

Levees: the Good, the Bad, and the Ugliness of Certification

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The Good



**When good levees operate as designed,
they make for a boring news story**



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The Bad



Good levees can go bad, and when they do, the results may be catastrophic

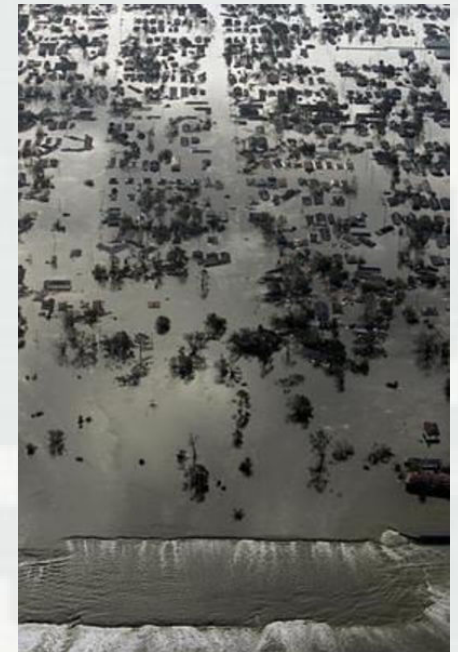


Remember, levees are designed for a specific flood event, under specific hydrological and geological conditions. Those conditions may change with time.



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The Ugly



Natomas is a community in northwestern Sacramento. It is the last area of Sacramento that has not been fully developed, and has seen major residential and commercial development in the 1990s and 2000s. Major growth has been mostly due to ARCO Arena, home court to the Sacramento Kings and Monarchs, and the now disbanded Sacramento Knights.

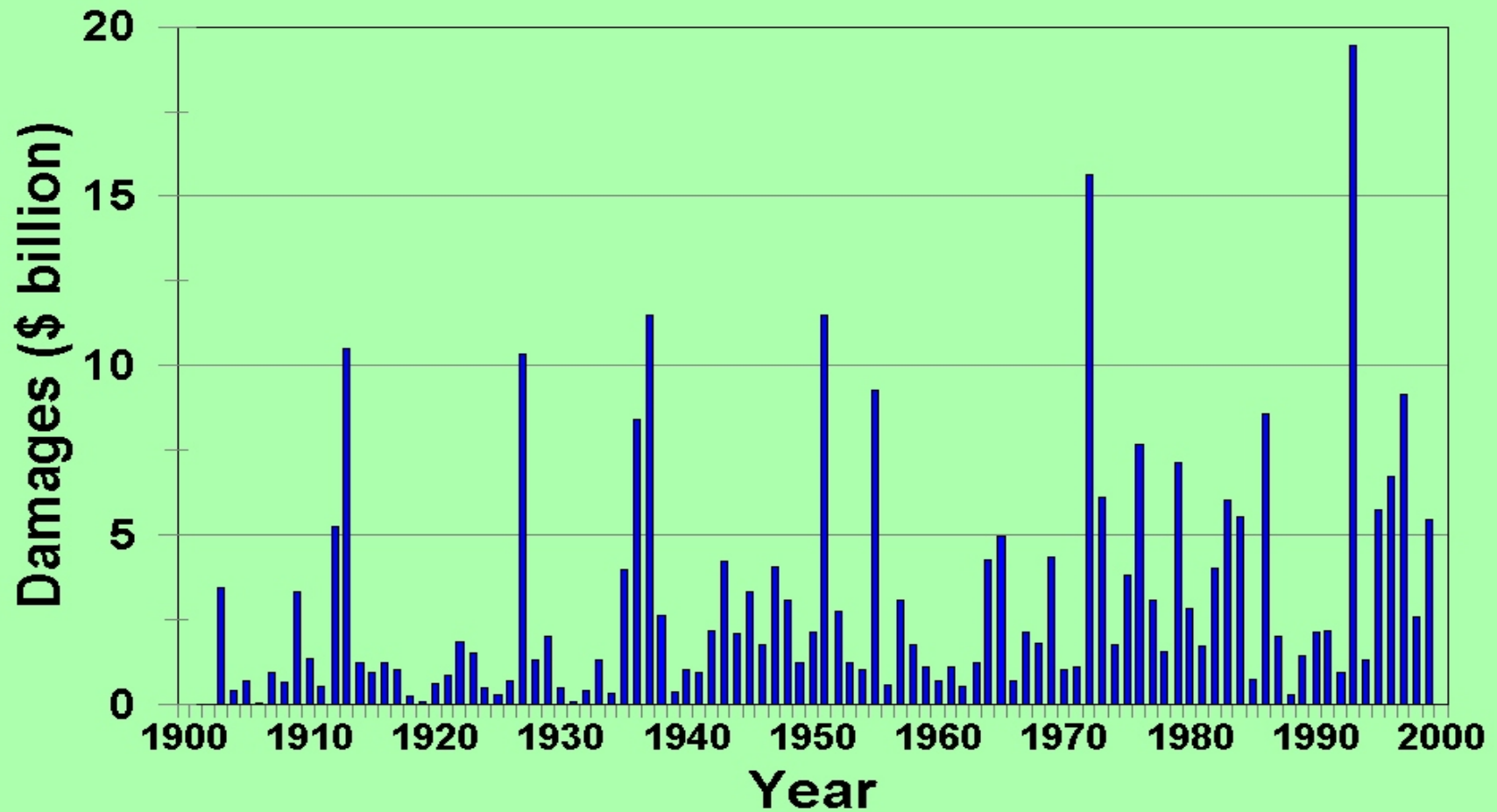


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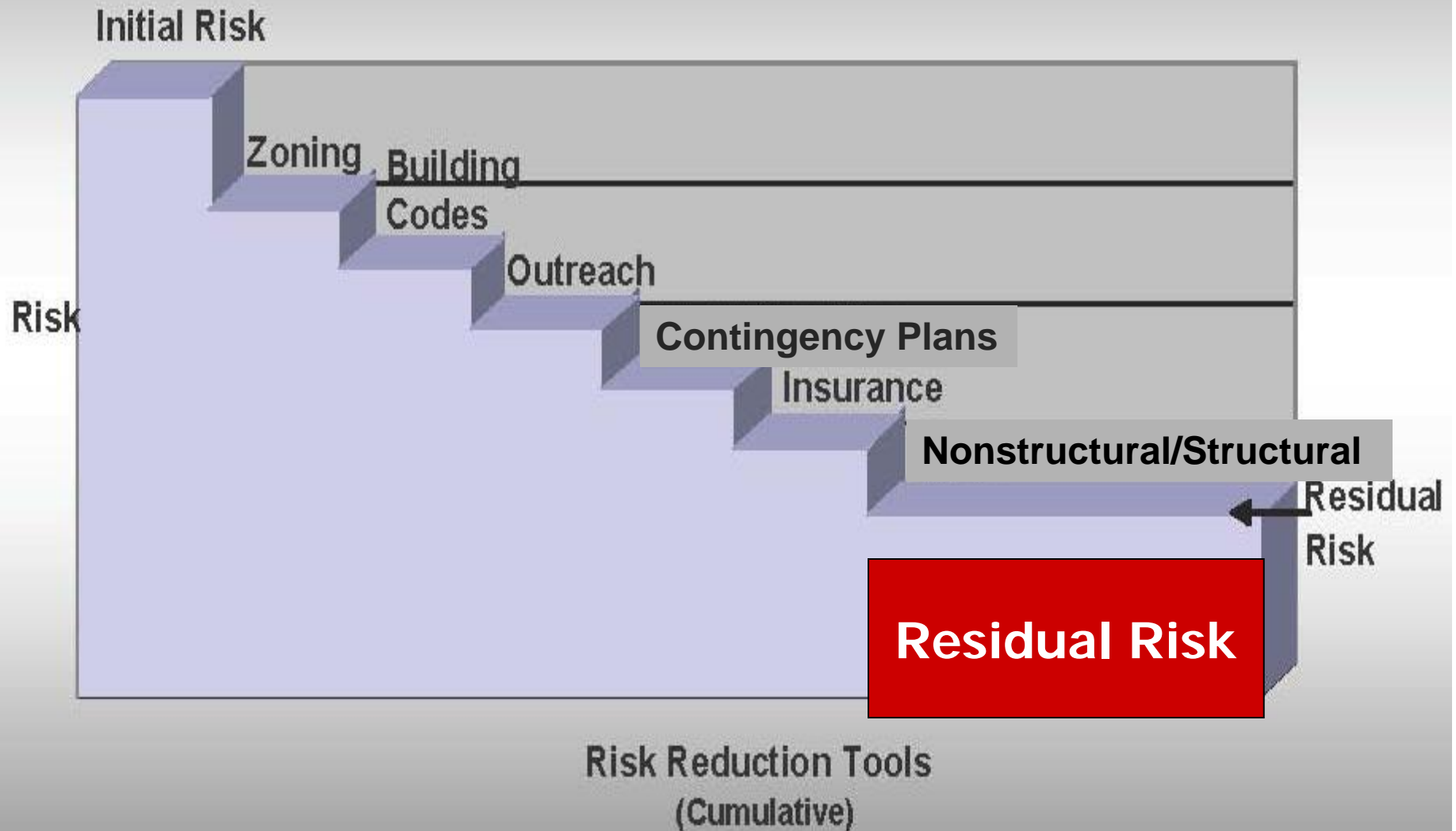
What's with all the fuss, anyway ??

Flood Damages

(constant dollars)



BUYING DOWN RISK



All stakeholders contribute to reducing risk!

Floodplain Management Background

- In 1968, Congress created the *National Flood Insurance Program (NFIP)* to help provide a means for property owners to financially protect themselves. The NFIP offers flood insurance to homeowners, renters, and business owners if their community participates in the NFIP.
- The NFIP is administered by the Federal Emergency Management Agency.
- NFIP consists of three main components:
 - Floodplain management
 - Flood hazard mapping
 - Flood insurance



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Flood Plain Management for NFIP

- A “community” must adopt and enforce minimum floodplain management standards to participate in the NFIP. (Section 1315 of the 1968 Act)
- What is meant by "floodplain management"? "Floodplain management" refers to an overall community program of corrective and preventive measures for reducing future flood damage. These measures take a variety of forms and generally include zoning, subdivision, or building requirements, and special-purpose floodplain ordinances.
- <http://www.fema.gov/business/nfip/fldmanre.shtm>



Flood Hazard Mapping

- **FEMA creates Flood Insurance Rate Maps (FIRMs) designating different areas of flood risk. Digital versions are called DFIRMs**
- **A Special Flood Hazard Area (SFHA) is land within the floodplain of a community subject to a 1 percent or greater chance of flooding in any given year, also referred to as the 100-year flood or base flood**
- **Mortgage lenders for all federal or federally-backed loans require flood insurance if the property is in a SFHA**

Land protected by a certified levee is mapped out of the SFHA. Flood insurance is recommended but not required to obtain a mortgage or business loan.



Flood Insurance Example

No insurance
required, but
recommended

Flood zone >100 year flood

Protected area mapped out of SFHA

100 year levee
Flow

Special Flood Hazard Area (SFHA)

Insurance required for
mortgage or business loan



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Levee Certification

Now, this is where it can get really ugly...



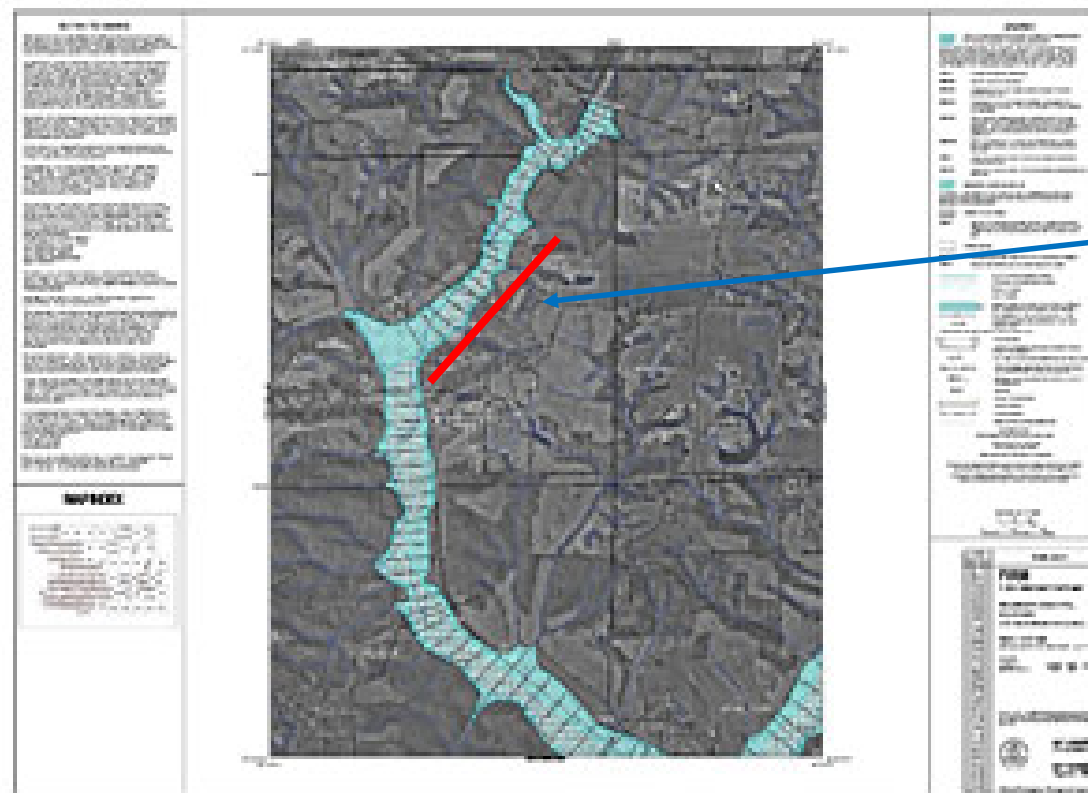
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Levee Certification for NFIP

- **Levee Certification Defined:** Levee certification is a technical finding for floodplain mapping purposes as part of the National Flood Insurance Program (NFIP)
- **It is the community's or the entity responsible for levee O&M to provide documentation and "certification" that the levee meets the requirements of 44 CFR 65.10**
 - **A certification submitted by a registered professional engineer must follow criteria outlined in 44 CFR 65.10 and provide associated documentation**
 - **A certification by USACE must follow ETL 1110-2-570, which is more intensive and rigorous than requirements of 44 CFR 65.10**



So you just received a letter (PAL) from FEMA requesting you to recertify your existing federal levee because the floodplain maps are to be updated, now what.....



**Levee Certification
Required**



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Typical Actions Taken

1. **Contact the Corps, they'll handle this issue for us**
 - **No can do. Current policy prevents Corps from recertifying existing levees**
2. **Contact your congressman. He'll force the Corps to recertify the levee**
 - **It's been tried many times, to no avail**
3. **Hire an Engineering Firm to recertify our levee.**
 - **That's the answer. But for the sake of your community beware that...**
 - a) **You should not recertify your levee using old data (paper to paper cert)**
 - b) **Conditions to which your levee was designed may have changed (hydrology, river stages, infrastructure, channel capacity)**
 - c) **Modification to your levee could result in a whole new set of requirements to meet USACE PL84-99 (33 USC 408) criteria.**



Issues related to certification

- **Certification applies only to levees protecting communities participating in the NFIP. PL 84-99 eligibility inspections do not replace certification analysis.**
- **Funding is not available for the Corps to certify levees except Corps' maintained levees.**
- **Thomas Amendment: ASA CW approval is required before a community can hire the Corps to perform the evaluation for certification.**
- **Corps has differing evaluation criteria than FEMA.**



Thomas Amendment

The Thomas Amendment permits the Corps to provide commercially available engineering services only if these are "not reasonably and quickly available through ordinary business channels" and that the Corps is "uniquely equipped to perform such services." Requires ASA CW approval to accept cost reimbursable work from a non Federal entity.

Economy Act

- **The Economy Act authorizes Federal agencies to enter into mutual agreements to obtain supplies or services by inter-agency acquisition.**
- **Acquisitions under the Economy Act are not exempt from the requirements of Subpart 7.3, Contractor Versus Government Performance.**
- **Requires District Commander approval to accept cost reimbursable work where a Federal agency is involved as the sole sponsor or as a cost share participant with a non federal sponsor.**



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44 CFR 65.10 vs. USACE ETL 1110-2-570*

What's the difference?

44 CFR 65.10

- Freeboard
- Certifies Design and construction
- Components can be submitted separately
- Applies to everyone
- No validity period
- Does not address residual risk
- Does not evaluate performance

USACE ETL 1110-2-570

- **Risk Analysis**
- Certifies entire system including all components and features
- No partial certifications
- Only applies to USACE certifications
- **10 year validity period**
- Addresses residual risk
- Evaluates Performance

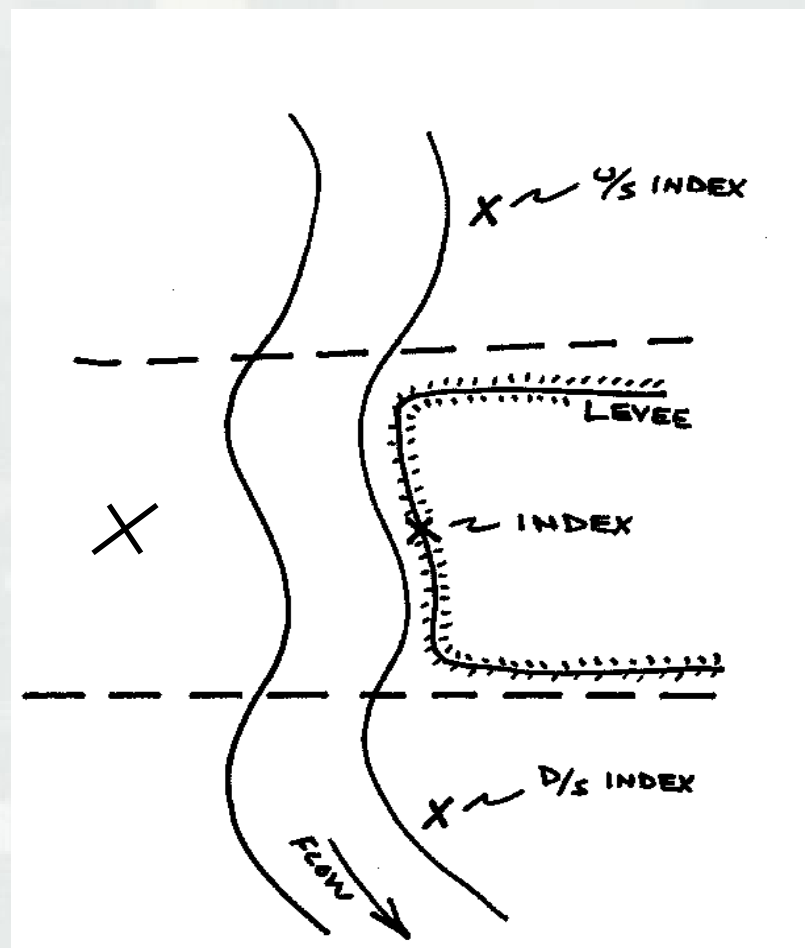
- **Risk analysis may return different results than FEMA's deterministic approach. (eg. Levee height may differ depending on method. Risk analysis generally costs more to perform.**

* ETL 1110-2-570 will soon be replaced with EC 1110-2-6067.



Levee Modifications under 33 U.S.C. 408

- Levee modifications occurring to PL84-99 levee systems require authorization under 33 USC 408 from HQUSACE.
- Levee risk and reliability assessment is required for without- and with- levee modifications using HEC-FDA computer software model.
- According to current HQUSACE policy, 3-foot of freeboard acceptable.
- HEC-FDA model must be run for index stations located upstream from, across, and downstream from the levee project.
- Significant changes in risk (CNP and AEP) must be mitigated (top of bank thru the 500-year event).



Freeboard vs. Risk and Uncertainty

- Standard freeboard (3-feet) may not adequately account for geographic and hydrologic differences and thus may provide different levels of flood protection at different places.
- The USACE felt that risk analysis techniques as it quantifies and explicitly incorporates uncertainties in relevant hydrologic, hydraulic, economic, and geotechnical parameters into levee design.
- Congress asked the National Research Council to review and assess USACE risk analysis techniques in its flood damage reduction studies.
- A report from Water and Science Technology Board commended the USACE for adopting the new techniques and departing from the traditional freeboard approach.



PL 84-99 Rehabilitation and Inspection Program (RIP)

Two key components:

- Authorizes USACE to assist communities with advanced measures, flood fighting and flood recovery.
 - Requires Governor request.
 - USACE will always assist regardless of status of levee in RIP.
- Authorizes USACE to assist with repair of eligible levees damaged from a flood event.
 - Eligibility is based acceptable or minimally acceptable rating obtained from a Continuing Eligibility Inspection (CEI) [**annual Inspection**].
 - Premised on satisfactory O&M by the non-Federal sponsor as measured against USACE inspection standards.
 - Federally constructed projects – repairs are 100% federally funded.
 - Non-Federal projects – repairs are cost shared 80% federal / 20% sponsor.



Periodic Levee Inspections (PI)

**Normally performed every 5 years by a multidisciplinary team.
Final report is provided to non-Federal sponsor FOUO.**

- Includes:
 - Continuing Eligibility Inspection (AKA - Routine Annual Inspection).
 - Comprehensive review of “existing” project data.
 - ✓ Design Documents
 - ✓ As-Built Plans
 - ✓ Construction Records
 - ✓ Historical Photos
 - ✓ Past Performance History
 - ✓ Instrumentation Records
 - Consolidated into a Final Periodic Inspection Report
- Does not include detailed engineering analysis.
- Report is also shared with FEMA if the project provides 1% chance flood protection.

Question: When was the hydrology last updated?



What are we looking for during annual inspections?



- **Sod Cover**
- **Unwanted vegetation**
- **Depressions/Rutting**
- **Erosion/Bank Caving**
- **Slope stability**
- **Cracking**
- **Encroachments**





**Credit to Hollywood for
their iconic support of this
feature presentation**



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