**VISSIM CODING ASSUMPTIONS SUMMARY**

## VISSIM Coding

#### Links/Connectors

1. Link Definition: Don't split links unless elements like changes in # of lanes, grade, lane use

restriction, or driver behavior dictate the need. Do not split the link under any structure unless necessary. The intent is to keep VISSIM link definition as close as possible to the freeway segment definition as defined by HCM.

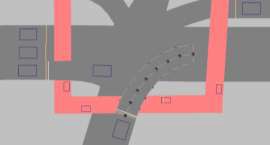
1. Freeway merge, diverge, and weave coding
   * + - The effective merging area should include the entire auxiliary lane (or lane drop) to the farthest extent of the auxiliary lane taper and capture the full effective length utilized by vehicles. Vehicles in VISSIM will utilize the extra link length when necessary, which more accurately models the utilization of the taper area
       - The merge or weaving section should be one link with the number of lanes equal to the number of lanes on the main freeway plus the number of lanes merging onto the freeway.
       - There should only be one connector at the end of the merge link or at the end of a lane drop section (See Figure below). Do not code connectors from lane 1 to lane 1. We can add dummy links later for aesthetic purposes.



1. Arterials: turn bays
   * + - For all the intersections in the network, turn bays shall be coded as separate parallel links to ensure vehicles enter the turn bay at the beginning of the bay and that no unrealistic lane changing occurs between the through and turning vehicles. Connectors should also start at the beginning of the taper and end at the point the bay reaches its full width (not necessarily where the striping begins).





* + - * All right turn connectors at signalized intersections should be coded as Right-Turn-on-Red (RTOR) where permitted and be signal controlled where no RTOR are permitted. For coding, extend turning connector to cover signal head on the link. Add stop bar on the connector and conflict zone at merge location.

#### Traffic Controllers and Behavior Elements

1. Signal head placement and detectors – place signal heads on stop bars or as close as possible. Detectors should be coded as 40’ in length and located 35’ before the stop bar.
2. Pedestrian signal heads and detectors – place crosswalks as close as possible to actual crosswalks. Make sure signal heads are located outside of the traveled right-of-way and that detectors are located upstream of signal heads.
3. Conflict Areas: Use them anywhere two links/connectors overlap in the network
   * Pedestrian Conflicts, RTOR, Permitted Lefts
   * Use the default parameters to begin with and parameters will be adjusted on a global or individual basis. Following are suggested parameters for adjustment.

|  |  |  |
| --- | --- | --- |
| Conflict Areas |  | Front Gap/Rear Gap/ Safety Dist Factor |
| Pedestrian Conflicts | Default |
| RTOR | 1/1/2 |
| Permitted Lefts | 1.5/1/1.0 |
| Left against right (permitted left and right Priority) | Use priority rules |
| Branching conflicts | Default |

1. Priority Rules
   * Priority rules can be used to supplement conflict areas to better replicate real-world conditions.
   * Use priority rules to make left-turn movement yield to opposing right-turns during permissive left-turn phasing.
   * Use priority rules to code “clear the box” conditions at intersections if necessary. Set Min. Gap Time = 0 sec; Min Headway = 30 feet; and Max. Speed = 12 mph.
   * Place red bar slightly upstream of signal head and green bar at the further edge of the intersection box. Set a condition for the priority rule to only be activated during green times of the corresponding signal phase.
2. Lane Change distance:
   * Initially set LC distance based on default values for arterial connectors
   * Initially set LC distance to 1000 feet per lane for freeway segment
   * LC could be adjusted during calibration to replicate desired behavior.
3. Speed reductions for ramps and turns
   * Use posted speed for ramps. If no data on speed is available on ramp speed, use the following:
4. Diamond ramp: 35mph
5. Loop ramp: 25mph
   * For arterial turns: Right = 9-13 mph; Left = 13-17 mph; If non-standard turning radius, use AASHTO Exhibit 3-16
6. Speed decisions at posted speed locations or on directional links at far side of the intersections. Use speed distribution named as the posted limit speed. *Desired speed decisions and/or reduced speed areas should never be used to mimic congestion in the calibration area. The only locations where speed decisions and/or reduced speed areas may be used to replicate congestion from bottlenecks is at the very ends of models, completely out of the study and calibration area and they can only be used to mimic congestion from upstream bottlenecks not included in the model and that are not anticipated to be fixed by the year of the future models.*
7. Node Definition at each intersection.
   * Number Node: use intersection number as defined for the study
   * Add a Node description with the intersecting roadways
   * Guidelines for drawing a node polygon:
8. make sure all intersection movements are included and do not overlap nodes
9. if the node includes link/connectors at different elevations (e.g., overpass), convert the node from polygon to segment nodes and remove those segments that are not part of the at-grade intersection
10. Unsignalized Intersections: the stop signs should be coded at the same locations as the stop bars in the field in addition to the conflict areas/priority rules at the actual vehicle/vehicle conflict zone. For intersections with yielding control, vehicle interactions should be controlled with just conflict areas and/or priority rules. Coding of unsignalized intersections should start with conflict areas and if it is necessary to better replicate real-world conditions, priority rules can be used instead.

#### Vehicle 2D/3D Model

Use I-66 IJR model vehicle fleet distribution for this project.

## Driving Behavior Parameters

#### Suggested behavior types

The following behavior types are suggested for the related freeway and arterial facilities in the model development. New behavior type can be added and driving behavior parameters can be adjusted for each type during calibration. The suggested parameters are summarized in the next section.

* Freeway
  + Freeway basic segment default: Freeway (free lane selection)
  + Freeway weave/merge/diverge: Mainline Weave Merge
  + Freeway reduced capacity: Mainline Reduced Capacity
* Arterial
  + Arterial default: Urban (motorized)
  + Arterial aggressive lane change: Urban (Aggressive Lane Change)
  + Arterial high capacity: Urban High Capacity (Aggressive Lane Change)

#### Freeway and Arterial Suggested Parameters

Use the behavior parameters for freeway and arterial segments in Table 1 to 3 below.

**Table 1 – Freeway Car Following Parameters (May be adjusted during calibration)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Freeway Car Following (Wiedemann 99) Calibration Parameters** | | | | |
| **Calibration Input** | | **Default Value** | **Unit** | **Suggested Values for**  **Freeway Reduced Capacity** |
| CC0 | Standstill distance | 4.92 | ft | 5.5 |
| CC1 | Headway time | 0.9 | s | 1.05 |
| CC2 | Following' variation | 13.12 | ft | 22.97 |
| CC3 | Threshold for entering 'following' | -8 | -- | use default |
| CC4 | Negative 'following' threshold | -0.35 | -- | use default |
| CC5 | Positive 'following' threshold | 0.35 | -- | use default |
| CC6 | Speed Dependency of oscillation | 11.44 | -- | use default |
| CC7 | Oscillation acceleration | 0.82 | ft/s2 | use default |
| CC8 | Standstill acceleration | 11.48 | ft/s2 | use default |
| CC9 | Acceleration at 50 mph | 4.92 | ft/s2 | use default |

**Table 2 – Arterial Car Following Parameters (May be adjusted during calibration)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Arterial Car Following (Wiedemann 74) Calibration Parameters** | | | |
| **Calibration Input** | **Default Value** | **Unit** | **Suggested Value for Urban High Capacity** |
| Average standstill distance | 6.56 | ft | 6.56 |
| Additive part of safety distance | 2.00 | -- | 2.0 |
| Multiplicative part of safety distance | 3.00 | -- | 2.8 |

**Table 3 – Freeway and Arterial Lane Change Parameters (May be adjusted during calibration)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Lane Change Calibration Parameters** | | | | |
| **Calibration Input** | **Default Value** | **Unit** | **Suggested Value** | **Suggested Value** |
| **Freeway Weave Merge** | **Arterial (Aggressive Lane Change)** |
| Maximum deceleration | -13.12 (Own) -9.84 (Trailing) | ft/s2 | -15 (Own) -12 (Trailing) | -15 (Own) -12 (Trailing) |
| -1 ft/s2 per distance | 100 (Arterial) 200 (Freeway) | ft | 200 | 100 |
| Accepted deceleration | -3.28 (Own) -1.64 (Trailing) | ft/s2 | -4 (Own) -3.28 (Trailing) | -4 (Own) -3.28 (Trailing) |
| Waiting time before diffusion | 60 | s | 60 | 60 |
| Min. headway (front/rear) | 1.64 | ft | 1.5 | 1.5 |
| To slower lane if collision time above | 0 | s | 0 | 0 |
| Safety distance reduction factor | 0.6 | -- | 0.25 | 0.25 |
| Max. dec. for cooperative braking | -9.84 | ft/s2 | -23 | -15 |
| Overtake reduced speed areas | Unchecked | -- | Unchecked | Unchecked |
| Advanced Merging | Checked | -- | Checked | Checked |
| Cooperative lane change | Unchecked | -- | Checked | Checked |
| Consider subsequent static routing decisions | Unchecked | -- | Checked | Checked |