

# GROUND

## ENGINEERING

October 18, 2021

Subject: Geotechnical Observation Summary  
Report, October 4, 2021 Site Visit, **Ralston  
Quarry**, Jefferson County, Colorado

Job No. 18-3046

Mr. Stan Opperman  
**Asphalt Paving Company**  
14802 West 44<sup>th</sup> Avenue  
Golden, Colorado 80403

Dear Mr. Opperman:

At your request, GROUND Engineering Consultants, Inc. (GROUND) visited the Ralston Quarry to collect visual observations of the slope remediation completed on the western side of the site. This letter summarizes the site visit and observations collected by GROUND at the Ralston Quarry in northeast Jefferson County, Colorado. This service was conducted as an additional service in general accordance with GROUND's Proposal No. 1807-1305, dated July 23, 2018.

GROUND previously completed an initial geotechnical and slope stability evaluation for this project. The results of that evaluation were provided in our report dated January 18, 2019.<sup>1</sup> We understand that the remediation discussed in that report has been completed. Reference is made to GROUND's 2019 report for a description of the site subsurface conditions, our geotechnical conclusions and parameters, and the limitations on our services, which also apply the parameters and considerations provided herein. We consider all parameters and considerations in our 2019 report not specifically superseded herein to remain valid for the project. Additionally, a site visit was performed on March 11, 2021 and was summarized in our letter dated March 31, 2021.<sup>2</sup> Reference is also made to that letter for a description of the site and slopes at that time.

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<sup>1</sup> GROUND Engineering Consultants, Inc., 2019, *Limited Geotechnical Evaluation, Slope Stability and Remedial Approach, Ralston Quarry, Jefferson County, Colorado*, Job No. 18-3046, prepared for Asphalt Paving Company, dated January 18.

<sup>2</sup> GROUND Engineering Consultants, Inc., 2021, *Geotechnical Observation Summary Report, March 11, 2021, Ralston Quarry, Jefferson County, Colorado*, Job No. 18-3046, prepared for Asphalt Paving Company, dated March 31.

### ***Slope Observation Summary***

In general, the remediated slopes appeared to have largely remained in their as constructed forms. Relatively thin vegetation was observed on the site slopes although the vegetation density appeared to have increased and the site slopes appeared to have increased vegetation density from our March site visit. The greatest apparent increases in vegetation density were observed on the shallower slopes. On the steeper areas, such as the buttresses, some increase in vegetation density was observed, but other areas remained largely unvegetated. Large scale soil cracking or other signs of significant slope movement or instability were not apparent. However, rills and other relatively small, local erosional features were observed in the slope surfaces. Some of these features appeared to have increased in size and were typically several inches wide and several inches deep. These features were most apparent in the areas with less vegetation. The areas with denser vegetation did not appear to have prominent erosional features. None of the erosional features appeared to be adversely affecting the slope at this time, but such features could present a source of risk, if they are allowed to become larger. The erosional features should be monitored, and where they become enlarged significantly, they should be regraded.



However, a much larger and more significant erosional feature was observed on the northern slope of Zone 1. This feature was several feet wide and about 1 to 4 feet deep. (See image below.) This feature was not observed during our March 2021 site visit and appeared to have



developed since that visit.

The feature did not appear to be an immediate threat to the slope's stability, but appears to have the potential to cause significant issues in the future. The area should be regraded and better control of the surface drainage on the slopes in that area should be developed.

A relatively small depression was observed in the lower third of the northern portion of the remediated slope (Zone 4) during our March 2021 site visit. This depression was less apparent during our recent visit. This may have been the result of grading efforts or additional slope settlement. Additionally, the depression appeared to support vegetation that was generally denser than the surrounding graded slope. (See image below.) This suggests that this area is holding more water after precipitation events. The affected area should be filled with properly compacted fill to restore the design slope grades, and monitored for additional settlement.



Additionally, evidence of seepage was observed below the rock berm below the remediated slopes. This evidence included surface water, wet soils and calcium carbonate and other salt precipitation on the soil surface. Relatively small juvenile erosional features and channelization appeared to be developing locally below the rock berm near the area of seepage during our March site visit, and were present during our October site visit. These features did not appear to have developed significantly since March. These areas should be monitored and if larger erosional features and channelization features develop, the affected area should be filled and regraded as appropriate.

**Limitations** This letter has been prepared for Asphalt Paving Company to present the geotechnical observations herein. It should not be assumed to contain sufficient information for other parties or other purposes.

The geotechnical data in this report relied upon a limited number of visual observations of the exposed slope surfaces on October 4, 2021 as discussed herein. It is not possible to guarantee all significant surficial features were observed, that other significant surficial have not developed after our observations, or provide comment about the current subsurface conditions.

GROUND makes no warranties, either expressed or implied, as to the professional data, opinions or conclusions contained herein. This document is intended only for the specific

purpose and client for which it was prepared. Re-use of, or improper reliance on this document without written authorization and adaption by GROUND Engineering Consultants, Inc., shall be without liability to GROUND Engineering Consultants, Inc.

We trust that this provides the information that you needed at this time. If you have any questions please contact this office.

Sincerely,

**GROUND Engineering Consultants, Inc.**

A handwritten signature in blue ink, appearing to read 'Ben Fellbaum', with a long horizontal stroke extending to the right.

Ben Fellbaum, P.G., E.I.

A handwritten signature in blue ink, appearing to read 'Brian H. Reck', with a long horizontal stroke extending to the right.

Reviewed by Brian H. Reck, P.G., C.E.G., P.E.