

Rail Station Passenger Congestion – the Good, the Bad and the Ugly



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GreenCityStreets.com

SPUR Lunchtime Forum

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Victoria Station London (photo: Leonie di Vienna on Flickr)



St Pancras Station London

People



Space

Too many People

Too little Space

(1)
**Shrink the
passengers**



(2) Increase the space.

Perronverlängerung Gleis 7/8: Mehr Kapazität, mehr Komfort, mehr Pünktlichkeit.



Termin:

Vorbereiten: Ab April 2014

Hauptarbeiten: Juli 2014 bis Dezember 2015

Inbetriebnahme: Dezember 2015

Projektleitung:

SBB AG

Infrastruktur, Projekte Region Mitte

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www.sbb.ch/bahnausbau

Die SBB baut bis Ende 2015 im Bahnhof Bern das Perron Gleis 7/8 westlich der Weisse und zentral Optimierungsarbeiten an Gleisanlagen und Signalen vor. Die Kundinnen und Kunden profitieren ab Ende 2015 von mehr Kapazität und mehr Komfort.

Dank der Verlängerung des Perrons Gleis 7/8 in Richtung Treiburg um 60 Meter können in Zukunft während der Hauptverkehrszeiten auch Züge mit 404 Meter Länge halten. So können die Kundinnen und Kunden komfortabler und schneller ein- und aussteigen, was wiederum die Pünktlichkeit des Verkehrs verbessert. Dank der partiellen Perronerweiterung gelangen die Passenden zudem künftig schneller in die Niederflrige Richtung Treiburg. Auch die Zugänge zur Weisse (Treppe, Rolltreppe, Lift) werden angepasst und eine zusätzliche Rolltreppe eingebaut. Zusätzlich wird das Gleis 1 so umgestaltet, dass dort künftig zwei S-Bahn-Züge hintereinander halten können.

Die Projektkosten belaufen sich auf 12,8 Millionen Franken. Das Projekt ist Teil Bahnbauprogramm «Zukunftige Entwicklung der Bahninfrastruktur 2015». 2015 beinhaltet schliesslich mehr als 100 Infrastruktur-Projekte im Umfang von 5,4 Milliarden Franken. Diese bewerkstelligen im Jahr 2015 Engpässe, schaffen mehr Kapazität und verbessern die Fahrplanstabilität.

Weitere Informationen: www.sbb.ch/bahnausbau und www.sbb.ch/sbb



Gent Sint Pieters Station



Antwerp Central Station



Vienna Hauptbahnhof



U-4 Budapest

(1) Shrink passengers

Reduce the time passengers spend in stations during crowded periods.

Think outside the box

Station

Think outside the box



Trip Planning

Allow passengers to choose trains based on:

- Expected demand
- Peak pricing

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Online timetable.

From: Bern All types Map
To: Zürich All types Map
Via:
Date: We, 17.12.14 Calendar
Time: 16:15 Departure Arrival
Advanced search New request Return journey Continue journey **Search connection**

Station/Step	Time	Duration	Chg.	Travel with	Information	Fare
Connections for We, 17.12.14						
1 Bern	dep 16:11	0:59	0	IC	1. 2.	from CHF 20.00 FareBuy
2 Zürich HB	arr 17:10					
1 Bern	dep 16:32	0:56	0	IC	1. 2.	from CHF 25.00 FareBuy
2 Zürich HB	arr 17:28					
3 Bern	dep 16:36	1:16	1	IR	1. 2.	from CHF 25.00 FareBuy
4 Zürich HB	arr 17:52					
1 Bern	dep 16:36	1:18	0	IR	1. 2.	from CHF 25.00 FareBuy
2 Zürich HB	arr 17:54					

Show all details Print Timetable booklet
Earlier First connection Last connection Later

e-mail Word mySBB Departure Arrival Relation

Legend Search/Webcode SBB Widgets Social Media

Technical requirement Imprint Legal information Data protection Print

Excursion ideas for up to 50% less. Find your favourite excursions and benefits from reduced RailAway offers.

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Bern
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Combined mobility
Leisure travel offers
At the station
Book hotel
Disabled passengers
Rail information
Around the station

SBB Travel Planner – www.sbb.ch



On-line Ticketing

- Reduce time passengers spend in stations.
- Reduce space needed for selling tickets.



Information Apps

- Enable passengers to arrive “just in time” for their trains.
- Can you encourage passengers to wait at Starbucks?

Qando application - Vienna



Questions

- Common info apps?
- Common ticketing apps?
- Apps + real incentives?
- Station wifi (roaming)?

SBB mobile app – also shows expected crowding.



Games

Influence behaviour

... shift passengers to less crowded stations?

... link to exercise apps?

Chromaroma (London)

<http://wearemudlark.com/projects/chromaroma/>

Chromaroma, adding colour to your journeys
A new game for London...

Sign Up Now or find out more

Use your Oyster card to play online
Chromaroma takes your travel data, and makes it into a game where every journey counts in a competition for the city!

Play with friends or compete against them
Set records, earn achievements, go on real missions. Travel like you mean it!

Sign Up Now or find out more

Schedule

- Does your schedule encourage passengers to wait in stations?
- Direct trains or transfers?



Control

Can you meter the
number of passengers
using your station?

Wiener Linien
U2 Station Stadion
Austrian Institute of Technology



(2) Increase space

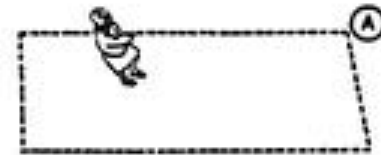
effective

(2) Increase  space

Analysis



TRB: Transit Capacity and
Quality of Service Manual
Part 7 – Stop, Station, and
Terminal Capacity



LEVEL OF SERVICE A

Walking speeds freely selected; conflicts with other pedestrians unlikely.



LEVEL OF SERVICE B

Walking speeds freely selected; pedestrians respond to presence of others.



LEVEL OF SERVICE C

Walking speeds freely selected; passing is possible in unidirectional streams; minor conflicts for reverse or cross movement.



LEVEL OF SERVICE D

Freedom to select walking speed and pass others is restricted; high probability of conflicts for reverse or cross movements.



LEVEL OF SERVICE E

Walking speeds and passing ability are restricted for all pedestrians; forward movement is possible only by shuffling; reverse or cross movements are possible only with extreme difficulty; volumes approach limit of walking capacity.



LEVEL OF SERVICE F

Walking speeds are severely restricted; frequent, unavoidable contact with others; reverse or cross movements are virtually impossible; flow is sporadic and unstable.

Subway Entrance Hall Model

Anylogic® Pedestrian Library Example



This sample model represents possible passenger flows in entrance hall of the simulated subway station.

Multiple passengers go through the ticket control to or from the subway. When going to subway part of them buy tickets at manual ticket offices or automatic ticket selling machines.

The subway station hall is equipped with

- automated ticket selling machines
- ticket offices
- automated ticket control (pay-passes)

Visitors choose their way to their targets in "free" space, without strict guidelines, walking around obstacles.

Simulation time: 425.1 sec.

Total number of passengers: 138

Pedestrian Simulation Programs (example)

Effective space

- Eliminate bottlenecks
- Optimize furniture
- Remove unnecessary items

SBB Bern Hauptbahnhof





Platform screens increase effective space.

London Bridge station (photo: Chris Sampson, on Flickr)



Channelling pedestrians (good? Bad?).

Budapest Metro transfer corridor



Escalators move passengers off platforms.

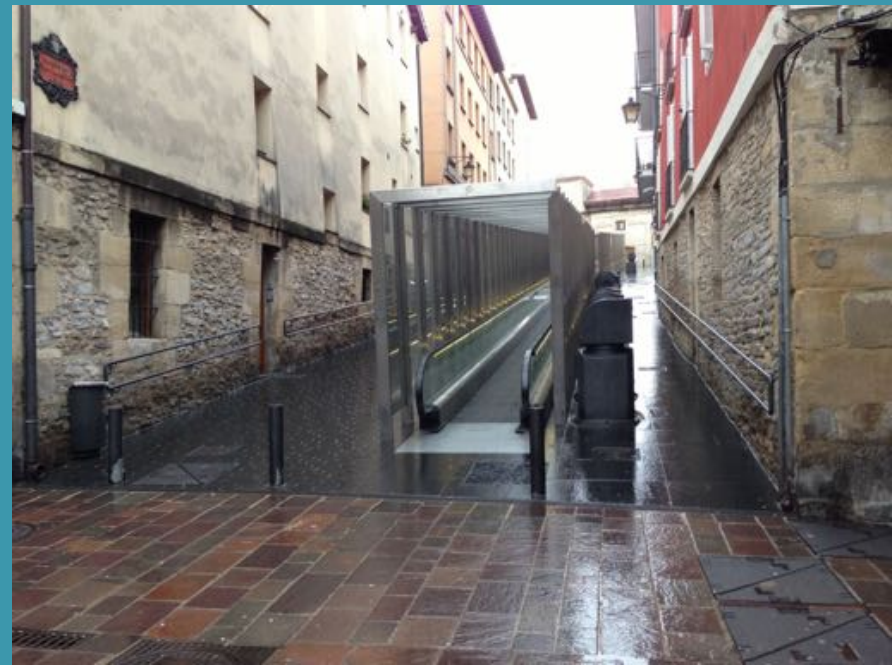
Zurich HB Lowenstrasse Station – three are better than two!

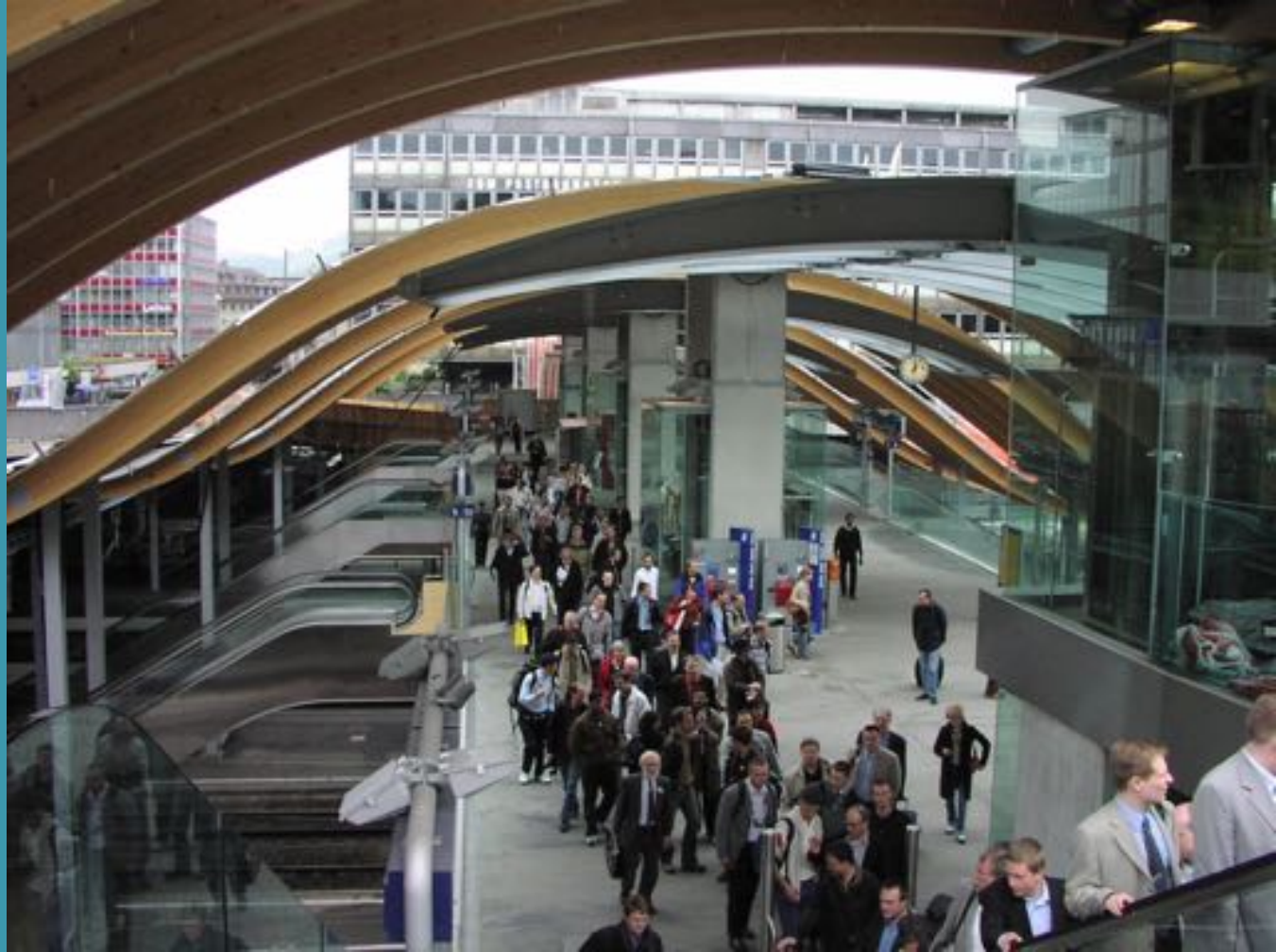


Better escalators:

- walk right
- maintenance
- ramps

Zurich, Vienna, Vitoria-Gasteiz



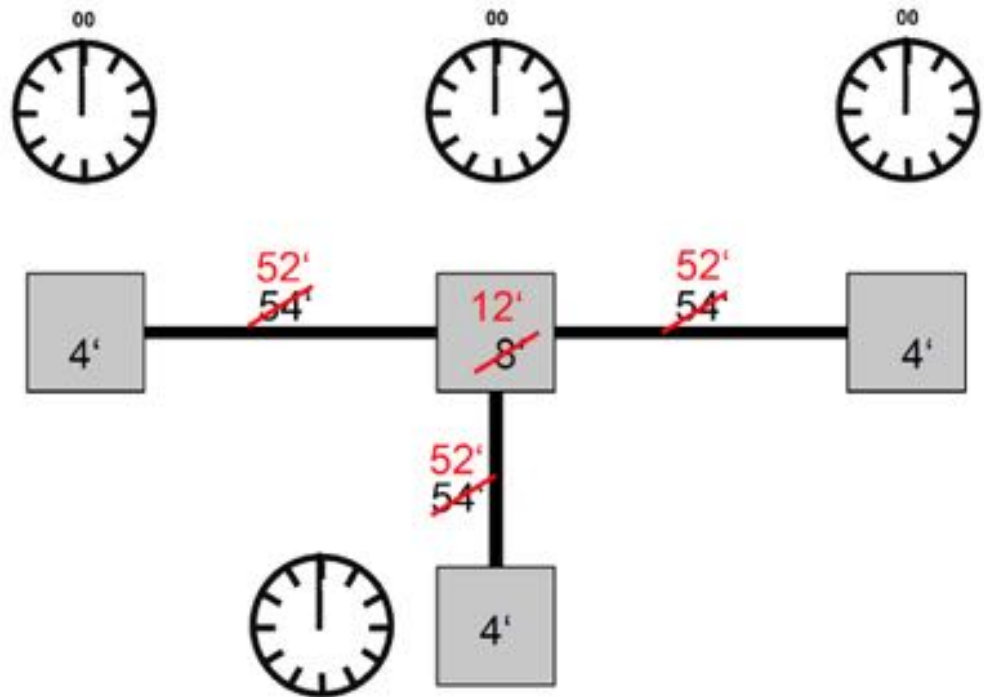


Extra exits encourage passengers to spread out on the platform.

Bern Hauptbahnhof: new exit built as part of Bahn2000 program.

Trade-offs: cost vs. opportunity

Hypothesis for transfer and run times



**Trade-off: Spending money in stations can ...
... save money on the network.**

SMA+ Partner: impact of increased station dwell time on Taktfahrplan.



Trade-off: Through stations reduce passenger congestion and significantly improve service.

Malmo Sweden: Citytunneln Project



Trade-off: stations as shopping centres: revenue versus more congestion?

Leipzig Hauptbahnhof (photo: pilot_mucha flickr)

Time

Spend

People



Space

Effective

**ETWAS UNPRAKTISCHES
KANN NIE SCHÖN SEIN.**

**WHAT IS IMPRACTICAL
CAN NEVER BE BEAUTIFUL.**

OTTO WAGNER





Andrew Nash helps clients design and manage innovative public transport, railway, urban planning and active transport projects. Current work includes greencitystreets.com (using information technology for better public participation), open source railway dispatching applications, public transport planning and active transport projects. See andynash.com for details and contact information.