Rapid Repair of Cracks on the Embankment Slopes Using Bio-Cement Dataset

Dataset available at: https://digitalcommons.lsu.edu/transet_data/130

(This dataset supports report **Rapid Repair of Cracks on the Embankment Slopes Using Bio-Cement**)

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The related final report **Rapid Repair of Cracks on the Embankment Slopes Using Bio-Cement**, is available from the National Transportation Library's Digital Repository at https://rosap.ntl.bts.gov/view/dot/61947.

Abstract: This research explored the feasibility of using Microbially Induced Carbonate Precipitation (MICP) to improve fine-grained soil mechanical properties, seal the soil cracks, and assess the improvement of MICP on slope stability. The conducted research tasks include (1) direct shear tests to investigate the mechanical behavior and biogeochemical reactions of low-plasticity silt treated by MICP, (2) cyclic wetting-drying tests to assess the feasibility of using MICP to seal and waterproof the soil cracks, and (3) SLOPE/W modeling of a slope treated by MICP. Direct shear tests were used to evaluate the shear responses of the low-plasticity silt under different overburden pressures (12, 25, and 35 kPa) and different bio-cement treatments. A series of cyclic wetting-drying tests were used to assess the effectiveness of MICP treatment on healing soil cracks. Crack lengths, area, width, and area percentage were measured and compared before and after the MICP treatment. SLOPE/W analysis was performed to assess the factor of safety of a slope under MICP treatment. The direct shear tests results show that the peak shear strengths increased by an average of 30% from the untreated to the MICP-treated soil samples. The wetting-drying cycle tests results show that MICP treatment can heal desiccation cracks, reducing crack length, crack width, and crack area. The results of the SLOPE/W modeling show that the MICP treatment had a positive effect on the improvement of slope stability, but more field tests are needed for optimizing the treatment solutions and procedures and assessing the long-term effect and ecological impacts.
Comments: Tran-SET Project: 20GTLSU11

Recommended citation:
Lin, H., & Cheng, G. (2021). Rapid Repair of Cracks on the Embankment Slopes Using Bio-Cement. Retrieved from https://digitalcommons.lsu.edu/transet_data/130

Dataset description:
This dataset contains 1 file collection, described below.

Data.zip:
- Data Folder
  - Figures 16 to 20.xlsx
  - Figures 1 to 14.xlsx
  - Figure 2.xlsx
  - Figure 21 Folder
    - Stark et al 2017 Untreated Peak.gsz
    - Stark et al 2017 UBC Peak.gsz
    - Stark et al 2017 UB Peak.gsz
    - Insstruction.xlsx
  - Figure 19 Folder
    - Instruction.xlsx
    - Figure 19 data.csv
    - Code – Figure 19.txt

File Type Descriptions:
- The .xlsx and .xls file types are Microsoft Excel files, which can be opened with Excel, and other free available software, such as OpenRefine.
- The .gsz file extension is associated with the GeoStudio that is used for geotechnical modeling. The GSZ file contains saved project modeled in the GeoStudio suite. The gsz file is ZIP container that includes GeoStudio modeling files stored in XML text file format (for more information on .gsz files and software, please visit https://www.file-extensions.org/gsz-file-extension).
- The .csv, Comma Separated Value, file is a simple format that is designed for a database table and supported by many applications. The .csv file is often used for moving tabular data between two different computer programs, due to its open format. The most common software used to open .csv files are Microsoft Excel and RecordEditor, (for more information on .csv files and software, please visit https://www.file-extensions.org/csv-file-extension).
- The .txt file type is a common text file, which can be opened with a basic text editor. The most common software used to open .txt files are Microsoft Windows Notepad, Sublime Text, Atom, and TextEdit (for more information on .txt files and software, please visit https://www.file-extensions.org/txt-file-extension).

National Transportation Library (NTL) Curation Note:
As this dataset is preserved in a repository outside U.S. DOT control, as allowed by the U.S. DOT's Public Access Plan (https://ntl.bts.gov/public-access) Section 7.4.2 Data, the NTL staff has performed *NO* additional curation actions on this dataset. NTL staff last accessed this dataset at https://digitalcommons.lsu.edu/transet_data/130 on 2022-05-25. If, in the future, you have trouble accessing this dataset at the host repository, please email NTLDataCurator@dot.gov describing your problem. NTL staff will do its best to assist you at that time.