

Control	Description
Access Control	- No person shall be allowed to enter the mining area without doing the mine induction
Access Control	- Day visitors without a medical or induction shall be allowed only to enter the office block of the mine
Auxiliary power	- Equip the traffic lights / robots with auxiliary power
DMS	- All training material must be issued by the document management system
DMS	- Training shall not be allowed when uncontrolled copies of the training material is used
Brake standard, brake testing procedure and TMM register	- Brake maintenance in accordance with brake standard and brake testing procedure and TMM register
Brake Testing Procedure	- Brake tests must be conducted in accordance with the brake test procedure
Brake Testing Procedure	- If emergency brakes is activated on a hydrostatic machine, the brakes must be examined in accordance with the OEM
Break down procedure	- Barricade vehicle sufficiently
Cage barricading	- The barricade design must be signed off by the section engineer responsible for the shaft area.
Cage Loading	- Use a slide out bed to ensure TMM's are not driven into the cage
Cage Loading	- Only trained, competent, experienced and authorised persons are allowed to drive a TMM into the cage
Cage Loading	- TMM to be properly secured / anchored to the cage before cage is lowered
Cage Loading	- Use slide out guides and winches to ensure TMM is well controlled when loaded into the cage
Cage Loading	- No person is allowed to be in the cage when a TMM is driven into the cage
Cage Loading	- All the information of the TMM that is required for the banksman to safely load the cage must be indicated on the TMM or must be supplied in a document indicating the weight, width, length and height
Cage Loading	- Anchoring points must also be clearly marked
Cage Loading	- The correct anchoring equipment must be used
Cage Loading	- TMM park brake must be applied when loaded into the cage
Cage Loading	- Using a slide / rolling platform will allow the crew to ensure the TMM is properly anchored before loading into the cage
Cage Loading	- The will also allow a winch / hydraulic cylinder to properly control the movement when loading the cage
Career path planning	- Career path planning
CxD	- Level 7 to detect level 9 and vice versa
CxD	- V-V slow down on level 9
CxD	- V-V slow down when dovetailing to keep safe following distance
CxD	- Reporting of incidents and near misses on a daily basis via hot spot analysis
CxD	CxD system must store interaction data for at least 90 [days]
CxD	Machine / CAS system must fail to safe as soon as negotiation between CAS system and machine does not correspond.
CxD	- V-P slow down and stop on level 9
CxD	- Reporting of TMM Pedestrian interaction on a daily basis
CxD	- V-E effective warning or auto slow down
CxD	- Road information must be detected and CAS CxD / machine must adjust zone size and reaction to signals received
CxD	- Following distance must be increased when vehicles are dovetailing. Implement CAS L9 slow down and distance control for TMM to TMM dovetailing
CxD	- Beacons to be installed to prohibit access or to slow down TMM's operating in these areas
CxD	- Implement CAS L9 for V-P
CxD	- Implement pedestrian tracking via Wi-Fi from intelligent cap lamps
CxD	- TMM to fail to safe if any interlock or safety device is bridged
CxD	- Report on daily basis if any system was bridged or when CAS system was bypassed by an authorised person
CxD	- Perform hot spot analysis to determine areas of high V-P and V-V interactions

Control	Description
CxD	- Install beacons to prevent vehicles from entering unauthorised areas
CxD	- V-V slow down and V-P stop under ground. V-V Stop on surface
CxD	- Beacons in the workshop area to limit vehicles to crawl speed
CxD	- Connecting CAS pre isolator that broken down vehicle acts as a beacon
CxD	- Enablement of pedestrian isolation when working on TMM but activated for passing TMMs
CxD	CPS must have rock penetration and must be verified underground
CxD	- Must warn pedestrians through the pillar and must not depend on signal bounce/reflection
CxD	- Level 7 - pedestrian rock penetration
CxD	- Beacons to be installed in areas where speed limit must be kept to crawl speed (declines etc)
CxD	- Vehicle to auto crawl in predefined areas
CxD	- Beacons to prevents TMM's from using unauthorised road ways
CxD	- Rock penetration required to effectively warn pedestrians as well as operators of possible interactions
CxD	- Install intelligent cap lamps for pedestrian tracking and interaction analysis
CxD	- Level 7 must detect level 9 machine and vice versa include effective warning
CxD	- Should not allow a close following distance between DT's when coming from the tips. When on the decline following distance of between 30 and 50 [m] is required. Dovetailing distance to be included
CxD	- Switched off vehicle must act as a beacon
CxD	CPS must be connected post-isolator
CxD	CPS must have rock penetration capabilities
CxD	- Equip cassettes with a beacon to effective warn TMM operators of their presence
CxD	CPS must have rock penetration to detect cap lamp on ground level
CxD	- Ensure a following distance of 30-50 [m]
CxD	- Allow TMM only to crawl when operating in the tipping area (possible beacon)
CxD	- Beacon should prevent unauthorised vehicles from entering the area
CxD	- TMM must only crawl past the waiting place entrance / exit
CxD	- TMM only allowed to crawl in the area. Install a beacon
CxD	- Pedestrians will not be able to be in close proximity of machine, because it will auto stop
CxD	- Report on a shift basis when pedestrians stop a machine.
CxD	- Pedestrian is not allowed to stand behind the wheel of a running machine and talk to the operator
CxD	- CAS controls to prevent TMM articulation and to safe park when pedestrian in vicinity.
CxD	- Beacon must prevent unauthorised vehicles from entering the decline
CxD	- Beacon must ensure that vehicle can only crawl down the decline
CxD	- Ensure that only one vehicle can be driving on the decline
CxD	- Beacon to only allow authorised vehicles into the tyre bay
CxD	- To safe park machinery when in the proximity
CxD	- Machine must not be able articulate
CxD	- TMM only be able to crawl in the workshop area
CxD	- TMM-TMM crawl when in a specified vicinity
CxD	- Use of beacons if appropriate
CxD	- Must have sufficient rock penetration to detect machine in muck bay
CxD	- Machine to fail to safe when sender/receiver fails
CxD	- Act as a beacon, indicating that machine is broken down
CxD	- Zone size to be checked before machine goes to operation every shift (>10% variance fail to safe)
CxD	- Zone sizes to be measured and recorded on every scheduled maintenance interval
CxD	- Zone size to be verified every time work is done on the machine CAS sensors

Control	Description
CxD	- Machine to fail to safe when a variance in zone size is detected
CxD	- Machine to fail to safe when any of the CAS components fail
CxD	- Machine to fail to safe as soon as any of the components fail. (ISO 21815)
CxD	- Override only done by a competent and authorised person (all overrides to be reported in the data logging on a daily basis)
CxD	- This person must do a Risk Assessment before doing an override and all relevant personnel must be informed
CxD	- Override only allows a specified time interval for the machine to be in limp home mode as specified in the CAS System Risk Assessment
CxD	- Vehicle must still act as a beacon when it is override and only allow vehicles to crawl when in close proximity of this TMM
CxD	- Vehicle must act as a beacon, even when it is switched off.
CxD	CPS system to be connected post-isolator
CxD	- When machine isolator is switched off and cap lamp is still detected in the TMM it must send a stop signal to all of the machines within a 100 [m] radius
CxD	- Interoperability between level 7 and 9 to be tested and monitored on a frequent basis as determined by the CAS System Risk Assessment
CxD	- Test beacons to be installed in park bays to check functionality before leaving the parking area
CxD	- Roll out software upgrades only per section and it must be done before the section starts operating
CxD	- All PDS / CAS systems must run on the same version of software
CxD	- Before software roll out, a trail must be done to test that the machines respond correctly
CxD	- Must record the persons details who installed the software update
CxD	- System must fail to safe when it detects tampering or zone instability
CxD	- Must lock the system and only a authorised, competent person must be allowed to unlock the system and authorise the machine to work
CxD	- Must keep a log of who the operator was when this happed
CxD	- Must immediately report to the control room as soon as this happens
CxD	- Equipment replaced must be logged in the CAS system
CxD	- CAS system must log the person's details who worked on it
CxD	- System must fail to safe when it detects new equipment installed and the equipment was not "Married" to the system
CxD	- Link high risk areas to beacons system
CxD	- priority TMMs right of way
CxD	- Machine must auto stop and safe park at least 2 [m] from a pedestrian
CxD	- Must have rock penetration and detect pedestrians even through a fully loaded LHD bucket while pedestrian is lying on the road
CxD	- TMM articulation lock and attachment lock when pedestrian in vicinity
CxD	- Must have dynamic zoning
CxD	- Safe park the machine when a pedestrian is in such a close proximity that he / she can enter the articulating part of a machine
CxD	- Zone size must be sufficient to ensure that the machine safe park when machine articulates and a pedestrian is Infront of the bucket
CxD	- Loop must detect when no operator is inside the vehicle and safe park the machine
CxD	- Beacons must be installed to ensure that TMM does not enter unauthorised roads
CxD	- When operator gets out of cab, the CAS system must immediately detect the operator as a pedestrian and safe park the vehicle
CxD	- Level 7 and 9 detection
CxD	- V-V Crawl
CxD	- Sufficient zone sizes to effectively warn operator and slow down (21m detection, 12m warning, 6m slow down)
CxD	- Broken down vehicle must act as a beacon

Control	Description
CxD	- V-V crawl past broken down vehicle
CxD	- V-V must have sufficient rock penetration to warn operators of oncoming traffic
CxD	- Beacons to slow down TMM's at intersections
CxD	- Should check the vehicle status as part of negotiation sequence and ensure that machine is ok to use
CxD	- Should make use of service brake and retarder to slow down TMM and not emergency brake
CxD	- TMM only allowed to crawl when on a decline
CxD	- Ensure that TMM's keep a 50 [m] following distance
CxD	- Ensure that TMM's keep a 30 - 50 [m] following distance
CxD	- V-V effective warning
CxD	- Level 9 detect level 7 and vice versa
CxD	- System must be able to detect obstacles over a blind rise and effectively warn the operator
CxD	- Must detect the approaching TMM and slow down the vehicle if the operator does not react in time
CxD	- TMM to TMM detection round corner rock penetration 21m detection, 11m warning and 6m crawl
CxD	- System must be able to sufficiently detect other TMM's around a curve
CxD	- Level 9 to detect level 7 and vice versa
CxD	- Effectively warn TMM operator as well as pedestrian of TMM approaching
CxD	- Slow down and stop TMM if pedestrian is in slow down zone and stop if pedestrian is in danger zone
CxD	- Level 9 - 9 rock penetration
CxD	- Level 9 - Level 7 rock penetration and detection
CxD	- Level 9 - Pedestrian rock penetration
CxD	- V-P crawl and stop
CxD	- Beacons to slow down TMM's at high risk intersections
CxD	- Rock penetration to detect other TMM's approaching the crossing
CxD	- Level 7 - level 9 rock penetration
CxD	- Level 9 - level 9 rock penetration
CxD	- Level 9 V-V crawl (beacon to stop non priority TMM)
CxD	- Level 9 V-P auto slow down and stop
CxD	- Level 9 V-V crawl
CxD	- Vehicles working in close proximity of one another must be equipped with Level 9 V-V crawl
CxD	- When pedestrian is in close proximity, all hydraulics must be de-activated. Articulation and boom lock to be activated
CxD	- TMM to auto safe park when boom / bucket is in striking distance of a pedestrian
CxD	- When pedestrian is in close proximity, all hydraulics must be de-activated
CxD	- Emergency response vehicle must be equipped with CAS but only detection
CxD	- Must have V-P and V-V rock penetration
CxD	- Machine only allowed to crawl in the specific area where loading and off loading takes place
CxD	- Machine must fail to safe as soon as any safety system or CAS sensor is damaged
CxD	- V-P stop
CxD	- V-E crawl
CxD	CPS impact on tow hook release of brakes to be verified
CxD	- Effectively warn operator of the presence of another TMM
CxD	- Beacons to ensure that TMM does not exceed crawl speed when driving through the brattice
CxD	- Level 7 - Level 9 detection
CxD	- Effectively warn pedestrian of the TMM's presence
CxD	- Level 9 to auto stop the TMM if a pedestrian walks through the brattice

Control	Description
CxD	CPS will fail to safe when TMM passed its maintenance schedule by a pre-determined threshold
CxD	- If spares are not available to repair the TMM CAS system, the machine shall fail to safe and not be able to operate
CxD	- System shall not allow unauthorised personnel to make any changes to the settings
CxD	All CPS components must be "married" to the system once it is replaced and only authorised and competent persons shall be allowed to do so
CxD	- Proper log keeping of persons doing maintenance to the system must be recorded on the system
CxD	- All LHD's must be fitted with CAS level 9
CxD	- Drill rig must only be allowed to tram in reverse
CxD	- Drill rig must only be allowed to tram when the boom is the tramming position
CxD	- System must be tested to ensure that the cas system's frequencies does not interfere with the fire suppression system of the TMM
CxD	- It must also be tested to ensure that it does not interfere with the fire detection system
CxD	- CAS must not interfere with fuel management system (EMC)
CxD	- System should detect and effectively warn the operator of pedestrians
CxD	- DT should stop at least 3 [m] from a pedestrian when the TMM is in reverse
CxD	- Effective warning
CxD	CPS tracking and interaction analysis and emergency stop
CxD	CPS interaction analysis and reporting
CxD	CPS Effective warning
CxD	CPS interaction reporting and analysis
CxD	CPS V-V, V-P, V-E
CPS System Risk Assessment	- Determine the maintenance strategies
CCTV	- AI monitoring of dangerous behaviour in this area
CCTV	- AI/Control room operator to monitor that the traffic lights are functional and report to the relevant personal as soon as it detect failure
CCTV	- AI/Control room operator to monitor all robot systems and report when robot is not working
CCTV	- Monitor conveyor belts for waste spillage
CMMS	- Maintenance and repairs done to each system must be logged and signed off in the CMMS for record keeping
CMMS	- Needs to flag the TMM is due for maintenance well in advance for the workshop to order spares that the TMM can be serviced on time (in accordance with OEM maintenance schedule unless condition based approval by engineer)
CMMS	- Critical spares list must be updated
CMMS	- Critical spares must have auto reordering levels which takes into consideration the life expectancy of the spare, lead time and how the spare exposed to damage
CMMS	- Planners needs to follow up on these spares on a weekly basis
CMMS	- All maintenance on the CAS system needs to be recorded thoroughly in the CMMS
CMMS	- All fire extinguishers must be registered on the CMMS together with their location
CMMS	- CMMS needs to generate job carts to all the relevant employees when a fire extinguisher needs to be serviced or inspected in their area
CMMS	- Fire extinguishers that were used must be reported on the CMMS together with a valid reason
CMMS / TMM Register	- Software versions of the PDS / CAS systems must be recorded and logged for tracking in the CAS data logger, TMM CAN data logger, CMMS or TMM Register
Competency Matrix	- Competency Matrix
Disciplinary Process	- Disciplinary action in line with company policy and procedure
Disciplinary Process	- Disciplinary process

Control	Description
Drill rig operation	- Drill rig must have its boom as close to the rig as possible in the tramming position
Drill rig operation	- Operator must ensure that all the hydraulic hoses are properly secured and not dragged on the ground
Electrical Maintenance	- Electrical connections needs to be inspected and certified by an electrician on a frequent basis
Emergency Response	- Area must contain sufficient fire suppression as specified by the fire risk assessment
Emergency Response	- Indicate emergency response points with the point number to help pin point the location when an energy happens
Environmental Management	- Diesel cassettes must be stored in a bunded area
Environmental Management	- Emulsion should not be stored next to the diesel cassette
Environmental Management	- Diesel, oil and emulsion spillage must be delt with immediately after it occurred
Environmental Management	- Diesel cassette must be parked in a designated bunded area
Environmental Management	- If diesel cassette are stored in a undesignated area, it must be barriered off and must be clearly visible from all possible sides that a TMM can approach the cassette
Environmental Management	- Emulsion cassette must not be stored in close proximity of the diesel cassette
Environmental Management	- Bunded area must be designed with sufficient space and sufficient room for cassette carrier to deliver cassette to bunded area
Environmental Management	- Clearly indicate when a emulsion cassette is stored in the bunded area
Environmental Management	- Bunded are must be designed to contain 150 [%] of the volume of chemical stored in it
Environmental Management	- Spillage must be delt with as soon as they occur and be handled in accordance with the spill management of the mine
Environmental Management	- Bunded area must be designed for easy access of the cassette carrier
Environmental Management	- Bunded are must be designed with sufficient space and sufficient room for cassette carrier to deliver cassette to bunded area
Environmental Management	- Clearly indicate when diesel cassette is stored in the bunded area
Environmental Management	- Environmental management
Environmental Management	- Bunded area must be designed to contain 150 [%] of the volume of chemical stored in it
Environmental Management	- Biodegradable water dissolving solvents/ soap must be used
Environmental Management	- Oil spillage and diesel spillage must be contained and not be washed into the haul road
Environmental Management	- Refuelling must only take place in a bunded area
Environmental Management	- Spillage must be contained as soon as it occurs
Environmental management	- Contain diesel and oil spillage
Environmental management	- Install quick couplers on vehicles to prevent spillage
Environmental management	- Contain spillage as soon as it occurs using spill kits
Environmental management	- Spillage should be contained and kept to the minimum
Equipment / Tool / Material Logistics	- Use the correct TMM for transporting material / equipment
Equipment / Tool / Material Logistics	- Ensure that material / equipment is properly secured when the TMM is loaded
Experience Matrix	- Experience Matrix
Explosives management	- Explosives should be stored out of the way of TMM's
Explosives management	- Sign standard
Explosives management	- Explosive storage areas should be clearly identified
Explosives management	- Explosives should be stored in a controlled environment
Explosives management	- Explosives register should be implemented to track explosives
Explosives management	- Explosives should be stored in a explosives container and be locked
Explosives management	- Only authorised personnel must be able to access explosives
Explosives management	- Process flow regarding issuing explosives should be revised/retrained and be implemented
Fatigue	- Fatigue

Control	Description
Fatigue Procedure	- Fatigue Procedure
Filling Procedure	- Tanks / cassettes must be filled to their design capacity and not be over filled
Fire Hazards Register	- live document to be updated as mine situation changes
Fire Management	- Ensure that the fire extinguishers is as specified in the fire management plan and that the correct amount of extinguishers is available and that they are operational
Fire Management	- Ensure that proper grounding and bonding are done before the machine transports the chemicals
Fire Response	- Must have adequate fire suppression as determined by the mine's fire risk assessment
Fire Risk Assessment	- When revising the fire risk assessment, check that all the TMM types has been covered in the risk assessment
Fire Risk Assessment	- When a new TMM type is purchased, ensure that it is added to the fire risk assessment before the TMM is allowed to start working
Fire Risk Assessment	- If BEVS is purchased, ensure that the operator as well as the fire fighting teams understand the fire suppression system and ensure that the fire risk assessment covers fire fighting of battery operated TMM's
Full Induction	- Needs to make use of the latest training material available
Full Induction	- If any procedure change, the training must also be updated and interim planning for persons that did the induction withing a month or two is required to update them on the new procedure
Haul Road Inspection	- Water depth to be measured and indicated whether it is safe to travel through it with a TMM
Haul Road Maintenance	- Ensure that the road to the TMM workshop is well maintained
Haul Road Maintenance	- Road must not have excessive bumps and potholes
Haul Road Maintenance	- Water and diesel spillage must not be able to get onto the road from where it occurs in the workshops
Haul road standard	- Road width
Haul road standard	- Maintenance
Haul road standard	- Road surface must be fit to travel on without slipping
Haul road standard	- Avoid grade breaks and blind rises as far as possible
Haul road standard	- Machine turning radius must be taken into consideration when designing the road
Haul road standard	- Drainage
Haul road standard	- Maximum grade must be in accordance with the machinery used and according to global best practice and MOSH leading practice
Haul road standard	- Road inspection must be done and maintenance must be prioritised from the inspection. Road inspection procedure to be developed and implemented.
Haul road standard	- Grade breaks and blind rises
Haul road standard	- Design roads to have T-junctions and not Y- Junctions
Haul road standard	- Road construction should be done to carry the sufficient loads
Haul road standard	- Drainage should be sufficient to keep roadways dry
Haul road standard	- Road inspection should be carried out at pre determined intervals
Haul road standard	- Road maintenance should be done and prioritised from the road inspection
Haul road standard	- Gradient should be in line with global best practice as well as MOSH leading practice
Haul road standard	- Draining must be a priority on these roads
Haul road standard	- Road must be inspected on a regular basis
Haul road standard	- Road maintenance must be prioritised from the road inspection done
Haul road standard	- Road maintenance should ensure that there is no spare parts lying in the road before the shift starts
Haul road standard	- Do not build a haul road more than the maximum gradients as specified in the mine TMM MCOP
Haul road standard	- Drainage must be high priority when designing and constructing haul roads
Haul road standard	- Take machine dimensions into consideration when design the haul road
Haul road standard	- Increase road width in and around the Tip area

Control	Description
Haul road standard	- Tip height to include sufficient clearance for dump truck to tip
Haul road standard	- Install catchment berms to prevent the operator from driving into structures
Haul road standard	- Construct waiting areas for the TMM's to wait while one of the TMM's is in the tipping area
Haul road standard	- Haul road standard
Haul road standard	- Construct catchment berms to prevent the machine from driving into the tip area
Haul road standard	- Clean tip wall to prevent waste material from forming a ramp which can cause the TMM operator to drive into the tips
Haul road standard	- Ensure that the road leading into the tip area is level and are constructed according to the California bearing ration to handle the weight.
Haul road standard	- Wider road for where materials are loaded and unloaded from the shaft
Haul Road Standard	- Gradient of ramps to be according to global best practice and MOSH leading practice
Haul Road Standard	- Arrester bed or straddle berm for TMM when brake failure occurs on the ramp
Haul road standard	- Try and create muck bays on level surfaces and not on declines
Haul road standard	- Construct road way wide enough for vehicle to pass one another
Haul road standard	- TMM reverse and forward prevention when TMM in danger zone. Engagement acknowledgement application
Haul road standard	- Keep decline gradients according to MOSH and Global best practice
Haul road standard	- Avoid grade brakes
Haul road standard	- Ensure road has sufficient drainage
Haul road standard	- Construct road way wide enough for TMM to pass one another head on where applicable
Haul road standard	- Try to keep all roadways as one ways
Haul road standard	- Avoid blind rises as far as possible
Haul road standard	- Avoid grade breaks
Haul road standard	- Keep curve radius as big as possible to improve sighting distance
Haul Road Standard	- Avoid Y-junctions
Haul Road Standard	- A T-junction is always better from a safety point of view
Haul road standard	- Road must be of a specific width and height
Haul road standard	- Roads must be maintained properly to decrease the emergency response time
Haul Road Standard	- Ensure that the haul road is designed with sufficient drainage
Haul Road Standard	- When water accumulates in the road, road maintenance must ensure it drains out and that it is filled up with material as specified in the road construction document
Haul Road Standard	- The cement roads in the workshop must have sufficient grip
Haul Road Standard	- Transition from the gravel to cement must be smooth that the drill rig does not struggle to drive onto it
Haul Road Standard	- Proper drainage must prevent the road getting slippery
House Keeping	- Old, used batteries should be discarded and not left in the road on in the diesel/emulsion bay
Illumination	- Illumination
Illumination Standard	- Area illumination to be specified for working areas
Illumination Standard	- Specify how often the illumination must be tested in a determined time frame
Illumination Standard	- Positioning of the lights should be specified
Illumination Standard	-Illumination colours for direction to and from critical areas to be explored.
Illumination Standard	- Illumination is required in the production areas
Illumination Standard	- Illumination must be tested on determined intervals as the mine develops
Illumination Standard	- Ensure that area is well illuminated
Illumination Standard	- Area must be well illuminated
Illumination Standard	- Measure LUX as specified in the illumination standard on a pre determined interval
Illumination Standard	- Area must be well illuminated that the operator can clearly see all structures
Illumination Standard	- Road ways leading to and from emulsion bays should be illuminated to clearly indicate the road ways

Control	Description
Illumination Standard	- Waiting place should be sufficiently illuminated (Same standard for office/ conference room illumination)
Illumination Standard	- Area must be illuminated sufficiently
Illumination Standard	- Indicate muck bays with colour light
Illumination Standard	- Confined areas where multiple TMM's work in close proximity should be well illuminated
Illumination Standard	- Area must be sufficiently illuminated
Illumination Standard	- Area where loading / off loading takes place must be well illuminated
Illumination Standard	- Cage must be sufficiently illuminated
Illumination Standard	- All primary roads and dual designated roads must be illuminated
Key Control	- A tag system shall ensure that no unauthorised person is allowed to operate any TMM without being trained, competent and authorised to do so
Key Control	- The system shall also not allow any operator to operate a TMM if his / her medical, induction or license has expired
Lifting and Rigging	- TMM only allowed to lift equipment that has the appropriate lifting point or that are on a pallet
Lifting and Rigging	- TMM is not allowed to push equipment / material / tools with its forks
Lifting and Rigging	- TMM is not allowed to operate outside its design intent
Loading Procedure	- Do not overload dump trucks
Loading Procedure	- LHD to clean the area at the end of each shift
Loading Procedure	- DT's must not be overloaded and be loaded in accordance with the TMM load distribution curve
Medicals	- Medical (vision + Hearing)
Mine design/Development /Haul road standard	- Keep muck bays to a minimum and make hanging wall higher to haul material as far as possible with dump trucks to limit haulage by LHDs
Mine Planning	- Always follow leading practice and separate TMM's and pedestrians
Mine Planning	- Always try to design roads for one way traffic only
Mine Planning	- Avoid pedestrians crossing the TMM roads as far as possible
Mine Safe Declaration	- Safe declaration before the start of each shift is crucial
OEM	- CAS supplier to supply mine with a proper failure mode analysis of the system
OEM	- Needs to supply mine with accurate as installed drawings of the system
OEM	- Needs to train and declare maintenance personnel competent and authorised to repair the system
Pedestrian alighting / boarding TMM Procedure	- Ensure TMM is switched off and safely parked with park brake applied
Planned Task Observation	- Planned Task Observation
Planning	- Plan to always drill, charge up and load faces apart from one another to avoid traffic congestion
PPE Standard	- PPE (Cap lamp)
PPE Standard	- Ensure that all the employees gets issued with PPE that adheres to the mine's PPE standard
Pre work RA	- Pre work RA
TMM pre-start	- Pre-start inspection
Procedural training	- Procedural training
PTO	- Plan Task Observations
Quick Induction	- The induction video needs to be updated on a regular basis as the systems on the mine changes
Quick Induction	- Pedestrians needs to be made aware of the TMP of the mine and the signage used
Refuelling	- Refuel using quick couplers to minimise spillage
Refuelling	- Install nozzle on pump that trips when the tank that is being filled is full
Refuelling	- Install a fuel management system as well as a oil dispensing system
Refuelling	- Should be done using quick couplers
Refuelling	- Pump must trip when the tank that is refuelled is full
Refuelling	- Hold only take place in well illuminated areas
Refuelling	- Cassettes must be stored in bunded areas

Control	Description
Refuelling Procedure	- Only quick couplers must be used to refuel cassettes and TMM's
Refuelling Procedure	- Pump must trip as soon as the tank it is refuelling is full
Refuelling Procedure	- Proper grounding and bonding must be done before refuelling a TMM or cassette
Refuelling Procedure	- Use quick connectors for refuelling
Refuelling Procedure	- Refuelling hose must be reeled up when done refuelling and not be stored in the mud
Refuelling Procedure	- Do not wash / cool the machine with water while refuelling
Reporting	- Incident reporting and analysis
Risk Assessment	- The risk assessment must be a live document and constantly be updated as new risks arise
Risk Management	- Styldrift risk management team will try to identify all the risks involved and will implement controls to ensure that employees are safe
Risk Management	- All the systems / controls implemented must be monitored on a daily basis and action must be taken when a control is not effective or by-passed
Risk Management	- Change management
Risk Management	- Change management must be applied whenever a new control is implemented and all relevant employees must be made aware of the controls implemented and why it is implemented
Road Inspection	- Road inspection should be done at the beginning of each shift by the tips operator and condition must be reported to the control room for further action
Road Inspection	- Inspect all the robot systems too see that they are functional before TMM's are allowed to operate in the area (safe declaration)
Road Inspection	- Waste spillage must be reported when doing road inspection
Road Inspection	- TMM operators must report waste spillage to the control room
Road Inspection + Maintenance	- Road inspection and maintenance
Road Maintenance	- Spillage must be removed
Road Maintenance	- Ensure that the height of the hanging wall is sufficient
Road Maintenance	- All primary roads must be well maintained to ensure that emergency response can reach the areas in minimum time
Road maintenance procedure	- Parking bay cleanliness standard (no rubbish, no filling and spillage of diesel, no discarded batteries)
Robot	- Robot should fail to safe when it detects a sensor failure and flicker
Robot	- Where possible control the robot with a PLC for system integration
Section	- Section 22 & 23 of MHSA training
Section 21 File	- Contractors may not supply any article to the mine that is harmful / unsafe to people
Section 21 File	- Contractors risk assessment must have effective controls listed to ensure the safety of employees
Sign Inspection	- All signs needs to be inspected on a regular basis and damaged signs needs to be reported and be replaced
Sign Inspection	- Sign inspection
Sign Inspection	- All signs needs to be inspected on a regular basis and poorly visible signs needs to be reported whether it needs to be cleaned or replaced
Sign Inspection	- Ensure that all the PPE signs are readable and not damaged
Sign Location Standard	- Specify which rules that will determine where which type of sign must be installed
Sign Location Standard	- Install signage where intersections have blind spots
Sign Location Standard	- Stop signs to be installed at all intersections
Sign Maintenance	- Reported signs needs to be cleaned
Sign Standard	- If specific vehicle cannot enter the area, signage must clearly indicate it
Sign Standard	- Signs must be according to the SABS road signs and must be reflective
Sign Standard	- Sign cleaning to be implemented
Sign Standard	- Clearly indicate the speed limits on the main travel ways as well as in areas where vehicles must crawl
Sign Standard	- Indicate the designated roadways clearly

Control	Description
Sign Standard	- Indicate designated parking areas for specific vehicles
Sign Standard	- Indicate the entrance and exit of the parking
Sign Standard	- Indicated the designated parking per TMM type
Sign Standard	- Install a indicator sign for the operator against the wall that he knows how far he is from the tip when reversing
Sign Standard	- Clearly indicated where emulsion cassette must be stored
Sign Standard	- Clearly indicate the bunded area capacity
Sign Standard	- Clearly specify where diesel cassette's are stored
Sign Standard	- Clearly indicate bunded area capacity
Sign Standard	- Waiting place should be clearly indicated and barricaded
Sign Standard	- Put up temporary signs indicating that vehicle is broken down
Sign Standard	- Communicate breakdown to control room for warning to other TMMs in area. Activate breakdown procedure
Sign Standard	- Indicate whether a crossing or T-junction is ahead
Sign Standard	- Stop signs to indicate where TMM's must stop
Sign Standard	- Refuelling bays must be clearly indicated
Sign Standard	- All sections and areas must have signage identifying the area
Sign Standard	- Indicate the nearest emergency response point
Sign Standard	- Ensure that where additional PPE is required, it is clearly indicated
Simulator	- The simulator must always have the latest requirements as part of the simulator test
Skills Training	- Skills training programme
Skills training matrix	- Skills training matrix
Structured Change Management programme	- Change management focusing on training people on focusing on external triggers
Structured Change Management programme	- Change Management programme structured around peer pressure and personal value.
Structured Change Management programme	- The initiatives should be a structured process which include a set of tools to help people engage, adopt and use a change in their day-to-day work.
Structured Change Management programme	- Tools include interactive group games, quizzes, toy or picture demonstrations, videos, acting etc.
Structured Change Management programme	- Change management process structured around the importance adherence and compliance
Structured Change Management programme	- Change Management programme structured around decision making and procedures.
TMM Break Testing Procedure	- TMM's breaks should be tested as per the break test standard
TMM Maintenance	- Oil leaks should be repaired asap
TMM Maintenance	- Cassette's must be inspected and CoC must be issued for each cassette on a pre-determined interval
TMM Maintenance	- Electrical power supplies must be inspected and signed off on a interval determined by a risk assessment
TMM Maintenance	- If machine cannot be repaired in the field, machine can be bypasses to enable limp home mode by only authorised person. Machine will only be able to be bypassed for a specified time determined by a baseline risk assessment
TMM Maintenance	- TMM's must be maintained in accordance to the OEM Manual
TMM Maintenance	- OEM specified parts must be used at all times
TMM Maintenance	- Electrical connections must be up to standard and all the wiring and switches must be inspected and tested on a regular basis
TMM Maintenance	- TMM needs to be maintained in accordance with the OEM manual
TMM Maintenance	- Breathers needs to be maintained and not be removed
TMM Management System	- Implement a TMM management system that detects problem areas such as oil consumption, break wear, engine temperature etc
TMM Management System	- System to report to the control room as soon as deviations are detected from the pre set conditions
TMM Operating Procedure	- Loading TMM - OEM methodology

Control	Description
TMM Operator	- Must report any oil leaks or faults on the machine as soon as it is identified and not wait until the end of the shift
TMM pre-start	- If visibility indicators are not functional, it is a No-Go
TMM pre-start	- TMM operator as well as the supervisor must sign off on the TMM pre-start inspection
TMM pre-start	- TMM pre-start inspection
TMM pre-start	CAS system failing the pre-start test must be a No-Go
TMM pre-start	- All fire extinguishers must be in place on the TMM
TMM Register	- Machine height
TMM Register	- Turning radius
TMM Register	- Line of sight
TMM Register	- Maximum grade that the machine can operate in
TMM Register	- TMM physical dimensions
TMM Register	- Intersections turning radius
TMM Register	- Height, width, length etc.
TMM Register	- Vehicles max operating gradient must be specified
TMM Register	- Road maintenance to ensure that decline is clear of materials that would enhance chance of slippery conditions (diesel, emulsions, mud etc)
TMM Register	- Isolation register
TMM Register	- Emergency response vehicle must be able to access all the sections in the area's that it is assigned too
TMM Register	- Emergency communication with control room a prerequisite
TMM Register	- Needs to predict when the machine will reach the end of life according to the expected hours vs the current hours
TMM Standard	- Cameras used where line of sight is restricted
TMM Standard	- Illumination on the vehicle must comply with the standard
TMM Standard	- Best line of sight indicators must be visible and working
TMM Standard	- Equip all TMM's operating at the tips with camera's to assist the TMM operator
TMM Standard	- TMM specific operating procedure to include OEM dumping methodology
TMM Standard	- Install cameras to assist operators with line of sight
TMM Standard	- Cassette's electrical connections must be safe and no bare wires should be visible
TMM Standard	- Electrical cables must not run through the emulsion / diesel spillage
TMM Standard	- TMM must be equipped with sufficient lighting to comply with the mine's illumination standard
TMM Standard	- Placement of the antennas to prevent damage to it as far as possible
TMM Standard	- Cameras to improve the line of sight of the operator
TMM Standard	- Reverse hooter to be audible and reach the dB value specified in the TMM standard
TMM Standard	
TMM Standard	- TMM Standard
TMM Standard	- Door interlock switches must be a no go if they are not working
TMM Standard	- Articulating barriers to be installed with a safety switch that prevents the machine from articulating when the barrier is removed
TMM Standard	- Door interlock switch must disable all hydraulics, enable park brake and disable the drive train
TMM Standard	- Machine must switch off the engine when the operator get out of the seat (Where applicable)
TMM Standard	- Modifications may not be made to the operators cab, unless it went through an engineering change request and was approved by the OEM
TMM Standard	- Machine safety interlocks may not be bridged or removed unless it was approved by the engineering manager and is accompanied by a Risk Assessment
TMM Standard	- The door interlock switch must immediately disable the drive train and hydraulics and enable the park brake
TMM Standard	- TMM should have cameras to assist operators with line of sight
TMM Standard	- Siren must be audible as specified in by the mine (10% above ambient noise)

Control	Description
TMM Standard	- Must have red flashing lights that is clearly visible when in operation
TMM Standard	- Matching TMM's for loading off loading appropriate weight
TMM Standard	- Install cameras on the TMM to assist the driver with visibility
TMM Standard	- TMM must have sufficient illumination
TMM Standard	- TMM must have a working audible reverse alarm
TMM Standard	- Must have sufficient illumination
TMM Standard	- Install cameras to assist the operator with visibility of his / her surroundings
TMM Standard	- Visibility indicator lights must be positioned as specified in the TMM standard per TMM type
TMM Standard	- Indicator lights must have a brightness as specified in the TMM and illumination standard
TMM Standard	- All the fire extinguishers on the TMM must be properly indicated and secured
TMM Standard	- Fire extinguishers must be installed in a easy accessible position
TMM Standard	- When a TMM is equipped with a fire suppression system, it must be interlocked with the TMM to disable the drive train, hydraulics and enable the park brake. It must also switch off the engine when the fire suppression is activated
TMM Standard	- LHD's must be fitted with cameras to improve the operators line of sight
TMM Standard	- Tanks / cassettes must be properly sealed to prevent spilling when tramming
TMM Standard	- Correct cassette must be used for emulsion and not mixed with a diesel cassette
TMM Standard	- All DT's must be equipped with reverse cameras
TMP	- Dual road ways
TMP	- TMM separation (Production from logistics)
TMP	- Early warning system (Lights when a vehicle is already tramming head on towards another TMM)
TMP	- Time Separation
TMP	- Always travel with the TMM in the direction to where the best line of sight is
TMP	- Clearly marked dedicated road ways
TMP	- TMM Pedestrian separation
TMP	- Dedicated walk ways (To prevent confusion between the line of sight of a right hand drive vehicle and left hand drive vehicle)
TMP	- Height restrictions must be clearly indicated at each area
TMP	- Unauthorised and restricted access areas must be indicated
TMP	- Machinery must be stored in designated areas and TMM's parked in designated parking bays
TMP	- Speed restrictions on slippery roads to maximum first gear
TMP	- Time separation when traveling on slippery roads
TMP	- Effective warning to indicated that other vehicles are tramming in the opposite direction
TMP	- Restricted areas must be clearly marked on the mine map
TMP	- Safety or any other restrictions for specific areas must be clearly marked when entering the area
TMP	- Safety restrictions must be clearly indicated when entering the area
TMP	- Only specific vehicle are allowed in specific area
TMP	- Dedicated walkways for pedestrians
TMP	- Single direction traffic flow for TMM's
TMP	- Time separation if pedestrians needs to walk through the workshop
TMP	- Install mirrors on where blind spots are present
TMP	- Install early warning systems such as indication lights
TMP	- Specify the maximum speed as well as the crawl speed at Styldrift (8 Km/hr travelling / tramming and 3 km/hr crawl)
TMP	- Early warning that other TMM's are tramming towards one another
TMP	- Pedestrians must use chair lift and not use the TMM only road ways
TMP	- Indicate the meaning of the red, yellow and green reflector tape on the road ways
TMP	- Layout tunnels to prevent pedestrians from crossing haul roads and also minimise the TMM's crossing pedestrian walk ways

Control	Description
TMP	- Time separation between logistics and production vehicles
TMP	- Define refuelling times (ex LHD end of shift, Drill rigs beginning of shift)
TMP	- Pedestrians crossing and using the haul road to the tips.
TMP	- Install early warning system for when DT or TMM is in close proximity
TMP	- Create more muck bays towards the production area
TMP	- Early warning system to warn TMM operators that there is a TMM approaching
TMP	- TMM's coming from the face has right of way and TMM going to the face must park in their nearest muck bay until the TMM from the face passed it
TMP	- Install following distance indicators on the walls
TMP	- Specify the following distance for specific areas
TMP	- Design park bays as a one way
TMP	- Indicate when a parking is occupied
TMP	- Ensure that occupied parking is indicated by utilising lights
TMP	- Design parking bays as a one way
TMP	- Each vehicle should have its own designated parking area
TMP	- Install mirrors to help the reduce blind spots in the area
TMP	- Indicate when a TMM is in the Tip area by use of a robot system
TMP	- Time separation for logistics vehicle and production vehicles
TMP	- Travel ways are not allowed to run through the waiting places
TMP	- Regulate traffic flow around the waiting place
TMP	- TMM / Pedestrian separation
TMP	- Waiting place must be at least one pillar away from the main travel way (To prevent TMM / Pedestrian interference)
TMP	- Barricade the area that no unauthorised personnel use the road as a short cut
TMP	- Minimise TMM's for material handling. Use over head crane and not Manitou
TMP	- Use the correct equipment. LHD bucket is not a tyre handler
TMP	- Clear indication when a TMM is driving on the decline
TMP	- Indicate when a machine is in the muck bay
TMP	- Install mirrors to help assist drivers with visibility when loading from muck bays
TMP	- Machines operating in the area must be equipped with cameras to improve drivers visibility
TMP	- Specify all the areas where robots needs to be installed
TMP	- If robot fails, specify the procedure for alternative signally
TMP	- Specify the procedure for alternative signalling in case of robot failure
TMP	- Haul road that has been declared safe in the mining face must be clearly indicated and illuminated to ensure drivers only use these roads
TMP	- Block off berm unauthorised roads
TMP	- Try to keep haul roads / travel ways as a one way
TMP	- Indication with robot / lights when an oncoming TMM is approaching to pull over into muck bay
TMP	- All intersections must be treated as a stop
TMP	- Where possible, mirrors should be installed to improve operator visibility
TMP	- Indicate on the wall dovetailing distance
TMP	- TMM should at least maintain a following distance of 50 [m] when dovetailing on a decline
TMP	- TMM only allowed to crawl down a decline
TMP	- TMM should at least maintain a following distance of 30 - 50 [m] when dovetailing on a level surface
TMP	- Indicate to other TMM's when production vehicles are approaching
TMP	- Install mirrors to assist operators with line on sight
TMP	- Indicate whether there are a TMM approaching from the merging tunnel
TMP	- Install mirrors to assist operators and pedestrians with line on sight
TMP	- TMM's are only allowed to travel on designated road ways
TMP	- All crossings shall be a 4-way stop
TMP	- Install mirrors to assist operators seeing oncoming TMM's
TMP	- All intersections or crossing must have a stop sign

Control	Description
TMP	- Install mirrors to assist pedestrians as well as TMM operators to see one another
TMP	* Install mirrors to assist pedestrians as well as TMM operators to see one another
TMP	- Keep the TMM's operating close to one another in a confined area to the minimum
TMP	- Emergency response vehicles has right of way
TMP	- When a TMM is carrying protruding loads, it must be clearly marked and be escorted by a flag man
TMP	- Protruding loads must be properly secured
TMP	- Pedestrians to must always be visible to the driver
TMP	- Pedestrians are not allowed to walk behind the TMM loading off loading
TMP	- Pedestrians are not allowed to stand behind the wheel of the TMM
TMP	- TMM operations
TMP	- Distance rule (3m)
TMP	- No standing in drop zone
TMP	- Stand in visibility zone
TMP	- Mirrors must be installed to reduce the blind spots for the TMM operator loading the TMM
TMP	- Pedestrians are not allowed closer than 2 [m] to the TMM
TMP	- When TMM's are loaded into the shaft, no pedestrians are allowed in the bank area, except the loading team
TMP	- If an emergency response vehicle enters the station, the banksman / station operator must ensure that their is no pedestrians standing in the waiting area where the ambulance must enter
TMP	- Only 1 TMM must be allowed in the bank / shaft area.
TMP	- TMM activities in this area must be time separated from pedestrians
TMP	- Do not drive through water when the depth is not indicated
TMP	- Avoid driving through the water as far as possible
TMP	- Indicate whether there is another TMM on the other side of the brattice using robots
TMP	- Pedestrians to have their own revolving door access and is not allowed to walk through the brattice
TMP	- TMM obstructing the roads on break down must be moved aside to ensure that the other TMM's can pass it, especially the emergency response teams
TMP	- No TMM is allowed to park on the side of the road. A TMM must be parked in its designated parking bay or be in the workshop
TMP	- Indicate on the main intersections when a TMM is responding to an emergency
TMP	- Emergency response vehicle always has right of way
TMP	- Dual designated road ways shall not be allowed when the road width is not sufficient for at least a 3 - 5 [m] space between the TMM and the pedestrian
TMP	- Not allowed where CAS level 9 is not installed on all the TMM's that utilises the road
TMP	- When a TMM is tramming on a dual designated road or primary road, the TMM may not use its bright
TMP	- LHD's must preferably be time separated from other TMM's when traveling on primary roads
TMP	- LHD's has right of way
TMP	- LP LHD's are only allowed to tram in reverse
TMP	- Time separation to ensure that no other TMM's is exposed to a TMM transporting explosives
TMP Risk Assessment	- A TMP Risk Assessment must be done after a traffic flow analysis was done to ensure that all risks are covered
TMP Risk Assessment	- The risk assessment must be a live document and be accessible by all relevant employees
TMP Risk Assessment	If a dual designated road is unavoidable, use other controls such as

Control	Description
TMP Risk Assessment	- CAS Level 9
TMP Risk Assessment	- Dedicated walk ways
TMP Risk Assessment	- TMM always tram in the direction where the operator has the best line of sight
Towing Procedure	- TMM may only be towed by using the OEM specified recovery points
Towing Procedure	- Personnel must be familiar with the TMM towing hook (some TMMs hitch disengage the TMM braking system when the TMM is towed)
Towing Procedure	- The correct sling or towbar must be used to tow the TMM as indicated in the TMM risk assessment per TMM type
Towing Procedure	- NEVER MAKE USE OF A CHAIN TO TOW A TMM
Towing Procedure	- Before towing a TMM a risk assessment must be done and be approved by the engineer
Towing Procedure	- Ensure that the towed vehicle's braking system is functional when towing it using a sling
Towing Procedure	- When braking system is not functional, make use of a towbar to tow the TMM
Towing Procedure	- If a towbar is not available, make use of a second TMM in the opposite direction to brake the towed TMM
Towing Procedure	- Towing procedure
Towing Procedure	- No pedestrian is allowed between the towing and towed vehicle
Towing Procedure	- Pedestrians to always stay on the highest point (If TMM is town on a incline, the pedestrians must be 50 m Infront of the towing vehicle, when towing on a decline, pedestrians must be 50 [m] behind the towed vehicle
Towing Procedure	- No pedestrians is allowed accept the pedestrians that is part of the recovery team
Training	- Every employee must be trained on the mine's approach to risk management
Training	- Every employee must be trained on the essence of risk identification
Training	- Training guidelines must be adequate for the trainers to use and ensure that the operators achieve the outcomes of the training
Training	- Training must be based on the environment that they will be working in and not be generic
Training	- Operators must pass a simulator test where the examiner has no influence to ensure that the operator is competent before he /she is issued with a license
Training	- The training guidelines for these programmes should highlight the requirements and rules specific to the risk identified
Training	- Training on procedures
Training Matrix	- The training linked from the training matrix to each persons clock card must be automatically updated if any changes are made to the matrix
Tyre management	- Personnel must use the correct equipment for doing the job (Lifting and tyre handling equipment)
Tyre management	- Pedestrians may not load tyres by hand into / onto running machinery
Ventilation Procedure	- Conduct a ventilation survey and draw up a action plan to improve ventilation in accordance with the ventilation procedure to improve ventilation in these areas
VFL	- Visible Feld Leadership
Waste Management	- Install sufficient dust bins in the sections
Waste Management	- Waste collection regime to be installed
Waste Management	- Waste rags not to be collected from conveyors
Wi-Fi	-Flagging any machine that is out of its operating area or not adhering to the safety restrictions in the area
Wi-Fi	- Report to control room operator when TMM is over speeding, using unauthorised road ways or when pedestrians are using TMM roadways
Wi-Fi	- Report on daily basis which vehicles were over speeding
Wi-Fi	- Report on which employees use the wrong roads under ground
Wi-Fi	- Cassette should contain Wi-Fi chip to enable the control room to track their location
Wi-Fi	- Control room operators must be notified as soon as pedestrian is stationary in a parking bay for more than a specified time
Wi-Fi	- Report to control room if machine has any failure on the CAS system

Control	Description
Wi-Fi	- Report to the control room as soon as TMM does not detect beacons and report to maintenance
Wi-Fi	- Report to control room as soon as a operators is making use of unauthorised roads
Wi-Fi	- TMM operators must first get permission from the control room before driving through a ventilation brattice
Wi-Fi	- Needs to report on the exact engine hours the machine has at the end of every shift
Wi-Fi	- Wi-Fi tracking and interaction analysis
Wi-Fi	- Wi-Fi tracking and reporting
Wi-Fi	- Wi-Fi reporting and analysis
Wi-Fi	- Wi-Fi tracking and analysis
Workshop layouts	- Workshop roads must have sufficient footing for vehicles to not slip
Workshop layouts	- Try to keep the road as level as possible
Workshop layouts	- Install mirrors at every intersection and work bay
Workshop layouts	- Indicate that work bay / pit is occupied
Workshop layouts	- Workshop must clearly be marked, indicating work bays, entrance, exit and to where the road leads - also be included in road sign location standard
Workshop layouts	- Intersections must lead to T-junctions and not Y-junctions
Workshop layouts	- Keep diesel stored in a bunded area
Workshop layouts	- Keep oil stored in a bunded area
Workshop layouts	- Install drains with a oil water separator to keep spillage from the workshop floors
Workshop layouts	- Install a proper drainage system
Workshop Layouts	- Ensure that sufficient drainage is installed in the wash bay area
Workshop Layouts	- Wash bay surface must have sufficient friction coefficient to ensure vehicles do not slip when floor is wet
Workshop Layouts	-Walkways must be made of grid to ensure pedestrians do not slip.
Workshop Layouts	- Install a platform for tyre handling to prevent machine from driving into pedestrians
Workshop Layouts	- Create dedicated pedestrian walk ways
Workshop Layouts	- Design area taken into consideration the machines and the equipment that must be used
Workshop Layouts	- Try do design working area in a one way drive through configuration
Workshop Layouts / Road design standard	- Workshop Layouts / Road design standard
Workshop Layouts / Road design standard	- Take into consideration vehicle dimensions when designing a new workshop
Workshop Layouts / Road design standard	- Dedicated walkways for pedestrians working on the TMM's
Workshop Layouts / Road design standard	- Single direction traffic as far as possible