## NDUSTRY UPDATE

Segmental Retaining Walls Add Stability to Shaky Ground

Until recently, Septement Recaining Walts (SNRW) were rardy installed in earthquake prome areas — primarily because information was lacking on how they would respond to significant seimite activity. That rend may on durage in response to verent, renthholding observations of SNRW in a action. Although engineers and regulators are till cautions, there is a growing acceptance SNRW as a perfect obtained. Here why:

- Reinforced soil SRWs are "ductile" (capable of being fashioned into a new form). This characteristic allows an entire wall to "deform" in response to large, rapid increases in dynamic loading (pressure).
- SRWs are flexible. The SRW's dry-stacked blocks can accommodate variations of wall movement caused by the variations in soil and foundation conditions along the wall, by moving between mortarless joints.
- The design of SRWs can be specially engineered to withstand seismic activity. Through calculated adjustments to the strength, vertical placement and length of soil reinforcement, the "global stability" or performance of the entire wall can be controlled during a quake.



This "cut-and-fill" segmented retaining well supports a tennis court in Diamond Bar, California that withstood the 1994 Northridge earthqueke.

FERA RADO TREMELINC IN CALIFORNIA The Northing California entroplave on Junyu 77, 1994 poignantly demonstrated SRW performance fratures. The quade was fest remody in all four counter surrounding Lia Angoles, in large part ends to a roong vertical acceleration or movement of the ground. Despit the violent shaking, SRW ever 15 feet in high performed externally well. Nine SRWs housed print found externally well. Nine SRWs housed print of the sign of district. We SRWs the extegrationed aroung ground acceleration (0.5g and 0.3yc) had only minor damage limited to surface tension cracks in or just behind the reinforced allorme. Even in these was severe cases, the walls remained intact and did not separate from the reinforced soil. Compared to the damage incurred by other structures in the area, the SRW turned in a solid performance.



PREDICTABLE PERFORMANCE BUILDS CONFIDENCE

The indury continues to learn and understand more about SRW performance under seismic conditions. Though engineering research, indury reperts have managed to accurately predict performance of SRWs in resins: regions. The National Concrete Masony Auscitation (NCAM) recently published a seismic design manual for SRWs containing a design method that does just that. When applied to the SRW observed after the Northdige quark. NCAM design method correctly predicted the performance of all of the walls. It also identified the specific failure mechanism at the two locations that suffrest minor damage.

## MORE SRWS MOVE INTO QUAKE COUNTRY

Thanks to demonstrated good performance under teinnic loading and inherent engineering features, SRWs are gaining popularity in enchpatake-ponce regions of the United States. In particular, SRWs are being increasingly relied upon to provide unport and change in grade for sume very entenivier and eather enderstand and the state of the state of the state performance of SRWs, contact the Androf Wall Systems ingeneering desparation at 13800.4734.52. ■

Michael Simac P.E., the author of this article, is a principal engineer with Earth Improvement Technologies located in Cramerton, North Carolina.