



A2 Sydenham Bypass Improvement Scheme

Amey

Life's better connected



Mark Kelly

Scheme Role – Project Manager



David Hamilton

Scheme Role – Drainage Design
Lead



Sam McIlwaine

Scheme Role – Highways
Design Lead

- Scheme Location.
- History Of The A2 Sydenham Bypass.
- Why Was The Scheme Needed?
- Key Constraints.
- Stakeholder Engagement.
- Pavement Design.
- VRS Design.
- Drainage Design.
- Construction Phasing.
- Scheme Outcomes.

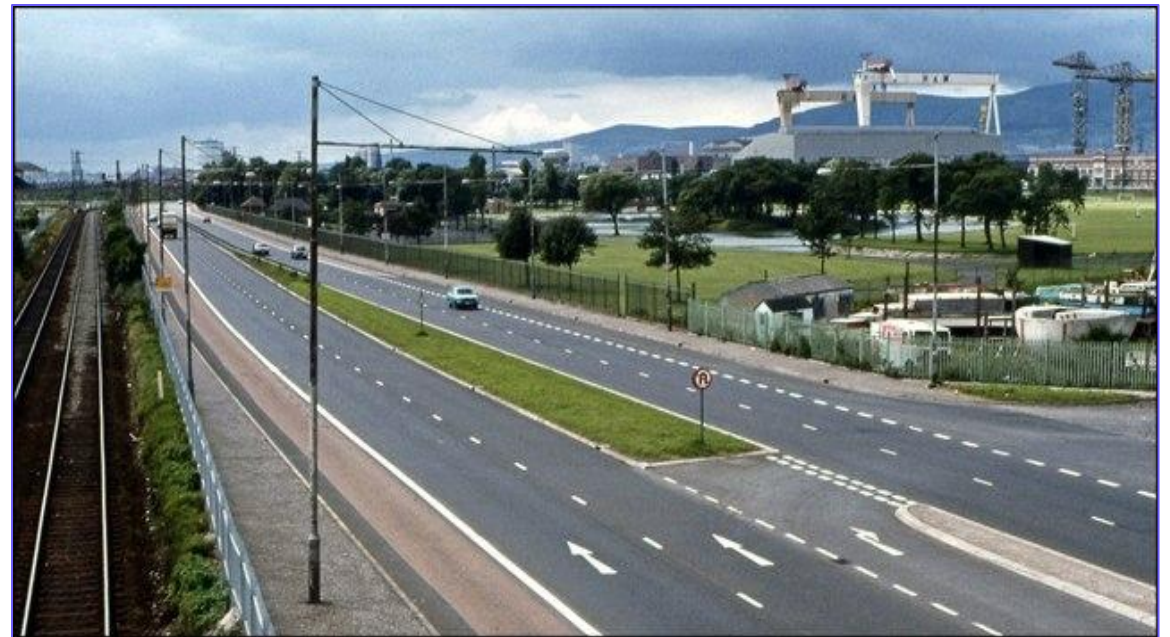


- Located in Belfast, Northern Ireland.
- A2 - Main arterial route from Belfast to the east (59,000 AADT).
- Cities and towns including Bangor, Newtownards and Holywood all directly serviced by A2 Sydenham Bypass.
- Dual Carriageway – Class A Road.
- Provides direct access to the key gateways of the Belfast City Airport, the Belfast Port and the SSE Arena.
- No suitable Class A diversion routes.



History Of The A2 Sydenham Bypass

- Opened in 1959 – Ireland's first modern dual-carriageway.
- Scheduled for construction in 1939 but was delayed due to WW2.
- The chief engineer visited the Autobahn's of Germany for inspiration.



Why Was The Scheme Needed?

- Poor existing carriageway condition with numerous defects identified.
- Regular reports of heavy flooding of carriageway.
- Collision hotspot at right turn facility.
- Collision hotspot at signalised junction.
- Sections of the existing central reservation had no safety barrier.



NEWS

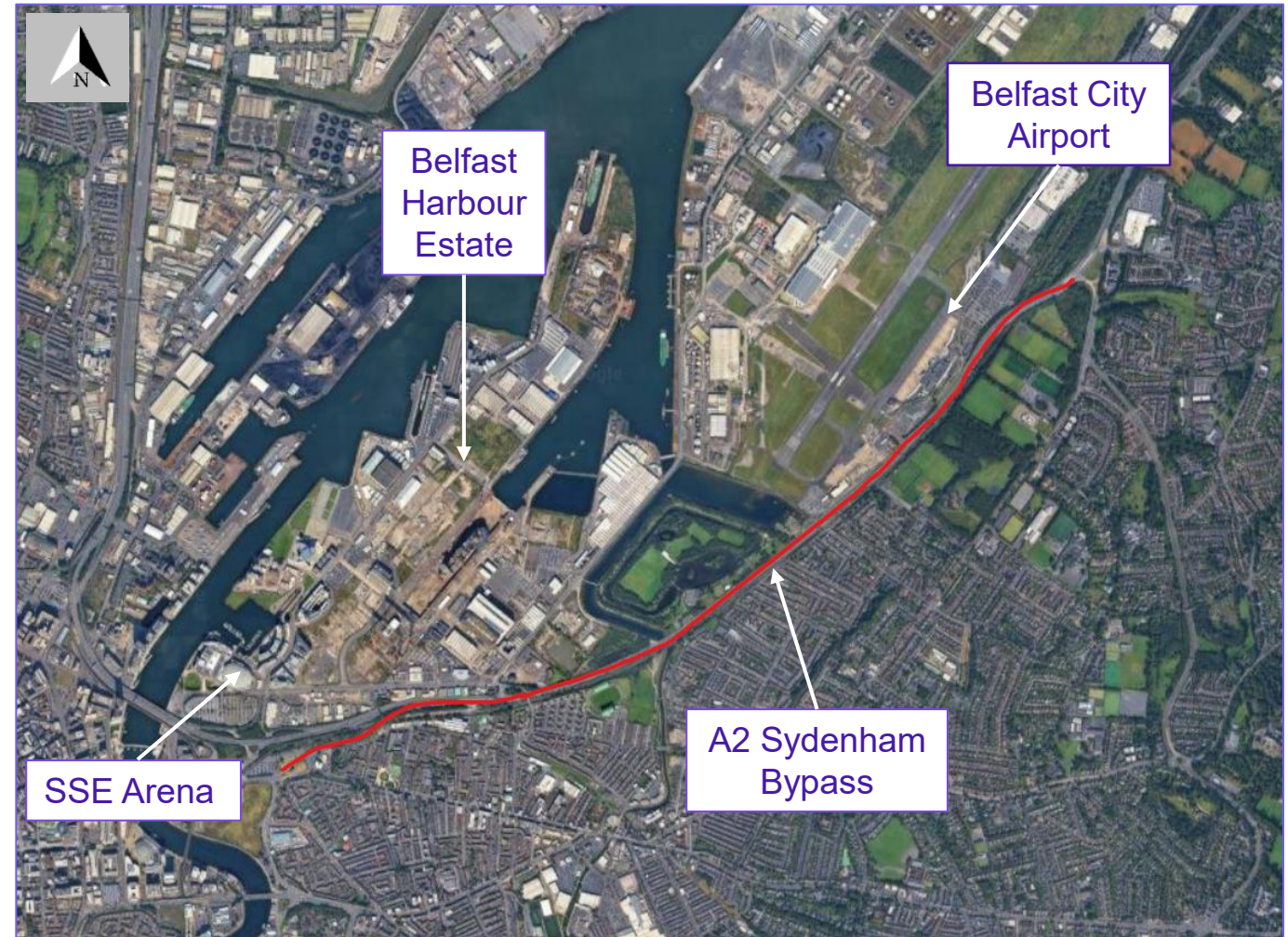
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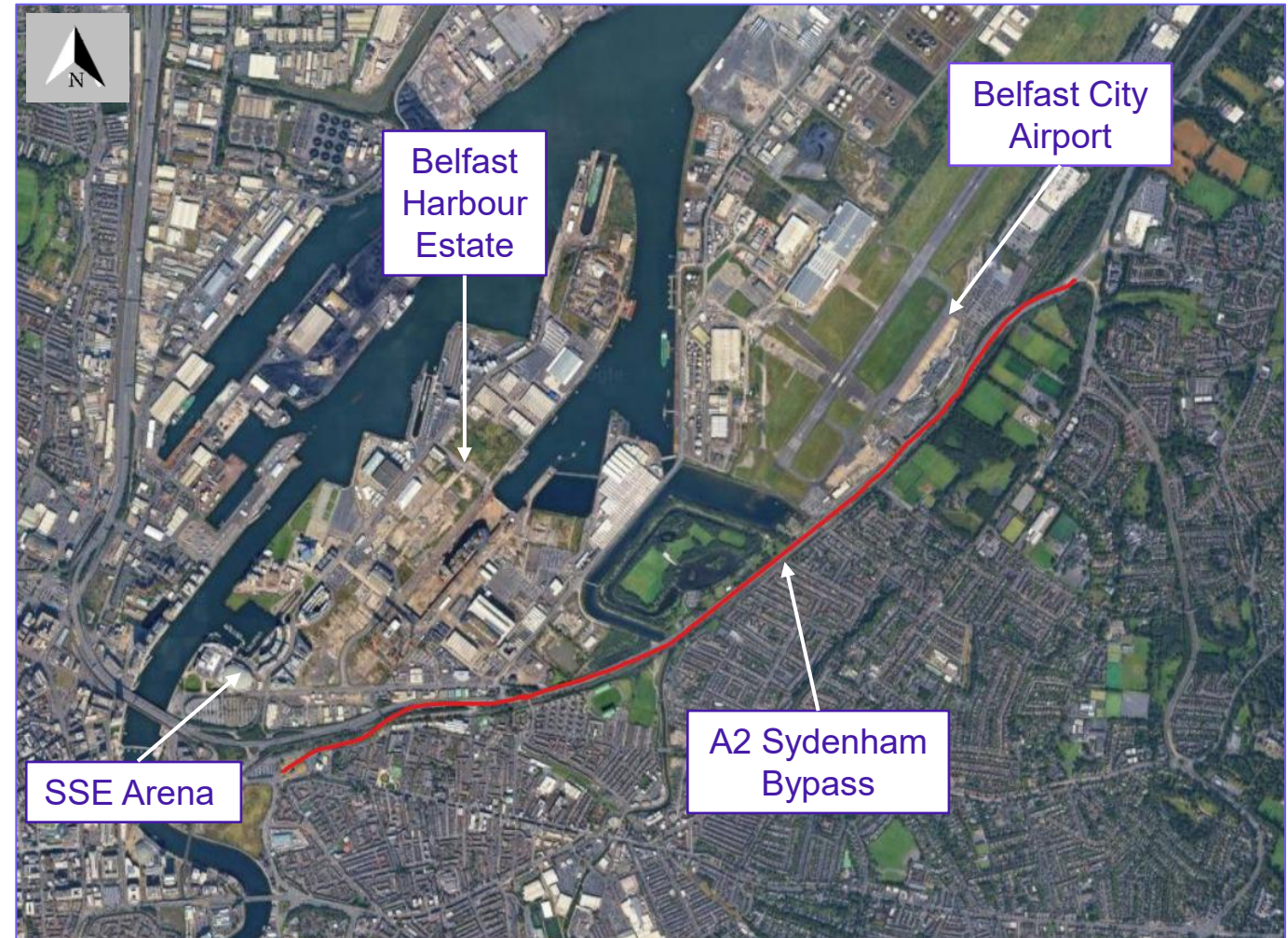
Long delays on Sydenham bypass due to flooding

- Second most heavily trafficked road in Northern Ireland behind the M1 motorway with 59,000 AADT.
- Belfast City Airport accessed directly from the A2 Sydenham Bypass.
- A2 Sydenham Bypass is a key access route for Belfast Harbour Estate and the SSE Arena.



Key Constraints - Physical

- Extremely flat carriageway with average long fall of 0.2% and average crossfall of 1%.
- The whole site is at approximately 2-3m above sea level.
- 2 no. existing overbridges and 2 no. existing underbridges present.
- Containment wall along carriageway to protect railway from vehicle intrusion.
- High voltage overhead cables and pylons.



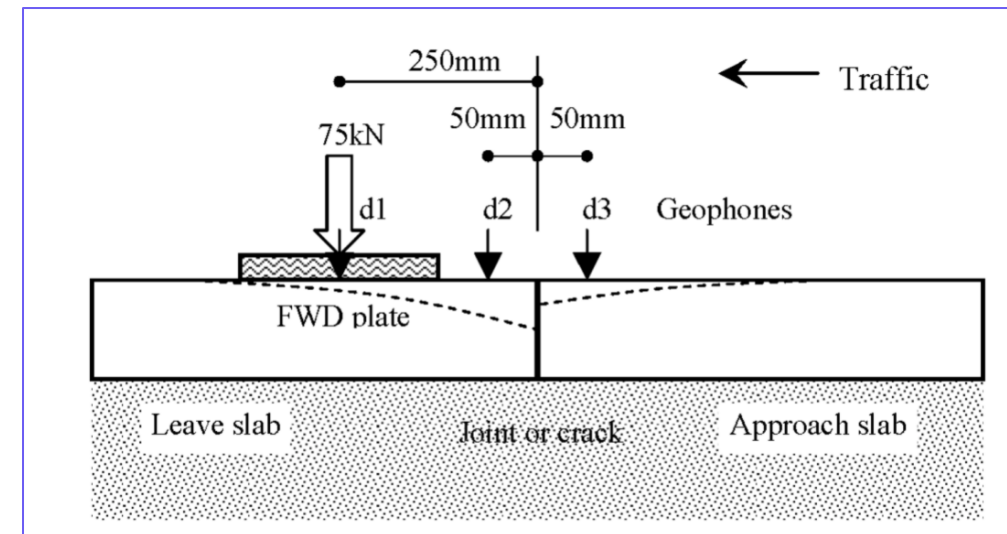
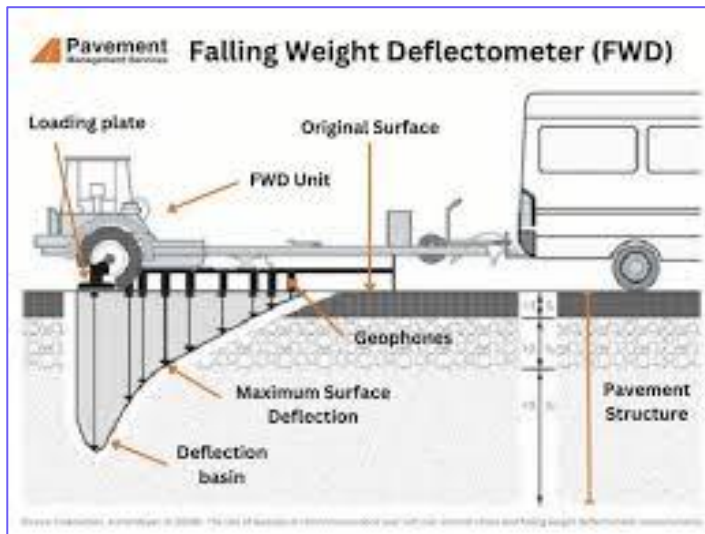
- Collaborative approach to stakeholder engagement led by local highway authority (DfI Roads).
- Engaged with City Airport, Harbour & SSE Arena as well as other local business parks.
- These discussions shaped and developed the phasing of the works and traffic management plans.
- Engaged with local government and a widespread media release and publicity prior to scheme start.
- Positive feedback received from local government and affected stakeholders.



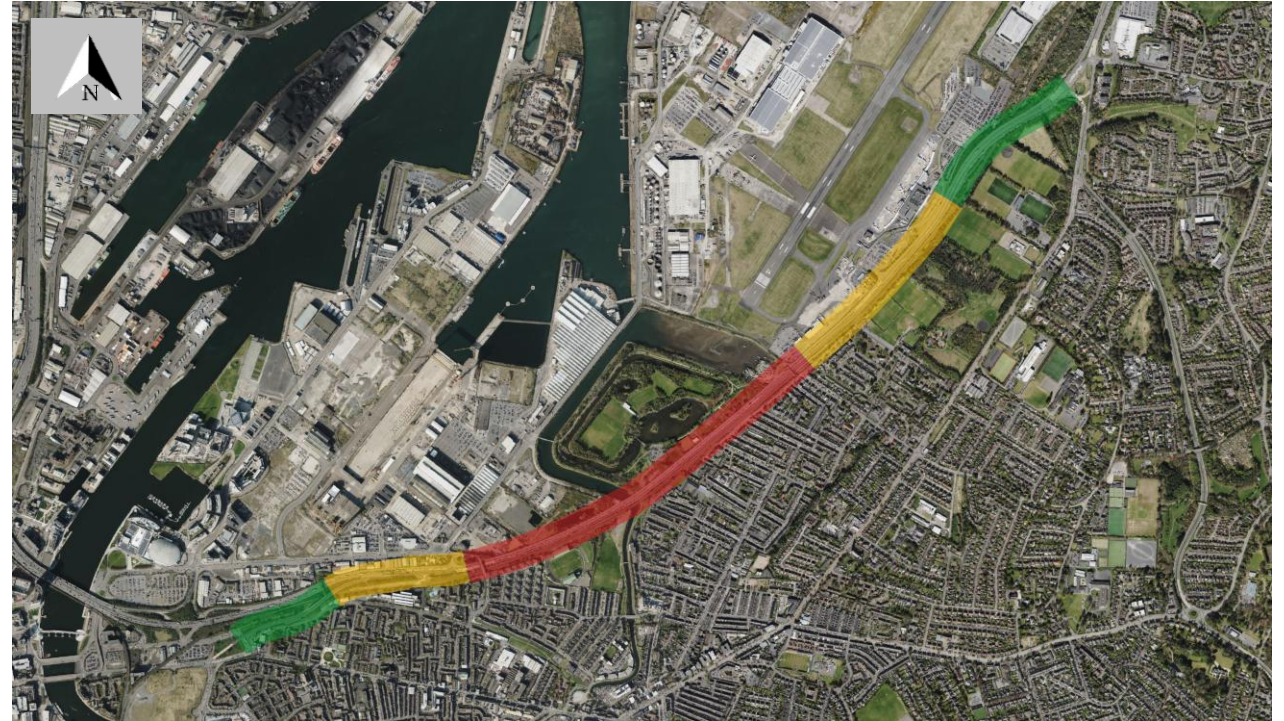
- Existing asphalt road overlaid a jointed unreinforced concrete slab.
- Defect plan identified:
 - Longitudinal cracking
 - Major fretting
 - Major crazing
 - Major transverse cracking
 - Potholes.
- The transverse cracking appeared at regular intervals (reflective cracking).



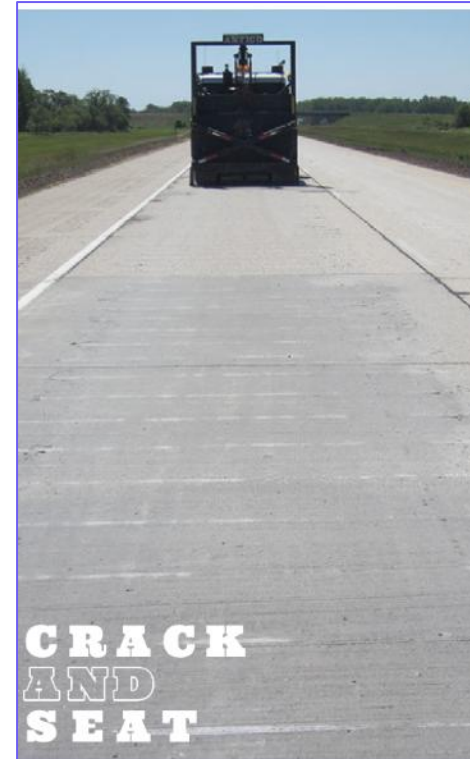
- Coring targeted towards defects.
- Ground Penetrating Radar Survey.
- Falling Weight Deflectometer Testing.
- Load Transfer Efficiency Testing.



- Coring identified pavement thickness and condition.
- GPR identified exact pavement makeup and thickness.
- FWD testing showed mixed results.
- LTE testing showed generally positive results.

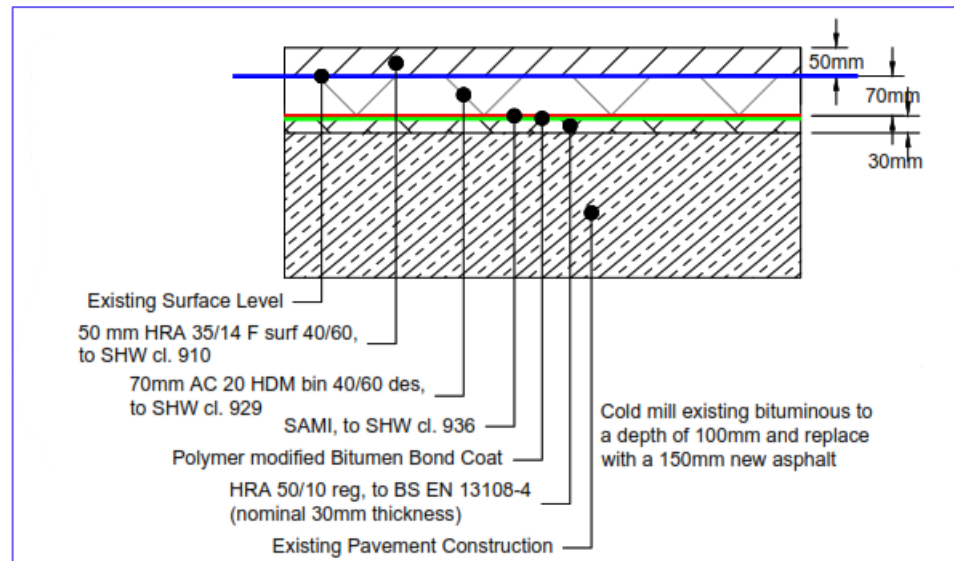


- Rigid Pavement
 - Full Reconstruction (removal of concrete base)
 - Crack, seat and overlay
 - Rubbilisation
 - Partial Reconstruction (overlay of existing concrete base)
- Fully Flexible
 - Inlay
 - Overlay

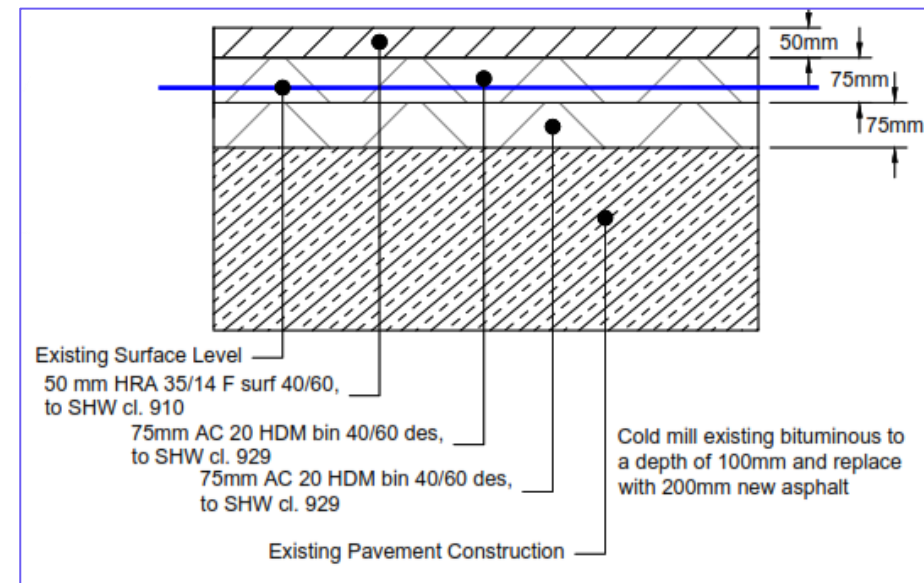
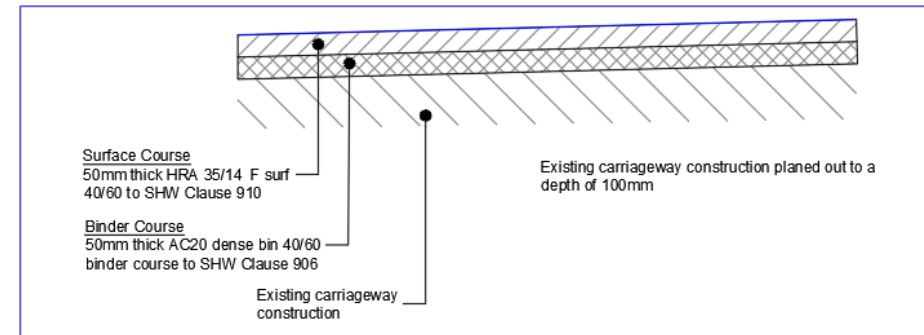


Pavement Design – Preferred options

- Rigid Pavement



- Fully Flexible



- Condition survey
 - Majority of existing safety barrier aged but in acceptable condition.
 - Mix of Tensioned Corrugated Beam (TCB) and Open Box Beam (OBB).
 - P1 Terminals present.
 - Existing barrier not present through central reserve.
 - Concrete barrier required in central reserve to standard.



- RRRAP completed to identify hazards (signage/structures/CCTV masts) and available working widths/set-backs
- Overbridge had existing sub-standard arrangement.
- Structural assessment identified Higher Containment barrier required.
- Existing safety barrier was retained where possible
- Gap in central reserve closed with new higher containment barrier.



Collision hotspots

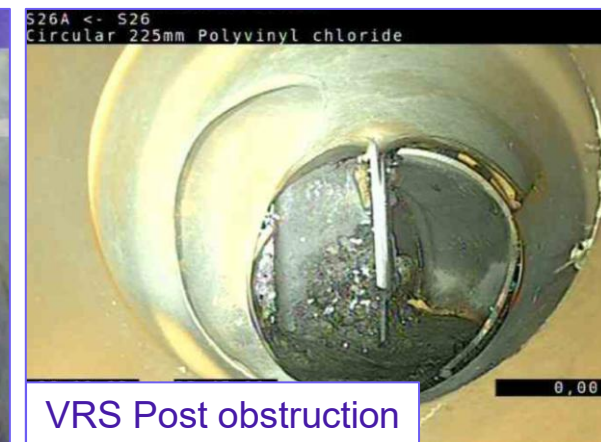
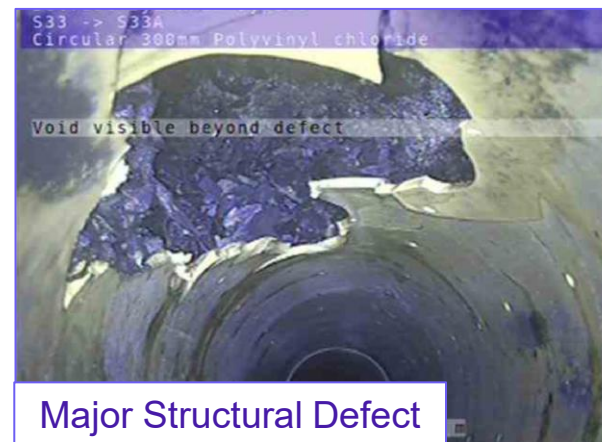
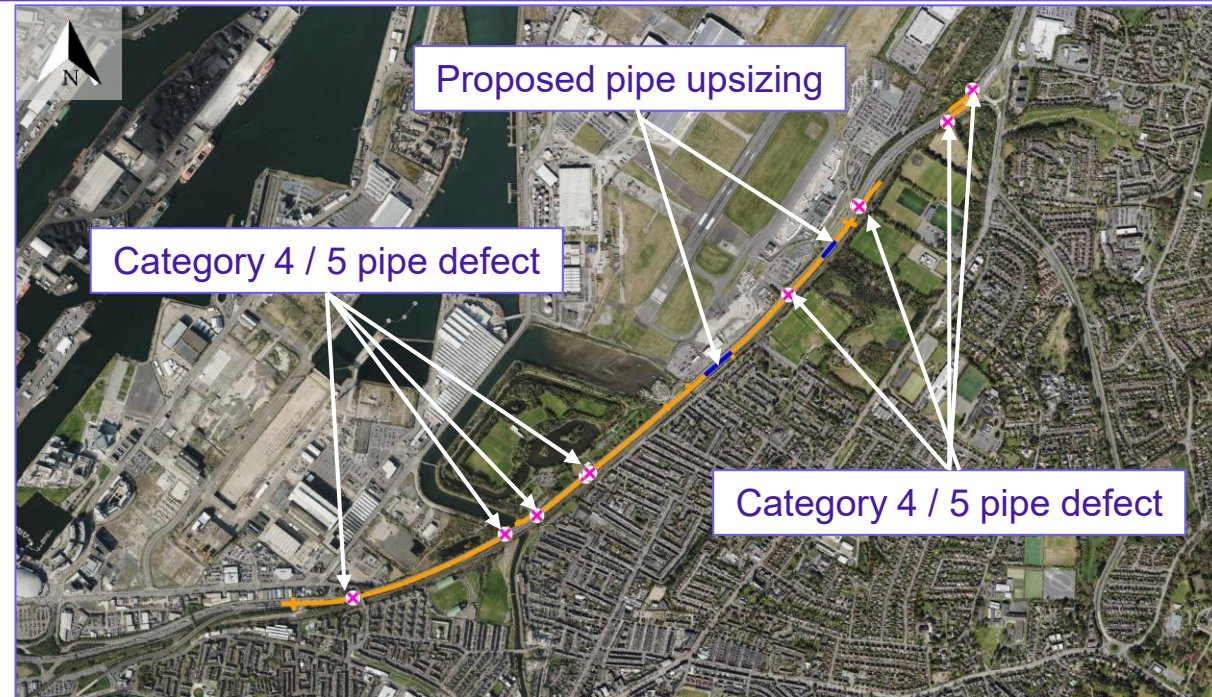
- Collision hotspot was present within the scheme extents. (>5 in 3-year period)
- Existing access provided to boat club and informal airport pick up.
- Public consultation carried out and closure of right turn facility recommended.
- Second collision hotspot was identified at a signalised junction.
- Re-alignment of kerblines and separate right turn phase introduced.



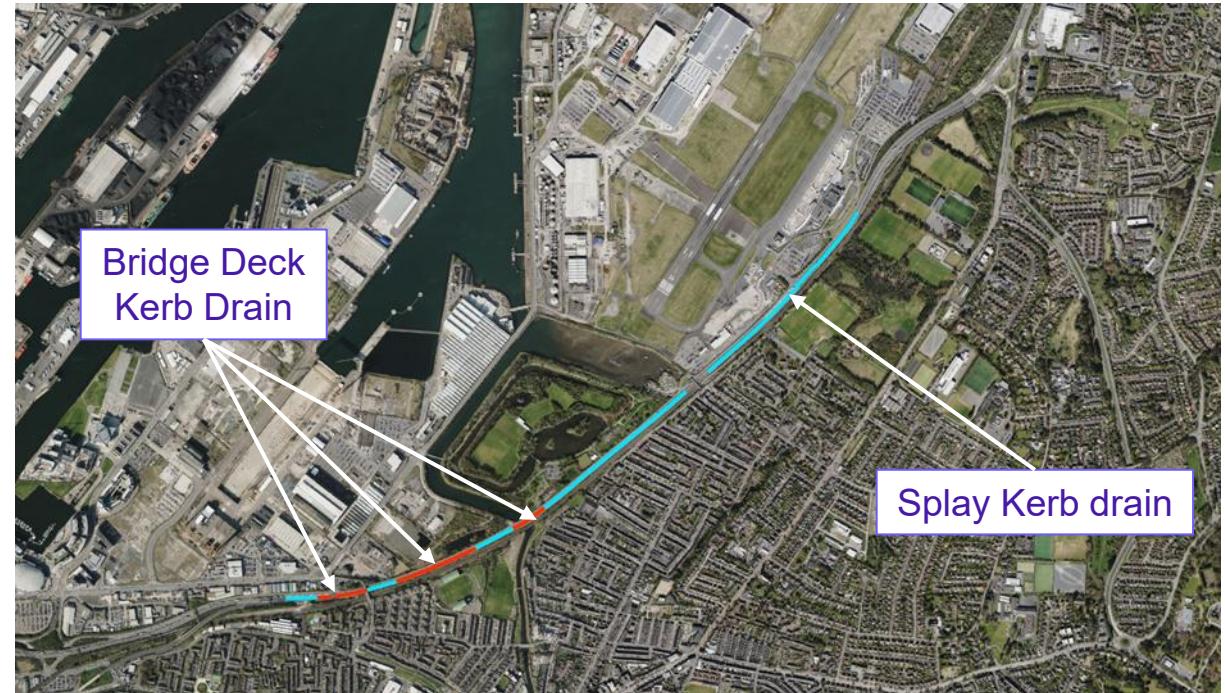
- Regular flooding of the existing network on the citybound route near Dee Street Bridge.
- Significant silt build up identified due to:
 - Very flat pipes (no self-cleansing velocity)
 - Irregular maintenance
 - Outfalls located at low level in a tidal watercourses.



- CCTV survey identified locations of category 4 and 5 structural/ service condition defects referring to DMRB CS 551.
- Existing pipe network modelled using MicroDrainage software to determine capacity issues.
- Isolated pipes repairs complete via:
 - Localised pipe replacement.
 - Structural liner.
 - Patch repair.



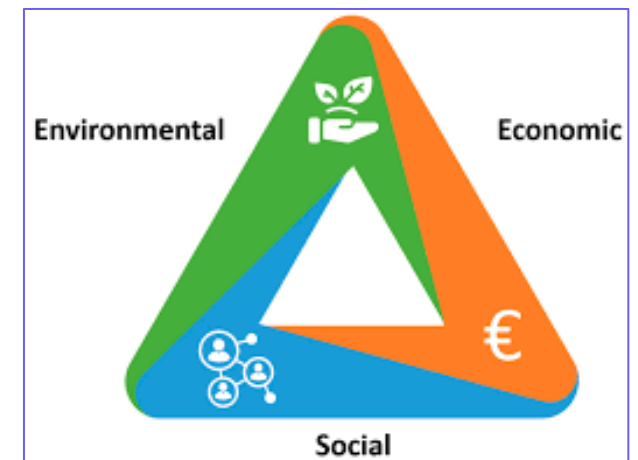
- Existing combined slot drains prone to blockages and difficult to maintain.
- Proposed combined splay and bridge deck kerb collection system installed to improve collection on road with minimal crossfall.



- **Phase 1- 2020 (Blue)**
 - Trial period completed over 3 weeks in July 2020 based on initial pavement design with limited pavement information available using overlay only.
- **Phase 2 - 2022 (Orange)**
 - Remainder of carriageway resurfacing only on the Bangor bound side in late 2022 over 8 weeks of weekend closures.
- **Phase 3 - 2024 (Red)**
 - Resurfacing of the Belfast bound carriageway side.
 - VRS.
 - Drainage.
 - Kerbing.
 - Footways.
 - Removal of collision hot spots.
 - 18-week programme of weekend and weeknight closures.



- Flooding issues resolved.
- Improved surface condition and residual life of pavement.
- Safety barrier improvements.
- Collision hotspots eliminated.
- Sustainability.
- Carbon.
- Positive feedback received from local government and affected stakeholders.
- Finalist for 2025 CIHT NI – Infrastructure Project of the Year



Questions



CIHT NI Awards 2025 - Finalist