

# Dr.-Ing. Roman Lenner, PE

Address:  
23 Charme St  
Stellenbosch, 7600, RSA

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## EDUCATION & REGISTRATION

**Universität der Bundeswehr – München, 2014**

Dr.-Ing. (PhD) in Concrete Structures, *Summa Cum Laude*

- Reliability and Assessment of Existing Concrete Bridges
- Karl-Kling Forschungspreis Award for the thesis

**Civil Professional Engineer** registered in California 2010

**Bridge Condition Inspection Certification** by WSDOT and FHA 2010

**University of California – Berkeley, May 2008**

MS in Structural Engineering

**The Citadel, The Military College of South Carolina, May 2007**

BS in Civil Engineering, *Summa Cum Laude*

## EXPERIENCE

*Associate Professor: Stellenbosch University, RSA 2014 – present*

- Reinforced Concrete Design and Strength of Materials
- Reliability and Assessment of Bridges
- Research Project: Updated bridge loading model
- Supervision: 5 MEng, 2 PhD students

*Short Term Consultant: World Bank, RSA 2018 – present*

- Transport – Southern Africa

*Scientific Assistant: Universität der Bundeswehr, Germany 2010 – 2013*

- Team of Experts for Military Bridge Assessment
- Various research projects
- Bridge Engineering, Reliability of Structures

*Structural Consultant: BUNG AG, Germany 2010 – 2014*

- Lohr Bridge over Main - Dynamic Analysis and Design
- Reutherbergtunnel Rettungstollen - Design and Drawings Review
- Marktheidenfeld Bridge over Main - Dynamic Analysis and Design
- Eppsteiner Tunnel - Design and Drawings Review

*Bridge Design Engineer: David Evans and Associates, USA 2008-2010*

- Seismic Design and Analysis
- Inspection and Non-linear assessment of suspension bridges
- Bridge design and preliminary TS&L

## KEY SKILLS

Concrete Design      FEM      Bridge Design      Tunnel Design  
Structural Reliability      Assessment      Load models

## LANGUAGES

English      German      Czech      Slovak

## PUBLICATIONS

*See attachment for a full list*

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## PUBLICATION LIST

### Education

**Dr.-Ing., Concrete Structures,**  
University of the German Armed  
Forces, Munich, 2014

**MSCE, Structural Engineering,**  
University of California, Berkeley,  
2008

**BSCE, Civil Engineering,** Citadel,  
2007

### Registration

Professional Engineer, CA

Pagel C., Lenner, R., Wessel, B., **Investigation into material resistance factors and properties of young, engineered *Eucalyptus grandis* timber.** Construction and Building Materials. Vol 230, 2020.

Basson, S., Lenner, R., **Reliability verification of bridges designed according to TMH-7.** Seventh International Conference on Structural Engineering, Mechanics and Computation, Cape Town, 2019.

van der Spuy, P., Lenner, R., Meyer, M.W. **Dynamic amplification factor for South African bridges.** Seventh International Conference on Structural Engineering, Mechanics and Computation, Cape Town, 2019.

Meyer, M.W., Lenner, R., van der Spuy, P. **The development of a vehicle-bridge interaction model for South African traffic.** Seventh International Conference on Structural Engineering, Mechanics and Computation, Cape Town, 2019.

van der Spuy, P., Lenner, R., Caprani C., de Wet T, **Multiple lane reduction factors based on WIM data.** Seventh International Conference on Structural Engineering, Mechanics and Computation, Cape Town, 2019.

Perez, S., Lenner, R., **Evaluating the influence of daily truck traffic flow on load effects using Monte Carlo simulations.** Seventh International Conference on Structural Engineering, Mechanics and Computation, Cape Town, 2019.

Perez, S., Lenner, R., **Bridge reduction factors based on Monte Carlo routine with copulas.** Engineering Structures Vol 198, 2019.

van der Spuy, P., Lenner, R., Caprani C., de Wet T, **Multiple lane reduction factors based on multiple lane weigh in motion data.** Structures Vol 20: 543-549, 2019.

van der Spuy, P., Lenner, R., **Establishing the effect of tail length on extrapolation when fitted to WIM data.** RILEM Spring Convention & International Conference on Sustainable Materials, Systems and Structures, Rovinj, 2019.

Van der Spuy, P., Lenner, R., **Towards a new bridge live load model for South Africa,** Structural Engineering International Vol 29(2):292-298, 2019.

Lenner, R., Viljoen, C., van Nierop, S., **A comparative study of target reliability index derivation for reinforced concrete structures governed by serviceability limit state,** Structural Concrete Vol 20(2): 670-677, 2018

- van der Spuy, P., Lenner, R., **Developing a new bridge live load model for South Africa**, Proceedings of the 9th International Conference on Bridge Maintenance, Safety and Management, IABMAS 2018. pp. 1405-1410. 2018.
- Lenner, R., de Wet, G., Viljoen, C., **Traffic characteristics and bridge loading in South Africa**, South African Journal of Civil Engineering, Vol 59 (4): 34-46, 2017.
- Van Nierop, S., Viljoen, C., Lenner, R. **Target reliability of Concrete structures governed by serviceability limit state design**. 15<sup>th</sup> International Probabilistic Workshop, Dresden, 2017.
- Lenner, R., Manas, P., Sykora, M., **Reliability Assessment of Existing Bridges for Military Use – Appropriate Values of Partial Factors for Traffic Loads**, 6<sup>th</sup> International Conference on Military Technologies, Brno, 2017.
- Lenner, R., Sykora, M. **Partial factors for imposed loads in areas for storage and industrial use**. Structure and Infrastructure Vol 13(11): 1425-1436. 2017.
- Lenner, R., Viljoen, C., **Traffic Loading in South Africa – Remedial Action**, Proceedings of fib Symposium 2016, Cape Town, 2016.
- Lenner, R., Sykora, M., **Partial factors for loads due to special vehicles on road bridges**, Engineering Structures Vol 106: 137-146, 2016.
- Lenner, R., Keuser, M., Braml, T., **Challenges in the assessment of existing concrete bridges**, Beton TKS, Vol. 5: 25-29, 2015.
- Keuser, M., Goj, K., Lenner, R., **Verstärkung historischer Brücken über den Main unter besonderer Berücksichtigung des Schiffanpralls**, Bautechnik, Vol. 92, Issue 7: 469-478, 2015.
- Lenner, R., Keuser, M., Sykora, M., **Safety Concept and Partial Factors for Bridge Assessment und Military Loading**, Advances in Military Technology, Vol. 9, No. 2:5-20, 2014.
- Sykora, M., Diamantidis, D., Holicky, M., Lenner, R., Manas, P.: **Risk-Informed Decision Making on Protective Measures for Highway Bridges**. 12<sup>th</sup> International Probabilistic Workshop, 2014.
- Sykora, M.; Holicky, M.; Lenner, R.; Manas, P.; **Target Reliability Levels for Existing Bridges Considering Emergency and Crisis Situations**, Advances in Military Technology, Vol. 9, No. 1:45-57, 2014.
- Lenner, R.: **Safety Concept and Partial Factors for Military Assessment of Existing Concrete Bridges**, PhD Thesis, Berichte aus dem Konstruktiven Ingenieurbau 14/2, Munich, 2014.
- Keuser, M., Hiller, E., Lenner, R.: **Reinforced Concrete Precast Panels as Noise Protection along High Speed Rail Tracks**, Beton- und Stahlbetonbau, Vol. 109, No. 4: 248-256, 2014.

Keuser, M., Lenner, R., Simon S.: **Neubau des Eppsteiner Tunnels – Berechnung für einen hangnahen Eisenbahntunnel**, Baustatik-Baupraxis 12 at TU München, 2014.

Sykora M., Holicky M., Lenner R., Manas P.: **Human Safety Criteria for Existing Bridges Considering Emergency and Crisis Situations**. 20<sup>th</sup> International Conference Engineering Mechanics, 2014.

Lenner, R.; Keuser, M.: **Safety Factors for Well Defined Loading on Bridges**, International Conference on Infrastructure Management, Assessment and Rehabilitation Techniques, Sharja, 2014.

Keuser, M., Meinhard, M., Lenner, R.: **Concept for the protection of bridge cables and external tendons against terrorist attacks**, The Fourth International fib Congress 2014: Improving Performance of Concrete Structures, Mumbai.

Sykora, M.; Holicky, M.; Lenner, R.; Manas, P.: **Optimum target reliability for bridges considering emergency situations**, Proceedings of the 11th International Probabilistic Workshop, Brno 2013.

Lenner, R.; Sykora, M.; Keuser, M.: **Assessment of existing concrete bridges exposed to military loads**, Proceedings of the 11th International Probabilistic Workshop, Brno 2013.

Lenner, R.; Sykora, M.; Keuser, M.: **Partial Factors for Military Loads on Bridges**, International Conference on Military Technologies 2013, Brno, 2013

Lenner, R.; Keuser, M.; Simon, S.: **Tunnel Eppstein – railway tunnel close to a free slope**, International Tunneling Association:12th International Conference “Underground Construction Prague 2013”, Prague, 2013

Keuser, M.; Lenner, R.; Fuchs, M.: **Retrofitting of structural concrete after damage caused by impact or explosion**, Proceedings of 3<sup>rd</sup> International Conference on Concrete Repair, Rehabilitation and Retrofitting: pp. 1266-1271, Cape Town, 2012

Wensauer, R.; Keuser, M.; Lenner, R.; Keuser, W.: **Upgrading of bridges across rivers to resist ship impact**, Proceedings of 3<sup>rd</sup> International Conference on Concrete Repair, Rehabilitation and Retrofitting: pp. 834-839, Cape Town, 2012

Lenner, R.; Keuser, M.; Braml, T.: **Statistical models for the material parameters of damaged concrete bridges**, Proceedings of 11<sup>th</sup> International Conference on Applications of Statistics and Probability in Civil Engineering: pp.1101-1107, Zürich, 2011

Lenner, R.; Keuser, M.; Heckersbruch, A.; Krüsemann, R.: **Concrete Fiber Reinforcement – Structural Material and Use for Supporting Structure Planning and Physical Protection against Weapons Effects**, ISIEMS14, Seattle, 2011

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University of California, Berkeley,  
2008

**BSCE, Civil Engineering,** Citadel,  
2007

### Registration

Professional Engineer, CA

### Expertise:

- Structural Reliability
- Bridge Loading and Dynamics
- Concrete design and analysis
- Bridge and tunnel design
- Dynamic analysis and design

### Research Projects:

#### **Load Model for bridge assessment – National Research Foundation 2018-2020**

As a project leader responsible to developing suitable methods for assessment of existing bridges by proposing modified models for the loading. Reliability of bridges designed according to the current design codes is also investigated.

#### **Load Model for design of design of bridges – 2016 - 2020**

As a project leader responsible for the development of a new load model based on Weigh-in-Motion data and statistical extrapolation techniques. Multiple lanes of WIM data are used to calibrate the load model over a number of adjacent lanes. Dynamic amplification is observed at the characteristic level for vehicles up to seven axles.

#### **Adoption of EN 1991-2 – University of Stellenbosch, Subcommittee B, 2014-2016**

Main researcher investigation the options of directly adopting EN 1991-2: Traffic loads on bridges for South Africa. General comparison of Weigh-in-Motion data along with calculation load effects along with investigation of the impacts of direct adoption.

#### **Bridge classification of military loads – Federal Office of Bundeswehr, Equipment, Information Technology and In-Service Support, 2010-2013**

As a scientific assistant and part of the research group developing the safety concept for crossing of military vehicles of existing bridges built by civilian authorities. On the basis of reliability theory proposed suitable partial factor for normal, caution and risk crossings.

#### **Noise protection panels for railways, Betonwerk Rieder GmbH, 2012**

As a scientific assistant testing reinforced concrete panels for pressure loading due to passing of high-speed trains and effect on improved and modified concept of reinforcement patterns of pre-cast panels.

#### **Noise protection panels for railways, Deutsche Bahn AG, 2012**

As a scientific assistant testing reinforced concrete panels for pressure loading due to passing of high-speed trains. Long cyclic loading for induction of fatigue into the reinforcement.

## **Professional Experience:**

### **SLGP inspections, Swaziland**

Inspections and support missions to Swaziland Local Government Project funded by the World Bank. The services include inspection of finish works of various objects – bridges, low-level water crossings, community halls and agricultural object.

### **Footbridges, Lesotho**

Design review and site inspections for the construction of footbridges in Lesotho under the Transport and Infrastructure and Connectivity Project funded by the World Bank

### **Bridge Load Model Development, South Africa**

Development of probability based load model for bridges in South Africa. Based on Weigh-in-Motion measurements the new load model is aimed to replace the outdated THM-7.

### **Lohr Bridge over Main River, Germany**

Ship impact analysis of an old masonry bridge under historical preservation. Built in 1876, this structure had to be retrofitted to withstand modern ship traffic impact loads to its piers and superstructure. The dynamic analysis was the basis for substructure design.

### **Reutherbergtunnel Rettungsstollen , Germany**

Design review of the over 1600m long escape routes at the Reutherberg Tunnel built by the new Austrian method. The review included performing of a FE analysis, soil/concrete interaction, slope stability and improvements and finally design review of the required reinforcement quantities. The construction plans were part of the review effort as well.

### **Markheidenfeld Bridge over Main River, Germany**

Ship impact analysis of an old masonry bridge under historical preservation. Built in 1842, this structure had to be retrofitted to withstand modern ship traffic impact loads to its piers and superstructure. The dynamic analysis was the basis for substructure design.

### **DB Noise Panels, Germany**

Report on the remaining service life of reinforced concrete noise protection panels subjected to dynamic wave loading by passing high-speed trains. This report was inclusive of testing, calculations and evaluation of results.

### **Eppstein Tunnel, Eppstein, Germany**

Design review of the 300m long railroad tunnel (over 100 million cost EUR) built by the new Austrian method. The review included performing of a FE analysis, soil/concrete interaction and design review of the required reinforcement quantities. Additional responsibilities included the review of slope stability and construction staging safety. The construction plans were part of the review effort as well.

### **U-Bahn U1/U2, Munich, Germany**

As an engineer performed a parametric non-linear FE analysis of various soil properties in order to determine the cause of multiple cracking of the subway

tunnel concrete lining. U1/U2 subway is the original and pioneered line built in Munich.

**Columbia River Crossing, Vancouver, Washington**

As a Bridge Design Engineer, he provided full design services for the fast-tracked SR 500 Interchange Bridge Preliminary Design as a part of TIGER Grant application. Roman was the main designer of four different structures, including traditional prestressed girder bridges and a non-typical buried rigid frame.

**SR 16 / Canterwood Boulevard NW / Borgen Boulevard NW Road Improvements, Gig Harbor, Washington**

Design engineer for three soldier pile walls, including one with anchored tie backs. This project involved layout, design, and detailing of soldier pile walls along the SR 16 Burnham Drive interchange.

**152nd Avenue PS&E, Bellevue, Washington – Project of the Year Award Nominee**

Project engineer for four soldier pile walls with shotcrete fascia. This project involved layout, design, and detailing of the soldier pile walls along 152nd Avenue.

**Island Inn Drive – Crabtree Creek, Albany, Oregon**

Bridge inspector for a suspension bridge located in Linn County, Oregon. Roman performed a non-linear analysis using SAP model of the current condition, performed capacity calculations, QA/QC and assisted with the development of the inspection report.

**E. 34th Street Bridge Rehabilitation, Tacoma, Washington**

Roman performed on-site construction inspection and provided the City of Tacoma inspectors with guidance. In addition, he provided design and detailing of necessary repair procedures and performed general construction support services such as material approvals and shop drawing reviews.

**I-405, I-5 to SR 169 Stage 1 Widening, Renton, Washington**

Bridge Design Engineer for the analysis, modification, and design of various traffic barriers and retaining walls along the I-405 corridor. Main element was a flood prevention wall built in extremely congested area in order to protect downtown Renton.

**I-405, Stage 2, Design Built Proposal**

As a Bridge Design Engineer Roman participated in preliminary design, cost analysis and constructability review for I-405 Widening and SR520 Interchange Improvements Design Built Proposal.

**Bridge Inspection and Load Rating Services, Statewide, Washington**

As a bridge designer and inspector, Roman participated in the inspection and load rating of various bridges throughout Washington State. In addition, he utilized SAP 2000 non-linear analysis for the capacity assessments of multiple suspension bridges within the scope of this project.

**2008 and 2009 Bridge Inspections, for Oregon State Department of Transportation, Oregon**

Part of Bridge inspection crew for 500 local agency bridges performing in-depth condition inspections and fracture critical inspections of all non-redundant steel bridges in accordance with national bridge inspection standards. The project includes all local agency owned bridges in nine counties in northeast Oregon.

**Oregon Rail Bridge Assessments, Statewide, Oregon**

Part of Bridge inspection crew for two truss bridges in Oregon. This project included using the NBI and BMS inspection ratings. Upon completion of inspection, Roman assisted with the development of the inspection report for bridge 743 and 716.

**Tacoma Rail Bridge Inspections, Tacoma, Washington**

This project involved the inspection of two truss bridges, a steel plate girder bridge and timber approaches. Roman served as a bridge inspector and upon completion of the inspection, he participated in the development of the inspection report.