Queensland Government

Our ref 517-00371.023 (M7113)
Your ref
Enquiries Dez Hehir (07) 5475 2881

Department of
Transport and Main Roads

TRAFFIC SIGNAL SEQUENCE REPORT

Introduction

This Traffic Sequence Report has been prepared in response to an incident that occurred at the intersection of King Street, Main Street, Church Street & Gloucester Road, Buderim on Saturday 10th October 2023 at approximately 21:30hrs.

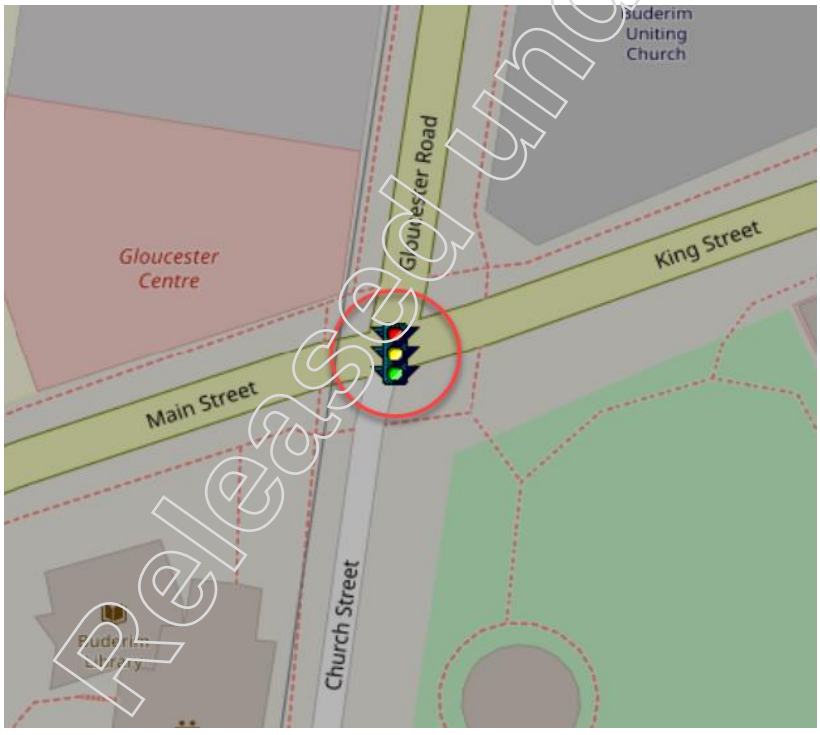
The purpose of this report is to explain the operation of the traffic signals, provide the critical signal timing data and identify any faults that may have occurred with the signal operation for the time requested. The data provided in this report is based on operations around the time of the incident and as such these may have been modified since to suit changing traffic conditions.

TMR Intersection Identification Number

M7113

Traffic Signal Location

Intersection of King Street, Main Street, Church Street & Gloucester Road, Buderim (circled)



Aerial Photography Image

Aerial picture above is the traffic signal location used for approach reference only.
Geometry may not be exact or to scale.
Current Traffic Signal Equipment and lane markings may differ from this image.
Image reference: Google Earth 2023

Traffic Signal Operation

The basic objective for the use of signal control is the time separation of conflicting traffic movements to ensure safe operation of the intersection.

Within the controller, traffic movements are associated with 'signal groups' (groups of signals that are connected on the same electrical circuit). These signal groups are allocated to phases (unique groups of traffic movements). This grouping of movements and allocation to phases, or design of the signal phasing, should result in safe and efficient control of the specific intersection layout with the traffic demands or volumes being considered.

The signal phasing, together with other data defining the operation of an intersection, is called the 'controller personality'. This data is 'burnt' onto an erasable reprogrammable read only memory module (EPROM) or PC Card (PCMIA) which must be plugged into the controller central processor unit for the controller to operate.

Isolated Mode

When operating in the isolated mode, the signals are operating in isolation from any other adjacent traffic signals and do not operate on set phase or cycle times. The phases operate in vehicle actuation mode whereby they are activated when the vehicle detectors register vehicle occupancy.

Vehicle detectors are loops of wire buried in the pavement connected to a sensor unit housed in a roadside cabinet. The inductance of the loop changes when metal is present above the loop and this change is used to detect the vehicles. If a vehicle passes over or is sitting above the detector for 1-2 seconds, it then registers that there is a demand for the appropriate phase.

The intersection will remain in the arterial Phase (Typically 'A' Phase) until a demand is registered on the loop detectors for any other phase. If a demand for another phase occurs, the signals will change through the phase sequence to the demanded phase/s either after a three second gap is registered in the demand for A Phase or when A Phase reaches its maximum green time, whichever comes first. Isolated mode is typically used after hours or during periods of low demand.

Coordinated Mode

In order to coordinate a route of signalised intersections, all the intersections within the route will operate on a common cycle time. The timing of the signals is controlled by various 'time of day' plans according to the expected traffic conditions throughout the day. Each phase in the cycle within each plan is allocated set duration times. These phase duration times vary dependant on pre-set criteria such as phase release settings and pedestrian frequency.

The amber, red and minimum green time settings "Critical Phase Time Settings" (Table 4) will always apply to any phase when called in the coordinated mode.

Intersection Operation at Time of Incident

On 10th October 2023 at 21:30hrs, the Intersection of King Street, Main Street, Church Street & Gloucester Road, Buderim was operating in *Isolated Mode*.

TMR can advise there were no critical signal faults recorded at time of incident.

Note: *The intersection traffic controller box incorporates protection that will not allow green lanterns to be displayed to conflicting traffic movements at any time. The traffic lights are designed to automatically switch off within 100 milliseconds if this occurs.*

Intersection Signal Phasing

Traffic movements at this intersection are controlled by 3 signal phases.
Phases are broken into Signal Groups (SG) or aspects as shown by the numbered arrows in **Diagram 1** *below*.

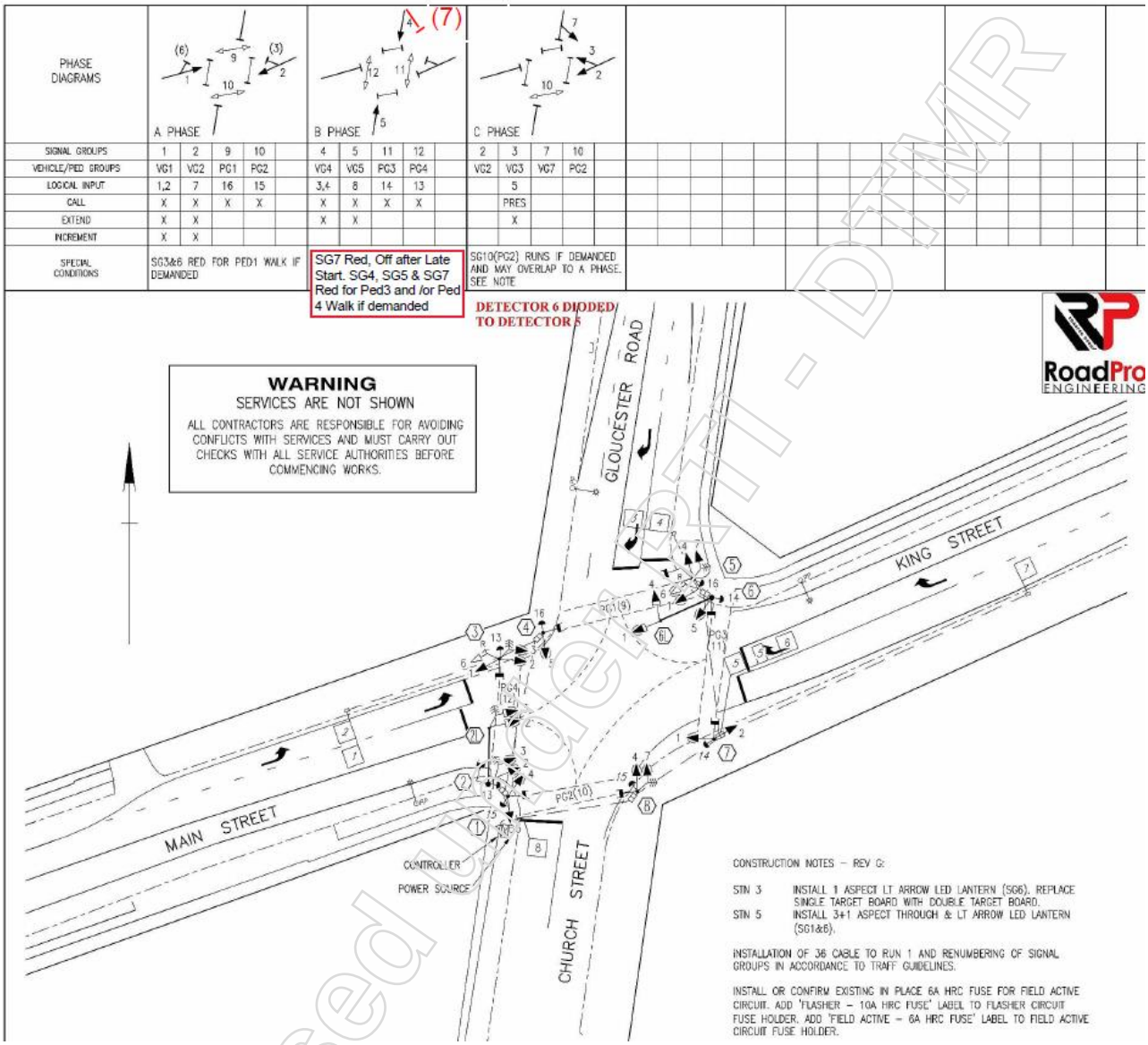


Diagram 1 – Traffic Signal Plan (Extract) for King Street, Main Street, Church Street & Gloucester Road, Buderim (M7113)

Intersection Signal Phasing

Traffic movements at intersection M7113 are controlled by 3 traffic phases.

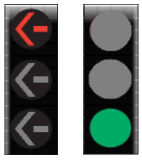
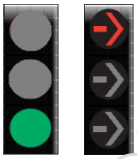
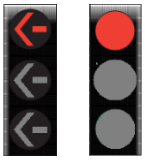
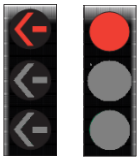
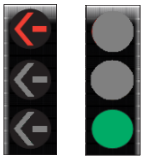
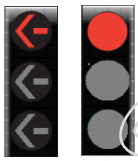
Table 1 (below) sets out the traffic lights or aspects displayed to traffic on each approach.
For this report;

Main Street is referred to as the West approach
King Street is referred to as the East Approach
Gloucester Road is referred to as the North approach
Church Street is referred to as the South approach.

Traffic Light / Lantern Aspects have been labelled below with the Signal Group (SG) to correspond with the Intersection Phasing Diagram (see Diagram 1 – Page 4)

Note: This report cannot specifically identify which traffic lights or aspects were being displayed at the exact time of the incident as the precise time cannot be identified.

Table 1 – Aspect Display for M7113

Phase	Traffic Light / Lantern Aspect Displayed to Traffic on:			
	West Approach – Main Street	**East Approach - King Street**	**South Approach – Church Street**	**North Approach – Gloucester Road**
A	 SG6~ SG1	 SG2 SG3~#	 SG5	 SG7 SG4
B	 SG6 SG1	 SG2 SG3	 SG5*	 SG7* SG4*
C	 SG6 SG1	 SG2 SG3	 SG5	 SG7 SG4

A Phase commences with a Red Right Turn Arrow on King St East approach, which turns off after 3 seconds allowing motorists to choose a safe gap in the opposing traffic and perform a filter turn (give way) for the remaining duration of the phase.

~ If Ped 1 pedestrian movement is demanded, then the left turn arrow (SG6) on the Main St approach and right turn arrow (SG3) on the King St approach are held 'red' at the beginning of A Phase, turning off once the pedestrian green "walk" period has expired (6 seconds).

* If Ped 3 & Ped 4 pedestrian movements are demanded, the left turn arrow (SG7) and through lantern (SG4) on Gloucester Rd, and the opposing Church St approach (SG5) are held 'red' at the beginning of B Phase, turning off once the pedestrian green "walk" period has expired (6 seconds).

Critical Phase Time Settings

Table 4 shows the critical phase time settings. Values relating to the critical timings of the intersection operations are stored within the intersection controller box in the 'controller personality'.
These values define crucial information such as the red time for the intersection or the minimum amber time allowed for each phase. Whenever a particular phase is introduced these critical phase times will apply, including when faults have occurred.

Table 4 – Phase Time Settings

Phase	Phase Time Settings (seconds)			
	Minimum Green+	Amber	Red~	Maximum Green*
A	6 + 3	4	2	50
B	6	4	2.4	30
C	6	4	2.0	30

\+ Minimum green is the minimum length of green time provided in a phase whenever that phase is called.

* Maximum Green time applies only when the intersection is operating in an isolated mode based on vehicle detector demand. When the intersection is operating in a coordinated route controlled by STREAMS intelligent traffic management software the phases run in dynamic plans and the maximum green time may vary.

~ Red time may also be referred to as 'All-Red time'. It is the minimum length of time between the end of the yellow interval on a phase or signal group through to the start of the green on the next phase or signal group. The purpose is to allow safe clearance for vehicles crossing the stop line toward the end of the yellow interval. This time varies according to the distance of the potential conflict area and design speed.

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Prepared by:

personal information

Dez Hehir
Senior Advisor (Traffic Systems) | North Coast | Arterial & Motorway Management
Statewide Network Operations Branch | Infrastructure Management and Delivery
Department of Transport and Main Roads

North Coast District
PO Box 1600
Maroochydore Qld 4558

Telephone **+61 7 5451 7055**
Website www.tmr.qld.gov.au
Email **SNO_Correspondence@tmr.qld.gov.au**
ABN 39 407 690 291