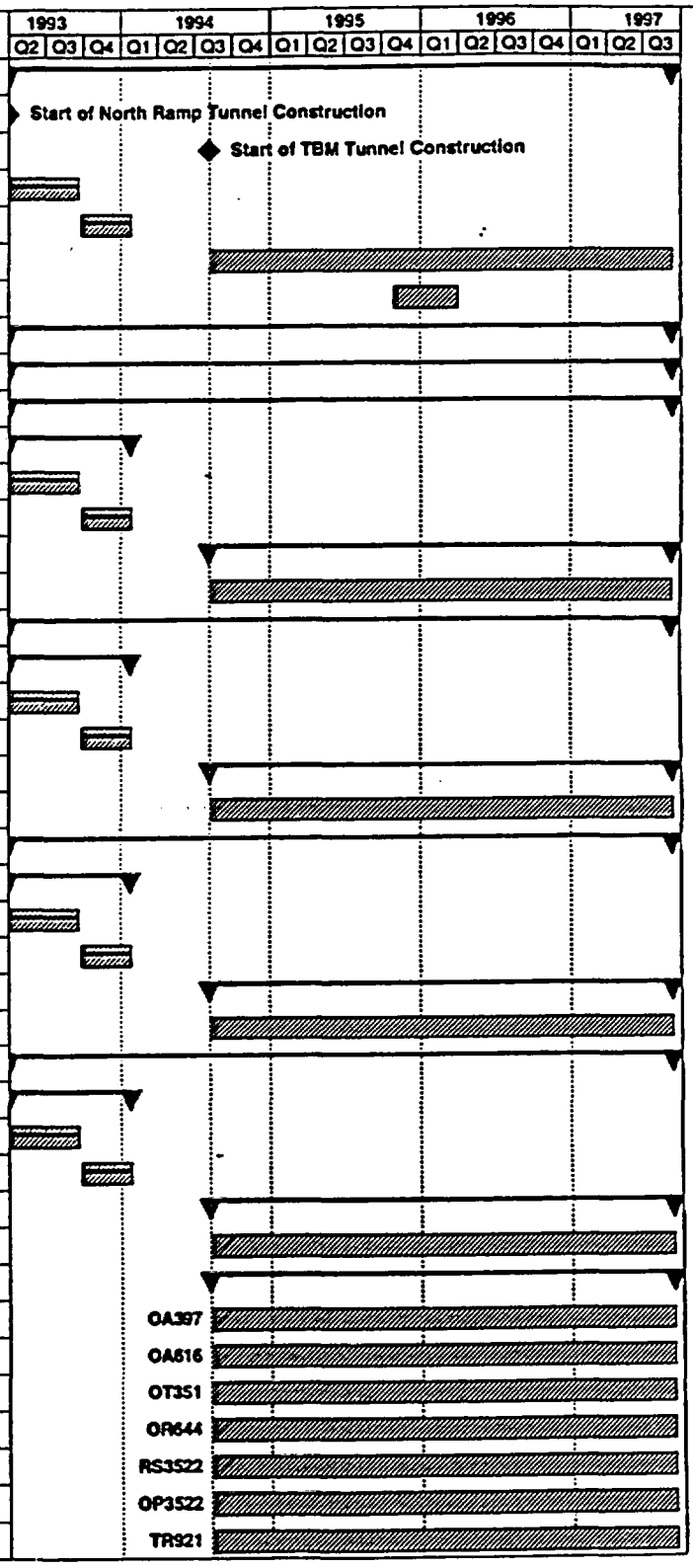
C. No interference envelope exists. Samples should be taken from rock that has not been disturbed by excavation or other testing. Dry coring may be required in some cases.

D. No other constraints or controls have been yet identified for this test.

Consolidated Sampling Test Planning Package Schedule

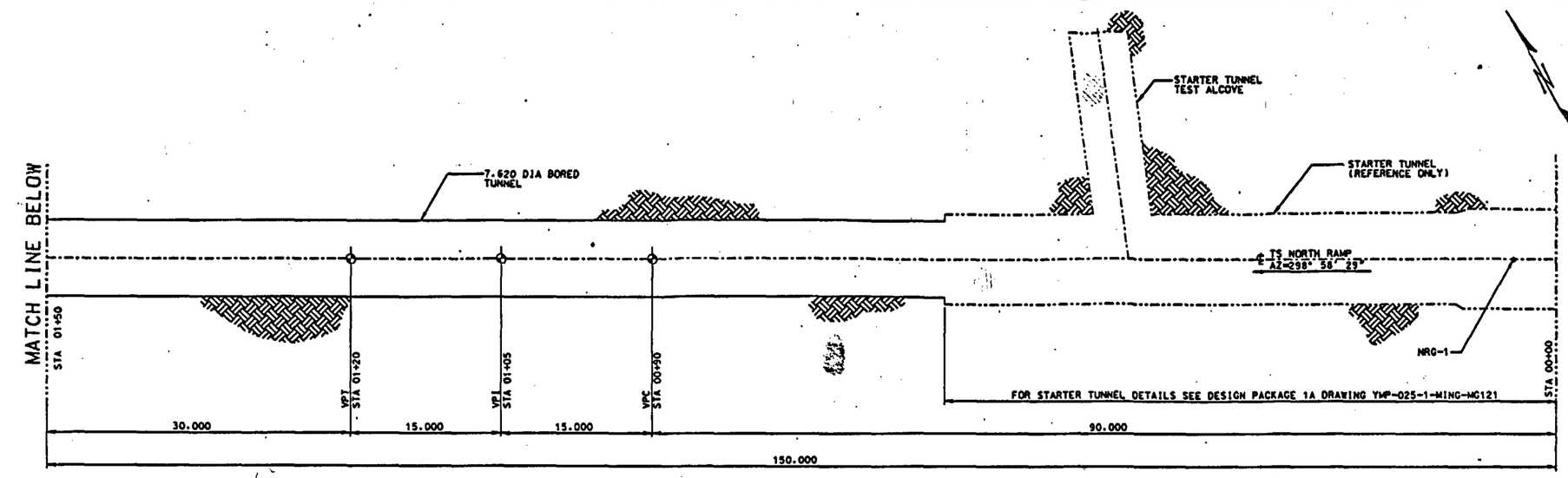
TPP 92-14
Ramps, MTL Drifts & Alcoves

ID	Task Name	Dur	Start
C1	JP 92-20 CONSTRUCTION ACTIVITY	1160d	4/2/93
C2	Start of North Ramp Tunnel Construction	0d	4/2/93
C3	Start of TBM Tunnel Construction	0d	8/8/94
C4	Starter Tunnel Construction	121d	4/4/93
C5	Alcove #1 Construction	88d	9/27/93
C6	Ramps & Main Tunnel Construction	810d	8/8/94
C7	North Ramp Extension Contruction (Contingency)	109d	11/1/95
I1	TEST IMPLEMENTATION - CONSOLIDATED SAMPLING	1161d	4/2/93
I2	Test Implementation - Discrete	1161d	4/2/93
I3	SNL	1161d	4/2/93
I4	Phase 2	214d	4/2/93
I5	Starter Tunnel	122d	4/2/93
I6	Alcove #1	88d	9/27/93
I7	Phase 3	810d	8/8/94
I8	Ramps & Main	810d	8/8/94
I9	LLNL	1161d	4/2/93
I10	Phase 2	214d	4/2/93
I11	Starter Tunnel	122d	4/2/93
I12	Alcove #1	88d	9/27/93
I13	Phase 3	810d	8/8/94
I14	Ramps & Main	810d	8/8/94
I15	LANL	1161d	4/2/93
I16	Phase 2	214d	4/2/93
I17	Starter Tunnel	122d	4/2/93
I18	Alcove #1	88d	9/27/93
I19	Phase 3	810d	8/8/94
I20	Ramps & Main	810d	8/8/94
I21	USGS	1161d	4/2/93
I22	Phase 2	214d	4/2/93
I23	Starter Tunnel	122d	4/2/93
I24	Alcove #1	88d	9/27/93
I25	Phase 3	810d	8/8/94
I26	Ramps & Main	810d	8/8/94
I27	Test Implementation - Matrix Support	810d	8/8/94
I28	Los Alamos TCO Test Management & Planning	810d	8/8/94
I29	Los Alamos TCO ESF Test Management	810d	8/8/94
I30	T&MSS Sample Management Facility	810d	8/8/94
I31	REECo Construction Test Support	810d	8/8/94
I32	RSN ESF Survey Support	810d	8/8/94
I33	JC Photographic Services	810d	8/8/94
I34	CRWMS M&O Project Control Support	810d	8/8/94



Project: Consolidated Sampling
Date: 8/9/94
Revision #2

Task | Milestone | Checked By:
Progress | Summary | Approved By:



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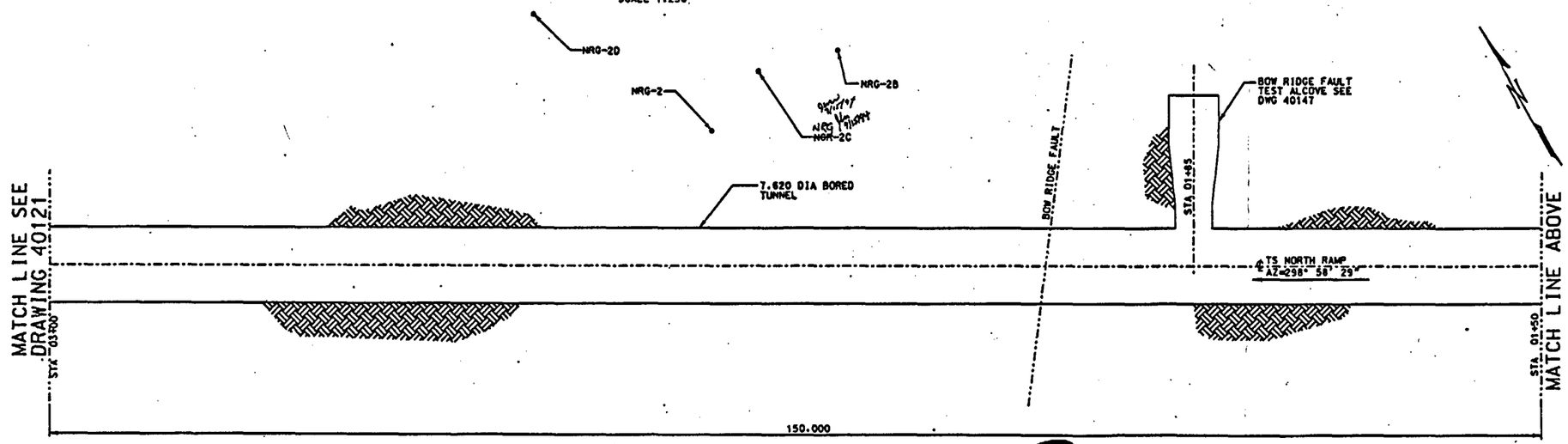

PLAN STA 01+50 TO STA 03+00
SCALE 1:250

NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
2. COORDINATES, ELEVATIONS, DIMENSIONS, AND STATIONING ARE SHOWN IN METERS, UNLESS OTHERWISE NOTED. METRIC VALUES ARE ROUNDED TO THREE DECIMAL PLACES. WHERE DISCREPANCIES BETWEEN ELEVATIONS & GRADIENTS OCCUR DUE TO ROUNDING, ELEVATIONS WILL GOVERN.
3. ALL METRIC COORDINATES ARE BASED ON AN INITIAL CONVERSION OF THE NORTH PORTAL COORDINATES FROM FEET TO METERS, USING A CONVERSION FACTOR OF 0.30480061. (01)
4. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
5. FAULT TRACE LOCATIONS SHOWN ON NORTH RAMP PLAN, EXCEPT FOR THE BOW RIDGE FAULT, ARE APPROXIMATIONS BASED ON AT-DEPTH PROJECTIONS OF INFORMATION FROM USGS OPEN FILE REPORT 84-494, PRELIMINARY GEOLOGIC MAP AND SECTIONS, BY SCOTT AND BONK (SEE BC0000000-01717-0200-00002 REV 00). SURFACE FAULT TRACES PROJECTED TO REPOSITORY HORIZON. THE BOW RIDGE FAULT TRACE IS AN AT-DEPTH PROJECTION BASED ON FIELD WORK FROM ON-GOING ROCK AND SOIL INVESTIGATIONS (REFERENCE SNL DWG NO. 88-60-09, REV 5, DATED 4-20-94 TDIF # 303195). (01)
6. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
7. THE 30 m VERTICAL CURVE IS AN EQUAL-TANGENT PARABOLIC TYPE CURVE.
8. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501. (01)

QA-1 / QA-2 / Q

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9501130285-01

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FIRST SUBMITTAL

FOR DRAWING INDEX SEE DRAWING 39002

DESIGN INPUTS
SEE DRAWING INPUTS LIST (01)

NOTICE OF OPEN CHANGE DOCUMENTS
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CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

GRAPHIC SCALE
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1:250

DOE/YMP ACCEPTANCE FOR CONSTRUCTION
By _____ Date 15 Sep 94

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

REV	DESCRIPTION	DATE	DRW	CHK	ENG	PER	L.D.E.	QA	O.E.
01	ISSUED FOR CONSTRUCTION	9-13-94							
00	APPROVED BUT NOT ISSUED	7-7-94	CLP	YRK	CRG	N/A	JMT	FCA	JLH

APPROVALS	INITIAL/DATE
DRAWN: C PEARCE	CLP 7-7-94
DESIGNATOR: W KENNEDY	YRK 7-7-94
CHECKED: C GARRETT	CRG 7-7-94
VERIFICATION: N/A	
LEAD DESIGN ENGINEER: J TAIPALE	JMT 7-7-94
QUALITY ASSURANCE: J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER: J NAAF	JLH 7-7-94

U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System
MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
EXCAVATION LAYOUT
PLAN - SHEET 1 OF 10

SIZE D | DOCUMENT IDENTIFIER: BABEAD000-01717-2100-40120-01 | REV 01
SCALE NOTED | QA CLASSIFICATION QA-1, QA-2 SEE NOTE 8 | U.S.E. 1.2.6 | CAD FILE MINE:40120.DGN

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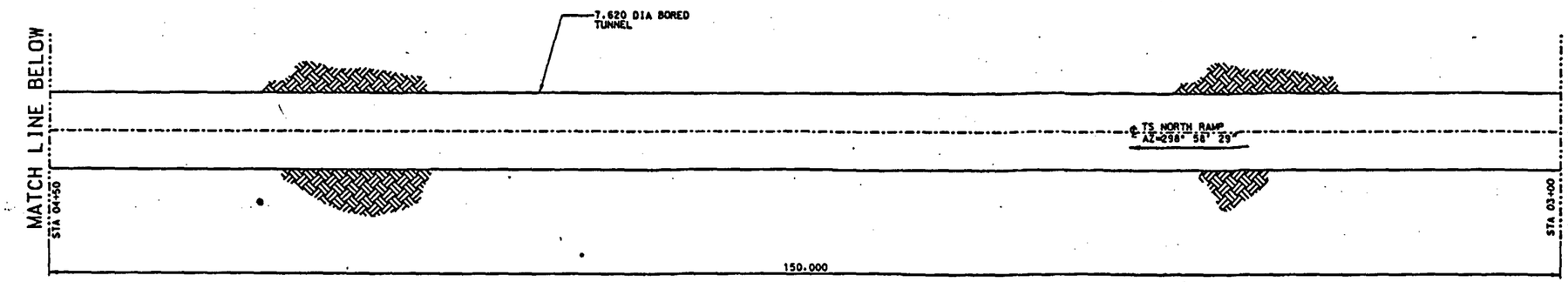

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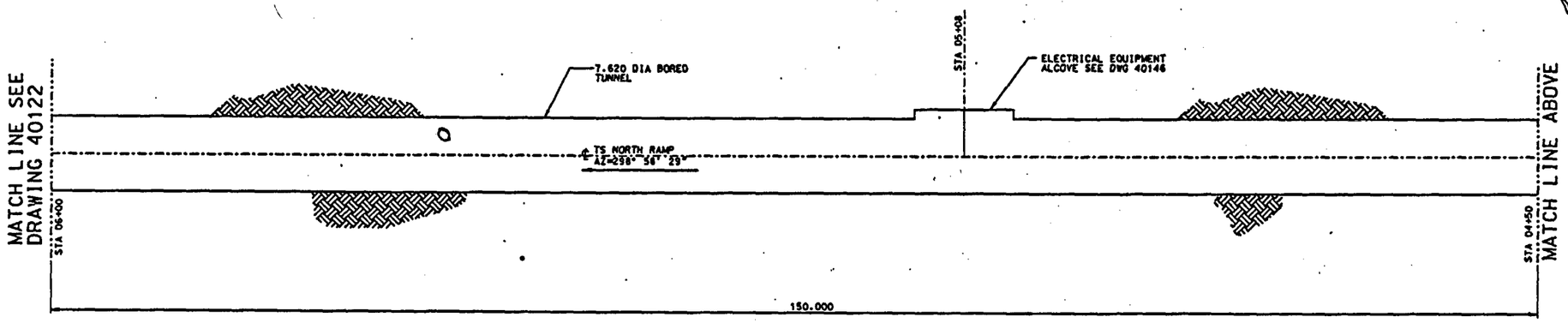

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NOTES:

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2. COORDINATES, ELEVATIONS, DIMENSIONS, AND STATIONING ARE SHOWN IN METERS, UNLESS OTHERWISE NOTED. METRIC VALUES ARE ROUNDED TO THREE DECIMAL PLACES. WHERE DISCREPANCIES BETWEEN ELEVATIONS & GRADIENTS OCCUR DUE TO ROUNDING, ELEVATIONS WILL GOVERN.
3. ALL METRIC COORDINATES ARE BASED ON AN INITIAL CONVERSION OF THE NORTH PORTAL COORDINATES FROM FEET TO METERS, USING A CONVERSION FACTOR OF 0.3048006[1].
4. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
5. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
6. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501.
7. ANY BOREHOLE INFORMATION, GEOLOGICAL INFORMATION, OR FAULT TRACE INFORMATION SHOWN IS FOR REFERENCE PURPOSES ONLY AND IS NEITHER DESIGN INPUT OR PART OF THE DESIGN.

QA-1 / QA-2 / Q

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DESIGN INPUTS
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CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

GRAPHIC SCALE
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1:250

DOE/YMP ACCEPTANCE FOR CONSTRUCTION
By _____ Date 10/17/94

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01	ISSUED FOR CONSTRUCTION	9-26-94	CLP	WRK	CRG	N/A	JNT	FCA	JLN
00	APPROVED BUT NOT ISSUED	7-7-94	CLP	WRK	CRG	N/A	JNT	FCA	JLN

APPROVALS	INITIAL/DATE
DRAWN C PEARCE	CLP 7-7-94
ORIGINATOR W KENNEDY	WRK 7-7-94
CHECKED C GARRETT	CRG 7-7-94
VERIFICATION N/A	
LEAD DESIGN ENGINEER J TAIPALE	JNT 7-7-94
QUALITY ASSURANCE J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER J NAAF	JLN 7-7-94

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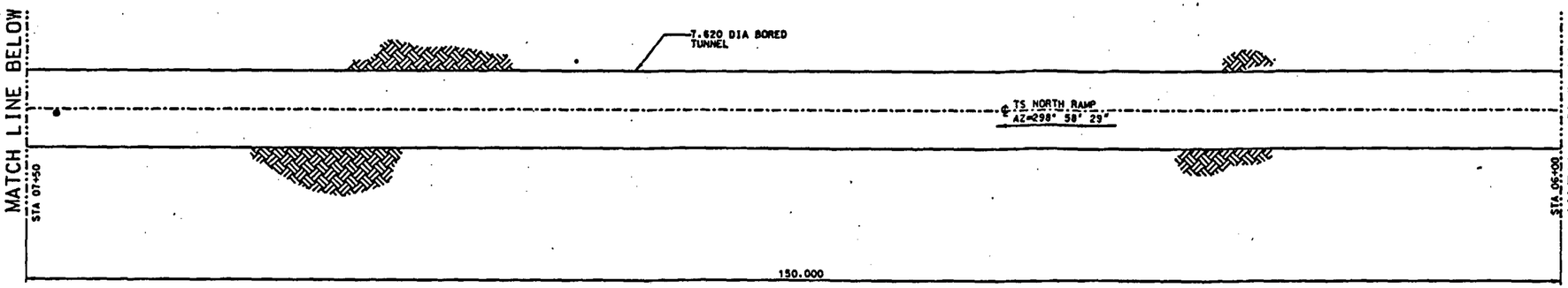
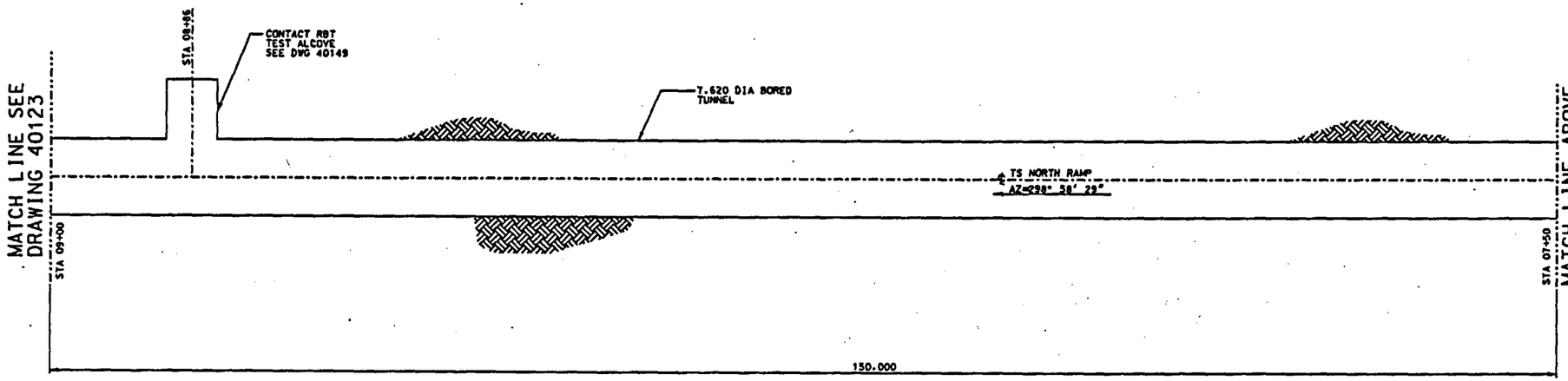
EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
EXCAVATION LAYOUT
PLAN - SHEET 2 OF 10

SIZE D | DOCUMENT IDENTIFIER: BABEAD000-01717-2100-40121-01 | REV 01
SCALE NOTED | QA: QA-1, QA-2 SEE NOTE 6 | U.S.L. 1.2.6 | CAD FILE MINE:40121.DGN

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED



PLAN STA 06+00 TO STA 07+50
SCALE 1:250



PLAN STA 07+50 TO STA 09+00
SCALE 1:250

NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
2. COORDINATES, ELEVATIONS, DIMENSIONS, AND STATIONING ARE SHOWN IN METERS, UNLESS OTHERWISE NOTED. METRIC VALUES ARE ROUNDED TO THREE DECIMAL PLACES. WHERE DISCREPANCIES BETWEEN ELEVATIONS & GRADIENTS OCCUR DUE TO ROUNDING, ELEVATIONS WILL GOVERN.
3. ALL METRIC COORDINATES ARE BASED ON AN INITIAL CONVERSION OF THE NORTH PORTAL COORDINATES FROM FEET TO METERS, USING A CONVERSION FACTOR OF 0.30480061. 01
4. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
5. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
6. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501. 01
7. ANY BOREHOLE INFORMATION, GEOLOGICAL INFORMATION, OR FAULT TRACE INFORMATION SHOWN IS FOR REFERENCE PURPOSES ONLY AND IS NEITHER DESIGN INPUT OR PART OF THE DESIGN.

QA-1 / QA-2 / Q

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DESIGN INPUTS
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NOTICE OF OPEN CHANGE DOCUMENTS				
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CHANGE DOCUMENT NUMBER	DOCUMENT	POSTED BY	DATE	STATUS

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1:250

DOE/TMP ACCEPTANCE FOR CONSTRUCTION
By _____ Date 10/12/94

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

REV	DESCRIPTION	DATE	DRN	CHK							
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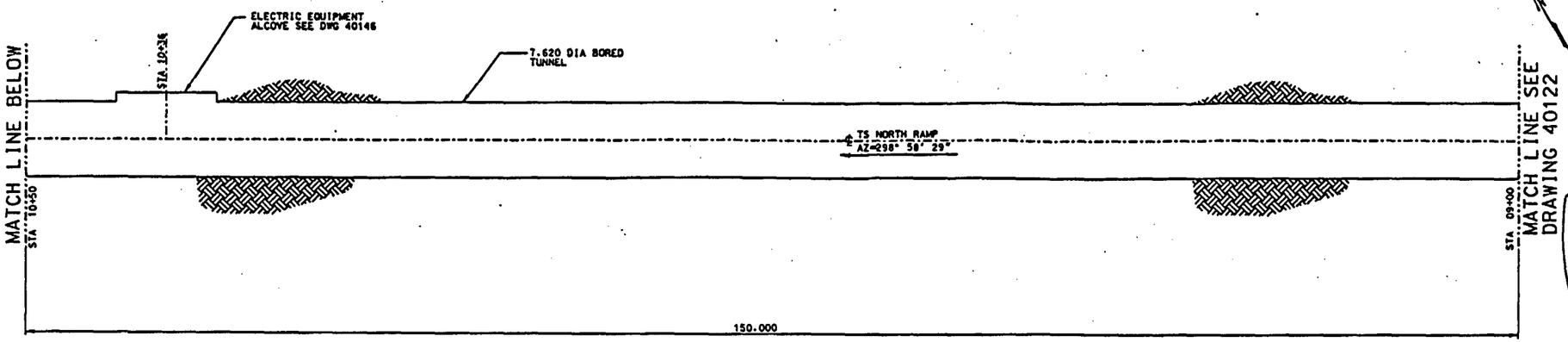
00	APPROVED BUT NOT ISSUED	7-7-94	CLP	WRK	CRG	N/A	JMT	FCA	JLN		

APPROVALS	INITIAL/DATE
DRAWN: C PEARCE	CLP 7-7-94
DETERMINATOR: W KENNEDY	WRK 7-7-94
CHECKED: C GARRETT	CRG 7-7-94
VERIFICATION: N/A	
LEAD DESIGN ENGINEER: J TAIPALE	JMT 7-7-94
QUALITY ASSURANCE: J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER: J NAAF	JLN 7-7-94

U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System
MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
EXCAVATION LAYOUT
PLAN - SHEET 3 OF 10

SIZE D | DOCUMENT IDENTIFIER: BABEA0000-01717-2100-40122-01 | CI IDENTIFIER | DRAWING NO. | REV
SCALE: NOTED | QA CLASSIFICATION: QA-1, QA-2 SEE NOTE 6 | U.O.M.: 1.2.6 | CAD FILE: MINE:40122.DGN



PLAN STA 09+00 TO STA 10+50
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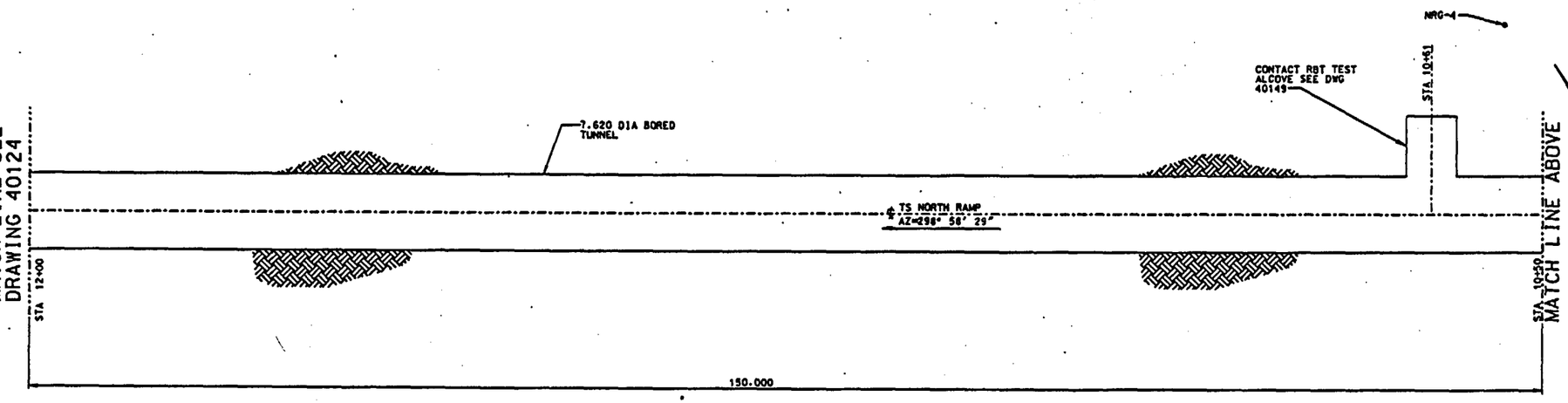

PLAN STA 10+50 TO STA 12+00
SCALE 1:250

NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
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3. ALL METRIC COORDINATES ARE BASED ON AN INITIAL CONVERSION OF THE NORTH PORTAL COORDINATES FROM FEET TO METERS, USING A CONVERSION FACTOR OF 0.30480061. (01)
4. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
5. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
6. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501. (01)
7. ANY BOREHOLE INFORMATION, GEOLOGICAL INFORMATION, OR FAULT TRACE INFORMATION SHOWN IS FOR REFERENCE PURPOSES ONLY AND IS NEITHER DESIGN INPUT OR PART OF THE DESIGN.

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DOE/YMP ACCEPTANCE FOR CONSTRUCTION
By _____ Date 11/12/94

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

REV	DESCRIPTION	DATE	DRN	CHK	ENG	MTR	C.S.E.	G.S.	S.S.
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00	APPROVED BUT NOT ISSUED	7-7-94	CLP	WRK	CRG	N/A	JMT	FCA	JLN

APPROVALS	INITIAL/DATE
DRAWN C PEARCE	CLP 7-7-94
DESIGNATOR W KENNEDY	WRK 7-7-94
CHECKED C GARRETT	CRG 7-7-94
VERIFICATION N/A	
LEAD DESIGN ENGINEER J TAIPALE	JMT 7-7-94
QUALITY ASSURANCE J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER J NAAF	JLN 7-7-94

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Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

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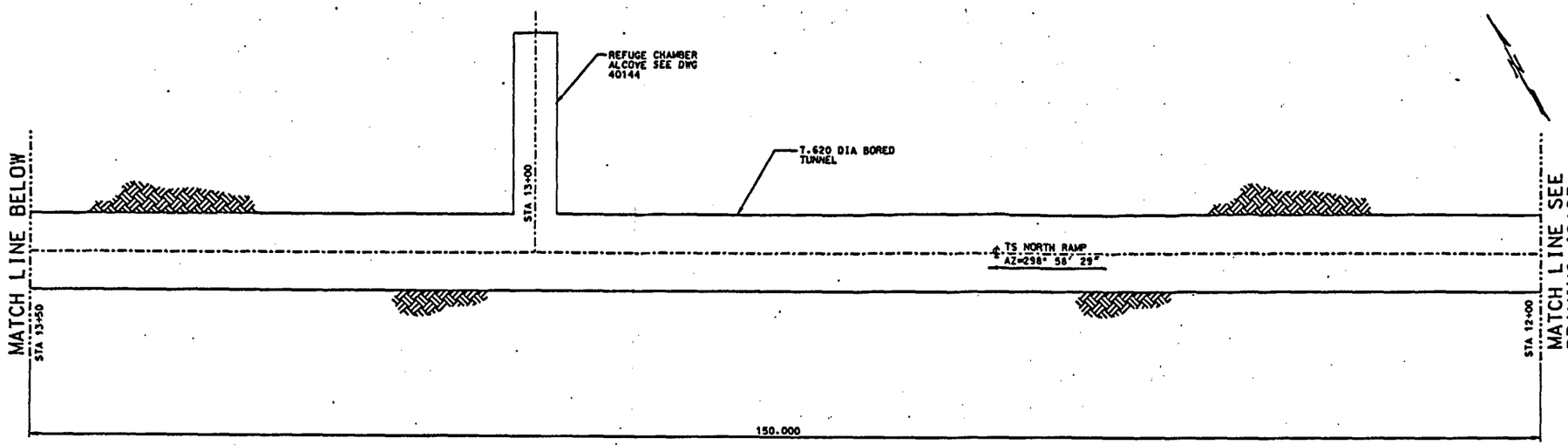
EXCAVATION LAYOUT
PLAN - SHEET 4 OF 10

SIZE D | DOCUMENT IDENTIFIER: BABEA0000-01717-2100-40123-01 | REV

SCALE NOTED | QA CLASSIFICATION QA-1, QA-2 SEE NOTE 6 | U.O.M. 1.2.6 | CAD FILE MINE:40123.DGN

24-SEP-1994 14:57



PLAN STA 12+00 TO STA 13+50
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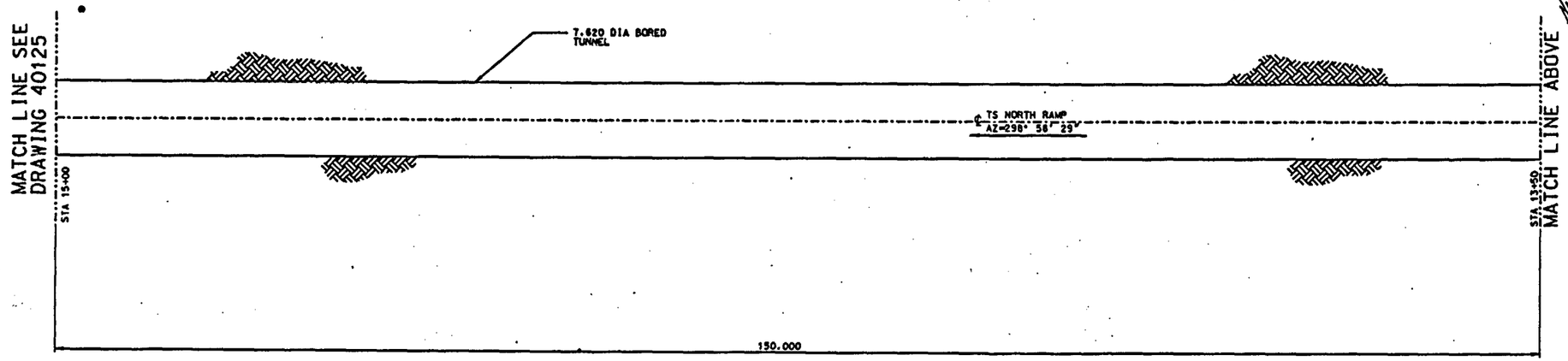

PLAN STA 13+50 TO STA 15+00
SCALE 1:250

NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
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3. ALL METRIC COORDINATES ARE BASED ON AN INITIAL CONVERSION OF THE NORTH PORTAL COORDINATES FROM FEET TO METERS, USING A CONVERSION FACTOR OF 0.30480061. 01
4. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
5. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
6. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501. 01
7. ANY BOREHOLE INFORMATION, GEOLOGICAL INFORMATION, OR FAULT TRACE INFORMATION SHOWN IS FOR REFERENCE PURPOSES ONLY AND IS NEITHER DESIGN INPUT OR PART OF THE DESIGN.

QA-1
QA-2
Q

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OCT 13 1994
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NOTICE OF OPEN CHANGE DOCUMENTS
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CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

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1:250

DOE/YMP ACCEPTANCE FOR CONSTRUCTION
By ____ Date 10/17/94

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

REV	DESCRIPTION	DATE	DRW	CHK	CHK	VER	L.E.D.			
01	ISSUED FOR CONSTRUCTION	9-26-94								
00	APPROVED BUT NOT ISSUED	7-7-94	CLP	VRK	CRG	N/A	JNT	FCA	JLN	

APPROVALS	INITIAL/DATE
DRAWN C PEARCE	CLP 7-7-94
ORIGINATOR W KENNEDY	VRK 7-7-94
CHECKED C GARRETT	CRG 7-7-94
VERIFICATION N/A	
LEAD DESIGN ENGINEER J TAIPALE	JNT 7-7-94
QUALITY ASSURANCE J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER J NAAF	JLN 7-7-94

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EXCAVATION LAYOUT
PLAN - SHEET 5 OF 10

SIZE D | DOCUMENT IDENTIFIER: BABEA0000-01717-2100-40124-01 | REV 01
SCALE NOTED | QA: QA-1, QA-2, SEE NOTE 6 | A.R.D. 1.2.6 | CAD FILE MINE:40124.DGN
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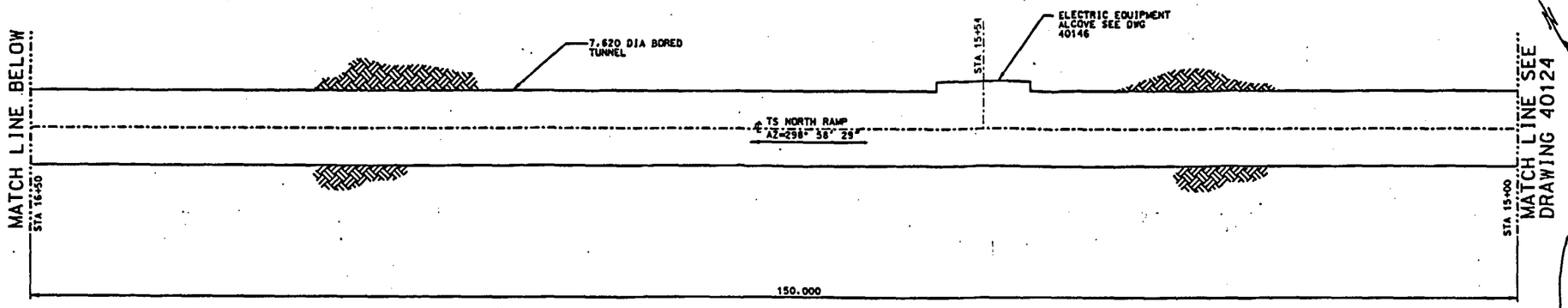

PLAN STA 15+00 TO STA 16+50
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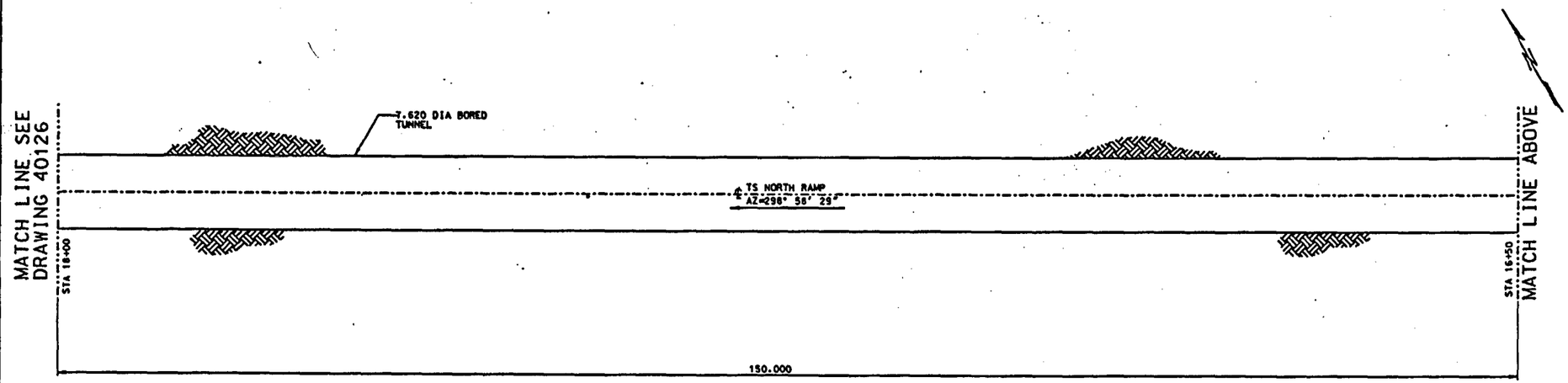

PLAN STA 16+50 TO STA 18+00
SCALE 1:250

NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
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4. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
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7. ANY BOREHOLE INFORMATION, GEOLOGICAL INFORMATION, OR FAULT TRACE INFORMATION SHOWN IS FOR REFERENCE PURPOSES ONLY AND IS NEITHER DESIGN INPUT OR PART OF THE DESIGN.

QA-1 / QA-2 / 0

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DESIGN INPUTS
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GRAPHIC SCALE
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By _____ Date 10/12/94

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

REV	DESCRIPTION	DATE	DRN	CHK	CRG	VER				
01	ISSUED FOR CONSTRUCTION	9-24-94								
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APPROVALS	INITIAL/DATE
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DRAFTING W KENNEDY	WRK 7-7-94
CHECKER C GARRETT	CRG 7-7-94
VERIFICATION N/A	
LEAD DESIGN ENGINEER J TAIPALE	JNT 7-7-94
QUALITY ASSURANCE J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER J NAAF	JLN 7-7-94

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M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
EXCAVATION LAYOUT
PLAN - SHEET 6 OF 10

SIZE	DOCUMENT IDENTIFIER	CI IDENTIFIER	DRAWING NO.	REV
D	BABEAD000		01717-2100-40125	01

SCALE	QA CLASSIFICATION	U.S.C.	CAD FILE
NOTED	QA-1 QA-2 SEE NOTE 6	1.2.6	MINE:40125.DGN

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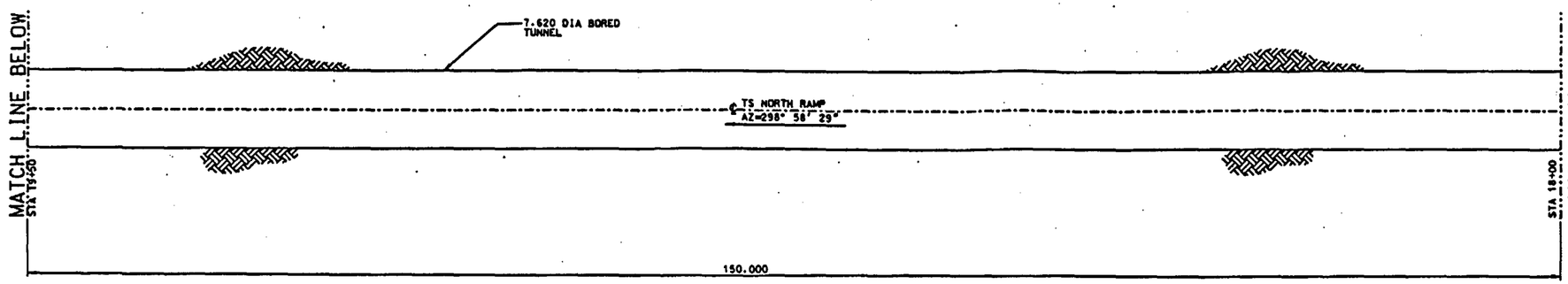
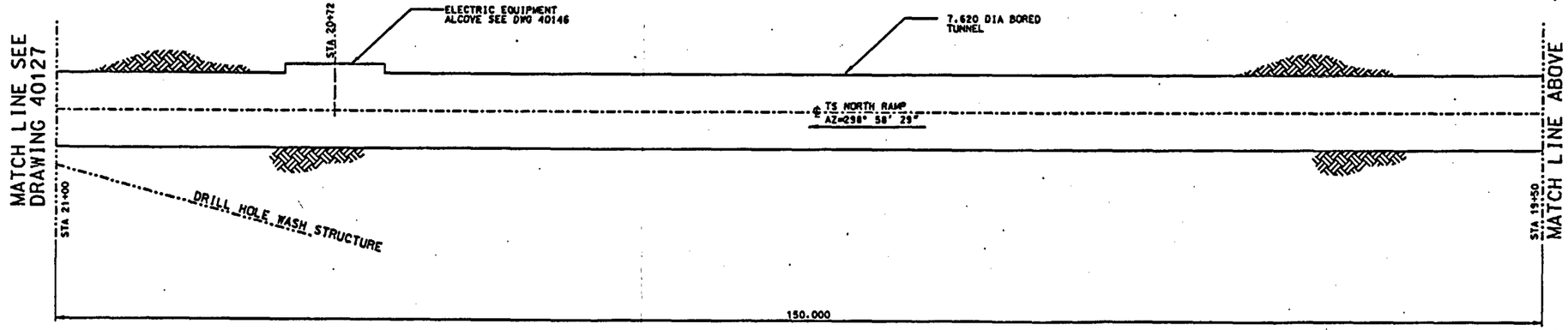
24-SEP-1994 15:11



PLAN STA 18+00 TO STA 19+50

SCALE 1:250



PLAN STA 19+50 TO STA 21+00

SCALE 1:250

NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
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4. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
5. FAULT TRACE LOCATIONS SHOWN ON NORTH RAMP PLAN, EXCEPT FOR THE BOW RIDGE FAULT, ARE APPROXIMATIONS BASED ON AT-DEPTH PROJECTIONS OF INFORMATION FROM USGS OPEN FILE REPORT 84-494, PRELIMINARY GEOLOGIC MAP AND SECTIONS, BY SCOTT AND BONK (SEE BC0000000-01717-0200-00002 REV 00, SURFACE FAULT TRACES PROJECTED TO REPOSITORY HORIZON). THE BOW RIDGE FAULT TRACE IS AN AT-DEPTH PROJECTION BASED ON FIELD WORK FROM ON-GOING ROCK AND SOIL INVESTIGATIONS (REFERENCE SNL DWG NO. 88-60-09, REV 5, DATED 4-20-94 TDIF # 303195). (01)
6. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
7. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501. (01)
8. ANY BOREHOLE INFORMATION, GEOLOGICAL INFORMATION, OR FAULT TRACE INFORMATION SHOWN IS FOR REFERENCE PURPOSES ONLY AND IS NEITHER DESIGN INPUT OR PART OF THE DESIGN.

QA-1 / QA-2 / Q

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NOTICE OF OPEN CHANGE DOCUMENTS

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CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

DESIGN INPUTS
SEE DRAWING INPUTS LIST (01)

GRAPHIC SCALE
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1:250

DOE/YMP ACCEPTANCE FOR CONSTRUCTION
By _____ Date 10/12/94

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

REV	DESCRIPTION	DATE	DRN	DSN	CHK	MEC	L.S.E.	S.E.	S.M.
01	ISSUED FOR CONSTRUCTION	9-14-94							
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APPROVALS	INITIAL/DATE
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CHECKER C GARRETT	CRG 7-7-94
VERIFICATION N/A	
LEAD WESTON ENGINEER J TAIPALE	JMT 7-7-94
QUALITY ASSURANCE J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER J NAAF	JLN 7-7-94

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EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
EXCAVATION LAYOUT
PLAN - SHEET 7 OF 10

SIZE	DOCUMENT IDENTIFIER: BABEA0000-01717-2100-40126-01	REV
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SCALE	QA CLASSIFICATION QA-1 QA-2 SEE NOTE 7	P.O.S.	CAD FILE
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SAME SHEET (01)

24-SEP-1994 13:14

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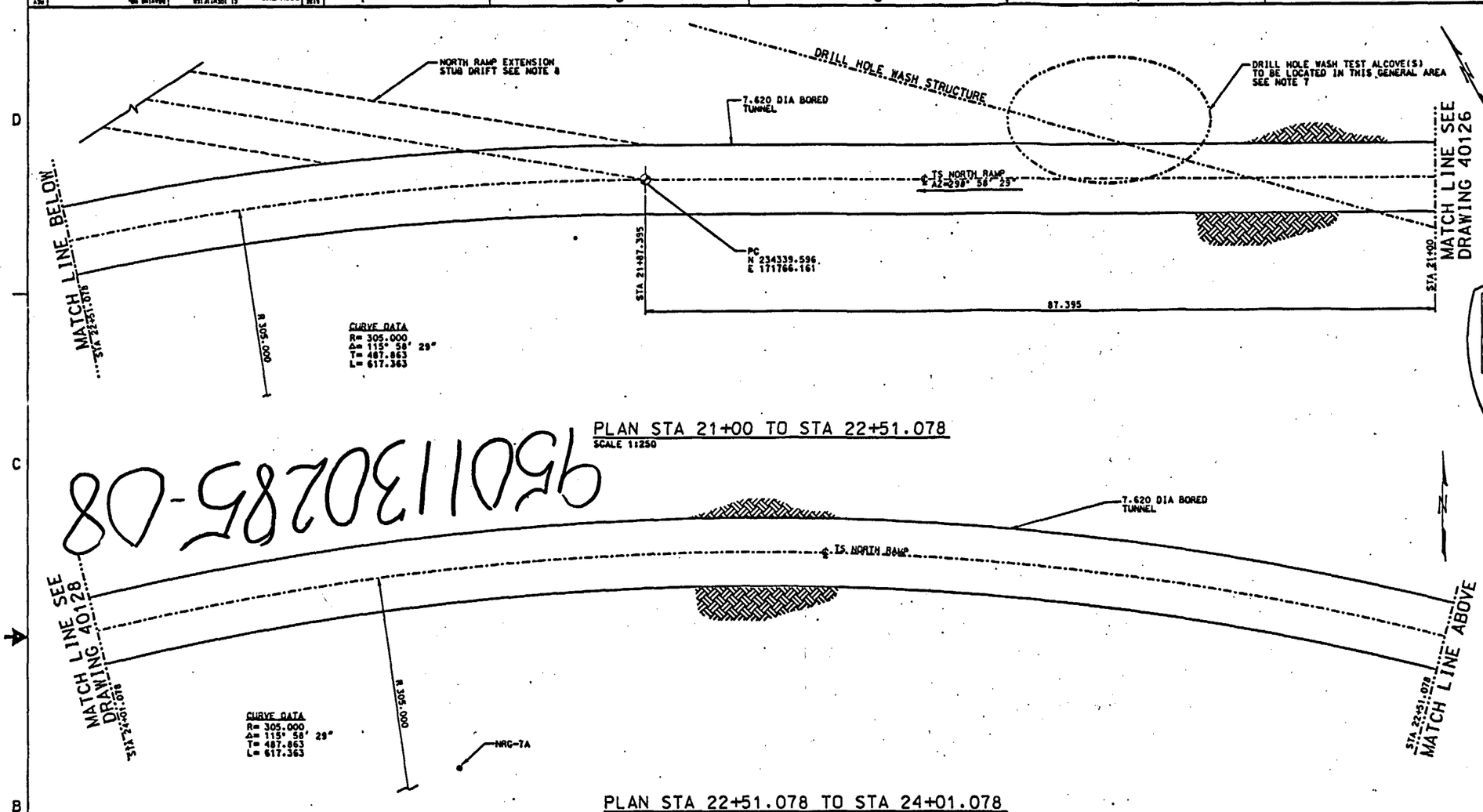

PLAN STA 21+00 TO STA 22+51.078
SCALE 1:250

PLAN STA 22+51.078 TO STA 24+01.078
SCALE 1:250

960113028S-08

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NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
2. COORDINATES, ELEVATIONS, DIMENSIONS, AND STATIONING ARE SHOWN IN METERS, UNLESS OTHERWISE NOTED. METRIC VALUES ARE ROUNDED TO THREE DECIMAL PLACES. WHERE DISCREPANCIES BETWEEN ELEVATIONS & GRADIENTS OCCUR DUE TO ROUNDING, ELEVATIONS WILL GOVERN.
3. ALL METRIC COORDINATES ARE BASED ON AN INITIAL CONVERSION OF THE NORTH PORTAL COORDINATES FROM FEET TO METERS, USING A CONVERSION FACTOR OF 0.3048006I. (D1)
4. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
5. FAULT TRACE LOCATIONS SHOWN ON NORTH RAMP PLAN, EXCEPT FOR THE BOW RIDGE FAULT, ARE APPROXIMATIONS BASED ON AT-DEPTH PROJECTIONS OF INFORMATION FROM USGS OPEN FILE REPORT 84-494, PRELIMINARY GEOLOGIC MAP AND SECTIONS, BY SCOTT AND BONK (SEE BC0000000-01717-0200-00002 REV 00. SURFACE FAULT TRACES PROJECTED TO REPOSITORY HORIZON). THE BOW RIDGE FAULT TRACE IS AN AT-DEPTH PROJECTION BASED ON FIELD WORK FROM ON-GOING ROCK AND SOIL INVESTIGATIONS (REFERENCE SNL DWG NO. 88-60-09, REV 5, DATED 4-20-94 TOIF # 303195). (D1)
6. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
7. CONFIGURATION OF THE DRILL HOLE WASH TEST ALCOVE(S) WILL BE DETERMINED AFTER THE ALCOVE IS LOCATED. FINAL LOCATION WILL BE BASED ON GEOHYDROLOGIC DATA OBTAINED DURING RAMP CONSTRUCTION.
8. THE NORTH RAMP EXTENSION STUB DRIFT WILL PROVIDE AN AREA TO ASSEMBLE/LAUNCH A TBM. THE ACTUAL LOCATION IS DEPENDENT ON GROUND CONDITIONS AND WILL BE FIELD DETERMINED. THE STUB DRIFT WILL BE DESIGNED ONCE THE DRIFT IS LOCATED.
9. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501. (D1)
10. ANY BOREHOLE INFORMATION, GEOLOGICAL INFORMATION, OR FAULT TRACE INFORMATION SHOWN IS FOR REFERENCE PURPOSES ONLY AND IS NEITHER DESIGN INPUT OR PART OF THE DESIGN.

QA-1 / QA-2 / Q

DESIGN INPUTS
SEE DRAWING INPUTS LIST (D1)

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CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

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1:250

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00	APPROVED BUT NOT ISSUED	7-7-94	CLP	WRK	CRG	N/A	JMT	FCA	JLN	

APPROVALS	INITIAL/DATE
DRAWN: C PEARCE	CLP 7-7-94
DESIGNED: W KENNEDY	WRK 7-7-94
CHECKED: C GARRETT	CRG 7-7-94
DESIGN REVIEW: N/A	
LEAD DESIGN ENGINEER: J TAIPALE	JMT 7-7-94
QUALITY ASSURANCE: J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER: J NAAF	JLN 7-7-94

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TS NORTH RAMP
EXCAVATION LAYOUT
PLAN - SHEET 8 OF 10

SIZE D | DOCUMENT IDENTIFIER: BABEA0000-01717-2100-40127-01 | REV 2
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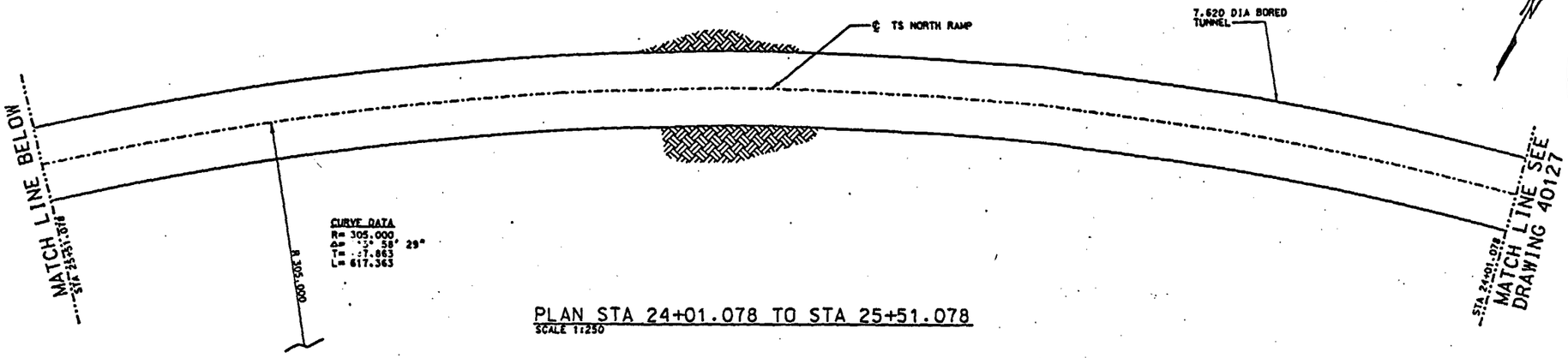

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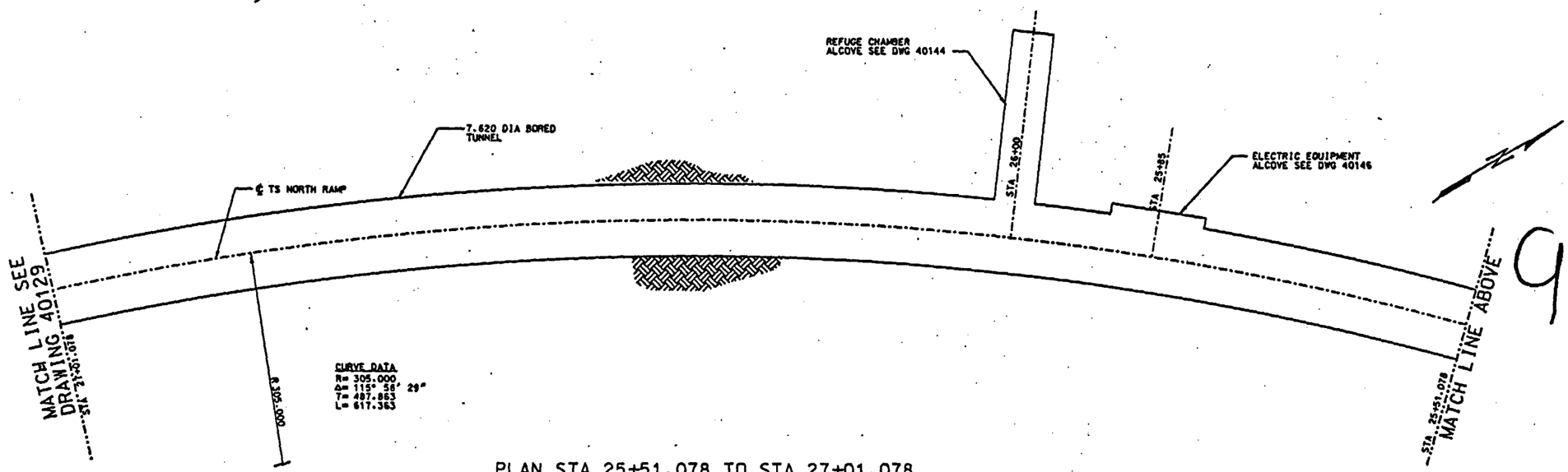
SCALE 1:250



PLAN STA 25+51.078 TO STA 27+01.078
SCALE 1:250

NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
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3. ALL METRIC COORDINATES ARE BASED ON AN INITIAL CONVERSION OF THE NORTH PORTAL COORDINATES FROM FEET TO METERS, USING A CONVERSION FACTOR OF 0.3048006l. (01)
4. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
5. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
6. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501. (01)
7. ANY BOREHOLE INFORMATION, GEOLOGICAL INFORMATION, OR FAULT TRACE INFORMATION SHOWN IS FOR REFERENCE PURPOSES ONLY AND IS NEITHER DESIGN INPUT OR PART OF THE DESIGN.

QA-1 / QA-2 / 0

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00	APPROVED BUT NOT ISSUED	7-7-94	CLP	WRK	CRG	A/A	JNT	FCA	JLN	

APPROVALS	INITIALS/DATE
DESIGN C PEARCE	CLP 7-7-94
INTEGRATOR W KENNEDY	WRK 7-7-94
CHECKER C GARRETT	CRG 7-7-94
VERIFICATION N/A	
LEAD DESIGN ENGINEER J TAIPALE	JNT 7-7-94
QUALITY ASSURANCE J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER J NAAF	JLN 7-7-94

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Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

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TS NORTH RAMP
EXCAVATION LAYOUT
PLAN - SHEET 9 OF 10

SIZE D | DOCUMENT IDENTIFIER: BABEA0000-01717-2100-40128-01 | CI IDENTIFIER | DRAWING NO. | REV
SCALE NOTED | QA CLASSIFICATION QA-1, QA-2 SEE NOTE 1 | U.S.C.S. 1.2.6 | CAD FILE MINE:40128.DGN

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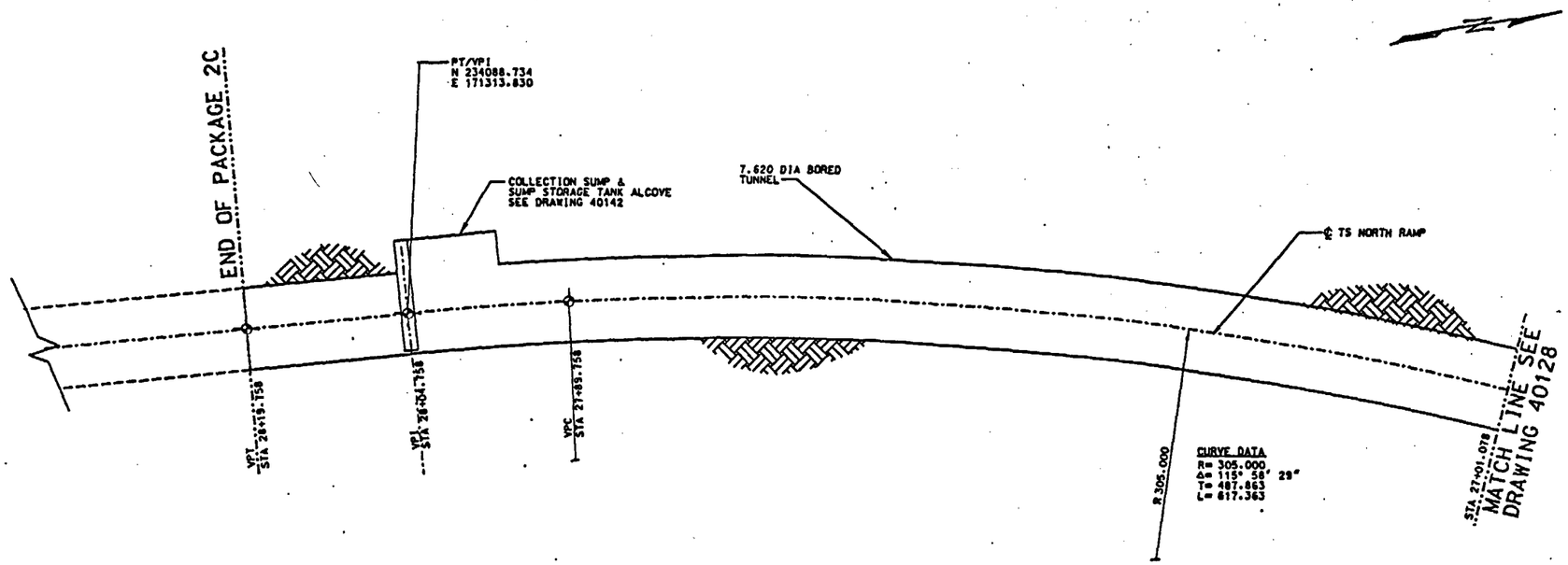

PLAN STA 27+01.078 TO STA 28+19.758
SCALE 1:250

NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM: CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
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3. ALL METRIC COORDINATES ARE BASED ON AN INITIAL CONVERSION OF THE NORTH PORTAL COORDINATES FROM FEET TO METERS, USING A CONVERSION FACTOR OF 0.30480061. 01
4. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
5. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
6. THE 30 m VERTICAL CURVE IS AN EQUAL-TANGENT PARABOLIC TYPE CURVE
7. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501. 01
8. ANY BOREHOLE INFORMATION, GEOLOGICAL INFORMATION, OR FAULT TRACE INFORMATION SHOWN IS FOR REFERENCE PURPOSES ONLY AND IS NEITHER DESIGN INPUT OR PART OF THE DESIGN.

QA-1
QA-2
Q

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DOE/TMP ACCEPTANCE FOR CONSTRUCTION
By _____ Date 10/13/94

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00	APPROVED BUT NOT ISSUED	7-7-94	CLP	WRK	CRG	N/A	JMT	FCA	JLN	

APPROVALS	INITIAL/DATE
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ORIGINATOR W KENNEDY	WRK 7-7-94
CHECKER C GARRETT	CRG 7-7-94
VERIFICATION N/A	
LEAD DESIGN ENGINEER J TAIPALE	JMT 7-7-94
QUALITY ASSURANCE J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER J NAAF	JLN 7-7-94

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PLAN - SHEET 10 OF 10

SIZE	DOCUMENT IDENTIFIER: CI IDENTIFIER	DRAWING NO.	REV
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SCALE	QA CLASSIFICATION	W.B.S.	CAD FILE
NOTED	QA-1, QA-2 (SEE NOTE 7) 01	1.2.6	MINE:40129.DGN

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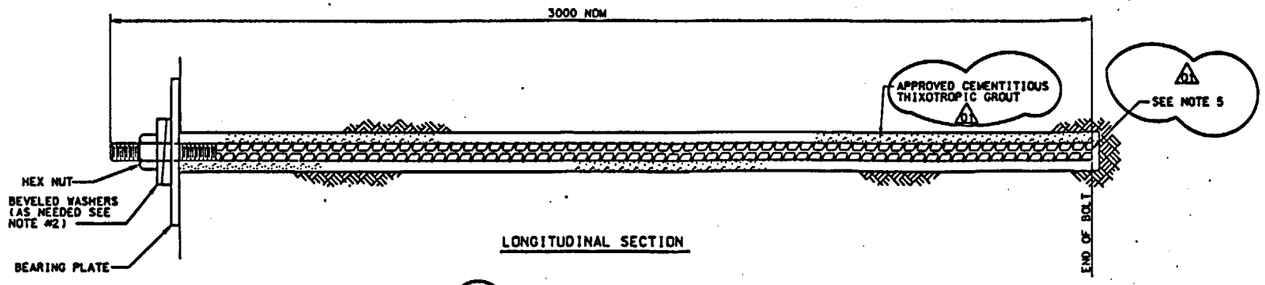
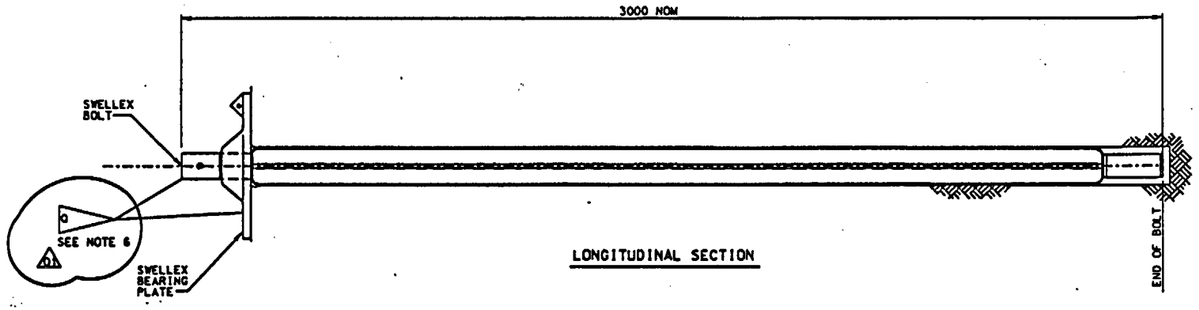


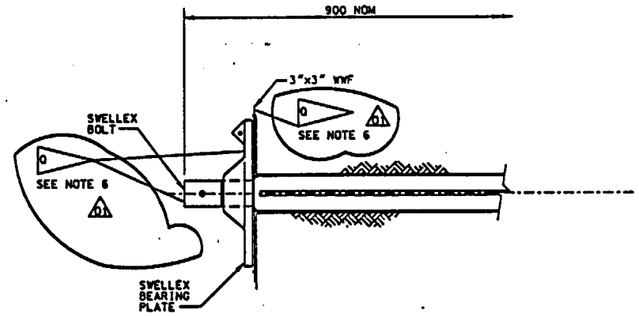
INSTALLATION DETAILS FOR SOLID #8 BAR ROCKBOLT WITH PRE-INSTALLED THIXOTROPIC GROUT

NOT TO SCALE



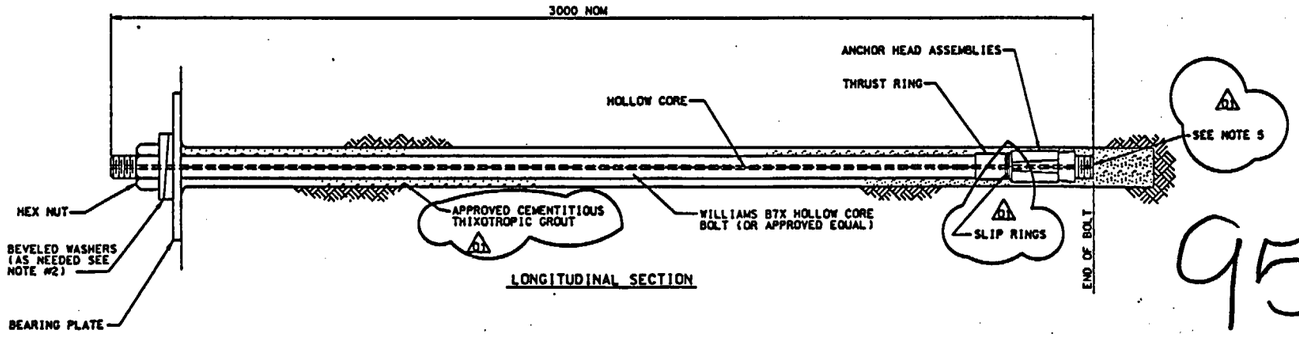
INSTALLATION DETAILS FOR SUPER SWELLEX ROCKBOLT

NOT TO SCALE



INSTALLATION DETAILS FOR 3"x3" WWF WITH PINS (STANDARD SWELLEX ROCKBOLT)

NOT TO SCALE



INSTALLATION DETAILS FOR HOLLOW CORE ROCKBOLT WITH MECHANICAL ANCHORS AND THIXOTROPIC GROUT

NOT TO SCALE SINGLE ANCHOR SHOWN

NOTES:

1. ROCKBOLTS SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS. ONLY APPROVED ROCKBOLT SYSTEMS SHALL BE USED AS SPECIFIED IN THE ROCKBOLTS AND ACCESSORIES SPEC SECTION 02165.
2. A SUFFICIENT NUMBER OF BEVELED WASHERS SHALL BE USED WITH THREADED ROCKBOLTS TO ENSURE UNIFORM BEARING ON THE BEARING PLATE.
3. BEARING PLATES SHALL BE INSTALLED BETWEEN THE BEVELED WASHERS AND ROCK.
4. THE MECHANICAL ANCHOR GROUTED ROCKBOLTS SHALL BE INSTALLED WITH A SINGLE MECHANICAL ANCHOR. HOWEVER, THE CONSTRUCTOR, WITH THE CONCURRENCE OF THE A/E, MAY USE A DOUBLE ANCHOR WHERE GROUND CONDITIONS WARRANT THE ADDITIONAL ANCHOR TO ENSURE SATISFACTORY PERFORMANCE.
5. DRILL HOLE DIMENSIONS/TOLERANCE SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
6. SUPER SWELLEX ROCKBOLTS, WWF AND PINS ARE SUBJECT TO Q CONTROLS PER SPEC. SECTION 02165, BUT ARE NOT CLASSIFIED QA-1 OR QA-5.

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TBV-193 SEISMIC DESIGN VALUES NEED TO BE VERIFIED
TBV-011 RMR VALUES NEED TO BE VERIFIED
TBV-192 100 YEAR MAINTAINABLE LIFE NEEDS TO BE VERIFIED
TBD-147 THERMALLY INDUCED STRESSES HAVE YET TO BE DETERMINED

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00	APPROVED BUT NOT ISSUED	7-27-94	JMH	JWK	RSS	SDB	JMT	JWW	JLN

APPROVALS	INITIAL/DATE
DRAWN J M HERRERA	JMH 7-14-94
DESIGNED J KEIFER	JWK 7-14-94
CHECKED R SKORSETH	RSS FOR 7-14-94
VERIFICATION S BAILEY	SDB 7-18-94
LEAD DESIGN ENGINEER J TAIPALE	JMT 7-14-94
QUALITY ASSURANCE J WILLIS	JWW 7-19-94
DEPARTMENT MANAGER J NAAF	JLN 7-27-94

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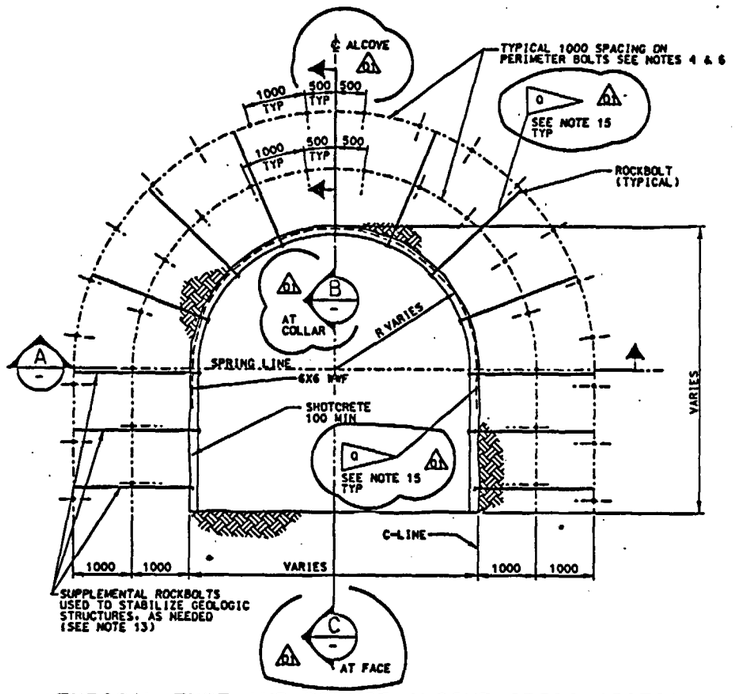
EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
ROCKBOLTS AND ACCESSORIES DETAILS

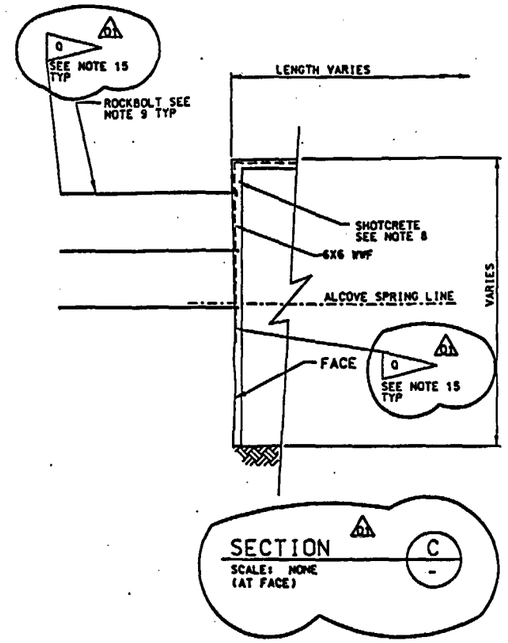
SIZE D | DOCUMENT IDENTIFIER: BABEAB000-01717-2100-40157-01 | REV
SCALE NOTED | QA CLASSIFICATION QA-1, QA-2, QA-5, SEE NOTE 6 | A.D.D. 1.2.6 | CAD FILE MINE:40157.DGN

11-OCT-1994 09:19



TYPICAL TEST AND REFUGE ALCOVE CROSS SECTION

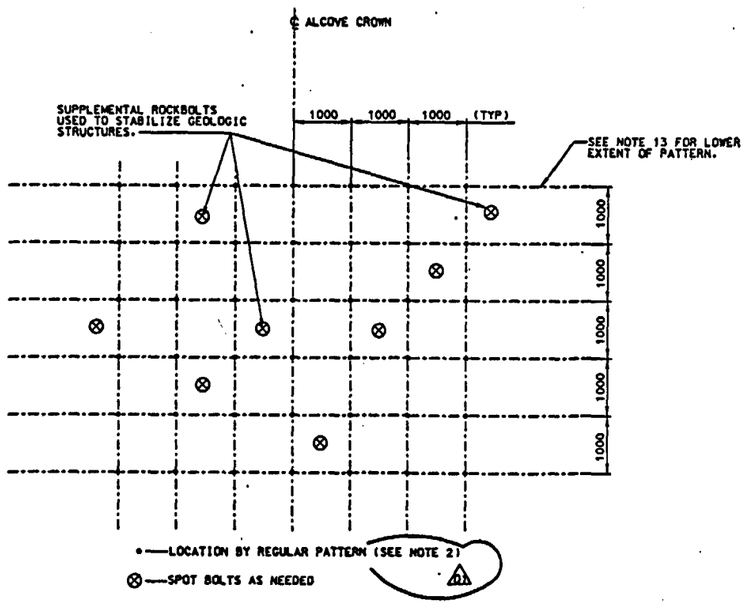
SCALE: NONE



NOTES:

1. GROUND SUPPORT SHALL BE INSTALLED IN COMPLIANCE WITH THE CONSTRUCTOR'S SAFETY AND CONSTRUCTION PROCEDURES AND IN ACCORDANCE WITH THE DESIGN DOCUMENTS.
2. BOLTING PATTERN IS NOMINAL - CONSTRUCTOR/A/E MAY ADJUST PATTERN LOCATION AND SPACING TO ADDRESS ROCK JOINTING AND OTHER GEOLOGIC STRUCTURES.
3. PRIOR TO THE DRILLING OF THE ALCOVE BLAST PATTERN. THE PERIMETER ROCKBOLTS OUTSIDE THE ALCOVE "C" LINE SHALL BE INSTALLED. GROUT IF USED (SEE NOTE 9). SHALL BE INSTALLED AT LEAST 72 HOURS PRIOR TO BLASTING.
4. THE PERIMETER ROCKBOLTS SHALL BE INSTALLED PARALLEL TO THE ALCOVE CENTERLINE AND HORIZONTAL WITH ALLOWABLE DEVIATION OF THE LOCATION OF THE BOTTOM OF THE HOLE EQUAL TO 5% OF THE LENGTH OF THE BOREHOLE.
5. UNLESS PERSONNEL SAFETY DICTATES OTHERWISE THE RAMP GROUND SUPPORT SHALL NOT BE INSTALLED INSIDE THE ALCOVE "C" LINE AREA TO BE EXCAVATED.
6. THE LOCATION OF THE ROCKBOLTS INSIDE THE ALCOVE MAY BE ADJUSTED BY THE CONSTRUCTOR IN THE FIELD TO ACCOMMODATE EQUIPMENT AND TO ELIMINATE INTERFERENCE WITH PREVIOUSLY INSTALLED ROCKBOLTS.
7. PERIMETER ROCKBOLTS SHALL BE EITHER HOLLOW CORE WITH MECHANICAL ANCHOR OR SOLID BAR ROCKBOLTS. ROCKBOLTS INSIDE THE ALCOVE SHALL BE SUPER SWELLEX. (ALSO SEE NOTE 15)
8. THE CONSTRUCTOR SHALL COORDINATE WITH THE RESPONSIBLE PRINCIPAL INVESTIGATOR (PI) AND THE TEST COORDINATION OFFICE (TCO) PRIOR TO APPLICATION OF SHOTCRETE IN ANY OF THE TEST ALCOVES.
9. CEMENTITIOUS GROUTING. INCLUDING THAT USED IN GROUTED ROCKBOLTS. FOR THE FIRST TEN FEET OF THE TEST ALCOVES IS PROHIBITED WITHOUT TCO CONCURRENCE. AND IS PROHIBITED COMPLETELY BEYOND.
10. INSTALL ROCKBOLTS AND WWF AS REQUIRED TO ENSURE SAFE WORKING CONDITIONS. SHOTCRETE MAY BE APPLIED WHEN GROUND CONDITIONS AND OVERBREAK DICTATE ITS USE FOR PERSONNEL SAFETY. (SEE NOTE 8)
11. SHOTCRETE SHALL BE APPLIED A NOMINAL 150 TO 100 MINIMUM THICKNESS. A REASONABLY SMOOTH ROLLING SURFACE PERIMETER SHOULD BE ACHIEVED AND SEVERE INDENTATIONS AND HOLLOWS FILLED TO PROMOTE A BETTER STRUCTURAL CONFIGURATION. THESE HOLLOWS AND RECESSES MAY EXCEED THE 150 SHOTCRETE THICKNESS. (SEE NOTE 8)
12. PATTERN GROUTED ROCKBOLTS AND FINAL SHOTCRETE COAT(S) MAY BE APPLIED OVER SHOTCRETE PREVIOUSLY INSTALLED FOR SAFETY.
13. INSTALL ADDITIONAL ROCKBOLTS AS NEEDED TO STABILIZE GEOLOGIC STRUCTURES. BOLTS MAY BE EXTENDED DOWN RIB.
14. ROCKBOLTS SHALL BE MIN 2000 NOMINAL LENGTH. ADJUSTMENTS TO ROCKBOLT LENGTH MAY BE MADE BASED ON FIELD CONDITIONS AND SPAN OF ALCOVE WITH A/E ACCEPTANCE. PERIMETER ROCKBOLTS INSTALLED FROM THE TS NORTH RAMP SHALL BE 3000 LENGTH.
15. SUPER SWELLEX ROCKBOLTS. WWF AND PINS ARE SUBJECT TO Q CONTROLS PER SPEC. SECTION 02165. BUT ARE NOT CLASSIFIED QA-1 OR QA-S.

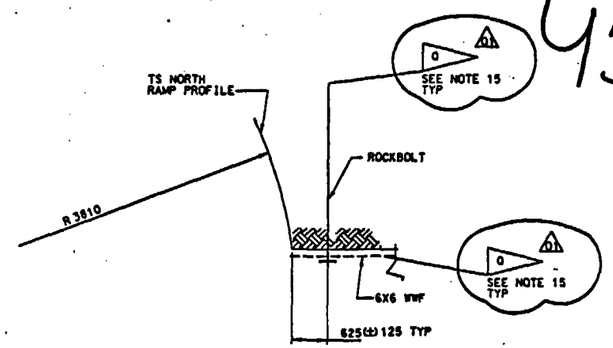
9501130285-12



DEVELOPED ROCKBOLT LAYOUT TEST AND REFUGE ALCOVE

DEVELOPED SECTION A

SCALE: NONE



LOCATION OF INITIAL ROW OF ALCOVE TYPICAL BOLT PATTERN

SECTION B

SCALE: NONE (AT COLLAR)

NOTE: SHOTCRETE NOT SHOWN FOR CLARITY

TBV-193 SEISMIC DESIGN VALUES NEED TO BE VERIFIED
TBV-198 GROUND SUPPORT SYSTEM IN ALCOVES NEEDS TO BE VERIFIED
TBV-192 100 YEAR MAINTAINABLE LIFE NEEDS TO BE VERIFIED
TBD-147 THERMALLY INDUCED STRESSES HAVE YET TO BE DETERMINED
TBV-011 RMR VALUES NEED TO BE VERIFIED

FOR DRAWING INDEX SEE DRAWING 39002

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CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE NOTED

ALL DIMENSIONS SHOWN ARE NOMINAL UNLESS OTHERWISE NOTED

DOE/YMP ACCEPTANCE FOR CONSTRUCTION

By _____ Date 10/12/94

REV	DESCRIPTION	DATE	DRN	DES	CHK	PCS	S.B.E.	S.A.	S.M.
01	ISSUED FOR CONSTRUCTION	10-11-94	GR	JWK	RS	BOB	JWT	JWW	JLN
00	APPROVED BUT NOT ISSUED	7-27-94	JWH	JWK	RSS	BOB	JWT	JWW	JLN

APPROVALS	INITIAL/DATE
DRAWN J M HERRERA	JMH 7-14-94
ORIGINATOR J KEIFER	JWK 7-14-94
CHECKED R SKORSETH	RSS FOR 7-14-94
VERIFICATION S BAILEY	SOB 7-18-94
LEAD DESIGN ENGINEER J TAIPALE	JWT 7-14-94
QUALITY ASSURANCE J WILLIS	JWW 7-19-94
DEPARTMENT MANAGER J NAAF	JLN 7-27-94

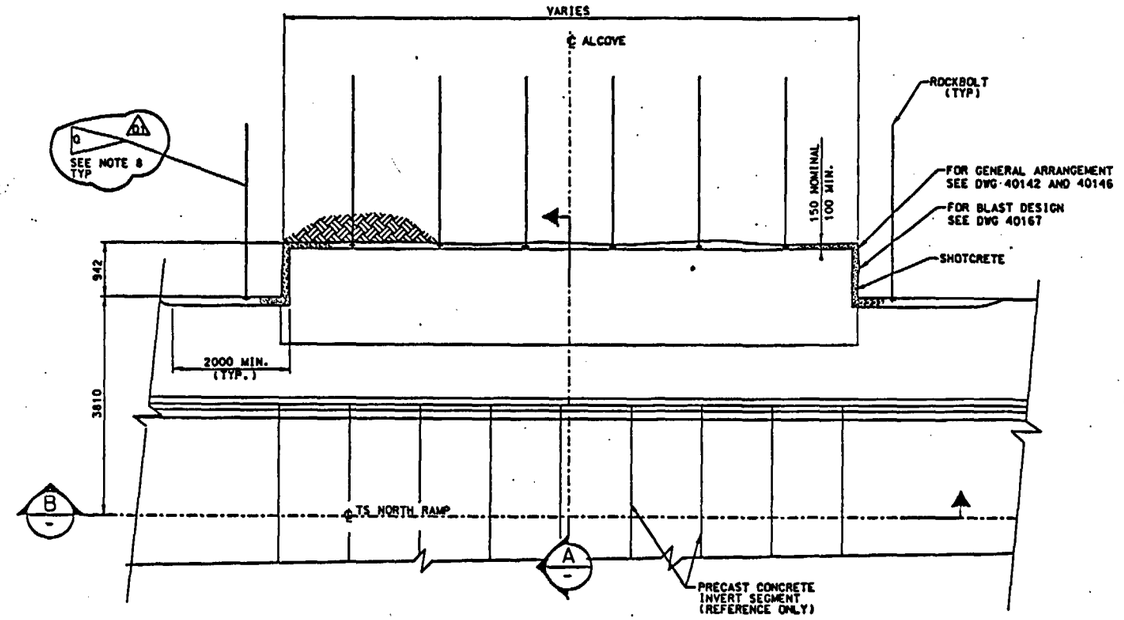
U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP ALCOVES ROCKBOLTS & SHOTCRETE SECTIONS

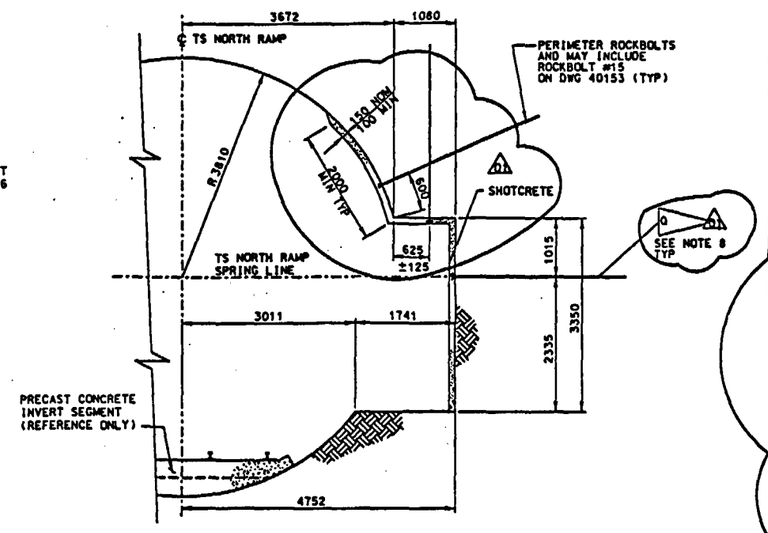
SIZE	DOCUMENT IDENTIFIER	SI IDENTIFIER	DRAWING NO.	REV
D	BABEA8000-01717-2100-40161			-01

SCALE	QA CLASSIFICATION	S.D.S.	CAD FILE
NOTED	QA-1 QA-S SEE NOTE 15	1.2.6	MINE:40161.DGN

01-OCT-1994 11:28



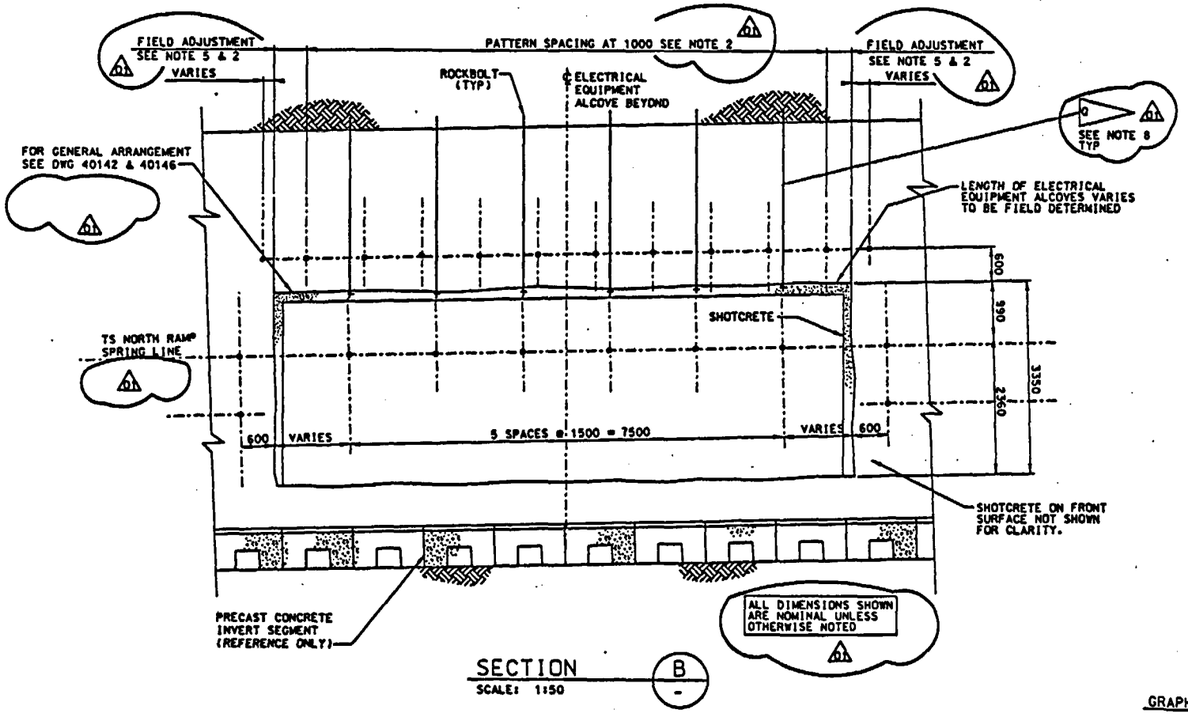
PARTIAL PLAN OF ELECTRICAL ALCOVES
SCALE: 1:50



SECTION A
SCALE: 1:50

NOTES:

1. GROUND SUPPORT SHALL BE INSTALLED IN COMPLIANCE WITH THE CONSTRUCTOR'S SAFETY AND CONSTRUCTION PROCEDURES AND IN ACCORDANCE WITH THE DESIGN DOCUMENTS.
2. BOLTING PATTERN IS NOMINAL – CONSTRUCTOR/AE MAY ADJUST PATTERN LOCATION AND SPACING TO ADDRESS ROCK JOINTING AND OTHER GEOLOGIC STRUCTURES.
3. PRIOR TO THE DRILLING OF THE ALCOVE BLAST PATTERN, THE PERIMETER ROCKBOLTS OUTSIDE THE ALCOVE "C" LINE SHALL BE INSTALLED. GROUT, IF USED, SHALL BE INSTALLED AT LEAST 72 HOURS PRIOR TO BLASTING.
4. UNLESS PERSONNEL SAFETY DICTATES OTHERWISE THE RAMP GROUND SUPPORT SHALL NOT BE INSTALLED INSIDE THE ALCOVE "C" LINE AREA TO BE EXCAVATED.
5. THE LOCATION OF THE ROCKBOLTS INSIDE THE ALCOVE MAY BE ADJUSTED BY THE CONSTRUCTOR IN THE FIELD TO ACCOMMODATE EQUIPMENT AND TO ELIMINATE INTERFERENCE WITH PREVIOUSLY INSTALLED ROCKBOLTS.
6. AT THE CONSTRUCTOR'S OPTION: WELDED WIRE FABRIC MAY BE INSTALLED IN THE ALCOVES DURING ROCKBOLTING. SEE NOTE 13
7. THE ELECTRICAL ALCOVES, INCLUDING THE GROUND SUPPORT, ARE CONSIDERED TO BE PART OF THE TS NORTH RAMP ACCESS, AND ARE SUBJECT TO THE SAME QA CONTROLS.
8. GROUTED ROCKBOLTS SHALL BE USED EXCEPT, AT THE CONSTRUCTOR'S OPTION AND WITH THE CONCURRENCE OF THE A/E, THE SUPER SWELLEX ROCKBOLT SYSTEM MAY BE USED IN PLACE OF THE GROUTED ROCKBOLTS WHERE GROUND CONDITIONS OR TEST INTERFERENCE REQUIREMENTS PRECLUDE THE USE OF GROUTED ROCKBOLTS. (ALSO SEE NOTE 13)
9. INSTALL ROCKBOLTS AND WWF AS REQUIRED TO ENSURE SAFE WORKING CONDITIONS. SHOTCRETE MAY BE APPLIED WHEN GROUND CONDITIONS AND OVERBREAK DICTATE ITS USE FOR PERSONNEL SAFETY.
10. SHOTCRETE SHALL BE APPLIED A NOMINAL 150 TO 100 MINIMUM THICKNESS. A REASONABLY SMOOTH ROLLING SURFACE PERIMETER SHOULD BE ACHIEVED AND SEVERE INDENTATIONS AND HOLLOWS FILLED TO PROMOTE A BETTER STRUCTURAL CONFIGURATION. THESE HOLLOWS AND INDENTATIONS MAY EXCEED THE 150 SHOTCRETE THICKNESS.
11. PATTERN GROUTED ROCKBOLTS AND FINAL SHOTCRETE COAT(S) MAY BE APPLIED OVER SHOTCRETE PREVIOUSLY INSTALLED FOR SAFETY.
12. SUPPLEMENTARY ROCKBOLTS REQUIRED TO STABILIZE GEOLOGIC STRUCTURES MAY BE INSTALLED AS NEEDED.
13. SUPER SWELLEX ROCKBOLTS, WWF AND PINS ARE SUBJECT TO Q CONTROLS PER SPEC. SECTION 02165, BUT ARE NOT CLASSIFIED QA-1 OR QA-5.



SECTION B
SCALE: 1:50

9501130285-13

HOLD HM94-16.0000-22
THIS HOLD APPLIES TO THE CONSTRUCTION OF THE ELECTRICAL ALCOVES SHOWN ON THIS DRAWING

TBV-193 SEISMIC DESIGN VALUES NEED TO BE VERIFIED
TBV-198 GROUND SUPPORT SYSTEM IN ALCOVES NEEDS TO BE VERIFIED
TBV-192 100 YEAR MAINTAINABLE LIFE NEEDS TO BE VERIFIED
TBD-147 THERMALLY INDUCED STRESSES HAVE YET TO BE DETERMINED
TBV-011 RMR VALUES NEED TO BE VERIFIED

ANSTEC APERTURE CARD

FOR DRAWING INDEX SEE DRAWING 39002

FIRST SUBMITTAL

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DESIGN INPUTS
SEE DRAWING INPUTS LIST

NOTICE OF OPEN CHANGE DOCUMENTS
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CHANGE NUMBER	DOCUMENT	POSTED BY	DATE	STATUS

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DOE/YMP ACCEPTANCE FOR CONSTRUCTION
By _____ Date 10/12/94

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01	ISSUED FOR CONSTRUCTION	10-11-94	[illegible]	JWK	JB	JWK	[illegible]	JWW	JLN	
00	APPROVED BUT NOT ISSUED	7-27-94	JWH	JWK	RSS	SDB	JMT	JWW	JLN	

APPROVALS	INITIAL/DATE
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ORIGINATOR J KEIFER	JWK 7-11-94
CHECKED R SKORSETH	RSS FOR 7-11-94
VERIFICATION S BAILEY	SDB 7-18-94
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U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP ALCOVES
ROCKBOLTS & SHOTCRETE
PLAN & SECTIONS

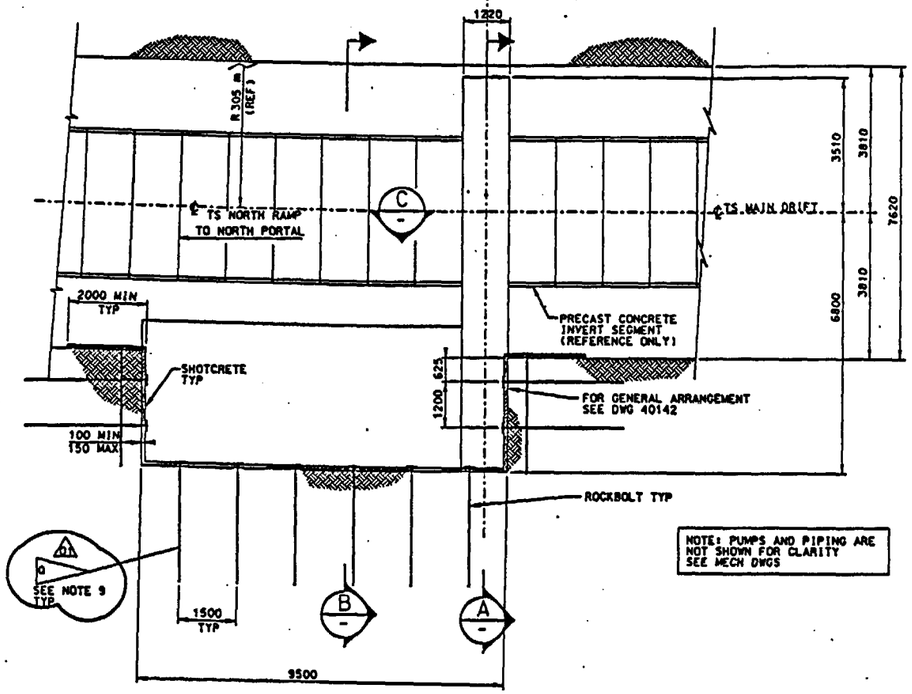
SIZE	DOCUMENT IDENTIFIER	DI IDENTIFIER	DRAWING NO.	REV
D	BABEA8000	01717-2100	40162	01

SCALE: NOTED | QA CLASSIFICATION (QA-1, QA-5 SEE NOTE 8 & 13) | W.B.S. 1.2.6 | CAD FILE MINE:40162.DGN

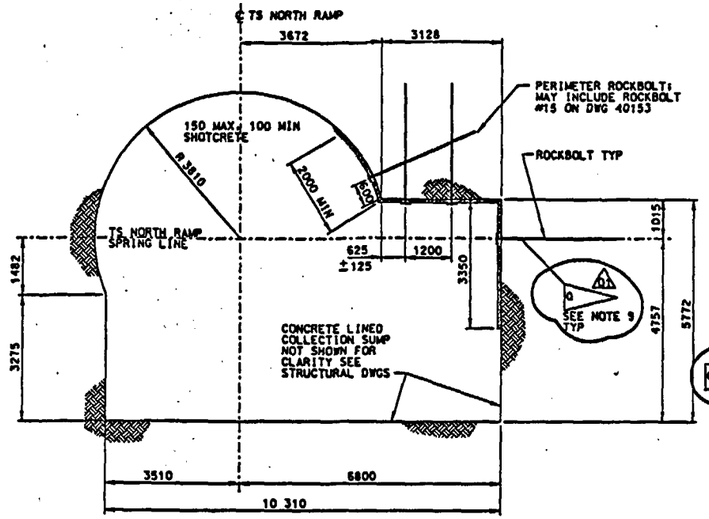
CADD CODE:

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE NOTED

11-OCT-1994 13:48



COLLECTION SUMP & SUMP ALCOVE PLAN
SCALE: 1:75



SECTION A
SCALE: 1:75

NOTES:

1. GROUND SUPPORT SHALL BE INSTALLED IN COMPLIANCE WITH THE CONSTRUCTOR'S SAFETY AND CONSTRUCTION PROCEDURES AND IN ACCORDANCE WITH THE DESIGN DOCUMENTS.
2. BOLTING PATTERN IS NOMINAL - CONSTRUCTOR/A/E MAY ADJUST PATTERN LOCATION AND SPACING TO ADDRESS ROCK JOINTING AND OTHER GEOLOGIC STRUCTURES.
3. PRIOR TO THE DRILLING OF THE ALCOVE BLAST PATTERN. THE PERIMETER ROCKBOLTS OUTSIDE THE ALCOVE "C" LINE SHALL BE INSTALLED. GROUT, IF USED, SHALL BE INSTALLED AT LEAST 72 HOURS PRIOR TO BLASTING.
4. UNLESS PERSONNEL SAFETY DICTATES OTHERWISE THE RAMP GROUND SUPPORT SHALL NOT BE INSTALLED INSIDE THE ALCOVE "C" LINE AREA TO BE EXCAVATED.
5. THE LOCATION OF THE ROCKBOLTS INSIDE THE ALCOVE MAY BE ADJUSTED BY THE CONSTRUCTOR IN THE FIELD TO ACCOMMODATE EQUIPMENT AND TO ELIMINATE INTERFERENCE WITH PREVIOUSLY INSTALLED ROCKBOLTS.
6. AT THE CONSTRUCTOR'S OPTION WELDED WIRE FABRIC MAY BE INSTALLED IN THE ALCOVES DURING ROCKBOLTING.
7. THE SUMP AND SUMP ALCOVE GROUND SUPPORT SYSTEM ARE CONSIDERED TO BE PART OF THE TS NORTH RAMP ACCESS, AND ARE SUBJECT TO THE SAME QA CONTROLS.
8. THE GROUND SUPPORT FOR THE COLLECTION SUMP EXCAVATION SHALL BE DETERMINED IN THE FIELD BY THE CONSTRUCTOR WITH CONCURRENCE OF THE A/E. THIS SUPPORT MAY INCLUDE ROCKBOLTS, WELDED WIRE FABRIC AND SHOTCRETE AND SHALL ADDRESS PERSONNEL SAFETY AND ADVERSE GEOLOGIC STRUCTURES.
9. GROUTED ROCKBOLTS SHALL BE USED, EXCEPT AT THE CONSTRUCTOR'S OPTION WITH THE CONCURRENCE OF THE A/E. THE SUPER SWELLEX ROCKBOLT SYSTEM MAY BE USED IN PLACE OF THE GROUTED ROCKBOLTS WHERE THE GROUND CONDITIONS OR TEST INTERFERENCE REQUIREMENTS PRECLUDE THE USE OF THE GROUTED ROCKBOLTS. SEE SPEC SECTION 02165. (ALSO SEE NOTE 14)
10. INSTALL ROCKBOLTS AND WELDED WIRE FABRIC AS REQUIRED TO ENSURE SAFE WORKING CONDITIONS. SHOTCRETE MAY BE APPLIED WHEN GROUND CONDITIONS AND OVERBREAK DICTATE ITS USE FOR PERSONNEL SAFETY.
11. SHOTCRETE SHALL BE APPLIED A NOMINAL 150 TO 100 MINIMUM THICKNESS. A REASONABLY SMOOTH ROLLING SURFACE PERIMETER SHOULD BE ACHIEVED AND SEVERE INDENTATIONS AND HOLLOWS FILLED TO PROMOTE A BETTER STRUCTURAL CONFIGURATION. THESE HOLLOWS AND RECESSES MAY EXCEED THE 150 SHOTCRETE THICKNESS.
12. PATTERN GROUTED ROCKBOLTS AND FINAL SHOTCRETE COAT(S) MAY BE APPLIED OVER SHOTCRETE PREVIOUSLY INSTALLED FOR SAFETY.
13. SUPPLEMENTARY ROCKBOLTS REQUIRED TO STABILIZE GEOLOGIC STRUCTURES MAY BE INSTALLED AS NEEDED.
14. SUPER SWELLEX ROCKBOLTS, WWF AND PINS ARE SUBJECT TO Q CONTROLS PER SPEC. SECTION 02165, BUT ARE NOT CLASSIFIED QA-1 OR QA-5.

ANSTEC APERTURE CARD

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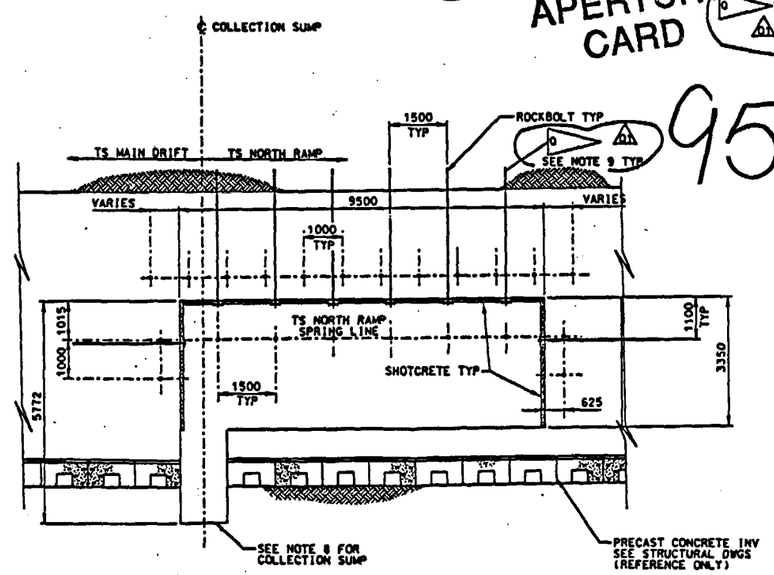

ELEVATION C
SCALE: 1:75

TBV-193 SEISMIC DESIGN VALUES NEED TO BE VERIFIED
TBV-198 GROUND SUPPORT SYSTEM IN ALCOVES NEEDS TO BE VERIFIED
TBV-192 100 YEAR MAINTAINABLE LIFE NEEDS TO BE VERIFIED
TBD-147 THERMALLY INDUCED STRESSES HAVE YET TO BE DETERMINED
TBV-011 RMR VALUES NEED TO BE VERIFIED

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OCT 13 1994
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DESIGN INPUTS
SEE DRAWING INPUTS LIST

NOTICE OF OPEN CHANGE DOCUMENTS
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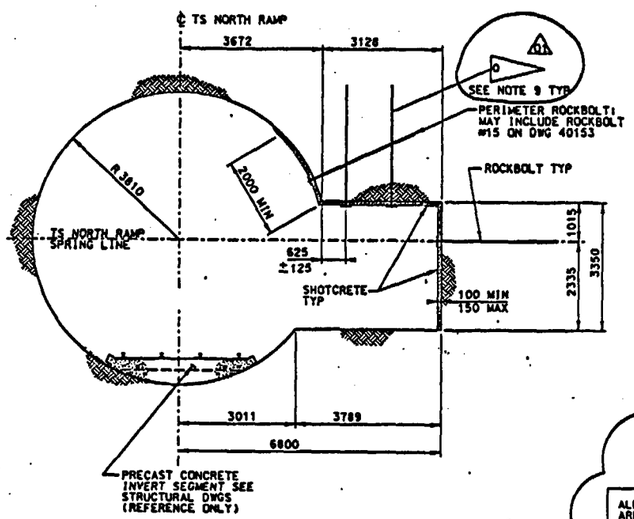

SECTION B
SCALE: 1:75

ALL DIMENSIONS SHOWN ARE NOMINAL UNLESS OTHERWISE NOTED

GRAPHIC SCALE
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1:75

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE NOTED

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REV	DESCRIPTION	DATE	DRW	DRG	CHK	PCR	L.D.E.	Q.A.	S.E.
01	ISSUED FOR CONSTRUCTION	10-11-94	GSP	SLK	AB	HWS	RDW		
00	APPROVED BUT NOT ISSUED	7-27-94	JWH	JWK	EFF	SDB	JMT	JWW	JLN

APPROVALS	INITIAL/DATE
DRAWN C PEARCE	JWH FOR 7-11-94
DRAFTSMAN J KEIFER	JWK 7-11-94
CHECKED E FITCH	EFF 7-11-94
VERIFICATION S BAILEY	SDB 7-18-94
LEAD DESIGN ENGINEER J TAIPALE	JMT 7-11-94
QUALITY APPROVAL J WILLIS	JWW 7-19-94
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U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
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EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP ALCOVE ROCKBOLTS AND SHOTCRETE PLAN, SECTIONS & ELEV

SIZE	DOCUMENT IDENTIFIER	DRAWING NO.	REV
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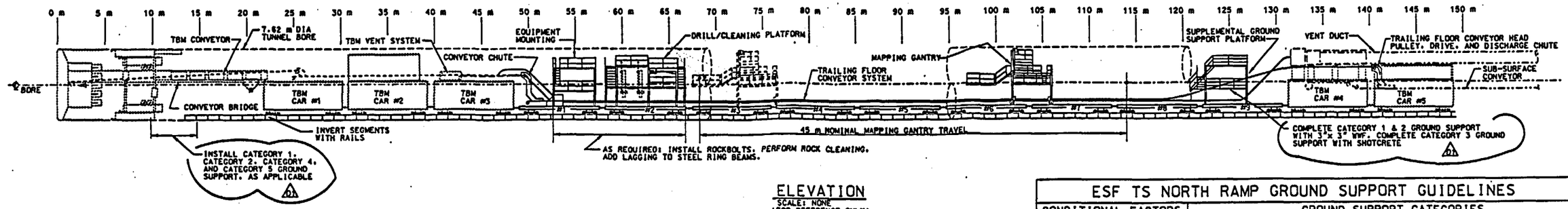
NOTED	QA-1, QA-5 SEE NOTES 9 & 14	1.2.6	MINE:40163.DGN



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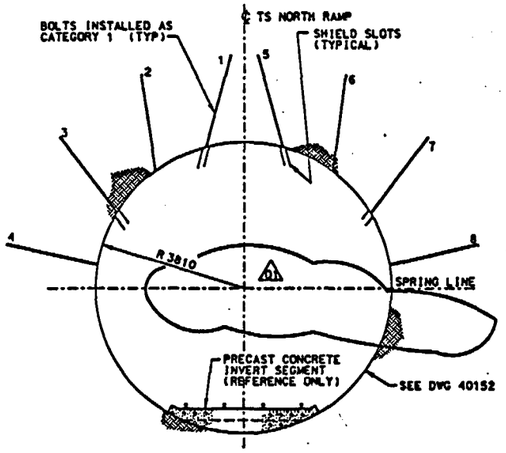
(FOR REFERENCE ONLY)



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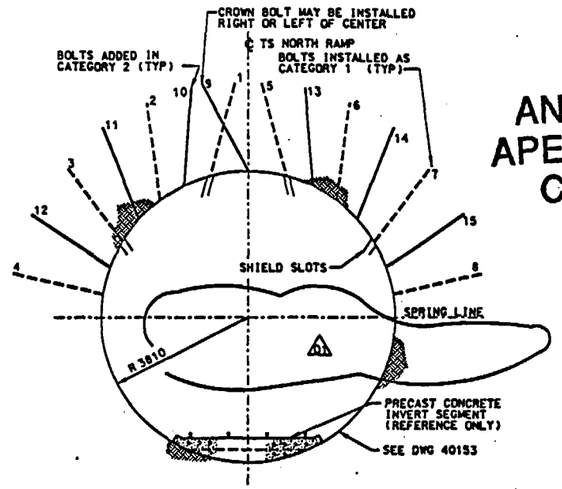

CATEGORY 2 GROUND SUPPORT
SCALE: 1:75 (REFERENCE ONLY)

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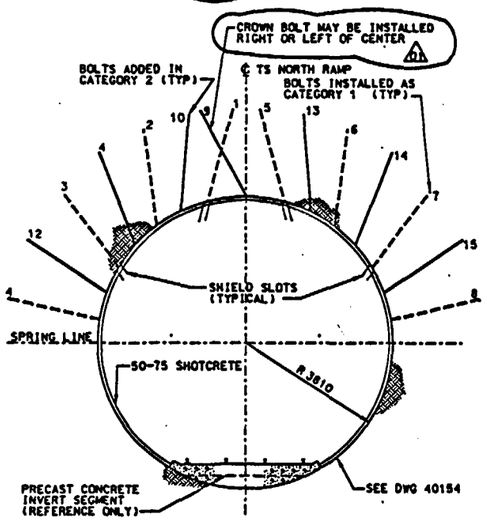

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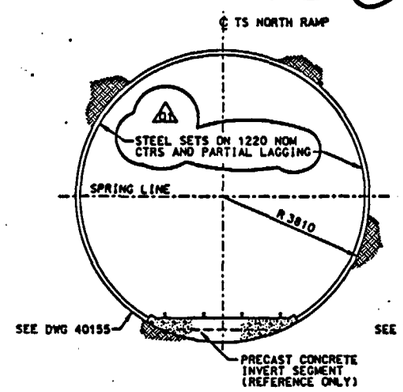

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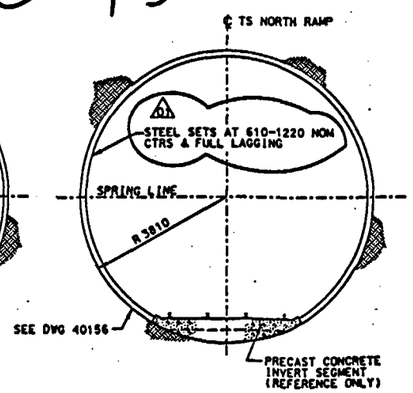

CATEGORY 5 GROUND SUPPORT
SCALE: 1:75 (REFERENCE ONLY)

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE NOTED

ALL DIMENSIONS SHOWN ARE NOMINAL UNLESS OTHERWISE NOTED

GRAPHIC SCALE
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1:75

DOE/TMP ACCEPTANCE FOR CONSTRUCTION
By [signature] Date 10/12/94

ESF TS NORTH RAMP GROUND SUPPORT GUIDELINES

	CONDITIONAL FACTORS		GROUND SUPPORT CATEGORIES
0 10-30 GOOD	RQD / Jn / Jr / Ja		
	≥10 / ≥10	≥1.5 / <1.5	CATEGORY 1 GROUND SUPPORT (REFER TO DRAWING 40152) ROCKBOLTS WITH 3" x 3" WWF.
	<10 / <10	≥1.5 / <1.5	CATEGORY 1 GROUND SUPPORT (REFER TO DRAWING 40152) ROCKBOLTS WITH 3" x 3" WWF SUPPLEMENT WITH SPOT BOLTING.
0 5.5-10 FAIR	RQD / Jn / Jr / Ja		
	>30 / ≥10	- / -	CATEGORY 1 GROUND SUPPORT (REFER TO DRAWING 40152) ROCKBOLTS WITH 3" x 3" WWF SUPPLEMENT WITH SPOT BOLTING UP TO CATEGORY 2 BOLT DENSITY.
	≤30 / <10	- / -	CATEGORY 3 GROUND SUPPORT (REFER TO DRAWING 40154) CATEGORY 1 ROCKBOLTS SUPPLEMENT WITH SPOT BOLTING UP TO CATEGORY 2 BOLT DENSITY. OMIT INSTALLATION OF 3" x 3" WWF. APPLY 50-75 SHOTCRETE WITH 100-150 IN LOCALIZED SPALLING & FALLOUT AREAS
0 4.0-5.5 FAIR	RQD / Jn / Jr / Ja		
	>5 / >5	- / -	CATEGORY 1 GROUND SUPPORT (REFER TO DRAWING 40152) ROCKBOLTS AND 3" x 3" WWF. SUPPLEMENT WITH SPOT BOLTING UP TO CATEGORY 2 BOLT DENSITY
	≤5 / ≤5	- / -	CATEGORY 3 GROUND SUPPORT (REFER TO DRAWING 40154) CATEGORY 1 ROCKBOLTS. SUPPLEMENT WITH SPOT BOLTING UP TO CATEGORY 2 BOLT DENSITY. OMIT INSTALLATION OF 3" x 3" WWF. APPLY 50-75 SHOTCRETE WITH 100-150 IN LOCALIZED SPALLING & FALLOUT AREAS
0 1.0-4.0 POOR	RQD / Jn / Jr / Ja		
	>10 / <30	>1.0 / >1.0	CATEGORY 2 GROUND SUPPORT (REFER TO DRAWING 40153) CATEGORY 2 ROCKBOLTS AND 3" x 3" WWF
	≥10 / ≥30	>1.0 / ≤1.0	CATEGORY 3 GROUND SUPPORT (REFER TO DRAWING 40154) CATEGORY 2 ROCKBOLTS OMIT INSTALLATION OF 3" x 3" WWF. APPLY 50-75 SHOTCRETE WITH 100-150 IN LOCALIZED SPALLING & FALLOUT AREAS
0 0.4-1.0 VERY POOR	RQD / Jn / Jr / Ja		
	- / -	- / -	CATEGORY 3 GROUND SUPPORT (REFER TO DRAWING 40154) CATEGORY 2 ROCKBOLTS OMIT INSTALLATION OF 3"x 3" WWF. APPLY 50-75 SHOTCRETE WITH 100-150 IN LOCALIZED SPALLING & FALLOUT AREAS
0 0.1-0.4 VERY POOR	RQD / Jn / Jr / Ja		
	>4 / ≤4.21.5	- / -	CATEGORY 3 GROUND SUPPORT (REFER TO DRAWING 40154) CATEGORY 2 ROCKBOLTS OMIT INSTALLATION AND 3" x 3" WWF. APPLY 50-75 SHOTCRETE WITH 100-150 IN LOCALIZED SPALLING & FALLOUT AREAS
	<1.5 / -	- / -	CATEGORY 4 (REFER TO DRAWING 40155) INSTALL STEEL SETS AT 1220 OC WITH PARTIAL LAGGING.
0 0.08-0.1 EXTREMELY POOR (PRE-RAINIER MESA BOW RIDGE)	RQD / Jn / Jr / Ja		
	>5 / >2	>0.25 / >0.25	CATEGORY 3 GROUND SUPPORT (REFER TO DRAWING 40154) CATEGORY 2 ROCKBOLTS OMIT THE INSTALLATION OF PINS AND 3" x 3" WWF. APPLY 50-75 SHOTCRETE WITH 100-150 IN LOCALIZED SPALLING & FALLOUT AREAS.
	<2 / -	>0.25 / ≤0.25	CATEGORY 5 (REFER TO DRAWING 40156) INSTALL STEEL SETS AT 610-1220 OC WITH FULL LAGGING.

NOTES:

1. THE ESF NORTH RAMP GROUND SUPPORT GUIDELINES ARE ESTIMATES BASED UPON PROJECTED INFORMATION AND APPLY TO THE EXPECTED "NORMAL" CONDITIONS. THE DECISION ON SUPPORT CATEGORY INSTALLED SHALL BE BASED UPON OBSERVATION OF ACTUAL CONDITIONS, INCLUDING LOCAL "OFF NORMAL" OR "ANOMALOUS CONDITIONS", AND MAY VARY FROM THE SUPPORT GUIDELINES. SEE SPEC SECTION 01501.
2. ELEVATION ILLUSTRATING CONSTRUCTION IS FOR GENERAL INFORMATION ONLY SEE OTHER DRAWINGS FOR INDIVIDUAL GROUND SUPPORT CATEGORIES AND DETAILS. ACTUAL CONSTRUCTION SEQUENCE MAY BE ADJUSTED, AS APPROVED TO MEET FIELD CONDITIONS.

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FOR DRAWING INDEX SEE DRAWING 39002

TBV-193 SEISMIC DESIGN VALUES NEED TO BE VERIFIED
TBV-011 RMR VALUES NEED TO BE VERIFIED
TBV-192 100 YEAR MAINTAINABLE LIFE NEEDS TO BE VERIFIED
TBD-147 THERMALLY INDUCED STRESSES HAVE YET TO BE DETERMINED

DESIGN INPUTS
SEE DRAWING INPUTS LIST

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DESIGNATION: J W KEIFER	JWK 7-11-94
CHECKED: R SKORSETH	RSS FOR 7-11-94
VERIFICATION: S BAILEY	SDB 7-18-94
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U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
GROUND SUPPORT MASTER
ELEVATION AND SECTIONS

SIZE	DOCUMENT IDENTIFIER	CI IDENTIFIER	DRAWING NO.	REV
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SCALE	QA CLASSIFICATION	S.D.D.	CAD FILE
NOTED	QA-1, QA-3	1.2.6	MINE:40151.DGN

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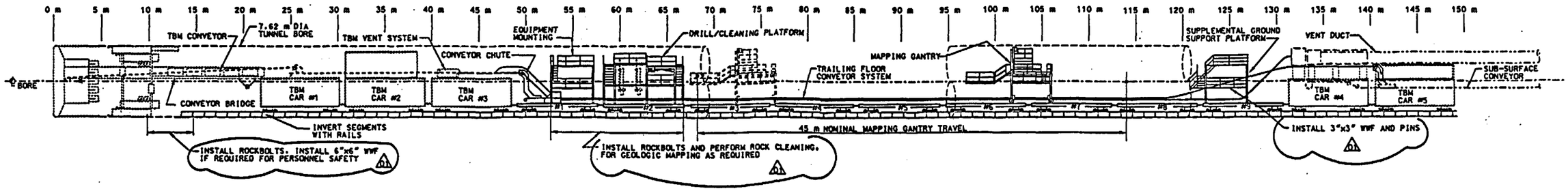
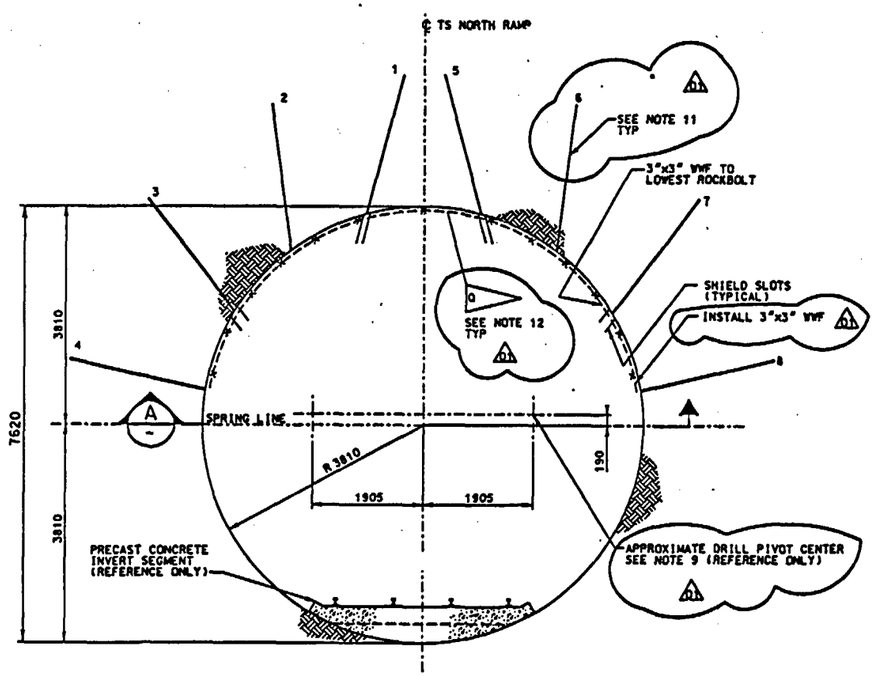


ELEVATION

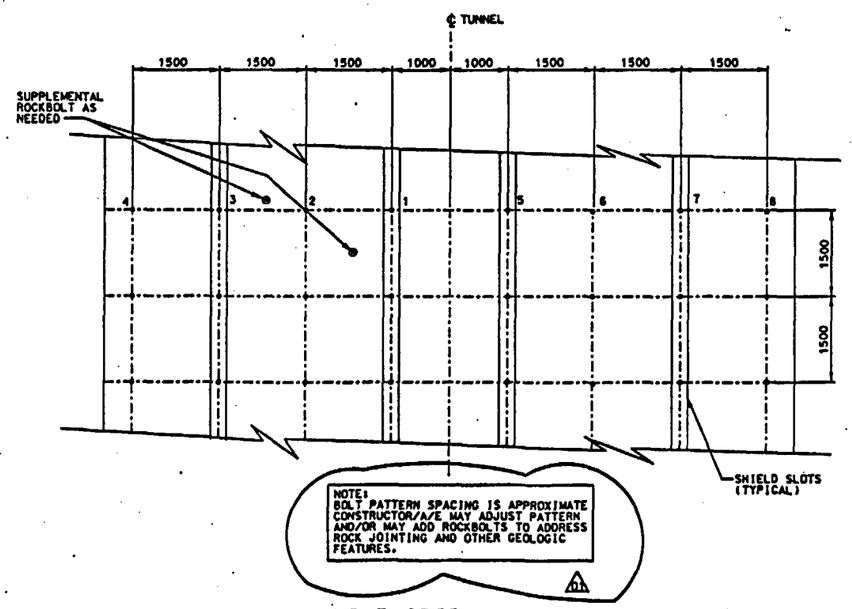
SCALE: NONE
(FOR REFERENCE ONLY)

ANSTEC
APERTURE
CARD



TYPICAL TUNNEL CROSS SECTION-CATEGORY 1. GROUND SUPPORT

SCALE : 1:50



DEVELOPED SECTION (A)

SCALE: 1:50

9501130285-16

GRAPHIC SCALE

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1:50

ALL DIMENSIONS SHOWN ARE NOMINAL UNLESS OTHERWISE NOTED

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE NOTED

DOE/YMP ACCEPTANCE FOR CONSTRUCTION

By _____ Date 10/13/94

NOTES:

1. INSTALL NOMINAL 3000 LENGTH ROCKBOLTS ON PATTERN AS SHOWN ON DEVELOPED SECTION A.
2. INSTALL ROCKBOLTS 1,2,3,5,6 & 7 WITH TBM ROCK DRILLS. ROCKBOLTS 1,3,5 & 7 MAY BE INSTALLED THROUGH OR BEHIND TBM TAIL SHIELD. ROCKBOLTS 2 & 6 REQUIRE INSTALLATION BEHIND TAIL SHIELD.
3. ROCKBOLTS 4 & 8 AND SUPPLEMENTAL ROCKBOLTS REQUIRE INSTALLATION AT DRILL/CLEANING PLATFORM.
4. CONSTRUCTOR MAY INSTALL 6" X 6" WWF AT TBM TAIL SHIELD IF REQUIRED FOR PERSONNEL SAFETY.
5. INSTALL SUPPLEMENTAL ROCKBOLT. WHERE GEOLOGICAL FEATURES ARE IDENTIFIED AS REQUIRING ADDITIONAL SUPPORT.
6. LOAD TEST ROCK BOLTS PER SPEC SECTION 02165
7. INSTALL 3" X 3" WWF WITH PINS AT SUPPLEMENTAL GROUND SUPPORT PLATFORM.
8. THE ROCKBOLT PATTERN LOCATIONS ARE NOMINAL AND MAY BE ADJUSTED OR SUPPLEMENTED BY THE CONSTRUCTOR IN THE FIELD. WHERE PRACTICAL. TO ADDRESS ROCK JOINTING AND OTHER GEOLOGICAL FEATURES. MINIMUM ROCKBOLT DENSITY SHALL BE 8 ROCKBOLTS PER 1500 OF TUNNEL LENGTH.
9. AS-BUILT POSITION OF DRILL PIVOT CENTER ON TBM MAY DIFFER. REQUIRING MINOR ADJUSTMENTS TO BOLT ORIENTATION AND SPACING TO FACILITATE HOLE DRILLING.
10. ELEVATION ILLUSTRATING CONSTRUCTION IS FOR GENERAL INFORMATION ONLY. ACTUAL CONSTRUCTION SEQUENCE MAY BE ADJUSTED. IF A/E APPROVED. TO MEET FIELD CONDITIONS.
11. IN ACCORDANCE WITH SPEC SECTION 02165. THE SUPER SWELLEX ROCKBOLT SYSTEM MAY BE USED IN PLACE OF THE GROUTED ROCKBOLTS WHERE GROUND CONDITIONS OR TEST INTERFERENCE REQUIREMENTS PRECLUDE THE USE OF THE GROUTED ROCKBOLTS. (SEE NOTE 12)
12. SUPER SWELLEX ROCKBOLTS, WWF AND PINS ARE SUBJECT TO Q CONTROL PER SPEC. SECTION 02165. BUT ARE NOT CLASSIFIED AS QA-1 OR QA-5.

TBV-193 SEISMIC DESIGN VALUES NEED TO BE VERIFIED
TBV-011 RMR VALUES NEED TO BE VERIFIED
TBV-192 100 YEAR MAINTAINABLE LIFE NEEDS TO BE VERIFIED
TBD-147 THERMALLY INDUCED STRESSES HAVE YET TO BE DETERMINED

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CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

REV	DESCRIPTION	DATE	DRN	CHK	CAL	VER	L.A.				
01	ISSUED FOR CONSTRUCTION	11-11-94									
00	APPROVED BUT NOT ISSUED	7-27-94	JMH	JWK	RSS	SDB	JMT	JWW	JLN		

APPROVALS	INITIAL/DATE
DRAWN: J M HERRERA	JMH 7-11-94
DESIGNED: J W KEIFER	JWK 7-11-94
CHECKED: R SKORSETH	RSS FOR 7-11-94
VERIFICATION: S BAILEY	SDB 7-18-94
LEAD DESIGN CHECKER: J TAIPALE	JMT 7-11-94
QUALITY ASSURANCE: J WILLIS	JWW 7-19-94
DEPARTMENT MANAGER: J NAAF	JLN 7-27-94

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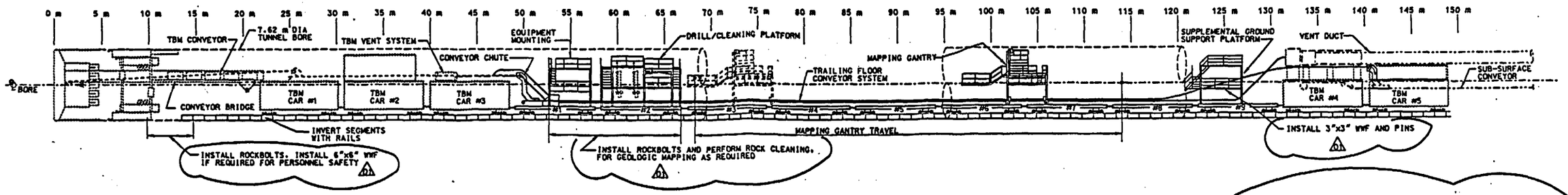
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
GROUND SUPPORT CATEGORY 1
ELEVATION AND SECTION

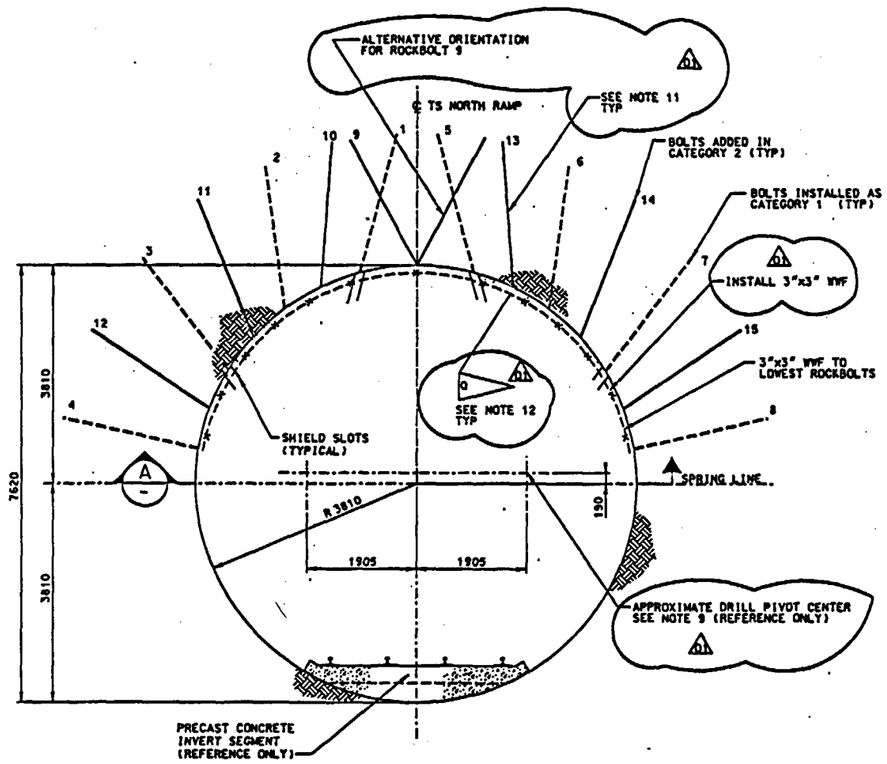
SIZE D | DOCUMENT IDENTIFIER: BABEAB000-01717-2100-40152-01 | REV 01
SCALE NOTED | QA CLASSIFICATION QA-1 OR QA-5 SEE NOTE 12 | U.O.M.: 1.2.6 | CAD FILE MINE:40152.DGN

01-OCT-1994 10:06

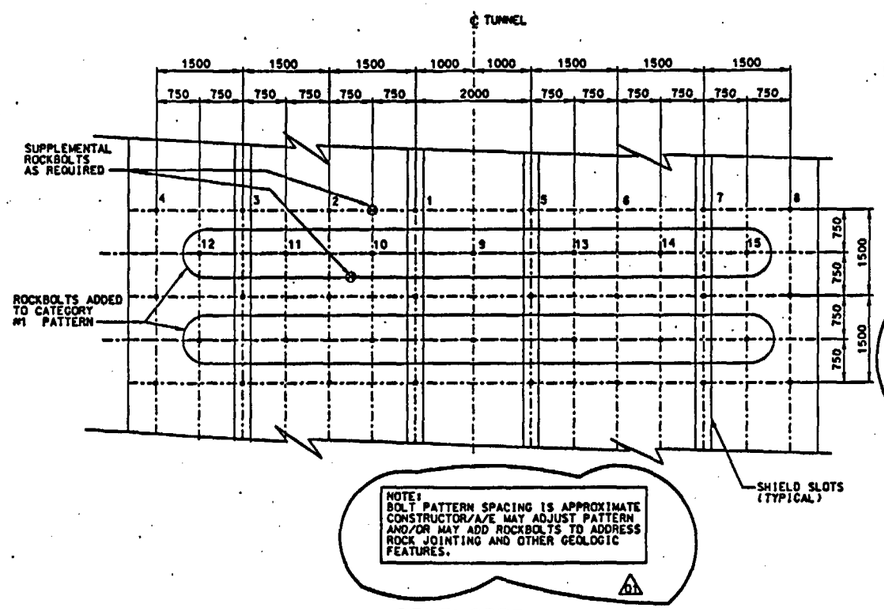


ELEVATION
SCALE: NONE
(FOR REFERENCE ONLY)

ANSTEC APERTURE CARD



TYPICAL TUNNEL CROSS SECTION-CATEGORY 2. GROUND SUPPORT
SCALE: 1:50



DEVELOPED SECTION (A)
SCALE: 1:50

NOTES:

1. INSTALL NOMINAL 3000 LENGTH ROCKBOLTS ON PATTERN AS SHOWN ON DEVELOPED SECTION A.
2. INSTALL ROCKBOLTS 1,2,3,5,6,7,9,10,11,13& 14 WITH TBM ROCK DRILLS. ROCKBOLTS 1,3,5 & 7 MAY BE INSTALLED THROUGH OR BEHIND TBM TAIL SHIELD. ROCKBOLTS 2,6,10,11,13&14 REQUIRE INSTALLATION BEHIND TAIL SHIELD. ROCKBOLT 9 MAY BE DEFERRED TO DRILLING/CLEANING PLATFORM IF TBM DRILL ORIENTATION LIMITS PRECLUDE INSTALLATION.
3. ROCKBOLTS 4,8,9,12 & 15 AND SUPPLEMENTAL ROCKBOLTS REQUIRE INSTALLATION AT DRILL/CLEANING PLATFORM. ROCKBOLT 9 MAY BE INSTALLED VERTICALLY OR ORIENTED TO EITHER SIDE WITHIN THE PRACTICAL LIMITS OF THE DRILLING EQUIPMENT.
4. CONSTRUCTOR MAY INSTALL 6" X 6" WWF AT TBM TAIL SHIELD IF REQUIRED FOR PERSONNEL SAFETY.
5. INSTALL SUPPLEMENTAL ROCKBOLT, WHERE GEOLOGICAL FEATURES ARE IDENTIFIED AS REQUIRING ADDITIONAL SUPPORT.
6. LOAD TEST ROCKBOLTS PER SPEC SECTION 02165
7. INSTALL 3" X 3" WWF WITH PINS AT SUPPLEMENTAL GROUND SUPPORT PLATFORM.
8. THE ROCKBOLT PATTERN LOCATIONS ARE NOMINAL AND MAY BE ADJUSTED OR SUPPLEMENTED BY THE CONSTRUCTOR IN THE FIELD. WHERE PRACTICAL, TO ADDRESS ROCK JOINTING AND OTHER GEOLOGICAL FEATURES. MINIMUM ROCKBOLT DENSITY SHALL BE 15 ROCKBOLTS PER 1500 OF TUNNEL LENGTH.
9. AS-BUILT POSITION OF DRILL PIVOT CENTER ON TBM MAY DIFFER. REQUIRING MINOR ADJUSTMENTS TO BOLT ORIENTATION AND SPACING TO FACILITATE HOLE DRILLING.
10. ELEVATION ILLUSTRATING CONSTRUCTION IS FOR GENERAL INFORMATION ONLY. ACTUAL CONSTRUCTION SEQUENCE MAY BE ADJUSTED. IF A/E APPROVED. TO MEET FIELD CONDITIONS.
11. IN ACCORDANCE WITH SPEC SECTION 02165. THE SUPER SWELLEX ROCKBOLT SYSTEM MAY BE USE IN PLACE OF THE GROUTED ROCKBOLTS WHERE THE GROUND CONDITIONS OR TEST INTERFERENCE REQUIREMENT PRECLUDE THE USE OF THE GROUTED ROCKBOLTS. (SEE NOTE 12)
12. SUPER SWELLEX ROCKBOLTS, WWF AND PINS ARE SUBJECT TO Q CONTROL PER SPEC. SECTION 02165. BUT ARE NOT CLASSIFIED AS QA-1 OR QA-5.

TBV-193 SEISMIC DESIGN VALUES NEED TO BE VERIFIED
TBV-011 RWR VALUES NEED TO BE VERIFIED
TBV-192 100 YEAR MAINTAINABLE LIFE NEEDS TO BE VERIFIED
TBD-147 THERMALLY INDUCED STRESSES HAVE YET TO BE DETERMINED

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CHANGE DOCUMENT	POSTED BY	DATE	STATUS

GRAPHIC SCALE
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1:50

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DOE/TMP ACCEPTANCE FOR CONSTRUCTION
By _____ Date 10/12/94

REV	DESCRIPTION	DATE	DRN	CHK	ENG	PER	L.S.E.	S.E.	S.M.
01	ISSUED FOR CONSTRUCTION	12-11-94	GP	JLA	JB	JLS	RSS	JWV	JLN
00	APPROVED BUT NOT ISSUED	7-27-94	JMH	JVK	RSS	SDB	JMT	JWV	JLN

APPROVALS	INITIAL/DATE
DRAWN J M HERRERA	JMH 7-11-94
DESIGNER J W KEIFER	JVK 7-11-94
CHECKED R SKORSETH	RSS FOR 7-11-94
VERIFICATION S BAILEY	SDB 7-18-94
LEAD DESIGN ENGINEER J TAIPALE	JMT 7-11-94
QUALITY ASSURANCE J WILLIS	JWV 7-19-94
DEPARTMENT MANAGER J NAAF	JLN 7-27-94

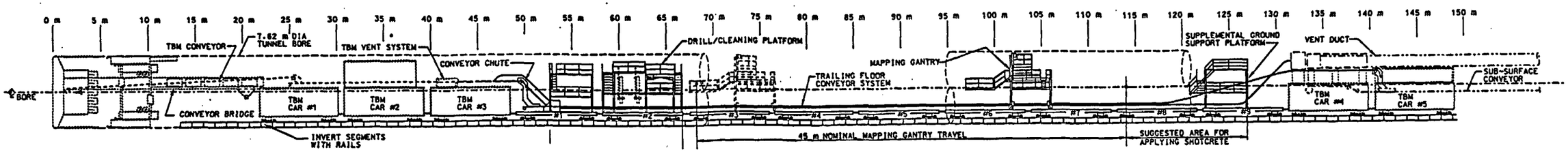
U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
GROUND SUPPORT CATEGORY 2
ELEVATION AND SECTION

SIZE D | DOCUMENT IDENTIFIER: BABEA8000-01717-2100-40153-01 | REV

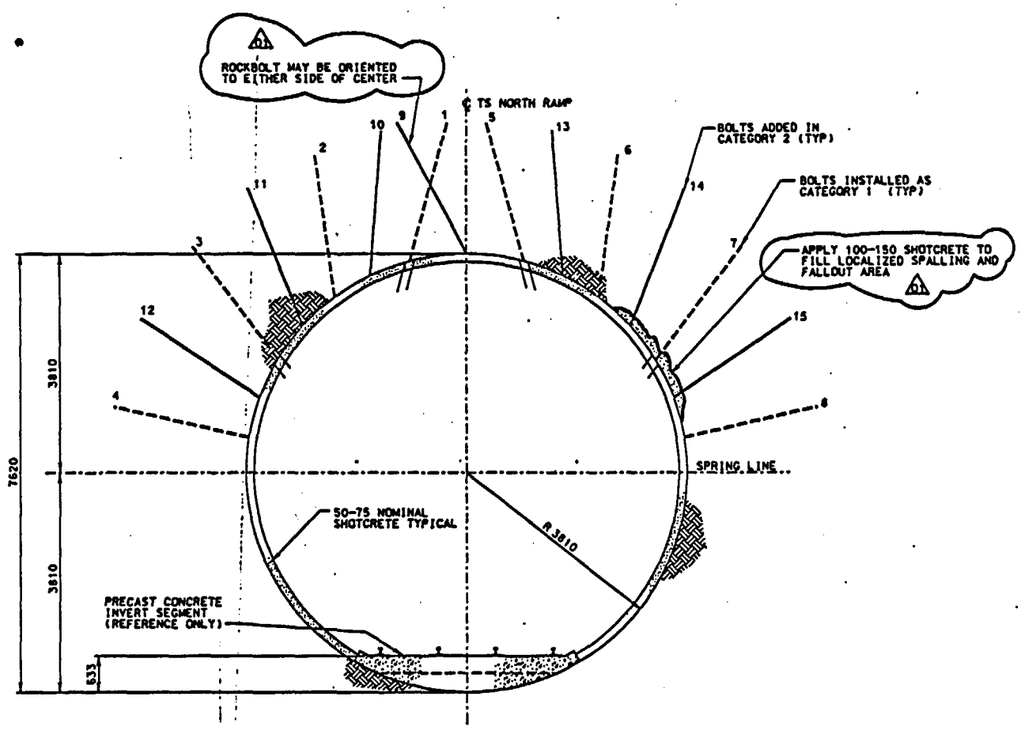
SCALE NOTED | QA: QA-1 OR QA-5 SEE NOTE 12 | F.S.F.: 1.2.6 | CAD FILE MINE:40153.DGN

11-OCT-1994 11:02



ELEVATION

SCALE: NONE
(FOR REFERENCE ONLY)



TYPICAL TUNNEL CROSS SECTION-CATEGORY 3. GROUND SUPPORT

SCALE: 1:50

ANSTEC APERTURE CARD

NOTES:

1. SUPPLEMENT GROUND SUPPORT CATEGORY 1 AND CATEGORY 2 WITH 50-75 NOMINAL SHOTCRETE OVER ROCKBOLTS AND 6"x6" WWF IF INSTALLED. REMOVE 6" x 6" WWF AND SPALLED ROCK BEHIND WWF TO FACILITATE SHOTCRETE APPLICATION IF NECESSARY.
2. APPLY SHOTCRETE TO ENTIRE PROFILE OF TUNNEL AND IN FIRM CONTACT WITH CURB ON INVERT SEGMENT.
3. PATTERN BOLT INSTALLATION SHALL BE CONSISTENT WITH DWG 40151, 40152 AND 40153.
4. ELEVATION ILLUSTRATING CONSTRUCTION IS FOR GENERAL INFORMATION ONLY. ACTUAL CONSTRUCTION SEQUENCE MAY BE ADJUSTED, IF APPROVED, TO MEET FIELD CONDITIONS.

TBV-193 SEISMIC DESIGN VALUES NEED TO BE VERIFIED
TBV-011 RMR VALUES NEED TO BE VERIFIED
TBV-192 100 YEAR MAINTAINABLE LIFE NEEDS TO BE VERIFIED
TBD-147 THERMALLY INDUCED STRESSES HAVE YET TO BE DETERMINED

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GRAPHIC SCALE
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1:50

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By _____ Date 10/12/94

REV	DESCRIPTION	DATE	DRW	CHK	ENG	PCA	L.D.E.	D.A.	S.N.
01	ISSUED FOR CONSTRUCTION	10-11-94	BE	CK	DB		JMT	JSW	JLN
00	APPROVED BUT NOT ISSUED	7-27-94	JMH	JWK	JJC	DB	JMT	JSW	JLN

APPROVALS	INITIAL/DATE
DRAWN: J M HERRERA	JMH 7-12-94
DESIGNATOR: J W KEIFER	JWK 7-12-94
CHECKED: R SKORSETH	JJC FOR 7-12-94
VERIFICATION: S BAILEY	SDB 7-18-94
LEAD DESIGN ENGINEER: J TAIPALE	JMT 7-12-94
QUALITY ASSURANCE: J WILLIS	JSW 7-19-94
DEPARTMENT MANAGER: J NAAF	JLN 7-27-94

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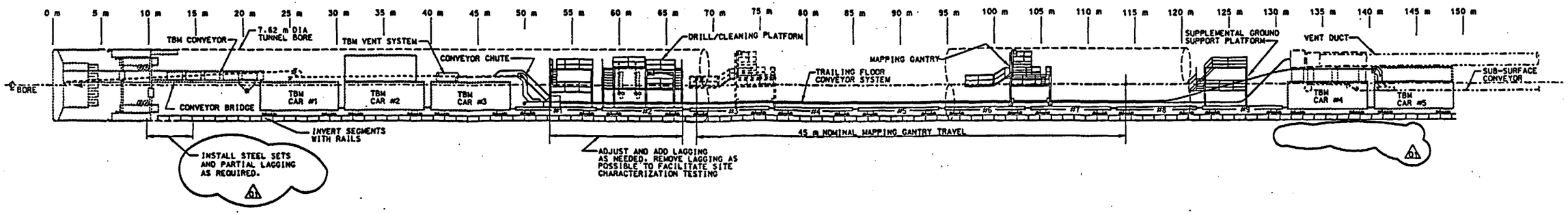
EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
GROUND SUPPORT CATEGORY 3
ELEVATION AND SECTION

SIZE	DOCUMENT IDENTIFIER	CI IDENTIFIER	DRAWING NO.	REV
D		BABEA8000-	01717-2100-40154	01

SCALE	QA CLASSIFICATION	S.B.S.	CAD FILE
NOTED	QA-1, QA-3	1.2.6	MINE:40154.DGN

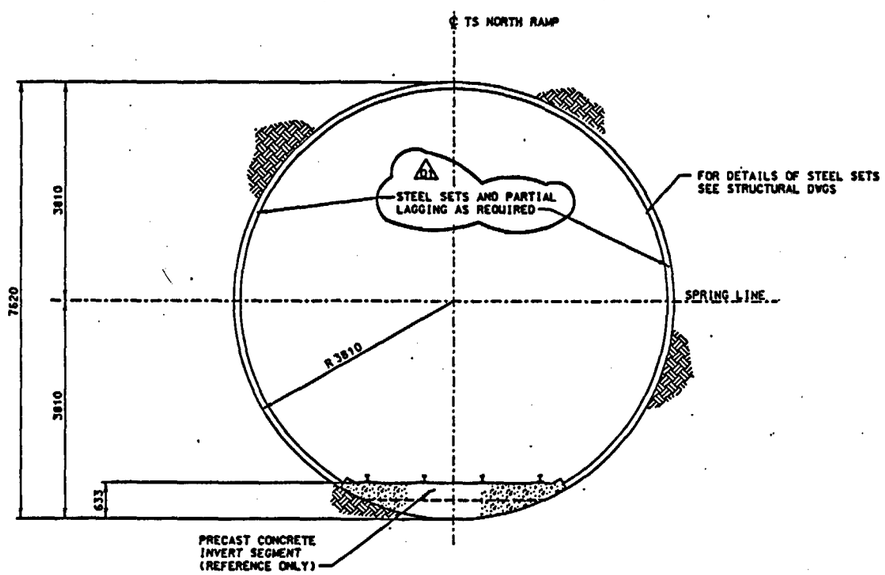


ELEVATION

SCALE: NONE
(FOR REFERENCE ONLY)

NOTES:

1. INSTALL STEEL SETS AT REAR TBM SHIELD AT NOMINAL 1220 OC.
2. LAG PROFILE TO PROVIDE GROUND SUPPORT AS REQUIRED.
3. ADJUST OR PARTIALLY REMOVE STEEL LAGGING AS POSSIBLE TO FACILITATE SITE CHARACTERIZATION TESTING.
4. REINSTALL ANY LAGGING REMOVED AT CONCLUSION OF TESTING.
5. ELEVATION ILLUSTRATING CONSTRUCTION IS FOR GENERAL INFORMATION ONLY. ACTUAL CONSTRUCTION SEQUENCE MAY BE ADJUSTED, IF APPROVED BY A/E, TO MEET FIELD CONDITIONS.



TYPICAL TUNNEL CROSS SECTION-CATEGORY 4. GROUND SUPPORT

SCALE: 1:50

ANSTEC APERTURE CARD

TBV-193 SEISMIC DESIGN VALUES NEED TO BE VERIFIED
TBV-011 RMR VALUES NEED TO BE VERIFIED
TBV-192 100 YEAR MAINTAINABLE LIFE NEEDS TO BE VERIFIED
TBD-147 THERMALLY INDUCED STRESSES HAVE YET TO BE DETERMINED

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ALL DIMENSIONS SHOWN ARE NOMINAL UNLESS OTHERWISE NOTED

GRAPHIC SCALE
0 1000 2000 3000 4000 mm
1:50

DOE/YMP ACCEPTANCE FOR CONSTRUCTION
By _____ Date 10/17/94

REV	DESCRIPTION	DATE	DRN	CHK	CHK	VER	L.E.D.	D.A.	D.E.
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00	APPROVED BUT NOT ISSUED	7-27-94	JMH	JWK	JJC	SDB	JMT	JWW	JLN

APPROVALS	INITIALS/DATE
DRAWN J M HERRERA	JMH 7-12-94
DESIGNED J W KEIFER	JWK 7-12-94
CHECKED R SKORSETH	JJC FOR 7-12-94
VERIFICATION S BAILEY	SDB 7-18-94
LEAD DESIGN ENGINEER J TAIPALE	JMT 7-12-94
FACILITY ENGINEER J WILLIS	JWW 7-13-94
DEPARTMENT MANAGER J NAAF	JLN 7-27-94

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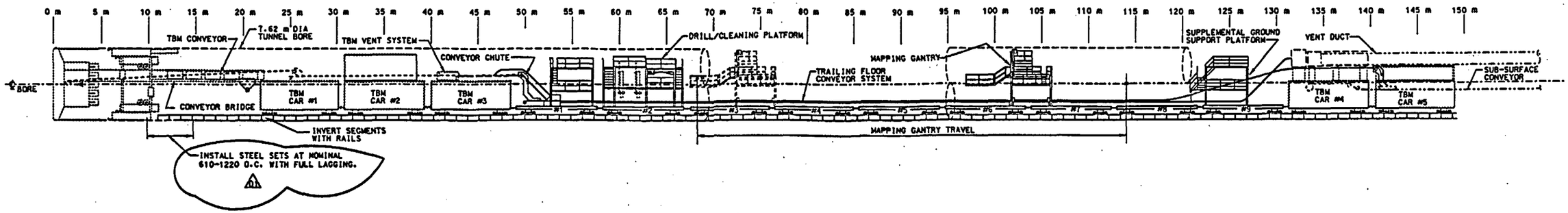
EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
GROUND SUPPORT CATEGORY 4
ELEVATION AND SECTION

SIZE D | DOCUMENT IDENTIFIER: BABEA8000-01717-2100-40155-01 | REV 1
SCALE NOTED | SYS. CLASSIFICATION OA-1, OA-5 | D.A.R. 1.2.6 | CAD FILE MINE:40155.DGN

11-OCT-1994 11:00

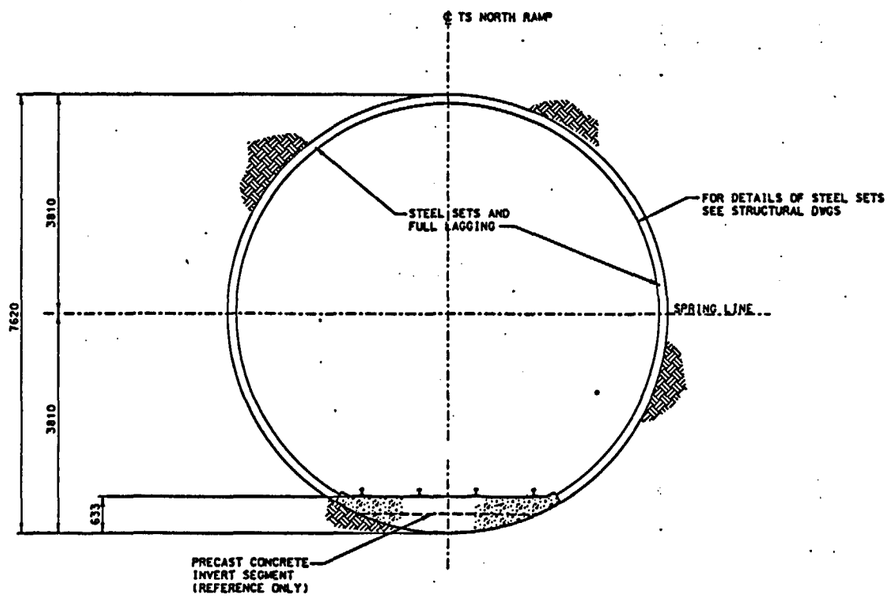


ELEVATION

SCALE: NONE
(FOR REFERENCE ONLY)

NOTES:

01 1. INSTALL STEEL SETS AT NOMINAL 610-1220 OC AT REAR TBM SHIELD.
2. LAG FULL PROFILE OF STEEL SETS TO THE EXTENT PRACTICAL.
3. ELEVATION ILLUSTRATING CONSTRUCTION IS FOR GENERAL INFORMATION ONLY. ACTUAL CONSTRUCTION SEQUENCE MAY BE ADJUSTED. IF APPROVED BY A/E. TO MEET FIELD CONDITIONS.



TYPICAL TUNNEL CROSS SECTION CATEGORY 5. GROUND SUPPORT

SCALE: 1:50

ANSTEC APERTURE CARD

TBV-193 SEISMIC DESIGN VALUES NEED TO BE VERIFIED
TBV-011 RMR VALUES NEED TO BE VERIFIED
TBV-192 100 YEAR MAINTAINABLE LIFE NEEDS TO BE VERIFIED
TBD-147 THERMALLY INDUCED STRESSES HAVE YET TO BE DETERMINED

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CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

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ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE NOTED

DOE/TMP ACCEPTANCE FOR CONSTRUCTION
By _____ Date 10/12/94

REV	DESCRIPTION	DATE	DRN	DNR	DNR	VCR	L.S.E.	S.A.	S.A.
01	ISSUED FOR CONSTRUCTION	11-11-94							
00	APPROVED BUT NOT ISSUED	7-27-94	JMH	JWK	RSS	SDB	JMT	JWW	JLN

APPROVALS	INITIAL/DATE
DRAWN: J M HERRERA	JMH 7-11-94
ORIGINATOR: J W KEIFER	JWK 7-11-94
CHECKED: R SKORSETH	RSS FOR 7-11-94
VERIFICATION: S BAILEY	SDB 7-18-94
LEAD DESIGN ENGINEER: J TAIPALE	JMT 7-12-94
QUALITY ASSURANCE: J WILLIS	JSW 7-19-94
DEPARTMENT MANAGER: J NAAF	JLN 7-27-94

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M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
GROUND SUPPORT CATEGORY 5
ELEVATION AND SECTION

SIZE	CI IDENTIFIER	DRAWING NO.	REV
D	DOCUMENT IDENTIFIER: BABEA8000-01717-2100-40156-01		

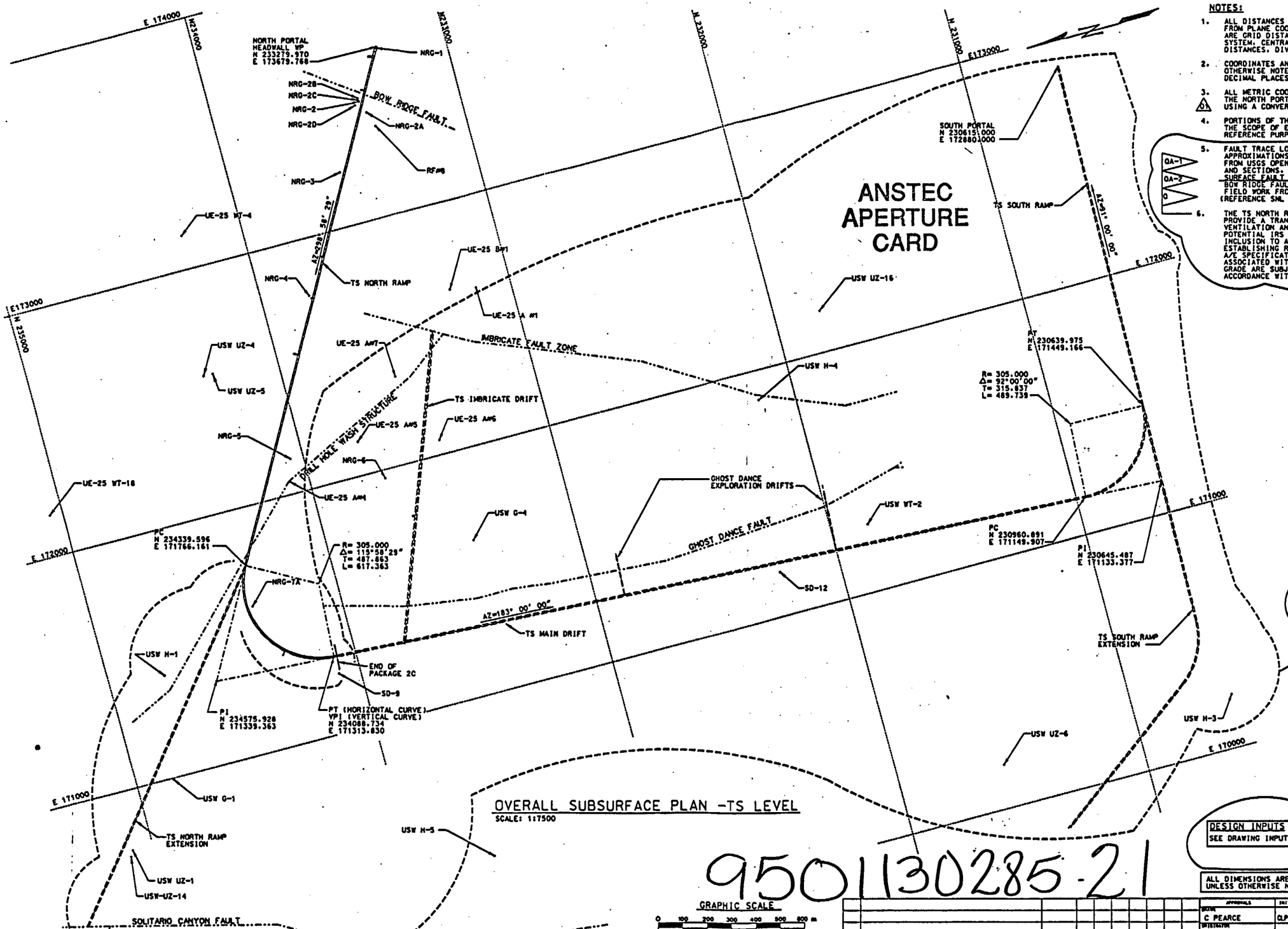
SCALE	QA CLASSIFICATION	V.D.D.	CAD FILE
NOTED	QA-1, QA-5	1.2.6	MINE:40156.DGN

CODE IDENT:

01

pcprcoo /proj/eet_oo/mine/dgn/2c/40156.dgn

11-OCT-1994 10:59



OVERALL SUBSURFACE PLAN -TS LEVEL
SCALE: 1:7500

GRAPHIC SCALE
0 100 200 300 400 500 600 m
1:7500

NOTES:

1. ALL DISTANCES SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
2. COORDINATES AND DIMENSIONS ARE SHOWN IN METERS, UNLESS OTHERWISE NOTED. METRIC VALUES ARE ROUNDED TO THREE DECIMAL PLACES.
3. ALL METRIC COORDINATES ARE BASED ON AN INITIAL CONVERSION OF THE NORTH PORTAL COORDINATES FROM FEET TO METERS, USING A CONVERSION FACTOR OF 0.30480061. 01
4. PORTIONS OF THE LAYOUT SHOWN BY DASHED LINES ARE OUTSIDE THE SCOPE OF ESF DESIGN PACKAGE 2C AND ARE SHOWN FOR REFERENCE PURPOSES ONLY.
5. FAULT TRACE LOCATIONS, EXCEPT FOR THE BOW RIDGE FAULT, ARE APPROXIMATIONS BASED ON AT-DEPTH PROJECTIONS OF INFORMATION FROM USGS OPEN FILE REPORT 84-494, PRELIMINARY GEOLOGIC MAP AND SECTIONS, BY SCOTT AND BONK (SEE BC00000000-01717-0200-00002 REV 00, SURFACE FAULT TRACES PROJECTED TO REPOSITORY HORIZON). THE BOW RIDGE FAULT TRACE IS AN AT-DEPTH PROJECTION BASED ON FIELD WORK FROM ON-GOING ROCK AND SOIL INVESTIGATIONS (REFERENCE SML DWG NO. 88-60-09, REV 5 DATED 4-20-94, TDIF # 303195).
6. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501. 01

QA-1 / QA-2 / Q

BOREHOLE DATA

BOREHOLE	NORTHING	EASTING	GROUND ELEV	DEPTH
NRG-1	233282	173676	1144	46
NRG-2	233405	173482	1157	90
NRG-2A	233386	173432	1152	81
NRG-2B	233406	173497	1159	100
NRG-2C	233408	173489	1159	46
NRG-2D	233424	173472	1156	52
NRG-3	233554	173223	1165	101
NRG-4	233807	172767	1250	221
NRG-5	234053	172142	1252	411
NRG-6	234369	171265	1241	335
NRG-7A	234355	171598	1282	461
RF#8	233365	173368	1155	39
SD-9*	234087	171242	1302	663
SD-12*	232245	171178	1324	610
USW G-1	234849	170993	1325	1829
USW G-4	233418	171628	1270	915
USW H-1	234774	171416	1303	1829
USW H-3	230594	170216	1483	1219
USW H-4	232149	171880	1249	1219
USW H-5	233671	170356	1479	1219
USW UZ-1	235085	170756	1348	387
USW UZ-4	234305	172560	1200	112
USW UZ-5	234267	172558	1204	111
USW UZ-6	231566	170178	1501	575
USW UZ-14*	235096	170731	1349	678
USW UZ-16	231812	172169	1220	514
USW WT-2	231850	171275	1301	628
UE-25 WT-4	234243	173139	1167	482
UE-25 WT-18	235052	172168	1336	623
UE-25 A #1	233142	172624	1139	762
UE-25 A #4	234078	172051	1250	152
UE-25 A #5	233769	172138	1236	148
UE-25 A #6	233447	172060	1235	152
UE-25 A #7	233553	172355	1221	305
UE-25 B #1	233247	172644	1201	1220

NOTE: BOREHOLE DATA IS SHOWN FOR REFERENCE PURPOSES ONLY AND WAS COMPILED FROM BOREHOLE LOGS, FIELD SURVEY REPORTS, AND THE GENISES DATABASE. BOREHOLE COORDINATES CONVERTED FROM FEET TO METERS USING A CONVERSION FACTOR OF 0.30480061. 01

* DENOTES IN-PROGRESS BOREHOLES. (BOREHOLE DATA NOT FINALIZED)

HOLD
HM 94-16.0000-08

RECEIVED
SEP 16 1994
DOCUMENT AND RECORDS CENTER

FIRST SUBMITTAL

FOR DRAWING INDEX SEE DRAWING 39002

NOTICE OF OPEN CHANGE DOCUMENTS
THIS DOCUMENT IS IMPACTED BY THE LISTED CHANGE DOCUMENT AND CANNOT BE USED WITHOUT THEM

CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

DESIGN INPUTS 01
SEE DRAWING INPUTS LIST

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

9501130285-21

DOE/YMP ACCEPTANCE FOR CONSTRUCTION
By _____ Date 15 Sept 94

REV	DESCRIPTION	DATE	DRN	CHK	CHK	MGR	L.D.E.	E.S.	E.N.
01	ISSUED FOR CONSTRUCTION	9-13-94							
00	APPROVED BUT NOT ISSUED	7-7-94	CLP	WRK	CRG	N/A	JNT	FCA	JLN

APPROVALS	INITIAL/DATE
DRAWN: C PEARCE	CLP 7-7-94
DESIGNED: W KENNEDY	WRK 7-7-94
CHECKED: C GARRETT	CRG 7-7-94
VERIFICATION: N/A	
LEAD DESIGN ENGINEER: J TAIPALE	JNT 7-7-94
QUALITY ASSURANCE: J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER: J NAAF	JLN 7-7-94

U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
OVERALL SUBSURFACE LAYOUT
TS LEVEL
PLAN

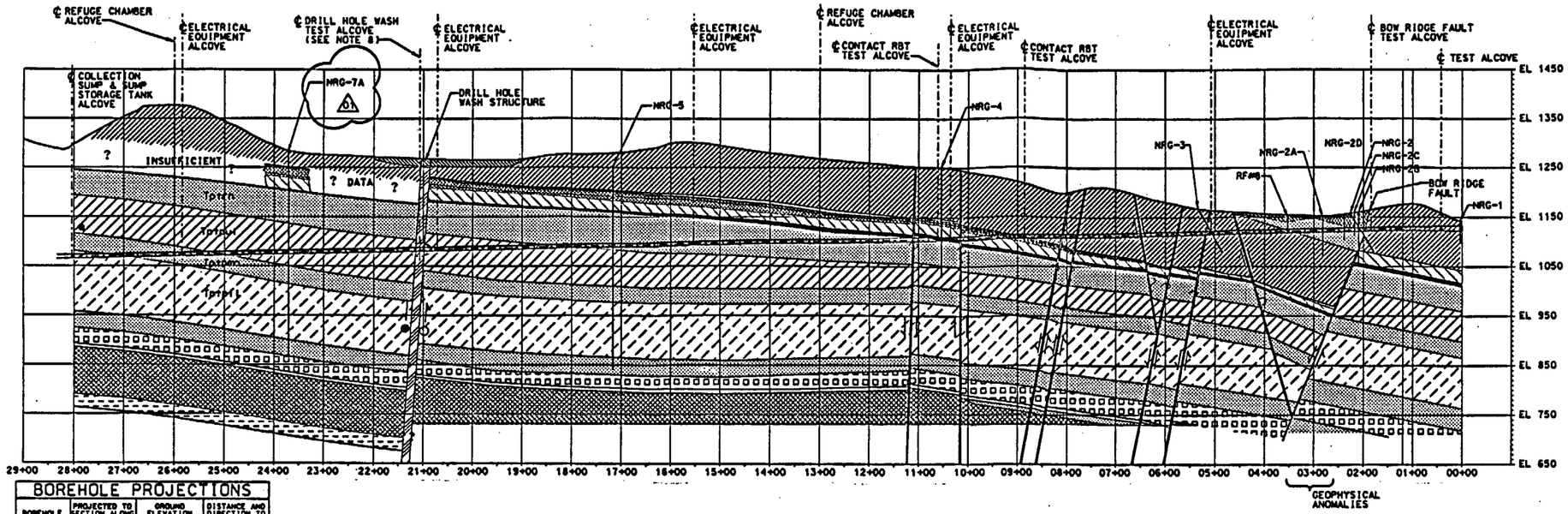
SIZE	DOCUMENT IDENTIFIER	DRAWING NO.	REV
D	BABEAD000-01717-2100-40100-01		

SCALE: NOTED | QA CLASSIFICATION: QA-1, QA-2, SEE NOTE 6 | S.D.S.: 1.2.6 | CAD FILE: MINE:40100.DGN

CADD CODE:

12-SEP-1994 18:49

DOCUMENT IDENTIFIER BABEAD000-01717-2100-40104-01

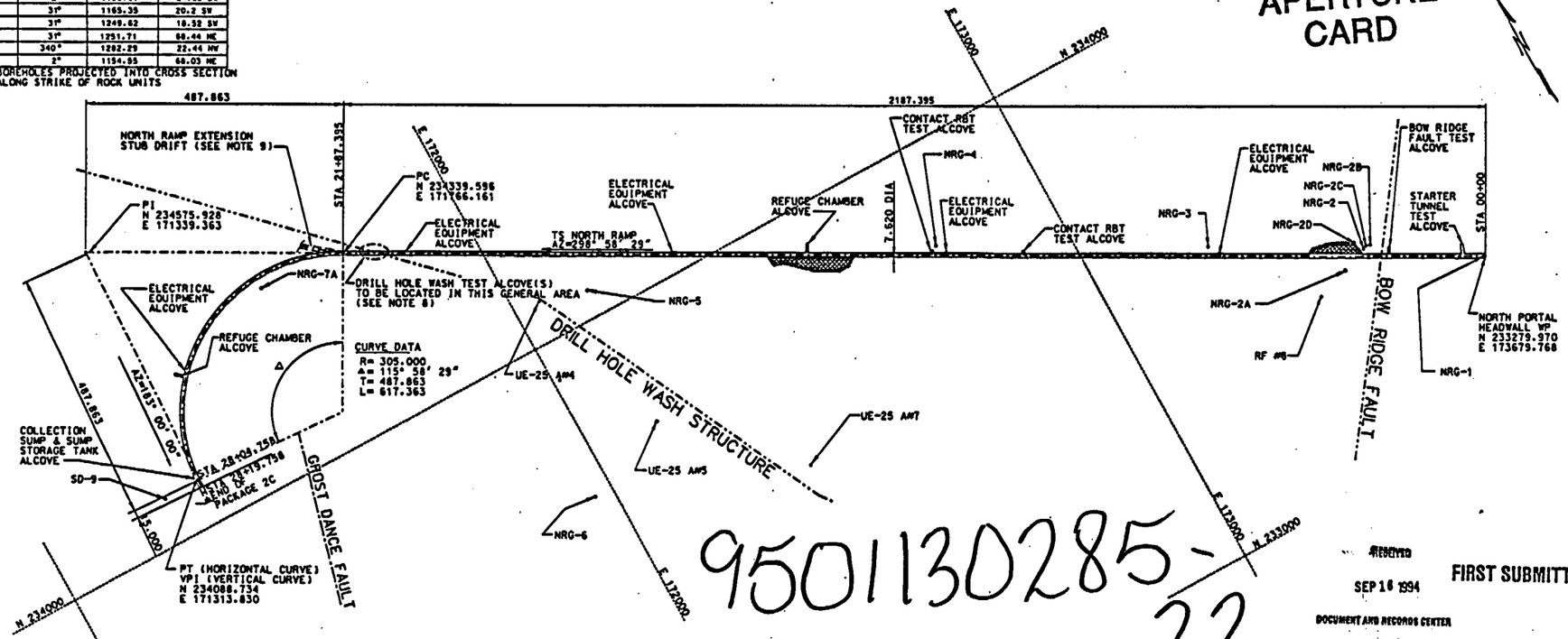


PROFILE OF TS NORTH RAMP

SCALE: 1:5000

BOREHOLE	PROJECTED TO SECTION ALONG AZIMUTH	GROUND ELEVATION (m)	DISTANCE AND DIRECTION TO SECTION (m)
NRG-1	2°	1144.05	0.0
NRG-2	2°	1157.23	15.2 SW
NRG-2A	2°	1152.31	30.85 NE
NRG-2B	2°	1158.67	24.05 SW
NRG-3	31°	1165.35	20.2 SW
NRG-4	31°	1249.62	18.52 SW
NRG-5	31°	1251.71	68.44 NE
NRG-7A	340°	1282.29	22.44 NW
RF#8	2°	1154.95	68.03 NE

NOTE: BOREHOLES PROJECTED INTO CROSS SECTION ALONG STRIKE OF ROCK UNITS



TS NORTH RAMP PLAN

SCALE: 1:5000

LEGEND

FORMATION	MEMBER	MAJOR ZONES	THERMO-MECHANICAL UNITS
QUATERNARY		Qoc: ALLUVIUM	
TIMBER MOUNTAIN TUFF	RAINIER MESA	Tmr: RAINIER MESA TUFF Tmbt1: PRE-RAINIER MESA TUFF BEDDED TUFF	UO
	?	Tpbt5: PRE-TUFF UNIT "X" BEDDED TUFF	
PAINTBRUSH TUFF	TIVA CANYON	Tpc: TIVA CANYON TUFF Tpbt4: PRE-TIVA CANYON TUFF BEDDED TUFF	TCw
	YUCCA MTN.	Tpy: YUCCA MOUNTAIN TUFF Tpbt3: PRE-YUCCA MOUNTAIN TUFF BEDDED TUFF	PTn
	PAH CANYON	Tpp: PAH CANYON TUFF Tpbt2: PRE-PAH CANYON TUFF BEDDED TUFF	TSw1
	TOPOPAH SPRING	Tptrn: CRYSTAL-RICH NONLITHOPHYSAL CRYSTAL-RICH VITRIC ZONE Tptpul: UPPER LITHOPHYSAL CRYSTAL-RICH AND CRYSTAL-POOR PARTS Tptpmn: MIDDLE NONLITHOPHYSAL CRYSTAL-POOR	TSw2
		Tptpll: LOWER LITHOPHYSAL CRYSTAL-POOR Tptpln: LOWER NONLITHOPHYSAL CRYSTAL-POOR	TSw3
		Tptpv1: VITRIC VITROPHYRE AND NON WELDED SUBZONES Tpbt1: PRE-TOPOPAH SPRING TUFF BEDDED TUFF	CHn1
	CALICO HILLS	Tcof: CALICO HILLS LAVA FLOW	CHn2
		Tcob: CALICO HILLS BEDDED TUFF	CHn3
CRATER FLAT TUFF	PROW PASS	Tcp: PROW PASS TUFF	PPw

STRATIGRAPHIC NOMENCLATURE IN DEVELOPMENT BY USGS

- DRILL HOLE WASH FAULT ZONE, LOCATION AND ATTITUDE UNCERTAIN
- FAULT, ?-ATTITUDE UNCERTAIN
- NORTH RAMP ALIGNMENT
- APPROXIMATE
- STRIKE-SLIP SEPARATION INTO PAGE
- STRIKE-SLIP SEPARATION OUT OF PAGE

NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
2. COORDINATES, ELEVATIONS, DIMENSIONS, AND STATIONING ARE SHOWN IN METERS, UNLESS OTHERWISE NOTED. METRIC VALUES ARE ROUNDED TO THREE DECIMAL PLACES. WHERE DISCREPANCIES BETWEEN ELEVATIONS & GRADIENTS OCCUR DUE TO ROUNDING, ELEVATIONS WILL GOVERN.
3. 01 ALL METRIC COORDINATES ARE BASED ON AN INITIAL CONVERSION OF THE NORTH PORTAL COORDINATES FROM FEET TO METERS, USING A CONVERSION FACTOR OF 0.30480061.
4. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
5. 01 GEOLOGIC AND STRUCTURAL INFORMATION IS SHOWN ON THE NORTH RAMP PROFILE FOR REFERENCE PURPOSES ONLY AND IS BASED ON FIELD WORK FROM ON-GOING ROCK AND SOIL INVESTIGATIONS (REFERENCE SNL DWG NO. 88-60-09, REV 5 DATED 4-20-94, TDIF #303195).
6. 01 FAULT TRACE LOCATIONS SHOWN ON NORTH RAMP PLAN, EXCEPT FOR THE BOW RIDGE FAULT, ARE APPROXIMATIONS BASED ON AT-DEPTH PROJECTIONS OF INFORMATION FROM USGS OPEN FILE REPORT 84-494, PRELIMINARY GEOLOGIC MAP AND SECTIONS, BY SCOTT AND BONK (SEE BC00000000-01717-0200-00002 REV 00, SURFACE FAULT TRACES PROJECTED TO REPOSITORY HORIZON). THE BOW RIDGE FAULT TRACE IS AN AT-DEPTH PROJECTION BASED ON FIELD WORK FROM ON-GOING ROCK AND SOIL INVESTIGATIONS (REFERENCE SNL DWG NO. 88-60-09, REV 5, DATED 4-20-94 TDIF # 303195).
7. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
8. CONFIGURATION OF THE DRILL HOLE WASH TEST ALCOVE(S) WILL BE DETERMINED AFTER THE ALCOVE IS LOCATED. FINAL LOCATION WILL BE BASED ON GEOHYDROLOGIC DATA OBTAINED DURING RAMP CONSTRUCTION.
9. THE NORTH RAMP EXTENSION STUB DRIFT WILL PROVIDE AN AREA TO ASSEMBLE/LAUNCH A TBM. THE ACTUAL LOCATION IS DEPENDENT ON GROUND CONDITIONS AND WILL BE FIELD DETERMINED. THE STUB DRIFT WILL BE DESIGNED ONCE THE DRIFT IS LOCATED.
10. 01 THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501.

QA-1 QA-2 Q

ANSTEC APERTURE CARD

9501130285

22

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FIRST SUBMITTAL

FOR DRAWING INDEX SEE DRAWING 39002

DESIGN INPUTS
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ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

NOTICE OF OPEN CHANGE DOCUMENTS
THIS DOCUMENT IS LIMITED BY THE LISTED CHANGE DOCUMENT AND CANNOT BE USED WITHOUT THEM

CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

GRAPHIC SCALE
0 100 200 300 400
1:5000

DOE/YMP ACCEPTANCE FOR CONSTRUCTION
By ____ Date 15 Sept 94

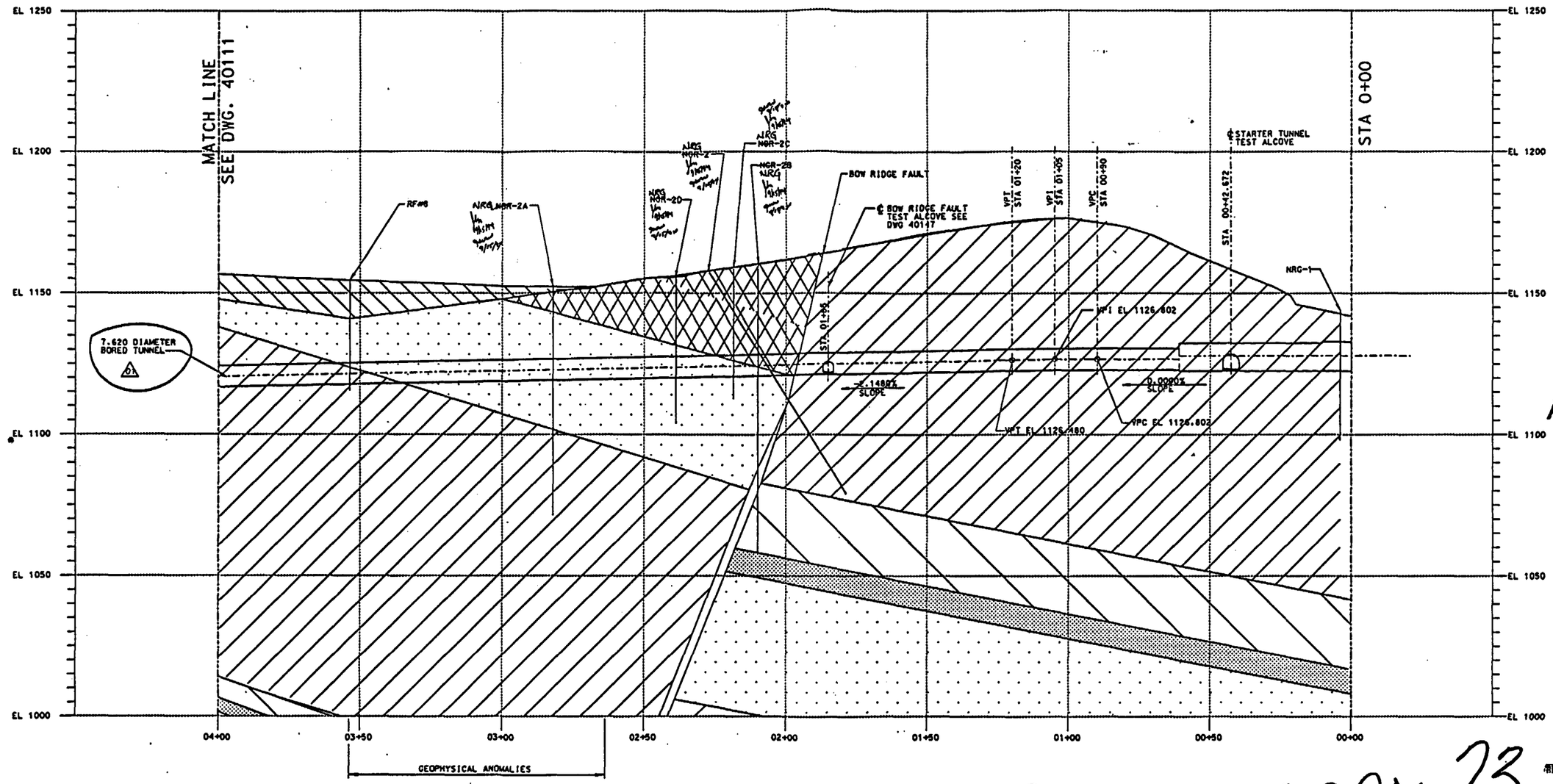
REV	DESCRIPTION	DATE	DRN	CHK	CHK	VER	L.D.E.	G.A.	G.M.
01	ISSUED FOR CONSTRUCTION	9-13-94							
00	APPROVED BUT NOT ISSUED	7-7-94	CLP	VRK	CRG	N/A	JMT	FCA	JLN

APPROVALS	INITIAL/DATE
DRAWN C PEARCE	CLP 7-7-94
DESIGNATOR W KENNEDY	VRK 7-7-94
CHECKED C GARRETT	CRG 7-7-94
VERIFICATION N/A	
LEAD DESIGN ENGINEER J TAIPALE	JMT 7-7-94
QUALITY ASSURANCE J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER J NAAF	JLN 7-7-94

U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
GENERAL ARRANGEMENT
PLAN & PROFILE

SIZE D | DOCUMENT IDENTIFIER: BABEAD000-01717-2100-40104-01 | REV 01
SCALE NOTED | QA CLASSIFICATION QA-1 OR QA-2 SEE NOTE 10 | S.D.L. N.2.6 | CAD FILE MINE:40104.DGN



ANSTEC APERTURE CARD

9501130285 23

RECEIVED SEP 16 1994 DOCUMENT AND RECORDS CENTER

FIRST SUBMITTAL

PROFILE - STA 00+00 TO STA 04+00

SCALE: 1:750

FOR DRAWING INDEX SEE DRAWING 39002

NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
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3. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
4. GEOLOGIC AND STRUCTURAL INFORMATION IS SHOWN ON THE NORTH RAMP PROFILE FOR REFERENCE PURPOSES ONLY AND IS BASED ON FIELD WORK FROM ON-GOING ROCK AND SOIL INVESTIGATIONS (REFERENCE SNL DWG NO. 88-60-09, REV 5 DATED 4-20-94, TDIF #303195). 01
5. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
6. REFER TO DRAWING 40104 FOR STRATIGRAPHIC LEGEND.
7. ELEVATIONS SHOWN FOR VERTICAL CURVE CONTROL POINTS REFER TO THE TUNNEL SPRING LINE. VPI ELEVATIONS REFER TO THE POINT OF INTERSECTION OF THE TANGENTS OF A VERTICAL CURVE.
8. THE 30 m VERTICAL CURVE IS AN EQUAL-TANGENT PARABOLIC TYPE CURVE.
9. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501. 01

QA-1 QA-2 Q

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

GRAPHIC SCALE
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1:750

DOE/YMP ACCEPTANCE FOR CONSTRUCTION
By _____ Date 12 Sept 94

DESIGN INPUTS
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01

NOTICE OF OPEN CHANGE DOCUMENTS
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CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

REV	DESCRIPTION	DATE	DRN	DES	CHK	VCR	L.D.S.	S.A.	S.S.
01	ISSUED FOR CONSTRUCTION	9-13-94	CLP	WRK	CRG	N/A	JMT	FCA	JLN
00	APPROVED BUT NOT ISSUED	7-7-94	CLP	WRK	CRG	N/A	JMT	FCA	JLN

APPROVALS	INITIAL/DATE
DRAWN C PEARCE	CLP 7-7-94
DESIGNER W KENNEDY	WRK 7-7-94
CHECKED C GARRETT	CRG 7-7-94
VERIFICATION N/A	
LEAD DESIGN ENGINEER J TAIPALE	JMT 7-7-94
QUALITY ASSURANCE J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER J NAAF	JLN 7-7-94

U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
EXCAVATION LAYOUT
PROFILE - SHEET 1 OF 7

SIZE	DOCUMENT IDENTIFIER	CI IDENTIFIER	DRAWING NO.	REV
D	BABEA0000	01717-2100	40110	01

SCALE	QA CLASSIFICATION QA-1, QA-2 SEE NOTE 9	U.D.S.	CAD FILE
NOTED	N.2.6		MINE:40110.DGN

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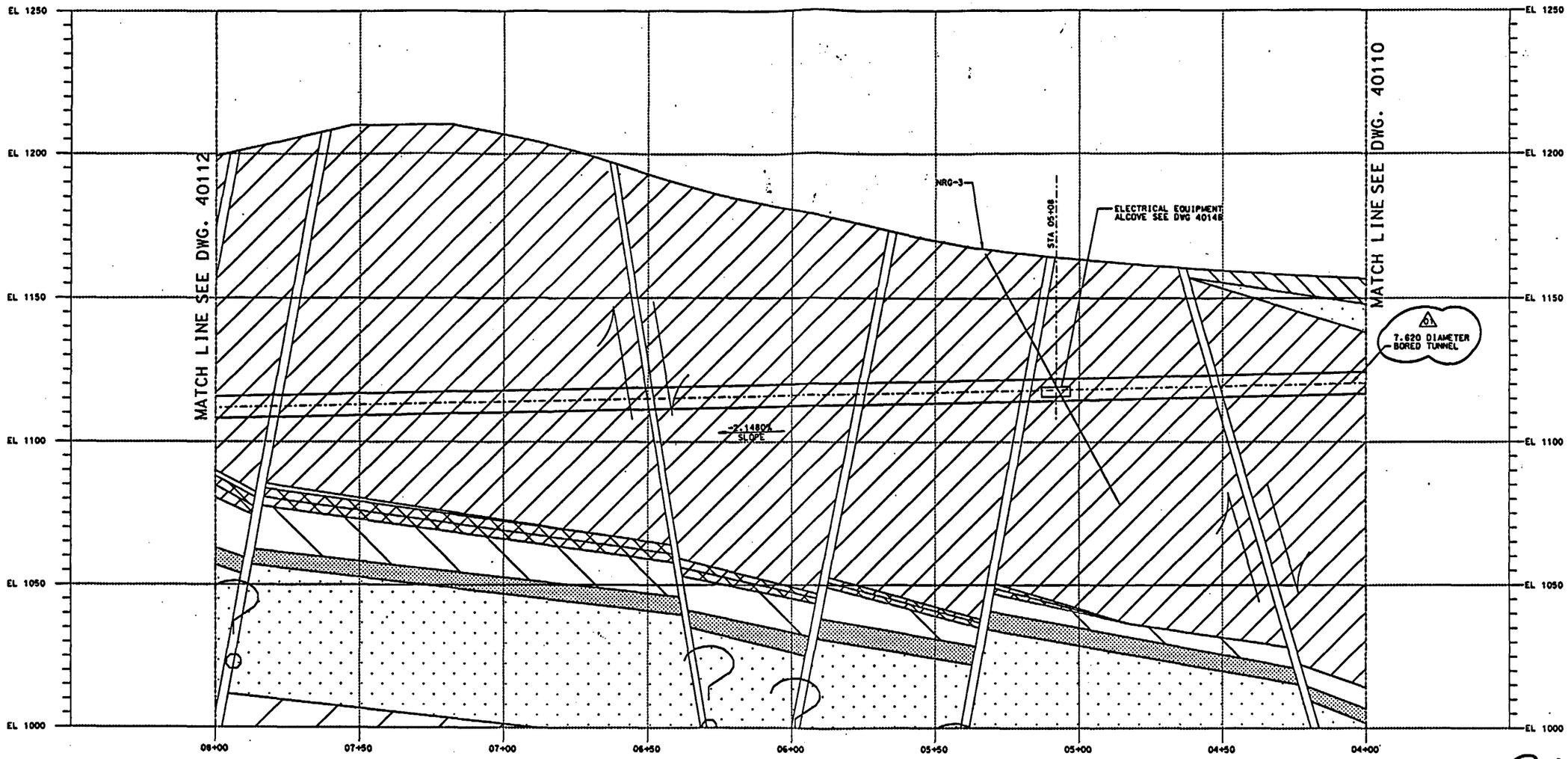

PROFILE - STA 04+00 TO STA 08+00
SCALE: 1:750

9501130285-24

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OCT 13 1994
DOCUMENT AND RECORDS CENTER
FIRST SUBMITTAL

FOR DRAWING INDEX SEE DRAWING 39002

ANSTEC APERTURE CARD

NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
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3. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
4. GEOLOGIC AND STRUCTURAL INFORMATION IS SHOWN ON THE NORTH RAMP PROFILE FOR REFERENCE PURPOSES ONLY AND IS BASED ON FIELD WORK FROM ON-GOING ROCK AND SOIL INVESTIGATIONS (REFERENCE SNL DWG NO. 88-60-09, REV 5 DATED 4-20-94, TDIF #303195).
5. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
6. REFER TO DRAWING 40104 FOR STRATIGRAPHIC LEGEND.
7. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501.
8. ANY BOREHOLE INFORMATION, GEOLOGICAL INFORMATION, OR FAULT TRACE INFORMATION SHOWN IS FOR REFERENCE PURPOSES ONLY AND IS NEITHER DESIGN INPUT OR PART OF THE DESIGN.

QA-1 / QA-2 / Q

DESIGN INPUTS
SEE DRAWING INPUTS LIST

NOTICE OF OPEN CHANGE DOCUMENTS
THIS DOCUMENT IS IMPACTED BY THE 5/31/92 CHANGE DOCUMENT AND CANNOT BE USED WITHOUT THIS

CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

GRAPHIC SCALE
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1:750

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

DOE/YMP ACCEPTANCE FOR CONSTRUCTION
By ____ Date 10/12/94

REV	DESCRIPTION	DATE	DRN	CHK	ENG	CHK	VER	CHK	CHK	CHK
01	ISSUED FOR CONSTRUCTION	9-26-94	CLP	WRK	CRG	N/A	JNT	FCA	JLN	N/A
00	APPROVED BUT NOT ISSUED	7-7-94	CLP	WRK	CRG	N/A	JNT	FCA	JLN	

APPROVALS	INITIAL/DATE
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DESIGNATION W KENNEDY	WRK 7-7-94
CHECKED C GARRETT	CRG 7-7-94
VERIFICATION N/A	
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DEPARTMENT MANAGER J NAAF	JLN 7-7-94

U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

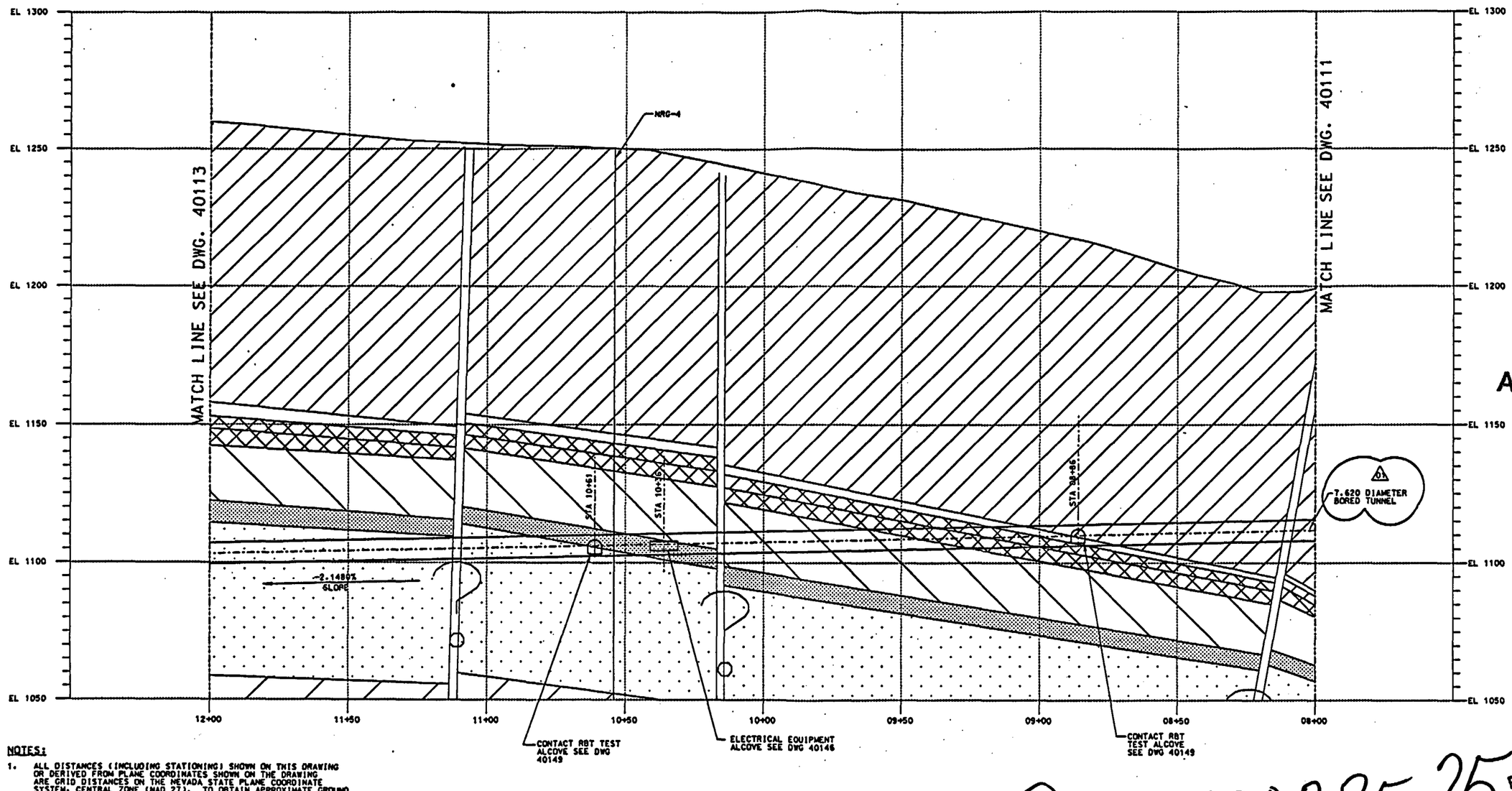
EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
EXCAVATION LAYOUT
PROFILE - SHEET 2 OF 7

SIZE D | DOCUMENT IDENTIFIER: BABEA0000-01717-2100-40111-01 | REV

SCALE NOTED | QA CLASSIFICATION QA-1 QA-2 SEE NOTE 7 | U.S.G.S. N.2.6 | CAD FILE MINE:40111.DGN

CAGE CODE:

BABEA0000-01717-2100-40111-01 D



PROFILE - STA 08+00 TO STA 12+00
SCALE: 1:750

NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
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5. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
6. REFER TO DRAWING 40104 FOR STRATIGRAPHIC LEGEND.
7. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501. 01
8. ANY BOREHOLE INFORMATION, GEOLOGICAL INFORMATION, OR FAULT TRACE INFORMATION SHOWN IS FOR REFERENCE PURPOSES ONLY AND IS NEITHER DESIGN INPUT OR PART OF THE DESIGN.

QA-1
QA-2
Q

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

GRAPHIC SCALE
0 10 20 30 40 50 60 m
1:750

DOE/YMP ACCEPTANCE FOR CONSTRUCTION
By _____ Date 10/12/94

REV	DESCRIPTION	DATE	DRN	DES	CHK	VER	C.V.T.	G.A.	D.A.
01	ISSUED FOR CONSTRUCTION	9-14-94	CLP						
00	APPROVED BUT NOT ISSUED	7-7-94	CLP	VRK	CRG	N/A	JNT	FCA	JLN

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U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
EXCAVATION LAYOUT
PROFILE - SHEET 3 OF 7

SIZE D | DOCUMENT IDENTIFIER: BABEAD000-01717-2100-40112-01 | REV
SCALE NOTED | QA CLASSIFICATION QA-1, QA-2, SEE NOTE 7 | N.A.D. N.2.6 | CAD FILE MINE:40112.DGN

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9501130285-25

FOR DRAWING INDEX SEE DRAWING 39002

DESIGN INPUTS
SEE DRAWING INPUTS LIST

NOTICE OF OPEN CHANGE DOCUMENTS
THIS DOCUMENT IS IMPACTED BY THE LISTED CHANGE DOCUMENT AND CANNOT BE USED WITHOUT THEM

CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

ANSTEC APERTURE CARD

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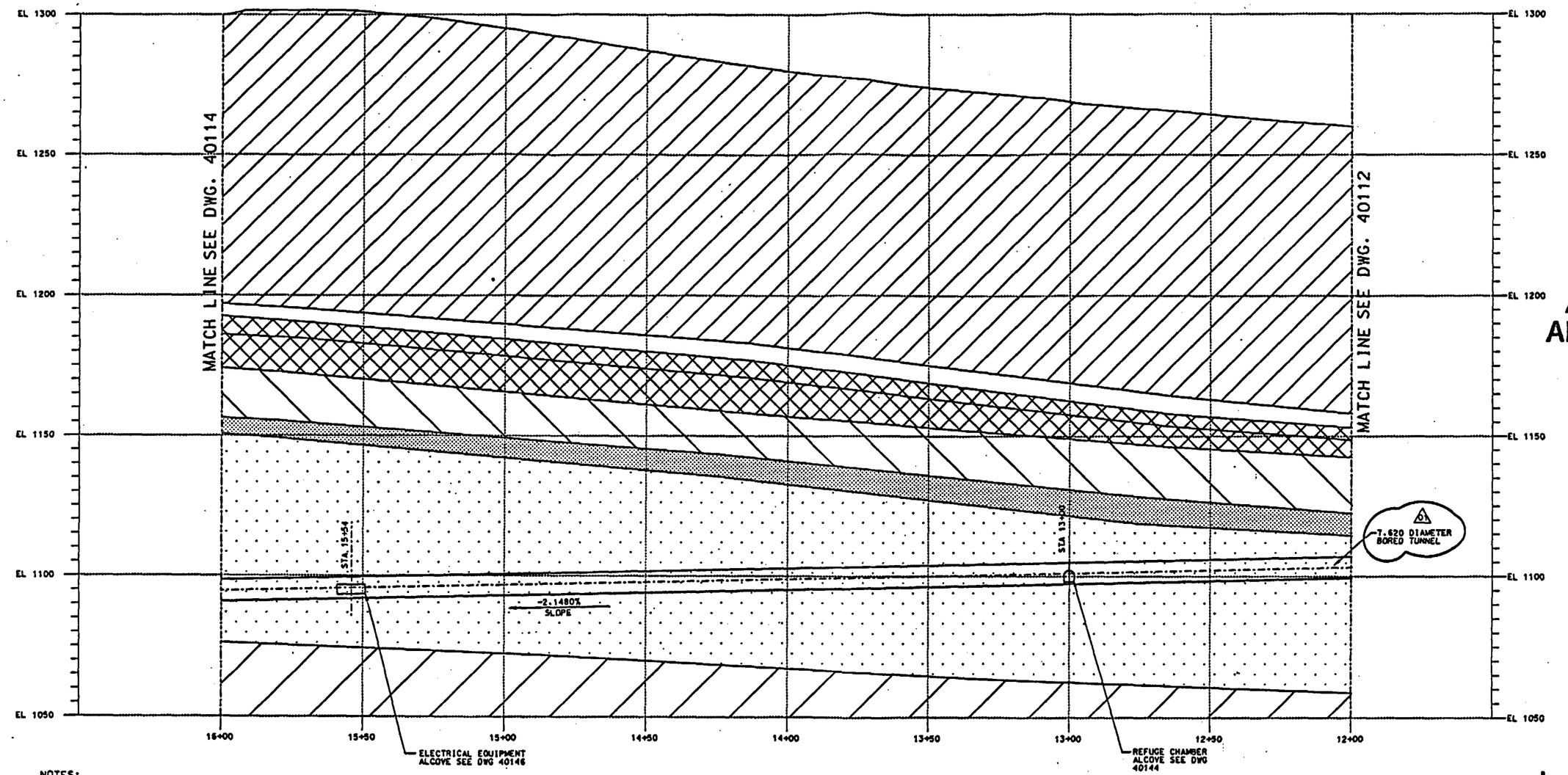

ANSTEC APERTURE CARD

PROFILE - STA 12+00 TO STA 16+00

SCALE: 1:750

9501130285-26

FIRST SUBMITTAL

RECEIVED
OCT 13 1994
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NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
2. COORDINATES, ELEVATIONS, DIMENSIONS, AND STATIONING ARE SHOWN IN METERS, UNLESS OTHERWISE NOTED. METRIC VALUES ARE ROUNDED TO THREE DECIMAL PLACES. WHERE DISCREPANCIES BETWEEN ELEVATIONS & GRADIENTS OCCUR DUE TO ROUNDING, ELEVATIONS WILL GOVERN.
3. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
4. GEOLOGIC AND STRUCTURAL INFORMATION IS SHOWN ON THE NORTH RAMP PROFILE FOR REFERENCE PURPOSES ONLY AND IS BASED ON FIELD WORK FROM ON-GOING ROCK AND SOIL INVESTIGATIONS (REFERENCE SNL DWG NO. 88-60-09, REV 5 DATED 4-20-94, TDIF #303195). 01
5. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
6. REFER TO DRAWING 40104 FOR STRATIGRAPHIC LEGEND.
7. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501. 01
8. ANY BOREHOLE INFORMATION, GEOLOGICAL INFORMATION, OR FAULT TRACE INFORMATION SHOWN IS FOR REFERENCE PURPOSES ONLY AND IS NEITHER DESIGN INPUT OR PART OF THE DESIGN.

QA-1
QA-2
Q

DESIGN INPUTS
SEE DRAWING INPUTS LIST 01

NOTICE OF OPEN CHANGE DOCUMENTS

THIS DOCUMENT IS IMPACTED BY THE LISTED CHANGE DOCUMENT AND CANNOT BE USED WITHOUT THEM

CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

GRAPHIC SCALE
0 10 20 30 40 50 60 m
1:750

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

DOE/YMP ACCEPTANCE FOR CONSTRUCTION
By [signature] Date 10/12/94

REV	DESCRIPTION	DATE	DRN	DWG	CHK	VER	L.D.E.	E.E.	D.E.
01	ISSUED FOR CONSTRUCTION	9-26-94	CLP	WRK	CRG	N/A	JNT	FCA	JLN
00	APPROVED BUT NOT ISSUED	7-7-94	CLP	WRK	CRG	N/A	JNT	FCA	JLN

APPROVALS	INITIAL/DATE
DRAWN C PEARCE	CLP 7-7-94
DESIGNER W KENNEDY	WRK 7-7-94
CHECKED C GARRETT	CRG 7-7-94
VERIFICATION N/A	
LEAD DESIGN ENGINEER J TAIPALE	JNT 7-7-94
QUALITY ASSURANCE J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER J NAAF	JLN 7-7-94

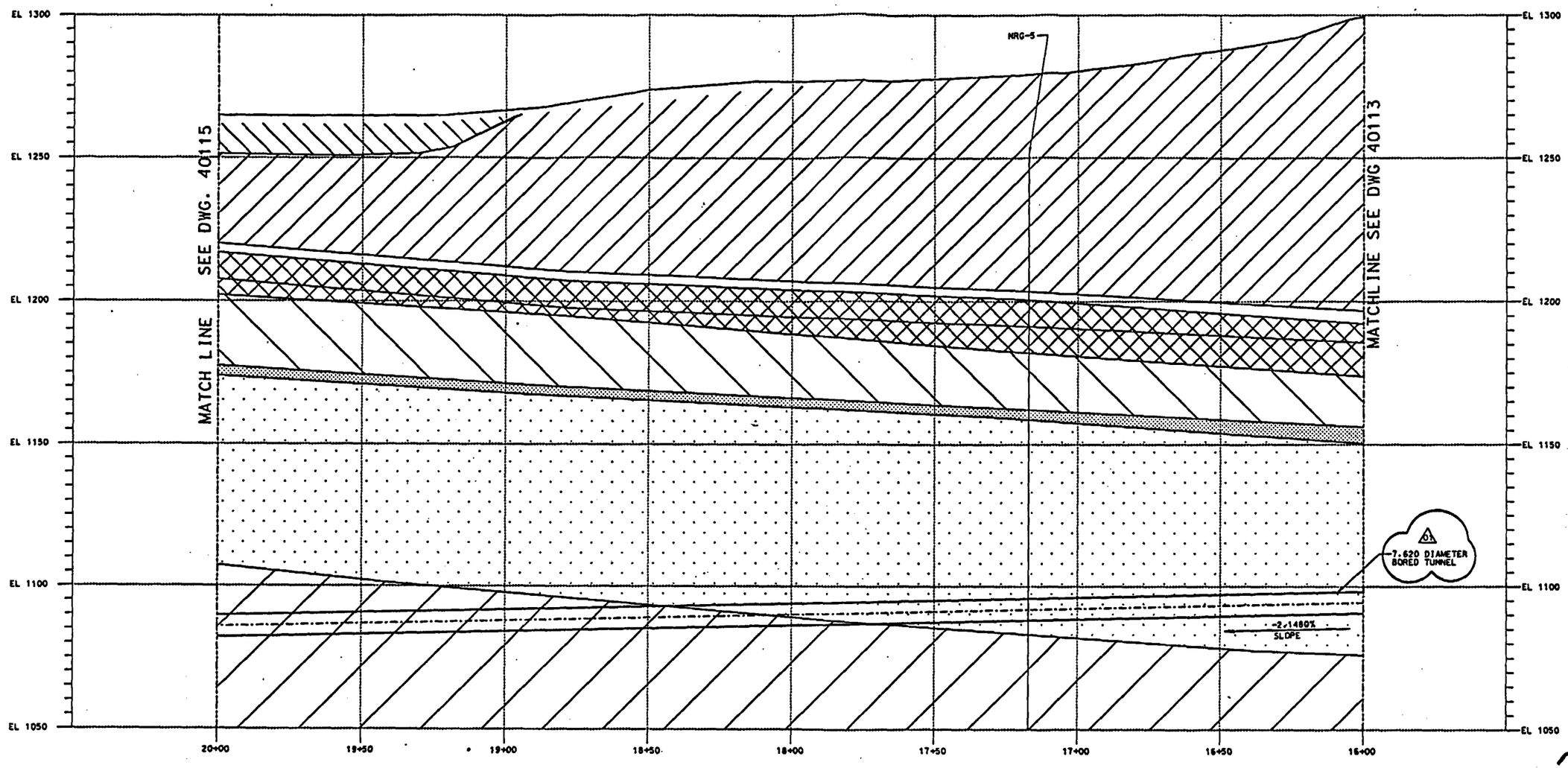
U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System
MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
EXCAVATION LAYOUT
PROFILE - SHEET 4 OF 7

SIZE	DOCUMENT IDENTIFIER: CI IDENTIFIER	DRAWING NO.	REV
D	BABEAD000-01717-2100-40113-01		

SCALE	QA CLASSIFICATION (QA-1 OR QA-2 SEE NOTE 7)	U.D.S.	CAD FILE
NOTED		N.2.6	MINE:40113.DGN

CAMC CODES 01



ANSTEC APERTURE CARD

PROFILE - STA 16+00 TO STA 20+00

SCALE: 1:750

9501130285 - 27

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RECEIVED OCT 13 1994 DOCUMENT AND RECORDS CENTER

FOR DRAWING INDEX SEE DRAWING 39002

NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
2. COORDINATES, ELEVATIONS, DIMENSIONS, AND STATIONING ARE SHOWN IN METERS, UNLESS OTHERWISE NOTED. METRIC VALUES ARE ROUNDED TO THREE DECIMAL PLACES. WHERE DISCREPANCIES BETWEEN ELEVATIONS & GRADIENTS OCCUR DUE TO ROUNDING, ELEVATIONS WILL GOVERN.
3. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
4. GEOLOGIC AND STRUCTURAL INFORMATION IS SHOWN ON THE NORTH RAMP PROFILE FOR REFERENCE PURPOSES ONLY AND IS BASED ON FIELD WORK FROM ON-GOING ROCK AND SOIL INVESTIGATIONS (REFERENCE SNL DWG NO. 88-60-09, REV 5 DATED 4-20-94, TDIF #303195).
5. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
6. REFER TO DRAWING 40104 FOR STRATIGRAPHIC LEGEND.
7. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN APPLICABLE SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501.
8. ANY BOREHOLE INFORMATION, GEOLOGICAL INFORMATION, OR FAULT TRACE INFORMATION SHOWN IS FOR REFERENCE PURPOSES ONLY AND IS NEITHER DESIGN INPUT OR PART OF THE DESIGN.

QA-1 / QA-2 / 0

DESIGN INPUTS
SEE DRAWING INPUTS LIST

NOTICE OF OPEN CHANGE DOCUMENTS
THIS DOCUMENT IS IMPACTED BY THE LISTED CHANGE DOCUMENTS AND CANNOT BE USED WITHOUT THEM

CHANGE DOCUMENT	POSTED BY	DATE	STATUS

GRAPHIC SCALE
0 10 20 30 40 50 60 m
1:750

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

DOE/TMP ACCEPTANCE FOR CONSTRUCTION
By [signature] Date 10/12/94

REV	DESCRIPTION	DATE	DWN	DES	CHK	VER	L.D.E.	D.A.	D.M.
01	ISSUED FOR CONSTRUCTION	9-26-94	[initials]	[initials]	[initials]	[initials]	[initials]	[initials]	[initials]
00	APPROVED BUT NOT ISSUED	7-7-94	CLP	WRK	CRG	N/A	JNT	FCA	JLN

APPROVALS	INITIALS/DATE
DRAWN C PEARCE	CLP 7-7-94
DESIGNATOR W KENNEDY	WRK 7-7-94
CHECKED C GARRETT	CRG 7-7-94
VERIFICATION N/A	
LEAD DESIGN ENGINEER J TAIPALE	JNT 7-7-94
QUALITY ASSURANCE J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER J NAAF	JLN 7-7-94

U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

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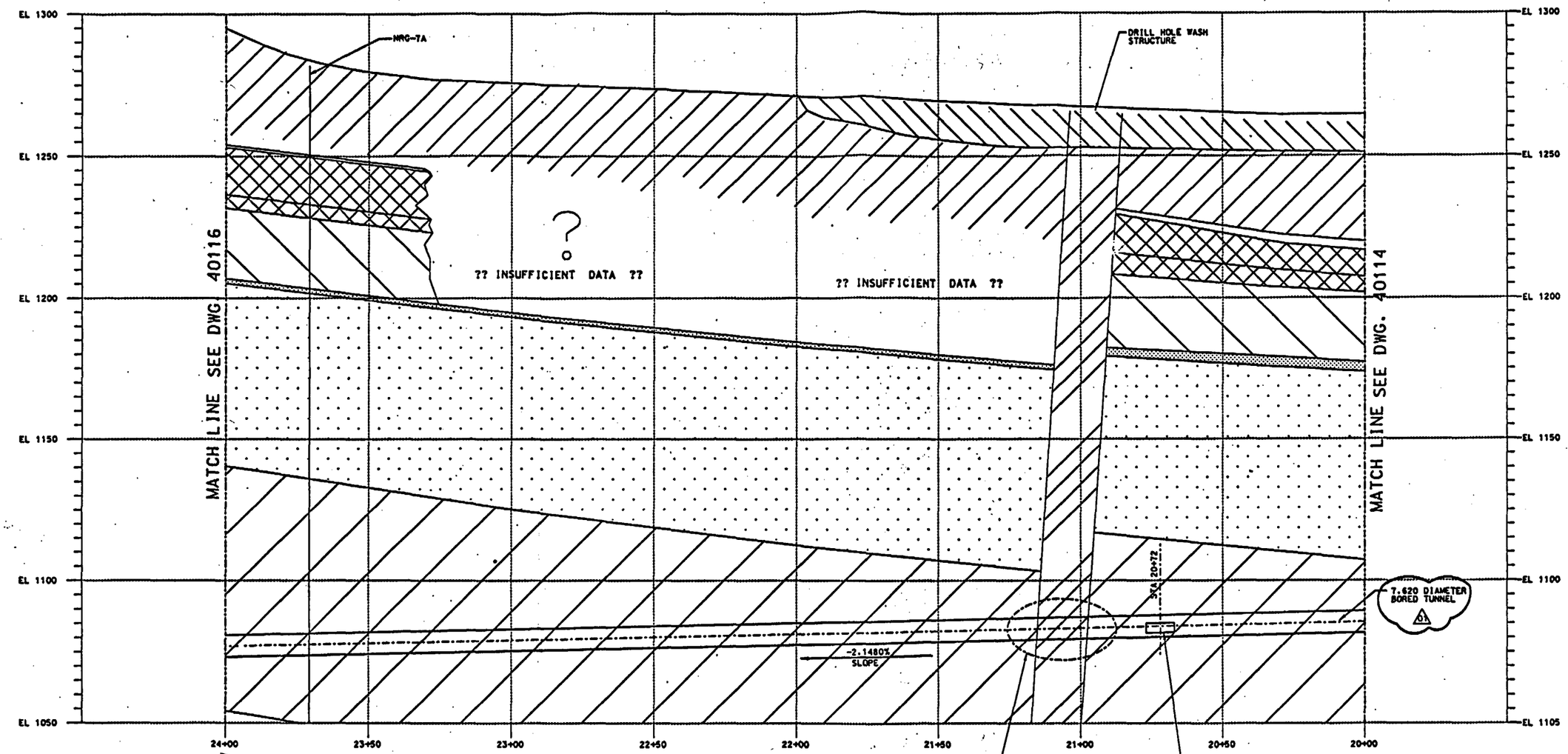
TS NORTH RAMP
EXCAVATION LAYOUT
PROFILE - SHEET 5 OF 7

SIZE D | DOCUMENT IDENTIFIER: BABEA0000-01717-2100-40114-01 | REV
SCALE NOTED | QA CLASSIFICATION QA-1, QA-2 SEE NOTE 7 | D.B.S. 1.2.6 | CAD FILE MINE:40114.DGN



ANSTEC APERTURE CARD

PROFILE - STA 20+00 TO STA 24+00

SCALE: 1:750

NOTES:

1. ALL DISTANCES (INCLUDING STATIONING) SHOWN ON THIS DRAWING OR DERIVED FROM PLANE COORDINATES SHOWN ON THE DRAWING ARE GRID DISTANCES ON THE NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (NAD 27). TO OBTAIN APPROXIMATE GROUND DISTANCES, DIVIDE GRID DISTANCES BY 0.999732.
2. COORDINATES, ELEVATIONS, DIMENSIONS, AND STATIONING ARE SHOWN IN METERS, UNLESS OTHERWISE NOTED. METRIC VALUES ARE ROUNDED TO THREE DECIMAL PLACES. WHERE DISCREPANCIES BETWEEN ELEVATIONS & GRADIENTS OCCUR DUE TO ROUNDING, ELEVATIONS WILL GOVERN.
3. REFER TO TABLE ON DRAWING 40100 FOR BOREHOLE INFORMATION.
4. GEOLOGIC AND STRUCTURAL INFORMATION IS SHOWN ON THE NORTH RAMP PROFILE FOR REFERENCE PURPOSES ONLY AND IS BASED ON FIELD WORK FROM ON-GOING ROCK AND SOIL INVESTIGATIONS (REFERENCE SML DWG NO. 88-60-09, REV 5 DATED 4-20-94, TDIF #303195). 01
5. ALCOVE LOCATIONS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS WILL BE FIELD DETERMINED.
6. CONFIGURATION OF THE DRILL HOLE WASH TEST ALCOVE(S) WILL BE DETERMINED AFTER THE ALCOVE IS LOCATED. FINAL LOCATION WILL BE BASED ON GEOHYDROLOGIC DATA OBTAINED DURING RAMP CONSTRUCTION.
7. REFER TO DRAWING 40104 FOR STRATIGRAPHIC LEGEND.
8. THE TS NORTH RAMP IS CLASSIFIED AS QA-1 BECAUSE OF ITS POTENTIAL TO PROVIDE A TRANSPORT PATH FOR WASTE EMPLACEMENT AND A PATH FOR VENTILATION AND/OR INSTRUMENTATION AND CONTROL EQUIPMENT WITH POTENTIAL IRS (QA-1) SIGNIFICANCE. IT IS CLASSIFIED AS QA-2 BY DIRECT INCLUSION TO ACCOUNT FOR THE POTENTIAL IMPORTANCE OF THE RAMP IN ESTABLISHING REPOSITORY SEALS. QA CONTROLS ARE APPLIED IN A/E SPECIFICATION SECTIONS TO SATISFY ESF REQUIREMENTS ASSOCIATED WITH THESE CLASSIFICATIONS. TUNNEL ALIGNMENT AND GRADE ARE SUBJECT TO QA CONTROLS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 01501. 01
9. ANY BOREHOLE INFORMATION, GEOLOGICAL INFORMATION, OR FAULT TRACE INFORMATION SHOWN IS FOR REFERENCE PURPOSES ONLY AND IS NEITHER DESIGN INPUT OR PART OF THE DESIGN.

QA-1 QA-2 Q

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

GRAPHIC SCALE
0 10 20 30 40 50 60 m
1:750

DOE/TMP ACCEPTANCE FOR CONSTRUCTION
By [signature] Date 10/12/94

9501130285-28

DESIGN INPUTS
SEE DRAWING INPUTS LIST 01

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FOR DRAWING INDEX SEE DRAWING 39002

NOTICE OF OPEN CHANGE DOCUMENTS
THIS DOCUMENT IS IMPACTED BY THE ATDT/ OPEN CHANGE REQUEST AND CANNOT BE USED WITHOUT THEM

CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

REV	DESCRIPTION	DATE	DRW	DSN	CHK	MCS	S.B.C.	R.A.	B.L.
01	ISSUED FOR CONSTRUCTION	9-14-94	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
00	APPROVED BUT NOT ISSUED	7-7-94	CLP	WRK	CRG	R/A	JMT	FCA	JLN

APPROVALS	INITIAL/DATE
DRAWN C PEARCE	CLP 7-7-94
DESIGNED W KENNEDY	WRK 7-7-94
CHECKED C GARRETT	CRG 7-7-94
VERIFICATION N/A	
LEAD DESIGN ENGINEER J TAIPALE	JMT 7-7-94
QUALITY ASSURANCE J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER J NAAF	JLN 7-7-94

U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
EXCAVATION LAYOUT
PROFILE - SHEET 6 OF 7

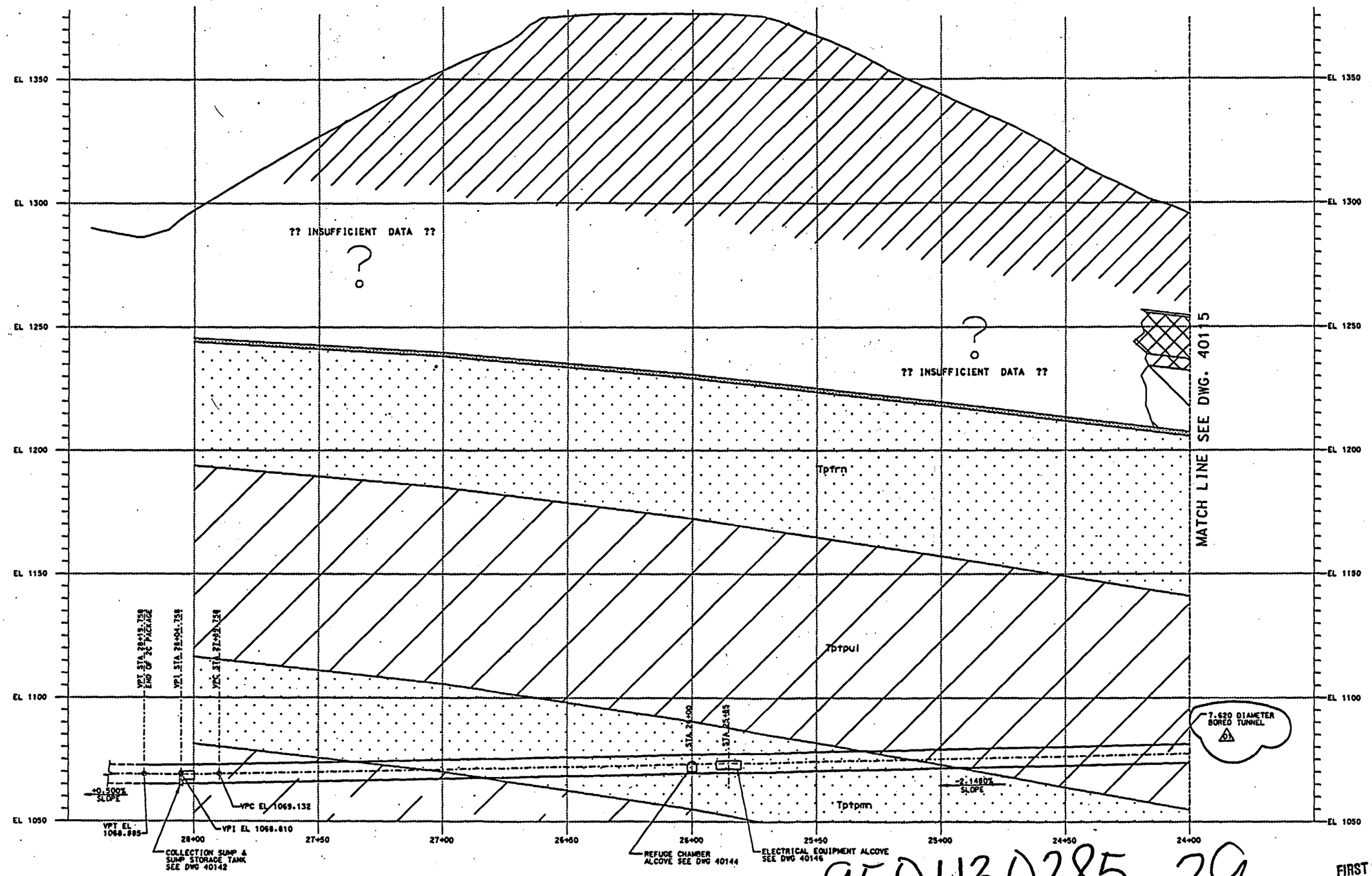
SIZE	DOCUMENT IDENTIFIER	DRAWING NO.	REV
D	BABEAD000-01717-2100-40115		-01

SCALE: NOTED | QA CLASSIFICATION QA-1, QA-2 SEE NOTE 8 | R-A-L 1.2.6 | CAD FILE MINE:40115.DGN

01

D DOCUMENT IDENTIFIER BABEA0000-01717-2100-40116-01

NOTE:
1. FOR NOTES SEE DRAWING 40110



ANSTEC APERTURE CARD

RECEIVED
OCT 13 1994
DOCUMENT AND RECORDS CENTER

DESIGN INPUTS
SEE DRAWING INPUTS LIST

FOR DRAWING INDEX SEE DRAWING 39002

NOTICE OF OPEN CHANGE DOCUMENTS			
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CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

FIRST SUBMITTAL

9501130285-29

PROFILE - STA 24+00 TO STA 28+19.758

SCALE: 1:750

GRAPHIC SCALE
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1:750

ALL DIMENSIONS ARE SHOWN IN METERS UNLESS OTHERWISE NOTED

DOE/TMP ACCEPTANCE FOR CONSTRUCTION
By ____ Date 10/12/94

REV	DESCRIPTION	DATE	DRN	CHK	ENG	WRK	L.D.E.	E.N.	E.N.
01	ISSUED FOR CONSTRUCTION	9-26-94							
00	APPROVED BUT NOT ISSUED	7-7-94	CLP	WRK	CRG	N/A	JNT	FCA	JLN

APPROVALS	INITIAL/DATE
DRAWN C PEARCE	CLP 7-7-94
DISTRIBUTION W KENNEDY	WRK 7-7-94
CHECKED C GARRETT	CRG 7-7-94
VERIFICATION N/A	
LEAD DESIGN ENGINEER J TAIPALE	JNT 7-7-94
QUALITY ASSURANCE J WILLIS	FCA FOR 7-7-94
DEPARTMENT MANAGER J NAAF	JLN 7-7-94

U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

EXPLORATORY STUDIES FACILITY PACKAGE 2C
TS NORTH RAMP
EXCAVATION LAYOUT
PROFILE - SHEET 7 OF 7

SIZE	DOCUMENT IDENTIFIER	CI IDENTIFIER	DRAWING NO.	REV
D	BABEA0000-01717-2100-40116-01			

SCALE	CLASSIFICATION	D-&-S.	CAD FILE
NOTED	QA-1 QA-2 QA-3 NOTE & DES 40110	1.2.6	MINE:40116.DGN