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Omgevingsbeïnvloeding - zettingsschade aan belendende panden -

Dipl.- Ing. H. Netzel

CRUX Engineering b.v.
TU Delft Faculteit der Bouwkunde
Delft Cluster

11 mei 2004

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INHOUD

Problematiek omgevingsbeïnvloeding

Aanpak onderzoek

Empirisch, analytische rekenmethodieken

Geavanceerde numerieke rekenmethodieken

en validatie met monitoring cases
COB-proef Sophiaspoortunnel Betuwe-Lijn
(invloed boortunnel op belendingen)

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Problematiek omgevingsbeïnvloeding

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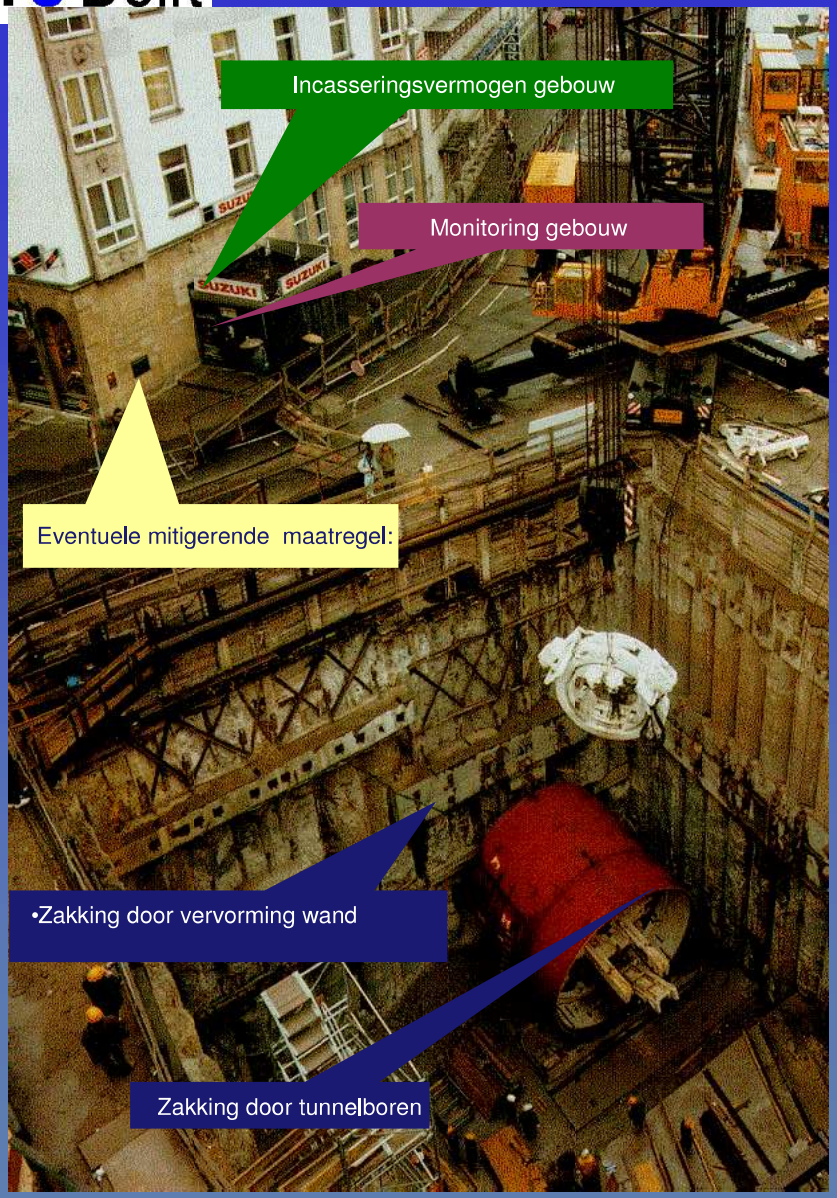
Omgevingsbeïnvloeding



Bron voor grondvervormingen t.g.v.:

- **Inbrengen bouwputwanden**
- **vervorming bouwputwanden door ontgraving**
- **grondwaterstandsveranderingen door b.v. bemalingen**
- **tunnelboren**

⇒ Integrale benadering grond en constructie ter bepaling van schaderisico's van belendende panden

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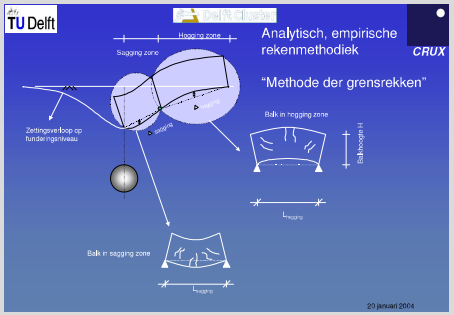
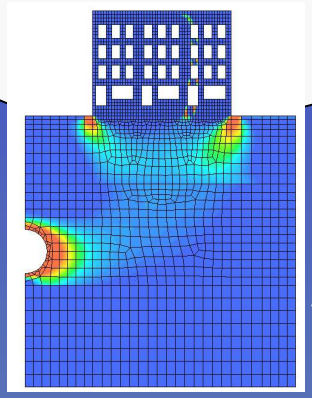
A.Empirisch, analytische predictiemethodiek

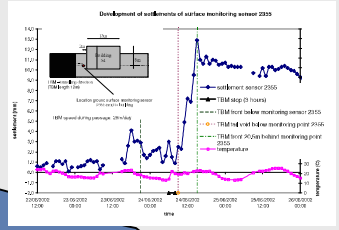


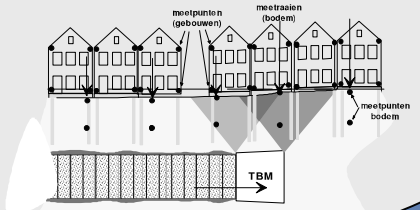
B. Geavanceerde numerieke modellering gebouwresponsie



Onderzoeks-cyclus

C.Validatie modellen met monitoringdata





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Empirisch, analytische schadepredictie gebouw door grondvervormingen

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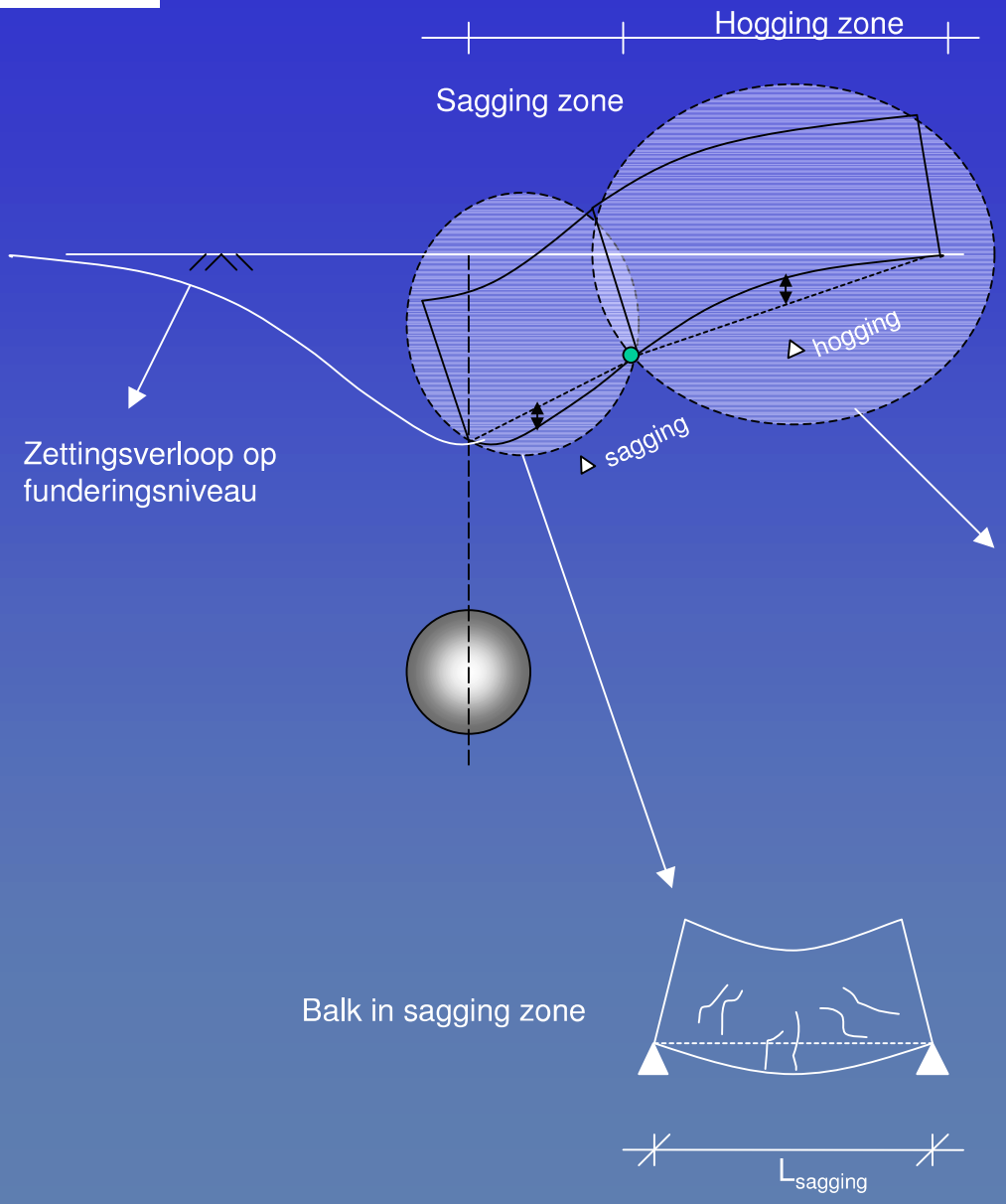
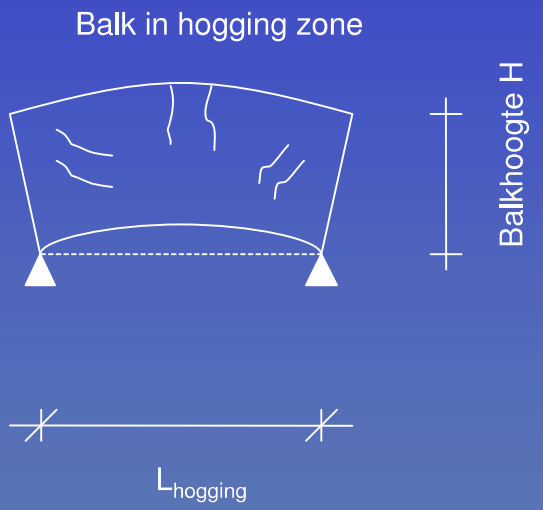
Empirisch, analytische rekenmethodiek

“Methode der grensrekken”





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Schadeclassificatiesysteem

Category of Damage	Degree of damage	Desciption of typical damage and ease of repair	Approximate of crack width (mm)
Aesthetic Schade	Negligible	Hairline cracks of less than about 0,1mm width	up to 0,1mm
	Very slight	Fine cracks which can easily be treated during normal decoration. Perhaps isolated slight fracturing in building. Cracks in external brickwork visible on close inspection.	Up to 1mm
	Slight	Cracks easily filled. Redecoration probably required. Several slight fractures showing inside of building. Cracks are visible externally and some repointing may be required externally to ensure watertightness.	Up to 5mm
Functional Damage, affecting Serviceability	Moderate	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable linings. Repointing of external brickwork and possibly a small amount of brickwork to be replaced.	5 to 15mm or a number of cracks > 3 mm
	Severe	Exten.sive repair work involving breaking out and replacing sections of walls, especially over doors and windows. Windows and door frames distorted, floors sloping noticeably.	15 to 25 , but also depends on number of cracks
Structural Damage affecting stability	Very severe	This requires a major repair involving partial or complete rebuilding. Beams loose bearing, walls lean badly and require shorting. Windows broken with distortion. Danger of instability.	Usually > 25mm, but depends on number of cracks

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Beperkingen empirisch, analytische rekenmethodiek

- Grondvervormingen worden volledig aan het gebouw opgelegd ongeacht grond-constructie interactie

- Veerenvoudigde modellering van de constructie als Timoshenko-balk houdt geen rekening met geometrische discontinuïteiten

- Initiële belasting van het pand wordt niet in rekening gebracht

⇒ Meer realistische gebouwrespons door interactieeffecten in rekening te brengen door geavanceerde numerieke rekentechnieken

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Geavanceerde modellering gebouwresponsie

2D –> 3D

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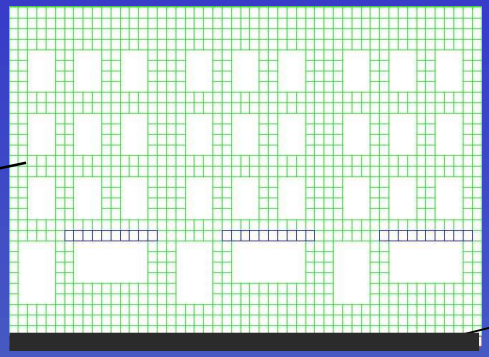
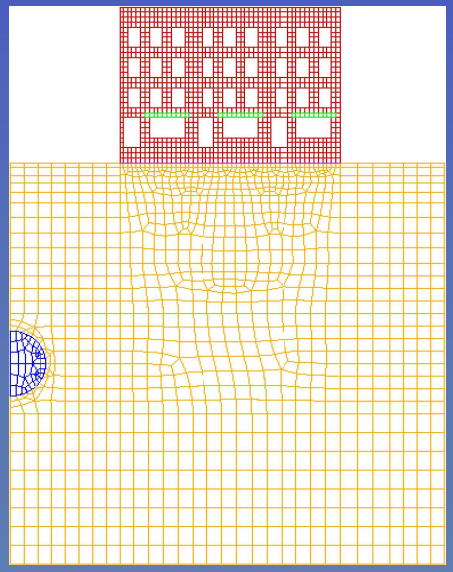
2D

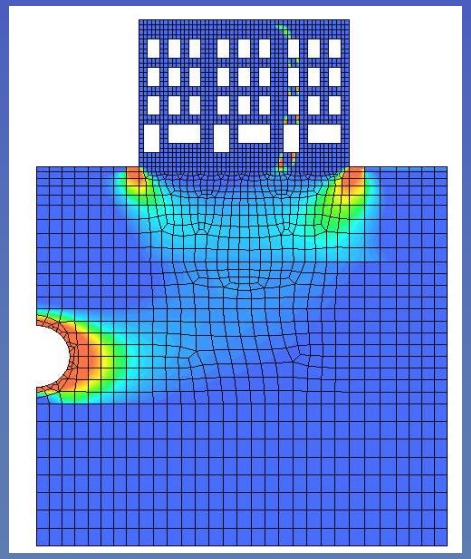
Semi coupled soil-structure interaction model



Smeared crack model metselwerk

Grond gemodeleerd als no-tension bedding





Fully coupled soil-structure interaction model

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Validatie met monitoring

COB - Full Scale Test

Zettingsbeïnvloeding door tunnelboren

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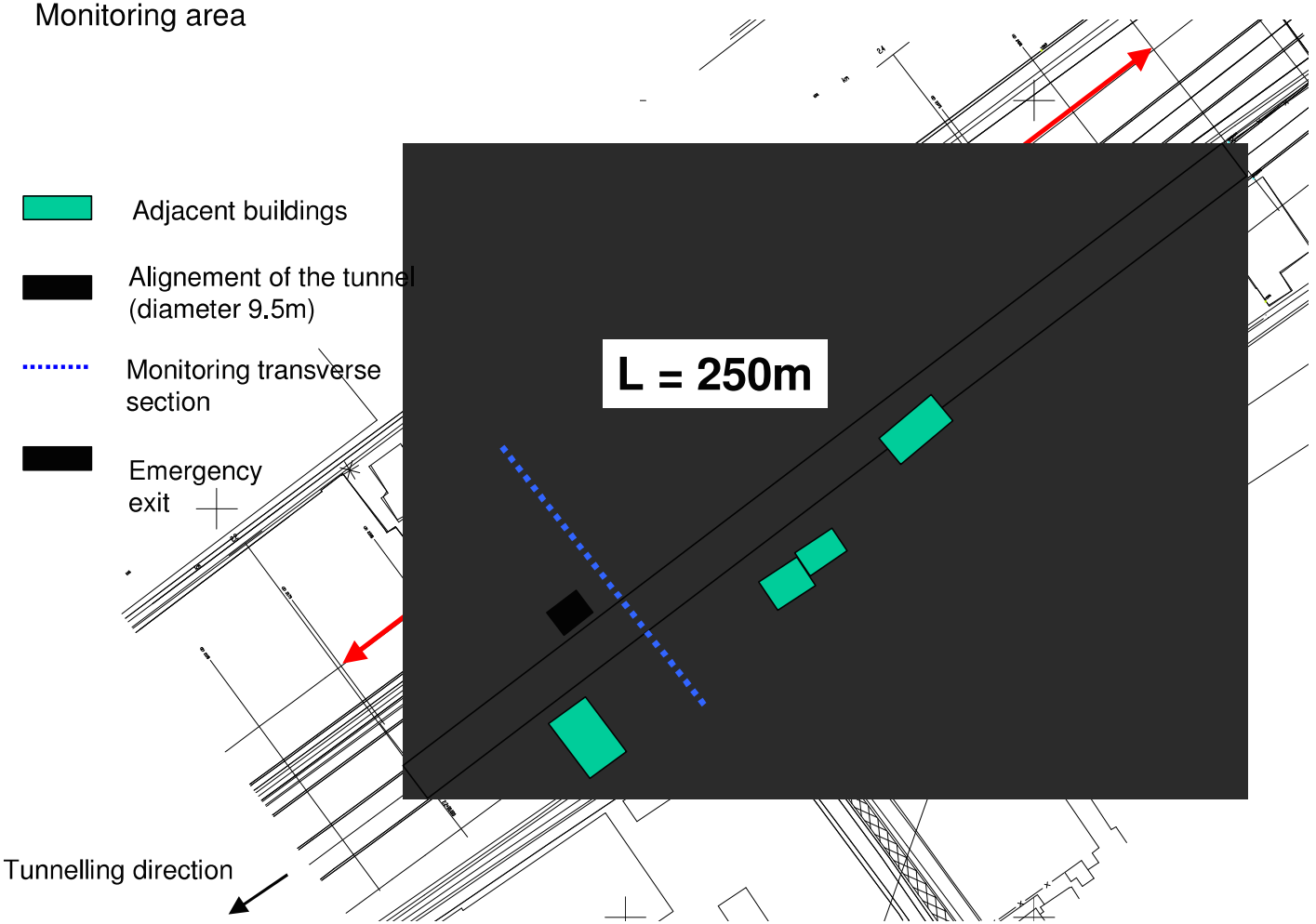
Monitoring area



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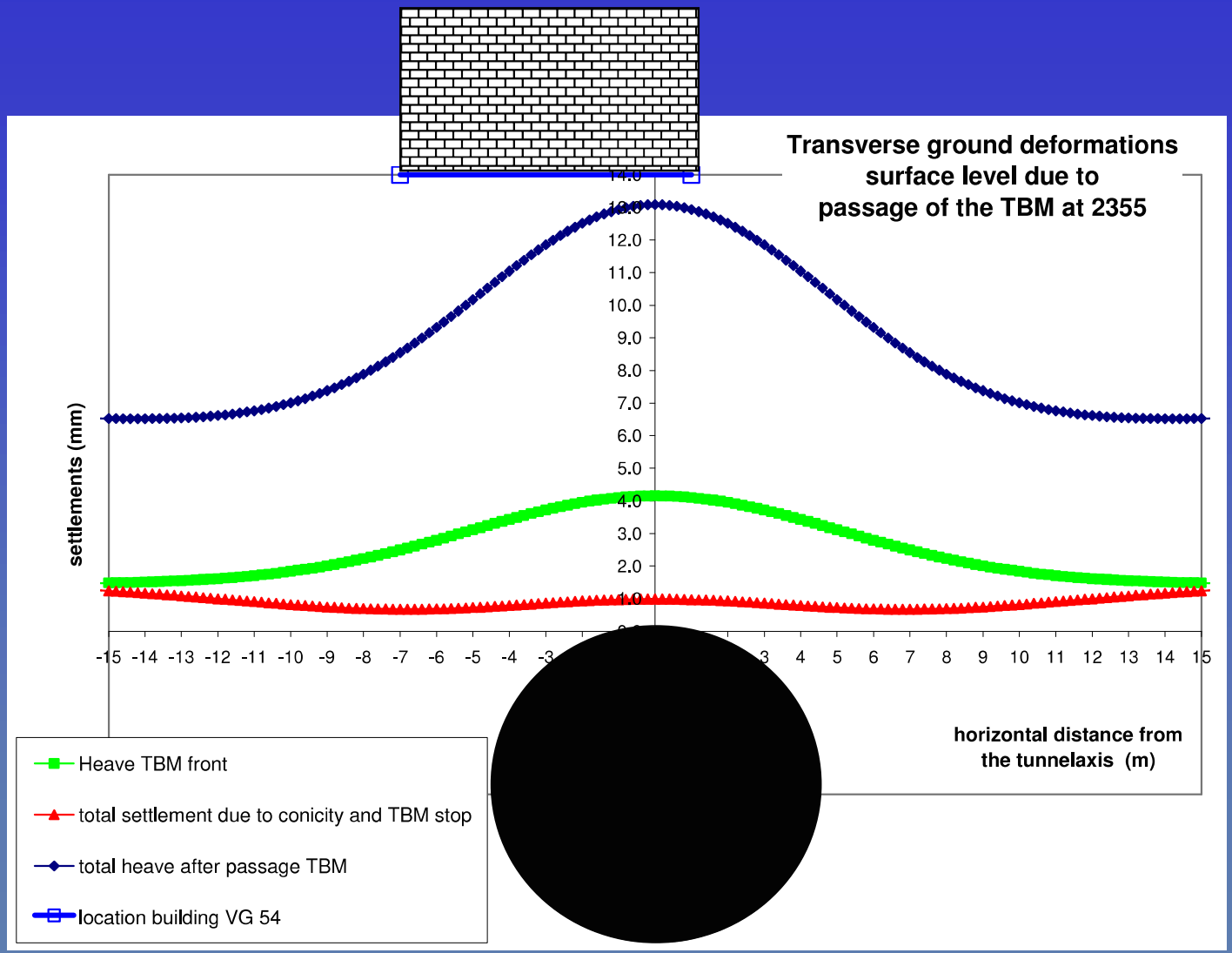

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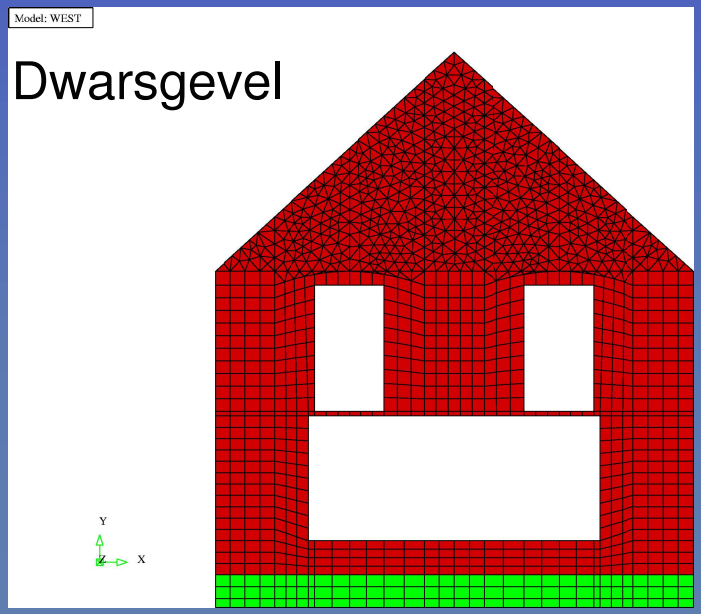

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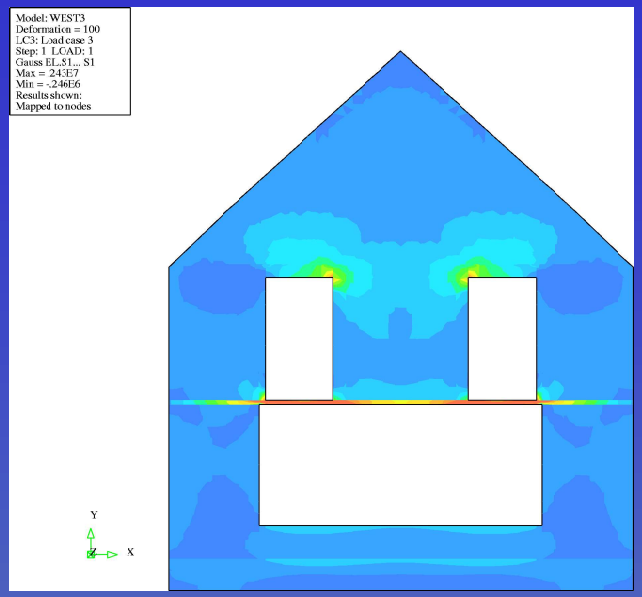

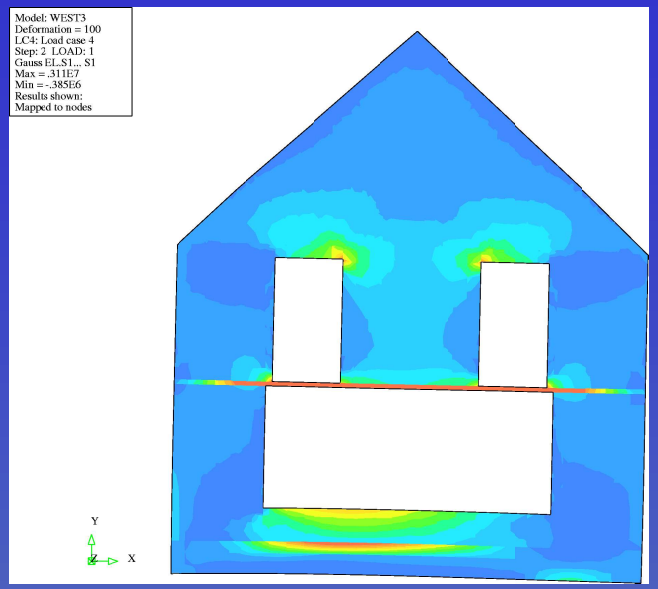

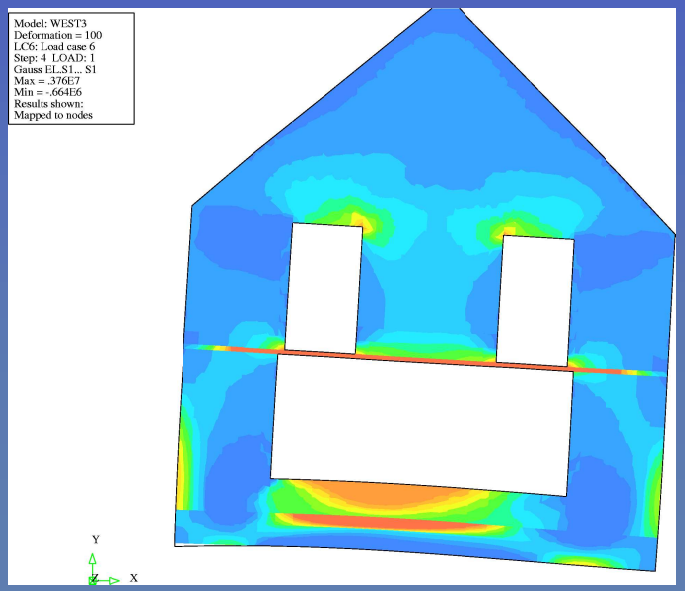

Rekveranderingen

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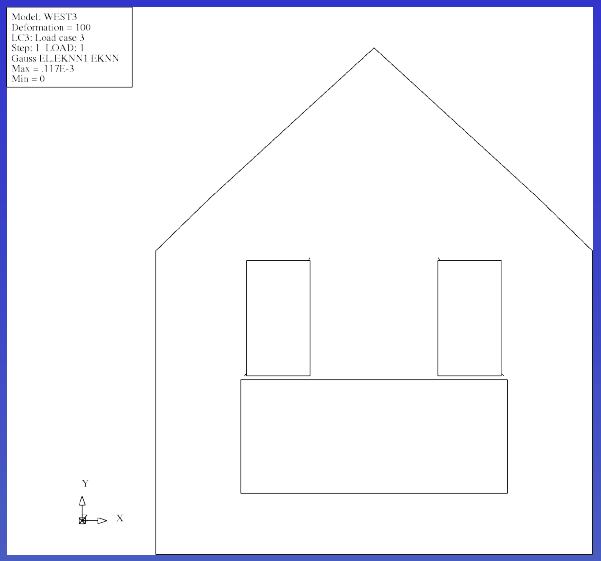

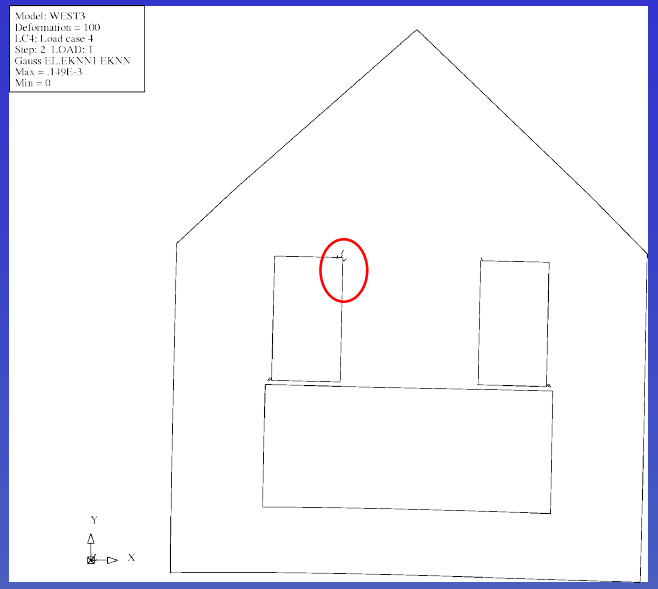

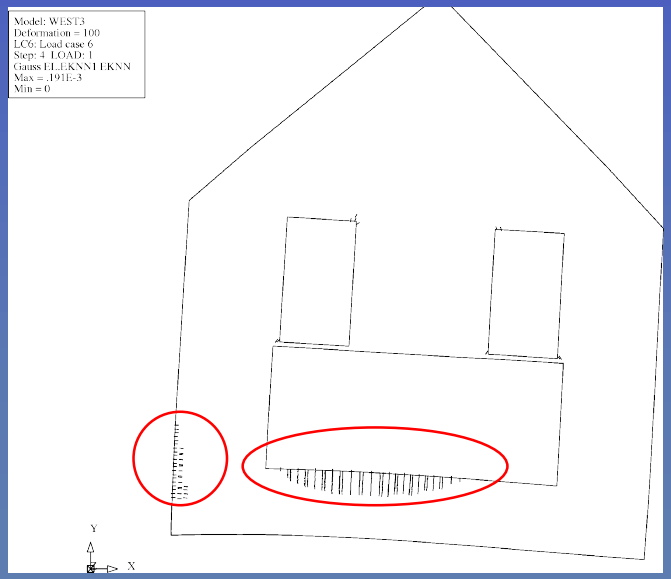

Scheurvorming

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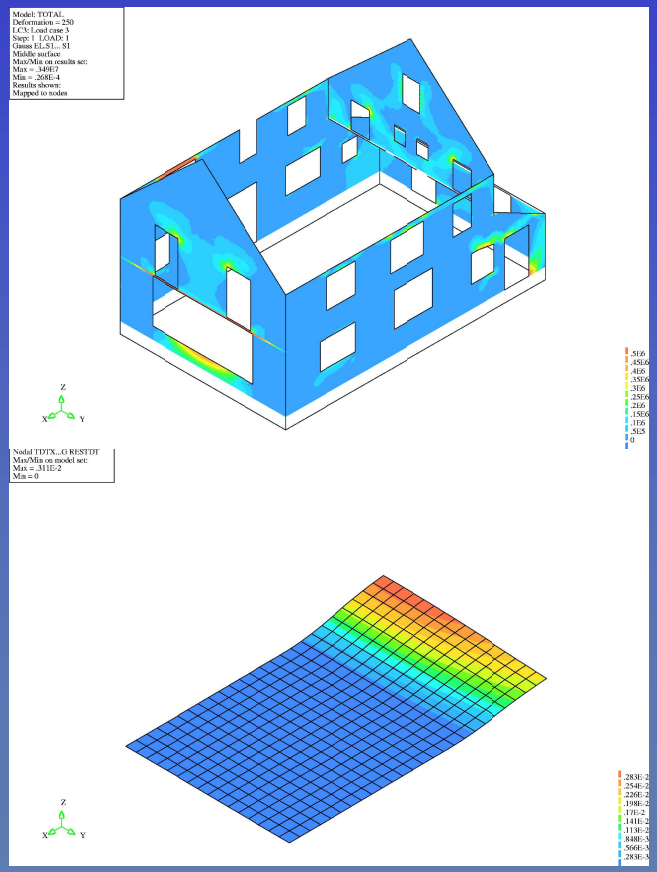

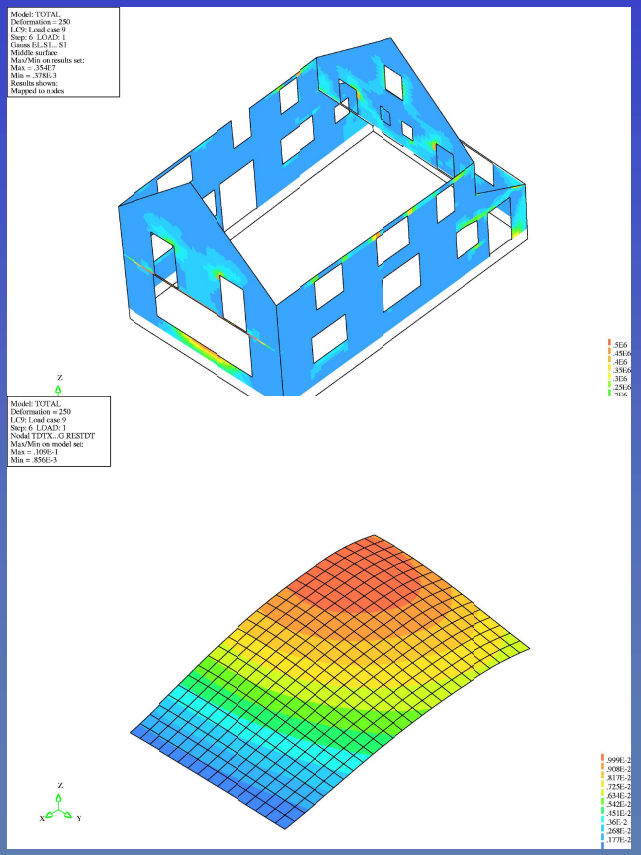

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