



Reference List Floating Trackbed Systems

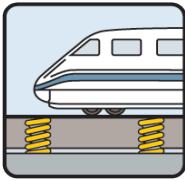


Brazil

Metro Brasilia Line 1 Subway tunnel underneath buildings completion 2000	continuous slab (in-situ) total length: axle load: speed: support frequency:	595 m 16 t 85 km/h 6.9 Hz
Metro Sao Paulo Line 2 completion 2006 - 2010	continuous slab (in-situ) total length: axle load: speed: support frequency:	9,135 m 17.5 t 100 km/h 5.9 - 15.0 Hz
Metro Sao Paulo Line 4 completion 2009 - 2010	continuous slab (in-situ) total length: axle load: speed: support frequency:	18,545 m 17.5 t 100 km/h 6.8 -10.5 Hz
Metro Sao Paulo Line 5 completion 2002	continuous slabs on strip support total length: axel load: speed: dead load: support frequency:	14,400 m 16 t 80 km/h 1.9 t/m 17.2 Hz
Metro Sao Paulo Line 11 Subway tunnel underneath residential buildings completion 2000	continuous slab (in-situ) total length: axle load: speed: support frequency:	600 m 21 t 90 km/h 7 Hz

China (excerpt)

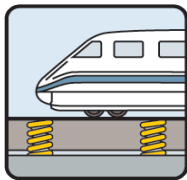
Metro Beijing Line 4 completion 2009	continuous slab (in-situ) total length: axle load: speed: support frequency:	3,070 m 14 t 80 km/h 6.0 - 7.0 Hz
Metro Beijing Line 6 1st stage completion 2012	continuous slab (in-situ) total length: axle load: speed: support frequency:	5,779 m 14 t 100 km/h 7 - 10 Hz
Metro Beijing Line 8 completion 2013	continuous slab (in-situ) total length: axle load: speed: support frequency:	6,765 m 14 t 80 km/h 9.5 Hz



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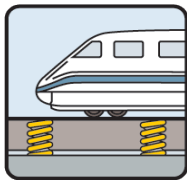
Metro Beijing Line 14 1st stage under construction	continuous slabs (in-situ) total length: 9,868 m axle load: 17.5 t speed: 80 km/h support frequency: 8 - 11 Hz
Metro Beijing Line 14 2nd stage under construction	continuous slabs (in-situ) total length: 11,194m axle load: 17.5 t speed: 80 km/h support frequency: 8 - 11 Hz
Metro Shanghai Line 7 completion 2009	continuous slab (in-situ) total length: 6,600 m axle load: 16 t support frequency: 7.5 / 9.4 Hz
Metro Shanghai Line 10, East and West Extension completion 2010	continuous slab (in-situ) total length: 6,100 m axle load: 16 t support frequency: 9.0 -10.0 Hz
Metro Shanghai Line 11 completion 2013	continuous slab (in-situ) total length: 11,167 m axle load: 16 t support frequency: 8.8 - 11.0 Hz
Metro Shanghai Line 12 West part under construction	continuous slab (in-situ) total length: 4,235 m short slab total length: 11,286 m speed: 80 km/h axle load: 16 t support frequency: 8.2 - 8.9 Hz
Metro Shanghai Line 13, 1st stage under construction	continuous slab (in-situ) total length: 2,876 m short slab total length: 8,204 m axle load: 16 t speed: 80 km/h support frequency: 8.2 - 8.9 Hz
Metro Shenzhen Line 1 completion 2009	continuous slab (in-situ) total length: 3,395 m axle load: 16 t speed: 80 km/h support frequency: 5 - 8.5 Hz
Metro Shenzhen Line 5 completion 2010	continuous slab (in-situ) total length: 5,332 m axle load: 16 t speed: 80 km/h support frequency: 7.8 / 9.0 Hz



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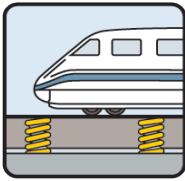
Metro Hangzhou Line 1 completion 2012	continuous slabs (in-situ) total length: 4,521 m axle load: 14 t speed: 80 km/h support frequency: 8.5 Hz
Metro Qingdao Line 3 under construction	continuous slabs (in-situ) total length: 10,738 m axle load: 14 t speed: 80 km/h support frequency: 8 Hz
Metro Suzhou Line 2 completion 2013	continuous slabs (in-situ) total length: 6,912 m axle load: 14 t speed: 80 km/h support frequency: 7.7 / 9.2 Hz
<u>Germany</u>	
Subway Berlin Subway tunnel below a hospital completion 1994	mini ballast troughs (2.5 m) total length: 400 m axle load: 9 t speed: 70 km/h support frequency: 7.5 Hz
Tramway Bielefeld Tramway passing a hotel building, slab used by trams and vehicles completion 1995	turnout slab at grade slab length: 65 m axle load: 10 t speed: 50 km/h support frequency: 5.0 Hz
Tramway Cologne Tunnel below residential buildings completion 1997	continuous slab (in-situ) total length: 1,800 m axle load: 10 t speed: 70 km/h support frequency: 6.5 Hz
Frankfurt / Main / International Airport Passenger-Transfer-System fully-automatic elevated train system with rubber wheels passing partially through and on top of buildings completion 1997	spring supported, elevated steel girders and concrete troughs, spring units partially combined with sliding elements total length: 1.200 m (different sections) axle load: 7 t speed: 60 km/h support frequency: 5.0 Hz
Frechen/Cologne Tramway completion 1999	2 turnout slabs at grade dimensions: 115 m ² / 120 m ² axle load: 9 t support frequency: 6.5 Hz
Stuttgart-Ruit Tramway Station Tunnel close to residential buildings completion 2000	continuous slabs (45 m) total length: 270 m axle load: 10 t support frequency: 5.7 Hz



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<p>Bochum Tramway completion 2005</p>	<p>long ballast troughs in tunnel total length: dead load: axle load: speed: support frequency:</p>	<p>90 m 7.8 t/m 10 t 80 km/h 6.4 Hz</p>
<p>Heidelberg - Kirchheim City Tram Line completion 2007</p>	<p>2 turnout slabs at grade total length: axle load: support frequency *:</p>	<p>52 m 10 t 7.5 Hz</p>
<p><u>Japan</u></p>		
<p>Tokyo, Waterfront Area Rapid Transit, Rinkai Fukutoshin Line Test slab in subway tunnel Subway tunnel underneath residential building completion 2000 - 2002</p>	<p>continuous slab (in-situ) total length: axle load: speed: support frequency:</p>	<p>200 m 10 t 100 km/h 9.5 - 10.2 Hz</p>
<p>Tokyo Metropolitan Intercity Railway Tsukuba Express completion 2004</p>	<p>continuous slab (in-situ) total length: axle load: speed: support frequency *:</p>	<p>1,112 m 15 t 85 - 160 km/h 8.7 - 10.0 Hz</p>
<p>Yokohama City Loop Line, Line 4 completion 2006</p>	<p>continuous slab (in-situ) total length: axle load: speed: support frequency *:</p>	<p>1,040 m 15 t 80 km/h 9 Hz</p>
<p>Fukuoka Hakata Station - Railway station within shopping mall building completion 2009</p>	<p>prefabricated ballast troughs total length: axle load: support frequency:</p>	<p>768 m 17 t 7.5 Hz</p>
<p><u>Korea</u></p>		
<p>Puchon Station Railway station within shopping mall building, passenger and freight trains completion 1997</p>	<p>long ballast troughs (46 m) total length: axle load: speed: support frequency:</p>	<p>1,350 m 22 t 120 km/h 6.1 Hz</p>
<p>Cheonan Station High Speed Track (TGV) on top of station building completion 1999</p>	<p>ballasted track on concrete slab supported on prestressable type GP spring elements and Viscodampers® total length: axle load: speed: support frequency:</p>	<p>4,800 m 22 t 350 km/h 6 Hz</p>



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Norway

Oslo

Wessels Plass

completion 2004

twin-track slab at grade above
public building

total slab length: 25 m
axle load: 10 t
support frequency: 5 Hz

Russia

Moscow Subway, Mezhdunarodnaya

completion 2006

continuous slabs in tunnel, incl.
for 4 turnouts & 1 diamond
crossing

total length: 800 m
axle load: 15 t
speed: 100 km/h
support frequency *: 6.5 Hz

Moscow Subway, Delovoy Tsentr

completion 2014

continuous slabs in tunnel

total length: 1,277 m
axle load: 15 t
speed: 100 km/h
support frequency *: 6.5 Hz

Switzerland

Basle

Tram T-Crossing close to Concert Hall

completion 2006

continuous turnout slabs at grade

total length: 420 m
axle load: 10 t
support frequency: 5 Hz

Taiwan

Taipei Metro

Xinyi Line

completion 2012

plain track, crossings, turnouts
in tunnel, GSI + KY-elements

total plain track length: 813 m
axle load: 162 kN
speed: 80 km/h
support frequency: 7 Hz

Taipei Metro

Songshan Line

completion 2013

plain track, crossings, turnouts
in tunnel, GSI + KY-Elements

total plain track length: 900 m
axle load: 162 kN
speed: 80 km/h
support frequency: 7 Hz

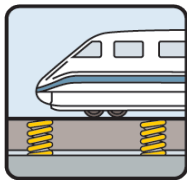
Taipei Metro

Ding Pu Line

completion 2014

200 m crossover, incl. 4 turnouts,
diamond crossing

axle load: 162 kN
speed: 80 km/h
support frequency*: 7 - 8 Hz



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Taiwan Taoyuan International Airport Access MRT System completion 2014	plain track, 8 turnouts in tunnel and on viaduct total length: 2400 m axle load: 150 kN speed: 90 km/h support frequency*: 6 - 8 Hz
Taipei Metro Circular Line completion 2015	plain train, 2 double crossovers incl. 8 turnouts, 2 diamond crossings in tunnel and on viaduct total length: 3,214 m axle load: 103 kN speed: 100 km/h support frequency*: 7 - 8 Hz
<h3><u>U. K.</u></h3>	
London DLR Lewisham Extension, Tunnel underneath residential buildings completion 1999	continuous slab (in-situ) total length: 860 m axle load: 10 t speed: 80 km/h support frequency: 6.5 Hz
London DLR Woolwich-Arsenal Extension completion 2009	continuous slab (in-situ) total length: 660 m axle load: 10 t slab dead load: 3.25 t/m support frequency *: 7 Hz
<h3><u>USA</u></h3>	
Charlotte NC LRT Line passing through Convention Centre completion 2002	long twin-track slabs at grade total length: 221 m axle load: 12.5 t speed: 50 km/h support frequency: 6.5 Hz
Los Angeles / Santa Monica Expo Line Phase II completion 2014	Continuous slab at grade total length: 250 m axle load: 11.1 t speed: 80 km/h support frequency: 4.9 Hz
Los Angeles / Santa Monica Expo Line Phase II completion 2014	Continuous slab at grade total length: 210 m axle load: 11.1 t speed: 80 km/h support frequency: 4.9 Hz

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*dead load only

Specification of FST- lengths includes up-and-down tracks and may refer to several FST parts in the line.