

# User Guide

## CITS3200 Group 18 Project

Semester 2, 2024  
University of Western Australia

### Soil Database Explorer App

Version 3.0

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Prepared by: CITS3200 Group 18

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#### *Preface*

This document outlines instructions to guide users of the Laboratory Testing Database application. It is intended to provide a comprehensive overview of the project's functionalities and features. The primary audience of this document includes the client, the unit mentor and project auditor.

#### *Target Audience*

- Client: Cristina Vulpe
- Mentor: Matt Schneider
- Auditor: Raul Poma Astete
- Unit Coordinator: Michael Wise
- External collaborators who have been identified by the client

#### *Project Team Members*

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# 1.0 Set Up

## 1.1 Database Set Up

An empty database file will be provided on the project GitHub page. When preparing to use the software to access a new database, make a copy of the empty database onto the file system.

Otherwise if accessing a prepared database, load that instead onto the file system.

Database files should have the extension '.db'.

## 1.2 Building From Source

This section is an advanced guide for building a binary from the source files. If a pre-built version is desired, use the provided executable file from a release version on the project GitHub page (<https://github.com/CurryduckwithEC/CITS3200-Laboratory-Testing-Database>).

### 1.2.1 Prerequisites

The prerequisite software is required to build this project:

- node.js
- python

The required python libraries are supplied as a requirements.txt in the GitHub repository.

Electron is a required module for node.js

### 1.2.2 Building the Python Component

First, clone a copy of the repository onto your local machine from a release branch. PyInstaller will be required to bundle the Python component of the source files into an executable.

It is advisable to create a new venv with only the modules in the requirements.txt for PyInstaller as it will pull all installed libraries regardless of whether they are used in the source files.

Once cd'ed into the directory of the project, pyinstaller can be invoked as

```
pyinstaller --onefile ./api/dash_page.py
```

### 1.2.3 Building the Electron App

Ensure that in main.js, build mode is turned on. The Boolean value for build should be marked as true. If building for an operating system other than Windows, ensure that the target variable specified in package.json is of the type for the intended operating system.

Install Electron as a dependency of the directory

```
npm install Electron --save-dev
```

The build command can then be called

```
npm start build
```

After the process is completed, the executable should appear in ./dist

## 2.0 Startup

### Soil Sample Database Interface

Database Directory

Browse

Access Key (Optional)

Submit

### 2.1 Database Browser

When first entering the program, a landing page will be displayed to the user to select the desired database at the top. Click the 'Browse' button and a file system pop-up will appear. Navigate through the file system to find the desired database file to be accessed. It is necessary that database files have a '.db' extension. Once selected, the file path should automatically populate.

## 2.2 Keys

Keys are optional when using the software. If accessing a database file without a key, only public tests within the database will be displayed. Any test spreadsheets marked as private will automatically be read as public.

Once a key is inputted into the key field before entering the dashboard, all private tests will be decrypted with the key and shown to the user. If the wrong key is used, the decryption of the private tests will further obfuscate the values and subsequently cause them to not be within the bounds of the filters.

All tests marked as private which are uploaded when a key is present will be encrypted by the key before being stored in the database. The same key is required to access that data again.

### 2.2.1 Advanced Key Management

It is possible to construct a manual access management system. There is no restriction to the keys that can be used with a singular database file. Private tests can be uploaded using one key, then another set of private tests can be uploaded using another key. This allows for the distribution of the database file to other users in conjunction with one of the keys, or several.

The key will only decrypt correctly those tests which were encrypted with that key.

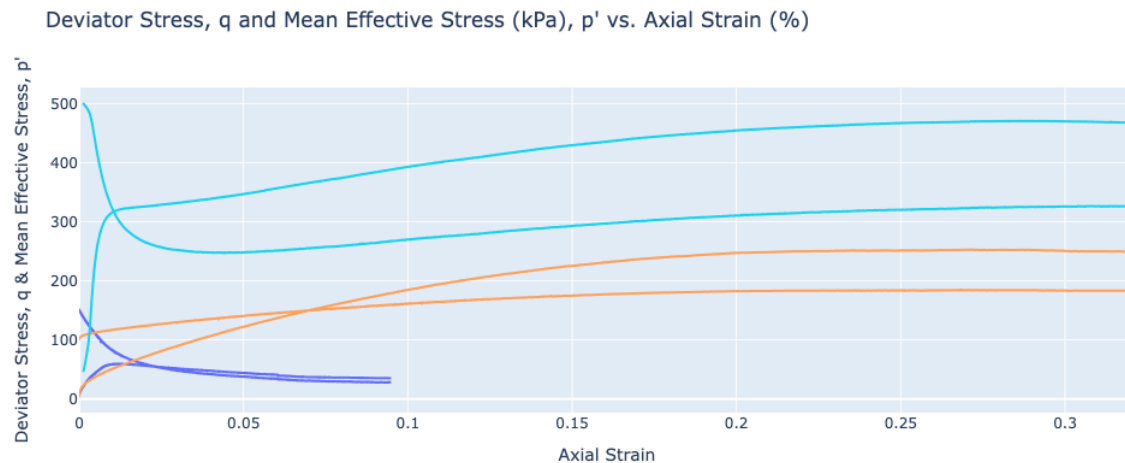
## 3.0 Dashboard

### 3.1 Visualisations

Once the data directory has been chosen, the application displays a dashboard which plots the data provided in the selected directory. The line graphs included are as follows:

- Plot 1:  $q, p'$  vs axial strain
- Plot 2: Induced PWP vs axial strain
- Plot 3:  $q$  vs  $p'$
- Plot 4: Volumetric stress vs axial strain
- Plot 5:  $e$  vs  $\log(p')$
- Plot 6:  $q/p'$  vs axial strain

An example of Plot 1 is shown below:



The user may interact with the graph by clicking and dragging to pan.

When hovering over a visualisation, the user will see the following icons in the top right-hand corner:



### 3.1.1 Saving Visualisations



By clicking the camera button, a pop-up will prompt the user to name and download the plot as a .PNG file to a designated location.

### 3.1.1 Zooming In and Out



By clicking the Zoom button, the user can interact with the visualisation by clicking and dragging to create an area the user wants to zoom into.



By clicking the Zoom In and Zoom Out button, the visualisation zooms in and out.



By clicking the Autoscale button, the user resets the zoom-in and zoom-out functions, causing the visualisation to return to its original, autoscaled format.

## 3.2 Filters

On the left of the visualisations, the user will find the filters section, divided by the following parts:

- Test specifications (Drainage, Shearing, Anisotropy, Consolidation, Availability)
- Sample specifications (Density, Plasticity, PSD)
- Variables (Axial Strain, Volumetric Strain,  $p'$ , Induced PWP, Deviator Stress, Void Ratio)

The user may click on the dropdowns to see the filters. An example of the Test specification filters is shown below:

The screenshot shows a sidebar menu with a 'Test' dropdown. Below it, several filter categories are listed, each with a title and a set of checkboxes or a range slider. The 'All' checkbox is checked. The 'Drainage' category has 'Drained' and 'Undrained' checkboxes, both checked. The 'Shearing' category has 'Compression' and 'Extension' checkboxes, both checked. The 'Anisotropy' category has 'Isotropic' and 'Anisotropic' checkboxes, both checked, and a range slider for values from 0.3 to 1. The 'Consolidation' category has a range slider for values from 10 to 1500. The 'Availability' category has 'Public' and 'Confidential' checkboxes, both checked.

Test ^

☒ All

**Drainage**

☒ Drained ☒ Undrained

**Shearing**

☒ Compression ☒ Extension

**Anisotropy**

☒ Isotropic ☒ Anisotropic

0.3 0.45 0.6 0.75 0.9 1

Min: 0.3 Max: 1

**Consolidation**

10 300 600 900 1200 1500

Min: 10 Max: 1500

**Availability**

☒ Public ☒ Confidential

By default, all filters are selected and the range of the variables is set to the full range.

The user is able to interact with these filters to indicate their desired selection or range of variables, and assess the plots corresponding to this criteria. There are three ways the user may input this information, depending on the nature of the variable:

1. **Select or Unselect**

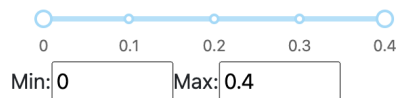
- a. An example of the Density filter, under the Sample section, is shown below:

## Density

☒ Loose ☒ Dense

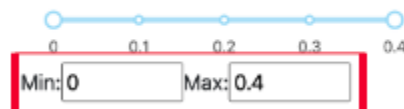
- b. By clicking on the check boxes, the user is able to:
    - i. Select “Loose” or “Dense”, choosing to include tests with these sample specifications in the plots
    - ii. Unselect sample specifications of “Loose” or “Dense”, choosing to exclude tests with these specifications in the plots
2. **Range Selection through Slider**
- a. An example of the Axial Strain filter, under the Variables section, is shown below:

### Axial Strain



- b. By clicking and dragging on the ends of the range slider, the user is able to set the maximum and minimum of the Axial Strain
  - c. The maximum and minimum value that the user has inputted is reflected at the bottom of the slider, in the “Min” and “Max” fields
3. **Range Selection through Manual Input**
- a. The user may manually type in their desired range into the “Min” and “Max” fields

### Axial Strain



- b. The range slider will also reflect the manually inputted range
- Once the user interacts with the filters, the data frame used to populate the graphs is altered to match the criteria. The plot then changes accordingly. This may take some time to render, depending on the number of observations in the plots.

### 3.2.1 “All” Checkbox

At the top of each section, there is an “All” checkbox, which is selected by default. When unselected, all filters in the respective section are unselected, and vice versa. This acts as a reset button to clear all filters in the section.

If all options in a filter are unselected, the filter is not applied to the dataframe. For example, if the Density filter, as shown below, has no options selected, no tests will meet the criteria. In this case, all tests will be plotted instead of none.

## Drainage

☐ Drained ☐ Undrained

### 3.3 Navigation

DatabaseApp      Graphs   Admin   axial\_deviator   axial\_pwp   q\_p   axial\_vol   e\_logp   stress\_ratio\_axial

After login, the user lands on the Graphs page.

At the top of the page is a navigation bar, which users can use to navigate around the app.

The "Graphs" page is the default page, with the dashboard showing graphs and filters.

The "Admin" page allows users to view the files uploaded into the database in a table, as well as to download, delete and upload new files.

The following links correspond to the different graphs. If on the Graphs page, clicking them will scroll automatically to that graph. If on the Admin page, clicking them will send the user to the Graphs page, and clicking again will scroll to the desired graph.

Each link corresponds to the following graph:

- **axial\_deviator:** Deviator Stress,  $q$  and Mean Effective Stress (kPa),  $p'$  vs. Axial Strain (%)
- **axial\_pwp:** Shear Induced Pore Pressure (kPa) vs. Axial Strain (%)
- **q\_p:** Deviator Stress,  $q$  (kPa) vs. Mean Effective Stress,  $p'$  (kPa)
- **axial\_vol:** Volumetric Stress (%) vs. Axial Strain (%)
- **e\_logp:** Void ratio,  $e$  vs.  $\log(p')$
- **stress\_ratio\_axial:** Stress Ratio,  $q/p'$  vs. Axial Strain

## 4.0 Admin Page

### 4.1 Upload Function

1. **Navigate to the Filter Section:**

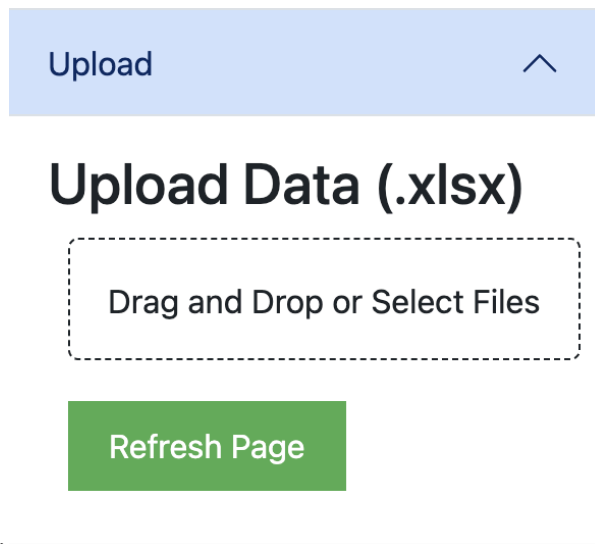
Scroll to the bottom of the filter panel and locate the sidebar labelled "Upload."



Click on the "Upload" section to proceed.



2. **Upload the File:** In the "Drag and Drop or Select Files" area, click to open the file selection dialog



From your local storage, choose the required `.xlsx` file for upload.

3. **Confirmation of Successful File Processing:**  
Upon successful file processing, the message '[filename] has been committed successfully' will be displayed to confirm the completion of the upload process.
4. **Handling Upload Errors:**  
If an error occurs during file upload, the system will display the message:  
"Error parsing file [filename]: [error details]" to indicate that the file could not be processed.
5. **Refresh and Generate Plot:**  
After the file has been successfully uploaded, click the green "Refresh" button located at the bottom of the page.  
Wait for the plot to generate based on the uploaded data.

#### 4.1.1 Excel File Format

The following must exist under either the first sheet within the workbook if the workbook only contains a single sheet **or** the fourth sheet within the workbook for a workbook with many sheets. A sample spreadsheet will be provided as an example on the project GitHub page.

The excel file being uploaded must contain the following cells which define the test conditions with their corresponding values within the first fifty rows:

- |                 |   |                          |
|-----------------|---|--------------------------|
| - Drainage      | → | {drained, undrained}     |
| - Shearing      | → | {compression, extension} |
| - Anisotropy    | → | [0, 1]                   |
| - Consolidation | → | [10, 1500]               |

- Availability → {public, private}
- Density → {loose, dense}
- Plasticity → {plastic, non-plastic, unknown}
- PSD → {clay, sand, silt}

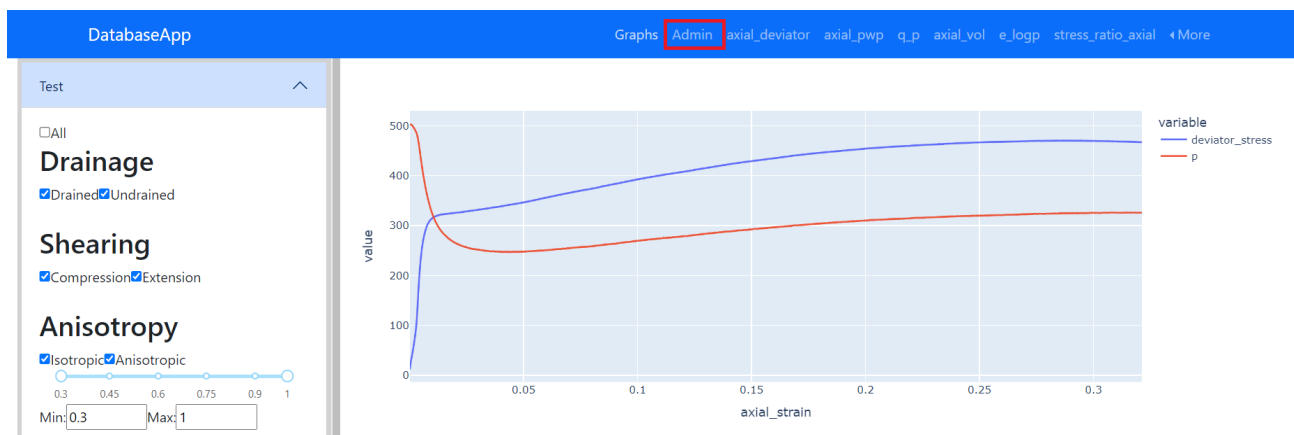
The following columns must exist in the table, the parser is case insensitive:

- Stage no. (either this must occur at the top left hand side of where the table starts)
- Time start of stage (or this must occur at the top left hand side of where the table starts)
- Axial strain
- Volumetric strain
- Excess PWP
- P'
- Deviator stress
- Void ratio
- Shear induced PWP

## 4.2 Download Function

### 1. Navigate to the Admin Page:

Ensure you are on the “Admin” page by selecting “Admin” from the navigation bar at the top of the page



### 2. Locate the “Download” Column:

In the “Current Database” table, identify the file you wish to download. The table provides a list of all uploaded files, with columns for the Test ID, File Name, Download, and Delete options.

#### Current Database

Test ID	File Name	Download	Delete
1	CSL_2_U.xlsx	Download	Delete

3. **Initiate the Download:**

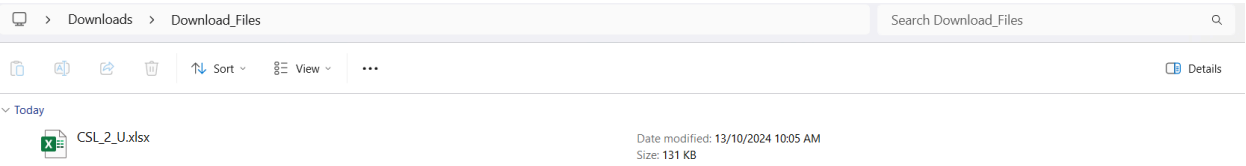
In the “Download” column, click the “Download” link corresponding to the file you wish to retrieve. This prompt will proceed to open your file explorer, allowing you to select where to store and download the file in CSV format on your machine.

Current Database

Test ID	File Name	Download	Delete
1	CSL_2_U.xlsx	Download	Delete

4. **Select Download Location:**

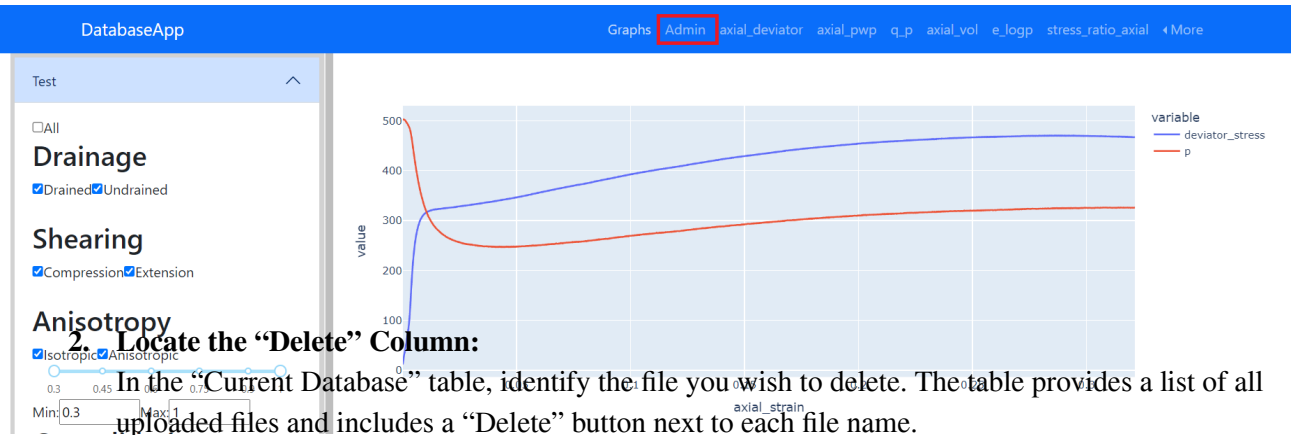
In the file explorer, navigate to your desired folder, and then confirm the download. The file will be saved with the same name as displayed in the File Name column.



4.3 Delete Function

1. **Navigate to the Admin Page:**

Ensure you are on the “Admin” page by selecting “Admin” from the navigation bar at the top of the page.



2. **Locate the “Delete” Column:**

In the “Current Database” table, identify the file you wish to delete. The table provides a list of all uploaded files and includes a “Delete” button next to each file name.

Current Database

Test ID	File Name	Download	Delete
1	CSL_2_U.xlsx	Download	Delete

### 3. Delete the Selected File:

Click the “Delete” button for the corresponding file. Once clicked, the test selected for deletion is removed from the “Current Database” table, indicating a successful deletion.

#### Current Database

Test ID	File Name	Download	Delete
1	CSL_2_U.xlsx	Download	Delete

### 4. Confirm Deletion on Plot Pages:

After deleting a file, you can navigate back to the “Graphs” page to confirm that the plots have been updated to not include the deleted file. This removal is reflected across all relevant visualisations.

## 5.0 Exiting

When exiting the application, go into the task manager and find the program. It should be named “Database access app...”. Select all the instances and end the tasks. Failure to close the app in this manner will leave certain backend processes running. This will interfere if the app is opened again.

If improperly closed, the orphaned tasks can be found in the task manager either as ‘dash\_page.exe’ or under the same name as mentioned prior. Either end these or restart the system.