Selecting Floodproofing Techniques – Technical Considerations

The effectiveness and cost of a floodproofing technique depends on the particular circumstances of the location and the building. Once you have identified those options that are consistent with regulatory requirements, evaluated the flood risks, and considered your floodproofing objectives, the attached floodproofing matrix can be used to evaluate the technical feasibility of the remaining options. [1]

Instructions

Step 1: Complete the "Regulatory Considerations" row by placing an X in the box for any floodproofing measure that is prohibited or infeasible based on regulatory considerations.

Step 2: In the left column, check the applicable flooding, site, and building characteristics.

Step 3: Place an X in the "Not Advisable" boxes that apply to the characteristics checked (unless there is a plan to engineer a solution to address the specific characteristic). These measures are infeasible.

Step 4: For the remaining measures, review the Special Considerations (below) that correspond to numbers in the rows with checked characteristics. These issues must be accounted for to make the measure applicable. If the consideration cannot be addressed, place an X in the box and eliminate that measure from consideration.

Step 5: The remaining floodproofing measures warrant additional evaluation of technical considerations, preferences, costs, and benefits. A preferred measure should evolve from the evaluation.

Special Considerations

1 – May be prohibited if the project constitutes a substantial improvement in a regulated floodplain.

2 – Technical constraints (and costs) for levees and floodwalls increase for higher flood protection levels.

3 – Fast flood velocity is conducive to erosion; special protective measures may be required.

4 – Flash flooding does not allow time for human intervention. These measures are only feasible if they perform without human intervention. Openings in foundation walls must be large enough to equalize water forces and should not have removable covers. Closures and shields must be permanently in place. Wet floodproofing cannot include last-minute modifications.

5 – A technique that requires human intervention is only feasible if there will be sufficient warning time to implement the emergency plan. Someone must: (1) be aware of the flood threat, (2) get to the site, and (3) implement all required protective measures.

6 – Ice and debris loads should be accounted for in the design of foundations and floodwall/levee closures.

7 – If the floodproofing technique will constitute a new encroachment (obstruction) in the regulatory floodway, a licensed professional engineer must demonstrate that it will not result in any rise in the height of the 100-year flood.

8 – All development in the regulated floodplain must comply with local requirements concerning substantial improvements, use of flood resistant materials, protection against flood damage, etc.

9 – Permeable soils[2] allow seepage under floodwalls and levees; therefore, some type of subsurface cutoff feature would be needed beneath structures. Saturation of permeable soils can also increase soil pressures against a structure, necessitating additional precautions for dry floodproofed structures.

10 – Concrete and masonry buildings and those with slab-on-grade foundations present special difficulties for lifting and moving.

11 – Basement walls are subject to hydrostatic pressure and buoyancy forces, which may make levees, floodwalls, and dry floodproofing inappropriate.

12 – Not advisable unless engineering solution is developed to address the specific constraint.

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[1] Based on "Retrofitting Screening Matrix" in FEMA 259 (*Engineering Principles and Practices of Retrofitting Flood-Prone Residential Structures,* 2001) and "Technical Considerations Scorecard" in FEMA 551 (*Selecting Appropriate Mitigation Measures for Floodprone Structures,* 2007).

[2] Soil survey information (maps, soil descriptions, and tables) is available at county Soil and Water Conservation Districts and online at http://websoilsurvey.nrcs.usda.gov.

		Floodproofing Measures						
		Elevation						
		On Foundation Walls	On Fill	On Piers, Piles, Posts, or Columns	Relocation	Dry Floodproofing	Wet Floodproofing	Levees and Floodwalls
Regulatory Considerations						1	1	1
Flooding Characteristics	**Flood Depth**							
	☐ Shallow (<3 feet)							
	☐ Moderate (3-6 feet)					Not Advisable		2
	☐ Deep (>6 feet)					Not Advisable	Not Advisable	2
	Flood Velocity							
	☐ Slow/Mod. (<5 feet per second)							
	☐ Fast (>5 feet per second)	3	3	3		3	3	3
	Flash Flooding							
	☐ Yes (< 1 hr warning)					4	4	4
	☐ No					5	5	5
	Ice and Debris							
	☐ Yes	12		6		Not Advisable		6
	☐ No							
Site Characteristics	**Site Location**							
	☐ Floodway	7	Not Advisable	7	7	7	7	Not Advisable
	☐ Regulated Floodplain	8	8	8	8	8	8	8
	Soil Type							
	☐ Permeable					9		9
	☐ Impermeable							
Building Characteristics	**Building Foundation**							
	☐ Slab on Grade	10	10	10	10			
	☐ Piers, Posts, Columns, or Crawl Space					Not Advisable		
	☐ Basement/Split Level		12	12		11		11
	Building Construction							
	☐ Concrete or Masonry	10	10	10	10			
	☐ Manufactured Home					Not Advisable	Not Advisable	
	☐ Wood or Other					12		
	Building Condition							
	☐ Good							
	☐ Fair	12	12	12	12	12	12	
	☐ Poor	Not Advisable	Not Advisable	Not Advisable	Not Advisable	Not Advisable	Not Advisable	12