DIMENSIONAL SERIES OF FREIGHT AND PASSENGER/FREIGHT MODULES OF UST

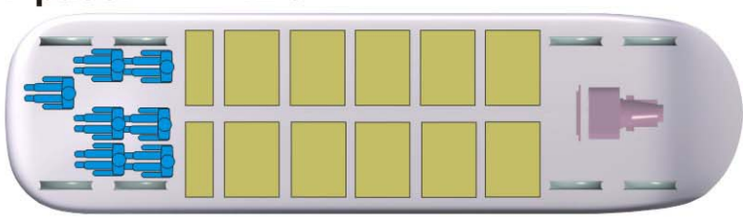
HEAD BLOCK

CENTRAL BLOCK

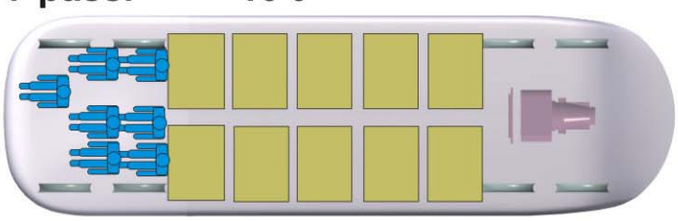
TAIL BLOCK

CARRYING CAPACITY

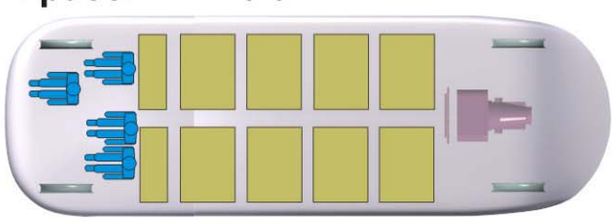
7 pass. 12 t



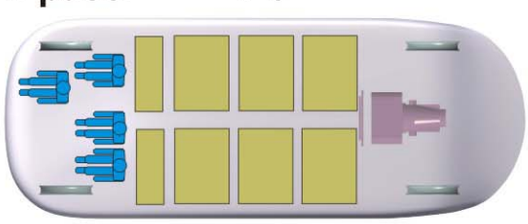
7 pass. 10 t



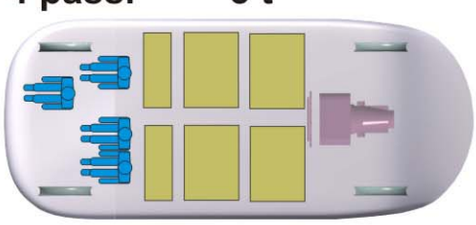
4 pass. 9 t



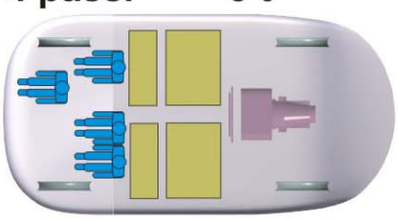
4 pass. 7 t



4 pass. 5 t



4 pass. 3 t



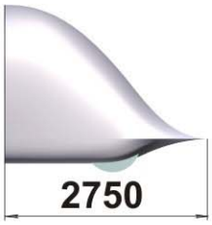
3 pass. 1 t

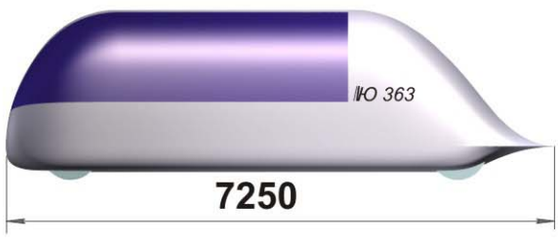
DIMENSIONAL SERIES OF UST PASSENGER MODULES

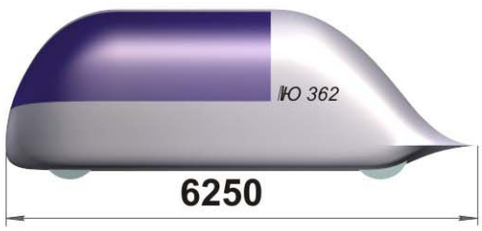
HEAD BLOCK

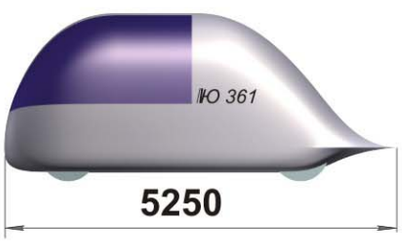
CENTRAL BLOCK

TAIL BLOCK



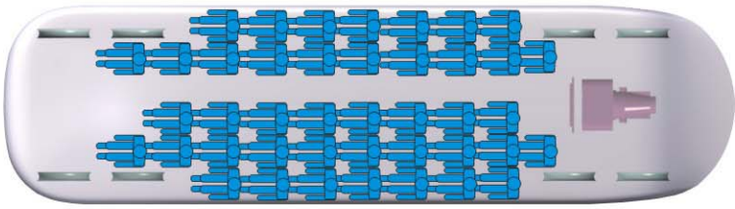




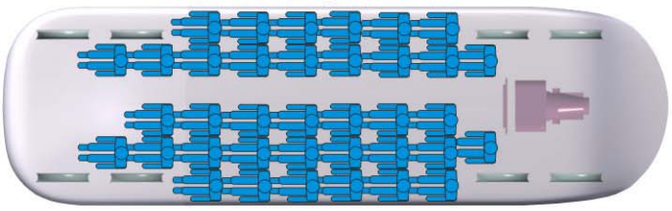


DISTRIBUTION OF SEATS IN THE SALOON

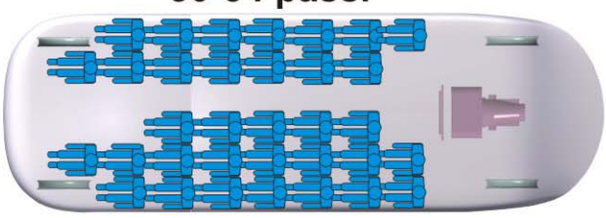
40-50 pass.



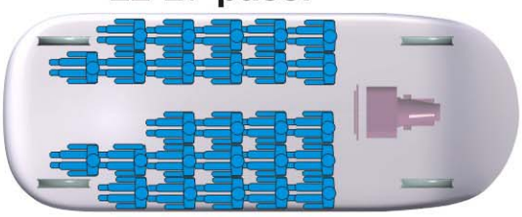
36-40 pass.



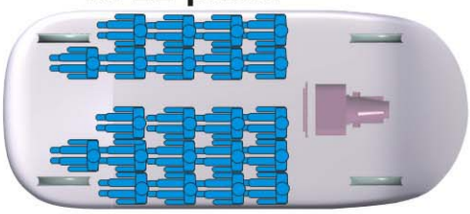
30-34 pass.



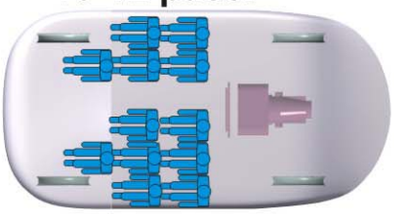
22-27 pass.



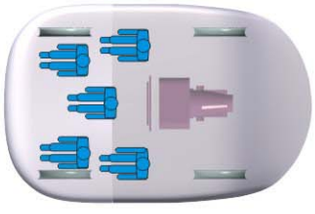
16-22 pass.



10-12 pass.



5 pass.

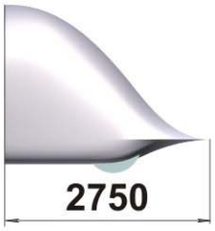


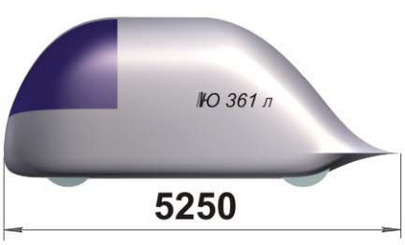
DIMENSIONAL SERIES OF UST LOCOMOTIVES

HEAD BLOCK

CENTRAL BLOCK

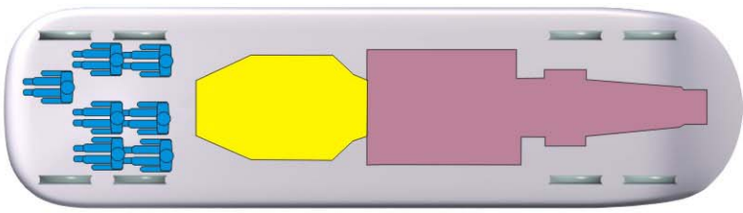
TAIL BLOCK



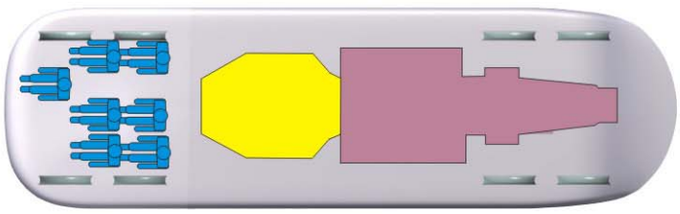


LOAD CARRYING CAPACITY OF A TRAIN

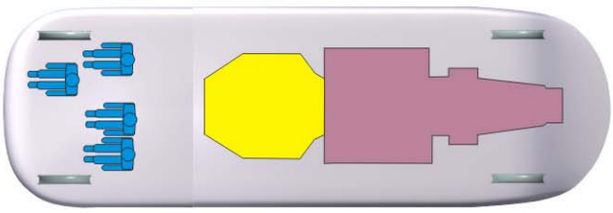
Up to 1000 t



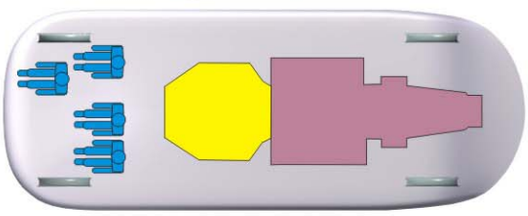
Up to 800 t



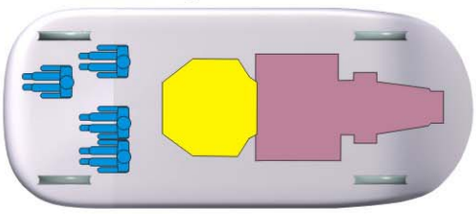
Up to 600 t



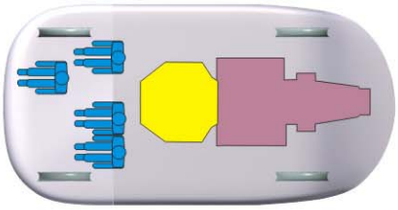
Up to 400 t



Up to 200 t



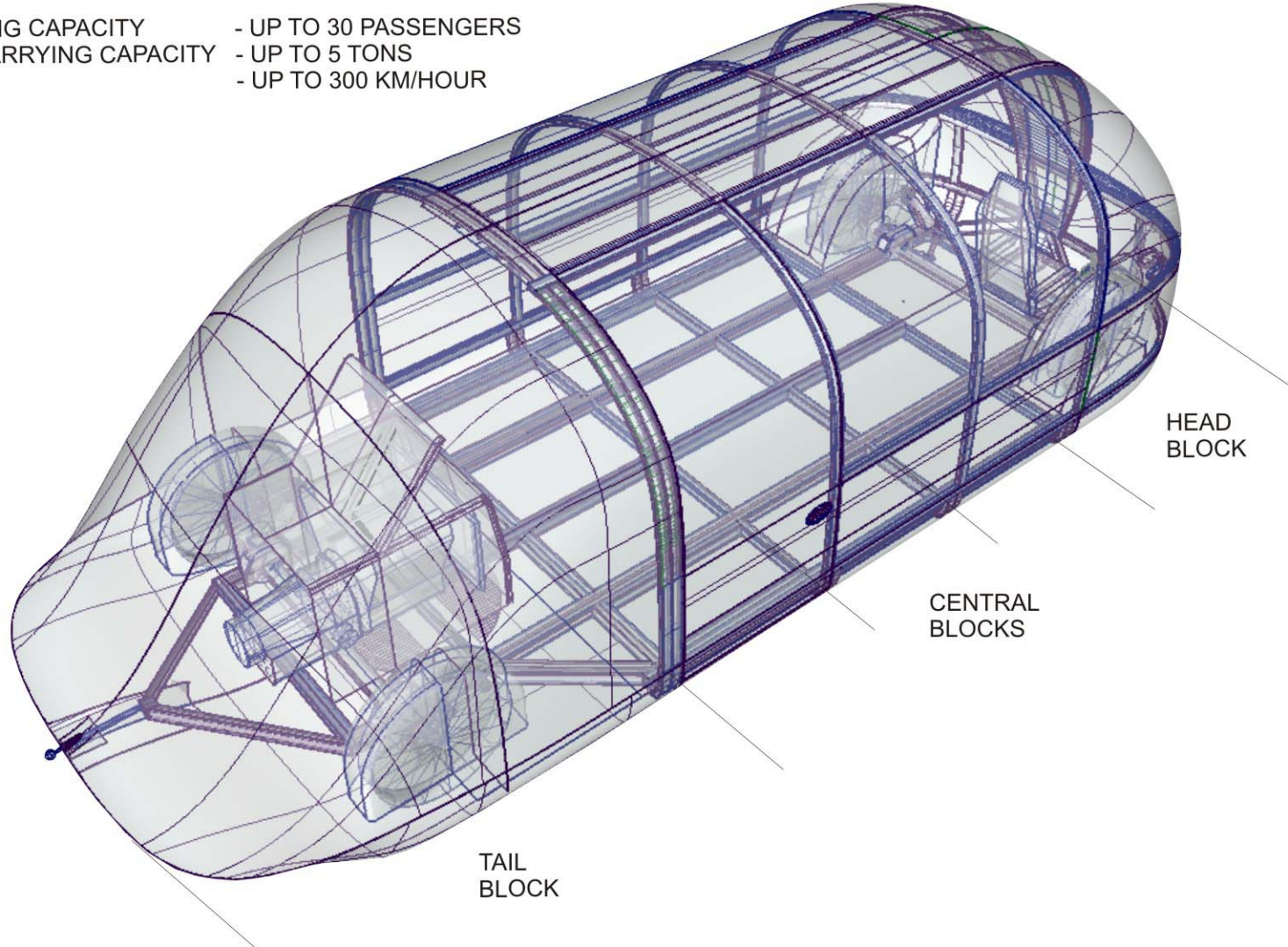
Up to 100 t



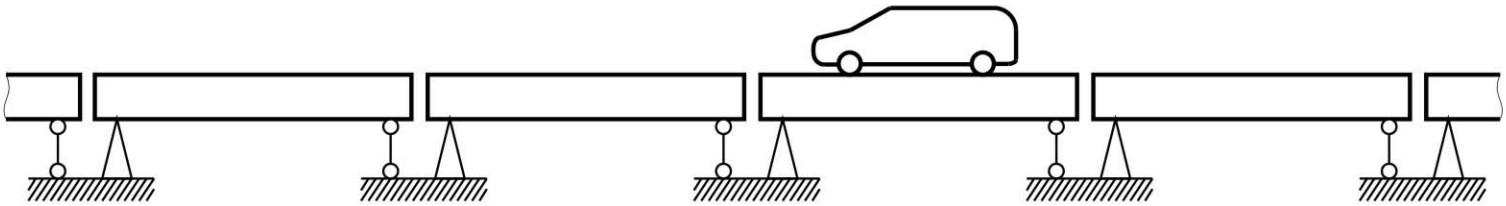
Up to 50 t

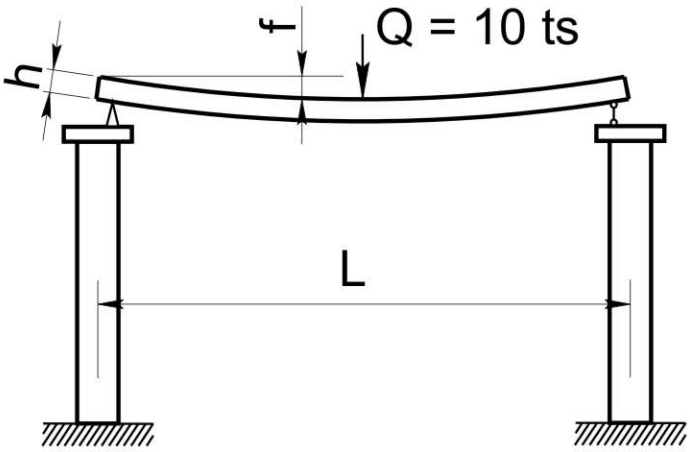
DESIGN OF A UNILET U-35

CARRYING CAPACITY - UP TO 30 PASSENGERS
LOAD CARRYING CAPACITY - UP TO 5 TONS
SPEED - UP TO 300 KM/HOUR



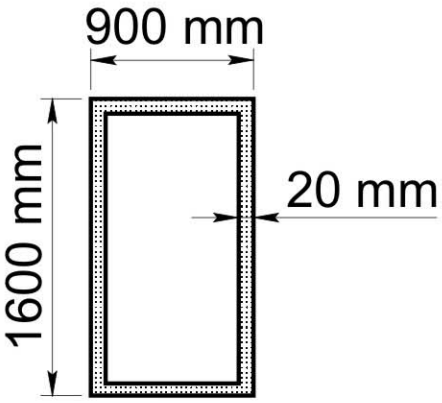
BEAM SPAN STRUCTURE



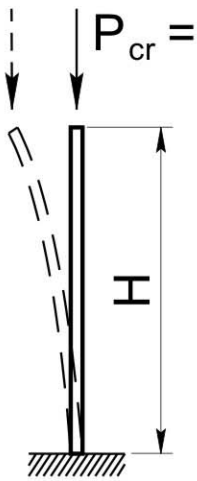


Specific deflection
of a box-type beam:

$$\frac{f}{L} = \frac{QL^2}{48'' E h^3} + \frac{5}{384} \frac{GL^2}{'' E h^3}$$



When L = 50 m, Q = 10 ts, f / L = 1 / 400,
$E = 2 \cdot 10^6$ kgs/cm^2, [F] = 2000 kgs/cm^2 (rolling):
F = 960 cm^2, D= 750 kg/m, G = 37.5 ts
$\Delta T^{\max}_{\Delta t = 100\,^{\circ}C}$ = 2400 ts (solid beam)

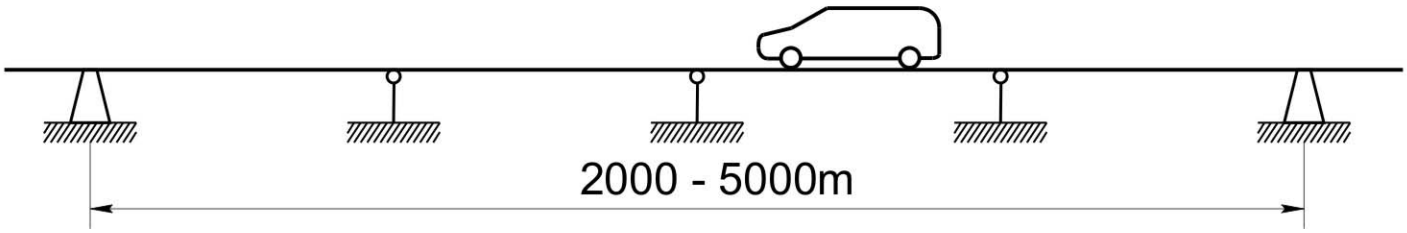


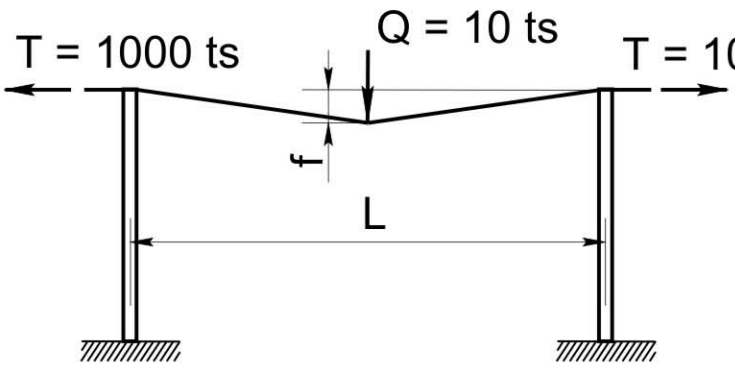
Bearing capacity of a support:

$$P_{cr} = \frac{\pi^2 E J_{min}}{(\mu H)^2} = \frac{1}{4} \left(\frac{\pi^2 E J_{min}}{H^2} \right),$$

where μH - reduced height of a support, $\mu = 2$

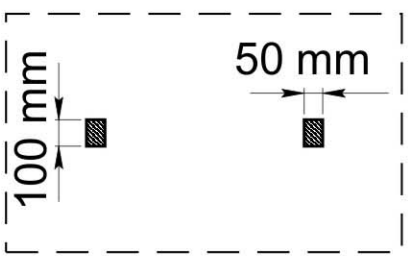
STRING SPAN STRUCTURE





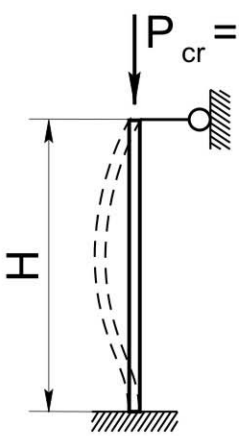
Specific deflection of a span:

$$\frac{f}{L} = \frac{Q}{4\,T}$$



When L = 50 m, Q = 10 ts, f / L = 1 / 400,
T = 1000 ts,
$[\sigma]$ = 10000 kgs/cm^2 (high-strength wire):
F = 100 cm^2, D= 78 kg/m,

$$\Delta T^{max}_{\Delta t = 100^{\circ} C} = 250 \text{ ts}$$



Bearing capacity of a support:

$$P_{cr} = \frac{\pi^2 E J_{min}}{(\mu H)^2} = 2\left(\frac{\pi^2 E J_{min}}{H^2}\right),$$

Where μH - reduced height of a support, μ=0.7

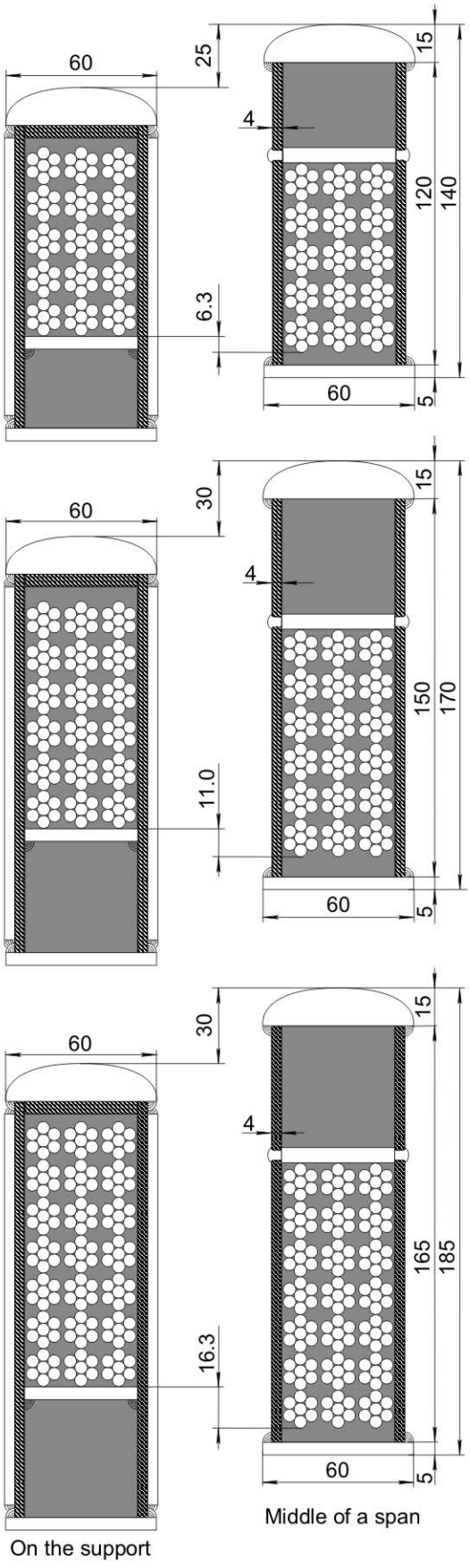
Specific elongation of a string under the load (f/L=1/400)

$$^*L = \frac{\sqrt{(L/2)^2 + f^2} - L/2}{L/2} = 0.0000124$$

Increase in the string strength under the load (f/L=1/400)

$$\sigma_Q - [\sigma] = {}^*L \cdot E = 24.8 \text{ kgs/cm}^2$$

COST OF A DUAL-TRACK UST



Alternative 1

Rail-string - RS 180/32.4	
String strength in a rail	180 ts
Mass of a rail-string (steel)	32.4 kg/m
Summary string strength	720 ts
Span	15 m
Average height of supports	2 m
Distance between the anchors	2 km

Alternative 2

Rail-string - RS 216/37.6	
String strength in a rail	216 ts
Mass of a rail-string (steel)	37.6 kg/m
Summary string strength	864 ts
Span	20 m
Average height of supports	3 m
Distance between the anchors	2 km

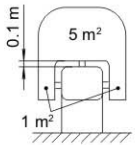
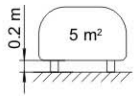
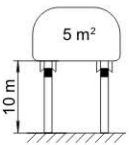
Alternative 3

Rail-string - RS 252/41.9	
String strength in a rail	252 ts
Mass of a rail-string (steel)	41.9 kg/m
Summary string strength	1008 ts
Span	25 m
Average height of supports	4 m
Distance between the anchors	2 km

First cost, thousand USD/km (for Russian conditions)

Name	RS 180/32.4	RS 216/37.6	RS 252/41.9
1. Track structure	201	234	260
2. Intermediate supports	27	23	20
3. Anchor supports	30	36	42
4. Other (approximately 10%)	26	29	32
Total	**284**	**322**	**354**

RESISTANCE TO THE MOVEMENT OF AN AVERAGE HIGH-SPEED* TRANSPORTATION MODULE

	Indicator	Aerodynamic resistance**			Wheel			Magnet suspension + linear electric motor (40% efficiency)	Aerial suspension (air cushion) (30% efficiency)
		 $C_x^{min} = 0.3$	 $C_x^{min} = 0.2$	 $C_x^{min} = 0.1$	Rubber (K = 0.05)	Steel: Wheel pair with conic wheels (K = 0.001)	Steel: Wheel with an independent suspension without a cone (K = 0.0005)		
Single module	Resistance strenght, kWt	1120	620	310	500	10	5	1700	2600
	Fuel consumption, t/year	1220	680	340	550	11	5.5	1800	2800
	Fuel cost, thousand USD/year***	610	340	170	275	5.5	2.75	900	1400
Module fleet on the Planet (10 mln. vehicles)	Resistance strenght, mln. kWt	11200	6200	3100	5000	100	50	17000	26000
	Fuel consumption, mln. t/year	12200	6800	3400	5500	110	55	18000	28000
	Fuel cost, billion USD/year	6100	3400	1700	2750	55	27.5	9000	14000

* Average transportation module: travel speed - 100 m/sec (360 km/hour); mass - 10 t; carrying capacity - 25 passengers (6 tons of freight); usage coefficient - 0.5 (12 hours/day); fuel consumption - 0.25 kg/kWt·hour; maximum midsection of a saloon - 5 m^2

** Aerodynamic resistance strength: $W_{a.r.} = \frac{1}{2} D v^3 \cdot c_x \cdot f_m$

*** Average world cost of fuel - 0.5 USD/kg

BASIC RESOURCES NECESSARY TO BUILD IN THE 21 CENTURY A NETWORK OF HIGH-SPEED MULTI-TRACK ROADS WITH THE TOTAL LENGTH OF 10,000,000 KM

Resource	Unit of measurement	Ground track			Elevated road			
		Road bed		Rail track structure	Beam spans (steel)			String spans
		asphalt concrete	reinforced concrete		For wheel transportation		Magnet (air) cushion	
					road bed (elevated)	mono-rail		
1. Land allocations (including infrastructure) (USD 200,000/ha)	million ha USD billion	50 10,000	50 10,000	50 10,000	30 6,000	5 1,000	5 1,000	2 400
2. Excavation and earth moving works (USD 5/cub. m)	billion cub. m USD billion	200 1,000	200 1,000	200 1,000	20 100	10 50	10 50	5 25
3. Reinforced concrete structures (USD 500/cub. m)	billion cub. m USD billion	2 1,000	50 25,000	10 5,000	100 5,0000	5 2,500	10 5,000	2 1,000
4. Steel structures (USD 2,000/t)	billion tons USD billion	0.1 200	4 8,000	5 10,000	20 40,000	20 40,000	40 80,000	3 6,000
5. Rubble cushion (USD 20/cub. m)	billion cub. m USD billion	50 1,000	10 200	30 600	- -	- -	- -	- -
6. Sand cushion (USD 10/cub. m)	billion cub. m USD billion	50 500	50 500	20 200	- -	- -	- -	- -
7. Asphalt concrete pavement (USD 100/t)	billion tons USD billion	100 10,000	- -	- -	3 300	- -	- -	- -
Total (for the road network)	USD trillion	23.7	44.7	26.8	96.4	43.6	86.1	7.4
Total (for 1 km of a track)	USD mln./km	2.4	4.5	2.7	9.6	4.4	8.6	0.7
Average travel speed	km/hour	120	120	200	150	150	350	350