

OFFICIAL



Southern Region Capital Delivery



Design Close Call guidance document

December 2021



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1. Design Close Calls – The context

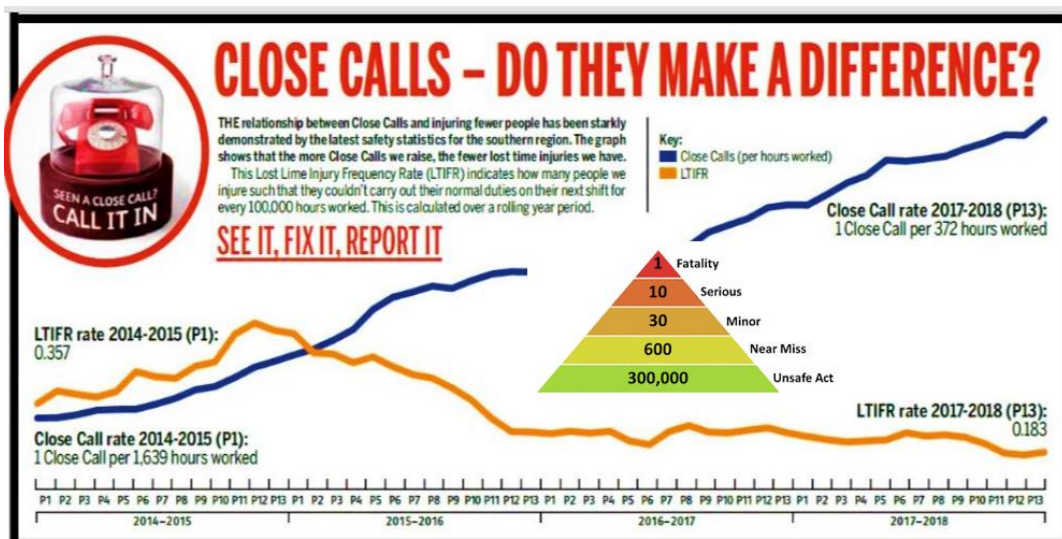
Design Close Calls (DCC) are for you, they are for everyone’s safety and can be raised by anyone. They are all around us and this document provides guidance on Design Close Calls within Southern Capital Delivery, including what they are, how to identify and raise them.

The real impact that raising DCCs have had already are highlighted in [Appendix A](#). The aim of raising a Design Close Call is to promote behaviours that drive a positive safety culture in the development and delivery of our projects.

DCC’s have a focus on design with the aim to help share design related safety lessons across the industry to influence future activities and it is key to understand that they can be identified at any stage of the project lifecycle.

Whilst the reporting, capturing and monitoring of Close Calls is widely used for site-based activities, they are not currently used as effectively for design activities. There is a direct relationship between the number of Close Calls raised and the number of accidents that happen on our projects and this approach should also translate to the development and design stages. Design Close Calls are therefore a subset of Close Calls themselves.

Understanding what hazards and risks are occurring during the design stages will allow us to take direct steps to reduce them in the future thereby improving the safety within all designs that are developed and subsequently reducing incidents and accidents occurring in site activities. This is already evident with the way raising close calls have made a difference to our project’s safety rates as shown by Figure 1.



Guidance on how to log a Design Close Call, depending on which organisation you work for is also explained at the end of this document.

2. Who is it for?



- It is everyone's responsibility to create a positive, no blame culture around design Close Calls.
- Leadership across all organisations will be critical in achieving this positive culture around Design Close Calls.
- Raising Design Close Calls should be actively reinforced as a positive behaviour at all levels of designer, contractor and client organisations.
- Design Close Calls must not be used to criticise and penalise individuals or Companies; the focus should be on identifying and learning from failures in process.

It is about the event not an individual's actions



A Design Close Call can be raised by any member of a project team whether designer, site operative, contractors responsible engineer (CRE), contractors engineering managing (CEM), project engineer, designated project engineer (DPE), project manager, graduate engineer or otherwise. Design Close Calls have had the most benefit where the DCC is discussed openly without any attachment of criticism or blame between the initiator and the person able to close out the close call. These are the discussions that lead to the most powerful shared learning to improve safety culture.

The initiator of the Design Close Call and the person able to close out the DCC also have the opportunity to engage with each other in a collaborative, learning spirit, to agree a proposed course of action if they wish to.

Teams at all levels should engage in reviewing the resulting data to identify and share trends and lessons learnt in an effort to reflect as well as celebrate good practice. Where serious issues arise, fair culture principles will be applied, as for site Close Calls.

3. What is it?



It is a safety observation that has the potential to have caused harm, injury or undue stress to people or the environment and arises from the design, a design decision or a design omission.

Design calls are all around us and the key is being able to differentiate between normal business and a Design Close Call. In any instance raising the issue even when unsure is better than not doing so at all.

A Design Close Call can be raised against a failure of process or lack of adherence to a process. Processes are there to help us get designs right and not put pressure on staff.

Generally, Design Close Calls should capture when these processes fail or there are unexpected results and should lead to collaborative discussions to avoid this in the future.

Consequently, a Design Close Call may be raised where:

- The associated design document or information containing errors or omissions has been distributed and it had been intended for someone else to use it without the need for further clarification.
- It is a safety hazard or there is potential for injury and undue stress to the project team. Further details are explained in sections 3.1 and 3.2.
- A document review notice (DRN) comment could also be raised as a Close Call, particularly if the resulting action could form the basis of shared learning for other teams to learn from, but there is no directive that one must lead to the other. Further shared learning and good practice is detailed in Section 3.3.

3.1 Hazard or injury

A design element or process which has the potential to cause harm or injury to people and/or the environment. This could be;

- a design error, oversight or omission;
- a design which harbours a latent hazard;
- a design assumption which has not been adequately tested or communicated;
- a design process which has not been correctly followed.

3.2 Undue Stress

A set of parameters which places members of the project team under sufficient stress to endanger or damage their wellbeing or compromise their ability to fulfil their role effectively; this is likely but not necessarily the result of pressure to deliver on time. However, there are other potential causes of stress which could be design or individual specific e.g. having to design to a bare minimum clearance.

3.3 Good Practice

Raising positive safety related design events by creating a Design Close Call allows for capturing observations of good and/or novel practice in the system so that they can be shared wider than the direct individuals or project team involved. When capturing a 'good practice' Design Close Call it can be described with three key bits of information to aid it being shared effectively:

- Understand the context and include that in the description;
- Attempt to understand the impact and what could have happened;
- Take the action or recommend an action that has the potential to stop the error happening
OR In the case of a good practice recommend how it can be repeated or shared.

3.4 Categorisation

When raising a Design Close Call, it would aid the subsequent trend analysis if the Close Call is raised by relating it to one or more of the following categories:

Category	Meaning
Behaviours	Poor behaviours in communicating with the designer or team.
Constructability	The design does not enable it to be built safely. The design does not consider adequate mitigation of construction hazards.
Design integration or deficiency	The design has not been adequately integrated or has errors and omissions that lead to the possibility of injury or an unacceptable hazard.
Time Pressure	Designer(s) has not been given adequate time to complete their tasks effectively and safely.
Temporary works/condition	Hazardous temporary conditions have been created and not adequately mitigated in the design or the temporary works design is not sufficient to be safely implemented.
Requirements and/or scope	The requirements or scope are poorly defined.
Survey Information	Survey information is inadequate or missing.
Environment and sustainability impact	Design, design decisions or omissions have led to a negative impact on the overall sustainability and or local environment.
General good practice	Instances where raising and reviewing design close calls has led to good practice that can be shared. An improvement in a design activity or process that has led to good safe by design principals which can be shared.

4. Why is it important?

4.1 Help us be safe

Design close calls are no different to site close calls in terms of the importance of collecting information to avert safety issues which could lead to serious harm to you, your colleagues or the environment.



4.2 Build a positive culture

Build a positive culture around reporting of issues arising from the design

To ensure the effectiveness of the Design Close Call process, teams need to understand the importance and value of collecting Close Call information and that raising a Design Close Call is **NOT** a means to criticise and penalise individuals or Companies.

4.3 Identify need for change

Analysing trends arising from design close call data is critical to identifying why and where we need to make changes to our design processes and understanding.

4.4 Enable lessons learnt

Lessons to be learned and future projects to be designed safer and more efficiently.

Appendix A illustrates some shared learning that has come as a direct result of raising a Design Close Call and illustrates:

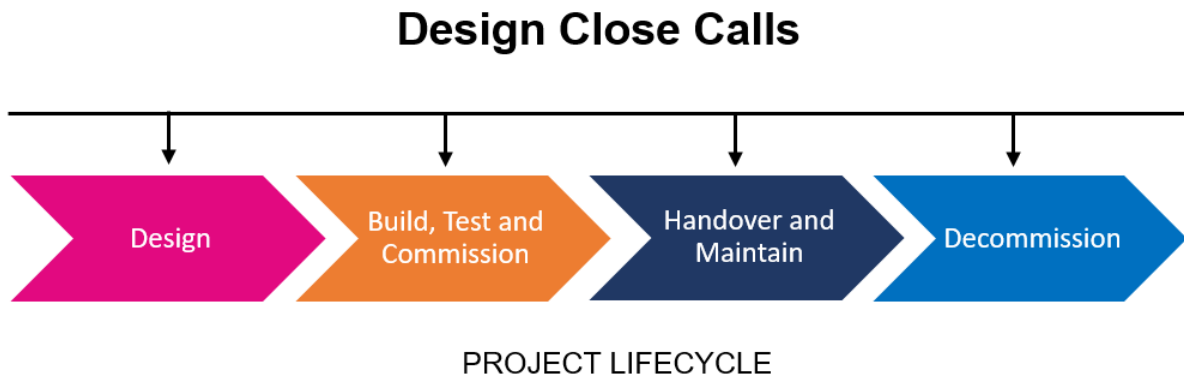
- The positive benefits that can accrue from sharing a good practice DCC for others to follow;
- A DCC raised to avert potential for harm or injury whose resolution has provided an opportunity for others to learn from.

4.5 Share ideas for future good practice

Take opportunities to share good practice when suggesting solutions to Design Close Calls raised. Raising Design Close Calls have had the most benefit where the DCC is discussed openly without any attachment of criticism or blame between the initiator and the person able to close out the close call. These are the discussions that lead to the most powerful shared learning to improve safety culture, to ultimately benefit everyone.

5. When to report

The reporting of Design Close Calls can be done at any time regardless of the stage of the project life cycle it is identified in. The design close call may be traced back to an initial design decision or omission even if identified at a later stage in the project lifecycle. Reporting should be carried out as soon as a DCC is identified and when it is safe to do so.



6. How to report

They should be raised within the relevant organisation's Close Call system and this process may vary slightly between different levels of the organisation itself. Each individual organisation will have its own process for review and closing out its DCCs. Please seek direct advice from your organisation in relation to your specific reporting procedure. Organisations can also request access to the RSSB data at a regional or national level or just review their own organisational data.

Ultimately the collected data will be transferred into the RSSB system which was updated in March 2019 to enable the categorisation of Design Close Calls. When logging a Close Call, the main Category of 'DESIGN' should also still be used at this stage. There is also an opportunity to include the Sub-Category the Close Call can be related to – as described in Section 3.4. This will then allow a download to be taken of those Close Calls specifically related to Design from the RSSB system to allow detailed analysis.

Once a DCC is in the system and has been raised the initiator has the opportunity to engage directly to suggest improvements and solutions to the DCC or alternatively can choose to remain anonymous.

The Network Rail Design Delivery Group has published a live dashboard of the Design Close Calls raised across the Industry on Safety Central. This aims to provide a national view on DCCs logged in the RSSB system. You can find more information on the Design Close Call section on [Safety Central](#).

7. Appendix – Case study examples

You can find more Design Close Call shared learning examples in the [booklet](#).

Design Close Call - Shared learning examples:

Case Study 1: Rive Axe Embankment Regrading (Aug 2018)

Background

To alleviate flooding in the local area, the existing railway embankment was to be replaced by culvert units over a length of approximately 40m. This involved the excavation of the embankment and installation of pre-cast concrete units. To enable these works to take place the existing trackside cables required temporarily re-locating to a cable bridge.



How did the DCC arise?

While the temporary works of the scaffold bridge were identified, the subsequent temporary condition created to position it was given less consideration.

A full design assessment of the embankment stability was not undertaken. The slope was considered using standard design solutions and track monitoring was in place as agreed by the design and assurance team.

- Regrading works can have the potential to de-stabilise the slope and with it the track
- The embankment did remain stable, as confirmed by track monitoring and subsequent design checks.

Shared learning for the future:

When considering delivery of a project, full attention should be given to the temporary conditions that will exist as well as temporary works that are needed. Remember that temporary works may, as in this case, create additional temporary conditions that require management themselves.

- Avoid excavations, re-shaping or re-grading of embankments where possible
- If excavation or re-grading is unavoidable, the temporary condition created must be subjected to our Temporary Works Procedure PD-SOP-091 and entered onto the Temporary Works Register by the Temporary Works Coordinator
- The designer used should be competent in geotechnical design. Seek guidance from our Engineering Managers if in doubt
- Ensure that design decision logs and design hazard logs are well maintained and reviewed so that others can see how solutions were arrived at
- Where elements of the works are critical to the operation of the railway consider requesting a peer review of the solution
- Internally, the Contractor has since re-briefed all temporary works designers on the processes for design and checking and reassessed the competence of their Temporary Works Coordinators.

Case study 2: Deans Lane footbridge (Sep 2020)

Background

Deans Lane Footbridge was a span renewal scheme via SMDF on the Wessex route and involved instating a new NR Standard Detail LM type 'hipped' single span bridge.



How did the DCC arise?

The scheme DPE identified design not compliant with Structure Gauge Clearance which led to:

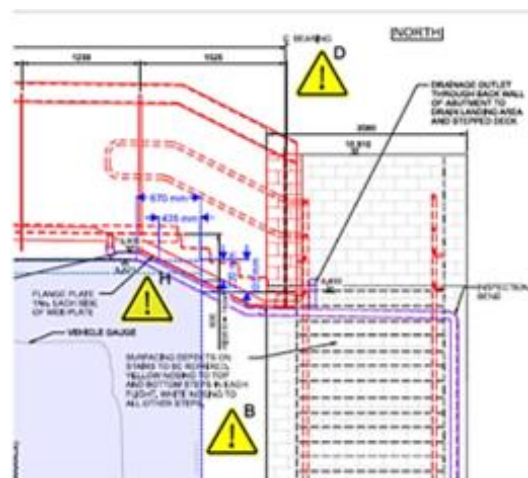
- Cat 3 DRN and resubmission
- Non-Conformance Report and Design Close Call Recorded
- The NCR identified that at both DDR and IDC the structural gauge clearance had been questioned
- The design team twice went away and confirmed it was compliant. They looked at the right standard but got the wrong answer.

Shared Learning for the future:

In an update to the Standard NR/L3/TRK/2049/MOD07 some key notes had been omitted in the figure. The current standard has been in use for three years which could have led to experienced engineers missing some key information.

This could be an example of 'confirmation bias which could indicate a need for change in behaviours within the industry,

Remote working due to COVID-19 could have played a part. In an open plan office environment informal advice may have been more likely to be sought or given.



Design Close Call - Good Practice examples

Case study 3: Epsom embankment recovery (Jan 2020)

Background

As part of the recovery of a failed embankment at Epsom, a damaged piece of S&C was removed and replaced with a section of plain line until such time that the cross-over could be reinstated.

How did the DCC arise?

This required that the signal rail and traction return rail are swapped, and modifications were required to the bonding to ensure the track circuit continue to work correctly and risk of electrocution to railway workers was avoided.

For this to be achieved, a temporary negative bonding design was installed, tested and commissioned in Week 41.

Then in Week 42, those changes had to be reversed to accommodate the re-introduction of the switch.

A separate negative bonding design was produced. The design required that key changes were made to the bonding scheme.

The technical review process expressed concerns that the nature of the work was unusual and could be confusing to installers and testers who may not have understood the background to the works. The review requested that additional detail was required in addition to conventional red and green drawings.

What is the good practice shared?

Be prepared to break with convention to ensure that safety critical designs are communicated with clarity. Communicating work content with enhanced clarity as part of the risk mitigation is Safe by Design.

The drawing content is considered best practice and all E&P design staff shall consider following a similar approach to present solutions for complex or unusual problems.

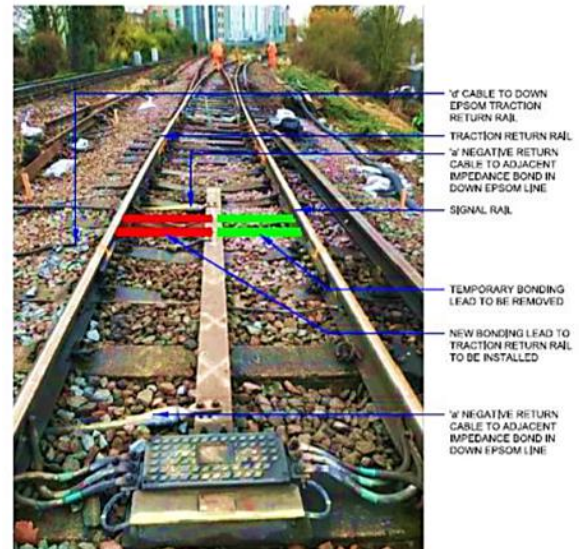


PHOTO SHOWING PROPOSED MODIFICATION OF IMPEDANCE BOND

Case Study 4: Coulsdon South access for all (AFA) Footbridge

Background

This was a Department for Transport funded scheme to provide step free access at Coulsdon South station, thereby delivering a safe railway that is accessible by all.

This includes constructing a new footbridge with new staircases as well as installing lift shafts. The scheme was developed to F001 by others with Bam Nuttall/Network Rail IP developing the F003 and F003.



How did the DCC arise?

Insufficient information was transferred with the F001 with regards to Constructability, Hazard log, Designer's decision and/or assumptions log to advise rational behind F001 design proposal.

- There was no handover or continuity between the F001 design delivery team and the subsequent design delivery process., therefore the F001 design philosophy had to be revisited
- The footprint/location of the structure appeared to have been poorly positioned in the first instance with some existing infrastructure being demolished to accommodate the new structure. This was rationalised on review
- Piling arrangement changed to avoid piling on embankment and position structure within NR boundary.

What is the good practice shared?

- Early buildability/constructability review of new schemes particularly those with previous design history
- Carry out Hazard Identification and Review prior to carrying out further design work
- Consult with people involved in previous (recent) projects in the vicinity of proposed works (Selhurst AFA lesson)
- Need to consider how we obtain designer's knowledge and continuity on handover? Designer's issues and decision log required
- Designer's assumptions log required
- Obtain as much historical records as possible even when some design work has been completed.
- Assume it is a "new" design scheme.

Case Study 5: East Croydon station footbridge –topographic survey requirements specification

Background

Analysis of the Southern Multi-Discipline Framework Design Close Calls in 2019-2020, highlighted that 38% were attributed to design/survey. This has led to the need to refresh and reinforce the good practice that should be adopted to drive a positive change.



How did the DCC arise?

Survey related Design Close Calls include examples of inadequate scope and also restricted access to site during possession, however the majority of DCCs relate to poor or insufficient survey data due to the misunderstanding of survey requirements.

This has led to delayed design, design progressed at risk, design rework and in most cases has significant cost and programme implications

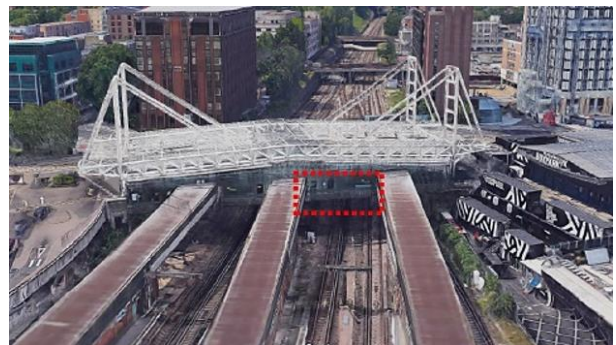
The survey specification must have as a minimum:

- Exact location of the survey
- Confirmation of the type of survey required (laser scanning)
- Clear description stating extent of survey and key features
- Required frequency of readings and level of accuracy
- Survey grid reference and accuracy band
- Required level of survey control
- Compliance with CAD Standard
- Comprehensive deliverables list including format and level of detail
- Review time estimate to complete the survey works and ensure this reflects the time allowed in the possession (with minimum 10% contingency).

What is the good practice shared?

The East Croydon station footbridge is a good example of a simple topographic survey specification using multiple annotated photographs to provide clarity of location and extent of survey requirements.

Utilising readily accessible technology to reduce the risk of misunderstanding.



Design Close Call - Other examples

Case Study 6: Proposed cross section for partial deck replacement (Sep 2019)

Background

During an Independent Technical Review (ITR) of an almost complete detailed design for a partial bridge renewal, it was identified that the soffit of the retained part of the deck would become the position of the minimum headroom through the bridge. Whilst the replacement elements were all designed to withstand loading from accidental actions, the newly vulnerable existing main girder:

- Wasn't strong enough to withstand impact from vehicle part way under the bridge and could result in its collapse under railway loading
- Presented a hazard to road users who would reasonably assume that having traversed below the new bridge that their path would be clear.

How did the DCC arise?

Design Close Calls include omissions from design drawings (or other information) that have the potential to result in harm. Information to highlight the clearance issues was missing and would have unintentionally concealed the presence of the downstand and the impact on headroom.

Without specific risk assessment, the risks to road users would be unquantified and mitigation of the risk may have been inappropriate. Key information to assist with the review/safety audit for the proposals was omitted from the drawings.

Isn't this design development? As the design had reached a sufficient level of maturity to consider it ready for an Independent Technical Review, this omission was considered to be a Design Close Call.

Is this poor design? The design itself was not considered poor as the remainder of the submissions were excellent. This highlighted exactly the reason why undertaking different levels of assurance is critical.

Lessons learnt:

- We need to recognise that in a growing business with new entrants to the Rail Sector that we need to continuously refresh this knowledge.
- Always show the point of minimum clearance on plan and section. This includes existing parts of the structure where only part of the structure is being replaced
- Avoid down-stand details and low points beyond the external bridge elevations
- The issue should be discussed at length in the Form 001 and Form 006 and Highway Authority Acceptance granted
- Ensure that the risks are identified in the designer's risk assessment (DRA).

Case Study 7: Crossrail E&P system design

Background

Network Rail Design Delivery (NRDD) were engaged in separate instances under the Crossrail project to provide packages of E&P system design for alternative feeding diagrams, and distribution protection settings. No formal appointment of CEM occurred for either package or overall. However, an NRDD staff member was acting CEM pending a formal appointment.

- Integrated Design Certificates (IDC) were arranged to review these two packages together, by the DPE directly with the separate CREs, and at short notice. Due to the CEM's absence from the office for a few days, the CREs failed to let the CEM know of the IDCs taking place.
- The IDCs resulted in highlighting a specific arrangement of T-feeding during staging, which requires the protection settings to be checked to ensure they will trip off the overhead line equipment within a given timescale to prevent equipment damage and keep rise of earth and induced voltages within safe limits.

How did the DCC arise?

The absence of a clearly appointed CEM and their involvement in arranging attending the IDC/ integrated design review (IDR) meeting may have led to this interface and safety requirements being missed

Lessons learnt:

- A CEM should not be appointed to all projects, on award, by the relevant programme engineering manager (PEM) in conjunction with the CEM's line manager and allocated NRDD project manager, in accordance with the NRDD Engineering Management Plan
- The CEM appointment shall include an assessment of the CEM's workload to confirm they have the capacity to act as CEM on the project
- The CEM is responsible for making sure that IDCs are carried out, and DPEs for IDRs, involving the CEM where our staff are required to attend; joint IDC/IDRs are to be arranged jointly by the CEM and DPE
- CREs should not arrange, respond to/or attend an IDC or IDR with the Project team members without the involvement of the CEM
- The behaviours and culture should be reviewed to identify the frequency of work commencing on a project without knowing who has been formally appointed to NRDD team roles, e.g. CEM, NRDD Project Manager, discipline CREs?
- When and how should you expect to have the project arrangements including project roles briefed to you?
- The project team should be familiar with the requirements of NRDD's Engineering Management Plan with respect to project appointments and the requirements of NR/L2/INI/02009 with respect to IDCs and IDRs?

Case Study 8: GRIP 3 conductor rail clash with sidings design

Background

£3bn Croydon Area Remodelling Scheme (CARS) involving railway remodelling, grade separation and new stations. Multi-disciplinary design integrated using federated 3D CAD model and regular Design Coordination Meetings.

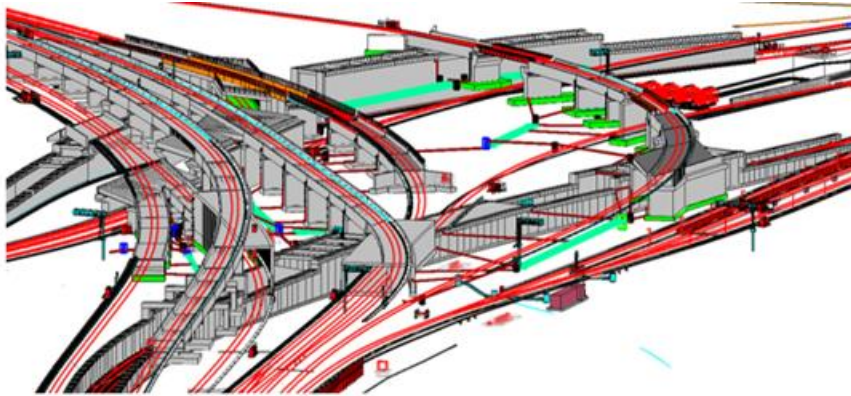
Design Close Call

GRIP 3 design conductor rail drawings originated and checked by design team, submitted for CEM Review.

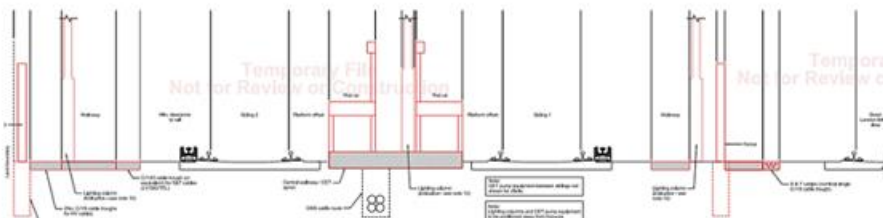
Two carriage stabling sidings provided as part of the project, the CEM identified an error with the drawings which showed live conductor rails on same sides of track as staff walkway and controlled emission toilets emptying facility and this was corrected prior to issue to NR.

Lessons Learnt:

- CREs need to actively step back and consider wider project issues and design integration
- Use Federated 3D CAD model to check design interfaces with other disciplines
- OCRA process worked, however ensure adequate time and resources allowed for Check (C)
- Design coordination meetings to be focused and targeted, to ensure key attendees engage in multi-disciplinary issues.



Extract from 3D CAD model showing grade separation and sidings



Proposed cross section through carriage stabling sidings with CET facilities and central staff walkway as required



WHAT?

A design Close Call is a **safety observation** of a design that could have caused harm, injury or stress to people or the environment. It's about the event, not the individual's actions.

THINK SAFETY:

- Observe behaviours
- Question constructability
- Assess the scope
- Challenge time pressures
- Check the design logic.



WHY?

It can help to **prevent safety issues** and make sure that **future projects are designed safer** and more efficiently. It can also help **build a positive culture** around reporting design issues.

SCAN THE QR CODE



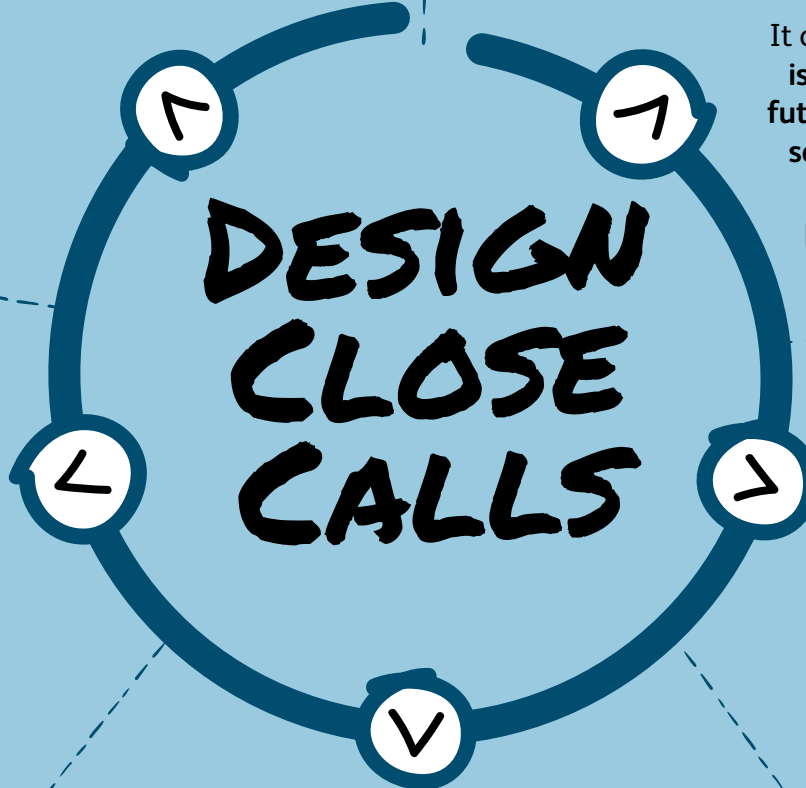
to view the Design Close Call guidance document

SHARE GOOD PRACTICE



WHEN?

Any Close Calls should be reported as soon as they are identified and it's safe to do so. They can be raised during any stage of the project lifecycle, as long as they originate from the design.



WHO?

Design Close Calls are for everyone's safety and can be raised by anyone.



everyone home safe every day

CHECK CATEGORY



HOW?

You can raise a Close Call through your employer's relevant system, logging it under the main 'DESIGN' category. Reporting can be done anonymously.





**EVERYONE HOME SAFE
EVERY DAY**

www.southernshield.co.uk