

Comparison of Double Unit Tunnel Form Building before and after Repair and Retrofit under in-Plane Cyclic Loading

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Abstract : This paper present the experimental work on the seismic performance of double unit tunnel form building (TFB) subjected to in-plane lateral cyclic loading. A one third scale of 3-storey double unit of TFB is tested at $\pm 0.01\%$, $\pm 0.1\%$, $\pm 0.25\%$, $\pm 0.5\%$, $\pm 0.75\%$ and $\pm 1.0\%$ drifts until the structure achieves its strength degradation. After that, the TFB is repaired and retrofitted using additional shear wall, steel angle and CFRP sheet. A similar testing approach is applied to the specimen after repair and retrofit. The crack patterns, lateral strength, stiffness, ductility and equivalent viscous damping (EVD) were analyzed and compared before and after repair and retrofit. The result indicates that the lateral strength increases by 22 in pushing direction and 27% in pulling direction. Moreover, the stiffness and ductility obtained before and after retrofit increase tremendously by 87.87% and 39.66%, respectively. Meanwhile, the energy absorption measured by equivalent viscous damping obtained after retrofit increase by 12.34% in pulling direction. It can be concluded that the proposed retrofit method is capable to increase the lateral strength capacity, stiffness and energy absorption of double unit TFB.

Keywords : tunnel form building, in-plane lateral cyclic loading, crack pattern, lateral strength, stiffness, ductility, equivalent viscous damping, repair and retrofit

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