

Morning all,
We have around a 15-minute slot to discuss the traffic signal design guidance which myself and other committee members have been undertaking in the background on the lead up to this year's conference.
I'm planning to present for around 10-minutes on the framework and initial hot topics from the committee workshop on the first signal guidance draft.

However, I am keen to open the floor to possible suggestions and feedback from conference delegates.

What is a Signalised Roundabout

- Roundabout with traffic signals controlling entries and/or circulation
- Can be partially or fully signalised
- Combines the benefits of roundabouts and signal control
- Common in UK



A signalised roundabout is not simply a roundabout with added, it has a different operational system

SNUG
SIGNALS NZ USER GROUP

Evolution of signalised roundabouts

- The Circus (Bath) 1768
- First modern roundabout in 1909 - Letchworth
- 1966 Modern Roundabout Rule (UK)
- First Signalised trials in the 60s and 70s
- Rapid UK expansion since the 1990s
- Signalised Gyratory extensively used in Europe from late 90s
- First in NZ – Tauranga 2008-09



SNUG
SIGNALS NZ USER GROUP

Rank
Country
Roundabouts per million people
1
France
664
2
Portugal
473
3
Norway
445
4
Ireland
435
5
Iceland
420

Why signalised a roundabout

Common drivers

- Congestion
- Unbalanced traffic flows
- Queue spillback
- Pedestrian Safety
- Better access

Benefits

- Improved traffic management
- Control traffic entry
- Improve network performance
- Queue control

SNUG
SIGNALS NZ USER GROUP

First in Australia



First in NZ



SNUG
SIGNALS NZ USER GROUP

Guidance –Why?

- Improves Safety
- Provides Consistency
- Incorporates Best Practice
- Facilitates Quality Assurance
- Reduces Project Risk



SNUG
SIGNALS NZ USER GROUP

Example Phase control

It is also interesting to note the "green wave" of the sequential phasing is anticlockwise (against the circulating flow of the traffic). Figure 4 demonstrates the anticlockwise "green wave" can allow the upstream traffic entering into the roundabout early and enable this bunch of traffic to chase the prior bunch of vehicles entered from downstream approach. This arrangement helps to reduce the start up loss time of a signal and minimise the wasted gaps between greens for each approach.

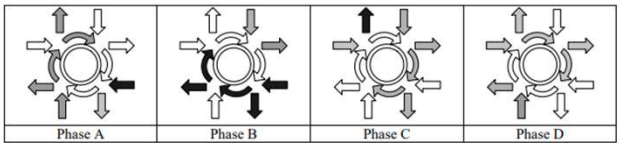


Figure 4: Signal Phasing - Anti-Clockwise Green Wave

SCATS Signal Control at Roundabouts

- Signalised Roundabouts require movement-based control
- The objective is to make a single controller behave like multiple coordinated controllers, with independent control of each roundabout approach.
- SCATS Flexilink mode is used which is similar to UK Cable Linking Facility (known as CLF) control.
- Flexilink uses fixed-time plans and schedules for time-of-day and day-of-week
- The standard Flexilink 'call pulse' function is programmed to terminate conflicting signal displays rather than entire phases.

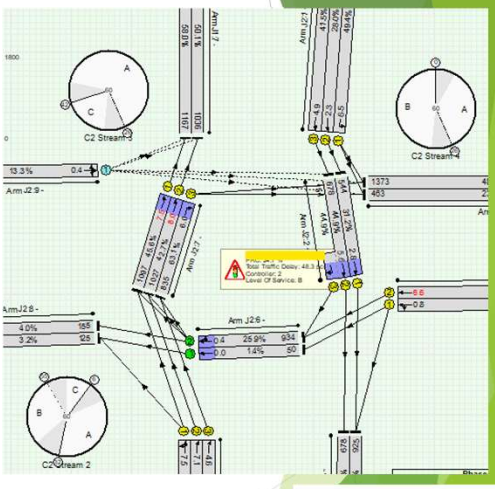
			C RELEASE	A RELEASE	B RELEASE								
	PL	CL	A (Pulse)	B (Pulse)	C (Pulse)	R-	R+	Y-	Y+	Z-	Z+	Q-	XSF
Plan Description	Closing SG =		4,6	3	5	8,10	9		11	1	2	7	
	Mvmnt =		E	D	G	H,I,K	J		N	A	B	G	
	0												
	1												
	2												
Mid Peak	3	50	5	27	44	0	22	CT	22	0	24	0	5($0010)
	4												
	5												
PM	6	60	6	32	55	1	27	CT	26	57	26	1	5($0010)
AM Peak	7	60	4	35	53	0	30	CT	26	0	30	0	5($0010)
	8												
Off Peak	9	40	11	25	0	4	21	CT	20	0	20	9	5($0010)
Alt PM	10	60	17	40	5	12	35	CT	19	0	35	12	5($0010)

Example of CIS Flexilink Plan for a signalised roundabout

SNUG
SIGNALS NZ USER GROUP

Tools to support SCATS Signal Control at Roundabouts

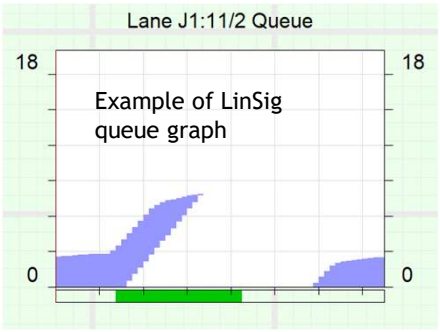
- SCATS Signal Programmer and CIS Developer
- Regional Transport Operations Centre (TOC) Operators
- Recent traffic counts and approach volumes
- Develop a traffic model or microsimulation model to test signal timings under various peaks.
- LinSig Modelling Software (Developed by JCT, UK) specialises in signal-control at roundabouts.

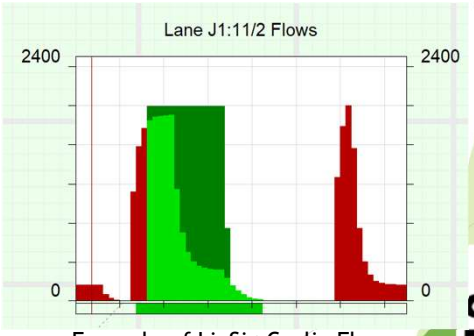


SNUG
SIGNALS NZ USER GROUP

Modelling for Roundabout Performance

- Review and balance **entry and circulatory lane flows**
- Use **Entry Lane Balancing** as the starting point, then
- Identify the **Critical Node** (highest Degree of Saturation) and allocate green time to manage circulatory flows while preventing roundabout lock-up.
- Optimise **Offsets and Coordination** to minimise circulatory queues, maximise progression, and prioritise storing queues on entries rather than the circulatory lanes.





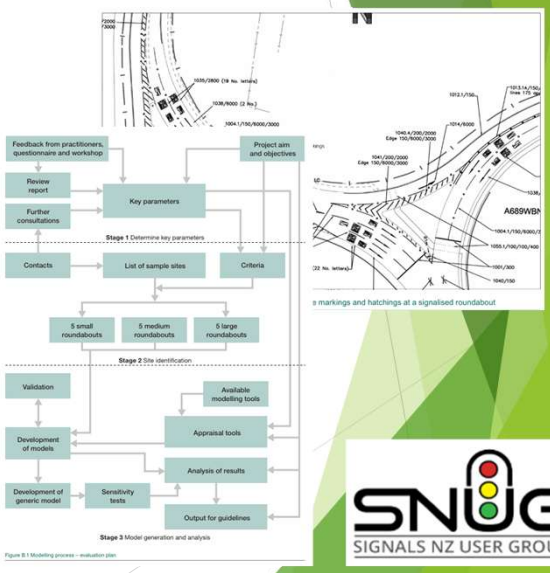
Example of LinSig Cyclic Flow Profile Graph

SNUG
SIGNALS NZ USER GROUP

Lane distribution has a major influence on roundabout performance.
Use entry lane balancing as the starting point
Identify the critical node (usually the highest degree of saturation and highest RDBT entry volume)
Talk to graph examples.

International Guidance – Best Practice

- DMRB CD 116 (UK)
- Local Transport Note 1/09 (UK)
- Austroads Guide to Road Design Part 4B (ANZ)
- MRWA D25#77071 Signalised Roundabouts Guidelines (WA)
- NZTA ITS Standards and Specifications (NZ) – Traffic Signals
- JCT – Technical Memos



SNUG
SIGNALS NZ USER GROUP

European Design Standards

- **France**
  - **SETRA/CEREMA Roundabout Design Guidance**
  - Strong focus on urban roundabouts and signalised operation.
- **Netherlands**
  - **CROW Design Manuals**
  - Extensive guidance on roundabouts, cyclist priority**Germany**
  - **RASt 06 and FGSV Intersection Guidance**
  - National standards governing urban road and junction design.
- **Switzerland**
  - **VSS Standards**
  - Frequently cited for urban signalised roundabouts.
- **Sweden**
  - **VGU (Road and Street Design Guidelines)**
  - Safe System-based approach for roundabouts and intersections.

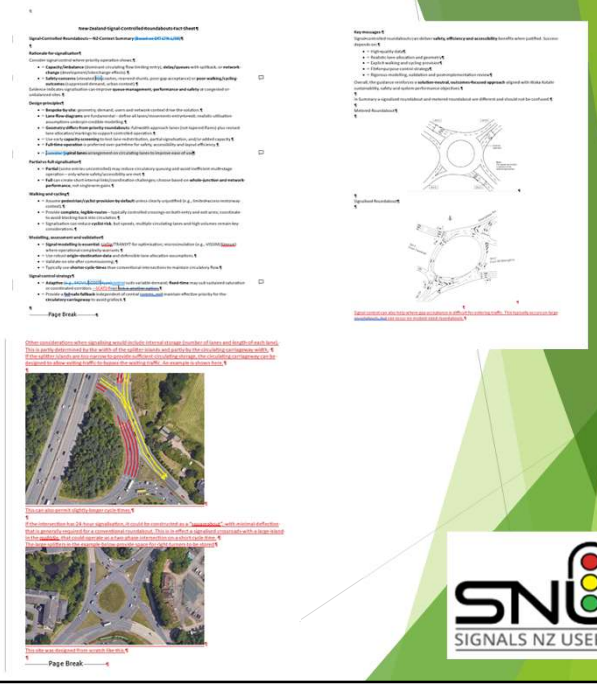




SNUG
SIGNALS NZ USER GROUP

SNUG - FAQ

- References
- Design Principals
- Modelling
- Worked Examples
- Who to contact
- Source Materials
- Anything else?



SNUG
SIGNALS NZ USER GROUP