Berlin
2017-12-05

# SC 7 / PT 4

# WG 3-Meeting in Berlin

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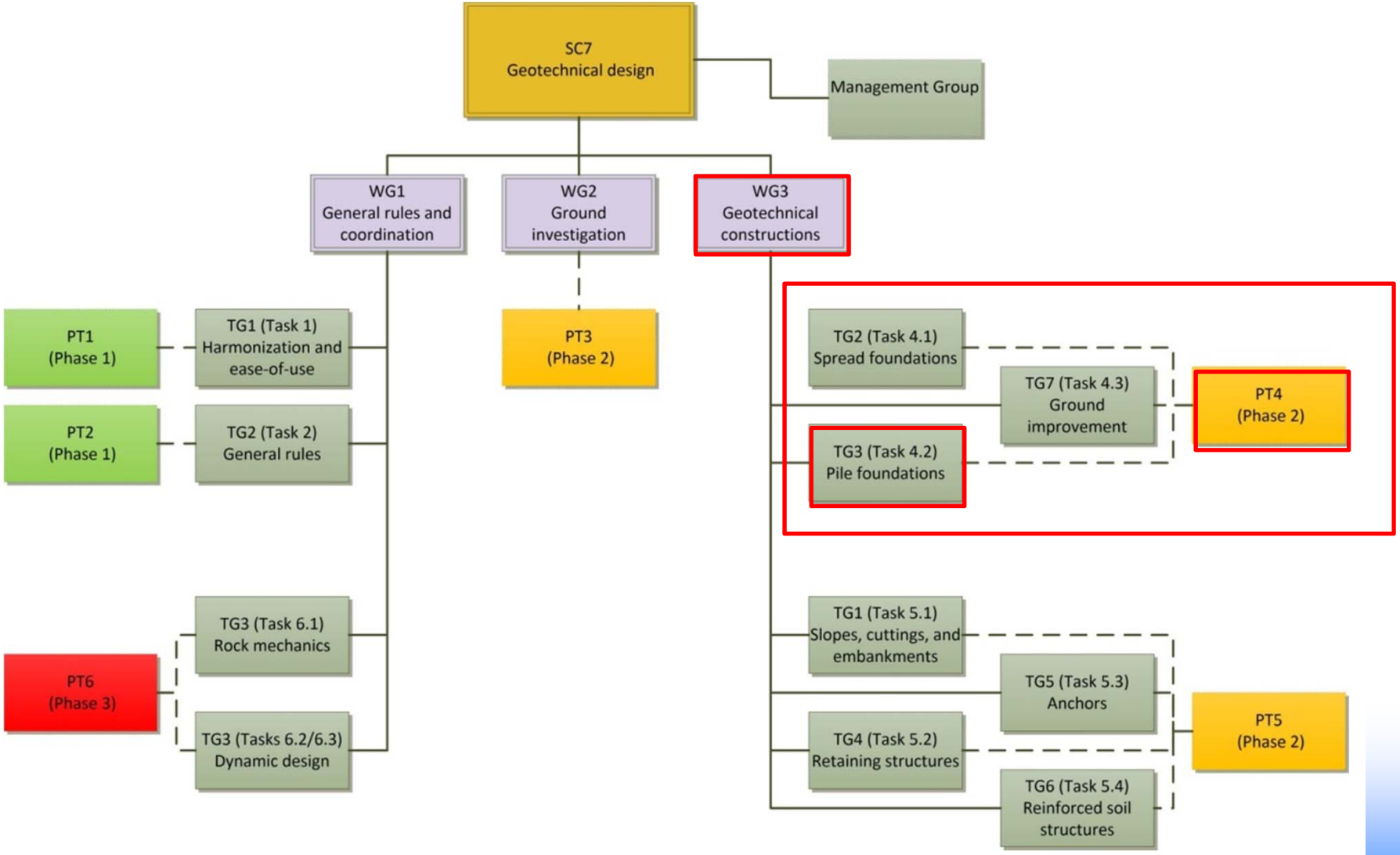
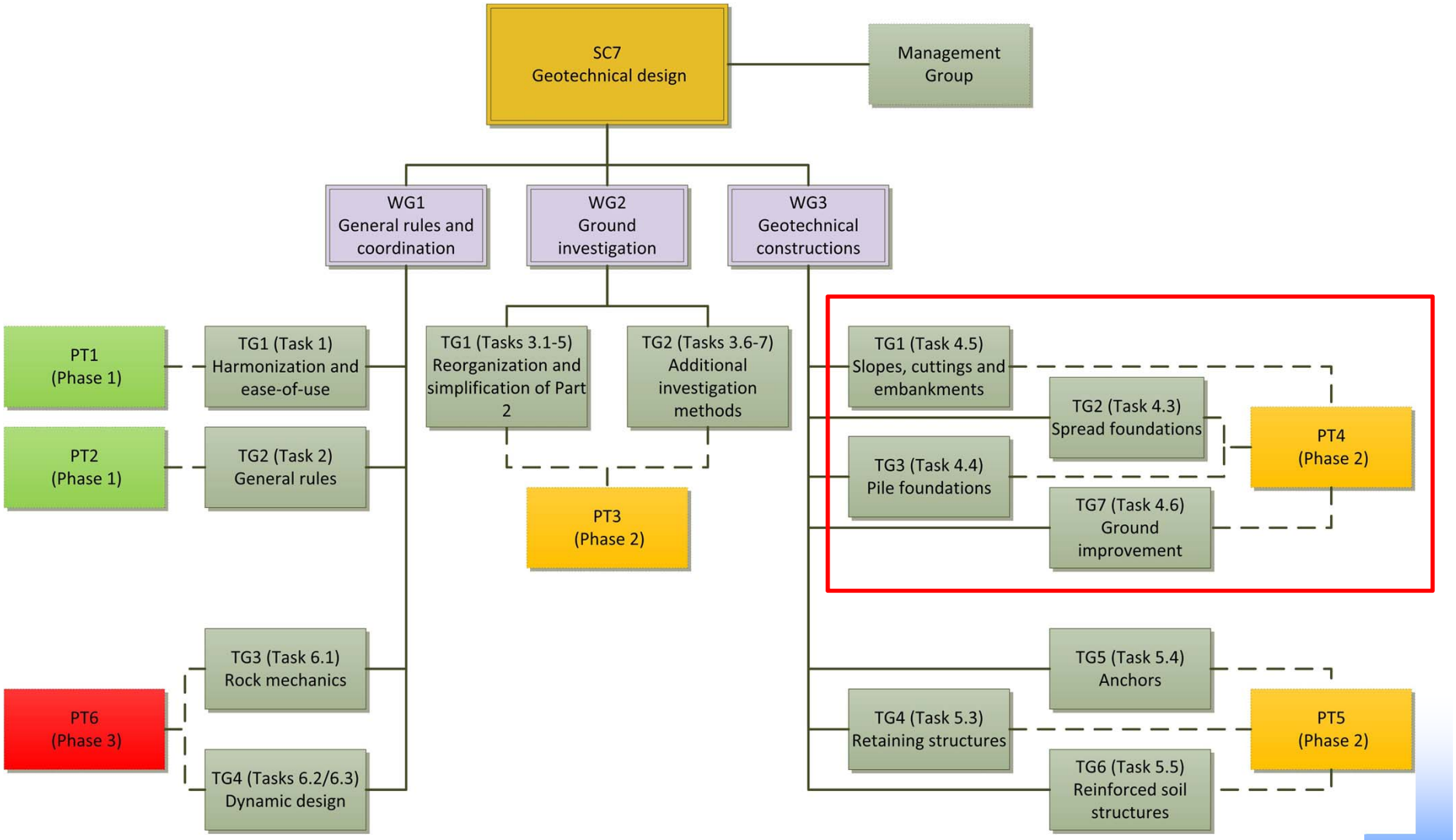
## Members of PT 4

| | | | | |
|---|---|---|---|---|
| **Leader** | **Moormann** | **Christian** | DEU | christian.moormann@igs.uni-stuttgart.de |
| **Member** | **Orr** | **Trevor** | IRL | torr@tcd.ie |
| **Member** | **Axelsson** | **Gary** | SWE | gary.axelsson@elu.se |
| **Member** | **Gavin** | **Kenneth** | NDL | k.g.gavin@tudelft.nl |
| **Member** | **Essler** | **Robert** | GBR | robert.essler@rdgeotech.co.uk |
| **(Ex-officio)** | **Bond** | **Andrew** | GBR | chairman@eurocode7.com |

## Tasks of PT 4 (previous)



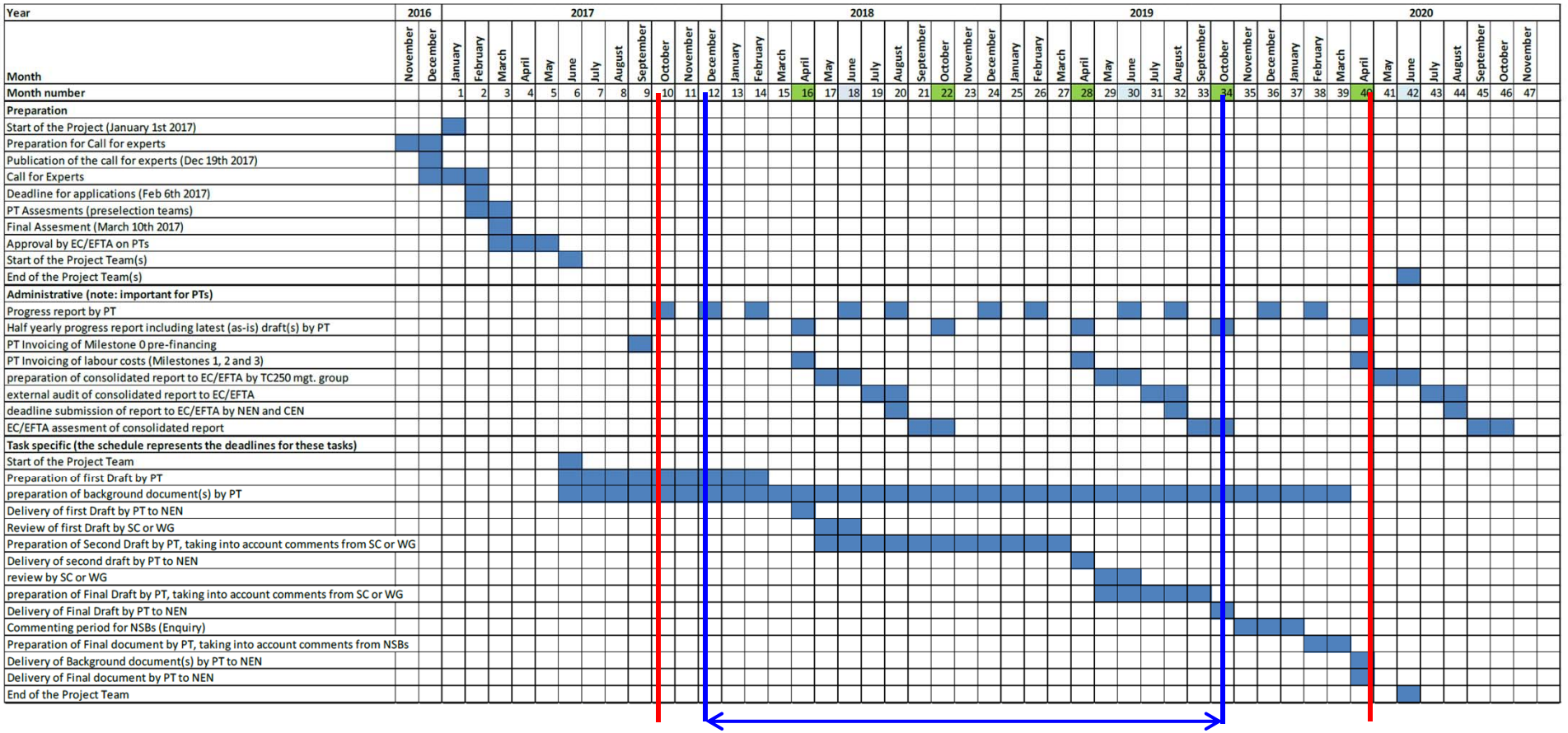
## Tasks of PT 4


SC7
Geotechnical design
Management
Group
WG1
General rules and
coordination
WG2
Ground
investigation
WG3
Geotechnical
constructions
PT1
(Phase 1)
TG1 (Task 1)
Harmonization and
ease-of-use
PT2
(Phase 1)
TG2 (Task 2)
General rules
TG1 (Tasks 3.1-5)
Reorganization and
simplification of Part
2
TG2 (Tasks 3.6-7)
Additional
investigation
methods
PT3
(Phase 2)
TG1 (Task 4.5)
Slopes, cuttings and
embankments
TG2 (Task 4.3)
Spread foundations
TG3 (Task 4.4)
Pile foundations
TG7 (Task 4.6)
Ground
improvement
PT4
(Phase 2)
PT6
(Phase 3)
TG3 (Task 6.1)
Rock mechanics
TG4 (Tasks 6.2/6.3)
Dynamic design
TG5 (Task 5.4)
Anchors
TG4 (Task 5.3)
Retaining structures
TG6 (Task 5.5)
Reinforced soil
structures
PT5
(Phase 2)

## Assignment of responsibilities to individual Project Team members

| | | ´editor´ | ´dialog partner´ / reviewer |
|---|---|---|---|
| 0 | Coordination, reporting, interdependencies, harmonization etc. | Christian Moormann | Ken Gavin |
| 1 | Slopes, cuttings and embankments | Gary Axelsson | Ken Gavin |
| 2 | Spread foundations | Trevor Orr | Christian Moormann |
| 3 | Pile foundations | Ken Gavin | Gary Axelsson<br>Christian Moormann |
| 4 | Ground improvement | Bob Essler | Trevor Orr<br>Christian Moormann |

## Timetable for the delivery of tasks




- Kick-off Meeting on PT4 October 2nd/3rd, 2017
- Formal contractual start backdated to January 1st, 2017
- Editing of draft of EC 7-3 to be completed by October 2019 → **22 months left**

## Detailed Workplan of PT4 – Deliveries

04/2018 **Delivery of 1st draft by PT 4 to NEN**

04/2019 **Delivery of 2nd draft by PT 4 to NEN**

**10/2019** **Delivery of final draft by PT 4 to NEN**

- review and discussion of comments
- Finalizing all documents

04/2020 Mandate of PT 4 formaly ends

# Timetable for the delivery of tasks

| Date | Task prepared |
|---|---|
| 02./03.10.2017<br>Brussels | ▪ Kick-off meeting<br>▪ Introduction by Chairman<br>▪ Draft of detailed working plan for PT4<br>▪ Assignment of responsibilities to individual Project Team members<br>▪ Identification of Tasks<br>▪ Draft of detailed timetable<br>▪ Discussion about general aims for editing EC 7-3 by PT (ease of use etc.) |
| 04./05.12.2017<br>Berlin | ▪ confirmation of assignment drafted in Brussels<br>▪ check of starting documents<br>▪ detailed working plan for sub-tasks<br>▪ Identification and coordination of interdependencies and elaboration of a concerted work plan for PT4<br>▪ First proposals / concepts for elaboration/revision of EC 7-3<br>▪ Preparation of joined meeting with WG 3 on 2017-12-05<br>▪ Draft of EC 7-1 (10/2017): review and comments/requests by PT4<br>▪ Draft of EC 2 (10/2017): review of contents as far as affecting structural design of piles |
| 01/2018<br>Telemeeting | ▪ Preparation of 1st draft by PT 4 |
| 02/2018<br>Stuttgart | ▪ Preparation of 1st draft by PT 4 |
| 03/2018 | ▪ Delivery of 1st draft by PT 4 to TGs for review |
| 04/2018 | ▪ Delivery of 1st draft by PT 4 to NEN |

## Aims for PT4

### Main goals for PT 4:

- **To enhance ease of use**

- **To harmonize practice across Europe**
  **→ minimize the use of NDPs**

## Aims for PT4

**To enhance ´Ease of use´**

**→ What is your / our common understanding?**

- **focus on basic rules relevant for safety and ULS/SLS proof**
- **only rules which are well-proven by engineering practice**
- **Simplify where possible**
  - **clarity of the text**
  - **avoiding textbook-like explanation**
  - **avoiding doublings**
- **cover issues so far no guideline provided**
- **Include calculation methods also?**

## Aims for PT4

**To harmonize practice across Europe (minimize the use of NDPs)**

**→ What is your / our common understanding?**

- **Use of NDPs → also related of proposals of PT1 and PT2**
- **Compilation of NDPs nationally used available for all items?**

- **Is there reliable/scientific basis for revising new set of**
  **- partial safety factors**
  **- correlation factors**
  **- model factors?**

## Aims for PT4

### Items which request evolution of existing sections

- spread foundations
- pile foundations
- Slopes, cutting and embankments

### New work item: ground improvement

- can be relevant for nearly all application like foundations, slopes, excavations
  → many interdependencies
- concept discussed by evolution group to be further developed

# Detailed Task Description

### A.8.2 Task SC7.T4: Foundations, slopes and ground improvement

| | | | |
|---|---|---|---|
| **Task Ref:** | **SC7.T4** | **Task Name:** | Foundations, slopes, and ground improvement |
| **Outline Task Scope:** | Include widely-used calculation models for geotechnical design based on existing national practice and recent research. Add calculation models for widely used foundations types and techniques, thereby reducing barriers to trade.<br><br>In drafting the new work, care will be taken to be as clear as possible, to use simple routes throughout the document, and to avoid additional and/or empirical rules for particular structure or structural-element types, all to the extent that is reasonably practical. | | |
| **Starting documents:** | New Eurocode 7 Part 3 (from Task 1) plus new/revised paragraphs from Task 6. | | |

| Sub-task Ref. | Sub-task name | Brief description, background and reasons for the work | Key benefits | Output (e.g. new Eurocode part; new or modified clauses in existing Eurocode part) | Further details on reference documents | Interdependencies | Related CEN/TC 250 subordinate groups |
|---|---|---|---|---|---|---|---|
| 1 | Reduction in number of National Choices (NDPs) | Review the contents of all Countries' National Annexes and key supporting documents provided to the Project Team. Following guidance provided by CEN/TC 250, agree NDPs to consider for detailed review with the relevant SC/WG/HG. Develop proposals to reduce the number of NDPs and/or enable better consensus on values adopted by Countries to be achieved. Incorporate those proposals agreed with the relevant SC/WG/HG into task deliverables. | | | CEN/TC 250 "Position paper on on reducing the number of Nationally Determined Parameters (NDPs) in the Structural Eurocodes" | | |
| 2 | Enhanced ease of use | Apply recommendations in CEN/TC 250 Position paper on enhancing ease of use of the Structural Eurocodes (N1239). Enhance ease of use by improving clarity, simplifying routes through the Eurocode, avoiding or removing rules of little practical use in design and avoiding additional and/or empirical rules for particular structure or structural-element types, all to the extent that it can be technically justified whilst safeguarding the core of essential technical requirements. | | | CEN/TC 250 N1239 "Position paper on enhancing ease of use of the Structural Eurocodes" | | |
| 3 | Spread foundations | Add (normative and informative) models for shallow foundations that have been demonstrated to yield good designs.<br>This work would make use of the background research being undertaken by TC250/SC7's Evolution Group 10 for 'Calculation models'.<br>Formal surveys of practising engineers have revealed demand for widely-accepted calculation models for spread foundations to be added to Eurocode 7. Engineers need guidance on the best models available for different design situations, without having to resort to non-normative (typically national, not international) documents. | Increased harmonization of design practice across Europe<br>Improved use of Eurocode 7 in day-to-day design practice<br>Reduced conservatism in design | Section 2 of new standard EN 1997-3<br>New annexes in EN 1997-3 | | SC7.T1 | SC7/WG3 "Geotechnical constructions" |
| 4 | Pile foundations | Document the most commonly used calculation methods and formulas to determine pile resistance or behaviour for inclusion in (informative) annexes of EN 1997-1. Provide recommended values of any model factors that are needed to ensure consistent levels of reliability.<br>Add to the standard new or more precise rules for common aspects of pile design, such as negative skin friction, lateral loads, pile groups, buckling, dynamic and cyclic loading, etc. These additional rules have to be elaborated. For seismic design of pile foundations a strong relation to EC 8 is planned.<br>This work would make use of the background research being undertaken by TC250/SC7's Evolution Group 7 for 'Pile Design'.<br>Formal surveys of practising engineers have revealed demand for widely-accepted calculation models for pile foundations to be added to Eurocode 7. Engineers need guidance on the best models available for different design situations, without having to | Increased harmonization of design practice across Europe<br>Improved use of Eurocode 7 in day-to-day design practice<br>Reduced conservatism in design | Section 3 of new standard EN 1997-3<br>New annexes in EN 1997-3 | | SC7.T1 | SC7/WG3 "Geotechnical constructions" |

## Detailed Task Description

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|---|---|---|---|
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| 2 | Enhanced ease of use | Apply recommendations in CEN/TC 250 Position paper on enhancing ease of use of the Structural Eurocodes (N1239). Enhance ease of use by improving clarity, simplifying routes through the Eurocode, avoiding or removing rules of little practical use in design and avoiding additional and/or empirical rules for particular structure or structural-element types, all to the extent that it can be technically justified whilst safeguarding the core of essential technical requirements. | |
| 3 | Spread foundations | Add (normative and informative) models for shallow foundations | Incre |

## Detailed Task Description

| | | | |
|---|---|---|---|
| 3 | Spread foundations | Add (normative and informative) models for shallow foundations that have been demonstrated to yield good designs.<br>This work would make use of the background research being undertaken by TC250/SC7's Evolution Group 10 for 'Calculation models'.<br>Formal surveys of practising engineers have revealed demand for widely-accepted calculation models for spread foundations to be added to Eurocode 7. Engineers need guidance on the best models available for different design situations, without having to resort to non-normative (typically national, not international) documents. | |
| 4 | Pile foundations | Document the most commonly used calculation methods and formulas to determine pile resistance or behaviour for inclusion in (informative) annexes of EN 1997-1. Provide recommended values of any model factors that are needed to ensure consistent levels of reliability.<br>Add to the standard new or more precise rules for common aspects of pile design, such as negative skin friction, lateral loads, pile groups, buckling, dynamic and cyclic loading, etc. These additional rules have to be elaborated. For seismic design of pile foundations a strong relation to EC 8 is planned.<br>This work would make use of the background research being undertaken by TC250/SC7's Evolution Group 7 for 'Pile Design'.<br>Formal surveys of practising engineers have revealed demand for widely-accepted calculation models for pile foundations to be added to Eurocode 7. Engineers need guidance on the best models available for different design situations, without having to resort to non-normative (typically national, not international) documents. | |

# Detailed Task Description

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | resort to non-normative (typically national, not international) documents. | | | | | |
| 5 | Cuttings and embankments | Add (normative and informative) models for cuttings and embankments that have been demonstrated to yield good designs.<br>This work would make use of the background research being undertaken by TC250/SC7's Evolution Group 10 for 'Calculation models'.<br>Formal surveys of practising engineers have revealed demand for widely-accepted calculation models to be added to Eurocode 7.<br>Engineers need guidance on the best models available for cuttings and embankments for different design situations, without having to resort to non-normative (typically national, not international) documents. | Increased harmonization of design practice across Europe<br>Improved use of Eurocode 7 in day-to-day design practice<br>Reduced conservatism in design | Section 4 of new standard EN 1997-3<br>New annexes in EN 1997-3 | | SC7.T1 | SC7/WG3 "Geotechnical constructions" |
| 6 | Ground improvement | Review existing ground improvement techniques and their design to find common principles and rules features for inclusion on Eurocode 7.<br>This work would make use of the background research being undertaken by TC250/SC7's Evolution Group 14 for 'Ground improvement'.<br>Techniques for improving in situ ground by deep compaction, soil mixing, and stone or concrete columns are widely used but not covered by the existing version of Eurocode 7. These techniques can offer considerable savings in the total costs of construction. | Provision of rules for design of ground improvement techniques<br>Improved economy in design | Additions to the text of EN 1997-1<br><br>Section 5 of new standard EN 1997-3 | | SC7.T1 | SC7/WG3 "Geotechnical constructions" |
| 7 | Harmonization of NDPs for pile design | Review the contents of all countries' National Annexes plus available JRC data; collate values for NDPs where they differ from recommended values.<br>Consult with different countries to understand rationale behind NDPs where they are significantly different from recommended values. Perform calculations to demonstrate significance of these variations in NDPs. Reduce the number of NDPs to an acceptable minimum.<br>This work would make use of the background research being undertaken by TC250/SC7's Evolution Group 8 for 'Harmonization´ and would be performed in conjunction with task SC7.A<br>Pile design varies significantly across Europe and could be made more consistent and economical by the establishment of common rules. | Increased harmonization of design practice across Europe | New annexes in EN 1997-3 | | SC7.T1 | SC7/WG3 "Geotechnical constructions" |
| 8 | Alignment with ENs 1992-6 (structural design of foundations) | Review existing rules given in ENs 1992, 1993, 1995 and 1996 regarding structural design of concrete, steel, timber and masonry foundations. Propose improvements to ensure better alignment with EN 1997 and to reduce unintended conservatism. Foundation construction can be made more economic by establishing better rules for structural design of foundations | Alignment with ENs 1992, 1993, 1995 and 1996<br>Reduced conservatism in design | Changes to ENs 1992, 1993, 1995 and 1996 | | SC7.T1<br>Tasks belonging to<br><br>SC2, SC3, SC4, SC5, SC6 | SC7/WG3 "Geotechnical constructions" |
| 9 | Practical design examples | Provide example calculations to Eurocode 7 for common foundation types.<br>This work would make use of the background research being undertaken by TC250/SC7's Evolution Group 3 for 'Model solutions'. | Provision of best-practice guidance | Scientific and Policy Report | | | SC7/WG3 "Geotechnical constructions" |

## Detailed Task Description

| | | | |
|---|---|---|---|
| 5 | Cuttings and embankments | Add (normative and informative) models for cuttings and embankments that have been demonstrated to yield good designs.<br>This work would make use of the background research being undertaken by TC250/SC7's Evolution Group 10 for 'Calculation models'.<br>Formal surveys of practising engineers have revealed demand for widely-accepted calculation models to be added to Eurocode 7. Engineers need guidance on the best models available for cuttings and embankments for different design situations, without having to resort to non-normative (typically national, not international) documents. | |
| 6 | Ground improvement | Review existing ground improvement techniques and their design to find common principles and rules features for inclusion on Eurocode 7.<br>This work would make use of the background research being undertaken by TC250/SC7's Evolution Group 14 for 'Ground improvement'.<br>Techniques for improving in situ ground by deep compaction, soil mixing, and stone or concrete columns are widely used but not covered by the existing version of Eurocode 7. These techniques can offer considerable savings in the total costs of construction. | |

## Detailed Task Description

| | | | |
|---|---|---|---|
| | | can offer considerable savings in the total costs of construction. | |
| 7 | Harmonization of NDPs for pile design | Review the contents of all countries' National Annexes plus available JRC data; collate values for NDPs where they differ from recommended values.<br>Consult with different countries to understand rationale behind NDPs where they are significantly different from recommended values. Perform calculations to demonstrate significance of these variations in NDPs. Reduce the number of NDPs to an acceptable minimum.<br>This work would make use of the background research being undertaken by TC250/SC7's Evolution Group 8 for 'Harmonization´ and would be performed in conjunction with task SC7.A<br>Pile design varies significantly across Europe and could be made more consistent and economical by the establishment of common rules. | |
| 8 | Alignment with ENs 1992-6 (structural design of foundations) | Review existing rules given in ENs 1992, 1993, 1995 and 1996 regarding structural design of concrete, steel, timber and masonry foundations. Propose improvements to ensure better alignment with EN 1997 and to reduce unintended conservatism. Foundation construction can be made more economic by establishing better rules for structural design of foundations | |

## Detailed Task Description

| | | | |
|---|---|---|---|
| 9 | Practical design examples | Provide example calculations to Eurocode 7 for common foundation types.<br>This work would make use of the background research being undertaken by TC250/SC7's Evolution Group 3 for 'Model solutions'. | |

## Starting documents

- **Systematic Review of existing EC 7-1 commented by TG´s**
- **Draft of EC 7-3 from Task 1 (PT 1 and PT 2)**
- **Final report (hand-over document) provided by TGs:**
  **for pile foundations and spread foundations,**
  **but so far not for ground improvement and slopes ….**

⇒ **Request to Task Groups (convenors):**
**Please send us a list of all relevant documents to be considered by PT 4 and forward these documents directly to us**

# Starting documents

## New Eurocode 7 Part 3 (from Task 1)

CEN/TC 250

Date: 202x-10

prEN 1997-3:202x

CEN/TC 250

Secretariat: NEN

**Eurocode 7: Geotechnical design — Part 3: Geotechnical constructions**

*Eurocode 7 - Entwurf, Berechnung und Bemessung in der Geotechnik — Teil 3: Geotechnische Bauten*

*Eurocode 7 - Calcul géotechnique — Partie 3: Constructions géotechniques*

ICS:

Descriptors:

## Starting documents

**New Eurocode 7 Part 3 (from Task 1) → new structure for SC7-3**

**Spread Foundations**

# Starting documents

## New Eurocode 7 Part 3 (from Task 1) → new structure for SC7-3

## Pile Foundations

## Starting documents

**New Eurocode 7 Part 3 (from Task 1) → new structure for SC7-3**

### Slopes, Cuttings and Embankments (1/2)

## Starting documents

**New Eurocode 7 Part 3 (from Task 1) → new structure for SC7-3**

### Slopes, Cuttings and Embankments (2/2)

## Starting documents

**New Eurocode 7 Part 3 (from Task 1) → new structure for SC7-3**

**Ground Improvement**

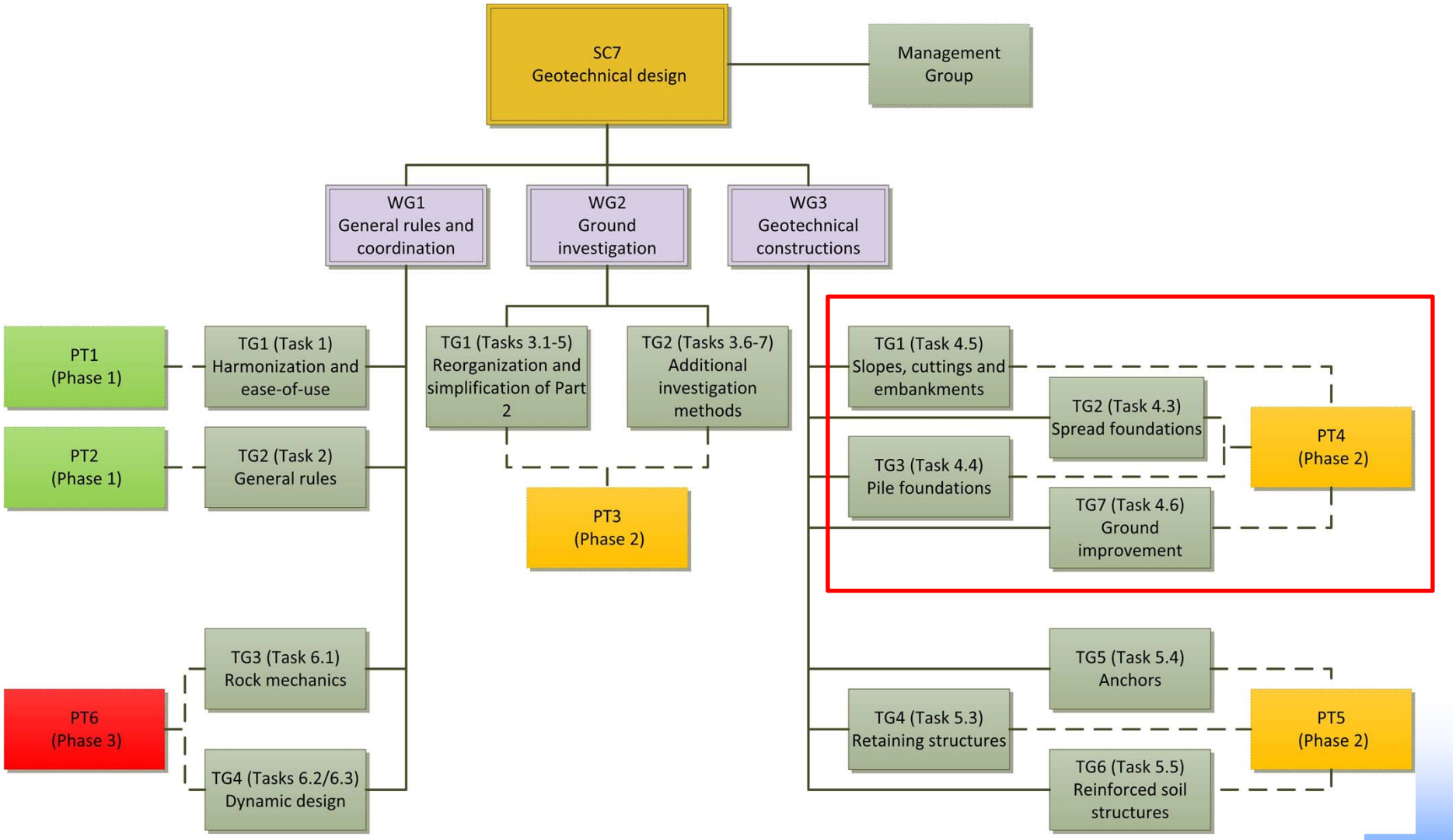
## Starting documents

**New Eurocode 7 Part 3 (from Task 1) → new structure for SC7-3**

**Informative Annexes**

# 5| Relationship of PT 4 to Task Groups

## Organisational chart



# 5| Relationship of PT 4 to Task Groups

## Review and interaction with Task Groups

**slopes, cuttings and embankments → to be shadowed by WG3/TG1**

**spread foundations → to be shadowed by WG3/TG2**

**pile foundations → to be shadowed by WG3/TG3**

**ground improvement → to be shadowed by WG3/TG7**

| | | ´editor´ | ´dialog partner´ / reviewer |
|---|---|---|---|
| 1 | Slopes, cuttings and embankments | Gary Axelsson | Ken Gavin |
| 2 | Spread foundations | Trevor Orr | Christian Moormann |
| 3 | Pile foundations | Ken Gavin | Gary Axelsson<br>Christian Moormann |
| 4 | Ground improvement | Bob Essler | Trevor Orr<br>Christian Moormann |

## Interaction of PT 4 with Task Groups

**Our basic idea**

- **to work independently**
- **to deliver our task in time**
- **to create a modern and forward-looking version of EC 7-3**

**but also**

- **to consider preliminary work done by EGs and TGs**
- **to consider proposals for improvement**
- **to consider best engineering practice across Europe**
- **to consider European diversity in geotechnical design**
- **to finally create documents which have potential to find acceptance by most European countries**

⇒ **to listen to TGs and to ask for TGs support**

# 5| Relationship of PT 4 to Task Groups

## Review and interaction with Task Groups

**Our proposal / expectation towards Task Groups**

**We need a good liaison and TGs support**

**review function:**

- review and comment of documents drafted by PT4
- PT4 intends to send draft of documents to TGs one month before formal delivery to NEN and to ask for comments

**consulting function:**

- supporting with national documents
- support for evaluation of NDPs
- support for identifying ´widely accepted calculation models´
- discussion of new proposals

**proposal for improved communication:**

- PT 4 leader and responsible ´editor´ willing to join TGs meetings on invitation by TG´s convenor