

# THE QUEENSLAND SUGAR INDUSTRY AND ITS TRAMWAYS

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This paper is written to accompany a presentation at the Seventh Australian Narrow Gauge Convention in Albury, Easter 2005. The notes begin with some background on the industry, followed by some brief modelling notes and a look at the future of the industry in Australia. A number of photographs and illustrations that amplify the notes are appended.

The presentation will include a look at the industry and its future, but will concentrate on the tramway systems, their operation and modelling potential. It will be illustrated with historic and current photographs, modelling tips, model photographs and at least one model diorama.

## The Industry

The Queensland sugar industry began near Brisbane (1865) with small plantations and local sugar mills. As the industry expanded, rivers and creeks were often used for transporting the cut cane; otherwise, bullock or horse-drawn carts moved the cane to the mill.

The industry gained impetus with the blockades of the American civil war, but by 1855 prices had dropped again and many mills were operating at a loss. This pattern of *boom and bust* has continued throughout the succeeding decades to the present.

The scale of the early industry can be seen in a William Boag photograph of 1872 showing a travelling sugar mill and rum distillery. The “Walrus”, a 100 foot long ex-schooner, travelled the Albert and Logan Rivers to collect cane from the nearby fields. Its primitive Queensland-built mill was capable of making two tons of sugar per day, and distilled molasses resulting from the sugar boilings was available to make rum [1].

Most early mill buildings were wooden, but the tropics dictated a more substantial construction. For example, the Colonial Sugar Refining Company (CSR) established a mill on the Herbert River near Ingham in 1883. Mill buildings were iron throughout: cast and wrought iron columns, tie rods and roof work; roof and sides sheathed with corrugated galvanised iron sheeting [2].

In the mill’s earliest years cane was primarily sourced from the company’s own plantations, but increasingly local farmers were encouraged to supply cane, especially following the change from Polynesian (Kanakas) to white labour after Federation. The mill also encouraged mechanisation with steam ploughs used from 1882 [3].

The mill has been modernised and expanded several times over the years. By the mid-1950s a major expansion to the mill, and to its growing area, made it

one of the largest in Australia, and the Ingham district was anticipating its first one million ton cane crop. Interestingly, Victoria Mill, an early adopter of chopped cane bins and diesel power, was also one of the last to retire its steam locomotives. Today the mill is still one of the largest and most modern in Australia and, along with nearby Macknade Mill, crushed over four million tonnes of cane in 2004.

The cane growing areas in the Herbert River District follow the river systems and extend out some distance from the mills, thus the need for the tramway system. The mid-1950s map (see Appendix) of the Herbert River District shows this relationship and the location of the two CSR-owned mills. Lucinda Point is the sugar wharf for the area.

The cane tramways came with the expansion of the growing areas and mill consolidations around the turn of the century. Portable track systems and lightweight rolling stock allowed temporary narrow gauge lines to be extended into the fields where wholestick cane was loaded by hand and the trucks pushed/pulled out to the permanent way. This type of equipment was the basis of the World War I trench railways, and surplus wartime equipment allowed the expansion of the Australian tramways.

The change from plantation to family-owned farms, along with the labour shortages of the twentieth century wars, encouraged innovation in both harvesting and transport technologies. Steam locomotives were still being purpose-built for the cane railway systems into the 1950s, but within two decades both wholestick cane and steam power had been replaced by cane billets transported in bins and pulled by diesel power.

The sugar milling process is constantly being improved, but the diagram from the mid-fifties (see Appendix) provides a reasonable description of what happens within the mill and its transport system. The raw sugar must still be refined before delivery to the customer.

Raw cane transport is one of the largest costs in the sugar milling process, and most of the Queensland mills operate rail systems to minimise these costs. Tracks are typically laid on easements beside Shire roads or along farmer’s fields. While trucks/bins were sometimes built by local farmers, the rail system, locomotives and rolling stock are mill owned and operated.

Since cut cane deteriorates fairly rapidly, the tramway system performs an important short-term storage role as well as its transport function. Empty wagons must be delivered to the farm pick-up points just-in-time for use, and full loads must be delivered to the mill as

rapidly as possible, maintaining a constant flow of raw cane. The cutting season extends over several months (typically June to November) to optimise sugar production and minimise the infrastructure investment required.

The 2003 Australian Sugar Cane Annual listed 26 mills in Queensland (Tablelands, Mossman, Mulgrave, Babinda, Mourilyan, South Johnstone, Tully, Victoria, Macknade, Invicta, Pioneer, Kalamia, Inkerman, Proserpine, Farleigh, Marian, Pleystowe, Racecourse, Plane Creek, Fairymead, Millaquin, Bingera, Isis, Maryborough, Moreton and Rocky Point) . . . however, Moreton and Fairymead Mills have subsequently closed. Some of the Mackay district mills had previously been mothballed but all crushed in 2004 [4].

Route kilometres are a bit harder to provide. However the Sugar Research Institute indicates “Queensland sugar mill owners own, operate and maintain 4,100 kilometres of narrow gauge (610 mm) railway” [5]. This figure is unlikely to take into account the 2004 Moreton Mill track removals. A small amount of cane is also carried on Queensland Rail tracks.

## The Tramways (Railways)

The Queensland Government Railway, now Queensland Rail, was a railway because it was established under a State railway “Act”. Tramway was the designation of a local government or privately owned rail system, typically a Shire or sugar mill tramway. Today Queensland rail systems generally operate under regulations of Queensland Transport’s Rail Safety Unit.

Sugar cane farms in Queensland are relatively small and are primarily family operations. Harvesting may be done by farmer-owned machines or by harvesting crews. In either case, the transport and harvesting system operates to provide equitable services to all farms. Thus the harvest and harvesting crews are shifted from area to area, and back again as the harvest progresses, ensuring that all farms share in the good and bad times of the season.

This requires a significant investment in scheduling and communication, with the result that the Mill’s cane inspectors decide what cane will be cut when and allocate empty bins for cut cane collection. Loco schedules are often computer-generated at the beginning of the season, with daily variations as circumstances (weather, breakdowns, derailments etc.) dictate.

There is some use of bar code and similar technologies for automatically recording bin movements but this is not widespread. However, farmers, contractors and loco crews must maintain accurate records of individual bin movements and their contents to enable farmers to be paid for the sugar content of their cane. The loco crews operate under radio control with increasing use of GPS monitoring.

Unlike some of the overseas cane railways, Queensland’s cane railways have generally used small four-wheeled wagons for transporting cane. Initially these were flat cars with stakes and hand-operated winches to tie down the wholestick cane. As the industry moved to cut cane billets some of these wagons received metal bins with mesh sides, often side dumping. Today such bins, having increased in size from three to four to six tons, are generally tipped in a rotary dumper, and some mills are using large bogie bins.

Train speeds were generally slow, partly because the cane bins do not have any braking system and partly because the cane lines were often not well maintained. Maintenance, for example, generally only occurred in the off-season, and several months of crushing season with heavy trains and occasional derailments had its effect on the narrow gauge track system.

Just as steam locomotive power increased in size with improvements in the rail system, diesel power has also increased in size. It didn’t prove economical to build new purpose-built locomotives when surplus diesel hydraulic locomotives became available from the mainline railways in the 1990s. Today some cane lines are better built and maintained than their mainline counterparts and operate high speed trains hauled by rebuilt and regauged ex-NSW 73 class and ex-QR DH class locomotives.

## Modelling

If modellers of narrow gauge railways are a niche market, sugar cane railway modellers are an even smaller niche market. Modelling scales and interests have therefore tended towards compromises that minimise the amount of absolute scratch-building required, with HOn30/009 and On30/O-16.5 as the most common choices. This allows modellers to use N and HO scale mechanisms, wheelsets and track components as well as standard HO and O scale building materials, parts etc.

Many potential cane tram modellers immediately fix on a mill with a number of locomotives and numerous cane wagons. However a sugar mill is a large and industrial complex, perhaps better modelled by implication on the backdrop and represented on the layout with a loco out-depot. The time period chosen (steam era with wholestick trucks, steam-diesel transition with a mix of wholestick trucks and bins, small bogie diesels, or modern heavy-haul diesels and bogie bins) will determine the type of trackwork, buildings, harvest scenes etc.

There are several methods for modelling the cane itself. These provide varying degrees of realism, and again the best solution might be to represent the cane fields on the backdrop.

This leaves the railway itself, perhaps a shelf or modular layout with a staging area representing the mill and several on-line farm pick-up points. One or

two locomotives, 20 or 30 cane trucks/bins and some special purpose navvy wagons would make an impressive layout in any scale/gauge.

If a mid-century cane mill has operating rights over a shire-owned railway connecting a couple of semi-rural communities you have the potential for limited goods and passenger traffic and added operating interest.

Alternatively, you might develop a “virtual” railway, constructing your cane railway system, locomotives, wagons, buildings etc. on the computer using one of the two main railway simulator programs.

If you elect to model in plastic, wood and metal you must be prepared for a significant amount of scratch-building. While HOn30/009, On30/O-16.5 and On24 modellers have the largest variety of commercial components, there are only a few kit manufacturers in any scale and even fewer manufacturers of cane railway locomotives and bins. Perhaps more significantly, quality and accuracy are very variable.

For my own modelling I’ve decided on a freelance sugar mill and have concentrated on building a variety of navvy and related equipment rather than long strings of cane trucks/bins. I started off in HOn30 several years ago but am gradually converting to On30 as my thumbs get larger and eyes get weaker. I do try to patronise local manufacturers (and custom builders) when possible, but the freelance theme allows me to kit-bash or modify commercial models to meet my needs.

I am not aware of any Porter steam locomotives being used in the cane fields, for example, but a Bachmann 0-4-0T or 0-4-2T makes a quite reasonable cane loco once the bell has been removed and the cab has been replaced with something more tropical.

Similarly, the chassis from a Boulder Valley Models “Mighty Midget 5-ton Switcher” is almost the same length as a Comeng Model G diesel loco, reducing the amount of scratch-building required for a reasonable model. As well, the commercial components are of good quality and undoubtedly resulted in a better underframe (better detail and squarer) than I could have scratch-built as a first effort in On30.

The new Bachmann On30 petrol locomotives should also provide an economical basis for modelling small Queensland cane locos.

A realistic model, whether of a specific system or freelance, will depend upon the quality of your scenery and supporting models, as much as the locomotives and rolling stock. It is essential that shapes, textures and colours be realistic for Australia, somewhat of a

problem if you depend totally upon imported products. Timber and tin construction defines much of the Queensland landscape and trees have a distinctive shape. The rainforest may have dense underbrush, but the cane fields are often located in drier areas where the underbrush is minimal and trees have distinctive shapes and colours.

Appropriate commercial vehicles and supporting details – everything from pallets to rubbish bins – are more readily available in HO scale but must still be chosen with caution. The inclusion of a French automobile or a left-hand drive truck in a cane farmer’s yard, for example, could totally destroy the realism of the scene you are trying to set.

The utility of the backscene has been implied above. It should also be used to set the scene in a more fundamental way, with appropriate sky colours, terrain and vegetation.

## The Future

As was mentioned above, the Queensland sugar industry has always been subject to periods of boom and bust. The last several decades, however, have been particularly disastrous for the industry and many farmers are simply hanging onto their farms with the hopes that they can sell them to developers and retire to the lifestyle they would like to have had during their working life.

The average age of a Queensland cane farmer has risen to near retirement age; young farmers are not entering the industry. Australian cane farms are quite small by international – for example, Brazilian – standards, leading to significant inefficiencies within the industry. All the mills located close to urban centres have lost cane farms to urban development, and the replacement fields have always had a lower productivity potential. Many of the cane growing areas are dependent upon irrigation for their water, and the competition for this water is increasing.

Most of Australia’s sugar is exported, leading to crisis within the industry when the value of the Australian dollar rises or the world sugar price declines.

“The worst raw sugar prices in living memory have pushed CSR to a slightly lower 2004 profit and forced it to forecast flat earnings for the following year . . .

“Over-production of raw sugar in Brazil coupled with the rising Australian dollar caused prices to fall . . .” [6]

However, late in 2004 short term prospects looked brighter.

“Farmers who earlier this year expected just \$200 for a tonne of cane can now get up to \$270 a tonne.

“While motorists have had to pay more for petrol, canegrowers have enjoyed watching raw sugar rise in concert with the soaring world oil price.

“Australian canegrowers are reaping the benefits of Brazil diverting much of its sugarcane into ethanol to keep pace with demands for green energy.

“The turnaround in fortunes for cane farmers has seen only 18 growers taking up the federal Government’s offer of \$100,000 to leave the industry.” [7]

Ultimately the industry is at the mercy of the world market, weather conditions and the predations of disease and pests. Since cane transport, mostly by rail, is such a large component of milling costs we can expect the future of Queensland’s cane railways to be equally fraught. Thankfully there are a number of cane railway locomotives and rolling stock preserved in places such as the Australian Narrow Gauge Railway Museum Society (Woodford), the Australian Sugar Cane Railway (Bundaberg), the Australian Sugar Industry Museum (Mourilyan), and the Illawarra Light Railway Museum Society (New South Wales).

## Resources

The following list of publications is a representative selection of the available resources for understanding and modelling the Queensland sugar cane industry. Most mills have a published history and there is a wide variety of publications, often with illustrations, providing information on some aspect of the industry and its sugar cane tramways.

Alcorn, Berenis and Dunn, Robin (1997). *Moreton Sugar Mill: Sweet heart of Nambour*. Maroochydore and Nambour: Berenis Alcorn and Robin Dunn. Published at the time of the Moreton Mill centenary, this book details the history of sugar growing and milling in the Nambour area.

Armstrong, John and Verhoeven, GH (2000). *The Innisfail Tramway: The history and development of the Geraldton Shire Tramway and the Mourilyan Harbour Tramway*. Melbourne: LRRSA. Revision of 1973 publication describing the two-foot gauge tramways in tropical North Queensland, including an update on sugar mill (cane tramway) operations since 1977.

Byrne, Dianne (1994). *A Travelling Photographer in Colonial Queensland: The work of William Boag*. South Brisbane: State Library of Queensland. A selection of 104 images from one of colonial Queensland’s premier photographers. Includes early sugar cane plantations and mills, timber harvesting, workers etc., as well as south east Queensland rural communities.

Crellin, IR (1979). *Australian Sugar Tramways: The Challenge of the 1980s*. Melbourne: Light Railway Research Association of Australia. The October 1979 issue of Light Railways (# 66) . A good review of cane railways at the end of the 1970s.

Gough, Bob and Webber, Brian (1999). *Queensland Sugar Cane Railways Album*. Yeronga, QLD: Authors. Colour and B/W photos and captions from the QLD cane railways.

Hutchinson, Jim (2004). *Modelling Loco Depots*. CaneSIG: [www.zelmeroz.com/canesig/model/handbook.htm](http://www.zelmeroz.com/canesig/model/handbook.htm). A seven-part series of downloadable notes on Queensland cane railway loco depots and their modelling. Updated and expanded from Jim’s “Modelling the Railways of Queensland 2000” presentation and notes.

Kerr, Bill, and Blyth, Ken [Comp] (1993). *They’re All Half Crazy: 100 years of mechanised cane harvesting*. Brisbane: Canegrowers. Traces mechanisation from 1888 to present, includes rare footage of Kanakas cutting cane as well as harvesters. Book to accompany video of similar title [cane harvesting].

LRRSA. *Light Railways*. Surrey Hills, VIC: Light Railway Research Society of Australia. Australia’s magazine of industrial and narrow gauge railways with historical, industrial, heritage and tourist railway information.

Roberts, Andrew K and Ellul, Andrew B (cartoonist) (1999). *One for the Road*. Eton, Qld: Roberts, Andrew K. Human side of the cane transport component of Queensland’s Sugar Mills, portrayed through photographs, anecdotes and cartoons. Includes 28 pages of mostly recent colour photos.

University of Sunshine Coast (2004). *The Last Crush: Closure of the Moreton Sugar Mill*. Nambour, Qld: Maroochy Shire Library. Commissioned video of the last season of the Moreton Sugar Mill through to December 2003. Shown on TV and issued in DVD format.

Wilson, Craig (2002). *Built by Baldwin: The story of E M Baldwin & Sons, Castle Hill, New South Wales*. Melbourne: Light Railway Research Society of Australia. A history of Australia’s E M Baldwin, manufacturer of sugar mill and mining locomotives. Includes photos, plans, customers & rosters etc., including proposed locomotives.

Zelmer, Lynn (2002-4). *CaneSIG: The Cane Railway (Tramline) Modelling Special Interest Group*. [www.zelmeroz.com/canesig/](http://www.zelmeroz.com/canesig/) This on-line resource service provides industry and modelling tips including a downloadable 14-part “Modelling Cane Railways” handbook and access to almost 2000 plans and photographs.

## References

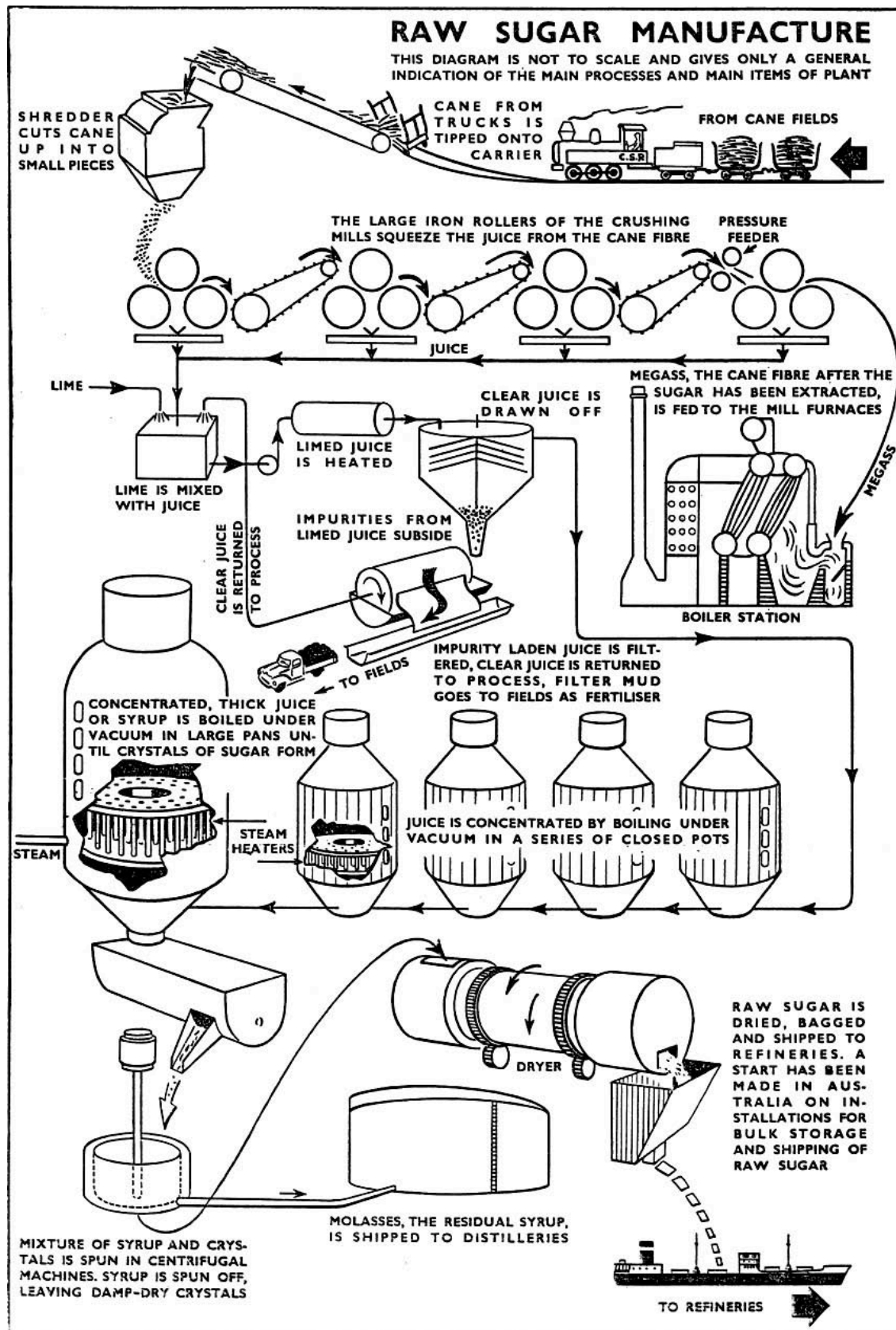
- [1] Plate 34, Boag negative 903 in Byrne, Dianne (1994). *A Travelling Photographer in Colonial Queensland: The work of William Boag*, South Brisbane: The State Library of Queensland, p 49.
- [2] Victoria Mill 1953, *The Colonial Sugar Refining Company Ltd*, p 32.
- [3] Ibid, p 4.
- [4] *Australian Sugar Cane Annual 2003*. Toowoomba: Australian Sugarcane.
- [5] [www.sri.org.au/sugarindustry1.html](http://www.sri.org.au/sugarindustry1.html), 26 Jul 04.
- [6] Ooi, Teresa (2004). "Sweet 'n' sour: sugar collapse hits CSR profit" in *The Australian*, 20 May, p 25.
- [7] Gerard, Ian (2004). "Sugar comes back from the dead", *The Australian*, 28 Oct, p 29.

## Acknowledgments

My sincere thanks to all of the railfans, modellers, historians and computing colleagues who have assisted me in learning about Queensland's cane trams and in making this information available via the CaneSIG web site.

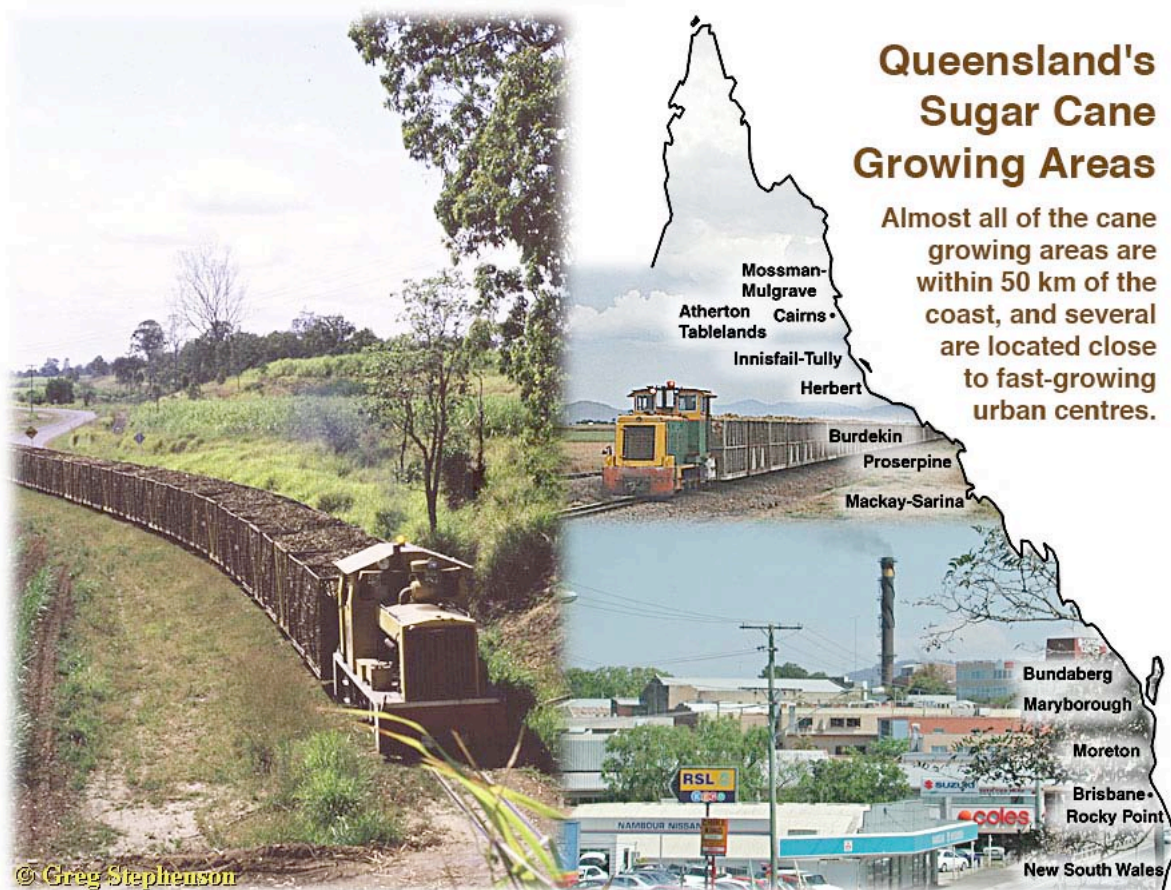
**Lynn Zelmer**

QldRailHeritage.com  
[www.zelmeroz.com/canesig](http://www.zelmeroz.com/canesig)  
E-mail: [lynn@zelmeroz.com](mailto:lynn@zelmeroz.com)

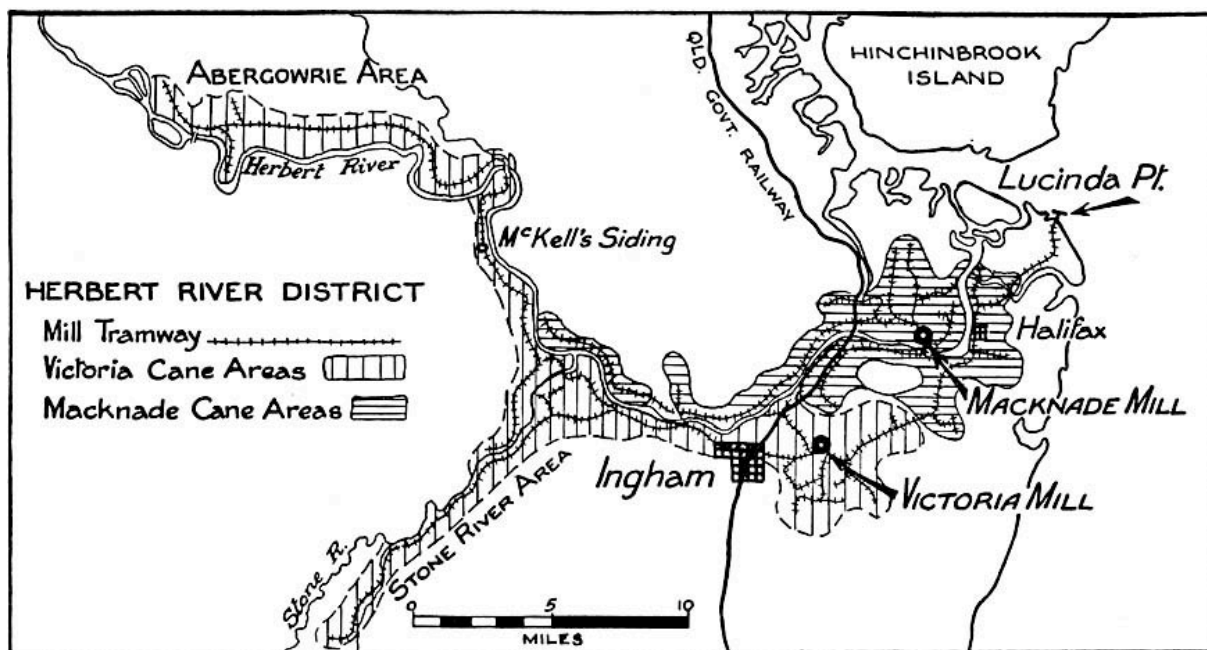


Source: R Wiles collection, originally from Lowndes, A G (1956),  
 South Pacific Enterprise: The Colonial Sugar Refining Company Limited, Sydney: Angus and Robertson, p 139.



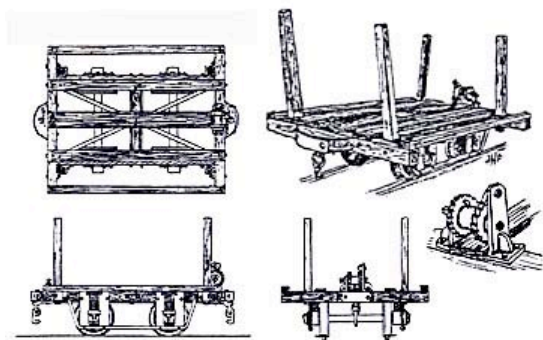


Greg Stephenson and Lynn Zelmer photos



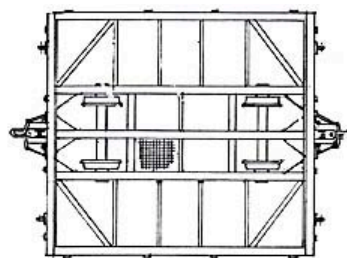
Source: Lowndes, A G (1956).  
South Pacific Enterprise: The Colonial Sugar Refining Company Limited, Sydney: Angus and Robertson, p 121





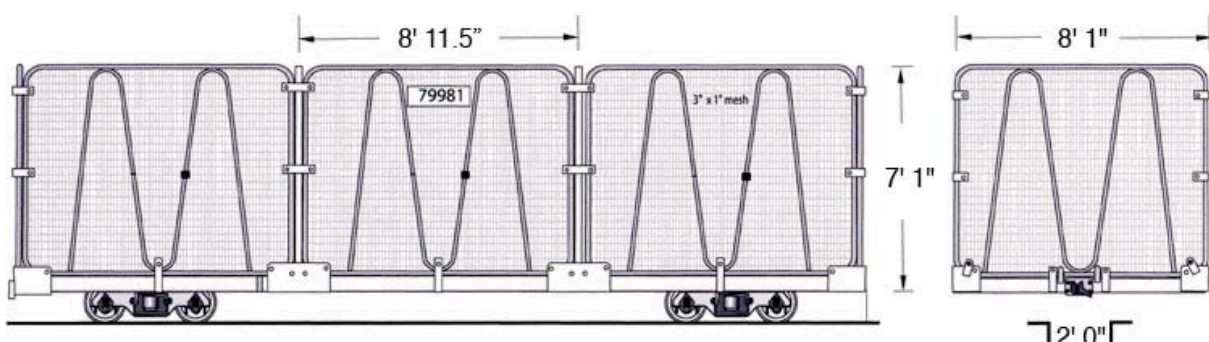
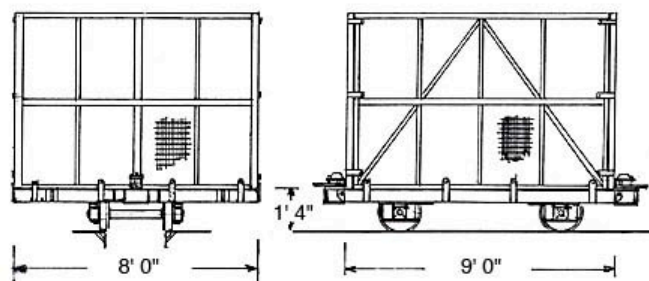
### Moreton Central Sugar Mill 4 ton cane bin

Drawn by Jim Fainges.  
Wheels 14" dia.  
Scale 3.5 mm = 1 ft.



### Moreton Sugar Mill (Nambour) whole stick truck

Drawn by Jim Fainges, 1997. Timber and iron construction; frame 5' 0" wide and 6' 0" long, base 1' 2" above the railhead. Scale 3.5 mm = 1 ft.



### Mackay Sugar - Marian Mill experimental 14 tonne bogie cane bin

Drawn by Jim Fainges 11/04 from field measurements by Lynn Zelmer. All dimensions other than those indicated were scaled from photographs. Mesh: 3" x 1". Sideframes 2.5" x 5" channel, open backed. Flat galvanised floor. Red reflectors on side (black dots on bin side). Bogies and wheel set have varied during experimental operations. Scale 3.5 mm = 1 ft.



Australian-built Jenbach locomotive, preserved by the Australian Narrow Gauge Railway Museum Society, Woodford. This is the prototype for Bob Dow's HOn30 scratchbuilding clinics of past conventions and is detailed in the CaneSIG "Modelling Cane Railways" handbook. Lynn Zelmer photo.





Bins passing through the rotary tipper at Fairymead Mill. Depending upon the coupling system used, bins may be tipped without disconnecting; otherwise they are uncoupled in groups for tipping and re-coupling in the empty bin yard. Movement through the tipper is generally automated, although it did require a locomotive pre-automation. Lynn Zelmer photo.



A tractor-hauled elevating tipper is delivering cane from a nearby farm into bins at Millaquin Mill. The tipper was loaded directly from the harvester in the field. The bins will convey the cane into the mill for crushing, just as if the cane had been delivered to a remote farm delivery siding, avoiding the need for two different delivery systems. This mill still operates nearby mechanical elevator systems to enable longer-haul trucks to unload their cane into waiting bins. Lynn Zelmer photo.





Mossman Mill's "Daintree" bogie locomotive with their bogie canetainer wagons. Note the headlight bracket to lift the lights above the cane bins. Greg Stephenson photo.



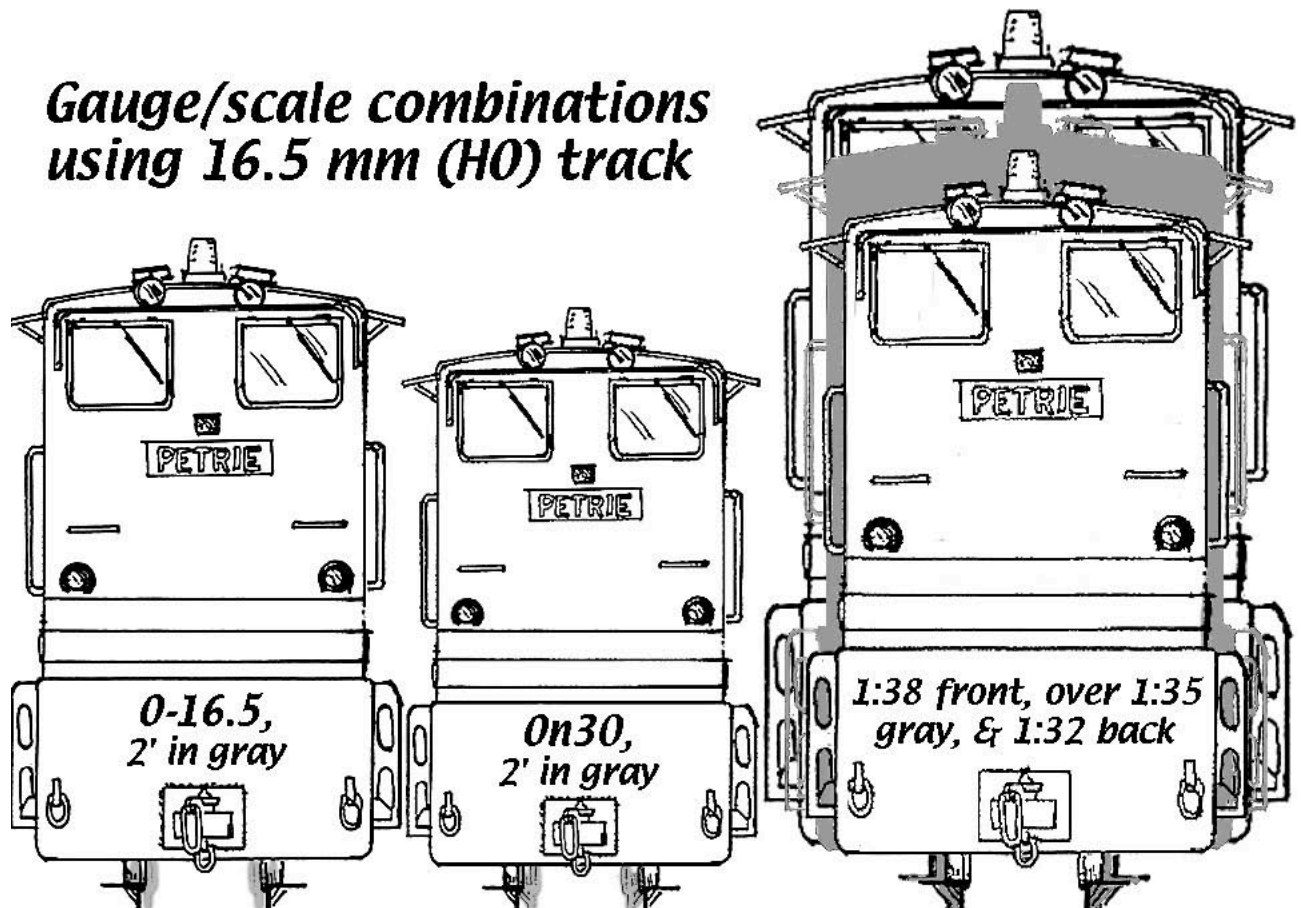
This 1984 shot of Tully Mill shows the potential of modelling the mill on the backscene. Sleeper piles, small buildings, and mill junk could disguise the transition from the foreground.



A typical timber and iron loco shed, this one at Mourilyan Mill, Goondi, 1999. Greg Stephenson photo.



## Gauge/scale combinations using 16.5 mm (HO) track



HO standard gauge track is 16.5 mm, representing 4' 8.5" at 3.5 mm to the foot. Queensland cane railway modellers use a variety of scales with 16.5 mm gauge because of the ready availability of HO track materials, mechanisms and wheel sets.

O-16.5 (left) uses a scale of 7 mm to the foot (1:43), resulting in a slightly wide gauge representing two feet (in gray).

On30 (centre) uses a scale of 1:48 or 1/4" to the foot, making a slightly wider 30" rather than two feet (shown in gray).

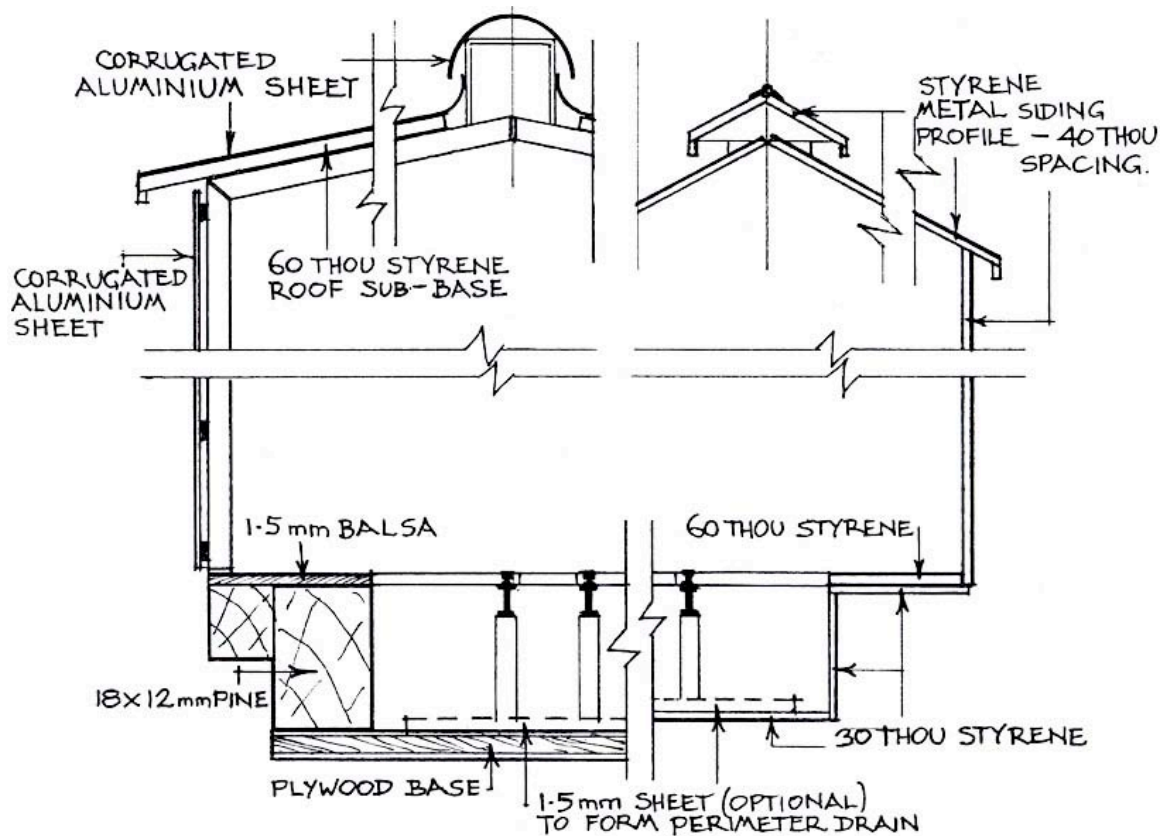
1:38 (8 mm to the foot) is a reasonably correct two foot representation from 16.5 mm gauge, as is 1:35 (0.0286" or 7.26 mm to the foot, making 22.7" gauge) and 1:32 (3/8" to the foot making 21"). Jim Fainges drawing.



A4-sized On30 diorama with computer enhanced canefield backscene and plexiglas cover. The loco is the 1:48 RJ (Hanovale)/Berg model of a Bundy Fowler, professionally assembled by The Model Works Australia.

The 4 ton cane bin is a 1:48 Aubrey model regauged for On30; the ute is a repainted cast metal model; the tree is an Aussie variety from Trackside Trees. The hand-laid sleepers are Mt Albert On3 switch ties (5" x 7" x 12') cut in half with code 70 nickel-silver rail. Lynn Zelmer photo.





Typical model loco shed construction details from Jim Hutchinson's "Modelling Loco Depots" notes on the CaneSIG web site. Jim Hutchinson drawing.



The last bin has been tipped at the Moreton Mill, Nambour, and little remains to indicate the presence of a sugar cane mill. This early morning shot was taken during the last crushing season as the train crews prepared to go out for their first run of the day. This modern loco shed has many of the typical construction characteristics illustrated above but lacks the steam loco ventilator at the roof ridge. Lynn Zelmer photo.

