# Designing a Journey

## The Importance of Design in the Improvement of Dublin's Public Transport System.

Ian Smith 4th ID

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# Introduction

This thesis examines the role of design in the improvement of Dublin's Public Transport system; the system being a combination of the bus and rail services, including the points of contact with these services such as ticketing, train stations and bus stops, as well an examination of the implications of the proposed light rail, or tram system.

For a public service such as this, with many separate but important sections, to function efficiently, a holistic approach to design is necessary. Often the lasting impression of public transport, the "Identity of the system," is that of the actual vehicle design (Pullen, 1990, pg. 214). However, as with any design there are far more considerations than pure exterior style. This is especially true in the public domain. Unity of colour and graphics, integration of ticket systems-where one ticket allows access to all forms of public transport-are methods of achieving an overall system identity. This thesis illustrates the importance of design from the first point of contact with the system, to the last.

How can design help the transport system? It is the job of an industrial designer to ensure that the system is designed in such a way as to appeal in human terms to its market; Industrial Designers concern themselves with human factors, understanding the hierarchy of user wants, as much as engineering capabilities:

*Designers are concerned with shape, form, function, and communication. They are concerned that products should lend themselves to cost effective manufacture, use appropriate materials and can be maintained easily. Most important of all, in the market place, designers ensure that the final product meets users needs - fully. Be it a railway*

*train or a ticketing system, timetables or signage, a uniform or station architecture and layout* (Pullen, 1990, pg.211).

Penny Sparke examines the role of the designer as co-ordinator in her book Consultant Design (1983). In it she traces the birth of the profession, noting how, in the 1940s, designers such as Raymond Loewy would employ up to 162 men, with a variety of expert skills, such as Architects, stress engineers, plastic engineers, marketing experts, and business psychologists (Sparke, 1983, pg.57). Raymond Loewy's acclaimed work for Pennsylvania Railroads-by converting car manufacturing methods to train design, along with his extravagant use of streamlining (Jodard, 1992, pg. 49)-illustrate that he, and his team, could balance the visionary and practical elements of the design process. The French born naturalised American designers work was among the forefront of what we now consider modern public transport design.

Having established the range of tasks a designer must face, this then raises a bigger question; what is the role of the designer in society? Where do his/her priorities lie; with the transport companies or with the consumer? Victor Papanek deals with such issues in his books Design for the Real World (1985) and Design For Human Scale(1985). His overriding philosophy is that design should be for human need rather than cynical financial gain. Moreover, he believes that the "lack of a relationship between design and people" is reflected in the poor quality, low-life products that litter society, and can "tatter social coherence"(Papanek, 1985, pp. 5, 6). He argues that society cannot afford to be so wasteful in economic, or indeed ecological terms. With public transport

this is particularly applicable in that it forms a crucial part of social infrastructure. At its most efficient, a designed public transport system should control traffic congestion, appeal to the variety of users, allowing them full mobility, and even instil a sense of pride in the system. At its most destructive, the system could damage the environment, the economy and public morale. R G Pullen, in his 1990 article "Driving Revenues," agrees with Papanek's philosophy, saying that "in Public Transport the real opportunities for innovation lie in a better understanding of consumers" (Pullen, 1990, pg.211).

The variety of public transport users means that the system must appeal to a broad range of tastes; including teenagers, the unemployed, the elderly and disabled. However with traffic congestion becoming an increasing burden on European cities, the main difficulty is how to entice car owners onto public Transport. How can the bus, train and tram compete with the comfort and freedom of the car? The role of design as a means of enticing people from their cars onto public transport is a major subject of discussion in this thesis. This thesis also shows how accessibility for the elderly and disabled benefits the overall system.

Public transport design has an important part to play in the environment of modern urban areas. Firstly, by reducing traffic congestion it reduces harmful emissions. This in turn helps create a pedestrian friendly environment with less air pollution and less of a struggle between pedestrian and vehicular traffic. Moreover public transport design plays an important role in the aesthetics of the urban environment; from the design of train

ILLUSTRATION 1 : A Wet Evening at a Crowded Bus Shelter at Wood Quay.

stations and bus shelters to that of the vehicles. An example of this is the way in which red double decker buses are now synonymous with London's street architecture.

## An overview of recent developments in Dublin's public transport:

At present Dublin's Public Transport city centre and suburban services are divided between two companies; Dublin Bus and Irish Rail, both subsidiaries of the semi-state company Coras Iompair Eireann (CIE). This thesis illustrates the lack of communication between these companies, which is reflected in a fragmented design approach which confuses the customer and is detrimental to the efficiency of the overall system.

However, Dublin is at a unique stage in its infrastructural development. Valuable E.U. funds are helping such projects as the proposed port tunnel, a tunnel under the Liffey linking the "C-ring" road system with the docks thus diverting heavy commercial vehicles from the city centre. The establishment of the Dublin Transport Office (DTO) has helped co-ordinate these proposals. The city is taking the initiative and seems intent on addressing the problems of traffic congestion (Cleary, 1996, pg. 20).

Traffic congestion is a major problem in Dublin and indeed other European cities. Recently the problem in this city has escalated to an extent that 100 extra gardai were assigned to "Operation Freeflow"; an emergency plan with an emphasis on enforcing parking regulations in and around the city centre (Cullen, 1996, pg.19). According to an

internal CIE document it is estimated that the traffic gridlock costs the country one billion pounds annually, effectively negating any positive impact of the annual transfers from the EU (Coleman, 1996, pg.1).

Public transport is an obvious way of alleviating this problem, a feeling shared by the public in a Dublin traffic survey released on the 1 July 1996; the results showed that 74% believed that public transport was the best means of overcoming the traffic congestion (MRBI, 1996, pg.8). However this should be done by providing a service that encourages, not forces, people to use public transport. The discrepancy between what the majority of the public say and what they do, by still choosing the car rather than bus or train, shows that at present the public transport system is not an attractive alternative to the car. The irony of the car versus public transport debate was summed up by the Minister of State for Transport in September 1996 when he said that "the car, for so long a symbol of personal freedom and mobility, now serves to restrict mobility in Ireland's major urban areas, and on roads" (Stagg,1996, pg.2).

With the emphasis on an broadening the appeal of public transport the role of design becomes all the more important. Besides "Operation Freeflow," which also includes the provision of more dedicated bus corridors, the other, more long-term solution proposed is LUAS, Dublin's Light Rail Transit. LUAS is seen by many as the definitive mode public transport; one that can bring Dublin's ageing transport system into the next millennium. A visually attractive on-street Light Rail system, using vehicles similar to those used in

Grenoble in France, the LUAS seems to be aimed at the higher end of the transport market. With the intention of "taking people out of cars"(McArdle, 1996) this thesis intends to show that LUAS scheme is based too heavily on the vehicle itself, a superficial view that forgets Light Rail's position in the overall system.

Indeed LUAS seems such an obvious effort to appeal to the 'new' passengers, that a substantial gap in design terms between the proposed tram, and the existing bus service, would only serve to highlight the inadequacy of the overall system. The solution should not be as overt as that in its struggle to attract car owners. If that becomes the case and LUAS does stand apart in design terms, will it not fail for that very reason? This thesis investigates its role within a functioning system and evaluate whether it can be successful rather than being a well-designed but isolated and ultimately useless limb.

## Methodology

This thesis examines the system from predominantly the user's point of view, taking the reader on a design journey culminating in an outline of how the system must be designed to improve and succeed into the next millennium. The first part of the journey is finding a point of entry to the system; to attract potential users this must be clear and appeal to their lifestyle. It is at this point that the thesis begins.

Chapter One analyses the present ticket system. While buses still accept fares pre-paid tickets are coming more to prominence. The important design considerations here are the points of availability of the tickets, the type of tickets, reusable or disposable, clarity of graphics and finally how the tickets are used. This chapter includes a study of the benefits of an integrated ticket system whereby tickets allow travel on all modes of Public Transport. This aspect of the journey has an unbelievable bearing on the overall system; a bad system can put people off before they have boarded the vehicle. I make comparisons to other methods of ticketing in Europe and use Hong Kong as a specific case study (Noble & Yeung, 1990).

Many people like the idea of a door-to-door service. The inclusion of designed "Park and Ride" facilities (car parking beside a point of entry to the public transport system) bicycle bays and a feeder bus service to main routes are the obvious methods of achieving this. In chapter one the current situation is discussed and compared to a designed solution.

By now we are at the station or stop; is it sheltered? Chapter two examines the actual design of the Station and Stop. Are there graphics indicating the route and other information? Is the area clean and well maintained? Vandalism seriously damages the customer's respect for the service and is a problem particularly associated with this part of the journey. Is it overcrowded? These aspects also have a huge impression on users and getting this aspect of the system right will go a long way to determining satisfaction with the service. Lengthy discussions with Dublin corporation and Adshel, the company

maintaining Dublin's bus shelters, were the main sources for this chapter. Brian Jennings, designer of a shelter system for Cemusa in Madrid, gave an invaluable insight into design criteria, problems and solutions in this area.

Chapter three concerns the design of the vehicle itself. Ultimately it is this, be it bus, train or tram, that must replace the car for many users. To do this the benefits of such a swap must be made into a feature of the design; the most obvious advantage being the fact that someone else is doing the driving for you. While many enjoy driving, doing so in peak hour traffic, which is when traffic congestion occurs, is by no means a pleasure. 'Road rage,' a recently coined term describing the building up of tension associated with bumper-to-bumper driving, illustrates this point perfectly. The vehicles should be designed inside and out using such varying considerations as use of graffiti proof materials to the anthropometrics concerning seat dimensions. The primary source was the existing bus fleet and the DART. First hand observation, using the buses and train services, was a useful way of getting an immediate overview of the current state of design in Dublin's public transport. Technical literature was then used to make comparisons with other similar vehicles in use around Europe.

Chapter four serves as an overview of the whole thesis, tying together the previous chapters and looking at the total system design. Here all the design solutions outlined in the previous chapters are brought together to show how they can combine to form a successful system. The LUAS and its place in the system is also discussed, now with the

advantage of being able to see how it would function in a designed system. This chapter is therefore forward looking, fitting together the pieces and taking a glimpse at how Dublin's transport system could operate in a designed environment. It highlights the areas that need urgent attention.

Much of the information in this thesis was achieved through interviews and discussions with executives in Dublin Bus, Iarnrod Eireann, and the DTO; notably John McBride, John Ryan and Martin Cosgrove in Dublin Bus, Fergus McArdle, an architect working for Iarnrod Eireann and John Flanagan in the DTO These interviews gave substantial insight into the thinking of Transport companies in terms of marketing, finance and their attitude to the service. They also provided useful information regarding possible short and long term initiatives for Dublin's public transport, such as the talk of privatisation of Dublin Bus, the Heuston Station link to the main north south line proposals, and new ticketing developments.

**Literature Survey:**

In order that this thesis is kept firmly in a design context my literary survey includes a number of works by renowned designers and design historians. Historically, Raymond Loewy was among the first Industrial designers to tackle some of the issues surrounding public transport design. Paul Jodard's description of the man in Design Heroes: Raymond

Loewy (1992) gave useful insights into the value of design in terms of image and marketing. This was further strengthened by Penny Sparke's description of the role of the designer in industry in her book, Consultant Design (1983). Victor Papanek provided a useful contrast to this capitalist based design strategy in his book, Design for the real world. Republished in 1985, it describes how design should be for user needs, not for cynical financial gain, a philosophy particularly apt for a public transport service.

Newspaper articles gathered between September 1996 and January 1997 was helpful in compiling up-to-date background information for this thesis. Current transport initiatives, including the viability of the LUAS, were all heavily debated during this period. "The Dublin Transport Initiative Final Report" (1993) and other DTO publications such as the "Report to the Minister for the Environment" (1996) provided useful and up to date statistics. This was aided by Government publications such as the "Dublin Transportation Study Technical Reports" compiled by Steer Davies Gleave for the Dublin Transportation Review Group in 1991.

Brochures on current ticket schemes and new bus services in Dublin are widely available. A publication by the Institute of Mechanical Engineers provided a comparative case study in the form of Noble and Yeung's 1990 article entitled "Marketing Hong Kong's Mass Transit Railway with Special Emphasis on Ticketing." Publications by the DTO and studies by Thermie (an EU initiative to promote greater use of European energy technologies,)

provided useful information regarding "Park and Ride" facilities and their role in the future of transport in the city.

The literature concerning station and stop design included publications by Iarnrod Eireann, IMechE, Adshel, Queensbury and Thermie. They include Grainger and Cuffe's 1988 publication entitled DART : A Technical Description, and "Impact 2:The More O'Ferrall Guide to Outdoor Advertising in Ireland," published in 1996 by Adshel. Architectural plans for possible LUAS stops and proposed renovations to Heuston and Connolly Stations were available through the CIE offices at Heuston Station. Interviews and first hand observation of European examples of station and stop design played an important part in terms of comparison.

Technical information regarding vehicle specifications was invaluable in assessing vehicle design. Iarnrod Eireann supplied a technical description of their DART (Dublin Area Rapid Transit) vehicles while Dublin Bus provided seating arrangement diagrams of their Volvo buses. Comparative design specifications were obtained in further publications by the Institute of Mechanical Engineers revealed reports on the Leyland Lynx, currently part of the Dublin Bus fleet, and a proposed "Super Bus" (Lowe, 1986). Moreover, there were a number of similar reports relating to the ergonomics of vehicles and indeed stations and stops such as R G Pullen's 1990 article "Driving Revenues."

The LUAS scheme is very much in the public domain and information was gathered from newspaper articles, from the aforementioned interviews and through reports and brochures received from the LRT (Light Rail Transit) offices in Heuston Station. Case studies of other similar systems in Europe, particularly the Grenoble LRT to which the LUAS is often compared, were obtained in a Thermie article entitled "Energy and Environmental Implications of Light Rail Systems."

For the design to be appealing to as wide a market as it now must be in order to compete with the car, it is vital that there are no weak stages of the journey. This thesis endeavours to expose the weak links in Dublin's existing system and propose possible methods of tackling these difficulties through design. The final system must make people feel as mobile as possible.

# Chapter 1

## Ticketing and "Park and Ride"

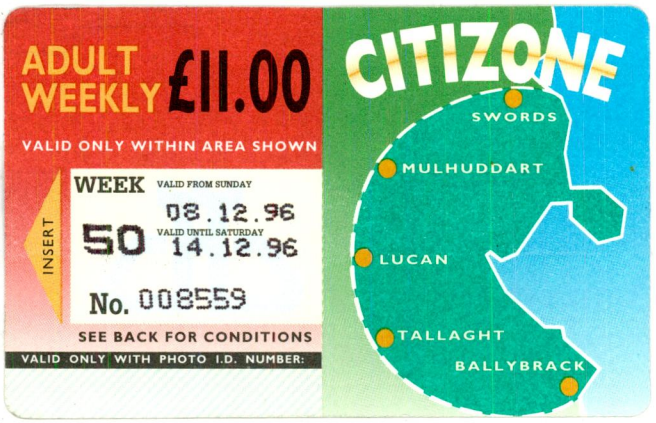
This chapter deals with the first section of our journey, from the door of our house to the initial point of contact with the system; the "Park and Ride" facilities and ticketing. While for many this may mean a brisk walk in the morning to a bus stop it must be reminded that it is with the luxury of the car that public transport now has to do battle in design terms. Although bus stops and train stations are presently accessible to great number of potential users it is through poor design that this potential is not turned into revenue for the transport companies. This chapter shows that providing motorists the possibility of driving to a local station, with safe good valued parking and clear logical ticketing can be an attractive alternative to driving the entire journey.

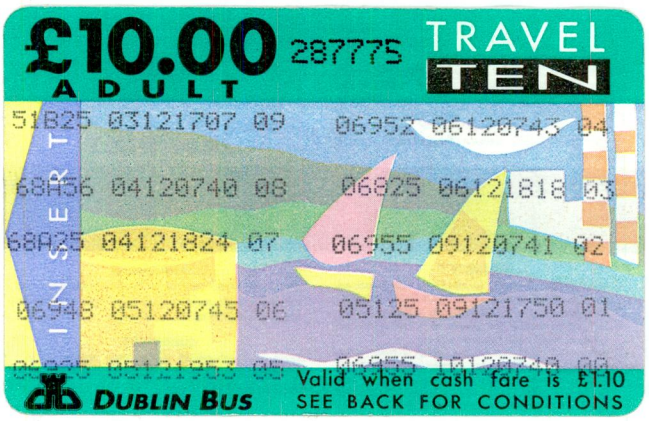
Ticketing is a crucial factor at this stage. The design considerations here include; where the tickets are available; how they are purchased (cash, credit card, direct bank link and so on); the permutations (weekly pass, ten journey, schoolchild fare for example); integration, that is use on other modes of public transport; method and place of validation; and finally, the comprehension of the graphic design on the vending and validating machine, and on the ticket itself.

Presently prepaid bus tickets are available around the city in newsagents and convenience stores while rail tickets are available at the stations. Purchasing is cash only. Identification is needed for student and scholar bus tickets in the form of USIT cards for the former and special identity cards for the latter. There a number of ticket permutations available for both modes of transport; daily, weekly, monthly, and ten journey (see Illustration 2). To have use of both services the price of the ticket is increased, thus giving the customer the immediate impression of a fragmented system.

On the outset these permutations seem logical enough. Indeed the LUAS team at Heuston station envisage their ticketing system to be incorporated into their car parking, as well as being fully integrated. However it is the form of the ticketing that is clearly ill conceived; all are unrenewable, printed paper tickets. Not only is this highly wasteful, but it is also short sighted design. Damaged or wet cards, both understandable when dealing with paper, are not read by the ticket validators, the device where the tickets are inserted on the bus, resulting in a build up of angry passengers behind and unfortunate victim, and a subsequent delay. Moreover, to keep a monthly card, in its flimsy paper, in working order for the duration of its life is a difficult task. While the elderly with their laminated travel passes, needing only visual validation by the driver, are thankfully denied this embarrassment, imagine a young mother struggling with a child and pram having to suffer further humiliation due to badly designed tickets.

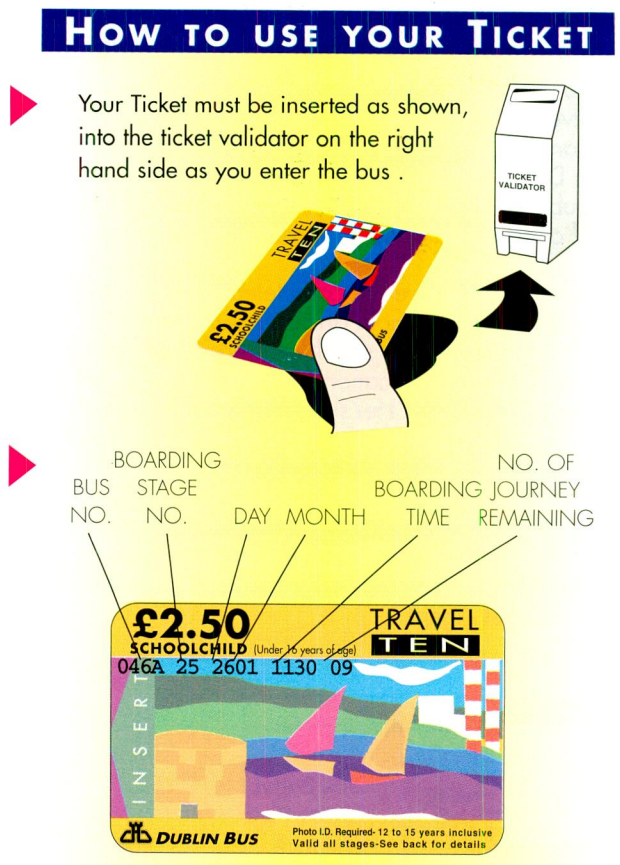
ILLUSTRATION 2 : (a) Ticket Samples




(b) Validator, How to use ticket

Anatomy of ticket



The ticket validators themselves also pose design problems (fig. (b) on Illustration 2). Due to the insertion of damaged cards and general misuse, the validators have proved unreliable (Cosgrove, 1996). Maintenance costs the company thousands per annum and as with any common problem it does not help the image of the company to have such a temperamental system. To their credit a renewable smart card system is currently being considered by the powers that be in Dublin Bus (Cosgrove, 1996). There are two systems being considered both using smart card technology, but while there is some talk of laminating the cards it is uncertain at this stage whether the material used in the card itself will be altered.

As far back as 1981, Hong Kong's Mass Transit Railway Corporation saw the potential in 'stored value ticketing' whereby the tickets are 'charged' for the desired journeys and can be returned and reintroduced into the system after further charging (Noble and Yeung, 1990, pg.55). While this system has been refined to suit Hong Kong's particular needs, with each individual journey being paid for, there is no reason why a similar system cannot be incorporated into Irish services. These cards would have none of the wastage of the current paper cards and be as durable as a credit card. Even on a psychological level there is an advantage, in that there is inherent value placed on plastic cards in today's society, while paper is associated with the past and is vulnerable.

With the same permutations as already exist in Dublin's services, and perhaps introducing different cards for different users, for example students, school children and adults, these

cards could be charged either weekly or as the user needs, using a system similar to that used in photo copying machines, whereby the card can either be retained by the user and recharged or put in designated recycle points, located beside charging machines where perhaps a percentage of a deposit is returned and the card can be resold.

It is a well documented fact that one of the less favourable aspects of using public transport is getting to the system; be it bus stop or train station. When discussing the viability of the LUAS tram scheme much of the talk was on "Park and Ride"; the provision of designated parking for those using the system (LRT Office, 1996, pg.5). However, presently there are no "Park and Ride" facilities on any main bus routes, while DART services have a small number of unsupervised and badly maintained parking facilities that are subsequently seldom used (Flanagan, 1996). Feeder buses are seen as a loose link in a weak chain, frequently arriving to train stations after the train has left (Flanagan, 1996) and bicycle bays are either unsupervised or non-existent. Indeed, the DTO can so far only name two sites for such facilities on the LUAS line; Balalley in Dundrum and beside the Fox and Geese in Tallaght (Flanagan, 1996). Neither site, at the furthest point from the city centre on both south-side lines, are multistoried and both will hold 500 cars(McArdle, 1996). And this is their way of encouraging people to use the system?

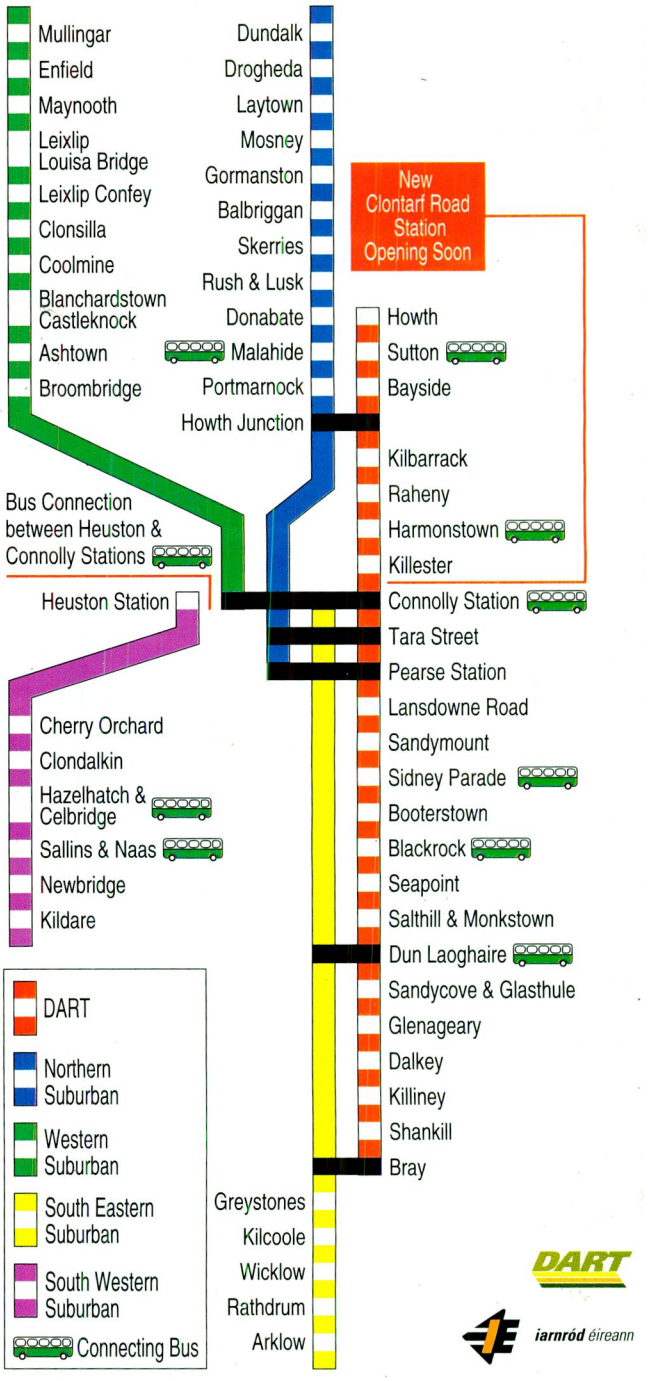
Both of these sites will be fully supervised and give passengers a direct link to the LUAS system. Moreover, it is intended that the tickets for the spaces will also be valid for the Tram (LRT, 1996, pg.3). But ultimately what use are two, possibly inadequate, parking

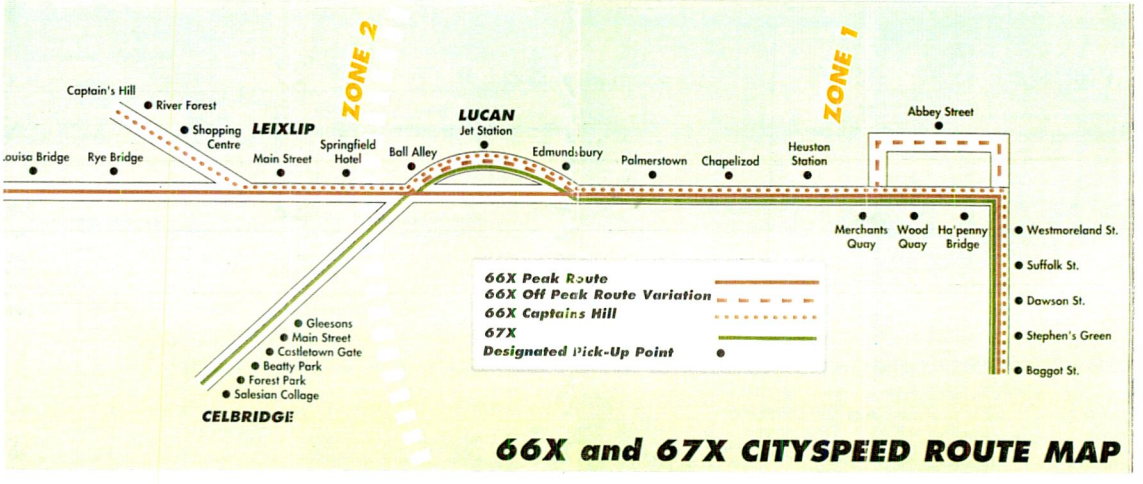
facilities to the entire system? If the LUAS is to recoup any of its intended outlay it must provide this basic requirement at least at the major stops along each route. This should be coupled with a fully integrated feeder bus connecting surrounding areas to the system. Indeed there is no reason why the DART and even some of the busier Quality Bus Corridors (QBC) should not also adopt this option. "Park and Ride" facilities could contain amenities such as shops and cafes to help recoup initial costs, an often used ploy on the continent (Pullen, 1990, pg.212). Bicycle bays could also be incorporated into the design, encouraging a healthy and pollution free option with the safety associated with multi-story car parking.

A perfect example of where a "Park and Ride" Facility is needed is Leixlip, an Irish Silicon Valley, in Co. Kildare. With Intel's European headquarters and the recent building of a large Hewlett-Packard plant in the town there is considerable pressure on public transport in that area at peak times. There is an existing Rail link to the area from Heuston Station and a QBC has recently been established from Lucan to the city centre (see Illustration 3). The journey from Leixlip to the city centre, around 15k, takes close to 55 minutes at peak times while it only takes 35-40 at off-peak hours. While Public Transport in the area as it stands can compete with the car in terms of time much of its failure is due to lack of a door to door service. Rather than having to brave the elements, potential passengers brave the stressful traffic in their car. At least with the "Park and Ride" facility they would have a viable option. These could be located beside the two train stations in the

ILLUSTRATION 3 : Suburban Rail and Bus route maps from City Centre to Leixlip (Rail map on left, Bus map below)

Note the difference in how the journey is represented on the two maps, again illustrating the fragmented approach to the system by the two companies.



area, both servicing the two main residential areas in the town, and thus offer the customer the option of bus or rail.

But the "Park and Ride" facility must not be an inadequate gesture; as Mr. Pullen describes in his article "Driving Revenues," if it is more hassle to park near the boarding point than at the destination, why bother (Pullen, 1990, pg.212)? The facility must be clearly signposted, with a logical flow of cars through the parking bay. It should be no more than a few hundred metres from the boarding point, well lit for dark mornings and preferably sheltered. Fergus McArdle in the DTO said that the current policy of flat bay parking for the LUAS scheme (no tiers) is due to stringent planning laws in the suburbs. This policy however is out of date as in many other European countries there are well designed parking facilities beside all main stops. In Helsinki for example, where their metro service is comparable with our DART, they have car park facilities of some sort at all suburban stations. In fact most stops have extensive shopping facilities thus ensuring that the car park has more than one function. In terms of security, a camera and a ticket validator, perhaps located at the entrance and exit like Dublin Airport and many other multi storey car parking facilities, would be enough to give car owners the necessary confidence to use the facility.

# Chapter 2

## Bus stops and train stations

The next step in our design journey involves the design of the bus stop and train station. This chapter examines first the bus stop and shelter, analysing its functions and comparing elements of its design to other European models. The second part of this chapter takes a brief look at DART stations and Heuston station. It is these elements of the journey that have a considerable effect on users. But with the problems of vandalism and poor maintenance, even in the controlled environment of the train station, and with revenue needed for other aspects of the journey, can industrial design provide solutions that are economically viable as well as ergonomic and functional?

## Bus Stop Design

Railway stations will always have an advantage over bus stops in that they have a designated site, shelter and situation for such extras as shops and stalls, all impressive selling points from the public's point of view and important in terms of revenue for train companies (Pullen, 1990, pg.211). Bus stops however are consigned to the bottom of the heap; very often no more than a pole with a flat top, unceremoniously dumped on the

side of the road with no consideration for how passengers get to the stop or how they must then get from it, negotiating puddles and potholes, safely onto the bus. At their best Dublin's bus stops are only successful in their display of advertising not in the provision of adequate shelter or seating.

Before considering the design itself, it is important to note that it is an advertising company, Adshel, who choose the type of shelter design rather than Dublin Bus. A contract between Dublin Bus and Adshel allows the latter 90% of the advertising revenue in return for handling maintenance and installation (McCabe, 1996). While advertising is an important aspect of the design, the total system requirements cannot be overlooked. In terms of shelter location, planning permission must be granted by the Dublin Corporation. Adshel, Dublin Bus as well as local residents or local authorities can apply for planning permission. As for the condition of the surrounding pavement, Dublin Corporation control this aspect of the environment. It must be remembered that in design terms accessibility begins at the stop itself.

The main problem with Bus Shelters is that no location is ever the same; the path width can change, the average number of people at peak times can fluctuate, even the occurrence of vandalism can differ. Immediately what is suggested here in design terms is a reasonable degree of flexibility. Yet, at present, there are only two basic types of shelter design in use (see Illustration 4) the cantilever and the "L-shaped". These can be combined to form double length versions (Adshel, pg.21, 1996). Currently there are

ILLUSTRATION 4 : Bus Shelter Designs

illustrations (Adshel, 1996, pg.21)


LUAS Station Computer Montage (LRT, 1996, pg.1)

no examples of where the pavement has been altered significantly to facilitate a bus shelter (McCabe, 1996). Dublin Bus lose One million pounds annually from accidents and injury, of which most occurs boarding and exiting the vehicle. While Rail platforms are guaranteed a certain fixed distance from the vehicle, with buses it is down to the skill of the driver but ultimately the state of the pavement. Here a concerted and combined effort is crucial in getting this part of the journey designed correctly. Firstly, the pavement around all stops, city centre and suburban, could be gradually sloped towards the stop itself, similar to the design proposed for LUAS stations (see Illustration 4). This would have the effect of raising the height of the pavement adjacent to where to doors on the bus align with the path, resulting in a smaller step for passengers onto the bus.

Added to this is the application of bus bay design, whereby the pavement around the stop is also receded from the road, thus giving the bus extra room to pull into, making location of the raised pavement easier for the bus driver and facilitating traffic passing. This is especially important for the QBCs to work efficiently; it is no use for the buses to be holding each other up. The idea of bus bays, or off-street parking, is being toyed around according to John Flanagan of the DTO, for use along the quays in Dublin but it does not include raised paving as yet. While this would aid the elderly and encumbered shoppers etc., it would also help speed up the boarding process, therefore making the service more efficient.

Then there is the design of the shelter itself. There are two basic styles of design in use in Dublin, both with the same basic form as shown in the previous illustrations (see Illustration 4). Measuring a metre and a half wide by 3 metres long, both models feature; zinc protected steel supports, an extruded aluminium roof construction with hidden fixings for added security, toughened glass or polycarbonate glazing and polyester powder coated, Stainless steel fittings (Queensbury, 1996, pg.3). The black, pitched roof version, introduced to four city centre locations in 1996, has the addition of 4mm bronze polycarbonate roof panels.

Interestingly enough, the design of this new model is visually linked to the surrounding street furniture; the black telephone boxes, the information board and even the rails of Trinity college (see Illustration 5). Adshel and Dublin Bus complain of a difficulty in getting planning permission for shelters in the city centre (McCabe & McBride, 1996). The reasons for this are twofold; Dublin Corporation fear that advertising hoardings will upset the street architecture, and similarly, shop owners object to the shelters obscuring their shop fronts. The introduction of this new design in late 1996 then is an attempt by Adshel, to redress this situation through design (McCabe, 1996).

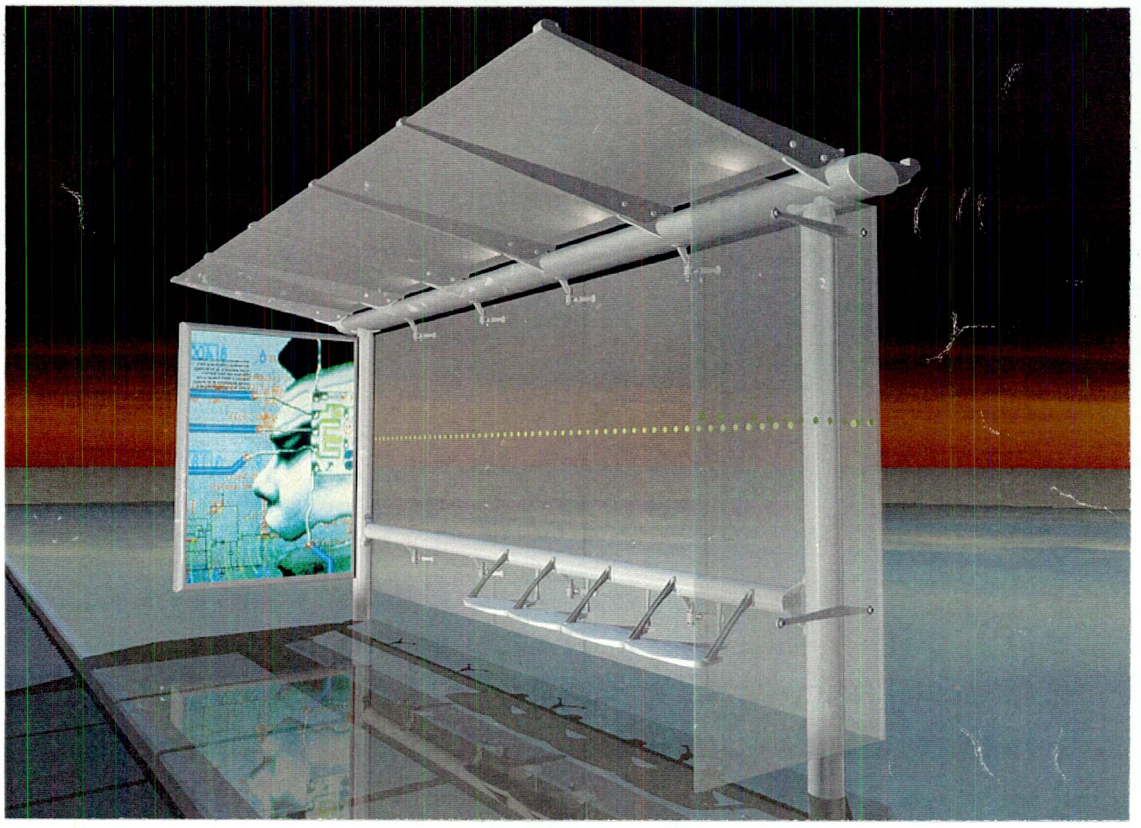
Seating is another important consideration in the design of bus shelters. While at peak times it is unnecessary to provide seating due to the frequency of the service, there are slack periods most days whereby seating, or simply something to lean against, is needed. At Nicholas Grimshaw & Partners, Brian Jennings and his team overcame this conundrum,

ILLUSTRATION 5 : New Black Shelter and Street Furniture


to have or not to have a seat, by incorporating an extruded beam, that encourages a leaning motion rather than sitting, into their design for Cemusa in Madrid (See Illustration 6). This gives passengers the option of taking the weight off their feet while they wait without suggesting that they will be stuck there for any length of time. This extruded beam is cheap and easy to manufacture while also being rugged and requires little or no maintenance (Jennings, 1996). Individual bucket style aluminium seating, again well designed (easy to clean, rugged but aesthetically pleasing) is also available and combined with these bars at certain stops.

Another problem with existing bus shelter and stop design is the lack of provision for bins. It seems logical that any area where people are forced together will have a certain amount of litter. Added to this is the fact that since smoking is prohibited on the vehicles there is a proliferation of butts left on the ground around the stop. This not only gives the area a sloppy appearance but also affects peoples view of the bus service (Cosgrove, 1996). New, strict litter pollution legislation was passed in 1996, and while not enforced as yet, it will have important implications for bus stop design (Appendix A). It requires all occupiers of premises that are used wholly or partly for the purposes of a bus or rail station, airport or seaport, including the surrounding pavement and kerbs to prevent or limit the creation of litter at the premises, land or in the vicinity (Appendix A). As far as Adshel are concerned, this means that they will have to include a bin where it is deemed necessary, if there is not one in the area already, and provide for the removal of the litter (Appendix A).

ILLUSTRATION 6 : Bus Shelter Design for Cemusa



This does not mean that Adshel will be emptying the bins however, that will be done by the Corporation or Local Authority.

The size and position of these bins, as well as their aesthetic, maintenance and functional aspects, will need to be considered. This Litter Bill must be seen as an opportunity to enhance the user experience, not just as legislature that must be adhered to. There is no necessity for bins to be ugly and difficult to maintain as the German designs in fig (a) (Illustration 7) illustrates. These bright, raised bins are clean, easy to maintain; note the simple locking/opening mechanism on the side and the clearance for street sweepers underneath. The mouth of the bins are tilted to facilitate the placing of litter inside as well as to stop wind scattering the contents.

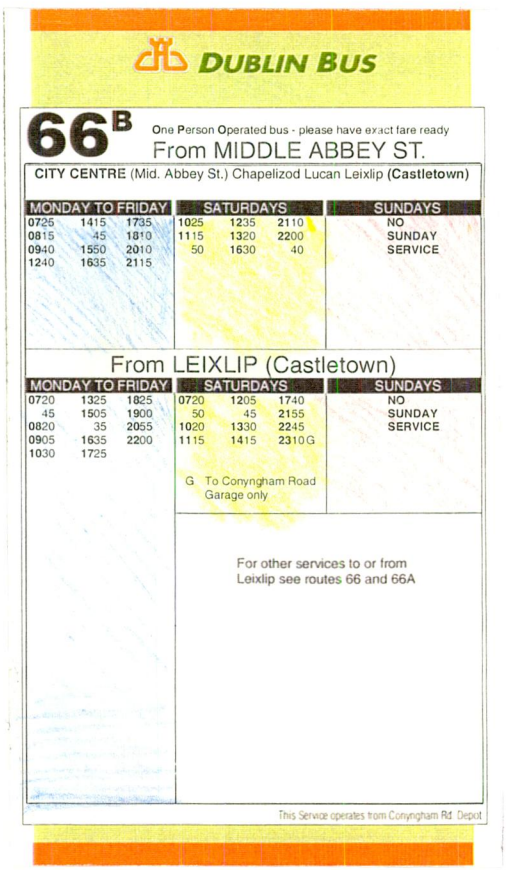
The timetable is located on a barrel-shaped device that rotates around the pole (see fig. (b) on Illustration 7). This Device is also used on shelters. It was designed here in Ireland and is now sold successfully to bus companies in a number of European and Baltic countries (McBride, 1996). A clever, cheap and simple design, it consists of a two piece construction that is secured around either the pole itself, or a special fitting incorporated into the shelter design (see illustration 7). Once secured it rotates freely allowing information be displayed around the entire circumference.

The timetable itself is printed in two parts with an adhesive on the back and is simply stuck onto the 'barrel'. While not entirely vandal-proof, the device is constructed from

## ILLUSTRATION 7 : (a) German Bin Design, Oberhausen



## (b) Timetable Carousel & Timetable Graphical Layout



DUBLIN BUS

**66B** One Person Operated bus - please have exact fare ready

From MIDDLE ABBEY ST.

**CITY CENTRE** (Mid. Abbey St.) Chapelizod Lucan Leixlip **(Castletown)**

| MONDAY TO FRIDAY | | | SATURDAYS | | | SUNDAYS |
|---|---|---|---|---|---|---|
| 0725 | 1415 | 1735 | 1025 | 1235 | 2110 | NO |
| 0815 | 45 | 1810 | 1115 | 1320 | 2200 | SUNDAY |
| 0940 | 1550 | 2010 | 50 | 1630 | 40 | SERVICE |
| 1240 | 1635 | 2115 | | | | |

From LEIXLIP (Castletown)

| MONDAY TO FRIDAY | | | SATURDAYS | | | SUNDAYS |
|---|---|---|---|---|---|---|
| 0720 | 1325 | 1825 | 0720 | 1205 | 1740 | NO |
| 45 | 1505 | 1900 | 50 | 45 | 2155 | SUNDAY |
| 0820 | 35 | 2055 | 1020 | 1330 | 2245 | SERVICE |
| 0905 | 1635 | 2200 | 1115 | 1415 | 2310G | |
| 1030 | 1725 | | | | | |

G To Conyngham Road Garage only

For other services to or from Leixlip see routes 66 and 66A

This Service operates from Conyngham Rd. Depot

tough injection-moulded polypropylene and is so economic that Dublin bus can quickly replace them. Moreover, due to the simplicity of attaching the timetable and advertising (usually restricted to Dublin Bus offers and new service information) information can be easily and quickly updated.

The size of the device is also clever in that it can hold a good amount of information, almost the equivalent of three A4 sheets of paper, thus allowing very good sized text and therefore clarity. Indeed the only poor aspect to this design is that, in order to install them, Dublin Bus had to remove a number of bins that used to be attached to the poles. However, these bins were realistically too small to have been any real use, and indeed should never have been attached to the pole in the first place; the location of a bin at the top of the queue for boarding is more of an obstruction than anything.

Then there is the actual graphics (Illustration 7 (b)). Recently, Dublin Bus changed the colour of many of its stops from a natural green to blue. The blue is representative of a new service, and the change is being used to emphasise a change in attitude of the company; a company facelift (Cosgrove, 1996). The logo itself is a bright orange which stands out on both these colours. use bright contrasting colours, different colours for the three, Mon-Fri, Sat and Sun, services and a clear Helvetica font.

It is in the information itself where the poor design really comes out. Firstly it is not clear enough whether the bus is going to or coming from the city centre. While this may seem

obvious to regular or local users to tourists or visitors it is especially confusing. In fact, rather than tell the customer where the bus is going to the timetable highlights where it is coming from. Here the hierarchy of user needs is overlooked; the most obvious and important piece of information here is where the bus is going to. Primarily towards or from the city centre and afterwards where in the city centre. This could be achieved quite simply through colour scheme alone; having one colour for all inward journeys and a different one for outbound journeys. This would give those unused to bus transit a certain degree of confidence in the system, as well as making it easier for tourists to get to grips with it.

Presently Dublin Bus are seeking to upgrade its bus shelter design. Having reverted to glass backs rather than plastic, due to the quality of the material, they are now going to test their first communications system in a shelter in Lucan (McBride, 1996). Located beside the Superquinn shopping centre, an ideal location in that it has a certain amount of security, a speaker is being fitted to the roof of the shelter giving information on the status of the next bus, if it is late, if so when it will arrive and so on. This is a significant development as an immediate response to a hold up is highly preferable to waiting 'in the dark'. It brings some of the 'luxury' associated with train stations to the bus stop. In design terms however, a visual display suitable for those with hearing disability, ideally combined with the aural information for the sight-impaired is a preferable solution.

ILLUSTRATION 8 : Stansted Airport

These improvements along with the new city centre designs show that there is a growing understanding of the importance of this aspect of the journey. As this chapter shows, a clear and recognisable design, flexible in terms of size, colour and style, as well as being clean and easy to maintain is possible, economically viable and ultimately profitable to the entire system.

The shelter designed for Cemusa (ILLUSTRATION 6) used to describe a suitable seating system, is a good example of how a practical, modular design can be stylish as well as functional. Its flexible design can be assembled in a number of permutations; from the basic one sided to the double sided construction, to free standing seating. A number of additions are available, such as a telephone, bin and advertising hoarding. The cast aluminium seating, resembling a breast Illustration, along with the glazing bracket details give the design a similar aesthetic to that of modern airports and train stations, Stansted airport being a perfect example (see Illustration 8) thus raising the profile of bus travel. There is no reason why a similar approach, perhaps with an aesthetic more specific to, and therefore reflective of, Irish culture.

## Train Stations

At the moment the image of train stations in Dublin is poor. At the top end of the scale there is Heuston station. The dignified facade mocked by a dark, grimy interior, it forms the backbone of the city's public architecture. Here is an illustration of the potential and

the extent of the work that needs to be done. Presently Irish Rail is waiting for money to begin its station improvement scheme in 1997. This includes a renovation of the Heuston station interior, as well as the upgrading of many of the DART stations (McArdle, Nov1996).

DART stations, and indeed Railway stations in general, have a number obvious advantages over bus stops in terms of design. The fact that they are within a controlled environment means that security issues and those of shelter and access to the system can be efficiently dealt with. Maintenance remains important however, and litter problems are as much a factor here as at bus stops. Indeed, in most cases, all that Dublin train stations really need is a thorough cleaning, a paint job and more extensive sheltering at many suburban stations.

However, in some cases accessibility, while not a problem in getting onto the actual vehicle, can often be difficult when it comes to getting to the platform itself. As in Salthill (Illustration 9) one of two stations rebuilt especially for the opening of the DART suburban line in 1984 (Grainger and Cuffe, 1988, pg.7) the problem is often traversing the track. The steps up to the bridges effectively deny the mobility impaired access to the service. While this problem is dealt with through underground walkways in city centre stations, the fact is that accessibility cannot be a token gesture; the system is either fully accessible or it is useless to those with mobility problems.

ILLUSTRATION 9 : Salthill DART Station, Dublin

Indeed, the Salthill example illustrates another common problem with suburban stations. While there is a bus shelter-type construction present, there is no reason why the entire platform cannot be sheltered, using a system that fits in with the surroundings. Shelter in a country with as much rain as Ireland is not as much a luxury as a necessity on a rail service. What impression can the customer have if they are expected to brave the elements in order to use this 'premier' service?

This attitude on the part of Iarnrod Eireann is also visible in their inadequate provision of bins. While all stations have bins, there are simply not enough, perfectly illustrated by the proliferation of litter on the tracks. This degrading of the appearance of the service could be greatly reduced by the addition of more bins; it would cost more to buy and maintain these bins than it would to continually clean the tracks. The new litter and pollution bill should go some way to encouraging Iarnrod Eireann to address this elementary problem.

# Chapter 3

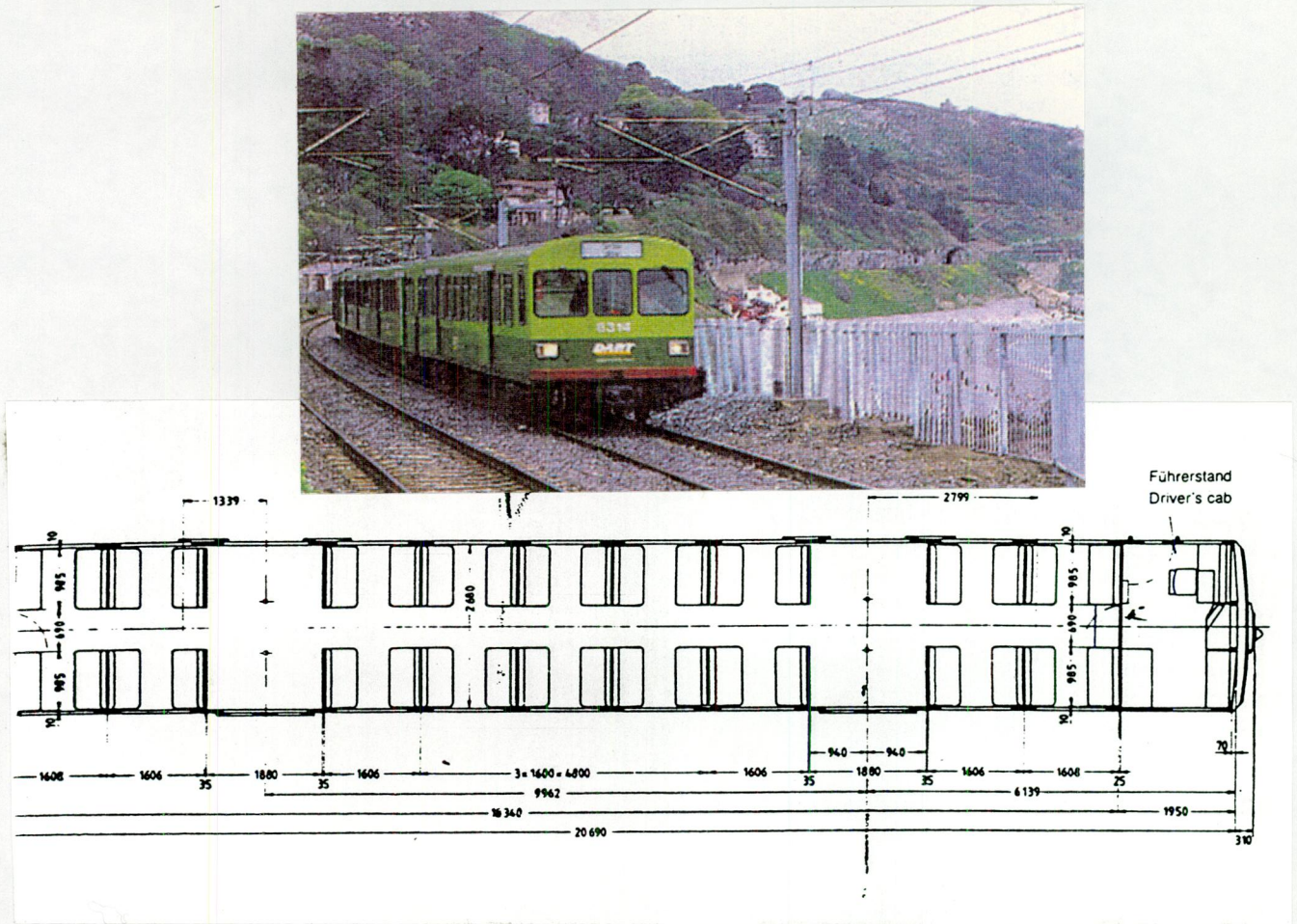
## Bus and Rail Vehicle Design

This chapter deals with the next, and possibly most impressionable stage of the journey; the design of the vehicles. Be it a bus, tram or train there are basic user requirements that must be in place. First is an examination of the highly popular and successful DART service. In design terms this is a transport success story and compares favourably with other European services. Then the new Volvo and Leyland buses are analysed, along with a discussion on the design implications of double decker buses as opposed to single deckers. Rather than discuss the vehicles in terms of the system as it exists, this chapter assumes that the problems discussed in the previous sections have been dealt with. In this way it should give an indication of how the existing vehicles would fare in a totally designed system and thus highlight the weak points in the overall system.

## The DART design

The DART service, an integrated Rapid Transit System, was introduced on 23 July 1984 with its official inauguration on 22 October (Iarnrod Eireann, 1988, pg.48). It

## ILLUSTRATION 10 : DART Design




### Table of losses

| | 1995 | 1994 | 1993 | 1992 | 1991 | 1990 |
|---|---|---|---|---|---|---|
| REVENUE | | | (millionPounds) | | | |
| Passenger Traffic | 12.60 | 11.80 | 11.60 | 11.20 | 10.70 | 9.60 |
| Misc | 0.40 | 0.27 | 0.19 | 0.19 | 0.25 | 0.23 |
| Total Rev | 13.00 | 12.00 | 11.80 | 11.40 | 11.00 | 9.90 |
| **Total Expend** | **22.95** | **21.40** | **21.30** | **21.20** | **16.00** | **15.00** |
| Operating Deficit | 9.90 | 9.30 | 9.50 | 9.90 | 5.00 | 5.00 |
| Interest | 3.90 | 4.80 | 6.00 | 5.10 | 10.50 | 11.20 |
| **Annual Deficit** | **13.80** | **14.10** | **15.40** | **15.00** | **15.50** | **16.20** |

heralded a new lease of life for suburban rail transit (see Illustration 10). With its initial capacity to carry over 80,000 passengers per day, up to 25,000 per hour at peak times, soon to be greatly improved by the introduction of new car sets and an upgrade of the electronic signaling system (Iarnrod Eireann, 1996, pg.1) the DART remains a key part of Dublin's public transport system.

Work on the construction of the Howth/Bray line began in 1980 and involved:

> installation of a new signaling system
> Electrification of 38k of double line railway
> Renewal of track
> Provision of a new train maintenance depot
> Modernisation of 23 stations and building of 2 new ones
> Provision of new passenger train fleet of 40 2 carriage trains
> (Iarnrod Eireann, 1984, pg. 3).

This represented investment similar to the proposed112 million pounds for the LUAS it is interesting to note that although the service is highly successful it remains heavily in debt; indeed Revenue from passenger traffic has never even come close to covering maintenance, infrastructural and operating costs (see table, Illustration 10) (Fitzpatrick, 1996, pg. 12). So is the 13million deficit worth it in terms of design?

Firstly there is the identification of the train. There should be no initial problems with the identification of the correct train in that information regarding its destination will be given at the station. The green colour of the train forms a visual link with the bus service which is desirable while also gives an obvious sense of nationality to the service. Graffiti on the exterior of the train does not seem to be as much of a problem as in other countries; from

personal observation German and Finnish suburban lines suffer badly from this form of visual vandalism, which can greatly degrade the image of a service. Cleanliness is an issue which should be looked into though; many of the trains can appear dirty, and while green is not a particularly bad colour for showing up dirt, it is when the passengers come into physical contact with the exterior, rushing towards a door, or on the doors themselves, that it becomes a problem.

The doors themselves slide apart along the exterior walls of the carriages but it is when they close that the first real glitch in what is so far a good design is noticed; while the closing mechanism is controlled by the driver, there is no automatic signal to let passengers know that the doors are to close, it is a simple whistle. Now while this may seem a perfectly fair if somewhat antiquated solution to the problem it does not consider the hearing impaired. By hearing impaired I do not only mean those with a form of deafness, but also those wearing walkman headphones for example. This also does not take into account the fact that somebody must be there to blow the whistle. A more effective design solution would be a beep or tone emitted along the length of the carriage coupled with an indication light, amber being a suitable colour from a psychological point of view. Accessibility is not an issue here with the platform height being the same as the floor of the carriage and only a minimum gap to traverse.

Once inside the carriage the initial feel is good. The green colour theme is continued on the seat upholstery, which is surprisingly untarnished in most cases, and the single glazed

windows, at 1200mm wide, are a good size for taking in the varying views of the city and the suburbs. Indeed this large window size is a design feature that has been built into many modern services such as the Helsinki Metro (which has most of its journey above ground). The thinking is that the combination of a bright interior and good view of the exterior cuts down on a claustrophobic feel while also adds to the 'feel good' factor.

A medium brown is used on the floor and a sparkled fleck a classic ploy in hiding the daily build up of dirt, but perhaps the design here need not have been so obvious. "The floor covering is made of water-tight non-slip synthetic material and is incorporated into the side wall paneling up to a height of 300mm, thus facilitating easy cleaning"(Iarnrod Eireann, 1984, pg.4).

The seating arrangement is symmetrical, double seats facing each other both sides (see previous Illustration) a common arrangement for suburban services and again similar to Helsinki. Standing area is restricted to around the entrances and exits, and since the trains are symmetrical, the side with the unused doors tends to hold most of the these (the use of side doors does not change along a given journey). There is no provision for baggage space overhead as it is rightly deemed unnecessary, and the resulting space is used for advertising; a useful way of recouping revenue. If DART service was extended to airport-baggage.

An interesting aspect of the design of the service is the automated signaling system. The high frequency of DART, 5 mins peak times, 15 off peak, necessitated the implementation of computer controlled signaling which incorporates automatic routing and in-car signaling (Iarnrod Eireann, 1988,pg.13 ). The lineside signals are electric colour light signals but as an extra safety precaution all signals are repeated on a console in the driving cab of each unit. Running speeds are displayed to the driver and brakes are applied automatically if the driver does not comply with that speed. The whole operation is monitored from the Central Traffic Control room in Connolly station (Iarnrod Eireann, 1988, pg.19). Another example of well applied engineering design is in the use of electricity in the system. The trains are powered by 1500V DC power received from overhead cables. But when the trains are braking the motors are switched to generator mode and so the Kinetic energy from the wheels is converted into electrical energy and is put back into the circuit. It is a pity that this design philosophy is not applied to other aspects of the Transport system such as the wastage of the ticketing.

With a capacity of 25,000 passengers per hour between Bray and Howth, DART is the strong limb in Dublin's Public Transport system and in terms of the vehicle itself, is a testament to good design. However in terms of comfort, while the cars themselves are well equipped the service is not;

> *Comfort has become a victim of the DART's own success. Some 40% of all DART travellers use the service going to and from work, there is a substantial overcrowding on the trains morning and evening. And the 5% growth in passenger numbers in 1995 being followed by a 7% increase in the current year, means that the overcrowding at peak hours is getting worse. Each train has 6 carriage units at peak hours but even these cannot cope adequately* (Fitzpatrick, 1996, pg.12).

**Dublin Bus design:**

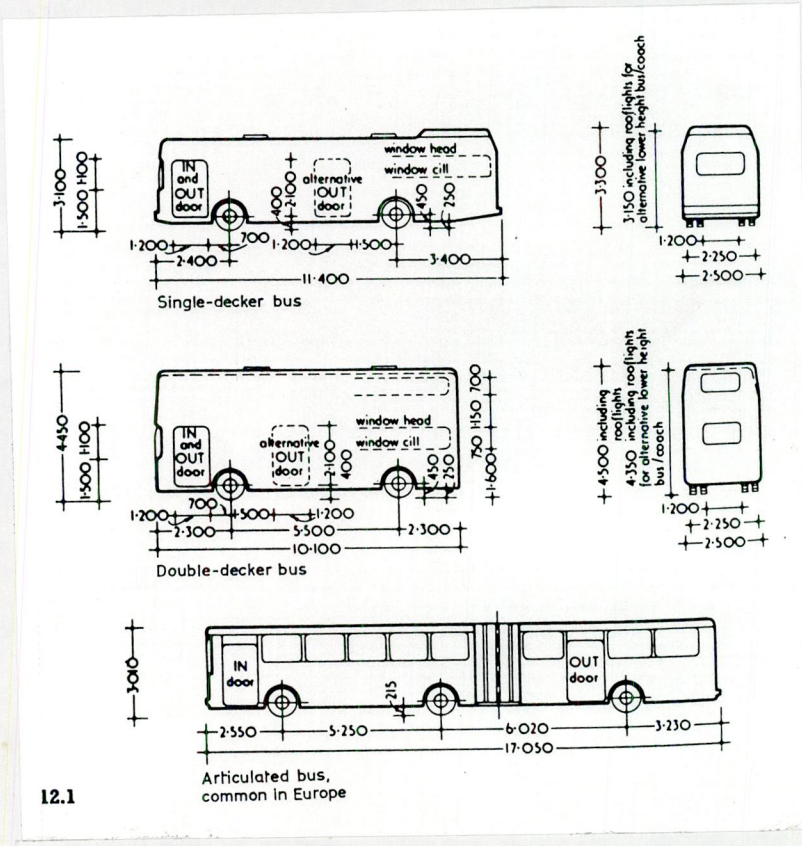
Now I will consider the bus service, the poor relative of the DART. It must be noted that buses are ignored at the expense of the overall transport system; as Baguelin and Thomas said in their review of French flat floor buses;

> *..it must be pointed out that underground and tramway systems require a complementary road transport network, with the proven flexibility of the bus* (Baguelin & Thomas, 1992, pg. 269).

In recent years Dublin's bus fleet has been extended to include single decked buses and minibus services. The single deckers (see Illustration 11) are used as part of a high frequency service known as City Swift; buses run every 5-10 mins at peak times and 15-20 off peak. These buses are new and well designed for the most part. Lower floors and no tricky stairs to negotiate (leaving good space for standing and luggage but ultimately less passenger space) make it a more accessible option than double deckers.

The colour scheme for this service has been change from green exteriors to white with blue and orange stripes, clearly separating it from other services. With only one low and clearly marked step to climb it promotes quick entrance and departure. Unfortunately, as with all services, the centre doors are only there for emergency or exiting at termini. This is due to the fact that it is the drivers who are culpable if anyone gets hurt not the company, and with the stops as badly designed and maintained as they are the driver simply does not take the chance (Cosgrove, 1996).

## ILLUSTRATION 11 : Bus Design


12.1

While this can be attributed to politics and trade unionism it is also an admission of the insubstantial design of the stops. Logically, if there was exiting at centre doors, the journey time could be improved, as boarding passengers would not have to wait for others to exit though the same doors first.

Inside the colour scheme is cool greys and turquoise, a somehow soothing combination especially in comparison to the mucky green interiors of the old double deckers. The seats are well designed and with a good layout. The seats to the left of the entrance have their back to the window and have suitable rails for helping the elderly. Right across from these is space for luggage. From then on the seats are laid out perpendicular to the windows with two on either side (except near the from where there is only one seat for two rows against the left handside of the bus looking towards the drivers cab). There is a gap for standing passengers, in order to keep capacity at a reasonable level, opposite what should be the exit doors.

Throughout they are individual seats as opposed to the double seats on double deckers. These single versions guarantees each passenger a fair amount of sitting room. The upholstery is a medium cool grey with lines of rainbow-like colour adding a suitable amount of life to the surroundings. The material used, as with all of the services is fire retardant. The rear of the seats are recessed to afford each passenger more leg room. The fluorescent lighting is particularly bright, and facilitates reading. However, perhaps a more subtle approach, a soothing yellow light, might be more appropriate. The windows

are large and tinted, although they tend to build up an awful amount of dirt and because it is only a single decker the views are hardly inspiring.

The grip rails at 35mm are a good diameter for those with arthritis and the buttons are the easy push one but the surface on the poles should be more tactile; they have a shiny chrome or, the slightly better, black coated finish. A 'bus stopping' indication sign is incorporated into the design to allow passengers, especially the elderly, know whether the bus is stopping; previously they became uneasy if they were unsure and did not know if they got a response from the bell. The bell also has a feature designed in whereby once it has been depressed once and the bus stopping light appears it stops ringing, thus giving the driver some piece of mind.

Overall they are a vast improvement in design terms over the old double deckers, with their insufficient lighting, dirty interiors, and lack of standing room. With lower floors than the previous Bombardier buses, a bright interior, a greater number of grip rails and well designed stop buttons the new fleet, are comparable with any good service.

Dublin Bus have bought a number of similarly designed double deckers. These share the same colour scheme and low floor, but the real question in design terms is the viability of double deckers. Dublin Bus are in quandary here; while they realise the problems associated with double decker design, people not wanting to go upstairs and therefore causing crowding downstairs, the negotiation of the stairwell with baggage, the question

is one of capacity; single deckers cannot compete with double deckers in this regard. On the continent this problem is solved by having double-length buses with an accordion style articulation between the two sections. However Dublin Bus had a number of those buses on trial around Dublin a number of years ago and the quality of the roads and the complexity of the street layout simply was not suited to those vehicles (Ryan, 1996).

Perhaps what is needed here is some lateral thinking. Work on the advantages of Double Deckers, their charm; the view from the top deck, the fact that apart from Britain we are among the few using the vehicles. The double decked city tour buses are the most successful service run by Dublin Bus and even the upper deck on the regular service is extremely popular with visitors to the city during summer months (Cosgrove, 1996). While novelty is not enough economics does have a part to play. At present many people have no problem using double deckers. Indeed every morning, on most suburban routes the upper ties can be seen crammed with passengers.

What is at issue here is quality of service; trying to up the image in an attempt to lure people from their cars. Double deckers won't do this; but coaches have the design semantics that can appeal to this market. It is a question of marketing; what these 'new' customers are after is a service that will replace the luxury of their car, accessibility is not an issue for these passengers but, to an extent, mixing with other commuters is. A coach has the right visual messages for this market. The quality of buses, single and double decked, is as good as can be accepted so a new product is what is needed.

# Chapter 4

## Design Solutions to Dublin's Transport Problems:

So it seems some of the pieces are in place for a successful system; the DART, the new Dublin Bus fleet, a tendency towards a change in attitude on the part of the Corporation and DTO towards "Park and Ride" and the much needed EU funding. Yet what remains to be done must be designed. What is crucial at this stage is consistency and attention to detail. For example, to build a bad Parking facility would have a negative effect on the whole system. It is imperative that any effort is fully thought through from a consumer standpoint; it is only then that the real ergonomic issues of how the system is used will be visible.

From the figures shown in Illustration 12, taken form the last Dublin Transport study compiled in Dec 1991, passenger numbers on Iarnrod Eireann's Dublin services doubled between the introduction of the DART service, in 1984, and 1987 (Davies Gleave, 1991, pg. 36). However, if these figures are taken in a broader context, as Illustration 13 shows, then the true impact of the car on public transport can be seen (Davies Gleave, 1991, pg.33). The drop from 225 million passengers in 1974 to 185 million in 1991 gives a clear indication of the battle public transport is fighting. Interestingly enough, the 'design success' that is the DART is losing 10M pounds a year (Fitzpatrick, 1996, pg.12).

**ILLUSTRATION 12 : Indexed Passenger Growth on Iarnrod Eireann Services.**

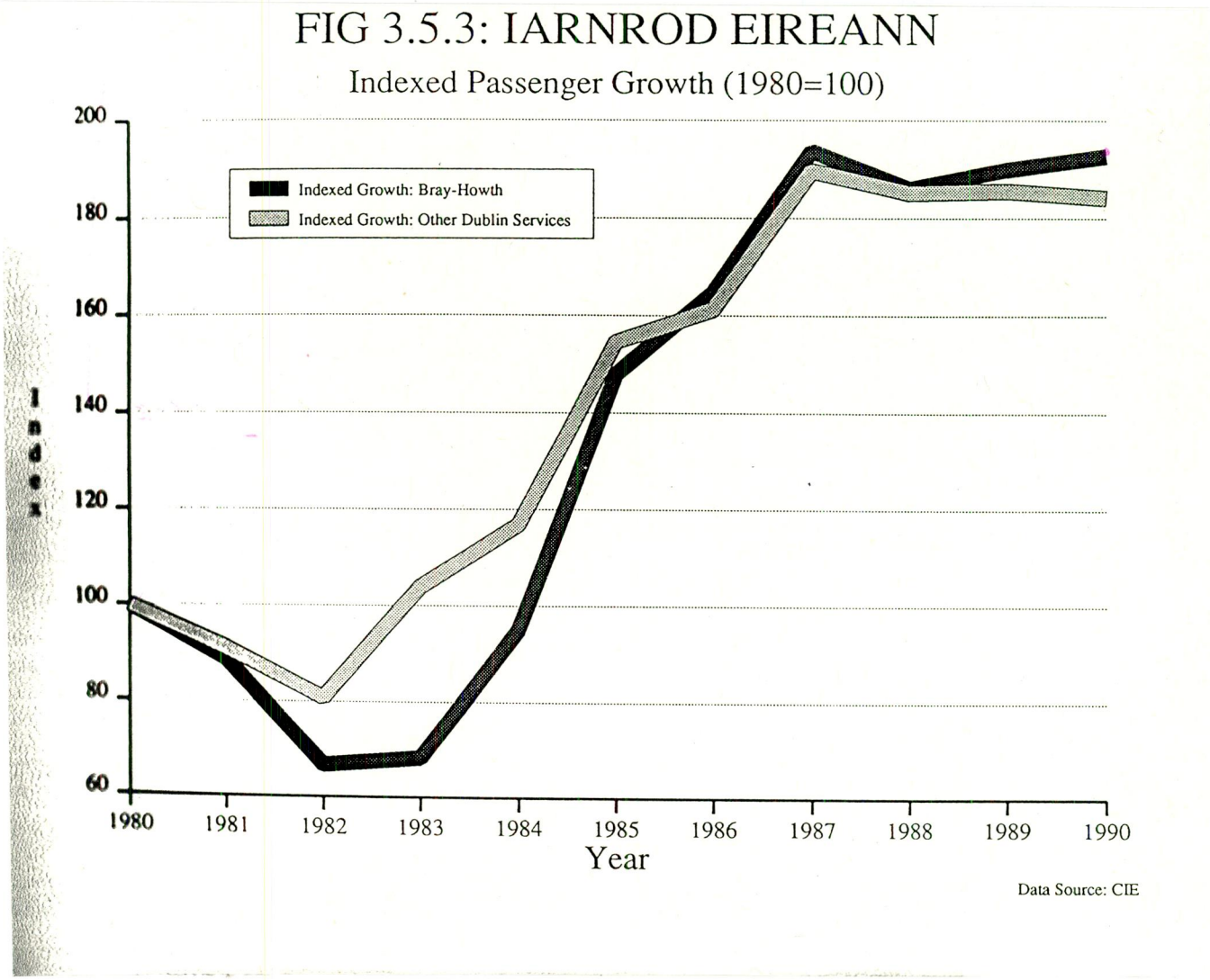
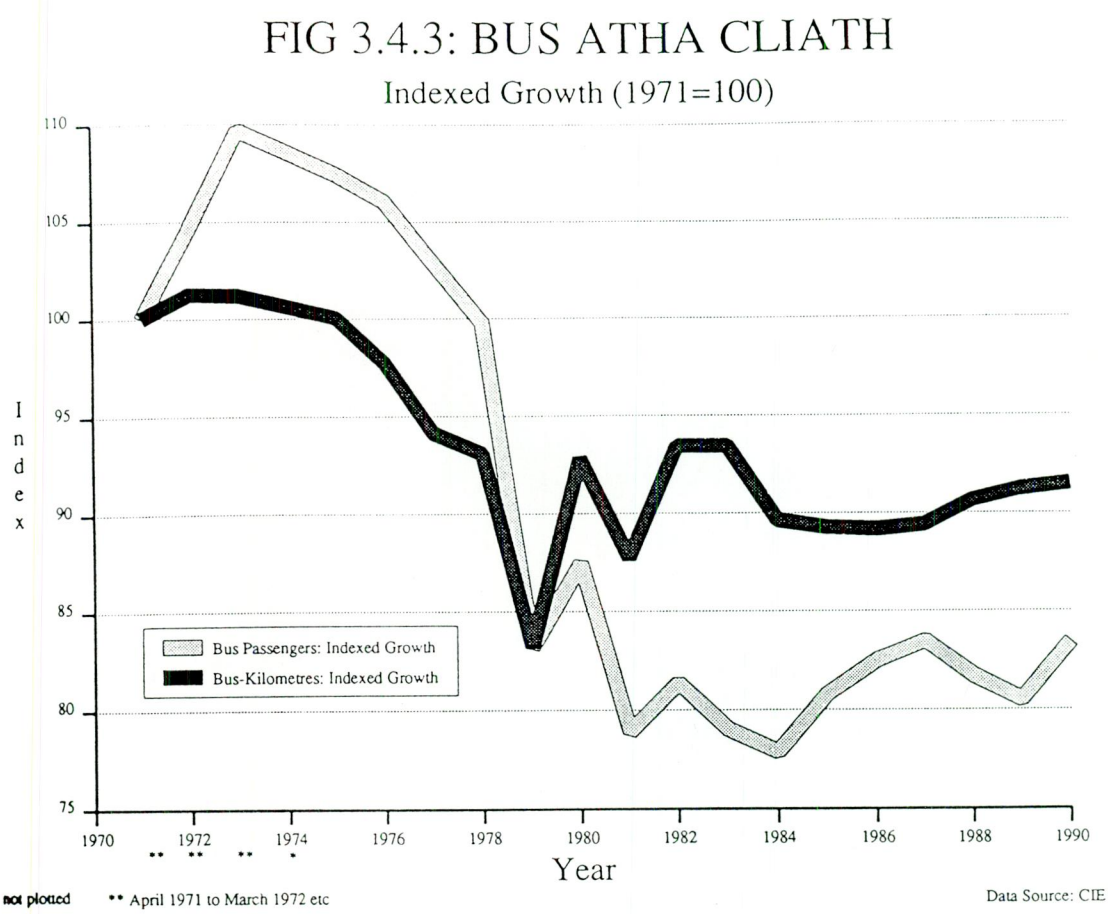
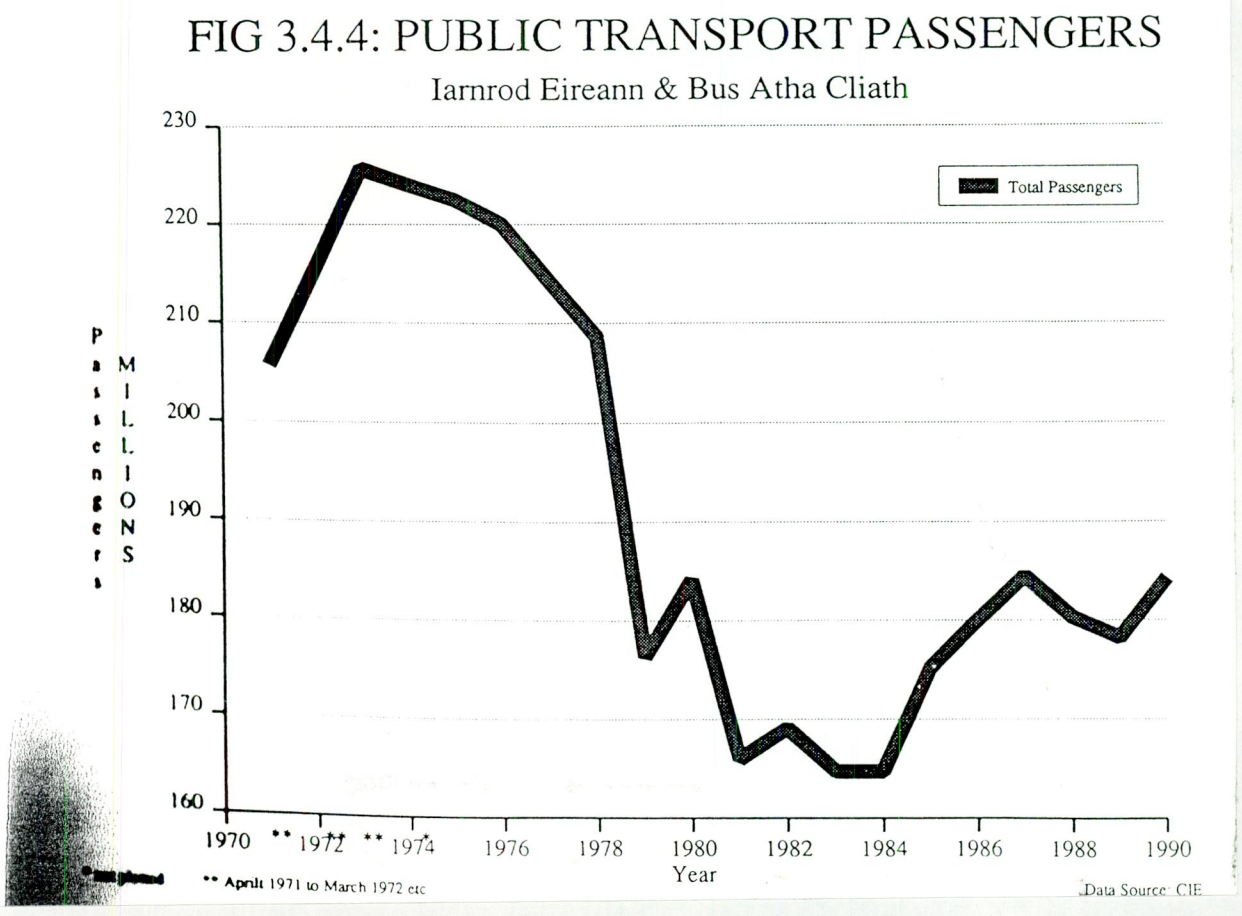


**ILLUSTRATION 13 : Indexed Growth Figures 1970-1990.**



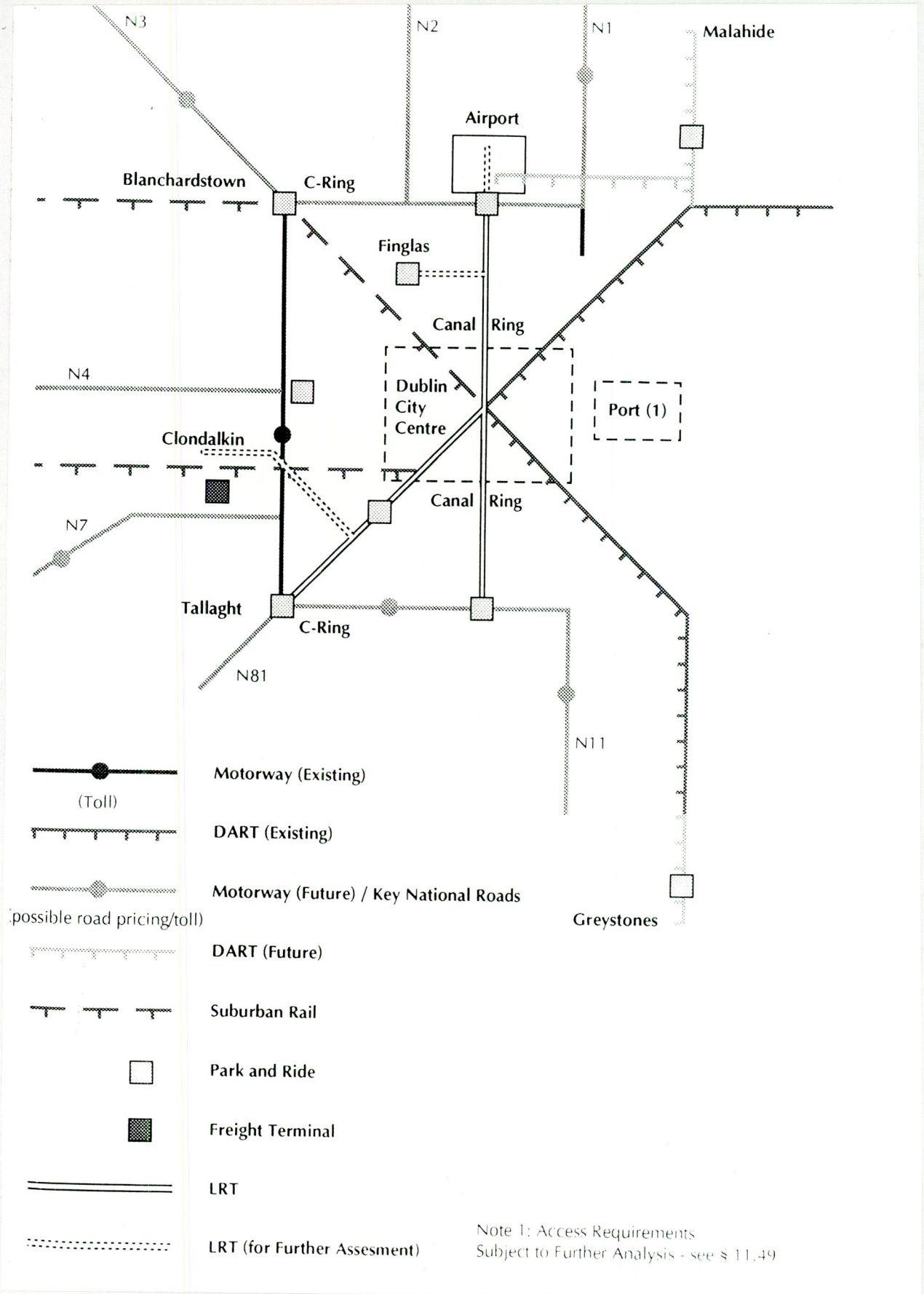
While this thesis has pointed out that this is an isolated service, isolated by the inadequacy of the system infrastructure around it, it still illustrates that design does cost money in the short term.

It is also apparent however that the city needs a designed public transport system. The much publicised LUAS is an indication of this as is 'Operation Freeflow' and the recent introduction of QBC's. In many design aspects LUAS does score highly; it is non polluting, accessible and a source of civic pride (LRT, 1996, pg.2). However, its inflexibility in capacity terms, the LUAS holds 200 people while the DART carries 1500 per six car coupling at peak times, and in terms of routing makes the former a systematic nightmare. And from its position on street level and its basic similarity to the bus service, as Ms Mary Harney pointed out that "It seems that LUAS is designed not to force people out of cars but out of buses" (Harney, 1996, pg.12).

There is a place for systems like LUAS, but, as the DART experience has borne out, the system must be improved before another link is added. The overall system must be carefully considered; mobility is a key word here. For example, presently there is no rail link to the airport. In terms of infrastructural design, surely this is more of a priority than the proposed LUAS line. This basic need was highlighted when Dublin Bus began a special airport service, a single decker bus with added luggage space and having Busaras, located beside Connolly train station, as its terminus. This service quickly became the most profitable route, with greater revenue than the seasonal sight-seeing tour buses.

## ILLUSTRATION

### 14 : Key Recommended Strategy Elements 2011 (Diagrammatic)



Other basic links that are needed in the city's public transport infrastructure are; a rail link to the Dublin port, thus giving the environmentally sound option of rail rather than road transport for goods; and one linking the western rail line at Heuston station with the main north-south line at Connolly station. While the airport link was acknowledged by the DTI, as shown in their diagrammatic strategy in Illustration 14, the two further suggestions, while clearly logical in terms of a full transport network, have yet to be truly considered. However these priority links were clearly stressed in a paper submitted to the DTO by W. Fleming, a member of Dublin Bus. Simply titled "LINK," the article weighed up the benefits of the LUAS and concluded that a more suitable system would be the link along the river Liffey in Dublin, between Heuston station and the grand canal, connecting at Tara St. station (Illustration 15) and then a further circular rail 'link' that would follow the ring road (Illustration 16). This second link would connect the suburbs and the radial transport systems as they exist at present, giving passengers the choice of bypassing the city centre if needs be (Fleming, 1995, pg. 1). But while the implementation of the LUAS now seems highly likely, these suggestions by Mr. Fleming remain relevant. There is room for both initiatives, indeed the LINK argument was one of priorities rather than initiatives.

In design terms, the introduction of Bus and Rail stations, each with "Park and Ride" facilities, well designed surroundings, a simple, integrated ticket system and with the choice of a variety of market driven services, are ways in which the individual services can

ILLUSTRATION 15 : LINK, City Centre Bus and Rail Link, Heuston Link.

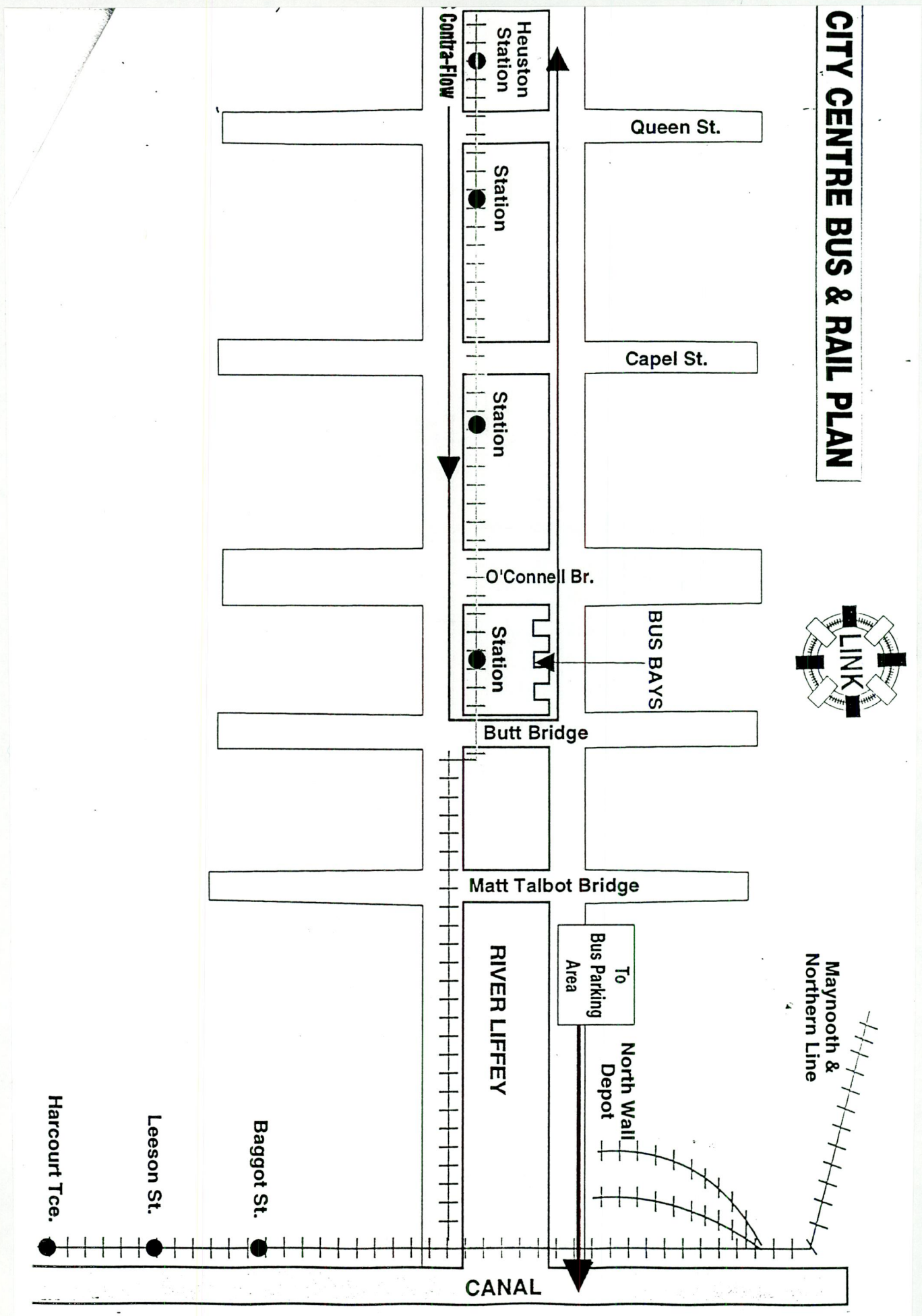
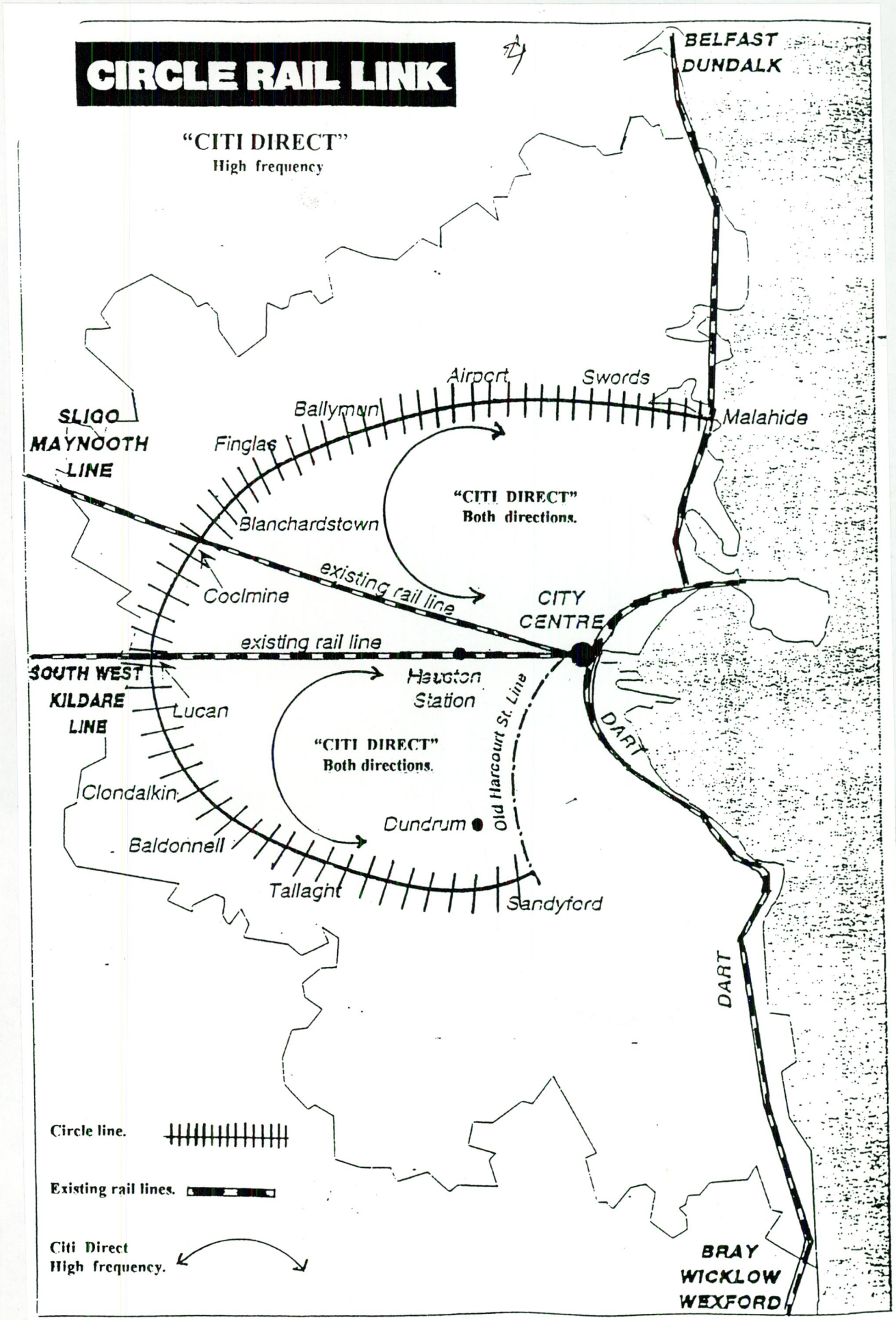


ILLUSTRATION 16 : LINK, Circle Rail Link and Circle Line Proposed Services.



be tied together to form a successful system. These services would include a DART as exists already, a double decker standard bus service, the City Swift, high frequency buses and a coach service for business class that serves peak morning and afternoon times and even the LUAS.

However, there is no point in creating inequality by restricting the basic design perks to certain routes. In terms of ticketing as discussed in Chapter one, there is a move towards greater integration especially important if the LUAS is to be successful. The need to integrate ticketing into any park and ride scheme also illustrates that the DTO and CIE are on the right track (Flanagan, 1996). Dublin Bus' initiative to change their ticketing to a smart card system could be crucial to the improvement of their service (Cosgrove, 1996). However they must be careful that the other transport companies are kept up to speed with proceedings so that the card system and validators on all modes of public transport can work in tandem.

As shown with the previous example co-ordination is the key to improving the system. Train stations too can only function properly if there is solid communication with the feeder bus system. Indeed, bus and train stations with "Park and Ride" facilities as discussed in Chapter two would prove an ideal local link to the public transport system. The flexibility of the bus and the speed and reliability of the train could combine to offer the customer a mode of transport that suits his or her destination. Moreover it would also serve as a means of good revenue for the transport companies in that shops and

commercial space could be rented in the same way as in main train stations around Europe.

Graphic design is another important area where improvement is needed. As Shown in Chapter I (Illustration 3)the different graphical representations by Dublin Bus and Iarnrod Eireann of the same City Centre to Leixlip route is a clear example of how the lack of co-ordination between these companies is reflected through graphics. The consumer must be presented with a standard system of visual representation. This way he/she will have a greater understanding of the breadth of options available, making the system more attractive in terms of mobility. This is the kind of attention to detail necessary for the system to succeed.

And who better to co-ordinate such a system than an industrial designer. It is the designer that best understands the needs of the user, the customer and the workers (Pullen, 1990, pg.211). It is the designer that can stand apart from the company politics and advise the DTO on what is best for the system, see the bigger picture, and therefore what is best for the companies in the long run. Raymond Loewy, who revolutionised the train aesthetic in the 1940's, discovered the importance of the small aspects of the system; his first design job for Pennsylvania Railroads was to re-design a bin (Jodard, 1992, pg. 48). So too in Dublin, it must not be just the vehicles and stations that are seen to be improved, it is *all* the parts of the system that people come in contact with that must be raised to an acceptable level. If the lives of the employees of the transport

companies are made easier through design, then through their satisfaction in their jobs the system will improve. Similarly, if the consumer is kept happy then their attitude will lift the employees, in turn helping the system.

# Appendix A

## Relevant excerpts from the LITTER POLLUTION BILL 1996

Published by the Stationery Office, Dublin 2
Presented by the Minister for the Environment 14th Nov. 1996
Note : To be made into an Act in 1997

16(1) Without limiting the application of section 6(4) where it appears to a local authority that special measures are required to be taken by an occupier of any premises to which this section applies in order to prevent or limit the creation of litter at the premises or on land in the vicinity there of, or both, caused or likely to be caused by the operation of the business of undertaking of the occupier, the local authority may, by notice served on the occupier, require the occupier to take such measures at the premises or on land in the vicinity thereof as the local authority considers necessary to prevent or limit the creation of litter and
provide for its removal.

(9) This section applies to an occupier of any premises that are used, wholly or partially, for the purposes of...
(g) a bus or rail station, airport or seaport
(h) a public car park
(i) a retail shopping centre
(j) a right of way restricted to the use of rail vehicles, or
(k) such other purposes as may be prescribed

(10) For the purposes of this section "land" means adjoining the premises to which a notice under this section relates that is part of-
(a) a footpath or pavement adjoining the land, and forming, or forming part of , a public road and any road gutter or at the side of any such footpath or pavement and forming part of a public road.
(b) any road gutter adjoining the land and forming of a public road, and
(c) any area of land forming part of a public road between any such footpath or pavement and the carraigeway (if any) of the public road and any road gutter adjoining such an area of land and forming part of a public road, and

"Land in the vicinity" means, in respect of premises of an occupier, land within a reasonable distance, as specified in a notice to the occupier under this section, not exceeding 100 metres of the premises.

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