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# Improving Pedestrian LOS at Signals

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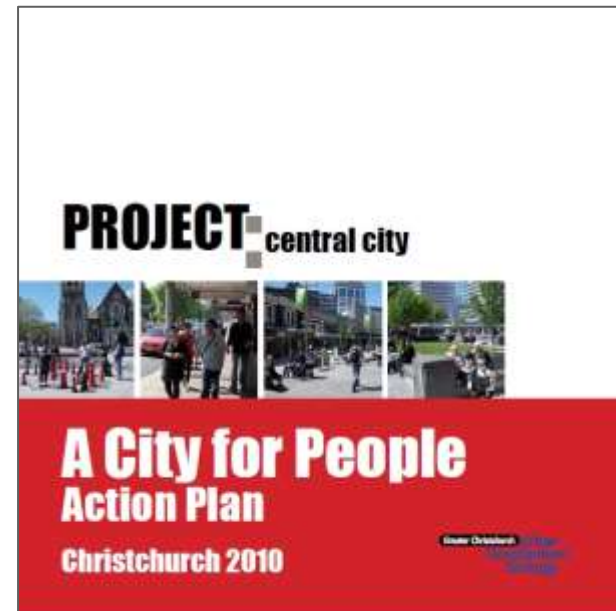
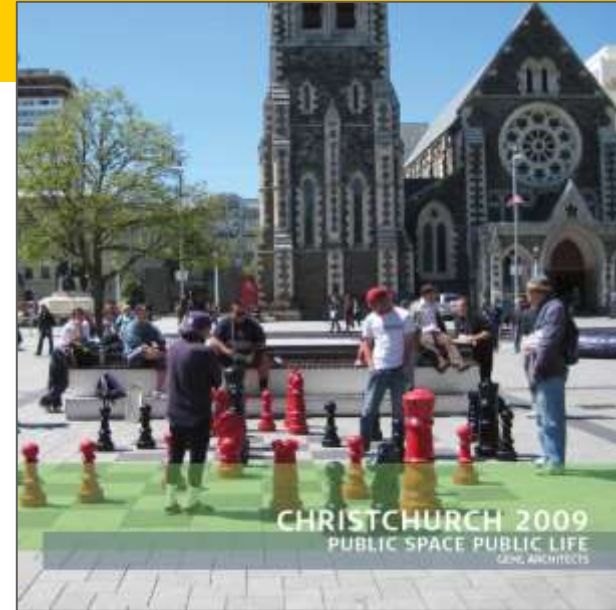


[www.viastrada.co.nz](http://www.viastrada.co.nz)



# Background

- Study of central Christchurch by Danish architect Jan Gehl
  - *Public Space Public Life* (2009)
  - High level look at how to further develop the central city
- CCC (Christchurch City Council) adopted implementation actions
  - *A City for People Action Plan* (2010)



# Background (cont'd)

- Objective of action plan is to lay foundation “for future growth and prosperity” (Bob Parker)
- Action item – improve pedestrian level of service (LOS)

## Pedestrian Friendly City

### ACTION

# Public Space Public Life Recommendations

A City for People Action Plan Recommendations

4

Increase pedestrian priority at intersections including reduced waiting times

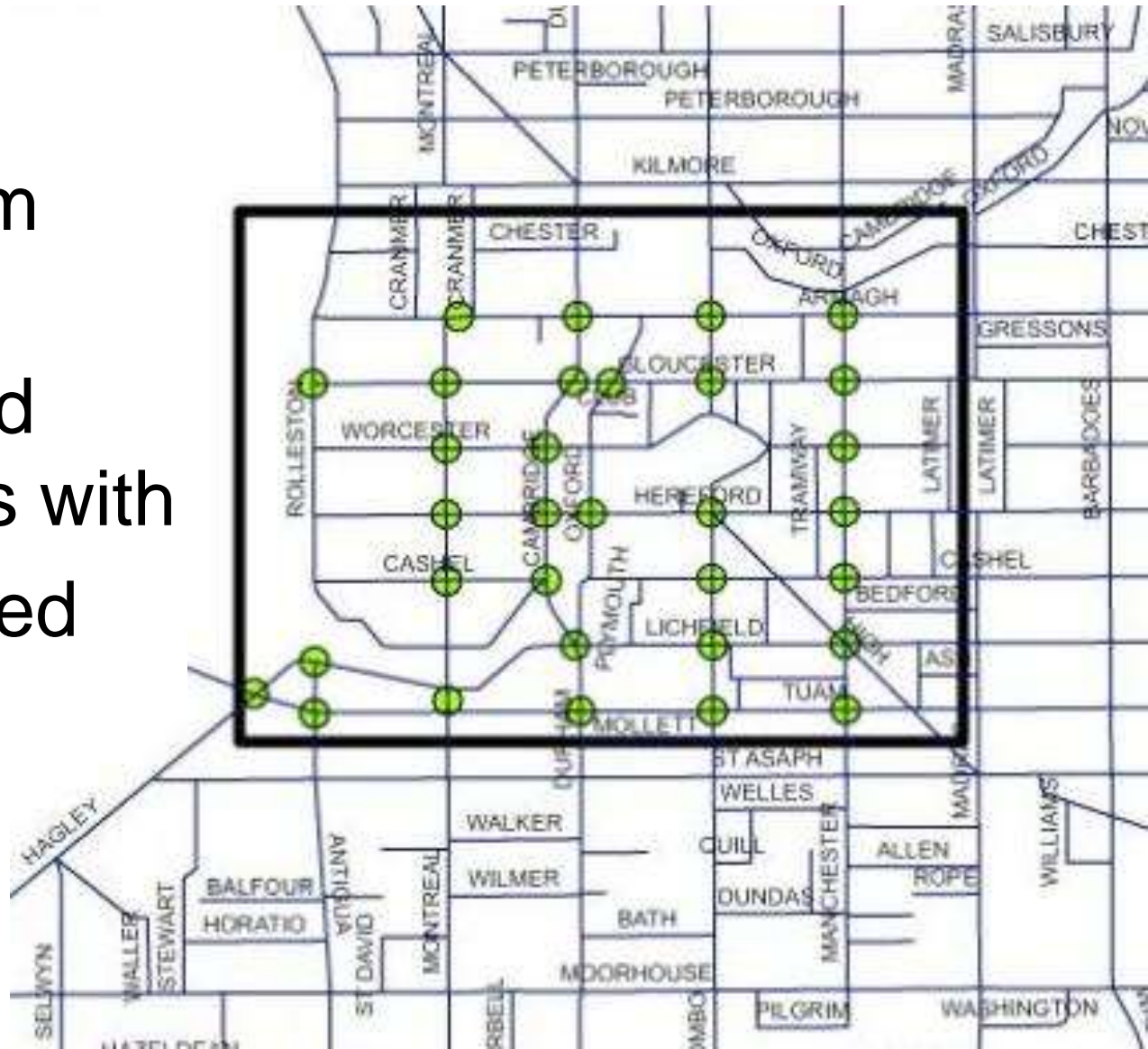
Review LTCCP levels of service to provide better recognition of pedestrians

Review traffic light (SCATS) operations with the objective of providing higher pedestrian priority including extended 'green person' crossing times



# Study area

- Study area adopted from Gehl report
- 32 signalised intersections with
- 110 signalised pedestrian crossings



# Methodology

## Stage 1: conference paper

- Develop a pedestrian LOS process
- Measure LOS for the signalised pedestrian crossings in the study area
- Prepare a toolkit of measures to improve LOS
- Develop an implementation strategy

## Stage 2: work undertaken since submitting paper

- Develop preferred option for each crossing
- Undertake network modelling
- Evaluate improvement



# Defining level of service

- No recognised system available for measuring pedestrian LOS at signals
- Method developed for this study:
  1. Crossing distance: kerb to kerb distance
  2. Delay time: average length of time before walk phase begins
  3. Green time ratio: ratio of delay to green walk time
  4. Exposure to risk: conflicting turning volumes

# Measuring level of service

- Review signal plans
- Site visits
  - ped counts, observations, hardware
- Data from the signals team
  - turning volumes, operational data
- Apply engineering judgement
  - exposure to risk
- LOS score for each crossing
  - spreadsheet analysis



# LOS rating

- Spreadsheet analysis assigns points
  - Range 0 to 100 points
- Points ranges get translated to LOS rating

LOS	Range	
A	100	83
B	82.9	66
C	65.9	49
D	48.9	32
E	31.9	16
F	15.9	0



# Numerical distribution of LOS

- Based on engineering judgement (we assigned scores and distributed points ranges)
  - No LOS F
  - Half of the crossings LOS D
  - Rest evenly distributed
  - Average score 48.9 points
- Wellington and Auckland perform less well
  - Based on Beca research

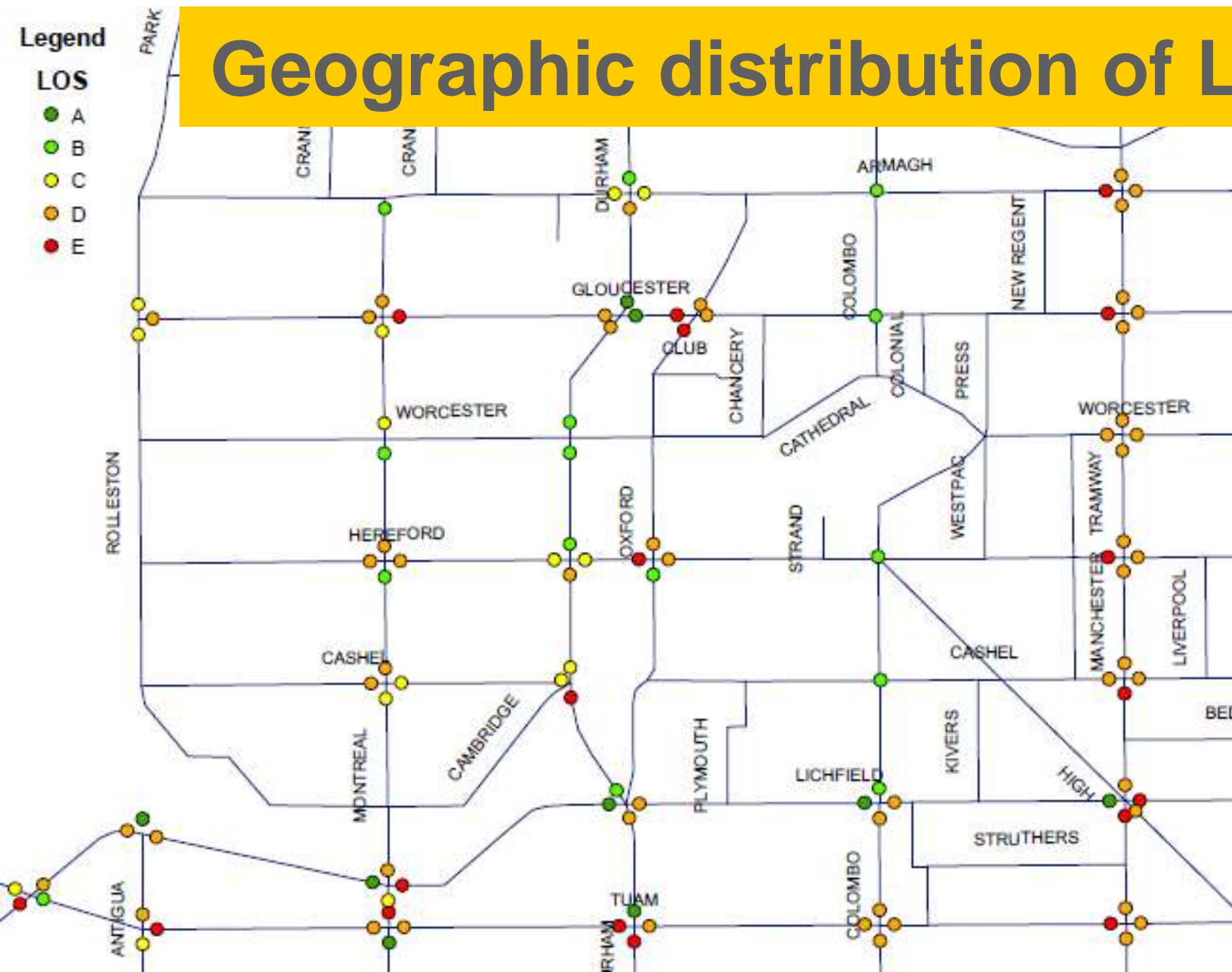
LOS	Number of crossings
A	9
B	15
C	15
D	53
E	18
F	0

# Geographic distribution of LOS

## Legend

LOS

- A
- B
- C
- D
- E



# Observations on distribution

- Many LOS A crossings are on one-way approaches

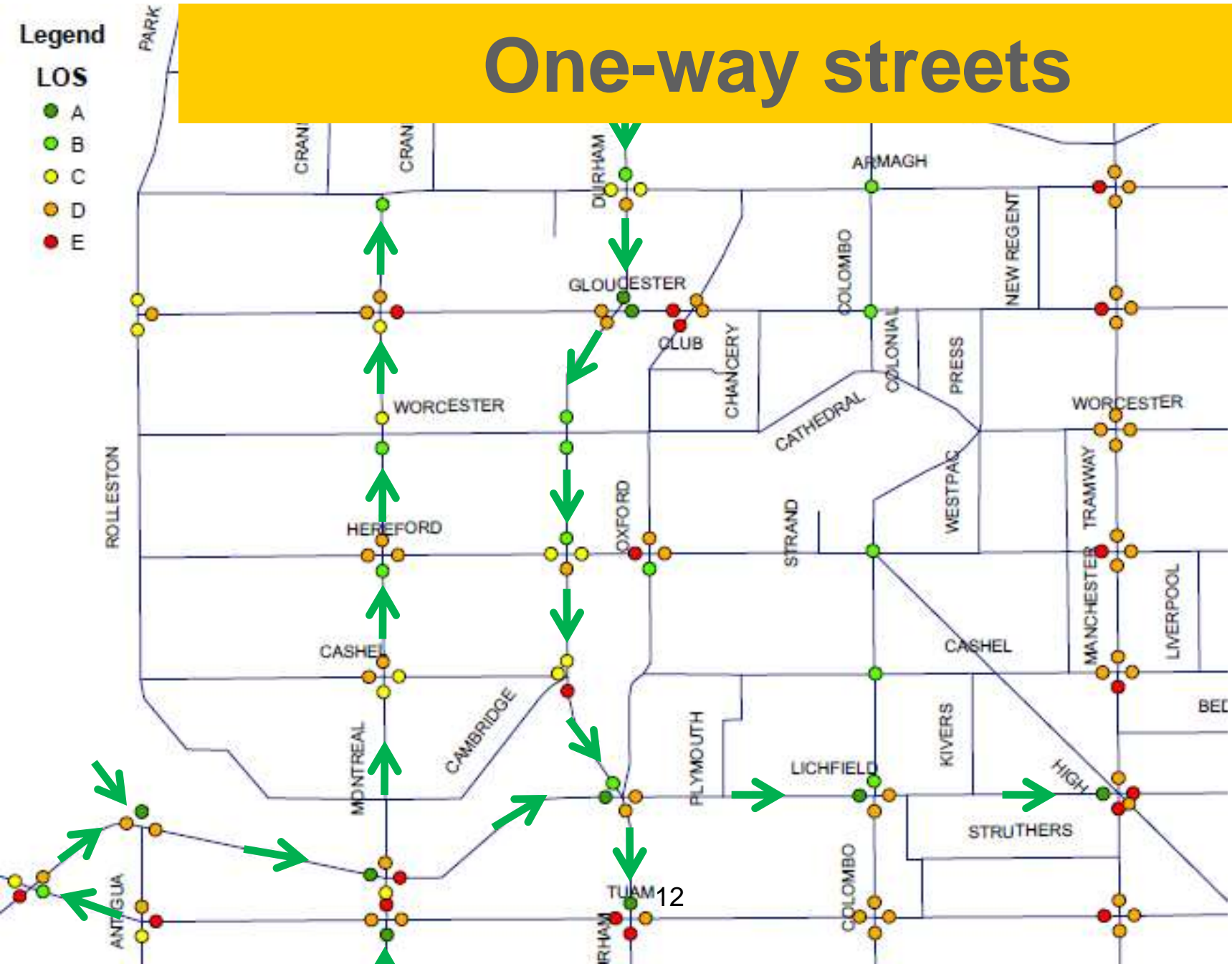


# One-way streets

## Legend

LOS

- A
- B
- C
- D
- E



# Observations on distribution

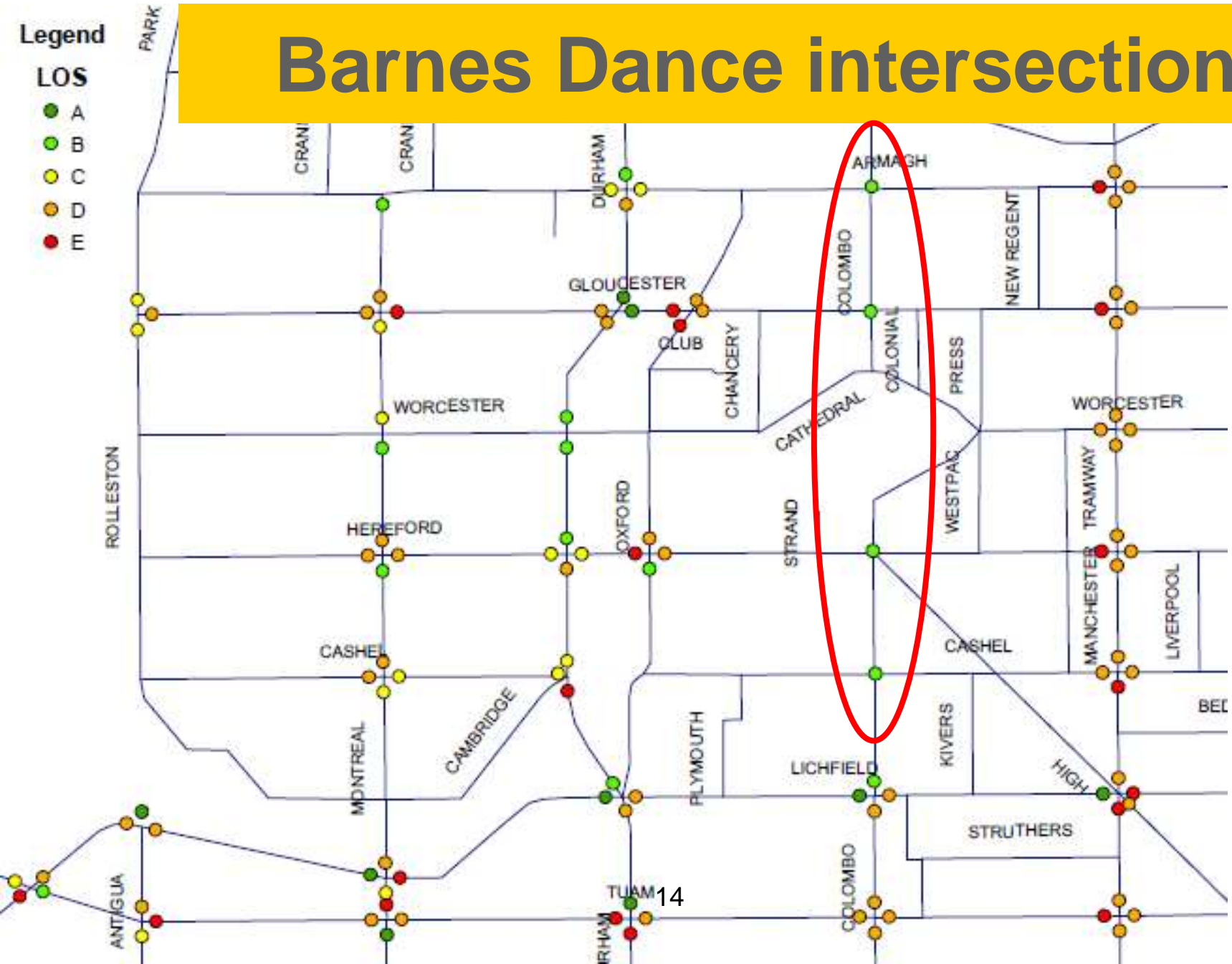
- Many LOS A crossings are on one-way approaches
- Barnes Dance (pedestrian scramble phase) intersections have LOS B

# Barnes Dance intersections

## Legend

LOS

- A
- B
- C
- D
- E



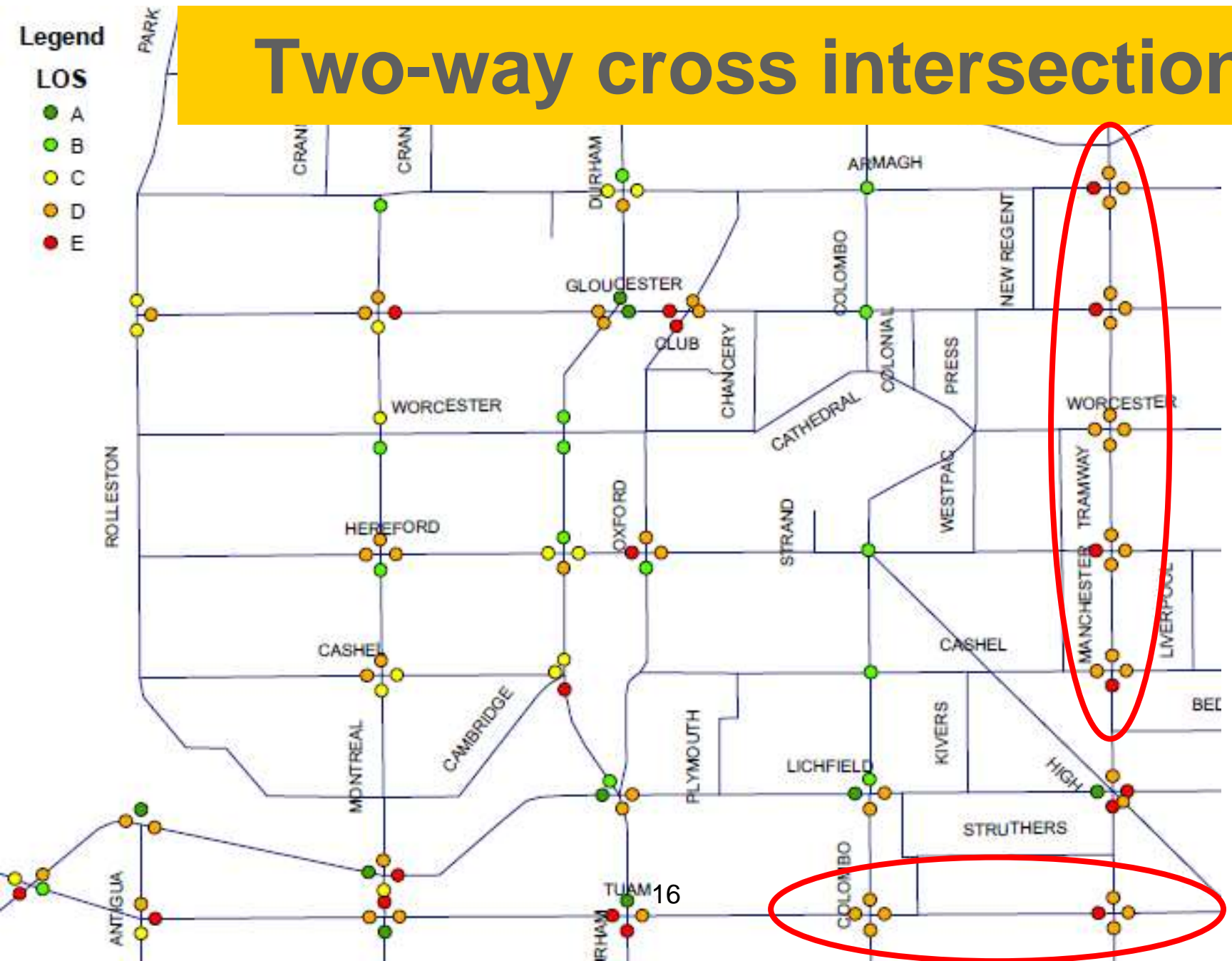
# Observations on distribution

- Many LOS A crossings are on one-way approaches
- Barnes Dance (pedestrian scramble phase) intersections have LOS A
- **Two-way cross intersections often have a low LOS**
  - Not a reflection of an inherent problem, rather a reflection how they are currently operated

# Two-way cross intersections

## Legend

- LOS A
- LOS B
- LOS C
- LOS D
- LOS E





# Toolkit of measures to improve LOS

- Reduce the waiting time for pedestrians (through cycle time reductions)
- Lengthen the pedestrian phase (reduce perceived conflict created by the “flashing red man”, plus reduced delay)
- Give pedestrians an advance start ahead of vehicles (several different methods available)
- Increase geographic distribution and time schedule for automatic call of pedestrian signals
- More Barnes Dances  
... and other measures



# The most effective tool

- Cycle time reduction most effective
  - More effective than increasing walk time
  - Requires departure from current operating philosophy
  - Need to balance pedestrian benefits with impacts on driver delays / capacity
  - Often benefits motorists, too



# Stage 2 – Implementation phase

- Not part of the written paper
- Hence will report results only
- Methodology
  - Study undertaken for each crossing
  - Considered most applicable tool(s) from Stage 1
  - Detailed proposals worked out
  - Network effects modelled in Paramics
- Final draft submitted to client

# Stage 2 – Results

- The cycle time in the CBD would be reduced in the interpeak
- Some intersections and one corridor taken out of co-ordinated system
- Proposal would raise average LOS

	Existing	Proposed
Score	48.9	59.0
Rating	D	C

- Overall network performance for motorists remains fairly unchanged

# Stage 2 – LOS comparison

- Average score 59 points – LOS C
- Significant pedestrian improvement without lowering vehicle performance

LOS	Number of crossings	
	Existing	Proposal
<b>A</b>	9	16
<b>B</b>	15	19
<b>C</b>	15	40
<b>D</b>	53	28
<b>E</b>	18	7
<b>F</b>	0	0

# Stage 2 – Implementation



- Implementation date uncertain



# Discussion & thank you

- Questions please
- Thank you for listening
- Contact phone numbers:
  - Axel Wilke (027) 2929 810
  - Jeanette Ward (021) 2969 524
  - Susan McLaughlin (03) 941 8569