Noah Tigner

GIS II

Lab 2

Summary Report

A number of maps have been provided to illustrate the accessibility and impact of the libraries in Lane County. Land and facilities were included in these maps based on their proximity to the libraries' service areas – the region in which a library is easily accessible. The first map draws a comparison between two ways that the service areas might be drawn, the second illustrates the facilities near these service areas across Lane County, and the third focuses on the Bethel Branch Library's service area in order to provide a higher degree of detail and granularity.

There are two primary ways of analyzing the service areas around a library. The first involves creating a 'Euclidean buffer' – a circle with a set radius that surrounds the centroid of the library being analyzed. The second method uses a variant of Dijkstra's pathfinding algorithm to provide a network analysis of the streets around a library in order to find the area that can be reached within a certain drive time. The map *Buffer Areas vs. Service Areas Around Public Libraries in Lane County* illustrates both types of analysis. Euclidean Buffers with a radius of 1.5 miles are drawn around each library, overlaid with a network analysis for a drive time of 4 minutes. The buffers typically have a larger area, but the network analysis provide a better picture of the areas in which a library is easily reached. There are cases in which a network service area extends past the buffer, perhaps due to roads with high speed limits or paths without numerous turns or stops. A buffer might include areas that are across a geographic boundary such as a river or freeway, while a network analysis only includes areas that can be reached within a reasonable time. When running a network analysis, the granularity of the area returned

by the analysis can be specified. The higher the precision of the analysis, the longer the analysis will take. For the data used in this analysis, the computational cost was negligible compared to the gains in precision. For these reasons, the other two maps provided use service areas based on high precision network analyses.

A common issue in spatial analysis is the Modifiable Area Unit Problem (MAUP). For example, a taxlot may only be partially overlapped by a service area. Decisions must be made to establish which overlapped or nearby taxlots are considered accessible by the service area. For the two maps not yet described, the solution to this problem involved two steps. First, the centroid (midpoint) of each taxlot (or other geographic area) was calculated. Then, the areas whose centroid was within a 0.25-mile distance of a service area were considered 'accessible'. This ¼ mile distance is arbitrary, but a reasonable distance, since any geographic area whose center is within that distance of a service area (4-minute drive time) is likely within walking distance (or walking distance plus a 4-minute drive). This ensures that areas within a reasonable distance of a service area are considered, regardless of how much of the area is overlapped.

The second map, *Housing, Parks, and Schools in the Service Areas of Lane County Public Libraries*, provides a high-level overview of the facilities and regions accessible to the public libraries in Lane County. Information such as the housing units per service area and the number of public parks per service area are provided as graphs. The final map is *Bethel Library Service Area.* This map prvides information on the facilities, parks, tax lots, and census blocks inside or nearby the service area of the Bethel Branch Library. Information such as the

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cumulative value per taxlot and number of homeowners per taxlot are also provided. Much of the information used in these maps and analyses came from the United States Census.