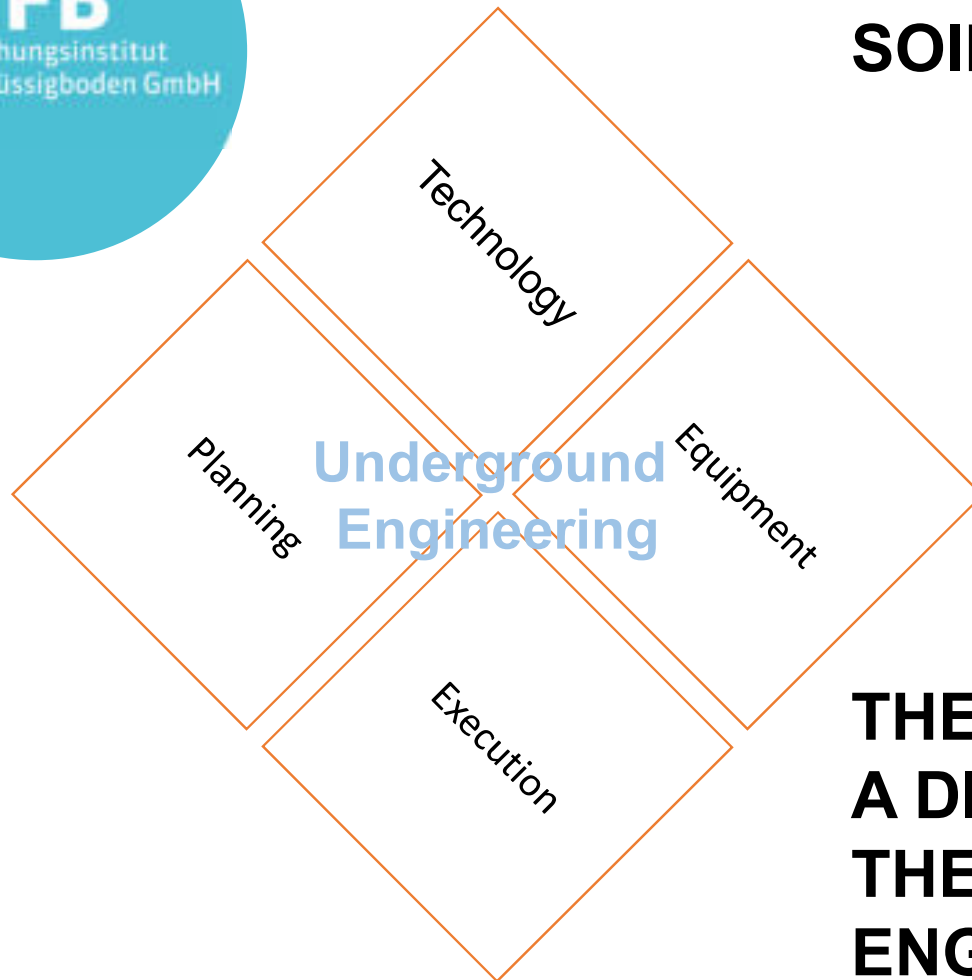




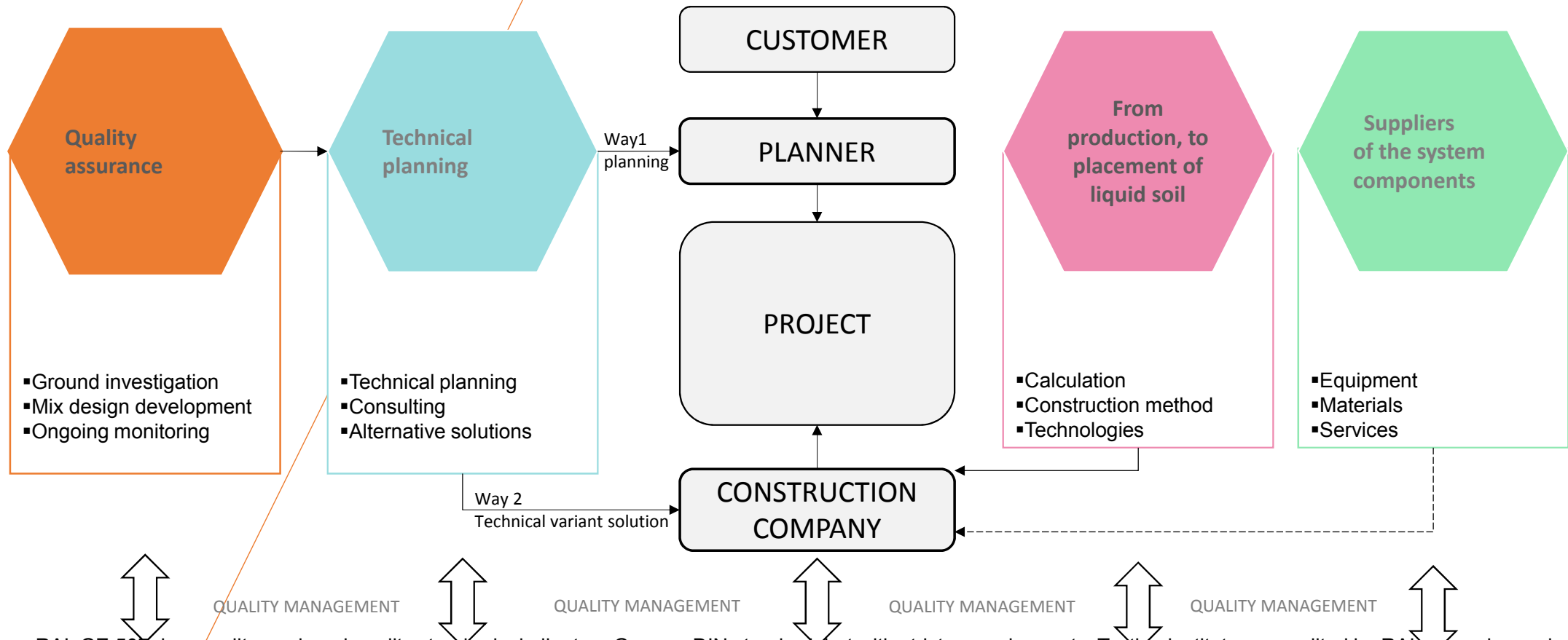
NEWS ABOUT THE RSS[®] LIQUID SOIL METHOD FROM 2017/2018



THE RSS[®] LIQUID SOIL METHOD – A DISRUPTIVE INNOVATION IN THE FIELD OF UNDERGROUND ENGINEERING

New services for users of the RSS liquid soil method - Olaf Stolzenburg, www.fi-fb.de

CONCERNED BUSINESS PROCESSES IN UNDERGROUND ENGINEERING

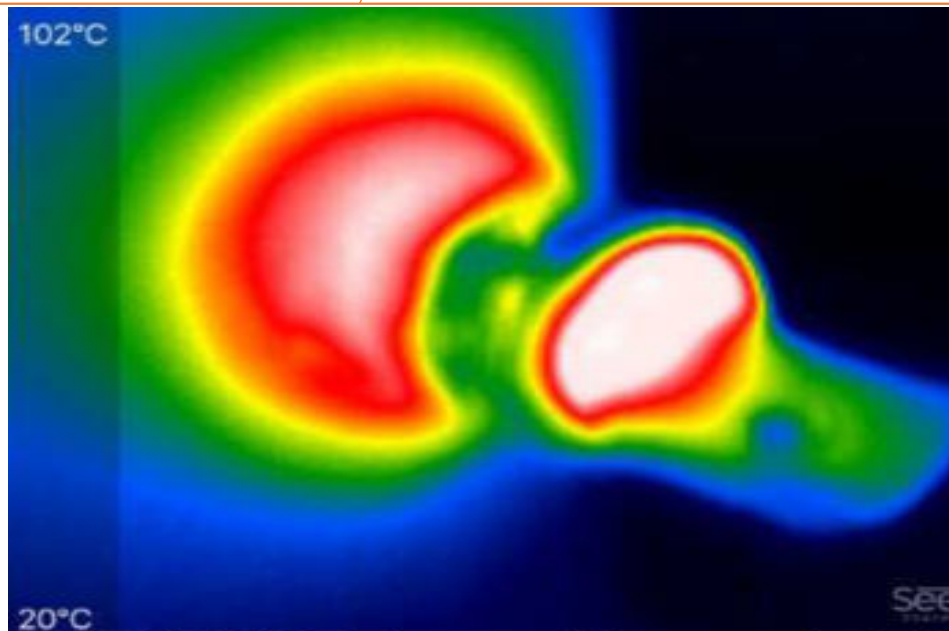


- RAL GZ-507: is a quality mark and quality standard, similar to a German DIN standard, but with stricter requirements. Testing institutes accredited by RAL supervise and verify the application of the liquid soil method according to RAL-GZ 507, and enforce required standards
- The required training for users in terms of quality assurance is offered by "RAL quality association for liquid soil e.V.", in collaboration with the developers and practitioners. see www.ral-gg-fluessigboden.de
- The „RAL Gütegemeinschaft Flüssigboden e. V.“ (RAL Quality Association for Liquid Soil) offers educational programmes for the many newly developed technologies and solutions for users, in cooperation with the developers and practitioners.
- Also see www.fi-fb.de; www.logic-engineering.de

NEW FROM RESEARCH & DEVELOPMENT

I

Testing of thermally stabilizing RSS® liquid soil at 90 ° C and under specified placement conditions



12/06/2017: Thermal image detail

Underground cable and GIL:

Development of an attempt to prove consistently good heat dissipation and lack of dehydration when using thermally stabilizing RSS® liquid flooring TS under installation conditions - basis for maximizing the electrical load or alternatively minimizing the required conductor cross-sections

NEW FROM RESEARCH & DEVELOPMENT

I Project for the recovery of old suspensions, initiated and accompanied by the Berlin Environmental Senate

Forschungsinstitut für Flüssigboden GmbH
privatrechtliches Unternehmen
Museumstraße 130
10559 Berlin
Tel: 030 41 241 27 51

FIFB
Forschungsinstitut
für Flüssigboden GmbH

Berlin.de
Beauftragung für Umwelt, Verkehr und
Wirtschaft - Berlin
am Aufbaujahr 2012
10119 Berlin
www.berlin.de

Beurteilung

Nr. E-16-264

Auftraggeber: Senatsverwaltung für
Stadtentwicklung und Umwelt
Brückenstraße 6
10179 Berlin

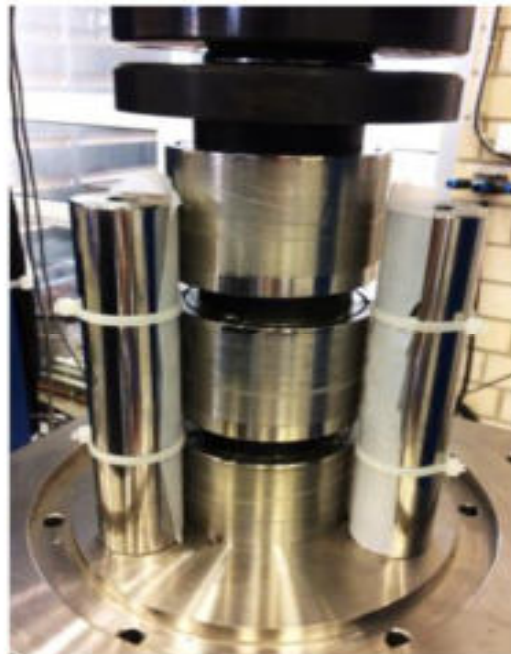
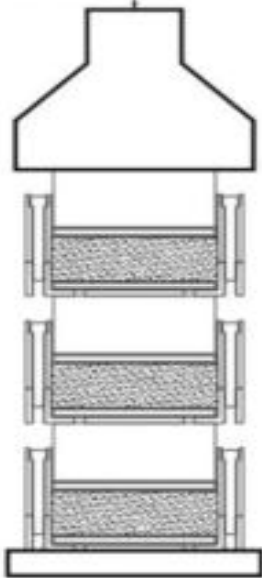
Gegenstand: Beurteilung der Wiederverwertbarkeit der übergebenen
Probe einer Bentonitallsuspension/Bentonitsand als Be-
standteil von Flüssigboden nach RAL GZ 507, hergestellt
aus einer örtlichen, Berliner Bodenprobe und der Eignung
dieses Flüssigbodens in Bezug auf die zu erwartenden
bodenmechanischen Parameter nach DIN 18136 und der
typischen Gebrauchseigenschaften beim Einsatz zur Ver-
füllung von Rohr- und Leitungsgräben

Recycling old suspensions: stimulated and accompanied by the Environmental Senate of the City of Berlin, a solution was worked out in order to be able to recycle and reuse old suspensions, eg from pipe operations and drilling etc. in a technically and legally correct way, in the sense of a circular economy. The required verification and process control meets the requirements of the legislator.

NEW FROM RESEARCH & DEVELOPMENT

I Railway construction and suitability of LS for use in pressure zones

dynamische Belastung



Railway construction: Proof of the suitability and applicability of RSS liquid soil D under dynamic load impact as the basis for the use for application in pressure zones of railway embankments as part of a joint R & D project initiated by the EBA with Münster University of Applied Sciences.

NEW FROM RESEARCH & DEVELOPMENT

Material behaviour in LS - basis of pipe statics and performance

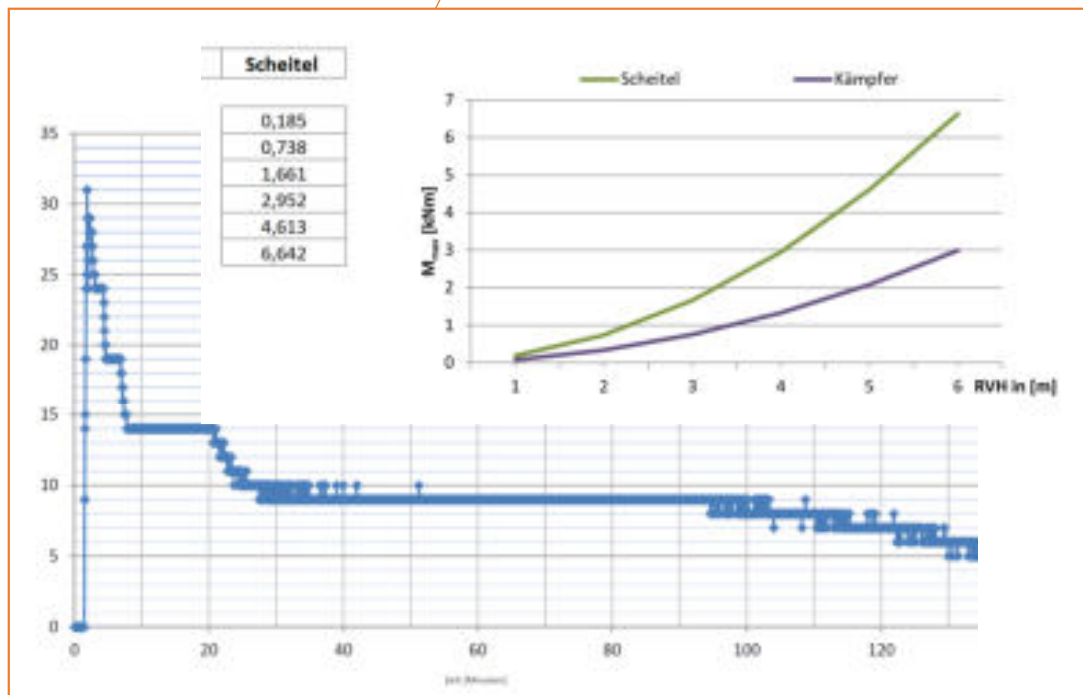


Data collection - Pipe statics: "Load case buoyancy in RSS liquid soil" - measurements on flexible pipes under installation conditions to determine the characteristic reconsolidation behaviour of liquid soil as the basis for more accurate buoyancy verifications. As a result of the thixotropic behavior of the RSS[®] liquid soil, the required data for power reserves and thus construction time reductions can be made available for further calculations.

NEW DEVELOPMENTS



Pipe statics Load case Liquid soil

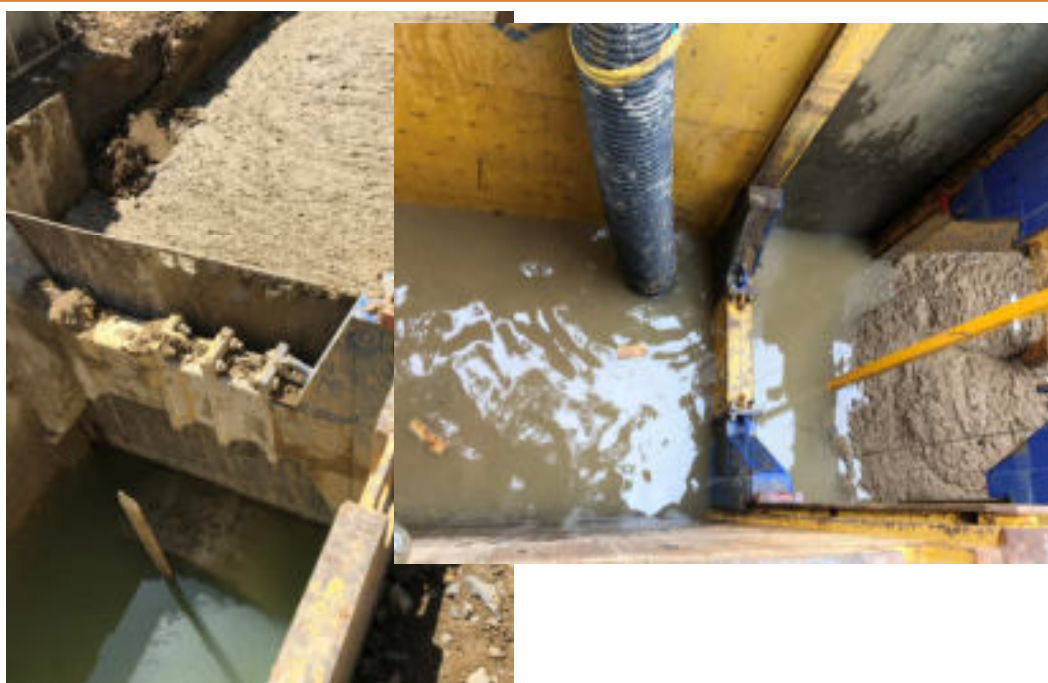


Pipe statics: Advancement of the calculation method for the development of the pipe statics with the aim of maximum construction output and thus shorter construction times with safety against buoyancy and pipe deformation, and advantageous, performance-promoting timing of pipe lengths and work steps. The basis for this is provided by the characteristic values for material and behaviour of the pipes, which have been determined in experiments, for concrete pipes with altered rheological properties of the liquid soil.

NEW DEVELOPMENTS



Constructing under water without drainage, deep foundation and without a watertight pit



Underwater construction: underwater construction of sewers as a modification of the floating placement technology, including calibration and verification of the correct position of the pipes installed under water with the appropriate and specially designed measuring equipment.

NEW DEVELOPMENTS

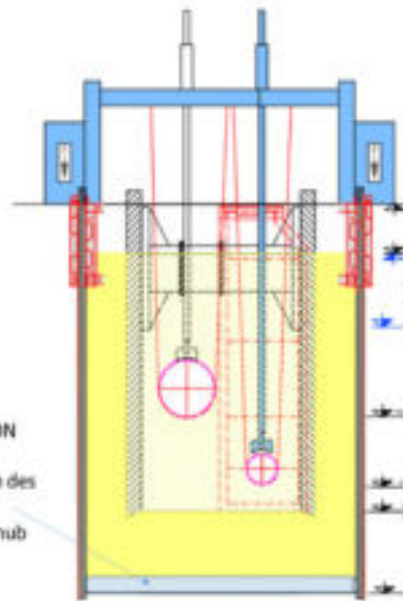


Constructing with small nominal sizes under the groundwater level



Setzen eines KG DN 500 Rohres im untersten Bereich des Rohrgrabens während Erstaushub „Holländische Bauweise“

Abbildung 20: Drainage "Holländische Bauweise"



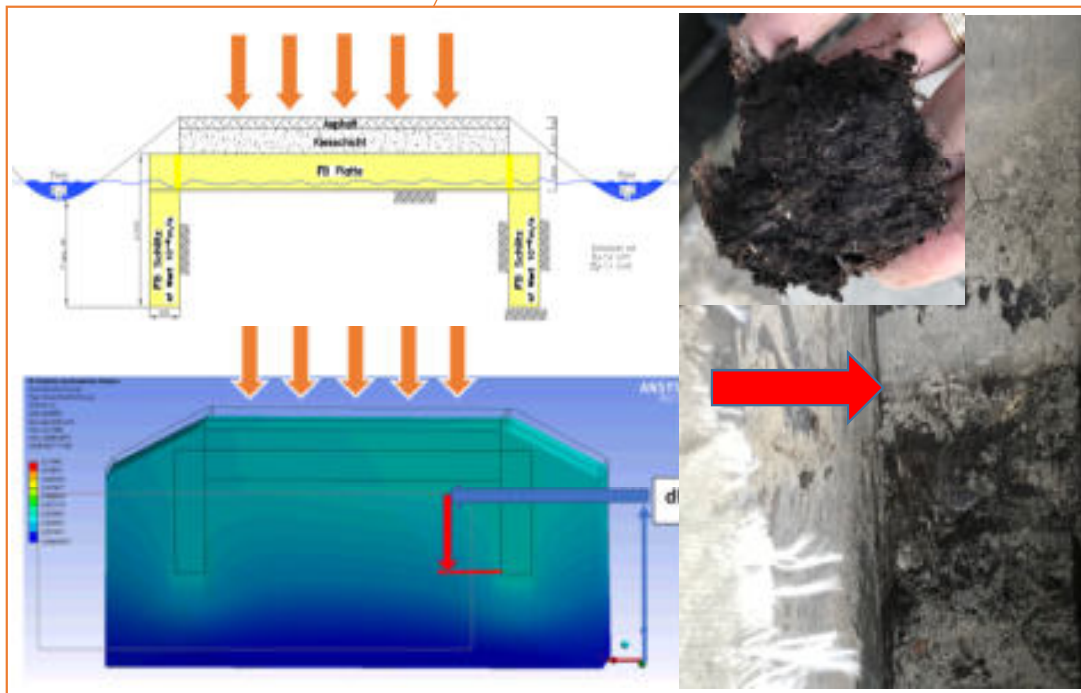
Constructing under water with small pipe sizes:

Development of a technology for constructing under the water surface even with small nominal pipe sizes without dewatering or lowering of the groundwater level, including the required measuring arrangement and verification.

NEW DEVELOPMENTS



Road construction on unsustainable surfaces, eg peat with RSS® liquid soil without mineralization - without settling

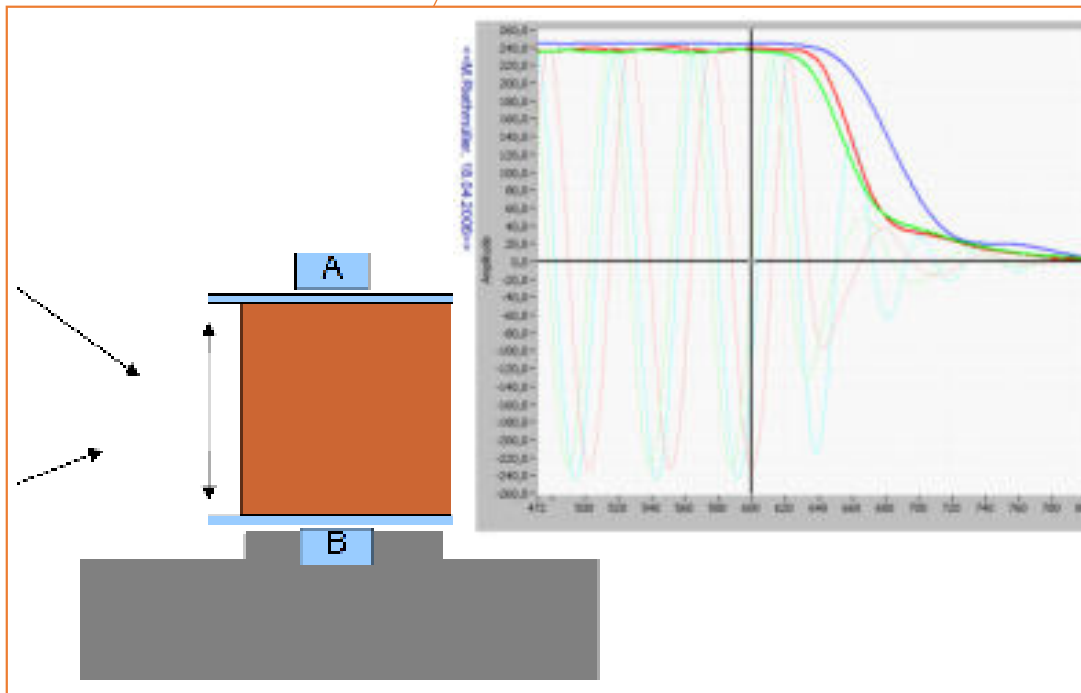


Experience in road construction with RSS® liquid soil on peat: testing the long-term stability of an innovative road construction concept based on the use of RSS® liquid soil slabs, complemented by constructive elements that allow to take into account the characteristics of a problematic subsoil and such hydrogeology in the construction and thus to ensure the long-term functionality of the built road.

NEW DEVELOPMENTS



Permanent building protection through RSS® liquid soil

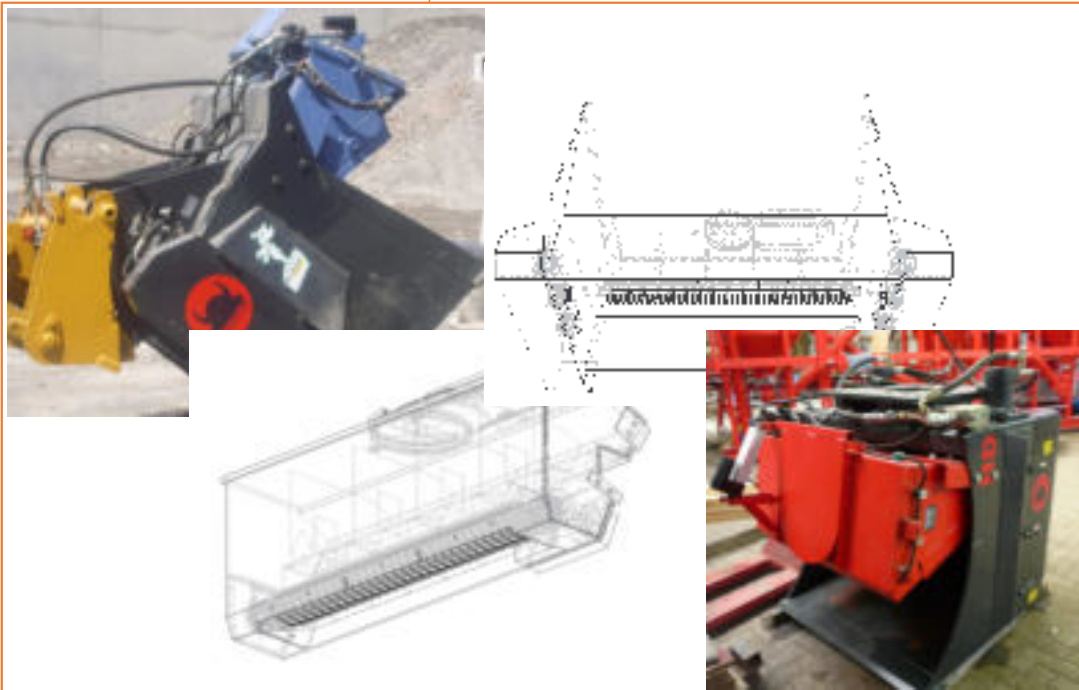


Safety with vibration damping: Use of the findings of the R & D project with the University of Münster and the associated formulation developments for applications for vibration protection up to the protection of monuments by means of RSS® liquid soil, which is exposed to permanent dynamic loads and must not lose its building-physical relevant properties.

NEW DEVELOPMENTS



Technology for the effective production of RSS® liquid soil

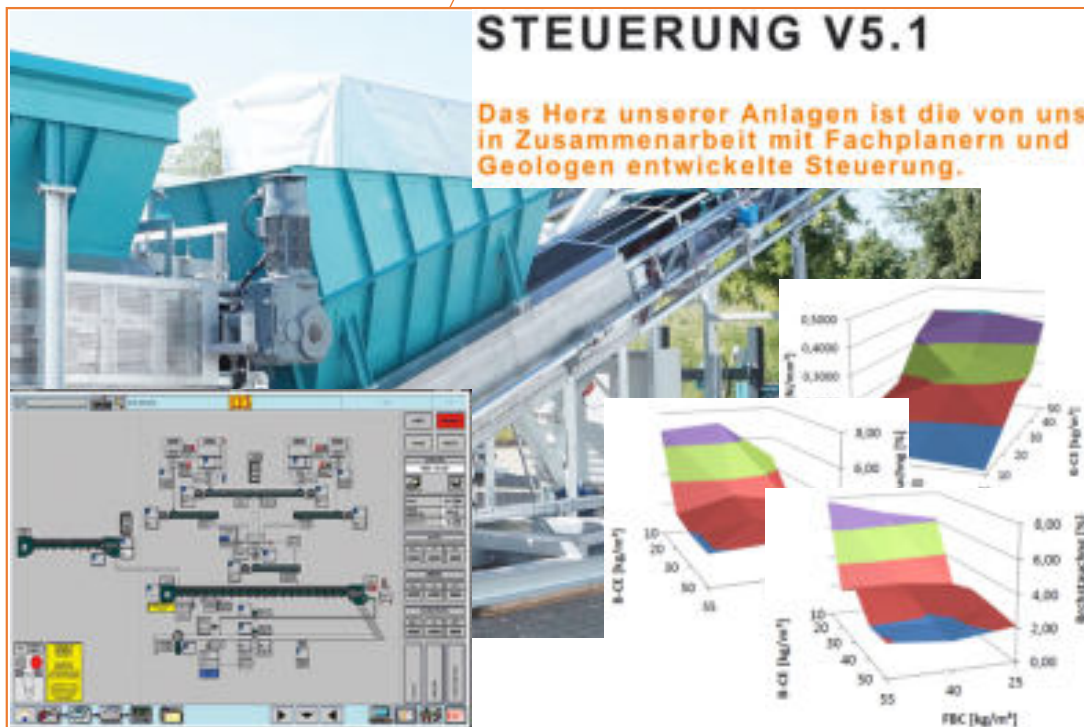


Dosing unit: for the effective addition of soil conditioning additives eg suitable special lime (ensuring the absence of unwanted secondary consolidation as a result of an uncontrolled puzzolanic reaction) and acceleration and targeted influencing of the reaction of the additives via controlled reaction kinetic processes. The goal was to overcome the technical limitations of older solutions of the same basic idea.

NEW DEVELOPMENTS



Technology for the effective production of RSS[®] liquid soil

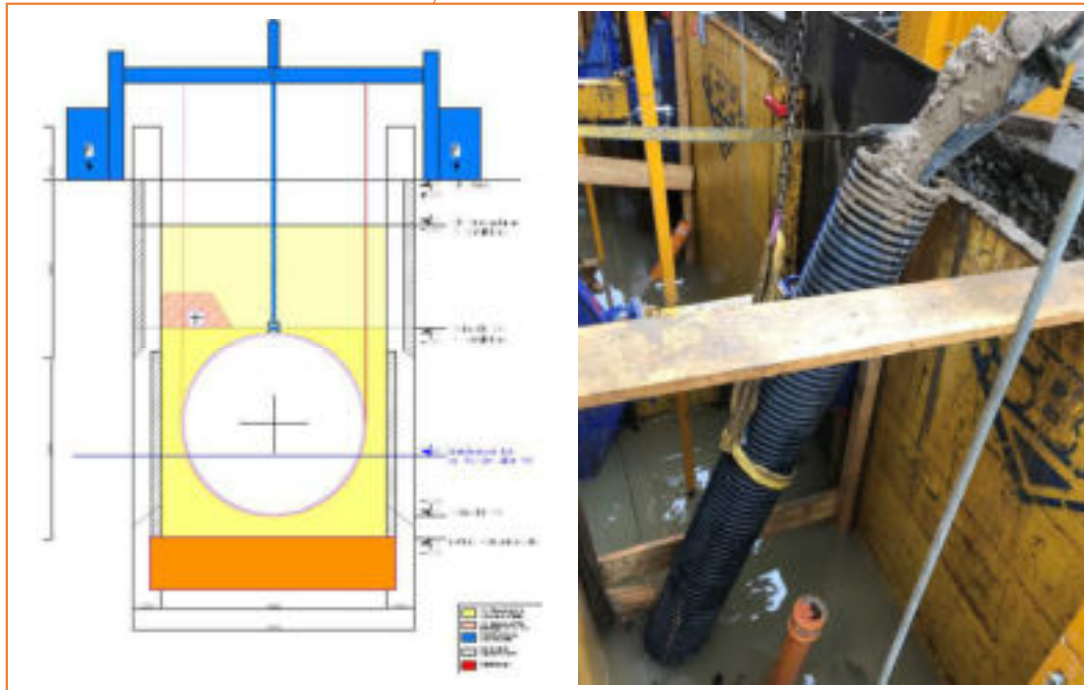


Compact unit: for the effective production of RSS[®] liquid soil even with strongly and constantly changing base materials. In addition to many technical details, it was the development of a new control system, with the help of which data (knowledge about liquid soil, source materials, mix designs and test values) collected since 1998 can be used on the construction site without any delay in order to construct damage free with the help of a closed quality assurance circuit. Added to this is technical diagnostics, as an aid to the operator, etc.

NEW APPLICATIONS



Prevention of base failure using RSS® liquid soil technology with simultaneous installation of the pipes

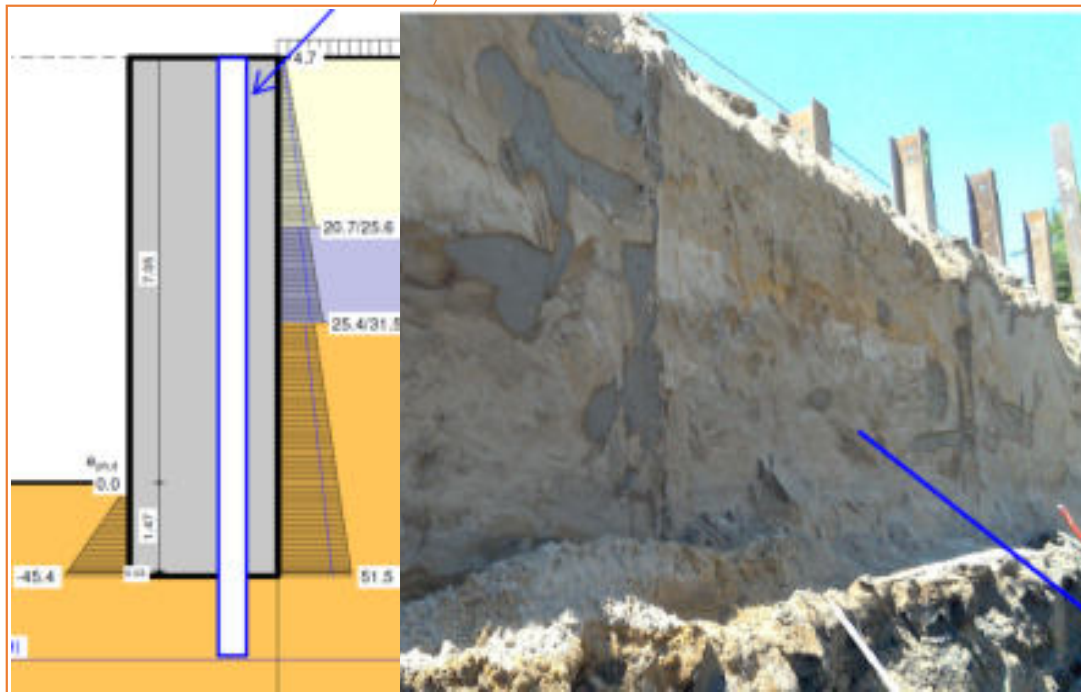


Prevention of base failure: by prescribed loading in the context of the application of the liquid soil method including all necessary calculation methods and verifications. The placement of the RSS® liquid soil is part of the timing of this construction design and thus supports the short construction time when using this technology developed by FiFB and LOGIC.

NEW APPLICATIONS



Substitution of re-anchored bulkheads using the RSS® wall



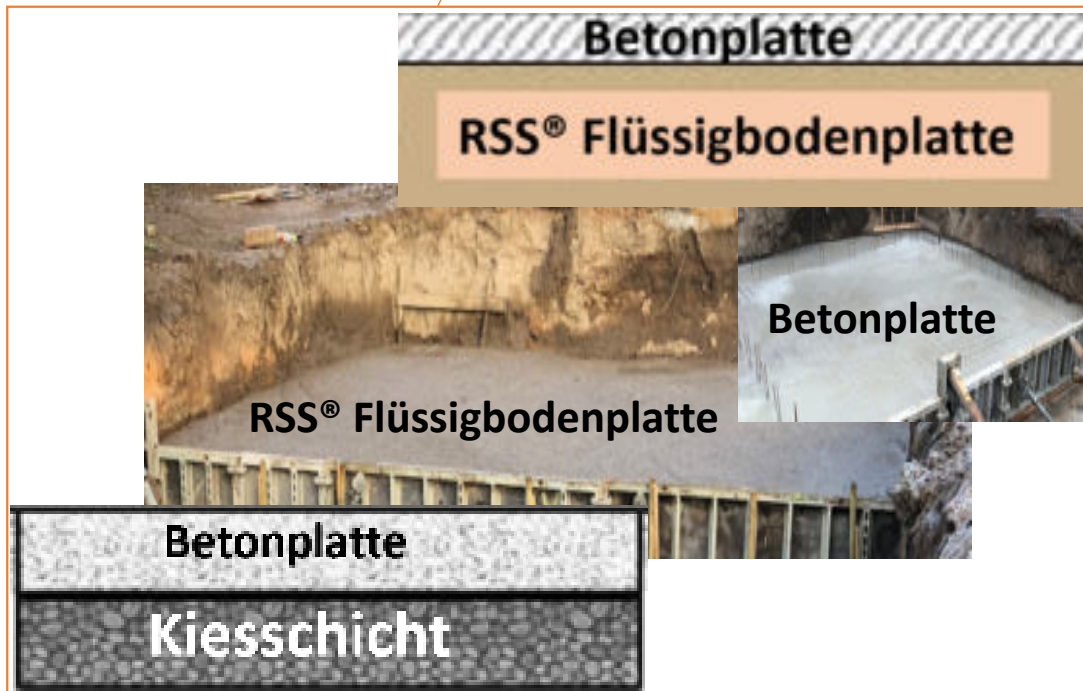
Innovative sheeting solution: RSS® wall as a substitute for waterproof, back-anchored bulkheads with all the necessary calculation methods and verifications.

NEW APPLICATIONS

Kiesschicht



Substitution of the capillary-breaking gravel layer by LS slab



Waterproof slab instead of gravel:
Construction of waterproof slab with RSS® liquid soil in groundwater and under water, together with the necessary calculation methods and verifications instead of a capillary-breaking layer of gravel.

NEW APPLICATIONS



Waterproof excavation pit made of RSS® liquid soil

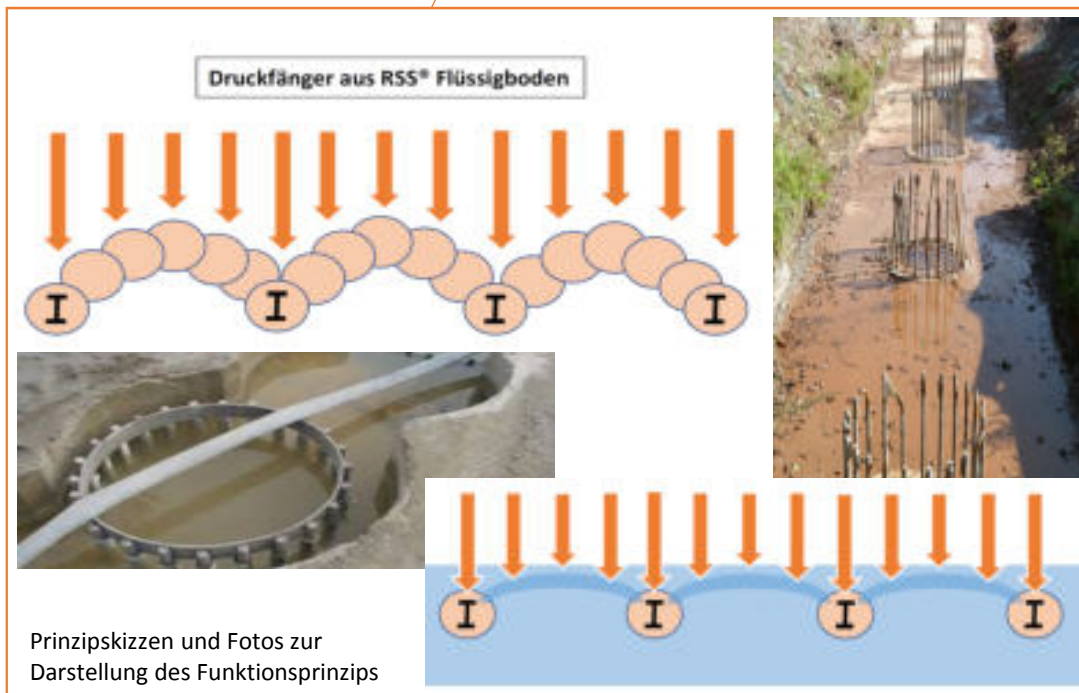


Waterproof pit: as RSS® wall in combination with a slab, also made of RSS® liquid soil for the creation of a watertight excavation pit including all the required calculation methods and verifications

NEW APPLICATIONS



Substitution of reinforced concrete bored piles with the help of RSS® liquid soil as excavation pit and pressure trap



Drilled piles made of RSS® liquid soil: can be used in various forms for the complete substitution of reinforced concrete piles, including all necessary calculation methods and required verifications

NEW APPLICATIONS



Slope stabilization with protection against abrasion, suffosion and static failure

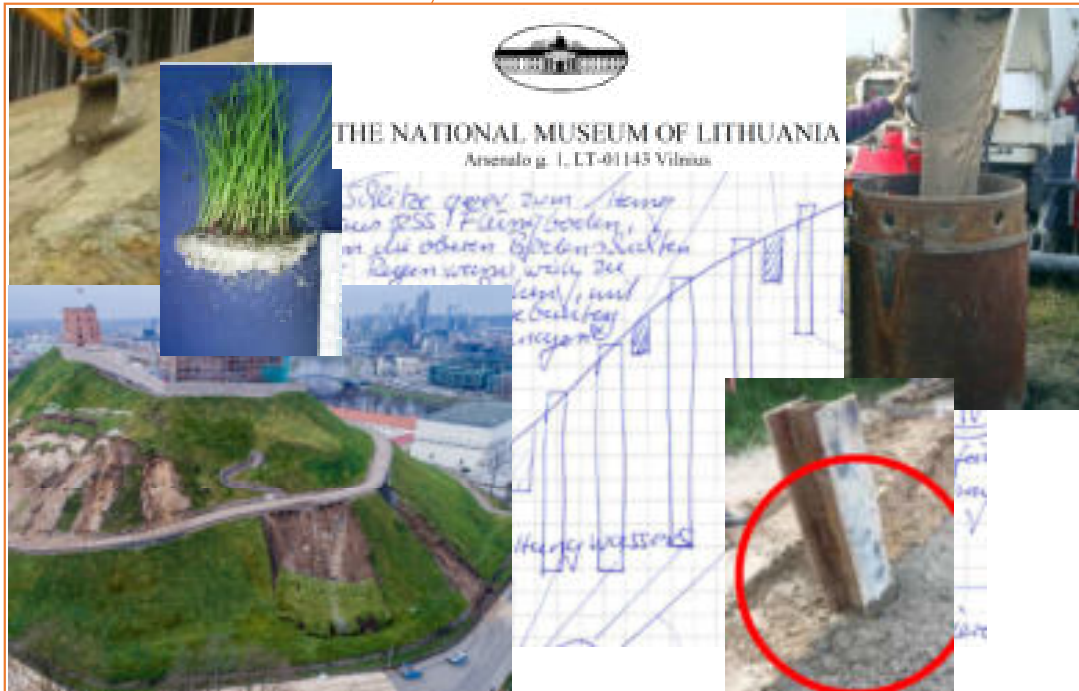


Slope stabilization: permanent bank fortifications in flowing waters, with further possibilities through the use of geotextile including all necessary calculation methods and verifications

NEW APPLICATIONS



Stabilization of steep slopes against failure by using solutions based on the RSS® liquid soil method

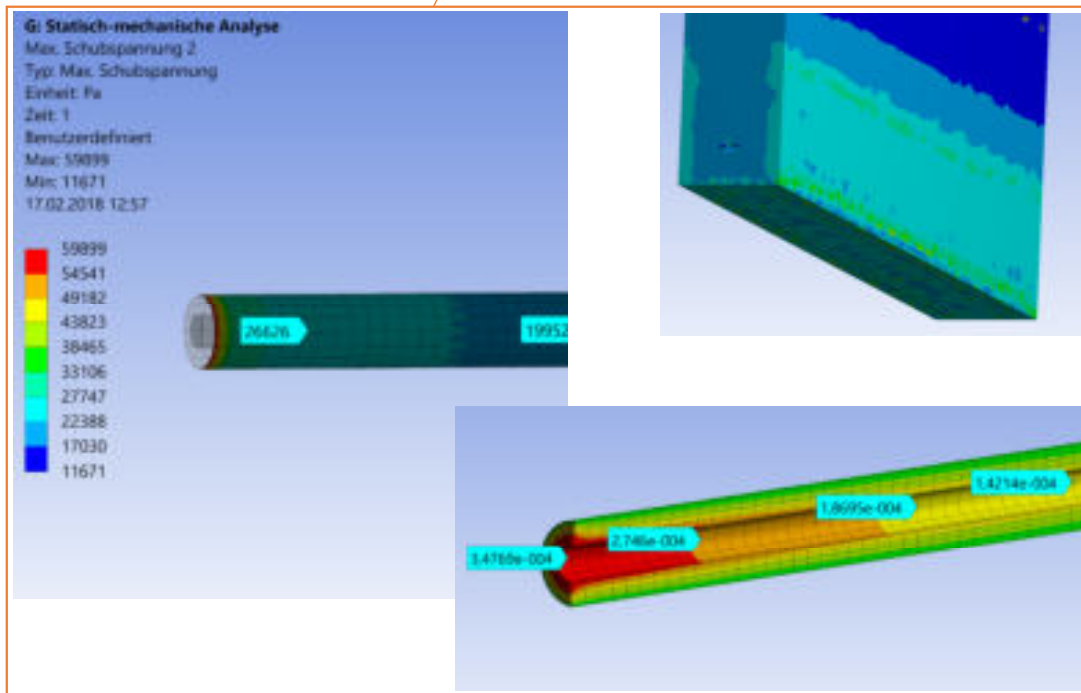


Steep slopes: Stabilization of steep slopes by means of a combination of bored piles, RSS wall and other constructional elements based on the liquid soil method, including all necessary calculation methods and verifications

NEW APPLICATIONS



Reduction in costs for district heating routes through the targeted use of mix design-controlled friction forces in RSS® liquid soil application

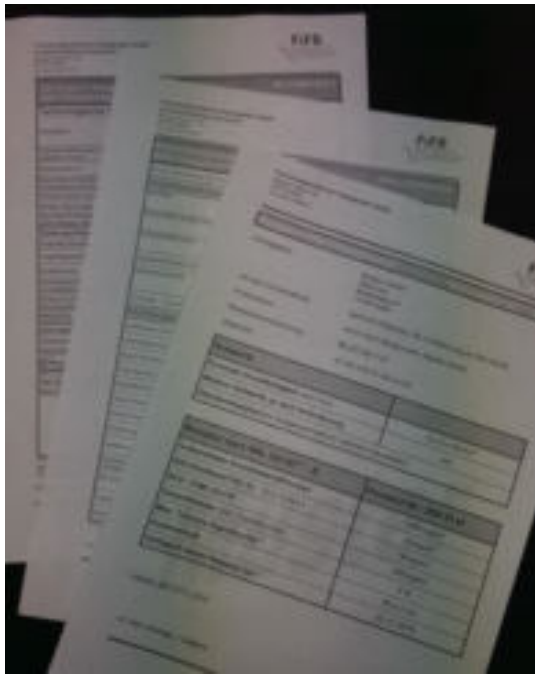


Minimization of overlapping and companders: Simplification of the use and verification of the static reserves and possibilities of the RSS® liquid soil method, including the necessary calculation methods and verifications for district heating projects

NEW SERVICES

IV

Support of an effective quality assurance

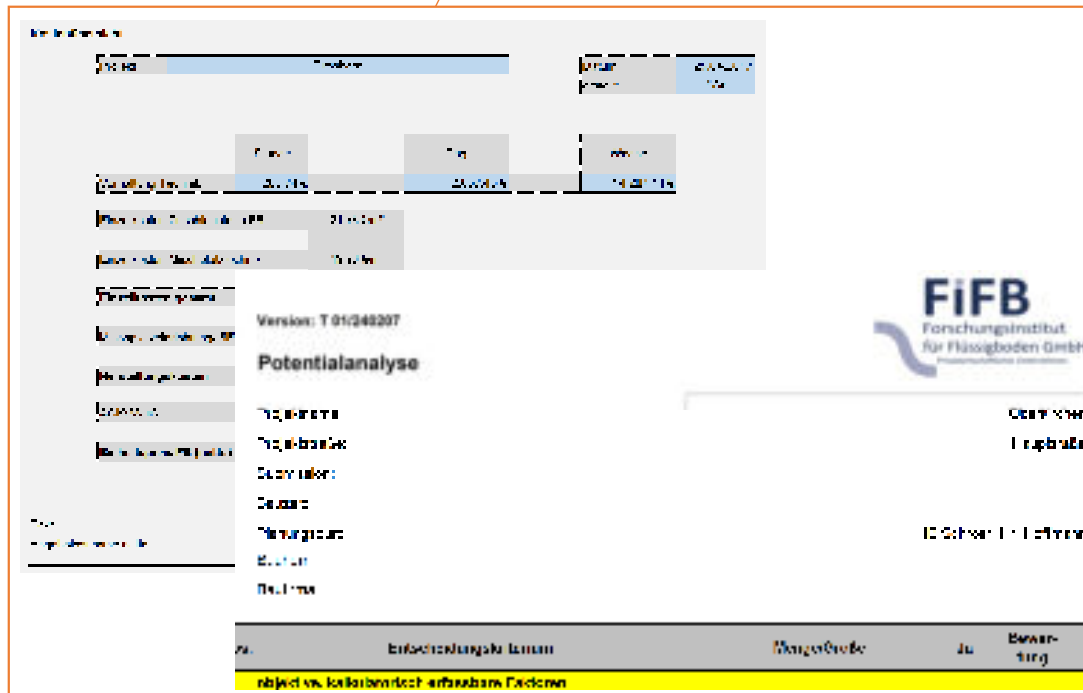


Quality assurance: on the website of the FiFB all relevant forms in the latest version for the quality assurance are offered for download, so as to assist the liquid soil users in the prevention of structural damage with the help of a competent quality assurance see www.fi-fb.de

NEW SERVICES

IV

Support of cost calculation and calculation



Calculation of costs / calculation: from March / April 2019 we will provide a web-based calculation aid, with the help of which you can quickly check the profitability of a liquid soil production

CONSULTING SERVICES

V

Idea search and decision basis for the use of the RSS® liquid soil method by means of a feasibility study

Machbarkeitsstudie

zur Verwendung von RSS® Flüssigboden nach RALGZ 507
beim Kanalbau Entwässerung
im Neubaugebiet "Pfaffeneger-West"



Machbarkeitsstudie

Kehl
zur Verwendung von RSS® Flüssigboden
beim Neubau eines RÜB mit /
in
Riedstadt-Leeheim
Verwendung des RSS® Flüssigbodenverfahrens
nach RAL GZ 507
in der
Raiffeisenstrasse, 26506 Norden

Machbarkeitsstudie

zur
Sanierung und Sicherung der
Fridericussielbrücke (Bauwerk 3)
unter
Verwendung des RSS® Flüssigbodenverfahrens
nach RAL GZ 507
in der
Raiffeisenstrasse, 26506 Norden

Feasibility studies: it provides a comparatively low cost and time saving opportunity for finding ideas and preparatory work for projects in order to obtain a decision basis for the use of the liquid soil method on the basis of qualitative and quantitative parameters, and thus also can safely integrate non-technicians in the processes of a decision-making.

CONSULTING SERVICES

V

Support for communication between builders and residents



Communication aid: Presentation of the benefits of using liquid soil in a form that is understandable to local residents, so as to avoid emotional issues and to help make the affected residents feel positive about the construction project by knowing the benefits to the environment and minimizing the burden on the affected residents but also to involve politicians and other non-technicians on the basis of verifiable facts.

CONSULTING SERVICES

V

Use of urban planning advantages of the application of RSS® liquid soil and related technical solutions



Urban planning: Advising municipalities on the urban planning advantages and possibilities of the liquid soil method, supplemented by flexible combi routes and intelligent concepts for construction, operation and maintenance with the goals of securing relevant cost savings and the development of concrete location advantages as the basis for successful site development.

VI

NEW OFFERS FOR EDUCATION AND TRAINING

Training of mixing masters and foremen - mastered processes on the construction site - the basis of safety, quality and cost-effectiveness

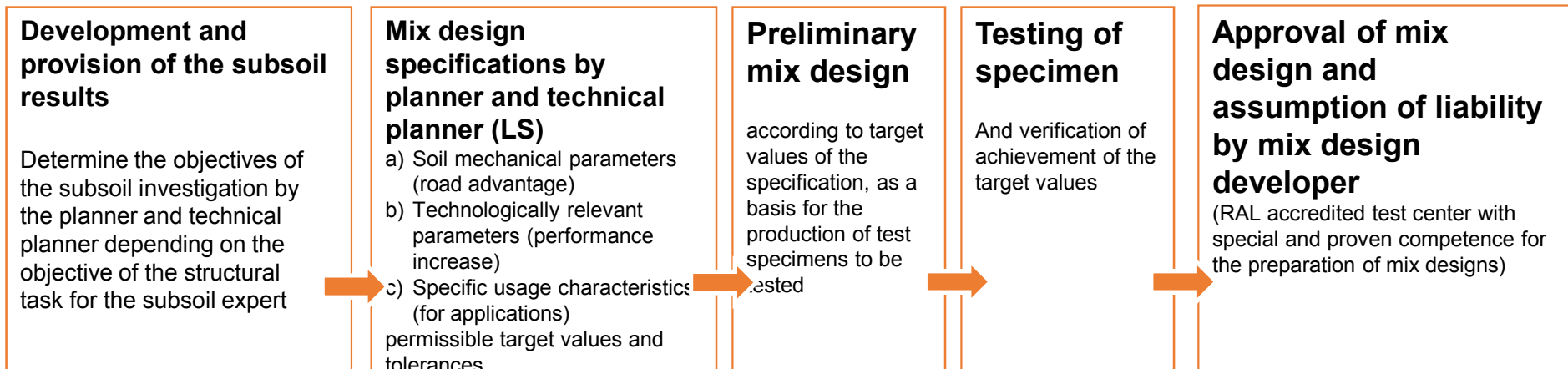


Education and training: training on dealing with soil, with plant control, and the required basics for mixing masters and foremen, to identify soil types and their characteristics as well as education in the application of small-scale tests for relevant soil changes to identify the causes and necessary steps including possibilities of active use of supports.

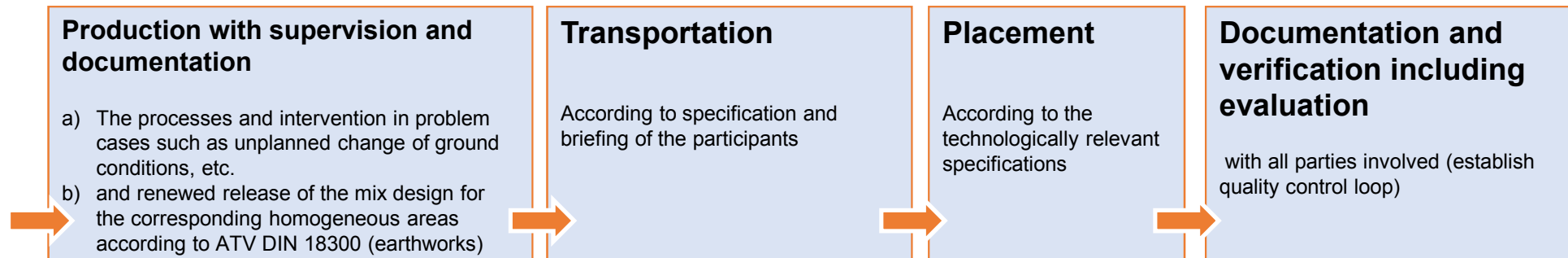
VI

NEW OFFERS FOR EDUCATION AND TRAINING

Quality assurance of a process instead of a product in connection with the concrete applications and technologies



PROCESS OF QUALITY ASSURANCE OF LIQUID SOIL ACCORDING TORAL GZ - 507



VI

NEW OFFERS FOR EDUCATION AND TRAINING

Training for calculators and planners for new technologies

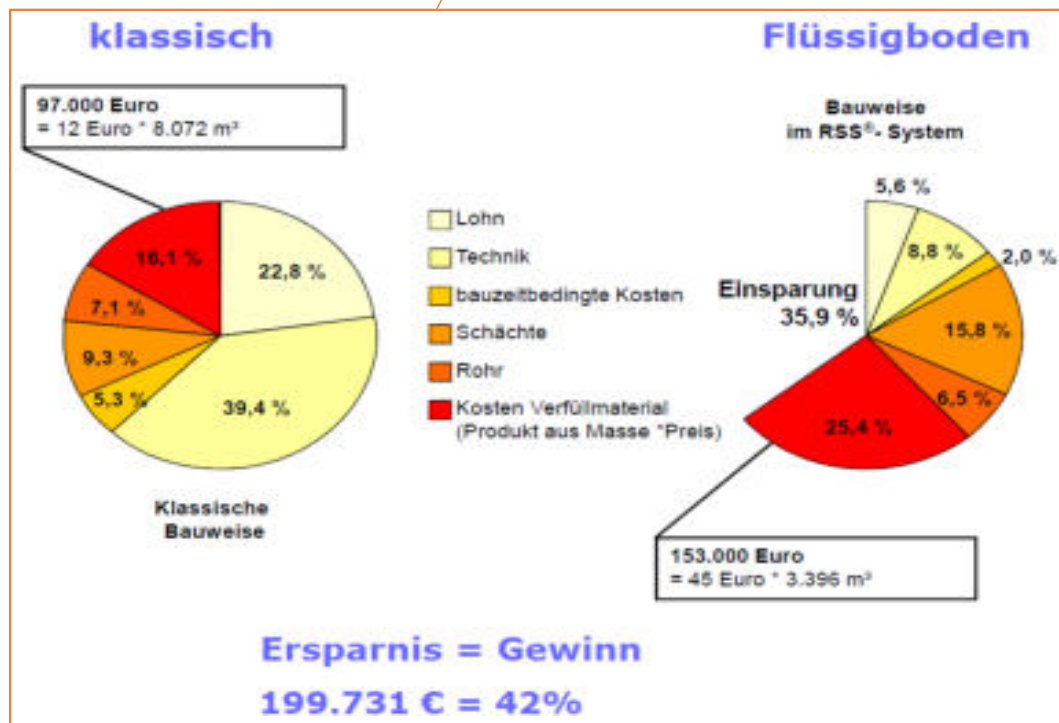


Education and training: Training on new applications and related new technologies and on technology related new cost structures. Identification of cost-relevant correlations between the quality assurance of a process instead of a product and their concrete verification. Competence transfer for over 170 different applications now possible.

VI

NEW OFFERS FOR EDUCATION AND TRAINING

Training a cost calculation as part of planning and costing and dealing with appropriate tools



Other technological solutions result in a different cost structure.

1. THIS REQUIRES A TECHNOLOGY-BASED COST CALCULATION
2. THE PLANNER OR THE CALCULATOR MUST SEE VERY ACCURATELY THE TECHNOLOGICAL FLOWS AND THE TECHNICAL TOOLS
3. THERE ARE SOFTWARE TOOLS HELPING TO CALCULATE THE DIFFERENCES OF DIFFERENT TECHNOLOGICAL SOLUTIONS

VII

NEW OFFERS FOR EDUCATION AND TRAINING

Technical planning services - basis of successful application
NEW - Training – Technical planner for liquid soil applications

5. technologisches
Konzept

6. logistisches
Konzept

7. technisches
Konzept

8. Nutzung und Wertung
städteplanerischer Vorteile

9. notwendige Nachweisführungen

10. umweltrechtliches Konzept

11. Beprobungen und Steuerung der
rheologischen Eigenschaften

12. Ausschreibungs-
phase

13. Qualitätssicherung

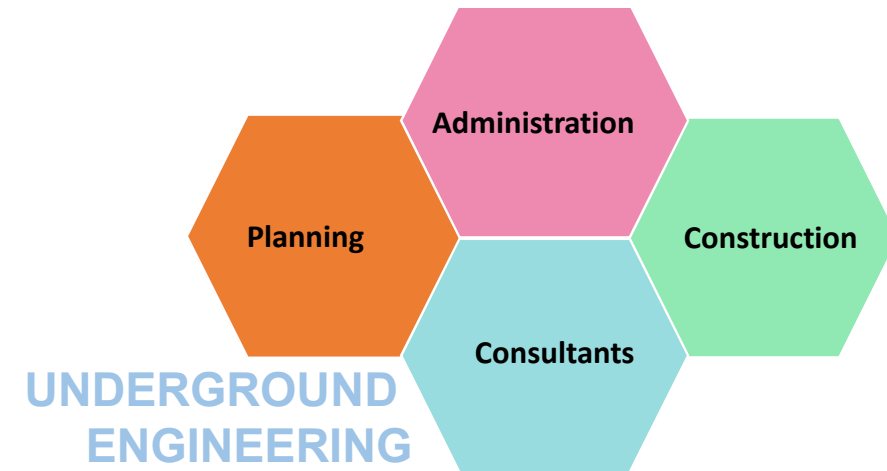
**The new possibilities of the LS procedure
require additional / other planning services!**

1. SUPPORT OF OPINION FORMATION BY MEANS OF FEASIBILITY STUDY
2. VALIDABILITY OF THE IMPACT OF NEW TECHNOLOGIES ON THE COST STRUCTURE
3. SUPPORT FOR OPINION FORMATION AND INFORMATION OF RESIDENTS
4. SUPPORT IN THE SEARCH FOR SOLUTIONS DURING THE DESIGN PHASE

VII

RESUME AND OUTLOOK

Serious changes in the future civil engineering market



- **An opportunity that should not be missed as an engineer, whether planner, subsoil expert or construction company**
- **An opportunity that is currently unique in many regions and application areas**
- **An opportunity that we, as the developer of the process and first universities, offer to its future civil engineers**
- **An opportunity that is not coupled to the borders of Germany**
- **An opportunity that can only be used with suitable, good training**
- **An opportunity with economic significance and advantages in the location competition**

THEREFORE, ALL INNOVATIONS DESCRIBED HERE ARE AVAILABLE TO ALL INTERESTED PARTIES TO THE SAME CONDITIONS. INTERESTED PLANNERS ARE ALREADY OFFERED EDUCATION AND TRAINING OPPORTUNITIES. THE EXPERIENCES ARISING FROM R & D PROJECTS AND YEAR-OLD PRACTICE ARE THEREFORE ACCESSIBLE TO ALL INTERESTED PARTIES TO THE SAME CONDITIONS!