BIM - The Challenges and Opportunities for Rail

Simon Wray, Infrastructure Lead, The BIMstitute, UK

Conceptual Design

Detailed Design

Analysis

Documentation

Programming

VISUALIZATION

Building Information Modeling

Fabrication

Renovation

Construction 4D/5D

Demolition

Operation and Maintenance

Construction Logistics

8 pillars of BIM

- PAS 1192-2: 2013 - How (Capex)
- PAS 1192-3: 2014 - How (Opex)
- PAS 1192-4:2014 – Data Exchange
- PAS 1192-5:2015 – Data Security
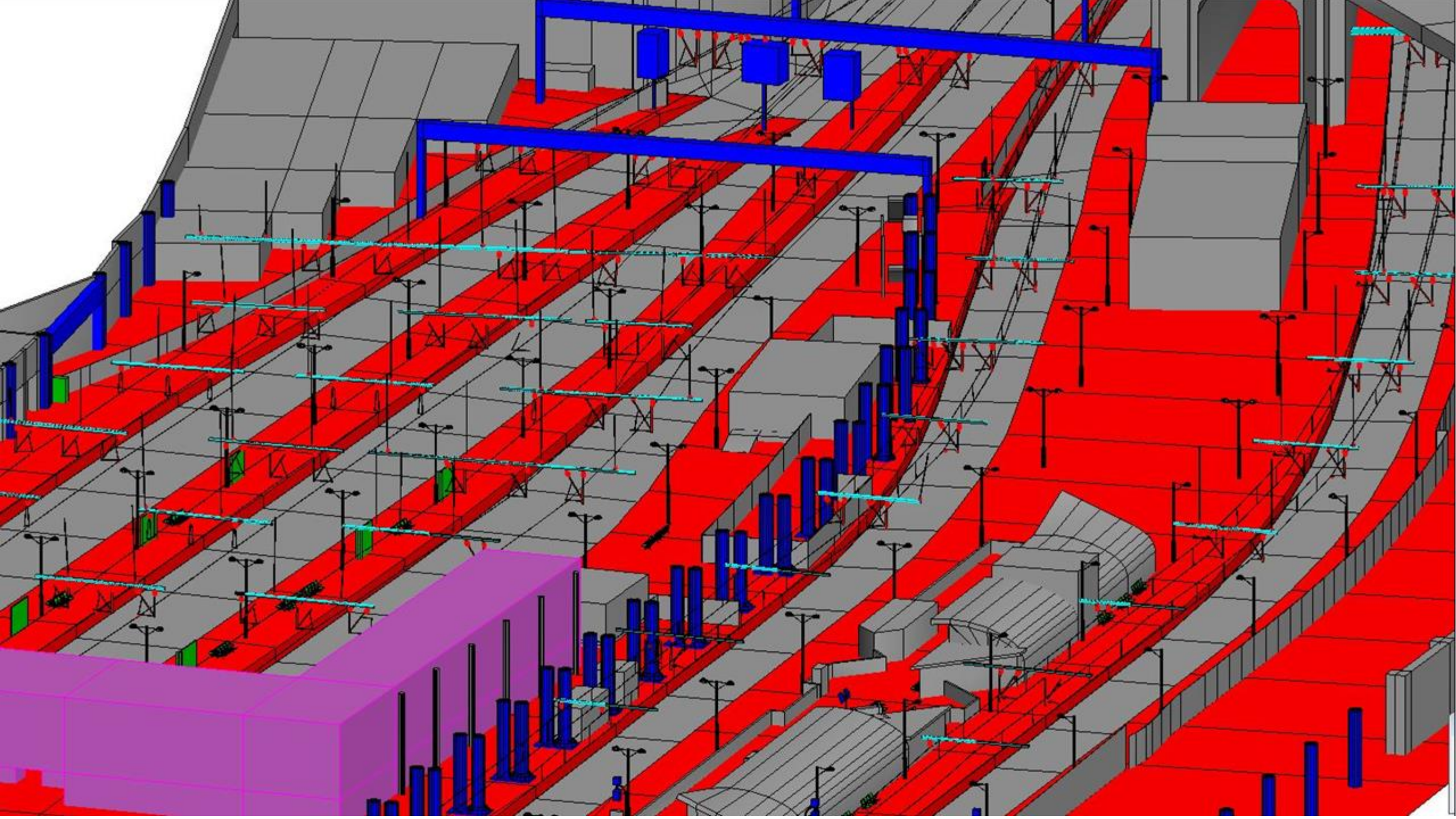- CIC BIM Protocol - Legal
- Soft Landings - Handover
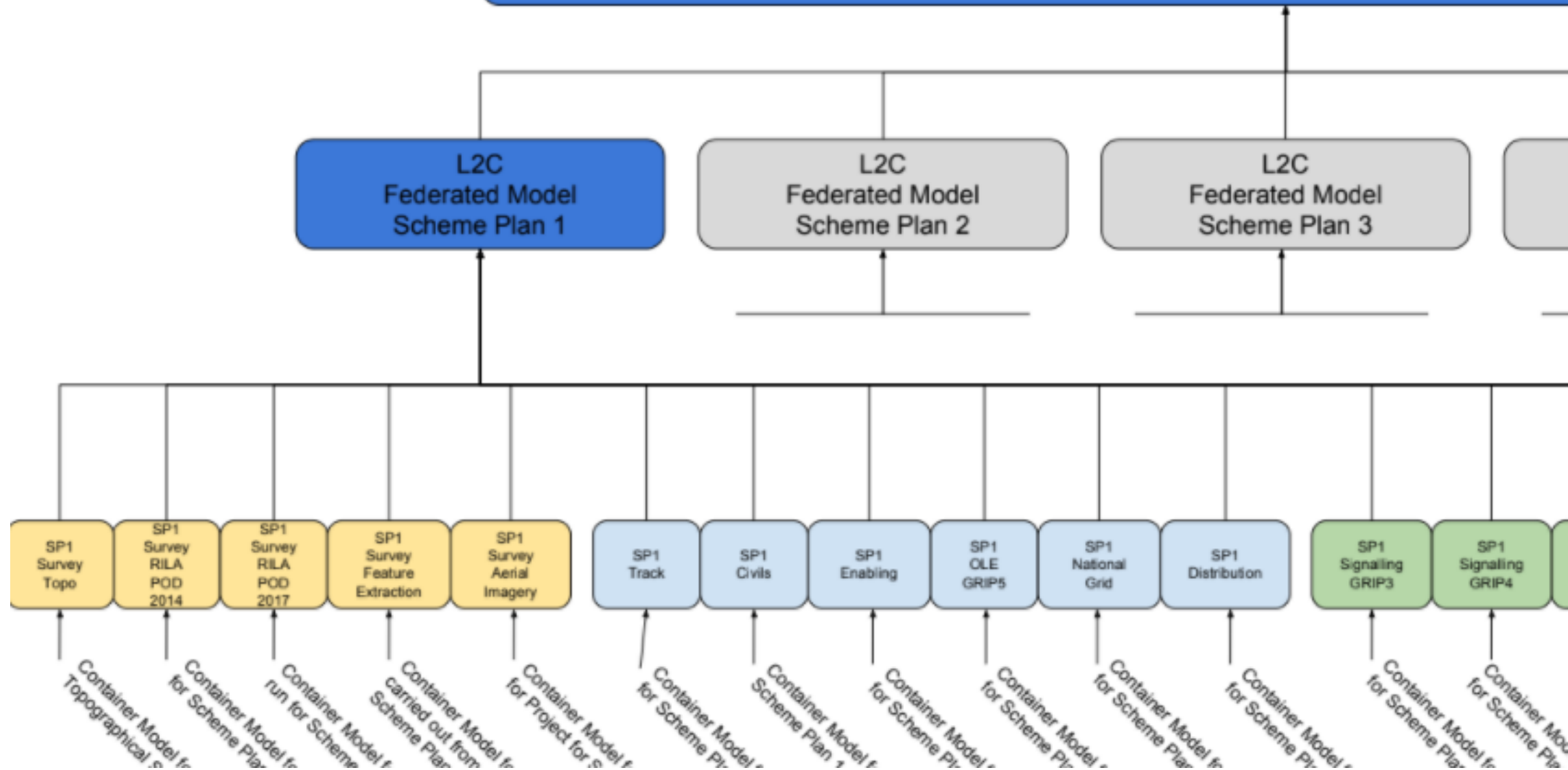- Digital Plan of Works - When
- Classification - Naming

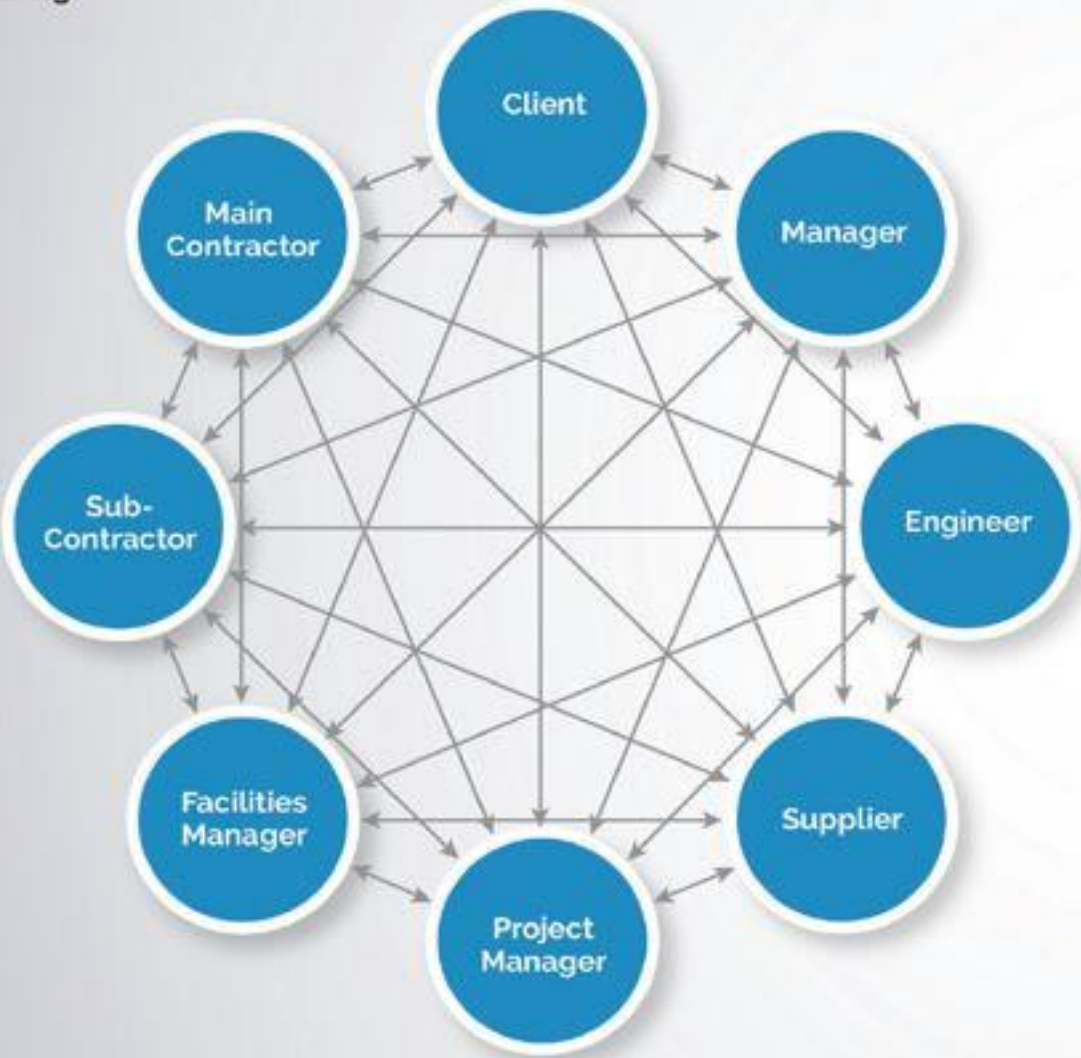Fundamentally BIM is centred around three core elements:

- Graphical Representation - An accurate digital 3-Dimensional representation of an asset

- Information (data and documents) - to support design, fabrication, construction, operations and maintenance

- Standardisation - Processes, standards and behaviours to work consistently and collaboratively

L2C Federated Model Scheme Plans 1,2, 3,4a and 5

- L2C Federated Model Scheme Plan 1
- L2C Federated Model Scheme Plan 2
- L2C Federated Model Scheme Plan 3

Scheme Plan 1 components:
- SP1 Survey Topo
- SP1 Survey RILA POD 2014
- SP1 Survey RILA POD 2017
- SP1 Survey Feature Extraction
- SP1 Survey Aerial Imagery
- SP1 Track
- SP1 Civils
- SP1 Enabling
- SP1 OLE GRIP5
- SP1 National Grid
- SP1 Distribution
- SP1 Signalling GRIP3
- SP1 Signalling GRIP4

Common Data Environment (CDE)
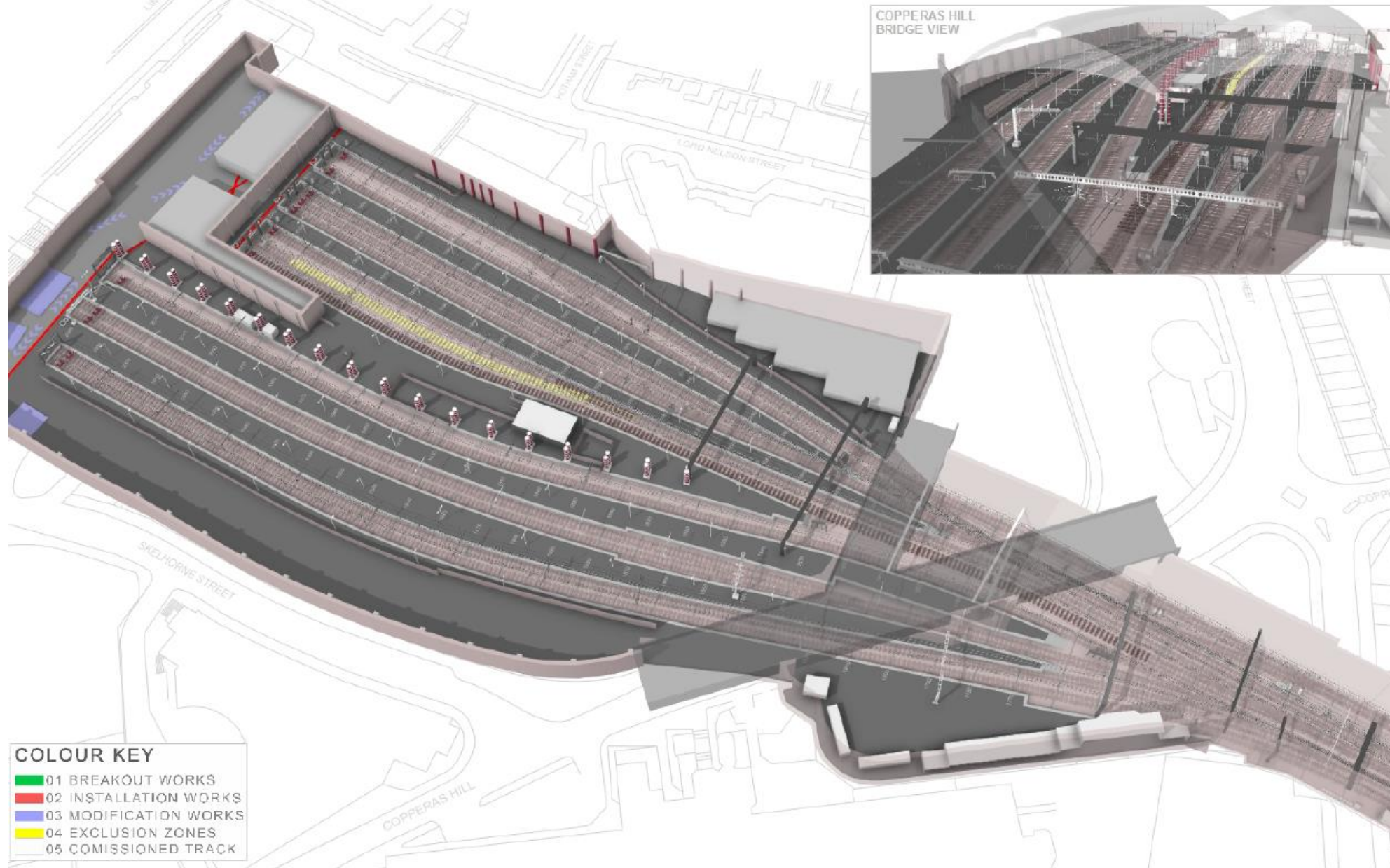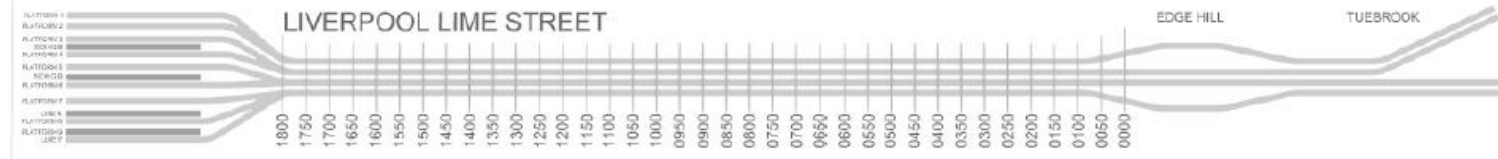
COPPERAS HILL
BRIDGE VIEW

COLOUR KEY

- 01 BREAKOUT WORKS
- 02 INSTALLATION WORKS
- 03 MODIFICATION WORKS
- 04 EXCLUSION ZONES
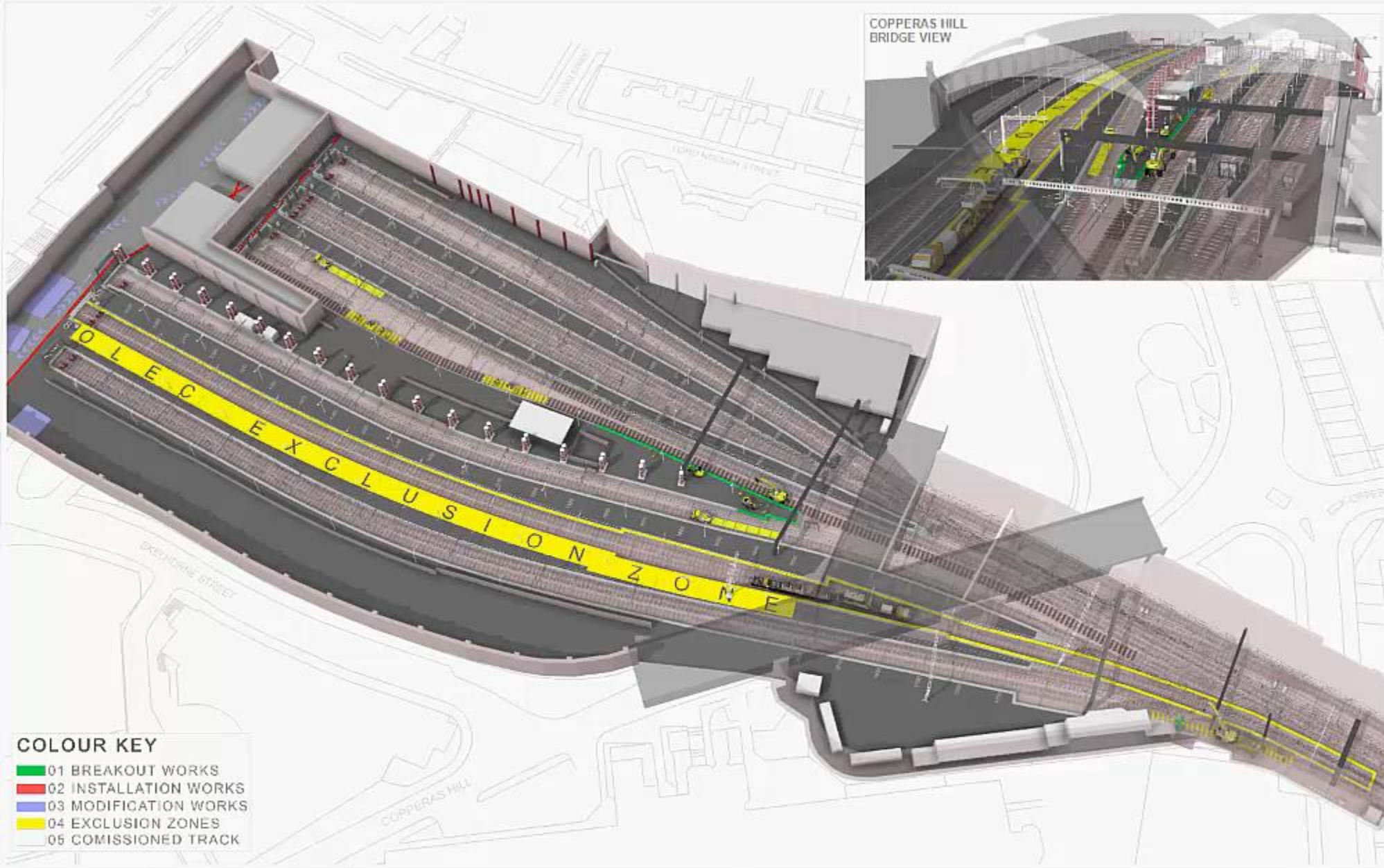- 05 COMISSIONED TRACK

LIVERPOOL LIME ST
4D SEQUENCE MODEL

NetworkRail

26.67 x 15.00 in

21:00 24/12/2017

LIVERPOOL LIME STREET

EDGE HILL   TUEBROOK

SIGNALS

| D/C SIG 56 IN SIDING D & PTS 55A&B | R/C SIGNAL 56 IN SIDING D | D/C SIGNAL 'B' | D/C SIGNAL 'C' | INSTALL SIGNAL B & COMM NEW P8 | INSTALL SIGNAL C & COMM NEW P8 |
| CLIP & SCOTCH PTS 317 | COMM 320 PTS | CARRY OUT PANEL MODS | CLIP & SCOTCH PTS 324 | D/C BUFFER COMPS | |

OLE + WIRING

LOAD WIRE @ RRAF	RUN WR P79A CATENARY	RUN WR P79A CONTACT	RUN WR P79B CATENARY	RUN WR P79B SPLICE	P8 WR P79A DROPPERS
P7 WR P79B DROPPERS	L193/74A REG NEW 7/8	L193/76B REG NEW 7/8	L193/79A REG NEW 7/8	L193/83A REG NEW 8	L193/81A REG NEW 8
L193/78A REG NEW 8	L193/104A REG NEW 8	L193/110A REG NEW 8	L193/122A REG NEW 8	L193/135A REG NEW 8	L193/135A REG NEW 8
L193/58 SWITCH L193/40 SPS	L193/40 COMP SPS EXIST 8	L193/42 SPS EXIST 8	L193/64 SPS EXIST 8	L193/68 SPS EXIST 8	L193/40 FINAL REG EXIST 8
L193/40 FINAL REG EXIST 8	L193/42 FINAL REG EXIST 8	L193/64 FINAL REG EXIST 8	L193/68 FINAL REG EXIST 8	PANNING	L193/58 SI INSTALL
L193/73 PES MOD	L193/142 PES MOD				

PLATFORMS

LIFT BUFFER STOP	REMOVE COPERS RISER DEMO	REMOVE REM. COPERS	RECOVER RISER WALL	RECOVER RISER WALL + PLAT	RECOVER PLAT 1
RRV B 1ST LOAD	RRV B 2ND LOAD	RRV B 3RD LOAD	RRV B 4TH LOAD	RECOVER PLAT 2	1ST EXC FOR FOUND
2ND EXC FOR FOUND	3RD EXC FOR FOUND	4TH EXC FOR FOUND	EGRESS PLANT FROM TRACK	MOB. PROTECT CONC + EDGE PRO	SAW CUT IMPACT WALL
BREAKOUT 250MM BELOW CONC	CLEAR DEBRIS	TEMP HRAIL EXIST P8	ERECT HOARDING TO P8	REM. TEMP HOARDING + INST FURN	COMM NEW PLAT 8 & 9

TRACK

| PLAIN LINE 05A PTS | ACCESS BURNERS | BURN EXIST P8 TRACK (10 BURNS) | MANPWR UNCLIP 1 | BURN EXIST P5 TRACK (50 BURNS) | INSTALL VORTOK EXIST P5 |
| RRV A 1ST LOAD | RRV A 2ND LOAD | RRV A 3RD LOAD | RRV A 4TH LOAD | MANPWR UNCLIP 2 | INSTALL VORTOK EXIST P5 |

MILESTONES

SECTION PROVING	HBACK ISO/POSS	CLEAR LINES HBACK	POSS & MARKER BOARD	ISSUE C FORM ISO PERMIT	BOCL CLEAR RT TO P8
STAFF BRIEFING	WHEELS FREE	STABLE PLANT	MAINLINE POSS START	ACCESS/ TRAVEL TO SITE	SIGN OUT/ EGRESS
END POSS	BGCL COMP NEW P8 WORKS				

PLATFORM 1
PLATFORM 2
PLATFORM 3
PLATFORM 4
PLATFORM 5
PLATFORM 6
PLATFORM 7
PLATFORM 8
PLATFORM 9

1800 1750 1700 1650 1600 1550 1500 1450 1400 1350 1300 1250 1200 1150 1100 1050 1000 0950 0900 0850 0800 0750 0700 0650 0600 0550 0500 0450 0400 0350 0300 0250 0200 0150 0100 0050 0000

LORD NELSON STREET
SKELHORNE STREET
COPPERAS HILL

COPPERAS HILL
BRIDGE VIEW

SIGNALS

| D/C SIG 6S IN SIDING D & PTS 6SA&B | R/C SIGNAL 6S IN SIDING D | D/C SIGNAL "B" | D/C SIGNAL "C" | INSTALL SIGNAL 6 & COMM NEW PS | INSTALL SIGNAL C & COMM NEW PS |
| CLIP & SCOTCH PTS 317 | COMM 325 PTS | CARRY OUT PANEL MODS | CLIP & SCOTCH PTS 324 | D/C BUFFER COMPS | |

OLE + WIRING

LOAD WIRE & RRAP	RUN WR PT9A CATENARY	RUN WR PT9A CONTACT	RUN WR PT9S CATENARY	RUN WR PT9B SPLICE	PB WR PT9A DROPPERS
PY WR PT5B DROPPERS	L193/74A REG NEW 7/8	L193/76B REG NEW 7/8	L193/79A REG NEW 7/8	L193/9 9A REG NEW 8	L193/31A REG NEW 8
L193/35A REG NEW 8	L193/17AA REG NEW 8	L193/110A REG NEW 8	L193/72A REG NEW 8	L193/30A REG NEW 8	L193/13GA REG NEW 8
L193/09 SWITCH L193/49 SPS	L193/40 COMP SPS EXIST 8	L193/42 SPS EXIST 8	L193/64 SPS EXIST 3	L193/69 SPS EXIST 9	L193/40 FINAL REG EXIST 8
L193/40 FINAL REG EXIST 8	L193/42 FINAL REG EXIST 8	L193/6A FINAL REG EXIST 8	L193/65 FINAL REG EXIST A	PANNING	L193/6B SI INSTALL
L193/73 PES MOD	L193/142 PES MOD				

PLATFORMS

LIFT BUFFER STOP	REMOVE COPERS RISER DEMO	REMOVE REM. COPERS	RECOVER RISER WALL	RECOVER RISER WALL + PLAT	RECOVER PLAT 1
RRV B 1ST LOAD	RRV B 2ND LOAD	RRV B 3RD LOAD	RRV B 4TH LOAD	RECOVER PLAT 2	1ST EXC FOR FOUND
2ND EXC FOR FOUND	3RD EXC FOR FOUND	4TH EXC FOR FOUND	EGRESS PLANT FROM TRACK	MOB. PROTECT CONC + EDGE PRO	SAW CUT IMPACT WALL
BREAKOUT 350MM BELOW CONC	CLEAR DEBRIS	TEMP HRAIL EXIST P6	ERECT HOARDING TO RE	REM. TEMP HOARDING + INST FURN	COMM NEW PLAT 8 & 9

TRACK

| PLAIN LINE 6SA PTS | ACCESS BURKERS | BURN EXIST P6 TRACK (10 BURNS) | MAN/PWR UNCLIP 1 | BURN EXIST P6 TRACK (50 BURNS) | INSTALL VORTOK EXIST P5 |
| RRV A 1ST LOAD | RRV A 2ND LOAD | RRV A 3RD LOAD | RRV A 4TH LOAD | MAN/PWR UNCLIP 2 | INSTALL VORTOK EXIST P6 |

MILESTONES

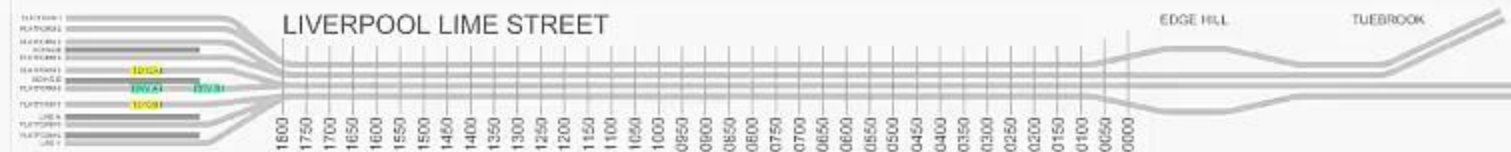| SECTION PROVING | HBACK ISO/POSS | CLEAR LINES HBACK | POSS & MARKER BOARD | ISSUE C FORM ISO PERMIT | BGCL CLEAR RT TO P6 |
| STAFF BRIEFING | WHEELS FREE | STABLE PLANT | MAINLINE POSS START | ACCESS/ TRAVEL TO SITE | SIGN OUT/ EGRESS |
| END POSS | BGCL COMP NEW PS WORKS | | | | |

COLOUR KEY

- **01 BREAKOUT WORKS** (green)
- **02 INSTALLATION WORKS** (red)
- **03 MODIFICATION WORKS** (purple)
- **04 EXCLUSION ZONES** (yellow)
- **05 COMISSIONED TRACK** (white)

LIVERPOOL LIME ST
4D SEQUENCE MODEL

NetworkRail

15:14 25/12/2017

LIVERPOOL LIME STREET

EDGE HILL   TUEBROOK

1800 1750 1700 1650 1600 1550 1500 1450 1400 1350 1300 1250 1200 1150 1100 1050 1000 0950 0900 0850 0800 0750 0700 0650 0600 0550 0500 0450 0400 0350 0300 0250 0200 0150 0100 0050 0000

Key Challenges

- B in BIM stands for Building

- Classifications are all written for buildings – not infrastructure

- Lack of informed and impartial support

- Fragmented asset information requirements

- Lot's of "noise" – hundreds of vendors, who to choose,?

- Rail Design tools not BIM compliant….

8 pillars of BIM

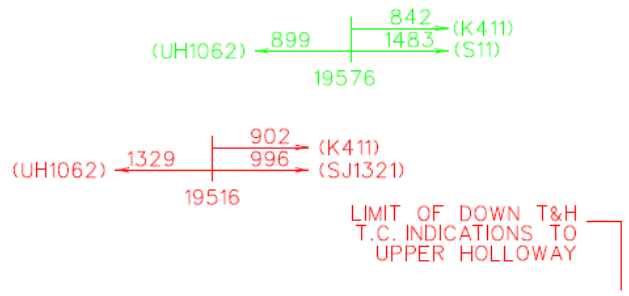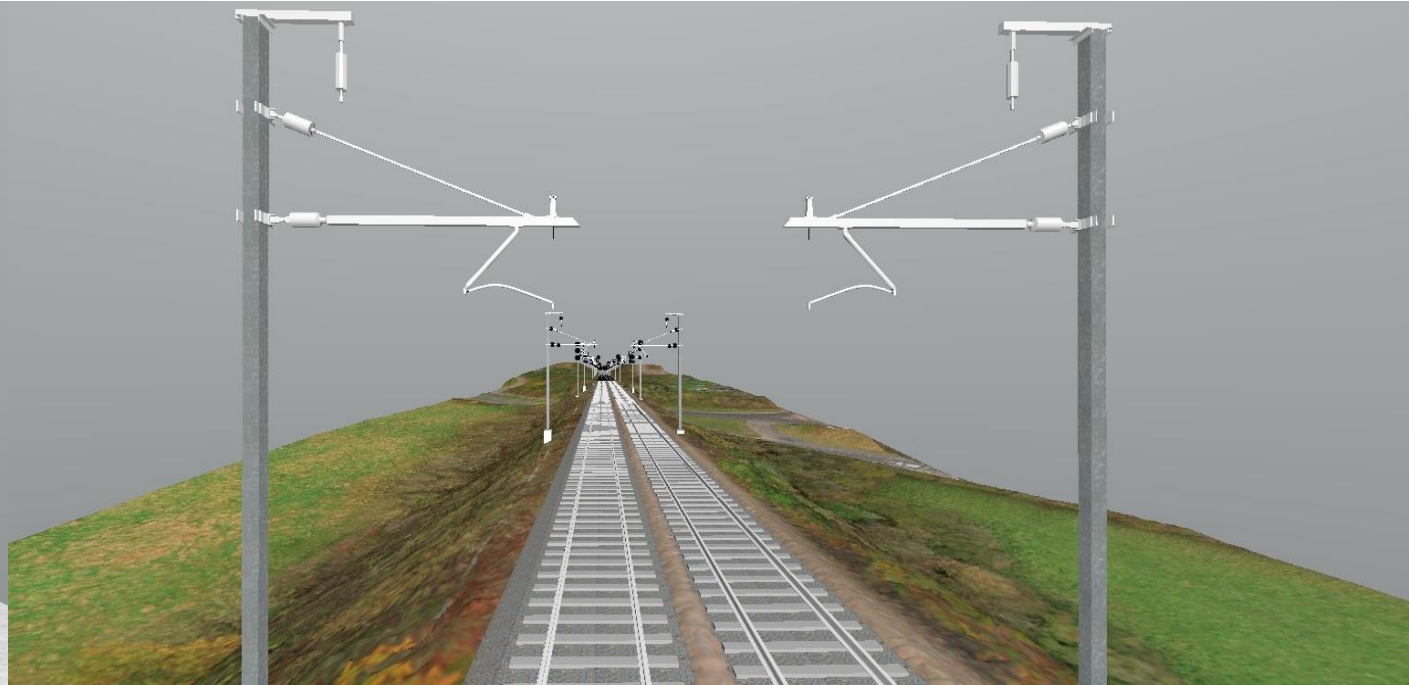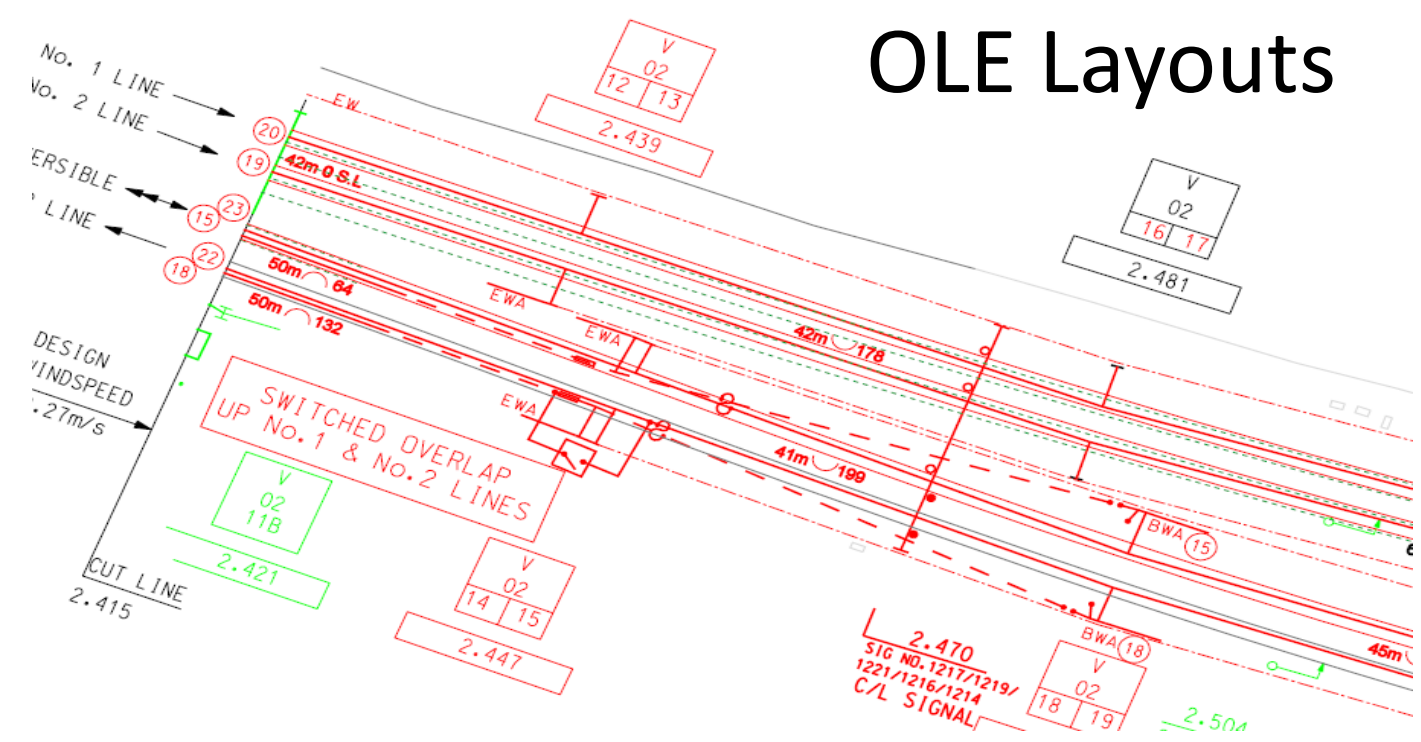| |
|---|
| PAS 1192-2: 2013 - How (Capex) |
| PAS 1192-3: 2014 - How (Opex) |
| PAS 1192-4:2014 – Data Exchange |
| PAS 1192-5:2015 – Data Security |
| CIC BIM Protocol - Legal |
| Soft Landings - Handover |
| Digital Plan of Works - When |
| Classification - Naming |

Scheme Plans
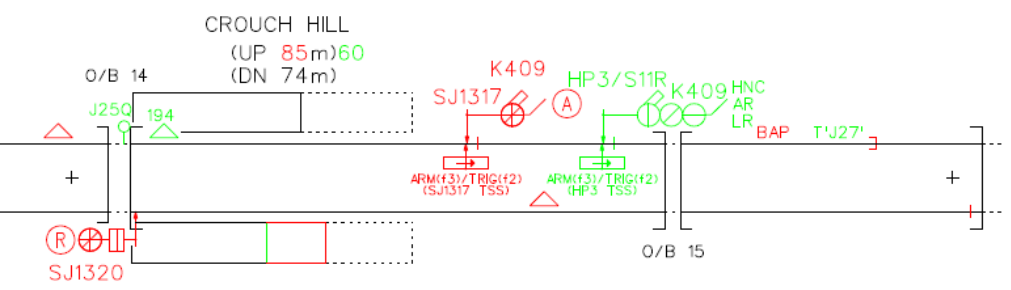
OLE Layouts

Kettering

Simon Wray, Infrastructure Lead, The BIMstitute, UK
Simon.Wray@bimstitute.com