Excavation Shoring

CSCE

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Golder Associates

Outline

- What is shoring?
- How does shoring function?
- What situations do we deal with in Calgary?
- What happens over time?

What is Shoring?

- Shoring provides temporary ground support to facilitate safe construction of the works.
- In the context of an open excavation, generally used in a situation where there isn't sufficient room to cut slopes to safe angles.
- Generally vertical.
- Includes structural elements that are intended to apply some form of load to the soil mass, to transfer loads through to some other material and to spread load out on the surface of the soil mass.
- Usually some of the structural elements of the shoring system are installed in advance of excavation.
- Almost always built and structurally loaded in stages.

What is Shoring?

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How Does Shoring Function?

- Depends on purpose: for now consider a circumstance that is tolerant of some movement and the shoring is composed of relatively flexible structural elements.
- Takes advantage of internal strength within the soil mass.
- Estimated loads that must be carried by the shoring are based on a combination of soil mechanics theory, empirical methods and experienced judgement.
- Monitoring and measuring actual performance supports the technical understanding of function. Data not necessarily transferable to other geological situations.
- Construction methods need to be appropriate for actual conditions in order to control loss of ground.

How Does Shoring Function?

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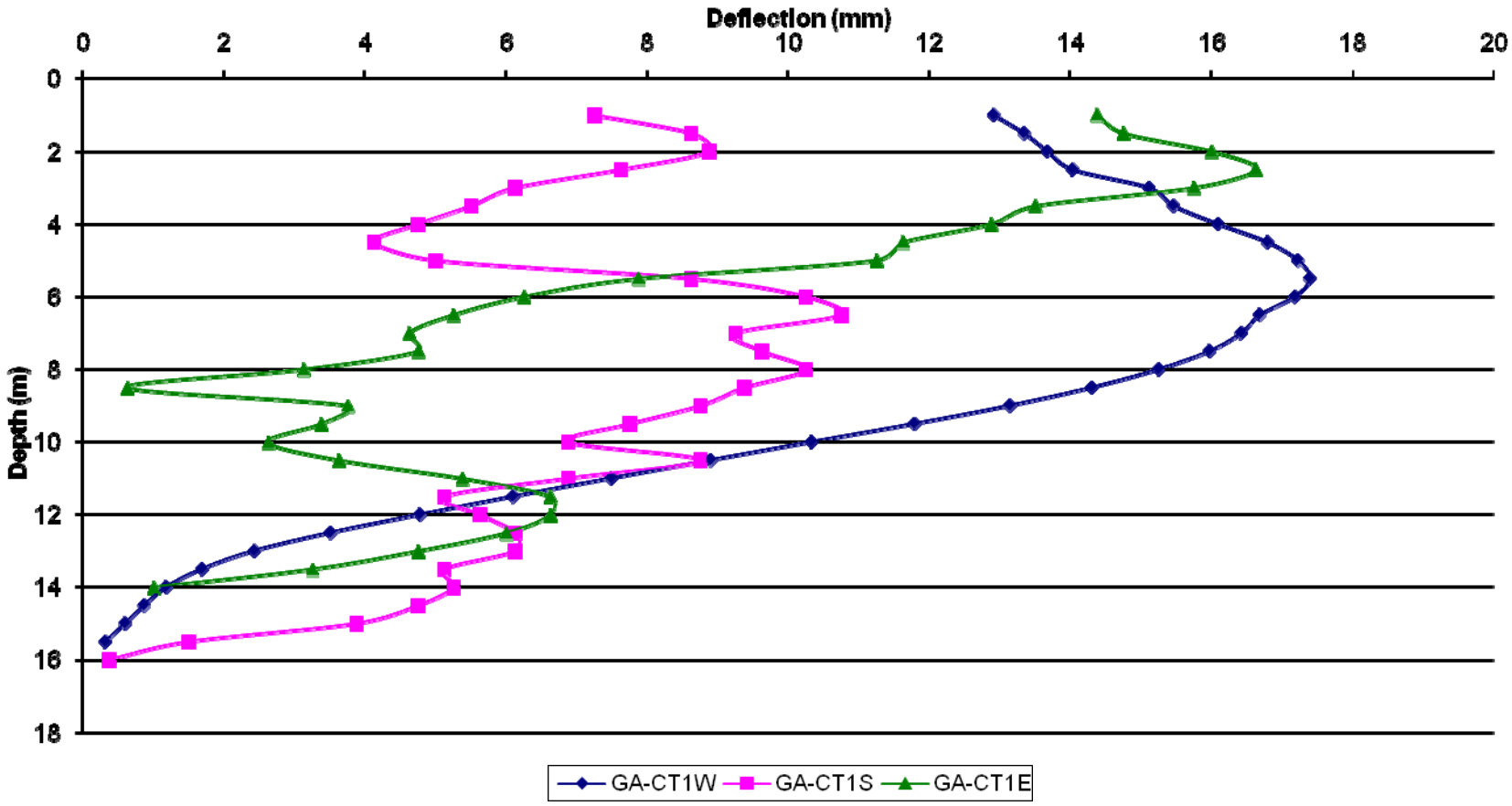
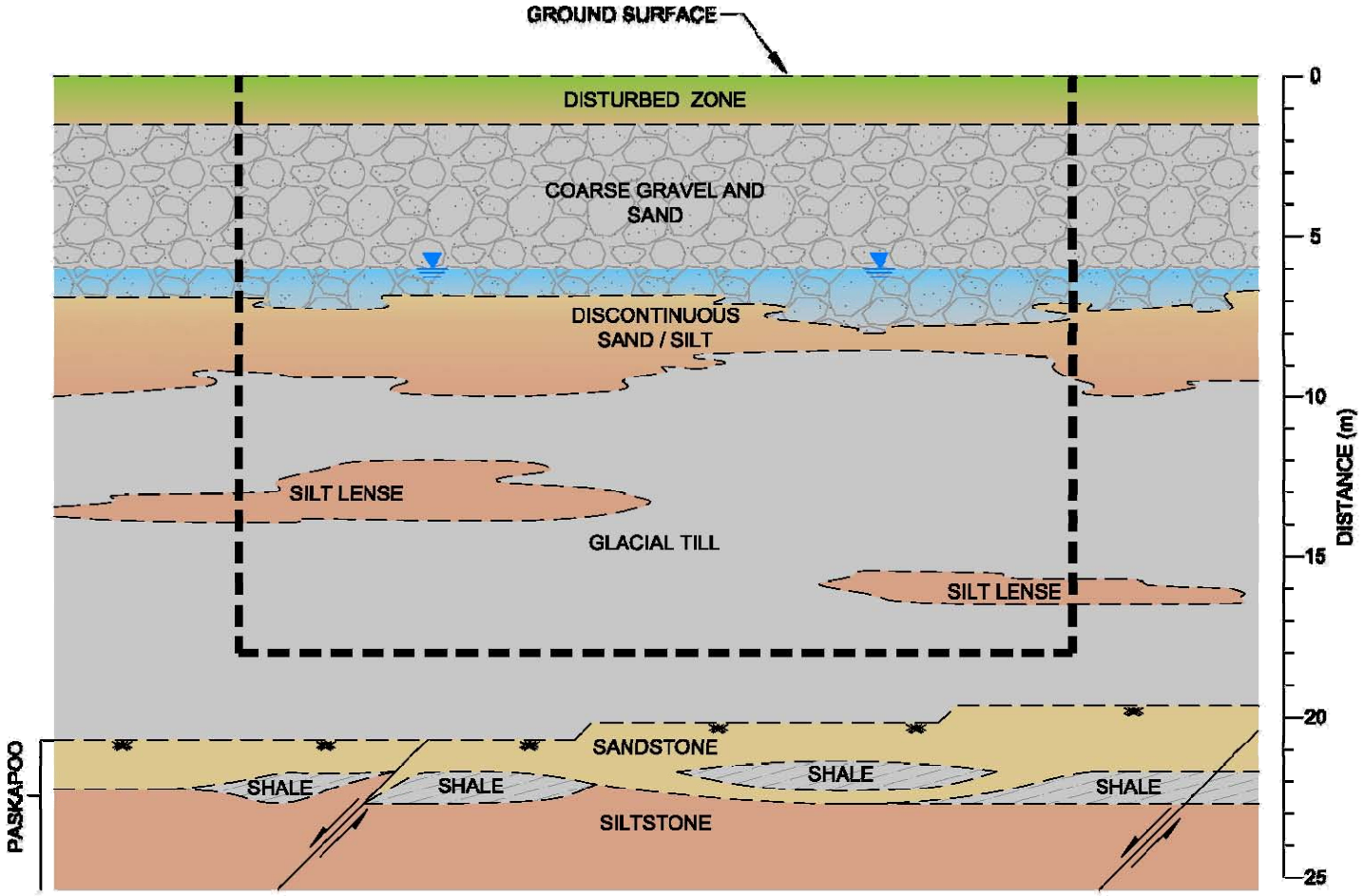


How Does Shoring Function?

- Alternatively, the design of the shoring system may be governed by deflection.
- Used where deflection of shoring system would cause damage to buildings or nearby infrastructure.
- Construction methods are focused on control of ground and control of deflection at all stages of the excavation.
- Actual deflections are generally closely monitored during construction.

What is the Situation in Calgary?



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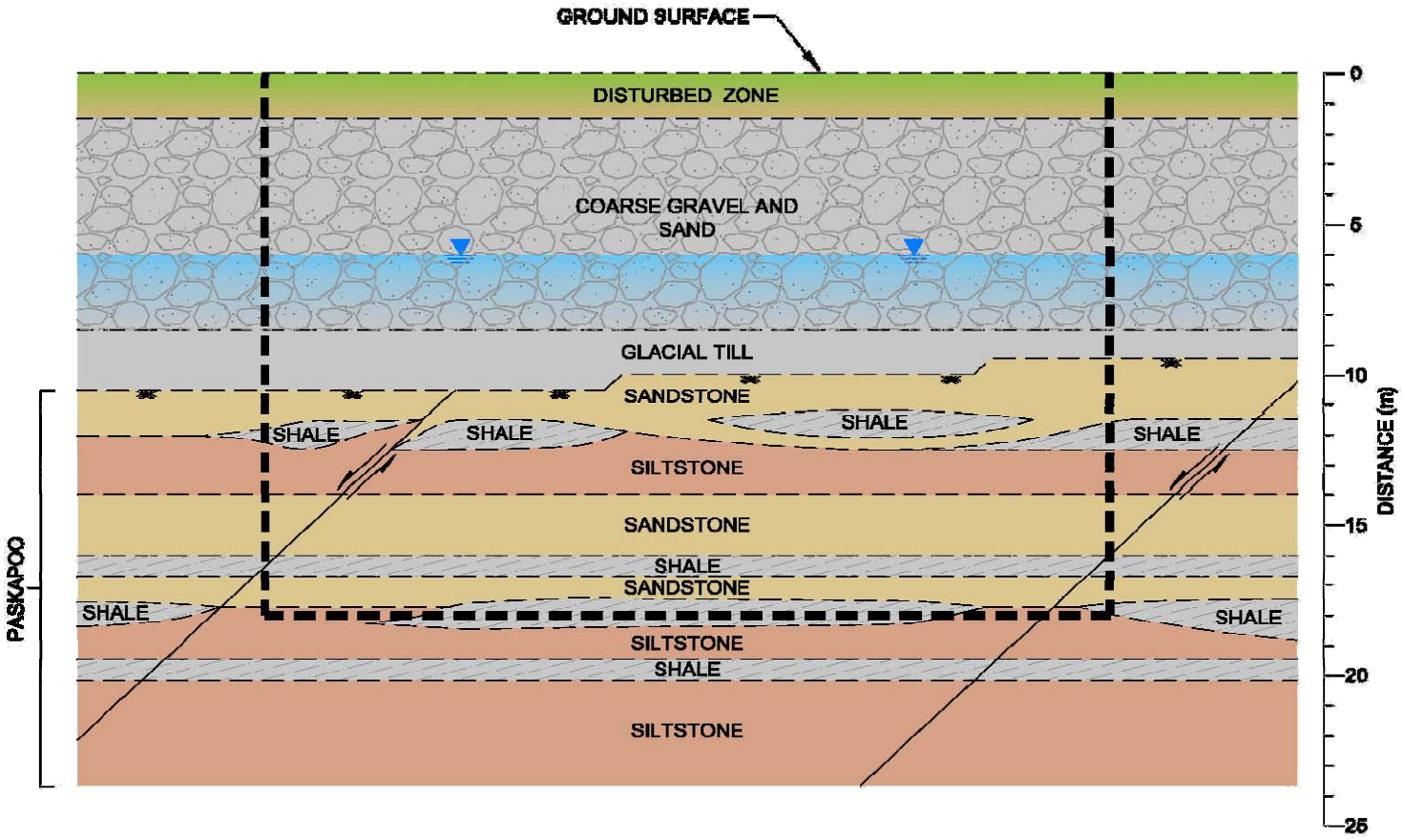

What is the Situation in Calgary?

What Happens Over Time?

- Creep
- Loss of Ground (all about water)

What Happens Over Time?

- Some soils and weak rock creep under load, sometimes at loads that are considerably less than peak strength of the soil.
- In the context of an anchored shoring system, this causes redistribution of loads among anchors and other structural elements, potentially leading to overstressing some of the elements.
- An internally strutted shoring system could have the same issues, though repair access to the strut foundation is often available.
- In Alberta, we have the added effects of ice in the winter. Ice loads can significantly overstress individual anchors.

What Happens Over Time?

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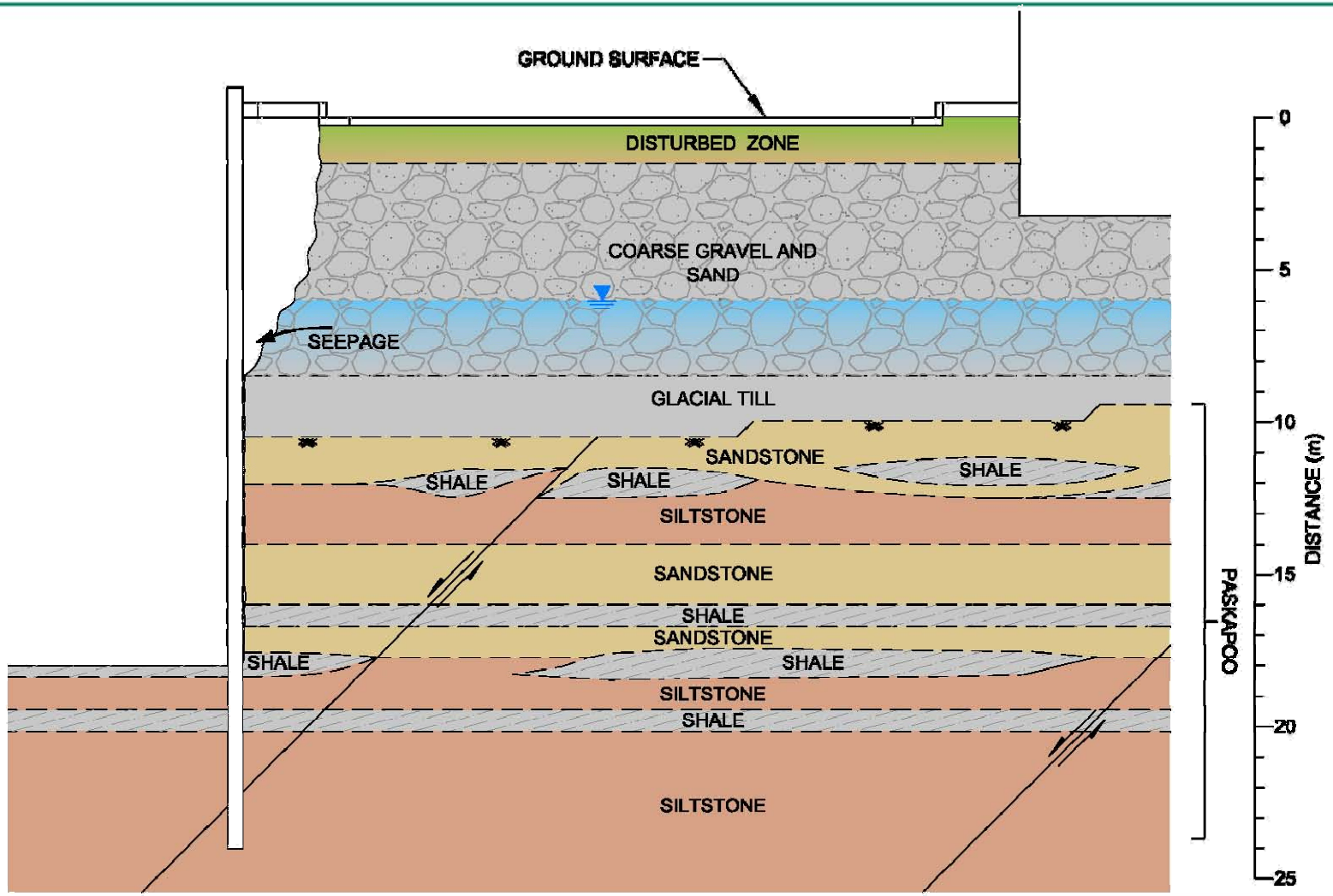

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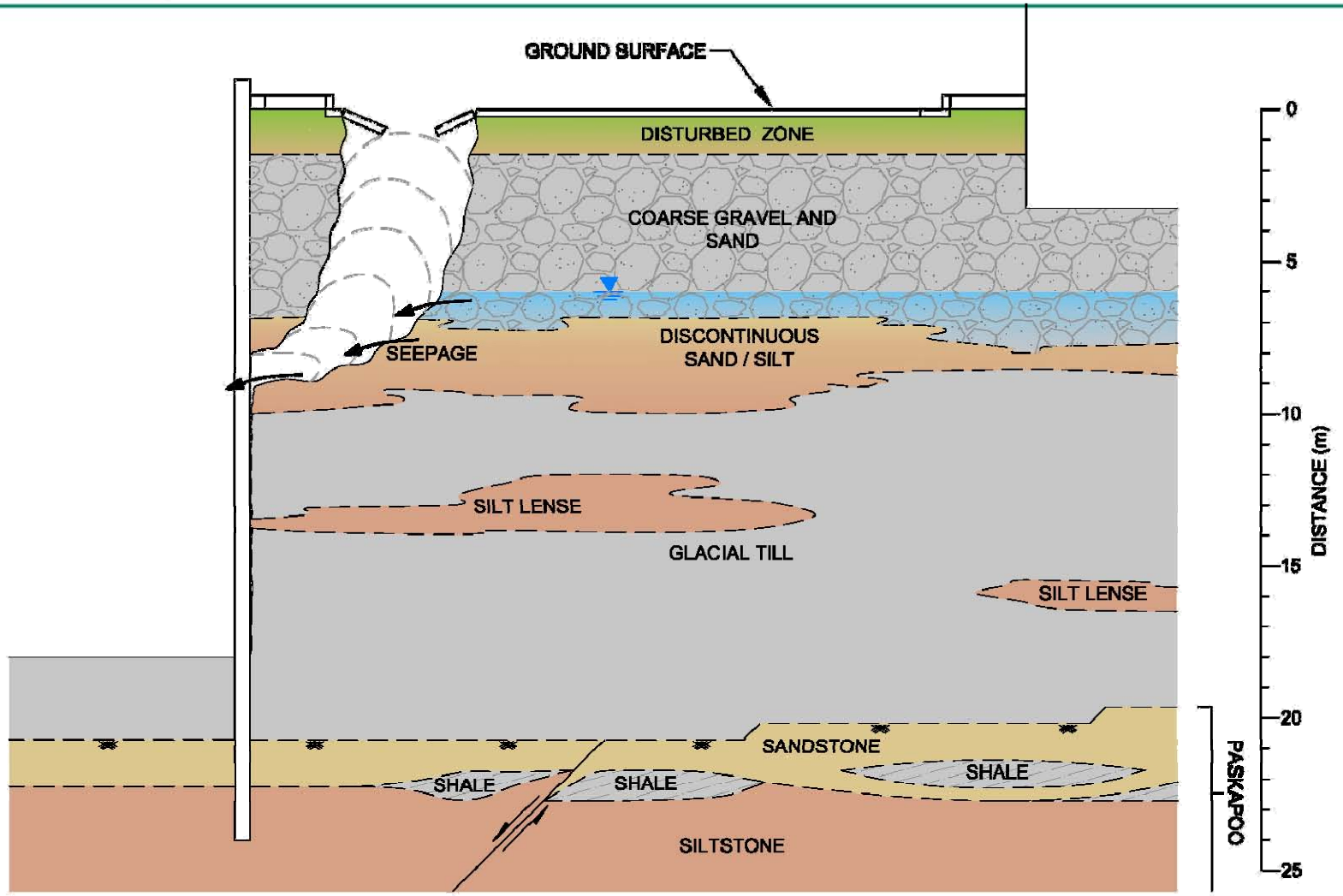

What Happens Over Time?

Questions?