

Subway Modernisation



IMechE Presentation, February 2014

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- **Overview**
- **The Past.....our origins**
- **The present.....our challenges and opportunities**
- **The future.....our modernisation**

Overview (video)

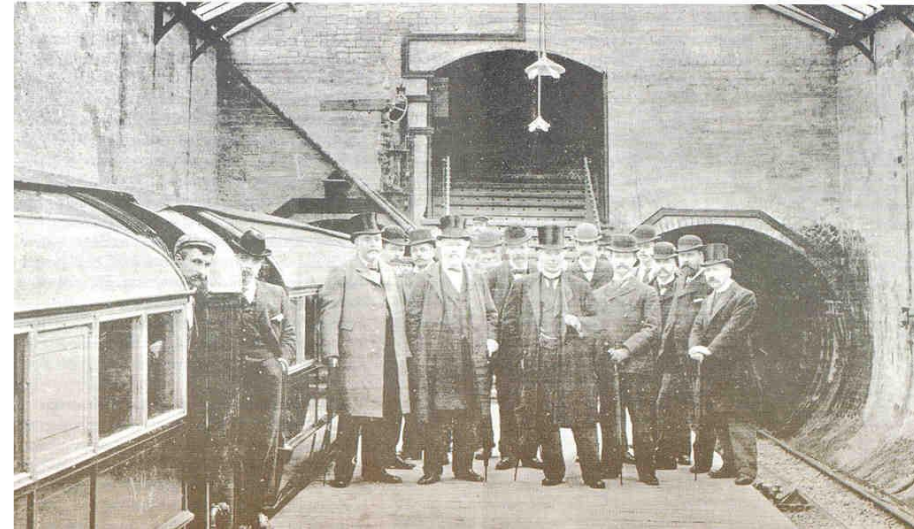
The Past.....

Subway – The Past



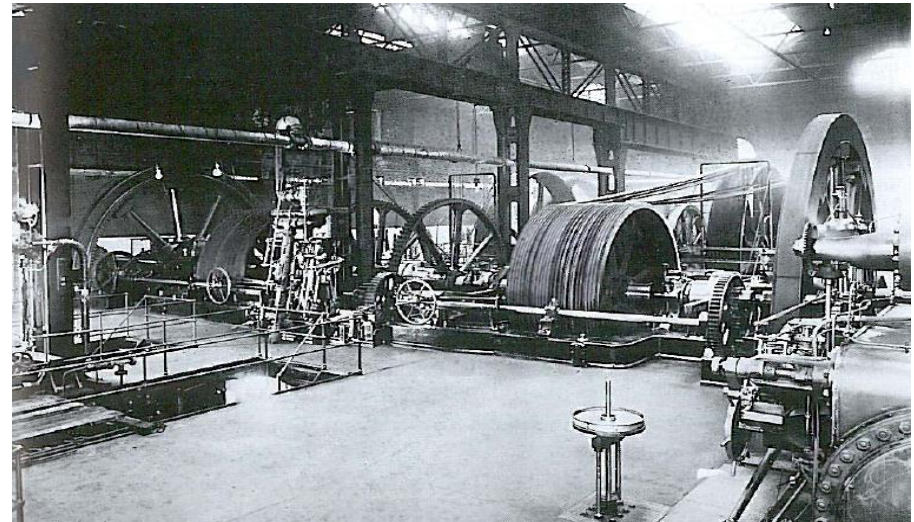
The origins:

- Three attempts at promoting Parliamentary Bill – successful 1890
- Construction started in 1891
- Opened to public December 1896 as a cable-hauled railway propelled by steam engines and privately owned.



Some “unique” features:

- 4ft track gauge, 11ft tunnel diameter
- Ballasted track
- 60t of cable hauled at 15 mph
- Rolling stock with two braking systems (mechanical and air)
- Own power station at Scotland St with steam engines

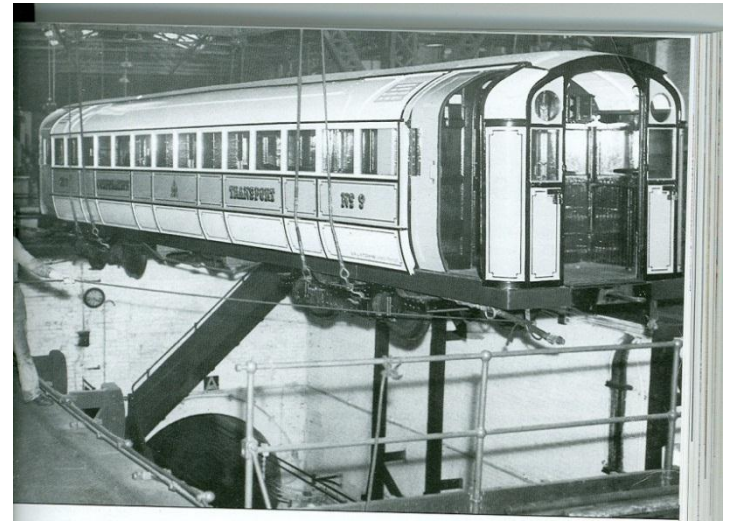


Subway – The Past



1935

- Converted to electric traction
- Utilise third rail
- Trains lifted out of service for maintenance (no ramped access)



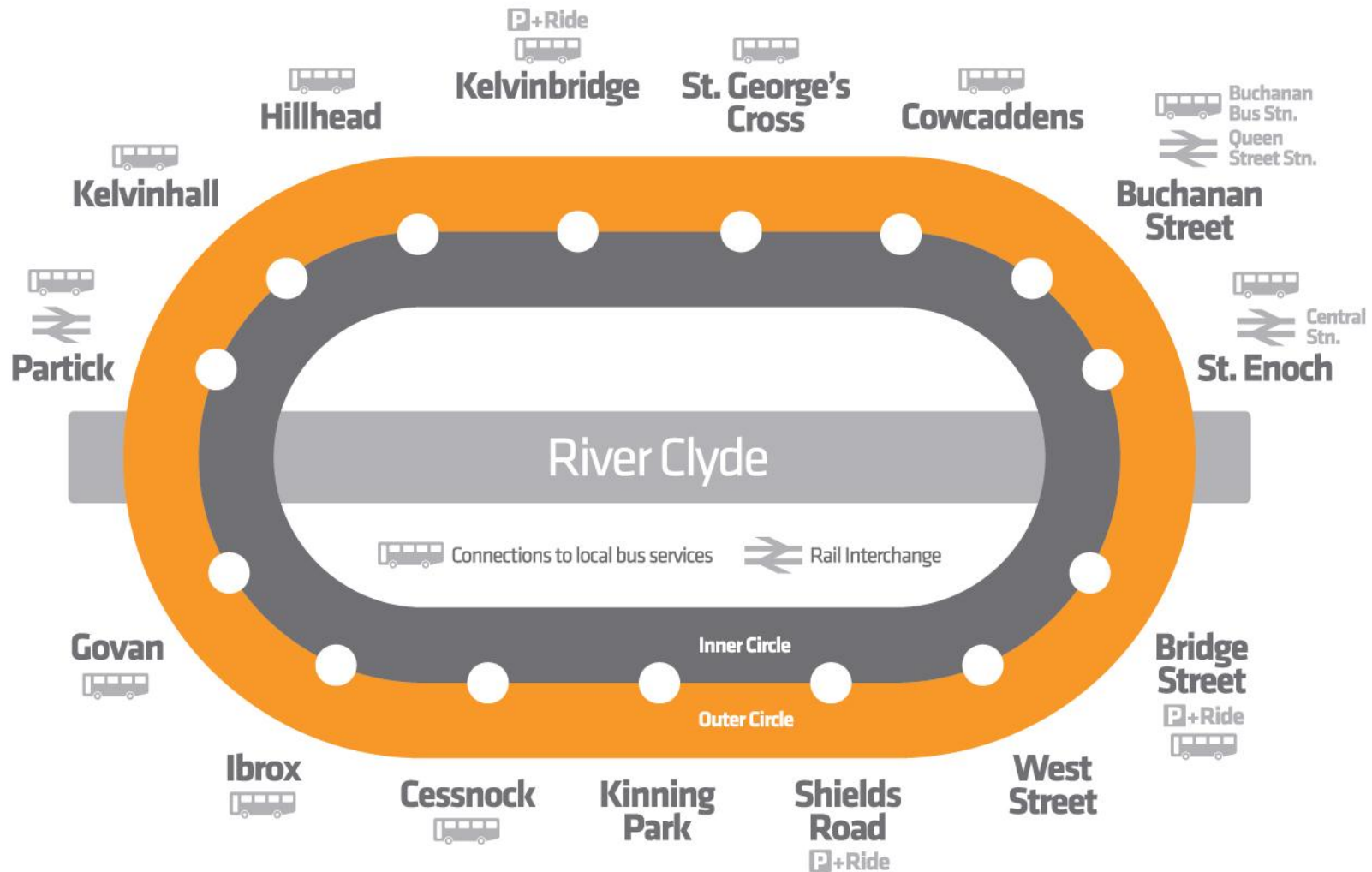
1977 - 1980

- Business case.....
- New trains (33 cars), signalling, track, upgraded stations, power supply, systems and new depot (ramped access)
- **CLOSED** for last modernisation



The Present.....

Subway – Present



Operations:

- c13 million passenger journeys per annum
- Automatic train operation
- 41 train cars (each train 3 car set)
- 4 minute frequency at peak
- 600v DC traction power fed from five substations
- Control room – controls signalling, traction current switching, public address, CCTV monitoring, communication with trains via TETRA radio system
- TMS/Scada – Bombardier Ebiscreen
- Contactless trainstop system



Staffing/Depot:

- 170 Operations staff covering control room, stations, driving and ancillary duties
- 75 maintenance staff covering Rolling Stock, Stations & Equipment, Tunnels, Track and Signalling Systems
- Broomloan Depot, Govan is the Maintenance facility where all the maintenance exams and repairs to the rolling stock are undertaken.
- Significant landholding including old test track area



Subway – Present



Infrastructure:

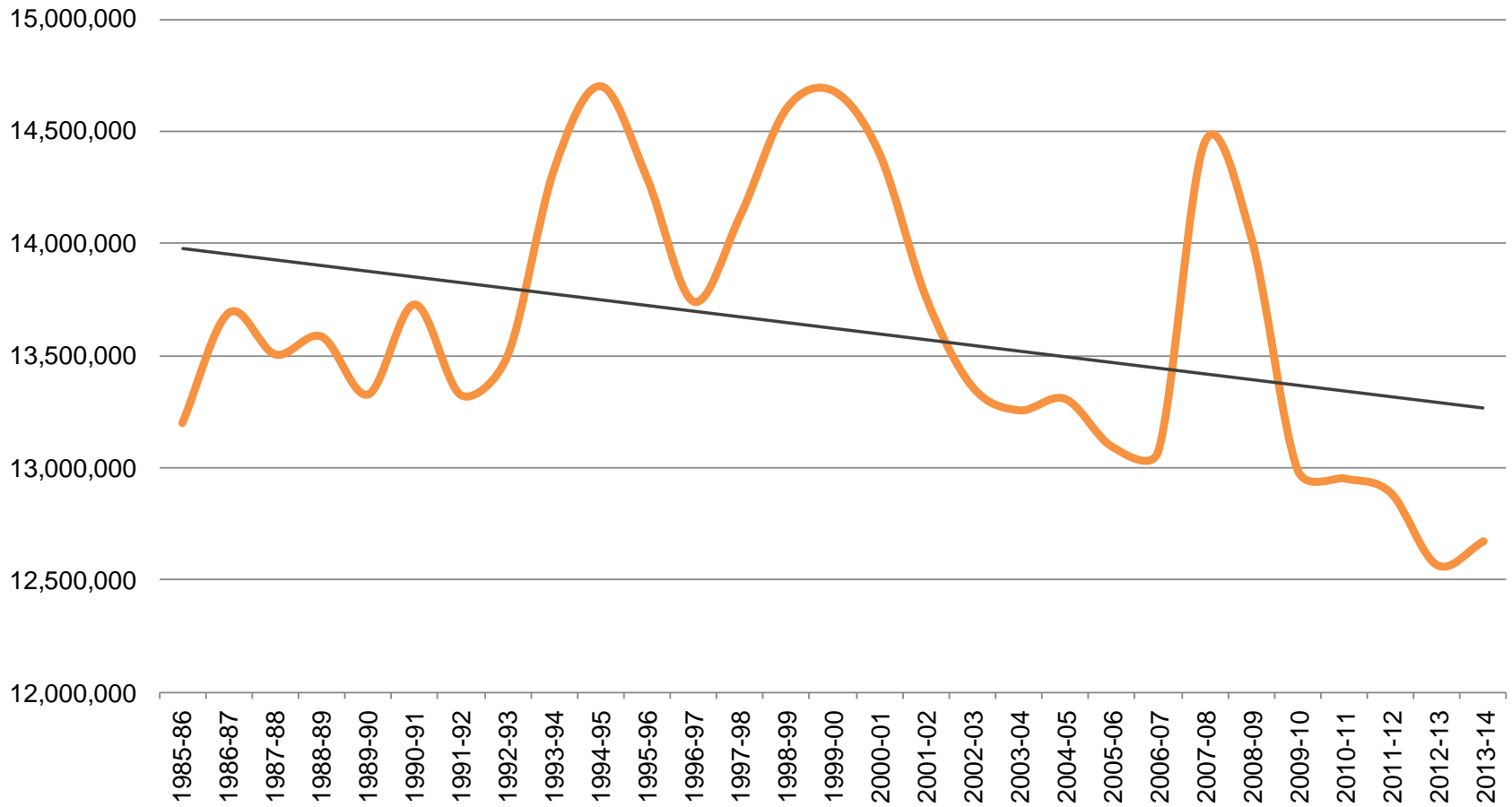
- 1220mm track gauge, 3.4m nominal tunnel diameter
- Fixed concrete trackbed
- Narrow island platforms in stations
- Flank platforms in five stations
- Twenty eight escalators and two travelators (no lift access)
- Twin tunnels (2x10km) with minimum cover in places- lots of water!
- Turnout chamber and ramped access



Subway – patronage



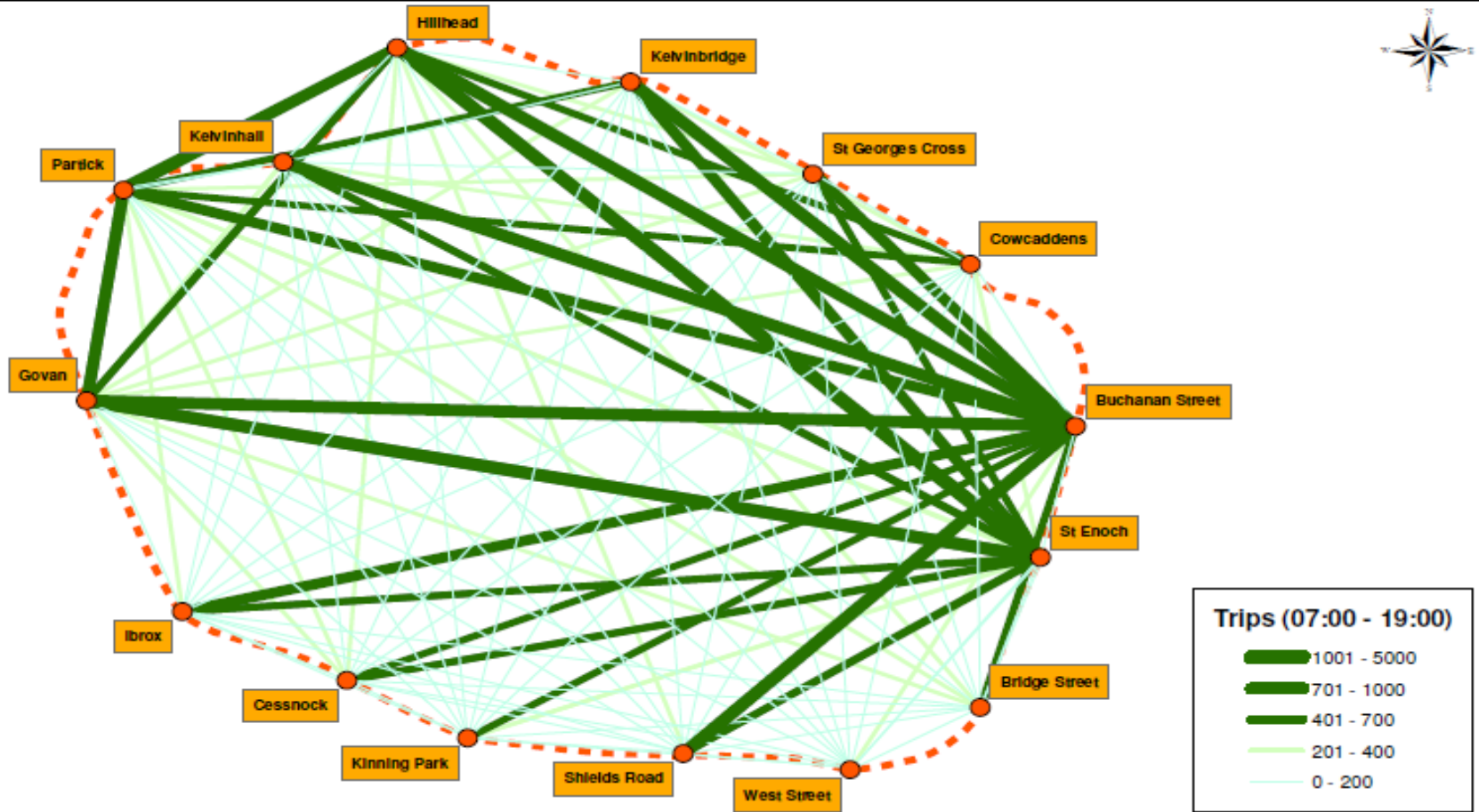
Subway Patronage



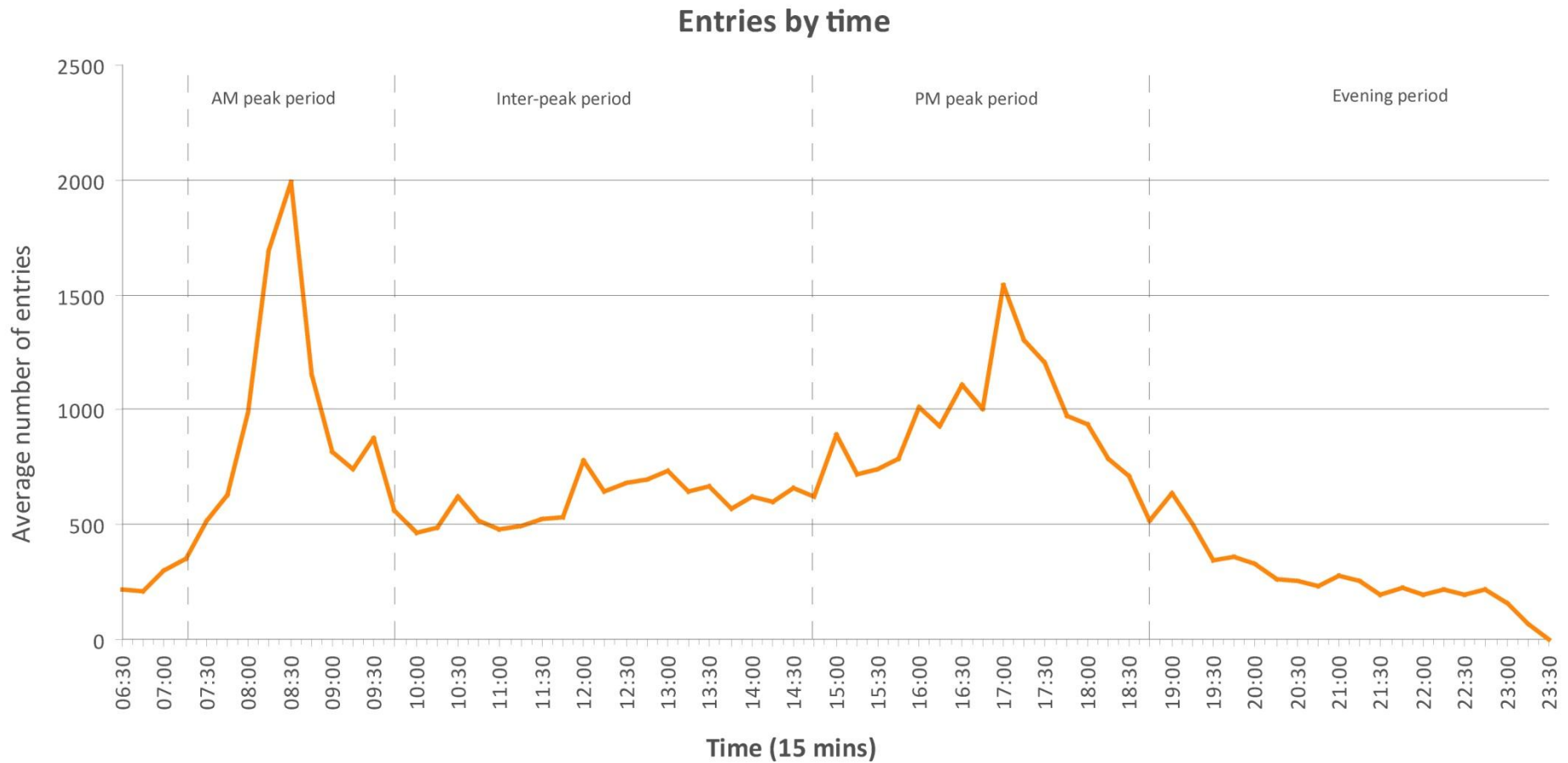
Subway – patronage network flows



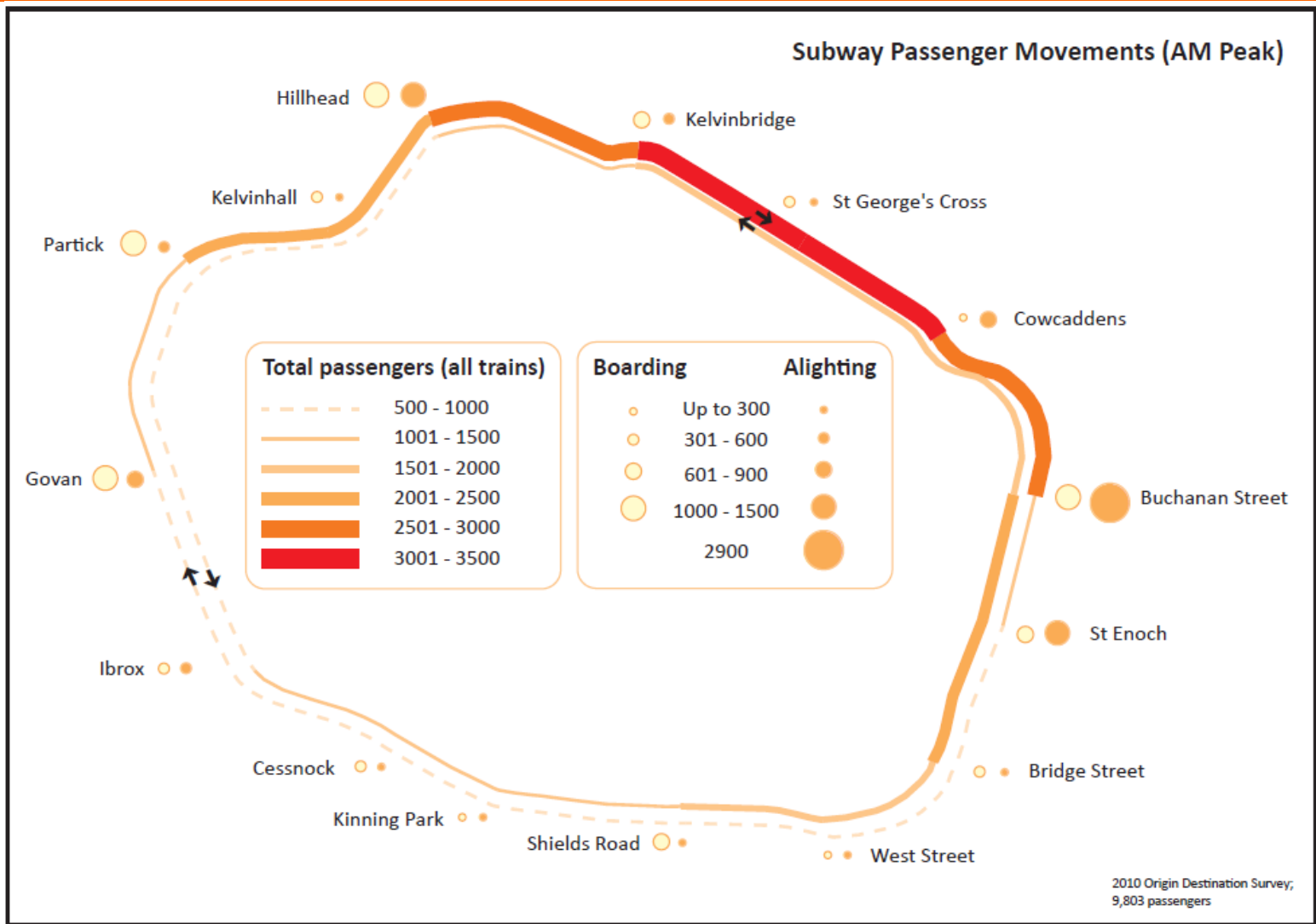
Glasgow SPT Underground Survey.
Weekday Data - Survey Dates 27th, 28th & 29th April 2010.
All Movements



Subway – patronage by time of day



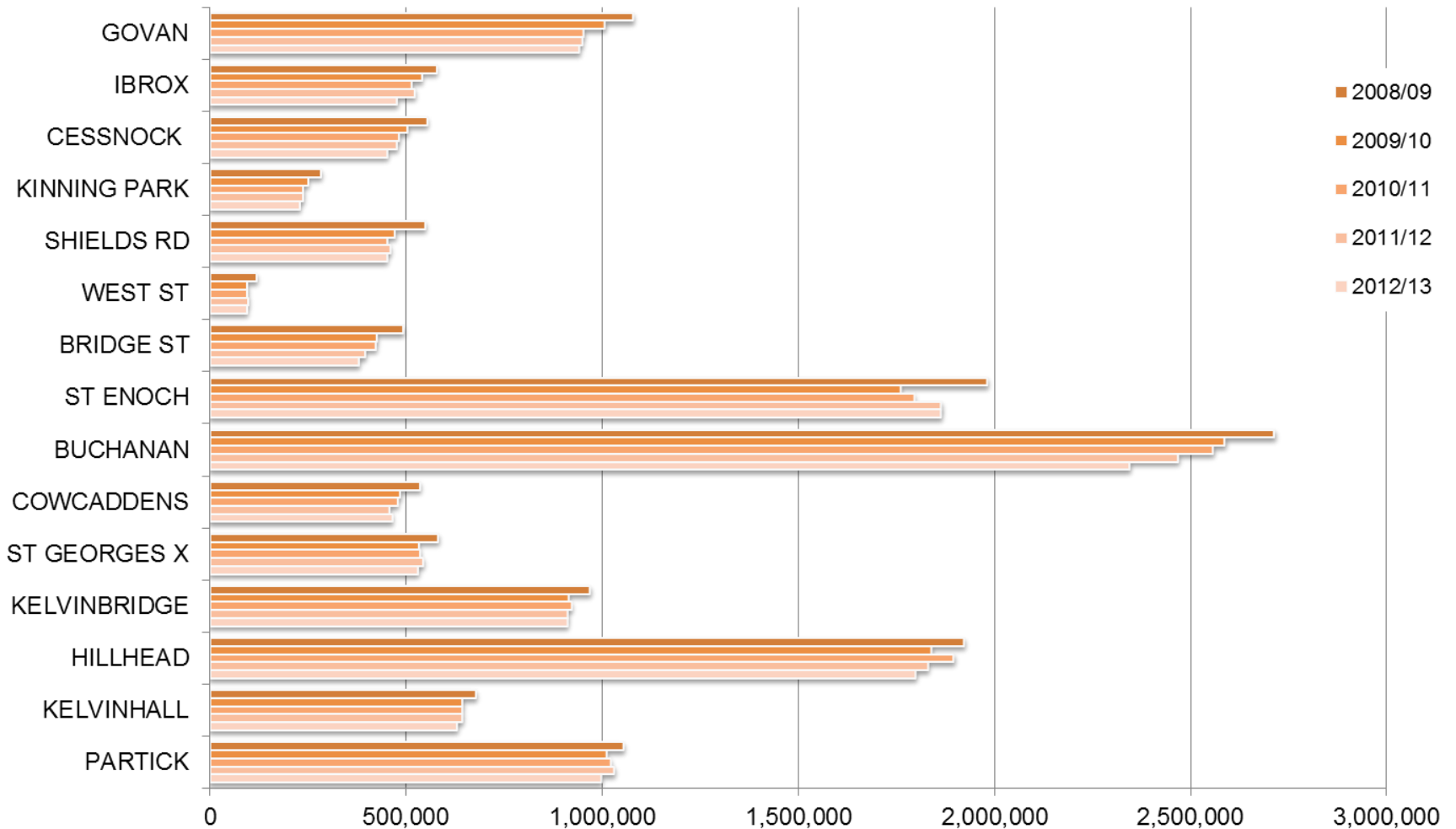
Subway – patronage network flows am peak



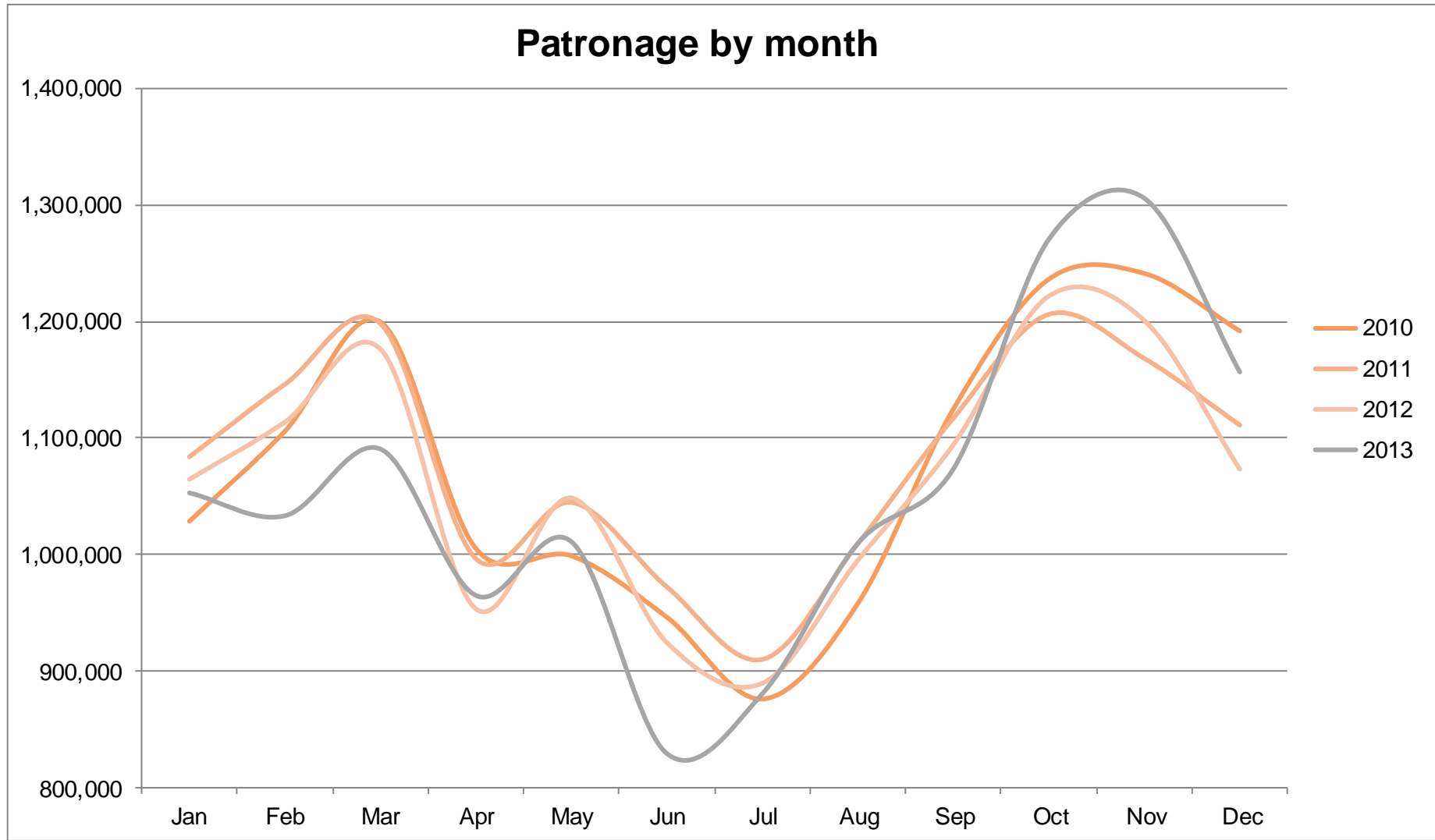
Subway – patronage by station



Patronage by station



Subway – patronage by month

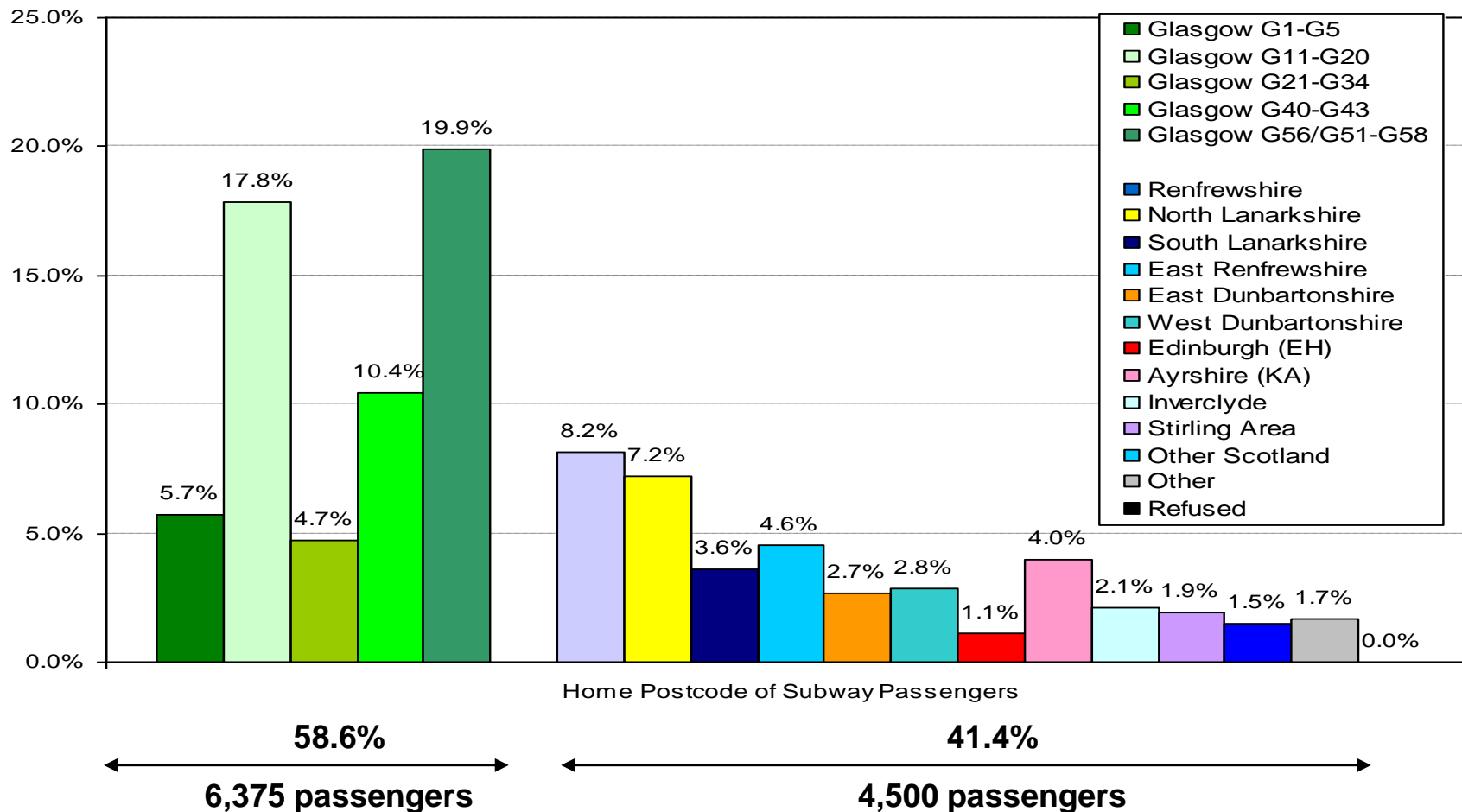


Subway – patronage origins

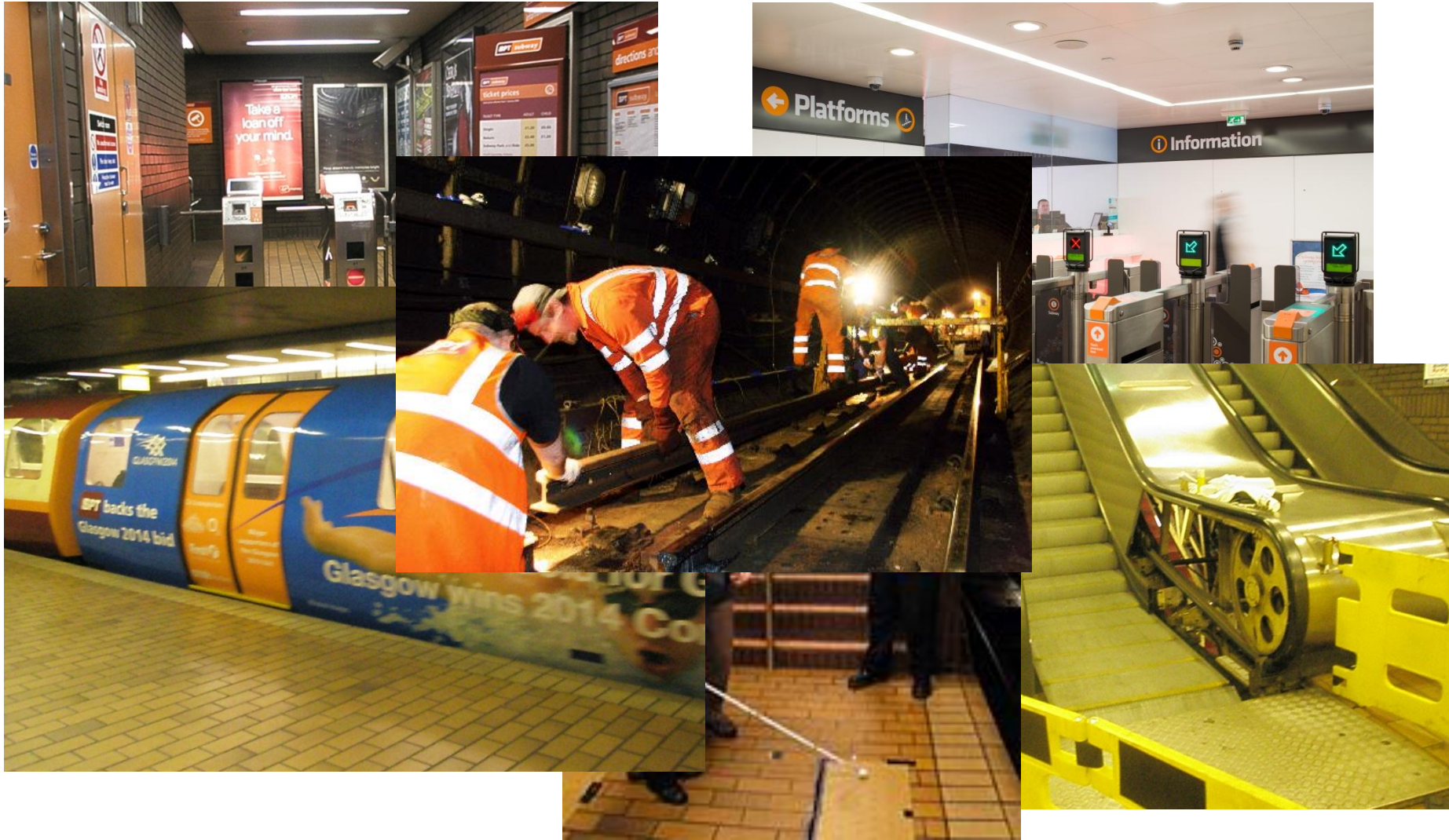


Our customers

Origin of Trips made on Glasgow Subway (AM Peak)



Subway – Todays Challenges



Subway – Today's Challenges



EXCLUSIVE: Underground to get sliding platform gates

**DOORS
OPEN
ON SUBW
SU TO GE
SU SUIC
BARR**

By VIVIANNE NICOLL
GLASS safe prevent su on Glasgow be fitted as part

SLIDING GLASS WALLS TO BE

EXCLUSIVE Lifts plan abandoned in face of three years closure

SUBWAY'S £300M DISABLED

£300m cost and closure rule out lifts for Subway

Only two stations to get access for people with disabilities

EXCLUSIVE
By VIVIANNE NICOLL

A PLAN to provide disabled access for Glasgow's Subway would double the current £300million modernisation costs



Just two stations will be accessible for the disabled

the underground tunnel between Kelvinhall and Patrick stations.

It is regarded as the worst part of the network for water ingress as a result of old coal seams and fractured rock.

The work is part of a £25m project to improve tunnels, brickwork and the track bed.

SPT chairman Jonathan Findlay said: "This is a significant amount of funding and it will be targeted at improving the worst hit area of our Subway tunnels for

EXCLUSIVE
ATSON

GOW'S Subway has been hit by a 'shambolic' handling of four days' of work. The system has seen no station closed since Monday night - but bosses are still not disclosing details of the damage.

Now SPT, the publicly funded body that operates the system, has been slammed for failing in its 'moral duty' to say exactly what caused the closure.

Graeme Hendry, the city's SNP leader said: "SPT's management of this week's closure has been a shambles."

FULL STORY - PAGES 465

BREAKING NEWS: Travel misery after tunnel checks



**BOLIC
ETIC**

**Don't know:
FIXED**

**REVEALING FULL
PAIRS**

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re said: sorry has tunnel. ly refused y if fallen cause and lated boss- ie" lack of

P leader id: "SPT's is week's shambolic justifiably sl with the tion.

ded organ- nora duty the public wrong, why to fix and l. ing a crisis us week it de time for

city council leader Gordon Matheson to sack the chairman for not being nice enough to him.

Councillor Alistair Watson, who was chairman of SPT for seven years until 2010, said the operator was facing a serious challenge to modernise the Subway while keeping the services running.

He said: "The current system is 40 years old - it is past its 'sell by' date. Like when you have an old car, it becomes less reliable. The challenge is the age of the system."

"There is a significant £300million refurbishment programme to upgrade the network and stations, but this work is being carried out while the Subway is still open."

VISION

The Future.....

Subway – Options for the future

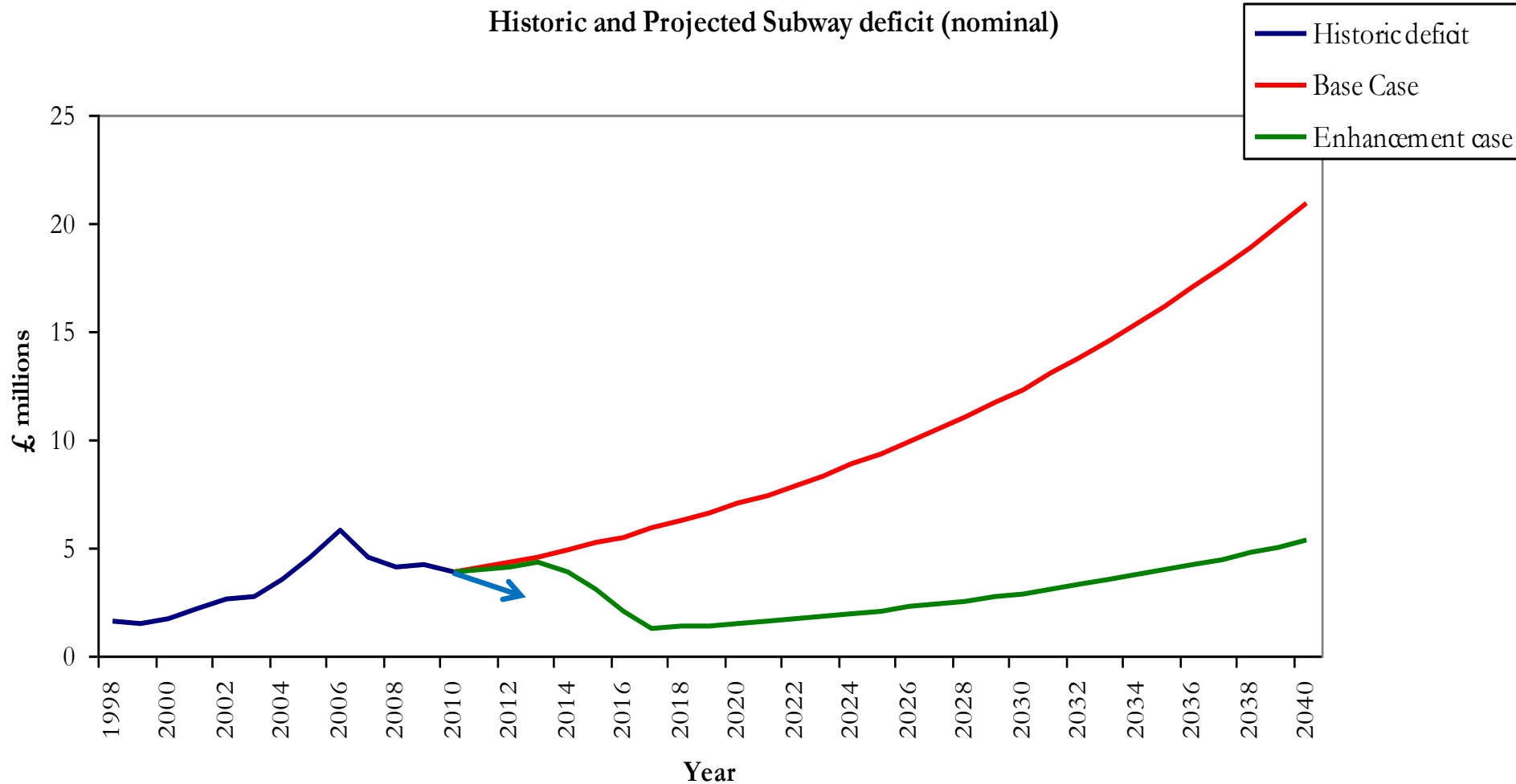


- 'Do Nothing' – and effectively close the system
- 'Base Case' – keep operating with short term investment approach
- **'Modernisation (Enhancement) Case' – transform the system and deliver a 21st century service**
- 'Blue Sky' – potential extensions



To Modernise or Not?

Long term operating impacts



Subway Modernisation



Five Principle Workstreams:

- **Human Resources** – Modernised employee relations and working practices
- **New Smart Ticketing System** (incl Station 16 Test and Training Centre at Broomloan)
- **Station Refurbishments** (including Escalator/Travelator replacement)
- **Infrastructure** Improvements (tunnels, track, yard and depot upgrades)
- **New Rolling Stock, Signalling, Comms etc** (full driverless technology)



Modernisation – employee relations/HR



- Working in partnership with our employees and trade unions
- Modern terms and conditions
- More flexible workforce for now and the future
- Overall cost savings achieved whilst providing job security
- Agreement signed in August 2012
- Further changes already underway and more to come



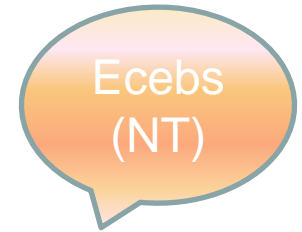
New Subway Smartcard Ticketing System



TICKET VENDING MACHINE (TVM)



WEB RETAIL



HOPS

CMS



TICKET OFFICE MACHINE (TOM) COMPONENTS



SLIMLINE AUTOMATIC TICKET GATE (ATG)



Minimising future maintenance costs with investment focused on:

- Water sealing and tunnel lining
- Rail and trackbed improvements / renewals
- Yard/depot improvements incl full renewal turnouts and ramps
- Drainage channels and associated infrastructure
- Technology and innovation (e.g KTP with Glasgow Caledonian University)



Modernisation – stations and accessibility



- Full refurbishment of all 15 stations
- Station refresh for all stations in advance of Commonwealth Games
- New escalators and travelators
- Accessibility improvements (incl lifts at St Enoch and Govan)
- Integration of advertising, public art, retail and non operational activities and income



Modernisation – new rolling stock, signalling etc



New integrated system including:

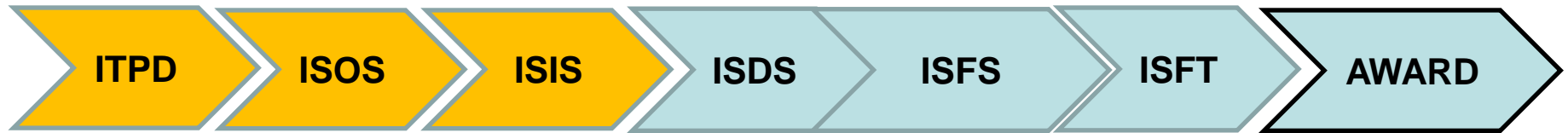
- New rolling stock
- Fully automated signalling and control (CBTC based)
- New control room
- Platform screen gates/track protection measures
- Power supply enhancements
- CCTV/passenger info
- Depot enhancements
- New trains and system maintenance option



Modernisation – new rolling stock, signalling etc



- **Competitive dialogue via Utilities Directive**



- Outline solutions, 5 consortium, dialogue sessions and clarification.
- Interim solutions, 2 consortium, more detail
- Design solution, validation of high level design at this stage dialogue sessions and clarification, aim to fine tune the high level solution
- Detailed final solution, draft final agreement of what is being procured
- Final tender submission, final agreement of what is being procured
- **CONTRACT AWARD!!**

Modernisation – new rolling stock, signalling etc



Customer feedback on results of initial testing at Broomloan test track:

Subway Modernisation Design Guide



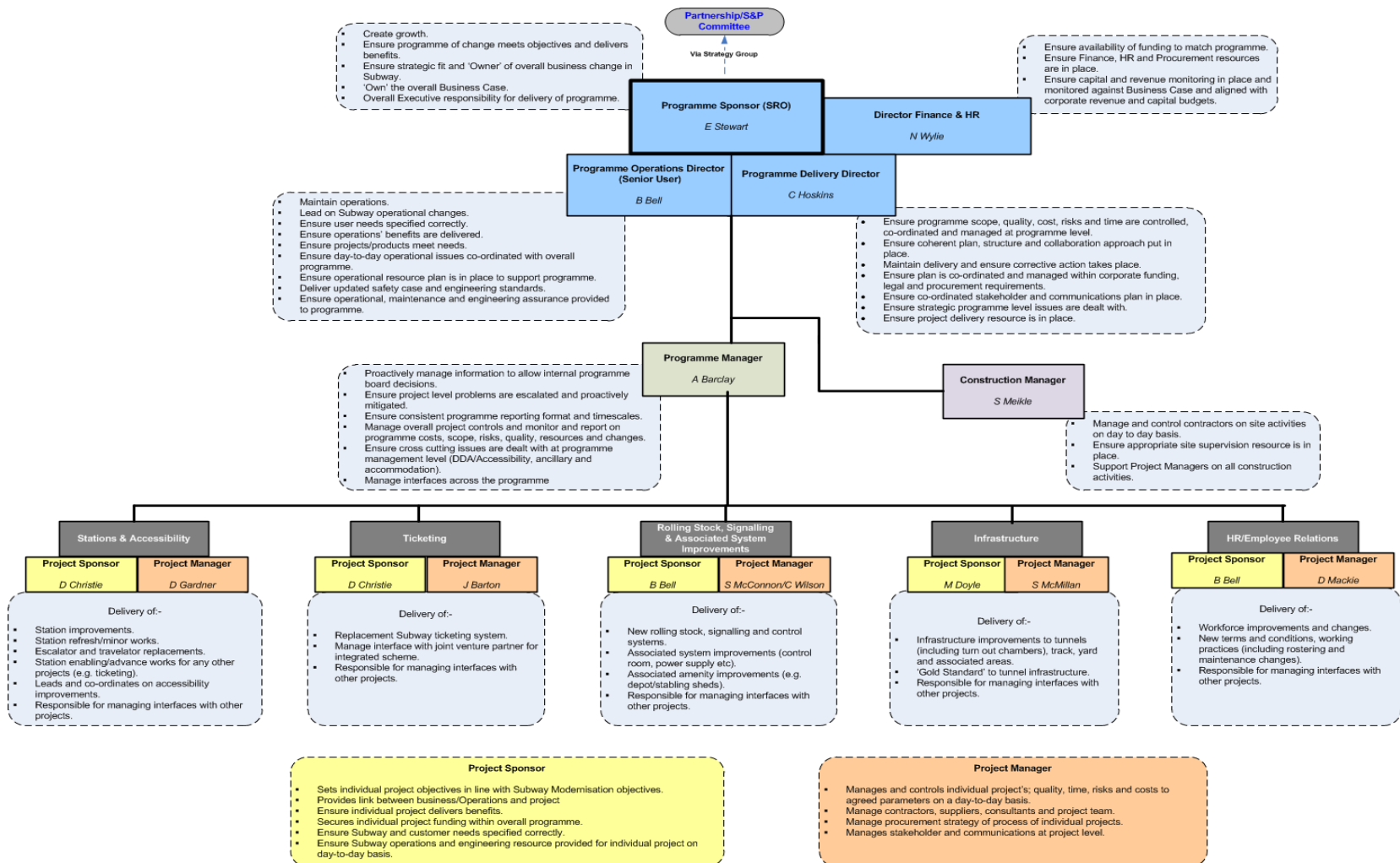
Subway 

St enoch example....

Subway Modernisation- governance



SUBWAY MODERNISATION – Organogram for Core Delivery Team



Outcomes and Benefits of Modernisation



Modernisation will deliver :

- the highest degree of **reliability** to our customers;
- more **flexibility** and ability to have extended operating hours at weekends and for large events;
- more **frequent** service particularly during peak times;
- new more comfortable trains;
- more attractive, accessible, **safe and secure** station environments that also benefit the surrounding community;
- more **socially inclusive** to better meet the needs of our citizens of all abilities;
- continued investment in staff to provide friendly and efficient **customer service**;

Subway
Modernisation
Design Guide



Outcomes and Benefits of Modernisation



Modernisation will deliver :

- a new Smartcard ticketing system that will provide easier access to the system as well as the potential for seamless travel on other modes such as bus and train;
- **more passengers** and hence mean it **costs less** and less to run;
- environmental benefits that contribute to maximise **energy efficiency** and minimise pollution;
- a **legacy** of infrastructure and assets that will transport our passengers comfortably for the next 30 years;
- be a source of **pride and inspiration** for the city, region and nation.

Subway
Modernisation
Design Guide



Questions?

www.spt.co.uk/subway

