

# Tackling Crime and Fear of Crime While Waiting at Britain's Railway Stations

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## Abstract

*Crime on the railways in Britain is an increasing concern for train operating companies, the British Transport Police (BTP), passengers, and local residents. Significantly, rail users consistently perceive their risks from crime to be considerably higher than official crime statistics indicate, having a negative affect on levels of patronage. This article presents an exploratory study of passengers' fear of crime while waiting at railway stations using Quick Time Virtual Reality (QTVR) walkthrough scenes. QTVR arguably represents an innovative, dynamic, and interactive environmental stimulus for gaining insights into passengers' fear of crime. Visibility at stations was identified as a crucial factor in determining levels of fear of crime. The design of the station shelter is analyzed as an example of how crime prevention through environmental design (CPTED) is being implemented on railway stations by Valley Lines (Wales and Borders Trains) on its network in South Wales (UK).*

## **Introduction**

The recent environmental and social concerns associated with an increasingly car-reliant society have provided a new impetus for promoting public transport. Rail travel represents 5 percent of all passenger journeys in the UK (Hamilton and Jenkins 2000) and is currently subject to a large-scale regeneration program with health and safety issues representing a critical focus in the light of recent tragedies at Paddington and Hatfield. The industry is certainly striving to encourage potential passengers to “let the train take the strain.” However, crime on the railways has recently emerged as a high profile priority requiring scrutiny and attention. Indeed, media reports of the murder of Liz Sherlock at Euston station have certainly raised public awareness and one headline in the *Independent* newspaper read “Robberies on the Rise in Britain’s Dark, Dangerous Train Stations” (Lashmar 2001). Railways represent a vital part of Britain’s public transport system and one of the UK government’s stated policy objectives is to provide safe travel for the public; “We want people to travel safely and to feel secure whether they are on foot or bicycle, in a car, on a train, or bus, at sea or on a plane” (DETR 2000, p75).

According to the British Transport Police recorded crime on the railways rose by 5.6 percent in 2001–2002 (Guardian 2002). Crucially, however, recorded crime statistics represent only a fraction of total crime (Mirrlees-Black et al. 1998). The “dark figure of crime” (Maguire et al. 1997) represents the missing data that may not be witnessed or discovered, or remains either unreported or unrecorded—for a variety of complex reasons. This issue also applies to the transport environment as the UK government acknowledges: “a large proportion of crime on public transport is not reported” (DETR 1998a). Reluctance to delay one’s journey, a lack of confidence that the offender will be apprehended, the absence of someone to actually report an incident to, and the belief that a reported incident will not be taken seriously are examples of nonreporting behavior.

This article discusses crime prevention through environmental design (CPTED) and the fear of crime as it relates to the railway station and its immediate access routes and presents an exploratory study of passenger’ fear of crime using Quick Time Virtual Reality (QTVR) as the environmental stimuli. The performance of one specific CPTED modification, the introduction of the transparent railway station shelter, is compared with its predecessor.

## **Crime Prevention Through Environmental Design (CPTED)**

CPTED (pronounced sep-ted) asserts that “the proper design and effective use of the built environment can lead to a reduction in the fear of crime and the incidence of crime, and to an improvement in the quality of life” (Crowe 2000, p1). The urban environment can be designed or modified to reduce opportunities for crime and fear of crime by promoting:

- *Natural Surveillance.* The placement of physical features, activities, and people in such ways as to maximize visibility. This also involves the lighting of public spaces and walkways at night.
- *Natural Access Control.* The physical guidance of people entering and exiting a space by the judicious placement of signs, entrances, exits, fencing, landscaping, and lighting.
- *Territorial Reinforcement.* The use of physical attributes that express ownership, such as fences, pavement treatments, artwork, signage, landscaping, and placement of buildings.
- *Image/Maintenance.* Allows for the continued use of space for its intended purpose and serves as an additional expression of ownership. This also involves supporting a positive image through the selection of materials, design, and scale.

CPTED strategies continue to be implemented in a wide range of urban settings at an international level and there is increasing volume of research activity seeking to evaluate real-world applications of CPTED (e.g., Levine et al. 1986; Loukaitou-Sideris and Banerjee 1994; La Vigne 1996; Hunter and Jeffery 1997; Sloan-Hewitt and Kelling 1997). However, Eck (1997) has reviewed various studies of public transport (Kenney 1987; Poyner 1988; Carr and Spring 1993; La Vigne 1997) and claims that despite such studies, little is currently known about the effectiveness of design interventions. The variety of crimes, number of different settings in the transport system, and the diversity of victim types effectively means that “we cannot therefore, identify with reasonable certainty, any specific tactic against specific crimes, that can be said to ‘work’ across similar settings in other cities” (Eck 1997, p16). Indeed, Schneider and Kitchen (2002, p293) argue that “approaches need to be tailored to specific local circumstances.” Clearly, although many CPTED measures may have been successful (or not) in any one context, a site-specific approach to analysing crime and the fear of crime at Britain’s railway stations and their immediate access routes appears to be vital.

Fear of crime in the built environment can result in the withdrawal of the community and a reduction of crucial “eyes on the street” that can actively contribute to policing a neighbourhood (Jacobs 1961; Newman 1973). Similarly, perceptions of crime on the railways will undoubtedly affect levels of patronage. Recorded crime on the railways is low while the perception of crime has consistently been found to be significantly higher (Brantingham et al. 1991; Crime Concern and Transport and Travel Research 1997). Crucially, Clarke (1996, p3) observes “...the fear of crime that stops many people using public transport has a serious impact on revenues.” Crime Concern and Transport and Travel Research (1997) suggested that there might be as much as a 15 percent increase in passengers for all rail journeys if a range of anticrime initiatives were successfully implemented.

Understanding the perceptual dimension to CPTED is clearly crucial, and has been explored with regard to residential housing (Tijerino 1998; Ham-Rowbottom et al 1999; Cozens et al. 2001). Regarding public transport, perceptions are no less important, as noted by the Legislative Assembly of Queensland (Australia): “...the public’s perception of crime is an important determinant of people’s usage of public transport” (Parliamentary Travel Safe Committee 1998, p16).

## **UK Government Policy for Tackling Crime on the Railways**

The UK government is committed to providing an effective, safe, and thriving public transport network (DETR 2000; DETR 2001) and clearly recognizes the contribution of design in facilitating or discouraging criminality (DOE 1994; Crime and Disorder Act 1998). Indeed, it has been asserted that “there is now an established link both between design and crime and the reduction of fear” (DETR 1998b).

One initiative specific to the railways is the Secure Station Scheme. This scheme is operated jointly by Crime Concern and the British Transport police (BTP) and is arguably central to the government’s strategy for reducing crime and the fear of crime in and around railway stations. It focuses on implementing CPTED strategies at individual stations to reduce crime and the fear of crime. Currently, more than 150 railway stations in the UK have been accredited by the BTP and offers “... an opportunity for Britain’s rail companies to improve security at their stations and display to customers their desire to reduce crime” (DETR 1998a, p1). The number of accredited railway stations continues to rise and the British government intends this number to increase (DETR 2000), although currently this only represents 3 percent of Britain’s 2,500 or so railway stations (Lashmar 2001).

Significantly, the accreditation can only be awarded to railway stations that exhibit a threshold level of reported crime as a proportion of passenger throughput—ignoring those railway stations with either high crime rates or low throughput levels—or both. Furthermore, to date no study has evaluated the effectiveness of this scheme. Therefore, for railway stations outside the scope of the Secure Stations Scheme (the majority of stations on the Valley Lines network), train operating companies (TOCs) must develop an alternative framework for tackling crime and the fear of crime.

Indeed, Clarke (1996) has called for more studies to be funded by transit authorities and therefore, more communication between railway managers and CPTED theorists and practitioners. Furthermore, the Head of Rail Research UK, Keith Madelin (2003, p31), recently remarked that the rail industry “has ignored the potential benefits of academic research into new technologies and systems that could help to solve some of its problems.”

### **The Valley Lines Study in South Wales (UK)**

The Valley Lines rail network (part of the Wales and Borders franchise) is located in South Wales and serves the communities of the Rhondda, Cynon, and Taff Valleys, in addition to stations in Cardiff, Barry, and Penarth (see Figure 1). BTP statistics reveal that 459 crimes took place on the Valley Lines' railway stations which operated 7.3 million passenger journeys annually (2000–2001). This does not include crimes that may have occurred on the train itself and equates to 6.26 crimes per 100,000 passenger journeys. Although not strictly comparable, the recorded crime rate per 100,000 population for the South Wales police force area in 1999 was 10,251 (Home Office 2000).

In a recent Valley Lines' Customer Satisfaction Survey (Pengwyn Services 2001) 1,000 rail users were interviewed while traveling on the network. To monitor passengers' fear of crime, specific questions were included to probe the issue of fear of crime while waiting at the station. Table 1 presents some of the preliminary findings. Clearly, a significant percentage of passengers experienced fear of crime at their local station.



**Table 1. Passengers' Fear of Crime During Daytime (All Stations)**

<i>Station Activity</i>	<i>% of Respondents Experiencing Fear of Crime</i>
Approaching the station	4
Waiting inside the platform shelter	7
Waiting on the platform	7
Using the station car park	10

Source: Pengwyn Services, February 2001. Customer Satisfaction Survey for Cardiff Rail Company Ltd.

Such feelings also varied considerably from station to station (Cozens 2002). Many stations on the network did not generate substantial levels of fear of crime, although as many as 39 percent of respondents at certain stations stated that they experienced fear of crime while waiting inside the brick platform shelter. Furthermore, various design measures were suggested by respondents as potential improvements that would reduce their sense of fear of crime (see Table 2).

**Table 2. Perceived Effectiveness of Improvements**

<i>Improvement</i>	<i>% of Respondents Stating Fear of Crime Would be Reduced</i>
Enhanced visibility (cctv, lighting, transparent shelters)	87
More rail staff visibly in attendance	87
Reliable information system	81
More passengers on the station	77
A cleaner environment	63

Source: Pengwyn Services, February 2001. Customer Satisfaction Survey for Cardiff Rail Company Ltd.

Clearly, fear of crime was experienced across the network and improved visibility was identified as a dimension that, if amended appropriately, respondents indicated would reduce their fear of crime while waiting at the railway station.

The study systematically collected data from respondents relating to the design and management of specific railway stations and their immediate access routes. The analysis of this data would facilitate the evaluation of the effectiveness of CPTED modifications in reducing crime and the fear of crime while waiting at railway stations. The use of QTVR technology to probe passengers' perceptions of personal safety in and around the railway station environment is presented as an innovative and constructive way forward. This article presents some of the initial findings and discusses the specific CPTED modification of the shelters provided at stations across the Valley Lines network.

## **The QTVR Study Methodology**

To investigate fear of crime across the network, a representative sample of six railway stations was selected. These were chosen to reflect the diversity of stations on the network in terms of affluence/deprivation, geographical location (urban/rural), physical and security features, and usage levels.

Representations of the stations using QTVR provided a standardized, dynamic and interactive stimulus for the often complex station layouts and access routes, which could repeatedly be reemployed in various locations.

QTVR involves the photography of several 360 degree panoramas at various points in the environment. These panoramas are subsequently stitched together to create a QTVR walk-through scene, whereby respondents can virtually travel through the standardized environment of the station and its approaches, view in and out, and pan left or right at any stage of their journey. Each focus group was shown the same standardized walkthrough panoramas of stations in the controlled setting of an interview room. This approach not only reduces the problems associated with physically walking groups of people around several stations at different times and under variable conditions (e.g., weather, lighting conditions, noise, usage patterns), it also allowed for a more focused analysis of the physical detail of each station by the respondents. The QTVR approach has been critically reviewed at conference (Cozens et al. 2002) and widely received as a highly innovative approach at peer review sessions and at subsequent presentations to groups of academics, planners, and the police. Queensland Police in Australia and West Yorkshire Police in the UK are already using QTVR for investigations at crime scenes. It is presented here as an example of how QTVR can be operationally applied to underpin the systematic analysis of the railway station environment and its immediate access routes.



A total of 47 respondents (26 females and 21 males) were interviewed and asked to complete a structured questionnaire following the presentation of QTVR walk-through panorama scenes of the six selected railway stations and their immediate access routes. Their comments during group discussions were also noted and later analyzed.

## **The QTVR Study Findings**

The initial findings from this study clearly indicate that there are specific times, geographical locations, and design features at stations that elicit fear of crime. A range of potential solutions was suggested by respondents to reduce fear of crime which included improved lighting (mentioned by 68% of respondents), CCTV (62%), more staff (43%), transparent shelters (43%), cleaner stations (38%), and cutting back vegetation (30%). Although such findings may appear similar to those that might be obtained with more traditional approaches, the QTVR approach has provided detailed site-specific insights into the design and management of the six representative railway stations on the Valley Lines network. The QTVR approach also provides potential scope in that the identical QTVR scenes can be shown to other specific stakeholder groups (e.g., tourists, young, elderly, disabled, nonrail user). A more detailed explanation of the wider findings have been discussed at length elsewhere (Cozens et al. 2002; Cozens et al. 2003) and this article specifically focuses on passengers waiting on the platform and the design characteristics of the station shelter, identified in this study as being particularly problematic for rail users. Various phased improvements are being implemented throughout the network and the replacement of the previous solid, low visibility brick shelters with high visibility transparent shelters is nearing completion of its first phase and provides an early opportunity for evaluation and critical review of this particular CPTED modification.

Visibility of and by others was mentioned by respondents in all the focus groups as being a crucial dimension to their fears of crime. The proximity of others (e.g., people in nearby houses and those engaged in activities overlooking the railway station) emerged as an important issue for those waiting on the platform.

*People feel safer on a station that other people can see. (Female Respondent 12)*

*Visibility is the key—you've got to feel safe, otherwise you're not going to use it are you? (F3)*

Similarly, when waiting on the platform, visibility of and by other rail users was regarded as inadequate. Significantly, 93 percent of females (compared to 53% for males) stated that they experienced fear of crime when waiting on the platform at night. Repeatedly, reference was made to the enclosed brick shelters, and respondents stated a marked preference for the high visibility transparent shelters that they had noticed being introduced at some local bus stops.

*Do something about the concrete shelter. (Male Respondent 8)*

*It's enclosed on three sides...it would be better if they had the new clearer ones... like the bus shelters. (M19)*

*It smells like a toilet— and even looks like one! (F20)*

**Figure 2. A Typical Brick Shelter Found on a Valley Lines Railway Station**



Clearly, visibility to others and opportunities for surveillance of the station platform are currently severely limited. The enclosed nature of the brick shelter encourages congregating youths who are not subject to any formal or informal surveillance by rail staff, rail users, or community members while concealed inside the shelter.

*I don't like that brick shelter— it's just a gang hang-out, it needs to be see-through. (F25)*

*It should never be totally enclosed like that. (F4)*

*Stations attract young people as places to go. In the brick shelters there's underage drinking and drugs and stuff— it's an ideal hangout. (F27)*

Respondents were also mindful of the lack of visibility and coverage by CCTV when waiting inside the brick shelters.

*The cameras can't see inside the brick shelter. (M14)*

*As soon as you get into the brick shelter you're hidden. (M16)*

Impaired visibility was clearly associated with fear of crime.

*From inside that shelter I can't see homes, roads, or other passengers— you need to see and be seen—just for peace of mind, that's all you need. (M21)*

Valley Lines has initially installed transparent shelters at seven stations to evaluate the effectiveness of this design modification in reducing fear of crime and increasing passenger flows. Figure 3 presents the transparent shelter design, which considerably enhances the opportunities for surveillance of the station by passengers waiting for trains and the visibility of the waiting passengers to others in the vicinity.

**Figure 3. Transparent Shelter**



*That transparent shelter is tidy— you can see all around. (F6)*

*I feel much safer in transparent shelters where you know people can see you.(M1)*

*You can see people coming from everywhere. (M12)*

Respondents also recognized that the transparent shelter would discourage youths from gathering and indulging in antisocial behavior, alcohol consumption, and vandalism.

*The kids don't want to hang out in the glass shelters— they can be seen. (F17)*

Most respondents clearly welcomed the enhanced opportunities for surveillance that the transparent shelters provide.

*That's one of those new shelters you see...which are open and security-wise they are better because if you can be seen, you don't feel so unsafe. (F10)*

In a customer satisfaction survey of more than 2,000 respondents (Wales and Borders Trains 2002), 18 percent commented that they had noticed physical improvements at the stations (which had thus far been installed at only a minority of stations). However, at railway stations where the transparent shelters had been installed, 93 percent of respondents stated that they had noticed the recent improvements to the physical fabric. Furthermore, of those, 71 percent stated that transparent shelters reduced their fear of crime due to improved visibility; being able to see around-and-about at all times and also the enhanced potential to be seen by others.

## **Conclusions**

This study indicates that QTVR is clearly useful customer-focused approach for investigating crime and passengers' fear of crime at railway stations. Brick shelters were repeatedly identified as being problematic by rail users and transparent shelters clearly represent a significant improvement for rail users. Undoubtedly, the installation of transparent shelters has been well received by rail passengers as a surveillance-enhancing design feature that can tackle crime and the fear of crime. Indeed, the findings suggest that if transparent shelters work to enhance surveillance and visibility and to reduce fear of crime, careful consideration should be given to other design features that might impair or reduce visibility. Indeed, in the after-dark railway station environment visibility is certainly reduced and a study of lighting at Valley Lines stations is now underway. A more extensive, longer-term study of the perceived impact of design and management changes is essential to verify these positive preliminary findings, but the approach adopted and the results thus far seem most encouraging.

Significantly, the Valley Lines network has witnessed an increase in annual passenger flows of some 33 percent during the period 2000–2003. It would not be inappropriate to suggest that a significant proportion of this increase in patronage is attributable to Valley Lines' ongoing passenger-led station improvement program.

Indeed, the new high visibility shelters not only reduced fear of crime but appear to have also produced higher levels of consumer confidence, and in the short term, higher levels of patronage.

In relation to the transparent shelters, it will certainly be interesting to gauge how long these continue to provide "shelter from the storm" and whether the perennial problem of vandalism on the railways reinvents itself in new guises. The train oper-

ating company Wales and Borders Trains (2003) recently announced that during the next 12 months, rail passengers in Wales will benefit from a £2.5m Welsh Assembly Government grant for improvements to railway stations. This funding will allow Wales and Borders Trains to modernize railway station facilities and enhance passengers' safety and in doing so, continue to increase levels of patronage. Welsh Assembly Environment Minister, Ms. S. Essex (Wales and Borders Trains 2003) stated, "This funding will improve essential facilities such as toilets, waiting rooms and shelters, and better passenger safety will be tackled through CCTV and lighting." Indeed, prioritizing expenditure on physical improvements will be a crucial task for the train operating companies and they are now beginning to acquire a more detailed understanding of passengers' fear of crime at railway stations in which the use of technologies, such as QTVR, is making a substantial contribution.

## References

- Brantingham, P. J, P. L. Brantingham, and P. S. Wong. 1991. How public transit feeds private crime: Notes on the Vancouver "Skytrain" experience. *Security Journal* 2, 2: 91–95.
- Carr, K. and G. Spring. 1993. Public transport safety: A community right and a communal responsibility. *Crime Prevention Studies* 1, 147–155.
- Clarke R. V. G. 1996. Editorial introduction: Crime and the economics of mass transit. In Clarke, ed., *Preventing Mass Transit Crime*. Crime Prevention Studies Volume 6, 1–4. Willow Tree Press, New York.
- Cozens, P. M. 2002. Exploring crime and the fear of crime within the railway environment. *Public Transport International* 51: 20–24.
- Cozens, P. M., D. Hillier, and G. Prescott. 2001. Crime and the design of residential property. Exploring the theoretical background. *Property Management* 19, 2: 136–164.
- Cozens. P. M., J. Waters, and R. H. Neale. 2002. A virtual reality approach to personal safety and the design of built environment facilities. *Proceedings of the ARCOM (Association of Researchers in Construction Management) 18<sup>th</sup> Annual Conference*. Volume 2: 461–473.
- Cozens, P. M., R. H. Neale, J. Whitaker, and D. Hillier. 2003. Investigating personal safety at railway stations using 'virtual reality' technology. *Facilities* 21, 7/8: 188–194.
- Crime and Disorder Act. 1998. *Crime and Disorder Act 1998*. Crown Copyright, London.
- Crime Concern and Transport and Travel Research. 1997. *Perceptions of safety from crime on public transport*. Crime Concern and Transport and Travel Research for DETR.
- Crowe, T. D. 2000. *Crime prevention through environmental design: Applications of architectural design and space management concepts*, 2<sup>nd</sup> ed. Butterworth-Heinemann. Oxford.
- DETR. 1998a. *Personal security on public transport. Guidelines for operators*. DETR Mobility Unit. Crown Copyright, London.



- DETR. 1998b. *Secure Stations Scheme. Guidelines for Operators*. Crown Copyright, London.
- DETR. 2000. *Transport 2010*. The Stationery Office, London.
- DETR. 2001. *PPG13 Transport*. Home Office, London.
- DOE. 1994. *Planning out crime circular 5/94*. Home Office, London.
- Eck, J. E. 1997. Preventing crime at places. Chapter 7 in Sherman, L.W, D. Gottfredson, D. MacKenzie, J. Eck, P. Reuter, and S. Bushway, *Preventing crime: What works, what doesn't, what's promising*. Report to the United States Congress, Prepared for the National Institute of Justice.
- Guardian. 2002. Police report rise in rail crime. Guardian Website <http://www.guardian.co.uk/Print/0%2C3858%2C4467190%2C00.html>. Visited 10/03/03.
- Hamilton, K., and L. Jenkins. 2000. A gender audit for public transport: A new policy for tackling social exclusion. *Urban Studies* 37, 19: 1793–1800.
- Ham-Rowbottom, K. A., R. Gifford, and K. T. Shaw. 1999. Defensible space theory and the police: Assessing the vulnerability of residences to burglary. *Journal of Environmental Psychology* 19: 117–129.
- Home Office. 2000. *Criminal statistics, England and Wales*. Government Statistical Service, London.
- Hunter, R. D and C. Ray Jeffery. 1997. Preventing convenience store robbery through environmental design. In Clarke, R.V., ed. *Situational Crime Prevention: Successful Case Studies*, 2 ed. Harrow and Heston, New York, 191–199.
- Jacobs, J. 1961. *The death and life of great American cities*. Vintage, New York.
- Kenney, D. J. 1987. *Crime, fear and the New York subways: The role of citizen action*. Praeger, New York.
- La Vigne, N. G. 1996. Safe transport: Security by design on the Washington Metro. In Clarke, ed. *Preventing Mass Transit Crime. Crime Prevention Studies Volume 6*: 163–198.
- La Vigne, N. G. 1997. Visibility and vigilance: Metro's situational approach to preventing subway crime. *National Institute of Justice—Research in Brief*. U.S. Department of Justice.



- Lashmar, P. 2001. *Robberies on the rise in Britain's dark, dangerous train stations. Independent*, 30 April, p7.
- Levine, N., M. Wachs, and E. Shiraz. 1986. Crime at bus stops: A study of environmental factors. *Journal of Architectural and Planning Research* 3: 339–362.
- Loukaitou-Sideris, A. and T. Banerjee. 1994. *Form follows transit? The Blue-line Corridor's development potential*. Los Angeles, CA: Department of Urban Planning, University of California, Los Angeles.
- Madelin, K. 2003. The research connection. *The Engineer*. March, 31–34.
- Maguire, M., R. Morgan, and R. Reiner, eds. *The Oxford Handbook of Criminology* (2nd ed.). Oxford: OUP.
- Mirrlees-Black, C., T. Budd, S. Partridge, and P. Mayhew. 1998. *The 1998 British crime survey*. HMSO, London.
- Newman, O. 1973. *Defensible space: People and design in the violent city*. Architectural Press, London.
- Parliamentary Travel Safe Committee. 1998. *Brisbane's Citytrain Network—Part—Passenger Security*. Report No.24. Legislative Assembly of Queensland.
- Pengwyn Services. 2001. *Customer Satisfaction Survey, 2001*. Cardiff Rail Company Ltd.
- Poyner, B. 1988. Video cameras and bus vandalism. *Journal of Security Administration* 11, 4–51.
- Schneider, R. H. and T. Kitchen. 2002. *Planning for crime prevention: A transatlantic perspective*. Routledge, London and New York.
- Sloan-Hewitt, M., and G. L. Kelling. 1997. Subway graffiti in New York City: Gettin' up vs. meanin' it and cleanin' it." In Clarke, R.V., ed. *Situational Crime Prevention: Successful Case Studies*, 2nd ed. Harrow and Heston, New York, pp. 242–282.
- Tijerino, R. 1998. Civil spaces: A critical perspective of defensible space. *Journal of Architectural Planning Research* 15, Part 4 (Winter): 321–337.
- Valley Lines. 2001. *Valley Lines network map*. Valley Lines, Cardiff.
- Wales and Borders Trains. 2002. *Customer satisfaction survey*. Unpublished, Wales and Borders Trains, Cardiff.

Wales and Borders Trains. 2003. All change for railway stations, states Ms. Sue Essex (Welsh Assembly, Environment Minister). Press Release, W030228-TP. 5 March.

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