TRANSIMS Version 5 Network Files

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Topics

- Overall goals and objectives
- Major concept changes
- File structure changes
- New data fields and features
- Presentation graphics

Goal – Improved User Interface

- Simplify editing
  - Simplify the network coding requirements
  - Reduce the number of coded dependencies between files
  - Use data nesting to avoid sorting problems and record inconsistencies
- Reduce user errors
  - Standardize control keys and key definitions
    - Directory and key names are the same as other files
    - Key names are simplified and clarified
  - Interpret user-provided unit specifications
    - More intuitive/familiar units of measure (e.g., 25.3 mps = ??? mph)
  - Simplify coding and editing

Goal – More Advanced Applications

- Enhance capabilities
  - Coordinated signal timing and phasing plans
    - Intersections coded with multiple nodes (e.g., divided arterials)
    - Near-by signal coordination and traffic circles
  - Metered or random vehicle processing rates by lane
    - Toll plazas, ramp metering, security gates
  - Vehicle type cost by lane and time of day
    - HOT lanes and variable tolls
  - Parking cost and access/egress times by time of day
    - Parking lot choice
  - Impact of vertical grades on truck speeds

Major Concept Changes

- Lane numbers and pocket lanes
- Multi-node signals
- Toll lanes and lane processing rates
- Process links → access links
- Link offsets

File Structure Changes

- Lane ranges
- Link direction
  - link-node → link-dir
- Parking time period nests
- Nested signal files
  - Signal time periods, timing plans, and phasing plans
- Transit schedules
  - route-run-stop list → route-stop-run columns (i.e., time tables)

New Data Fields

- Node – subarea
- Link – area type, grade, divided
- Location – XY → link, offset, setback
- Parking – time-in, time-out
- Lane Use – toll, fixed and variable processing rates
- Timing Plans – cycle length
- Phasing Plans – movement
- Detectors – use type

Facility Type Numbers

- Version 4 → Version 5

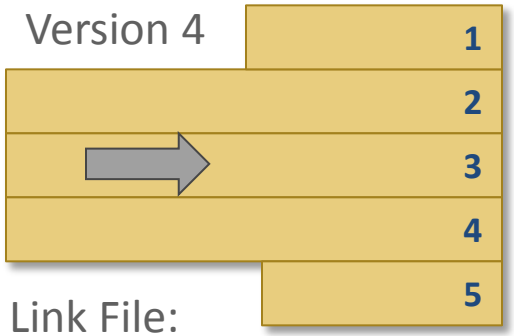
1 = Freeway	Freeway
2 = Expressway	Expressway
3 = Principal	Principal Arterial
4 = Major	Major Arterial
5 = Minor	Minor Arterial
6 = Collector	Collector
7 = Local	**Local Thru**
8 = Frontage	Local
9 = Ramp	Frontage Road
10 = Bridge	Ramp

- Version 4 → Version 5

11 = Walkway	Bridge
12 = Bikeway	**Tunnel**
13 = Busway	**Other**
14 = Light Rail	Walkway
15 = Heavy Rail	Bikeway
16 = Ferry	Busway
17 = External	Light Rail
18 =	Heavy Rail
19 =	Ferry
20 =	External

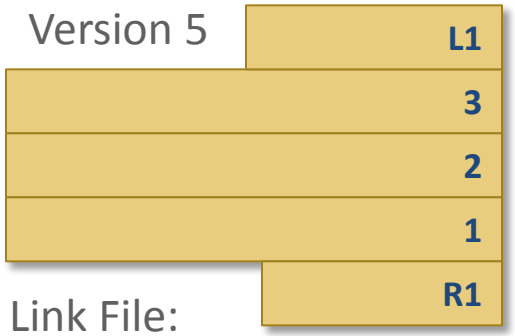
Lane Numbers

- The link file no longer tracks pocket lanes
  - Pocket lanes are numbered separately – L1, R1
- Lanes are now numbered from right to left
  - Greater consistency with other simulation packages and HCM



Link File:
3 thru lanes
1 left pocket
1 right pocket

Pocket File:
lane 1 turn
lane 5 turn



Link File:
3 lanes

Pocket File:
1 right turn
1 left turn

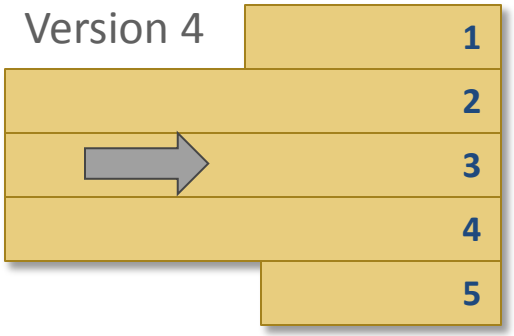
Lane Number Usage

- Impacted network and output files
  - Link, Pocket, Lane-Use, Detector
  - Lane Connectivity → Connection
  - Problem, Snapshot, Occupancy
- Lane coding
  - Version 4: most files require separate records for each lane or lane combination
  - Version 5: all files use lane ranges or lane range combinations
    - Lane range examples: 1..3, R1..3, 3..L1, L1..L2, ALL
    - Fewer records to edit, add, delete, sort
    - Fewer coding errors and less time consuming
    - Software builds and validates the lane relationships

Lane Range Example – Lane Use

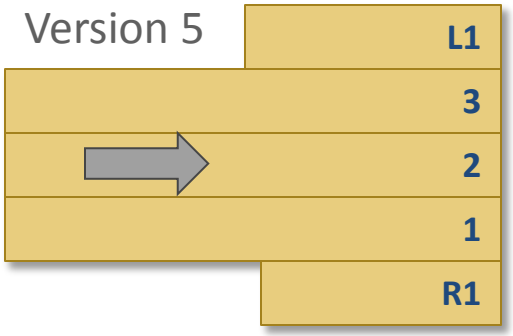
- Limit all lanes to HOV in the AM Peak period

Version 4



Lane Use Records:
Lane 1, HOV, period, etc .
Lane 2, HOV, period, etc.
Lane 3, HOV, period, etc.
Lane 4, HOV, period, etc.
Lane 5, HOV, period, etc.

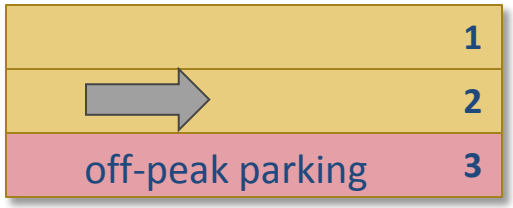
Version 5



Lane Use Records:
Lanes ALL, HOV, period, etc.
or
Lanes R1..L1, HOV, period, etc.

Add a Pocket Lane in Version 4

- Add a pocket lane to a link with parking restrictions



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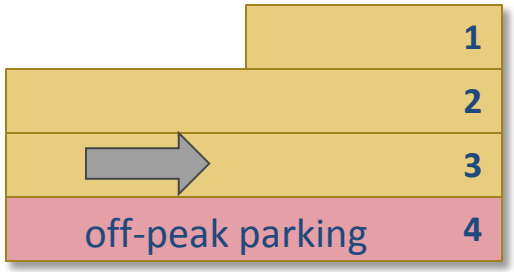


Link File:
3 thru lanes
0 left pocket
0 right pocket

Lane Use File:
Lane 3, closed, period 1
Lane 3, closed, period 2
Lane 3, closed, period 3

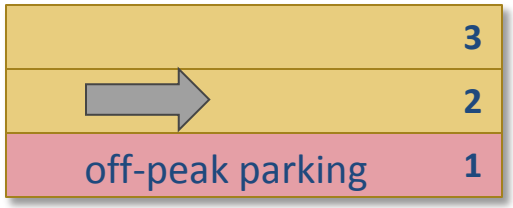
Link File:
3 thru lanes
1 left pocket
0 right pocket

Lane Use File:
Lane **4**, closed, period 1
Lane **4**, closed, period 2
Lane **4**, closed, period 3

Pocket File:
lane **1** turn

Add a Pocket Lane in Version 5

- Add a pocket lane to a link with parking restrictions



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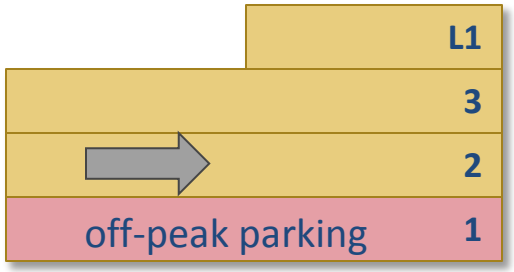


Link File:
3 thru lanes

Lane Use File:
Lane 1, closed, period 1
Lane 1, closed, period 2
Lane 1, closed, period 3

Link File: (no change)
3 thru lanes

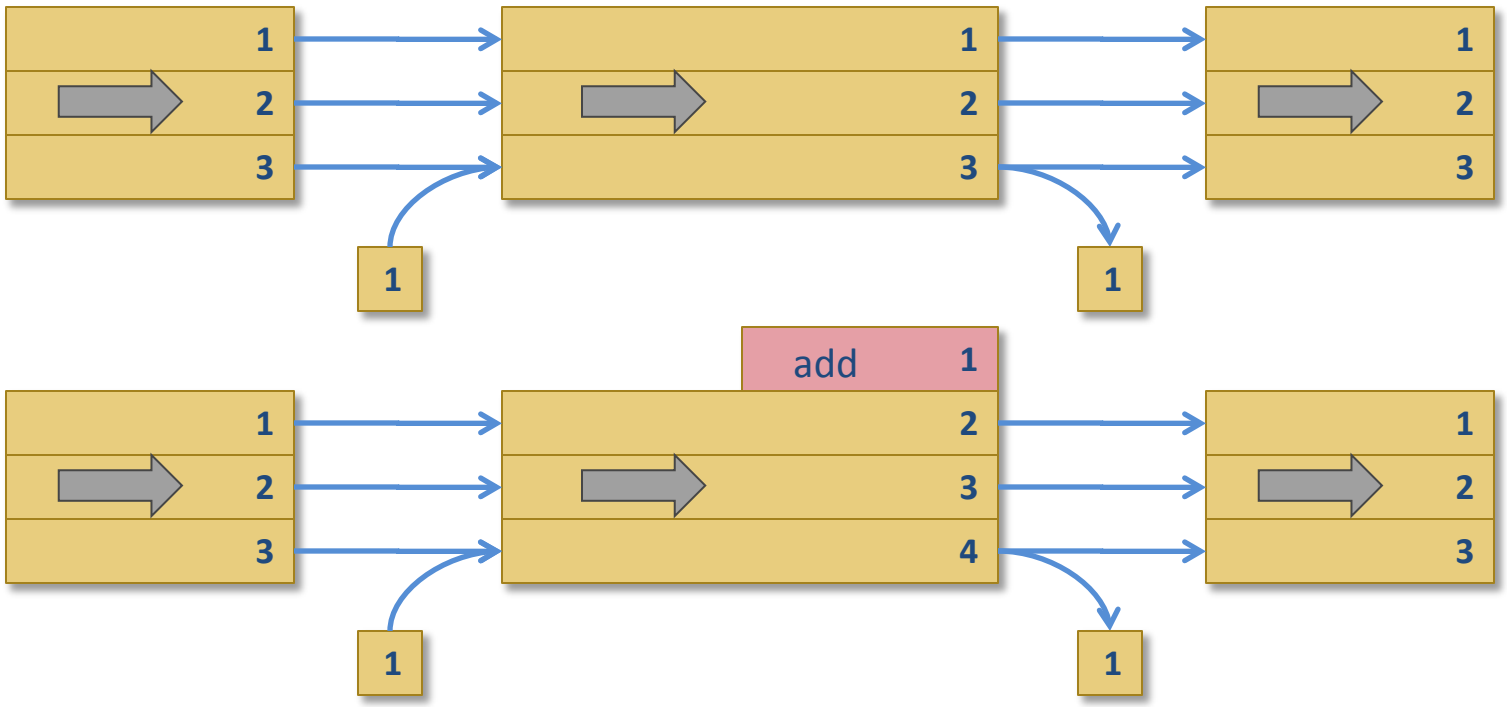
Lane Use File: (no change)
Lane 1, closed, period 1
Lane 1, closed, period 2
Lane 1, closed, period 3

Pocket File:
1 left turn

Link Connection Impacts

- Version 4
  - Lane numbers apply to both ends of the link
    - Pocket lanes at one end impacts lane numbers at the other end
    - Adding and deleting pocket lanes impacts all lane-related files
- Version 5
  - Lane numbers at each end are independent
    - Pocket lane changes require relatively few network changes

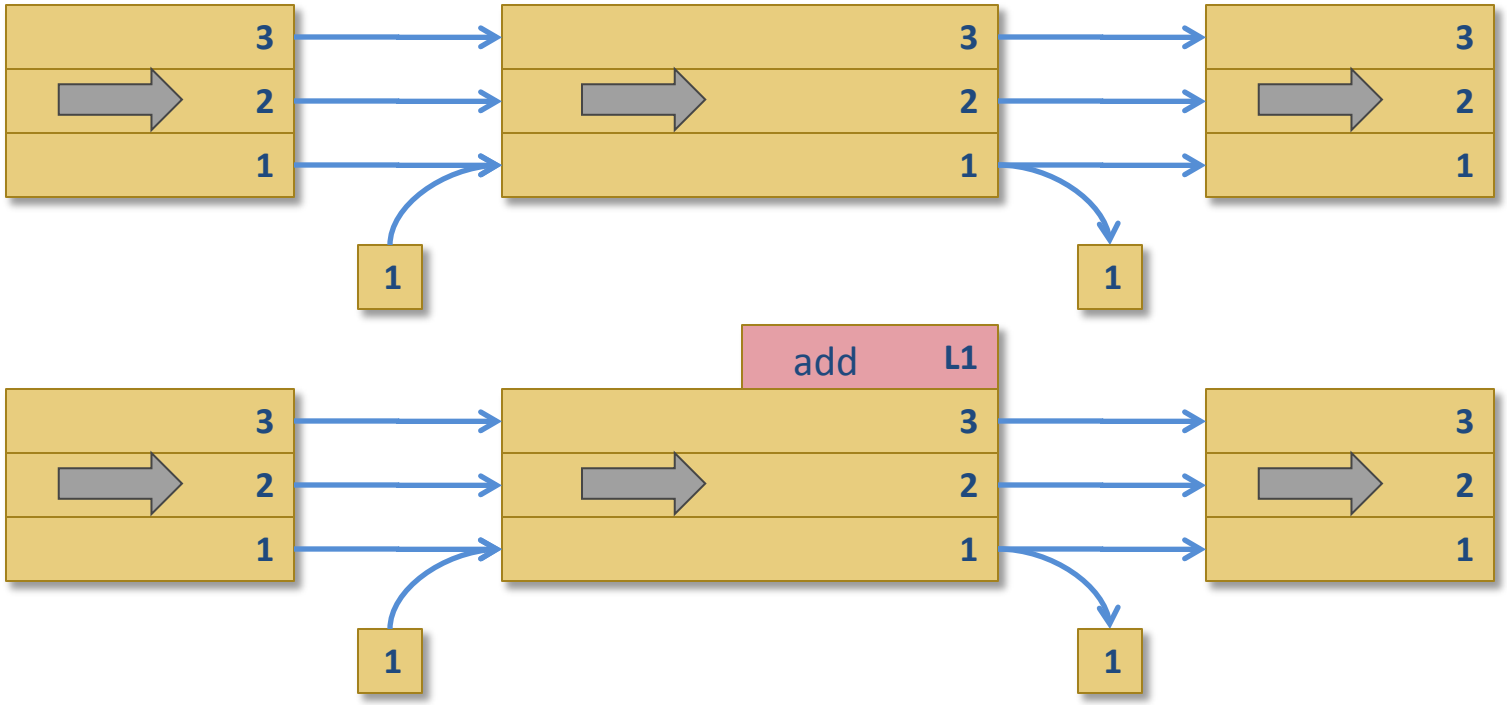
Version 4 Lane Connectivity Edits



Lane Connectivity:
Lane 1 to 1 → Lane 1 to **2**
Lane 2 to 2 → Lane 2 to **3**
Lane 3 to 3 → Lane 3 to **4**
Lane 1 to 3 → Lane 1 to **4**

Lane Connectivity:
Lane 1 to 1 → Lane **2** to 1
Lane 2 to 2 → Lane **3** to 3
Lane 3 to 3 → Lane **4** to 2
Lane 3 to 1 → Lane **4** to 1

Version 5 Connection Edits

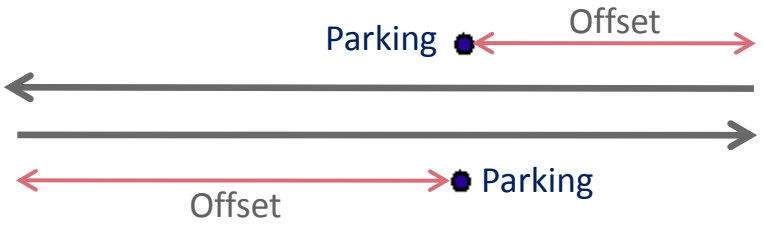


Connection File:
Lane 1..3 to 1..3 (no change)
Lane 1 to 1 (no change)

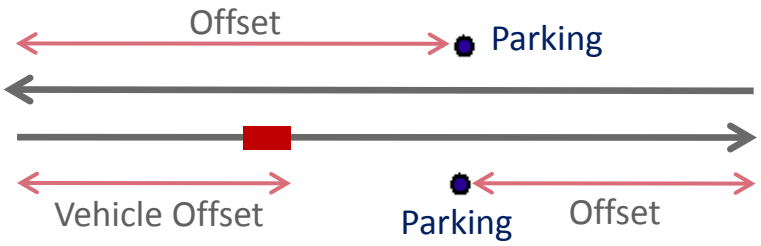
Connection File:
Lane 1..3 to 1..3 (no change)
Lane 1 to 1 (no change)

Link Offset

- Link offsets are measured from the beginning of the link in the direction of travel



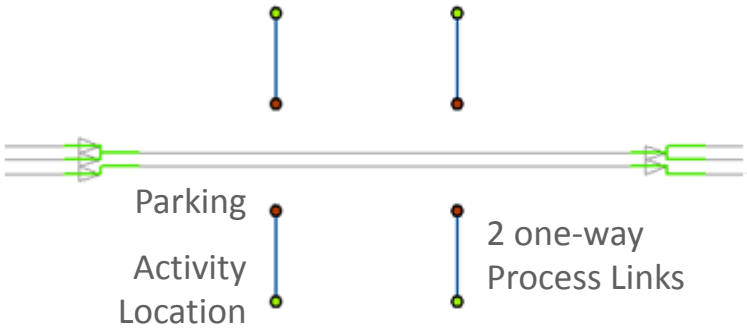
- Version 4
  - Network offsets are measured from the end of the link
  - Microsimulator offsets are measured from the beginning of the link



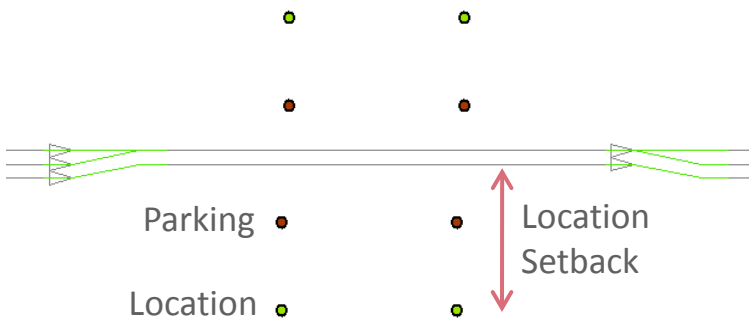
Process Links → Access Link

- Version 5 does not need Process Links
  - Link-offsets are used to build direct two-way connections
  - Access Links are only used for special connections
    - Two-way or one-way links between nodes, locations, parking lots, and transit stops

Version 4.0



Version 5.0



Access Link Options

- Version 4 process links are required to connect
  - activity locations ←→ parking and activity locations ←→ transit stops
- Version 5 access links may connect
  - locations ←→ parking, locations ←→ stops, locations ←→ nodes
  - locations ←→ locations, stops ←→ stops, nodes ←→ nodes
  - parking ←→ stops, parking ←→ nodes, stops ←→ nodes
- Walk links with travel time, distance, and cost
- Transit stops no longer need activity locations
  - Activity locations with a zero zone number are deleted

Lane Use File

- Version 5 differences
  - Lane ranges, direction code, offsets, length units
- Version 4 toll file → Version 5 lane use file
  - Enables tolls by lane (e.g., HOT lanes)
- Lane processing rate added
  - Fixed and variable/random vehicle delays
  - Toll plazas, ramp metering, security gates

Parking File

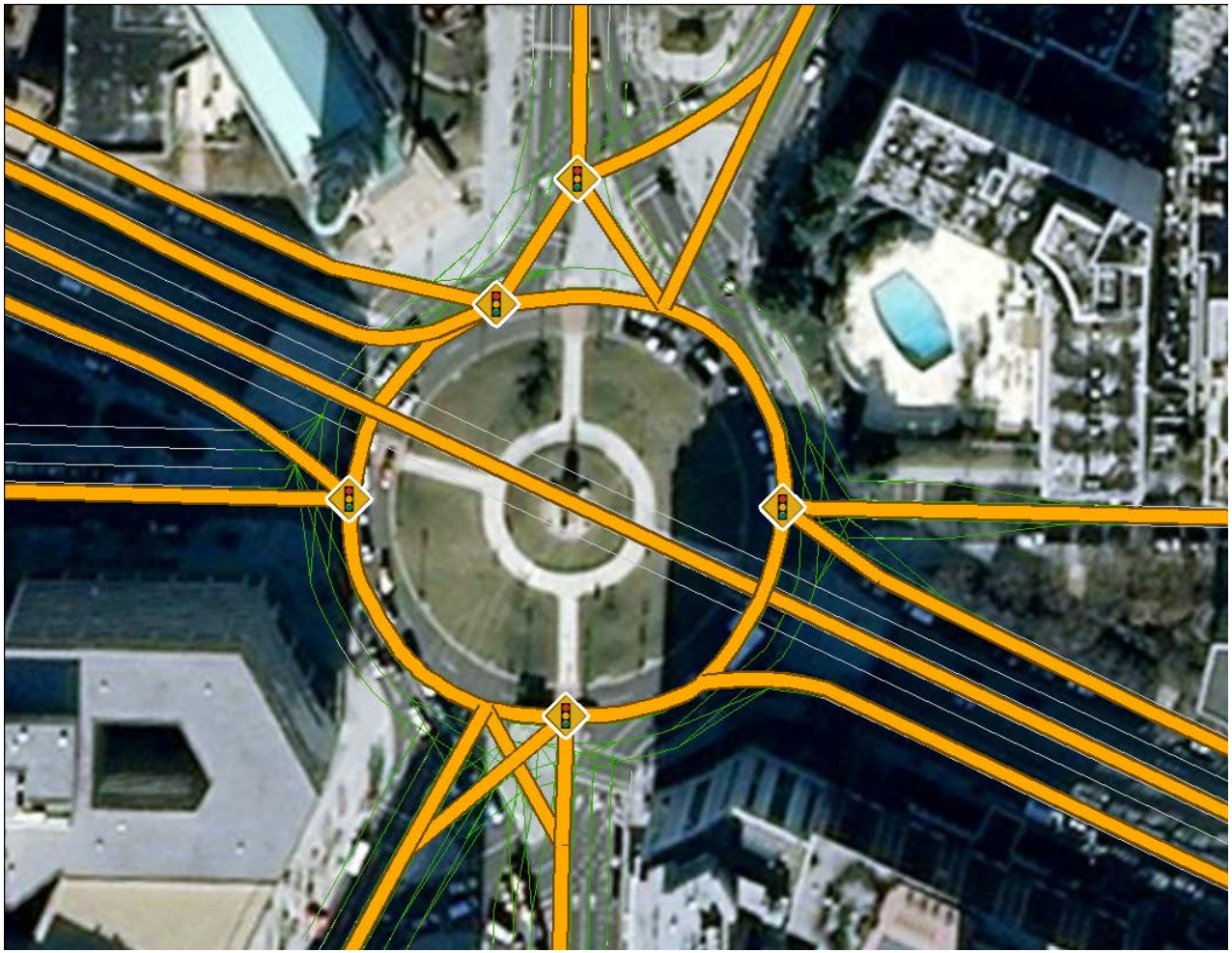
- Nested record structure
  - Single and unique parking lot location – link-offset and type
- Time-of-day and use/vehicle type nests
  - Variable parking costs
  - Access and egress times (~terminal time)
    - Time required to park or un-park the vehicle
  - Parking spaces
    - Shadow prices or access time can be used to model capacity constraints

Traffic Signals

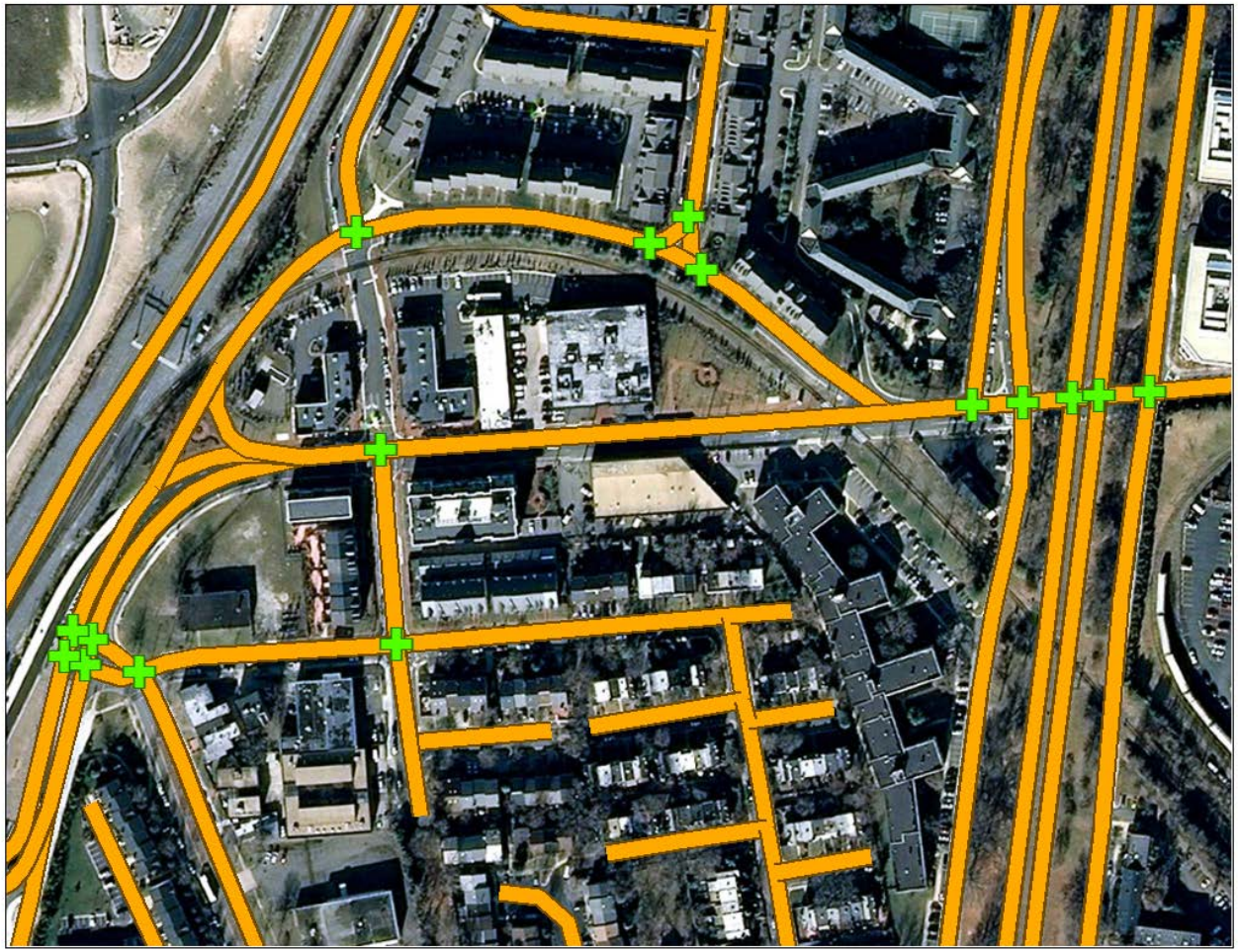
- Signalized node → signal controller
  - Four cross-referenced files
    - Signal, Timing Plan, Phasing Plan, Detector
    - Signal Coordinator file dropped
- Primary differences
  - Multi-node signal coordination
  - Re-usable timing and phasing plans
  - Barrier, ring, and position codes
    - Greater compatibility with traffic signal software
  - Detectors include use types (e.g., buses or trains)
  - Nested file structures for tighter record management and fewer coding errors

Multi-Node Signal Controllers

Traffic Circles



Divided Roadways



Signal File

- Version 5 differences
  - Node → controller number
    - Controls a list of nodes
  - Nested time period records (with end times)
    - Improve record management and minimize coding mistakes
  - Re-useable timing and phasing ID numbers

Signal	Group	Times	Nodes
Start	End	Timing	Phasing
1	2	5	101|102|103
0:00	6:00	1	1
6:00	9:30	2	1
9:30	16:00	1	1
16:00	19:00	3	1
19:00	27:00	1	1

Timing Plan File

- Version 5 differences
  - Controller number + timing ID indexing
    - Signal type (timed/actuated), offset, and cycle length
  - Nested phase records
    - Improve record management and minimize coding mistakes
  - Barrier, ring, and position codes
    - Clearer sequencing and improved linkages to traffic signal software

Signal	Timing	Type	Cycle	Offset	Phases	Notes		
Phase	Barrier	Ring	Position	Min_Green	Max_Green	Extension	Yellow	All_Red
1	1	Actuated	100	0	4	0:00..6:00		
1	1	1	1	5	5	0	0	0
2	1	1	2	20	39	12	3	1
3	1	1	3	5	9	3	0	0
4	1	1	4	20	39	12	3	1

Phasing Plan File

- Version 5 differences
  - Node → controller number and direction code
    - Multi-node signals and cross-referencing
  - Nested movements records
    - Improve record management and minimize coding mistakes
  - Movements descriptions
    - User help and improved linkages to traffic signal software

Signal	Phasing	Phase	Movements	Detectors
Movement	Link	Dir	To_Link	Protection
1	1	1	4	1|3
EB_Left	4892	1	3164	Protected
WB_Left	4202	0	439	Protected
NB_Right	439	0	4202	Stop_Permit
SB_Right	3164	1	4892	Stop_Permit

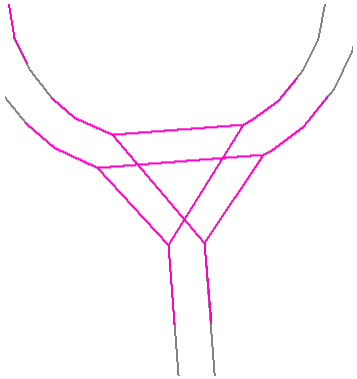
Detector File

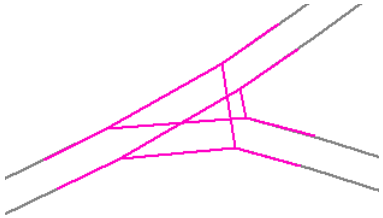
- Version 5 differences
  - Node → direction code
  - Offset from the beginning of the link (meters/feet)
  - Lane ranges with pocket lane codes
  - Use types
  - No signal coordinator

Detector	Link	Dir	Offset	Length	Lanes	Type	Use	Notes
1	4892	1	1043.5	30	L1	Presence	Any	Left Turn
2	4892	1	1043.5	30	R1..2	Presence	Any	Thru Right
3	4202	0	1137.9	30	L1	Presence	Any	Left Turn

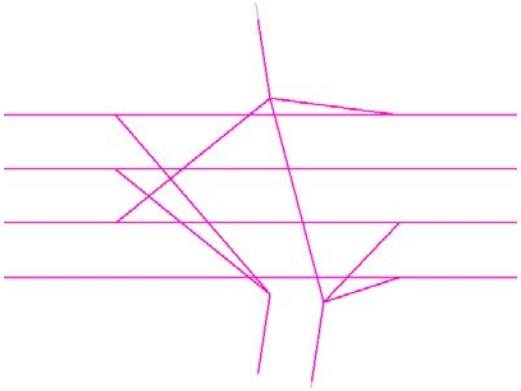
Presentation Graphics

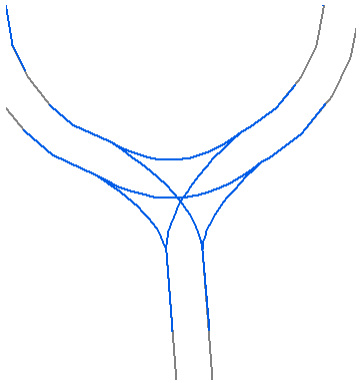
- ArcNet with curved connections

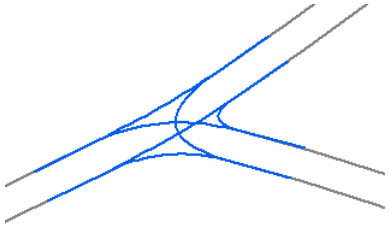




Version 4







Version 5