

International Society for Soil Mechanics and Geotechnical Engineering

ISSMGE - TC206

Technical Committee Meeting

30-06-2026 at 09:30hrs - UK time

Update on TC206 work

Duncan Nicholson - Chairperson TC206

Ying Chen – Vice Chairperson TC206

Alessandro Martucci - Secretary

Agenda for 30-06-26

1. **Minutes of 24/03/26 – review actions.** Covered in agenda.
2. **TC206 Admin Update**
   - **Update – Alessandro Martucci.**
3. **Conferences**
   - **OM Conference 17/3/26 at Imperial College**
     - **Feedback from Conference**
   - **Vienna Conf. June 26 Update**
     - **Feedback from Conference – Summarise later**
     - **TC220 Conference– India**
4. **CIRIA Guide R185 Revision**
   - **Arup/ Mott MacDonald have won tender.**
   - **Progress report**
5. **Proposal for ICE Geot. Eng. Journal – Special Issue.**
   - **Abstracts required – Ying Chen**
6. **Working Groups - Planned meetings.**
   - **Monitoring – Hock**
   - **Existing Structures – Mandy/ Ying**
   - **RTBA - Franz**
   - **Tunnelling – Chris**
   - **Eurocodes - Johan**
   - **Contracts- Tony**
7. **TC Presentation on 30-06-26**
   - **Vienna Conf TC206 Summary.**
8. **Next TC Members' meeting**
   - **30 Sept 2026**
     - **Vienna Conf - Keynote Presentation Tony O'Brien**
   - **End Jan 2027 - Special Issue or Ciria Guide?**
9. **Next Management Meetings (09.00hrs UK time)**
   - **Summer break TBC**
   - **9 September TBC**

1) Technical Committee Minutes Meeting on 24-03-26

- Minutes Circulated.
- Issues to be updated during this meeting.

TC206 Administration –
- Mr Alessandro Martucci is the new TC206 Secretary.

- **Main Duties** – Compile presentation material / minutes of meetings etc.
- 1) **Update TC206 Website** (Google Drive)
  - TC206 Members meeting minutes & presentations (2023 to 2025)
    - Knowledge information sharing.
    - Lisbon - Conf Workshop Presentations.
- 2) **Update ISSMGE - TC206 webpages**
  - What can we store? Including past events (2023 to 2024)
  - New Terms of Reference.
- **3) TC206 Membership Tracking and Development.**

ISSMGE TC206 Administration Website Update



Many thanks to Alessandro Martucci (secretary) for populating the TC206 web site with our minutes and presentations.

https://www.issmge.org/committees/technical-committees/applications/observational-method

Observational Method

About

News

Terms of Reference

Membership

Planned Activities

Deliverables

Members Group Minutes and PPTs

Management Group Minutes and PPTs

Working Groups Minutes and PPTs

1st TC206 Conference (17/03/2026) - Photos and Presentations

Contact

Sign-up to receive committee news

Host Member Society: United Kingdom

Short name: **Observational Method** (TC206) - Terms of Reference - approved

Contact: TC206 Secretary, Alessandro Martucci

TC-206 External Website: tc206issmge

Edit

ISSMGE TC206 Web Site Update

Example:- Management Group Minutes.

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3) Conference Summary

- TC206 OM Conference – Imperial College – 17 March 2026 (Day before Rankine Lecture)
  - All presentations on TC206 Web site.

- ISSMGE 21st Int Conf - Vienna - 14-19 June 2026
  - Reported in this Meeting.

- TC220 -12th Int. Symp. Field Monitoring in Geomechanics 6-10 August 2026

- 6th Int. Conf. on Information Technology in Geo-Engineering (6th ICITG) in Graz, Austria, - 3 to 16 October 2026. - https://www.icitg2026.com
  - *The conference will provide a platform to discuss current developments in digital transformation within geo-engineering. Topics include case studies on information technology in practice, integration of digital systems such as Scan2BIM and BIM2FEM, the use of open benchmark datasets, uncertainty quantification and mitigation, applications of machine learning including reinforcement learning and large language models, as well as Real-Time Back-Analysis (RTBA).*

1st OM Conference - Flier

17 March 2026

Our thanks to Troung and Franz for their work to make the OM Conference a great success.

SIMSG ISSMGE

Observational Method Conference

Perspectives and feedback from academics, consultants, contractors, clients, and technical committees.

17 March 2026, Imperial College London

Conference program

9AM / **Session 1**– Overview of TC206 OM activity and Revised Ciria Observational Method Guide / Chair: Duncan Nicholson
Speakers: Tony O'Brien, Marcelo Sánchez

11AM / **Session 2** – Keynote Presentations / Chair: Ying Chen
Speakers: Suzanne Lacasse, Jamie Standing, Colin Eddie

2 PM / **Session 3** – Developments in Real-time back analysis / Chair: Franz Tschuchnigg
Speakers: David Taborda, Luca Piciullo, Hock Liong Liew, Stuart Hardy, Fadi Haddad, Ignasi Aliguer

5 PM / **Session 4** - Closing discussion on New CIRIA Guide / Chair: Hoe Chian Yeow

6 PM / **Close** / Post conference reception

Registration Details

Link to register:
https://www.omconference2026.com/event
Deadline to register: 28 February 2026
Registration fee:
General ticket: £50
Young Members of BGA: £25

Organisers

TC206 Chair: Duncan Nicholson (Arup)
TC206 RTBA lead: Franz Tschuchnigg (TU Graz)
TC206 member: Truong Le (Mott Macdonald)

omconference2026.com

BGA THE BRITISH GEOTECHNICAL ASSOCIATION ciria IMPERIAL ARUP MOTT MACDONALD

1st OM Conference
17/3/26
Imperial College



Conference Attendees



Lecture Room



Panel Session

Does TC206 want to hold 2nd OM Conference?
When? Where?

Vienna Conf – 14-19 June 2026.
Rules for OM Presentation Session:

- **Oral presentation:** 10 to 12 minutes within a dedicated session. (6 No in 90 mins)

- **Poster and short presentation:** a poster and one MS PowerPoint slide. (13 No)

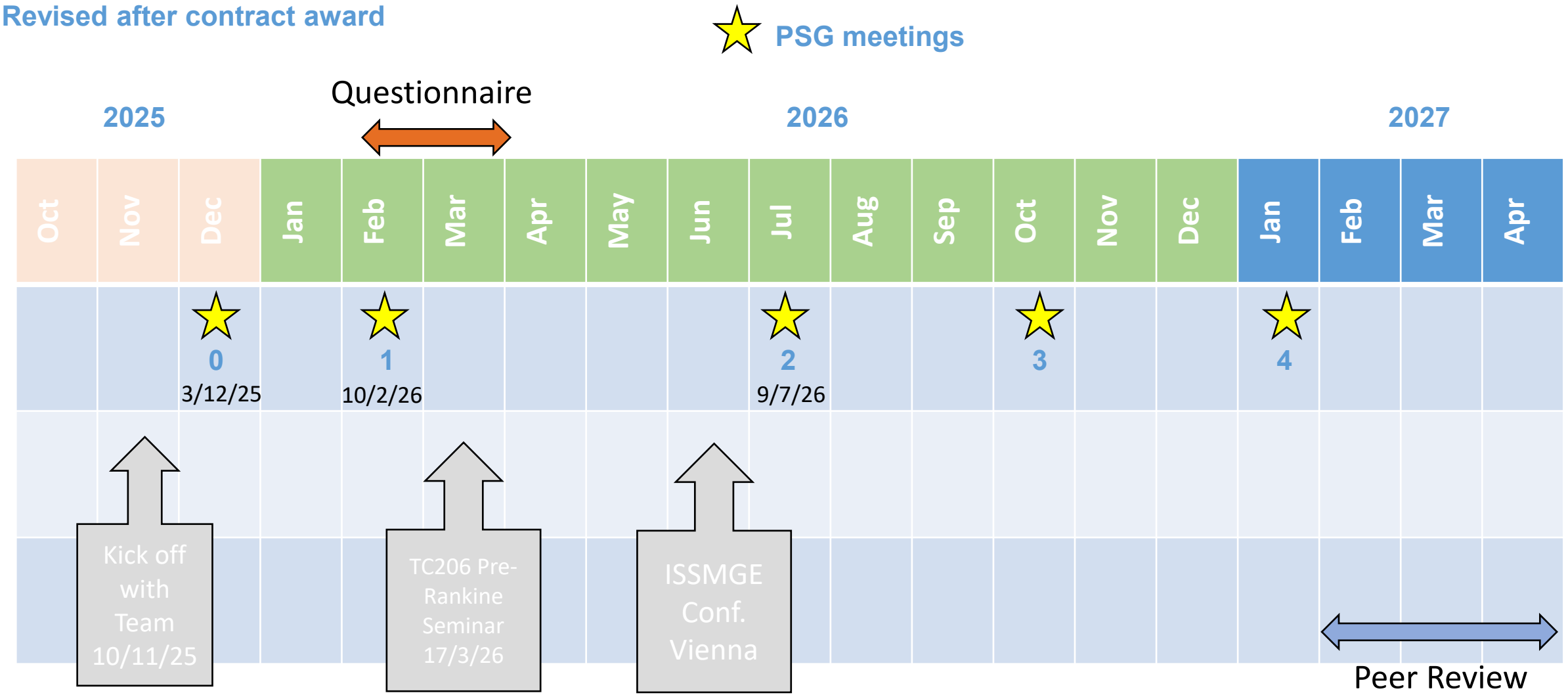
- **Keynote Presentation by Tony O'Brien**.

4)CIRIA Revised R185 on Observational Method

- Contract awarded to Arup / Mott MacDonald
- Kick off Meeting with Collaborators on 10 November 2023.
- CIRIA Steering Group Meeting on 3/12/25.
- Using OM Conference 17/3/25 to gather industry feedback.
- Johan Spross is TC206 rep on steering group.

Program

Revised after contract award



5) ICE Proceeding – Geotechnical Engineering - Special Theme Issue: Observational Method

- Special Theme Issue: Observational Method – (New papers supporting Guide)
- Call for Paper

  Call for Papers: New Developments in Observational Method | Emerald Publishing

  - Topics:
    - Case Histories
    - Overview & Developments of OM in past two decades
  - Key Dates:
    - Abstract by 31st March
    - Full length paper by 17th July

ICE Proceeding – Geotechnical Engineering (Ying Chen) - Special Theme Issue on OM

- Preliminary Programme:



Send paper Invitation invite Abstracts

Submit draft Journal paper

Final Journal paper (completed peer review & addressing comments)

Publish Special Theme OM Issue

6) TC206 Working Groups

- Real Time Back-Analysis - Franz Tschuchnigg
- Monitoring - with TC220 - Hock Liong Liew, Dorota Symonidou
- Old Structures – Mandy Korff.
- Eurocodes – Johan Spross.
- Tunnelling – Chris Menkiti.
- Contracts – Tony O'Brien.

No progress reports at this meeting.

7)Next Meetings

. Next TC Members' meetings

- **30 June 2026.**
  - **Feed back on Vienna Conf.**

- **30 Sept 2026.**
  - **Possibly Vienna Conf - Keynote Presentation by Tony O'Brien**

- **End Jan 2027.**
  - **Special Issue or Ciria Guide?**

9.Next Management Meetings (09.00hrs UK time)

- **Summer break TBC**
- **9 September TBC**

Any Other Business

- Get involved by joining working groups.
- Suggestions for Interesting OM presenters.
- Next OM Conference? - When? Where?

ISSMGE 21st Int. Conf. - Vienna - 14-19 June 2026

- Oral Session. – TC206 selected 6 papers for 10-12 min. presentations.
- Poster Session – TC206 to allocate 13 places. (2 min presentation).
- "Workshop" Session - (90 minutes?) – TC206 to organise.
  - Contracts
  - RTBA.
- Informal evening dinner - for TC206 members during conference.
- Keynote Presentation on OM by Tony O'Brian – focus on collaboration and teams.
- Conf. Proceedings now are available.

Six Oral Presentations

Application of the observational method for the optimisation of supports: examples of the extension of the Knuedler car park and the Hosingen bypass in Luxembourg

Steve Gruslin, Tiffany Hennebaut

Application of the Observational Method to existing structures: quay walls

Mandy Korff, Rick Voortman, Geeralt van den Ham

Effective implementation of the Observational Method for the HS2 Old Oak Common station box

Joao Angelino, Stuart Hardy, Matthew Sharratt

Observational Method in Hong Kong's Context

Alvin LAM, James SZE, Jack YIU

Application of the observational method on high speed two retaining structures

Hock Liong Liew, Natalie Wride, Alice Smith, Joe Mazgajczyk, Anthony O' Brien

Back Analysis and Observational Method for Strut Removal for a Deep Underground Excavation in Singapore using Genetic Algorithm Tools

Rosemary Jia Jing Vong, Kannan Vinayagam, Nicholas Mace, Michael Gordon Williamson, Jasper Mong Kiak Sim

TC206 Workshop

- Part 1

Duncan

Welcome & Introduction
(Duncan Nicholson)

What Does the OM need to Succeed
(Chair: Tony O'Brien)

Introduction
Tony O'Brien, Mott MacDonald

Achieving Agreement to Use the OM
Hock Liong Liew, Mott MacDonald

From Contracts to Codes – what else does the OM need to Succeed?
Tony O'Brien, Mott MacDonald

Discussion

- Part 2

Franz

RTBA
(Chair: Franz Tschuchnigg)

Introduction to Real-Time Back Analysis and recent developments
Franz Tschuchnigg, Institute of Soil Mechanics, Foundation Engineering and Computational Geotechnics, Graz University of Technology

Back analysis of the Old Oak Common box using surrogate models
Yunxiang Yang, Imperial College London

Back analysis of a deep excavation - insights from manual and machine learning approaches
Ying Chen, Transport for London

Near Real-Time Back Analysis to support the application of the Observational Method on High Speed Two retaining structures
Natalie Wride, Mott MacDonald

Closing
(Duncan Nicholson)

Vienna Conf – Six Oral Presentations -



First Presentation

Application of the observational method for the optimization of supports: examples of the extension of the Knuedler car park and the Hosingen bypass in Luxembourg

Steve GRUSLIN[1)], Tiffany HENNEBAUT[2)]

[1)] GEOCONSEILS, Luxembourg

[2)] GEOCONSEILS, Luxembourg

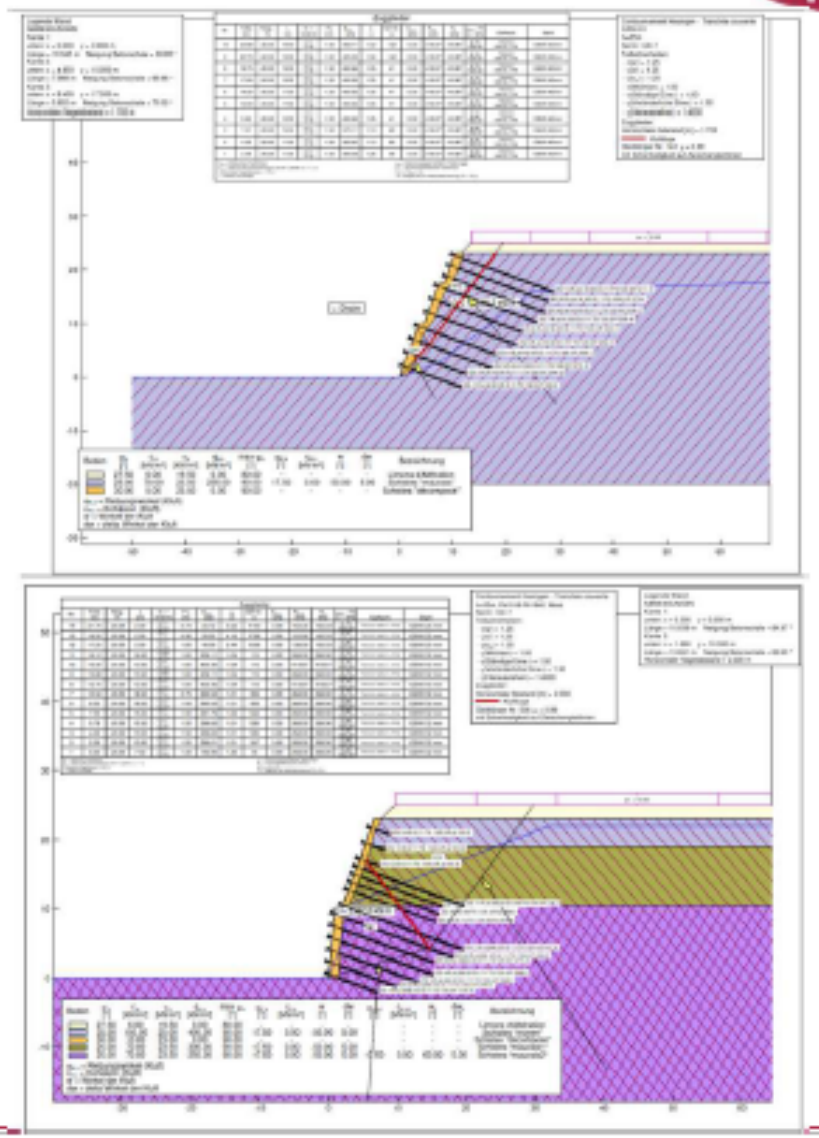
Methodology

- Geotechnical calculations carried out to verify the stability of the walls, considering the various load cases depending on the locations concerned

- Several scenarios envisaged based on the geotechnical studies and additional field observations, each corresponding to a type of support to be applied

➔ enabled to prepare several standard plans with the various types of securing.

DPN Comment
Ab Initio Approach A or B?
Soil nailing enables rapid variation on site.

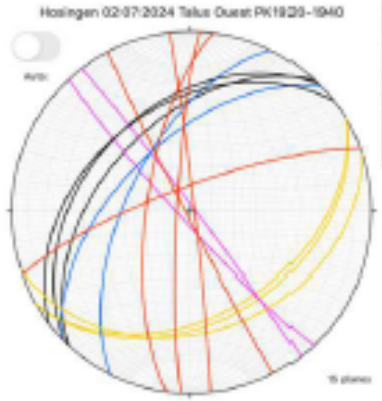


Methodology

- During the works: in-situ analysis of the state of the rock (geomechanical characterization and classification - RMR, Q, GSI -, stereographic measurements) to determine which securing method can be applied to the rock that has already been excavated

- The imput parameters for the classification were based on:
  - The Rock Qualitiy Designation “RQD”
  - Uniaxial compressive strength based on laboratory tests
  - Rockschmidt hammer measurements taken in the field and compared with the uniaxial compressive strength results.





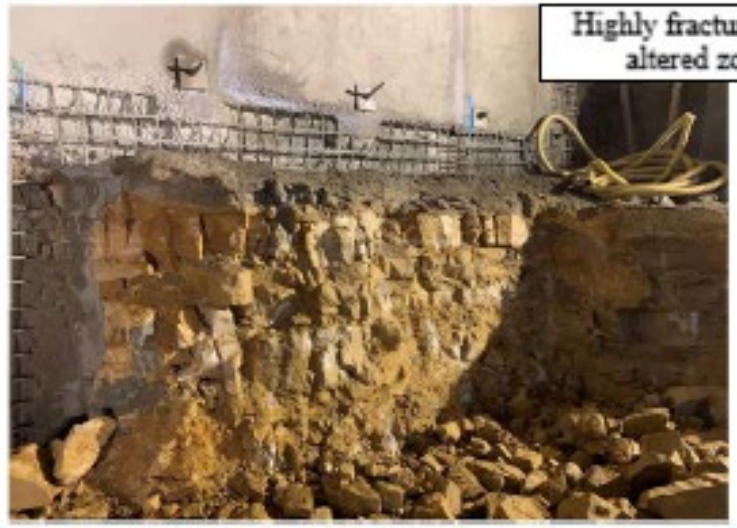




Knuedler car park – Typical cases

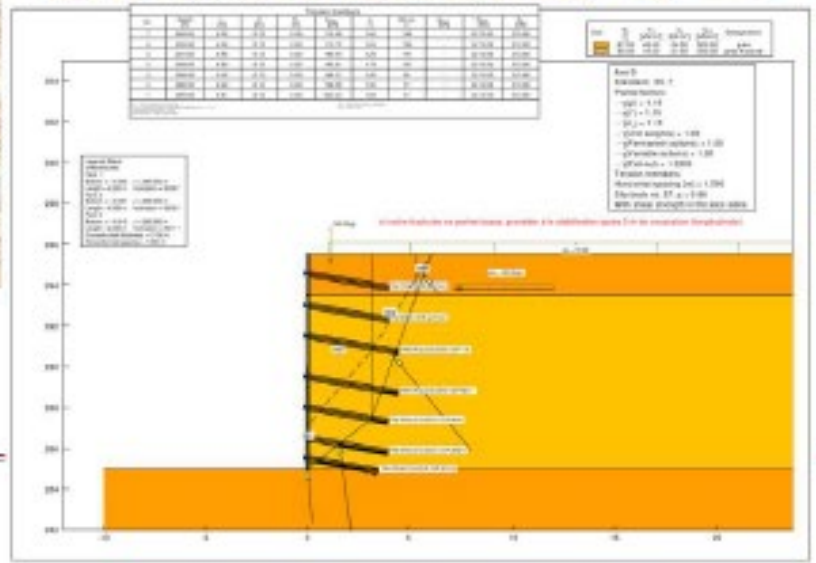
- Highly fractured and/or altered areas

Highly fractured and altered zone	7,5 - 12	19 - 31	Weathered rock







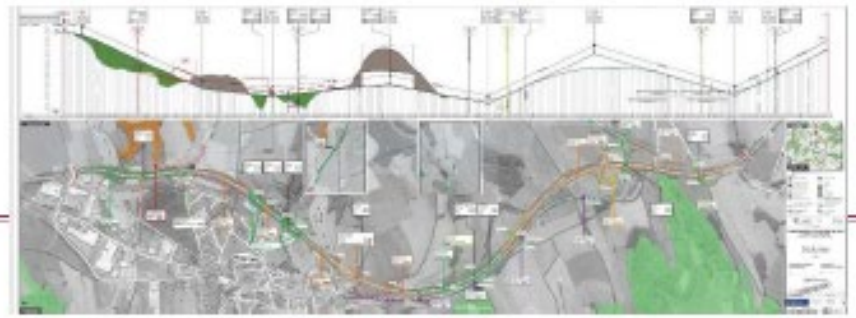


Hosingen bypass: description of the project

- Hosingen cut-and-cover tunnel project:
  - 200m of cut-and-cover tunnel through the village of Hosingen in Luxembourg
  - Aim of the project → divert the traffic currently passing through the village by creating a traffic lane better suited to the flow of traffic
  - Soils and rock excavations were carried out on slopes ranging from 15 to 25 meters in height
  - The implementation of steel wire mesh was prioritized to minimize the use of concrete in the stabilization works



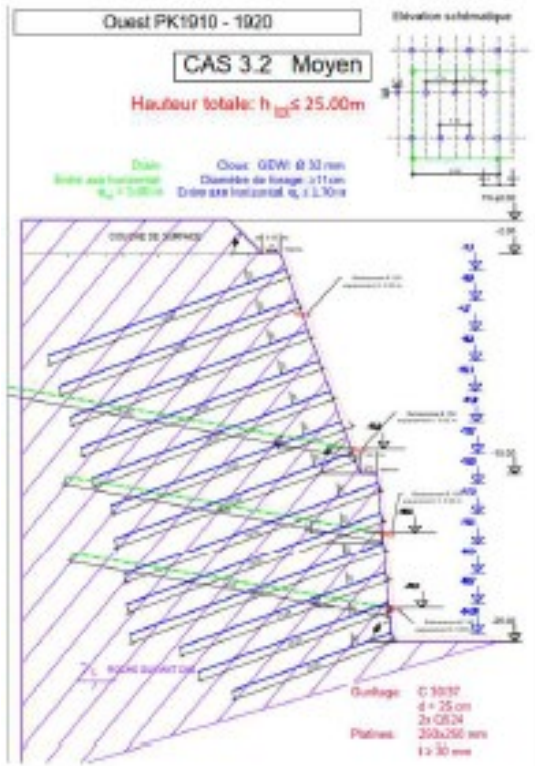


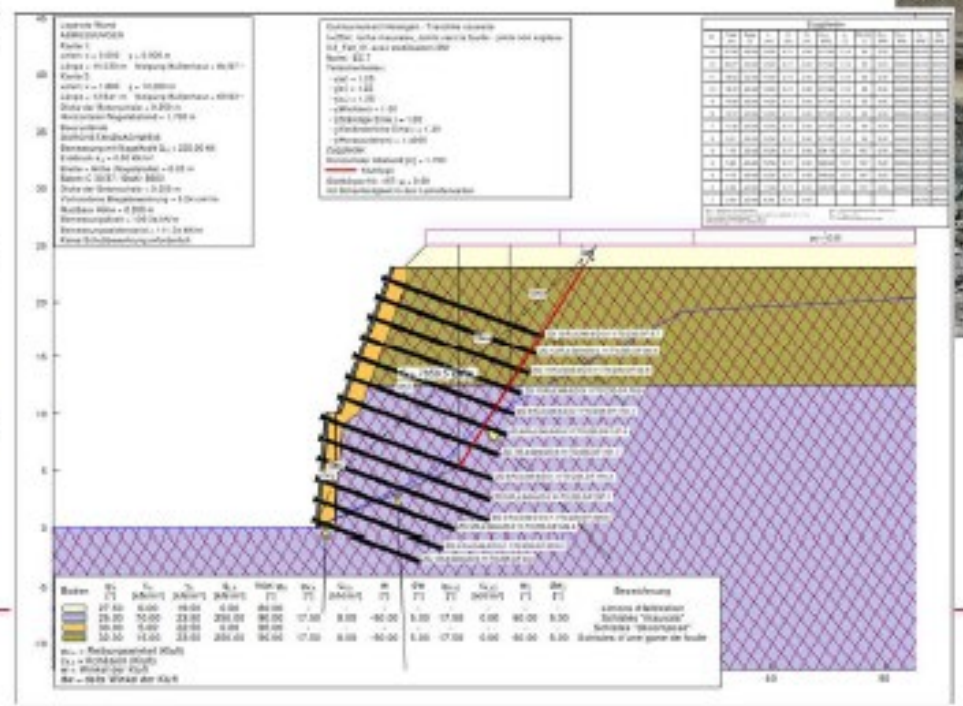


Hosingen bypass: particular securisations

- Several faults of second or third degree, combined with folded areas

  ➔ secured by a concrete shell







DPN Comment - Soil nailing is a very flexible OM System.
Builds on SCL in tunnels.

Second Presentation

Effective Implementation of the Observational Method for the HS2 Old Oak Common Station Box

Joao Angelino, Matthew Sharratt
WSP, London, UK, Joao.Angelino@WSP.com
WSP, London, UK, Matthew.Sharratt@WSP.com

Stuart Hardy
ARUP, London, UK, Stuart.Hardy@ARUP.com

- London Clay – 70m thick.
- Narrow Excavation at East End.
  - Depth 23m x 16m wide.
- Objective – Use OM Process to justify Temporary Prop Removal.

Inclinometers E14 and I27

- Initial Predefined Design Condition.
  - used to set Red Trigger (*Mixed Earth Design*).
  - Required temporary prop.

- Most Probable Condition
  - Introduced by contractor prior to excavation.
  - Used to set **Amber Trigger**
  - *Change to Total Stress Design + soil stiffness increase + reduced over-dig).*
  - Remove temporary prop.

DPN Comment

- *Ipso Tempore Approach C.*
- *Predefined Design Excavation started before OM checking complete.*

- *OM goal to remove Temporary Prop (TP) level.– no delays.*

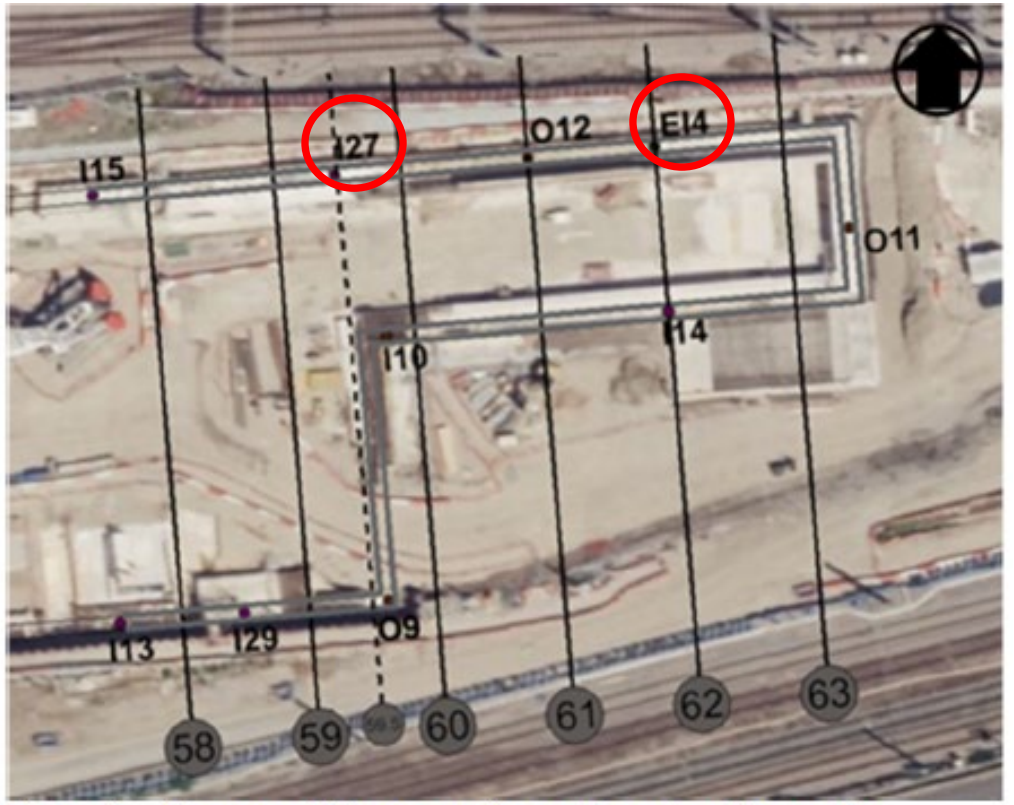


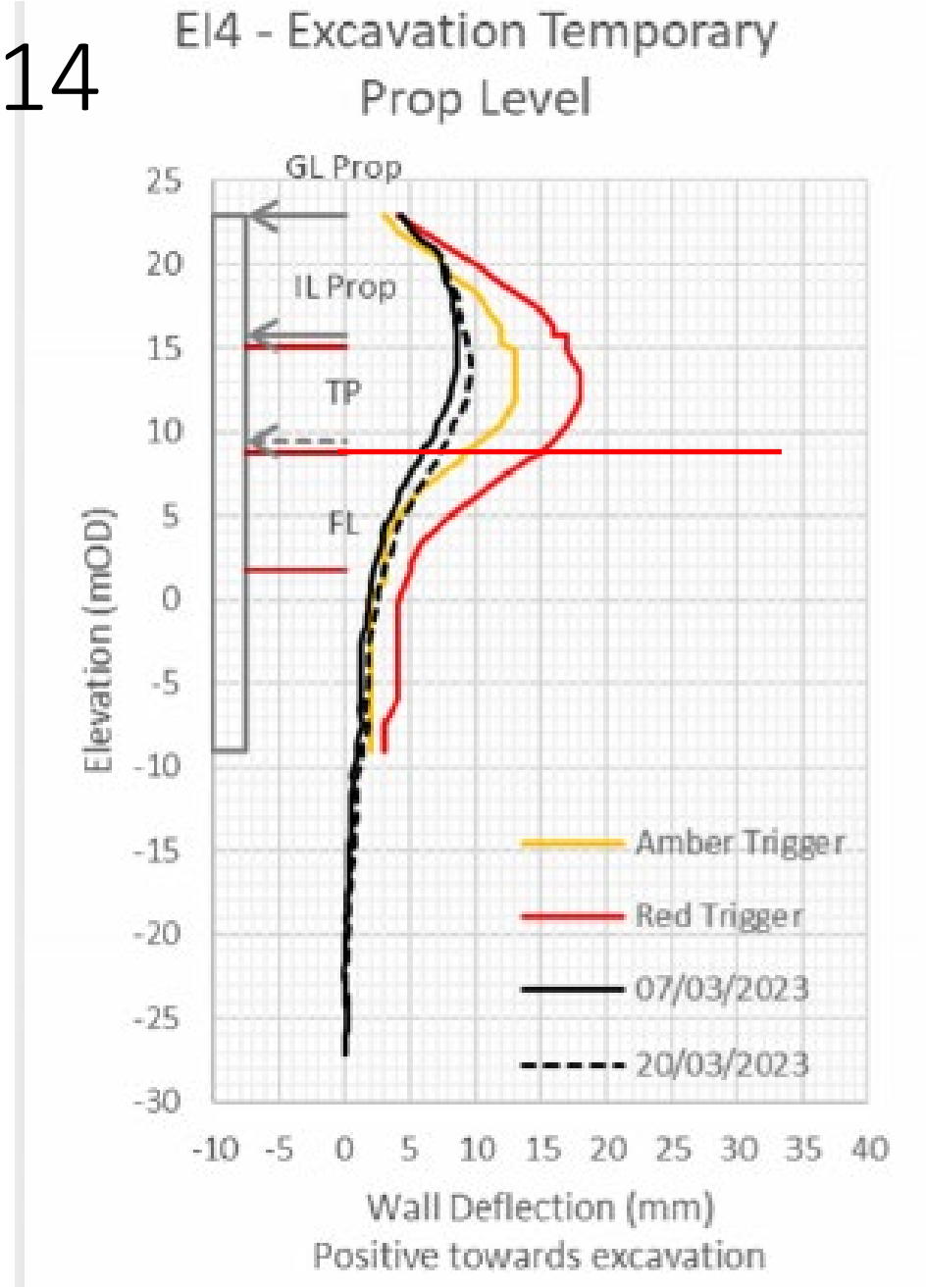
Figure 5. Progress of the excavation and construction works

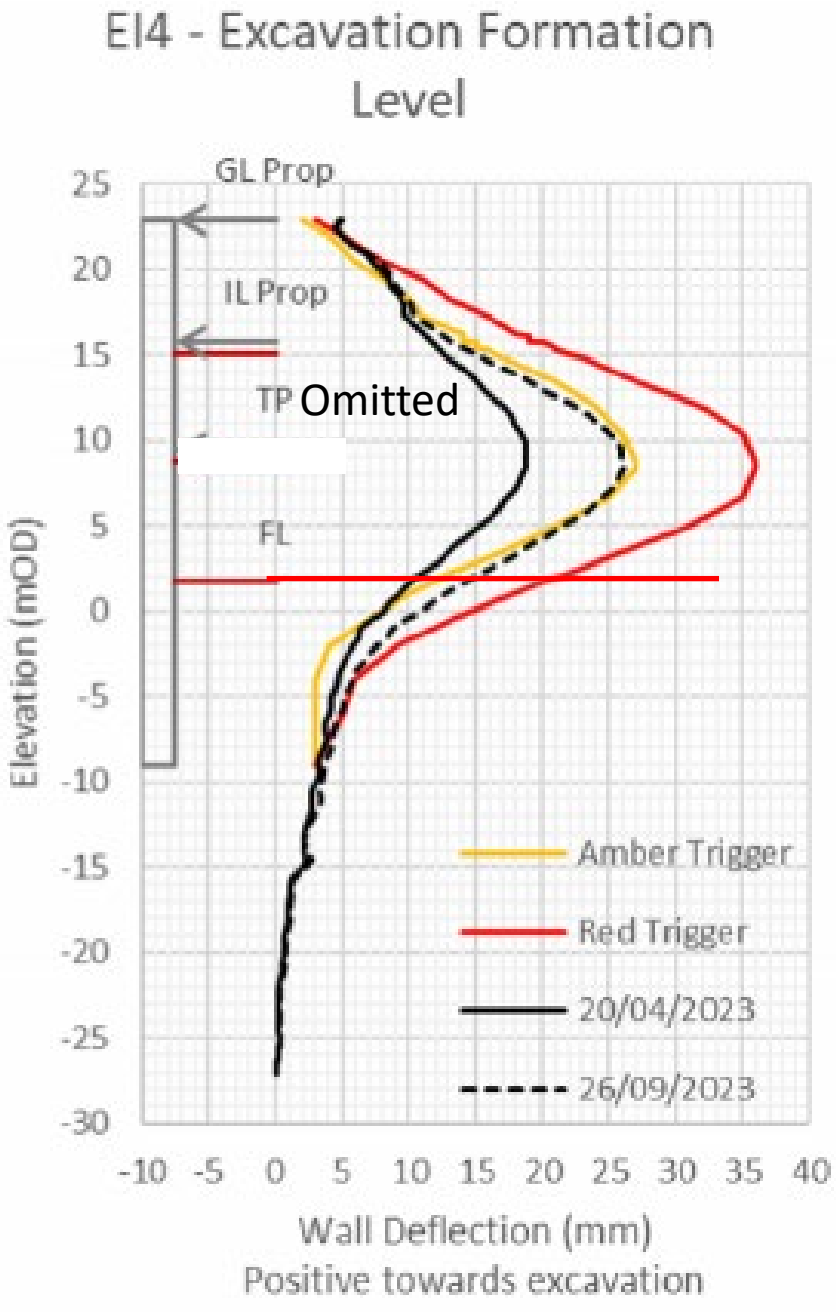
Table 3. Summary of key construction dates

Stage	East of GL 59.5	West of GL 59.5
Excavation ground level prop	None	None
Excavation intermediate level prop	20/08/2022 to 15/09/2022	23/09/2022 to 18/10/2022
Excavation temporary level prop	13/02/2023 to 07/03/2023	27/03/2023 to 27/04/2023
Excavation formation level	20/03/2023 to 20/04/2023	27/04/2023 to 05/07/2023
Construction base slab	14/07/2023 to 21/07/2023	17/07/2023 to 23/08/2023

Inclinometer E14

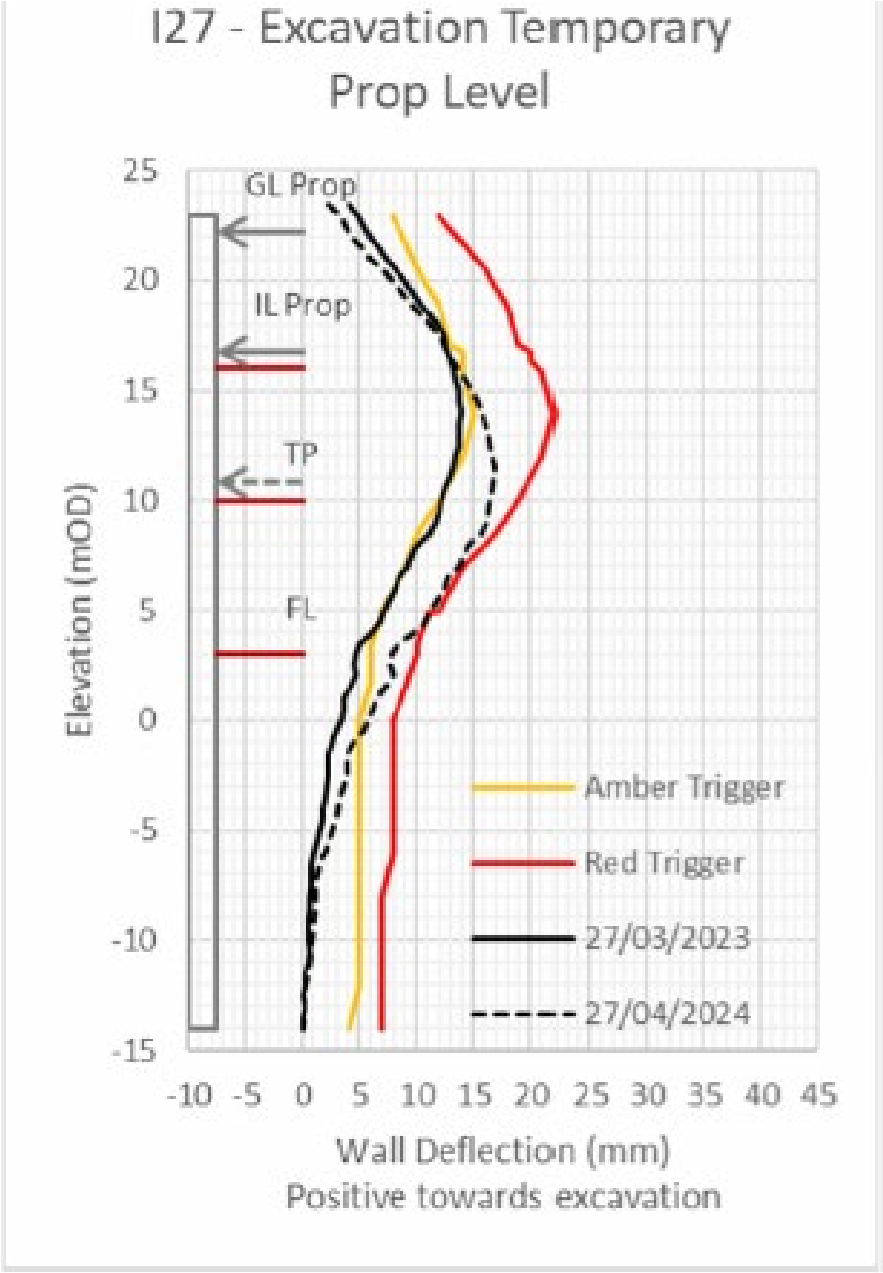
- TP = Temporary Prop.





Inclinometer I27

- At interface of narrow and wide sections.



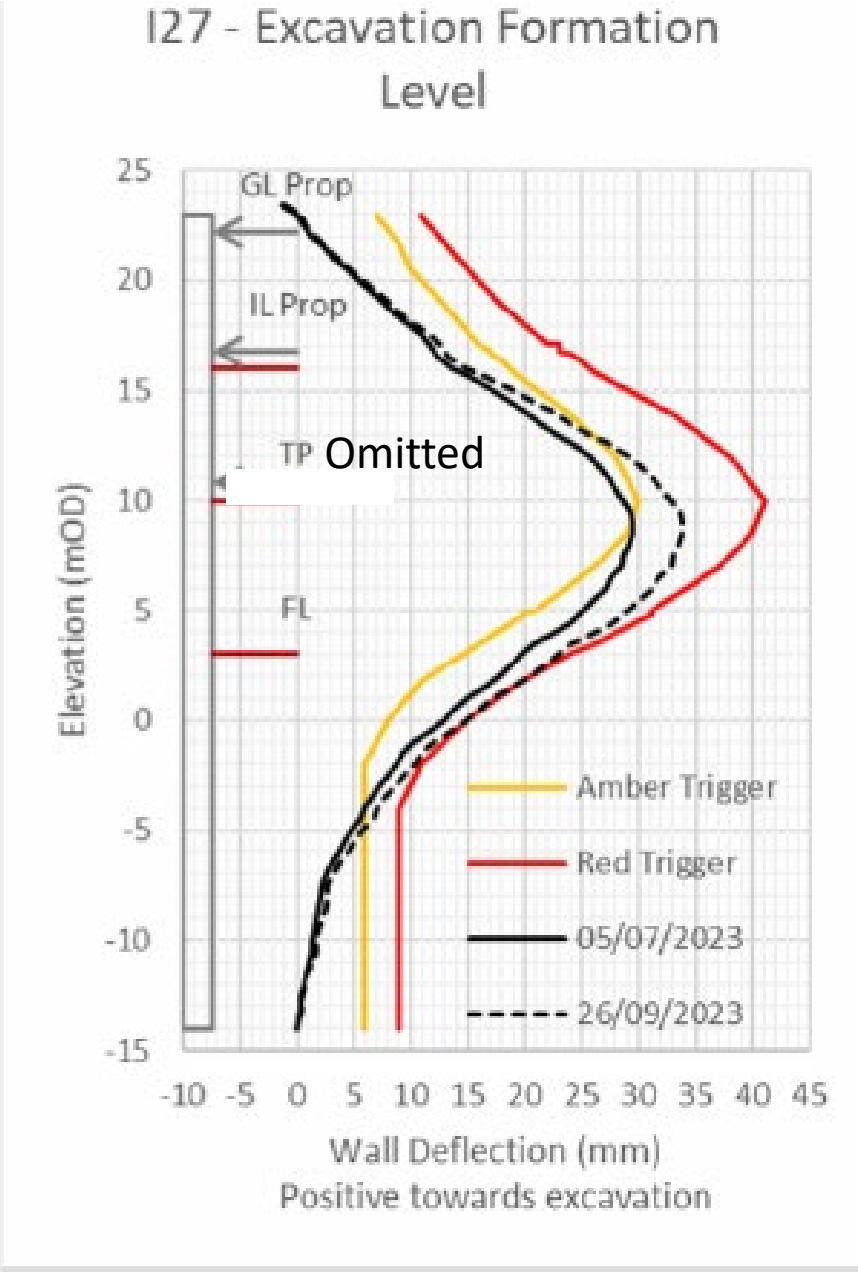
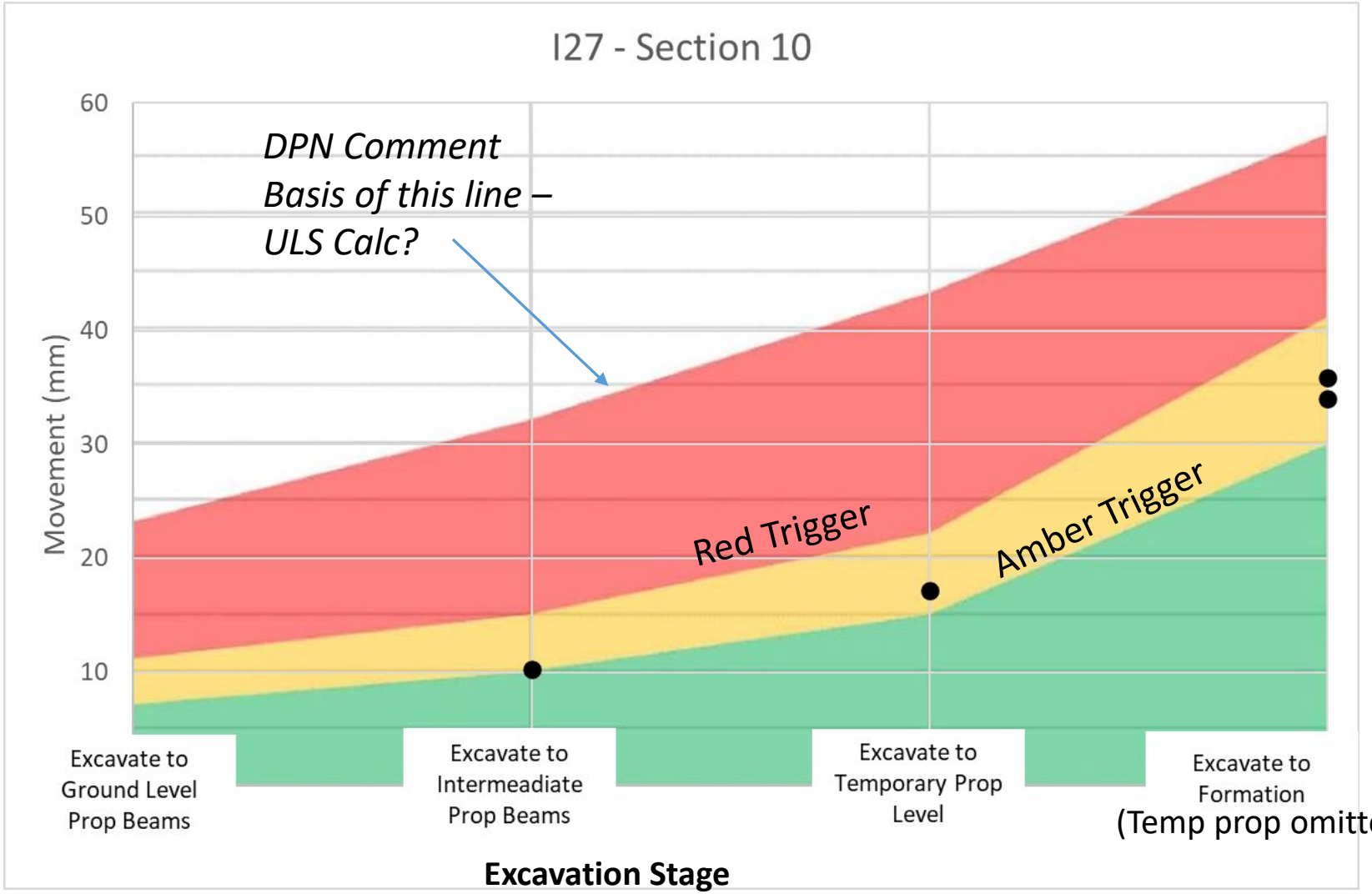


Figure 7. Monitoring data from SAA in-place inclinometer I27

Section 10 - I27

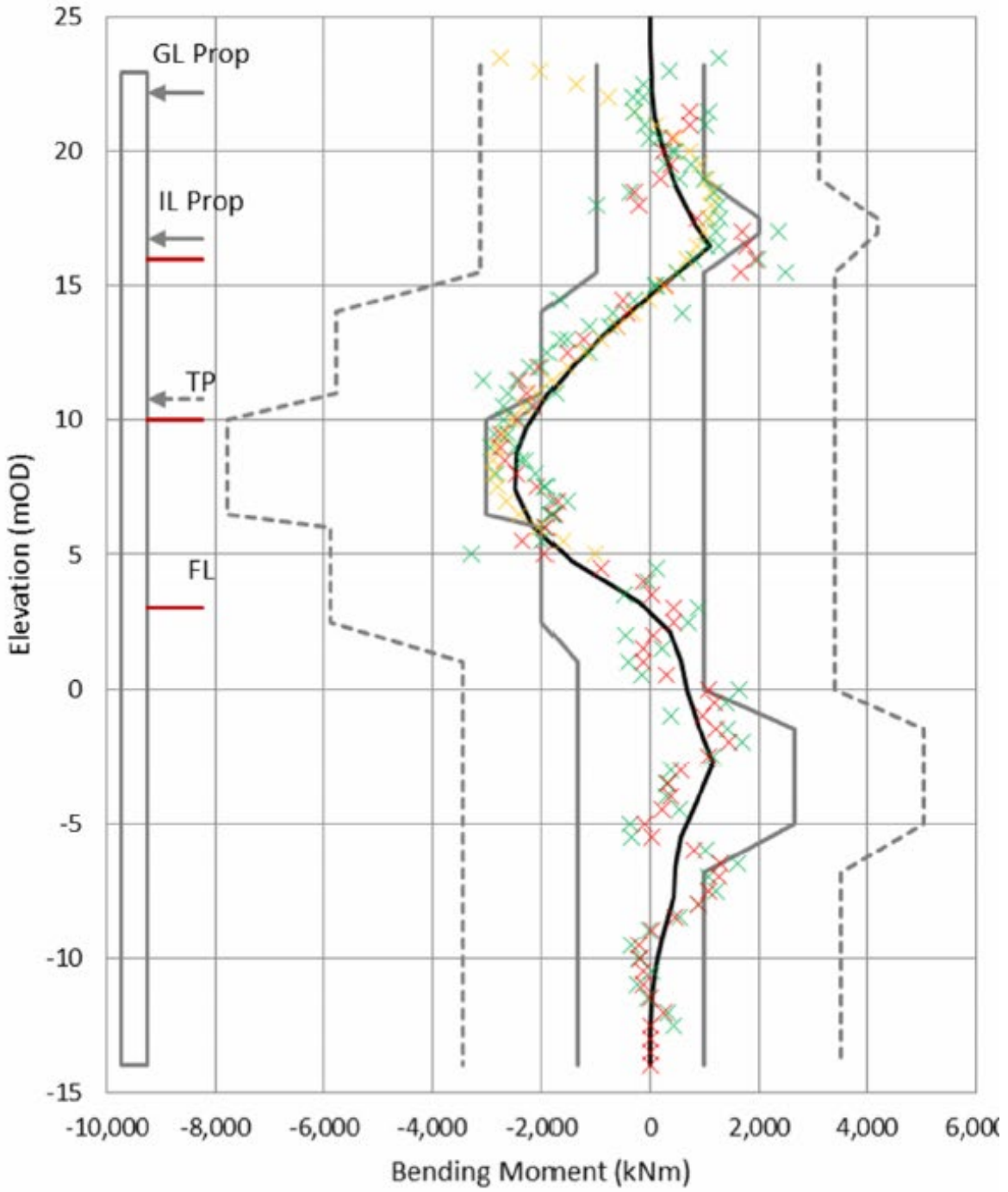


I27- Excavation to formation SLS Moment check

- Piecewise Quadratic Curve Fitting (average 5 points)
- Piecewise Cubic Curve Fitting (5 points)
- Global high-order polynomial curve fitting
- Adjusted slope
- Gofer Output
- SLS Structural Capacity SLS includes Crack Width limits
- ULS Structural Capacity

Back analysed wall force I27

DPN Comment - Interesting comparison of moments from Inclinometers. – Agreement with a good fit to back analysis .



Third Presentation
ICSMGE 2026

Observational Method in Hong Kong's Context

Author: **Alvin Lam, Director, Arup**

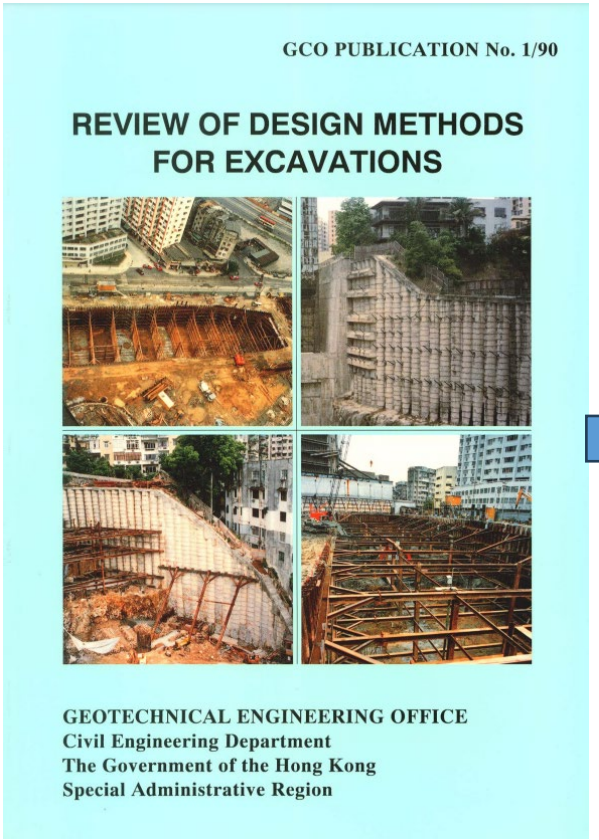
Coauthors: **James Sze, Director, Arup & Jack Yiu, Director, Arup**

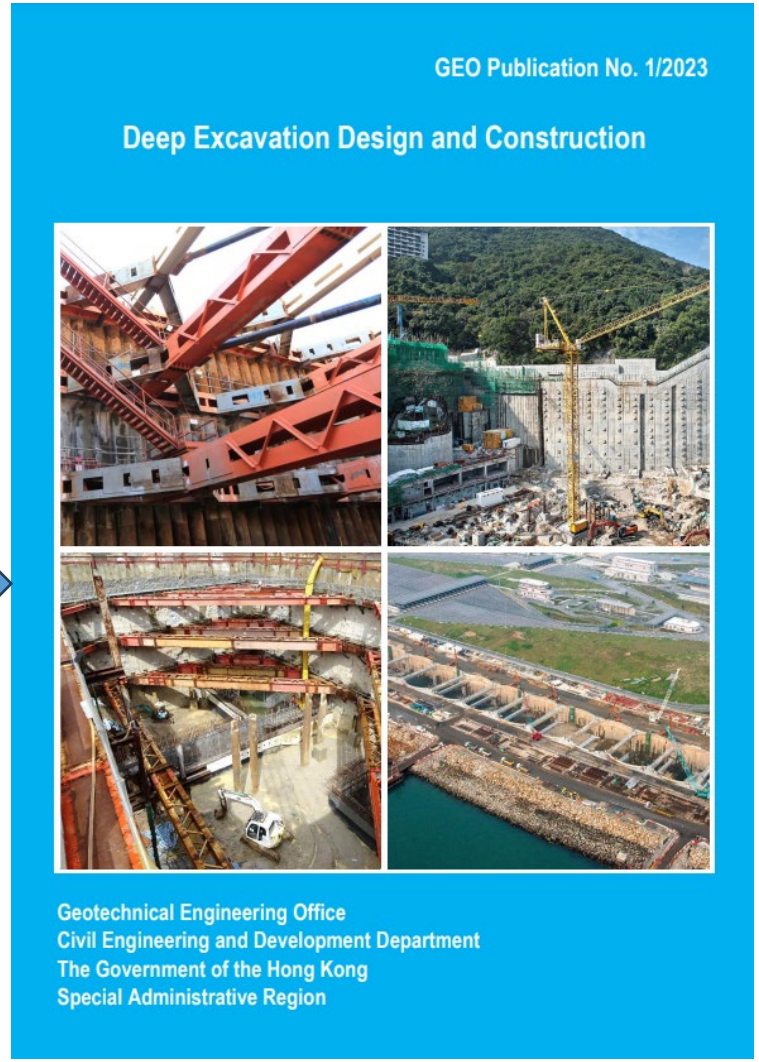
15 June 2026

Revamped Guidebook for Deep Excavation Design

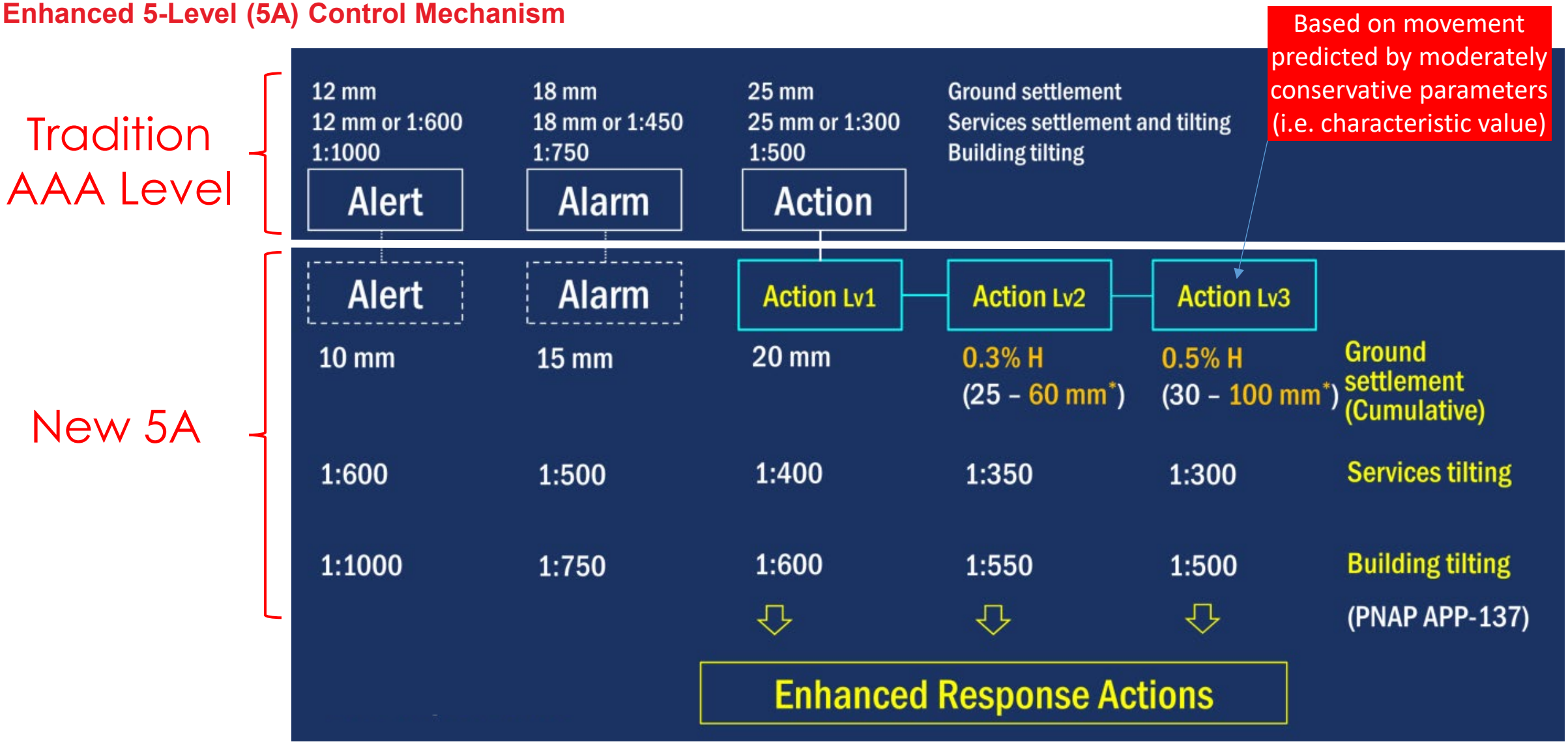
Enhanced 5-Level (5A) Control Mechanism

- Published in December 2023
- Review design standards
- Recommend practical solutions
- Separate the control mechanism for **serviceability** and **safety issues**
- Execute **pre-determined actions agreed with the stakeholders to prevent suspension of works** based on actual site performance





Enhanced Control Mechanism



Comparison with OM's Context

Green
< recalibrated movements

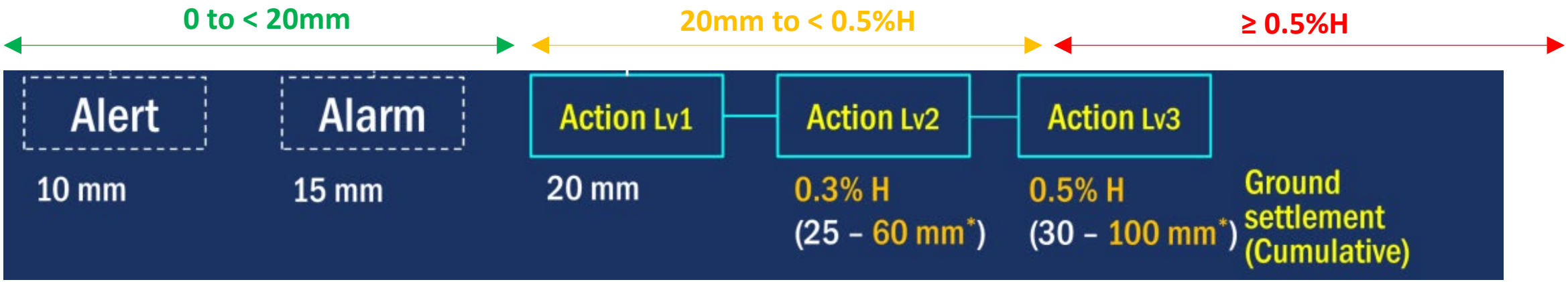
- Inspect and/or conduct condition survey if needed
- Prepare response plan & enhance monitoring if needed

Amber
< characteristic movements

- Execute pre-determined actions including utility/road serviceability checks and remedial/repairing works
- Conduct detailed investigation
- Formulate contingency and emergency plan for reaching Level 2 & 3 respectively

Red
> characteristic movement

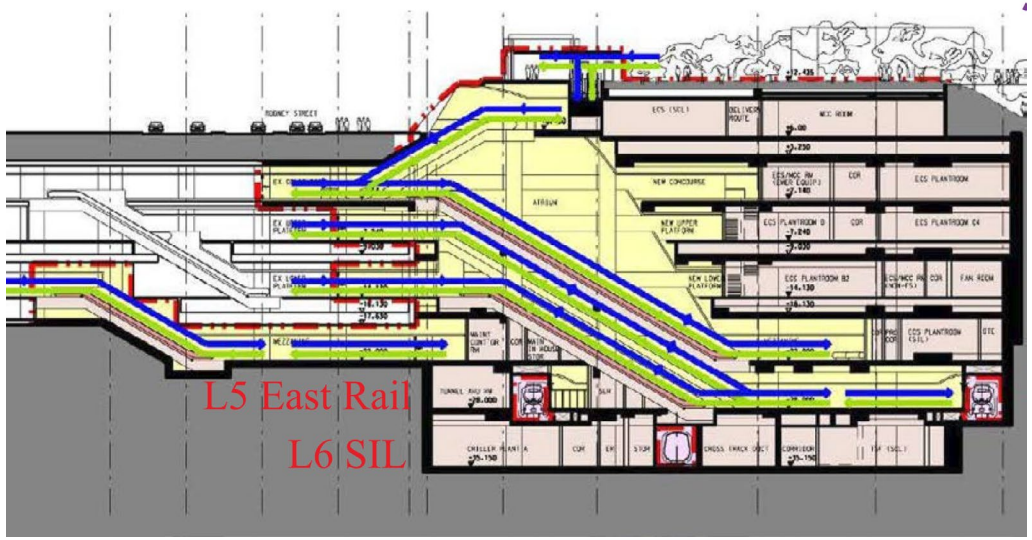
- Suspend related construction activities and formulate works resumption plan
- Conduct condition survey, investigation and emergency plan
- Revise design and method statement
- Predict remaining movement and establish future trigger values

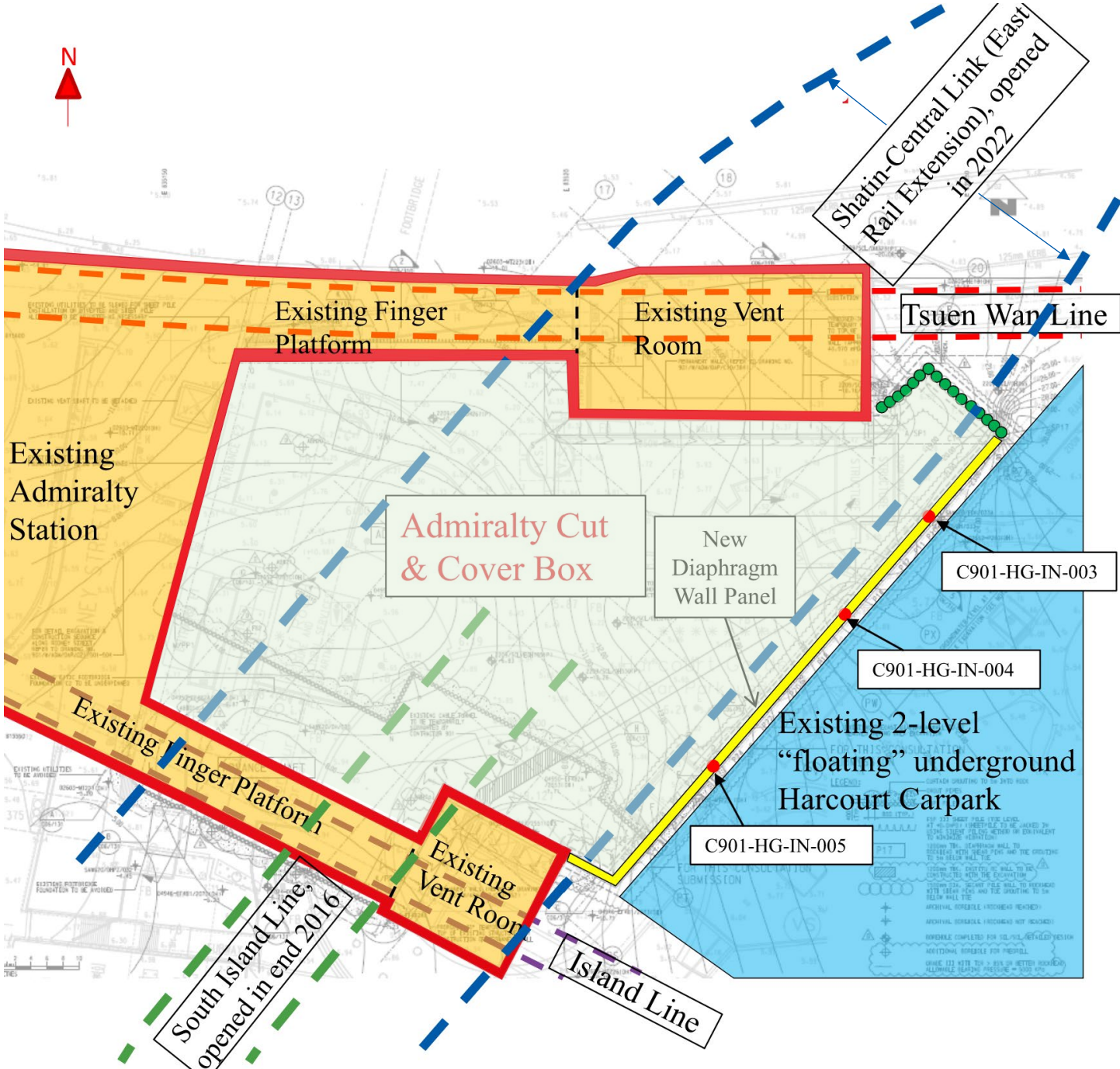


New Admiralty Station

Site Arrangement

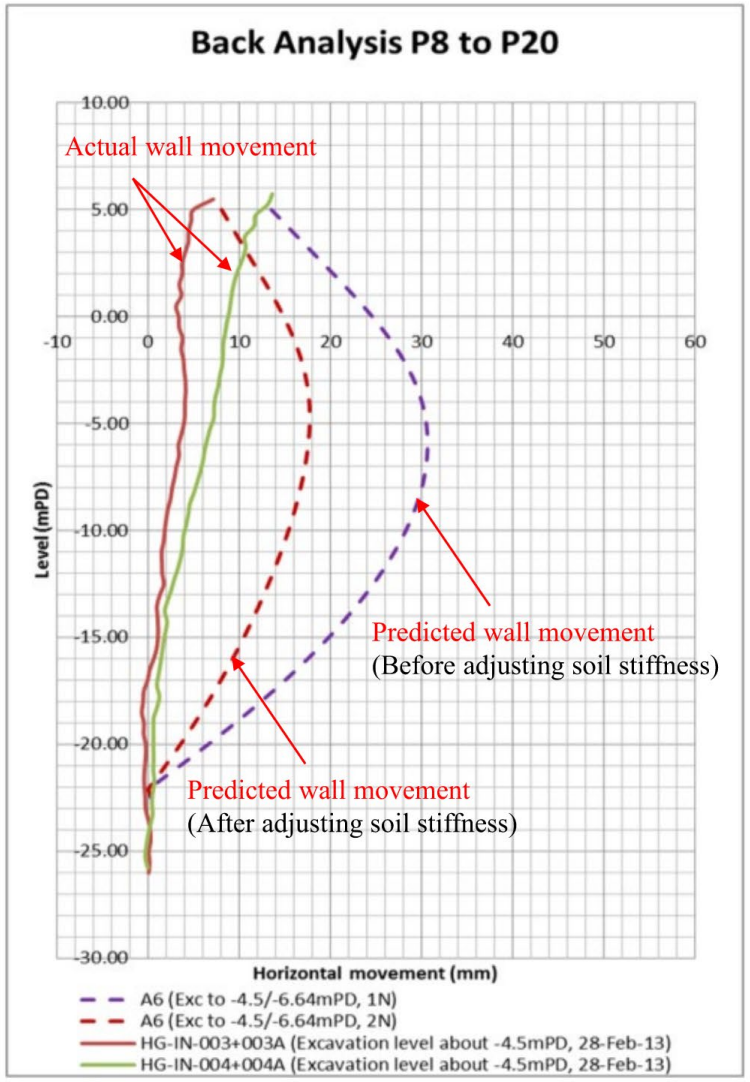
- Plan area ~90m x 74m
- 6-level, 45m deep excavation
- Abutting existing station & existing underground carpark, underneath Island Line & Tsuen Wan Line tunnels
- Fast track project



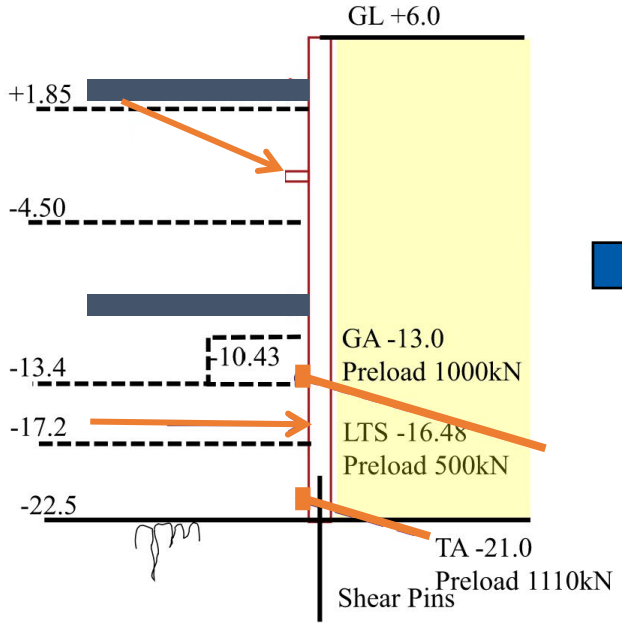


OM Approach – *Ipso tempore - Approach C*

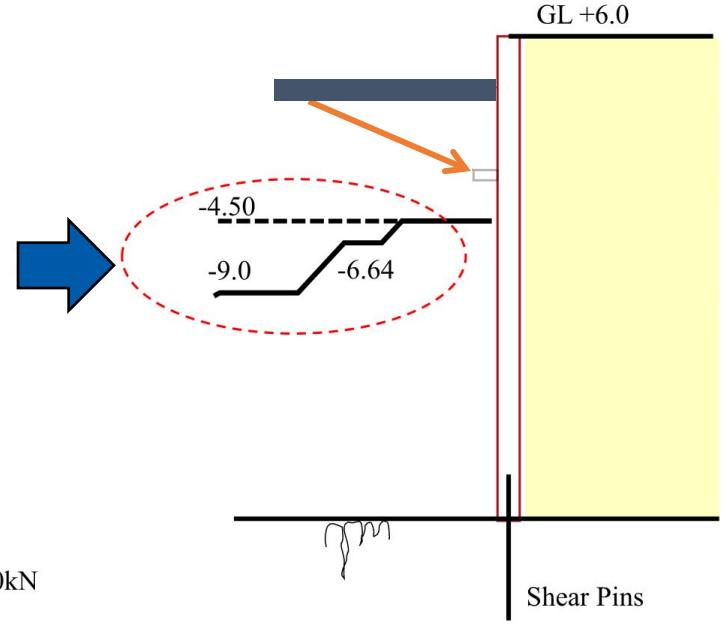
Excavation started with Predefined Design. At -4.5mPD OM introduced – Approach C



- Back analysis based on inclinometer and ground settlement readings taking during excavation
- 1st Back Analysis (Exc. to -4.5mPD) → advance excavation at area beyond carpark side



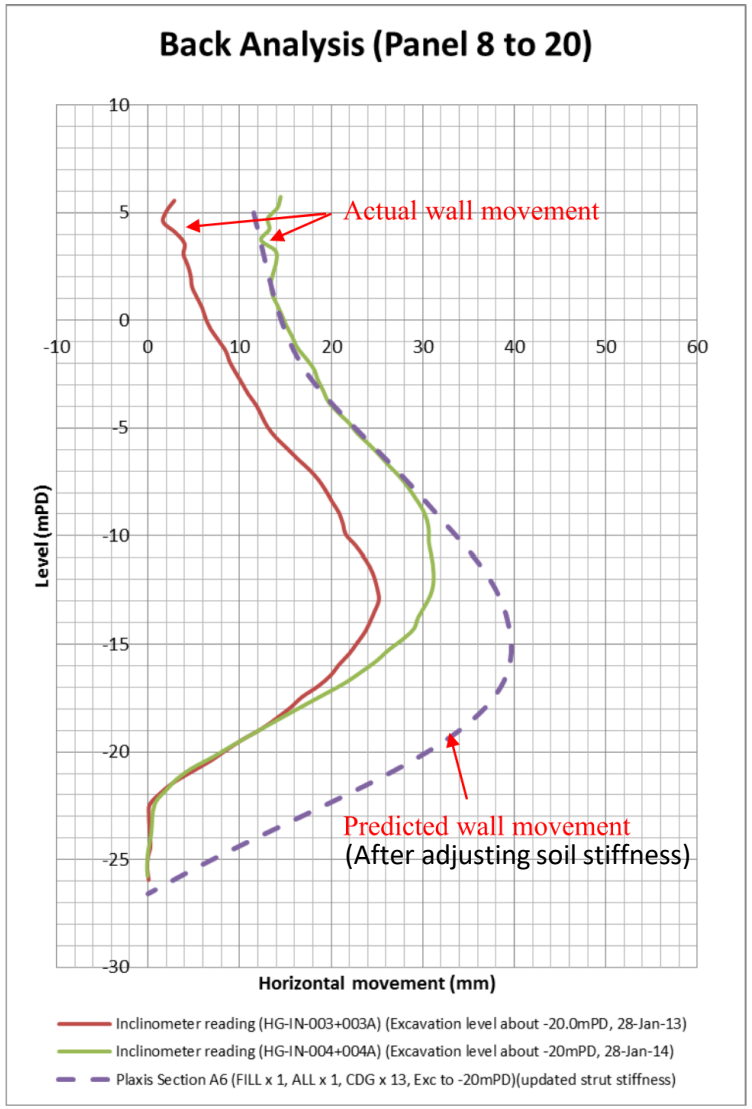
Initial ELS System



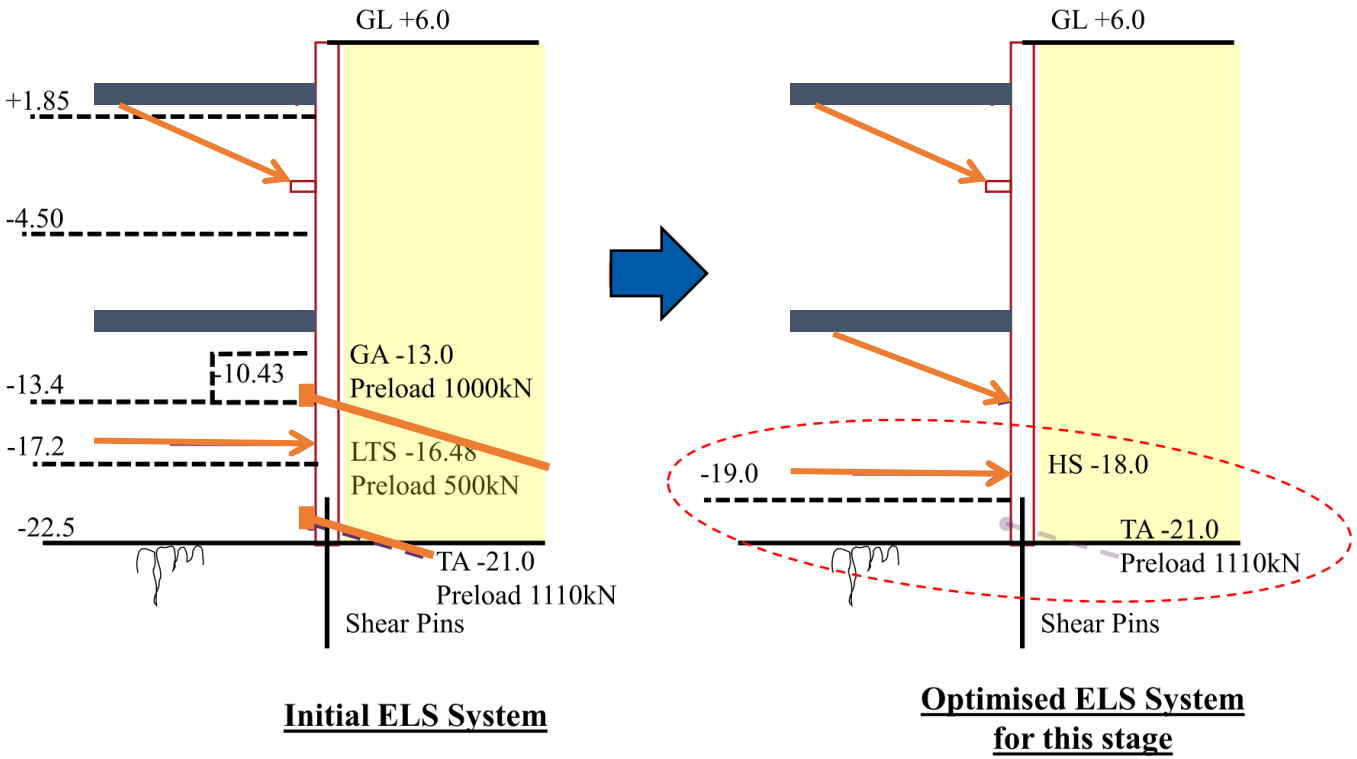
Optimised ELS System for this stage

OM Approach – *Ipso tempore - Final Stage*

Pro-active to make modifications



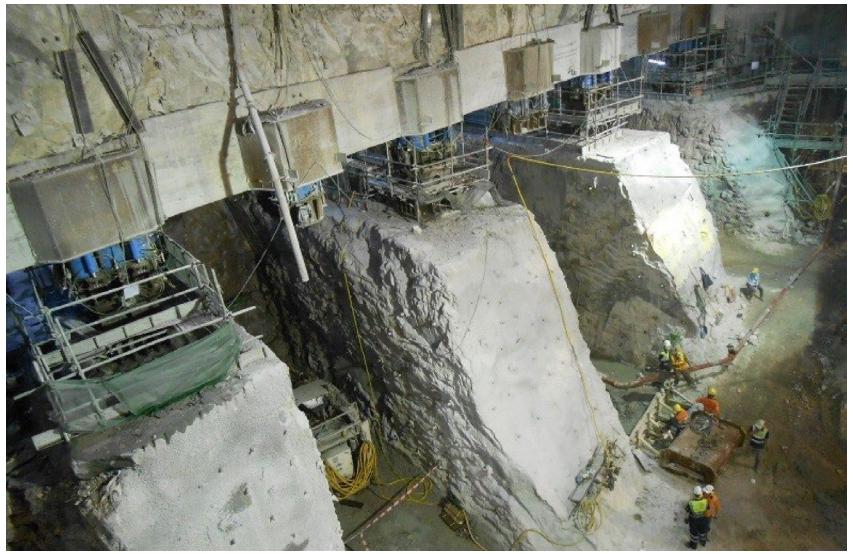
- 3rd Back Analysis (Exc. at -19mPD) → toe anchor @-21mPD eliminated. Strut at -16.5mPD slightly adjusted to -18.0mPD



General Site Photos

New Admiralty Station







CIRIA C760 Observational Method

OM in Hong Kong's Context

CIRIA C760 OM Approach	Approach	Hong Kong's Context
Approach A Ab Initio	Optimistically Proactive Approach	• Rely on relevant case study data for back-analysis • Data ownership typically rests with the client consortium, making it **difficult to obtain consensus for data sharing** across parties
Approach B Ab Initio	Cautiously Proactive Approach	• Development of **additional design scenarios and alternative construction sequences** demand more time for design and drawing preparation, **posing a challenge in Hong Kong's fast-paced design** and construction environment • **Stringent and lengthy statutory approval process** hinders the implementation of OM approach
Approach C Ipso Tempore	Proactive Modification Approach	• Base on **actual site performance to re-calibrate parameters** for remaining works • Under New 5A control mechanism, based on **actual site performance to address serviceability issues**
Approach D Ispo Tempore	Reactive Correction Approach	• When action level is exceeded, based on actual site performance to implement remedial measures including ground strengthening, increasing strut layers, sizes and preloading, tightening groundwater control and excavation sequence, etc.

Summary

OM in Hong Kong's Context

- GEO Publication No. 1/2023 offers geotechnical engineers a structured yet flexible framework for managing excavation-induced ground movement, **balancing safety, serviceability, and construction efficiency**.

- Implementation of OM **depends on comprehensive and reliable monitoring**, which can be difficult to achieve in Hong Kong's congested urban environment.

- For **large-scale infrastructure projects with longer duration**, CIRIA C760 OM **Approach C** has been successfully implemented based on actual site performance to re-calibrate parameters for remaining works

Fourth Presentation

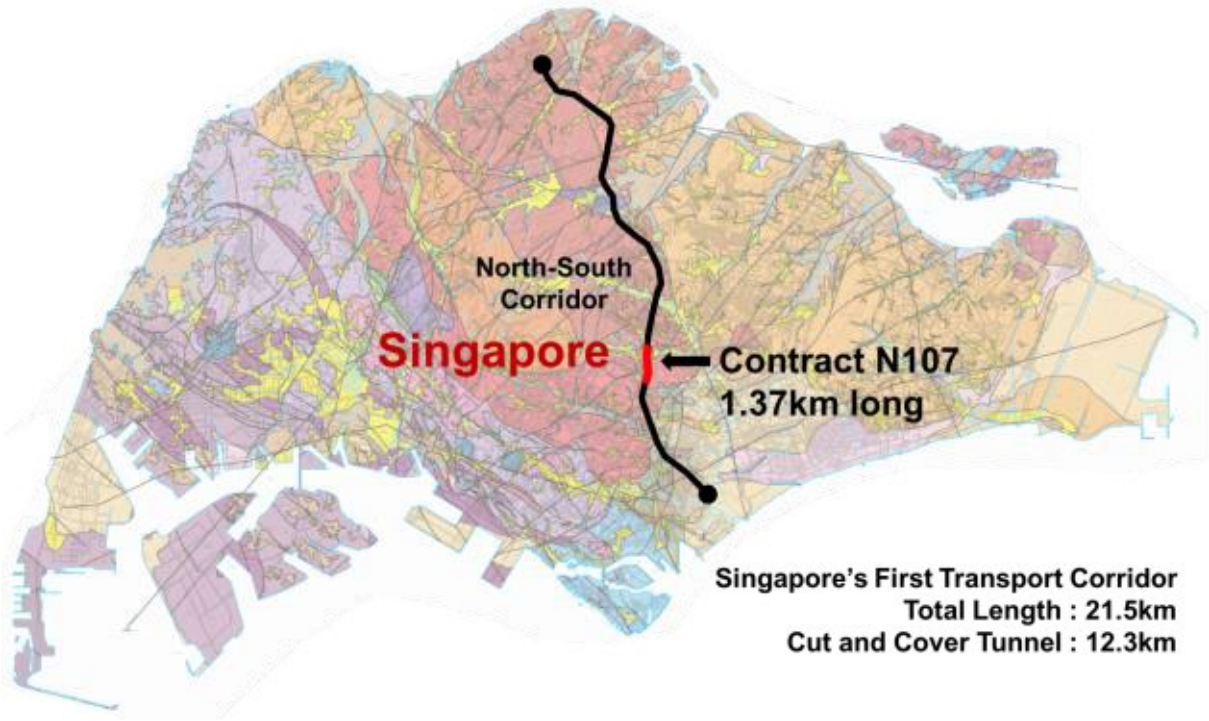
Back Analysis and Observational Method for Strut Removal for a Deep Underground Excavation in Singapore using Genetic Algorithm Tools

Rosemary Vong, Jasper Sim, Michael Williamson, Nicholas Mace, Kannan Vinayagam
Mott MacDonald Pte Ltd, Singapore

Agnes Lee, Wong Jia Jing
Land Transport Authority, Singapore

Chuah Sze Seng, Yet Nai Song
Building and Construction Authority, Singapore

Lee Junki, Park Hyunku
Samsung C&T, Singapore



Zone A4 - Cross Section – *Goal omit contingency strut*

- Paper initially written up:-

Vong et al, (2025), Sustainable Innovative Underground Infrastructure Design Using Innovative Artificial Intelligence(AI)Back Analysis, Underground Singapore 2025.

- Use of DAARWIN for Machine Learning

DPN Comment

- *OM Approach C.*

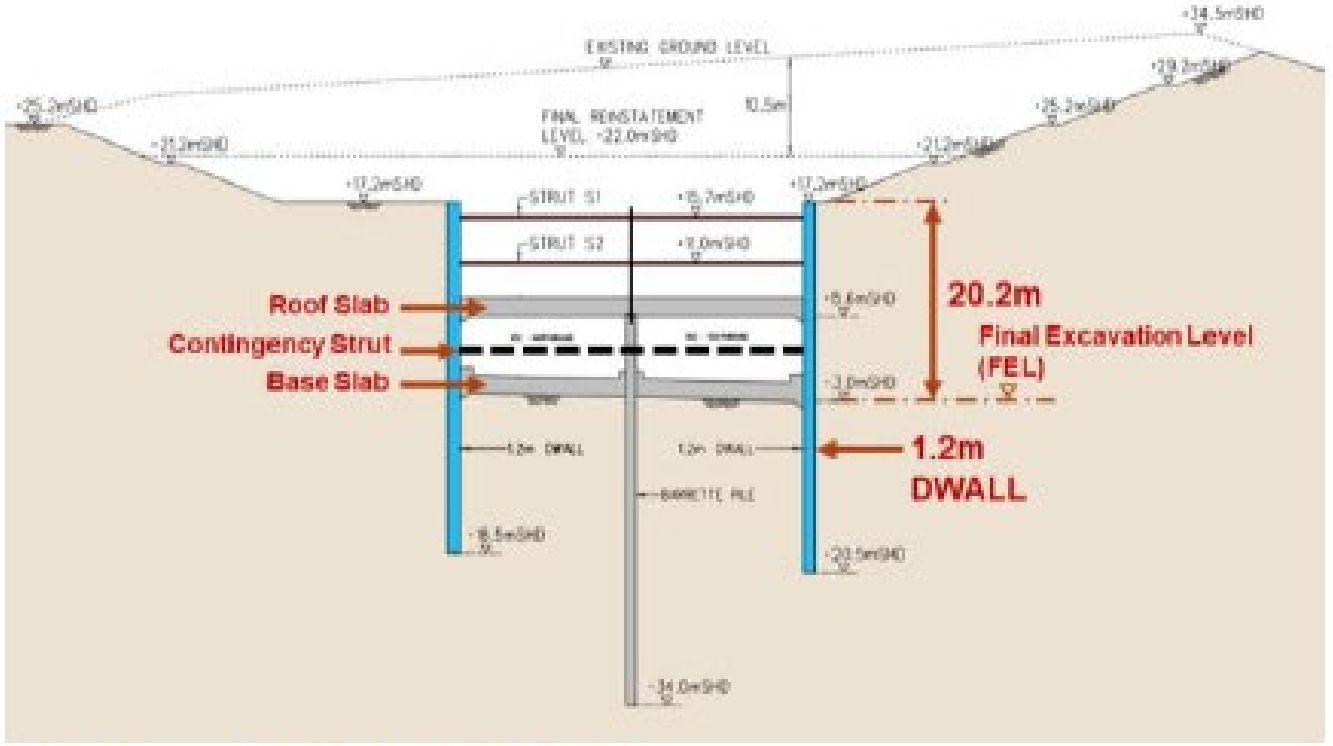


Figure 3. Zone A4 Cross Section

Effect of Water Pressure

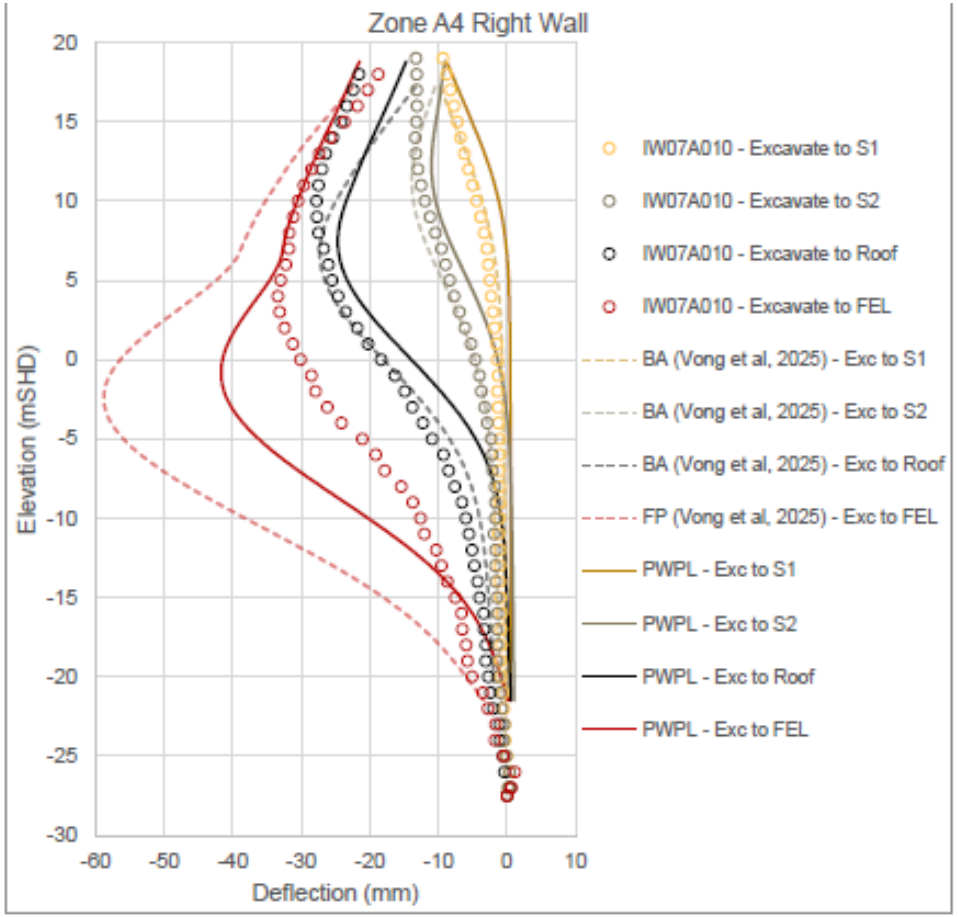


Figure 9. Comparison of predicted wall deflection with the updated pore water pressure

Effect of Wall Stiffness

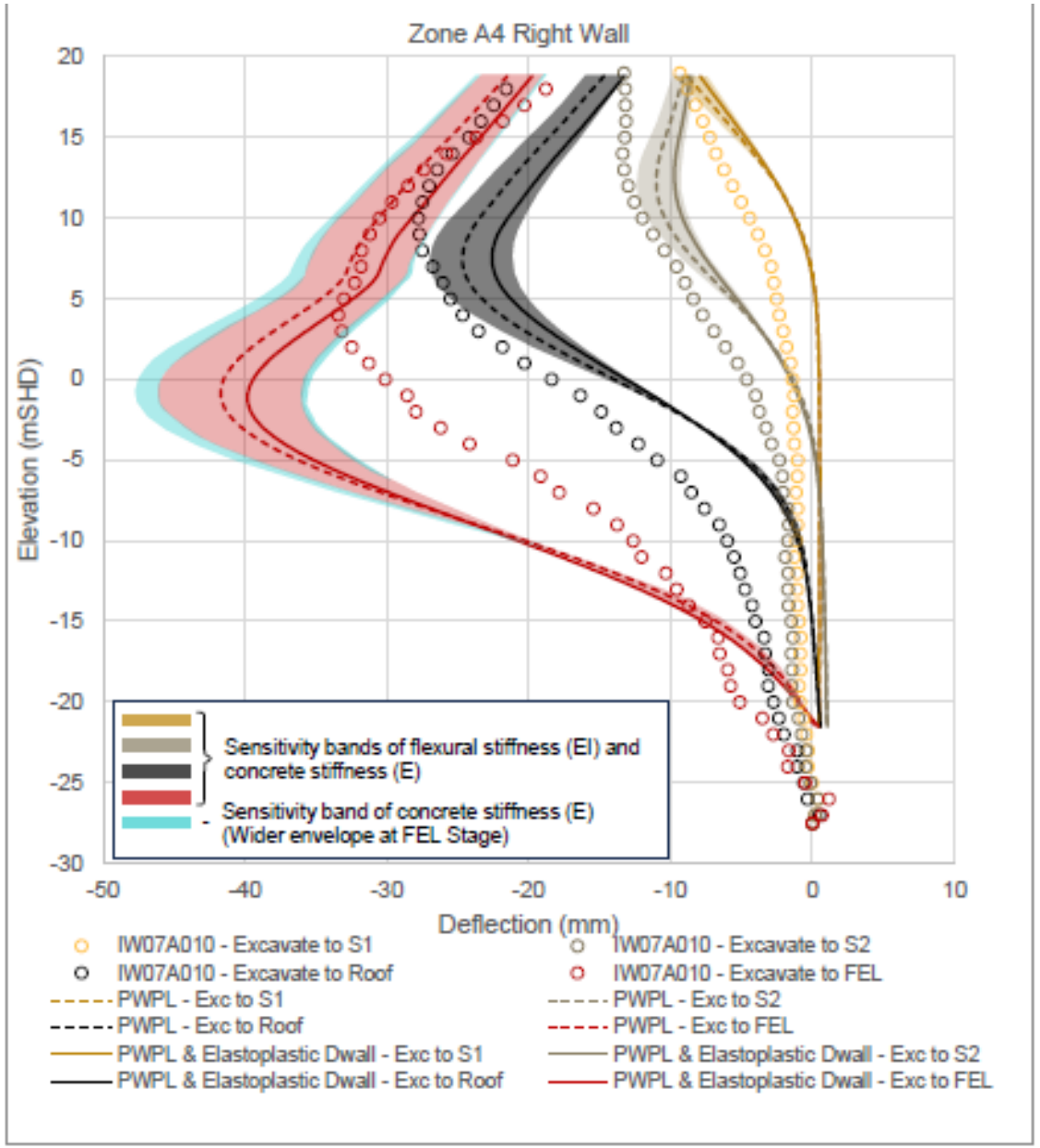


Figure 10. Wall deflections from the sensitivity analyses.

Effect of Wall Plate Model or Wall Cluster model

DPN Comment
These examples show the movements are not just controlled by soil parameters also consider :-

- *Accurate water pressures.*
- *Effect of wall stiffness.*
- *Wall modelled with plate or cluster.*

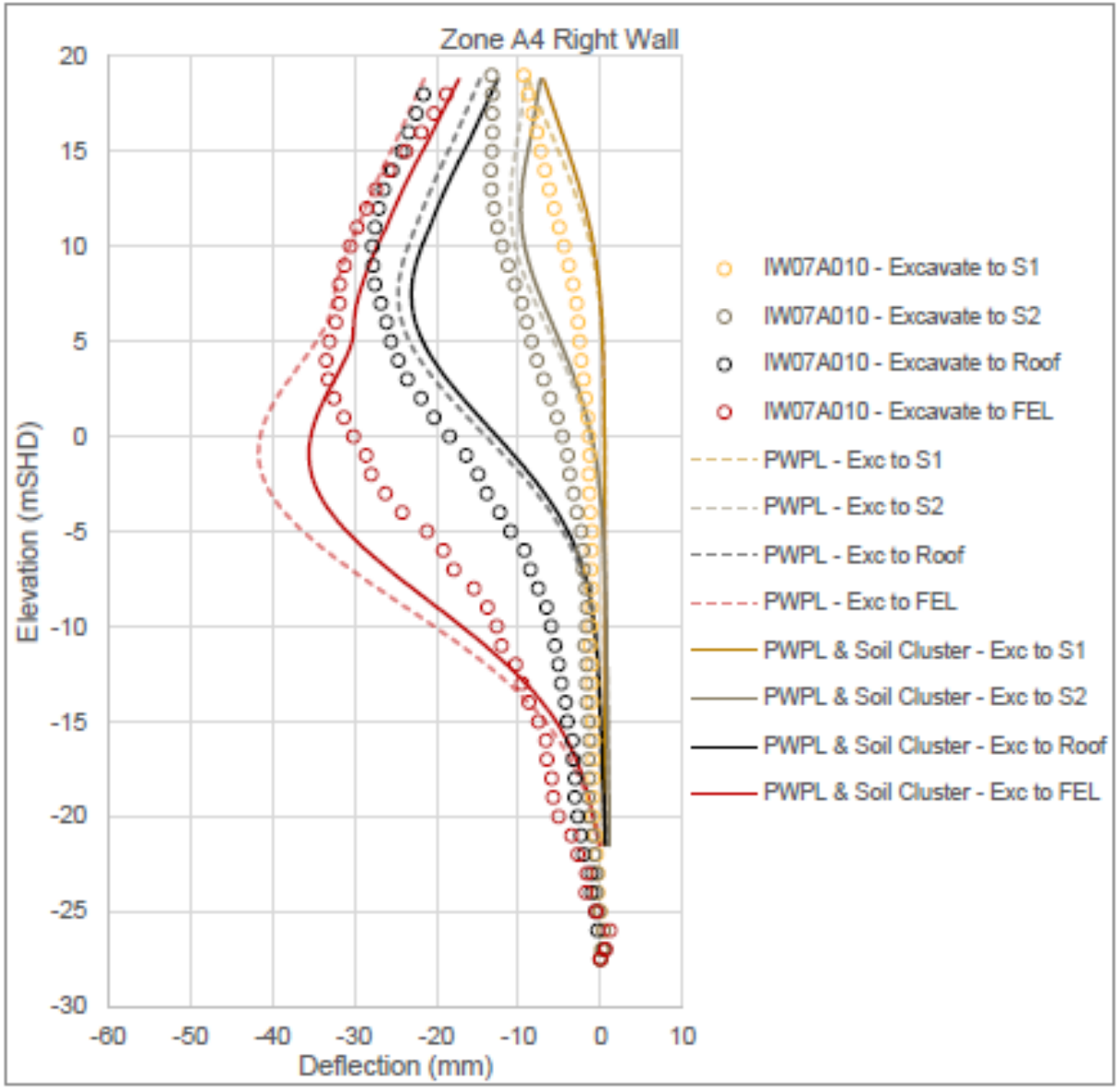


Figure 13. Wall deflections with soil clusters modelling approach.

Fifth Presentation

Application of the Observational Method on High Speed Two retaining structures

Hock Liong Liew[1)], Natalie Wride[2)], Alice Smith[3)], Joe Mazgajczyk[4)], Tony O'Brien[5)]

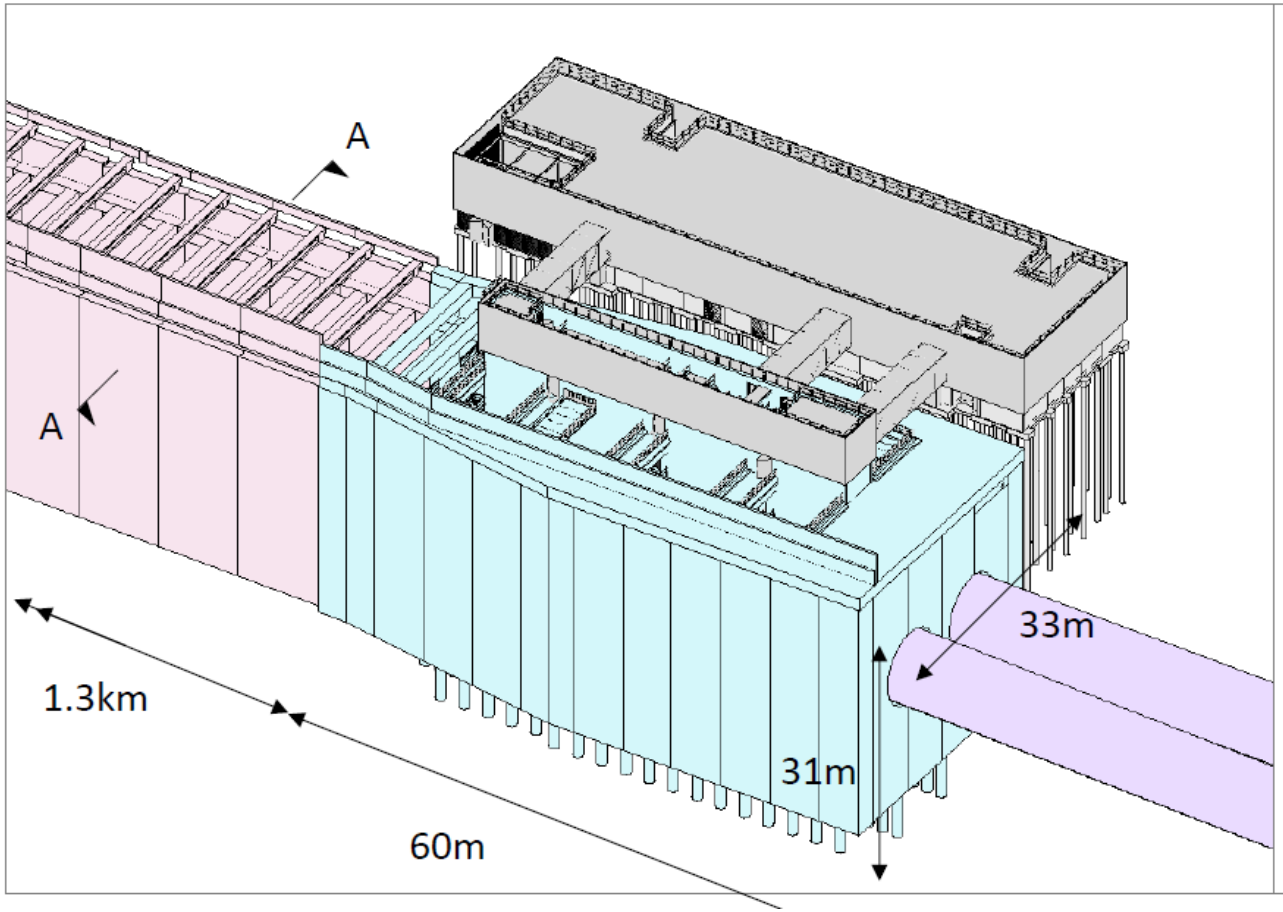
DPN Comment:

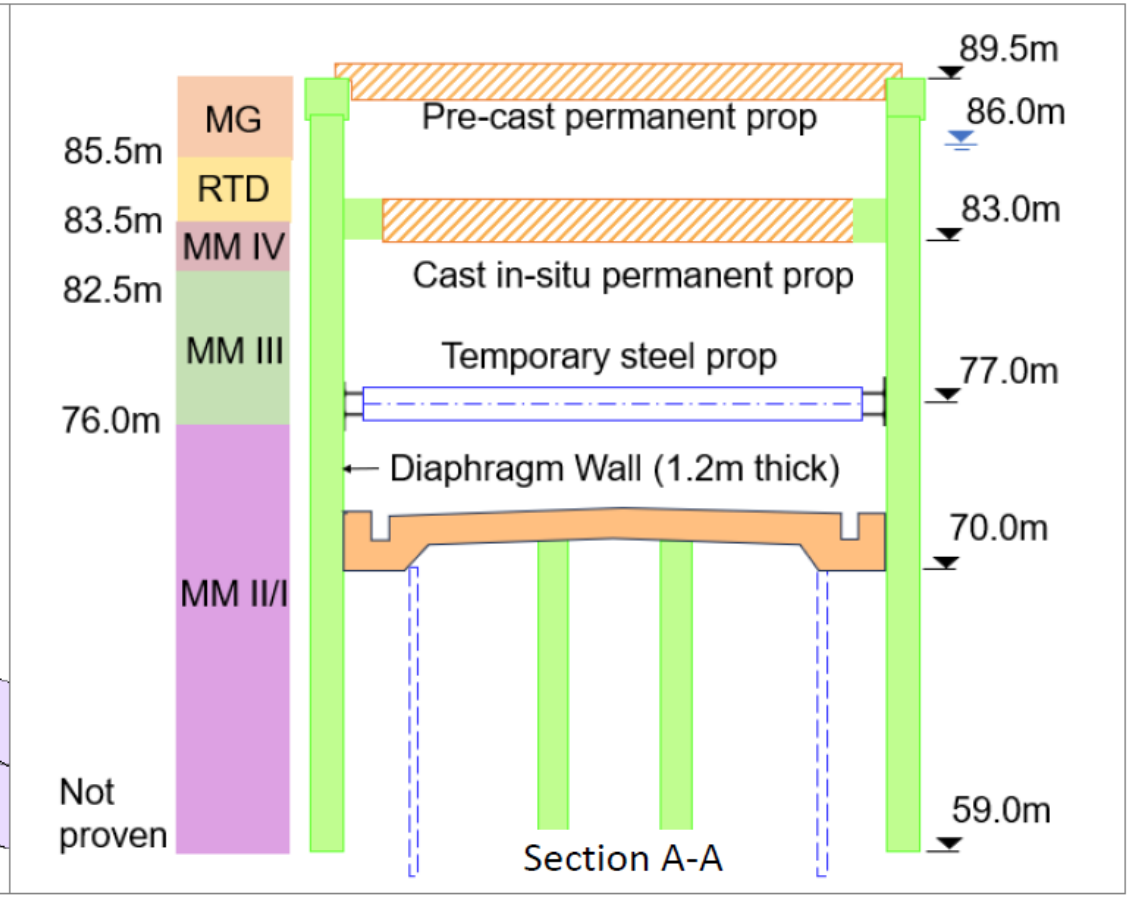
- *Initial Predefined (characteristic) design completed and checked for tender.*
- *Walls installed to Predefine design.*

- *OM introduced to omit temporary props.*
- *OM Approach C - most probable parameters defined during excavation with progressive modification.*

HS2 – Washwood Heath Retained Cut

O.M. – optimise support system



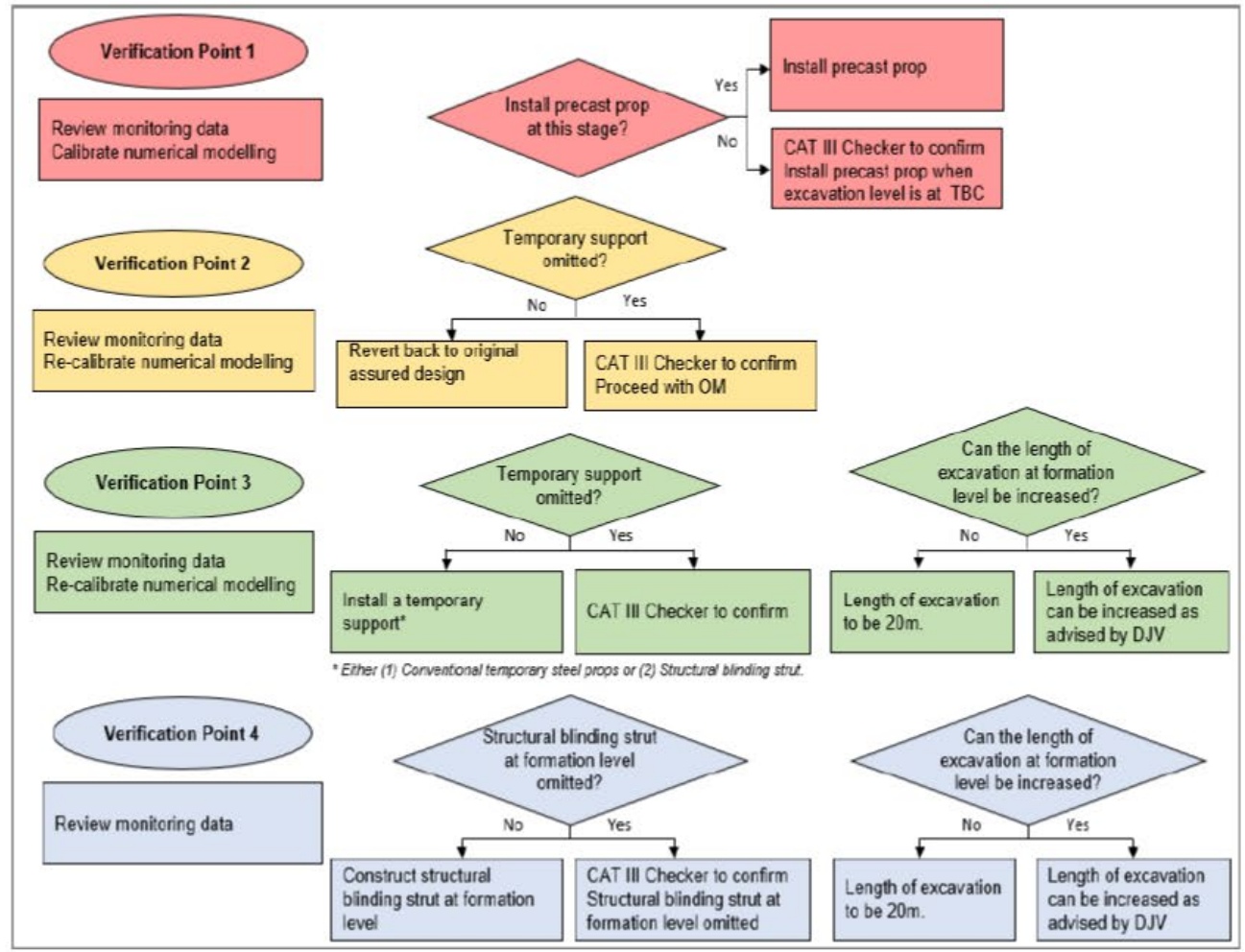


Achieving agreement to use O.M

Early engagement + Verification Process

- Client – early engagement to agree the assurance process
- Contractor – workshops held to agree the construction sequence and contingency measures
- Independent checker – weekly meetings to avoid late surprises; verification points – to agree subsequent works
- Technology – early DAARWIN (a R.T.B.A. tool) trial on adjacent structure to confirm effectiveness

Stakeholder CONFIDENCE is key!



Instrumentation and Monitoring (I&M)

- Critical observation – wall displacement
- Primary systems – IPIs, SAAs, ODS
- Secondary systems – piezometers, observation wells, magnet extensometer
- Redundancy + protection – are essential
- Risk of data overload - designed to answer a specific “geotechnical question”
- Construction records – comprehensive





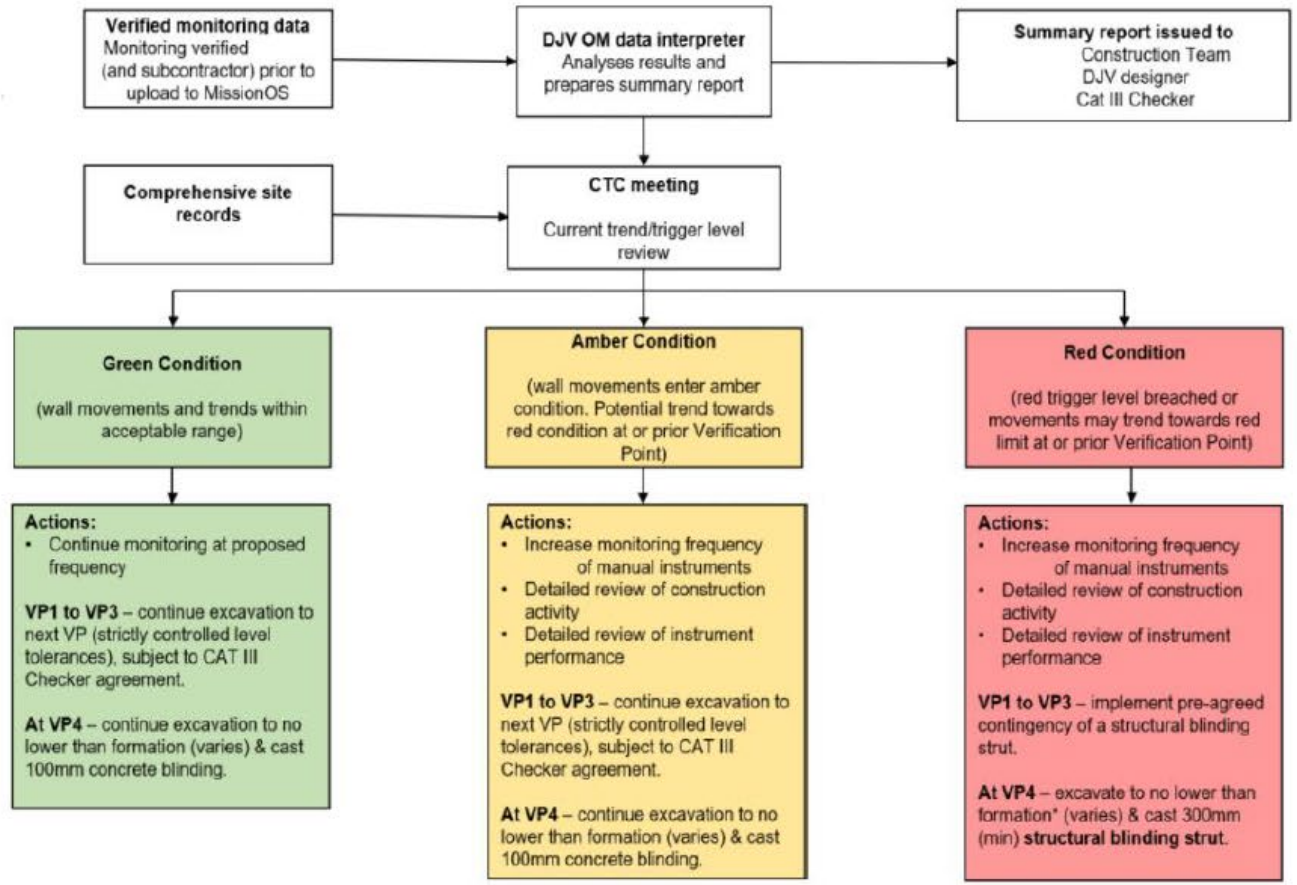






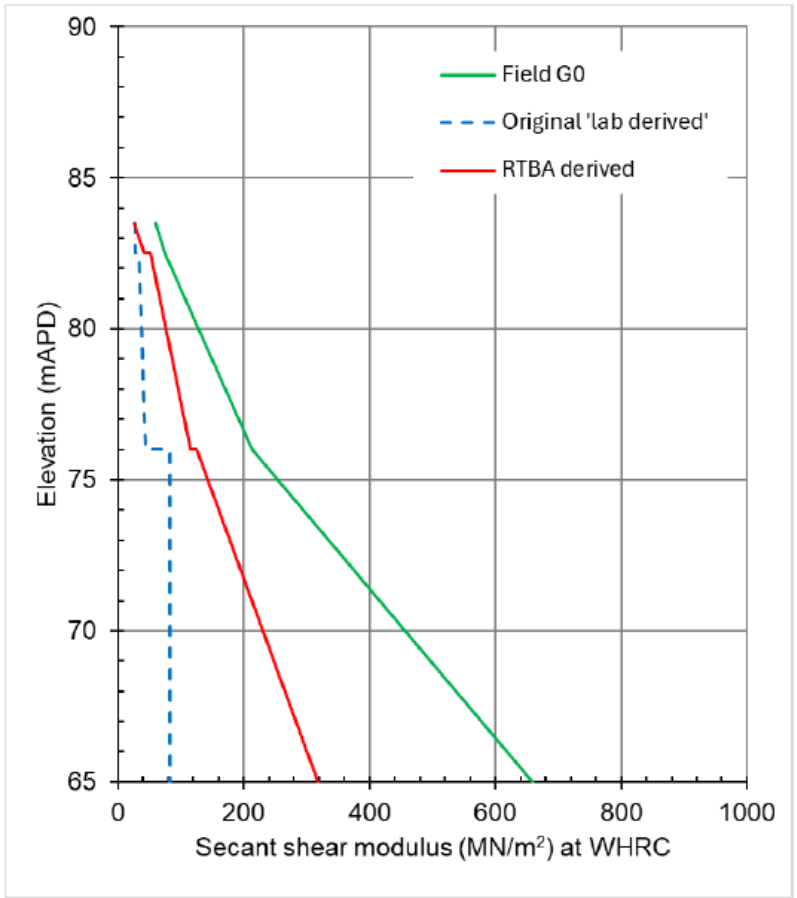
Construction Control + Contingencies

- Traffic light-based triggers (Green / Amber / Red)
- Red Limit – driven by wall structural capacity (SLS + ULS)
- Pre-agreed actions were embedded in the construction sequence:
  - Green → proceed with excavation
  - Amber → proceed with increased scrutiny and monitoring
  - Red → deploy contingency unless otherwise justified
- 300 mm structural concrete blinding strut – a pre-designed contingency, installable within 24 hours.

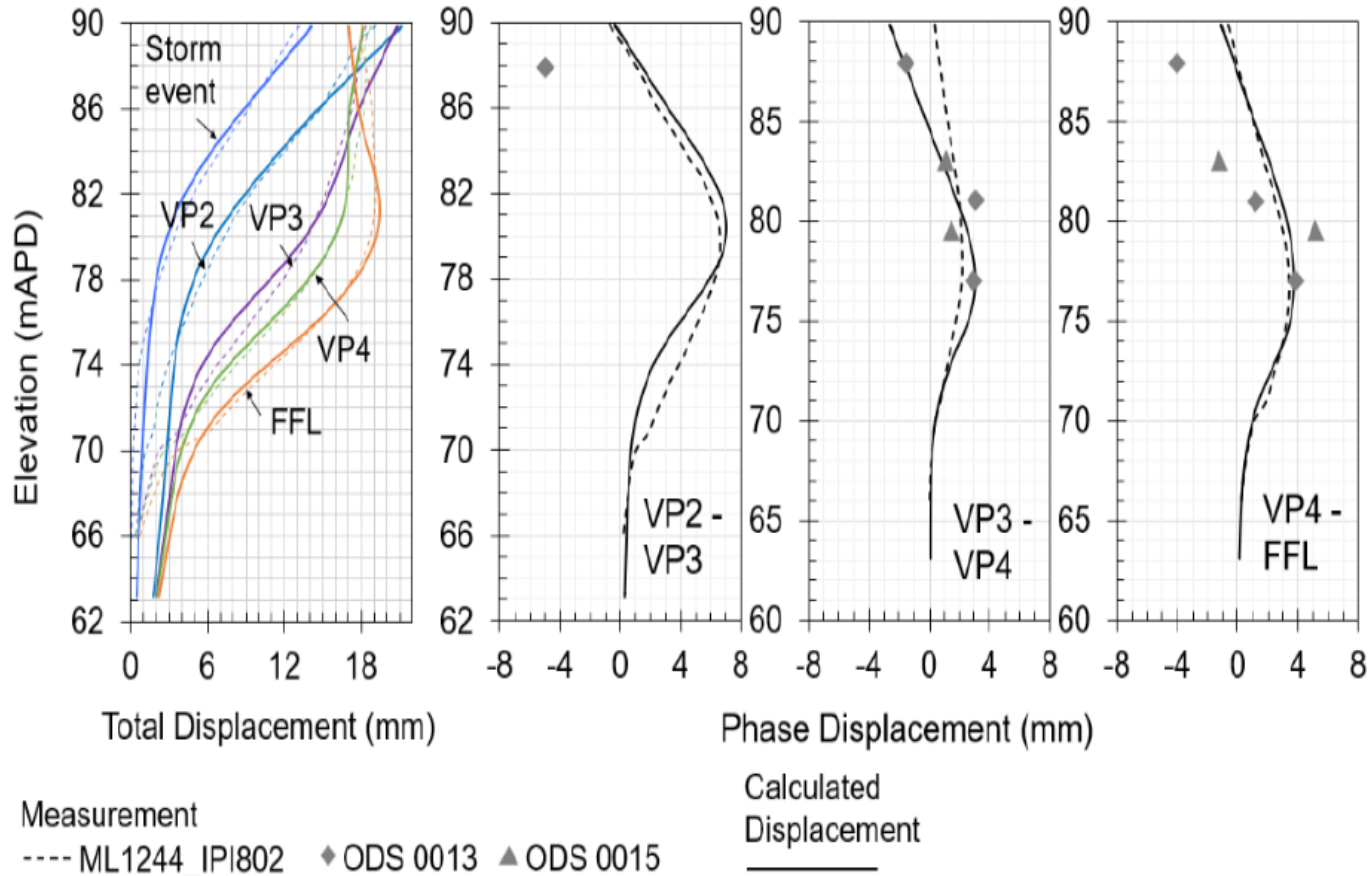


Back-Analysis Results vs Observations

Typical Mobilised stiffness – multi-propped 80-90 % field Go; cantilever walls 50-70% field Go.



Comparison of secant shear modulus values



Results of near real-time back analysis

Key Project Outcomes



- Significant programme and cost savings
- Over 50 props removed – over 3000 tCO_2e savings (≈ 3000 London–New York return flights per passenger)
- Removal of time constraint for top precast prop installation – greater construction flexibility, improved site access, enhanced operational efficiency
- Enhanced safety through the elimination of temporary works
- Enabled early detection of accelerated movement + timely contingency action –managed extreme weather risks

- *"All threats were reduced, opportunities enhanced and issues resolved promptly… no matter what risk or issue arose I could always talk openly with the designer and utilise their knowledge to enable me to have the confidence to safely deliver the works."*
  - Feedbacks from the construction manager

Sixth Presentation



2026 AUSTRIA VIENNA WHERE IT ALL BEGAN 21st ICSMGE

Application of the Observational Method to historic structures: Quay walls (paper 231)

Mandy Korff (Deltares/TUDelft)

Rick Voortman & Geeralt van den Ham

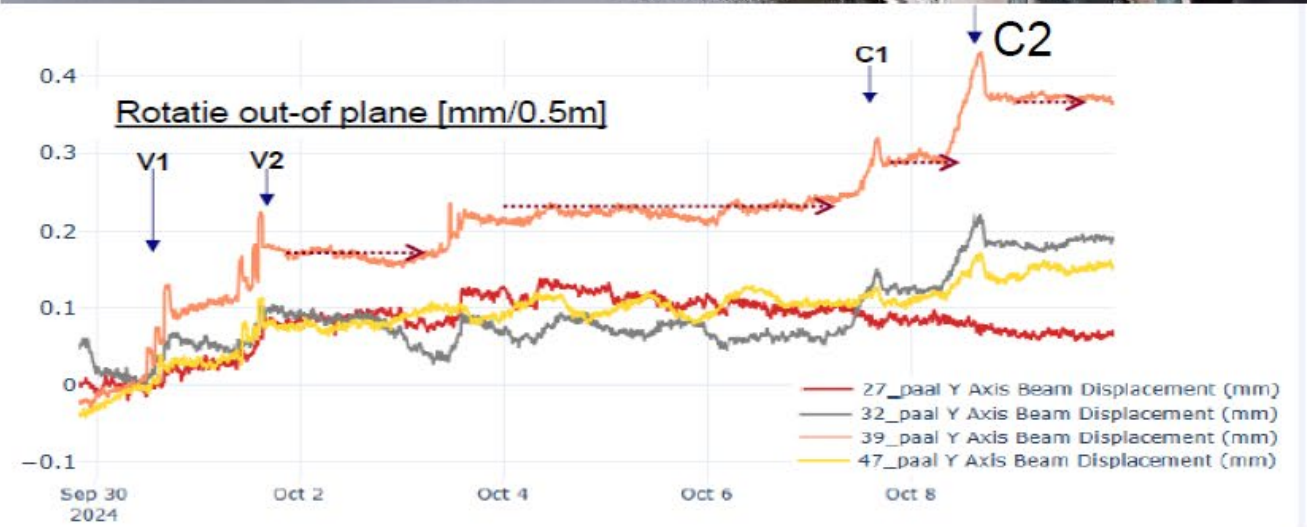
(City of Amsterdam)

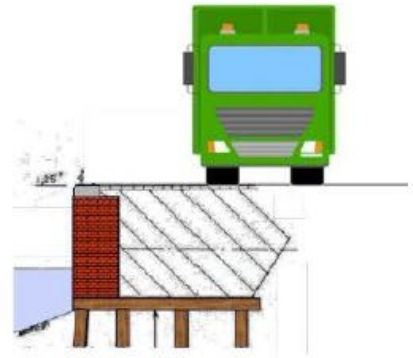
TUDelft Deltares

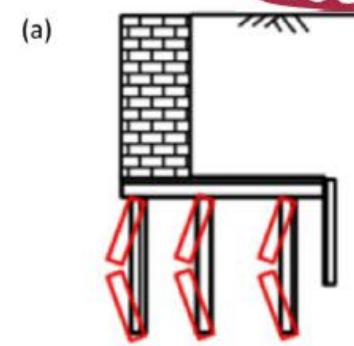
Gemeente Amsterdam

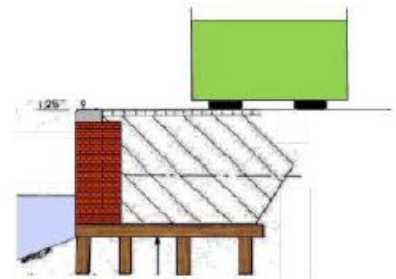
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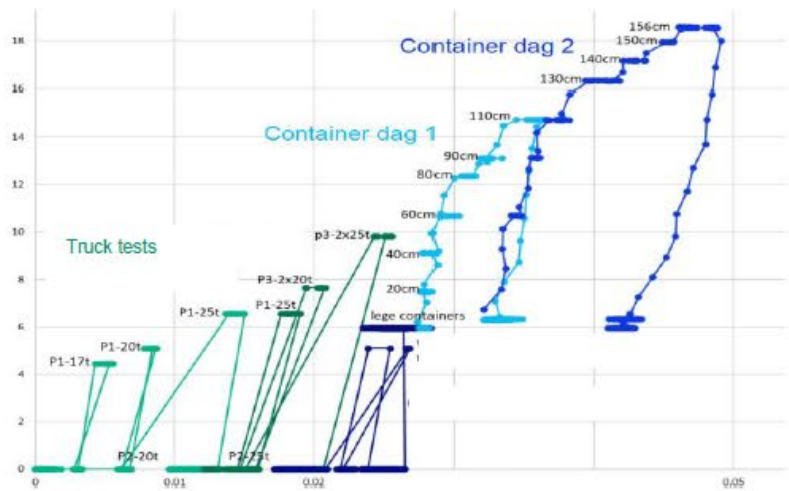












Application of OM to historic structures
Conclusions and summary

- The use of the Observational Method for historic structures is developed out of the need of dealing with the inherent uncertainties of old, largely varying, buried structures. With traditional methods many walls would have to be renovated or renewed, while their current performance in practice does not reflect such low reliability levels.
- For OM to be used, all failure mechanisms need to be very well understood
  - For complex, historic and buried structures, this is not always the case
  - FEM models are not sufficient

Therefor:

- Full scale testing => link failure criteria to deformations measured.
- Forensic investigation of failed quays and quays demolished for renewal.
  - e.g. Grimburgwal collapse in Korff et al (2022).

Vienna Conf. TC206 – Workshop Part 1

TC206 Workshop: Achieving Agreement to use the OM and RTBA

Chair: Tony O'Brien, Franz Tschuchnigg

Room L1
16:15 - 17:45

16:15 - 16:20	**Welcome & Introduction** (Duncan Nicholson)
16:20 - 16:50	**What Does the OM need to Succeed** (Chair: Tony O'Brien)
16:20 - 16:22	**Introduction** Tony O'Brien, Mott MacDonald
16:22 - 16:32	**Achieving Agreement to Use the OM** Hock Liong Liew, Mott MacDonald
16:32 - 16:40	**From Contracts to Codes – what else does the OM need to Succeed?** Tony O'Brien, Mott MacDonald
16:40 - 16-50	**Discussion**

What does the Observational Method need to Succeed

1. The Art of Achieving Agreement
2. Contracts
3. Safety, Serviceability + Codes

Tony O'Brien[1)], Hock Liong Liew[2)]

Mott MacDonald, United Kingdom

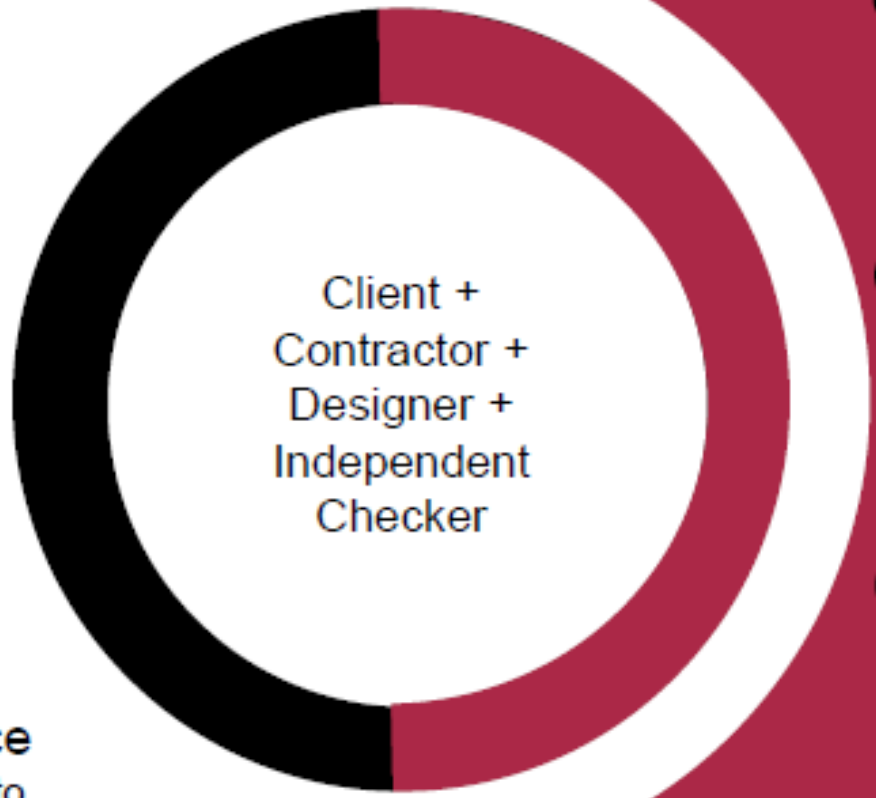
Paper ID: 1145, 1154

Main Barriers

1. **Contracts**
   Traditional contracts – inhibit design change during construction, no or limited equitable risk/reward sharing

2. **Industry culture**
   Risk-adverse, siloed behaviours, resistance to change – 'business as usual' unless crisis-driven – 'best way out'

3. **Design checking / assurance**
   Independent checking – reluctant to approve changeable designs, increasingly complex governance processes – limit flexibility



Achieving agreement

1. **Convincing business case**
   Clear commercial and technical benefits over conventional approaches.

2. **Sound technical basis**
   Multi-disciplinary skills often needed; competence and clarity must be evident.

3. **Risk management**
   Demonstrate acceptable safety and address differing stakeholder risk perspectives.

4. **Trust**
   Must be actively built; central to successful OM implementation

Observational Method + Contracts

NEC example (Note – **new** NEC creates more opportunity for the OM)
New version of FIDIC also provides a V.E. clause – so also supports OM!

Alignment of commercial interests is key

Additional effort needed + we need	**To Stimulate**	**NEC ECC4**
• Close co-ordination: client, contractor, designer, checkers • Non-adversarial environment – teamwork • Trust	• Need commercial incentivisation clauses in contract • share benefits • Value Engineering Clause in Contract - has been a "game changer" when introduced **(for any type of Contract!). It states how benefits shall be shared.**	• Payment Mechanisms, A to F (Target Cost preferred) • **Early Contractor Involvement (secondary option X22)** • **New core clause in NEC ECC4, Clause 16 – Value Engineering**

CODES + SERVICEABILITY

- O.M. used successfully well before Codes explicitly recognised OM
- Currently EC7 – permits use of O.M.; so Helpful
- Code does not provide much detail – (and perhaps we should not expect or want this?)
- Codes remain largely focussed on ULS checks
- Many OM applications about controlling deformation, ie SLS
- Although analytical power increased substantially, our ability to predict deformation reliably with any precision is limited (especially for complex geologies / some construction processes)
- Lessons Learnt from Case Histories and experienced engineering judgement continues to be key.

MOTT MACDONALD

2026 AUSTRIA VIENNA WHERE IT ALL BEGAN 21st ICSMGE

Invited Keynote Lecture

THE OBSERVATIONAL METHOD Lessons learnt future potential



Tony O'Brien, FREng.
MM Fellow

Hock Liong Liew, MICE.
Technical Director

TC 206 MEETING

- UPDATE “REAL TIME BACK ANALYSIS (RTBA)” GROUP

- **Franz Tschuchnigg**

Computational Geotechnics Group
Institute of Soil Mechanics, Foundation Engineering and Computational Geotechnics
Graz University of Technology

- GENERAL THINGS

- 34 meetings

- Conferences & workshops

- Paper at ICSMGE

- Technical presentations at meetings

- Group is growing

- RTBA @ ICSMGE

ICSMGE - Workshop

Duncan & Franz & Tony O

- “Workshop” Session booked (90 minutes)
- 2 discussion topics – Contracts & RTBA
- Link to Oral Session Papers.

- RTBA @ ICSMGE

ICSMGE - Workshop

Duncan & Franz & Tony O

TC206 Workshop: Achieving Agreement to use the OM and RTBA Chair: Tony O'Brien, Franz Tschuchnigg Room L1 16:15 - 17:45	
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16:40 - 16:50	**Discussion**

- RTBA @ ICSMGE

ICSMGE - Workshop

RTBA BLOCK

16:50 - 17:40	**RTBA** (Chair: Franz Tschuchnigg)
16:50 - 17:04	**Introduction to Real-Time Back Analysis and recent developments** Franz Tschuchnigg, Institute of Soil Mechanics, Foundation Engineering and Computational Geotechnics, Graz University of Technology
17:04 - 17:16	**Back analysis of the Old Oak Common box using surrogate models** Yunxiang Yang, Imperial College London
17:16 - 17:28	**Back analysis of a deep excavation – insights from manual and machine learning approaches** Ying Chen, Transport for London
17:28 - 17:40	**Near Real-Time Back Analysis to support the application of the Observational Method on High Speed Two retaining structures** Natalie Wride, Mott MacDonald
17:40 - 17:45	**Closing** (Duncan Nicholson)

+ TC206 Dinner@Tuesday:

- RTBA @ ICSMGE

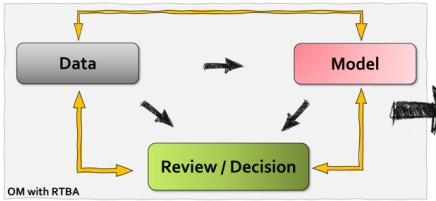
TC206 - OBSERVATIONAL METHOD WORKSHOP

Introduction to Real-Time Back Analysis and recent developments related to the Observational Method

F. Tschuchnigg*, D. Nicholson, A. Cañavate Grima
V. Zania, L. Nguyen (TC206 RTBA working group)

**Graz University of Technology*
Institute of Soil Mechanics, Foundation Engineering and Comp

CONCLUSIONS



Outcome of **RTBA within OM** is an updated design model informed by live (or near-live) observational data.

RTBA is not solely about generating forecasts but about **transforming observational data into actionable insights** that actively guide decision-making.

RTBA could **transforms OM into a quantitative, data-driven process** enabling geotechnical projects to remain responsive and resilient while ensuring safety, efficiency, and predictive control throughout the construction lifecycle.

- RTBA @ ICSMGE

Back analysis of the Old Oak Common box using surrogate models

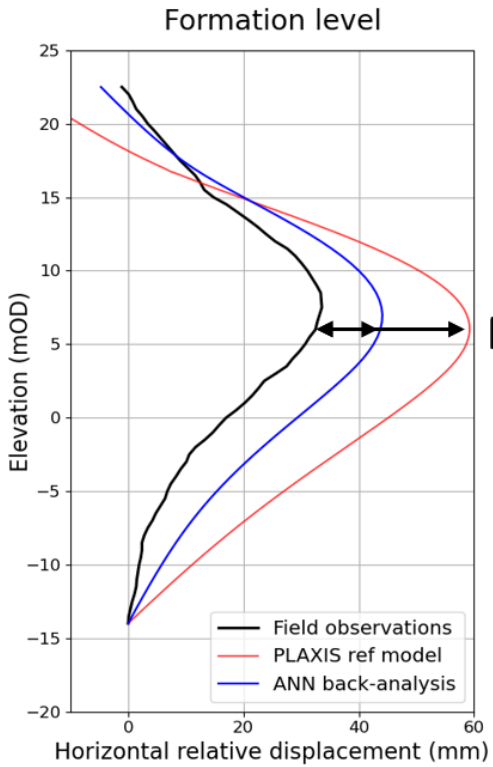
Yunxiang Yang[1)], **David M G Taborda**[1)], Aikaterini Tsiampousi[1)], Agustín Ruiz López[2)], Antonio M G Pedro[3)], Stuart Hardy[4)]

[1)] Imperial College London, London, UK

[2)] Seequent – The Bentley Subsurface Company, Delft, The Netherlands

[3)] Universidade de Coimbra, ISISE, ARISE, Coimbra, Portugal

[4)] ARUP, London, UK



Best-fit parameter set & the reference model using stiffness parameters proposed in Sailer et al. (2019) and the monitoring data.

Clearly, the new set of parameters can replicate very accurately the observed displacement.

- **Improvement:** ~ 55% reduction in maximum absolute displacement error

- RTBA @ ICSMGE

Back-analysis of a Deep Excavation:

insights from Manual & Machine learning approaches

Paper ID168

Dr Ying Chen | 16 June 2026

(Transport for London, UK)

- ❑ Both Manual and Machine learning back analysis approaches can provide 'good matching' predictions, subjected to following choices:
  - Geotechnical numerical model (i.e., 2D FEM, 3D FEM).
  - Soil constitutive models.
  - Monitoring data (i.e., accuracy and reliability).
- ❑ Interpretation of back analysis Optimal values requires engineering review.

- RTBA @ ICSMGE

Near Real-Time Back Analysis to support the Application of the Observational Method on High Speed Two Retaining Structures

Natalie Wride[1)], Zhandos Orazalin[1)], Hock Liong Liew[1)], Tony O' Brien[1)]

[1)] Mott MacDonald, UK

DAARWIN based on machine learning algorithms can enhance the implementation of OM as a back-analysis tool and coupled with our MM tools resulted in a combined interactive project database to support OM delivery in near real time..

Near real time back analysis has proved invaluable in:

- Characterising the stiffness of the Mercia Mudstone, enabling the uncertainty of mass strength and stiffness behaviour to be safely and cost-effectively managed and,
- Safely managing the local effects of an extreme weather event.

- RTBA @ ICSMGE





TC 206 MEETING

- UPDATE “REAL TIME BACK ANALYSIS (RTBA)” GROUP

- **Franz Tschuchnigg**

Computational Geotechnics Group
Institute of Soil Mechanics, Foundation Engineering and Computational Geotechnics
Graz University of Technology