INTEGRATING MASS TRANSIT INFRASTRUCTURE INTO THE FABRIC OF SUBURBS: ‘A bottom up perspective’.

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Abstract
This paper will look at a methodology of 'bottom-up' transport planning using localised multilayered data and existing mass transit infrastructure, to help revitalize ailing and unsustainable suburban transport, using Dublin West as a case study area. Urban Acupuncture. A phrase coined by Finnish architect Marco Casagrande² to describe a process of analysis which favours small localized intervention rather than grand scale urban rejuvenation as a method of healing our sick cities. He views cities as organisms with energy flows that can be manipulated to help their development into a more environmental and sustainable city – a 3rd generation city, a post industrial city.

One of its more recent exponents is Jaime Lerner, former major of Curitiba and instigator of the Curitiba BRT initiative, who is now touring the world promoting his own book on urban acupuncture. There have also been urban acupuncture artists like Gordon Matta-Clarke, an American working mostly in the seventies who used a system of cross referencing to find vacant lots of decayed urban fabric which he used to make bold architectural statements. While it took Gordon Matta-Clarke three years to find fifteen sites, the new work of mapping software and GIS(Geographic Information Systems) technology means a thousand dilapidated or abandoned sites can be found in a matter of minutes.³

The question then arises, how, if at all, can we apply a similar methodology of ‘urban acupuncture’, the bottom up strategy, to city wide mass transit?

The answer of course is that we can’t. But what we can do is focus our attention on small, localized, subtle interventions that harness and exploit local authority planning and existing sustainable public transport infrastructure.

The suburbs of Dublin West⁴ were chosen as a case study area for the following reasons:
1. Large population - almost 118,000 inhabitants and the fastest growing suburban area in the GDA.⁵
2. Fragmented or dislocated residential neighbourhoods – typical of this area.
3. Mixed Development throughout - host to NAC, Sports Campus, 3rd Level Institute, IDA Campus, Corporate Parks, Industrial Parks and the retail hub of the Blanchardstown Shopping Center.
4. Use of localized statistical information - through the Fingal Data Hub (FCC) and CSO stats.
5. Close proximity of the Maynooth rail line, the M3 Parkway to Docklands line and the proposed Luas extension to Broombridge, means that given the right conditions, a modal shift from private car to bus and/or rail, is a viable and realistic prospect for this suburban area.

1. Introduction
Transport planning in Ireland and in particular within the Greater Dublin Area, is at a critical juncture. Our current economic cycle of recession has proven a welcome development in the reduction of greenhouse gases and an apparent increase in cycling and walking as a mode of sustainable transit. But it has also brought with it a worrying trend of reductions in public transport budgets and in the culling of large infrastructural projects not just in Ireland but throughout Europe. A ‘wait-and-see’ scenario with regard to transport planning and investment in primary and secondary infrastructural transport projects could prove a detrimental and costly strategy when the economic cycle turns towards growth. A higher level of economic prosperity always brings increases in numbers of passenger journeys by all modes of transit. At a time of economic resurgence in the Euro zone, having standard or sub-standard transport systems would negatively impact on our ability to be competitive with other similar European cities in a sustainable long term future. It should therefore remain a priority of land use planning and local and national government policy to continue investment in large scale public transit infrastructure and the promotion of sustainable forms of transport.

City centre measures relating to ‘polluter / user pays’, limited city centre traffic access using detection technology, and preferential public transit signalling at intersections and along the
quays will improve public modal share and reduce private car ridership. However, by far the most damaging aspect of private car commutes from outer urban areas into the city centre is the availability of car parking spaces at on-street meters, multi-storey car parks, private car parking spaces attached to commercial premises and high levels of state owned inner city parking. Without the implementation of relatively inexpensive measures within the city centre, outer urban transit upgrades and policies will not yield the results needed to move towards a greener more seamless transport network. Figures released recently by the National Transport Authority give an indication of modal share from 2006 to 2011 into Dublin city centre (Table 1).

Table 1 – Passenger journeys into Dublin City in 2006 and 2011

*includes taxi’s & motorcycles, but not Goods Vehicles due to changes in HGV access
Canal Cordon Count figures for 2006 & 2011 released by the National Transport Authority (NTA)

The success of current transportation policies and the effects of a downturn in the economic prosperity of the country can be seen in the change in percentages and numbers of people travelling into the city centre and the modes of transport used (Table 2).

Table 2 – % change in modal share and ridership into Dublin city from 2006 to 2011

*includes taxi’s & motorcycles, but not Goods Vehicles due to changes in HGV access
Canal Cordon Count figures for 2006 & 2011 released by the National Transport Authority (NTA)

The question this paper tries to answer is whether there are relatively small scale interventions in current transit mechanisms and current land use policies, which in the context of the Dublin metropolitan area and in particular the area of Dublin West, could yield tangible and measureable improvements in modal share. Reductions in private car use for commuting, better quality of life by shortened and consistent commuting travel times and lowering of congestion in city centre and outer urban centres. A pre-requisite to any improvement in current transit services and in modal share to sustainable forms of transport, is the involvement of all key public and private stakeholders. In particular Local Authorities will need to be more involved in the mechanisms and management of local transit support systems. Localized traffic management systems will have to be set up and maintained in outer urban areas throughout metropolitan Dublin if we want to see reductions in private car usage and greenhouse gas emissions. This would in effect mean that Local Authorities will have to produce Sustainable urban mobility plans with assessment and monitoring roles at regular intervals as part of their Council Development Plans.
2. Transport Provision in Dublin West:
The Dublin West area was chosen as a case study area because of its growing population and the relative proximity of multimodal transit infrastructure. In accordance with the electoral divisions of Dublin West, the area can be broken down into 10 sub-regions (Fig. 1).

![Electoral Divisions in the Dublin West Area and the existing Maynooth and M3 Parkway rail line stations](image)

Shaded circles on the map shown in Fig. 1 represent the location and catchment within an 800m radius of mainline commuter rail stations along the Maynooth and M3 Parkway route. The relative population for each of the 10 Electoral divisions is shown in Table 3 below.

The first part of this analysis assesses current levels of service provision and ridership throughout the main public transport modes. The largest contributors to public transport infrastructure and services in the Dublin West area are Irish Rail (IR), Bus Eireann (BE) and Dublin Bus (db).

### Table 3 – Population in each electoral division of the Dublin West Area

<table>
<thead>
<tr>
<th>Electoral Division</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castleknock-Knockmaroon</td>
<td>4307</td>
</tr>
<tr>
<td>Castleknock-Park</td>
<td>4061</td>
</tr>
<tr>
<td>Blanchardstown-Abbotstown</td>
<td>1807</td>
</tr>
<tr>
<td>Blanchardstown-Roselawn</td>
<td>4917</td>
</tr>
<tr>
<td>Blanchardstown-Delwood</td>
<td>10692</td>
</tr>
<tr>
<td>Blanchardstown-Coolmine</td>
<td>4789</td>
</tr>
<tr>
<td>Blanchardstown-Corduff</td>
<td>2751</td>
</tr>
<tr>
<td>Blanchardstown-Mulhuddart</td>
<td>1545</td>
</tr>
<tr>
<td>Blanchardstown-Tyrrelstown</td>
<td>32051</td>
</tr>
<tr>
<td>Blanchardstown-Blakestown</td>
<td>92383</td>
</tr>
</tbody>
</table>

CSO – Census 2006 – Small Area Mapping Statistics - [http://census.cso.ie/sapmap](http://census.cso.ie/sapmap)

2.1 Irish Rail - Maynooth & M3 Parkway Current and Proposed services:
The proposed building of Metro West and Metro North and the electrification of the Maynooth and M3 Parkway lines is still in its infancy. Plans for a new dedicated LUAS line (Line D) from the city centre to Broombridge have been given the green light. No other major infrastructural transport projects are planned for the duration of the new Fingal Development Plan 2011-2017 set out by Fingal County Council.

In total the Maynooth line accounted for 19.3% of all passenger rail journeys on the entire Irish Rail network in 2011. A recent injection of €2 million for upgrades to stations and other facilities along the Maynooth commuter service have been welcomed. There are still service issues along the Maynooth line regarding signalling upgrades, overlapping of commuter
routes with intercity routes, length of trains, station facilities, peak demand and intermodal connections. Currently, travelling from stations within the Dublin West area to Connolly station, the Maynooth commuter line has an average of 1 train every 18 mins at morning peak times (7am-10am), an average of 1 train every 30 mins at off peak times (10am-4pm) and an average of 1 train every 20 mins at evening peak times (4pm-7pm). 14

Table 4 – Number of passengers using intercity/outer suburban rail services by route 2006-2011

<table>
<thead>
<tr>
<th>Year</th>
<th>Dublin Drogheda</th>
<th>Dublin Maynooth</th>
<th>Dublin Cork</th>
<th>Dublin Kildare</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>5.2</td>
<td>2.1</td>
<td>2.8</td>
<td>2.1</td>
</tr>
<tr>
<td>2007</td>
<td>5.6</td>
<td>2.3</td>
<td>3.0</td>
<td>2.2</td>
</tr>
<tr>
<td>2008</td>
<td>6.0</td>
<td>2.5</td>
<td>3.2</td>
<td>2.3</td>
</tr>
<tr>
<td>2009</td>
<td>6.3</td>
<td>2.7</td>
<td>3.3</td>
<td>2.4</td>
</tr>
<tr>
<td>2010</td>
<td>6.6</td>
<td>2.9</td>
<td>3.4</td>
<td>2.5</td>
</tr>
<tr>
<td>2011</td>
<td>7.0</td>
<td>3.1</td>
<td>3.5</td>
<td>2.6</td>
</tr>
</tbody>
</table>

For those wishing to travel from the recently extended M3 Parkway line, there is only 1 train to Connolly Station at peak times. All other trains, which at peak times average 1 every 30 mins, travel to the Docklands Station located approximately 1.8 km from O’Connell Street and Dame Street to the south. According to Irish Rail demand for the M3 Parkway line has lead to a reduction of train services, despite the construction at M3 Parkway of Ireland’s largest park and ride facility with 1,200 car parking spaces, set down area, and bike park. 15

Traffic counter data from the recently upgraded M3 motorway shows an average of 30,649 vehicles passing the M3 Parkway exit every day. 16 Approximately 14,000 vehicles exit or enter the motorway at this location on a daily basis. A maximum of 100 cars are parked in the M3 Parkway car park on a regular basis. Bus Eireann provide a single bus service (111) once every hour to the towns of Trim & Athboy at peak times. 17 No other bus services stop at this station.

2.2 Bus Eireann – Current and Proposed services:
Bus Eireann routes carry 70,000 to 80,000 passengers per day. Services in Dublin West run mostly through the area to the city centre with no direct services from outlying areas to Dublin West. The routes which service the area are the 109 from Cavan/Kells, the 105 from Ashbourne and the 111 from Athboy/Trim. The 109 express route allows only for a stop at the Blanchardstown slip road off the M3 for service to the Blanchardstown Shopping Center 1.5 km away. 18 At morning peak (7 am – 10 am) there are no less than 6 buses passing through Blanchardstown Shopping Center per hour, while evening peak (4 pm-7 pm) sees almost 8 buses per hour passing through. All these buses use the same route into and out of the city centre. Recent changes to Bus Eireann timetables show a reduce amount of buses actually going into the Blanchardstown Shopping Center, more than likely due to traffic congestion around the centre and increased travel times.

2.3 Dublin Bus – Current and Proposed services:
Travel to and from the city centre by bus is the most popular mode of public transportation for commuters in the Dublin metropolitan area 19. Dublin Bus carries over 500,000 passengers per day. Dublin Bus routes servicing the Dublin West area include No.s 17A, 37, 39, 39A, 76A, 220, 236, 238, 239, 270, and accounts for 500 daily bus services to and from the Blanchardstown Shopping Center and along orbital routes from the centre to Swords, Dublin Airport and Liffey Valley. An airport link is provided by a private coach company (Urbus). The local 3rd level Blanchardstown Institute of Technology (ITB) provides a shuttle service to and from the Blanchardstown Shopping Center.
Recent improvements include simplified routing and Real time information screens at some bus stops (with NTA involvement). A sample map of the ‘simplified’ routing can be seen in Fig. 2. From one bus stop located on the southern side of the city centre along Baggot Street (Stop No. 783), during peak times there are 23 buses servicing the Castleknock - Blanchardstown area. Approximately 1 double decker bus every 2.6mins. Impressive as this may seem, the simplification of routing has come at the expense of travel time and amalgamation of different services. For example the 39a bus route up until recently ran from the Dublin West catchment of Ongar as far as the terminus at Hawkins Street close to the city quays and Trinity College. A distance of 18km. Now this same route partly covers the services of the No. 10 route through the city and out as far as UCD Belfield. A total route distance of 24km with 70 bus stops and 6km of QBC. According to Dublin Bus the 39a takes 71mins. to complete its journey, ‘off peak’.

(Dublin bus estimated journey times are for ‘off-peak’ services).

Fig. 2 – Route schematic map for Dublin Bus services from Dublin West

3. LOW KEY HI-IMPACT STRATEGIES FOR LOCAL MOBILITY PLANNING

3.1 Irish Rail & Fingal County Council - Maynooth & M3 Parkway lines:
Low key Hi-impact interventions:

- **Improved services into Connolly and Pearse Stations:**
  This has been a problem for Irish Rail due to shortages of siding, congestion and limited access at Connolly, Tara Street and Pearse Street stations. However 1 train every 18-20mins at peak times into and out of Connolly Station is insufficient for existing demand and if increased rail ridership is to be achieved this deficiency will have to be redressed to levels of parity with existing LUAS services as a matter of high priority.

- **Improved services along the M3 Parkway line:**
  Considering the strategic nature of the park and ride facility and the volume of private car traffic at this junction on a daily basis (30,000+ cars) it is imperative that higher frequency service is offered and marketed to the commuting public. The current practice of by-passing city centre stations in favour of the less congested Docklands Station which is approx. 2km away from Dame Street and O’Connell Street, is counter-productive given the high level of city centre based employment.

- **Dublin Bike facilities at Docklands Station:**
  This measure should be given priority because of the location of the station in the docklands and the distances to centres of employment other than the IFSC. A Dublin Bike facility is located at 1km from the station on the north quay but this does little to attract south city commuters heading over the Samuel Beckett bridge.

- **Direct BRT shuttle service to Blanchardstown Shopping Center from Maynooth line:**
  The Blanchardstown Shopping Center provides high employment, 7000 free car parking spaces after 9am, 180 shops and 20 restaurants. Only one orbital route the 239 which has a 1hr frequency at peak times and 3hr frequency at non-peak times connects passengers to the commuter rail line 1.5km away. A suggested routing for a dedicated BRT style shuttle connecting Blanchardstown Shopping Center and Coolmine Station is shown below with a terminus in the shopping centre behind Fingal County Council offices (Fig. 2 photo 5), directly opposite the main entrance to the shopping centre (Fig.2).
Free Bike from Blanchardstown Shopping Center to Coolmine Station: Cycle path along the same route as the proposed BRT shuttle with Dublin Bike style provision. This may attract ridership from commuters being dropped at the centre or future park and ride commuters. The free bike can be limited to Irish Rail, Bus Eireann and Dublin Bus ticket holders.

Park & Ride facilities at Blanchardstown Shopping Centre: The inclusion or separate provision of rail and bus park and ride facility at the Blanchardstown shopping centre or at Fingal County Council lands adjacent to the shopping centre, or at underutilized commercial/residential car parking sites, would mean the lack of supply of park and ride facilities at Coolmine Station could be addressed without future state subvention. Light weekend demand for park and ride facilities would complement high weekend demand for parking at the Blanchardstown shopping center. A ticket controlled barrier could be used to ensure only transit ticket holders could use this facility at a reduced price while non-transit users pay a full price.

Park & Ride facility at Clonsilla Station: Currently there are 763 car parking spaces at 5 of the 9 stations serving the Maynooth line to Connolly Station. This line has an average ridership of 11,500 passengers per day. Of the 3 stations servicing the area of Dublin West only one station has a park and ride facility of 170 spaces (Coolmine Station). The catchment area of Clonsilla Station borders larger, less densely populated communities outside of an 800m radius (a best practice maximum walking or cycling distance from a main public railway station). These include the areas of Ongar, Little Pace, Clonee, Castaheaney & Blakestown which are all within a 5-8mins commute by car and which account for a catchment of approximately 35,000 people. (A commuter rail station built closer to Ongar at Hansfield along the M3 Parkway line has yet to be opened) Of the 10 Electoral Divisions in Dublin West an average of 20% of people are working or attending at 3rd level institutions. This translates into almost 7,000 possible commuters outside an 800m radius from the existing Maynooth commuter station at Clonsilla. There are lands adjacent to the Clonsilla Station which would suit redevelopment for a priority Park and Ride facility. At an average of 4 car parking spaces per 1,000 inhabitants that equates to 140 parking spaces, or 1 car park space per every 50 commuters within 5-8mins. travel time by car to the station.

Rapid feeder bus network to Maynooth Commuter rail stations: (SEE BELOW: Dublin Bus & Fingal County Council).
3.2 Bus Eireann & Fingal County Council – Routing and Interchange facilities:

**Low key Hi-impact interventions:**

- **Bus Eireann commuter stop at M3 Parkway at peak times:**
  Stated travel times for the Kells-Busaras 109 service from Dunshaughlin (main bus stop prior to M3 Parkway) to Busaras is 45mins. However, this is a mean time based on ideal driving conditions. Peak times are closer to 55mins. Furthermore the reduction of Bus lane availability on the return journey from the city centre (Arran Quay to M3 Parkway is a distance of 17km of which only 1.3km are dedicated bus lane on an outbound journey) means a 45mins travel time is highly optimistic and unrealistic.\(^{27}\) Again peak times here are closer to 60mins. M3 Parkway to Connolly Station rail service in either direction takes 36mins without fluctuations due to traffic congestion levels. This is a round trip saving of up to 48mins but could be as much as 60mins per return journey. This equates to a saving of min. 4 hours per week of commuting time along the 109 Kells - Busaras Bus Route if a stop was introduced during peak times at the M3 Parkway location.

- **Local Feeder buses to M3 Parkway Station:**
  Roundtrip feeder buses from population centres such as Dunboyne village (pop. 9,578 located within 2km), Dunshaughlin Village (pop. 5,239 located within 10km), Ashbourne (pop. 10,994 located within 15km), Ratoath (pop. 10,561 located within 10km) & Fairyhouse, Ireland’s largest weekly outdoor market and popular horse racing and competition venue, will all add to ridership.\(^{28}\) Estimated roundtrip times are 56mins, so even 1 feeder bus could operate on an hourly basis or 2 buses every 30mins.

- **Interchange facilities at the Blanchardstown Shopping Center:** As part of the Blanchardstown Shopping Center Masterplan and referred to in the Fingal Development Plan 2011-2017, a transport interchange or hub located adjacent to the shopping centre would help improve access to and from the shopping centre for Bus Eireann services. This would provide added ridership from Kells, Navan and Trim to the Blanchardstown Shopping Center for employment and retail/leisure uses.

3.3 Dublin Bus – Route strategy, BRT, feeders and interchange facilities:

**Low key Hi-impact interventions:**

- **Routing Strategies:** Using long radial routes running through the city centre from outer urban centres instead of terminating in the city, does solve issues related to bus parking congestion and shift changes in the city centre. However, the ramifications of this strategy affect predominantly the passengers. Longer and inconsistent travel times, higher levels of passenger congestion in the city centre stages, reduced punctuality due to longer distances travelled over non-QBC sections and more bus stops to service. Transport services need to be based on people and their mobility needs and less on well-established economically driven, staff friendly routing.

- **Feeder Buses:** Since the introduction as part of the highly successful Curitiba BRT, the use of feeder buses has become widespread in urban transport systems.\(^{29}\) Special feeder services can be perceived as small to medium size buses operating at low headways on short routes, preferably configured in a loop shape. Feeder buses can offer a high-quality service intended to be attractive to riders with buses of recognizable exterior look, colours and logo. Feeder bus routes in outer urban centres require high quality interchange facilities with other more direct bus routes and rail connections. Feeder routes in the Dublin West area...
should also be based on a thematic approach. For example, precise city enumeration area statistics for Dublin West can inform us that a majority of students who attend or will soon be attending a 3\textsuperscript{rd} level institution are based predominantly in the areas of Blanchardstown-Blakestown and Castleknock-Knockmaroon (Table 5). Starting in these areas a College feeder bus route could be introduced which takes students directly to their 3\textsuperscript{rd} level institute or secondary level school. The same approach would suit corporate or industrial park personnel who could avail of a frequent feeder route to access other bus or rail services.

- **BRT corridor to City Centre**: A dedicated BRT (Bus Rapid Transit) corridor linking the city centre to Dublin West is now an absolute necessity and no longer a luxury. There are substantial infrastructural investments which still need to be made with regard to increased rail capacity on the Maynooth Commuter line at Connolly and Pearse Stations. A BRT corridor would provide a short term cost effective solution at a more affordable price than heavy or light rail. One of the characteristics of many outer urban centres throughout the Dublin Metropolitan area, is the legacy of low density urban sprawl with poor transit infrastructure. Unlike many of the American, South American and Chinese BRT models, the Dublin metropolitan area has no real dedicated transit corridors of wide multi lane thoroughfares. Our urban form is inherited and organic and not planned. The existing housing stock cannot be removed to create wide thru routes to accommodate dedicated BRT lanes. Nor do we have the exchequer funds to build long elevated roadways as in Xiamen, China (Fig.3). However, close scrutiny and careful design of the BRT route exploiting any state and local authority assets, could overcome the planning shortfalls of the last 5 decades at an affordable cost.

- **Blanchardstown Shopping Center Transport Interchange (Fig.5)**: Another crucial part of any outer urban mobility plan is a well developed and easily accessible transport interchange. Examples from Madrid, where heavy investment in underground interchanges has begun to reap rewards\textsuperscript{10}, or at the Kamppi Shopping Centre in Helsinki, where a new coach, bus and rail transport hub was completed recently.
4. Conclusions

Based on an analysis of existing transport infrastructure in the Dublin West region a realistic modal shift from car to public transport can be achieve by implementing low key hi impact measures in the short term future. The greater involvement of local authorities and analysis of available local data will play a major role in the success of these measures. The restructuring of existing bus networks to suit demand can be achieved by the introduction of localized feeder bus services connecting to inter-urban high priority BRT bus corridors and commuter rail stations. All these modes are dependent on a local transport interchange that passengers can access quickly and move through as seamlessly as possible. A dedicated BRT shuttle connection from the Blanchardstown shopping centre directly to a commuter rail station is essential as are the installation or segregation of park-and-ride facilities for bus and rail networks at stations and at the Blanchardstown Shopping Centre.

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