



DIRECTOR

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Doc: AkeiL/3/6/2006

Dt: 3/6/2006

Dear Sir,

Sub: Safety concerns – no guarantee for elevated metro along road endangering public vs. guranteed safety of pre-certified Skybus technology

It has come to my notice that States are unwittingly endangering the existing road traffic by constructing all along the road elevated metro rail with conventional railway technology, for which no guarantee nor certificate exists that the train will never jump the tracks nor derail in lifetime not only to endanger the train travelers but more so the road users below and adjacent properties. Additionally the city will look grotesque with the heavy metro structure at 6 m height destroying the cityscape. At the time Delhi metro was contemplated, there was no alternative, but now the states have a choice to avoid this danger to people and defacement of cityscape.

States will also miss out a historical opportunity to change the lives of urbanites for better by not adopting India's own Skybus technology, as some consultants not adequately informed, are giving misleading information and advice to states. Skybus actually solved some fundamental safety problems of railway- a solution which world awaited so long- it is not surprising that business interests of outdated technologies are spreading mis-information to prevent adoption of Skybus.

The power of the business interest of the foreign suppliers can be gauged, by the fact that even a good man like Mr Sreedharan, whom I respect, has fallen victim, and is writing to states against the better and safer railway system- which is Skybus.

I as a scientist-engineer, consider it my duty to put down the facts in public interest- I have no vested interest- as I have assigned all the royalties which my patent for Skybus will earn, to the Government of India, through Konkan Railway Corporation.

Administrators don't have time and patience to deeply go through the matter, being **too busy**, but I **pray** that, you will be doing service to yourself and your own conscience, if you allocate your precious time and **read**, what I have submitted herein. You can change lives of the common man, at no cost to the state, provide urban transport using India's most modern technology- please do not discount what I say, merely because I am Indian. India can lead, please.

Any system/sub-system/component/interface element when used satisfying proven established relevant international/ national standards, is considered pre-certified.

1. **In a table form it is shown how Skybus is pre-certified, just like metro rail, because all elements in Skybus are made to satisfy existing international safety standards just as a railway.**

Please read particularly Item 11



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Matters of Fact: verifiable easily

Description		Conventional Metro rail like Singapore/Kolkata/Delhi	India's patented Skybus metro rail –rights belong to the country
1. Railway track-Rails	Rails	52kg/62kg/m heavy rails as per standards- pre-certified	52kg/62kg/m heavy rails as per standards- pre-certified
	Fastenings	UIC standard pre-certified	UIC standard pre-certified
	Sleeper-blocks	UIC /Indian Rly standards – pre-certified	UIC/ Indian Rly standards Pre-certified
2. Track geometry	Gauge/alignment/ twist	UIC/IR standards- pre-certified	UIC/IR standards Pre-certified
3. Elevated structure	Pre-stressed concrete/ pile/ open foundations etc	Standard rly codal practices Pre-certified	Standard rly codal practices-Pre-certified
4. Wheel-sets coned and single flanged	Solid wheel sets	Standard UIC/IR codes of practice Pre-certified	Standard UIC/IR codes of practice Pre-certified
5. Axle bearings /gearing driving motors –full bogie sets with standard braking		Standard commercially used driving bogies in all world metros to UIC/ISO /IR standards Pre-certified	Same standard UIC/ISO/IR standard driving bogies- pre-certified
6. Passenger coach load transfer	The loading points on top of the bogie	The fixed loading points for load transfer – for which the bogie is designed and proven to function over decades Pre-certified	The same load transfer points used- no change Pre-certified
	Springing and damping	Springing and damping fine tuned for the track	Same springing and damping used Pre-certified



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		geometry over years Pre-certified	
7. Mass distribution diagram	Constant improvement aimed to uniform distribution and keep centre of gravity as low as possible vis-vis the railway track	The centre of gravity is about 1 to 1.5 m above the rail tracks , and all design parameters of track geometry and curving evolved proven standards over decades- standards laid Pre-certified	The mass diagram is improved further, lowering the centre of gravity close to the rail track , relatively improving stability and safety- but still no advantage is taken but the same standards followed- pre-certified
8. System integrated-safety requirements	Passenger comfort norms prescribed – more severe than the derailment/ track distortion forces	UIC/Indian Rly standards – dynamic tests shd satisfy –tests show satisfied	Same UIC/IR stds to be satisfied- tests show that these are satisfied
9. Dynamic safety to be assured during life cycle in worn out condition for springs / wheel sets, increased clearances	New and worn out tolerance limits laid by codes of practice	New and worn out conditions simulated and tests reconfirm that the norms in para 8 satisfied only before introducing the rolling stock. But later no tests are conducted- maintenance manuals followed to observe the tolerance limits for worn elements. Static check only.	In addition to following the conventional rly practice, improved system of daily monitoring to the same rigid standard as done at the time of clearance- with fully instrumented bogies assure much higher degree of safety- unique to Skybus. So dynamic monitoring exists. Far superior to existing metro railways.
10. Track transfer systems	Movement controlled with signals interlocked to prescribed standards as per UIC/IR	Points crossings position changed with due interlocking with signals IR/UIC/CENELC standards applied. Pre-certified.	Track itself gets shifted in similar manner, safety again assured observing the same interlocking of position of track with signals, observing IR/UIC/CEN ELEC standards Pre-certified.



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<p>11. Special unique features to be compared</p>	<p>1. Capacity to handle cargo in the form of containers or carry trucks on roll-on-roll off basis- to decongest roads of trucks</p> <p>2. Prevention of railway coach escaping the railway tracks</p> <p>3. Prevention of derailments, wheel shall not climb rail</p> <p>4. Station</p>	<p><u>Cannot do</u></p> <p>Has to depend on chance, and depend on all elements working as per design- NO positive design feature to hold railway track and wheels together except for gravity-<u>No one can guarantee.</u></p> <p><u>No special design feature-</u> depends on the till now used gravity only- has the proneness as the existing railways to derail and go out of control when rail breakage takes place or axle /wheel breaks.</p> <p>Not less than 600m to 1km long</p>	<p>Possible in Skybus technology only</p> <p>Positive holding together of railway track and the coach provided by design- can never escape tracks-<u>it is guaranteed by design and performance.</u></p> <p>Special feature of <u>derailment arrester prevents wheels</u> from climbing over the rail and the running bogie can never escape the rail track</p> <p>Max 60m long for 60,000 pphpd</p>
<p>12. Emergency /disaster management</p>	<p>1.Fire</p>	<p>In underground metro just scary and very little consolation from the thick manuals</p> <p>In elevated system too, the fire generally entraps with smoke the coach and</p>	<p>The Skybus system has the fire causing electricals and AC systems motors/ electricals held inside the concrete box over head separated from passenger coach- any</p>



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		<p>people are known to suffer asphyxiation-further evacuation needs people to lump through the fire and smoke rising – creating problems</p>	<p>fire and smoke will rise above over head, not affecting the coach. Evacuation is more practical- slides, bridging to another Sky coach easy access to a double decker bus below – create alternate methods of recue. Additionally fire control inside the closed concrete box is simpler and automatic with built in auto sprinkler /foam systems to be auto activated. This is not possible in other conventional systems.</p>
<p>13. Getting stuck – failure of power/s eizure of axle etc : evacuation</p>	<p>The train/coaches may get stranded inside a tunnel/elevated structure – how do you evacuate</p>	<p>In underground it is a nightmarish task- In elevated system, the path provided is too narrow next to track for people to get down the height of wheels and bogie, as we can see in current trains, and path is at rail level making it difficult for people to get down.</p>	<p>There is an easier method of evacuation- in case total power failure- there is an emergrnncy generator giving just enough power to take the coach to the nearest station- in case this is not possible- then three modes of evacuation present</p> <ol style="list-style-type: none"> 1. slides down to the road below- the traffic on road brought to halt by sirens and flashing lights to facilitate 2. In case of seized axle, sideways clearance with simple bridging with another Skybus unit is possible. 3. When height from road below is too much, then a side platform at the floor level of coach-



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			easy to get on- leads to steps to go to Skytop above- where they get a 9m wide path to walk off- or electric vehicles can pick them and ferry to nearest station-in case of senior citizens. Thus much better superior systems available on Skybus comparatively.
14. Capacity	20,000 to 80,000 passengers per hour per direction needed- scalable over next 30 years	Meets the requirements with headway of 90 sec min	Meets the requirement with maximum of 3 units forming a 60 m, carrying 1200 passengers every minute yielding 72000 passengers per hour direction or 80m long multi unit can yield 96,000 passengers per hour per direction. Scalable from 20,000 to 80,000 passengers per hour per direction. These figures are based on the same principles of calculating the headways and through put with current train control systems- advantage of Skybus is it's short length and capacity to deliver more passengers per lineal metre.
15. Capital cost	The traffic handling capacities being the same, comparison of cost of creating passenger seat km can be a good comparison- say consider a system to handle 20,000 passengers per hour per direction or 40,000 peak time	<ol style="list-style-type: none"> Underground metro:Rs 400cr/40,000= Rs 100,000 Elevated metro rail : Rs 170cr/40,000= Rs 42,500. (figures taken from	Skybus technology: Rs 60cr/40,000= Rs 15,000. (Actual experimental test track costed Rs35 cr with rolling stock incl station etc- hence Rs 60 cr is per km is



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	passengers : cost per a double route/40,000 passengers per hour	offer received for Mumbai recently)	practically feasible)
16. Financial viability need for viability gap funding	When revenues are not enough- Government provides viability gap funding to make project viable for private BOT operators to take up the project	The conventional system has outlived its economic viability & relevance- capital costs so high cannot be viable. Though Government is offering 20% of project cost as gap funding, operators want close to 45% subsidy. So public funding becomes necessary	Financially viable- does not require any Government subsidy. Returns of IRR 15 to 20% make the project bankable, without Government support. Factors for lowered costs: 1. Dead loads reduced 2. Practically no urban land required. 3. No demolition of any existing structures- as it can handle turning radius of 20 to 40m and even vertical lift if needed. 4. Stations are simple 50 to 60m long and there are no points and crossings 5. Digitally empowered system being derailment free and capsized-free is the safest system, reducing provisions for undefined risks.
17. Visual acceptance	City scape and along the roads the transport system should not become a grotesque invasion visually	At the 6m height, and heavy concrete wide overhead structure, cuts the 30deg cone formed at eye level of road users, creating a visually grotesque intrusion.	The Skybus fixed structure is at 9m and above from road level, and avoids cutting the cone of visibility for road users, giving free view of city from road level.
18. Noise pollution	City roads with a train running overheads may suffer additional noise pollution	In case of conventional metro, this has proved to be a major problem for residents, because air borne noise is difficult to control.	In Skybus, the noise generating rail/wheel point is totally enclosed inside the concrete box, trapping the same within. Noise pollution controlled.



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Items 1 to 10 prove the point that Metro rail and Skybus Metro rail have the same degree of safety- further items 11 to 18 prove the superior safety features of Skybus technology.

2. In my capacity as a professional railway expert, scientist engineer with patents for Skybus metro rail technology, internationally published original research and technical papers, as well as a senior administrator/bureaucrat (35 years) and project manger of having constructed and operated the first BOT project Konkan Railway (1990-2005) , former MD of Konkan Railway Corporation, and as the inventor who assigned intellectual property worth Rs 30,000 cr to the people of the country (as verified by Price-waterhouse Coopers), I swear and state that when we have proven India's Skybus metro rail technology, much superior to conventional railway, the country will be not only wasting public funds in the name of providing metro rail on the lines of Delhi Metro rail, but creating a serious hazard all along the existing roads.
3. In summary: I state and hold myself accountable for the veracity of what I claim:
 - 3.1. that India now owns world's best railway technology in the form of Skybus and Intellectual property earns royalties for the country, as the inventor has voluntarily assigned his rights , there fore Skybus technology is people's technology and I am working to promote public interest.
 - 3.2. that Skybus is as much Pre-certified as the existing conventional railway system as evident from the table above and for reasons given there in
 - 3.3. that the Skybus technology has additional safety features improving upon and removing the serious lacunae and unsafe features of existing railway used in metro rail
 - 3.4. that the Skybus provides better visual acceptability, because the fixed structure is about 9m above the road level and will not infringe the 30 deg.cone of visibilty .
 - 3.5. that since alternative superior and improved technology **Skybus** is available duly **pre-certified**, just as much as the metro rail, which also is getting safety certificate at commissioning stage, under the applicable act of state, for public carriage from TUV Rhienland Germany-
 - 3.6. that it is technically a criminal act to recommend for any technically competent person to still go for unsafe old railway for metro rail.
 - 3.6.1. the lives of travelers are endangered because of possible derailments and capsizing as the railway track and running wheels are not firmly and positively connected to prevent losing control in the old railway technology
 - 3.6.2. the lives of those traveling on the roads also are exposed to added risk of train traveling all along the road overhead, losing control and rolling down on them with disastrous consequences



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4. The State authorities constrained by lack of objective technical advice, are in the danger of creating waiting disaster in the name of metro rail facility, a train traveling all along the median of road, may jump rail track and find itself on the road below-
acid test for the consultants, which state can use is, just ask for a guarantee that the train will never jump tracks in it's life time, and in case it does, suffer pain of punishment both for the BOT operator and the consultant, under the relevant Cr.PC provisions.
5. If you don't get such guarantee, then better don't adopt that technology. Skybus technology can provide this guarantee.
6. You are in the seat of power given in trust by the common people to decide their fate: it is the choice you have to make:
 - 6.1. **adopt conventional old railway** technology based Delhi/Kolkata/Singapore metro creating
 - 6.1.1. a proven disaster-prone system endangering lives of people on the roads
 - 6.1.2. raise a loan and write off public funds to the extent of Rs25,000 cr impoverishing common man, if you execute projects worth Rs 50,000 cr
 - 6.2. **adopt India's Skybus technology** creating
 - 6.2.1. the safest railway system in the world, which cannot derail nor escape tracks to fall on the road below
 - 6.2.2. with no requirement of funding nor subsidy from the state, but create wealth of Rs 25000 cr
7. I am in no position of power nor, I represent any powerful MNC interest, but as scientist-engineer of India, consider it my duty to share my knowledge, for country's benefit, with administrators so that they may take informed decisions. I believe no one has enough authority to knowingly endanger public life.

Let us serve wisely Sir!

with regards,

(B.Rajaram)

Shri B.K. Chaturvedi
Cabinet Secretary
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