The total network travel time is 42,841 vehicle minutes, calculated using the sum product of Flow and Congested Time.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Fig 1: Busiest Links by Volume. | | | |
| Link Number | | Street Name | Flow (vph) |
| 7-19 | | Chagrin Rd. | 1846.1 |
| 2-10 | | W. Central Ave. | 1688.65 |
| 4-7 | | Murphy’s Way | 1521.58 |
| 10-2 | | W. Central Ave. | 1483.28 |
| 8-7 | | N. Meridian Road | 1339.62 |
| 1-2 | | W. Central Ave. | 1337.52 |
| 17-9 | | Commerce Ave. | 1308.54 |
| 1-4 | | Hypotenuse St. | 1307.19 |
| 9-17 | | Commerce Ave. | 1300.5 |
| 18-19 | | Bella Luna Rd. | 1296.15 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Fig 2: Links Over Capacity | | |
| Link Number | Street Name | Flow (vph) | V/C ratio |
| 8-7 | N. Meridian Rd. | 1339.62 | 1.48846 |
| 1-2 | W. Central Ave | 1337.52 | 1.48613 |
| 18-19 | Bella Luna Rd. | 1296.15 | 1.44017 |
| 7-8 | N. Meridian Rd. | 1257.02 | 1.39669 |
| 9-8 | N. Meridian Rd. | 1218.31 | 1.35368 |
| 8-9 | N. Meridian Rd. | 1199.1 | 1.33233 |
| 2-1 | W. Central Ave. | 1189.29 | 1.32143 |
| 19-18 | Bella Luna Rd. | 1075.37 | 1.19486 |
| 14-15 | Bella Luna Rd. | 1050.64 | 1.16738 |
| 15-18 | Bella Luna Rd. | 1006.64 | 1.11849 |
| 17-16 | Market St. | 963.005 | 1.07001 |
| 14-13 | Wooden Palate Ave. | 1273.99 | 1.06166 |
| 9-5 | Rush St. | 634.893 | 1.05816 |
| 7-19 | Chagrin Rd. | 1846.1 | 1.02561 |
| 9-10 | N. Meridian Rd. | 921.654 | 1.02406 |

Congestion hotspots occur in the “Downtown” area around Demand Nodes 7 and 9, and on the East Side of Simpletown, in Demand Areas 19 and 14.

2. Characterize Network Performance

Setting α = 0 within the BPR function produced *t*congested = *t*freeflow.

|  |  |
| --- | --- |
|  | Total Travel Time (Vehicle min) |
| Baseline | 42840.9 |
| Freeflow | 33294.7 |

The computed Congestion Index is 1.287. Under congested conditions, Total Travel time in vehicle minutes is increased by a factor of 1.287.

|  |  |  |
| --- | --- | --- |
| FromNode | Street Name | Flow (vph) |
| 7-8 | N. Meridian Rd. | 7 |
| 9-17 | Commerce Ave. | 6 |
| 17-9 | Commerce Ave. | 6 |
| 2-10 | W. Central Ave. | 5 |
| 6-4 | Race St. | 5 |
| 10-11 | S. Meridian Road | 5 |
| 11-10 | S Meridian Rd. | 5 |

Generally, the most-travelled links are in the denser “downtown area,” with the centrally-located N-S and E-W axial streets (N. Meridian Road, Commerce Ave, Central Ave) seeing the most traffic. Of the ring roads, Bella Luna Road carries the greatest volume of traffic, 2-4 times the amount of Circle Freeway North, Circle Freeway South, and Blast Furnace Road. As the model is configured, the central location of the axial roads makes them more attractive for a shortest-path algorithm, whereas the higher-capacity ring roads are hardly utilized at all.

All scenarios divert traffic onto Hypotenuse St., Murphy’s Way, and N. Meridian Road. Circle Freeway South also sees a notable increase in volume, ranging from 3% to 18% over baseline. This increase in volume does not extend to Circle Freeway North, which sees 0 volume change over all three scenarios; Hypotenuse St. and Murphy’s Way instead takes any change in volume resulting from the projects.

Converting from V/C ratios to Level of Service (LOS) designations (Table) allows for classification of the total vehicle minutes on the Simpletown Network (Fig ). Based on this analysis, the Race St. / Rush St. Couplet + Skid Road Closure alternative eliminates the greatest percentage of LOS F and LOS D conditions on the network, with significant increases to LOS C. Based on this analysis,

|  |  |  |
| --- | --- | --- |
| **Level of Service** | **Description** | **V/C range** |
| A | Free-flow conditions. | 0.00 to 0.60 |
| B | Reasonably unimpeded operations. | 0.61 to 0.70 |
| C | Stable operations, with restrictions. | 0.71 to 0.80 |
| D | Approaching unstable operations. | 0.81 to 0.90 |
| E | Operations with significant intersection approach delays. | 0.91 to 1.00 |
| F | Operations with extremely low speeds. | Greater than 1.00 |
| Source: Transportation Research Board, *Highway Capacity Manual, Special Report 209*  (Washington, D.C., 1994) | | |