Assignment-1 (Salt lake city west Jordan network)

Problem 1: How many nodes are in the West Jordan network? How many zones are in the West Jordan network?
149 nodes, 41 zones

Problem 2: What is the speed limit along 9000 South? How many lanes are present along 9000 South in the Base Condition model?
Speed limit – 39 m/h
No of lanes – 2

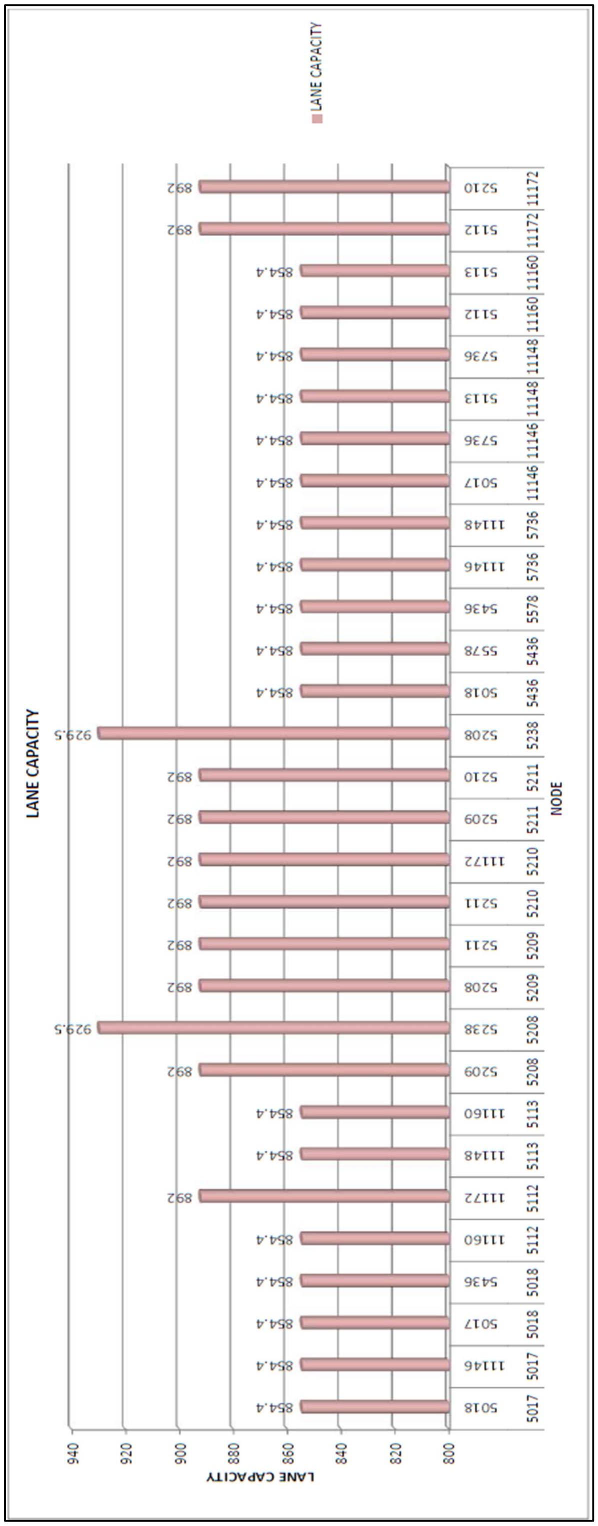
Problem 3: What is link capacity? How is it different from lane capacity?
Link capacity is the number of vehicles along one direction of a segment, which includes the capacity of all the lanes. In other words, link capacity is the sum of lane capacities along one direction of a segment. Lane capacity is the capacity of a particular lane.

Problem 4: Describe the link capacity on Redwood Road in the West Jordan Network (how link capacity varies by location, point out bottlenecks, etc.). It might also be a good idea to include the average link capacity and/or use a histogram.

name	from_node_id	to_node_id	number_of_lanes	lane_capacity(vph)	link capacity(vph)
Redwood R	5017	5018	3	284.8	854.4
Redwood R	5017	11146	3	284.8	854.4
Redwood R	5018	5017	3	284.8	854.4
Redwood R	5018	5436	3	284.8	854.4
Redwood R	5112	11160	3	284.8	854.4
Redwood R	5112	11172	2	446	892
Redwood R	5113	11148	3	284.8	854.4
Redwood R	5113	11160	3	284.8	854.4
Redwood R	5208	5209	2	446	892
Redwood R	5208	5238	1	929.5	929.5
Redwood R	5209	5208	2	446	892
Redwood R	5209	5211	2	446	892
Redwood R	5210	5211	2	446	892
Redwood R	5210	11172	2	446	892
Redwood R	5211	5209	2	446	892
Redwood R	5211	5210	2	446	892
Redwood R	5238	5208	1	929.5	929.5
Redwood R	5436	5018	3	284.8	854.4
Redwood R	5436	5578	3	284.8	854.4
Redwood R	5578	5436	3	284.8	854.4
Redwood R	5736	11146	3	284.8	854.4
Redwood R	5736	11148	3	284.8	854.4
Redwood R	11146	5017	3	284.8	854.4
Redwood R	11146	5736	3	284.8	854.4
Redwood R	11148	5113	3	284.8	854.4
Redwood R	11148	5736	3	284.8	854.4
Redwood R	11160	5112	3	284.8	854.4
Redwood R	11160	5113	3	284.8	854.4
Redwood R	11172	5112	2	446	892
Redwood R	11172	5210	2	446	892

Average link capacity= 871.94 veh/hour

When the number of lanes reduces from higher number to lesser number, the chance of bottle neck is relatively high. In the above table the highlighted links have only one lane but other links that connect to those nodes has more number of lanes and so there is a possibility of bottleneck at those nodes.

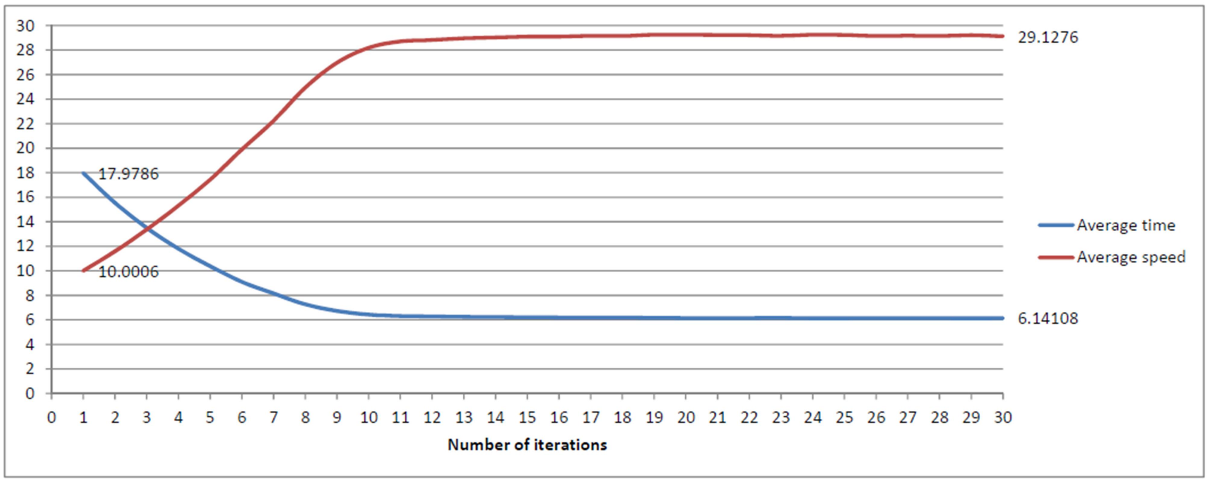


Problem 5: What is the number of agents/vehicle to be simulated, as reported in the output_summary.csv file?
Vehicles/agents to be simulated – 12638

Problem 6: The first large table in the output_summary.csv file describes summary statistics for each iteration of the simulation. What was the average travel time, average trip time index, average speed, and network clearance time (in minutes) for the last iteration? What pattern do you observe in the average travel times and speeds as the iteration number increases? (Plots might be useful to display these patterns/trends.)

30th iteration:

Average travel time	6.14108
Average trip time index	1.12151
Average speed	29.1276
Network clearance time (min)	1440



As the number of iterations increase average speed increases and so average travel time reduces. The same trend can be observed in the above plot.

Problem 7: Similar to Problem 6, use the first large table in the output_summary.csv file to find the average travel time, average trip time index, average speed, and network clearance time (in minutes) for the last iteration? Do you notice many differences in these values compared to the results for the “no work zone” model?

30th iteration – no work zone

Average travel time	6.14108
Average trip time index	1.12151
Average speed	29.1276
Network clearance time (min)	1440

30th iteration – with-work zone

Average travel time	6.5063
Average trip time index	1.1643
Average speed	27.9374
Network clearance time (min)	1440

There is difference in values between no-work zone and with- work zone models. Average speed has reduced and correspondingly average travel time has increased for with- work zone model when compared to no-work zone model. This is because of the lane reductions in work zone model.

Problem 8: Following the procedure described in Step 5, use screen captures to provide Link MOE plots for Lane Volume and Speed (in MPH), with 15-minute aggregation intervals, for both links between Node 1 and Node 2 (both directions). This should result in 4 images.

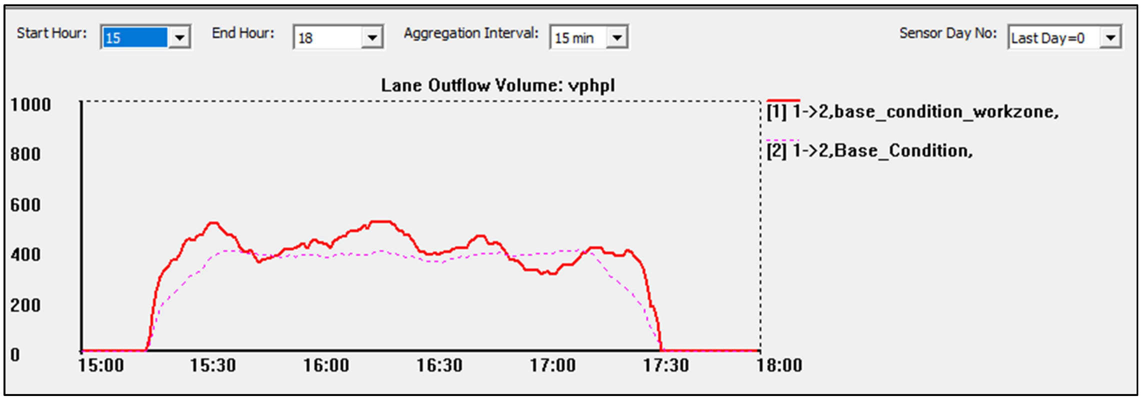


Fig-1 Node 1 to node 2 (volume MOE plot)

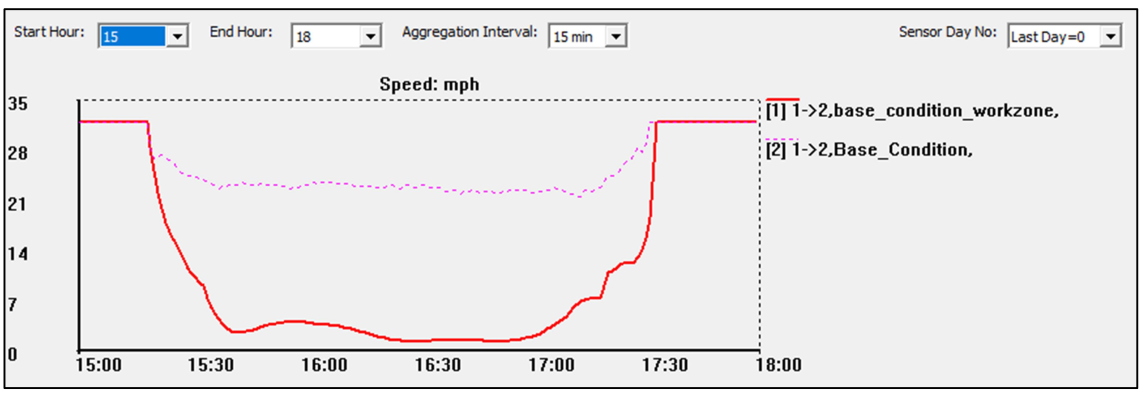


Fig-2 Node 1 to node 2 (speed MOE plot)

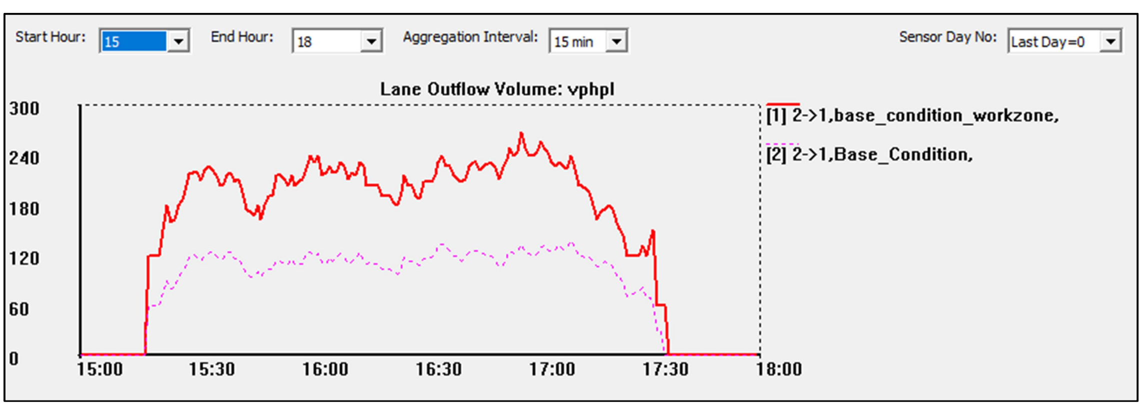


Fig-3 Node 2 to node 1 (volume MOE plot)

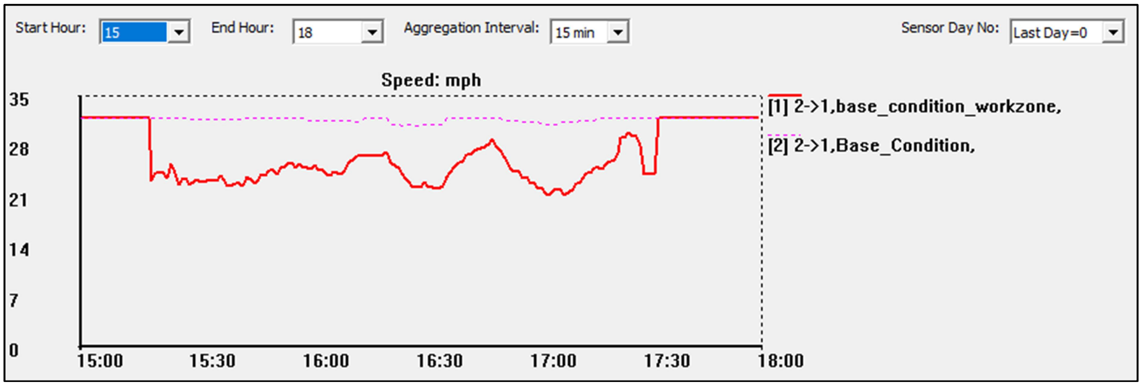


Fig-4 Node 2 to node 1 (speed MOE plot)

Problem 9: From the plots generated in Problem 8, did you notice any differences in speed and volume on these links between the two networks (with and without the work zone)? Do the differences in speed/volume make sense? Does one direction of travel experience more congestion?

For the above figures it's clear that the speed and volume on the links (between node-1 and node-2) are different for no-work zone and with-work zone conditions.

- From the speed MOE plots we can observe that the average speed in no-work zone condition is more than the average speed in with-work zone condition.
- As the average speed is less, average travel time is more in with-work zone condition.
- Now if we observe the volume MOE plots, volume (vehicles per lane per hour) in with-work zone condition is higher than the volume in no-work zone condition. This is because of congestion in with-work zone condition.

On comparing fig-1 and fig-3 (volume MOE plots), the maximum volume from node-1 to node-2 is close to 550 veh/lane/hour and the maximum volume from node-2 to node-1 is close to 250 veh/ lane/hour. Therefore, vehicles moving from node-1 to node-2 experience more congestion.