Transport Assessment Health Warning

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TA Health Warning – address the slipping standards of Traffic Impact Submissions or risk damaging the public purse! That is the message printed in this paper which highlights the alarming way in which standards are continuing to slip and the most likely causes for this. Lack of appropriate training and experience using the various traffic modelling software tools on the part of submitting consultants and the failure of receiving bodies to always ensure that traffic impact submissions are independently checked by experienced traffic modelling auditors, are highlighted as major contributors to the problem. The paper continues by suggesting a better way forward that would ensure that it is the perpetrator of the errors rather than the public purse that pays for sub-standard traffic impact submissions. Finally, the paper invites the views of TEC readers.

1.0 INTRODUCTION

A Transport Assessment (TA) provides detailed information on a range of transport conditions and related issues for the 'before', 'during construction' and 'post-construction' phases of proposed development.

A fundamental part of the TA report is the traffic impact (TI) study, which assesses the impact of traffic generated by the proposed development on local junctions for each of the above phases. Typically, developer consultants use one or more of the following software products to carry out the TI evaluations:

- Arcady (for priority roundabouts)
- Picady (for priority controlled Tee and Crossroad junctions)
- Oscady Pro (for stand-alone signal controlled junctions)
- LinSig2 (for stand-alone junctions and small networks of signal controlled junctions)
- Transyt or Transyt/TranEd (for small to large networks of signal controlled junctions)
- Transyt, Transyt/TranEd or LinSig2 (for signal controlled roundabouts)

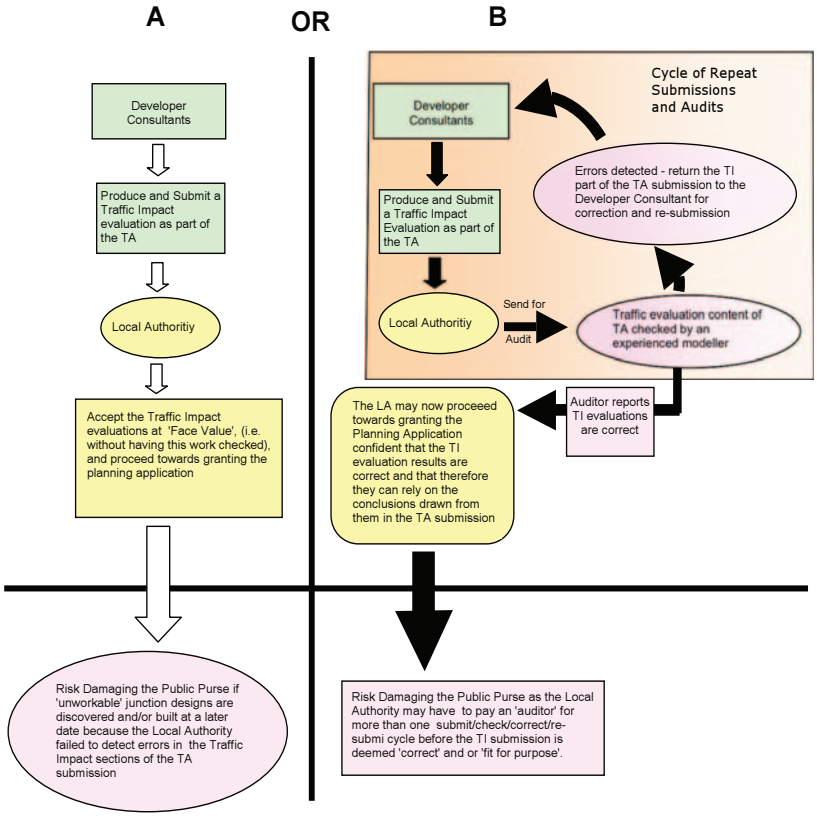
The TI must demonstrate that the development will not cause problems of congestion or danger in the development area. The TA submitter draws important conclusions from the TI results. The receiving authority's decision on whether or not to grant a planning application is influenced by these conclusions.

So where does the 'damaging the public purse' bit come in?' There are two ways in which this can happen. These are illustrated in Table 1, and described below.

(i) Developer consultants submit poor and/or erroneous traffic impact evaluations as an integral part of their TA submissions. Because the errors make the traffic impact seem less than it actually will be, the receiving development control team accept the TI content 'at face value' and proceed towards granting the planning application. The authority then discovers that the proposed junction layout(s) cannot actually 'work'. At this late stage the development control team elects to get the original TI modeling checked by an experienced auditor. The auditor reports back that there are serious errors in the submission. Result: the 'public purse' now has to pay for an experienced traffic modeller and/or junction designer to redo the work correctly.

(ii) As above, developer consultants submit poor and/or erroneous traffic impact evaluations as an integral part of their TA submissions. The development control team wisely recognises that they do not have the expertise to properly check the TI content. Accordingly, they send this to an experienced traffic modelling auditor. The auditor reports back that 'there are numerous errors, and, as a result, no value can be placed on conclusions drawn in the associated TA submission'. A cycle of 'return/correct/re-submit/re-audit' then commences. Result: it is the 'public purse' that has to pay for all the repeat audit work.

Table 1: The Current Process wrt Traffic Impact Evaluation



What do you want to Model ?	Prior Requirement Training	Software Training
Priority Junctions	None	Arcady & Picady
Isolated Signalled Junctions	Introduction to traffic signal terminology and methodology	Oscady Pro; or LinSig
Networks of Signalled & Priority Junctions	Introduction to traffic signal terminology and methodology	Transyt; Transyt and TranEd or LinSig2
Design of Signal Controlled Roundabouts	Introduction to traffic signal terminology / methodology and Design of Signalled Roundabouts Course	Arcady *(for Giveway Arms)* and Transyt; or Transyt & TranEd; or LinSig2

Table 2: Recommended 'Structured' Training for Traffic Impact Modellers. Providers of, and details for the above courses may be found at www.ahead4transport.co.uk

This state of affairs should not be allowed to continue. Accordingly, this paper endeavours to:

- illustrate 'in what way' Traffic Impact standards are slipping;
- suggest 'how and why' this might be happening; and
- propose a possible 'better way forward'.

2.0 SLIPPING TI STANDARDS ILLUSTRATED

Typical modelling errors that 'cross our auditing desk/s', and conclusions that auditors must draw as a result, are presented below.

2.1 Arcady – evaluation of priority controlled roundabouts

Common TI submission errors are:

- Geometric input data measurements that appear to be simply 'guessed' or are poorly executed – a description of their measurement is provided in the TRL Arcady Application Guide, AG49. (The Arcady measurements require careful geometric constructions using a protractor, compass, scaled curves, and scale rule on 1/500 and 1/1000 scale drawings);
- Measurements of l', the length over which the flare develops - often out by a factor of up to 2 times;
- Measurement of e, the normal width of the approach arm at the entry to the roundabout. This value is often over-estimated. Arcady capacity predictions are particularly sensitive to the input e values. Specifying values that are 'too large' produces over-optimistic Arcady results!
- No account made for 'approach lane starvation' and/or 'unequal lane usage' in each of the peak hour periods modelled. Failure to properly account for this produces over-optimistic Arcady results, (ref TEC, Arcady Health Warning, TEC, March 1997).

2.2 Transyt or Transyt/TranEd – evaluation of networks comprising linked traffic signal controlled junctions

Common TI submission errors are:

- Omission of the link/node diagram or stage diagrams;
- Incorrect representation of the network in the Transyt or TranEd link diagram;
- No provision of modeling assumptions – these often have to be requested;
- Submission of 'failed' Transyt models – ie Final Link prediction tables that exhibit excessive degrees of saturation and/or blocking-back (ie small crosses appearing in the mean max queue column);
- Incorrect modelling of give-way links and/or signal controlled opposed right-turners;
- Incorrect measurement of TRL RR67 Saturation Flow values;
- Failure to convert vehicle count data to pcus prior to specifying in Transyt or TranEd;
- Failure to ensure that source flow and leaving flow on a link add up to the total link flow;
- Incorrect modeling of flared approaches;
- Failure to properly model 2 to 1 exit merges (ie Funnels);
- Failure to recognise blocking back occurring, and to deal with it using the Transyt program's 'excess queue limit' facility;
- Failure to understand basic traffic signal control terminology and methodology, leading to:
  - Stage diagrams with 'impossible' traffic control sequences;
  - Use of 5 second intergreen values throughout;
  - Failure to specify any link minimum times;
  - Incorrect calculation of stage minimum times;
  - Failure to understand the difference between link delays and 'bonus greens' in TranEd;
  - Failure to properly understand the various uses of end lag in Transyt.

Training Note: *Transyt modellers require a proper understanding of traffic signal terminology and methodology, followed by specific training in use of the TRL Transyt software program. Transyt/TranEd modellers require the same training as for Transyt, followed by TranEd training.*

2.3 LinSig2 - Evaluation of stand-alone or small networks of signal controlled junctions

Common TI submission errors are:

- Derived Saturation Flow Values – these are often too generous because of a failure to measure the input geometric parameters correctly from drawings and/or understand when and where to designate nearside lanes;
- Use of 5 second intergreens throughout clearly indicating that the submitter does not actually know that these require careful measurement in accordance with DfT TAL1/06;
- Incorrect measurement of intergreen values;
- Lack of experience in choosing suitable stage sequences and orders;
- Lack of knowledge regarding the application of phase delays;
- Failure to specify correct phase or link minimum values;
- Incorrect allocation of lanes to links where link saturation flows are for more than one lane;
- Lack of signal control knowledge with respect to indicative arrows and filter arrows.

Training Note: *LlinSig2 modellers require a proper understanding of traffic signal terminology and methodology, followed by specific training in use of the JCT LinSig2 software program. Established LinSig1 users also require specific training when upgrading to LinSig2.*

2.4 Design of signal controlled roundabouts

In recent years, the need and/or desire to signal control many of the UK priority roundabouts has grown considerably. Unfortunately, many UK developer consultants mistakenly believe that learning how to use traffic modelling computer software, is sufficient training for the design of signalled

roundabouts. This could not be further from the truth.

To competently produce designs of signal controlled roundabouts that operate safely and satisfactorily, you need to acquire additional specialist skills to enable you to:

(a) Spiral-mark the roundabout from the outset – on spiral-marked roundabouts, traffic is essentially 'flight-path' led through the roundabout from entry to exit without having to 'weave' or otherwise change lane;
(b) Conduct pre-modelling lane-flow analyses to determine whether proposed design options will work – ie afford within capacity solution(s). The JCT Flowround and LinSig2 software can be used to conduct lane-flow analyses;
(c) Iterate further lane-flow analyses until a workable solution is found - ie adding or extending short lanes (flares) on the approaches, spreading or reducing concentrations of flow in circulating lanes, replicating the lane-flow pattern in road markings, and even evaluating potential connections through the central island ;
(d) Correctly apply Transyt or Transyt/TranEd to evaluating 'successful' signal controlled roundabout designs developed during processes (a) to (c) above or finalise the Linsig2 modelling of the whole process.

Common TI signaled roundabout submission errors are:

- Submitters are unaware of the need to spiralise the roundabouts for platooned traffic, and thus present proposals that would require 'impossible' or dangerous lane movements;
- Submitters are unaware that lane-flow analyses may be used to indicate whether their proposed design can possibly work before commencing Transyt /TranEd evaluation work;
- Submitters using Transyt to evaluate their design proposals do not understand the special way in which minor shared links and link weightings must be applied. As a result, and somewhat alarmingly, their Transyt runs can give results that are naively optimistic.
- Modelling links as flared on the circulating carriageway – almost always incorrect.
- Use of much too high or much too low saturation flow values for circulating lanes;
- Incorrect use of weightings on both entry and circulating links(Transyt);
- Aggressive and inappropriate use of the excess queue limits on circulating links (Transyt);
- Failure to understand and therefore check and/or adjust platoon progression through the roundabout to ensure that the junction will operate safely and satisfactorily.

Training Note: *TRL offer some guidance in their Transyt/12 Application Guide AG48. Specialist training providers BCC and JCT offer 1-day courses in the design of signalled roundabouts. You can view details at www.ahead4transport.co.uk.*

2.5 Auditor Conclusions

In the light of finding the type of errors described above, auditors might be forgiven for assuming, and therefore reporting that:

- The submitter cannot have received any formal training in the use of the applied software (ie Arcady, Picady, Transyt, LinSig etc) and/or the design of signalled roundabouts;
- The TI modeller exhibits little or no understanding of basic signal control terminology and methodology;
- The submitted TI work has not been checked, and/or supervised during its production by a more experienced modeller;
- In the case of TranEd submissions, the network appears to have been modelled by someone who has no prior experience of the Transyt software. (The need to be acquire Transyt training prior to using TranEd should be well understood from the information available);
- The work has not been subject to meaningful final inspection or quality assurance.

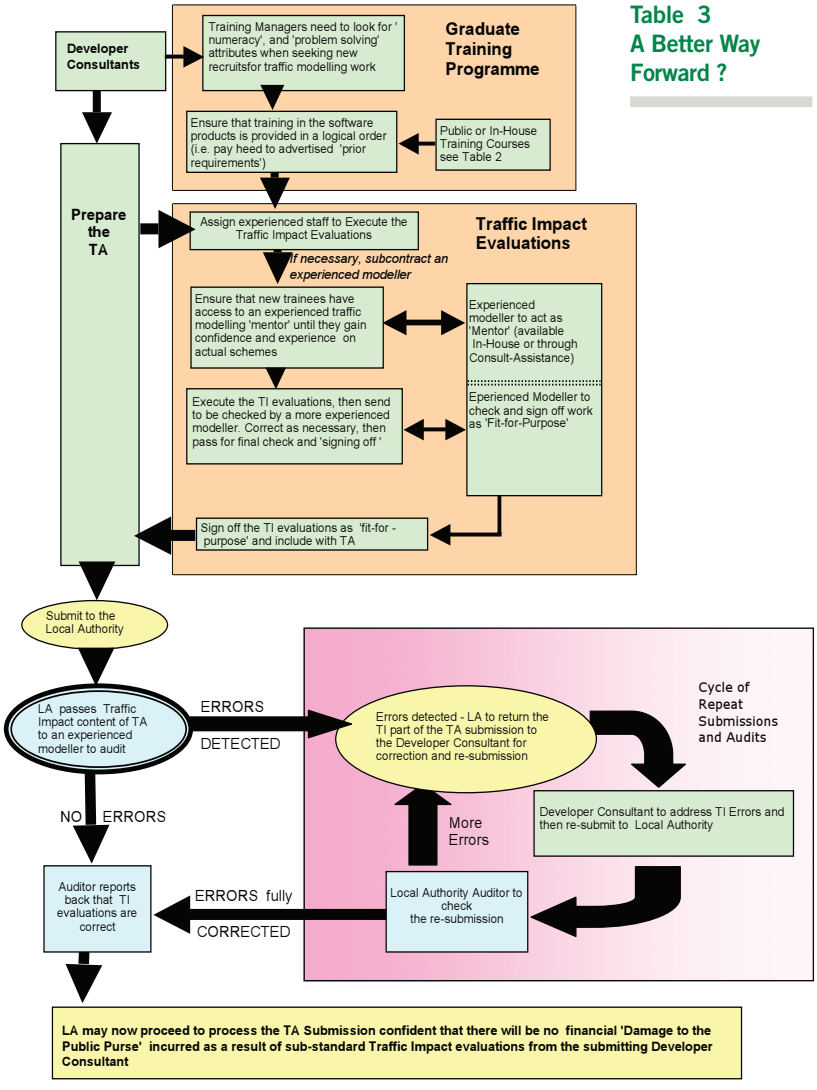
3.0 SLIPPING TI STANDARDS – POSSIBLE CAUSES

3.1 Developer Consultants

One or more of the following may be a contributing factor:-

(a) Failure to recognise the need to 'buy in' expertise for the service if insufficient expertise is available in-house.
(b) Investing 'minimum effort' in the traffic impact submission in the belief that the receiving authority will (as possibly before) redo the work at cost to the 'public purse', rather than the submitting consultant or their client.
(c) Failure to keep abreast of the ever-growing technical and numerate skills required to properly apply the new generation of traffic control software programs, and ensure adequate training for traffic modelling teams.
(d) Insufficient resource allocation to annual training budgets.
(e) Lack of knowledge amongst training officers regarding the logical order in which courses should be attended. Table 2 provides this information for persons seeking training in Arcady, Picady, Transyt, TranEd, LinSig2,

Table 3
A Better Way Forward ?



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and/or signalled roundabout design.

(f) Failure to supply experienced mentor support following training. Training officers need to appreciate that simply attending a single public or in-house training course does not of itself guarantee that a person is able to immediately evaluate the traffic impact of a new development proposal. Accordingly, every effort should be made to ensure that new trainees have access to mentor support in the form of a more experienced modeller for a short period following training. Given such support, new trainees will soon gain the necessary confidence and experience required in this exacting field of work.

(g) Recruitment policies and processes not facing the reality that detailed traffic modelling and design depend fundamentally on aptitudes in 'numeracy and problem solving.

(h) Failure to build up and reward technical traffic modelling expertise within the organisation.

3.2 Public Authorities

One or more of the following may be a contributing factor:

(i) Failure by development control team to recognise that they need a traffic modelling specialist to audit and report back to them on the 'accuracy' of the traffic impact content before they progress the TA.

(j) Failure to insist and/or check (during early scoping meetings) that developer consultants only use trained and experienced traffic engineering modellers to execute/supervise the traffic impact work.

(k) Failure to ensure that the cycle of audit/report/correct/resubmit/audit again, is not at the expense of the 'public purse'.

4.0 IS THERE A BETTER WAY FORWARD?

The author believes that a better way forward might be as follows (ref Table 3):

Consultants should ensure:

i) When building their traffic modelling teams, that they actively seek persons who are highly numerate and can demonstrate good problem solving skills.

ii) When organising training, that they pay more attention to advertised 'prior requirements', ie the logical order in which training courses need to be attended for the different software products (ref Table 2).

iii) Ensure that trainees newly returned from courses have access to an experienced 'mentor' for a short period of time.

iv) Ensure that all traffic impact calculations are checked by an experienced modeller before work is signed off as 'fit for purpose'.

v) Consider building up internal expertise in the traffic modelling field of work, by rewarding talented modellers in a way that makes it worth their while to stay 'hands-on' rather than feel obliged to 'seek managerial posts' to progress their careers.

and

Local Authorities should:

vi) Consider informing all submitting consultants at early scoping meetings, that they are expected to employ the services of an experienced traffic modeller for the TI work. Accordingly, consider requesting that the consultant complete an 'Experience Declaration Form'. Table 4 suggests a possible format for this form.

vii) Ensure that submission-receivers (ie Development Control and/or Transport Planning Departments), understand that they have a responsibility to send the traffic impact content to be checked by an experienced traffic modeller prior to their progressing the TA. If no such expertise exists in-house, then the Authority should make provision to employ and pay an external auditor to fulfil this role.

viii) Set up a mechanism, whereby, following the first cycle of 'submit and audit', any further auditing is paid for by the Consultant, and not the Authority.

The above is intended to 'pave the way' towards ensuring that it is the 'perpetrator', rather than the 'public purse' that pays for sub-standard traffic impact submissions!

Do you have a view?

ACKNOWLEDGEMENTS

The following persons are thanked for their most useful feedback during the preparation for, and drafting of this paper – Gafoor Din (Warrwickshire County Council), Mike Cruickshanks & Tony Sharp (South Gloucestershire Council), Ray Trethewey(Hannah Reid), Brian Simmonite, Douglas Reid (JCT) and Ian Turvey (Turvey Consultancy Limited). Most useful contributions were also received from delegates attending the JCT 12th Traffic Signals Symposium (September 2007, Nottingham University), during a most lively discussion period that followed a short presentation on this subject by the author.

REFERENCES

Arcady/6 User Guide; TRL Application Guide 49.
Arcady Health Warning : Account for Unequal Lane Usage or risk damaging the public purse! TEC, March, 1997.
Transyt 12 User Guide; TRL Application Guide 48.

Table 4: A suggested Sample 'Experience Declaration Form'

Software	Modeller or Checker Please specify which	Name (Qualifications)	What training have you received in using this software? (include any courses)	Date Courses Attended	Copy of Training Cert enclosed?	How many schemes have you used this software on since training?
Transyt/12	Modeller	Graham Smith	Intro Traff Signals In-House Training	Jan-06	yes	Worked on two small networks previously, and have mentor access to John Cooper.
	Checker/ Supervisor	John Cooper (BSc; MICE)	Intro Traffic Signals Transyt/12 workshop TranEd workshop Des Sig Rbts	Mar-04 Nov-05 Jan-06 Mar-07	yes yes yes yes	Worked on numerous town centre Transyt Network schemes over a period of 3 years.
Repeat for other software products and for Design of Signalled Roundabouts, if applicable						