HIGHWAY DESIGN PROJECT REPORT

Introduction

The introduction should be written in English. In this section a short description of project must be presented which includes; data and information used for the project, brief definition of applications and calculations made, special cases or assumptions if any exists. Introduction length is expected to be 400-600 words length.

1. Design Traffic Calculation and Selection of Highway Geometric Standards

T_0 = 650000 veh
Percentage of heavy vehicle = 14% (10 + The digit before last digit of student number)
Percentage of passenger car = 100% - 14% = 86%
1 heavy vehicle = 2 passenger car units
T_0 = 650000*(0.86*1+0.14*2) = 741000 pcu/year

$T_n = T_0*(1+r)^n$
r = 2% (The last digit of student number)
Service life: 20 years
$T_{20} = 741000*(1+0.02)^{20} = 1101087$ veh/year

$$\text{AADT} = \frac{1101087}{365} = 3016,7 = 3017 \text{ pcu/day}$$

Daily Hour Traffic = Annual Average Daily Traffic * K

$$K = \frac{1}{6}$$

$$\text{DHT} = \frac{3017}{6} = 502.8 \approx 503 \text{ pcu/hr}$$

DHT = 503 < 800 pcu/hr, so 3rd class highway is selected.

Straight distance between endpoints = 618.22 m
Elevation difference between endpoints = 50 m

$$\text{Straight line slope} = \frac{50}{618.22} = 0.081 = 8.1\%$$

Design Traffic (pcu/hr)	: 503 pcu/hr
Topography	: Undulating
Design Speed (km/hr)	: 60 km/hr
Min. Horizontal Curve Radius (m)	: 200 m
Min. Crest Vertical Curve Radius (m)	: 5000 m
Min. Sag Vertical Curve Radius (m)	: 2000 m
Max. Grade (%)	: 8%
Max. Super-elevation (%)	: 8%
Crossfall (%)	: 2%
Lane Width (m)	: 3 m
Shoulder Width (m)	: 1 m

Carriageway Width (m) : 8 m
Right-of-Way Width (m) : 20 m

2. Calculations about zero polygon

Max. grade for 3rd class highways on undulating topography is 8%.,
Straight line slope = 8.1% > 8%
Slope = 8%

1st zero polygon study, radius = $\frac{5}{8\%} = 62.5\,\text{m}$

Zero polygon is 525m behind, so new radius = 62.5 + 525/10 = 115m

2nd zero polygon study, radius = 115m

Zero polygon is 49m behind. So last compass radius is increased to 164m and zero polygon reached to the endpoint.
Last compass slope = 5/164 = 3%

3. Calculations of Route Survey and Horizontal Curves

Calculations of all horizontal curves (Δ, R, t, L_c and e) on the route should be written in detail.

$\Delta = 139.89°$
R = 200 m

$$T = 200 * \tan(\frac{139.89°}{2}) = 547.86\,\text{m}$$

$T_{measured}$ = 547.90 m

$$L = \left(\frac{200 * 139.89 * \pi}{180}\right) = 488.31\text{m}$$

$L_{measured}$ = 488.32 m

$$e = 200 * \sec\left(\frac{139.89}{2}\right) - 200 = 383.22\,\text{m}$$

$e_{measured}$ = 383.26 m

4. Calculation of Stations' Kilometers

Kilometer of critical stations on the route should be given as the following

Station	Km
A	0+000
PC	$0+403^{67}$
B	$0+647^{83}$
PT	$0+891^{99}$
C	$1+160^{19}$

5. Ground Elevations used on the plan and profile

Ground elevations of all stations on the plan should be given as the following.

Station	Km	Ground Elevation (m)
A	0+000	625.00
1	$0+048^{27}$	630.00
H_1	0+100	630.70
2	$0+125^{79}$	630.00
H_2	0+200	626.92
3	$0+247^{80}$	630.00
4	$0+278^{22}$	635.00
5	$0+299^{52}$	640.00
6	$0+317^{36}$	645.00
7	$0+340^{04}$	650.00
8	$0+366^{18}$	655.00
PC	$0+403^{67}$	659.28
9	$0+408^{08}$	660.00
10	$0+451^{77}$	665.00
11	$0+488^{02}$	670.00
H_5	0+500	671.15
12	$0+568^{44}$	670.00
13	$0+589^{61}$	665.00
H_6	0+600	663.56
14	$0+628^{18}$	660.00
B	$0+647^{83}$	659.44
15	$0+700^{48}$	655.00
16	$0+734^{62}$	650.00
H_8	0+800	649.06
17	$0+846^{69}$	650.00
18	$0+882^{38}$	655.00
PT	$0+891^{99}$	656.96
19	$0+906^{38}$	660.00
20	$0+918^{05}$	665.00
21	$0+935^{18}$	670.00
22	$0+957^{43}$	675.00

23	$0+983^{46}$	680.00
H_{10}	1+000	682.70
24	$1+019^{54}$	685.00
25	$1+045^{94}$	685.00
26	$1+087^{07}$	680.00
H_{11}	1+100	678.80
C	$1+160^{19}$	675.00