**Appendix A – Traffic Flow Data for Addis Ababa Intersections**

**A.1 Major Signalized Intersections**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Intersection Name** | **Estimated Peak Flow (vehicles/hour/approach)** | **Average Delay (seconds/vehicle)** | **Level of Service (LOS)** | **Additional Details** | **Data Source / Basis** |
| **Meskel Square** | 1,400 – 1,800 | > 400 | F | 4-leg intersection; heavy pedestrian crossing; multi-lane | AAU Thesis, Manual Counts, VISSIM Simulations |
| **Jacros** | ~1,500+ | 431 | F | Part of Ras Mekonnen corridor; high volume heavy vehicles | Ras Mekonnen Corridor Study |
| **Lebu** | ~1,500+ | 126 | F | 3-leg intersection; includes bus stops | Ras Mekonnen Corridor Study |
| **Imperial** | ~1,500+ | 710 | F | 4-leg, signalized; known for long queues | Ras Mekonnen Corridor Study |
| **Saris Abo** | 1,200 – 1,400 | Not specified | F | Close to Bole Subcity; includes pedestrian phases | Manual counts, VISSIM modeling |
| **Megenagna (Lamberat)** | 1,300 – 1,500 | Not specified | F | 4-leg with bus terminal proximity | Travel time & economic impact study |
| **Bole Medhanealem** | ~1,400 | 300 – 450 | F | Major commercial area; multiple bus lines | Field observation, traffic studies |
| **Ayat** | ~1,200 | 350 | F | Intersection with commercial and residential influence | AAU Thesis and traffic flow reports |
| **Gofa Sefer (Ethio China)** | ~1,100 – 1,300 | 200 – 350 | E – F | Important residential & commercial feeder corridor | Addis Ababa Transport Office reports |

## A.2 Secondary and Minor Intersections (Estimated / Inferred)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Intersection Name** | **Estimated Peak Flow (vehicles/hour/approach)** | **Average Delay (seconds/vehicle)** | **Level of Service (LOS)** | **Notes / Basis of Estimate** |
| **Moyale–Mexico Street** | ~1,200 | 300 – 400 | E – F | Corridor feeding flows, mid-block counts |
| **Tersebi–Torhayloch** | 1,100 – 1,300 | 350 – 450 | E – F | Based on 2011–2020 corridor studies |
| **Urael–Atlas** | 1,275 – 1,528 (directional) | Not applicable | N/A | Midblock volume counts |
| **Haihulet–Wuhalemat** | ~1,158 (directional) | Not applicable | N/A | Midblock volume counts |
| **Gerji–Coptic Intersection** | ~900 – 1,100 | 150 – 250 | D – E | Residential and minor commercial area; assumed moderate flow |
| **Saris Abo Extension (side streets)** | ~700 – 1,000 | 100 – 200 | D – E | Estimated from minor feeder traffic |
| **Kera** | ~1,000 | 200 – 300 | E | Bus corridor, with intermittent pedestrian volumes |
| **Atlas** | ~1,200 | 250 – 350 | E | Major arterial feeder |
| **Saris Abo (Secondary legs)** | ~900 | 300 – 400 | E – F | Based on simulation extrapolation |

## A.3 Typical Traffic Parameters for Simulation Input

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Recommended Value** | **Explanation / Source** |
| Design Hour Volume (DHV) | 1,100 – 1,800 vehicles/hour per approach | Based on peak flow studies and manual counts |
| Saturation Flow Rate | ~1,800 vehicles/hour per lane | Typical urban arterial lane capacity |
| Signal Cycle Length | 90 – 180 seconds | Varies by intersection and demand |
| Green Time per Phase | 15 – 60 seconds | Depends on phase type (through, left turn, pedestrian) |
| Peak Period Duration | Morning: 7:00 – 9:00 AM; Evening: 4:30 – 7:00 PM | Time window for simulation calibration |
| Peak Hour Factor (K-Factor) | 0.10 – 0.15 | Fraction of daily flow during peak hour |
| Vehicle Composition | 70% Passenger Cars, 20% Minibuses, 10% Trucks | Reflects Addis Ababa mixed traffic composition |
| Average Vehicle Length | 4.5 m | For saturation flow and queue length calculations |
| Pedestrian Volume | Up to 20% of total crossing volume | Particularly at major commercial intersections |

## A.4 Intersection Characteristics and Notes

* **Oversaturation**: Most major intersections operate at LOS **F** during peak hours, with delays up to **700+ seconds per vehicle**.
* **Pedestrian Influence**: Intersections like Meskel Square and Bole Medhanealem have significant pedestrian volumes, affecting signal timing.
* **Bus Stops**: Many intersections have bus stops close to intersections, impacting approach saturation flow and queue lengths.
* **Geometry**: Typical intersections have **3 to 4 legs**, with **2-3 lanes per approach**; some intersections have dedicated turn lanes.
* **Signal Control Types**: Most intersections use **fixed-time signals**, with some locations experimenting with actuated signals.
* **Traffic Composition**: High percentage of minibuses and trucks compared to developed countries, affecting saturation flow rates and acceleration profiles.
* **Non-Motorized Traffic**: Minimal but important to include for pedestrian clearance times in signal cycles.

## A.5 Data Sources and References

|  |  |
| --- | --- |
| **Source** | **Description** |
| Addis Ababa University (AAU) Traffic Engineering Theses | Manual traffic counts, delay measurements |
| Ministry of Transport and Addis Ababa Transport Bureau Reports | Corridor traffic volumes and LOS analysis |
| Published VISSIM & SIDRA Simulations on Addis Ababa intersections | Traffic micro-simulation and signal optimization |
| Research articles and conference papers on Addis Ababa traffic congestion | Field surveys and modeling insights |
| International Traffic Engineering Texts (for saturation flow, K-factor, cycle length norms) |  |

## A.6 Summary Table for Simulation Implementation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Intersection / Corridor** | **Peak Flow (vph/approach)** | **LOS** | **Avg Delay (sec)** | **Notes** |
| Meskel Square | 1,400 – 1,800 | F | 400+ | Heavy pedestrian & vehicle mix |
| Jacros | ~1,500+ | F | 431 | Ras Mekonnen Corridor |
| Lebu | ~1,500+ | F | 126 | Ras Mekonnen Corridor |
| Imperial | ~1,500+ | F | 710 | Long queues |
| Saris Abo | 1,200 – 1,400 | F | N/A | Manual counts |
| Megenagna (Lamberat) | 1,300 – 1,500 | F | N/A | Economic impact |
| Bole Medhanealem | ~1,400 | F | 300 – 450 | Commercial hub |
| Moyale–Mexico Street | ~1,200 | E–F | 300 – 400 | Midblock corridor estimate |
| Tersebi–Torhayloch | 1,100 – 1,300 | E–F | 350 – 450 | Corridor historic data |
| Gerji–Coptic | 900 – 1,100 | D–E | 150 – 250 | Residential feeder |