



**BMACHO
2023
CONFERENCE
SPRINGWOOD
SPORTS CLUB**

The Ian Jack Memorial Lecture 2023





Katoomba's Tramway System

Did you know that the word
“Tram”
comes from the Scottish word for a
coal skip?

Photo Credits: P. Hammon, Mitchell Library, Macleay Museum, Mining
Museum, Powerhouse Museum, State Archives, Leonie Knapman,
Y. Meyers, B.M. Historical Society, Philip Pells.

J. B. North's Katoomba Holdings.



33°43'08.63" S 150°18'09.31" E

© 2009 MapData Sciences PtyLtd, PSMA

elev 980 m

© 2008 Google

Eye alt 6.37 km

J. B. North's
dual
reversible
incline
1883.



Incline and Tramway
designed by Norman
Selfe.



North's Tramway - 1883



The AKO&M Tramway - 1892



The tramway now connected the Glen Shale Mines in Megalong and the Ruin Castle Shale mine to the base of the Katoomba Colliery incline

The AKO&M Tramway - 1892



A total of 15.2 km of track
Enough to go from
Katoomba to
Mt Victoria

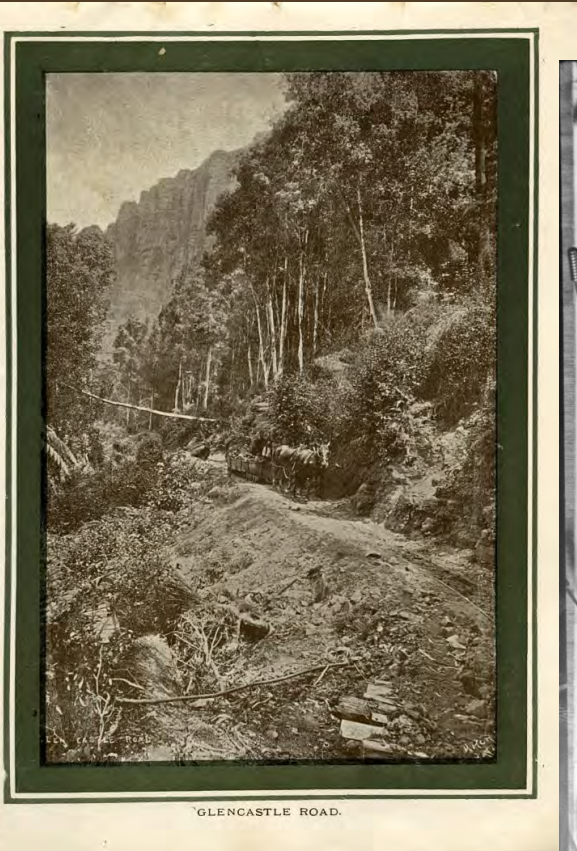
North's Tramway

We only have two photos of the Shoots Tramway, one at the Southern end and one near today's Ashlar Road which includes Hogan's Bridge.



North's Tramway

And we have four photos of the Tramways in the Valley.



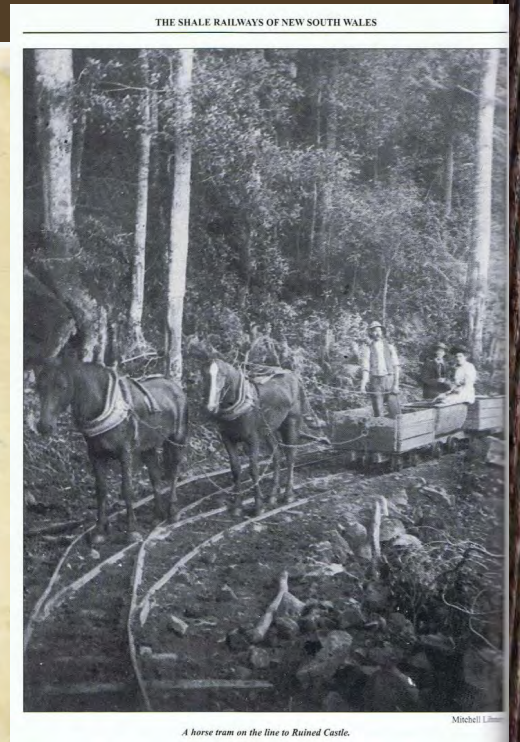
GLENCASTLE ROAD.



2.2.194

On the Tram line, Katoomba

B



THE SHALE RAILWAYS OF NEW SOUTH WALES

A horse tram on the line to Ruined Castle.

Mitchell L.

North's Tramway

Nothing has been published about the operation of these Tramways.

They were not a “set and forget” operation transferring loaded skips
from the coal face to the NSWGR railway siding.

The incline was sandwiched between tramways at either end.

The final system was a result of many upgrades
and technological change over 20 years.

North's Tramway

WHY CHOOSE AN
OVERROPE TRAMWAY?

North's Tramway

UNDER ROPE TRAM.



Southern Highland News

KATOOMBA COAL MINE TRAMWAY PROFILE

Total lift 99M Total Distance 2,111M
Avg Gradient 2.7 deg.



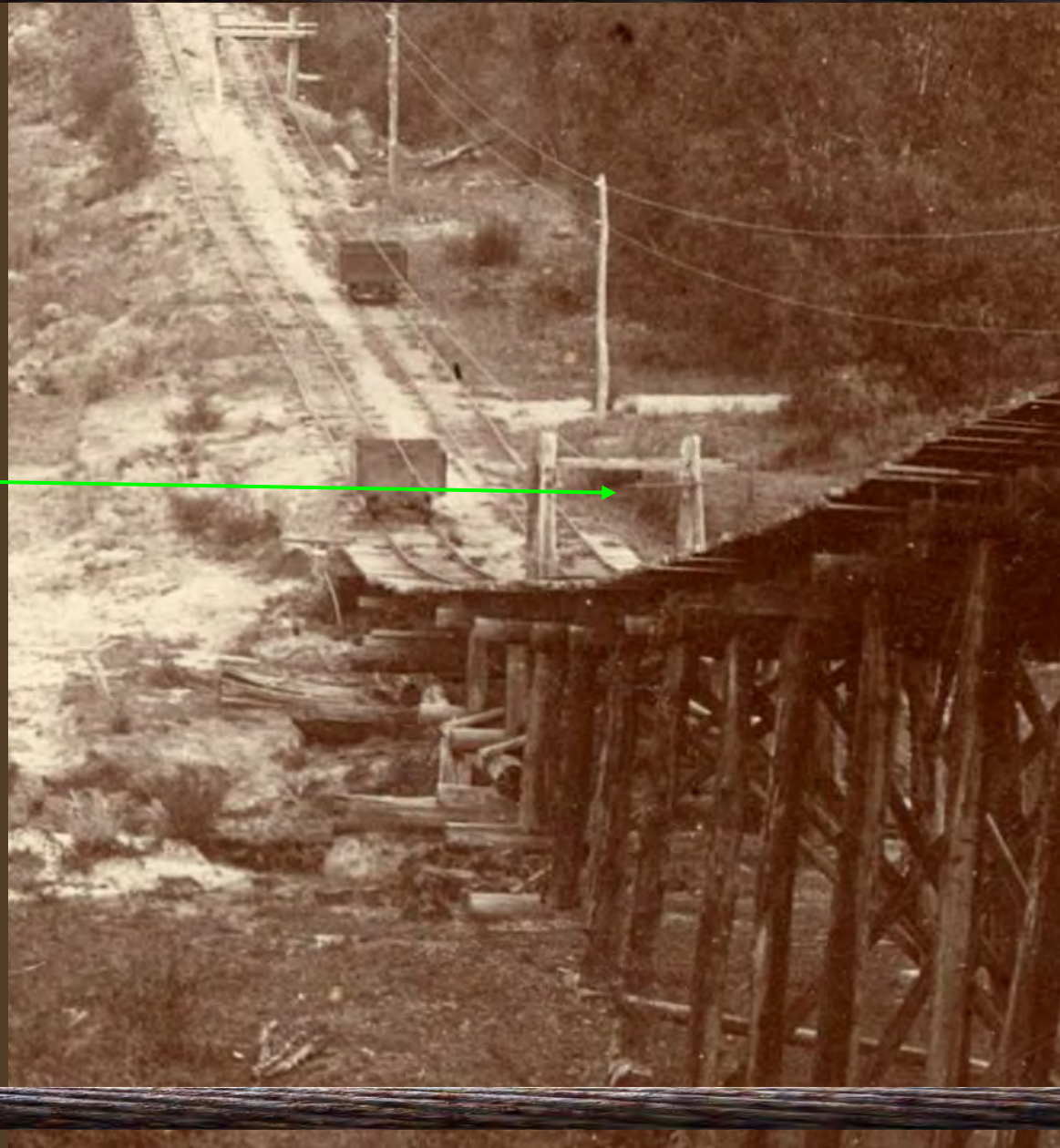
North's Tramway

Upcast rollers



North's Tramway

The position had to be carefully judged so that the weight of the skip pulled the grips down below the roller as it passed under, but the rope ran on the roller at other times.. because the ropes were still capable of lifting the skips off the rails.



North's Tramway

Rope grips



Under rope clip

SAFE • SIMPLE • CERTAIN • HARMLESS •
LIGHTWEIGHT • MAXIMUM GRIP •
ALL STEEL • NON-SLIP •



**COLLIERY
HAULAGE
CLIPS**

Patentees and Sole Manufacturers
BOLTON CRUCIBLE STEEL CO. LTD.
BELLA ST. FOUNDRY, BOLTON

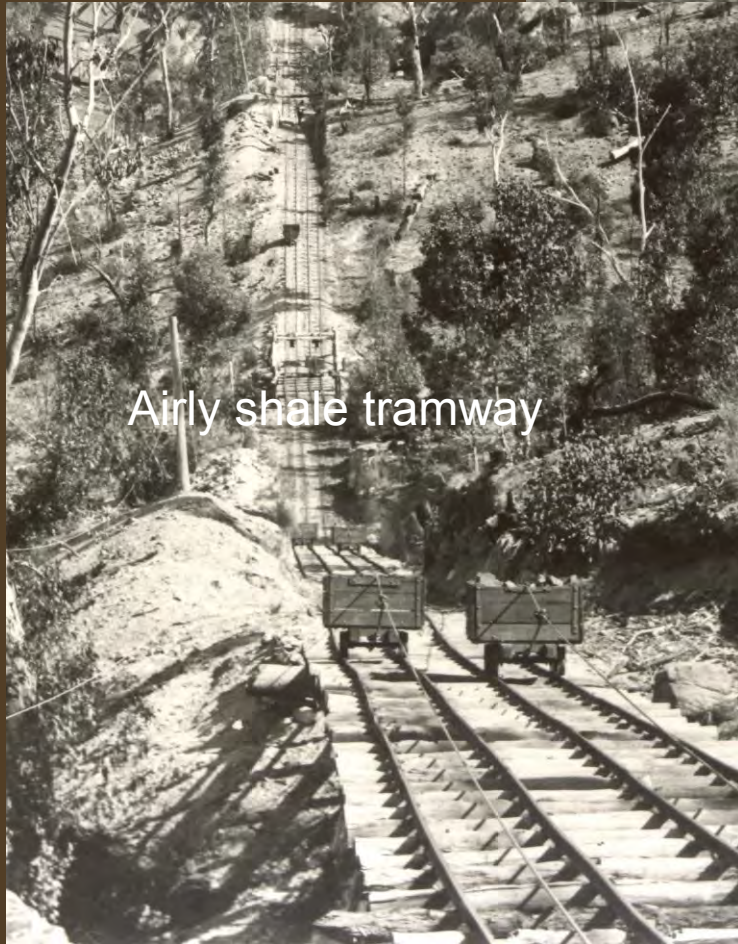
Full particulars and prices

7-9. On the left is the 'Hambone clip', which became the commonest clip used on top endless haulage. The chain to



Snaffle or Lashing chain

North's Tramway



Airly shale tramway



These are "S" clips
much safer than snaffle chains

Shoots Tramway Skip Dimensions

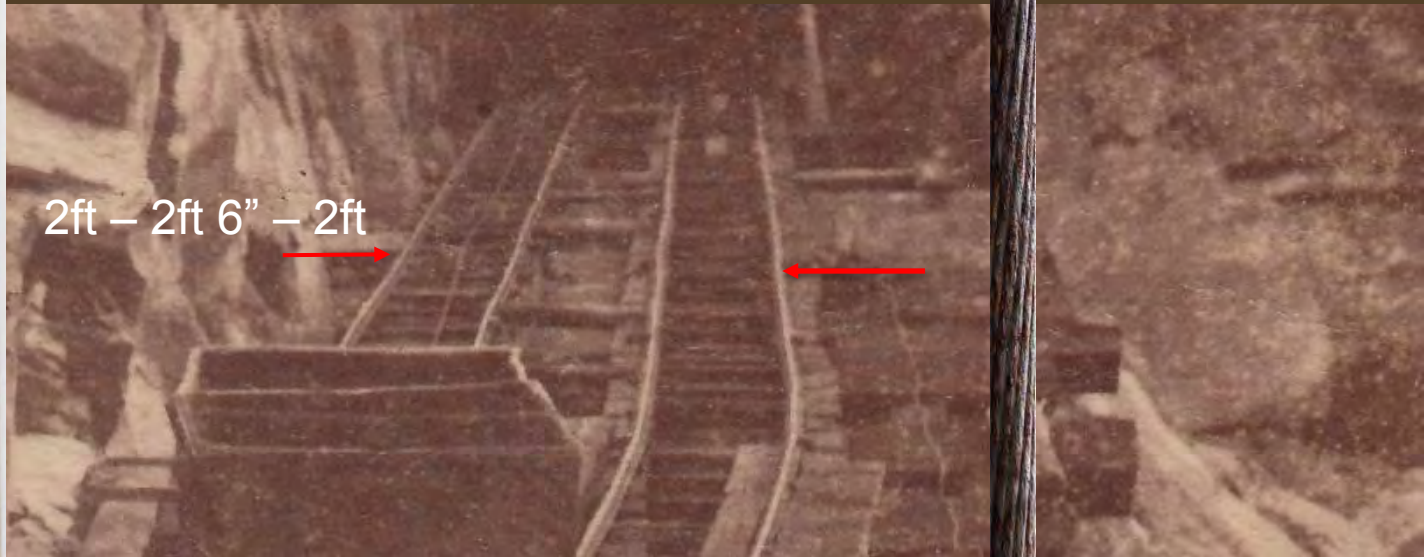
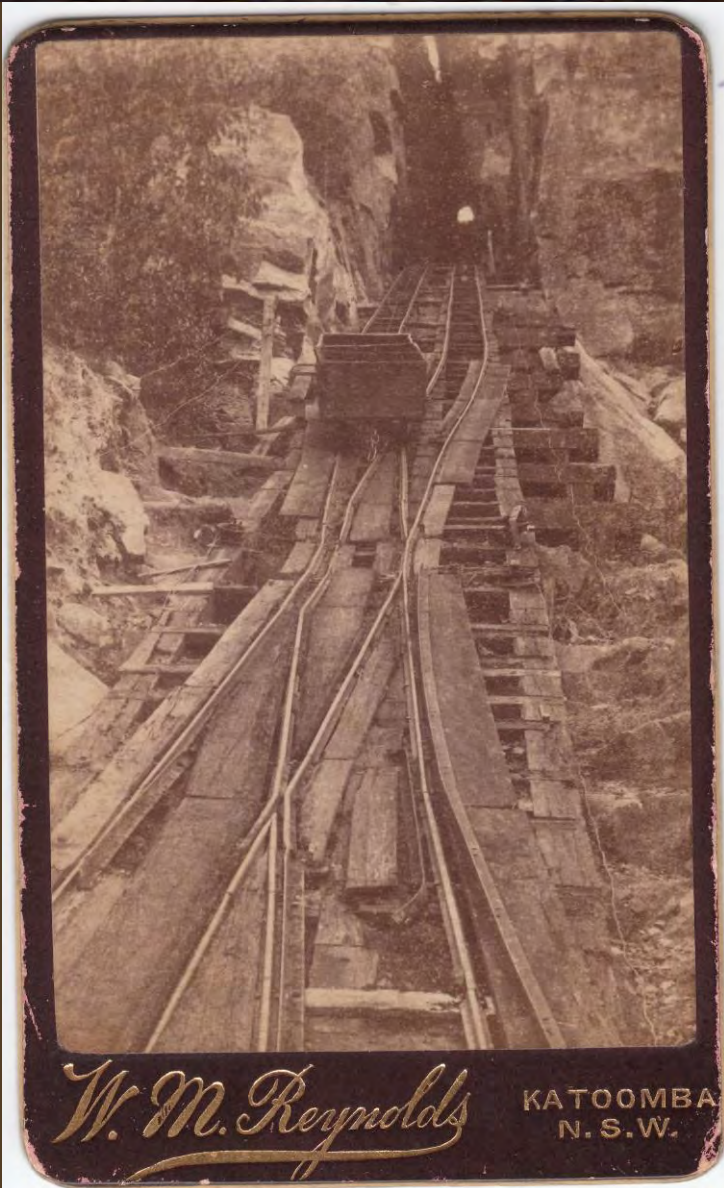


Shoots Tramway



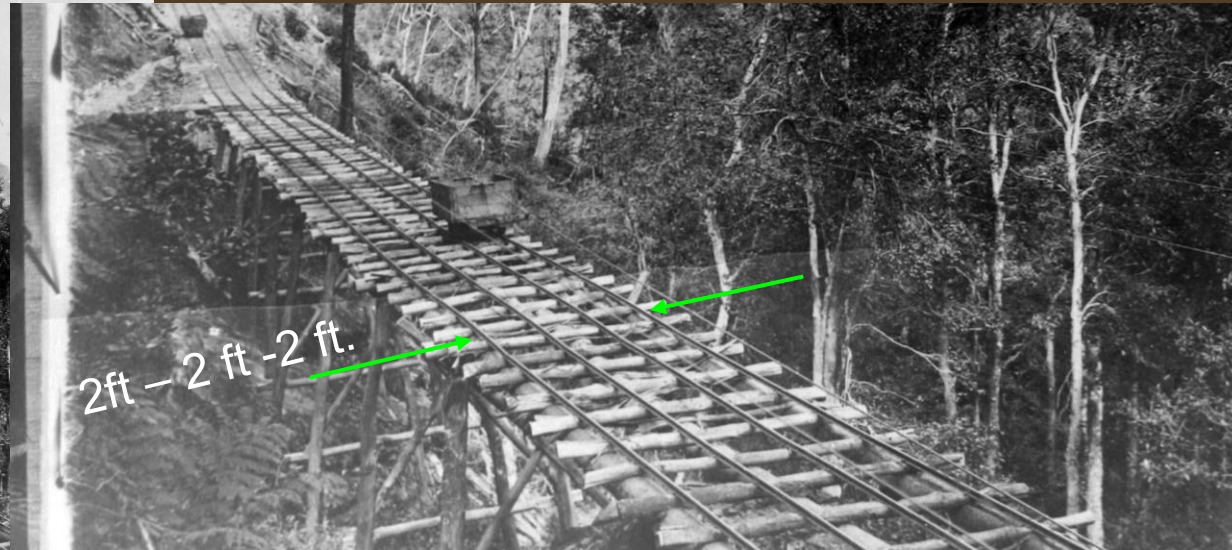
2ft clearance between passing skips.

MAIN INCLINE



Glen Tramway

Some basic dimensions.



Glen Tramway

Some basic dimensions.

Why 2ft – 2 ft -2 ft.?
Because it had to
pass through three
tunnels.



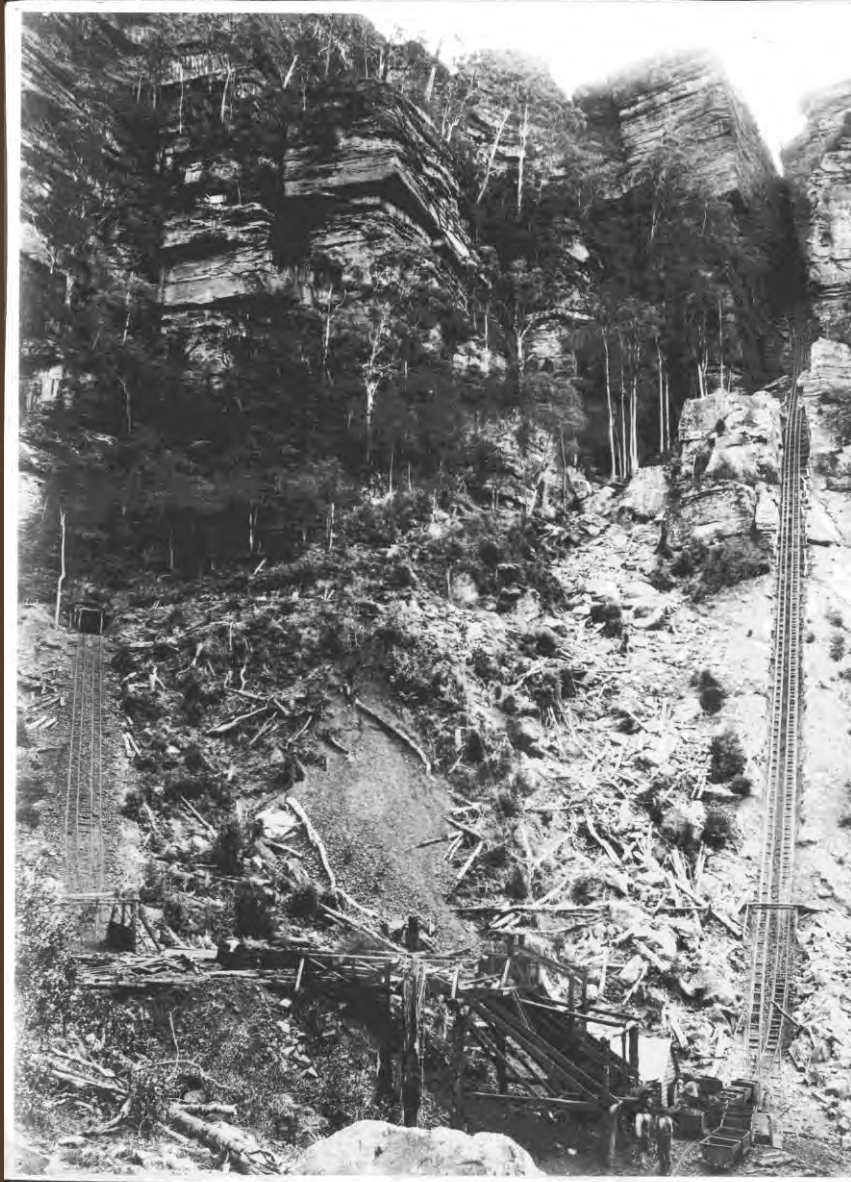
Glen Tramway

Some basic dimensions.



Image © 2009 Sinclair Knight Merz






©2008 Google

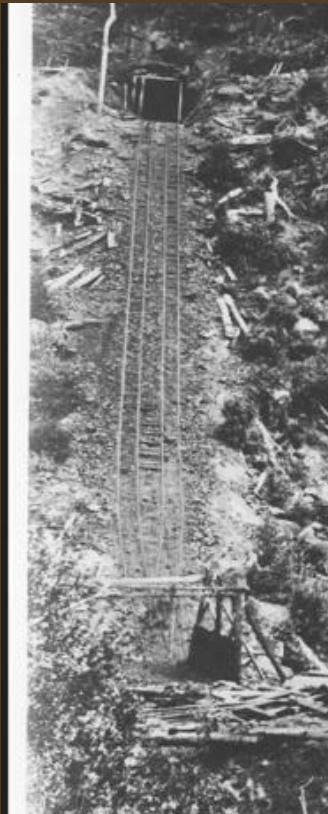


North's Tramway






Let me introduce you
to my schematic of the
Katoomba Colliery
Tramway system
and take you down
the timeline.....

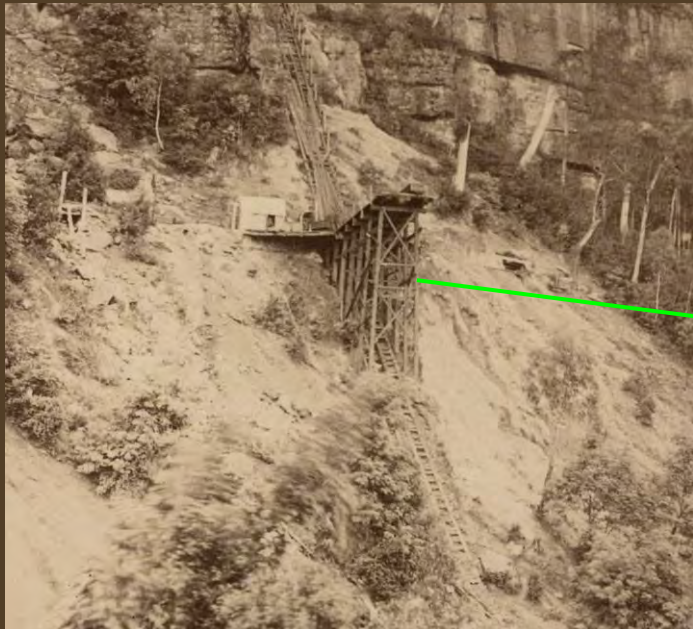
So, initially the system looked like this.

-  Rope hauled full
-  Rope hauled empty
-  Rope hauled bi-direction
-  Pony hauled bi-direction
-  Hand pushed bi-direction

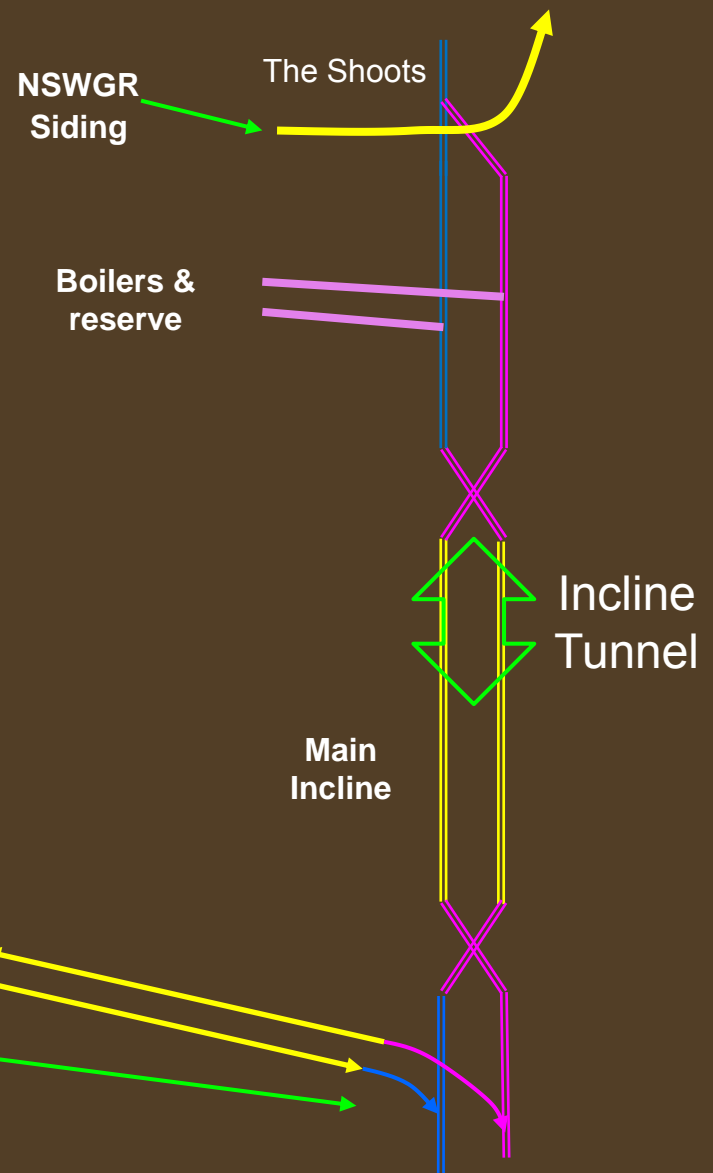


The next major change was to move the bottom station in 1886.

-  Rope hauled full
-  Rope hauled empty
-  Rope hauled bi-direction
-  Pony hauled bi-direction
-  Hand pushed bi-direction



Katoomba Coal Mine



This enabled a coal skip to journey from the coal face to the Shoots.

Followed by the building of the
Pendant Tramway in 1889.



Bleichert Ropeway

Katoomba
Coal Mine

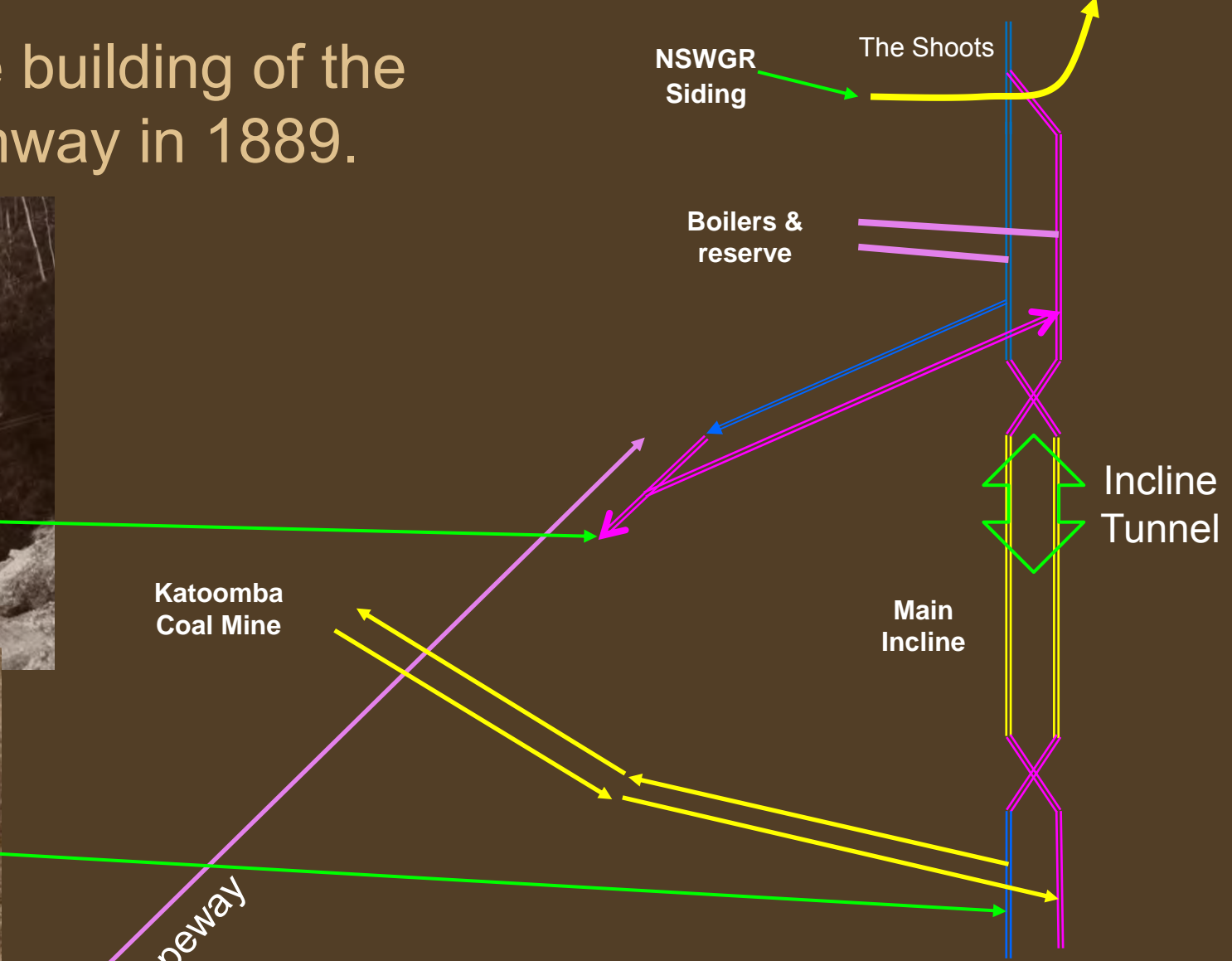
NSWGR
Siding

The Shoots

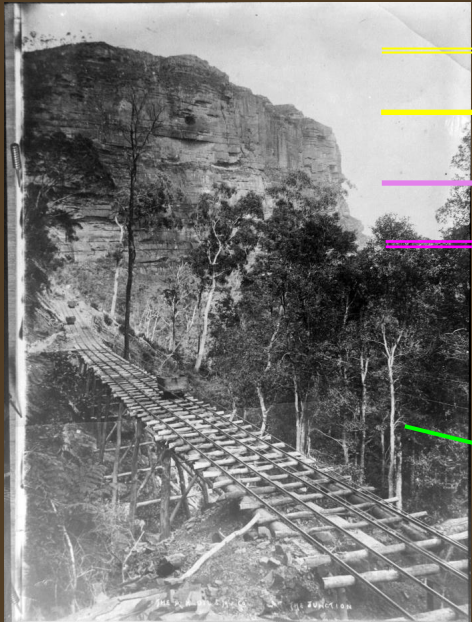
Boilers &
reserve






Main
Incline

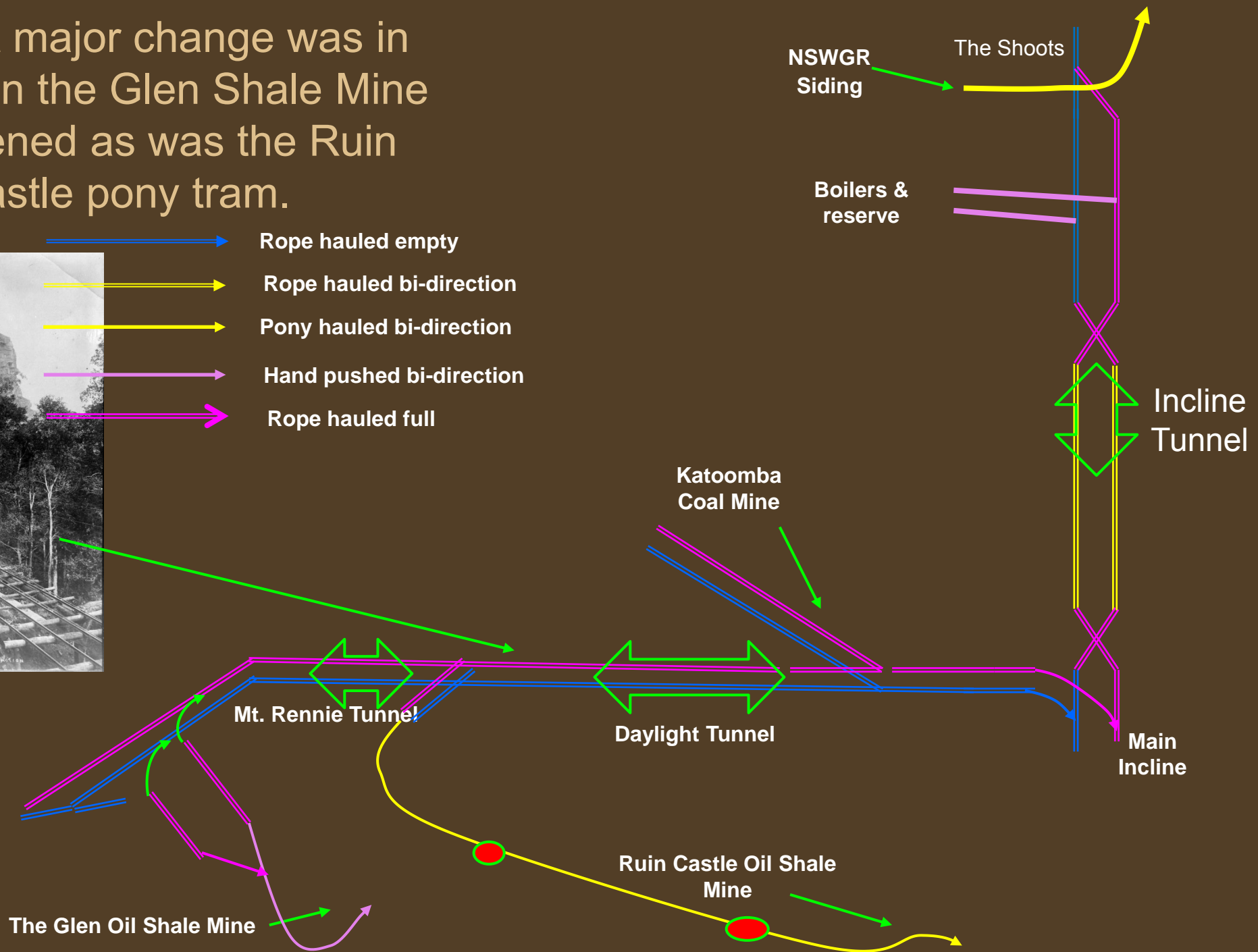
Incline
Tunnel

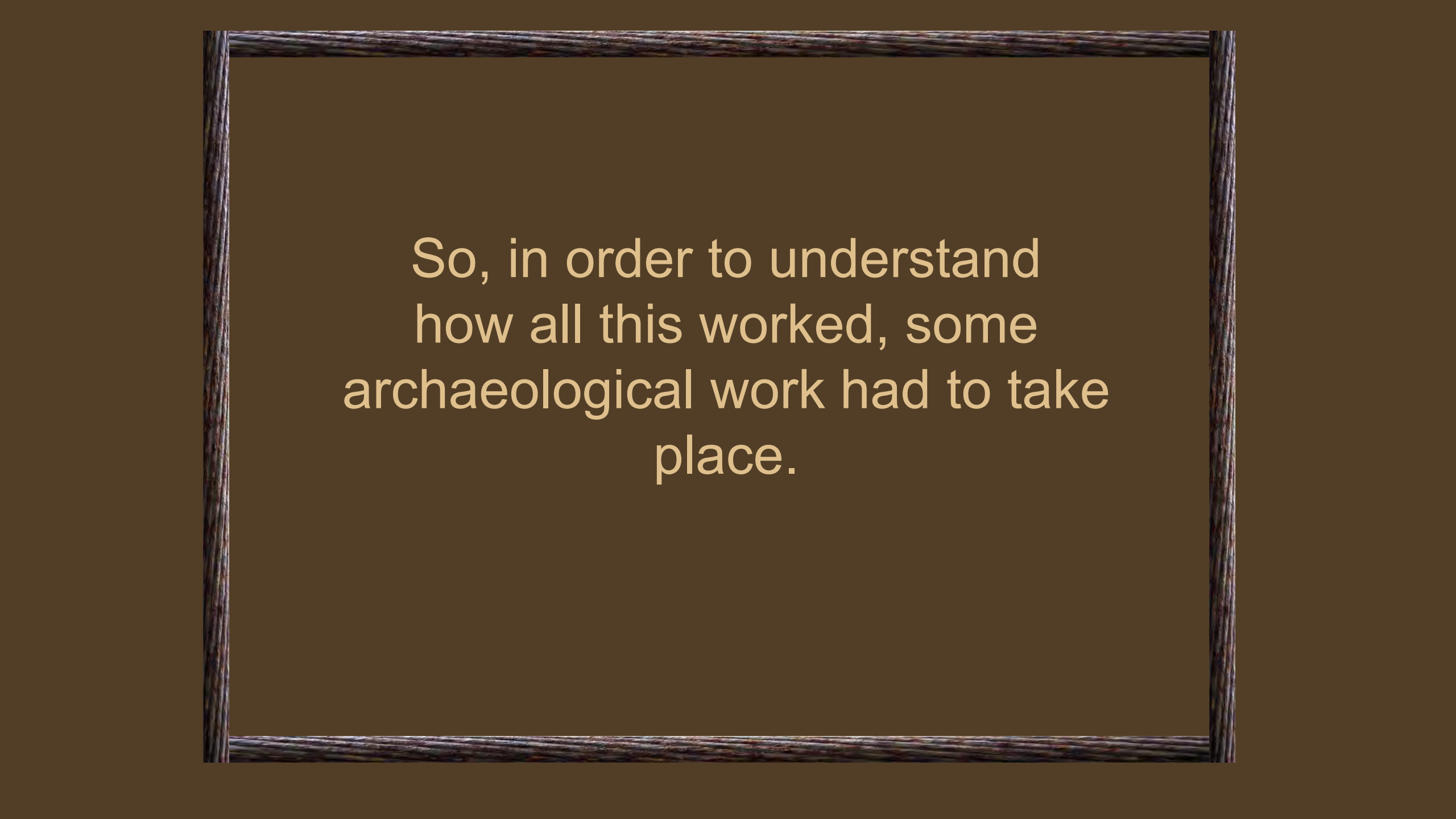


The next major change was in 1892 when the Glen Shale Mine was opened as was the Ruin Castle pony tram.



-  Rope hauled empty
-  Rope hauled bi-direction
-  Pony hauled bi-direction
-  Hand pushed bi-direction
-  Rope hauled full





So, in order to understand
how all this worked, some
archaeological work had to take
place.

The Shoots – What was there?

KATOOMBA

TOWNSHIP

North's
Subdivision

FROM DELTAURD'S...
Table Top Mountain
Charming views
Beautiful building sites
for Villas &c
THE DOUGLASS - KATOOMBA
BATHURST ST
WATERSON ST
GREAT WESTERN RAILWAY
KATOOMBA WATERFALL

SALE ON THE GROUND

Saturday ~~22^d~~ Sep '83

By **HARDIE GORMAN** 29th

Terms **TORRENS TITLE**
10% DEPOSIT
BALANCE IN
8 QUARTERLY PAYMENTS
EXTENDING OVER 2 YEARS

VENDOR
COVENANTS TO BUY BACK
WITH 7% INT ON
MONEY PAID
AT END OF
2 YEARS

PINE GULLY

GREAT WESTERN HOTEL

KATOOMBA WATERFALL

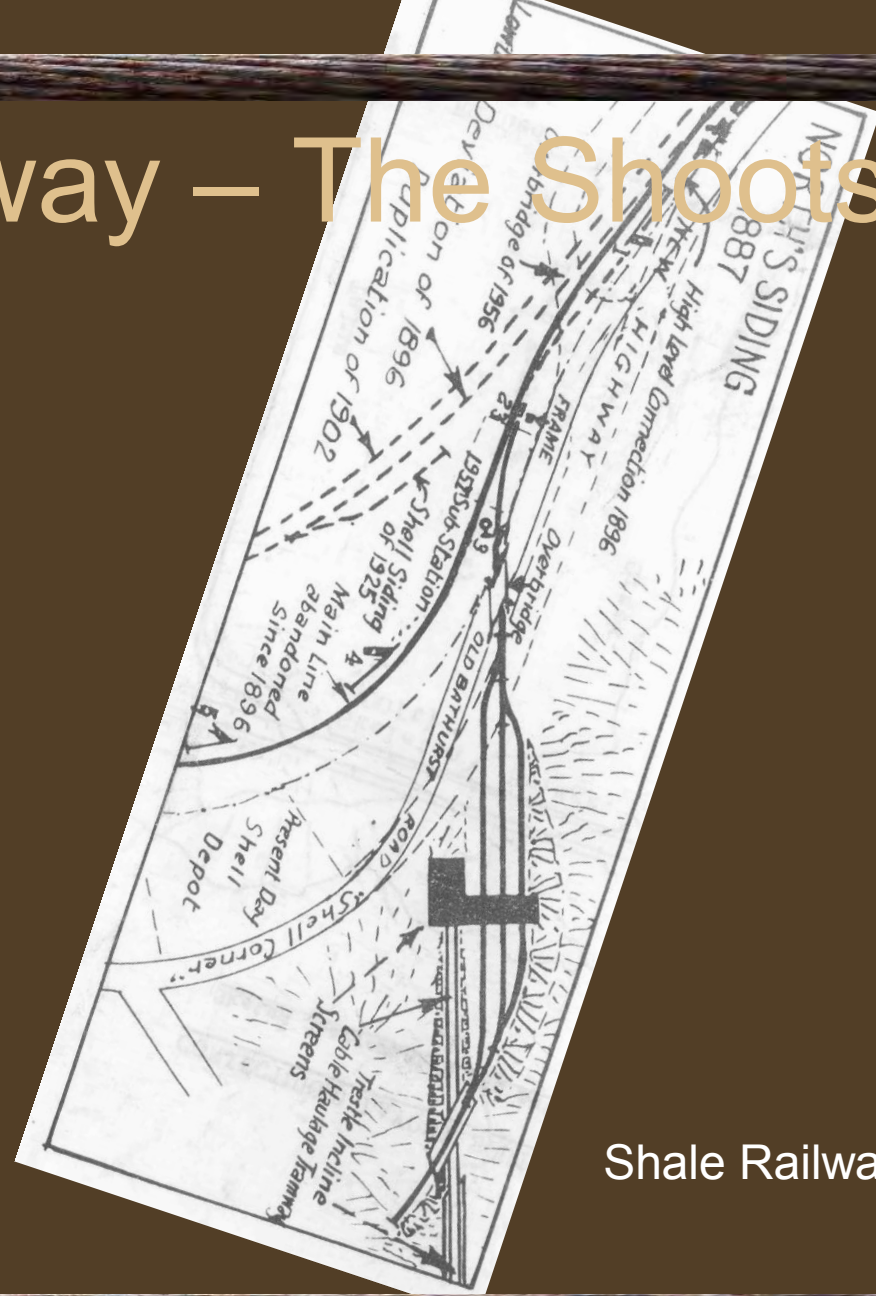
RECREATION RES. & CRICKET GROUND

L. A. CURTIS
LICENSED SURVEYOR
30 Syd. Arcade

The shaded lots
are not for sale

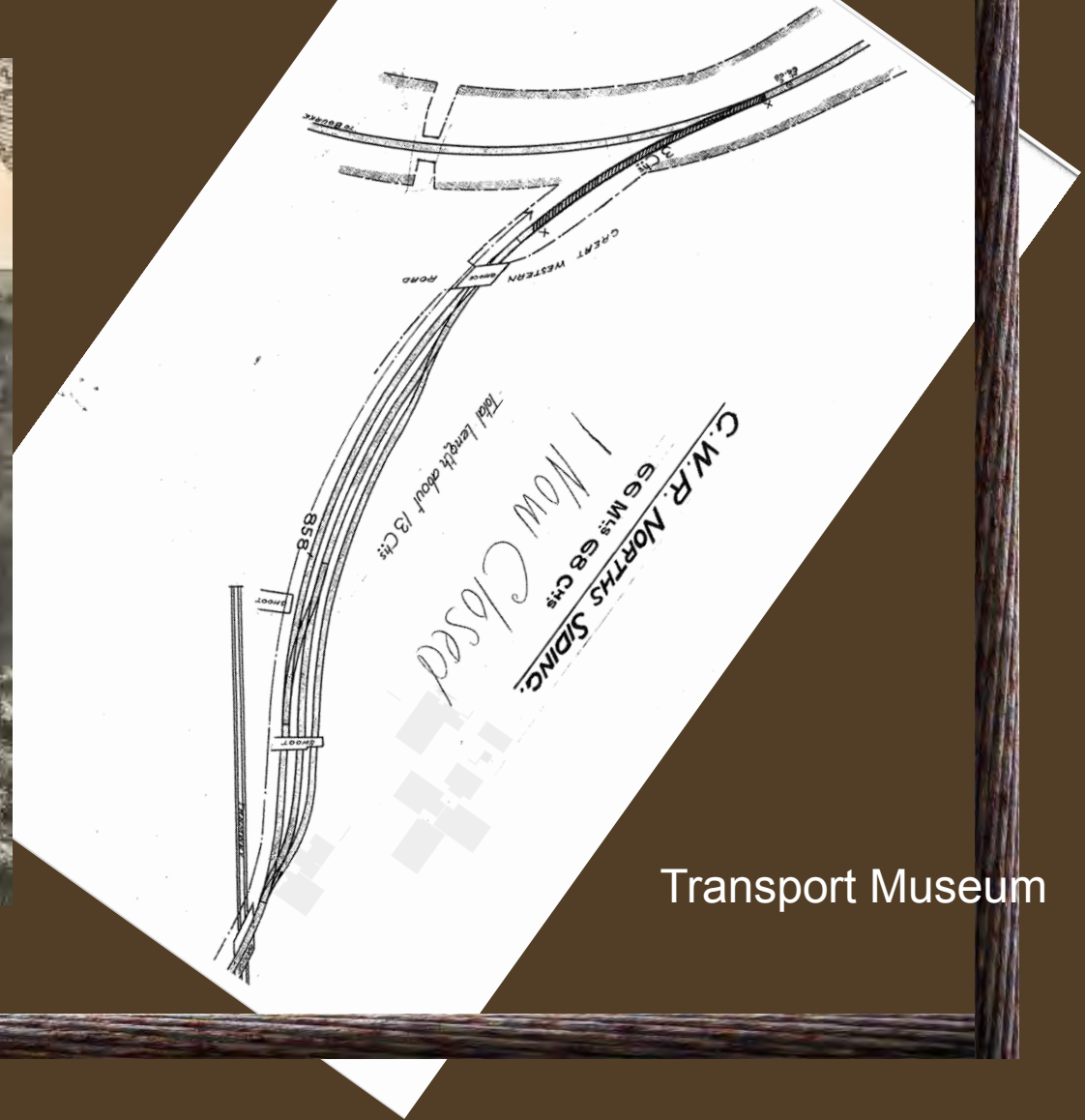
©1883, SYDNEY, N. S. W. PRINTED BY J. H. COOPER

North's Tramway – The Shoots



Shale Railways of NSW

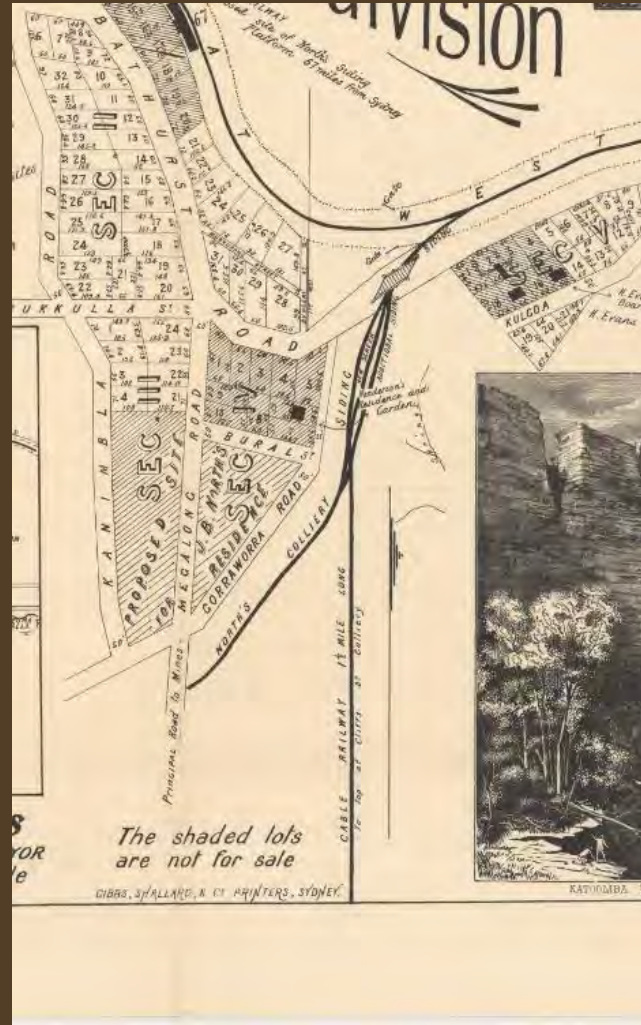
North's Tramway – The Shoots



The Shoots



Zooming in.....



A great place to start
as it has remained
undisturbed since
1905.

The Shoots



And today
looks like this.

The Shoots



Adjust the scale.

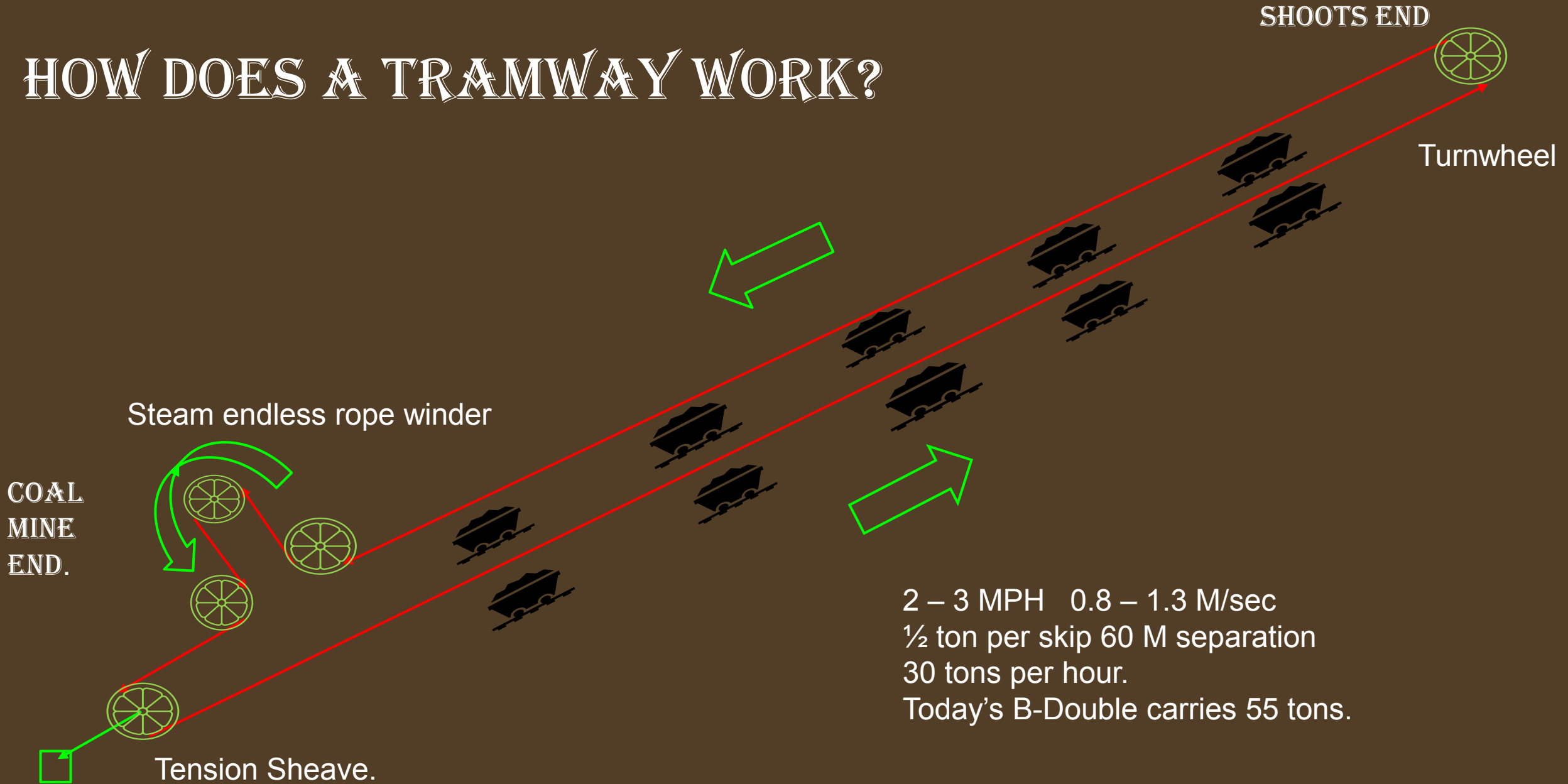
The Shoots

And overlay the real estate map - we can see what used to be there.

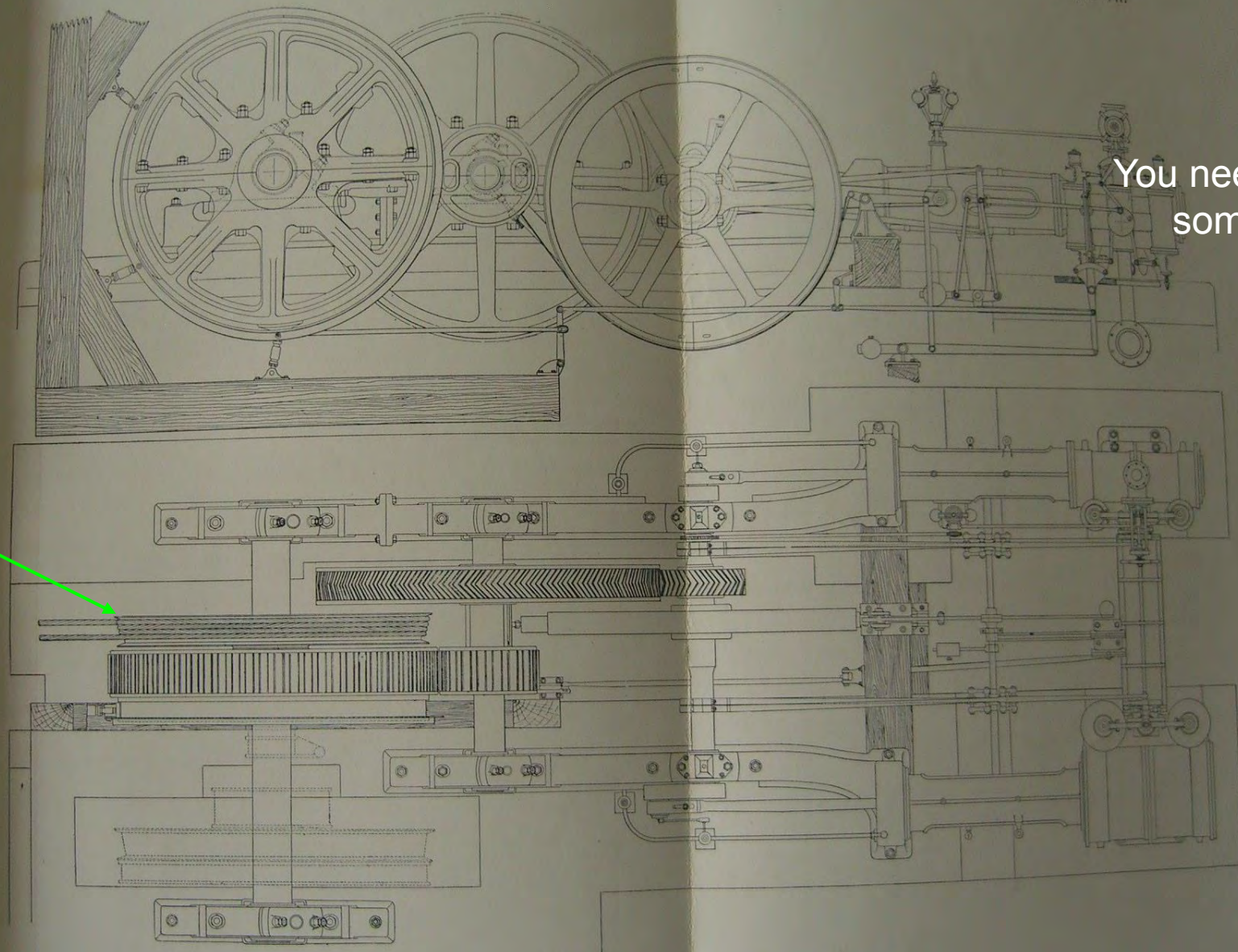
So now we can go searching.



HOW DOES A TRAMWAY WORK?



2 – 3 MPH 0.8 – 1.3 M/sec
½ ton per skip 60 M separation
30 tons per hour.
Today's B-Double carries 55 tons.



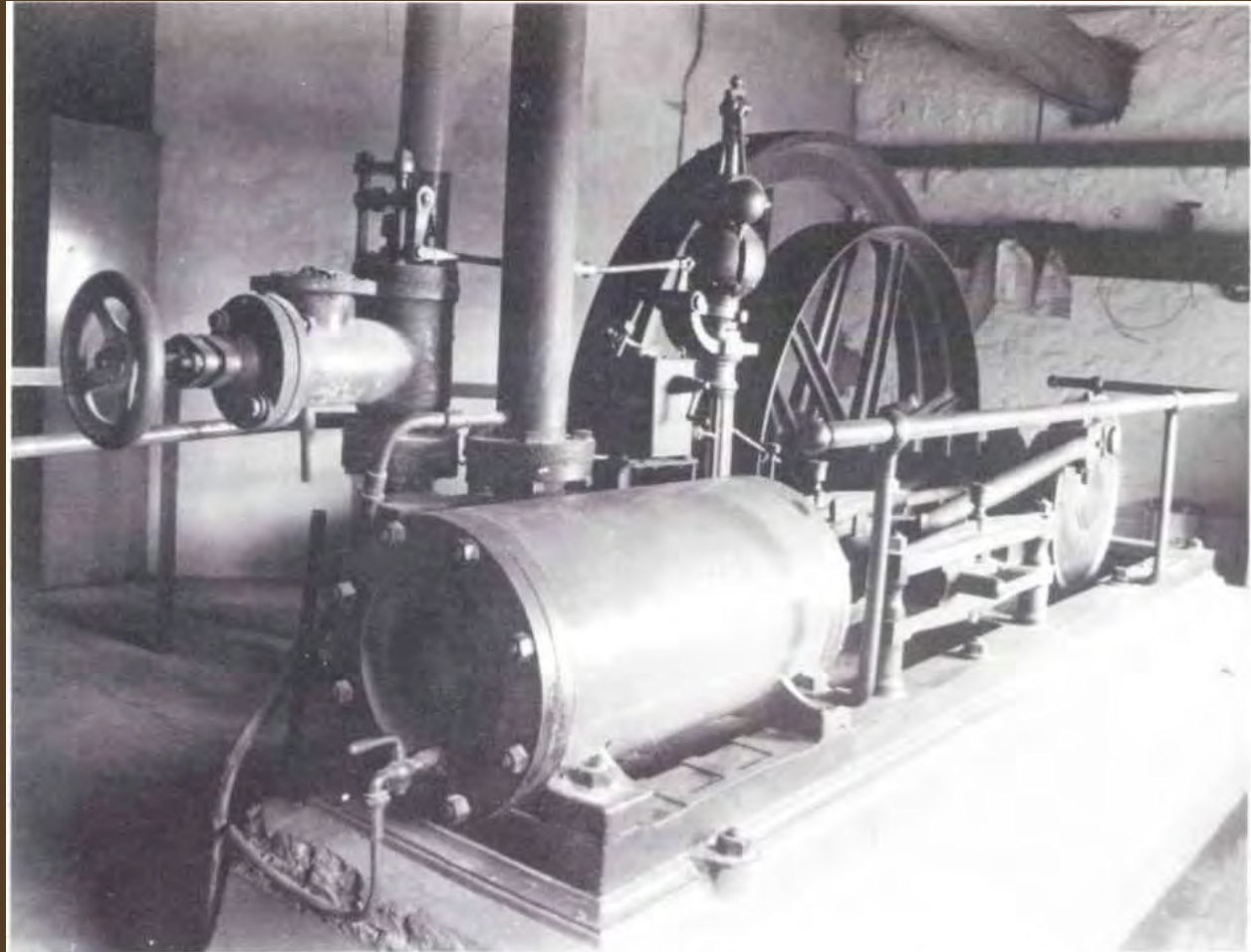
Surge Wheel



You need a steam engine something like this

COMPOUND ENGINE DRIVING ENDLESS-ROPE HAULAGE

8-61
255 0
8.250
72-100
RTEDI
DI
05593
ERCOLEDI
MERCREDI
60
62
64



Or this....

Breweries and whisky distilleries used a large number of small engines. This single-cylinder horizontal engine drove machinery at the Glenmoray-Glenlivet distillery. Fitted with a throttle governor and simple slide valve, it was built by G. Chrystal, St John's Foundry, Perth, about 1897.

The Shoots

At the top end there was a turnwheel something like this.



The Shoots

HERE



Highly trained sniffer dog on the case



And Brian Fox's walking team.

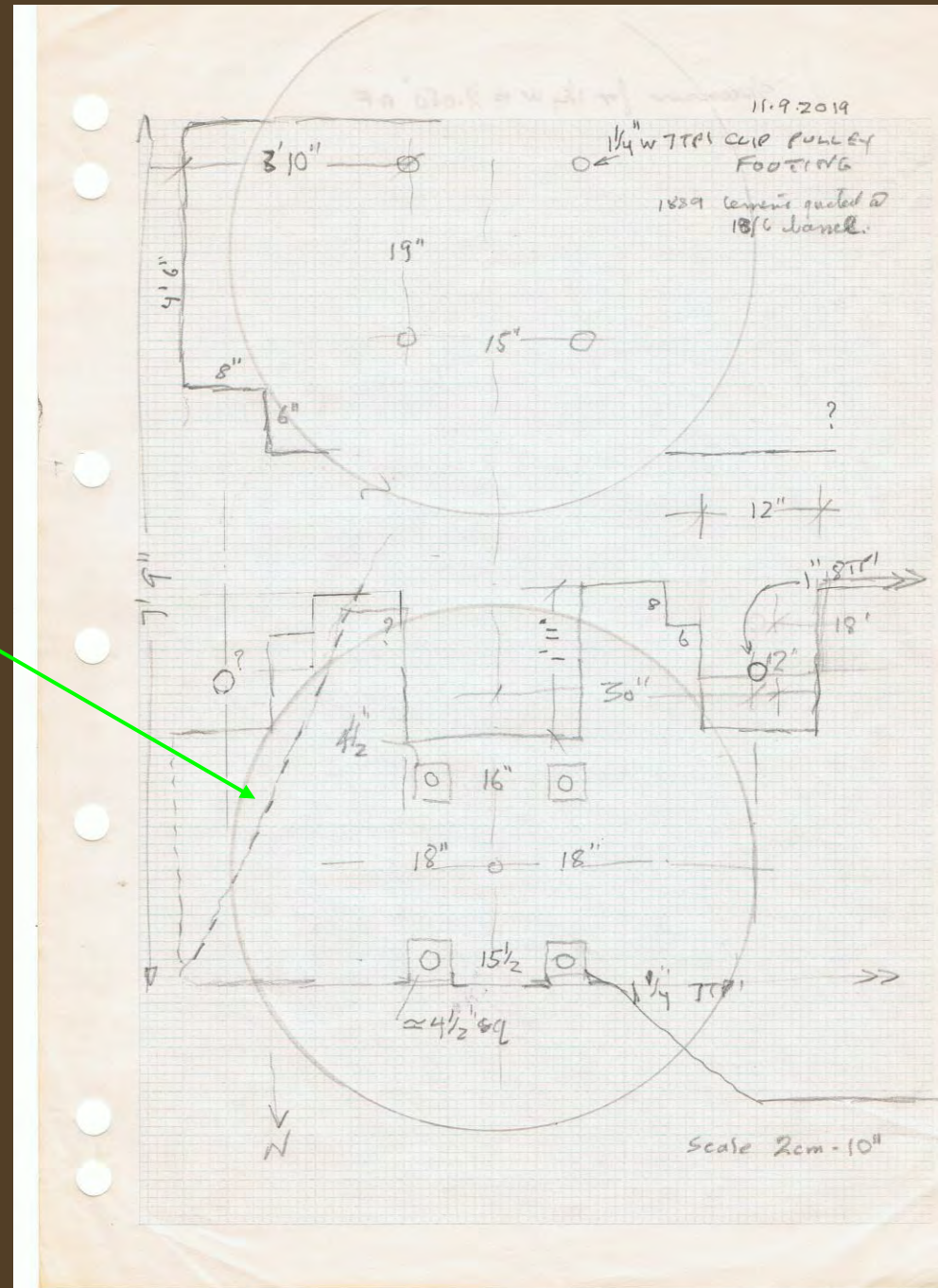


This is what they found.





Here are the 2 concrete footings still on site.
On the left the original turnwheel footing.
On the right the clipwheel footing.



KATOOMBA COAL MINE TRAMWAY PROFILE



Total lift 99M Total Distance 2111M
Skip spacing 60M. Transit time at 1 M/S=35 min
Avg Gradient 2.7 deg.
Weight of coal = 17 tons Power approx. 10 HP/7.8kW
Plus friction!!!

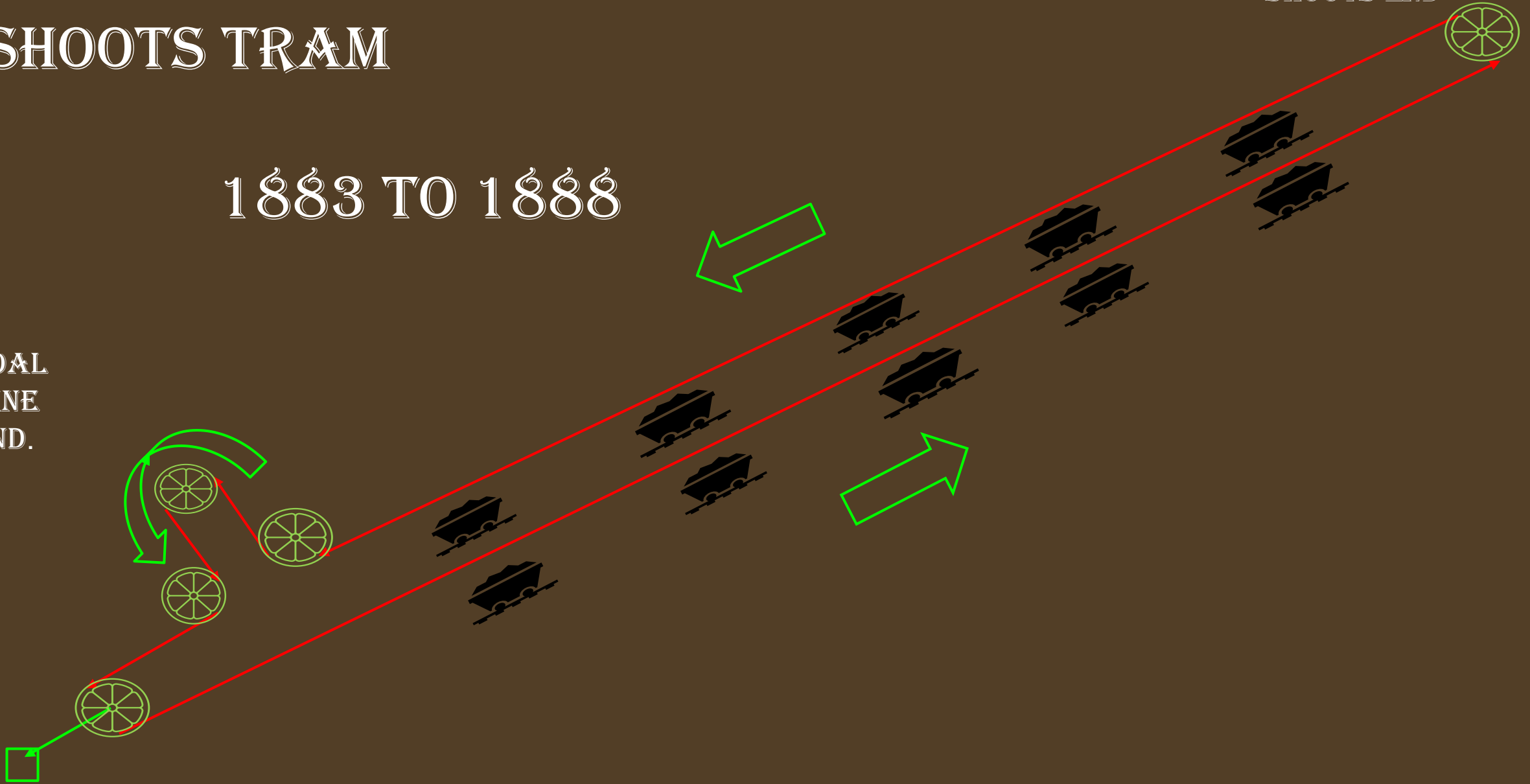


DRIVE CHANGES TO THE SHOOT'S TRAM

SHOOT'S END

1883 TO 1888

COAL
MINE
END.



Gladstone Pendant Tramway 1888

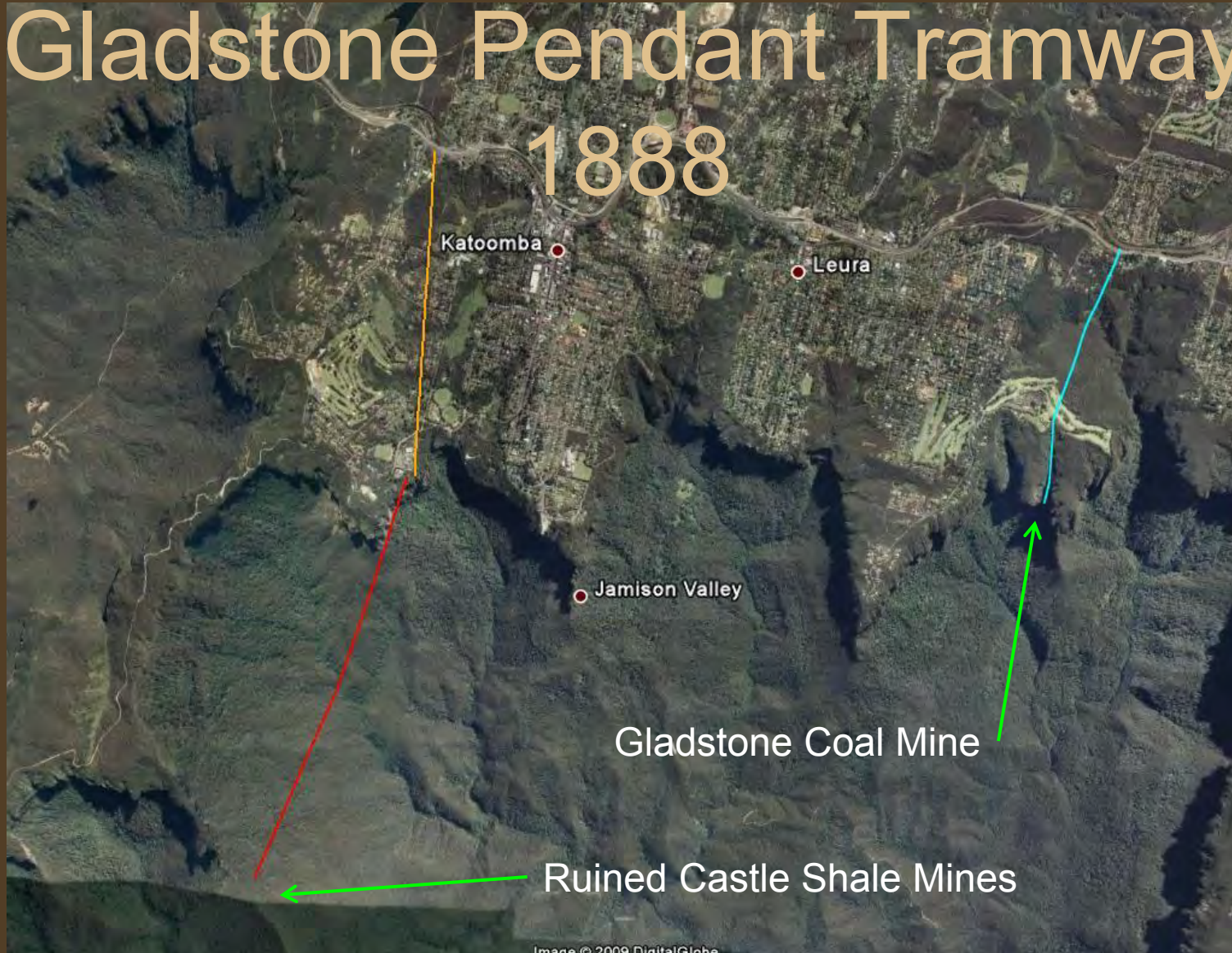


Image © 2009 DigitalGlobe

Image © 2009 Sinclair Knight Merz

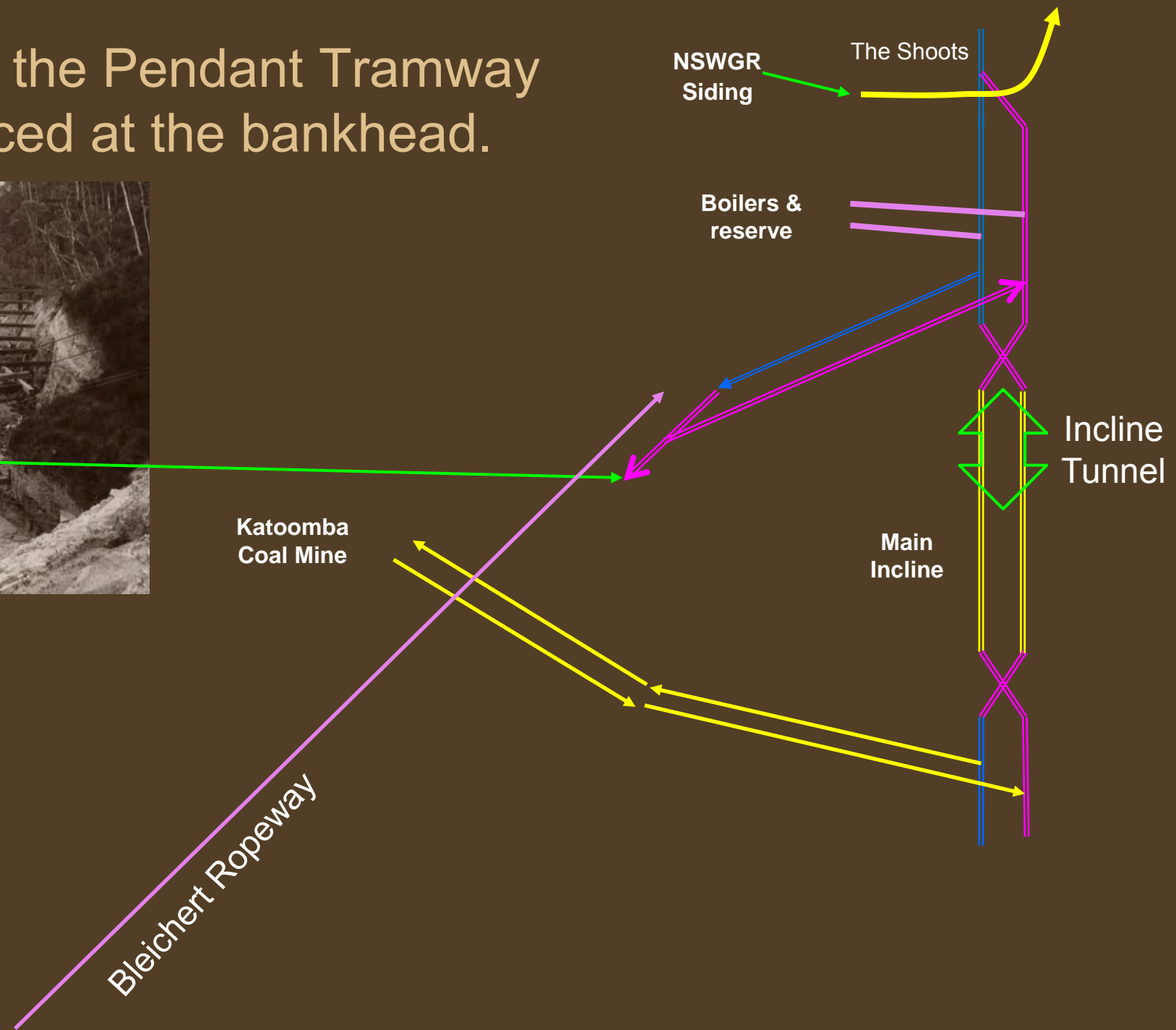
33°43'53.36" S 150°19'07.17" E

elev 725 m

Mar 15, 2007

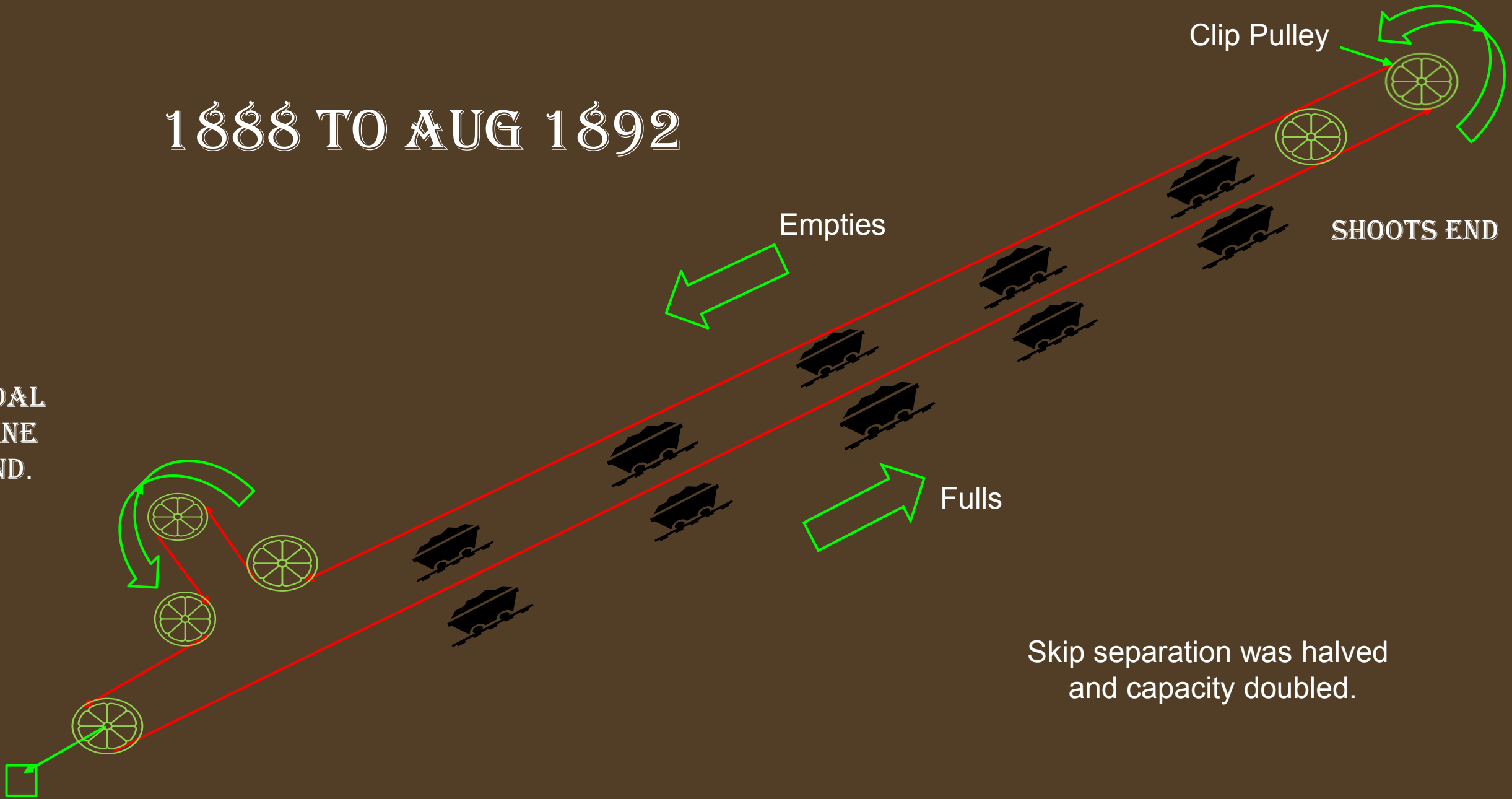
Eye alt 8.90 km

The skips from the Pendant Tramway were introduced at the bankhead.



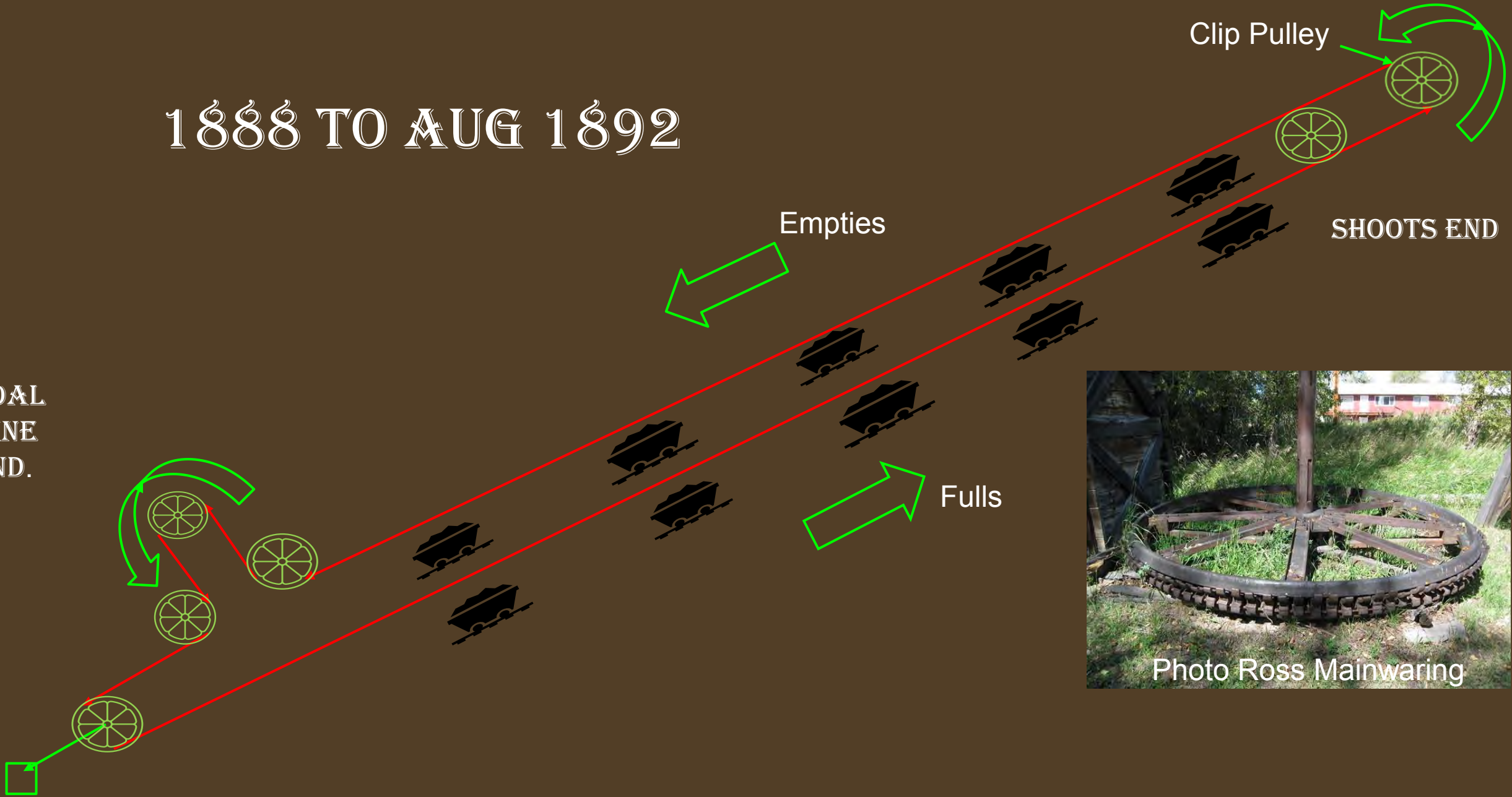
1888 TO AUG 1892

COAL
MINE
END.



1888 TO AUG 1892

COAL
MINE
END.

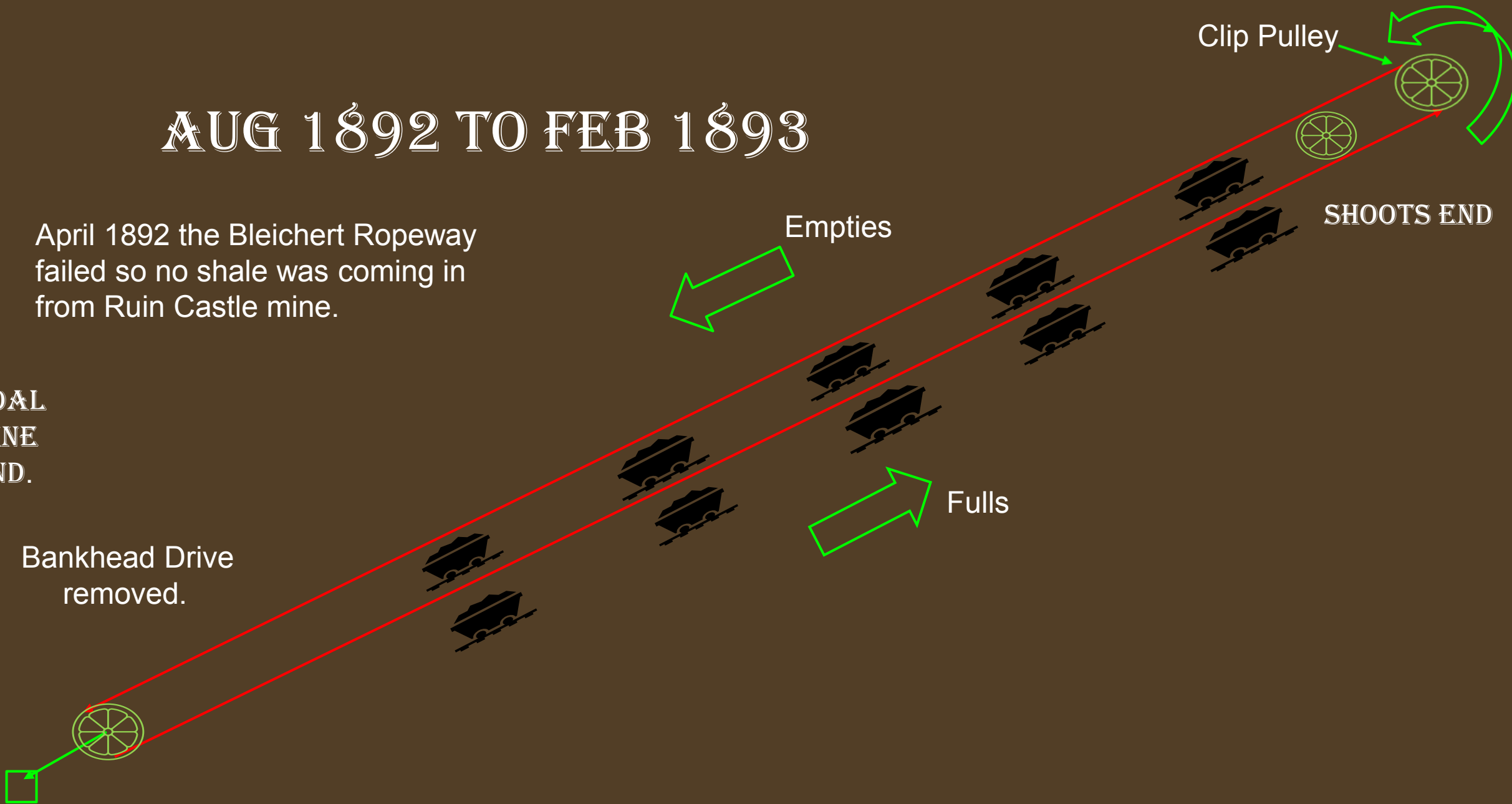


AUG 1892 TO FEB 1893

April 1892 the Bleichert Ropeway failed so no shale was coming in from Ruin Castle mine.

COAL
MINE
END.

Bankhead Drive
removed.

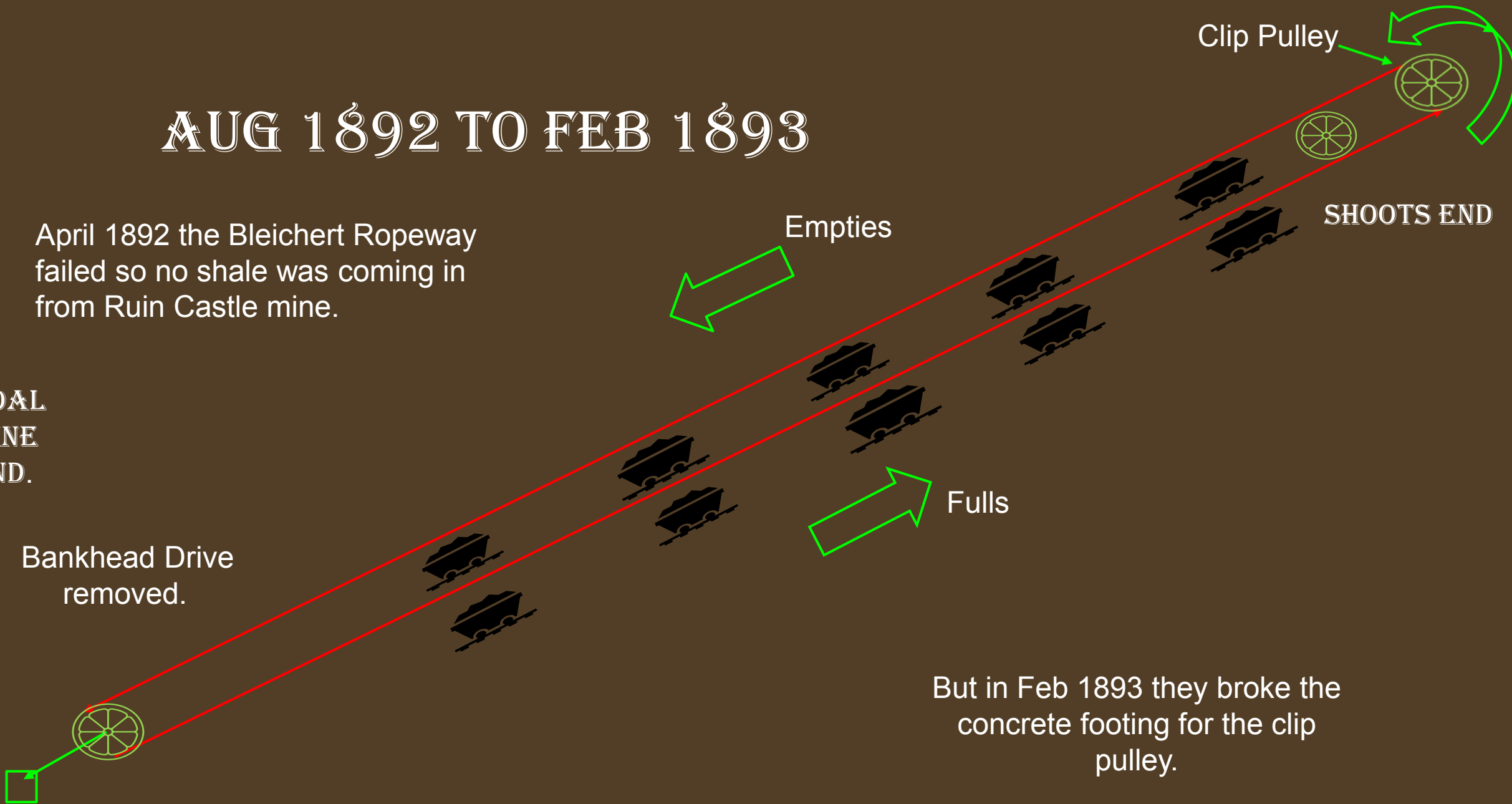


AUG 1892 TO FEB 1893

April 1892 the Bleichert Ropeway failed so no shale was coming in from Ruin Castle mine.

COAL
MINE
END.

Bankhead Drive
removed.



But in Feb 1893 they broke the concrete footing for the clip pulley.

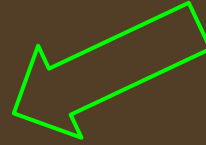
FEB 1893 TO 1895

The Bleichert drive was being used to power the Glen Tram.

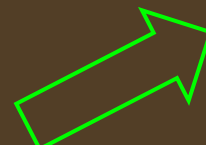
SHOOTS END



Empties

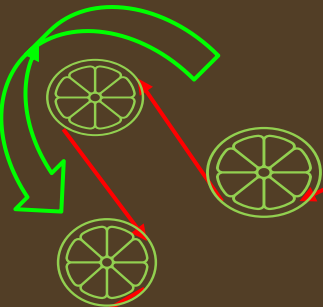


Fulls

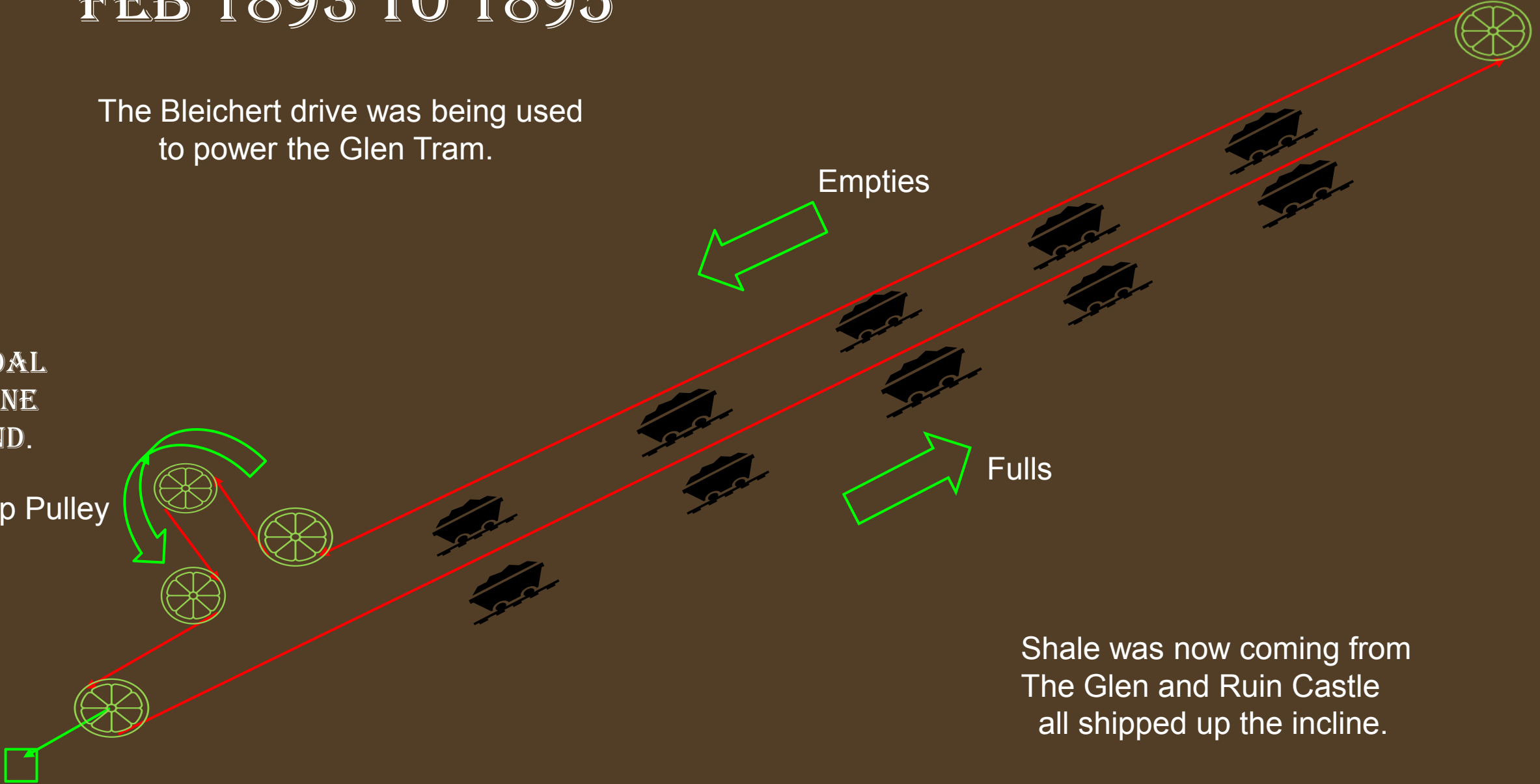


COAL
MINE
END.

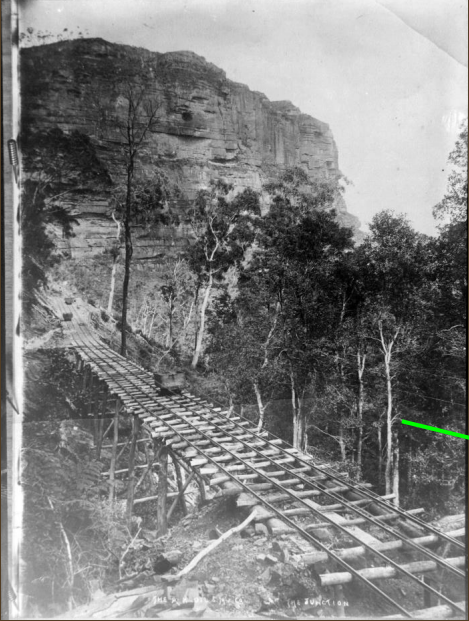
Clip Pulley



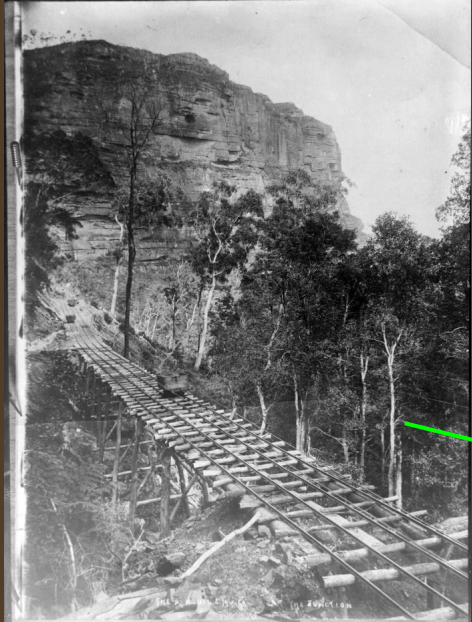
Shale was now coming from
The Glen and Ruin Castle
all shipped up the incline.



The system probably never ran at design capacity.



The only surge bins to hold surplus or seconds – were at the Shoots – anything else - one stop all stop.

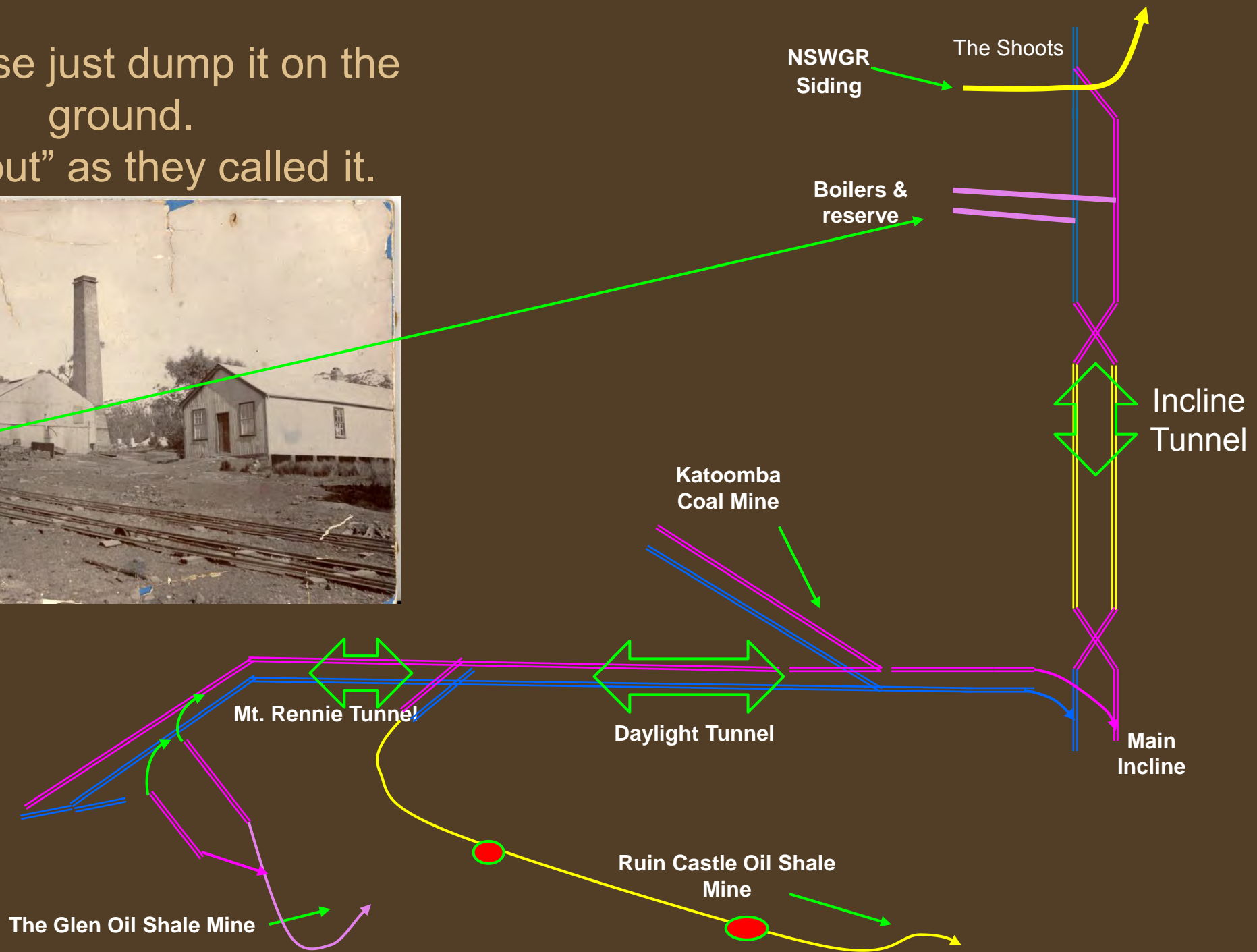


SECONDS AND SURPLUSES WERE
PUT DOWN THE CHUTE TO THE RECOVERY ROAD

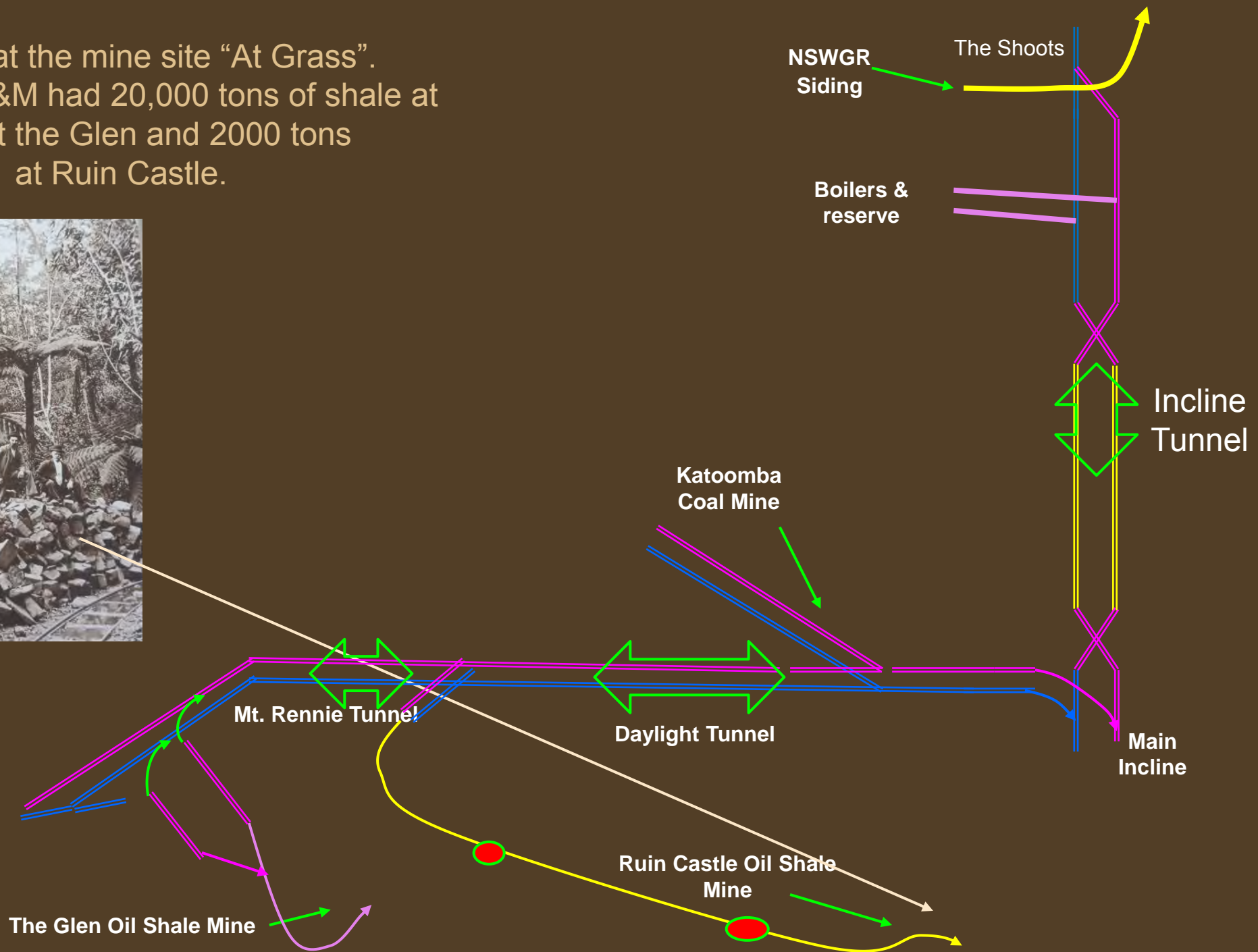


Otherwise just dump it on the ground.

“Shot out” as they called it.



Or if still at the mine site "At Grass".
In 1903 AKO&M had 20,000 tons of shale at
grass at the Glen and 2000 tons
at Ruin Castle.



Skip Movements



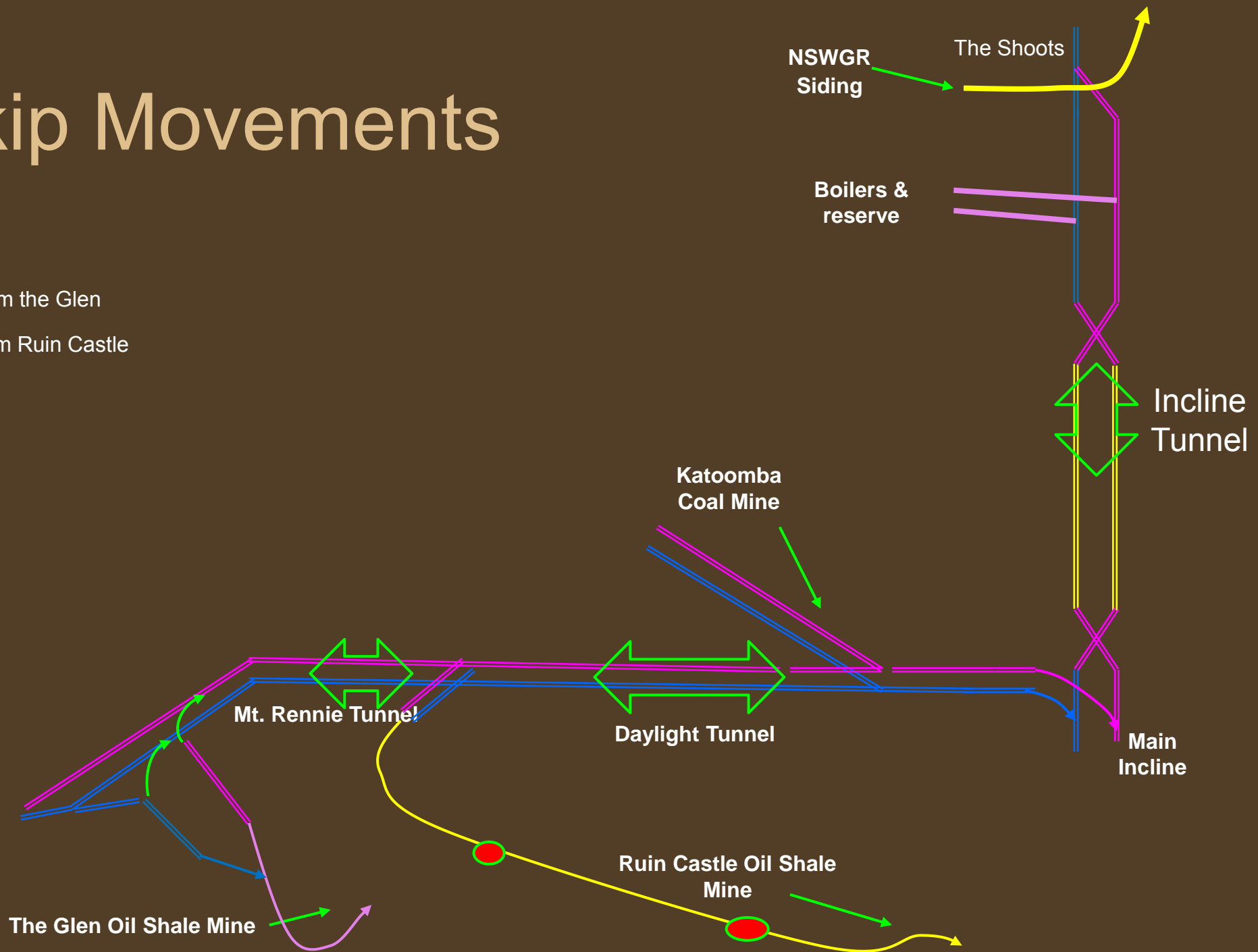
Coal



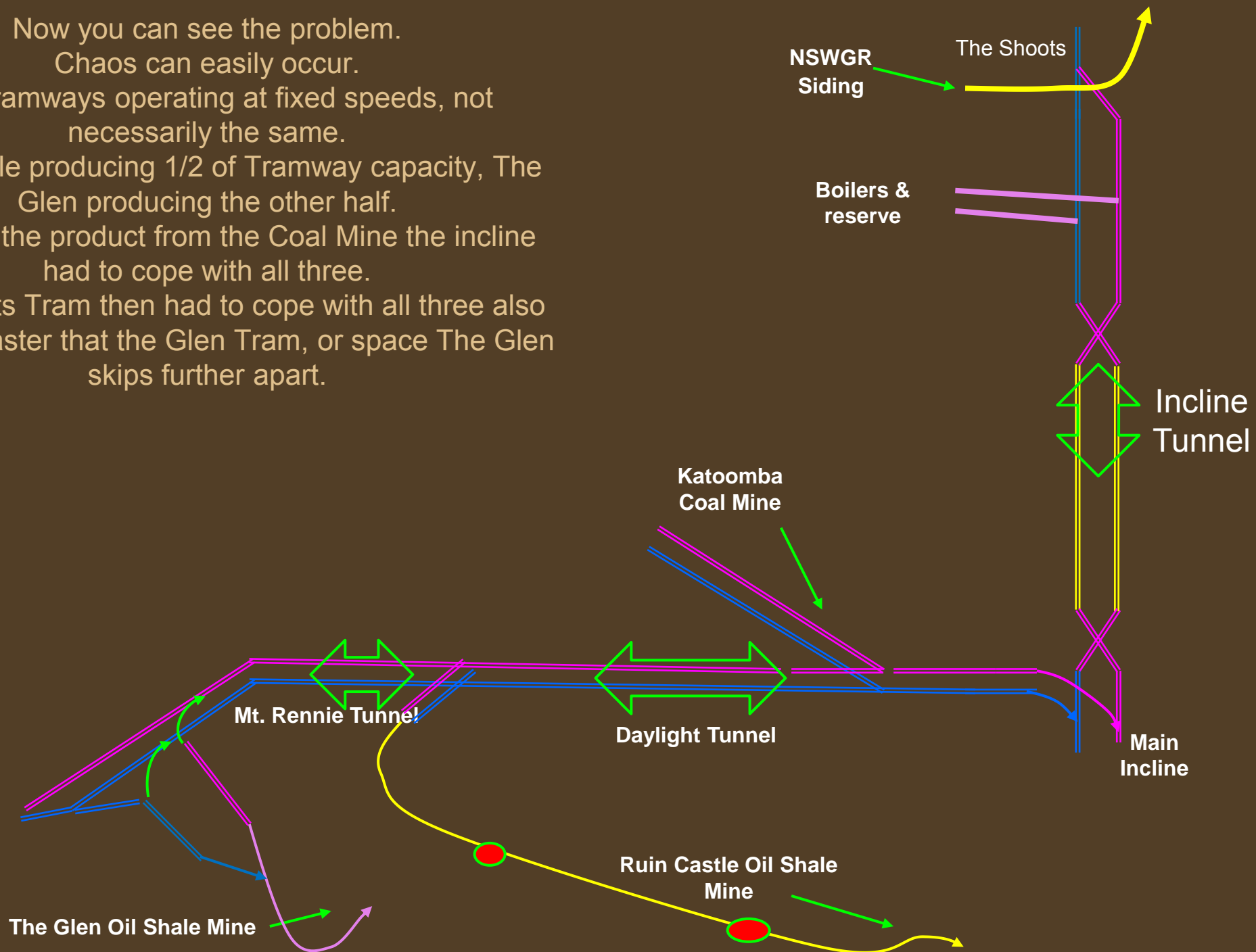
Shale from the Glen



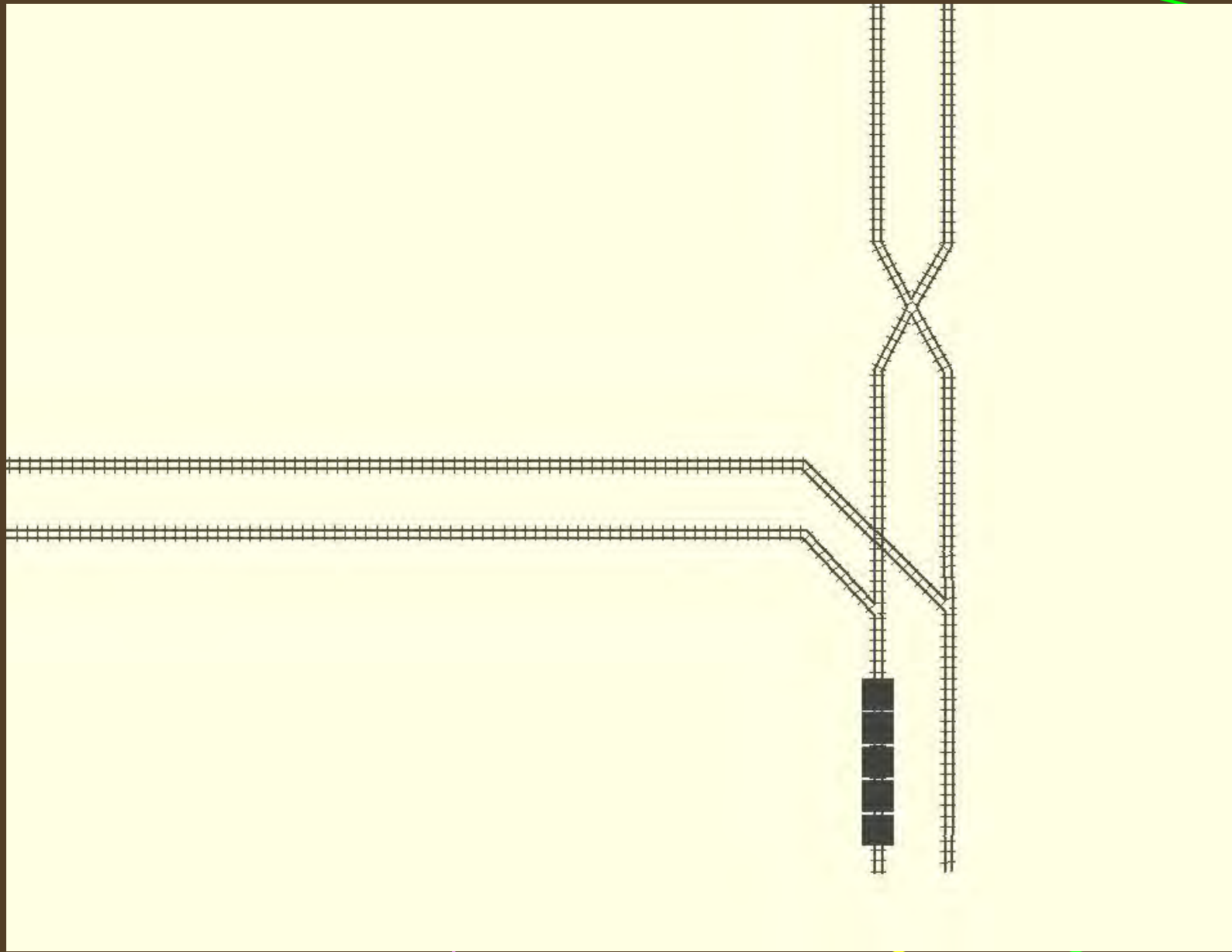
Shale from Ruin Castle



Now you can see the problem.
Chaos can easily occur.
Two tramways operating at fixed speeds, not necessarily the same.
Ruin Castle producing 1/2 of Tramway capacity, The Glen producing the other half.
Added to the product from the Coal Mine the incline had to cope with all three.
The Shoots Tram then had to cope with all three also – i.e. run faster than the Glen Tram, or space The Glen skips further apart.



John Cooper



NSWGR

The Shoots

Incline
Tunnel

Main
Incline

The Glen Oil Shale Mine



John simula



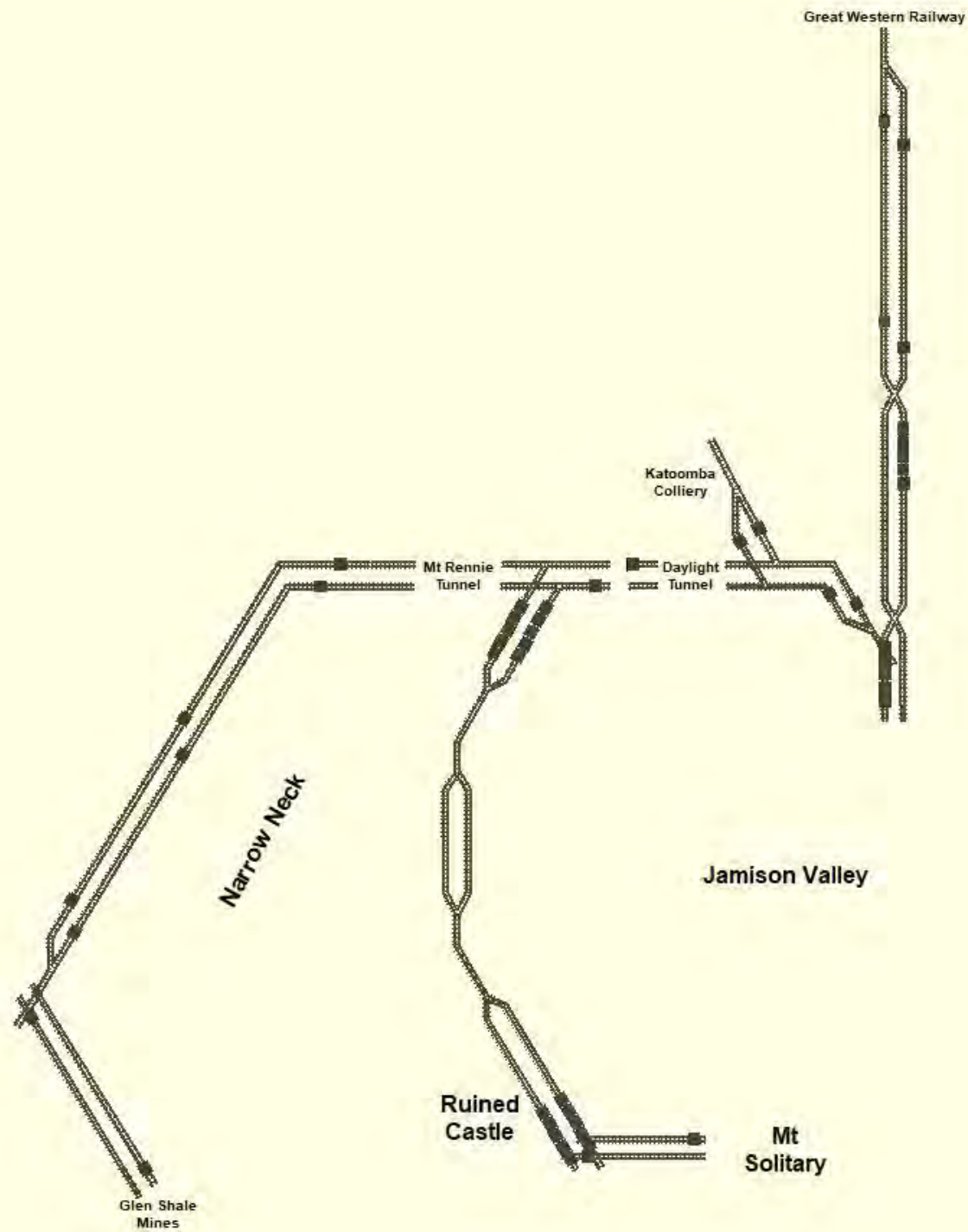
Coal



Shale from the Glen



Shale from Ruin Ca



Incline
Tunnel

In
line

The Glen

John Cooper

NSWGR

The Shoots

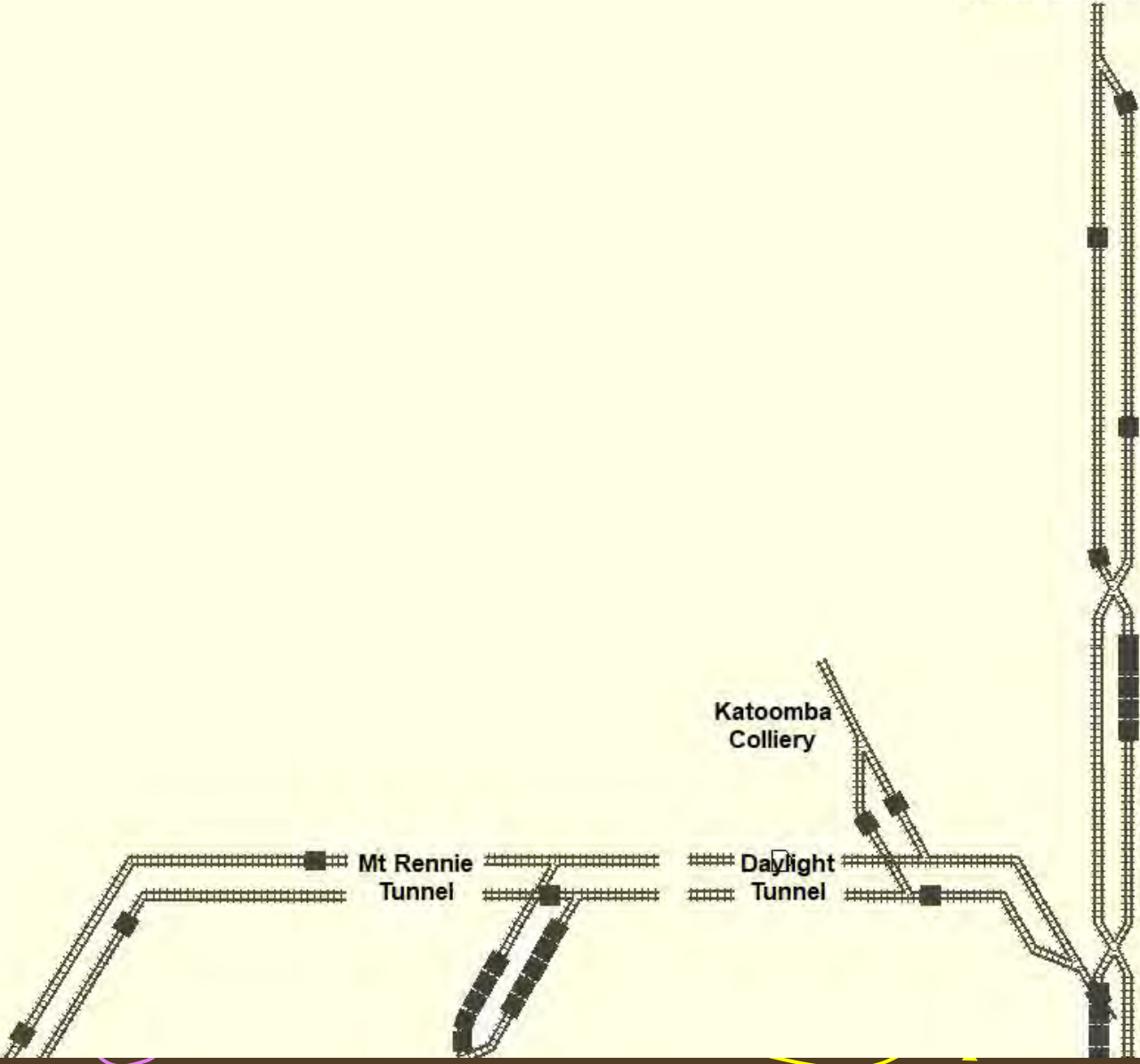


Great Western Railway

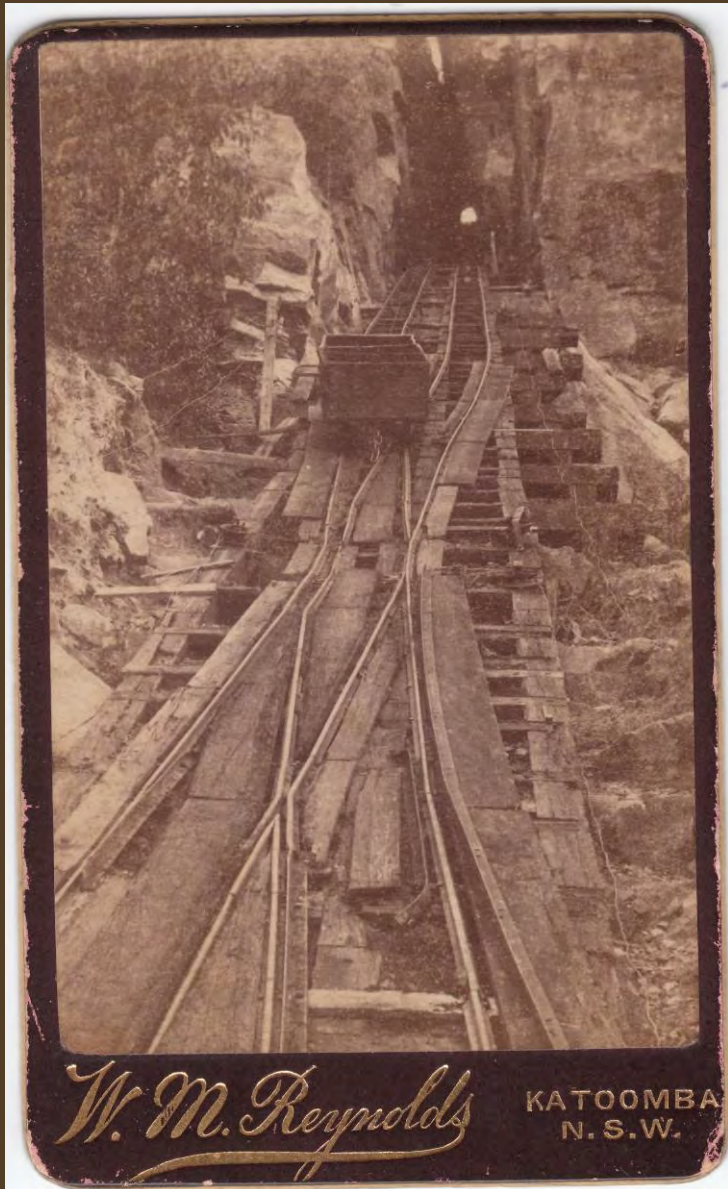
Katoomba Colliery

Mt Rennie Tunnel

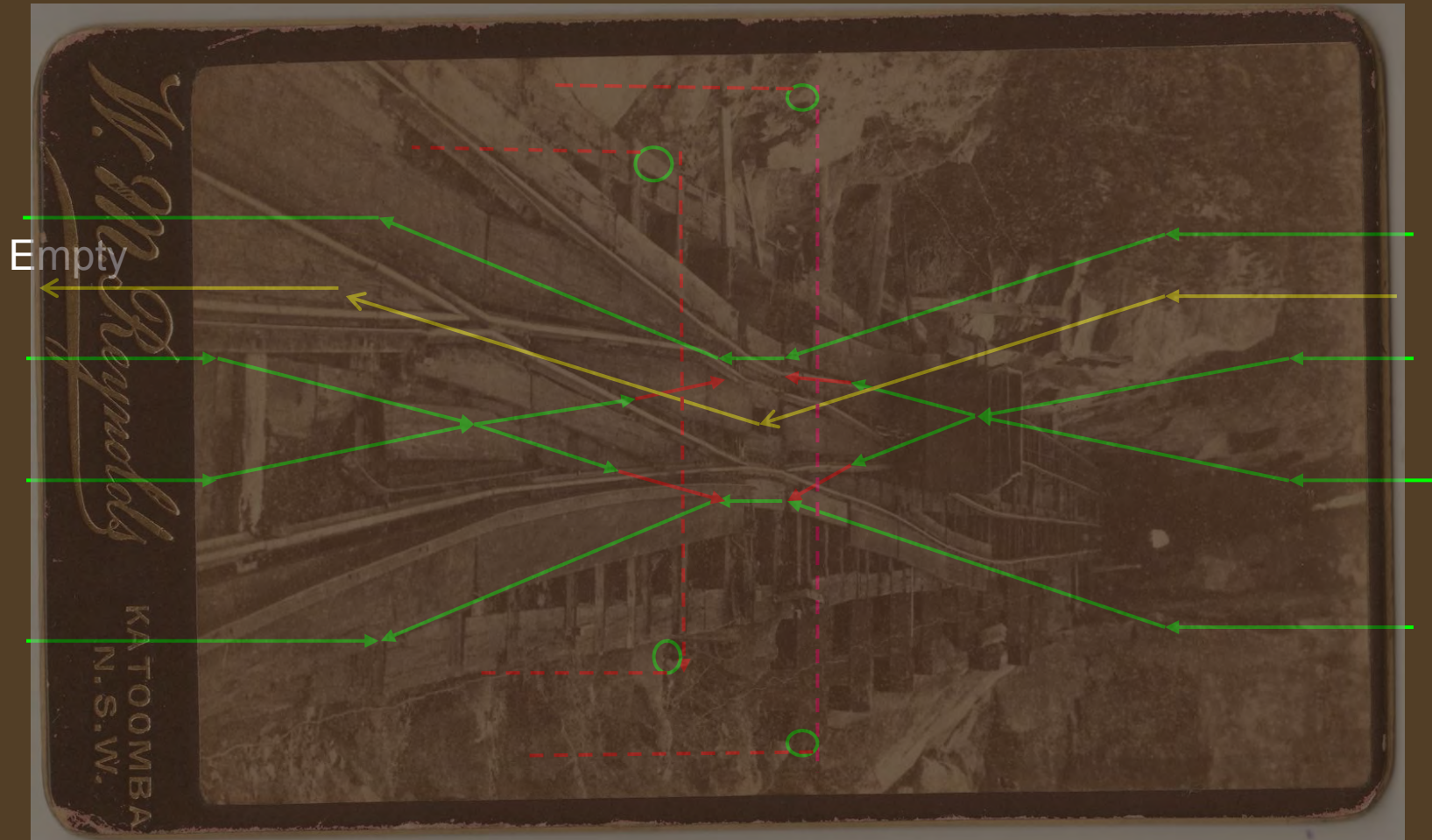
Daylight Tunnel



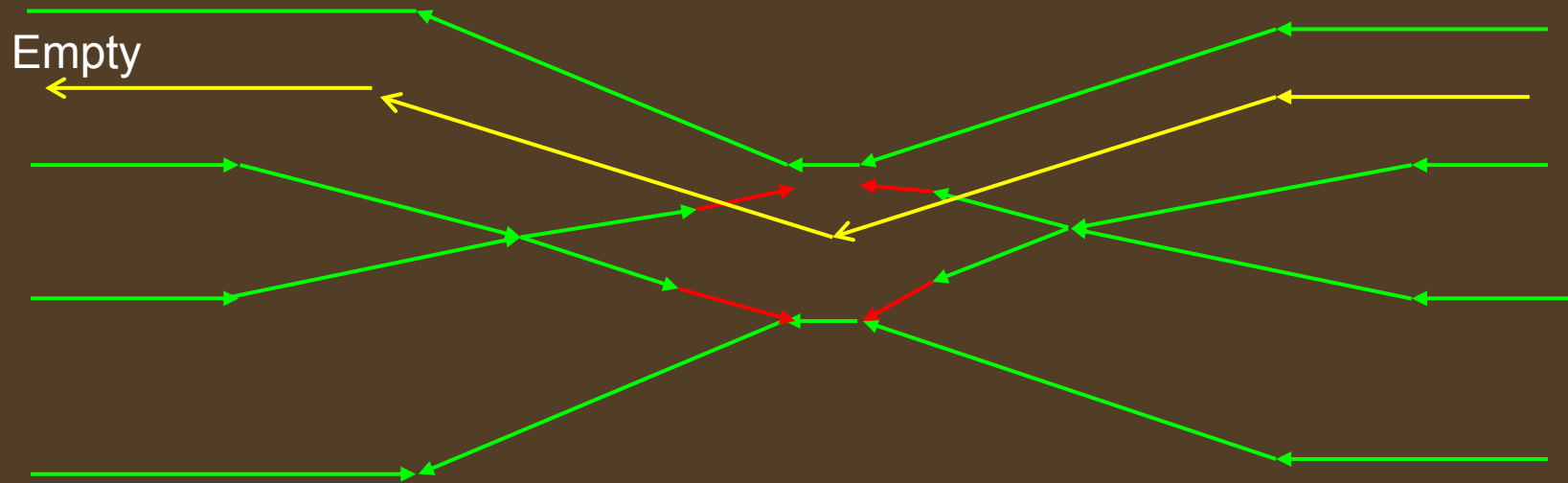
Let us look here



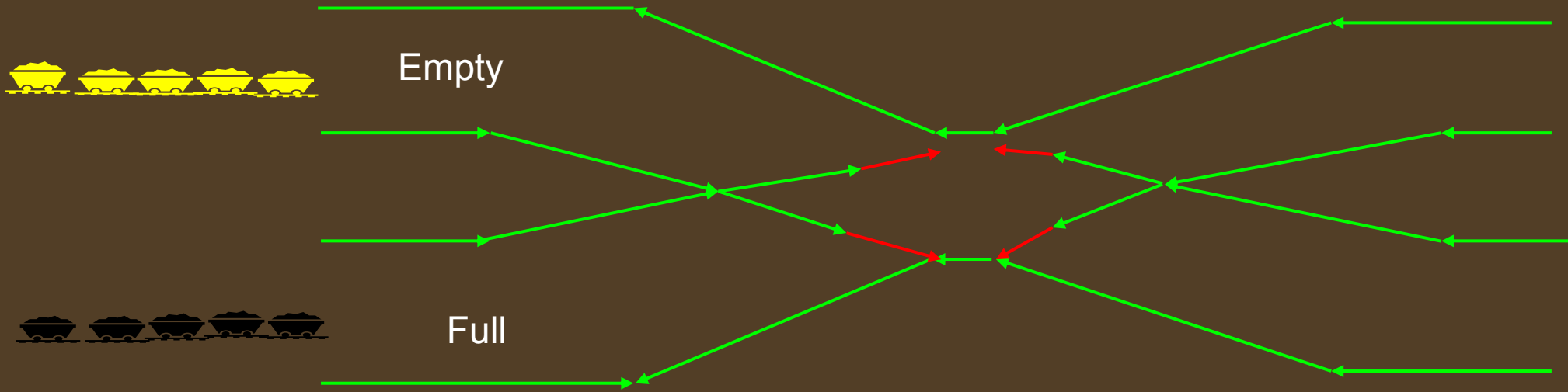
Double Slip Switch



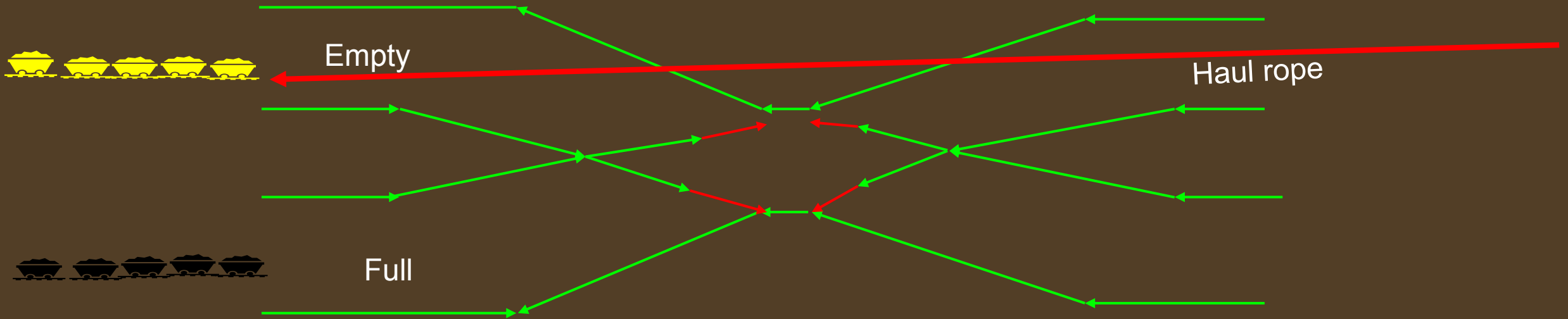
Double Slip Switch



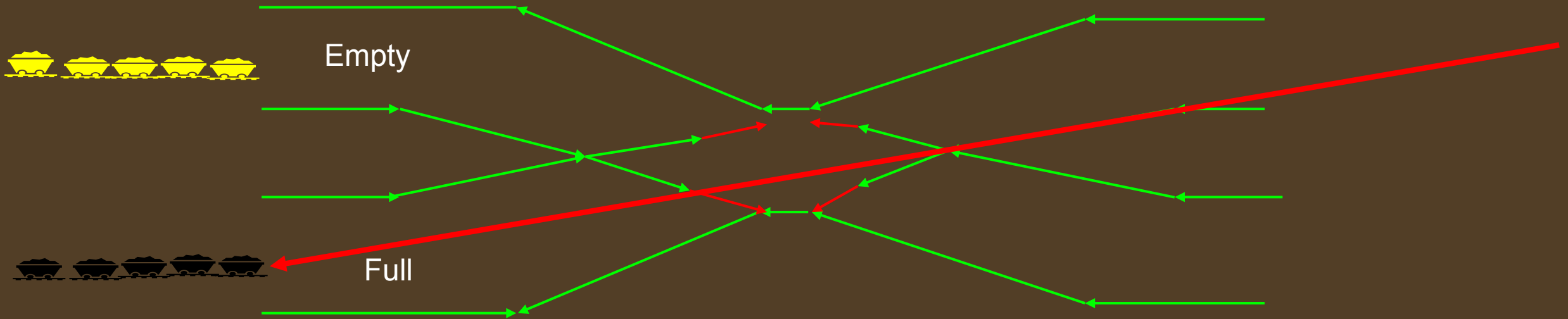
Double Slip Switch



Double Slip Switch



Double Slip Switch



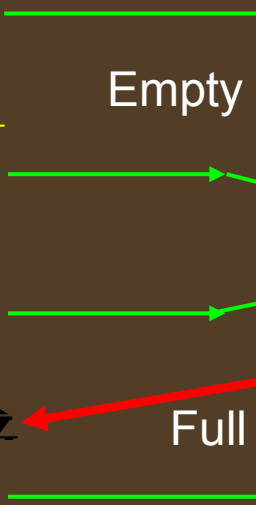
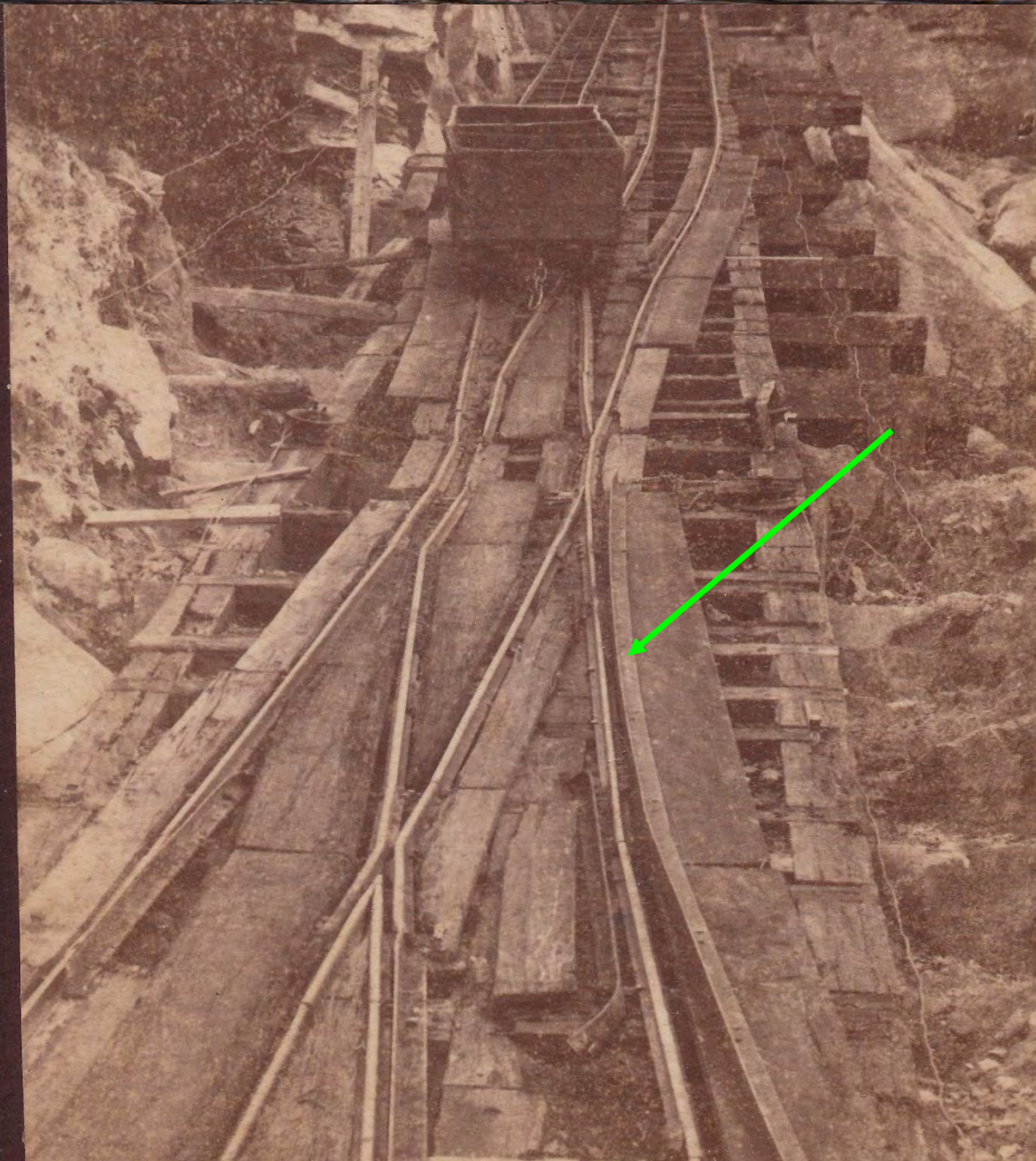
LAZY POINTS



Empty



Full

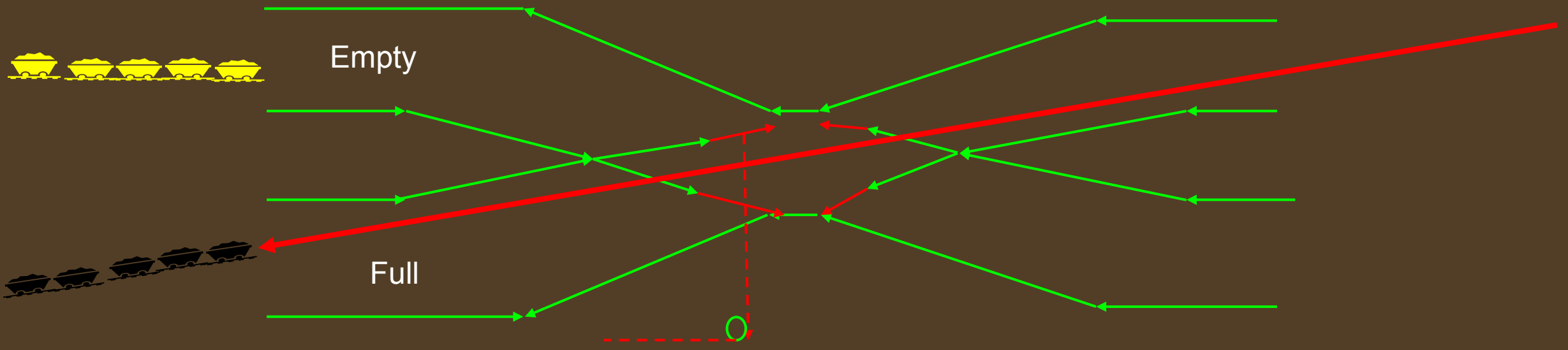




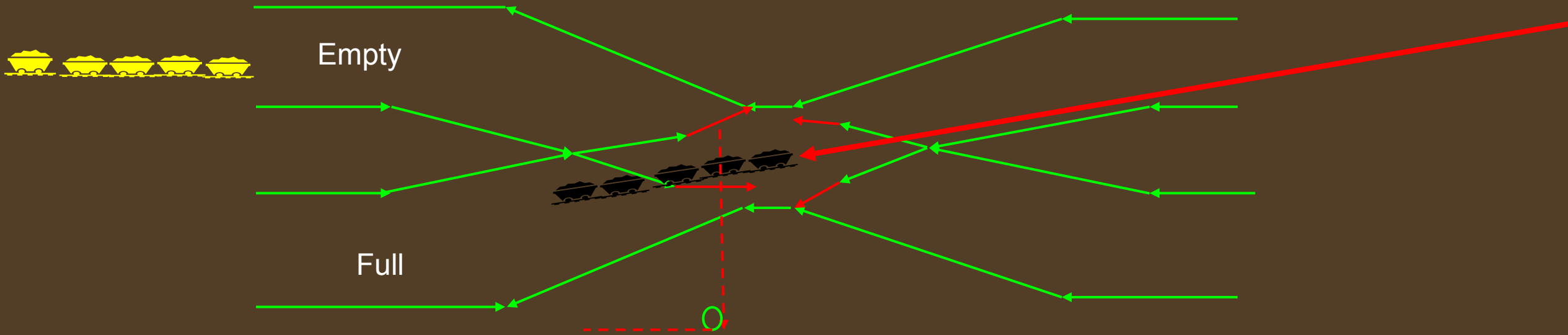
Double Slip Switch



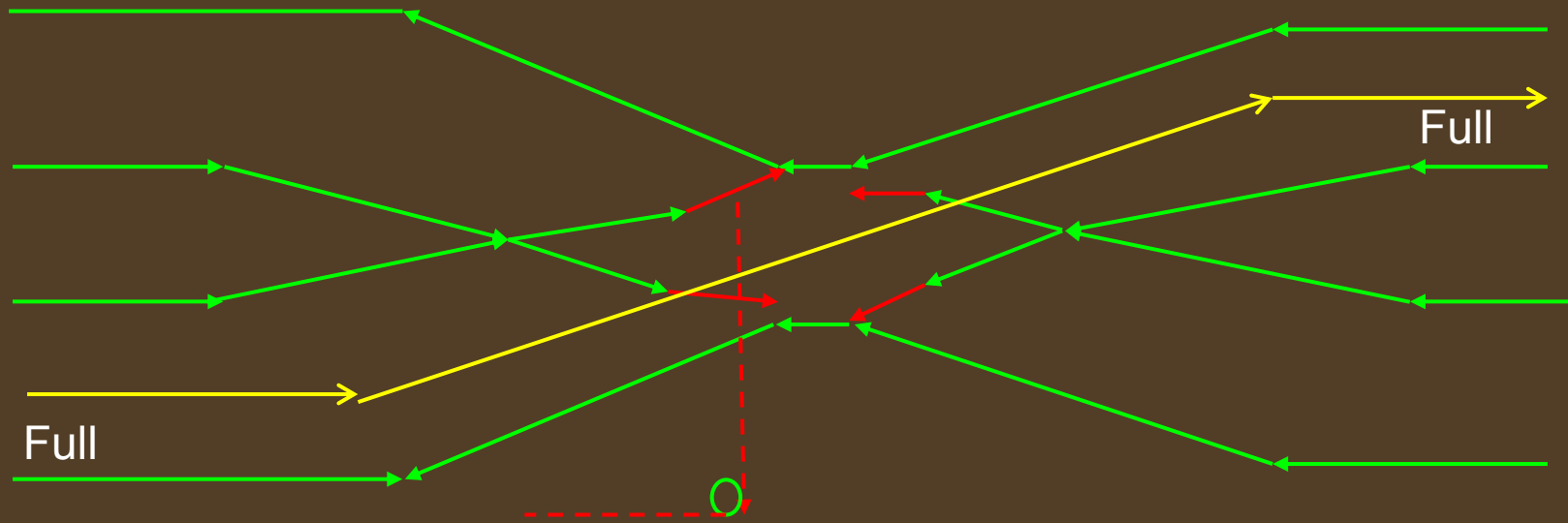
Double Slip Switch



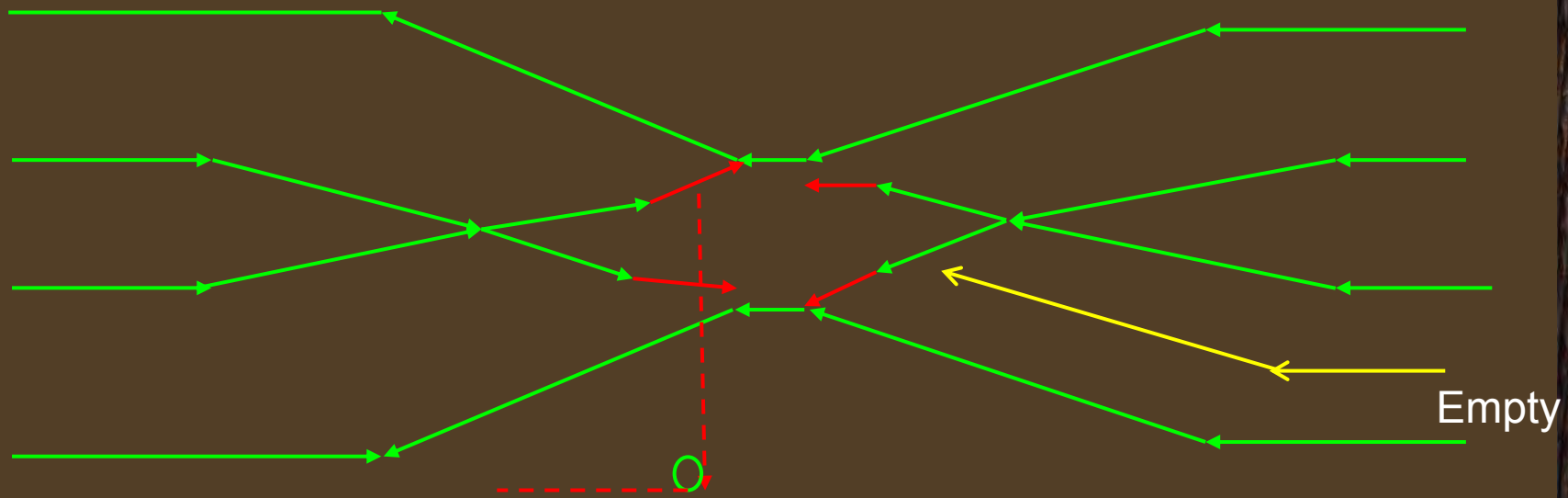
Double Slip Switch



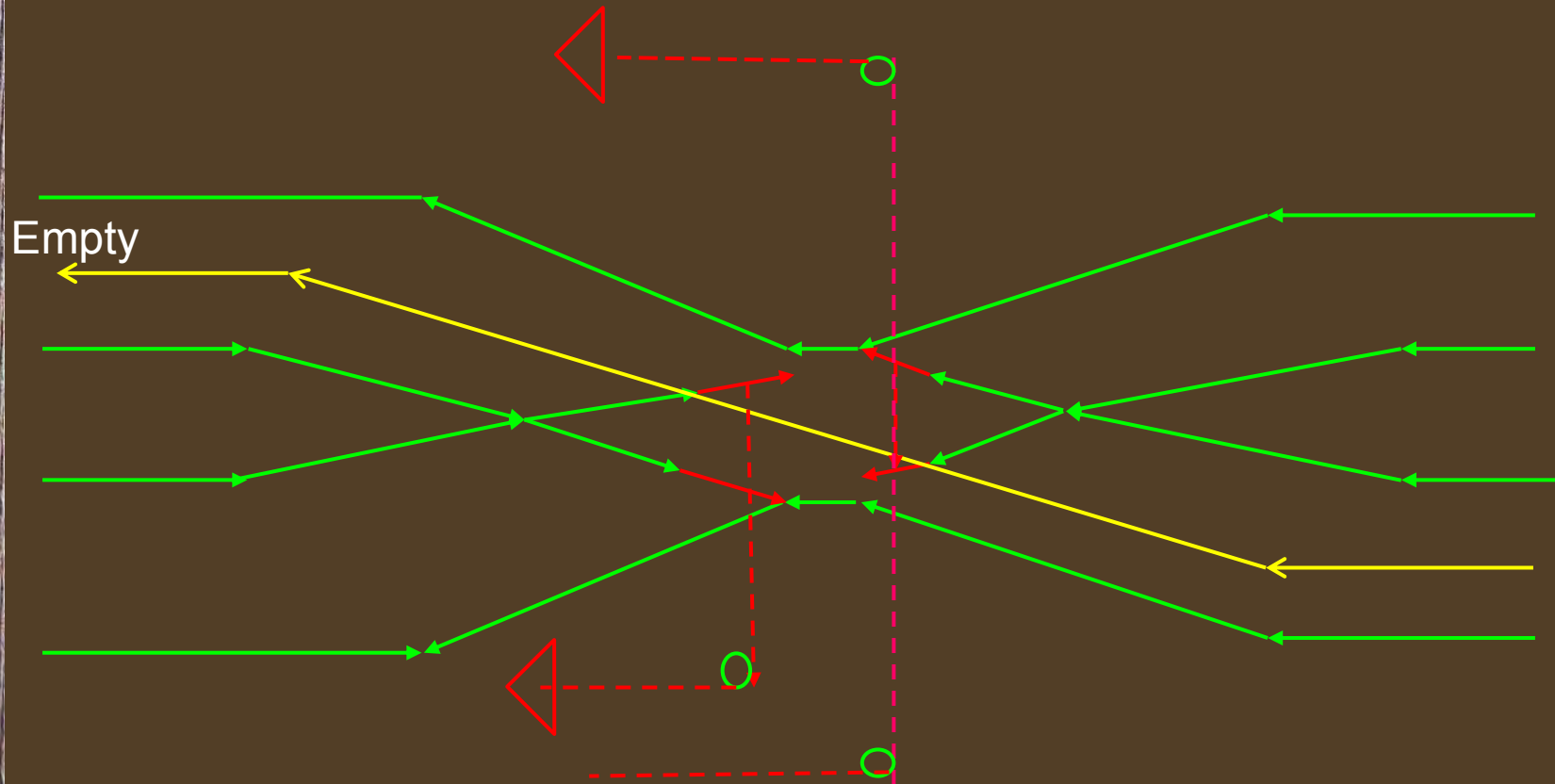
Double Slip Switch



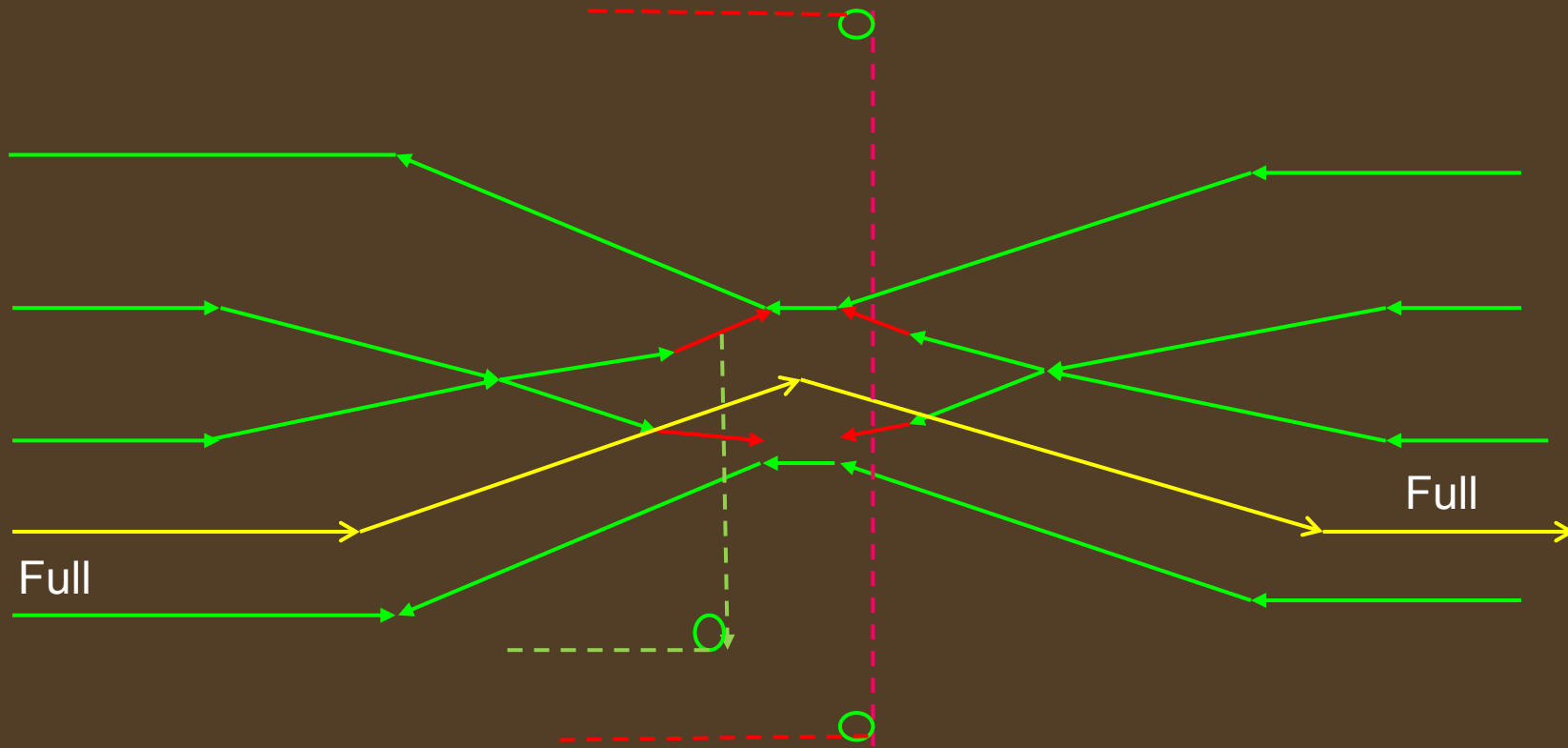
Double Slip Switch



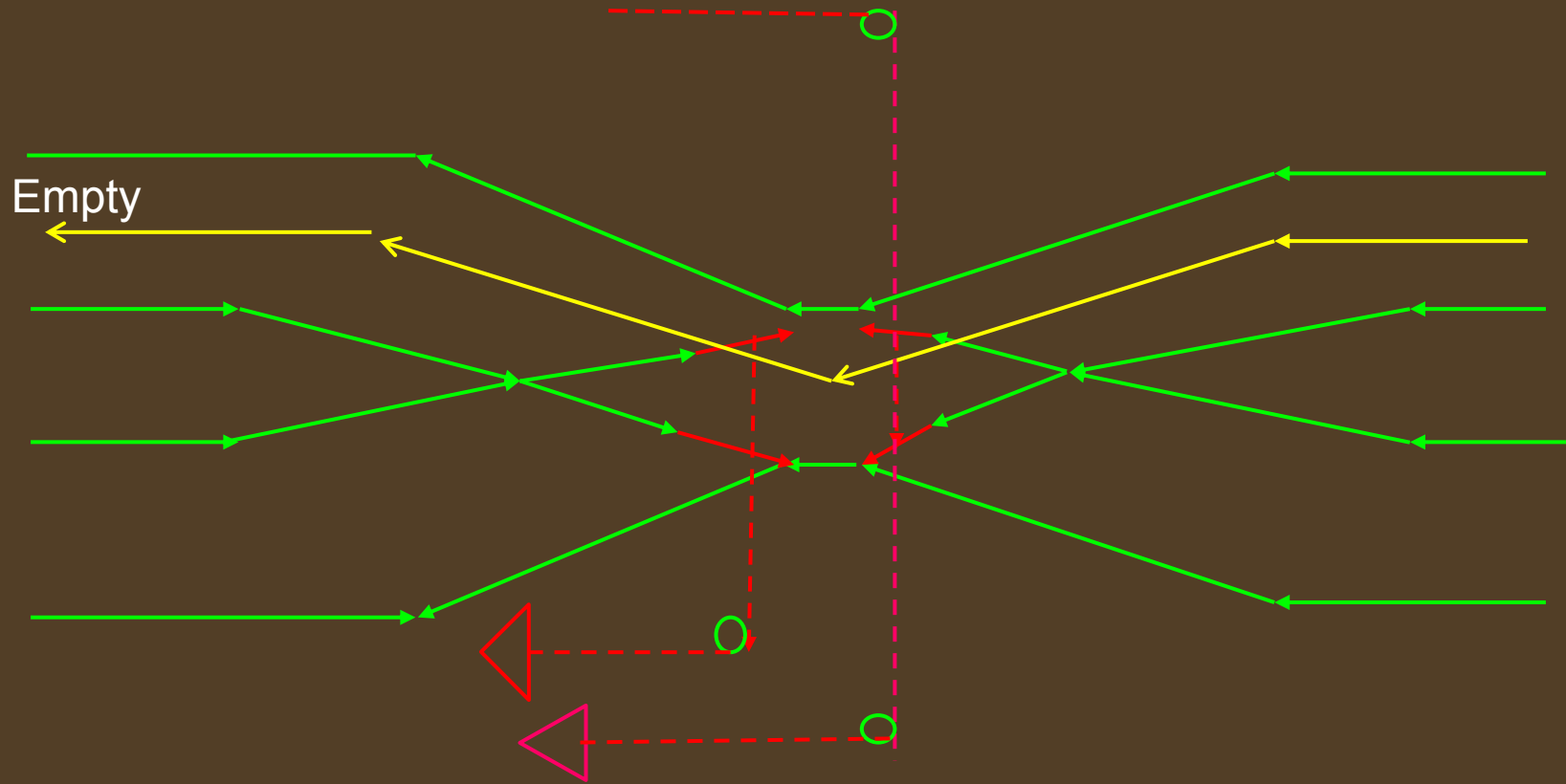
Double Slip Switch



Double Slip Switch



Double Slip Switch



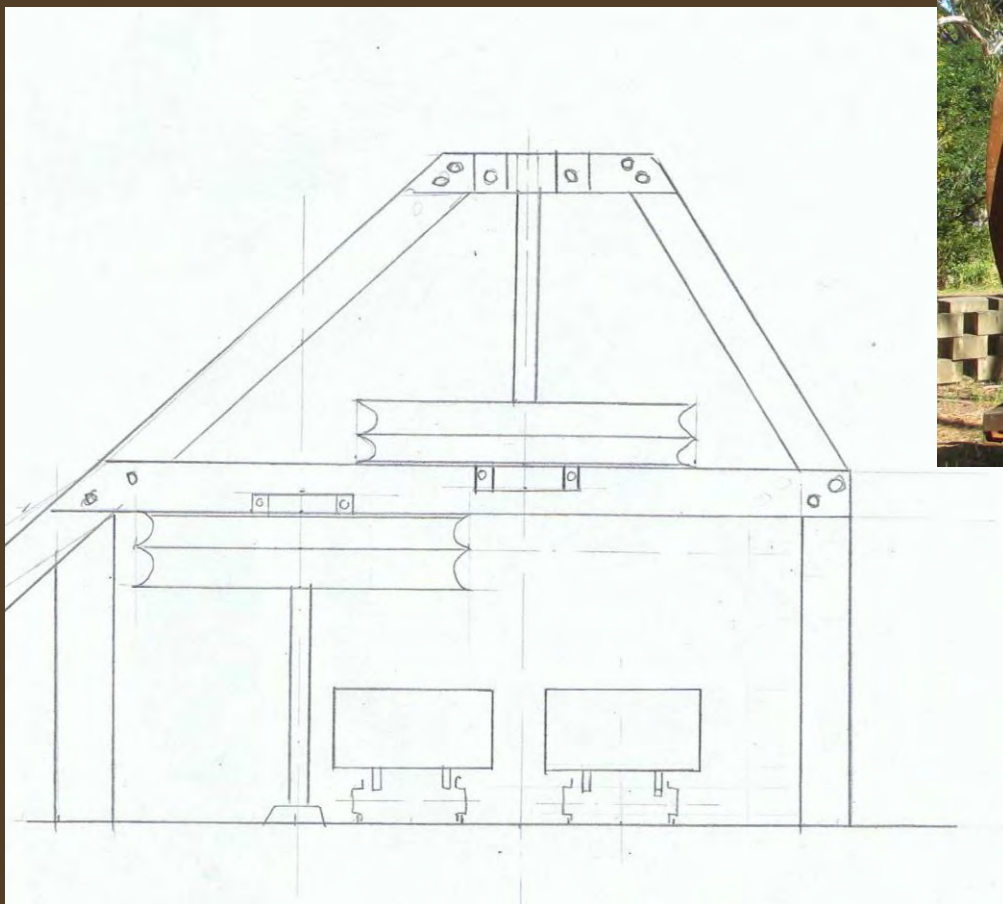


Further complications
The TURNWHEELS

TURNWHEELS

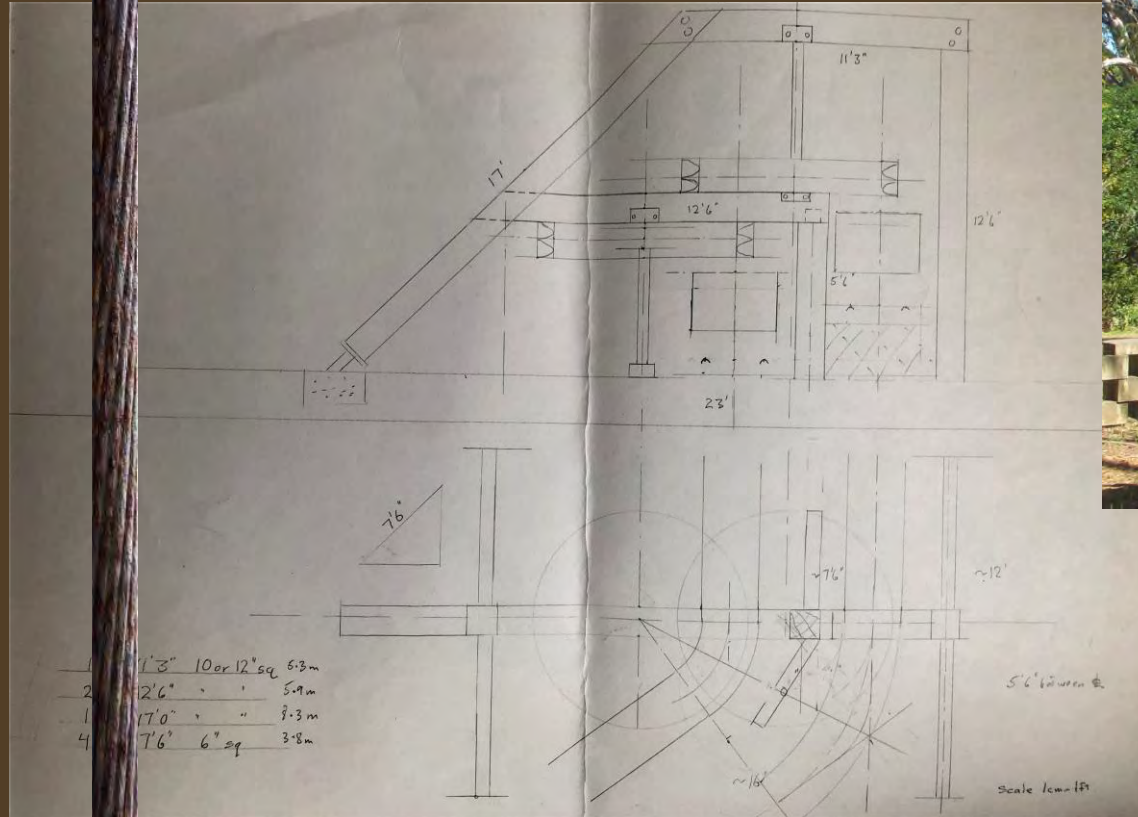


TURNWHEELS



Mounted by Keith Duncan

TURNWHEELS



A work in progress for the FOX Findout Team

TURNWHEELS



A work in progress for the FOX Findout Team



COMMUNICATONS

COMMUNICATONS



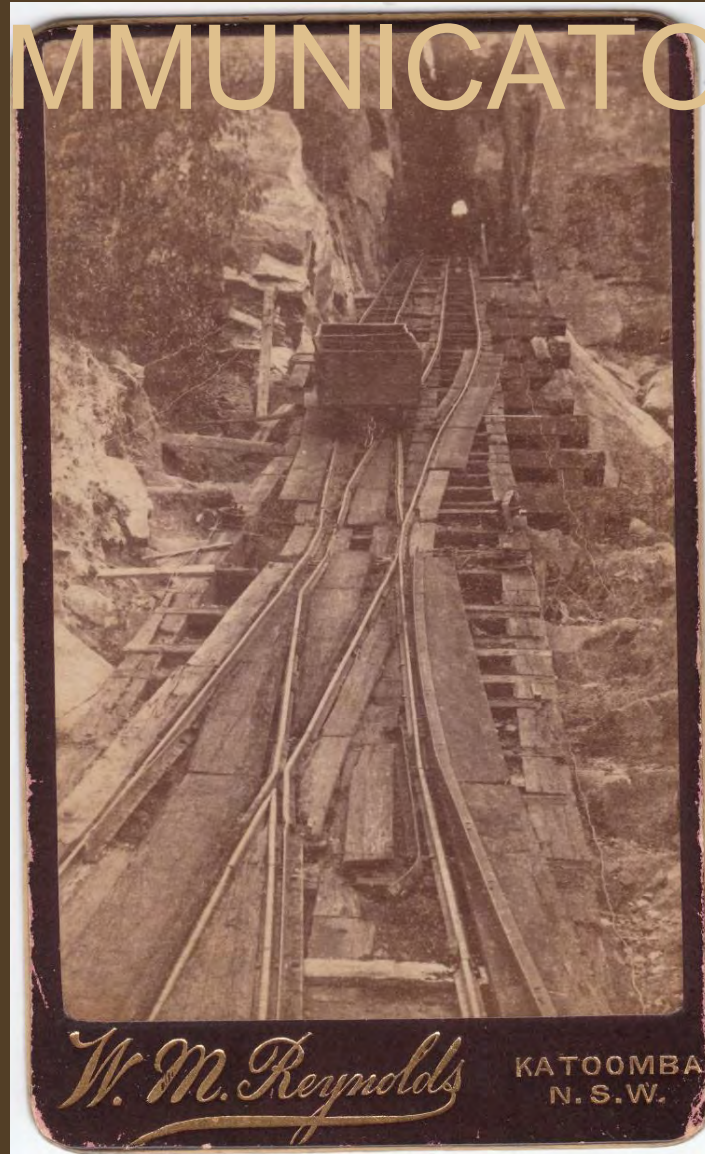
Photo 1886.

COMMUNICATIONS



Rapper wire.

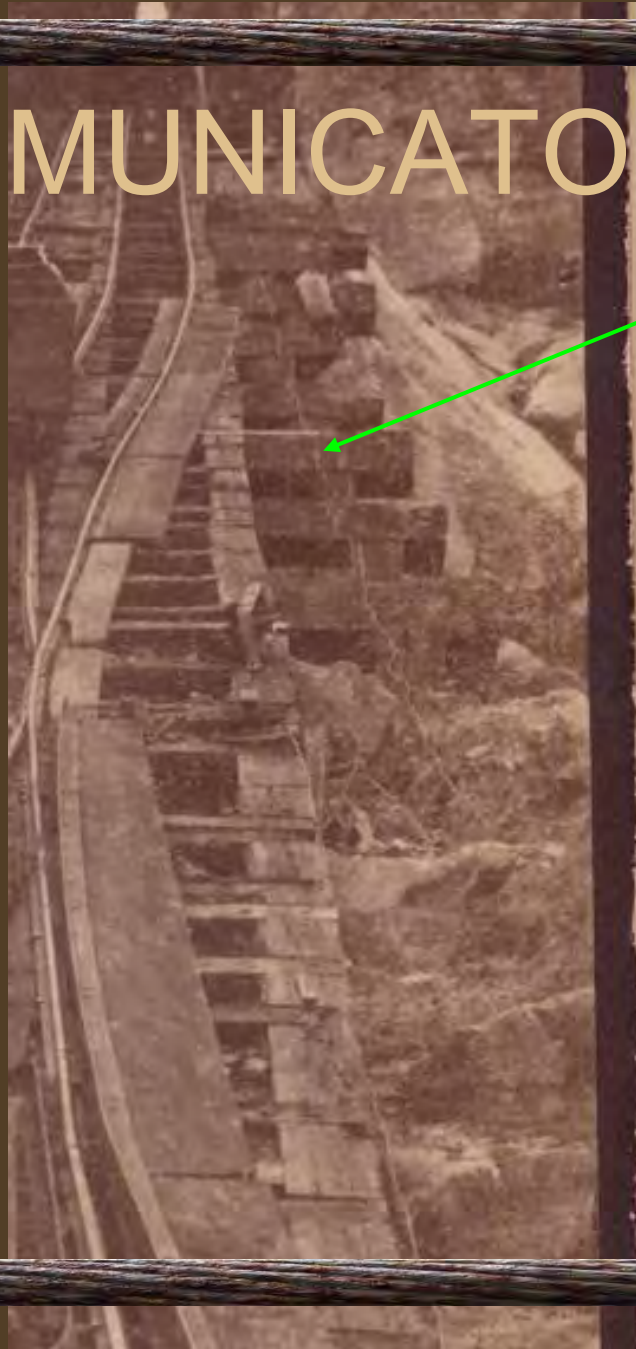
COMMUNICATIONS



Still in place
in 1889.

COMMUNICATONS

Rapper wire.

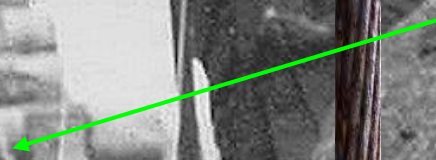


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Still in use in 1926

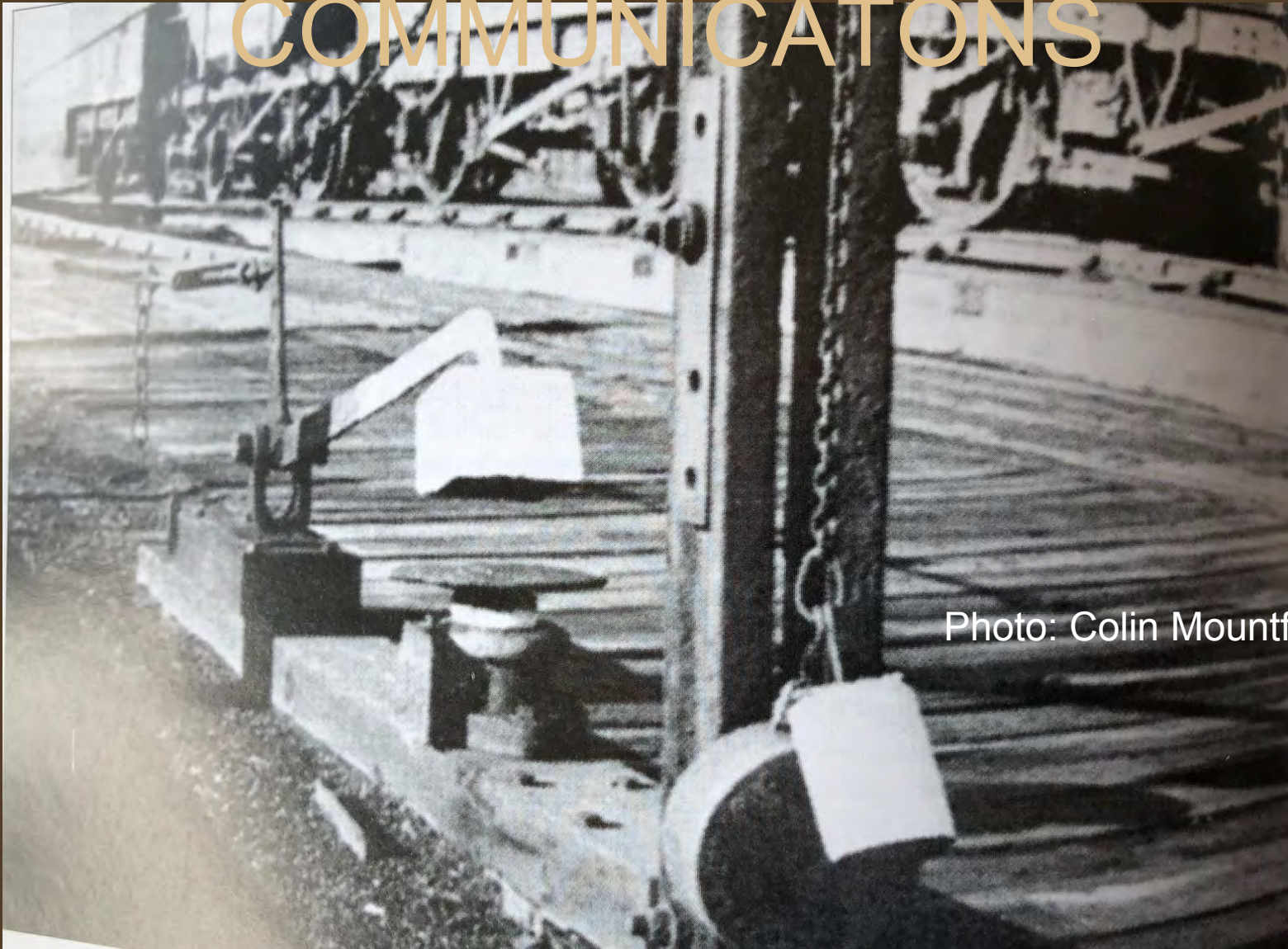
Rapper wire.





Rapper wire.

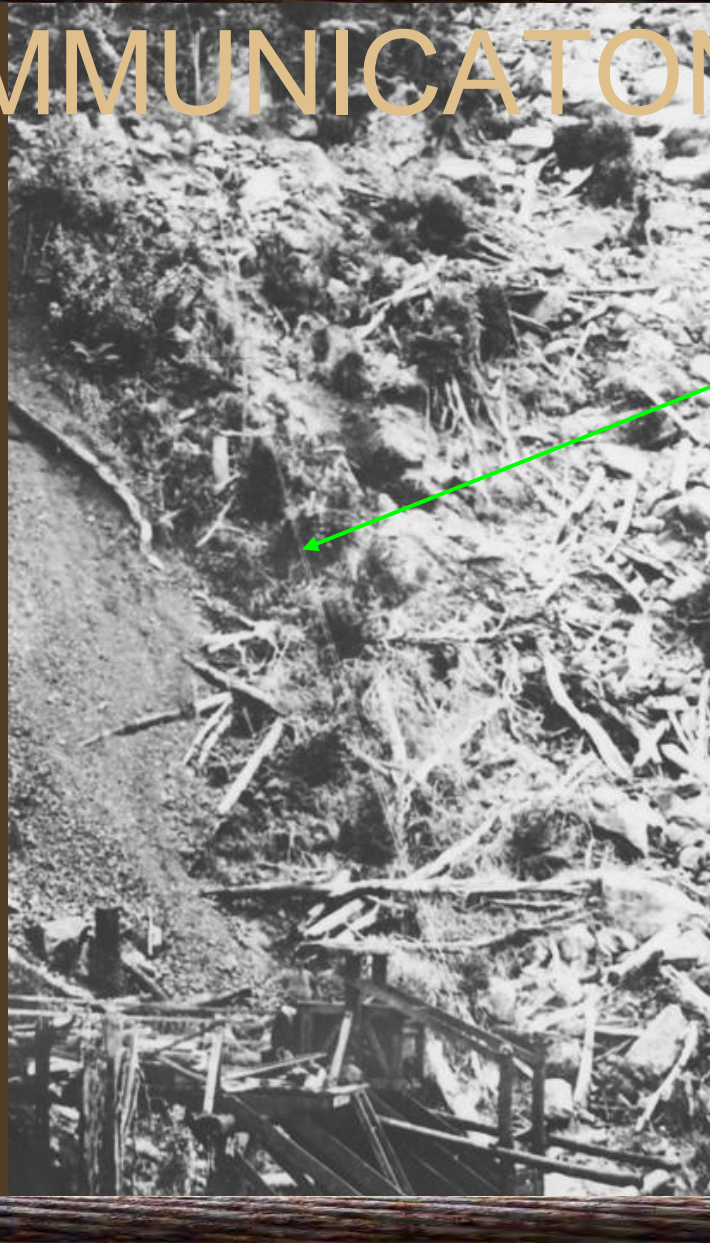
COMMUNICATIONS



This is the noisy end of a rapper wire.

Photo: Colin Mountford.

COMMUNICATIONS



Replaced with
electric signalling.

COMMUNICATONS



COMMUNICATONS



COMMUNICATONS



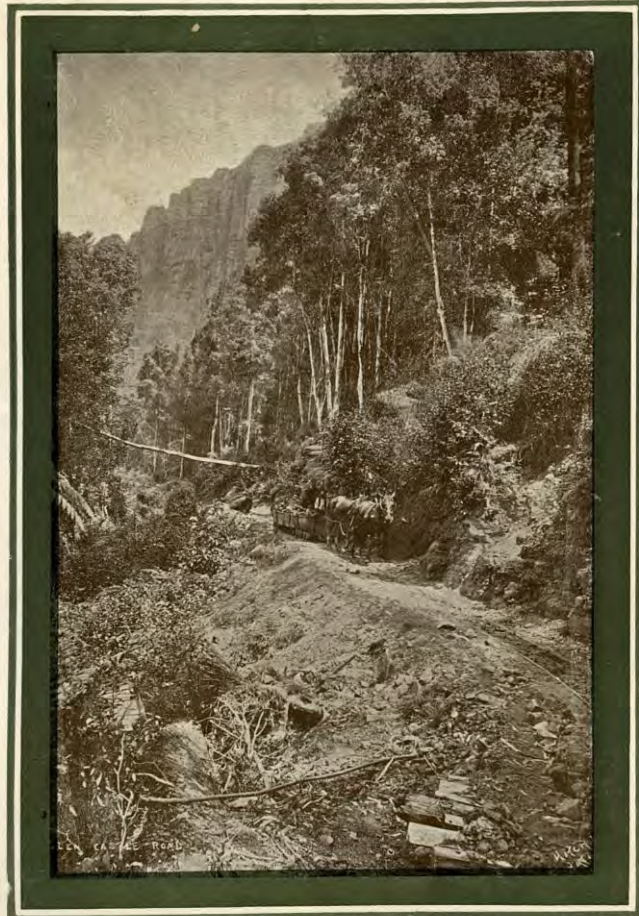
COMMUNICATONS





Pony Interchange

Pony Interchange



GLENCASTLE ROAD.

THE SHALE RAILWAYS OF NEW SOUTH WALES



A horse tram on the line to Ruined Castle.

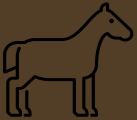
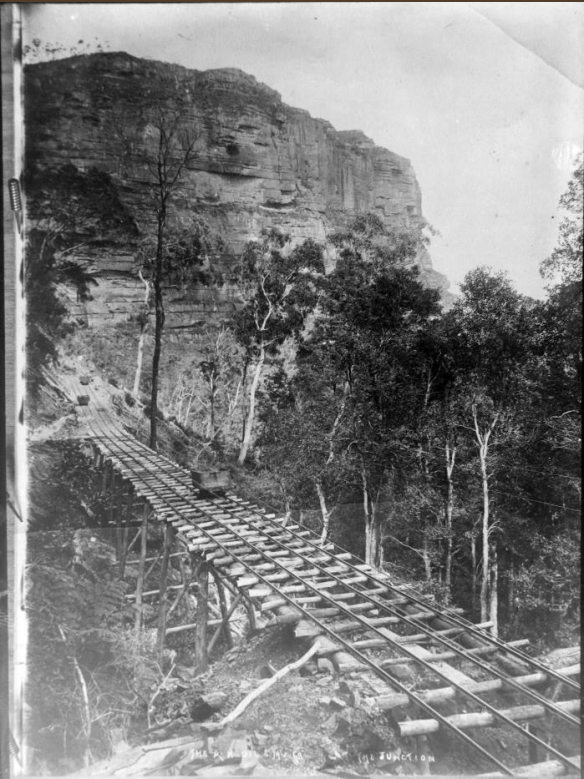
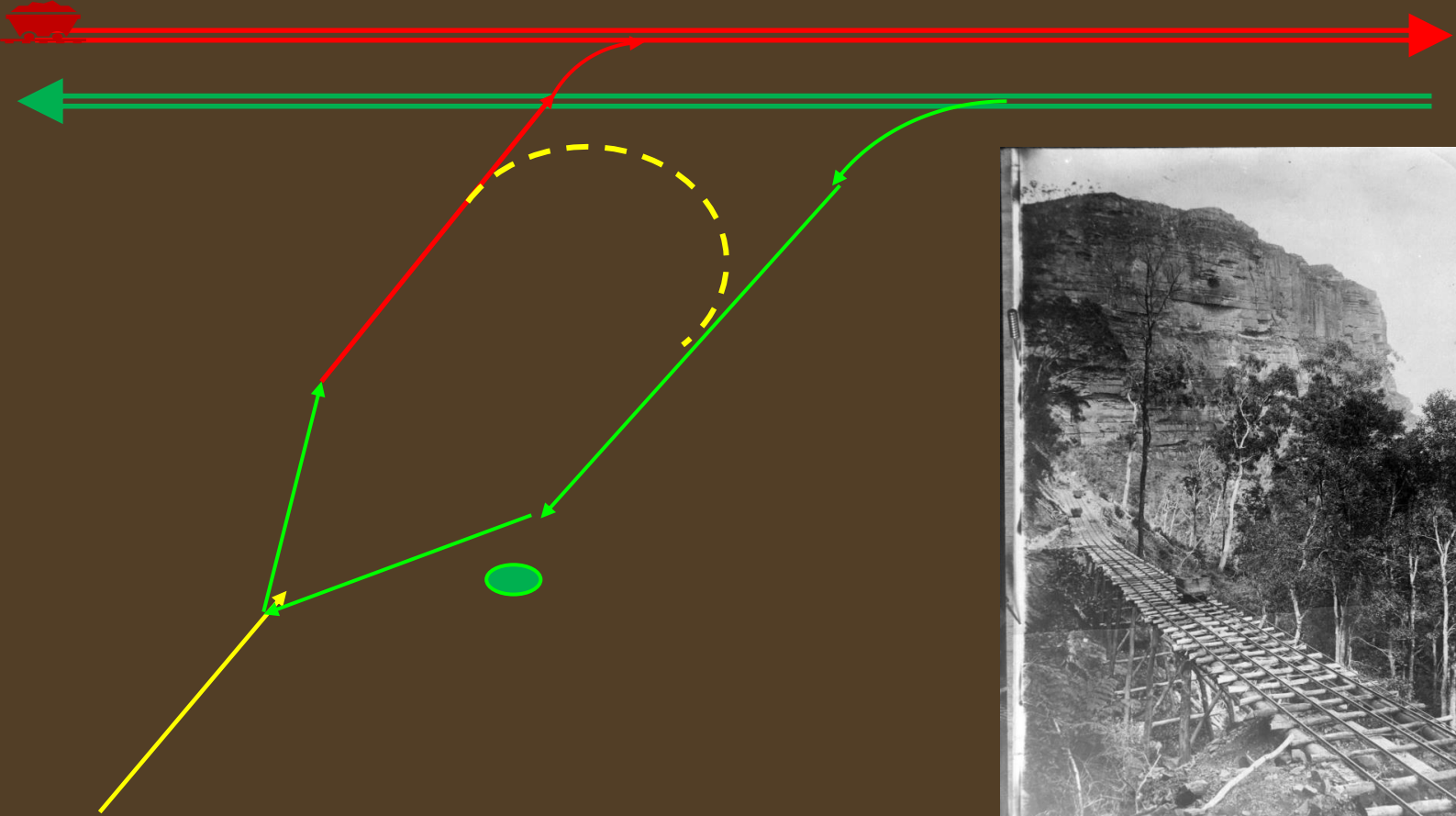
Mitchell Library

Pony Interchange

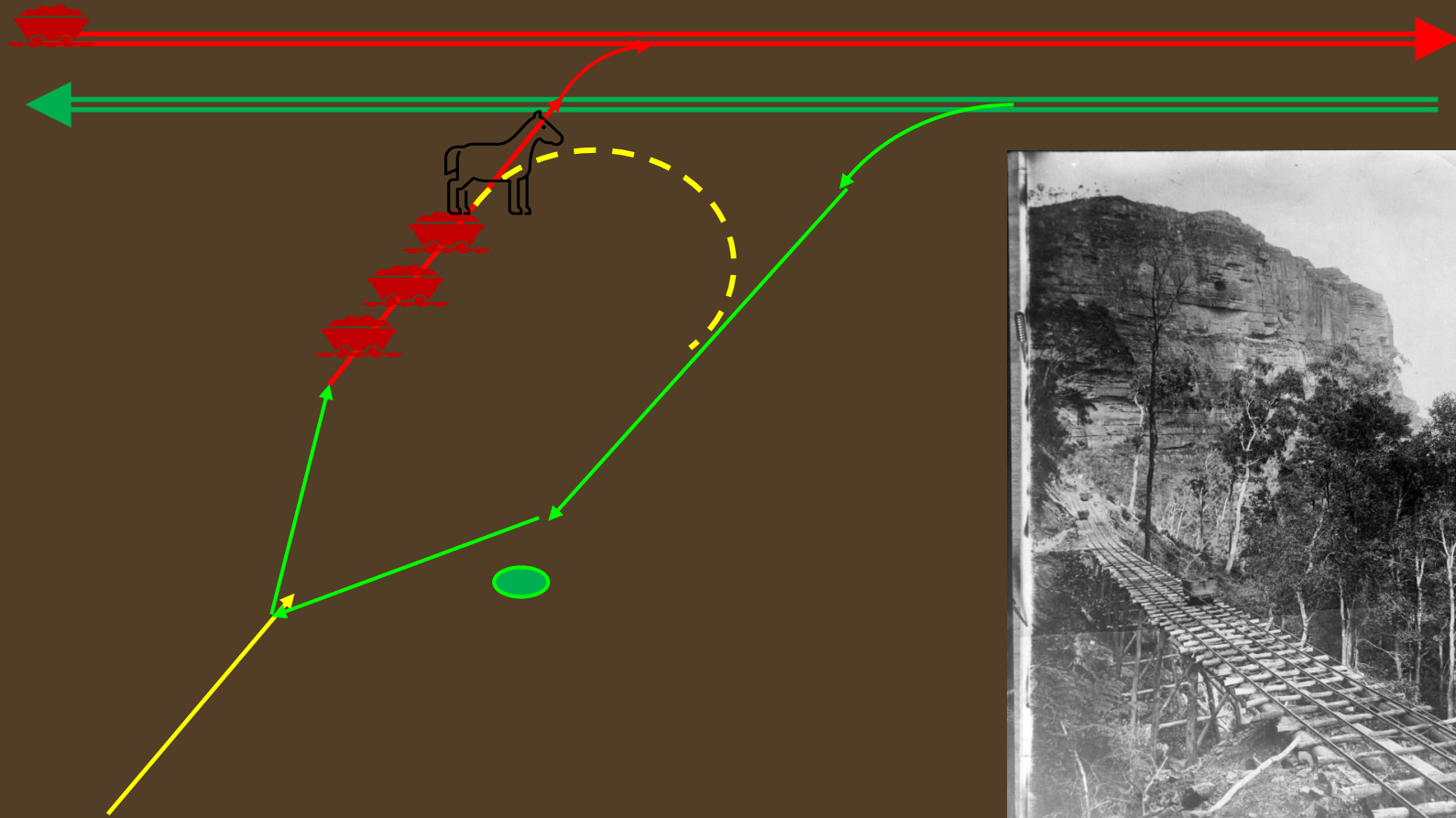
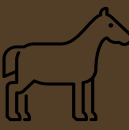


This photo tells us that we have two ponies pulling 5 skips of shale – 2 iron and 3 wooden, about 2 tons of shale.

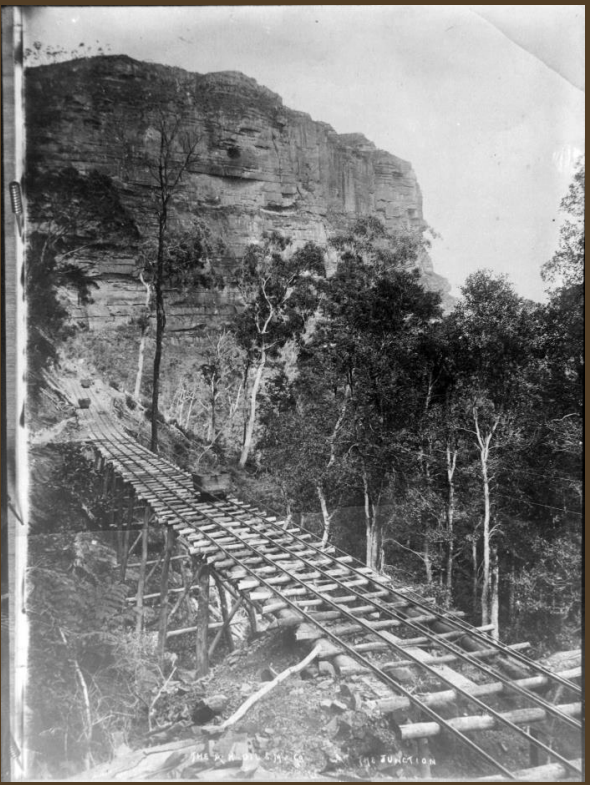
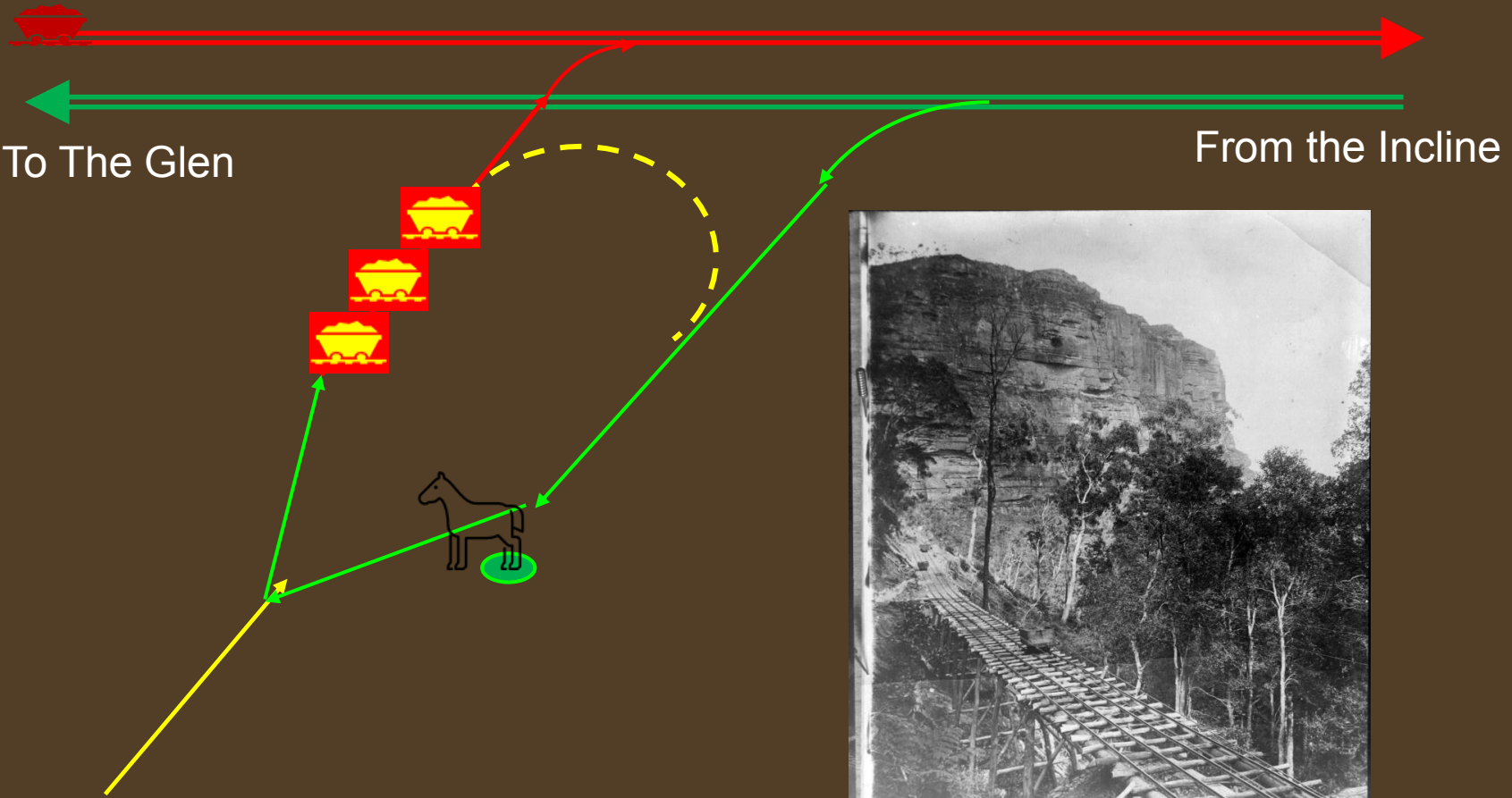
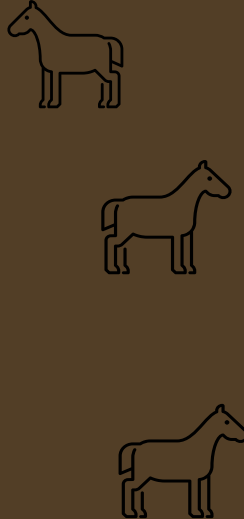
Pony Interchange



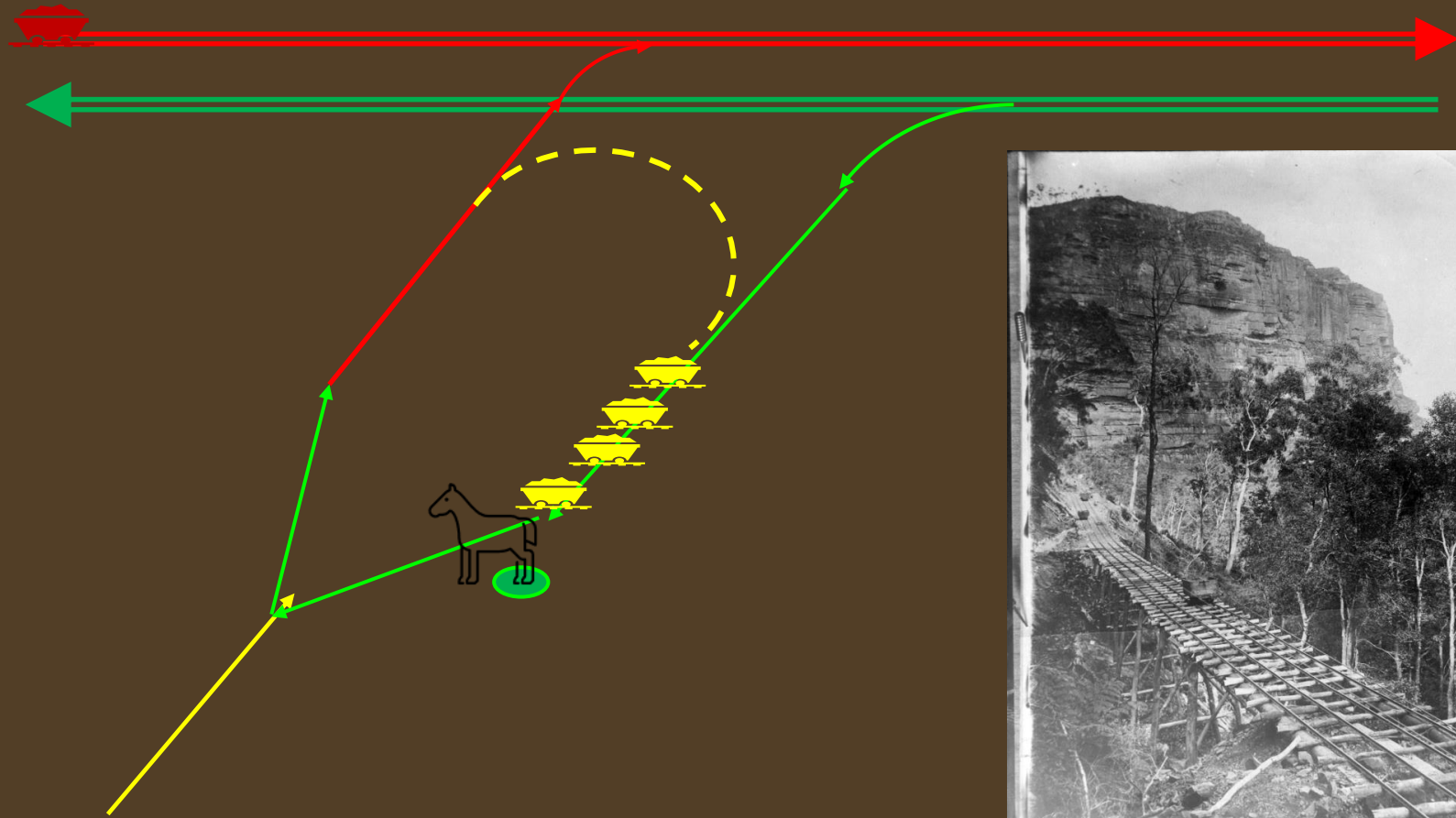
Pony Interchange



Pony Interchange



Pony Interchange



Pony Interchange



5 Skips delivered every ten minutes
both import and export.
Distance to Ruin Castle mine 3.3kM
Pony speed 1M/s therefore
in 10Min a rake of skips moves 600 Metres.
Therefore $3,300/600=5.5$
5 of these bypass sidings are needed.
5 rakes travelling in each direction
Total of 20 ponies.
Total travel time = 55 minutes.

Some sort of staff system is needed for
the single line traffic.

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Pony Interchange

Front pony has no bridle.

Note the spring points.

Reins go through horns on pony's collar.

Chain goes to ring high up on skip to prevent catching and jamming.



CLOSING DOWN

- **AKO&M'S** LEASE was for 94 years from 1st August 1890, yet in September of 1905, at a coal enquiry, Robert Saddington claimed that the lease expired on Sept 5th 1904. The lease is notated to have been surrendered on 13th Sept 1907.
- In 1896 AKO&M pulled out of Katoomba moving most of the plant to Capertee.
- In 1903 everything was re-established to remove thousands of tons of seconds from both Glen and Ruined Castle for export and sale to AGL.
A bushfire in Jan 1905 burnt the top end of Hogan's Bridge of the Shoots Tram.
By Jan 1906 all of AKO&M's equipment had been moved again to Capertee and Genowlan.

ALWAYS FINISH WITH A NICE
SUNSET

