Slurry wall technology and lessons learned for the Saskatchewan mining industry

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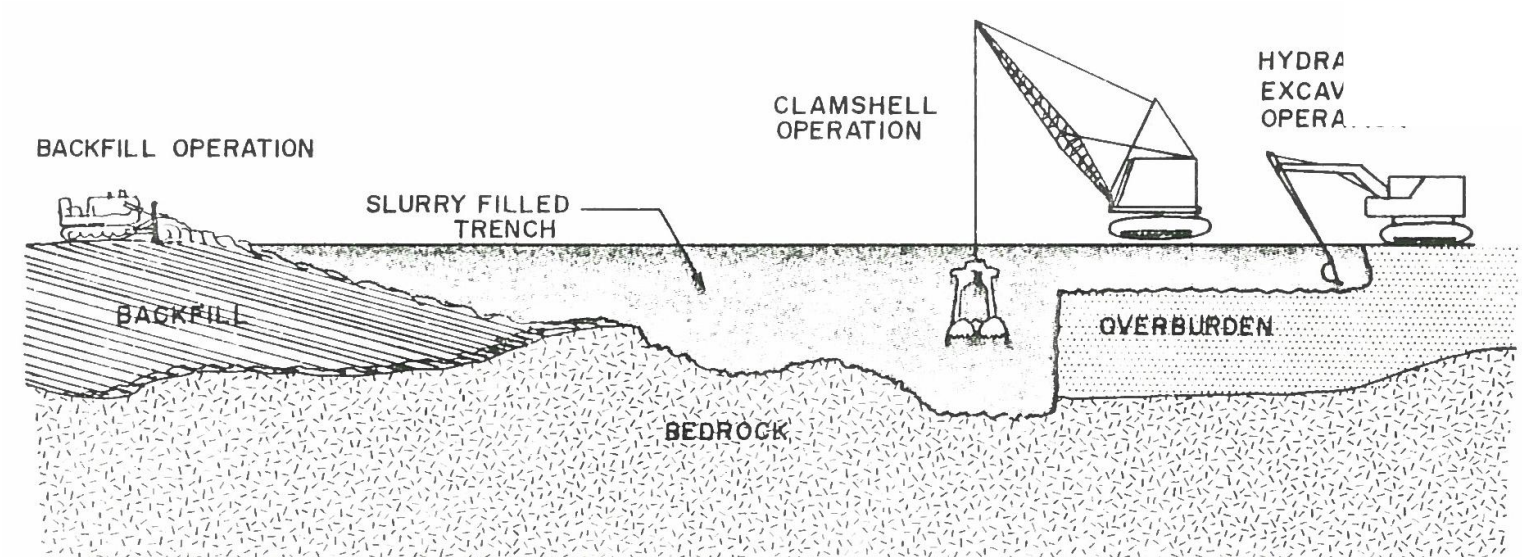
Introduction

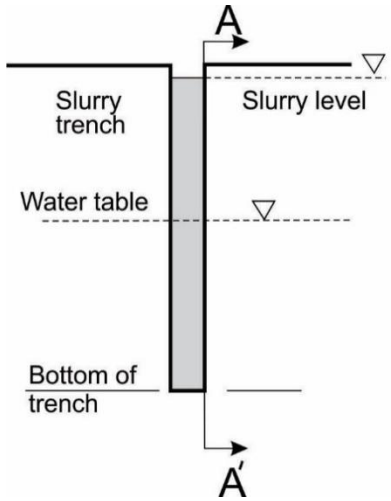
- Review of slurry wall technology and lessons learned
- Hundreds of slurry walls constructed in North America
- Saskatchewan use – potash, uranium, coal mines and industrial applications
- Widespread use - leading to the assumption that slurry walls are “standard” engineering and construction.
- However, nothing standard about slurry wall construction – especially where they are intended to last for up to 500 years.
- Review of lessons learned the past four decades and challenges moving forward

Review of slurry wall construction

- Slurry walls
- Post second world war “spin-off” of pond liner technique from the 1700 and early 1800’s known as “puddle clay”



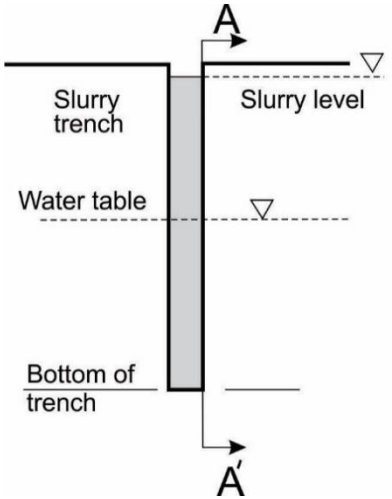
Review of slurry wall construction



Stability fn:

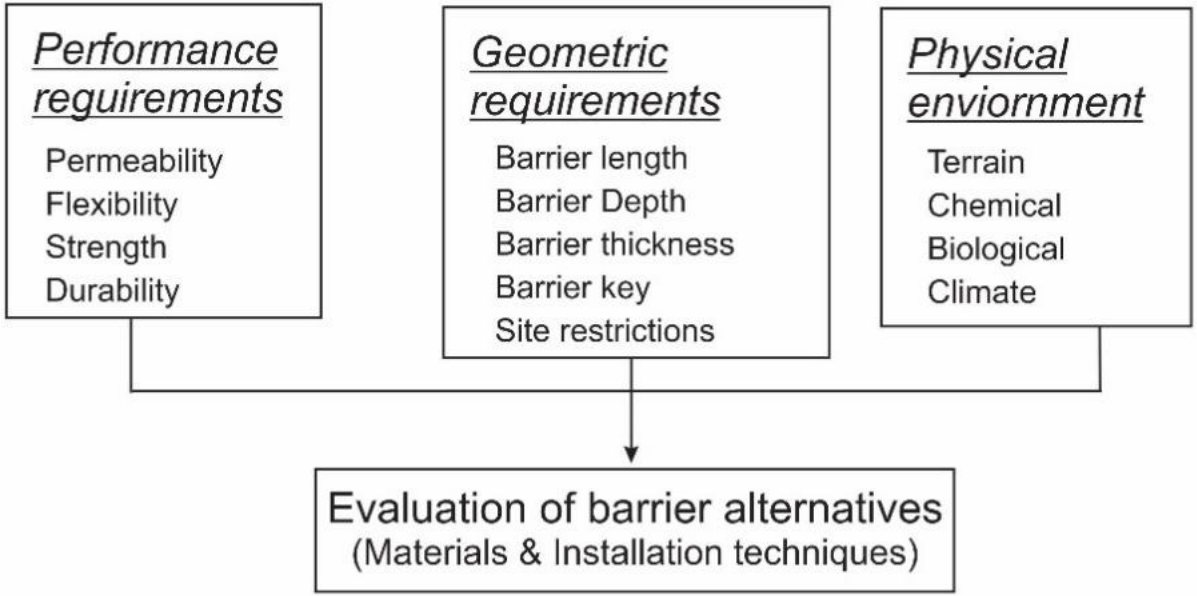
1) Trench depth
2) Water table elevation
3) Water table fluctuations
4) Ground water movement
5) Slurry level in trench
6) Density of slurry
7) Ground water chemistry
8) Presence of filter cake
9) Adjacent surcharge loads
10) Vibration
11) Time
12) Nature of excavated soils
    1) - composition
    2) - density
    3) - pre-consolidation
    4) - etc.

Review of slurry wall construction



Review of slurry wall construction

Critical design considerations



Performance requirements

1. Low permeability – generally 1×10^{-9} m/s

2. Strength
   Usually not specified, unless subject to erosion – high adjacent water flows

3. Flexibility
   Final barrier might be subjected to load

4. Durability
   Barrier might be subject to physical or chemical attack.

Geometric requirements

1. Barrier Length

2. Barrier Depth

2. Barrier Thickness

Geometric requirements

3. Barrier Thickness, cont..

4. Barrier Key

Geometric requirements

5. Site restrictions

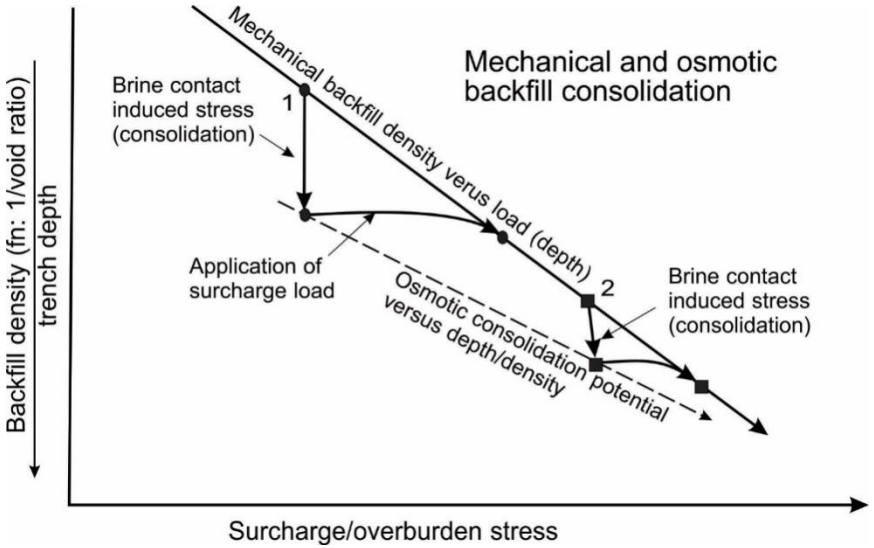
CLAMSHEL BUCKET SLURRY WALL
(Urban Area)

Physical environment

1. Terrain

Physical environment

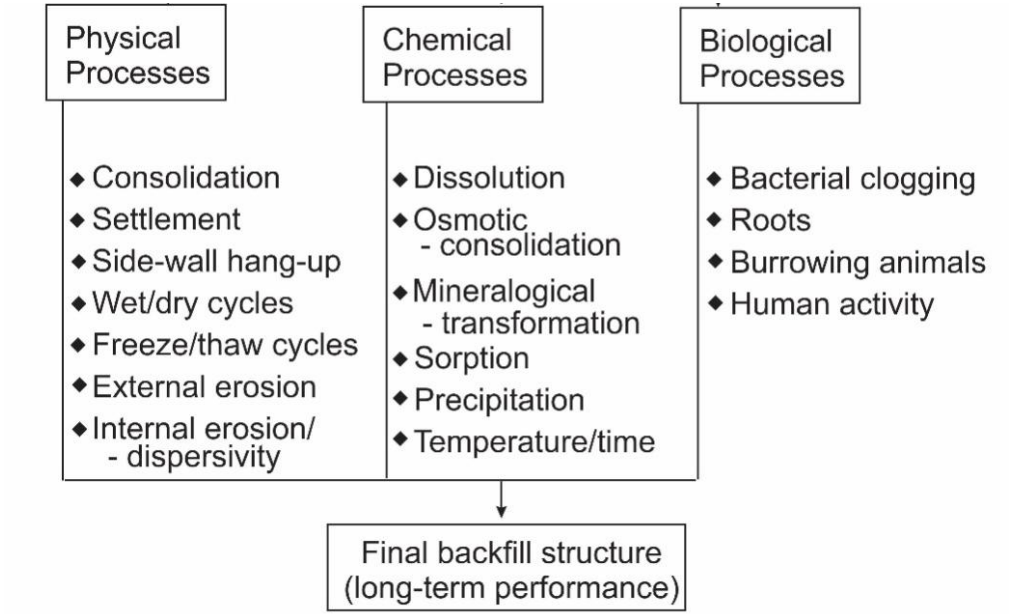
2. Chemical environment



Physical environment

4. Climate

Processes Impacting Slurry Wall Performance



Saskatchewan slurry wall experience

Excavation and trench stability

Pre-drill boreholes along route
- Need to establish depth of slurry wall

Collect soil samples prior to excavating
- Backfill mixing

Collect water samples prior to excavating
- Impact on slurry and backfill performance

Saskatchewan slurry wall experience

1. Excavation and trench stability

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Excavation and trench stability

Summary

- Nothing “standard” about slurry walls design/construction
- Many potential issues and high degree of QC/QA is required
- Special consideration required for slurry walls intended for long-term decommissioning applications