

		ACTION	DATE
TO	1. SENIOR ENGINEER, CONTROLLER APPLICATIONS		
	2. RON TRAYNOR, EASTERN PROJECTS		
FROM	BRENDAN SAMG	DATE	6/10/21
SITE	PRINCES HIGHWAY EAST / SHADY CREEK / ROLLO STREET	SITE NO.	6631
REGION	EASTERN	MUNICIPALITY	BAW BAW

GENERAL

Works Program Job?	Yes	Project Number	43JG101
Classification	COMPLEX	Task Number	679
Description	<input type="checkbox"/> New intersection signals <input type="checkbox"/> New pedestrian operated signals <input checked="" type="checkbox"/> Controller swap. Reason for swap	Controller replacement	

CONTROLLER DETAILS

Type	Eclipse	Software Version & Release	V6.1 R20	Lanterns	LED
Number of Signal Groups	Vehicle	10	Pedestrians	2	Total 12
Number of special outputs / Pedestrian Wait State Outputs			2		
Controller capacity	12				
Number of detectors	Vehicle	14	Pedestrians	2	Total 20
	Tram		Other	4	

CONTROLLER APPLICATIONS

Target Date for Draft Opsheet	ASAP
Target Date for completion of Program	ASAP
Prepare Interlocking	

PERSONALITY CHECKSUMS

	Hex	Octal
Total	B4	264
Times	49	111
Pers	FD	375
Dispatched	29/10/21	

EASTERN PROJECTS - SIGNAL INSTALLATION

If switch-on of a metro site is to occur without a Telstra line, seek approval of the T/L Signal Services

SCATS connection	Connection to existing controller must be transferred to the new controller
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PRIOR NOTICE

A job must be entered into RAI Action database before this switch on will be allowed.

<input checked="" type="checkbox"/> SCATS data changes - notify	BRENDAN SAMG	Ext	8999
OR	CHRIS EER	Ext	8711
before 3:00pm on the day before switch on.			

SCATS Data Changes -

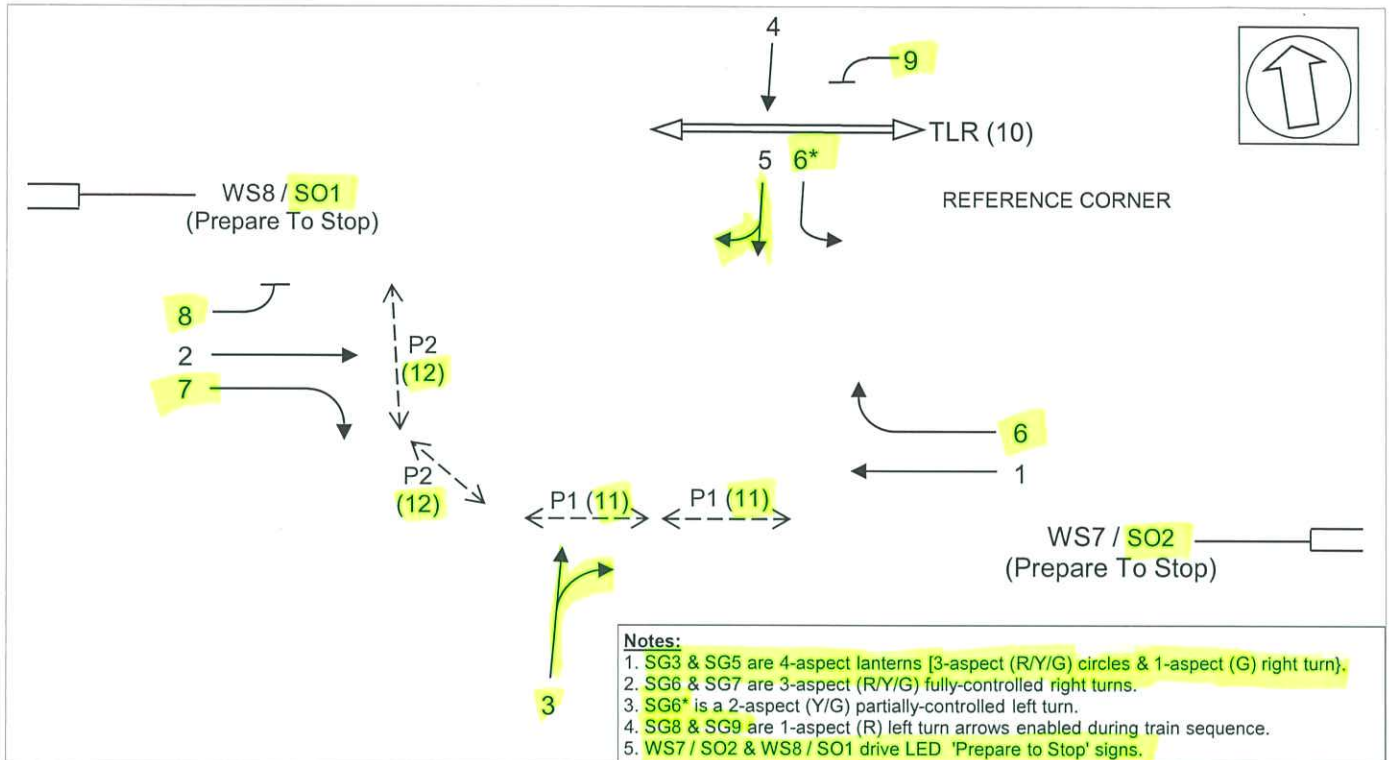
TRAFFIC MANAGEMENT CENTRE

<input checked="" type="checkbox"/> Please notify BRENDAN SAMG (x8999) on job completion.

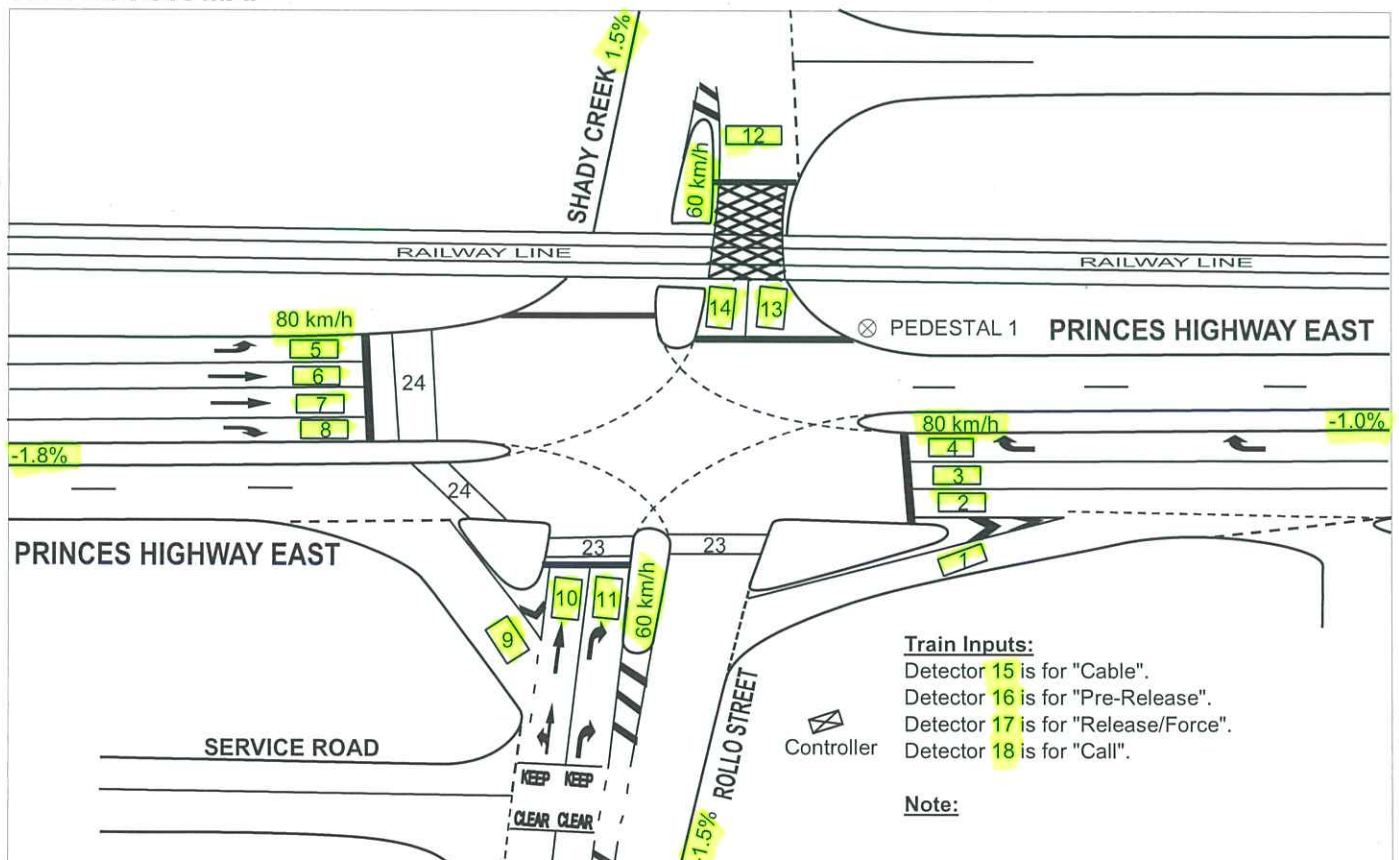
DATE OF NEW CONTROLLER SWITCH ON

SITE NAME	PRINCES HIGHWAY EAST / SHADY CREEK / ROLLO STREET			SITE NO.	6631
MUNICIPALITY	BAW BAW	DESIGNED BY	BRENDAN SAMY	DATE	6/10/21
PLAN NO.	767803	DESIGN CHECKED	<i>Chin Ker</i>	DATE	11/10/2021
CONTROLLER TYPE	Eclipse	PROM CHECKED	<i>28/10/21</i>	DATE	28/10/21

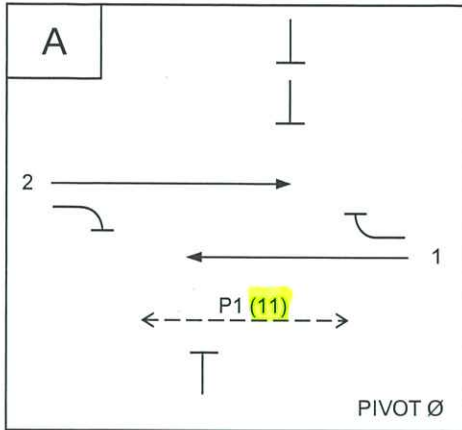
GROUP ALLOCATION



DETECTOR MAP

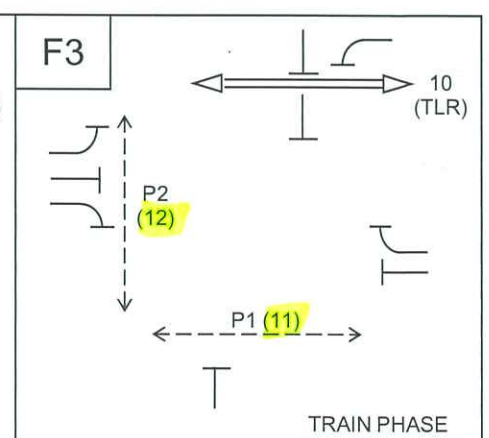
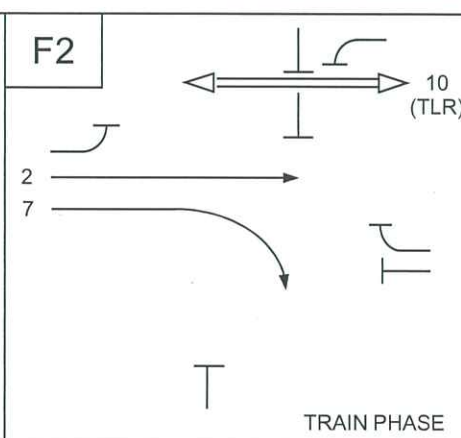
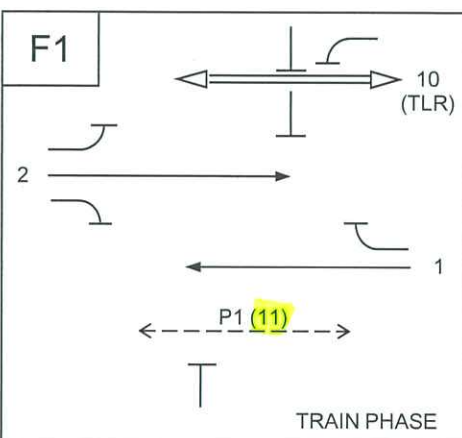
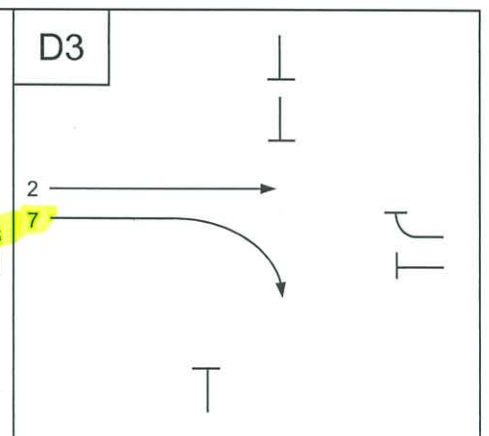
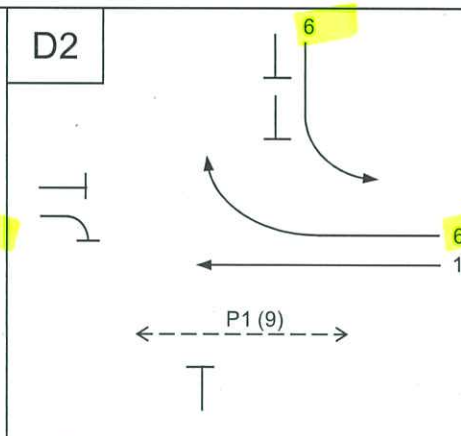
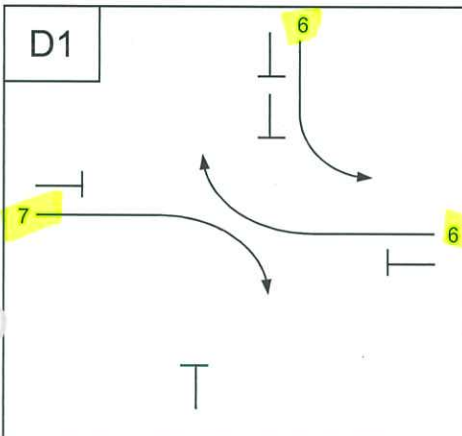
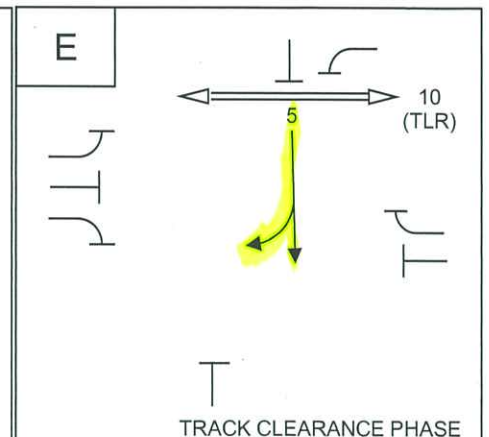
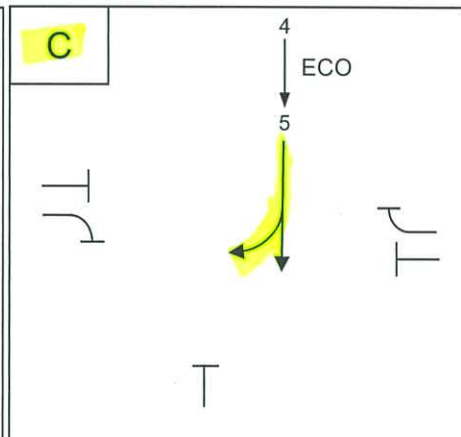
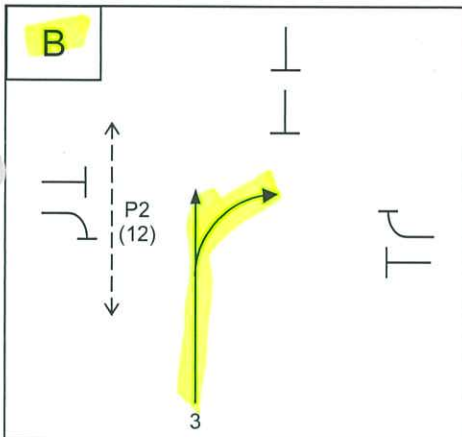


PHASING DIAGRAM



Refer General Notes

PHASE	PROHIBITED PHASE CHANGES TO	REVERSION ON MAXIMUM	MAXIMUM V.I.G ON REVERSION
A	F1, F2, F3		
B	F1, F2, F3		
C	B, F1, F2, F3		
D	B, C, F1, F2, F3		
E	A, B, C, D, F3		



V.A. SEQUENCE ABCDEF

DESIGNED BY: BRENDAN SAMY

DATE 6/10/21

DETECTOR FUNCTIONS

DETECTOR No.	Internal / External	Input Number	CALL PHASE	LOCKING CALL	NON-LOCKING CALL	SET VIG ON PHASE	EXTEND PHASE	SPECIAL FUNCTION			DETECTOR ALARMS						
								Detector Type	Description	Refer Special Notes	DA Category	Disable	DA on S/C only	Fault Simulation			
														Call & Extend	Call Only	Ignore Alarm	Refer Special Notes
1	I	1	-				-		Counting Loop		0					✓	
2	I	2	A	✓			A				0			A			
3	I	3	A	✓			A				0			A			
4	I	4	D	✓			D				0			D			
5	I	5	A	✓			A				0			A			
6	I	6	A	✓			A				0			A			
7	I	7	A	✓			A				0			A			
8	I	8	D	✓			D				0			D			
9	I	9	-				-		Counting Loop		0						✓
10	I	10	B				B				0			B			
11	I	11	B				B				0			B			
12	I	12	C				C				0			C			
13	I	13	C				E				0				C		
14	I	14	C				E				0				C		
15	E	3	-				-	RAIL	Cable Monitor	✓	1	✓					
16	E	4	-				-	RAIL	Pre-Release	✓	1	✓					
17	E	5	-				-	RAIL	Release/Force	✓	1	✓					
18	E	6	E,F	✓			-	RAIL	Call	✓	1	✓					
19											1						
20											1						
21											1						
22											1						
23	E	1	A		✓			P1		✓	6		✓				
24	E	2	B		✓			P2		✓	6		✓				
25																	
26																	
27																	
28																	
29																	
30																	
31																	
32																	

DETECTOR FUNCTIONS

DETECTOR No.	Internal / External	Input Number	CALL PHASE	LOCKING CALL	NON-LOCKING CALL	SET VIG ON PHASE	EXTEND PHASE	SPECIAL FUNCTION			DETECTOR ALARMS						
								Detector Type	Description	Refer Special Notes	DA Category	Disable	DA on S/C only	Fault Simulation			
														Call & Extend	Call Only	Ignore Alarm	Refer Special Notes
33																	
34																	
35																	
36																	
37																	
38																	
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DESIGNED BY: BRENDAN SAMG

DATE 6/10/21

APPROACH DEFINITIONS**PHASE APPROACHES**

Approach No	EXTENDING DETECTORS	APPROACH TIMER AND TIMESETTING DEFINITION*	SIGNAL GROUP	APPROACH EXPIRY (EXPAP)	Refer Special Notes
1	2, 3	A11	1		
2	6, 7	A22	2		
3	5	A33	2		
4	10	B11	3		
5	11	B22	3		
6	12	C11	4		
7	4	D11	6		
8	8	D22	7		
9	13, 14	E11	5		
10					
11					
12					
13					
14					
15					
16					

* There are 8 approach timers and 4 approach timesettings available per phase:

- Where there are 4 or fewer approaches per phase, allocate one timesetting to each timer.

For example: A11, A22, A33, B11, C11.

- Where there are more than 4 approaches per phase, two or more timers must have the same timesetting.

For example: A11, A21, A32, A43, A54, B11.

SPECIAL APPROACHES

Approach No	EXTENDING DETECTORS	APPROACH TIMESETTING	SIGNAL GROUP	DESCRIPTION	Refer Special Notes
1	2, 3	F11	1	Train Ø	✓
2	6, 7	F22	2	Train Ø	✓
3	8	F33	7	Train Ø	✓
4					

APPROACH DEFINITIONS**PHASE APPROACHES**

Approach No	EXTENDING DETECTORS	APPROACH TIMER AND TIMESETTING DEFINITION*	SIGNAL GROUP	APPROACH EXPIRY (EXPAP)	Refer Special Notes
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					

* There are 8 approach timers and 4 approach timesettings available per phase:

- Where there are 4 or fewer approaches per phase, allocate one timesetting to each timer.

For example: A11, A22, A33, B11, C11.

- Where there are more than 4 approaches per phase, two or more timers must have the same timesetting.

For example: A11, A21, A32, A43, A54, B11.

GENERAL NOTES

SUMMARY OF XSF FLAGS

(Communications Operation of XSF flags is required)

- XSF1** – Allows late introduction of P1 in AØ (*Masterlink only*).
- XSF2** – Allows auto introduction of P1 at the start of SG1.
- XSF3** – To terminate MSS8 for compensation use.
- XSF6** – Selects Special Maximum for SG6 in DØ via Special Purpose Timesetting No. 25.
- XSF7** – Selects Special Maximum for SG7 in DØ via Special Purpose Timesetting No. 26.

SUMMARY OF MSS FLAGS

- MSS1** – Set on receipt of CALL – used to force the site to Isolated. MSS1 is cleared by termination conditions.
- MSS2** – Set at start of train phase (FØ) until start of intergreen of train phase.
- MSS3** – Set by Abnormal Condition 1: Force before TLR.
- MSS4** – Set by Abnormal Condition 2: Late Release.
- MSS5** – Set by Abnormal Condition 3: Force without Call.
- MSS6** – Set by Abnormal Condition 4: Break in Cable Monitor.
- MSS7** – Not used.
- MSS8** – Set at the start of the train phase and will stay on until intergreen of BØ, CØ or DØ (*after the train phase*).
- MSS14** – Set when FORCE input is received - used to monitor CALL/FORCE interval.
- MSS15** – Set when the PRE-RELEASE input is first terminated – used to monitor the PRE-RELEASE/ RELEASE interval.

GENERAL OPERATION

- REVn. – First scan after start-up demands BØ, CØ & D1Ø.
- Clear vehicle demands during associated phase green and yellow.
- SG4 uses CØ ECO period when transitioning from CØ → DØ, CØ → EØ, CØ → AØ & CØ → BØ.
- Use AØ Yellow for DØ when transitioning from D2Ø or D3Ø to phases other than AØ.

SIGNAL GROUP OPERATION

Signal Group 6

- SG6 Special Movement uses DØ minimum green for its minimum green, DØ yellow for its yellow and DØ Special All Red for its all red when it operates in DØ.
- XSF6 is used to set the maximum time for SG6 in DØ. The time is accessible in Special Purpose Timesetting No. 25. When XSF6 is set, SG6 will be forced off after a period equal to the DØ minimum green plus the time stored in Special Purpose Timesetting No. 25.

Signal Group 7

- SG7 Special Movement uses DØ minimum green for its minimum green, DØ yellow for its yellow and DØ All Red for its all red when it operates in DØ.
- XSF7 is used to set the maximum time for SG7 in DØ. The time is accessible in Special Purpose Timesetting No. 26. When XSF7 is set, SG7 will be forced off after a period equal to the DØ minimum green plus the time stored in Special Purpose Timesetting No. 26.

Signal Group 8

- SG8 is a single aspect (R) left arrow.
- SG8 left arrow is enabled at the start of AØ, BØ, CØ or DØ All Red when going from AØ → EØ, BØ → EØ, CØ → EØ, or DØ → EØ.
- SG8 red remains on during EØ, F1Ø, F2Ø and F3Ø until the resumption of Normal Operation with the start of compensation phase.
- SG8 remains blank during AØ, BØ, CØ and DØ (*Green inside controller*).

Signal Group 9

- SG9 is a single aspect (R) left arrow.
- SG9 left arrow is enabled at the start of AØ, BØ, CØ or DØ All Red when going from AØ → EØ, BØ → EØ, CØ → EØ, or DØ → EØ.
- SG9 red remains on during EØ, F1Ø, F2Ø and F3Ø until the resumption of Normal Operation with the start of compensation phase.
- SG9 remains blank during AØ, BØ, CØ and DØ (Green inside controller).

PEDESTRIAN GROUP OPERATION

Pedestrian 1

- P1 calls AØ.
- P1 can introduce anytime in D2Ø & at the start of AØ and can overlap from D2Ø → AØ.
- P1 can introduce anytime in AØ if XSF1 is set (Masterlink only).
- P1 auto introduces at the start of SG1 when XSF2 is set.
- P1 can introduce at the start of F1Ø.
- P1 may be reintroduced in F3Ø only if P2 has been demanded.

Pedestrian 2

- P2 calls BØ.
- P2 introduces at the start of BØ.
- P2 can introduce at the start of F3Ø when demanded, it will cause P1 to be demanded in F3Ø (but not the reverse).

PHASE OPERATION

Phase D

The following operations are required for DØ if going from DØ → EØ:

- In order to ensure SG1 and SG2 operate minimum green time requirements, use DØ ECO if going from D2Ø or D3Ø to EØ at the point SG1 or SG2 introduces in DØ, start Timer 1 (Refer to Special Purpose Timesetting No. 21). SG1 or SG2 must operate for at least the period shown in Timer 1.
- When transitioning from DØ → EØ, DØ ECO operates for any extra time required to guarantee SG1 or SG2 minimum green. When Timer 1 expires, terminate DØ ECO. SG1 or SG2 then closes down at start of DØ yellow when transitioning to EØ.
- Expire DØ ECO if transitioning DØ → AØ.

OPERATION OF ILLUMINATED SIGNS

Wait State 7 (WS7) / Special Output 2 (SO2)

- Drives the operation of two flashing LED "PREPARE TO STOP" signs on the east approach.
- **WS7/SO2** is switched on at the start of AØ ECO when transitioning from AØ → BØ, AØ → CØ, AØ → D1Ø, AØ → D3Ø or AØ → EØ.
- **WS7/SO2** is switched on at the start of DØ ECO when transitioning from D2Ø → BØ, D2Ø → CØ or D2Ø → EØ.
- Expire DØ ECO when transitioning from D2Ø → AØ.
- **WS7/SO2** stays on until SG1 is green in AØ, D2Ø or F1Ø.
- **WS7/SO2** is switched on at the start of FØ ECO if transitioning from F1Ø → F2Ø, F1Ø → F3Ø, F1Ø → BØ, F1Ø → CØ, F1Ø → D1Ø or F1Ø → D3Ø.
- The flashing "Prepare to Stop" sign is activated from a point prior to SG1 closing down. This time is stored in AØ Early Cut-Off (ECO), and is calculated as follows.

$$\begin{aligned}
 \text{Advance Warning Time} &= \text{Time to travel from Sign to Stopline (160 m at 80 kph)} \\
 &- \text{Time to travel from Nominal Stopping Distance to the Stopline} \\
 &+ \text{Reaction Time (including time to travel the viewing distance)} \\
 &= 160/22.22 - 5.0 \text{ (i.e. SG 1 Yellow) } + 1.5 \\
 &= 3.7 \text{ seconds} \\
 &\quad \text{Use 5.0 seconds}
 \end{aligned}$$

Wait State 8 (WS8) / Special Output 1 (SO1)

- Drives the operation of two flashing "PREPARE TO STOP" signs on the west approach.
- **WS8/SO2** is switched on at the start of AØ ECO when transitioning from AØ → BØ, AØ → CØ, AØ → D1Ø, AØ → D2Ø, AØ → EØ.
- **WS8/SO2** is switched on at the start of DØ ECO when transitioning from D3Ø → BØ, D3Ø → CØ, D3Ø → EØ.
- Expire DØ ECO when transitioning from D3Ø → AØ.
- **WS8/SO2** stays on until SG2 is green in AØ, D3Ø, F1Ø, or F2Ø.
- **WS8/SO2** is switched on at the start of FØ ECO if transitioning from F1Ø or F2Ø → F3Ø, F1Ø or F2Ø → BØ, F1Ø or F2Ø → CØ, F1Ø or F2Ø → D1Ø, F1Ø or F2Ø → D2Ø.
- The flashing "Prepare to Stop" sign is activated from a point prior to SG2 closing down. This time is stored in AØ Early Cut-Off (ECO), and is calculated as follows.

$$\begin{aligned}
 \text{Advance Warning Time} &= \text{Time to travel from Sign to Stopline (170 m at 80 kph)} \\
 &- \text{Time to travel from Nominal Stopping Distance to the Stopline} \\
 &+ \text{Reaction Time (including time to travel the viewing distance)} \\
 &= 170/22.22 - 5.0 \text{ (i.e. SG 1 Yellow) } + 1.5 \\
 &= 4.2 \text{ seconds} \\
 &\quad \text{Use 5.0 seconds}
 \end{aligned}$$

RAIL LINK NOTES

1.0 GENERAL INTERFACING REQUIREMENTS

Electrical interfacing between the TRAFFIC SIGNAL controller and the LEVEL CROSSING controller is provided by a multi-core telephone-type cable having at least 10 pairs. The wiring is detailed in the STANDARD RAIL-LINK CABLE TERMINATION CHART (Appendix 2).

1.1 STANDARD RAIL LINK INPUTS

For a standard installation, the following five inputs are generated by the rail crossing control system and fed into detector inputs in the traffic signal controller:

- | | | | |
|-----------------------|-------------------------|-----------------|----------------------|
| • CABLE MONITOR | via | Detector No. 15 | - usually ON |
| • PRE-RELEASE | via | Detector No. 16 | - usually ON |
| • RELEASE/FORCE (R/F) | via | Detector No. 17 | - usually ON |
| • CALL | via | Detector No. 18 | - usually OFF |
| • BOOM HORIZONTAL | (Not used at this site) | | |

Each of these inputs is generated from a rail level crossing relay. Each can be in the *on* or *off* state.

1.2 STANDARD RAIL LINK OUTPUTS

The traffic signal controller generates the following two outputs, which are sent to the rail crossing control system through a special signal group:

- TRAFFIC LIGHT RESPONSE (TLR) via SG10

2.0 BASIC OPERATING PROCEDURE

The TYPICAL SEQUENCE CHART in Appendix 1 shows the sequence of events and the change in state of each input and output.

2.1 CALL

When the presence timer for CALL input expires, the CALL is deemed to be **established** and will force the controller to go into the train operation described below:

- The controller will clear all existing phase demands from the NORMAL PHASE SEQUENCE i.e. the controller will remain in the currently running phase and initiate a “pre-emptive transfer” to the TRAIN PHASE SEQUENCE. If a pedestrian is in WALK when the “CALL” is received then select *Special Purpose Timesetting No. 9* for the pedestrian walk time.
- If the controller is changing phases (phase intergreen) when the CALL is received then do not service pedestrian in the phase which is about to run.
- If the controller is in BØ green when the CALL is received, the controller immediately stops the extension for BØ without violating BØ minimum green and pedestrian times. The controller then proceeds to EØ (*train clearance phase*).
- If the controller is in CØ green when the CALL is received, the controller immediately stops the extension for CØ and closes down SG4 at start of CØ ECO without violating CØ minimum green and pedestrian times. The controller then proceeds to EØ (*train clearance phase*).
- If the controller is in D1Ø green when the CALL is received, the controller immediately stops the extension for DØ and terminates DØ without violating DØ minimum green and pedestrian

times. The controller then proceeds to **EØ** (*train clearance phase*).

- If the controller was in **D2Ø** or **D3Ø** green when the CALL is received, the controller immediately stops the extension for **DØ** and terminates **DØ** at the **DØ ECO** (without violating **DØ** minimum green) and pedestrian times. The controller then proceeds to **EØ** (*train clearance phase*).
- **MSS1** flag is set at the point when the CALL is first received. The point at which the MSS1 flag is removed is outlined in Section 3.3, which relates to the provision of train compensation operation.
- If on-line the controller is forced to isolated mode of operation. When on-line to the regional computer this is achieved via the MSS1 flag using VR30.

2.2 TRAIN PHASE SEQUENCE

The Train sequence phase is as follows:

- **EØ** - Track Clearance Phase
- **FØ** - Train Phase

2.2.1 Track Clearance Phase

- The track clearance phase is held until **SG5** gaps or maximum extension green expires.
- Proceed to train phase (**F1Ø**) after Track Clearance Phase.

2.2.2 Train Phase

- The train phase starts in **F1Ø**.
- The controller will cycle from **F1Ø → F2Ø** or **F1Ø → F3Ø** on demand. The controller will rest in **F1Ø** if no other demands.
- SG1 and SG2 use **FØ** minimum green and yellow.
- Special Approach 1 uses **FØ** approach 1 timesettings to control SG1 extension.
- Special Approach 2 uses **FØ** approach 2 timesettings to control SG2 extension.
- Special Approach 3 uses **FØ** approach 3 timesettings to control **SG7** extension. **SG7** uses **Special Purpose Timesetting No. 14** for **F2Ø** Maximum Extension Green.
- SG1, SG2 use **FØ** Maximum Extension Green for its maximum extension green.
- P2 calls **F3Ø**.
- Within the train phase, provide a 3.0 second **solid Don't Walk** at the conclusion of P1 and/or P2 **Clearance in F3Ø**.
- If pedestrian is in walk when Pre-Release input is received, then select Special Purpose Timesetting No. 9 for the pedestrian walk time.

2.3 TRAFFIC LIGHT RESPONSE (TLR)

The TLR is issued to the railway track circuitry (by means of the Railway Signal Group 10) to indicate arrival at a nominated instant in the Train Phase Sequence. The controller provides phase status information to the Rail Authority in the form of the TLR output (SG10). The TLR output is issued:

- At the start of **EØ** (*track clearance phase*) minimum green period if going from **AØ → EØ**, **BØ → EØ**, **CØ → EØ** or **DØ → EØ** (*track clearance phase*).

2.4 FORCE

The FORCE is indicated by the RELEASE/FORCE input going off.

The receipt of the FORCE {termination of the RELEASE/FORCE (R/F) input} will not cause a flashing yellow response during the period that the TLR output is activated.

2.6 PRE-RELEASE

The re-activation of the PRE-RELEASE input (*Detector 16*) is an indication that the train has cleared the control section of track and that the booms are about to lift. When it is received the controller initiates a pre-release sequence that directs the controller to terminate all signal groups in the train phase without violating pedestrian or minimum green times. If a pedestrian is in walk when the PRE-RELEASE is received, then select Special Purpose Timesetting No. 9 for the pedestrian walk time, so that normal operation may resume as soon as possible. The controller will then proceed to the TRAIN phase all-red interval and remain there pending reinstatement of the RELEASE/FORCE (R/F) input.

2.6.1 Second call during train phase

Following receipt of the PRE-RELEASE input, if a second CALL is recognised prior to the controller being in the train phase intergreen period (*i.e. the booms have moved off the horizontal but the controller is still not in the train phase intergreen*) then the train phase sequence should recommenced as per 2.1 above.

2.6.2 Second call during train phase intergreen

If a second CALL is received during the train phase intergreen period then proceed to the subsequent phase for minimum green only (but do not service pedestrians) and then commence a new train phase sequence as in 2.1 above.

2.7 RELEASE (R/F) INPUT

The Release is indicated by the Release/Force input going to the ON state. This indication releases the traffic signal controller to resume normal vehicle operation with an appropriate phase according to site specific requirements (Refer Compensation Sequence, as per 3.3.1 below).

3.0 SPECIAL PROCEDURES

3.1 ABNORMAL CONDITIONS

These conditions should not occur in normal operation. However, when they do, appropriate steps should be taken to register the event and to take action as follows.

3.1.1 Abnormal condition 1 - Force before TLR

Although 35 seconds at least should elapse between receipt of a CALL input and the FORCE (*termination of the R/F input*), there may be occasions when the FORCE occurs prior to the controller issuing the TLR output. This will force a '**Flashing-Yellow**' response and generate ABNORMAL CONDITION message No 1 via **MSS3**. When the full RELEASE is received (*the R/F input is reinstated*) the controller will go through an all-red start-up sequence and resume normal operation.

3.1.2 Abnormal condition 2 - Late Release

The RELEASE TIMER (*Special Purpose Timesetting No. 12*) commences counting from receipt of the PRE-RELEASE. If the R/F is not reinstated before expiry of this timer, then the controller will generate ABNORMAL CONDITION message No 2 via **MSS4** and go to '**Flashing-Yellow**'.

When the R/F input is reinstated, the controller will go through an all-red start-up sequence and resume normal operation.

3.1.3 Abnormal condition 3 - Force without Call

If the R/F input is terminated without a previous CALL input, the controller will generate ABNORMAL CONDITION message No 3 via **MSS5** and go to '**Flashing-Yellow**'. When the R/F input is reinstated the controller will go through an all-red start-up sequence and resume normal operation.

3.1.4 Abnormal condition 4 - Break in Cable Monitor

If there is a break in the CABLE MONITOR input, the controller will generate ABNORMAL CONDITION message No 4 via **MSS6** and go to '**Flashing-Yellow**' until the CABLE MONITOR is reinstated. When this input is reinstated the controller will go through an all-red start-up sequence and resume normal operation.

3.2 CALL TERMINATION TIMER

When a CALL input terminates prior to the FORCE (*in the presence of the R/F input*), a timer will begin to count down (*Special Purpose Timesetting No. 13*). Any further CALL inputs will reset the timer. Once the FORCE is received (R/F terminated), the timer is ignored. If the R/F input is not terminated prior to expiry of the timer, then the controller will AUTO-RELEASE from the train phase sequence and resume normal vehicle operation. The purpose of this facility is to prevent the traffic signal controller from being "locked up" indefinitely by spurious inputs (in the case of automatic track circuits) or by inadvertent or excessively early calls (in the case of manned signal-boxes). Typical timesettings may be 30 sec. (automatic) or 70 sec. (manual).

3.3 OPERATING MODES

3.3.1 Isolation conditions

As discussed in Section 2.1, when the CALL input is received, the MSS1 flag is set and will instruct the regional computer (via VR30) to force the controller into Isolated operation. The MSS1 flag will remain on until the termination conditions are met, as dictated by the COMPENSATION sequence requirements. The details of the COMPENSATION sequence are described below.

Compensation Sequence

1. Following FØ, resume operation in BØ, CØ & DØ (If BØ is not demanded then resume in CØ or DØ if demanded. If both BØ & CØ are not demanded, then resume in DØ if DØ is demanded).
2. When the CALL input is received, the **MSS1** flag is set and will stay on until the start of BØ intergreen after the train phase or until the Special Compensation Timer (described below) expires whichever occurs first, if running Isolated or Flexilink when the call was received.
3. Compensation phase timers are described below:
 - Special Purpose Timesetting No. 10 for BØ Special Compensation timer (after the train phase) if the site was running Isolated or Flexilink.
 - Special Purpose Timesetting No. 11 for BØ Special Compensation Timer (after the train phase) if the site was running Masterlink when the call was received (*not used at this site*).
 - Special Purpose Timesetting No. 23 for CØ Special Compensation timer (after the train phase) if the site was running Isolated or Flexilink.

- Special Purpose Timesetting No. 24 for CØ Special Compensation Timer (after the train phase) if the site was running Masterlink when the call was received (*not used at this site*).
- Special Purpose Timesetting No. 27 for DØ Special Compensation timer (i.e. SG6 after the train phase) if the site was running Isolated or Flexilink.
- Special Purpose Timesetting No. 28 for DØ Special Compensation Timer (i.e. SG6 after the train phase) if the site was running Masterlink when the call was received (*not used at this site*).

3.3.2 Compensation techniques

Once the train is clear of the crossing and the booms have risen to approximately 60 degrees, the RELEASE is indicated by the R/F input going on. At this point, the traffic signals should start in BØ (*or CØ if BØ is not demanded*), which allows traffic to cross the rail tracks.

3.3.3 Resumption of dynamic mode

At the start of the train phase the MSS2 flag is set and will stay on until the start of the intergreen of the train phase. The termination of the MSS2 flag is used to determine the moment at which the cycle generator is to be set for Masterlink operation (*not used at this site*).

3.3.4 Flexilink operation

FLEXILINK is permitted to run.

4.0 MSS FLAGS - SUMMARY OF OPERATIONS

4.1 MSS1

This Flag is SET upon receipt of the CALL and is used to force the site into isolated operation. This Flag is DROPPED to allow the Local Controller to pick up Flexilink or Masterlink operation. (See 3.3.1)

4.2 MSS2

This Flag is SET at the start of the TRAIN PHASE green. This Flag is DROPPED at the start of the TRAIN PHASE intergreen and is used to SET the cycle generator in preparation for picking up co-ordination. (See 3.3.2)

4.3 MSS3 to MSS7

These are described under ABNORMAL CONDITIONS. (See Section 3.1.1 to 3.1.5)

4.4 MSS8

MSS8 is set at the start of the train phase and will stay on until the intergreen of BØ, CØ or DØ (after the train phase), or until XSF3 flag is set regardless of the mode the site was running prior to going to the train phase. XSF3 flag is set via VR45.

4.5 MSS14 & MSS15

On receipt of the FORCE input, MSS14 flag is set. MSS14 remains set until the FORCE input is removed (*i.e. the RELEASE/FORCE input is re-instated*). MSS14 is used to monitor the CALL/FORCE interval.

When the PRE-RELEASE input is first terminated, the MSS15 flag is set. MSS15 remains set until the PRE-RELEASE input is reinstated. MSS15 is used to monitor the PRE-RELEASE/RELEASE interval.

MSS14 and MSS15 can be used with MSS1 to monitor the CALL to FORCE interval.

5.0 VARIATION PARAMETER TABLES

5.1 SEND SITE ISOLATED

VP1 = 5 - test MSS
 VP2 = 0 - current slot
 VP3 = 1 - MSS flag
 VP4 = 30 - send Isolated

5.2 SET CYCLE GENERATOR (Not used here)

VP5 = 5 - test MSS
 VP6 = 0 - current slot
 VP7 = 2 - MSS flag
 VP8 = 20 - reverse condition
 VP9 = 53 - set cycle generator
 VP10 = - value

5.3 ABNORMAL CONDITION MESSAGE NO.1 - "DCL 0821: FORCE BEFORE TLR

VP11 = 5 - test MSS
 VP12 = 0 - current slot
 VP13 = 3 - MSS flag
 VP14 = 36 - read TC file
 VP15 = *A* - true TC data set *A*
 VP16 = 0 - no action if false

5.4 ABNORMAL CONDITION MESSAGE NO.2 - "DCL 0821: LATE RELEASE

VP17 = 5 - test MSS
 VP18 = 0 - current slot
 VP19 = 4 - MSS flag
 VP20 = 36 - read TC file
 VP21 = *B* - true TC data set *B*
 VP22 = 0 - no action if false

5.5 ABNORMAL CONDITION MESSAGE NO. 3 - "DCL 0821: FORCE WITHOUT CALL

VP23 = 5 - test MSS
 VP24 = 0 - current slot
 VP25 = 5 - MSS flag
 VP26 = 36 - read TC file
 VP27 = *C* - true TC data set *C*
 VP28 = 0 - no action if false

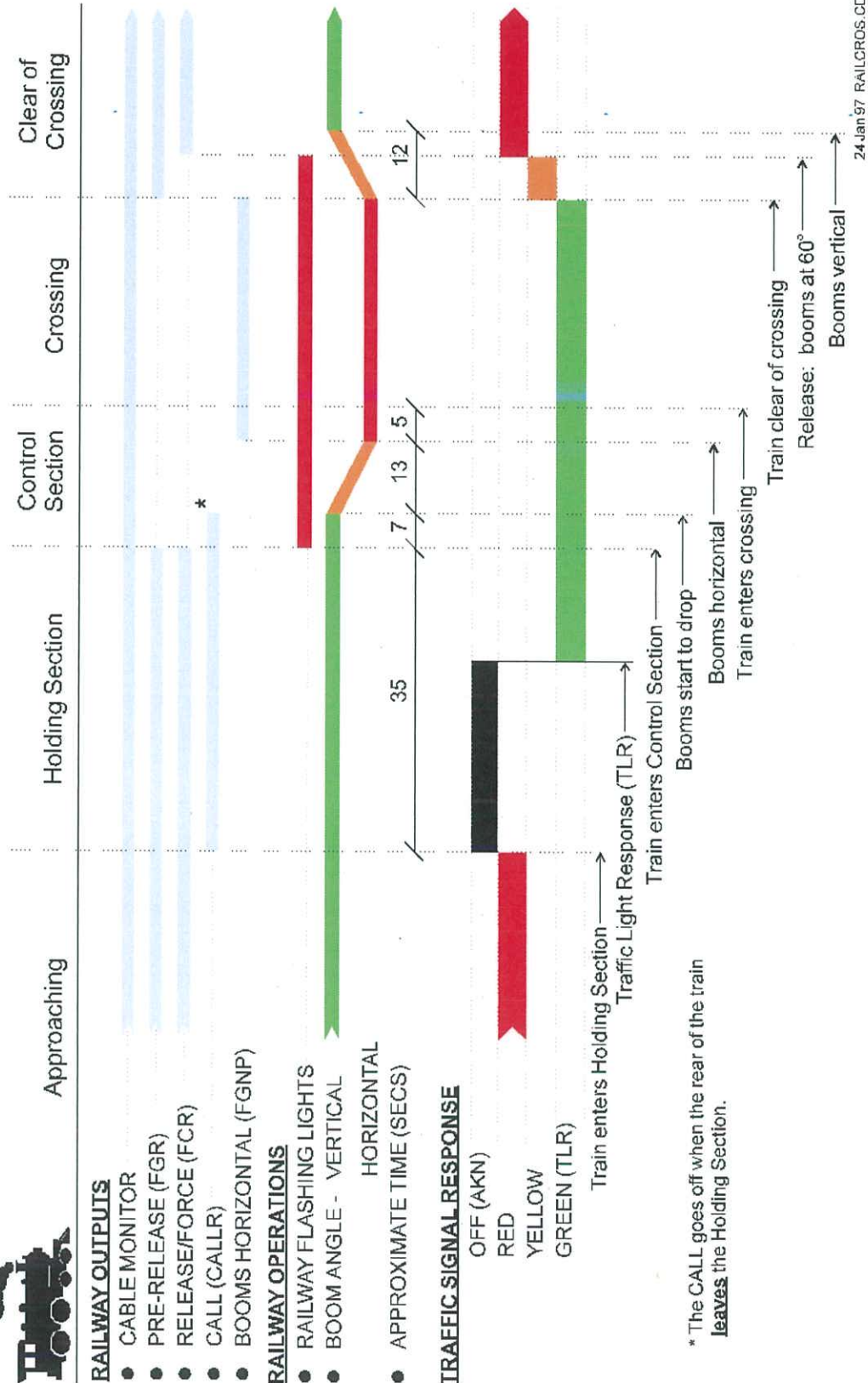
5.6 ABNORMAL CONDITION MESSAGE NO 4 - "DNC 0821: BREAK IN CABLE MONITOR

VP29 = 5 - test MSS
 VP30 = 0 - current slot
 VP31 = 6 - MSS flag
 VP32 = 36 - read TC file
 VP33 = *D* - true TC data set *D*
 VP34 = 0 - no action if false

Appendix 1

LINKING OF TRAFFIC SIGNALS TO RAILWAY LEVEL CROSSING CONTROLS



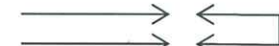
TYPICAL SEQUENCE CHART



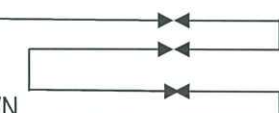

STANDARD RAIL LINK CABLE TERMINATION CHART

FOR CONTROLLERS WITH RELAY OR SOLID-STATE LOAD SWITCHING

**Delete the inputs and or outputs on this page which are not used.*

RAIL-LINK DESCRIPTION or FUNCTION	NO-TRAIN CIRCUIT STATUS	PAIR REF No.	CONDUCTOR INSULATION COLOUR	TERMINATION DETAILS
Cable Monitor (Continuity)	CLOSED	1 st	WHITE BLUE	Det. Return Detector Number: 15
Pre-Release (FGR)	CLOSED	2 nd	WHITE ORANGE	Det. Return Detector Number: 16
Release/Force (R/F or FCR)	CLOSED	3 rd	WHITE GREEN	Det. Return Detector Number: 17
CALL	OPEN	4 th	WHITE BROWN	Det. Return Detector Number: 18
BOOMS HORIZONTAL	OPEN	5 th	WHITE GREY	Det. Return Detector Number: _____
SPARE	OPEN	6 th	RED BLUE	Not Terminated Not Terminated
SPARE	OPEN	7 th	RED ORANGE	Not Terminated Not Terminated
SIGNALS OFF (FY or BO) Relay	OPEN	8 th	RED GREEN	 (N/C) 'FLASH' RLY
ACKNOWLEDGE CALL (AKN)	OPEN	9 th	RED BROWN	 (N/O) 'A' RLY (N/C) 'B' RLY
TRAFFIC LIGHT RESPONSE (TLR)	OPEN	10 th	RED GREY	 (N/O) 'A' RLY (N/O) 'B' RLY

For solid-state load-switching, suitable termination is as follow:

ACKNOWLEDGE CALL (AKN)	OPEN	9 th	RED BROWN	 (N/C) 'RED' RLY (N/C) 'YEL' RLY (N/C) 'GRN' RLY
TRAFFIC LIGHT RESPONSE (TLR)	OPEN	10 th	RED GREY	 (N/O) 'GRN' RLY

- 'TLR' (and "AKN" outputs are driven by SIGNAL GROUP: **10** using the "RED", "OFF", "GRN" and "YEL" logic states as shown in the 'Typical Sequence Chart'.
- The (AKN) output may be required occasionally (for manual operation at signal-box sites) thus requiring installation of the "RED" and "YEL" 240 Volt relays in addition to the "GRN" 240 Volt relay.

DESIGN OF INTERGREEN AND PEDESTRIAN TIMES

INTERGREEN TIMES

PHASE	CLEARANCE DETAILS			LEGAL SPEED	DESIGN SPEED		INTERGREEN		
	GROUP TRANSITION	DISTANCE	GRADE (%)*		YELLOW	RED	YELLOW	RED	TOTAL
A	1 → P2	34.5	-1.8	80	80	80	5.0	2.0	7.0
B	3 → 5	26.0	-1.5	60	60	45	4.0	2.5	6.5
C	5 → P1	29.0	1.5	60	60	60	4.0	2.0	6.0
D	7 → P1	32.0	-1.8	80	45	45	3.0	3.0	6.0
E	5 → P1	29.0	1.5	60	60	60	4.0	2.0	6.0
F	1 → P2	34.5	-1.8	80	80	80	5.0	2.0	7.0
G	→								

*Positive grade indicates an uphill approach & negative grade indicates a downhill approach. Specify negative grade values with a "-" prefix

PHASE SPECIAL ALL REDS AND SPECIAL MOVEMENT ALL REDS

FROM PHASE	TO PHASE	CLEARANCE DETAILS		DESIGN SPEED	ALL RED	PHASE or S.M. No**
		GROUP TRANSITION	DISTANCE			
B	A	3 → 2	34.0	60	2.0	Use BØ All Red
C	D	5 → 7	22.0	45	2.0	CØ All Red
D1	D2	7 → P1	32.0	45	3.0	SM7
D1	D3	6 → 2	27.0	45	2.5	SM6
F2	F3	7 → P1	32.0	45	3.0	FØ Special All Red
		→				

** Specify where the timesetting is stored (the phase special all red or the special movement time setting number)

PEDESTRIAN TIMES

PED	PHASE(S)	WALK			CLEARANCE				MINIMUM SOLID DON'T WALK
		DISTANCE (m)	TIME		DISTANCE (m)	TIME			
			GRAPH	ADOPTED		GRAPH	CL1	CL2	
P1	A	10.0	10	10	7.0	5	5.0	0.0	7.0
P2	B	19.0	18	15	15.0	10	8.0	2.0	4.5

DESIGNED BY: BRENDAN SAMY

DATE 6/10/21

CONTROLLER TIMESETTINGS - 1
PHASE TIMESETTINGS

Front Panel Command: Phase No.Timesetting No (e.g. 3.2 accesses C phase late start)

DESCRIPTION	Timesetting No	PHASE						
		A (1)	B (2)	C (3)	D (4)	E (5)	F (6)	G (7)
RED / YELLOW	1	-	-	-	-	-	-	-
LATE START	2	-	-	-	-	-	-	-
MINIMUM GREEN	3	10	8	8	6	8	10	
INCREMENT	4	-	-	-	-	-	-	
MAXIMUM INITIAL GREEN*	5	-	-	-	-	-	-	
MAXIMUM EXTENSION GREEN	6	40	10	10	8	4	30	
EARLY CUT OFF	7	5.0		4.0	6.0		5.0	
YELLOW	8	5.0	4.0	4.0	3.0	4.0	5.0	
ALL RED	9	2.0	2.5	2.0	3.0	2.0	2.0	
SPECIAL ALL RED	10	-	-	-	2.5	-	3.0	
GAP 1	11	2.5	2.5	3.0	2.5	2.5	2.5	
GAP 2	12	2.5	2.5	-	2.5	-	2.5	
GAP 3	13	2.5	-	-	-	-	2.5	
GAP 4	14	-	-	-	-	-	-	
HEADWAY 1	15	0.6	1.2	1.6	1.2	0.6	0.6	
HEADWAY 2	16	0.6	1.2	-	1.2	-	0.6	
HEADWAY 3	17	1.2	-	-	-	-	1.2	
HEADWAY 4	18	-	-	-	-	-	-	
WASTE 1	19	7	7	7	7	7	7	
WASTE 2	20	7	7	-	7	-	7	
WASTE 3	21	7	-	-	-	-	7	
WASTE 4	22	-	-	-	-	-	-	

* Maximum Initial Green = Minimum Green + V.I.G.

PEDESTRIAN TIMESETTINGS

Front Panel Command: Pedestrian No.Timesetting No (e.g. 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	10.0	15.0						
CLEARANCE 1	3	5.0	8.0						
CLEARANCE 2	4		2.0						

* Minimum walk time - used in Isolated and Flexilink operation

For walk times in Masterlink operation, refer to slot data.

DESIGNED BY: BRENDAN SAMY

DATE 6/10/21

CONTROLLER TIMESETTINGS - 2**SPECIAL MOVEMENT TIMESETTINGS**

Front Panel Command: B.Timesetting No (e.g. B.5 accesses Special Movement Timesetting No 5)

Timesetting No	Timesetting (Range: 0-5)	FUNCTION
1		
2		
3		
4		
5		
6		
7		
8		

SPECIAL PURPOSE TIMESETTINGS

Front Panel Command: B.Timesetting No (e.g. B.19 accesses Special Movement Timesetting No 19)

Timesetting No	Timesetting (Range: 0-200)	FUNCTION
9	4	Train: Alternate Pedestrian Walk Time for P1 & P2 for train sequence operation
10	20	Train: BØ Special Compensation Timer after the train phase (Isolated / Flexilink)
11	1	Train: BØ Special Compensation Timer after the train phase (Masterlink)
12	30	Maximum time to stay in train phase intergreen (time for Pre-Release to flashing yellow if Release/Force input not re-instated)
13	70	Maximum time to stay in train phase following CALL with No Release/Force termination (Time from Call to resumption of normal operation if Release/Force input not terminated)
14	10	F2Ø maximum extension green
15	10	P1 Walk time substitution when Y+ (Flexilink) is set
16	15	P2 Walk time substitution when Y+ (Flexilink) is set
17		
18	0	LIMIT GREEN WATCHDOG TIMER
19	0	SPECIAL FACILITY CONTROLS ALARM TIMER
20	10	ALL RED START UP INTERVAL
21	6	Timer 1: To guarantee SG1 or SG2 minimum green time in DØ before going to EØ
22	4	Duration of MSS Flags
23	20	Train: CØ Special Compensation Timer after the train phase (Isolated/Flexilink)
24	1	Train: CØ Special Compensation Timer after the train phase (Masterlink)
25	4	SG6 maximum extension green in DØ when XSF6 is set
26	4	SG7 maximum extension green in DØ when XSF7 is set
27	15	Train: DØ Special Compensation Timer after the train phase (Isolated/Flexilink)
28	1	Train: DØ Special Compensation Timer after the train phase (Masterlink)
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		

CONTROLLER TIMESETTINGS - 3**PRESENCE TIMESETTINGS**

Front Panel Command: D.Detector No (e.g. D.7 accesses presence time for detector 7)

DETECTOR No	TIMESETTING (Range: 0-15)	DETECTOR No	TIMESETTING (Range: 0-10)
1		25	
2		26	
3		27	
4		28	
5		29	
6		30	
7		31	
8		32	
9		33	
10		34	
11		35	
12		36	
13		37	
14		38	
15		39	
16		40	
17		41	
18	1.0	42	
19		43	
20		44	
21		45	
22		46	
23		47	
24		48	

NOTE: Set presence time to zero if the detector is not a presence detector

NOTE: No support for presence timesettings for dets 25-48

DAILY EVENT TIMESETTINGS

FUNCTION	TIMESETTING
Daily start time (Hours)	
Daily start time (Minutes)	
Daily finish time (Hours)	
Daily finish time (Minutes)	

Use presence timesettings for dets 1 - 24 or
special movement timesettings for dets 1 - 40

CONTROLLER TIMESETTINGS - 4

SPECIAL MOVEMENT TIMESETTINGS

GROUP No	STAGE 1 TIMESETTINGS (Yellow Timing)	STAGE 2 TIMESETTINGS (Red Timing)
1	5.0 (FØ Yellow)	2.0 (FØ All Red)
2	5.0 (FØ Yellow)	2.0 (FØ All Red)
3		
4		
5		
6	3.0 (DØ Yellow)	2.5 (DØ Special All Red)
7	3.0 (DØ Yellow)	3.0 (DØ All Red)
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		

NOTE: Stage 1: Timesetting (Yellow Time)
Default is zero, uses phase yellow if special movement is activated
Can specify phase timesettings, eg. A phase yellow, or a time value, eg. 3 secs
Stage 2: Timesetting (Red Time)
Default is zero, Traff will use 2 secs red as default if special movement is activated
Can specify phase timesettings or other timesettings, eg. A phase red, or a time value, eg. 2.5 secs

FLEXILINK OPERATION

PHASE SEQUENCES

No	PHASE SEQUENCE
1 (No Y+)	ABCDEF
2 (Y+)	

NOTES:

1. All phases must be specified in the phase sequence
2. Only specify phase sequence 2 if it is different from phase sequence 1.

LOOK AHEADS & RELEASES

PHASE SEQUENCE 1		
PHASE	LOOK AHEAD*	RELEASE
A	No	R-
B	Yes (To C, D, A)	R+
C	Yes (To D, A)	Q-
D	Yes (To A)	Auto
E	Yes (To F)	Auto
F	Yes (To B,C,A)	Auto
G		

PHASE SEQUENCE 2		
PHASE	LOOK AHEAD*	RELEASE
A		
B		
C		
D		
E		
F		
G		

* Specify the phases to which look ahead is permitted, e.g. Yes (to E, F, G, A)

INHIBIT PHASES

The following phases can be inhibited in flexilink by setting the call pulse one step before the call pulse of the next phase in sequence **None**

PULSE STEP LENGTH

☐ One Second
 ☒ Two Second

MASTERLINK & FLEXILINK SPECIAL FLAGS

FLAG	FUNCTION
Y- Flexi	The site will operate in flexilink mode if the signal is continuously sent (C) or is used as an offset (e.g. 25)
Y- Master	
Y+ Flexi	P1 & P2 Walk time substitutions (<i>Refer Special Purpose Timesettings No. 15 & 16 respectively</i>)
Z- Flexi	
Z- Master	
Z+ Flexi	
Z+ Master	
R- Flexi	AØ RELEASE PULSE
R+ Flexi	BØ RELEASE PULSE
Q- Flexi	CØ RELEASE PULSE
Q+ Flexi	

SCATS INTERSECTION DATA

The data shown on this page is typical data that can be used for testing controller operations.

This data is not necessarily applicable when the site is switched on in the field.

TYPICAL SLOT DATA

SLOT <i>n</i>	=	6	,	4	,	2
		(phases)	(split plans)		(walks)	
INT	=	6631				
VC	=	6				
CS	=					
COM	=	NET				
PK	=	!				
S#	=					
LM	=	1				
RMN	=	0				
DCL	=	0				
AT	=	12				
BT	=	7				
CT	=	10				
DT	=	12				
ET	=	6				
FT	=	12				
GT	=					
W1	=	0A	W1 T	=	12	
W2	=	15	W2 T	=	15	
W3	=		W3 T	=		
W4	=		W4 T	=		
W5	=		W5 T	=		
W6	=		W6 T	=		
W7	=		W7 T	=		
W8	=		W8 T	=		
PP1	=	0,0A				
PP2	=	0,0A				
PP3	=	0,0A				
PP4	=	0,0A				

TYPICAL SPLIT PLAN DATA

PHASE SEQUENCE 1		PHASE SEQUENCE 2		PHASE SEQUENCE 3	
A	= 0PDB	A	=	A	=
B	= 20C	B	=	B	=
C	= 20D	C	=	C	=
D	= 15TGA	D	=	D	=
E	= 1F	E	=	E	=
F	= 1A	F	=	F	=

TYPICAL VARIATION PARAMETERS

VP1	=		VP22	=		VP43	=	
VP2	=		VP23	=		VP44	=	
VP3	=		VP24	=		VP45	=	
VP4	=		VP25	=		VP46	=	
VP5	=		VP26	=		VP47	=	
VP6	=		VP27	=		VP48	=	
VP7	=		VP28	=		VP49	=	
VP8	=		VP29	=		VP50	=	
VP9	=		VP30	=		VP51	=	
VP10	=		VP31	=		VP52	=	
VP11	=		VP32	=		VP53	=	
VP12	=		VP33	=		VP54	=	
VP13	=		VP34	=		VP55	=	
VP14	=		VP35	=		VP56	=	
VP15	=		VP36	=		VP57	=	
VP16	=		VP37	=		VP58	=	
VP17	=		VP38	=		VP59	=	
VP18	=		VP39	=		VP60	=	
VP19	=		VP40	=		VP61	=	
VP20	=		VP41	=		VP62	=	
VP21	=		VP42	=				

SITE NO. 6631