

# Tunnel Constructability

Are You an experienced professionals/structural engineer or experienced Contractor in Tunnel & Bridge Construction. I am sure you will be competent to provide a qualified judgement about active, passive & static earth pressure, and **expected „cracks in the arch shell“** for the two presented cases—without computing / quantifying the forces, moment diagrams and deflection curves —.

## (Case1) Static system with „single articulation“



Left side of Arch LT :

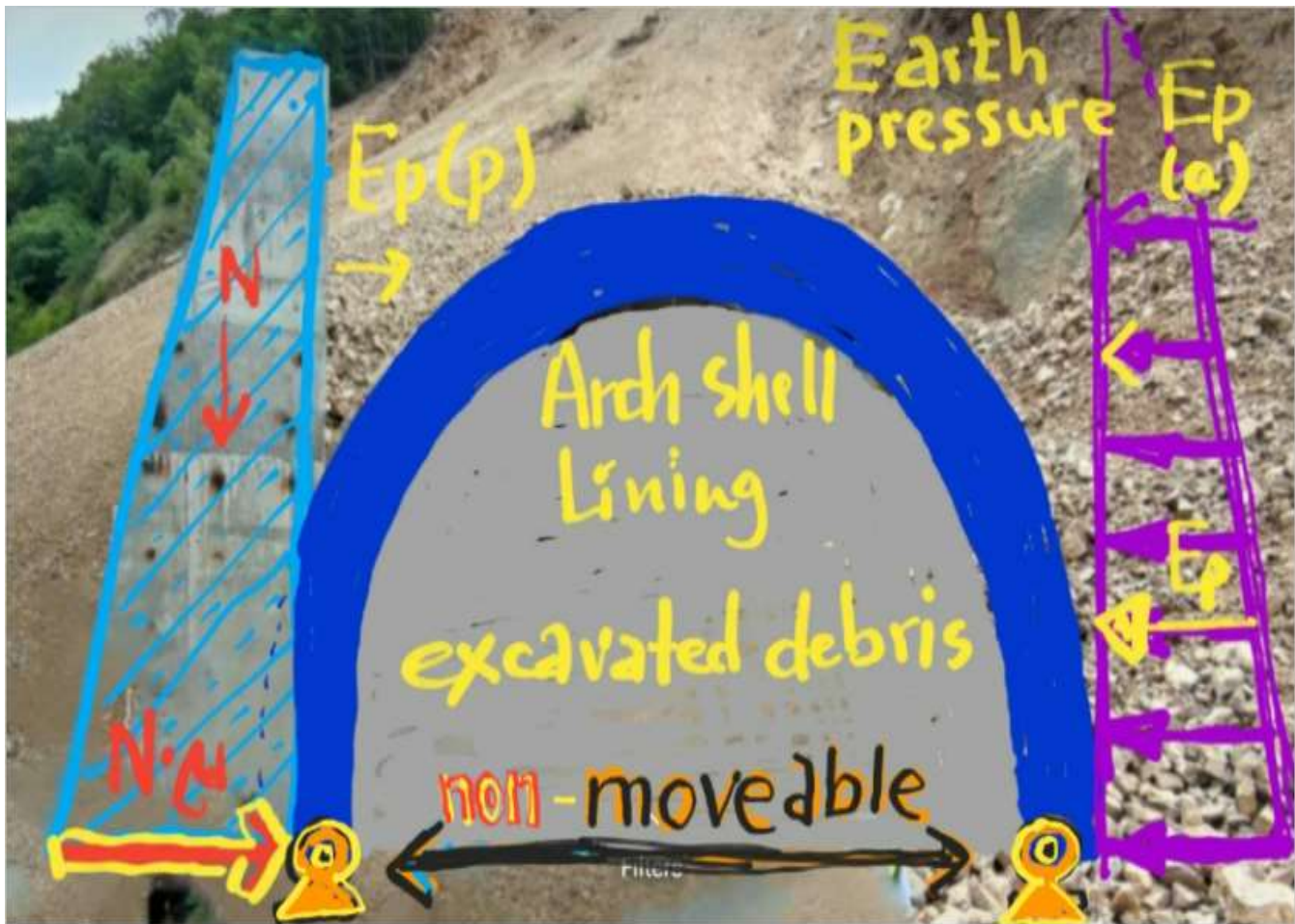
- (1) Sliding force  $N \cdot \mu$  underneath the RI-concrete retaining wall
- (2) passive earth pressure  $E_p(p)$  between retaining wall and arch shell
- (3a) **moveable** „bearings“, **compressible soil** between left and right „bearings“

Right side of Arch RT:

- (3b) **moveable** „bearings“, **compressible soil** between left and right „bearings“
- (4) active earth pressure  $E_p(a)$

## (Case2) Static system with „fixed articulations“

in ceteris paribus, except the non-moveable „bearings“



(1) sliding force  $N \cdot \mu$  (2) passive earth pressure  $E_p(p)$ , (3a+3b) NON-moveable „bearings“, NON-compressible soil between left and right „bearings“ (4) static earth pressure  $E_p(s)$

### Question Q1 + Q2+ Q3 to Red FiDiC / MDB

**Q1 : Location of Cracks in the arch shell** Where do you expect CRACKS / structural failure due to the demonstrated structural indeterminate of the Tunnel Ensemble?

>>> Area C1 = 0°-30°, LT-bearing=0°, C2=30°-60°, C3=60°-90°, 90°=Crest, C4=90°-120°, C5=120°-150°, AND / or C6=150°-180° (clockwise)

**Q2 : Ensemble?** What is your opinion about the constructed „Tunnel Ensemble“?

A2 >>> i.e. design philosophy and construction methodology

Note: NATM is apparently not be applied to validate the Constructability during design & design review.

**Q3 : Gallery?** Should have the Consultant / Engineer proposed a GALLERY in the course of DESIGN REVIEW (based on Design Manual) latest, supported by specific exploratory works / soil investigations (e.g. angle of repose with moisture content, sieve analysis), or even a re-alignment of the Highway/ Bridge approach, not to touch the slope with weathered material/debris.



Note : Your opinion is just a point of view without any legal binding.

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