

Validation and Operational Performance of South Island Regional Road Network Following Kaikoura Earthquake

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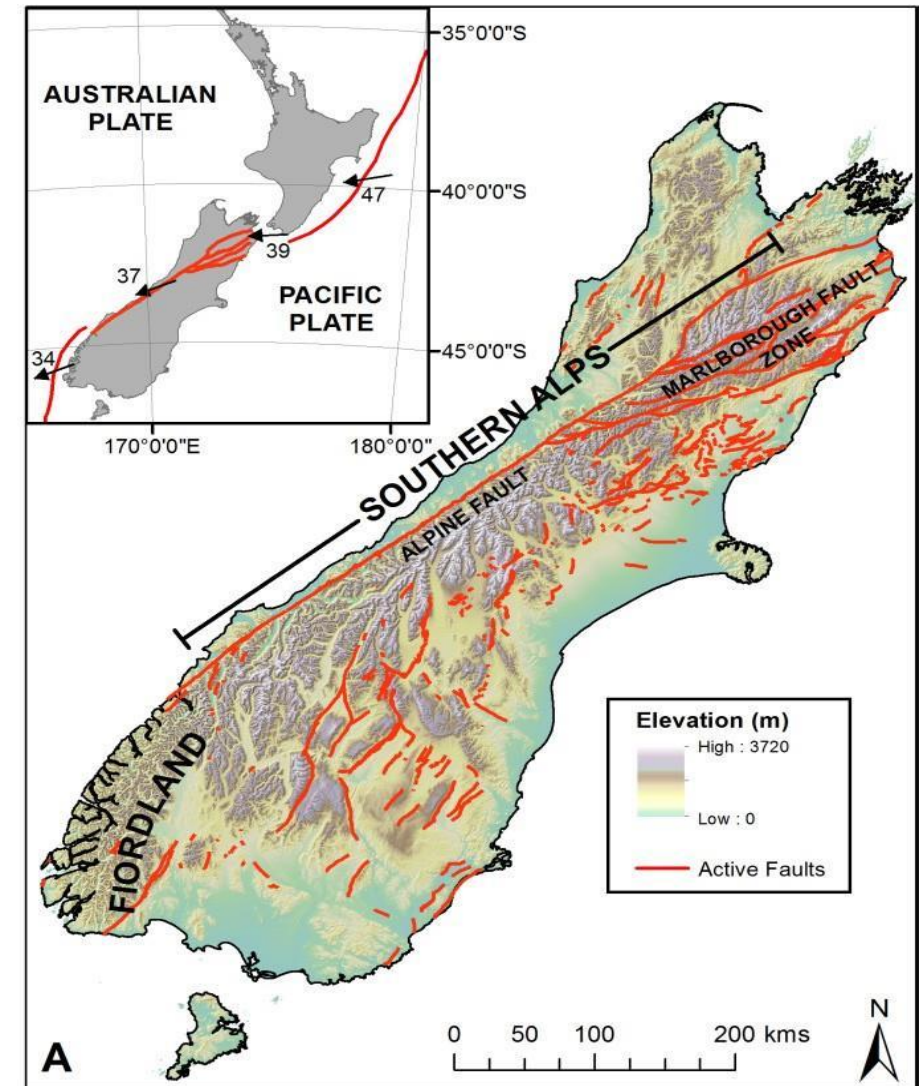
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Dr Prakash Ranjitkar

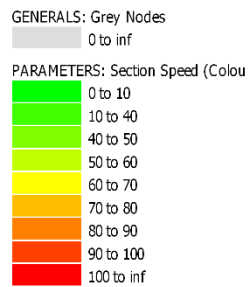
Background

- The main aim:
 - Assess the **operational resilience** of a **regional road network** in the South Island, New Zealand, in the event of a **major earthquake (Alpine Fault M8 Earthquake (AF8))**.

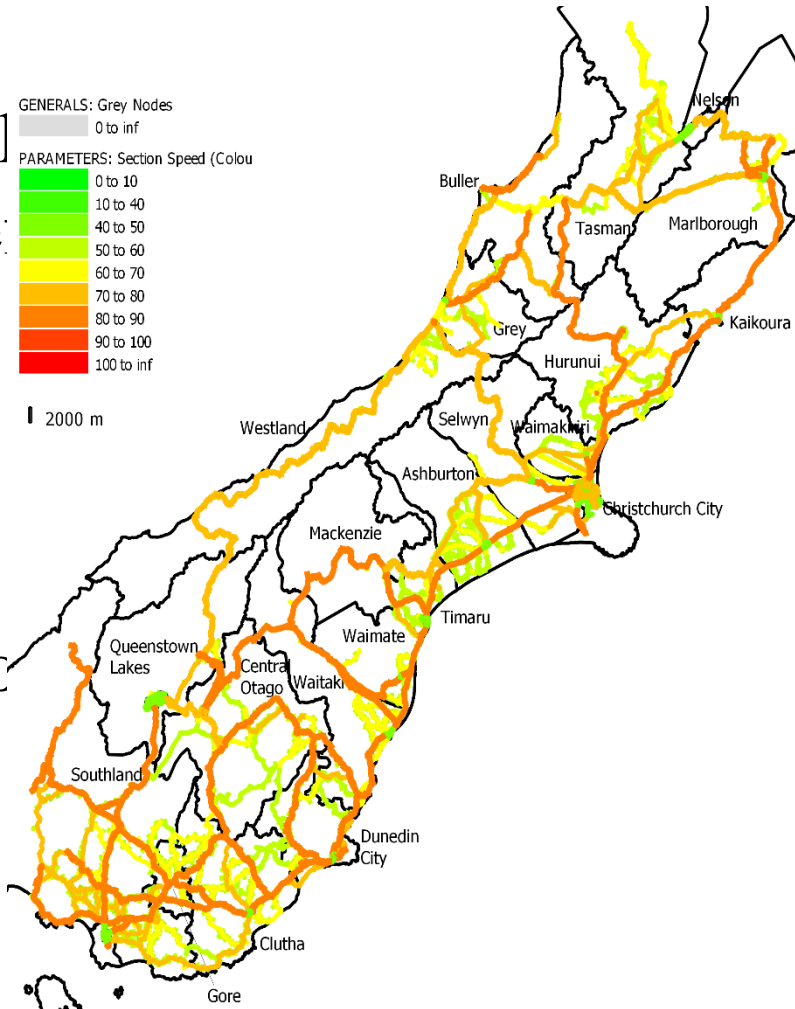


Development of Regional Road Network

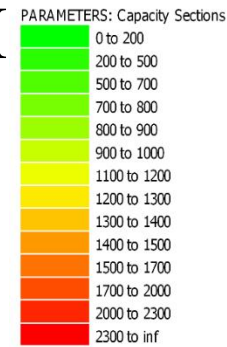
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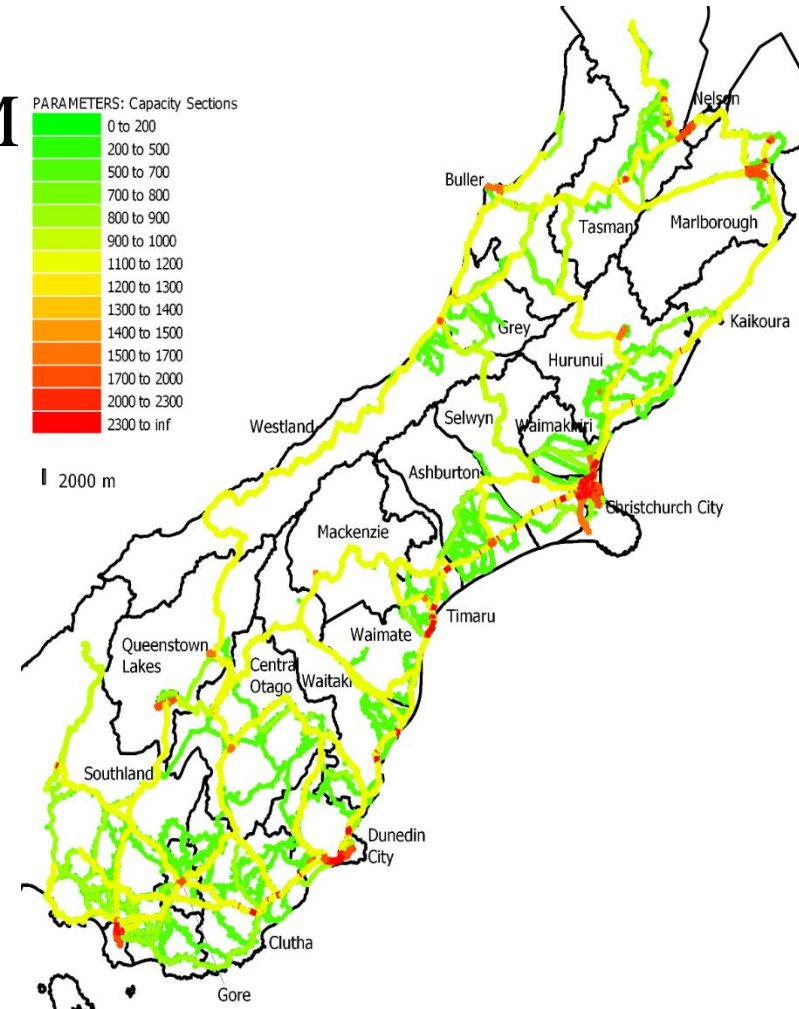
2000 m



Open Street M

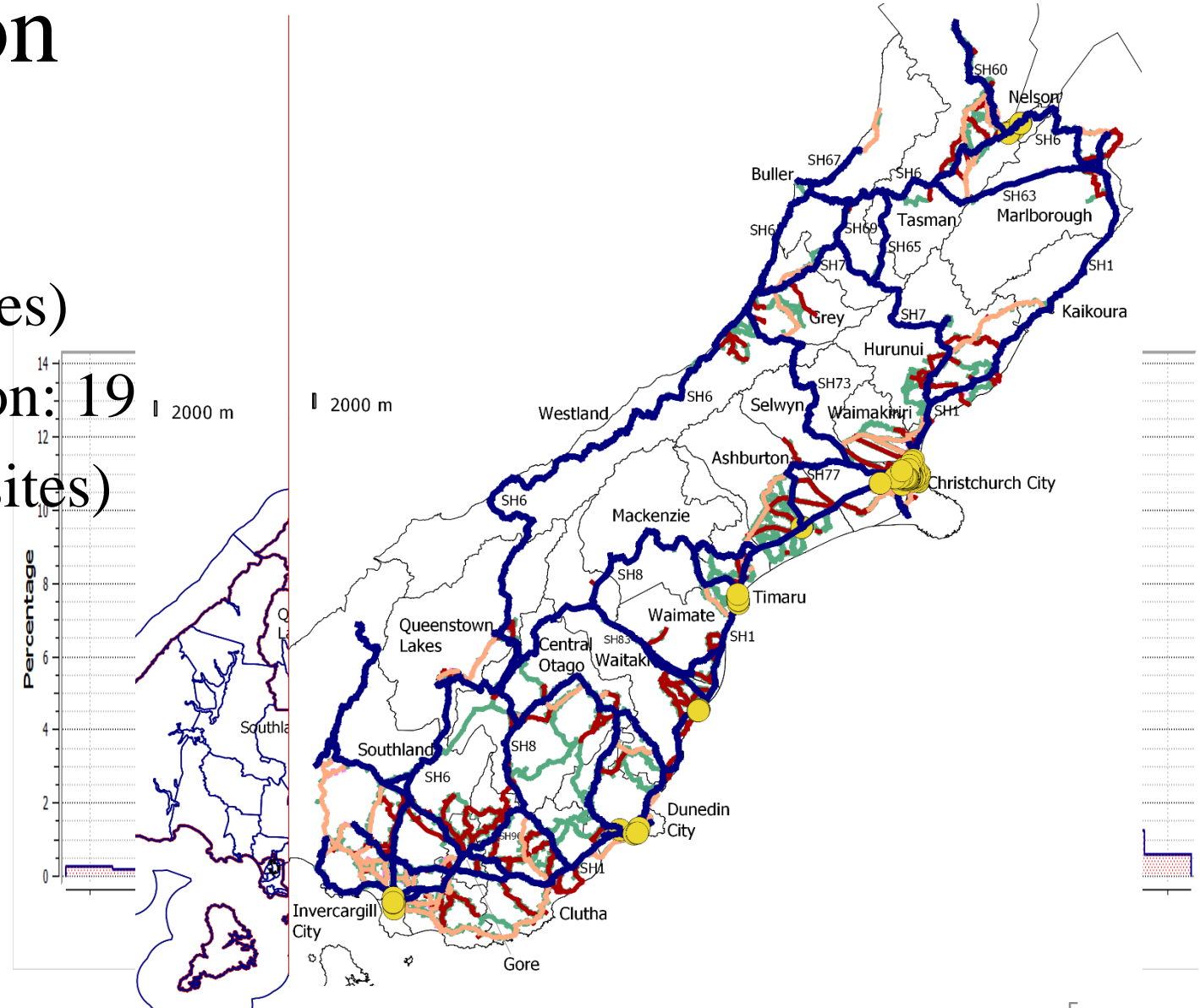


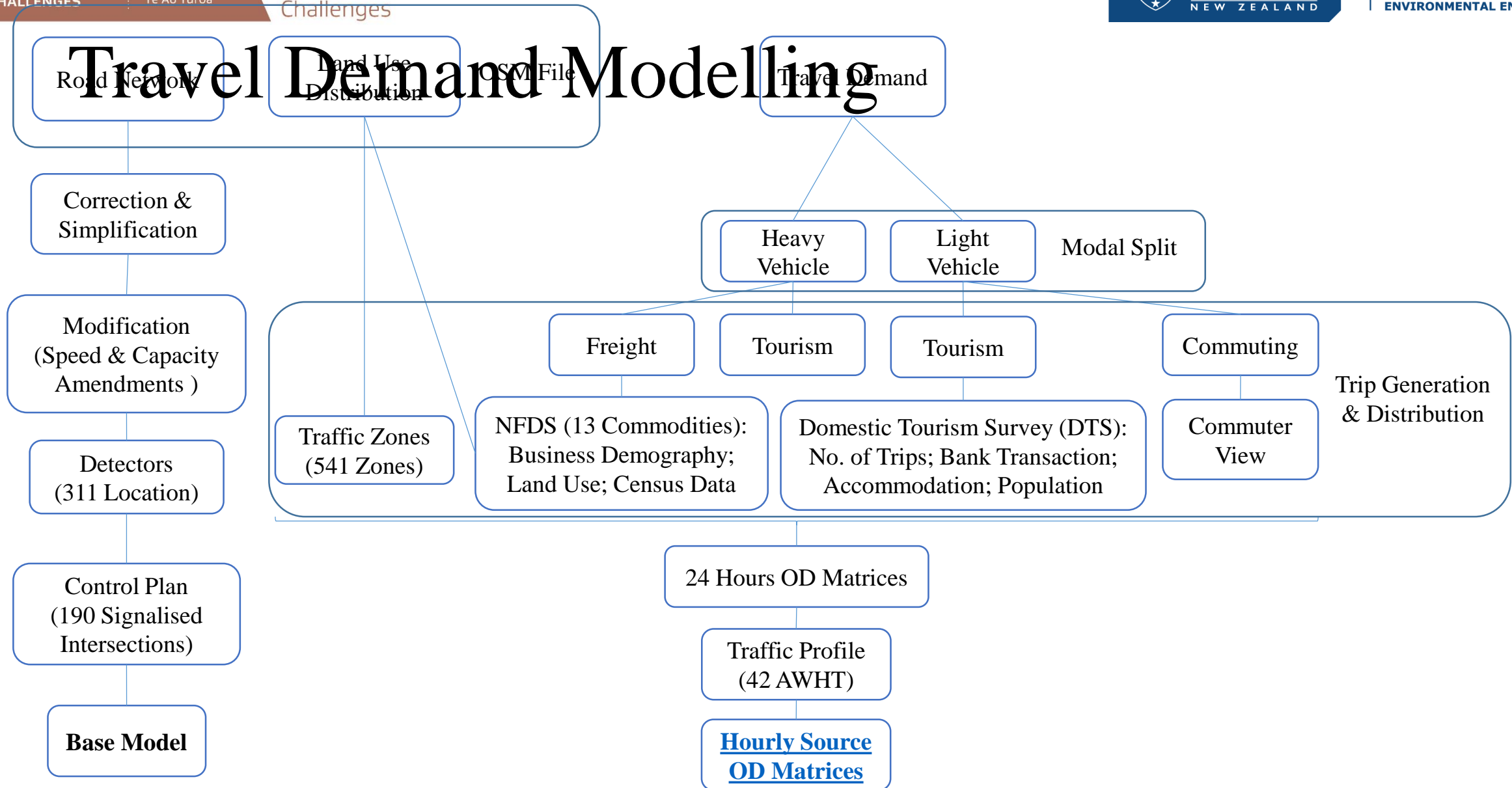
2000 m



General Information

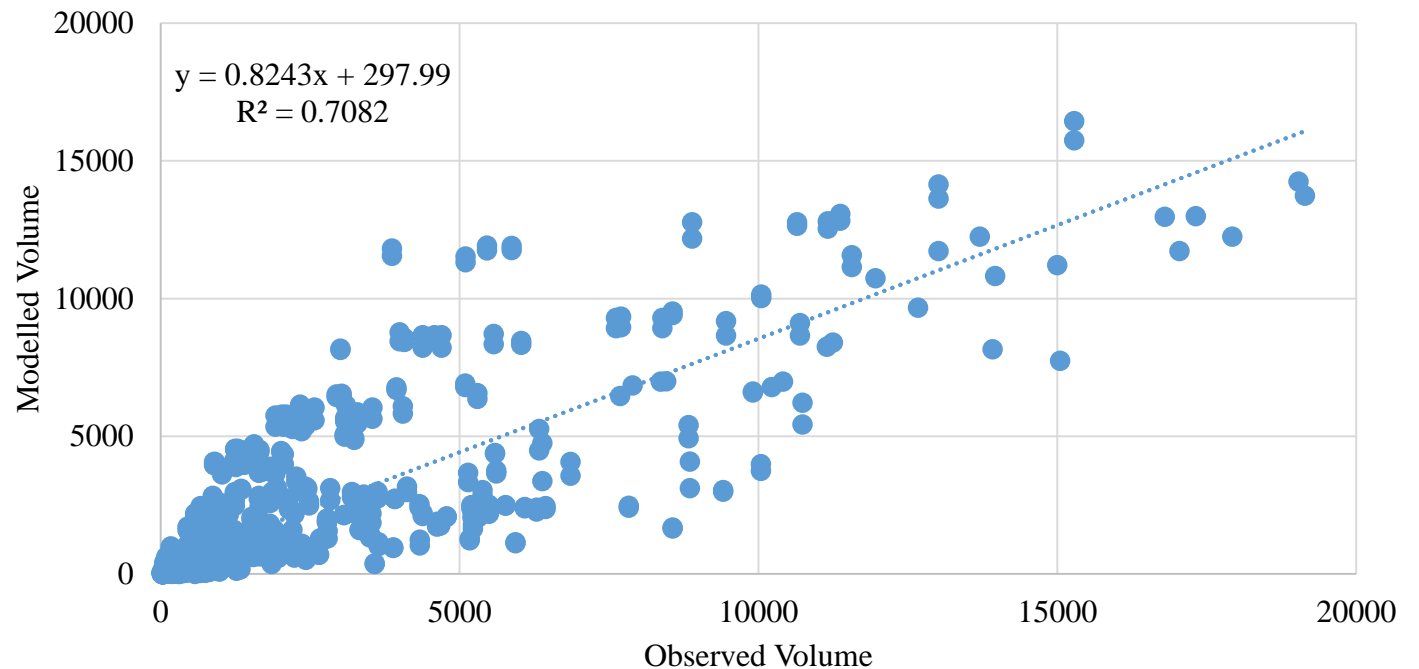
- Base Year: 2013
- 541 Unit Areas (Traffic Zones)
- No. of Signalised Intersection: 19
- No. of Detectors: 622 (311 sites)
- 24 Hours period
- General Traffic Profile
42 sites (AWHT)



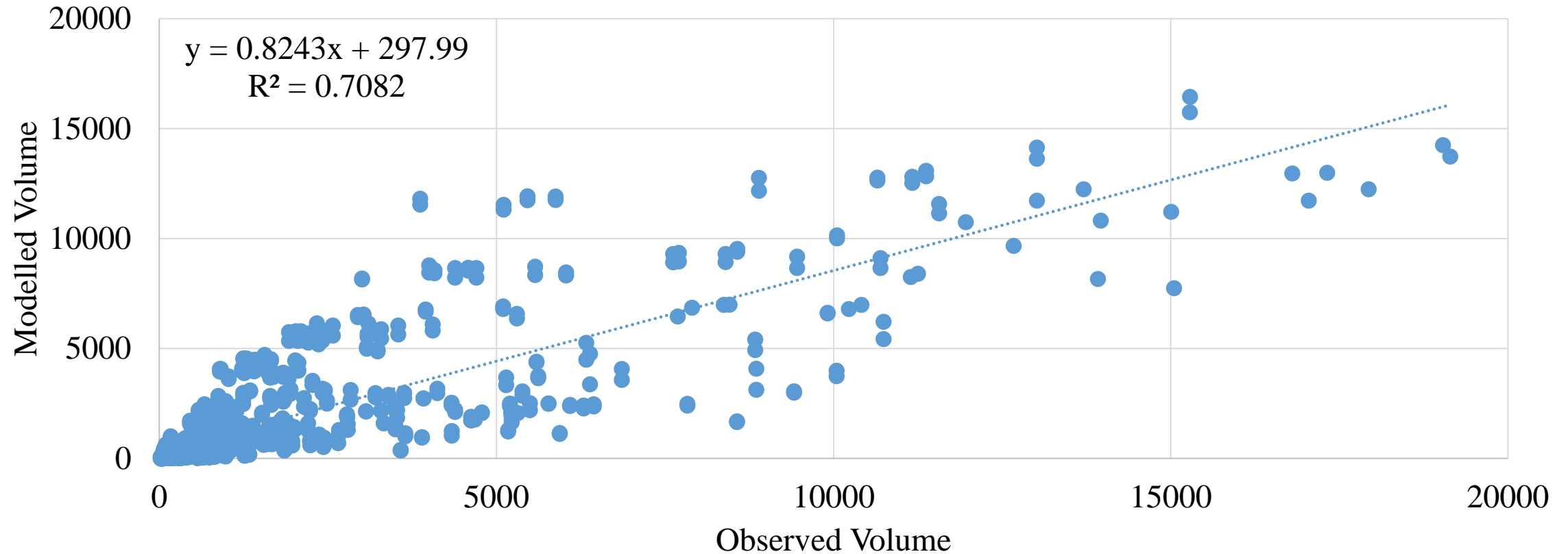


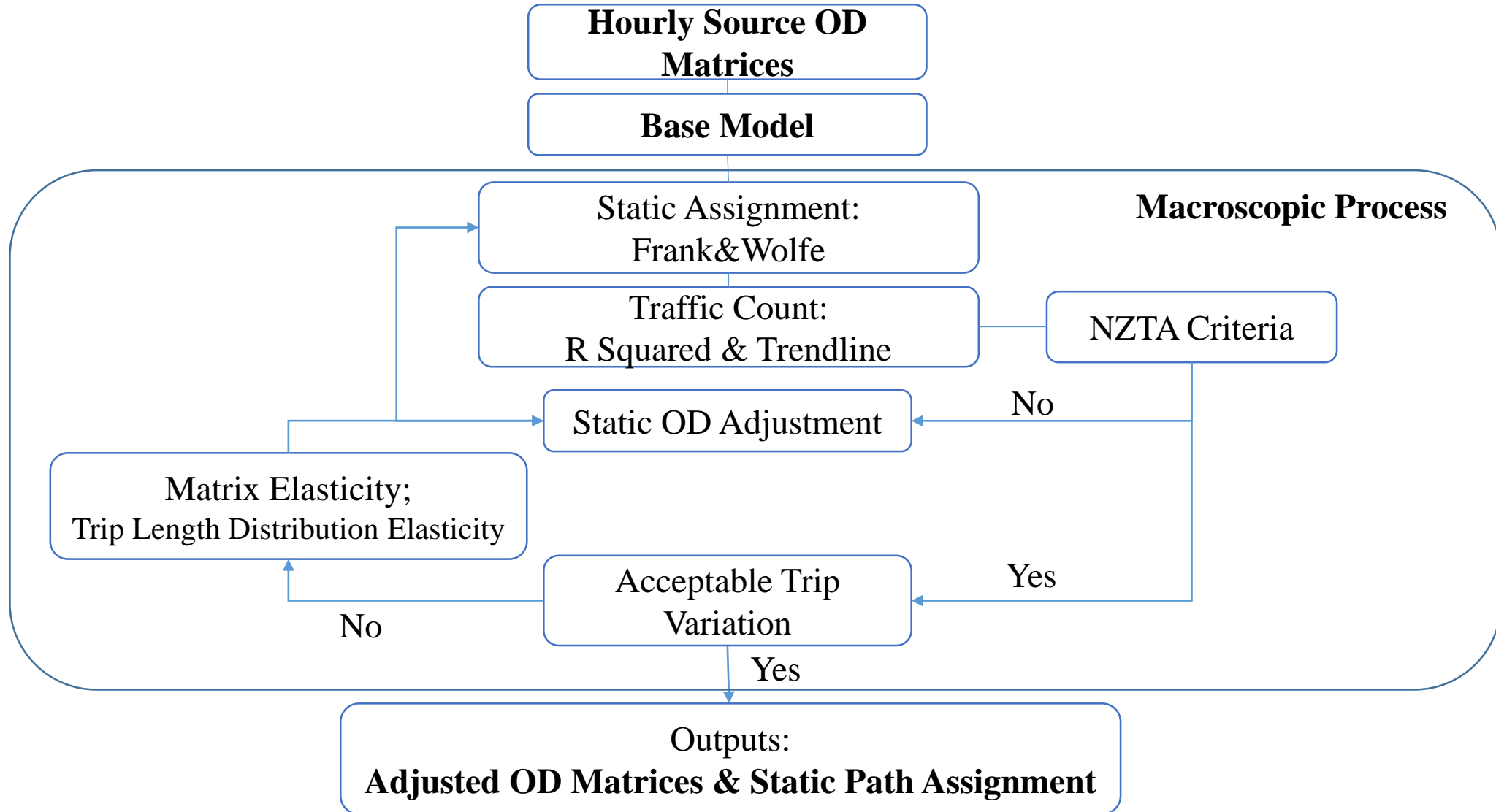
Static Assignment (Source Matrix) 2013

- Total Commuter Trips: 323,484
- Total Tourism Trips: 68,097
- Total Freight Trips (Heavy Vehicles): 16,778
- All Detectors (622)
- R Square: 70.8%



NZTA Modelling Guideline

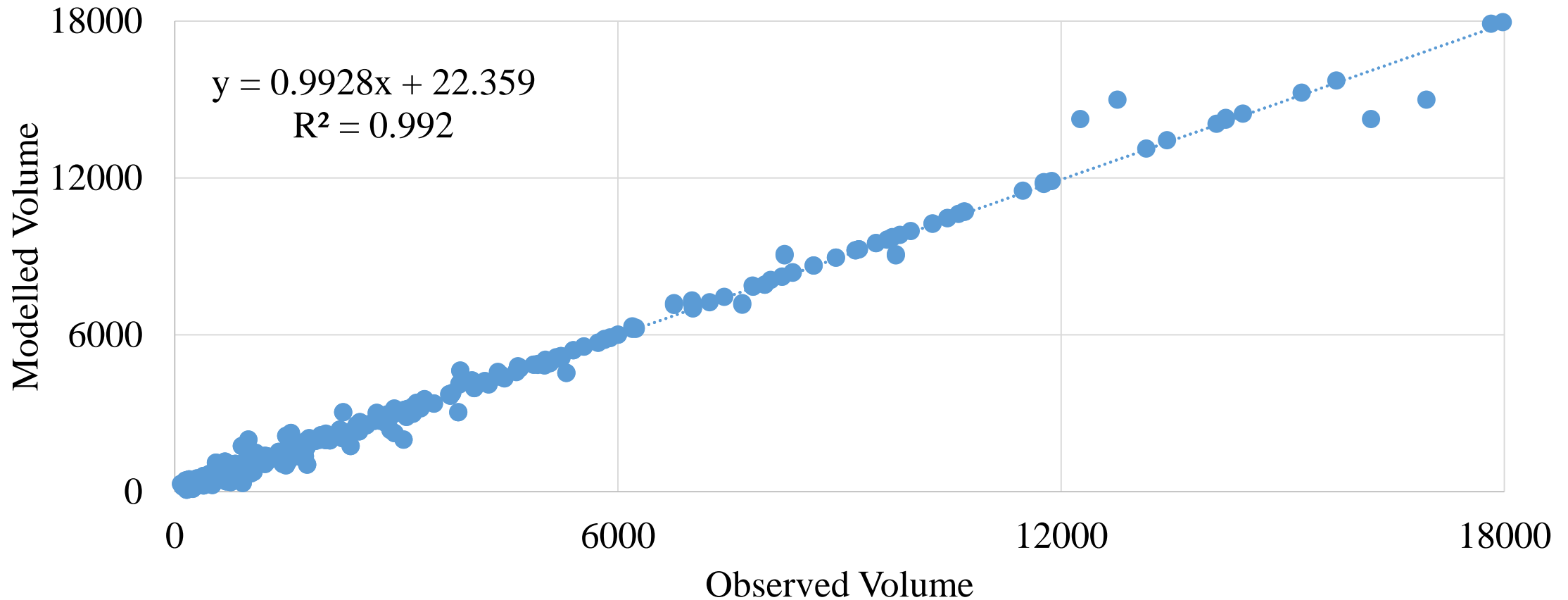


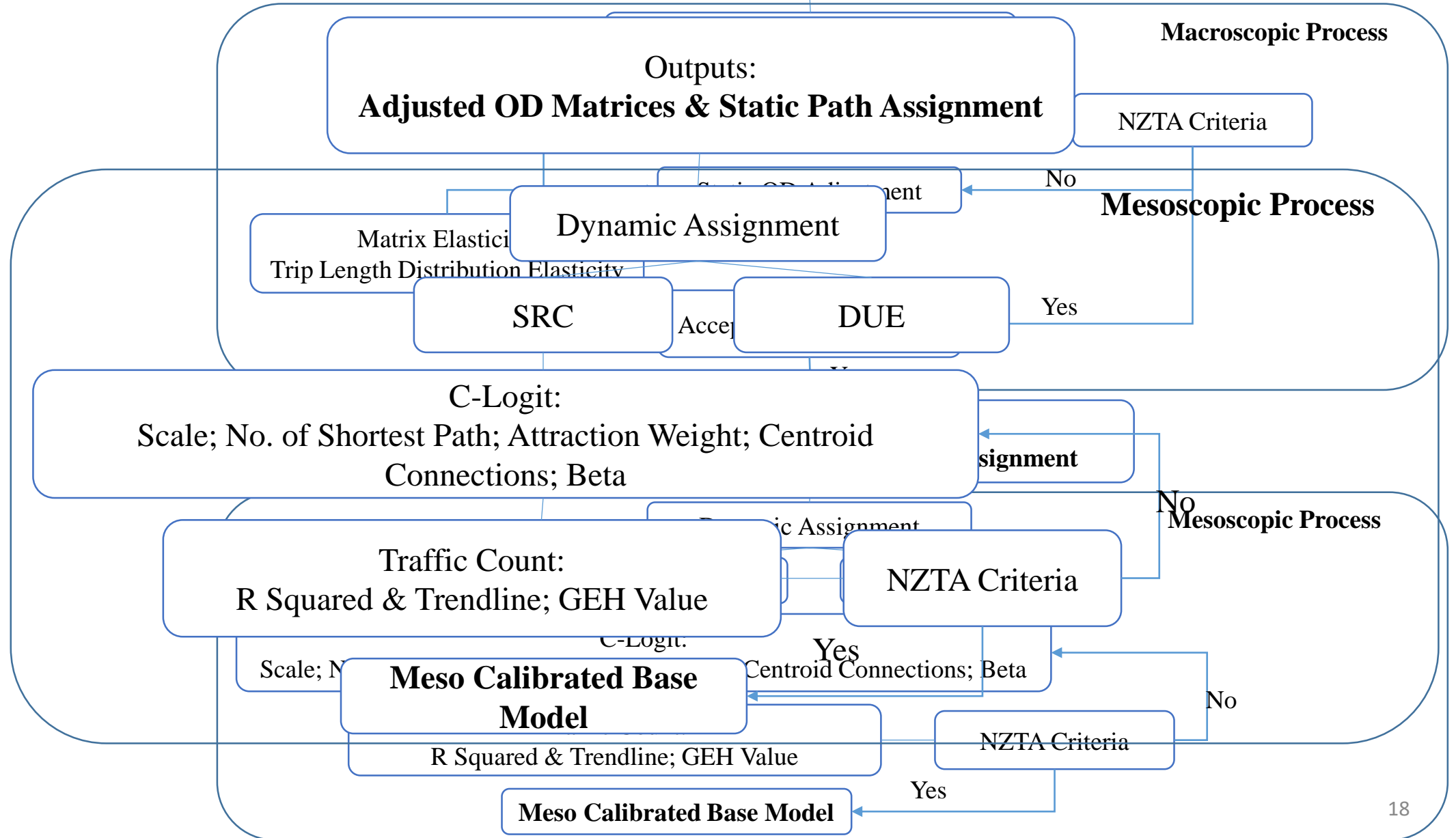


Summary of Static OD Adjustment (2013)

Purpose	Source Trips	Adjusted Trips	R2 source	R2 Adjusted	Explanation	
Commuting	323,484	516,217	61.7	99.2	59.6%	47.2%
Tourism	68,097	65,082			-4.4%	-0.7%
Freight	16,779	25,790	55.6	98.8	53.7%	2.2%
Total	408,360	607,089	-	-	48.7%	48.7%
R2	70.8	99.2	NA	NA	622 Detector	
R2	75.5	NA	NA	NA	250 Detector	

Summary of Static OD Adjustment (2013)



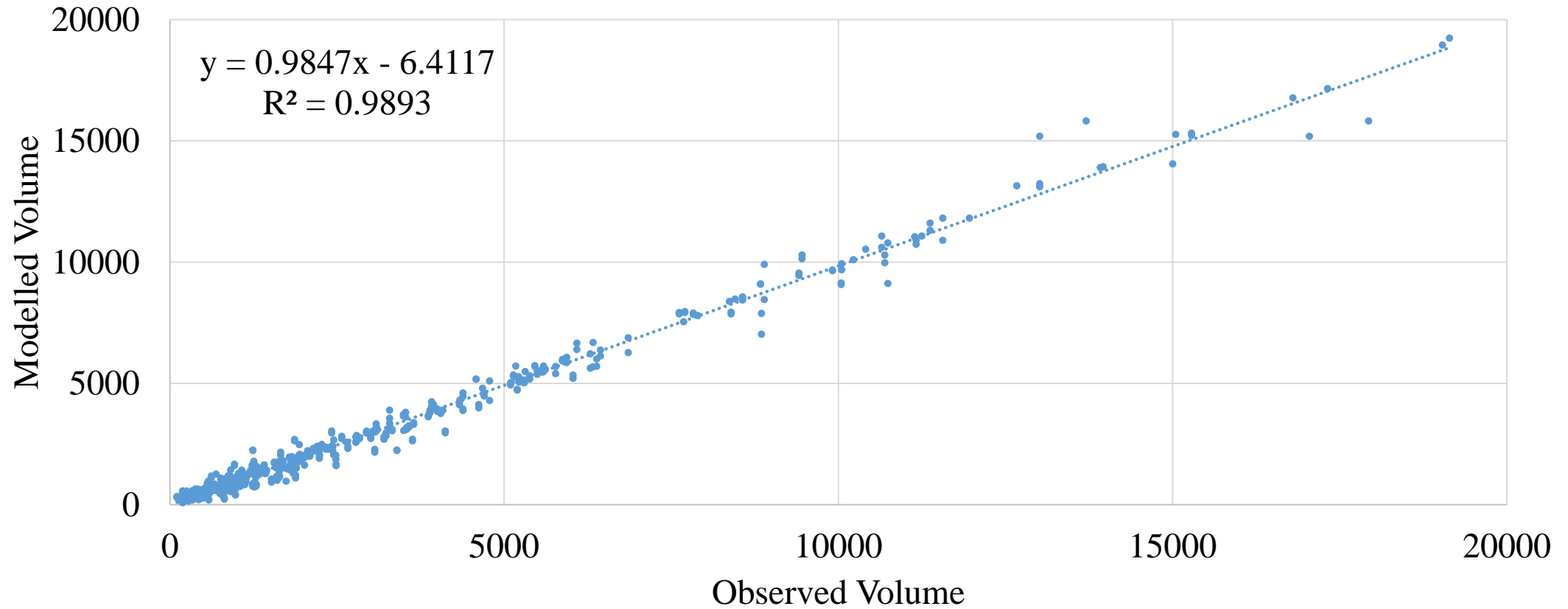


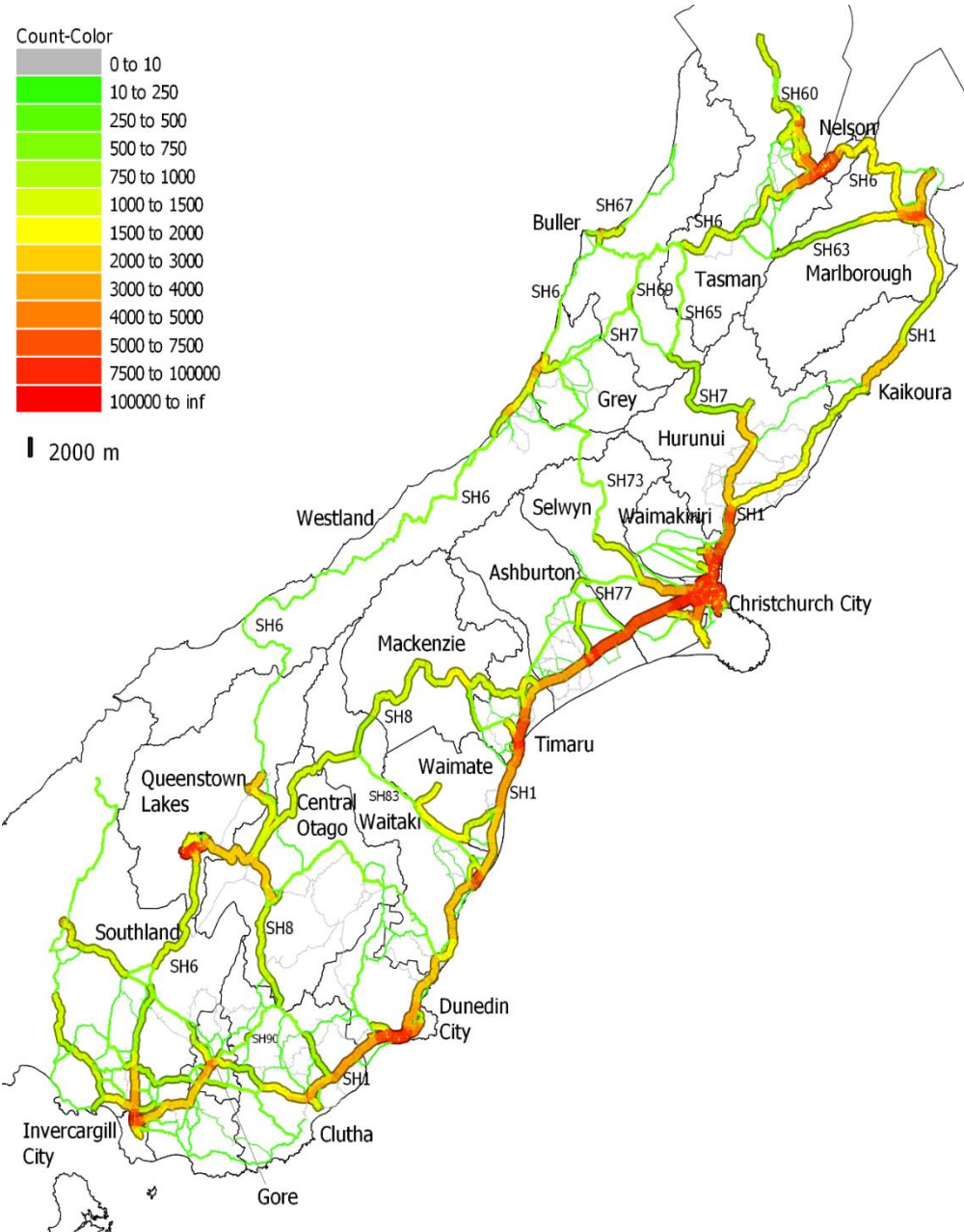
Meso Calibration Issue

- Issues:
 - Waiting vehicles to enter to the network (Mean virtual queue)

```
#outputFile = "F:\Siavash\SI Network/CentroidVirtualQueue.txt"
#file = open(outputFile, "w")
#file.write("Name,ID,MeanVirtualQueue\n")
centroidType = model.getType("GKCentroid")
for centroid in GK.GetObjectsOfType(centroidType):
    centroidConfiguration = centroid.getCentroidConfiguration()
    if centroidConfiguration.getId() == 1136801:
        meanVirtualQueue = centroid.getDataValueTS(model.getColumn("DYNAMIC::GKCentroid_meanVirtualQueue_1141961_0_0_odOrigin"))
        if meanVirtualQueue.getAggregatedValue() > 100:
            print (centroid.getName(), centroid.getId(), meanVirtualQueue.getAggregatedValue())
            #file.write("%s,%s,%s\n" %(centroid.getName(), centroid.getId(), meanVirtualQueue.getAggregatedValue()))
#file.close()
print "Done"
```

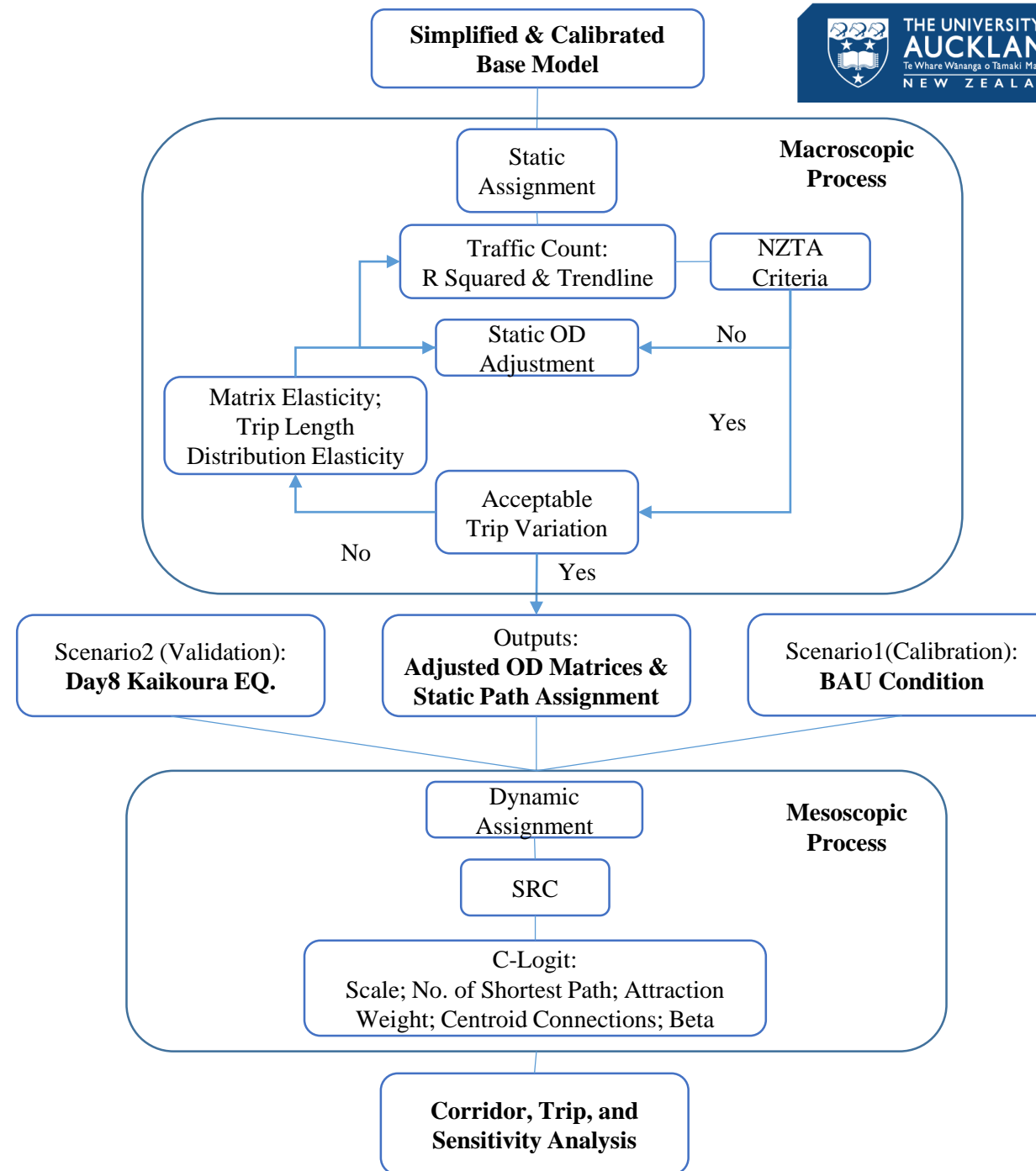
Meso Calibration 2013 Dataset





Daily Traffic Count Data of South Island State Highways

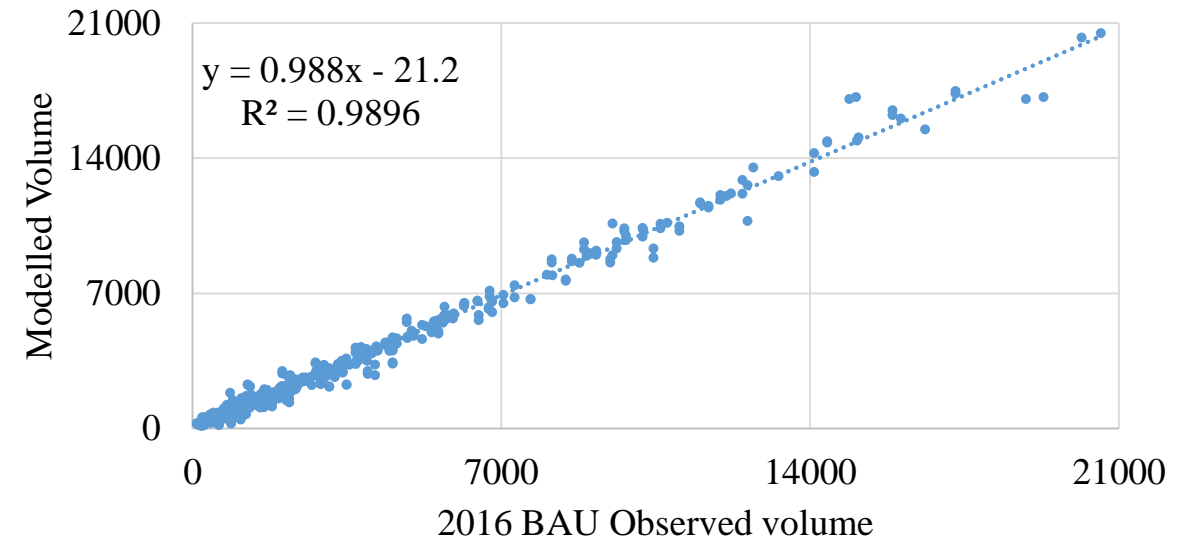
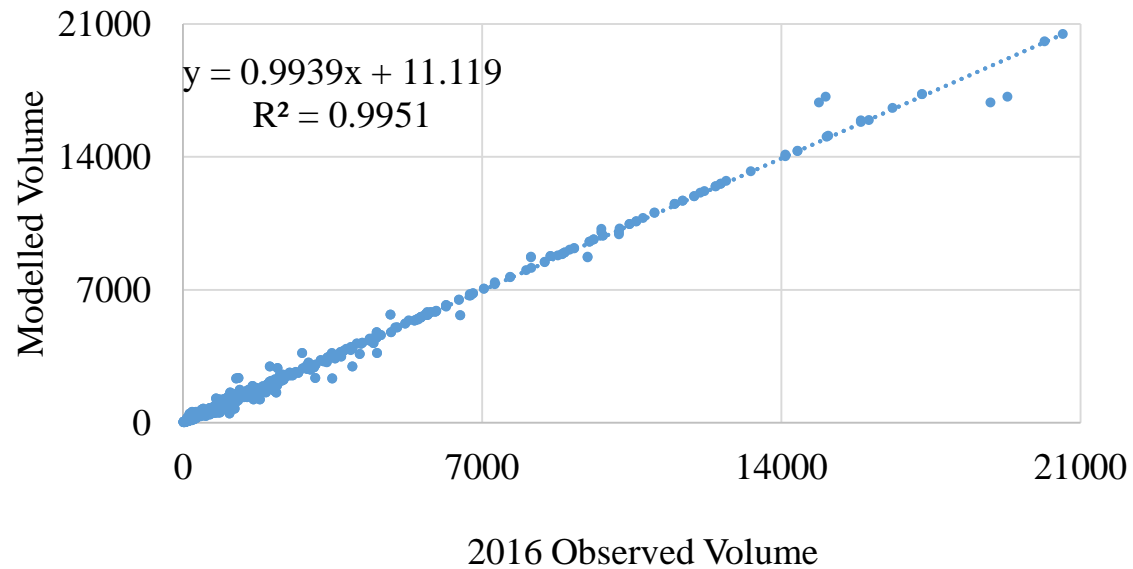
Methodology to Assess the Operational Performance of the Network



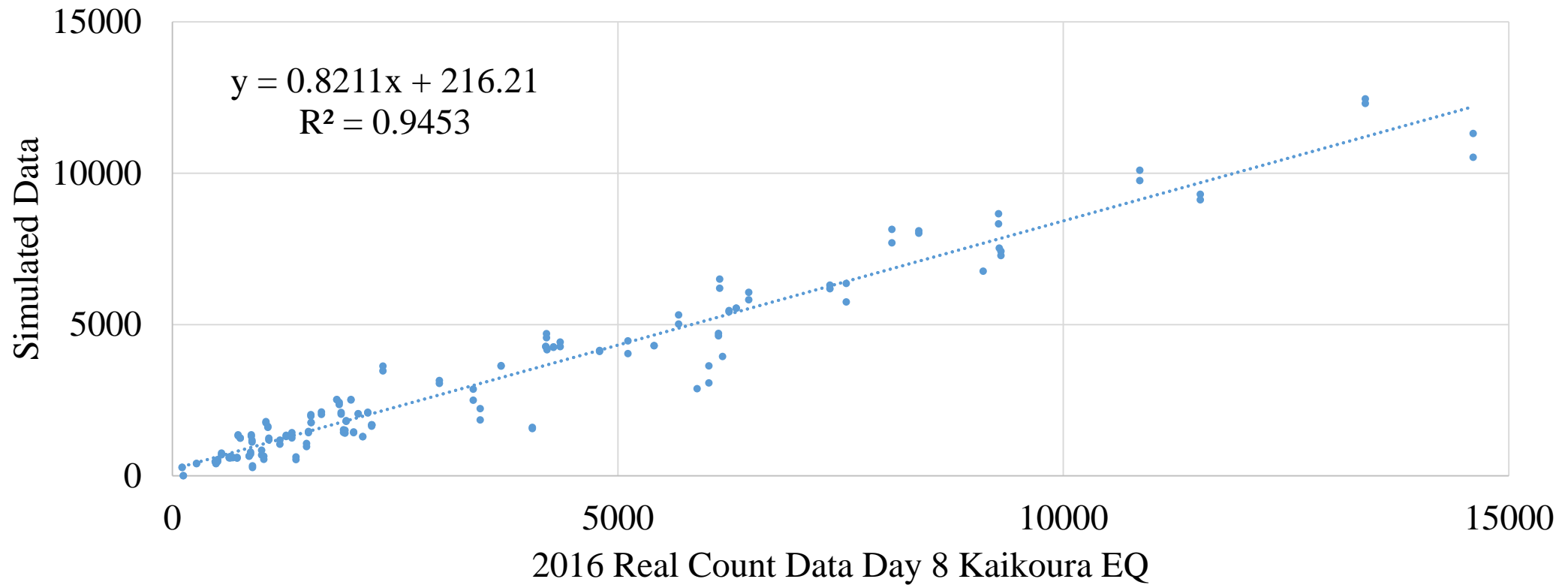
Summary of Static OD Adjustment (2016)

	2013 Trips	2016 Trips	Variation	Weighted Variation
Commuting	516,217	539,469	4.50%	3.83%
Tourism	65,082	72,488	11.38%	1.22%
Heavy Vehicles (Freight)	25,790	28,834	11.80%	0.50%
Total	607,089	640,791	-	5.55%

Static (left) and Dynamic (Right) Assignment

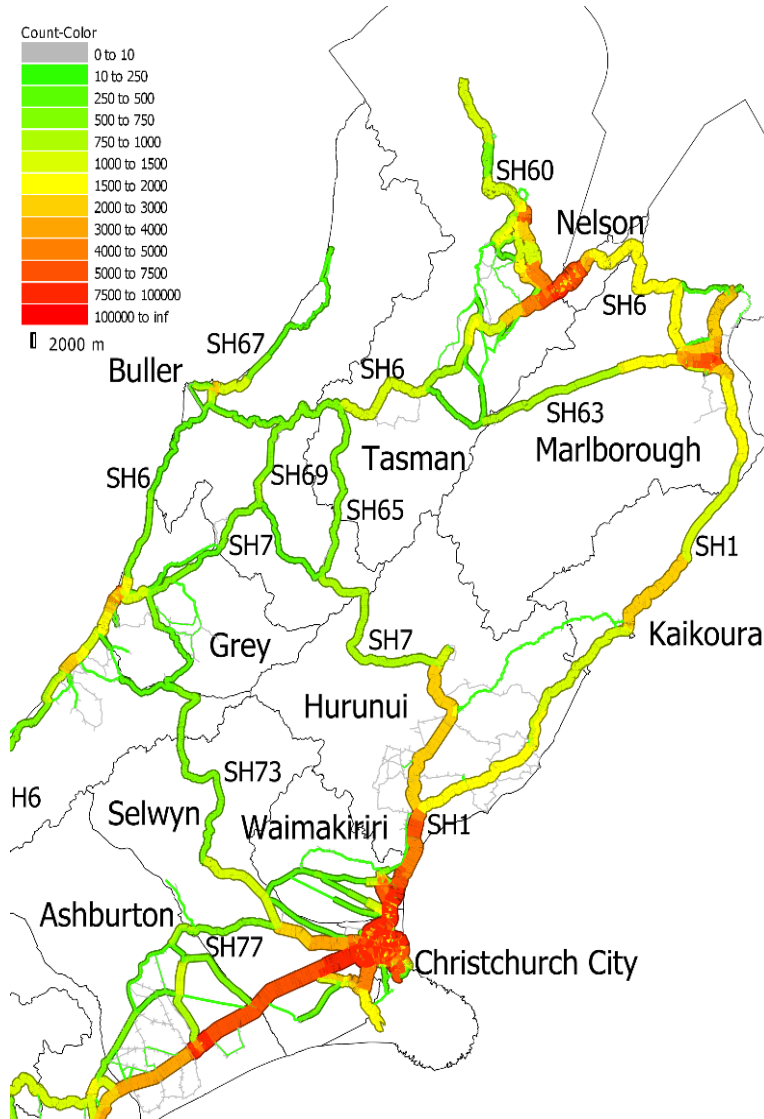


Validation for Day 8 after the Kaikoura EQ.

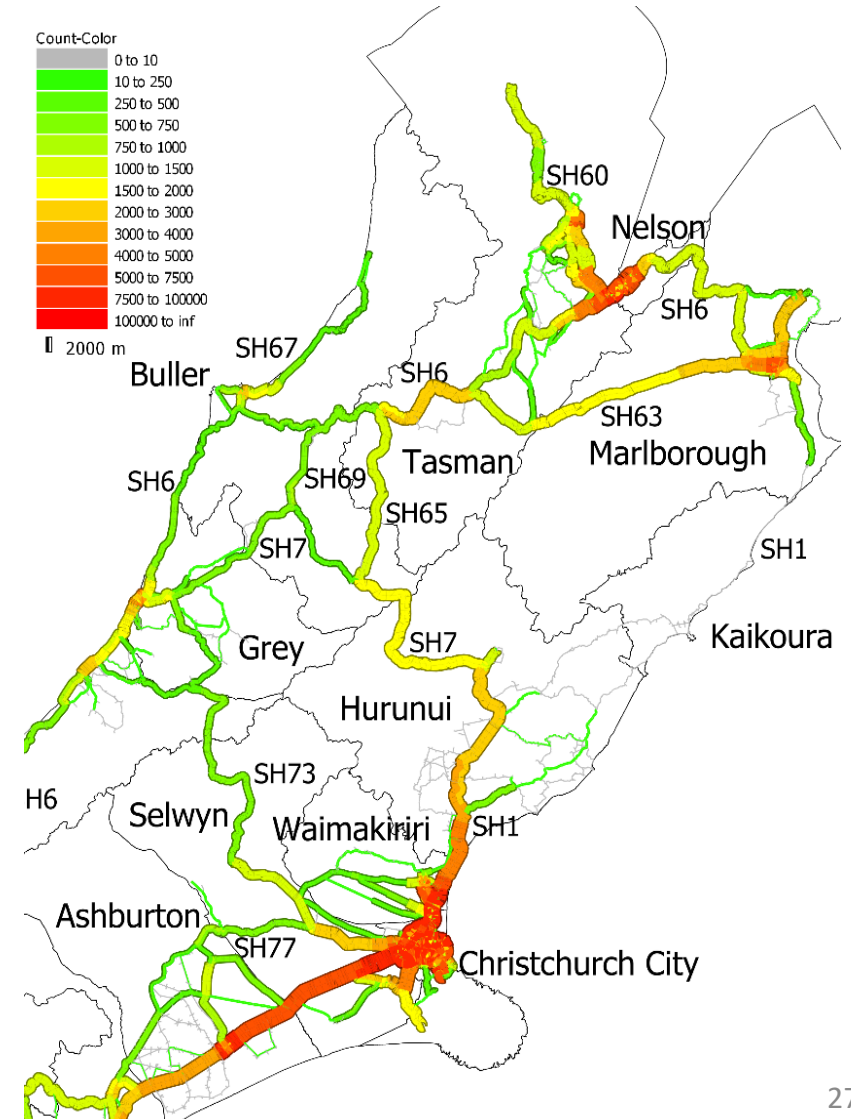


Overall View

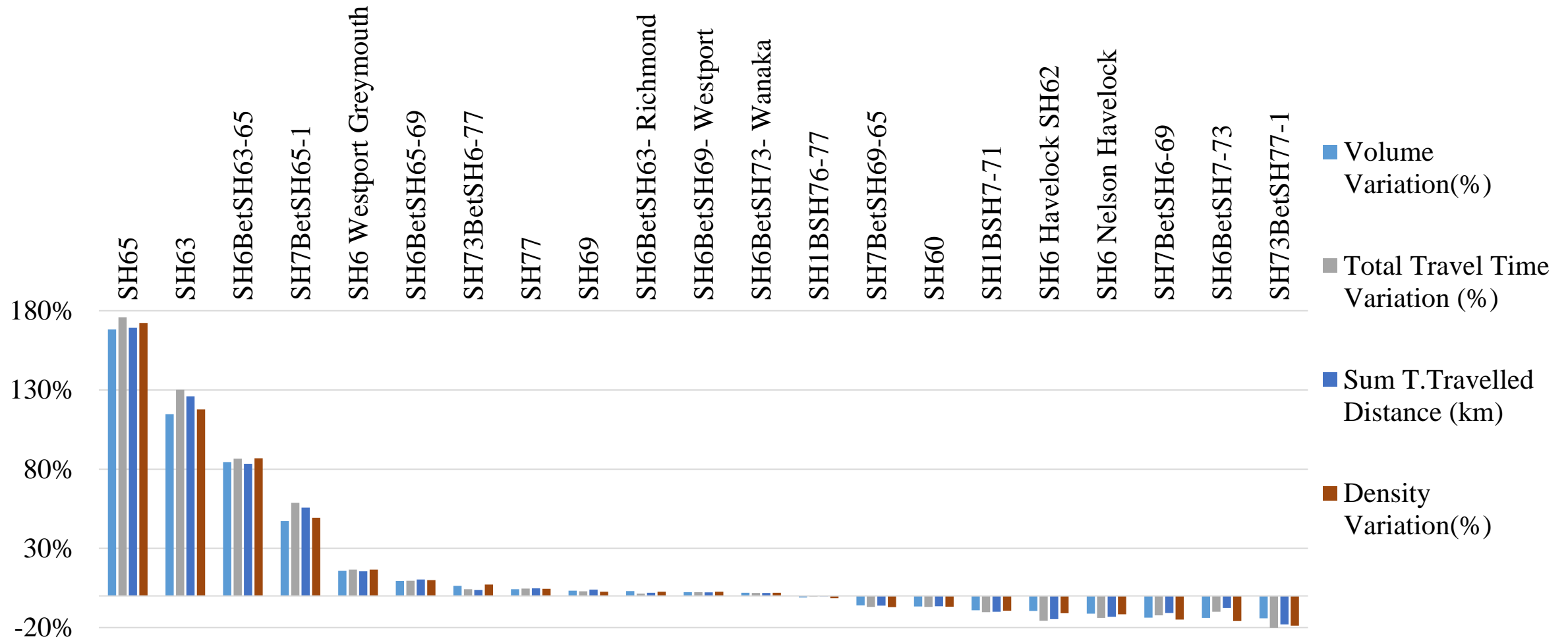
BAU



Day 8



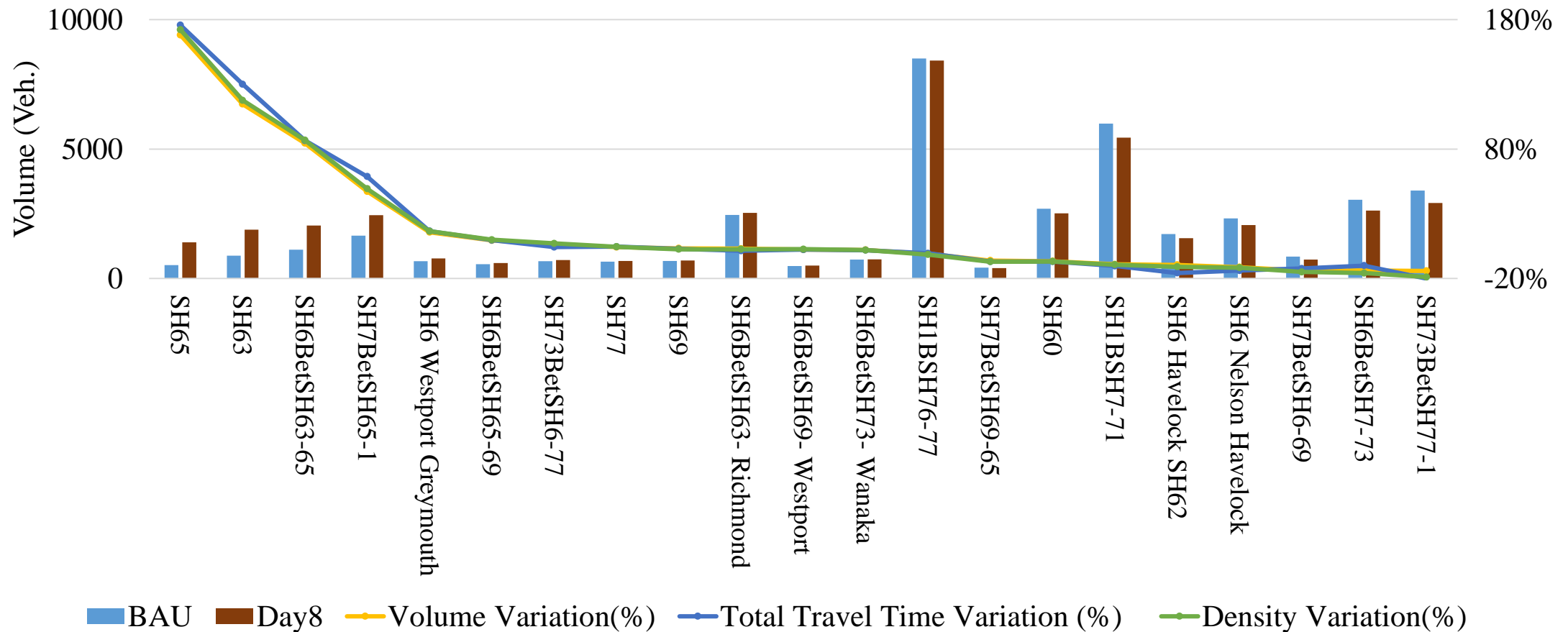
Overall Corridor Analysis



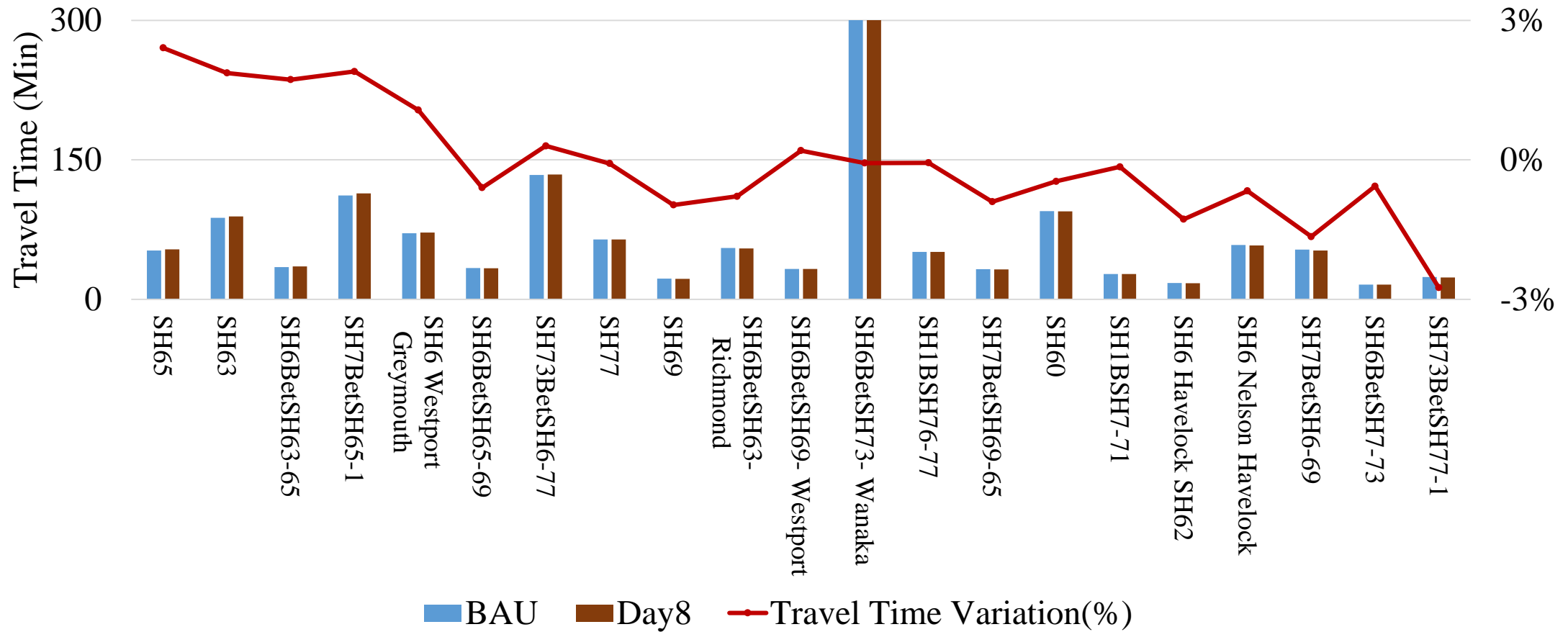
Corridor Analysis (Main Four SHs)

Corridors	TT 2016 BAU	Ave. Count	Total TT	TT	Total Travelled Distance	Sum Delay Time	Ave Density
SH65	0.88	168%	176%	2.41%	169%	30%	172%
SH63	1.46	115%	130%	1.87%	126%	34%	118%
SH6BetSH63-65	0.58	85%	87%	1.72%	83%	23%	87%
SH7BetSH65-1	1.86	47%	59%	1.90%	56%	20%	49%

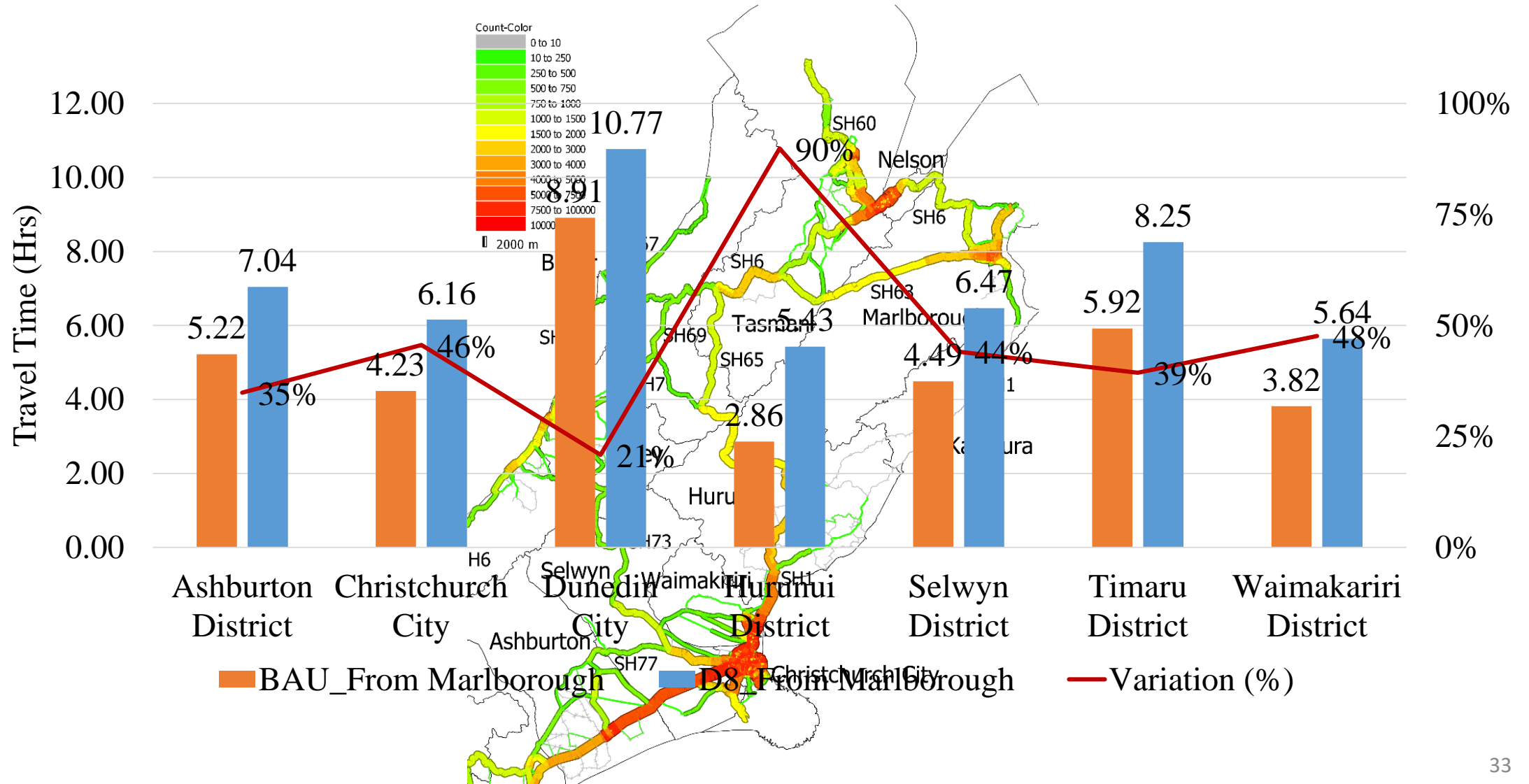
Impact on Total TT and Density



Impact on Travel Time (TT)



Trip Analysis (Impact on Marlborough Dis.)



Thank You
Questions?????

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