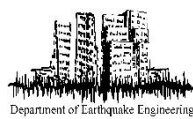




# Strengthening Tsunami & Earthquake Preparedness in Pakistan

## Tsunami Load Calculation Program Manual



Department of Earthquake Engineering



**Department of Earthquake Engineering**  
**NED University of Engineering & Technology, Karachi**

# TSUNAMI LOAD CALCULATION PROGRAM MANUAL

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# Tsunami Load Calculation Program Manual

## 1.1 Introduction

Tsunami load calculation program is a windows-based standalone application that estimates tsunami loads on building structures as per guidelines of Criteria for Tsunami Design of Building and Other Structures [1]. These guidelines have been prepared by the Department of Earthquake Engineering at NED University of Engineering & Technology and they apply only in Pakistan. This manual provides the details of different features of this application and explains their function for the convenience of users.

The interface of the application has been divided into 5 tabs which are located at the top of Home Screen of the application. These tabs are named as City Selection, Building Info, Computation, Loads and Summary. These tabs are circled in Figure 1.

## 1.2 City Selection

User selects city where the building structure is located. A drop-down menu provides the list of cities where design is needed. These cities include Karachi, Gwadar, Pasni, Ormara and Jiwani (See Figure 1).

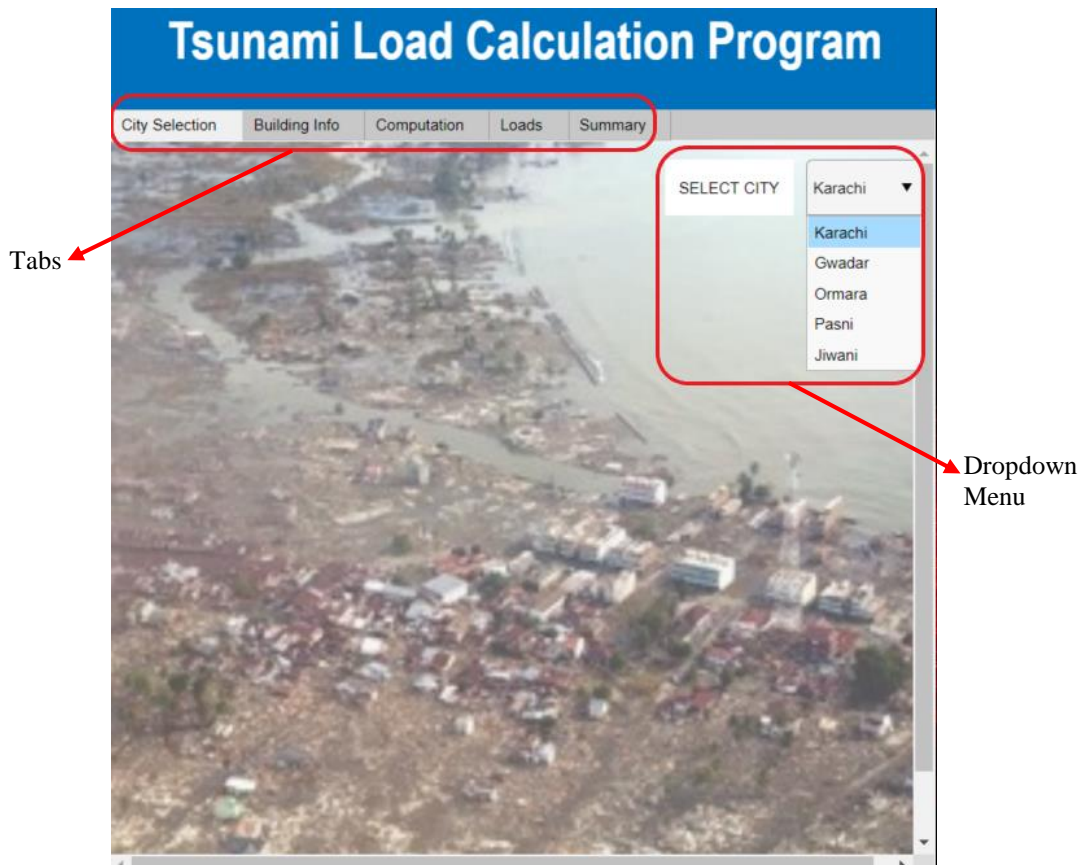


Figure 1. City Selection

## 1.3 Building Info

In this tab, user provides information about the building structure such as building location, building width and story height (See Figure 2). The program plots three topographic transects using this information as per Criteria for Tsunami Design of Building and Other Structures [1].

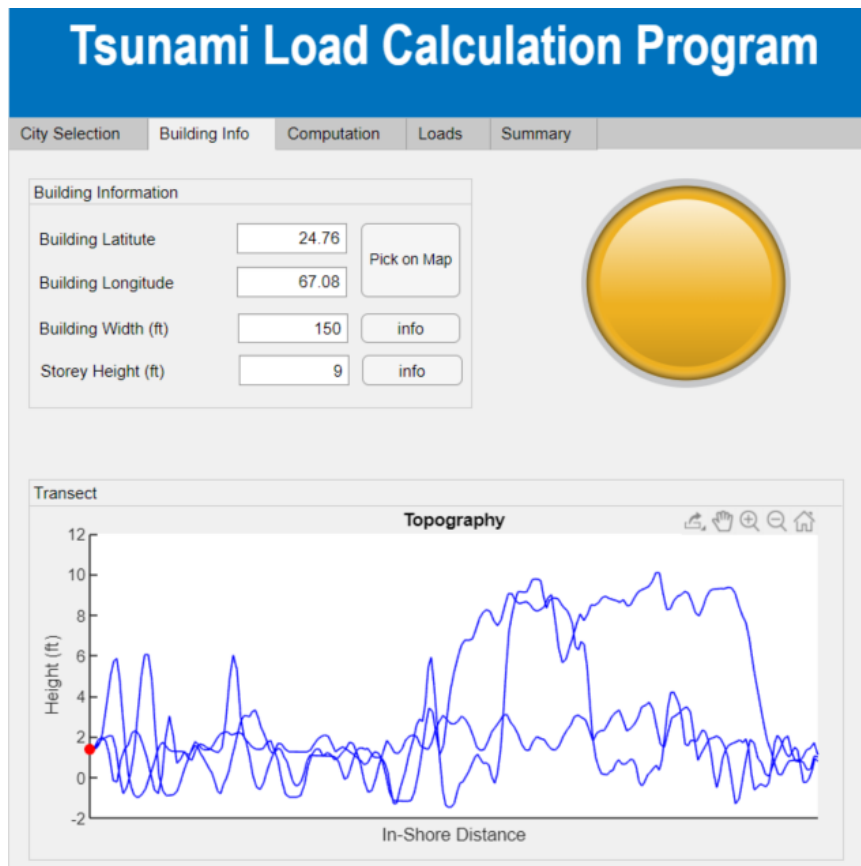


Figure 2. Building Information

#### 1.4 Computation

In this tab, program plots the flow depth and flow velocity profiles for the three transects and determines the design flow velocity and design flow depth. Calculate Loads button performs the load calculation and the results can be seen circled in Figure 3.

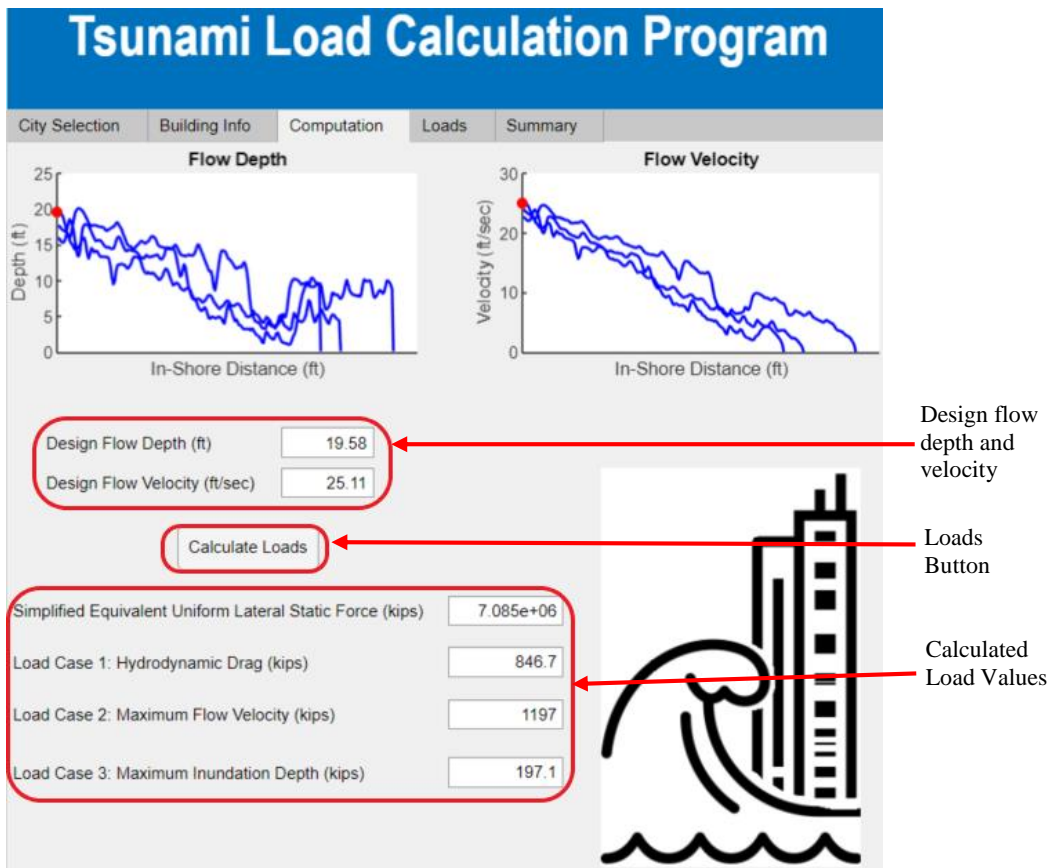


Figure 3. Computation Tab

## 1.5 Loads

This tab provides a plot of the three load cases calculated in the computation tab (See Figure 4).

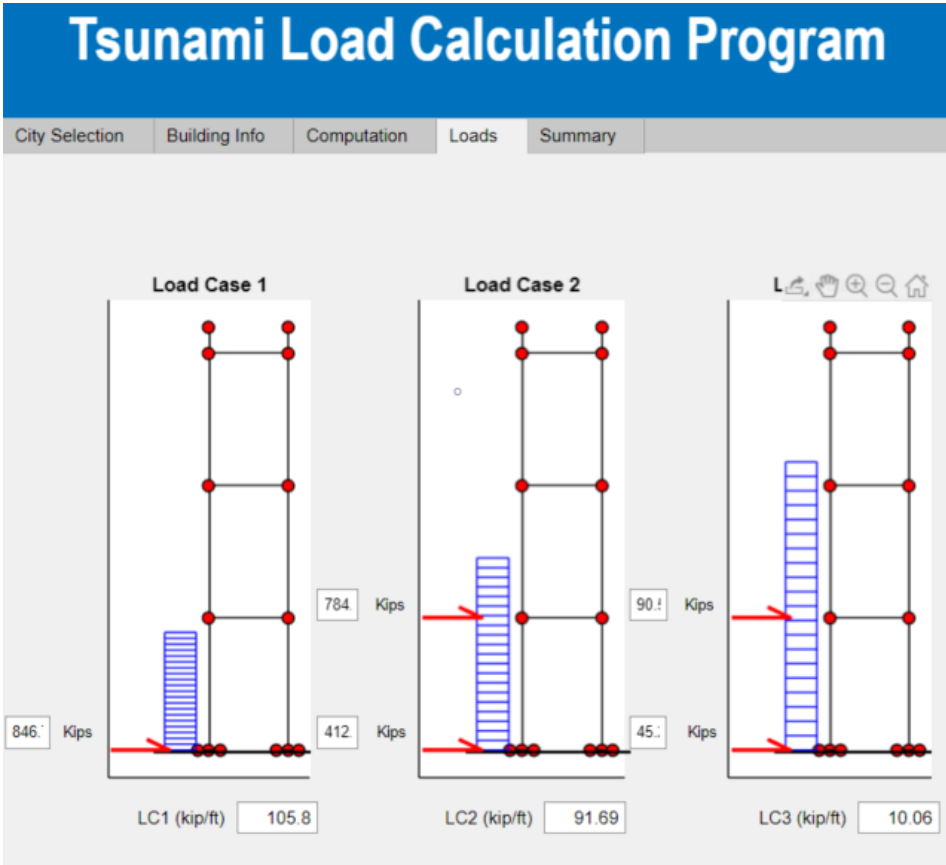


Figure 4. Loads Tab

### 1.6 Summary

This tab provides the user a summary of calculated loads. Program also provides user with option to generate a report using the Report button (See Figure 5).



**Tsunami Load Calculation Program**

City Selection | Building Info | Computation | Loads | **Summary**

**Flow Parameters**

Maximum inundation depth (ft)	19.58
Maximum flow velocity (ft/s)	25.11

**Load Case 1:**

Hydrodynamic Drag (kips)	846.7	(Hydrodynamic drag associated with buoyancy)
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**Load Case 2:**

Hydrodynamic Drag (kips)	1197	(velocity = max velocity, depth = 2/3 max flow depth)
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**Load Case 3:**

Hydrodynamic Drag (kips)	197.1	(velocity = 1/3 max velocity, depth = max flow depth)
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**DESIGN TSUNAMI LOAD:**

<b>Design Tsunami Load (kips)</b>	<b>1197</b>	This load should be compared with the lateral force resisting capacity of building under observation
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**Notes**

- Forces calculated from 3 Load Cases are overall forces, individual components should be checked by tributary area and framing details.
- Manning Coefficient value 0.03 has been used for energy grade line analysis (EGLA).
- Debris impact loads are not part of this tool. Detailed analysis should be carried for inundation depths greater than 3ft for structure in vicinity of containers.

**Report**

Screenshot (to take snapshot) **Report**

Button to generate report

Figure 5. Summary Tab

## References

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