Vertical Evacuation Best Practices for the International Community
International Tsunami Information Center (ITIC), 17 August 2020
For more info, contact ITIC: itic.tsunami@noaa.gov

Vertical evacuation may be a life-saving solution where natural high ground does not exist, or a local tsunami does not allow sufficient advance warning time to enable evacuate to high ground. Strong vertical evacuation buildings should provide a safe refuge for people to escape a tsunami. By simple definition, a vertical evacuation building is a structure with sufficient height and strength to resist tsunami wave effects.

In response to a request from the UNESCO IOC TOWS Inter-ICG Task Team on Disaster Management and Preparedness, ITIC has compiled international best practices in tsunami vertical evacuation. Highlights have been posted to the ITIC Vertical Evacuation web site http://itic.iocunesco.org/index.php?option=com_content&view=article&id=2070&Itemid=2927 and a complete listing is provided below. Best practices were categorized by country and the keywords engineering assessment, building code, mitigation, and response. Each reference contains a brief summary for rapid comprehension. A total of 117 references were found, and are listed below. USA, Japan, and Indonesia had the most references.

ITIC welcomes additional contributions to this compilation (please send to itic.tsunami@noaa.gov)

References, as of 17 August 2020
EndNoteX9, Unedited APA 6th Format
Keywords: Engineering Assessment, Response, Mitigation, Building Code

<table>
<thead>
<tr>
<th>Ocean</th>
<th>References per Ocean</th>
<th>Country</th>
<th>References per Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>9</td>
<td>Building Code</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General Countries</td>
<td>3</td>
</tr>
<tr>
<td>Pacific</td>
<td>79</td>
<td>Australia</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Canada</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chile</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>China</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ecuador</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Japan</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>South Korea</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>New Zealand</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>USA</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vietnam</td>
<td>1</td>
</tr>
<tr>
<td>Indian</td>
<td>26</td>
<td>Indian Ocean Region</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>India</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Indonesia</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maldives, Thailand, Indonesia, Sri Lanka</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sri Lanka</td>
<td>1</td>
</tr>
<tr>
<td>North Atlantic and Mediterranean</td>
<td>3</td>
<td>Morocco</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Turkey</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Europe</td>
<td>1</td>
</tr>
</tbody>
</table>
GENERAL:

Building Code:


General Countries:


Pannier, R. (2016). Ensuring safety of people in case of severe floods: feasibility and relevance of vertical evacuation strategies in high population density areas. E3S web of conferences, 7. doi:10.1051/e3sconf/20160719004

PACIFIC OCEAN:

Australia:
Dall’Osso, F., & Dale, D.-H. (2010). Public assessment of the usefulness of “draft” tsunami evacuation maps from Sydney, Australia – implications for the establishment of formal evacuation plans. Natural Hazards and Earth System Science, 10. Summary: Tsunami evacuation maps were drafted for Manly, Sydney, Australia to identify vertical evacuation structure locations and received positive survey results from Manly residents. Keywords: Engineering Assessment

Canada – British Columbia:


Chile:


China:


Ecuador:

Japan:


New Zealand:


Summary: Article summarizes processes for identifying population demand for vertical evacuation structures.


South Korea:


USA:


Chock, G. Y. K., Carden, Lyle, Robertson, Ian, Wei, Yong, Wilson, Rick, & Hooper, John (2018) Tsunami-Resilient Building Design Considerations for Coastal Communities of Washington, Oregon, and


USA – American Samoa:

USA – California:

USA – Hawaii:


**USA – Oregon:**


Hatfield Marine Science Center. (2020). Retrieved from https://hmsc.oregonstate.edu/marine-studies-building#Engineering%20Model

**USA – Washington:**

- Executive Summary
- Checklist. 7 steps

Ocosta Elementary School, 1st US Vertical Evacuation Structure, 2016
• ‘It will happen here’: Washington Coast school builds nation’s first tsunami refuge, Seattle Times, June 9, 2016
• Stronger than Waves, video, NOAA


Vietnam:

INDIAN OCEAN:
Indian Ocean Region:

India:

India – Odisha:


Indonesia:


Kurniati, T., Sy, A., & Purnawan, P. (2020). The accessibility of tsunami prone areas society towards potential shelters: a case study in Padang Barat sub-district. E3S web of conferences, 156, 04001. doi:10.1051/e3sconf/202015604001


Maldives, Thailand, Indonesia, Sri Lanka:

Sri Lanka:

NORTH ATLANTIC OCEAN AND MEDITERRANEAN:
Europe:

Morocco:
Amine, M., Ouadif, L., Baba, K., & Bahi, L. (2018). Assessment of the tsunami hazard on Moroccan coasts using numerical modeling. MATEC Web of Conferences, 149. doi:10.1051/matecconf/201814902079

Turkey – Istanbul: