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Developments in Intermodal Equipment[1]

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This panel topic is developments in intermodal equipment. My name is Dean Wise. I am a Vice President with Mercer Management Consulting based in Boston.

Thinking back on this subject, one of the first conferences I went to after I joined Mercer (formerly Temple, Barker & Sloan) was a conference where the subject was also intermodal equipment. This was in 1982 or 1983. Back then, a lead discussion was on whether we really needed to go from a 40-foot intermodal trailer to a 45-foot trailer.

At the time, the motor carrier industry was starting to standardize it at 48, so some people were saying, the competitors are already out eight feet and we are thinking, do we need to go another five. The answer was, maybe the shippers don't need it, but you sure better provide that extra five feet for flexibility and for those that do need it, and because the competitors are doing it.

Ever since that time, I've realized that intermodal equipment is never standing still. One thing you may notice from the program is that we don't have anyone here talking about double-stack. Five years ago this entire session would have been about double-stack. But, it has moved so fast in the industry that we want to go beyond what is now basically assumed to be one of the standards — double-stack — and talk about some of the new developments.

Our speakers today are going to cover the view from the leasing industry. Charlie Wilmot is going to go first. Then we are going to move to one of the innovators in equipment, Larry Gross, who is President of RoadRailer. Then we are going to go to the crazy idea edge by hearing from Dick Sherid, who is with CSX. He is going to talk about the Iron Highway, which is an idea that has been around but that I think most people still aren't quite tuned in to.

Our first speaker, Charlie Wilmot, is Vice President at XTRA Corporation. XTRA is one of the two leading leasing companies that provide intermodal trailers and containers. About a year ago Charlie was with Strict Corp., where he was President of Strict Industries. At that time, XTRA and Strict merged and XTRA's stock was at about 22. Charlie tells me that today it is at about 44, so he has already had an impact in his first year. That kind of raises the sights for next year a little bit. Charlie is going to talk about the overall fabric of trailer and container supply for intermodal, which is somewhat unique, but also again, changing rapidly and never standing still.

Our next speaker is Larry Gross. Larry is President of RoadRailer Corp. Larry

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has been in the RoadRailer business for ten years, at least. It is one of the most innovative pieces of technology to come along in transportation, and he is going to tell us where it has been and where it is going.

Our third speaker was to be Jim Taylor, General Manager of Iron Highway. Jim was not able to make it, but we are fortunate to have someone who has been involved with this whole technology for an even longer period of time — since it was a gleam within the inventor's eye about six years ago, to today where it has been tested at the test track in Colorado. Dick Sherid is going to tell us about this technology called the Iron Highway. You will find this quite intriguing and it is a very interesting application.

Charlie Wilmot
Vice President
XTRA Corporation

Before I begin on the subject of intermodal equipment technology, I'll give those of you who may not be familiar with XTRA a little bit of a background. XTRA is a New York Stock Exchange company. We are one of 20 companies that make up the Dow Jones transportation index. Today we are exclusively in the truck trailer, container, and chassis leasing business throughout North America. We have about 130,000 trailers and pieces of equipment that represent a value of approximately $1.0 billion.

We market these products through two principal operating subsidiaries. The first is XTRA Lease, which leases and rents highway trailers to highway truckers, private carriers, and the like, through approximately 86 locations in the United States, Canada, and Mexico. The second subsidiary is XTRA Intermodal, which rents and leases piggyback trailers, otherwise known as intermodal trailers, domestic containers, chassis, and the like, to railroads, steamship operators, and so on.

On the intermodal side of our business, our piggyback fleet represents about 35% of the total piggyback trailers in railroad intermodal, and our domestic containers represent about 25% of all the domestic containers currently in service.

Suffice it to say that we are heavily invested in the intermodal industry — an industry which is, by all measures, growing at the rate of about 7% a year in intermodal loadings, and an industry that we feel still has tremendous room for increased growth and that we find very exciting.

I'm going to begin my talk with a review of the growth and changes that have taken place, and the size and make-up of the so-called intermodal box fleet over the last five or six years. Then I'll focus more closely on the domestic container and piggyback sectors of that marketplace.

Next, I'll review a couple of highlights from a survey of truck trailer manufacturers that we recently finished. That survey produced some interesting information that I think will provide a good comparison to the happenings in intermodal.

Finally, we will wrap up with my gazing into my crystal ball and trying to find some kind of profound observations about where we are headed in the future.

Basically what this first slide shows is the total size and consist of the box fleet from 1988 through 1990 to 1993. When I say box fleet, I mean total number of containers and trailers in the so-called

intermodal pool. We've been conducting an inventory of this equipment since 1988 on an annual basis and more recently twice a year in order to capture the fast-changing patterns taking place in the intermodal box fleet.

First of all, the total size of the fleet in 1988 was 125,000 vehicles, and was again 125,000 in 1990. Only when we get to 1993 do we see an increase in the size of the fleet to 129,500 vehicles.

In point of fact, our surveys show that the size of the fleet at 125,000 vehicles continued through the fall of 1992. In other words, there was effectively no change in the overall size of the fleet for a five-year period of time, until the first six months of 1993, according to our surveys, which we regard as fairly accurate.

What has changed rather dramatically within this same time frame is the consist of the boxes in service within the fleet. Although there were different size trailers, effectively speaking, 95% of the universe in 1988 was trailers. When you get to 1990, there are changes in the numbers and percentages of the different size trailers. But the container fleet had grown to about 17% of the fleet at that time. By 1993, the size of the fleet has expanded, but the percentage of domestic containers within the fleet has grown to about 27%.

In 1988, containers and trailers, both 48-foot in length, which happens to be the way we counted them that year, represented about 12,000 vehicles. About 8,000 of them in that year were containers and about 4,000 were 48-foot trailers. As you can see, the 48-foot trailer population increased to about 7% in 1990 and since then has increased to about 13% in our total current inventory.

Here I have isolated the domestic containers from the other products, and you can see that the population of domestic containers has steadily increased since 1988 at a pace of approximately 20% per annum. And, we have projected a significant increase in the size of this fleet over the next two years. This increase includes both first generation domestic containers, which are typically 107 inches in height on the inside and 48-feet long, as well as so-called second generation containers, the likes of which J.B. Hunt is currently building and adding to his fleet.

We at XTRA have some specific concerns about the technology that is being employed in the Hunt boxes, but generally speaking, we are very optimistic about the changes that have been made and the efforts that are being made to design a viable second generation box. We have based our prediction for the increase in the size of the fleet on those encouraging signs.

This increase, although it is obviously dramatic in terms of the population of the fleet, may be somewhat misleading because it is not necessarily increases to the dedicated intermodal box fleet. A lot of these boxes will be added by truckload carriers who will be using them predominantly on the highway.

We will see a lot less intermodal usage on rail than would a typical box in the fleet that was developing from 1988 to 1993. I've got a problem in doing my surveys in years going forward because I don't know exactly how to count Hunt's box versus a box which spends its entire life cycling through the intermodal system. So, it may be somewhat misleading, but it clearly is a strong sign for growth in the area of domestic containers.

Let's look now at the other even larger segment of the intermodal box fleet and that is the trailer side. In 1988, 1990, and 1993, the trailer fleet was definitely the dominant portion of the intermodal box fleet and continues to be so.

While the domestic container inventory has been growing at a rate of about 20% per year, there has been attrition in the trailer fleet as owners of trailers have retired older and less productive units. However, with the sudden and significant increase in demand for equipment that began last year, the trailer fleet seems to have bottomed out. In fact, we are projecting an increase in the trailer fleet of about 5,000 to 6,000 units over the next year. This prediction assumes that business levels will continue to make it difficult for trailer owners to capture units that might otherwise be scheduled for retirement.

Although the number of 48-foot piggyback trailers has increased significantly over the last five years, they are still only about 13% of the total box fleet. The additional units that we project being added to the fleet over the next year are going to be almost exclusively 45-foot 102 equipment as opposed to 48-foot equipment. The logical question here would be, why 45's instead of 48's or 53's. 48's are clearly the standard and 53's are increasingly becoming the standard through the rest of the North American transportation sector.

I believe the best answer for that is that the largest portion of the intermodal rail car fleet still cannot handle 48-foot trailers efficiently, and the motivation for railroads to make their operations more efficient outweighs their motivation to be 100% market competitive with trailer sizes. Given the trend toward domestic containers, I don't expect this philosophy to change much over the next couple of years, unless the industry is unsuccessful in bringing to the fold a truly competitive second generation container. In that case, it is possible, if not likely, that the 20 to 25 truckload carriers who are developing their intermodal programs today may opt to tender their own 48- and 53-foot highway trailers rather than take the plunge with domestic containers.

This slide shows results from our recent survey of truck trailer manufacturing trends. I wanted you to see this, lest there be any skeptics among you that believe that the rest of the trucking transportation business is not headed toward the 53-foot trailer. If you combine our survey results with the Truck Trailer Manufacturing Association's tallies going back to 1980, the 53-foot trailer is fast becoming the standard throughout North America.

This summer, when Ontario allowed 53's, it was one of the last major economic areas of North America other than Mexico to allow 53's. This slide hopefully will be your wake-up call in terms of the debate between 48- and 53-foot equipment. As you can see from the trend lines, 53's are very much here to stay.

Here then is my forecast for the future of intermodal equipment technology — the development of RoadRailer and Iron Highway notwithstanding. First, there still are and will continue to be vital markets for both trailers and containers in intermodal for the foreseeable future.

In both cases, however, they must be improved products over and above those that are available today. They must be competitive in weight and dimension to any alternative offered on the highway. They must offer good prospects for reasonable financial service life. They must contribute to improved intermodal

efficiency, not detract from it. They must minimize the unmanageable capital cost of just whimsically retooling the entire current intermodal system.

We at XTRA believe that both truck and rail programs are headed in that direction and it is really very exciting to be a part of it.

Larry Gross
President
RoadRailer Corp.

I'd like to tell you a little bit about RoadRailer. We are a division of Wabash National Corporation, which is the second largest trailer manufacturer in the country. We have been the second largest since about the middle of 1991. Wabash National will build about 20,000 trailers this year.

We are second only to Great Dane in production. We have a full product line of trailers, including 53-foot plate vans, 28-foot pups for the LTL business, flat trailers, intermodal equipment of all types — a full product line, including domestic containers that I will tell you about, in addition to the RoadRailer product line.

We are excited to be part of this fast growing organization. It is only eight years old. Wabash National has gone from zero to a very strong position in the trailer industry. Just to give you an idea, we are building in excess of 100 trailers a day at our single Lafayette, Indiana location where all our production occurs.

Primarily, I'm going to talk about what we are doing with RoadRailer, but also about the efforts we are making on the domestic container side. Perhaps I can give you some flavor of what we think some of the comparison points are as we look at those two technologies. First, a detour.

This chart shows some of the major events that have occurred since the dawn of the 90's. How many of these events would have been predicted if we had sat here even four or five years ago and tried to make predictions? I think the message of that is the quote, "The inevitable never happens. It is the unexpected always." So, as we look at some of the predictions we are making now, mine included, for what is going to be happening in our little segment or the intermodal segment, you need to treat them with a grain of salt. Change is inevitable but it is usually not what you think is going to happen.

Having done that, I will bravely sail forth into the unknown and make a few predictions, not so much toward the intermodal side as the over-the-road side. Charlie already alluded to the 53-foot, and we, from the manufacturing side, are certainly in accord with that — the 53-foot trailer is dominant, certainly for the full truckload segment, at this time.

The second item is what we call plate wall construction, which is a type of construction for the trailer where, instead of having a plywood interior liner then an aluminum post and then a thin exterior aluminum skin, this trailer has a much thicker piece of aluminum with just a very thin post outside joining panels of aluminum. That is called plate wall. That has significance in terms of the interior width of the trailer, because that whole wall assembly is a very skinny assembly and allows a maximum amount of width inside the trailer. It has implications in terms of durability and low maintenance costs, as well.

This type of construction is only now beginning to enter the intermodal arena,

both through the addition of some of the new generation containers that Charlie referred to, as well as through the movement of truckload motor carriers to 53-foot over-the-road trailers on flat cars. We are starting to see, for the first time, the intermodal user having plate wall technology available.

Another item that we see on the over-the-road side that has not really penetrated the traditional intermodal market is air-ride suspension. As air-ride prices and rates continue to decline, we expect to see continued penetration on the full truckload side for this type of technology, which reduces maintenance cost on the box in addition to providing a better quality ride for the cargo.

If we polish up the crystal ball a little bit and look down the road, I wouldn't say these are inevitable, but I would certainly say they are possible and that, as we plan our intermodal system, we need to acknowledge these possibilities and allow for them. One of the items that we think is most exciting is a new type of trailer that is based on a lower fifth wheel height on the tractor, a 40-inch fifth wheel height instead of 49-inch, which generates a trailer with a 120-inch inside height.

What is making this possible are advances in tire and brake technology that allow a smaller tire to be used under the tractor and drive axles and trailer, without compromising the weight-carrying capacity of the trailer. What we are talking about is going from a 110- to 112-inch inside height to 120-inch, perhaps an eight or nine percent increase in the cube of the trailer, and virtually free, because the trailer is no heavier or significantly more expensive than the traditional trailer.

There is a fleet of about 150 of these being operated by one of our good customers, Schneider National, which is sort of a pilot program for this type of equipment.

One of the challenges of the 120-inch inside height trailer is that you have to be able to bring the rear-end of the trailer up to the standard dock height, which is typically 48 inches. The rear end of the trailer is normally, in highway mode, sitting around 40 inches. This trailer has to be an air-ride trailer, and then the air-ride is utilized to raise the rear end of the trailer up to dock height. So, here is another item that is going to move us towards an air-ride trailer.

I expect that as intermodal continues to make inroads on certain lanes, you are going to see a counter-balancing strategies on the part of some of the truckload carriers that choose to remain over-the-road to go towards equipment such as this. This equipment cannot be duplicated by a domestic container without a great many problems because a 120-inch inside height domestic container cannot be stacked within the clearance envelope that is available on the railroads.

Another item which is outside the trailer industry's control but is more a subject of government regulation and issues surrounding NAFTA, is the increased payload on the trailer that might accompany a tri-axle suspension. That is certainly a possibility, although it is not very active at the moment. There is some discussion of creating a high-volume corridor linking Canada and Mexico via the NAFTA route.

The last item that we are starting to see, believe it or not, is yet another increase in the length of the trailer to 57-feet. In fact, in all the Sun Belt states, it is now possible to run a 57-foot trailer from California to Florida.

History says that these types of innovations are going to occur on a regular basis. I won't make any predictions as to when or in fact whether 57 is the right length. I think the only thing that we can safely say is that the evolution of trailer dimensions will probably not stop at 53.

Turning now to the RoadRailer, we have been working very hard to internationalize the RoadRailer technology. We are running in full commercial operation right now in Australia and New Zealand. We have test commercial operations underway in the U.K., France, and between Denmark and Italy, through Germany, over the Brenner Pass.

We have just signed a license to bring RoadRailer to India and we expect to conclude an agreement in Thailand shortly. The last two are very interesting to us because we feel there is a natural fit between the RoadRailer technology and the needs of developing countries that don't have an intermodal infrastructure. These are the first two expressions of that.

Certainly some of the big, big markets that represent a potential for RoadRailer are the former Soviet Union and China. Those are areas that we will be taking a look at in the months and years to come.

When we talk about where we are domestically with RoadRailer, we have to concentrate mainly on the activities of Triple Crown, which is Tom Finkbiner's former baby and now a jointly owned subsidiary — 50% by Conrail and 50% by Norfolk Southern. They have been very successful in making use of what the RoadRailer technology has to offer.

We have just finished delivering about 900 53-foot what we call Mark V trailers, this being the newer type of RoadRailer trailer that has a separate rail running gear that gets left behind when the trailer goes out on the highway. That is in addition to the 1,000 48-foot Mark IV's that Triple Crown was operating originally.

Charlie made reference to the difficulty that the railroad industry has in transitioning from one trailer size to another, be it 45- to 48- or 48- to 53-foot. The nice thing here is that Triple Crown was able to make that transition simply by acquiring equipment of the largest dimension that was legally allowed on the highway, and the newest 53-footers that we just delivered can be operated on the oldest rail equipment that they have. So everything is compatible and they don't have to struggle to match a trailer size to a rail car capacity.

The list that you see are the railroads that either operate RoadRailers, or in some cases, own RoadRailers. Some are just in the test mode. Norfolk Southern and Conrail actually own RoadRailer equipment for their Triple Crown service. Canadian Pacific operates for Triple Crown on a hook-and-haul basis between Detroit and Toronto.

When we were bought by Wabash National back in 1991, we set forth some development goals for the technology which we felt needed some improvement if it was to realize its full role in the intermodal marketplace.

The most important was to take the trailer, which at the time carried a pretty hefty weight and cost premium, and try to bring the trailer down to what we call a universal intermodal vehicle, one that is identical, or as close as possible, to the over-the-road standard trailer.

That has implications in terms of the dimensions of the trailer, the weight and

load capacity of the trailer, and the cost. At the same time, we needed to take the rail side of the RoadRailer equation and make it easier for the railroads to deal with. That required making it a simpler, more standard vehicle, improving the compatibility of RoadRailer with conventional train operations, running longer RoadRailer trains than the 75 units that had been the standard, and getting the maintenance down and the reliability up on the railroad.

This is an example of the latest RoadRailer trailer. It is what we call an Ultra-Light 53-foot plate RoadRailer trailer. This is one of the 900 that we have delivered to Triple Crown. In fact, this is a new trailer that has been assembled into a train in the back of our plant in Lafayette. You are looking at the RoadRailer terminal, which was created at a cost of about $3,000 by paving one of the tracks that happened to run in back of the plant. I am not saying you can always create a RoadRailer terminal for that amount, but it is an indication of one of the flexibilities of the RoadRailer technology.

This trailer is a plate trailer. You can see the white plates that we refer to, as well as the thin silver exterior posts that connect those two plates. Let me talk a little bit about the characteristics of that trailer. The dimensions of this trailer you can also treat as being identical to that of an over-the-road trailer. The weight distribution, the tare weight of that trailer, has been brought down to about 600 pounds more than the over-the-road equipment size trailer. It has an air-ride and does all of the things that a RoadRailer has to do in order to run on the railroad.

Simultaneously with this, we have been working on a second generation high cube container which is the type of development that Charlie referred to. I want to make some comparisons here because we feel that, having done a great deal of research on this topic, we have some idea of what is going to be possible on the container side, and what is going to be possible on the RoadRailer side. The left hand side of this chart shows the dimensions of what I will call the gold standard, which is the over-the-road 53-foot plate trailer. This is what Schneider National or any of the full truckload carriers are buying these days.

With Ontario falling to the 53-foot wave, we would expect to see just about 100% 53-foot acquisition by these people. The inside height on that trailer is 112 inches in the back; 110-1/2 at the nose; 101-1/4 inside width; a door opening height of 111-1/2 inches; a heavy-duty floor capable of withstanding a 17,000 pound forklift load; and a tare weight with lift pads, which is how, let's say, a Schneider National is ordering it, of about 14,600 pounds.

For the high cube container, the length we show as 50% 53-foot and 50% 48-foot. That is the current status, which is dictated by the capacity of the double-stack well of 48 feet. So, in order to run a 53-foot container on most of the equipment that is out there now, you've got to have a 48-footer underneath that 53-footer.

Railcar manufacturers are feverishly working on a 53-foot well car, which will allow two 53's to be stacked, but the first of those has not yet, as I understand it, entered testing. I would expect to see them coming into testing next year. There are weight and cost implications in trying to stretch that 48-foot vehicle to 53-foot.

Inside height — we talk about a nominal 110 trailer. We get close to that —

maybe 109-1/4 to 109-3/4, depending on what manufacturer or what design is being utilized. On the 53, in terms of clear inside height, because of the stacking frames and what not, you are probably looking at more like a 107 than a 109-3/4, although that is subject to change.

The inside width — again, on a 53 that does not have the interior stacking frames at the 40-foot points, you are going to get close to the inside width of the plate trailer's 101; for the lower container on a 48-foot with stacking frames at the 40-foot points, you are really looking at a clear inside width of 98-1/2.

Door opening — approximately 110 inches; floor loading is a big issue with these containers.

What you are having to do is fit this high cube container in an outside height envelope of 114-1/2 inches. Well, if you want 110 inches inside and 114-1/2 outside, that leaves you 4-1/2 inches for the floor system and the roof. To give you a comparison, the over-the-road trailer uses 7-1/2 inches of depth to do that. What you have is a very tough technical challenge of trying to squeeze that floor and roof system into 4-1/2 inches without compromising the weight, the durability, or the cost.

We feel some decisions have been made with regard to the capacity of the floor, which we would estimate at about 12,000 pounds. Now, whether or not that is enough to meet the marketplace and prove durable is an open question. Our experience would suggest no, that you need to have something more in the 17,000 pound category.

On the tare weight side, the over-the-road trailer is 14,600. Right now, the high cube container on chassis is somewhere in the 16,200 range. We don't think it is going to go much below that. In fact, I think there is some evidence that it is going to creep up from that as the trailers and containers are subject to real life conditions and we find out where we have to reinforce them.

The RoadRailer dimensions are identical to the over-the-road trailer with the exception of the tare weight, which is approximately 600 pounds heavier or about 1,000 pounds lighter than the container.

I mentioned earlier a mixed train operation. This picture is of some of the testing that we did with Southern Pacific and Schneider National. In the back is a little device that doesn't show up too clearly on this picture, which is what we call a coupler mate. It has a regular railroad coupler on the back. What that allows you to do is to couple the RoadRailers up to a conventional train and run them behind a conventional intermodal train.

We have to be careful how we do that because our RoadRailer trailers are not as strong as a rail car and they have a limited capability to withstand the fore and aft shocks that are generated by slack action in a conventional train. But, we have done the computer work and we know we can do this under a fairly wide variety of circumstances.

Here you see another example of a mixed train operation. This is some testing that we did with Amtrak looking at running RoadRailers behind their passenger trains to carry mail. That is a 105-mile-an-hour trailer that you are looking at, because that is how fast that train went during the test. We expect to see some additional developments in that area next year. Here is another photo of the mixed train testing on

Southern Pacific, which was done between Los Angeles and Portland. You can see the traditional piggyback cars in front of the RoadRailers at the rear.

Taking a look at where we are going to be putting our efforts in the future — one of the most exciting developments is a refrigerated RoadRailer. We are also looking at a container chassis version of the RoadRailer, which perhaps is the tool that ties together both the double-stack arena and the RoadRailer arena by being able to carry domestic containers as a RoadRailer on that chassis and then to flip them onto the double-stack car when necessary.

Here is a picture of the RoadRailer reefer, what we call a RefrigerRailer. This is a 48-foot nose-mount trailer with a tare weight of about 17,000 pounds, again 1,000-2,000 pounds less than a domestic refrigerated container on chassis and perhaps 1,000 or so more than an over-the-road reefer trailer. This unit is now in structural testing. We will have it in service, we hope, within the next month or two.

AutoRailer is a very interesting topic. There seems to be a growing realization on the part of both the users of railroad service in the movement of fully set-up automobiles as well as the railroads themselves that the current system needs some improvement.

This is one of our potential answers for that. It is under development. What we are looking at here is a RoadRailer of the 120-inch inside height variety that is designed to carry set-up automobiles in one direction and dry freight in the other. Here you see the unit in highway mode riding on a 40-inch fifth wheel tractor with that 49-inch deck height that we talked about before. For unloading, we simply slide the tandem all the way forward, raise the landing gear, and then we have a dealer delivery unloading system for set-up automobiles.

If we peel the skin off of this unit, this is what the inside will look like. This drawing shows six mid-sized automobiles, but it will handle six full-size automobiles without any tiedowns or jigsawing of the cars. For the backhaul, the racks are raised up to the ceiling and you have a trailer that has the same inside height as a conventional trailer today — about 110 inches in the nose and 112 at the rear.

What you see at the bottom is actually the air-ride suspension. Here the air-ride is extended to bring the trailer up to dock height. Here it is in the normal highway mode.

This is the unloading process. You see six full-size automobiles. One of the things that is happening in terms of automobile design, particularly with these cab forward type vehicles that you see here, is that they don't nest very well in a container. Their configuration is such that you can't gain much by trying to jigsaw them in. That is why we felt it necessary to go to the 120-inch inside height, so you could just drive them straight in without a problem.

Here it is in an end view. This is, of course, a very critical item, because we are talking about driving these cars in. That means you've got to get the driver out. By going to the plate trailer, we have the maximum inside width. This gives 18 inches with a smoother trailer wall, which we feel will work very well in that regard.

The last item I will show you is the same thing as before, except this trailer is 15 feet high, so it is not an over-the-road trailer. It is designed for movements solely on the rail and between terminals. The advantage here

is that we are able to handle over-height vehicles like a minivan or a four-wheel drive type utility vehicle. This is the replacement, we think, for the railroad bi-level car because it is much lighter and carries the vehicles in a fully enclosed environment. Also, it can be loaded by the manufacturer off rail.

This has been a snapshot of where we are and where we are going. Hopefully, I have peaked your interest a little bit.

Dick Sherid
CSX

I'm going to talk about the Iron Highway project. I think we should clarify in the beginning. Keep in mind all of the things the previous two presenters have told you about the changes in the industry and the trends, etc. Our project is certainly in line with trying to address the kinds of things that are facing our industry. It probably goes a bit further, in that you have noted how things have been made obsolete by changes in links and changes in weight, and those types of things.

Several years ago, we tried to identify what we needed to do long-term to move to the next stage of intermodal development. Fortunately, we got involved with New York Airbrake — a gentlemen by the name of Tom Ingle, who actually originated this idea.

We were looking at how we could address some new markets, not necessarily to obsolete anything that is in the industry now or the things that people are doing, but to look at markets that we can't touch today. I am going to run through a series of slides fairly quickly.

CSX Intermodal is not a railroad and it is not a trucking company, even though we have a motor carrier division, and a lot of people think of us as a railroad. But CSX elected five years ago to make its intermodal company a separate business unit of the corporation. We are really a large transportation marketing company. We do have terminals, assets, and trailers, lots of extra trailers. We buy transportation from CSX and a number of other rail carriers — Conrail, Norfolk Southern, SP, Burlington Northern, and we run a national network.

We began this project by looking at the things that impede us in growing this business. Making intermodal terminals is very expensive. General purpose locomotives do a good job at what they were designed to do, but they are very expensive, the maintenance of them is very high, and they take almost 20% of their own power to move themselves around. Maintenance and reliability is an issue, as are the assembly of trains, switching of cars, and getting that spine car to match up with that 53-foot that you want to move. All of those things are expensive.

As for intermodal rail cars, the 89-footer does very well with two 45-foot trailers. We have a lot of 89-foot cars, but that is not, as you saw earlier, the trailer of choice in the marketplace.

Rail compatible trailers — that is what we really found was the most pressing issue. It was to try to get a technology that did not tie the piece of equipment that a customer chose to use to the rail industry — equipment that had to move or be forced back to the rail system.

We decided to develop a system that would get into new markets, transport any trailer, have strategic flexibility, and lower the break-even cost. When you look at lowering your break-even point, keep this in mind — today, to be

economical, an intermodal train usually has to go 500-700 miles, and we would like to have 100 or more boxes on it. We want to design a system that you could operate in short haul markets down to, in some situations, 250 miles, and run in quantities as low as the equivalent of 23 53-foot boxes.

This slide supports what you saw earlier. You can see how quickly, from 1982 to 1990, the change to 48-foot or longer trailers within the industry took place. That made quite a bit of our equipment obsolete, since the rail industry focused on the 45-foot. Look at the size of the other market.

I think we are being generous here based on the statistics that Charlie had saying that we have 135,000 pieces of rail equipment. On the other hand, the market that we would like to get is, let's say, five percent of those 2.2 million highway trailers that are running around, which also get 3-4 times as many moves per year as a rail piece of equipment gets. The utilization factor is much higher.

What we have envisioned is to have a line haul option for motor carriers, using the type and size of equipment that they elect to buy to suit the needs of their customers. When surveying motor carriers, one of the things that we were told is, we don't want our box sitting around 24 hours waiting for your once-a-day departure.

We would like to have multiple departures per day. Getting down to units of 20 would certainly help move in that direction. That is set as one of our goals. Another is a higher reliability factor, which is especially necessary when you get into packaged products like those UPS and LTL's handle. Reliability has improved in rail intermodal, but we are not participating heavily in very time sensitive markets. Just to give you a picture of what we see as profitable business today in intermodal, we are using Chicago as the hub and everything inside the red is one of the reasons you don't see those short haul markets being covered by intermodal today. Some of those in that circle probably have been under consideration for discontinuing. What we would like to see is, if you were using these hubs, you could serve everything outside of those markets and make money with it.

Here we are looking at a single, integrated train element — a continuous platform that is approximately 1,200 feet long. It could be varied to suit any particular application, because it is fairly well overpowered compared to today's intermodal trains.

This is a picture of the prototype that we are testing in Pueblo, Colorado. Schneider seems to be showing up often today. It looks like they are looking for new ways to do things. But from this, you can see the yellow ramp, which is part of a split ramp that would be in the center of this 1,200 foot platform. It has a hand operation so that the operator of the power unit simply comes back, plugs in his control, and drives the train apart, while standing right next to the ramp.

This is a shot of the ramp together. You can see the connecting cord where the operator is hooking it up to drive it apart. This is the other side of it, with the air brake on whichever side you are not going to move shut down in a lock. We had UPS trailers out there, because we wanted to make sure that they would load okay, since they are low in the back. We are testing two different kinds of hitches. Originally, we were looking at a movable hitch. These platforms are all 28-foot articulated platforms. This is a totally integrated, non-slack unit. We

were going to have a movable hitch on each 28-foot platform. The hitch manufacturers said, wait a minute, we can put multiple hitches on there for about the same price. Your maintenance will be far less and you will get almost the same utilization factor. So, we are testing both the locked-in-place hitch and a movable hitch.

This one, you can see, is on a track that has mechanisms that would end up causing more maintenance long-term as you move this hitch. The plunger on the end is what separates it. That is all controlled by an arm and hydraulics on the hostler that release it, move it, drop a hook in that hole in the center, and pull it up to put it onto the trailer.

This is a picture of the one that was locked in place. The suspension system here is quite unique. If any of you have noticed box cars and rail cars with trailers on them, even articulated you will see them swaying in the breeze as they go along.

These units are all designed with independently rotating wheels, no axles across. They have their own suspension system of elastic pneumatic springs on a shock system. They also have a steerable wheel. But the really unique part of this is where you see the end of a brass plate sticking out.

There is no weight riding on the articulated joint in the center. These platforms all ride with the weight distributed over the rail on the outer part, so that any motion of the platform is transmitted throughout the entire length of the element. This cuts out the rock-and-roll motion that there normally is on rail cars.

The torsion bars are on an offset lobe on each wheel and turn the wheel so that the flange stays 90 degree to the rail all the time. They cut down friction and reduce fuel consumption, as well as improve safety.

Integrated multiple power units — there is one power and control unit at each end of this element — will be in the final version.

It has two 750-horse diesel electric engines that run A/C power through drive trains that are under the first five platforms. That is designed to use the trailer and the freight that you are hauling as your traction weight, and therefore cut down on the weight of the whole unit and reduce fuel consumption.

Again, the whole thing is set up in modular fashion to cut the normal maintenance costs for the rail industry. The way locomotives are designed at a million or a million and a half dollars a piece, they break down and you pull them out of service and send them to a shop and hope you get them back soon.

These are designed so you can do a quick change of drive trains or the computer control systems or whatever. Here on the 750-horse engines you can see the forklift holes at the bottom, and there are about five quick disconnects. You can pull into a terminal to load and unload and you can change out a power unit in about a half-hour.

A lot of this is for reliability. This shows one of the screens that would appear in the cab for the operator. All the bearings, all the moving parts have sensors and are monitored on a continuous basis so that you would have advance notice of anything going amiss.

Our timetable has probably slipped one quarter in 1993 as far as test marketing. We are changing the front truck on the test unit. The freight got a tremendous ride, but the crew thought there was too

much vibration coming up from the rail, so they are changing it out to a passenger locomotive front truck. Getting that new truck out there to finish the test has set us back probably three or four months.

This is a photograph of two units passing that was taken in Pueblo when I was out at the test. I always heard of these pictures of intermodal with a sunset in the background from I guy I used to work with. I am going to send him a photo one day when this thing is successful and say, we are now moving into the era of the sun rising on intermodal.

(The following is a video.)

In 1989, CSX Intermodal began a cooperative effort with New York Airbrake to develop an innovative form of transportation known as the Iron Highway. Combined with superior ride quality and the most advanced technologies available, the Iron Highway can load and unload highway trailers without lift equipment and make intermodal transportation available to private fleet operators in markets of 250 to 700 miles.

This is a small prototype of the system now being tested at the Association of American Railroads' research facilities in Pueblo, Colorado. Each element is 1,200 feet long. At both ends are aerodynamic power and control units, now in final stages of design.

Each element is powered by four light-weight 750-horsepower diesel engines which sends power to motors that drive the first five wheel sets on platforms at each end. The engines are mounted on modular pods and can be removed and exchanged in thirty minutes at the terminal, whenever necessary for maintenance. Each 1,200 foot element can hold 20 53-foot trailers or a combination of smaller equipment in any configuration.

As many as five Iron Highway elements can be linked together to form a 6,000 foot train. At the center of each element is the loading ramp. The ramp opens to split the train, creating two loading areas. The entire element can be loaded in 50 minutes using two hostlers and unloaded in 30 minutes. The hostler can ride on this ramp to provide direct customer service in remote locations.

The Iron Highway is designed to permit trailers of any type or length, including light-weight highway trailers, to be moved intermodally with a movable hitch located on each 28-foot platform. The hitch can be quickly moved into place, thus providing full utilization of the entire loading surface.

Because of the simplicity of its design, low cost terminal operations can be located virtually anywhere along the rail system, near a motor carrier terminal, or a private carrier operation. All that is needed is a relatively level loading surface and roadway access.

With each element having its own power and control units, train lengths can vary to fit customers' volume needs, and frequent service scheduling and multiple departures between major metropolitan areas will be possible.

The Iron Highway will help to reduce highway congestion and will reduce fuel consumption per trailer mile. There are over 130,000 reinforced rail trailers and domestic containers in use today. There are over two million highway trailers that are not reinforced. The Iron Highway is designed to extend intermodal service in this totally new market. Once loaded, the element closes up and the train is ready to go.

In addition to its emphasis on customer convenience, the Iron Highway is systematically designed to meet customers' needs, and offers many technological advances that will provide a ride quality unmatched anywhere today.

A new suspension system combined with steerable, independently rotating wheels reduces rolling resistance by 30%, enabling smoother, articulated travel under all rail conditions.

Final testing of the Iron Highway will be completed this fall, followed by the construction of full elements for market testing. Designated lanes and pilot customers are now being selected for test marketing in 1994. The Iron Highway is scheduled to be fully operational in 1995.

(End of video)

Sherid - One more thing — the market we plan to serve or target is any business that is moving in either a private fleet operation or LTL motor carriers or truckload carriers, or anyone else who has a fleet of equipment that they manage and operate. In other words, we have determined that one of the things we do best is to move a box from here to here.

We'll let someone else manage the fleet so that it is not deterred from going in the natural flow that freight moves in. In other words, it won't be forced back to the rail system. We only want to move between points the boxes that would naturally flow that way.

Wise - We have come a long way from the phantom five feet. It is now a matter of three inches in some places, as Larry was saying. Larry, who cares? Why do we care about that extra two or three inches in the width and door height and so forth?

Gross - I think the key question is, if you are going to develop a vehicle that is going to be used by the full truckload motor carrier as a universal trailer, then any compromise that you make from the existing trailer has got to be very carefully weighed.

That will then be your universal trailer that you use not only for intermodal but for over-the-road as well. If you look at, let's say, a J.B. Hunt, they are talking of perhaps a 50-50 mix of intermodal versus over-the-road.

If you listen to a Schneider, maybe that number is more like 20% intermodal, 80% over-the-road. So, what the full truckload motor carrier has got to do is to carefully evaluate each of the compromises that they are going to have to make in equipment capacity in order to give it an intermodal capability.

While three inches or even 3/4 of an inch might not sound like a lot, there are certain market segments out there, for instance, that need a certain inside height — beverage containers, for example. You are going to write that segment off if you can't get their size of pallet or size of product stacked into your new trailer.

Really, it is a question of nibbling around the edges — I'm going to lose five percent over here and ten percent over here of the heavy load commodities because the container is 1,000 to 1,500 pounds heavier. They have got to make the trade-off as to whether or not that is a good idea.

If they decide that it is not, then either you have to back away from the universal piece of equipment strategy and go towards a segregated fleet and say, I'm going to have an intermodal unit and I'm going to have an over-the-road unit, or you have to back away

from the new intermodal equipment and stay with piggyback.

If you go for a separate intermodal fleet, there are all sorts of inefficiencies that are going to come into play because now you have two J.B. Hunt boxes or Schneider National boxes. If one customer is a container and one customer is a trailer, you have to make sure he loads the container to the place that is intermodally served, and the trailer to the place that is over-the-road served, and it is going to be very difficult to do that.

Wise - Charlie, how about your point of view here. What is the acceptable level of compromise in terms of dimensions?

Wilmot - Of course nirvana is to get a universally acceptable box. It is interesting that you should mention the phantom five feet. I recall there was a fellow by the name of Harry Bruce who was the chairman of the IC Railroad at the time.

Just a little bit of history — he apparently spent the better part of several weeks when the 45-foot trailer was really beginning to take off, and he was objecting to it. He would go around checking the safety seals on the equipment on his railroad. He opened the trailers and found that these new 45-foot trailers were only loaded to approximately the 40-foot location inside the trailer.

It appeared that 90% of the trailers that were leased to him by these onerous leasing companies who wanted to open up new markets by promoting 45-foot trailers instead of 40-foot trailers, were selling this phantom five feet that he didn't need on his railroad. Harry, who is no longer with the IC Railroad — I thought at the time — kind of missed the point. The point is that if you've got a system that is largely selling its service to guys who only load 40-foot depth, that is fine, and if you want to stay with that, that's fine.

But, if you want to expand to a more acceptable universal size that satisfies the needs of more of the shipping public, then you need to have not only the 45-foot equipment or in this case the 48- or 53-foot equipment, but maybe you ought to kick your marketing people in the can and start selling to the people who need the larger size trailers.

It was interesting to note in Larry's comments that he is kind of foreshadowing the increase in popularity of 57-foot equipment, which, as we know, is now very popular in 14 states in the Sun Belt. I don't know if I subscribe to the inevitability of a 57-foot trailer. The infrastructure of the cities and towns throughout the rest of the United States will make 57-foot trailers very difficult to accept. I think 53-foot trailers will find much more universal appeal, and eventually railroad intermodal technology will find a way to adapt itself more successfully to 53-foot trailers.

Wise - Dick, any comments on the subject of dimensions?

Sherid - I agree with both of the speakers. As I said before, what we really have to design are services to satisfy what the ultimate customer wants. Both of these reactions are in an effort to design a rail-compatible piece of equipment, or in Charlie's case, one division is over-the-road, but design that equipment to meet the trends that are taking place in the marketplace. Those could be made obsolete by a number of things, because equipment is usually built to last a long time. That is why we are trying to develop a transport system that will meet all of these needs and not constrain anything about the

box, be it a container or a trailer that is popular in the marketplace.

I should mention that CSX has a lot of trailer business and we run a double-stack network and we are expecting all of those things to continue to grow they way they are. It is just that we are looking at a way to get into short haul markets that we can't touch today. The economics just don't permit it.

Question - One of the speakers mentioned that he would like to see containers and trailers that have a service life of 10-15 years. How does that compare with what there is right now? That seems a little higher than what I understood.

Answer - In fact, for the equipment that we add to our portfolio we look for useful service life in the neighborhood of 10-15 years. History would bear out that equipment does have that kind of a financial service life. But, I'm not exactly sure why you say that is not the norm. Perhaps what you are referring to is that a great many of the truckers, for instance, will use more on the order of 7-8 years. Is that the discrepancy you are referring to?

Comment - Yes.

Answer - That equipment will go on to have additional service life, but probably for other carriers in other applications. So, the equipment that we add to our portfolio may be in a certain kind of service for 7-8 years and then be transferred to a different kind of service for the balance.

But, if the trailer itself doesn't see some kind of financial service for a period of 10-15 years, it is very difficult to bring it to the market and be economically competitive with the buying power and the financial cost structure that many of our customers have when they go out and buy their own equipment as opposed to leasing it.

So, we need to have a 10-15 year service life and to offer equipment on an operating lease basis in order to continue to invest in equipment.

Question - I wonder if there are some reports on the experience with Amtrak and the RoadRailer. Has that worked out? Is it operating the way they wanted it to and do they plan to expand?

Answer - Up until this point, we have just run technical tests and some very limited commercial trials. What we have established is that the equipment will operate at 90 miles an hour, which was the target threshold for running technically, in a safe manner, behind the existing passenger trains.

What they are in the process of doing right now is putting together a specification for production equipment which we expect to see in the next month or two. It will look slightly different. The trailer will be tailored to their requirements. Then we will hopefully build that and be in a limited but extended service demonstration project some time in 1994.

Yeager - I am with an intermodal marketing company and we represent shippers, even though we are called intermodal marketeers now. We feel there is an awful lot of emphasis on standardization that may create some problems. We feel there is a greater need for a 45-foot 102 with a 110-inch door than any other piece of equipment. That is because many of our shippers who are now ordering 48-foot trailers have to block and brace, whereas they could use the door as a reinforcement. The reason they are ordering 48-foot equipment is because the 40's and 45's

are in such bad condition. They are old, beat-up trailers. We feel that, although there is a need for 48- and 53-footers, there is also a tremendous need for 45-footers. We hope that is going to be taken into consideration.

Wilmot - You are absolutely right. I don't think you saw my presentation. One of the things that I showed was that the attrition that has taken place in the 45-foot and shorter equipment fleet on the trailer side has bottomed out this year, and we are forecasting growth in that segment over the next year or two, with probably a net increase of 5,000 to 6,000 units.

As opposed to 48- and 53-foot equipment for intermodal, there is a clear need for revitalizing the 45-foot fleet intermodally and I don't want you to think that I or Transamerica are trying to ignore that. We are both investing heavily in upgrading that aspect of the fleet.

Wilmot (in response to a comment) - The trailer of choice in North America is the 53. Phil's principal involvement today is in the movement of intermodal goods. The principal customer base for piggyback intermodal is still more weight sensitive than it is cube sensitive. It does not necessarily reflect the trend that is going on generally in the North American transportation system.

Phil has a particular and unique need for 45-foot equipment that I think is very justifiable and one that we are trying to respond to and that the industry is responding to. By this time next year, you should see the size of the fleet more in the neighborhood of 100,000 units as opposed to 95,000 units today, as the chart showed.

Comment - I am very happy to hear that because I think it is very important for intermodal.

Comment - If I could just say one more thing on that. I want to draw a distinction. I think where the intermodal system needs to be going is to be able to offer a variety of equipment to meet the needs of the marketplace.

I think there is a problem if you see 45-foot equipment being added and the primary motivation is that there is not capacity to handle any trailer larger than that. In other words, equipment is being added for operational rather than marketing reasons.

If there is a marketplace out there for 45-foot equipment or 28-foot, or whatever, I think the intermodal industry needs to be in a position to offer that capacity.

Wise - Let me turn that around, Phil. As somebody that serves the shippers, why don't you buy the 45-foot equipment?

Yeager - We don't have the money. It is a very simple thing. We are putting our money into computers and people and we are trying to satisfy the shipper's needs. We feel there are people who will invest in new equipment, and I think the railroads will lease and buy plenty of new equipment if utilization is improved. That is the job we are facing — our responsibility is to make sure that asset is better utilized.

Question - What is it that beats up a trailer?

Wise - I think the answer to that is, all of the above. In particular, intermodal trailers or piggyback trailers tend to get a little bit harder use not only because of the lift-on-lift-off techniques that are used to put them on the railroad, but also because of the very large and congested terminal configurations that exist in intermodal.

Another reason is that the trailer changes hands so frequently. There tends to be a lack of accountability for who is responsible for the trailer at any point in time. It is that lack of accountability in the intermodal system, in particular, that ages an intermodal trailer more rapidly than a highway trailer.

Comment - From the over-the-road perspective, it is the loading and unloading of the vehicle where most of the damage occurs.

That is one reason why the plate technology has gained favor. Plate technology is less susceptible to that type of thing.