TECHNICAL NOTE

COMPLETING THE STREET: RETHINKING HOW WE DESIGN ROADS

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Qualifications and Affiliations

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ABSTRACT

This paper describes changes in road design from the historic and traditional design of urban arterials pursuing the desire to provide for moving as many motor vehicles as quickly as possible, to providing a design that takes into consideration the needs of all the users of the entire road right-of-way, as well as responding to the adjacent landuse. This later concept has been dubbed “complete streets” and the concept of context sensitive design is fast becoming a popular and challenging alternative to traditional arterial street design.

INTRODUCTION

For the last 60 years most urban streets have been designed with the need of drivers as foremost and putting private vehicles first. This has lead to the way of thinking that a "good" road or street is one that helps making travelling in a car easier, faster with fewer stops. The needs of people who want to use streets in other ways such as for walking, shopping, pushing prams, cycling, waiting for a bus, playing or just sitting and watching the world go by, have been given relatively little consideration. The resulting street environment has therefore done much to promote the use of the private vehicle and little to encourage the use of other modes; in fact in some instances the design of roads has actively discouraged walking, cycling and the overall enjoyment of a road corridor as an urban space.

This paper is intended to be a thought provoker and discussion starter around what we as transport professionals may need to do around our thinking and our design processes and standards so that the road corridor can be reclaimed back for all users.

It outlines the traditional road design processes, discusses the problems that have occurred as a result of these approaches and then suggests alternatives to the design of urban transport corridors based on work carried out in the USA and UK and emerging work coming out of New Zealand.

As shown by Fraser (1981) in Figure 1 below, streets have historically been a place of movement, interaction and activity. While the road corridor provided for vehicle movement, it was also a place to walk, shop, talk and play.

Figure 1: Queen Street Auckland, 1903

It was really only in the middle of the 20th century as motor vehicles became common, two ideas came to dominate thinking about the design of roads and have continued largely unchallenged today. The first was that the most important role of roads was to facilitate fast journey times for cars and that the road should be designed to accommodate this. This was in terms of not only the geometric design of the roadway and signage but also the operation of traffic signals, with all being focused around "efficient " and often fast movement of vehicles.

The second idea was that mixing of vehicular traffic and pedestrians was inherently dangerous and that ideally pedestrians should be kept completely separated from traffic.

According to LaPlante and McCann (2008) the very fundamentals of the traditional functional classification of road systems with the emphasis on mobility for the private vehicle need to be questioned. This traditional functional classification for arterial roads, which is contained in many of our District Plans, is by definition to provide for mobility for vehicles with emphasis on operating speed and traffic carrying capacity.

This thinking results in road design elements that give dominance to vehicles often at the expense of other users, such as free left turns for vehicles, increased turning radii at intersections, wider and more traffic lanes, more green time and phases at traffic signals allocated to vehicles, all measures focused on providing the least amount of interference for traffic. This in turn has lead to some urban arterials dividing neighbourhoods, creating sterile environments and increasing speeds on urban roads which result in unsafe conditions for all road users. The introduction of regulation and enforcement has tried to compensate for this but below why do we have a speed limit of 50 km/hr on a road which has been designed to allow us to easily travel at 80 km/ hr? Examples of these notions are highlighted in the photographs below.

Photograph 1: Footpath serving the biggest high school on New Zealand, Browns Bay Auckland

Photograph 2: East Coast Road, Browns Bay, 50 km/hr posted speed limit and operating speed of 80 km/hr

DESIGNING STREETS IN CONTEXT

As a reaction to the above outcomes of traditional or conventional road design philosophy, much work has been done overseas and to a more limited amount in New Zealand on Context Sensitive Design concepts and the Complete Streets movement has sprung up as a result.

So what does this mean? As explained by La Plante (2007), this means that traditional road design and functional classifications are being questioned as to their effectiveness in delivering sustainable transport outcomes, resulting in a view that this thinking needs to be replaced or at least complemented by a new street design and road corridor classification system. These classifications need to include a process whereby the needs of all the transport users are taken into account as well as the interaction of the road corridor in the community, in other words the context of the street.

For example, Auckland City Council (2007) as part of the Liveable Arterial project has classified each urban arterial with regard to a new classification function, as either a general vehicle emphasis road, a community emphasis road, a passenger transport emphasis road, or a freight emphasis road. The Institute of Transportation Engineers (ITE) (2006) in the USA propose in their draft recommended practice for Context Sensitive Design that each route should be classified according to a context zone (such as rural, suburban and different types of urban zones), and according to a thoroughfare type (such as freeway, boulevard, avenue and street).

This notion of classifying a road corridor in terms of its place or landuse function as well as its link or movement function has been further explored and documented by Jones, Boujenko and Marshall, (2008) in detail in the UK publication "Link and Place."

COMPLETING THE STREET

Completing the Street is a complementary notion to the Context Sensitive Design principles and focuses on all road users in the road corridor. A complete street is defined as a street that works for motorists, for bus passengers, for cyclists, and for pedestrians, including people with disabilities.

Importantly a complete streets policy is aimed at producing roads that are safe and convenient for all users. The intent is to change the everyday practice of transport authorities so that every mode should always be part of every stage of every road project whether it is a minor maintenance project or a major road widening project.

THINKING BEYOND THE PAVEMENT

In order for the complete street design philosophy to be truly effective and successful we need to start doing things differently.

Policies and Processes

We need to rewrite and/or focus especially our local authorities' policies, procedures and design processes to serve all users of transport. While I know that many local authorities have wonderful transport strategies around sustainability, walking and cycling, these need to be put into action. This means that right from the beginning of a project, from the scoping phase of the project, of defining what the project is about, all transport modes need to be considered equally within the context of the road environment. No longer will road design be around focusing on moving cars through a corridor as fast as possible in the safest way. It will rather be focused on "level of service", journey times and safety for all users. It is about redefining mobility from being focused on moving cars through a road corridor as fast as possible to a more balanced definition of mobility and safety for all users in the community.

As outlined by Newsome, T, Steinman N and Ewing R, (July 2003), planners and roading engineers in North Carolina USA have defined a six step planning and design process undertaken for all their road projects. The process involves a new way of road design planning starting with the consideration of existing and future landuse and transportation context, then moving onto identifying landuse and transportation deficiencies and objectives, before recommending and testing cross sections including having to make trade-offs as a result of road corridor constraints and/or community outcomes.

Design Guidelines

Effective local authority's policies and design processes should lead to the rewriting of design manuals and guidelines. This doesn't mean that we no longer take account of any of the guidelines and standards as contained in design manuals such as the AASTHO Green Book (2004). Rather the thinking encapsulated within the notion of completing the street should be used in conjunction with these standards and guidelines. Some standards may be challenged and good examples of design manuals that have been produced as a result include the Massachusetts Highway Department Project Development (2007) as well as the previously mentioned ITE and Charlotte Department of Transport documents.

These documents also need to include guidelines on not only standards associated with transport functions within the road corridor such as pedestrians, cyclists, passenger transport, freight and access but also guidance with regard to stormwater treatment, provision for services, planting and street furniture within the road corridor. A much more inclusive and collaborative approach to the design of road corridors is required from all professionals.

A further step in creating a truly integrated design is to complement the standard output of traditional road design namely the vertical design, the longitudinal design and cross sections with a three dimensional design including all aspects of the design within the roadway itself, within the area adjacent to the roadway and the adjacent landuse. This three dimensional design has the ability to assist with the safety audit process and can also be used to undertake an urban design audit of the transport project.

Training and Information Sharing

Additional training for any professionals involved in the design of a roading corridor is of course fundamental to achieving a complete street design. The ultimate balancing of the needs of all the transport users within a certain project is a challenge, especially considering that the majority of transport projects have to be undertaken within defined road reserves. Projects that I have been involved in around context sensitive design and completing the street thinking have included input from many professional disciplines including community, economic development, planning, water engineering, urban design, parks and landscape architecture and traffic engineering.

Monitoring Results

Finally local or regional authorities need to also start to implement within the complete streets process, methods of monitoring and tracking the outcomes. We need to measure the success of a project in serving all users and the community. This can be around safety of all transport modes, multi modal level of service standards as well as community, environmental and economic outcomes.

COMPLETING ARTERIAL ROADS

One of the biggest challenges facing road designers is the retrofitting of existing urban arterial routes as these roads tend to be the most hostile towards cyclists, pedestrians and bus passengers, but all of these modes can be present in significant numbers.

Completing an arterial road must deal with controlling vehicular speeds. In addition to the timing of traffic signals for an acceptable operating speed, other possible measures for consideration depending on the context of the road corridor include:

- As suggested by NCHRP (2007) narrower traffic lanes should be considered (3.0m in urban areas)
- Tightening corner kerb radii to the minimum needed for "effective" turning radii. ITE (2006) suggests the radii should be designed to accommodate the largest vehicle that will frequently turn the corner.
- The elimination of "free"-left turn lanes at intersections.
- The introduction of raised medians/islands as they visually narrow the road, provide a calming effect and give pedestrians refugee in crossing a street.
- Median and roadside planting. Further visually narrows the roadway, creates amenity and can be used to also treat storm water.
- Retain kerb parking (especially through town centres and main streets) as this provides for community access, provides a calming effect and protects pedestrians from traffic.
- Kerb extensions in conjunction with on street parking which reduces pedestrian crossing distances, improves sight lines and helps control parking.
- Rethinking of pedestrian provisions. Most of these flow out of the above speed controlling measures. However pedestrians should be provided with more opportunity to cross roads. At signalised intersections more focus should be given to pedestrians, which could include pedestrian lead time indicator, countdown clocks, and the installation of full pedestrian phases.
- Use of "shared" road space for vehicles and pedestrians in town centres.

This list is by no means exhaustive and as each road corridor is unique there will be many more solutions available to us as we start to take seriously the re-design of our arterial roads for community liveability, while retaining a reasonable level of mobility along the corridors for all modes of transport.

CONCLUSION

So in conclusion I urge you all to, at least, be curious about the concepts of context sensitive design of roads and completing the street and take the time to read and review the work that has been carried out in the USA and the UK.

I challenge all planners and engineers who are responsible for implementing our urban roading system to work together and look at all the various alternatives and not be stuck in narrow interpretations of roading guidelines.

REFERENCES

Internet

FRASER, R. (1981) Victoria Arcade. Some Auckland Painters of the Fin de Siècle. *Art New Zealand.* http://www.art-newzealand.com/Issues11to20/victoria.htm

Journals

LAPLANTE AND MCCANN, B (May 2008) Complete the Streets: We can get there from here, *ITE*

Papers

LAPLANTE, J (June 2007),"Retrofitting Urban Arterials into Complete Streets *Paper at the 3rd Urban Symposium.* Seattle Washington USA

NEWSOME, T, STEINMAN N and EWING R, (July 2003) Charlotte's Urban Street Design Guidelines: A Context-Sensitive Decision-Making Model*, Paper at the 2nd Urban Symposium. Anaheim*, California USA

Books

AUCKLAND CITY COUNCIL (Oct 2007) The Liveable Arterial Plan Auckland New Zealand

ITE, (2006) Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, A Draft Recommended Practice, Washington DC, USA

JONES, P, BOUJENKO, N AND MARSHALL, S (2008) Link and Place, A Guide to Street Planning and Design, Wiltshire, UK

AASTHO (2004) A Policy on Geometric Design of Highways and Streets), Washington DC, USA

MASSACHUSETTS HIGHWAY DEPARTMENT (2006) Project Development and Design Guide USA

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM (2007) Preliminary Report, Urban and Suburban Lane Widths Kansas City, USA

DEPARTMENT OF TRANSPORT (2007), Manual for Streets UK

NEW YORK CITY (2009) Street Design Manual, Department of Transport, USA