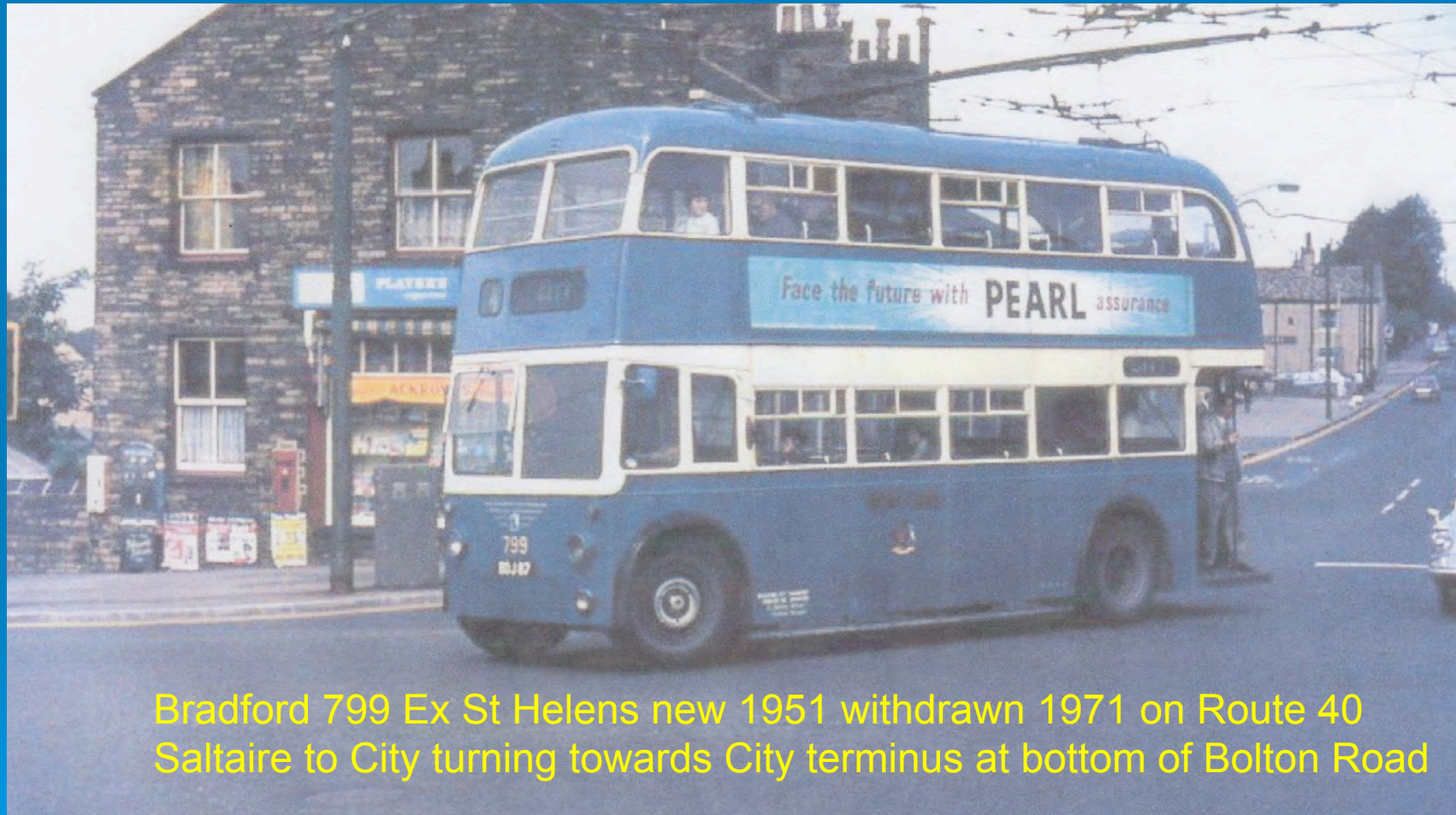




# WHITHER THE TROLLEYBUS?

Headingley Heart Centre 27 February 2013



Bradford 799 Ex St Helens new 1951 withdrawn 1971 on Route 40  
Saltaire to City turning towards City terminus at bottom of Bolton Road

D H TOWNSLEY C.eng. MIMechE. MCIM

- The last trolley bus to be put into service in Britain was built for Bournemouth in 1962
- The last trolley bus in Britain ran in Bradford in 1972
- Eleven years after the last Bradford unit ran a prototype demonstrator was built in 1983 but it never ran in public service.

The last Trolleybus built in Britain but which never ran in commercial service. On exhibition at Blackpool 23 September 1983



Now in the Trolley Bus Museum at Sandtoft Doncaster

## D H Townsley Personal Details

- Born Carlton Hill Leeds 1933
- Educated Central High School
- Chartered Engineer & Chartered Manager
- 40 years with Hunslet Engine Company
- 16 years with Mott MacDonald Ltd

Specialisms railway rolling stock and vehicle design, transport planning, vehicle specification, procurement and operation.

Accredited by Railtrack as a signatory for certificates of design and manufacture.

# The Aim of the Author

To kick start a logical and progressive programme towards a Realisable Cohesive and Economic Transport System for Leeds.

In this, NGT or any derivative of it is only a small, but important, part made all the more urgent by what is seen to be an un-necessarily expensive and inappropriate medium.

# INNOVATION

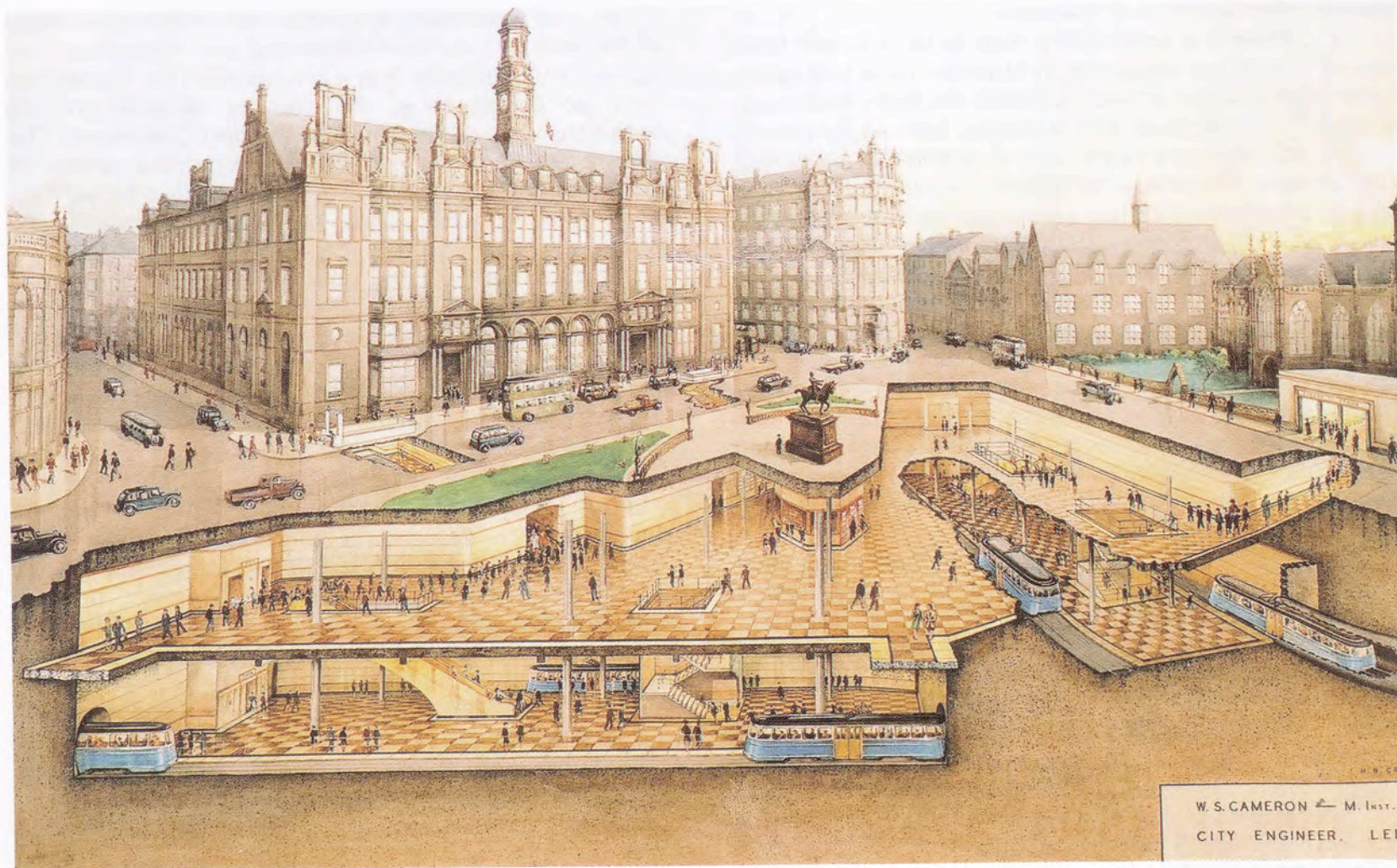
Historically LEEDS has  
been in the forefront of  
public transport

The background of the slide is a solid blue color. In the lower right quadrant, there are several faint, concentric circular ripples, similar to those created by a stone dropped in water, rendered in a slightly lighter shade of blue.

## A Brief LEEDS TRANSPORT HISTORY

- The first electric tramway in Britain 1891
- First British Trolleybus Services start simultaneously in Leeds and Bradford 1911
- Underground Tramway proposed 1945
- Two 'State of the Art' single deck cars 1953
- Last tram runs in Leeds 1959

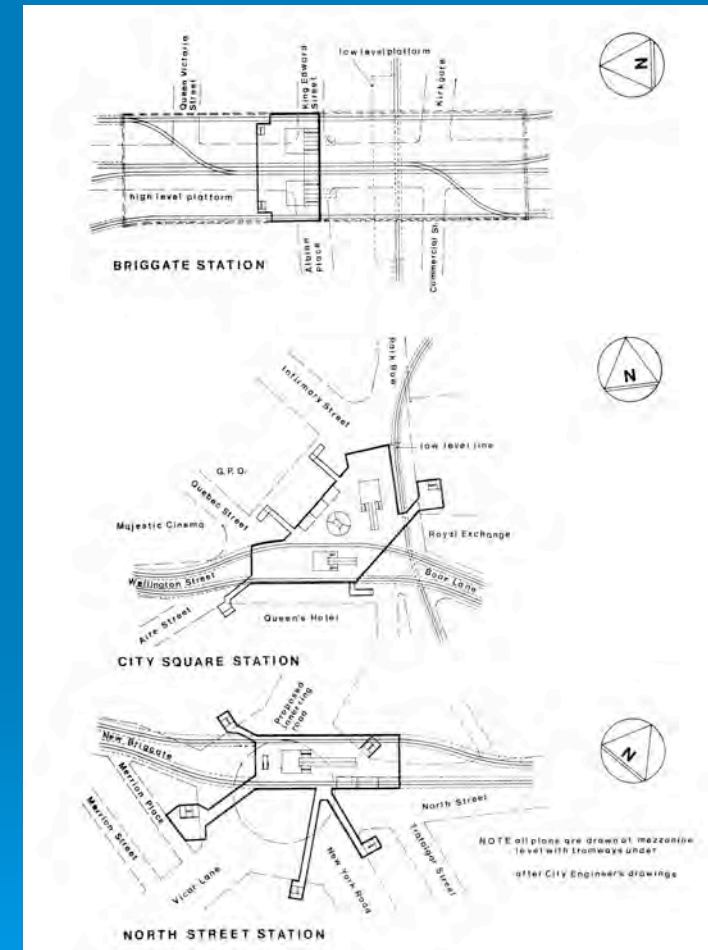
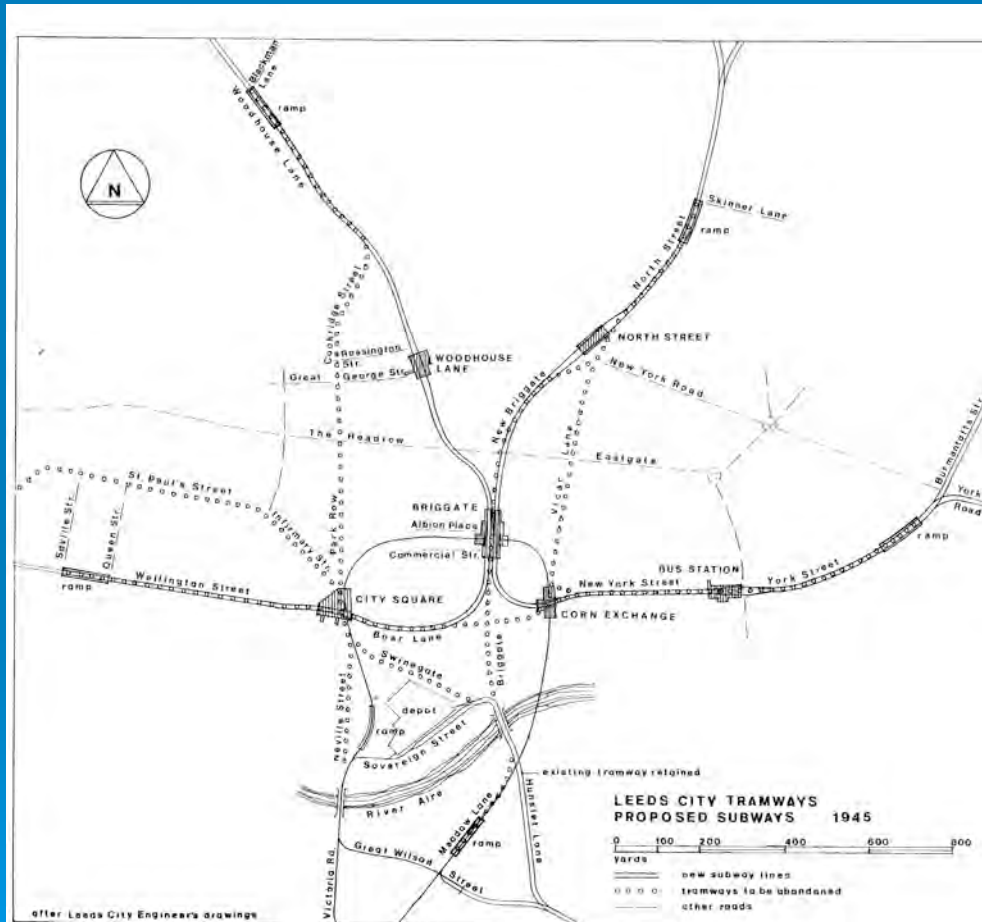




An artist's impression of the proposed subway station in City Square

Slide courtesy Jim Soper

# Proposals for underground tramway stations in Leeds 1945



Slide courtesy Jim Soper

*“I feel the time has come when the City Council must formulate their policy for the next 20 years. In my opinion we shall have trams for many years. The ultimate set up will probably be 200 to 250 modern trams and 600 buses compared with about 400 trams and 400 buses as at present.”*

*“ We hear criticisms of Leeds trams but if the critics could ride in a modern silent tram instead of one that is twenty five years old they would quickly change their minds”*

Alderman Donald Cowling – Deputy Chairman of Leeds City Council Transport Committee writing in ‘The Yorkshire Post’  
26 July 1950

# Completion of Middleton Circular



MIDDLETON early 1950. Posed shot with two Leeds 'Middleton Bogie' cars and 'borrowed' 'Feltham' car still in London Transport Livery.  
Victor Matterface, Tramways Rolling Stock Engineer, on left

# The Modern Tram 1953

Leeds 602 built at Cross Gates by Charles Roe in 1953. Preserved at Crich in original Coronation Purple livery. One of three prototype cars for evaluation but discarded due to change of political administration. A superbly smooth and quiet ride



# THE ROAD TO SUPERTRAM

- 1987 Council Notes a 'Sense of Urgency'
- 1988 WYPTE plans for tramway in East Leeds Corridor styled 'MetroLine'
- 1988 Council flirts with VAL and Briway
- 1989 'MetroLine' project collapses and Council concentrates on Briway
- 1990 Leeds Transport Strategy advocates rebirth of 'MetroLine' as 'Supertram'
- 1990-2005 A Roller Coaster Ride
- 2005 'Supertram' project axed

# In July 1988 Council and PTA Members visited Grenoble -

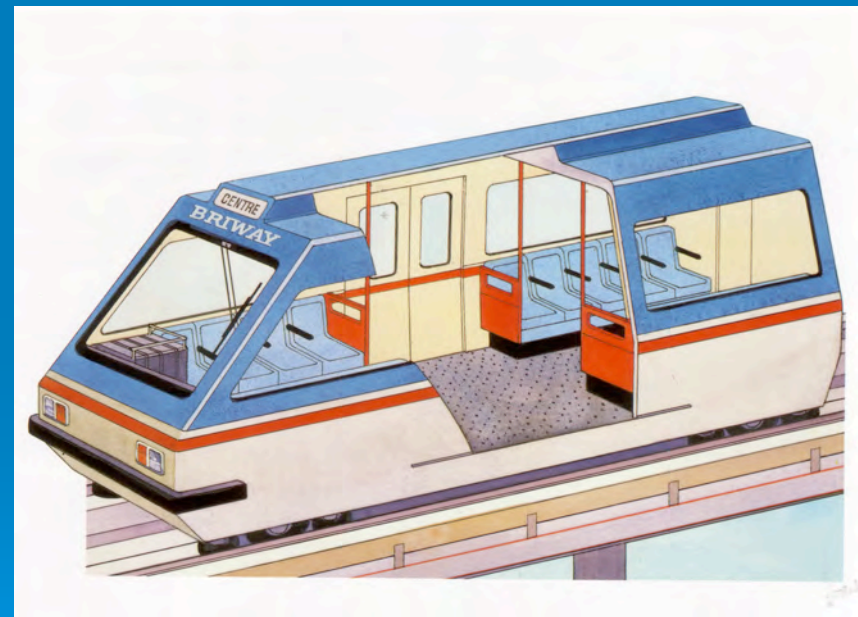


- and the Council Members  
extended the visit to Lille





Later in 1988 Council members visited the Briway demonstration track in Surrey designed by Helicopter owner Alan Bristow



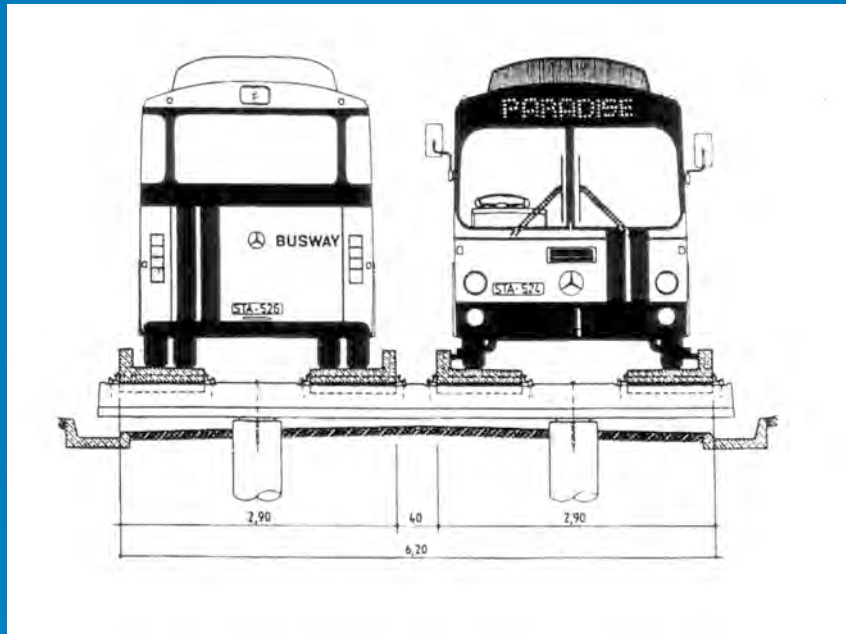
# Along came LEEDS GUIDED BUS

## A parallel Development

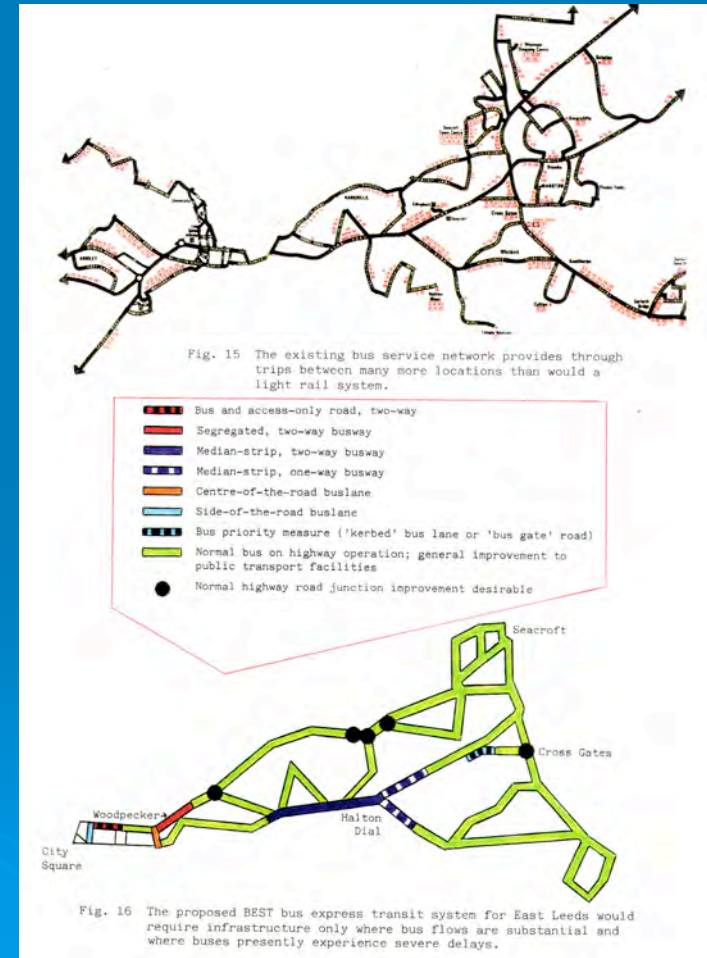


AN UN-NECESSARILY COMPLICATED AND COSTLY ALTERNATIVE  
TO WELL PLANNED CONVENTIONAL BUS LANES

# Guided Bus was first advocated by Yorkshire Rider who produced their prospectus for the East Leeds corridor in February 1989



‘The road-width needed for a guided bus is no greater than that needed for a light rail route’ Quote and diagrams from Yorkshire Rider prospectus



A short length of test guideway was laid down at Bramley Depot c1988

- Pilot scheme put into service at Scott Hall Road and Potternewton Lane Junction c1995 plus a further short section at King Lane by Lingfield Bank
- York Road scheme brought into service August 2001
- Bradford Manchester Road October 2001

*'Up to 25 new rapid transit lines in major cities and conurbations, more than doubling light rail use'*

## John Prescott's 10 Year Transport Plan 2000

# 'Railtex' International Rail Exhibition - NEC Birmingham November 2004



The following year Alastair Darling axed the Leeds Supertram Scheme in favour of a “Top of the Range’ bus system.









And this is what he had in mind as “Top of the Range”  
after talks with First Group’s Moir Lockhead  
The ‘ftr’ StreetCar Concept





# What did StreetCar offer?

(From First Group Promotional Document in 2004)

-  Tram styling
-  Air Conditioning
-  Passenger Information Screens
-  Concealed Lighting and LED Spotlights
-  Wheel Covers and Spats
-  Low Emission Diesel or Dual Fuel Engine
-  CCTV
-  Fully enclosed Drivers Cab

- But it is still a bus, and a long one at that – 52 feet - and items 1 to 4 plus 7 and 8 are standard on all current trams whilst 5 and 6 are only needed because it is a bus.

First Group's Top  
Management has  
changed since the  
Streetcar "experiment"



# Experience with the ftr StreetCar

After being courted by operators over the last few years ftr (future?) and other bendy buses are less popular today and most applicable to routes with relatively long straight sections and very few sharp bends and congested junctions. High initial cost, very high maintenance costs, need for double manning in some cases and increasing numbers of accidents with cyclists all play a part in their unpopularity.

Informed sources suggest that further purchases of these vehicles are unlikely. Yet NGT is at least a two unit articulated bendy vehicle and even three units have been suggested at one time or another.

# The Guided Bus

Although acclaimed by some, the York Road guide-way is of very little, if any, value. Of the two bus operators who originally participated as partners in the scheme one pulled out three years ago. **Out of 15 regular scheduled service buses that use the longest length of York Road every hour only six use the guide-way** whilst the other nine, plus numerous school buses, coaches and taxis, do not. All these categories of public passenger vehicles use the conventional bus lanes to good effect where they are provided.



Left:  
Artists impression of  
Proposed Leeds NGT single  
Articulated Trolley Bus

Both Vehicles are the maximum  
allowable length of 18 metres  
for single articulation and can  
carry typically 37 passengers  
seated plus 76 standing

Right:  
ftr single articulated  
diesel bus previously  
running on route 4 in  
York and in Leeds  
between Seacroft and  
Pudsey. Now all are  
transferred to  
operating HyperBus  
route 72 between  
Leeds and Bradford



# The Nancy three car guided trolleybus showing guide trough

This was installed on an existing trolley bus system using the overhead wires already in place

Note misalignment

Excessive Road Wear  
10km/hr speed limit on curves due to breaking guide wheels  
Poor ride

Guide Trough

**Difficult to control and accident prone**



Looks familiar? It should do. An ftr Streetcar with trolley poles sketched in. This is effectively what NGT will look like if an 18 metre single articulated vehicle is adopted.



# Unless a bi-articulated 27metre long vehicle is chosen



IMAGINE TWO OR MORE OF THESE JOCKEYING FOR POSITION IN BOAR LANE  
Plus all the other bus routes



From all this it emerges that with NGT we could have all the problems of the bendy bus, more so if a bi-articulated vehicle is chosen, with the aggravation of the guided bus plus the addition of trolley poles and overhead wires. But not at least until 2016!

£250 million pounds spent for years of disruption and a resultant inferior system taking all aspects into consideration

Bendy buses, diesel or trolley, increase congestion because of their 80% increase in length with no increase in payload and a diesel bendy bus is roughly twice the cost of the double decker. The trolley bus is dearer still, partly on account of the smaller production volume. The bi-articulated bus is over twice the length of the double decker and even more costly.

Using the same rule of thumb and using vehicles for which the infrastructure is in place £250million would buy:

➤ 1,500 standard double decker buses

or

➤ 1,000 hybrid double decker buses

or

➤ 800 electric double decker buses

or

➤ 60 complete 4 car (240 vehicles) 100mph inter-urban electric train sets

or

➤ 90 complete five section 80km/h top of the range trams

Trolley buses are mainly used in former Russian and Eurasian states and the penalties in this country of using small isolated fleets with regard to spares and operating costs should not be underestimated. There are none currently in Britain and relatively few in Western Europe.

# Why Trolleybuses – Metro's View

**"modern trolleybuses are an increasingly common sight in European and North American cities."**

They are thereby trying to convey that Leeds is on the crest of a trolleybus wave that's sweeping Europe and North America.

**This is a distortion of the facts**

# The True Position

- Metro has been misled. **There have been no new trolleybus systems in North America for years.**
- Edmonton scrapped its trolleybus system in 2009 in order to reduce the city's expected \$35 million deficit and Vancouver is the one remaining Canadian trolley bus system. The United States has five remaining systems out of an original fifty.

To put things into perspective the number of Hybrid and electric buses already in operation in Britain (550+ and growing) exceeds the total number of trolleybuses in the whole of the United States and is twice the total number of trolleybuses still operational in **Germany, France, Holland** and **Belgium** put together. In these countries any purchases of new trolleybuses in the last twenty years have only been to replace life expired units for systems where the overhead infrastructure was already in place.

Switzerland, Italy and Greece remain modest users of trolleybuses with about 1300 units in total. A new system has been started in Lecce and Pescara has a small experimental line with automatic steering. Both are innovative and carry a large element of risk.

Trolleybuses are favoured in some mountainous regions where electricity is abundant and cheap.



The following published questions and answers taken from the minutes of an All Party Parliamentary Light Rail Group fact-finding mission to Budapest in January 2012, designed to inform about trolleybuses, which was *supported and organized by trolleybus equipment manufacturer Vossloh* are illuminating.

**“UK Question** - Do you get a better modal shift to public transport with trolleybuses than with motorbuses?

**Budapest Answer** - We find that passengers tend not to notice the difference between trolley and motorbuses.

**UK Question** - The proposed Leeds trolleybus system is designed to emulate light rail. Would you consider use of a higher spec trolleybus?

**Budapest Answer** - Doubtful if we would install any new trolleybus routes. We would look towards the future availability of electric buses.”

# From this we can conclude

- Trolleybuses do not lead to increased use of public transport.
- Budapest would like to replace its trolleybuses with battery-powered buses.
- Budapest would already have replaced its trolleybuses with diesel buses had it been able to afford to.

Much is made in NGT publicity literature of the 'sparks effect' explaining "*When you install these overhead cables you install a sense of permanency, some sense of a reliable and unchanging system that's in place with clarity about where they run from and to. The overhead cables just add a sense of a big city feel to the place, it's something you can't quite quantify but it works.*" **Really??** Not a very convincing argument.

- On BBC Look North 15 January 2013 the head of the trolleybus project for West Yorkshire public transport provider Metro, said the scheme was not a "congestion buster". and continued: "It's hard at this stage to say whether congestion will be higher or lower as a result of the scheme".
- **Surely easing congestion is what this operation is all about**

- The reference to battery-powered buses in the Budapest answers is interesting. The Government's Green Bus Fund has already provided over £46 million to support the purchase of 542 "electric" buses in various parts of the country and 600 more are on order for London. Most of these are 'Hybrids' combining diesel and battery power and 22 of these are running on route 7 in Leeds.
- The total also contains a number of 'pure' electric buses built locally by Optare and running in Coventry, Warrington, Epsom and Heathrow and also successfully trialled in other places. These are all single deck at present. A double deck variant will augment the range and work is well advanced on rapid wireless recharging which can be effected on route at normal stops without causing any delay.

With a passenger capacity in excess of 50 per vehicle, this trio of Optare Versa EV's, now in service with Travel De Courcey in Coventry, represent the largest solely battery-powered electric buses currently on Britain's roads.



Additionally Milton Keynes Council with a consortia of bus operator Arriva and five other companies, including manufacturer Wrightbus, has signed a deal for new wirelessly-charged electric buses due to begin operating between Wolverton and Bletchley in summer 2013. It claims each bus will cost between £12,000 and £15,000 less to run per year than the equivalent diesel bus.

It is therefore more than likely that fully self contained electric buses will be available for service **before NGT** and without the erection of overhead wires which will inevitably be rendered obsolete almost as soon as they appear. They would have the attraction of being able to support home industry, which is a more tangible economy boost than the unproven optimistic figures suggested by the promoters of NGT



# An Optare Versa Hybrid electric bus in Warrington



# Nearly There. A Wright/Volvo Hybrid on Route 7

Only one stage from fully electric, no wires, no massive roadworks



# The Ultimate Double Decker?



A Three-Axle 12metre long  
Hybrid British double decker  
in Hong Kong



Glasgow put  
25 of these in service  
in 2010

WHAT DO YOU EXPECT FROM  
A “TOP OF THE RANGE” BUS  
SERVICE AS SUGGESTED BY  
ALASTAIR DARLING?

TO SIT?

OR

TO STAND?

# Typical passenger capacities for Different types of Vehicle. Average figures

Length	Type	Seated	Stand	Total
18m	Single Artic	37	76	113
25m	Double Artic	68	124	192
12m	Single Deck	46	22	68
10m	Double Deck	68	21	89
12m	Double Deck	81	44	125

These figures can vary within limits and subject to comfort factor. Less seats, more standing.

Note 12m Double Deck is three axle

# Park and Ride

One of the basic requirements of a Park and Ride connecting vehicle appears to have been totally ignored in the NGT scheme. If a motorist is to park his or her car on the perimeter of a city he or she will only board a PSV if that vehicle leaves without a long wait and gives him/her a quick run to his/her destination. In this respect a Light Rail Vehicle is best but a bus can be better than nothing.

The York Park and Ride services are very successful because they use dedicated vehicles running in most cases with limited stops from the Car Parks to selected points in or near to the City Centre. With NGT every vehicle stops on request which is bad enough when you are rushing to work but intolerable when you try to return and the 'bus is full of people only going short distances. If the originating terminus is at Holt Park and the 'bus can already be carrying a fair load when arriving at the car park this would be another deterrent. This could be alleviated if there were dedicated limited stop Car Park buses in between the 'stoppers' but the overhead wire collection makes this difficult.



A Park & Ride bus should be dedicated and clearly marked as such -



- not running around incognito. It should advertise the car park facility for maximum effect

# Service Levels

- Note that I have not mentioned levels of service and existing routes.
- This is because NGT and its inflexibility has in itself a negative impact on the transport structure of the A660 Corridor and automatically upsets the value of other routes

This slide was contained in a Metro NGT Presentation given earlier this month. It suggests a saving in journey time over the present scheduled services of 17 minutes

## Holt Park to City Centre

- Route Length = 9.1km
- Segregated Length = 4km (44%)
- Frequency = 12mins (6mins from P&R)
- Journey times Holt Park to City Centre
  - NGT: 27mins (21mins from P&R)
  - No.1 Bus : 44mins (36mins from P&R)

**BUT WAIT And See The Next Slide**

The business case submitted in March claims that the journey time from the city centre (Cookridge Street) to Holt Park will be 27 minutes 51 seconds on the trolleybus, later adjusted to 29 minutes 52 seconds.

Metro's timetable shows that the number 1 bus is currently scheduled from Holt Park to Park Row in 29 to 34 minutes. So, depending on which figures you use, the saving is approximately either 4 minutes or 1 minute.

It is suggested the trolleybuses will have conductors, thereby replicating the ftr StreetCar procedure.

Metro's journey planner site shows that the number 1 bus makes 30 stops between City Square and Holt Park. NGT's business case shows that the trolleybus will make 17.

It seems any time saving realized can easily be explained by the fewer stops, and the presence of conductors which begs the question why submit the city to the enormous expense and inconvenience which is involved to produce precisely nothing.

## 2013 - Eight years after the Darling Axe. Where are we now?

- Still no tram. Trolley bus proposal for North and South Leeds which does not address the basic problem.
- Guided Busway only used by one operator and not showing any advantage over much cheaper standard bus lanes. Needs replacement by modern tramway.
- Novelty of the 'StreetCar' worn off and no perceived advantage despite enormous cost.
- Authorised electrification of core railway routes offers unique opportunities for a radical re-think of local arrangements. But are we doing anything about it?

- Metro say that as far as a Government Grant is concerned “Trolley Bus Mode” is non-negotiable. No Trolley Bus means No Money. Metro then goes on to say “ there are various technical options available”
- Surely Electric Buses without trolley poles are a “technical option” deliverable now without TWA and a much cheaper and better one at that. To argue otherwise is utter madness particularly when the original Government directive did not specify “trolley buses’ but called for a “Top of the Range” Bus Service.

# A Way Forward? 1

A way forward in this case would be to keep the NGT scheme as it is in its basic form and return to the Consultants and the DfT saying that in view of the advances in technology since the project started in 2006 the principle of electric buses is to be retained but without the overhead wires, thereby cheapening the cost and enabling the introduction of services to be speeded up by around two years.



# A Way Forward? 2

At the same time and in the face of existing fierce opposition an opportunity will be taken to reduce or replace any sections of fixed or other restrictive guided busway more to the level of the Kirkstall Road scheme. This would enable existing and future bus services to use the improved infrastructure to the advantage of all and thereby contribute to some measure of reduced congestion. Over time the number of emission free buses would inevitably increase and be added to without alteration to the infrastructure.

Properly presented it would be difficult to imagine how any Secretary of State could not look favourably on such a scheme. An added bonus would be retention of the moneys saved to be used for a future LRT scheme on a more suitable route.

# Transport and Works Act

- NGT requires a costly and time consuming Transport and Works Act.
- The Kirkstall Road scheme did not but it is showing improvements in traffic flow.
- Is there a moral here

# FACT

Leeds has a traffic problem both on its main arteries and within the city which will rapidly escalate with time and if left unattended will seriously affect the continued prosperity and development of the region

# Question

Why does Leeds need a Light Rapid Transit System **in addition** to a co-ordinated bus and rail network ?

# Answer

A train of modern vehicles running on seamless steel rails is the quickest, safest, quietest and most economic means yet developed for land transportation of large numbers of people. Experience has also shown that in the right circumstances motorists will use a park and ride facility feeding rail vehicles, either tram or train, when they will not so readily do so in the case of buses being offered.

Q. Where does the congestion really start

A. Outside the M62 – M1 – A1- A6120 - A6110 ring around the city

Q. Where do most of these people want to go?

A. Within 300 yards of the Leeds 'Loop' road

Consequently -----

-----does it therefore not make sense to dilute this traffic volume at its point of entry into the City?

This suggests the optimum Park and Ride as being in the Thorpe Park / Brown Moor / Swillington Common area at the M1/A63 junction which would catch traffic from North East, East, South and South West of the city. There is then an uninterrupted, wide, demolition free route for over four miles to Quarry Hill and the City Centre Loop. ----

----- This would funnel a high percentage of out of town traffic onto a single high density, virtually direct, LRT route and onto a loop in the city which would distribute passengers to places of work, entertainment and to the main railway and bus stations within a short journey time of twenty minutes or so, possibly less.-----



---Additional lines with Park and Ride locations at Stourton and Lawnswood could be added later to additionally service the M1 and the North West. These lines would also feed into the city loop.

# Thank You For Listening



ANY QUESTIONS?



**Additional Slides**  
**Not used in NGT talk.**  
**Mainly applicable to**  
**Light Rail Schemes**



# Leeds System Questions

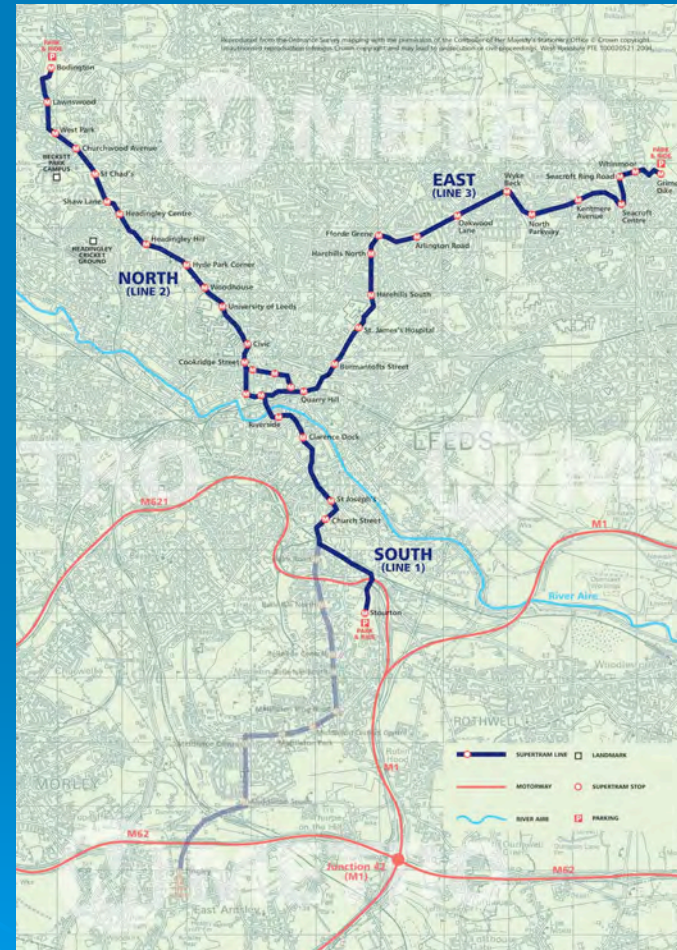
- Is it serving appropriate corridors?
- How does it penetrate the central core?
- How does it integrate with buses?
- How does it integrate with trains?
- Is the alignment too restrictive?
- Is the track layout appropriate
- Have the wrong type of vehicles been specified?
- Is the PTE the best promoting body?
- Is the routeing politically or strategically motivated?

# GNER Proposals

The interest shown by GNER in further electrification and a possible 'Gateway' station east of Leeds support this view and provide an opportunity for 'joined up thinking' on integrated transport to the benefit of all

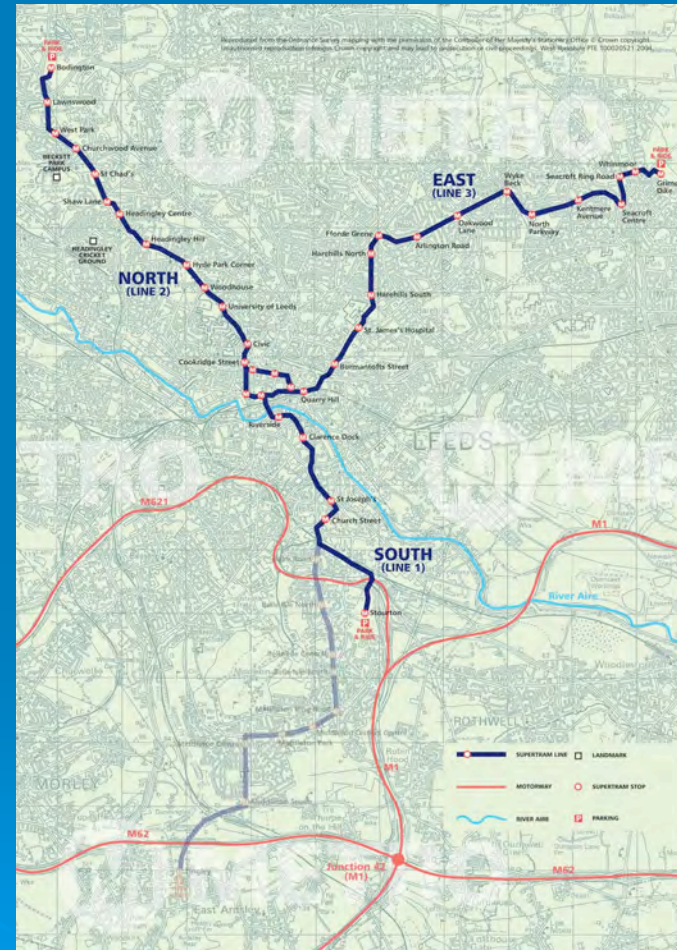
# The rejected Leeds plans in comparison

These three lines cater more for local people who are already tolerably well served with bus routes, rather than tackling the congestion at its root out of town source. The park and ride stations have limited catchment areas.



# The Existing Leeds plans in comparison

All three lines are largely on narrow roads through heavily built up areas suggesting a high cost for a relatively low return. They are tortuous which could inhibit out of town motorist appeal





# Warwick Parkway

## A privately funded initiative



- New station at M40 junction 15
- Railhead for Warwickshire & Worcestershire
- 400 parking spaces
- Bus and airport coach links
- Station owned by Laing Rail
- Completed on time at a cost of £5.2m, 42% of budget estimate

Slide courtesy of Adrian Shooter,  
Chairman Chiltern Railways and  
Managing Director Laing Rail

# York built tram on 'grass' track in Strasbourg





Derby built tram in Nottingham. Unobtrusive overhead line poles

Nottingham. Note complete absence of overhead poles





The New Order at Lisbon - June 2005

# Ultra Low Floor tram in Kloosternburger Strasse, Vienna

Photo copyright 2005 David Pirmann



# LRT Costs in £Millions per Kilometre

1982-3 Tyne & Wear Metro	- 56km	@ 11.3
1992 Manchester Phase 1	- 31km	@ 6.2
1994-5 Sheffield	- 29km	@ 10.5
1999 Midland Metro	- 21km	@ 7.6
2000 Croydon Tramlink	- 28km	@ 7.8
2004 Nottingham	- 14.3km	@ 15.4
Current Projected - Leeds	- 28km	@ 15.8
Authorised – Edinburgh - Line 1	- 15.7km	@ 15.5
Projected – Edinburgh - Line 2	- 15.3km	@ 15.0

All Costs updated to 2004 prices

Source: National Audit Office/Roger Ford

# Rising Costs

Leeds asked for a special car - expensive

Depot and Eastgate turn - expensive

Some over specification - expensive

Nevertheless projected costs were compatible with other recent British projects and all post 2000 schemes are some fifty to one hundred percent higher in real terms than schemes already started.

**WHY?**



# A National Problem

- Costs of transport and other allied industry schemes generally have spiralled to such an extent that many are no longer viable.
- There is an emphasis on providing proof where it can not be provided, management by committee, costly 'brainstorming', second and third opinions to keep ahead of litigation.

# Contributory factor 1

## Quote from a recent confidential survey

'An engineers time nowadays is spent probably 60% justifying what he has done ... making sure that the boss can cover his backside if anything goes wrong, and not enough on putting his mind to the engineering task before him which is why the engineering is rubbish but the management is super'

# Contributory factor 2

- Experience has shown that up to 60% risk factor can be added on to cost to get to consortium bid price.
- Therefore anything that can reduce risk should have an immediate effect on bid price
- This assumes bidders are still keen on the project.

# Other contributory factors

- Consultancy Fees
- Hazard Analysis and Risk Assessments
- RVAR and DDA
- Safety Cases
- Too many Independent Safety Assessments
- Intrusive Quality Assurance
- Micro Management and Interference
- Too much 'talk' and not enough 'do'
- Dilution of Specialist Knowledge and abandonment of Professional Judgment

# What Future?

To try to cheapen a scheme wholly by looking at the physical content without querying the management, legislative, regulatory and approval mechanisms nationwide can only lead to an unsatisfactory product and ultimate failure to meet expectations.

# A Doctors Mandate?

There has been an urgent need for some time for the competent people in the Industry to look at the LRT scene in its entirety and consider the effect of all contributory factors in order to guide government, clients, manufacturers and service providers towards developing the much needed transport schemes at a price we can afford.