ARTPLAN 2012 Computational Methodology

Multimodal

For Version 9/11/2012

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User Inputs

$AreaType := 1$

$AADT_1 := 43250$ $K := 0.095$ $D := 0.55$ $PHF := 0.95$

$Length_1 := 2500$	Link length (ft)
$\%HV := 2.5$	Percent Heavy Vehicles
$SegNumLanes_1 := 3$	Number of lanes on segment in one direction
$FFS_1 := 50$	Free-Flow Speed (mi/h)
$Cycle_1 := 120$	Cycle length (sec)
$gC_1 := 0.50$	Main street thru g/C ratio
$ArrivalType_1 := 4$	
$\%RightTurns_1 := 8$	Percent right turns
$MedianType_1 := 1$	0 = None, 1 = Non-Restrictive, 2 = Restrictive
$IntThruLanes_1 := 3$	Number of intersection thru lanes
$LeftTurnBay_1 := 1$	0 = No, 1 = Yes
$W_{outln_1} := 12$	0 = Narrow, 1 = Typical, 2 = Wide, or specific width in ft
$ShoulderBikeLn_1 := 1$	0 = No, 1 = Yes
$PvtCond_1 := 1$	0 = Non-desirable, 1 = Typical, 2 = Desirable
$Sidewalk_1 := 1$	0 = No, 1 = Yes
$SwRdwySep_1 := 1$	0 = Adjacent, 1 = Typical, 2 = Wide
$SwRdwyBar_1 := 1$	0 = No barrier, 1 = Continuous barrier (at least 3' high) or elements (at least 3' high) spaced less than 20 ft apart
$OnStreetParking := 1$	0 = No, 1 = Yes
$ParkingActivity := 2$	0 = Not Applicable, 1 = Low, 2 = Medium, 3 = High
$BusFrequency_1 := 2$	buses/hour

$PassLoadFact := 0.8$ Passenger loading factor

$Amenities_1 := 4$

1 - Poor (No bench or shelter)
2 - Fair (Bench only)
3 - Good (Shelter only)
4 - Excellent (Shelter & Bench)

$BusStop := 1$ 0 = None 1 = Typical, 2 = Major

Calculated or Assumed Inputs

$HourlyDirVol_1 := round(AADT_1 \cdot K \cdot D)$ $HourlyDirVol_1 = 2260$ Auto Directional Hourly Volume (veh/h)

$$MajorStreetFlowRate_1 := \frac{HourlyDirVol_1}{PHF} = 2378.9$$

$IntWidth := 60$ From running time calculation

$SegLength_1 := Length_1 + IntWidth = 2560.0$ ft

$NumAccessPts := 3.79$ From running time calculation Number of access points in peak direction; based on link length

$RunningTime := 38.83$ sec From running time calculation

$$SegAutoRunningSpd := \frac{3600}{5280} \cdot \frac{SegLength_1}{RunningTime} = 45.0$$

Segment auto running speed; does not include control delay (mi/h)

$SegAutoAvgSpd := 31.9$ Segment auto average speed; does include control delay (mi/h)

$R_{p_1} := 1.333$ From signal delay calculations Platoon ratio

$\%Green_1 := 0.667$ From signal delay calculations Percent arrivals on green

$ControlDelay := 15.8$ From signal delay calculations

$ParkStripes := 1$ 0 = Parking spots not striped, 1 = Parking spots are striped (assumed for all on-street parking scenarios)

$CrossStreetSpeed := FFS_1 - 5 = 45$ mi/h (based on T-7F export assumption)

$$CrossStreetLanes := \frac{IntWidth}{12}$$

$CrossStreetLanes = 5$ total lanes in the cross-street (both directions)

$CrossStreetVol := 50\% \cdot MajorStreetFlowRate_1 \cdot 2 = 2378.9$ veh/h (both directions)

$W_{cd} := \text{IntWidth} = 60$ curb-to-curb width of the cross-street (ft)

$g_{walk} := gC_1 \cdot \text{Cycle}_1 = 60.0$ sec

$$\text{AvgPedXingWait} := \frac{0.5 \cdot \left(\text{Cycle}_1 - g_{walk}\right)^2}{\text{Cycle}_1} = 15.0$$ sec Equation 18-67, HCM 2010

$$\text{RTORandPermLT} := \text{MajorStreetFlowRate}_1 \cdot \left(1 - \%\text{Green}_1\right) \cdot \frac{\%\text{RightTurns}_1}{100} = 63.4$$ Conflicting movement approximation (veh/h)

$\text{NumRTIslands} := 0$ # of right-turn channelizing islands

$$p_{pk} := \left| \begin{array}{l} \text{return } 0 \text{ if OnStreetParking} = 0 \\ \text{if OnStreetParking} = 1 \\ \quad \left| \begin{array}{l} 0.2 \text{ if ParkingActivity} = 1 \\ 0.5 \text{ if ParkingActivity} = 2 \\ 0.8 \text{ if ParkingActivity} = 3 \end{array} \right. \end{array} \right.$$ Proportion of on-street-parking occupied

$p_{pk} = 0.5$

$$W_{ol} := \left| \begin{array}{l} \text{return } 10 \text{ if } W_{outln_1} = 0 \\ \text{return } 12 \text{ if } W_{outln_1} = 1 \\ \text{return } 14 \text{ if } W_{outln_1} = 2 \\ \left(\text{return } W_{outln_1}\right) \text{ otherwise} \end{array} \right.$$ Width of outside lane (ft)

$W_{ol} = 12$

$W_{bl} := 5 \cdot \text{ShoulderBikeLn}_1 = 5$ Width of bike lane (ft)

$$W_{os} := \left| \begin{array}{l} \text{return } 0 \text{ if OnStreetParking} = 0 \\ \text{return } 8 \text{ if OnStreetParking} = 1 \end{array} \right.$$ Width of paved outside shoulder (ft)

$W_{os} = 8$

$$W_A := \left| \begin{array}{l} \text{out} \leftarrow 6 \cdot \text{Sidewalk}_1 \text{ if SwRdwySep}_1 = 0 \\ \text{out} \leftarrow 10 \cdot \text{Sidewalk}_1 \text{ if SwRdwySep}_1 = 1 \\ \text{out} \leftarrow 15 \cdot \text{Sidewalk}_1 \text{ if SwRdwySep}_1 = 2 \end{array} \right.$$ Available sidewalk width (ft)

$W_{buf} := 2 \cdot \text{Sidewalk}_1 = 2$ Width of sidewalk/roadway buffer (ft)

Pedestrian Intersection

$F_w := 0.681 \cdot \text{CrossStreetLanes}^{0.514}$ $F_w = 1.557$ Equation 18-69, HCM 2010

$CVol := \frac{RTORandPermLT}{4} = 15.8$ conflicting movements in a 15-min period

$Vol_{xso} := \frac{CrossStreetVol}{4 \cdot CrossStreetLanes} = 118.9$ volume in the outer lane of the cross-street in a 15-min period Equation 18-73, HCM 2010

$F_v := 0.00569 \cdot CVol - NumRTIslands \cdot (0.0027 \cdot Vol_{xso} - 0.1946)$ $F_v = 0.09$ Equation 18-70, HCM 2010

$F_s := 0.00013 Vol_{xso} \cdot CrossStreetSpeed$ $F_s = 0.696$ Equation 18-71, HCM 2010

$F_{delay} := 0.0401 \cdot \ln(AvgPedXingWait)$ $F_{delay} = 0.109$ Equation 18-72, HCM 2010

$PedIntScore := 0.5997 + F_w + F_v + F_s + F_{delay}$ $PedIntScore = 3.05$ Equation 18-68, HCM 2010

Pedestrian Link

$$f_b := \left| \begin{array}{l} \text{return } 5.37 \text{ if } SwRdwyBar_1 = 1 \\ \text{return } 1.0 \text{ if } SwRdwyBar_1 = 0 \end{array} \right.$$

$f_b = 5.37$ Buffer area coefficient

$$W_t := \left| \begin{array}{l} \text{return } (W_{ol} + W_{bl} + W_{os}) \text{ if } p_{pk} = 0 \\ \text{return } (W_{ol} + W_{bl}) \text{ if } p_{pk} \neq 0 \end{array} \right.$$

$W_t = 17.0$ Total width of outside through lane, bicycle lane, and shoulder (ft)

$$W_v := \left| \begin{array}{l} \text{return } W_t \text{ if } MajorStreetFlowRate_1 > 160 \vee MedianType_1 = 2 \\ \left[\text{return } W_t \cdot (2 - 0.005 \cdot MajorStreetFlowRate_1) \right] \text{ otherwise} \end{array} \right.$$

$W_v = 17.0$ Effective total width of outside through lane, bicycle lane, and shoulder (Exhibit 17-17, HCM 2010)

$$W_1 := \left| \begin{array}{l} \text{return } (W_{bl} + W_{os}) \text{ if } p_{pk} < 0.25 \vee ParkStripes = 1 \\ (\text{return } 10) \text{ otherwise} \end{array} \right.$$

$W_1 = 13.0$ Effective width of combined bicycle lane and shoulder (Exhibit 17-17, HCM 2010)

$W_{aA} := \min(W_A, 10) = 10.0$ Adjusted available sidewalk width

$f_{sw} := 6 - 0.3 \cdot W_{aA} = 3.0$ Sidewalk width coefficient

$F_w := -1.2276 \cdot \ln(W_v + 0.5 \cdot W_1 + 50 \cdot p_{pk} + W_{buf} \cdot f_b + W_{aA} \cdot f_{sw})$ $F_w = -5.514$

$F_v := 0.0091 \frac{MajorStreetFlowRate_1}{4 \cdot SegNumLanes_1}$ $F_v = 1.804$

$$F_s := 4\cdot\left(\frac{SegAutoRunningSpd}{100}\right)^2$$ $F_s = 0.808$

$PedLinkScore := 6.0468 + F_w + F_v + F_s$ $PedLinkScore = 3.15$

Pedestrian Segment (i.e., combination of link and intersection)

$S_{pf} := 3.3$ ft/s Recommended value for pedestrian free-flow walking speed with > 20% elderly pedestrians.

$D_c := Length_1\cdot 0.5 = 1250.0$ worst case, assuming signal with crosswalk on each end of link

$D_d := D_c\cdot 2 = 2500.0$ ft Equation 17-33 HCM 2010 Diversion distance

$g_{walk\_mi} := gC_1\cdot Cycle_1\cdot 0.5 = 30$

$$d_{pc} := \frac{0.5\cdot\left(Cycle_1 - g_{walk\_mi}\right)^2}{Cycle_1} = 33.8 \quad \text{sec}$$ crossing delay

$$v_p := \frac{80}{60\cdot 6} = 0.222$$ ped/ft/min Equation 17-25 HCM 2010

$$S_p := \left(1 - 0.00078\cdot v_p^{\,2}\right)\cdot S_{pf} = 3.3$$ Equation 17-26 HCM 2010 Pedestrian walking speed

$PedSegScore := 0.318\cdot PedLinkScore + 0.220\cdot PedIntScore + 1.606$ Equation 17-36 HCM 2010

$PedSegScore = 3.28$ Pedestrian perception index

Bicycle Intersection

$W_t := W_{ol} + W_{bl} + OnStreetParking\cdot W_{os}$ $W_t = 25$

$F_w := 0.0153\cdot W_{cd} - 0.2144\cdot W_t$ $F_w = -4.442$

$$F_w := 0.0066 \cdot \frac{MajorStreetFlowRate_1}{4 \cdot IntThruLanes_1} \qquad F_v = 1.308$$

$$BikeIntScore := 4.1324 + F_w + F_v \qquad BikeIntScore = 1.00$$

Note: The HCM 2010 provides a method to calculate delay to bicyclists at signalized intersections; however, this delay is not used as a basis for determining LOS.

Bicycle Link

$$W_e := \begin{cases} \max(W_v - 10 \cdot p_{pk}, 0) & \text{if } W_{bl} + W_{os} < 4 \\ \max(W_v + W_{bl} + W_{os} - 20 \cdot p_{pk}, 0) & \text{otherwise} \end{cases}$$

From Exhibit 17-21, HCM 2010

$W_e = 20$ ft

$$PctHV_a := \begin{cases} (50) & \text{if } MajorStreetFlowRate_1 \cdot \left(1 - \frac{\%HV}{100}\right) < 200 \wedge \%HV > 50 \\ \%HV & \text{otherwise} \end{cases}$$

From Exhibit 17-21, HCM 2010

$PctHV_a = 2.5$

--- The following calculation is a replacement for the preceding one ---

Calculate the truck factor [per FDOT project # BD-545-81 (PI: Linda Crider)]

$$TF := \begin{cases} out \leftarrow \left(\frac{\frac{MajorStreetFlowRate_1}{4 \cdot SegNumLanes_1} \cdot \frac{\%HV}{100}}{3} \right) \cdot \frac{\%HV}{100} & \text{if } \left(\frac{MajorStreetFlowRate_1}{4 \cdot SegNumLanes_1} \right) \cdot \frac{\%HV}{100} \le 3 \\ out \leftarrow \frac{\%HV}{100} & \text{otherwise} \end{cases} \qquad TF = 0.025$$

$$v_{ma} := \begin{cases} MajorStreetFlowRate_1 & \text{if } MajorStreetFlowRate_1 > 4 \cdot SegNumLanes_1 \\ (4 \cdot SegNumLanes_1) & \text{otherwise} \end{cases}$$

From Exhibit 17-20, HCM 2010

$v_{ma} = 2378.9$ veh/h

$$S_{Ra} := \max(SegAutoRunningSpd, 21)$$

From Exhibit 17-20, HCM 2010

$S_{Ra} = 44.95$ mi/h

$$P_c := \begin{cases} \text{return } 4.5 & \text{if } PvtCond_1 = 2 \\ \text{return } 3.5 & \text{if } PvtCond_1 = 1 \\ \text{return } 2.5 & \text{if } PvtCond_1 = 0 \end{cases}$$

From ARTPLAN's existing methodology

$P_c = 3.5$

$$F_w := -\left(0.005 \cdot W_e^{\,2}\right) \qquad F_w = -2$$

$$F_w := 0.507 \cdot \ln\left(\frac{v_{ma}}{4 \cdot SegNumLanes_1}\right) \qquad F_v = 2.682$$

$$F_s := 0.199 \cdot \left(1.1199 \cdot \ln\left(S_{Ra} - 20\right) + 0.8103\right) \cdot \left(1 + 0.1038 \cdot PctHV_a\right)^2 \qquad F_s = 1.393$$

$$F_{s2} := 0.199 \cdot \left(1.1199 \cdot \ln\left(S_{Ra} - 20\right) + 0.8103\right) \cdot (1 + 10.38 \cdot TF)^2 \qquad F_{s2} = 1.393$$

$$F_p := \frac{7.066}{P_c^{\,2}} \qquad F_p = 0.577$$

$$BikeLinkScore := 0.760 + F_w + F_v + F_{s2} + F_p \qquad BikeLinkScore = 3.41$$

Bicycle Segment (i.e., combination of link and intersection)

$F_{bi} := 1.0$ signalized intersection

$$BikeSegScore := 0.160 \cdot BikeLinkScore + 0.011 \cdot F_{bi} \cdot e^{BikeIntScore} + 0.035 \cdot \frac{NumAccessPts}{\frac{SegLength_1}{5280}} + 2.85$$

$BikeSegScore = 3.70$

$$LOS(score) := \left| \begin{array}{l} \text{return "A" if } score \le 2 \\ \text{return "B" if } score \le 2.75 \\ \text{return "C" if } score \le 3.5 \\ \text{return "D" if } score \le 4.25 \\ \text{return "E" if } score \le 5 \\ \text{return "F" if } score > 5 \end{array} \right.$$

$LOS(PedIntScore) = \text{"C"}$ $LOS(BikeIntScore) = \text{"A"}$

$LOS(PedLinkScore) = \text{"C"}$ $LOS(BikeLinkScore) = \text{"C"}$

$LOS(PedSegScore) = \text{"C"}$ $LOS(BikeSegScore) = \text{"D"}$

Transit Link LOS Computational Steps

$PedLOSGrade_1 := LOS(PedLinkScore) = \text{"C"}$

1. Determine adjustment factors

A. Calculate pedestrian LOS adjustment

$$
\text{PedAdj}(i) := \left|
\begin{array}{l}
\text{return } 1.15 \text{ if } \text{PedLOSGrade}_i = \text{"A"} \\
\text{return } 1.1 \text{ if } \text{PedLOSGrade}_i = \text{"B"} \\
\text{return } 1.05 \text{ if } \text{PedLOSGrade}_i = \text{"C"} \\
\text{return } 1.0 \text{ if } \text{PedLOSGrade}_i = \text{"D"} \\
\text{return } 0.85 \text{ if } \text{PedLOSGrade}_i = \text{"E"} \\
\text{return } 0.55 \text{ if } \text{PedLOSGrade}_i = \text{"F"}
\end{array}
\right.
$$

$$\text{PedAdj}(1) = 1.05$$

B. Calculate passenger load factor adjustment

$$
\text{LoadFact}(i) := \left|
\begin{array}{l}
\text{out} \leftarrow 1.05 \text{ if } \text{PassLoadFact} < 0.3 \\
\text{out} \leftarrow 1.0 \text{ if } \text{PassLoadFact} < 0.7 \\
\text{out} \leftarrow 0.95 \text{ if } \text{PassLoadFact} \le 1 \\
\text{out} \leftarrow 0.85 \text{ if } \text{PassLoadFact} > 1
\end{array}
\right.
$$

$$\text{LoadFact}(1) = 0.95$$

C. Calculate roadway crossing difficulty adjustment

$$
\text{CrossAdj}(i) := \left|
\begin{array}{l}
\text{out} \leftarrow 0.8 \text{ if } \dfrac{\text{MajorStreetFlowRate}_1}{\text{SegNumLanes}_1} < 200 \wedge \text{SegNumLanes}_1 = 1 \wedge \text{MedianType}_1 = 2 \\
\text{out} \leftarrow 0.875 \text{ if } \dfrac{\text{MajorStreetFlowRate}_1}{\text{SegNumLanes}_1} < 350 \wedge \text{SegNumLanes}_1 \le 2 \wedge \text{MedianType}_1 \le 2 \\
\text{out} \leftarrow 0.95 \text{ if } \dfrac{\text{MajorStreetFlowRate}_1}{\text{SegNumLanes}_1} < 550 \wedge \text{SegNumLanes}_1 \le 3 \wedge \text{MedianType}_1 \le 1 \\
\text{out} \leftarrow 1.0 \text{ if } \dfrac{\text{MajorStreetFlowRate}_1}{\text{SegNumLanes}_1} < 775 \wedge \text{SegNumLanes}_1 \le 4 \wedge \text{MedianType}_1 \le 1 \\
\text{out} \leftarrow 1.05 \text{ if } \dfrac{\text{MajorStreetFlowRate}_1}{\text{SegNumLanes}_1} \ge 775 \wedge \text{SegNumLanes}_1 \le 4 \wedge \text{MedianType}_1 \le 1
\end{array}
\right.
$$

$$\text{CrossAdj}(1) = 1.05$$

D. Calculate the amenities adjustment

$$
\text{AmenitiesAdj}(i) := \left|
\begin{array}{l}
\text{return } 0.9 \text{ if } \text{Amenities}_1 = 1 \\
\text{return } 1.0 \text{ if } \text{Amenities}_1 = 2 \\
\text{return } 1.0 \text{ if } \text{Amenities}_1 = 3 \\
\text{return } 1.1 \text{ if } \text{Amenities}_1 = 4
\end{array}
\right.
$$

$$\text{AmenitiesAdj}(1) = 1.1$$

E. Calculate the relative transit speed adjustment

$$S_{Rt} := \min\left(\text{SegAutoRunningSpd}, \frac{49}{1 + \exp\left(-3.54 + \frac{1937}{\text{Length}_1}\right)}\right) = 44.951$$

Equation 17-45 HCM 2010
transit vehicle running speed

$$r_{dt} := 0.540 + 0.0698 \cdot S_{Rt} = 3.678$$

Equation 17-48 HCM 2010
transit vehicle deceleration rate

$$r_{at} := 0.540 + 0.0698 \cdot S_{Rt} = 3.678$$

transit vehicle acceleration rate

$$d_{ad} := \left(\frac{5280}{3600}\right) \cdot \left(\frac{S_{Rt}}{2}\right) \cdot \left(\frac{1}{r_{at}} + \frac{1}{r_{dt}}\right) = 17.927$$

Equation 17-46 HCM 2010
transit vehicle accel/decel delay due to transit stop, minus f_ad term

$$d_{ps} := \left| \begin{array}{l} \text{out} \leftarrow 0 \ \text{ if } \ \text{BusStop} = 0 \\ \text{out} \leftarrow 15 \ \text{ if } \ \text{BusStop} = 1 \\ \text{out} \leftarrow 35 \ \text{ if } \ \text{BusStop} = 2 \end{array} \right.$$

transit vehicle delay due to serving passengers
replacement for Equation 17-49 HCM 2010

$$d_{ps} = 15$$

$$d_{re} := 0$$

Re-entry delay from a bus pull-out. Assume no bus pull-out;

$$d_{ts} := d_{ad} + d_{ps} + d_{re} = 32.927$$

Equation 17-50 HCM 2010
delay due to a transit vehicle stop for passenger pick-up at stop i within the segment

$$t_{Rt} := \frac{3600 \cdot \text{Length}_1}{5280 \cdot S_{Rt}} + d_{ts} = 70.847$$

Equation 17-44 HCM 2010
segment running time of transit vehicle

$$S_{Ttseg} := \frac{(3600 \cdot \text{Length}_1)}{5280 \cdot (t_{Rt} + \text{ControlDelay})} = 19.672$$

Equation 17-52 HCM 2010
travel speed of transit vehicles along the segment

$$\text{RelativeBusSpeed}_1 := \frac{S_{Ttseg}}{\text{SegAutoAvgSpd}} = 0.617$$

$$\text{SpeedAdj}(i) := \left|\begin{array}{l} \text{return } 1.5 \text{ if } \text{RelativeBusSpeed}_i \ge 0.90 \\ \text{return } 1.2 \text{ if } \text{RelativeBusSpeed}_i \ge 0.75 \\ \text{return } 1.0 \text{ if } \text{RelativeBusSpeed}_i \ge 0.60 \\ \text{return } 0.9 \text{ if } \text{RelativeBusSpeed}_i \ge 0.50 \\ \text{return } 0.7 \text{ if } \text{RelativeBusSpeed}_i < 0.50 \end{array}\right.$$

$$\text{SpeedAdj}(1) = 1.0$$

2. Determine Link Bus LOS.

$$\text{ModifiedFrequency}(i) := \text{BusFrequency}_i \cdot \text{PedAdj}(i) \cdot \text{LoadFact}(i) \cdot \text{CrossAdj}(i) \cdot \text{AmenitiesAdj}(i) \cdot \text{SpeedAdj}(i)$$

$$\text{ModifiedFrequency}(1) = 2.30$$

$$\text{BusLOS}(i) := \left|\begin{array}{l} \text{out} \leftarrow \text{"A"} \text{ if } \text{ModifiedFrequency}(i) > 6 \\ \text{out} \leftarrow \text{"B"} \text{ if } 4 < \text{ModifiedFrequency}(i) \le 6 \\ \text{out} \leftarrow \text{"C"} \text{ if } 3 \le \text{ModifiedFrequency}(i) \le 4 \\ \text{out} \leftarrow \text{"D"} \text{ if } 2 \le \text{ModifiedFrequency}(i) < 3 \\ \text{out} \leftarrow \text{"E"} \text{ if } 1 \le \text{ModifiedFrequency}(i) < 2 \\ \text{out} \leftarrow \text{"F"} \text{ if } \text{ModifiedFrequency}(i) < 1 \end{array}\right.$$

$$\text{BusLOS}(1) = \text{"D"}$$

3. Determine Facility Bus LOS.

The values immediately below are from the ARTPLAN output for the example file

$\text{ModifiedFrequency2} := 2.19$ $\text{ModifiedFrequency3} := 1.88$ $\text{Length2} := 1500$ $\text{Length3} := 1700$

$$\text{FacilityAdjBuses} := \frac{\text{ModifiedFrequency}(1) \cdot \text{Length}_1 + \text{ModifiedFrequency2} \cdot \text{Length2} + \text{ModifiedFrequency3} \cdot \text{Length3}}{\text{Length}_1 + \text{Length2} + \text{Length3}}$$

$$\text{FacilityAdjBuses} = 2.15$$

$$\text{FacilityBusLOS} := \left|\begin{array}{l} \text{out} \leftarrow \text{"A"} \text{ if } \text{FacilityAdjBuses} > 6 \\ \text{out} \leftarrow \text{"B"} \text{ if } 4 < \text{FacilityAdjBuses} \le 6 \\ \text{out} \leftarrow \text{"C"} \text{ if } 3 \le \text{FacilityAdjBuses} \le 4 \\ \text{out} \leftarrow \text{"D"} \text{ if } 2 \le \text{FacilityAdjBuses} < 3 \\ \text{out} \leftarrow \text{"E"} \text{ if } 1 \le \text{FacilityAdjBuses} < 2 \\ \text{out} \leftarrow \text{"F"} \text{ if } \text{FacilityAdjBuses} < 1 \end{array}\right.$$

$$\text{FacilityBusLOS} = \text{"D"}$$