

## Assignment 3: Tunnel

### 7308ENG Advanced Geotechnical Engineering

T2/2020

#### Instruction:

- Based on the information provided, using the software PLAXIS2D for numerical simulation, students need to provide a report (around 10 pages, excluding cover page, table of contents and references).
- Assignment needs to submit through the online system: learning@griffith (no hard copy is required)
- Deadline: **18<sup>th</sup> September 2020 17:00**
- Weight of the assignment: 20%
- Please fill in the assignment cover page as the first page of your submission.
- Use the following filename for your submission: sXXXXX\_surname\_project3.pdf (XXXXX is your student ID)
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#### Background:

In 2009, a residential canal was proposed at the Pimpama Riverside Development and geotechnical investigation was performed to assess the geotechnical settings of the area. The results of this investigation include a map (Figure 1), a series of boreholes logs (Appendix 1), soil properties (Appendix 2) and material for structures (Appendix 3).

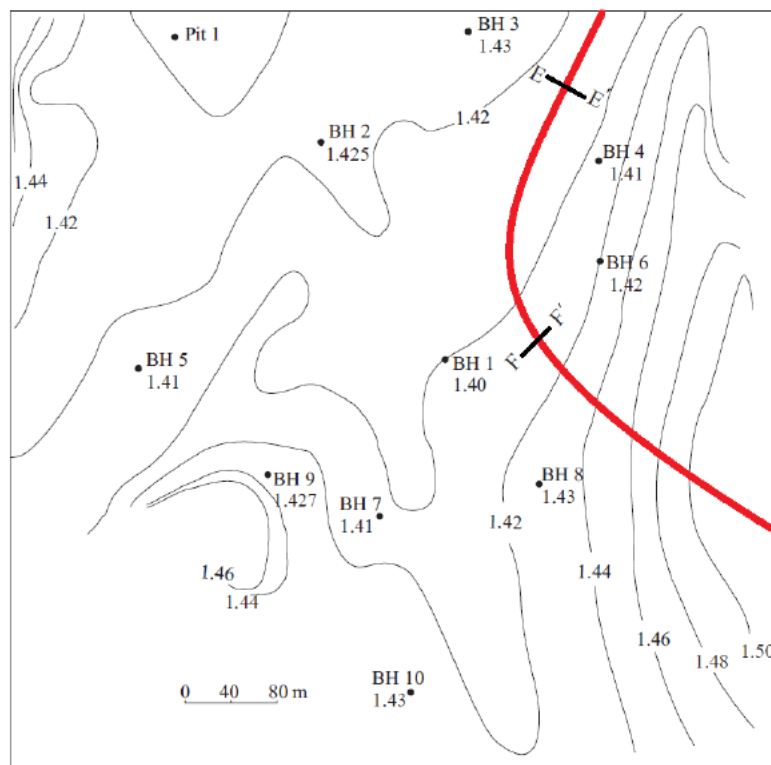


Figure 1: Maps of the project area (red line is the path of channel)

#### Task

We plan to construct a tunnel at sections EE' and FF'. For these two sections, we will have different design for the tunnel with the following options:

- Option 1: One large tunnel that allow traffic for both directions, two lanes for each direction. That is, the tunnel allows to have four traffic lanes.
- Option 2: Two small tunnels that allow one-way traffic for each one. Each tunnel allows two traffic lanes.

PART (A): Based on your design, use the software, PLAXIS 2D to carry out numerical simulation (referring to Figure 2). Discuss the results and compare both options.

(Note:  $q_1=q_2=10 \text{ kN/m}^2$ ,  $D_1=D_2=2 \text{ m}$ ,  $L=2 \text{ m}$ ,  $TD=6 \text{ m}$ ,  $B=10 \text{ m}$ )

PART (B): Parametric study

- (1) Varying  $q_1$  and  $q_2$ .
- (2) Varying  $D_1$  and  $D_2$ .
- (3) Varying the space between two footings ( $L$ ).
- (4) Varying the burial depth of the tunnel ( $B$ )
- (5) Consider different diameters of the tunnel and burial depth for your design, space between two tunnels for the option of two tunnels.
- (6) You can also vary other parameters as you want

Based on your parametric study, make your recommendation.

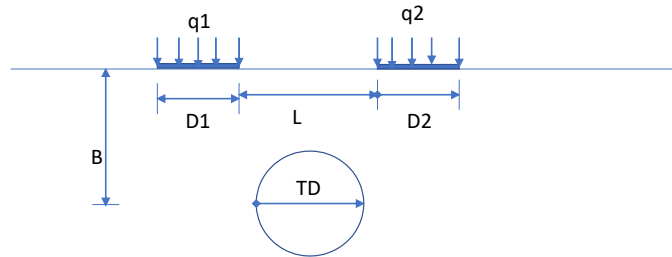


Figure 2: Configuration of tunnel construction (Option for one tunnel)