

# Expansion and Development of Santa Fe's Corwith Intermodal Facility

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The Corwith railroad terminal was established in 1888 as the eastern terminus for Santa Fe freight trains. The location of the yard at right angles to the main line was unique. The shape, short and broad, was sufficient for the trains of 100 years ago but hardly adequate for mid-twentieth century trains. The terminal was modified slightly during the ensuing years, but it took the tremendous increase in business during World War II and the beginning of the diesel era to bring about the complete restructuring of the yard facilities. That constantly changing transportation requirements could be fitted into this mediocre yard site is impressive. With the advent of piggybacking, it was necessary to purchase additional land for intermodal facilities. It is enlightening to briefly touch on the history of a yard site that was selected in the wild railroad expansions of the 1880s, has served continuously since then, and has developed into the largest intermodal terminal in the United States.

After almost a century of expansion, the big question for Corwith is "where do we go from here?" Corwith is already the largest piggyback facility in the United States and is still growing. Conceptual plans, now on file, offer the opportunity to further increase trailer-on-flatcar (TOFC) track capacity by 47 percent. In 1984 the number of units handled (trailer or container ramped or deramped) was 485,865, an average of 1,328 per day. March was the peak month with 45,027 units or one unit per minute for the entire month. The maximum 1-day performance was 2,100 lifts, which equates to one lift every 4.8 min for each of the six mobile gantry cranes and the one side loader. It is the consensus of the operating officials that 50,000 units a month can be handled through the existing Corwith intermodal facility.

None of this could have been envisioned during the wild railroad expansions of the 1880s. During the 20 years after its first construction efforts in Kansas, the Santa Fe had constructed, bought, or obtained trackage rights from Kansas City to the Pacific Ocean and the Gulf of Mexico, totaling more than 6,000 mi. Kansas City was no longer regarded as a suitable terminus and the railroad was extended to Chicago in 1888. Corwith had its beginning in the same year when a 190-acre site was purchased from Nathan Corwith. This site was developed as the eastern terminus for Santa Fe freight trains.

Whether by design or accident, the location of the terminal in relation to the main line was excellent. The yard, at right angles to the main line and a train length away, reduced train arrival and departure conflicts. It was the best possible arrangement for a switching yard in which all trains were to be broken up and reblocked for multidirectional outbound movements, primarily for transfer to other railroads. This arrangement is not practical for

set-outs and pickups or for run-through operations, but these are not and have never been functions of Corwith.

Unfortunately, the shape of the site, short and broad, became a handicap for mid-twentieth century operations. In 1888 steam engines were small, tractive effort was low, and trains were short. For many years the length of the site was sufficient for two yards, end to end, with room to spare.

Additions and alterations were made to the yard and eventually the layout consisted of a roundhouse, a storehouse, a car repair shop, and other support facilities in the middle of the 190-acre site. Yard tracks surrounded the buildings. The old arrangement, with occasional modifications, served its purpose well during the days of steam railroading.

With the tremendous increase of traffic during World War II and the coming of the diesel era, the yard deficiencies could no longer be ignored. The yard arrangement did not lend itself to efficiency of operation and was inadequate to properly handle the growing demand. More than half the tracks were less than 3,000 ft long, which caused considerable doubling and delays. Inadequately designed lead tracks further contributed to poor car handling and added to the congestion.

In 1949 restructuring of the entire Corwith facility was authorized to better use the available land. The old buildings were removed from the middle of the yard and new buildings were constructed along the west side and at the corners, thus providing longer tracks and better grouping of associated yards. The 9-year project came to a climax with completion of the "push button" retarder yard in 1958. Storage capacity was increased from 4,600 cars to 6,100 cars and working capacity from 1,500 cars to 3,000 cars. New facilities included

- A 32-track retarder yard,
- A 16-track inbound-outbound transfer yard,
- An eight-track hold yard,
- A nine-track local yard,
- Three large freight houses,
- A car repair shed,
- A diesel shop,
- A terminal office building,
- A storehouse, and
- An icing dock.

All of these additions were on the original 190-acre site.

But while this "state-of-the-art" construction was being completed, a new method of freight han-

dling was evolving. Santa Fe began experimenting with transporting trailers on flatcars in 1952. Semiperishable products were successfully moved in Dry Ice trailers. By 1954 TOFC service was offered from Chicago to California and the Gulf of Mexico on expedited freight trains. But during the Corwith reconstruction period, the emphasis was still on boxcar traffic and freight forwarder operations. Piggyback facilities were not a major consideration in 1958 and were, therefore, relegated to a small area at the south end of the yard.

The facility consisted of four stub tracks, two movable steel ramps, and two wooden ramps. This was expanded later to eight tracks with a total capacity of 34 88-ft flatcars.

With the realization that piggybacking was not a passing experiment came the need for long-range planning. Major considerations included evaluation of the possible arrangements of tracks and facilities on the available land, possibilities of obtaining additional land either at Corwith or at a new location nearby, and projection of intermodal growth and impact of truck traffic on city streets.

It was decided the transportation needs could best be fitted to the operating conditions and expansion possibilities available at Corwith. Accordingly, a parcel of land adjacent to the east side of the Corwith Yard was purchased in 1959 and the ramp operation was moved to the new parcel in 1960. Nine ramp tracks provided loading space for 68 cars thus doubling the working capacity in one move.

The 1959 land purchase was followed by the purchase of other contiguous parcels in 1961, 1962, 1971, and 1977 for a total of 130 acres dedicated to intermodal activities.

It was fortunate that this property was available in the early stages of transition from boxcar to piggyback. Traffic density was high in the switching yard and no tracks could have been released for loading trailers in the 1960s and 1970s.

As the expansion to the east continued, the distance from the longitudinal axis of the Corwith Yard increased, thus increasing the lead lengths and decreasing the effective working capacity of the strip tracks. It has never been economically feasible to lengthen the yard because of physical restraints at each end. The longest piggyback tracks at Corwith, in its present stage of development, have a capacity of 38 cars.

New design approaches were necessitated by the introduction of a mobile gantry crane at Corwith in 1964. In light of the new loading procedures, the best use of the land was reevaluated and a plan was developed to meet requirements as far into the future as limited experience and questionable projections would permit.

Most of the engineering design for the new loading methods was routine in nature and presented no particular problems. But the design of the reinforced concrete strip runways for the mobile gantry crane did not produce the desired service life. The intermodal yard is built over swampy land and foundry cooling lakes filled over with foundry waste material. The heavy traffic has now settled and stabilized this underlying material and modification of the concrete strip design is producing satisfactory results.

The first concrete ribbons were 4 ft 0 in. wide x 8 in. thick with a layer of reinforcing mesh. These were replaced with 6 ft 0 in. x 12 in. strips with two layers of reinforcing. Number four longitudinal bars were 8 in. on center and the number three transverse bars were 48 in. on center. This design was fairly successful but was later improved by thickening the edges to 18 in.

In 1970 the strip was widened to 9 ft 0 in. to better accommodate the gantry crane operations. The

edge thickening and reinforcing is the same as that for the 6 ft 0 in. section. The Santa Fe is surely going to be looking closely at the roller-compacted concrete concept.

Intermodal business grew along the lines of the most optimistic forecasts and the Corwith complex kept pace by adding more strip tracks, more equipment, faster checkpoint procedures, better computer control, better trailer location and retrieval methods, and better interdepartmental cooperation. The equipment presently assigned to the Corwith intermodal operation consists of six mobile gantry cranes, one side loader, one portable ramp, and 29 yard tractors supported by a pool of 88 ramp men and 33 yard hostlers. The facility has six strip tracks plus one short container track with a total capacity of 212 cars. Parking for 4,200 trailers is provided.

At one time it appeared that road traffic to the facility had reached the predicament ascribed to Toots Shor's famous Broadway restaurant by Yogi Berra when he said, "Nobody goes there anymore, it's too crowded."

Relief was provided by moving the checkpoint, expediting inspection procedures, and making full use of computers for in-out record keeping. Santa Fe experience indicates that truckers prefer a large intermodal terminal when it is well organized. One of the principal reasons is the decreased likelihood of bobtail trips.

Santa Fe has pioneered many of the gate developments in the industry because the company slogan of "seeking a better way" was given a considerable boost when the inbound trailer traffic began blocking Chicago streets.

The in-out check system began with a small fenced in area controlled with a pipe frame gate close to the street line. Ground inspections were walk around. Top-side inspections were made from ladders. All communications were verbal and records were handwritten.

A new era of TOFC facility management dedicated to security, efficient checkpoint procedures, and smooth traffic flow was ushered in with the construction in 1971 of a modern two-story terminal building with space for supervisory staff, clerical forces, and operating personnel. The control tower atop the building provides a vantage point for monitoring yard activities.

This was followed by a new yard entrance about 1,000 ft northeast of the terminal office and well away from any city streets. This checkpoint shortens inspection time for trailer acceptance. It has five roofed inspection lanes, two bypass lanes, and a two-story office building to house the checkpoint personnel.

Drivers use talk-back speakers located ahead of the entrance to give preliminary information about their trailer shipment and receive inspection lane and parking assignments. The driver remains in his cab throughout the entire check-in and inspection procedure.

The freight controller, located on the second floor of the checkpoint office building, enters all information into the computer system for immediate transfer to using agencies. He also assists with trailer roof inspection. The control tower operator at the TOFC building can monitor and direct all ground movements and loading-unloading progress for efficient internal operations.

Enough cannot be said for the progressive management of the Corwith intermodal facility. Unique applications of new technical, electronic, and management concepts keep the system functioning at an average production of more than 1,300 units a day and make it look easy. American Railway Engineering Association (AREA) Committee 14, Yards and Terminals,

classifies a high-volume intermodal terminal as 300 and more lifts per day. The Corwith terminal has handled 2,100 lifts in 1 day.

The industry trend toward the "hub" concept or the "centralized intermodal terminal" has reduced the number of terminals to fewer than one-third of the number in existence 12 years ago. Santa Fe has gone from more than 100 terminals to 27 terminals and finds the large terminals to be more efficient.

Each intermodal yard is unique and requires special design features to best match the available resources to the designated role in the transportation system. Corwith, which is short and broad, was limited from the beginning to a basic design that would make best use of short tracks. The tracks had to be as close to the longitudinal axis of the existing yard as possible to avoid unnecessary reduction in length. The area remaining on the street side of the site was prepared for trailer parking. The checkpoint gate is located on the same side as the parking lots, thus providing convenient trailer drop-off or pickup without interfering with track-side traffic.

Good ground traffic circulation provides about industry-average cycle time for support activities. Trailer movements in the track area are expedited by center crossings over all six tracks, thus eliminating end runs to and from trackside unless it is more advantageous to cross at the end crossings.

Loading, unloading, and switching operations are keyed to train arrival and departure. These estimated times are available to all personnel engaged in planning and are constantly updated for accuracy.

The basic operating plan requires the center trailer crossing to be open as much of the time as possible. Inbound TOFC trains are yarded on one of the strip tracks. The center crossing is immediately cut and cleared for trailer crossings.

Transferring cars between the TOFC yard and support yards is accomplished by switch engines working at each end of the yard. Cars are pulled away from the center crossing to the ends of the yard thus avoiding blocking the center crossing.

Ordinarily, outbound trains are assembled in the outbound yard alongside the TOFC yard. However, if the train can be run from the TOFC yard without delaying loading-unloading operations, it will be done. Obviously, switch moves and transfers of cars between yards must be closely supervised and expedited to take advantage of windows in the train schedules.

In the Corwith expansion, it was essential to recognize the monthly as well as the weekly cycles in ramping and deramping requirements. Design could not be based on averages. March and October are historically the busiest months. Loadings peak on Fridays, most generally, and will be more than three times Sunday loadings. Unloadings peak on Sundays and Mondays and are about twice Wednesday unloadings. Overall, the number of lifts is about 150 percent greater on Fridays than on Sundays.

Obviously, with these large fluctuations, accumulating a supply of flatcars for weekly peak loading is a major operational chore. To properly protect the Corwith operation, more than 1,000 empty flatcars must be available at the beginning of the week. By weekend, this holding will be reduced to nearly zero.

Good planning based on a 7-day traffic projection determines where the 1,000 to 1,200 empty cars can best be held to avoid conflicts with other railroad operations. No single available yard will hold all of them.

As many cars as operating conditions will permit will be held in the inbound-outbound yard adjacent to the TOFC yard, but train arrivals and departures

have priority in this active yard. However, as many as 500 cars may be held on 13 tracks, other business permitting.

Second choice is the 34-track hump classification yard. Track space for approximately 265 cars is usually available here on seven tracks.

Third choice is in the satellite yard known as the Junction Yard approximately 1 mi distant. Space for 400 cars is usually available here on 10 tracks. An additional 75 cars may be held on one of the main-line tracks and 75 more on the Willow Springs siding.

Each unique facility design requires a unique operational procedure. Bad design cannot be entirely overcome by good operational procedures, but good design supplemented by good operational procedures can turn a mediocre yard site into a superior producer. It is because of local management expertise, cooperation, and in-depth understanding of Corwith operational requirements that such a large intermodal terminal can function efficiently and on time.

The changing role of Corwith is dramatically portrayed by comparing the 1964 traffic mix (TOFC 40 cars per day, general freight 980 cars per day) to the 1982 traffic mix (TOFC 480 cars per day, general freight 560 cars per day). During this transition, more and more of the Corwith resources were committed to intermodal support functions. The dual functions at Corwith are compatible as long as the combined space requirements do not regularly exceed the capacity of the facility.

The entire 320 acres of land at Corwith are fully used and there is little chance for further affordable acquisitions. Does this mean that intermodal expansion at Corwith is finished? Not at all. Because of the shift in freight-handling methods, the Corwith retarder yard is no longer needed. More of the old yard tracks can be used as needed in intermodal yard support and a few tracks can be dedicated exclusively to intermodal operations. This will be the most pressing need in the next expansion because no more space is available for strip tracks on the east. By replacing old yard tracks with new strip tracks, the expansion will reverse direction and move toward the longitudinal axis of the yard permitting longer TOFC tracks. It is this approach that has led to the conceptual design to provide an increase of 47 percent in total strip track capacity.

Because of deregulation, technical and procedural problems (especially in container-on-flatcar handling), possible merger consequences, imbalance between loads and empties, economic uncertainties, and the leveling off of intermodal business in 1985, any near-term expenditure on the Corwith intermodal facility will probably be a "cautious expansion."

Intermodal business is not merely a numbers game because growth is not always rewarded with increased profits. Technical developments in trailer and container handling may require large expenditures in the future, just to remain competitive. Area market saturation may be a real concern, in which case any additional TOFC business will probably come from convincing trucking companies that intermodal is more efficient for long hauls. Railroads may in some cases be competing where intermodal is not the most efficient method and profits are marginal. Deregulation provides a freedom of competition to some modes of transportation that cannot be realized by the railroads, which operate under the restraints of antiquated work rules.

But no matter what happens in the future, Corwith is well positioned, as it approaches entry into its second century of operation, to continue the present level of operation, accept a greater proportion of general freight, or continue to expand into an even larger centralized intermodal terminal.