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ALTERNATIVES TO THE USE OF HERITAGE SQUARES FOR BUS LAYOVER IN DUBLIN CITY CENTRE

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ABSTRACT

In recent years the practice of on-street bus layover in Dublin's city centre has been criticised. The problem was resolved in part by relocating bus termini, mainly to other edge-of-centre on-street locations. These included certain protected heritage environments such as Merrion Square. Objections have been raised by prominent heritage interest groups, notably the Irish Georgian Society. The use of such locations has been justified by state bus agencies on grounds of cost, expediency and lack of viable alternatives.

This study, prepared as part of a DIT Community-Links initiative with the Irish Georgian Society, investigates the potential for an alternative, viable and sustainable bus layover strategy for Dublin city centre. The study considers the wider social, cultural and environmental costs of bus layover in protected heritage environments. It also examines the relevance and role of planning in the coordination of bus operations in the city centre. The analysis takes due consideration of best practice in bus layover operations, including: layover design and operations, linkages and street design.

The research team carried out surveys of layover operations at Merrion Square. The highest number of buses in layover at any one time was 9 and the average was 5. On average, buses were in layover for 10, 22 and 14 minutes during the morning, afternoon and evening survey periods. For private services this tended to be significantly longer, often an hour or more. Relatively few passengers alighted or embarked at the terminus. The design of the layover space is highly inadequate and the presence of buses on the Square creates a foreboding atmosphere, materially detracting from its potential UNESCO World Heritage Status. Contact with transport agencies suggested that from an operations point of view the arrangement was acceptable, also that no viable alternatives was seen to exist.

The team looked at international best practice and investigated five potential layover solutions, including: the status quo; an alternative site close-by; a single city centre layover site; removing the terminus by implementing 100% cross-city services; and, the use of Dublin Bus garages for layover. A multi-criteria analysis concluded that the use of Dublin Bus garages for layover was the clear and most suitable option.

The study recommends, in the case of the Merrion Square services, that terminus and layover operations be relocated to the most proximate garage, in this case the Ringsend Depot on Ringsend Road. This can best be achieved by rerouting the end-of-service from Merrion Square to Docklands, via Pearse Street. It is likely that this would yield fuel savings, in addition to significant increased patronage. Congestion through the College Green Bus Gate would be relieved, in turn improving LUAS Cross-City operations. Greater connectivity would be achieved from Maynooth and the western suburbs to Docklands, a significant centre of employment. Proper rest facilities would be available to drivers.

The use of Dublin's Georgian Squares for bus layover is untenable bad practice, without comparison in other heritage cities. A viable alternative exists which can increase revenue, improve operations and lead to a more efficient overall public transport network.

INTRODUCTION

The Architectural Conservation and Planning Committee of the Irish Georgian Society approached DIT through the Access and Civic Engagement Programme seeking solutions to the problem of bus layover in heritage environments such as Merrion Square. The students of the Transport and Mobility module, part of the BSc in Spatial Planning at DIT, undertook to investigate the potential for alternatives to the use of such heritage environments for bus layover in Dublin city centre.

In recent years the practice of on-street bus layover in Dublin's immediate city centre has been criticised. The problem was resolved by relocating bus termini, mainly to other edge-of-centre on-street locations. These included certain protected heritage environments such as Merrion Square. Objections have been raised by prominent heritage interest groups, notably the Irish Georgian Society. The use of such locations has been justified by state bus agencies on grounds of cost, expediency and lack of viable alternatives.

Merrion Square is on the tentative list of world heritage sites under the "property name" of The Historic City of Dublin [1]. Georgian Dublin represents a significant moment in the history of the Age of Enlightenment with the establishment of the Wide Streets Commissioners and the founding of many charitable and public institutions, including the Royal Hospital, Marsh's Library, Dr. Stevens', Mosses' and St Patrick's Hospitals, and Kilmainham Gaol, in buildings of high architectural quality [2].

Merrion Square is also part of an Innovation Project developed by Failte Ireland which aims to build awareness of the square's rich history and heritage, stimulate civic pride, and unlock the tourism potential of the area [3].



Currently Merrion Square is used as city centre layover and terminus for a number of bus services including Dublin Bus routes 25, 26, 66, 67, along with several private coach companies, including Swords Express, Kearns, and Martley's. This is despite the Irish Georgian Society's objections. Over 92% of services terminating at the Square are operated by Dublin Bus. Indeed the use

of the Square for layover emanated from a review of the Dublin Bus network, referred to as "Network Direct" which was rolled out between 2009 and 2013. Therefore much of the following analysis hinges on the activities of Dublin Bus at the site of interest, with privately operated services providing a useful comparator in instances.

METHODOLOGY

The collation of information, data and the empirical research was based on operational surveys, interviews with stakeholders and a series of special workshops on compact bus operations. The following interviews were held: -

- Dublin Bus Area Operations Manager
- Irish Georgian Society

Workshops on Compact Bus Operations were held, including: -

- Comparisons with International "compact bus station" Layouts
- A Netherlands International Field Trip
- An Optioneering Workshop
- A Multi-criteria Analysis Workshop

FINDINGS

Surveys were carried out of bus layover operations at Merrion Square on 3rd March 2015. The surveys collected the following data: -

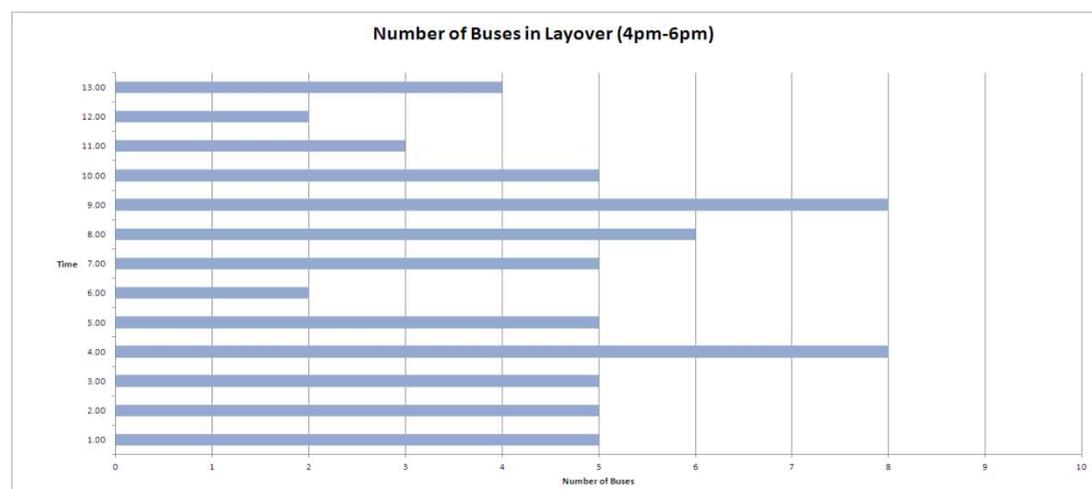
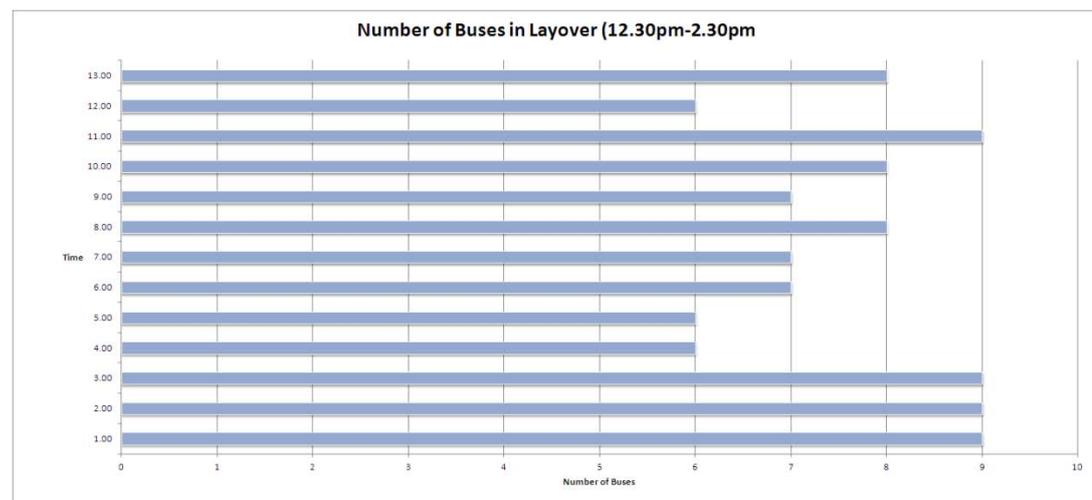
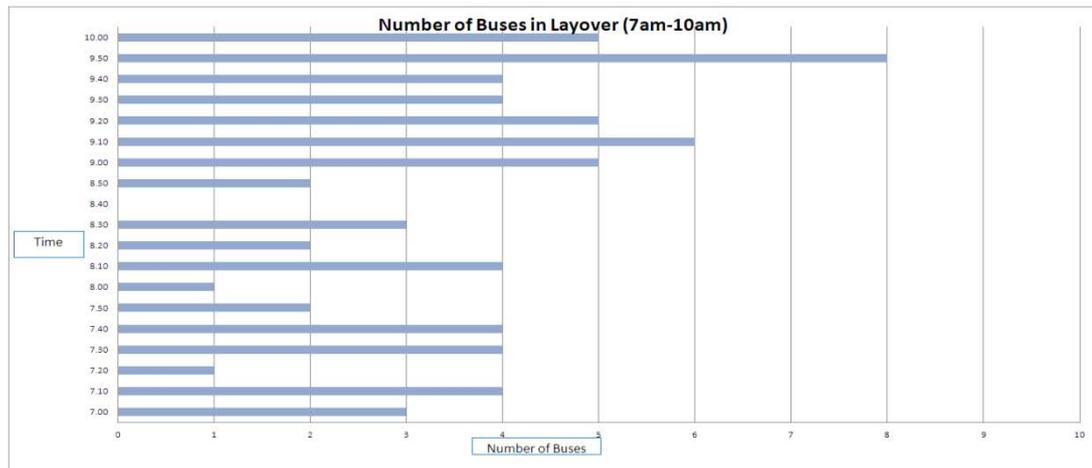
- Length of layover time by service;
- The number of vehicles that were in layover at ten minute intervals;
- Passengers boarding and alighting at the terminus.

Three survey periods were captured: -

- 7:00am – 10:00am
- 12:30pm – 2:30pm
- 4:00pm – 6:00pm

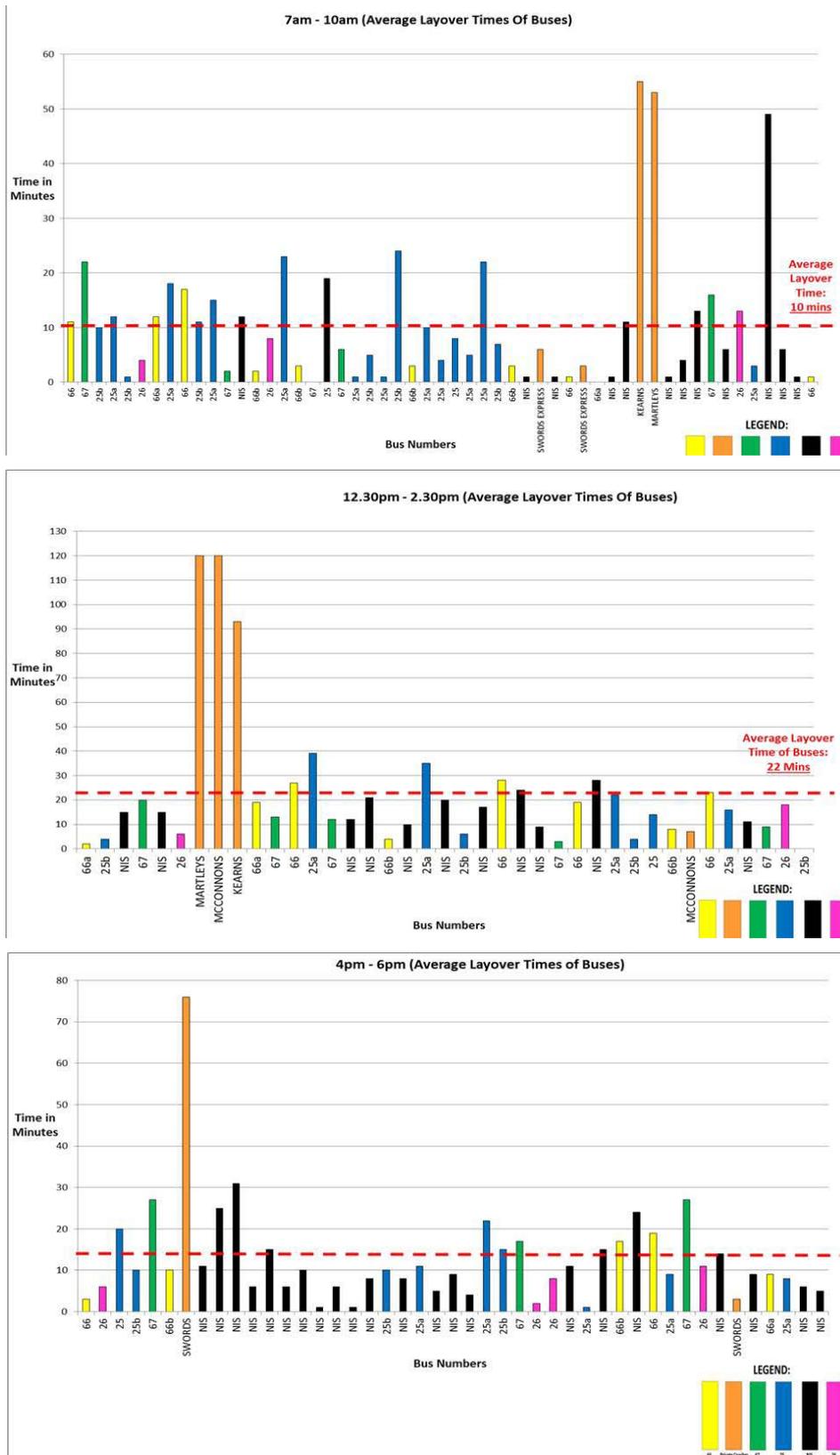
During the surveys photographs were taken of ongoing bus operations and general observations were made. Opportunities to engage in conversation with drivers also presented during the day, which provided useful background information.

Figures 1 A-C show the number of buses in layover at 10 minute intervals over the survey period. Over the course of the day the average number of buses in layover at any time-point was 5. The peak number of buses in layover at any given time was 9. The busiest part of the day, in terms of layover occupancy, was during the afternoon period when there were never less than 6 buses in layover.



Figures 1 A-C: Number of buses in layover at 10-minute intervals during the (a) morning (b) afternoon and (c) evening survey periods

Figures 2 A-C show the length of time each service remained in layover at the terminus. The average layover time across all services was 10 minutes, 22 minutes and 14 minutes in the morning afternoon and evening surveys respectively.



Figures 2 A-C: Average layover time during (a) morning (b) afternoon and (c) evening

Within this, however, there were significant variances. The survey broke down layover times by operator. By far the most efficient operator was Dublin Bus, who also operated over 92% of the services throughout the day. Dublin Bus services were in layover for an average of 8, 15 and 12 minutes over the three survey periods. Private operators, by comparison, tended to leave buses in layover for hour-long periods approximately. An exception was Swords Express who operated three rapid turnarounds (under 10 minutes each) but had one service in layover for 76 minutes, which skewed the operator's average.

The students observed a typical set of operations during the day. The buses arrive on Merrion Square where they set down and wait for their next journey. They set down on the corner of the south east side of the square and, in the case of Dublin Bus, are not permitted to leave their engines running. This practice was routinely observed throughout the day.

Just before arrival on the square, the buses automatically change to Not-in-Service. For example, the bus may be a 66 when it arrives but it will take off on its next journey as a 25. Drivers explained, when asked about the layover times, that a 25 minute set down time was allowed for traffic congestion on the route but that this was not an official break.

When the buses depart on their next journey, they set off from the corner of the square and move to the pick-up point, which is approximately 100-150 yards to the east. At this point, they leave their engines running until they move off the square. This could be 5 minutes up to 15 minutes approximately.

During the observations, the students noticed that there were very few people embarking and disembarking at the termini throughout the day. For example in the morning survey, 14 people were dropped off at the layover stop and 25 were picked up.

Over the course of the 7-hour survey period, 137 services were observed using the square for layover. The students also noticed that there were 3 private coaches at the opposite end of the square, apparently in unmanaged, long-term layover. Two of the coaches remained for best part of the day, the other left at 2:00pm.

The research team met with the Dublin Bus Area Operations Manager of Summer Hill Garage, Dublin. The reason given for the bus layover on the square is due to drivers arriving either early to start the day's work or due to traffic on completion of a journey from Maynooth. Dublin Bus allows 1 hour and 40 minutes to complete this journey which sets off at Merrion Square to Maynooth and then back to Merrion Square. This allows for traffic congestion or any other problems that may be encountered along the way. If the driver arrives back early he cannot leave the set down point until his next scheduled time as Dublin Bus have a responsibility to the passengers and to the National Transport Authority to arrive to their scheduled stops on time. The main depot for the terminus is Summerhill garage, not the most proximate or accessible of the garages. It was posited that from Dublin Bus's point of view they are happy with the status quo and they see no reason, from an operational point of view, to move from the square in the near future.

BEST PRACTICE IN COMPACT BUS OPERATIONS

In order to come up with an alternative to the use of heritage environments for bus layover, the students carried out a series of workshops on compact bus operations. Initially it was necessary to gain an understanding of the nature of compact bus operations.

Compact Bus Stations are bus stations specifically designed to increase throughput and reduce land take for centrally located bus services. This is achieved through a combination of technology, design and logistics. The concept has allowed city centre bus stations to be retained by increasing throughput and reducing land requirements.

Many of the elements required for a compact bus station are advanced measures requiring some rethink of bus operations. A functional "Compact Bus Station" contains a variety of critical elements: -

- Compact layout
 - Dedicated Layover Space
 - Quality running way to layover
 - Real Time Information Systems
 - Quality of overall network
-

The approach can equally apply to on-street termini and city-based services, such as at Merrion Square. In this case, the critical element is an efficient and attractively designed pick-up / set-down point. On-street compact operations require a very high level of street design, incorporating traffic management, high-level bus priority, environmental landscaping, high-quality bus stop facilities and on-street information systems. In peak or tourist environments, stewards or marshalling may be recommended [4].

A requirement for an efficient compact bus operation is the availability of an adequate and proximate layover site. The ability for the operator to call up buses quickly and at short notice has an important effect on efficiency. The wait time for passengers is reduced, the throughput of each bay can be increased and the space for boarding and alighting optimised.

The layover is an essential part of transport scheduling and operation of services. In definition, the layover is the amount of time that the bus is waiting to enter or re-enter service back onto its designated route. The importance of a layover is to allow time for the bus driver to take a short break, which must be allowed for on a number of occasions over the course of a working day for safety reasons. However the layover also acts as a margin for late running buses; if a bus is late on one trip, the layover creates a buffer between the end of that trip and the start of that buses next trip. In this way a service won't be late to start its next trip and can run as normal, according to the schedule.

Layover requirements are often determined by the reliability of the bus network. The greater reliability of journey times the less space is needed for layover, particularly in the city centre.

There are many examples of quality compact bus operations in city centres around Europe [5]. A good example of an efficient on-street network in a heritage urban environment is Nantes. Due to the efficiency of the boarding and alighting there is no overtaking at bus stops. Stops are built with all the design quality of a tramway station, including real time passenger information, automatic ticket machines, seating and glass shelters [6].

Oxford, perhaps one of the most stunningly picturesque heritage cities, has revitalised its city centre and conserved its heritage through traffic management and highly efficient on-street bus operations. Bus layover takes place outside of the city centre in very high-quality facilities that ensure efficient and passenger-friendly operations [7].

ALTERNATIVES TO THE USE OF MERRION SQUARE FOR BUS LAYOVER

Based on the Merrion Square layover survey results, looking at international best practice and interviews with Dublin Bus and the Georgian Society, the students believe that there are up to 5 alternatives available for consideration: -

- Status quo;
- Alternative on-street site;
- Single new central layover site;
- 100% cross-city services;
- Bus layover at garages.

Each option was appraised on its own merits and the pro's and con's of each considered.

SCENARIO 1: Maintain Status Quo. The status quo refers to the existing state or condition, in this study, the use of Merrion Square for bus layover. Currently there are approximately eight (unmarked) bus layover spaces plus four bus stops located on Merrion Square. Six Dublin Bus routes terminate at Merrion Square, along with a number of private services.

PRO'S	CON'S
Ideal edge-of-centre location	Affects key tourist and protected heritage environment
Spacious and room for expansion	Noise levels from buses
Lightly trafficked Street	Nowhere for driver rest break
Extends bus routes through city centre	Not a dedicated layover design
Potentially brings tourists to squares	Quantum of buses creates a foreboding atmosphere
	Impact on residences and businesses

The use of this site as a bus terminus and layover space is not ideal for a multitude of reasons including culture, tourism, heritage, and urban design. Although it is an advantageous site from the point of view of bus operations, the negative impact on a key heritage and tourism asset far outweigh the benefits to the economy. For this reason alone, alternative solutions merit immediate investigation. In addition, the location is not a dedicated layover design, creating discomfort for passengers, drivers and passers-by (who include tourists). No driver rest facilities exist as should be the norm at a dedicated layover site.

SCENARIO 2: Relocate to an alternative on-street location nearby. One possible solution would be any alternative on street layover in close proximity to Merrion Square, (euphemistically referred to by the student team as the “anywhere but here (ABH)” option). A number of local options were considered thereof.

James Street East. James Street East is situated south east of Merrion Square beside the historic Mount Street Crescent where the famous St. Stephen’s Church is located, also known as The Pepper Canister Church. A relatively quiet site consisting of offices and residential areas and within close proximity to a primary school, this site has the potential capacity layover of five to six buses. Access to James Street East is through Fitzwilliam Street Upper and Baggot Street Lower. Mount Street is also a protected heritage environment and a highly valued view corridor within the Dublin Georgian landscape.

Fenian Street. Fenian Street is a busy street with mixed commercial and residential use situated north of Merrion Square at a distance of 410m. This site has the potential capacity layover of five to six buses which would get access to Fenian Street through Merrion Square East and Hollis Street.



Wilton Place. Wilton Place / Terrace is situated South-East of Merrion Square at a distance of 1 kilometre and has the potential layover capacity of seven to eight buses. It is a relatively quiet site close to public amenities such as Wilton Park and Grand Canal. Access to Wilton Place / Terrace is through Fitzwilliam Street Upper and Cumberland Road.

Of these, the best location for a short term alternative would be Wilton Place (for which pro’s & con’s analysis done below). Wilton Place is the site with the greatest distance from Merrion Square, but has the greatest capacity for on-street layover. Wilton Place is still not an ideal location for a number of reasons such as: close proximity to public amenities such as Wilton Park and the Grand Canal, inadequate infrastructure, aesthetic impacts, the distance of one kilometre away from bus stops at Merrion Square. Generally this would be seen as moving the problem and something of a short-term solution.

PRO'S	CON'S
Within close proximity to Merrion Square	Close proximity to public amenity (Grand Canal)
Available capacity	Close proximity to residential and commercial areas
Lightly used streets	Short term solution
	Close proximity to Park (children)
	No dedicated layover facilities
	Heritage environment
	Close to strategic cycle route

SCENARIO 3: A dedicated single new city centre layover site. In 2012, the consulting company, Jacobs, published the report “Dublin Commuter Coach Parking Facilities” on behalf of the National Transport Authority (NTA). The report deals with Commuter Coach

Parking Facilities in central Dublin and shows potential off street locations for Coach Parking facilities in Dublin City. The report does not focus on the layover problems of the city bus network but is important to consider nonetheless [8].

The report identifies 79 spaces available for layover around the city centre of which 34 were in use at the time of the survey. The brief given to the consultants was to identify a single potential city centre coach parking site. The report considered 17 sites and shortlisted 6: -

- Railway freight yard – located off Sheriff Street
- North Docks, adjacent Topaz service station
- East Wall Road (adjacent Dublin Port Tunnel)
- UCD Belfield Campus
- Broadstone Depot
- South Bank Road (former Irish Bottle Factory site)



Ultimately, the Jacobs’ study favoured the implementation of a coach parking facility on the north site of the river, to be financed by commercial charging.

Another report, “The Dublin City Coach Station Project” by the Mountjoy Square Community Group in 2011, also favoured a single site solution [9]. The report identifies its preferred option at the former Fish Market site at Mary’s Lane in Smithfield, Dublin 1. The study believes that there are approximately 90 ‘coach’ parking bays throughout the city council area. The solution also does not consider the Dublin Bus layover problem within the city.

In June 2015 Dublin City Council submitted a Part 8 application for a temporary coach parking facility at a separate location, adjacent to the Docklands Rail Station. No decision has been made on this application, which lies within a Strategic Development Zone on lands zoned for mixed use development [10].

None of the above studies consider another potential single-site solution which, in the view of the student team, out-performs those other sites under consideration. In relation to private

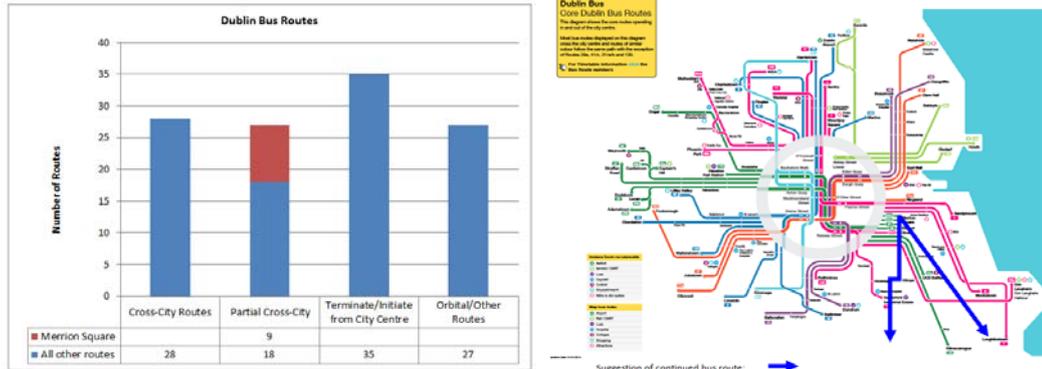


coaches, Connolly Station car park holds potential for the installation of a large city-centre layover for coaches and buses. Currently, the car park at Connolly Station is used primarily for car usage, supposedly for park and ride. Other studies suggest that its use as a park & ride is extremely limited and that most people are using the car park for commuting [11]. This is a poor use of land adjacent to a major rail station.

PRO'S	CON'S
Single dedicated industry-standard facility	Some network changes may be needed
Potential revenue stream	Could affect general traffic in area
Property of CIE	Building costs
	Does not address actual network issues
	Access
	City crossing capacity
	Fuel costs

While neither the Jacobs or the Mountjoy Residents Group studies take into consideration the problem of layover for city-based bus services, they do highlight the extent of the problem of poor layover and parking management for buses in the city. The problems are not unrelated and could very well be addressed with a common solution. The problem of “cruising” created by such inadequate coach-parking management is also not raised by either study, yet it materially impacts on traffic and the quality of the city centre environment.

SCENARIO 4: 100% Cross-city Services. The introduction of the Network Direct Project by Dublin Bus in 2010 increased cross city services throughout the network [12]. To date there are 28 cross city routes that Dublin Bus uses, nine of which terminate at Merrion Square. A suggestion would be to continue these routes further south and south east. Some runs could be pushed towards UCD which would increase capacity for the university. Also there is Donnybrook bus garage to the south which also could be a good area for the buses to terminate and initiate from.



PRO'S	CON'S
Main services do not need to change	Close proximity to public amenity (Grand Canal)
More services	Some network changes may be needed
Cheap to implement	Fuel costs increase
Continued bus movement	Potential oversupply on new routes
Increases capacity on certain routes	Implications for network management
Improves visual amenity	Increase in light runs

Overall the cross-city option for service routes would help to solve the issue of bus layover at Merrion Square. The proposal has some cost implications and may also have implications for overall network management by effectively removing a key layover function from the city centre. However, cross city routes are already in operation for the majority of the network.

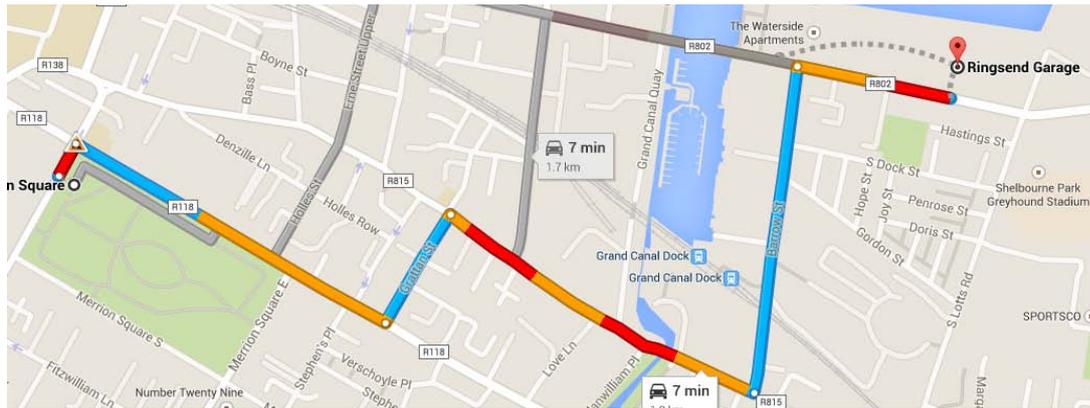
SCENARIO 5: Relocate all layover operations to garages. A final alternative solution considered was the use of existing Dublin Bus garages for layover.

Currently, according to an area manager from Dublin Bus, buses on the Maynooth routes start and end the scheduled trip from the Summerhill bus depot. This represents a significant inefficiency as dead runs have to work their way through the most congested part of the city centre network.

The most accessible city centre garage for the Maynooth services is currently the Ringsend Garage. Sufficient day-time capacity exists at the Ringsend Garage to accommodate all of the layover operations at Merrion Square.

A further observation is that this route would take services through the Docklands area, which is the area of greatest employment concentration in the city centre. It would appear highly advantageous to connect the Maynooth and western suburbs not only with the city centre, but also Docklands. Terminating at a designated bus garage would entail proper driver rest and vehicle maintenance facilities, as should be the case for city-based bus services.

Currently, the distance from Merrion Square to the Ringsend Depot is 1700m. However, an even more direct route could also be taken, via Westmoreland Street, Townsend Street (or a potential Pearse Street contra-flow) and Pearse Street. This would only be 200m longer than the current service route, but would be more fuel efficient as it avoids most of the worst city centre congestion, including the College Green bus gate.



It would provide direct city centre access and would relieve congestion through the College Green bus gate. This in turn would be a benefit for the forthcoming cross-city LUAS operations. In present plans, the Maynooth services will have to cross over the LUAS corridor twice and share running in places through the city centre, which is sub-optimal.



Finally, a further advantage has been identified by the student research team. Dublin Bus could provide layover facilities to private service, ideally at a minimal or very competitive rate. This would provide a revenue stream to Dublin Bus and make professional, industry-standard driver rest and vehicle maintenance facilities fully available to private operators.

PRO'S	CON'S
Move the public and private buses from Merrion Square	Some passengers alighting at Nassau Street and Merrion Square may be inconvenienced
Proper driver rest and vehicle maintenance facilities	
City Centre access maintained	
Connects Maynooth and western suburbs to the Docklands	
Relieve congestion through the College Green Bus Gate	
Speedier, more reliable route	
Likely increase in patronage	
Dublin Bus could charge for layover facilities	
Could potentially form part of a radical reorganisation and improvement in city bus and garaging services	
Benefit LUAS Cross-City operations	

The proposed solution has wider and potentially highly beneficial implications. In fact, it suggests that there is potential for a much wider review of layover and garage infrastructure serving the city and merits further consideration.

MULTI-CRITERIA ANALYSIS

The appraisal of options was followed by a multi-criteria analysis to weigh the various options against each other and to identify a preferred solution. Scores were marked on a 1 to 10 scale, 1 being the worst and 10 being the most suitable. Ten relevant criteria were identified:-

- Fuel costs
- Operating efficiency
- Economic impact on tourism
- Capacity
- Quality of layover
- Urban design
- Linkage quality
- Impact on modal share
- Impact on urban environment
- Customer experience

While each criterion was weighted equally, four broad areas were considered in their selection: economic benefits; operational efficiency; environmental quality, and customer experience.

The status quo was ranked lowest of the five options, receiving a score of 47 points (out of 100). The most advantageous option was the Layover at Garages alternative, receiving a score of 80 points.

Group	Criteria	Status Quo	Alternative On-street Location	Single Site Scenario	Layover at Garages	100% Cross-city
A. Economic Benefits	Fuel Costs	5	5	3	6	4
	Impact on Mode Share	7	8	7	9	5
	Impacts on Tourism	2	3	7	7	5
B. Operational Efficiency	Quality of Layover	3	2	8	9	5
	Linkage Quality	10	5	4	8	8
	Capacity	5	5	7	9	8
	Operating Efficiency	7	7	4	8	6
C. Environmental Quality	Urban Design	3	4	7	7	6
	Impact on Urban Environment	1	6	6	8	8
D. Customer Experience	Customer Experience	4	5	7	9	6
	Total Score	47	50	60	80	61

CONCLUSIONS AND RECOMMENDATIONS

Based on the multi criteria analysis the preferred option was the "Layover at Garage" scenario. It scored the highest across each criteria, including: operating efficiencies, capacity, quality of layover, impact on the urban environment, customer experience, fuel costs, etc. On only one criterion – linkage quality – did another scenario outperform it. In terms of linkage quality, the status quo is the optimal solution as the terminus and layover are co-located. It could even be argued that co-location also applies to the Layover at Garage solution since the route can potentially be extended through the Docklands to the Ringsend Depot.

The Layover at Garage scenario offers a number of significant improvements over the status quo. Firstly, by routing the services through Docklands – one of the biggest employment centres in the city – patronage should be significantly improved. Connectivity from Maynooth and the western suburbs to significant employment would be greatly enhanced. Proper layover facilities would be provided, including decent driver rest facilities, which are currently unavailable. Better use would be made of the existing garages, which tend to be fully occupied at night, but only semi-utilised during the daytime.

The research undertaken by DIT students contradicts the assumption that no viable alternative exists to the current use of protected heritage environments for bus layover. Not only have several alternatives been identified, the preferred alternative offers significant operational advantages over the status quo. These benefits should accrue to the users of bus services, the bus operators and the wider city economy.

Given the availability of a viable alternative and the sensitive and valued amenity of Dublin's Georgian Squares, there appear to be no credible reasons for persisting with the current situation. Redesigning the affected bus routes would take a degree of consideration and would require consultation and planning. However, the network revision would be relatively minor and should benefit far more travellers than those who might be negatively affected. Overall the network would be more efficient. The implementation of a contra-flow bus lane on Pearse Street would further enhance the quality of the affected routes and should be given due consideration.

The practice of using heritage environments for bus layover is considered bad practice (not known to be replicated in other European capital cities) and can be replaced by efficient compact bus operational procedures which will improve patronage and operations as well as benefitting the wider city economy.

Finally, the study has given rise to a number of considerations and insights into the efficiency or otherwise of the wider bus network and garaging infrastructure. Such procedures can likely be extended to the city-wide bus network at large and merit further consideration.

Acknowledgements

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