Specification for design and construction of mine roads
(1) A surface mine’s safety and health management system must provide a specification for the design and construction of mine roads to enable the safe movement of vehicles about the mine.

(2) The specification must have regard to the particular conditions at the mine, including the following—
(a) the characteristics of the mine vehicles;
(b) the types of materials used for road construction;
(c) the methods of working the mine.
R128 (3) The specification

(3) The specification must be developed through a **formal risk assessment process** and must provide for the following for the roads—

(a) barriers;
(b) curvature;
(c) grade;
(d) guideposts;
(e) pavement shape;
(f) safety berms;
(g) signs;
(h) surface material;
(i) width.
(4) The specification must provide for appropriate control measures for preventing persons and vehicles from falling over road edges with a vertical drop of more than 0.5m.

(5) For a primary haul road regularly used for 2-way traffic, the specification must provide for a road width at least 3.5 times the width of the largest vehicle regularly using the road.

*primary haul road* means a road—
(a) intended to be used, during the life of the mine, by heavy vehicles to move overburden, coal and reject material from the mine; and
(b) capable of carrying mixed traffic at high speed.

*width*, for a road, means the width of its useable running pavement clear of guideposts, grader rills and safety berms.
Specification for Design and Construction roads

(1) The site senior executive must ensure at least 1 open-cut examiner is involved in developing, reviewing and auditing the part of the mine’s SHMS relating to the mining activities in and around the mine excavation.

(2) Subsection (1) does not require the examiner to be involved in a matter that is not within the examiner’s competency.

OCE must be involved in Developing, Reviewing & Auditing the Design and Construction Specification
OCE role in developing and reviewing SHMS
Reg 108(1)

(1) The site senior executive must ensure at least 1 open-cut examiner is involved in developing, reviewing and auditing the part of the mine’s SHMS relating to the mining activities in and around the mine excavation.

(2) Subsection (1) does not require the examiner to be involved in a matter that is not within the examiner’s competency.

OCE must be involved in Developing, Reviewing & Auditing the Design and Construction Specification
Incidents ....

- Loss of Control
  - Slides after watering
  - Distraction
  - Fatigue
  - Other Impairment
- Failure to Give way (obstructions, visibility)
Survey of last slide

- Off Camber - 2.6% cross fall
- Watering pattern
Surface
Complex curves - speed, watering?
Extract from Incident

DT48 back loading fill material has failed to negotiate a slight left hand turn, coming to rest / stop on centre bund of roadway.

Preliminary indications from operator are that this is a fatigue related event. Safety – Centre Bunds were present and in compliance with Design and Construction of Haul Road. They were effective in arresting the motion of the vehicle.
Incident Report from Mine

Water truck strip sprayed the intersection when Truck was returning from crib & commenced turning a 90 degree left turn at approximately 15 kph the truck slid and made contact with the centre divider.

Organisational
No formal wet weather training has been conducted

Task/environment conditions
Occurred on nightshift Haul road was clay based material

Individual/team actions
Watering of haul road was conducted outside requirements of SOP 12 Intersection was stripped sprayed not spot sprayed RDT operator travelling at excessive speed RDT operator did not identify hazard of the wet haul road RDT operator was travelling with all tyres on the wet line

Absent or failed defenses
Watering of haul road was conducted outside requirements of SOP 12 Maintaining and Watering Roads

Training
Clay, Night
Spray method
Speed
All tyres on wet line
Failure to identify hazard
Watering at intersection not following SOP
## Safety Bulletin-144  Referenced other Bulletins

<table>
<thead>
<tr>
<th>Safety Bulletin</th>
<th>Date</th>
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<th>Link</th>
</tr>
</thead>
</table>
**Notes**

**Advanced Techniques or Procedure**

**Road Categories**
- Type of roads

**Design**
- Design competencies required
- Approval for temporary roads
- Definition of equipment using the road

**Road Characteristics**
- Pavement & sheeting
  - Cross fall
  - Width
- Gradients
- Friction testing
- Max. Speed / Gear

**Corners / Bends**
- Super elevation
- Switch backs
- Horizontal curvature of bends - haul roads
- Centre Bunding - high risk corners

**Crests and Toes**
- Sight Distance
- Ramp Crests and toes, including a 20 m flat section

**Intersection**
- Intersections Designs including guidance on traffic m
- Intersection audits

**Bunding / Barriers**
- High Risk Bunds
- Median Bunds

**Inspection and Audit**
- Measure and Monitor including OCE
- Compliance and audit processes
- Compliance audits using 3D scans

**Road maintenance work instructions**
- Entering work areas

**Signage**
- Signs and placement
- Guideposts

**Training**
- Communication and training

**Traffic Management Plan**
- Site physical plan updated...

**Roles and responsibilities defined**

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**ASPECTS IN SPECIFICATION**

**Road Categories**
- Vehicle types
- Usage

**Design** – competencies, approval

**Road Characteristics** – as per Regs

**Speed**

**Corners / Bends**

**Crests and Toes**

**Intersections**

**Bunding and barriers**

**Signage**

**Construction** – to specification & approval

**Traffic control plans**

**Inspection and Audit**

**Training**

**Roles and responsibilities defined**
- Overall site owner in Management system
Recognised standard is to be developed ....
Examples of specification

Grade of inside batter can be a hazard...

Key is to make known and usable...
Minimum 1m berm height for haul road intersections to provide light vehicle visibility.

Centre dividers are to be installed on high speed corners to reduce risk of interaction with oncoming traffic. Dividers are to be established before the road turns and end where the road straightens out again.
One mine site has made a ready reckoner for Standards in the field

<table>
<thead>
<tr>
<th>Design element</th>
<th>Photo/Drawing example</th>
<th>Detail</th>
<th>Design element</th>
<th>Photo/Drawing example</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curvature</td>
<td></td>
<td>Needs to provide a clear line of sight</td>
<td>Conventional safety berms non High hazard areas</td>
<td></td>
<td>Half the wheel width for the largest vehicle using the road is the minimum. The inside batter on the bend would sit slightly steeper than the outside slope.</td>
</tr>
<tr>
<td>Approach ramps to through road intersection</td>
<td></td>
<td>Needs to provide a flat section prior to information of through road</td>
<td>Defined High hazard area safety bunds</td>
<td></td>
<td>High Risk Areas are typically about 10 m wide, within 30 m marks, or High Walls / ramps on the pit side if the batter is steeper than 1:4. High Hazard Berms must be at least 1m high with a minimum base of 700. Slope inner face (Ratio: 1.6 vertical:1 horizontal) provides greater re-direction and less chance of rollover. Berms are to be.</td>
</tr>
<tr>
<td>Signs</td>
<td></td>
<td>Use site approved signage. Maintain clean and straight. Remove if not required.</td>
<td>Grade</td>
<td></td>
<td>Where possible the grade should be consistent with 10% as a maximum.</td>
</tr>
<tr>
<td>Guidposts</td>
<td></td>
<td>100 metre spacing on straight sections and 66 metres on corners, keep straight and clean</td>
<td>Road width</td>
<td></td>
<td>One lane, one way 1.5 times the width of the broad vehicle using the road. Two lane, two way 0.6 times the width of the largest vehicle using the road.</td>
</tr>
</tbody>
</table>

NB - This is a visual tool for guidance only. If you note anything that looks different; contact your Supervisor or OCE.
Intersections

Take care
High crash
Intersection
400 m
This is the “High Crash intersection”
Intersections .... Sites can be complex and dynamic

Role of mine planning to ensure hazards are identified and controls in place

- Hierarchy of controls consideration

Traffic control plans for Complex circuits
Fatality
Processes for Design and Approval of Roads and Intersections
Use of survey & aerial photos - identify issues
Survey highlight – grade & width issue
Identification of Non compliant intersections & informal roads ...

Temporary access roads that are left or not managed can result in open faces and unplanned intersections.