PAVEMENT SERVICEABILITY

- Pavement History.

The original pavement was built in the 1950s. Matipo Ave was progressively widened and finally kerbed and channelled and sealed in 1984

- Pavement Condition

There are no records of the pavement depth but it is known that the Council typically built their pavements with 50mm to 100mm of compacted Rhyolite overlying the insitu sand ash subgrade. By todays standards this is very light

There have been 6 reseals since 1986 It was last sealed in 2016 Prior to the last reseal in 2016 extensive repair work was carried out. One particular digout was 28m long x 2m wide in the down hill wheel path. A number of repair patches were also evident. Rutting is visible ~~developing~~ in the wheel tracks

~~Rutting is in the wheel tracks is developing with the ruts typically~~ 15mm to ~~2mm deep using a~~ 2.5m straight edge An intervention strategy is normally ~~instigated at~~ rutting approaches 30-35mm. Beyond this point the upper structural pavement layer losses its mechanical locking properties ~~and deteriorates~~ with the risk of accelerated pavement failure occurring

The digouts & wheel track rutting are signs of developing stress in the lower pavement

CONSTRUCTION IMPACTS

There is a direct correlation between the number and weight of heavy vehicles and the service life of the pavement. Light vehicles have little impact on pavement loading. To put things into perspective

1 HEAVY TRUCK IS EQUIVALENT TO 5000-10,000 CARS depending on wheel loads and axle configuration

At present Matipo is a quiet cul-de-sac and the predominate H.C.V movement is typically the weekly rubbish truck

The volume of bulk material needed to be transported to the site can readily quantified.

Heavy Vehicle trips associated with the base infrastructure development is in the order of 1100. House lot development which includes R.O.W's, driveways, building platforms and building supply vehicles would mean a further 1500, - 1800 heavy vehicle trips. This does not include light trade vehicles

For the purpose of determining pavement loading I have considered inward flow only and all trucks fully loaded. The load factor for a fully loaded 3 axle truck is 1.9

TAG	Infrastructure Development	House lot Construction
HCV trips	1100	1600 Trips
Load Factor	1.9	1.9
Total EDA	2090	3040

By multiplying the volume of heavy vehicle volumes by the appropriate load factor I am able to establish the pavement load index.

This is expressed as E.D.A. Equivalent Design Axle

For the TAGH infrastructure construction the loading in 20yr EDA

= 2.90 EDA

For the residential building the loadings is

= 3040 EDA (Equivalent Design axles)

ie Total loading

= 5130 E.D.A

Historic loading

Since the Kerb and Channel and sealing of the initial 800m was completed in 1984 Matipo Ave has been extended 300m a 25 additional houses built.

The sum of the routine loading since 1984 and the extension work = 5400 EDA's

The annual routine loading approx 100 EDA

I wist to draw your attention to two interesting facts that come from this analysis.

(1) We can see that the pavement loading generated from the TAGH development and the housing ~~equate~~ equates to the entire traffic loading on lower Matipo Ave in the last 35 years

I have included Matipo Ave extension in the historic loading

(2) The construction loading for the TAGH infrastructure development alone is equivalent to 20 years of normal useage on Matipo Ave.

I cannot categorically say construction traffic on Matipo Ave will ~~will~~ cause pavement failure

but

with some certainty

I can say it will reduce the residual life of the pavement by atleast 20 years

Pavement restoration process.

Based on a C.B.R. of 10, current design charts suggest the pavement would need to be 300-350mm deep to provide adequate protection of the subgrade.

i.e an overlay of ~~about~~ 200mm would be required.

However, overlaying the existing pavement to achieve the required pavement depth is not that simple. It would mean relaying the footpath and creating an acute break over angle at the access driveways.

Chamfering back the edge of the pavement overlay to contain the pavement ~~work~~ within the confines of the existing kerb & channel is not feasible. The existing carriageway is already below standard. The chamfer would reduce the traffic lane by approx 300mm and introduce a new hazard with a deep channel adjacent to the traffic lane.

Achieving the desired pavement strength with a thin structural asphaltic concrete overlay has been discounted because of the anticipated high deflections. Probably the most viable option would be to countersink the pavement. This is the method used for the recent Pukehangi Road / Devon Road pavement reconstruction. The Matipo Ave. site will likely to prove even more challenging because of the steeper grades, with houses both sides and and a narrow carriageway which would complicate traffic management.

There is also a line of six manholes in the existing carriageway which will demand a more cautious excavation methodology.

Because of the 12% gradient, special measures will need to be put in place to contain stormwater and silt runoff.

ANY MAJOR PAVEMENT WORK WOULD DEFINITELY HAVE TO BE A SUMMER OPERATION.

Attempting to restore/repair extensive areas of failing pavement during the winter months while contending with construction AND community traffic, would be an unmitigated disaster.

For this reason a proactive rather than reactive pavement repair strategy is called for if Matipo Ave was to be used as a construction road.

COST

~~Pavement restoration process~~	Similar in complexity and scale to the recent Pukehangi/Devon Road pavement reconstruction.
Cost	Pukehangi Road contract price: $500,000.
Duration	Five months for the Pukehangi Road project.
Community impact	As Matipo Avenue is a *cul de sac* there will be no alternative route to bypass the restoration work if the pavement should fail. Environmental impacts include noise, dust, vibration, and stormwater management.