



COLORADO
Division of Reclamation,
Mining and Safety
Department of Natural Resources

1313 Sherman Street, Room 215
Denver, CO 80203

Date: October 4, 2017

To: Jared Ebert; Division of Reclamation, Mining & Safety

From: Peter Hays; Division of Reclamation, Mining & Safety

**Re: Loveland Ready-Mix Concrete, Inc.; Knox Pit; File No. M-2017-036;
Exhibit 6.5 – Geotechnical Stability Exhibit Review**

The Division of Reclamation, Mining and Safety (Division/DRMS) has reviewed the Geotechnical Stability Analysis included in Exhibit 6.5 for the Knox Pit 112c permit application. The Division is required to make an approval or denial decision no later than December 17, 2017. Therefore, a response to the following Geotechnical Exhibit adequacy review concerns should be submitted to the Division as soon as possible.

The following list describes the information used by the Division as presented in the permit application to evaluate slope stability for the proposed mine site. Please review the list and confirm the list is accurate.

- Loveland Ready-Mix Concrete, Inc. plans to construct a compacted engineered backfill liner of fine-grained material around the perimeter of each mined pit with a final slope of 3H:1V.
- The stability analysis was based on fourteen (14) exploratory borings drilled by Authentic Drilling, Inc. with oversight by Telesto Solutions Inc. (Telesto).
- The exploratory borings indicated two (2) to five (5) feet of clay loam soil overlying eleven (11) to twenty-eight (28) feet of sand and gravel below the ground surface.
- Groundwater levels were measured at depths between three (3) to eight (8) feet below the ground surface.
- The stability analysis cross-sections assume the highwall will be no closer than fifty (50) feet from any permanent man-made structure.
- The final pit highwall will be no steeper than 0.5H:1V prior backfilling of the highwall during reclamation.
- The geotechnical stability analysis was performed by Telesto using GeoStudio software SLOPE/W.
- The material properties for each of the soil materials used in the stability analysis were based on field testing. No laboratory soil parameter were conducted by Telesto.



- Material properties for the weathered and competent claystone bedrock were not deemed necessary and were not conducted by Telesto.
1. The Applicant states a minimum fifty (50) foot offset will be maintained at all times between the highwall crest and the structure to be safeguarded, however the stability analysis were modeled with a thirty (30) foot offset from the crest of the Little Cache La Poudre Ditch and from the base of the Platte River Power Authority Power Pole to the highwall crest. Please explain this discrepancy between the proposed minimum offset distance and the stability analysis offset used in the models.
 2. Please verify and update the Exhibit C – Mine Plan Map to indicate the mining offset radius around the power line poles as fifty (50) feet in Mine Phases 1 and 2.
 3. The Applicant states no material piles or other loads will be allowed within the fifty (50) foot offset between the highwall and permanent structures. A material stockpile is indicated on the right side of cross-section B-B' on Figure 4 submitted with the stability analysis. Please explain this discrepancy and update Figure 4 and/or the stability analysis models as required.
 4. The Applicant states no material piles or other loads will be allowed within the fifty (50) foot offset between the highwall and permanent structures. A landscape berm is indicated around the perimeter of the site on Exhibit C – Mine Plan Map submitted with the permit application. Please explain this discrepancy and update Exhibit C and/or the stability analysis models as required.
 5. Please update the Exhibit C – Mine Plan Map to indicate the required fifty (50) foot offset from all permanent man-made structures.
 6. The General Backfill Detail included on Exhibit C – Mine Plan Map submitted with the permit application indicates a liner key into competent bedrock and a perforated drain pipe surrounded by drain sand behind the keyway. The stability analysis models do not account for the keyway or drain pipe. Please explain this discrepancy and update the stability analysis models to incorporate the missing features.
 7. Please provide the SLOPE/W slope stability analysis data from the Telesto stability analysis models to allow the Division to duplicate the analysis with Clover Technology's Galena software for verification purposes.

If you have any questions, please contact me at peter.hays@state.co.us or (303) 866-3567 Ext. 8124.