Cane Tram Notes
A C Lynn Zelmer, Series Editor

Mackay Sugar level crossing QR's North Coast line, 1998. The combined stop and railway sign is obviously for the shire road; the target and lights protect QR from the cane railway. Clearance must be obtained required from the QR controller, before the derails can be reset to allow the cane train to proceed.

Rail Safety: An Introduction

Queensland has two agencies responsible for rail safety. Mainline operations (QRN and PN primarily) and many of the heritage railways come under the Rail Safety unit of Queensland Transport. Cane railways, amusement parks railway, etc., are controlled by Workplace Health and Safety. In both cases there are regulations governing safety for workers and the general public, including anyone travelling on a train.

CTN02, *Douglas Shire Tramway Train Control Staff*, looks at one of the earlier forms of train control. The cane railways today operate with a variety of more sophisticated systems using radio, computers, and GPS but all have the goal of safe running of trains.

This note explores some of the equipment and systems that the railways are using to minimise accidents and operate trains safely.

Level Crossing Protection

Level crossings are the most obvious point of contact between the railways and the public. Unfortunately, there are several fatal level crossing accidents, as well as many more 'near misses' every year on Australian railways.

The cane railways used to travel slower than the mainline trains, but with heavier locomotives and better track this is no longer always the case. Since cane bins do not have brakes a cane train's braking ability depends upon locomotive brakes and a mid- or end-of-train brake van, if any.

The type of level crossing protection depends on the risk involved due to the amount of traffic and the design of the intersection. Recent events in Australia have seen another call for all level crossings to be protected by boom gates. This will never be possible for financial reasons, and some drivers drive around boom gates, just as they ignore stop signs and flashing lights.

Signs and flashing lights protect cane railway level crossing with semi-rural road. Near Bli Bli, 2002.

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Cane railways are generally slower than the mainline services, so it should be easier to avoid accidents at level crossings. However, the cane railways are seasonal and some drivers do not appear to recognise when lights have been put back into service for the crushing season.

Standard cane railway level crossing lights: the oncoming train triggers the lights, which remain on until the train has crossed the road, Proserpine Mill, 2003. Lights at some crossings will also have an indicator light so that train crews can be assured that the lights are working.

Differences between QR mainline and Plane Creek cane railway signage are easy to spot when the two lines run close together. The cane railway 'Give Way' sign (right) is visible just beyond QR's 'Stop' sign (left). Mt Christian, south of Mackay, 1997.

Cane Railways On/Near Roads

Generally speaking the cane railways do not own the land that they are using. Instead they have agreements with Shire Councils and cane farmers to operate over their lands. As a result, cane lines often run on or beside shire roads or bridges, and through farm properties. In some locations they even run immediately in front of houses or very close to the sides or back of houses.

Trackage in farmer's fields doesn't necessarily require warning signs, as farm workers are expected to know the location of all rail lines. It would be real easy, however, to be surprised by a train over the road if you were travelling along the road from the right. Millaquin Mill area, 2007.

There likely are 'Yield' signs where the cane track joins the shire road but neither bridge nor tram line is marked on the approach to this shared road/rail bridge, likely Mulgrave Mill area c 1990. Greg Stephenson, photographer.

To repeat the obvious, the type of signage or other controls in a particular location is the result of a risk assessment (identify hazards, evaluate impact and consequences) and is generally a function of the amount of traffic expected in a particular area, coupled with unique features and accident record of the site.

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Here Marian Mill's line shares the Mattie O'Neill Bridge over Cattle Creek, 2001. The sign (below) warns pedestrians and others to keep clear of the railway's side of the bridge/

Underpass for a shire road near Finch Hatton, 1986. Greg Stephenson, photographer

In recent years level crossings have begun to be been eliminated or replaced with grade separation (overpasses or underpasses), particularly in high road traffic areas such as the Bruce Highway near Isis Mill. This improves the flow of traffic on both systems and reduces the potential for accidents.

Reducing the risk

Many of the mills have safety programs designed to inform the public, especially children, about safety rules when around the trains. Some have specially marked locomotives for their safety programs (see Moreton Mill photo page 6) and cane bins also often have reflective spots or stripes to make them more visible when crossing roads, especially roads without flashing lights.

Cane Trains and QR

QR was more directly involved in the sugar industry when it carried cane for a number of mills than it is today. It does carry bulk sugar and molasses from some mills to wharf or market, but most of the traffic on QR lines running through cane growing areas would be relatively high speed container trains or the Tilt Train, all of which are inconvenienced by the necessity to slow down or stop for a crossing with a cane train (see page 1 title photo). As well, crossings add gaps and complexity to the trackwork, thus have more potential for causing derailments.

The cane railways experimented with drawbridge arrangements but these have proved hard to maintain and have mostly been removed. Now QR likely removes the crossover outside the crushing season, or the crossing has been replaced with a grade separation (see Mulgrave Mill photo on page 5).

Drawbridge to allow cane railway to cross QR's mainline near Mackay. October 1997.

Train Control

Train scheduling was a manual task at all mills well into the 1990s, with fixed base telephones

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and radios providing communication with crews. Today trains are likely managed by computer software, with communication via mobile phones, dedicated radio systems, and GPS links. Conventional railway signalling systems are the exception, rather than the rule.

The train controller, likely operating in the cane inspector's office, needs to know where trains are located, their size and direction of travel, all of which is available using GPS technology. Modern radio systems allow crews to talk to their base, each other, and sometimes even harvesting and in-field transport crews.

Accidents, particularly those involving the loss of life, are often the catalyst for reviews of traffic management practices and, in the case of CSR led to the *RailSafe* system described in the box below.

CSR *RailSafe*

While I can't speak for other companies, CSR use a system known as RailSafe. *This consists of a virtual representation of a mill's rail system on a computer screen.*

Locomotives request clearance instructions from the Traffic Officer as they reach points on the system. The Traffic Officer then moves the train's head icon to the next clearance point and moves the train's tail icon to free up the previous section. The computer based software does not allow two trains to occupy the same section of track at any given time. When the transaction is complete, the Traffic Officer issues the new clearance information to the train, which then continues on it's merry way.

RailSafe *also incorporates GPS technology, so the location of the locomotive and it's brakevan (if it has one) is displayed on the* RailSafe *screen in real time. This allows the Traffic Officer to make better informed decisions regarding clearances and preferences of locomotive movements. The locomotive's direction of travel (to or from the mill) and current speed are also available..*

Aboard the locomotive is a touchscreen, which displays the current limit of clearance information, speed, and other data. If drivers detects a hazard on or alongside the line, they are able to log it, along with its GPS co-ordinates for transmission to the Track Repair teams.

Jason Lee, Thu Dec 13, 2007

Some mills operate single operator trains (no off-sider) and some have even experimented with remotely controlled trains, where the driver controls the train with a radio link while standing beside the track. This lets him assemble or break-up trains without having to walk the length of the train several times.

Track side signs provide crews with operational information, such as the need to sound the train's whistle, and restrictions. 2001 Mackay area.

Drivers may be permanent staff, doing track maintenance and similar work during the off season, or seasonal employees. Computer-based simulators allow drivers (above) to become familiar with the road, locomotives and train dynamics prior to the crushing season. Mackay Sugar 2001.

Mackay Sugar end-of-rake marker (left). Other markers include round targets (all white or red and white) and lengths of wholestick cane.

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Mulgrave Mill, 1995. Greg Stephenson, photographer.

Unlike most railway wagons, cane bins do not have braking systems. Instead train braking is provided by the loco brakes, assisted at some mills by a mid-train or end-of-train brake van or, occasionally, a mid-train or end-of-train radio-controlled loco. A brake van is essentially a very heavy wagon with radio-controlled brakes which are remotely applied by the locomotive driver (See photo above and page 6).

With a normally braked train the driver knows immediately when the train has broken or derailed as the brakes get applied and the train comes to a stop. Cane trains use a variety of end-of-rake markers which allow them to see the rear end of the train.

Finally, track conditions determine how fast a train can travel over a particular piece of track, and how big a load can be hauled. The Isis Mill notice (page 7) is one example of such load restrictions. Mills generally tru to avoid heavy grades and bridges that can be washed out by flooding. Mackay Sugar realigned its track over one such hill to avoid 'doubling the hill', ie breaking the train into two to get up the hill, and realigned a large part of its Cattle Creek track to use the better quality bridges that remained when QR abandoned the branch line.

Additional Reading

Sugar Industry Code of Practice 2005

This Sugar Industry Code of Practice, including its supplementary documents ***Sugar Mill Safety*** *and* ***Cane Rail Safety****, give practical advice about ways to manage exposure to risks identified as typical in the sugar industry. The code identifies hazards common to the sugar industry and suggests possible controls.*

Available from Queensland Department of Employment and Industrial Relations (www.deir/qld.gov.au/workplace/).

Mulgrave Mill grade separation with QR, Redlynch; 1995. Locomotives used on this line require reduced height cabs to allow them to pass under the QR formation. Greg Stephenson, photographer.

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This is Moreton Mill's equivalent of 'Thomas the Tank Engine'. 'Coolum' displays a public safety face and message and was regularly used with school children to promote rail safety. Nambour, 2002.

Mackay Sugar B-B DH loco #55 Balberra (Walkers 657 of 1970, rebuilt TulkGon 1994) with bogie brake van. 25 Aug 2005. Jonathan Bayliss photographer.

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E-mail: lynn@zelmeroz.com
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ISIS CENTRAL SUGAR MILL CO. LTD.
A.C.N. 009 657 078

Postal address: PMB 1
Childers, Queensland 4660
Telephone: (07) 4126 6166
Fax: (07) 4126 6336

NOTICE TO LOCOMOTIVE DRIVER, TRAFFIC OFFICERS AND CANE INSPECTORS

From today load limits will apply to locomotives operating on sections of track within the network hauling full bins. **These load limits must not be exceeded without the approval of a Traffic Officer.**

SECTION OF TRACK	D9	D10	D11	DH
Maranos points to Rudds points	40	40	55	70
Smiths Loop to Kowbi	40	40	55	70
Johnsons Bank to Yard	40	40	55	70
Mittelheusers points to Yard	40	40	55	70
Top Foleys to Foleys Roadway	40	40	55	70
Forestry Loop to Turpentine	40	40	55	70
Loeskows to Elliott river bridge	40	40	55	70
End Tofts to top Kellys	18	18	22	25
Barnes School to Top Kellys	30	30	45	50
Plaths to McCoshs	20	20	30	35
Maeykes to Main line points	25	25	30	30
Ritchies to Golcherts	25	25	35	35
Horton to Diamond	40	40	56	65
Gelsominos and Katts to Steeleys	30	30	40	40
Boltons to Robinsons	40	40	56	65
Robinsons to Sharmans	40	40	56	70
Uphams Loop to Pad	18	18	25	25
Pad to Yard	21	21	30	30

Drivers Note : You must take account of the prevailing weather conditions.

M J RIECK
CHIEF ENGINEER
8 October 1999

T G COX
CHIEF CANE INSPECTOR

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