Review of Bitumen Sealing Practices and Pothole Filling Works

Byron Shire Council

August 2017

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Introduction

Morrison Low has been engaged to undertake a review of Byron Shire Council's bitumen sealing practices and pothole filling works and related operations for:

- primer and final seals on new gravel pavements associated with road renewal projects
- primer seals and AC wearing surfaces on new gravel pavements associated with road renewal projects
- reseal works on existing sealed road pavements for both bitumen sealing and AC re-sheets
- filling and repair of potholes in sealed road pavements.

Preamble

In Roman times it was known that the exclusion of water from the road subgrade was necessary for a sound, long lasting road. The romans achieved this by placing a thick layer (up to two metres) of large stone through which water could drain, topped with cobbles or pitching stones.

Today the seal, whether it is a spray seal, asphaltic concrete or polymer seal, is applied for the following reasons:

- To exclude water from the base and subgrade in order to maintain the structural integrity of the road
- To provide a wearing surface so that the gravel base doesn't ravel
- To provide increased skid resistance
- To suppress dust
- To provide a higher comfort level to road users

Preamble

Road seals have a finite life and require maintenance and renewal to maintain an adequate level of service expected by the community.

Typically a spray seal has a life expectancy of between 10 and 15 years. Assuming that the original construction has been adequate, the typical mechanism for seal deterioration is oxidation. Oxidation results in the seal becoming brittle leading to cracking and potholing which in turn allows water into the pavement and ultimately failure of the pavement.

This process can be avoided through a resealing program that intervenes prior to the breakdown of the seal.

Typically a reseal is less than 10% of the cost of reconstruction and will result in lower maintenance costs and a continuation of the required level of service.

It is the responsibility of local government to provide required services on a best value outcome basis for its community.

Background

The purposes of this review is to consider:

- if current practices demonstrate value for money for the community
- if Council practices are up to date with changes in technical specifications, new technology and industry practices
- the application of new and alternative surfacing treatments
- feedback from the community that they are unhappy with the condition of Council's road network and want it improved
- the provision of increased funding in 2015/16 and 2016/17 for a road reseal program and asset renewal of sealed road pavements in poor condition
- a proposed special rate variation (SRV) for additional income from revenue generated by rates for increased asset renewal works; primarily for roads and bridges and also targeting a larger road reseal program
- observations / perceptions that pothole filling works do not last long enough, need to be redone and that new potholes appear next to recently filled holes

Background

- the increased level of requests for information and interaction from the community on the increased level of road works and reseal works and the proposed SRV
- the increased scrutiny of the roadworks by management, councillors and the community with respect to any perceived blemishes or defects that appear to not represent value for money, good quality workmanship by Council staff and subcontractors and use of up-to-date practices
- the stripping of small areas of primer seals on road asset renewal projects and the perceptions that the works have not been done properly or are of poor quality
- procurement of the road maintenance and renewal contracts to ensure they are providing best value for the organisation
- ways to implement any actions from the review in the tender documents for these services for the new periodic contracts effective from 1 July 2017

Workshop

- Morrison Low facilitated a workshop on the 11 April 2017 with Infrastructure Services operational and engineering staff along with the current asphalt patching subcontractor supervisor to better understand the current pothole filling and sealing practices of the organisation
- The workshop was conducted as a continuous improvement exercise, having two functions:
    1. To identify issues from the perspective of the staff undertaking the work, potentially relating to adequacy of design, suitability of materials, suitability of equipment, staff technical knowledge, work practices, transfer of information before and during the job, job supervision and monitoring, etc.
    2. To identify solutions and other opportunities for recognised issues by the staff that will be required to change their practices to assist in improving asset performance

Site Visit

A site visit was conducted on 20 April 2017 with key engineering field staff. Sites inspected included:

- Broken Head Road – recently reconstructed sections and a segment identified for heavy patching and reseal
- Myocum Road – various sections reconstructed and resealed over the past 5 years (approximately)
- The Pocket Road, Main Arm – Jetmaster patching crew onsite undertaking edge repair
- Ocean Shores – Subcontractor asphalt crew undertaking pothole patching work
- Federal Drive – existing construction site
- Bangalow Road – various segments reconstructed / rehabilitated during the past five years (approximately)
- Various relevant sites featuring previous reseals and patching works.

Current Practices and Situation

Bituminous surfacing

- Bituminous surfacing provides a wearing surface for traffic and waterproof membrane to ensure that moisture does not enter the pavement and the pavement structure maintains its overall strength
- Council currently utilises the Northern Rivers Local Government (NRLG) NSW Development Construction Specification C244 – Sprayed Bituminous Surfacing for cutback bitumen applications and RMS R107 for Polymer Modified Bitumen (PMB) applications
- Historically, renewal and maintenance programs have not received adequate funding in annual budgets, and parts of the network are now in decline

Current Practices and Situation

- Reseal program budget decreased in 2016 however increased in 2017

Year	Local	Regional	Total
2008/09	$ 403,740.64	$158,426.70	$ 562,167.34
2009/10	$ 319,453.08	$130,045.45	$ 449,498.53
2010/11	$ 323,986.02	$183,569.00	$ 507,555.02
2011/12	$ 268,528.73	$200,727.71	$ 469,256.44
2012/13	$ 338,283.50	$ 81,342.67	$ 419,626.17
2013/14	$ 504,100.00	$ 57,388.03	$ 561,488.03
2014/15	$ 354,342.83		$ 354,342.83
2015/16	$1,558,900.00	$ 39,177.76	$1,598,077.76
2016/17	$ 837,500.83		$ 837,500.83
2017/18	$1,321,000.00		$1,321,000.00

Current Practices and Situation

- Revenue from the proposed SRV is anticipated for capital road renewal projects in year one and heavy patching in year two and increased reseal projects and maintenance works
- Council's seal design is undertaken by the contractor based on nominated conforming materials. There is no formal design form (similar to RMS 395A and 395K) required under the specification and AUSTROADS design procedure for sprayed seals, however the contractor utilises RMS design criteria for Council works
- The contractor modifies the design application rates based on actual materials to be used on site prior to sealing activities
- The contractor submits daily spray sheets as required by the specification detailing actual applications for cross referencing invoicing and payment calculations
- There was no documentation available demonstrating that the contractor routinely submits conforming inspection and test plans and field checklists or records of inspection

Current Practices and Situation

- In the case of newly constructed works, no ball penetrometer tests are undertaken by the contractor prior to commencing works, and therefore there is no assurance that the aggregate size is the most appropriate for the works
- Some concerns relating to isolated failures on a recently primersealed pavement (Myocum Road) were raised during the workshop, however on inspection these appeared to have been possibly caused by turning traffic into urban specification type driveway crossovers
- A primerseal is a one stage process and was developed as an alternative to a prime and seal (two stage process) when it was not practical to prime, such as in cool and /or damp weather conditions or where there is the need to construct roads under traffic where vehicle volumes may damage a prime

Current Practices and Situation

- However, primerseals can often be expected to perform under final seal conditions where traffic movements are heavy, and are sometimes placed in cold and damp conditions and when pavement hardness and dryback are not at optimal levels. As such, regular monitoring of their performance is necessary
- NRLG Construction Specification C244 and NRLG CQC1 Quality Control Requirements do not specify hold, witness or inspection points pertaining to spray sealing activities
- There is no internal checklist of submitted documents requirements to assist Council contract supervision staff in verification and administration of specifications

Current Practices and Situation

Reseal Preparation

- Currently there is no forward program for preparing the following year's scheduled reseal road segments. Programming of resealing works is undertaken separately from the capital works / infrastructure program
- Preparation normally includes:
  - repair of edge breaks
  - repair of pavement failures / heavy patching
  - shape correction
  - crack filling
  - corrective treatment of seal surface
  - maintenance of shoulders and table drains
- Preparation is currently undertaken in the same financial year
- Preparation involving cutback bitumen should be undertaken a minimum of six months prior to resealing (for works involving fluxed bitumen minimum twelve months prior)

Current Practices and Situation

Pothole Filling Works - General

- Current pothole filling activities serve only to hold a certain failure for the short term; there is insufficient budget to program effective repair works. This may be appropriate practice for roads which are beyond routine maintenance i.e. roads that are not suitable to reseal because of their condition
- Current work crews attending to pothole filling activities are
  1. Jetmaster patching crew – attending to rural roads
  2. Asphalt (AC) crew (Subcontractor) – attending to urban areas (two days per week) and regional roads (one day per week)
- Pothole filling works are scheduled on priorities generated by Reflect software. Reflect is used to assess road defects and customer requests against criteria such as size, location etc. and assign response priorities in accordance with our Infrastructure Services Risk Management Procedure. Schedules are then manually developed to ensure efficient use of resources in surrounding areas

Current Practices and Situation

- The number of customer action requests for potholes has been steadily decreasing since 2014, this may be attributed to the increased information provided on council's website, the increased accomplishments undertaken, and the level of information being provided to the customers i.e. the response times.

Current Practices and Situation

Pothole Filling Works – Jetmaster team

- The Jetmaster team is resourced with Council internal operators and plant. The traffic control is generally undertaken by subcontractors, depending on budget availability (where Council resources may be diverted to assume the role)
- The Jetmaster team work road by road, full length at a face, patching all defects present at the time and appropriate to equipment and materials available
- The work is predominantly confined to rural roads
- The Jetmaster team work six days a week across the Byron LGA area (four - five days on area based roads; then one to two days on high priority defects)
- Types of defects that are attended to include potholes, edge repair and seal repairs
- Limitations on the output of the Jetmaster team are governed by the capacity of the truck (materials carriage) and distance to site

Current Practices and Situation

- Two operators are trained to operate the specialised jet patching equipment. There is a workforce plan in place for transfer of skills when required
- Council's plant operator has extensive local experience and ongoing trialling of aggregate for jet patching has been successful in determining a final product which provides a better than short term solution for road patching
- Jet patching is a cost efficient and environmentally friendly pot hole filling process
- The jet patching method of pothole filling provides very rapid response repair to a sealed road surface with very little labour involved
- Jet patching is a safe method of repair. Not only does it require less manual handling, but speedy installation can reduce traffic control requirements, congestion and delays. Operators are not exposed to traffic for extended periods and motorists are less frustrated by what appears to be continual traffic delays

Current Practices and Situation

- Due to the number, location and limited time, the jet patcher can only perform part of the overall operation to patch the network's potholes; instant patch repair materials (premix bucket or bags) are used for urgent repairs that have to be carried out quickly, often in difficult locations, asphalt patching should be used in high stress areas
- Disadvantages of the jet patching operation can be the fine overspray of emulsion bitumen and loose aggregate that can be left behind after the emulsion has 'broken'. When required, Council could utilise a mechanical street sweeper following the repair setting up
- The cost efficiency of the jet patcher for pothole filling in busy urban areas diminishes with additional traffic control required and the requirement to follow the operation with a mechanical street sweeper

Current Practices and Situation

Pothole Filling Works – Asphalt Patching Team

- The asphalt patching team work on a rotational basis across all townships and work is identified through the Reflect software, and prioritised and scheduled by Council's Team Leader for Bridges, Concrete and Signs
- The subcontractor asphalt team comprises of three labourers/operators, flocon truck and traffic controllers
- The contractor is paid at an hourly rate and supplies asphalt at a rate per tonne per the current contract terms. The hourly rate applies to travel to all areas within the LGA
- The asphalt is supplied through the contractor and is sourced from Northern Rivers Quarry and Asphalt (Lismore City Council - Blakebrook)
- The subcontractor advised that the quantity of asphalt supplied on a daily basis is dependent on the quarry itself, and that if they have large productions scheduled for that day then it is sometimes not possible to supply the maximum flocon truck capacity of 5 tonne

Current Practices and Situation

- Currently the asphalt pothole patching works as a ‘throw and go’ exercise, reaching as wide an area as generally one load (up to 5 tonne) of asphalt will extend in a defined area. It is acknowledged that this is patching not repair work and the objective of the exercise is not intended as a long term solution
- Existing failed pavement is not profiled or removed, or edges cut square to provide a clean edge
- Compaction of the asphalt is generally by a vibrating plate (or in some instances, a hand roller)
- As the pothole defects are often within an area of pavement failure, the subcontractor fills the pothole and thinly spreads the asphalt around the surrounding area in an attempt to seal any adjoining or adjacent cracks or seal failures in the immediate vicinity

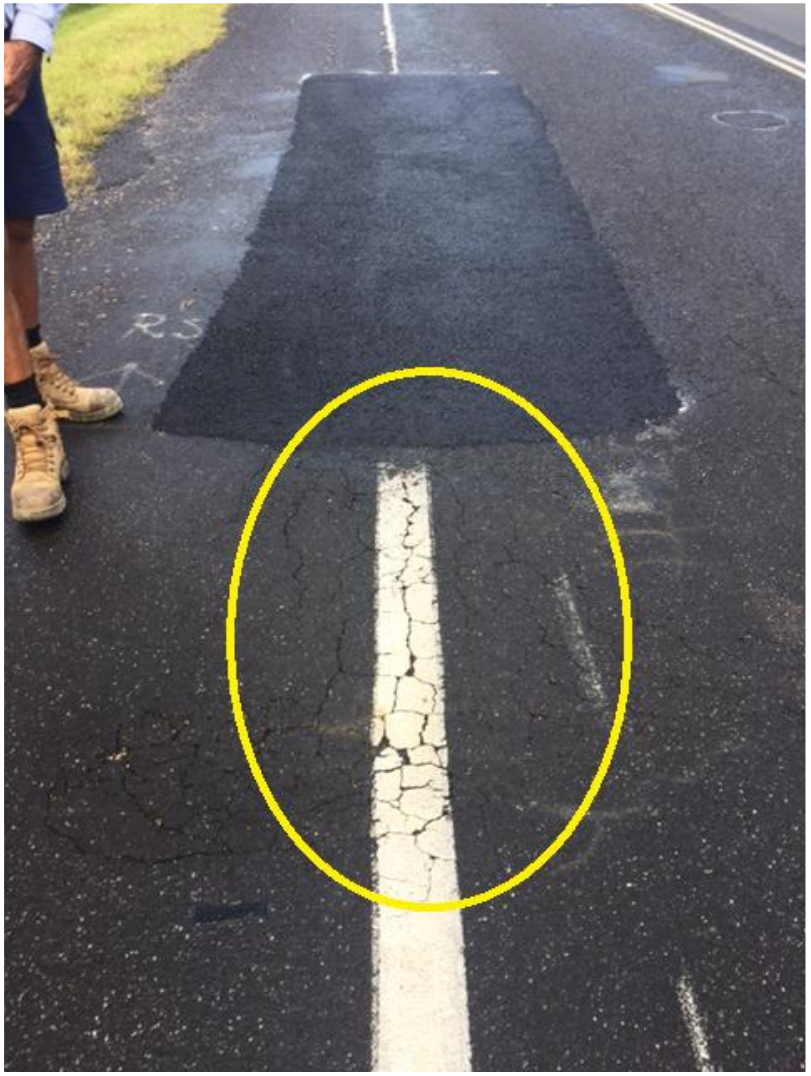
Current Practices and Situation

- Inevitably, in attempting to waterproof the surrounding area, damage occurs to the existing sealed surface during compaction as a result of the structural integrity of the pavement and / or seal
- Where asphalt patching is being used to hold areas of regional roads (i.e. Broken Head Road) the practice is reasonably effective in holding the surface, pending heavy patching and resealing
- The subcontractor is placing and compacting the asphalt whilst leaving the final patch slightly raised to achieve greater thickness over the pavement depression

Site Observations

Broken Head Road - Site Observation

- *The condition of the pavement and seal is such that the subcontractor will be required to return to site to patch the adjoining area of pavement within a short timeframe*
- *Heavy patching or renewal / rehabilitation works are the only long term, cost effective solutions for this type of failure*



Site Observations

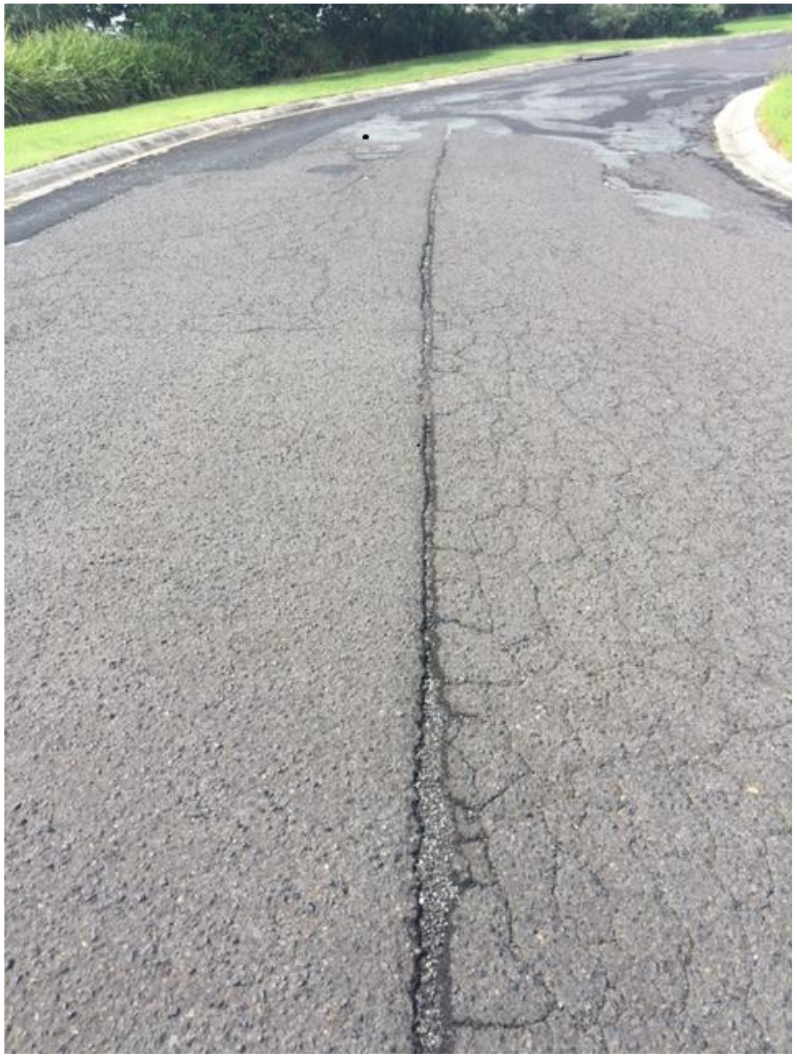
Ocean Shores - Site Observation

- *Many sealed surfaces within the urban area of Ocean Shores appear to have deteriorated to a condition which is beyond routine maintenance*
- *Seals appear oxidised and are in disrepair. Unfortunately a patching and / or resealing program will not benefit all roads, and more extensive renewal / rehabilitation methods will be required*
- *Although some of the infrastructure appears to have been under-designed or poorly constructed during development stage (i.e. kerb not placed on extended pavement subbase and is now moving) past maintenance practices have also been lacking*

Site Observations

Ocean Shores - Site Observation

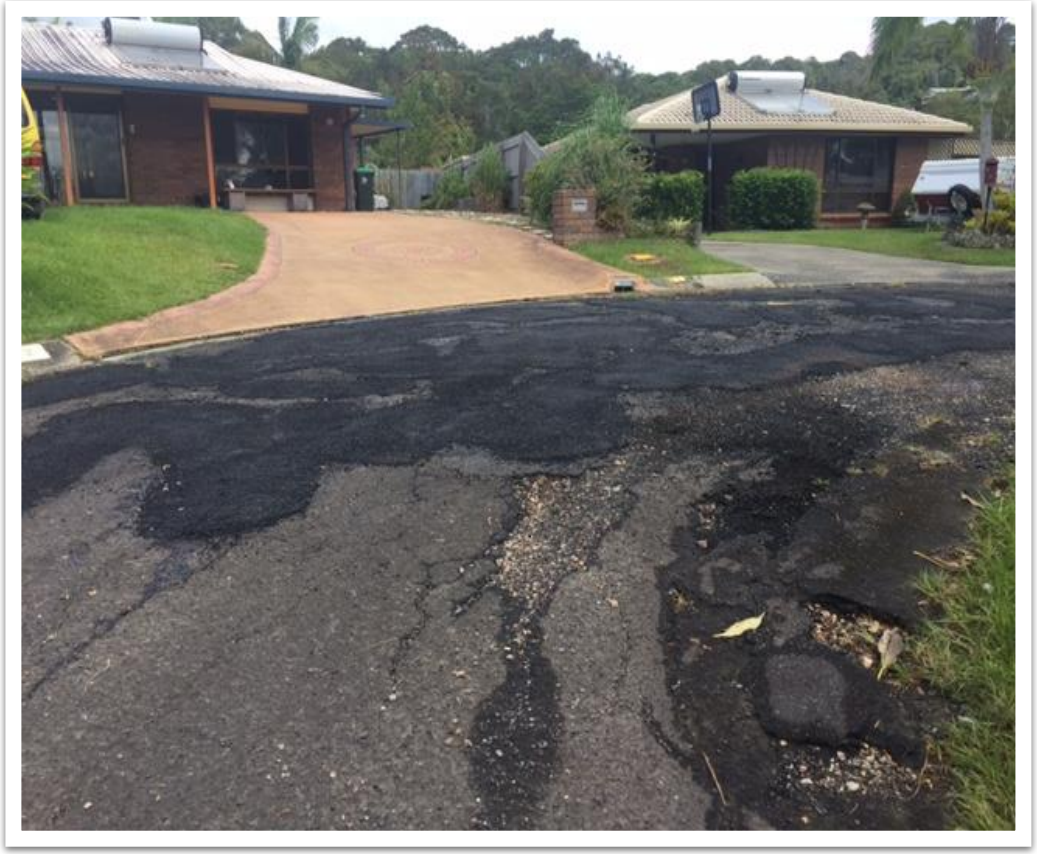
- *Generally the majority of the pavement seems in reasonable condition, except where there has been ingress of moisture to the pavement on moving kerb lines or in areas of seal cracking. Most defects appear seal related rather than pavement based (as the initial defect)*
- *Longitudinal cracks along construction / seal joints have not been filled, moisture has entered the pavement and substantial cracking has occurred in the adjacent seal over past years*



Site Observations

Ocean Shores - Site Observation

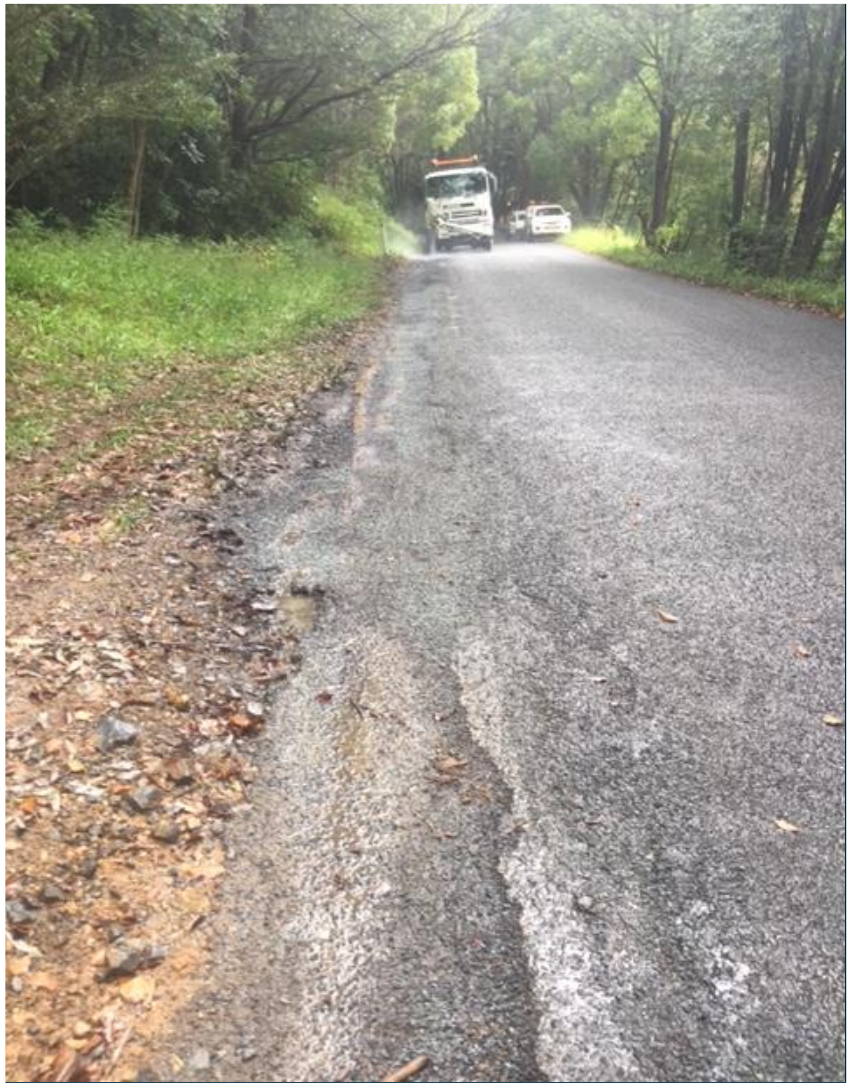
- *Asphalt (hotmix) spread thinly is an expensive short term solution. Although a superior product, its performance when spread at less than 2.5 times the nominal aggregate size is well below optimum*
- *Council is obtaining a reasonable life from the asphalt patching works, however outputs are subject to budget constraints and are generally restricted to a maximum of 5 tonne of mix per day therefore area coverage is limited*



Site Observations

Edge treatment for road safety - Site Observation

- *Edge repairs are currently undertaken with the jet patcher*
- *Failure to attend to the initial cause of the edge break (usually shoulder re-sheeting, grading and drainage) means that inevitably the defect is likely to recur in a short space of time*



Findings

- Council has a challenging road network. The population is growing in northern NSW, in particular towards the coastal regions. Tourism is resulting in excess of two million visitors to the Byron LGA annually
- Parts of the Byron LGA road network are now suffering from a lack of funding for preventative maintenance in past years and some roads are beyond routine maintenance
- To achieve optimum value for money in the maintenance of the network, strategic maintenance and renewal activities must be undertaken
- Strategic maintenance activities would include table drain maintenance, heavy patching and shoulder re-sheeting, grading and strengthening
- The overall strategy should be to waterproof and protect pavements, whilst providing an adequate wearing surface, and ideally the above activities should be carried out prior to the pavement resealing program
- These activities should be strategically programmed to ensure optimum value for money and to achieve optimum condition of the road network

Findings

- Whilst reseal preparation work is carried out on roads in the reseal program there is no wider strategic maintenance program in place
- Five return visits to the same site for patching failures in the same confined area by the asphalt patching crew can quickly amount to the order of $20,000 in reactive maintenance
- Heavy patching would be normally defined as a discrete area of failure greater than 20m2. Where quantities can be wrapped up to reasonable sized work packages, heavy patching can often be procured at rates in the order of $55-65/m2 for stabilisation and sealing
- These larger heavy patching works would normally be considered as capital works and as such the appropriate technical assistance and controls should be put in place to manage these projects. It should be noted that a number of these larger heavy patches add value to the asset and should be classified as capital works (regardless of how the work is funded) for financial purposes

Findings

- Council's forward reseal program should be provided to the Works section with a minimum of six months notice. This will allow maintenance works to be carried out and planned and sufficient notice given to the sealing contractor to arrange reseals at an appropriate time during the warmer months
- It should be noted that pothole repairs do not add value to a road pavement but are essential in the asset reaching its design life
- Council has not been funding the amount of resealing normally dedicated in a sealed roads asset management plan and therefore has a backlog of sealed roads that have lost their ability to prevent ingress of moisture into the pavement
- As reseals have not been funded, heavy patching and long term sustainable repairs have also been neglected
- In part as a consequence of the lack of reseals and heavy patching, Council is spending a large amount on pot hole filling

Findings

- In urban areas such as Ocean Shores where the seals are aged and oxidised, the utilisation of the jet patcher would cover more area in the given timeframes than an asphalt 'throw and go' exercise. It would provide a more cost efficient method of seal repair and could provide more extensive water proofing of the adjacent pavement. Damage to the existing seal would be minimised with compaction not required
- It is recognised that the operation would require the mechanical street sweeper to follow, and that in warmer weather the turning of traffic into driveways may cause the jet patched areas to bleed. However, in terms of preventative maintenance it may provide a longer term solution to the ongoing pothole reactive maintenance occurring as a result of the declining seal condition pending rehabilitation works
- Consideration should be given to undertaking edge repair by the asphalt patching team, whilst utilising the jet patcher for seal repair in areas such as Ocean Shores

Findings

- Quantities of asphalt supplied for patching works is generally limited to 3-5 tonne at the discretion of the quarry. The subcontractor is charging at an hourly rate including travel to site. Although output may be increased by Council providing an additional load by supply and delivery to the AC patching crew, this may not be cost effective due to double handling and issues loading asphalt into the flocon truck at site
- The annual budget for asphalt pothole patching currently exceeds $400,000. This converted to conventional asphalt repair (profile and reinstate at 100mm depth) would provide in excess of 4000m^2 of work at maximum rates (minimum daily quantities)
- Intervention and response levels are in accordance with Infrastructure Services Risk Management Procedures
- Council is trialling the use of Assetic software – MyPredictor to model a 10 year program from a budget, road priority, roughness, rutting and cracking. A program has not yet been adopted

Findings

- NRLG Construction Specification C244 and NRLG CQC1 Quality Control Requirements do not specify hold, witness or inspection points pertaining to spray sealing activities. Hold and witness points should be included to compliment LG specification or RMS specifications used into the future. Specifications R106 and R107 and RMS Q4 are widely used within NSW and any contractor will be more than familiar with their content and quality requirements. RMS has the resources and dedicated expertise to regularly review the specifications and can provide technical documentation to assist council in administering the specifications
- There appears to be a high degree of trust in the bituminous surfacing contractors which exposes Council to both reputational and financial risk
- There is a general deficiency of quality assurance documentation received from the contractor (given that they are quality certified organisations) and a greater stance in quality control is required by Council contract supervision staff

Findings

- There is no internal checklist of submitted documents requirements to assist Council contract supervision staff in verification and administration of specifications
- Council operational and engineering staff are committed and enthusiastic, however there appears to be a deficiency in experience and practical exposure to industry practice and contract management. There is no doubt there is commitment from management in ensuring training is available to junior staff. There may be some value added in providing a mentor from a neighbouring council or external resource for their ongoing growth and industry exposure
- Councils that are not involved in the RMS Road Maintenance Council contracts often have less exposure and financial capability to gain experience in contemporary industry practice that is often trialled or undertaken by RMS - staff may benefit from a mentoring scheme associated with this type of work

Findings

- A prime and seal is a two-stage process and generally provides a cost effective and better quality treatment (where practicable i.e. on low traffic roads or constructed sections of roads that can remain without traffic for up to 48 hours at a time)
- The application of a primer to a prepared granular base, generally consisting of bitumen and cutter oil, it has no aggregate, and is used to bind the surface of an unbound granular layer, provide a bond onto which a bituminous surfacing can adhere, assist in waterproofing the pavement, assist in curing stabilised pavement and to provide a surface that minimises absorption of the binder from the seal coat into the pavement
- A binder sprayed onto the primed surface, usually 48 hours afterwards, covered with a layer of aggregate, rolled and opened to traffic. This provides the wearing course for traffic and waterproofs the pavement
- Where practicable, Council might consider a prime and seal in lieu of primerseal as initial seal treatment as a cost saving method and superior treatment

Findings

- Primerseals are now recommended by RMS (Roads and Maritime Services) as an initial treatment on newly constructed roads and are the preferred initial treatment on roads with an AADT of 200 or more, for porous pavements, and in weather conditions where a prime and seal is considered to be a high risk
- RMS T271 Ball Penetration Test should be undertaken by the contractor prior to the initial seal (usually the day prior to sealing) to ensure the pavement is properly prepared for seal and that the nominated aggregate size is appropriate for the works
- There is no indication that design selection for failed resealed pavements has been incorrect, rather that the existing pavement and wearing course was possibly beyond routine maintenance

Recommendations

1. Budget and Asset Management Process

- In the case of Byron Shire Council, a sustainable road infrastructure management plan can be best achieved by developing a 10 year plan and budget based on the following principles:
  - Identify, categorise roads by not only condition rating but also by failure mechanism and proposed treatment
  - Reseal roads that are approaching a need for reconstruction i.e. less than 10%pavement failures (by area) as a first priority
  - Rehabilitate roads with heavy patching and reseals where pavement failures by area total between 10% and 30% as a second priority
  - Reconstruct roads where pavement failures are greater than 30% as a last priority unless there are overriding safety or political imperatives

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Recommendations

1. **Budget and Asset Management Process (Cont.)**
   - Undertake treatments that are appropriate to the failure i.e. don't apply a 'one size fits all' or a 'this is how we've always done it' approach
   - Utilise an asset management system with sound deterioration modelling capabilities and treatment options to optimise outcomes
   - Develop an overarching road maintenance strategy that ensures that capital expenditure is optimised and maintenance activities support an overall improvement in road condition

Recommendations

2. Specification and Design

- *Bituminous Surfacing*
  - Include hold and witness points to compliment NRLG Construction Specification C244 and NRLG CQC1 Quality Control Requirements OR utilise RMS specifications used into the future
  - Implement RMS form 395 A and K or a similarly created form for the contractor to clearly submit the basis of his seal design to the client (implement hold point)
  - Clearly specify RMS T271 Ball embedment test for initial seals (implement hold/witness point) to ensure the pavement is properly prepared for seal and that the nominated aggregate size is appropriate for the works

Recommendations

2. Specification and Design (cont.)

- *Asphalt Surfacing*
  - Consider requesting an establishment rate to various identified sectors within the Byron LGA and a separate price per tonne supplied and laid
  - If accepting an hourly rate as the payment basis, specify a minimum output per 4 hours or 8 hours
  - Request a rate on a small 400-500mm profiler or bobcat mounted (with broom) in addition to the 1.0m wide profiler for larger scale works
  - Request a pothole and minor pavement repair methodology as part of the tender submission requirements along with an inspection and test plan and dedicated safe work method statement specifically for the works
  - As part of the submission request the tenderer to nominate personnel for the works
  - For larger work request the tenderer nominate an accomplishment, testing and auditing schedule and reporting regime

Recommendations

2. Specification and Design (cont.)

- *Design*
  - Where practicable, consider a prime and seal in lieu of primerseal as initial seal treatment as a cost saving method and superior treatment

Recommendations

3. Communication

- Create construction / maintenance activity method statements – implementing consultative processes and involving relevant staff in their creation
- Create inspection and test plan to communicate the contract specification requirements and work steps required (end to end) to contract management staff providing easy access to alert staff to testing frequencies and required results
- Provide the Council reseal program to the works section with a minimum of six months notice. This will allow maintenance works to be planned and effectively undertaken, with sufficient notice given to the sealing contractor to arrange reseals at an appropriate time during the warmer months
- Inform the community by way of newsletter and website of any new maintenance strategies or work practices that may impact them and inform them of what they can expect

Recommendations

4. Technical Knowledge and Industry Work Practices

- Implement mentoring scheme for field and engineering personnel with neighbouring council or external resource

Recommendations

5. Work Practices

- Consider undertaking edge repair by the asphalt patching team, whilst utilising the jet patcher for seal repair in areas such as Ocean Shores
- Implement asphalt repair work (profile and reinstate) in drier months for more sustainable results
- Undertake a cost benefit analysis of the capital purchase of a second jet patching unit which incorporates a bitumen spray bar and spreader to assist in holding lower condition rated roads during the ten year road improvement program
- Consider undertaking heavy patching as in-situ stabilisation of granular pavements and spray sealing issued in cost effective work packages
- Implement contract crack sealing program with contemporary materials
- Workshop and review service and intervention levels with stakeholders and relevant staff for maintenance response to ensure they are appropriate and contemporary

Recommendations

6. Contract Management and Administration

- Council contract management and supervision staff familiarise themselves with contract specifications and contract documents (training and mentoring may be a requirement)
- Council contract management and supervision staff take a greater stance in quality control or insist on the contractor providing appropriate quality assurance documentation to ensure contract specification compliance and mitigation of Council's risk
- Create and implement internal / specification checklist of submitted documents requirements to assist Council contract supervision staff in verification and administration of specifications

Implementation Plan

Stage 1 – Develop Ten Year Sustainable Road Infrastructure Management Plan

- Inspect all network roads
- Identify failure mechanism
  - Stage of deterioration
  - Treatment options
  - Timing of treatment
- Develop ten year program
- Cost analyse ten year program
- Plan approval
- Communicate plan to community
- Implement plan