FORENSIC ENGINEERING FOR GEOTECHNICAL ENGINEERS

CONTENTS - 1

(Does not cover Legal Issues, Expert witness, Expert evidence)

FORENSIC ENGINEERING FOR GEOTECHNICAL ENGINEERS

CONTENTS - 2

1.1 Definition-1

- Application of engineering knowledge to Legal Problems (Oxford Dictionary)
- Deals with investigation of failures of geotechnical origin, not only from technical point of view but also with the probability of legal proceeding in mind (Rao – 2005 - Chairman of TC40 Group ISSMGE)
- Can be stressful, disheartening & hostile but also interesting & stimulating

1.1 Definition-2

- Geotechnical failure: unacceptable difference between intended (expected) and actual (observed) performance of a geotechnical structure
- Non-conformity with design expectation
- Not necessarily catastrophic, may be in the form of excessive settlement & deformation

1.2 Scope -1

- 2 sided: 1. Activities involved with geo-failure & 2. Relates to dispute/court;

  In reality only small fraction involvement with litigation
- Failure can result from combination of conditions; incompetence design, cons methodology, workmanship, geology, etc
- Sorting through debris/wreckage of collapse & pinpoint cause of failure

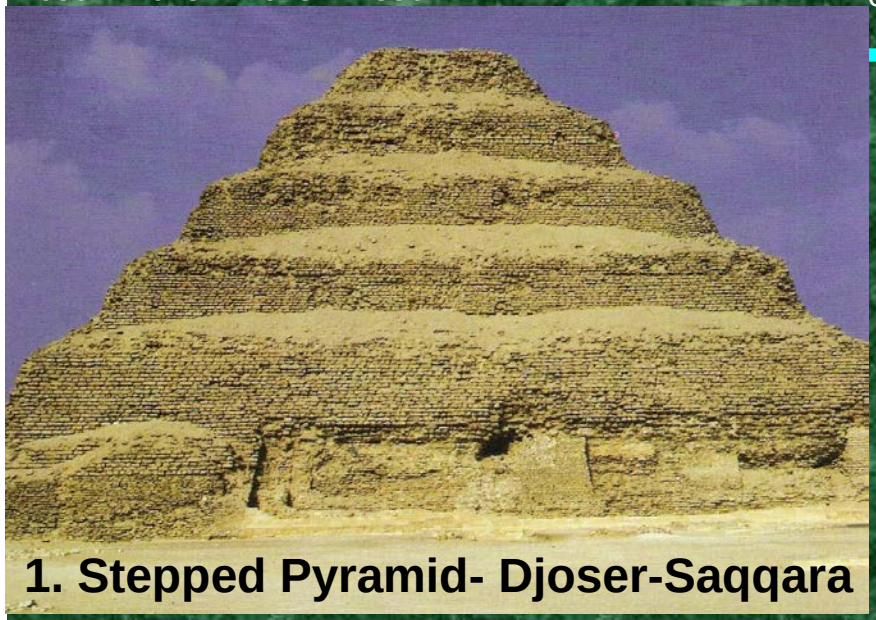
1.2 Scope -2

- To help settle disputes between parties, diagnose roots of problem after which appropriate repair to follow
- Many failures could be avoided if each knew about the mistakes made by others
- Forensic geo-eng. serves to improve the science and art of geo-eng. Profession [1980's ASCE & ISSMGE]

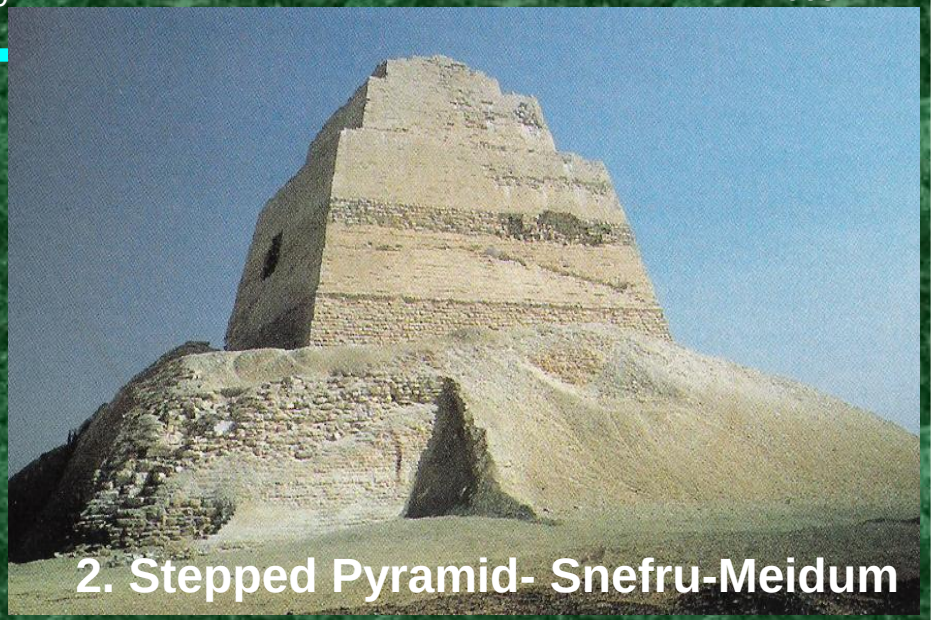
TIME SCALE

1 55 2 10 3 65 4

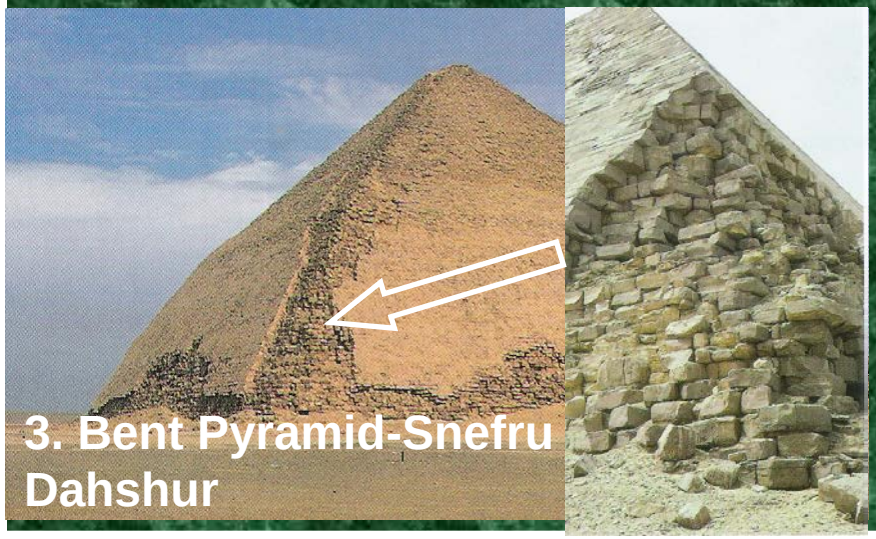
-2680 -2625 -2615 -2550 0 +2009



1. Stepped Pyramid- Djoser-Saqqara



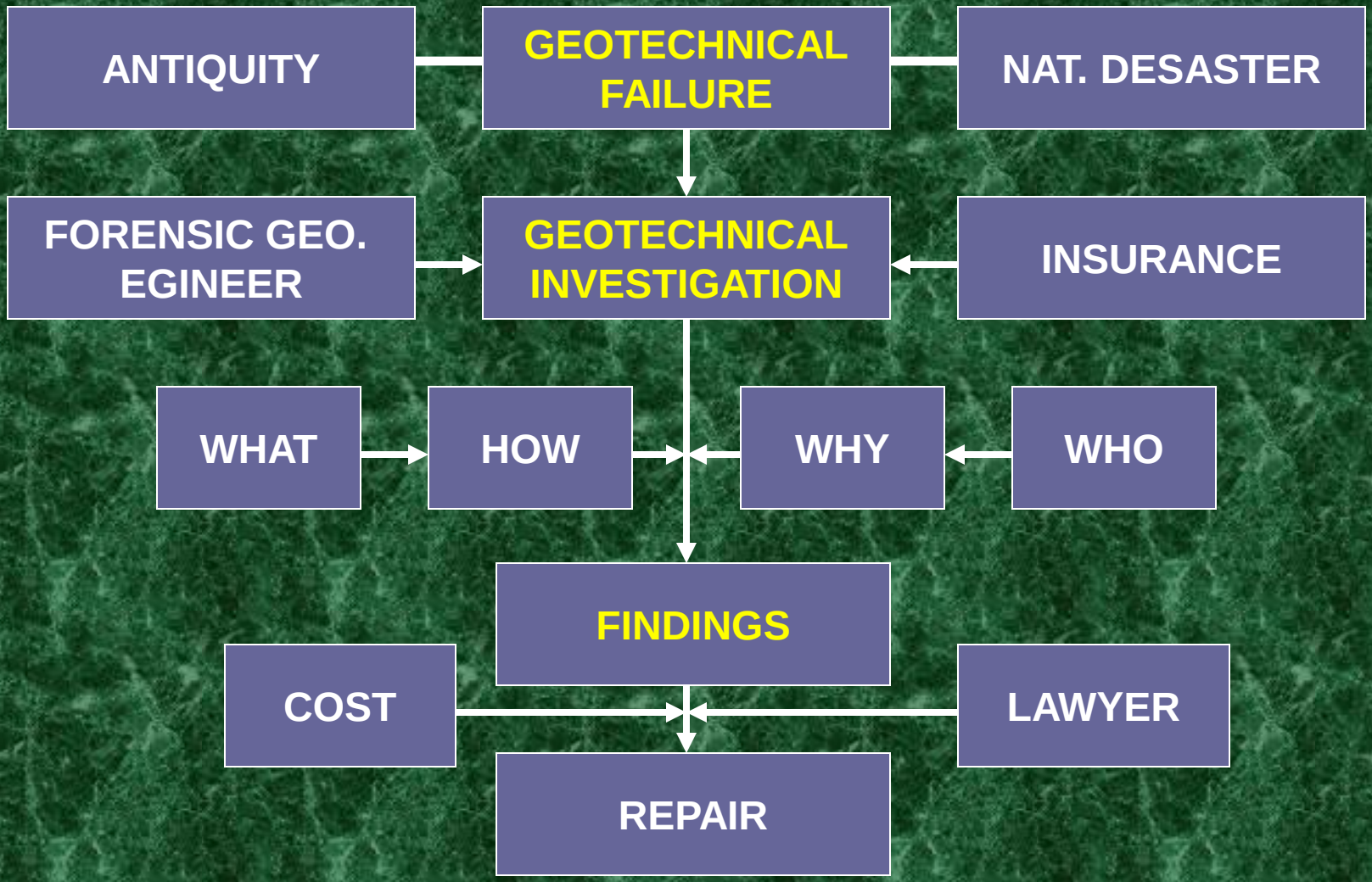
2. Stepped Pyramid- Snefru-Meidum



3. Bent Pyramid-Snefru Dahshur

4. Perfect Pyramid- Giza

1.2 Scope-3


ANTIQUITY
GEOTECHNICAL FAILURE
NAT. DESASTER
FORENSIC GEO. EGINEER
GEOTECHNICAL INVESTIGATION
INSURANCE
WHAT
HOW
WHY
WHO
FINDINGS
COST
LAWYER
REPAIR

1.3 Nature

- Soil as natural & complex material
- Technological advancement in geotechnical engineering often attended by failures: loss of financial, reputation, life
- Errors and omissions having significant engineering consequences [Sowers 1993: 88% of foundation failure due to human shortcoming, the rest due lack of knowledge]
- Natural disasters, antiquity

1.4 Involvement

- Brought about or instigated by developers, owners, contractor, government agencies, architects, engineers, lawyers
- Conduct investigation, draw conclusions and communication of results often demand highest professional & ethical standards

2.1 Qualifications -1

- Expert in the field of geotechnical engineering
- Having thorough knowledge of the subject under investigation
- Education & years of practice
- Basic qualifications
- Professional qualifications

2.1 Qualifications -2

- Experience [years & decades in analysis, design, construction, testing, inspection, trouble shooting, interest in problem solving, self confidence, not arrogance, ethical, high level of intellectual sophistication, (some can be learnt, some intrinsic)]
- Academic & prof qualification & experience alone not adequate; must learn from own experience & that of others. Design is different from failure investigation.
- Good F.Goe-Eng must be good designer & investigator. A good geo-designer may not be a good F.Geo-Eng.
- Need to know how to deal with Insurance Co. & Lawyers

2.2 Ethics

High ethical standards:

- Impartial
- Honest
- Seeker of truth
- Accountability
- Transparent
- No bonus for winning outcome
- Declare fee

2.3 Thoroughness

- Cross check all statements/conclusions
- Back analysis
- Reconstruction of case/event/failure
- State assumptions: must be clear based on experience and local practice
- Report is his, assistance must be declared
- Report limitations
- Admit if facts not fully researched
- Appropriate analysis/computer prog

2.4 Facts

- Documents
- Photographic records of evidence
- Observation, comprehension and description of the facts
- Factual witness
- Present the facts not opinion

2.5 Detective Skills

- Vigilant, watchful, on the lookout
- Attention to small details
- Clarity of thought
- Open mindedness
- Tough, firm
- Must have seen a lot of geo-failures

2.6 Willing to travel

- At short notice
- Approach site at all possible direction

2.7 Ability to work with others

- Appoint assistance from other area of expertise
- Often as team leader
- Sometimes best alone

2.8 Effective communicator

- Effective investigation reporter
- Communication of findings through report or verbal of the investigation is the ultimate poduct and forms main task of the forensic works

2.9 Ability to stand trial

- Can be cross-examined/questioned
- Court proceeding often brutal business
- Attorney from the other side will not allow his client exposed to harmful evidence; accrue small errors; discredit
- Be calm, consistent & logical
- Keep simple storey line
- All facts technically coherent

END OF TOPIC