Flood Preparedness and Response

U.S. Army Corps of Engineers, San Francisco District

Flood Preparedness Workshop

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John Cheng

Readiness Branch

Flood Preparedness and Response

- Provide guidance and basic recommendations regarding planning, preparation, and response for high water events

- Assist owners/operators in managing levees, floodwalls, pumping stations, and any other components of flood risk management systems

Flood Preparedness and Response

- Sources

  - Department of Homeland Security Emergency Preparedness Guidelines for Levees, 2012

  http://www.damsafety.org/media/Documents/Security/EmergencyPreparednessGuidelinesForLevees.pdf

  - International Levee Handbook, 2013

  http://www.leveehandbook.net/

  - California Department of Water Resources Levee Threat Monitoring Guidelines, 2013

  http://www.water.ca.gov/floodmgmt/docs/Levee_Threat_Monitoring_Guidelines.pdf

  - USACE Levee Owner's Manual, 2006

  http://www.nws.usace.army.mil/Portals/27/docs/emergency/LeveeOwnersManual%28final%29.pdf

Flood Preparedness and Response

- Emergency planning and identification of vulnerable areas
  - Emergency Preparedness Plan
- Readiness and preparedness
  - Evacuation plans
  - Training and exercises
  - Community outreach
- Event and crisis management
  - Preliminary response activities
  - Full response activities
  - Post response activities

Preparedness: Emergency Preparedness Plan

- Levee agency's Emergency Plan should address:
  - evacuation activities
  - communication protocols with local EOCs and the general public
  - individual roles and responsibilities during an emergency
  -supplies and materials that may be needed

- Establish priorities for responding to an emergency such as:
  - Protection of life and property
  - Communication of hazardous conditions to public agencies and the public
  - Restoration of normal operations

Preparedness: Emergency Preparedness Plan

- Establish close working relationships with State and local emergency management and public safety agencies

  - Share emergency plan with local OES and DWR Flood Operations Center

- Establish communication with residents and businesses whose properties could potentially be impacted by a levee breach

Preparedness: Emergency Preparedness Plan

- Emergency notification flowchart
  - who will be notified by whom and in what priority
  - names and essential contact info (home, office, cell)
  - emergency management agencies that need to be notified
  - ensuring adequate personnel available to operate 24 hours a day

- Telephone directory
  - Area EOC, local contractors, flood fight supply and equipment vendors, hospitals, railroad/highway departments, police and fire departments, and any other critical numbers

Preparedness: Emergency Preparedness Plan

- Annotated drawings describing project features and potential areas of concern during a flood event
  - Low areas
  - Areas subject to boils
  - Areas of known seepage
  - Areas of recent rodent activity
  - Alternate access points to the levee
  - Locations of drains that should be checked for closure
  - Available sources and locations of sandbags, pumps, and other supplies

Preparedness: Emergency Preparedness Plan

- Detailed table of locations of project features that may need to be closed (floodgates, flap gates, etc)

  - denote river level or other indicators that would signal that each of these features needs to be closed

- Protocols to notify corresponding highway or railroad agencies responsible for closing roads or railroad tracks running through levees and floodwalls

Preparedness: Evacuation Plans

- While levee owners/operators may or may not be directly responsible for developing an evacuation plan, they are encouraged to participate in the planning process and maintain close contact with appropriate governmental agencies during emergencies to provide timely and accurate information on levee conditions

- Collaboration among levee owners and operators, local law enforcement officials, emergency management agencies, and other appropriate entities

Preparedness: Training and Exercises

- Training for new personnel on operating, maintaining, and patrolling the levee system
  - operation of closure structures
  - response to sandboils
  - patrolling area during flood
- Flood response plans: practice and communicate with personnel to ensure effectiveness
- Exercises help inform how much time and manpower is necessary to complete certain tasks

Preparedness: Training and Exercises

- Basic training and exercises:
  - Physical operation of project features
  - Notification of emergency response personnel
  - Test of communications/backup communications system
  - Mobilization of monitoring teams and monitoring project features
  - Basic flood fight techniques
  - Coordination and control (volunteers, patrols, operators, nearby levee districts, highway department, State EOC, etc)
  - Dissemination of information to the public

Preparedness: Community Outreach

- Public Materials/Public Meetings

  - Areas protected

  - How the system works

  - Potential impact on the community and ongoing costs for regular operation and maintenance

  - Consequences of levee failure

  - Local flood evacuation plans

  - Historical overview of past floods and experiences

  - Flood response plans and procedures – how the community can contribute

Preparedness: Community Outreach

- Awareness of adjacent systems

  - understand how adjacent sections of levees or components on private property impact the larger system

  - community could still be flooded if adjacent systems do not operate properly

Response: Preliminary Response Activities

- Upon receipt of official information forecasting imminent high water:

  - quickly mobilize response team

  - notify all personnel involved in flood fighting

  - assign sections of levee to individual levee personnel

- Local, State, and Federal assistance

  - It is vital that levee owners/operators be aware of the type of support that State and local governments can provide, and whom to contact in order to receive necessary support

Response: Preliminary Response Activities

- Review emergency preparedness plans and lessons from past
- Verify that personnel have access to gate keys, current rosters, listing of project features, and other critical items
- Coordinate efforts with communities upstream and downstream
- Alert the community to the potential for flooding
- Ensure State and local emergency operations centers are informed of the situation
- Begin documenting the situation, and send situation reports to the State and local emergency operations centers, as appropriate

Response: Preliminary Response Activities

- Initial project inspection (high water conditions)

  - Condition of any recent levee repairs

  - Water conditions and any accumulation of trash, debris, ice

  - Transportation: roads, rail, and water access

  - Material: identify location, quantity, and conditions of all necessary tools and materials (sacks, sandbags, lumber, and lights) and distribute and store them at points where maintenance is anticipated

  - Communication: locate and check all two-way radios and telephones

  - Drainage structures: special attention should be given to flap gates and other drainage structures that might not be accessible later

Response: Preliminary Response Activities

- Additional activities

  - Review assignments for patrols, closings, etc

  - Obtain lists of all construction equipment, motorboats, cars, earthmoving equipment, and trucks that can be made available

  - Assess needed support (vehicles, radios)

  - Verify serviceability of flood fighting equipment

  - Record gauge readings and monitor river stages

  - Close the levee to the public

  - Install levee or floodwall closures as necessary.

  - Remove all hazardous materials and/or explosives from the vicinity of the levee

Response: Preliminary Response Activities

- Patrols: for early detection of levee problems, damages, failures
  - Entire levee should be patrolled at least once per day
  - Patrols should be conducted by teams rather than individuals
  - General: record gage readings hourly, inspect riverside fences for debris, verify accessibility of access roads, photograph all issues
  - Levee: Look for sandboils, slides, sloughing, wave wash, scouring, check flap/sluice gates, check gap closures
  - Floodwalls: Look for saturated areas, sandboils, settlement, bank caving, leakage, seeps, sink holes, check gap closures
  - Pump stations: verify proper ventilation of pumping plant to prevent overheating, look for sink holes or wet areas that indicate conduit separation

Response: Preliminary Response Activities

- Equipment for Patrols
  - Portable radio or cell phone
  - Watch
  - Log book
  - Patrolling instructions
  - Plan of action for patrolling
  - Plans of flood control project
  - Operation and Maintenance Manual
  - Weather gear
  - Flashlights
  - Record Log
  - Life jackets
  - Probing rod
  - Short wooden stakes
  - 40 feet of one-half inch (1/2”) nylon safety line to connect team members
  - Camera
  - Field boots
  - Hard hats

Response: Preliminary Response Activities

- Safety/Security Precautions

  - Patrol team: walk side-by-side with one person on waterside of levee near the water surface, one at the top, and one on the landside toe of the levee

  - Person closest to the water should be wearing a safety line

  - Watch out for floating objects (limbs and roots of uprooted trees), best to walk upstream when patrolling the waterside of the levee

  - Each patrol team member should be thoroughly familiar with the community evacuation plan and signals.

Response: Preliminary Response Activities

- Safety/Security Precautions

  - If evacuation is necessary, patrol team should move together to predetermined location. When returning to levees/floodwalls, physical conditions may be considerably different from before evacuation, especially if levee was overtopped.

  - If overtopping occurs during nightfall, patrols should not resume until daylight, though there may be cases where this recommendation cannot be followed

  - Patrols should also be watchful for anyone that seems out of place, or any activity that seems suspicious. Report suspicious activities observed by the patrol to law enforcement

Response: Preliminary Response Activities

- General Maintenance Activities

  - Once initial inspection has been completed, levee personnel should consider addressing any pressing maintenance issues before the river rises further

  - Drainage structures (temporary closures if necessary)

  - Fill holes, gullies, and washes in the levee crown, embankments, and landside berms with compacted fill if possible, otherwise sandbags

  - Examine all drainage ditches on the landside of the levee and remove any obstructions

  - Repair all levee settlement and depressions. Avoid taking material for these repairs from the area adjacent to the levee

Response: Preliminary Response Activities

- Interaction with the public

  - If there are many observers on the levees or at the floodwalls, recommended that an additional patrol team member be assigned as a safety officer

  - Patrol team, however, is not responsible to order observers off the levees and floodwalls

  - Recommended that each team carry and distribute instruction cards describing the community evacuation plan in order to inform observers of potential danger

Response: Full Response Activities

- Patrol continuously, 24 hours per day, 7 days per week (as situation requires), especially if there are ponding areas during high water
- Ensure all closures and gates are in place, and all preliminary response maintenance activities are completed
- Remove padlocks from access gates to facilitate patrols
- Monitor inventory of flood fighting equipment, materials, and supplies as they are used
- Keep the public informed of the current situation through media, if warranted

Response: Full Response Activities

- Repair erosion and seepage problems as quickly as possible
- Ensure competent pumping station operators are on duty (understand pump operations and capable of manual operation)
- Use of portable pumps may be needed to pump water over levee if water is ponding in undesirable areas or rising too quickly in ponding areas
- Monitor debris basins and trash racks for sediment/debris
- Remove debris from trash racks at pump stations periodically when station is in operation

Response: Full Response Activities

- Evacuation Plan Activation

  - Levee personnel should be ready to evacuate the area

  - Coordinate evacuation with police, fire department, and first responders immediately

  - Follow the predetermined routes

  - Meet in predetermined locations and immediately confirm the safety of all levee personnel

Response: Full Response Activities

- Volunteer Assistance - if it becomes necessary to recruit volunteers during the flood fight:

  - Identify primary and alternate assembly areas with adequate parking

  - Arrange transportation, subsistence, and shelter for labor force

  - Contact media to request that volunteers report to designated assembly area

  - Maintain sign-in roster at assembly area to account for volunteers and personnel

  - Identify staging areas away from the work site but as close to flood fight locations as possible

Response: Full Response Activities

- Volunteer Assistance:

  - Separate staging areas for sandbag filling, carrying and loading, materials stockpiles, rest and breaks, first aid

  - Establish emergency operations center to oversee flood fight operations and for interagency coordination, staffed 24 hours daily until the situation is resolved

  - Establish traffic patterns that will be used to move sandbags from the staging area to the work site (one-way traffic patterns on the levee system if conditions permit)

  - Be certain that the people laying sandbags are well supervised by a trained individual

Response: Post Response Activities

- Once water has subsided:

  - Reopen any sluice gates that were closed once the water on the river side has receded to 3 inches below the pond level on the protected side

  - Open all closure structures and properly store all components

  - Remove and properly dispose of all temporary protection measures (sandbags and material placed during temp levee raises)

  - Take inventory of all remaining flood fight equipment and supplies. Repair or replace damaged equipment, restock supplies in preparation for the next flood event

  - Salvage supplies, return borrowed equipment

Response: Post Response Activities

- Once water has subsided:

  - Inspect the entire flood control work, noting locations of damage and extent of damage at each location

  - Meet with key personnel, volunteer representatives, community partners soon after the event to debrief, share remaining concerns, and discuss lessons learned

  - Revise local emergency preparedness plans to account for lessons learned and changes to recommended procedures

  - Document the event: keep a map record of the levee, indicating areas that were in distress at the time of the flooding (useful for making repairs/improvements, and as guide for next flood event

Response: Post Response Activities

- Once water has subsided:

  - Locate and keep records of the flood's high water marks for future planning, along with any rainfall and river data gathered

  - Make repairs to the levee as soon as possible in preparation for future flood event

  - Initiate actions to provide permanent flood protection measures if the existing system relies heavily on temporary solutions during emergencies

Questions?

- John Cheng
  Readiness Branch
  (415) 289-3078
  john.c.cheng@usace.army.mil