

Meeting: Infrastructure Committee 09 September 2020
Name of item: FNDC 20/21 Unsealed Road Upgrades and Drainage Programme
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1 Purpose

The purpose of the briefing is to present the summary of the Unsealed Road Upgrade sites for the 2020-2021 Annual Works Plan (AWP) and associated Drainage works across the District.

2 Background

Complaints from road users about Far North District's unsealed road condition early in 2019 saw the Councilors request an independent audit of the unsealed roads. The General Manager - Infrastructure & Asset Management subsequently commissioned an independent report.

Hutchinson Consulting Engineers (HCE) carried out an assessment of 21 carriageways throughout the Far North District over three days from Wednesday 17th to Friday 19th July (see Attachment 3 - Report Reference L21634a). The carriageways were independently selected by HCE to provide as best range as possible of traffic volumes, road classification and carriageway characteristics while ensuring an adequate spread across the district.

During their site observations HCE covered approximately 1,100km of the FNDC network and the unsealed portion of the network was generally observed to be in satisfactory condition, with the majority of carriageways assessed as fit for purpose.

Where deficiencies were observed three obvious mechanisms of pavement failure are summarised as follows:

1. Inadequate drainage;
2. Incorrect crossfall, and;
3. Insufficient pavement thickness.

HCE generally found the maintenance works to have been completed in accordance with the contract specification although suggesting that the methodology and frequency could be improved. In 2019 FNDC developed the Dust Matrix prioritization tool to help inform decision making of investments for seal extensions, with dust nuisance management a key driver.

3 Discussion

The FNDC unsealed network is predominantly very low traffic volumes with:

- 92% of the unsealed roads average daily traffic (ADT) <100 vehicles per day (vpd);
- 98% with ADT ranging between 100 to 200vpd, and;
- Only 2% of the unsealed roads carry traffic >200vpd.

During HCE's site observations, the unsealed roads generally exhibited inadequate crossfall and carriageway shape (particularly on the exit of horizontal curves) resulting in potholes being an obvious issue.

Other recommendations to improve the network condition included increased attention to drainage, particularly where notable scour is occurring at discharge points with construction of cut off drains at the top of significant cut batters to mitigate erosion of the embankments. Increasing the frequency and extent of roadside drainage works in conjunction to focus on the above was a re-occurring theme.

The 'Inspection Led' methodology specified within the Maintenance Contracts contains mechanisms to adjust inspections if required. Now the data for the past two years of inspections has been obtained the process of assessing and revising inspection frequencies can be undertaken to increase the frequency of drainage works.

Further emphasis to re-shape the carriageway to create sufficient crossfall and super elevation by targeted aggregate replenishment in areas where subgrade is exposed and/or high traffic volumes are present was also recommended.

3.1 Unsealed Road Shape and Crossfall Improvements

The Network Supervisors are instructing the Maintenance Contractors to increase road shape by aggressive unsealed road grading to a target 8% max to 6% min cross fall. This will benefit in improved rain runoff and reduce the frequency of pothole occurrence.

The risk is there will be a visual perception the roads are being narrowed and that the gravel recovered from the outer wheel paths (and graded into the crown to achieve the desired crossfall) may result in localized areas of subgrade material reflecting through (clay lenses). These outer wheel paths may fail under traffic loads and require treatment with additional maintenance gravel applications and associated costs. Contingency has been set aside for localised on-demand spot metalling treatments of where this occurs.

The Area Supervisors have been creating Treatment Lengths (TLs) of the unsealed road network and a Heavy Metal Build Up (HMBU) program has being developed to re-shape and strengthen roads (with good crossfall and super elevation) by targeted aggregate replenishment in areas where subgrade is exposed and/or high traffic volumes are present.

The Annual Work Plan (AWP) for Unsealed Road Upgrades in 2020-2021 has been set with commencement already underway (see Attachment 2). The benefits will be a reduction in reactive maintenance and associated costs with associated safety benefits resulting from improved road condition, including width. The risk can be increased traffic speeds with associated perceived safety issues.

Careful consideration to aggregate supplies (i.e. quarry source and properties) is being applied to ensure compliance with the technical specifications for gravel products. Based on some gravel sources being a long distance from the sites, and associated cartage distances seeing large loads travel long distances, effectively 'consuming' the road asset on-route, Contractors are being actively encouraged to look at opening new alternative gravel sources.

Unsealed road gravels require higher amounts of fines and plasticity (i.e. clay) to help bind the unsealed road surfaces together for longer periods. In some instances, this results in these gravel roads presenting themselves as "slushy" or "slippery", generating public complaints. We remind stakeholders these are symptoms of unsealed road lifecycles, including the repeat occurrence of potholes and corrugations, with routine cyclic maintenance treatments ongoing.

3.2 Roadside Drainage Works

The Network Supervisors are instructing the Maintenance Contractors to increase roadside drainage works including:

- Upgrades in culvert sizes;
- Inlet/outlet extensions;
- Headwall structures;
- Increased frequency of water table cut-outs to direct run-off out of the water table and mitigate potential for scouring and concentrated run-off, and;
- Scour protection i.e. placement of rock rip-rap, particularly on steep sections of carriageway.

The benefits will be a reduction in roadside slips that narrow the roads with drop-off hazards however the works will likely result in an increase in drainage structures being added to the asset base, attracting increased depreciation and costs.

The Annual Work Plan (AWP) for Drainage work in 2020-2021 has already been programmed (see Attachment 2) with emphasis on ensuring sealed roads planned for resealing having all high lip removed and proper positive longitudinal roadside drainage.

In addition, the drainage works will also be focused to compliment the unsealed road HMBU works (item 3.1 above) with work already underway.

Note - Sealed Roads undergoing rehabilitation have specific targeted drainage renewals funding.

3.3 Grading with Compaction of Seasonal Peak Traffic Routes

Road users often ask “*why don’t Council always roll the roads?*” (i.e. compact them) when we grade them. The simple fact is this treatment costs up to 5x more than routine grading and is therefore prohibitive across a 1,260km unsealed network, due to funding constraints.

Notwithstanding this, the Roding Department has taken the initiative to target unique roads with high summer season traffic volumes (See Attachment 2). The aim is to compact these roads in the months leading into the Christmas and New Year Holiday period, enabling these roads to remain intact for a longer period. This, combined with the compacted finished surfaces of the HMBU works (Item 3.1 above), should see a significant improvement across almost 200km of unsealed roads (15%) throughout the District.

Experience in the longevity of compacted unsealed road surface notes the duration can be relatively short-lived, depending on the traffic demand and environment (dry/windy) with anywhere from 2 to 10 weeks possible, before corrugations develop (or potholes if wet).

3.4 Application of Unsealed Dust Suppressant (UDS)

The Roding Department have identified 169 sections on 56 district roads that meet criteria used to determine which routes to apply Unsealed Dust Suppressants (UDS).

The application of the UDS totals more than 29km of the network (2%) and the treated sections of road will not be graded post-application to prolong the life of the product.

The roads were selected based on having:

- Houses within 25 metres of the road;
- An average light vehicle speed on the road greater than 60kph;
- Traffic volumes of more than 130 vehicles per 24 hour period, and;
- A heavy commercial vehicle component of 20 or greater.

The compounds used in the UDS are a temporary solution for controlling road dust and are sprayed onto the road surface at the beginning of summer. The compounds bond with road

dust but do not make the road surface slippery and have a short lifecycle of around three months, depending on traffic volumes and the impact of wet weather.

4 Summary

The Roothing Department has worked over the past 12 months to segment the large unsealed road network into definable, manageable sections (treatment Lengths) and developed a proactive Annual Works Plan for the physical construction of these works.

Construction has begun and every effort will be made to coordinate the application of UDS to roads that have had the above HMBU and/or grading with compaction carried out prior to being sprayed, optimising the surface finish quality and durability of the product application.

It is anticipated that this works programme will make a discernable change in the quality of the unsealed road condition this summer 2020-2021.

We remind all stakeholders that the natural behaviour of unsealed roads is highly variable and subject to the environmental forces of nature + variable traffic demands. Corrugations in the dry and potholes in the wet are to be expected and the Roothing Department will continue to push Contractors to pro-actively respond and intervene to treat these defects in a timely manner.

5 Attachments

1. 2020-2021 Annual Works Plan for Unsealed Road Upgrades and Drainage
2. Hutchinson Consulting Engineers Report Reference L21634a

6 Report Approval

Approved by:



Calvin Thomas - NTA Manager
18th August 2020