

NYCS Rail

By Dave Staplin

The NYC rail sections were less numerous than PRR's, but generally inferior in the heavier weights. The Dudley sections came in lighter weights than 90 and were used by some other railroads, Seaboard Air Line for one. Somewhere, I have a catalog of NYC/PRR sections and if I can find it, will post the Dudley sections. Some of them were never rolled.

During World War Two, there appears to have been an agreement between the railroads to limit the sections being rolled, especially one-of-a-kinds. NYC substituted 112RE for 105 Dudley, which had the same 5 - 1/2-inch base. So tie plates were interchangeable. Lehigh Valley substituted 131RE for its 136 LV section, but the bases were different and required different tie plates. By reducing the number of sections, the steel companies did not have to change rolls in the mills as often, increasing their output in the face of a large demand that had not been experienced in many years.

By the way, RE denotes that a rail section was approved for general use by the American Railway Engineering Association AREA then, AREMA now).

Following World War Two, NYC resumed buying 105 Dudley. During the War, a lot of 112RE was installed on the Big Four and Michigan Central. In general, the railway industry laid a lot of new rail during the War, as they had deferred doing so during the Depression and were faced with a large onslaught of traffic. Following World War II, as traffic declined and finances worsened, new rail purchases, especially in the Northeast dwindled again. Rail and Crossties were (and are) two of the largest railroad engineering budgetary items.

The trend from every railroad having its own rail sections to industry standards started at the turn of the 19th to the 20th Century and accelerated with the Depression. The first "modern" heavy rail sections were the 127 Dudley and 131RE, which was actually developed by PRR. At its inception the 127 Dudley was ahead of its time, but by 1945, it was obsolete. I use the term "modern" to denote stretching the height of the section without greatly changing the weight. While the 127 was designed new, the 131 represented a "stretching" of the 130PS section with a greater height and base width. This resulted in a higher moment of inertia about the neutral axis, which in laymen's terms gave the rail a better resistance to vertical bending. That was important for heavier loads, higher speeds, and unbalanced driving wheels and improved the life of the rail joints. These characteristics were inherent in the original design of the 127-pound section. It should be noted that some railroads went even farther with this

concept by developing "head free" sections, which is a whole additional discussion

However the "stretching" came at a price of thinner heads, thinner webs (in relation to height) and resulted in higher local stresses in the rail. The "stretched" sections in particular developed high stresses in the area where the head joined the web. With advent of control cooling, rail lasted longer and at higher stress levels, the next mode of failure (since transverse fissures were greatly reduced) was head/web failures. In particular, they were head separations from the web both in the joint (common) and the body of the rail (less common, but dangerous). In addition, vertical split heads (also dangerous) were an issue. Finally, the thin heads meant that with relatively little head wear; the wheel flanges could strike the top of the joint bars. The early Dudley bars for the 127 did not have a pronounced rib at the top of the bar, so they were less prone to the wheel flange striking the bars, but there was a downside to that in weaker bars. The issue with the "stretched" rails became apparent to railway engineers during World War II and the ARA undertook some studies to mitigate the issue. The radius connecting the head to the web was broadened and that solved the stress issue, but not so much the issue with joint bars being struck by flanges. Most of the major US roads adopted the resulting 132RE section for use in heavy traffic territory. The 112RE was similarly upgraded to 115RE. Base widths remained the same in respective sections, so tie plates were common.

The PRR struck out on its own and developed the 133 sections to replace the 131RE and while they were at it, developed a 140 section for heavier traffic. They also upgraded their 152PS section to 155 pounds for very heavy traffic. The designs of the 133 and 140 were so successful that the ARA adopted them. Union Pacific adopted the 133 RE as its standard and used it right up until recent years. The 140RE was adopted by a host of eastern roads, CNJ, Reading and B&O to name a few.

By the mid 50s, it became evident that continuous weld rail would be future standard for main line railroading and rail wear offered by the 132 section was not adequate. The Colorado Fuel and Iron Company (CF&I then, Evraz now) developed taller versions of the 132 (136) and 115 (119). They had the advantage of using common sized joint bars and base widths). Everybody in the west except UP wound up adopting the 136 and ARA approved it as a standard section. PRR and UP stuck with their 133, 140 and 155 which did not suffer from short heads.

Meanwhile, back on NYC, two things happened that later triggered a third event. The 127 pound Dudley section also suffered from high stresses between the head and web so NYC engineers, looking over their shoulders at what ARA had done, broadened the connecting radius, but kept the same nominal weight. This

resulted in the 127 Dudley Modified and I think it was first rolled around 1953 or 1954. The joint bar design had to be changed and both the top of the bar and the drilling were improved. As NYC was going through hard financial times, the Dudley Modified was not rolled in great quantities. But it performed relatively well and was greatly prized by track supervisors. The change in the top of the joint bar brought the short head to light as a weakness when NYC started welding all new rail and most relay rail about 1960. So NYC engineers took the 136RE and stretched the base from 6 inches to 6 - 1/4 inches, which matched the 127 base widths. Therefore NYC rail could be changed without buying new tie plates, an important economy feature for a cash strapped railroad. The majority of the resulting 136NYC was laid between Cleveland and Toledo, the heaviest long stretch of traffic on the NYC at that time.

With the advent of Penn Central, the 140RE was adopted as the standard for the merged railroad. But many miles of 127 Dudley jointed rail was reclaimed, cropped (removed bolt holes) and welded for reuse. By welding the rail, the head and web separations in the joint bar limits were eliminated as a problem. It was the same with the 112RE. However, the 105 Dudley, with its wide 5 - 1/2-inch base proved uneconomical to weld. To get such a wide base on a rail of that weight, Dudley had to make the base thin, which later caused problems in forging welds, where it deformed.

There are the rail weights for which I can find Dudley designs. This doesn't guarantee that there was actually rollings from these designs, but it does document the design.

Documenting old rail sections in the field is very hard because the mill brands are typically corroded except in very dry climates. Some of the earlier brands had section numbers from the steel company's catalogue and not the rail weights and sections were we are accustomed to seeing on modern rail. (70 DY75 DY80 DY85 SAL and DY90 NYC and Dudley95 Dudley100 Dudley105 NYC Dudley115 Dudley120 NYC127 NYC Dudley127 DYM)

It is also the case that seeing other light rail sections on certain NYC subsidiaries could be due to purchase/installation prior to NYC control.

It was typical of the late 1800s for rail section "families" to be developed. ASCE (American Society of Civil Engineers) had such a family. The American Railway Association (often branded as ARA) also had family. It was a predecessor to the today's AAR (Association of American Railroads). The Dudley designs constituted another "family."

More than anyone wanted to know, but while we think the Century had the Broadway beat, however in truth, the latter road had better rail sections.