

This article on roundabouts continues from last week (August 16, 2012). People often ask, “How do roundabouts compare with signalized intersections?” So today I address roundabouts versus signalized intersections.

The popular US Department of Transportation, Federal Highway Administration (FHWA) Informational Guide only focuses on design of circular roundabouts, but many of the roundabouts in Trinidad and Tobago and other Caribbean islands have odd (non-circular) shapes, most having been introduced more than 50 years ago.

I suppose it is intuitive, especially in engineering design, to consider a roundabout as being circular, but in the case of circumstances with limited access to resources to acquire and reconfigure surrounding land uses at an existing intersection, technical analysis must be based on the theories and practice of those who brought to us and successfully managed these roundabouts many decades ago.

In August 2010, I presented a paper at the Annual Meeting of the Institute of Transportation Engineers, held that year in Vancouver, titled “*Operational Improvements to a Skewed, Elliptical Roundabout in Port of Spain, Trinidad and Tobago.*” The example used was the Roxy Roundabout, which was discussed last week. In fact, the operations of that roundabout were recently rearranged with the current traffic management measures in that area.

The paper attempted to provide a simple, yet effective approach for analysing existing non-traditional roundabout intersections. It concluded that a traditional circular roundabout appears to give the ultimate long-term solution, which could more easily be considered in planning and reserving in new land developments, rather than adapting existing, constrained layout settings.

Traffic operations

For most two-lane roadways, a simple, two-phase signal control with low-turning flows will likely result in a higher intersection capacity than a roundabout. Intersection capacity is likely to be similar for roundabouts and signalized intersections if the signal has three signal phases. In installations that would require four or more phases, roundabouts generally result in a higher intersection capacity.

When comparing a roundabout’s operation with that of a traffic signal, it is important to recognize that outside the intersection’s peak hours when traffic demands are lower, roundabouts result in little or no delay to motorists, whereas a signal will always result in delay, even under extremely low flow conditions.

At intersections with multiple through travel lanes on the intersecting streets, a traffic signal usually will have a higher intersection capacity. However, it should be noted that many multi-lane streets have been built primarily to provide adequate capacity at the signalized intersections. In some cases, the capacity of roundabout intersections may be sufficient to either avoid having to widen streets from two-lane roadways to multi-lane roadways or allow multi-lane roadways to be reduced to two-lane roadways. This would be particularly desirable in areas where jurisdictions are attempting to create a more pedestrian friendly environment by providing a narrower roadway cross section.

With a roundabout, it is unnecessary for traffic to come to a complete stop when no conflicts are present. When there are queues on one or more approaches, traffic within the queues usually continues to move, and this is typically more

tolerable to drivers than a stopped or standing queue. The performance of roundabouts during off-peak periods is particularly good compared with other intersection forms, usually with very low average delays.

For congested roundabouts as result of heavy directional (unbalanced) entry flows, there is an opportunity to meter the roundabout (that is, control the rate of directional entry flow) in order to balance the movement to as well as circulating within the roundabout.

Spatial Requirements

Roundabouts often require more space in the immediate vicinity of the intersection than comparable stop-controlled or signalized intersections. This space requirement is dictated by a number of factors, including the size and shape of the roundabout (e.g., circular versus noncircular).

To the extent that a comparable roundabout would outperform a signal in terms of reduced delay and thus shorter queues, it will require less queue storage space on the approach legs. If a signalized intersection requires long or multiple turn lanes to provide sufficient capacity or storage, a roundabout with similar capacity may require less space on the approaches. As a result, roundabouts may reduce the need for additional right-of-way on the links between intersections, at the expense of additional right-of-way requirements at the intersections themselves.

Aesthetics

Roundabouts offer the opportunity to provide attractive entries or centrepieces to communities. Landscaping is a desirable aesthetic feature and can be installed on the central island and splitter islands as long as sight-distance requirements are met. It

may be possible to place monuments and art in some portions of the central island if they do not pose a significant safety hazard to errant vehicles.

Final part next week: safety, operation and maintenance costs, and environmental comparisons.

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