



**GUIDELINES FOR THE
MANAGEMENT OF STRATA IN
UNDERGROUND MINES AND TUNNELS**

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1. INTRODUCTION

The employer is responsible for the development of the Strata Management Plan (SMP) as part of their duty in regard to hazard identification and hazard management in underground mines and tunnels.

Falls of ground and slow development or extraction rates are risks that can result from poor strata control processes. To manage these and other strata related risks a Strata Management Plan (SMP) will be developed and continuously improved at underground operations.

A SMP is a documented process that outlines the procedures for safe excavation of strata, for monitoring effects of excavation and managing strata control issues. It also defines the roles and responsibilities of personnel in managing the strata related risks at an underground excavation site.

1.1. Definitions

Barrier Pillar	A continuous pillar designed to separate or compartmentalize a series of pillars, one panel from another, workings from void, protection of surface features and infrastructure, and between neighbouring underground excavations.
Cut out Distance/or cycle	The distance in which a roadway or tunnel is advanced in a single cutting cycle, whether that be done by shot firing, continuous excavator or hydraulic monitor.
Deep workings	Underground workings having a depth to floor of more than 40m
Hazard	A hazard is a source of potential injury or fatality, or a situation with potential to cause loss.
Hazard map	A process of identifying, mapping and documenting geological, geotechnical and other strata control related hazards. Typically, the final product is an annotated plan that identifies known strata hazards.
Intersection	The area where two (or more) roadways or tunnels meet or cross one another.
Lining	Generally, the permanent tunnel structural full surface support. This is installed either after the tunnel has been driven or as is the case with soft rock TBMs as they are bored.
Pillar	Any shape of intact coal seam (or rock) that has roadways developed around its circumference. They may have some or all of the following purposes: I. Support of roof

- II. Protection of surface facilities, and underground roadways, shafts etc, and
- III. Control of Rockburst, especially in deep mines.

Pillar Safety Factor	The strength of the pillar divided by load expected on a pillar.
Plan (for Mining)	Is a document detailing the responses and responsibilities of personnel when a given level of strata deformation or hazard level is encountered or exceeded.
Risk Assessment (RA)	A Risk Assessment involves the coordination of specialist and operational staff to systematically identify and assess risks to safety, values (financial). It shall involve the determination of consequence and the probability of occurrence. Furthermore, the RA shall identify appropriate measures to minimize or control potential risks.
Roadway/Levels	An excavation developed in ground enabling movement of personnel and material
Safety Factor	A measure of the ability (strength) of a support system to withstand a load $\text{Safety Factor} = \frac{\text{Strength}}{\text{Load}}$
Shaft	An opening in a mine having an inclination above the horizontal of 15 degrees or more; through which employees or materials are transported; or that is used as a main intake or outlet for ventilation.
Shallow workings	Underground workings having a depth to floor of less than 40m
Strata Management Plan	A documented process that sets the procedures and controls for safely and efficiently managing strata related risks. It also defines the roles and responsibilities of personnel in managing these risks
Strata Support Plan	A drawing or series of drawings that geometrically define the location and type of the minimum support to be installed in the strata being excavated and sequence of support.
Support	A structure or structural feature built into or installed around an underground excavation to maintain its stability and includes a pillar left in situ for the purpose.
TBM	Tunnel Boring Machine

Tunnel	A place where a person works with ground cover overhead for the purpose of making an excavation intended to be greater than 15 meters long; or with or without ground cover for the purpose of making a shaft intended to be greater than 4.5 meters deep. This includes activities, buildings, headworks, or plant associated with the development or completion of the excavation or shaft. The HSE Mining Underground Regulations provides some exclusions to this definition.
Unsupported Roof	Area in-bye of last line of support (TBM or similar) or as defined as the area of influence as described in the Support Installation Sequence Plan.
Void	The area where the planned collapse of roof strata, which normally occurs as a result of extraction coal or strata sometimes referred to as a goaf.

2. STANDARD FOR THE DEVELOPMENT OF STRATA MANAGEMENT PLANS

2.1. Purpose

The purpose of this guideline is to provide underground operations with a structure for the development of site specific Strata Management Plans (SMPs)

The purpose of an SMP is to-

- a. Ensure a risk based approach is taken;
- b. Ensure that introduced risk controls are monitored to ensure their effectiveness
- c. Ensure the regular review of the strata management plan

2.2. Objective

A. The objective of a Strata Management Plan is to ensure the following conditions are satisfied:-

- a. Appropriate levels of support are designed, installed, maintained, and monitored throughout all stages of excavation.
- b. Site-specific "Support Rules" for each panel or development heading are implemented.
- c. Obligations under the Health and Safety in Employment Act 1992 and the Health and Safety in Employment (Mining – Underground) Regulations 1999 are met or exceeded

B. Routine monitoring and mapping of roadway and pillar conditions and the timely assessment of additional strata control measures are determine and acted upon. Likewise, monitoring, mapping and formal technical, assessments are to be the basis for reducing or increasing strata control measures or for introducing new support methods.

- a. The SMP is to provide a "living," technical and operational based decision-making process by which the ground support needs of any given roadway can be assessed.
- b. All technical assessments are to mitigate risk.

2.3. Relationship of the Strata Management Plan

A. An SMP is just one of a number of management plans that should be used at underground excavations.

B. The framework for all site SMPs shall include but is not limited to:

- a. The "documents" or the SMP itself and related appendices and safety management plans;
- b. A documented Technical Risk Assessment that includes a review of all Strata Control issues and processes;
- c. Process of routine strata control assessment (hazard mapping, monitoring);
- d. Monitoring of strata movement around roadways (databases), interpretation of the data and as required technical review;
- e. Installation of the required support and monitoring equipment (Manager's Support Rules and Support Installation Sequence Plan);
- f. Process of review, auditing and authorization;

- g. Communication of the plan, and;
- h. Training.

3. THE SITE SMP DOCUMENT

An SMP should contain the following key elements:-

- A. Introduction/Objectives
- B. SMP Scope and excavation method
- C. Definitions if new terms are used
- D. Hazard Identification and risk assessment
 - a. Geotechnical/Geological Factors
 - b. Operational Factors
 - c. Technical Risk Assessment (TRA)
- E. Control Process
 - a. Sign Off of Managers Support Rules
 - b. Support Installation Sequence Plan
- F. Design Process
 - a. Development Support System
 - b. Design of Excavation Support System – peer review
 - c. Fall of ground/exceptional circumstances
- G. Resources and their Roles and Responsibilities
 - a. Strata Management Designer
 - b. Workforce (including contractors)
 - c. Other Key Strata Management Personnel
- H. Communication
- I. Training
- J. Installation and Inspections
 - a. Installation
 - b. Inspections

K. Monitoring

L. Excavation planning and Hazard Map

M. Document Control

3.1. Introduction/Objectives

- A. This section of a site SMP will briefly describe the excavation to be undertaken and principle strata control hazards.
 - a. Geothermal characteristics
 - b. Depth of Excavation
 - c. Excavation Method
 - d. Shift work system and management structure;
 - e. Ventilation
 - f. Access to/from the heading/face;
 - g. Current and future underground workings design(s)

- B. The objectives shall include, but not be limited to:
 - a. Appropriate levels of support safety are designed and installed
 - b. All excavation supports are maintained and monitored throughout all stages of the excavation.
 - c. Hazard map is reviewed and results monitored.
 - d. Routine monitoring of roadway conditions and the timely assessment and implementation of additional or altered strata control measures.
 - e. Providing a technical and operational based decision-making process by which the ground support needs of any given roadway or tunnel can be assessed.
 - f. Develop a “living process” to meet the above objectives that involves all levels of the workforce.

3.2. SMP Scope and Mining Method

- A. The scope shall state that the SMP relates to underground excavations design, implementation, monitoring, and performance review, and will cover, but not be limited to:
 - a. All types of roof and rib support;
 - b. Inspection of roadway conditions;
 - c. Monitoring of strata movement around roadways and voids
 - d. Installation of required support
 - e. Key individual responsibilities
 - f. Communication of the plan
 - g. Training
 - h. Auditing and peer review.

i. Excavation method

- B. An SMP does not cover ventilation, inrush, or subsidence; however, an SMP is likely to have a close relationship with these, and other, management plans.

3.3. Hazard Identification –Risk Assessment

- A. A formal, documented technical risk assessment (TRA) shall be performed for strata and geological hazards for all excavations prior to development of its SMP. This does not preclude the need for strata related TRAs if changes in ground conditions fall outside those originally assessed in the TRA.
- B. The TRA should evaluate hazards, assess their probability and consequence, and determine risk mitigation measures.
- C. The risk associated with strata and geological related hazards should be estimated by considering the consequence and probability of the hazard. In some circumstances, the probability of a potential failure may be quantified from past ground failures. A Register shall be used to record all failures that occur in supported or unsupported ground. These are to be treated as an accident and reported and investigated.
- D. It is recommended that the strata TRA be done as part of the SMP.

ALL TECHNICAL RISK ASSESSMENTS SHALL BE DOCUMENTED AND RETAINED ON FILE.

3.3.1 Geotechnical/Geological Factors

Factors that shall be considered but are not limited to:

- A. Adequacy of exploration data (stratigraphy, lithology, geophysics, rock mass and defect strength)
- B. Adequacy of In Seam/vein Data (quality, seam thickness variations for mines)
- C. Adequacy of Interpretation of Data
- D. Regional variations in the Stress Field
- E. Structural anomalies identified
- F. Roadway and tunnel design model adequate for development and extraction and for life of usage or project
- G. Pillar strength modelling methodology to industry best practice
- H. Permanent and temporary lining design modeled for all conditions, design life and usage

3.3.2 Operational Factors

Factors that shall be considered include but are not limited to:-

- A. Management of stress concentrations

- a. In underground excavations
 - b. During extraction
 - c. Prior to first major void fall and all on-going void falls
 - d. Post extraction (multiple seams/veins)
- B. Adequacy of Manager's Support Rules covering, installation, availability and suitability of support hardware for use and storage
- C. Identification of changes in conditions and mitigation responses
- D. Understanding of risk and consequences of failure
- E. Pillar and Roadway dimensions – must be geotechnically appropriate
- F. Management of roof and/or rib falls, pillar crush, guttering, roof squeeze and/or floor heave, deformation and/or failure of support mechanisms.
- G. Slurry TBM, slurry and circulation
- H. Void filling behind installed lining systems as required.

3.4. Control Process

- A. The Tunnel or Mine Manager has ultimate responsibility for ensuring that the SMP is complied with.
- B. Under the SMP certain responsibilities may be delegated to people in appropriate roles that are required for the development, implementation, and continuous improvement of the plan.

3.4.1 Sign Off of SMP, Manager's Support Rules, and Hazard map

- A. The Tunnel or Mine Manager shall have sole authority to approve and issue the Manager's Support Rules, Support Installation Sequence Plan, and the SMP.
- B. Temporary changes or deviations from the Manager's Support Rules will require a formal risk assessment and the approval of the Mine or Tunnel Manager, and may require the review of a Geotechnical Engineer or Senior Mining Engineer. Any changes to these documents, shall be recorded, filed, and distributed to all concerned.
- C. A copy of the SMP, all Hazard Map, and Manager's Support Rules shall be kept in the Undermanager (Undermanager should be read to include Deputy Manager, Superintendent, or Foreman), and mine or Tunnel Manager's offices.

- D In mines the Undermanager shall ensure that all Production Supervisors responsible for roadway and pillar stability, during development and extraction, are familiar with the content and their responsibilities under the SMP, Hazard Maps.
- E In mines the Undermanager shall ensure that a copy of all Hazard Maps is available in all crew crib rooms or on panel notice boards.

3.5. Design Process

- A. All documentation plans and logs relevant to the design process shall be kept and filed for the duration of the project. Prior to commencement of tunnelling mining associated with development or excavation, all information available pertinent to the support system design shall be assessed. If the information is insufficient, recommendations for further work to address the gaps shall be made and completed. No roadway development, tunneling or extraction should take place in an area that has not been assessed and a support system appropriate to the prevailing conditions established and recorded.
- B. The geotechnical assessment should include, but is not limited to the following:
 - a. Roadway and/or pillar dimensions
 - b. Life and uses of roadway/excavation/tunnel
 - c. Method of extraction/development/tunneling
 - d. Location of cross cuts and stubs
 - e. Void or caving characteristics
 - f. Performance of similar roadways/excavations/tunnels
 - g. Monitoring results
 - h. Structural geology interpretation and extrapolation between panels
 - i. Seam/vein thickness and dip
 - j. In-situ stress regime (direction and magnitude)
 - k. Excavation depth
 - l. Physical inspection (roof/floor/rib/void/lining conditions)
 - m. Gas drainage data
 - n. Groundwater
 - o. Qualitative and quantitative assessments of current and previous strata support systems
 - p. Exploration data
 - q. Back analysis of failures
 - r. Roof, rib and floor lithology and rock properties
 - s. Performance history of support and lining methods in previous sections or mines or tunnels within the region (e.g. Percentage of gloved bolts, encapsulation tests, load transfer data)
 - t. Available modelling data.
 - u. Specifics e.g. monitor or continuous miner, TBM type lining system, pipe, and conveyor installations.

3.5.1 Development of Support System

Following assessment of the relevant information, a support system appropriate to the expected conditions shall be designed. Consideration of the following (but not limited to) should be given:

- I. Type of mineral deposit and its depth
- II. Geology and geological discontinuities
- III. Physical property of the strata
- IV. Mining method of extraction

A support system may include, but not be limited to:

- A. Primary support
- B. Roadway
- C. Supplementary support (suitable for long term use of roadways and including extraction requirements)
- D. Monitoring equipment
- E. Pillar dimensions/reinforcements
- F. Method of development
 - a. Timing of support installation
 - b. Sequence of driveage development
 - c. Seam thickness, roof and floor coal thickness
- G. Concrete lining – segmented, pipejack, insitu concrete

3.5.2 Extraction Support System for Underground Excavations

Prior to extraction and following assessment of all relevant information, a support system appropriate to the prevailing conditions shall be designed.

This may include but is not limited to:

- a. Supplementary support (i.e. support in addition to that installed on development)
- b. Intersection support
- c. Consolidation of bad ground or faults e.g., structures/zones of weakness.
- d. Passive support (e.g. Props)
- e. Monitoring
- f. Work procedures for extraction

3.5.3 Surface to Seam(s) and In-Seam Drill Holes in Underground Excavations

Due to the high risk of inundation, spontaneous combustion, and ventilation leakage all surface and in-seam drill holes shall be fully grouted. The Mine Manager is responsible for ensuring that a risk assessment has been completed for all drill holes in proximity of the mine or tunnel. No surface or in-seam drill holes shall be drilled if the hole cannot be grouted to an appropriate standard or all risks assessed or managed.

3.6. Resources and their Roles and Responsibilities

A Strata Management Team or named engineer shall be responsible for ensuring that the site strata management plan is developed, implemented, reviewed, and revised. Ultimate responsibility lies with the Mine or Tunnel Manager. The site will determine the appropriate levels of support, monitoring, and hazard response for all underground excavations. Where appropriate, monthly strata management team meeting shall be held and documented.

3.6.1 Strata Management Responsibilities

A. Strata Management needs to be controlled by the Mine or Tunnel Manager. The strata support design should be completed by a suitably qualified professional engineer taking into account input from a geologist or geotechnical engineer. The strata designs should be peer reviewed before used on site. On site strata support reviews should be carried out to take into account changing ground conditions.

The review may be carried out by Strata Management Team consisting of-

- a. Mine Manager
- b. Geotechnical Engineer/Engineering Geologist
- c. Undermanager (see note in 3.4.1 C)
- d. Geotechnical Consultant (as needed)

C. Mine or Tunnel Manager Shall -

- a. Oversee and drive the Strata Management Plan and ensure the SMP is audited annually.
- b. Appoint and ensure that the necessary resources are provided to manage the SMP.
- c. Ensure all persons working underground undertake appropriate training in Strata Control.
- d. Ensure the mine or tunnel complies with all requirements of the SMP.

3.6.2 Other Key Strata Management Requirements are-

A. Any areas that exceed design dimensions must be reported to the mine or tunnel manager

B. Accurate and up to date plans and records of the underground workings shall be maintained.

- C. A comprehensive training and assessment plan shall be developed and implemented. Records of any training and assessment conducted shall be maintained.
- D. An adequate and useable, supply of support and strata control materials shall be maintained.

3.7. Communication

A Clear communication process shall be implemented.

The process shall ensure that:-

- a. Operators/underground workers are provided with an understanding of expected conditions, anticipated support, mining or tunnelling procedures, and any relevant changes in support design prior to implementation.
 - b. Personnel are aware of typical warning signs, which suggest that the installed support may be inadequate, and needs review.
 - c. Close communication exists between all members working under the SMP. This includes communicating effectiveness of SMP to site management.
 - d. Site management has an early opportunity to respond to unexpected excavation conditions and/or support system behaviour.
- C. Communication channels may include but are not limited to:-
- a. Hazard Maps and cross-sections
 - b. Support rules and drawings
 - c. Strata Management Team meetings and minutes
 - d. Shift reports
 - e. Relevant monitoring systems
 - f. Audit reports
 - g. Toolbox talks
 - h. Hazard/accident reports

3.8. Training

- A. The Mine or Tunnel Manager shall develop a plan, which shall include the following:
 - a. Assessment procedures and schedules for determining the competency of personnel to all aspects of strata control (support planning, installation, monitoring, strata hazard identification etc) and management standards and requirements.
 - b. Identify and record personnel requirements for training and training undertaken of the above.

3.9. Installation and Inspections

Support installation and strata control inspections shall be carried out to prescribed and documented standards in the SMP.

3.9.1 Installation

- A. The designed support shall be installed in accordance with the established standards and procedures, Support Installation Plan, and manufacturers recommended methods of installation. All underground workers responsible for installation of support shall be formally trained and assessed by the Manager or a suitably qualified person approved by the Manager.
- B. Personnel should not carry out roof support work under an unsupported roof.
- C. Shift supervisors shall:
 - a. observe the ground conditions and installation effectiveness,
 - b. Report any adverse conditions to the person responsible for Strata Support.
- D. If roadway support consumables or equipment are defective, such as to compromise the ability to adequately support the roadway or tunnel, it shall be repaired or replaced before further excavation is undertaken or support is installed.
- E. Sites should ensure that when handheld bolters are used the air pressure is running at 95psi or greater, or as per manufacturers specifications.
- F. The shift supervisor should ensure that:
 - a. The support mechanisms installed in a shift are undertaken by competent staff
 - b. All drill bits used comply with the requirements defined in the Strata Support Plan or supplier recommendations,
 - c. Compressed air for handheld bolters is clean and dry and that a “turtle” or oil bottle is installed in the air supply line as required,
 - d. Air pressure when the bolter is operating shall be at recommended pressure.
- G. A maximum cut out distance shall be defined in the Strata Support Plan and will cover the following:
 - a. Development or tunnel headings
 - b. Secondary (e.g. sublevel or cross-cut roadways) development roadways
 - c. Special infrastructure sites (e.g. screen bays, pump stations, belt change overs)
 - d. Extraction (i.e. CM or monitor)

3.9.2 Inspections

- A. All underground excavations shall have regular and standardized inspection procedures. The HSE (Mining-Underground) Regulations 1999 specifies required minimum standards for inspection in underground mines and tunnels.

- B. Failure to maintain approved and correct inspections and reporting procedures for strata control can cause the following situations:
- a. Inadequate measurement and monitoring of the underground environment such that accidents may occur which risk affecting the health and safety of personnel and the mine or tunnel.
 - b. Inadequate inspections and reporting such that statutory obligations are not complied with.
 - c. Inadequate reporting to meet company requirements.

Recording Requirements

- A. An 'Operations Record' as defined in the HSE (Mining-Underground) Regulations 1999, Regulation 14, shall be kept at each underground organisation office. This record shall contain the following information:
- B. Date, time, and findings of every examination, which shall be carried out as follows:
- a. Before the start of each shift, and during each shift, every area of the underground organisation where personnel are or will be present; and
 - b. At least weekly, every other accessible part of the underground organisation; and
 - c. At least weekly every vehicle in the organisation.

Face and Working Place Inspection

- A. The Manager or delegate shall ensure the face; roof, ribs, and extraction areas are inspected and assessed for hazardous strata conditions, stability, and support and underground worker safety. This inspection shall be carried out and recorded within two hours of an oncoming shift and at regular intervals during the shift, but not more than 8 hours apart. The timing of this inspection corresponds to the Ventilation Inspection requirements and therefore could be performed together.
- B. All underground personnel shall report an unplanned fall of ground to the responsible Shift Supervisor or the Manager who in turn shall document it in a hazard/incident register and ensure that the Manager is informed of the fall. The Manager or delegate shall then inspect the area, and compile a report on the key geotechnical contributing factors and strata management plan compliance and shall ensure the fall is fully reported.

All Other Accessible Areas of the Mine Inspections (for mines only)

- A. The Mine Manager shall establish a plan for mine officials to carry out the following inspections for the general condition (this includes Strata Control) of the mine at least once per week:
- a. Main roadway return airways
 - b. Each air district return airways
 - c. All seals and ventilation structures
 - d. All accessible falls and void.
- B. All general condition inspections shall be documented.

3.10. Monitoring

- A. The Geotechnical or Design Engineer shall ensure a formalised monitoring programme, that determines the support effectiveness and ground behaviour is established and documented.

Monitoring should include:

- a. Visual inspections
 - b. All installed monitoring equipment
 - c. Air pressure at the face or support installation area for effective air supply during installation
 - d. Pre-tension applied by all pre-tensioning equipment shall be monitored on a systematic basis by the operator. The pre-tension will be audited and the results documented every 6 months to ensure that the support system is being installed to its designed capability.
- B. As a minimum, the following parameters require quantifying, monitoring, recording, and interpreting:
- a. Virgin or stress field environment
 - b. Mining induced stresses from extraction
 - c. Long term excavation and pillar stability (assessment of actual vs. planned/modeled)
 - d. The Monitoring Plan shall clearly state the schedule and personnel responsible for the various monitoring required in the plan.

3.11. Mine Mapping and Hazard maps

- A. The Tunnel/Mine Manager or delegate shall ensure all roadways and excavation covered by the SMP are mapped and interpreted within 2 weeks of it having been excavated. Mapping should aim to identify all hazards related to strata conditions at the time of mapping. Retrospective or periodic back-bye mapping shall also be performed and stored.
- B. The mapping shall be recorded and interpreted by a suitably qualified person all paper and electronic copies shall be kept in perpetuity as required under the HSE (Mining-Underground) Regulations 1999. The hazard mapping interpretation shall at all times attempt to predict future hazards in all areas of the underground excavation. Any potential hazards shall be recorded/displayed on the Hazard Register., and presented and discussed with the relevant personnel. The Hazard Register and updates shall be authorized and signed by the Manager and updated regularly.

3.12. Document Control

All site SMPs shall have a document control process for:-

- a. The site Strata Management Plan
- b. Hazard Register
- c. Strata Support Plan
- d. Strata Support Rules

The control process shall require these documents to be reviewed and edited, if necessary, at least annually.

3.13. Continuous Improvement

3.13.1 Review

The controlled documents shall be reviewed and edited, if necessary, annually by a suitably competent person. Changes to the site controlled documents shall be ratified by the site Manager.

3.13.2 Audits

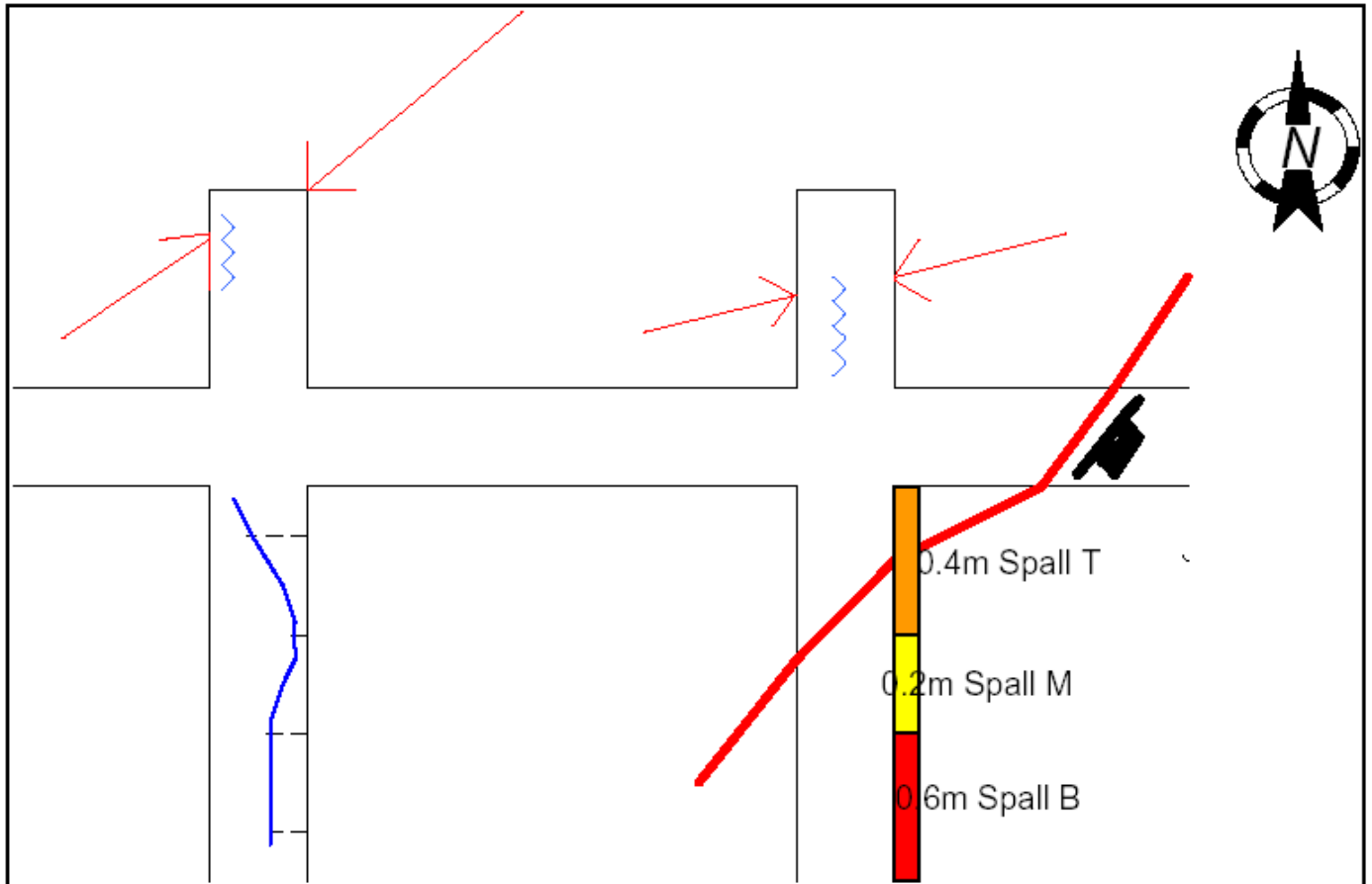
- A. Audits of the system and the Strata Support should be conducted regularly by an experienced person, preferably an experienced independent engineer.

- B. These Audits shall include but are not limited to SMP documentation, hazard mapping, review of miner's or tunneller's strata control understanding and feedback system, hardware audit (air pressure, bolters, resin storage, bolts, sets, lining etc).

Appendix 1 – A Hazard Mapping Guideline

Figure 1 illustrates how structure, stress direction, rib spall, and guttering may be captured.

Figure 1. Example map with guttering, rib spall, stress direction, and structure (fault) showing.



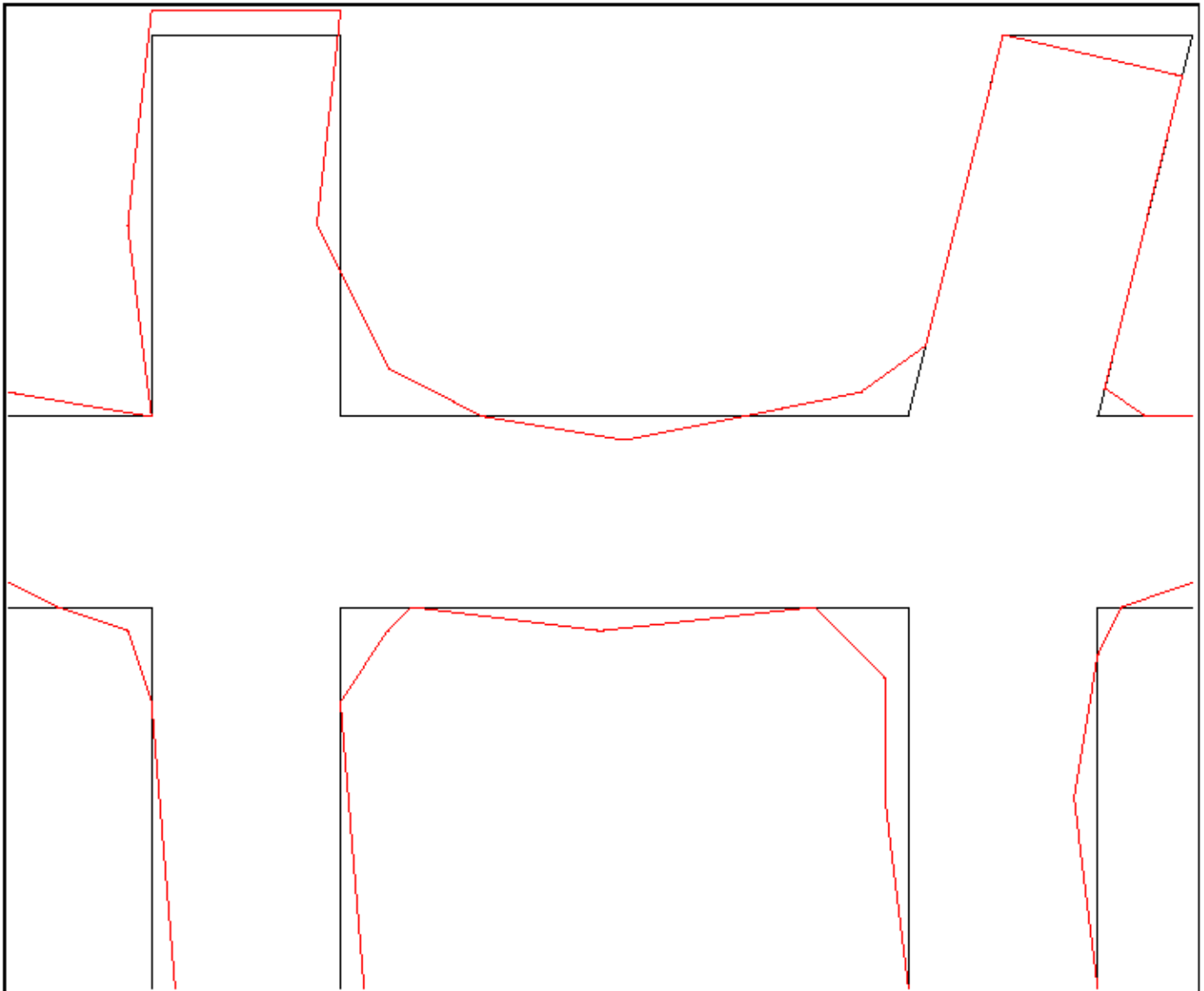


Figure 2. Designed roadway (black line) vs Actual roadway location.

Map 1. Geology

Will include faults, bedding, joints, cleat, partings, shears, and sooties.

Map 2. Guttering

Will map location, record height, and if available indicated/interpreted stress direction.

Map 3. Ribs

John Sheppard approach i.e. shade, indicate spall location by B = bottom, M = middle, T = top of rib, record spall width (depth into rib) i.e. 0.3m.

Map 4. Designed versus Actual Roadway

Surveyors to record and communicate variations in actual roadway location compared to designed roadways. This is not to be a one off, periodic measurement of roadway width and height should be performed.

Map 5. Support Deformation

The loading of support mechanisms (bolts, GXTs, cables, sets and props) should be performed post development, during extraction and post extraction (as required).

Map 6. Cross section

This map should map:

- structure
- roadway roof and floor
- seam roof and floor
- soft/hard zones from drill logging
- partings

Should also compare designed vs. actual roadway location. Extensometer readings and locations should also be presented on this map.

Map 7. Summary Map

Should be of a format that is:

- summarises the key results of Maps 1-6.
- easily understandable (map will be posted on panel notice-boards u/g, provided to management and discussed at Tool Box meetings).

POST-EXTRACTION TECHNICAL REVIEW

Post-extraction a full technical review of roadway/excavation performance and strata management procedures shall be conducted at each site. This should be done on a panel-by-panel basis.