



Plywood Sheathed Freight Equipment: Prototypes and Models

Ted Culotta

Hindsight 20/20 6.0

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Thank you

- Bill Welch
- Al Hoffman
- Bat Masterson
- Bob Heninger
- Dick Harley
- Tony Thompson
- Ryan Mendell



St. Louis Refrigerator Car Company



- 4200-, 4400-, 4500-, 4600-series confirmed photographically
- Others possible

St. Louis Refrigerator Car Company



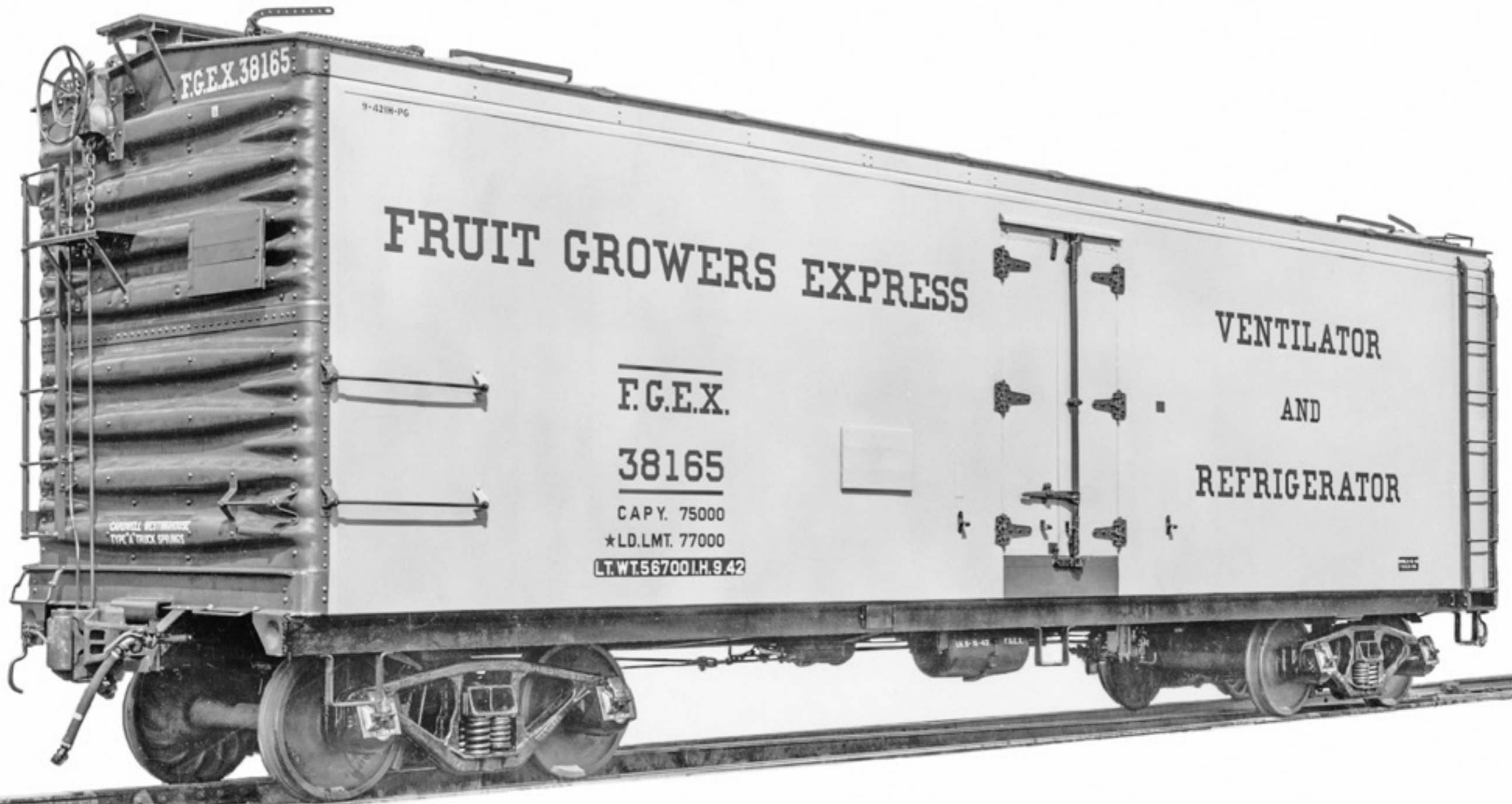
- Some cars were resheathed with tongue and groove siding

Fruit Growers Express Consortium Emergency Refrigerator Cars FGEX/WFEX/BREX



Burlington Refrigerator Express built 100 plywood sheathed
Emergency cars in 1942, nos. 74400-74499, at the Plattsmouth shops

Fruit Growers Express Consortium Emergency Refrigerator Cars FGEX/WFEX/BREX



In 1942 and 1944, the consortium's Indiana Harbor shops built three groups of plywood sheathed cars for Fruit Growers Express, 38000-38199, 38200-38265, and 38266-38373

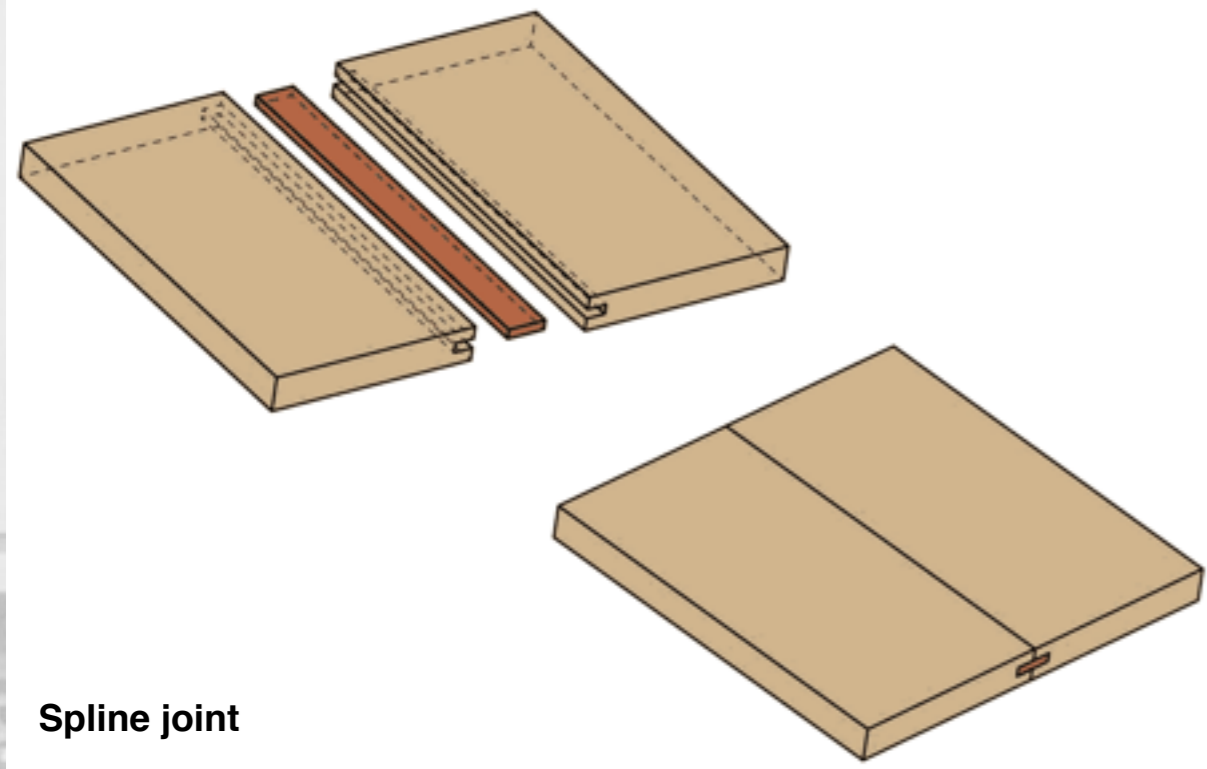
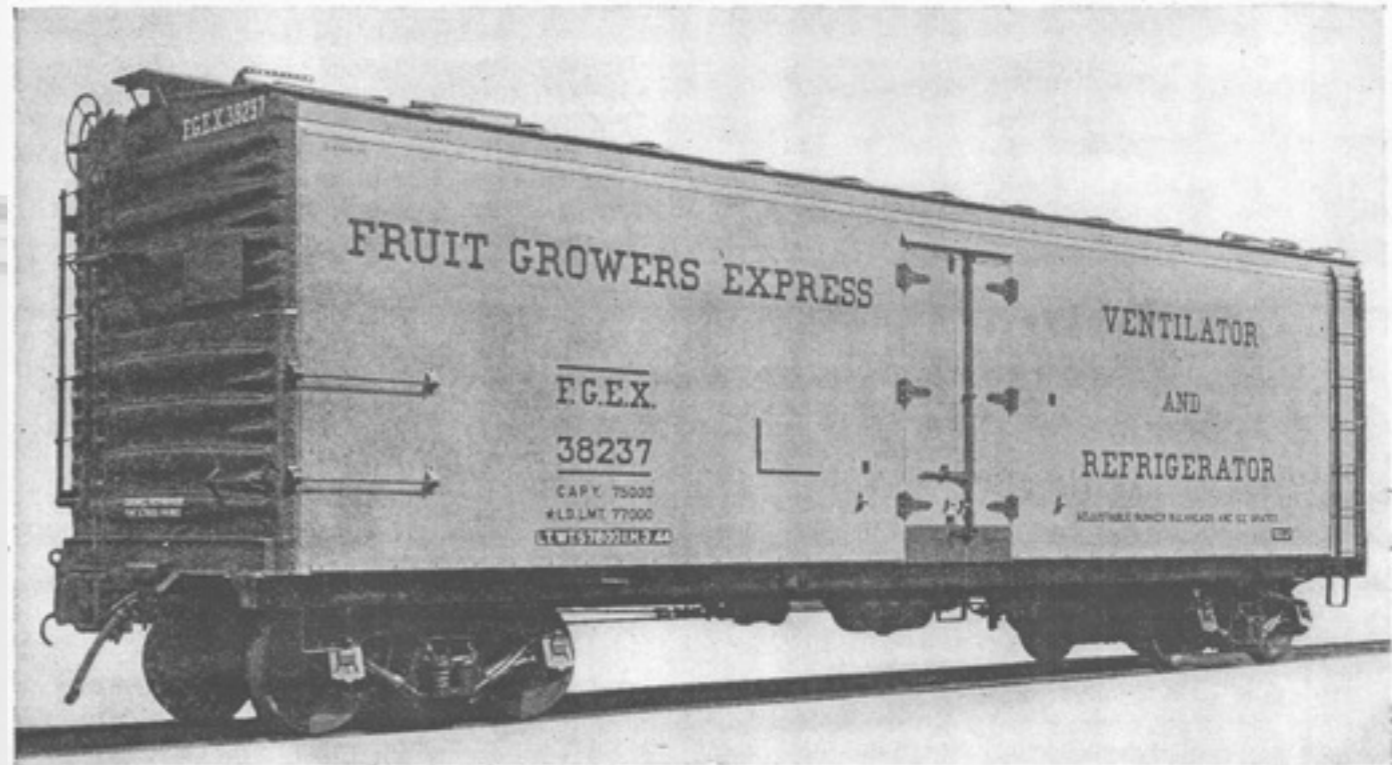
Fruit Growers Express Consortium Emergency Refrigerator Cars FGEX/WFEX/BREX



In 1942 and 1944, the consortium's Indiana Harbor shops also built three groups of plywood sheathed cars for Western Fruit Express, 66400-66499, 66500-66549, and 66550-66624

Forty-Ton Refrigerator Cars

Fruit Growers Express Consortium Emergency Refrigerator Cars FGEX/WFEX/BREX

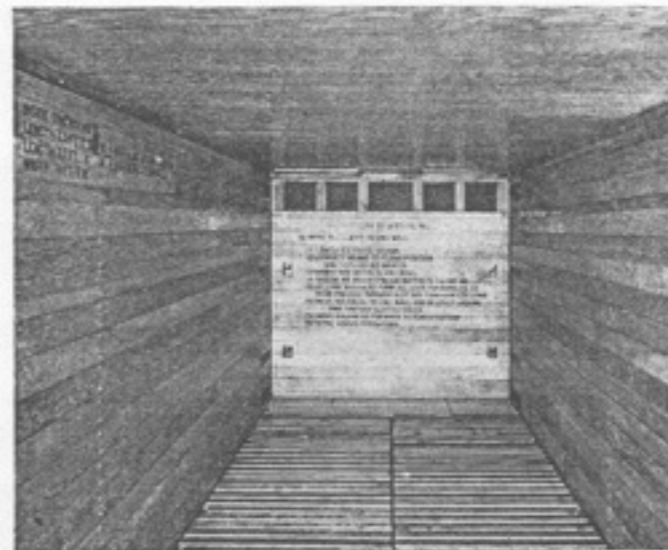


Spline joint

woodmagazine.com

Two hundred and twenty-five 40-ft. end-ice-bunker refrigerator cars are being constructed at the Chicago plant of the Fruit Growers Express Company. Although these cars follow a design which has been in general use for a number of years they are interesting particularly because of the amount of plywood which enters into their construction and because of the type of adjustable ice bunker

Some cars fan equipped — Ice bunkers adjustable for stage icing — Movable bulkheads add four feet to lading length when icing is not required



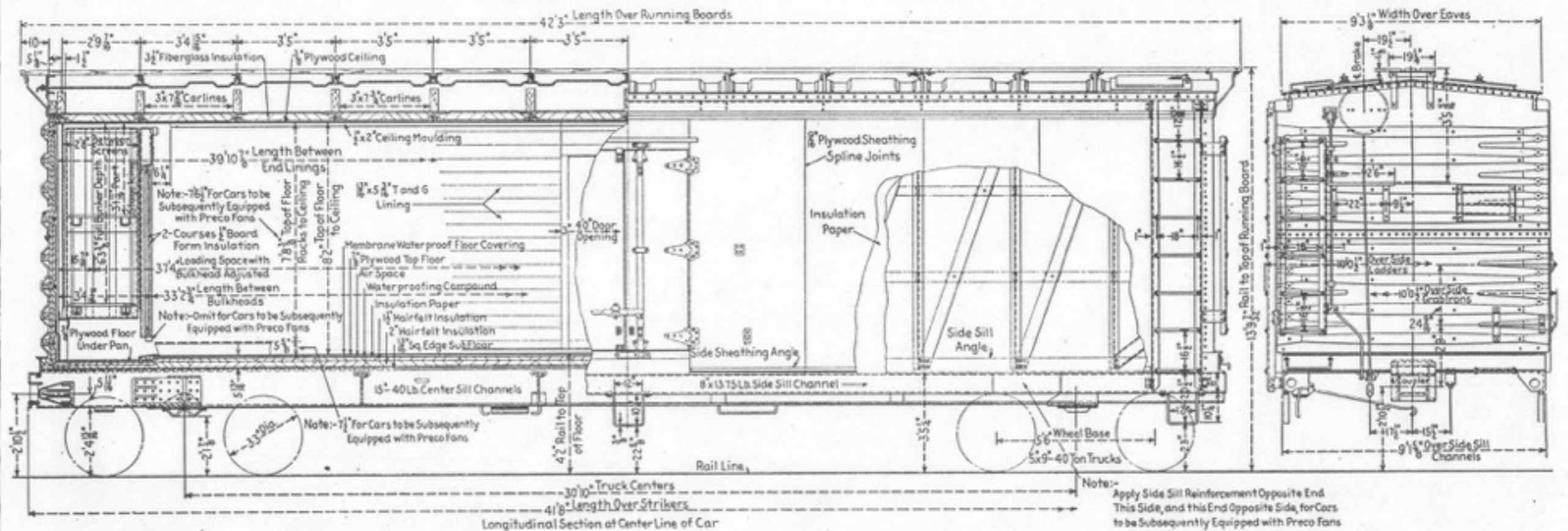
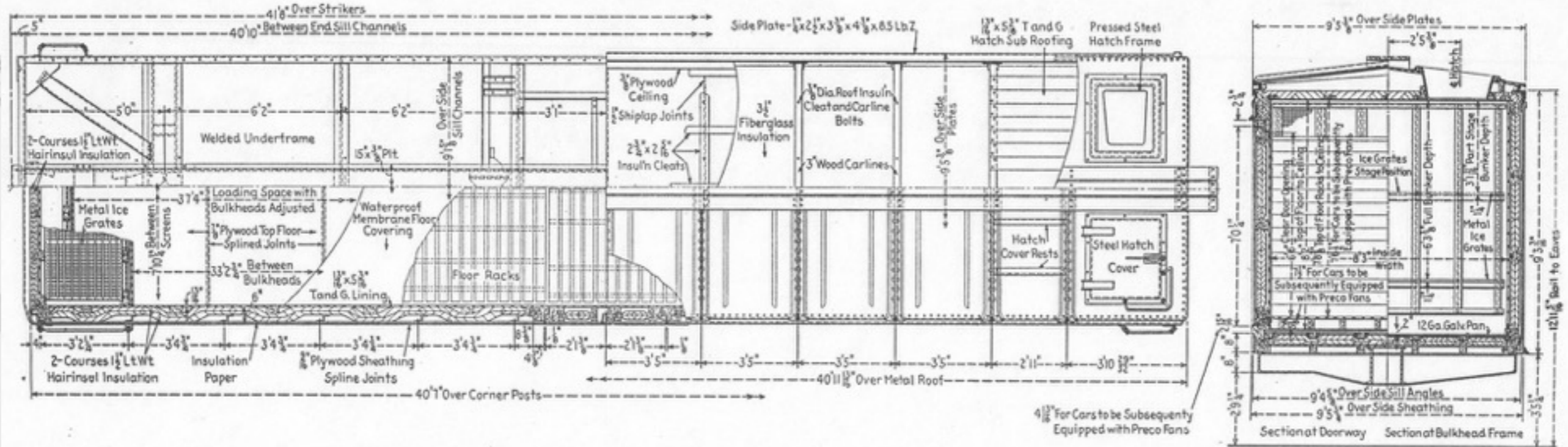
Loading length of cars is increased to 37 ft. 4 in. when the bulkheads are in the collapsed position—The ice grates serve as extensions of the floor racks when cars are used in non-iced service

which this company has developed for use on its equipment. The cars are being allocated to two different companies with the Western Fruit Express receiving 50 and the Fruit Growers Express 175. The cars which the Western is receiving are equipped with ventilating fans furnished by the Pacific Railway Equipment Company. Installation of these fans requires minor changes in design which are indicated on the drawings.

The Burlington Refrigerator Express Company is also building at its Plattsmouth, Nebraska, shops 75 Preco fan-equipped refrigerator cars of the same general design as the cars of the other companies except that vertical-grain fir siding is used instead of plywood sheathing.

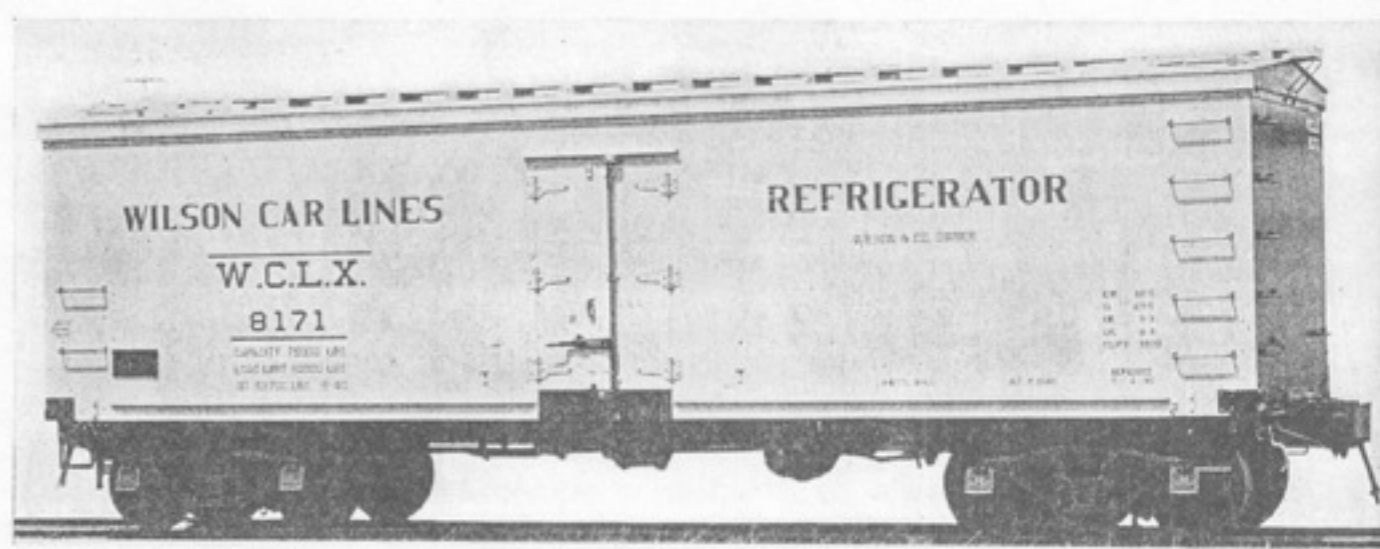
The use of plywood for cars built by the Fruit Growers Express Company has increased during the past several years and its use was further accelerated by critical steel shortages which made it necessary to use plywood or lumber as outside sheathing. The plywood has proved to be a satisfactory material for such an application although it cannot be said to have replaced steel or other

Fruit Growers Express Consortium Emergency Refrigerator Cars FGEX/WFEX/BREX



Details of car structure showing the extensive application of plywoods and the insulation employed—Variations in dimensions are given for cars to be equipped with air-circulating fans

Wilson Car Lines Meat Refrigerator Cars - Company Design



Plywood Refrigerator Car Built in 1940

Refrigerator Cars of Plywood*

Valuable experience now being accumulated with cars built of this material which is at present largely devoted to marine and other important war-time uses

By Harry A. Dodge

Sales Engineer, Harbor Plywood Corporation, Chicago

THERE is nothing new about the basic principles of plywood and they can be traced back to the ancient Egyptians. What is new is the technique of manufacture which, while producing in mass quantities, improves regular plywood from a product intended for uses such as kitchen cabinets into a plywood suitable for refrigerator cars and heavy construction, including marine and other war-time exterior applications where it is for the present almost exclusively used.

The most important point in connection with the successful use of plywood in refrigerator cars or any railway equipment is that the proper type of plywood be selected.

Plywood, regardless of the type, of which there are many, consists of an odd number of veneers bonded together with the grain of each adjoining ply at right angles to the other and, although the appearance may be basically the same, we have to go into the technique of manufacture to really determine if it is suitable. A responsible plywood manufacturer has no desire to supply a plywood not intended for the use to which it will be put, and the manufacturer's recommendations should always be observed.

I am going to refer briefly to the basic technique used by the Harbor Plywood Corporation in manufacturing plywood in the Pacific Northwest, in accordance with the requirements for exterior-type Douglas fir plywood in the United States commercial standards plus rigid

individual requirements as set up by our engineers and production men. The manufacture of this plywood was first started in 1935, at which time applications were made to determine its performance in refrigerator cars. These applications were highly successful and, from that time on, progress was rapid and performance was almost beyond expectations. This plywood is the best that we can produce to resist decay and the effects of water and weather, and is a scientific development which comes more in the category of an engineered lumber than just plywood.

How "Engineered" Plywood Is Manufactured

The logs are cut into desired lengths which results in what is known as peeler blocks. The peeler blocks are cut into veneer on a rotary-type lathe which revolves the peeler block against long, sharp knives. This action results in a flow of veneer emerging from the machine in a continuous sheet in much the same manner as unwinding a roll of news print. Following this operation, the veneers are cut to desired widths in a clipper machine and subsequently dried to the proper moisture content. Particular care is given the drying operation so that the strength and tenacity of wood fibers are not damaged. It is an accurately-controlled system, insuring the uniform exhaustion of moisture and the setting of natural resins. The operations up to this point in the manufacture are basically the same, regardless of the type of plywood to be manufactured with the ex-

* Abstract of a paper presented at the December 14, 1942, meeting of the Car Foremen's Association of Chicago.

Wilson Car Lines Meat Refrigerator Cars - Company Design



The Wilson Car Lines design employed four sets of pressed steel crossbearers and (what appear to be) cast steel body bolsters

Pacific Fruit Express

- The first PFE plywood sheathed cars were two experimental R-30-9 *rebuilt*s (the -9s were classed by PFE as *reconditioned* because they did not receive steel frame superstructures, but retained the wood frame design of the original cars.) These two cars differed from other -9s through the use of steel framing for the superstructures.
 - PFE 94300 had a Viking roof and integral ice hatches.
 - PFE 96522 had extra heavy insulation.
 - They were rebuilt in 1938 and 1939, respectively.
- One R-50-1 was rebuilt into a two-compartment, plywood sheathed car, PFE 100036 (class R-50-1-2) in 1940.

Pacific Fruit Express - R-50-5



The final 209 of the heavily insulated R-50-5 rebuilds were sheathed with Harborite plywood, as shown here. These cars were rebuilt at the Nampa, Idaho shops between 1945 and 1947.

Pacific Fruit Express - R-30/40-24



The 2,610 rebuilds (nos. 65921-68532) in the R-30-24 and R-40-24 class(es) used plywood sheathing. Differences from other rebuilds included full-height door openings and Improved Dreadnaught ends, as well as diagonal panel roofs on the final approximately 200 cars.

Pacific Fruit Express - R-30/40-24



Pacific Fruit Express - R-30/40-9



At the same time that the -24s were being rebuilt, many refurbished -9 cars required service. Numerous -9s received plywood side sheathing in the late 1940s. The ends retained tongue and groove sheathing boards. Documented car nos. include 93151 shown above, as well as 91593, 94242, 94789 (page 247, *PFE, 2nd Ed.*,) and 64771 (a -21 rebuild.) For more info, see page 148 of *PFE, 2nd Ed.*

Canadian Pacific - Plywood Sheathed Emergency Box Cars

In 1942, Canadian Pacific received 750 plywood sheathed Emergency box cars, nos. 249000-249749



Plywood Sheathing on Canadian Pacific Cars

come \$97,000. That item was lumped in a general \$232,000,000 item covering "lands donated for right-of-way and other carrier purposes by local governments, associations, and private corporations, including apparent aids." It was Dr. Duncan's position that donations by individuals, associations, and private corporations should be eliminated from any figure purporting to show "public" aids. Also, he questioned whether there was any sound basis for assumptions made in arriving at the figure for "apparent aids." It was in commenting on this item that Dr. Duncan recalled what his teacher of statistics used to say—"Beware of the smug finality of figures."

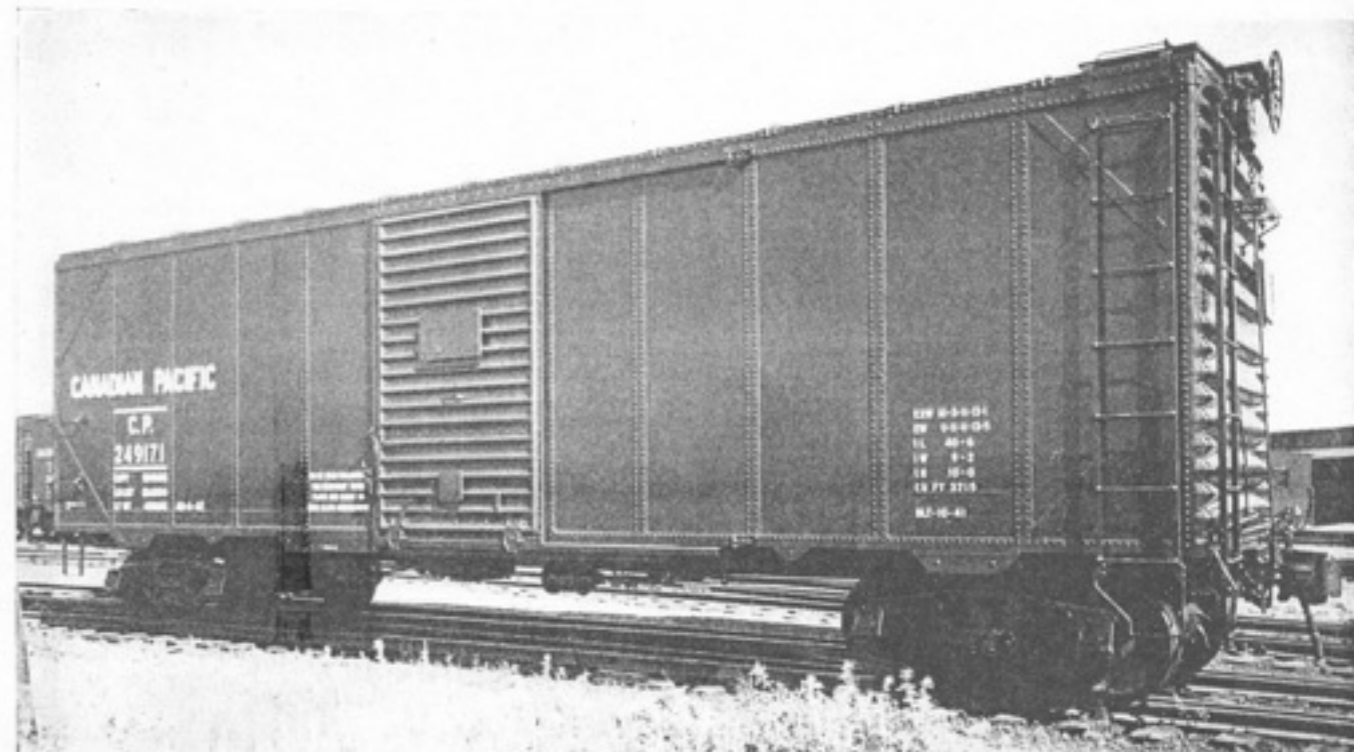
He proceeded in like fashion to point to what he regarded as infirmities in other figures used in the coordinator's tabulation, which totaled up to a figure of \$1,443,000,000 for "all aids to railroads." Dr. Duncan hoped he had shown that there is "no valid foundation" for such a sum. In any event, he pointed out, the coordinator had conceded that present railroad owners derive little if any benefit from the so-called "historical aids." Commenting on the Board's waterway exhibit, Dr. Duncan criticized the failure to include in the cost calculations an item representing the equivalent of taxes. He also objected to the inclusion in any waterway's traffic of government freight used to improve the waterway itself. The 1940 traffic figures for the Missouri river between Kansas City and the mouth, he pointed out, showed a total of 753,845 tons; but 404,262 tons or 52 per cent of the total was material for river improvement work. Likewise on the stretch between Kansas City and Sioux City, 450,413 tons or 81 per cent of the 552,523 total represented materials going into work on the river. If such traffic were eliminated the 1940 unit costs on those two stretches of the Missouri would be changed from \$6.35 per ton to \$13.70 and from \$6.60 to \$35.73, respectively. Traffic counts to be of any value require that the investigator look beyond the total figures into the character of the traffic, Dr. Duncan warned.

FIVE-PLY fir siding, $\frac{3}{8}$ in. in thickness, will be used to replace .10-in. steel sheathing in the construction of 750 box cars now being built for the Canadian Pacific Railway. Before deciding upon the substitution the railroad tested the practicability of the idea by removing the steel sheathing from a 40 ft. 6 in. double-sheathed car and replacing it with plywood. This car was then subjected to severe service tests and met all necessary requirements.

A net saving of 2,063 lb. of steel per car is realized in the replacement of the steel by plywood.

In the experimental car, after the steel sheathing was removed, plywood was applied to the Z-bar posts which formed the car structure after a bar equal in thickness to the Z-bar leg was welded on to form a cover and means for fastening the plywood in place. The plywood siding was bolted in place. The bolts pass through the cover plate, the plywood and the post, using the rivet holes which were already in the posts. The joint between the outside steel cover and the plywood was then sealed with cement to prevent the lodging of water and dust in the joints.

This double-sheathed car has many advantages over the single-sheathed car of the last war period. The plywood car retains standard dimensions inside, whereas the single-sheathed car loses $1\frac{1}{2}$ in. in width and saves only about 500 lb. of steel. Because of difficulties in obtaining clear lumber in standard lengths the single-sheathed car suffers in comparison, as loose knots, weather checks and splits, and additional joints allow more dust and water to enter the car. In addition to saving more steel per unit the double-sheathed plywood car provides greater protection to vital war shipments.



Double-Sheathed Car Using Laminated Wood Sheathing Which Releases 2,063 Lb. of Steel

Vol 113-1

Canadian Pacific - Plywood Sheathed Emergency Box Cars



In 1943, Canadian Pacific received 500 plywood sheathed Emergency box cars from Canadian Car & Foundry (nos. 223950-224449.) Series 239000-239199 (National Steel Car) and 239200-239249 (Eastern Car) were single sheathed cars (non-plywood.)

Great Northern Railway - Plywood Sheathed Box & Automobile Cars

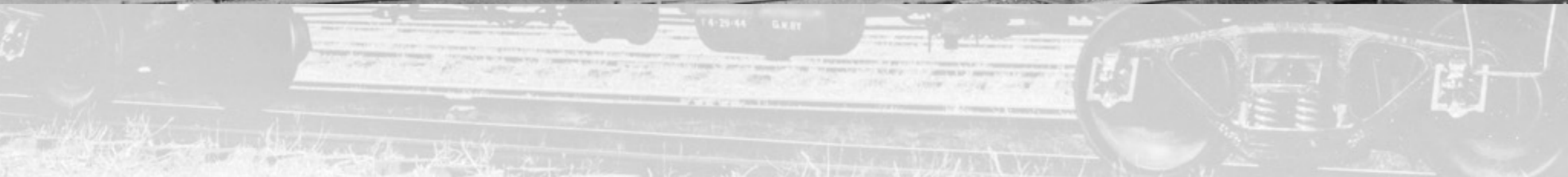
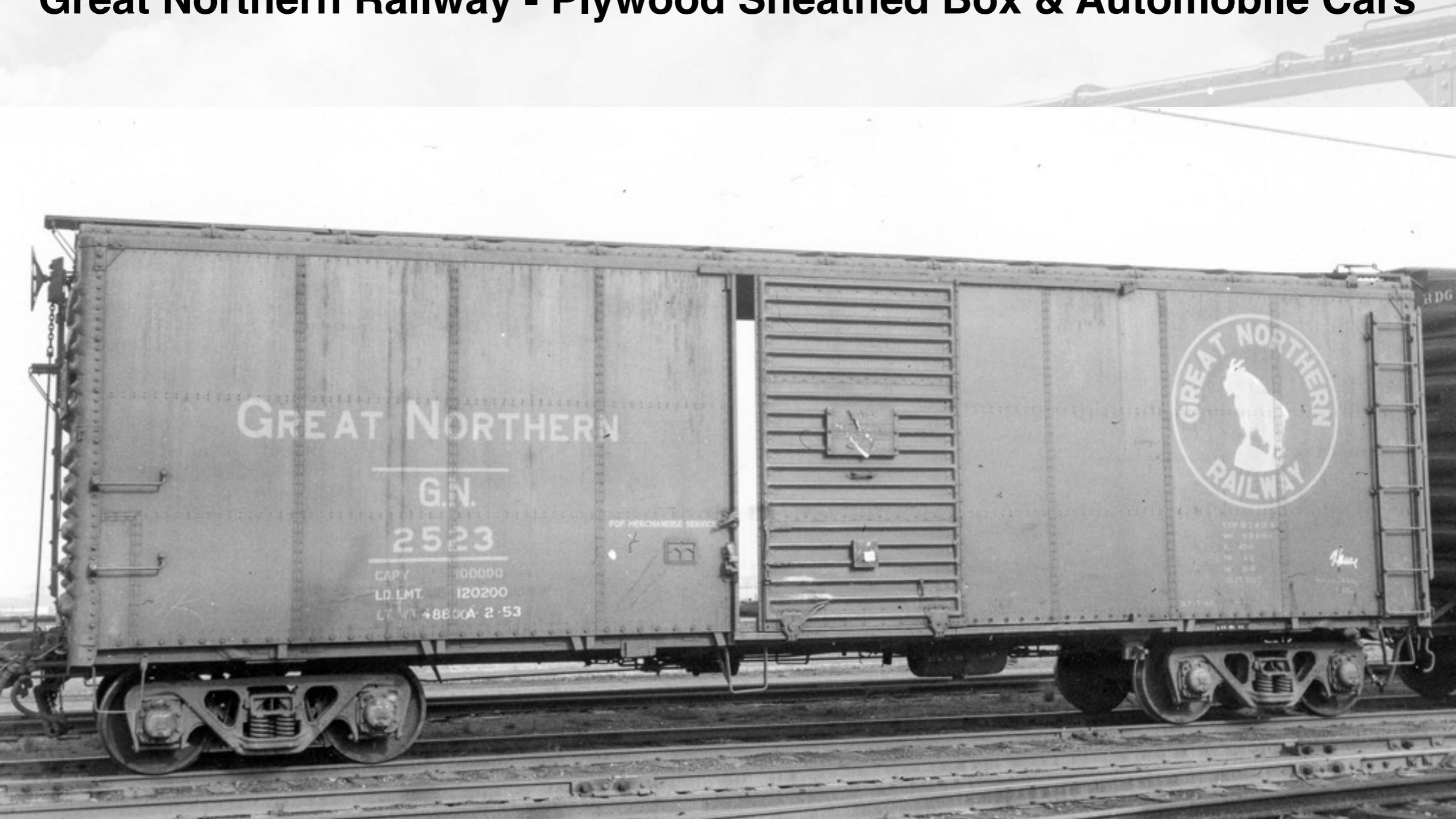
Series Start	Series End	Qty.	Built	Notes
44025	44999	375	1944	Emergency; 4/5 Dreadnaught ends
44400	44999	600	1944	Emergency; 4/5 Dreadnaught ends; composite plywood doors
2501	2524	24	1944	Emergency; Express Merchandise box cars
10000	10499	500	1945	3/4 Improved Dreadnaught ends
10500	10899	400	1947	3/4 Improved Dreadnaught ends
38700	38799	100	1947	Automobile cars
32000	32999	1000	1937-1942	Resheathed ARA-design box cars



Great Northern Railway - Plywood Sheathed Box & Automobile Cars



Great Northern Railway - Plywood Sheathed Box & Automobile Cars



Tacoma, Wash., February 20, 1955, Col. Chet McCoid photo, Bob's Photo

Great Northern Railway - Plywood Sheathed Box & Automobile Cars



Great Northern Railway - Plywood Sheathed Box & Automobile Cars

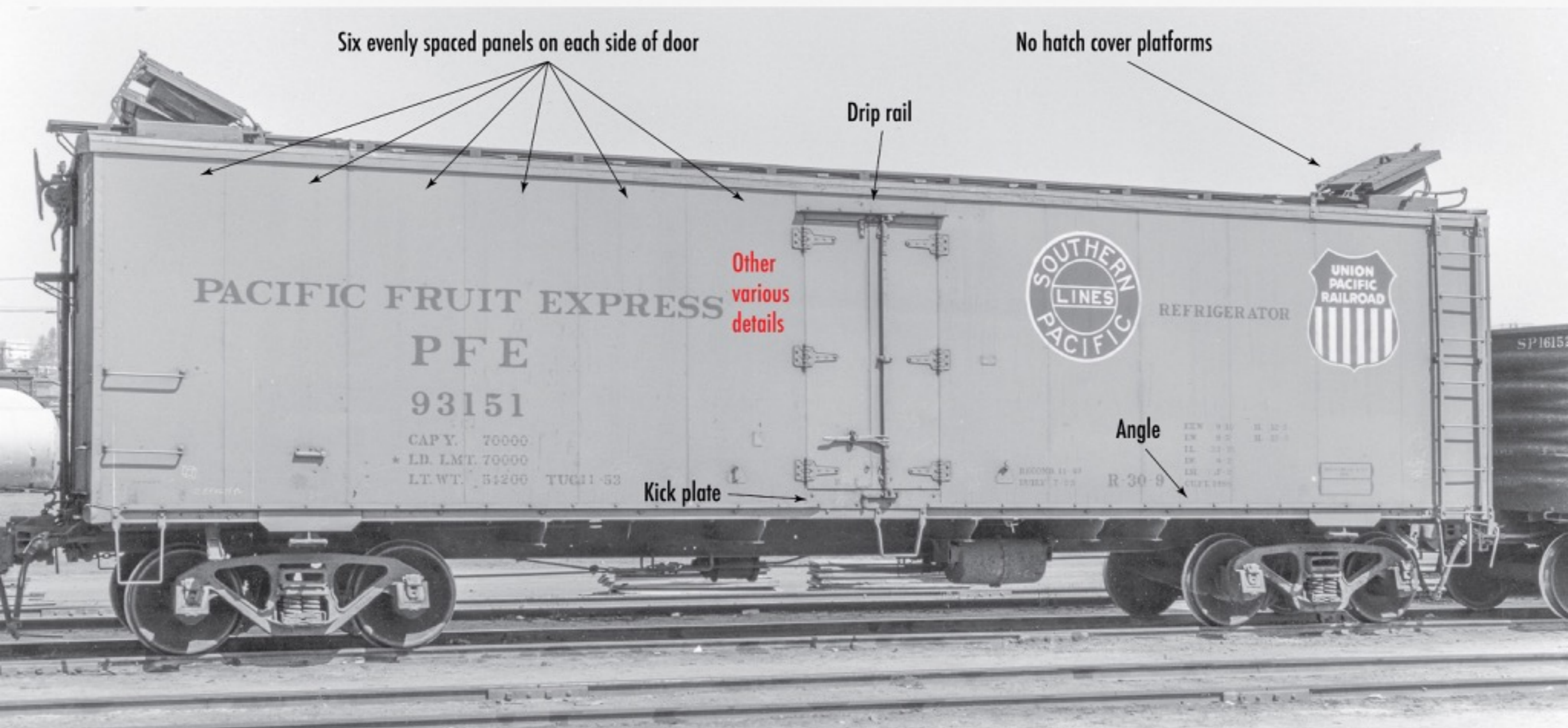


Plywood Sheathed Freight Cars

HO Scale Models

Road	Prototype	Manufacturer	Notes
BREX	Emergency Reefer	Sunshine Models	out of production
CP	Emergency Box Car	Yarmouth Model Works	out of production
FGEX	Emergency Reefer	Sunshine Models	out of production
GN	Emergency Box Car	Sunshine Models	out of production
GN	Postwar Box Car	Sunshine Models	out of production
GN	Postwar Box Car	Intermountain	continuing production
PFE	R-30/40-24	Sunshine Models	out of production
PFE	R-30/40-9	National Scale Car	forthcoming parts set
WFEX	Emergency Reefer	Sunshine Models	out of production

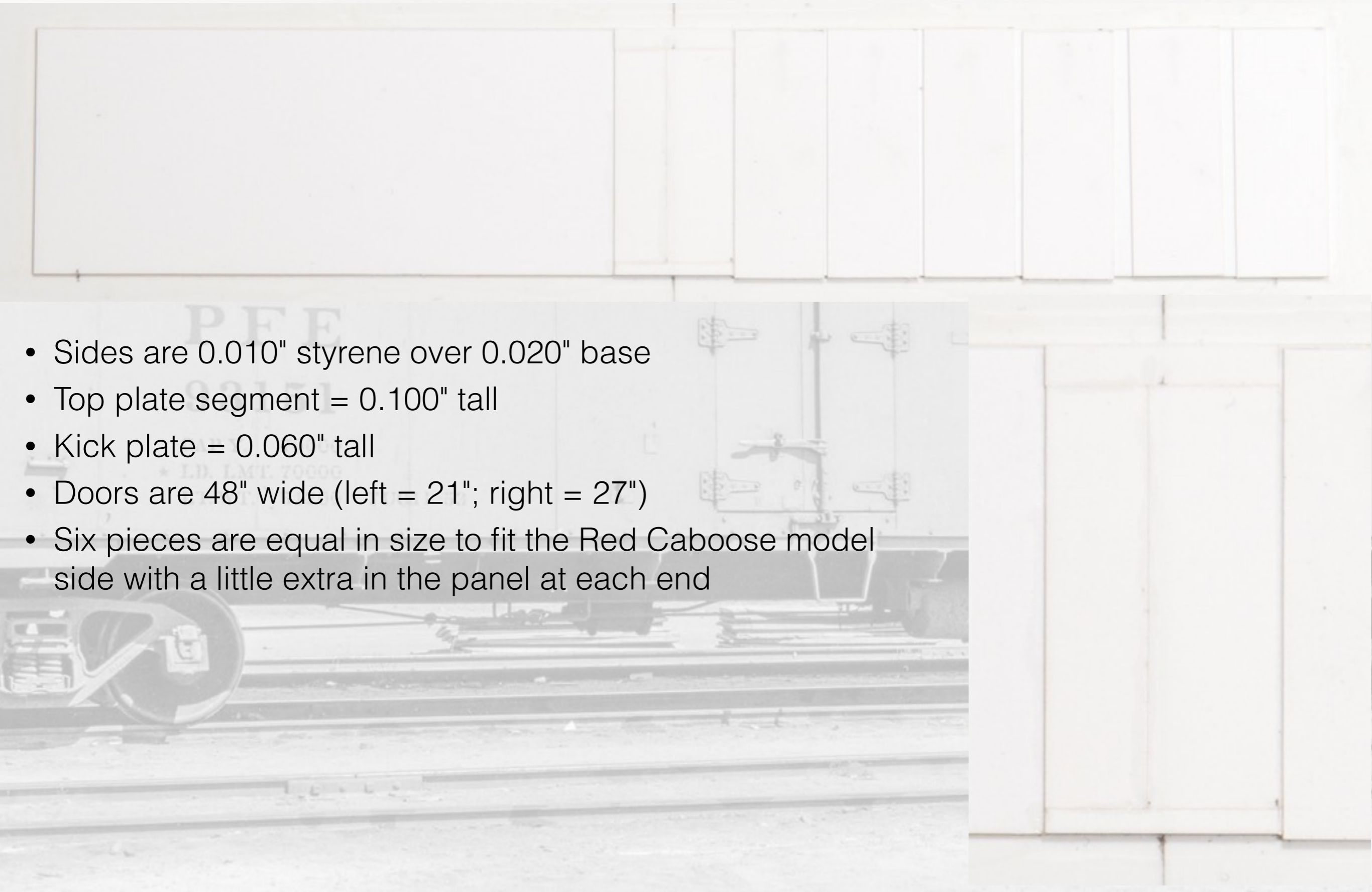
Modeling the Pacific Fruit Express - R-30/40-9



Note that while I will be discussing HO scale models, most of the material can be used for other scales, notably O, where a Red Caboose model exists

Modeling the Pacific Fruit Express - R-30/40-9

- Sides are 0.010" styrene over 0.020" base
- Top plate segment = 0.100" tall
- Kick plate = 0.060" tall
- Doors are 48" wide (left = 21"; right = 27")
- Six pieces are equal in size to fit the Red Caboose model side with a little extra in the panel at each end



Modeling the Pacific Fruit Express - R-30/40-9



0.005" styrene 6 scale inches tall
HO scale 1x3 on edge
Hardware from Red Caboose

Grandt Line details

0.010" square styrene strip

Grandt Line hinges

3" x 6" 0.005" styrene with N-scale Archer rivets (same on other side)

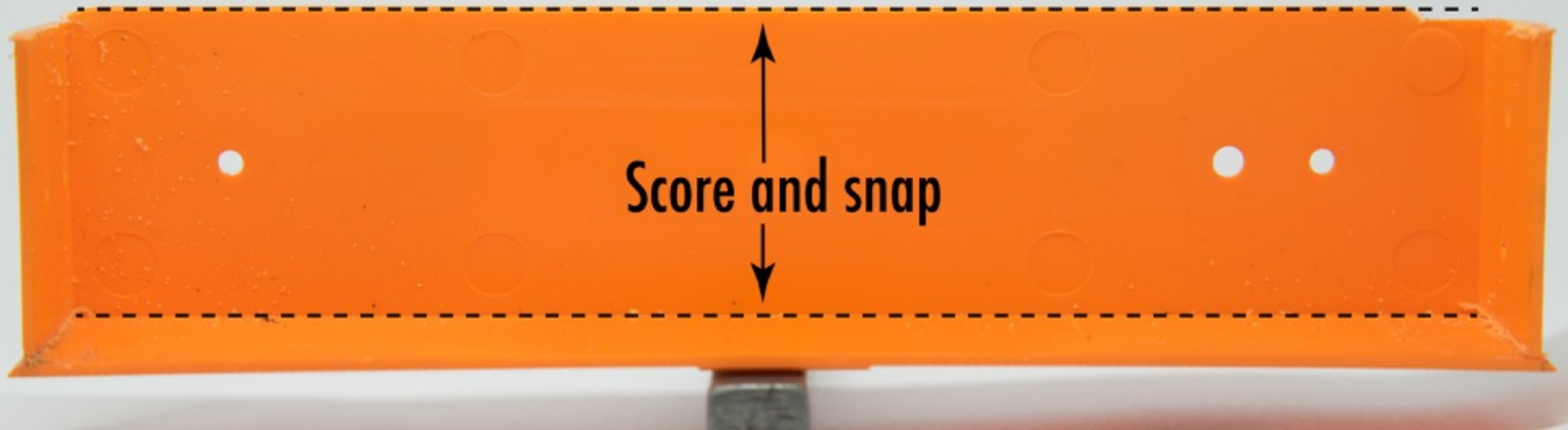
Grandt Line details

Hardware from Red Caboose

Hooks harvested from Red Caboose over 0.005" styrene

This block contains a detailed close-up of the model's interior structure. It features a central vertical strip of 0.010" square styrene. On either side of this strip are two vertical lines of N-scale Archer rivets, which are attached to a 3" x 6" 0.005" styrene sheet. The structure is supported by hardware from a Red Caboose. At the top and bottom, there are Grandt Line details and hinges. Small hooks, also harvested from a Red Caboose, are attached to the structure over the 0.005" styrene. The labels include arrows pointing to the specific components.

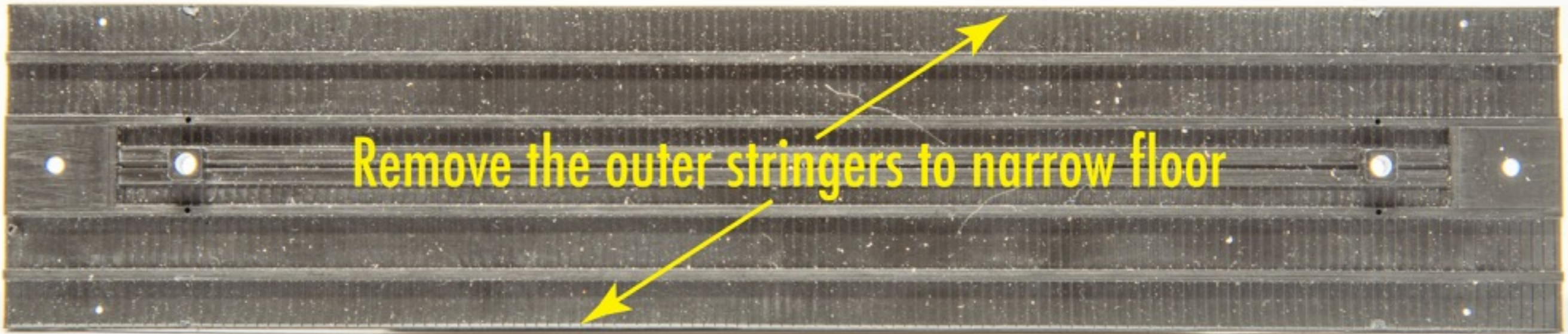
Modeling the Pacific Fruit Express - R-30/40-9



The sides are removed from the rest of the car body, leaving the sub-floor and sub-ends in place

note: early Red Caboose kits of refurbished -9s were too short (height). Visit here for more info: <https://harley-trains.smugmug.com/PFEModels/PFE-Wood-Ice-Reefer-Models/R-30-9/>

Modeling the Pacific Fruit Express - R-30/40-9



The floor was narrowed to allow the addition of new stringers/side sills

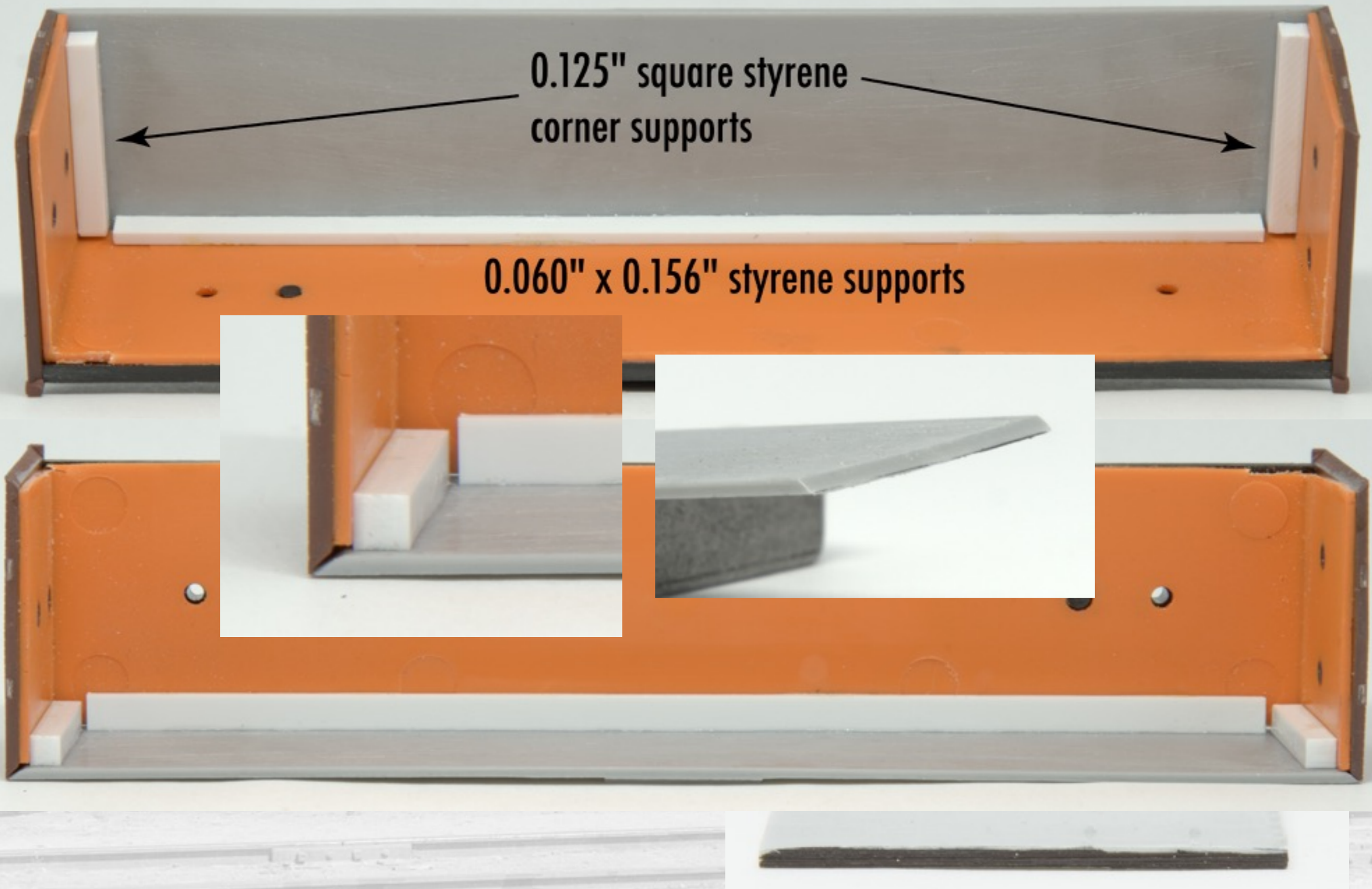


Modeling the Pacific Fruit Express - R-30/40-9



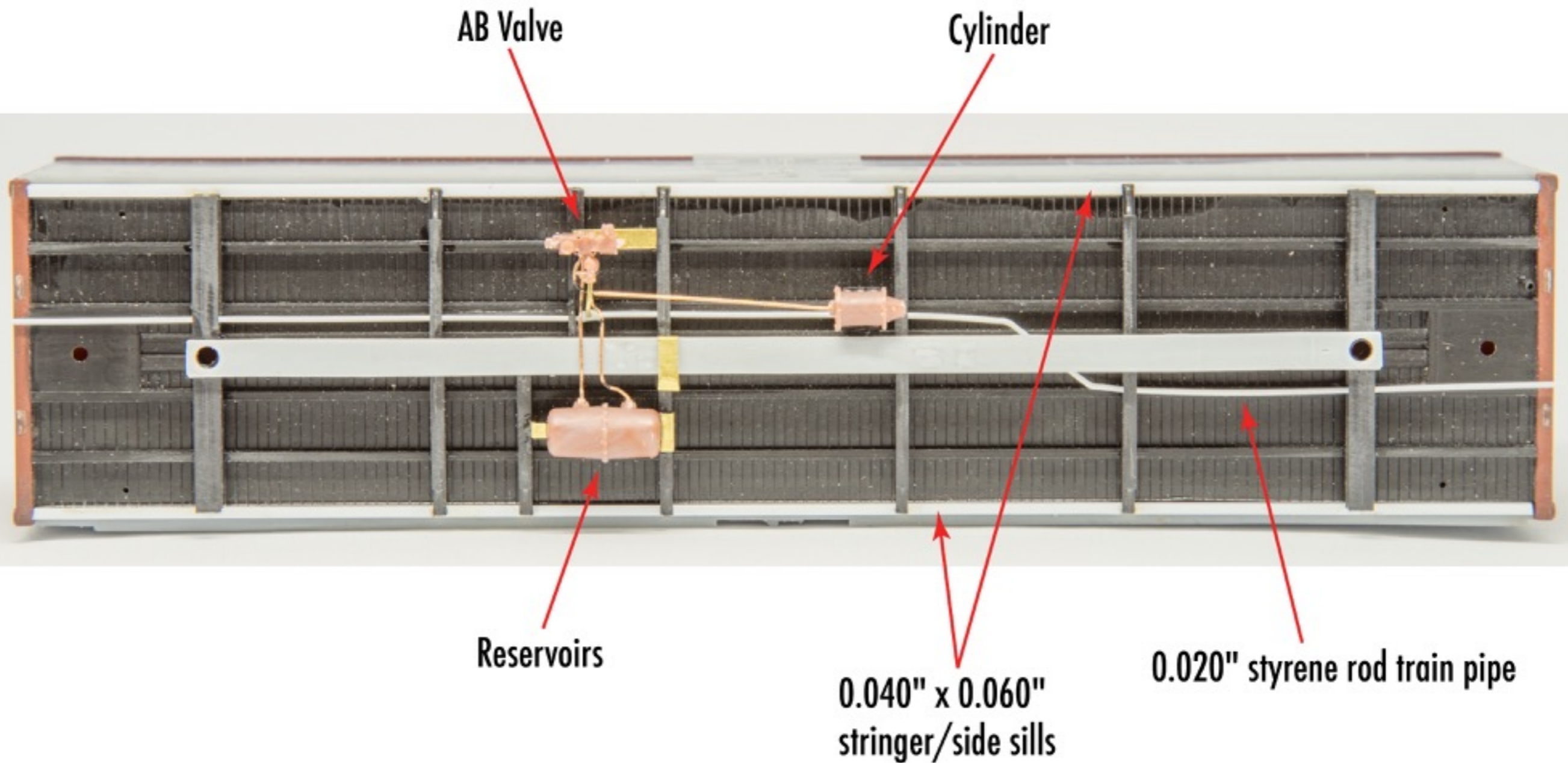
Add the ends to the sub-ends and the floor to the sub-floor

Modeling the Pacific Fruit Express - R-30/40-9

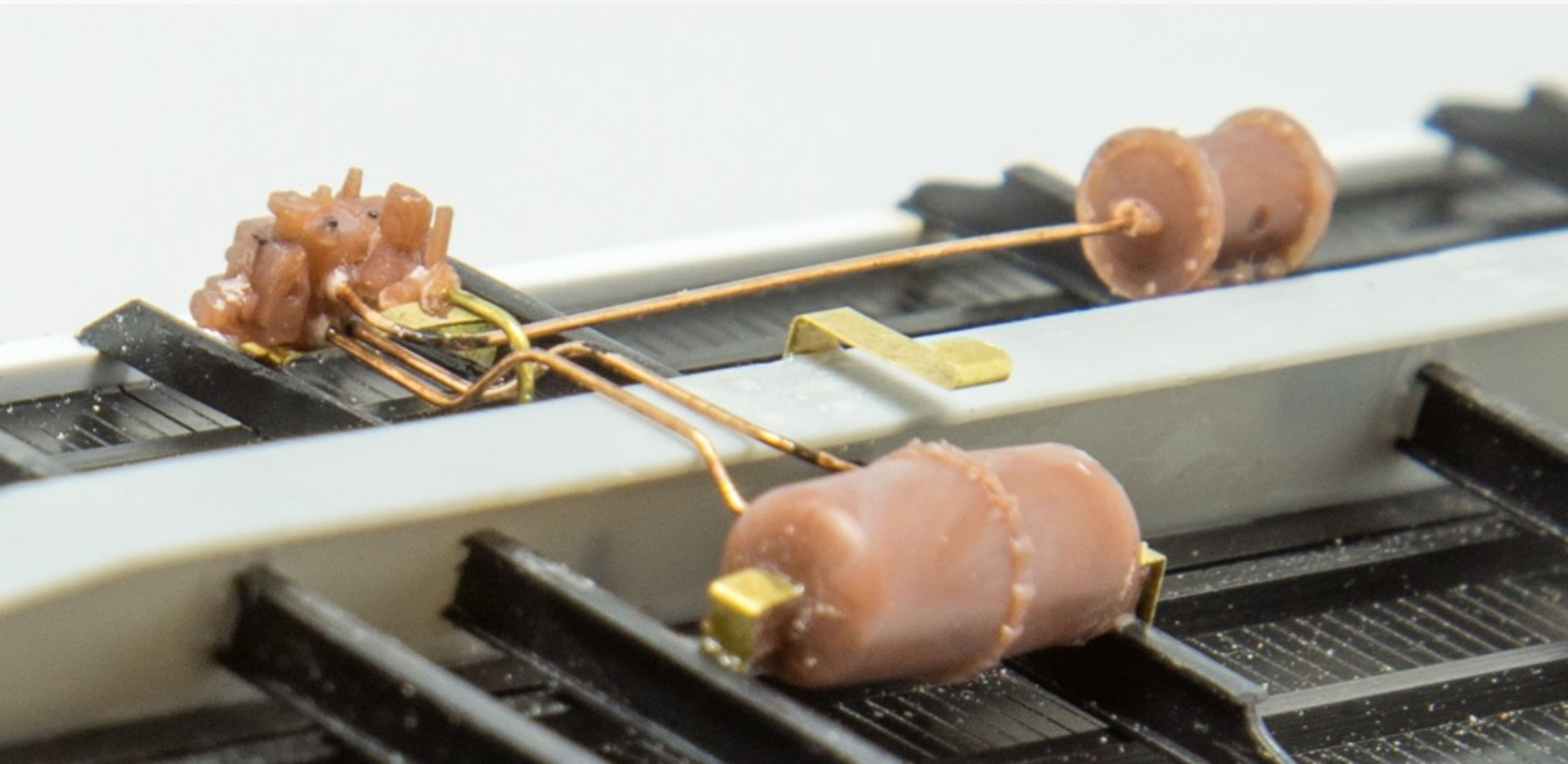


The corners of the sides are mitered as on the Red Caboose kits

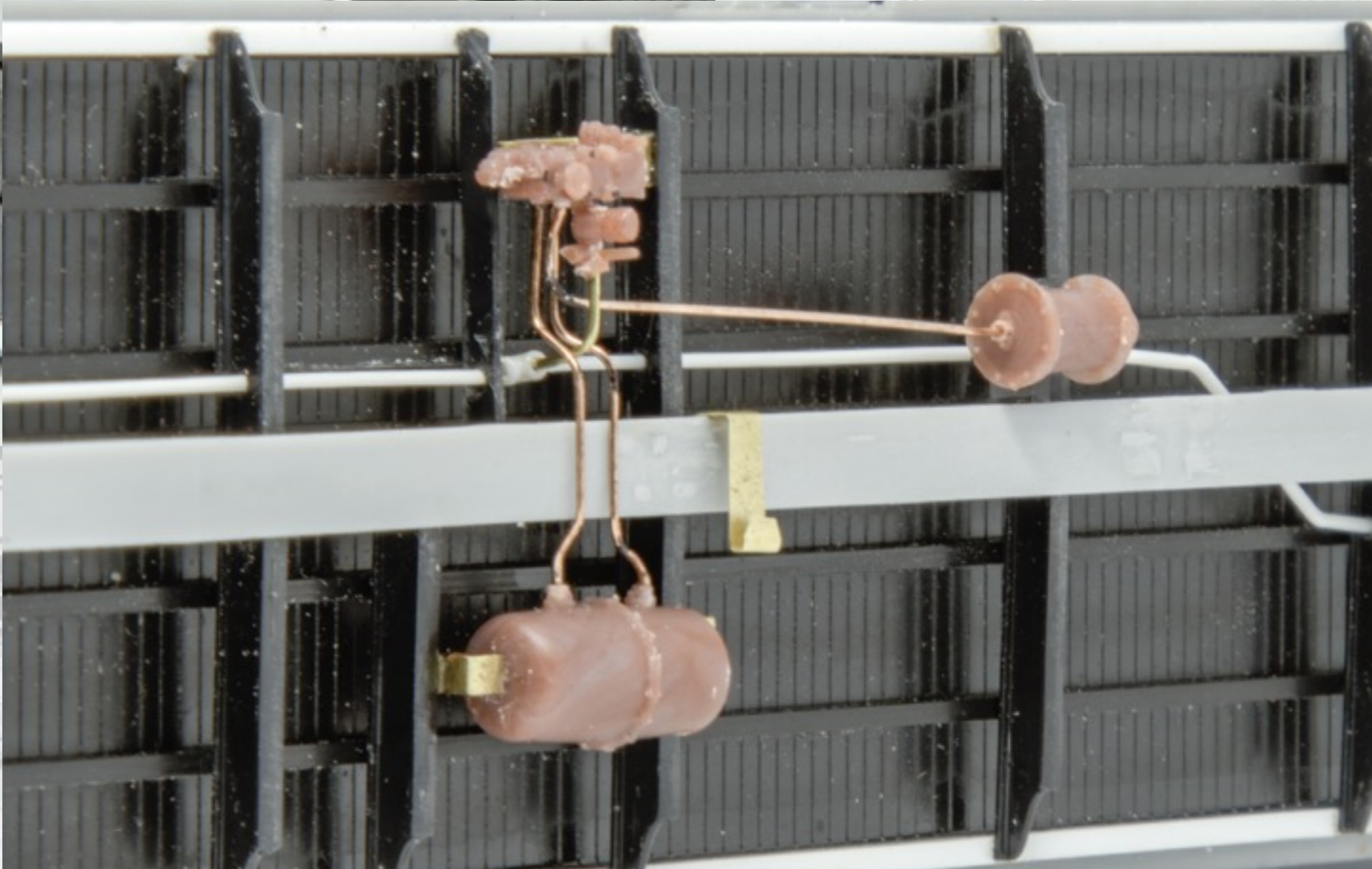
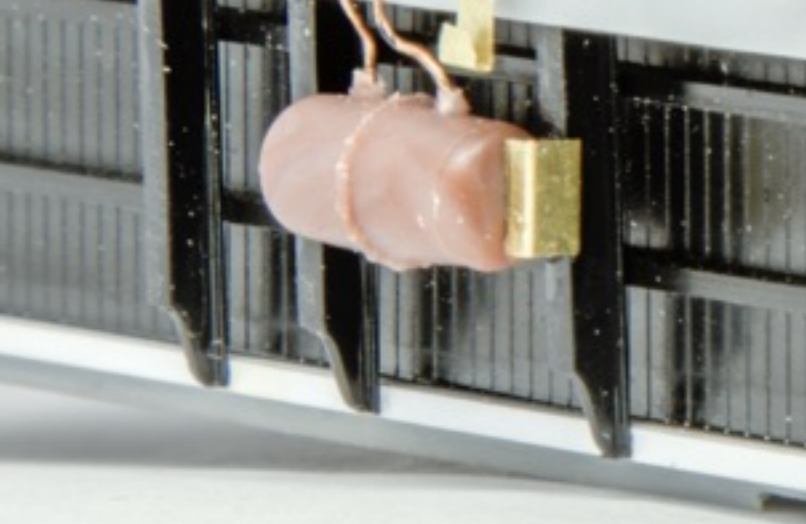
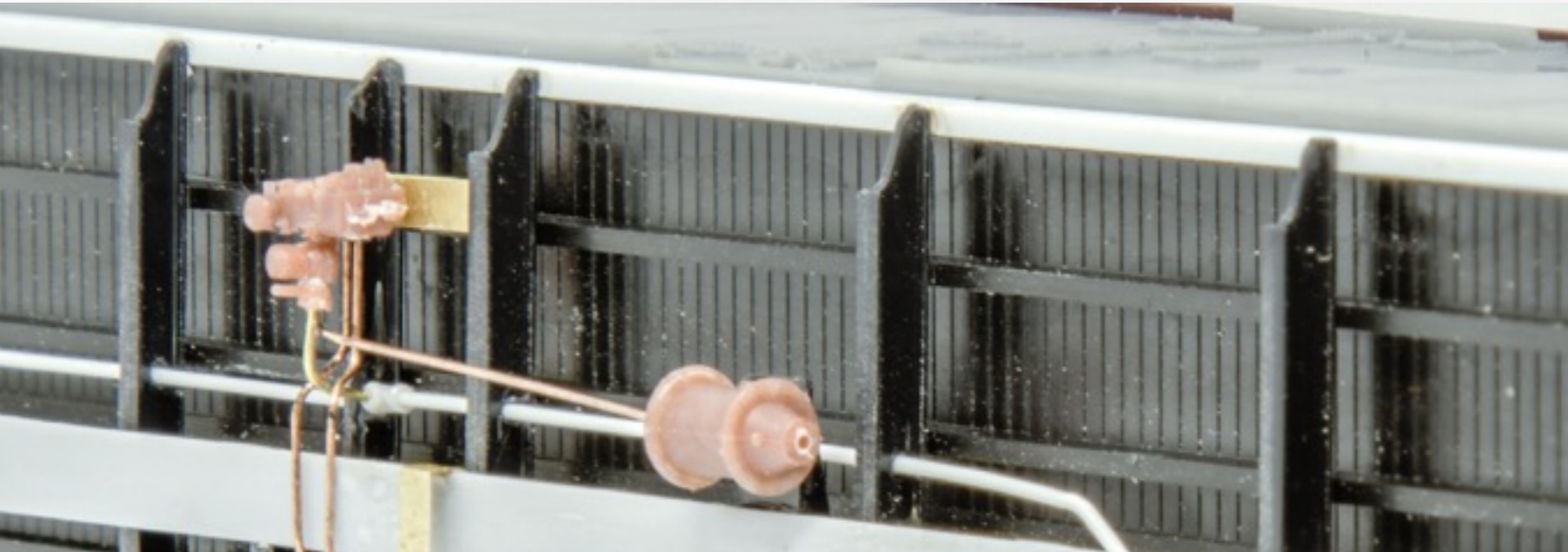
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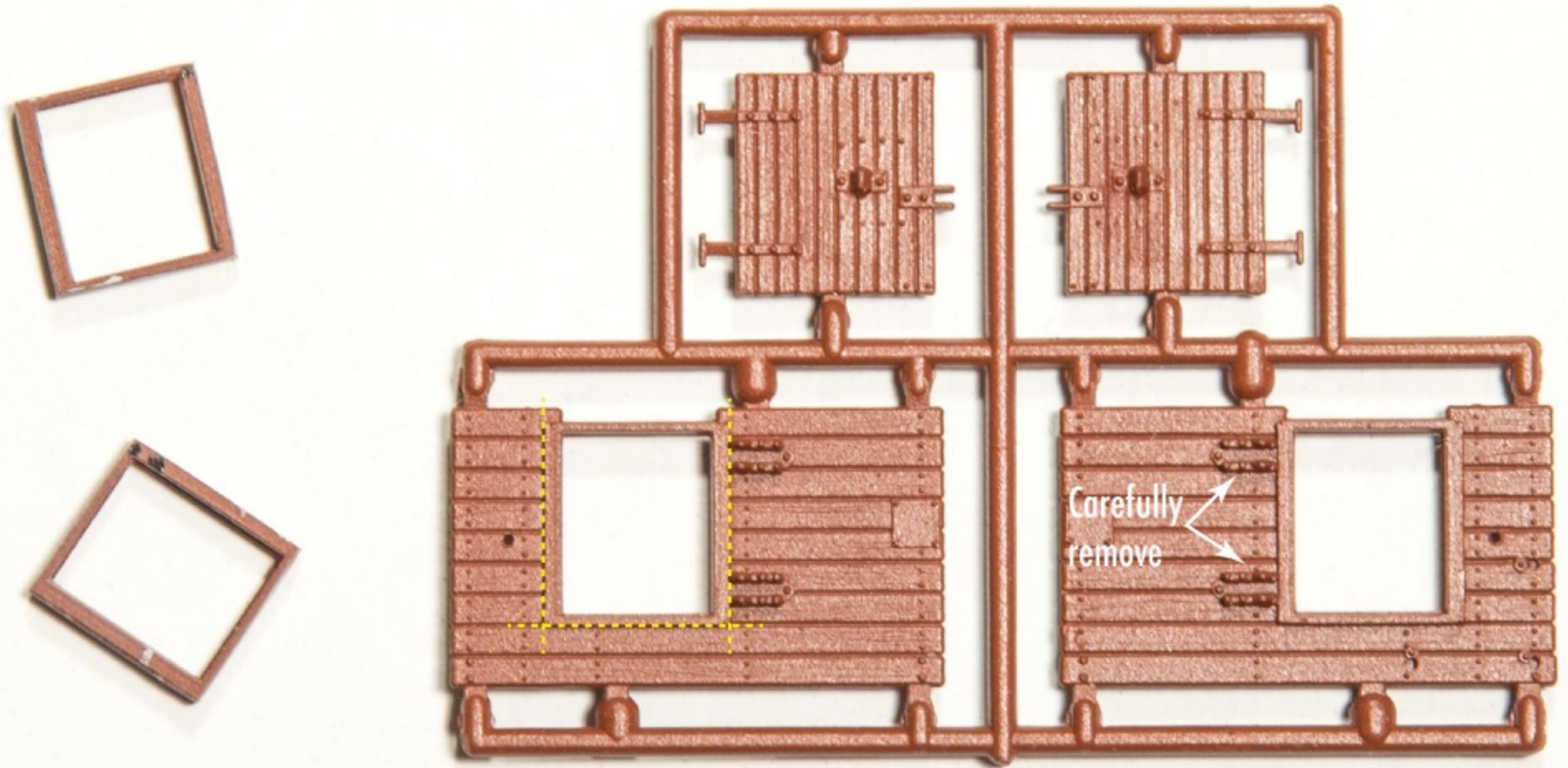
Modeling the Pacific Fruit Express - R-30/40-9



Modeling the Pacific Fruit Express - R-30/40-9

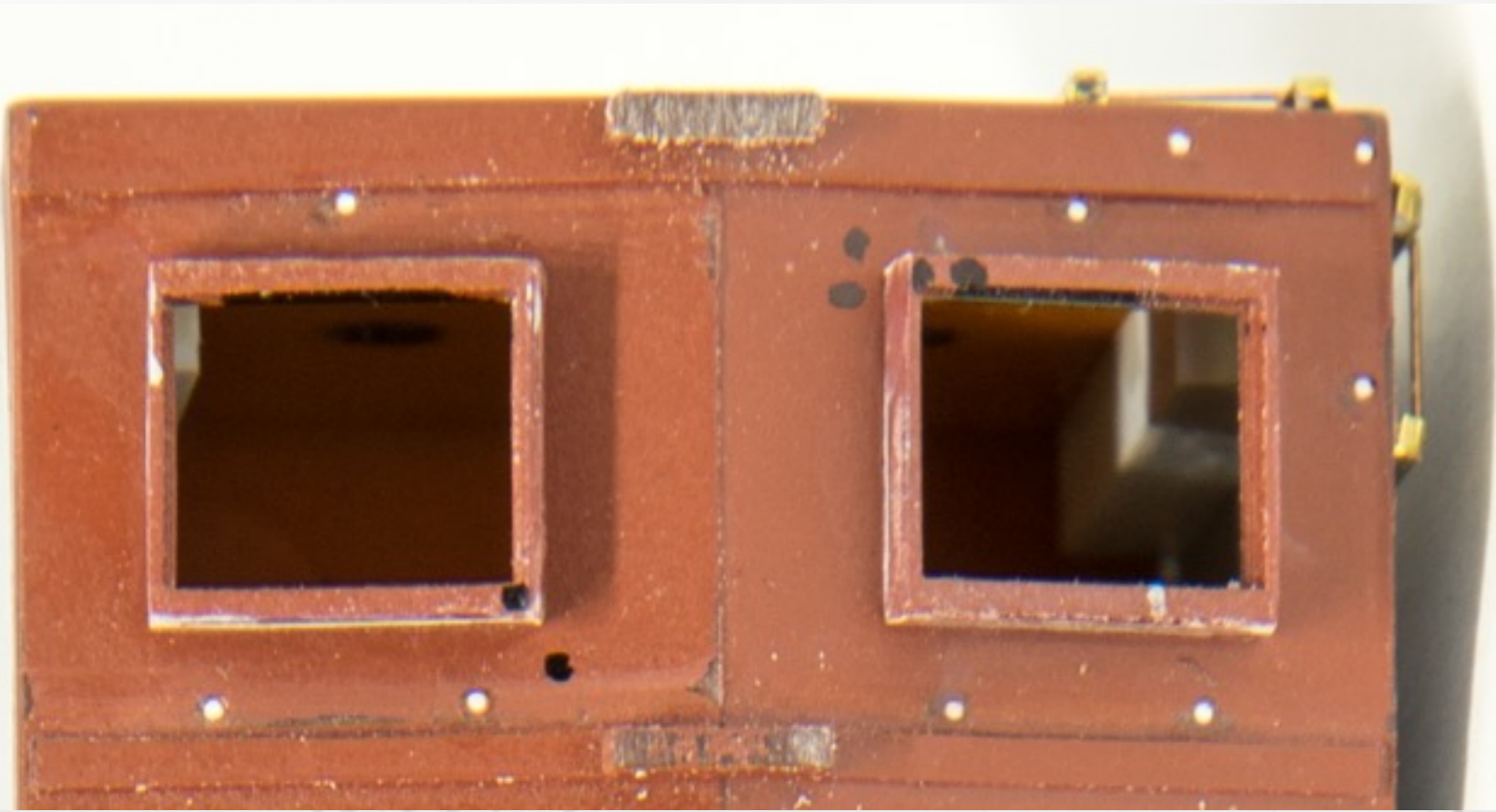


Modeling the Pacific Fruit Express - R-30/40-9

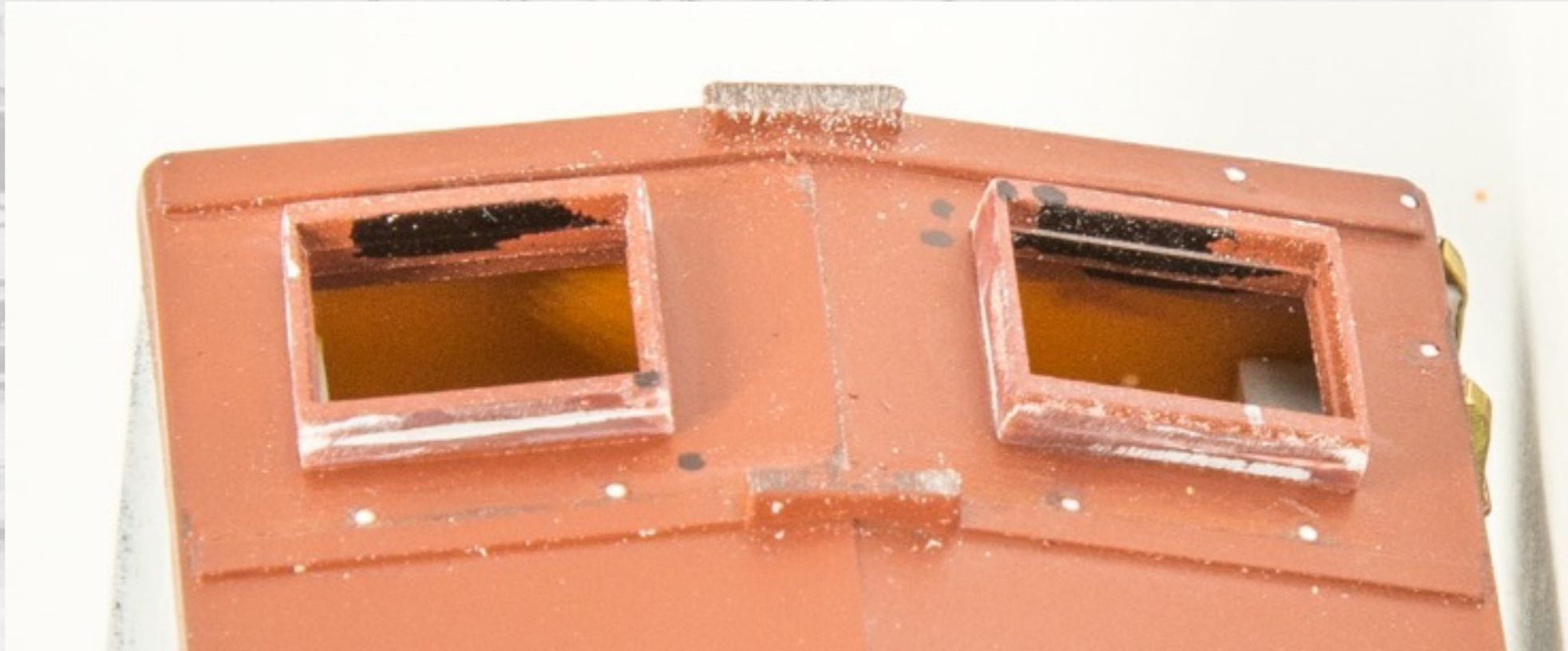


To replicate the hatches without hatch platforms, remove the platforms, but retain the hatches and the hatch hardware

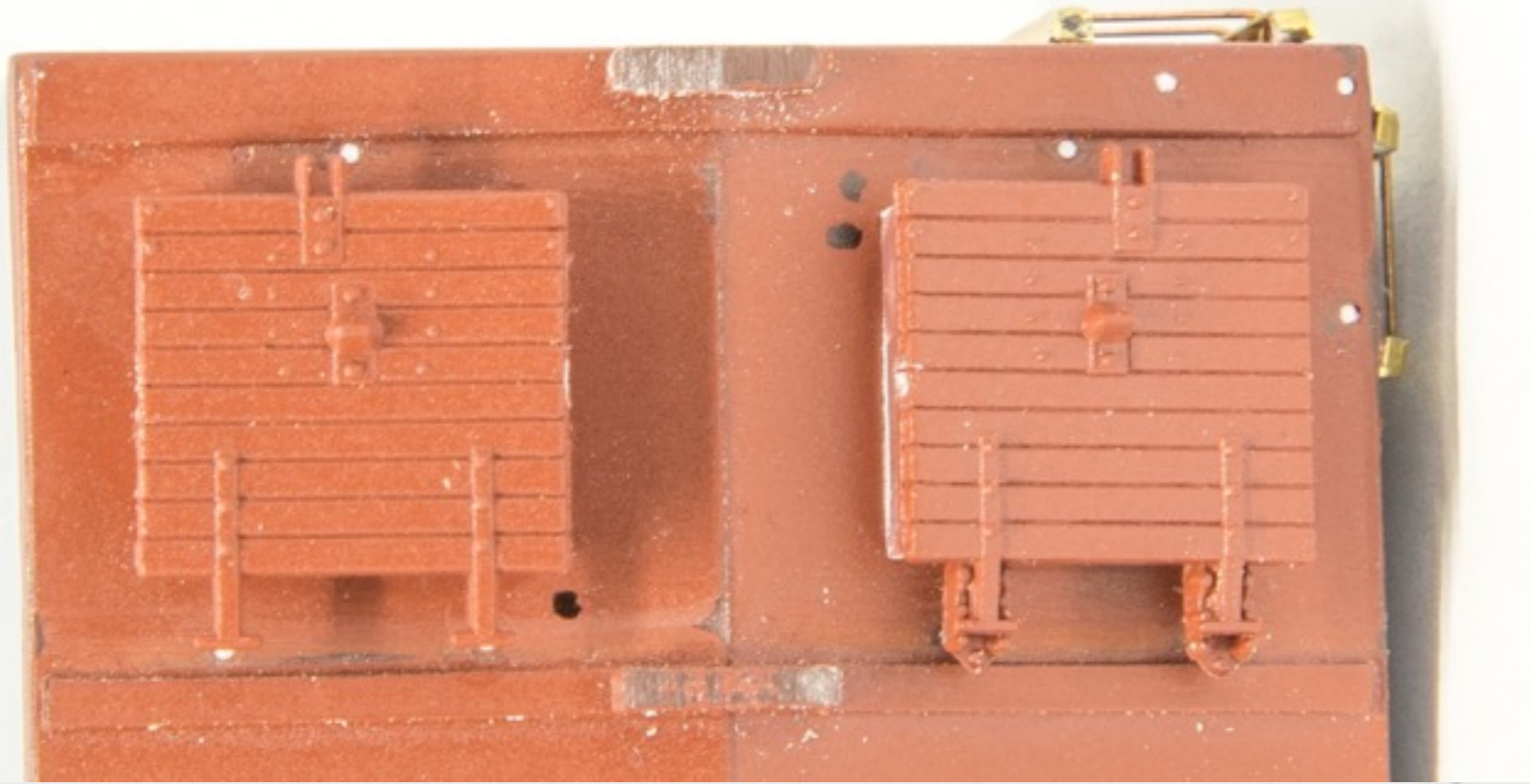
Modeling the Pacific Fruit Express - R-30/40-9



The hatches installed, after cleaning and sanding



Modeling the Pacific Fruit Express - R-30/40-9



The hatch covers were installed, followed by the hardware



Modeling the Pacific Fruit Express - R-30/40-9



To be continued...



Plywood Sheathed Freight Equipment: Prototypes and Models

References

- Dorin, *Great Northern - Lines East, Second Ed.*, Signature Press, 2001
- Thompson, Church, and Jones, *Pacific Fruit Express, Second Ed.*, Signature Press, 2000
- Thompson and Harley, *Southern Pacific Freight Car Painting and Lettering Guide*, SPH&TS, 2016
- GNRHS Reference Sheet no. 37 - Great Northern Plywood Boxcars, Series 10000 and 10500
- “Great Northern Builds Plywood Cars in Company Shops,” *Railway Age*, August 5, 1944
- “Plywood Used Extensively in Forty-Ton Refrigerator Cars,” *Railway Mechanical Engineer*, June 1944 [FGEX/WFEX]
- “Refrigerator Cars of Plywood,” *Railway Age*, January 23, 1943 [Wilson Car Lines]
- “Plywood Refrigerator Cars,” *Railway Mechanical Engineer*, February 1943 [Wilson Car Lines]
- “Plywood Sheathing on Canadian Pacific Cars,” *Railway Age*, July 4, 1942



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Hindsight 20/20 6.0

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