



Mining in Control

**The Turmalina Turnaround Plan
Mine Design and Sequencing**

Turmalina Turnaround Elements, from 7.5 koz/Q to 15koz/Q

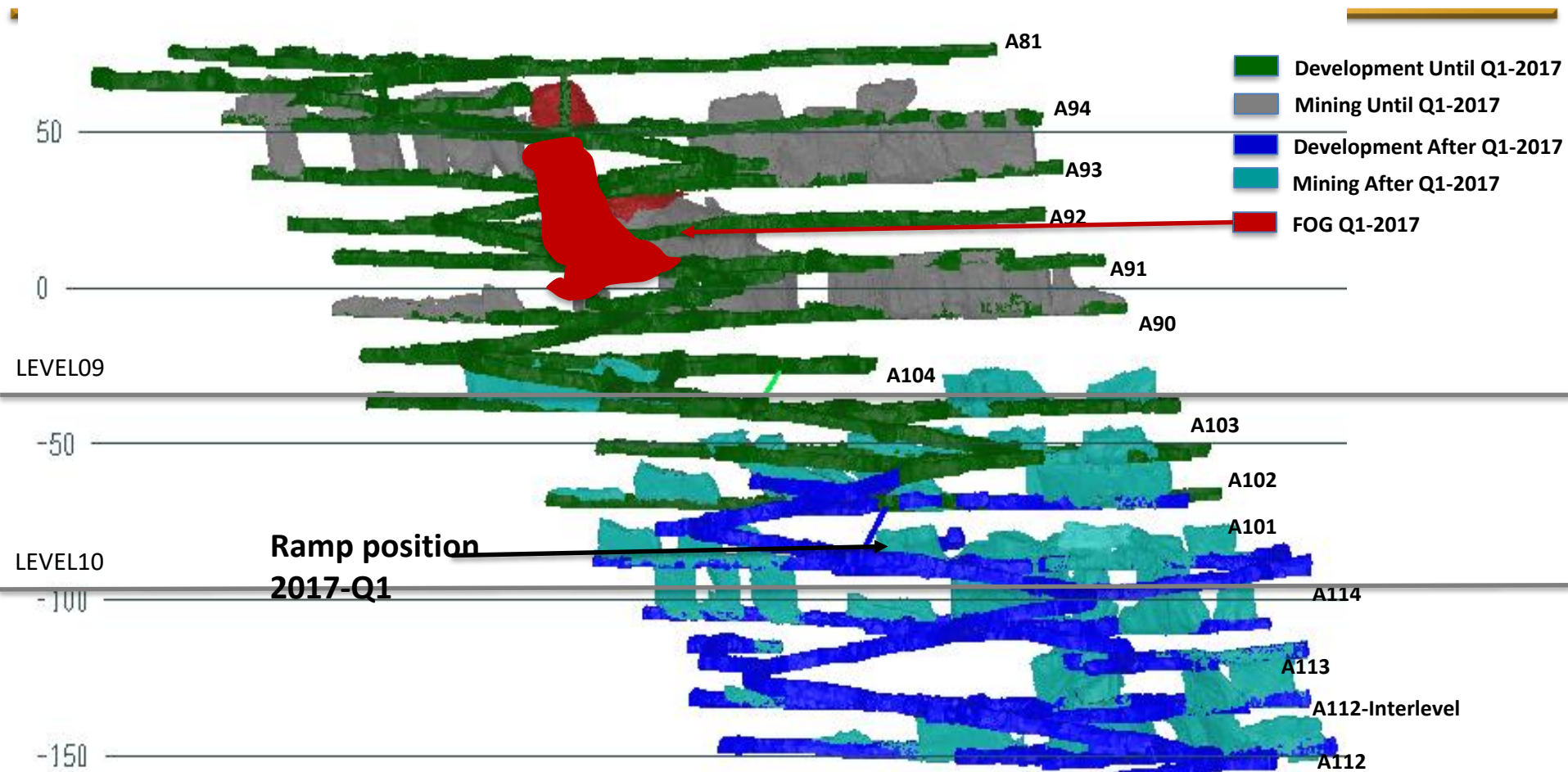
The main elements for MTL turnaround are:

1. People – Increase mine working hours with 4 shifts/day schedule, increase workforce size, increase skill levels, upgrade the organizational structure.
2. Ore Reserves – Drill down to maintain mine life of 4 years. Drill laterally to increase production capability.
3. Development – Increase development rates and developed reserves.
4. **Mine Design and Sequencing – Systematic sequencing in all ore zones, and implementation of Transverse stopping with cemented paste fill in the Principal Zone of A Orebody, mine designs within the geotechnical conditions of the orebodies;**
5. Equipment – Upgrade the equipment fleet and increase equipment availabilities.
6. Infrastructure – Upgrade plant structural rehabilitation, ventilation, pumping, paste fill system, electrical distribution, compressed air system, mine control center and install centralized blasting.
7. Improve quality – Drill and blast, paste fill, geotechnical designs and ground support systems, structural geology mapping, definition and delineation drilling, dilution, ore loss, ore quality control system and reconciliation.

This presentation addresses #04 Mine Design and Sequencing showing the main differences between the past and the plan.

Note: Updates are available on other plan elements in the May 28, 2019 Press Release

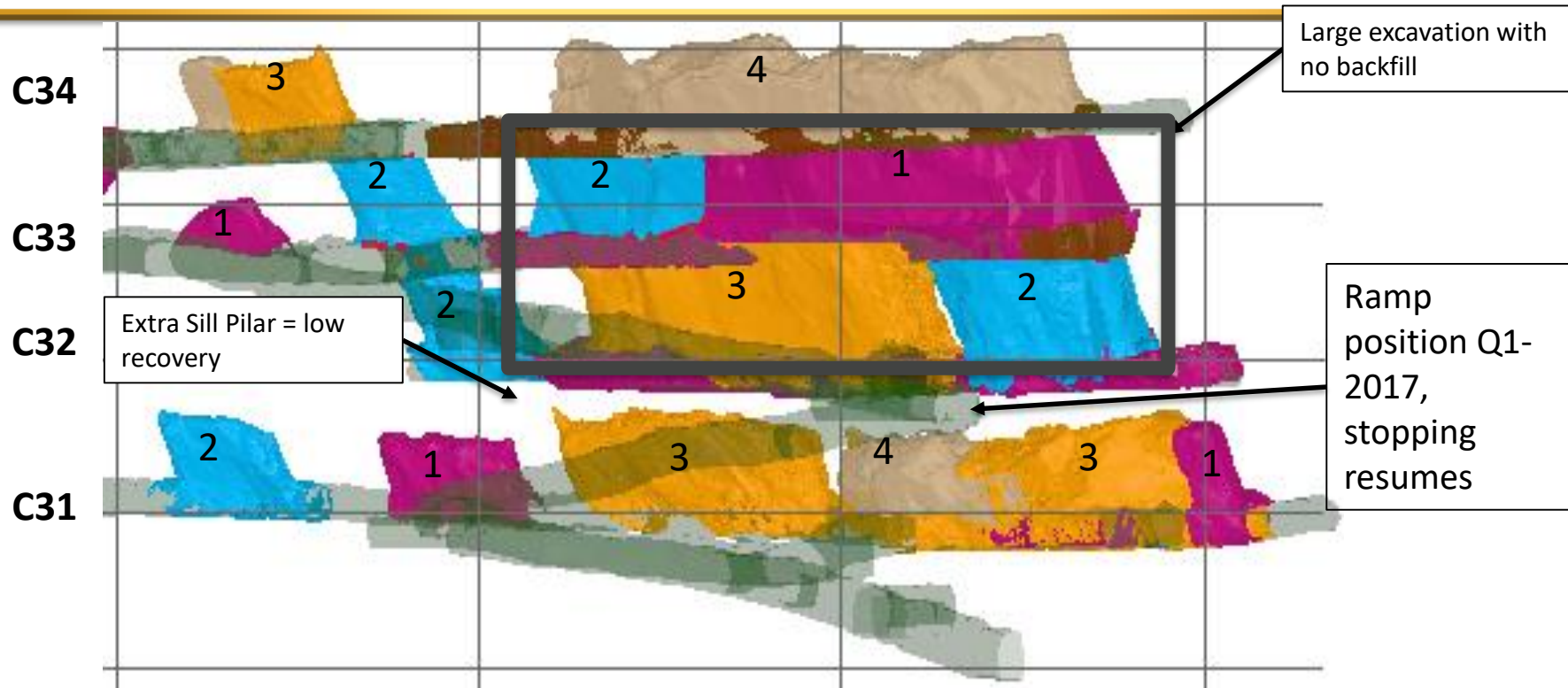
Previous Mine Design and Sequence – Level 09



**Ramp position
2017-Q1**

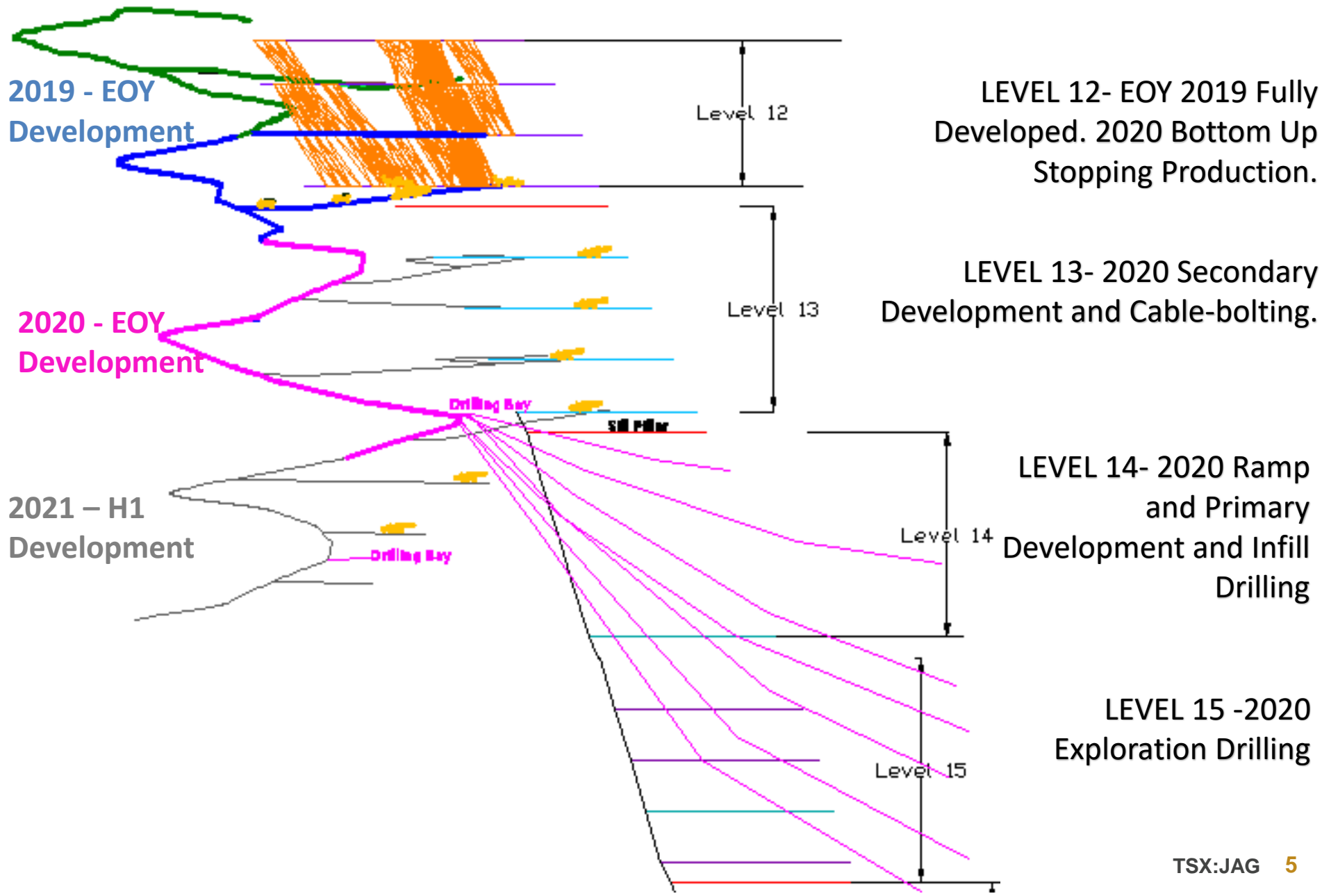
- A Fall of Ground in Q1 2017 was caused by stope size and development intensity exceeding geotechnical limits. Resulting in abandonment of Level 09.
- Development before (green) and after (blue) FOG. Ramp just below 10/2.
- Mining out-of-sequence started in Level 10 due to lack of developed ore. Stope span designs continued to be in excess of geotechnical limits creating production delays and rework.
- Low ore recovery, about 40% of the ore was left in pillars.
- The same issues were faced in 2018 on level 11 due to cost constraining primary development.

Previous Mine Design and Sequence – Orebody C3



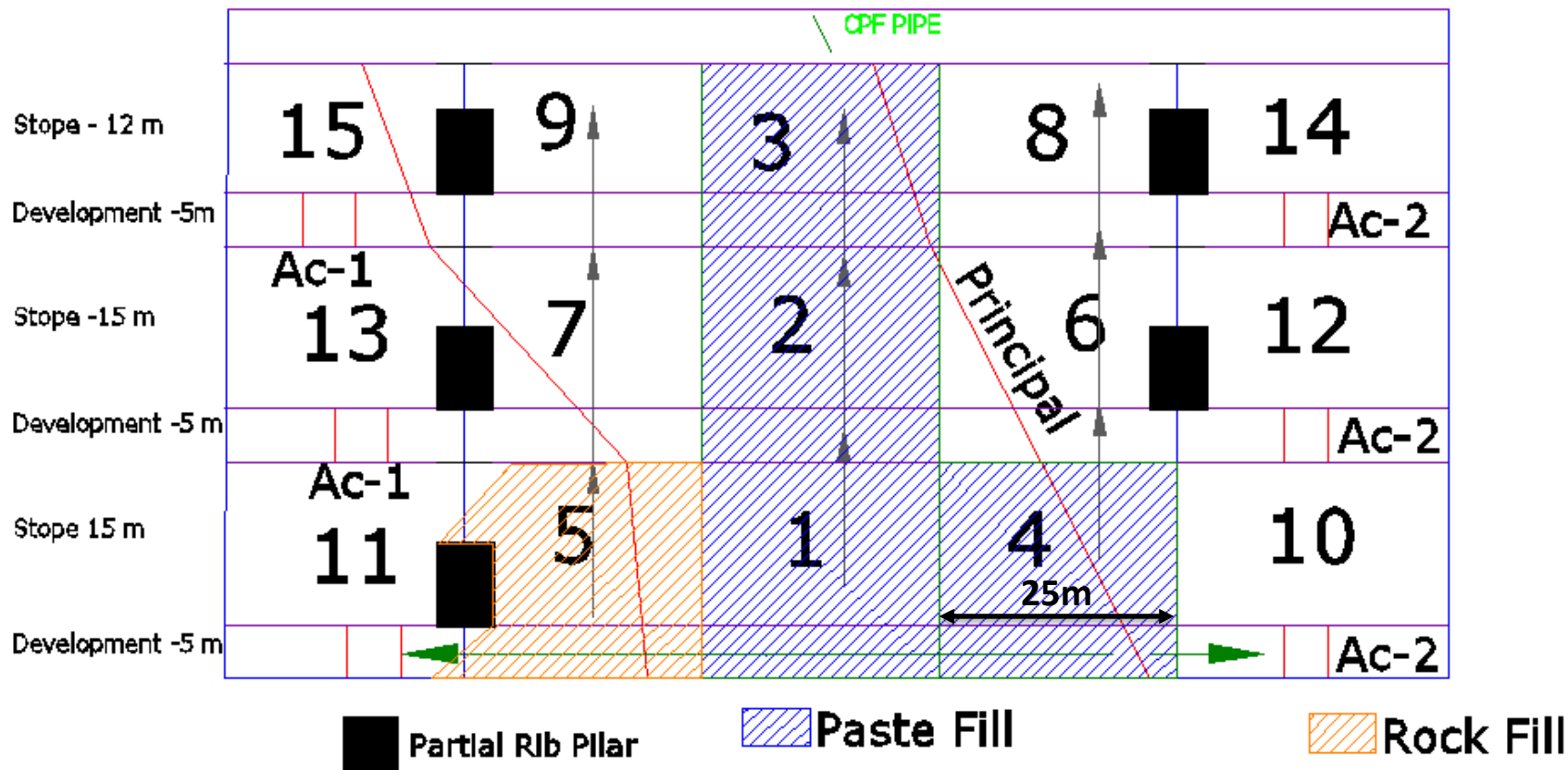
- Low developed reserves available.
- Non Systematic Mining sequence resulted in large excavation creating excess dilution and ore loss.
- Lack of definition drilling created mining low grade ore.
- Extra Sill-pillars (between 32 and 31) due to out-of-sequence mining resulted in ore loss.
- In 2018/2019 C4 Extended sublevel interval height resulting in continued ore loss and dilution and requiring inter-levels to be developed.

2020 Sustainable Mine Design and Sequencing

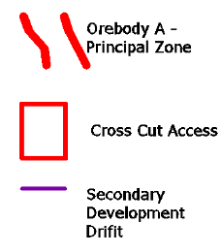


New Transverse Sequence for Orebody A Principal Zone – “Mining in Control”

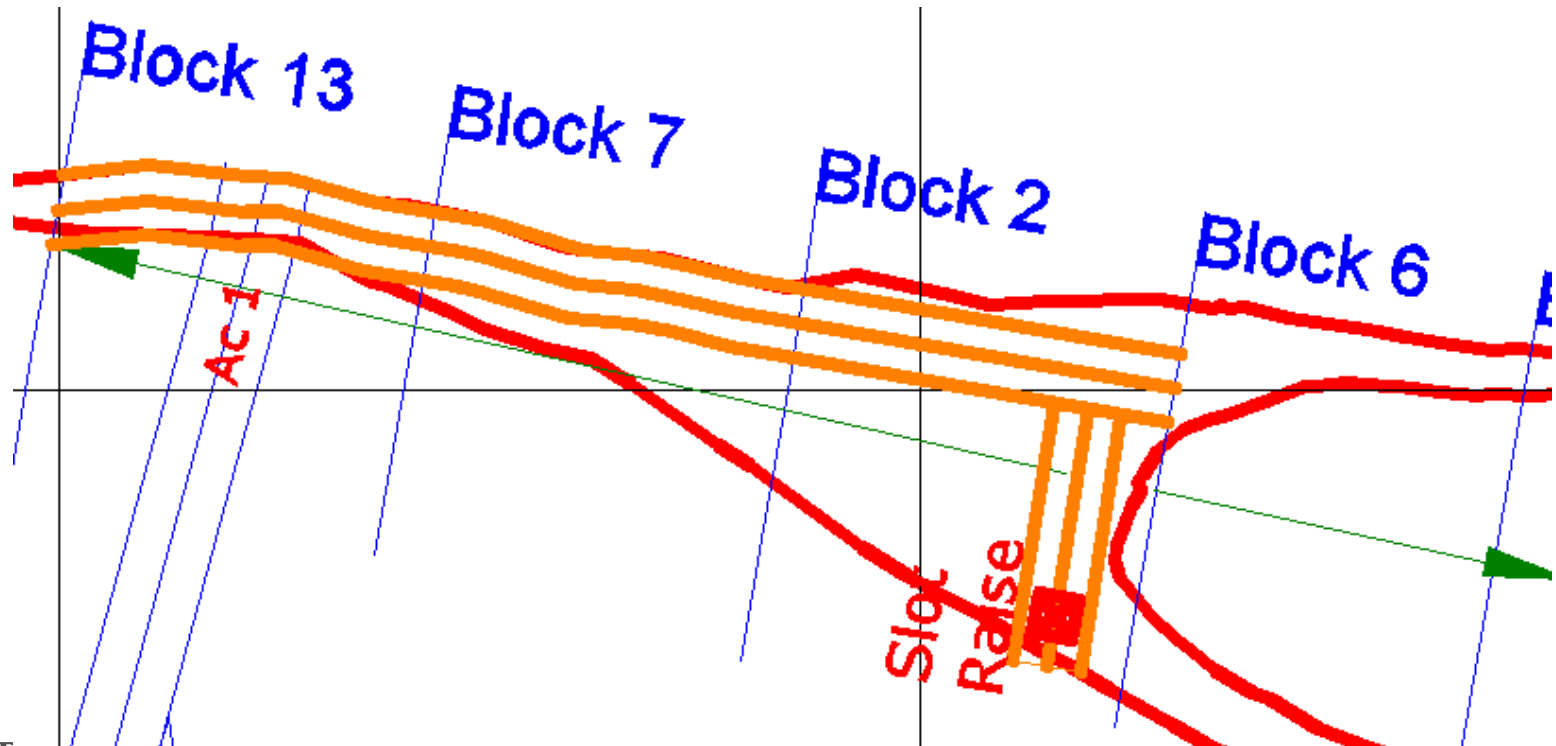
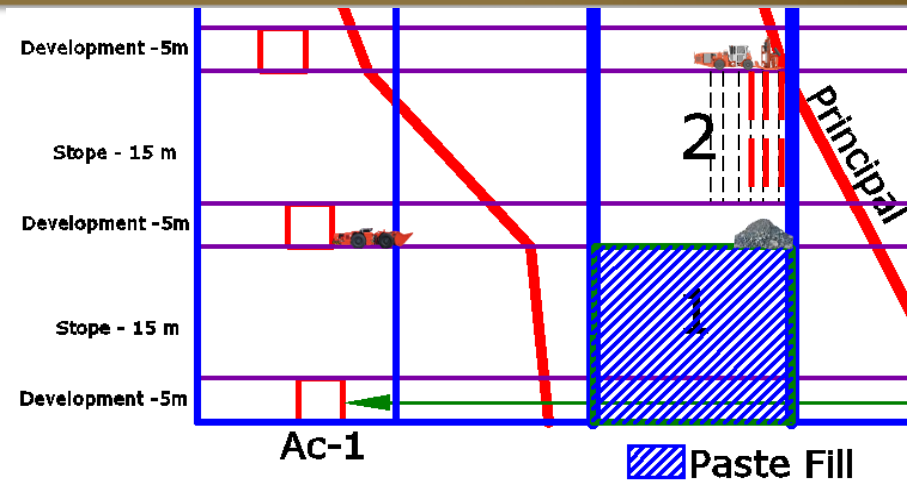
Principal Zone 8m to 22m thick, >7g/t



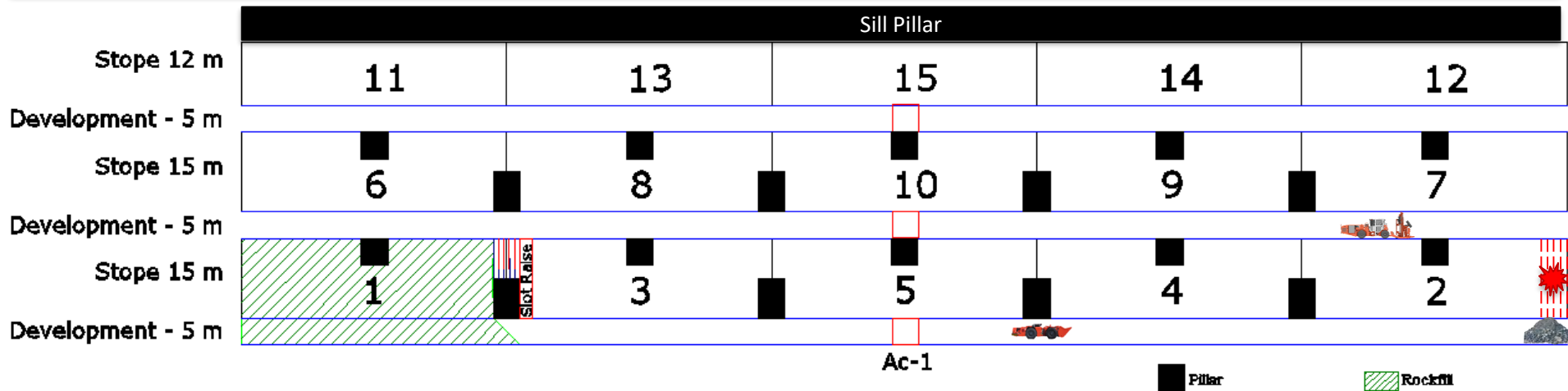
- Mining in Control – Safer and more productive by limiting the open hanging wall span, stabilizing the area with cable bolting and with a cemented paste fill Pilar.
- Mine the remaining stopes in the Principal Zone to the Sequence shown.
- Increase Recovery and minimize dilution due use of CPF, 25m limited span and bottom up sequencing.
- Stopes over accesses are mined last.



New Transversal Sequence for Orebody A Principal Zone – “Mining in Control”

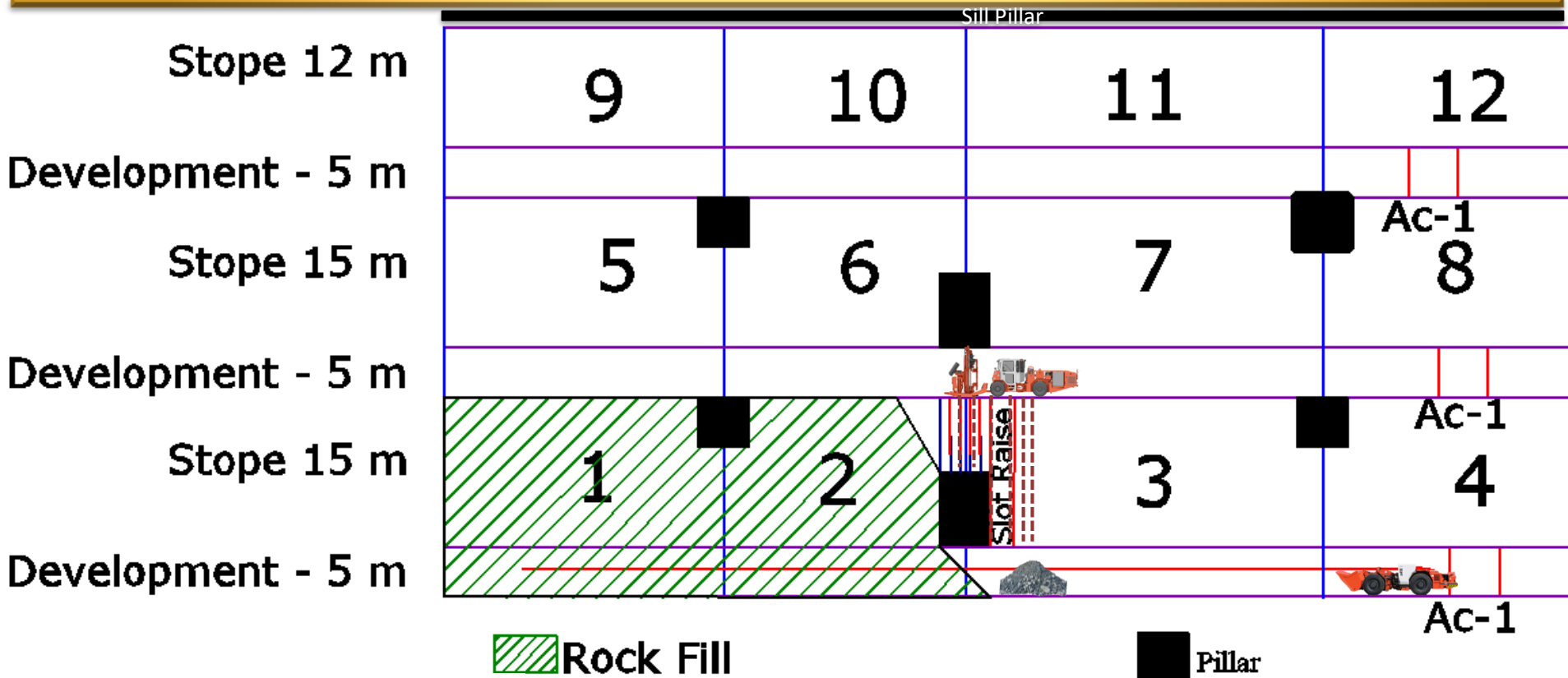


2020 Sequence for Areas with Center Access – Orebody C-SE Level 5



- Mine the bottom sublevel first from the extremity and retreating toward the center.
- Rock-fill after mining 55 meter long stope (~10kt) with one center pillar and one end pillar.
- Alternate between one side of the access and the other. Rock-fill on one side while drilling/blasting/mucking the other side.

2020 Sequence for areas with End Access – Orebody C Central and A-NW



- Mine the bottom sublevel first from the extremity, retreating toward the access.
- Rock-fill after 55 meter long stope with one center pillar and end pillar to contain rock-fill.

