A strategic timetable for public transport in York and North Yorkshire

designed by Jonathan Tyler of Passenger Transport Networks, York [PTN] – using Swiss concepts and the *Viriato* planning tool developed by consultants SMA in Zürich

1 Premise, methodology and context

1.1 This Report illustrates a network of integrated rail and bus services in York and North Yorkshire as proposed in the accompanying Manifesto. It is based on the premise that public transport must urgently be reorganised to a high standard in order to contribute to climate-protection targets by attracting significant numbers of travellers out of private cars and also to redress the social inequity arising from its decline. The standards are derived from common practice in Switzerland and other parts of Europe.

1.2 PTN is grateful to SMA of Zürich for a user-licence for *Viriato* over many years. PTN however is solely responsible for the data and proposals. *Viriato* is essentially a tool for optimising railway operations and timetables: this means that some terminology cannot be altered when it is used to plan and display bus services. Adapting it for the current purpose has taken time, and some limitations are discussed below.

1.3 The context is the formation in May 2024 of the York and North Yorkshire Combined Authority. It will be led by a directly-elected Mayor with extensive transport planning powers. In particular, the Mayor will be responsible for producing and implementing a Local Transport Plan. This could include an Enhanced Partnership with bus operators but may introduce a scheme for franchising services designed by the Authority. The plan specified here will be offered as a starting point for an entirely new approach.

1.4 The project was initiated by local groups that are campaigning to protect and enhance public transport in the territory, several of whom operate services themselves. They have outlined and commented on the proposals, but final responsibility for the plan rests with PTN.

1.5 The task is being supported by a grant from the Foundation for Integrated Transport. Its mission is based on the fundamentals

* that citizens have a right to get around without a car;
* that people should be able to travel with minimum impact on other people's lives and the environment; and
* that the operation and presentation of trains and buses should be integrated.

2 Geography and principles in outline

2.1 The purpose of the exercise is to outline an ambitious strategic plan for public transport in North Yorkshire. It starts from the conviction that environmental, economic and social issues are converging to render four decades of diminished train and bus services neither sustainable nor acceptable. Public transport must be transformed to become an attractive and viable alternative to the use of private cars and to secure quality journey opportunities for those without access to a car. In future services must be frequent, brisk, convenient, day-long and 7-day across a dense and integrated network of routes – as outlined in our Manifesto.

2.2 Desire lines for public transport commonly cross administrative boundaries, for example between the north-east of North Yorkshire and Teesside and the south-west and West Yorkshire.

There may be a case for larger units for the planning of public transport, or alternatively it will be important that neighbouring authorities work better together to achieve attractive cross boundary services. However, to make the present task manageable with available resources the focus is limited to the territory of the Combined Authority. Geographically therefore the proposals cover the railway network and inter-urban bus routes connecting centres in that County, either directly or by coordinating timetables at key interchanges. Some routes linking places in North Yorkshire with places in surrounding counties are incorporated where they perform significant functions in North Yorkshire (including 360° cover around York).

2.3 It is desirable to establish a hierarchy of services, with inter-city trains at the head and a rich layer of village services at the base. The principal urban centres will be served by a frequent and dense system of local routes. We have not presumed to timetable them here (which is not to say that they do not require substantial enhancement), although we would expect them to be carefully coordinated with the inter-urban routes to secure comprehensive connectivity between centres. In some cases Park & Ride services may also be incorporated.

2.4 All these services are assumed to call at every recognised bus stop. As the network develops some links may justify express runs in addition. In some cases existing routes divert from the direct road to serve smaller settlements: this may be justified by demand, but it is inadequate and disruptive of the overall plan when it only occurs occasionally. Other solutions are required.

2.5 Provision for smaller communities off the main roads will require initiatives to explore new ways of securing attractive frequencies and links with the primary network. In line with the principle that every settlement above a (low) minimum size should have a basic standard of timetable, places that presently have no or very limited public transport will be served either by local routes coordinated with the primary routes or by 'on demand' arrangements. Occasional buses or runs even only on selected days will be subsumed in the overall plan [see ¶6.5-6.8]. All such services will be planned as an integral feature of a comprehensive network.

2.6 The selected centres are listed in Table 1. This list is drawn from research by the present author that used Census and urban-hierarchy data to carefully divide Britain into 780 coherent ***catchment areas*** (ie. the areas and populations sum to all-Britain totals). All of these within the project geography are shown in the 'netgraph' [see ¶3.3], together with some other places to indicate routeing.

3 Process and data

3.1 The *Viriato* program is designed for planning regular and integrated railway timetables. For this project it has been successfully deployed to plan inter-urban bus routes (subject to accepting railway nomenclature). It cannot however handle their detail without requiring disproportionate data management; that applies even more for urban routes. For strategic reasons the plan will not include minor variations [see ¶6], and as it happens *Viriato* does not readily accommodate them.

3.2 Acquiring reliable data has not been easy. Bus timetables are published on-line by a range of operators in various formats (few print versions are available). Many do not differentiate between arrival and departure times at the main locations. Most vary running times through the day. The times input to the schedules for each route are therefore provisional best estimates (but may in some cases be corroborated later by field observations). This in turn means that the inter-connected pattern may need revision.

3.3 The primary output is the colour-coded 'netgraph'. The nodes of the network are shown as rectangles and routes linking them as lines with numerals representing arrival and departure times applying throughout the working day. Customer timetables can be (but so far only have been for illustrative purposes) prepared to show the standard, repeating daytime service. Because of the regularity they can be simplified into an "at these minutes past every hour" format, flanked by the start-up and close-down services where some runs are curtailed. It is envisaged that when the network is introduced the netgraph will be central to marketing the concepts of regularity and connectivity and that high graphic design values will be applied to printed and on-line tabulation of service detail.

4 Standards

4.1 A principal feature of the Swiss system is the careful planning of interchange at selected nodes: this secures good journey times for origin <> destination pairs that cannot be served by through services, either because of geographic characteristics or because demand is too limited. Day-long repetitive timetabling and high operating standards make this the preferred option rather than occasional direct trains. Achieving this structure for a multi-modal network requires judgment. The Swiss approach leads to a programme of infrastructure projects that increase capacity and reduce running times to improve interchange arrangements. Circumstances in a largely road scheme are rather different, but some equivalent proposals may emerge as the provisional ideas are explored.

4.2 Enhancing connectivity between the principal centres of North Yorkshire requires that the busiest routes should operate every 30 minutes (and in a few cases every 15) from early morning to late in the evening. Other busy routes should run hourly, and not less than two-hourly in the least populous areas. On sections served by two routes times should be evenly spaced, for example hourly buses on the Scarborough <> Leeds trunk route will alternate at 30-minute intervals with the hourly Whitby (Thornton-le-Dale) <> Leeds service west of Malton – as they mostly do now.

4.3 The timetables are assumed to operate every Monday to Saturday. On some routes peak-hour extras may be added but are not detailed at this stage. Sunday services would generally start later than on weekdays but thereafter run as on weekdays, perhaps with some thinning out on some routes. It may be hoped that growing use of buses for leisure purposes will limit this and so lead to the 7-day timetables that are common in Switzerland.

4.4 As a general rule services should begin soon after 06:00 hours, preferably at the full frequency for the route. Workplaces should receive at least one run by 08:00. Last services should be offered at least after 22:00, and up to midnight where there is a significant evening economy.

4.5 Such a timetable will not alone be sufficient. A high quality of *electric* vehicles will embody the transformation to convenient timetables. Bus stops and particularly bus stations will need comprehensive renovation to make them attractive places to wait for, board and leave buses. This particularly includes locations at which travellers will interchange between trunk and feeder services. The schedules of high-frequency urban routes, some with more buses / hour than at present, will be coordinated with the inter-urban timetable to minimise interchange times, although the logistics in bus stations and around groups of stops in town centres do not always make the ideal attainable.

4.6 This vision is ambitious. Some critics will dismiss it – in spite of the climate and social emergencies. Others will query the nature and scale of the change envisaged in the context of the current muddle in Government policy caused by erratic funding, populist measures and an absence of a long-term objective – after years of decline. We have interpreted our remit as being to challenge the mediocre standards arising from the prevailing governance and funding of public transport – especially buses – but we recognise that the transition may need to be phased.

4.7 At some point it will be necessary to evaluate the proposals, but this should not use conventional business and econometric methodologies. There will of course be calculations regarding the vehicle, personnel and other inputs, but it is the benefits that will be significant beyond basics such as savings in journey time. These will include:

* reductions in carbon outputs and vehicle-related pollutants as people switch from private cars to buses and trains;
* improved amenity as urban congestion is moderated;
* better physical and mental health;
* fewer road accidents;

* measurable amelioration of transport-related poverty in poorly-served areas; and
* the widespread benefits of a more equitable economy.

5 General assumptions

5.1 The legal, institutional and operational context of our timetable will have a profound effect on the structure and details of the routes, their timing and the connectivity between them – but is unknowable at present. We may hope that a new government committed to redevelopment of public transport will both institute planning in the public interest and increase funding – and note our advocacy of Swiss standards and the Buurtbus system in the Netherlands.

5.2 It should be understood that the detail presented here illustrates ideas but necessarily makes assumptions that in practice will be affected by many factors. Thus for example:

* the primary East Coast train service is timed for both the fast and the more-stops trains in each direction to pass at York in order to maximise connectional opportunities – but this ideal may be modified by wider considerations across the network and there could be pushback from station managers regarding a surge of passenger flows every 30 minutes;
* the (long overdue) half-hourly train service between York and Scarborough is timed as a self-contained operation that optimises links with the Edinburgh <> London trains – that has its merits in terms of connectivity for Scarborough, Whitby and Malton travellers and perhaps for reliability too, but in practice it will have to be decided in relation to the offer for journeys to / from places west of York as an element of the national timetable;
* existing bus operators are likely to express scepticism about growth in usage and the increase in costs (as yet unmeasured while we focus on principles), but attitudes may change if the Combined Authority begins to consider franchising; and
* the exercise has focussed on desirable timetables without at this stage considering issues of vehicle and crew scheduling.

Ideally of course the plan for North Yorkshire would be one regional segment of an all-Britain scheme – but until that happy day we hope that our County will become a recognised exemplar.

6 Regularity and variations

6.1 A truly integrated and high-convenience timetable depends on day-long regularity: people get to know and rely on the repeating pattern. The argument that digitalisation renders this unnecessary is weak since not everyone has ready access to on-line data, and even if they have it is not always easy or quick to find it. Absolute regularity must therefore be the starting assumption in presentation of the service. Difficulties must however be recognised.

peak-hour variations

6.2 To some extent variation in timings is a function of busy-ness (railway schedules too sometimes contain extended dwell times in peak hours), but it largely reflects traffic congestion. We should be optimistic that the proposed timetable reform will be accompanied by strong measures to ensure that buses have priority in traffic. Ideally this would facilitate identical timings all day. Variation in loadings could then be covered by timing for the busier journeys, with easier off-peak schedules aiding reliability. This will take time to achieve. However, the ideal is shown in the documentation in order to focus on the core principles (and also because the software cannot readily show variation – the Swiss generally don't do it !).

6.3 It should be noted too that any significant variation would likely upset the connectivity scheme, either by breaking links in the peak or requiring excessive interchange margins off-peak. This issue is far more pronounced than it is on a railway network – markets and operational contexts differ – and will need to be discussed in depth.

school buses

6.4 Buses provide a vital service for schoolchildren and college pupils. Some routes cater exclusively for this need with dedicated vehicles, and others meet it with minor variations or route extensions. In some cases however the school functions are fulfilled by significantly altering the basic schedule – often at the expense of all other travellers. Ideally this practice should be removed, even if it means securing the resources to run school journeys independently. This might be offset by deploying school vehicles for promotional and excursion journeys between the peaks and during holidays.

route deviations and small villages

6.5 It is common for routes to vary between successive runs during the day. For example East Yorkshire's half-hourly York <> Hull timetable has the X47 leaving the main road to serve Barmby Moor and Wilberfoss while the alternating X46 runs direct. The timing difference is 7 minutes, and it would be interesting to know why EY reduce those villages to an hourly service. There is a similar difference between the two Scarborough <> Bridlington routes. At this stage we have not differentiated the alternative timings.

6.6 Reliance's roughly hourly York <> Easingwold <> Thirsk service (30 and 30X) diverts via Raskelf in alternate hours, at the cost of 4 minutes. Similar arrangements are made for Alne and Tollerton. The presumption must be that the company has made a commercial decision, but in the network envisaged retaining hourly provision and regularity may trump that: the question is whether serving those villages hourly would generate enough extra use to offset any lost by the slightly longer timing. There are many other villages that have no more than a market bus a few days a week. These cater for residual need and are greatly valued facilities. In most cases it would be stretching to propose increasing their frequency as conventional routes, at least until the new approach has transformed attitudes to using – and supporting – public transport. This should also cover the 'tourist' routes.

6.7 In Switzerland and the Netherlands quite small places can expect a useful, day-long bus service. We are a long way from that being the norm in Britain. The key question is going to be how we move toward that standard. If regular deviations are not justified, and to address the issue of infrequent provision generally, thought needs to be given to the best way of securing higher frequencies for smaller settlements located away from the main roads. The ideal model of a much-enhanced scheme would provide a bus (or taxi) to convey travellers from settlements above a minimum size to a (well-designed) interchange point on the main road, and vice versa. The booking arrangements would be the simplest possible and would advertise regular connecting times.

6.8 A thorough analysis and public discussion is needed about how best to serve small places and low-density areas within the broader strategy. It should study the reasons why so many Demand Responsive projects have failed, local perceptions of real need, collaboration with other services in these areas, the potential application of Community Transport legislation, the vital well-being role of economic and social inclusion and European practice.

interchange locations

6.9 In order to simplify the netgraph places with a train station are shown as one location incorporating the bus station or group of stops, This is physically correct, or at least a reasonable approximation, and implies good facilities for interchange in Whitby, Scarborough, Filey, Hull, Darlington (for the Richmond service), Northallerton (for the Wensleydale service), York, Knaresborough, Harrogate, Selby and Settle. Relative locations are less good in Middlesbrough and Bridlington (but these are not major interchanges in this study). Although Thirsk is shown as one location the distant siting of the station will require a specific connection with the town.

6.10 York may present problems because even after the forthcoming reconstruction of the area in front of the station there may be contention for space between the frequent urban services and the inter-urban routes. The massed arrival and departure of platoons of buses that characterise some Swiss train stations may only be achievable in Britain as opportunities for redesign arise.

Table 1
North Yorkshire catchment areas

catchment	population	area [ha]	density [people/ha]
Middlesbrough + Stokesley	343495	34171	10.1
Hull (conurbation)	333047	22375	14.9
Otley + Pudsey + Horsforth + Yeadon + Guiseley + Baildon	220072	18743	11.7
York	198985	30583	6.5
Redcar + Guisborough + Saltburn + Loftus + Great Ayton	126076	40885	3.1
Lancaster + Morecambe	119868	25119	4.8
Ilkley	117673	20070	5.9
Darlington	106137	26838	4.0
Harrogate + Knaresborough	103451	26845	3.9
Scarborough	72353	29472	2.5
Skipton	51102	28695	1.8
Selby	48942	28961	1.7
Beverley	43805	20589	2.1
Wetherby + Tadcaster	43449	22749	1.9
Market Weighton	42598	28224	1.5
Bridlington	40395	15417	2.6
Pocklington	36427	51351	0.7
Richmond + Catterick	36371	33605	1.1
Northallerton	27338	34173	0.8
Driffield	26440	43302	0.6
Ripon	24276	23937	1.0
Whitby	23405	36878	0.6
Malton	20831	37656	0.6
Barnard Castle	18606	50791	0.4
Thirsk	17412	23177	0.8
Bedale	16357	32293	0.5
Filey	13593	16628	0.8
Easingwold	13196	26342	0.5
Kirkby Lonsdale + Ingleton	13092	43958	0.3
Pickering	12990	30095	0.4
Settle	10809	62426	0.2
Boroughbridge	10782	15336	0.7
Pateley Bridge + Grassington	10101	44394	0.2
Green Hammerton	9831	17849	0.6
Leyburn + Reeth	9593	70852	0.1
Kirkbymoorside	7276	38530	0.2
Kirkby Stephen	7078	51534	0.1
Helmsley	6647	33023	0.2
Sedbergh + Hawes	5088	37916	0.1

Minor nodes within catchments :
Buckden, Bolton Abbey, Brompton (Northallerton), Giggleswick,
Goathland, Garsdale, Hovingham, Masham, Muker
Osmotherley, Robin Hood's Bay, Staithes

Source: 2011 Census. Nationally the 780 catchments contain the entire population of Britain.
Boundaries defined by Passenger Transport Networks, York in 2020

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