APPENDIX 9

Transport Assessment

T.J. O'CONNOR & ASSOCIATES

CONSULTING ENGINEERS

Client: King Tree Services Ltd
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TRANSPORT ASSSESMENT FOR A PROPOSED GREEN WASTE COMPOSTING FACILITY AT COOLBEG, RATHNEW, COUNTY WICKLOW.

June 2004

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1 INTRODUCTION

T.J. O'Connor & Associates were retained by Kiaran O'Malley & Co, Chartered Town Planners, to prepare a transport assessment forming part of a planning application on behalf of King Tree Services Ltd. for a proposed Green Waste Composting Facility at Coolbeg, Rathnew, County Wicklow.

The report includes a brief description of the site and its environs, the characteristics of the project and an assessment of the likely transportation impacts of the green waste composting facility.

2 RECEIVING ENVIRONMENT

The site for the proposed composting facility is located west of the N11, Dublin to Wexford National Primary Route. The total site area is 2.1ha. (5.18acres) and is bounded to the north and south by agricultural lands, to the east by the worked out sand and gravel pit and to the west by agricultural lands for an approved residual waste landfill. At present the site can be accessed via a junction with the N11, which previously served the worked out sand/gravel extraction facility at this location. (See Fig 2.1).

To the southeast of the site the N11 meets the R751 regional road to Wicklow and the L1113 local road at a staggered junction. This junction is locally referred to as the Beehive Junction, due to the presence of The Beehive Bar & Restaurant on the southeast corner of the junction.

The Beehive junction is an at-grade left – right staggered junction. There is approx. 100m between the two minor arms of the junction, namely the R751 and the L1113. All turning movements are permitted at this junction. The junction provides dedicated right turn lanes on both the north and south arms of the junction to facilitate right turn movements from the N11 to both the R751 and the L1113. In addition there is the provision of acceleration lanes for merging traffic from the minor arms of the junction. It is considered that this junction is well defined by road markings and signage, and from observation operates efficiently.

The N11 is the national primary route from Dublin to Wexford. At present the route extends southwards from Dublin via Rathnew and onto Arklow. In recent years the N11 has been upgraded at a number of locations, including the Arklow Bypass, the Newtownmountkennedy Bypass and the Glen of the Downs Improvement Scheme. The section of the N11 from NewtownMountKennedy to Rathnew is currently being upgraded to dual carriageway standard.

Wicklow County Council are currently undertaking final public consultations in respect of the proposed upgrading to dual carriageway standard that section of the N11 from Rathnew to the Arklow Bypass, the proposed realignment of which runs adjacent to the eastern boundary of the proposed development site. The proposed alignment of this route in the environs of the proposed development site is shown on Fig 2.2. The current expectation for the year of opening of the proposed Road Improvement Scheme is Year

2008. Upon completion of the works, the road network in the environs of the proposed development site will have significantly changed. It can be seen from the proposals that the Beehive junction will be upgraded to a grade separated junction. This proposal will improve both the flow of traffic and safety at the junction by removing conflicts between turning traffic. For the purposes of this transport assessment, it is considered appropriate to base all calculations on the base year traffic and traffic forecasts used for the N11 Rathnew to Arklow Road Improvement Scheme (year 2000). An extract of the route options study which shows the existing and projected route flows is presented in Appendix A

To the west of the proposed development site, Greenstar Recycling Holdings obtained planning permission (Reg. Ref. No. 01/52859) in respect of a proposed commercial residual waste landfill site. Therefore for the purposes of this report and to give a robust analysis, it is assumed that the proposed adjacent landfill site will be operational. Data in respect of trip generation etc. for the proposed landfill has been extracted from the relevant documentation submitted as part of the planning application for same.

Manual Classified Traffic Counts were undertaken at the Beehive junction, by others, as part of the planning application for the adjacent landfill site. For the purposes of consistency and ease of comparison it is proposed to use the same data as that submitted in relation to the landfill site. The classified traffic counts were undertaken in November 2000, therefore it is necessary to calculate the required growth factor to update the counts to our base year 2005.

For the purposes of calculating growth factors and for ease of comparison with the proposed road improvement scheme, the Manual Classified Counts were converted from 12-hour counts to Annual Average Daily Traffic (AADT) figures using the An Foras Forbartha estimators. Following the calculation of the AADT figures based on the 12-hour counts it is possible to compare them to the AADT figures contained in the N11 Rathnew to Arklow Road Improvement Scheme. From this comparison a growth factor can be estimated and the Year 2000 counts can be brought to the Year 2003 base. The AADT's and associated growth factor are summarised in Table 2.1 below:

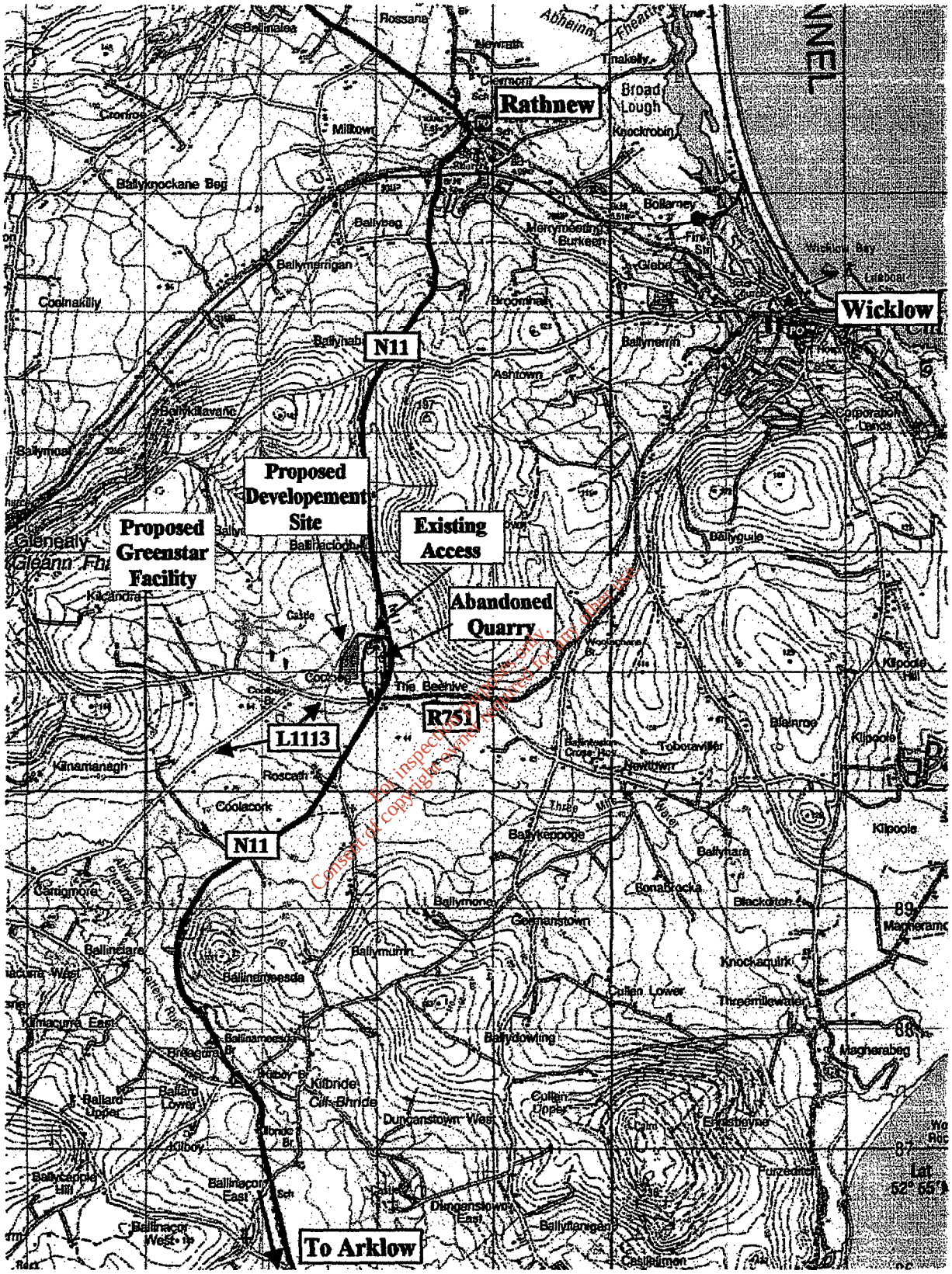
Table 2.1: Comparison of AADTs and estimation of growth factor

	N11 South	L1113	N11 North	R751
Year 2000 AADT	11766	1299	10113	3636
N11 RIS* AADT	13662	1510	11745	4224
Growth Factor	16.14	16.11	16.24	16.17

* - denotes Road Improvement Scheme

Using the N11 Road Improvement Scheme AADT figures, and the turning movements from the November 2000 counts, the year 2003 peak hour flows at the junction are calculated. As the anticipated year of opening for the Green Waste Composting Facility is year 2005, a growth rate of 3% per annum has been applied to the year 2003 flows to give the 2005 base year flows.

Figures B1&B2, Appendix B, presents the November 2005 am & pm base year peak hour turning movements at the Beehive junction which are based upon the N11 Road



Ordance Survey of Ireland Licence No: DI0044

Figure 2.1
Site Location

Tranport Assessment for a Proposed Green Waste Composting Facility at Coolbeg, Rathnew, Co. Wicklow

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CONSULTING ENGINEERS

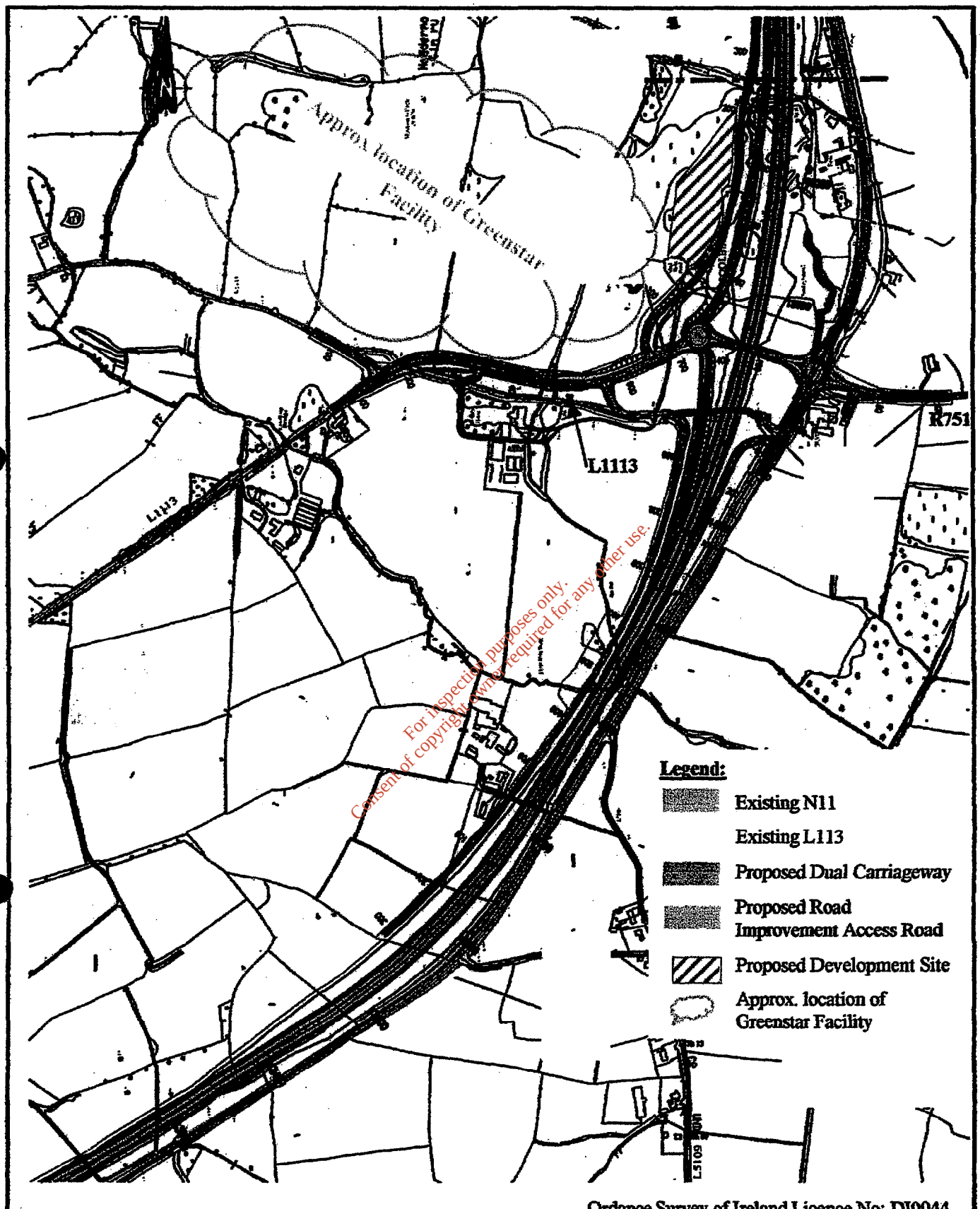

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Figure 2.2

Post RIS Road Layout

Tranport Assessment for a Proposed Green Waste Composting Facility at Coolbeg, Rathnew, Co. Wicklow

T.J. O'CONNOR & ASSOCIATES
CONSULTING ENGINEERS

Improvement Scheme figures **and** include trips associated with the proposed adjacent landfill facility.

However based on data obtained from the NRA permanent counters on the N11, it is clear that the volumes of traffic on the route increase during the summer months. Therefore, it is necessary to assign a factor to the November counts to allow for the increased flow during the summer months. Based on historic data from the NRA permanent counters N11-019 at Ashford and N11 – 017 at Jack White's Inn, it is seen that traffic volumes during August are almost double those recorded in November, a seasonal factor of 44% has therefore been applied. Applying this 44% increase to all traffic (i.e. including side road and HGV's) will make the analysis robust.

Figures B3&B4, Appendix B, presents the August 2005 am & pm base year peak hour turning movements at the Beehive junction.

3 CHARACTERISTICS OF THE PROPOSAL

The proposed development consists of a green waste composting facility on a 2.1ha. (5.18acre) site. The proposed operation broadly comprises the acceptance of green waste i.e. trees / tree cuttings, grass cuttings, which are then screened and treated prior to composting. The process, from acceptance of green waste until production of compost, takes some 12- 15 weeks. For a more detailed description of the operation proposed at the site refer to documentation prepared by Kiaran O'Malley & Co, OCM Consultants and DHV Environment & Infrastructure, also submitted as part of the planning application.

In respect of access to the proposed development site there are three main scenarios which require consideration namely, (i)Construction Phase, (ii)Pre-road Improvement Scheme and (iii)Post Road Improvement Scheme.

Construction Access:

For construction phase, it is proposed to access the site via the existing access to the N11, which was used by the old sand/gravel extraction operation at the site. The construction works will consist mainly of excavation and filling within the site proper and will generate very little external traffic. Subsequently it is proposed to surface the site with an asphalt type surfacing followed by ancillary works i.e. boundary fencing, construction of storage shed etc. (see planning application drawings). The construction works are anticipated to take some 20-24 weeks and in general the volumes of construction traffic will be low. (There may be a concentration of HGV construction traffic during the laying of the asphalt pavement on the site).

Pre-Road Improvement Scheme Access:

For the operation of the facility prior to the completion of the N11 Road Improvement Scheme, it is proposed to access the site via an entrance off the L1113, as shown in T.J. O'Connor & Associates Drg No. P1. The proposed entrance is located some 150metres

west from the junction of the N11 / L1113. A temporary access road will be constructed northwards from the L1113 to the entrance to the facility.

Post – Road Improvement Scheme Access:

From Fig 2.2 it can be seen that as part of the upgrading of the Beehive junction to a grade separated interchange, it is proposed to realign the L1113. In addition to the proposed realignment, a local access road will be constructed. This road will replace the temporary access road referred to in the pre-road improvement scenario.

In respect of trip generation at the facility, it is necessary to consider the operation of the facility itself. In the first instance, an application will be made for a waste permit from Wicklow County Council. Should a waste permit be granted, a maximum of only 1,000m^3 of material can be present at the facility at any one time. However, the facility will be required to obtain a licence from the Environmental Protection Agency (EPA) to enable in excess of 1,000m^3 of material to be present subsequently on the site at any one time. The proposed EPA licence application would limit the acceptance to 40,000 tonnes of material per annum. For the purposes of the transportation assessment, only the operation of the facility under an EPA licence will be considered, again giving a robust analysis of the likely traffic impact.

From data obtained from King Tree Services, it is understood that the volume of compost produced is some 60% of the raw material accepted. Therefore on the basis of the EPA Licence, 40,000 tonnes/annum of raw material will be accepted at the site and some 24,000 tonnes/annum of compost will be produced. The "loss" of material is accounted for by the process as described in the O'Callaghan Moran process description document accompanying the planning application.

From the data above, estimations of the likely trip generation characteristics of a such a facility can be made. The trip generation estimations are made using data from a similar facility in Den Ouden, Holland, which was inspected. The data from the Den Ouden facility was obtained by DHV Environment & Infrastructure. In calculating the trip generation for the facility, it is important to take cognisance of the following:

- The proposed facility will operate Monday to Friday from 06:00 to 20:00 and Saturdays from 06:00 to 18:00.
- The facility will not open on Sundays. This equates to circa. 310 working days per annum.
- The volume of material accepted by the plant will vary seasonally. This is due to higher volumes of grass cutting etc in the summer months
- There are two distinct main trip generators on the site namely:
  - (i) the import of raw materials
  - (ii) the export of final product (compost)
- The demand for compost is seasonal, therefore trip generation in respect of export of compost only occurs for a six month period i.e. 155 working days.
- Based on data obtained from the Den Ouden facility, it is clear that when considering trip generation there are three distinct periods over which the generation varies:
  - (i) Winter months – Import of raw material only

(ii) Summer months (average volumes) – Import of raw material and export of compost

(iii) Summer months (busy periods / high volumes) – import of raw material (140% of average) and export of compost (300% of average) – see table 3.1 below

- The facility will be open to the general public, therefore green waste is likely to be transported to the site by various categories of vehicles i.e. car, light van, HGV

The following assumptions have been made in respect of trip generation at the proposed facility:

- It is assumed that all private companies will use 20-tonne trucks for transportation of material.
- Average load for import of raw material is 7.5 tonnes.
- 10% of all material imported and exported will be attributable to the general public.
- Average load of import and export by the general public is taken at 0.5 tonnes

Based on the data obtained from the Den Ouden facility and the assumptions outlined above, the trip generation at the facility can be calculated as shown in Table 3.1 below.

Table 3.1: Trip generation at proposed green waste composting facility

	Private Companies			General Public		
	Tons/yr	Tons/day	No of trucks	Tons/yr	Tons / day	No of cars
Import						
Average Day	36,000	36,000/310 = 116.1	116.1/7.5 = 16	4,000	4,000/310 = 12.9	12.9/0.5 = 26
Busy Day	-	225*	225/7.5 = 30	-	25*	25/0.5 = 50
Export						
Average Day	21,600	21,600 / 155 =139.4	139.4/20 = 7	2,400	2,400/155 = 15.5	15.5/0.5 = 31
Busy Day	-	450*	450/20 = 23	-	50*	50/0.5 = 100

* This denotes an assumed value for a busy day based upon the ratio obtained from the Den Ouden Facility, Holland

Based on the above information the trip generation associated with each of the seasonal periods is presented in Table 3.2 below:

Table 3.2: Trip generation associated with seasonal variations in demand

	Winter		Summer (Average Day)		Summer (Busy Day)	
	Cars / Vans	HGVs	Cars / Vans	HGVs	Cars / Vans	HGVs
Import	26	16	26	16	50	30
Export	-	-	31	7	100	23
Total no of vehicles/day	26	16	57	23	150	53
Total no of movements/day	52	32	114	46	300	106

Figures B5 & B6 Appendix B, show the August 2005 am & pm peak hour turning movements at the Beehive Junction for all traffic including the proposed development.

4 PREDICTED IMPACT OF THE PROPOSAL

In assessing the potential impacts of the proposed green waste composting facility on the local road network, it is considered that there are three distinct scenarios, which will occur, namely the Construction Period, Pre-road Improvement Scheme period and Post Road Improvement Scheme period.

As stated previously it is proposed that the construction access would be via the existing access off the N11, which was used previously by the sand/gravel extraction operation on site. This access is located close to the 40mph zone, which currently operates between the Beehive junction and the end of the Newtownmountkennedy Bypass. Construction works at the site are anticipated to be carried out over a 20-24 week period and trip generation due to the construction works will be relatively low. It is considered that the impact in relation to construction traffic will be insignificant.

It is anticipated that the year of opening for the proposed facility is 2005, however at this time the facility will be operating under a waste permit and therefore trip generation at the site will be low. The facility will begin to operate at full capacity upon the grant of an EPA licence. For the purposes of this report it is assumed that the facility will be fully operational by 2005/2006. From the NRA permanent counter data and the trip generation figures for the facility, it is apparent that August represents the peak period for both traffic volumes on the N11 and trip generation due to the proposed facility. As August represents the worst-case scenario it has been used for the purposes of modelling of the Beehive Junction. Modelling of the Beehive junction has been undertaken using the PICADY software (Priority Intersection Capacity and Delay – produced by TRL) for the August 2005 Do-Nothing Scenario and Do-Something Scenario AM and PM peak hours. The traffic flows at this junction for the Do-Something scenario are shown in Figures B5&B6. The Do-Nothing scenario includes the trip generation associated with the adjacent landfill site, with the Do-Something scenario also including the trip generation due to the proposed composting facility. The results of the PICADY analysis are presented in Table 4.1 below with the full outputs presented in Appendix C.

Table 4.1: Summary of PICADY analysis at the Beehive Junction

Scenario	Max RFC	Max Queue (vehs)	Max Delay (min/veh)
AM Peak			
2005 Do-Nothing:			
From L1113	0.260	0.3	0.15
Right turn to R751 from N11 Sth /L1113	0.559	1.2	0.20
From R751	0.510	1.0	0.20
Right turn to L1113 from N11 Nth /R751	0.333	0.5	0.17
2005 Do-Something:			
From L1113	0.335	0.5	0.18
Right turn to R751 from N11 Sth /L1113	0.573	1.3	0.21
From R751	0.525	1.1	0.21
Right turn to L1113 from N11 Nth /R751	0.375	0.6	0.18

Contd.

Scenario	Max RFC	Max Queue (vehs)	Max Delay (min/veh)
PM Peak			
2005 Do-Nothing			
From L1113	0.240	0.3	0.14
Right turn to R751 from N11 Sth / L1113	0.514	1.0	0.22
From R751	0.746	2.8	0.32
Right turn to L1113 from N11 Nth / R751	0.222	0.3	0.13
2005 Do-Something			
From L1113	0.310	0.4	0.16
Right turn to R751 from N11 Sth / L1113	0.528	1.1	0.23
From R751	0.765	3.0	0.33
Right turn to L1113 from N11 Nth / R751	0.256	0.3	0.13

In general, a priority junction is said to be saturated when the RFC (Ratio Flow to Capacity) reaches 0.85. From the above it can be seen that the junction operates within this limit and that the impact of the additional trips due to the proposed facility is minimal with only minor increases in RFC due to the additional movements.

Following the completion of the N11 Rathnew to Arklow Road Improvement Scheme it is considered that the increase in capacity of the N11, i.e. from single lane to dual carriageway, and the provision of a grade separated interchange at the Beehive junction, will be capable of coping with the traffic associated with the proposed development. It is not considered necessary to undertake any capacity assessment of the improved junction. In addition, the provision of the grade-separated junction will significantly improve safety at the junction by removing conflicting turning movements.

5 MONITORING

It is proposed that monitoring of the immediate road network will be undertaken to ensure that the routes to / from the site remain free of any materials associated with the development. Cleaning of the routes will be undertaken if necessary.

APPENDIX A: EXTRACT FROM N11 RATHNEW TO ARKLOW ROUTE SELECTION STUDY

Wicklow County Council
County Buildings
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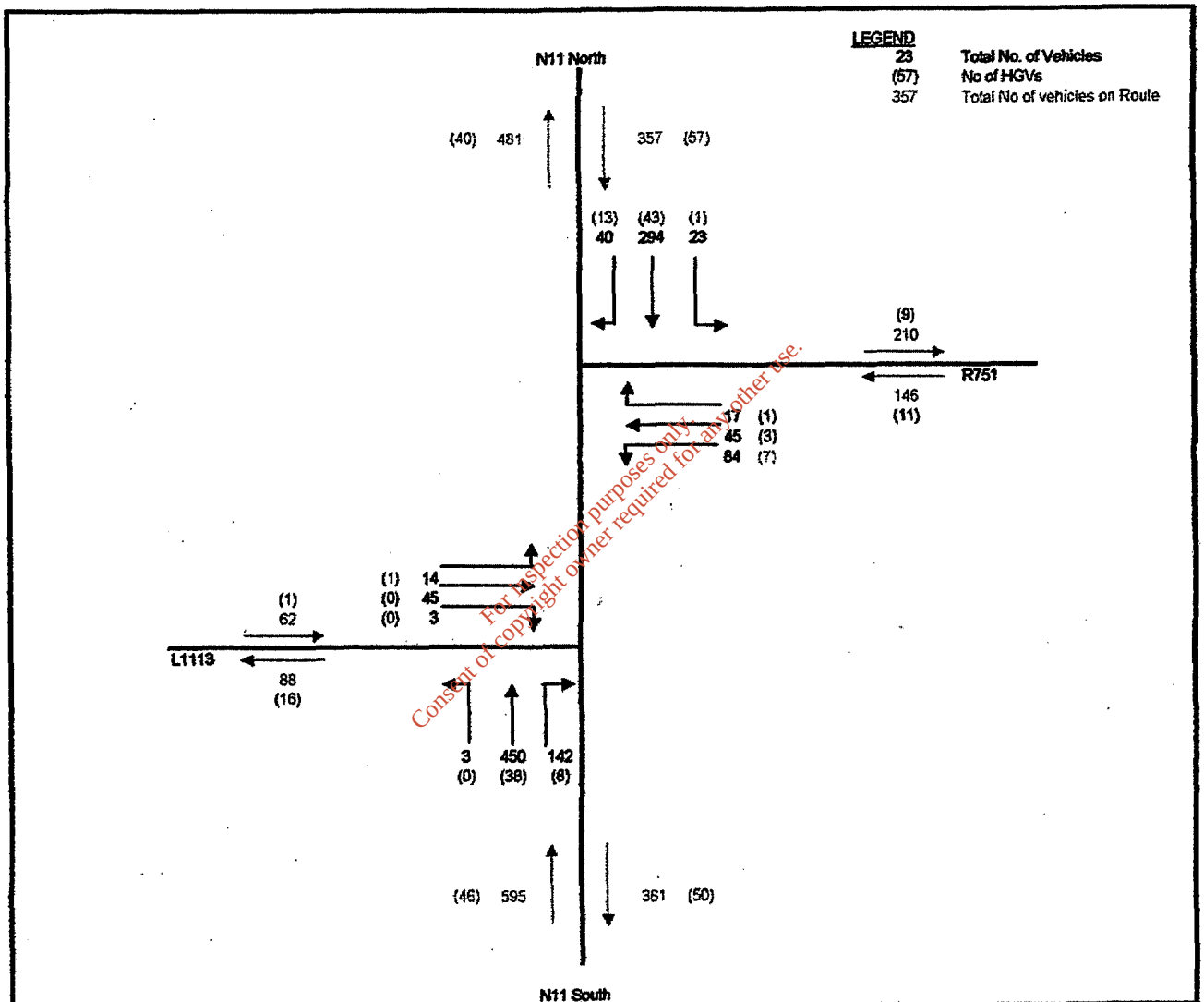
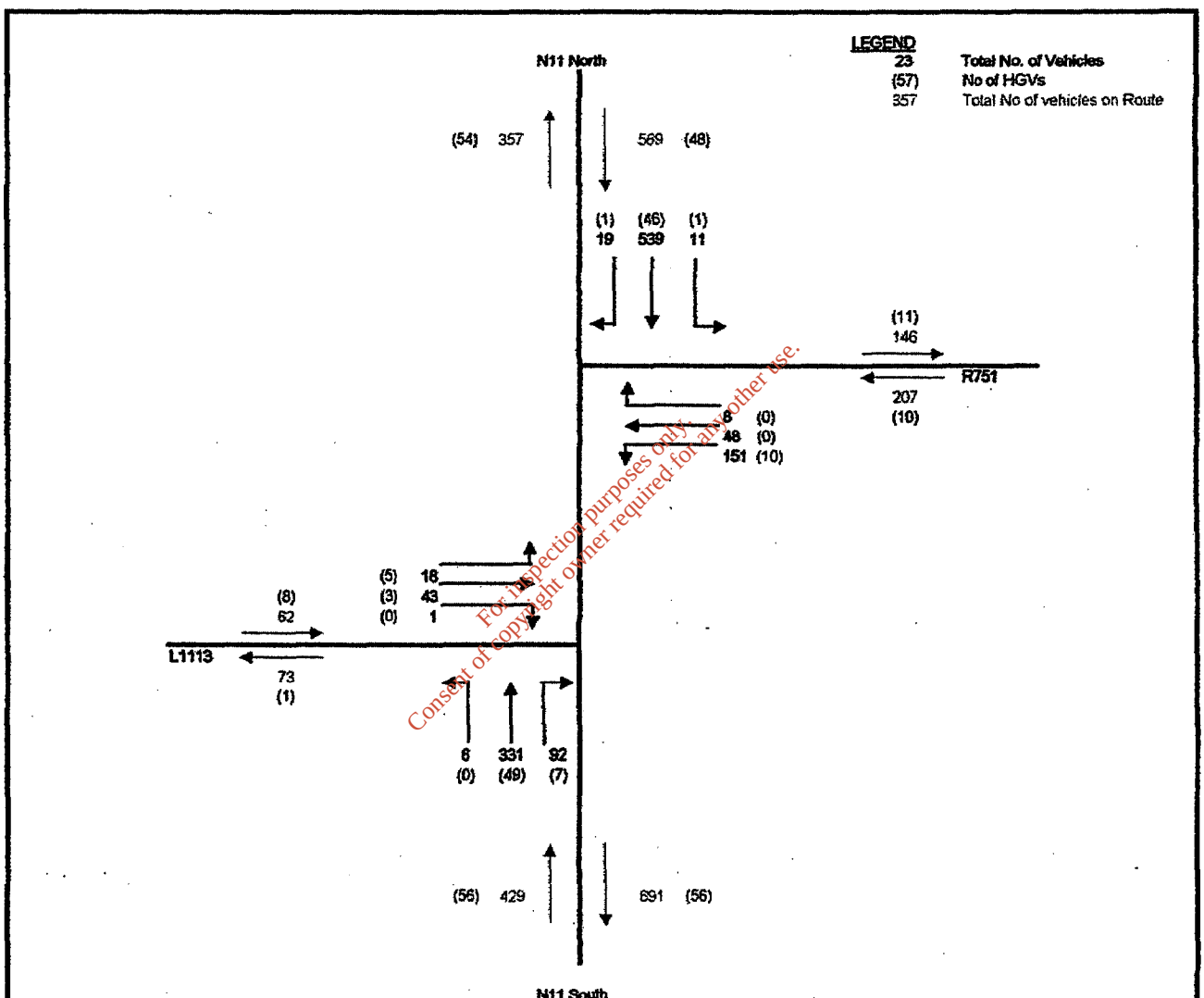
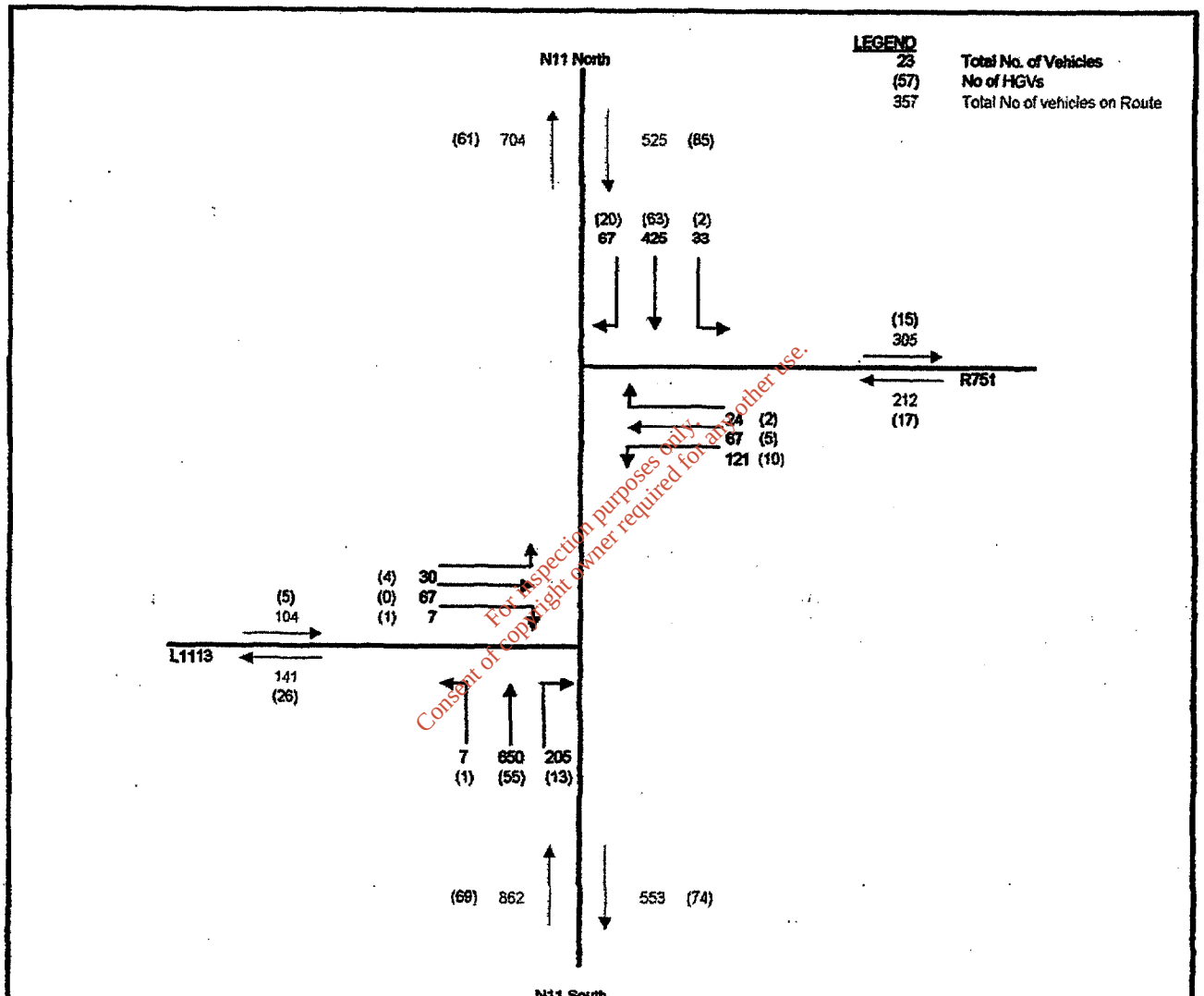
APPENDIX B: PEAK PERIOD TRAFFIC MOVEMENTS AT THE BEEHIVE JUNCTION



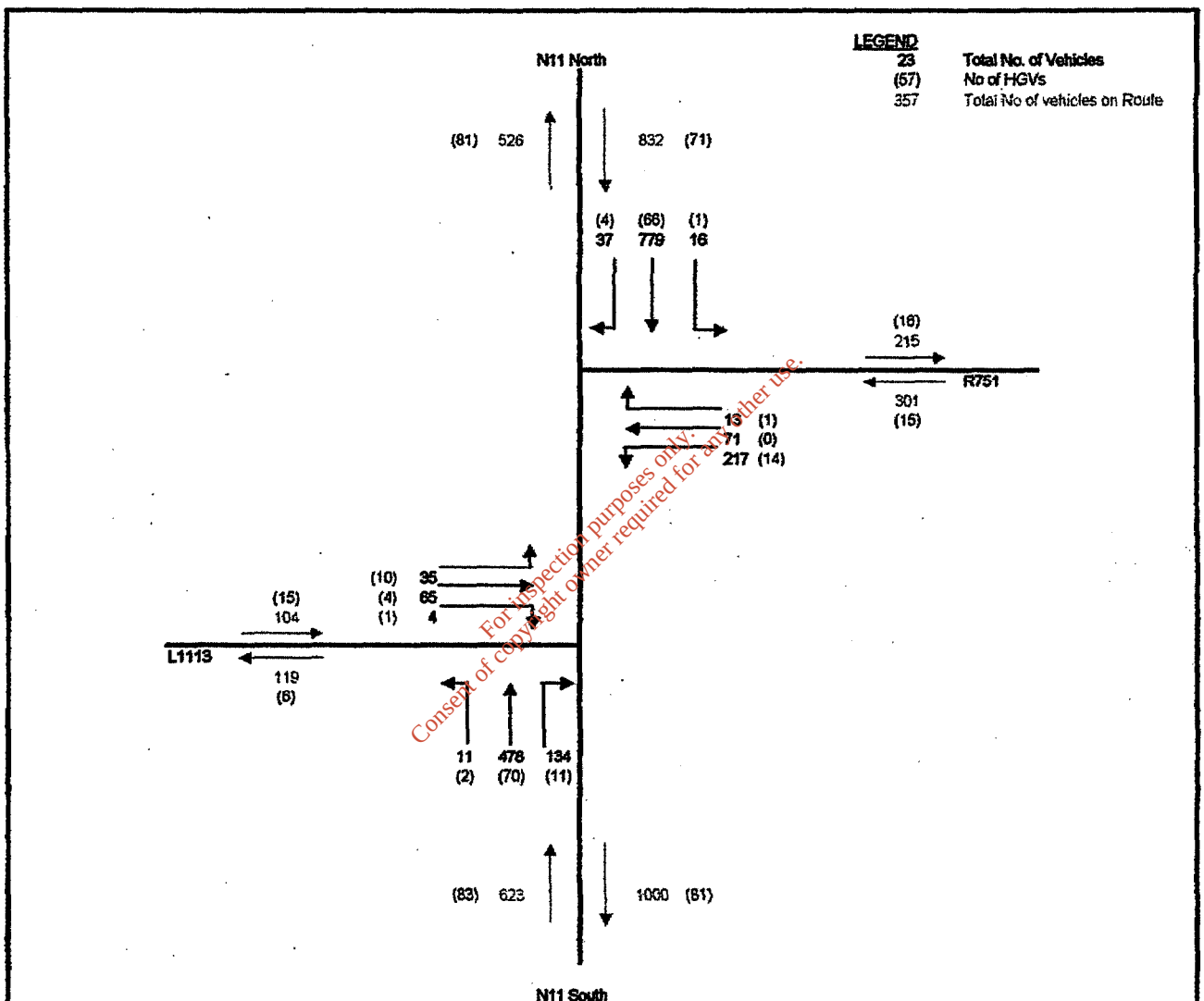
Appendix B Figure B1	Traffic Flows at Beehive Junction - November 2005 AM Peak Transport Assessment for a Proposed Greenwaste Composting Facility at Coolbeg, Co. Wicklow	



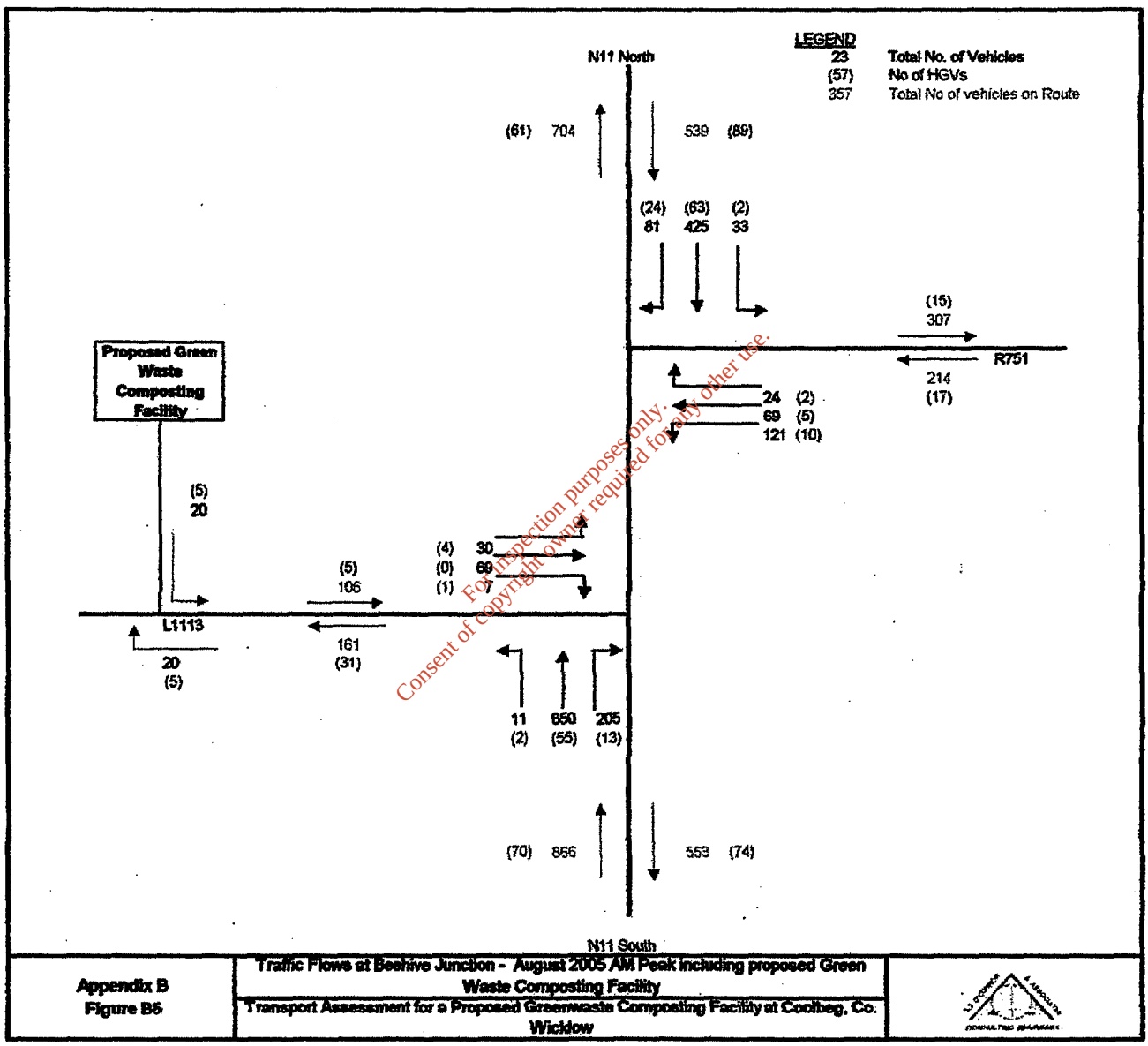
Appendix B Figure B2	Traffic Flows at Beehive Junction - November 2005 PM Peak Transport Assessment for a Proposed Greenwaste Composting Facility at Coolbeg, Co. Wicklow	



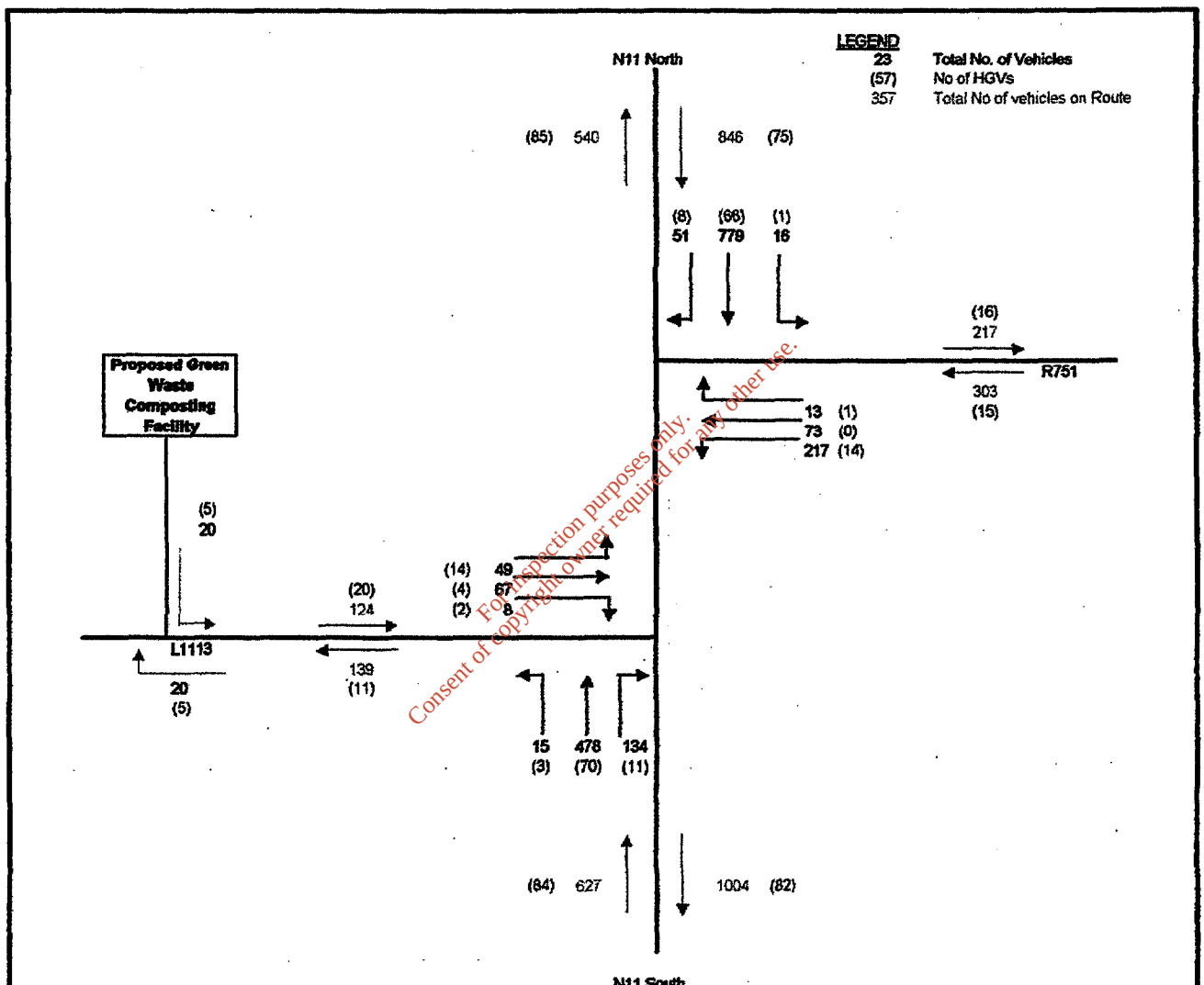
Appendix B Figure B3	Traffic Flows at Beehive Junction - August 2005 AM Peak Transport Assessment for a Proposed Greenwaste Composting Facility at Coolbeg, Co. Wicklow	



Appendix B Figure B4	Traffic Flows at Beehive Junction - August 2005 PM Peak Transport Assessment for a Proposed Greenwaste Composting Facility at Coolbeg, Co. Wicklow	



Appendix B Figure B6	Traffic Flows at Beehive Junction - August 2005 AM Peak including proposed Green Waste Composting Facility Transport Assessment for a Proposed Greenwaste Composting Facility at Coolbeg, Co. Wicklow	



Appendix B Figure B6	Traffic Flows at Beehive Junction - August 2005 PM Peak including proposed Green Waste Composting Facility Transport Assessment for a Proposed Greenwaste Composting Facility at Coolbeg, Co. Wicklow	

APPENDIX C: PICADY Outputs for the Beehive Junction

TRL LIMITED

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 4.1 ANALYSIS PROGRAM
RELEASE 3.0 (MAR 2001)

ADAPTED FROM PICADY/3 WHICH IS CROWN COPYRIGHT
BY PERMISSION OF THE CONTROLLER OF HMSO

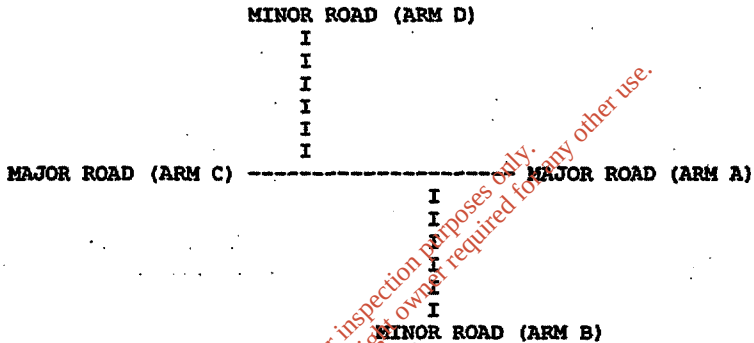
THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:-
"D:\1360 Proposed Geenwaste Composting Ctr\PICADY\INPUT\2005 AM Base.VPI"
at 18:10:34 on Monday, 7 June 2004

RUN TITLE
****
August Year 2005 including Landfill - AM Peak

..MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA



ARM A IS N11 South
ARM B IS L113
ARM C IS N11 North
ARM D IS R751

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

GEOMETRIC DATA

DATA ITEM		MINOR ROAD B		MINOR ROAD D	
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	7.30 M.	(W)	7.30 M.	
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.	(WCR)	0.00 M.	
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.10 M.	(WA-D)	3.10 M.	
- VISIBILITY	(VC-B)	250.0 M.	(VA-D)	200.0 M.	
- BLOCKS TRAFFIC		NO		NO	
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	150.0 M.	(VD-A)	200.0 M.	
- VISIBILITY TO RIGHT	(VB-A)	250.0 M.	(VD-C)	200.0 M.	
- LANE 1 WIDTH	(WB-C)	3.50 M.	(WD-A)	3.50 M.	
- LANE 2 WIDTH	(WB-A)	0.00 M.	(WD-C)	0.00 M.	

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	NUMBER OF MINUTES FROM START WHEN TOP OF PEAK IS REACHED	NUMBER OF MINUTES FROM START WHEN FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	RATE OF FLOW (VEH/MIN) AT TOP OF PEAK	RATE OF FLOW (VEH/MIN) AFTER PEAK
ARM A	15.00	45.00	75.00	10.77	16.16	10.77
ARM B	15.00	45.00	75.00	1.30	1.95	1.30
ARM C	15.00	45.00	75.00	6.56	9.84	6.56
ARM D	15.00	45.00	75.00	2.65	3.98	2.65

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C	ARM D
07.45 - 09.15	ARM A	0.000	0.008	0.754	0.238
		0.0	7.0	650.0	205.0
		(0.0)	(8.0)	(8.0)	(8.0)
	ARM B	0.067	0.000	0.288	0.644
		7.0	0.0	30.0	67.0
		(4.8)	(0.0)	(4.8)	(4.8)
	ARM C	0.810	0.128	0.000	0.063
		425.0	67.0	0.0	33.0
		(16.2)	(16.2)	(0.0)	(16.2)
	ARM D	0.571	0.316	0.113	0.000
		121.0	67.0	24.0	0.0
		(8.0)	(8.0)	(8.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
07.45-08.00								
B-ACD	1.30	9.25	0.141		0.0	0.2	2.3	
A-B	0.09							
A-C	8.13							
A-D	2.56							
AB-C	(8.50)							
AB-D	(3.39)	9.80	0.346		0.0	0.5	7.4	
D-ABC	2.65	9.30	0.285		0.0	0.4	5.6	
C-D	0.41							
C-A	5.31							
C-B	0.84							
CD-A	(6.81)							
CD-B	(1.67)	8.74	0.191		0.0	0.2	3.4	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
B-ACD	1.55	8.49	0.183		0.2	0.2	3.2	
A-B	0.10							
A-C	9.70							
A-D	3.06							
AB-C	(10.15)							
AB-D	(4.06)	9.42	0.431		0.5	0.7	10.7	
D-ABC	3.16	8.66	0.365		0.4	0.6	8.2	
C-D	0.49							
C-A	6.34							
C-B	1.00							
CD-A	(8.14)							
CD-B	(2.00)	8.16	0.245		0.2	0.3	4.7	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-ACD	1.90	7.32	0.260		0.2	0.3	5.0	
A-B	0.13							
A-C	11.88							
A-D	3.75							
AB-C	(12.43)							
AB-D	(4.97)	8.89	0.558		0.7	1.2	17.2	
D-ABC	3.88	7.62	0.509		0.6	1.0	14.1	
C-D	0.60							
C-A	7.77							
C-B	1.22							
CD-A	(9.96)							
CD-B	(2.44)	7.35	0.332		0.3	0.5	7.0	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45								
B-ACD	1.90	7.31	0.260		0.3	0.3	5.2	
A-B	0.13							
A-C	11.88							
A-D	3.75							
AB-C	(12.43)							
AB-D	(4.97)	8.89	0.559		1.2	1.2	18.5	
D-ABC	3.88	7.60	0.510		1.0	1.0	15.2	
C-D	0.60							
C-A	7.77							
C-B	1.22							
CD-A	(9.98)							
CD-B	(2.45)	7.36	0.333		0.5	0.5	7.4	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.45-09.00								
B-ACD	1.55	8.48	0.183		0.3	0.2	3.5	
A-B	0.10							
A-C	9.70							
A-D	3.06							
AB-C	(10.15)							
AB-D	(4.07)	9.42	0.431		1.2	0.8	12.2	
D-ABC	3.16	8.65	0.366		1.0	0.6	9.2	
C-D	0.49							
C-A	6.34							
C-B	1.00							
CD-A	(8.17)							
CD-B	(2.01)	8.16	0.246		0.5	0.3	5.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.00-09.15								
B-ACD	1.30	9.25	0.141		0.2	0.2	2.5	
A-B	0.09							
A-C	8.13							
A-D	2.56							
AB-C	(8.50)							
AB-D	(3.40)	9.80	0.347		0.8	0.5	8.4	
D-ABC	2.65	9.29	0.285		0.6	0.4	6.3	
C-D	0.41							
C-A	5.31							
C-B	0.84							
CD-A	(6.83)							
CD-B	(1.68)	8.74	0.192		0.3	0.2	3.7	

WARNING THE JUNCTION MODELLED CAN CARRY HIGH-SPEED MAJOR ROAD TRAFFIC. (AG23 REF. 8.4.2(v)).

QUEUE FOR STREAM B-ACD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.2	
08.15	0.2	
08.30	0.3	
08.45	0.3	
09.00	0.2	
09.15	0.2	

QUEUE FOR STREAM AB-D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.5	*
08.15	0.7	*
08.30	1.2	*
08.45	1.2	*
09.00	0.8	*
09.15	0.5	*

QUEUE FOR STREAM D-ABC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.4	
08.15	0.6	*
08.30	1.0	*
08.45	1.0	*
09.00	0.6	*
09.15	0.4	

QUEUE FOR STREAM CD-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.2
08.15	0.3
08.30	0.5
08.45	0.5
09.00	0.3
09.15	0.2

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-ACD	142.6	95.1	21.8	0.15	21.8	0.15
A-B	9.6	6.4				
A-C	891.3	594.2				
A-D	281.1	187.4				
AB-C	(932.4)	(621.6)				
AB-D	(372.9)	(248.6)	74.4	0.20	74.5	0.20
D-ABC	290.7	193.8	58.6	0.20	58.6	0.20
C-D	45.2	30.2				
C-A	582.8	388.5				
C-B	91.9	61.2				
CD-A	(748.5)	(499.0)				
CD-B	(183.6)	(122.4)	31.3	0.17	31.3	0.17
ALL	2335.2	1556.8	186.1	0.08	186.2	0.08

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PER
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERI

END OF JOB .

****** PICADY 4 run completed.

end of file

[Printed at 06:10:47 PM on 6/7/04]

TRL LIMITED

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 4.1 ANALYSIS PROGRAM
RELEASE 3.0 (MAR 2001)

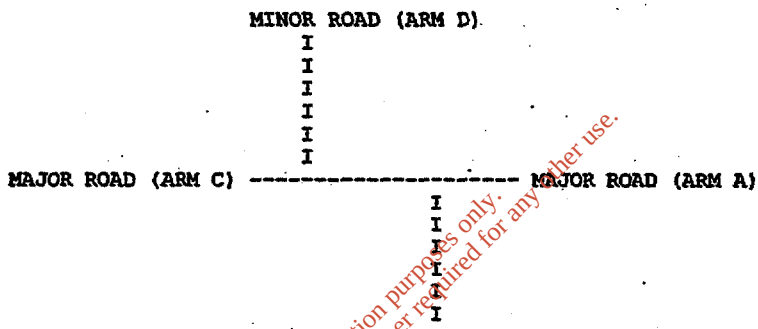
THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:-
"D:\1360 Proposed Geenwaste Composting Ctr\PICADY\INPUT\2005 PM Base.VPI"
at 18:10:57 on Monday, 7 June 2004

RUN TITLE
****
August Year 2005 including Landfill - PM Peak

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA



ARM A IS N11 South
ARM B IS L113
ARM C IS N11 North
ARM D IS R751

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

GEOMETRIC DATA

DATA ITEM		MINOR ROAD B		MINOR ROAD D	
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	7.30 M.	(W)	7.30 M.	
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.	(WCR)	0.00 M.	
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.10 M.	(WA-D)	3.10 M.	
- VISIBILITY	(VC-B)	250.0 M.	(VA-D)	200.0 M.	
- BLOCKS TRAFFIC		NO		NO	
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	150.0 M.	(VD-A)	200.0 M.	
- VISIBILITY TO RIGHT	(VB-A)	250.0 M.	(VD-C)	200.0 M.	
- LANE 1 WIDTH	(WB-C)	3.50 M.	(WD-A)	3.50 M.	
- LANE 2 WIDTH	(WB-A)	0.00 M.	(WD-C)	0.00 M.	

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	7.79	11.68	7.79
ARM B	15.00	45.00	75.00	1.30	1.95	1.30
ARM C	15.00	45.00	75.00	10.40	15.60	10.40
ARM D	15.00	45.00	75.00	3.76	5.64	3.76

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
07.45 - 09.15					
	ARM A	0.000	0.018	0.767	0.215
		0.0	11.0	478.0	134.0
		(0.0)	(13.3)	(13.3)	(13.3)
	ARM B	0.038	0.000	0.337	0.625
		4.0	0.0	35.0	65.0
		(14.4)	(0.0)	(14.4)	(14.4)
	ARM C	0.936	0.044	0.000	0.019
		779.0	37.0	0.0	16.0
		(8.5)	(8.5)	(0.0)	(8.5)
	ARM D	0.721	0.236	0.043	0.000
		217.0	71.0	13.0	0.0
		(5.0)	(5.0)	(5.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
07.45-08.00								
B-ACD	1.30	9.33	0.139		0.0	0.2	2.3	
A-B	0.14							
A-C	5.97							
A-D	1.67							
AB-C	(6.41)							
AB-D	(2.48)	8.35	0.297		0.0	0.4	5.9	
D-ABC	3.76	9.13	0.412		0.0	0.7	9.7	
C-D	0.20							
C-A	9.74							
C-B	0.46							
CD-A	(12.42)							
CD-B	(1.34)	9.99	0.134		0.0	0.2	2.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
B-ACD	1.55	8.78	0.177		0.2	0.2	3.1	
A-B	0.16							
A-C	7.13							
A-D	2.00							
AB-C	(7.66)							
AB-D	(2.97)	7.82	0.379		0.4	0.6	8.6	
D-ABC	4.49	8.44	0.533		0.7	1.1	15.6	
C-D	0.24							
C-A	11.63							
C-B	0.55							
CD-A	(14.85)							
CD-B	(1.61)	9.52	0.169		0.2	0.2	2.9	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-ACD	1.90	7.93	0.240		0.2	0.3	4.5	
A-B	0.20							
A-C	8.74							
A-D	2.45							
AB-C	(9.38)							
AB-D	(3.63)	7.08	0.513		0.6	1.0	14.3	
D-ABC	5.50	7.38	0.746		1.1	2.6	34.1	
C-D	0.29							
C-A	14.24							
C-B	0.68							
CD-A	(18.14)							
CD-B	(1.95)	8.88	0.220		0.2	0.3	4.1	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45								
B-ACD	1.90	7.92	0.240		0.3	0.3	4.7	
A-B	0.20							
A-C	8.74							
A-D	2.45							
AB-C	(9.38)							
AB-D	(3.64)	7.08	0.514		1.0	1.0	15.4	
D-ABC	5.50	7.37	0.746		2.6	2.8	40.5	
C-D	0.29							
C-A	14.24							
C-B	0.68							
CD-A	(18.20)							
CD-B	(1.97)	8.88	0.222		0.3	0.3	4.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.45-09.00								
B-ACD	1.55	8.78	0.177		0.3	0.2	3.4	
A-B	0.16							
A-C	7.13							
A-D	2.00							
AB-C	(7.66)							
AB-D	(2.97)	7.82	0.380		1.0	0.6	9.9	
D-ABC	4.49	8.43	0.533		2.8	1.2	19.4	
C-D	0.24							
C-A	11.63							
C-B	0.55							
CD-A	(14.94)							
CD-B	(1.64)	9.53	0.172		0.3	0.2	3.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.00-09.15								
B-ACD	1.30	9.33	0.139		0.2	0.2	2.5	
A-B	0.14							
A-C	5.97							
A-D	1.67							
AB-C	(6.41)							
AB-D	(2.49)	8.35	0.298		0.6	0.4	6.7	
D-ABC	3.76	9.12	0.412		1.2	0.7	11.3	
C-D	0.20							
C-A	9.74							
C-B	0.46							
CD-A	(12.47)							
CD-B	(1.36)	9.99	0.136		0.2	0.2	2.4	

WARNING THE JUNCTION MODELLED CAN CARRY HIGH-SPEED MAJOR ROAD TRAFFIC. (AG23 REF. 8.4.2(v)).

QUEUE FOR STREAM B-ACD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.2	
08.15	0.2	
08.30	0.3	
08.45	0.3	
09.00	0.2	
09.15	0.2	

QUEUE FOR STREAM AB-D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.4	
08.15	0.6	*
08.30	1.0	*
08.45	1.0	*
09.00	0.6	*
09.15	0.4	

QUEUE FOR STREAM D-ABC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.7	*
08.15	1.1	*
08.30	2.6	***
08.45	2.8	***
09.00	1.2	*
09.15	0.7	*

QUEUE FOR STREAM CD-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.2
08.15	0.2
08.30	0.3
08.45	0.3
09.00	0.2
09.15	0.2

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-ACD	142.6	95.1	20.5	0.14	20.5	0.14
A-B	15.1	10.1				
A-C	655.4	437.0				
A-D	183.7	122.5				
AB-C	(703.4)	(468.9)				
AB-D	(272.8)	(181.8)	60.8	0.22	60.9	0.22
D-ABC	412.7	275.2	130.6	0.32	130.6	0.32
C-D	21.9	14.6				
C-A	1068.2	712.1				
C-B	50.7	33.8				
CD-A	(1365.2)	(910.1)				
CD-B	(147.9)	(98.6)	19.1	0.13	19.1	0.13
ALL	2550.5	1700.3	231.0	0.09	231.1	0.09

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PER
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERI

END OF JOB

****** PICADY 4 run completed.

end of file

[Printed at 06:11:13 PM on 6/7/04]

TRL LIMITED

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

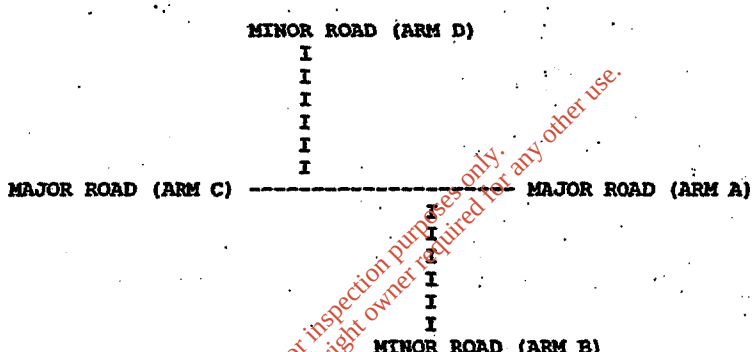
PICADY 4.1 ANALYSIS PROGRAM
RELEASE 3.0 (MAR 2001)

Run with file:-
"D:\1360 Proposed Geenwaste Composting Ctr\PICADY\INPUT\2005 AM Base + Dev.VPI"
at 18:50:26 on Monday, 7 June 2004

RUN TITLE
****
August Year 2005 including Landfill and Proposed Development - AM Peak

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA



ARM A IS N11 South
ARM B IS L113
ARM C IS N11 North
ARM D IS R751

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

GEOMETRIC DATA

DATA ITEM		MINOR ROAD B		MINOR ROAD D	
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	7.30 M.	(W)	7.30 M.	
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.	(WCR)	0.00 M.	
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.10 M.	(WA-D)	3.10 M.	
- VISIBILITY	(VC-B)	250.0 M.	(VA-D)	200.0 M.	
- BLOCKS TRAFFIC		NO		NO	
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	150.0 M.	(VD-A)	200.0 M.	
- VISIBILITY TO RIGHT	(VB-A)	250.0 M.	(VD-C)	200.0 M.	
- LANE 1 WIDTH	(WB-C)	3.50 M.	(WD-A)	3.50 M.	
- LANE 2 WIDTH	(WB-A)	0.00 M.	(WD-C)	0.00 M.	

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN: FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN): BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	10.82	16.24	10.82
ARM B	15.00	45.00	75.00	1.55	2.32	1.55
ARM C	15.00	45.00	75.00	6.74	10.11	6.74
ARM D	15.00	45.00	75.00	2.67	4.01	2.67

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
07.45 - 09.15					
	ARM A	0.000	0.013	0.751	0.237
		0.0	11.0	650.0	205.0
		(0.0)	(8.1)	(8.1)	(8.1)
	ARM B	0.089	0.000	0.355	0.556
		11.0	0.0	44.0	69.0
		(8.1)	(0.0)	(8.1)	(8.1)
	ARM C	0.788	0.150	0.000	0.061
		425.0	81.0	0.0	33.0
		(16.5)	(16.5)	(0.0)	(16.5)
	ARM D	0.565	0.322	0.112	0.000
		121.0	69.0	24.0	0.0
		(7.9)	(7.9)	(7.9)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
07.45-08.00								
B-ACD	1.55	8.80	0.176		0.0	0.2	3.0	
A-B	0.14							
A-C	8.13							
A-D	2.56							
AB-C	(8.67)							
AB-D	(3.42)	9.67	0.353		0.0	0.5	7.7	
D-ABC	2.67	9.23	0.290		0.0	0.4	5.8	
C-D	0.41							
C-A	5.31							
C-B	1.01							
CD-A	(6.81)							
CD-B	(1.87)	8.69	0.215		0.0	0.3	3.9	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
B-ACD	1.85	8.01	0.231		0.2	0.3	4.3	
A-B	0.16							
A-C	9.70							
A-D	3.06							
AB-C	(10.36)							
AB-D	(4.09)	9.28	0.440		0.5	0.8	11.1	
D-ABC	3.19	8.57	0.373		0.4	0.6	8.4	
C-D	0.49							
C-A	6.34							
C-B	1.21							
CD-A	(8.14)							
CD-B	(2.24)	8.11	0.276		0.3	0.4	5.4	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-ACD	2.27	6.77	0.335		0.3	0.5	7.1	
A-B	0.20							
A-C	11.88							
A-D	3.75							
AB-C	(12.68)							
AB-D	(5.00)	8.74	0.572		0.8	1.3	18.1	
D-ABC	3.91	7.46	0.524		0.6	1.1	14.9	
C-D	0.60							
C-A	7.77							
C-B	1.48							
CD-A	(9.96)							
CD-B	(2.73)	7.30	0.374		0.4	0.6	8.4	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45								
B-ACD	2.27	6.76	0.335		0.5	0.5	7.4	
A-B	0.20							
A-C	11.88							
A-D	3.75							
AB-C	(12.69)							
AB-D	(5.01)	8.74	0.573		1.3	1.3	19.6	
D-ABC	3.91	7.45	0.525		1.1	1.1	16.1	
C-D	0.60							
C-A	7.77							
C-B	1.48							
CD-A	(9.98)							
CD-B	(2.74)	7.30	0.375		0.6	0.6	8.9	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.45-09.00								
B-ACD	1.85	8.00	0.231		0.5	0.3	4.8	
A-B	0.16							
A-C	9.70							
A-D	3.06							
AB-C	(10.36)							
AB-D	(4.10)	9.28	0.442		1.3	0.8	12.8	
D-ABC	3.19	8.56	0.373		1.1	0.6	9.6	
C-D	0.49							
C-A	6.34							
C-B	1.21							
CD-A	(8.17)							
CD-B	(2.25)	8.11	0.277		0.6	0.4	6.1	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.00-09.15								
B-ACD	1.55	8.80	0.176		0.3	0.2	3.3	
A-B	0.14							
A-C	8.13							
A-D	2.56							
AB-C	(8.68)							
AB-D	(3.43)	9.67	0.355		0.8	0.6	8.7	
D-ABC	2.67	9.22	0.290		0.6	0.4	6.4	
C-D	0.41							
C-A	5.31							
C-B	1.01							
CD-A	(6.83)							
CD-B	(1.88)	8.69	0.216		0.4	0.3	4.3	

WARNING THE JUNCTION MODELLED CAN CARRY HIGH-SPEED MAJOR ROAD TRAFFIC. (AG23 REF. 8.4.2(v)).

QUEUE FOR STREAM B-ACD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.2	
08.15	0.3	
08.30	0.5	
08.45	0.5	
09.00	0.3	
09.15	0.2	

QUEUE FOR STREAM AB-D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.5	*
08.15	0.8	*
08.30	1.3	*
08.45	1.3	*
09.00	0.8	*
09.15	0.6	*

QUEUE FOR STREAM D-ABC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.4	
08.15	0.6	*
08.30	1.1	*
08.45	1.1	*
09.00	0.6	*
09.15	0.4	

QUEUE FOR STREAM CD-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.3	
08.15	0.4	
08.30	0.6	*
08.45	0.6	*
09.00	0.4	
09.15	0.3	

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-ACD	170.0	113.4	29.9	0.18	29.9	0.18
A-B	15.1	10.1				
A-C	891.3	594.2				
A-D	281.1	187.4				
AB-C	(951.5)	(634.4)				
AB-D	(375.6)	(250.4)	77.9	0.21	77.9	0.21
D-ABC	293.4	195.6	61.2	0.21	61.2	0.21
C-D	45.2	30.2				
C-A	582.8	388.5				
C-B	111.1	74.0				
CD-A	(748.4)	(499.0)				
CD-B	(205.5)	(137.0)	37.0	0.18	37.0	0.18
ALL	2390.0	1593.3	206.0	0.09	206.0	0.09

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PER
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERI

END OF JOB

****** PICADY 4 run completed.

end of file

[Printed at 06:50:54 PM on 6/7/04]

TRL LIMITED

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

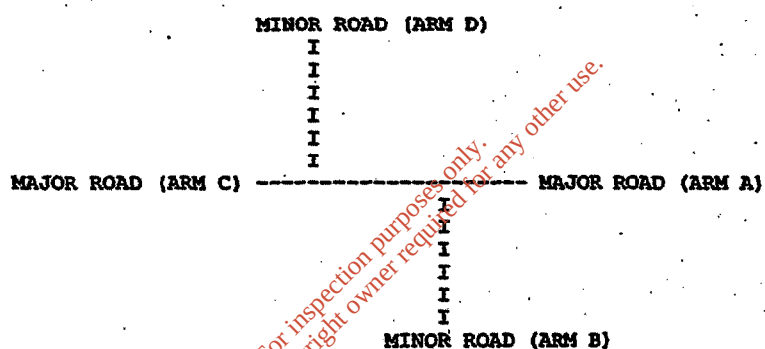
PICADY 4.1 ANALYSIS PROGRAM
RELEASE 3.0 (MAR 2001)

Run with file:-
"D:\1360 Proposed Geenwaste Composting Ctr\PICADY\INPUT\2005 PM Base + Dev.VPI"
at 18:49:43 on Monday, 7 June 2004

RUN TITLE
****
August Year 2005 including Landfill and Proposed Development - PM Peak

MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA



ARM A IS N11 South
ARM B IS L113
ARM C IS N11 North
ARM D IS R751

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

GEOMETRIC DATA

DATA ITEM		MINOR ROAD B		MINOR ROAD D	
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	7.30 M.	(W)	7.30 M.	
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.	(WCR)	0.00 M.	
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.10 M.	(WA-D)	3.10 M.	
- VISIBILITY	(VC-B)	250.0 M.	(VA-D)	200.0 M.	
- BLOCKS TRAFFIC		NO		NO	
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	150.0 M.	(VD-A)	200.0 M.	
- VISIBILITY TO RIGHT	(VB-A)	250.0 M.	(VD-C)	200.0 M.	
- LANE 1 WIDTH	(WB-C)	3.50 M.	(WD-A)	3.50 M.	
- LANE 2 WIDTH	(WB-A)	0.00 M.	(WD-C)	0.00 M.	

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	NUMBER OF MINUTES FROM START WHEN TOP OF PEAK IS REACHED	NUMBER OF MINUTES FROM START WHEN FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	RATE OF FLOW (VEH/MIN) AT TOP OF PEAK	RATE OF FLOW (VEH/MIN) AFTER PEAK
ARM A	15.00	45.00	75.00	7.84	11.76	7.84
ARM B	15.00	45.00	75.00	1.55	2.32	1.55
ARM C	15.00	45.00	75.00	10.57	15.86	10.57
ARM D	15.00	45.00	75.00	3.79	5.68	3.79

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
07.45 - 09.15					
	ARM A	0.000	0.024	0.762	0.214
		0.0	15.0	478.0	134.0
		(0.0)	(13.4)	(13.4)	(13.4)
	ARM B	0.065	0.000	0.395	0.540
		8.0	0.0	49.0	67.0
		(16.1)	(0.0)	(16.1)	(16.1)
	ARM C	0.921	0.060	0.000	0.019
		779.0	51.0	0.0	16.0
		(8.9)	(8.9)	(0.0)	(8.9)
	ARM D	0.716	0.241	0.043	0.000
		217.0	73.0	13.0	0.0
		(4.9)	(4.9)	(4.9)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
07.45-08.00								
B-ACD	1.55	8.96	0.173		0.0	0.2	3.0	
A-B	0.19							
A-C	5.97							
A-D	1.67							
AB-C	(6.58)							
AB-D	(2.51)	8.25	0.303		0.0	0.4	6.1	
D-ABC	3.79	9.06	0.418		0.0	0.7	9.9	
C-D	0.20							
C-A	9.74							
C-B	0.64							
CD-A	(12.42)							
CD-B	(1.54)	9.94	0.155		0.0	0.2	2.6	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
B-ACD	1.85	8.35	0.222		0.2	0.3	4.1	
A-B	0.22							
A-C	7.13							
A-D	2.00							
AB-C	(7.86)							
AB-D	(3.00)	7.71	0.389		0.4	0.6	8.9	
D-ABC	4.52	8.35	0.542		0.7	1.1	16.1	
C-D	0.24							
C-A	11.63							
C-B	0.76							
CD-A	(14.85)							
CD-B	(1.84)	9.47	0.195		0.2	0.2	3.5	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
B-ACD	2.27	7.33	0.309		0.3	0.4	6.3	
A-B	0.27							
A-C	8.74							
A-D	2.45							
AB-C	(9.63)							
AB-D	(3.67)	6.96	0.527		0.6	1.1	15.0	
D-ABC	5.54	7.25	0.764		1.1	2.8	36.6	
C-D	0.29							
C-A	14.24							
C-B	0.93							
CD-A	(18.13)							
CD-B	(2.24)	8.82	0.254		0.2	0.3	4.9	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45								
B-ACD	2.27	7.32	0.310		0.4	0.4	6.6	
A-B	0.27							
A-C	8.74							
A-D	2.45							
AB-C	(9.63)							
AB-D	(3.67)	6.96	0.528		1.1	1.1	16.3	
D-ABC	5.54	7.24	0.765		2.8	3.0	44.1	
C-D	0.29							
C-A	14.24							
C-B	0.93							
CD-A	(18.20)							
CD-B	(2.26)	8.83	0.256		0.3	0.3	5.1	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.45-09.00								
B-ACD	1.85	8.33	0.222		0.4	0.3	4.5	
A-B	0.22							
A-C	7.13							
A-D	2.00							
AB-C	(7.87)							
AB-D	(3.01)	7.71	0.390		1.1	0.7	10.3	
D-ABC	4.52	8.35	0.542		3.0	1.2	20.3	
C-D	0.24							
C-A	11.63							
C-B	0.76							
CD-A	(14.95)							
CD-B	(1.88)	9.47	0.198		0.3	0.3	3.9	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.00-09.15								
B-ACD	1.55	8.95	0.173		0.3	0.2	3.3	
A-B	0.19							
A-C	5.97							
A-D	1.67							
AB-C	(6.59)							
AB-D	(2.52)	8.25	0.305		0.7	0.4	6.9	
D-ABC	3.79	9.06	0.418		1.2	0.7	11.6	
C-D	0.20							
C-A	9.74							
C-B	0.64							
CD-A	(12.47)							
CD-B	(1.56)	9.94	0.157		0.3	0.2	2.9	

WARNING THE JUNCTION MODELLED CAN CARRY HIGH-SPEED MAJOR ROAD TRAFFIC. (AG23 REF. 8.4.2(v)).

QUEUE FOR STREAM B-ACD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.2	
08.15	0.3	
08.30	0.4	
08.45	0.4	
09.00	0.3	
09.15	0.2	

QUEUE FOR STREAM AB-D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.4	
08.15	0.6	*
08.30	1.1	*
08.45	1.1	*
09.00	0.7	*
09.15	0.4	

QUEUE FOR STREAM D-ABC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.7	*
08.15	1.1	*
08.30	2.8	***
08.45	3.0	***
09.00	1.2	*
09.15	0.7	*

QUEUE FOR STREAM CD-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.2
08.15	0.2
08.30	0.3
08.45	0.3
09.00	0.3
09.15	0.2

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-ACD	170.0	113.4	27.8	0.16	27.8	0.16
A-B	20.6	13.7				
A-C	655.4	437.0				
A-D	183.7	122.5				
AB-C	(722.5)	(481.7)				
AB-D	(275.5)	(183.7)	63.6	0.23	63.6	0.23
D-ABC	415.5	277.0	138.6	0.33	138.7	0.33
C-D	21.9	14.6				
C-A	1068.2	712.1				
C-B	69.9	46.6				
CD-A	(1365.2)	(910.1)				
CD-B	(169.9)	(113.2)	22.9	0.13	22.9	0.13
ALL	2605.3	1736.9	252.9	0.10	252.9	0.10

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PE
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERI

END OF JOB

****** PICADY 4 run completed.

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