U.S. Department of Transportation
Federal Railroad Administration

Tunnel Safety Analysis

Office of Safety **February 1990**

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Summary

In May 1987, a New Jersey Transit Rail Operations, Inc., passenger train, en route from New York City to New Jersey, pulled the catenary down behind itself and came to a stop in the North River Tunnel under the Hudson River. After a delay, some 700 passengers were evacuated from the train, led for 1/2 mile along a tunnel walkway and then, up several flights of stairs to an open area in Weehawken. There were no serious injuries, but there were several cases of heat prostration and there was personal inconvenience on a monumental scale.

This incident led the Federal Railroad Administration to question the nature of planned improvements in the North River Tunnels and the safety status of tunnels elsewhere in the country through which passenger trains operate. A response to the first issue was readily assembled based on the extensive betterments underway then and planned for this facility. Assessing the quality of passenger train safety in all tunnels utilized in the United States by conventional trains (as opposed to rail rapid transit) required a more extended effort. This report is the result of that investigation.

In order to limit the number of structures surveyed to the longer ones that could be expected to present more impediments to the safe and orderly withdrawal of disabled-train passengers, tunnels of less than 1,000 feet in length were excluded. This limitation is reasonable considering that passenger trains seldom consist of less than four cars and often have many more cars than this implying a minimum total train length of 400 or more feet. Most likely, a train of this or greater length will have either the head or rear end close to or outside of a tunnel portal should an unplanned stop occur in a tunnel less than 1,000 feet long. The number of railroads operating passenger trains through tunnels greater than 1,000 feet in length was determined to be:

Railroad	Total Length (miles) of Tunnels	Number of Individual Structures
Alaska Railroad	3.5	2
SP/CalTrans	1.7	4
SEPTA	2.1	2
PATH	15.9	**
Metro-North	2.0	1
New Jersey Transit	2.7	3
Long Island Rail Road	6.6	2
Amtrak (NEC only)	21.5	14
Amtrak (extra-NEC)	*	*

*Outside of the Northeast Corridor Amtrak passenger trains transit 81 tunnels, a statistic that conveys

Conclusions

From the mass of data that has been reviewed, certain salient points emerge:

1. In general, the Corridor commuter railroads included in this study have adequate plans in place for responding to passenger train emergencies in tunnels. Among the five commuter railroads surveyed, the PATH program is superior, followed closely by the policies of SEPTA, Metro-North and the Long Island Rail Road. New Jersey Transit has deficiencies in its passenger safety program in (1) not having established a close liaison with the emergency response forces of the communities through which it operates, and (2) not incorporating hands-on exercises in the training of its employees.

2. Amtrak, while chiefly an intercity passenger carrier with the confines of the Northeast Corridor, operates in conjunction with SEPTA, Metro-North, the Long Island Rail Road and New Jersey Transit. Moreover, it manages the heavy rail commuter operation of the Massachusetts Bay Transportation Authority in the Boston area and crews, as well as dispatches the trains of the Maryland Rail Commuter service that run on its tracks. Among these various activities, Amtrak's support of adequate policies for the evacuation of passengers from distressed trains halted in tunnels varies from acceptable to nonexistent. Amtrak has some inexplicable voids in the delineation of site-specific passenger evacuation procedures of certain facilities in the Northeast Corridor. At the same time, this railroad recognizes a need to adjust its emergency response planning in the New York area to take into account increased traffic and advancing age of the structures and took a substantial step to meet this requirement.

3. By comparison with the procedures of the east coast commuter railroads, the approach to safe evacuation of passenger trains advocated by the Southern Pacific Transportation Company and its client, the California Department of Transportation, is primitive. There is great room for improvement here in (1) evolution of policy, (2) staff training and (3) coordination with local emergency response teams. The railroad, it seems, recently undertook the first steps toward making more effective the relationship with fire departments in some communities through which its commuter train pass.

4. This study uncovered the fact that there are no emergency evacuation plans in place to cover Amtrak trains in any tunnel 1,000 feet or longer anywhere in the country away from the Northeast Corridor. From the documentation provided to FRA by Amtrak, it is clear that the freight railroad contractors, who for the most part, extend

operating privileges to Amtrak and dispatch Amtrak trains over their lines, deny any obligation to participate in the formulation of tunnel safety policy. The most complete description of a railroad emergency response plan was given to Amtrak by CSX Transportation, a railroad responsible for 16 tunnels through which Amtrak trains operate. This manual: "Corporate Policies and Procedures Regarding Emergencies", is almost 60 pages long and it defines departmental and individual roles to be followed in the several kinds of misfortunes to which freight railroads are vulnerable. There are no references in this text to passengers, passenger trains or evacuations therefrom. Another railroad, which among other tunnels, owns and controls two multi-mile long structures, refers to evacuation instructions "...as enumerated in Timetable Special Instructions..." A review of these sources yields scant guidance that would be of value if it were necessary to detrain and evacuate several hundred passengers from a distressed train. In general, the freight railroad procedures, where anything at all is spelled out, are geared toward the preservation of freight train crewmembers, a number hardly ever exceeding six for any one train. While intricate plans for the assurance of passenger safety in tunnels similar to the New York commuter railroad models are probably inappropriate for application to a freight railroad structure that sees the passage of two Amtrak trains per day, certainly something more tangible than nothing is not only appropriate, but imperative. There is wide variation in the methods used by all surveyed passenger carrying railroads to train on-board crews. Amtrak management acknowledges both the seriousness and complexity of this issue and assigned staff from several departments to work together on the problem with the individual contractor railroads. FRA will observe the effectiveness of this dialogue by evaluating progress at the end of 90-day intervals. In cases where reasonable headway is not apparent, the agency may elect to exercise its authority in order to accelerate the rate of accomplishment.

5. Some types of passenger cars present problems which would impede the rapid evacuation of passengers to the roadbed unless special purpose equipment is available and used by train crews.

6. Considerable variability exists in the nature and numbers of tools and other devices intended to facilitate passenger evacuation from distressed cars.

7. Consistent clarity is a characteristic with which all railroad participants in this study express the instructions addressed to employees responsible for the safety of passengers in tunnels (and elsewhere). Ambiguity is not a notable feature of these manuals, but at the same time, it is not totally absent. An example is the treatment of train

crew responsibility to provide adequate lighting for passenger detraining to the roadbed in the dark. Four of the railroads do not address the topic at all in provided copies of instructions. That is not ambiguous, but it is not very helpful. Three other railroads are uniform in directing employees to provide "sufficient" light in such circumstances and are equally consistent in failing to define what sufficient light is and from what source the train person is to obtain it. Crewmembers commonly carry a two-cell flashlight, or a four-cell, unfocused brakeman's lantern in their hand grips, but the output of these devices can scarcely be considered as adequate during the types of emergencies that have been discussed in this report.

8. The original inclination to treat the commuter railroads and Amtrak as sufficiently different to warrant separate consideration in this report is justified. For the most part, the problems, while similar in nature, demand unique solutions. Commuter rail operations tend to be high volume activities compactly distributed. Conversely, Amtrak operations, particularly away from the Northeast Corridor, involve a lesser volume widely distributed. The political and economic consequences of a serious interruption of commuter rail service, even when passenger safety is not at risk, are sufficiently severe to encourage managements to develop complex schemes for minimizing the effects of equipment or systemic breakdown. On the other hand, and possibly excepting corridor operations, Amtrak's problem is the more difficult one to solve; that of transporting relatively smaller numbers of people, safely and efficiently, over a track network of many thousands of route miles.

Recommendations

To:	Advice
Southern Pacific Transportation Co./ California Department of Transportation	Railroad: Continue to exploit the current process whereby carrier management is opening a dialogue with the emergency response forces distributed along the route, San Francisco - San Jose. CALDOT: When the contract for the provision of this service comes up for renewal in 1990, require that the successful applicant develop and implement, early in its period of performance, a comprehensive plan for dealing with the variety of incidents or accidents to which the commuter service is subject. The approaches taken by other transportation authorities discussed in this report are suggested for consideration as models. Moreover, departmental management must, at the same time, institute a policy of energetic oversight to assure that this plan is completed in a timely fashion, is reasonable for the needs of the service and is put into and kept in effect by properly trained staff.
Southeastern Pennsylvania Transportation Authority	Reconsider the original decision not to provide in each passenger car a suite of hand tools to facilitate car evacuations. Further, review the procedures and criteria that are used by supervisors to evaluate the readiness of train crews to respond competently to passenger train emergencies in order to guarantee that such performance appraisals do indeed occur and that they are based on uniformly understood standards.

Port Authority Trans-Hudson Corporation	Review the provision of evacuation ladders to assure that there are enough of these devices on-board each train to permit evacuation of passengers, if indicated, at maximum efficiency.
New Jersey Transit Rail Operations, Inc.	If this is not now being done, solicit the attention of local emergency response teams to the particular aspects of commuter train operation, familiarity with which will strongly improve the effectiveness with which these units support the railroad during emergencies. Additionally, seriously consider introducing the concept of accident simulation to an otherwise convincing training scheme.
National Railroad Passenger Corporation	Press on with the organization and application of the management team that will have the assignment of formulating a plan and a schedule to deal with the universal problem of no formal passenger train evacuation procedures subscribed to by any of the contractor railroads. This plan certainly must address the question of assigning priorities to resolving the problem on the basis of attacking first the tunnels posing the greatest inherent hazards to passenger of disable trains. Once a satisfactory plan is in place, Amtrak management shall proceed promptly to implement it according to its stated schedule. Every 90 days, until substantial progress in achieving a reasonable agreement with each of the nine contractor railroads is demonstrated, Amtrak shall report to FRA's Associate Administrator for Safety on the status of this

program.

Pursue with all deliberate speed the progression of the proposed life safety study in the New York area and extend its resulting principles, where appropriate, to other facilities owned or controlled by Amtrak.

Review the safety instructional material that now appears in diverse formats, for the guidance of train operating personnel with the idea of consolidating it all under one heading and possibly, considering the size of the various Amtrak operating regions, issuing one or a series of manuals dedicated to the subject. It may be that the Special Instructions sections of Employee's Timetable is not the best place in which to present detailed guidance on passenger safety. Inevitably, individual items in Special Instructions are accorded equal weight by the viewer since no attempt is made to distinguish among entries as to importance. Thus, in the current Northeast Corridor timetable, it is left to the employee to decide whether or not comparable emphasis is to be placed on who may ride trains without having paid a fare, for example, and emergency evacuation procedures in the North and East River tunnels. Perhaps, a distinction is made among timetable entries during periodic staff retraining, but this is not known with certainty in FRA.

All Passenger Carrying Railroads	Review the availability to train crews of hand-carried devices for providing adequate illumination when it is necessary to detrain passengers to the roadbed in the dark.

Consider the utility, particularly, but not exclusively in the New York area, of using the widely accepted (military, air transport, etc.) "sand-table exercise" concept as a training device for both railroad and emergency response personnel. This is a proven-effective training tool in circumstances where multiple-agency personnel may come together to control an emergency.

The contractor railroads serving Amtrak national routes which pass through tunnels 1,000 or more feet long, i.e.,

- o Atchison, Topeka and Santa Fe Railway Company
- o Burlington Northern Railroad Company,
- o Consolidated Rail
- o CSX Transportation Incorporated,
- o Denver and Rio Grande Western Railroad Company
- o Norfolk Southern Corporation,
- o Soo Line Railroad Company,
- o Southern Pacific Transportation Company,
- o Union Pacific Railroad

As facility owners and controllers, cooperate with Amtrak, on a case by case basis, in:

1. Defining a reasonable level of responsibility for the safety of passengers on trains passengers on trains disabled in tunnels.

2. Arriving at a procedure that is appropriate for each facility to evacuate passengers, those who may be injured or unwell, and Corporation, others with least hazard and greatest efficiency from a distressed train.

   This procedure or plan shall also address the problems of medical evacuation from remote locations of injured people needing prompt transport to treatment centers and the provision of access to incoming emergency personnel.

3. Implementing these procedures through staff training and constant supervisory monitoring of performance in order to assure staff readiness to respond competently to the advent of crises.

INTRODUCTION

At 2:10 p.m. on May 30, 1987, New Jersey Transit Rail Operations, Inc., Train No. 7841 departed Pennsylvania Station in New York City en route to Trenton, New Jersey, with approximately 700 passengers on-board. Almost immediately following departure from the station, the train, an eight-car multiple unit consist (each car electrically self-propelled), entered the North Tube-Track 2 of the two-tunnel complex under the Hudson River known as the North River Tunnels and accelerated toward the authorized speed of 60 miles per hour. Soon, thereafter, at approximate milepost 2.3, slightly more than one-half mile short of the North Tube's west portal in North Bergen, New Jersey, Train 7841 came to an unscheduled stop, a consequence of having been deprived of electrical power. To understand why this happened, it must be realized that this electrically propelled train drew its energizing power from a continuous overhead wire, part of what is called the catenary system. Coupling between train and wire is accomplished by means of a device, with which each car is equipped, called a pantograph. The pantograph, which may be either spring or hydraulically loaded, pushes a plate called a "shoe" against the wire with a more or less constant force. As a rule, not all pantographs in a train need to contact the wire at one time to propel the equipment. When a train moves, activated pantograph shoes slide along the bottom surface of the catenary wire, thus providing an uninterrupted power flow to the equipment. Train 7841 stopped because the failure of a shoe component allowed part of the pantograph on the rear car to engage wire support and the entire catenary system was then progressively pulled down behind the train. Grounding of the wire tripped circuit breakers in New York City and in New Jersey shutting down the 11,000 volt ac power supply and stranding the train in the tunnel.

Train movements in the North River Tunnels are dispatched by personnel of the National Railroad Passenger Corporation (Amtrak) from facilities in Pennsylvania Station. Circuit breaker activation alerted these people to the distress of train 7841 and the location in the tunnel of the stopped Train was evident on the illuminated model board simulating the track network in the train dispatcher's office. Oral communication with the train crew established that, while the power outage caused shutdown of air conditioning and customary lighting of car interiors (battery operated emergency lighting of minimum intensity came into play), there was no fire and no smoke and therefore, no immediate threat to basic passenger safety.

When a passenger train is immobilized due to breakdown, the most satisfactory method of handling the problem is for other equipment to approach and couple onto the affected train and pull or push it to the nearest station or at least out of a tunnel if that is where the incident occurred. If it is impractical to move the disabled train, the indicated procedure is to transfer the passengers from one train to the relief equipment via the end-to-end coupling and then transport them to safety. The last resort, evacuation of passengers from the crippled train to the ground and then leading them on foot to safety, is the least desirable option because it exposes people to safety hazards with which they are not trained to cope. Resolution of the dilemma presented to Amtrak train dispatching staff by the breakdown of the New Jersey Transit train exhibits some interesting aspects that would be useful to look at briefly.

Apart from the pantograph shoe failure, Train 7841 was mechanically sound. It was not derailed and no damage existed that would rule out moving the train with other equipment. However, the defective pantograph was still entangled in the catenary and could only with great difficulty be removed. Rescue equipment could not approach thi: train from the rear because the damaged catenary was down on the track. If the disabled train were to be pulled forward out of the tunnel, it would continue to pull down the catenary, thus protracting the period during which the North tube would be out of service while subsequent repairs were being made. The two North River tubes carry an average of 260 trains each weekday and for the length of time that one would not be usable a serious inconvenience to a large number of commuters and intercity travellers would exist. Had there been fire, smoke or fumes present to jeopardize the passengers of Train 7841, Amtrak management would have had the train pulled from the tunnel regardless of consequences, but this was not the case so the option was not considered.

Multiple unit commuter type trains, of which No. 7841 was an example, are ideally configured to transfer passengers from front or rear to a relief train because there is no locomotive at either end through which passengers would have to pass, a severely complicating factor when present. Since Train 7841 could not be approached from the rear by a relief train because of the downed catenary, relief equipment would have to come into the North Tube from the west portal, hooking up to No. 7841's headend. This equipment could not be powered from an overhead catenary because the wire in the North tube was de-energized; it would have to draw power from an unaffected third-rail source if electrically propelled or be powered by a diesel-electric locomotive. As it happens, clearance limitations in both tubes limit the types of diesel electric locomotives that can enter and third rail power does not extend from either tube beyond the west portal. This means that passenger equipment of the Long Island Rail Road, which also uses Pennsylvania Station, could enter the South Tube, but could not pass beyond the west portal to cross over at Bergen Interlocking in order to back into the North tube and connect with No. 7841 for passenger transfer. While there are diesel-electric locomotive types in Pennsylvania Station that could have been sent, via the South Tube to the Bergen crossover and then back into the North Tube to extricate Train 7841 (as eventually was done), this was not a satisfactory option until such time as the immobilized train was free to move. Emergency managemen personnel are always apprehensive of compounding already present difficulties in a tunnel by intruding exhaust emitting locomotives unless they can perform an assigned task and get back out promptly.

When the North River Tunnels were built in 1907, a total of 22 cross passageways were included to provide access at intervals between the north and south tubes. All of these were sealed off during World War II as an anti-sabotage measure and only four had been reopened at the time of Train 7841's mischance, none of which were suitably located to permit efficient passenger transfer had a Long Island train been drawn up in the South Tube near the disabled train to receive evacuees. Please note here that the design of the North River tunnels incorporates on both sides of the two tubes, so-called benchwalls which, in effect, provide single-person-wide walkways, at approximately car floor height, for the entire length of each tunnel. The open cross passage ways join the north benchwall of the South Tube to the south benchwall of its companion tunnel. All of the factors inhibiting the freedom of Amtrak management to choose among various options to extricate Train 7841's passengers from their increasingly uncomfortable predicament were considered and, in the end, it was decided that the most reasonable course was to have the passengers leave the train, proceed eastward along the south benchwall and ascend eight flights of stairs to street level via the Weehawken Exitway where busses could readily re-embark the passengers.

By 5:00 p.m., all ambulatory passengers had reached this surface location and most were being transported to Newark, New Jersey, the closest point from which to resume their interrupted journeys by other means. As noted earlier, two passengers were taken to the hospital for the treatment of heat induced disorders. These two people were transported to the west portal by diesel-electric locomotive sent into the North Tube for the purpose. They were met at the tunnel exit by emergency medical staff.

The wonder of it all is that several hundred people could be evacuated from the trains, walked almost one-half mile along the narrow benchwall to the exit way and up the stairs to the surface without incident. A major contributor to this fortunate outcome was the existing lighting in the tunnel, the power for which was unaffected by the incident. Also, miraculously, there seem not to have been any aged or handicapped passengers for which such a means of egress would have been impossible without considerable assistance.

The reason for describing this incident in some detail are twofold: first, this is the event that aroused the interest leading to the tunnels safety investigation and, second, it exemplifies many of the factors that come into play when the normal progress of a train through a tunnel is interrupted. Fortunately, the outcome of this incident was, in the main, benign. A lot of people were delayed, made uncomfortable and vastly irritated but, there was no fire, no panic and no injuries beyond temporary heat-related upsets. Consider though, an alternative, hypothetical scenario where there is fire, smoke, and little or no illumination, all of which occurs many thousands of feet from tunnel egress. How would our several hundred passengers fare then? The passenger train tunnel safety investigation, the results of which are reported in these pages, is a first attempt to identify and describe the procedures in place, on a widespread basis, to provide aid and comfort to the passengers of a train that has come to grief in a long tunnel.

The incident, though it caused not more than serious inconvenience to several hundred people and somewhat greater heat-related distress to the few transported to the hospital, raised questions as to the level of safety in the North River Tunnels and, by extension, other tunnels elsewhere that are used by passenger trains. Responding to this concern, the Federal Railroad Administration advanced an inquiry designed to accumulate data upon which an evaluation of passenger safety in tunnels could be based. This report presents the findings of that inquiry along with a description of the survey technique employed.

As the initial step in this project, it was necessary to first, determine the type and extent of data that would be needed to illuminate the problem of tunnel safety and, then, sources of these data had to be defined. To simplify the data collection process, a basic assumption was made that tunnels less than 1,000 feet in length would not be included in the survey. To understand the rationale supporting this assumption consider the following: in reality, the integrity of passenger trains in tunnels can be impaired in only one of two ways --either two trains, one or both of which may be passenger carrying, collide or a single passenger train may come to grief either through derailment or mechanical breakdown stranding the equipment in a tunnel. In any case, fire, smoke or noxious fumes may be present. The urgent action for a train crew and emergency personnel who may be present is to separate passengers from whatever hazard is a threat to their safety or well-being. As discussed earlier, if there is no discernible hazard associated with a stopped train, passenger flight, at least initially would be strongly contraindicated. When it becomes necessary to evacuate passengers from trains at locations away from platform areas designed to receive pedestrian flows, an additional element of risk is introduced and this is compounded by the length of tunnel that evacuees must transit. For tunnels less than 1,000 feet long, some part of the affected train is likely not to be confined within the structure, thus permitting de-training in the open if the provision of a relief train is not feasible or, if a short train is involved the distance from the train to the open air is not more than a few hundred feet with light emanating from the proximate tunnel portal.

Hence, the 1,000 foot or longer criterion.

To be able to appreciate the quality of safety associated with the passage of passenger trains in any tunnel, two types of data are required:

- Design details including dimensions, types of construction and the presence or absence of walkways along with descriptions of ancillary support systems for communication, lighting, ventilation and the availability of such equipment as fire extinguishers and self-contained breathing apparatus.

- Procedural codes that would come into play should a passenger train become distressed in a tunnel. These would range from rules or instructions governing the conduct of crews of disabled passenger trains, the readiness of train crews to deal with emergent situations, the availability of contingency plans to be implemented outside a tunnel by train control management to agreements with local police and fire departments and with local hospitals as well as casualty evacuation agencies.

In order to solicit responses to these two data categories from railroads operating passenger trains in long tunnels, a detailed questionnaire was devised (see Figure 1). This questionnaire was then sent to the managements of the following railroads: National Railroad Passenger Corporation (AMTRAK), the Long Island Rail Road (LI), Metro North Commuter Railroad (MNCW), New Jersey Transit Authority (NJTR), Port Authority Trans-Hudson Corporation (PATH), Southeastern Pennsylvania Transportation Authority (SEPTA), the Southern Pacific Transportation Company-California Department of Transportation (SP-CALTRANS) combined operation serving San Francisco and the Alaska Railroad Corporation (ARR).

Identification of these seven railroads from among the larger population comprising the industry as a whole was not a difficult task. Scrutinizing the industry in the light of two criteria: provision of regularly scheduled passenger service and the operation of these trains through tunnels 1,000 feet or more in length quickly separated the railroads of interest from the balance. It is interesting to note the volume or passengers transported by these carriers in 1987, the most recent full year for which data is available:

Amtrak	31,865,000
LI	71,972,000
MNCW	34,777,000
NJTR	45,005,000
PATH	58,190,000
SEPTA	22,995,000
SP-Caltrans	6,513,000
ARR	361,000

The Following Information Is Required For All Tunnels and Track Enclosures Such As Snowsheds 1,000 Feet In Length or Longer

STATISTICAL

Owning railroad *

Route designation: division, subdivision and other name if widely used, e.g., "the Northern Route".

Location: decimal milepost to the approximate 1/10 mile for each portal.

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Length in thousands of feet.

Single or multiple track. If the latter, number of tracks and bores.

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

Type and frequency of signing to indicate location within tunnel.

Wayside telephone or other type of communication system and approximate unit spacing.

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

Train operating speed in tunnel.

Provision of walkways adjacent to track.

Nature and extent of tunnel lining type(s).

Access other than via portals.

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

Air quality standards for the tunnel.

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

PROCEDURAL

Tunnel owner's stated policy regarding the evacuation of passengers from a distressed train stranded within the tunnel.

If the train operator is not the tunnel owner, what procedures are followed by the train-operator management to assure that the tunnel owner is ready and able to implement the owner's own evacuation policies?

Train operator's detailed guidelines for on-board train personnel for the safekeeping of distressed-train passengers or for the evacuation of train occupants from tunnels including reference to the specific problems presented by aged, handicapped or injured passengers.

Methods of training staff in the application of these guidelines including accident simulation exercises.

Procedures followed by train-operator supervision to assure on-duty staff readiness and capability to adhere to these guidelines.

Equipment on passenger trains specifically intended or appropriate to assist in the evacuation of passengers from long tunnels.

General description of emergency response plans including identification of all organizational parties to any agreements and a brief description of their individual responsibilities.

TUNNEL SAFETY SURVEY DETAILS

Figure 1

Not all of these passengers were conveyed through long tunnels, but it is safe to say that, with the exception of Amtrak, most were. Amtrak's singular distinction resides in the operation of passenger trains through the longest tunnels, by far, in the country. For example, the well-known Moffat Tunnel in Colorado is almost 33,000 feet (6.2 miles) long and by no means is this the longest.

A notable characteristic of this seven-railroad list is that, once again excepting Amtrak, the remaining carriers are all what would be called commuter railroads. Taking the commuter railroads as a class, a unique feature is that all but SP-Caltrans are located in the northeast. There is an extensive commuter operation that serves the Chicago region, but these trains are not required to run through long tunnels.

In the process of soliciting responses to the questions exhibited in Figure 1, FRA appealed directly to the commuter railroads for cooperation and this was forthcoming. Amtrak was equally cooperative, but the timeliness of response was strongly affected by this carrier's need to deal with many separate railroads with which it has trackage right agreements in order to come up with answers. Recall that Amtrak controls train movements only over tracks that it owns: the Northeast Corridor from Washington to Boston, the line from Philadelphia to Harrisburg and the so-called Michigan District from Porter, Indiana to Kalamazoo, Michigan. All other intercity passenger service is over routes owned and controlled by other corporate entities. The implications of this complex series of arrangements will become clearer later on in this discussion.

The tunnel facilities of each of the commuter railroads are few enough in number that they can be considered in detail both as to physical (statistical) and procedural details. This will be a useful approach in that it can provide the reader with a fairly good understanding of just what the tunnel environment is like and how the operating authorities have set up to cope with tunnel emergencies involving large numbers of people.

On the other hand, Amtrak, with the exceptions of the underwater tunnel approaches to Manhattan, offers the reverse of the commuter railroad situation; very many facilities, widely distributed over national routes, each one of which is used by only a small number of trains per day. Away from the Northeast Corridor area, Amtrak uses 81 tunnels owned and controlled by nine other corporate bodies. In the interest of expediency, a summary approach will be brought to bear in sorting out the physical features and procedural codes for these many facilities.

If we regard, for example, the Park Avenue tunnel (MNCW) in New York City which carries an average of 530 trains each weekday through its approximate two-mile length and SP's tunnel No. 41 in Norden, California which is also about two miles long, but which carries two Amtrak passenger trains each day, it becomes clearly necessary to recognize the variable risk associated with each facility. In this case, risk is a function of exposure. For a given period, say one day, an empirical index could be readily derived reflecting the total number of passenger train-hours accumulated in each facility, the assumption being that the greater the number of trains run through a tunnel and the longer it takes to complete a trip, the greater the risk that some misfortune will occur within tunnel confines. This is a pretty elementary concept and its validity is borne out by experience. Over a 5-year period, there will be more passenger train incidents in tunnels in and around urban centers than anywhere else in the country simply because the frequency of train operations is greater. What this suggests is that the need for comprehensive procedural plans is substantially more pressing in cities than elsewhere and, as will be shown, this is the way the development of emergency planning and the provision of safety-related equipment within tunnels evolved. In no way is it suggested or implied that the demand for adequate emergency planning in the cases of the less frequently utilized tunnels is trivial. While it is true that the possibility of two passenger trains colliding in the SP tunnel is much more remote than would be the case with the dense New York commuter operation, the total number of people involved in either situation, once an incident has occurred, is of the same order of magnitude. Say, for example, 700 in the intercity train instance compared with perhaps 1,400 for two commuter trains. The exigencies of evacuation would be pretty much the same for either example; what would decidedly be different would be the impact on the surrounding environment (other trains, street traffic at points of egress and neighborhood disruption).

Before directing attention to the responses of the individual railroads, it will be helpful to understand the data analysis scheme. For the ARR and the commuter railroads, which will be taken up first, the actual replies to the tunnel questionnaire (Figure 1) are presented regarding the physical features of a structure. With respect to procedural codes, provided source documents are cited and the salient points are summarized. There is no significance in the order in which these railroads appear other than that the Long Island Rail Road and New Jersey Transit Rail Operations come last because they each have operating privileges in certain of the under-river tunnels, owned and controlled by Amtrak, which lead into New York City. A somewhat analogous situation exists in the Park Avenue tunnel through which Amtrak operates an average of 20 trains per day controlled by dispatchers of the Metro-North Commuter Railroad.

As a final note, a word of caution would be appropriate here. There are a large amount of data presented in this report, far more on the subject than have appeared under one title, heretofore. Despite its apparent comprehensiveness, there are limits evident on the ultimate usefulness of this report. Chief examples of this caveat reside in two ineluctable facts:

- by design, a specific subset of the total population of railroad tunnels in the U.S. is examined; freight-traffic-only tunnels, regardless of length, are not included nor are any tunnels less than 1,000 feet;

- in all cases, it is safe to say, the procedural aspects of preserving the safety of passengers in tunnels that are espoused by the passenger carriers are under review and, therefore, subject to evolutionary reform; some of what is reported, herein, will change.

Figures 1 through 11 are inserted in the text to illustrate certain ideas that are being discussed. The intent supporting their inclusion is clarification. Presenting sections extracted from the emergency plan of one railroad or another does not imply any qualitative assessment of the material by the Federal Railroad Administration.

ALASKA RAILROAD CORPORATION
(ARR)

Background

ARR is a state owned railroad which runs from Seward, Alaska to Fairbanks, Alaska. The ARR was originally owned and operated by the Federal government from 1914 until 1985. On January 5, 1985, the State of Alaska purchased the railroad from the Federal government.

The ARR operates over 575 miles of track. ARR is involved in freight transportation which represents the majority of tonnage and revenue. The ARR also operates passenger equipment which accounts for 1,000 train movements per year and approximately 350 rail diesel car movements per year. Passenger business accounted for 361,000 customers in 1988.

The ARR operates through two tunnels over 1,000 feet in length. Both of these tunnels are located on the Whittier Subdivision. The Whittier Tunnel is 13,358 feet in length, and the Portage Tunnel is 5,069 feet in length. The two tunnels are located within one mile of each other. The ARR transported approximately 197,000 passenger through these tunnels in 1988.

Statistical

OWNING RAILROAD

Alaska Railroad Corporation ... Whittier Tunnel

ROUTE DESIGNATION: DIVISION, SUBDIVISION AND OTHER NAME IF WIDELY USED, E.Q., "THE NORTHERN ROUTE."

Whittier subdivision

LOCATION: DECIMAL MILEPOST TO THE APPROXIMATE 1/10 MILE FOR EACH PORTAL.

South Portal MP F 2.5
North Portal MP F 5.1

PLACE NAMES NEAREST TO EACH PORTAL THAT CAN BE FOUND IN THE RAND MCNALLY RAILROAD ATLAS.

South Portal - Whittier, Alaska
North Portal - Portage, Alaska

LENGTH IN THOUSANDS OF FEET.

13,358

SOUTHERN PACIFIC TRANSPORTATION COMPANY/
CALIFORNIA DEPARTMENT OF TRANSPORTATION
(SP-CALTRANS)

Background

This 47-mile route between San Francisco and San Jose has provided rail transportation to commuters since 1907 when the Southern Pacific (SP) completed the Bayshore Cutoff as it was known then. The SP struggled in recent years, with less and less success, to avoid the financial burden associated with this service. Finally, in 1980, the California Department of Transportation (Caltrans) assumed responsibility. Today, the "Peninsular Commute" is completely re-equipped with 73 gallery-type, bi-level push-pull passenger cars and 18 3,200 hp diesel electric locomotives. Passenger volume in 1987 was reported to FRA as 6.5 million. (Rolling stock details taken from: Passenger Train Journal, March 1987.)

Questionnaire Responses

Statistical

OWNING RAILROAD

SP owns the fixed plant facilities and Caltrans owns the rolling stock which is dispatched, crewed and maintained by SP.

ROUTE DESIGNATION

Western Division, San Francisco Subdivision, also known as the Peninsula Commute Service.

LOCATION: DECIMAL MILEPOST TO THE APPROXIMATE 1/10 MILE FOR EACH PORTAL.

There are five tunnels on the line, San Francisco to San Jose, two of which are parallel bores. One of this pair is not used today so the operation is essentially single track at this location.

- Tunnel No. 1: MP 1.3 to MP 1.6
- Tunnel No. 2: MP 1.9 to MP 2.1
  (EB and WB bores)
- Tunnel No. 3: MP 3.2 to MP 3.6
- Tunnel No. 4: MP 4.3 to MP 5.0

PLACE NAMES NEAREST TO EACH PORTAL THAT CAN BE FOUND IN THE RAND MCNALLY RAILROAD ATLAS.

Not provided in any case.

LENGTH IN THOUSANDS OF FEET.

Tunnel No. 1:	1,817	feet
Tunnel No. 2: (EB and WB bores)	1,086	"
Tunnel No. 3:	2,364	"
Tunnel No. 4:	3,547	"

SINGLE OR MULTIPLE TRACK.

All tunnels, except the No. 2 bores are double track.

FREQUENCY OF PASSENGER TRAIN USE.

There are 26 passenger trains, each way, on weekdays.

PRESENCE OF ENERGIZED HIGH VOLTAGE CONDUCTORS, ELECTRICAL TRANSMISSION SYSTEMS OR CHARGED PIPELINES.

None

TYPE OF ILLUMINATION IN TUNNELS.

None

TYPE AND FREQUENCY OF SIGNING TO INDICATE LOCATION WITHIN TUNNELS.

None

WAYSIDE TELEPHONE OR OTHER TYPE OF COMMUNICATION SYSTEM.

None

CHARACTERISTICS OF SIGNAL AND TRAIN CONTROL SYSTEM THAT WOULD INDICATE TO A CENTRAL POINT SPECIFIC INFORMATION ON TUNNEL OCCUPANCY.

None

TRAIN OPERATING SPEED IN TUNNELS.

Tunnel No. 1:	25 mph
Tunnel No. 2:	50 mph
Tunnel No. 3:	60 mph
Tunnel No. 4:	60 mph

PROVISION OF WALKWAYS ADJACENT TO TRACK.

Crushed rock ballast layer only.

NATURE AND EXTENT OF TUNNEL LINING TYPE(S).

All bores, brick and concrete.

ACCESS OTHER THAN VIA PORTALS.

None

GENERAL DESCRIPTION OF TUNNEL VENTILATION SYSTEM.

Natural ventilation

AIR QUALITY STANDARDS FOR THE TUNNEL.

Not specified.

Procedural

TUNNEL OWNER'S STATED POLICY REGARDING THE EVACUATION OF PASSENGERS FROM A DISTRESSED TRAIN STRANDED WITHIN THE TUNNEL.

Evacuation policy, in tunnel or open track, is defined in the SP publication: Peninsula Commute Service Emergency Plan (12-15-87... 18 pages) under section D, Train Evacuation, which, because it is brief, is reproduced below:

1. If circumstances of emergency situation require that passengers be evacuated from the train, Conductor will select best location based upon the immediacy of the emergency. Stopping at station platform is the most preferable location for evacuation. An alternate location will be chosen considering the safest detraining location for passengers. In all situations, passengers will be detrained on side of train away from adjacent track, if practicable.

2. Some train evacuations will be more difficult to effect than others depending upon the location at which they must occur; however, the most important consideration during any passenger evacuation is the safety of the passenger.

3. The train conductor shall make a public address announcement to the passengers telling them why, when and how they must disembark train, where to go and what

to do after they disembark, and any special precautions that may apply at the evacuation site. Passengers shall be asked to help one another, especially those who are handicapped because of age or physical disability.

4. The train crew members shall ensure that all passengers have disembarked and continue to assist and direct the passengers in any way possible to ensure their safety.

The Emergency Plan not only covers train evacuations, but other incidents and situations that can interfere with the safe operation of trains such as severe weather, earthquakes, mechanical breakdown and so on.

TRAIN OPERATOR'S DETAILED GUIDELINES FOR ON-BOARD TRAIN PERSONNEL FOR THE SAFEKEEPING OF DISTRESSED-TRAIN PASSENGERS OR FOR THE EVACUATION OF TRAIN OCCUPANTS FROM TUNNELS INCLUDING REFERENCE TO THE SPECIFIC PROBLEMS PRESENTED BY AGED, HANDICAPPED OR INJURED PASSENGERS.

Instructions specifically pertaining to train evacuation in tunnels are essentially presented in the item above. The direction that passengers shall be asked to help one another, especially the handicapped, (3) is truly unique in the commuter rail scene observed. Its equivalent has only been encountered elsewhere during this research in the manual issued by the Massachusetts Bay Transportation Authority relative to its rapid transit operation.

METHODS OF TRAINING STAFF IN THE APPLICATION OF THESE GUIDELINES INCLUDING ACCIDENT SIMULATION EXERCISES.

Here, cited in its entirety, is the information proferred by SP:

Employees desiring to mark up in Commute Service are required to:

1. make familiarizations trips;
2. be examined by management on-board a bi-level passenger car to determine familiarity with the operating and safety features of this equipment;
3. submit to a thorough oral review of the Emergency Response Plan.

Employees assigned to commuter service are drawn from the ranks of freight service staff.

SP advises that there is no formal employee training program operative at the moment, but there are plans to create one.

PROCEDURES FOLLOWED BY TRAIN-OPERATOR SUPERVISION TO ASSURE ON-DUTY STAFF READINESS AND CAPABILITY TO ADHERE TO THESE GUIDELINES.

When supervisors are efficiency testing or riding trains, the crews are questioned as to responses in different emergency situations.

EQUIPMENT ON PASSENGER TRAINS SPECIFICALLY INTENDED OR APPROPRIATE TO ASSIST IN THE EVACUATION OF PASSENGERS FROM LONG TUNNELS.

Each car is equipped with a sledge hammer, pry bar and two fire extinguisher, one at each end.

From Figure 2 it is clear that the distance from the floor at the center carbody door to the roadbed is something on the order of 24 inches (consider 36-inch diameter wheels). This is not an excessive distance for passengers to step down, with assistance for older and infirm passengers to be sure. It would appear that emergency egress, form this type of car to the roadbed is more readily accomplished than is the case with single-level cars used elsewhere. Further discussion of the ease-of-egress problem will come up in the treatment of commuter rail operations serving the New York City area.

GENERAL DESCRIPTION OF EMERGENCY RESPONSE PLANS INCLUDING IDENTIFICATION OF ALL ORGANIZATIONAL PARTIES TO ANY AGREEMENTS AND A BRIEF DESCRIPTION OF THEIR INDIVIDUAL RESPONSIBILITIES.

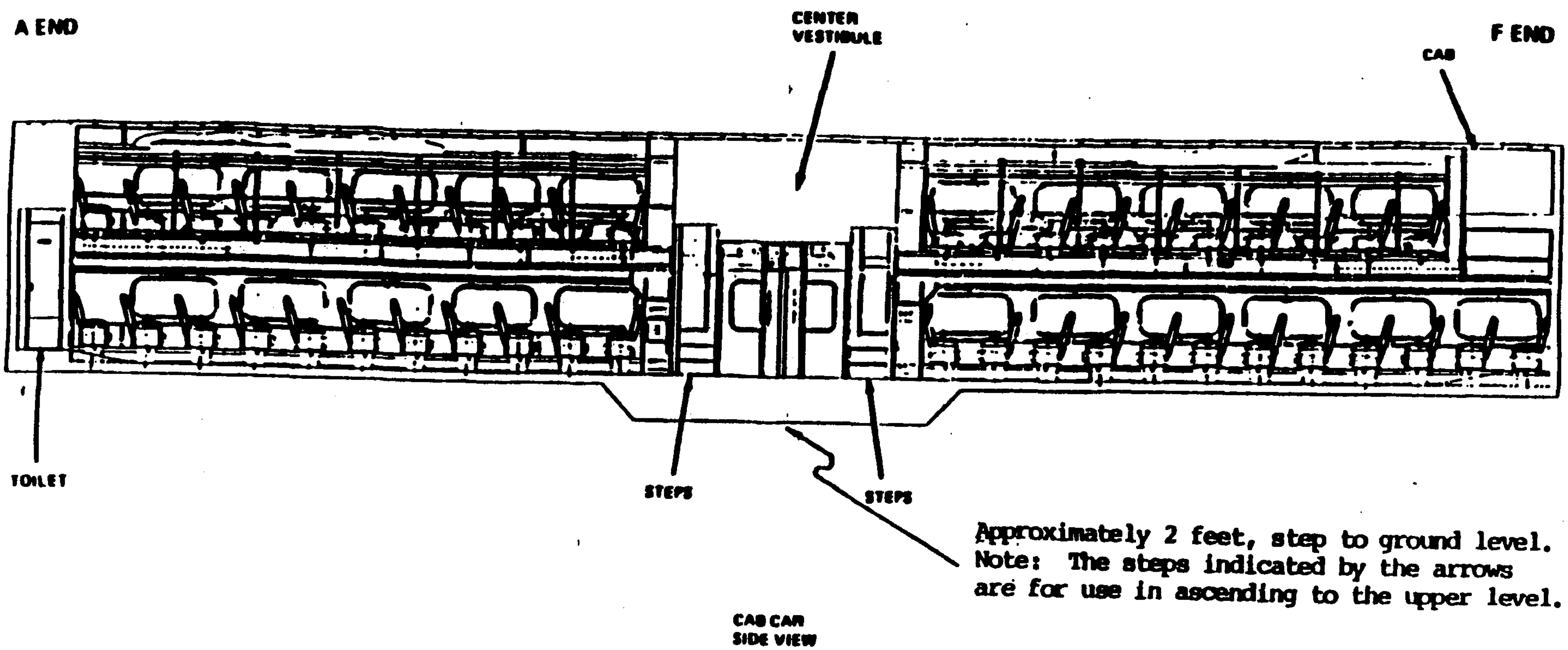
In the past, classes for fire departments to learn how to deal with commute service rolling stock in an emergency have been handled on an as-asked-for basis.

It is not stated how actively the various fire departments availed themselves of this option.

A more aggressive approach is now claimed by SP staff, but no details on this initiative were made available.

Commentary

By comparison with the rail commuter operations in some other metropolises, that of the Caltran Peninsula Rail Service is a modest operation; 17,000 daily patrons in the 1987/1988 fiscal year. By the same token its preparedness to deal with an emergency requiring one or more train evacuations, in a tunnel or open track, for that matter, is equally modest compared with the plans in place in other areas.



SKETCH SHOWING PROXIMITY OF BI-LEVEL
CAR EXIT STEP TO GROUND

Figure 2

Courtesy: SP

Southeastern Pennsylvania Transportation Authority (SEPTA)

Background

SEPTA's Regional Rail Division, which operates passenger trains in two tunnels in Philadelphia, is one element of a larger organization that includes other standard and broad gage services, both subsurface and surface, and also deploys diesel and trolley bus fleets. The Regional Rail Division operates commuter trains over 224 track miles owned and managed by the authority and 289 other track miles owned and controlled by either the Consolidated Rail Corporation or Amtrak. Operations in the two tunnels are controlled by Regional Rail Division staff. The service is provided by 338 MU electric cars and 35 push-pull cars. Passenger volume in 1987 was reported by the carrier as 23 million (Plant details drawn from: The Pocket List of Railroad Officials, 3rd quarter 1988).

Questionnaire Responses

Statistical

OWNING RAILROAD

Southeastern Pennsylvania Transportation Authority.

ROUTE DESIGNATION: DIVISION, SUBDIVISION AND OTHER NAME IF WIDELY USED, E.Q., "THE NORTH ROUTE".

a. Center City Commuter Tunnel.
b. 32nd Street Tunnel.

LOCATION: DECIMAL MILEPOST TO THE APPROXIMATE 1/10 MILE FOR EACH PORTAL.

Not provided in either case.

PLACE NAMES NEAREST TO EACH PORTAL THAT CAN BE FOUND IN THE RAND MCNALLY RAILROAD ATLAS.

Irrelevant in this case.

LENGTH IN THOUSANDS OF FEET.

a. Center City Commuter Tunnel is 9,180 feet long.
b. 32nd Street Tunnel is 1,900 feet long.

SINGLE OR MULTIPLE TRACK. IF THE LATTER, NUMBER OF TRACKS AND BORES.

a. Multiple tracks, Suburban Station: 8 tracks.
   Multiple tracks, Center City-Market East: 4 tracks.
b. Two tracks.

FREQUENCY OF PASSENGER TRAIN USE -- NUMBER OF PASSENGER TRAINS PASSING THROUGH PER DAY OR WEEK OR OTHER LIKE PERIOD.

a. 467 per day.
b. 225 per day.

PRESENCE OF ENERGIZED HIGH VOLTAGE ELECTRICAL CONDUCTORS, ELECTRICAL TRANSMISSION SYSTEMS OR CHARGED PIPELINES.

(a and b) 11,500 volt overhead catenary.

TYPE OF ILLUMINATION IN TUNNEL, ALONG WITH APPROXIMATE UNIT SPACING AND INDIVIDUAL INTENSITY.

(a and b) Mercury vapor and fluorescent lighting - approximately every 75 feet. Normally power for this lighting system is supplied by two outside feeders and if either one is lost, the other will pick up the full load automatically. In the event that both outside sources are lost, an emergency on-line generator will provide limited power which, while light levels will be lower than usual, will power about every other lighting fixture.

TYPE AND FREQUENCY OF SIGNING TO INDICATE LOCATION WITHIN TUNNEL.

The carrier's response to this query simply referred to "Operational Procedure #12, PFD as the data source. As noted in detail later, this is a Philadelphia Fire Department document (OP #12, PFD). From this, the following is abstracted in reference to a) the Center City Commuter Tunnel only:

- Every 100 feet there is painted on the wall an inscription in this style (typically)... 46+00/10th-9th. From this, an observer may conclude that he is 4,600 feet from the tunnels west portal and is below ground between 9th and 10th Streets (station 00+00 is the tunnel portal).

- Beneath each of the 100-foot location markers is a directional arrow pointing toward the nearest emergency exit.

No information was provided by the respondent on signing in the 32nd Street Tunnel.

WAYSIDE TELEPHONE OR THE TYPE OF COMMUNICATION SYSTEM AND APPROXIMATE UNIT SPACING.

Again the respondent made unspecific reference to OP#12, PFD and the following is abstracted in reference to the Center City Commuter tunnel only;

- Provision exists for use of fire department radios within this tunnel. Whether other frequencies are available is not stated.

- Emergency telephones are "... mounted inside a red box that looks like a street firebox." The distance interval between these telephones is not given and the manual does not raise the point of infrequent spacing.

- At other unnoted intervals there are "... automatic telephones mounted inside a gray colored box with 'telephone' marked on each side." The full purpose of these telephones is not clear from the OP#12, PFD, text which, not surprisingly, dwells on the use of this system by fire fighters.

CHARACTERISTICS OF SIGNAL AND TRAIN CONTROL SYSTEM THAT WOULD INDICATE TO A CENTRAL POINT SPECIFIC INFORMATION ON TUNNEL OCCUPANCY.

Consists of interlocking model board type system.

TRAIN OPERATING SPEED IN TUNNEL.

Maximum of 45 mph.

PROVISION OF WALKWAYS ADJACENT TO TRACK.

Walkways are located on both sides of track area, both tunnels. Ample space afforded throughout tunnel areas.

NATURE AND EXTENT OF TUNNEL LINING TYPE(S).

Cast concrete, both tunnels.

ACCESS OTHER THAN VIA PORTALS.

a. Various egress routes. See Operational Procedure #12, PFD.

b. Either end of tunnel.
OP#12, PFD states that there are seven emergency exits variably spaced apart in the Center City Commuter tunnel, a). The 32nd Street tunnel provides egress via the two portals.

GENERAL DESCRIPTION OF TUNNEL VENTILATION SYSTEM. IF FACILITIES ARE PRESENT BUT INOPERATIVE, PLEASE SO NOTE.

For the Center City Commuter tunnel there is forced air at Market East Station. The Suburban Station system was inoperative at the time of inquiry.

32nd Street Tunnel is ventilated by natural air flow.

AIR QUALITY STANDARDS FOR THE TUNNEL.

City of Philadelphia standards apply for each of the two tunnels.

Procedural

in replying to the solicitation, the management of SEPTA elected to avoid explicit responses to specific procedural inquiries continued in the questionnaire. It was left to FRA staff to derive the information, for the most part, from the supplied copy of the internally prepared manual, Emergency Evacuation Procedures for Regional Rail Division Employees. This is the second of three extensive documents which SEPTA submitted to FRA as descriptive of that carrier's passenger train safety program. It would be worthwhile to pause here, before continuing with the examination of how this carrier reacts to the occurrence of passenger train emergencies in tunnels, to look at the nature of all primary source material sent to FRA:

1. Operational Procedure #12 Philadelphia Fire Department July 1984 32 pages.

2. Emergency Evacuation Procedures for Regional Rail Division Employees Southeastern Pennsylvania Transportation Authority SEP-1 January 1, 1986, 39 pages.

3. Center City Commuter Rail Connection Emergency Plan Prepared by: Urban Engineers, Inc., Revision 2, August 14, 1984, 33 pages.

Item 1, OP#12, PFD, was generated by staff of the Philadelphia Fire Department. Its purpose is to provide a guide for department officers and members in dealing with fires and other emergencies that happen on railroad properties, in the open and in tunnels. The subjects covered are briefly listed:

... Fighting fires in electrified territory.
... Railroad fires involving hazardous chemicals.
... Combatting fires at train derailments.
... Emergencies in railroad tunnels. This section comprises more than two-thirds of the manual.

Item 2, Emergency Evacuation Procedures, etc. was assembled, in-house by SEPTA staff. It is divided into two parts: Evacuation Procedures and Equipment Procedures. The first provides guidelines for train and engine staff who may become responsible for shepherding passengers from disabled trains to relief trains or along the roadbed to safety. Detailed instructions are advanced for a variety of circumstances where passengers may be transferred from one train to another or detrained in cuts, on fills, in tunnels or a to-be-avoided-at-all-costs-if-possible evacuation onto an elevated structure. Extreme caution is the common thread , in much of the literature provided by the several railroads, when the subject of train evacuation on trestles is treated. The second part of this manual, equipment procedures, which is by far the most extensive section, covers the safety related features of the five types of passenger equipment to which operating staff of the Regional Rail Division may expect to be assigned along with switching and road diesel locomotives.

Item 3, the Center City ... Emergency Plan, is a series of architectural drawings presenting plan views of the entire Center City Commuter Tunnel and its three stations. All of the safety appliance locations are keyed into these drawings which, in effect, constitute a visual inventory as well as a directory. It would appear that this document is primarily a training tool.

Highlights of the Emergency Evacuation Procedures manual are as follows:

- A chain of responsibility is established.
- Need and method of communication described.
- Techniques to be employed by train crews in assisting passengers to leave a disabled train are discussed in detail for each possible situation.
- It is emphasized that police and fire department MUST (sic) be utilized during evacuation in tunnels when possible.
- The question of caring for handicapped or disabled passengers is specifically covered.

Clearly there exists a plainly delineated policy regarding the evacuation of passengers from the two SEPTA tunnels.

There are detailed instructions for on-board train personnel for the evacuation of passengers from tunnels.

With respect to training SEPTA informs FRA that: periods of instruction on emergency evacuation are held annually. "Periodic emergency evacuation exercises held with PFD. Annual inspection made of emergency evacuation stairs and exits to street level." FRA has no way of estimating the effectiveness of these training measures.

The railroad did not respond to the question of how management assessed staff readiness and capability to adhere to the established procedures. The reason for raising this issue in the first place is that exposing an organizations staff to any kind of training without an attempt to evaluate ultimate effectiveness can bring unpleasant surprises to that organization's management eventually.

With the exception of fire extinguisher and emergency exit windows, SEPTA's Emergency Evacuation Procedures manual mentions no equipment on passenger trains specifically intended to assist in the evacuation of passengers from long tunnels. There is no reference to hand tools, battery powered hand lights or medical appliances such as stretchers. Notably, there is no reference to the availability of ladders to enable passengers being evacuated from trains to actually descend from the cars down to the tunnel roadbed.

Commentary

The documentation provided by SEPTA describes a comprehensive scheme for handling passenger train emergencies in tunnels. Coordination with the municipal fire department appears to exist. What is less obvious from the provided data is how well it would all mesh together if the need suddenly arose to implement the plans in earnest. Presumably, the "periodic" emergency evacuation exercises with the PFD would reveal any interagency coordination shortcomings. But, in the absence of any explanation by the respondent as to how management goes about evaluating the effectiveness of staff training, it can only be hoped that the involved employees will act correctly when called upon to do so.

The apparent lack of on-board tools, portable lights and other equipment to facilitate passenger train evacuation is a source of concern.

Port Authority Trans-Hudson Corporation
(PATH)

Background

In taking up the PATH case, this report begins a discussion of the various railroads that serve Manhattan island and the several tunnels that are essential to the provision of this service. PATH is the current reincarnation (1962) of the original Hudson and Manhattan Railroad Company (H&M) which, in 1904, opened the first tunnel under the Hudson River between Manhattan and Hoboken. by 1909, H&M had completed construction on this entirely unique subterranean and subaqueous tunnel complex that is controlled by PATH today (see Figures 3 and 4). In the early days of operation, there was, over part of the system, a joint operation coordinated with the Pennsylvania Railroad, but shared operation is no longer practiced today. Of all the railroads that are discussed, PATH is singular in the sense that it does not operate over tracks controlled by any other railroad nor does the equipment of any other railroad or transportation authority enter on PATH property. This carrier does not have to share control of its operations with any other entity.

The PATH equipment roster shows 313 M-U cars for revenue service. This rolling stock is operated over a total of 35 track miles which includes 6.4 route miles of surface lines and 5.7 miles of yard tracks.

Questionnaire Responses

Statistical

ROUTE DESIGNATION: DIVISION, SUBDIVISION AND OTHER NAME IF WIDELY USED, e.g. "THE NORTHERN ROUTE".

PATH operates four (4) service routes:

Newark, New Jersey to the World Trade Center in New York City, New York via Journal Square, Jersey City, New Jersey.

Journal Square to 33rd Street, New York City.

Hoboken, New Jersey to World Trade Center.

Hoboken to 33rd Street.

LOCATION: DECIMAL MILEPOST TO THE APPROXIMATE 1/10 MILE FOR EACH PORTAL.

Mile marker 2.33. Note that there is only one entrance/exit to the PATH tunnel complex (see location marked "Portal" at the upper left corner of Figure 4). In effect, trains enter at Portal (just east of Jersey City), operate throughout the below-surface system and if scheduled to do so, emerge at the same location.

PLACE NAMES NEAREST TO EACH PORTAL THAT CAN BE FOUND IN THE RAND MCNALLY RAILROAD ATLAS.

Academy Street, Merseles Street, Waldo Avenue.

LENGTH IN THOUSANDS OF FEET.

84,000 feet (15.9 miles).

SINGLE OR MULTIPLE TRACK. IF THE LATTER, NUMBER OF TRACKS IN BORES.

Two track system - one track per bore.

FREQUENCY OF PASSENGER TRAIN USE -- NUMBER OF PASSENGER TRAINS PASSING THROUGH PER DAY OR WEEK OR OTHER LIKE PERIOD.

There are 1,147 passenger trains per day on the entire PATH system.

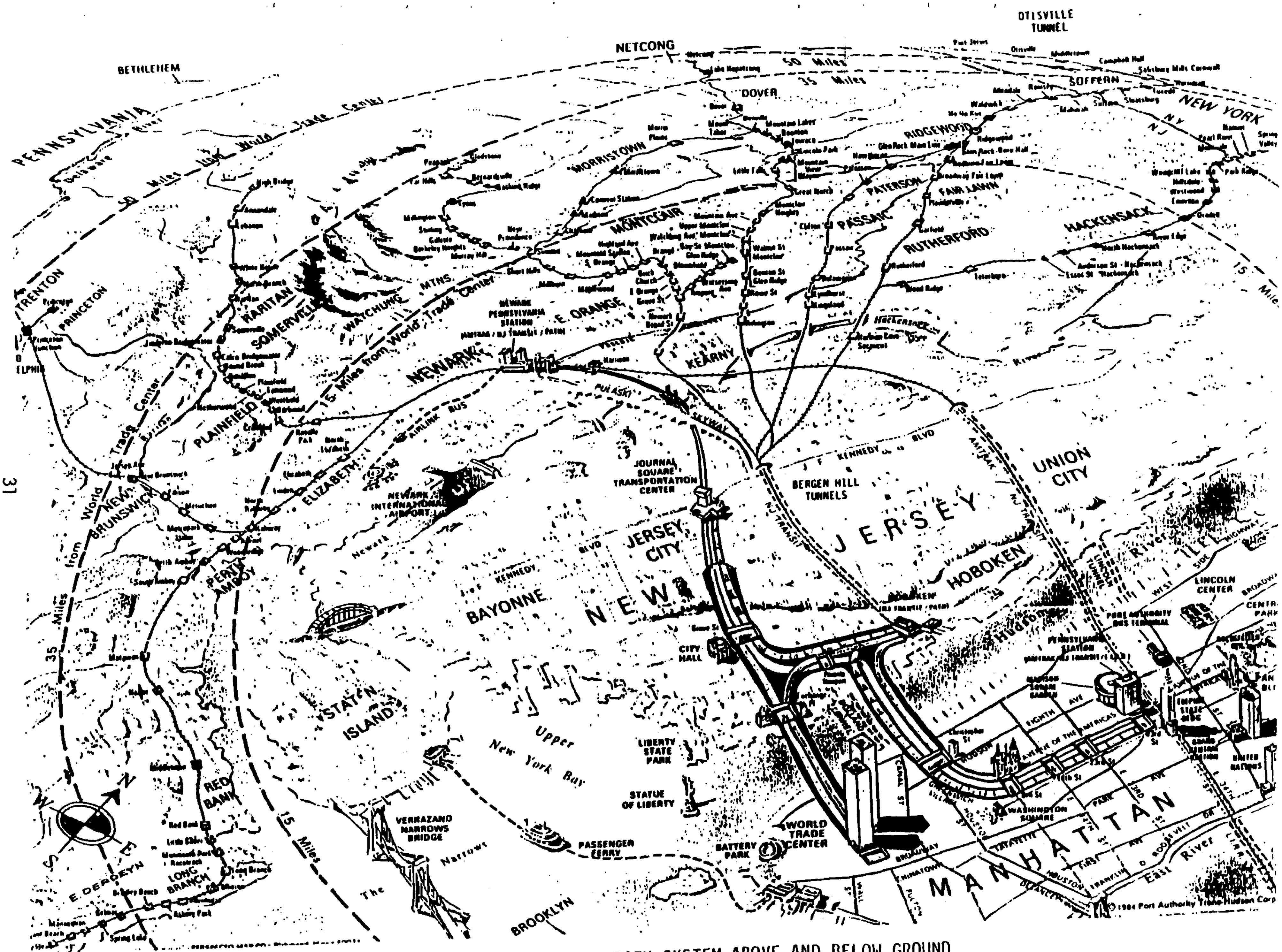
PRESENCE OF ENERGIZED HIGH VOLTAGE ELECTRICAL CONDUCTORS, ELECTRICAL TRANSMISSION SYSTEMS OR CHARGED PIPELINES.

Tunnels have several types of cabling along the right-of-way in a duct system, with open manholes approximately every 500 feet. Voltages range from 27,000 VAC, 13000 VAC, 1100 VAC, 480 VAC and 600 VDC. Trains draw power from an energized third rail.

A tunnel fire standpipe system is also present charged at normal street pressure with Siamese connections for charging by fire department(s).

TYPE OF ILLUMINATION IN TUNNEL ALONG WITH APPROXIMATE UNIT SPACING AND INDIVIDUAL INTENSITY.

Fluorescent lighting, one 16 watt fixture every forty (40) feet in tunnels proving approximately 2 foot candles of illumination.



PANORAMIC VIEW OF PATH SYSTEM ABOVE AND BELOW GROUND
ALSO SHOWS NJTR BERGEN HILL AND OTISVILLE TUNNELS

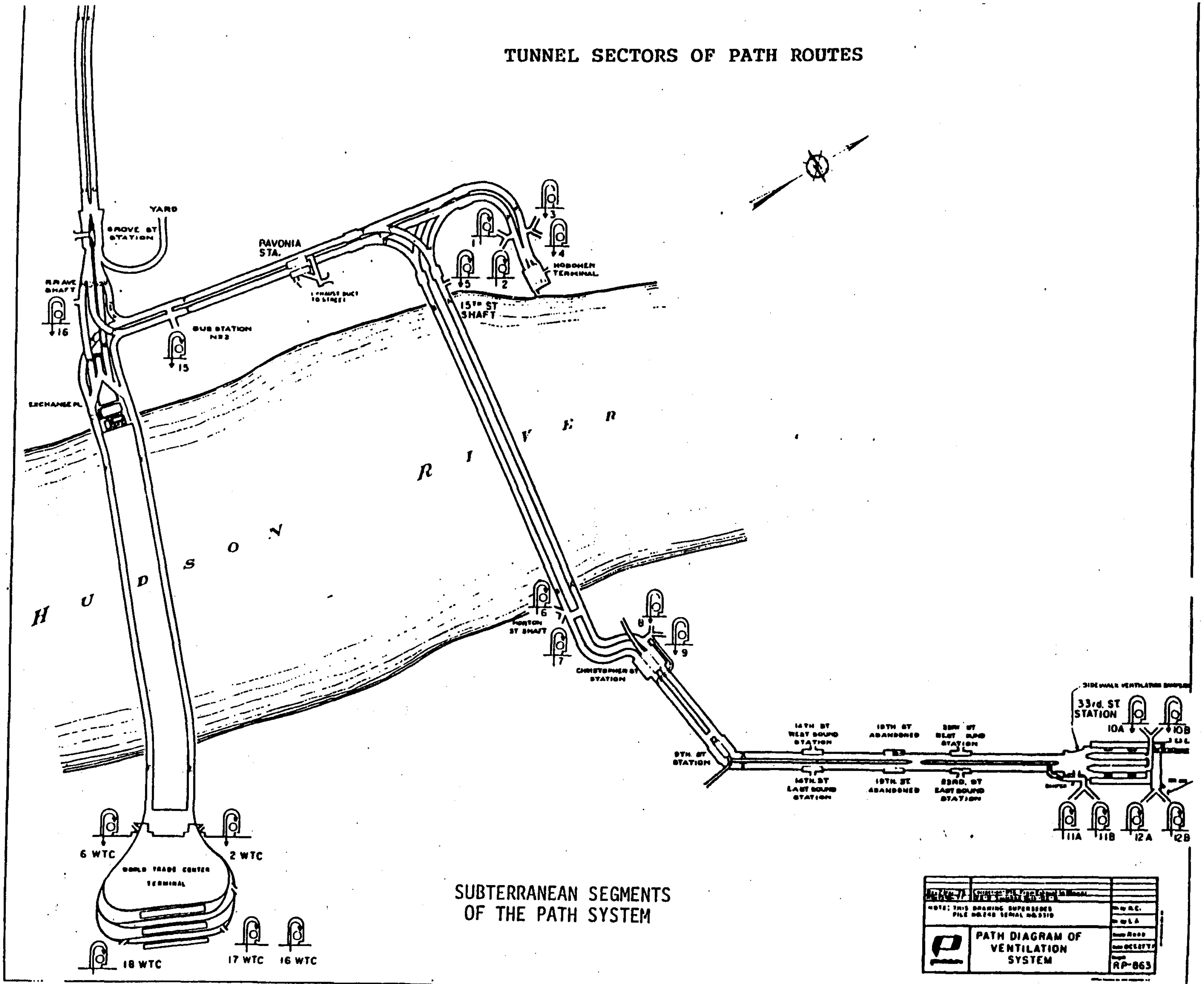

TUNNEL SECTORS OF PATH ROUTES
YARD
GROVE ST STATION
RAVONIA STA.
15TH ST SHAFT
HOBOKEN TERMINAL
BUS STATION
EXCHANGE PL
HUDSON RIVER
CHRISTOPHER ST STATION
9TH ST STATION
14TH ST WEST BOUND STATION
19TH ST ABANDONED
23RD ST WEST BOUND STATION
14TH ST EAST BOUND STATION
19TH ST ABANDONED
23RD ST EAST BOUND STATION
33rd ST STATION
10A
10B
11A
11B
12A
12B
1
2
3
4
5
6
7
8
9
15
16
6 WTC
2 WTC
WORLD TRADE CENTER TERMINAL
18 WTC
17 WTC
16 WTC
SUBTERRANEAN SEGMENTS OF THE PATH SYSTEM
PATH DIAGRAM OF VENTILATION SYSTEM
RP-863

Figure 4

TYPE AND FREQUENCY OF SIGNING TO INDICATE LOCATION WITHIN TUNNEL.

Engineering stations marked every 1+00 feet (tunnel) and marked every 0.1 miles in the open area.

In addition, the location of each signal number is cross referenced to each tunnel location for operational control.

WAYSIDE TELEPHONE OR OTHER TYPE OF COMMUNICATION SYSTEM AND APPROXIMATE UNIT SPACING.

Primary communications is via train to wayside radio with three separate frequencies. R-1 is used as the normal Operations Frequency, R-2 for Police use only and R-3 for Emergency Management.

There is, in addition, a proprietary wayside Emergency Backup Telephone (EBT) System which operates on a Common Battery to Switchboard in the Operations Control Center. EBT telephones are located at all Gamewell (Power Removal Location) stations, all emergency exit shafts, major switching locations (Caissons, Junctions and Interlockings).

A Centrex (dial) telephone is available at all pump locations, signal relay rooms, station platforms (end) and several shafts and ventilation installations as well as Power Substations.

CHARACTERISTICS OF SIGNAL AND TRAIN CONTROL SYSTEM THAT WOULD INDICATE TO A CENTRAL POINT SPECIFIC INFORMATION ON TUNNEL OCCUPANCY.

The PATH signal system uses train occupancy of each signal block with indication of such occupancy displayed at the Control Center on a Train Display Board. Any failure in train occupancy circuits fails safe and indicates an occupied block until the problem is corrected.

TRAIN OPERATING SPEED IN TUNNEL.

The maximum permissible speed within the tunnel areas is 40 mph. Specific speed in each tunnel segment varies with track conditions and is restricted by speed control and posted speed signs.

PROVISION OF WALKWAYS ADJACENT TO TRACK.

The top of the tunnel duct bank allows sufficient room to have personnel remain clear of operating trains. In areas of limited clearance, there are emergency manholes or niches built into the walls.

NATURE AND EXTENT OF TUNNEL LINING TYPES.

Brick lined	1,977 feet
Cast Iron rings	36,444 feet
Cast Iron and Concrete	3,851 feet
Concrete lined	41,780 feet

ACCESS OTHER THAN VIA PORTALS.

Stations, emergency exits (World Trade Center North & South), 15th Street (Jersey City), Washington Street (Jersey City), Morton Street (New York City), Hoboken Track Elevator, Henderson Street Yard Access - Tunnel Y.

GENERAL DESCRIPTION OF TUNNEL VENTILATION SYSTEM. IF FACILITIES ARE PRESENT, BUT INOPERATIVE, PLEASE SO NOTE.

Railroad Avenue Vent - Operational (remote control)
Pavonia Vent Shaft - Operational (remote control)
15th Street Fan - under repair (remote control)
Washington Street Vent - Operational (remote control)
Caisson No. 1 Vent - under construction
Morton Street Vent - Design phase
Hoboken Vent - Operational (manual operation)
World Trade Center Vent - Operational (manual operational)
Exchange Place Vent - under construction .
33rd Street Fans - Operational (manual operation)

System has (will have) capability of operating in supply or exhaust modes pending location and definition of the incident.

Upon completion of work at Morton Street, Exchange Place and Caisson I, which represent the remaining major component of the Systemwide Tunnel Ventilation Program, all vent fan locations will be operated via remote control at the John F. Hoban Operations Control System in a network scheme to optimize air flow.

AIR QUALITY STANDARDS FOR TUNNEL.

All revenue train operations utilize electric traction power and therefore do not impact adversely on air quality. Maintenance activities utilizing any fossil fuel equipment incorporates scrubbers to control any air quality impacts.

Procedural

TUNNEL OWNER'S STATED POLICY REGARDING THE EVACUATION OF PASSENGERS FROM A DISTRESSED TRAIN STRANDED WITHIN THE TUNNEL.

Evacuations or rescues may be carried out when a life threatening situation exists or when a stalled train will be delayed for an extended period of time. The order to evacuate is normally made by the Trainmaster, however, a train crew can initiate an evacuation of a train when communications with the Control Center are lost and a life threatening situation exists.

TRAIN OPERATOR'S DETAILED GUIDELINES FOR ON-BOARD TRAIN PERSONNEL FOR THE SAFEKEEPING OF DISTRESSED TRAIN PASSENGERS OR FOR THE EVACUATION OF TRAIN OCCUPANTS FROM TUNNELS INCLUDING REFERENCE TO THE SPECIFIC PROBLEMS PRESENTED BY AGED, HANDICAPPED OR INJURED PASSENGERS.

Specific guidance for all personnel, not just train crews, who might be involved in responding to any emergency or non-routine event is contained in the document: PATH Emergency and Non-routine Operating Procedures Manual. This eleven-chapter manual describes the wanted response from many employee categories in every conceivable situation. Two of the four parts of the second section (chapter 200) address the issues of train and station evacuation and rescue (the third and fourth sections look of third rail power - on/off and ventilation).

Sections 201 and 202 are organized to present, in a standardized format, explicit duties for trainmasters, train crews, power director, PATH police, etc., to be pursued in the event of several different evacuation scenarios. Five situations are covered for tunnels.

- Evacuation from a stalled train to the track and walk to nearest exit.
- Evacuation from a stalled train to an adjacent rescue train.
- Transferring passengers from a segment of a train that is inoperable to a part of the train that can be uncoupled and moved.
- Evacuation or rescue using a prime mover (not a locomotive) to move all or part of a stalled train or to bring empty cars to a disabled train.
- Evacuation by pushing or pulling a stalled train with another train.

Many stations are integral components of the tunnel system havin both surface and sub-surface elements. The evacuation of passengers from troubled stations areas is also handled as a series of possible situations and the indicated actions of involved employees. This approach is also followed where power is to be (or has been) interrupted, then restored and in situations where augmented ventilation is desirable. all told, there are 139 pages in this manual.

Few people are expected to be familiar with the entire manual, but specific work disciplines are drilled in the execution of their individual responsibilities.

METHODS OF TRAINING STAFF IN THE APPLICATION OF THESE GUIDELINES INCLUDING ACCIDENT SIMULATION EXERCISES.

All Motormen and Conductors participate in a two-day Crew Refresher Training Program each year where emergency procedures and evaluation guidelines are reviewed. In addition, unrehearsed and unannounced emergency simulation exercises are conducted each year to test emergency preparedness. A notable feature of the simulation program is that the element of surprise is extended to the participation of police and other emergency services organizations. When these non-railroad agencies are called to respond to simulated emergency, only the top level of agency managements know that the "event" is not real and they have the authority to cancel their involvement immediately should a genuine crisis arise elsewhere. These simulation exercises are claimed to be particularly effective in revealing staff or procedural shortcomings across the board. The way in which the manual is organized, where the specific responsibilities of the various job categories are defined in tabular fashion, facilitates the identification of staff performance shortcomings that are uncovered in simulations.

PROCEDURES FOLLOWED BY TRAIN-OPERATOR SUPERVISION TO ASSURE ON DUTY STAFF READINESS AND CAPABILITY TO ADHERE TO THESE GUIDELINES.

All train operators sign on to duty in the presence of supervisory staff. In addition, supervisors travel around the system monitoring train crew fitness and performance.

EQUIPMENT ON PASSENGER TRAINS SPECIFICALLY INTENDED OR APPROPRIATE TO ASSIST IN THE EVACUATION OF PASSENGERS FROM LONG TUNNELS.

- General emergency instructions are posted in each car.
- An emergency ladder to descend from the rail vehicle (head car or rear car) to the track bed.
- Dry power fire extinguisher.
- Emergency lighting - including a special light to illuminate the area of descent by ladder from a head or rear car.

Commentary

Of all the emergency procedure schemes examined in this study, that of PATH is one of the more rigorous. That carrier's approach to spelling out in detail the required responses of several levels of management to a variety of urgent action situations is truly unique; no other railroad sets up its guidelines in this way. It is plain that each involved employee has access to unambiguous instruction; he or she knows what is expected in each of these situations and associates also know what the person's obligations are.

The relationships with the emergency services available from the communities served by PATH seem to be productive of efficient action in the case of real need.

On the basis of the data provided, it is hard to discern more than one way in which improvement to the system could be recommended. The single caveat that comes to mind concerns the availability of but two ladders to facilitate train-ends only passenger evacuation. There are no steps on PATH cars to assist passengers to readily descend to the roadbed. Therefore, all passengers, possibly several hundred, would seem, in an evacuation emergency, to have to exit over one ladder since simultaneous evacuation from each end of a disabled train is likely to be not workable. If this is a valid criticism, it suggests a potentially severe constraint affecting evacuation efficiency. (See Figure 10 for some notion of the rapidity with which a trainload of people could be detrained from one end of a car in a consist designed to be serviced by high level platforms only.)

Metro-North Commuter Railroad Company
(MNCW)

Background

MNCW is a component, along with the Long Island Rail Road, of the regional administrative jurisdiction, the Metropolitan Transportation Authority. It came into being on January 1983 to take over the New York city commuter operations of the Consolidated Rail Corporation, itself a successor to the earlier railroads serving these regions; the New York Central and Hudson River Railroad and the New York and New Haven Railroad. This represents well over 100 years of commuter operation.

MNCW operates commuter trains over 660 miles of track radiating north and northeast from grand Central Terminal into southeastern New York and southwestern Connecticut. Equipment includes 40 passenger locomotives and 653 passenger-carrying vehicles, many of which are self-propelled. Passenger volume in 1987 was 34.8 million. The single tunnel more than 1,000 feet long, through which this railroad and Amtrak operate passenger trains is the Park Avenue tunnel which extends from 57th Street to 98th Street in Manhattan. As will be noted below, MNCW's train traffic in this facility is greatly superior numerically, to that of Amtrak.

Questionnaire Responses

Statistical

OWNING RAILROAD

MNCW is responsible for train operation in the tunnel, but is not the owner.

ROUTE DESIGNATION: DIVISION, SUBDIVISION AND OTHER NAME IF WIDELY USED, E.Q., "THE NORTHERN ROUTE."

Hudson Line.

LOCATION: DECIMAL MILEPOST TO THE APPROXIMATE 1/10 MILE FOR EACH PORTAL.

South Portal: MP 0.73, North Portal: MP 2.80

PLACE NAMES NEAREST TO EACH PORTAL.

South Portal is at 59th Street, North Portal is at 98th Street.

LENGTH IN THOUSANDS OF FEET.

10,600 feet

SINGLE OR MULTIPLE TRACK.

Four tracks in each of three sequential tunnel segments.

FREQUENCY OF PASSENGER TRAINS USE -- NUMBER OF PASSENGER TRAINS PASSING THROUGH PER DAY OR WEEK OR OTHER LIKE PERIOD.

532 trains daily, Monday through Friday. 228 trains each day on weekends and holidays. Amtrak's share of this traffic would be 18-20 trains on a weekday.

PRESENCE OF ENERGIZED HIGH VOLTAGE ELECTRICAL CONDUCTORS, ELECTRICAL TRANSMISSION SYSTEMS OR CHARGED PIPELINES.

700 V underrunning 3rd rail for traction power, insulated and covered with plastic cover.

TYPE OF ILLUMINATION IN TUNNEL, ALONG WITH APPROXIMATE UNIT SPACING AND INDIVIDUAL INTENSITY.

Each track has 40 watt, 3 foot florescent lights on the side wall. Lights are spaced 25' apart. Every 3rd light is on a separate circuit. Every 2nd light battery operated. Normal Operation: Every 3rd light lit. Emergency Operation: All lights lit.

TYPE AND FREQUENCY OF SIGNING TO INDICATE LOCATION WITHIN TUNNEL.

Location within the tunnel can be determined by:

1. Signal number, approximately every 1,000 feet.
2. Tunnel alarm boxes which given street location-approximately each 600 feet.
3. Numbers on the emergency lighting fixtures-approximately every 20 feet.

WAYSIDE TELEPHONE OR OTHER TYPE OF COMMUNICATION SYSTEM AND APPROXIMATE UNIT SPACING.

Normal radio base stations at 59th, 72nd and 86th Street.
Emergency radio base stations at Track 25, 59th Street, Tower A, B, 72nd and 86 Streets.
Phones are located approximately 250 feet apart on Track #1 at 59th, 72nd, and 86th Street and on tracks #3 and #4 at 68th, 78th and 95th on Track #2.

CHARACTERISTICS OF SIGNAL AND TRAIN CONTROL SYSTEM THAT WOULD INDICATE TO A CENTRAL POINT SPECIFIC INFORMATION ON TUNNEL OCCUPANCY.

There is no present indication to a central point as to tunnel occupancy. The only indication is verbal from the tower operator to the dispatcher.

TRAIN OPERATING SPEED IN TUNNEL.

Passenger trains: 35 mph.

PROVISION OF WALKWAYS ADJACENT TO TRACK.

None

NATURE AND EXTENT OF TUNNEL LINING TYPE(S).

The tunnel section consists between two basic types:
1. Cut stone walls with I-beam and brick roof.
2. Bridge-arch sections-5500 feet.

ACCESS OTHER THAN VIA PORTALS.

There are emergency exits via stairways to Park Avenue at 59th Street, 72nd Street and 86th Street.

GENERAL DESCRIPTION OF TUNNEL VENTILATION SYSTEM. IF FACILITIES ARE PRESENT, BUT INOPERATIVE, PLEASE SO NOTE.

The tunnel is ventilated naturally through open grating to the street above, approximately every 200 feet.

AIR QUALITY STANDARDS FOR THE TUNNEL.

There has been no reason to take any tests for air quality.

Procedural

TUNNEL OWNER'S STATED POLICY REGARDING THE EVACUATION OF PASSENGERS FROM A DISTRESSED TRAIN STRANDED WITHIN THE TUNNEL.

It is not clear, from the provided materials, who the tunnel owner is, but for the purpose of this discussion such information is irrelevant. The respondent states that the tunnel owner plays no part in passenger evacuation planning. All responsibility is acknowledged by MNCW.

TRAIN OPERATOR'S DETAILED GUIDELINES FOR ON-BOARD TRAIN PERSONNEL FOR THE SAFEKEEPING OF DISTRESSED-TRAIN PASSENGERS OR FOR THE EVACUATION OF TRAIN OCCUPANTS FROM TUNNELS INCLUDING REFERENCE TO THE SPECIFIC PROBLEMS PRESENTED BY AGED, HANDICAPPED OR INJURED PASSENGERS.

MNCW supplied a packet entitled Metro-North Service Description Plans. This included:

- o MNCW/New York City Transit Authority (NYCTA) Alternate Service Plan.
- o Grand Central Terminal Operating Configency Plan.
- o Customer Service Department Crisis Response Plan.
- o Customer Service Emergency Response Plans for 125th Street Station.
- o New York City Police Department (NYCPD) Operations Order No. 07/85.

From a review of this material it is evident that MNCW management has established guidelines for the direction of staff in a wide variety of emergency situations of which the evacuation of passengers from a disabled train in the Park Avenue tunnel is simply a typical example. Because of the large numbers of passengers transported each day.. A service interruption can quickly compound into a major inconvenience from any thousands of people unless alternate plans are implemented smoothly. In the event of a tunnel service disruption, management is confronted with the need to not only assist the disabled train passengers, but also to provide alternate means of transport by-passing the tunnel. Three of the four plans noted above and the NYCPD Operation Order are concerned with the latter aspect of tunnel service interruption. Addressing transportation efficiency rather than safety they are of academic interest in this discussion. The customer Service Department Crisis Response Plan is global in scope and does not confine itself to rescue activities in anyone part of the MNCW system. However, it does establish a list of management personnel to whom emergency response assignments are allotted by name and location. It becomes clear, at this point, that a key component of adequate staff response to a tunnel emergency is training.

METHODS OF TRAINING STAFF IN THE APPLICATION OF THESE GUIDELINES INCLUDING ACCIDENT SIMULATION EXERCISES.

Train crews are instructed in tunnel alarm, tunnel phones and evacuation stairways/ramp use. All train and engine personnel are instructed on all tunnel equipment.

Additionally, all employees and managers who have need to enter the tunnel pass through the Park Avenue Tunnel Orientation Course, the syllabus of which appears as Figure 5.

No examination is required at the completion of this course, but such is not the case for the all-day tunnel walk course. Here a class room setting is used in the morning to demonstrate the correct use of emergency equipment stored in the tunnel and on board trains. Later in the day, after having received oral counsel on what to look for and observe, strides are taken for a three-hour walk through part of the Park Avenue Tunnel. Returning from this exercise, they are given a multiple-chore quiz on what they saw and heard, the questions being artfully designed to reinforce earlier instruction and impressions. Questions not only concern the locations of emergency facilities, but also emergency procedure responses.

PROCEDURES FOLLOWED BY TRAIN-OPERATOR SUPERVISION TO ASSURE ON-DUTY STAFF READINESS AND CAPABILITY TO ADHERE TO THESE GUIDELINES.

Transportation supervision check train crews while riding trains and on-board customer service personnel also check staff when carrying out on-board inspections.

EQUIPMENT ON PASSENGER TRAINS SPECIFICALLY INTENDED OR APPROPRIATE TO ASSIST IN THE EVACUATION OF PASSENGERS FROM LONG TUNNELS.

Fire extinguisher, adjustable ladders, public address systems, sledge hammers and pry bars. Within the tunnel, at 41 locations, there are one or more emergency ladders/ramps.

GENERAL DESCRIPTION OF EMERGENCY RESPONSE PLANS INCLUDING IDENTIFICATION OF ALL ORGANIZATIONAL PARTIES TO ANY AGREEMENTS AND A BRIEF DESCRIPTION OF THEIR INDIVIDUAL RESPONSIBILITIES.

The emergency response plan used for the Park Avenue Tunnel by Metro-North Commuter Railroad consists of the deployment of managers to key locations in the tunnel. At 59th, 72nd and 86th Street, there are emergency exits to the street, that are equipped with stairways/ramps, fire extinguisher and telephones. Managers are also sent to the mouth of the tunnel, 98th Street, as an evacuation point if necessary.

The managers who are involved in this plan have been instructed on evacuation and emergency procedures and are equipped with the necessary itmes to gain access to the trains.

Fire, police and emergency medical services have all attended simulations and meetings concerning emergency evacuation plans. Metro-North has established and administered on a ongoing basis, familiarization classes of our facilities and train equipment for the emergency service groups. Annual

TITLE: Park Avenue Tunnel Emergency Training

OBJECTIVE: To assure Operations Department personnel are capable of a safe and orderly response to emergency situations in the Park Avenue Tunnel.

COURSE FORMAT: Classroom setting, interactive videotape, instructor-delivered instruction, Metro-North tunnel emergency card, car configuration, and emergency equipment location handout.

EXAMINATION: N/A

TARGET AUDIENCE: Operations Department personnel.

CYCLE: Yearly, in conjunction with Rules classes and as requested.

TOPICS COVERED:

- General Orientation to the Park Avenue Tunnel
- Definition of a Tunnel Emergency
- Emergency Communications: Train Dispatchers, Power Supervisor, Passengers
- Location and Use of Telephones, Tunnel Alarm Boxes, Ramps, and Emergency Exits
- Special Instructions in Timetable (100L-A) and Transportation Notice
- Automatic Signal Numbers and Train Location
- Tunnel Alarm Box Numbers and Train Location
- Location and Use of Emergency Equipment-On-Board Folding Ladders and Fire Extinguishers
- Passenger Evacuation Procedures and Crowd Control

COURSE LENGTH: 2 hours

MNCW ORIENTATION OUTLINE

Figure 5

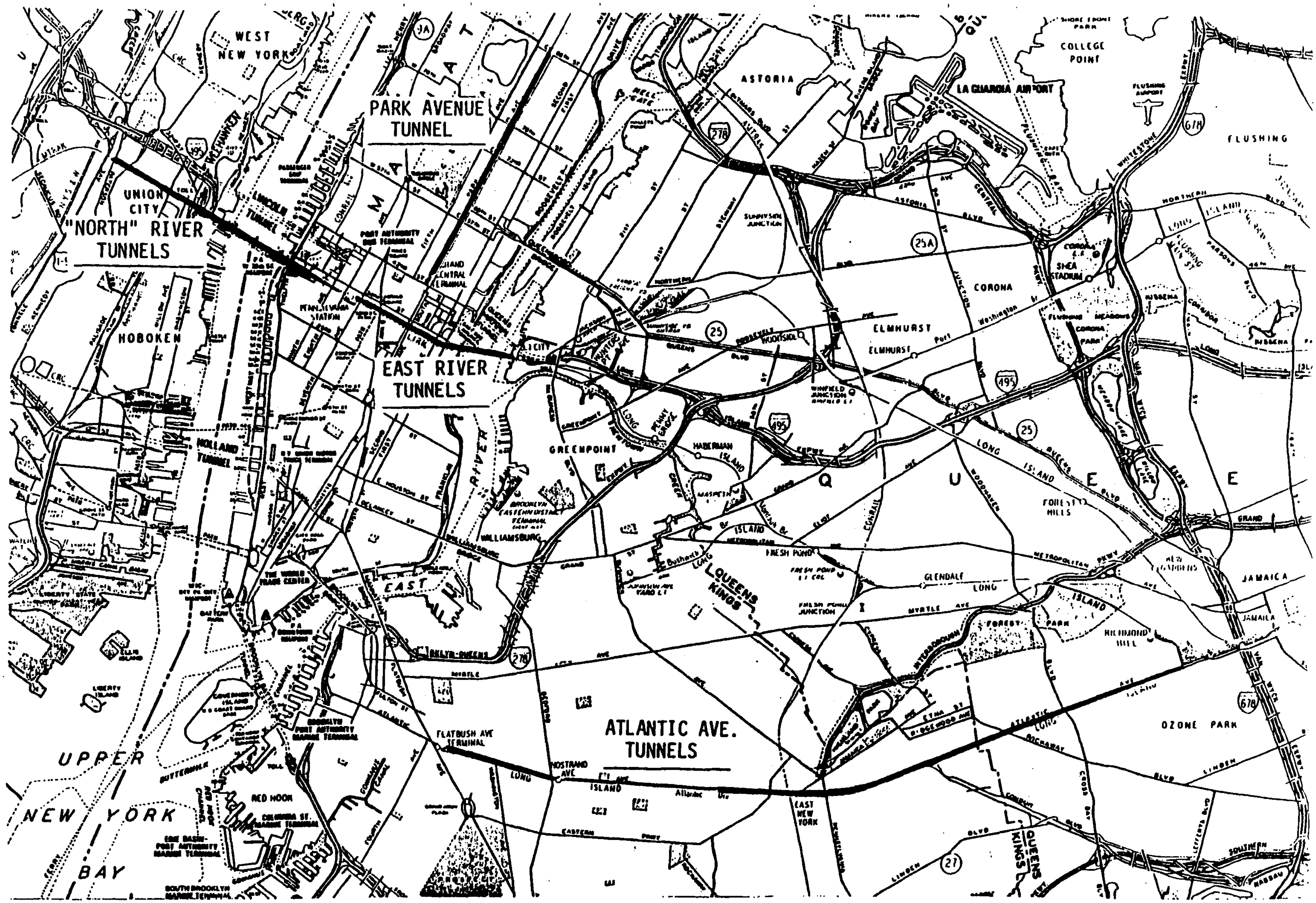
simulation exercises are conducted involving MNCW staff and personnel of outside agencies.

Commentary

The foregoing text outlines in a cursory fashion the physical details and procedural aspects relating to the safety of passengers in what is one of the two most intricate subterranean railroad track layouts in the world. The second member of the pair is Pennsylvania Station, also in Manhattan. In order to grasp the adequacy of railroad emergency response plans, it is necessary to have some understanding of how a facility in question is designed. The preponderance of tunnel structures covered in this report are straightforward passageways having an entrance and an exit and not widely differing physical features in between. But, as noted in the Background section on PATH, tunnels serving Manhattan Island tend to be unlike those elsewhere. Where there are limited access underground facilities as immediate extensions of tunnels, logic would dictate including these structures as part of the entire complex being evaluated.

In the subject case, Grand Central Terminal extends from 42nd Street to 45th Street, storage tracks exist from 44th to 50th Streets, the so-called "throat" area that permits the distribution, via a multitude of switches, of traffic moving between the two, one-above the other station platform levels and the tunnel proper runs from about 48th Street to 59th Street at which point the south portal of the Park Avenue tunnel, itself, appears and that structure extends. Northward for 39 city blocks. (See Figure 6).

The provision of a safe environment at minimum inconvenience for train passengers being transported through this entire system, as well as elsewhere on the railroad, is what the service disruption plans are mainly about. Assuming only a small and probably unavoidable incidence of human failure in the implementation of these plans, no conceptual deficiencies can be noted.



RELATIVE LOCATIONS OF FOUR TUNNEL COMPLEXES
IN THE GREATER NEW YORK AREA

Figure 6

New Jersey Transit Rail Operations, Inc.
(NJTR)

Background

New Jersey Transit Rail Operations, as successor to the Consolidated Rail Corporation, inherited the eastern New Jersey/New York commuter lines originally operated by the Erie. Lackawanna, Central New Jersey, Penn Central, Pennsylvania Reading Seashore Line and the New York and Long Branch railroads. NJTR operates trains through three tunnels; two in northern New Jersey and one in southeastern New York. As may be recalled from the incident discussion in the introduction to this report, NJTR has operating privileges in Amtrak's Hudson River tunnels. In situations where the passenger trains of one railroad enjoy running rights over the tracks of another carrier, it is the Federal Railroad Administration's position that the major responsibility for the safe evacuation of passengers from disabled equipment rests with the railroad whose personnel crew the affected trains. Paralleling this viewpoint is the position that it is the obligation of the carrier that owns and/or controls train traffic in a tunnel to have developed and put in place adequate plans for the emergency support of appropriate fire, police and medical evacuation services as needed. With the consideration of this railroad (NJTR), we encounter, for the first time, the idea of joint operation in a given facility where responsibility for passenger safety is shared rather than being reserved to a single entity. In subsequent sections of this report, the concept will reappear repeatedly culminating the survey of Amtrak practices in the nation-wide scene where that railroad has to deal in these terms with several other carriers, each of whom provide tunnels for joint use distributed over the country as a whole.

NJTR physical plant includes 1,160 miles of track, 137 road haul locomotives and 970 passenger cars. Passenger volume in 1987 was 45 million.

Questionnaire Responses

<u>Statistical</u>

(Note: in order to display data in two-column fashion per page, individual questions are cited in abbreviated form).

	BERGEN HILL TUNNELS	OTISVILLE TUNNEL
Owning Railroad	NJTR	Conrail
Route Designation	Hoboken Division - Morristown Line	Southern Tier Line
Location	MP 1.10 to MP 1.90	MP 75.1 - MP 75.9
Place Names Nearest Each Portal	East Portal-Jersey City/ Hoboken West Portal-Jersey City	East Portal-Middletown West Portal-Port Jervis
Length	4,377 feet each	5,315 feet
Single or Multiple Track	Multiple Track-2 Bores, 2 Tracks Per Bore	Presently Single Track-1 Bore
Frequency of Passenger Train Use	Approximately 300 Passenger Trains Daily	Approximately 14 Passenger Trains Daily and 8 Road Freights
Presence of Energized High Voltage	Old Tunnel (North Bore): Track 3- overhead catenary 27.6kV, 60Hz, 1 ph open wire Track 1- overhead catenary 27.6kV, 60Hz, 1 ph open wire New Tunnel (South Bore): Track 2- overhead catenary 27.6 kV, 60 Hz, 1 ph open wire feeder cable - 27.6kV, 60Hz, 1 ph insulated cable; signal power cable - 2.3kV, 100 Hz, 1 ph insulated cable; power cable - 13.8kV, 60 Hz, 3 ph lead covered cable; Track 4- overhead catenary 27.6 kV, 60 Hz, 1 ph open wire feeder cable - 27.6kV, 60Hz, 1 ph insulated cable; signal power cable -	None

	2.3kV, 100 Hz, 1 ph insulated cable; power cable - 13.8kV, 60 Hz, 3 ph lead misc. low voltage communication and signal cables, installed messengers, trough or wood trunking	
Type cf Illumination in Tunnel	No illumination currently Presently in design with construction completion anticipated in 1989	No illumination
Type and Frequency of Signing	Number plate on signal and station mark-up located every 50 feet	Station marks every 100 feet
Wayside Telephone or Other Type of Communication System	No present communications in tunnel. Wayside phones are located on both ends of tunnel. Completed in 1988 is a radio leaky line installation for each bore, which operates at NJTR passenger frequency of 161.400 mhz	Phones out of service; New radio system being installed by Conrail
Characteristics of Signal and Train Control Systems	Centralized traffic control on all four tracks to Hoboken Terminal Tower	Interlocking rules
Train Operating Speed in Tunnel	Passenger - 50 MPH Freight - 40 MPH	Passenger - 30 MPH Freight - 30 MPH
Walkways Adjacent to Track	None	None
Nature and Extent of Tunnel Lining Type(s)	Old Tunnel (North Bore): Continuous masonry liner in westerly half; easterly half contains bald rock with short masonry liner sections New tunnel (South Bore): Unreinforced concrete liner	Rock
Access Other Than Via Portals	Passengers to be evacuated from tunnel in accordance with procedures established in NJTR Operating Procedure 6.0 (see discussion below)	None
Tunnel Ventilation System	Two large air shafts which combine and connect both	None

	bores approximately 1,200 and 1,600 feet from the west and east portals, respectively	
Air Quality Standards	NJTR follows current NIOSH/OSHA standards for air quality for maintenance and construction work in the tunnels.	NJTR follows current NIOSH/OSHA standards for air quality for maintenance and construction work in the tunnel

Procedural

TUNNEL OWNER'S STATED POLICY REGARDING THE EVACUATION OF PASSENGERS FROM A DISTRESSED TRAIN STRANDED WITH THE TUNNEL.

Re. the North (Hudson) River tunnels, the respondent, having operating privileges in a facility owned and controlled by Amtrak, refers to that railroad's Northeast Corridor Special Instructions (in particular, the first 18 pages which cover not only the North River tunnels, but also the four East River tubes) as the controlling document. Operations in this two-river tunnel complex will be discussed as a separate part of the Amtrak segment of this report, its concluding section.

NJTR's policy in re. the Bergen and Otisville tunnels is expressed for the most part, in Standard Operating Procedure manual 1.0, 2.0 and 6.0 which are discussed below. Note that, while Conrail owns the Otisville tunnel, all trains, passenger and Conrail's road freight traffic, are controlled by NJTR dispatchers.

IF THE TRAIN OPERATOR IS NOT THE TUNNEL OWNER, WHAT PROCEDURES ARE FOLLOWED BY THE TRAIN-OPERATOR MANAGEMENT TO ASSURE THAT THE TUNNEL OWNER IS READY AND ABLE TO IMPLEMENT THE OWNER'S OWN EVACUATION POLICIES?

Meetings were held with Amtrak as the procedures were developed.

TRAIN OPERATOR'S DETAILED GUIDELINES FOR ON-BOARD TRAIN PERSONNEL FOR THE SAFEKEEPING OF DISTRESSED-TRAIN PASSENGERS OR FOR THE EVACUATION OF TRAIN OCCUPANTS FROM TUNNELS INCLUDING REFERENCE TO THE SPECIFIC PROBLEMS PRESENTED BY AGED, HANDICAPPED OR INJURED PASSENGERS.

NJTR guidelines are contained in three manuals issued in 1987:

Standard Operating Procedure		Title
No. 1.0	13 pages	Command Center Emergency Procedures
No. 2.0	18 pages	Rail Emergency Evacuation Plan
No. 6.0	16 pages	Fire/Smoke In Tunnel Emergency Procedures

The tables of contents from each of these volumes are reproduced as Figures 7-A through 7-E.

Carrier states, in responding to the questionnaire, that: "Aged and handicapped are directed as to which direction to evacuate and rescue personnel are directed to them by the train crew."

METHODS OF TRAINING STAFF IN THE APPLICATION OF THESE GUIDELINES INCLUDING ACCIDENT SIMULATION EXERCISES.

Transportation Supervisors, Train and Engine crews are provided with written instructions for Amtrak's tunnel and NJTR tunnels.

Supervisors in the Transportation Department received SOP training in July of 1987.

Train and Engine crews attend a slide presentation which started in February 1988. All train service employees will attend a class within a four year period. In March of 1986 trainmen started to receive instruction in tunnel evacuations. The May 1987 incident in Amtrak's tunnel is discussed during this instruction class.

No simulation exercises have been conducted in our tunnel. Amtrak conducted a drill which NJTR supervisors observed.

PROCEDURES FOLLOWED BY TRAIN-OPERATOR SUPERVISION TO ASSURE ON-DUTY STAFF READINESS AND CAPABILITY TO ADHERE TO THESE GUIDELINES.

Supervisors check the employees to ensure that written instructions are in their possession.

EQUIPMENT ON PASSENGER TRAINS SPECIFICALLY INTENDED OR APPROPRIATE TO ASSIST IN THE EVACUATION OF PASSENGERS FROM LONG TUNNELS.

No equipment is provided to assist in evacuation from tunnels.

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TABLES OF CONTENTS, NJTR SOPS
Figure 7-A

TITLE	NUMBER	DATE	PAGE
Standard Operating Procedure No. 2.0	R-9.02	7/1/87	1

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Figure 7-B

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Figure 7-C

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Figure 7-D

TABLE OF CONTENTS (CONT'D)

Figure 7-E

GENERAL DESCRIPTION OF EMERGENCY RESPONSE PLANS INCLUDING IDENTIFICATION OF ALL ORGANIZATIONAL PARTIES TO ANY AGREEMENTS AND A BRIEF DESCRIPTION OF THEIR INDIVIDUAL RESPONSIBILITIES.

The emergency response plans set in place by this carrier are outlined in Figures 7-A through 7-E. In its response to this item, the carrier places particular emphasis on Standard Operating Procedure No. 1.0 (see Figure 7A) in that this document contains a "notification list and list of responsibilities." Basically, SOP No. 1.0 considers, first, if a situation merits setting up a command post and, if it does, the responsibilities of certain positions and organizational groups are defined. A literal reading of the text suggest that if the decision is taken not to energize a command post, the balance of the SOP becomes inapplicable.

There is no discussion in the provided documentation of agreements that may exist with non-railroad emergency response services and a description of the responsibilities of these forces is vestigial. In the latter case, the most comprehensive instruction is contained in Section 3.4.1 of SOP No. 6.0 by which the control of electric traction power in the Bergen tunnels during an emergency attended by the local fire departments (Jersey City and/or Hoboken) is covered.

Commentary

Here is a passenger safety-in-tunnels scheme that is impressive, overall, on paper. There are some issues evident in the material, however, that are disturbing to consider and which, in the end, suggest that there is ample opportunity for the plans to go awry if the need arises to put them into effect during the evacuation of a disabled train in a tunnel or elsewhere for that matter.

It is not at all clear from the provided materials what sort of relationships have been established with the local emergency forces. These people assuredly have not been involved in any emergency simulation exercises because this type of training has not been extended to NJTR employees. It is gratifying to note that illumination is being installed in the heretofore dark Bergen Hill tunnels, but less rewarding to see that the longer, single-bore Otisville tunnel remains dark. Admittedly, traffic volume in the Otisville facility is much less than at Bergen Hill (and the tunnel is owned by another railroad) and in the normal prioritization of capital improvements, Bergen Hill should come first. No equipment is provided on-board trains to assist in passenger evacuation and this is a unique situation when compared with the three other commuter railroads serving metropolitan

New York. SOP No. 2.0 instructs train operating personnel that "sufficient light" must be provided to insure safe movement of passengers (on the ground) to a secure area, but it does not say where this light is to come from. A frequently specified point in the instructional manuals of the various railroads is that train headlights are to remain lit during a train evacuation. Recall, however, from the discussion of the incident described in the Introduction where a NJTR train was stopped without power under the Hudson River. There was no headlight illumination in that case, the evacuation being facilitated by lights along the tunnel wall. In the instance of an evacuation to the roadbed in the open at night in power-off electrified territory, one wonders about the provision of light. Again, the three other commuter railroads have, either on board or distributed in tunnels, ladders to facilitate the descent of passengers to the roadbed when a train is to be evacuated.

Reflection on these issues gives rise to an uneasiness with respect to NJTR readiness to cope with greatest effectiveness with emergencies of the type being considered in this study.

The Long Island Rail Road Company
(LIRR)

Background

While it is not a large railroad, the LIRR has a long and variegated history. The railroad was chartered in 1834 with the idea of completing a passenger service link-up between Brooklyn, thence by ferry across Long Island Sound to Connecticut and on to Boston. This idea of a cross-water route persists to the present day in the form of the 1965 proposal to build a rail bridge over the sound to Rhode Island. At the end of 1900, the Pennsylvania Railroad was in charge of the Long Island having promised to provide tunnels under the East River and terminal facilities in the soon-to-be constructed Pennsylvania Station in return for a controlling interest in the railroad. Electrification commenced in 1905 in anticipation of serving a constantly growing passenger market, the ultimate expansion of which, in real numbers, could only have been dimly foreseen then. These brief details are supplied to establish the connection between the LIRR and the Pennsylvania Railroad during that first decade of this century which witnessed the PRR's formidable capital improvement program that prepared Manhattan island to be a 20th century railroad passenger hub (and produced 14.9 track miles of underwater tunnels).

In 1965, as a solution to overwhelming financial and other-type problems encountered as a private domain operation, LIRR was purchased by the state of New York for $65 million from the Pennsylvania Railroad and placed under the administration of the Metropolitan Commuter Transportation Authority.

LIRR consists of 685 miles of track, 86 road haul locomotives and 1,177 passenger vehicles of which 935 are electric multiple unit cars and 242 are unpowered coaches.

Statistical

OWNING RAILROAD

The LIRR operates trains from Queens to Manhattan via the East River tunnels which are owned by Amtrak and in the Atlantic Avenue tunnels in Brooklyn and Queens. The state of New York owns the Atlantic Avenue tunnels and LIRR uses them as a lessee This discussion is concerned with the Atlantic Avenue tunnels only. The East River tunnels will be taken up under the following section which covers Amtrak operation in New York and nationally.

ROUTE DESIGNATION: DIVISION, SUBDIVISION AND OTHER NAME IF WIDELY USED. E.G., "THE NORTHERN ROUTE".

Atlantic Branch

LOCATION: DECIMAL MILEPOST TO THE APPROXIMATE 1/10 MILE FOR EACH PORTAL.

The line from the Flatbush Avenue Terminal in Brooklyn to the Jamaica Station in Queens extends along the alignment of Atlantic Avenue. From west to east there is a 1.5 mile tunnel, 1.7 mile elevated railroad, and then a 5.2 mile tunnel section which terminates in the vicinity of Jamaica Yard at which point the tracks again run on an elevated structure (See Figure 7).

Westerly Terminus - Milepost 0.0
Flatbush Avenue Terminal
1st Portal - Milepost 1.5
Nostrand Avenue
2nd Portal - Milepost 3.2
Ralph Avenue
3rd Portal - Milepost 8.4
123rd Street

LENGTH IN THOUSANDS OF FEET.

Section 1 - 8,000 feet (from west to east)
Section 2 - 27,000 feet

SINGLE OR MULTIPLE TRACK. IF THE LATTER, NUMBER OF TRACKS AND BORES.

Two tracks with electrified third rail in what are essentially cut and cover tunnels.

FREQUENCY OF PASSENGER TRAIN USE -- NUMBER OF TRAINS PASSING THROUGH PER DAY OR WEEK OR OTHER LIKE PERIOD.

45,645 trains per year - Weekdays
6,201 trains per year - Saturdays
6,786 trains per year - Sundays
180 average per day - Weekdays
115 average per day - Saturday/Sunday

PRESENCE OF ENERGIZED HIGH VOLTAGE ELECTRICAL CONDUCTORS, ELECTRICAL TRANSMISSION SYSTEMS OR CHARGED PIPELINES.

Electrified third rail.

TYPE OF ILLUMINATION IN TUNNEL, ALONG WITH APPROXIMATE UNIT SPACING AND INDIVIDUAL INTENSITY.

Presently in operation are 50 watt incandescent fixtures spaced at 50 feet. This system provides an average of 5 feet of light on the benchwall area. Scheduled for installation in 1990 is an updated system which will include 100 watt high pressure sodium fixtures at 40 feet spacing. This system will provide an average 5.3 feet of light on the benchwall area.

TYPE AND FREQUENCY OF SIGNING TO INDICATE LOCATION WITHIN TUNNEL.

Within the Atlantic Avenue Tunnels are mile markers and signal markers which indicate location within the tunnel.

WAYSIDE TELEPHONE OR OTHER TYPE OF COMMUNICATION SYSTEM AND APPROXIMATE UNIT SPACING.

Alarm system consists of alarm boxes, each indicated by a blue light, located about 1,500 feet apart on the tunnel walls. The alarm boxes include telephone for voice communication with the power director.

CHARACTERISTICS OF SIGNAL AND TRAIN CONTROL SYSTEM THAT WOULD INDICATE TO A CENTRAL POINT SPECIFIC INFORMATION ON TUNNEL OCCUPANCY.

Four interlocking towers (Dunton, East New York, Van and Brook), indicate train occupancy at various locations within the Atlantic Avenue tunnels. Locations and times manned indicated are:

Dunton - 7 days/24 hours per day.
E. New York - Normally closed.
Van - Monday through Friday, 7:00 a.m.-11:00 p.m.
Brook - 7 days/24 hours per day.

TRAIN OPERATING SPEED IN TUNNEL.

45 mph from Milepost 0.0 to Milepost 4.0
80 mph from Milepost 4.0 to Milepost 8.4

PROVISION OF WALKWAYS ADJACENT TO TRACK.

Benchwall construction similar in design to the East and North River tunnels (See Figure 8).

NATURE AND EXTENT OF TUNNEL LINING TYPE(S).

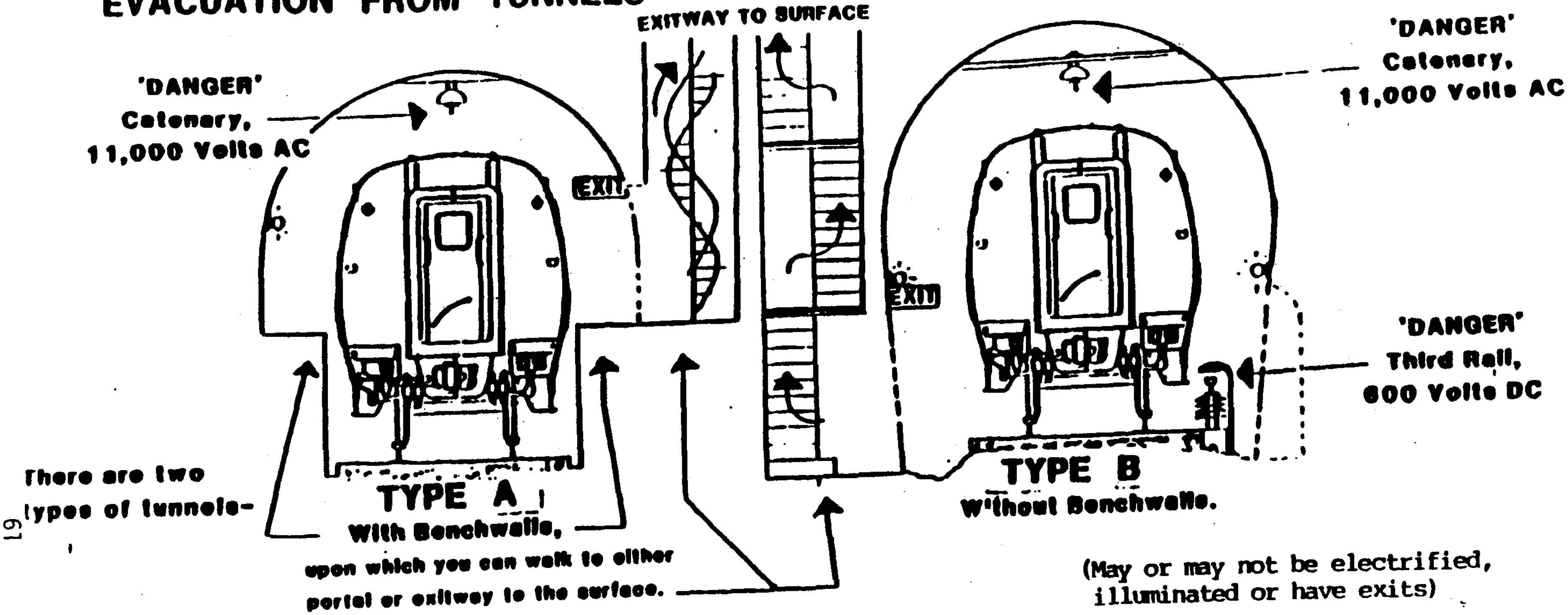
The Atlantic Avenue Tunnels are constructed of reinforced concrete. The tunnels do not travel under any body of water, nor are they subject to ground water infiltration. Therefore, the tunnels are not lined.

ACCESS OTHER THAN VIA PORTALS.

There are twelve emergency exits distributed along the lengths of the two Atlantic Avenue Tunnel segments.

GENERAL DESCRIPTION OF TUNNEL VENTILATION SYSTEM. IF FACILITIES ARE PRESENT, BUT INOPERATIVE, PLEASE SO NOTE.

EVACUATION FROM TUNNELS



NOTE-

Evacuation must be under the direction of Fire or Rescue Authorities. However,
If imminent danger to life exists, such as a fire, evacuation may be commenced upon direction of the Train Conductor.

Train Conductors will be govern by Timetable Special Instructions.

When necessary to evacuate your train, instruct passengers to carry only their hand bags, cameras , or other small personal items.

Leave all luggage on the train.

Walk in direction away from any source of smoke.

TUNNEL TYPES, LIRR AND AMTRAK
Figure 8

Courtesy: Amtra

Passive -- air shafts to grated street-level openings.

AIR QUALITY STANDARDS FOR THE TUNNEL.

Long Island Rail Road operations within the Atlantic Avenue Tunnels are limited to electric MU trains. Diesel locomotives are restricted from operating within the tunnels. Consequently, air quality within the tunnels is much the same as on the city streets just above.

Procedural

TUNNEL OWNER'S STATED POLICY REGARDING THE EVACUATION OF PASSENGERS FROM A DISTRESSED TRAIN STRANDED WITHIN THE TUNNEL.

The facility owner is an agency of the State of New York and as such, plays only a nominal role in establishing day-to-day operating policy for the LIRR.

TRAIN OPERATOR'S DETAILED GUIDELINES FOR ON-BOARD TRAIN PERSONNEL FOR THE SAFEKEEPING OF DISTRESSED-TRAIN PASSENGERS OR FOR THE EVACUATION OF TRAIN OCCUPANTS FROM TUNNELS INCLUDING REFERENCE TO THE SPECIFIC PROBLEMS PRESENTED BY AGED, HANDICAPPED OR INJURED PASSENGERS.

Specific information, prepared for the guidance of LIRR passenger train crews confronted with the possibility of having to de-train passengers away from station platforms is contained in Appendix B to the Special Instructions section of the current Employees' Timetable.

The Table of Contents for this 20-page manual is reproduced as Figure 9. Generally, the LIRR's treatment of the passenger train evacuation process is similar to that of the other commuter railroads serving metropolitan New York. The use of rescue trains to move a disabled train to a suitable passenger unloading area or to receive passengers as transfer from disabled equipment is, naturally, the preferred method where possible. Where evacuation to the roadbed or benchwalls in tunnels is unavoidable, the literature covers requisite train crew and management responses in the usual series of scenarios ranging in escalation of risk of injury to the participants starting with the movement of passengers along a roadbed to a nearby station through embankment/cut situations and tunnels to the universally abhorred evacuation onto an elevated structure form which the passengers must be removed under fire department supervision.

LIRR makes a distinction in the elective or mandatory use of police and fire department assistance during train

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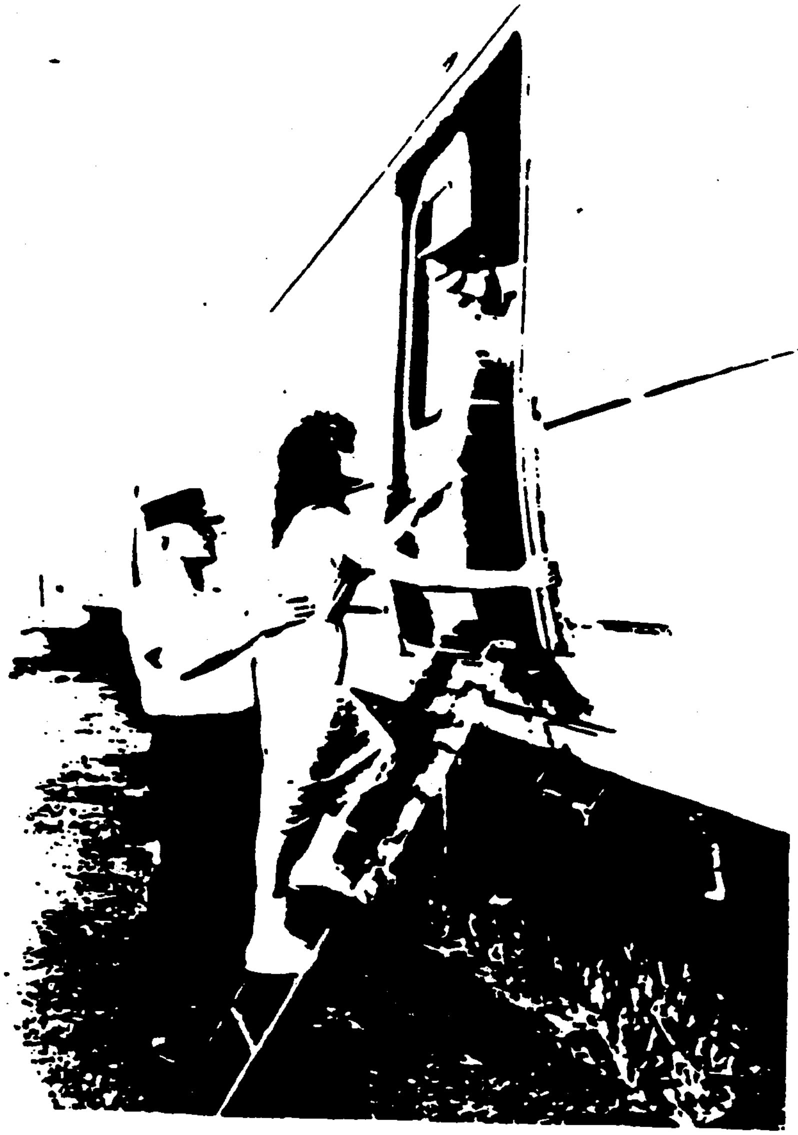
FROM: APPENDIX B, EVACUATION PROCEDURES
LIRR EMPLOYEES TIMETABLE

Figure 9

evacuations. In the case of an evacuation at grade level, either along the roadbed to a nearby station or to a public area, utilization of police and fire department assistance can be selective (clearly, train crews cannot make these decisions individually). For all other evacuation circumstances, it is stated that the assistance of police and fire departments is obligatory. By implication, this suggests that such emergency staff must be in position before an evacuation can commence.

A significant population of LIRR passenger cars are of the type designed for service where all station platforms are high-level (at car floor height). This equipment does not have stair steps at any end or elsewhere to facilitate descent of passengers to the roadbed. High level station platforms and cars mated to this feature are a great convenience for the travelling public, but special problems are immediately apparent when it is necessary for passengers to detrain from this type of equipment away form station platforms. This accounts for the special emphasis placed by LIRR on the availability of ladders and rescue boards to facilitate rapid passenger egress, if necessary, from a stranded train (See Figure 10). Pairs of ladders are located on each pair of LIRR M-U cars and rescue boards are kept at key stations, towers and yard offices throughout the system. The latter are used in train-to-train evacuations relying on a rescue train. While Appendix B does not so state, it is assumed that the crew of a rescue train being dispatched to effect a transfer of stranded passengers would gather a supply of these devices before departure. Storage locations are noted in Appendix B.

The direct concern of this report is passenger safety within tunnels. The Atlantic Avenue Tunnels, on which the discussion is focussed, were designed and built to have benchwalls on each side of the two parallel facilities at car floor elevation and to which evacuating passengers can have ready access. Ladders and rescue boards are largely superfluous in these tunnels. So, why the interest in these devices at this point? Simply this, up to the consideration of this railroad's procedures, emphasis on the utilization of this equipment elsewhere has appeared to be less pronounced, yet, access to benchwalls is available only in the North and East River tunnels and in the Atlantic Avenue tunnels. Moreover, it would be shortsighted in the extreme to restrict the thrust of this report to passenger safety in tunnels alone without any allusion to obvious companion problems associated with open track train evacuations. All of the railroads address, in one way or another, the general question of train evacuation of which the tunnel case is just a subset. Once the decision is made to evacuate a train away from a station platform, the risk of harm to passengers quickly increases unless the chosen method is end-to-end transfer to a rescue train. The unadorned fact is that



Above:
Passenger descending
from car via ladder

Below:
Rescue board
in use.

DEMONSTRATIONS OF EMERGENCY EQUIPMENT

Figure 10

Courtesy: LIRR

moving passengers off a train stopped in the open is, for the most part, fraught with the hazard of personal injury and, where a better way to accomplish this is uncovered, it needs to be revealed to the possible advantage of others.

METHODS OF TRAINING STAFF IN THE APPLICATION OF THESE GUIDELINES INCLUDING ACCIDENT SIMULATION EXERCISES.

Each newly hired employee, Trainman/Engineer/Block Operator, is provided with a course of instructions on Appendix B, Special Instructions 100 L-1 through 100 L-5, fire extinguishers, alarm systems, communications, etc. In addition, field trips to the tunnels are conducted with employees. A refresher course is given every three years to each employee in Operations.

PROCEDURES FOLLOWED BY TRAIN-OPERATOR SUPERVISION TO ASSURE ON-DUTY STAFF READINESS AND CAPABILITY TO ADHERE TO THESE GUIDELINES.

All Transportation Supervisors are fully qualified on all aspects of emergency evacuation procedures and undergo refresher training on Rules and Procedures on a yearly basis. The Movement Bureau is staffed 24 hours a day, 365 days a year, and is the controlling authority in these matters.

EQUIPMENT ON PASSENGER TRAINS SPECIFICALLY INTENDED OR APPROPRIATE TO ASSIST IN THE EVACUATION OF PASSENGERS FROM LONG TUNNELS.

All M-U trains carry emergency egress ladders. Rescue boards for transfer of passengers from train to train are stored at key locations. In addition,a emergency tools, lighting, self-contained breathing apparatus, etc., are available in key locations to assist supervision in rescue train operations.

GENERAL DESCRIPTION OF EMERGENCY RESPONSE PLANS INCLUDING IDENTIFICATION OF ALL ORGANIZATIONAL PARTIES TO ANY AGREEMENTS AND A BRIEF DESCRIPTION OF THEIR INDIVIDUAL RESPONSIBILITIES.

The Employee Training and Development Department of the LIRR has prepared two courses which are offered to units of the New York city fire and police departments to familiarize the staff of these organizations with the physical characteristics and the types and severity of events that can affect the railroad system. The Atlantic Avenue Tunnels are included in the scope of this attention. The courses are presented, on a three-year cycle, at every fire company headquarters in the boroughs of Brooklyn and Queens. At the same frequency, police department emergency service contingents are invited to seminars presented at the railroad's Morris Park shop. Course length varies from 2 1/2 hours for fire department members to 6 1./2 hours for police officers. Course content covers the physical features and hazards about which these people need to be aware in functioning in the railroad environment (including electrified territory),the types of incidents for which the railroad may need outside assistance and the roles to be played by emergency staff in supplying this assistance. Recall that, according to the strictures imposed by Appendix B, police and fire department assistance "must" be utilized during evacuation in tunnels. Additionally, the important element of establishing effective communication with railroad crisis management is covered.

Commentary

LIRR claims to transport approximately 7.8 million weekday passengers per year through the Atlantic Avenue Tunnels. This translates into some 30,000 per day, a number that is not grossly different from the 17,000 passengers reported previously for the SP's Peninsula Commute operation in San Francisco. Yet, the approaches of these two railroads to ensuring passenger safety could scarcely be more different in thoroughness.

National Railroad Passenger Corporation
(AMTRAK)

Background

Amtrak operates trains under three distinctly different scenarios, each one of which encompasses the transit of 1,000-foot or longer tunnels by passenger trains:

- o As the manager of the commuter rail operation sponsored by the Massachusetts Bay Transportation Authority (MBTA) for the greater metropolitan Boston area.
- o As the owner of the Northeast Corridor route, Washington to Rhode Island/Massachusetts stateline.
- o By virtue of agreements with other owning, freight railroads, the operation of intercity passenger trains elsewhere in the country.

In the first two of these cases, Amtrak is responsible for train operations and the crewing of trains. In the last case, Amtrak crews the trains, but the railroads control operations except for the Washington, D.C. to Indianapolis and San Antonio to Los Angeles routes on which the railroads (Southern Pacific and CSX Transportation) crew, as well as dispatch, the trains. Where operating crews are not Amtrak employees, Amtrak provides passenger safety training to these people as well as to its own passenger service personnel. In time, Amtrak expects to rely on its own staff to provide operating crews for the passenger trains running over these two routes.

We will see that, when Amtrak ventures forth onto the properties of the freight railroads (contractors) a wholly new mindset with respect to passenger traffic is encountered. Up to now, this report has considered passenger train operations over rights of way dedicated, primarily, to this type of service. When joint operation occurs, the major participants, in terms of train volume, have been passenger carriers. In approaching the Amtrak intercity operation over a network dedicated chiefly to the movement of products, not people, a novel set of problems are introduced and they will have to be examined. First, however, Amtrak's contract operation supporting the eastern Massachusetts MBTA operation will be reviewed. Then tunnel safety, Boston to Washington (the Northeast Corridor), will be examined and finally, the state of tunnel safety over Amtrak's intercity routes will be taken up.

Data related to the 81 tunnels on the nine freight railroads having 1,000-foot or longer tunnels through which Amtrak intercity trains run are daunting in magnitude when compared with what we have been dealing with so far. What this means is that discussing tunnel statistics and procedures on a one-by-one basis, as has been done heretofore, becomes impractical for the intercity route facilities for two reasons: first, Amtrak has already compiled the statistical or physical feature details for these structures in a format quite similar to that employed to characterize the 14 tunnels addressed in the six previous commuter rail discussions and second, apart form the responses that Amtrak has tried, through its elaborate training methods, to inculcate in its train service and operating crews, there are no procedures in place anywhere of a site-specific nature that would apply to the evacuation of passengers. The implications of this lacuna will be taken up in the conclusions and recommendation sections of this report. The data that Amtrak organized to describe these 81 tunnels is presented as an appendix to this report.

Questionnaire Responses

Statistical

OWNING RAILROAD

Salem Tunnel -- Massachusetts Bay Transportation Authority

ROUTE DESIGNATION: DIVISION, SUBDIVISION AND OTHER NAME IF WIDELY USED. E.G., "THE NORTHERN ROUTE".

East Route. This line is north/east of Boston and is not considered here as part of the Northeast Corridor.

LOCATION: DECIMAL MILEPOST TO THE APPROXIMATE 1/10 MILE FOR EACH PORTAL.

West Portal -- M.P. 16.29

PLACE NAMES NEAREST TO EACH PORTAL THAT CAN BE FOUND IN THE RAND MCNALLY RAILROAD ATLAS.

Salem and Beverly, Massachusetts.

LENGTH IN THOUSANDS OF FEET.

2,176 feet

SINGLE OR MULTIPLE TRACK. IF THE LATTER, NUMBER OF TRACKS AND BORES.

Single.

FREQUENCY OF PASSENGER TRAIN USE -- NUMBER OF TRACKS AND BORES.

24 trains per day each way.

PRESENCE OF ENERGIZED HIGH VOLTAGE ELECTRICAL CONDUCTORS, ELECTRICAL TRANSMISSION SYSTEMS OR CHARGED PIPELINES.

None.

TYPE OF ILLUMINATION IN TUNNEL, ALONG WITH APPROXIMATE UNIT SPACING AND INDIVIDUAL INTENSITY.

Fluorescent Fixtures at 100' Intervals.

TYPE AND FREQUENCY OF SIGNING TO INDICATE LOCATION WITHIN TUNNEL.

None.

WAYSIDE TELEPHONE OR OTHER TYPE OF COMMUNICATION SYSTEM AND APPROXIMATE UNIT SPACING.

None.

CHARACTERISTICS OF SIGNAL AND TRAIN CONTROLS SYSTEM THAT WOULD INDICATE TO A CENTRAL POINT SPECIFIC INFORMATION ON TUNNEL OCCUPANCY.

Amtrak reports simply: "Track circuit". As this single track section lies between two home signals at each end of the double track line connected by the single track (and tunnel), it is likely that there is a positive indication when a train is in the tunnel.

TRAIN OPERATING SPEED IN TUNNEL.

30 mph.

PROVISION OF WALKWAYS ADJACENT TO TRACK.

None.

NATURE AND EXTENT OF TUNNEL LINING TYPE(S):

Cast concrete.

ACCESS OTHER THAN VIA PORTALS

None.

GENERAL DESCRIPTION OF TUNNEL VENTILATION SYSTEM. IF FACILITIES ARE PRESENT, BUT INOPERATIVE, PLEASE SO NOTE.

Two exhaust fans.

AIR QUALITY STANDARDS FOR THE TUNNEL.

None established.

Procedural

TUNNEL OWNER'S STATED POLICY REGARDING THE EVACUATION OF PASSENGERS FROM A DISTRESSED TRAIN STRANDED WITHIN THE TUNNEL.

and

TRAIN OPERATOR'S DETAILED GUIDELINES FOR ON-BOARD TRAIN PERSONNEL FOR THE SAFEKEEPING OF DISTRESSED-TRAIN PASSENGERS OR FOR THE EVACUATION OF TRAIN OCCUPANTS FORM TUNNELS INCLUDING REFERENCE TO THE SPECIFIC PROBLEMS PRESENTED BY AGED, HANDICAPPED OR INJURED PASSENGERS.

Consolidated comment: Here we have a not-replicated elsewhere situation where the facility owner (MBTA) claims to have a tunnel safety plan and the train operator (Amtrak) was silent on the issue. Knowledge of the existence of this plan reached FRA too late to permit a review prior to competing this report. An evaluation of its effectiveness would be moot, in any case, since it has not been implemented.

Amtrak did not supply any information for this facility regarding any of the issues usually discussed in the procedures sections. Therefore, it is not known in FRA how Amtrak, as the contractor responsible for training and evaluating passenger train employees crewing the MBTA trains, at least north of Boston, goes about this task. Some little light will be shed on the problem in taking up the next facility, the Back Bay tunnel, which, at once, serves Northeast Corridor intercity trains and those of the MBTA commuter rail operation from the south of Boston.

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NORTHEAST CORRIDOR TUNNELS ... TABLE OF ORDER

... Back Bay, Boston (part of the Southwest Corridor)

... East Haven, Connecticut

... East River, Queens to Manhattan
... Hudson (North) River, Manhattan to Bergen, New Jersey

... Baltimore:

Old and New Union Tunnels, parallel bores just north of the passenger station.

Baltimore and Potomac Tunnels, double track bores just south of the passenger station. Three discontinuous segments:

John Street Section
Wilson Street Section
Gilmore Street Section,

... First Street Tunnel, Washington, D.C.

Questionnaire Responses

OWNING RAILROAD

Back Bay Tunnel ... MBTA

ROUTE DESIGNATION: DIVISION, SUBDIVISION AND OTHER NAME IF WIDELY USED. E.G., "THE NORTHERN ROUTE".

Boston Division, Southwest Corridor.

LOCATION: DECIMAL MILEPOST TO THE APPROXIMATE 1/10 MILE FOR EACH PORTAL.

West 226.9 East 227.5

PLACE NAMES NEAREST TO EACH PORTAL THAT CAN BE FOUND IN THE RAND MCNALLY RAILROAD ATLAS.

West: Massachusetts Avenue-Ruggles Street.
East: Columbus Avenue-Berkley Street.

LENGTH IN THOUSANDS OF FEET.

5,600

SINGLE OR MULTIPLE TRACK. IF THE LATTER, NUMBER OF TRACKS AND BORES.

3 tracks - Nos. 2, 1 and 3

FREQUENCY OF PASSENGER TRAIN USE -- NUMBER OF TRACKS AND BORES.

160 per day including MBTA rapid transit trains running over an adjacent, dedicated right of way in the same tunnel.

PRESENCE OF ENERGIZED HIGH VOLTAGE ELECTRICAL CONDUCTORS, ELECTRICAL TRANSMISSION SYSTEMS OR CHARGED PIPELINES.

None.

TYPE OF ILLUMINATION IN TUNNEL, ALONG WITH APPROXIMATE UNIT SPACING AND INDIVIDUAL INTENSITY.

Wall mounted, high intensity fixtures spaced at 25 feet.

TYPE AND FREQUENCY OF SIGNING TO INDICATE LOCATION WITHIN TUNNEL.

Milepost plaques every 1/10th mile.

WAYSIDE TELEPHONE OR OTHER TYPE OF COMMUNICATION SYSTEM AND APPROXIMATE UNIT SPACING.

None.

CHARACTERISTICS OF SIGNAL AND TRAIN CONTROLS SYSTEM THAT WOULD INDICATE TO A CENTRAL POINT SPECIFIC INFORMATION ON TUNNEL OCCUPANCY.

Automatic train control with wayside signals.

TRAIN OPERATING SPEED IN TUNNEL.

100 mph, passenger 30 mph, freight

PROVISION OF WALKWAYS ADJACENT TO TRACK.

Safety walkways -- north and south side.

NATURE AND EXTENT OF TUNNEL LINING TYPE(S).

Concrete (original construction: cut and cover).

ACCESS OTHER THAN VIA PORTALS.

West end, Back Bay station platforms.

GENERAL DESCRIPTION OF TUNNEL VENTILATION SYSTEM. IF FACILITIES ARE PRESENT, BUT INOPERATIVE, PLEASE SO NOTE.

Three reversible fans with two additional air intake locations.

AIR QUALITY STANDARDS FOR THE TUNNEL.

No standards established.

Procedural

TUNNEL OWNER'S STATED POLICY REGARDING THE EVACUATION OF PASSENGERS FROM A DISTRESSED TRAIN STRANDED WITHIN THE TUNNEL.

The tunnel owner, the MBTA, has established a safety procedure for this shared facility which has been and continues to be coordinated with the municipal emergency response services and with Amtrak.

IF THE TRAIN OPERATOR IS NOT THE TUNNEL OWNER, WHAT PROCEDURES ARE FOLLOWED BY THE TRAIN-OPERATOR MANAGEMENT TO ASSURE THAT THE TUNNEL OWNER IS READY AND ABLE TO IMPLEMENT THE OWNER'S OWN EVACUATION POLICIES.

The tunnel owner is a rapid transit train operator having the bulk of the traffic in this tunnel complex. MBTA developed procedures for application in this facility and aggressively promotes them. As noted above, Amtrak coordinates its own outlook with that of MBTA.

TRAIN OPERATOR'S DETAILED GUIDELINES FOR ON-BOARD TRAIN PERSONNEL FOR THE SAFEKEEPING OF DISTRESSED-TRAIN PASSENGERS OR FOR THE EVACUATION OF TRAIN OCCUPANTS FROM TUNNELS INCLUDING REFERENCE TO THE SPECIFIC PROBLEMS PRESENTED BY AGED, HANDICAPPED OR INJURED PASSENGERS.

The governing (actually the only) source of guidance is: Southwest Corridor Emergency Evacuation Procedures, October 1, 1987, prepared by Amtrak's Boston Division Safety Department. There is no mention of the Back Bay Tunnel in the current Northeast Corridor Employees Timetable under the tunnel evacuation section of the Special Instructions. This is a fairly brief document (six pages) which covers the following topics:

- o Officials to be notified (Amtrak and outside).
- o Train emergency -- evacuation (three paragraphs).
- o Locations of emergency exits (4) which are indicated by blue lights.
- o Fire on-board (two paragraphs).

This material does not cover many of the passenger evacuation options that were noted in previous sections of this report. It will, perhaps, be elaborated upon in the future (see commentary at the end of the Hudson River tunnels section, following).

METHODS OF TRAINING STAFF IN THE APPLICATION OF THESE GUIDELINES INCLUDING ACCIDENT SIMULATION EXERCISES.

All train operating and passenger service crews are subjected to annual retraining.

PROCEDURES FOLLOWED BY TRAIN-OPERATOR SUPERVISION TO ASSURE ON-DUTY STAFF READINESS AND CAPABILITY TO ADHERE TO THESE GUIDELINES.

Trainmasters, Road Foremen, Safety Department staff and other officials observe and evaluate staff performance and ability to respond readily to emergent incident during frequent train trips.

EQUIPMENT ON PASSENGER TRAINS SPECIFICALLY INTENDED OR APPROPRIATE TO ASSIST IN THE EVACUATION OF PASSENGERS FROM LONG TUNNELS.

Fire extinguishers, public address systems, axes, sledge hammers and pry bars.

GENERAL DESCRIPTION OF EMERGENCY RESPONSE PLANS INCLUDING IDENTIFICATION OF ALL ORGANIZATIONAL PARTIES TO ANY AGREEMENTS AND A BRIEF DESCRIPTION OF THEIR INDIVIDUAL RESPONSIBILITIES.

An exact description of the emergency response plan generated by MBTA was not available for this analysis. It's companion Amtrak document is described, above. All of this material has been reviewed repeatedly with the local emergency response teams. Amtrak has held repeated tutorials in which these people received hands-on experience with the safety features of that carrier's passenger rolling stock (emergency access/egress, lighting, special precaution as in dining cars, 480 v trainline circuits and so on).

Commentary

There is abundant evidence that the combined approach of the two operating entities that use the Back Bay Tunnel is effective in an emergency. The National Transportation Safety Board, in commenting on emergency response/disaster preparedness (see Reference 2, Background Sources), had this to say relevant to the 1987 rear-end collision in this tunnel, "The Safety Board believes that the response of the emergency personnel to the accident site was very good. ...The emergency forces are to be commended." An outcome of this sort does not happen by accident, so there is cause for some satisfaction. But, considering to whom the comments are addressed, there would be no basis for complacency on the parts of the passenger carriers.

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Questionnaire

<u>Statistical</u>

OWNING RAILROAD

East Haven Tunnel ... Amtrak

ROUTE DESIGNATION: DIVISION, SUBDIVISION AND OTHER NAME IF WIDELY USED. E.G., "THE NORTHERN ROUTE".

Boston Division, Northeast Corridor.

LOCATION: DECIMAL MILEPOST TO THE APPROXIMATE 1/10 MILE FOR EACH PORTAL.

West - MP 76.50 East - MP 76.75

PLACE NAMES NEAREST TO EACH PORTAL THAT CAN BE FOUND IN THE RAND MCNALLY RAILROAD ATLAS.

West: Grand Avenue - Clifton Street
East: Russel Street

LENGTH IN THOUSANDS OF FEET.

1,200

SINGLE OR MULTIPLE TRACK. IF THE LATTER, NUMBER OF TRACKS AND BORES.

2 tracks - Nos. 1 and 2 (single bore, three segments)

FREQUENCY OF PASSENGER TRAIN USE -- NUMBER OF TRACKS AND BORES.

20 per day

PRESENCE OF ENERGIZED HIGH VOLTAGE ELECTRICAL CONDUCTORS, ELECTRICAL TRANSMISSION SYSTEMS OR CHARGED PIPELINES.

None.

TYPE OF ILLUMINATION IN TUNNEL, ALONG WITH APPROXIMATE UNIT SPACING AND INDIVIDUAL INTENSITY.

None.

TYPE AND FREQUENCY OF SIGNING TO INDICATE LOCATION WITHIN TUNNEL.

None.

WAYSIDE TELEPHONE OR OTHER TYPE OF COMMUNICATION SYSTEM AND APPROXIMATE UNIT SPACING.

None.

CHARACTERISTICS OF SIGNAL AND TRAIN CONTROLS SYSTEM THAT WOULD INDICATE TO A CENTRAL POINT SPECIFIC INFORMATION ON TUNNEL OCCUPANCY.

Automatic train control with wayside signals.

TRAIN OPERATING SPEED IN TUNNEL.

70 mph

PROVISION OF WALKWAYS ADJACENT TO TRACK.

None.

NATURE AND EXTENT OF TUNNEL LINING TYPE(S).

Unlined; cut through granite.

ACCESS OTHER THAN VIA PORTALS.

None.

GENERAL DESCRIPTION OF TUNNEL VENTILATION SYSTEM. IF FACILITIES ARE PRESENT, BUT INOPERATIVE, PLEASE SO NOTE.

Two ventilation shafts between tunnel segments.

AIR QUALITY STANDARDS FOR THE TUNNEL.

No standards established.

Procedural

Amtrak provided no procedural information on the subject of passenger train safety in this facility. The section: Special Instructions, of the current Northeast Corridor Employees timetable, while it does offer some guidance to on-board staff confronted with emergencies in the New York tunnels, the Baltimore and Potomac complex and the First Street tunnel, is silent on the subjects of the East Haven and Union tunnels. It can only be concluded that the matter has been overlooked or considered not worthy of attention. On-board staff, in an emergent situation, must fall back on the lessons covered in formal safety training courses sponsored by the railroad. Fortunately, this is not an inconsiderable resource upon which to have to depend, but it is not much use to local emergency response personnel.

As will become apparent in further discussion, reliance by Amtrak management upon the skill and professionalism of operating crews and on-board passenger service personnel is the only real choice available when trains operating over the intercity network of the freight railroads come to grief. It is premature, at this point, to take up the ramifications of the passenger safety relationship that is afforded today to Amtrak by its contractors. Ironically, the issue first surfaces here in considering deficiencies associated with facilities that are wholly within Amtrak's control. If Amtrak's staff training is this important, he nature and thrust of the activity could be usefully summarized and such a summary is presented in Figure 11.

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<u>East River Tunnels.</u> Preliminary comments: There are four parallel tunnels under the East River. These tunnels have many common design features. So, to make the presentation as compact as possible, these facilities will be treated as one unit where similarities exist. Departures from commonality will be discussed under the relevant line number. Moving in an eastward direction, from Pennsylvania Station under the river toward Queens, the tubes are designated, right to left, as Lines 1, 2, 3 and 4. Recall that the major user of this tunnel complex is the LIRR (495 trains per weekday).

Some regard the East River and Hudson River tunnels along with the intervening Pennsylvania Station as, in reality, segments of a unified subterranean complex. If the potential air rights development above Yards B and E at the station is realized, this will enclose the last open space along the route and reinforce the one-tunnel idea. For this discussion though, it is convenient to separate the two sets of tunnels. (See Figure 6).

Questionnaire Responses

<u>Statistical</u>

OWNING RAILROAD

Amtrak.

ROUTE DESIGNATION: DIVISION, SUBDIVISION AND OTHER NAME IF WIDELY USED. E.G., "THE NORTHERN ROUTE".

New York Division, Northeast Corridor

AMTRAK
HRD-01/85 REV 11/88
Rev DS/tb

COURSE NUMBER: CSE-001
COURSE LENGTH: 4 Hours
NUMBER OF LESSONS: 5

EMERGENCY SITUATIONS

MASTER SHEET

COURSE DESCRIPTION:

This course is intended for Amtrak Conductors, Assistant Conductors, and On Board Service Personnel. Participants learn what to do in the event of an emergency on board Amtrak trains. The course defines various emergency situations, describes locations in which they are likely to occur, and details actions to take in each case. Emphasis is placed on employees' responsibilities during an emergency and the importance of effective communication, decisive action, and cooperation among all on board employees. The course is designed to meet the Department of Transportation requirement that on board personnel receive emergency situations training upon initial employment and refresher training annually thereafter.

The course is a combination of lecture/discussion, audio-visual, role play, and hands-on training lasting approximately 4 hours. It can be effectively delivered on board railroad equipment or in a classroom (except for Lesson V which covers actual equipment use on board Amtrak cars).

The audio-visual portion of the course is designed to meet annual refresher training requirements. It stands as an independent unit and can be used as an information source.

The hands-on section of this course is exceedingly important in training newly hired on-board employees.

COURSE OBJECTIVES:

After successfully completing this course, each participant will be able to:

1. Define and describe on board and train emergencies.

2. Describe on board employees' responsibilities during an emergency.

3. Describe the circumstances which warrant passenger transfer or train evacuation.

4. List priorities and procedures to be followed when transferring passengers to another train or other kind of transportation.

5. List the emergency equipment available on board.

6. Discuss the effects of an on board electrical failure and list the steps to be taken in such a situation.

Amtrak Training Course

Figure 11

LOCATION: DECIMAL MILEPOST TO THE APPROXIMATE 1/10 MILE FOR EACH PORTAL.

Line 1	Line 2	Line 3	Line 4
0.1 west	0.1 west	0.1 west	0.1 west
2.7 east	2.5 east	2.7 east	2.7 east

LENGTH IN THOUSANDS OF FEET.

Line 1	Line 2	Line 3	Line 4
13,465	12,476	13,113	12,898

SINGLE OR MULTIPLE TRACK.

Four parallel tubes, each enclosing a single track.

FREQUENCY OF PASSENGER TRAIN USE -- NUMBER OF PASSENGER TRAINS PASSING THROUGH PER DAY OR WEEK OR OTHER LIKE PERIOD.

Data breaking down the density of train movements per line was not provided. In the aggregate, though, there will be well over 500 per weekday.

PRESENCE OF ENERGIZED HIGH VOLTAGE ELECTRICAL CONDUCTORS, ELECTRICAL TRANSMISSION SYSTEMS OR CHARGED PIPELINES.

Line 1, 2 and 4: 12,000 v catenary, 750 v third rail, 2,300 v signal, 11,000 v primary feeder and a 2 1/2 inch air line charged at 90 psi. Line 3 contains the same except that there is no primary feeder.

TYPE OF ILLUMINATION IN TUNNEL, ALONG WITH APPROXIMATE UNIT SPACING AND INDIVIDUAL INTENSITY.

110 v - 25 & 40 watt lights spaced 50 feet.

TYPE AND FREQUENCY OF SIGNING TO INDICATE LOCATION WITHIN TUNNELS.

Reflective metal signs staggered at 50-foot intervals on each wall. Signs indicate distance and direction to nearest exit.

WAYSIDE TELEPHONE OR OTHER TYPE OF COMMUNICATION SYSTEM.

Alarm boxes and telephones are spaced at irregular intervals along tunnel. Exact locations are specified in the current issue of the Employees Timetable and indicated by wall lights in the tunnels. Continuous coaxial antennae in each tunnel facilitate radio communication.

CHARACTERISTICS OF SIGNAL AND TRAIN CONTROL SYSTEM THAT WOULD INDICATE TO A CENTRAL POINT SPECIFIC INFORMATION ON TUNNEL OCCUPANCY.

Track occupancy indicators at Towers for full length of each tunnel.

TRAINS OPERATING SPEED IN TUNNELS.

50 mph

PROVISION OF WALKWAYS ADJACENT TO TRACK.

Walkways both sides - 6 feet above rail, 28 inches in width. These walkways are formed by the benchwalls, a tunnel design feature unique to the New York area and Baltimore's New Union Tunnel. (See Figure 8).

NATURE AND EXTENT OF TUNNEL LINING TYPE(S).

Concrete and cast iron.

ACCESS OTHER THAN VIA PORTALS.

First Avenue Shaft - MP 1.2   Long Island City Shaft - MP 1.9

GENERAL DESCRIPTION OF TUNNEL VENTILATION SYSTEM.

Exhaust fans at shaft locations -- Blower fans at shaft location Long Island City Shaft - 65,000 cfm, 20 HP motor blower-out of service. The net effect of this equipment being out of service is that there is not today, any mechanical ventilation in any of the four tunnels. Flushing air flow results from the piston action of trains moving through the tunnels at 50 mph. While air quality in these electrified tunnels is satisfactory, what is missing, in the absence of a reversible fan system, is the capability of controlling the flow of heat and smoke from a fire. A local Amtrak spokesman stated that the rehabilitation of the malfunctioning equipment is being considered (see the last item in the following Procedural discussion for the East River tunnels).

AIR QUALITY STANDARDS FOR THE TUNNEL.

Minimum oxygen level is 21%.

Procedural

TUNNEL OWNER'S STATED POLICY REGARDING THE EVACUATION OF PASSENGERS FROM A DISTRESSED TRAIN STRANDED WITHIN THE TUNNEL.

Since Amtrak is the owner, the response to this inquiry is explicit in the next discussion.

TRAIN OPERATOR'S DETAILED GUIDELINES FOR ON-BOARD TRAIN PERSONNEL FOR THE SAFEKEEPING OF DISTRESSED-TRAIN PASSENGERS OR FOR THE EVACUATION OF TRAIN OCCUPANTS FROM TUNNELS INCLUDING REFERENCE TO THE SPECIFIC PROBLEMS PRESENTED BY AGED, HANDICAPPED OR INJURED PASSENGERS.

Detailed instruction for guidance of train crews involved in a tunnel. Train evacuation (East and North River Tunnels) is contained on 13 pages of the current (as of 1-15-89) Employees Timetable under that section of the Special Instructions entitled: North and East River Tunnels, Emergency Evacuation Procedures. The topics addressed are:

... Operation of communication and alarm systems.

... Emergency communication procedures.

... Methods of rescue in tunnels:

train to train;

MU (train) push-out or pull-out;
locomotive tow rescue;

passenger flight from a stopped train (last and least desirable -- to be avoided if at all possible).

... Removal of power (from 3rd rail and catenary).

... Fire extinguisher protocol (East River tunnels only).

For employees of LIRR, timetable and book of rules and General Notices of the Long Island Railroad will apply and be the authority for movement of Long Island Railroad trains and track cars in the East River Tunnels under the direction of Amtrak officers. Differences between Amtrak and Long Island Railroad operating rules and procedures will be covered in Long Island Railroad Special instructions and General Notices and reviewed in periodic examination classes.

Please note that the East River Tunnels exitways at First Avenue (Manhattan) and Long Island City, (Queens) are both served by single-width spiral stair-cases which are deemed by

Amtrak to be not suitable for utilization as a prime means of egress for passengers being evacuated (possibility of ascending smoke/fumes and/or descending emergency response staff). In effect, then, there are no exits for passengers being evacuated on foot from any of the East River tunnels other than the east or west portals.

METHODS OF TRAINING STAFF IN THE APPLICATION OF THESE GUIDELINES INCLUDING ACCIDENT SIMULATION EXERCISES.

Amtrak's lines in the Northeast Corridor are partitioned into four divisions, Boston, New York, Philadelphia and Washington. Each division has an assigned analysis and training staff that is part of the Amtrak system Safety Department. As in the case of operating crews that must negotiate Boston's Back Bay tunnel frequently, similar staff on the other divisions are retrained annually. In effect, they do participate in emergency simulations, but only in the sense that stationary vehicles at a division point or hardware mock ups are used to supplement formal class work. FRA has no information about Amtrak staging on-site simulations, either with its own people or outside emergency response forces.

PROCEDURES FOLLOWED BY TRAIN-OPERATOR SUPERVISION TO ASSURE ON-DUTY STAFF READINESS AND CAPABILITY TO ADHERE TO THESE GUIDELINES.

Transportation and safety supervisors evaluate train crews while riding trains and customer service personnel also check staff when carrying out on-board inspections.

EQUIPMENT ON PASSENGER TRAINS SPECIFICALLY INTENDED OR APPROPRIATE TO ASSIST IN THE EVACUATION OF PASSENGERS FROM LONG TUNNEL.

As with all Amtrak passenger equipment; fire extinguishers, axes, sledge hammers and pry bars.

GENERAL DESCRIPTION OF EMERGENCY RESPONSE PLANS INCLUDING IDENTIFICATION OF ALL ORGANIZATIONAL PARTIES TO ANY AGREEMENTS AND A BRIEF DESCRIPTION OF THEIR INDIVIDUAL RESPONSIBILITIES.

There is no emergency response plan, per se, for either the East or North River Tunnels. We have seen that there is a reasonably comprehensive set of guidelines for on-board train personnel in the current Employees Timetable. However, there is no indication of a coordination of this approach to tunnel safety with outside emergency response agencies. However, it is gratifying to report that this isolation may soon end. In the spring of 1989, Amtrak solicited support from the engineering/ scientific communities to create what is called: A Life Safety Study and Computer Modeling Analysis for New York City Railroad Tunnels and Pennsylvania Station. The intended scope of this effort is impressively broad and if the final product turns out to be conceptually sound and if Amtrak implements the recommendations, a whole new era of tunnel safety may be introduced in the New York City area. An effort of the magnitude envisioned has not been done before by the U.S. railroad industry. Therefore, it would not be unrealistically optimistic to think that the principles identified in this work would have acceptance and application elsewhere to the benefit of a large number of passengers.

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<u>Hudson (North) River Tunnels.</u> Preliminary comments. There are two parallel tunnels under the Hudson River (which, in the railroad vernacular are designated as the North River Tunnels). From the physical feature data submitted by Amtrak it is apparent that those two tubes are essentially identical except for the locations of alarm boxes and wall telephones. We are not informed as to the presence of fire extinguishers, a significant variation from the similarly designed East River tunnels. Moving in an eastward direction from Newark, New Jersey, toward and under the river to Pennsylvania Station, the right-hand structure is described as the South Tube -- Track 1 and its companion on the left as North Tube -- Track 2. The major user of these facilities is NJTR with 132 trains per day. Amtrak's passenger train volume is 74 per day.

This tunnel-pair will be treated as a single installation in the following discussion.

Questionnaire Responses

<u>Statistical</u>

OWNING RAILROAD

North River Tunnels ... Amtrak.

ROUTE DESIGNATION: DIVISION, SUBDIVISION AND OTHER NAME IF WIDELY USED. E.G., "THE NORTHERN ROUTE".

New York Division, Northeast Corridor

LOCATION: DECIMAL MILEPOST TO THE APPROXIMATE 1/10 MILE FOR EACH PORTAL.

East Portal (Manhattan) ... MP 0.5
West Portal (North Bergen) ... MP 3.0

PLACES NAMES NEAREST TO EACH PORTAL.

See above.

LENGTH IN THOUSANDS OF FEET.

13,393

SINGLE OR MULTIPLE TRACK.

Single track, each of two tubes.

FREQUENCY OF PASSENGER TRAIN USE -- NUMBER OF PASSENGER TRAINS PASSING THROUGH PER DAY OR WEEK OR OTHER LIKE PERIOD.

206 total.

PRESENCE OF ENERGIZED HIGH VOLTAGE ELECTRICAL CONDUCTORS, ELECTRICAL TRANSMISSION SYSTEMS OR CHARGED PIPELINES.

12,000 v catenary, 750 v third rail, 2,300 v signal line 11,000 v primary feeder 2 1/2 inch air line charged to 90 psi.

TYPE OF ILLUMINATION IN TUNNEL, ALONG WITH APPROXIMATE UNIT SPACING AND INDIVIDUAL INTENSITY.

25 w and 40 w fluorescent at 50-foot spacing.

TYPE AND FREQUENCY OF SIGNING TO INDICATE LOCATION WITHIN TUNNELS.

Reflective metal signs at 100-foot intervals indicating direction to nearest exit.

WAYSIDE TELEPHONE OR OTHER TYPE OF COMMUNICATION SYSTEM.

Exact locations are specified in the current edition of the Employees Timetable and indicated by wall lights in the tunnels. Continuous coaxial antennae in each tunnel facilitate radio communication.

CHARACTERISTICS OF SIGNAL AND TRAIN CONTROL SYSTEM THAT WOULD INDICATE TO A CENTRAL POINT SPECIFIC INFORMATION ON TUNNEL OCCUPANCY.

Track occupancy indicators at Tower cover the full length of tunnel.

TRAINS OPERATING SPEED IN TUNNELS.

60 mph

PROVISION OF WALKWAYS ADJACENT TO TRACK.

Benchwall walkways both sides - 6 feet above rail, 30 inches in width (See Figure 8).

NATURE AND EXTENT OF TUNNEL LINING TYPE(S).

Concrete.

ACCESS OTHER THAN VIA PORTALS.

Weehawken Shaft at M.P. 1.9   11th Avenue Shaft at MP 0.7

GENERAL DESCRIPTION OF TUNNEL VENTILATION SYSTEM. IF FACILITIES ARE PRESENT, BUT INOPERATIVE, PLEASE SO NOTE.

Exhaust and blower fans at shaft locations.

AIR QUALITY STANDARDS FOR THE TUNNEL.

Minimum oxygen level 21%.

Procedural

There is no specific discussion of these issues for the Hudson River Tunnels; they are alike and virtually inseparable from the factors dominating the safety scene in the East River Tunnels. The comments in that discussion are equally apropos of this facility.

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QUESTIONNAIRE RESPONSES

Statistical

OWNING RAILROAD

Old and New Union Tunnels ... Amtrak.

ROUTE DESIGNATION: DIVISION, SUBDIVISION AND OTHER NAME IF WIDELY USED. E.G., "THE NORTHERN ROUTE".

Philadelphia Division South, Northeast Corridor

LOCATION: DECIMAL MILEPOST TO THE APPROXIMATE 1/10 MILE FOR EACH PORTAL.

Old		New	
North:	MP 94.94	North:	94.70
South:	MP 95.25	South:	95.30

PLACES NAMES NEAREST TO EACH PORTAL.

Wholly within Baltimore city limits.

LENGTH IN THOUSANDS OF FEET.

Old	New
3,403	3,406

SINGLE OR MULTIPLE TRACK.

Old	New
Single track	Two tracks

FREQUENCY OF PASSENGER TRAIN USE -- NUMBER OF PASSENGER TRAINS PASSING THROUGH PER DAY OR WEEK OR OTHER LIKE PERIOD.

Forty-four, each bore, per day.

PRESENCE OF ENERGIZED HIGH VOLTAGE ELECTRICAL CONDUCTORS, ELECTRICAL TRANSMISSION SYSTEMS OR CHARGED PIPELINES.

Identical each bore: 6,600 v signal power, 11,000 v catenary and 132.000 v, so called oil-o-static high voltage transmission line (in open track, normally carried overhead on catenary support structures) encased in concrete.

TYPE OF ILLUMINATION IN TUNNEL, ALONG WITH APPROXIMATE UNIT SPACING AND INDIVIDUAL INTENSITY.

110/120 v, 100 w incandescent lights at 75-foot intervals, both tunnels.

TYPE AND FREQUENCY OF SIGNING TO INDICATE LOCATION WITHIN TUNNELS.

None.

WAYSIDE TELEPHONE OR OTHER TYPE OF COMMUNICATION SYSTEM AND APPROXIMATE UNIT SPACING.

Amtrak states: "Special radio relay system" in both tunnels.

CHARACTERISTICS OF SIGNAL AND TRAIN CONTROL SYSTEM THAT WOULD INDICATE TO A CENTRAL POINT SPECIFIC INFORMATION ON TUNNEL OCCUPANCY.

Centralized traffic control, both tunnels.

TRAINS OPERATING SPEED IN TUNNELS.

Passenger trains: 45 mph, both tunnels.

PROVISION OF WALKWAYS ADJACENT TO TRACK.

Old tunnel: None. New tunnel: 2 1/2 foot walkways (benchwalls) 4-feet above tracks, each wall. Note: however, that there not a side clearance problem in the Old tunnel in that it originally accommodated two tracks.

NATURE AND EXTENT OF TUNNEL LINING TYPE(S).

Concrete.

ACCESS OTHER THAN VIA PORTALS.

None.

GENERAL DESCRIPTION OF TUNNEL VENTILATION SYSTEM. IF FACILITIES ARE PRESENT, BUT INOPERATIVE, PLEASE SO NOTE.

None.

AIR QUALITY STANDARDS FOR THE TUNNEL.

None established.

Procedural

TUNNEL OWNER'S STATED POLICY REGARDING THE EVACUATION OF PASSENGERS FROM A DISTRESSED TRAIN STRANDED WITHIN THE TUNNEL.

With one exception, there is no mention of this facility in any of the documentation provided to FRA by Amtrak. The single exception is an undated document: National Railroad Passenger Corporation--Emergency Evacuation Procedures which appear to have been issued about 10 years ago. Distribution and current availability is not known. The bulk of the contents concern detailed instructions on the safety features of Amtrak rolling stock of that era. Section 17, pages 109 through 114, is entitled: "Tunnel Fires and Emergencies", and covers the New York City and Baltimore tunnels, but in away that is less comprehensive than more contemporary material. The Union Tunnel reference gives their lengths, locations of four telephones and notes that there are no internal exit ways serving either bore. So, no discussion of the issues associated heretofore with the "Procedural" part can be pursued here. The next following tunnel to be taken up is the Baltimore and Potomac three-sequence complex which is covered, briefly, in the current Employee's Timetable.

COMMENTARY

Deferred to the last item of the Baltimore and Potomac tunnels discussion.

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Baltimore and Potomac Tunnels. This structure is, in effect, a continuous tunnel interrupted briefly at two locations resulting in three tunnel segments identified by Amtrak, north to south, as the John, Wilson and Gilmore Streets sections. Physical features within these three sections are practically identical. Consequently, this facility will be treated as a single entity with the few differences noted where appropriate.

Questionnaire Responses

OWNING RAILROAD

Amtrak

ROUTE DESIGNATION: DIVISION, SUBDIVISION AND OTHER NAME IF WIDELY USED, E.G., "THE NORTHERN ROUTE".

Philadelphia Division South, Northeast Corridor.

LOCATION: DECIMAL MILEPOST TO THE APPROXIMATE 1/10 MILE FOR EACH PORTAL.

John Street	Wilson Street	Gilmore Street
MP 96.11 - MP 96.45	MP 96.50 - MP 96.98	MP 97.03 - MP 97.42

PLACES NAMES NEAREST TO EACH PORTAL.

Wholly within Baltimore city limits.

LENGTH IN THOUSANDS OF FEET.

John Street	Wilson Street	Gilmore Street
1,152 feet	3,653 feet	2,190 feet

SINGLE OR MULTIPLE TRACK.

Two tracks.

FREQUENCY OF PASSENGER TRAINS USE -- NUMBER OF PASSENGER TRAINS PASSING THROUGH PER DAY OR WEEK OR OTHER LIKE PERIOD.

102 trains per day including 14 trains in commuter service.

PRESENCE OF ENERGIZED HIGH VOLTAGE ELECTRICAL CONDUCTORS, ELECTRICAL TRANSMISSION SYSTEMS OR CHARGED PIPELINES.

The same as the Union Tunnels, preceding: 6,600 v signal power, 11,000 v catenary and the 132,000 v oil-o-static line.

TYPE OF ILLUMINATION IN TUNNEL, ALONG WITH APPROXIMATE UNIT SPACING AND INDIVIDUAL INTENSITY.

Tunnel lighting is provided by a specialized system described by Amtrak as: 277/480 volt, 60-watt luminaire at 39-foot spacing.

TYPE AND FREQUENCY OF SIGNING TO INDICATE LOCATION WITHIN TUNNELS.

Location identification every 90-feet.

WAYSIDE TELEPHONE OR OTHER TYPE OF COMMUNICATION SYSTEM AND APPROXIMATE UNIT SPACING.

Telephones are located at each of the six portals and at the one-third points of each tunnel segment. These locations are marked by blue lights. The same type of "special radio relay system" noted as being in the Union Tunnels is also present here.

CHARACTERISTICS OF SIGNAL AND TRAIN CONTROL SYSTEM THAT WOULD INDICATE TO A CENTRAL POINT SPECIFIC INFORMATION ON TUNNEL OCCUPANCY.

Centralized traffic control throughout.

TRAINS OPERATING SPEED IN TUNNELS.

Passenger trains: 30 mph

PROVISION OF WALKWAYS ADJACENT TO TRACK.

Tunnel construction is unusual in that the rail/crosstie system is secured directly to the tunnel invert without an intervening ballast layer. Egress for passengers on foot is thereby somewhat easier.

NATURE AND EXTENT OF TUNNEL LINING TYPE(S).

Masonry walls 2 1/2-3 feet thick supporting a compressed brick archway five layers thick.

ACCESS OTHER THAN VIA PORTALS.

At each of the two interior portals as well as at the end-portals.

GENERAL DESCRIPTION OF TUNNEL VENTILATION SYSTEM. IF FACILITIES ARE PRESENT, BUT INOPERATIVE, PLEASE SO NOTE.

None.

AIR QUALITY STANDARDS FOR THE TUNNEL.

None established.

Procedural

TUNNEL OWNER'S STATED POLICY REGARDING THE EVACUATION OF PASSENGERS FORM A DISTRESSED TRAIN STRANDED WITHIN THE TUNNEL.

and

TRAIN OPERATOR'S DETAILED GUIDELINES FOR ON-BOARD TRAIN PERSONNEL FOR THE SAFEKEEPING OF DISTRESSED-TRAIN PASSENGERS OR FOR THE EVACUATION OF TRAIN OCCUPANTS FROM TUNNELS INCLUDING REFERENCE TO THE SPECIFIC PROBLEMS PRESENTED BY AGED, HANDICAPPED OR INJURED PASSENGERS.

Since Amtrak is both the owner and train operator, in the instances of the Union and B&P Tunnels, comment on these two topics can be consolidated here. We have seen that there is neither a stated policy nor few guidelines covering the Union Tunnels. The current Employees Timetable does offer some guidance to train crews should a problem occur in the B&P tunnel. This is cited below:

> 100F-D1. B. & P. TUNNEL - In the event of an accident or irregularity occurring to a train in the B&P Tunnel which endangers the safety of passengers or train, immediate action must be taken to get passengers to a place of safety. If it can be safely done, trains should be moved out of the tunnel. If this is not practicable, trains should proceed to the first tunnel exit.
>
> When necessary to transfer passengers from one train to another, trainmen will endeavor to spot the platforms on the opposite track to facilitate transfer of passengers.

It is of the utmost importance that conductors should report promptly from the first telephone any detentions or troubles to their trains in the tunnel, and when air brakes become inoperative, comply with Air Brakes rules.

Telephone locations are indicated by blue lights.

PROCEDURES FOLLOWED BY TRAIN-OPERATOR SUPERVISION TO ASSURE ON-DUTY STAFF READINESS AND CAPABILITY TO ADHERE TO THESE GUIDELINES.

and

EQUIPMENT ON PASSENGER TRAINS SPECIFICALLY INTENDED OR APPROPRIATE TO ASSIST IN THE EVACUATION OF PASSENGERS FROM LONG TUNNELS.

Essentially the same as reported for the New York City tunnels.

GENERAL DESCRIPTION OF EMERGENCY RESPONSE PLANS INCLUDING IDENTIFICATION OF ALL ORGANIZATIONAL PARTIES TO ANY AGREEMENTS AND A BRIEF DESCRIPTION OF THEIR INDIVIDUAL RESPONSIBILITIES.

In general, Safety Department staff of the Philadelphia division, work with emergency response units in Baltimore and elsewhere along their assigned sector of the Corridor in much the same fashion as their counterparts on the other three divisions. These seems to be no overall, formal matrix of management-prescribed objectives and goals to unify the labors of all management representatives in optimizing the passenger train safety environment. Possibly, this situation will be modified upon receipt of the new wisdom sought through the Life Safety Study being contracted for in the New York area.

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Questionnaire Responses

Statistical

OWNING RAILROAD

First Street Tunnel, Washington, D.C. ... Amtrak

ROUTE DESIGNATION: DIVISION, SUBDIVISION AND OTHER NAME IF WIDELY USED, E.G., "THE NORTHERN ROUTE."

Washington Division, Washington Terminal.

LOCATION: DECIMAL MILEPOST TO THE APPROXIMATE 1/10 MILE FOR EACH PORTAL.

North Portal: M.P. 136.1 South Portal: M.P. 137.0

PLACES NAMES NEAREST TO EACH PORTAL.

Washington, D.C. and Arlington, VA.

LENGTH IN THOUSANDS OF FEET.

4,890 feet.

SINGLE OR MULTIPLE TRACK.

Two tracks, one in each bore connected by cross passages -- 4,100 feet. At the north end of the tunnel proper is an enclosed area including six tracks and this is designated by Amtrak as the "Subway" -- 790 feet.

FREQUENCY OF PASSENGER TRAINS USE -- NUMBER OF PASSENGER TRAINS PASSING THROUGH PER DAY OR WEEK OR OTHER LIKE PERIOD.

14 per day

PRESENCE OF ENERGIZED HIGH VOLTAGE ELECTRICAL CONDUCTORS, ELECTRICAL TRANSMISSION SYSTEMS OR CHARGED PIPELINES.

12,000 v catenary located in the north 1,300 feet of each bore and in the Subway. The catenary feeder is on the east wall of the east bore.

TYPE OF ILLUMINATION IN TUNNEL, ALONG WITH APPROXIMATE UNIT SPACING AND INDIVIDUAL INTENSITY.

100 w incandescent lights at 100-foot intervals.

TYPE AND FREQUENCY OF SIGNING TO INDICATE LOCATION WITHIN TUNNEL.

None.

WAYSIDE TELEPHONE OR OTHER TYPE OF COMMUNICATION SYSTEM AND APPROXIMATE UNIT SPACING.

Three telephone locations equally spaced. Road and yard frequency radio throughout the tunnel.

CHARACTERISTICS OF SIGNAL AND TRAIN CONTROL SYSTEM THAT WOULD INDICATE TO A CENTRAL POINT SPECIFIC INFORMATION ON TUNNEL OCCUPANCY.

This is interlocking territory controlled by a local tower.

TRAINS OPERATING SPEED IN TUNNELS.

Passenger trains: 25 mph

PROVISION OF WALKWAYS ADJACENT TO TRACK.

Adjacent to track at track level.

NATURE AND EXTENT OF TUNNEL LINING TYPE(S).

Brick arch, concrete and stone walls.

ACCESS OTHER THAN VIA PORTALS.

None.

GENERAL DESCRIPTION OF TUNNEL VENTILATION SYSTEM. IF FACILITIES ARE PRESENT, BUT INOPERATIVE, PLEASE SO NOTE.

Two fans at north portals to force air flow southward.

AIR QUALITY STANDARDS FOR THE TUNNEL.

None established.

Procedural

TUNNEL OWNER'S STATED POLICY REGARDING THE EVACUATION OF PASSENGERS FROM A DISTRESSED TRAIN STRANDED WITHIN THE TUNNEL.

and

TRAIN OPERATOR'S DETAILED GUIDELINES FOR ON-BOARD TRAIN PERSONNEL FOR THE SAFEKEEPING OF DISTRESSED-TRAIN PASSENGERS OR FOR THE EVACUATION OF TRAIN OCCUPANTS FROM TUNNELS INCLUDING REFERENCE TO THE SPECIFIC PROBLEMS PRESENTED BY AGED, HANDICAPPED OR INJURED PASSENGERS.

The current reference to passenger safety in this facility that is included in the employee's timetable is reproduced, in its entirety, below:

> 100F-W1.FIRST STREET TUNNEL
> Southbound revenue passenger trains will not depart lower level station tracks on other than a Slow Clear (Rule 287) signal indication.
> When an emergency condition exists, which will require the evacuation of a passenger train in the First Street tunnel, and requires passengers to pass through manholes between the northward and southward main tracks; such evacuation will not commence until the

conductor has communicated with the track director, K Tower and has received positive assurance that there are no train movements on the adjacent track.

The train director, K Tower will be responsible to ensure all movements are restricted until the evacuation has been completed.

PROCEDURES FOLLOWED BY TRAIN-OPERATOR SUPERVISION TO ASSURE ON-DUTY STAFF READINESS AND CAPABILITY TO ADHERE TO THESE GUIDELINES.

and

EQUIPMENT ON PASSENGER TRAINS SPECIFICALLY INTENDED OR APPROPRIATE TO ASSIST IN THE EVACUATION OF PASSENGERS FROM LONG TUNNELS.

Essentially similar to what has been described previously for other facilities in the Northeast Corridor.

GENERAL DESCRIPTION OF EMERGENCY RESPONSE PLANS INCLUDING IDENTIFICATION OF ALL ORGANIZATIONAL PARTIES TO ANY AGREEMENTS AND A BRIEF DESCRIPTION OF THEIR INDIVIDUAL RESPONSIBILITIES.

On May 12, 1988, an incident occurred in this tunnel that necessitated the evacuation of a passenger train. The affected train was pulled from the tunnel back to a platform in Union Station by another locomotive, power for the passenger train having been shut down. One hundred and thirty passengers were transported to local area hospitals for medical examinations and several were treated for smoke inhalation (diesel locomotive exhaust products), but no one was admitted.

This incident was investigated by staff of the National Transportation Board and the Federal Railroad Administration with recommendations being advanced on the upgrading of lighting, ventilation, communications and fire control systems within the tunnel. Further, it was recommended that Amtrak develop an emergency plan for Union Station and the adjacent terminal area, including the First Street Tunnel and coordinate this plan with municipal emergency response forces in the District of Columbia.

Amtrak management was thoroughly receptive to these recommendations and took immediate steps toward implementation. Before the end of 1989, substantial ancillary equipment, intended to markedly improve safety within this tunnel, will have been installed. Amtrak has almost completed an Emergency Situation Response Plan. When this is done, it will be reviewed with District emergency response staff, simulated crises involving Amtrak and outside people will be staged and post-drill critiques carried out.

Conclusions

From the mass of data that has been reviewed, certain salient points emerge:

1. In general, the Corridor commuter railroads included in this study have adequate plans in place for responding to passenger train emergencies in tunnels. Among the five commuter railroads surveyed, the PATH program is superior, followed closely by the policies of SEPTA, Metro-North and the Long Island Rail Road. New Jersey Transit has deficiencies in its passenger safety program in (1) not having established a close liaison with the emergency response forces of the communities through which it operates, and (2) not incorporating hands-on exercises in the training of its employees.

2. Amtrak, while chiefly an intercity passenger carrier with the confines of the Northeast Corridor, operates in conjunction with SEPTA, Metro-North, the Long Island Rail Road and New Jersey Transit. Moreover, it manages the heavy rail commuter operation of the Massachusetts Bay Transportation Authority in the Boston area and crews, as well as dispatches the trains of the Maryland Rail Commuter service that run on its tracks. Among these various activities, Amtrak's support of adequate policies for the evacuation of passengers from distressed trains halted in tunnels varies from acceptable to nonexistent. Amtrak has some inexplicable voids in the delineation of site-specific passenger evacuation procedures of certain facilities in the Northeast Corridor. At the same time, this railroad recognizes a need to adjust its emergency response planning in the New York area to take into account increased traffic and advancing age of the structures and took a substantial step to meet this requirement.

3. By comparison with the procedures of the east coast commuter railroads, the approach to safe evacuation of passenger trains advocated by the Southern Pacific Transportation Company and its client, the California Department of Transportation, is primitive. There is great room for improvement here in (1) evolution of policy, (2) staff training and (3) coordination with local emergency response teams. The railroad, it seems, recently undertook the first steps toward making more effective the relationship with fire departments in some communities through which its commuter train pass.

4. This study uncovered the fact that there are no emergency evacuation plans in place to cover Amtrak trains in any tunnel 1,000 feet or longer anywhere in the country away from the Northeast Corridor. From the documentation provided to FRA by Amtrak, it is clear that the freight railroad contractors, who for the most part, extend

operating privileges to Amtrak and dispatch Amtrak trains over their lines, deny any obligation to participate in the formulation of tunnel safety policy. The most complete description of a railroad emergency response plan was given to Amtrak by CSX Transportation, a railroad responsible for 16 tunnels through which Amtrak trains operate. This manual: "Corporate Policies and Procedures Regarding Emergencies", is almost 60 pages long and it defines departmental and individual roles to be followed in the several kinds of misfortunes to which freight railroads are vulnerable. There are no references in this text to passengers, passenger trains or evacuations therefrom. Another railroad, which among other tunnels, owns and controls two multi-mile long structures, refers to evacuation instructions "...as enumerated in Timetable Special Instructions..." A review of these sources yields scant guidance that would be of value if it were necessary to detrain and evacuate several hundred passengers from a distressed train. In general, the freight railroad procedures, where anything at all is spelled out, are geared toward the preservation of freight train crewmembers, a number hardly ever exceeding six for any one train. While intricate plans for the assurance of passenger safety in tunnels similar to the New York commuter railroad models are probably inappropriate for application to a freight railroad structure that sees the passage of two Amtrak trains per day, certainly something more tangible than nothing is not only appropriate, but imperative. There is wide variation in the methods used by all surveyed passenger carrying railroads to train on-board crews. Amtrak management acknowledges both the seriousness and complexity of this issue and assigned staff from several departments to work together on the problem with the individual contractor railroads. FRA will observe the effectiveness of this dialogue by evaluating progress at the end of 90-day intervals. In cases where reasonable headway is not apparent, the agency may elect to exercise its authority in order to accelerate the rate of accomplishment.

5. Some types of passenger cars present problems which would impede the rapid evacuation of passengers to the roadbed unless special purpose equipment is available and used by train crews.

6. Considerable variability exists in the nature and numbers of tools and other devices intended to facilitate passenger evacuation from distressed cars.

7. Consistent clarity is a characteristic with which all railroad participants in this study express the instructions addressed to employees responsible for the safety of passengers in tunnels (and elsewhere). Ambiguity is not a notable feature of these manuals, but at the same time, it is not totally absent. An example is the treatment of train

crew responsibility to provide adequate lighting for passenger detraining to the roadbed in the dark. Four of the railroads do not address the topic at all in provided copies of instructions. That is not ambiguous, but it is not very helpful. Three other railroads are uniform in directing employees to provide "sufficient" light in such circumstances and are equally consistent in failing to define what sufficient light is and from what source the train person is to obtain it. Crewmembers commonly carry a two-cell flashlight, or a four-cell, unfocused brakeman's lantern in their hand grips, but the output of these devices can scarcely be considered as adequate during the types of emergencies that have been discussed in this report.

8. The original inclination to treat the commuter railroads and Amtrak as sufficiently different to warrant separate consideration in this report is justified. For the most part, the problems, while similar in nature, demand unique solutions. Commuter rail operations tend to be high volume activities compactly distributed. Conversely, Amtrak operations, particularly away from the Northeast Corridor, involve a lesser volume widely distributed. The political and economic consequences of a serious interruption of commuter rail service, even when passenger safety is not at risk, are sufficiently severe to encourage managements to develop complex schemes for minimizing the effects of equipment or systemic breakdown. On the other hand, and possibly excepting corridor operations, Amtrak's problem is the more difficult one to solve; that of transporting relatively smaller numbers of people, safely and efficiently, over a track network of many thousands of route miles.

Recommendations

To:	Advice
Southern Pacific Transportation Co./ California Department of Transportation	Railroad: Continue to exploit the current process whereby carrier management is opening a dialogue with the emergency response forces distributed along the route, San Francisco - San Jose. CALDOT: When the contract for the provision of this service comes up for renewal in 1990, require that the successful applicant develop and implement, early in its period of performance, a comprehensive plan for dealing with the variety of incidents or accidents to which the commuter service is subject. The approaches taken by other transportation authorities discussed in this report are suggested for consideration as models. Moreover, departmental management must, at the same time, institute a policy of energetic oversight to assure that this plan is completed in a timely fashion, is reasonable for the needs of the service and is put into and kept in effect by properly trained staff.
Southeastern Pennsylvania Transportation Authority	Reconsider the original decision not to provide in each passenger car a suite of hand tools to facilitate car evacuations. Further, review the procedures and criteria that are used by supervisors to evaluate the readiness of train crews to respond competently to passenger train emergencies in order to guarantee that such performance appraisals do indeed occur and that they are based on uniformly understood standards.

Port Authority Trans-Hudson Corporation	Review the provision of evacuation ladders to assure that there are enough of these devices on-board each train to permit evacuation of passengers, if indicated, at maximum efficiency.
New Jersey Transit Rail Operations, Inc.	If this is not now being done, solicit the attention of local emergency response teams to the particular aspects of commuter train operation, familiarity with which will strongly improve the effectiveness with which these units support the railroad during emergencies. Additionally, seriously consider introducing the concept of accident simulation to an otherwise convincing training scheme.
National Railroad Passenger Corporation	Press on with the organization and application of the management team that will have the assignment of formulating a plan and a schedule to deal with the universal problem of no formal passenger train evacuation procedures subscribed to by any of the contractor railroads. This plan certainly must address the question of assigning priorities to resolving the problem on the basis of attacking first the tunnels posing the greatest inherent hazards to passenger of disable trains. Once a satisfactory plan is in place, Amtrak management shall proceed promptly to implement it according to its stated schedule. Every 90 days, until substantial progress in achieving a reasonable agreement with each of the nine contractor railroads is demonstrated, Amtrak shall report to FRA's Associate Administrator for Safety on the status of this

program.

Pursue with all deliberate speed the progression of the proposed life safety study in the New York area and extend its resulting principles, where appropriate, to other facilities owned or controlled by Amtrak.

Review the safety instructional material that now appears in diverse formats, for the guidance of train operating personnel with the idea of consolidating it all under one heading and possibly, considering the size of the various Amtrak operating regions, issuing one or a series of manuals dedicated to the subject. It may be that the Special Instructions sections of Employee's Timetable is not the best place in which to present detailed guidance on passenger safety. Inevitably, individual items in Special Instructions are accorded equal weight by the viewer since no attempt is made to distinguish among entries as to importance. Thus, in the current Northeast Corridor timetable, it is left to the employee to decide whether or not comparable emphasis is to be placed on who may ride trains without having paid a fare, for example, and emergency evacuation procedures in the North and East River tunnels. Perhaps, a distinction is made among timetable entries during periodic staff retraining, but this is not known with certainty in FRA.

All Passenger Carrying Railroads	Review the availability to train crews of hand-carried devices for providing adequate illumination when it is necessary to detrain passengers to the roadbed in the dark.

Consider the utility, particularly, but not exclusively in the New York area, of using the widely accepted (military, air transport, etc.) "sand-table exercise" concept as a training device for both railroad and emergency response personnel. This is a proven-effective training tool in circumstances where multiple-agency personnel may come together to control an emergency.

The contractor railroads serving Amtrak national routes which pass through tunnels 1,000 or more feet long, i.e.,

- o Atchison, Topeka and Santa Fe Railway Company
- o Burlington Northern Railroad Company,
- o Consolidated Rail
- o CSX Transportation Incorporated,
- o Denver and Rio Grande Western Railroad Company
- o Norfolk Southern Corporation,
- o Soo Line Railroad Company,
- o Southern Pacific Transportation Company,
- o Union Pacific Railroad

As facility owners and controllers, cooperate with Amtrak, on a case by case basis, in:

1. Defining a reasonable level of responsibility for the safety of passengers on trains passengers on trains disabled in tunnels.

2. Arriving at a procedure that is appropriate for each facility to evacuate passengers, those who may be injured or unwell, and Corporation, others with least hazard and greatest efficiency from a distressed train.

   This procedure or plan shall also address the problems of medical evacuation from remote locations of injured people needing prompt transport to treatment centers and the provision of access to incoming emergency personnel.

3. Implementing these procedures through staff training and constant supervisory monitoring of performance in order to assure staff readiness to respond competently to the advent of crises.

Background Sources

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4. Emergency Procedures Training of On-Board Passenger Train Personnel: A Report to Congress. Federal Railroad Administration. February 1985

5. Assessment of Amtrak Employee Safety Federal Railroad Administration. October 1987

6. Fire and Life Safety Training Needs of Rail Rapid Transit System and Fire Service Personnel. Transportation Systems Center. July 1985 (reprint) Report No. UMTA-MA-06-0098-83-1.

7. Tunnel Ventilation, Lighting and Operation. Transportation Research Board. Undated. Transportation Research Record 883.

8. Safety Recommendations In Re National Railroad Passenger Corporation Train No. 19 Incident in the First Street Tunnel, Washington, D.C. on May 12, 1988. National Transportation Safety Board. Washington, D.C. November 30, 1988. Recommendations R-88-74 and R-88-75.

9. The Pocket List of Railroad Officials, International Thompson Transport Press, Inc., Volume 93, No. 4 1987

10. Grand Central...The World's Greatest Railway Terminal. William D. Middleton, Golden West Books, San Marino, California 1977

11. Rails under the Mighty Hudson. Brian Cudahy. The Stephen Greene Press. Brattleboro, VT. 1975.

12. Steel Rails to the Sunrise. Ron Ziel and George Foster. Duell, Sloan and Pearce, Inc. New York, NY. 1965.

13. a. Procedures in Emergencies Involving Fire Departments.
    b. Emergency Procedures for Rail Line Employees.
    Massachusetts Bay Transportation Authority. Boston, Massachusetts. August 1978

APPENDIX

Introductory Comments

The following text represents the replies provided to Amtrak by its contractor freight railroads in responding to the survey questionnaire (See Figure 1). The nine reporting railroads, in every case, supplied information of a statistical nature only. As noted in the body of this report, the contract railroads did not acknowledge the existence of any appreciable procedural policies applicable to passenger train operations, so that section will be missing for all tunnels listed. This material is reproduced exactly as received from Amtrak with the exception that the specifications of Amtrak-owned or controlled facilities were extracted and re-ordered to form the base of the discussion under the concluding railroad in the body of the report.

TABLE OF CONTENTS

SECTIONS

PREFACE

This report contains the results of Amtrak's statistical survey of all tunnels, snowsheds, and overbuilds of one thousand feet or greater in length used by its revenue trains.

This survey was undertaken in response to a request from the FRA for our participation in its effort to assess the extent of safety and evacuation procedures in effect for tunnels of minimum length of one thousand feet used by passenger trains.

This final report consists of completed tunnel statistical data forms as submitted to Amtrak by tunnel-owner railroads.

STATISTICAL

Owning Railroad *

The Atchison, Topeka & Santa Fe Railway

Route designation: division, subdivision and other name if widely used. e.g., "the Northern Route".

Colorado Division, Raton Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East (North) End M.P.652.0; West (South) End M.P. 652.5 (2789.5 ft.)

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East - Morley, Colorado West - Raton, New Mexico

Length in thousands of feet.

2789.5

Single or multiple track. If the latter, number of tracks and bores.

Single

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day, (1 E.B. - 1 WB)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

20 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

All concrete liner

Access other than via portals.

5 safety holes, 1 air shaft.

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

Safety holes and air shaft.

Air quality standards for the tunnel.

None.

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Pacific Division 5th Sub

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal: 49.8 West Portal: 49.5

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal: Lyle, Wa West Portal: Washougal, Wa

Length in thousands of feet.

1503'

Single or multiple track. If the latter, number of tracks and bores.

1

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC (Occupancy in tunnel indicated on CTC Panel)

Train operating speed in tunnel.

60 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Unknown

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *
BNRR

Route designation: division, subdivision and other name if widely used. e g., "the Northern Route".
Pacific Division 5th Sub.

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal: 35.1 West Portal: 34.7

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal: Lyle, Wa West Portal: Washougal, Wa.

Length in thousands of feet.

2382'

Single or multiple track. If the latter, number of tracks and bores.

1

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.
2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.
None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.
None

Type and frequency of signing to indicate location within tunnel.
None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.
CTC (Occupancy in tunnel indicated on CTC Panel)

Train operating speed in tunnel.
55 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Rock

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Unknown

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Pacific Division 3rd Sub

Location: decimal milepost to the approximate 1/10 mile for each portal.

North Portal: 95.0 South Portal: 95.2

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

North Portal: Castle Rock, Wa South Portal: Rocky Point, Wa

Length in thousands of feet.

1165'

Single or multiple track. If the latter, number of tracks and bores.

2, Single Bore

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

6 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC (Occupancy in tunnel indicated on CTC Panel)

Train operating speed in tunnel.

40 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Unknown

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e.g., "the Northern Route".

Pacific Division 3rd Sub

Location: decimal milepost to the approximate 1/10 mile for each portal.

North Portal: 5.6 South Portal: 6.3

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

North Portal: Tacoma, Wa South Portal: Nisqually, Wa

Length in thousands of feet.

4391'

Single or multiple track. If the latter, number of tracks and bores.

2, Single Bore

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

6 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC (Occupancy in tunnel indicated on CTC Panel)

Train operating speed in tunnel.

40 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Unknown

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Pacific Division 2nd Sub

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal: 1.1 West Portal: 0.2

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal: Seattle, Wa West Portal: Seattle, Wa

Length in thousands of feet.

5142'

Single or multiple track. If the latter, number of tracks and bores.

2, Single Bore

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 Per Day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC (Occupancy in tunnel indicated on CTC Panel)

Train operating speed in tunnel.

20 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Unknown

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e g , "the Northern Route".

Pacific Division 2nd Sub.

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal: 1783.2 West Portal: 1783.7

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal: Everett, Wa West Portal: Everett, Wa

Length in thousands of feet.

2440'

Single or multiple track. If the latter, number of tracks and bores.

1

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC (Occupany in tunnel indicated on CTC Panel)

Train operating speed in tunnel.

25 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Unknown

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Pacific Division 2nd Sub

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal: 1700.3 West Portal: 1708.2

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal: Leavenworth, Wa West Portal: Monroe, Wa

Length in thousands of feet.

41152'

Single or multiple track. If the latter, number of tracks and bores.

1

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

Yes

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

Lights at Bays 21 Location

Type and frequency of signing to indicate location within tunnel.

Bay Numbers

Wayside telephone or other type of communication system and approximate unit spacing.

At Bays

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC (Occupancy in tunnel indicated on CTC Panel)

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

See "*" Below

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

Fan System & Door at East Portal, Venting & Flushing

Air quality standards for the tunnel.

Unknown

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

* 2'x3' Doors on South Wall of Tunnel from Bay 13 to West Portal. These Doors open into Pioneer Tunnel, and must be closed after each use. Exits are to be used only when no other exit available from tunnel.

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e.g., "the Northern Route".

Pacific Division 2nd Sub.

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal: 1684.0 West Portal: 1684.8

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal: Leavenworth, Wa West Portal: Monroe, Wa

Length in thousands of feet.

4059'

Single or multiple track. If the latter, number of tracks and bores.

1

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC (Occupancy in tunnel indicated on CTC Panel)

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Unknown

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e.g., "the Northern Route".

Pacific Division 2nd Sub

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal: 1680.1 West Portal: 1680.6

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal: Leavenworth, Wa West Portal: Monroe, Wa

Length in thousands of feet.

2601'

Single or multiple track. If the latter, number of tracks and bores.

1

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC (Occupancy in tunnel indicated on CTC Panel)

Train operating speed in tunnel.

55 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Unknown

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Spokane Division 1st Sub.

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal: 1336.1 West Portal: 1336.4

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal: Libby, MT West Portal: Troy, MT

Length in thousands of feet.

1396'

Single or multiple track. If the latter, number of tracks and bores.

1

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC: (Occupancy in Tunnel indicated on CTC Panel)

Train operating speed in tunnel.

55 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Unknown

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e.g., "the Northern Route".

Spokane Division 1st Sub

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal: 1264.6 West Portal: 1271.6

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal: Stryker, Mt. West Portal: Ripley, Mt.

Length in thousands of feet.

36970'

Single or multiple track. If the latter, number of tracks and bores.

1

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

yes

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

Lights at Bay, 20 locations

Type and frequency of signing to indicate location within tunnel.

Bay Tumbers

Wayside telephone or other type of communication system and approximate unit spacing.

At Bays

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC (Occupancy in tunnel indicated on CTC Panel)

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

Fan System and Door at East Portal, Venting and Flushing

Air quality standards for the tunnel.

Unknown

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Montana Divi ion 2nd Sub

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal: 1192.5 West Portal: 1193.0

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal: Browning, MT West Portal: Columbia Falls, Mt.

Length in thousands of feet.

2281'

Single or multiple track. If the latter, number of tracks and bores.

1

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC (Occupancy in tunnel indicated on CTC Panel)

Train operating speed in tunnel.

40 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Unknown

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Montana Division 2nd Sub

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal: 1176.1 West Portal: 1176.4

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal: Browning, Mt. West Portal: Columbia Falls, Mt.

Length in thousands of feet.

1746'

Single or multiple track. If the latter, number of tracks and bores.

1

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC (Occupancy in tunnel indicated on CTC Panel).

Train operating speed in tunnel.

50 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Unknown

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Montana Divi.-lon 2nd Sub

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal: 1168.2 West Portal: 1168.5

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal: Borwning, Mt West Portal: Columbia Falls, Mt.

Length in thousands of feet.

1420'

Single or multiple track. If the latter, number of tracks and bores.

2

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC (Occupancy in tunnel indicated on CTC Panel)

Train operating speed in tunnel.

25 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Timber

Access other than via portals.

Between Support Posts along North Side

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Unknown

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Montana Division 2nd Sub

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal: 1159.95 West Portal: 1160.2

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal: Browning, Mt. West Portal: Columbia Falls, Mt.

Length in thousands of feet.

1025'

Single or multiple track. If the latter, number of tracks and bores.

2

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC (Occupancy in tunnel indicated on CTC Pannel)

Train operating speed in tunnel.

25 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Timber

Access other than via portals.

Bewteen Support Posts along South Side

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Unknown

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

BNRR

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Montana Division 2nd Sub

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal: 1159.7 West Portal: 1159.9

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal: Browning, Mt West Portal: Columbia Falls, Mt.

Length in thousands of feet.

1069'

Single or multiple track. If the latter, number of tracks and bores.

2

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC: (Occupancy in tunnel indicated on CTC Panel)

Train operating speed in tunnel.

25 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Timber

Access other than via portals.

Between Support Posts along South Side

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Unknown

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

Conrail

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Central Region, Allegheny Division, Pittsburgh Line

Location: decimal milepost to the approximate 1/10 mile for each portal.

247.4 East Portal   248.1 West Portal.

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Gallitzen, PA

Length in thousands of feet.

3.612

Single or multiple track. If the latter, number of tracks and bores.

Single

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 Passenger Trains per day.

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

Radio on train.

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS territory controlled by operator at AR Tower.

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Yes

Nature and extent of tunnel lining type(s).

Stone Arch Lining

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Good

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

Conrail

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Central Region, Allgeheny Division, Pittsburgh Line

Location: decimal milepost to the approximate 1/10 mile for each portal.

213.6 East Portal 213.8 West Portal

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Spruce Creek, PA

Length in thousands of feet.

1.151

Single or multiple track. If the latter, number of tracks and bores.

Single Track Eastbound Track #1 Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 Passenger Trains Per Day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

Radio On Train

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS Territory Controlled by Dispatcher at Altoona, PA

Train operating speed in tunnel.

40 mph.

Provision of walkways adjacent to track.

Yes

Nature and extent of tunnel lining type(s).

Brick Arch Lining

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Good

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

Conrail

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Central Region, Allegheny Division, Pittsburgh Line

Location: decimal milepost to the approximate 1/10 mile for each portal.

213.6 East Portal   213.8 West Portal

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Spruce Creek, PA

Length in thousands of feet.

1.075

Single or multiple track. If the latter, number of tracks and bores.

Single Track Westbound Track No. 2 Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 Passenger Trains Per Day.

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

Radio on Train.

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS Territory controlled by dispatcher at Altoona, PA

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.

Yes

Nature and extent of tunnel lining type(s).

Brick Arch Lining

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Good

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

Conrail

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Central Region, Allegheny Division - Pittsburgh Line

Location: decimal milepost to the approximate 1/10 mile for each portal.

247.4 East Portal 247.7 West Portal

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Gallitzen, PA

Length in thousands of feet.

1.63

Single or multiple track. If the latter, number of tracks and bores.

Single

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

1 Passenger Train Per Day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

Radio on train.

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS territory controlled by operator at AR Tower.

Train operating speed in tunnel.

30 mph.

Provision of walkways adjacent to track.

Yes

Nature and extent of tunnel lining type(s).

Stone Arch Lining.

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Good

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

CSX Transportation

Route designation: division, subdivision and other name if widely used. e.g., "the Northern Route".

Baltimore Division, Cumberland Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal - M.P. 142.0 West Portal M.P. 142.2

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Pow Pow, W. VA

Length in thousands of feet.

1,015 ft.

Single or multiple track. If the latter, number of tracks and bores.

Double Track.

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Two per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

One mile east and west of portals

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS rules, tracks are signaled in both directions

Train operating speed in tunnel.

55 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

CSX Transportation

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Baltimore Division, Cumberland Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal M.P. 145.8 West Portal M.P. 146.1

Place names nearest to each portal that can be found in the Rand McNally Pailroad Atlas.

Pow Pow, W. VA

Length in thousands of feet.

1,592 ft.

Single or multiple track. If the latter, number of tracks and bores.

Double Tracks

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Two per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

Within one mile east and west of portals

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS rules, tracks are signaled in both directions

Train operating speed in tunnel.

55 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

CSX Transporta_ion

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Baltimore Division - Mail Line Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal M.P. 210.0 West Portal M.P. 210.8

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Meyersdale, PA

Length in thousands of feet.

4,475 ft.

Single or multiple track. If the latter, number of tracks and bores.

Double Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Two per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

Near portals

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS with no trail control

Train operating speed in tunnel.

45 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

2,404 ft. Cone, 2,071 ft. brick

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

CSX Transportation

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Baltimore Division, Main Line Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal M.P. 235.7 West Portal M.P. 235.9

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Confluence, PA

Length in thousands of feet.

1,081 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Two per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

Near end portals

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS with no train control

Train operating speed in tunnel.

35 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Brick

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

NOne

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

CSX Transporta ion

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Baltimore Division - Main Line Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal M.P. 239.1 West Portal M.P. 240.5

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Confluence, PA

Length in thousands of feet.

1,856 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Two per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

End Portals

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

Information not provided by CSX

Train operating speed in tunnel.

35 mph (M.P. 239-239.6) 50 mph (M.P. 239.6 - 241.4)

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Brick

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

CSX Transportation

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Baltimore Division, P&W Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal M.P. 144.4 West Portal M.P. 145.0

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Pow Pow, W. VA

Length in thousands of feet.

3,355 ft.

Single or multiple track. If the latter, number of tracks and bores.

Double Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Two (2) per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

One (1) mile east of east portal

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS Rules, Tracks are signaled in both directions

Train operating speed in tunnel.

55 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

CSX Transportation

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Baltimore Division, P&W Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal M.P. 326.9 West Portal M.P. 327.4

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Pittsburgh

Length in thousands of feet.

2,872 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

Within one mile east and west of portals

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS rules, tracks are signaled in both directions.

Train operating speed in tunnel.

35 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Brick

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

CSX Transportation

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Huntington Division - Alleghany Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal - M.P. 305.0 West Portal - M.P. 305.6

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

White Sulphur, VA

Length in thousands of feet.

3,055 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Six per week

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

At east portal and 100 yards west of west portal.

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy. TCS with no train control - dispatcher could approximate by monitoring track circuits on model board

Train operating speed in tunnel.

40 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

NOne

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

CSX Transportation

Route designation: division, subdivision and other name if widely used. e g., "the Northern Route".

Huntington Division, Alleghany Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East portal M.P. 307.3 West Portal M.P. 308.2

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

White Sulphur, VA

Length in thousands of feet.

4,743 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Six per week

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

Telephones located 100 yards from both east and west portal.

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS with no train control. Dispatcher could approximate location by monitoring track circuits on model board.

Train operating speed in tunnel.

45 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete 2,482 ft. Brick 2,261 ft.

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

CSX Transportation

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Huntington Division - Alleghany Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal M.P. 307.3 West Portal M.P. 308.2

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

White Sulphur, VA

Length in thousands of feet.

4,751 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Six per week

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

Telephone located within 100 yards from each portal

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy. TCS with no train control. Dispatcher could approximate location by monitoring track circuits on model

Train operating speed in tunnel.

45 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

CSX Transportation

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Huntington Division. Alleghany Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal M.P. 327.3, West Portal M.P. 327.7

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Ronceverte, W. VA

Length in thousands of feet.

2,067 ft.

Single or multiple track. If the latter, number of tracks and bores.

Double Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Six per week

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

At the east portal and west portal

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS with no train control-dispatcher could approximate location by watching track circuits on model board

Train operating speed in tunnel.

60 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

CSX Transportation

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Huntington Division, Alleghany Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal M.P. 328.4, West Portal M.P. 328.9

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Ronceverte, W. VA

Length in thousands of feet.

2,806 ft.

Single or multiple track. If the latter, number of tracks and bores.

Double track.

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Six per week

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

100 yds from west portal (none at east portal)

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS with no train control. Dispatcher could approximate location by watching track circuits on model board.

Train operating speed in tunnel.

60 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

CSX Transportation

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Huntington Division, Alleghany Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East portal M.P. 348.6 West Portal M.P. 349.8

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Hinton, W. VA

Length in thousands of feet.

6,168 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Six per week

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

Two tenths of a mile west of west portal (None at east portal)

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS with no train control - dispatcher could approximate location by watching track circuits on model board

Train operating speed in tunnel.

40 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

CSX Transportation

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Huntington Division - Mountain Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal M.P. 205.0 West Portal M.P. 205.7

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Crozet, VA

Length in thousands of feet.

3,979 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Six per week

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

Two tenths of a mile west of west portal.

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS with no train control - dispatcher could approximate location by monitoring track circuits on model board

Train operating speed in tunnel.

40 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

CSX Transportation

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Huntington Division, Mountain Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal M.P. 260.3 - West Portal M.P. 260.5

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Millboro, VA

Length in thousands of feet.

1,335 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Six per week

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

Two tenths of a mile east of east portal, none at west portal

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy. TCS with no train control. Dispatcher could approximate location by monitoring track circuits on model board

Train operating speed in tunnel.

60 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Brick

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

<u>**STATISTICAL**</u>

Owning Railroad *

CSX Transportation

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Huntington Division, New River Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Port M.P. 380.4 West Portal M.P. 380.7

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Prince, W. VA

Length in thousands of feet.

1,588 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Six per week

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

Telephones at M.P. 379.9 and M.P. 381.7

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

TCS with no train control - dispatcher could approximate location by monitoring track circuits on model board.

Train operating speed in tunnel.

40 mph

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

TUNNEL #10

Owning Railroad *

Denver and Rio Grande Western Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Colorado Division, Denver to Dotsero Route

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal - MP 27.4
West Portal - MP 27.7

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal = Denver, CO

Length in thousands of feet.

1.6K = 1,572 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

N/A

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

N/A

Type and frequency of signing to indicate location within tunnel.

N/A

Wayside telephone or other type of communication system and approximate unit spacing.

N/A

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

N/A

Train operating speed in tunnel.

25 mph

Provision of walkways adjacent to track.

N/A

Nature and extent of tunnel lining type(s).

Rock/Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

N/A

Air quality standards for the tunnel.

N/A

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

TUNNEL #17

Owning Railroad *

Denver & Rio Grande Western Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Colorado Division, Denver to Dotsero Route

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal 29.5 West Portal 29.8

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal = Denver, CO

Length in thousands of feet.

1.7K = 1,730 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Main Line Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 Per Day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

N/A

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

N/A

Type and frequency of signing to indicate location within tunnel.

N/A

Wayside telephone or other type of communication system and approximate unit spacing.

N/A

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

N/A

Train operating speed in tunnel.

25 mph

Provision of walkways adjacent to track.

N/A

Nature and extent of tunnel lining type(s).

Rock/Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

N/A

Air quality standards for the tunnel.

N/A

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

TUNNEL #23

Owning Railroad *

Denver & Rio Grande Western Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Colorado Division, Denver to Dotsero Route

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal 33.2 West Portal 33.5

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal = Denver, CO

Length in thousands of feet.

1.6K = 1,622 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track Main Line

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 Per Day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

N/A

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

N/A

Type and frequency of signing to indicate location within tunnel.

N/A

Wayside telephone or other type of communication system and approximate unit spacing.

N/A

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

N/A

Train operating speed in tunnel.

25 mph

Provision of walkways adjacent to track.

N/A

Nature and extent of tunnel lining type(s).

Rock/Concrete

Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

N/A

Air quality standards for the tunnel.

N/A

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Sweetwater Tunnel

Owning Railroad *

Denver & Rio Grande Western Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Colorado Division, Denver to Dotsero Route

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal - 159.2
West Portal - 159.4

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal - Range (MP 155.5)
West Portal - Dotsero (MP 167)

Length in thousands of feet.

1,115 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track Main Line

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 Per Day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

N/A

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

N/A

Type and frequency of signing to indicate location within tunnel.

N/A

Wayside telephone or other type of communication system and approximate unit spacing.

N/A

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

N/A

Train operating speed in tunnel.

40 mph

Provision of walkways adjacent to track.

N/A

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

N/A

Air quality standards for the tunnel.

N/A

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

GLENWOOD TUNNEL

Owning Railroad *

Denver & Rio Grande Western Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Colorado Division, Dotsero to Grand Junction Route

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal - 359.0
West Portal - 359.3

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal - Grizzly (MP 355) West Portal - Glenwood, CO (MP 360)

Length in thousands of feet.

1,327 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track Main Line

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 Per Day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

N/A

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

N/A

Type and frequency of signing to indicate location within tunnel.

N/A

Wayside telephone or other type of communication system and approximate unit spacing.

N/A

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

N/A

Train operating speed in tunnel.

25 mph

Provision of walkways adjacent to track.

N/A

Nature and extent of tunnel lining type(s).

Rock

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but incperative, please so note.

N/A

Air quality standards for the tunnel.

N/A

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

TUNNEL #19

Owning Railroad *

Denver & Rio Grande Western Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Colorado Division, Dotsero to Grand Junction Route

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal 32.1 West Portal 32.3

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal = Denver, CO

Length in thousands of feet.

1.1K = 1,055 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Main Line Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 Per Day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

N/A

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

N/A

Type and frequency of signing to indicate location within tunnel.

N/A

Wayside telephone or other type of communication system and approximate unit spacing.

N/A

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

N/A

Train operating speed in tunnel.

25 mph

Provision of walkways adjacent to track.

N/A

Nature and extent of tunnel lining type(s).

Rock/Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

N/A

Air quality standards for the tunnel.

N/A

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

THISTLE TUNNEL WESTBOUND

Owning Railroad *

Denver & Rio Grande Western Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Utah Division - Helper to Salt Lake Route

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal 680.4 West Portal 681.0

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal-Rio, Utah West Portal -Thistle, Utah

Length in thousands of feet.

3,000 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track Main Line

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

One Per Day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

N/A

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

N/A

Type and frequency of signing to indicate location within tunnel.

N/A

Wayside telephone or other type of communication system and approximate unit spacing.

N/A

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

N/A

Train operating speed in tunnel.

35 mph

Provision of walkways adjacent to track.
N/A

Nature and extent of tunnel lining type(s).

Concrete

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

N/A

Air quality standards for the tunnel.

N/A

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

MOFFAT TUNNEL

Owning Railroad *

Denver & Rio Grande Western Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Colorado Division, Denver to Dotsero Route

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal 50.2 West Portal 56.4

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal - East Portal, CO
West Portal - Winter Park, CO

Length in thousands of feet.

32.8K = 32,800 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track Main Line

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 Per Day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

N/A

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

Illumination Varies

Type and frequency of signing to indicate location within tunnel.

Mileposts (51 Thru 56)

Wayside telephone or other type of communication system and approximate unit spacing.

21 Wayside telephones, one in each Refuge

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC Relay located in Denver

Train operating speed in tunnel.

40 mph

Provision of walkways adjacent to track.

N/A

Nature and extent of tunnel lining type(s).

Rock/Concrete/Gunite

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

Three fans located at the East Portal.

Air quality standards for the tunnel.

N/A

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

MOFFAT TUNNEL

Owning Railroad *

Denver & Rio Grande Western Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Colorado Division, Denver to Dotsero Route

Location: decimal milepost to the approximate 1/10 mile for each portal.

East Portal 50.2 West Portal 56.4

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

East Portal - East Portal, CO
West Portal - Winter Park, CO

Length in thousands of feet.

32.8K = 32,800 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track Main Line

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 Per Day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

N/A

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

Illumination Varies

Type and frequency of signing to indicate location within tunnel.

Mileposts (51 Thru 56)

Wayside telephone or other type of communication system and approximate unit spacing.

21 Wayside telephones, one in each Refuge

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC Relay located in Denver

Train operating speed in tunnel.

40 mph

Provision of walkways adjacent to track.

N/A

Nature and extent of tunnel lining type(s).

Rock/Concrete/Gunite

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

Three fans located at the East Portal.

Air quality standards for the tunnel.

N/A

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

Soo Line Railroad

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Southern District, Tomah Sub.

Location: decimal milepost to the approximate 1/10 mile for each portal.

East 243.9 West 244.2

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

West Portal - Sparta, Wis. East Portal - Tomah, Wis.

Length in thousands of feet.

1,330 ft. (1.33)

Single or multiple track. If the latter, number of tracks and bores.

Single

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Two Per Day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

Track circuit would indicate occupancy, thru a code system to the control operator.

Train operating speed in tunnel.

35 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Brick

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

Soo Line Railroad

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Southern District, Tomah Sub.

Location: decimal milepost to the approximate 1/10 mile for each portal.

East 243.9 West 244.2

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

West Portal - Sparta, Wis. East Portal - Tomah, Wis.

Length in thousands of feet.

1,330 ft. (1.33)

Single or multiple track. If the latter, number of tracks and bores.

Single

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Two Per Day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

Track circuit would indicate occupancy, thru a code system to the control operator.

Train operating speed in tunnel.

35 mph.

Provision of walkways adjacent to track.

None

Nature and extent of tunnel lining type(s).

Brick

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #26, Coast Route (LA Division, Santa Barbara Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 441.2

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Santa Susana, Calif.

Length in thousands of feet.

7,368.99 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 Northbound, 1 Southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

DTC ABS

Train operating speed in tunnel.

40 mph.

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete only entire length (7,368.99 ft.)

Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.
TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #17, Main Line-Shasta Route (Calif.) Oregon Division, Black Butte Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 408.0

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Dorris, Calif

Length in thousands of feet.

2,076

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 northbound, 1 southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC?

Train operating speed in tunnel.

40 mph

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete (1,651 ft.), Timber posts between concrete ribs (425 ft.)

Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.
TBD

Air quality standards for the tunnel.
TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Trasnportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #18, Main Line-Shasta Route (Calif.), Oregon Division, Black Butte Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 410.0

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Dorris, Calif.

Length in thousands of feet.

1,145 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 Northbound, 1 Southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

40 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s)

Concrete (107 ft.), gunited w/steel bents (133 ft.), gunited w/o steel ber (885 ft

Timber posts between concrete ribs (20 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pac:fic Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #3, Main Line-Shasta Route via Cascade Line (Oregon Division, Cascade Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 537.77

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Cascade Summit, Oregon

Length in thousands of feet.

3,654.61 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 Northbound, 1 Southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (3,046.61 ft.), Timber posts between concrete ribs (608 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *
Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.g., "the Northern Route".
Tunnel #7, Main Line-Shasta Route via Cascade Line (Oregon Division, Cascade Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 547.05

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Cruzatte, Oregon

Length in thousands of feet.

3,164 f.t

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 Northbound, 1 Southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete (2,689 ft.) Timber posts between concrete ribs (475 ft.)

Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.
TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #9, Main Line-Shasta Route via Cascade Line (Oregon Division, Cascade Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 548.27

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Cruzatte, Oregon

Length in thousands of feet.

1,144.30 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 northbound, 1 southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (844.20 ft.) timber posts between concrete ribs (189 ft.) unlined (111 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #14, Main Line-Shasta Route via Cascade Line (Oregon Division, Cascade Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 551.77

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Frazier, Oregon

Length in thousands of feet.

2,121.43 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 northbound, 1 southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (2,074.43 ft.) Unlined (47 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #16, Main Line-Shasta Route via Cascade Line (Oregon Division, Cascade Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 555.98

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Fields, Oregon

Length in thousands of feet.

2,213.41 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 Northbound, 1 Southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete entire length of tunnel.

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Comp ny

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #22, Main Line-Shasta Route via Cascade Line (Oregon Division, Cascade Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West portal M.P. 581.85

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Westfir, Oregon

Length in thousands of feet.

1,999.07 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 northbound, 1 southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

45 mph

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete (1,759.07 ft), timber posts between concrete ribs (240 ft.)

Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.
TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transporation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #4, Main Line-Overland Route (Sacramento Division, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 568.7

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Ryndon, Nevada

Length in thousands of feet.

3,917.60 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

70 mph

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete (1,017.10 ft.), gunited, w/ steel bents (2,194 ft)., gunited w/o steel bents (504 ft.)/Timber posts between concrete ribs (202.50 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #6, Westward Main Line-Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 193.7

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Summit, Calif.

Length in thousands of feet.

1,653.5 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Unlined entire lenght (1,653.5 ft.)

Access other than via portals.

None

General desc-iption of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #15, Eastward Main Line-Overland Line (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 114.2

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Rocklin, Calif.

Length in thousands of feet.

1,904.76 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete entire length (1,904.76 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #17, Eastward Main Line-Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 117.3

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

New Castle, Calif.

Length in thousands of feet.

1,648.16 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day(1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (1,259.16 ft.), Timber posts between concrete ribs (200 ft.), gunited without steel bents (189 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #18, Westward Main Line-Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 120.5

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

New Castle, Calif

Length in thousands of feet.

1,000 ft.

Single or multiple track. If the latter, number of tracks and bores.

Double track (Single bore)

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 on eastbound track, 1 on westbound track)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

#1 track 30 mph
#2 track 50 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete entire length of tunnel (1,000 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #20, Eastward Main Line-Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 123.1

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Auburn, Calif.

Length in thousands of feet.

1,248.33 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete (112.33 ft)., Gunited w/ steel bents (276.0 ft.), gunited w/o steel bents (860.00 ft.)

Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.
TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #21, Eastward Main Line-Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 124.6

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Auburn, Calif

Length in thousands of feet.

1,210.66 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 east bound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).
Concrete (531 ft.), Gunited with Steel bents (428 ft.), gunited without st bents (43. ft.), Timber posts between concrete ribs (208.66 ft.)

Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".
Tunnel #28, Eastward Main Line- Overland Route (Sacramento Region, Roseville
Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.
West Portal M.P. 134.8

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.
Bowman, Calif.

Length in thousands of feet.

3,208.86

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.
2 per day (1 eastbound - 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete entire length (3,208.86 ft.)

Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.
TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

AMTRAK

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SYSTEM TUNNEL SURVEY

STATISTICAL DATA

DECEMBER 1988

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #26, Coast Route (LA Division, Santa Barbara Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 441.2

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Santa Susana, Calif.

Length in thousands of feet.

7,368.99 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 Northbound, 1 Southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

DTC ABS

Train operating speed in tunnel.

40 mph.

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete only entire length (7,368.99 ft.)

Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.
TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #17, Main Line-Shasta Route (Calif.) Oregon Division, Black Butte Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 408.0

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Dorris, Calif

Length in thousands of feet.

2,076

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 northbound, 1 southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC?

Train operating speed in tunnel.

40 mph

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete (1,651 ft.), Timber posts between concrete ribs (425 ft.)

Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.
TBD

Air quality standards for the tunnel.
TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Trasnportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #18, Main Line-Shasta Route (Calif.), Oregon Division, Black Butte Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 410.0

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Dorris, Calif.

Length in thousands of feet.

1,145 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 Northbound, 1 Southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

40 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s)

Concrete (107 ft.), gunited w/steel bents (133 ft.), gunited w/o steel ber (885 ft

Timber posts between concrete ribs (20 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".
Tunnel #3, Main Line-Shasta Route via Cascade Line (Oregon Division, Cascade Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.
West Portal M.P. 537.77

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.
Cascade Summit, Oregon

Length in thousands of feet.

3,654.61 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 Northbound, 1 Southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.
None

Type and frequency of signing to indicate location within tunnel.
None

Wayside telephone or other type of communication system and approximate unit spacing.
None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (3,046.61 ft.), Timber posts between concrete ribs (608 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *
Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.g., "the Northern Route".
Tunnel #7, Main Line-Shasta Route via Cascade Line (Oregon Division, Cascade Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 547.05

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Cruzatte, Oregon

Length in thousands of feet.

3,164 f.t

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.
2 per day (1 Northbound, 1 Southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.
None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.
None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete (2,689 ft.) Timber posts between concrete ribs (475 ft.)

Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.
TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #9, Main Line-Shasta Route via Cascade Line (Oregon Division, Cascade Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 548.27

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Cruzatte, Oregon

Length in thousands of feet.

1,144.30 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 northbound, 1 southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (844.20 ft.) timber posts between concrete ribs (189 ft.) unlined (111 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #14, Main Line-Shasta Route via Cascade Line (Oregon Division, Cascade Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 551.77

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Frazier, Oregon

Length in thousands of feet.

2,121.43 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 northbound, 1 southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (2,074.43 ft.) Unlined (47 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.
TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #16, Main Line-Shasta Route via Cascade Line (Oregon Division, Cascade Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 555.98

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Fields, Oregon

Length in thousands of feet.

2,213.41 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 Northbound, 1 Southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete entire length of tunnel.

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.
TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #22, Main Line-Shasta Route via Cascade Line (Oregon Division, Cascade Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West portal M.P. 581.85

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Westfir, Oregon

Length in thousands of feet.

1,999.07 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 northbound, 1 southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

45 mph

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete (1,759.07 ft), timber posts between concrete ribs (240 ft.)

Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.
TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transporation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #4, Main Line-Overland Route (Sacramento Division, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 568.7

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Ryndon, Nevada

Length in thousands of feet.

3,917.60 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

70 mph

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete (1,017.10 ft.), gunited, w/ steel bents (2,194 ft)., gunited w/o steel bents (504 ft.)/Timber posts between concrete ribs (202.50 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.
TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #6, Westward Main Line-Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 193.7

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Summit, Calif.

Length in thousands of feet.

1,653.5 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Unlined entire lenght (1,653.5 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #15, Eastward Main Line-Overland Line (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 114.2

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Rocklin, Calif.

Length in thousands of feet.

1,904.76 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete entire length (1,904.76 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #17, Eastward Main Line-Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 117.3

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

New Castle, Calif.

Length in thousands of feet.

1,648.16 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day(1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (1,259.16 ft.), Timber posts between concrete ribs (200 ft.), gunited without steel bents (189 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pac.'..ic Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #18, Westward Main Line-Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 120.5

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

New Castle, Calif

Length in thousands of feet.

1,000 ft.

Single or multiple track. If the latter, number of tracks and bores.

Double track (Single bore)

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 on eastbound track, 1 on westbound track)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

#1 track 30 mph
#2 track 50 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete entire length of tunnel (1,000 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #20, Eastward Main Line-Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 123.1

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Auburn, Calif.

Length in thousands of feet.

1,248.33 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete (112.33 ft)., Gunited w/ steel bents (276.0 ft.), gunited w/o steel bents (860.00 ft.)

Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.
TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #21, Eastward Main Line-Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 124.6

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Auburn, Calif

Length in thousands of feet.

1,210.66 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 east bound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete (531 ft.), Gunited with Steel bents (428 ft.), gunited without st bents (43. ft.), Timber posts between concrete ribs (208.66 ft.)
Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Paci-- T-ansportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #28, Eastward Main Line- Overland Route (Sacramento Region, Rosevill Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 134.8

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Bowman, Calif.

Length in thousands of feet.

3,208.86

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound - 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.
Ballast Only

Nature and extent of tunnel lining type(s).
Concrete entire length (3,208.86 ft.)

Access other than via portals.
None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.
TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *
Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".
Tunnel #29, Eastward Main Line - Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.
West Portal M.P. 135.9

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.
Colfax, Calif

Length in thousands of feet.

1,009 ft.

Single or multiple track. If the latter, number of tracks and bores.
Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (405 ft.), Timber posts between concrete ribs (604 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #33, Westward Main Line-Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 144.9

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Colfax, Calif.

Length in thousands of feet.

1,331 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track (Double track width bore - track located on centerline)

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete entire lenght (1,331 ft.)

Access other than via portals.

None

General des-ription of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #41, Eastward Main Line-Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 193.3

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Norden, Calif.

Length in thousands of feet.

10,325.66

Single or multiple track. If the latter, number of tracks and bores.

Single

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (6,171.66 ft)., Unlined (4,154 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

<u>STATISTICAL</u>

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #2, Main Line-Overland Route (Sacramento Region, Salt Lake Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 539.5

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Carlin, Nevada

Length in thousands of feet.

1,887.10 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

70 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (101.1 ft), gunited w/steel bents (1,298 ft.) gunited w/o stell bents (400 ft.), timber posts between concrete ribs (88 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Cwning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #3, Main Line-Overland Route (Sacramento Region, Salt Lake Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.O. 566.6

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Osino, Nevada

Length in thousands of feet.

2,473 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

70 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Timber posts between concrete ribs (1,199 ft), timber (1,149 ft.), Concrete (125 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *
Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".
Tunnel #5½, Coast Route (Western Division, Salinas Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 155.3

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Metz, Calif

Length in thousands of feet.

1,305 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 northbound -- 1 southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

DTC ABS

Train operating speed in tunnel.

60 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete only entire length (1,305 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #6, Coast Route (Western Division, Salinas Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 239.3

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Cuesta, Calif

Length in thousands of feet.

3,610.33 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 northbound, 1 southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

25 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete Only entire length (3,610.33 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #7, Coast Route (Western Division, Salinas Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 239.3

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Cuesta, Calif.

Length in thousands of feet.

1,354.25 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 northbound, 1 southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

35 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (665 ft.), Timber (589.25 ft.) gunited w/steel bents (100 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Railway Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Eastern Division - Southern Region

Location: decimal milepost to the approximate 1/10 mile for each portal.

North Portal - Milespost 170.1; South Portal - Milespost 170.4

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Tye River & Lynchburg, VA approx. 1 mile north of Lynchburg, VA

Length in thousands of feet.

1,334 feet

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 Passenger

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.----240 Volt line (nc encased in conduit) attached to sidewall of tunnel. A fiber optic line (US Sprint), encased in concrete below track level was recently installed here.

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

None

Train operating speed in tunnel.

79 mph

Provision of walkways adjacent to track.

via Portals

Nature and extent of tunnel lining type(s).

Concrete Lining

Access other than via portals.

via Portals

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #29, Eastward Main Line - Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 135.9

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Colfax, Calif

Length in thousands of feet.

1,009 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

50 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (405 ft.), Timber posts between concrete ribs (604 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #33, Westward Main Line-Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 144.9

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Colfax, Calif.

Length in thousands of feet.

1,331 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track (Double track width bore - track located on centerline)

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete entire lenght (1,331 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #41, Eastward Main Line-Overland Route (Sacramento Region, Roseville Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 193.3

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Norden, Calif.

Length in thousands of feet.

10,325.66

Single or multiple track. If the latter, number of tracks and bores.

Single

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

30 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (6,171.66 ft)., Unlined (4,154 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #2, Main Line-Overland Route (Sacramento Region, Salt Lake Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 539.5

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Carlin, Nevada

Length in thousands of feet.

1,887.10 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound, 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

70 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (101.1 ft), gunited w/steel bents (1,298 ft.) gunited w/o stell bents (400 ft.), timber posts between concrete ribs (88 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Cwning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #3, Main Line-Overland Route (Sacramento Region, Salt Lake Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.O. 566.6

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Osino, Nevada

Length in thousands of feet.

2,473 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 eastbound 1 westbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS DT

Train operating speed in tunnel.

70 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Timber posts between concrete ribs (1,199 ft), timber (1,149 ft.), Concrete (125 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *
Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".
Tunnel #5½, Coast Route (Western Division, Salinas Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 155.3

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Metz, Calif

Length in thousands of feet.

1,305 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 northbound -- 1 southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

DTC ABS

Train operating speed in tunnel.

60 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete only entire length (1,305 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #6, Coast Route (Western Division, Salinas Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 239.3

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Cuesta, Calif

Length in thousands of feet.

3,610.33 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 northbound, 1 southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

25 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete Only entire length (3,610.33 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Union Pacific Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Gray Summit Tunnel, Sedalia Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

M.P. 39.14

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Gray Summit, Missouri

Length in thousands of feet.

1,580 ft.

Single or multiple track. If the latter, number of tracks and bores.

Multiple track (double track) (Number of bores not provided by UPRR)

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

4 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

Aerial cable through tunnel.

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

Information not provided by UPRR

Wayside telephone or other type of communication system and approximate unit spacing.

Information not provided by UPRR

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

70 mph

Provision of walkways adjacent to track.

No walkways except ballast section.

Nature and extent of tunnel lining type(s).

Concrete - Lined

Access other than via portals.

Information not provided by UPRR

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Information not provided by UPRR

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

Union Pacific Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #43, Lake Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

M.P. 753.69

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Sage, Nevada

Length in thousands of feet.

5,681 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

Information not provided by UPRR

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

Information not provided by UPRR

Wayside telephone or other type of communication system and approximate unit spacing.

Information not provided by UPRR

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

40 mph

Provision of walkways adjacent to track.

No walkways except ballast section

Nature and extent of tunnel lining type(s).

Shotcrete-lined rock.

Access other than via portals.

Information not provided by UPRR

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Information not provided by UPRR.

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

Union Pacific Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #41 Winnemucca Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

649.24

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Tonka, Nev

Length in thousands of feet.

2,373 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

1 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

Information not provided.

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

Information not provided by UPRR

Wayside telephone or other type of communication system and approximate unit spacing.

Information not provided by UPRR

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS

Train operating speed in tunnel.

45 mph

Provision of walkways adjacent to track.

None, except ballast section.

Nature and extent of tunnel lining type(s).

Shotcrete-lined rock

Access other than via portals.

Information not provided by UPRR

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Information not provided by UPRR.

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

Southern Pacific Transportation Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #7, Coast Route (Western Division, Salinas Subdivision)

Location: decimal milepost to the approximate 1/10 mile for each portal.

West Portal M.P. 239.3

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Cuesta, Calif.

Length in thousands of feet.

1,354.25 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day (1 northbound, 1 southbound)

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

None

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

35 mph

Provision of walkways adjacent to track.

Ballast Only

Nature and extent of tunnel lining type(s).

Concrete (665 ft.), Timber (589.25 ft.) gunited w/steel bents (100 ft.)

Access other than via portals.

None

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

TBD

Air quality standards for the tunnel.

TBD

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

TBD = To be determined, or not available in SP general office files.

STATISTICAL

Owning Railroad *

Southern Railway Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Eastern Division - Southern Region

Location: decimal milepost to the approximate 1/10 mile for each portal.

North Portal - Milespost 170.1; South Portal - Milespost 170.4

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Tye River & Lynchburg, VA approx. 1 mile north of Lynchburg, VA

Length in thousands of feet.

1,334 feet

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 Passenger

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.----240 Volt line (n encased in conduit) attached to sidewall of tunnel. A fiber optic line (U Sprint), encased in concrete below track level was recently installed here

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

None

Wayside telephone or other type of communication system and approximate unit spacing.

None

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

None

Train operating speed in tunnel.

79 mph

Provision of walkways adjacent to track.

via Portals

Nature and extent of tunnel lining type(s).

Concrete Lining

Access other than via portals.

via Portals

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

None

* = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.

STATISTICAL

Owning Railroad *

Union Pacific Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Gray Summit Tunnel, Sedalia Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

M.P. 39.14

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Gray Summit, Missouri

Length in thousands of feet.

1,580 ft.

Single or multiple track. If the latter, number of tracks and bores.

Multiple track (double track) (Number of bores not provided by UPRR)

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

4 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

Aerial cable through tunnel.

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

Information not provided by UPRR

Wayside telephone or other type of communication system and approximate unit spacing.

Information not provided by UPRR

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

70 mph

Provision of walkways adjacent to track.

No walkways except ballast section.

Nature and extent of tunnel lining type(s).

Concrete - Lined

Access other than via portals.

Information not provided by UPRR

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Information not provided by UPRR

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

Union Pacific Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #43, Lake Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

M.P. 753.69

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Sage, Nevada

Length in thousands of feet.

5,681 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

Information not provided by UPRR

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

Information not provided by UPRR

Wayside telephone or other type of communication system and approximate unit spacing.

Information not provided by UPRR

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

40 mph

Provision of walkways adjacent to track.

No walkways except ballast section

Nature and extent of tunnel lining type(s).

Shotcrete-lined rock.

Access other than via portals.

Information not provided by UPRR

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Information not provided by UPRR.

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

Union Pacific Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #41 Winnemucca Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

649.24

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Tonka, Nev

Length in thousands of feet.

2,373 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

1 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

Information not provided.

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

Information not provided by UPRR

Wayside telephone or other type of communication system and approximate unit spacing.

Information not provided by UPRR

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS

Train operating speed in tunnel.

45 mph

Provision of walkways adjacent to track.

None, except ballast section.

Nature and extent of tunnel lining type(s).

Shotcrete-lined rock

Access other than via portals.

Information not provided by UPRR

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Information not provided by UPRR.

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

<u>STATISTICAL</u>

Owning Railroad *

Union Pacific Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #39, Winnemucca Subdivision.

Location: decimal milepost to the approximate 1/10 mile for each portal.

MP 635.37

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Palisade, Nevada

Length in thousands of feet.

1,081 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

1 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

Information not provided by UPRR

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

Information not provided by UPRR

Wayside telephone or other type of communication system and approximate unit spacing.

Information not provided by UPRR

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS

Train operating speed in tunnel.

45 mph

Provision of walkways adjacent to track.

No walkway except ballast section.

Nature and extent of tunnel lining type(s).

Concrete lined throughout

Access other than via portals.

Information not provided by UPRR

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.

None

Air quality standards for the tunnel.

Information not provided by UPRR

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

Union Pacific Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #4 Calienta Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

433.56

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Kyle, Nevada

Length in thousands of feet.

1,226 ft.

Single or multiple track. If the latter, number of tracks and bores.

Double track width but containing one track only

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

2 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

Aerial cable through tunnel

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

Information not provided by UPRR

Wayside telephone or other type of communication system and approximate unit spacing.

Information not provided by UPRR

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

35 mph

Provision of walkways adjacent to track.
No walkway, but has full ballast section where second track would be located.

Nature and extent of tunnel lining type(s).
Concrete throughout

Access other than via portals.
Information not provided by UPRR

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.
None

Air quality standards for the tunnel.
Information not provided by UPRR

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

Union Pacific Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #18, Peninsula Tunnel, Seattle Subdivision

Location: decimal milepost to the approximate 1/10 mile for each portal.

M.P. 4.50

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Portland, Oregon

Length in thousands of feet.

5,436

Single or multiple track. If the latter, number of tracks and bores.

Single track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

Used by Portland to Seattle Amtrak trains ONLY if necessitated by a need for a detour.

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

25 #10 cable and pole box in tunnel.

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

Information not provided by UPRR

Wayside telephone or other type of communication system and approximate unit spacing.

Information not provided by UPRR

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

CTC

Train operating speed in tunnel.

25 mph

Provision of walkways adjacent to track.
No walkway, but full ballast section where second track would be located.

Nature and extent of tunnel lining type(s).
Concrete lined throughout

Access other than via portals.
Informatation not provided by UPRR

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.
None

Air quality standards for the tunnel.
Information not provided by UPRR

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**

STATISTICAL

Owning Railroad *

Union Pacific Railroad Company

Route designation: division, subdivision and other name if widely used. e.q., "the Northern Route".

Tunnel #39, Winnemucca Subdivision.

Location: decimal milepost to the approximate 1/10 mile for each portal.

MP 635.37

Place names nearest to each portal that can be found in the Rand McNally Railroad Atlas.

Palisade, Nevada

Length in thousands of feet.

1,081 ft.

Single or multiple track. If the latter, number of tracks and bores.

Single Track

Frequency of passenger train use -- number of passenger trains passing through per day or week or other like period.

1 per day

Presence of energized high voltage electrical conductors, electrical transmission systems or charged pipelines.

Information not provided by UPRR

Type of illumination in tunnel, along with approximate unit spacing and individual intensity.

None

Type and frequency of signing to indicate location within tunnel.

Information not provided by UPRR

Wayside telephone or other type of communication system and approximate unit spacing.

Information not provided by UPRR

Characteristics of signal and train control system that would indicate to a central point specific information on tunnel occupancy.

ABS

Train operating speed in tunnel.

45 mph

Provision of walkways adjacent to track.
No walkway, but full ballast section where second track would be located.

Nature and extent of tunnel lining type(s).
Concrete lined throughout

Access other than via portals.
Informatation not provided by UPRR

General description of tunnel ventilation system. If facilities are present, but inoperative, please so note.
None

Air quality standards for the tunnel.
Information not provided by UPRR

*** = Read "Owning" as the railroad entity responsible for and controlling train traffic in the tunnel.**