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**Appendix F LinSig Model Development Note**

DRAFT

## TECHNICAL NOTE

**Job Name:** Brentwood  
**Job No:** 28085 / 1004  
**Note No:** 28085 /TN001  
**Date:** 21-09-15  
**Prepared By:** Jerry Hargreaves  
**Subject:** **Model checking and calibration**

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### Introduction

This note has been prepared to demonstrate how the model calibration process has been carried out on a series of LINSIG models (base 2012) for a local infrastructure development plan for Essex County Council. The LINSIG models have been prepared to represent the on-site junction / traffic conditions of the signalised junctions at busy peak hour periods. The calibration process has made use of on-site geometric measurements, controller data information and video survey footage for the morning and evening weekday peak hours.

The purpose of the LINSIG models is to assess the existing capacity of the junctions and to test the impact of additional traffic growth and new Development within the local area. A wider Infrastructure Development Plan document in supporting the local plan process will be submitted with this note to Essex County Council, outlining the current and future traffic conditions.

### LINSIG Assessment Tests

The AM (08:00 - 09:00) and PM (17:00 – 18:00) peak hours are considered to be the worst periods for traffic generated by the development site and the traffic impact on the junctions. The LINSIG base models outlined in this note have been calibrated for these time periods only and do not reflect the signal timings / operation for other times of the day.

### Junctions Modelled

- Junction 1 – Chelmsford Road / Shenfield Road
- Junction 8 – Ingrave Road / Middleton Road / Seven Arches Road
- Junction 10 – A1023 High Street / Weald Road / Kings Road
- Junction 17 – A 1023 London Road / Mascalls Lane / Spital Lane
- Junction 18 – Warley Hill / Eagle Way / Mascalls Lane
- Junction 23 – Lower Dunton Road / Westmayne



# TECHNICAL NOTE

## Data used for calibration

- Controller / signal data obtained from Essex County Council
- Video recordings of the above junctions (except junction 23 – no video recordings available) carried out on 12<sup>th</sup> November 2012.
- Modelled traffic flows - these have been taken from the Transport Assessment Report
- On-site measurements of junction geometry (03<sup>rd</sup> July 2014)

## Network Settings and Network Layout

Network settings have been kept unchanged from the LINSIG defaults.

The models consist of six standalone signalised junctions and associated pedestrian crossing facilities.

Short Lanes: have been used to represent the flared approaches to the junctions to reflect on-site measurements (for measurements refer to document [..\Calculations\Junction Modelling Network\\_A.xlsx](..\Calculations\Junction Modelling Network_A.xlsx)). Other aspects of the network layout have been coded according to observations from the survey video footage.

## Lane Data

Lane data has been derived from measurements taken from O/S mapping or from on-site measurements taken on 3<sup>rd</sup> July 2014. To reference these measurements refer to document [..\Calculations\Junction Modelling Network\\_A.xlsx](..\Calculations\Junction Modelling Network_A.xlsx).

Lane lengths: only the relevant flare lengths have been changed from the default 60 metres

Saturation flows: these have been derived using the geometric measurements and RR67. For signalised pedestrian crossings, a default value of 1800 pcu/hr has been used.

Controlling phases and controller: according to Timing Sheets provided by Essex County Council.

Multi-lanes: have not been used.

Start & end displacements: default values have been used.

Queue de-sliver: not required.

Ignore random delay: disabled – random delay has been considered in all lanes.

## Connector Data

Cruise time: since the models represent isolated junctions and the networks are relatively small, cruise times have been calculated using a cruise speed of 20kph and the distance to clear the junction.

Platoon dispersion behaviour: default value of 35.



## TECHNICAL NOTE

### Controller Data

All items coded according to the following Essex County Council Signal Timing Sheets:

- Junction 1 – Ref. 09J09: Issue 1.0.1 – last modified 20/05/10
- Junction 8 – Ref. 09J2: Issue 5.0.24 – last modified 11/08/03
- Junction 10 – Ref. 09J01: Issue 1.2.7 – last modified 07/07/09
- Junction 17 – Ref. 09J04: Issue 0.15.23 – last modified 20/05/10
- Junction 18 – Ref. 09J11: Issue 0021– last modified 23/10/01
- Junction 23 – Ref. Lower Dunton Rd / Westmayne: Issue 0002 – last modified 13/12/94

Controller Name & SCN: as per timing sheets provided by Essex County Council.

Controller Type: MSL, MTC, UTC Controller with integral facility.

Treat Phase Minimums as ...: treated as controller minimums.

Allow multiple stage streams: the junction operates using a single stage stream.

Non-standard filters: unchecked.

### Phase Data

All items coded according to the Essex County Council Timing Sheets mentioned above (ref, Controller data).

### Lane Behaviour & Control Data

Signalised / give-way control:

- Junction 1 - there are no give way movements within the signal operation.
- Junction 8 – Give way right turn movements on all approaches. Opposing lane parameters set to JCT recommendations for RT traffic within signalised junctions. Storage and clearance in front of stoplines based on observations.
- Junction 10 – Give way right turn movements on all approaches. Opposing lane parameters set to JCT recommendations for RT traffic within signalised junctions. Storage and clearance in front of stoplines based on observations.
- Junction 17 – Give way right turn movements on all approaches. Opposing lane parameters set to JCT recommendations for RT traffic within signalised junctions. Storage and clearance in front of stoplines based on observations.
- Junction 18 – Give way right turn movements on Warley Road north and southbound approaches. Opposing lane parameters set to JCT recommendations for RT traffic within signalised junctions. Storage and clearance in front of stoplines based on observations.
- Junction 23 - there are no give way movements within the signal operation.

Clear conflict: kept as recommended value 2 seconds for all junctions.



## TECHNICAL NOTE

### Intergreen & Interstage Data

All items coded according to the Essex County Council Signal Timing Sheets above (ref, Controller deta).

### Stage Sequence and Signal Timings

From examination of the junction operation in the morning and evening peak hours using the video footage, the cycle time, stage sequences and phase timings have been adjusted in the model to accurately represent the observed signal timings. The following table indicates information obtained from the observations:

Junction	Cycle Time	Phases	Stages	Comments
Junction 1	AM Peak - 51 cycles Average = 70 secs  PM Peak - 58 cycles Average = 60 secs	Phases A, B, C, D, E called every cycle  Phase F (ped) called AM - 9 times / hr PM - 2 times / hr  Phase G (ped) called AM - 26 times / hr PM - 7 times / hr	Stages 1, 2, 5 called every cycle  Stage 3 never called  Stage 4 AM - called every 2 cycles PM - called every 4 cycles  Stage 6 AM - called every 4 cycles PM – not called	Cycle times, phase times and stage sequences have been adjusted in the model to reflect on-site conditions
Junction 8	AM Peak – 36 cycles Average = 100 secs  PM Peak - 31 cycles Average = 115 secs	Phases A, B, C, D called every cycle  Phase E, F, G, H (ped stage) called AM - 26 times / hr PM - 18 times / hr	Stages 1, 3 called every cycle  Stage 2 AM - called 3 in every 4 cycles PM - called every 2 cycles	Cycle times, phase times and stage sequences have been adjusted in the model to reflect on-site conditions
Junction 10	AM Peak – 42 cycles Average = 85 secs  PM Peak - 38 cycles Average = 95 secs	Phases A, B, C, D, E called every cycle  Phase F, G, H, I, J (ped stage) called AM - 31 times / hr PM - 29 times / hr	Stages 1, 3 called every cycle  Stage 2 never called  Stage 4 AM - called 3 in every 4 cycles PM - called 3 in every 4 cycles	Cycle times, phase times and stage sequences have been adjusted in the model to reflect on-site conditions
Junction 17	AM Peak – 46 cycles Average = 80 secs  PM Peak - 39 cycles Average = 90 secs	Phases B, C, D, E, F,G called every cycle  Phase A (ped stage) called AM - 7 times / hr	Stages 1, 2, 3 called every cycle  Stage 4 AM - called 3 in every 4 cycles	Cycle times, phase times and stage sequences have been adjusted in the model to reflect on-site conditions

## TECHNICAL NOTE

		PM - 5 times / hr	PM - called 3 in every 4 cycles	
Junction 18	AM Peak – 35 cycles Average = 100 secs  PM Peak - 36 cycles Average = 100 secs	Phases A, B, C, D, E called every cycle  No ped crossings	Stages 1, 2, 3, 4 called every cycle. Stage 2 RT indicative arrow very short (1 to 2 secs)	Cycle times, phase times and stage sequences have been adjusted in the model to reflect on-site conditions
Junction 23	No video footage available for this junction. Cycle time has been derived from maximum phase and intergreen times.			

The base modelling results shown in the LINSIG outputs have been checked, wherever possible, to represent the delay and queueing experienced on the junction approaches. Similarly, the use of the demand activated pedestrian crossings has been as accurately reflected in the signal timings and stage sequences as possible.

### DOCUMENT ISSUE RECORD

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