

Places
Winter 1996

The Third Motor Age

By Walter Kulash

I am a traffic engineer. I love the smell of freshly laid asphalt on a cool winter morning! For the first twenty or so years of my career I worked in the very normal traffic engineering direction of providing ever more capacity. This was the transportation problem, not enough capacity, and engineers devoted all their efforts to moving more traffic, whatever the cost.

As early as the 1960s, there were indications, such as citizens' revolts against urban freeways, that public acceptance of continued road expansion might be limited. In recent years, the pendulum has begun to swing rapidly in that direction. Local elected officials, primarily mayors, tell us that the cost of providing ever more capacity has been too high, financially as well as in terms of quality of life. We are entering a new motor age, one in which the goal of maximizing traffic speed and volume is being balanced against other goals for creating livable urban settings.

The First Motor Age

It will help me explain where we are going if I describe from where we have come. The field of traffic engineering evolved very rapidly from unexpected quarters. William Eno, not a household name, was the father of the field. He never drove a car himself, but he was an avid horseman, and he realized that we would have to deal in an organized fashion with this tremendous invention that was crowding horses off the streets.

Eno helped establish many of our traffic conventions, like green signals for go, red for stop and driving on the right side of the road. He also had some prescient insights about the automobile. For example, he cautioned that a proposal for a pedestrian bridge across New York's Fifth Avenue was a bad idea. We would not learn to live with the automobile by separating ourselves from it, he warned.

In those early years, we did not try to rebuild our cities to accommodate cars. We thought we could incorporate cars by adapting existing street forms. The designs have proven to be enormously durable. Almost every city, for example, still has the twenty-four-to twenty-six foot-wide street type with generous sidewalks and plantings.

Through this period, cities grew in a familiar fashion. Their form started with a few major streets, quite often inherited from pre-urban paths, waterways or livestock routes. Then, as the city grew, more pieces of fabric were added. The pieces didn't always match, and they were quite often under different political jurisdictions, but the process was very organic and natural. From a traffic engineering point of view the interesting feature of this system was that it was a dense, highly connected network. There were many ways to get from one point to another.

Traffic engineering proceeded very rapidly after an initial codification of the rules, and by 1941 it had produced a manual of almost anything you needed to know about the subject. For example, we had watched capacity carefully, and the 1941 *Traffic Engineering Handbook* reported that the capacity of a lane of traffic was remaining steady at about 1,500 vehicles per hour. Cars were improving, drivers were becoming more skilled, traffic engineering was advancing, but a lane still carried 1,500 vehicles per hour. Apparently, we were up against a human performance capability.

The Second Motor Age

Traffic engineering's adolescence started in the 1920s, with visionaries who concluded that we had to reconfigure our cities and our lives for the automobile. They argued that there was no longer a place for traffic-filled streets; cities could no longer adapt to, or live with, the automobile. We begin to see distinctly suburban street patterns with separate land uses, major boulevards (but fewer of them) and no more fine-grained street network.

A 1928 diagram by LeCorbusier accurately describes this new street and land-use pattern – major arterials going directly into a pod of land use. Our own American icon, Frank Lloyd Wright, came to exactly the same conclusion. The “Broadacre City,” as he called it, is “everywhere or no-where.” This was part of the image of the second motor age – big arterial roads, few of them isolated land uses, suburban-type towers surrounded always by a sea of green.

From these visions certain things are missing. You never see a storage place for all the vehicles: where would they park? Where did people buy and sell things? The two activities that dominate our landscape today – parking and the notion that once you bundle people together on a road somebody is going to want to sell them something there – did not occur to these visionaries.

The dominant features of our present road system took form at this time. The pattern of isolated pods of development was thought to be appropriate for the automobile age, separating traffic, with its impacts, from surrounding activity. The expected extinction of walking eliminated the need to have origins and destinations within walking distance of each other. The functional classification of roads established a hierarchy of streets according to their intended traffic use, and it dictated that the upper end of the spectrum, the arterial street, be reserved for long-distance, high-speed travel, ideally unimpeded by friction from driveways and commerce.

Until this time traffic engineering was the duty of the already overworked municipal engineer. But the second motor age also marked the emergence of the professional, full-time traffic engineer, isolated from other disciplines. The consequence of this isolation has been to remove the practice of traffic engineering from the broader concerns about what makes cities healthy and pleasant.

A Third Motor Age?

Until now, we traffic engineers have defined and responded to the traffic problem with vertical thinking: Cars aren't moving, so get out there and move the cars. That typically has meant more pavement – wider lanes, more lanes, wider turns. Lately, these strategies have become very difficult and expensive, and attention has turned to making the pavement we already have more efficient through innovations like intelligent vehicle highway systems, smart cars and better signal systems.

Now a growing number of mayors, commissioners and citizens are rephrasing the question. Isn't moving people, not cars, what we really mean to do? What about improving the quality of travel, rather than its quantity? Can we move fewer people fewer miles? What about changing our land use or stopping the need to constantly flee from cities? Who says that vehicles must move at an unimpeded flow regardless of what that is doing to our cities? We've changed many types of standards over the years; isn't it time to rethink our standards on traffic?

We are now realizing that trying to cure traffic congestion with more capacity is like trying to cure obesity by loosening your belt. We've loosened the belt for fifty years, but the problem has only become worse.

We're starting to realize dangers we've been creating in our new street layouts – the ones supposedly designed for this new motor age. Conventional suburban street patterns direct every trip through one (and only one) way out of a particular land use pod and onto an arterial, which is the only route to the entrance of another land use pod. This makes an ugly mess out of arterials.

Moreover, we are bundling thousands of people together in one place, along arterials. Almost no kind of municipal will or citizen outcry can stop businesses from wanting to sell something to this captive audience.

On the other hand, we're realizing the treasure we have in our traditional street layouts. Our old pattern of development, found in the core of almost every city, mixed land uses and connected them with dense street networks. This pattern handles traffic by dispersing trips through the network in a variety of ways. Traffic never builds up to a large volume on any single route, and people make local trips, like going from home to school, without getting on major arterials.

This dense network of small streets outperforms the pattern found in suburbia. A network theoretician would explain this performance in terms of redundant routes, multiple intersections and the uncooperative nature of traffic flow. Similar networks of highly interconnected links are the basis of computer design and telephone networks. This is not news to traffic engineers, but factors like land use codes and subdivision design have driven road design in the opposite direction.

Our highway capacity manual makes an interesting and little understood point: there is no economy of scale on wide streets. It says that the maximum capacity of a street is about 1,900 vehicles per lane per hour, times the number of lanes. There is no economy gained

with wider streets. A lane carries this 1,900 vehicles whether it's on a beautiful little residential street, a handsome commercial street or the ugliest arterial in the world.

Another interesting feature of traffic is that you move the most vehicles at twenty-five to thirty-five miles an hour – the design speed of traditional urban streets. Most people think that we can move more vehicles at higher speeds, but the increase in spacing that drivers require outweighs the increase in speed. You can prove it yourself. Go out and count!

Trip Quality – The Missing Dimension

Traffic engineers are concerned with the speed and capacity of travel. Other qualities may actually be more important to travelers, but they are not measured. To illustrate this difference in quality, let's take a typical daily trip to a local retail store on two different road systems.

Our first trip begins on a pleasant local street in a conventional suburban subdivision. Consider the quality of the typical daily trip. In this subdivision, you quickly come to the collector street, which has been walled off to protect the subdivision from traffic. Inevitably you travel on a commercial strip because this is the only available route. You arrive at a parking lot and walk into your destination.

How does our quality plot look? Our trip was good when we started off in that nice subdivision, the trip along the walled connector wasn't so good, it became poor along the arterial, and I've not found anybody who likes the parking lot walk! Most of the trip was bad, and the most important parts of the trip, where we were actually meeting the environment with our feet, were the worst of all. Can't we do better?

Let's take a comparative trip in a traditional urban setting. You start off in a traditional neighborhood environment. Then you come to a connector street. (This street, by the way, is carrying the same density of traffic as a major street, and this is how good it can look while it's doing that.) After driving down an arterial street, you arrive at a shopping area, such as we find in many traditional American downtowns. There is parking available, and a brief walk to your final destination.

The first trip may have been a little quicker, but who cares? It was an awful experience. The second trip was lovely, most of the way. Anybody who sells a product recognizes immediately that the second trip would be vastly preferable to the first. We can sell that product more easily, financially and politically. We traffic engineers have never dealt with having to sell what people really want and are just beginning to understand this.

Traffic engineers are also beginning to understand the "park once" environment, in which you drive into an area, park once and walk to numerous destinations. In a suburban "park many" atmosphere, you drive, park, go to a single destination, get back in the car and repeat the process. The former creates nicer environments, enormously less exhaust emissions and fewer vehicle trips – and is highly valued by places that have it.

There are many ways to make traffic flow differently and change the character of streets. One can narrow intersections so only a single vehicle can get through, or create elaborate, deliberate narrowings that make drivers behave differently, deflecting their path.

Reclaiming pavement from traffic is becoming popular. In the Miami Beach art deco district, a wide street was narrowed to one lane of pavement in each direction to make more space for night time crowds, street life and commercial displays. In Beverly Hills, traffic lanes are being turned into spaces for sidewalk cafes and diagonal parking.

Then there are various innovative traffic control devices. Speed bumps are respectable, better looking and better engineered than the nuisances we associate with drive-in restaurants. They perform a valuable service by slowing traffic and encouraging it to use other routes. The round-about traffic circle is making a comeback. It's a thoroughly respectable traffic engineering device that can lend scenic appeal. A recent article in the *ITE Journal* demonstrated convincingly that roundabouts have higher capacity with better safety than normal intersections in most cases.

In the emerging Third Motor Age, the U.S. is moving toward an intermodal transportation policy – an understanding that growth in automobile mobility is not infinitely sustainable and that other modes of transportation (walking, transit) must satisfy a greater portion of travel demand. This is evident at all levels of government. The Federal ISTEA legislation set an unexpectedly strong course toward intermodalism. Florida and Texas, suddenly finding themselves highly urbanized, have moved rapidly with intermodal policies. Ten U.S. cities have installed new light-rail systems in the last decade, and several are expanding. Portland, Baltimore and Denver have demonstrated impressively how light rail can be a stimulus for better land use and urban design.

The Third Motor Age will see urban designers, environmentalists, community activists and advocates of livability permeating transportation planning. Engineers, who have traditionally dominated transportation planning and design, will ultimately respond with creativity in devising operable standards of assuring new qualities, such as livability. In fact, terms like “parkways,” “boulevards” and “signature streets” are already entering the road planning vocabulary. The design of streets as premier urban spaces, once an exciting and promising endeavor, is poised for revival.