

Material input parameters for Phase2 analyses:

RHYOLITE

BRITTLE HOEK-BROWN

Peak:
 $\sigma_c = 270.0$ MPa
 $m_b = 6.621$
 $s = 0.2811$
 $a = 0.25$

Residual:
 $\sigma_c = 150.0$ MPa
 $m_{bres} = 8.6$
 $s_{res} = 0.0001$
 $a_{res} = 0.75$

SUPPORT

CABLES/BOLTS

Cables:
 50 ton – 20m long
 @ 2.5m x 2.5m
 bond length = 50%
 Pre-stress = 40 tonnes

Bolts:
 20 ton – 5m long
 @ 1.25m x 1.25m
 fully bonded

AMPHIBOLITE

BRITTLE HOEK-BROWN

Peak:
 $\sigma_c = 215.0$ MPa
 $m_b = 2.656$
 $s = 0.1639$
 $a = 0.25$

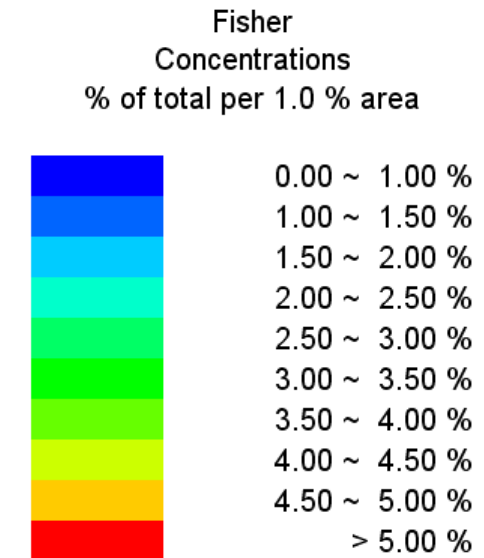
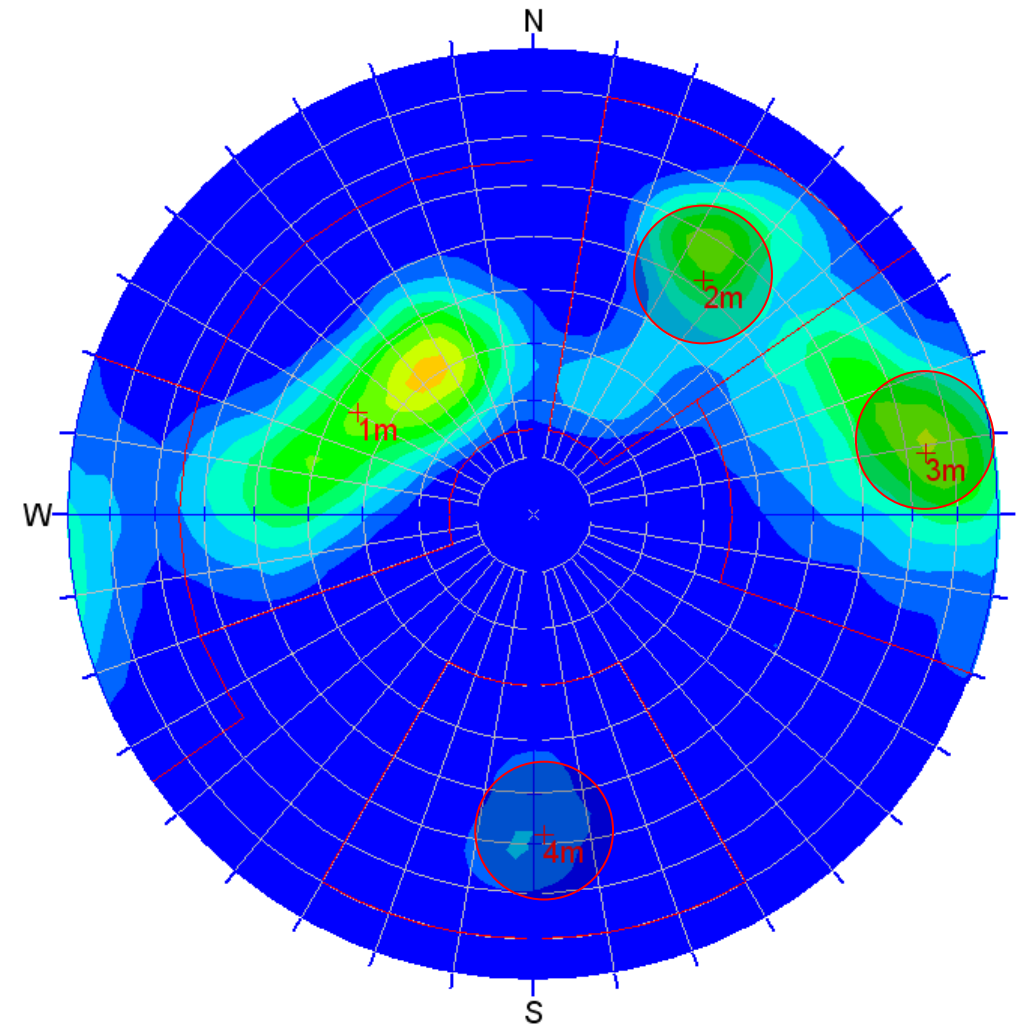
Residual:
 $\sigma_c = 215.0$ MPa
 $m_{bres} = 8.0$
 $s_{res} = 0.0001$
 $a_{res} = 0.75$

SHOTCRETE/LINER

Shotcrete/Liner:
 Thickness = 30 cm
 $\sigma_c = 40.0$ MPa
 $\sigma_T = 3.0$ MPa

Mesh: 6 mm wire
 @ 100mm x 100 mm

FABRIC



No Bias Correction
 Max. Conc. = 4.7460%

Equal Area
 Lower Hemisphere
 6464 Poles
 2770 Entries

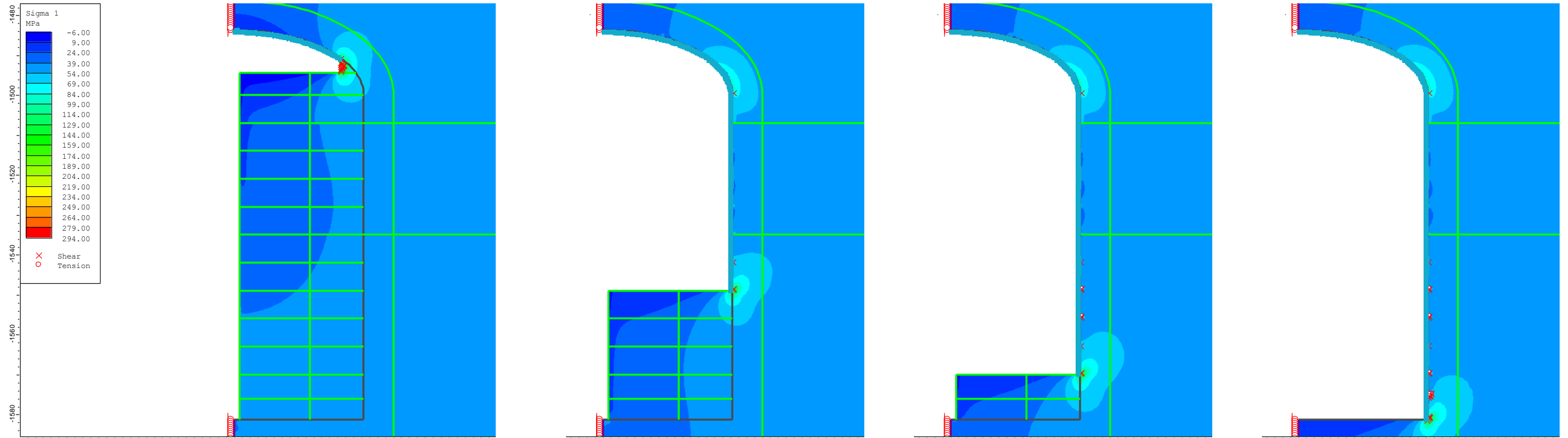
Orientations
 ID Dip / Direction

1	m	36 / 120
2	m	52 / 216
3	m	74 / 261
4	m	58 / 358

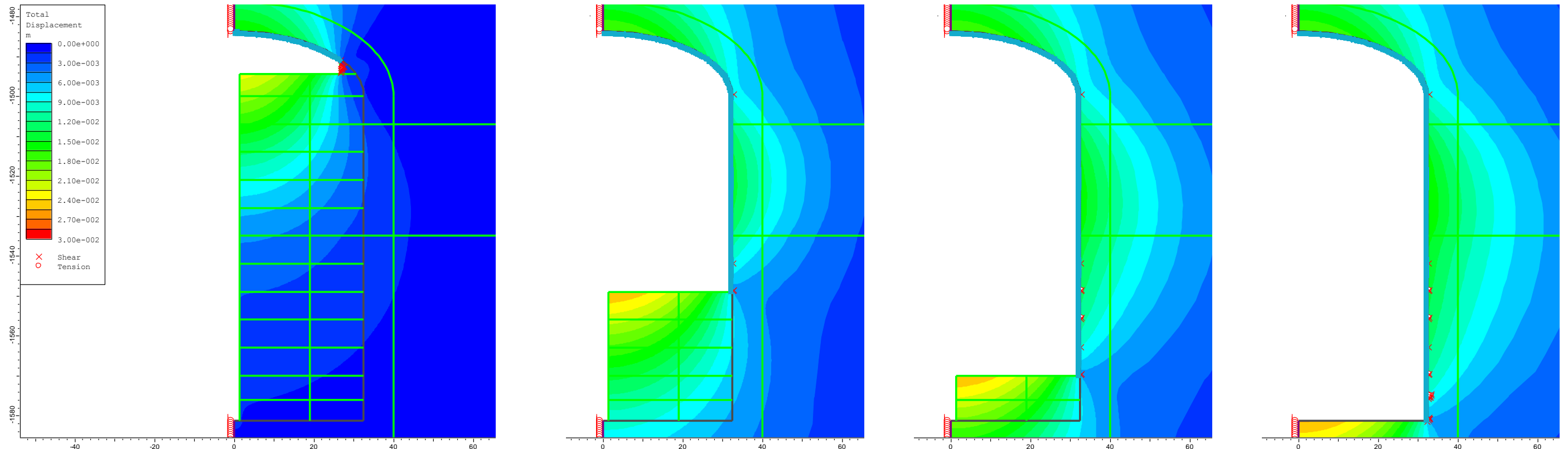
JOINT PROPERTIES

ALL JOINT SETS

$c = 12.0$ MPa $c_{res} = 3.6$ MPa
 $\phi = 47^\circ$ $\phi_{res} = 42^\circ$
 $T = 1.0$ MPa $T_{res} = 0.4$ MPa
 $k_n = 100000$ MPa/m
 $k_s = 10000$ MPa/m



Major principal stress distribution – selected stages – minor damage observed during excavation of the dome and at the bottom of every bench



Total displacement distribution – selected stages – maximum displacement (25.6 mm) observed at the centre of the floor at every stage. Maximum displacement at the wall mid-height = 16.4 mm. Maximum displacement in the crown = 18.2 mm.

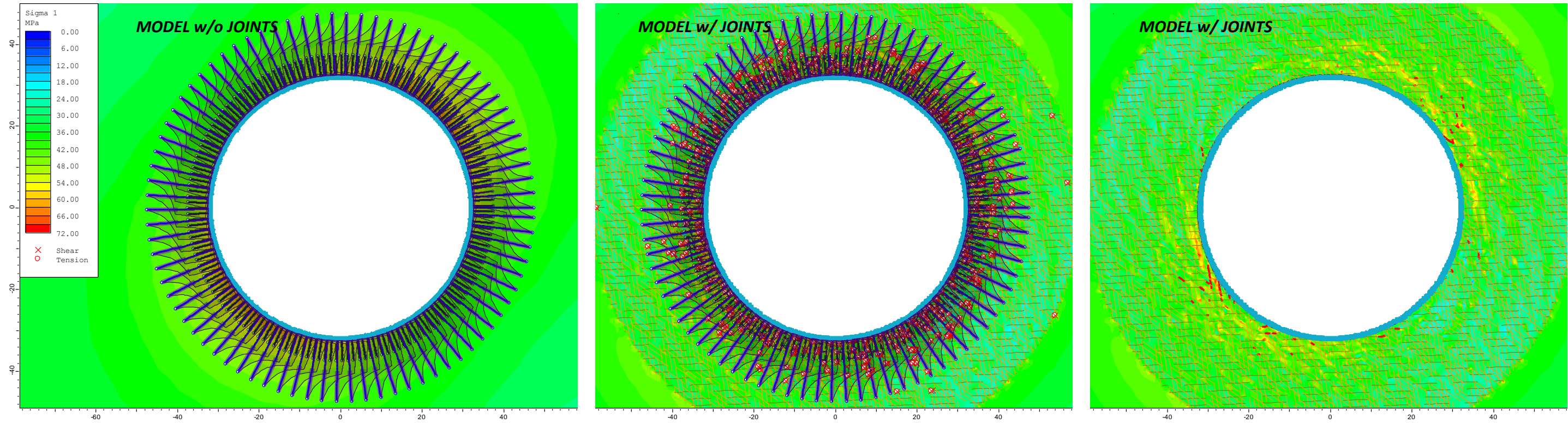
DATE: July-2011

PROJECT: 113-81779

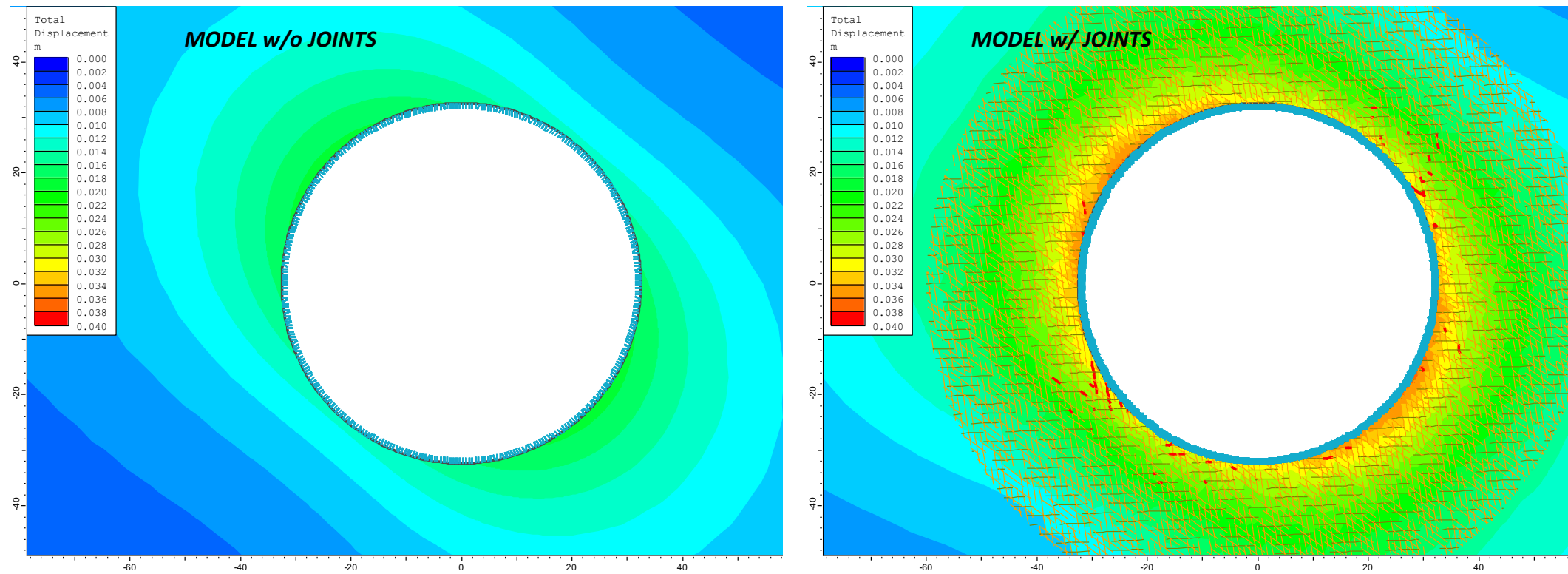


DOC: J.L.C.

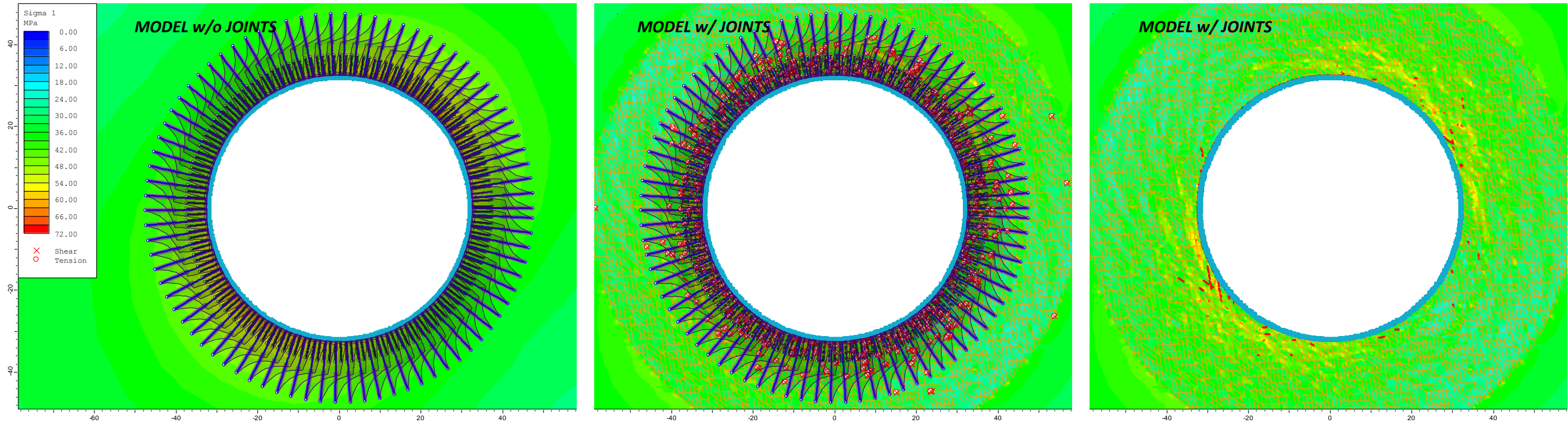
CHK: M.F. APD: R.P.



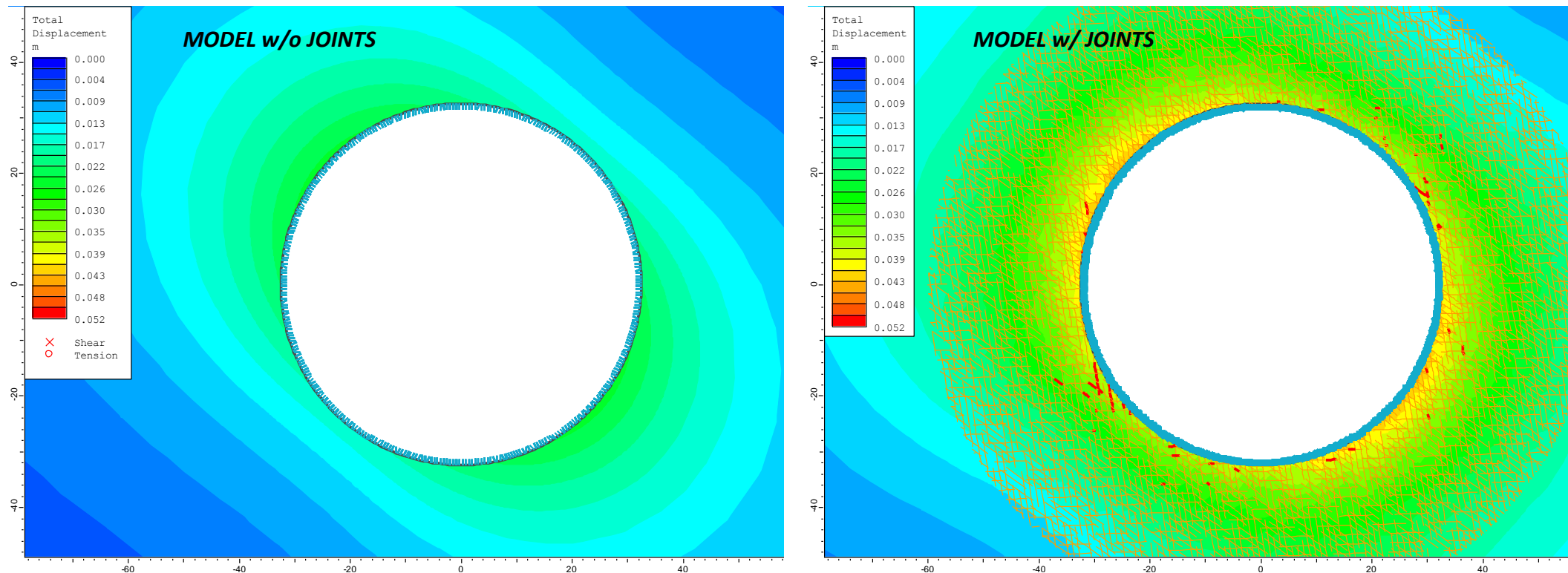
Cables were pre-stressed to 40 tonnes. Cables in model with explicit joint sets picked up an additional ~2 tonnes of load. Minor rock damage and minor joint slip.



Total displacement distribution. Maximum displacement w/o joints= 18.9 mm. Maximum displacement w/ joints = 37.8 mm.



Cables were pre-stressed to 40 tonnes. Cables in model with explicit joint sets picked up an additional ~2 tonnes of load. Minor rock damage and minor joint slip.



Total displacement distribution. Maximum displacement w/o joints= 24.7 mm. Maximum displacement w/ joints = 44.7 mm.