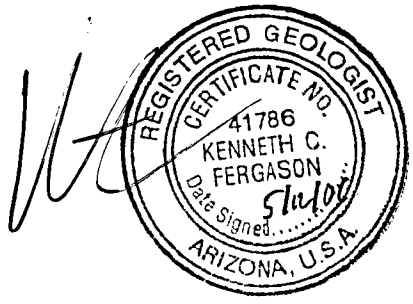
TDR TRENCH INVESTIGATION AND CABLE INSTALLATION REPORT
MCMICKEN DAM POST DESIGN COMPLETION
WORK ASSIGNMENT 1
MARICOPA COUNTY, ARIZONA

Submitted to:

Flood Control District of Maricopa County
Phoenix, Arizona

Submitted by:

AMEC Earth & Environmental, Inc.
Phoenix, Arizona



May 12, 2006

AMEC Job No. 6-117-001007
Work Assignment No. 1

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Michael D. Greenslade, P.E.
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009-6399

Dear Mr. Greenslade:

Re: TDR Trench Investigation and Cable Installation Report
McMicken Dam Post Design Completion
Work Assignment No. 1
Contract FCD 2004C068
Maricopa County, Arizona

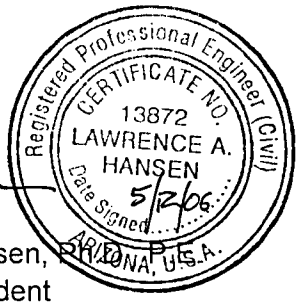
Transmitted herewith are four copies of the TDR Trench Investigation and Cable Installation Report for the referenced project. If you have any questions, please contact the undersigned.

Respectfully submitted,

AMEC Earth & Environmental, Inc.

Kenneth C. Fergason, P.G.
Geologist

Reviewed by:



Lawrence A. Hansen, P.E.
Senior Vice President

for

Ralph E. Weeks, P.G.
Senior Geologist

c: Addressee: (4)

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1.0 INTRODUCTION

This report presents the results of a focused geotechnical investigation and a program of construction oversight related to the installation of the coaxial cable components of a time domain reflectometry (TDR) monitoring system designed as part of the earth fissure zone remediation project for McMicken Dam. The scope of these tasks included the investigation and mapping of the soil profile exposed in the shallow trench excavated to receive the TDR cable, followed by construction oversight to confirm that the excavation of the TDR trench and grout encasement of the coaxial cable along McMicken Dam were in conformance with project design specifications.

While the trench excavation was open, a limited investigation for the purpose of identifying potential earth fissures was conducted along the trench from existing dam Station 75+50 to Station 105+50. AMEC representatives were on site at the behest of the Flood Control District of Maricopa County (District) in a quality assurance role. AMEC worked closely with the District, the contractor and the Arizona Department of Water Resources (ADWR), who has regulatory authority.

Part of the scope of this effort included the development of trench logs delineating the geologic profile. This effort included the search for of any significant cracking in the soils present from about Station 75+50 to Station 105+50.

2.0 METHODS OF INVESTIGATION

Construction observations of the TDR trench excavation and TDR cable installation were completed by an on-site geologist or engineer in accordance with the recommendations of the design engineer. Kenneth Fergason, P.G., Brett Howey, P.E., Ralph Weeks, P.G., and Courtney Cowie, E.I.T., all with AMEC, served in this fashion. The investigation of exploratory trench was primarily conducted by Mr. Fergason and Mr. Weeks.

2.1 Observation of Trench Excavation and Cleaning

The excavation and cleaning of both the North-South TDR Trench (N-S Trench) and the East-West TDR Trench (E-W Trench) were observed by the on-site geologist or engineer to guide the installation process. The geologist or engineer communicated with the contractor to achieve these goals. The process was documented with photographs and daily notes, which are included at the end of this report in Appendices A and B, respectively. The locations of the N-S Trench and the E-W Trench are shown on Sheet 1.

2.2 Preparation of Exploratory Trench Logs

The N-S Trench was first utilized as an exploratory trench for the purpose of ascertaining if any earth fissures were present. To this affect, a detailed log was prepared from Station 75+50 to Station 105+50 with detailed inserts in specific areas of interest. A detailed log was not

prepared for the E-W Trench, since it was adjacent to the dam extension, and the foundation excavation for the dam extension had previously been logged. The logs include geological and geotechnical descriptions of the soils encountered, and descriptions of soil discontinuities present. The results of the trench investigation were utilized to further refine the placement of tape-extensometer monitoring monuments. The trench logs were completed by Mr. Fergason and reviewed by Mr. Weeks. Trench logs are presented in Appendix C and photographs of the trench are presented in Appendix A at the end of this report.

As part of the trench logging program, a series of orientations of soil discontinuities present in the trench were taken. These orientations include soil discontinuities shown on the logs and discontinuities that are part of the soil structure and may not be shown on the logs. It is possible, and even likely, that a significant number of these discontinuities are equipment effects and/or stress relief features from the excavation of the trench. Orientations were taken in azimuth form and the dip was assumed to be vertical. The orientation data is presented in a table and a series of rose diagrams in Appendix D at the end of this report.

2.3 Observation and Inspection of TDR Cable Emplacement

The installation of the TDR cable, including the initial and final cement slurry emplacement, was observed by the on-site geologist or engineer to insure that it met with the design specifications. The geologist or engineer communicated with the contractor to achieve these goals. Included in this process was designing the spacing for the crimp locations in the TDR cables, and aiding District personnel in the crimping process. This process was documented with photographs and daily notes, which are included at the end of this report in Appendices A and B, respectively. The locations of the crimps in the TDR cable are shown on Sheet 1.

3.0 Exploratory Trench Conditions

The soil conditions typical of the N-S Trench can be summarized as three general units based on their geologic and engineering properties. Trench logs are presented in Appendix C.

Unit 1. Unit 1 is comprised of surficial soils of fluvial/aeolian origin, including recent channel deposits. This unit is Holocene in age and can be generalized in the three descriptions below.

- Unit 1a consists of silty sand with occasional zones of sandy silt. It contains variable amounts of gravel, occasional clayey zones, and predominately fine to medium grained sand. Unit 1a ranges from being non-cemented to weakly-lime cemented, with a stage cementation of I to I+. It is typically non-plastic to low in plasticity with a color of light reddish-brown.

- Unit 1b consists of clayey sand to clayey gravel with occasional silty zones and predominately fine to medium grained sand. This unit is typically non-cemented to weakly lime cemented, stage I to I+, low to medium in plasticity and reddish-brown in color.

- Unit 1c consists of sand, gravel, and cobbles with silt and occasional zones of sand with silt. Occasional small diameter boulders are present and sand and gravel are well graded and sub-rounded. The unit is non-cemented, Stage I or less, non-plastic, and light brown in color.

Unit 2. Unit 2 consists of Pleistocene alluvial soils that often form a cemented profile underlying Unit 1 soils. This unit can be generalized into the three descriptions below.

- Unit 2a consists of silty sand, gravel and cobbles to sand, gravel and cobbles with silt. Occasional small diameter boulders are present and the sand and gravel are well graded and sub-rounded. The unit is moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+. Unit 2a is non-plastic to low in plasticity and light brownish gray to light grayish brown in color.

- Unit 2b consists of sandy silt with zones of silty sand. It contains variable amounts of gravel and the sand is predominately fine-grained. Unit 2a is weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of Stage III, non-plastic to low in plasticity, and light brownish gray in color.

- Unit 2c consists of sand, gravel, and cobbles with silt and occasional small diameter boulders. The sand and gravel are well graded and sub-rounded. The unit is non-cemented to weakly lime cemented, Stage I to Stage I+, non-plastic, and light brown in color. Occasional lenses of sand with silt are present.

Unit 3. Unit 3 consists of Pleistocene alluvial soils that typically are coarser grained and less cemented than Unit 2 soils. This unit is generalized into the three descriptions below.

- Unit 3a consists of sand, gravel, and cobbles with silt and occasional small diameter boulders. The sand and gravel are well graded and sub-rounded. Unit 3a is non-cemented to weakly lime cemented, Stage I to II, non-plastic, and light grayish brown in color. Occasional lenses of sand with silt are present.

- Unit 3b consists of silty sand and gravel, occasional cobbles, and rare small diameter boulders. The sand and gravel are well graded and sub-rounded. Unit 3b is weakly to moderately lime cemented, Stage I+ to II+, non-plastic to low in plasticity, and light brownish gray in color.

- Unit 3c consists of silty sand and gravel, occasional cobbles, and rare boulders. Sand is predominately medium- to fine-grained, gravel is well graded and sub-rounded. Unit 3c is moderately to strongly lime cemented, Stage II+ to III+, non-plastic to low in plasticity, and light brownish gray to light gray in color.

The age of soils described above was approximated by the degree of cementation and stratigraphic relationships. Age designations were not rigorously verified, and should be considered approximate and uncertain.

As part of the exploratory trench, soil discontinuities were identified on the logs and described. The soil discontinuities identified in the trench were generally associated with soil structure, desiccation, and equipment effects from excavation. Zones with soil discontinuities were logged, described, and photographed in greater detail and are present Appendix C.

4.0 DISCUSSION

4.1 TDR Cable Installation

The observation and inspection of excavations associated with TDR cable installation is presented in the form of photographs and daily logs in Appendices A and B, respectively. All aspects of this process met with design specifications.

The cable installation proceeded in five stages: 1) excavation and cleaning of trench, 2) pouring of the first layer of controlled low strength material (CLSM), 3) placement of TDR cable in trench and crimping of cable, 4) pouring of second layer of CLSM, and 5) backfill of trench. Periodically throughout the installation process, the integrity and functionality of the TDR cable system was tested by District personnel.

The excavation of the trench was completed by both backhoe and trackhoe excavators and detailed descriptions are presented in photographic and written form in Appendices A and B, respectively. Removal of particles greater than 4 inches in diameter and areas of significant sluff was performed by hand laborers.

The TDR cable was emplaced on the first layer of CLSM and tied in place using aluminum ties that were placed after the pour at about 50-foot spacing. The cable was crimped by District personnel prior to its placement in the trench, and crimps were located with a GPS survey once the cable was tied in place. During examination of the cable after placement in the trench, a kink was found at about Station 7+50 in cable TDR-22. The kink was located with the GPS survey and the cable tested by District personnel. The kink represents the equivalent of an unintended crimp. Photos of this process are presented in Appendix A and daily reports in Appendix B.

4.2 Exploratory Trench Conditions and Zones of Potential Strain

The most significant finding of the exploratory component of this investigation is that no earth fissures appear to be present in the trench investigated. However, the density and character of soil discontinuities present do indicate that four zones of potential ground strain are present. These zones were logged in greater detail and are found at Stations 101+00 to 102+00, 96+00 to 96+50, 94+40 to 94+50, and 75+80 to 76+10.

Conditions observed in the N-S trench contained limited exposure of cemented material of an ideal nature for observing earth fissures and soil discontinuities. Roughly half of the N-S Trench was composed of course-grained material with limited amounts of cementation, limiting the ability to confidently identify soil discontinuities due to insufficient soil strength. However, conditions were sufficient that confidence is high that if an earth fissure of significant aperture (greater than 0.5 inches) were present it would have been identified.

The soil discontinuities present in the N-S Trench typically had very little to no aperture. None were large or persistent enough to be considered an earth fissure, and formation mechanisms appear to be related to desiccation and soil structure. Apertures ranged form no aperture to about 1/16 inch. Often discontinuities were not evident until the trench was open for several days and enhanced by desiccation. Typically discontinuities were limited to the upper few feet of the trench excavation, however, in the vicinity of Station 101+50 and 96+50 some were found deeper. In the vicinity of Station 101+50, several discontinuities with no aperture were found on the bottom of the trench. However, these discontinuities were not continuous, but discrete single cracks of lengths of 2 to 3 feet. The density and orientation of discontinuities at the four locations mentioned above leads to the conclusion that they may represent zones of strain related to ground subsidence.

These four zones of potential strain are consistent with observations presented in earlier reports (AMEC, 2003a and AMEC, 2003b). The 36-month InSAR interferogram from December 1996 to December 1999 (AMEC, 2003a) indicates that the greatest change in elevation along the location of the N-S Trench occurred between about Stations 90+00 and 105+00, suggesting that ground strain may be present in these locations. The three newest InSAR scenes spanning from November 22, 2002 to September 19, 2005 indicate that subsidence is still occurring along McMicken Dam. Subsidence rates are range from about .07 inches per year (in/yr) at about former dam Station 40+00 to 0.19 in/yr at about Station 180+00. Total subsidence ranges from about 0.22 to 0.57 inches, respectively. An area where a notable increase in subsidence rate occurred over relatively short horizontal distances is from about Station 50+00 to 70+00, where rates increase from about 0.07 in/yr to 0.12 in/yr. Additionally, subsidence modeling results predict zones of tensional ground strain from about Stations 75+00 to 85+00, with peak strains at about Station 82+00, and from about Stations 90+00 to 100+00, with peak strains at about Station 94+00 (AMEC, 2003b).

Orientations of the soil discontinuities present in the N-S trench were obtained as a part of this investigation and are present in Appendix D. It is likely that a significant number of these orientations were formed from excavation equipment activity and stress relief. The most prominent orientation of the soil discontinuities is similar to the orientation of ground deformation as indicated by InSAR (AMEC, 2003a).

In response to recognizing the presence of likely zones of ground strain, it was recommended to the District that increased monitoring of these zones occur. The installation of tape extensometer monuments sufficient to encompass these four zones of possible strain was

5.0 REFERENCES

AMEC Earth & Environmental, Inc. (AMEC), 2003a, Earth Fissure Investigation Report, McMicken Dam, AMEC Job No. 4-117-001088, Prepared for the Flood Control District of Maricopa County Structures Assessment Program – Phase II, Contract FCD 2000C006, Work Assignments Nos. 4 & 5, AMEC Job No. 0-117-001122, January 27, 2003.

AMEC Earth & Environmental, Inc. (AMEC), 2003b, Final Zoning of Earth Fissure Risk & Determination of Part(s) of the Dam that Require Dam Safety Modifications McMicken Dam Fissure Risk Zone Remediation Project, Prepared for the Flood Control District of Maricopa County, Contract FCD 2002C011, Work Assignment No. 2A, AMEC Job No. 2-117-001066, November 5, 2003.

APPENDIX A

SELECT PHOTOGRAPHS

Select Photographs

Photo 0912_2 showing the excavation of the E-W TDR trench with a CASE super-580 backhoe.

Photo 0914_2 showing the excavation of the N-S TDR trench with a CAT 245B trackhoe.

Photo 76_4 showing a typical soil discontinuity at about Station 75+90.

Photo 1024_14 showing the pour for the first layer of CLSM.

Photo 1024_11 showing aluminum ties for the cables.

Photo 1031_2 showing the TDR cable being crimped.

Photo 1031_7 showing a 10-inch long crimp in cable TDR-22.

Photo 1103_2 showing the dent/unintended crimp in cable TDR-22.

View of TDR cables TDR-21 and TDR-22 in trench prior to second layer of CLSM.

Photo 1103_10 showing from left to right TDR cables TDR-21, TDR-22, TDR-14, and TDR-13 at about Station 75+00 prior to second pour of CLSM.

APPENDIX B

DAILY FIELD NOTES

Daily Field Notes

Monday, September 12, 2005

- Kenneth Fergason leaves office at 0530.
- Arrive at site at about 0630. No one at project trailers.
- Arrive at dam site at 0650. Mike Greenslade and John Rodriguez, with the District, are on site with the contractor and just beginning excavation of the east-west TDR (E-W trench) trench. Brett Howey with AMEC is on site for pipe survey. Trench is excavated with a CASE super-580 backhoe with a 24-inch bucket. Trench depth is typically 4 to 4.5 feet in depth and 2 to 3 feet below the Holocene-Pleistocene contact.
- Jay Guertin with AMEC on site at 0750.
- 0850, about 110 feet of trench excavated to about Station 10+50. Excavation is difficult and the backhoe is near refusal.
- 0930 – Mr. Howey, Mr. Greenslade, and Mr. Guertin leave the site. Excavation of trench is at about Station 10+00.
- 1030 – Excavation is at about Station 9+25.
- 1130 – Backhoe breaks down at about Station 9+00.
- 1230 – Backhoe is still down with the mechanic en-route. Leave site.

Tuesday, September 13, 2005

- Mr. Fergason arrives site at about 0630. Contractor is already excavating E-W trench.
- 0720 – Excavation is at about Station 8+50.
- Mr. Guertin stops by for 5 to 10 minutes at 0745.
- 0835 to 0850 – replace tooth on backhoe bucket.
- 0900 – Excavation is at about Station 8+00.
- Mr. Greenslade arrives on site about 0930.
- Ralph Weeks with AMEC and Kevin MacDondald arrive on site at about 1000. Walk length of E-W trench and North – South TDR trench (N-S trench) and discuss excavation and installation plan with contractor.

- 1130 – Excavation is at about Station 7+00. From Station 7+50 to 7+00 the trench was excavated to about 6 feet and the contractor backfilled with about 1 foot of loose material. The contractor was instructed to remove this material. Contractor responded that it would be removed before the CLSM poor. Note: material removed on October 12, 2005.

- 1300 – Backhoe breaks down and excavation is at about Station 5+80. Attend weekly meeting.

- Leave site at about 1400.

Wednesday, September 14, 2005

- Mr. Fergason site at 0600.

- Begin excavation at E-W trench at 0615. Hydraulic line not fixed, significant leaking of hydraulic fluid. Stop excavation at 0625 due to hydraulic leak.

- Begin excavation of N-S trench at about 0615 at about Station 105+40 with a CAT 245B trackhoe.

- 0800 – Excavation of N-S trench is at about Station 104+10.

- 0930 – Excavation of E-W trench going again at about Station 5+00.

- 0945 – Excavation of N-S trench is at about Station 102+30. Contractor is using a small bulldozer (CAT D5C XL) in trench to facilitate the removal of loose materials. Mr. Guertin on site from about 0945 to 1020.

- 1050 – Excavation of E-W trench is at about Station 4+75.

- 1130 – Excavation of E-W trench is at about Station 4+00 and excavation of N-S trench is at about Station 101+00.

- 1230 – Excavation of E-W trench is at about Station 3+75 and N-S trench is at about Station 100+00. Rosco brush arrives on site.

- 1430 – Excavation of E-W trench is at about Station 3+00 an N-S trench is at about Station 98+00. Use Rosco construction brush in trench to clean trench bottom. Not many good surfaces to be cleaned and there is lots of loose material still. Attempted to clean out trench with blade – this was not effective. Decide to continue with dozer and brush, but not push issue of cleaning too hard and immediately excavate the key trench after excavation of outer trench.

- 1600 – Stop excavation at N-S trench at about Station 97+70.

- 1630 – Stop excavation at E-W trench at about Station 2+00. Leave site.

Thursday, September 15, 2005

- Mr. Fergason arrives at site at 0615.
- Begin excavation of both trenches at about 0645.
- 0800 – Backhoe excavating E-W trench breaks down with broken hydraulic line.
- 0840 – Excavation of N-S trench at about Station 96+20.
- 0930 – Mr. Rodriguez is on site. Discuss issues of loose material in trench bottom and trenching the keyway.
- 0950 – Trackhoe breaks down when N-S trench is at about Station 95+00. Identify zone of strain in vicinity of Station 96+20.
- 1030 – Mr. Howey arrives on site.
- 1045 – Begin excavation of N-S trench with a different trackhoe (Komatsu PC400 LC).
- 1200 – Mr. Rodriguez on site until 1300.
- 1300 – Excavation of N-S trench at about Station 89+00.
- 1315 – Begin excavating E-W trench with CAT 416D backhoe.
- Mr. Howey leaves site at about 1330.
- 1400 – Excavation of N-S trench at about Station 87+00.
- 1440 – Stop excavation of N-S trench at about Station 85+00.
- 1500 – Meet with Mr. Guertin and Mr. Rodriguez regarding excavation of trench keyway. Contractor intends to use a trenching machine and there is concern about loose material in the trench. Agreed that we would proceed with the trencher and find a different method if loose material becomes a problem.
- 1600 – Mr. Fergason leaves the site.

Monday, September 19, 2005

- Mr. Howey, with AMEC, arrives on site at about 0600.
- Visitors this day – Delbert and Mark (DBA), J. Guertin (AMEC), and J. Rodriguez (FCDMC)

- 0715 – CAT 245B excavation of N-S exploration trench starting at about Sta. 85+00
- 0800 – CAT 245 B breaks a hydraulic line and is taken out of service and replaced with Komatsu PC400
- 0215 – completed Stage 1 excavation of N-S exploration trench
- 0300 – CAT 416D backhoe continued excavation of E-S TDR trench at about Sta. 0+00 and with excavation progressing towards the east.
- Mr. Howey leaves site at about 1530.

Tuesday, September 20, 2005

- Mr. Howey and Ms. Cowie, with AMEC, arrive on site at about 0600.
- Visitors this day – Delbert (DBA), R. Weeks (AMEC), J. Guertin (AMEC), and M. Greenslade (FCDMC)
- 0900 – A visual walking inspection of the E-W TDR trench was performed by Mr. Weeks, Mr. Howey, and Ms. Cowie, all with AMEC. Visual observations were made from the edge of the trench. Two passes (one each side) along the length of the trench were completed. Entry into the trench was not utilized. The visual inspection did not locate any areas with evidence of fissure cracking distress.
- Other construction activities on this day included: Continued excavation of the E-W TDR trench across the downstream O&M road and connection with the N-S exploration trench, excavation of TDR trenches on the downstream dam slopes, and the weekly construction meeting.
- Mr. Howey and Ms. Cowie mapped approximately 600 feet of the N-S exploration trench, Stage 1 east sidewall.
- Mr. Howey and Ms. Cowie leave site at about 1515.

Wednesday, September 21, 2005

- Mr. Howey and Ms. Cowie, with AMEC, arrive on site at about 0630.
- Visitors this day – Delbert (DBA) and J. Guertin (AMEC).
- No construction activities occurred on this day at either the N-S exploration trench or the E-W TDR trench.
- Mr. Howey and Ms. Cowie mapped approximately 2400 feet of the N-S exploration trench, Stage 1 east sidewall.

- Mr. Howey and Ms. Cowie leave site at about 1545.

Thursday, September 22, 2005

- Mr. Howey and Ms. Cowie, with AMEC, arrive on site at about 0630.
- Visitors this day – Delbert, Tom D., Tim (DBA), J. Rodriguez (FCDMC), trench subcontractor, and J. Guertin (AMEC).
- 0745 – Was informed by DBA that trenching would not begin until Monday of the following week. Departed site.
- 0830 – Received phone call from DBA informing us that there was a change in schedule and that a trencher for the Stage 2 excavation in the N-S exploration trench would begin this day. Turned around and headed back to the site.
- 0915 – Mr. Howey and Ms. Cowie return arrival to site.
- 1000 – Jetco 7337 wheel trench arrives on site by truck transport. Trench is offloaded.
- 1100 – Trencher begins excavation of Stage 2 trench. Trenching is extremely dusty and is leaving the sidewall disturbed and covered with approximately 1-2 inches of fine silt. Trench bottom is also full of about 6-12 inches of loose material. All visitors present for the day discussed the trenching product and determined that it will not be an acceptable means in which to excavate the N-S exploration trench Stage 2.
- Mr. Howey and Ms. Cowie leave site at about 1145.

Monday, September 26, 2005

- Mr. Fergason and Courtney Cowie, with AMEC, arrive on site at about 0650.
- Meet with Mr. Guertin and the contractor regarding plans for the day. The trackhoe is not on site and no excavation is planned for the day.
- Walk through and inspect excavation.
- Mr. Fergason and Ms. Cowie leave the site at about 0815.

Wednesday, September 28, 2005

- Mr. Fergason arrived site at about 0955. Contractor began excavating key trench at about 0730 with a CAT 319c trackhoe equipped with a 24-inch bucket with one or two laborers in trench cleaning bottom.
- 1000 – Excavation of N-S trench is at about Station 103+00.

- 1045 – Meet with Mr. Guertin and discuss laying back the walls of the outer trench in areas where it is greater than 5 feet deep. These areas were marked with paint.

- Create a compositional log of the trench from about Station 105+20 to 102+00.

- 1515 – Excavation of N-S trench is at about Station 100+00. Mr. Fergason leaves site.

Thursday, September 29, 2005

- Mr. Howey arrived site at about 0615. Contractor began excavating key trench at about Sta. 98+00 with a CAT 319c trackhoe equipped with a 24-inch bucket with one or two laborers in trench cleaning bottom.

- Began mapping Stage 2 east sidewall of N-S exploration trench from Sta. 101+00 to 102+00. Identified several areas of cracking and potential strain relief.

- 1500 – Excavation of N-S trench is at about Station 92+00. Mr. Howey leaves site.

Friday, September 30, 2005

- Mr. Fergason and Ms. Cowie arrive on site at about 0800. Mr. Rodriguez is on site in the project trailers. Crest of dam is inspected to locate earlier identified crack. It is located at about station 96+05. Trench logs are prepared for trench from Station 102+00 to 93+00. The keyway trench is currently excavated to Station 91+50.

- Leave site at about 1200.

Monday, October 3, 2005

- Mr. Fergason and Ms. Cowie arrive on site at 0645. Excavation of N-S trench is continuing at about Station 91+00. Continue to log excavated portion of trench. Trench is logged from Station 96+00 to 90+00. Soil discontinuity readings are taken from Station 105+25 to 90+00.

- 0740 – Mr. Guertin is on site for about 10 minutes.

- 0840 – Excavation of trench is at about Station 89+00.

- Leave site at about 1315. Excavation of N-S trench is at about Station 83+00.

Tuesday, October 4, 2005

- Mr. Fergason and Ms. Cowie arrive on site at 0700. Excavation of N-S trench is at about Station 78+00. Log trench from Station 75+50 to 90+00. Obtain soil discontinuity orientation from Station 75+50 to 90+00. Mr. Rodriguez is on site.

- 0915 – Excavation of N-S trench is complete.

- Mr. Greenslade is on site from about 1100 to 1130.
- Mr. Weeks is on site from about 1230 to 1300.
- Mr. Fergason and Ms. Cowie leave site at about 1300.

Wednesday, October 5, 2005

- Mr. Fergason arrives at site at 0700. Leak in the water line at about Station 101+10 partially floods trench with up to a few inches of water. Continue to log trench in detail and review existing logs.
- Mr. Fergason leaves the site at about 1300.

Thursday, October 6, 2005

- Mr. Fergason arrives at site at 0700. Continue to log trench in detail and review existing logs.
- 0830 – Mr. Guertin on site for about 5 minutes.
- Mr. Fergason leaves site at about 1230.

Monday, October 10, 2005

- Mr. Fergason and Tim Ostapuk with AMEC arrive at site at 0640. Continue to log in detail, review existings logs, and photograph trench. Complete trench logging.
- Mr. Fergason and Mr. Ostapuk leave site at about 0930.

Tuesday, October 11, 2005

- Mr. Fergason and Mr. Weeks arrive at site at 0800. Review trench logs and trench conditions. Identify additional crack on crest in vicinity of Station 96+00.
- 0945 – Mr. Greenslade arrives on site.
- 1000 – Ravi Murthy and Jon Benoist with ADWR arrive on site. Review and discuss trench. ADWR requests that zones of strain and the feature at about Station 85+15 are located and marked in the field for further investigation at a later date. ADWR clears trench to be cleaned and the CLSM poored.
- 1200 – Attend partnering and weekly meetings.
- Mr. Weeks and Mr. Fergason leave site at about 1400.

Wednesday, October 12, 2005

- Mr. Fergason arrives at site at 1000. Mark locations of strain and feature at about Station 85+15 with lathe, nails and GPS. Locations marked include Stations 101+25, 96+25, 94+45, 85+15, and 76+00. Inspect E-W trench where cleaned. Confirm that zone from 7+00 to 7+50 was properly cleaned. Cleaned portion looks adequate.

- Mr. Fergason leaves site at 1130.

Monday, October 17, 2005

- Mr. Fergason arrives sites at about 0930.

- Inspect trenches and speak with Mr. Rodriguez regarding adequacy of trenches.

- Leave site at 1000.

Monday, October 24, 2005

- Mr. Fergason arrives on site at about 0700. Mr. Guertin and Mr. Rodriguez on site at 0715. Mr. Rodriguez leaves at about 0735. Inspect trench for loose debris and rocks – conditions are adequate accept fro a few zones that need minor cleaning.

- 0800 – First truck arrives with a 1.5 sack CLSM mix. Begin pouring first layer of CLSM to a thickness of at least 9 inches. Each truck empties ~10 cubic yards of CLSM into the trench in about 15 minutes of time.

- 20 total trucks. Last truck arrives at 1345.

- Aluminum ties are placed in the CLSM mix at a spacing of about 50 feet.

- Mr. Fergason leaves site at 1415. Approximately 200 cubic yards poured, with about 1300 feet remaining.

Tuesday, October 25, 2005

- Mr. Fergason arrives site at 0700.

- First truck arrives at 0755 and begins pour.

- Eight total trucks, with last truck arriving at 1000 for a total of about 73 cubic yards.

- Attend weekly meeting at 1300. Crimping will begin on Monday, October 31 and the cable will be laid out by the contractor on Saturday, October 29.

- Mr. Fergason leaves site at 1345.

Monday, October 31, 2005

- Mr. Fergason arrives site at 0630. Mr. Greenslade and Bill Leal with the District are on site. Mr. Greenslade is testing the cable. Mr. Fergason marks crimp locations and lengths while District personnel crimps the cable with the crimping tool. The District will survey crimp location to as-built the trench on Thursday, November 3.

- 1030 – Contractor begins to prepare trench for laying the cable into the trench. The contractor will place the cable in the trench on Tuesday, November 1.

- Mr. Fergason leaves site at 1115.

Thursday, November 3, 2005

- Mr. Fergason arrives site at 0930. Inspect trench and TDR cable. A kink (unintended crimp) was found on cable TDR-22 at about Station 7+50. District personnel surveyed all crimp locations and the dent on cable TDR-22. Mr. Greenslade is on site.

- In the east-west portion of the TDR trench, cable TDR-22 is located on the south side of the trench and cable TDR-21 is located on the north side of the trench. At the cable box located at about Station 75+00 on the embankment, from south to north the cable order is TDR-21, TDR-22, TDR-14, and TDR-13. In the N-S portion of the TDR trench cables TDR-14 and TDR-12 are located on the east side of the trench and cables TDR-13 and TDR-11 are located on the west side of the trench. At the measurement box on the embankment at Station 105+20 cable TDR-11 is located on the south side and cable TDR-12 is on the north side.

- 1000 – Begin to pour the second layer of CLSM to a thickness of at least 9 inches. 24 trucks planed for the day. With the remaining for November 4. Mr. Guertin will observe the pour on November 4.

- Comments and notes: 20-30 percent of the aluminum ties have broken. A person needed to hold the cables during the second pour to prevent them from being pushed to the edge of the trench.

- Mr. Fergason leaves site at 1520.

APPENDIX C

TEST TRENCH LOGS

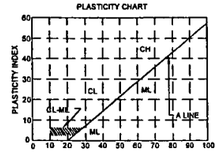
UNIFIED CLASSIFICATION SYSTEM FOR SOILS

Soils are visually classified by the United Soil Classification System on the trench logs presented in this report. Grain-size analysis and Atterberg Limits Tests are often performed on selected samples to aid in classification. The classification system is briefly outlined on this chart. For a more detailed description of the system, see " The Unified Soil Classification System " ASTM Designation: D2487

MAJOR DIVISION			GRAPH SYMBOL	GROUP SYMBOL	TYPICAL DESCRIPTION
COARSE-GRAINED SOILS (Less than 50% passes No. 200 sieve)	GRAVELS (50% or less of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passes No. 200 sieve)		GW	Well graded gravels, gravel-sized mixtures or sand-gravel-cobble mixture.
				GP	Poorly graded gravels, gravel-sized mixtures or sand-gravel-cobble mixture.
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve) — Limits plot below "A" line & hatched zone on plasticity chart		GM	Silty gravels, gravel-sand-silt mixture.
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve) — Limits plot below "A" line & hatched zone on plasticity chart		GC	Clayey gravels, gravel-sand-clay mixture.
	SANDS (More than 50% of coarse fraction passes No. 4 sieve)	CLEAN SANDS (Less than 5% passes No. 200 sieve)		SW	Well graded sands, gravelly sands.
				SP	Poorly graded sands, gravelly sands.
		SANDS WITH FINES (More than 12% passes No. 200 sieve) — Limits plot below "A" line & hatched zone on plasticity chart		SM	Silty sands, sand-silt mixtures.
		SANDS WITH FINES (More than 12% passes No. 200 sieve) — Limits plot below "A" line & hatched zone on plasticity chart		SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)	SILTS & CLAYS Liquid limit less than 50 — LIMITS PLOT BELOW "A" LINE & HATCHED ZONE ON PLASTICITY CHART	SILTS OF LOW PLASTICITY (Liquid limit less than 50)		ML	Inorganic silts, clayey silts with slight plasticity.
		SILTS OF HIGH PLASTICITY (Liquid limit more than 50)		MH	Inorganic silts of high plasticity, silty soils, elastic silts.
		CLAYS OF LOW PLASTICITY (Liquid limit less than 50)		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		CLAYS OF HIGH PLASTICITY (Liquid limit more than 50)		CH	Inorganic clays of high plasticity, fat clays, silty and sandy clays of high plasticity.

NOTE: Coarse-grained soils with between 5% to 12% passing the No. 200 sieve and fine-grained soils with limits plotting in the hatched zone on the plasticity chart to have dual symbol.

PLASTICITY CHART



DEFINITIONS OF SOIL FRACTIONS

SOIL COMPONENT	PARTICLE SIZE RANGE
Boulders	Above 300mm (12in.)
Cobbles	300mm to 75mm (12in. to 3in.)
Gravel	75mm (3in.) to No. 4 sieve
Coarse gravel	75mm to 19mm (3in. to 3/4in.)
Fine gravel	19mm (3/4in.) to No. 4 sieve
Sand	No. 4 to No. 200
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Fines (silt or clay)	Below No. 200 sieve

DESCRIPTION OF MASTER SOIL HORIZONS AND SUBHORIZONS

O horizon - Surface accumulations of mainly organic material; may or may not be, or has been, saturated with water. Subdivided on the degree of decomposition as measured by the fiber content after the material is rubbed between the fingers.

Oi horizon - Least decomposed organic materials; rubbed fiber content is greater than 40% by volume.

Oe horizon - Intermediate degree of decomposition; rubbed fiber content is between 17% and 40% by volume.

Oa horizon - Most decomposed organic materials; rubbed fiber content is less than 17% by volume.

A horizon - Accumulation of humified organic matter mixed with mineral fraction; the latter is dominant. Occurs at the surface or below an O horizon; Ap is used for those horizons disturbed by cultivation.

E horizon - Usually underlies an O or A horizon, and can be used for eluvial horizons within or between parts of the B horizon (e.g., common above fragipan, x). Characterized by less organic matter and/or fewer sesquioxides (compounds of iron and aluminum) and/or less clay than the underlying horizon. Many are marked by a concentration of sand and silt. Horizon is light colored due mainly to the color of the primary mineral grains because secondary coatings on the grains are absent. relative to the underlying horizon, color value will be higher or chrome will be lower.

B horizon - Underlies an O, A, or E horizon, and shows little or no evidence of the original sediment or rock structure. Several kinds of B horizons are recognized, some based on the kinds of materials illuviated into them, others on residual concentrations of materials. Subdivisions are:

- **BH horizon** - Illuvial accumulation of amorphous organic matter-sesquioxide complexes that either coat grains or form sufficient coatings and pore fillings to cement the horizon.
- **Bhs horizon** - Illuvial accumulation of amorphous organic matter-sesquioxide complexes, and sesquioxide component is significant; both color value and chroma are three or less.
- **Bk horizon** - Illuvial accumulation of alkaline earth carbonates, mainly calcium carbonate; the properties do not meet those for the K horizon.
- **Bl horizon** - Illuvial concentrations primarily of silt. Used when silt cap development reaches stages 5 and 6.
- **Bo horizon** - Residual concentration of sesquioxides, the most soluble materials having been removed.
- **Bq horizon** - Accumulation of secondary silica.
- **Bs horizon** - Illuvial accumulation of amorphous organic matter-sesquioxide complexes if both value and chroma are greater than three.
- **Bt horizon** - Accumulation of silicate clay that either formed in situ or is illuvial (clay translocated either within the horizon or into the horizon); hence it will have more clay than the assumed parent material and/or the overlying horizon. Illuvial clay can be recognized as grain coatings, bridges between grains, coatings on ped or grain surfaces or in pores, or thin, single or multiple near-horizontal discreet accumulation layers of pedogenic origin (clay bands or lamellae). In places, subsequent pedogenesis can destroy evidence of illuviation.
- **Bw horizon** - Development of color (redder hue or higher chroma relative to C) or structure, or both, with little or no apparent illuvial accumulation or material.
- **By horizon** - Accumulation of secondary gypsum.
- **Bz horizon** - Accumulation of salts more soluble than gypsum.

K horizon - A subsurface horizon so impregnated with carbonate that its morphology is determined by the carbonate. Authigenic carbonate coats or engulfs nearly all primary grains in a continuous medium. The uppermost part of a strongly developed horizon is laminated, brecciated, and/or pisolithic. The cemented horizon corresponds to some caliches and calcretes.

C horizon - A subsurface horizon, excluding R, like or unlike material from which the soil formed, or is presumed to have formed. Lacks properties of A and B horizons, but includes materials in various stages of weathering.

Cox and Cu horizons - In many unconsolidated deposits, the C horizon consists of oxidized material overlying seemingly unweathered C. The oxidized C does not meet the requirements of the Bw horizon. In stratigraphy, it is important to differentiate between these two kinds of C horizons. Here Cox is used for oxidized C horizons and Cu for unweathered C horizons.

Cr horizon - In soils formed on bedrock, there commonly will be a zone of weathered rock between the soil and the underlying rock. If it can be shown that the weathered rock has formed in place, and has not been transported, it is designated as Cr. Such material is the saprolite; in situ formation is demonstrated by preservation or original rock features, such as grain-to-grain texture, layering, or dikes. If such material has been moved, however, the original structural features of the rock are lost, and the transported material may be the C horizon for the overlying soil. Those Cr horizons with translocated clay, as shown by clay films, are termed Crt.

R horizon - Consolidated bedrock underlying soil.

TERMINOLOGY USED TO DESCRIBE THE RELATIVE DENSITY, CONSISTENCY OR FIRMNESS OF SOILS

The terminology used on the trench logs to describe the relative density, consistency or firmness of soils relative to the standard penetration resistance is presented below. The standard penetration (N) in blows per foot is obtained by the ASTM D1586 procedure using 2" O.D., 1 3/8" I.D. samplers.

1. Relative Density. Terms for description of relative density of cohesionless, uncemented sands and sand-gravel mixtures.

N	Relative Density
0 - 4	Very loose
5 - 10	loose
11 - 30	Medium dense
31 - 50	Dense
50+	Very dense

2. Relative Consistency. Terms for description of clays which are saturated or near saturation.

N	Relative Consistency	Remarks
0 - 2	Very soft	Easily penetrated several inches with fist.
3 - 4	Soft	Easily penetrated several inches with thumb.
5 - 8	Medium stiff	Can be penetrated several inches with thumb with moderate effort.
9 - 15	Stiff	Readily indented with thumb, but penetrated only with great effort.
16 - 30	Very stiff	Readily indented with thumbnail.
30+	Hard	Indented only with difficulty by thumbnail.

3. Relative Firmness. Terms for description of partially saturated and/or cemented soils which commonly occur in the Southwest including clays, cemented granular materials, silts and silty and clayey granular soils.

N	Relative Firmness
0 - 4	Very soft
5 - 8	soft
9 - 15	Moderately firm
16 - 30	firm
31 - 50	Very firm
50+	Hard

STAGES OF CARBONATE MORPHOLOGY

Stage	Gravelly Parent Material	Nongravelly Parent Material
I	Thin discontinuous clast coatings; some filaments; matrix can be calcareous next to stones; about 4% calcium carbonate	Few filaments or coatings on sand grains; <10% calcium carbonate
I +	Many or all clast coatings are thin and continuous	Filaments are common
II	Continuous clast coatings; local cementation of few to several clasts; matrix is loose and calcareous, enough to give somewhat whitened appearance	Few to common nodules; matrix between nodules is slightly whitened by carbonate (15% - 50% by area), and the latter occurs in veinlets and as filaments; some matrix can be noncalcareous; about 10 %- 15% calcium carbonate in whole sample, 15% - 75% in nodules
II +	Continuous clast coatings; local cementation of few to several clasts; matrix is loose and calcareous, enough to give somewhat whitened appearance; carbonate in matrix is more pervasive	Common nodules; 50% - 90% of matrix is whitened; about 15% calcium carbonate in whole sample

Continuity of fabric high in carbonate

Stage	Gravelly Parent Material	Nongravelly Parent Material
III	Horizon has 50% - 90% K fabric with carbonate forming an essentially continuous medium; color mostly white; carbonate-rich layers more common in upper part; about 20% to 25% calcium carbonate	Many nodules, and carbonate coats so many grains that over 90% of horizon is white; carbonate-rich layers more common in upper part; about 20% calcium carbonate
III +	Most clasts have thick carbonate coats; matrix particles continuously coated with carbonate or pores plugged by carbonate; cementation more or less continuous; >40% calcium carbonate	Most grains coated with carbonate; most pores plugged; >40% calcium carbonate

Partly or entirely cemented

Stage	Gravelly Parent Material
IV	Upper part of K horizon is nearly pure cemented carbonate (75 - 90% calcium carbonate) and has a weak platy structure due to the weakly expressed laminar depositional layers of carbonate; the rest of the horizon is plugged with carbonate (50 - 75% calcium carbonate)
V	Laminar layer and platy structure are strongly expressed; incipient brecciation and pisolith (thin, multiple layers of carbonate surrounding particles) formation
VI	Brecciation and recementation, as well as pisoliths, are common

Modified from Birkeland (1999) with original compilations from Gile and others (1981) and Machette (1985)

SELECTED SUBORDINATE DEPARTURES

Lower-case letters follow the master horizon designation. Those that are mainly specific to a particular master horizon are given above. Some can be found in a variety of horizons; they are listed below.

b - Buried soil horizon with major features formed prior to burial. May be deeply buried and not affected by subsequent pedogenesis; if shallow, they can be part of a younger soil profile.

c - Concretions or nodules cemented by accumulations of iron, aluminum, manganeses, or titanium.

f - Horizon cemented by permanent ice. Seasonally frozen horizons are not included, nor is dry permafrost material (material that lacks ice but is colder than 0°)

g - Horizon in which gleying is a dominant process, that is either iron has been removed during soil formation or saturation with stagnant water has preserved a reduced state. Common to these soils are neutral color, with or without mottling. Most have chrome of two or less and many have redox concentrations. Strong gleying is indicated by chromas of one or less, and hues bluer than 10Y. Much of the above color is due to the color of reduced iron, or the color of uncoated grains from which iron pigment has been removed. Bg is used for horizons with pedogenic features in addition to gleying is the only pedogenic feature, the horizon is designated Cg.

j - Used in combination with other horizon designation (Btj, Ejl) to denote incipient development of the particular feature or property. A rule for some designations would be to use it for those horizons that do not meet criteria for diagnostic horizons (e.g., Ej for an eluvial horizon that does not meet the criteria of the albic horizon).

k - Accumulation of alkaline earth carbonates, commonly calcium carbonate.

m - Horizon that is more than 90% cemented. Denote the cementing material (Km, carbonate; qm, silica; Kqm, carbonate and silica; etc.).

n - Accumulation of exchangeable sodium.

ss - Presence of slickensides.

v - Has two uses. (1) Plinthite, iron-rich, humus-poor, reddish material that hardens irreversibly when dried. (2) If A horizons in arid environments have a vesicular structure (round voids), they are designated Av.

x - Subsurface horizon characterized commonly by a bulk density greater than that of the adjacent horizons, firmness and brittleness, and very coarse prismatic structure with bleached vertical faces (fragipan character). An E horizon nomenclature designations are identical, and both are pedogenic, a prime is applied to the lower E horizon. In this example, the profile would be A/E/BtE'/Bx/Cox.

y - Accumulation of gypsum.

z - Accumulation of salts more soluble than gypsum (e.g. NaCl).

From Soil Survey Division Staff (1993), with modification; after Birkeland (1999).

SOIL COLOR DESIGNATIONS

Descriptions of soil color are based on the Year-2000 revised Munsell Soil Color Charts published by GretagMacbeth. The determination of soil color is accomplished by direct comparison of the soil sample with an series of color charts that each depict a constant hue, and the array of color variations of both value (lightness) and chroma (strength) of that hue. Hue indicates the color's relationship to the true colors of yellow, green, blue and purple. The Mussell system employs both a name for the selected color and an alpha-numeric notation. These notations denote the hue, value and chroma of the selected color. For example, a notation of 5YR 6/3 denotes a hue in the middle of the yellow-red spectrum (scale runs from 0 to10, yellow to red) with a value of 6 (the higher the number the lighter), and a chroma of 3 (medium strength). The description of a 5YR 6/3 soil is light reddish brown.

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	N.T.S.

KEY TO TRENCH LOGS

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
CONTRACT FCD 2004C068, WORK ASSIGNMENT NO. 1

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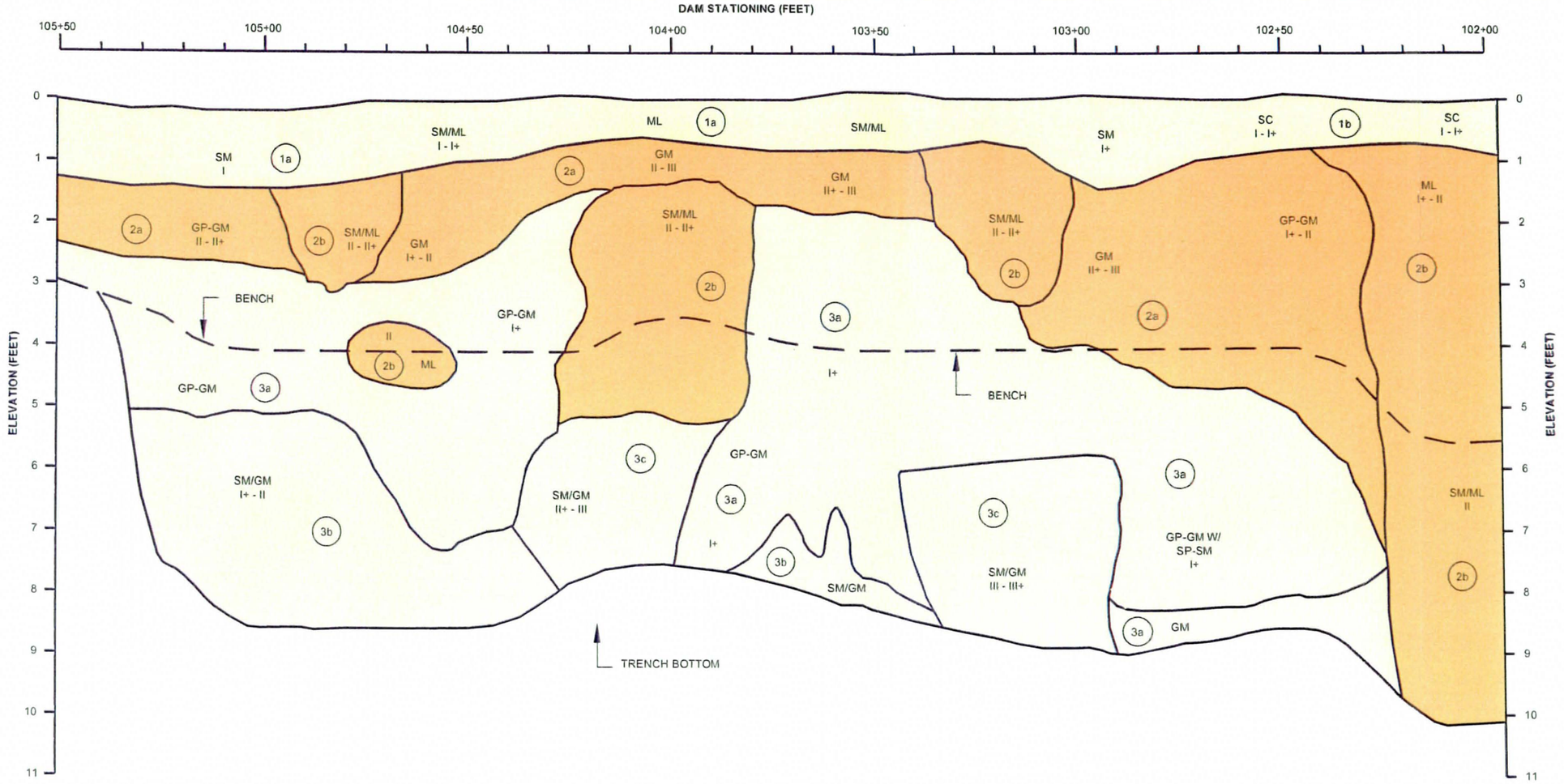

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 30', VERTICAL 1" = 2'

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
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FIGURE C-1

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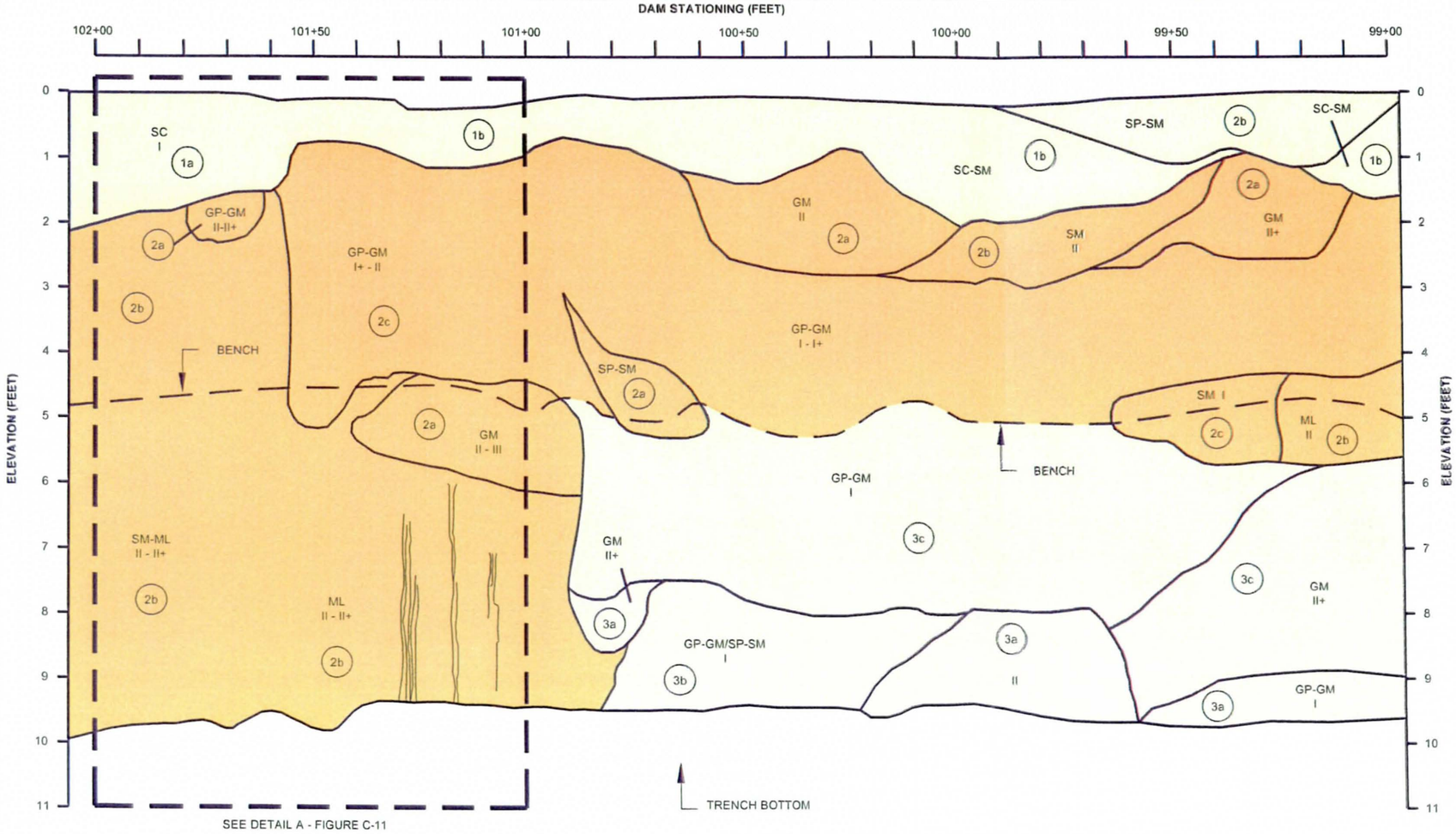

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 30', VERTICAL 1" = 2'

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
CONTRACT FCD 2004C068, WORK ASSIGNMENT NO. 1

FIGURE C-2

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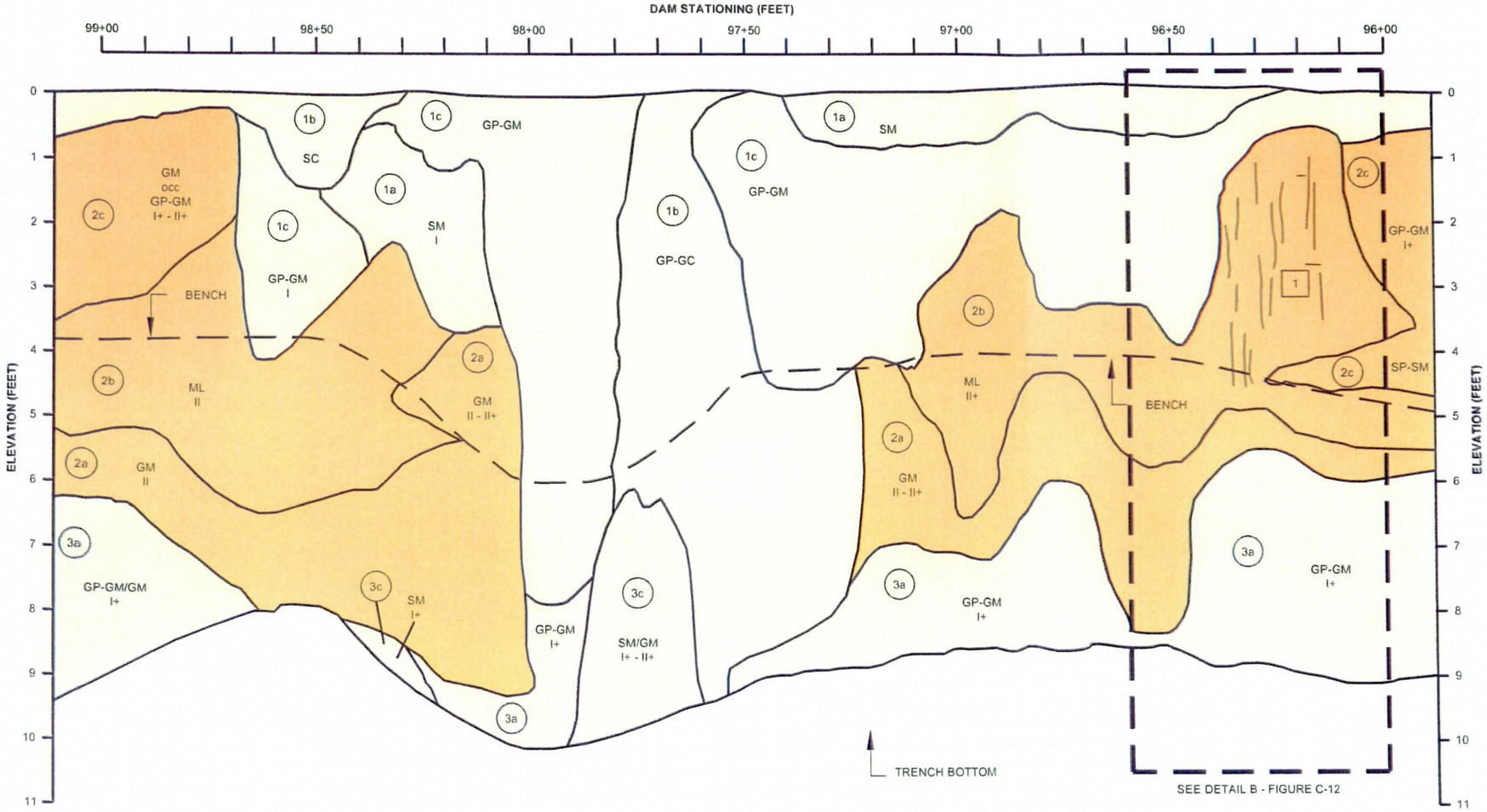

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 30', VERTICAL 1" = 2'

NOTE:

1 - ZONE OF STAIN:
SOIL DISCONTINUITY GENERALLY ARE EXPRESSION OF PLASMATIC/COLUMNAR SOIL STRUCTURE, OPEN UP TO ~1/8" (POSSIBLE MACHINE) TYPICAL LENGTH <1'; SPACING SEVERAL INCHES TO 1'+

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
CONTRACT FCD 2004C068, WORK ASSIGNMENT NO. 1

FIGURE C-3

amec

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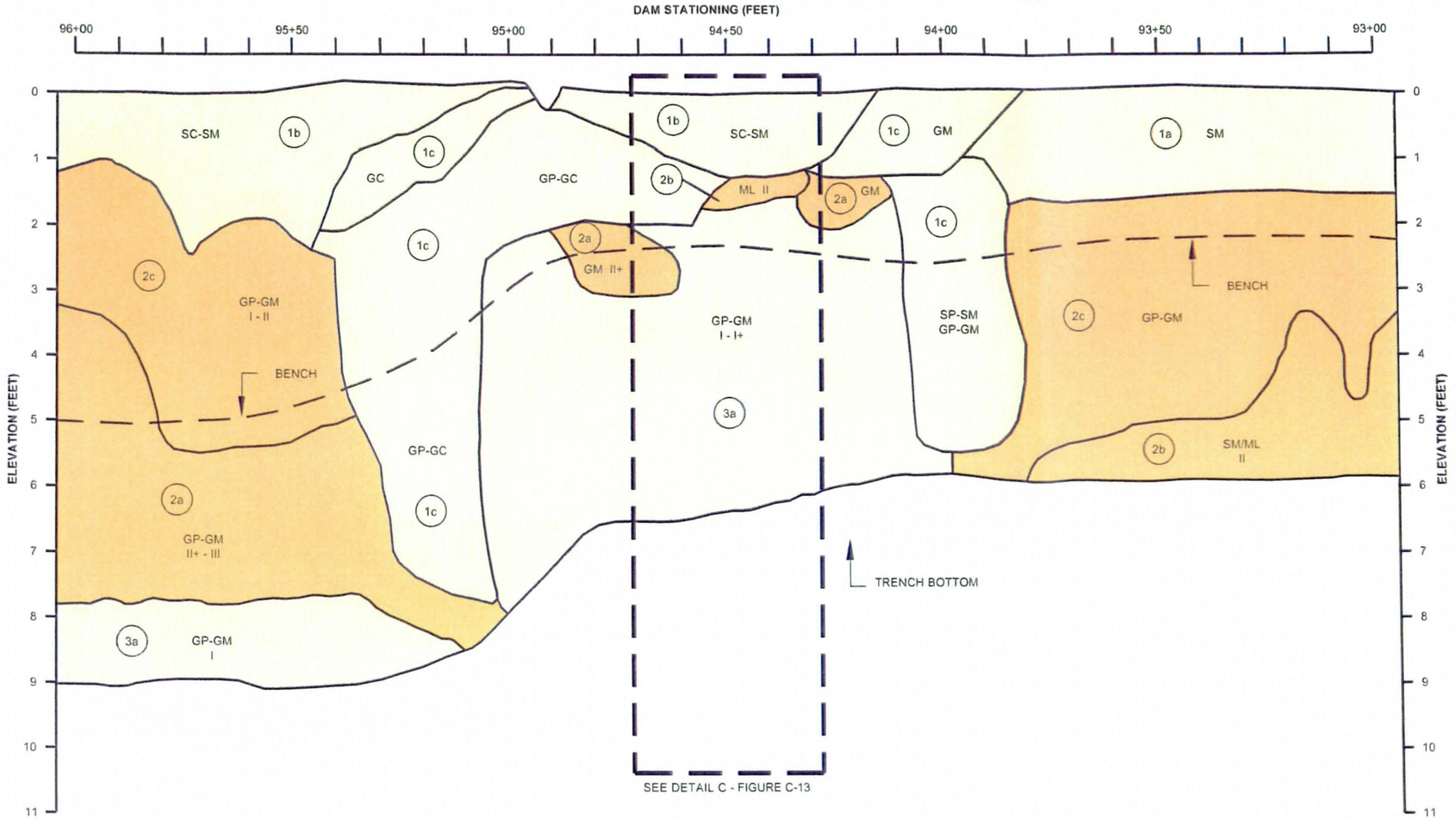

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 30', VERTICAL 1" = 2'

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
CONTRACT FCD 2004C068, WORK ASSIGNMENT NO. 1

FIGURE C-4

amec

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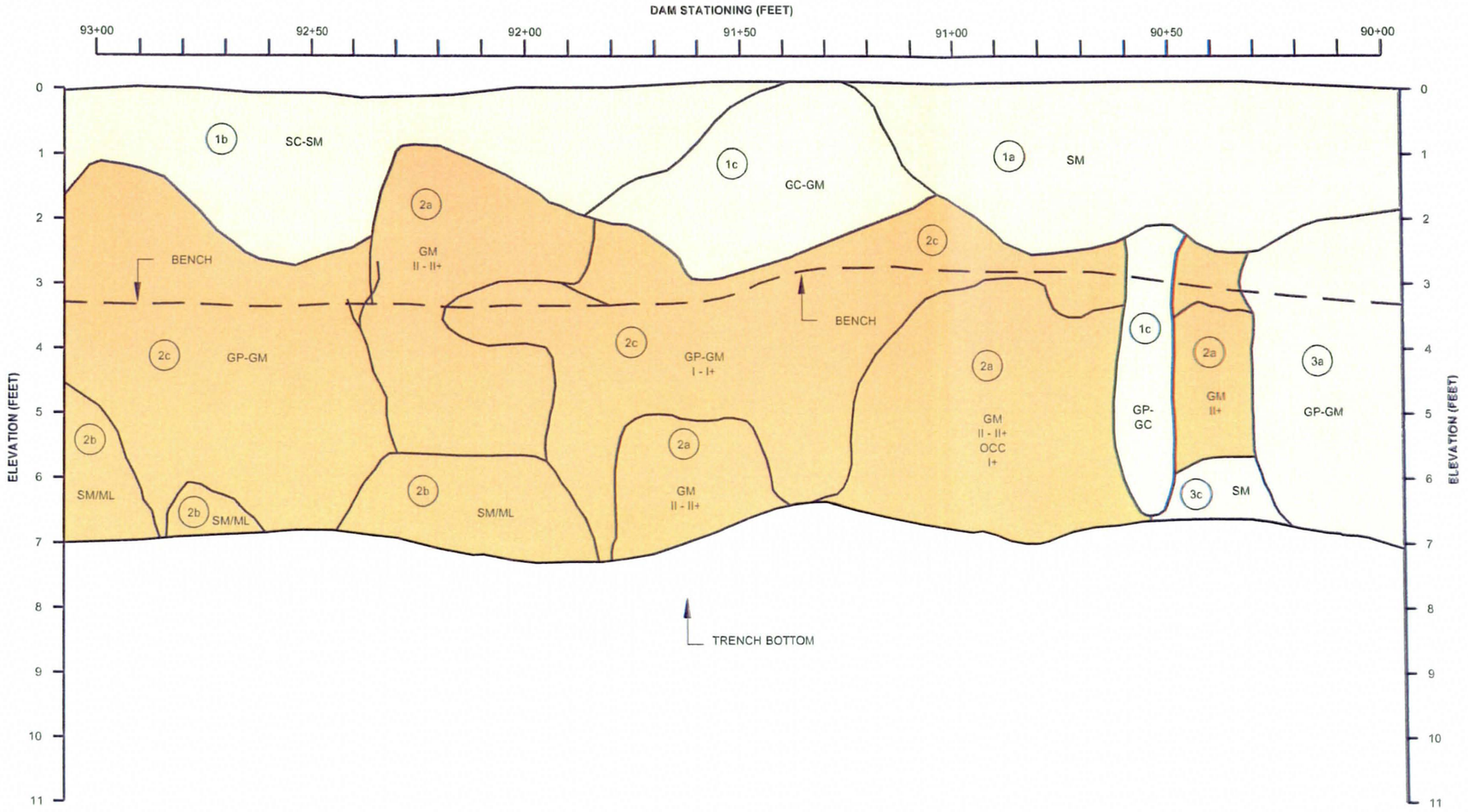

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 30', VERTICAL 1" = 2'

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
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FIGURE C-5

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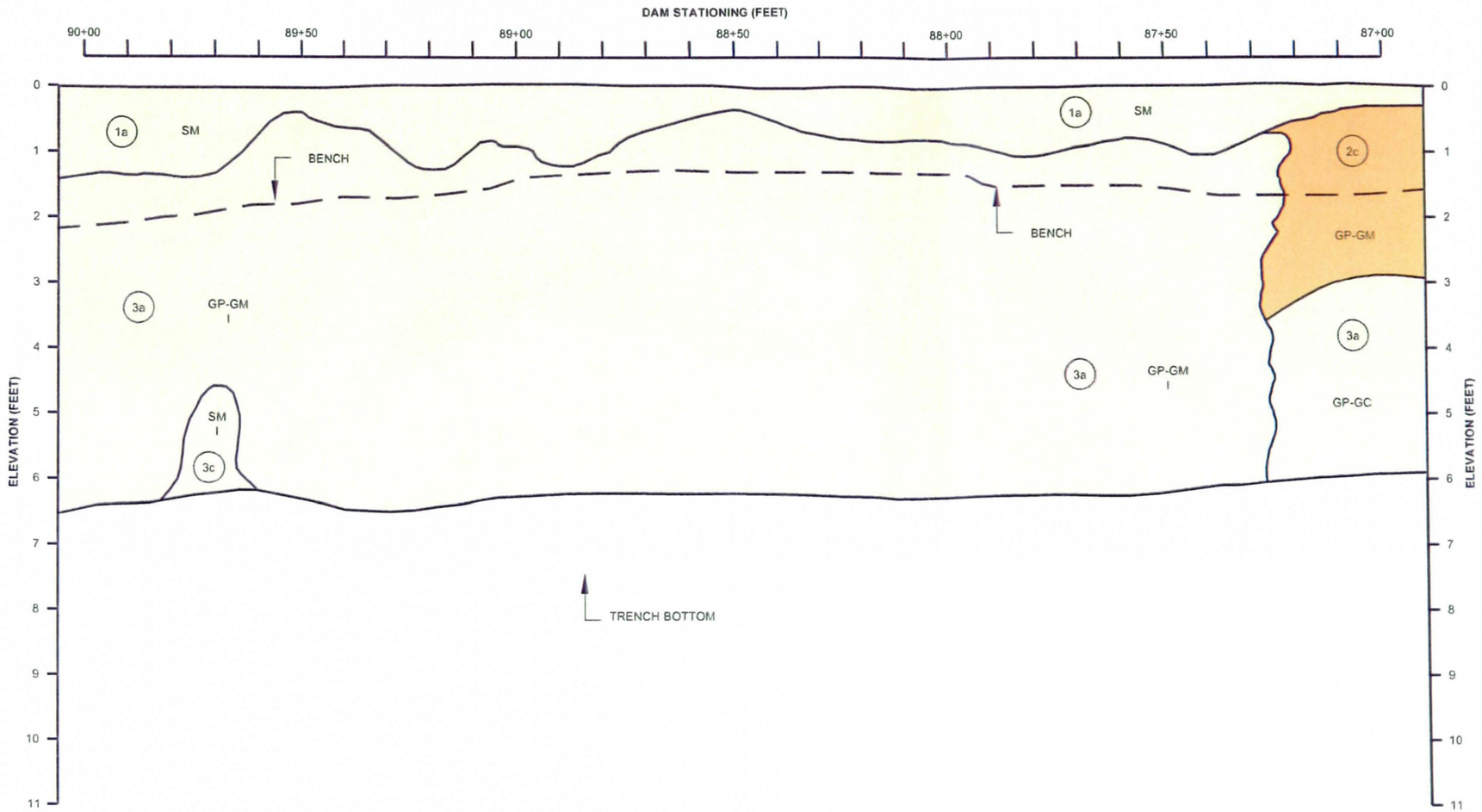

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 30', VERTICAL 1" = 2'

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) — USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
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FIGURE C-6

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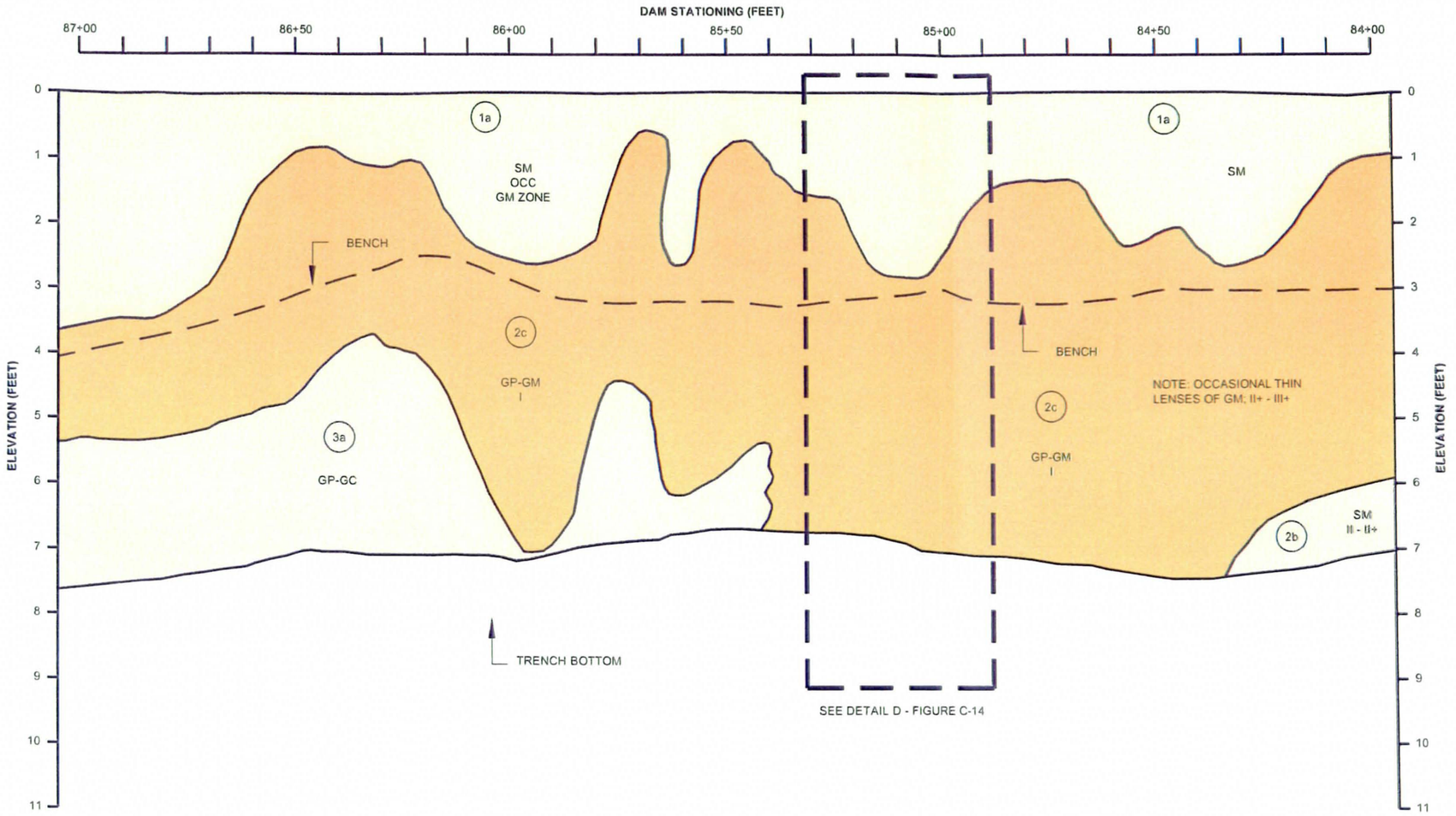

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 30', VERTICAL 1" = 2'

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
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FIGURE C-7

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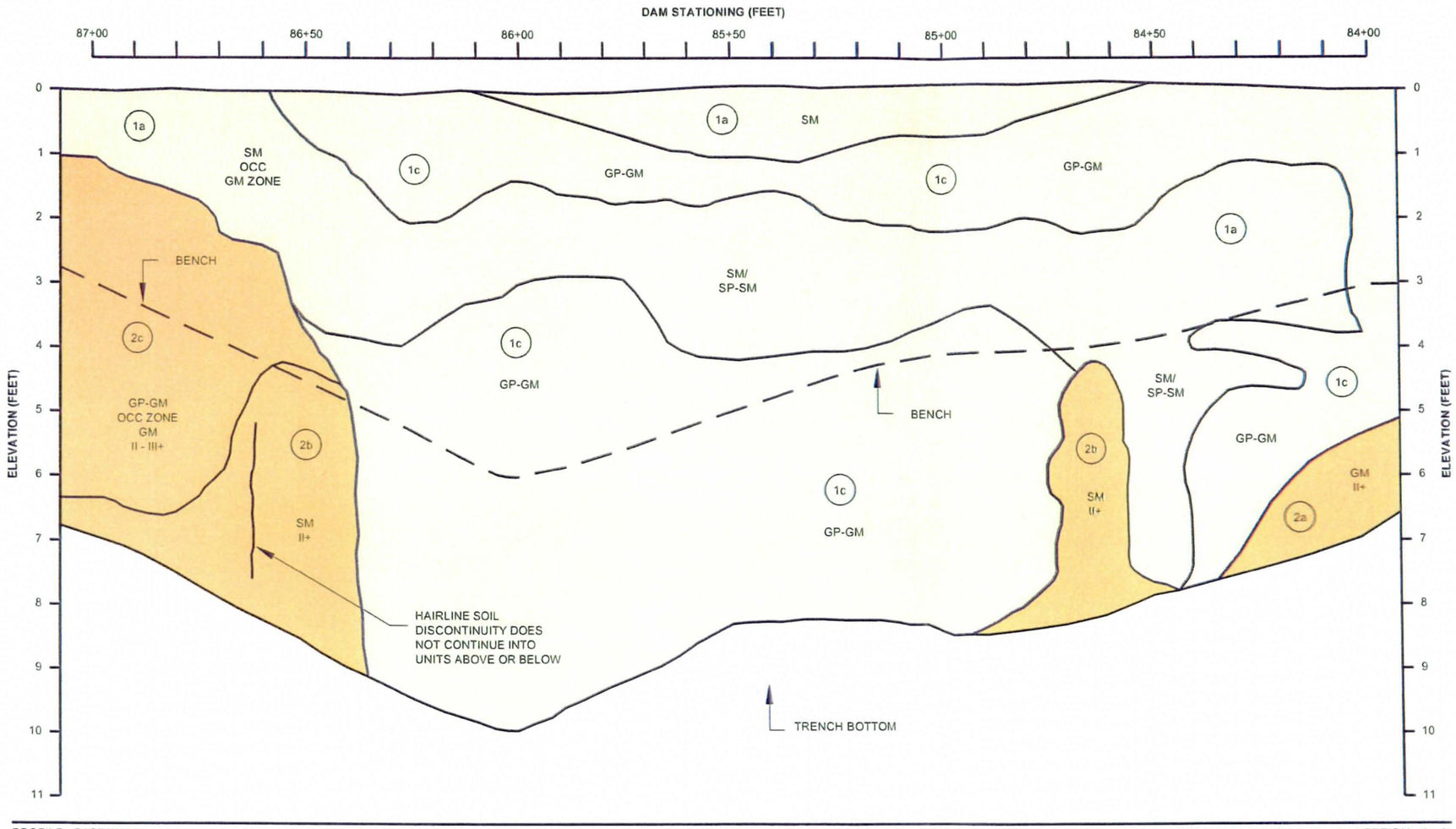

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 30', VERTICAL 1" = 2'

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
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FIGURE C-8

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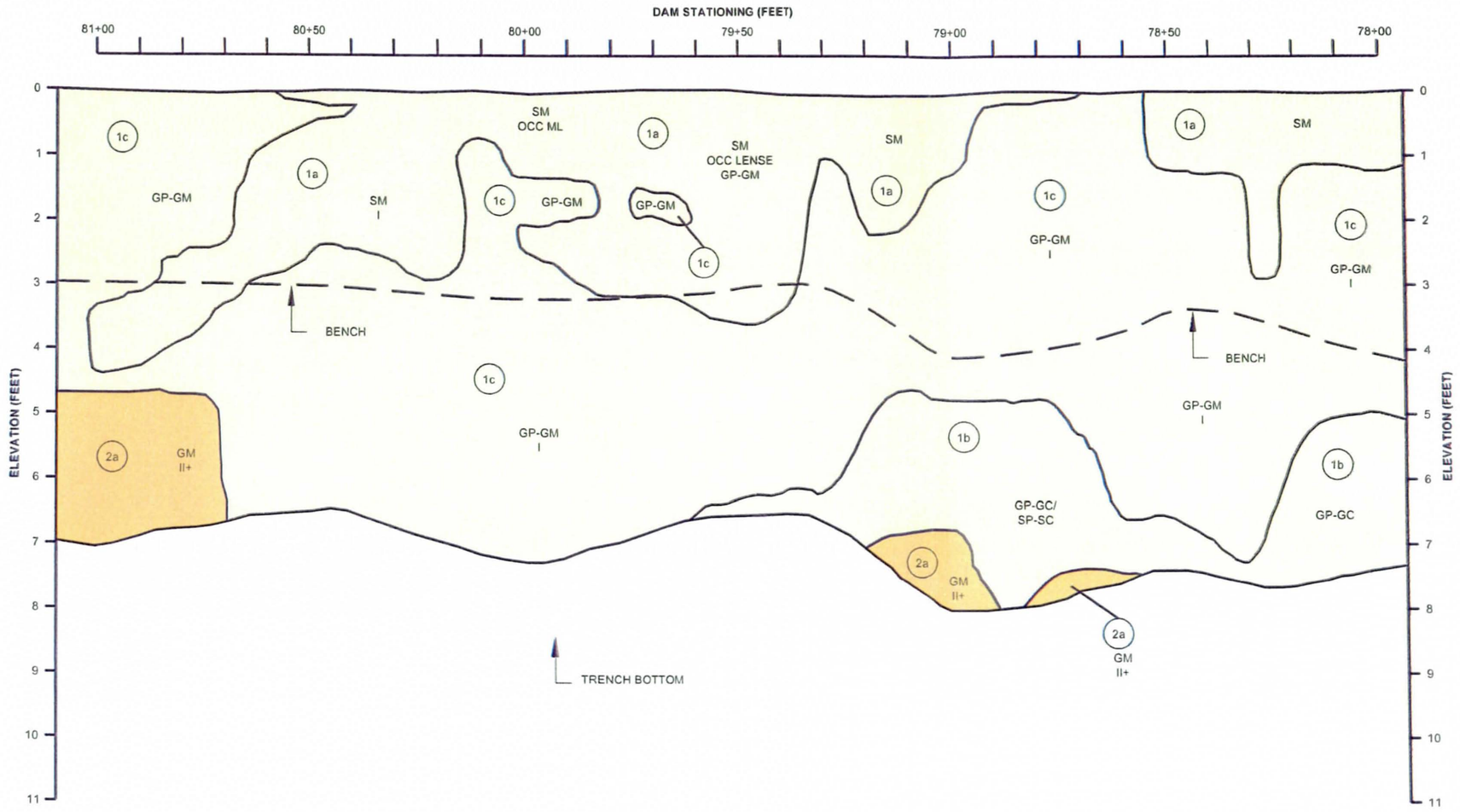

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 30', VERTICAL 1" = 2'

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
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FIGURE C-9

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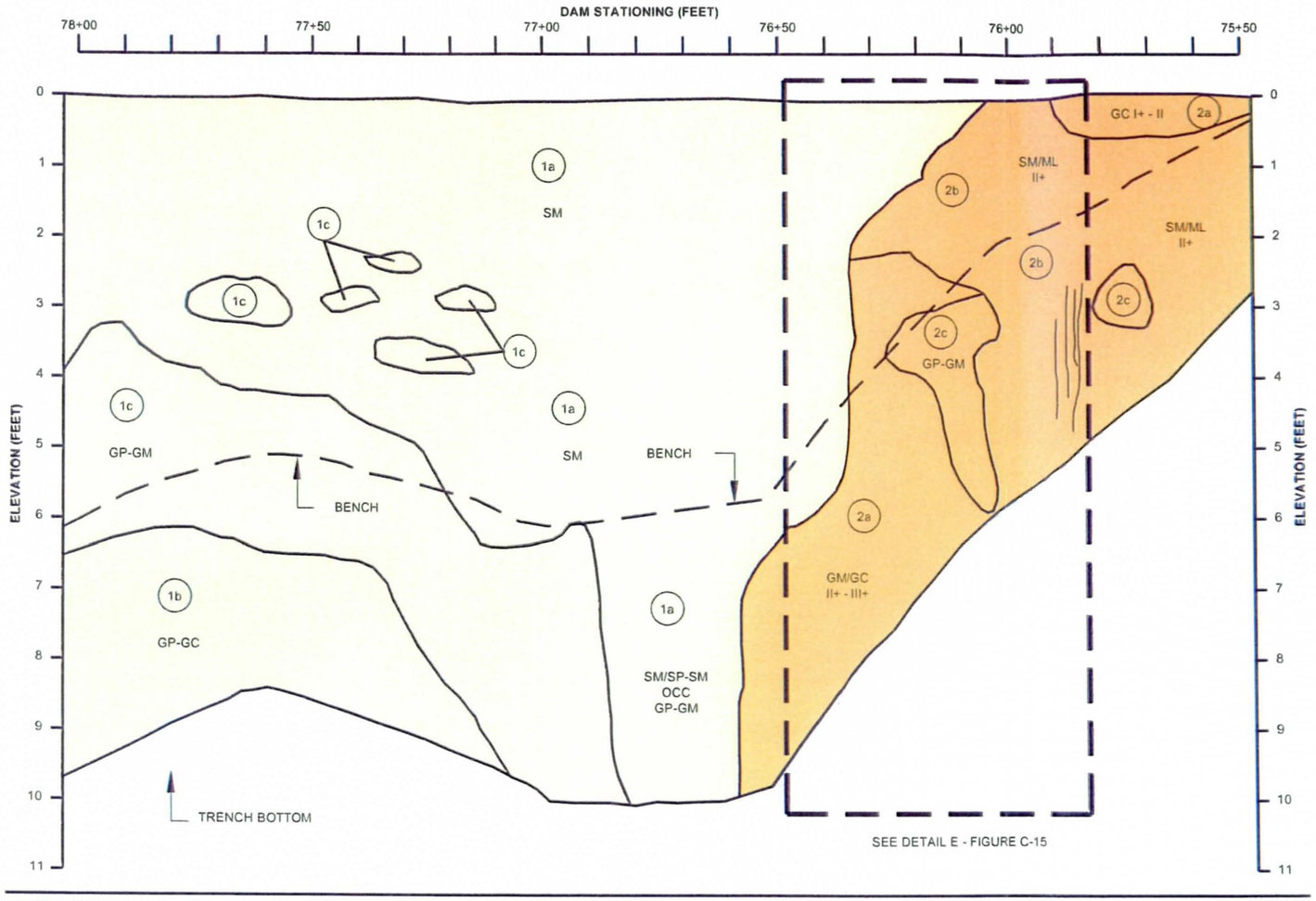

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 30', VERTICAL 1" = 2'

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
CONTRACT FCD 2004C068, WORK ASSIGNMENT NO. 1

FIGURE C-10

amec

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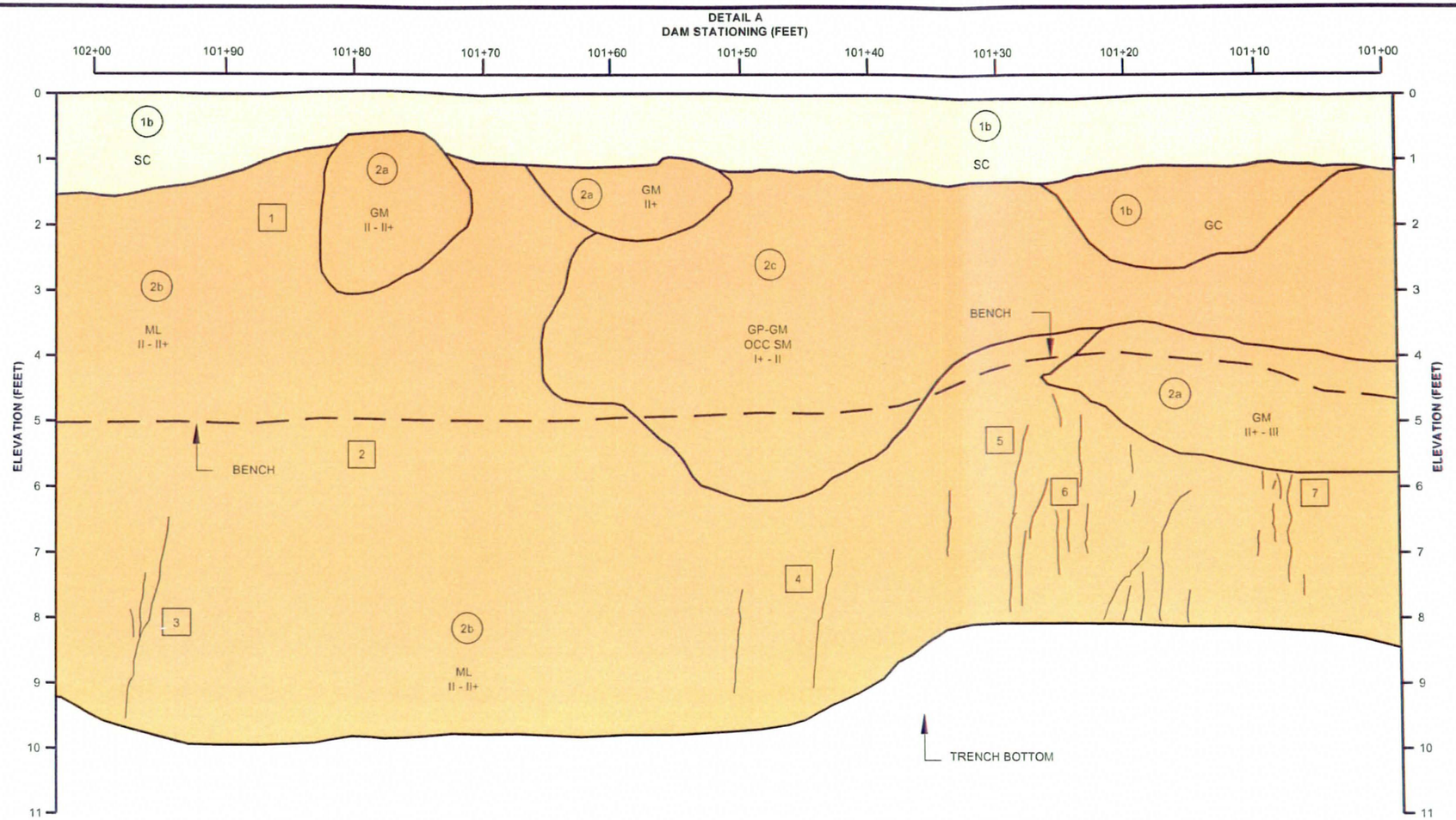

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 10', VERTICAL 1" = 2'

NOTES:

1 - BLOCKY SOIL STRUCTURE NEAR SURFACE, BLOCK SIZE TYP <1"

2 - WHERE UNIT 2b IS PRESENT AT TOP OF BENCH EXCAVATION CAUSED SOIL TO BREAK UP IN BLOCKS; BLOCK SIZES RANGE FROM <1" TO ~6"

3 - CRACKS HAVE NO APERTURE TO HAIRLINE (<1/16") WAVY-STEPPED; DO NOT APPEAR TO CONTINUE TO BOTTOM OF TRENCH; PHOTO 101_1

4 - CRACKS HAVE NO APERTURE TO HAIRLINE (<1/16") WAVY-STEPPED; DO NOT APPEAR TO CONTINUE TO BOTTOM OF TRENCH; PHOTO 101_2

5 - CRACKS HAVE NO APERTURE TO HAIRLINE (<1/16") WAVY-STEPPED; OCCASIONALLY PRESENT ON BOTTOM OF TRENCH; PHOTO 101_3 FRACTURE SURFACE COUTED WITH CALCIUM CARBONATE

6 - CRACKS HAVE NO APERTURE TO HAIRLINE (<1/16") WAVY-STEPPED; OCCASIONALLY PRESENT ON BOTTOM OF TRENCH; PHOTO 101_4 & 101_5

7 - CRACKS HAVE NO APERTURE TO HAIRLINE (<1/16") WAVY-STEPPED; OCCASIONALLY PRESENT ON BOTTOM OF TRENCH; PHOTO 101_6

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
CONTRACT FCD 2004C068, WORK ASSIGNMENT NO. 1

FIGURE C-11

amec

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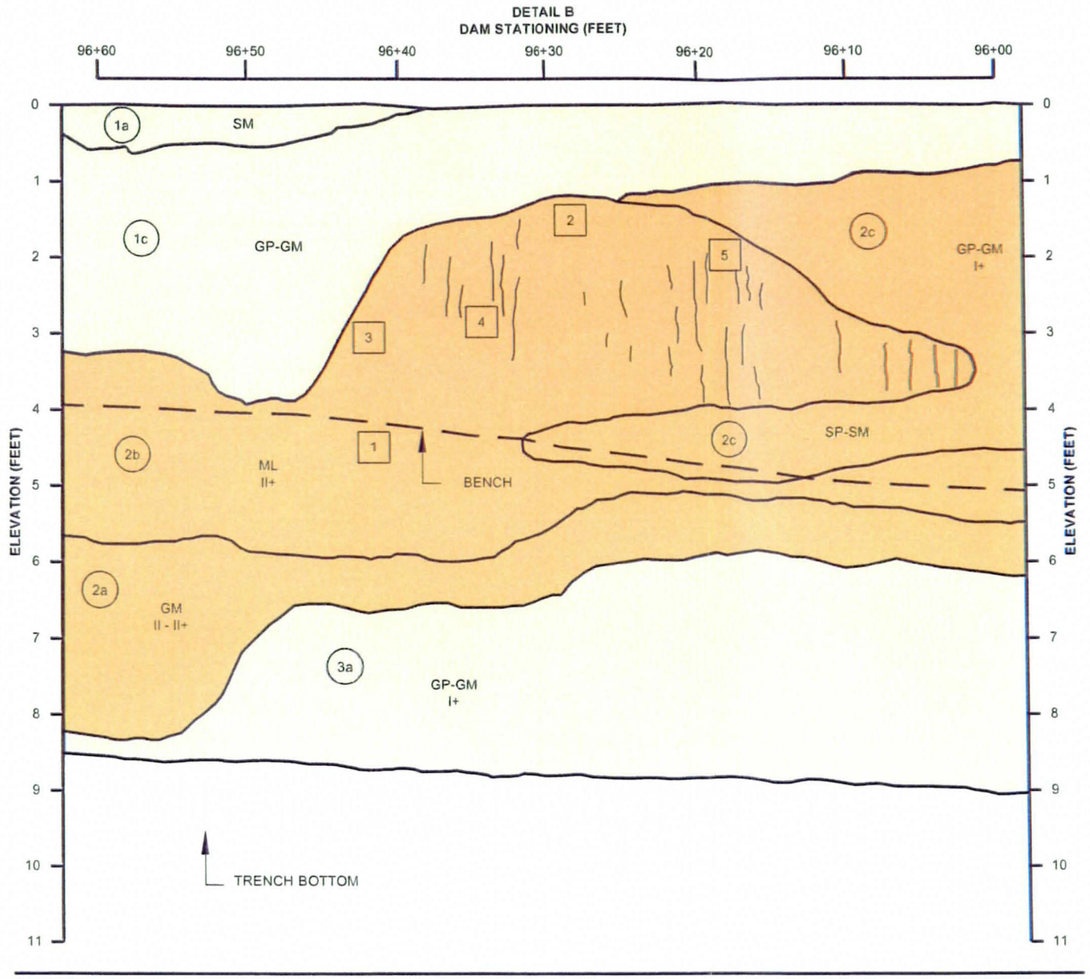

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 10', VERTICAL 1" = 2'

NOTES:

1. WHERE UNIT 2b IS PRESENT AT TOP OF BENCH SOIL IS BROKEN BY MACHINE EFFECTS INTO BLOCKY SECTIONS, TYPICAL BLOCK SIZE FROM <1" TO 4"
2. NEAR TOP OF UNIT 2b SOIL STRUCTURE IS BLOCKY WITH BLOCK SIZE TYPICALLY <1"
3. TYPICAL SOIL STRUCTURE OF UNIT 2b BENEATH TOP PORTION IS PRISMATIC TO COLUMNAR WITH TYPICAL "HEIGHTS" OF 1" TO 6"
4. DISCONTINUITIES ASSOCIATED WITH SOIL STRUCTURE; TYPICALLY <1' LONG; OCCASIONALLY APPROACH 2'; WAVY TO STEPPED, TYPICALLY HAIRLINE TO <1/16" DIAMETER, DO NOT CONTINUE INTO UNITS ABOVE BELOW PHOTO 96_1 & 96_2
5. DISCONTINUITIES ASSOCIATED WITH SOIL STRUCTURE; TYPICALLY <1' LONG; OCCASIONALLY APPROACH 2'; WAVY TO STEPPED, TYPICALLY HAIRLINE TO <1/16" DIAMETER, DO NOT CONTINUE INTO UNITS ABOVE BELOW PHOTO 96_3 & 96_4

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
CONTRACT FCD 2004C068, WORK ASSIGNMENT NO. 1

FIGURE C-12

amec

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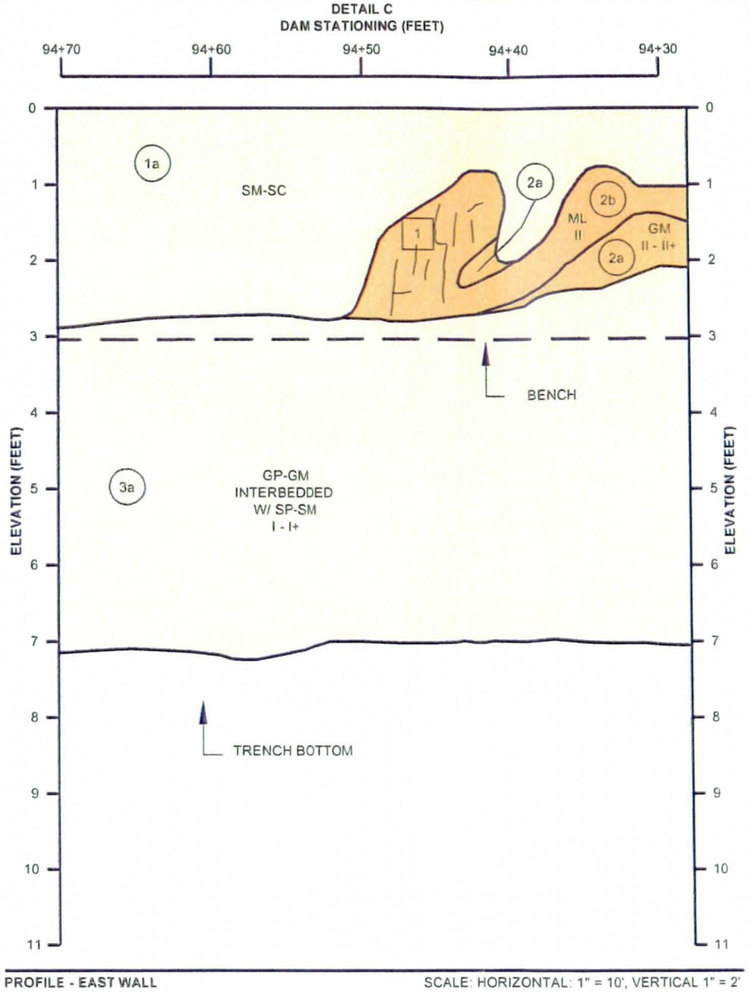

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 10', VERTICAL 1" = 2'

NOTES:

1 - SOIL STRUCTURE PRISMATIC TO COLUMNAR; CRACKING ASSOCIATED WITH STRUCTURE; HAIRLINE TO 1/16" APENTURE; SOME ROOTLETTS; PHOTOS 94_1 & 94_2. CRACKS DO EXTEND INTO UNIT ABOVE OR BELOW

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
CONTRACT FCD 2004C068, WORK ASSIGNMENT NO. 1

FIGURE C-13

amec

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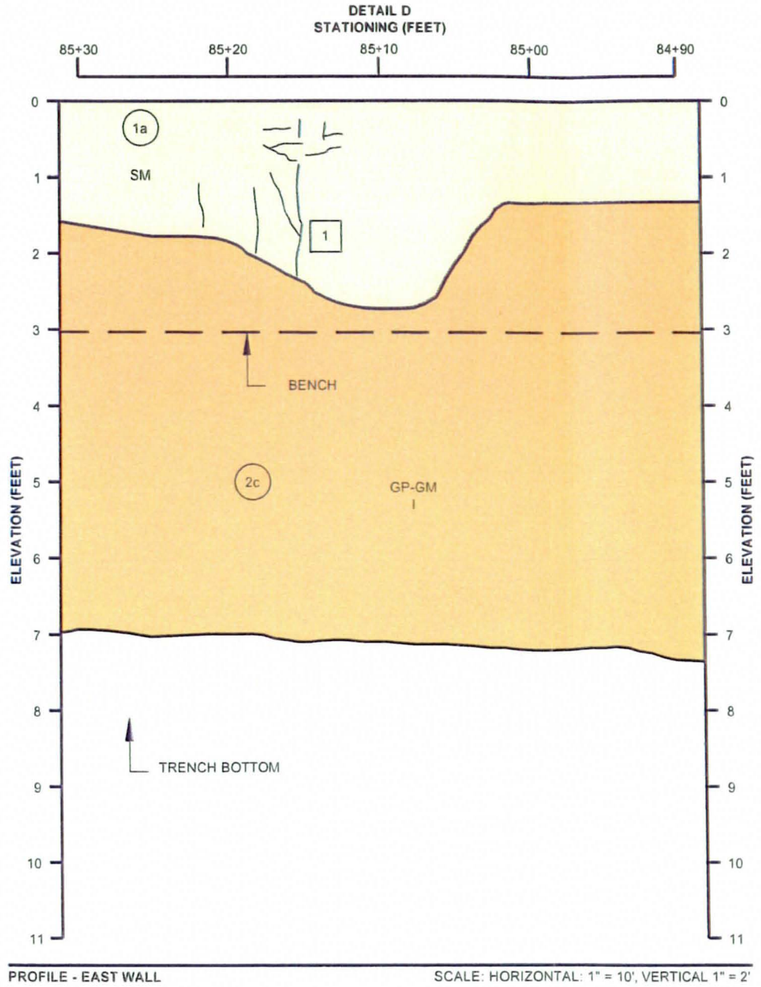

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 10', VERTICAL 1" = 2'

NOTES:

1 - SOIL DISCONTINUITY WITH APERTURE OF 1/4"; DOES NOT CONTINUE INTO UNIT BELOW; APPEARS TO BE CAUSED BY EXCAVATION EQUIPMENT AND LATER MOVEMENT OF EQUIPMENT; PHOTOS 84_1, 84_2 & 84_3

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) — USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
CONTRACT FCD 2004C068, WORK ASSIGNMENT NO. 1

FIGURE C-14

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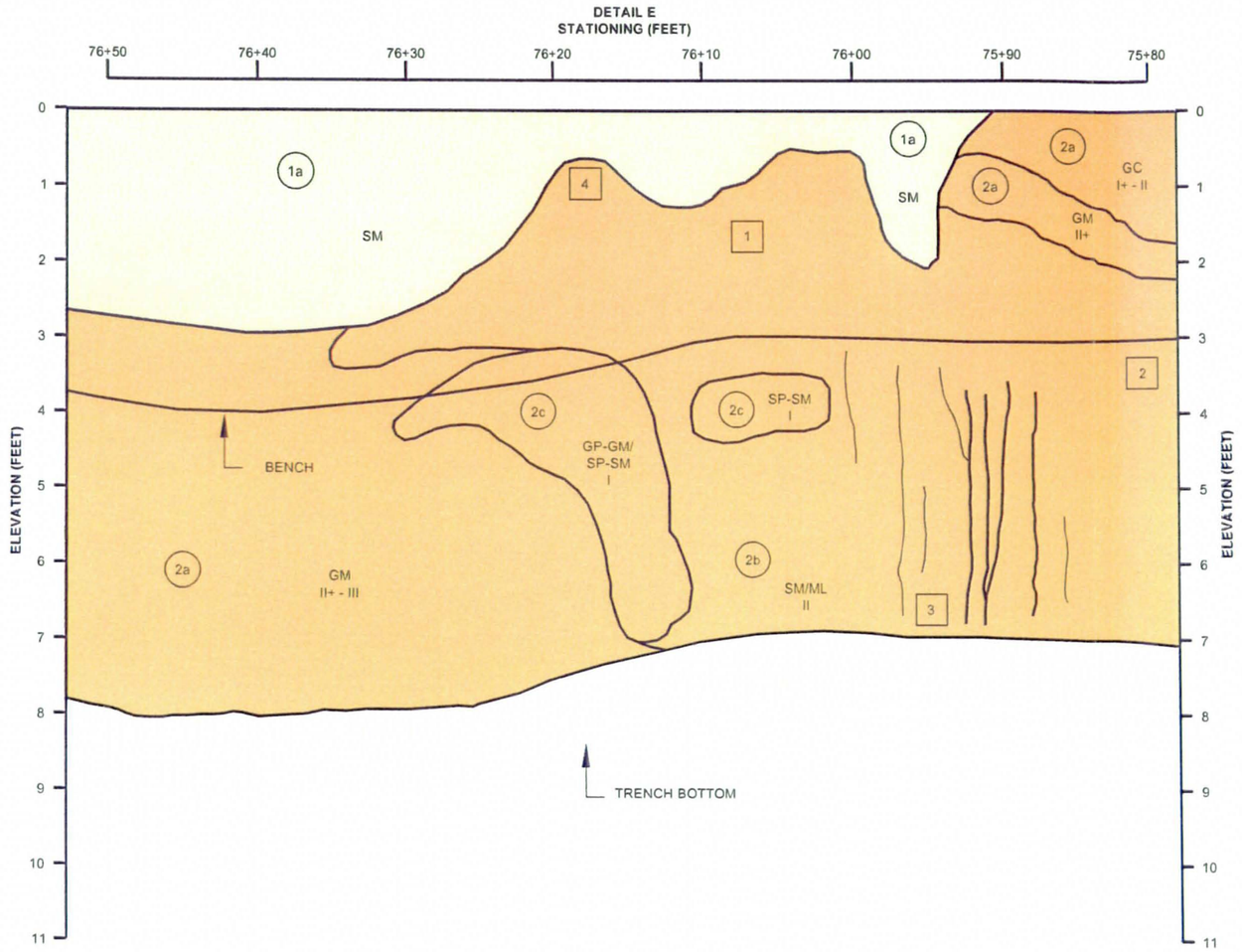

PROFILE - EAST WALL

SCALE: HORIZONTAL: 1" = 10', VERTICAL 1" = 2'

NOTES:

1 - UNIT 2b HAS A BLOCKY TO PRISMATIC TO COLUMNAR SOIL STRUCTURE IN UPPER BENCH EXPOSURE, BLOCKS TYPICALLY <1" & COLUMNS TYPICALLY <6" HIGH

2 - WHERE UNIT 2b IS EXPOSED AT BENCH IT IS BROKEN UP BY MACHINE EFFECTS INTO BLOCKS TYPICALL 1" TO 5" IN SIZE

3 - SOIL DISCONTINUITIES ARE HAIRLINE, TYPICALLY WAVY TO STEPPED, GENERALLY <1' IN LENGTH; NEVER MORE THAN 3', TYPICALLY ONLY FOUND ON EAST SIDE OF TRENCH; NOT EVIDENT ON TRENCH BOTTOM, DO NOT APPEAR TO EXTEND INTO UNITS ABOVE OF BELOW PHOTOS 76_1, 76_2, 76_3 & 76_4

4 - PRISMATIC TO BLOCKY SOIL STRUCTURE PHOTO 76_5

Eolian/Alluvial Unit 1 - Surficial soils of fluvial/aeolian origin and recent channel deposits. This unit is Holocene in age.

1a - (SM occasional ML) Silty and with occasional zones of sandy silt, no to some gravel, occasional clayey zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, non-plastic to low plasticity, light reddish-brown.

1b - (SC/GC occasional GP-GC) Clayey sand to clayey gravel, occasional silty zones, predominately fine to medium grained sand, non-cemented to weakly lime cemented, less than or equal to Stage I+, low to medium plasticity, reddish-brown.

1c - (GP-GM) Sand, gravel, and cobbles with silt, occasional zone of sand with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented, less than Stage I, non-plastic, light brown.

Alluvial Unit 2 - Pleistocene alluvial soils. Unit 2 soils often form a cemented cap underlying Unit 1 soils.

2a - (GM occasional GP-GM) Silty sand, gravel and cobbles to sand, gravel and cobbles with silt, occasional small diameter boulders, well graded sand and gravel, sub-rounded, moderately lime cemented with occasional zones of weakly or strongly cemented material, Stage II to III with occasional zones of Stage I+ or III+, non-plastic to low plasticity, light brownish gray to light grayish brown.

2b - (SM/ML) Sandy silt with zones of silty sand, no to trace of gravel, predominately fine-grained sand, weakly to moderately lime cemented, Stage I+ to II+ with occasional zones of III, non-plastic to low in plasticity, light brownish gray.

2c - (GP-GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, no to Stage I+, nonplastic, light brown. Occasional lenses of sand with silt (SP-SM).

Alluvial Unit 3 - Pleistocene alluvial soils. Unit 3 soils typically are coarser grained and less cemented than Unit 2 soils.

3a - (GP-GM to GM) Sand, gravel, and cobbles with silt, occasional small diameter boulder, well graded sand and gravel, sub-rounded, non-cemented to weakly lime cemented, Stage I to II, nonplastic, light grayish brown. Occasional lenses of sand with silt (SP-SM).

3b - (GM/SM) Silty sand and gravel, occasional cobble, rare small diameter boulder, sub-rounded, weakly to moderately lime cemented, Stage I+ to II+, nonplastic to low in plasticity, light brownish gray.

3c - (GM) Silty sand and gravel, occasional cobble, rare boulder, predominately medium to fine-grained sand, WG gravel, sub-rounded, moderately to strongly lime cemented, Stage II+ to III+, nonplastic to low in plasticity, light brownish gray to light gray.

Note: Age designations are uncertain.

KEY

- EOLIAN/ALLUVIAL UNIT - 1 HOLOCENE
- ALLUVIAL UNIT - 2 PLEISTOCENE
- ALLUVIAL UNIT - 3 PLEISTOCENE
- SM (I,II) USCS SOIL CLASSIFICATION WITH STAGE OF CARBONATE MORPHOLOGY
- CONTACT
- TEST TRENCH BENCH

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	3/2006
SCALE:	AS SHOWN

TRENCH LOG - EAST WALL

TDR TRENCH INVESTIGATION & CABLE INSTALLATION REPORT
McMICKEN DAM POST DESIGN COMPLETION
CONTRACT FCD 2004C068, WORK ASSIGNMENT NO. 1

FIGURE C-15

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APPENDIX D

SOIL DISCONTINUITIES

Soil Discontinuity Table

Discontinuity Orientation (degrees from north)	Approximate Dam Station
158	76+00
171	76+00
62	76+00
60	76+00
152	76+00
66	76+30
60	76+30
58	76+30
115	76+30
132	76+30
130	76+30
132	76+30
152	76+30
156	76+60
160	76+60
175	79+60
160	79+60
85	79+60
84	79+60
170	79+60
148	83+70
84	83+70
100	83+70
128	83+70
112	83+70
112	83+70
92	85+15
74	85+15
142	85+15
116	85+15
135	86+40
158	86+40
120	86+70
88	87+20

Soil Discontinuity Table (Continued)

118	87+20
140	87+50
87	87+50
72	87+50
130	87+50
100	87+50
150	87+50
158	88+45
162	88+70
104	89+10
22	89+10
168	92+70
175	92+70
180	92+70
54	92+70
102	94+40
86	94+40
31	94+40
180	94+50
182	94+50
146	94+55
48	94+55
110	94+55
126	94+55
179	94+55
74	94+55
155	94+55
172	94+55
99	94+55
202	94+55
175	94+55
181	94+55
97	94+55
102	94+55
42	94+80
54	94+80
70	94+80

Soil Discontinuity Table (Continued)

141	95+20
94	96+05
110	96+05
146	96+05
81	96+05
148	96+05
95	96+05
152	96+10
92	96+10
58	96+10
160	96+10
75	96+10
155	96+10
128	96+10
25	96+10
75	96+15
148	96+15
128	96+15
54	96+15
56	96+15
154	96+15
75	96+20
138	96+20
118	96+20
145	96+20
152	96+20
140	96+20
118	96+20
118	96+20
78	96+20
82	96+20
85	96+20
101	96+20
178	96+20
62	96+20
158	96+20
102	96+20

Soil Discontinuity Table (Continued)

54	96+20
164	96+30
178	96+30
118	96+30
115	96+30
138	96+30
58	96+30
128	96+30
128	96+30
58	96+30
130	96+90
62	96+90
79	98+20
174	98+25
77	98+40
158	98+40
148	98+40
75	98+40
138	98+60
168	98+60
184	98+60
98	98+75
171	99+00
139	99+00
90	99+00
124	99+00
80	99+00
66	99+00
160	99+00
148	99+00
164	99+00
75	99+00
30	99+00
67	99+30
78	99+30
136	99+30
76	99+30

Soil Discontinuity Table
(Continued)

156	99+30
71	99+30
112	99+40
26	99+40
168	99+50
142	99+50
105	99+50
148	99+50
148	99+60
140	99+60
45	99+60
171	99+60
132	99+60
58	99+60
154	99+60
132	99+60
58	99+60
156	99+60
138	99+80
164	100+00
80	100+00
145	100+90
86	100+90
175	100+90
153	101+20
62	101+20
168	101+20
121	101+20
164	101+20
86	101+30
88	101+30
146	101+30
90	101+30
53	101+30
10	101+30
162	101+40
108	101+40

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Soil Discontinuity Table (Continued)

46	101+40
126	101+60
182	101+60
35	101+80
72	101+80
171	101+90
160	101+90
88	101+90
71	101+90
190	101+90
61	101+90
102	102+00
70	102+00
112	102+00
155	102+00
145	102+00
148	102+00
138	102+00
152	102+10
88	102+10
85	102+10
130	102+10
68	102+10
140	102+10
168	102+10
116	102+10
59	102+10
50	102+10
140	102+20
175	102+20
165	102+20
99	102+20
69	102+20
94	102+20
115	102+30
125	102+30
148	102+30

Soil Discontinuity Table (Continued)

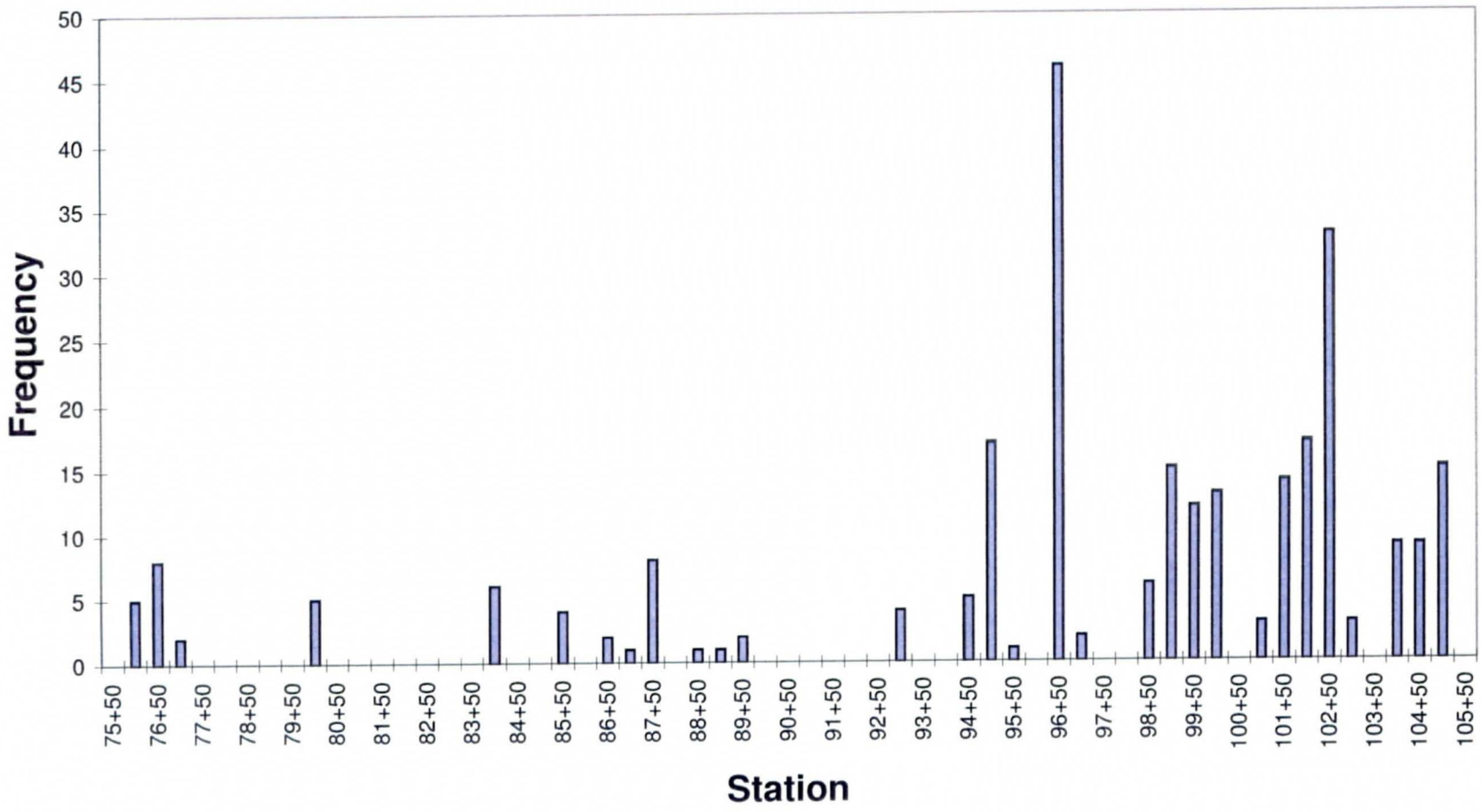
107	102+30
18	102+30
38	102+30
142	102+30
150	102+40
60	102+40
40	102+40
58	102+40
132	102+40
68	102+40
72	102+40
153	102+40
172	102+40
181	102+40
138	102+75
13	102+75
106	102+75
137	103+80
120	103+80
120	103+80
118	103+80
132	103+80
20	104+00
66	104+00
130	104+00
95	104+00
137	104+10
110	104+10
100	104+20
24	104+20
87	104+50
9	104+50
88	104+50
93	104+50
122	104+50
86	104+60
95	104+60

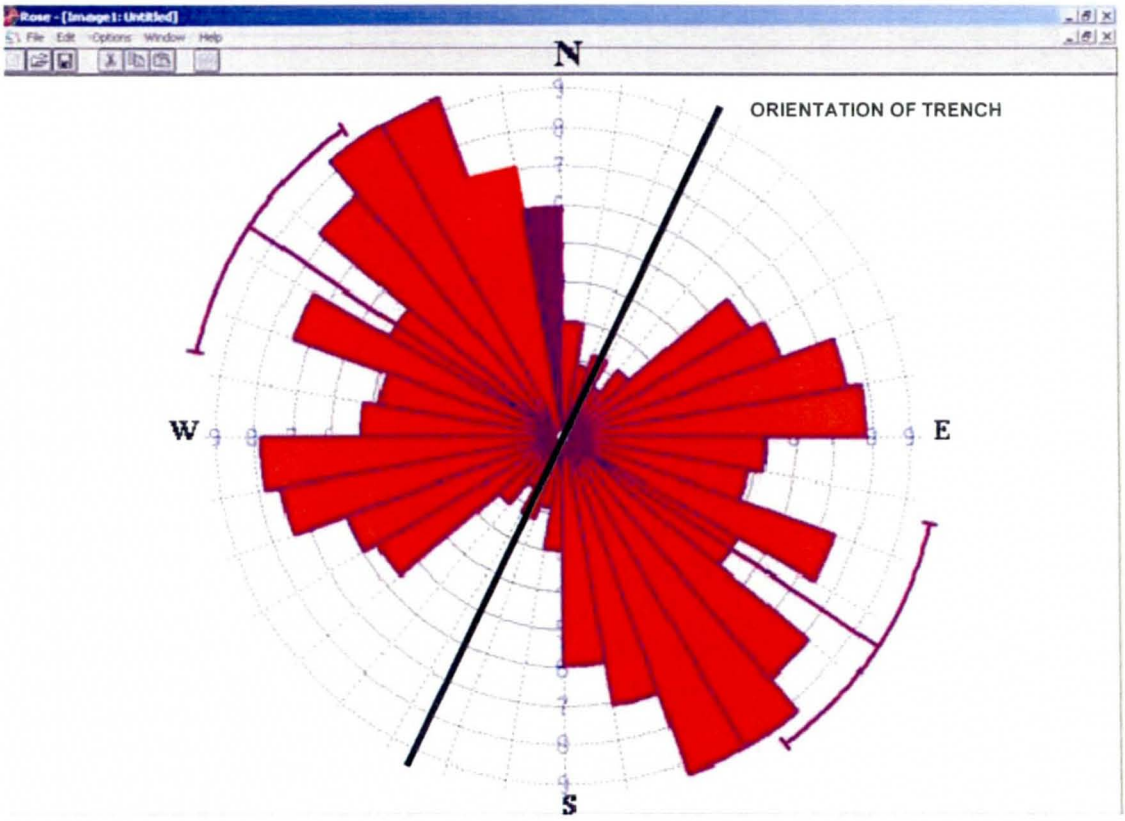
Soil Discontinuity Table (Continued)

61	104+60
10	104+60
151	104+60
118	104+60
78	104+60
82	104+60
161	104+60
165	104+60
151	104+60
155	104+60
114	104+80
45	105+00
145	105+00

Flood Control District of Maricopa County
TDR Trench Investigation and Cable Installation Report
McMicken Dam Post Design Completion
Work Assignment No. 1
Contract FCD 2004C068
AMEC Job No. 6-117-001007

Figure D-1
Soil Discontinuity Distribution





Calculation Method ... Frequency
Class Interval ..... 10 Degrees
Filtering ..... Deactivated
Data Type ..... Bidirectional
Rotation Amount ..... 0 Degrees
Population 269
Maximum Percentage ... 9.3 Percent
Mean Percentage ..... 5.6 Percent
Standard Deviation ... 2.5 Percent
Vector Mean ..... 303.95 Degrees
Confidence Interval .. 20.78 Degrees
R-mag 0.23

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	4/2006
SCALE:	N.T.S.

SOIL DISCONTINUITY ORIENTATIONS
ALL DATA

TDR TRENCH INVESTIGATION & INSPECTION REPORT
McMICKEN DAM POST DESIGN COMPLETION
CONTRACT FCD 2004C068, WORK ASSIGNMENT NO. 1

FIGURE
D-2

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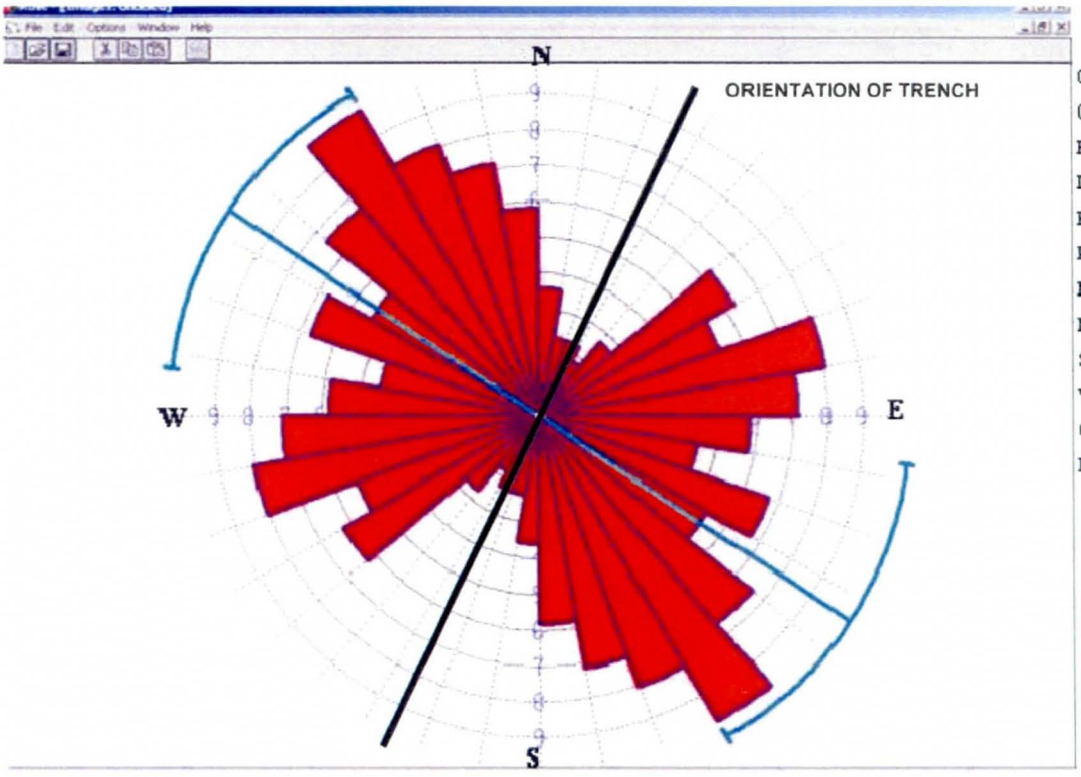

Calculation Method ... Frequency
Class Interval ..... 10 Degrees
Filtering ..... Deactivated
Data Type ..... Bidirectional
Rotation Amount ..... 0 Degrees
Population 224
Maximum Percentage ... 9.8 Percent
Mean Percentage ..... 5.6 Percent
Standard Deviation ... 2.28 Percent
Vector Mean ..... 303.87 Degrees
Confidence Interval .. 26.3 Degrees
R-mag 0.2

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	4/2006
SCALE:	N.T.S.

SOIL DISCONTINUITY ORIENTATIONS
DATA FROM STA. 90+00 TO STA. 105+00

TDR TRENCH INVESTIGATION & INSPECTION REPORT
McMICKEN DAM POST DESIGN COMPLETION
CONTRACT FCD 2004C068, WORK ASSIGNMENT NO. 1

FIGURE
D-3

amec

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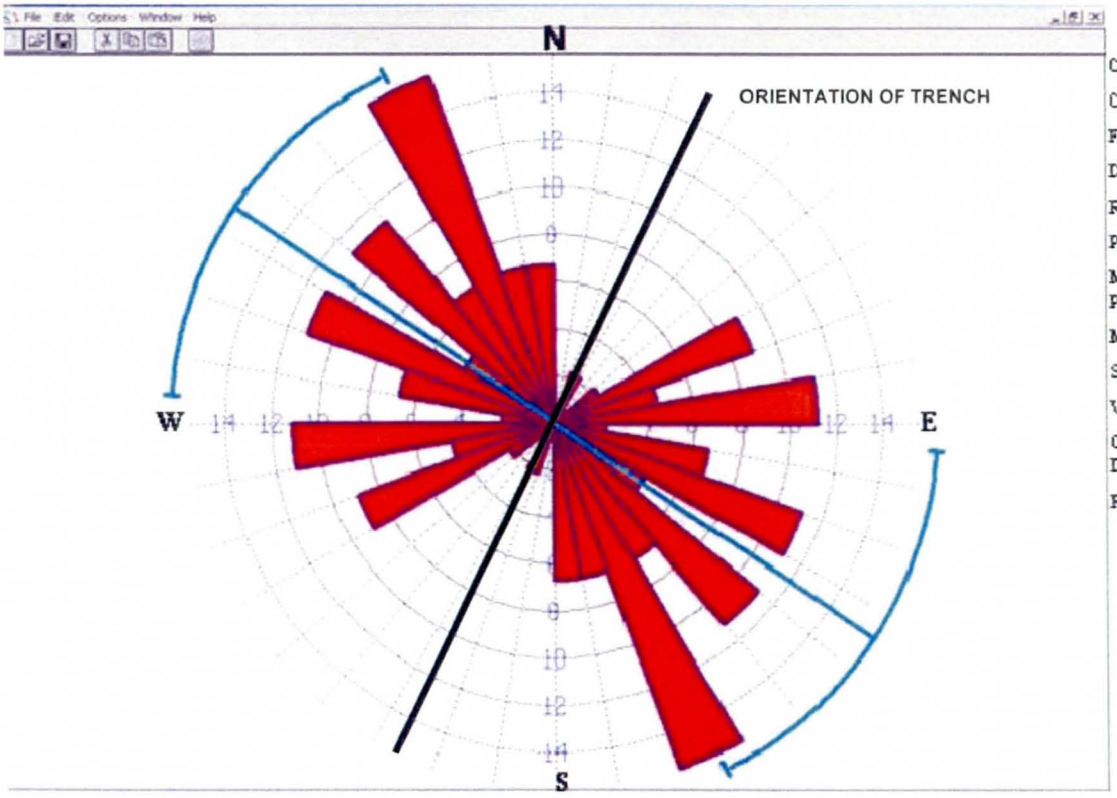

JOB NO.	6-117-001007
DESIGN:	KCF
DRAWN:	GWH
DATE:	4/2006
SCALE:	N.T.S.

SOIL DISCONTINUITY ORIENTATIONS
DATA FROM STA. 75+00 TO STA. 90+00

TDR TRENCH INVESTIGATION & INSPECTION REPORT
McMICKEN DAM POST DESIGN COMPLETION
CONTRACT FCD 2004C068, WORK ASSIGNMENT NO. 1

FIGURE
D-4

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Aerial Photo Taken 5/11/2005

McMicken Dam

New Dam Extension

DAS-2 Cable Reading Enclosure

DAS-1 Cable Reading Enclosure

North-South TDR Trench

East-West TDR Trench

Cable End Enclosure

Cable End Enclosure

Legend

Crimp Locations

TDR Cable

1 inch equals 150 feet

150 75 0 150 300 Feet

N W E S

Map Document: (\\Phx1-fs1\gis_share\Projects\6-117-001007\MXD\Crimp_Locations.mxd)
04/27/2006 -- 2:25:56 PM

JOB NO.:	6-117-001007
DESIGN:	LAH
DRAWN:	EMP
DATE:	04/27/2006
SCALE:	1" = 150'

TDR Trench Investigation and Cable Installation
McMicken Dam Post Design Completion
Work Assignment No. 1
Contract FCD2004CO68

TDR Crimp Locations

SHEET 1

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