

MANUAL TRAFFIC COUNT AND CAPACITY ASSESSMENT REPORT

Route: Bhainse – Bhimfedi – Kulekhani – Balkhu Road

Location: Bhimfedi Junction

Survey Period: September 01, 2026 – September 03, 2026

1. Executive Summary

This report presents the engineering analysis of a 3-day manual classified traffic census conducted at the **Bhimfedi Junction** along the Bhainse–Bhimfedi–Kulekhani–Balkhu road corridor. The primary objective of this study is to evaluate the existing traffic volume, assess the baseline **Average Daily Traffic (ADT)**, apply seasonal correction indices to determine the **Annual Average Daily Traffic (AADT)**, and project equivalent traffic stress in **Passenger Car Units (PCU)**.

The evaluation establishes a vital metric baseline used to verify alignment with the infrastructure thresholds defined in the [Nepal Road Standards \(NRS-2070\)](#). The current seasonal data yields an baseline traffic density of **4,942 raw vehicles/day**, scaling to an annual normalized baseline of **5,683 vehicles/day**. When adjusted for structural friction using standard PCU coefficients, this demands an active operational design handling **4,759 PCU/day**.

2. Project Background & Methodology

2.1 Project Site Context

Bhimfedi Junction serves as a critical strategic nodal point linking the Hetauda industrial valley to the Kathmandu capital region via the mid-hill corridor. Directional flows are classified as:

- **Direction A:** Traffic bound northbound towards Kathmandu.
- **Direction B:** Traffic bound southbound towards Hetauda.

2.2 Survey Methodology

A manual classified traffic count was deployed over a 72-hour period encompassing a detailed hourly breakdown from 07:00:00 to 18:00:00 daily.



Temporal Bounds: September 01, 2026, through September 03, 2026.

- **Seasonal Factor Application:** Due to seasonal variations under post-monsoon conditions in September, the Department of Roads (DOR) Highway Management Information System (HMIS) framework dictates a mandatory **Seasonal Variation Factor (SF) of 1.15** to scale short-term counts to annualized volumes.

3. Traffic Data Compilation & Traffic Composition

3.1 Raw Daily Traffic Totals

The cumulative structural volume across the 3-day collection sequence generated **14,826 total vehicle interactions**:

- **Day 1 (2026-09-01):** 4,678 vehicles
- **Day 2 (2026-09-02):** 4,959 vehicles
- **Day 3 (2026-09-03):** 5,189 vehicles
- **Grand Total Volume:** 14,826 vehicles (comprising 7,820 Direction A vehicles and 7,006 Direction B vehicles).

3.2 Modal Split Analysis

The overall baseline Average Daily Traffic (ADT) evaluates to **4,942 vehicles/day**. The traffic spectrum breaks down into the following operational modal distribution:

- **Motorcycles (MC):** 1,891 daily units, constituting the highest single slice of modal layout at **38%**.
- **Utility Vehicles:** 1,806 daily units, establishing **37%** of the core flow.
- **Four-Wheel Drive Vehicles (4W):** 451 daily units at **9%**.
- **Micro Buses:** 234 daily units at **5%**.
- **Medium/Light Freight Trucks:** 15 daily units.
- **Agricultural Equipment (Tractors):** 3 daily units.
- **Local Commuter Transit (Motorized 3-Wheelers):** 38 daily units.
- **Heavy Freight Infrastructure (Multi-Axle/Heavy Trucks/Big Buses):** Registered 0 units passing this junction during this specific short-term September operational logging window.

4. Engineering Refinement: Filtering & PCU Conversions

4.1 Traffic Analysis Excluding Localized Commuter Nodes

To isolate heavy economic and regional logistics cargo paths from small, highly localized neighborhood short-distance transfers, the workbook isolates traffic by **Excluding MC (Motorcycles) and Rickshaws**.

- **Total Core Regional ADT: 3501 vehicles/day.**
- **Filtered Dynamic Composition:** Within this adjusted commercial stream, Utility Vehicles represent **59%** of regional flows, whereas Car components capture **16%**.

4.2 Standard PCU Equivalency Adjustments

To calculate the true physical road space demand, raw AADT values are multiplied by the legal **Nepal Road Standard PCU factors**:

- *Utility Vehicles:* Factor 1.5 → **2,077 AADT** yields **2,077 PCU**.
- *Motorcycles (MC):* Factor 0.50 → **2,175 AADT** compresses to **1,087 PCU**.
- *Car Component:* Factor 1.00 → **562 AADT** yields **562 PCU**.
- *Four-Wheel Drive (4W):* Factor 1.00 → **518 AADT** yields **518 PCU**.
- *Micro Buses:* Factor 1.50 → **269 AADT** scales up to **404 PCU**.

The combined annualized framework yields a **Total AADT of 4,759 PCU/day**. When local motorcycle patterns are fully excluded, the permanent regional transport structural impact settles at **3,671 PCU/day**.

5. Capacity Evaluation & Road Widening Decision Analysis

5.1 Horizon Projections (20-Year Perspective Window)

Applying the standard geometric growth formula mandated by the Department of Roads ($P_n = P_0 * (1 + r)^n$) at a conservative national highway growth coefficient ($r = 6.5\%$) over a 20-year operational planning horizon ($n = 20$), the traffic projections are:

- **Current Volume Baseline (P_0): 4,759 PCU/day**

- **10-Year Intermediate Projection (P_{10}):** ~8,932 PCU/day
- **20-Year Design Target Horizon (P_{20}):** 16,770 PCU/day

5.2 Capacity Threshold & Level of Service (LOS) Evaluation

The Bhimfedi section traverses highly constrained **mountainous and steep terrain**.

1. **Terrain Capacity Constraints:** According to **Table 5-1 of NRS-2070**, while a flat plain 2-lane road can manage 15,000 PCU/day, the strict physical design threshold for a standard two-lane highway in steep mountain terrain drops to **6,000–7,000 PCU/day**.
2. **Current Volume-to-Capacity (V/C) Status:** Current V/C Ratio = $4,759 \text{ PCU/day} / 6,500 \text{ PCU/day}$ (Average Mountain Capacity) = 0.73

A V/C ratio of **0.73** indicates the corridor is operating at reasonable way .The road handles traffic reasonably well, but speed delays are starting to form on steep inclines.

3. **Future Horizon Breakdown:** Within the next 5 to 7 years, compound growth will push daily volumes past 7,000 PCU/day, crossing a V/C ratio of **1.0**. This will degrade the road causing daily traffic gridlock.



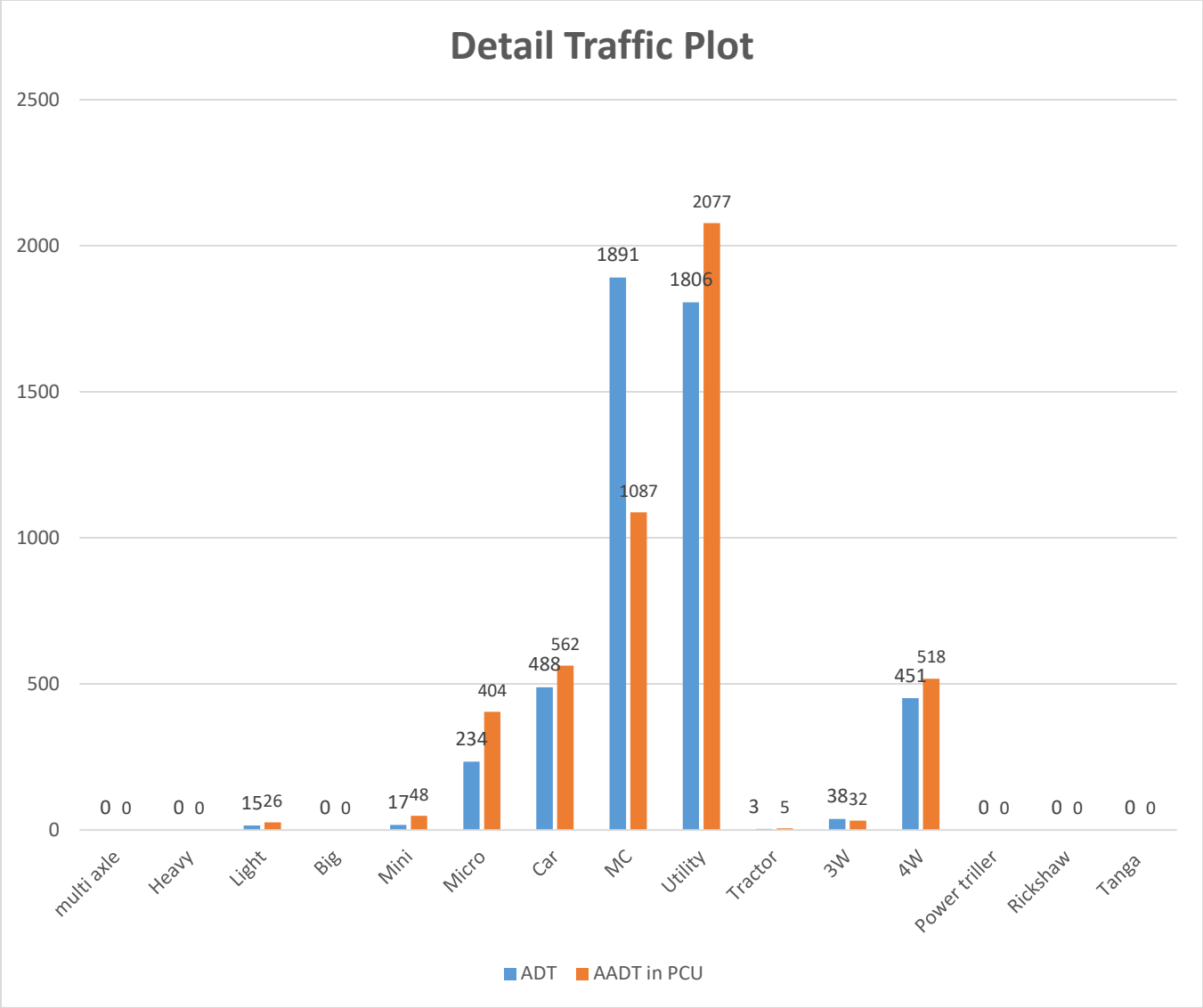
6. Report Conclusion & Recommendations

6.1 Final Engineering Conclusions

- **Volume Validation:** The manual traffic census proves that the Bhimfedi corridor currently acts as a medium-intensity transport link, recording an annualized volume of **4,759 PCU/day**.
- **Congestion Drivers:** Traffic is heavily dominated by light utility vehicles, cars, and motorcycles, which make up over **83%** of the total road occupancy. Long-haul heavy multi-axle freight traffic is currently absent from this segment.
- **Immediate Capacity Status:** The highway operates within its structural limit ($V/C = 0.73$), avoiding full breakdown for now. However, it is steadily approaching its maximum capacity for a mountain road.

6.2 Actionable Planning Recommendations

1. **Immediate Action (Years 0–3):** Maintain the existing 2-lane layout. Prioritize structural optimization by constructing localized uphill passing bays and dedicated climbing lanes at steep, narrow curves to prevent slow-moving utility vehicles from bottlenecking traffic.
2. **Intermediate Action (Years 5–10):** Begin formal engineering design reviews, environmental impact assessments, and land acquisition planning. The 10-year projected load (~8,932 PCU/day) will exceed the capacity of the mountain terrain, making future road widening essential.
3. **Long-Term Horizon Target (Year 20):** Because the 20-year projected volume (**16,770 PCU/day**) approaches the **20,000 PCU expressway threshold** defined in the Nepal Road Standards (NRS-2070), the corridor must eventually be expanded into a multi-lane divided highway to safely manage long-term regional trade demand.



Detail data of Manual Counting of Traffic

		Manual Traffic Count																																
Location : Bhimfedi (Bhainse -Bhimfedi-kulekhani-Balkhu road)												Direction a: Towards Kathmandu								Seasonal variation factor : 1.15														
Data collected from : 01-Sep -2026												Direction b: Towards Hetauda																						
Data collected to : 03-Sep- 2026																																		
Date	Start Time (Hrs)	Motorized Vehicle																								Non-motorized Vehicle						Total		
		Truck						Bus						Car		Motor Cycle		Utility Vehicle		Tractor		Motorized Three Wheeler		Four Wheel Drive		Power Tiller		Rickshaw		Bullock Cart/ Hand Cart/ Tanga				
		Multi Axle		Heavy		Light		Big		Mini		Micro																						
		a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	Total
01-Sep-2026	Daily Total	0	0	0	0	6	5	0	0	6	7	112	130	261	206	1152	603	853	852	3	1	27	22	158	274	0	0	0	0	0	0	2578	2100	4678
02-Sep-2026	Daily Total	0	0	0	0	9	13	0	0	4	6	154	16	235	271	1170	693	897	1029	3	0	20	15	132	292	0	0	0	0	0	0	2624	2335	4959
03-Sep-2026	Daily Total	0	0	0	0	0	12	0	0	8	19	162	128	207	285	1218	837	848	939	0	1	14	15	161	335	0	0	0	0	0	0	2618	2571	5189
Total		0	0	0	0	15	30	0	0	18	32	428	274	703	762	3540	2133	2598	2820	6	2	61	52	451	901	0	0	0	0	0	0	7820	7006	14826
Grand Total		0	0	0	0	45	0	0	50	0	702	0	1465	0	5673	0	5418	0	8	2	61	52	1352	0	0	0	0	0	0	0	14826	0	14826	
Average daily traffic (ADT)		0	0	0	0	15	0	0	17	0	234	0	488	0	1891	0	1806	0	3	2	61	52	451	0	0	0	0	0	0	4942	0	4942		
Composition (%)		0%	0%	0%	0%	0%	0%	0%	5%	0%	10%	0%	38%	0%	37%	0%	0%	0%	1%	2%	61%	52%	9%	0%	0%	0%	0%	0%	100%	0%	100%			
Total ADT Exc MC and Rickshaw		3051																												0	0	0		
Composition Exc MC and Rickshaw (%)		0%	0%	0%	0%	1%	0%	8%	0%	16%	0%	59%	0%	1%	0%	15%	0%	0%	0%	1%	51%	0%	0%	0%	0%	0%	0%	100%	0%	0%				
Average annual daily traffic (AADT)		0	0	0	0	17	0	19	0	269	0	562	0	2175	0	2077	0	3	2	61	52	518	0	0	0	0	0	0	5683	0	5683			
AADT Exc MC and Rickshaw		0	0	0	0	17	0	19	0	269	0	562	0	0	0	2077	0	3	2	61	52	518	0	0	0	0	0	0	3509	0	3509			
PCU factor		4	3	0	1.5	3	2.5	1.5	0	1	0	0.5	0	0.5	0	1	0	1.5	2	61	52	1	1.5	0.5	2	0	0	0	0	0	0			
AADT in PCU		0	0	0	26	0	48	0	404	0	562	0	1087	0	2077	0	5	2	61	52	518	0	0	0	0	0	0	4759	0	4759				
AADT in PCU Exc MC and Rickshaw		0	0	0	26	0	48	0	404	0	562	0	0	0	2077	0	5	2	61	52	518	0	0	0	0	0	0	3671	0	3671				