

APPENDIX E— Learner Handout: Construct a TVES Tower or Berm in 30 minutes

- You have 30 minutes to construct your tower or berm.
- Use the supplies provided to construct a vertical evacuation structure that will have a finished elevation of 50’ using a scale of 1” = 10’. With this scale, your tower will be at least 5” tall.
- The model TVES is constructed on a base that should be only 1” larger than the structure on all sides.
- Label the base with the team member’s names and period number.

Tower:

- Provide “refuge” space for 200 people.
(FEMA requirement is a minimum 10 square feet per person = 2,000 square feet.)

Tower shape	Dimensions	Scale: 1” = 10’
Square	44.72’ X 44.72’	approximately 4.5” X 4.5”
Rectangle	40’ X 50’	approximately 4” X 5”
Height of finished floor*	50’	5”

- Design your own support system (number and location of vertical girders)
- Include stair locations
- Create a storage space for emergency supplies
- * Optional: you can add an additional floor (above 5”), and a protective roof for shelter from rain.

Berm:

- 2,000 sq ft = a semi-circle with a diameter of 71.36’. With a scale of 1” = 10’, the diameter will be 7.1”.
- Construct a ramp to the finished elevation. FEMA recommended a 1:4 ratio slope. (The 35’ safe elevation requires a 140’ ramp.) With a scale of 1” = 10’, the ramp length will be 14”. (Note, the ramp can double back to save space.)

Note on TVES elevations: The finished elevation height includes an additional allowance for freeboard, or separation between the level of water and level of refuge. The required minimum freeboard is one story height, or 10 feet (3 meters), whichever is greater, above the tsunami inundation elevation used in tsunami force calculations.



Figure A: Example of a model vertical evacuation structure.



Figure B: Example of model berm evacuation structure.