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OTAGO CENTRAL RAIL TRAIL : AN ARCHAEOLOGICAL ASSESSMENT

(Short Answers in Conservation Science)

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Archaeological assessment of the Otago Central Rail Trail

Jill Hamel May 1994

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Introduction

The Otago Central Railway from Wingatui to Cromwell was built between 1879 and 1921. Commercial operations from Middlemarch to Clyde ceased in 1990 and most of the rails were lifted, leaving only the gorge section from Wingatui to Middlemarch to be used by the Taieri Gorge excursion train (Fig. 1). The corridor from Middlemarch to Clyde was handed over to the Department of Conservation in 1993 for use as a rail trail, and an interim policy and development plan issued in March 1994.

The following is a summary of the matters in the interim development plan which an archaeological survey can contribute to. Management Direction Three is *to preserve and enhance where possible the historic and heritage attributes of the rail trail* (Sec 3). Since "the structures and formation on the corridor from Middlemarch to Wedderburn constitute an archaeological site" under the Historic Places Act, having been built before 1900, there is also a legal requirement to consult with and obtain permission from the Historic Places Trust. The plan states that the Department will consult with the Historic Places Trust over the management of the entire corridor and seek approval for work which affects archaeological sites *per se* between Middlemarch and Wedderburn (Sec 4.1.2).

Under Sec 4.2.4 the plan notes that a full assessment of land which is required for public recreational and *heritage protection purposes* will be carried out as time permits, with a view to disposing of land not required for these purposes. Sec 4.3 comments on the need for an inventory of assets such as bridges, gates, marker posts and buildings for both their economic and *intrinsic values.* Sec 4.6.1 mentions that modifications to bridges will have regard to their intended use, safety and *historical integrity*. On-site interpretation is a long term proposal (Sec 4.8.2).

All of these objectives, if adopted, should be based on an inventory which has an archaeological component, so that historic integrity is maintained and unobtrusive features such as work camps and early sidings are not missed out or accidentally destroyed. The inventory will need to be analysed, with the help of publications on other New Zealand railways, to determine the importance of existing structures on a national scale and their history and place in the functional system of the railway. From this analysis it will be possible to determine the degree of modification for safety and visitor enjoyment that is acceptable if historic integrity is to be maintained.

This pilot study has been funded by a grant from Science and Research Division of the Department of Conservation. It provides a short history, some archaeological detail, a compilation of documentary material, an assessment of the gaps in the records and how much time and effort will be required to complete the inventory. I will also discuss how to determine the acceptability of modifications required for safety and ease of public use.

A brief history of the line.

Most of the following material is drawn from Dangerfield and Emerson's "Over the Garden Wall" , 1967.

The rail trail section of the Otago Central Railway was built from Middlemarch to Hyde in 1891-1894, to Wedderburn by 1900 and to Clyde by 1907. Construction was a great deal easier than over the previous section through the Taieri Gorge, but the pattern of work was set to some extent on the first section. In taking the unusual course of letting the construction of the Wingatui viaduct to the Dunedin firm of R S Sparrow and Co, the Minister of Public Works stated that this viaduct was to be the standard pattern for the rest of the line. He was looking for savings in time and money from bulk manufacture of girders. All the ironwork was manufactured by Andersons Ltd of Christchurch in a temporary workshop at Wingatui where the girders were built up, marked and dismantled for transport to the site. The bridges were built, therefore, in the heyday of Victorian engineering in New Zealand.

The work system for the Middlemarch/Hyde section was unusual. Instead of letting out sections of the formation to contractors, who were said to have made large profits and paid their workmen poorly in the gorge section, a cooperative system was established. The men formed themselves into parties of up to 10 or 12, selected a head man and worked directly under the government engineer. He assessed the value of the work to be done and applied current wage rates plus a small percentage to represent the profit that a contractor would have made. The men should have earned a little more than any contractor would have offered them, but they were very dependant on the engineer's judgement (Dangerfield and Emerson 1967:17).

Under the cooperative system each man was issued with a tent, which he was expected to repair and replace. Expensive equipment was supplied, but the men used their own shovels, picks and wheelbarrows. They hired drays and horses from the local farmers and provided their own explosives. This system might be expected to result in more variation in building methods, but the simplicity of the technology and the hands-on vigilance of the engineer could have maintained uniformity. The bridges were built under the more usual contract system.

Whereas there were Public Works camps for the unemployed in the gorge section, we can expect smaller and more informal camps especially where work on the line was relatively slow as between Middlemarch and Ranfurly, with more of the men drawn from nearby settlements. The goldfields town of Hyde boomed again with bakers, butchers and grog shanties and larger school rolls.

On the Middlemarch to Poolburn section, where the work went ahead more rapidly, there were 250-300 men employed at a time and one of the largest camps on the line was set up at Rough Ridge. Wedderburn became the headquarters for the Public Works for about 18 months and, since it had never been a mining town, most of the signs of earlier settlement will date to this period around 1900. In its turn Ida Valley station became a busy rail and coach terminus while the difficult Poolbum gorge section was completed. Omakau was reached among great rejoicings in 1904.

The section through the Crawford Hills was only moderately difficult but required some zigzags to lose height. A deviation for the coach road was built on top of Tiger Hill to avoid an overbridge across the deep railway cutting. (In 1964 the overbridge was constructed and the road brought back on to its old line.) About 200 men transferred to a camp at Chatto Creek, where besides the usual offices for Public Works staff, there was a blacksmiths and probably a bakery. Apart from brick chimneys for fireplaces, the latter are the structures most likely to have left traces. The section through the more settled Alexandra and Clyde area is unlikely to have separate camps for the men.

During the working life of the line bridge repairs have been continuous, as piles and beams rotted or cracked. Sinking piles were a major concern and much of the inspections were taken up with measuring the exact distance of the rail from the ground. A major session of bridge renewal began in the 1930s as it was realised that timber was not standing up well to the dry hot climate of the Manuherikia Valley. Virtually all the timber superstructures in the Valley were replaced.

The line was straightened in one or two places. The bridge at Prices Creek was shifted downstream in 1963 because it had been built in unstable ground, typical of the Hyde geology, and the opportunity was taken to run the line straight across the gully. Both the old and new bridge had steel girders, but instead of wooden piles the new bridge has reinforced concrete piers.

A history of the closure of the railway from the community point of view can be derived from the Railway's correspondence with the Alexandra Borough Council over Bridge 85, for both road and rail. The Council had a 1906 agreement to pay NZR only 30 pounds per year for maintenance. When the Council began to suspect that NZR was about to close the line, they became anxious about the status of the bridge and NZR became wistful about the low contribution from the Council. There was a fair amount of acrimony in the mid 1980s on the matter, until finally the Council took the bridge over when the railway closed.

The available documentation

The two most interesting sets of data on the rail trail are the Chainage Book and the bridge inspection files. The Chainage Book was drawn up when the railway was established and shows every feature of the line chain by chain. This is still held by New Zealand Rail, but I was able to make a photocopy for the Department. Pages of the chainage book, annotated during a survey of part of the line appear in Appendix 3. An analysis of the bridge inspection files is provided in Appendix 1. There is also a file of cards for the bridges, one card per bridge which provides basic information and includes a small photograph. The Department also holds some large plans of bridges (originals held by NZR, Wellington), a set of detailed

survey drawings for the whole line, indexed on a set of cadastral maps (Fig.2), as well as several inspection reports by DoC staff. An indexed set of photographs for the whole line as it exists in 1994 (three or four photographs for each bridge) is being established. Other historic materials are held by Jim Dangerfield, George Emerson and Peter Mason.
A full description of these materials is lodged with the Otago Conservancy Office.

Bridges - from the single span No 37 to the Muttontown viaduct.
The most spectacular structures on the line are the bridges, especially the Poolburn viaduct and the long wooden trestle bridges crossing the Manuherikia and Waikerikeri. There has been sufficient replacement of bridges over the 100 years of the line's working life to provide a short history of bridge technology. The oldest type of structure is represented by the masonry abutments and piers of the smaller bridges, through different types of lattice and leaf girders, wrought iron and steel girders, to the reinforced concrete replacement bridges of the 1960s. (Sadly one of the first concrete arch bridges in the South Island, which was built about 1907 over Leaning Rock Creek in the Cromwell Gorge has been destroyed by the Clyde Dam works.) The chronology and details of where to find the best specimen of each type of structure is beyond the scope of this report but some of the high points were easily derived from the archives.

When built in 1901, the Poolburn viaduct was the third highest railway viaduct in New Zealand, exceeded only by the Wingatui viaduct on the same line and the Maungarangiora viaduct in Hawkes Bay (Troup 1973). The quarry sites in the tors lie only about a kilometre up hill and the archaeology of how the bridge was built would be of interest (G.Emerson pers.comm.). Historically these big bridges fall between the masonry viaducts of mid nineteenth century colonial railways and the concrete bridges of the mid twentieth century. The Capburn Bridge was probably the last to use wrought iron work. The later bridges are very typical in their use of steel trusses and wooden trestle construction of their period at the turn of the century. The trestle construction was an American development for crossing wide river beds. The major change in bridge construction along the line can be seen in the three miles and the three years between the building of the Poolburn Viaduct with its lattice girders and the Manuhenkia Bridge No 1, with its concrete piers and plate girders. The change of style was not complete, however, and major span on the Alexandra road-rail bridge is a 100 foot lattice girder.

Some concrete was used in a structurally simple manner on the earlier bridges, as in the iron cylinders filled with concrete used on the Taieri River Bridge near Waipiata in 1898 and later in the road rail bridge over the Manuherikia at Alexandra in 1906. RSJ (reinforced steel joists) were typically used when bridges were replaced in the 1940s in the Manuherikia Valley. Some bridges, such as at Muttontown and Manorburn, are historic hybrids, with 1940s RSJ superstructures and 1905 wooden trestles.

In total there are now 51 bridges along the line. Previously there were also three cart bridges in the Ida valley station yard, a bridge into a ballast pit at Chatto Creek and bridge 83 which suffered the ignominy of being replaced by a large concrete culvert. Of the 51 extant bridges, eight are overbridges for roads and the other 43 are bridges over rivers. At some of the overbridges, the rail crosses above the road, as at the Olrig farm access. The longest bridge is the Manuherikia No 1 bridge (363 ft, 110.6 m) and the highest is Poolburn Viaduct (121 ft, 36.8 m). The longest span is the 157' steel lattice girder on the Poolbum viaduct, and the best examples of *wholly* wooden trestle bridges are at Gorge Creek and Wether Burn. The bridge with the most spans is the Muttontown Bridge with 18, but the old Manorbum bridge also had 18, reduced to 9 when it was rebuilt. It is not clear why the Manorbum bridge was reduced from 18 to 9 spans, except for the possible economy of maintaining an earth embankment compared to a complex wooden trestle. In 1904 before the advent of the bulldozer the trestle was more easily built than an earth embankment and this may have decided the number of spans (Robert Storm: pers.comm.).

The road rail bridge at Alexandra has a long centre span and short side spans (44+44+100+44+44 feet) to allow the dredges which still worked the river in 1906 free passage below the bridge. The piles of the Manuherikia No 1 bridge were driven using compressed air for the first time on this line. The Manuherikia No 2 Bridge of 10 spans, built on a curve above the Chatto Creek confluence, is the most remote and least photographed of the big bridges (Jim Dangerfield's comments). Other associations with gold mining show up in the large bridges built over sludge channels, such as the Hogburn and Muddy Creek and which were later reduced in size.

Stations, tunnels and other features.

The stations and tunnels are listed by Dangerfield and Emerson (1967), who give their location by mile peg, height above sea level, comments on the origin of the name and give some details of their history. There is little or no description of the physical structures at each (Appendix 2).

Some of the surviving railway station buildings are at Middlemarch, Ranfurly, and Alexandra, but I was not able to provide a compilation of them all. There are an unknown number of small storage sheds, signal levers, road signs, cattle stops, and gates on the corridor of the line, and station yards, goods sheds, and platelayer's and surfacemen's houses off the corridor.

The files on tunnel inspections are very simple. There are no drawings or photographs and little indication of how tunnels built. The tunnels from the whole line are in the one file, but Tunnels 6 to 10 are on the gorge section. Only Tunnel 11 (Prices)and Tunnels 12 and 13 (Poolbum Gorge) are on the Rail Trail section. There are interesting letters in the file back to 1926 about mishaps with carriages, trucks and loads of hay striking the tunnel walls. The lengths of the tunnels are given in Appendix 2.

Other archaeological features which will tell the tale of how the railway was constructed and run include railway station buildings, sheds, point levers, sections of rail, two major camp sites at Rough Ridge and Chatto Creek, ballast pits, earth-formed sidings and stone revetment s holding up the formation alongside lakes such as at the Idaburn Dam and the defunct Taieri Lake.

The basic measure of distance on a railway line is the number of miles and chains (and later on, kilometres) from some starting point. For the Otago Central line the point was Wingatui, and marked mile and chain pegs ran along the formation. When metrication was adopted by the railways in 1974, the old mile pegs were left in place, putatively until the line gangs got used to metrics. In fact some of the pegs still survive and presumably were never uplifted. When a section of the line was shortened, as at Prices Creek, the pegs on the new section were measured by "short miles" so that all the other pegs along the line need not be moved. As well as the mile pegs, each curve had a plate on a peg showing the radius of the curve, the amount of cant (height of the outer rail above the inner rail), and the length of the transition between the curve and the straight rails.

A partial archaeological survey

For all the massive documentation, there is no substitute for a foot reconnaissance as a means of providing a useful inventory of what is actually present. There was no need to reinvent the wheel, however, by making yet more drawings of the railway. The Chainage Books provided a perfect base for a fast inventory of the line, and on 18 May David McFarlane and Peter Petchey used mountain bikes to check the section between Middlemarch and Hyde. They carried the analysis from the bridge inspection files (Appendix 1) with photocopies from the appropriate part of the chainage books. They each did a separate section of track, and in six hours each was able to cover 7-8 miles and describe 8 bridges. The heavy ballast slowed up travel but did not make it impossible.

There is no point in providing a blow by blow account of what was found during the survey, since the information is accurately recorded on the chainage sheets. The new features which showed up were such things as: -
the presence of large culverts built like small bridges, with masonry piers and wing walls but often with no decking left;
some fine examples of stone work, especially the arched culverts (see the one at 51 m 43 c, north of Boundary Creek);
the one and only shelter shed surviving, though it had lost its fireplace;
the presence of pitching (stone paving) in the stream beds under both culverts and bridges,
the wide range of marker posts (there seemed to be five different series);
the middle rails still left on bridges;
the wide range of ballast types (the heavier ballast was put on when diesel engines were used);
the frequency of informal ballast pits, some of them full of water and providing both stock

water and wildlife habitat;
the presence of a heap of cross -bars from telephone poles, highlighting the total loss of the telephone line which was an important part of the communication system for the railways;
pull-off rails at right angles to the line, usually at standard gauge for the jiggers, but south of Rock and Pillar station there are two sets each about 3 m apart, of unknown function;
the frequency of railway litter, such as spikes, sleeper screws, bolts and curve plates off marker posts,
small stockpiles of ballast, boxed in with old sleepers.

During the survey, it was noted that Bridge 52 over Scrub Creek just south of Hyde has a spectacular crack where the north west wing wall is separating from the abutment. I was able to immediately check in the bridge inspection files that this crack, when measured in 1986 was 50 mm wide at the top running to nothing at the bottom, and has not moved since 1960 at least. This was useful example of the value of having the bridge files readily available.

Summary and discussion

The Otago Central Railway can been seen as the last of the lines built in the heroic age of railway construction in Victorian New Zealand. Though Victoria died in 1901, the methods used on the line tended to be old fashioned for their time, especially the use of lattice girders. The Midland line is likely to have similar lattice girder work left, and there is the occasional lone example on the main trunk, such as the old Maungaweka Viaduct now bypassed.

The Otago Central line provides a unique historic series of bridge construction from masonry abutments, a range of girder types, and the wooden trestles of 1900 to the reinforced concrete structures of the 1960s. They are also unique in their extensive use of stone, and provide valuable, well-dated examples of the schist masonry typical of Otago. A full study of the technology that they represent could not be presented here, but would be relatively easy to research from publications by the N Z Railways and Locomotive Association (Roberts 1987, 1990).

It will be well worthwhile to stabilise and reduce the rate of decay and replacement as much as possible on all the bridges. (Replacement to carry people and horses safely will, of course, be much slower than the rate required when the rail was in use.) The greatest efforts of preservation, as defined by the New Zealand ICOMOS Charter, should be put into the best examples of each type of bridge, the old wooden trestle bridges being probably the most difficult to maintain.

In considering the importance of other features along the Rail Trail, the railway should be regarded as a whole functioning system. Representative stations and demonstration sites should be established to give an understanding of the way the railway was built and maintained, the obvious choices being Hyde and Clyde if satisfactory negotiations can be achieved with owners of buildings, railway stock and track sections. Representative examples of even simple things, such as different types of sleeper attachments (spikes, screws and clips), different weights of line and ballast and their function should be documented and preserved either in situ or in well organised demonstration sites. The distribution of workmen's houses, ballast pits, stock piles of ballast, the telephone line and other features should be documented for at least part of each major section of the line to provide an intelligible system.

There are numerous hints in the bridge files that would give verisimilitude to safety modifications such as handrails and decking. For instance the Taieri Bridge was once decked as a road bridge, providing historic justification for replanking it. (When the deck was lifted, long planks down the middle of the rail were considered adequate for the surfaceman's wife and child to cross on in 1904. An example of this type of crossing on a lower bridge could be considered to provide a contrast with modern safety requirements.) The metal standard and pipe rail for the footbridge on the Five Mile Creek Bridge has a very satisfying Victorian industrial appearance, and should be researched for its age and utility as a model for rails on other bridges.

At the larger bridges a facility which would be much appreciated by photographers in particular would be a track and steps to allow the underneath of the bridges to be examined. Since linemen and inspectors constantly wanted to get under bridges also, examination of the ground should reveal their old access routes. A matter of safety, which should be considered, is the blocking off of the inspection ladders which lead under the larger bridges to single plank and wire footways along the underside. These would be difficult to maintain safely and could be a hazard for children. One example might be set up eventually as a demonstration with netting sides under a relatively low bridge.

The history of the line can be brought alive by remembering the people. The use of the cooperative system which eliminated the contractor may have been socially innovative. The lives of surfacemen and platelayers, as well as the more visible station hands, can be illustrated by the retention of some of the typical isolated houses of the former and a relatively intact rural station yard for the latter. The importance of the line to the rural community can be highlighted by marking the position of every station, siding and stockyard.

Further work

There is still much material to be gleaned from the archival material but, rather than make further summaries, it would be more effective to investigate groups of features prior to their modification when specific questions can be asked. To do this efficiently the NZR files should be gathered into one place and properly shelved where they can be readily accessed. The bridge files and probably their cards, the bridge drawings, the large scale maps, the copy of the chainage book and the department files and photographic records should be kept together in one place, the obvious site being the Conservancy office, with duplicates of the most useful material for the western end of the line at the Alexandra Office. (The Department has a strong argument for retaining the bridge inspection files beyond the period of developing the rail trail, in that when safety problems occur with the bridges quick decisions will need to be made. The inspection files are crucial to making these decisions effectively.)

Probably the most important decision to be made in the near future is the proper housing of both the historic files and the recently acquired data. The fragility of some of the material in the bridge inspection files and of the old maps should be considered. The need for rapid and efficient access should not be compromised, however, and this suggests copies should be made of some material and the historic documents lodged with National Archives. Of the recently acquired data, the photographic material is in most need of filing in a way that guarantees safe storage and easy retrieval. Loose storage in packets, as they are at present, seems the least desirable.

Only 16 miles of the 94 miles of the trail could be surveyed for this report. This section had 16 bridges which took up most of the working time of 12 hours. This leaves 35 bridges to photograph and 78 miles of trail to ride, which could easily be covered in 60 hours, and more probably 40-50 hours. Working 6-7 hour days with 2 hours travel each day, two people could probably cover the rest of the trail in four days.

When the rest of the line has been surveyed, a proper comparative analysis should be carried out to determine where the best examples of various features are on each section. Much more industrial history is illustrated by these bridges than I have been able to research. I have not even started to search for historic photographs such as those George Emerson described to me of the Poolburn viaduct in the course of construction. The survey from Middlemarch to Hyde suggests that masonry culverts might be an important feature of this section and worthy of special interpretation.

Throughout the work, the simple philosophies of the New Zealand ICOMOS charter should be remembered. Preservation should be given precedence over restoration and reconstruction, and when considering adaptation to a compatible use only changes which can be substantially reversed should be considered.

Acknowledgements

I am grateful to Department of Conservation staff for their assistance in compiling this report, and particularly to David McFarlane. I am grateful to Robert Storm of NZR, Jim Dangerfield, George Emerson and Peter Mason for their patient answers to my questions. On a personal note this has been a "remembrance of things past". I made my first journey into Central Otago alone as a child in 1946 on this line, and the pleasures of the trip are well remembered.

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Appendix 1
Otago Central Rail Trail.

Data from bridge inspection files of Otago Central Railway, supplied by NZR

About every 10 years a very detailed inspection was carried out of each bridge, the last major inspection being in 1980. The first page of each inspection report briefly describes the bridge and the dimensions of each major element. A stylised profile drawing shows the height of each girder above the creek or ground level. The number of piers is shown, but the type of structure, i.e. wooden, masonry, steel, is not always clearly shown. The larger the bridge the more simplistic the drawing is. The state of the paint and whether or not tar has been used is reported.

The files for the smaller bridges start around 1900, but the closed files of some larger bridges(Nos 50,55,56,57,66a,67,69,85,86), along with those of four other bridges which have been removed (68a, 68b, 76 and 83) are held in the National Archives, Dunedin.

The following listing gives for each bridge -

Its number as counted from Wingatui and then the grid reference to the local NZMS 260 map. This is followed by the length in feet and inches for the main beam or girder, which was taken from a major inspection of about 1970. (Imperial measurements are used for the length because most of the bridges were built in imperial. One metre = 3.28 feet.) For some bridges the length had to be converted from a metric measurement made in 1980, and these figures are shown within the following description. The height above the creek bed is given in metres from the last major inspection in 1980. A brief description follows, along with any notes of obvious interest seen in passing as the bridge files were used to get the basic data. The girder plans were numbered and some types are repeated. Other useful details about such things as handrails, ballast guards and water tanks can be gained from these files. A plan for a proposed stockbridge is shown in the Wether Burn file in National Archives, which could provide a basis for a footbridge design.

Piles, piers or spans are always counted from the Middlemarch end of the bridge.

Fire protection in the 1940s was "a 40 gal drum and 1 bucket" at one end of the bridge. By 1960 these had been replaced by a concrete water container and no bucket at one end of short bridges and both ends of long bridges. The drums and buckets were probably purloined.

37 c855195 Dewar Stream. 13'8", 1.9 m. Single span,timber beams on timber sills, on stone masonry abutments and wing walls.

38 864218 Camlet Creek. 13'1", 1.6 m. Single span timber beam on timber sills, stone masonry abutments and wing walls.

39 870235 Six Mile Creek. 21'10", 1.82 m. Single span, metal girder on timber sill (CCE plan No 43100) on masonry abutments and wing walls.

40 879256. 32'11", 5.2 m. Single span, metal girder on timber sills on masonry abutments and wing walls

41879257 21' 10, 2.7 m. Single span, metal girder on timber sill (CCE plan No 43100) on masonry abutments and wing walls

42 893282 Wandle Creek 11' 11 ", 3.48 m . Single span timber beam on timber sills, stone masonry abutments and wing walls.

43 ?896293 ?Sth, Nant Creek 32'11", 6.96 m. Single span, metal girder on timber sills on masonry abutments and wing walls Girder of leaf plate iron CCE Plan No 43539

44 902303? Nant Creek 21'10", 2.54 m. Single span, metal girder on timber sills on masonry abutments and wing walls Girder leaf plate iron CCE Plan No 43539

Rock and Pillar Station

45 902305 Last Creek 32' 11", 4.1 m. Single span, metal girder on timber sills on masonry abutments and wing walls. Girder leaf plate No 43539

46 907317 House Creek 21'10", 1.49 m. Single span, metal girder on timber sills on masonry abutments and wing walls Girder leaf plate No 43110

47 911328 Heeney Creek 14'4" + 13' 3" + 14' 1" = 41'8". 3.4 m .
Three spans, timber beams and caps on three pile piers (silver pine piles in 1965). Piles were replaced in some piers - the middle pile in Pier 4 in 1976 and the piles in Pier No 1 in 1981, but in 1980 most of the piers still silver pine! The silver pine piles in Pier No 3 have no depth mark. Piles driven since 1966 were known to be 6 m plus.

48 921339 Gills Creek 32'10", 6.8 m. Single span, metal girder on timber sills on masonry abutments and wing walls Girder Plan 43539

49 924347 Boundary Creek 32'10", 6.7 m. Single span, metal girder on timber sills on masonry abutments and wing walls Leaf plate girders Plan 43969

50 934363 Five Mile Creek (Six Mile Creek) 31' 2" + 102'9" + 31'8" = 164' 7". 17.8 m.
Three spans of girders (9.5 +31.33 +9.65 = 50.48 m), Span 1 and 3 leaf deck plate girders, Span 2 leaf lattice girders; to CCE Plan 43969 and PWD 12392 lattice girders. Masonry piers and wing walls. Massive timber sills and corbels. Walkway on eastern side. Lot of welding repairs to centre span from 1937 onwards, cracked welds repaired in 1954. There was a proposal to replace the centre girder with a Calender-Hamilton "B" type beam in 1966.

51 936387 Scrub Burn 48'10", 9.46 m. Single span, metal girder on timber sills on masonry abutments and wing walls. Leaf lattice girders, CCE Plan 75278 from PWD 17284

52 939395 Nth,Scrub Creek 32'11", 7.4 m . Single span, metal girder on timber sills on masonry abutments and wing walls Girder Plan No 43539

Hyde Station

53 944412 Coal Creek 174" + 29'6" + 28' 7 + 29 6" + 1711" = 122' 10", 8.7 m
Five spans (5.27+9.0+8.71+8.98+5.45 = 37.41 m) , Spans 1 and 5 timber beams, spans 2,3,4 leaf plate iron girders to CCE Plan 43549. Wooden piles, wooden caps. 1896

54 949420 Hyde township 21'2" + (3 x 32'9") + 21'2" = 140'7", 9.0 m
Five spans (6.45 + (3 x 10.0) + 6.45 m.= 42.9 m) , 6 piers of wooden piles; piers 1 and 6 each have a single row of 3 piles, piers 2 and 5 each have a double row of 3 piles, piers 3 and 4 each have a double row of 2 piles; spans 1 and 5 are timber, spans 2,3,4 are leaf girders to Plan 43969. Wooden corbels, complex trestle work with walings and raker braces. 1896

55 961446 Prices Creek (43'9" x 3) + (65' 10" x 2) + 32'9" = 2958", 28.9 m.
Six spans (13.34 x 3) + (20.08 x 2) + 10 m = 50.18 m) on reinforced concrete piers. Concrete abutments. Spans No 1,2,3 have rivetted steel plate girders CCE 19543, Spans No 4,5 have steel plate girders CCE22093, Span No 6 has steel plate girder CCE 19546.

The new bridge was built from about 1961 - 63 to replace the unstable structure upstream in slumping ground. Even on the new site the contractor had gross trouble making the new formation and fencing it. The weather was so wet that the fill apparently swelled after being placed in position and fence posts came loose. There was a slip at the Wingatui end during the work. The bridge was opened in June 1963.

The old bridge was sold in 1967 with difficulty because the local farmer would not grant access, and included a lot of ironbark timber. Its girders (CCE Plan 43969) were retrieved, cleaned, painted and stored. The files only goes back to 1962 and the earlier ones were probably dumped. 1896, 1963

56 956463 Capburn 66'+ 66 = 132', 31' 6" Two spans. Girders iron lattice DCE Plan 922 on timber caps and corbels. In 1937 the timber sill and corbels on Pier No 1 were replaced with precast concrete blocks. Masonry piers and abutments and wing walls. Girders welded 1958-59. May have had a Calender-Hamilton "B" type beam put in place in 1966. Built 1897

57 882539 Taieri River 77'+80'+80'+77'= 314', 24 m.
Four spans of steel through trusses, three sets of wrought iron cylinder piers (4'6" diameter) in pairs filled with concrete. Concrete abutments in the form of double piers and wing walls.
This bridge was designed as a road rail bridge though no road ran to it. As early as 1900 the District Engineer wanted to lift the decking. When this was done in 1906 the local surfaceman asked for help because it was "not safe for missis and little boy to cross over and there is no other road to go and get our stores". The engineer suggested that planks be laid down the middle of the rail for them!
In 1934 the rail beams were very vulnerable to fire because they were split on top. Letters in the file suggest putting zinc sheeting over the exposed parts of the beams but this would have been expensive and make inspection difficult. Then it was suggested that it would be cheaper to turn the beams upside down since the bottoms were not split. This was approved.
In 1935 the beams were welded and repaired, in 1961 high strength bolts and washers inserted and the bridge was painted in 1965.
Foundation measurements by magnetic induction method were done by DSIR Dec 1979. Pier 4 on the south side -estimated depth of pier below rail head 16 m +/- 0.5 m; Pier 2 South side 18 m +- 0.5 m; Pier 3 north side 16 m +/- 0.5 m. Lot of information on results from drill hole of the sediments. 1897

58 866546 Hogburn or Waipiata Stream. 9'6" + 21'+ 21'2" + 20'8" + 21'4" +9'6" = 103' 2", 4.9 m.
Six spans (2.88 + 6.4 +6.45 +6.3 +6.5 +2.9 m = 31.43) . Spans 1 and 6 are hardwood beams; spans 2,3,4,5 are steel girders. Piers 1 and 7 are concrete abutments and wing walls with a grouted bolster sill, Piers 2,3,4,5,6 are 3 pile piers with stump piles and ?wooden corbels. Interesting early history in the file of water flow and access to a commonage under Wingatui end of bridge. 1897

59 865549 Road overbridge Waipiata Naseby Road 5.65 +5.83+5.6 m = 17.08 m, 4.5 m above rail
In 1984 it was a wooden three span bridge with wooden railings, probably about 56' long. Abutments were hardwood on mud sills. Totara beams and two piers with three wooden piles. Deck tanalised pine. Considered unsafe for traffic. Small photograph. By 1987 there was a three span bridge on concrete piers with a three stud trestle, but No. 4 beam is totara and No. 1 beam is hardwood. Hardwood sill under Pier No 1. This bridge seems to have been refurbished rather than replaced. 1897, about 1985.

60 855563? Farm access north of Waipiata. 11'7" long and 2.758 above track.
Single span timber beam on timber sills, stone masonry abutments and wing walls 1897

61 826591 Creek sth of Ranfurly 11'7", 1.7 m. Single span timber beam on timber sills, stone masonry abutments and wing walls 1897

Ranfurly Station

62 809613 Creek nth of Ranfurly 9'6", 2.35 m . Single span timber beam on timber sills, stone masonry abutments and wing walls 1898

63 802623 Eweburn 20'7" + 20'11" + 20'11" + 21'2" + 20'8" + 21'1" +20'6" _ 145'10", 4.2 m to creek
Seven spans (6.27 +6.38 +6.37+ 6.46+ 6.3 +6.43+6.24 = 44.45 m) of steel girders with strengthening plates top and bottom, wooden piles and caps. Bridge reduced in length in 1977 when the piles at the north end rotted, spans 8,9,10 removed and replaced with an embankment. 1898-9

64 786645 Cross Eden Creek 10'0", 2.35 m. Single span timber beam on timber sills, stone masonry abutments and wing walls 1899

65 744713 Wether Burn 19'4"+19'6"+18'7"+19'1"+19'=95'6", 4.4m
Five spans (5.9 + 5.95+ 5.68+ 5.83+ 5.8 = 29.16 m) , timber beams and sills, 3 pile wooden piers. In 1904 a stockbridge hitched to the side of the bridge was asked for and a cross section drawn (National Archive file). Lot of movement noted in 1952. One span (5.65 m long) at north end was filled in with an embankment when a pile in pier 7 required renewal in 1982. 1899

66 733718 SH85 overbridge, 25'5" +31'5" +25'5" = 82'3", 5.01 m to railway line. Three spans (7.75 + 9.59+ 7.75 = 25.09 m) of prestressed concrete beams on concrete piers Old bridge replaced 1966-67 Abutments under new bridge unstable. 1900, 1966-7

66a 717751 Private access overbridge. 27'1" long, 4.27 m to track. Single span (8.25 m) of reinforced concrete beams and abutments

67 661726 Gorge Creek 21'6" + 19'10" + 19'8" +20' +20' + 19'8" +20' + 19'10" +20'6"+20'+21'10"=222'10", 3.6m. Eleven spans (6.55+6.05+6.0+ 6.1 +6.1 +6.0 +6.1 +6.05 + 6.25 +6.1 +6.65 = 67.95 m) of 3 rail hardwood beams, wooden caps and corbels, 3 pile wooden piers 1901

67a 653717 Idaburn Dam 15'+15'= 30', 1.8 m above water
Two spans of hardwood beams, wooden pile piers, wooden caps and corbels. Built in 1919 to replace a 3' diam concrete pipe to take floods. Terse letter from Chief Civil Engineer of NZR to District engineer who proposed removing this bridge in 1973. Agreement with Public Works to repair any damage caused by the proposed Idaburn dam in 1939. A plan of the dam shows a platelayer's cottage at about 93 m 60c on the west side of the line. 1919

68 94m 64c 644710 Sth, Idaburn Dam 9'1", 2.75 m Single span, timber beam on timber sills, stone masonry abutments and wing walls. 1901

Idaburn Station 97m 53c See sketch of yard in plan's file. 1901.Yard closed 1977.

[68a 97m 55c 601699 Road bridge from Ida Valley station to road 14'6", 1.25 m
68b 97m 56c 600699 Road bridge from station to houses. 14'10", 2.1 m.
[68c 97m 57c 599698 Road bridge from station to road 21' long. All single span hardwood beams on timber sills and masonry abutments. Transferred to Vincent County about 1972.]

69 536666 Poolburn Viaduct 66+66+157+66 = 355', 36.8 m.
Four span steel lattice girder bridge, stone masonry piers and abutments, with wooden jack piles on the 3rd and 4th piers. In 1967 there was trouble with pigeons fouling the bridge. 1901

70 680502 Manuherikia No 1. 66+66+ 66+66+99= 363', 17.8 m
Five spans with four 66' lattice girders and one 99' girder, the rails are on wooden beams, concrete on rock abutments, and twin concrete cylinder piers.
One one occasion, the beams under the rails were set on fire because Strongman coal burnt out the firebox of an engine, and dropped the fire into the ash grate which buckled under the heat and dropped live coals on to the bridge. It was repaired with more beams. Built 1902-3

71 489681 Lauder Creek 16'11 " + 171 " + 17'3" + 172" + 17' 2" + 17' =102' 7", 3.0 m . Six spans (5.16 +5.2 +5.25 + 5.225+ 5.23 + 5.18 = 31.25 m) RSJ (reinforced

steel joist) girders, on concrete piers and abutments. RSJs were put in place 1933-34. The previous bridge was timber and decayed badly by 1929. Built 1903-4

72 471669 Muddy Creek 20'5"+ 19'11 "+20'8" = 61'0". 5.8 m
Three spans, RSJs on two three pile and one 4 pile pier. RSJs put in place in 1933-34, to replace decayed timbers. Built over a sludge channel from Matakanui. 1904

73 462661 Overbridge Muddy Creek 21'6" +20'+216 = 63'0", 4.32 m to track.
Three spans to carry Muddy Creek Road over the track. Piers 2 and 3 are 3 pile trestles on concrete feet, timber beams, abutments are a concrete sill and a timber sill on the ground, jarrah decking in 1975. Photograph 1984 Built 1904

74 411621 Thomsons Creek 22'+ 44'+22'= 88', 4.6 m. Three spans, spans 1 and 3 timber and span 2 a steel plate girder, concrete piers and sills. 1905

74a Tiger Hill Overbridge 32', 4.9 m to track. Single span, reinforced concrete. Plan B 1401 Built 1961-62.

75 Farm access 10'2", 2.92 m Single span, ironbark beams on timber sills on masonry abutments

76 356580 Near Chatto Creek .9'10", 1.38 m. Single span timber beams on timber sills on masonry abutments.

76a 118m 21c c355580 Ballast pit siding 12' 0.3 m Single span beams on mud sills. Used as an engine shed siding around 1909 and later for low quality ballast. Pit overgrown and closed in 1965 but bridge beams left in place.

77 352538 Manuherikia No 2 18'10" + 39'6" + 39'7" + 39" 11" +39'2" +39' 9" + 39'5"+35'11"+39'9"+18'6"=350'4" 9.9m
Ten spans (5.74 +12.04 + 12.09 + 12.17 + 11.94 + 12.12 + 12.02 +10.96 +12.12 + 5.64 = 106.84 m), steel girders on wooden piles with wooden braces and walings. Shifted the trestles in 1968 with a steam crane No. 225. There was a fire on the bridge in 1969. Repairs to Piers 11, 9, 5,2, in 1969

78 330209 Olrig Farm access 20'5" 2.9 m Single span, concrete abutments, 3 leaf RSJ girder, concrete abutments

79 323499 Moss Creek (?Dip) 23'+ (22'6"x 4) +23'= 136' 9.8 m. Six spans of RSJ girders, piers 1 and 7 have 3 piles and 2 rakers, piers 2-6 have 4 piles and 4 rakers. A twenty foot span added at the north end in 1916. The old bridge had eight 20' spans. . Letter of 7/12/43 describes the bad state of the bridge which was then 37

years old. The piles and beams needed renewing because the timbers split very quickly due to the hot dry summers - should be renewed in steel and concrete according to the District Engineer. Replaced in 1949.

Galloway Station

80 304474 Nth of Manorburn 15' 1.5 m Single span of hardwood beams on concrete abutments.

81 298466 Manorburn 1948 plan shows 20'2" x 7 + 19'11" x 2 = 181' in that order . 5.19 m. Nine spans of RSJ girders, 2 piers of three piles and eight piers with four piles.
The old bridge had 18 spans, each 20 foot long, of ironbark beams and three pile piers of ironbark and walings, wooden caps and corbels. It was rebuilt in 1944 after engine drivers complained of engines bouncing and rocking on it. Piers had been badly driven and were not square to the track and beams had split because of the hot dry summers. Nine spans were filled in when the new bridge built.

82 297464 Sth, Manorburn 7'7" 1.2 m One span, hardwood beams on masonry and concrete abutments (concrete pad under wooden sills).

(83) 295461 2nd creek sth of Manorburn 21'+30'2"+30'+20' = 100'2" 3.5 m. Four span bridge, timber beams, piers 1, 2 and 3 timber, Piers 4 and 5 concrete. Replaced in 1936 with spoil from a slip in the Cromwell Gorge and a square culvert 8'x 5'. The concrete piers are probably buried. See sketch of old bridge in plan's file.

84 291459 3rd creek sth of Manorburn 10'5" 1.73 m Single span, timber beam and sill, masonry abutments with a concrete pad.

85 276447 Manuherikia No 3 road rail bridge 44'+44'+100'+ 44'+44'+22'3"= 298'3" 15.3 m Six spans of which Spans 1,2,4,5 have leaf riveted plate girders, Span 3 is a lattice steel girder and Span 6 has rail beams. Hardwood transoms.Side fences of kaun and red pine and cyclone netting. Concrete abutments and wing walls, Concrete piers. Photograph 1980 in the inspection file. Conflict in 1980s over ownership of bridge.

86 231495 Muttontown 18'4" + 19'3" + 19'3" +18' 8" + 18'8" + 18'10" +19'11" + 18' 6" + 18'4" + 192" + 18'8" + 19'3 + 18' 10" 18' 11" + 192" +18'4" + 19'4" +18'8" = 340' 1" 9.61 m
18 spans (5.6 + 5.85+5.86 + 5.7 +5.7 +5.75 +6.07 + 5.65 + 5.6 + 5.85 + 5.7 + 5.85 + 5.75 + 5.76 + 5.85 + 5.6 + 5.905 + 5.7 = 103.75 m) , RSJ girders (2 leaf steel spans with rivetted stiffeners on top), wooden caps, 5 piles on piers 2 -17, 1,

Data base of bridges .

Name (miles and chains from Wingatui)	Grid ref	Location	Height(m)	Length(ft)	Spans
Middlemarch					
Bridge 37 (40 m 63 c)	857201	Dewar Stream	1.90	14	1
Bridge 38 (41m 77 c)	804217	Camlet Creek	1.60	13	1
Bridge 39 (43m 5c)	870235	Six Mile Creek	1.82	22	1
Bridge 40 (44m 42c)	879256		5.20	33	1
Bridge 41 (44m 49 c)	879257	Lug Creek	2.70	22	1
Bridge 42 (45m 70c)	893282	Wandle Creek	3.48	12	1
Bridge 43(46m 71c)	?896293	Sth, Nant Ck	6.96	33	1
Bridge 44(47m 11c)	?902303	Nant Creek	2.54	22	1
Bridge 45 (48m 5c)	?902302	Last Creek	4.10	33	1
Bridge 46 (48m 58c)	908319	House Creek	1.49	22	1
Bridge 47 (49m 49c)	911329	Heeney Creek	3.40	42	3
Bridge 48 (50 m 58c)	921339	Gills Creek	6.80	33	1
Bridge 49 (51m 26c)	924348	Boundary Creek	6.70	33	1
Bridge 50 (52m 44c)	934363	Five Mile Creek	17.80	164	3
Bridge 51 (54 m 47 c)	944387	Scrub Creek	9.46	55	1
Bridge 52 (54m 71c)	939395	Nth,Scrub creek	7.40	33	1
Hyde Station (c58)					
Bridge 53 (56m 7c)	944412	Coal Creek	8.70	123	5
Bridge 54 (56m 61c)	949420	Hyde Township	9.00	141	5
Prices Creek tunnel					
Bridge 55 (59m 39c)	961446	Prices Creek	28.90	296	6
Bridge 56 (60m 63c)	956463	Capburn (Tiroiti)	9.60	132	2
Kokonga Siding					
Bridge 57 (71m 01c)	882539	Taieri River	24.00	314	4
Bridge 58 (72m 14c)	866546	Hogburn(Waipiata)	4.90	103	6
Bridge 59 (72m 30c)	865549	Waipiata Naseby Rd	4.50	56	3
Bridge 60 (73m 47c)	855563	Farm access	2.75	12	1
Ranfurly Station					
Bridge 61 (76m 1c)	826591	sth of Ranfurly	1.70	12	1
Bridge 62 (77m 57c)	809613	nth of Ranfurly	2.35	10	1
Bridge 63 (78m 40c)	802623	Eweburn	4.20	146	7
Bridge 64 (80m 20c)	786645	Cross Eden Creek	2.35	10	1
Bridge 65 (85m 45c)	744713	Wether Brun	4.40	96	5
Bridge 66 (86m 29c)	733718	Wedderburn (road)	5.01	82	3
Bridge 66a (89m 55c)	717751	Private overbridge	4.27	27	1
Bridge 67 (93m 27c)	661726	Gorge Creek	3.60	223	11
Bridge 67a (94m 3c)	653717	Idaburn Dam	1.80	30	2
Bridge 68 (94m 64c)	644710	sth of Idaburn Dam	2.75	9	1
[Bridge 68a (97m 55c)]	600699	Ida Valley Station	1.25	15	1

[Bridge 68b (97m 56c)]	600699	Ida Valley Station	2.10	15	1
Bridge 68c (97m 57c)	599698	Ida Valley Station		21	1
Bridge 69 (102 m 30c)	536666	Poolburn Viaduct	36.80	355	4
Bridge 70 (105m 10c)	680502	Manuherikia R. No 1	17.80	363	5
Bridge 71 (106m 0c)	489681	Lauder Creek	3.00	103	6
Bridge 72 (107 m 25c)	471669	Muddy Creek	5.80	61	3
Bridge 73(108 m 9c)	462661	road br, Muddy Ck Rd	4.32	63	3
Bridge 74 (112m 17c)	411621	Thomsons Creek	4.60	88	3
Bridge 74a (116m 28c)	387594	Tiger Hill road bridge	4.90	32	1
Bridge 75 (?115m 6c)	c375598	farm access	2.92	10	1
Bridge 76 (118m 18c)	356580	Near Chatto Creek	1.38	10	1
Bridge 76a (118m 21c)	355580	Ballast pit siding	0.30	12	1
Bridge 77 (120m 75c)	352538	Manuherikia R. No 2	9.90	350	10
Bridge 78 (123m 54c)	330209	Olrig farm access	2.90	21	1
Bridge 79 (124m 5c)	323499?	Moss Creek (?Dip)	9.80	136	6
Bridge 80 (126m 29c)	304474	nth of Manorburn	1.50	15	1
Bridge 81 (126m 54c)	298466	Manorburn	5.19	181	(18) 9
Bridge 82 (126m 65c)	297464	sth of Manorburn	1.20	8	1
[Bridge 83 (127m 1c)]culvert	295461	2nd sth of Manorburn	3.50	100	4
Bridge 84 (127m 29c)	291459	3rd sth of Manorburn	1.73	11	1
Bridge 85 (128m 43c)	276447	Manuherikia R. No 3	15.30	298	6
Bridge 86 (132m 48c)	231495	Muttontown Gully	9.61	340	18

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