Topic 6
Uninterrupted Facilities
(Chapter 9)
Traffic Facilities

- **Uninterrupted Facilities**
  - Two-lane highways
  - Multi-lane highways
  - Expressways and Freeways

- **Interrupted Facilities**
  - Intersections
  - Arterials
Uninterrupted Facilities

- **Multilane Highways**
  - Speed limits: 40 ~ 55 mph
  - Traffic volume range: 15,000 to 40,000 per day
  - Partial access control
  - Divided or undivided

- **Freeways**
  - Speed limits: 60 ~ 75 mph
  - Full-access control (except freeway ramps)
  - Divided with median
  - Minimum two lane each direction
Freeway Facilities

- Freeway segments

Basic Off-ramp Basic Weaving Basic On-ramp
Basic Sections: LOS
(HCM Chapter 23)
Prevailing Conditions

- 12 ft lane
- Lateral clearance is 6 ft or greater
- Passenger car only
- Interchange spacing is at least 2 miles apart (0.5 interchange per mile)
- Five lanes each direction for urban freeway
- Grades do no exceed 2 percent
- Commuter drivers
LOS Procedure

- Step 1: Determine Free-flow Speed (FFS)
- Step 2: Determine volume (pc/h/ln)
- Step 3: Calculate density, $k$
- Step 4: Determine LOS (Table 9.33)
LOS Procedure

- Step 1: Determine Free-flow Speed (FFS)

\[
FFS = u_f = BFFS - f_{LW} - f_{LC} - f_N - f_{ID}
\]

- \(BFFS\) – 70 (urban), 75 (rural)
- \(f_{LW}\) – (Table 9.34)
- \(f_{LC}\) – (Table 9.35)
- \(f_N\) – (Table 9.36)
- \(f_{ID}\) – (Table 9.37)
Example 9.13

- $N = 3$;
- $LW = 11$ ft;
- $LC = 3$ ft;
- $ID = 1.5$ per mile
Step 2: Determine volume (pc/h/ln)

\[ q_p = \frac{q}{(PHF)(N)(f_p)(f_{HV})} \]

\[ f_{HV} = \frac{1}{1 + P_T(E_T - 1) + P_R(E_R - 1)} \]

\[ f_p = 0.85 \sim 1.00, \text{ 1.00 for commuter traffic} \]

\[ E_T, E_R \text{ – (Tables 9.25, 9.26, 9.27, 9.28)} \]
E_T and E_R Based on Types of Freeway Segments

- **Extended Segments (Table 9.25)**
  - Grades ≥ 3% but less than ¼ mile, or
  - Grades < 3% and less than ½ mile

- **Segments with Specific Grades (Tables 9.26 and 9.27)**

- **Segments with Specific Downgrades (Table 9.28)**

- **Composite Grade**
  - Two or more consecutive upgrades
  - Grades < 4% or length < 4000 ft (average technique)
  - Otherwise, use truck performance curves
Example 9.11

- **Grade:** 3% - 2000 ft; 2% - 1500 ft;
  
  \[ P_T = 6\%; \]
  \[ P_R = 10\%; \]
LOS Procedure

- Step 3: Calculate density, $k$
  
  
  $k = \frac{q_p}{u_f}$

- Step 4: Determine LOS (Table 9.33)
Example 9.15

- $q = 3000$ vph;
- PHF = 0.85;
- Trucks = 12%
- $L_W = 11$ ft;
- $L_C = 6$ ft;
- $ID = 1$ per mile
- Terrain = level
- $f_p = 1.0$
Applications

- Determine LOS, given $q$, $N$, and $FFS$
- Determine Speed, given $q$, $LOS$, and $FFS$
- Determine $q$, given $LOS$, and $FFS$
- Determine $N$, given $q$, $FFS$, and $LOS$