On-Ramp Part 1

Isolated

Right Side On-Ramp onto a six-lane freeway

Acceleration Lane length = 900 ft

FFS Main = 65 mi/h

FFS Ramp = 35 mi/h

Level Terrain

10% Heavy

Freeway demand volume: 2100 veh/h

Ramp demand volume = 800 veh/h

PHF = 0.84

Driver Pop: Mixed, CAF= 0.939, SAF= 0.950

Eq. 12-12

Eq. 14-1

= 2750.3 pc/h

Vr= = 1047.72 pc/h

Eq. 14-3

PFM for 6- lane: 0.5775 + 0.000028(900) = 0.6027

Eq. 14-2

V12: VF PFM

V12: 2750.3 0.6027 = 1657.6 1 pc/h

VF0: VF + VR VF0: 2750.3 + 1047.72 = 3618.02 pc/h

Eq. 14-14

V3: VF – V12 V3: 2750.3 – 1657.6 = 1092.7 pc/h

V3 is less than 2700 pc/h/ln

Eq. 14-20

VR12: V12 + VR VR12: 1657.6 + 1047.72 = 2705.3 pc/h < 4600 pc/h

Eq. 14-21

Cmda  pc/h

Eq. 14-22

DR: 5.475 + 0.00734(VR) + 0.0078 (V12) – 0.00627 (LA)

DR: 5.475 + 0.00734(1047.72) + 0.0078(1657.6) – 0.00627(900) = 20.52 pc/mi/ln

LOS C 🡪 on the threshold of LOS B

Ex. 14-13

MS  )

Ms ) = .31949

SR 37.3 mi/h

SR mi/h

VOApc/h (500 < VOA < 2300, SO  from Ex. 14.13)

Ex. 14-15

SO mi/h

Smi/h

On-Ramp Service Volume – Part 2

Using Eq. 14-22,

Where,

Using the calculated VF equation and the threshold values for LOS, service flow rates are calculated:

|  |  |
| --- | --- |
| LOS | VF |
| A: DR=10 | 1356.09 pc/h |
| B: DR=20 | 2689.8 pc/h |
| C: DR=28 | 3756.7 pc/h |
| D: DR=10 | 4690.3 pc/h |

For LOS E

The capacity of the facility is 7050/ln from Ex. 14-10, which is larger than the VF for LOS D. So a LOS D is present.

The service flow is calculated in units of pc/h and needs to be converted by multiplying the value by the fHVand PHF.

|  |  |  |  |
| --- | --- | --- | --- |
| Level of Service | Service Flow, Ideal  (pc/h/ln) | Service Flow, Prevailing  (veh/h) | Service Volume  (veh/h) |
| LOS A | 1356.09 | 1356.09 x (.909) = 1232.7 | 1233.7 x (.84) = 1036 |
| LOS B | 2689.8 | 2689.8 x (.909) = 2054 | 2054 x (.84) = 2054 |
| LOS C | 3756.7 | 3756.7 x (.909) = 3414.8 | 3414.8 x (.84) =2868 |
| LOS D | 4690.3 | 4690.3 x (.909) = 4263.5 | 4263.5 x (.84) = 3581.34 |
| LOS E | 5108.7 | 5108.7 x (.909) = 4643.8 | 4643.8 x (.84) = 3900 |

The HCM-Calc results are below for comparison, although I calculated that there will be a LOS D the program did not.

