Transport Planning

The importance of transport planning

Transport planning is crucial in planning sustainable developments and ensuring accessibility for all individuals.

In the design phase of all major public amenities require significant transportation planning.

At the planning stage of the following amenities it is important that significant planning takes place in relation to transportation.

-Sporting venues – stadiums

-Retail parks and shopping centres

-Residential areas

-Industrial parks or commercial centres

In the case of major amenities the production of a transportation plan can be a crucial component in providing planning permission. E.g. Ikea store and the national children's hospital.

The importance of transport planning

-Justify funding

When for example justifying the expenditure on a new road or a public transport service a detailed plan of how this road/service will impact upon the population needs to be conducted.

-Obtain planning permission

When a large development is being planned one of the key elements in such a plan is the traffic impact assessment and the transportation plan for the new site. These plans are included in the application for planning permission.

-Environmental considerations

It is important that in the transport plan that environmental considerations are taken into account.

Transport and Sustainable Development

Sustainable development is a socio-ecological process characterised by the fulfilment of human needs while maintaining the quality of the natural environment indefinitely.

Road transport now accounts for 21% of Irish CO2 emissions, with road traffic rising by around 2% per year. Globally aviation is growing at around 5% per year.

One of the key elements in sustainable transport planning is to minimise the distance individuals have to travel, and if longer distance travel is necessary that good public transport links are provided.

Mixed use developments are often cited as a means to promote sustainable developments using several transportation tools.

Mixed use developments

These developments have a number of amenities located within the development, thereby minimising distance traveled.

An Irish example of such a development is Adamstown.

This development was planned with sustainable transport as one of the developments key selling points.

The development is being built with reference to the European Town Centre model. This model encourages the development of amenities with residential areas.

This has resulted in the development opening with a rail station, quality bus corridor, schools, sports facilities etc.


Dublin Airport
N3
IBM
Blanchardstown
Maynooth
Rail link
Castleknock
Lucan
Leixlip
Intel
M50
M4
Hewlett Packard
Dublin City Centre
Celbridge
Adamstown
New Adamstown Railway Station
Wyeth
Clondalkin
Dublin/Kildare Railway link
LUAS Park & Ride
N7
M50
Newcastle
Tallaght
Sallins
Citywest Business Park

Methods of transport planning

When accessing or planning in transport in an area, one method of accessing the potential impacts of traffic is called a traffic impact assessment (TIA).

Traffic Impact Assessments enable highway authorities and developers to assess whether any highway improvements are likely to be required as a result of new or modified developments, and, if so, the nature of those improvements.

A traffic impact analysis is a study which assesses the effects that a particular development's traffic will have on the transportation network in the community. These studies vary in their range of detail and complexity depending on the type, size and location of the development.

Traffic impact studies should accompany developments which have the potential to impact the transportation network. They are important in assisting public agencies in making land use decisions.

Traffic impact studies help communities to:

• Forecast additional traffic associated with new development, based on accepted practices.

• Determine the improvements that are necessary to accommodate the new development.

• Assist communities in land use decision making.

• Assist in allocating scarce resources to areas which need improvements

• Identify potential problems with the proposed development which may influence the developer's decision to pursue it.

• Allow the community to assess the impacts that a proposed development may have.

• Help to ensure safe and reasonable traffic conditions on streets after the development is complete.

• Reduce the negative impacts created by developments by helping to ensure that the transportation network can accommodate the development.

• Provide direction to community decision makers and developers of expected impacts.

•Protect the substantial community investment in the street system.

Stages in a traffic impact assessment

Typically the first stage in this process is when a scoping study is conducted.

The scoping study will seek to answer some of the following questions:

-Size and description of proposal.

-Description of existing uses of the land.

-Does the development involve relocation of an existing use?

-Are traffic surveys of the existing condition required?

-What is the potential modal split?

-Potential traffic generation from the site.

-Are further traffic generation surveys required?

-What is the rate of traffic growth locally?

-Will the site attract traffic from other adjacent sites?

-What will be the area of impact of the proposal?

-When is the critical time period of assessment?

-What are the assessment years?

-When will the site become fully operational?

-Will adjacent links or junctions become overloaded?

-What level of car-parking provision is required?

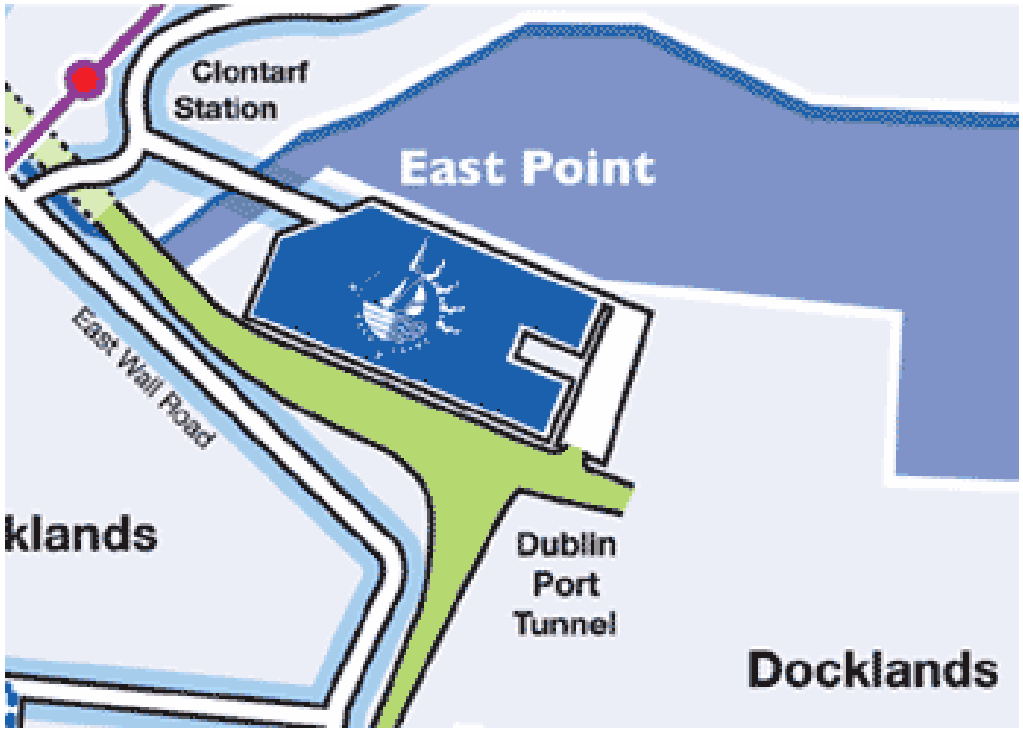
-Are there any special circumstances relevant to this proposal?

-Is the development in line with the County Development Plan?

- What improvements/modifications are required for pedestrians,

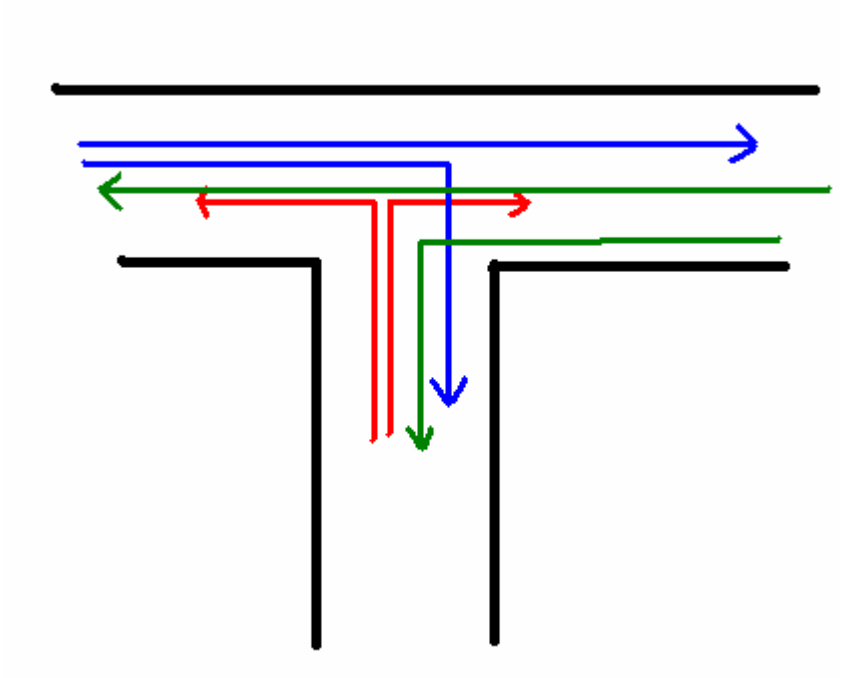
Stage 2: Trip generation

Critical junctions will be examined.



At these critical junctions turning movements and traffic flows are examined.

The numbers of vehicles at each of the movements will be counted, this will be done over specific time periods.



The results of the traffic counts will have the number of vehicles, vehicle type and the movement in question.

	MOVEMENT 1						MOVEMENT 2						MOVEMENT 3					
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	CAR	LGV	OGV1	OGV2	BUS	TOT	CAR	LGV	OGV1	OGV2	BUS	
7:00	98	20	3	2	1	124	12	2	0	0	0	14	4	2	3	0	0	
7:15	110	22	2	3	1	138	11	5	0	0	0	16	6	2	1	0	0	
7:30	123	8	4	1	3	139	14	4	1	0	0	19	3	1	2	0	0	
7:45	68	18	6	0	2	94	34	6	1	1	0	42	10	1	2	1	0	
H/TOT	399	68	15	6	7	495	71	17	2	1	0	91	23	6	8	1	0	
8:00	65	3	2	1	1	72	28	13	1	0	0	42	8	6	4	1	0	
8:15	39	10	5	0	0	54	18	4	0	0	0	22	5	2	3	0	0	
8:30	42	12	5	0	0	59	41	13	2	1	0	57	10	2	3	2	0	
8:45	46	3	5	1	2	57	18	7	1	2	0	28	6	3	3	2	0	
H/TOT	192	28	17	2	3	242	105	37	4	3	0	149	29	13	13	5	0	

Trip Generation

The first step is to estimate the peak hour trip rates. This can be done in a number of ways.

It can be done in a number of ways.

-Extensive surveys can be completed of all individuals in the area

-Use a series proxies to estimate the trip generation based upon the number and square meters of the development

These figures are applied to the number of individuals in the development

Table 3.3 Trip Generation Rates

Land Use	Base Unit	Rates		
		AM Peak	ADT	ADT Range
Residential				
Single Family Home	per dwelling unit	.75	9.55	4.31-21.85
Apartment Building	per dwelling unit	.41	6.63	2.00-11.81
Condo/TownHome	per dwelling unit	.44	10.71	1.83-11.79
Retirement Community	per dwelling unit	.29	5.86	
Mobile Home Park	per dwelling unit	.43	4.81	2.29-10.42
Recreational Home	per dwelling unit	.30	3.16	3.00-3.24
Retail				
Shopping Center	per 1,000 GLA	1.03	42.92	12.5-270.8
Discount Club	per 1,000 GFA	65	41.8	25.4-78.02
Restaurant (High-turnover)	per 1,000 GFA	9.27	130.34	73.5-246.0
Convenience Mart w/ Gas Pumps	per 1,000 GFA		845.60	578.52-1084.72
Convenience Market (24-hour)	per 1,000 GFA	65.3	737.99	330.0-1438.0
Specialty Retail	per 1,000 GFA	6.41	40.67	21.3-50.9
Office				
Business Park	per employee	.45	4.04	3.25-8.19
General Office Bldg	per employee	.48	3.32	1.59-7.28
R & D Center	per employee	.43	2.77	.96-10.63
Medical-Dental	per 1,000 GFA	3.6	36.13	23.16-50.51

Trip Generation

An estimate is made for each element of the development

Then the total trip generation is calculated

Development Use	Units/GFA		Trips			
			AM (8:00-9:00)		PM (17:00-18:00)	
			Arrive	Depart	Arrive	Depart
Residential Units	300	Units	48	129	102	54
Crèche	590	Sq m	27	17	12	14
Retail	220	Sq m	19	20	39	38
Community Centre	150	Sq m	6	3	28	22
Total			**101**	**170**	**181**	**128**

Parking Availability

In the proposed development the number of parking spaces must also be examined.

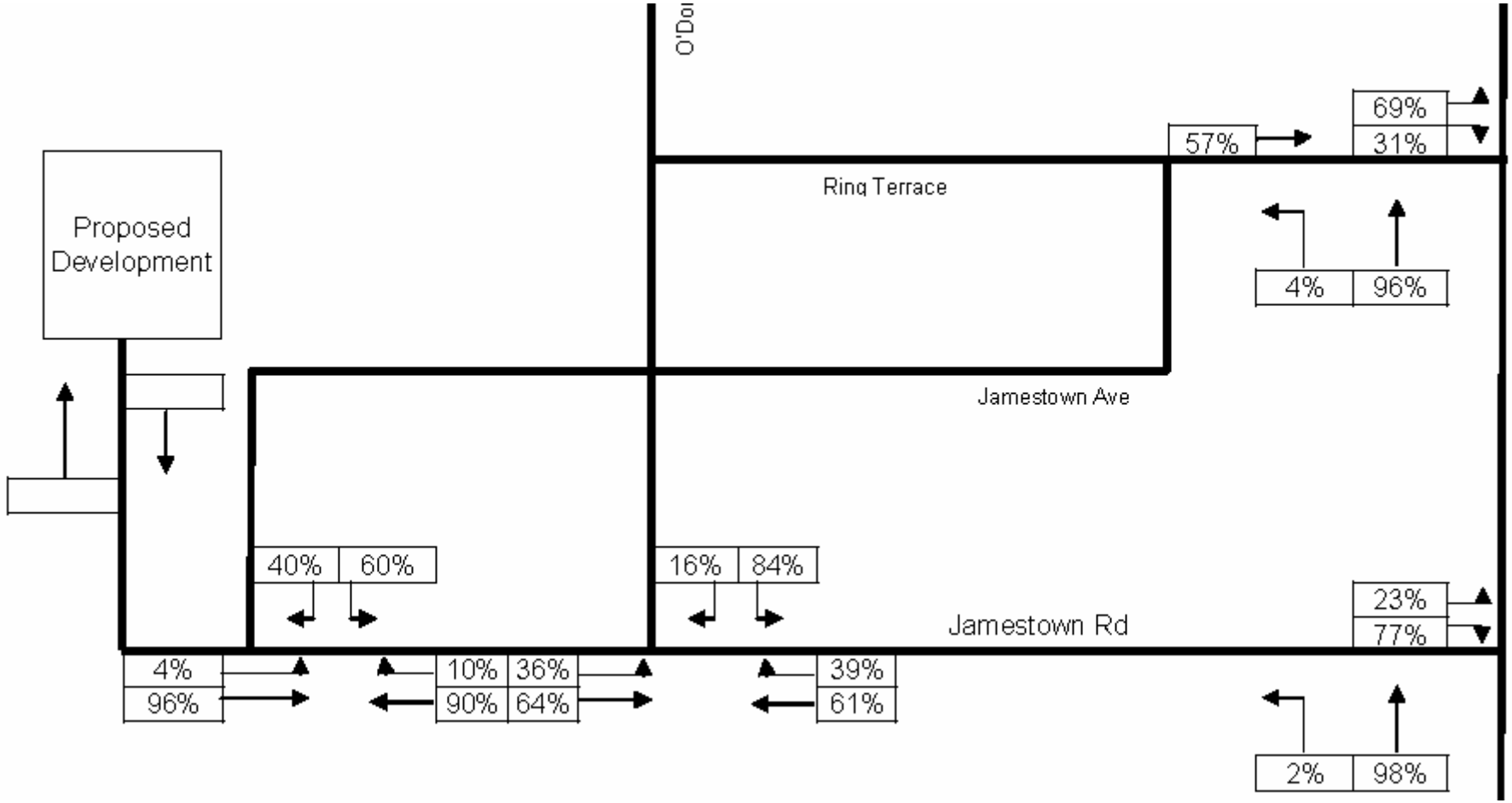
The development will have a specific number of parking spaces allocated based upon the types of dwelling.

These parking standards will vary by the type of dwelling, residential, comercial, retail etc. These parking standards also may vary by district.

As the availability of parking is considered to be a trip attractor this needs to be examined.

Trip Distribution

Based upon the results of the trip generation stage the total number of trips in the network are distributed across the network adjacent to the site.



Trip Assignment

Refer to the notes on trip assignment for more information on this process.

A standard trip assignment model (gravity model) is used to assign trips across the network.

Traffic Growth

An important factor when examining the impact of a new development is to look at future traffic growth.

Growth factors from the National Road Traffic Forecasts (NRTF) are used. These are taken from the national roads authority.

	All roads TRL HGV	All roads TRL CARS & LGV	National Primary HGV	National Primary CARS & LGV	National Secondary HGV	National Secondary CARS & LGV	Non Nationals HGV	Non National CARS & LGV
2002	100	100	100	100	100	100	100	100
2003	103	104	105	105	104	105	102	102
2004	106	107	109	110	107	108	104	105
2005	109	110	112	114	111	112	105	107
2006	111	113	116	118	114	116	107	109
2007	114	116	120	123	117	120	109	111
2008	117	119	124	127	121	124	110	113
2009	120	122	128	131	124	127	112	115
2010	123	125	133	136	128	131	114	117
2011	126	127	137	139	131	134	116	118
2012	128	129	140	142	134	136	117	119
2013	130	131	143	144	137	139	118	121
2014	132	133	146	147	139	141	120	122

Traffic Growth

The growth factor applied is = Future year / Current year

$$\frac{2014(122)}{2008(113)} = 1.08$$

This growth factor is applied to the traffic flows around the proposed new development.

At this stage traffic flows for a number of different years are estimated.

-Opening year flow
-Opening year + 5
- Opening year +10
-Opening year + 15

The final stage of the TIA is to examine the overall impact of the proposed development.

Future growth in traffic levels will be examined focusing upon flows with and without the proposed development. The difference between the two will demonstrate the overall impact of the new development.

A number of traffic flow diagrams are required.

-Trip distribution

-Trip assignment

-Background traffic

-Site traffic

-Committed development traffic

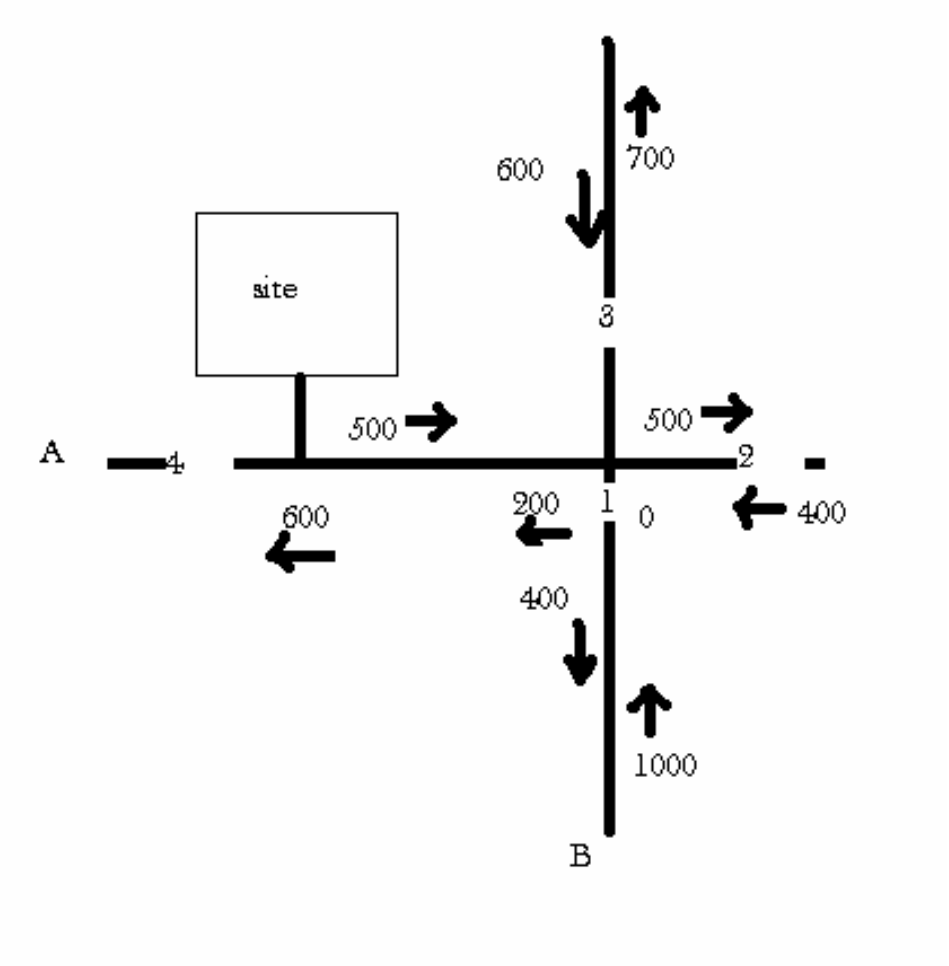
-Committed road schemes

-Opening year with and without development
-Opening year with and without development + 5 years
-Opening year with and without development + 10 years
-Opening year with and without development + 15 years

Each of these need to be done with AM and PM traffic counts

Example:

The following is the flow data on a number of links surrounding a proposed business park.



Example:

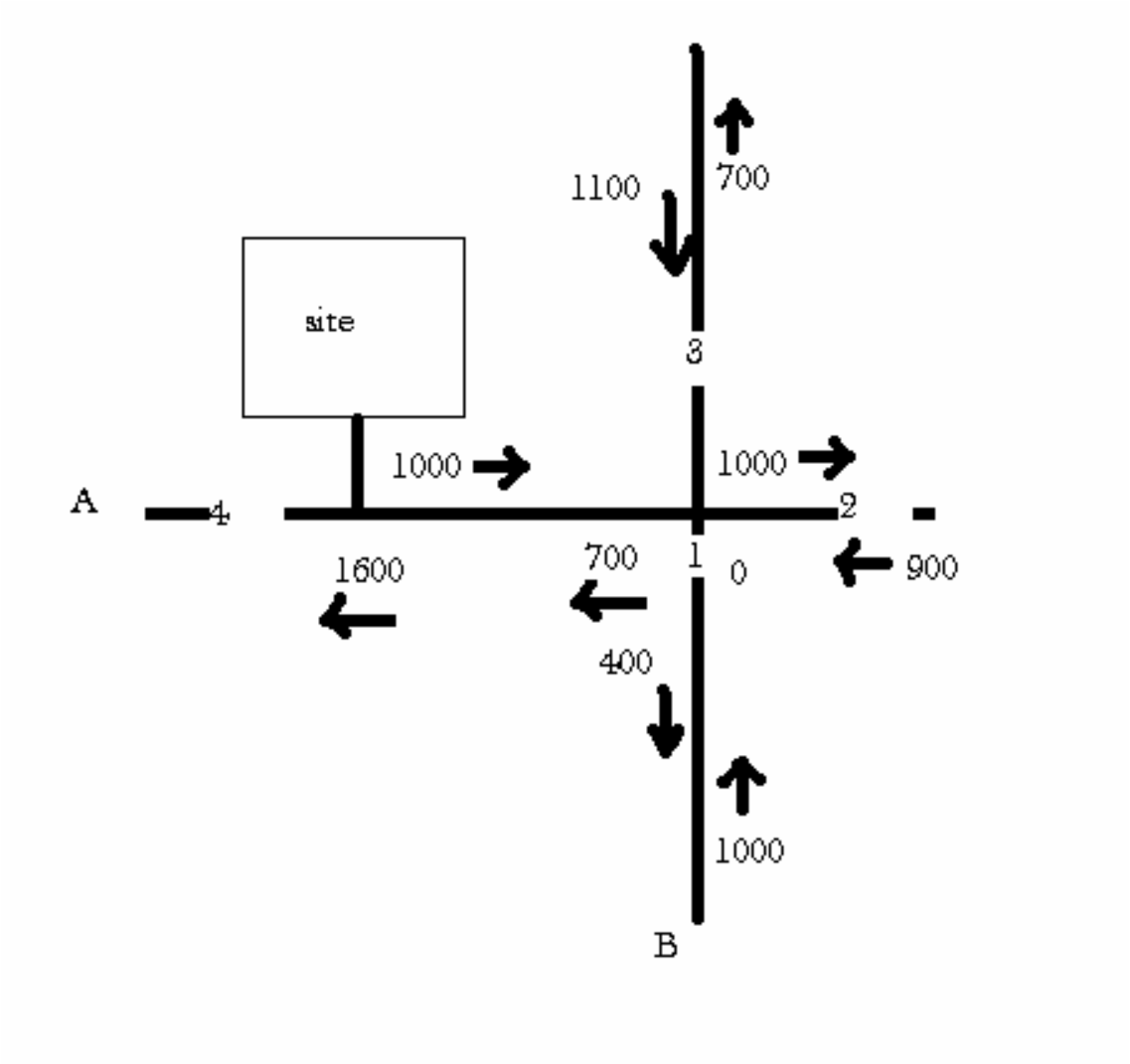
Initially the flow in the early morning peak is as follows.

The new site opens, and it is estimated that it will attract 1000 trips in the morning peak, and 500 will depart.

Links	Movement 1	Movement 2
1	1000	400
2	400	500
3	600	700
4	600	500

Example:

Therefore the following network diagram could be used to depict the opening years traffic.



Example:

The traffic on each of the links can be given by the following.

	Before Development		After Development	
Links	Movement 1	Movement 2	Movement 1	Movement 2
1	1000	400	1000	400
2	400	500	900	1000
3	600	700	1100	700
4	600	500	1600	500

Example

You are asked to examine the future 5, 10, 15 year scenarios. From the National Road Traffic Forecasts you are required to calculate the growth rates in each of these future years.

	All roads TRL HGV	All roads TRL CARS & LGV	National Primary HGV	National Primary CARS & LGV	National Secondary HGV	National Secondary CARS & LGV	Non Nationals HGV	Non National CARS & LGV
2008	117	119	124	127	121	124	110	113
2009	120	122	128	131	124	127	112	115
2010	123	125	133	136	128	131	114	117
2011	126	127	137	139	131	134	116	118
2012	128	129	140	142	134	136	117	119
2013	130	131	143	144	137	139	118	121
2014	132	133	146	147	139	141	120	122
2015	134	135	149	150	142	144	121	124
2016	136	137	152	153	144	146	122	125
2017	138	139	155	156	147	149	124	126
2018	140	141	158	158	149	151	125	127
2019	143	143	161	161	152	153	126	129
2020	145	144	164	164	155	156	127	130
2021	147	146	167	166	157	158	129	131
2022	149	148	170	168	160	160	130	132
2023	151	149	173	170	162	162	131	133
2024	153	151	176	173	165	164	133	134
2025	155	152	179	175	168	165	134	135
2026	157	153	182	177	170	167	135	136
2027	159	155	185	179	173	169	136	136

Example

You are asked to examine the future 5, 10, 15 year scenarios. From the National Road Traffic Forecasts you are required to calculate the growth rates in each of these future years.

The growth factor applied is = Future year / Current year

$$\frac{131}{119} = 1.1$$

$$\frac{141}{119} = 1.2$$

$$\frac{149}{119} = 1.25$$

Example

Based upon the + 5 year scenario

	Before Development		After Development	
Links	Movement 1	Movement 2	Movement 1	Movement 2
1	1000	400	1000	400
2	400	500	900	1000
3	600	700	1100	700
4	600	500	1600	500
Links + 5 years				
1	1100	440	1100	440
2	440	550	990	1000
3	660	770	1210	770
4	660	550	1760	550

Example

Based upon the + 10 year scenario

	Before Development		After Development	
Links	Movement 1	Movement 2	Movement 1	Movement 2
1	1000	400	1000	400
2	400	500	900	1000
3	600	700	1100	700
4	600	500	1600	500
Links + 10 years				
1	1200	480	1200	480
2	480	600	1080	1200
3	720	840	1320	840
4	720	600	1920	600

Example

Based upon the + 15 year scenario

	Before Development		After Development	
Links	Movement 1	Movement 2	Movement 1	Movement 2
1	1000	400	1000	400
2	400	500	900	1000
3	600	700	1100	700
4	600	500	1600	500
Links + 15 years				
1	1250	500	1250	500
2	500	625	1125	1250
3	750	875	1375	875
4	750	625	2000	600

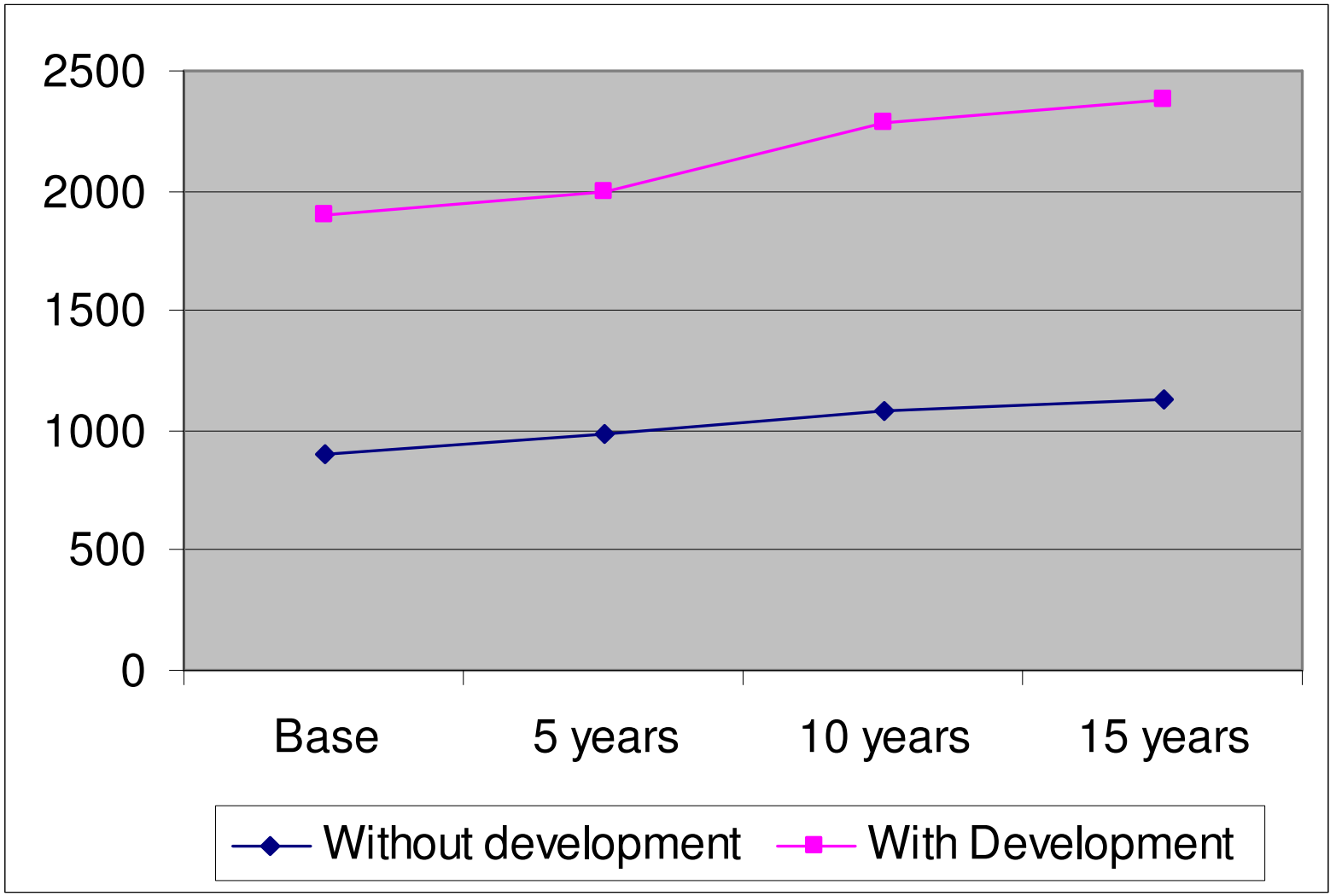
Example

The next step is to examine the increases in flows along each of the roads examined.

The table below presents the total link flows.

	Base year		+5		+10		+15	
Links	BD	AD	BD	AD	BD	AD	BD	AD
1	1400	1400	1540	1540	1680	1680	1750	1750
2	900	1900	990	1990	1080	2280	1125	2375
3	1300	1800	1430	1980	1560	2160	1625	2250
4	1100	2100	1210	2310	1320	2520	1375	2600

Flows on link 2



Example

Consider

-Capacity on link 1 is 1600 vehicles per hour

-What recommendations would you make based upon these results?

- How would you suggest the planner alter the plans?

Junction Performance

- Determining the impact of the development for all traffic scenarios the capacity of all critical junctions in the study area

-The purpose of this exercise is to identify queues and delays

-Capacity of is determined by the number of lanes and lane with

-Typically the max operational capacity of a link is 85% of overall capacity for non-signalised junctions and 90% for signalised junctions

-Above the values queues become unstable, the lengthen and congestion builds

-Saturation flow = ration of flow to capacity

Other modes

-Examining access through public transport, cycling and walking

-Frequency and capacity of public transport services

-Proximity of the development to public transport modes

-Proximity of cycle lanes

-Car sharing, pooling and car clubs.

Format of the TIA report

Background

•Description of proposed development

•Identification of peak hours and whether weekends will be used in the impact analysis

•Description of study area

•Location of proposed Access points

Base traffic conditions

•Description of road network and intersections adjacent to site and at access points

•Counts during peak-impact hours

Site traffic generation

•Trip generation rates used and the source of these rates

•Traffic generated during peak impact hours

Site traffic distribution

•Method used to distribute traffic

•Table showing estimated traffic movements by direction

•Discussion of method used for traffic assignment and assumptions for assignment of traffic to network

Non-site traffic predictions

•Definition of design year—opening of proposed development

•Identification of development in study area whose traffic is to be included in calculations

•Adjustments of off-site through traffic volumes

•Assembling of off-site traffic forecast for design year

Traffic Assignments

•Assignment of peak-period traffic to intersections and access points

•Figures for existing peak impact traffic hours, site traffic and total traffic

•Recommended access design improvements

Review of site plan

•Parking layout

•Loading dock locations and access, including design truck used

•Recommended changes