National Urban Freight Conference

Redeveloping Aged Urban Rail Freight Infrastructure:

The Challenge to Make It Perform Better Given Four Decades of Industry Suburbanization

James R Blaze
Director Strategic Planning & Special Studies
ZETA-TECH Associates Inc.
blaze@zetatech.com
jimb@railpersonnel.com

856-779-7795

www.metrans.org.
National Urban Freight Conference
METRANS Transportation Center
Phone: 213-821-1025
Email: giuliano@usc.edu

In the post World War II period, American society has undergone an intense suburbanization. While most think of residential change, the fact is that industry and jobs have also left the old center city focused railway network behind.

By the mid 1970's, many industrial development experts (logisticians is what we call them today) no longer rated rail freight service in their top ten list of site plan requirements. Trucking was the preferred way to ship high value goods and that mode choice was often made easier when shippers considered the weak financial condition of many of the bankrupt railroads of the era[1]. Upwards of 75 percent of commercial and industrial plants in the past twenty years have been located far from the nearest railway

[1] The Penn Central, Erie Lackawanna, Rock Island, Milwaukee Road and others were freight railroads that performed poorly because their plant and equipment was is terrible shape given their continuing losses from operations.

line[2]. As a result, today and going forward a majority of potential new railway shippers can not receive direct carload deliveries or ship their outbound goods by rail from a plant sidetrack. The railway main lines and even the railway branch lines are now located many miles away from the shipper plants and warehouses.

In the intervening years since the late 1970's, North America's freight railways have seen a resurgence in traffic. Profitability is increasing. By the end of 2005, this author predicts it is likely that two of the six largest US railways will report they are earning their "cost of capital"[3].

Yet most of the urban industrial plants have no rail car loading sidings and therefore cannot be served directly by freight trains. As a consequence, intermodal freight is generally the only means of serving the majority of today's potential urban freight shippers[4].

There are other issues related to the resurgence in rail freight such as the fact that increasing the number of trains on strategic urban rail lines does result in two types of urban congestion. One is the congestion and delays as freight trains block highway movements at many of the at-grade highway crossings. The second form of congestion occurs as freight trains and commuter trains compete for train path space on the many single track rail lines near major cities.

[2] Beshers, Blaze and Resor, Study of carload rail freight for the FRA, 2003.
[3] Cost of capital is a measure that determines if operating earnings meet or exceed the weighted cost of equity and net book asset value on a railway company Balance Sheet.
[4] The reference to "shippers" is used herein interchangeably with the reference "receivers" since for accounting purposes they are different players in the transactions.

How to handle more growth is a critical technical issue with so many single line railway track configurations. Without signals, a single-track urban railway can handle perhaps 20-freight trains per day efficiently[5]. To add capacity will require large capital investment either by the commuter authorities or by the freight railroad managers. How can planners best accommodate a doubling of freight traffic within a decade and a half[6] is not yet clear.

One fact is certain, in today's widely accepted environment calling for more rail freight growth, track capacity has to be added. Adding track can be expensive. The table below indicates how to consider these potential track investment capital costs.

Table 1
Criteria for Capacity Improvements[7]

Type of Signal Control	Maximum Capacity	Remedy to Increase Capacity	Est. Cost per Mile
Dark territory (no signals)	15 MGT	Install ABS	$125,000
ABS territory	35 MGT	Install CTC & Passing Sidings	$65,000
CTC single track	75 MGT	Add double track	$1,015,000
CTC double track	150 MGT	Additional track	$1,015,000

NOTE: CTC capacity enhancement reflects cost of additional track at $1 million per mile plus the cost of CTC signaling on new track at $15,000 per mile.

In the meantime, independent of private rail management investment planning, many different public planners have also offered a series of urban freight rail investment solutions that are expensive. For example, between four and five billion dollars is

[5] 18 to 25 trains per day may be thought of as a useful rule-of-thumb for planners.
[6] See US DOT and other freight planner references for more on possible rail growth,
[7] Track Capacity Economics, ZETA-TECH Associates, Resor, Patel, and Blaze, 2004.

predicted[8] to be spent just around Houston for urban rail freight requirements. Six billion dollars or more is targeted in the southern part of the Mid Atlantic States.

This paper discusses the reasons for the public and commercial concern about revitalizing the urban rail freight sector. It evaluates two different approaches to modernizing the railways: one with capital-intensive projects, the other with incremental and specific changes that are less expensive but potentially effective.

Specific examples of urban rail freight changes are discussed while looking at several case study urban environments. Contrasting economic approaches are evaluated as BENCHMARKS for best practices that urban planners and railway managers can consider for these and similar settings throughout the United States.

The projects reviewed in this paper include:

The Los Angeles Area (The Alameda Project);
The Greater Houston Area Rail Relocation Proposal;
The Chicago Create Project;
The Baltimore-Newark I-95 Corridor (Mid-Atlantic States);
The Kansas City Sheffield Project.

---

[8] Calculated by this author from selective Houston reports,– some with conflicting estimates.

ALAMEDA CORRIDOR FREIGHT LINE AS A BENCHMARK FOR PLANNERS

The Los Angeles/Long Beach port complex has been the scene of massive Chinese import trade handling in the past decade. Extreme growth was predicted strategically by urban and port planners back in the 1980's. The proposed solution was to invest in a $2.4 billion public investment for a high use rail freight corridor. That corridor is known as the Alameda Corridor.

The Alameda Corridor today serves by far the busiest port complex in North America. Booming trade with Pacific Rim nations has resulted in ports freight of 100 million tons per year. Some predict growth could triple in the next 25 years, with the volume of high-value containerized freight. About one-quarter of all containerized products arriving in the USA enters the country through the ports of Long Beach and Los Angeles.

THE PROJECT

Two large railroad companies serve this corridor: Burlington Northern Santa Fe (BNSF), and the Union Pacific (UP).

Both companies formerly operated individual single-track routes into the ports area. Before the corridor project, these railroad companies would move port and other cargo in around 35 trains per day. Each train would cross local streets at speeds of just 10 and 20 mph. The idea of developing a single, consolidated rail corridor in the area was first floated in 1984. But to implement the idea, a project funding mechanism was required.

It took five years of planning for local planners to establish the Alameda Corridor Transport Authority (ACTA). The job of the authority was to design and construct the $2.4 billion project. The four existing railway freight routes were to be replaced by a single consolidated, grade-separated 32km (20 mile) line. Along the new line, the average speed of the freight trains would increase to about 35 mph. That was the plan.

PROJECT ECONOMICS

As the map shows, the project allowed trains of two competing private railroads to shift from heavily congested and accident-prone at-grade road crossings to the new completely grade separated rail right-of-way. By consolidating 90 miles of branch rail lines into a high-speed rail expressway, the Alameda Corridor eliminated conflicts at more than 200 at-grade railroad crossings where cars and trucks previously had to wait for long freight trains to slowly pass.

in 1995 the project was given limited federal authorization, and designated a high-priority intermodal corridor. That administrative ruling allowed the project to employ several additional federal financing options. In January 1998, approval of a $400 million federal loan by President Clinton put the final piece of the funding jigsaw in place. The project also received an additional $47 million in Intermodal Surface Transportation Efficiency Act funds.

Of the total $2.4 billion, $1.165 billion came from revenue bond proceeds, another $394 million from the port authorities, and more than $340 million from the Los Angeles County Metropolitan Transportation Authority and several state funds. Railway shippers

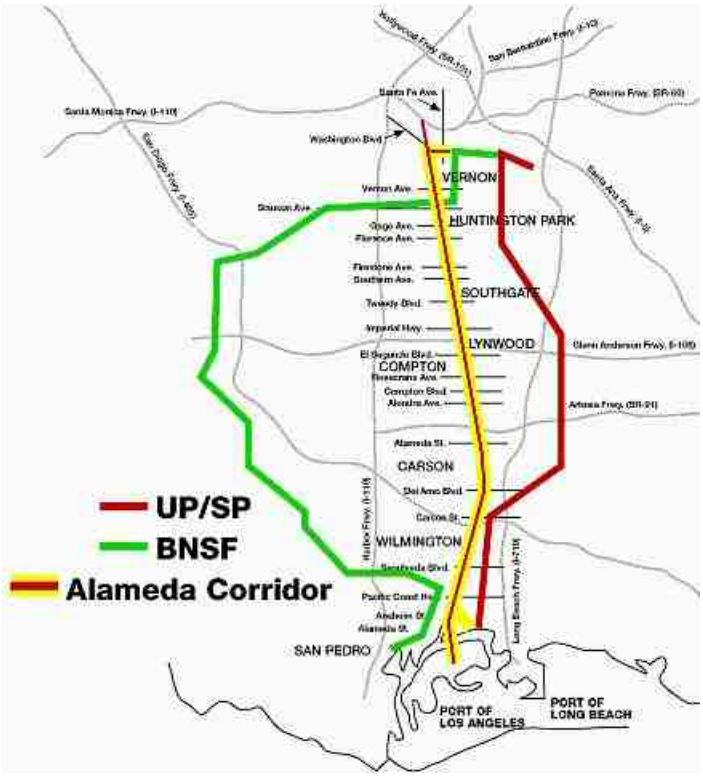
that have their goods ride along the new corridor are assessed an added fee per loaded container and per empty containers to help pay off the bonds.

Trains using the line use standard US rolling stock. No special railway wagon design was required to use the new railway line. Many of the trains employ container wagons stacked two high. Some trains transport mixed freight and bulk goods such as coal or oil. No special rolling stock has had to be ordered in order for the new rail line to work as planned. Electric locomotives, as an example, were not required for train power since that would add additional capital cost to the project.

Construction began in 1997. The central feature of the Alameda Corridor is a 33-foot deep trench, running for 10 miles parallel to Alameda Street between downtown LA and the maritime ports on the Pacific Ocean coast. The regional authority in charge of the project (ACTA) appointed an engineering team to take charge of project construction. That team executed preliminary design work and oversaw the final design.

The project used a 'design-build' strategy for the Alameda Street trench section. The line was completed on time and it opened officially in April of 2002.

The ten-mile long Mid-Corridor Trench section of the route is 15.2 meters wide, and accommodates two tracks plus a roadway for maintenance access. The trench has an overhead clearance of 7.5 meters that allows it to easily accommodate double-stacked



container trains. The track can be converted into a third rail track configuration within the trench if required in the future. The trench has an overhead clearance of 7.5 meters which means that the corridor can easily accommodate double-stack container trains.

BENCHMARK Based on Alameda Corridor Results

So far, the line has been financially successful. As partial evidence, the small amount of advanced federal funding for the project has already been paid off in full. The project was completed on time and on budget.

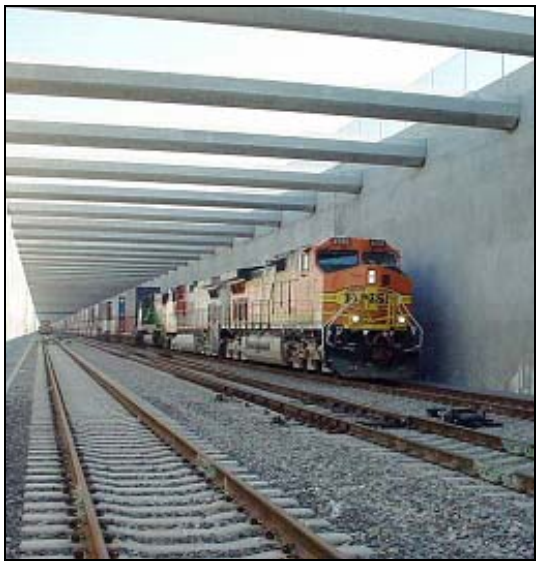


Photo shows a conventional double-stacked container train in the Alameda trench.

One of the reasons for the result was the strong focus on having the beneficiaries pay for the project on a user fee basis. The beneficiaries were not viewed as the railroad companies. The beneficiaries were viewed as the shippers.

That shows in the way the user rate fees were set up. Table 2 shows just some of the rates scheduled to go into effect in January of 2006.

Table 2
2006 – Example of Alameda Rail Corridor User Rates[9]

	Loaded Maritime Containers	Empty Maritime Containers	Non Maritime Containers – (Either Empty or Loaded)
22 feet or less	$ 17	$ 4	$ 4
> 22 feet to 44 feet	$ 34	$ 9	$ 9
> 44 feet to < 48 feet	$ 38	$ 10	$ 10
48 feet to < 52 feet	$ 40	$ 11	$ 11
52 feet	$ 45	$ 12	$ 12

[9] Pacer StackFacts, Dec 12, 2005.

So shipper paid surcharges are the way this project was financed. Should that be the basis for all rail redevelopment projects or is this an exceptional case? Many in the rail industry think that type of resource schedule is an exception. Local planners have to find that information out early in the process as opposed to after a plan is put together.

GREATER HOUSTON PROJECT CONCEPT AND ITS BENCHMARK CONSIDERATIONS FOR PLANNERS

Houston presents another case study for urban railway planners. Houston has a maze of regional tracks that focus both upon the port complex and on the huge chemical and petroleum industry around the central city and its suburbs[10].

The railway network that serves the port complex and the industries around greater Houston is often described as a rail system. However, the current network arose without a focused development strategy or a long-term plan to provide an optimum service pattern to its customers. The current Houston railway track network is an amalgam of independent railway management decisions made by at least six prior railway companies. Investors and managers from the Katy, the Rock Island, the Fort Worth & Denver, and other railroads each separately, and at different periods of time, decided to build tracks to serve this region. Table 3 shows this corporate lineage.

The current pattern of tracks did not therefore emerge with the intent of connectivity and self-reinforcement like the Interstate highway network. Rather, it is the result of a series

[10] The Houston area freight railways compete with the other freight modes for a share of the business generated by approximately 250 chemical plants, 74 natural gas facilities and 30 oil refineries. In addition, there is the massive Houston port complex that they serve. J. Parker Lamb, Trains Magazine, Oct 1999.

of railway mergers and acquisitions that took place as opportunities presented themselves between strong and weak railroad competitors.

The numerous rail corridors that approach and exit Houston are used for many major commodity moves. Table 4 identifies the many different commodity markets that the Union Pacific would serve at Houston. A similar breakdown list would apply to the BNSF rail freight market segments at Houston.

Private Railway Incremental Investment Around Houston

Regarding capitalization and financing of infrastructure, there are significant differences between the railways and competing modes of transport like trucks and barges. Railroads pay for all aspects of their business, from power to the maintenance and rehabilitation of their right-of-way infrastructure. Railroads bear the cost of network improvements out of operating margins. This means that rail managers are focused on projects with the highest economic return in the shortest possible period of time.

Table 3
Corporate Lineage of Houston's Urban Railroad Companies

2005 Company	Predecessor Company Serving Houston	Control or Merger Date
Union Pacific	Southern Pacific	1996
	Missouri Pacific	1980
	Katy	1988
BNSF	Atchison,Topeka,and Santa Fe	1995
	Burlington Northern	1970
Kansas City Southern Industries	Texas-Mexico	2005

Table 4
Examples from the Union Pacific of Major Commodity Flows in the Houston Area

Railroad	Commodity/Service	Lane
UP Corridor Service	Intermodal	West Coast – Houston Port
	Intermodal	West Coast – Houston Domestic
	Intermodal	West Coast – New Orleans & East
	Coal	Powder River – Texas Utilities
	Grain	North Central States – Export
	Rocks/Minerals	West Texas – Houston
	Chemicals	Movement to all US Points
	Plastics	Movement to all US Points

Both BNSF and UP have thousands of potential investment projects spread across their networks that serve twenty or more U.S. states. However, a private railroad company's ability to invest is a function of both its total annual income and its rate of return on invested capital. At 2004 business levels, a railroad the size of BNSF or the UP is realistically limited to around $2 billion of investment each year.

Meanwhile, local Houston urban and port planners are focused upon two needs that they see as important. One is the need to advance intermodal rail traffic into and out of the Port of Houston to help support that growing segment of freight. The second is the community need to grade separate the railway and highway junctions or otherwise eliminate the congestion around local highway-railway at-grade intersections.

The first need should be put into some context. Intermodal Houston maritime rail traffic is not actually as big right now as it would seem. Table 4 illustrates how from and to the west the intermodal rail traffic is not as port focused as it may seem in press reports. True, it is a growing trade segment. But, it is a far cry from being an Alameda like growth segment. Rosenberg Junction is located in the southwestern approach to the

Houston region. Houston specific port related intermodal traffic is a fairly small percentage of the rail volume.

Table 4
Type of BNSF & Union Pacific Trains Passing Rosenberg Junction

Train Type	BNSF	Union Pacific	KCS
Mixed Freight	10	11	1
Grain	6		
Coal or Aggregate	10	9	
Intermodal	2	7	
Port Intermodal	2		

Source: January 2004 survey by Stephen Foyt, Railway search tree.

Houston Area Strategic Railway Network Redevelopment Plans

To help improve railroad train movements while eliminating highway-railway crossing congestion, Houston planners seem to favor a multiple phase large scale project approach that can in part be described as a major "freight route consolidation".

The large scale Houston plans for urban rail redevelopment include five features.

1. A Port of Houston and Harris County Conceptual Rail Corridor Consolidation Plan would build a northern freight rail by-pass along an old rail route together with a major reroute of north/south freight trains onto a Union Pacific corridor.

2. Another project phase features construction of a tall bridge[11] that would take freight trains to the south of Houston east/west across the Houston Ship Channel.

3. A major project called the Sugar Land and Rosenberg Rail Relocation Project is called for as part of the grand regional scope of needs.

4. A long-term Trans-Texas Corridor Project (TTC-69) would, if built, provide a full by-pass of the central Houston rail network if fully implemented.

5. A fifth approach envisions eventually moving the locations of major classification yards within the Houston railway network.

[11] The "PORTfolio", Harris County Freight Railroad Corridors and Urban Mobility Program, The Port of Houston and The City of Houston, 2005. Alternatively, construction of an east/west rail freight tunnel under the Houston Ship Channel

Each of the above plans appears to have different local and sometimes federal champions. While project costs have not yet been fully estimated, various sources suggest a cost range for full implementation could be in the $3 to $5 billion range. A large, but yet unknown, percentage of this cost will have to come from public sources, since many of the direct project benefits will not go to the railways or the railway customers.

To further complicate matters, the major initiative to relocate the big classifications yards has to be integrated with the national role that these local yards play. That could be difficult for local planners since these yards[12] serve traffic requirements that stretch from Los Angeles to New Orleans and from the Mexican border to Chicago. Do Houston urban planners have the analytical tools for such analysis?

HOUSTON MAY HAVE TO RE-EVALUATE ITS PLANS USING OTHER BENCHMARKS

These Houston project plans are expensive. They may not obtain all of the funding required. Recognizing the competition for federal funding, Houston planners need to measure the following considerations against competition for Washington funding.

> The Houston area capital needs for rail (at four to five billion dollars) would almost equal that of the entire Mid Atlantic States region.
>
> To date, planners have not yet agreed upon a project prioritization.
>
> Costs and Benefits calculation, spread out by what each key party would obtain, are not yet specified.
>
> No incremental lower cost approach towards project implementation has been evaluated yet.

[12] Settegast Yard (a former MP site) and Englewood Yard (a former SP yard)

Planners continue for the moment to look towards Washington for much if not most of the project funding.

Payment by users and a definition of who users might be are two resource subjects that have not yet been articulated by the local Houston planners.

What backup strategy should Houston planners consider?

THE CHICAGO CREATE PROJECT CONCEPT AND ITS BENCHMARK CONSIDERATIONS FOR PLANNERS

The City of Chicago DOT and the State of Illinois DOT have been working with the major railroads around Chicago for a number of years to help build additional capacity into the region's rail network of tracks. The parties reached agreement in 2003 to finance five rail corridor projects[13]. There was a great deal of public relations image that surrounded this "agreement" when it was first announced. Here are some the facts about the project and what has happened since it was announced.

A fully funded Chicago CREATE Project[14] would have built 25 new grade separations and six (6) rail-over rail "flyovers" to separate freight and passenger trains, and a list of forty or more railroad operational improvements.[15] The local railroad managers were able to convince their respective corporate offices that there were sufficient private benefits associated with this grand design plan to allow for the railroads to contribute a

[13] June 16, 2003, FRA Press release, http://www.fra.dot.gov/us/content/1486.
[14] For a complete project description, go to www.createprogram.org.
[15] CTC signal work, siding tracks, and opposing movement project work.

collective match of up to $210 million. The total project cost was estimated to be $1.5 billion.[16]

Local planners predicted that construction would create more than 1,000 jobs. The total annual public benefits were calculated to be almost $500 million[17].

BENCHMARK LESSONS FROM CHICAGO

There were large predicted benefits perhaps spread out over too many beneficiaries with too many other resource conflicts as to priority needs.

The original inside man in DC was Congressman W. Lipinski and that single source reliance alone may have cost the project sponsors access to about $600 to $800 million in the current Washington funding[18].

CATS, the local MPO agency, does have one valuable resource – That MPO has DATA from which new ideas can come for other practical approaches to increasing urban rail capability. CATS also has a very dedicated Intermodal Advisory Task Force (IATF)[19] working to generate community participation on such freight work and research.

A paltry $100 million SAFETEA-LU award in 2005 from the Congress and the Administration in DC buys only about one to two flyovers and maybe two to four grade separations during the entire four year period of this legislation. Who gets this small amount is anybody's guess. In the meantime, the total project is in a state of flux.

[16] However, a longer term scope of up to $4 Billion in capital work has been considered by other planners involved in the data analysis of regional rail needs.
[17] That kind of public benefit almost suggests that the project could be totally publicly funded. Just three years would recapture all of the project investment.
[18] Confidential source.
[19] www.catsiatf.com.

Making incremental choices are an obvious next choice, but who makes them and how is not clear. As an example of incremental choices, the Englewood Flyover may be a very high benefits segment[20] of the project, but a decision to move forward with this one segment as of December 2005 has not been made. As an alternative, the project managers could agree to one or more of the other "infrastructure project wish list".

Here is one short list of possible incremental projects that when used with matching local funds would increase the benefits from the current $100 million of Washington funds.

- The Panhandle Flyover near Western Ave.
- A Strategic By-Pass Track at Clearing Yard
- The Englewood Flyover
- IHB track capacity to add more trains a day and increase velocity through bottlenecks like McCook and Blue Island

To make the best decisions given the funding limits from Washington, a process for cost/benefit calculations of conflicting project choices has to be put in place.

Having a goal of raising average train speeds by x%[21] is not a clear measure of what choices should be made. American railroaders like to know exactly what such a percentage gain works out to in dollars and cents on the bottom line.

[20] This one project would contribute to the eventual relocation of Metra's Southwest Suburban Orland Park service and in part 1) allow NS freight service to avoid some conflicting movements while also 2) facilitating CN freight movements into the project's Central Corridor.

[21] The reader should set his or her own percentage goal. Then, figure out what that percentage means to the railroad company.

However, a clear Chicago region champion, that everyone will follow, may no longer be in place.

But the bottom line is "what do they do when Washington sends only token funding"?

- ✓ Do they just wait another four years for the next key legislation?
- ✓ No. They need to make some incremental first investment or lose the funding[22].
- ✓ But, they have to make very sound choices probably using some focused cost benefit analysis method against the pending project list.
- ✓ One way to do this is to make choices based on the percentage of total delay that could be eliminated as certain projects are implemented[23].

In the meantime, railroad managers continue to make Chicago area investments in their plant but in doing so they focus on incremental calculations that improve profits for their operation rather than the group as a whole.

THE BALTIMORE – NEWARK –I-95 CORRIDOR (MID ATLANTIC PROJECT) AND ITS BENCHMARK CONSIDERATIONS FOR PLANNERS

For at least the past two decades the Interstate 95 highway corridor between Richmond Virginia and the NYC metro area has been heavily used by trucks hauling goods over very long distances. At times, trucks now constitute twenty percent to thirty percent of interstate vehicle volume[24] along the critical east coast interstate highways. It would

[22] There is a list of rail industry projects in the $300 million plus range that is being discussed in some circles but was not publicly available to this author in mid December 2005.
[23] ZETA-TECH study in Kansas City terminal in 1995 that pinpointed the Sheffield bottleneck.
[24] The Mid Atlantic Rail Operations Study, Summary Report April 2002, pg 8.

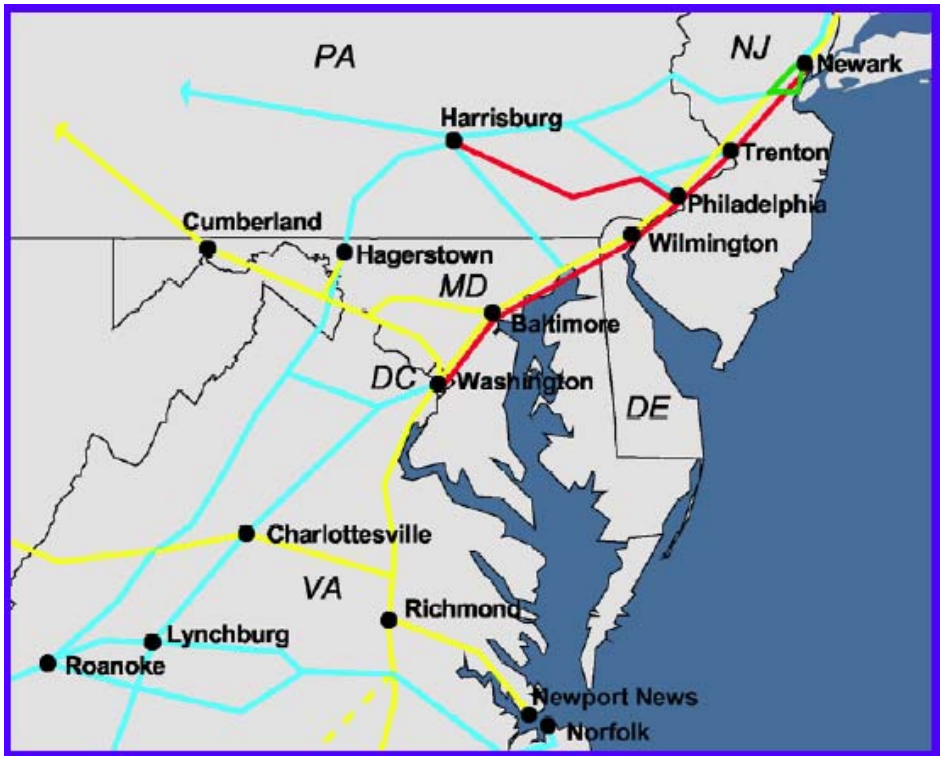
seem to be a natural market for railroad intermodal freight to capture market share as congestion on the roads grows. But modal diversion to rail is not that simple.

Here are some of the issues surrounding the desire of planners to shift freight away from highway trucking to more intermodal rail use.

> Doublestack intermodal along the old CONRAIL and NEC service line is the way to serve the corridor by rail efficiently by rail. But doublestack operation require high overhead clearances.
>
> Doublestacks would require an estimated $1 to $2 billion capital investment in tunnel and other overhead clearance work between Washington and Philadelphia.
>
> No public agency currently has funding or the muscle to get that kind of capital for clearance project construction.
>
> The private gain after financing such a large expenditure would not be profitable to a railway company like CSX.

Recognizing this and other rail conflict and congestion needs, the two large private railroads (CSX and NS) together with a few of the public transit agencies (like SEPTA and AMTRAK got together to figure out where the critical choke points were. They were assisted in part by the I-95 Corridor Coalition.[25]

[25] The Mid Atlantic Rail Operations Study.



Map Identifies General Mid Atlantic States Rail Corridors

The study participants calculated the estimated project implementation costs and

- Five year needs for funding are about $2.4 Billion (2002 figure)
- Long range total rail needs are about $6.2 Billion

Benchmark Issues for these Mid Atlantic States

No broad national US funding mechanism exists to kick start this or the competing projects like it.

The 75 projects already identified will only continue to grow in capital required as inflation will continue to add to project costs

The participants bought into the idea that the 1991 ISTEA legislation and the 1998 TEA-21 federal legislation would generate the future funding.

They did not count on the continuing delays to the follow-on 2005 legislation and the in general under funding of the competing 2005 projects.

Further complicating the investment strategy is the continuing saga surrounding Amtrak's life expectancy and the future of the North East Corridor. Many of the contemplated projects involve segments of this corridor.

No significant state project resources exist to add as local matching funds. A state the size of Pennsylvania for example may only have ten million dollars or so in funds each year to add to the pot – from which they would have to divert funding from otherwise rural projects across the Commonwealth.

This Mid Atlantic corridor will require rail policy integration and rail policy funding coordination among five states.

Rather than try to focus for example on two states that can agree early, the sponsors seem to want to add more states north of New Jersey as if additional players will bring voting mass to shake funds loose. That strategy may backfire.

A bi-state authority for rail project like the Port Authority of NY/NJ might be a better solution to reaching complicated project agreement and achieving a workable funding mechanism.

The project planners could use a single small and "benefit rich" kick-off project upon which to build success for the support of the total project scope. But no one has brought forward such an approach as of the end of 2005.

Then there are some political issues to consider. For example, with all of this rail redevelopment research in place since 2002, why did the Mid Atlantic Project not even get a place-holding level of funding in the just passed SAFETEA-LU 2005 bill?

If the recent Howard Street Tunnel fire and city evacuation problem did not get attention for serious rail relocation funding, then what would it take to get such funding from Washington?

Given the hazardous materials routing controversy surrounding Washington's attempts to eliminate hazmat rail movements through the District, it is not clear how or where these Mid Atlantic projects fit in a modern approach to railroad relocation of the aged rail infrastructure along the Northeast Corridor and I-95.

Lastly, but importantly, no one has emerged as the project champion. Even better would be perhaps a triumvirate leadership united for project implementation. That will be difficult since such a statesman must emerge from among competitors.

THE KANSAS CITY SHEFFIELD PROJECT COULD BE AN IMPORTANT BENCHMARK FOR URBAN PLANNERS

In the 1994, the railroads serving the Kansas City rail terminal district realized that they had serious congestion problems as north/south and east/west freight flows crossed one another at many places in the district. ZETA-TECH Associates of Cherry Hill, New

Jersey was hired to evaluate the collective private transport traffic data files of the railroads that together ran their trains on the Kansas City Terminal Railroad tracks. In less than three months of analysis, ZETA-TECH Research revealed that about eighty percent of the region's terminal railway traffic congestion involved just fourteen of the many possible rail routes through the terminal . Furthermore, ZETA-TECH calculated that about two thirds of the total congestion delay occured as trains passed through area called Big Blue Junction and Sheffield Junction.

The method ZETA-TECH employed for the Kansas Cit study calculated the economic benefits of eliminating the delay.[26] ZETA-TECH analyzed records of 60,000 individual car movements representing a six-month operational period. ZETA-TECH used expert operational equations to predict both the mean transit time and the expected variance of transit time over each terminal route examined.

ZETA-TECH's study concluded that four routes had serious congestion problems that could be expected to worsen in the future. An illustration of the results is shown in Table five. When reading the table, note that the larger the standard deviation the less reliable the railroad service along that route. Using this analysis, the metrics allowed the community leaders and the railway managers to realize where project benefits could be found and then applied to pay for the possible range of improvement projects. The metrics also simplified the process of deciding which projects to implement.

[26] Randolph Resor was ZETA-TECH's project leader in 1995. resor@zetatech.com

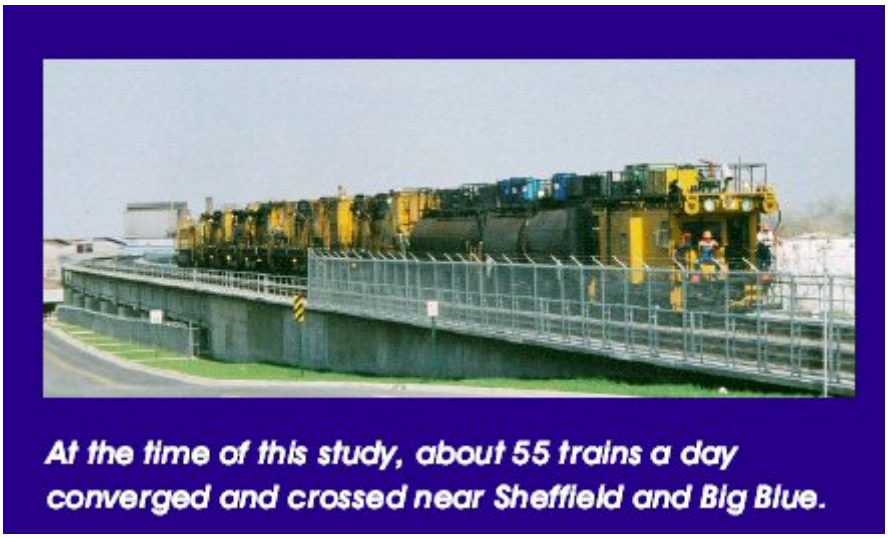
Table 5
Variance in Train Delay Times – 1995 Kansas City Study by ZETA-TECH
(Time in Minutes)

		Meant Transit Time	Std. Deviation Tome
Route A	Month 1	12.2	22.3
Route A	Month X	13.9	38.7
Route B	Month 1	9.8	11.0
Route B	Month Y	12.5	56.9

Once the project alternatives were selected, then the project had to be both designed and then built to meet the scale of payback benefits. TranSystems Corporation of Kansas City was hired as the project design contractor and overall construction manager.[27] The company implemented the first flyover as a bridge project using cantilevered piers put into place over existing tracks. Construction had to be managed to avoid service disruption in a space where approximately 250 trains pass each day.

Before the Sheffield flyover was completed, the typical speed of trains passing through the area was in the 15 to 30 mph range. After completion of the project, train speeds allowed are in the 55 mph range. This is important because finding ways to increase train velocity is one of the major ways to help improve the efficiency of mature urban railway properties.[28]

[27] http://www.transystems.com For more information about this company, go to this site.
[28] William C. Vantuono, "Capacity is where you find it: how BNSF balances infrastructure and operations", Railway Age, Feb. 2005.



At the time of this study, about 55 trains a day converged and crossed near Sheffield and Big Blue.

To finance the project, a special bonding authority called the Westside Intermodal Transportation Corporation was created. This entity issued 20-year industrial revenue bonds to cover about half of the project's total cost. The $74 million Sheffield Flyover is located on rail property controlled by the KC Terminal Railway, a terminal operating railway owned jointly by the various local KC area railroads. In effect, the bonds are being paid off using a variable use fee.

Collateral for the bonds came from the pre-negotiated user contracts and the temporary deed transfer of certain used railway assets.

The first project was so successful in reducing the ZETA-TECH calculated train delays costs that a second 'flyover' (called the Argentine Connection) was later designed and built. Construction on this second flyover began in 2002 and operations over the new facility started in 2004 in an area near the Kansas and Missouri border known as Santa Fe

Junction.[29] The $60 million Argentine Connection is about two miles long with 1.2 miles located in the State of Kansas and 0.8 miles in Missouri.

While these two urban railway redevelopment projects do carry freight that has either a local Kansas City regional origin or destination, the overwhelming amount of the rail freight is simply bridging the region.[30] As this traffic moves through the urban region it results in local jobs and other economic activity that benefits the community. One estimate by BNSF officials is that their railroad company alone handles more than 1.6 million truck trailers and containers a year which otherwise might pass through the region on the interstate highway routes.[31]

One of the main benefits for rail corporations implemented in the two Kansas City

Off Book Implementation

- Means the normal fixed cost of a bridge project
  - Becomes a variable charge on the income statement of the railroad users
  - Instead of another asset that needs to satisfy cost of capital returns on investment

"Good News for Freight Railroads"

[29] An estimated 55 east-west trains and 25 north-south trains cross that flyover project each day.
[30] The two flyovers in Kansas City represent just a small fraction , for example, of the 2,217-mile Chicago-Los Angeles main line of the BNSF. Yet each train on the main line route must pass over the two tracks now improved by the flyovers.
[31] Brian Cookson, Kansas City Business Journal, Nov. 2, 2001.

projects involves the benefits of "off book" financing. Using this approach, normal fixed costs of the rail project are turned into variable costs.

Benchmark Lessons from Kansas City for other urban rail planners

Five benchmark lessons stand out from the Kansas City rail urban redevelopment program. They are:

- ✓ Develop the project scope from a specific cost-benefit examination of existing congestion related train delay costs.
- ✓ Look to Washington only for "a broader interpretation" for the use of some existing federal program funding to help enable the project to move forward.
- ✓ Look to the state and the local railroads for creative regional funding mechanisms.
- ✓ Design the project facility to enable recovery of bonded funds from a variable based user fee that can assist the railways with their need to earn the cost of project capital.
- ✓ Use innovative techniques such as establishing loan collateral for the bonds out of both the pre-negotiated user contract revenue streams together with the temporary deed transfer of the surrounding "project use" railway assets.

Examples of Two Other Projects

Other projects contending for funding either recently or in the future, but not discussed in detail within this paper, include:

Reno NV

Over a quarter of a billion dollars[32] to grade separate 11 highway/rail crossings.

- ✓ Opened to rail traffic on Sunday Oct 16th, 2005
- ✓ A trench with a center depth of about 33-feet extending about 2.2 miles in length

[32] $282 million project. ReTRAC managed project said to have created 5,000 local jobs with a $360 million impact on the local economy. Fifteen to 34 trains a day may use the rail line.

- ✓ A 2002 set of financing agreements involved a $50.5 million TIFIA direct loan and senior lien bonds of about $114 million.
- ✓ Loan security included a pledge of county sales and hotel room taxes.
- ✓ Two additional loans will repay $17 million from tax revenues from a special assessment district and $5 million from lease income.
- ✓ The project allows UP to increase its train length through Reno to 8,000 feet[33].
- ✓ The railroad contributed some of the right-of-way to the project.

Brownsville TX

A three decade long project;
Classic rail and highway grade separation project in an urban setting;
Additional scope to include a new rail bridge to the Mexican border crossing.

The Hard Facts Surrounding Resource Availability

The reality is that there is no US national policy articulated regarding the need for or the means to accomplish these urban rail freight goals. There is some official support from federal agencies, but very little in available funding[34].

Nevertheless, planners in different regions and urban areas always assume that Washington will help and most of the consultants do not dissuade them of those notions.

Money from Washington usually comes from special deals involving added legislative change to some other purpose bill or from the so called waves of ICE-TEA bills that are generally delayed by one or more years.

---

[33] http://news.rgj.com/apps/pbcs.dll/article?AID=/20051017/NEWS10/510170327/1016/NEWS

[34] The lack of federal railway programs to in part assist with local urban railroad redevelopment is not "new" news but is rather "old news". Journalist Don Phillips, late of the Washington Post, and now writing for the International Herald Tribune pointed out in 2004 that "… the federal government is missing-in-action in the war for capacity ..."

The latest bill in 2005, called SAFETY-LU, is characterized by the facts that:

- ✓ Passage involved multiple years of delay – the bill signed in 2005 was late.
- ✓ The current bill was woefully under the expected authorization levels when it finally did pass.
- ✓ The bills passage is not the same as receiving the funds since final funding authorization requires separate legislation.
- ✓ It is likely that four to six years of further delay will occur until the next major upgrade is passed by a future Congress and agreed t by a future administration.

Given these short falls in national resources, and the four decades of industrial location decision-making that now isolates suburban railroad freight customers from the rail network, how should regional planners respond to the challenge of redeveloping aged urban rail infrastructure to make it perform better?

Based on the patterns of successes and shortcomings outlined in this brief paper, here are this author's suggestions as planning benchmarks and best practices.

Best Practices Lessons for Rail, Intermodal, State DOT, and Urban Planners

Using the past four decades as a pragmatic guide, and the existing realities of federal government resources and policies, these are the guidelines that I offer to my peers in the rail and urban planning profession. More accurately, these observations represent a distillation of ideas shared by a broad base of professional associates with whom I have had the pleasure of working. However, to be fair, they are my interpretation of that sharing experience and each of them cannot be held accountable for my prioritization and wording.

Best practices would mean:

- ✓ Looking locally for resources -- specifically financial;

- ✓ Looking for incremental approaches instead of the "grand design" avenues favored by so many;

- ✓ Designing project scale with an eye towards capturing tangible benefits that can be used to pay for the projects;

- ✓ Strategic scope is always important for a project image but an incremental approach can be more critical when trying to achieve both quick implementation and sound budgeting;

- ✓ Planners need to prioritize projects with an eye towards both the benefits and the costs;

- ✓ Prioritization means looking at delay costs on a regional basis and then measuring the percentage of delays that can be eliminated with the sequential implementation of alternative solutions at the best value per unit of cost. The potential benefits from projects like the Kansas City flyovers became clear because the railway companies were willing to share confidential operational data so that an independent consultant could find and measure the collective benefits from cooperating among the multiple companies (in that case the entire terminal train delay benchmark);

- ✓ In the near term of the next five years, do not rely on Washington for either leadership or resources;

- ✓ Find ways to assist the creative private forces that in fact have given America the most efficient rail freight system in the world:

    - o Urban Planners need not lead the process of change;
    - o But they do need to nourish the best of the emerging market changes;
    - o Help implement a broad urban landscape change for the next wave of freight rail improvements by adapting critical changes to policy and regulatory practices.

- ✓ Urban planners need to become familiar with the economic trade-offs that can increase benefits by adopting best practices that accommodate:

    - o Rail heavy axle loads in the 33 to 35 metric ton range;
    - o Rail equipment with net to tare ratio of 5 or greater;
    - o CTC and PTC signalization economics to increase daily train capacity at costs less expensive than adding parallel tracks;
    - o Lowering intermodal terminal costs to increase the competitive window of short haul intermodal and divert more trucks off of corridors like I-95 and Houston to Dallas;

- ✓ Planners need to consider the key operating metrics that can affect urban rail capacity considerations. These include the following checklist items:
- ✓
    - The number and length of trains;
    - The peak train patterns that can occur;
    - The typical horsepower available to the passing trains;
    - The grades and curvatures of the track segments;
    - The variance in train speeds by type of train seeking paths and track time;
    - Dispatching priorities that will be given to various train types;
    - The track speeds allowed according to the track maintenance specifications and FRA rules;
    - The types of signal systems being used or that could be deployed as new systems;
    - The local service pattern of trains serving rail siding customers;
    - The approach operating characteristics of freight trains either entering large terminals or port areas and leaving same;
    - The single track, double track and triple-track available;
    - Length and spacing of sidings.

- ✓ It is also important that local planners look for ways to foster innovation rather than just "concrete pouring". Planners need to be open to freight operation managers that have experience and ideas for improvements like consolidation terminals and information technology enhancements. Information sharing and technology, after all, has the potential to "double existing road and rail capacity" without pouring more concrete or adding rail tracks.

    - Just as one example, "HYUNDAI's Tacoma maritime terminal could double terminal capacity without building anything".[35]

IN CLOSING

Fifty years after the containerization business model first became operational, urban planners need to realize that hardly any government investment or planning lead that revolution.

THE INITIAL RISKS FOR THE BENFITS OF CONTAINERIZATION were taken almost exclusively by entrepreneurs like Malcolm McLean. This means that sometimes

[35] John Vickerman, on "USDOD Agile Port Technology IT Demo Project, TranSytems, 2005

the best way to create better transport is to stand back and let the market process evolve under business leadership.

At some point those business leaders will need government help in changing the operating rules and in the execution of larger scale urban projects. That is when more classical urban planners can help. Planners, operating under data review confidentiality, can use data analysis to examine the commercial patterns that privately held databases never disclose.

(End)

ENDNOTES

[2] Beshers, Blaze and Resor, Final Report: Scheduled Railroading and The Viability of Carload Service, Prepared for the Office of Policy at the Federal Railroad Administration, March 16, 2004

[6] Journal of Commerce, May 2005. Also see multiple US DOT and other freight planner references for more on possible rail growth.

[7] Resor, Patel, Blaze, Track Capacity Economics, ZETA-TECH Associates, 2004.

[9] Pacer Corporation, Pacer StackFacts, Dec 12, 2005.

[10] J. Parker Lamb, Trains Magazine, Oct 1999.

[11] The Port of Houston and The City of Houston, The PORTfolio: Harris County Freight Railroad Corridors and Urban Mobility Program, Feb. 2005.

[13] FRA Press release, from December 2005 Web Site, http://www.fra.dot.gov/us/content/1486., Original dated June 6, 2003.

[14] Chicago CREATE Project Website, December 2005, URL www.createprogram.org.

[19] From web site access December 2005, URL www.catsiatf.com.

[23] Randolph Resor, ZETA-TECH Associates Inc., 1995.

[24] Cambridge Systematics, Inc. and Parsons Brinckerhoff Quade and Douglas, Inc. The Mid Atlantic Rail Operations Study: Summary Report April 2002.

[27] http://www.transystems.com.

[28] William C. Vantuono, "Capacity is where you find it: how BNSF balances infrastructure and operations", Railway Age, Feb. 2005.

[31] Brian Cookson, Kansas City Business Journal, Nov. 2, 2001.

[33] Jaclyn O'Malley, Reno Gazette Journal, Oct 17, 2005

Don Phillips, a Trains,Magazine citation made my Paul E. Nowicki, BNSF Railroad Company, "Railroads in 2020: Can Investment Keep Up", TRB Meetings, Washington DC January 2004.

[35] John Vickerman, "USDOD Agile Port Technology IT Demo Project, TranSytems Corp., 2005, (Requested Presentation).

Reference Materials not specifically cited but employed as background

Blaze and Zarambski, "Lessons from the North American Rail/Intermodal Experience: Integrating Technical Engineering with Strategic Business Planning", IRCA Rail International - Schienen der Welt, Paris, May 2004

Blaze and Resor, "Short Haul Rail Intermodal: Can it Compete with Truck", Transportation Research Record, 2005

Randy resor, Pradeep Patel, Mike Smith, and Jim Blaze, “Quantification of the Business Benefits of Positive Train Control”, Prepared for the Federal Railroad Administration, March 15, 2004.

Blaze and Resor, “Railroad Industry Structure, Competition, and Investment”, Toulouse, France, Nov. 2003.

Blaze and Zarembski, "The Economics of Heavy Axle Loads: Costs and Benefits", Heavy Haul Conference, Paris, March 2003.
Blaze and Resor, “Devising an Effective Public/Private Partnership Strategy”, Railway Age, Dec. 2002

Blaze, “Evolving A New Model for Passenger Rail Service in the 21st Century: Public Funding and Private Access”, Transportation Law Institute Meeting, Crystal City Marriott, Nov 3, 2002

Blaze and Resor, “Railway Business Models Continue to Evolve”, The International Railway Journal and Rapid Transit Review, Sept 2002.

Blaze, Y”ou Can Charge Strategically for the Use of Your Railway”, European Infrastructure Managers Initial Meeting, Lisbon Portugal, June 2002.

Blaze, “Using TrackShare to allocate cost between rail freight and rail passenger trains”, Seminar on infrastructure charging and EU railway policy, UIC-CER-UN/TER, Paris, 25-28 September 2001.

This author wishes to thank a few others for sharing some of their private ideas. The presented paper, however, does not necessarily reflect their specific views and was not reviewed by them.

Rob Harrison, Director, University of Texas Center for Transportation Research, Austin TX.

Lawrence Kaufman, Transportation Journalist and Historian, Denver Colorado,

Ted Krohn, International Railway Consultant and former Washington Federal Railroad Administration Manager.

Gerald Rawling, Freight Manager, Chicago Area Transportation Study.

Key Concepts, Terms, and Phrases

- Railroad Redevelopment
- Railroad Modernization
- Urban Rail Renewal
- Railroad Relocation
- Grade Crossing Separation
- Urban Goods Movement by rail
- Intermodal Planning
- Railroad Benchmarks
- Best railroad investment practices