



Traffic Signal OpSheets

and how to apply the information in SIDRA

Thursday 26th November 2020

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Welcome, Purpose and Scope

What is an OpSheet? What information does it tell us?

How can OpSheet information be used to create more accurate signalised intersection models in SIDRA?

Which OpSheet information should be used as SIDRA input data?



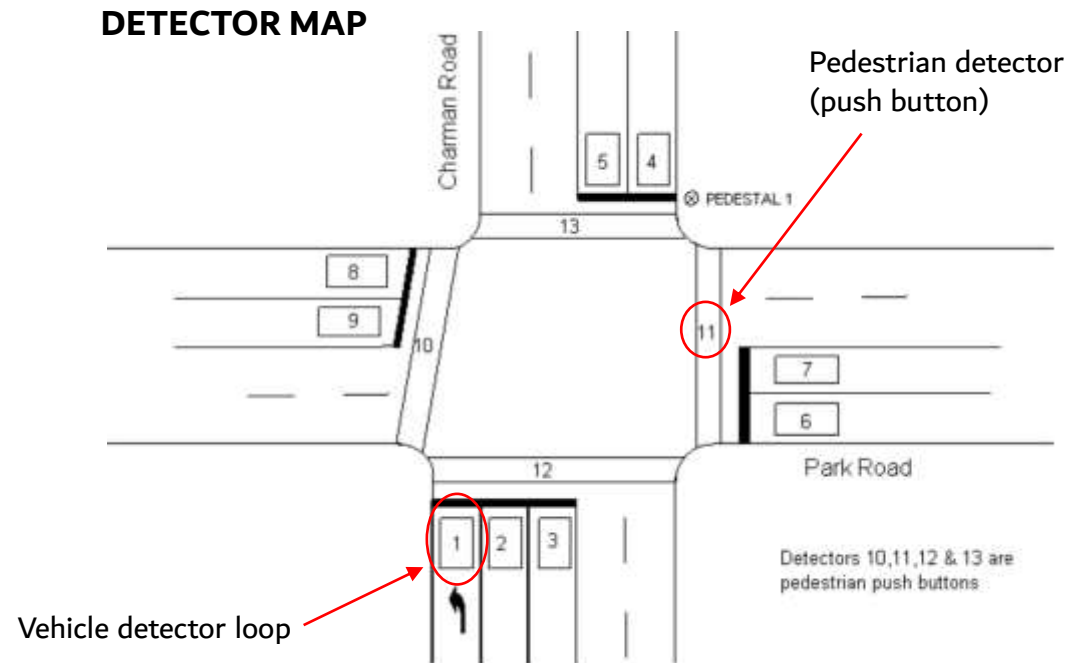
What is an OpSheet?

Controller Operation Specifications (OpSheets)

provide a summary of the operational design criteria for traffic signals across Victoria.

OpSheets include the following useful information for modelling intersections in SIDRA:

- **Detector Layout Map**
 - Vehicle Detector Loops
 - Pedestrian push buttons



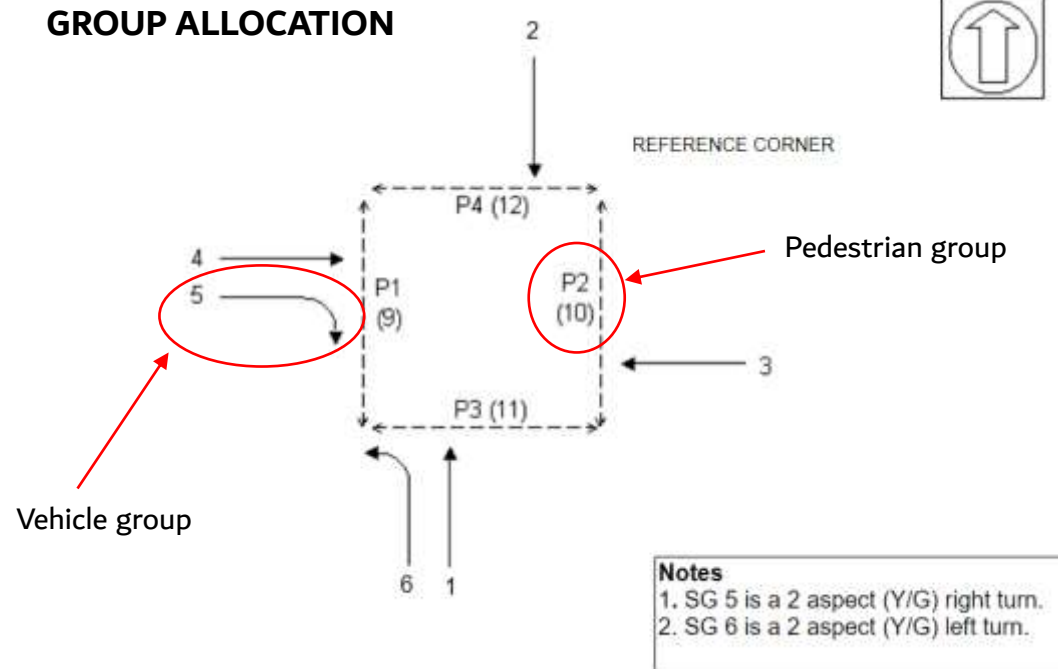
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- **Allocation of Signal Groups**



What is an OpSheet?

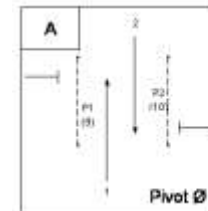
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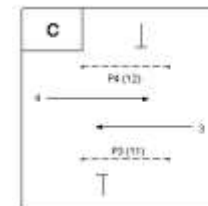
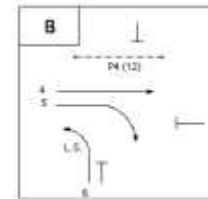
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- **Detector Layout Map**
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 - Pedestrian push buttons
- **Allocation of Signal Groups**
- **Signal Phasing Sequence**

PHASING DIAGRAM



Refer General Notes



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OpSheets include the following useful information for modelling intersections in SIDRA:

- **Detector Layout Map**
 - Vehicle Detector Loops
 - Pedestrian push buttons
- **Allocation of Signal Groups**
- **Signal Phasing Sequence**
- **Signal Timing Details**
- **Op Notes (if applicable)**

<p>GENERAL NOTES</p> <p>SUMMARY OF XSF FLAGS (Communications Operation of XSF flags is required)</p> <p>XSF1 - Automatic introduction of P1 & P2 in AD.</p> <p>XSF2 - Automatic introduction of P3 & P4.</p> <p>XSF3 - Allows detector 9 to place non-locking calls for B0.</p> <p>GENERAL OPERATION</p> <ul style="list-style-type: none">• If in CO green, clear demands for B0.• Late start SGI in B0 when going from AD → B0. <p>PEDESTRIAN GROUP OPERATION</p> <p>Pedestrian 1</p> <ul style="list-style-type: none">• P1 calls A0.• P1 can be introduced at the start of A0.• P1 auto-introduces at the start of AD when XSF1 is set. <p>Pedestrian 2</p> <ul style="list-style-type: none">• P2 calls A0.• P2 can be introduced at the start of A0.• P2 auto-introduces at the start of AD when XSF1 is set. <p>Pedestrian 3</p> <ul style="list-style-type: none">• P3 calls C0.• P3 can be introduced at the start of C0.• P3 auto-introduces at the start of C0 when XSF2 is set. <p>Pedestrian 4</p> <ul style="list-style-type: none">• P4 calls C0.• P4 can be introduced at any time in B0 and the start of C0 and can overlap from B0 →• P4 auto-introduces at the start of SGI when XSF2 is set. <p>DETECTOR OPERATION</p> <p>Detector 9</p> <ul style="list-style-type: none">• Detector 9 places a locking call for B0 if its presence time expired during CO yellow.• Detector 9 places non-locking calls for B0 if its presence time expired when XSF3 is set.
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Add David's content on signal phasing

Traffic Signal Timing



OpSheets can provide SOME information to assist inputting signal timing in SIDRA.

Intergreen times: The yellow and red times allocated to each phase
 SIDRA default = 4.0 s yellow / 2.0 s red
 Only whole numbers can be inputted into SIDRA

PHASING & TIMING - Site1 Site Folder - General

Sequence | Sequence Editor | **Phase & Sequence Data** | Timing Options | Movement Data

Selected Sequence (For Editing): **Leading Right Turn**

Phase Data

Phase	A	B	C	D
Variable Phase	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reference Phase	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Phase Time *	3s	3s	3s	3s
Phase Frequency				
Yellow Time	4 sec	4 sec	4 sec	4 sec
All-Red Time	2 sec	2 sec	2 sec	2 sec
Dummy Movement Exits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Minimum Green Time				
Maximum Green Time				

There must always be a phase (and only one phase) checked as the Reference Phase. The first phase will be used as the default Reference Phase.

* Phase Time and Phase Frequency: NOT APPLICABLE (Blue Green Phase Times option has not been selected under the Timing Options tab)

Detection Data

Major Movement: Minor Movement:

SITE NAME **CHARMAN ROAD / PARK ROAD** SITE NO. **4626**

CONTROLLER TIMESETTINGS - 1

PHASE TIMESETTINGS Front Panel Command: Phase No.Timesetting No (eg 3.2 accesses C phase late start)

DESCRIPTION	Timesetting No	PHASE						
		A	B	C	D	E	F	G
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
RED / YELLOW	1	-	-	-	-	-	-	-
LATE START	2	-	2	-	-	-	-	-
MINIMUM GREEN	3	10	5	8	-	-	-	-
INCREMENT	4	-	-	-	-	-	-	-
MAXIMUM INITIAL GREEN*	5	-	-	-	-	-	-	-
MAXIMUM EXTENSION GREEN	6	60	14	25	-	-	-	-
EARLY CUT OFF	7	-	-	-	-	-	-	-
YELLOW	8	4.0	3.0	4.0	-	-	-	-
ALL RED	9	1.5	2.0	1.5	-	-	-	-
SPECIAL ALL RED	10	-	-	-	-	-	-	-

Modify yellow time in SIDRA model

Traffic Signal Timing



OpSheets can provide SOME information to assist inputting signal timing in SIDRA.

Minimum Green time: The minimum allowable green time allocated to each phase.
 OpSheets provide the minimum time per phase
 SIDRA includes minimum time per movement

VEHICLE MOVEMENT DATA - Start (Site Folder: General)

Path Data | Calibration | **Signals**

Approach Selector

Road Name: S

Movement Class

- All Movement Classes
- Light Vehicles (LV)
- Heavy Vehicles (HV)

Movement Data - Signals

From South to East	W	N	E
	L2	T1	R2
Signal Coordination	Program	Program	Program
Arrival Type			
Arrivals During Green			
Stopline Travel Time	Program	Program	Program
Turn-On Road	<input type="checkbox"/>		
High Priority for Green Splits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle Movement Timing Data			
Start Loss	3 sec	3 sec	3 sec
End Gain	3 sec	3 sec	3 sec
Minimum Green	Program	Program	Program
Maximum Green	Program	Program	Program
Minor Phase Actuation	None	None	None
Early Cut-Off	No	No	No
Late Start	No	No	No

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RED / YELLOW	1	-	-	-	-	-	-	-
LATE START	2	-	2	-	-	-	-	-
MINIMUM GREEN	3	10	5	8	-	-	-	-
INCREMENT	4	-	-	-	-	-	-	-
MAXIMUM INITIAL GREEN*	5	-	-	-	-	-	-	-
MAXIMUM EXTENSION GREEN	6	60	14	25	-	-	-	-
EARLY CUT OFF	7	-	-	-	-	-	-	-
YELLOW	8	4.0	3.0	4.0	-	-	-	-
ALL RED	9	1.5	2.0	1.5	-	-	-	-
SPECIAL ALL RED	10	-	-	-	-	-	-	-

Traffic Signal Timing



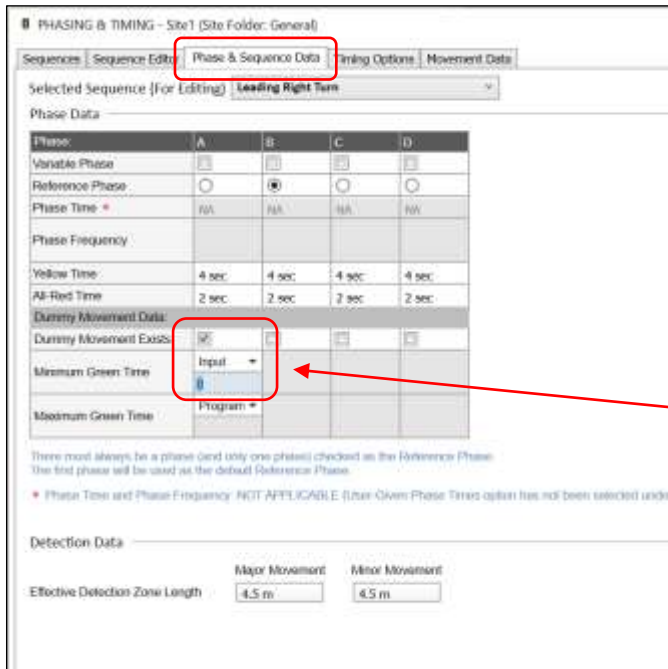
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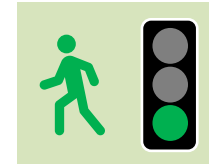
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DESCRIPTION	Timesetting No	PHASE						
		A (1)	B (2)	C (3)	D (4)	E (5)	F (6)	G (7)
RED / YELLOW	1	-	-	-	-	-	-	
LATE START	2	-	2	-	-	-	-	
MINIMUM GREEN	3	10	5	8	-	-	-	
INCREMENT	4	-	-	-	-	-	-	
MAXIMUM INITIAL GREEN*	5	-	-	-	-	-	-	
MAXIMUM EXTENSION GREEN	6	60	14	25	-	-	-	
EARLY CUT OFF	7	-	-	-	-	-	-	
YELLOW	8	4.0	3.0	4.0	-	-	-	
ALL RED	9	1.5	2.0	1.5	-	-	-	
SPECIAL ALL RED	10	-	-	-	-	-	-	

Pedestrian Timing

Pedestrian Timing Parameters – extracted from OpSheets:

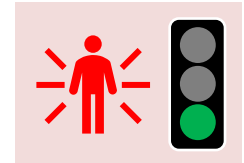
Walk time:

Green time allocated for pedestrians



Clearance 1:

Flashing red for pedestrians, during vehicle green

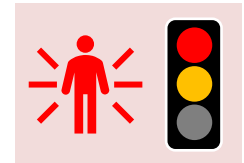


Clearance 2:

Flashing red for pedestrians, during vehicle intergreen

- This may be zero for some intersections

- SIDRA defaults Clearance 2 = 2 seconds, and needs to be checked against the OpSheet parameter



For the calculation of clearance times – a **walking speed of 1.5 m/s** is applied

In SIDRA – a walking speed of 1.3 m/s and a crossing speed of 1.2 m/s are applied as default

Pedestrian Timing

Example: Charman Road / Park Road intersection

PEDESTRIAN TIMESETTINGS Front Panel Command: Pedestrian No.Timesetting No (eg 18.2 accesses P2 walk)

DESCRIPTION	Timesetting No	PEDESTRIAN							
		P1 (17)	P2 (18)	P3 (19)	P4 (20)	P5 (21)	P6 (22)	P7 (23)	P8 (24)
DELAY	1	-	-	-	-	-	-	-	-
WALK*	2	8.0	8.0	8.0	8.0				
CLEARANCE 1	3	9.0	9.0	11.0	10.0				
CLEARANCE 2	4								

* Minimum walk time - used in Isolated and Flexilink operation

★ PEDESTRIANS - Site1 (Site Folder: General)

Pedestrian Movements | Pedestrian Movement Data | Pedestrian Timing Data

Approach Selector

RoadName

Data apply to Pedestrians crossing in front of the selected leg.

Pedestrian Timing Data

	Full Crossing
Movement ID	P1
Pedestrian Minimum Time	Program
Pedestrian Maximum Time	Program
Pedestrian Actuation	Program
Walk Time Extension	<input type="checkbox"/>
High Priority for Green Splits	<input type="checkbox"/>
Crossing Speed	1.2 m/sec
Minimum Walk Time	5 sec
Minimum Clearance Time	5 sec
Clearance 1 Time	Program
Clearance 2 Time	Input
Start Loss	2 sec
End Gain	3 sec

Modify Clearance 2 time to zero seconds on all approaches



Pedestrian Timing

Example: Bay Road / Bluff Road intersection

PEDESTRIAN TIMESETTINGS Front Panel Command: Pedestrian No. Timesetting No (eg 18.2 accesses P2 walk)

DESCRIPTION	Timesetting No	PEDESTRIAN							
		P1 (17)	P2 (18)	P3 (19)	P4 (20)	P5 (21)	P6 (22)	P7 (23)	P8 (24)
DELAY	1	-	-	-	-	-	-	-	-
WALK*	2	8.0	8.0	8.0	8.0				
CLEARANCE 1	3	7.0	8.0	8.0	8.0				
CLEARANCE 2	4	1.0	1.0	1.0	1.0				

* Minimum walk time - used in Isolated and Flexilink operation

★ PEDESTRIANS - Site1 (Site Folder: General)

Pedestrian Movements | Pedestrian Movement Data | Pedestrian Timing Data

Approach Selector

RoadName

Data apply to Pedestrians crossing in front of the selected leg.

Pedestrian Timing Data

	Full Crossing
Movement ID	P1
Pedestrian Minimum Time	Program
Pedestrian Maximum Time	Program
Pedestrian Actuation	Program
Walk Time Extension	<input type="checkbox"/>
High Priority for Green Splits	<input type="checkbox"/>
Crossing Speed	1.2 m/sec
Minimum Walk Time	5 sec
Minimum Clearance Time	5 sec
Clearance 1 Time	Program
Clearance 2 Time	Input
Start Loss	2 sec
End Gain	3 sec

Modify Clearance 2 time to 1 second on all approaches



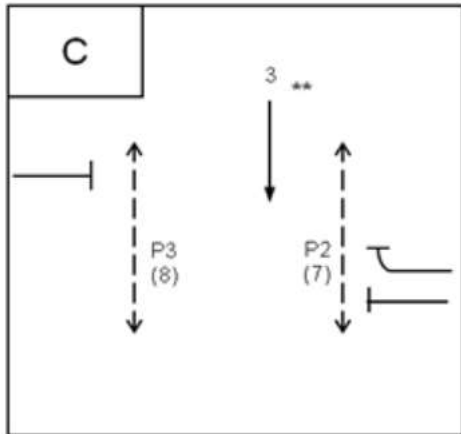
OpSheet Notes

Provides details on site specific operation, including:

- operation / trigger for early cut offs and/or late starts
- time based changes to phasing (e.g. peak period FCRT / PCRT)
- use of illuminated signs (e.g. Give Way to Pedestrians)

Example: Rathdowne Street / Grattan Street intersection

** - refer notes



SIGNAL GROUP OPERATION

Signal Group 3

Late start SG3 in Cf when P2 and/or P3 is demanded.

Expire Cf late start when there are no demands for P2 and P3.

Time applied as a Late Start (could implement <7s on average if pedestrian actuation low)

PHASE TIMESETTINGS Front Panel Command: Phase No. Timesetting No (e.g. 3.2 accesses C)

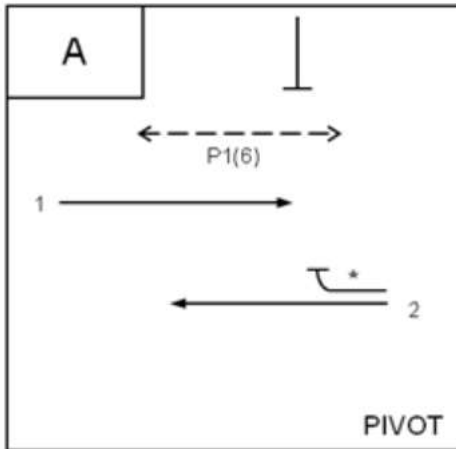
DESCRIPTION	Timesetting No	PHASE			
		A (1)	B (2)	C (3)	D (4)
RED / YELLOW	1	-	-	-	-
LATE START	2	2		7	
MINIMUM GREEN	3	8	6	8	6
INCREMENT	4				

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Provides details on site specific operation, including:

- operation / trigger for early cut offs and/or late starts
- time based changes to phasing (e.g. peak period FCRT / PCRT)
- use of illuminated signs (e.g. Give Way to Pedestrians)

Example: Rathdowne Street / Grattan Street intersection



Time applied for Red Arrow Drop Off during PCRT operation

* - red arrow drops in A phase 7:00 - 9:00 AM & 4:00 - 6:00PM M-F

Signal Group 4

PART TIME FULL CONTROL OF SIGNAL GROUP 4

SG4 operates as a partially controlled right turn (conditional red) during the following periods: 7:00AM – 9:00AM and 4:00PM – 6:00PM, Monday – Friday.

SG4 operates as a fully controlled right turn at all other times.

The operation of SG4 is controlled via the internal clock (on-line & off-line).

PHASE TIMESETTINGS		Front Panel Command: Phase No. Timesetting No (e.g. 3.2 accesses C)			
DESCRIPTION	Timesetting No	A (1)	B (2)	C (3)	PHASE D (4)
RED / YELLOW	1	-	-	-	-
LATE START	2	2		7	
MINIMUM GREEN	3	8	6	8	6
INCREMENT	4				

Other Traffic Signal Information



What information OpSheets do not provide:

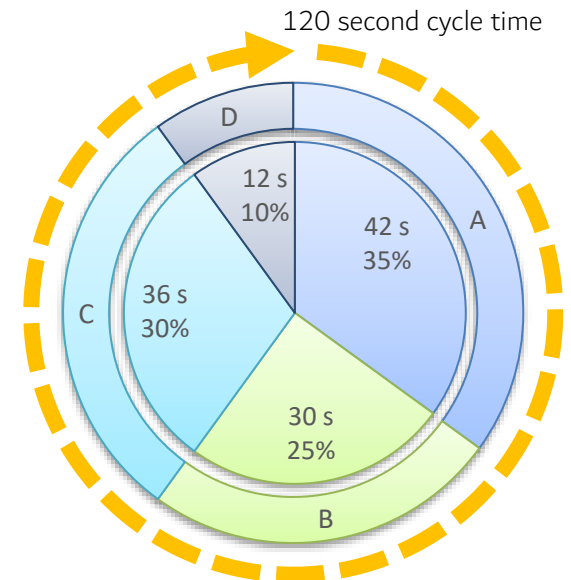
Cycle Time: The time elapsed for one complete sequence of phases to occur

Phase Time / Phase Split: The time or percentage of the cycle time allocated to each phase including the green time and intergreen (yellow & red) time

Phase Frequency: The frequency of a phase occurring

Signal Offset: Time interval between the start / end of coordinated green displays at linked intersections

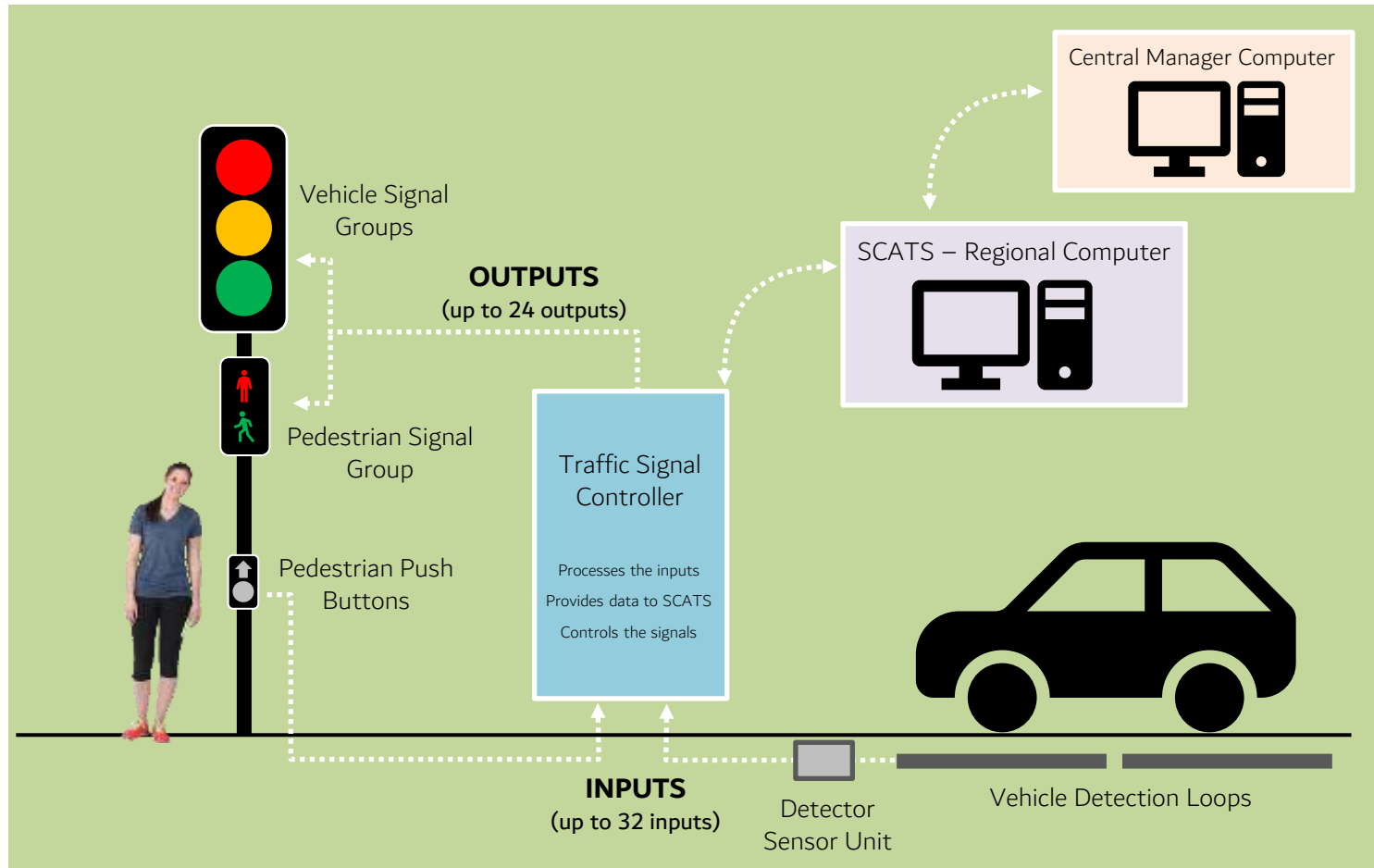
HOWEVER, this information **can be obtained from SCATS...**



What is SCATS?



SCATS – Sydney Coordinated Adaptive Traffic System



IDM Data



Intersection Diagnostic Monitor (IDM) data can provide a historical summary of the intersection operation during a specified time period, as captured by SCATS.

IDM data can be requested from DoT and provides the measured:

- Phase times
- Phase frequency
- Overall cycle time (cycle length)
- Pedestrian phase frequency (pedestrian actuation)

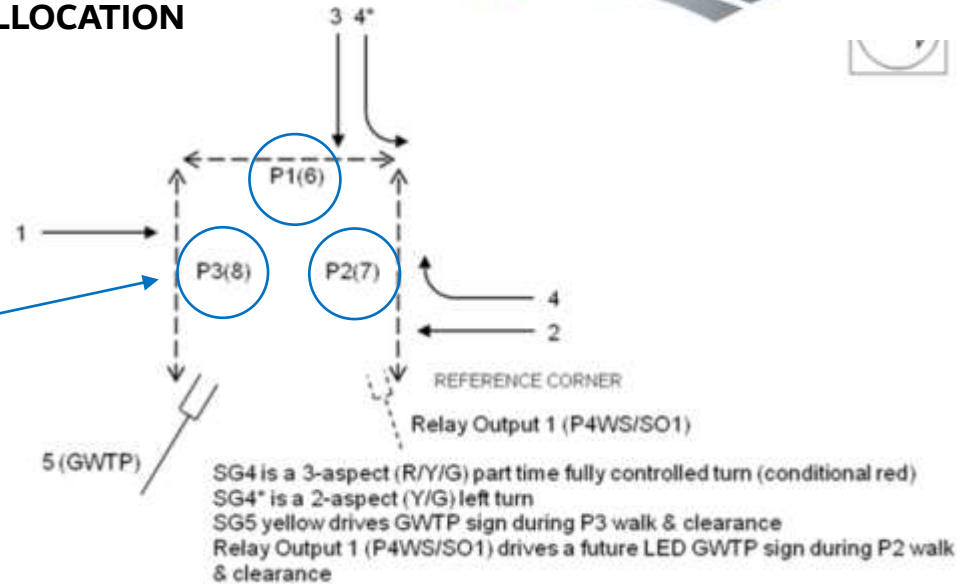
IDM Data

GROUP ALLOCATION

Example: Rathdowne Street / Grattan Street intersection

Phase Frequency
A & C – 100%
D – 38%

Pedestrian groups – 6, 7 & 8



Report: Periodic statistics for site 4397

15 minute intervals

From: Tuesday, 27 August 2019, 12:00:00 AM AEST

To: Tuesday, 27 August 2019, 11:59:59 PM AEST

Time period filter: 7:00:00 AM to 7:00:00 PM

Tuesday, 27 August 2019, 7:45:00 AM AEST to Tuesday, 27 August 2019, 8:00:00 AM AEST:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	66	83	76	609
C phase	8	28	29	28	227
D phase	3	12	14	13	39
Active cycle length	2	109	110	109	219
Actual cycle	7	95	120	109	764
Split plan 2	2	0	0	0	0
Signal group 1	8	61	77	70	562
Signal group 2	8	73	77	75	601
Signal group 3	8	16	17	16	130
Signal group 4	4	7	15	9	39
Signal group 6	4	50	62	58	233
Signal group 7	8	8	8	8	64
Signal group 8	6	8	8	8	48
XSF 1	8	36	52	45	362

Phase Times

Cycle Time –
model as 110 s in SIDRA

Pedestrian Actuation
50% / 100% / 75% actuation

SCATS Volume Data



SCATS can also provide **Traffic Volumes**, as counted by the vehicle detector loops.

This data is available online and can be used to model intersections where turning movement count (TMC) data is unavailable.

Data is available for download by date (CSV file):

- by year, for data available between 2014 - 2019
- by month for 2020 data

<https://discover.data.vic.gov.au/dataset/traffic-signal-volume-data>

Data and Resources	
 Traffic Signal Volume Data 2014	Explore -
 Traffic Signal Volume Data 2015	Explore -
 Traffic Signal Volume Data 2016	Explore -



Thank you – Any Questions?

