Part 5

OPERATION AND MAINTENANCE ASPECTS

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- Most projects are most susceptible to erosion during and shortly after construction, when the ground is disturbed and bereft of protective vegetation or flatwork.
- Most states hold the builder explicitly liable for any ***performance problems*** at least one year after an occupancy permit has been issued.

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Duty to Maintain

- Both public and private property owners have a **duty to maintain** drainage improvements so that they continue functioning as intended
- Failure to properly maintain such structures or improvements can lead to liability exposure if the alleged neglect was a ***direct*** or ***significant factor*** in triggering property damage

Clogged Drop Inlets

- Clogged culverts and drop inlets are the most common liability exposure for most public agencies that maintain drainage improvements
- Someone should be assigned to inspect drainage collection, conveyance, and discharge improvements twice per year, at the beginning and end of the wet season
- Clogged drop inlets that are not maintained pass the runoff onto the next collection point, often overwhelming it

Clogged V-ditches

- Drainage interceptor ditches are always susceptible to infilling from slope erosion
- Ditches should be mucked of debris to maintain capacity.
- This is **reasonable and customary maintenance**

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Clogged Culverts

Negligence can be assuaged for failure to maintain hardened drainage improvements within a reasonable time interval of learning that flow capacity has been hindered or impaired by any manner of hazard, such as catchment of organic debris, siltation, accidental mechanical damage or weathering

- All culverts are subject to clogging by debris, especially organic debris and
- These show examples of clogged culverts in semi-arid areas, with sandy soils more susceptible to erosion

Culvert blow-out

- Occasionally, culverts will become clogged during intense storm events, then suddenly “explode” as the water pressure pushes the entrained debris out of the pipe.
- This can cause a lot of damage
- Whoever owns the culvert partakes in the liability for such damage, because it is a unnatural improvement

- **Never underestimate the sheer volume of organic debris that can be swept downstream in a significant runoff event.** This shows a sea of woody debris that clogged the intake structure of the Mojave Forks Dam (built by the Army Corps of Engineers) in California during a high runoff event in January 2008. Note man standing by railing for scale!

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- V-ditches are difficult to maintain on expansive soils, because of seasonal shrink-swell cycles, which pull the surrounding ground ***away*** from the concrete ditch
- Ditches in expansive soils may require deeper cutoff stems on the upslope side to maintain contact with the slope

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Discretionary vs Ministerial Duties

- Public agencies have ministerial duties, which are those activities which MUST be performed, regardless of time or manpower constraints, such as levee patrols during floods
- These same agencies also exercise discretionary duties, which are those activities which are discretionary, and may not necessarily be performed. For instance, site inspections by building inspection personnel are generally held to be discretionary duties. Most agencies give priority to patrol their busiest corridors, transportation arteries, or channels first.

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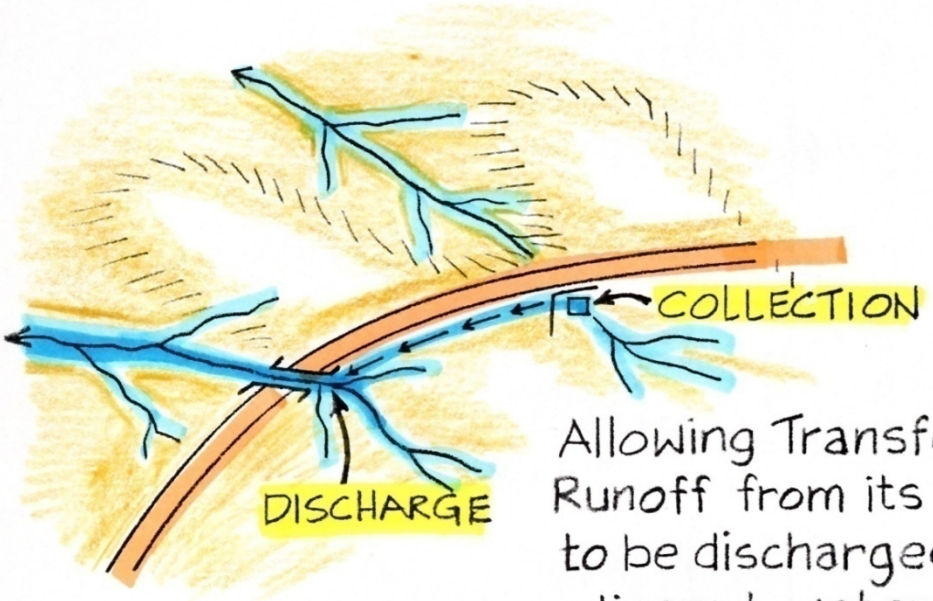
EXAMPLES OF INVERSE CONDEMNATION SUITS AGAINST GOVERNMENTAL AGENCIES



Allowing Transfer of Collected Runoff from its natural watershed to be discharged in another adjacent watershed.

- **The Natural Watercourse Rule of common law assuages that the diversion of runoff from its native watershed to any adjacent watershed constitutes an unnatural concentration of flow.**
- **If this concentration plays a 'significant' role (> 20% contribution) in causing future damage, this may incur liability to the agency that approved the diversion, as well as the owner of said diversion.**

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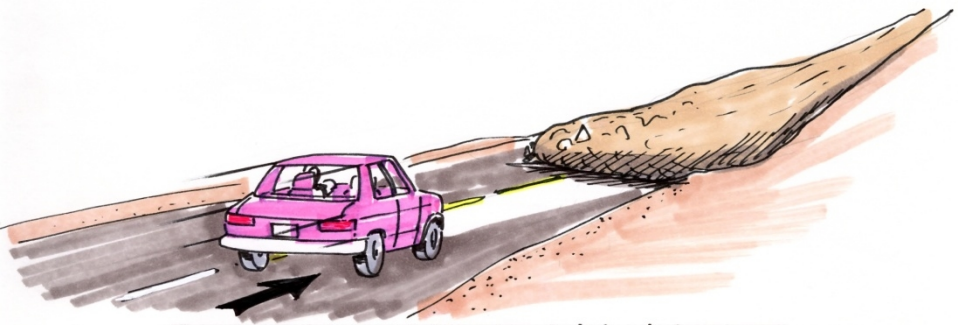
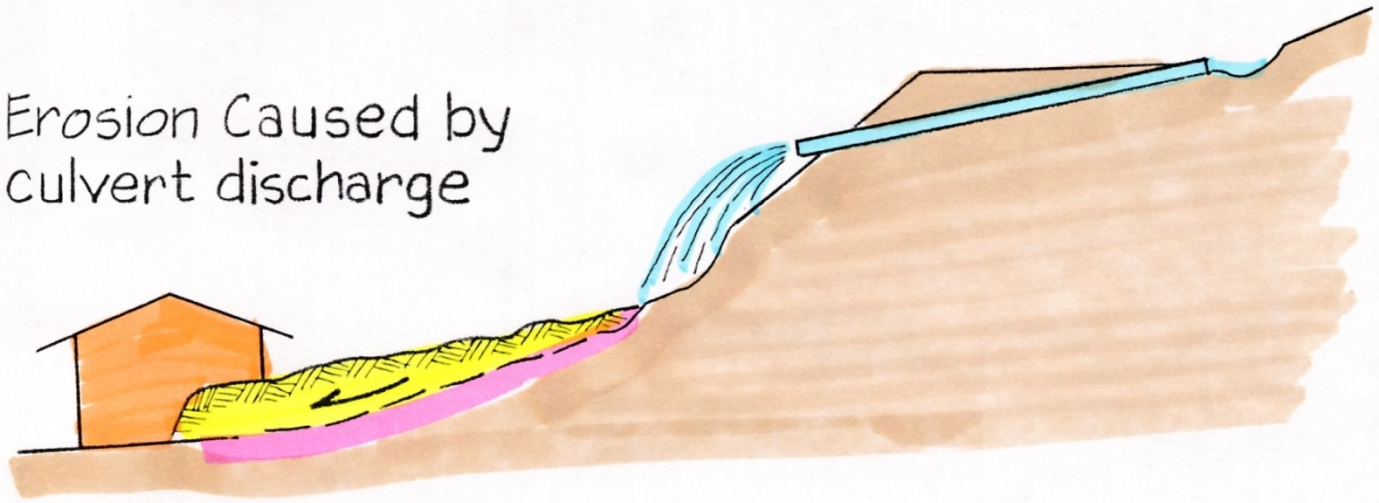
Road Hazards



- Public agencies have a duty to maintain roads and drainage ways in a reasonable manner (if it is not reasonable, then it is negligent)
- In areas with a history of past problems, most agencies provide some forewarning, usually in the form of signage

EXAMPLES OF INVERSE CONDEMNATION SUITS AGAINST GOVERNMENTAL AGENCIES



- **Agency-owned culverts are considered improvements from which the general public derives benefit. They are assumed to engender *unnatural concentrations of flow*, which must be handled in a 'reasonable manner.'**
- **Unimproved natural channels do not carry similar liability, because they are conveying natural flow**

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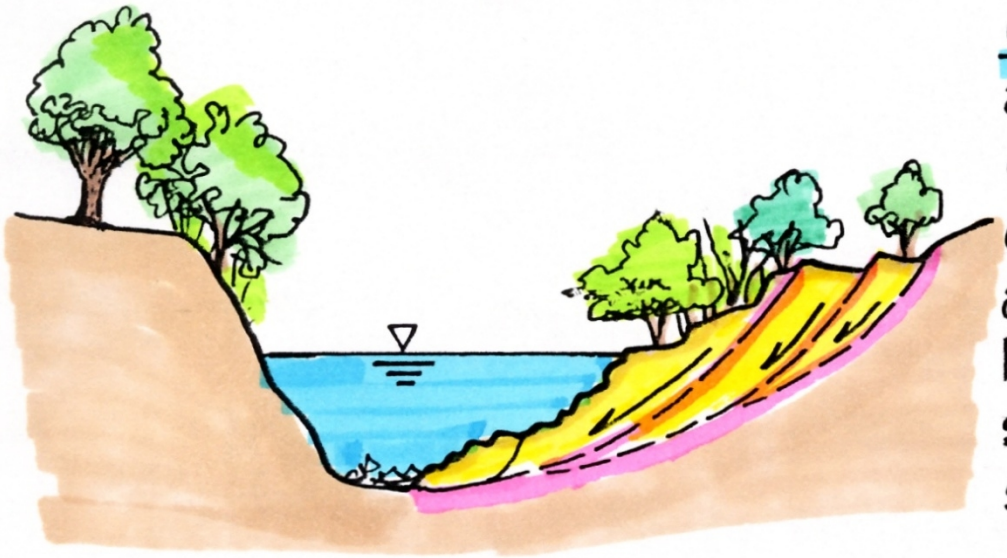

Creekbank Erosion
a natural creek may constitute a public use or improvement if it accepts discharge from hardened improvements such as culverts or storm drains

- **A natural channel may be assuaged to be "public improvement" if runoff is channeled into that channel from a number of agencies for the public benefit.**

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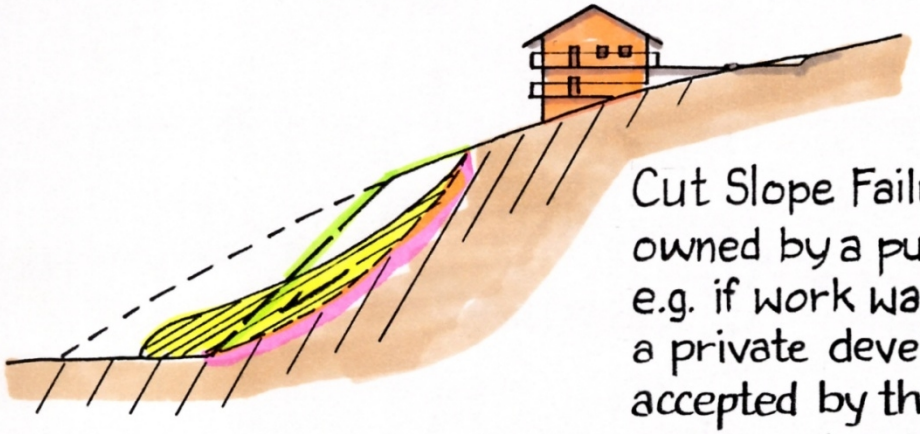
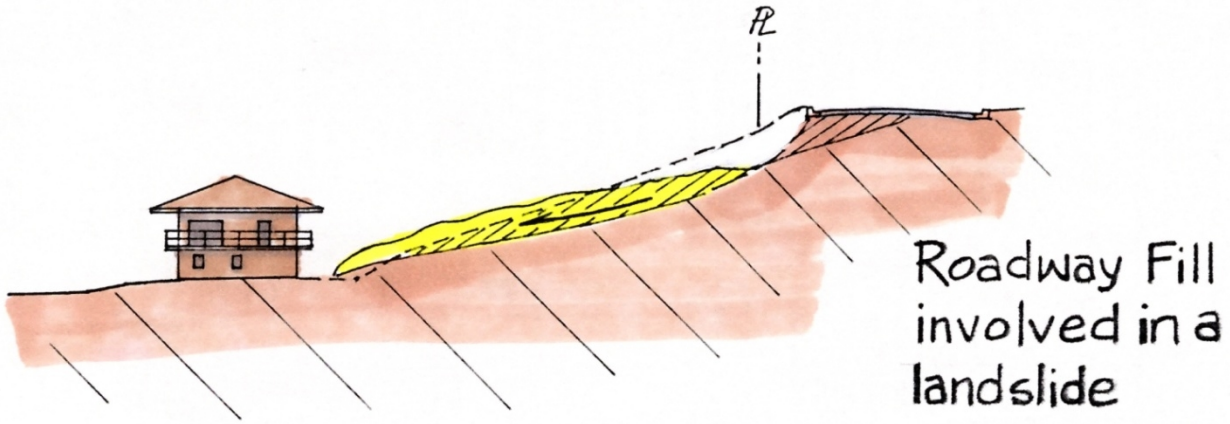


Cut Slope Failure where cut is owned by a public agency e.g. if work was originally done by a private developer and subsequently accepted by the public agency or if the public agency contracted the work or designed it.

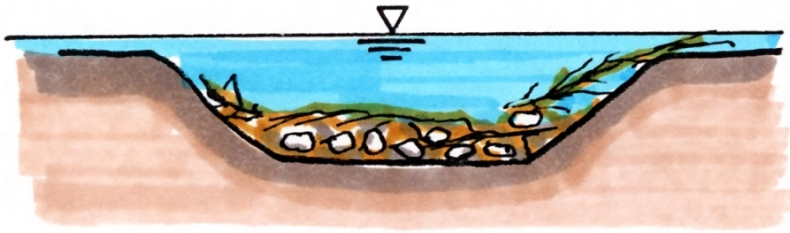
- **Cuts for public improvements, such as streets or flood control channels, are an unnatural improvements made for the public welfare. The costs of their subsequent failure and repair is usually born by the public agency.**

EXAMPLES OF INVERSE CONDEMNATION SUITS AGAINST GOVERNMENTAL AGENCIES



- **Similarly, fill embankments associated with public improvements are also considered public property, and the cost of their repair is usually born by the public agency. Most public agencies wait until a Federal Disaster Area has been declared by Presidential Proclamation, so they can request 75% funding from FEMA to restore 'damaged rights-of-way.'**

EXAMPLES OF INVERSE CONDEMNATION SUITS AGAINST GOVERNMENTAL AGENCIES



Overflow of Storm Drainage Facilities Due to Short Term High Intensity Rainstorms

- **Failure to maintain the design flood control channel can often lead to inverse condemnation suits against flood protection agencies.**
- **Mucking of flood control channels can be problematic in areas where riparian habitat for any endangered species has been identified in such channels; often preventing their maintenance.**

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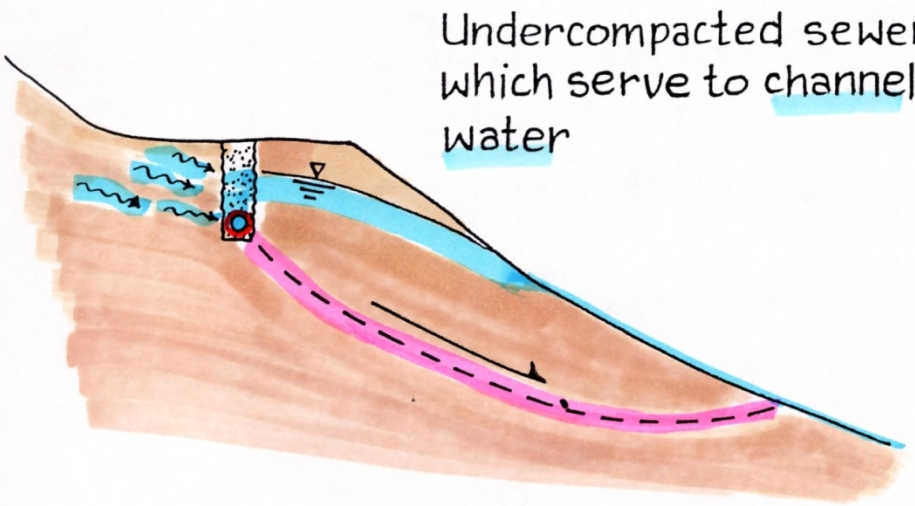

- **On occasion, something as innocent as a gravel-filled sewer trench can trigger liability; because it serves as a quasi-subdrain, which may discharge onto an adjacent private slope (causing an unnatural concentration of pore pressure). If the trench backfill has zero cohesion (sand or gravel), then it may serve as a giant tension crack, lessening slope stability.**

About the Presenter

J. David Rogers, Ph.D., P.E., P.G. holds the Karl F. Hasselmann Chair in Geological Engineering at the Missouri University of Science & Technology. He can be contacted at rogersda@mst.edu

- Professor Rogers owned engineering consulting firms in Los Angeles and San Francisco and a general engineering contracting firm prior to entering academia.
- Professor Rogers served as Chair of the Building Codes Committee of the Association of Environmental & Engineering Geologists between 1990-97 and was AEG representative to the International Conference of Building Officials (ICBO) while the 1991, 1994 and 1997 UBC's and 2000 IBC were developed.
- Since 1984 he has taught short courses on grading and excavation codes for ICBO, the University of Wisconsin, University of California, the Association of Bay Area Governments and the City of Los Angeles.

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