Change Directive
MSE/Gravity Retaining Wall
Wildcat Road Construction
May Day and Idaho Complex
La Plata County, Colorado

June 3, 2014

Description of Change

In order to meet the proposed finished road grades shown on Sheet C4.11 of the Construction Plans, Mayday Idaho Mine Complex, Wildcat Road, La Plata County, State of Colorado, the following changes to the retaining wall construction are necessary:

1. The MSE/Gravity Retaining Wall will require the addition of approximately 200 to 230 square feet of MSE/gravity wall block (35 to 40 blocks).
2. The wall section above the gravity wall between Stations 19+12 and 19+00 will transition to a MSE wall starting at the fifth course of block. Geogrid lengths will be as described on the attached memorandum.
3. The MSE wall between Stations 19+00 and 18+49 will increase as necessary to meet the proposed finish road grade. The MSE wall in this section will be constructed in accordance with Section 1 on Sheet S4 and the instructions included on the attached memorandum.
4. The transition between gravity wall and MSE wall currently shown on Sheets S1 and S2 at Station 18+49 will move to Station 18+41to accommodate the estimated increased retaining wall height from 6 blocks (9 feet) to 8 blocks (12 feet) between these stations. The MSE wall in this section will be constructed in accordance with Section 1 on Sheet S4.
5. The gravity wall section between Stations 18+41 and 17+88 will be increased in height as necessary to meet the proposed finish road grades.

David S. McLay, PE, DSM Engineering, LLC
Colorado License No. 38699

Agree to Complete the Change Directive:

For Opal Group, Inc.

R²INCORPORATED
ENVIRONMENTAL AND ENGINEERING SERVICES
STRATEGICALLY POSITIONED-TECHNICALLY PREPARED

GEORGE M.L. ROBINSON, P.G.
J. ERICH RAUBER, P.E.

PROJECT MEMORANDUM

To: George M.L. Robinson
From: J. Erich Rauber, P.E.
Date: June 1, 2014
Subject: MSE Wall Design Revisions

This memorandum presents the results of planned design revisions in connection with the subject project. The project construction drawings present designs for MSE walls that are a maximum height of 15 feet. Field revisions have resulted in two conditions not contemplated by the drawings:

- MSE walls up to 20 feet high
- The need to increase the height of a gravity wall from 9 to 18 feet high

Each of these conditions are discussed in the following sections.

MSE Walls 20 Feet High

Increasing the project MSE wall to a maximum height of 20 feet is feasible.

External Stability

Factors of safety follow for each of the following conditions:

Overturning	F.S. = 2.3
Sliding	F.S. = 1.5
Bearing	F.S. = 3.4 (Assumes that the ground surface is relatively flat at least 12 feet on the outboard side of the wall, or bedrock is less than 18 inches below the bottom of the wall.)

Internal Stability

Reinforcing mats should not be over 18 inches apart. They should consist of Mirafi 5XT over the lower 10 feet and should be at least 9 feet long; over the upper

10 feet, Mirafi 3XT may be used in lieu of 5XT, and the mat lengths should progressively increase in length from 9 feet to 12 feet then remain at 12 feet to the top of wall.

Increasing Height of Gravity Wall

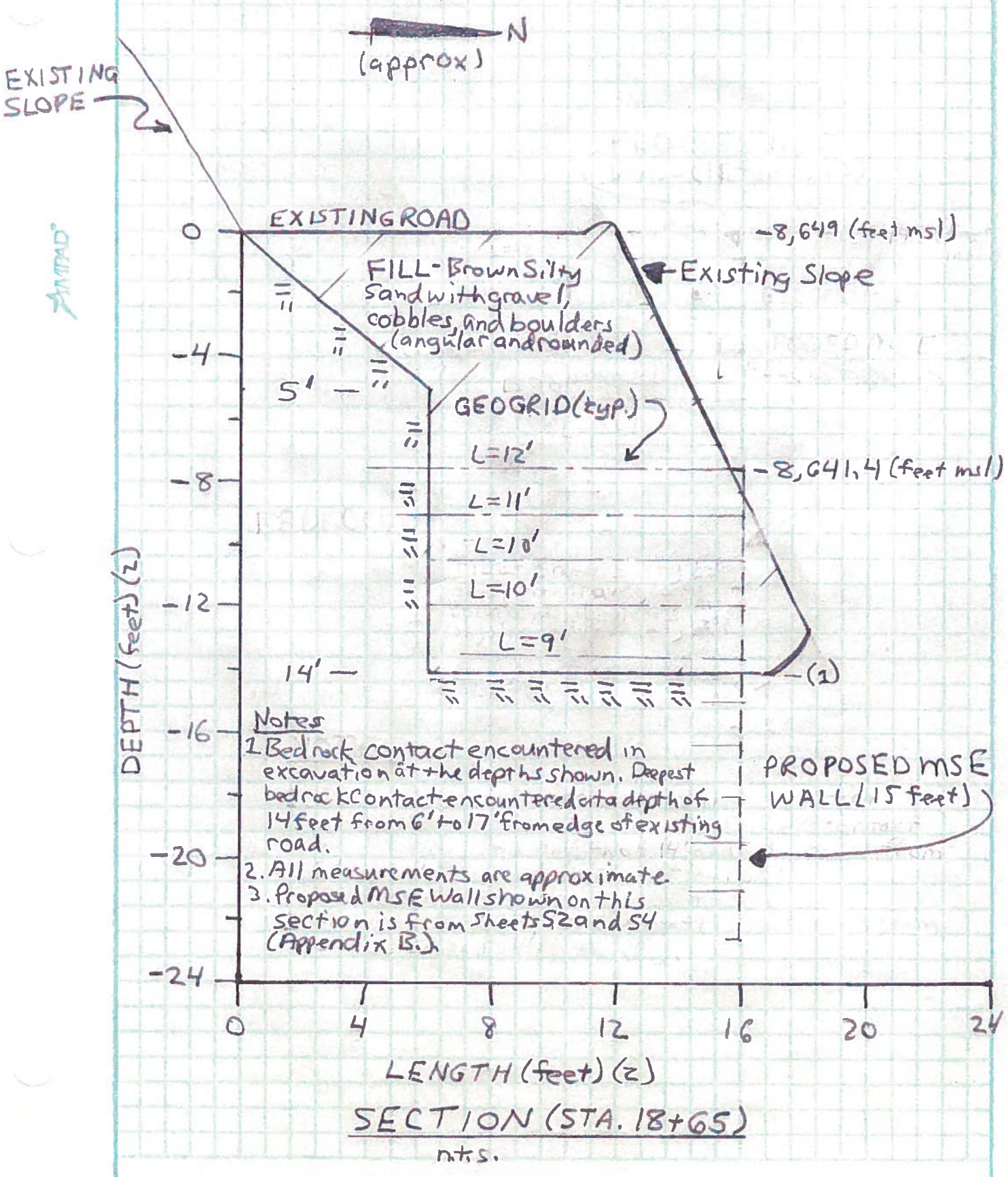
From a geotechnical engineering standpoint, increasing the height of the gravity wall is feasible, provided the following considerations are addressed:

1. Extend the wall height by constructing an MSE wall the from the current 7.5 foot height up to the planned 18 foot height. Use Mirafi 5XT mats. The upper mat should be at least 13 feet long, the next mat down should be at least 11 feet long, with 10 long mats the rest of the way down at 18 inch intervals.
2. Construct an earthen embankment at least 3 feet high in front of the gravity wall to provide lateral support. The embankment should be placed, compacted, and constructed on the same material as that specified for MSE wall backfill.
3. Stresses in the wall will concentrate along at the top of the gravity wall and the new MSE wall above. The wall blocks at 9 feet must be able to resist a shear force of approximately 8 kips/foot of wall.

If these conditions are not desirable, we recommend that the gravity wall be removed and an MSE wall designed as described in the preceding section installed.

If you have any questions, please contact me at (303) 210-7575.

FIGURE 3



Notes

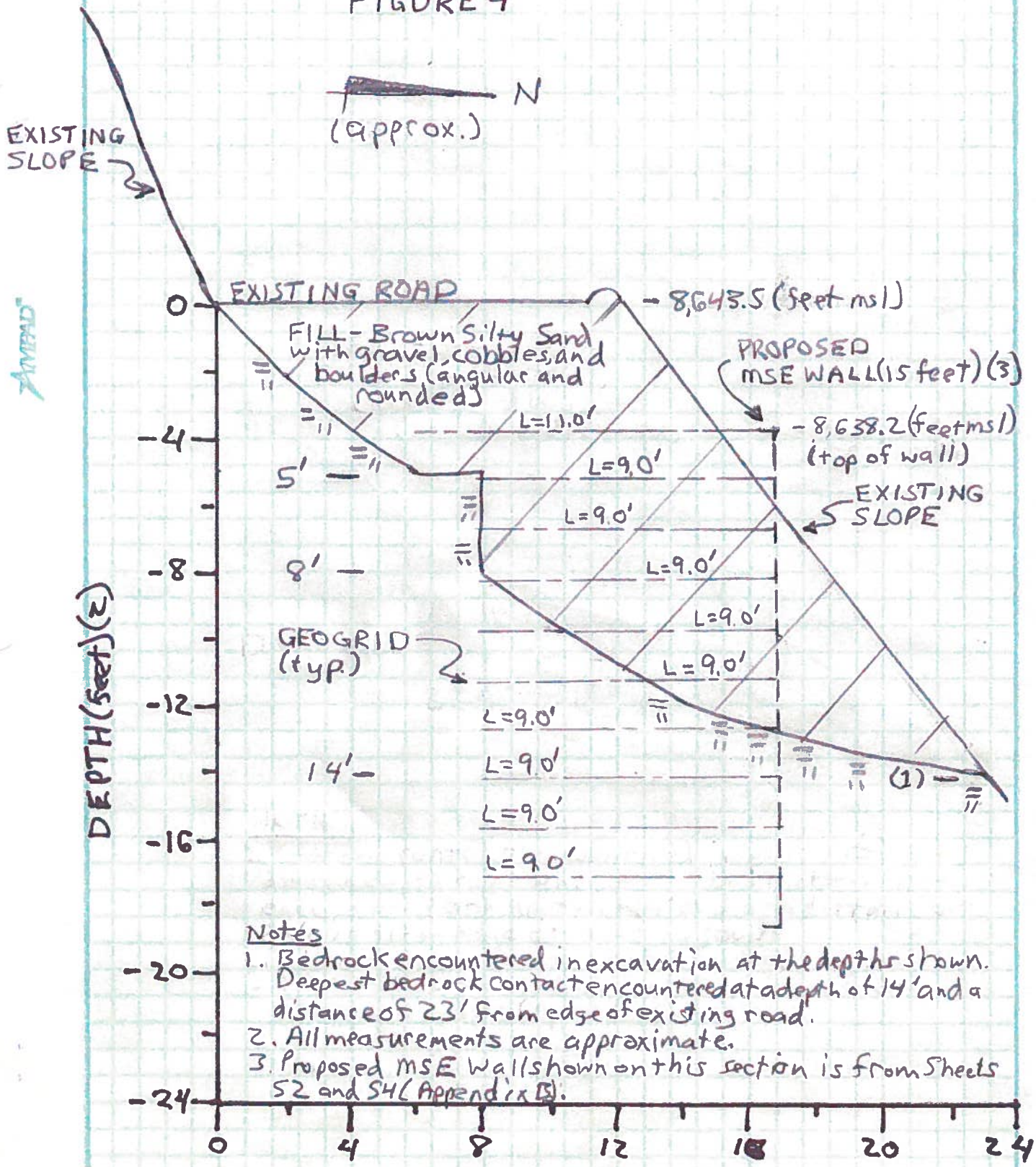
1. Bedrock contact encountered in excavation at the depths shown. Deepest bedrock contact encountered at a depth of 14 feet from 6' to 17' from edge of existing road.
2. All measurements are approximate.
3. Proposed MSE Wall shown on this section is from Sheets S2 and S4 (Appendix B.).

SECTION (STA. 18+65)

n.t.s.

TEST PIT RC-03 Supplemental Geotech. Invest. April 2014

FIGURE 4



Notes

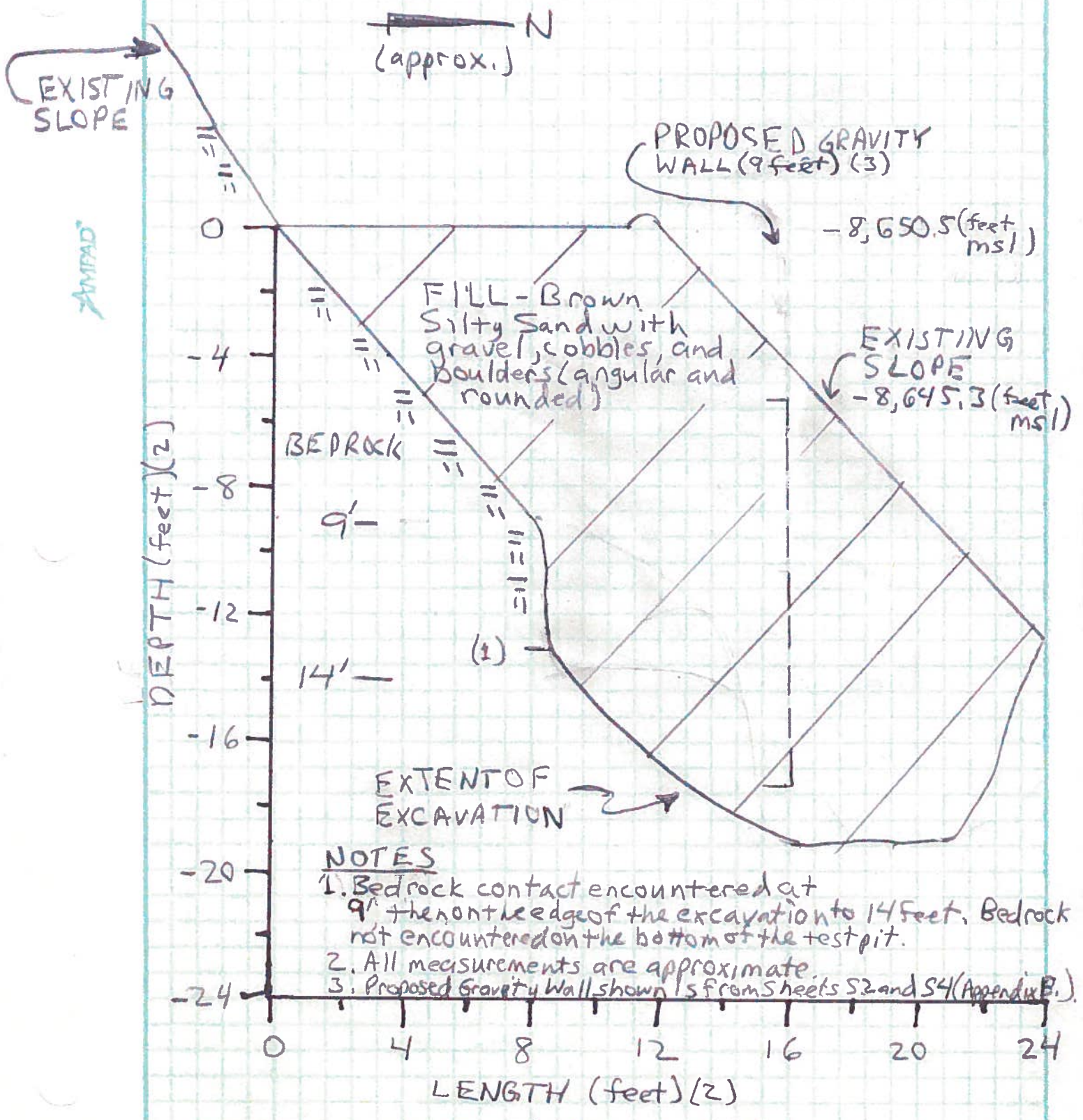
1. Bedrock encountered in excavation at the depths shown. Deepest bedrock contact encountered at a depth of 14' and a distance of 23' from edge of existing road.
2. All measurements are approximate.
3. Proposed MSE Wall shown on this section is from Sheets S2 and S4 (Appendix B).

SECTION (STA. 18+86)

n.t.s.

TEST PIT RC-04 Supplemental Geotech. Invest. April 2014

FIGURE 5

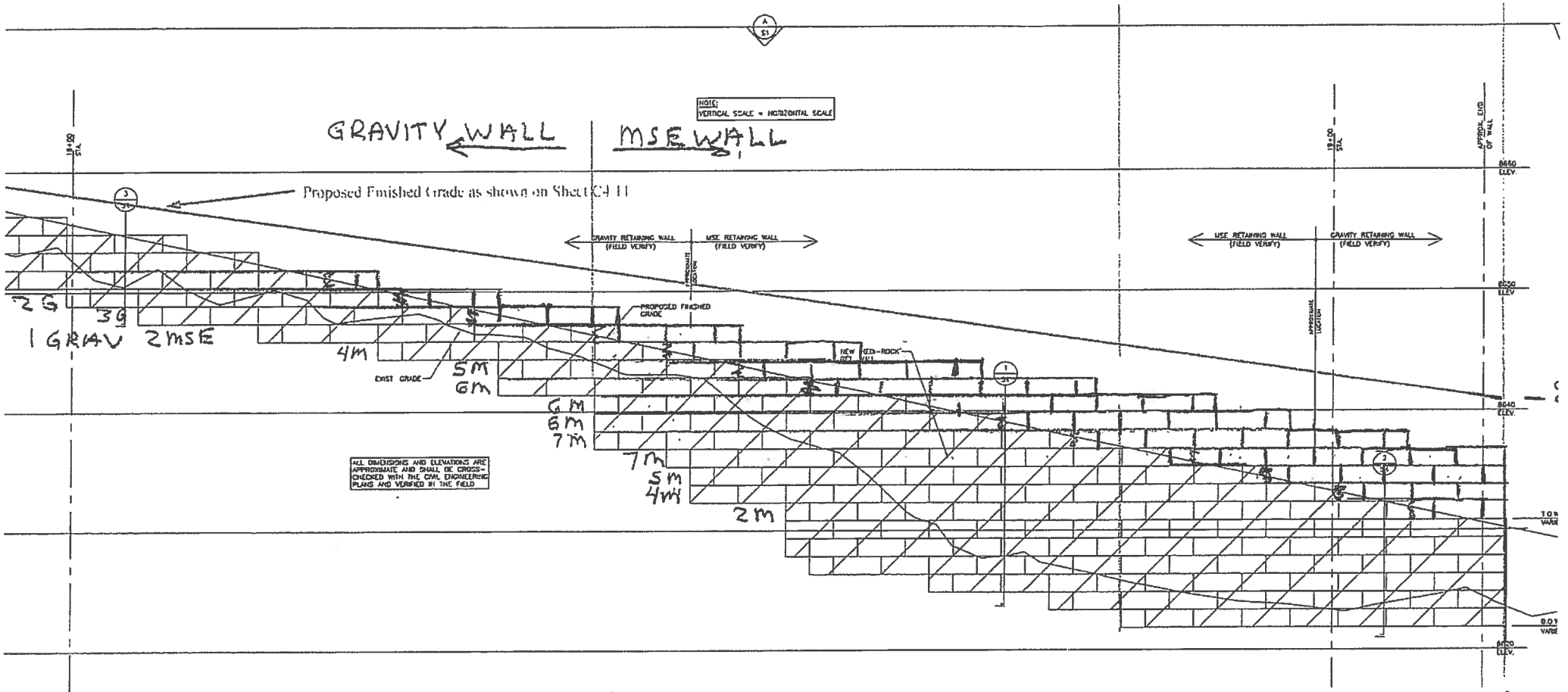


NOTES

1. Bedrock contact encountered at 9' the ont he edge of the excavation to 14 feet. Bedrock not encountered on the bottom of the test pit.
2. All measurements are approximate
3. Proposed Gravity Wall shown is from Sheets S2 and S4 (Appendix B.)

SECTION (STA. 18+42)

n.t.s.



A S2 RETAINING WALL PROFILE PLAN
SCALE: 3/16"=1'-0"

RETAINING WALL NOTES / REQUIREMENTS:

1. SEE DETAIL A/S3 FOR TYPICAL MINIMUM EARTH WORK REQUIREMENTS FOR RETAINING WALLS.
2. RETAINING WALLS HAVE BEEN DESIGNED AS 'REDI-ROCK' RETAINING WALLS & SHALL BE INSTALLED PER THE MFR's. RECOMMENDATIONS.
3. SEE SHEET S3 FOR GENERAL STRUCTURAL NOTES, DESIGN LOADS, CONSTRUCTION REQUIREMENTS, MATERIAL DESCRIPTIONS AND TYPICAL DETAILS NOT SPECIFICALLY REFERENCED BUT WHICH SHALL APPLY TO THE APPROPRIATE CONDITIONS.
4. REINFORCED RETAINING WALLS HAVE BEEN DESIGNED FOR GEOGRID MATS OF MIRAFI MIRAGRID. SEE SPECIFIC DETAILS AND GENERAL NOTES FOR INSTALLATION & ADDN'L. INFO.
5. THE RETAINING WALL DESIGNS ARE BASED ON A GEOTECHNICAL REPORT BY CLC ASSOCIATES, CLC JOB# 12-0008, DATED APRIL 6, 2012 AND ADDITIONAL RECOMMENDATIONS BY CLC ASSOCIATES. THIS REPORT IS AN INTEGRAL PART OF THESE PLANS AND SHALL BE KEPT ON-SITE WITH THE PLANS AT ALL TIMES.

:REASE

msE BLOCKS = 52 Full

TY BLOCKS = 6 Full

SE WALL CHANGE

nsE BLOCKS = 10
RAV. BLOCKS = -10

:ign vs. 46-inch reality

TOTALS

ADDITIONAL MSE BLOCK = 62

COLORADO DAVID PROFESSIONAL

5/8/2012