TSUNAMI LOAD CALCULATION PROGRAM

Department of Earthquake Engineering

NED University of Engineering and Technology

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Table of Contents

1. Introduction..... 1
2. Building Location.....2
3. Velocity Profiles..... 3
4. Flow Depth Profiles.....4
5. Design Tsunami Load.....5
6. References.....6

1. Introduction

This is an automatically generated report by Tsunami Load Calculation Program. Load calculations have been performed for the three load cases as per Criteria For Tsunami Design of Buildings and Other Structures published by the Department of Earthquake Engineering at NED University of Engineering & Technology, Pakistan. These cases represent hydrodynamic drag forces associated with buoyancy, maximum flow velocity and maximum flow depth. For further details, user is suggested to refer Criteria For Tsunami Design of Buildings and Other Structures [1].

Load calculations are performed based upon user provided data of building location, building width and story height. Inundation depths and flow velocities are calculated both from energy grade line analysis and site-specific analysis, and are compared by the program. The most conservative of these are used in the calculation of tsunami load. Note that Tsunami Load Calculation Program calculates overall loads. The user is advised to perform capacity analysis at member level even when the calculated tsunami loads are lesser than design base-shear of building structure under consideration.

2. Building Location

Building location was provided by the user graphically on an interactive map which is located at 24.76073° latitude and 67.07080° longitude. Three transects as per Criteria For Tsunami Design of Buildings and Other Structures [1] guidelines have been constructed with respect to the selected building location. First transect is perpendicular to the shoreline. Second and third transects are rotated 22.5° clockwise and 22.5° counter-clockwise to the first transect, respectively. The building location is shown as a red dot in the Figure 1 below whereas the transects are drawn as solid dotted black lines.

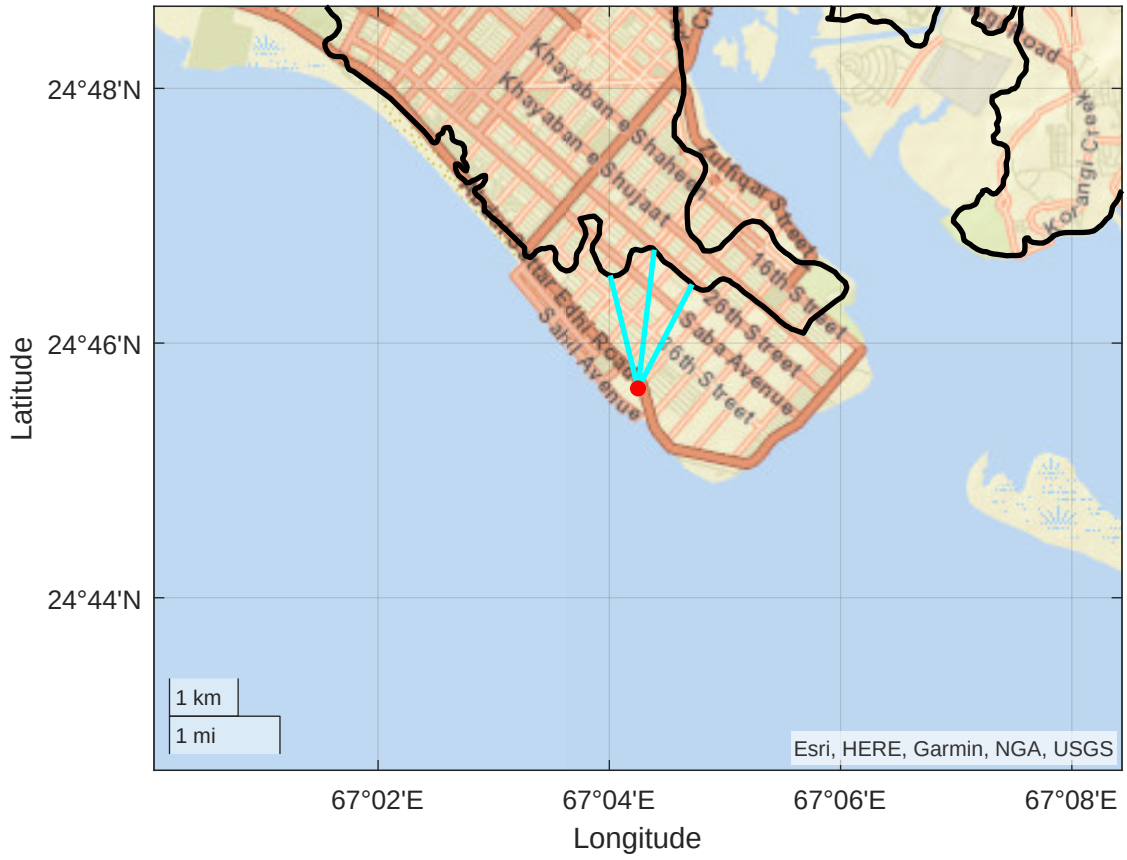

Figure 1. Building location and transects

3. Velocity Profiles

Velocity profiles for all the three transects are shown in Figure 2. Red dot shows the maximum flow velocity value at building location from the three transects. Design flow velocity is 22.61 ft/sec (6.89 m/sec) which is obtained from Transect 3.

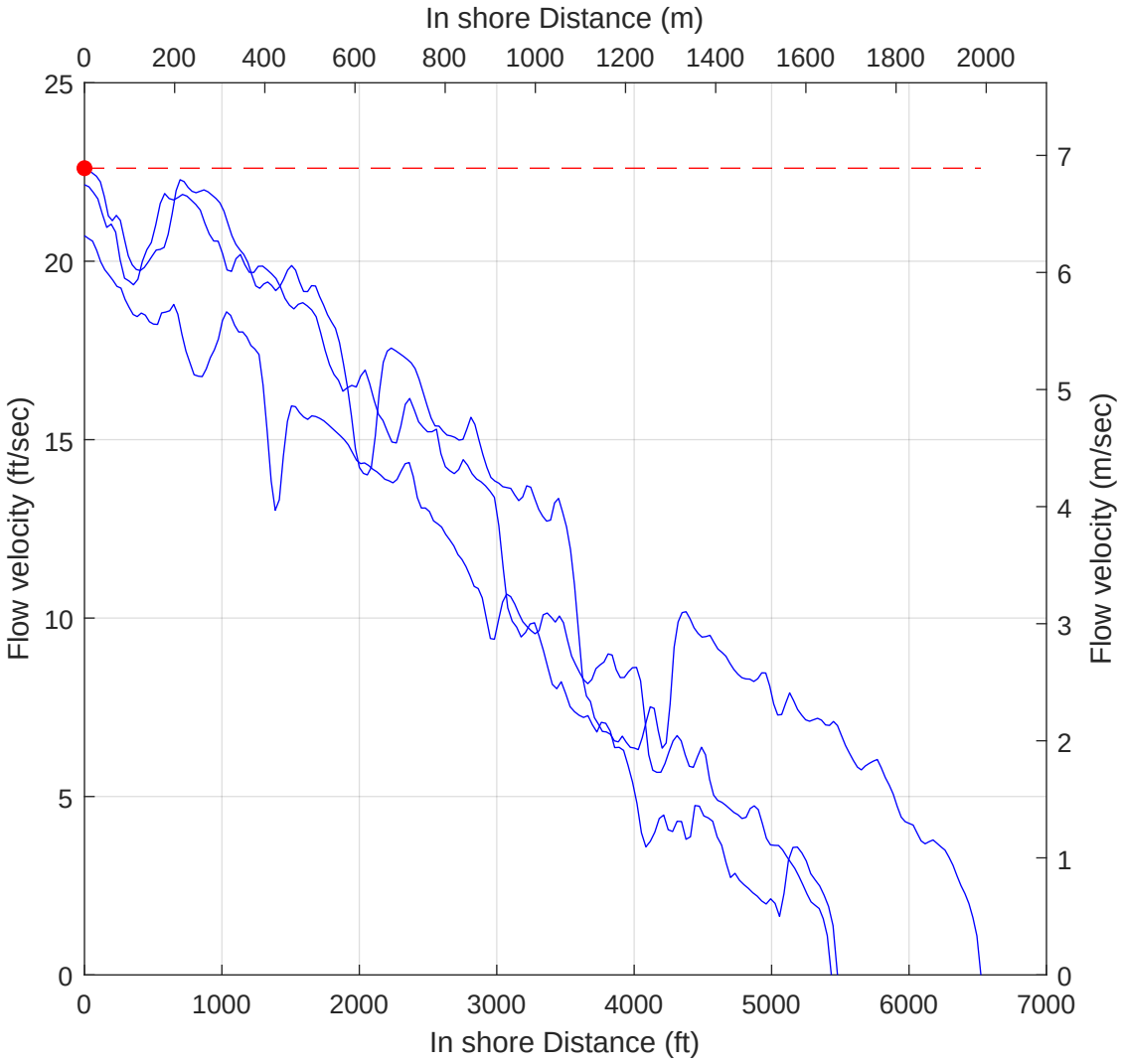

Figure 2. Velocity profiles

4. Flow Depth Profiles

Flow depth profiles for all the three transects are shown in Figure 3. Red dot shows the maximum flow depth value at building location from the three transects. Design flow-depth is 15.87 ft (4.84 m) which is obtained from Transect 3.

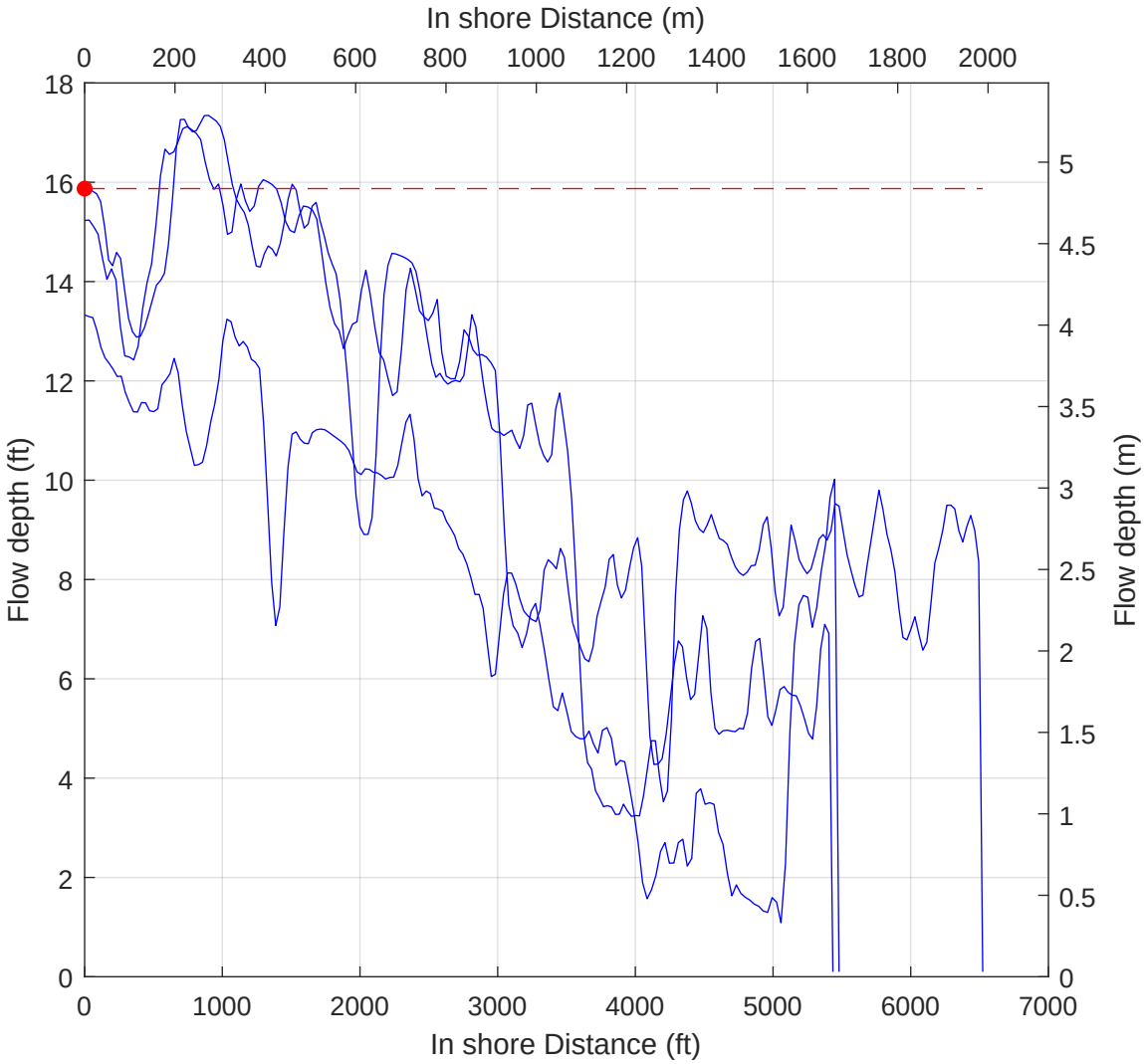

Figure 3. Flow depth profiles

5. Design Tsunami Load

As mentioned earlier, three load cases suggested by Criteria For Tsunami Design of Buildings and Other Structures [1] have been considered. Values of tsunami loads on the selected building are summarised in Table 1 for all considered load cases. For detailed formulation about load cases, user is referred to Criteria For Tsunami Design of Buildings and Other Structures [1].

Tsunami design load is taken as the maximum load from these three load cases which comes out to be 802.877 kips (3571.356 kN).

Table 1. Tsunami Load Cases

Load Case 1	802.877 kips (3571.356 kN)
Load Case 2	797.464 kips (3547.277 kN)
Load Case 3	130.072 kips (578.586 kN)

6. References

[1] Department of Earthquake Engineering (EQD) (2021). "Criteria For Tsunami Design of Buildings and Other Structures", NED University of Engineering & Technology, Pakistan. https://eqd.neduet.edu.pk/Publications