Extreme Excavation Extrapolator

By:

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Introduction

An issue that faces most construction projects involves dealing with groundwater seepage into the construction site. Should a site require excavation below the water table elevation in a particular area, groundwater will start to seep through the surrounding soil on site in an attempt to fill the vacant area created. Therefore, in order to continue carrying out the project and avoid creating a more hazardous working environment the ground water must be removed constantly to avoid delays, injury or irreparable damage to the project.

However, due to certain regulations that ensure the quality and protection of the available water, water that is removed from a site must needs be stored, tested, and treated before being discharged into the drain system.

The purpose of the proposed app is to help the process of dewatering become, hopefully, more efficient. Our initial idea is to allow the user to define a footprint of the building along with the necessary excavation depth. This, along with the necessary calculations used to determine the seepage rate of water through particular soils, can be used to determine the amount of water that will infiltrate the soil into the site. This can allow the developer to bring the equipment necessary for dewatering beforehand and think of certain solutions to combat difficulties before they arise.

Another factor of ground water regards slope stability. Simply put, should the walls of an excavation site be at a less than suitable slope, there is a risk that the slope will “slump” down, bringing with it all the soil or debris that was resting within and on top of it. A safely constructed can be calculated beforehand using various equations. It’s proposed that the app also be capable of performing this calculation, in order to, again, prevent

damage and injury.

The benefits of this app could be seen as not only increasing the efficiency of dewatering processes but also protecting the quality and sustainability of our water supply.

Vector and Raster Data Required

Vector data that will be needed for this web app include land parcels, soil types, lakes, rivers, streams, and springs, protected drinking water zones, water rights regions, watersheds, flood areas, etc. The raster data that will be required for this app include groundwater data, and digital elevation models.

Data Distributed Via Map Services

This tethys app will provide land developers important information such as slope stability and the flowrate of effluent water, so they can know the correct size of the pump needed to keep their site dry.

General Geoprocessing Workflow

The workflow will begin by locating the site that is being developed. It will then use groundwater modeling tools to calculate piezometric pressure and then calculate the flow rate based on these pressures. For slope stability, the type of soil and depth of excavation will be taken into account. These results will then be reclassified into set categories given by the city, showing the correct way to contain the water.

Basic Front-End User Interface Functions

The user will start with the base map. They will be instructed to delineate the area of interest by drawing a polygon. The developer will be prompted to enter details about their construction project, such as dimensions of the excavation. After the analysis is run, it will provide a pop-up box that displays the necessary information.

GitHub (Slack??) Code Storage

None in our group remember talking about GitHub in class so I am assuming that we are supposed to address how we are going to use Slack here. Brandon Roberts already created a separate channel for us (#nerdalicious) on the class Slack account. This is the area where we will store and edit our code.

Source Code License

We are planning on licensing the source code under MIT. For the purposes of our project we don't feel like it is necessary to restrict the reuse of our code. We want others to be able to reuse our source code if they want.

General Team Member Responsibilities

While all team members will participate in every aspect of the project, each member of the team has been assigned a role overseeing certain facets to keep things organized.

Kyler Ashby - Team Leader

Kyler will work to ensure that team responsibilities are distributed fairly. If possible the project will be divided according to team member strengths to maximize the benefits of working in a group.

Seth Richardson - Presentation Specialist

In addition to work on the application and code, Seth will work on making sure that the final product is not just functional, but visually appealing as well. Seth will also lead out on the PowerPoint for any presentations given by the group.

Brandon Roberts - Coding Guru

Brandon will take the lead with any bugs and difficult sections of code related to our project. He will ensure that the final code is both functional and easily understandable.

Conclusion

We hope that our project will be able to be a valuable estimation tool for builders hoping to get an idea of the requirements of their projects, thereby increasing efficiency which should help in reducing costs and impact on the local surroundings.