## 2.2.1 Innovative GIS Applications for Traffic Engineering

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For many years Geographic Information Systems for Transportation (GIS-T) have been important tools for transportation modelers, urban planners and other professionals, affording them access to and analysis of geospatial transportation data of ever-growing volume, variety, and complexity. GIS-T technologies enable transportation professionals to perform complex analysis with greater efficiency and do so in a better-informed way. These virtues have yet to be fully realized at the microscopic traffic level. Traditionally, GIS-T applications are associated with a high-level view of transportation networks as systems of links, or arcs, and nodes. Applications in traffic modeling and operations depend on a dynamic (time dependent) microscopic lane-based urban and rural transportation facilities.

There is growing interest in a viable lane-based GIS. Various models for such a technology have been proposed in the literature, but for the most part abandoned in practice for their intractability. Such a high-fidelity, geographically accurate representation of highways, streets and intersections as a system of topologically connected, adjacent, and even opposing lanes capable of supporting detailed traffic inventory and analysis has until recent years remained elusive. This paper summarizes the limitations of traditional GIS-T for traffic, the motivation for such a technology, and recent developments in the application and extension of GIS to traffic analysis. This paper also highlights a plausible future and potential of a GIS for traffic engineering. An example of a large scale deployment of this technology for Phoenix, AZ will be shown. This example is a component of an ongoing project between Caliper Corporation and the Maricopa Association of Governments and is believed to be the largest deployment of such technology worldwide.