

Hynds Paper of the Year 2002

Development of a Strategic Plan for Rural Roads

Abstract:

Wanganui District's local road network, in common with many local networks, has a number of low volume, low standard roads. Rising user expectations are increasingly creating demands from users for improvements. These demands conflict with a desire to hold the rates down.

The paper describes the development of a series of construction standards, tailored to different road groupings, which are designed to be a compromise between usability and affordability. A consultation process with residents ensured that there was general acceptance that the standards are appropriate, so that they can be used to manage expectations.

Development of the standards has not solved the problems of managing this type of network, but it has provided a framework for decision making. The intention is to provide solid ground, particularly for elected representatives, in moving away from ad hoc responses to requests (the squeaky wheel syndrome) towards a more rational and focussed targeting of limited funds.

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Reference: Road Users and Service Standards -The Development of Structured Service Standards for Rural Roads. **I McGowan and D Taylor**. Presented at *Institute of Public Works Engineers Australia* Conference, Sydney, August 1999.

Development of a Strategic Plan for Rural Roads

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1 Introduction

The Strategic Plan for rural roads was developed by the Wanganui District Council (WDC) on the initiative of the Rural Community Board. It covers a wide range of issues, but this paper is chiefly concerned with the development of a set of standards, which are used, amongst other things, to manage expectations and prioritise improvements. The need for a Strategic Plan for rural roads in Wanganui arose out of the particular characteristics of the network. Most of these characteristics will be shared, to a greater or lesser degree, with other local authority rural networks in New Zealand. For Wanganui District Council, the relevant characteristics are:

- (a) A network which has developed on an ad hoc basis and is largely sub-standard in terms of current expectations, particularly the ability to cater for heavy vehicles.
- (b) A shortage of funds to maintain and upgrade the network. In the case of Wanganui, this is exacerbated by the demands of a large multi-year project to upgrade the wastewater system and separate stormwater flows from wastewater.
- (c) Large areas of unstable countryside, which are prone to slips, dropouts and washouts, resulting in high repair costs.
- (d) Continually rising expectations among users, which match or exceed the level of improvements to the network. Rising expectations are generated by a number of factors, but two are worth particular mention. The first is the development of lifestyle blocks, the owners of which hanker for a place in the country, but are used to urban standards of services, and the second is farmers who, while accustomed to rural standards, are driven by economics to want larger vehicles to use the roads.

The above factors produce a situation where frequent complaints are received about the network and the political arm of the Council comes under considerable pressure to accede to requests to improve individual roads – the squeaky-wheel syndrome. These requests conflict with demands to keep the rates down in a District that is not particularly wealthy, and already faces pressure on the rates.

2 Existing Network

2.1 Historical Development

The rural road network in Wanganui comprises 621km of road, with 309km being sealed and 312km unsealed. The network was developed at a time in New Zealand when a road classification system was in place, which defined three classes of road and allowed restrictions to be placed on the size and weight of vehicles using roads classified below the Class 1 level. Land use in the district was largely pastoral farming and the roads were

developed at a minimum level to service this type of activity, because the steep and unstable nature of the country makes costs relatively high. Reflecting this background, only 7km of the network was of Class 1 standard.

Anecdotal evidence indicates that security of access was comparatively low, with large flood events occasionally cutting off access to remote farms for a number of days before access was restored. However, this did not cause undue distress as the farms were largely self-sufficient and few residents had jobs or commitments in the town.

2.2 Changing Demands

A number of economic, social and legislative changes over the past 20 years or so have impacted on the suitability of the network for the demands placed on it:

- (a) Changing land-use. Declining economics of pastoral farming, particularly on marginal land, have led to an increase in alternative uses, particularly forestry and, to a lesser extent, dairy.
- (b) Transport economics. The advent of larger and heavier trucks has improved the economics of remote properties, leading to pressure to improve the roads to cater for such vehicles.
- (c) Lifestyle Blocks. The increasing popularity of rural blocks as a lifestyle choice has created a larger commuter population. These commuters tend to drive low-slung “city” vehicles, rather than the more rugged “farm” type vehicle, and thus demand smoother roads as well as increased security of access.
- (d) Legislative changes. Around 1986, new legislation abolished the road classes, with all roads becoming Class 1 by default, unless special application was made. Since any restricted road suffered funding reductions, in practice, very few roads were exempted from the Class 1 classification. As a result of this change it became permissible to drive any vehicle up any road, but no corresponding upgrading of the roads to match increased demands was carried out. This change has been accompanied by progressive increases in the permissible size and weight of vehicles.

2.3 Current Network Standards

The Wanganui District comprises a narrow coastal strip of relatively flat land, backed by a hinterland of steep hill country, which is generally unstable and prone to slips and dropouts. Roads in the flatter area are generally of adequate standard although narrower than desirable, while the hill country roads tend to be narrow, with poor alignment and sub-standard sight distances and running close to high banks above or steep drops below. Available carriageway widths range from about 7m to less than 2.5m on sections of some low volume roads. Shoulders are non-existent and, in many places, vehicles need to move off the road onto the feather edge to pass opposing vehicles. On some sections of the lowest volume roads it is not possible for two vehicles to pass. Most such roads carry less than 30 vpd, so it is a fairly rare occurrence to meet an opposing vehicle, but such an

incident requires backing up or waiting at a slightly wider section. Needless to say, there are difficulties when a truck-and-trailer unit is involved and sight distances are inadequate.

Traffic volumes range from less than 10 vpd up to around 1500vpd, although there are few roads carrying more than 500 vpd.

2.4 “Shoulder” Slope

On State Highways, the slope of the “feather edge”, (the run-off at the edge of the pavement construction), is normally specified at 20%. This is to allow vehicles to pull off the road in case of a need to stop, but still provide adequate drainage run-off. On many of the local roads in Wanganui District, it is frequently necessary for vehicles to pull onto this area to pass opposing vehicles, so a compromise on this slope is necessary. The current specification is for a slope of 17-20%, but this is felt to be too steep by many residents as the feather edge is regarded as a shoulder, and drivers want to be able to pull onto it at speed when passing opposing vehicles. The trade-off is that any further reduction of this slope implies either a wider construction or shallower drains, both of which have cost implications. This point was one of the hotly debated issues during the consultation process and produced interesting results, with important ramifications for the management of expectations, as discussed later under the determination of cross-sectional standards.

2.5 Consultation with Residents

In 1998/9, as work began on preparing to renew the maintenance contracts, it was decided to carry out a survey of rural residents to determine whether the current maintenance standards were perceived to be appropriate. At the same time, an exercise was carried out to assess the views of residents on which aspects of the roads were important to them. Consultation took the form of a series of public meetings and provision of forms on which users could rate various aspects of the roads. The results of this exercise were published in a paper by Ian McGowan and Dean Taylor of the WDC (1). The issues raised by the public included a number of capital issues as well as feedback on maintenance standards.

3 Objectives of Strategic Plan

The concept of a Strategic Plan for rural roads was primarily conceived as a means of managing expectations of the users and prioritising requests for work to be carried out. One of the keys to this is to draw a clear distinction between maintenance standards and capital improvements. Requests to improve maintenance standards can be addressed by changes to the specifications in the maintenance contracts and, consequently to the maintenance budgets, while improvements of a capital nature require construction and a budget outside the maintenance process. The distinction is important because many of the complaints about “poor maintenance” actually relate to capital improvements. Typical examples include requests for wider shoulders or improved sight distances, while

maintenance issues cover issues such as roughness and running course gravelling for unsealed roads.

Once the capital/maintenance distinction is established it can be used as a basis for discussions with residents over priorities and funding levels. The financial implication of a change in maintenance standards is a sustained rise in maintenance funding, while a capital improvement requires an injection of upfront funding accompanied (usually) by an adjustment to maintenance budgets as well.

3.1 NRB Standards

Recognising that the network is below desirable standards, work commenced on defining a suitable benchmark. Attention initially focussed on the NRB standards of 1985 and the existing network was compared with these standards. From the preceding discussion it will be obvious that the network is well below NRB standards, but the comparison is a useful starting point to define the size of the problem. A rough costing exercise was undertaken and this yielded the information that upgrading the network to these standards would cost of the order of \$90 million. Since it is obviously impossible for the District Council to fund this sum, work commenced on defining priorities.

3.2 Acceptable Standards

One of the primary objectives of the rural road Strategic Plan was to define a set of standards that would strike a balance between affordability and convenience, while not compromising safety. Once defined and accepted these can then be used as a tool for managing expectations as well as identifying and prioritising any needed improvements. Once again, the key to the approach is the involvement of the residents; i.e. the residents are drawn into the process of deciding what kind of standards are acceptable and how much they are prepared to pay for their roads. This ensures buy-in from the ratepayers and makes the process politically sustainable, in that elected representatives have a firm basis for rejecting requests for ad-hoc improvements, in favour of those which fit the Standards as agreed by the users as a group.

4 Road Categories

In order to develop a set of standards, it is first necessary to place the roads into categories. The idea is that for each category, a set of standards is defined, which strikes a balance between cost and usability. The chief characteristic defining the requirements of a road is the traffic volume, and this has been used as the basis of an initial grouping for roads in the network. (Due to their very different characteristics, sealed and unsealed roads are grouped separately, although this is a measure of condition rather than of requirements.) The idea of including other factors, such as strategic importance, was considered but, in the end, it was concluded that almost all other possible considerations defining the importance of a road are already reflected in the traffic volume. It must be stressed that this conclusion was reached for the Wanganui network – managers of other networks may come to a different conclusion.

4.1 Basis of Categories

Choosing the number of categories and the volume dividing points generated considerable debate. It was desired to limit the number of categories as too large a number becomes unwieldy to administer but, at the same time, there is a need to cover all types of situation. The selected approach is to have a fairly small number of categories defined firstly by traffic volume and existing surface (sealed or unsealed). In situations where the road is different for some reason, this is handled by a special category overlaying the basic specification rather than creating numerous sub-categories. When choosing the volume divisions, the test used was whether a particular division resulted in a classification of the existing roads that made sense to those familiar with the network. The chosen division points meet this test and were also favoured because they correspond to those used in the RAMM database. In terms of the sealed/unsealed division, the existing condition of the road is taken as a given, because any roads which qualify for sealing will do so under the normal BCR criteria. Similarly, any roads that are sealed will not normally have the seal removed, regardless of their current traffic volume.

The basic categories are defined as follows:

	Road Surface	Average Daily Traffic Volume (vpd)
Category 1	Sealed	Greater than 500
Category 2	Sealed	101-500
Category 3	Sealed	Up to 100
Category 4	Unsealed	Greater than 30
Category 5	Unsealed	Up to 30

4.2 Special Categories

As discussed above, when the volume classification was applied to the existing rural network, most roads fell into what is felt to be the right category. However, a number of roads have special characteristics, which make the normal standards for the category inappropriate. Thus a number of special categories were defined. These have additional requirements defined over and above the normal standards for the category. The special categories of road are defined as follows:

Category	Definition
Village	Defined as a settlement in WDC District Plan.
Rural Residential	> 12 houses grouped, > 25 houses per km.
Forestry	Sustained logging activity of more than 3 months within 5 years.
River Road	Full length of Whanganui River Road (Heritage, tourism)

4.3 Basic Category Standards

For the purposes of consultation, an initial set of standards was defined. This is shown in the table. The selection of these standards is one of the key steps in the process and needs careful consideration.

Standard for each Road Category					
Standards	Road Category				
	1	2	3	4	5
Surface	Sealed	Sealed	Sealed	Unsealed	Unsealed
Width (m)	6.0+	4.5 - 5.5	3.5 - 4.5	4.0 - 4.5	2.5 - 4.0
Centreline	Yes	Discretionary	Discretionary	No	No
Edge Marker Posts	Yes	Discretionary	No	No	No
RRPM	Yes	No	No	No	No
Feather Edge	To suit site	17 - 20%	17 - 20%	17 - 20%	17 - 20%
Speed Value (km/hr)	80	70	60		
Comfort (NAASRA)	<130	<130	<130	<200	<200

The defined characteristics are:

a) **Width**

This ranges from 6.0m + for Category 1 roads down to a minimum of 2.5m for Category 5 roads. The choice of width carries a number of implications:

- i) Width is the major determinant of cost. Any upgrading of width involves construction of extra pavement and often relocation of fences plus extensive earthworks. The fact that the narrowest sections of road are normally found in the steepest sections of country implies a large earthworks cost.
- ii) Very narrow roads (2.5 - 4m) are not wide enough for 2 vehicles to pass. Although such occurrences are rare on roads carrying less than 30 vpd, some provision needs to be made, especially where articulated vehicles use the road. Thus some provision for passing bays will be required.

Roads that are wider than the standard for the appropriate category will, of course, not be reduced in width.

b) **Centreline**

This would be provided on Category 1 roads and on other roads where there is sufficient width.

c) **Edge Marker Posts**

These would be provided on Category 1 and some Category 2 roads.

d) **Raised Reflective Pavement Markers (RRPM)**

These would be provided on Category 1 roads only.

e) **Feather Edge**

The “feather edge” is the part of the pavement beyond the carriageway, where the pavement material slopes down towards the drain. On most of the narrower roads vehicles will need to pull onto this in order to pass a vehicle coming the other way. The slope will therefore be controlled at 17-20% for all except Category 1 roads, which have sufficient width for passing. The defined slope is flat enough to pull onto at low speed, but not at normal travelling speed.

f) **Speed Value**

The speed value is controlled by the width and geometry of the road and the aim would be to achieve consistency on a particular road rather than a target speed for all works in a category. The listed values are suggestions as to a suitable target range.

g) **Comfort**

This will initially be defined by NAASRA roughness as shown on the chart. This is not an ideal measure, as it is difficult to measure condition in response to complaints or requests, but it is included at this stage to give an indication of the sorts of levels that would be targeted. It is hoped that development work on a portable roughness meter, which can be attached to the back of an ordinary vehicle, will be completed in the near future.

4.4 Special Category Standards

The characteristics of the special categories are chosen to suit the particular needs of each special category and will over-ride the category specification if the standards are higher than those for the general category standard as defined by traffic volume. The suggested standards are listed below.

(a) Village

- Footpaths:- maintain existing, otherwise provide a 1.2 m wide concrete footpath on one side of street where pedestrian traffic justifies it. (The level of pedestrian traffic to justify a footpath has not been defined at this stage).
- Streetlighting – NZS standard.
- Vegetation control – as for Category 1 roads
- Side drainage slopes no flatter than 8 : 1 – to provide access to road edge where footpath is between the road edge and the road boundary.

(b) Rural Residential

- Footpaths – paved where pedestrian traffic justifies it.
- Streetlighting – “flag” lights at road intersections
- Vegetation control - as for Category 1 roads
- Mow to fence once per year where not maintained by property owners

(c) Forestry

- Road width sufficient to enable safe passage of heavy traffic.
- Passing bays – 6 metres wide as required at suitable sites.
- Sight distance – adequate to provide a safe stopping sight distance.
- Curves widened up to 6 metres where able to be cost effectively achieved.
- Warning signage during harvesting phase of forestry operations.
- Improvements in pavement (metal) depth to enable carriageway surface integrity to be maintained at optimal maintenance cost.

(d) Whanganui River Road

- Road width to be a minimum of 4 metres
- Passing bays as required at suitable sites
- Vegetation control - as for Category 1 roads
- Provide vistas of the river at suitable locations

5 Costs

The estimated rough order cost to bring the network up to the defined standards was calculated to be \$10-\$20M. It is thus evident that even these minimal standards will represent no more than desirable goals for some years to come – it will not be possible to bring the entire network up to these standards without a substantial injection of capital. Some means of targeting or prioritising improvements thus needs to be developed.

6 Public Consultation

6.1 Process

Once an initial set of standards had been defined, the exercise went to public consultation. This took the form of a series of public meetings at which the concept of the Strategic Plan was explained, along with the suggested standards and cost estimates. Following this, a feedback session was conducted. The question put to the residents was essentially:

“Do you agree with the suggested standards, or would you like more/less money to be spent to produce higher/lower standards?”

The costs of the various options as well as the potential impact on the rate burden were made clear during this part of the exercise. It was also stressed that implementation of the standards was not immediately affordable and would be a process covering a number of years.

6.2 Results of Consultation

Feedback from the consultation was largely to the effect that residents did not want the suggested standards modified upward or downward. This was not a surprising result, given that the suggested standards could be best described as minimal and that the cost of achieving even these minimal standards is beyond the means of the District. However, as discussed in the conclusions, this in itself is a useful outcome in that it serves to focus the minds of everyone concerned on the unfavourable economics of maintaining very low volume roads.

7 Improvement Priorities

Given that the current standards are lower than the agreed levels, attention is being focussed on short term, low cost improvements. The biggest issues with this type of network are sight distances and opportunities to pass. The two issues are interlinked because, if two truck and trailer units happen to meet on a narrow stretch of road it is impractical for either of them to back up. The way this can be prevented is to ensure that regular passing opportunities are provided and that sight distances are available, as far as possible, to the next passing bay. In the steepest terrain, this is often not possible without significant capital expenditure and the remedy then is to post those roads as being unsuitable for truck-and-trailer units.

The next stage of implementation of the Strategic Plan is to begin targeting the types of improvement outlined above as funds become available.

8 Conclusions

- (a) The development of a Strategic Plan for rural roads has not solved the problems inherent in managing such a network. However, it has served to focus attention on the key issues, particularly the tension between engineering standards, user aspirations and budget constraints.
- (b) Following from the above, the Strategic Plan is a key tool in managing expectations of users and balancing them against the available budget, while also providing elected representatives with a firm basis for decision making in determining priorities.
- (c) In addition to providing long-term strategic direction, the Strategic Plan also helps to target short-term improvements.

- (d) Such a Strategic Plan can only succeed if buy-in is achieved from road users, residents and elected representatives, and it is essential to manage the process in such a way as to achieve this.

9 Further Work

Following the completion of the Rural Road Strategic Plan, the Wanganui District Council is planning a similar exercise on urban roads.

10 Acknowledgements

I would like to acknowledge the contributions of:

- (a) Ian McGowan, Director of Roads and Public Spaces at Wanganui District Council, whose initiative and interest as the Client made the project possible and contributed greatly towards its completion, and who also provided encouragement and assistance in reviewing this paper.
- (b) Ian Brown, then Chairman of the Rural Community Board, who initiated and supported the project, particularly through the public consultation phase.

11 Reference

1. Road Users and Service Standards -The Development of Structured Service Standards for Rural Roads. **I McGowan and D Taylor**. Presented at *Institute of Public Works Engineers Australia* Conference, Sydney, August 1999.