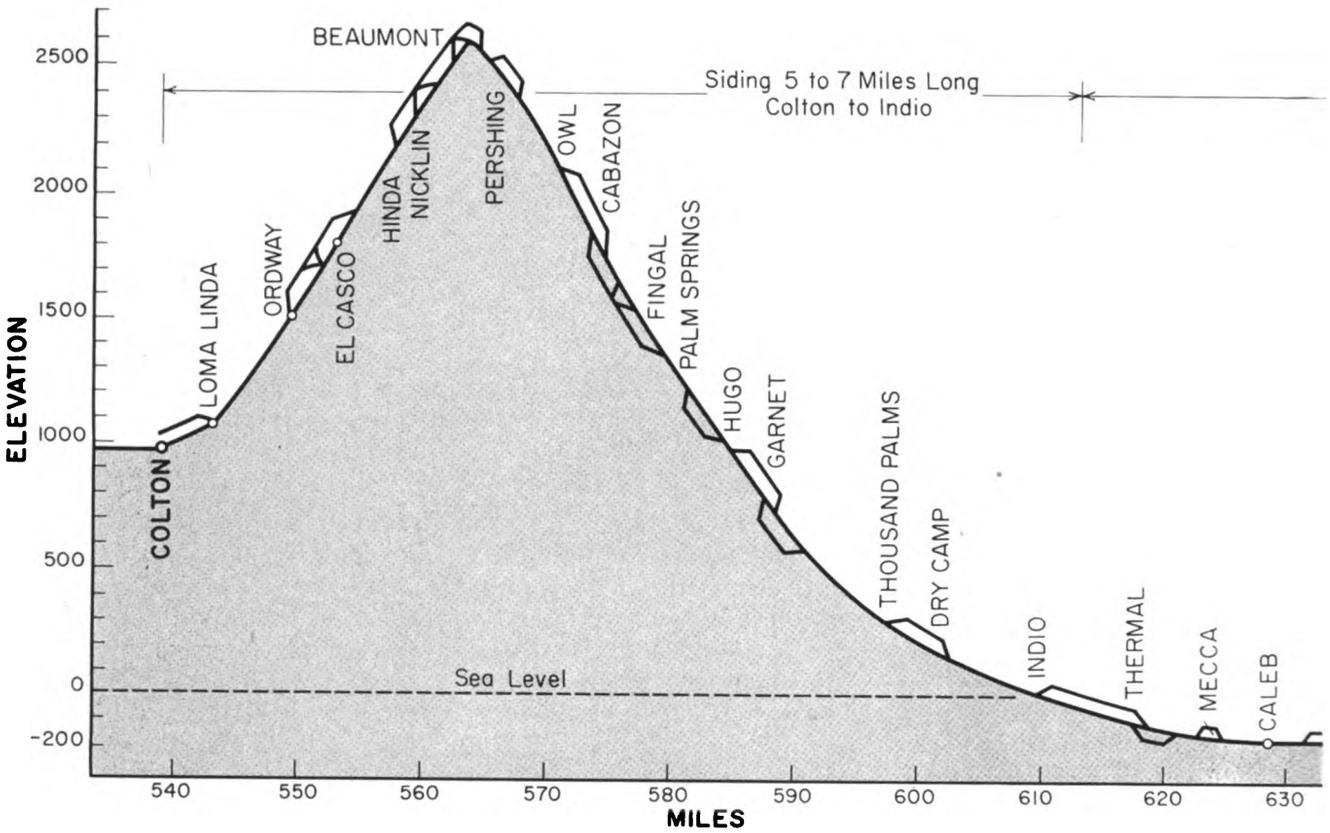


Sidings are 5 to 7 miles long on heavy grades on 72 miles between Colton and Indio

How Long Sidings Save Train Time

PROBLEM—To reduce delays on 194 miles of Southern Pacific busy single-track, Colton, Calif., to Yuma, Ariz., handling up to 35 trains daily.
SOLUTION—Delays have been reduced by hours, because practically all train meets are now non-stop on CTC territory with sidings about 9,000 ft. long, spaced an average of 8 minutes on 122 miles of easy grades, and sidings 5 to 7 miles long, with special signaling on the 72 miles of 1.0 to 1.9 per cent grades. New ideas—Approach signals on sidings as well as "high-green" over turnout, and flashing yellow for "call-on," are new signaling aspect practices which save train time.—

IN 1956 THE SOUTHERN PACIFIC installed centralized traffic control to replace automatic block signaling on 122 miles of single track between Indio, Calif., and Yuma, Ariz., and also numerous revisions were made in the sidings on 72 miles between Colton, Calif., and Indio, where CTC was installed several years ago.

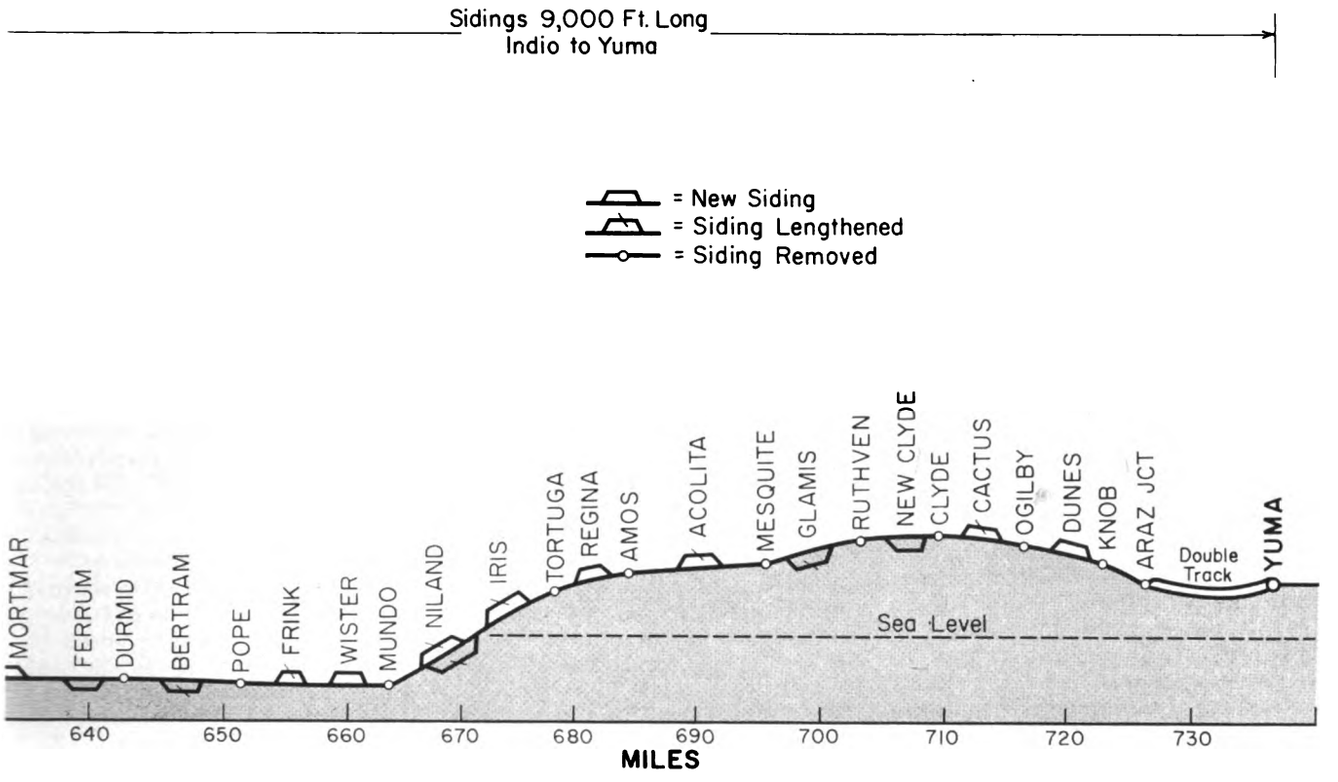
Six-Mile Sidings on Grades

As part of the 1956 project, the Southern Pacific made extensive track changes and signaling revisions on the 72 miles between Colton and Indio, where CTC had been installed in 1945. Starting at an elevation of 973 ft. at Colton, the grade ascends eastward at about 1.0 percent for 5.5 miles to Bryn Mawr, and about 1.5 percent for 17.5 miles to the crest of the mountains at Beaumont, elevation 2,569 ft. From Beaumont on east, the grade descends eastward (at 0.9 percent to 1.9 percent) for 20 miles to Palm Springs, and then at 0.4 percent to 1.8 percent, 20 miles on down to Indio which is 10 ft. below sea level.

Ascending these grades, either way, passenger train speed is about 25 to 30 mph, and tonnage freights, 15 to 18 mph. Descending these grades the passenger train speed is about 45 mph and the freights 25 mph. An important operating problem was to avoid stopping trains, especially on ascending grades, when making meets. The solution was to introduce very long sidings (5 to 7 miles) so that a longer period of time, 10 to 12 minutes, would be available in which to make a meet, with neither train being required to stop. Trains running at 25 mph or less, because of ascending or descending the heavy grade, would, in most instances, not be required to reduce speed while entering or leaving sidings.

Accurate checks were made to record train speeds, and exact time of numerous trains on each section of main track. On this basis, the very long sidings, 5 to 7 miles, were planned.

In most instances each long siding was made possible by building two or three miles of second track to connect two previous short sid-



Sidings are 9,000 ft. long on easy grades on 122 miles between Indio and Yuma

ings (6,500 ft.). To thus eliminate so many of these 6,500 ft. sidings would seriously reduce the opportunity for making close meets, especially between passenger trains. Accordingly this need was met by installing a pair of power crossovers between the main track and the very long (5 to 7 mile) siding, near the center of the siding or in other cases about 7,000 ft. from one end. With this arrangement, another advantage is that two trains of the same or opposing direction can use the long siding while another train passes on the main track.

What Track Changes Were Made

There was a long siding east from Colton for 2.6 miles to Loma Linda, and a similar siding, 2.4 miles, over the crest of the grade at Beaumont. At the mid-point of each of these sidings, there was a pair of crossovers between the two tracks so that the siding could be used as a long siding or as two sidings. Also, as installed in 1945, there were, between Loma Linda and Indio, a total of 20 single sidings, ranging from 6,600 ft. to 6,900 ft. About 13,532 ft. of track was built to connect the sidings at Ordway and El Casco, thus making a siding 5.1 miles long, with a pair of crossovers 6,500 ft. from the west end. Similar sections of second track were built to connect the previous sidings at Hinda and Nicklin, as well as from Nicklin to the existing long siding at Beaumont, thus making a total of 7.2 miles of siding, with a set of crossovers two miles from the west end and another set at Beaumont.

Track was built to connect Owl siding with the north siding at Cabazon, making 3 miles of siding. Also, track was built to connect the south siding at Cabazon with Mons, and from Mons to Fingal, thus making about 5.7 miles of siding. Sidings at Hugo and Garnet were connected to form 3.3 miles of siding.

On these long sections, the second track is designated as "siding" in-so-far as train operations are concerned. Actually these sidings are constructed and maintained for safe and efficient train operation at speeds up to 25 mph. The turnouts and crossovers are No. 14, good for diverging speeds at 25 mph. Because of the heavy grades, the main track speeds of freight trains in this section do not exceed 15 to 18 mph, when ascending grades, or 25 mph when descending, therefore these trains can, in many instances, enter or leave the sidings at normal speeds.

As part of this CTC project, numerous track changes were made to secure longer sidings, located on a time-distance basis. Now, each siding is a minimum of about 9,000 ft. long, so that, in most instances, opposing trains can meet without either train being required to stop. Based on a freight train speed of 50 mph, the time from the departing end of any siding to the entering end of the next, is approximately 8 minutes, which is roughly 6.7 miles, plus or minus. Double track, signaled for right-hand running, extends 8 miles from Indio east to Thermal. A new 9,000-ft. siding was built just east of Thermal. A 7,320-ft. siding at Mecca was extended 7,000 ft. providing a 4,000-ft. controlled siding, and a 5,200-ft. industry track at the west end. A 7,200-ft. siding at Caleb was removed. A new 9,000-ft. siding was built at Ferrum. A 3,600-ft. siding at Durmid, MP 642, and a 5,331-ft. siding at Pope, MP 651, were removed. The sidings at Bertram, Frink and Wister were lengthened to 9,000 ft. each. A 3,750-ft. siding at Mundo, MP 664, was removed. At Niland both sidings were lengthened, one to 12,740 ft. and the other to 10,829 ft. At Iris the siding was lengthened to 9,000 ft.

A 7,011-ft. siding at Tortuga and a 5,374-ft. siding at Amos were re-

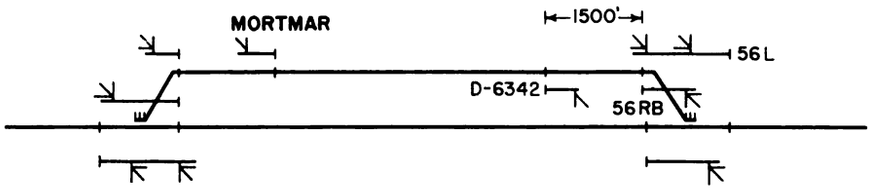
moved, a new siding being built midway, at Regina. Sidings at Acolita and at Glamis were lengthened to 9,000 ft., and a 5,507-ft. siding, midway, was removed. A 5,382-ft. siding at Ruthven, MP 703, and a 3,660-ft. siding at Clyde, MP 709, were removed, a new 9,000-ft. siding being built midway at Clyde, MP 706. The siding at Cactus was lengthened to 9,000 ft., and the siding at Ogilby was removed except for a single switch connected to a spur.

That no reasonable expense was spared, to put the sidings in exactly the correct places, is shown by the fact that a 6,936-ft. siding at Knob, between MP 722 and MP 723, was removed, and a new 9,000-ft. siding was constructed at Dunes, between MP 722 and MP 720. The distances from the east switch of the new Dunes siding to the west switch of the old Knob siding is only 500 ft. A study of train movements, since this CTC was placed on service, proves that the money for relocating and changing the sidings was justified by the savings in train time.

New Idea—Distant Signal on Siding

Each of these 9,000-ft. sidings is equipped with track circuits which enter into the control of signals. With a switch reversed, the aspect for a train to enter an unoccupied siding is red-over-green, which indicates "proceed on diverging route," speed governed by number of turnout, usually 25 mph. For example, referring to the plan, if an eastbound train enters the west end of the siding at Mortmar as directed by a red-over-green aspect, it should continue at that speed as far as this can be done with safety, rather than reducing to a slower speed.

Because of two curves near the east end of the siding, the engineman may have a short sighting distance to the leave-siding signal 56 RB. The same is true on other sidings. Therefore the Southern Pacific developed the practice of installing approach signals on sidings, such as approach signal D-6342. If signal 56 RB is displaying the Stop aspect, D-6342 displays "yellow," or if 56 RB is "Clear" then D-6342 is "green."



Distant signals on sidings, are new practice

High-Green Saves Time Over Turnout

Double track, with each track signaled for both directions, extends from Araz Junction 6.6 miles to Yuma. At Araz Jct. the single track connects to the double track in an equilateral turnout including a No. 20 frog, and 30-ft. switch points, the distance from point-of-switch to clearance being 403 ft. The curvature is so light that trains are authorized to move through these turnouts at 50 mph, on the "high green" aspect. A similar equilateral turnout is located at Thermal.

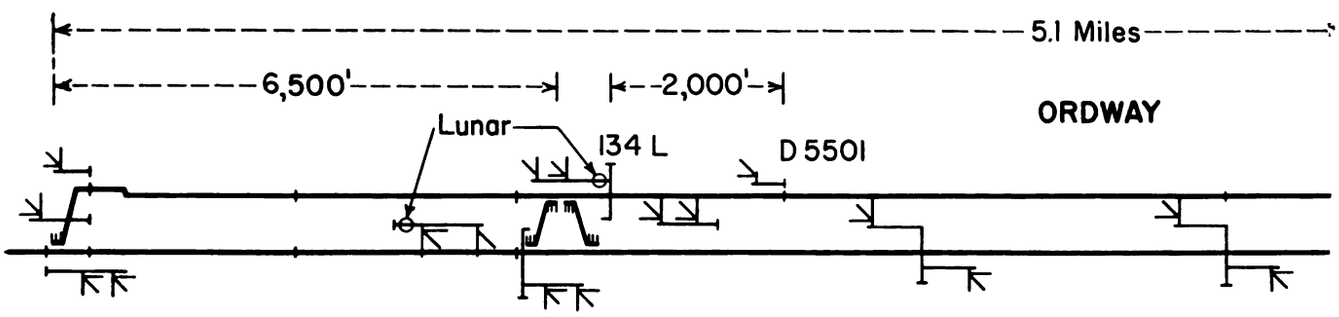
Special Aspects Avoid Stops

Having planned the extra long sidings (5 to 7 miles) an equally important factor was to provide signal aspects to direct trains to approach, enter, and proceed on these long sidings at maximum safe speeds. Some additional aspects, not previously used on the Southern Pacific, were required.

The track and signal layout at Ordway is typical. To enter an unoccupied siding the normally used aspect is "red-over-green" which indicates "proceed on diverging route," speed being governed by the size of the turnout, usually 25 mph. When this "red-over-green" aspect to enter an unoccupied siding is displayed on 136L, then the approach signal 5543 displays the "yellow-over-green" aspect. This gives the engineman advance information so that he can bring his train up to and through the turnout at 25 mph, whereas, if only the customary approach aspect "yellow" were displayed, he would have to reduce speed prepared to stop short of signal 136L. Thus the "yellow-over-green" on the approach signal avoids a speed reduction and thus saves time.

Normal aspect for a movement from the main track into a siding occupied by preceding train is "red-over-yellow," which indicates "proceed on diverging route at restricted speed." After a westbound train has entered the east end of the unoccupied Ordway siding it has approximately 4 miles to go at a speed of up to 25 mph, before arriving at the westbound home signal 134L located at the crossovers. Because of numerous curves, sighting distances to signals are short. Therefore, to give advance information, thus permitting trains to proceed at 25 mph as long as it is safe to do so, a westward approach signal, D-5501, is located on the siding, 1,500 ft. in approach to signal 134L. This use of a two-aspect approach signal on sidings is a new practice. This practice, in combination with the track circuit controlled aspect of "red-over-green" to enter an unoccupied siding as previously discussed, saves 3 minutes for a long train compared with an aspect that would indicate only "enter siding and proceed prepared to stop short of train or obstruction."

If the crossovers are normal, and the section of siding between the



This track and signal plan of the 5.1-mile siding at Ordway shows how the special

Thirty-Five Trains Daily

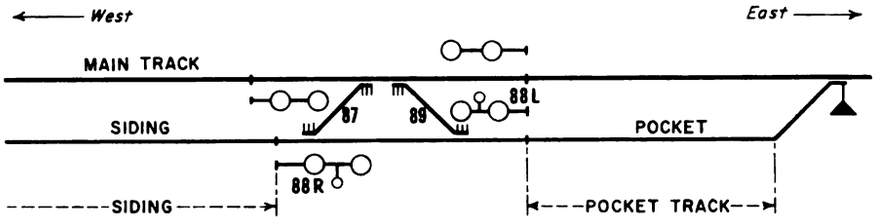
The traffic includes four passenger trains each way daily, the Sunset Limited, the Golden State, the Imperial and the Argonaut. The Arizona overnight "piggyback" and merchandise train is operated eastward Monday through Thursday inclusive. About ten through freight trains are operated each way daily. Iron ore, from mines on a branch line, are handled by the Southern Pacific, 121 miles, between Ferrum and a steel mill at Fontana, Calif., 50 miles east of Los Angeles.

From Niland a line extends south 41 miles through the Imperial Valley. In a typical year the shipments from this valley included 11,428 cars of sugar beets, 600 cars of watermelons, 869 cars of cantaloupes, 1,204 cars of carrots, 12,996 cars of lettuce. Thus, in addition to about 20 scheduled through passenger and freight trains daily, there are numerous local freights and "turns" from Indio to Ferrum and return, and from Indio to Niland and return. Helper locomotives are required on heavy grades—Colton to Beaumont, and Indio to Beaumont on all tonnage trains, and on passenger trains of more than 18 cars. The return of helpers, to the bottom of grades, adds to the number of train movements. Thus, on some sections of this territory, the number of movements daily may range as high as 30 to 35.

---

crossovers and the west end is unoccupied, signal 134L can be controlled to display "yellow." If the section of siding between the crossovers and the west end is occupied by a train of the same direction (westward in this instance), signal 134L can be controlled to display "red-over-red-over-lunar" aspect, this lunar lamp being mounted on cantilever mast below and in line with the two signal heads. This aspect authorizes a train to proceed without stopping at "Restricted Speed" prepared to stop short of a train of the same direction. This is a new use of the "lunar" as a signal aspect. If crossover 131 is reversed for the westbound train on the siding to diverge to the main track, then signal 134L can be controlled to display the "red-over-green" aspect and the approach signal D-5501 would display "green."

A point of special interest is that the 5 miles of main track along the siding is cut into five automatic blocks by three double locations of automatics and the home signals at the crossovers. The purpose for so many automatic blocks in this 5 miles is to provide every opportunity for trains on the main track (when making a meet) to keep moving without a stop, if the other train is just getting in the clear on the siding. Also these short blocks are an aid for following moves on heavy ascending grade. The extent to which signals are thus used in CTC is a new idea, developed by the Southern Pacific, and has proved to be an important factor in making non-stop meets. Another aid in making non-stop meets is the practice that the first train to arrive, regardless of class, is routed to the siding. Thus in many instances a passenger train is routed through a siding. However, it does not lose appreciable time in doing so.



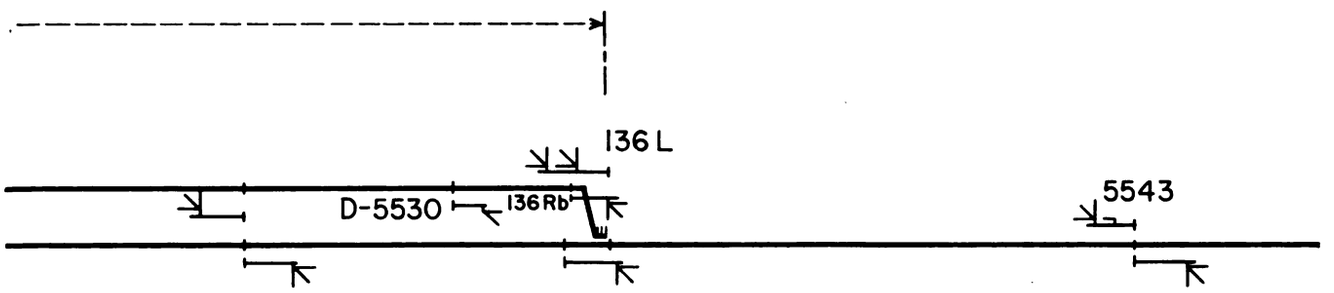
Flashing aspect for pocket track moves

Flashing Aspect for Call-On

At Niland the east end of the south siding is connected to the main track by a power crossover No. 87, and the siding track extends on east as a pocket track which is used to hold cars that have been set out or are to be picked up by through trains of either direction on the main track. A second power crossover, No. 89, makes such moves possible for moves in the other direction. For example, if a westbound train stops on the main line; cuts off the locomotive and is routed to the pocket track to pick up a few cars; then a special aspect, non-track circuit controlled, is required to direct the locomotive to go back to its train which is occupying the main-track circuit.

To meet this need, signals 88R and 88L are equipped with an extra lamp unit with a yellow lens. This lamp is controlled by a special toggle lever on the dispatcher's CTC machine. If the crossovers are in proper position and opposing signals are at "stop," the toggle lever to the right causes the yellow lamp in signal 88R to flash; or, if thrown to the left, the yellow lamp on signal 88L is flashed. Such an aspect authorizes the locomotive, with or without cars, after stopping, to go back to couple onto its train without calling the dispatcher.

The second half of this article will be in the next issue.



aspects are used to keep trains moving at the highest speeds that are consistent with safety