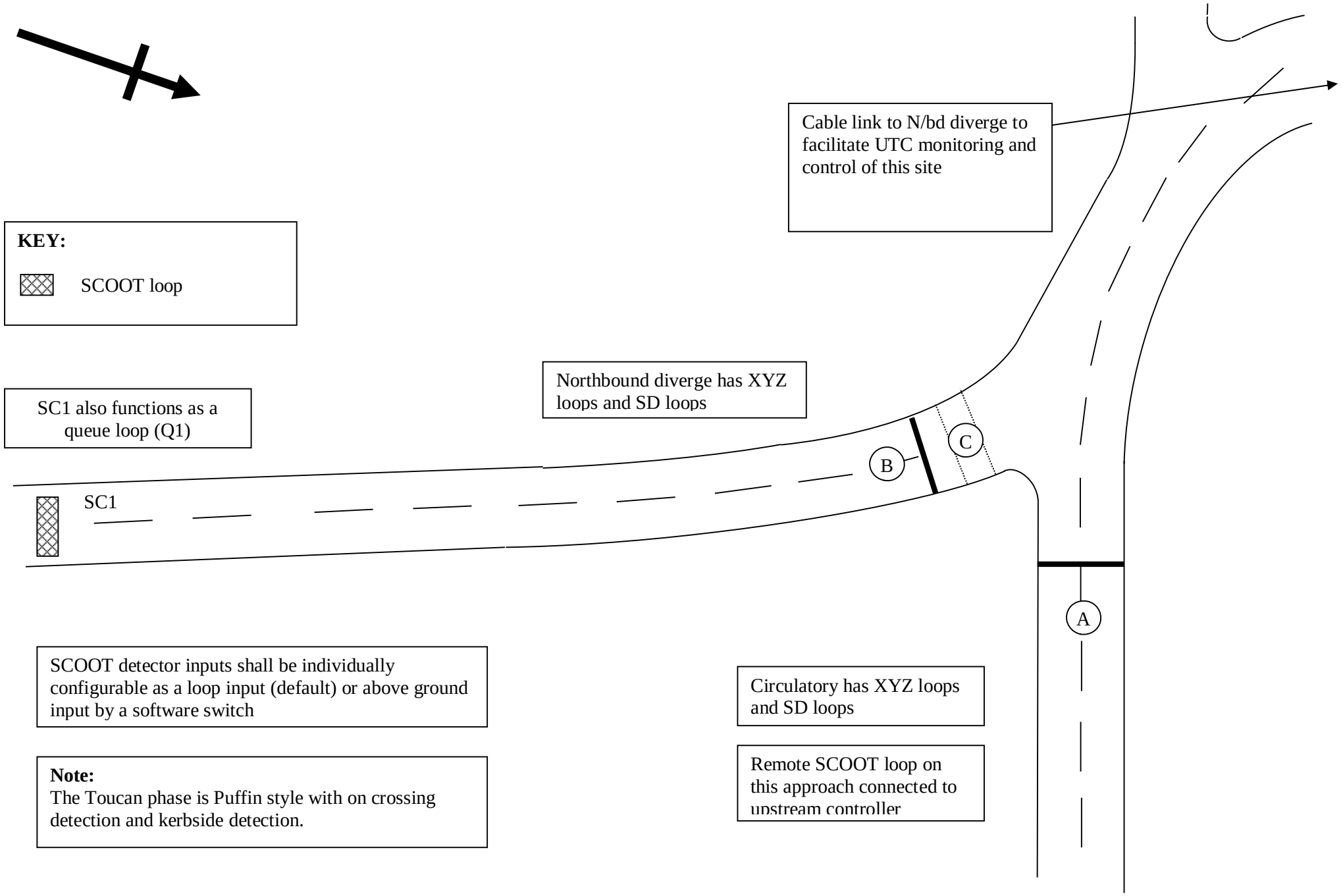
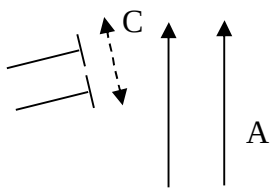
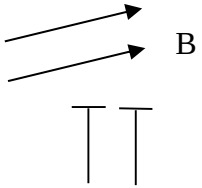
FRC-P-___SRM-21-S-12907

GRONTMIJ

INTERSECTION GENERAL DESCRIPTION: FRC – South Queensferry Gyratory – Northbound Diverge		
DRAWINGS: FRC_P_SRM-025-D-NT-SIG-12913	**REFERENCE:** TBC	**CONTROLLER SCN:** 2AEC1 **OTU SCN:** 2AB00
SPECIFICATION COMPRISING: 23 **PAGES**	**CONTROLLER IP ADDRESS:** -	**OTU IP ADDRESS:** 10.27.196.182
CUSTOMER'S ENGINEER: Stein Connelly (0141 300 8243)	**SUBNET:** 255.255.252.0	**GATEWAY:** 10.27.199.254
SPECIFICATION ISSUE: 2.0	**CONTROLLER:** Peek	
SPECIFICATION BY: Peter Routledge (01904 793 666)	**CONTROLLER TYPE:** PTC-1 ELV	
Issue 2.0	As-built PR 03.05.18	
MAINS SUPPLY: 230 **V** 50 **Hz**	**DIMMING:** Yes	**DIMMING VOLTAGE** ELV


Cable link to N/bd diverge to facilitate UTC monitoring and control of this site
KEY:
SCOOT loop
Northbound diverge has XYZ loops and SD loops
SC1 also functions as a queue loop (Q1)
SC1
B
C
A
SCOOT detector inputs shall be individually configurable as a loop input (default) or above ground input by a software switch
Circulatory has XYZ loops and SD loops
Remote SCOOT loop on this approach connected to upstream controller
Note:
The Toucan phase is Puffin style with on crossing detection and kerbside detection.

STAGING STREAM 1			
Stage 1  Demanded by A	**Stage 2**  Demanded by B	**Stage 3** All Red Dummy D	`

	STREAM 1	STREAM 2	STREAM 3	STREAM 4
ALL RED	3			
START UP	1			
REVERSION	1			

General Notes

General Notes

1. This is configuration is based on drawing FRC_P_SRM-025-D-NT-SIG-12913;
2. If the controller supports a Web GUI it shall include (accessible via the 'tree' menu):
   a) An electronic version of this specification (pdf) and the layout/ducting/schedules drawings (pdf); and
   b) A mimic schematic including, as a minimum:
      - Traffic and pedestrian detector inputs that change colour as they go active/inactive;
      - Running stage/ phase(s) (green/red) indication; and
      - Operative mode indication.
3. The site will normally operate under UTC/SCOOT (with demand dependency and gapping out) control with overnight fallback to VA and CLF plans in the event of UTC failure.
4. Fault reporting will be undertaken through UTC;
5. Controller fitted with five quad detector packs;
6. Both tactile and audible devices shall be installed;
7. Red lamp monitoring for pedestrians plus other lamp monitoring shall be provided;
8. Minimum value for minimum traffic green to be 5 seconds, dummy minimum 0 seconds; pedestrian and IGA minimums 5 seconds, minimum intergreens two seconds less than the working value but 5 seconds minimum;
9. Minimum/maximum extension to be 0.1/10.0 seconds; and
10. DFM to flash on safety red lamp fail only.

PUFFIN safety feature

1. To ensure faulty or vandalised kerbside detection cannot prevent pedestrian demands from being serviced, pedestrian demands shall be latched/unlatched as follows:
   - if the kerbside detector is active when the PB is pressed – unlatched; and
   - if the kerbside detector is not active when the PB is pressed – latched and
2. To support the safety feature, pushbuttons and associated kerbside detectors shall be monitored in pairs (except when there are two pushbuttons associated to one kerbside detector) but note once a demand has been accepted it shall be held by any kerbside detector associated with the phase.

PUFFIN Timings

1. On-crossing extension time: on-crossing detectors have a built in extension time of 0.5 seconds. A total extension time of 1.0 seconds is required therefore the controller extension time should be set to 0.5 seconds;
2. Registered demand extension time: 1.0 seconds;
3. Kerbside demand extension time: a value is 1.0 seconds is required but as kerbside detectors have an inbuilt extension of 0.8 seconds, the controller extension time should be set to 0.2 seconds; and
4. With the above, a pedestrian demand shall be cancelled two seconds after the pedestrian departs assuming there is no subsequent kerbside detector demand.

General Notes Cont.

General UTC Operation

1. The controller shall be configured with UTC bits for monitoring and control, including lamp failure bits;
2. Traffic count bits shall be returned to the UTC instation;
3. A cable link to the N/bd merge controller has been provided to facilitate monitoring and control of this site via the OTU at the N/bd Merge.
4. SCOOT loops shall be connected to the controller and passed onto the OTU via the link cable. SCOOT inputs initially configured as loops but shall be individually capable of being reset by a software switch to an above ground detector input; and
5. SCOOT loop SC1 also functions as a queue loop.

PHASE DATA																														
USE OF STAGES					**PERMITTED PHASE COMBINATIONS**																					**TIMINGS**				
DESCRIPTION	**Condition of appearance (1)**	**Condition of termination (2)**		**Type of Phase (3)**	**C indicates conflicting moves**																				**Minimum green**	**MAX SET**			
		Type	**Ass'd Phase**		**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Q**	**R**	**S**		**A**	**B**	**C**	**D**
																									AM Peak	**PM peak**	**Daytime OP**	**Overnight**
A Circulatory	0	0		T		C		C																7	30	30	25	20
B Northbound diverge	0	0		T	C		C	C																7	30	30	25	20
C Peds across northbound diverge	0	0		TN		C		C																6				
D All red dummy	0	0		D	C	C	C																	3				
E																												
F																												
G																												
H																												
I																												
J																												

Note 1: Condition of Appearance

0 - Phase always appears
1 - Phase appears only if demand exists at start of interstage
2 - Phase appears, if demanded, at any time up to the end of the stage
3 - Phase appears, if demanded, at any time until the window time expires
4 – Phase always appear in UTC and CLF and demand dependant in other modes

Note 2: Condition of termination

0 - Phase terminates at end of stage
1 - Phase terminates when associated phase gains ROW
2 - Phase terminates when associated phase loses ROW

Note 3: Type of Phase

T - Traffic
F - Filter arrow
I - Indicative arrow
D - Dummy
S - Switched sign
PD - Pedestrian (far side)
PU - Puffin
TF - Toucan (far side crossing signals)
TN - Toucan (nearside crossing signals)
PB – Puffin with blackout

PHASE INTERGREENS AND DELAYS (SECONDS)

TO PHASE

FROM PHASE

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
A		5		3															
B	5		5	3															
C		#		#															
D	2	2	2																
E																			
F																			
G																			
H																			
I																			
J																			
K																			
L																			
M																			
N																			
O																			
P																			
Q																			
R																			
S																			

PHASE DELAYS

No	Delay Phase	From Stage	To Stage	By (Secs)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Starting Intergreen period (excluding amber period) = 11

-See Sheet 7

UTC INTERSTAGE

TO STAGE

FROM STAGE	1	2	3	4	5	6	7	8	9	10
1	■	a								
2	b	■								
3			■							
4				■						
5					■					
6						■				
7							■			
8								■		
9									■	
10										■

Note: The stage intergreen is taken as the largest intergreen between phases in concurrent stages.

* indicates a non-permitted move

a – min = 5s max = 13s
b – min = 5s max = 7s

PEDESTRIAN PHASES – ADDITIONAL DATA

Puffin Pedestrian to Vehicle Intergreen (LTN2/95)

Phase details		Times (seconds)				
Phase	**Road width L (m)**	**Period 5 (Fixed all red)**	**Period 6 (Variable all red)**	**Period 7 (Additional all red after max change)**	**Period 8 (Additional all red after gap change)**	**Max Intergreen After Ped (including starting amber)**
C	9.0	3	8	0	0	13

Notes:

1. Period 5 + 6 = (L/1.2+ Pc);
2. Period 6 = ((L/1.2 + Pc) – P5) = ((L/1.2+ Pc) – 3 = L/1.2; where
   - L = road width in metres
   - Pc = the pedestrian comfort time = 3 seconds

Phase	Audible	Tactile	Phase	Audible	Tactile
C	Yes	Yes			

USE OF STAGES

Active Phases (including dummys but excluding regulatory signs)																				Stream
Stage	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Q**	**R**	**S**	
1	Y		Y																	1
2		Y																		1
3				Y																1
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
Max Revertive Demand Phase	A	B																		

Fixed Time Mode Stage Sequence								
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Stage**
								Stage No
								Duration

Fixed time running to current maximum	Yes

Demand Dependent Phases in Fixed Time			
A		**J**	
B		**K**	
C		**L**	
D		**M**	
E		**N**	
F		**O**	
G		**P**	
H		**Q**	
I			

Manual Selection

Button	Stage	Description
1	1	Circulatory and peds across northbound diverge
2	2	Northbound diverge
All Red	3	

Manual always available
Yes

PROHIBITED/ALTERNATIVE STAGE MOVEMENTS

Stream 1

Mode	Restrictions
UTC	Yes
CLF	Yes
VA	Yes
FT	Yes
Manual	No
Priority	-
Emergency	-

KEY:
Y = move permitted
X = move not permitted

VA

From Stage \ To Stage	1	2	3	4	5	6	7	8
1		Y	X					
2	Y		X					
3	Y	Y						
4								
5								
6								
7								
8								

MAN

From Stage \ To Stage	1	2	3	4	5	6	7	8
1		Y	Y					
2	Y		Y					
3	Y	Y						
4								
5								
6								
7								
8								

FT

From Stage \ To Stage	1	2	3	4	5	6	7	8
1		Y	X					
2	Y		X					
3	Y	Y						
4								
5								
6								
7								
8								

UTC
CLF

From Stage \ To Stage	1	2	3	4	5	6	7	8
1		Y	X					
2	Y		X					
3	Y	Y						
4								
5								
6								
7								
8								

DETECTORS AND PUSH BUTTONS - LOCATIONS AND FUNCTIONS													
Reference/Description			**External**	**Extension**	**Phase**		**Non-latching**	**Uni-directional**	**Call/cancel**		**DFM fail mode/Group**	**Speed detection**	**Special Instructions**
					Demanded	**Extended**			**Call delay (secs)**	**Cancel delay (secs)**			
1.	AX	Pack 1 – 1		1.6	A	A					A1		
2.	AY	Pack 1 – 2		1.6	A	A					A1		
3.	AZ1	Pack 1 – 3		1.6	A	A					A1		Copy for TC1
4.	AZ2	Pack 1 – 4		1.6	A	A					A1		Copy for TC2
5.	BX	Pack 2 – 1		1.6	B	B					A2		
6.	BY	Pack 2 – 2		1.6	B	B					A2		
7.	BZ1	Pack 2 – 3		1.6	B	B					A2		Copy for TC3
8.	BZ2	Pack 2 – 4		1.6	B	B					A2		Copy for TC4
9.	A1A	Pack 3 – 1									M1		Speed discrimination loops
10.	A1B	Pack 3 – 2									M1		
11.	A2A	Pack 3 – 3									M1		
12.	A2B	Pack 3 – 4									M1		
13.	B1A	Pack 4 – 1									M2		
14.	B1B	Pack 4 – 2									M2		
15.	B2A	Pack 4 – 3									M2		
16.	B2B	Pack 4 – 4									M2		
17.	SC1	Pack 5 – 1									-		
18.	Spare	Pack 5 – 2									-		
19.	Spare	Pack 5 – 3									-		
20.	Spare	Pack 5 – 4									-		
21.	Q1	-							10	2	M2		Copy of SC1
22.	$C_{PUSH\ BUTTON\ 1}$	Pole 5	Y		C						M3		Pushbuttons
23.	$C_{PUSH\ BUTTON\ 2}$	Pole 6	Y		C						M3		
24.	$C_{USH\ BUTTON\ 3}$	Pole 7	Y		C						M3		
25.	$C_{USH\ BUTTON\ 4}$	Pole 8	Y		C						M3		

26.	$C_{ON\text{-}CROSSING\ 1}$	Pole 5	Y	0.5	-						M4		On-crossing detectors
27.	$C_{ON\text{-}CROSSING\ 2}$	Pole 7	Y	0.5	-						M4		
28.	$C_{KERBSIDE1}$	Pole 6	Y								M5		Kerbside detectors
29.	$C_{KERBSIDE2}$	Pole 7	Y								M5		
30.													
31.													
32.													
33.													
34.													
35.													

Detector type	
Detector supply voltage	
Y = use input on DFM fail A = force active on DFM fail I = force inactive on DFM fail M = monitor input and write to fault log only	

Group	**Active (minutes)**	**Inactive (hours)**
1	30	18
2	30	18
3	30	Not monitored
4	30	Not monitored
5	30	Not monitored

MODE PRIORITY

Mode	Priority
Hurry call	
Priority	
Selected manual	1
UTC	3
Selected FT or VA or CLF	2
CLF	4
VA	5

Facility switch	Not operative
Manual	
FT	
VA	

SPECIAL HURRY CALLS

Ref	Stage	Call input	Cancel input	Ack'd output	Seconds			Notes
					Call delay	Hold	Pre-vent	
1								
2								
3								
4								
5								
6								
7								
8								
9								

MASTER TIME CLOCK AND CLF MODE														
No	**Day type**							**Hour**	**Min**	**Sec**	**Introduce Function**	**Function No**	**Plan/ Parameter**	
	M	**T**	**W**	**T**	**F**	**S**	**S**							
1	Y	Y	Y	Y	Y			07	00	00	Max set A	2	b	**Function**
2	Y	Y	Y	Y	Y			09	30	00	Max set C		b	0 Isolate controller
3	Y	Y	Y	Y	Y			12	00	00	Max set B		b	1 Introduce plan
4	Y	Y	Y	Y	Y			14	00	00	Max set C		b	2 Introduce event/function
5	Y	Y	Y	Y	Y			15	00	00	Max set B		b	
6	Y	Y	Y	Y	Y			19	00	00	Max set C		b	a) switch input/output active/inactive
7	Y	Y	Y	Y	Y			22	00	00	Max set D		b	b) introduce max set
8						Y		08	00	00	Max set A		b	c) switch sign on/off
9						Y		09	30	00	Max set C		b	d) switch stage/phase in/out of cycle
10						Y		12	00	00	Max set B		b	e) switch to/from part time mode
11						Y		14	00	00	Max set C		b	f) extend pedestrian green
12						Y		16	00	00	Max set B		b	g) Introduce loud audible
13						Y		18	00	00	Max set C		b	h) Remove loud audible
14						Y		22	00	00	Max set D		b	
15							Y	09	00	00	Max set A		b	
16							Y	10	00	00	Max set C		b	
17							Y	12	00	00	Max set B		b	
18							Y	14	00	00	Max set C		b	
19							Y	16	00	00	Max set B		b	
20							Y	19	00	00	Max set C		b	
21							Y	21	00	00	Max set D		b	
40	Y	Y	Y	Y	Y			07	00	00	CLF Plan 1	1	1	
41	Y	Y	Y	Y	Y			10	00	00	Isolate	0	0	
42	Y	Y	Y	Y	Y			12	00	00	Isolate	0	0	
43	Y	Y	Y	Y	Y			14	00	00	Isolate	0	0	
44	Y	Y	Y	Y	Y			16	00	00	CLF Plan 3	1	3	
45	Y	Y	Y	Y	Y			19	00	00	Isolate	0	0	
46	Y	Y	Y	Y	Y			20	00	00	Isolate	0	0	
47						Y		08	00	00	CLF Plan 1	1	1	
48						Y		10	00	00	Isolate	0	0	

49						Y		13	00	00	Isolate	0	0	
50						Y		16	00	00	CLF Plan 3	1	3	
51						Y		18	00	00	Isolate	0	0	
52						Y		20	00	00	Isolate	0	0	
53							Y	09	00	00	CLF Plan 1	1	1	
54							Y	11	00	00	Isolate	1	1	
55							Y	12	00	00	Isolate	0	0	
56							Y	16	00	00	CLF Plan 3	1	3	
57							Y	18	00	00	Isolate	0	0	
58							Y	20	00	00	Isolate	0	0	
59	Y	Y	Y	Y	Y			08	00	00	Enable audible	2	g	
60	Y	Y	Y	Y	Y			22	00	00	Disable audible		h	
61						Y		08	00	00	Enable audible		g	
62						Y		22	00	00	Disable audible		h	
63							Y	08	00	00	Enable audible		g	
64							Y	22	00	00	Disable audible		h	

SQF – Nbd Diverge - CLF MODE - INFLUENCE SETS – Updated Plans

Plan Number	1	**Stream**	1
Group	**Time**	**Group Influence**	**Related Stage**
1.	135	PE	2
2.	9	F	2
3.	30	PE	1
4.	40	F	1
5.	67	PE	2
6.	77	F	2
7.	98	PE	1
8.	108	F	1
9.			
10.			
11.			
12.			
Cycle Time	136 **seconds**	**Offset** 0 seconds	

Plan Number	3	**Stream**	1
Group	**Time**	**Group Influence**	**Related Stage**
1.	135	PE	2
2.	9	F	2
3.	30	PE	1
4.	40	F	1
5.	67	PE	2
6.	77	F	2
7.	98	PE	1
8.	105	F	1
9.			
10.			
11.			
12.			
Cycle Time	136 **seconds**	**Offset** 0 seconds	

I	Isolate to local VA
F	Immediate move to defined stage
DD	Demand dependent move to defined stage
H	Hold
PE	Prevent moves except to defined stage

CLF MODE - INFLUENCE SETS

Plan Number	4,7	**Stream**	1
Group	**Time**	**Group Influence**	**Related Stage**
13.	39	PE	2
14.	49	F	2
15.	75	PE	1
16.	85	F	1
17.	107	PE	2
18.	117	F	2
19.	7	PE	1
20.	17	F	1
21.			
22.			
23.			
24.			
Cycle Time	136 **seconds**	**Offset** 0 seconds	

Plan Number	2, 5, 8	**Stream**	1
Group	**Time**	**Group Influence**	**Related Stage**
1.	36	PE	2
2.	46	F	2
3.	75	PE	1
4.	85	F	1
5.	104	PE	2
6.	114	F	2
7.	7	PE	1
8.	17	F	1
9.			
10.			
11.			
12.			
Cycle Time	136 **seconds**	**Offset** 0 seconds	

I	Isolate to local VA
F	Immediate move to defined stage
DD	Demand dependent move to defined stage
H	Hold
PE	Prevent moves except to defined stage

CLF MODE - INFLUENCE SETS

Plan Number	6, 9	**Stream**	1
Group	**Time**	**Group Influence**	**Related Stage**
1.	36	PE	2
2.	46	F	2
3.	75	PE	1
4.	85	F	1
5.	104	PE	2
6.	114	F	2
7.	7	PE	1
8.	17	F	1
9.			
10.			
11.			
12.			
Cycle Time	136 **seconds**	**Offset** 0 seconds	

Plan Number		**Stream**	
Group	**Time**	**Group Influence**	**Related Stage**
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
Cycle Time	**seconds**	**Offset** seconds	

I	Isolate to local VA
F	Immediate move to defined stage
DD	Demand dependent move to defined stage
H	Hold
PE	Prevent moves except to defined stage

UTC CONTROL AND REPLY BITS																
	Northbound Diverge															
Bit	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Control	F1	F2*	DX	D2	GO		TS									
Reply	G1	G2	DF	DR2	CF	RR	TSR	MC	LF	RF1	RF2					
Bit	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
Control																
Reply	SC1											Q1	TC1	TC2	TC3	TC4

Relationship of phase demands to D bits	**D2**							
	B							

Notes:

1. OTU located at Northbound merge;
2. UTC control required when force bit(s) present;
3. DX demands all phases;
4. TS and TSR times to be confirmed;
5. CF to reply on any fault log entry except a detector fault;
6. RF1 is first red fail, RF2 second red fail and LF is any lamp fail;
7. * indicates demand dependant force;
8. SC'x' are SCOOT reply bits; and
9. Q'x' are queue reply bits.

Traffic Flow data

a) TC'x' are traffic flow count bits – see detector sheets; and
b) A reply bit shall be created and returned every fourth vehicle, i.e. on the fourth change of state.

Reply bit options

	G1/G2	**MC**	**Remote reconnect**	**DF**	**CF**	**Other**
Manual mode selected and operative		Y	Y			
Manual mode selected			Y			
No lamp power and/or signal off	Y					
Controller fault					Y	
Detector fault				Y		
FT or VA mode selected			Y			

LINK CABLE SCHEDULE																			
Link Cable Ref	**Core Allocation**																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	F1	F2*	DX	D2	GO		TS													
2	G1	G2	DF	DR2	CF	RR	TSR	MC	LF	RF1	RF2	SC1	Q1	TC1	TC2	TC3	TC4			

Notes:

1) Link cables 1+2 go to the Northbound merge controller

	Control
	Reply
	Spare

SPEED DISCRIMINATION/SPEED ASSESSMENT

Equipment Type: SDE
Number as assessors:
Assessor loop spacing Standard - 12feet/3.66m

* Indicates if phase terminating with non high speed extension is not to have an extra intergreen

Assessor	Associated Phase	Assessor Type
0	A	1
1	A	1
2	B	1
3	B	1
4		
5		
6		
7		

Phase terminated	Extra intergreen	*
A	2	Yes
B	2	Yes
C		
D		
E		
F		
G		
H		

Assessor Types:
1 = Double SDE (Threshold 30mph, extension 3.0 seconds)
2 = Inner assessor for triple SDE (Threshold 35mph, extension 3.5 seconds)
3 = Outer assessor for triple SDE (Threshold 45mph, extension 3.5 seconds)
4 = Speed assessment (Threshold 28mph, extension 5 seconds)

Notes:

1. If an XYZ loop or speed discrimination loop pair loop is declared faulty then the intergreen for the associated approach shall be increased by 2 seconds (note when this is the case for XYZ loops no further speed related intergreen extensions shall be implemented). If the faulty loop is switched off in software the additional intergreen shall not apply

RED LAMP MONITOR EXTEND INTERGREEN FACILITY

To Phase

From Phase

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
A	■																
B		■	Y														
C			■														
D				■													
E					■												
F						■											
G							■										
H								■									
I									■								
J										■							
K											■						
L												■					
M													■				
N														■			
O															■		
P																■	
Q																	■

LMU extend intergreen timings (Seconds)

	Stream			
	1	**2**	**3**	**4**
Supplementary intergreen	2*			
Maximum all red time	10			

* adjustable in handset in range 0-9 seconds

SPECIAL CONDITIONS FOR STAGE CHANGES – MODE VA				
From	**To**	**Demanded by**	**Running stage extended by**	**Inhibited by demand for**
1	2	Dem B	Ext A	-
2	1	Dem A or C	Ext B	-

Notes:
a) Conditions for reversion not shown; and
b) Minimums not shown.

SPECIAL CONDITIONS FOR STAGE CHANGES – MODE UTC				
From	**To**	**Condition for Change**		
1	2	[F2 & (D2 or Dem B)]	or	[(F1 & F2) & (D2 or Dem B) & -ext A & GO]
2	1	[F1]	or	[(F2 & F1) & -ext B & GO]

SPECIAL CONDITIONS FOR STAGE CHANGES – MODE CLF
To be based on UTC conditions