Symbiotic Networks – Telecommunications Infrastructure Growth in State Highways: An Auckland Case Study

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Introduction

Highways are the arteries of a healthy society which deliver the essential movements of people, goods and services. New Zealand's State Highway forms a spiderweb-like network throughout the country interconnecting towns and cities. This often acts as a blueprint for the installation of smaller utility networks. Historically the Government has protected the interests of key utility services like water, power, and telecommunications to exist on State Highways provided consent is obtained from the Road Controlling Authorities (RCA).

A critical utility to the nation's economic success is a world class telecommunications network. With increasing demand for greater mobile and broadband coverage, the Government has initiated policies like local loop unbundling and cell site co-location to boost the expansion and upgrade of telecommunication networks. Consequently there will be a greater presence of telecommunication infrastructure on State Highways.

The greatest demand for expansion in both roading and telecommunications networks will inevitably be in large urban centres. This paper explores the implications of the growth of telecommunications infrastructure on the State Highways, and ways to manage the resultant impacts while allowing for a sustainable co-existence of both networks.

The Auckland Motorway Alliance Approach

The Auckland Motorway Alliance (AMA) undertakes the operation and maintenance of Auckland's State Highway network for the NZ Transport Agency (NZTA). The AMA has set goals to deliver a safe, reliable and efficient highway network along with leaving a positive legacy for future generations. The AMA intends to achieve these goals whilst accommodating the telecommunications infrastructure growth within its network through breakthrough performance in the areas of Asset Management, Traffic Safety and Traffic Operations.

Asset Management

A key goal in Asset Management is to optimise the 'Level of Service' provided by the network through efficient management of existing corridor assets. The highway is live which grows and evolves over time as traffic demand increases. Therefore it is also important to safeguard possible future expansions of State Highways.

Accordingly telecommunication companies are required to engage NZTA and AMA at the project feasibility stage to verify that candidate sites do not conflict with NZTA's future State Highway development plans. Wherever possible alternative sites are suggested that are suitable for all parties. Details such as position, depth, size of installations as well as construction methodology need to be determined so that proposed installations do not undermine NZTA's existing corridor assets like pavements, bridges, and slope-batters. The use of trenchless methods to install underground services is strongly advocated as this is less intrusive on the surface and minimises ground reinstatement issues. In certain situations, installations on existing NZTA structures can be permitted provided

measures are undertaken to avoid damaging internal rebars. Above-ground installation requests are required to have anti-graffiti coatings. Telecommunication companies are actively encouraged to explore ways to reduce the frequency required for routine cyclic maintenance as this will minimise delays to traffic in the long term.

Traffic Safety

A critical aspect of Traffic Safety engineering is the minimisation of above-ground roadside installations which tend to act like magnets for errant vehicles. Cell towers can pose a crash hazard to motorists if not protected and positioned correctly on the highway corridor. When above-ground installations are not at a safe distance from live carriageway, cell sites need to be protected by energy absorbing systems to mitigate effects of collisions. This can be achieved by the installation of guardrails or crash barriers on the leading side. Pole frangibility on the cell towers is another way of minimising the severity of accidents. Maintenance activities on the cell sites can also create a visual distraction to the motoring public. One of the ways AMA minimises the 'rubber-necking' is by requiring cell operators to position cabinet doors so they swing open on the non-carriageway side of the highways. This conceals the activity from the view of the motoring public.

Traffic Operations

The key goal of the Traffic Operations team is to ensure that the network performs efficiently at all times. Network performance is often under threat during the construction and maintenance activities. Consequently prior to construction works commencing, telecommunication companies need to develop appropriate temporary traffic control measures subject to approval from AMA. These measures include compliance with industry codes of practise for temporary traffic control and limiting work hours to off-peak periods. Telecommunications companies are also encouraged to explore possible access from local roads during construction and maintenance activities to minimise effects on the State Highway traffic.

Conclusion

Ultimately growth in the telecommunications sector will benefit society in a social, economic and environmental context. Single strands of optical fibre currently being installed in Auckland are capable of supporting transfer rates of 2.5 tera-bytes per second therefore ensuring that these networks are capable of meeting today's and the next generations data transmission needs. The transition to a complete fibre network will make high-end applications like effective video conferencing possible allowing desktop based occupations to connect directly to the place of business and have the facilities to work from home. Businesses are expected to become more decentralised, resulting in the minimisation of commutes to and from work. Consequently this will extend the life of roading pavements and lead to a reduction in vehicle emissions.

However these benefits can have negative effects on the highway corridor due to the foreseeable constant drive for broadband and cell network expansion. The challenge for RCAs is to provide for telecommunications growth whilst maintaining the integrity of existing corridor assets, minimising impacts on future highway development plans and safeguarding daily traffic operations on their networks. Through implementing sensible, pragmatic strategies in the areas of Asset Management, Traffic Safety and Traffic Operations, RCAs can deliver a positive legacy for a sustainable future.