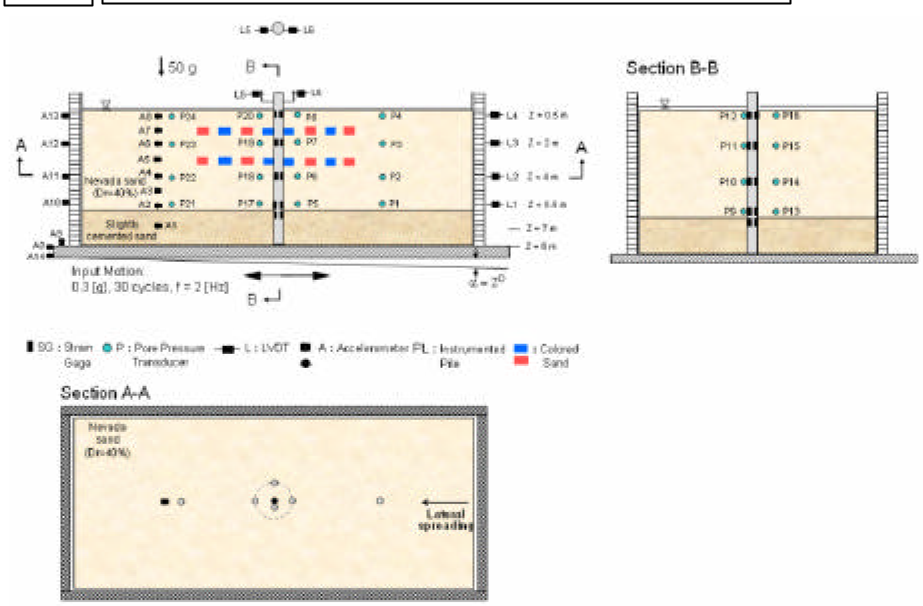
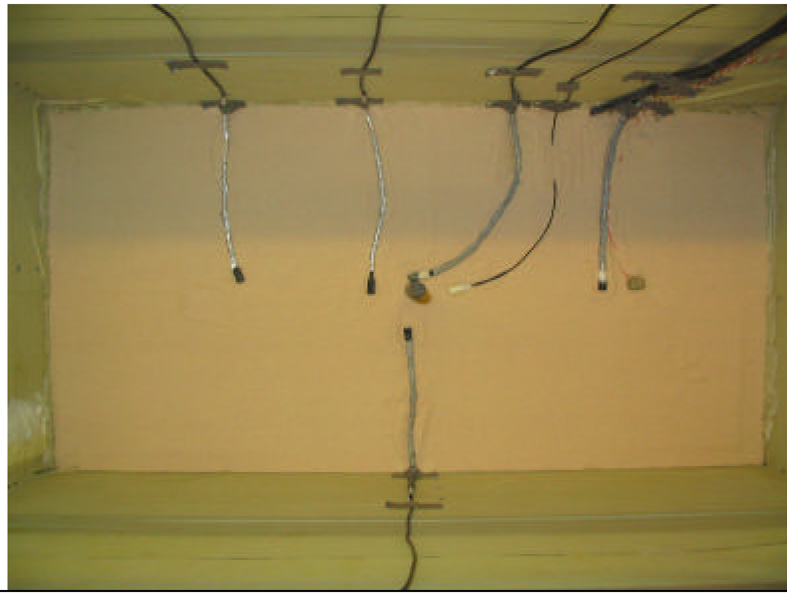
Respuesta de pilotes sometidos a corrimiento lateral de suelo licuado

1

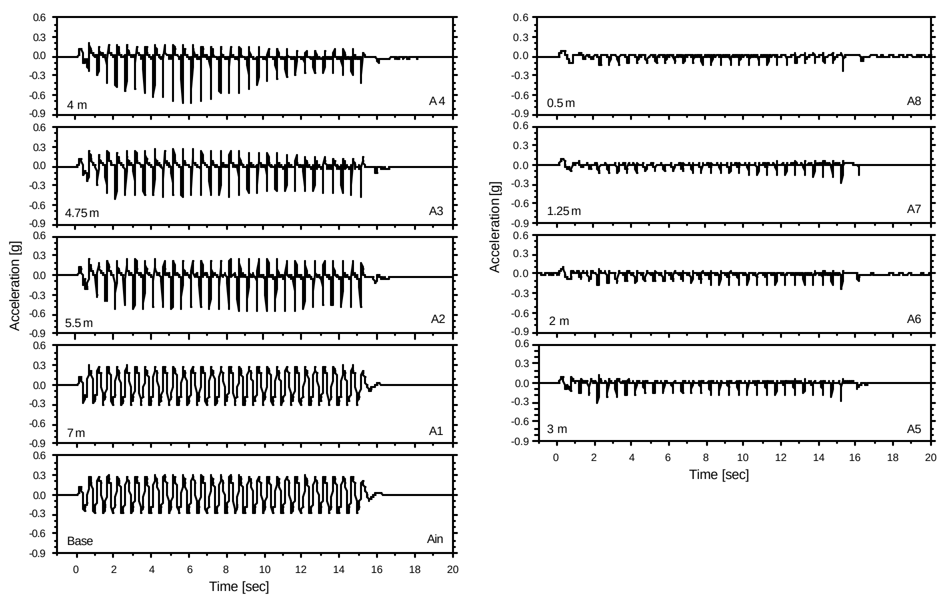
Esquema de Modelo 1x1-v (saturado con líquido viscoso)



2 Preparación del Modelo 1x1-v



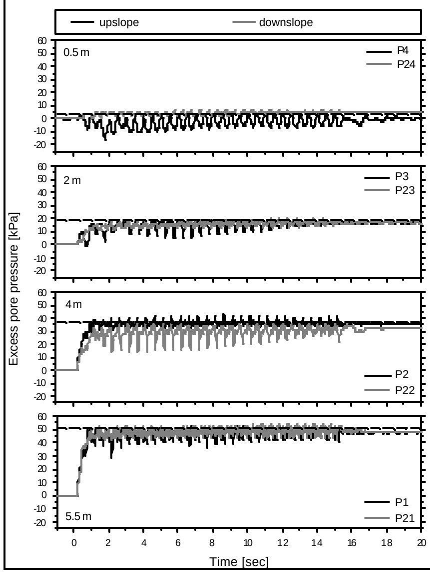
3 Historia de aceleraciones



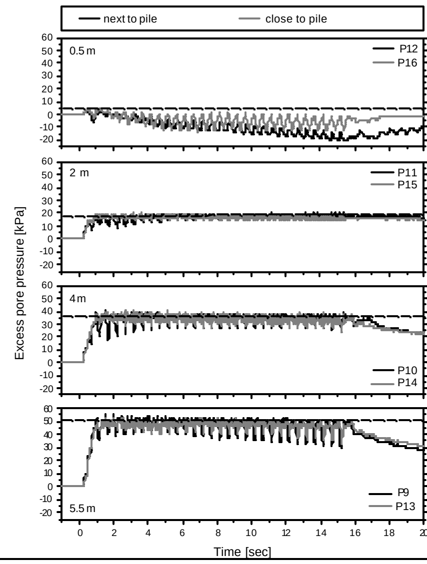
4

Exceso de presión de poros

Lejos del pilote

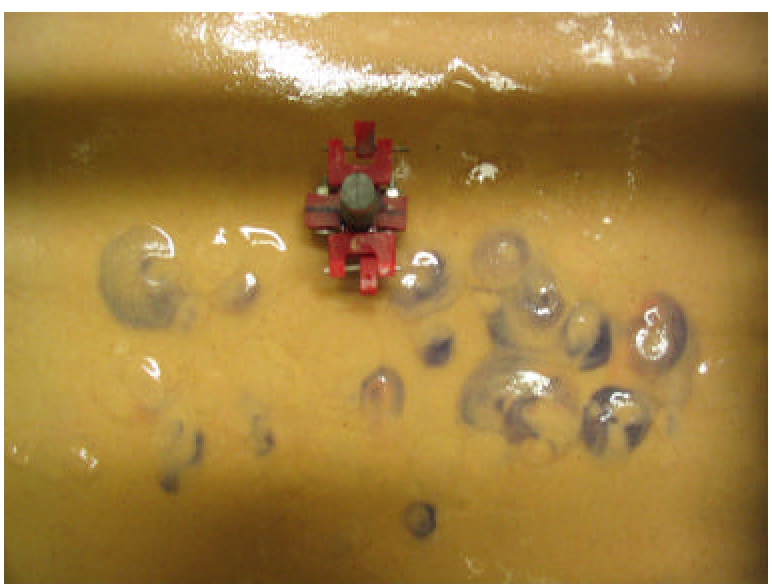


Al lado del pilote



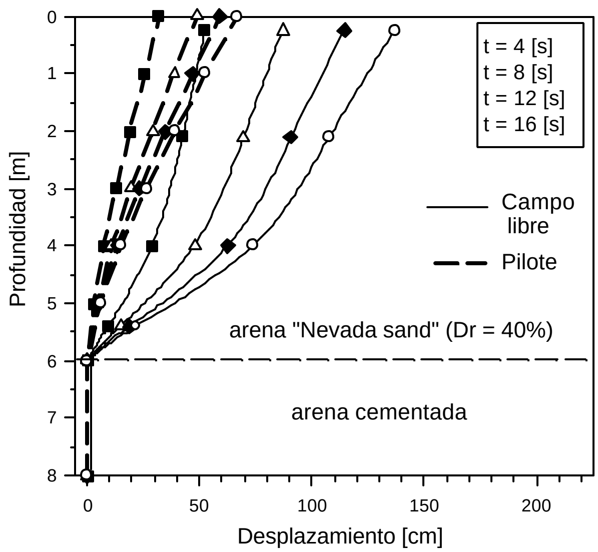
5

“Sand boils”



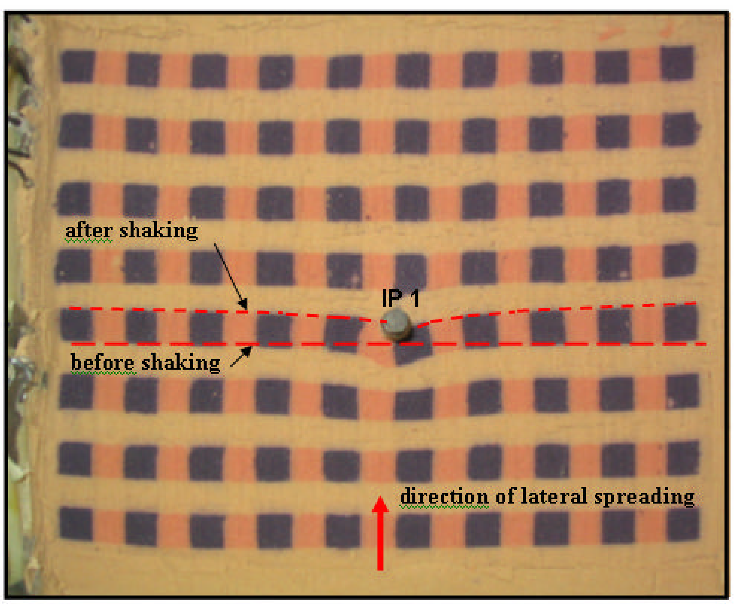
6

Perfil de desplazamientos laterales del campo libre y del pilote



7

Patrón de desplazamientos del suelo licuado



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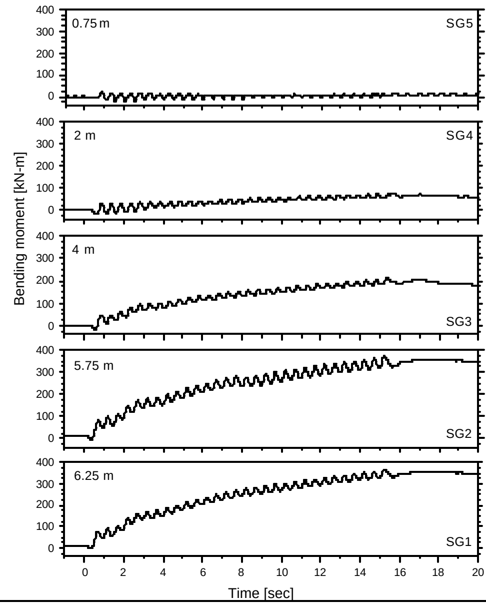
Historia de momentos de flexión



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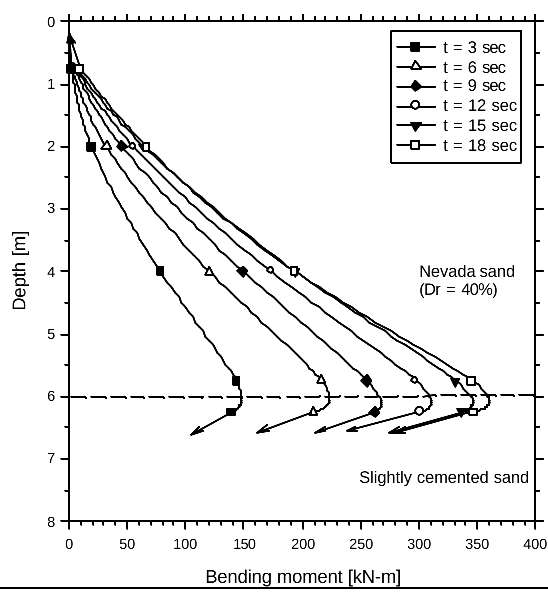
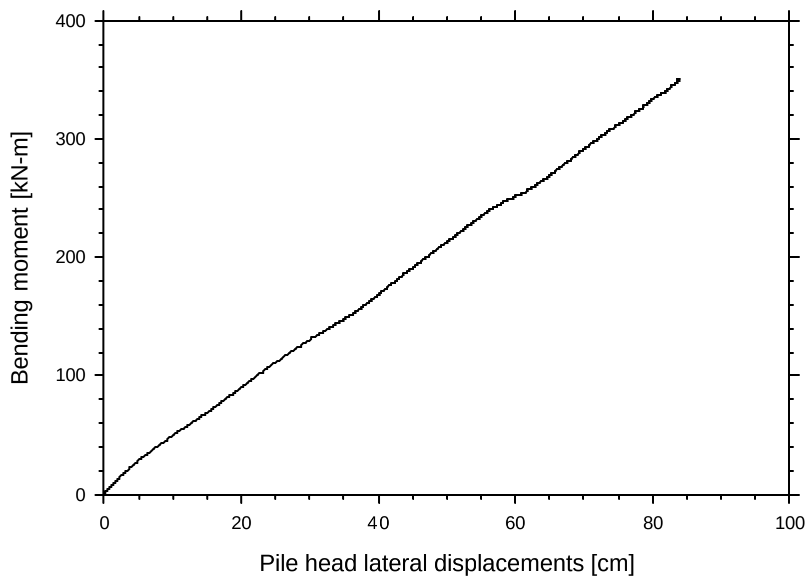
Perfil de momentos de flexión



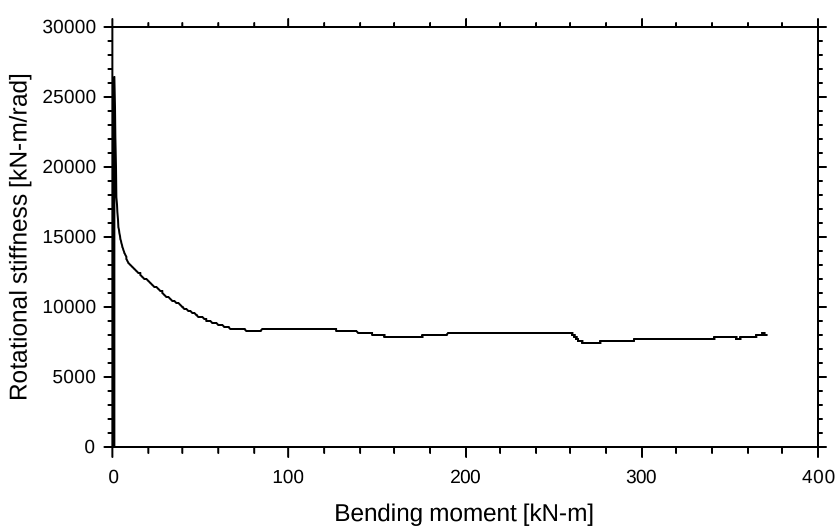
10

Momento de flexión en la base del pilote vs desplazamiento lateral del pilote en la cabeza



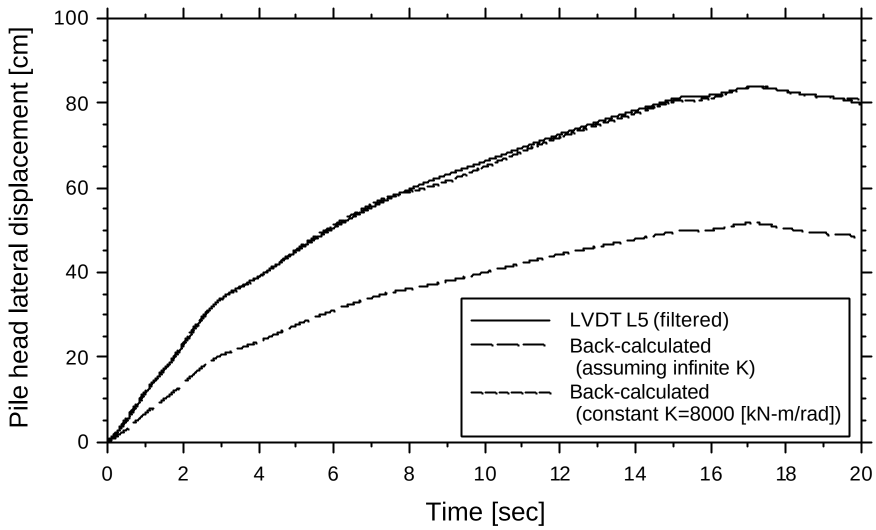
11

Rigidez rotacional de la arena cementada al rededor del pilote vs. momento de flexión en la base del estrato de arena licuada.



12

“Back-calculated” desplazamiento lateral de la cabeza del pilote



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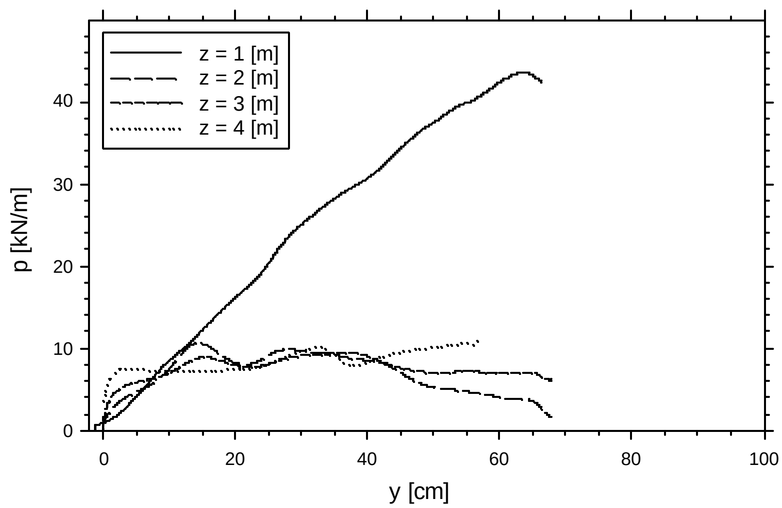
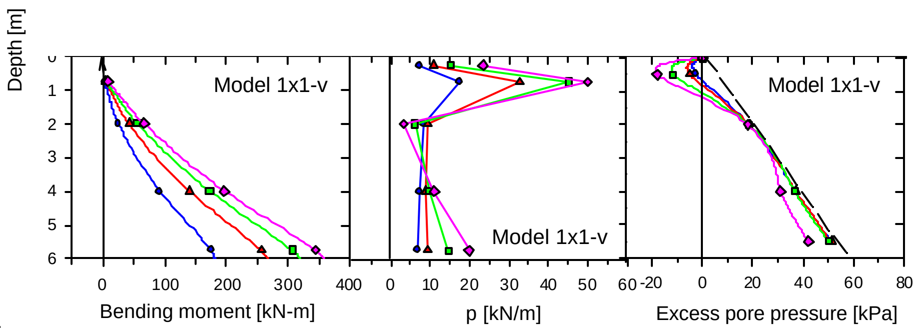
“Back-calculated” curvas p-y



14 Resumen de la respuesta del pilote aislado



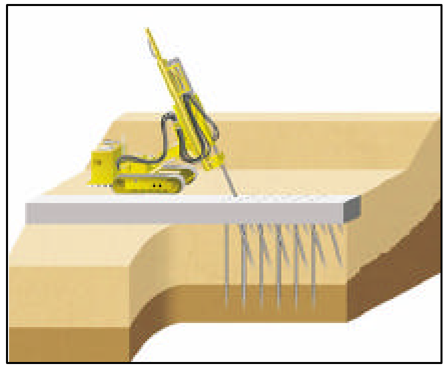
15 Vulnerability of highway bridges to lateral spreading

- Vulnerability of highway bridges to ground failures arising from liquefaction clearly demonstrated in past earthquakes, damage primarily associated to lateral spreading.
- Evaluation of lateral spreading involves considerable uncertainty; current state of practice utilizes Newmark approach.
- Once geometry of failure and magnitude of lateral deformation are estimated, an assessment should be made to see if the foundation is able to withstand the displacement demands.

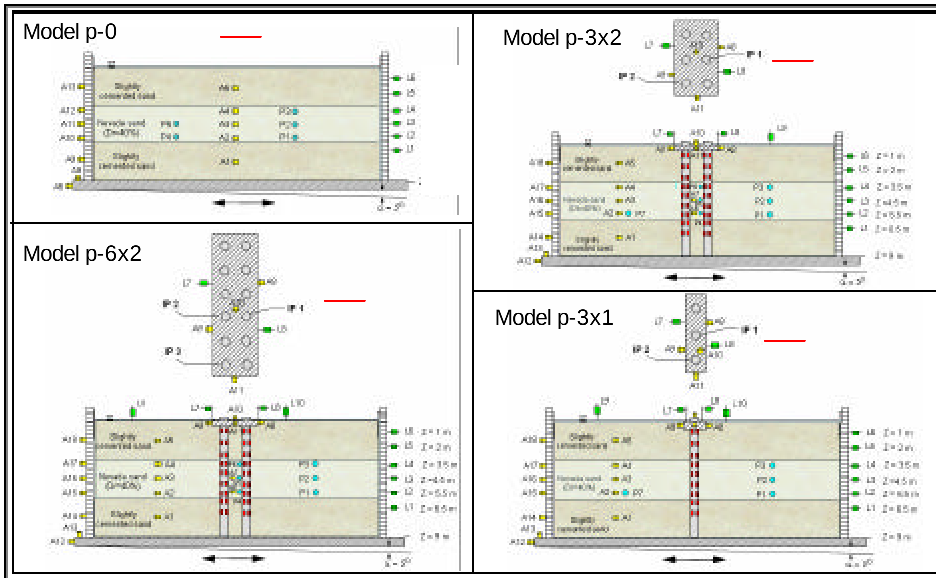
The Landing Road Bridge, after the 1987 New Zealand earthquake

16 Pinning reinforcement effect on lateral spreading

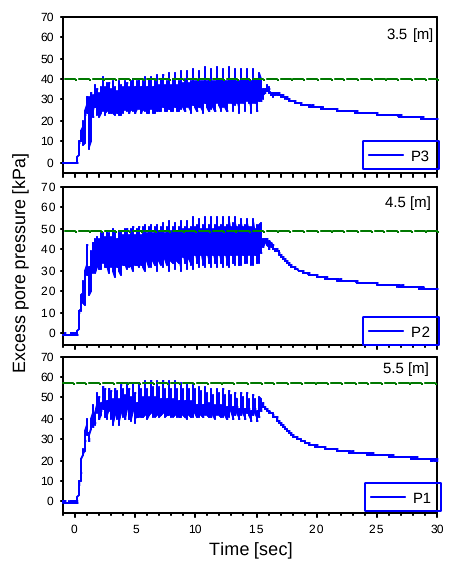
- A refinement of the previous approach is to consider the reinforcing or pinning effects the piles have on the lateral stability.
- Lateral soil deformation may be reduced by restraining forces from pile foundations, expected loads imposed on piles can be smaller than those estimated without consideration of pile pinning effect..
- A series of four centrifuge tests were conducted to study the pinning effect the pile groups have on the lateral spreading. The centrifuge models simulate the case when a nonliquefied crust rides on top of a liquefied sand layer.

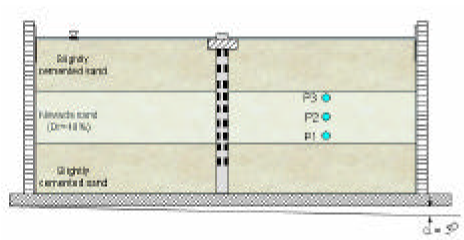


1 Setup and instrumentation of centrifuge tests



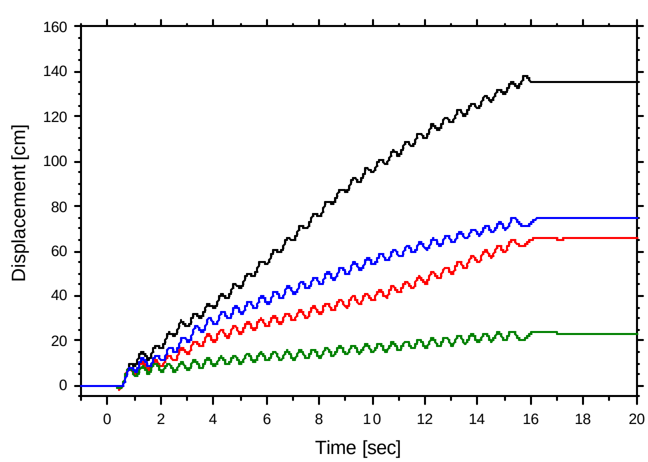
18 Excess pore pressure time histories, Model p-3x1

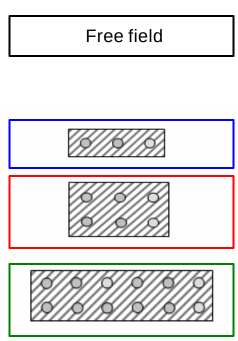




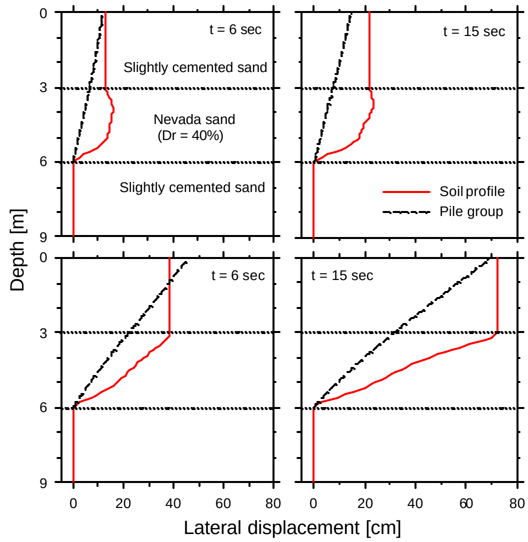
Longitudinal section

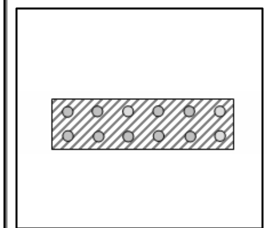
19 Ground surface lateral displacements

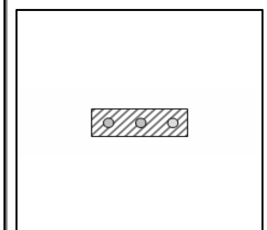




20 Pile group and soil lateral displacement profiles

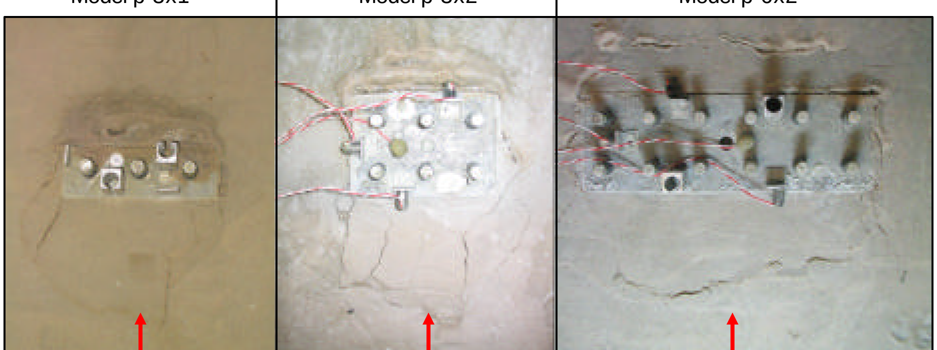






21 Ground surface condition around pile groups

Model p-3x1	Model p-3x2	Model p-6x2



Free field disp. = 75 cm	Free field disp. = 65 cm	Free field disp. = 23 cm
Pile cap disp. = 67 cm	Pile cap disp. = 43 cm	Pile cap disp. = 15 cm

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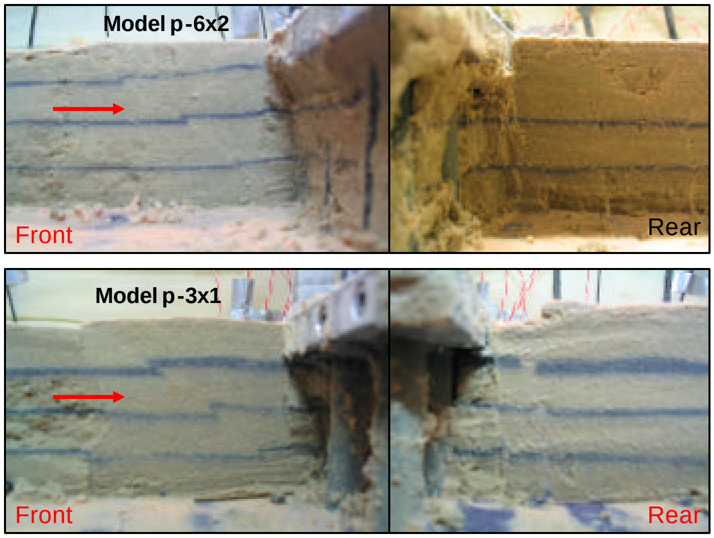
Passive failure in front of pile groups



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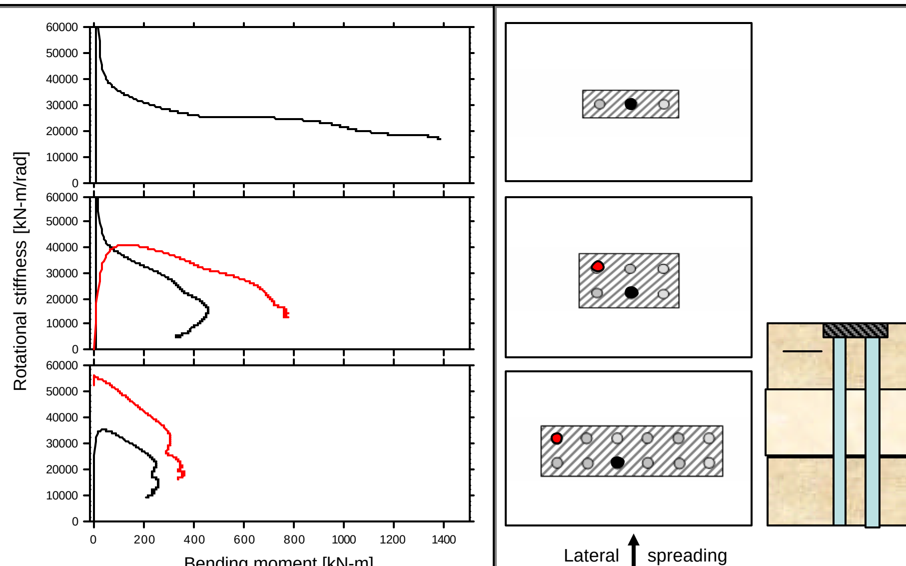
Rotational stiffness provided by the bottom cemented layer



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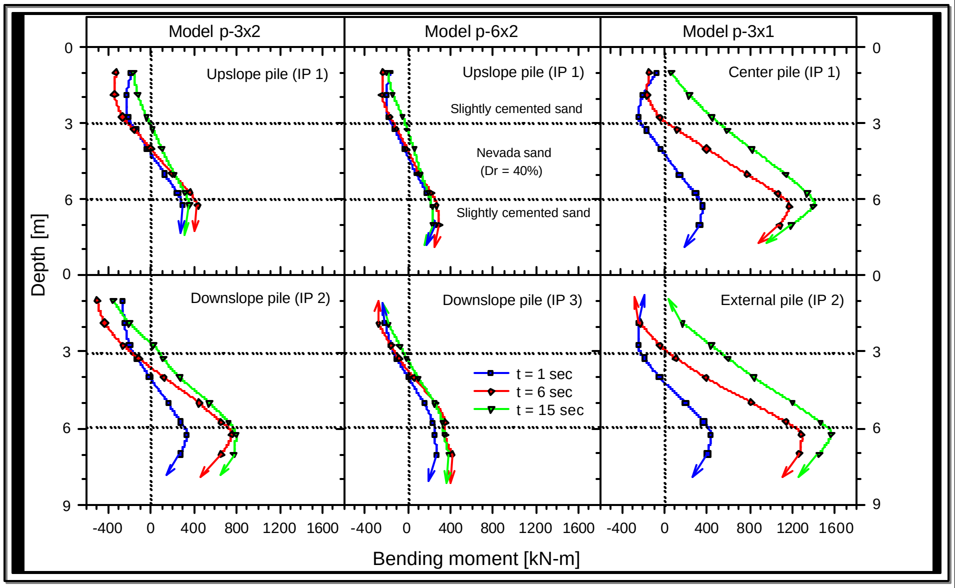
Summary of bending moment profiles



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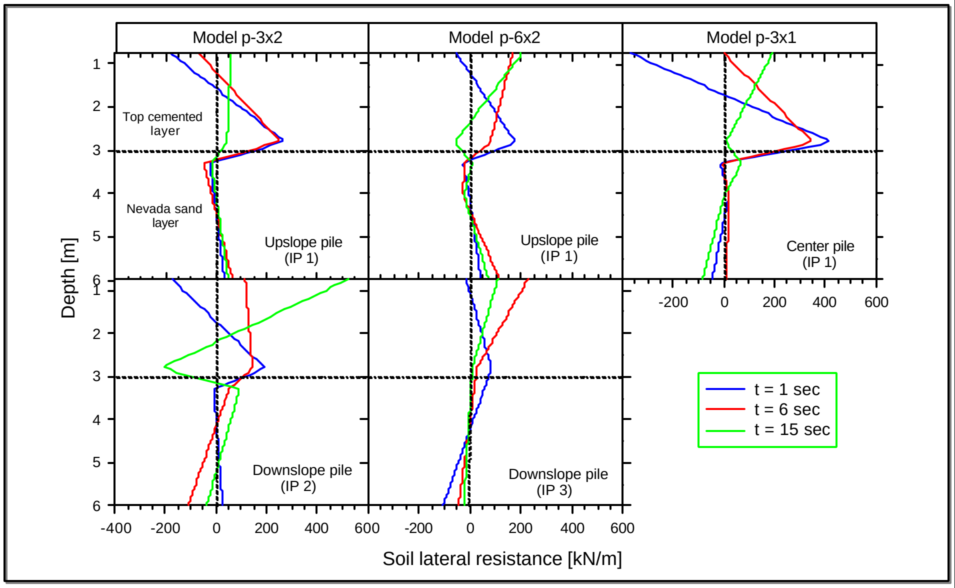
Lateral resistance against pile groups



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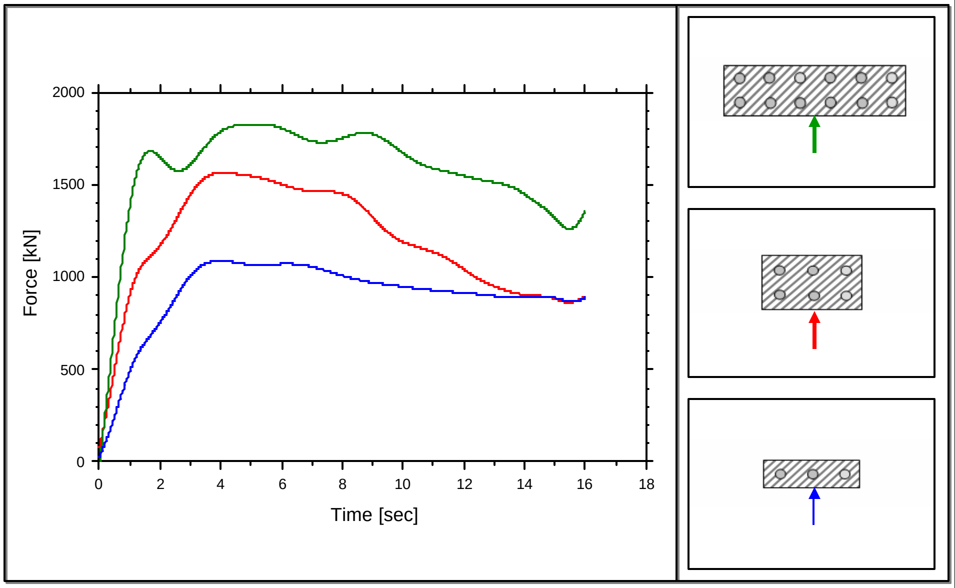
Force time histories against pile groups



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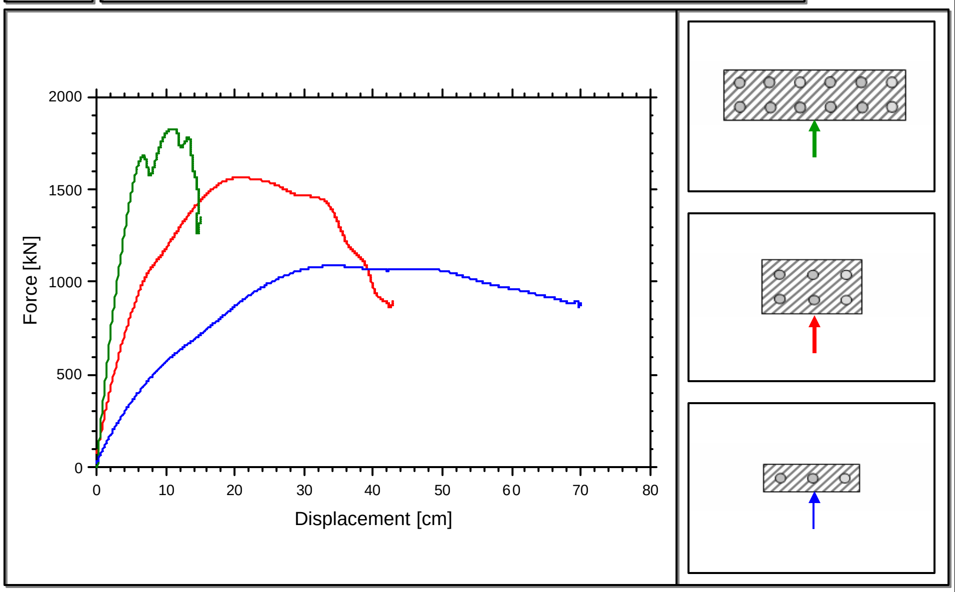
Force versus pile group lateral displacement



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Normalized force versus pile group lateral displacement