STATE OF COLORADO

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Response to Castle Adequacy Review Response #3

1 message

Warren Dean <warren@whd22.com> Wed, Feb 26, 2020 at 4:03 PM
To: "Cazier - DNR, Tim" <tim.cazier@state.co.us>, "Cunningham, Michael" <michaela.cunningham@state.co.us>, "Means - DNR, Russ" <russ.means@state.co.us>
Cc: Craig Vaughn <craig.vaughn2@gmail.com>

Hello Tim, On February 19, 2020, I sent you my comments on CMC's response to your Adequacy Review letter #3. Please include these comments from Carl Mount and Craig Vaughn with mine to constitute a full review of CMC's Response.

We do not think that your requests "exceed the requirements" to conduct a thorough review of Permit Amendment #4 and associated financial assurances. All we ask is that CMC prove that its plan will work and provide the sufficient assurances to guarantee performance, per regulations. After close scrutiny, we feel many loose ends and important details remain totally or significantly unaddressed. If a safe, stabilized quarry and comprehensive reclamation are the goals, we and Colorado need more.

I have seen your Adequacy Review Letter #4, dated February 20, 2020, but have not seen a response from CMC We will keep our eyes open and watch where we go from here.

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20.02.24 Mount Review of Castle Adequacy Review Response #3.pdf
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Carl B Mount and Associates, Inc. LLC

Memo

To: Warren Dean

From: Carl B. Mount

CC: Craig Vaughn P.E., Cesare, Inc.

Date: February 26, 2020

Re: Continental Materials Corporation/Castle Aggregate, Pikeview Quarry, Permit M-1977-211, Amendment 04, Review of February 7, 2020 Operator Adequacy Answer to DRMS Third Adequacy Review and DRMS Fourth Adequacy Review.

Introduction

I have reviewed the February 7, 2020 Continental Materials Corporation (CMC) Adequacy Answers to the Colorado Division of Reclamation, Mining and Safety (DRMS) Adequacy Review 3 dated January 23, 2020. DRMS Adequacy Review 3 incorporated many, but not all, of the concerns brought up in objection and comment memoranda submitted to DRMS by Warren Dean (WD) and Carl B Mount and Associates Inc, LLC (CBMA) on October 30, 2019 and comment memoranda submitted to DRMS on January 14, 2020. For clarity, in this memo I am attempting to adopt the numbering system used by DRMS in their Third Adequacy Review letter. I have also reviewed the DRMS Fourth Adequacy letter dated February 20, 2020.

I reiterate here that none of the questions contained in this memo are "new issues" since they all relate to basic requirements of mined land reclamation as applied to this specific site and include:

- Geologic investigations and requests for baseline geologic and slide data.
- Geologic stability of rocks underlying the engineered buttress fill.
- Geologic stability of the rock slopes above and to the west of the quarry highwall.
- Monitoring and the lack of availability of records (slide monitoring records at this point along with further groundwater monitoring) for review by the public.
- Stability of the final engineered buttress fill including how design assumptions cannot be verified because of lack of information included in the public record, definition of properties and

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monitoring of material to be used for construction, engineering techniques to build the fill (including but not limited to the materials used, lift thickness, moisture conditioning and compaction techniques, lack of as-built verification for structures already on site and protection of the final fill surface.

- Surface water management on site especially as related to lack of upland drainage control both during operations while conducting the reclamation plan and after construction of the engineered buttress fill.
- Accelerated erosion from overly long reclaimed slopes that are now planned for the engineered buttress fill with no upland drainage diversion.

Availability of Documents and Monitoring Information in the Public Record:

1. The Exponent Report is now in the DRMS public file and available for review. This report contains data from a drilling program initiated after the two slides of December 2, 2008 and September of 2009. The Exponent Report concludes that the primary cause of the translational slides were from a previously unknown clay layer present in the upper Sawatch formation. This clay layer still exists under parts of the Pikeview Quarry to the north and south of the area involved in the December 2, 2008 and subsequent slides.

2. Data from slide monitoring except very limited amounts contained in Exhibit 6.5 are still not available. DRMS required monitoring after the slide of December 2, 2008 in the Amendment 03 process in order to monitor the slide area to see if the material was still moving. There are no raw data and no periodic reports or interpretations of slide monitoring data in the record and, even though DRMS has requested that this information be provided, CMC has not done so to date. See comments on DRMS Question 10 and 44 below. Without this information it is difficult or impossible to determine whether the buttress fill design is responsive to the on-site conditions of the quarry especially with respect to the upper, possibly unstable hanging block of limestone material in the south part of the west highwall of the quarry and the granite slopes west and above the quarry highwall which may be unstable because of Rampart Range Fault splays and removal (through slides) of natural buttressing of these blocks of material.

Present AM04, Adequacy Review Letters, and DRMS Fourth Adequacy Review Response Concerns

CMC Adequacy Responses received on February 7, 2020 and the Fourth DRMS Adequacy Review letter:

The DRMS Third Adequacy Review numbering system for the review of the Amendment 4 proposal and responses to previous DRMS Adequacy Reviews has been adopted here for clarity.

Application

CBMA has not commented on this section previously and has no comments on DRMS questions 1-3.

6.4 Specific Exhibit Requirements – Regular 112 Operations

Exhibit C – Pre-mining and Mining Plan Map(s) of Affected Lands

4 and 5 – No comments

6. Maps now contain information that is critical to the bond calculation mainly in the form of unsubstantiated borrow amounts indicated in various areas of the mine to "demonstrate" that all borrow can be obtained from on site. However, proposed amendment still states that "CMC will continue to accept fill from offsite sources for use as backfill." The reality is this material will not be of high quality and will be highly variable if available at all. Existing plans to homogenize import materials in stockpiles do not seem sufficient to assure the material placed will equal or exceeds the strengths utilized in stability calculations. CMC's consultants should address how they have modeled the slope taking into consideration this wide range of fill materials and provide. If DRMS intends to allow import from unknown sources, the third party engineer must be retained to screen the materials coming onto the site. Please see additional comments under question #43 below.

Exhibit D- Mining Plan

Specifications for Engineered Fill

9. DRMS stated in its Third Adequacy Review of January 23, 2020 "The response to our preliminary adequacy comments addressed compaction specifications. However, conversations during the December 5, 2019 site visit led the DRMS to believe *lift thicknesses would be no more than one foot* (emphasis added). Please revise the narrative to limit the lift thickness to one foot and address the following:"

   CMC states in their answers to DRMS adequacy Review 3 "The text in Exhibit D has been revised to specify a lift thickness of one-foot."

Section 5.0 Placing and Compacting General Fill

Section 5.1 states "Each Layer of fill shall be placed in approximately 1-foot thick lifts *unless approved by the engineer, but never to exceed 3 foot maximum*." (emphasis added). Under this language the engineer on site could approve all lifts to be thicker than one foot. Wording for Section 5.1 (Page D-11) must state that lift thickness will never exceed one foot unless specifically required by a third-party QA/QC engineer on site for limited fill around initial covering of already existing rocky rubble areas if needed.

Section 5.5 states "Boulders and cobbles may be incorporated into the general fill by compaction efforts other than the general prescription." It is unclear if "boulders" will be no greater than 12 inches in measurement in any dimension. The Universal Building Code requires material be no greater than 12 inches in any dimension when placed in an engineered fill. Section 5.5 must be changed accordingly to guarantee that fill material be no more than 12 inches in any one dimension. Additionally, what is an acceptable percentage of 12" material? For example, if say 40% of the fill mass is rounded 12" boulders, in a matrix of clay and sand, how will compaction be achieved in the space between the boulders? Compaction equipment will essentially roll across the tops of the oversize material and fail to densify the fines in between. Situations like this will require full time site observation and testing by a qualified and experienced third party engineering firm.

Section 5.8 states "Granite Materials that are pushed by dozer from the top of the quarry will be a downhill push to move bulk general fill (granite). Once the material is generally located to its final position, a second dozer push will distribute the granite parallel to the quarry face in *an appropriate lift thickness* (emphasis added). Once the loose fill is watered, compaction efforts will complete the placement in a level fashion that is cross hill and horizontal." There is no maximum lift thickness specification in this statement. The engineer on site (which could be an engineer on CMC staff as written) could approve a lift thickness much greater than the one-foot thickness limit requested by DRMS. The maximum lift thickness of less than one-foot and maximum material particle size of less than 12 inches in any one dimension must be stated so it applies to this material.

It must be reiterated here that TC Wait's Memo to Berhan Keffelew dated September 24, 2012 in response to a very similar method proposed in AM03 was: "The amendment describes the fill on the lower slopes being placed in a top - down manner, using dozers to push material around. This will be a considerable amount of material, with some areas nearing or over 100 feet in fill. *Poorly placed fill may not provide the buttressing effect that will help with overall slope stability* (emphasis added). Fill placement procedures and detailed specifications are needed to ensure the structural integrity of the fill section."

DRMS in the review of Amendment 04 has requested (twice) that fill lift thicknesses be no more than one foot. However, the DRMS Fourth Adequacy Review claimed that the CMC responses detailed above were adequate.

Why would DRMS now allow a method with fewer placement controls, lifts thicker than one foot, and compaction of only the very top foot of unspecified thickness lifts for a less conservatively designed and steeper buttress fill?

9. a-h.

Under subsections 9a-h, the DRMS appears to want the proper tests done to ensure proper compaction. However, compaction records will be impossible for the public to access and review if they are "…maintained on site for DRMS inspection (Question 9.e. response, Page 3)." CMC also states, "CMC will include the construction testing results in the monthly monitoring summary; this summary will include construction quality assurance test results, geotechnical monitoring results, construction volumes, and drone survey results." It is not clear from this whether the report will contain historic prism monitoring results upon which Exponent, CGS and DRMS have based past decisions. Like the Exponent Report, prism monitoring or summaries thereof are basic data that can be used to determine whether parts of the slide and material that is no longer supported above the past slides are moving or not. CMC needs to produce it. Interested parties cannot review it if it is not available in a public forum. Compaction and engineering test results also need to be entered on the DRMS document public record. Also see comments to question 44 below.

CMC responses in the monitoring section, which appear only to pertain to the engineered fill going forward, are located below under question 10.

10. **Slide monitoring.** DRMS requests under 10.a. for CMC to provide "Slide monitoring reports, summaries and/or data for the monitoring that has occurred to date for visual inspections, drone investigations and prism monitoring."

CMC responds, "The slide monitoring to date has included robotic prism surveying, visual inspections, drone imaging, and the monitoring was performed primarily for worker safety. The data were reviewed on an as-needed basis again for worker safety, but formal reports were not prepared. During reclamation activities, CMC will prepare monthly monitoring reports that summarize the monitoring data."

The CMC response is non-responsive to the DRMS question posed and doesn't even give a reason why CMC will not produce it. DRMS asked for past data and CMC promised to produce future data. Past data is needed to determine whether the presently proposed and less conservative plan will work. Certainly the data must exist. If worker safety were truly what the monitoring is for, then long-term monitoring data for at least the possible hanging block of limestone material (prisms P66, P70, T1) and any granitic blocks to the west of and below the westernmost splays of the Rampart Range Fault (prisms P68, P33, P69) must be investigated to determine whether slide movements are continuing or not. Past prism monitoring data and summary reports would indicate whether this is or is not the case.

CMC must produce it.

CMC has used limited amounts of the prism data when Exponent needed it to produce their report (see Figure 16, Page 87 of the Exponent Report (2011)). Also, this data was used to provide information to CGS for the review dated February 2, 2010. Certainly it can be produced now. Given the history of slides due to unknown ground conditions and questionable mining methods, how can the proposed engineered buttress fill reclamation plan be deemed responsive to ground conditions if those conditions are not investigated, especially when the data exists? DRMS must be able to review this data that CMC has but so far will not provide.

Exhibit D Section 6.0 & 7.0 – Control Testing and Monitoring the fill progress

These section have improved, but there is still no commitment by CMC to supply as built drawings and professional engineering certifications of the constructed fill with a guarantee that a third party professional engineer is on site observing the fill construction and adequately documenting construction operations and testing. To ensure that the fill has been placed properly, a third party engineer should provide necessary lab testing and observation to confirm fill material suitability, monitor placement procedures including compaction testing and provide as built drawings and engineering certifications for the fill itself, similar to the commitment to do so for the surface water channels that cross over the reclaimed areas (see Record Drawings section of response to DRMS question 33). These costs will be significant and should be quantified and presented for use in the bond calculation.

Section 6.4 states, “Records of the fill testing shall be kept on site and made available to DMRS for inspection.” This is not acceptable and puts burden on DRMS to actively seek out the reports that may or may not document quality fill placement.

Section 7.1 states, “The existing Leica monitoring system shall remain in use with additional prisms added to the fill slope as the grade is completed. Records shall be maintained on site and available for DRMS inspection.” Maintaining records on site make it impossible for the public to review the monitoring. Will these results be sent to DRMS offices on a monthly basis and entered into the public record so that interested members of the public can independently verify the construction implementation? Given the history of lack of finding out ground conditions and mining methods leading to instability and failure at this site, the monitoring records must be placed in the public record.

Section 7.6 states, “CMC shall submit monitoring summary reports on a monthly basis.” When will submittal of monitoring reports and the reports being available in the public record start?

12. **Topsoil Importation:**

Generally, this section is good with the caveat that DRMS must hold sufficient bond to import topsoil from off-site by paying market rate (easily determined by searching the internet) and include the cost of screening, monitoring and distribution of the topsoil to various areas on site. Distribution will be difficult on the steep slopes proposed and this will be an additional reclamation cost. This cost must be included in the reclamation bond.

The operator must locate on a map where imported topsoil will be stored or state that the topsoil will be stored in presently designated topsoil storage areas.

Additionally, a contingency cost for topsoil damage from accelerated erosion (thus necessitating purchase of more topsoil and distribution on now difficult to access slopes) and repair of damaged slopes will need to be included in the reclamation bond.

33. **Stormwater Management**

CMC Response to question 33g relating to stormwater diversion during reclamation is the same CMC proposed solution that has not worked before. CMC is counting on "existing diversions" that have failed in the past. The DRMS Fourth Adequacy Review letter says that this response is adequate.

The failure of the northern diversion is what caused water to cascade down the quarry wall in 2015. This ditch looks like it is still not repaired as of 2018 (see Figure 1). It is now obvious that this approach leads to consistent failure of the upland diversion ditches. Why is DRMS not requiring designs for this structure at this point and requirements that the structure be built to those designs?

34. Benched vs Backfilled Highwalls

I agree with DRMS that additional clarification is required. If the highwalls are left in place with no benching or backfilling they could be as high as 100 feet or more.

35. The DRMS fourth adequacy review answers are appropriate and real answers to these questions are necessary.

36. The weed control plan is necessary and appropriate.

37. There are still no tree survival criteria for a number of trees (say 70% of those planted) surviving for a certain length of time (say 5-7 years after all man-supplied inputs have ceased). The vegetation sampling plan is fine for herbaceous species and perhaps even for shrubs but inadequate for trees (even if from the USFS approval). The tree criteria are especially important since trees are going to be

used to try and cover the benched highwalls in the upper parts of the quarry.

38. I agree that the response is adequate.

39. I agree that CMC has provided the Exponent Report and it has much useful information in it.

40. DRMS should not allow the operator to more than halve the Seismic Coefficient for design of this buttress. Even applying the seismic coefficient from a study performed in 1984, simple mathematical calculations indicate that 0.075*0.5 = 0.0325 (standard mathematical rounding would put the SC at 0.033). Further, the operator should at least apply that part of the method in the Hynes-Griffin and Franklin conclusions section that requires material shear strengths be multiplied by 0.8. Has this been done? It is very important to note that these seismic analyses techniques should not be used in cases where materials in either the embankment or foundation are susceptible to liquefaction under the design cyclic loading. Based on CMC's revised specifications for Engineered Fill, liquefiable soils are not specifically excluded from use in the buttress or embankment. It is not unreasonable to believe that fine sands, silts and other liquefiable materials could find their way on to the site given the open invitation to "donor" fill importation. What screening methods will be employed to further restrict these materials from placement in critical areas? Equipment operators should not be tasked with making these determinations.

41. The CMC response is adequate in my opinion.

42. The haul road reclamation response is simplistic and the narrative previously submitted by CMC indicated that there would possibly be several haul roads and switchbacks needed to haul materials from on site borrow areas. One way to handle this would be to have no more than 5000 feet of typical haul road on site at any one time without written permission and a reclamation bond increase prior to exceeding the limit of haul road distance on the entire site. Without that limit set in enforceable terms, the current response only allows one haul road for the entire site (not including haul roads in the processing area). Haul roads already exist around the processing area that must be included in this calculation. Another way to handle this would be to allow a greater not-to-exceed distance of haul roads to be present on site and hold an adequate reclamation bond to alleviate compaction on the entire distance. DRMS needs to address this inadequate response that will lead to an inadequate reclamation bond amount.

43. In the January 8, 2020 response, CMC proposed to get material from the north lower section of the quarry to build the engineered buttress fill and add this area to the affected land. No cross sections or calculations were offered to demonstrate that there is enough material in this area to complete the reclamation plan and also claims that all material will be removed from this area without blasting. CMC also did not define where "…another borrow area…" is located if material from the first proposed area cannot be obtained without blasting. The material from this area was not characterized for its suitability to use in the engineered buttress fill. It was not clear whether there was enough material to

complete the reclamation plan from this area since no calculations of the amount of material in this area are included in the application. Will DRMS require such demonstrations or hold sufficient bond to import enough material to complete the reclamation plan?

DRMS appropriately asked in the Third Adequacy Review, "The SAR response indicates additional borrow area north and east of the shop area can supply sufficient backfill to achieve the required grades for reclamation and avoid the DRMS requiring bond to import backfill from offsite. Please provide a demonstration of sufficient backfill from this newly identified area."

CMC responded by placing unsubstantiated numbers of the amount of fill that could be obtained in various areas on Maps C-1 and C-2. There are no backup calculations or demonstration of present topography and future topography to demonstrate that this actual amount of borrow material can be obtained from these areas or that these areas can be sufficiently excavated to obtain the borrow material without over-steepening the slopes. This type of "demonstration" of borrow availability is unacceptable.

The biggest problem with allowing an inadequate showing of borrow availability in this case is that supplying or obtaining borrow in this quantity is going to be by far the largest reclamation cost to adequately reclaim this site. This reclamation task is the most expensive one from a reclamation bonding perspective. It is highly probable that material can indeed be obtained more cheaply on site and it is incumbent upon the operator to provide a much better demonstration and plans for this proposal (topographic maps that compare present topography to topography after the borrow has been moved may be appropriate). Without such a rigorous demonstration, DRMS should bond for supplying a large part of the material by purchasing it from offsite.

44. The CMC response to this DRMS adequacy question is not responsive to the actual question. The CMC response addresses actual slide body stability (which is important but not the subject of the question). Perhaps the question was misunderstood.

Aerial photos of 2017 (Figure 2) and 2018 (Figure 3 - whole quarry; Figures 4 and 5 - detail) indicate a scarp above the southernmost hanging block at the top of the highwall. The Sawatch clay layer underlies the hanging block located on the south side of the western highwall. Exponent deemed the clay layer the primary failure cause for the December 2, 2008 and related slides. In other words, we are not talking about safety factors of unconsolidated materials such as exist in the body of already failed material but a special condition of a clay layer in the upper part of the Sawatch Formation that could lead to sudden and unexpected sliding of now hanging material above that layer now that the buttressing blocks of material below this have already failed and slid downslope. An additional complicating and destabilizing factor is that the scarp and the separation of materials at the top of the block will probably allow additional surface water to flow directly to the clay layer and further lubricate and destabilize this block.

The Exponent Report of 2011 includes a cross-section in Appendix 39 (G-G') that is indeed drawn along the slope gradient and probably intersects part of the present hanging block of limestone in the southern part of the west highwall of the quarry (Figures 6 and 7). After reading this part of the Exponent Report, the concern of instability of this rather large block of material only grows larger because it clearly shows that this is a hanging block and the block could slide in the near future if not properly buttressed, avoided, or handled in some other appropriate way. CMC and DRMS need to recognize this to protect worker safety and address this concern.

One of the ways to determine whether this block is presently moving is for CMC to produce long-term prism monitoring data for the possible hanging block of limestone material (prisms P66, P70, T1). DRMS must request that CMC produce this data to ensure worker safety and/or unnecessary problems that will not be covered by the reclamation bond.

Questions from the Fourth DRMS Adequacy Review

45. It is not surprising that DRMS software came to similar safety factor conclusions when using the same assumptions that Stantec used. The real question should be determining whether assumptions decided on by Stantec are reasonable, within what would be considered similar to materials in other situations and based upon actual engineering testing of the materials. Has Stantec done this testing and given the results of these tests to DRMS? Are the design assumptions appropriate for the variety of materials that may find their way into the fill slope?

Other concerns not addressed by DRMS

The Exponent Report noted that groundwater in the lower part of the quarry was "...from a confined groundwater condition." This groundwater pressure could have adverse effects on stability of the buttress fill if not properly managed. Most likely this groundwater is fed from the surface water drainage that 'disappears' in a drainage above the quarry, but without tracing or investigating that surface water feed to groundwater it is impossible to tell.

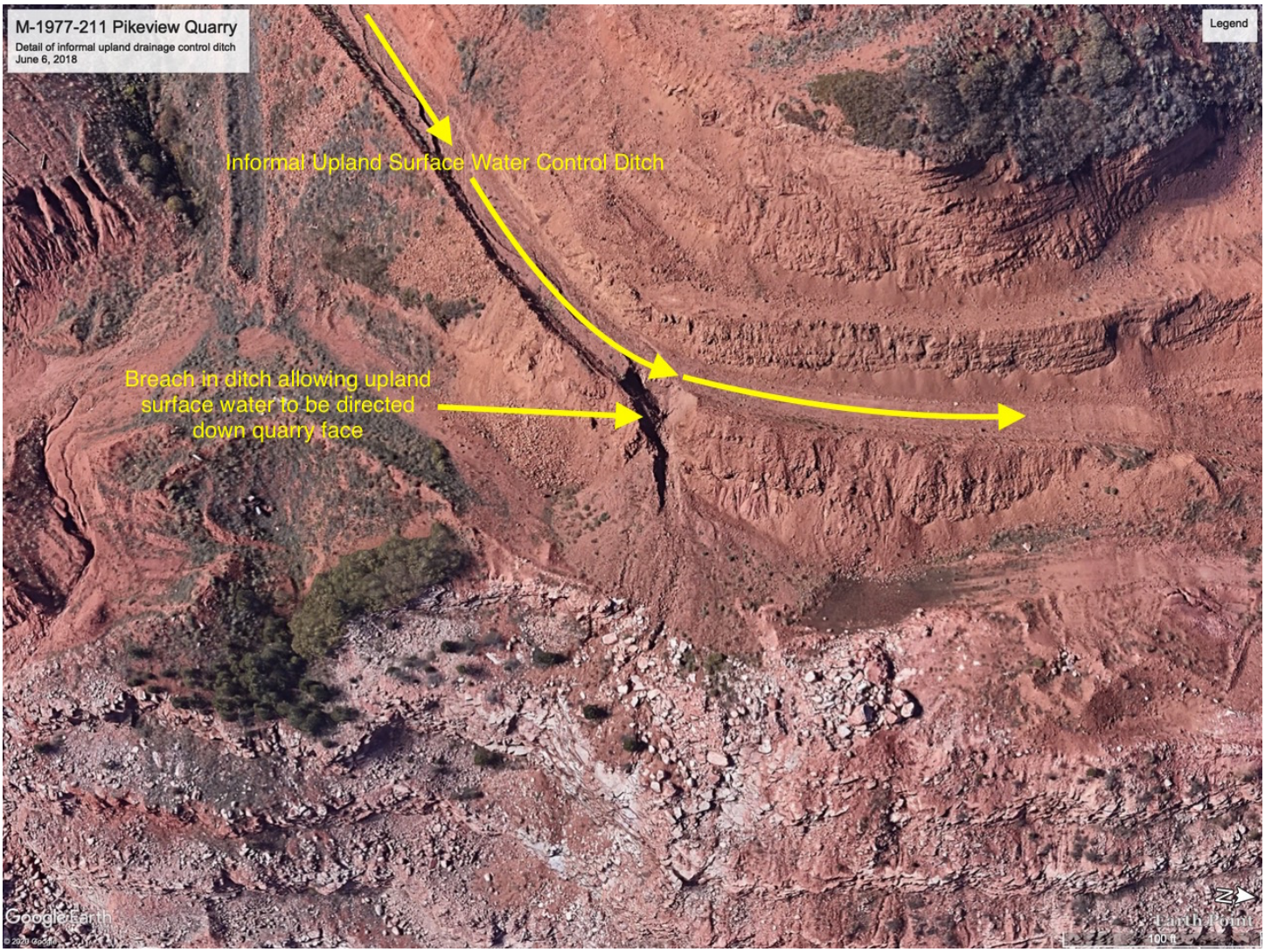

Figure 1. From Google Earth aerial photo of June 6, 2018 showing informal upland drainage ditch breached in approximately 2015 and still not repaired as of 2018. Above west quarry highwall, north side.

Figure 2 – Pikeview Quarry conditions on June 9, 2017.

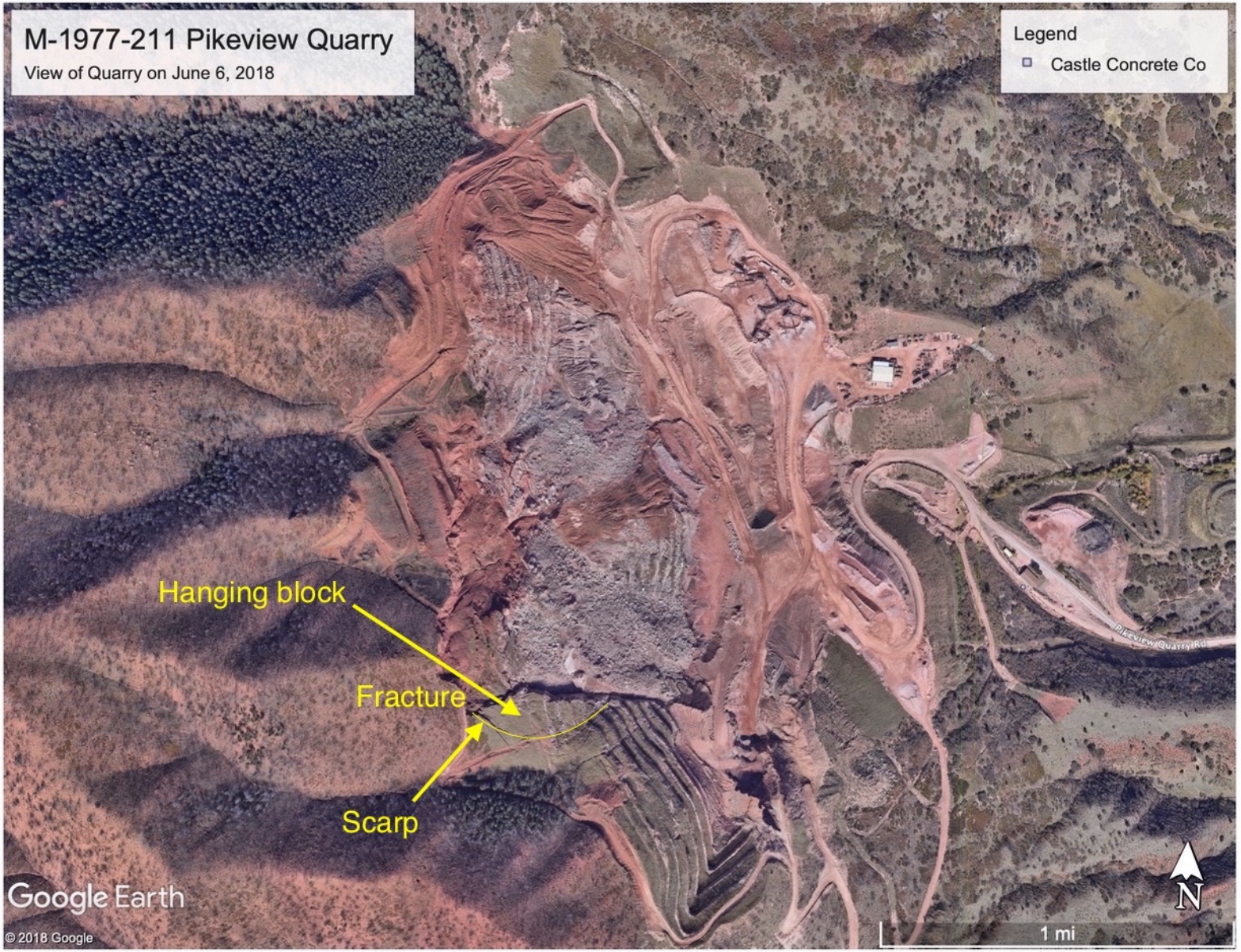
M-1977-211 Pikeview Quarry
View of Quarry on June 6, 2018
Legend
Castle Concrete Co
Hanging block
Fracture
Scarp
Pikeview Quarry Rd
Google Earth
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Figure 3 – Pikeview Quarry conditions on June 6, 2018.

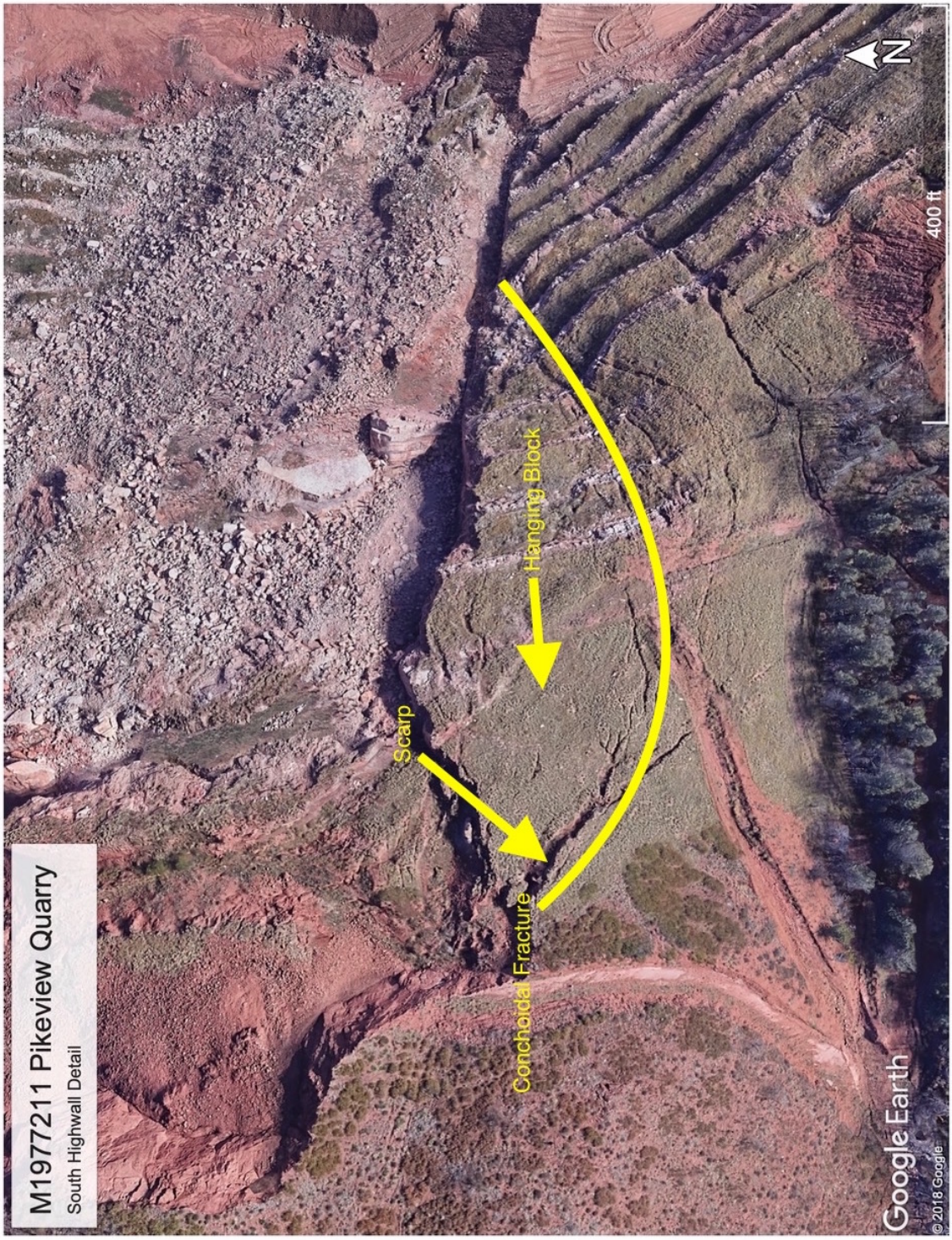

Figure 4 – Pikeview Quarry – Detail of conchoidal fractures in the south part of the West Highwall, 2018.

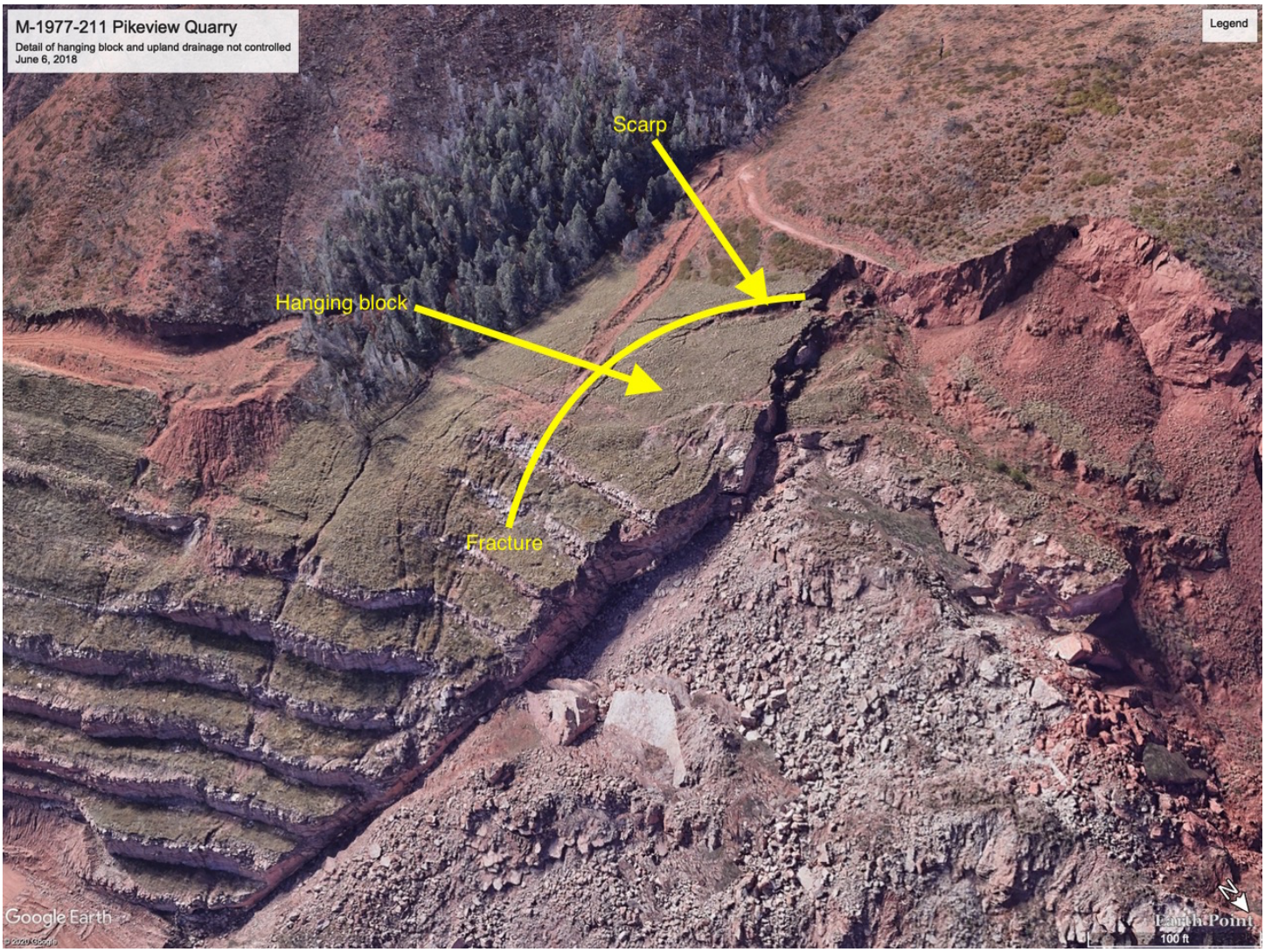

Figure 5. Oblique aerial photo from Google Earth showing detail of south most hanging block at top of west highwall. Scarp above block and block noted by arrows and conchoidal fracture denoted by line.

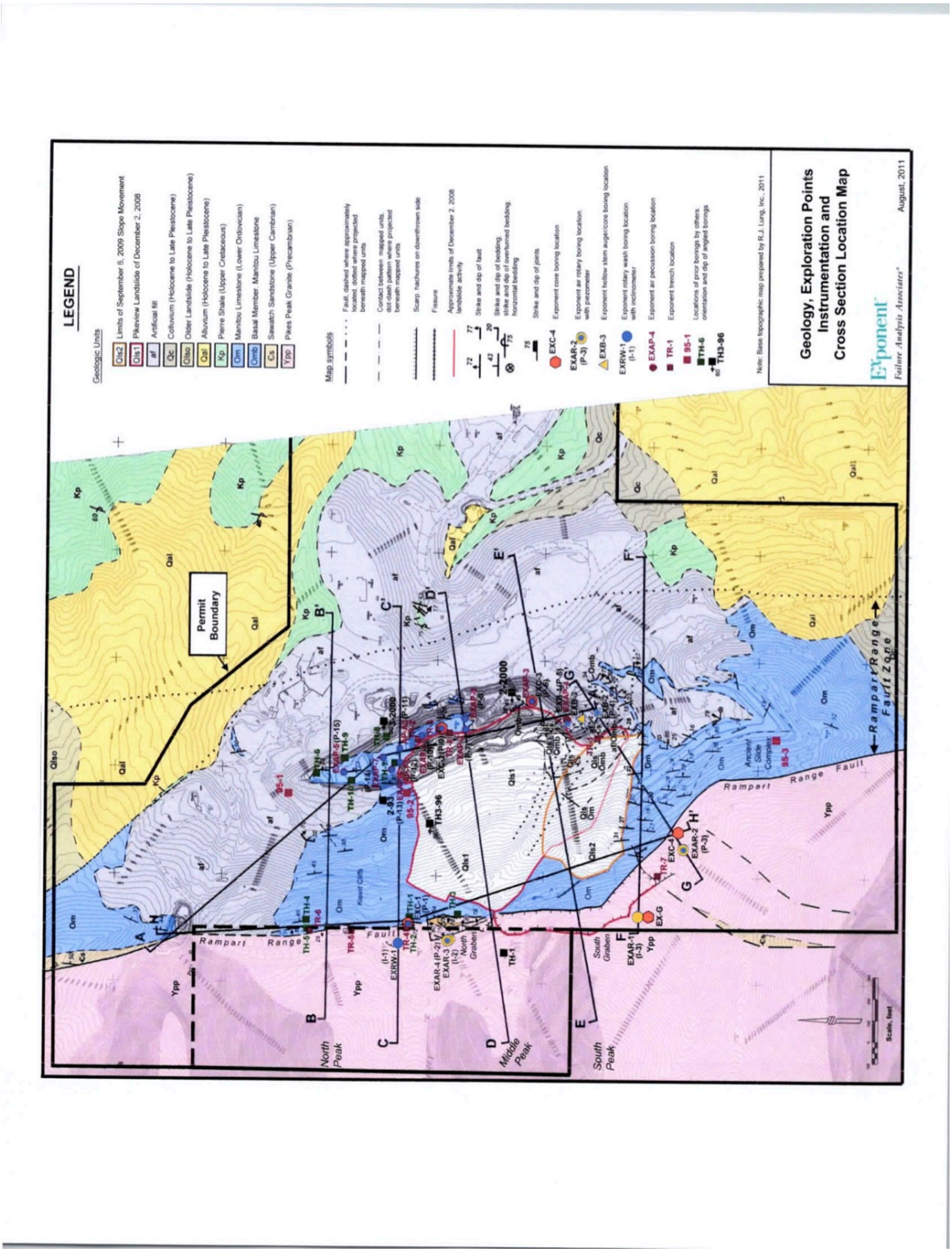

Figure 6 – From Exponent Report (2011), Appendix 39. Map of Pikeview Quarry showing Cross Section Locations including G-G'.

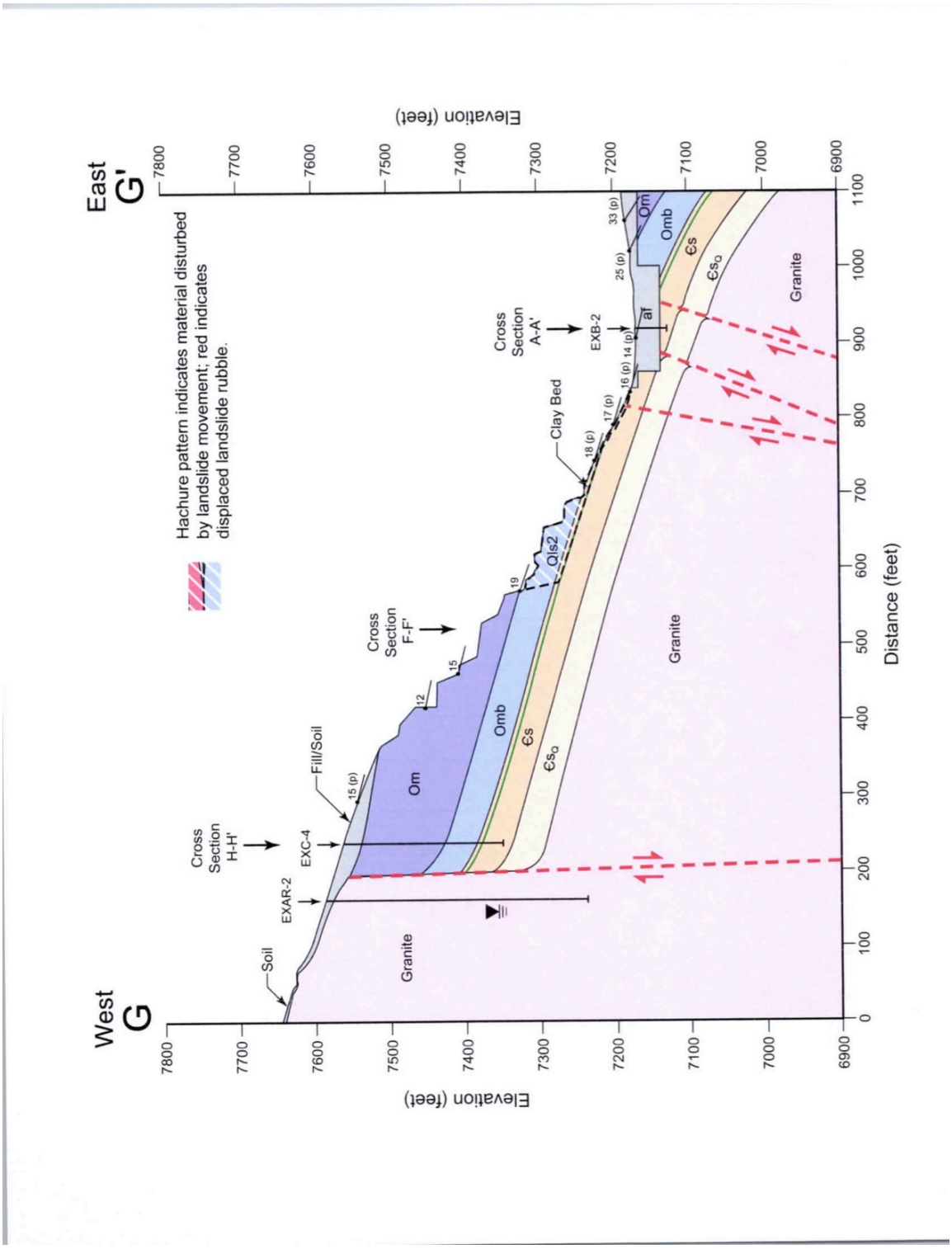

Figure 7 – From Exponent Report (2011), Appendix 39. Cross Section G-G' showing limestone hanging block on top of clay layer that was the primary cause of the December 2, 2008 slide and subsequent slides.