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Appendix 'F'

Renewals' Capital Requirements

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1. 'Renewals Works' – What They Are and How They Are Identified

An explanation of what land transport renewals works are and how the need for them is identified is in Attachment 'A'.

2. The Land Transport Renewals Works Needs in the Southland District

Explanations of the main renewals needs, during the next ten years, are in Attachments 'B' to 'L', viz:

Sealed Roads
Pavement Rehabilitation – Attachment 'B'.
Seal Widening – Attachment 'C'.
Reseals – Attachment 'D'.

Gravel Roads
Pavement Rehabilitation – Attachment 'E'.
Carriageway Widening – Attachment 'F'.
Maintenance Metalling – Attachment 'G'.

Bridges – Attachment 'H'.

Drainage – Attachment 'I'.

Footpaths – Attachment 'J'.

Traffic Services – Attachment 'K'.

Street Lights – Attachment 'L'.

Miscellaneous/Minor Improvements/Associated Improvements/Active Transport Projects – Attachment 'M'.

3. Future Renewals Programme

Tables F.1.a and F.1.b summarise the conclusions reached under the various headings in Attachments 'B' to 'M', and show the total forecasted land transport renewals needs for the District for the next ten years.

Table F.1.a Estimated Renewals Expenditure Required ($'000) – 2009/19

2007/08 Actual	2008/09 Approved	Work Category No	Renewals By Type	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
2,756	3,096	211	Unsealed road metalling	2,690	2,690	2,690	2,690	2,690	2,690	2,690	2,690	2,690	2,690
3,853	4,341	212	Sealed road resurfacing	5,336	5,336	5,336	5,103	4,870	4,404	4,404	4,404	4,870	5,336
62	70	213	Drainage renewals	75	75	75	75	75	75	75	75	75	75
4,193	4,002	214	Pavement rehabilitation	4,241	4,411	4,580	4,750	4,920	5,089	5,259	5,428	5,598	5,768
0	0	215	Structures Component Replacements	250	250	100	100	100	100	100	100	100	100
56	9	222	Traffic services renewals	1,021	1,021	1,021	1,021	1,021	1,021	1,021	1,021	1,021	1,021
188	558	322	Bridge renewals	495	495	495	495	495	495	495	495	495	495
623	673	341	Minor improvements	685	685	685	685	685	685	685	685	685	685
0	140		Stewart Island Storm Damage/Slips	1,160	0	0	0	0	0	0	0	0	0
11,731	12,889		TOTALS	15,953	14,963	14,982	14,919	14,856	14,559	14,729	14,898	15,534	16,170
			Inflation Allowances	0	434	882	1,257	1,622	1,945	2,352	2,793	3,355	3,925
			Total Renewals (incl inflation)	15,953	15,397	15,864	16,176	16,478	16,504	17,081	17,691	18,889	20,095

Notes relating to Table F.1.a:

- Costs based on programmes set out in attachments to Appendix F.
- Gravel road renewals based on estimated assessments of underpinned and additional negotiated quantities provided for under maintenance contracts. 90% of costs taken as renewals and 10% as new capital reflecting width, strength and shape improvements.
- 90% of bridge replacement costs taken as renewal with the rest taken as new capital to allow for those bridges which are replaced with two lanes rather than the existing one or with a higher load carrying capacity than the original design loading.
- Drainage costs are split 50% renewals/50% new capital.
- The age profile of streetlights is such that few renewals are expected.
- Table excludes Footpaths.
- All Physical Works costs include fees.
- Cost fluctuations not included in figures above.
- Forward projected budgets based on costs assessed as at 1 July 2009.
- Minor Improvements calculated as 8% of Maintenance and Renewals Expenditure. The total is split 40% to Renewals and 60% to New Capital
- Figures are assessed in July 2009 dollars. Inflation is added to the combined total using the rates described in R.G.2.

Table F.1.b Estimated Renewals Capital Expenditure – 2009/19

Note: Table excludes footpaths and inflation.

Table F.2 Estimated Renewals Expenditure Required for Roading Associated Urban Works ($1,000) – 2009/19 (Excludes Inflation)

Renewals Requirements	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Footpaths										
EDENDALE	10	10	10	10	10	0	0	0	0	0
OHAI	4	3	3	3	3	3	3	3	3	3
OTAUTAU	10	10	10	10	10	10	10	10	10	10
RIVERTON	40	40	40	40	40	40	40	40	40	40
TE ANAU	15	15	0	0	0	50	50	50	50	50
TOKANUI	5	5	5	5	5	0	0	0	0	0
TUATAPERE	60	0	0	0	15	15	15	15	15	15
WINTON	100	0	0	250	0	0	0	0	0	0
WYNDHAM	3	3	3	3	3	3	3	3	3	3
Kerb and Channel										
TE ANAU	180	7	7	0	0	0	0	0	0	0
Totals Excluding Inflation	427	93	78	321	86	121	121	121	121	121

Note:

- Long term programme not fully known at this stage.
- The financial information relating to footpaths is allowed for in the Local Community Budgets.
- Table excludes inflation.

4. 'How' Renewal Work to be Undertaken

Renewal work will be undertaken via contracts let on a competitively bid, project by project (or group of projects) basis, including aspects of long term road maintenance and traffic services contracts.

5. Deferred Renewals

Southland District Council have an ongoing programme of renewals which attempts to even out the peaks and throughs that can occur in programmes. As the programmes are prioritised to ensure that the most critical renewals are carried out, before holding them would result in excessive maintenance expenditure, we do not believe we have any deferred renewals. As such none are allowed for in this Plan.

6. Issues

- Vulnerable to changing industry (coal) (synthetic fuel).
- Change in farming practise (expansion of dairy).
- Bulk trees.
- dTIMS CT model needs to be completed to allow review and refinement of predicted programmes. This may be incorporated into the final version of the 2009 LT CCP.

7. Future Action and Improvements

Schedule -
Future Improvement Priorities

Ref. No. (1)	Item (2)	Appendix Relative Urgency (3)						Comments
		1	2	3	4	5	6	
F1	In subsequent plans methodologies for dealing with peak in AWPT's beyond 2016 will need to be considered						✓	Complete as dealt with in this Plan.
F2	Use dTIMS CT (low volume) and other modelling techniques to refine future AWPT projections						✓	First stage complete, further modelling dealt with elsewhere.
F3	Improve pavement drainage to get maximum life			✓				This is now a business as usual item.
F4	Complete long term seal widening programme and update Attachement C, Appendix F and X.2 as appropriate. This update will need to allow for the latest ARAMP groups			✓				There is no longer a need to have this as a specific improvement action as seal widening will be more reactive as the opportunity or need arises. Will be looked at as part of Strategy Network Review R22.
F5	Develop regional walking and cycling strategy					✓		Action incorporated into F26.
F6	Determine whole of life benefits of twin coat seals versus single coat seals					✓		This is complete.
F7	More analysis needs to be carried out on changes to gravel road widths since 2001. It may be necessary to remeasure all gravel road widths in the district. Once completed this information will be used to update Attachment F, Appendix F and X.3 as appropriate. This update will need to allow for the latest ARAMP groups					✓		As there are few complaints regarding under width gravel roads, this item is no longer critical and can be removed from the Improvement Plan.
F8	Monitor/use results of gravel loss survey					✓		Complete.
F9	Gather data to complete table F.G.1 to include the kms of wearing course in each contract.							No longer required.
F10	Upgrade bridge section once full bridge inspections complete. This will include updated tables on bridge widths		✓					To complete prior to final publication of 2009 Plan.
F11	Progress dealing with off road bridges				✓			These present a potential liability to Council. Covered by B4.
F12	Complete the process of gathering all inventory and condition data on the culvert network					✓		Covered by C1 of Improvement Plan.
F13	The Council must continue to assess what information there is value in recording in the bridge database and to continue to collect this data where applicable					✓		To be completed alongside F10.

F14	One area that would benefit from collecting data or determining where possible, is the bridge design loading					✓		Long term "nice to do".
F15	The degree of side protection at bridge sites needs to be reviewed at the time of replacement of the bridge to determine the most suitable form of side protection. Safety improvements should be carried out where particular sites are identified as requiring upgrades to the side protection					✓		Incorporate into F24.
F16	Posted bridges on roads carrying regular heavy vehicle movements should be upgraded where suitable					✓		Ongoing business as usual activity.
F17	Ensure permits for installation of stock underpasses spell out responsibilities if they are no longer needed				✓			May be tidied up as part of District Plan review.
F18	Develop complete records of extent, location, condition and future maintenance requirements to develop long term plans for footpath assets					✓		Initial reports to go to all Community Boards and CDA's. Complete alongside H1, Z13, X14.
F19	Continue upgrades of fingerboards and chevron signs					✓		Business as usual activity, not improvement.
F20	Continue exercise of controlling all intersections					✓		Business as usual activity, not improvement.
F21	Determine value of adding RAPID no. ranges to road name boards					✓		Under consideration as significant cost.
F22	Monitor need to change to Class 1 reflective material with associated cost increases					✓		Business as usual activity, not improvement.
F23	Develop full inventory of streetlights and condition					✓		Due to be completed soon.
F24	Develop deficiency database to prioritise safety improvements					✓		Complete alongside F15.
F25	Develop a programme of amending the marked width of traffic lanes and sealed roads				✓			Placed on hold pending outcome of NZTA Technical Audit.
F26	Develop walking and cycling strategies to identify the walking and cycling infrastructure that is required in the future					✓		Align with Regional Active Transport Strategy and GPs.
F27	Make integrated planning a central part of achieving good transport outcomes					✓		Part of Strategic Network Review, cover as part of R22.
F28	Refine rehabilitation projections with additional modelling to make this modelling business as usual over the next 3-year period				✓			dTIMS, FWD - for adoption of new LTCCP.
F29	The Council Request for Service system needs to be modified to ensure all complaints and safety issues can							To be developed alongside performance monitoring system for kPIs and LOS. Refer also B05.

	be reported in such a way that appropriate action can be taken.							
F30	The long term maintenance metalling needs for the District need to be developed over time.							Under review with Maintenance Contractors.
F31	Review where treatments such as Otta seals fit into the long term maintenance regime.							Trials currently underway to assess costs and expected lives.

Key:

1 = Extremely urgent (needs to be addressed now)
2 = Very urgent
3 = Urgent
4 = Reasonably or fairly urgent
5 = Not urgent
6 = A good idea for some time in the future

Attachment 'A'

How Renewals Work Identified

'Renewals Works' or 'Renewals Capital Works' are:

"Works to upgrade, refurbish or replace existing facilities with facilities of equivalent capacity or performance capacity."

Reference: The International Infrastructure Management Manual 2002.

These notes explain what the main forms of land transport renewal works are, and how they are identified.

1. Sealed Roads

1.1 Forms of Renewal Works

The main forms of renewal on the sealed network are:

Pavement Rehabilitation (formally known as AWPT)

This is the renewal of a limited area in which no geometric improvements are required. (See Associated Improvements)

Pavement Rehabilitation work does not increase the existing seal width, or provide a seal width greater than is required for the standard of traffic using the road. Formation widening may be permitted where it is required for support or structural integrity.

The work may include overlays and lime/cement stabilisation.

It will include drainage work to maintain the integrity of the pavement.

Maintenance Chip Seals

This is pavement resurfacing when a reseal is applied to an established sealed road.

Examples of this category of work are:

i) Conventional chip reseals, including second coat seals

ii) Void filling seal coats

iii) Texturing seals

iv) Other special purpose chip seals that fall under the maintenance chip seal work category of NZTA

Seal Widening

Seal widening is permitted as a renewal item where it is able to be shown to be the least cost method of overcoming edge break or of reducing shoulder maintenance and / or of improving safety. It can be carried out as a minor improvement or an associated improvement.

The work may include shoulder strengthening and / or formation widening where this is necessary to maintain the structural integrity of the pavement. It will include drainage work to maintain the integrity of the pavement.

Associated Improvements

Associated Improvements are generally carried out at the time of a pavement rehabilitation. They include:

a) Widening of the seal.

b) Drainage improvements.

c) Signage improvements.

1.2 How Areas Requiring Renewal Identified and Prioritised

Areas requiring renewals are identified by a combination of:

a) Drive over inspections by Area Engineers.

b) The results of the RAMM rating surveys.

c) An analysis of the ratepayer service requests that are received throughout the year.

d) Contractor feedback and inspections.

e) The trends in annual maintenance costs.

f) Falling weight deflectometer results.

g) The results of the dTIMs deterioration modelling work.

Renewals work is prioritised on the following basis:

a) The work that produces the greatest long term projected savings in maintenance costs (in $ per km) receives the highest priority. This looks at whole of life costs.

b) Associated Improvement and Minor Improvement work is carried out along side pavement rehabilitation work when we are sure it can provide worthwhile safety benefits to road users and it is economical to do the work at the same time as a renewals project.

c) Resealing work is prioritised on maintaining a safe waterproof surface to provide adequate skid resistance and reduce water getting into the pavement leading to failure. The seals with the greatest risk of failure are completed first while maintaining a balance between the risks of leaving the existing seal coat too long and not getting the maximum possible economic life out of each seal coat.

1.3 The Level of Renewal Work

The level of renewal works varies, depending on:

a) The conditions of the carriageway;

b) The degree of deterioration of the top surface;

c) The level of the ongoing maintenance demand;

d) The likely future demand on the road; and

e) The differing economic lives of the materials used; and

f) The age profile of the carriageway surface and structure.

2. Gravel Roads

The need for renewals work on the gravel roads may be caused by increased loading, rather than by just condition over time. For example, the harvesting of a nearby forestry block or the conversion of a farm to dairy may drastically increase the volume and type of traffic on a particular road, and cause a rapid deterioration in its condition.

The main forms of renewal on the gravel network are:

a) Pavement Rehabilitation

b) Maintenance Gravelling

c) Road Widening (to reduce road deterioration and increase safety)

The main parameter that signals the need for renewal of a gravel road is its deteriorating condition and increasing maintenance costs. As the road surface deteriorates, it gets rougher and requires more frequent maintenance to keep at an acceptable level.

Roads requiring work are identified by monitoring maintenance needs and costs, condition and level of public complaints. This can be used for forecasting the level and rate of deterioration, and scheduling the roads for renewals attention before the level of deterioration gets too unacceptable.

3. Bridges

Bridge renewal needs are identified through a range of programmes.

The way in which replacement has to be addressed is governed very much by the financial analysis. If, for instance, an alternative route is available, it may be uneconomic to replace / upgrade the existing bridge, and therefore we would require road users to use the alternative route. Each situation has to be considered on its merits, and the options discussed with the land owners concerned.

Bridges are looked at for renewal or upgrade based on their current condition, the danger they present to users, the inconvenience generated by posting them and the ability to obtain NZTA funding for the work. They are then prioritised taking into account the above factors and the desire to maintain a relatively steady flow of upgrades and replacements to even out the budget and maintain the bridge building capabilities in Southland.

When a new structure is built, it is designed to carry full HN-HO-72 loads as per the Transit New Zealand (now NZTA) Bridge Manual, or alternatively it is designed as a rural road bridge for 0.85HN (Class I) loads.

Where a structure is on a low volume road that is not expected to become a heavy vehicle route in the future, it is designed for Class I loads. Structures on low volume roads and with a good alignment to the road are generally constructed as single lane bridges, with a clear width of 4.2m between kerbs. Where funding permits and when the bridge is on a poor alignment to the road, it is designed as a two lane bridge with 8.0m clear width between kerbs.

Based on the provisions of the Transit New Zealand Bridge Manual, all structures have, in the past, been designed to be able to pass a 50 year average return interval rainfall event with no interruptions to traffic, as almost all roads in the District have traffic counts of less than 2,500 vpd. In very low volume cases the option of accepting a lower standard will be considered.

Replacement structures are generally designed using reinforced concrete, as this provides the best durability of all the possible materials. By using precast elements, the on-site construction time can also be kept to a minimum, reducing the interruption to road users.

The risks associated with accepting other standards are that the structure may not be eligible for funding subsidy from NZTA, and that the structure may be designed to carry inappropriate load configurations. An alternative loading design distribution may result in a structure being unusable by heavy vehicles in the future.

4. Drainage

Drainage renewal work is work that replaces sections of kerb and channel and replaces or upgrades culverts.

Usually every two years as part of the RAMM condition rating a condition assessment is carried out on the kerb and channel. The maintenance contractors check the culvert conditions annually. As a result of these inspections, those drainage facilities that need it are replaced. There is no formal programme for this as it happens on an “as required” basis.

Replacement works are also undertaken in association with road reconstruction and maintenance projects (pavement rehabilitation, seal widening, reseals, safety projects and redevelopments) where this is deemed appropriate from a whole of life or capacity point of view.

5. Footpaths

Footpath renewal work includes the replacement of damaged sections of footpath, where replacement is more economic than repair.

The areas addressed in this way are those that do not meet the level of service expected by footpath users, or which have not been constructed to the same standard as in similar parts of the network.

The footpath networks in each town are managed and funded by the individual Community Boards. The Area Engineers provide assistance in the day to day management of the footpaths.

6. Traffic Services

Traffic Services' renewal work is undertaken on an 'as needs' basis, when the signs, markings or other structures:

a) Do not meet the required levels of service standards, or

b) Do not meet the specifications required by NZTA guidelines and rule or the Traffic Regulations, or

c) Are not to the same standard as similar parts of the network.

The need for work can be identified from a number of sources, including the NZ Police, the Land Transport Safety Division of Land Transport NZ, Road Safety Audits, members of the public, feedback from Council contractors, and from the elected Councillors and Council staff.

7. Street Lighting

Street lighting assets are replaced when Powernet judges that the poles are no longer structurally sound and / or when the replacement of any component part is more economic than continuing repair.

Attachment 'B'

Sealed Roads – Pavement Rehabilitation Needs

1. Introduction

The Southland Sealed Network has been constructed over time using varying depths of subbase gravel, with a layer of stronger basecourse gravel over the top and sealed with bitumen and sealing chips.

These pavements flex under the weight of heavy traffic and over time wear out, leading to excessive deflections in the pavement and cracking of the seal coats which allows water into the pavement and accelerates the deterioration.

Initially, as the pavements deteriorate local areas of failure can be treated using a variety of treatments but eventually it becomes more economic to treat a larger area of pavement failure. This is done using a Pavement Rehabilitation.

A pavement rehabilitation only involves the work required to strengthen the existing pavement. Any improvements carried out at the same time needs to be done as associated or minor improvements based on the NZTA funding criteria.

2. Sealed Road Rehabilitation Needs

To determine future needs it is useful to review the Southland networks history and project the needs forward based on the best available information.

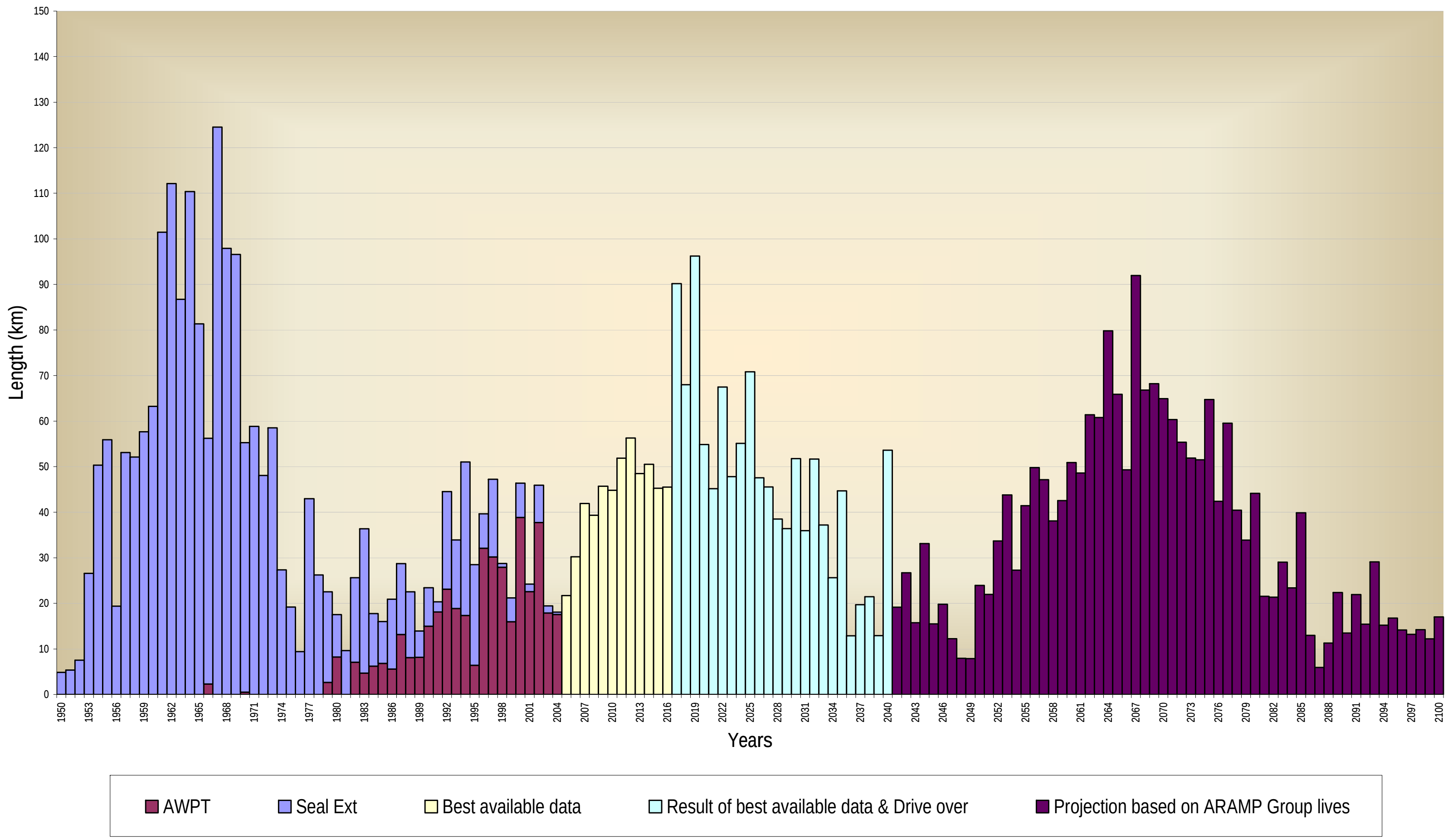
Table F.B.1 therefore shows:

- The history of the development of the sealed pavement network.
- The date at which the upper pavement surface was built and sealed, either as a seal extension or subsequent pavement rehabilitation.
- Predicted pavement rehabilitation needs in the future. (As projected in the 2006 Plan).

This shows a large proportion of the sealed network was constructed from 1960 to 1975. In the 2006 Plan expectations based on the lives achieved of pavements which had failed, FWD testing where available, condition assessments, expected future traffic and detailed network knowledge indicate that on average the pavements should last 48 years prior to needing Pavement Rehabilitation. This raised the expectation that a similar but more spread out peak of reconstruction was starting. Over time the peaks decrease as while there was an average life of 48 years expected, this varied for different types of roads subject to differing traffic loadings.

There are signs of this in the period from 1980 onwards which includes a combination of seal extension and Pavement Rehabilitation. The up and down nature of the last few years leading up to 2006 was due to pavement contracts being let during a construction season (September-April), but the figures being presented in calendar years.

Table F.B.1 Historic Seal Extensions / Pavement Rehabilitations and Future Projections (2006)



It was hoped that prior to the production of the 2009 Plan, the assumptions used to build up the forward projections in the 2006 Plan could be better tested using a wide range of data including:

- Detailed condition rating of the full sealed network.
- FWD (Falling Weight Deflectometre) testing of the full network. This testing provides an indication of the strength of the pavement and expected remaining life.
- Video of the full network.
- Rutting and roughness data (collected as high speed data).

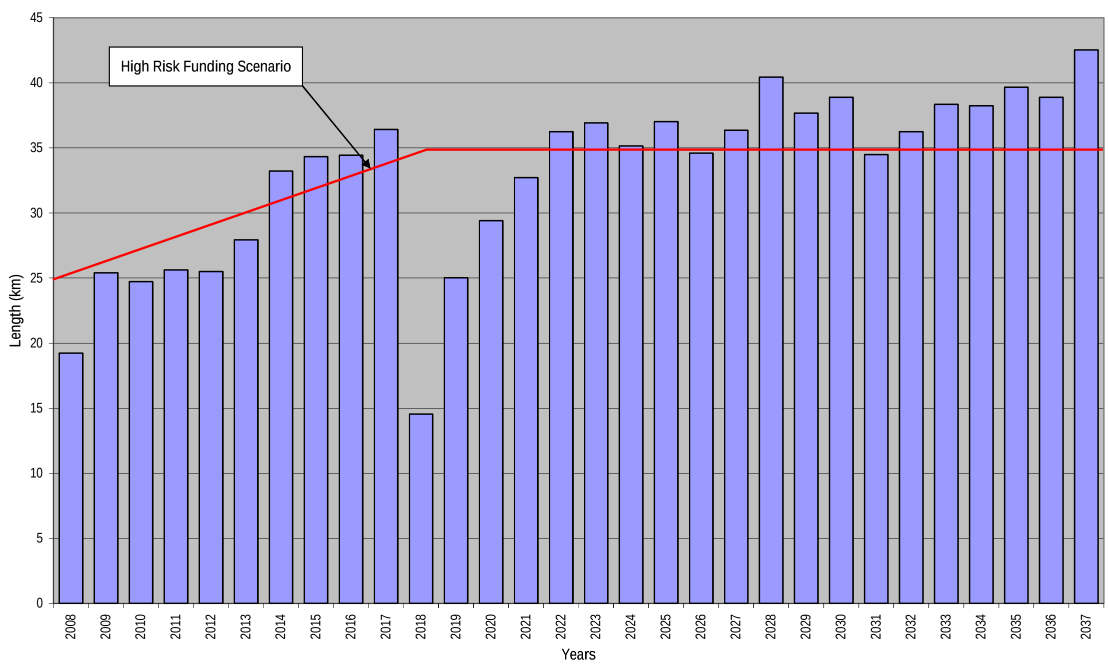
By combining this data using various systems and programmes we hoped to get a range of projections which could show if there is consistency in the projections or a variation in expected rehabilitation needs.

Unfortunately the consultant (Pavement Management Services Ltd) who won the High Speed Data Collection Contract failed to deliver on time, reducing the ability to put up to date and accurate information into the various programmes to enable better projections to be made.

Since the 2006 Plan some work has been able to be done on forecasting, as follows:

- 20% of the network has been reviewed onsite with the latest information available at the time to test assumed required rehabilitation dates. The net result of this review (which moved dates forward and backwards) was an average increase in life expected of the pavements of 5 years.
- FWD data has been picked up and initial analysis of this showing remaining life of each test section has been provided. When we extrapolate the results of all the new testing across the whole network and spread an initial zero remaining life peak in 2008, totalling 160km of work, over the next 10 years the results are shown on the attached Table F.B.2.

Table F.B.2 FWD Coarse Results of Pavement Remaining Life



In developing a long term programme we need to consider the above information as well as:

- The fact that the 2006 projections were based on lives developed from failed pavements and an assessed remaining life of pavements that had been tested with FWD.
- The fact that over the last three years we have managed to survive with only carrying out 23-26km of rehabilitation a year. The lower figures than projected have partly been due to tight funding constraints due to a combination of factors including the inflation allowance in the 2006 Plan being nowhere near the cost of roading construction and resealing cost increases.
- The initial high speed testing results indicating that the condition of the network is continuing to deteriorate (both in terms of rutting and roughness).
- The major increase in dairy and forestry industry related traffic that is occurring and forecast to accelerate over the coming years.
- The ability to push out rehabilitation dates by increasing expenditure on maintenance and reseals at an increasing rate. This fits with the ability to accept a lower level of service in terms of roughness of ride and safety with ruts holding water. There is also the potential, in some cases, to decide to revert roads to gravel rather than rehabilitating.
- The potential that some roads may need to be upgraded to cope with 50T loads.
- The increasing average age of the sealed network. In 1958 the average age of the sealed network was three years old. By 1978 this had climbed to 12 years, by 1998 it was 25 years and in 2008 it was 29 years old. If we assume we now have a mature network with not too much new pavement being built, to maintain the network in balance we need to achieve an average life of 58 years (i.e. 2 times 29 indicating an average halfway through life) which is regarded as a very optimistic figure (especially as pavements are only designed for 25 years). At an average life expectancy of 58 years we need to carry out approximately 34kms of rehabilitation per year.
- In the future it is expected that the lives that pavements achieve will reduce as the increasing amount of heavy traffic leads to a faster rate of deterioration.

Any adopted forward projection is a balancing act of determining which factors are going to be most critical. As an absolute minimum, it is recommended that the level of rehabilitation be set at 25km per annum for 2009/10 increasing steadily to 35km per annum by 2019/20. Beyond this point it may be possible to hold it steady at 35km per annum, depending on the level of service to be maintained. This should be viewed as a high risk strategy, given the existing age profile of the network. A slightly less risky scenario is to allow to get up to the 35km per annum level over a shorter timeframe of say 5 years.

It should be noted that the scenario set out using the remaining life results from FWD testing is very optimistic as many pavement sections have failed before they reach the 0 remaining life point and it is more economical to rehabilitate a larger section of road where, say 20% of the pavement has failed, rather than just do the failed sections as they fail.

Table F.B.3 shows current pavement rehabilitation programme projections to 2028 from RAMM and shows the effect of the scenario on a more pessimistic set of data.

The 20% detailed review of the sections in RAMM suggests that up to a 5 year increase in the pavement life expectancy from the data set used for the 2006 Plan could be justified.

This would equate to an average pavement life expectancy of 52 to 53 years for 2008, i.e. 5 years more than the 48 year average life projected in the 2006 Plan.

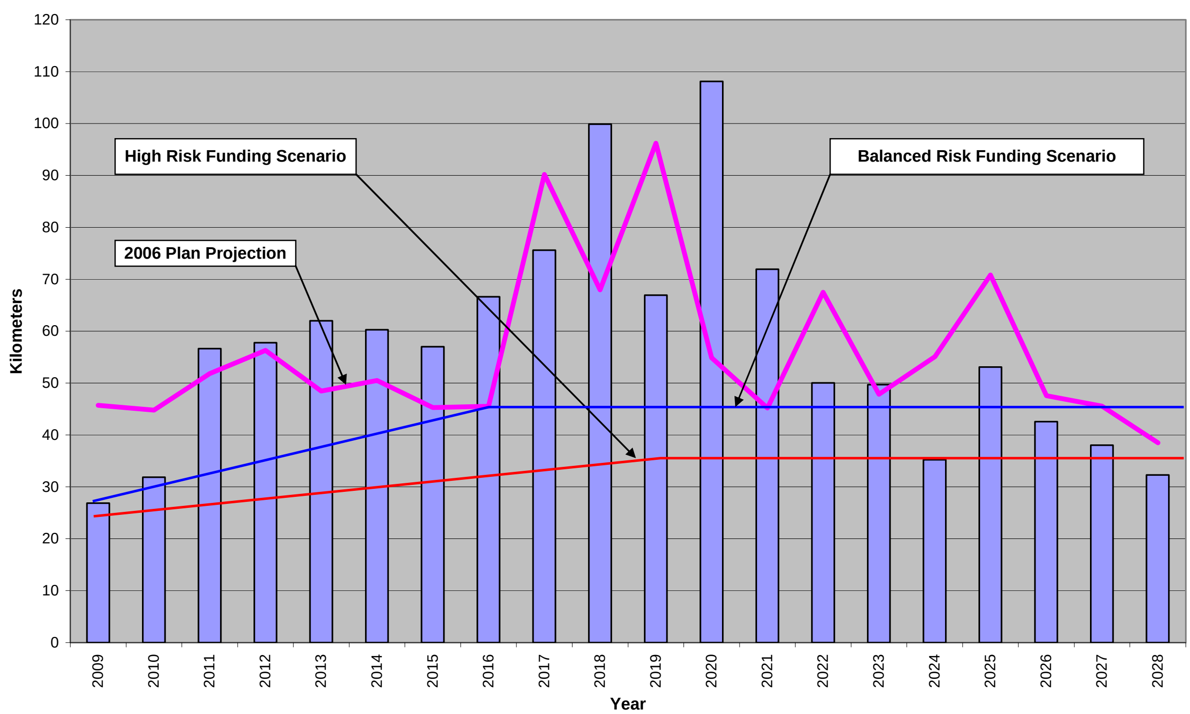
As a stable network should have an average pavement age close to half of the pavement life expectancy, it would suggest that with an average pavement life of 29 years in 2008, the balance point has been passed.

While the figures in Table F.B.3 might be regarded as pessimistic, and they demonstrate that the 2006 figures where conservative, there is a risk that they may prove to be correct especially given the expected growth in heavy traffic.

If we where to adopt a more middle of the road scenario, the second (blue) line on F.B.3 would be a better balance of the risks. This starts off at 27.5km of rehabilitation in 2009/10, increasing by 2.5km per annum for 7 seven years to 45km per annum and then holding steady at this figure.

The third line shows the level of rehabilitation projected at the time the 2006 Plan was completed. This can now be regarded as the low risk funding scenario.

Table F.B.3 Current Pavement Rehabilitation Projections from RAMM



In weighing up the relative risks of adopting various rehabilitation scenarios it may be useful to consider Tables F.B.4 and F.B.5 which show the age of all the pavement sections as at 2008, for rural and urban roads respectively. These highlight the significant areas of sealed rural pavement that have already exceeded a life of 50 years and the huge amount of pavement exceeding 40 years old (which is the current average age of pavements that are being replaced). This brings graphically home just how large the issue of ageing pavements is becoming, so we cannot afford to set pavement rehabilitation budgets too low.

This is further shown in Table F.B.6 the Pavement Age / Life Graph.

Table F.B.4 Current Rural Pavement Area by Age

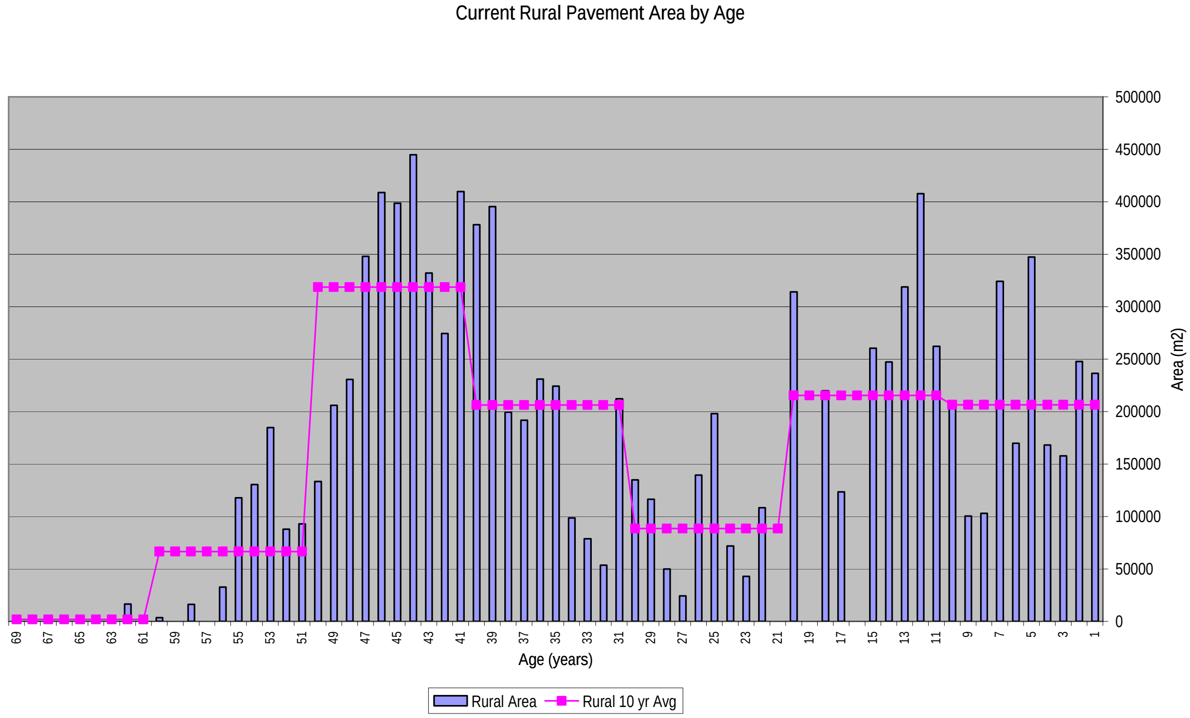


Table F.B.5 Current Urban Pavement Area by Age

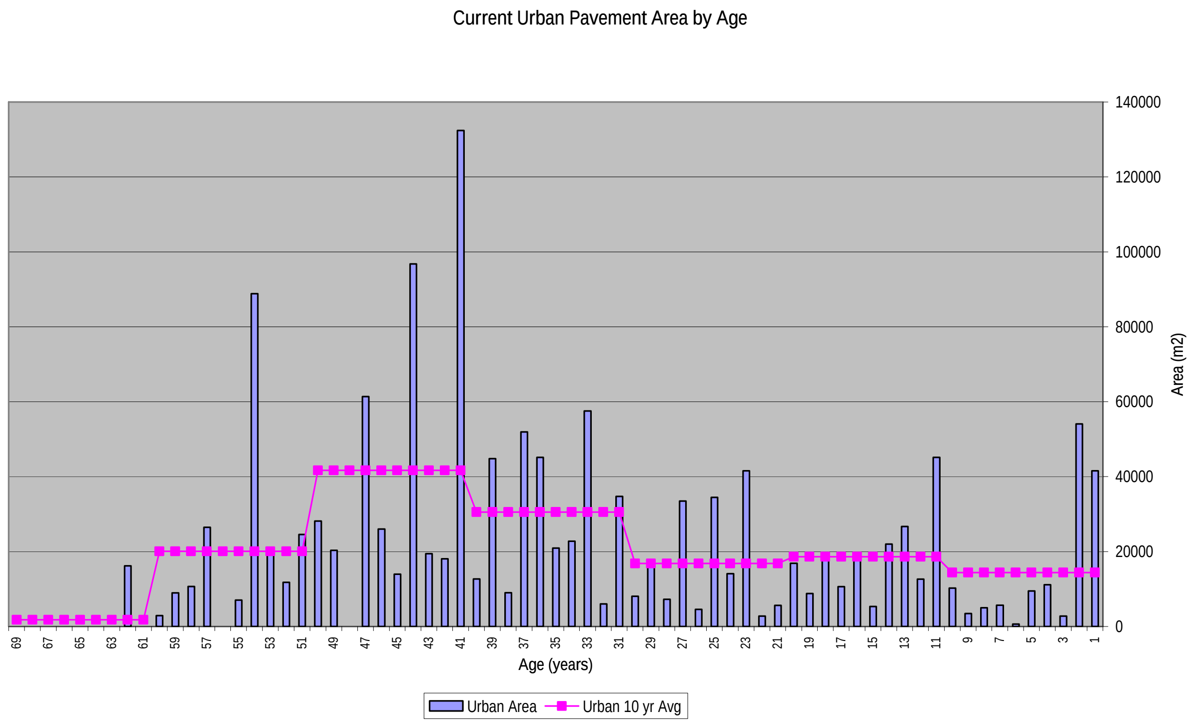


Table F.B.6 shows the history of the pavements from 1988/89. This shows a steady increase in the average age of the pavements and a corresponding reduction in the expected remaining life. There is some discussion as to whether the average expected life of 52 years used for this comparison is appropriate. This 52 years has come from assigning lives to each pavement based on historical renewals which indicated a life up to 53 years was appropriate. This table was 1 year less than this maximum figure. The current range in lives is 6 to 100 years. These lives are currently being reviewed using FWD data, high speed condition data and dTIMS.

The network area life shows how the network has grown over the years and the corresponding amount of first coats achieved in that time. The amount of first coats includes pavement renewals, improvements due to new widths, seal extensions and vested assets. The current amount of renewals carried out historically has not stabilised the average age as this continues to climb.

Table F.B.6 Pavement Age / Life

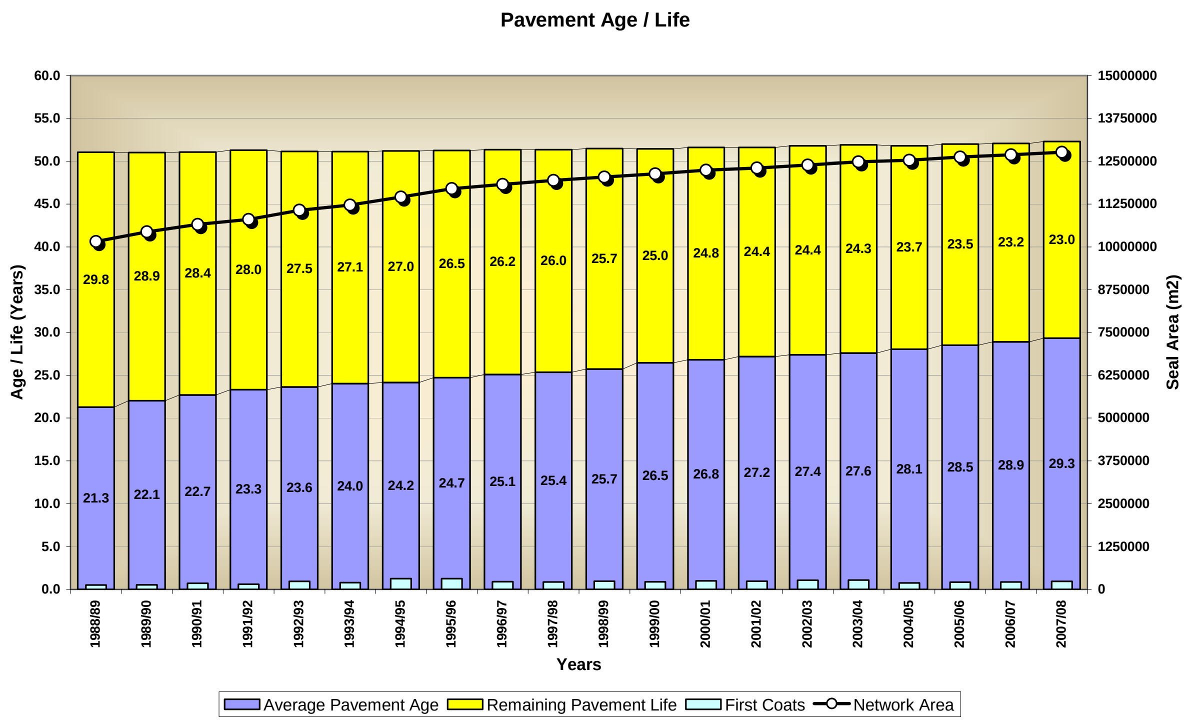


Table F.B.6 shows that the average pavement age, currently is almost 29 years old which indicates that the present level of rehabilitation has not kept the total network in balance. For a network to be in balance it is expected that the average pavement age will be close to half the average expected life of the total network. At this stage in the development of the network, this is not a major cause for concern due to the timeframe the network has developed over. If the average age was allowed to get much higher it would reach a critical stage where it would be difficult for maintenance to keep up with the level of deterioration. The expected life of pavements is a critical factor in determining what will happen long term with the sealed network.

The average age of the pavements will only start to reduce once the quantity of rehabilitation exceeds the long term average requirement of 35 to 38km/year. With an optimistic average expected pavement life of 52 years, an evenly developed and maintained network which is stable should have an average pavement age of 26 years, which has now been passed.

Historically the age has been below this due to the larger amount of relatively new pavement from seal extension. As the annual quantity of seal extension has reduced, the average pavement age has increased overtime and can only be brought back in balance by an increased amount of rehabilitation.

Care needs to be used when looking at average expected lives and long term average requirements. This is particularly relevant when dealing with a network where such a large proportion of the network was built over a limited timeframe. Approximately 50% of the network was built over a 12 year period.

Fortunately the sections of road involved in this have varying lives so they do not come due for rehabilitation at the same time but there is still a significant peak building up over the next 10 to 15 years that will require significantly more rehabilitation than any long term average.

Included into the above is the fact that many of the early (1980's and 90's) seal extensions where based on 20 year design lives with little allowance for the heavy loading from dairy and logging being experience.

The total costs associated with the projected 10 year programme have been incorporated into Table F.1.

If the full rehabilitation requirements cannot be fully funded options include use of loans or a host of short/medium term heavy duty maintenance treatments to hold the pavements until more funding is available. Long term either of these would be expected to cost more, but could spread the cost. Other options may be to consider allowing/converting very low volume sealed roads (say less than 50 vpd) back to gravel when they are due for rehabilitation or even reseal.

Over time the completion of the full dTIMS CT pavement modelling software should be available which will help refine these predictions.

To get as much life out of all the pavements more funding will be put into improving drainage, using a priority system to get the greatest benefit for the money.

Based on all of the above it was recommended to Council at their APAC meeting on 29 October 2008 that the level of rehabilitation shown as the balanced risk funding scenario in Table F.B.3 be funded. This was our best assessment of what was required at that stage and was accepted.

Following this meeting further modelling work was carried out including an exercise to try to predict what increase in maintenance costs would occur if rehabilitations were capped at various levels and what effect these scenarios would have on the pavement condition. None of this modelling justified expenditure above the red line (the high risk funding scenario) on Table F.B.3.

Table F.B.7 below shows the modelled affects on maintenance costs for the portion of the sealed network that is currently in RAMM as requiring rehabilitation over the next 15 years. This models three options as follows:

a) No rehabilitations so all roads get heavy duty (HD) maintenance and reseals at the end of their pavement life and ongoing maintenance and reseals at an increasing frequency (green on chart).

b) The "Red Line" level of rehabilitations with those that miss out on rehabilitation when RAMM says they need it being treated as for A.

c) The "Blue Line" level of rehabilitations with those that miss out on rehabilitation when RAMM says they need it being treated as for A.

What this shows (if the rates and assumptions are right) is that it takes seven years before we get a cost advantage from the rehabs rather than HD maintenance, but eventually there is a very large cost difference. With discounting this time frame would become longer and the cost difference a bit smaller.

In terms of the choice between the red and blue lines the payback does not look that large and we need to wait for 10 years as well.

Given the above and the fact that models are indicating a current significant backlog (which does not appear to be evident at present) but then less rehab requirements, we may be better to take an approach that feels more risky but from the models and the above looks to be reasonable, ie the "red line". It should be noted that dTIMS does show an average of 39 kms pa needed between 2008/2013 but only 30kms pa between 2008/2018 (but with less confidence in the later years). Based on history, our gut feel and the projected increases in HCVs we would still be more comfortable with the blue line but given the above we have limited hard evidence to back this up.

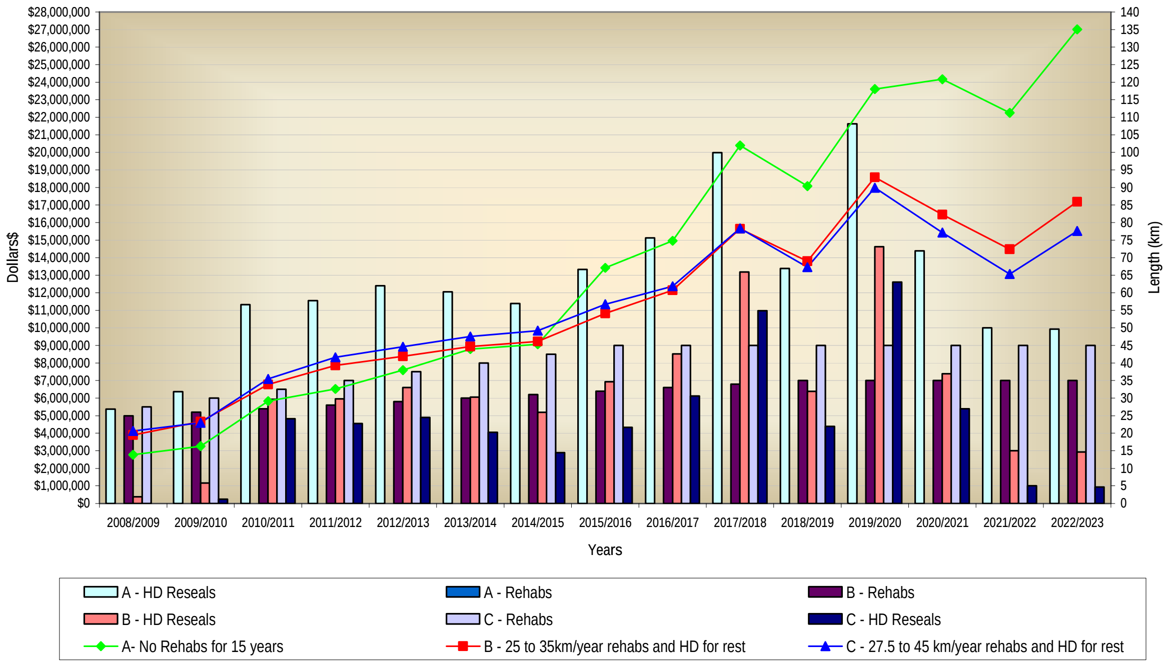
Therefore adopting the red line on the understanding that over the next 3 years we will do more work on models and available data, plus have 3 more years of history is possibly the best way to go. This is especially the case given current financial crisis and the fact that we have the ability to revisit the programme and potentially substantially increase it in 3 years time if required. Meanwhile if the programme comes under more significant pressure we can lower standards by doing shorter lengths of rehab on just the worst sections of a road where it is efficient to do this.

This would mean a programme of 78kms rather than 90kms over the next 3 years and probably a slight increase in roughness and rutting of the sealed network, which we may need to accept given issues of affordability and comparisons with other networks.

Overall the models indicate that the risk of funding up to just the red line (high risk scenario) is a risk worth taking and that it is unlikely to see a situation where there is imminent danger that maintenance expenditure cannot keep up with the degradation of the network's condition.

The funding recommendation for the rehabilitation programme is therefore to adopt the high risk scenario (the red line) of funding 25 km per annum in 2009/10 increasing at a rate of 1 km per annum for 10 years until we get to 35 km per annum and hold steady at this level. This will be subject to review in the 2012 Plan.

Table F.B.7 Potential Maintenance Costs



The maps in Attachment C of the front part of this document show the draft 3 Year Programme of pavement rehabilitation and reseal works, based on the best available information as at 09/06/09.

Attachment 'C'

Sealed Roads – Seal Widening Needs

1. Introduction

The current sealed network is subject to increasing traffic usage with many roads being below the ideal width for the use being made of them. This leads to a reduced level of safety for travellers on the network and higher maintenance costs due to the loss of the seal edge mainly from truck and trailers travelling along it.

To overcome this a programme of seal widening is carried out. Much of this is carried out as a minor or associated improvement at the same time as a pavement rehabilitation with the road being rebuilt at a greater width, but other sections cannot wait until an pavement rehabilitation is due so need a standalone seal widening.

2. Sealed Road Widening Needs

Under the 2006 Land Transport Activity Management Plan Southland District Council (SDC) had five 'groups' of sealed roads. These groups and associated design widths, levels of usage, and the proportion each forms of the network are documented in Table This table of sealed roads included both urban and rural roads, which made up 39.6% of the total network.

Table F.C.1 Southland District Council 2006 Sealed Road Width Standards

Class	Definitions Used Elsewhere	Length	% of Total	VPD	Des Width	Min Width	Unsealed Shoulder Width	Total Design Width	Total Min Width
Group 1	Rural Arterial	97	1.97%	800+	7.50	7.00	0.75	9.0	8.50
Group 2	Arterial / Collector / Local	393	7.97%	400-799	7.20	6.70	0.75	8.7	8.20
Group 3	Local	440	8.93%	200-399	6.80	6.30	0.75	8.3	7.80
Group 4	Residential	973	19.71%	50-199	6.50	6.00	0.75	8.0	7.5
Group 5	Minor Local	48	0.97%	0-49	6.00	5.50	0.50	7.0	6.50

F.C.2 and Table F.C.3 provide some comparisons between the latest measured seal widths with data from previous years.

Table F.C.2 Comparison of Sealed Road Width Compliance Percentages between 2001 and 2008

Road Group	Road Length 2008 ARAMP (km)	Target Width (m)	Compliance 2008	Road Length 2005 ARAMP (km)	Compliance 2005	Road Length 2003 ARAMP (km)	Compliance 2003	Compliance 2001
1	97	7.5	68%	95	63%	77	54%	49%
2	393	7.2	44%	378	40%	257	39%	36%
3	440	6.8	35%	442	34%	534	32%	25%
4	973	6.5	25%	966	20%	963	23%	18%
5	48	6.0	38%	54	31%	104	50%	46%
Totals	1951			1936		1935		

Compliance increased for most road groups over the years despite the increase in the road lengths in Groups 1, 2 and 4.

The increase in the lengths of Group 1, 2 and 4 roads is due to the increasing traffic volumes and the updating of road groups to ensure greater consistency along routes.

Table F.C.3 2008 Sealed Road Width Deficiencies

Road Group	Road Length 2008 ARAMP (km)	Target Width (m)	Compliance 2008	2008 Length of Road Under-width By (km)			
				< 0.5m	0.5 - 1.0m	> 1.0m	Total
1	97	7.5	68%	17	9	5	31
2	393	7.2	44%	110	89	22	221
3	440	6.8	35%	152	97	36	285
4	973	6.5	25%	335	250	142	727
5	48	6.0	38%	20	4	6	30
Totals	1951			633	450	211	1294

These standards catered for relatively narrow distributions of traffic volumes, with the corresponding variation in design widths being comparatively small, particularly between Groups 1 to 3. Also Groups 1 and 5 had very limited lengths associated with them.

Due to these issues and the fact that the standards applied did not truly suit urban streets an Engineering Standards Review was carried out. This looked at a range of issues and options including comparisons with other road controlling authorities. As a result the review came up with the following standards which were accepted by the Southland District Council at their meeting on 13 August 2008.

Table F.C.4 2008 Rural Road Width Standards

Class	Definition	Length	% of Total	Daily Traffic Volume	Desirable Width (m)	Minimum Width (m)	Grassed Shoulder Width (m)
Group 1	Rural Arterial	490	9.94%	400+	7.50	7.00	2.0
Group 2	Arterial / Collector / Local	-	-	-	-	-	-
Group 3	Collector	442	8.93%	200-399	7.00	6.50	1.5
Group 4	Local	973	19.71%	50-199	6.50	6.00	1.5
Group 5	Minor Local	48	0.97%	0-49	6.00	5.50	1.5

These new rural standards combine groups 1 and 2 and retain groups 3, 4 and 5. While group 5 is very small it helps highlight these very low volume sealed roads. The steps in width are now a more significant step which helps better signal to a driver the importance of the road they are travelling on.

Grassed shoulders have been adopted throughout as they are better environmentally (less spraying and filtering of road run off), they look tidier and reduce the impression of a very wide open road when the full clear zones are provided. The grass roots help retain the fine material on the shoulder reducing edge drop offs and edge break of the seal and they should not cost significantly more to maintain long term than a gravel shoulder.

Based on the new standards for rural roads, the levels of deficiency shown in table F.C.5 currently exist on the network.

Table F.C.5 Rural Sealed Road Width Deficiencies

Rural Sealed Road Widths - Target v Compliance							
Road Group	Road Length 2008	Target Width	Compliance 2008	2008 Length of Road Under-width By (km)			
				< 0.5m	0.5 - 1.0m	> 1.0m	Total
1 & 2	440	7.5	28%	156	99	63	319
3	395	7.0	24%	108	126	64	299
4	880	6.5	25%	321	229	112	662
5	44	6.0	40%	19	4	3	26
	1759			605	458	243	1306

It should be noted that the new standards will only be applied to routes where it suits, such that overtime the routes will become consistent. In some cases where a route has almost been completed to the old standard it will be finished off to the old standard.

There are currently (2008) 243 kms of rural sealed roads (13.8% of the network) that have seal widths that are under-width by a metre or more. This figure has gone up from the previous plan as the Road Groups and Engineering Standards have been reviewed as part of the development of this Plan. This has lead to the changes in length shown in the table which has affected the levels of compliance for each group.

Generally over the last 7years the degree of compliance was increased through standalone seal widening and widening carried out as part of a pavement rehabilitation. This has now been offset by roads which have moved to a higher group, due to re-rating and/or higher traffic volumes and the change to Engineering Standards.

In 2006 the Southland District Council completed 1.9 kms of standalone seal widening while in 2007 there were 9.2 kms completed.

The urban width standards where as previously shown for the whole sealed network. The 2006 Plan noted that this was not appropriate and needed to be reviewed to allow for parking and cycling demands. As a result of the 2008 review the widths shown in Table F.C.6 have been adopted.

Table F.C.6 Southland District Council 2008 Urban Road Sealed Widths

Class	Definition	Reserve Width (m)	Parking Width (m)*	Traffic Width (m)	Cycle Lanes (m)**	Total Width (m)
Group 1	Arterial	20.0	2 x 2.5	2 x 3.5	2 x 1.5	15.0
Group 2	Collector	20.0	2 x 2.5	2 x 3.0	2 x 1.5	14.0
Groups 3, 4 and 5	Local and Residential	20.0	1 x 2.0	2 x 3.0	-	8.0

* Parking widths provided where there is an existing or future parking demand. Parking lanes could be either sealed or unsealed depending on nature of urban area.

** Cycle lanes to be provided on a discretionary basis where an existing or future cycle demand is identified or anticipated. Therefore they may not be required on all roads.

The levels of compliance to these standards is shown in Table F.C.7.

Table F.C.7 Urban Sealed Roads Width Deficiencies

Urban Sealed Road Widths - Target v Compliance							
Road Group	Road Length 2008	Target Width	Compliance 2008	2008 Length of Road Under-width By (km)			
				< 0.5m	0.5 - 1.0m	> 1.0m	Total
1	16	15.0	4%	0	1	15	16
2	32	14.0	2%	0	1	30	31
3,4 & 5	143	8.0	23%	7	9	93	110
	192			8	11	138	157

As can be seen there is a very low level of compliance with the maximum widths specified. In adopting these standards, SDC was aware of this but wished to set the standard for new works and future upgrades where possible. It should be noted that as parking and cycle lanes are case specific, each urban roading situation needs to be reviewed on its merits to confirm how these standards should be applied in each case. Such a case specific review will reveal a much higher level of compliance.

The issue of seal road widths involves both the width of seal and the width and shape of the unsealed shoulders adjacent to the seal. These unsealed shoulders provide support for the seal edge and a potential recovery area for traffic which strays off the seal.

A sample review of unsealed shoulder widths in 2001 showed a large proportion of District roads also have narrow or no unsealed shoulders. This issue is discussed in detail under item 5 shoulders and clear zones.

The consequence of roads being under-width is twofold, and relates to maintenance costs and safety.

3. Maintenance Costs

The consequential maintenance costs associated with underwidth roads are edgebreak and unsealed shoulder rutting. The expenditure relating to edgebreak repair is significant but difficult to quantify as the costs are built into lump sum figures in maintenance contracts.

Maintenance of unsealed shoulders is a performance based item within the maintenance contract and therefore it is more difficult to isolate shoulder rutting and edgebreak repair costs. Being part of a performance based lump sum encourages the contractor to maintain the shoulder to avoid edge break. However, from knowledge of local roading conditions it has been noted that shoulder drop-off is an ongoing problem particularly on the District's narrow sealed roads.

Another benefit of widening narrow seals is the potential to get more life out of the existing pavement as the traffic loading is moved away from the previous wheel tracks and as extra shoulder support is provided to the pavement. Wider pavements also allow the loads to use a greater width of the road so the loading is not as concentrated on narrow wheel tracks.

The drawback of seal widening is the initial cost to carry out the widening and the ongoing cost of resealing the extra width of seal.

4. Safety

The Land Transport Safety Authority (LTSA) (now part of NZTA) monitors crash data on behalf of Road Controlling Authorities (RCA). Each year LTSA reviews crash data from the previous five years and report on results, trends and key safety issues. Since these reports have been produced Southland has always shown a high dominance of single vehicle loss of control crashes. Although the total number of crashes in this category has decreased, it is still the most common type of crash to occur.

A 1995 LTSA report detailing the results of a study into the effect of shoulder improvements on rural crash sites makes the following comments:

"Adequate road shoulders provide a safety factor for recovery when drivers lose control of their vehicles. Lack of usable road shoulders can contribute to loss-of-control crashes, because there is no recovery area. Overtaking crashes and head-on crashes may also be reduced by the provision of widened shoulders."

From the 41 open road routes analysed, the following observations were made:

- *Loss of control crashes on straights were reduced by 55%*
- *Loss of control crashes on bends (on the route) were reduced by 36%*
- *Overtaking crashes were reduced by 61%*
- *Head-on crashes on straights were increased by 2%*
- *Overall there was a 37% decrease in crashes on open roads where shoulders were improved"*

Shoulder improvements for the study included installing shoulders where none existed, sealing existing shoulders and widening shoulders.

Increases in seal width also help promote cycling and increase safety for cyclists over the life of this Plan.

It is planned that work with cycling groups will be carried out to identify particularly popular routes or routes of concern and look at what long term options are appropriate. In urban areas this may involve setting up a route or series of routes which can be used for recreational purposes.

At this stage this is regarded as a longer term option for the improvement plan of the LTAcMP update. Therefore no funding will be set aside in the plan at this stage.

5. Shoulders and Clear Zones for Sealed Roads

Since 2001 considerable work has been carried out to improve the shoulders of the districts roads and the area beyond them (the clear zone). The shoulders on all new construction and reconstructed roads have been built at a suitable slope and width, and various attempts made to bind up to the material on the unsealed shoulder to better maintain a firm surface and reduce the loss of material from the shoulder area. The recent decision in 2008 to go to wider grassed shoulders is a means to further enhance this.

The clear zone is the area beyond the edge of the traffic lane which reduces the risk of harm to vehicle occupants if they run off the road. The philosophy is to have space so that the driver can regain control and get back on the road or stop without rolling the vehicle or hitting a solid object. It includes the road shoulder (both sealed and unsealed) as well as the recoverable area beyond this.

Draw backs with clear zones include the cost of producing and maintaining them along with the increased perception of safety which can lead to increased speed. One way to reduce the perception of safety is to make the road feel narrower by allowing grass or low growing vegetation to grow up to the edge of the sealed carriageway.

The existing standards for clear zones are as follows:

Table F.C.8 Southland District Council Clear Zone Width Standards

Class	Definition	Speed Limit	Fill Slopes			Cut Slopes		
			<6:1	5:1 - 4:1	>3:1	3:1	4:1 - 5:1	<6:1
Group 1 800+ VPD	Rural Arterial	100km/h	6.00	8.00	NA	3.50	5.50	6.00
		90km/h	5.00	6.00	NA	3.00	4.50	5.00
		70-80km/h	4.50	5.00	NA	3.00	3.00	4.50
		<60km/h	3.00	3.50	NA	3.00	3.00	3.00
Group 2 & 3 200-799 VPD	Arterial / Collector / Local	100km/h	5.00	6.00	NA	3.00	4.50	4.50
		90km/h	3.50	4.50	NA	2.50	3.00	3.00
		70-80km/h	3.00	3.50	NA	2.50	3.00	3.00
		<60km/h	2.50	2.50	NA	2.50	2.50	3.00
Group 4 & 5 0-199 VPD	Residential / Minor Local	100km/h	5.00	6.00	NA	3.00	4.50	4.50
		90km/h	3.50	4.50	NA	2.50	3.00	3.00
		70-80km/h	3.00	3.50	NA	2.50	2.50	3.00
		<60km/h	3.00	3.00	NA	2.00	2.00	2.00
Groups 7,8 & 9	Unsealed	70-80km/h	3.00	3.50	NA	2.50	2.50	2.50
		<60km/h	2.50	2.50	NA	2.50	2.50	3.00

As part of the development of this Plan update, the above standards were reviewed and compared with those used by other roading authorities.

As a result of this review and discussions with Council it was decided to retain these standards as the ideal, where it is sensible to try to achieve this level. It was also agreed that greater consistency in the application of the clear zone standard along a route would be sought.

6. Seal Widening Programme

The Council has historically undertaken approximately 25 kilometres per year of seal widening. This was within the Pavement Rehabilitation budget and as standalone seal widening. In order to improve the shortfall between current and target widths a suitable level of commitment to seal widening is needed. The ideal time to seal widen is the year before a reseal is due, thereby utilising the reseal date as a second coat seal to the widened area. This saves cost and guarantees the longest life from the renewed surface.

Utilising the reseal due dates in 2002 for all sealed roads and the under-width data, a programme for seal widening was created. This showed that at an average of 60 kilometres per year all roads could be brought up to the target seal width by 2020. At a cost of approximately $40,000 per kilometre this required a commitment of $2.4M per year or an extra $1.0M per year increase over the 2001/2002 seal widening programme.

This cost would have been a significant commitment on rates. As a lower cost and reasonable alternative it was decided in the 2002 ARAMP that all roads with a seal width within 500mm of target and with less than 100 vpd could be considered to be within an adequate tolerance level of complying and all seal widths outside this range targeted for improvement. This would have needed an average programme of approximately 46 km per year of standalone seal widening and seal widening incorporated into pavement rehabilitation's.

To date this level of total seal widening has not been achieved due to a combination of budget constraints, changed priorities and funding subsidy issues.

It is now considered that a more realistic target is to complete the widening of all roads which are 500mm or more under their target widths over three reseal cycles. (Approximately 35 to 40 years and involving 701 km of road).

Most of this will be picked up as part of the very significant pavement rehabilitation programme over this period so the only standalone seal widenings required are:

i) Those that do not come up for pavement rehabilitation over this period
ii) Those which Council is not prepared to wait for based on their deficiency ranking in the Council Deficiency Database.
iii) Those that would complete a route much earlier than by waiting for one or two final sections to need pavement rehabilitation.

A long term standalone seal widening programme is currently under production which will be prioritised on the basis of traffic volumes / mix, the degree that the roads are underwidth, how long the wait is until the pavement rehabilitation and the completion of routes.

Within this Plan an allowance of $150,000pa of standalone seal widening has been made in the minor improvement budget. (This allows for 3 to 4 kms per annum).

As the quantity of pavement rehabilitation increases, the proportion involving seal widening reduces as we start to rehabilitate roads which were previously seal widened (with a design life of 10 years) and rehabilitated (with a design life of 25 years).

From this is can be seen that if the scenario of a significant increases in pavement rehabilitation is followed, and we accept seal widths which are within 500mm of the 'ideal', we do not need to increase the seal widening programme significantly.

In addition to pavement rehabilitation's and standalone seal widenings there will also be some widening carried out as maintenance widening which is essentially wide edge break repairs.

An issue which may affect the overall seal widening programme is the development of a walking and cycling strategy. This may lead to the widening of seal on particular cycling routes, changing priorities and timing of the seal widening programme. This is discussed further in Section 4.

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7. Making Best Use of Available Seal

With the adoption of the SDC delineation standard it was accepted that all roads which received an edgeline would have their traffic lane widths marked at 3.0m wide.

Recent work, has indicated, that this may not be getting the most benefit from the available seal and that where possible, the traffic lane should be marked wider and the sealed shoulders reduced. Table F.C.10 shows the expected crash rates for different combinations of traffic lanes and shoulders. This shows that the benefit of wider traffic lanes is greater than the loss associated with narrower sealed shoulders. It is therefore proposed to alter the delineation standard to boost the width of the traffic lanes up to 3.5m where this is possible. Edgelines, where provided, should still be a minimum of 100mm clear of the edge of seal. This may mean that in a number of cases roads that currently have edgelines will no longer have them. During the transition to this change, where edgelines are being changed, the old ones will need to be left to wear away.

Generally with the new and old Engineering Standards this will mean the following:

Table F.C.9 Traffic Lane Widths

Seal Width	Marked Lane Width	Residual Sealed Shoulder (beyond edge line)
7.5	3.5	200
7.2	3.4	150
7.0	3.25	200
6.8	3.25	100
6.5	3.25 (no edge line markings)	Nil
<6.5	Half the road width (no edge line markings)	Nil

Since the RISA was carried out a Technical Audit by NZTA has also been carried out. This did not highlight the same issues as the RISA and in fact disagreed with some of the RISA findings. The final report of the Technical Audit is still to be provided. Once this is received decisions on how far to take the above will be made.

Table F.C.10

Accident rates for various cross-section configurations (Crashes/km/yr)					
Road Group / Standard	**Total Shoulder Width**	**Sealed Shoulder Width**	**Lane Width**	**Total Seal Width**	**Rates**
Group 1					
Existing	1.5	0.75	3	7.5	20.74
Existing with Wider Lane	1.25	0.5	3.25	7.5	20.09
Existing Maximum Lane Width	1	0.25	3.5	7.5	19.57
Proposed	2.75	0.75	3	7.5	19.01
Proposed with Wider Lane	2.5	0.5	3.25	7.5	17.68
Proposed Maximum Lane	2.25	0.25	3.5	7.5	16.55
Group 2					
Existing	1.35	0.6	3	7.2	21.8
Existing with Wider Lane	1.1	0.35	3.25	7.2	20.39
Existing Maximum Lane Width	0.85	0.1	3.5	7.2	20.08
Proposed	2.75	0.75	3	7.5	19.01
Proposed with Wider Lane	2.5	0.5	3.25	7.5	17.68
Maximum Lane	2.25	0.25	3.5	7.5	16.55
Group 3					
Existing	1.15	0.4	3	6.8	22.45
Existing with Wider Lane	0.9	0.15	3.25	6.8	21.89
Proposed	2	0.5	3	7	19.46
Proposed with Wider Lane	1.75	0.25	3.25	7	18.86
Group 4					
Existing	1	0.25	3	6.5	23.48
Existing with Wider Lane	0.75	0	3.25	6.5	22.46
Proposed	1.75	0.25	3	6.5	20.76
Proposed with Wider Lane	1.5	0	3.25	6.5	20.07
Group 5					
Existing	0.5	0	3	6	25.78
Existing with Wider Lane	0.5	0	-	6	
Proposed	1.5	0	3	6	22.1
Proposed with Wider Lane	1.5	0	-	6	
Notes:					
It should be noted that pavement marking widths for Centreline and Edge line have not been included					
Centreline = 100mm					
Edge line = 75mm					
Under the current delineation standard No Edge lines are required for Group 4 and 5 roads					
With Centreline markings, lane widths for Group 5 roads fall below 3m					

Attachment 'D'

Sealed Roads – Reseal Needs

1. Introduction

The seal layer on a road provides a degree of water proofing to the pavement layers below, as well as providing a driving surface which is designed to provide an acceptable level of surface friction. Over time the seal deteriorates through a combination of factors including:

i) Breakdown or inbrittlement of the bitumen under the effects of UV light (sunshine) or from chemical attack from the stock effluent or oils leaking from vehicles. This can lead to cracking of the seal coat or potholing which reduces the water proofing protection provided by the seal.

ii) Binder rise or pushing down of chips into surface below. This can lead to flushing or bleeding which lowers the surface friction (due to a loss of texture) leading to skid resistance problems and lower levels of safety.

iii) Polishing or breakdown of sealing chips from the action of traffic. This can lead to skid resistance problems and safety issues also.

iv) Effects of traffic such as pavement deformation and cracking.

v) Loss of sealing chips from the bitumen binder due to having insufficient binder to withstand the traffic stresses on the sealing chips.

Because of the above issues, overtime every sealed road needs to be resealed.

2. Reseal Needs

Reseal needs are driven by the following:

- The history of previous reseal treatments.
- The lives that the reseal treatments achieve. These are influenced by the pre reseal pavement conditions, traffic over the life of the seal, weather conditions and the construction of the reseal.

Table F.D.1 shows the history of reseals and reseal types used in terms of length, and Table F.D.2 shows the same information but within terms of area. Area is a more appropriate way to show reseals due to the difference in widths especially when comparing urban and rural.

These two tables show the following:

- Increasing recent trend in the quantity of two coat seals.
- Variation in the quantities achieved for each year. This is influenced by funding and amount of resealing required.
- The network area line shows how the total sealed area has increased over time due to seal widening and extensions, improvements in widths at rehabilitation time and addition of vested assets (currently increasing by approximately 50,000 m^2 per year).
- The large quantity of void fill seals carried out in 1999/2000 and 2000/2001 prepared the roads for longer term treatments in three to five years time, and helped balance the reseal budget at that time but have meant additional area, i.e. expenditure over the same timeframe.

- With an increasing network area, increasing traffic and ageing pavements, this means a greater area of resealing is required which frequently needs more expensive treatment due to the condition of the existing surface.
- The two coat seals currently cost slightly more but also have a 10-20% higher expected life. (The proof of this has not been fully collaborated yet due to currently not having resealed sufficient quantity with which to validate the expected lives but indications are that these lives are not likely to be fully achieved).
- While two coat seals may not achieve a significantly longer life they do have a number of benefits including their increased strength and ability to better handle turning and traffic stresses, their ability to be placed over existing sealed surfaces with variable texture, and being less susceptible to bleeding as they can be applied with a smaller quantity of bitumen.
- Recently the cost fluctuations of the bitumen has had a significant impact on the reseal quantity achieved using a fixed budget. This is demonstrated in Table F.D.1a which shows the bitumen price fluctuations.

Table F.D.1 Historic Resealing by Type and Length

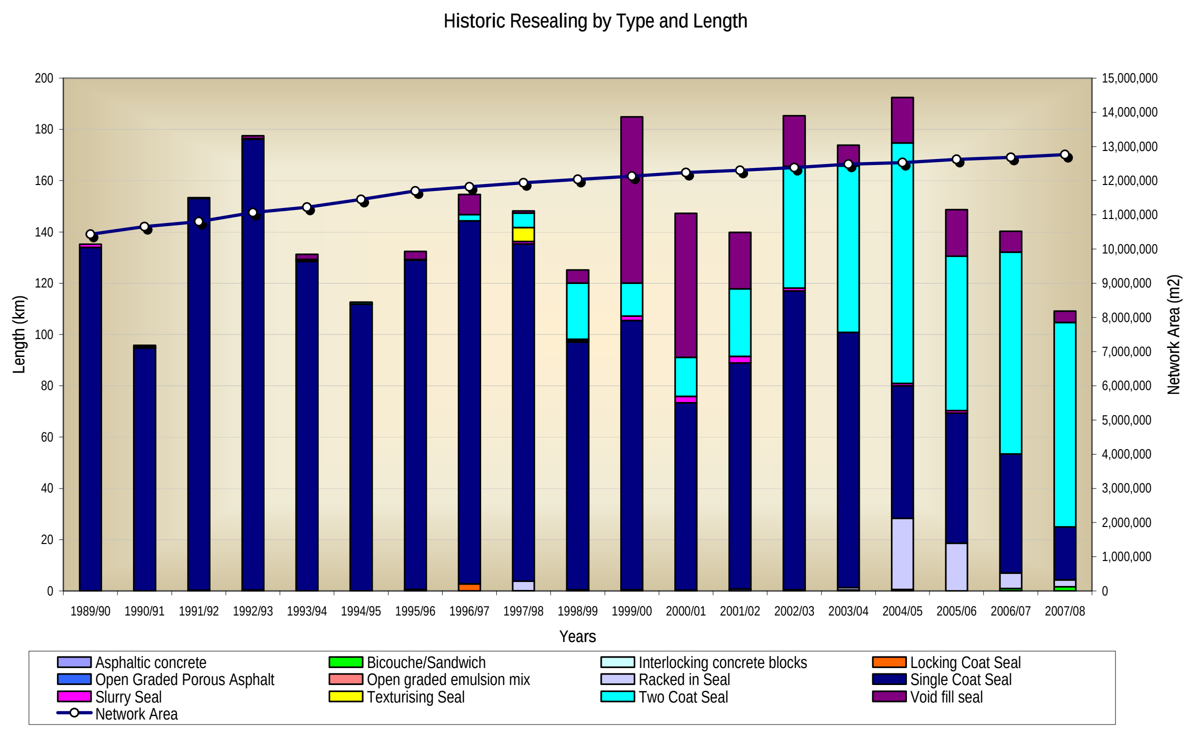


Table F.D.1a Bitumen Price Fluctuations

Table F.D.2 Historic Resealing by Type and Area

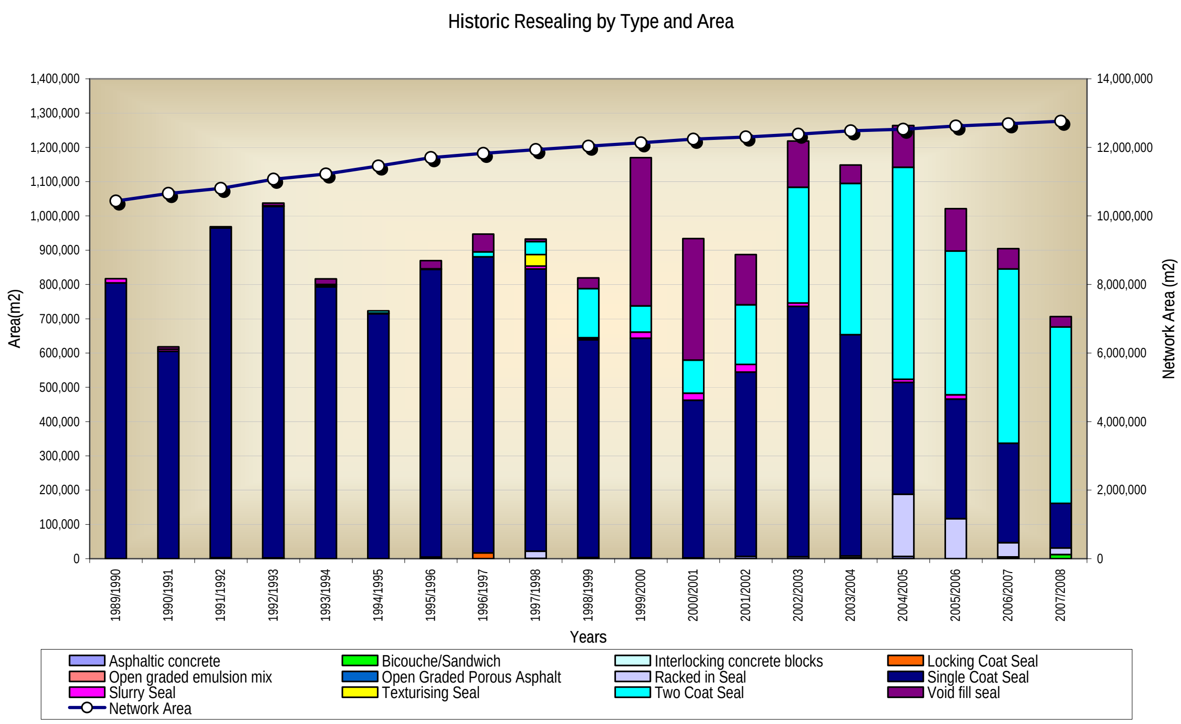


Table F.D.3 shows a steady reduction in the expected remaining seal life and the corresponding reduction in the average age up until 2001/02. This has essentially halted by the use of longer life seals and a greater quantity of reseals over the next three years. This produced a healthier network where the average age is almost equal to half the average expected life. However the last 2 years have been affected by the following:

- Cost fluctuations of bitumen (e.g. for the 2008/09 year even before spraying 1 litre of bitumen the provisional cost fluctuation between tender time (June 2008) and September 2008 was 6.8%. This had the potential to take $250,000 straight out of the budgets. Since September this figure started to drop with the affect that by November the prices were actually less than at tender time resulting in a saving).
- More expensive treatments to deal with ageing pavements, variable texture, etc.
- Some seal coats being effectively holding treatments where they are given shorter but appropriate lives as the pavements did not make it onto the rehabilitation list so the only treatment left is a holding reseal.

Table F.D.3 Seal Age / Life

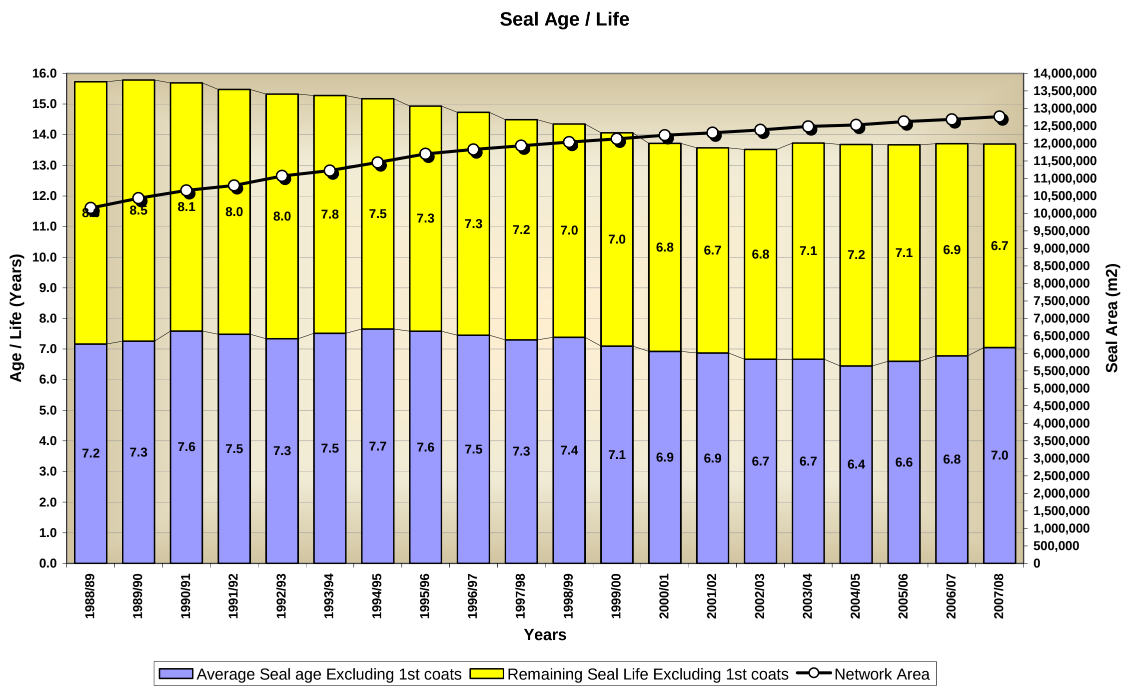


Table F.D.4 shows the current predictions from RAMM along with the smoothed quantities and dollars. The current predictions have allowances built into the future years due to the future reseal cycles coming on stream. Each year's reseals, while on average expected to return in 13.7 years (current expected average life) actually start returning from around 5 years on in relatively small quantities but they do compound. While the current expected life of the reseals is 13.7 years the life used to calculate the required reseals for each year needs to account for the first coats that now require a 2nd coat. When allowing for the 2nd coats the area weighted average life is 13.2 years.

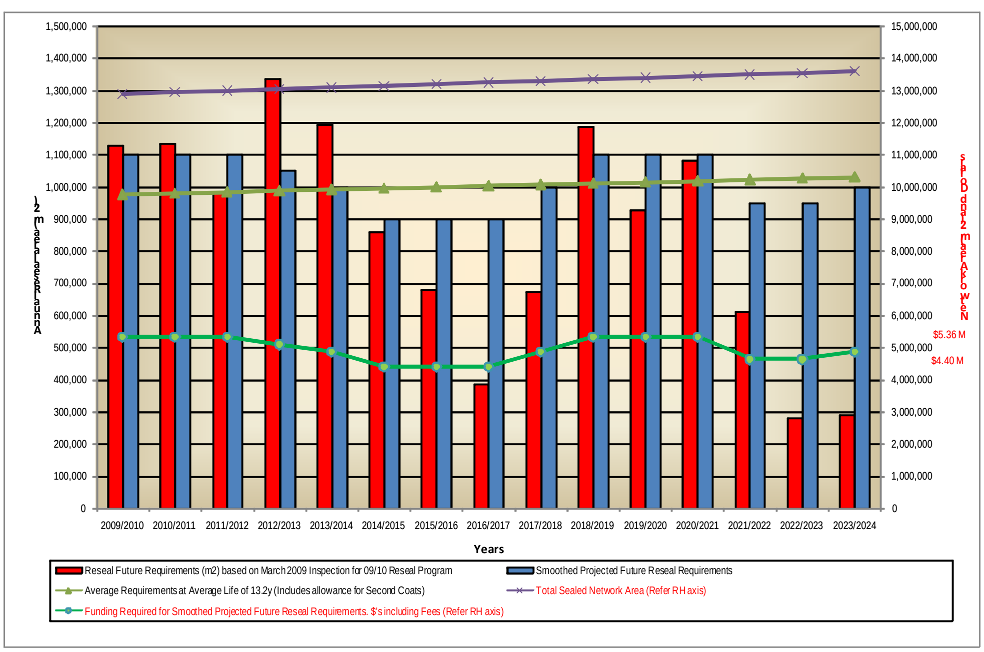
With the current expected life of 13.2 years maintained to 2020/2021 and increasing network area (approximately 50,000m^2 per year) the average requirements grow from 970,000m^2 to 1,030,000m^2. However if the expected life were to decrease, by say 0.1 years per year until the life reaches 12.5 years and is maintained at this level, due to increasing traffic over increasingly aged pavements, then the quantities would grow to around 1,088,000m^2 per year at 2020/2021.

Previously there was a spike in the predictions for 2009/2010 which were artificially higher by around 150,000m^2 due to pavements in that year that were due for reseal and also pavement rehabilitation. These rehabilitated pavements mean that the reseal that was due in 2009/2010 will in fact now come due as second coats in 2011/2012 after the road has been rehabilitated. From 2009/2010 on each year approximately 150,000m^2 gets added due to second coats coming on stream and approximately 150,000m^2 comes off as the pavements are rehabilitated. This spike has been removed by carefully looking at all of the road sections previously projected in RAMM as needing reseal and reassigning new reseal dates based on current conditions, the likelihood that the sections will require rehabilitation rather than reseal and the likely available budget. This review was carried out in March 2009. Due to the above, development of a more detailed 5 year reseal programme will help smooth out the spike showing up in 2012/13.

There is a degree of conservatism in the future predictions as it is easier to push a reseal off another year or two if its condition is appropriate rather than wish we had resealed it 2 years ago. Taking this into account allows some smoothing to be carried out. With the years 2009/2010 to 2012/2013 and the years 2018/2019 and 2020/2021 at or above the average requirements, the smoothed quantity line is the line of best fit to balance the total expected quantity of reseals over the next 15 years. The smoothed projections also have built into them a second cycle of reseals as after a few years some roads which have been reseal start requiring another reseal depending on what they were treated with and what traffic they are carrying. This quantity increases as time passes.

The costs associated with the smooth quantity line and based on the June 2008 average rate of \$5.18m^2 had been added into Table F.1. Originally for the purpose of this Plan, it was assumed that the rate will be the same at the end of June 2009. This assumption was based on the drop in bitumen prices occurring at the time the Plan was being put together in November 2008. Following a review of total budgets in March 2009 it was decided to use a lesser rate based on the lower interim February 2009 cost fluctuation figures. The new figure used was an average rate of \$4.66 per m^2 which is effectively a 10% reduction. Given the extreme volatility in bitumen prices there is a risk that this new rate will be too low but given the step increase in the overall roading funding requirements it was decided this risk was worth accepting.

Table F.D.4 Predicted Reseals



3. Seal Life Achievement

Most of the sealed roads in the District are chip sealed (chipseal is a layer of sprayed bitumen with a stone chip spread on top as a running surface). A few, mainly urban roads, are surfaced with asphaltic concrete (AC) hotmix. The AC surface tends to be used where noise and chip loss are factors. It has the advantages of a longer service life, no stone loss and a pleasant appearance, but comes at a significantly higher cost (five to ten times the cost of a chip seal).

Analysis of actual seal life compared to seal design life shows that SDC is receiving close to the design life from most of its sealed surfaces (approximately 9% of the network has surfacing that exceeds these design lives). This information is demonstrated in Table F.D.5 below. It should be noted however that historical sealing records are incomplete and a great deal of the information relies on the local knowledge of engineering staff. Approximately 80% of the roading network inventory contains complete historical sealing information. The remaining 20% are either greater than 16 years old or have no record of the underlying surface due to the date that the RAMM database was established.

Table F.D.5 Surface Life Achievement by Surface Type

Surface Type First Chip	Second Chip size in 2 coat Seal	Current Area Sealed (m2)	Expected Design Life Range of Current Seals (Years)	Notes	Historical Areas Resealed (Excludes Current Seal Coat) (m2)	Achieved Historical Life Range	Historical Weighted Average Life Achieved
Grade 2	-	234,921	11 - 16		835,174	4 - 27	16.9
Grade 2	Grade 4	254,856	13 - 18	*	764	1 - 24	21.0
Grade 2	Grade 5	233,596	12 - 17	*	22,022	8 - 10	9.6
Grade 3	-	3,978,387	9 - 14		4,953,368	1 - 42	14.7
Grade 3	Grade 5	2,959,457	11 - 16	*	29,250	1 - 10	3.6
Grade 4	-	2,118,738	7 - 12		4,424,644	1 - 26	13.8
Grade 4	Grade 5	84,411	9 - 14	**	-		
Grade 4	Grade 6	151,037	9 - 14	*	1,737	5 - 8	7.7
Grade 5	-	1,815,343	5 - 8		2,599,226	1 - 21	8.7
Grade 5	Grade 6	40,538	6 - 9	**	-		
Grade 6	-	142,460	3 - 6		479,879	1 - 15	7.5
Asphalt	-	29,605	15 - 20	**	-	-	-
Open Graded Emulsion mix ***	-	-	-	***	7,049	1 - 15	8.2
Open Graded Porous Asphalt ***	-	-	-	***	872	4 - 4	4.3
Slurry	-	98,223	8 - 10		35,042	3 - 14	9.1
Paving Blocks	-	2,942	10 - 20	**	-	-	-

Key:

- * These are very new reseal types and only a very small area has been resealed which means a rogue result on one piece of data significantly affects the lives
- ** Insufficient records
- *** Not a current surface type

Notes:
Above data excludes all first coat data.
Expected life range is dependant on the following:

- Condition of road and existing seal prior to reseal.
- Traffic volumes and percentage of heavy vehicles.

Historical life achieved is dependant on the following:

- Correct date entry of historical records including type of seal
- Correct data entry of start, end and width of subsequent reseal
- Life achieved is only that of historical records recorded
- Life achieved is averaged over date range from 1928 to today and therefore includes the longer lasting seal coats of earlier times when the loading and traffic volumes were lighter and the pre reseal conditions did not involve reseals over several existing reseal layers which can cause problems

The increasing size of the sealed network due to seal widening and seal extension operations has lead to the need to increase the reseal budget over the years.

It is expected that the long term reseal budget requirements will continue vary in future years until the programme can be further smoothed out over future reseal cycles.

The maps in Attachment C of the front part of this document show the draft 3 Year Programme of AWPT and Reseal works, based on the best available information as at 09/06/09.

Attachment 'E'

Gravel Roads – Rehabilitation Needs

1. Introduction

The unsealed pavement structure is assumed to consist of a permanent subbase layer protected by a maintenance metal layer, which is replenished as required to maintain the overall structural integrity.

In a number of cases this proves not to be the case either due to a poor standard of construction/drainage when initially built, weak areas of subgrade, substantial increases in heavy traffic loading which the road cannot cope with or insufficient application of maintenance metal to keep up with the level of deterioration. Any loading increase would typically be the result of forestry logging, quarrying, gravel cartage or dairy conversions.

Having 60% of the maintained network in gravel creates a significant maintenance problem for Council. Most people believe that having a sealed road is much cheaper than gravel because the grader is not necessary and we do not need to keep adding gravel. NZTA require a full economic analysis to be completed to demonstrate a positive net outcome for any extension of seal projects. In general terms a traffic volume of 200 to 250 Adjusted Average Daily Traffic (AADT) is required before a positive net value will be available. The AADT is used as it takes into account seasonal variations and heavy vehicle numbers on a road. Heavy vehicle percentages of 20 and above will assist in achieving this number. The relative costs of sealed, gravel and Otta Sealed roads are indicated in Table F.E.1.

Table F.E.1

Optimal Maintenance Cost Comparison				
Cost per year of gravel & grade				
6	years	$16,000	$2,700	per year
Construct & Seal - Traditional Sealed Road Treatment				
Construction				
40	years	$180,000	$4,500	per year
Sealed Maintenance				
40	years	$145,000	$3,600	per year
Otta Seal - Modified Gravel Dust Suppression Seal				
6	years	$20,000	$3,300	per year

The figures above are net costs. The gravel road figure has been calculated on a six yearly average maintenance metal cycle and assumes that at least 5mm of maintenance metal is applied per year. Current gravel road expenditure is significantly below this optimal figure.

Maintenance of the gravel road network is included in the Councils three Network Maintenance Contracts. As Councils maintenance contracts have developed so have the management methods used to assess and maintain the gravel network. The methods used vary from conventional lump sum and descriptive requirements to the combined management of the South Eastern Alliance. The Central Area contract will be re-tendered early in 2009 and is likely to use a combination of these methods.

Currently this Plan makes no provision for any seal extensions, apart from those which are required due to growth and will be partly funded by development contributions.

2. Gravel Roads Rehabilitation Needs

The particular treatment chosen depends on the cause of the problem with the existing road and the availability of suitable materials locally. The final selection depends on the overall economics of the various options.

The selection of treatments and sites takes place between the Maintenance Contractors and Southland District Council's Area Engineers. They jointly seek to overcome the worst problem areas on the network in terms of high maintenance needs and levels of complaint. Few specific rehabilitations are carried out on the gravel road network as the application of additional running course material will normally be sufficient to restore the road surface.

The costs of any gravel rehabilitation required are allowed for under maintenance metalling.

Attachment 'F'

Gravel Roads – Carriageway Widening Needs

1. Gravel Roads – Carriageway Widening Needs

Councils desired carriageway widths are included in Table X3.3. These widths are used for development or upgrading of gravel roads. Changes to the existing network are not envisaged within the ten year planning cycle unless specific rate payer complaints are received or a safety issue is identified. Widening can normally be achieved by nibbling at the existing road edge to achieve the additional width and a subsequent application of maintenance gravel to the central carriageway.

2. Issues

- The Council Request for Service system needs to be modified to ensure all complaints and safety issues can be reported in such a way that appropriate action can be taken.

Attachment 'G'

Gravel Roads – Maintenance Metalling Needs

1. Maintenance Metalling Needs

Maintenance metal is the sacrificial top layer of the unsealed road, also known as the wearing course. This is replenished as required to retain the overall structural integrity.

Gravel loss trials carried out over the past five years have indicated that our gravel roads have an average loss factor of 5mm to 7mm per year. For our network we therefore need a minimum maintenance metal program of 94,500m^3 per year or a more likely programme, based on the increase in heavy vehicles, of 132,000m^3 per year. Metal application at this level has not been achieved over at least the last five years.

For the five year period 2000 to 2005 our maintenance contracts included a requirement for a minimum of approximately 45,000m^3 per year. In the 2007/08 year our maintenance graveling quantity increased to 815,00m^3 using "R" funds and this will be further increased next year. The cost of a 132,000m^3 metal program is about $2.69M per year.

Having under applied maintenance metal over at least a five year period our presently planned metal program is really only standing still particularly if predicted increases in heavy traffic are taken into account.

The Alliance contract "best for network" approach has resulted in a full five year planning cycle being developed. The North Western and Central contracts are currently assessed on an annual basis and a metalling program agreed with the Area Engineer.

Further investigation of the use of bound wearing course, that may have a higher upfront cost but result in a longer service life, is needed. Changes to our traditional contract models will be required to fully facilitate this change. Within the Alliance contract an attempt is being made to monitor costs and condition improvements by the use of these bound wearing courses on some roads.

Priorities are tourist routes and other sites where comfort, ride, dust and minimising loose metal for light vehicles are a priority.

Increasing metal maintenance will help avoid the need to increase routine maintenance budgets to cope with increasing heavy traffic over time.

2. Issues

- The long term maintenance metalling needs for the District need to be developed over time.
- Review where treatments such as Otta seals fit into the long term maintenance regime.

Attachment 'H'

Bridges' Needs

1. Introduction

The level of service of a bridge can be considered in terms of load capacity, width between kerbs and number of lanes. A weight restriction will have the greatest impact on heavy vehicles as additional trips need to be made to cart the same quantity of goods. Insufficient width between kerbs has an impact in terms of safety and on inadequate number of lanes has an impact on heavy traffic due to delays and increased travel time and operating cost. When considering a bridge for replacement these three levels of service need to be considered in terms of the number of heavy vehicles using the particular bridge, as well as other replacement priorities.

Potential renewals are identified through the different inspection programs. Where a structure can no longer adequately carry Class I loads, is on a route with a large proportion of heavy vehicles and there are no suitable alternative routes available, the structure may be upgraded. When a structure is upgraded it is brought up to Class I loading criteria. Where a structure does not meet the level of service for width between kerbs or the required number of lanes, a replacement or widening may also be considered.

Alternatively a structure may be replaced with a new bridge. In the past structures for replacement have been identified based on passing the Transfund (now NZTA) Benefit/Cost (B/C) criteria for an economic roading facility. When the structure did not produce a high enough B/C ratio to warrant a full replacement, an upgrade would have been further investigated.

Due to the extent of the Southland District Council's roading network there are often alternative routes available. The length of the alternative routes are often unreasonable for a road user to have to travel but based on the B/C ratio threshold the replacement is deemed uneconomic. Because of this, in past years a number of structures on no-exit roads have been replaced as they were the only ones which could generate a fundable B/C ratio.

The current NZTA bulk funding model allows replacements with a total capital cost of less than $200,000 to be replaced based on passing a simple flow chart. The flow chart examines whether alternative routes are available, whether the alternative routes require upgrading and also whether there are other more economically viable options for replacing the bridge such as a ford. This funding model has made it less difficult to justify replacing a number of structures in the district.

Long bridges, which provide the only access to a limited number of properties present a major difficulty at the time that it becomes necessary to upgrade or replace them. Due to the cost of the replacement compared to the number of vehicles using them they have in the past been classed as uneconomic by NZTA. Each of these needs to be considered on a case by case basis, and discussed with the land owners to look at the options available.

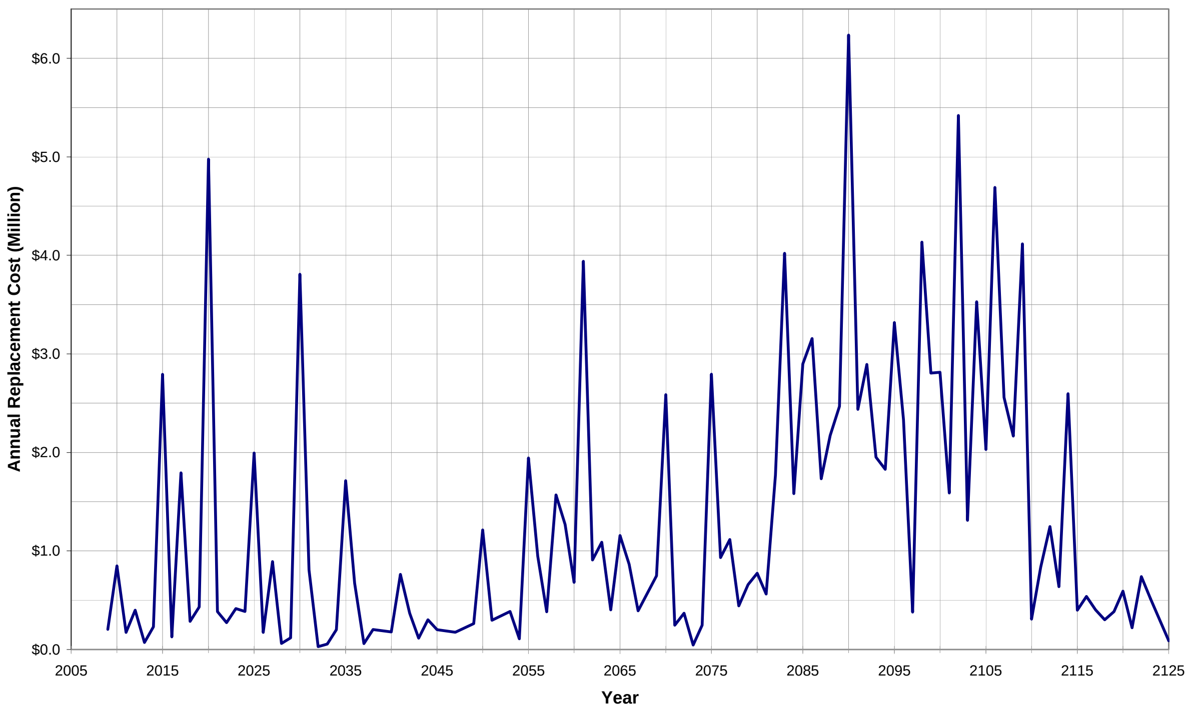
Drainage culverts not classified as bridges are replaced as required as a part of the maintenance contracts. Due to the lack of information on the existing drainage asset there is currently no forward work program for drainage culvert replacements.

2. Summary of Future Costs

Bridges

Figure F.H.1 below shows the expected bridge replacement value required per year based on the raw data in the RAMM Bridges module as at the 2008 valuation exercise. This plot is provided to show the overall expenditure trends. The remaining useful lives determined during the 2005/06 detailed inspections are still to be compiled and included with this data.

Figure F.H.1 Projected Replacement Cost vs Year



Note that the peaks that occur in 2015 and 2020 are due to assumed construction dates for timber bridges and armco culverts and the total asset life that has been assigned for the asset type. The remaining life for these asset types can be extended through upgrading and by posting a weight restriction for a short period to reduce the magnitude of the peaks. The data above also includes the replacement cost of off road bridges which are on legal road reserve but which are unmaintained.

The 2015 peak includes approximately $1.4 million to replace the Mararoa Road Bridge over the Mararoa River and the Riversdale Pyramid Road Bridge over the Mataura River as well as $1.4 million for 19 other structures. It is unlikely both of these bridges would be carried out in one construction season.

It should also be noted that the methodology for valuing the armco culverts tends to overestimate their replacement cost. The replacement for all culverts is based on the road length times the invert length multiplied by a rate per square meter determined from previous culvert replacement contracts. In effect the RAVM module is calculating the value to replace the existing structure with a structure of the same size.

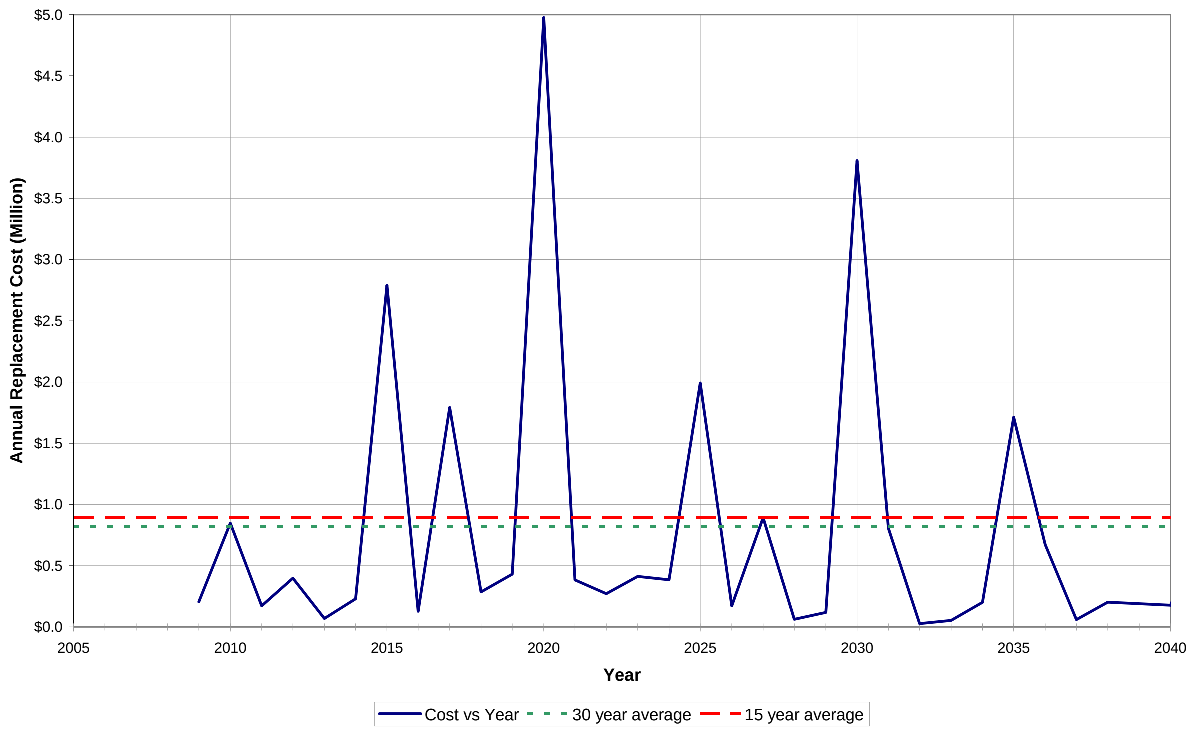
A number of the armco culverts in the district have been constructed with very long invert lengths that are much wider than the carriageway width that they support. When it is determined that the armco culvert requires replacement, more specific on site study may well show that the invert length of the culvert can be greatly decreased. In determining the replacement program, reduced invert lengths have been assumed.

The figure below shows a detailed view of the next 30 years with some different funding scenarios shown on it. To spread the peaks to an even annual budget over the next 30 years would require annual expenditure of around $820,000. However, it may be possible to extend the life of some of the structures which fall due in the next 30 years and reduce the annual expenditure further.

The proposed programme for the next ten years is an annual expenditure of $650,000, made up of $550,000 for replacements (split 90% renewals and 10% new capital) and $100,000 for structural upgrades. This figure has been set lower to maintain price tension for the replacements and to reflect that the 8 year average is approximately $605,000. For 2009/10 and 2010/2011 an additional $150,000 has been allowed each year for upgrades to protect the bridge on Weir Road adjacent to the Mararoa Weir.

From previous years replacement programmes it is estimated that approximately 10% of the renewals figure is New Capital with the remaining 90% Renewal Capital. This New Capital is associated with replacing single lane structures with two lanes and increasing load capacity to current highway standards.

Figure F.H.2 Projected Replacement Cost vs Year



As noted above it is possible to spread the high peaks to more manageable levels. However, there is risk in deferring replacements if the structures have deteriorated to a point where they can no longer safely carry Class I loads. Even if the structure is posted, heavy vehicles may continue to use it and exceed the weight limits with the potential for collapse of the structure. For this reason the replacement and upgrade program has allowed to upgrade posted bridges to 100% Class 1 on a priority basis.

Long term deferrals will incur higher maintenance costs, which may become uneconomic and may also run the risk of there being insufficient funding to replace the structure in the future.

The above general bridge programming information is based on assumed lives and expected ages in the bridge database to allow review of the very long term overall picture.

With the completion of the 6 yearly structural review of all of the timber and steel bridges (those most likely to need upgrading or replacement in the short to medium term), it has been possible to produce a more detailed 10 year programme of upgrades and replacements.

The level of accuracy of this programme will be greater in the earlier years and may be subject to more change in the later period as rates of deterioration differ from assumed, traffic use of bridges change due to economic development, floods affect various bridges differently and issues unable to be picked up during inspections are uncovered.

The programme assumes that many of the bridges which are currently posted with restrictions will remain so or not be upgraded in the foreseeable future. The split of posted bridges into future upgrades verses long term postings and off road bridges is shown in table F.H.3.

This splits the 66 posted bridges into four categories as follows:

1. Bridges which justify future upgrading or replacement to bring back to Class 1 loading.
2. Bridges which may be difficult to justify replacing in the future due to their cost, limited use or the alternative routes which are available. These may therefore remain posted in the long term.
3. Bridges which are at the extremes of the network and may benefit in the future from a review in terms of the Extent of Network Policy and their place in it. At this stage it has been assumed that some of these will be replaced.
4. Bridges which are beyond the end of the maintained network (often in the middle of a paddock) which present a liability to Council. More rapid progress should be made on dealing with these. (It should be noted that this list only includes those off-road bridges with restrictions – there are others on the network without any postings at this stage.) Based on the discussion above, Table F.H.4 provides details of the proposed 10 Year Bridge Replacement Programme.
5. The two bridges marked with an * have been physically replaced or upgraded but the postings have not yet been revoked by publicly advertising.
6. The 7 bridges marked with a + are due to be upgraded or replaced by 30 June 2009.

Table F.H.3 Long Term Status of Bridges Posted in April 2009

To Upgrade or Replace in the Future

WARD	STRUCTURE NO.	NAME OF ROAD	NAME OF WATERWAY	WEIGHT LIMITS MAX WT ON ANY AXLE (KG) or POSITION ON BRIDGE	GROSS WEIGHT (% CLASS I)	MAX SPEED LIMIT (KM/HR)
6	3052.001	Ben Callum	Otapiri Stream		90%	30+
6	2865.002	Benmore Otapiri	Bastion Creek	Central on bridge	90%	30
10	1186.001	Birch	Waituna Creek	Central on bridge	90%	30
6	2802.001	Campbell	Swale Creek		40%	10+
9	2563.001	Channel	Makarewa Flood Channel		90%	20
10	1183.001	Cook	Waituna Creek Branch	Central on bridge	100%	20
6	2647.001	Deans	Winton Stream		80%	30
6	2896.001	Dipton Flat	Dipton Stream	Central on bridge	100%	20

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To Upgrade or Replace in the Future (Continued)

WARD	STRUCTURE NO.	NAME OF ROAD	NAME OF WATERWAY	WEIGHT LIMITS MAX WT ON ANY AXLE (KG) or POSITION ON BRIDGE	GROSS WEIGHT (% CLASS I)	MAX SPEED LIMIT (KM/HR)
6	2896.002	Dipton Flat	Dipton Stream Tributary	Central on bridge	100%	20
5	2371.002	Dunearn	Terrace Creek Tributary	Central on bridge	90%	30
2	3598.004	Dunrobin Valley	Aparima River Tributary		80%	30
2	3742.001	Fairlight	Mataura River		80%	30
11	1373.001	Frazer	Waiarikiki Stream	Central on bridge	100%	30
11	1057.001	George	Waikawa River West Branch		60%	30
11	1084.001	Graham	Waipapa Stream		70%	30
11	1146.002	Gray	Titiroa Stream		70%	30
11	1146.001	Gray	Titiroa Stream Branch	Central on bridge	80%	30
10	1173.001	Lawson	Waituna Creek Branch	Central on bridge	100%	30
4	2066.005	Lillburn Monowai	Dean Burn Tributary		90%	30
4	2120.001	Lindsay	Grass Burn		90%	30+
10	1608.001	MacAdam	Gold Creek	Central on bridge	80%	30
11	1065.001	Marinui	Marinui Stream	Central on bridge	70%	30+
7	1274.001	Matai West	Oteramika Creek		90%	10
3	3226.003	McDonald	Rob Roy Creek West Branch		80%	30
7	1504.001	McDonald	Hedgehope Stream	Central on bridge	90%	30
7	1505.001	McIntosh South	Hedgehope Stream	Central on bridge	80%	30
3	3231.001	McKenzie	Washpool Creek		80%	30+
10	1584.001	McKerchar	Myross Creek	Central on bridge	100%	30
9	2515.001	McKinnon	Mossburn Creek		90%	30
3	3224.001	McRorie	Washpool Creek		80%	30
6	2897.002	Riverside School	Dipton Stream Tributary	Central on bridge	70%	10
9	2555.001	Sharks Tooth	Sharks Tooth Tributary	Central on bridge	100%	30
6	3043.003	Spirt Burn	Spirt Burn		90%	30*+
2	3652.005	Sutherland	Murray Creek		90%	30
3	3144.001	Tomogalak	Tomogalak Stream	Central on bridge	100%	30
9	2466.002	Valley	Oporo Creek Branch	Central on bridge	90%	30
11	1066.002	Waimahaka Fortification	Waimahaka Stream	Central on bridge	100%	30
3	3147.001	Wilson	Larnach Stream		90%	30
3	3264.004	Winding Creek	Winding Creek Branch	Central on bridge	80%	30
11	1334.002	Matheson	Cadden Burn	Central on bridge	100%	30
9	1703.001	Waianiwa Oporo	Oreti River Tributary		70%	30
3	3294.001	Wendon Creek	Wendon Stream	Central on bridge	70%	30

Long Term Posting

WARD	STRUCTURE NO.	NAME OF ROAD	NAME OF WATERWAY	WEIGHT LIMITS MAX WT ON ANY AXLE (KG) or POSITION ON BRIDGE	GROSS WEIGHT (% CLASS I)	MAX SPEED LIMIT (KM/HR)
10	1253.001	Badwit	Waituna Creek	Central on bridge	100%	30
6	2895.001	Benmore	Oreti River	4600	50%	30
11	1113.001	Boat Harbour	Toetoes Creek		70%	10
4	3407.002	Lake Monowai	Waiau River	7000	28,500 kg	10
3	3158.001	Murphy	Waimea Stream		70%	10*+
9	2475.001	Nelson	Lochiel Stream		40%	10
9	1709.001	Otahuti Wrights Bush – North	Waianiwa Creek		80%	10
6	2596.001	Scott	Makarewa River		60%	20
6	2526.001	Thompsons Crossing – West	Winton Stream		70%	30
3	3246.006	Whitecoomb	Deep Creek		50%	10

Extent of Network

WARD	STRUCTURE NO.	NAME OF ROAD	NAME OF WATERWAY	WEIGHT LIMITS MAX WT ON ANY AXLE (KG) or POSITION ON BRIDGE	GROSS WEIGHT (% CLASS I)	MAX SPEED LIMIT (KM/HR)
1	3582.001	Mararoa	Mararoa River		80%	30
6	2826.001	McBride	Otapiri Stream		90%	30
10	1624.001	McGilvray	Weelwood Stream	Central on bridge	100%	30
6	2661.001	Smith	Oreti River Tributary	Central on bridge	70%	10
2	3618.001	Taylor	Oswald Stream		80%	30
11	1067.001	Wairata	Waimahaka Stream	Central on bridge	80%	30

Off Road Bridges (currently posted)

WARD	STRUCTURE NO.	NAME OF ROAD	NAME OF WATERWAY	WEIGHT LIMITS MAX WT ON ANY AXLE (KG) or POSITION ON BRIDGE	GROSS WEIGHT (% CLASS I)	MAX SPEED LIMIT (KM/HR)
3	3192.004	Ardlussa Cattleflat	Mataura River Tributary		90%	30
3	3353.001	Carter	Waimea Stream		70%	10
6	3037.002	Magee	Oreti River Tributary		20%	10
6	2615.001	McDonald	Makarewa River		10%	10
6	2619.001	Off Hall	Makarewa River Tributary	Central on bridge	40%	10
10	1197.001	Tapper	Duck Creek		40%	10
6	2654.001	Welsh – East	Winton Stream		20%	10
11	1321.001	Wyndham River	Kuriwai Stream		30%	10

Key: 1 = Te Anau 2 = Five Rivers 3 = Waikaia 4 = Tuatapere 5 = Wallace 6 = Winton 7 = Te Tipua 8 = Riverton 9 = Wallacetown 10 = Waihopai 11 = Toetoes

At the current rate of annual expenditure on bridge replacement and upgrades of $650,000 per annum it will take in the order of 10-15 years to remove all postings on bridges where it is warranted. This extended timeframe may have a major impact on road users. If there are complaints from road users, the programme can be modified to bring forward the replacement or upgrade of a particular structure. If the Southland District Council receives a significant number of complaints, steps may be needed to increase the rate of removal of posted structures.

Table F.H.4 shows an estimated total expenditure for each year which varies in some cases from $650,000 annual allowance in this Plan for bridge renewals. The constant $650,000 figure has been retained in the Plan to reflect levels of uncertainty with the estimates and final likely treatments (i.e. possible upgrade rather than replacement.)

Table F.H.4 Draft 10 Year Replacement / Upgrade Programme

Replacement Year	Year	Structure Number	Alternate ID Number	Road Name	Existing Type Description	Existing no of lanes	Original Design Loading	Replacement (R) or Upgrade (U)	Replacement no of lanes	Replacement design loading	Bridge Span or Culvert Invert Length (m)	Total Cost (Including Fees) $1,000's	Renewal Capital $1,000's	New Capital $1,000's	Comments
2007/08	0	1777	2852.003	CENTRE BUSH OTAPIRI RD	Armco Culvert	2	Class I	R	2	HN-HO-72	12	$115	$100	$15	Construction carried over to 08/09 season
2007/08	0	1261	1592.002	HORSESHOE BUSH RD	Armco Culvert	2	Class I	R	2	HN-HO-72	12	$115	$100	$15	Construction carried over to 08/09 season
2007/08	0	1318	1677.001	PRICE RD	Armco Culvert	2	Class I	R	2	HN-HO-72	9	$115	$100	$15	Construction carried over to 08/09 season
2007/08	0	1500	2120.001	LINDSAY RD	Timber Beam & Deck	1	Class I	R	2	HN-HO-72	6	$50	$50	$0	Construction carried over to 08/09 season
2007/08	0											**$230**	**$200**	**$30**	
2008/09	1	2205	3231.001	MCKENZIE RD	Timber Beam & Deck	1	Class I	U	1	Class I	7	$47	$47	$0	Potentially replace deck with concrete superstructure rather than timber upgrade
2008/09	1	1767	2802.001	CAMPBELL RD	Timber Beam & Deck	1	Class I	R	1	HN-HO-72	7.5	$81	$70	$11	
2008/09	1	2096	3052.001	BEN CALLUM RD	Timber Beam & Deck	1	Class I	R	1	HN-HO-72	7.5	$103	$90	$13	
2008/09	1	1052	1065.001	MARINUI RD	Steel & Timber Beam Timber Deck	1	Class I	U	1	Class I	15	$62	$62	$0	
2008/09	1	1087	1302.001	TYNEHOLM RD	Armco Culvert	2	Class I	R	2	HN-HO-72	9	$117	$100	$17	
2008/09	1	2285	3175.001	NINE MILE RD	Armco Culvert	2	Class I	R	2	HN-HO-72	9	$153	$135	$18	
2008/09	1	2305	3352.002	ROCHE RD	Armco Culvert	2	Class I	R	2	HN-HO-72	9	$110	$100	$10	
2008/09	1											**$673**	**$604**	**$69**	
2009/10	2	1156	1274.001	MATAI RD WEST	Timber Beam & Deck	1	Class I	U	1	Class I	6	$30	$30	$0	
2009/10	2	1322	1692.001	ALLISON RD	Timber Beam & Deck	1	Class I	R	1	HN-HO-72	4.5	$60	$45	$15	
2009/10	2	1026	1084.001	GRAHAM RD	Timber Beam & Deck	1	Class I	R	1	Class I	6	$80	$80	$0	
2009/10	2	1762	2647.001	DEANS RD	Timber Beam & Deck	1	Class I	R	1	HN-HO-72	11	$160	$130	$30	
2009/10	2	1242	1238.001	FLEMING RD	Armco Culvert	2	Class I	R	2	HN-HO-72	9	$140	$115	$25	Invert concrete lined previously, replacement required
2009/10	2	2052	3002.001	McDONALD RD	Armco Culvert	2	Class I	R	2	HN-HO-72	9	$140	$115	$25	Potential upgrade by concreting invert as alternative
2009/10	3	1277	1068.001	MACADAM RD	Timber Beam & Deck	1	Class I	U	1	Class I	6	$30	$30	$0	
2009/10	2											**$640**	**$545**	**$95**	
2010/11	3	1945	3582.001	MARAROA RD	Timber Beam & Deck	1	Class I	R	1	Class I	70	$650	$650	$0	
2010/11	3											**$650**	**$650**	**$0**	
2011/12	4	2078	2865.002	BENMORE OTAPIRI	Timber Beam & Deck	1	Class I	U	1	Class I	6	$30	$30	$0	
2011/12	4	1144	1504.001	MCDONALD RD	Timber Beam & Deck	1	Class I	R	1	Class I	24	$300	$300	$0	Need to consider with McIntosh South Rd
2011/12	4	1143	1505.001	MCINTOSH RD STH	Timber Beam & Deck	1	Class I	R	1	Class I	24	$300	$300	$0	PSA with Mcdonald Rd
2011/12	4											**$630**	**$630**	**$0**	
Other bridges to be considered for upgrade or replacement in 10 year programme															
		1044	1066.002	WAIMAHAKA FORTIFICATION RD	Timber Beam & Deck	1	Class I								
		1063	1057.001	GEORGE RD	Timber Beam & Deck	1	Class I								
		1065	1334.002	MATHESON RD	Timber Beam & Deck	1	Class I								
		1081	1316.001	POLLOCK RD	Timber Beam & Deck	1	Class I								
		1096	1146.002	GRAY RD	Timber Beam & Deck	1	Class I								
		1097	1146.001	GRAY RD	Timber Beam & Deck	1	Class I								
		1117	1373.001	FRAZER RD	Bdy Bridge Timber (SDC Resp)	1	Class I								
		1184	1187.001	KAPUKA NORTH	Armco Culvert	2	Class I								
		1186	1186.001	BIRCH RD	Timber Beam & Deck	1	Class I								
		1188	1191.001	WAITUNA RD	Armco Culvert	2	Class I								
		1194	1183.001	COOK RD	Timber Beam & Deck	1	Class I								
		1196	1173.001	LAWSON RD	Timber Beam & Deck	1	Class I								
		1201	1172.001	MOFFAT RD	Timber Beam & Deck	1	Class I								

Replacement Year	Year	Structure Number	Alternate ID Number	Road Name	Existing Type Description	Existing no of lanes	Original Design Loading	Replacement (R) or Upgrade (U)	Replacement no of lanes	Replacement design loading	Bridge Span or Culvert Invert Length (m)	Total Cost (Including Fees) $1,000's	Renewal Capital $1,000's	New Capital $1,000's	Comments
		1206	1168.001	WAGHORN	Timber Beam & Deck	1	Class I								
		1222	1202.001	WELSH RD	Armco Culvert	2	Class I								
		1272	1606.001	ROSS RD	Timber Beam & Deck	1	Class I								
		1285	1624.001	MCGILVRAY RD	Timber Beam & Deck	1	Class I								
		1290	2503.001	PULLAR RD	Timber Beam & Deck	1	Class I								
		1327	1703.001	WAIANIWA OPORO RD	Timber Beam & Deck	1	Class I								
		1334	2466.003	VALLEY RD	Armco Culvert	2	Class I								
		1335	2466.002	VALLEY RD	Timber Beam & Deck	1	Class I								
		1348	1704.001	WEIR RD	Armco Culvert	2	Class I								
		1377	1785.001	RANKIN RD	Timber Beam & Deck	1	Class I								
		1391	1794.002	OMUTU RD	Armco Culvert	2	Class I								
		1411	1992.001	FRYER RD	Timber Beam & Deck	1	Class I								
		1470	2066.005	LILLBURN MONOWAI RD	Timber Beam & Deck	1	Class I								
		1641	2661.001	SMITH RD	Timber Beam & Deck	1	Class I								
		1661	2533.003	GAP RD EAST	Armco Culvert	2	Class I								
		1678	2563.001	CHANNEL RD	Timber Beam & Deck	1	Class I								
		1693	2555.001	SHARKSTOOTH RD	Timber Beam & Deck	1	Class I								
		1784	2856.002	TURNBULL RD	Timber Beam & Deck	1	Class I								
		1788	2865.004	BENMORE OTAPIRI RD	Timber Beam & Deck	1	Class I								
		1817	2371.002	DUNEARN RD	Timber Beam & Deck	1	Class I								
		1818	2373.002	HARBOUR ENDOWMENT RD	Timber Beam & Deck	1	Class I								
		1825	2373.001	HARBOUR ENDOWMENT RD	Timber Beam & Deck	1	Class I								
		1828	2376.001	HISHON RD	Armco Culvert	2	Class I								
		1885	2128.001	PURVIS RD	Timber Beam & Deck	1	Class I								
		1900	3407.003	LAKE MONOWAI RD	Timber Beam & Deck	1	Class I								
		1994	3598.004	DUNROBIN VALLEY RD	Timber Beam & Deck	1	Class I								
		2002	3652.005	SUTHERLAND RD	Timber Beam & Deck	1	Class I								
		2063	2897.002	RIVERSIDE SCHOOL RD	Timber Beam & Deck	1	Class I								
		2064	2896.002	DIPTON FLAT	Timber Beam & Deck	1	Class I								
		2067	2896.001	DIPTON FLAT	Timber and Steel Beams Timber Deck	1	Class I								
		2072	2895.002	BENMORE RD	Timber Beam & Deck	1	Class I								
		2076	2865.001	BENMORE OTAPIRI RD	Timber Beam & Deck	1	Class I								
		2078	2865.002	BENMORE OTAPIRI RD	Timber Beam & Deck	1	Class I								
		2101	3047.001	CUNNINGHAM RD	Timber Beam & Deck	1	Class I								
		2108	3136.002	LONGRIDGE RD	Armco Culvert	2	Class I								
		2144	3742.001	FAIRLIGHT RD	Steel Beams Timber Deck	1	Class I								
		2156	3144.001	TOMOGALAK RD	Steel Beams Timber Deck	1	Class I								
		2191	3147.001	WILSON RD	Timber Beam & Deck	1	Class I								
		2199	3226.002	MCDONALD RD	Timber Beam & Deck	1	Class I								
		2202	3226.003	MCDONALD RD	Timber Beams and Deck	1	Class I								
		2203	3224.001	MCRORIE RD	Timber Beam & Deck	1	Class I								
		2213	3264.004	WINDING CREEK RD	Timber Beam & Deck	1	Class I								
		2226	3245.003	PIANO FLAT RD	Armco Culvert	2	Class I								
		2268	3294.001	WENDON CREEK RD	Timber Beam & Deck	1	Class I								

Replacement Year	Year	Structure Number	Alternate ID Number	Road Name	Existing Type Description	Existing no of lanes	Original Design Loading	Replacement (R) or Upgrade (U)	Replacement no of lanes	Replacement design loading	Bridge Span or Culvert Invert Length (m)	Total Cost (Including Fees) $1,000's	Renewal Capital $1,000's	New Capital $1,000's	Comments
		2277	3302.001	RIVERSDALE PYRAMID RD	Steel Beam & Timber Deck	1	Class I								
		2297	3343.001	HARDIMAN RD	Timber Beam & Deck	1	Class I								
		2306	3352.001	ROCHE RD	Timber Beam & Deck	1	Class I								

During the 2005/06 bridge inspections a number of significant heavy duty maintenance items have been identified. These are summarised in the table below which is still being developed.

Table F.H.5 Significant Heavy Duty Bridge Maintenance Items

Structure No.	Road Name	Waterway Name	Issue	Estimated Cost
3426.001	Weir Road	Mararoa River	Major earthworks required to support true left bank abutment	To be determined
3565.004	Kakapo Road	Whitestone River	Rock rip – rap protection required to prevent scour of upstream true right bank abutment and embankment	To be determined

Drainage Culverts

Because of the lack of information on the existing number of drainage assets not classified as bridges, preparing a forward work program is not possible. Replacement and upgrading of drainage culverts should be carried out as required and the current level of expenditure through maintenance contracts should be continued to ensure the asset remains in adequate condition. The process of gathering information on the drainage culverts should continue to enable better programming in the future.

3. Issues

Inventory

The RAMM bridges module has been developed to suit the requirements of a number of users with different requirements. Due to this there is a wide array of information that can be stored in the database. Historic data collection in the district has not collected some of the information that can be entered into the database. The Council must continue to assess what information there is value in recording in the bridge database and to continue to collect this data where applicable.

One area that would benefit from collecting data or determining where possible is the bridge design loading. At present the design loading of approximately 40% of the network is unknown. In some instances this information could be found by searching historic drawings. Having this information would enable overweight vehicle travel checks to be carried out with a greater degree of certainty. The focus for this exercise needs to be directed towards roads which are commonly used by overweight vehicles.

Knowing the design loading would also allow for the calculation of a conservative bridge class and deck capacity factor for each of the bridges. Having this information simplifies the overweight vehicle travel checking procedure as it can be compared directly against the vehicle axle index (VAI) and vehicle gross index (VGI) for a particular load.

The inventory of the drainage culverts should continue to be updated and verified so that a full inventory is available. The information that is collected by the maintenance contractor must be accurate and of a suitable format for easily uploading into RAMM to streamline the process.

Bridge Width

There is increasing pressure on the width of bridges due to increases in the size of farm machinery and other agricultural equipment. Tractors running dual tyres are often in excess of the 4.0m design width for a single lane bridge which results in damage to the barrier and kerbs on a bridge. The Council must balance the demand for increased width between kerbs from wide vehicles with the need to maintain appropriate widths for safety. If the width is increased too much, there may be confusion from passenger vehicles as to whether the bridge is single lane or two lane, possibly resulting in accidents.

The NZTA Bridge Manual recommends a lane width of 3.5m minimum and a clearance to the road edge or barrier of 600mm preferred and 300mm absolute minimum for low volume roads (< 500 vpd). This gives a minimum width of 4.1m and a preferred width of 4.7m for low volume roads.

The safety of road users provided by bridge widths must be balanced against the additional cost of construction of the bridge. A number of short bridges are replaced with concrete box culverts with standard unit widths of 1.5m or 2.25m. Multiples of these sizes provide adequate width where the stream is perpendicular to the road but where it is at a skewed angle, additional units are required, increasing cost.

A vehicle is classified as oversize or overwidth if the width of the wheel track exceeds 2.5m. Farm or agricultural contracting vehicles cannot be guaranteed to be under this limit when travelling short distances on rural roads. A quick survey of tractor sales outlets in Invercargill indicates dual tyred tractors can be as large as 4.6m in overall width but average around 4.0m.

Through the development of this Plan it has been decided that a minimum of 4.2m is appropriate for the District.

Side Protection

The degree of side protection at bridge sites needs to be reviewed at the time of replacement of the bridge to determine the most suitable form of side protection. Safety improvements should be carried out where particular bridge sites are identified as requiring upgrades to the side protection.

Capacity

Posted bridges on roads carrying regular heavy vehicle movements should be upgraded where suitable. This will depend on the degree of deterioration of the foundations and other members. Where the foundations are in fair or good condition but the beams and deck are in poor condition, an upgrade is a suitable option. Where the entire structure is in poor condition and the capacity is limited by the capacity of the foundations a replacement is a more suitable option.

Posted bridges on roads with low traffic volume and where there is no demand to carry out an upgrade or replacement should be maintained at a safe level until it becomes uneconomic to do so, at which point they should be replaced.

Bridges on legal road reserve but unmaintained road should continue to be posted at a low load limit to restrict their use and to limit the Councils liability by reducing the risk of a collapse and injury.

Rate of Replacement

Bridges which are in poor condition and are not suitable for upgrading should be replaced with new concrete structures. Replacements in concrete have a higher expected life than steel or timber structures and are more economic over the long term when maintenance costs are considered.

The rate of replacement of structures should be kept at a reasonably constant level to prevent a high demand for replacements in any one year, potentially leading to financial strain. This is especially important over the next 10 – 15 years with a number of timber bridges and armco pipes coming towards the end of their expected/economic lives.

Off-Road Bridges

The Council is continuing to identify and transfer ownership of a number of off-road bridges. These structures are on legal road reserve but non-maintained sections of road and are generally in poor condition. The Council is aiming to remove these structures from the network to reduce its liability in the event of a structural collapse.

Until they are removed from the network these bridges should continue to be posted at a low load limit to restrict their use and to limit the Council's liability by reducing the risk of a collapse and injury.

Underpasses

The Council is continuing to promote the installation of stock underpasses where there is a conflict between road users and stock crossing the road. Sites with higher traffic volumes and a greater number of crossings by stock during the season are given the highest priority. The cost of the installation of the underpass is paid by the farmer, with some subsidy available from the Council. Ongoing management and routine maintenance of the underpass is undertaken by the Council to ensure a suitable condition is maintained.

There are a handful of underpasses that have been installed throughout the district which are no longer required due to the sale of land on either side of the road as separate blocks. Ownership of the underpass is maintained by one of these blocks. Where the underpass is not in regular use, there is a greater reliance on the Council to perform the management and maintenance function.

Design Loading

The Ministry of Transport has been examining options for allowing increases in the axle weights of heavy vehicles. One option is to allow a large increase in the size of vehicles but restrict them to a specific network of roads, mainly state highways. This proposal would have little effect on the local authority's roading networks. The other option is to allow all heavy vehicles to make a smaller increase to axle weights. This option would have a significant effect on the local authority's networks.

Heavier axle weights would exceed the capacity of some of the marginal structures in the network at present and these would have to be replaced earlier than anticipated. The increased weight would also speed up the degradation of a number of the bridges resulting in higher maintenance costs and shortening the life of the asset.

The Ministry of Transport is currently conducting a trial allowing 50 tonne vehicles to travel on specific routes. This trial is being carried out by allowing specific vehicles with known axle weights and spacings to travel on pre-approved routes. This is similar to the approval process for an overweight vehicle. The routes used in the trial are predominantly state highways but also include some Southland District Council roads in the Te Anau area.

The vehicles used for the trial are the same length as current Class I vehicles but are being allowed to exceed the Class I axle limits.

The routes allowed in the trial have a minor impact on the bridge network as there are only minor culverts on the route. There may be an impact on the pavements. To limit this, approval for travel on Southland District Council roads as a part of the trial, was conditional on maximum travel speeds of 30 km per hour.

Following completion of the trial, modifications to the rules for heavy vehicles may be made to allow any vehicle up to 50 tonne to travel on approved routes. This would require a detailed level of study to determine which roads within the Southland District would be capable of carrying 50 tonne loads.

It is likely that some structures built earlier than 1972 or to Class I design loading would not be capable of carrying the 50 tonne vehicles. However, this is dependant on a number of factors and each bridge would need to be considered separately.

Attachment 'I'

Drainage Needs

1. Introduction

Drainage renewal work is work that replaces sections of kerb and channel and replaces or upgrades culverts.

Every two years, as part of RAMM condition rating, a condition assessment is carried out on the kerb and channel. The maintenance contractors check the culvert conditions annually. As a result of these inspections those drainage facilities that need it are replaced. There is no formal programme for this as it happens on an "as required" basis.

Replacement works are also undertaken in association with road reconstruction and maintenance projects (pavement rehabilitation, seal widening, reseals, safety projects and redevelopments) where this is deemed appropriate from a whole of life or capacity point of view.

Due to the lack of formal information currently available to base a long term planned drainage renewal programme on, an annual allowance of $150,000 is made for major drainage renewals. Any cost over this is absorbed into the maintenance budget.

As much of this work involves extending existing pipes or replacing existing pipes with larger pipes to increase capacity, this $150,000 needs to be apportioned between renewals and new capital. Given the limited knowledge available on the network, a 50/50 split is seen as reasonable. This gives $75,000pa in each of renewals and new capital.

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Attachment 'J'

Footpaths' Needs

1. Introduction

Renewals include the replacement of damaged sections of footpath when replacement is more economic than repair.

Areas in need of renewal are those that do not meet the standard for the level of service expected by footpath sers or SDC, or are not to the same standard as similar parts of the network. At this time, identification of maintenance needs are brought about by staff in the course of their duties, public complaints and feedback from maintenance contractors during their inspections.

New subdivisions have been constructed to meet the Council Subdivision Standards. These standards are also used for new construction when upgrades take place.

2. Capacity

The Council Subdivision Standards are used as a basis for Capacity requirements. These are based on the number of houses being serviced. A significant number of streets within existing townships will not comply with the subdivision standards. There has been no attempt made to increase the existing network across the District in recent years. The predominant issue is the quality of the existing footpaths rather than the physical capacity of the footpaths. There is currently an exercise being carried out to check non-compliance of the existing footpath network against the design criteria of the subdivision standards. This will take some time to complete.

Preliminary results of the review of the network in each township (based on a desktop study using the subdivision standards) have produced the required lengths and areas shown in Table F.J.2. Details of these are yet to be provided to all Community Boards or Community Development Areas for their consideration. It is highly likely that these figures, which are generally conservative, will be substantially reduced after this consideration of affordability and the required level of service to be provided by the footpath has been fully carried out.

3. Replacements

Individual township plans are required to locate all footpaths, access their condition and remaining life. This project should be completed over the next three years.

To date the footpath conditions have not been formally accessed in sufficient detail to produce a detailed programme of replacements. (Maintenance inspections are carried out to identify short term issues and repairs). The full network rating needs to be carried out to determine if the initial dates for renewals shown in Table F.J. 2 are appropriate or can be spread out. The figures in the table are based on replacing like with like (i.e. not upgrading gravel footpaths to paved footpaths), and assumed lives and construction dates in a number of cases.

4. Remaining Life

Due to the lack of condition ratings a forecast of remaining life cannot be made. Assumed lives have been used in Table F.J.2

F.J.1

Township	Renewals 2009/10	Improvements 2009/10	Annual Maintenance $	Footpath Length
Athol	$0	$0	$0	0
Balfour	$0	$37,000	$0	2,735
Browns	$0	$0	$0	552
Colac Bay	$0	$18,000	$0	1,541
Edendale	$10,000	$15,000	$1,000	8,777
Garston	$0	$0	$0	0
Gorge Road	$0	$0	$500	381
Lumsden	$0	$0	$0	3,361
Manapouri	$0	$250,000	$0	7,909
Mossburn	$0	$0	$0	3,614
Nightcaps	$0	$0	$0	4,552
Ohai	$4,000	$0	$0	5,663
Orepuki	$0	$0	$0	914
Otautau	$10,000	$0	$0	11,448
Riversdale	$0	$0	$0	2,908
Riverton	$40,000	$0	$0	20,648
Stewart Island	$0	$10,000	$0	1,281
Te Anau	$15,000	$70,000	$0	56,637
Thornbury	$0	$6,000	$0	833
Tokanui	$5,000	$0	$1,000	1,267
Tuatapere	$60,000	$0	$0	9,119
Waikaia	$0	$0	$0	468
Wallacetown	$0	$40,000	$0	1,521
Winton	$100,000	$0	$0	29,732
Woodlands	$0	$7,000	$1,000	1,006
Wyndham	$3,000	$0	$2,500	10,666

Note: Annual Maintenance figures to be confirmed.

Table F.J.2

	2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		Total Dollars	Total Area m2	Total Length m	Potential New Footpath in:			
Townships	$	Area	$	Area	$	Area	$	Area	$	Area	$	Area	$	Area	$	Area	$	Area	$	Area	$	Area	$	Area				Length (m)	Area (m2)	AC ($)	Concrete ($)
ATHOL																									0	0	0	1700	2380	153,000	222,000
BALFOUR																							58369	615	58369	615	364	200	280	18,000	26,000
BROWNS			18974	291																					18974	291	135	40	56	4,000	6,000
COLAC BAY			96546	1479																			37098	568	133644	2047	1141	800	1120	70,000	102,000
CURIO BAY																									0	0	0	600	840	55,000	79,000
DIPTON			70923	1124																					70923	1124	586	600	840	51,000	74,000
DRUMMOND																									0	0	0	2000	2800	187,000	272,000
EDENDALE			3395	52									32084	491					2458	191			75992	1164	113929	1898	969	700	980	66,000	96,000
FORTROSE																									0	0	0	1200	1680	108,000	158,000
GARSTON																									0	0	0	400	560	56,000	82,000
GORGE ROAD			17851	513																					17851	513	306	700	980	65,000	95,000
LIME HILLS																									0	0	0	2700	3780	245,000	357,000
LUMSDEN			39449	604																			8465	414	47914	1018	459	8400	11760	771,000	1,121,000
MAKAREWA WORKS*																									0	0	0				
MANAPOURI													10016	153											10016	153	110				
MONOWAI																									0	0	0	300	420	16,000	24,000
MOSSBURN																							307	24	307	24	16	900	1260	84,000	122,000
NIGHTCAPS							12211	949					3100	188					3330	51			398	6	19039	1195	582	1700	2380	159,000	231,000
OHAI			6996	147																	2377	36			9372	184	104	700	980	61,000	88,000
ORAWIA																									0	0	0	400	560	35,000	51,000
OREPUKI			58592	897																					58592	897	515	1200	1680	113,000	164,000
OTAUTAU			64131	225					28173	432			33462	513									51565	711	177331	1880	1007	3300	4620	302,000	439,000
RIVERSDALE													1415	110											1415	110	62	6300	8820	573,000	833,000
RIVERTON	1331	28	313358	8332																			68734	1285	383422	9645	6414	13300	18620	1,218,000	1,771,000
STEWART ISLAND			12218	257					1939	41															14157	298	184				
TE ANAU			194306	2976									122838	1881			13711	210							330856	5067	2963				
THORNBURY																									0	0	0	600	840	51,000	74,000
TOKANUI			59483	1730	47890	969																			107374	2699	1231	1100	1540	103,000	149,000
TUATAPERE	1934	41	75274	1153					25002	526			20110	308									8912	137	131232	2164	1206	1900	2660	173,000	252,000
WAIANIWA																									0	0	0	1200	1680	109,000	159,000
WAIKAIA			2281	48			11548	243																	13829	291	119	4200	5880	386,000	561,000
WAIKAWA																									0	0	0	900	1260	85,000	124,000
WAIMAHAKA																									0	0	0	600	840	56,000	82,000
WAIRIO																									0	0	0	1700	2380	159,000	232,000
WALLACETOWN													42759	655							3265	50			46024	705	366	6600	9240	604,000	878,000
WINTON	18770	1459	818213	20263	14957	1163	66556	3409	3342	260	30789	2350	121526	3738	13362	1039					7563	588	139229	3695	1234306	37965	17335	400	560	40,000	58,000
WOODLANDS			27495	1168																			13809	286	41304	1454	647	900	1260	84,000	122,000
WYNDHAM			268363	4184							87562	1341	99477	1524					12431	190			710	55	468544	7294	3360	3600	5040	262,000	407,000
Year Total Area		1528		45442		2132		4602		1258		3692		9562		1039		210		433		674		8960		79531	40182	71840	100576	6,522,000	9,511,000
Year Total Dollars	22034		2147848		62848		90316		58456		118351		486786		13362		13711		18219		13204		463588		3508724						

Notes relating to Table F.J.2:

- Replacement is like with like. No upgrades (i.e. gravel footpaths remain gravel).
- Some start dates are guessed dates but this is the best data available.
- Potential new footpaths are based on SDC policy and a desktop review.
- Potential new footpaths need to be prioritised by Community Boards once a detailed report is provided and fully considered. At the same time upgrades should be considered.
- Spikes in renewals have been caused by the current age of the footpath being greater than the total useful life assumed in the Valuation Report. When this happens we have assigned a minimum remaining useful life of 2 years.
- RAMM uses as an urban definition - any road with a speed restriction on it.
- The replacement dollars have come from the 07/08 Valuation.
- Rates used for calculating the replacement dollars have an allowance for fees.
- Total Useful Life is what was used in the 07/08 Valuation.
- Current due date has not been condition assessed. A full footpath condition rating should be carried out to better qualify renewal needs.

5. Footpath Funding

All footpath work, apart from work which can be classified as safety footpath work, is funded by the local community. The programming of the work and the level of funding (along with associated level of service) is set by the local Community Board or Community Development Area Committee.

6. Issues

- The lack of records relating to extent, location, condition and future maintenance renewal and new footpath requirements prevents good long terming planning for this asset. Over time this information can be gathered and full plans put in place. Maintenance expenditure comes from each township's Misc Roading Account. Maintenance is carried out on an as required basis to the level of funding available. Long term plans are not available or worked to. Community Boards and Community Development Area Committees make decisions about renewal and new capital works in their areas. These local people set the priorities for their township. The costs are budgeted from local rates and are included within each areas accounts.
- There is a high level of dissatisfaction with footpaths in some areas as shown in the results of the 2008 Customer Satisfaction Survey. A copy of the results of this are shown in Table X.5.2.
- Programmes / funding to be developed alongside or as a follow up to this Plan. This will involve providing reports to each Community Board and CDA on a potential programme of renewals and new/upgrading works and receiving their feedback to make progress on long term plans for footpaths.

Attachment 'K'

Traffic Services' Needs

People First
Southland District Council

1. Traffic Services Renewals Needs

Traffic services are provided to give drivers information to aid their decision making. This information can be split into two main categories.

1. Road location and direction indicators which give advanced warning of a change in direction of the road and/or guidance on where the limits of the road is in poor visibility conditions. These traffic services include roadmarkings (edgelines, centre lines, no passing lines and limit lines), RRPM's (raised reflectorised pavement markers or cats eyes), edge marker posts, bridge end markers and curve warning and other hazard signs along with intersection control signs.

2. Direction and destination signage needs to be as clear as possible within the constraints of the available budget to allow people to decide where they are going and indicate this to other road users without carrying out sudden manoeuvres which place themselves and others at risk.

Therefore all traffic services provide important delineation assistance which aids the safe use of the network. The expenditure on delineation provides significant pay back in terms of safety benefits.

The traffic services renewal / replacement process is an ongoing one, with two main avenues for identifying needs.

The first is through routine inspections and the Council's Service Request System. This identifies assets in need of renewal due to age, damage or any other reason making the asset unfit for purpose. Identification can come from a number of sources including NZ Police, member of the public, Council or contractor staff or safety audits.

The second is areas in need of renewal that do not meet the standards for the Level of Service expected by users or Council, do not meet the requirements of the Council's Delineation or Pavement Marking Standard, or are not to the same standard as similar parts of the network.

Assets that are identified via the first process are normally replaced on a monthly basis by the appropriate contractor and paid for through the Traffic Services budget. This would include signs, markings and RRPMs.

Assets that fall into the "in need of renewal" category because they do not meet specific standards or requirements normally require a change over the entire network. Where possible the renewal process is spread over a longer time period to reduce the financial burden on existing budgets.

Currently assets that require this network wide renewal are:

- Chevron curve indicator signs. Currently these are black and white signs with Class 1 reflectively. The Council's adopted Delineation and Pavement Marking Standard requires the use of the newer, longer, yellow and black permanent warning signs (PW66 or PW67) for curve delineation. There are 355 single curve indicators (RC2 and RC3) and 175 chevron curve warning signs (RC4 or RC5) currently installed that will be reviewed. It is anticipated that this will occur on a curve by curve basis as the existing signs fail to provide an acceptable Level of Service, due to age, damage, etc. The estimated asset is reasonably new and it will be some time before this renewal process has a significant financial impact.

2. Traffic Services – New Capital Requirements

The following are New Capital but are presented here for completeness. The financial aspects are covered in Appendix H.

3. Delineation Standards

The SDC Delineation and Marking Standard requires all intersections to be controlled. There are approximately 2,100 intersections involving two or more SDC controlled roads with approximately 1,125 of these having a formal control. Approximately 970 remain uncontrolled. It should be noted that at the uncontrolled intersections some are not in fact intersections but rather where roads change names.

The estimated cost for installation of control signs at these intersections is $200,000 at 07/08 contract rates.

There are other associated costs involved that have not been included. This includes intersection review to establish the type of control required, the priority route and the road to be controlled. Some intersections will require physical works to allow a priority route and controlled road to be established safely.

4. Emergency Services

The main purpose of the RAPID property numbering system is for property location by Emergency Services during an emergency response. RAPID numbers have now become the street addresses along the roads for rural properties.

An upgrade to the system has been proposed that would see RAPID number ranges shown on Road Name Blades (RNB) at intersections.

Various sign options are available and costs could vary from $440,000 to $835,000 (2005 rates) depending on the option deemed most appropriate. (Options and pricing can be found in letter/report to SDC dated 13 June 2005).

These options for the inclusion of RAPID numbers on the road name signs have not been considered at present in the development and funding projections for this Plan.

5. Sign Reflectivity

Signs are generally made with Class II (EG) reflective material except those that must be Class I (HI) to comply with the Land Transport Rule, Traffic Control Devices 2004.

Class II material is a 1950's technology that may not be available commercially in the future.

A forced change to Class I reflective material could add 10-30% to the cost of signs currently made with Class II material. This would equate to a 10-20% increase to the annual signs maintenance budget. At this stage no allowance has been made for this as it is not expected to impact in the near future. This should continue to be reviewed in future plans. The potential unavailability of engineering grade material in the future may be a “beat up” by the manufacturer to encourage road controlling authorities to switch to the higher cost, higher reflective materials which are not needed in many cases.

During September 2008 a NZTA Road Infrastructure Safety Assessment (RISA) was carried out of a sample of the Southland District Council rural sealed network. This highlighted scope to improve the reflectivity of edge marker posts (which are being progressively replaced through the maintenance contracts and as roads are being rehabilitated) and provide chevron signs on sever curves to add to the benefits of the curve warning signs. Any upgrades as part of these recommendations will be funded from the traffic services budgets allowed in this Plan.

Since the RISA was carried out a Technical Audit by NZTA has also been carried out. This did not highlight the same issues as the RISA and in fact disagreed with some of the RISA findings. The final report of the Technical Audit is still to be provided. Once this is received decisions on how far to take the above will be made.

Attachment 'L'

Streetlights' Needs

1. Introduction

Streetlights exist in most towns, particularly on intersections. Their locations have come about based on historic local decisions. The reasons for installing streetlights in towns is more likely to be a pedestrian safety or personal security issue than a vehicle safety issue. Streetlights installed at rural intersections (flag lighting) are installed for vehicular traffic safety.

In many situations the Councils light fittings are mounted on PowerNet poles. In the other situations they are mounted on the Council's dedicated streetlight columns.

2. Capacity

Very few historic streetlights were designed to any illumination design criteria or standard. Subsequent renewal of outdated fittings was motivated by increasing maintenance costs and the desire for reduced energy costs. New fittings replaced old ones in the same location.

Community Boards and Community Development Area Committees set their own local priorities for lighting changes and improvements. Because of this the Council operates from the premise that the current fittings are fit for the purpose.

3. Condition

A total update and renewal programme of all outdated light fittings was carried out in the late 1990's. All fittings are now High Pressure Sodium.

The lights are maintained under a network wide contract. The contractor is NES (Network Electrical Servicing). The contractor is required to respond to all outages and to routinely check and clean every fitting. This objective is to ensure deteriorating equipment is replaced on a just-in-time basis. No specific snap-shot-in-time condition rating exercise has been carried out as part of the development of this Plan. This is thought to be unnecessary because of the newish age of the lights and because of the maintenance regime.

4. Remaining Life

The remaining life of the streetlights is influenced by a number of factors including:

1. Condition of basic fitting – affected mainly by corrosion or accident and/or vandal damage.
2. Condition of electronic components – renewal as needed under maintenance contract.
3. Condition of the lamp – renewal as needed under maintenance contract.
4. Latest technology developments – future technology could make complete replacement of fittings economically viable. Current state of the art technology does not warrant making changes.

5. New Streetlights

Streetlights in new subdivisions must be in accordance with SDC Subdivision Standards. All proposed street lighting plans are subject to approval by the network provider and SDC. SDC take over the responsibility for the operation and maintenance of the streetlights once the development is complete.

The capital cost of installing new lighting is classified as a traffic services renewal under NZTA's funding categories.

Attachment 'M'

Miscellaneous Projects

Minor Improvement Project

Associated Improvement Projects

Active Transport Projects

1. Introduction

This Plan allows for and includes a number of projects throughout the District which fall outside the renewals and new capital work mentioned in other parts of Appendices F and H.

This work includes upgrading of the roading network and preventative maintenance work on Stewart Island along with Minor Improvement and Associated Improvement Projects throughout Southland.

This section also covers active transport.

2. Stewart Island Improvement Projects

The roading network on Stewart Island is coming under increasing pressure due to the increasing tourist demands associated with the National Park. The Stewart Island Roading Strategy has identified a large number of projects which are required to cope with this. These include reconstruction of roads (allowed for under Pavement Rehabilitation), widening of roads and development of footpaths (to get pedestrians off the roads), dealing with slip areas, building Ridge Road as an alternative to the coastal sections under the threat from slips and the sea.

Some of this work is allowed for as separate line items in the financial tables while other work is incorporated into the Minor Improvement Projects and Pavement Rehabilitation budgets.

In late 2006 a contract was let to reseal all of Stewart Island as well as carry out a significant amount of pavement repairs and catch up work. This included drainage improvements, small areas of pavement rehabilitation, extending seal up side roads to reduce gravel migration, shoulder reconstruction and gravelling of unsealed roads. Due to a slow start by the contractor and slip and foreshore storm damage, the work was not completed until February 2009. The roads on the Island are now substantially improved.

Due to consenting and other hold ups the slip repairs and foreshore protection will not be completed until later in 2009. The funding for the foreshore protection should be utilised out of the current budget for this work but the slip repair work will need to be funded in 2009/10. The cost of this is estimated at $1.5M, depending on the detail of the remedial work which is currently being worked on.

The only other improvements that may possibly be funded are likely to be through the active transport allocation which would be used to encourage pedestrians off the Stewart Island Roads where they are in danger of being run down.

The building of Ridge Road should similarly be considered a very long term “nice to have” for the time that it becomes uneconomic to continue to maintain/retain portions of the coastal road. While the physical works side of this has been left out of the 10 year time horizon of this Plan, it would be prudent to continue the exercise of obtaining land designations for the future road as when it does become a necessity it would be best to avoid the long delays involved in consultation, negotiation, designation, consents, etc.

3. Preventative Maintenance Work

This work mainly involves the upgrading and reconstruction of damaged and suspect sections of the sea walls on Stewart Island to protect the road around the coastline which provides the only access to a number of properties. The bulk of this work is budgeted to occur in the 2008/09 year.

4. Minor Improvement Projects

These projects involve a wide variety of improvements across the full roading network designed to generally improve the network and to reduce crash risks through a range of projects which are limited in cost to no more than $150,000. (To increase to $250,000 from 2009/2010).

Examples of these types of projects included are:

- Curve realignments and intersection improvements.
- Minor geometric (including shape) improvements.
- Guard railing of hazards (drop offs, bridge ends, etc).
- Widening of sealed and gravel roads.
- Sealing approaches to single lane bridges and steep gravel road sections to keep heavy traffic on the correct side of the road (also reduces maintenance costs).
- Improved signage and delineation.

Council in partnership with the Government is targeting a reduction in road trauma (injuries and fatalities). The expenditure on this variety of minor improvements is one mechanism for making incremental improvements to make the roading network safer.

The cost of these projects has been apportioned between Renewals (40%) and New Capital (60%) as shown in Tables F.1.a and H.1.a.

A deficiency database is being developed to store areas on the network which could be improved, which can be used to rank projects to see which give the best likely safety return for the money spent.

5. Associated Improvements

These are improvements carried out at the same time as pavement rehabilitations and include widening of seal, drainage improvements and signage improvements. They are carried out as the pavement rehabilitations offer an opportunity to make a number of improvements economically compared to carrying out the improvement work as standalone projects.

6. Active Transport

Active and Shared Transport Modes

The definition of an active transport mode is when transportation is powered by humans and includes cycling, walking, using a wheelchair, in-line skating and skateboarding. While a shared mode is defined as a vehicle that contains more than one person. Measures that encourage mode sharing include public transport, ridesharing and car pooling schemes.

Increasing the use of public transport, cycling, walking, and other shared and active modes is important in reducing congestion, fossil fuel consumption and greenhouse gas emissions from transport. Active modes will also contribute to improving public health and the vibrancy of urban areas. Increasing the availability and accessibility of shared and active modes will help improve people's ability to participate in society.

Nationally, walking and cycling trips are decreasing while the numbers of trips made by passenger transport are static. These trends are applicable to Southland District.

The 2008 Government Policy Statement (GPS) and New Zealand Transport Strategy (NZTS) promote active transport modes. The NZTS targets for 2040 that specifically relate to active transport modes include:

Ensuring Environmental Sustainability

- Halve per capita greenhouse gas emissions from domestic transport by 2040.
- Reduce the kilometres travelled by single occupancy vehicles, in major urban areas on weekdays, by ten percent per capita by 2015 compared to 2007.

Assisting Safety and Personal Security

- Reduce road deaths to no more than 200 per annum by 2040.
- Reduce serious injuries on roads to no more than 1,500 per annum by 2040.

Improving Access and Mobility

- Increase walking, cycling and other active modes to 30 percent of total trips in urban areas by 2040.
- Increase use of public transport to seven percent of all trips by 2040 (i.e. from 111 million boardings in 2006/7 to more than 525 million boardings in 2040).

Protecting and Promoting Public Health

- Reduce the number of people exposed to health endangering noise levels from transport.
- Reduce the number of people exposed to health endangering concentrations of air pollution in locations where the impact of transport emissions is significant.

In comparison, the 2008 GPS has adopted a lower short-term target (one percent growth per year) than that implied by the long-term target in the NZTS (two to three percent growth per year) to increase the mode share of walking and cycling, because currently rates of walking and cycling are declining. The immediate task is therefore to stabilise walking and cycling rates, and then to focus on growth.

The 2008 GPS has set the following targets for public transport and walking and cycling:

- Increase patronage on public transport by three percent per year through to 2015.
- Increase the number of walking and cycling trips by one percent per year through to 2015.

To meet the above targets for increasing patronage on public transport in the Southland District to encourage people to change to using public transport, it is recommended that the Council:

- Develop a public transport strategy that identifies the public transport services and infrastructure that will be required in the future.

- To take an integrated approach to traffic management to improve the reliability of public transport services and co-ordinate any measures with other council policies, such as parking policies.
- To encourage the growth of homes and businesses around public transport systems
- To encourage local community developments that make public transport, walking and cycling safe, easy and attractive transport options.

To meet the above targets for increasing walking and cycling trips in the Southland District to encourage people to change to these active modes of travel, it is recommended that the Council:

- Develop walking and cycling strategies to identify the walking and cycling infrastructure that is required in the future.
- Make integrated planning a central part of achieving good transport outcomes.
- Make walking and cycling safe, easy and attractive travel choices.

Taking into account the predominantly rural character of the District, the demand for public transport, walking and cycling infrastructure will be mainly concentrated within the towns. However the exceptions will include:

- Provision for recreational cyclists training on identified rural routes.
- Where public transport currently links the towns with Invercargill or will do so in the future based on predicted demand.
- The Total Mobility Scheme that the Council contributes to already which ensures that transportation is available for all members of the Southland community, including those with limited mobility.

Budgets associated with these recommendations are included in Appendix E and H. These allow for the initial development of strategies in the first two years followed by expenditure on facilities and services.

In March 2009 the new Government released a new draft GPS which appears to have a reduced emphasis on active and shared transport. This is only draft at this stage so the limited budgets allowed in this Plan for these transport modes have been retained.