

LAYOUT DESIGN WITH A PASSENGER TRAIN EMPHASIS

A clinic presented to the National Model Railroad Association, Portland, Oregon, August 23-29, 2015 by Robert A. Clark

The premise of this clinic is that a passenger train oriented layout can be designed, built and operated just as well as the traditional freight dominated one. Most track plans minimize passenger train facilities and trackage. This is common to virtually all writings on layout design, and leads to the usual layout with its two or three track passenger terminal with the tracks being used for passenger car storage as well as arrivals, departures, and servicing. This is “selective compression” with a vengeance.

Operation of passenger trains on home layouts also has been discounted, although passenger train operation is fairly well discussed in the publications. Freight trains appear to offer a lot of switching possibilities compared to passenger trains because model rails think of passenger service as it is today. Fixed consists that are run from originating city to destination city undisturbed by switching enroute are now normal, although they were once quite rare. As late as 1967 you might have found yourself riding a car switched into as many as five trains in a through service between Houston or Dallas and Richmond (California)/Los Angeles operated by the Santa Fe, which necessitated much switching enroute (see my *California Special* article in the NMRA Bulletin).

There is no reason a layout should not feature passenger trains, terminals, and operations as an alternative to freight trains.

Handout Organization

This handout focuses on layout design, with a brief closing section on operations. A companion clinic on passenger terminals and servicing facilities was presented at Milwaukee in 2010, emphasizing prototype details and specifications illustrated by slides. The 2010 clinic is available on the NMRA clinic CD for that convention

The layout design discussion begins with a section on “conceptualizing the trains” (what Andy Sperandio recently called “start with a theme” or “define the railroad you want”). The concept centers on the passenger trains that are to be operated on the layout as impacted by era and consists/services. Overall layout design, including staging and main line, is discussed next. Layout Design Elements features engine servicing, turning trains (wyes and loops), the passenger terminal (tracks and platforms), mail and express facilities, commuter yards, and coach yard modeling (service buildings and platforms).

Operation in terminals, in the coach yard, and on the main line (through stations, junctions {merging and separating trains}), is the final topic. Credits and references close the handout.

LAYOUT DESIGN: CONCEPTUALIZING THE TRAINS

To design a layout that satisfies your needs, create an operations scenario.

What era?

What kinds of passenger trains/consists?

What market or function do these trains serve?

What train length/number of cars?

Ideas on how to conceptualize passenger train operations are found in “Passenger Train Operations on the Chesapeake System” by Bruce Alcock and Michael Raskob in the August 1996 issue of Model Railroader. Their basic idea is to imitate routes and services on prototype railroads serving the geographic region in which your railroad is set (easy if you are modeling a particular prototype). Devise a system map. Calculate distances between major cities. Compute running times between the cities. Choose consists and services serving these cities. Plan staging for trains to be operated (some cities/terminals are “beyond the basement”). After planning is completed, provide information for your layout operators: train schedules, consists, switch lists. Finally, practice operations, perhaps with just a

snap track setup imitating the layout design to start. Then rehearse schedules on the actual layout to develop your timetables.

Perhaps the best model railroad featuring passenger train operations and servicing buildings was Chuck Hitchcock's as written up in [Model Railroad Planning 1997](#), "Twelve Hours at Argentine". Also see his earlier article in [Great Model Railroads 1991](#). The plan for the key terminal on this layout and the use of staging tracks are discussed in Koester, [Realistic Model Railroad Operation](#), pages 32-33. There is also a Keller video/DVD of this layout.

ERA

The choice of era will have a major impact on train length and composition, as follows:

1930's – Shorter consists as the depression has reduced train lengths. Local trains disappear as automobile use expands. Diners, Pullmans and coaches air-conditioned resulting in roof "bubbles".

1935-1941 – New lightweight streamlined cars replace equipment on top name trains. All coach streamliners appear.

1942–1946 – War (troop trains) and demobilization result in very heavy traffic: every car in use with long consists.

1946-1955 – New streamlined cars and trains slowly come off production lines. More locals disappear.

1956-1967 – Passenger traffic declines rapidly, losing ground to jets and autos. Fewer trains with fewer RPOs. In 1967, loss of mail and railway express revenues greatly reduces number of passenger trains.

1968-1971 (pre Amtrak) – Only one short train left on major routes.

PASSENGER TRAIN CONSISTS

To understand passenger terminals, we need to understand passenger train consists. There is a logic to passenger train consists. Cars are placed in a particular sequence for a number of reasons. We need to understand car types to create consists that look right and provide for prototypical operations. See my article in the January and February 2002 [Model Railroading](#) and Reddie's article in May 2003 [Model Railroader](#).

The consists of trains varied by function/market. Car types were picked with an eye to the services to be provided. The Pullman Company designed certain cars for particular classes of service, such as short overnight trips as distinguished from long transcontinental runs of more than one night. In the streamlined era, sleepers were often hand tailored to expected demand for sleeper space: this led to such peculiar configurations as 4 section, 7 duplex roomette, 3 bedroom, 1 compartment cars on Great Northern's streamlined Empire Builder. Each type of car had to have a facility to service it.

I was questioned at previous clinics about my stress on adherence to prototype practices, particularly with respect to time dating/era. There is an increasing interest in the hobby on accurate modeling, including passenger trains. But on your layout, you are free to do what you like.

There is also the problem of accuracy and availability of passenger car models. In HO, the variety is increasing in both mass produced cars such as Walthers and custom kits with car sides of plastic or brass. And both brass and plastic train sets are continuing to be provided with ever more accurate cars

If you like trains with a rainbow of different colored car sides, pick a prototype that forwarded through cars to other railroads, each in the home road color schemes. Also, off-line cars in their home road paint schemes were often leased, to cope with traffic variations or shortages of needed car types (e.g. the foreign road sleepers in the summer California Zephyr).

Heavyweight Era Consists

What types of passenger train consists might be seen and what car types might be involved? The following are quite typical of the heavyweight era:

1. day express - through coaches, with a baggage car and possibly a railway post office car (RPO) on the headend, and some form of food service (diner-lounge, buffet-observation); possibly a parlor car or sleeper with space sold as parlor seats.
2. mail and express - an RPO to work mail and several baggage style cars used for mail storage (those next to the RPO open, end door unlocked, so pouches and sacks can be worked enroute), express (again in baggage style cars), baggage car, and perhaps express refrigerators or horse cars, with a rider coach to carry the crew and any hardy traveler who didn't mind a fast, rough ride.
3. overnight service - a coach and sleeper train, with head-end cars (baggage/storage mail/express and RPO), coaches, food service (full diner and separate lounge or diner-lounge), Pullmans for short haul use (more single accommodations such as sections for businessmen instead of compartments for families), and perhaps an observation with sleeping and lounge space. For a short, model railroad length train, try a baggage-RPO combine, two coaches, and Pullman sleeper-buffet-sunroom combination - the depression era Erie Limited.
4. transcontinental service or prestige overnight train - this could be an all Pullman train, with head-end cars including express refrigerators (although many prestige named trains would not carry head-end cars), club baggage with barber chair, several Pullmans of varying configurations to cover all pocket books, a full diner, and an observation-sleeper-lounge.
5. secondary long haul service - most transcontinental and prestige trains had a companion run, slower, making more stops, with less elegant facilities and perhaps using equipment which previously had been used on the top train, with coaches added, possibly separate food and lounge space for the coach passengers who were barred from Pullman country which was marked by the diner for the first class trade.
6. day accommodation - how about an eastern milk train with milk cars, baggage and express cars, a few older coaches, and possibly a diner-lounge?
7. commuter - coaches, with possibly a combine to offer limited baggage service off-peak, and maybe a club car for the tired, thirsty businessman on his way home in the evening.

In the heavyweight era, car styles changed about 1930 as higher train speeds forced open platform customers into the newly developed sunrooms (solariums) and the depression caused the dropping or conversion of full diners in favor of combination food service and sleeper cars for the lighter loads. In the thirties, many heavyweights were air conditioned, adding a roof bubble that changed car appearance. Some cars were rebuilt with a semi-streamlined roof and under floor skirts to imitate the appearance of streamliners that were beginning to be bought.

Baggage Cars

One rather fine point in selecting head-end equipment that some modelers may wish to note is that a baggage-type car was seldom used to carry baggage. The baggage car as mail storage car was loaded with mail sacks at the point of origin, and then either sealed and set out at a destination point, or coupled next to a railway post office car and kept unlocked so that sacks of mail could be sorted enroute, moving back and forth between the mail storage car and the RPO, until all mail for the mail storage car's destination had been "worked". Similarly, express cars, indistinguishable in appearance from baggage cars (except for lettering for the Railway Express Agency), could be either loaded and sealed at origin and run through between end points (e.g. a load of magazines printed in the East and shipped to the West for distribution there) or kept open (unsealed) to handle local traffic over the train's route.

All three functions were handled in cars of similar construction and appearance, and generally interchangeable in use. However, your favorite railroad may have lettered some such cars as "mail storage" and others as "express" or "baggage". Photos of these cars commonly show "baggage" lettering on one end of a double door car and "Railway Express Agency" (or one of its predecessors before 1920) on the other end. Cars used for these three purposes were railway-owned and supplied to the user (Post Office or Railway Express Agency) for a charge.

The two following quotations are from Edward M. DeRouin's Chicago Union Station, page 64.

“Some {head end} cars were easily distinguished from the traditional baggage, or storage car: the Railway Post Office car (RPO), horse cars, box cars assigned to express or mail service, former W.W.II troop and kitchen cars, and express refrigerator cars. Horse cars often contained additional doors on the sides and/or had end doors. The box cars and former troop cars were of a design easily distinguishable from baggage cars. [Ed: the troop cars were derived from 50' box cars]. The express refrigerator cars contained ice bunkers on each end and smaller, insulated doors associated with refrigerator cars.”

“_____. Some [baggage/storage] cars, known as Destination Relay Cars, could be partially loaded or unloaded at designated stations. These cars were identified by the placement of a pink or salmon colored placard on the cars placard holder located on the car's exterior near a door. (Some) Storage cars _____ were packed solid. Known as Destination Cars, they were loaded and moved intact to their destination and identified by a blue placard.[These cars were sealed or locked while in transit] The third classification of storage car and identified by a white placard was the Full Working Storage Car. Pouches and parcels would be removed or added to these cars at stations enroute.” Modelers should note that these placards are a detail that can be added to baggage cars to increase their operational interest.

Note that Railway Express also had its own wood or steel express refrigerator cars, and that many railroads had express refrigerator cars and express box cars to handle express, painted in colors to match passenger equipment and lettered for the railroad. If you want to refine your passenger train operations, assign your baggage cars to one of these three uses, and place in the train or switch in your terminal appropriately: mail storage cars to the mail dock or post office building; express cars to the REA building; and baggage cars to the station track near the station's baggage room.

Milk Cars and Trains

Milk traffic was carried in passenger trains. I presented a clinic on milk cars and trains at the Hartford convention (2009). The handout is available from NMRA Headquarters on the [Clinics at Hartford CD](#)

Lightweight Consists

In the lightweight, streamlined era, a more diverse and colorful train could be put together. A much wider variety of equipment evolved than before, such as dome cars, slumber coaches, etc.. Streamlined trains were more colorful because of the break away from pullman green to varying paint schemes for each streamliner (even on the same railroad - e.g. Southern Pacific's City, Sunset, Daylight, Golden State, and Lark/Cascade schemes), and greater interchange of cars with other railroads with different colors (e.g. through B&O, NYC and PRR cars to the West). This mixture of colors was especially notable on the head-end. And don't forget the rainbow effect in Amtrak's first years of operation when equipment was dispersed across the country.

Some possible lightweight consists are (the prior heavyweight consists are also appropriate):

1. The all coach streamliner - start with a baggage or baggage-dormitory (a new car type), add coaches before and after a two car diner-kitchen set, a recreation or lounge car, and an observation-lounge on the rear. Dome cars can be placed anywhere in the consist.
2. The coach-sleeper streamliner - take the California Zephyr with baggage, home-road coach for short haul passengers, dome coaches for through passengers, dome-snack bar (lounge)-dormitory car, diner, sleepers (three types: bedrooms and compartments, bedrooms and roomettes, sections) and a dome-sleeper-lounge-observation bringing up the markers. On other lines, full dome lounges, baggage-dormitories, dome-diners, dormitory-lounges, lunch-counter-diner or coffee shop car (for coach passengers), dome sleepers, and other car types introduced in the streamline era could be substituted. The Santa Fe was unique in developing a coach streamliner (the El Capitan) with all high level cars including the diner and the lounge. Most western lines had one or more domes of varying types in their name trains, aimed at the tourist trade.

RESEARCHING CONSISTS

The chronology of eras and its impacts on consists is well described in Twilight of the Great Trains by Frailey which covers consists in the ten years prior to Amtrak (1971). Recommended especially for insight into marketing of passenger services are Welsh, By Streamliner: New York to Florida, and Stegmaier, Baltimore and Ohio Passenger Service 1945-1971, two volumes. These two books cover the post war era, illustrating the gradual transition from heavyweights to lightweights and the attrition of passenger service. There are an increasing number of similar, useful books for other railroads, some by these same authors. For the first five years of Amtrak, see Frailey's Zephyrs, Chiefs and Other Orphans which contains detailed rosters of each train for several post-1971 dates, illustrating the mixture of cars from railroads all over the system and explaining Amtrak's marketing logic for each consist. For additional discussions of consists, see Sperandio, The Model Railroader's Guide to Passenger Equipment and Operation; Chubb, How to Operate Your Model Railroad, Chapter 4, pp. 39-42; and Mallery, The Complete Handbook of Model Railroad Operations, First edition, Chapter 9, Passenger Operations, 181-191

It can be difficult to determine what the consists of many passenger trains actually were. However, the Internet has greatly improved access to consist information through sites dedicated to rail fans. The key reference is the "consist book" which railroads issued to their passenger service and yard employees to tell them what kinds of cars went in each train on what days. These can be bought from railroadiana dealers (rarely), and a few consist books have been published. The historical society for your favorite prototype railroad may have consist books in its archives that you can access.

The Official Guides give timetable style equipment lists that give a general idea of car types and sleeper accommodations included in a train, but often fail to define the exact configuration of Pullman cars used. Head-end cars are not listed. Wayner has published two books on actual consists: Passenger Train Consists of the 1940s and Passenger Train Consists 1923 to 1973. The references following list articles with diagrams tracing car movements like the one attached from my article in the Bulletin. Unless one can find car by car pictures of a train, or has a powerful reading glass to look at prints or slides, it is generally impossible to determine car names, numbers and type from train photos. The latter approach requires a good knowledge of how to determine car type from window patterns (or a vivid imagination!). There is considerable research material available but, in the end, the modeler may still feel that he hasn't really answered the question as to what cars might typically appear in a particular train at various points in time. If you freelance, your life is much easier.

OVERALL DESIGN

Passenger trains may have been discounted as the basis for a personal size layout largely because scale 85' passenger equipment does not look good on the small radius curves used by many modelers. This is an overriding factor that has to be taken into account in layout design.

Another plus for the passenger train oriented layout is the large number of joint terminal companies, which furnished the switch engines, lettered for the terminal company. In the case of Dearborn station, the Chicago and Western Indiana was the terminal company line, which switched trains for six railroads, but Santa Fe also switched its own trains with switchers from its roster. Other joint terminals were Cincinnati, Dallas, St. Louis, New Orleans, Cleveland, Washington, and Kansas City. The designer is free to operate a large and diverse set of passenger trains.

STAGING

Contemporary layout design emphasizes the use of staging tracks to suggest traffic flow from beyond the visible limits of the layout. In the case of a passenger train oriented layout, the flow of trains into and out of the terminal and its supporting coach yard and related tracks, could come from and go to staging yards. **Fig.a**. I apologize for the lack of accurately scaled plans but the person who did the graphics for me could not make the software both use real dimensions and convert to a computer file that could be transmitted over the Internet to the magazine without turning the drawings into garbage.

Staging yards may be stub ended or double ended, depending on which of three options described below best describes the operating pattern.

1. If you have only one consist for each train:
 - A. If the train originates at the terminal and runs to the staging yard, then later back to the terminal during the operating session, it must be turned in staging and requires a loop with a double ended staging yard (or a “reverted” loop with a single ended yard per Armstrong)).
 - B. If the train originates from staging and runs to the terminal, it will be turned at the terminal and can make the reverse trip to a stub ended staging yard, but must be turned between operating sessions.

Typically, the operating pattern will call for trains originating at both the terminal and in staging, so the staging yard probably will be at least partially double ended and incorporate a loop or reverted loop for turning trains originating at the terminal.

2. With two consists for each train, both directions can be accommodated without turning in staging during operation. Of course, this is a capital-intensive solution, requiring lots of cars and duplicate motive power. At least one brass importer offered a consist for each direction (as well as supplementary car sets!).

Another alternative would be active staging in which consists are changed by hand (called a “fiddle” yard, popular on British layouts)

Staging design will be a major decision in layout development. The space and location for staging loops is a big decision. In **Fig. a**, the loop is under the coach yard loop to save space. Staging capacity must be in relationship to the number of trains to be operated, for which the operations scenario mentioned earlier is key. Staging capacity also must be related to coach yard and terminal capacity as well.

MAIN LINE

Through stations also could incorporate tracks for set out cars. **Fig. b**. For a stimulating example of a through station, see Armstrong, Track Planning for Realistic Operation, (Fig 1-10. first ed.; 1-9, 3rd ed.) “on-line passenger train switching” and reprinted in Kalmbach’s The Model Railroaders Guide to Passenger Equipment and Operation, p. 93. See also diagrams for small town set out sidings in this handout exhibits section.

Do you want to show trains from various railroads splitting off to their own tracks after leaving the terminal and its joint trackage? A junction is the way to introduce additional action on the main line. Although individual railroads might branch off at separate junctions, the separate lines might lead into a common staging yard behind the scenes. Armstrong has a layout design for Pennsylvania Railroad’s station in Richmond, Indiana in his 18 Tailor-made Model Railroad Track Plans (Kalmbach, 1983), page 37, a location where six lines crossed and passenger cars were exchanged between trains, and trains combined and split. In DeRouin’s book, Moving Mail and Express by Mail, pages 72-79, he shows exchange of cars between trains at Richmond, IN with a station track plan, train consists, and describes switching with diagrams.

LAYOUT DESIGN ELEMENTS

As a start on envisioning and selecting the layout design elements from which selection can be made, break down the components or elements into two broad classes: functions located in or near the terminal and those located at a more remote location – the coach yard. The following refers primarily to stub end stations. At the terminal, there might be (in addition to the terminal building, tracks, platforms and perhaps a train shed), facilities for United States Post Office traffic, for the Railway Express Agency, and private or railroad business cars. In the coach yard would be such specialized facilities as a car washer, a commissary for resupplying dining cars, Pullman Company facilities for servicing sleeping cars, a service track for each train along with drop pits for changing out wheel sets, and a group of buildings housing the craft shops needed to keep the cars in repair. These might be supplemented – depending upon the space available for your layout – by a coach yard for commuter trains, a power plant to supply steam, electricity,

and compressed air, and a major car shop. Note that in some cases, the coach yard(s) was/were adjacent to the terminal, such as in St. Louis and Cincinnati.

ENGINE SERVICING FACILITIES

Engine servicing facilities are a possible design element of a passenger train oriented layout. A single engine terminal could also serve both a passenger terminal and a freight yard. There are numerous sources of information in the model railroad literature to cover this topic. Keep in mind that turnaround time controlled how much ready track capacity had to be provided at engine facilities (roundhouses and ready tracks) serving passenger train locomotives.

TURNING TRAINS

A means for turning the train is needed because many passenger cars, particularly Pullmans/sleepers, diners, and observation cars, were designed to be run in one direction only. Pullman cars often were arranged internally so that the corridor side faced the track in the opposite direction (cutting down noise from passing trains) and giving the passenger the view of the right hand side of the line. A loop track, often with the coach yard encircled, was common. **Fig. c.** At some terminals, whole trains were turned on a wye arrangement. From a modeler's standpoint, a loop probably is more advantageous because the coach yard can be fitted inside the loop and the move through a loop is less likely to result in derailments occasioned by the backing moves required by a wye. See Armstrong's Track Planning for Realistic Operation (Fig. 1-14, 1st ed.; 1-13, 3rd ed.) for a large number of examples of prototype terminal track patterns relating the terminal tracks to the main line including loops and wyes.

THE PENINSULA

A long and wide peninsula makes a good location for locating a terminal and its associated coach yard side by side, but separated by a view block between the two facilities in order to suggest that there is some distance between the two. Both could be reached from a wye off the main line, which would provide the needed turning capability. **Fig. d.** See Mallery, Design Handbook for Model Railroads, pp. 47-51. To suggest the urban nature of the terminal, the backdrop/view divider on its side could be a scene with high-rise buildings for a major city. The head house (station building) need only be a shallow façade with butterfly sheds over each platform or a massive train shed (but train sheds conceal the trains!). Many station and platform shed kits are available in HO, although some have European characteristics that can be removed for US use. The coach yard side of the divider might be a warehouse/industrial setting with lower height buildings in the background.

THE TERMINAL

How Many Tracks

More than one throat track is needed to facilitate the maneuvers suggested above. Parallel tracks would permit the switchers to move cars to and from the coach yard and to switch post office and Railway Express Agency tracks without blocking access to passenger platforms. **Fig.e.**

A key consideration in design of the terminal and the coach yard is the balance in capacity or trackage between the two areas. In the prototype, the passenger platform tracks in the terminal or station were not used for car or train storage (unlike some model railroads). Passenger train consists were moved to the coach yard as soon as passengers, and any baggage, mail or express handled within the station, were unloaded. A track to hold private or railroad official/business cars might also be included in the station trackage pattern.

Therefore, the number of tracks in the coach yard would normally be a multiple of the number of passenger tracks in the station. Depending on the cycle of each train, the number of hours the basic train consist was in the coach yard might be as much as almost a full day. This is why on some routes, the railroads might have to provide as many as six consists to cover one route (e.g. the California Zephyr) in order to insure that there was adequate servicing time to turn the consist between arrival and departure. It was rare to provide as little as six hours to turn a name train.

On a model railroad, a minimum number of tracks for a terminal would be two, one on each side of a common passenger platform. **Fig.f.** This pair would accommodate one departing and one arriving train. If the assumed traffic level on the layout was three trains a day each way, three coach yard tracks would be adequate assuming a servicing cycle of less than twelve hours. Trains might arrive in early morning, around noon, and at dinner time. Departures might be scheduled for 8 am, late afternoon, and about 9 pm. See Armstrong's Track Planning for Realistic Operation (Fig. 1-11, 1st ed.; 1-10, 3rd ed.) for stub terminal trackage arrangements with more platforms and with and without engine escape crossover tracks. For the model railroad, engine escape crossovers increase complexity and space requirements without greatly improving operations. Note Armstrong's suggestions for careful attention to design of the throat. Multiple platform prototype terminals often had parallel leads with double slip switches to each track for flexibility and to bypass a track that might be blocked by a derailment. However, double slips are problematic in the model railroad setting.

How Long Should the Tracks Be?

Model passenger cars are long when scale length cars (80-85 feet) are modeled. In HO, each full length car will require almost a foot. However, Con Cor and Athearn make cars in the range of 70-75 feet that have a satisfactory appearance if not mingled with those of prototype lengths. Harriman style cars in 60 foot lengths are available from MDC/Roundhouse. Con-Cor has just added 65' MP-54 cars based on Pennsy prototypes. Head end cars typically are shorter – from 60 to 70 feet – and require less track length for their facilities.

The second variable in designing terminal and coach yard track lengths is consist length: how many cars do you plan to use in your passenger trains? An eight car train (RPO, baggage, two coaches, diner, 2 sleepers, sleeper/lounge/observation) would require about eight feet, one foot per car, plus length for the motive power. Consists were discussed above in terms of trains for various prototype markets. Selective compression can be used to adjust train length to space. For example, use the winter length California Zephyr instead of the summer peak to cut coaches from 4 to 2, and sleepers from 4 or 5 (including a sleeper leased for the season from a foreign road) to just 2 between the diner and the dome observation. The number of head end cars can also be reduced from multiple mail storage and express cars to one of each, which would still require switching to the two separate post office and express buildings/tracks.

Station trackage needs to be long enough to accommodate the motive power also. Passenger diesel E units will require almost a foot per unit in HO.

Station Platform Design and Modeling

Typically, each passenger platform had a track on either side. In American practice, such platforms were usually at track level, not raised to car floor level, although some railroads with heavy commuter traffic did use high level platforms. Baggage was handled from the baggage room in the station out to the checked baggage car by rolling carts or wagons out the platform and placed alongside the baggage car(s). The following dimensions are given for the width of the passenger platforms within the station as recommended by the American Railway Engineering Association (AREA):

Combined passengers and wagons: 20 feet

Exclusive passengers: 17 feet

Exclusive wagons: 11 feet

Clearance between platform edge and obstructions such as stairs, elevators, ramps: 6 feet

AREA specifications changed over the years. Because their Manual was a loose-leaf document, it may be difficult to find a copy that has the appropriate pages for the time period you are interested in.

MAIL AND EXPRESS

Also near the passenger platforms would be a post office with its tracks and a railway express building with its tracks. For a small layout, one or two tracks holding two or three cars such as RPOs, mail storage, or express cars at the two buildings should be sufficient to handle the amount of mail and express being moved. The Railway Express Agency building typically would be brick, with the name painted on the

building. The Post Office building might be concrete, with the name carved in the concrete over the front entrance. A typical placement of the post office and express tracks and buildings would be parallel and to the same side of the passenger platforms at the terminal. Such an arrangement occurred in New Orleans, Washington, D.C., and Dearborn (Chicago). A car floor height platform between each pair of tracks made for more efficient handling of cargo. When cars were spotted side by side, doors could be aligned so that bridge ramps could be placed between the cars and hand trucks or forklifts move from the platform, through the first car and into the second, parallel car.

In some major terminals, such as Kansas City, mail was loaded and unloaded from RPOs and mail storage cars on the station platform and moved to and from the Post Office building by conveyor belts under the tracks or the station concourse. However, this arrangement cuts back on switching moves, which model railroaders would tend to want to increase rather than reduce. One way to conserve space at a model railroad terminal would be to have the loading tracks for mail cars within the Post Office building, as in Chicago's Union and Dearborn stations, although this would conceal the cars.

COMMUTER FACILITIES

Commuter operations were common to the East Coast and Chicago. Because the pattern of morning and evening rush hour traffic tends to be repetitious and the need for large train storage capacity in a coach yard near the terminal would consume scarce space, commuter operation is suitable only for those with a strong interest and adequate space.

COACH YARD DESIGN AND MODELING

The inbound lead track to the coach yard might have a car washer. Typically, there was a parallel lead track that bypassed the car washer, and was used as a switching lead. Car washers are listed in the Walthers catalog.

On the prototype, coach yard tracks tended to be double ended, so that switchers could reach into the tracks from both ends. However, on a model railroad, this pattern increases the space required as well as doubling the number of turnouts required. **Fig. g.** with single ended sidings is more appropriate on a model railroad. However, a double-ended yard is very attractive if space permits. See **Fig. c.** The Sunnyside yard for the Pennsylvania on Long Island suggests one way to integrate a loop for car turning with a double ended coach yard. Armstrong has coach yard examples in his Fig. 4-9, 1st ed.; 4-9, 3rd ed..

Buildings and Architecture

A common arrangement was to place a line of buildings, perhaps a set of sturdy brick buildings, on one side of the coach yard, parallel to actual yard tracks. Within the buildings were a wide variety of functions, such as the following list taken from the drawings for Southern Pacific's 1937 Mission Road coach yard in Los Angeles: pipe and tin shop, upholstery and carpentry shop, supply room, yard master's office, Pullman supply room, commissary, sheds for propane and coal (for diners), fumigation building, locker rooms, paint shop, and carpet rack. Within the commissary were kitchens, bakeries, grocery warehouse, laundries, linen storage, china and utensil storage, meat lockers and butcher shop, and space for ice and fuels: coal, coke, propane, or Presto-logs depending on what the diner stoves and ovens used. The architecture of these buildings might vary widely in style as well as material (i.e. from wood sheds through corrugated iron, to brick and concrete).

Several coach yards had power plants for the coach yard and terminal complex. These supplied heat, steam, electricity, and compressed air to the station and coach yard. With the numerous buildings available in plastic today, the modeler can easily create such a row of service buildings. See the three part article by V.S. Roseman in Model Railroading for May, June, and July 2002.

Coach Yard Platform Design and Modeling

In the coach yard, an alternating pattern of wide servicing platforms providing room for service carts and wagons to move, and narrower platforms with service boxes and outlets for the various utilities (electricity, water, compressed air, steam) was common. Dimensions are taken from the AREA standards. Platforms with only worker passage should be 10 feet wide, while those on which service vehicles moved, 18 feet.

Fig. h. There would be a track between the platforms so that both sides of the cars could be worked as appropriate. Some coach yards had platforms of a uniform width with a spacing of 20 feet between track centers. Tracks for storing cars held for peak loads or simply storage usually had only narrow platforms, which might have outlets for steam and electricity for cars that were on standby status. Droege – Passenger Terminals and Trains – has dimensions for the World War I era.

As seen in the coach yard photos, one set of platforms had cabinets and connections. A number of manufacturers make trackside cabinets (as part of signaling systems) that could be used for those in coach yards. They also could be built as simple styrene box shapes. Connections for water and steam and compressed air could be made from appropriate sizes of wire. Electrical connections look like small lids or boxes on the platform surface and could be bashed from styrene. Lighting for platforms was sometimes by lamps that look like street lights, and in other cases the typical high towers with floodlights: both are available on the market.

Some of the platform tracks might have pits between the rails so that repairs could be made, especially to change wheel sets. Jacking pads were provided along some platforms. In some coach yards, there were separate tracks for repairs on individual cars, frequently with pits. Pits often were concrete with depths of 39" to 45" below top of rail. Rails for pit tracks often were set on top of the concrete wall of the pit. Wheel drop pits had jacking pads. Jacking pads were either continuous or spaced at car length intervals. Wheel and truck storage areas were adjacent to wheel drop pits.

OPERATIONS

IN THE TERMINAL

In the prototype, the passenger platform tracks in the station were NOT used for car or train storage (unlike many model railroads). Passenger train consists were moved to the coach yard as soon as passengers, and any baggage, mail, or express handled within the station, were unloaded. Headend mail and express cars were quickly moved to other tracks away from the station platforms. Attached in this handout is an extract from the Terminal Railroad Association of St. Louis Historical Society on the switching of the City of St. Louis. Note the many switching moves to service and assemble the train. See the book by Edward DeRouin, Chicago's Union Station: A Look at its History and Operations Before Amtrak for the best description I have found on the operation and layout of a major terminal. The article by Fred Soop in the July 2011 The Dispatcher's Office gives a good idea of the tremendous volume of planning and paperwork to handle scheduling the use of trackage in a terminal or staging.

Operations in the terminal complex usually began with a switcher pulling back to a separate lead track the passenger train consist so that the arriving engine that had been trapped against the bumper post could be freed to move to the engine servicing facilities (unless the station had engine escape tracks or crossovers, which allowed the engine an immediate escape). The passenger carrying cars were moved to the coach yard. Next, a terminal switcher might draw off the headend cars (mail and express) to place these cars at the Post Office and Railway Express Agency facilities. Finally, the road engine made its escape from the station. Much of the mail and express traffic was handled in what model railroaders call baggage cars. Mail was handled in mail storage cars, which typically, were not lettered as such although a few railroads did. Railway express loads were handled in, besides "baggage" cars, box express cars, express reefers, and converted troop sleepers or troop kitchen cars. In "back in" terminals like St. Louis, first the engine cut off, then the head end was removed, and finally the passenger cars.

In stations such as St. Louis, switching operations might become hectic if Pullmans passing from an Eastern railroad to a Western railroad (or vice versa) arrived late, as Pullmans typically were placed in outgoing consists in very specific order, holding up assembling the outgoing trains. If all else failed, the through cars were placed on the end of the departing train, creating problems for the receiving railroads at stations down the line where cars were to be cut out.

Typically, outgoing trains were backed down from the coach yard to the platforms about one hour before departure by a switcher attached to the front of the passenger carrying cars. Then, mail and express cars were added, and finally the road engine backed on.

IN THE COACH YARD

Another switcher might be used to pull the passenger carrying cars (coaches, diners, lounges, sleepers, observations) through a car washer and around a loop or balloon track to turn the equipment so that it was headed properly for departure. An intriguing exception I noted in an article in [Passenger Train Journal](#) was the New York Central's *20th Century Limited*. Only the head end, dining and observation cars were turned, assuring that the bedrooms were always on the Hudson River side of the train (Central's 10-6 sleepers were marshaled with their bedrooms on the front end of the car to carry out this policy).

Then, the remaining consist would be broken up into the sub yards where the coaches were placed, diners and Pullmans/sleepers serviced, and car repairs made. Tracks for car repairs with wheel drop pits might be provided if there was room for them on your layout.

As noted earlier, the passenger carrying part of the train would be moved to the coach yard for cleaning and replenishing. In prior clinics, I raised the question of whether or not Pullmans were switched to a separate sub yard and diners and other food serving cars were moved to commissaries. Alternatively, such cars remained in the consist and were parked in the coach yard in the normal consist order, and cleaned and restocked in place. My guess is that storing the whole consist (except for head end cars) on one track was the preferred approach by the 1920s. Chicago Union Station, opened in 1927. and Cincinnati, in 1933, follow that pattern.

As the more or less fixed consists associated with streamliners appeared just before and after World War II, it would have been logical to have the consists be serviced in the same car order as they had been pulled from the station, with service carts and wagons being moved along the service platforms from the specialized buildings at one side of the coach yard to where the diners and sleepers were in the consist, without splitting the train apart. Of course, if cars needing repairs had to be removed from the consist, they would be switched out to repair tracks. Also, coaches or Pullmans that were only run on certain days of the week or to meet seasonal peak loads, would be cut in or out. Coach yards often had some tracks designated to hold cars used to meet such loads.

How did coach yard switch crews know how to assemble trains? Consist books gave yardmasters the sequence and type of cars in passenger trains. See references and attached example. Trains were assembled at originating terminals and switched along the route in accordance with consist books. In terminals, switching was done with a switch list like the Amtrak example attached which told yard crews exactly which cars to use by car number or name

Passenger terminal operations would be based on train schedules in the employee's timetable. Many terminal companies issued their own employee timetables. Tight timing might provide a strong interest for model railroad operating personnel. However, on a model railroad, terminal operations might have to be on a slower 2 or 3 to 1 fast clock because of the longer time switching takes.

ON THE MAIN LINE

Through Stations

At previous clinics I have emphasized en route switching of passenger trains, particularly head end cars carrying railway express and storage mail. Diners also used to be set out overnight in the 1920s after having served dinner leaving a terminal and then were picked up early the next morning to serve breakfast going back to a terminal. Many Pullmans (sleeping cars) were picked up and set out at intermediate cities of modest size as the long distance passenger trains passed through on their way from one metropolis to another.

For a stimulating example of such a station with a system map and an example schedule showing trains leaving off and picking up cars, see Armstrong, [Track Planning for Realistic Operation](#). (This information is reprinted in Sperandeo's [The Model Railroaders Guide to Passenger Equipment & Operation](#) p.93) Your operators would have opportunities to perform switching much like a way freight.

Junctions: Merging and Separating Trains

On the main line, combining and separating trains was common at junctions and at important cities with multiple lines coming together. An article I wrote for the NMRA Bulletin in 1972 shows numerous additions and subtractions to the Santa Fe's 1967 "*California Special*" that I rode from Houston to Richmond (CA), ending up on the "San Francisco Chief" after switching my Pullman at several junctions along the way. For a classic merging of sections, see the side bar in Chubb on the joining of the Colorado Springs and Denver sections of the Rock Island's *Rocky Mountain Rocket* at Limon, Colorado (diagram in handout). See Larry Goolsby, Atlantic Coast Line Passenger Service: The Postwar Years at pages 21 and 81-82 for activity at Florence, S.C. involving express, mail, coach, and sleeper operations. Vic Roseman has done a number of articles on such operations at stations like Harrisburg and Kansas City. For another stimulating prototype example, see the diagram (pp. 20 & 21) in the article "Pacific Limited – The Long Distance Local" in The Streamliner, (UPHS) Winter 2009, 14-24.

SUMMARY

In summary, while model railroaders must selectively compress their imitation of the prototype, there appears to be an opportunity for the passenger car "nut" to design a layout (especially the many terminal facilities) that will capture the flavor of the prototype and offer at least as much excitement as a freight oriented layout. He can relegate the freight facilities to the token status to which passenger service is now relegated on most model pikes. (Articles on passenger train route switching and operation out on the line indicate that the modeler need have no fear that passenger trains can't be as much fun to operate as a way freight.) Today, a passenger terminal could be the central feature, supported by extensive staging tracks to store passenger trains (giving the modeler the opportunity to have two sets of equipment for each train - one for the arriving train and one for the departing train if the timetable set this up.)

CREDITS

The primary source for the black and white photographs of the Chicago passenger facilities used in this clinic were provided by John Sz wajkart, author of the Train Watchers Guide to Chicago. Many of the color slides were purchased from Al Chione. Other photos were copied from books and articles: their source is shown on the slides.

The best source for prototype information on big city terminals is one book: Chicago Union Station by DeRouin. I have greatly reduced the list of station/terminal references below as most references fail to cover information about railroad operations and facilities (e.g. coach yards), focusing instead on architecture, history, financing, or human interest. The selected references are largely those that provide a track plan or railroad operational information.

The major reference for engineering details is:

American Railroad Engineering Association, Manual for Railway Engineering (fixed properties): Manual of Recommended Practice. Washington, D. C.: American Railway Engineering Association, 1993. See Chapter 14 Yards and Terminals, Part 6 – Passenger Facilities (Rewritten 1985)

This clinic is a reduced form of a four part article in Model Railroading magazine's January, February, March, and April 2002 issues: "The Passenger Train Oriented Layout". Model Railroading followed up my article with a three part article in the May, June, and July issues by V.S. Roseman: "Passenger Servicing Facilities – Their Construction on Your Railroad". Vic's article is a splendid augmentation that features examples of adaptation and kit bashing of structures and additional description of servicing activities. These two articles were put on a CD by Highlands Station and issued as Modeling Passenger Operations and Facilities. However, Highlands Station is out of business.

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