A High Performing and Scalable Model for   
Computing and Visualizing Urban Transit Accessibility

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**1 INTRODUCTION**

Accessibility is an essential component of urban development and in order to pursue meaningful infrastructural developments or analyses, one requires both accurate and scalable measures of urban accessibility. Such measures for accessibility play an important role in areas such as road development, city district planning, distribution of amenities, access to healthcare, and so forth. More generally, accessibility measures are vital for supporting equitable and optimal distribution of resources across urban landscapes. Despite the importance of such measures, much of past accessibility research only considers a few modes of travel. These include driving, biking, and walking, but overlook the importance of public transit as a primary mode of travel. (reference: Liu, S., Zhu, X., 2004. An integrated GIS approach to accessibility analysis. Trans. GIS 8, 45–62.). This may be for a few reasons such as a lack of standardized public transit data, or simply a lack of routing engines that can efficiently model complex journeys through transit networks.

Being able to measure urban transit accessibility is essential and more important than it has ever been for a few major reasons. First, as society undergoes a Third Industrial Revolution, much focus will have to be given to urban and regional planning. (Roberts, Brian. (2015). The Third Industrial Revolution: Implications for Planning Cities and Regions. Workiing Paper Urban Frontiers. 1.) Sharing economies and sustainability driven planning will undoubtedly increase our dependence on public transit and electric vehicles, although much of the population is not likely to own electric cars anytime soon (need a reference lol). Not to mention, car dependence generally has poor outcomes on human health and the environment through greenhouse gas emissions, traffic congestion, accidents, and has even been linked to obesity related disorders. (Sallis, J.F., Frank, L.D., Saelens, B.E., Kraft, M.K., 2004. Active transportation and physical activity: opportunities for collaboration on transportation and public health research. Transport Res. A – Pol. 38, 249–268.).

Secondly, we need to recognize that certain population segments do not readily have access to private car travel, and that these segments will always exist to some degree (need a refence). Considering that they be marginalized, elderly, or youth population, all tend to rely on public transit and also tend to be more vulnerable relative to other social segments. [statistic from our presentation on how many use transit in canada]. Therefore, modeling transit accessibility is paramount in urban planning when considering society as a whole.

To address the lack of standardized methods for obtaining transit accessibility information, this research responds with a simple, scalable, and high performing methodology to accomplish such task. We limited travel modes to walking, and public transit (bus, metro, etc.) as one would use realistically, and perform a case study on Vancouver using cultural amenities such as museums, libraries, art galleries, and theatres.