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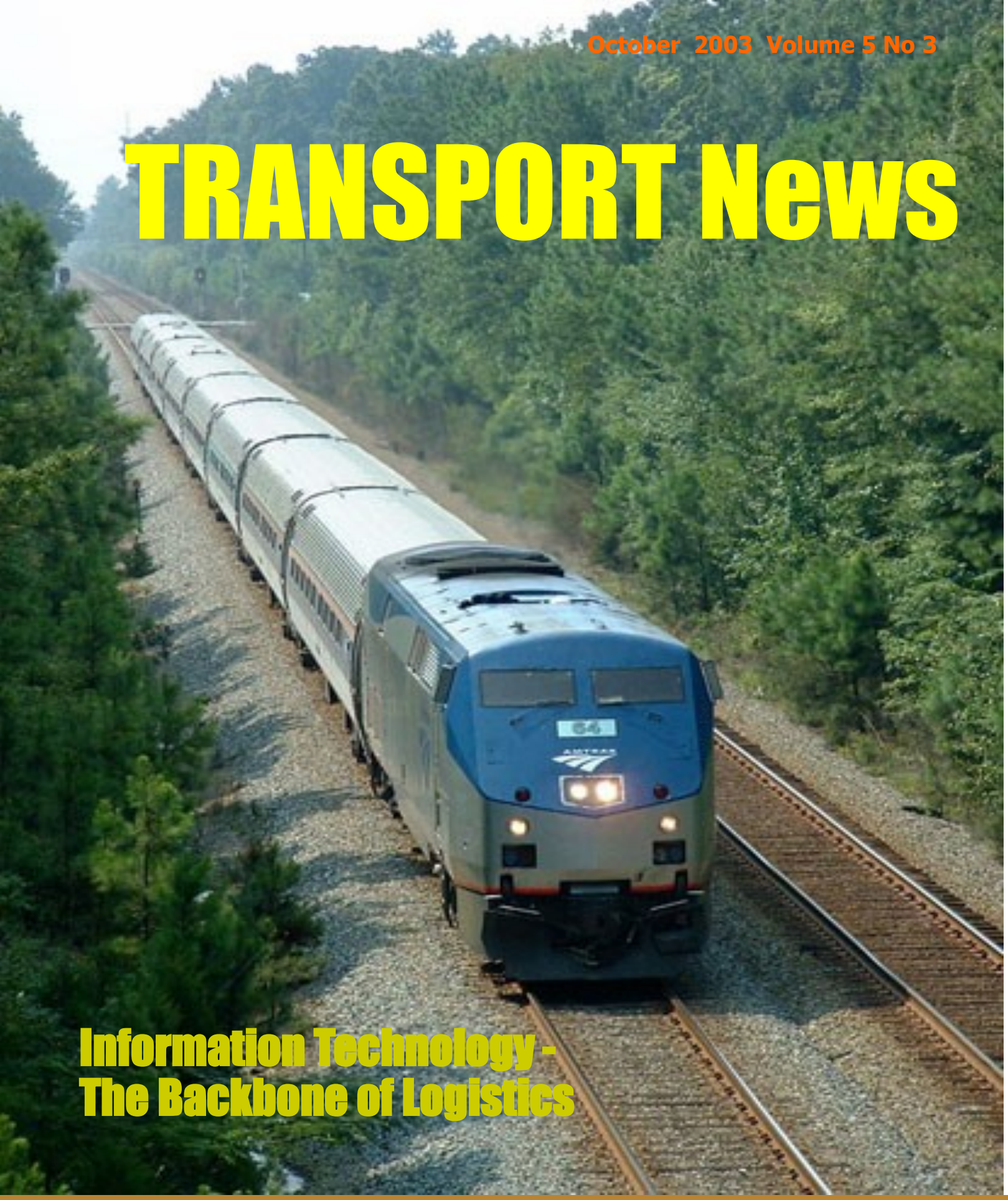

Information Technology - The Backbone of Logistics

Journal of the Centre for Transportation Research and Management

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Editor : Davinder PS Sandhu

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CTRAM Membership enquiries may be sent to :
Executive Director, CTRAM, Room 4, Rail Bhavan, Ministry of Railways, New Delhi

Articles / papers for publishing may be sent to:
Editor, TRANSPORT News, 24B, Railway Colony, S.P. Marg, Chanakyapuri, New Delhi. Papers in electronic form preferred and may be e-mailed to dpss@ndf.vsnl.net.in

Editorial

It sounds like an oft repeated, even ancient cliché, but the future of logistics lies in the effective use of information technology. All industries must of course use all available technology in the service of the customer, but as a single hope for jacking up efficiencies, IT does remain unique.

Logistics is a labour-intensive business, right across from shipping to airlines to road and rail. As business volumes rise, manpower requirements increase in proportion. Indeed, rising demands on the logistics business start taking handling propositions out of the manual domain—weights, time margins etc. The correct response of the logistics industry is to then leverage technology factors into day to day operation. The corporation then sees induction of advanced trucking, handling, warehousing, and stacking technologies, to equip itself to handle heavier, and higher volumes. This holds true for both passenger and freight sectors. Passenger operations typically see lighter load per transaction, but the transactions run into millions, every day. For freight, the number may be less for bulk cargo, but each transaction must handle thousands of tones. For courier and small cargo services, the balance sets in at somewhere between the passenger and freight sectors.

But, who is going to tie all these men and machines together?

Enter IT.

We are aware of the gigantic advances in on line transaction processing that forms the backbone for continuous-process industries like logistics. These technologies give us Indian Railways' Passenger reservation System, Freight Operations Information system, National Train Enquiry System, and now the Coaching Operations Information System. Further use has started in Data Loggers, and other MIS packages.

Where Indian Railways and other logistics providers have to move is the domain of introducing IT in front line contact. These are areas of bar coding, contact-less smart cards, embedded tracking systems and an aggressive customer contact regime. IT should move to system health monitoring (wheel profiles etc), and advance information to maintenance depots.

The great news is that the costs of these implementations are headed southwards, and with reasonable investment levels, quantum increases in efficiency can occur.

A Transport Strategy for Punjab

-Davinder PS Sandhu

Abstract

There is a prevalence of transport myopia in our planning paradigm and this flows from a compartmentalised and sectoral approach to transport infrastructure. Various modes plan future projects in isolation, and fail to achieve a synergy that would have come out of a multi modal approach. When a passenger steps out of his home, he uses a footpath to walk, takes a bus to the railway station, covers part of his journey by trains and may use a taxi to reach his final destination. It is evident that to the passenger, all are modes of transport and he uses them one after another in the same journey. Problems arise when planning process fail to see this inter connection of various legs of journey, and thus cannot provide a well coordinated answer to the passengers' itinerary.

This myopic view also causes an adverse effect on the safety aspect. It is of no comfort to the user that an accident is more or less likely to happen in this or that mode of transport. The user would like to be uniformly safe over the various modes that he is using.

These problems are in the know of users and planners alike in the state of Punjab. It is essential that we perceive the concept of the users requirements and plan for servicing the requirements in a holistic & multi modal manner.

The data with regard to transport statistics is not easily available, and even at the national

Davinder PS Sandhu has held charge as Operations and Commercial Manager of the Delhi Division of Indian Railways.
This is an excerpt from State Development Report of Punjab, published by the Planning Commission of India. Sandhu has authored the chapter on Infrastructure - Power, Transport, & Telecom.

level, remains a matter of dispute. In fact it was surprising to note that Economic Surveys of Punjab do not include transport as a sub-head in the sectoral analysis.

Estimates for transport output in the country are produced by separate ministries. The data for road transport is released by the Ministry of Surface Transport and for railway traffic by the Ministry of Railways. Both these Ministries question the data released by Planning Commission for their sectors, and the World Bank differs with all of them in this regard. (The Transport Sector – G. Raghuram, India Infrastructure Report 2001)

We will examine the existing transport infrastructure, the agenda before it and arrive at a blue print for the future.

The average annual compounded growth rate of Gross Domestic Product in Punjab is as follows:

(6^{th} & 7^{th} plan at 1980-81 prices)
(other : at 1993-94 prices)

Sector	6^{th} plan 80-81 84-85	7^{th} plan 85-86 89-90	8^{th} plan 92-93 96-97	98-99	99-2000	2000-01
Primary	5.37	5.24	3.10	3.06	7.02	2.07
Agricul-ture	5.44	5.29	3.07	2.92	7.00	1.97
Second-ary	5.04	8.65	7.12	11.78	5.90	5.73
Tertiary	5.14	5.22	5.79	4.94	7.74	7.14
Overall	**5.23**	**5.98**	**4.83**	**5.79**	**6.99**	**4.78**

(Economic & Statistical Organisation, Punjab)

It can be seen, therefore, that the major growth component is being recorded in the secondary and tertiary sectors at about 6% and 7% respectively. The AACGR of Gross State Domestic Product in Punjab is around 5%. It can thus be presumed that the transport capacity, both passenger and freight will have to be doubled over the next decade to accommodate this growth rate.

It is of significance that Punjab has one of the highest Vehicle density per 100 km of road at 3102.7; only Delhi, Haryana and Gujarat are higher. Punjab's capital Chandigarh has the distinction of the national highest in this regard at 21587. (Motor Transport Statistics in India, Ministry of Surface Transport, 2000).
The existing transport infrastructure in Punjab is as follows:

NATIONAL HIGHWAYS

The following National Highways serve Punjab:

The major artery is national highway No. 1, also known as the Grand Trunk road or Sher

NH No.	From	To	Length (kms.)
1	Shambu (Haryana	Ludhiana - Jalandhar - Amritsar	279.42
1-A	Jalandhar	Tanda - Mukerian - Pathankot Samba (excluding Himachal Pradesh	104.734
10	Dabwali (Haryana	Malout -Abohar - Fazilka	109.06
15	Pathankot	Gurdaspur-Amritsar-Zira-Faridkot-Bajakhana-Bathinda-Malout-Abohar-Usmankhera (Rajasthan Bound-	363.67
20	Pathankot	Chakki (Himachal Boundary)	11.975
21	Zirakpur (Excluding	Mohali-Kharar-Ropar-Kiratpur-	76.88
22	Ambala Barrier	Zirakpur-Kalka (Haryana Bound-	30.99
			Total = 977 kms.

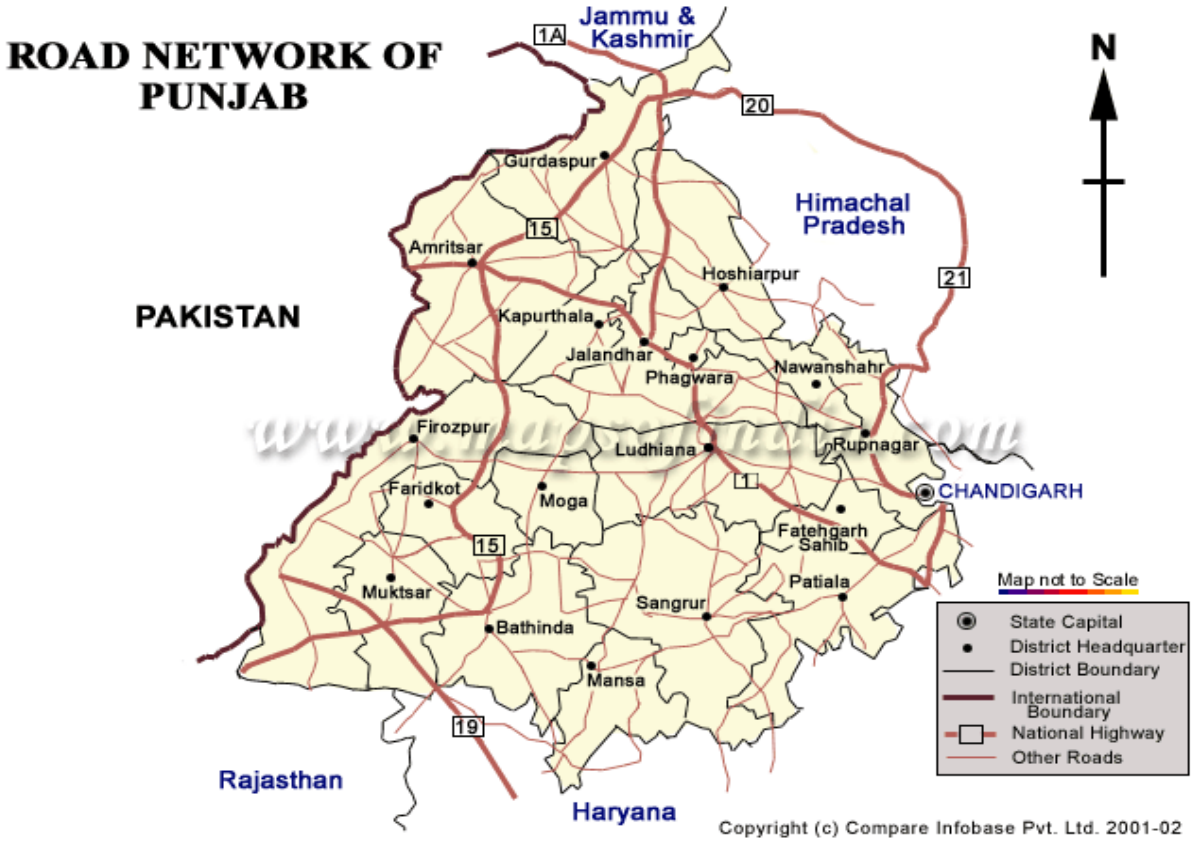
Shah Suri Marg. It runs through Punjab, entering at Shambhu, and runs right accross to the Wagha Border with Pakistan. This connects the major towns of Ludhiana, Jalandhar and Amritsar along with the industrial townships of Sirhind and Govindgarh. A number of state highways also branch of for other major towns like Firozpur, Patiala, Bhatinda, Hoshiarpur, etc.

The total length of these national highways in Punjab is 977 kms.

These highways are also of strategic nature, considering the status of Punjab as a border district, important for the defence of the nation. National Highway No. 1 also serves to connect Jammu & Kashmir, approached via Jullundhar & Amritsar. National Highways are maintained by the Govt. of India and serve Punjab well.

STATE HIGHWAYS and MAJOR DISTRICT ROADS

These arterial roads referred to as plan roads and are maintained by the PWD Department of the Punjab Govt. and are spread over the total length of 7305 kms. Of these, 2166 kms are State Highways, 1799 kms are District Roads, and 3340 kms are Other District Roads.



As can be seen from the map, state highways network is fairly extensive. Some of these roads owing to their importance are being elevated to the status of National Highways. The important plan roads under this account are likely to be:

- Kiratpur Sahib-Anandpur Sahib-Nangal Road
- Chandigarh-Patiala-Sangrur-Barnala-Bhatinda Road
- Kharar-Ludhiana-Moga-Ferozepur Road
- Ropar-Hoshiarpur-Dasuya-Mukerian-Gurdaspur-Kathua Road
- Jalandhar-Nakodar-Moga-Sangrur-Patran-Narwana-Rohtak-Delhi Road
- Bathinda-Fatehabad Road

LINK ROADS CONNECTING VILLAGES

All villages of Punjab are connected by link roads, running for 31657 kms. The standard design is that the link road touches the village, and then goes around it and leaves for connecting the next village. The part of the road going around the village is called “Phirni” with usuallly 2 or 3 bus stoppages located at convenient points. Rarely do these link roads enter village. The village is served by brick-laid lanes that connect to the Phirni.

RAILWAYS

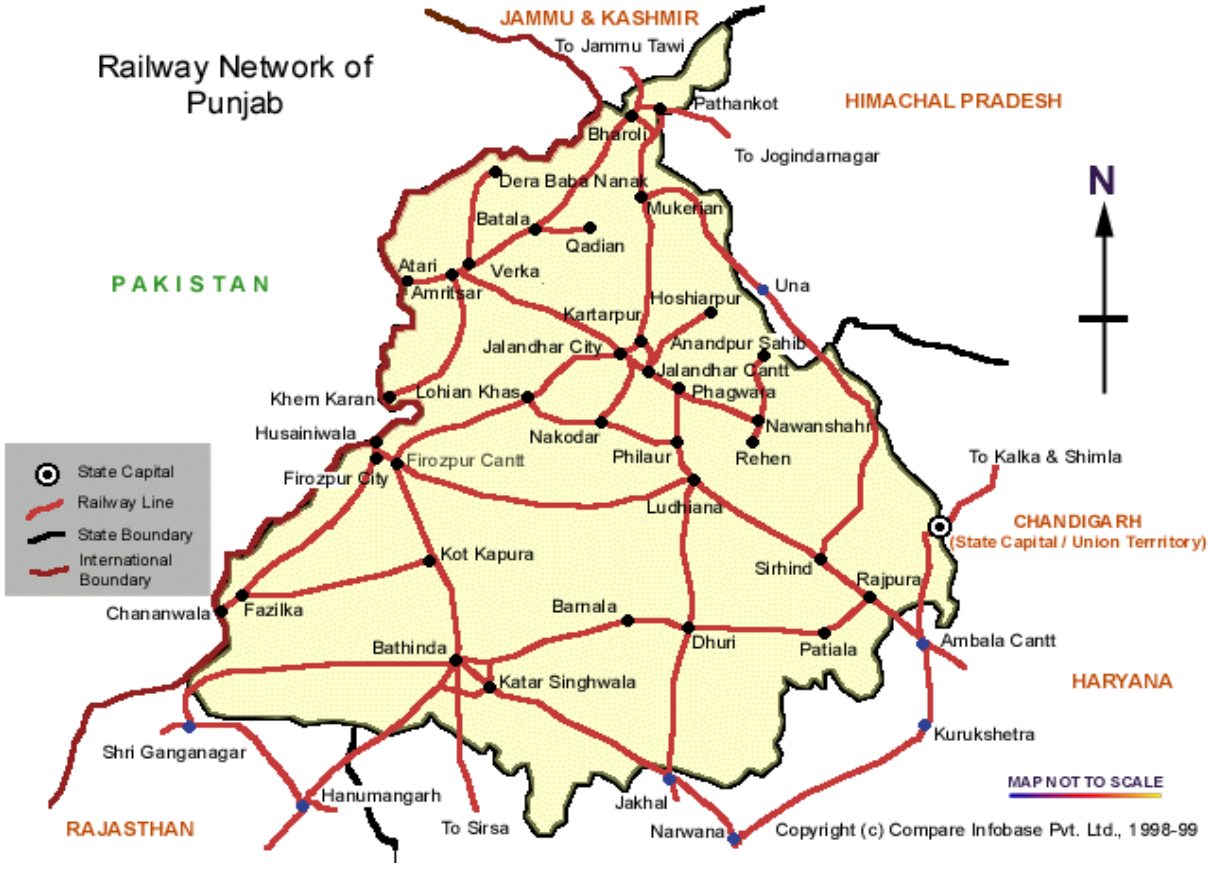
There is 3664 track Kms. of railway track in Punjab. As can be seen from the railway system map of Punjab, the major double line railway artery runs parallel to national highway

No. 1 all the way from Shambhu to Amritsar. From this there are two main branches, one going towards Patiala, Bhatinda, Abhohar and the other moving towards Moga & Firozpur. The third branch takes off from Jullundhar and moves towards Jammu. There are many other small branch lines connecting the food grain producing Mandis of Punjab primarily to

assist in the loading and movement of wheat and rice to other parts of India.

The capital of Chandigarh is connected by a line branching off from Ambala and moving towards Chandigarh via Lalru.

One of the major sanctioned works for new railway works under execution by Northern Railway is Chandigarh-Ludhiana rail link, scheduled for completion upto Morinda junction by



2004.

WATER WAYS

There is no planned movement of passenger or freight by using the inland waterways. The major river systems of Sutlej and Beas are not found suitable for transportation, the water being effectively used for power generation and irrigation purposes. The well developed canal irrigation system could have offered some opportunity, but none of the bridges etc. were designed for permitting any water vessels to move under them. As such transportation by inland waterways in Punjab is negligible, and future growth scenario appears to be uncertain.

AIR TRANSPORT

Punjab is served by Raja Sansi International Airport at Amritsar and through the domestic airport situated at Chandigarh. There are smaller airstrips at Patiala, Ludhiana etc, but only Amritsar and Chandigarh are capable of handling large commercial aircraft, with others only capable of small aircraft and Helicopters.

There are no mass based air taxi services available in the state. Considering the overall socio-economic scenario and the defence requirements of air space in the border state of Punjab, this sector cannot be banked upon for any mass movement in the near future.

IMPORTANCE OF ROAD AND RAIL : AN AGENDA

Punjab is, therefore, wholly dependent on road and railways for its transport requirements. It is these two sectors that must provide the necessary transport infrastructure to look after the needs of the state. An agenda for the transport sector in Punjab could be set as follows:

- Considering the length and breadth of the state, it should be possible to move across the state between major towns in three to four hours.

- The state capital houses the legislature, the judiciary and the administrative Government centres. In addition, it houses the Punjab University, and the Post Graduate Institute of Medical Education & Research. It also has Engineering, Architecture, Medical and Management Institutes which attract students and professionals.

- Thus movements to and from the state capital to other parts of the state will continue to remain important. However, Chandigarh is situated at the edge of the state and, therefore, transport infrastructure must provide quick and reliable mode, that ensures that people can go back after business in the state capital in the same day.

- One of the larges causes of unnatural deaths in Punjab is road accidents. Transport infrastructure of the future must ensure quick and reliable movement, while enhancing overall speed.

- Punjab will continue to need large amount of coal for feeding its thermal power plants. Other bulk requirements would remain in the area of cement, steel and fertiliser. Transport sector should be capable of moving these large quantities towards the consumption centres.

- Considering the strength of Punjab in agriculture, and push towards agro processing, transport sector must facilitate the movement of processed food out of the rural areas for final processing near the urban areas or the consumption of the processed food. There will also be a need to move these quickly out of Punjab towards consumption areas in other parts of India. There will be need of refrigerated containers, called “reefers”.

- With the advent of virtual Mandis, food grains and other agricultural product will need to be moved from the villages towards aggregation centres, for movement in bulk. The roads must be capable of handling container trucks to facilitate the same.

- With the rapid urbanisation of Punjab expected to touch 43% by 2020, it would be desirable to put in place, frequent services between major towns, and sub-urban transportation systems in the bigger towns of Amritsar, Jullundhar, Ludhiana and Patiala.

- Cycling remains an important mode of transport for distances upto 5 to 6 kms. While being good for the health, it also helps preserve the environment. On pre-identified groups leading from surrounding villages of the major towns, dedicated cycling tracks must be put in place to facilitate commuting by cycles. This will also provide demand for the well developed cycle industry of Ludhiana.

- Considering the large number of accidents on the road and related deaths and the increasing instances of cardiac diseases, trauma management will become important in the future. The patients will need quick attention, and transport services should be in place to respond to these health emergencies in the future.

With this agenda for the transport sector, a blue print for future development can be laid down.

ROAD SECTOR

The plan and link road network is serving Punjab well. However, the design of these roads and technical specifications do not permit a regular movement of heavy vehicles. As a result they usually become unserviceable during monsoons, and consume large amounts of money in their maintenance.

It is desirable that the concept of life cycle costing instead of immediate cost should be applied, which will disclose that the long term cost of building a more expensive road may be lower than that of building a cheap road with high maintenance cost.

It should also be appreciated, that as in telecom sector, in the road sector also, the last mile is as important as major back bone. It is found that while lot of attention is being paid to national highways and state highways, the links to the rural areas in terms of these roads leave much to be desired. In a future scenario, where the Punjab Govt. is targeting growth in agro processing industries, the village has to be well linked and integrated into the road

transport infrastructure through wider roads that are capable of taking heavier axle loads than at present.

The link road also witnesses a large movement of tractors. The tyres of these vehicles are intended for off-road use and, therefore, exert greater wear & tear on metal roads than other vehicles. Therefore, it is of the more importance that the village roads are designed well and built to last for taking these demanding roads.

A number of road improvement projects were in hand, with commissioning promised shortly:

Private Participation in Roads

Punjab has invited private sector to participate in the road sector, and has defined a policy with the following salient features:

- The highway sector has been declared as an industry so as to enable easy borrowing terms and floating of bonds.
- The provisions of MRTP Act have been relaxed to enable large firms to enter highway setor.
- Custom duty on import of construction equipment has been reduced and procedure streamlined.
- For the projects taken up on B.O.T. basis, the State government will permit entrepreneurs to charge toll that the market forces will bear.
- The land will be made available at a nominal lease to the entrepreneur taking up the projects.
- The entrepreneur will be permitted to exploit commercial potential of the sites under the rail overbridges for a period of 30 years.
- Any other compensation package can also be considered to make the projects

Major Road Construction Projects near Completion	Cost Rs in lakh
Bridge over choe on Badowan Sardulpur Sakrulli Paldi link	118.97
Bridge over Langerpur choe on Dasuya Rampur road	115.00
Replacement of old submersible bridge on Patran-Moonak To-	130.00
H.L. Bridge over Sutlej river creak crossing Pala Megha Pir	97.64
H.L. Bridge over river Ghaggar near Makraur Sahib	147.05
Bridge over Sirhind Canal x-ing Ludhiana Chandigarh road near Neelon	233.44
H.L. Bridge over river Ghaggar on Annadana to Nawangaon	196.96
Southern Byepass at Ludhiana.	850.00
Ring Road around Hoshiarpur Phase II	250.72
Ring Road around Hoshiarpur Phase III	356.11
Raising/widening Hussainpur Saidpur	228.02
Improvement of Dasuya Hoshiarpur Road	113.62
Raising Gurdaspur Dera Baba Nanak Road	93.20
Raising Jalandhar Hoshiarpur Road	68.88
Raising Hoshiarpur Phagwara Road	80.00
Raising/strengthening Ropar Bela Road (4.00 Kms)	75.00
Raising/Strengthening Dehlon Raipur Gujjar Pakhowal Road	108.00

viable.

Other features are:

- Invitation of "Licence Period" competitive bids
- Government will bear the cost of pre-feasibility studies and acquisition of land for the project will be time bound. The government may take the land through negotiation with land owner.
- Suitable provision relating to adjustment of toll fee structure for inflation exchange rate variation.
- Permitting development of highway facilities along side so as to provide predetermined revenue sources for the entrepreneurs with in the frame work of Rules/Acts.
- Dispute resolution under Indian Arbitration Act, 1996. In the event of losses arising out of exceptional circumstances or force majeure, the government may suitably compensate the entrepreneur on the basis of fair and balanced allocation to risks.

It must be pointed out that there is the usual misconception at work in private invitation in this sector. Punjab says that “due to resource crunch, it has not been possible to upgrade road infrastructure in the State commensurate with the ever increasing traffic volume”. The issue is not resource crunch, but the absence of a sound technical and economic basis to road sector policy.

Under such conditions, the private sector will conduct “cherry picking”, and leave the unprofitable roads in the government sector. The clause of compensating the entrepreneur on the basis of risk is particularly dangerous, and amenable to misuse. If the risks are to be borne by the government, then what is the role of private business?

A number of projects are already proposed on the Build-Own-Transfer Model, as under:

Road and Rail Bridges

Punjab should propose maximum rail bridge projects, since as per a recent policy directive of the Ministry of Railways, they will provide the required 50% of the project cost for all such proposals.

Road Projects

Efforts are also under way to obtain assistance from multi-lateral agencies for four laning projects, valued at Rs 1600 crores. These include Zirakpur-Patiala-Sangrur, Ropar-Nawanshehar-Phagwara, and Kharar-Morinda-Ludhiana-Jagroan-Moga corridors.

Cycle Tracks

Punjab uses the cycle, and this healthy habit should be encouraged. From about 10 kms from major towns, dedicated cycle tracks should lead in, from multiple radials, selected on the basis of settlements nearby. At present, the cyclist is sharing the national highway or district road with heavy and medium vehicles. He risks fatality, and is forced off the road quite often by motorized vehicles. Cycle tracks will relieve road congestion, reduce pollution, and keep up a healthy practice, at negligible cost to government. With the provision of these tracks, demand for Punjab’s indigenous cycle industry will also increase.

Fund Generation

Collating the funds requirements, it is seen that about Rs2800 crore are needed to upgrade the road infrastructure to desirable standards.

Name of Bridge	Estimated cost
District Ropar	
Bridge over Kishanpur choe in Km 19 on Ropar Balachaur road	**127.00**
Rail overbridge at level crossing No. 24-B at Morinda on Sirhind-Nangal Dam Rail Line	**1756.72**
H.L. Bridge over river Sutlej at Kiratpur Sahib	**3500.00**
District Ludhiana	
Rail overbridge Ludhiana-Dhuri rail line in replacement of level crossing No. 2A/2 near Preet Palace at Ludhiana	**2204.00**
District Mansa	
Rail overbridge at Mansa on Mansa Sardulgarh Sirasa Road	**1000.00**
District Bathinda	
Rail overbridge at Bathinda on Bathinda Sirsa Road	**1000.00**
District F.G.Sahib	
Rail overbridge on Sirhind Chuni Road	**335.00**
District Sangrur	
Jandali Bridge near Ahmedgarh over Bathinda Branch	**70.00**
Rail overbridge on Dhuri Byepass	
a) Over Dhuri Ludhiana road	**500.00**
b) Over Dhuri Barnala Road	**500.00**
District Gurdaspur	
Rail overbridge on Amritsar Pathankot Road in Gurdaspur town	**1000.00**
H.L.Bridge over River Beas on Gurdaspur Kathua Road,	**4575.00**
H.L.Bridge over River Beas on Gurdaspur Mukerian Road,	**3550.00**
District Jalandhar	
H.L.Bridge over River Sutlej 24 span25 mtr. each on Mehatpur Sidhwan Jagraon Road	**4000.00**
H.L.Bridge over Sutlej parallel to Rail-Road bridge 24 span 25 mtr. each near Gidderpindi on Jalandhar Makhu Road	**4000.00**
District Nawansahar	
H.L.Bridge 24 span 25 mtr. each including guide bund etc. on Rahon Mattewara Ludhiana road over River Sutlej	**4000.00**
H.L.Bridge 24 span 25 mtr. each including guide bund etc. on Rahon Machiwara road over river Sutlej	**4000.00**
District Patiala	
Rail overbridge 22 No.Phatak Patiala	**1500.00**
Rail overbridge in Rajpura Town	**1500.00**
District Amritsar	
Rail overbridge on Amritsar Batala Road near Verka	**1200.00**
District Faridkot	
Bridge near Abohar Branch on Mukatsar Malout road	**60.00**
District Kapurthala	
Rail overbridge at Phagwara on Phagwara Nakodar Road.	**1000.00**
Total	**41699.34**

The toll road model is a bag of mixed success, and the initial euphoria over the schemes has been much tempered. While efforts to attract private investment should continue, for Punjab, it is suggested that local taxation on petroleum products should be considered as a

Name of Road	Estimated Cost
District Ludhiana	
Northern Bypass coonnecting Ludhiana-Ferozepur road to Ludhiana-Jalandhar Road	1000.00
Widening/Strengthening of Ludhiana-FerozepurRoad	
a) Four laning Ludhiana Mullanpur Section	2000.00
b) Widening/Strengthening of Mullanpur Jagraon section	1000.00
Four laning of Ludhiana-Chandigarh road	40000.00
District Hoshiarpur	
Widening/Raising of Hoshiarpur-Dasuya Road with H.L. Bridges on choes	2000.00
District Faridkot	
Ludhiana Moga road Section Ajitwal to Moga	1000.00
4-laning moga byepass including railway overbridge on ludhiana-ferozepur railway line	1400.00
4-laning Byepass at Mukatsar	200.00
District Sangrur	
Amargarh Byepass (23 wide) including cost of land	100.00
District Gurdaspur	
Improvement of Batala-Beas road (Laying B.M. and P.C.)	200.00
District Jalandhar	
4-Laning Jalandhar Kalassanghian Tashpur road Km 0 to 32.10	3200.00
4-Laning Phagwara Nawanshahar Balachaur road Km 0 to 48.73	4880.00
4-Laning of Jalandhar Kapurthala Makhu Road	4720.00
District Nawanshahar	
Nawanshahar Byepass	1500.00
District Patiala	
Four laning Bahadurgarh-Rajpura road	1500.00
Raising Banur Tepla road	700.00
Stg. Patiala-Khanauri Road	60.00
District Amritsar	
4-Laning of Amritsar to Rajasanasi road(Airport)	700.00
Additional Bye Passes	
Byepass at Banga	1000.00
Byepass at Phagwara	1000.00
Byepass at Balachaur	1000.00
Inter District Roads	
Four laning of Zirakpur Patiala Sangrur road	3440.00
Ropar Nawanshehar Phagwara Road	3173.00
Kharar Morinda Ludhiana Jagroan Moga road	3744.00
Total	**79517.00**

route for capital building. The consumption of motor spirit (petrol) and High Speed Diesel was 597130 and 2508438 kilo litres respectively in 2000-2001. (Economic Survey of Punjab). There is thus a possibility of raising Rs 300 crores per year by imposing a special cess

of Re1/- per litre. The cess should be deposited in a non-lapsable Road Development Fund, which will provide the required capital inflow over the next ten years.

RAILWAY SECTOR

The Railway system should open up three main arteries connecting Punjab with Chandigarh:

- Chandigarh-Lalru-Rajpur-Patiala-Sangrur-Bathinda-Malout-Abohar
- Chandigarh-Morinda-Samrala-Ludhiana-Jagraon-Moga-Talwandi-Ferozepur
- Chandigarh-Ludhiana-Phillaur-Phagwara-Jalandar-Amritsar

For this two works are required:

- The completion of the sanctioned work of Chandigarh-Ludhiana corridor.
- The fresh sanction and completion of Lalru Rajpura link.

Punjab should immediately lobby with the Ministry of Railways in this regard. While the target for connecting Chandigarh to Morinda has been laid down as 2003, the final leg to Ludhiana should be commissioned by 2005. For this, land acquisition and other assistance from Punjab be provided expeditiously.

The Railways should also sanction afresh and commission by 2005 the Lalru-Rajpura link, techno-economic surveys for which have already been done.

The following table proposes railway development along these corridors:

(with diesel traction)
(at current prices)

Considering the power deficit scenario in Punjab, it may be desirable to plan for diesel traction mode for train operation on these corridors. There is a popular perception of somehow electric traction being superior to diesel, but this is not correct. The whole of US and Canadian system is still based on diesel traction. The choice of traction is a techno-economic variable, and should be based on a rational analysis. Considering the overall energy situation, and the type of requirement in Punjab, it may be desirable to move with diesel mode for the present on these alignments. This will also lower the cost by upto Rs one crore per kilometer of track.

In Phase I, funds requirement is Rs 550 crores, out of which Rs 250 crores is already committed by the Railways. In Phase II, the need is for Rs 900 crores. Over the next 8 years, the fresh funds needed are thus about Rs 1200 crores.

As per Railways Act, no local taxation can be applied upon railway services, unless notified by the Central Government, but the possibility of this exists nevertheless. Punjab should propose raising half this sum through a local service tax to be recovered from passengers, originating journeys from within Punjab. The potential to raise fares exists in Punjab, where ticketless travel is a rare phenomenon. A comparison of current Road / Rail fares would clarify:

Thus, bus fares are about 75% higher than rail, and there exists a possibility of increasing rail fares in Punjab through a special purpose taxation, without substantially affecting the travel mode.

The Ministry of Railways should be negotiated with to collect the tax and credit it to a Punjab Rail Development Fund to be maintained by them, to be used for development of rail-

Corridor	Phase I (2005)	Funds needed	Phase II (2010)	Funds needed
Chandigarh-Abohar	Complete Lalru-Rajpura link Upgrade Rajpura-Abohar to 110 kmph	Rs 100 crores Rs 100 crores	Doubling of Chandigarh-Bathinda	Rs 400 crores
Chandigarh-Ferozepur	Complete Chandigarh-Ludhiana Upgrade Ludhiana-Ferozepur to 110 kmph	Rs 250 crores (already sanctioned by Railways) Rs 100 crores	Doubling of Chandigarh-Ludhiana Doubling of Ludhiana-Ferozepur	Rs 200 crores Rs 200 crores
Chandigarh-Amritsar	Complete Chandigarh-Ludhiana	Already accounted above	Line capacity enhancement works on Ludhiana-Amritsar	Rs 100 crores

way infrastructure in Punjab. It can be negotiated that the Ministry of Railways would give a matching grant every year, to develop rail corridors as outlined above. Since nowadays Railways ticketing is networked, and a ticket can be purchased from any station, and even on the Internet, special procedures will need to be evolved for crediting the monies to the fund. However, since it is already computerized, it should not be difficult to implement on the reserved segment. Unreserved sales will take place from stations within Punjab, and this can be accounted at Punjab stations itself.

At current traffic levels, a 10% surcharge would raise about Rs 60 crores every year, and with a matching support from Indian Railways, rail development can proceed on schedule.

It may also be mentioned that the infusion of this investment in the transport sector will lead to a large scale multiplier effect on the overall growth of Punjab economy.

PASSENGER TRANSPORT PLAN

There are six important movement arteries for passengers in Punjab.

Corridor	Mail Rail Fare	Ordinary Bus Fare
Chandigarh-Bathinda	58.00	99.00
Chandigarh-Ferozepur	64.00	101.00
Chandigarh-Amritsar	62.00	102.00

Each of these corridors represents distances greater than 200 kms, with an average of 130 kms. The movement represents cross state moves and is presently largely road based, except on the Rajpura-Ludhiana-Jullundhar-Amritsar corridor, where competing rails services are well patronized. The last corridor is not amenable to rail service, since it is a hilly terrain and would require large infusion of capital for starting fast rail services.

The smaller segments of passenger moves are less than 200 kms, and essentially move as a bridge between these major corridors.

It is, therefore, suggested that the major corridors should provide reliable and fast rail based service for moving across the state and between towns on these corridors. The cross state services should move in the morning towards Chandigarh from Abohar/Firozpur/Amritsar, and return in the evening. Maximum travel time should not exceed about three hours or so. The stoppages on these fast cross state services will be at the major towns.

Sub-urban services on these corridors, stopping at every station, will provide connection to these services. The frequency of the suburban services can be planned to run at about an hourly interval in the morning and evening and a few services in the intervening hours.

Services on less than 100 kms segments between major corridors will be looked after by the road sector.

1. Chandigarh-Rajpura-Patiala-Bhatinda-Malot-Abohar.
2. Chandigarh-Morinda-Samrala-Ludhiana-Jagram-Moga-Firozpur.
3. Chandigarh-Ludhiana-Phagwara-Jullundhar-Amritsar.
4. Rajpura-Sirhind-Govindgar-Ludhiana-Jullundhar-Amritsar.
5. Amritsar-Tarantaran-Patti-Jeera-Firozpur-Fazilka.
6. Chandigarh-Ropar-Nawanshahar-Hoshiarpur-Pathankot

The following essentials should be provided for:

COMMON TICKETING

- A ticket purchased for a journey which entails travel on both road and rail modes

will be issued as a single ticket providing access to both.

- An authority to look after road fares, and the issue of joint ticketing, will be formed. A framework to share revenues for railway journeys will need to be decided.

MULTI MODAL TERMINALS

- Road and rail terminals at major towns to be co-located in a manner facilitating easy transhipment. Services like rest rooms, parking, refreshment areas, etc. can be planned jointly for both modes.

USE OF INFORMATION TECHNOLOGY

- System information, tracking of road transport moves through GPS, issuing of smart cards, acceptance of credit cards, etc. to be implemented on the network to facilitate customers.

FREIGHT SECTOR

On date, freight sector is characterised by multiple handling of commodities, rising wastages, and transport cost. For example, harvested wheat is stocked in the farmer's house, then brought to the Mandi and dumped, then bagged, then transported to a godown, then brought to the railway station and dumped, and then loaded into the railway wagon. The reverse is also true for inward commodities for consumption in Punjab. The same multiple handling is done for cement, steel, fertilisers, coal for public use, etc.

In keeping with the thrust sector of the Government of Punjab, a transport system will have to answer the requirement of agro processing industries also. This will demand assured transit for rural and semi urban areas to the consumption centres in Punjab and outside and may also need refrigerated wagons.

NEED FOR WAREHOUSING

In keeping with the need to minimise handling, correctly sized ware houses will have to be established at the consumption/production centres, and at major rail heads in Punjab.

The farmers can be encouraged to bag the wheat at source in their farms, and stock them at the local ware house. These local ware houses can be reasonably priced and scientifically designed to ensure the stocking of foodgrains, and assist in subsequent movement directly to consumption centres/rail heads.

At the rail heads commodities moving in for consumption in Punjab can be stocked in the ware houses linked to the rail terminals. Commodities can move directly from these ware houses to the consumption points. The Railways being the custodians of bulk transport, and also having land at most places, should invite private sector to participate in the management of such warehouses, attached to rail heads. It is learnt that schemes are already being readied in the Ministry for such an endeavour.

IT AND TELECOM A MUST

To implement this paradigm of decreased handling, lower wastage and lower overall cost, the freight transport and distribution sector will have to be backed by a reliable IT & Tele-

com set up. It has earlier been mentioned that the physical market or Mandi, should be replaced with a virtual market, where commodity exchanges permit trading on line. The farmer in the village, or a co-operative set up will trade directly with their buyers. At the same time the village co-operatives and other local bodies, and individuals will also be in a position to sources their requirements of other commodities which may be stocked at the rail heads, etc.

These schemes can be implemented as pilot projects in one district in the first phase and then proliferated quickly over the whole state. The advantages that will accrue in terms of stemming wastages and lowering costs will bring about a monumental change in the method of movement of distribution of commodities. Additionally it will open up the entire world to Punjab villages to trade with and become an engine for development.

The implementation of this system will also reduce the overall transport cost by cutting of superfluous moves. For example when commodities move from the village, during the multiple handing cycle, they may be travelling repeatedly over the same stretch. In the proposed commodity exchange in a virtual Mandi scenario, there will only be precise movement from one point to another without any repetitive or unnecessary movement. While lowering the cost of transport, this will also reduce the congestion on the road network.

It is also seen that tractors which are essentially designed for off road application, move on the road and provide the initial 15 kms of transport, when moving to the Mandi. The design of their tyres places heavy stresses on the road surface leading to damage both to the tyre and the road. In the proposed set up, freight movement will be through vehicles designed for this purpose, which will ensure that roads last longer.

MOVE TOWARDS CONTAINERISATION

Movement by containers will be the standard scheme in the future. The proposed set up will start facilitating the induction of this modern set up in the commodity transport in Punjab. Refrigerated containers called reefers are now commonly available and can become helpful to in the development of agro processing industry in Punjab.

Containers will also ensure a seamless movement from consumption to production centres whether intra state, inter state or international.

CONCLUSION

Punjab has the pride of place amongst the state of India and its economic success story stood out as an example to others. In recent times, the going has not been good, and it is high time that the state moves once again towards a cycle of sustainable growth.

It is anticipated that Punjab will move towards more economic cropping patterns, and move quickly in the area of agro processing. This will be coupled with a conscious effort to develop the knowledge base in information technology, and other segments of the tertiary sector.

The state should announce putting in place an infrastructure base that will help in answering these ambitious requirements. It is recommended that:

While specific recommendations with regard to Transport have been detailed, it is strongly recommended that the above mentioned paradigms should be embedded in the infrastructural planning process. This will ensure the resurgence of Punjab infrastructure, propelling it on a sustainable growth curve.

1. The state should give up a subsidy based approach and move towards a tech-
2. Realise that users are willing to pay for services, provided the overall quality of services meets their requirements. People would rather pay for good services,
3. Major reforms should be brought through people's participation, not govern-
4. Induction of new technologies should not give rise to new bureaucracies, but
5. While the rural sector will remain important, a policy shift emphasising the increasingly urban character to Punjab should be inbuilt in the decision making

Can IT transform Indian Railways?

Prof Sowmyanarayanan Sadagopan

Indian Railways (IR) has been a much-admired organization for several decades in the last century. Started two centuries ago in 1853, it is the second largest Railway system in the world. It runs more trains (more than 1,100 pairs of trains carrying 11 million passengers per day) than many Railways put together. It employs directly about two million people; indirectly it gives employment to another 10 million people with an annual wage bill of USD 4 Billion. By one estimate one out of every ten Indians depend directly or indirectly on IR. Undoubtedly it is the most affordable means of transport for the poorest of the poor in a third world country.

IR network is one of the largest; with more than 100,000 Kilometers of track, nearly half a million fright cars and close to 10,000 locomotives. It is very diverse too; multiple gauges such as narrow gauge, meter gauge, broad gauge; highest altitude tracks such as Ooty & Shimla; most difficult yet beautiful terrains such as Konkan & Bailadila; uses a range of technologies - Steam, Diesel and Electric locomotives and caters to the most diverse audience (Palace on Wheels for Maharajas and ordinary second class travel for the man on the street)

It is one of the most integrated organization, that has multiple business lines

- Railway Track – Design, laying, track maintenance, track electrification and signaling, bridge design, bridge construction
- Railway Locomotive – Design, manufacture, operate & maintain steam, diesel and electric locomotives
- Railway Coach – Design, manufacture, operation & maintenance of ordinary and

Professor Sowmyanarayanan Sadagopan is the Director of the Indian Institute of Information Technology, Bangalore (iiit-b). He can be reached at ss@iiitb.ac.in

luxury coaches including Electric Multiple Units (EMU)

- Railway Station – Design, construction, operation & maintenance

- Signaling & Telecommunications - Design, installation, operation & maintenance of VSAT,
  Microwave, Wire & Wireless communication

- And of course - the actual running of the trains

- Catering for the passengers (including running of the kitchens, restaurants on the railway stations)

- Providing amenities such as linen for the passengers

- Railway Reservation (design through CRIS, operation and maintenance)

- Own & manage very large Real Estate space in prime areas of most cities & towns, and

- Operating thousands of Railway Crossings across the country

It has its own budget, several dozens of factories, hundreds of Railway Workshops with outstanding precision mechanics, thousands of hospitals and clinics. It has its own Service Commission to hire people, a specialized Engineering Service (a cadre of high quality officers). It is indeed a world by itself!

In terms of the traffic volume, a ratio of 1:4 between Roadways and Railways during the forties (time of Indian Independence) is reduced to 4:1 today!

Most of the freight traffic has moved to Road transport sector that has grown impressively in the past five decades. Road transport benefits more people directly, takes care of the “last mile problem” by reaching the goods right up to the doors of the customer, has a predictability that is far better than what IR offers and in the past decade even cheaper! The case of passenger traffic is no different. Today most youngsters routinely think of driving on the road than on the train. Business travel is shifting significantly to Air Transport, as the pressure on time increases and the fact that distances between the major cities in India are large.

Inherently the Road transport has all things piled against it – energy inefficient, expensive (as the world oil prices are moving north, heavy dependence of Forex (as India depends heavily on oil imports from Kuwait and Iraq), less comfortable (ride quality on rail is far better), accident prone (close to 100,000 people die on Indian roads every year compared to fewer than thousand on IR). Yet, consumers have consistently shifted to road transport over the past fifty years.

What is most surprising is the timing –

Most countries including USA are looking at the Rail option seriously, thanks to its energy effi-

ciency and environmental friendliness. Countries like Japan are investigating the potential of very high-speed rail travel. In countries like Germany, Rail as alternate to inland Air are being explored (for example Frankfurt Airport).

Luckily there is still a huge potential within IR, particularly the assets (both human resources and the physical resources), that can “turn around” IR.

As an organization, the loyalty that is enjoyed by Railways from its employees is unprecedented. An average Railway employee has a pan-Indian outlook, will find the friendly hand of a fellow IR man anywhere across the length and breadth of the country, would swear by the organization and hardly ever “strikes” (the way Bank employees do all the time). The systems and processes developed and perfected over a century works even today. Until recently IR had a very good record in punctuality, cleanliness, friendliness and safety. The Passenger Reservation System (CONCERT) used by IR is the most sophisticated, reliable and working application of IT that has truly benefited practically EVERY Indian.

The IT boom that is going around particularly in India is yet to touch IR (except through Railway Reservation System and the leasing of Railway track for laying optical fiber by private parties). Thanks to the globalization wave that accompanied IT boom in India, organizations are appreciating the need to focus on “core competencies”.

IT has also helped significantly many major service organizations – banks, financial services, courier service, road transport, airlines, shipping lines, air cargo, hotels, tour operators, flower exports, garment exports, software services, design engineering services, pharmaceuticals, training institutes through enhanced customer service, tracking service and many other personalized services that are offered in “any time, any where” mode.

How can IR benefit from IT?

First and foremost is the clear division of IR into Rail services (track and stations) that offers infrastructure and Train Services that provides operations. People who make the roads and maintain them do not run buses/trucks. Those who manage airports do not run airlines. Even Indian Telephones department has separated infrastructure from service providers (SOT & DTS). AT&T improved considerably once they separated equipment from services. Accordingly Indian Railway must manage (maintain, upgrade) Railway. Running of the trains (both passenger and freight) must be separated. Railways should charge those who run trains for the usage.

Second, we need a scientific tariff structure that computes and charges tariff based on actual usage (pay per use model), in a way similar to TRAI.

Third, introduce IT significantly to provide state-of-the-art signaling and communication service that can dramatically improve safety record. The Indian telecom & software industry provides services to global customers and it is only fitting that IR uses the Indian talent pool.

Fourth, switch over the train operations from “circuit-switched” model to a “packet-switched” model. Let me explain.

The current system of long distance trains/freights train is similar to circuit switching in telephony. In circuit switched telephony when two parties talk, a virtual pair of wires is dedicated to the parties, end to end, throughout the length of the conversation. Typically the conversation is one-way, full of pauses, repetition etc., and the resultant use of the channel capacity is rather

low. Packet switching (which led to TCP/IP), breaks voice/data into packets and sends them over any of the existing paths and reassembles them at the receiving end. Packet switching uses the channel capacity exceptionally well, thereby permitting several data/voice connections using a common carrier. Phenomenal efficiencies are associated with packet switching in data / voice telephony.

Airlines, the world over, follow a similar practice under the name of 'hub and spokes' model. Instead of running flights between two pair of locations say Chennai to Washington DC or Bangalore to Paris, they run a few trunk circuits between busy hubs - say between Frankfurt to different cities in India and different cities in the USA. This leads to simplicity of scheduling, minimizes cascaded delays (delay in one segment affecting all subsequent flight segments) and allows optimization of traffic using combination of large, medium and small aircraft. More important, it permits many players to bring in their sector specific knowledge, expertise etc and enable them to co-work and cooperate in offering shared services (multiple international airlines partnering with Jet Airways in India)

IR can follow a similar strategy. Currently IR runs several hundreds of long distance trains (Chennai – New Delhi, Cochin Gorakhpur etc.,). This model unduly limits operational flexibility and complicates scheduling; a set of connected coaches (a train) is dedicated for several days to a fixed route – something similar to a circuit switched telephone connection that dedicates a pair of phone lines for the entire duration of the conversation. A similar reengineering of IR would call for short-haul (4-10 hours) standardized trains that run at regular intervals between major towns and cities. Such short-hauls are also "less tiring" to the passengers. This is the "hub and spokes" model that Airlines have perfected over the decades.

The key advantage is operational flexibility, which in turn would lead to significant track utilization even with less sophisticated signaling. Having standardized coaches makes scheduling far easier. With complex reservation software, long-haul passengers can be "switched" with guaranteed "seats"; the only inconvenience is the switching (change of trains) for long distance passengers. But the inconvenience would be more than offset by other conveniences this "packet switching" option offers.

Having dedicated long distance trains "lock" passengers into "delays"; there is very little "option" available to the passenger, even if it costs more money. The complexity of scheduling trains makes re-routing operationally difficult. Simple standard schedules for trains (with complex passenger allotment handled by reservation software), enables re-routing (a feature airlines routinely offer). More so in India, where operating staff has to contend with varying train formation, coach capacity, coach mix for every train.

In turn Railway coaches can be "mass manufactured" both by Railway Factories and Private Sector. In a sense everyone is more concerned with "flow" in the right direction and one keeps moving all the time leading to faster travel for ALL passengers with multiple routing options.

The complexity of fare calculation can be handled by IT. Walk into any town in Tamil Nadu today and you will see this strategy working; most passengers walk into the Bus Station and quickly get into a bus of their choice that is moving in the "right direction" without waiting for a single bus that takes them in a "single hop". To take care of special needs of elderly people and people with disabilities or special needs, we could continue to operate "special long distance" trains (the way they are). But switching over to the "hub and spokes" model would mean much faster "overall travel".

Fifth, we need to fundamentally rethink our notion of Train stations. Today they are deserted, often unclean, very crowded and IR has no money to maintain. Just as Airports around the

world (except India of course) recognize the economic potential of Airports, we need to re-think our strategy to develop Train Stations.

The recent decision to convert all suburban stations into IT parks in Chennai is an interesting development.

Train stations in Japan are full of commercial activity. IR has prime property in and around train stations that are in the heart of the town. What can be a better place to host commercial activities (retail stores, entertainment, shopping malls). The customer travels to the Train station anyway – why make the customer go over to another place away from the station.

This would release private investment in Train Stations and improve dramatically the overall "look and feel" of the train stations. This meshes well with the "hub and spokes" model too; during change-over from one train to another train, passengers would need a place to stay, eat and shop (all these can be wonderfully handled by Train Stations remodeled as centers of activity).

Sixth, extend the "hub & spokes" model for the freight traffic also, along with a shift towards containerization. Shipping & Air Cargo saw tremendous benefits of containerization. Thanks to IT (Barcode, IR Tags, RF tags) the major reason for non-acceptance of IR as freight carrier can be addressed – assurance of delivery times & tractability of the parcels. In fact customers can track their parcels directly over the Internet, a practice that is around for years (UPS, FedEx, DHL, US Post). Also a partnership with trucking industry can ensure timely delivery at door steps (a feature that is increasingly common among multi-modal logistics providers)

Seventh, solve the "last mile" problem by partnering with road transport. There could be regular "pick up" and "drop" service from the Train Stations that would save the consumers the harassment of local travel using Auto-rickshaws and private taxis that fleece the consumers. Thanks to IT, the ticketing can include such options and provide one point "charge" that includes "local" charges. Long distance Telecom industry has perfected the "billing" of charges across "local" partners through their sophisticated billing software. Today such software is mature enough to handle complex "partnerships". It would also benefit the road transport industry as they can form into "fleet" operation and absorb the risk of seasonal demand that is characteristic of travel industry.

Eighth, providing amenities is something that is best handled by private sector. IR should only play the role of quality control and completely get out of this "losing" business.

I have avoided "pure IT" initiatives by IR – getting into telephony, providing Internet backbone, leasing track space for fiber optic cables etc., In my opinion, they all can supplement, but can never substitute the core function of IR – that is high quality transportation.

What would all this mean over a period of time, say, a decade?

Railways would get back the major share of traffic volume. Ride quality is far better on Rail than on Roads at least in India. Rail is a far more eco friendly and energy efficient mode of transport. IR still enjoys customer "good will" and a "loyal" workforce. If at least some of the points raised in this note were implemented, IR would become cash rich and significantly improve the quality of their formidable infrastructure. In turn IR would save energy, pollution and tons of money to India, save millions of lives lost on the roads year after year and regain the "lost glory".

A cash rich IR can “go global” and build world class coaches for the world market, build railways for many emerging markets and hope to become one of the “admired” organizations serving the largest number of “smiling” customers. All this call for political will, though. We do hope that some time, somewhere the “powers that be” would think on those lines!

We Indians never give up hope!!

GUIDELINES FOR FORMULATION & IMPLEMENTATION OF IS / IT STRATEGY ON INDIAN RAILWAYS

-K.M. Rao

Purpose : In this paper, the concept of IS/IT strategy, in brief and broad guidelines to be kept in view while formulating IS/IT strategy for Indian Railways(IR) and for its implementation are discussed.

1. IS / IT Strategy:

1.1 Strategy can be defined as an integrated set of actions aimed at increasing the long term well being and strength of the company relative to its competitors. Strategy is different from planning and Porter cautions that that it shall not be confused with improving operational effectiveness.

1.2 An IS/IT strategy is "the process of identifying a portfolio of computer – based applications to be implemented, which is both highly aligned with corporate strategy and has the ability to create an advantage over competitors."

1.4 The IS/IT strategy shall become an integral part of the development of business strategy, business plan and its subsequent implementation. This is achieved by closely aligning the IS/IT strategy with the business strategy to improve the overall competitiveness & productivity by improving the core business processes and exploiting the opportunities provided by IT to redesign the processes.

1.5 Some of the common factors to be kept in view while formulating the IS/IT strategy are (i) a broad view of business perspectives – vision, long term goals, structure, values, corporate culture, management style etc (ii) impact of existing IS strategy, its strengths and weaknesses (iii) role of IS/IT within the organisation and also in other similar organisations/ businesses and (iv) extent of support of management for the IS/IT.

2. Guidelines for Formulation of IS/IT Strategy and its implementation on Indian Rail-

Shri K.M. Rao is an IRSE officer, presently studying for his MBA degree at the National Graduate School of Management, Australian National University .

ways (IR):

Critical Success Factors (CSF) are the limited number of areas in which satisfactory results will ensure successful performance of the organisation. They are the few key areas where things must be right. CSFs at various levels shall be identified with the help of management and the IS/IT strategy shall ensure support to the executives at various levels in measuring and monitoring them in real time as shown in Appendix A.

The objectives of the IS/IT strategy must be embedded in the core competencies, resources and capabilities of the organisation. The IT plan shall have (i) features for centralised storing of data at divisional and zonal headquarters levels, which can be accessed by officials at various levels and (ii) decentralised applications at the level of various maintenance units, offices of various departments in the division and zones. Important guidelines for formulating the IT strategy and its implementation are given below:

2.1 Review and Reengineer the present business practices for their effectiveness:
In order to reduce the costs and provide quick and efficient service to the customers and make available necessary information to the executives, the existing business processes shall be reviewed by the experts from the field and IT experts, with a view to conduct all normal transactions electronically. Applying technology to an ineffective or inefficient process will only produce marginal results or may even actually result in higher costs or less efficient service.

Therefore, this is the right stage to check for duplications, lacunae in the present practices & procedures, strengthen the weak links and to introduce redundancies at critical junctures to ensure correctness of decisions. IT plan shall streamline and improve all business practices, reduce their cycle times and make them robust. The aim shall be to provide prompt and competitive service delivery to the customers / executives at various levels, through sound business practices duly supported by IT. IT shall be used to enable process improvements.

Steps recommended in this regard:

(i) Identification of Stakeholders for each business practice: Officials in the field, divisions, zone and Railway Board, other departments, public, labour unions, competitors, media, Commissioner of Railway Safety, State governments etc.,

(ii) Identification of existing business processes at various levels within a department and those requiring interaction with other departments and according order of importance / priority for implementation.

(iii) Analysing the present practices, identifying the lacunae, redundancies, checking fitness with business rules and overall business strategy, redefining the benchmarks with industry standards, modifying the processes etc. (Appendix B & C)

(iv) I dentifying information needs to meet the short listed processes above and the levels / locations from where the information has to be provided.

2.2 Treat Information as a Strategic Resource:

For a gigantic and dynamic organisation like IR involving interactions with millions of customers, 1.5 million workforce and sheer geographical spread, the IS/IT plan shall treat information as one of the strategic resources and provide necessary framework to collect in-

formation in sufficient detail so that it is available across the organization as an input for transacting routine business processes and also for taking functional, technical and organizational decisions. The information shall be collected as close as possible to the source and with utmost care, to avoid any mistake and duplication. The aim shall be to make available updated and right type of information, at the right time to the right person in the organisation to enable him to take right decisions.

2.3 IT Plan to take an enterprise perspective:

Since the same data and resources are used by officials at several layers in the same / several departments, an enterprise wide focus shall always be maintained to ensure interoperability, integrity, compatibility and shared usage of technology and resources. Suitable standards shall be laid down for data definitions and descriptions to avoid duplication of work, ensure accuracy of data and promote data sharing. The IT architecture and standards shall enable sharing of resources, office space, training and portability.

For example, if concrete apron is to be constructed at a station, the typical needs of various officials are listed out which the IT framework shall be in a position to address:

Design assistant - latest drawings issued by the headquarters.

Estimator - the latest rates

Accounts official - latest rates, estimate provisions & sanctions

DEN - Agencies which executed similar works in the zone

Tender Committee – Credentials & Performance of agencies, last rates of similar works.

THOD/PHOD - whether an existing apron is being replaced, what was its service life, whether the structure gave the required service life, if it is being replaced prematurely what were the sections and reinforcement details adopted earlier, any technical deficiencies in the previous work for premature failure, incidences of running of over loaded wagons etc.,

Vigilance: whether the structure is being replaced prematurely, if so the officials who supervised the construction, what are the other works they have supervised in the past, works presently being executed by the agency elsewhere in the zone etc.

2.4 Back up Plans for effective business recovery procedures:

The IT framework shall identify potential risks in case of failure of any of the systems and evolve suitable measures / alternate procedures to support the conduct of business transactions in case of any emergency. The IT resources shall also cater to providing suitable systems for recovery of data and important applications so as to minimise the losses.

2.5 Laying Policy Guidelines for providing access to information:

Since the databases contain very vital and sensitive information about various departments in the organisation, which will be accessed by staff at various levels across the entire organisation, the top management shall lay down specific guidelines for providing access to

specific information to staff at various levels to ensure security and privacy of huge databases.

2.6 Training and Education of Staff:

The IS/IT plan shall include identifying the training needs of all concerned officials and making a detailed plan for imparting training to match with the implementation of IS/IT. It is also necessary to involve the stakeholders at all levels in finalising the list of business processes, the actual activities to be carried out etc., A discussion forum via the Web / intranet will be of great use in involving various stakeholders across the organization and obtaining their views. Apart from providing a platform for informal strategic thinking, knowledge sharing and mobilising the synergy, this will also help in preparing the officials at all levels for a change of attitude and make the proposed IS/IT strategy acceptable at all levels.

2.7 Implementation Scheme:

Various business transactions that shall be carried out electronically in each department should be identified and prioritised duly grouping them into logical units. Then the phases of implementation shall be finalised, resources required worked out, suitable time frame for implementation and responsibility for implementation shall be decided. The IS/IT strategy shall also include a study on System Change Impact. In order to assimilate the new ways of doing work, a plan for changing the organisational culture will have to be made and implemented so that the officials may be able to assume their new roles, without many problems. Project based management approach[3] shall be adopted for implementing the IS/IT strategy, with monitoring at the highest level in the organisation.

2.8 Effective Communication about IT strategy within the organisation:

It is very important to maintain effective communication about the IS/IT strategy and its implementation at all levels in the organisation for successful implementation. Enough signals shall go across the organization, especially at lower levels, that the whole exercise is to help them in discharging their duties more effectively and to remove drudgery from their day-to-day work. All stakeholders shall be made to understand that the IS/IT is being implemented to streamline the working, make it more efficient and productive but not with a view to curtail jobs.

Endnotes:

1. Customers include officials of other departments.
2. All inter and intra departmental transactions are to be treated as business processes.
3. Normally objectives of a project are stated in terms of producing outputs; the fitness-for-purpose of outputs, capability of the user(s) and external environment factors decide the outcomes. We need more exacting project management models in which the objectives of a project are expressed in terms of realising outcomes. “Project Management is a formalised and structured method of managing change in a rigorous manner. It focuses on producing specifically defined outputs by a certain time, to a defined quality and with a given level of resources so that planned outcomes are achieved”.

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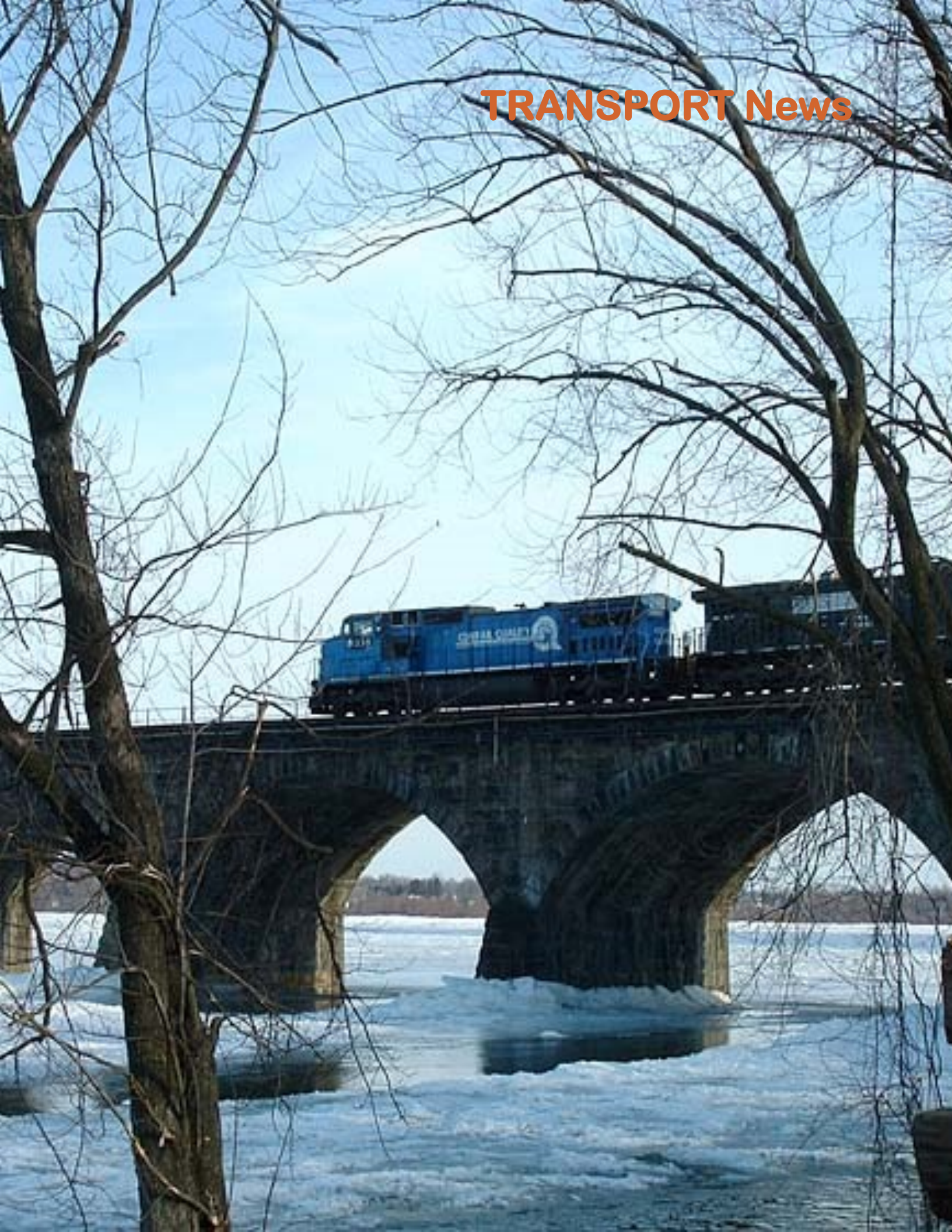
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