NATIONAL REGISTER OF HISTORIC PLACES ASSESSMENT FOR THE WINSTON TUNNEL FAN HOUSE, RICE TOWNSHIP, JO DAVIESS COUNTY, ILLINOIS

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INTRODUCTION

The Winston Tunnel Fan House is located in rural Rice Township, Jo Daviess County, Illinois, approximately six miles southeast of the city of Galena. Constructed in 1912-1916 on the main line of the Chicago and Northwestern Railroad, the fan house was erected to help ventilate the Winston Tunnel, which was the longest railroad tunnel ever excavated in Illinois. The fan house was a building complex that originally consisted of a small brick engine room, a fan, and a nozzle (or cowling) around the entrance to the tunnel. Two additions were made to the original brick engine room over the years. The ventilation station remained in use until 1948, when the railroad began using diesel engines exclusively. The rail line passing through the Winston Tunnel finally was abandoned in 1971. The lands on which the tunnel and fanhouse are located are now owned by the Illinois Department of Natural Resources (IDNR) and are administered as a unit of Apple River Canyon State Park. The Winston Tunnel Fan house poses unique management challenges for IDNR due to its remote location and its deteriorated condition. In order to determine the appropriate management course for this resource, IDNR requested Fever River Research (Springfield, Illinois) to conduct a National Register of Historic Places Assessment of the fan house. The goals of the project were to provide a brief history and physical description of the fan house complex and to determine its historical significance and National-Register eligibility. The field investigation was conducted in February and May 2003.

All aspects of the National Register assessment were done under the direction of Floyd Mansberger (Principal Investigator) of Fever River Research. Mansberger conducted the field investigation and co-authored the report with Christopher Stratton, also of Fever River Research. The report was submitted to and reviewed by Dr. Harold Hassen, Cultural Resources Coordinator for IDNR. Jeff Hensal, Site Superintendent at Apple River Canyon State Park, helped coordinate the field investigation and participated in the initial visit to the site. Thanks also are owed to Joe Pierson of the Chicago and Northwestern Historical Society Archives, who provided copies of original engineering drawings for the fan house and other materials relating the Winston Tunnel.

HISTORICAL CONTEXT

The Winston Tunnel Fan House is located within the “driftess” region of northwest Illinois. This area was not exposed to the glaciations that shaped the low, rolling landscape found across most of the state; instead, the terrain is hilly and rugged, being characterized by high, steep ridges and narrow valleys. This terrain presented understandable challenges to railroad builders in the nineteenth century. The first railroad to be constructed in the area was the Illinois Central, which laid a branch line from Chicago to Galena in the early 1850s. Galena at that time was an important lead mining center and one of the busiest river ports on the Upper Mississippi. The Illinois Central entered into Jo Daviess County from the east and followed the less rugged terrain found in the county’s northern tier of townships before dropping down to the Galena River valley and taking this natural corridor into Galena. West of Galena, the railroad followed the Galena River to its juncture with the Mississippi River and then swung northwest, taking advantage of the floodplain along the latter stream. It crossed the Mississippi at Dunlieth (now East Dubuque), located opposite the city of Dubuque, Iowa. In the 1870s, the Burlington, Quincy, and Northern Railroad built a line through the western part of the county, generally following the Mississippi River. At Galena junction, near the mouth of the Galena River, the Burlington met with the Illinois Central, and from that point the two railroads had adjoining lines into Dunlieth.

The Chicago Great Western Railroad, with which the Winston Tunnel is associated, was the third and last railroad constructed through Jo Daviess County in the nineteenth century. This railroad company originally was founded as the Minnesota and Northwestern Railroad and completed its first track in Minnesota in 1884. The company quickly purchased a number of smaller lines, steadily expanding its service from Minnesota into Wisconsin, Iowa, and Illinois. The Minnesota and Northwestern itself was incorporated within the Chicago, St. Paul, and Kansas City Railroad in 1887. The line operated under this name until January 1892, when it was renamed the Chicago Great Western (often simply referred to as the "Great Western") in January 1892. It continued under this name until July 1, 1968, when it was sold to the Chicago and Northwestern Railroad Company. A. B. Stickney was the principal investor early in the company's history (Finch 1988:250, 252).

A key component to the Chicago Great Western's expansion program was obtaining a connection to Chicago, which was the largest rail hub in the Midwest. Starting in spring of 1886, the company (then operating as Minnesota and Northwestern Railroad) began scouting for the best route between Chicago and Dubuque, Iowa. The route ultimately chosen passed through Chicago (Cook County), St. Charles (Kane County), Sycamore (De Kalb County), Byron (Ogle County), and South Freeport (Stephenson County)—as well as a number of other towns—before reaching rugged Jo Daviess County. In Jo Daviess, the line tracked through the central part of the county, traveling along high ridges between the towns of Stockton and Elizabeth on its way towards the Mississippi River. West of the Elizabeth, the line dropped down into the Apple River valley for a short distance before turning northwest up Irish Hollow, a narrow valley formed by Irish Hollow Creek. The hollow terminated at a high ridge that rose 240' above the valley floor and blocked the railroad's access to the Mississippi River. To surmount this obstacle, the railroad company decided to excavate a nearly half-mile long tunnel through the ridge. Recognizing the costs and delay involved in building the tunnel (not to mention the extensive grading required east of there), the company acquired the rights to use the Illinois Central track from South Freeport to Dunlieth for one year (Huddleston 1998:41).

The construction contract for the section of rail line running between South Freeport and Dunlieth was awarded to Shepard, Winston, and Company, and it was from this firm that the Winston Tunnel derived its name. Construction on the tunnel started early in 1886. The project was a massive undertaking and ultimately involved a workforce of 354 men, often working round-the-clock to complete the job. The workers were paid a standard rate of $1.75 per twelve-hour shift (Finch 1988:253). Many of the workers lived on site, and a camp was established for them on the east side of the tunnel. Characteristic of such short-term industrial communities, the housing consisted of rude shed-roofed, frame "shanties" build alongside the railroad. There also was Gallagher's Hotel—described as "little more than a tar paper shack"—which served as a tavern, boarding house, and reputed place of prostitution (Huddleston 1998:43).

The tunnel engineers had expected to bore through solid bedrock, but they soon discovered that this was not the case. Describing the problems encountered, the *Dubuque Daily Times* on August 31, 1887 reported:

> It is next to impossible to drive through the tunnel, which runs through a bed of blue clay, which can not be worked with picks, and on which blasting has little effect…. The tunnel, when completed, if the time ever comes when it is completed, will be the longest tunnel in the state, and as the blue clay when exposed to air becomes a rotten shale rock, which crumbles to pieces, the tunnel will have to be strongly arched from one end to the other. The cost of tunnel will probably exceed the cost of grading fifty miles of any part of the road (Huddleston 1998:41).

The walls and roof of the tunnel were cribbed up with 12"x12" wood beams, spaced 4' apart, and steel beams were used to support the spring arch. Stone was laid up behind the beams buttressing the walls of the tunnel. The roadbed was paved with cyclopean concrete. Construction on the tunnel was completed on January 10, 1888, and first train passed through it ten days later. The final cost of the project was over $600,000, which exceeded original estimates (Huddleston 1998:43). Although there many workers injured in the project, only man was killed; this was John Hill, a native of Finland, who killed at the west end of the tunnel on March 12, 1887 (Finch 1988:253).

During the construction of the Winston Tunnel, a 198'-tall vertical shaft was excavated from the top of the ridge down to the tunnel. The purpose of this shaft was two fold: during construction, it was used as another means of hauling out excavated rock and clay; and, once the tunnel was completed, it was hoped that the shaft would serve as a ventilation tube, drawing the coal smoke from the train upwards out of the tunnel. Unfortunately, the ventilation shaft did not provide an adequate draw, and the tunnel would fill with smoke as the train passed through it, suffocating both railroad personnel and passengers (Finch 1988:253-254). Commentators observed that the train crews emerged from the tunnel looking like "boiled lobsters" (Huddleston 1998:43). Faced with angry complaints by their workers, the railroad took various steps to reduce the choking smoke, including increasing the speed of the train through the tunnel. None of these proved very successful, however (Finch 1988:254).

In addition to its ventilation problems, the Winston Tunnel also posed maintenance headaches for the railroad. A few years after the tunnel was opened for traffic, the wall timbering showed signs of decay and a second set of 12"x12" timbers had to be added. Even with this added shoring, by ca. 1900 the timbering was in bad shape and had begun to settle. Poor drainage inside the tunnel had contributed to the deterioration. The Chicago Great Western Railway Company ultimately hired the Lorimer, Gallagher, and Walsh Construction Company to completely renovate the tunnel. Work began in 1902 and continued for two years. The lower walls of the tunnel were relined with 3' of concrete that was faced with brick. The arch of the tunnel was laid up with four-courses of brick, and concrete was then poured in as backfill into the void between the brickwork and the original arch timbering. Once the walls were completed, the floor of the tunnel was lowered 1' to 3' and covered with 6" of concrete. New ties and ballast were then added. The project also involved the rebuilding of the approaches to the tunnel. Brick and concrete abutments were built around each of the portals, and extending off of these for some distance stone retaining walls were laid up. One of the biggest challenges of the renovation was the fact that the Winston Tunnel had to remain open to traffic the entire time.

The tunnel was located on Chicago Great Western's main line between Chicago and Olewain, Iowa, and twenty-five trains passed through it daily during this period.[1] Most of the renovation work was conducted from the beds of work trains, which were backed out of the tunnel at the approach of a regularly scheduled train (Huddleston 1998:43, 45).

Two small depots eventually were established at either end of the Winston Tunnel. One was named "Winston" and was located at the east portal, while "Rice" lay approximately 1.5 miles west of the opposite end. It is not clear exactly when these stations were first established. Neither is depicted on the 1893 atlas of Jo Daviess County, though this same publication shows other small stations along the railroad (North West Publishing Company 1893:13, 43). Winston Station definitely was in place by 1901, however, as is indicated by railroad map drawn that year entitled "C. G. W. Ry. Depot and Grounds at Winston." This map shows a cluster of seven buildings at the depot, located roughly one-quarter mile east of the tunnel. It also shows a railroad siding immediately west of the depot, which apparently was used as a pull-off point by east-bound trains, and a small (6'x8'-6") watchman's tower at the mouth of the tunnel (Huddleston 1998:51-52). In 1905, the Winston Station was relocated approximately 700' west of its original location, placing it closer to the tunnel. As part of this move, the railroad erected a standardized compliment of buildings at the new site. These buildings included a 12'x12' one-story brick interlocking tower, a frame coal shed, and a privy. The tower was all-purpose, serving as a depot, watchman's tower, and switch station, and cost $587 to build. The combined cost of the privy and coal shed was $100. The railroad constructed an identical suite of buildings at Rice Station (Pierson 2001:22-23).[2] Both depots were intended primarily to coordinate the movement of trains through the Winston Tunnel, though they also serviced local passenger traffic.

In 1912 the west end of the Winston Tunnel was extended 60' by building a concrete-walled arch that was then covered with stone and earth backfill. (Huddleston 1998:47). The extension may have been necessary to keep erosion debris from dropping down off the cut bank above the tunnel onto the tracks. Around this same time, the Chicago and Great Western decided to construct a ventilation plant at the west portal to the tunnel, in the hope that this would solve the now decades-long smoke problem.

The type of ventilation plant erected was based on the "Churchill method of ventilation," which was designed especially for railroad tunnels. The system was developed by an engineer named Charles E. Churchill and was first utilized by him during the construction of the Norfolk and Western Railroad's tunnel at Elkhorn, West Virginia in 1901. The concept behind the system was to generate a draft through the tunnel sufficient enough to draw smoke out ahead of the train. All of the machinery needed was located at one end of the tunnel. A steel-frame cowling (or nozzle) was constructed around the portal to the tunnel, and extending off this was ductwork feeding into a two large fans. The fans were positioned on opposite side of the tracks from one another and were powered by motors (electric or diesel-powered) housed in buildings

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[1] Beyond Oelwein, the Chicago and Great Western had branch lines to Minneapolis-St. Paul, Omaha, and Kansas City.

[2] At the time of the 1902 tunnel renovation, Rice Station was referred to as "West Tower." It is possible that this station (and possibly Winston) began their histories as watchman's or signal towers rather than as depots.

located directly behind them. The Churchill ventilation system also was installed on the West Shore Railroad Tunnel in Weehauken, New Jersey—a 27'-wide, 4,225'-long bore with two tracks—in 1912. Its application in the latter instance was discussed in the August 9, 1912 issue of *Railway Age Gazette*—an article that was republished later that same month in *Coal Age* (*Coal Age* 1912:289).

The original engineering drawings for the Winston Tunnel's ventilation station are dated June 1912 and called for a dual fan layout like that used on the Weehawken tunnel. The two engine rooms were to measure 23'-6"x25'-0," have brick walls and a flat roof, and be connected by means of concrete-lined "subway" tunnel that ran beneath the railroad tracks. Two 7,500-gallon oil tanks were to be located on the north side of the tracks, west of the engine rooms (Chicago Great Western 1912). It is not clear how soon after the plans were drawn that construction actually took place. However, the fact that a railroad map dated June 30, 1916 shows the ventilation station in place indicates that the facility was erected at some point over the four-year period 1912-1916 (Chicago Great Western 1916). The plant ultimately constructed differed from the one originally designed in a number of ways. To begin with, only the northern fan engine room and fan were ever built. The engineers in charge of the project possibly felt that one fan would be sufficient to vent the tunnel. Also, the fan engine room was made slightly larger (25'x27') than the original plans called for, and the oil storage tank held only 12,000 gallons of fuel rather than 14,000 gallons. The facility was equipped with a "Startevant" fan with a 9'-1"x7'-4" face and a 170 h.p., 3-cylinder, diesel engine. In addition to the ventilation plant proper (consisting of nozzle, fan, fan engine room, and fuel tanks), the railroad constructed a 10'x18' frame storehouse and wood water tanks at the site. The entire compliment of buildings, structures, and equipment cost $30,517, including freight costs. The specific costs are detailed below (Interstate Commerce Commission 1918):

1. Engine house 25'x27' (1-story, brick with concrete foundation)	$2,477.00
2. Diesel oil engine (170 h.p. 2-cycle 14"x21"	$12,750.00
Freight	$136.00
Installation	$505.45
Foundation (concrete)	$360.75
3. Startevant fan (9'-1"x7'-4" face)	$3,500.00
Freight	$26.00
Foundation (concrete)	$550.00
4. Fan nozzle (50')	$2,945.00
Freight	$90.00
Foundation	$5,090.00
5. Rotary Pump (1-¼ ") and F. M. Pump (3-½'x4'x3')	$406.00
6. Discharge	$10.00
7. Oil storage pit (concrete, 12'x12'x34')	$738.00
8. Oil Tanks (steel, 12,000 gal.)	$177.00
9. Pipe drain	$58.00
10. Water tanks (wood, 6'x6'x4')	$144.00
11. Storehouse (10'x18')	$144.00
	$30,517.00

The ventilation station for the Winston Tunnel was referred to simply as the "Fan House" by railroad employees and was listed as such on Chicago and Great Western's timetables. An operator was kept at the fan house round-the-clock and was responsible for starting the fan engine upon the approach of a train. In time, this job became regarded as one of—if not *the*—

worst job on the railroad. Not only did it involve working alone on a long twelve-hour shift, it had the added disadvantage of being at a very remote location. There were no roads leading directly to the fan house, so the operators had to travel by handcart from either Winston or Rice Stations. Typically, the operator being relieved took the handcart back to the station, and the man going on duty was thus stuck at the fan house until the next shift. Some operators were dissatisfied with the arrangement and preferred to have their own handcarts on site. Another drawback to the job was the persistent rumors of the tunnel being haunted. Stories varied as to whether the tunnel was haunted by the ghost of the man killed during the initial construction of the tunnel, or belonged to one of the victims of subsequent railway accidents that occurred in the vicinity of the tunnel. While most men disliked the operating the fan house, the job did appeal those men who liked to drink on the job, and many of the operators were regarded as drunkards (Finch 1988:254). Two one-room additions eventually were made to the original fan house.

There was a brief period of intense activity around the Winston Tunnel following United State's entrance into World War I in April 1917. During the first months of the war there was an exaggerated fear that German agents might commit acts of sabotage, and soldiers were posted at both ends of the tunnel to protect it. The troops operated out of troop cars parked at Winston Station. They remained here for only three months before being reassigned (Huddleston 1988:47). Railroad traffic increased dramatically nationwide during the war, and the Winston Tunnel no doubt saw a greater number of trains passing though it than had previously. In 1918, a 12"-thick concrete floor (twice as thick as that installed in 1902) was poured in the tunnel, and new ballast, ties, and rails were laid down. These additions marked the last significant improvements made to the tunnel until 1944, when the eastern 920' of the tunnel was relined with 8" steel ribs set in concrete. This lining was applied directly over the one constructed in 1902-1904. Another 546' of the tunnel was relined in 1947 (Huddleston 1998:47, figs. pp. 44-45).

The tunnel's ventilation station was shut down after the Chicago and Great Western dieselized its line of locomotives in 1948. Diesel engines produced far less smoke than the old coal-burning locomotives, thus negating the need of the fan. The fan, engine, and nozzle/cowling later were removed from the site (Huddleston 1998:57).

The Chicago Great Western also pursued rerouting their line through Jo Daviess County during this period. A number of factors played into this effort, including the recurring maintenance costs for the Winston Tunnel and the usage fees the company had pay to the Illinois Central for using their track between Galena Junction and Dubuque. A 1951 study by DeLeuw, Cather and Company proposed a new route, referred to as "Stockton Air Line Railroad," running between Stockton (Jo Daviess County) and Farley, Iowa. This line would cut ten miles off the existing route and eliminate the need for both the Winston Tunnel and Illinois Central track, but would cost over 37 million dollars to complete and would necessitate the construction a enormous span over the Mississippi River. As a result of its estimated cost, the proposed "Air Line" plan was shelved. By the 1960s, however, the tunnel once again was presenting problems. Not only was the tunnel badly in need of maintenance, but it also did not provide sufficient clearance for the taller rail cars then coming into use. DeLeuw, Cather and Company was hired to conduct yet another study, this time relating to the relative costs of improving the tunnel or rerouting the line around (Huddleston 1998:57, 59). Improving the existing tunnel proved to be cheaper option, and the engineering firm recommended that the floor of the tunnel be lowered to accommodate the taller rail cars (DeLeuw, Cather, and Company 1964). Their recommendations were never followed through on, however, due in large measure to the fact that Chicago Great Western already had started merger negotiations with the Chicago and Northwestern Railroad. This merger was completed in July 1968. By this date, only four trains were passing through the Winston Tunnel daily. The Chicago and Northwestern saw little need to continue the Great Western's old main line through Jo Daviess County, since it had a parallel route thirty miles south (crossing the river at Clinton, Iowa) (Huddleston 1998:59). The final train trip through the Winston Tunnel occurred on October 31, 1971. Within a year, the line between Galena Junction and Byron, Illinois was completely abandoned and scrappers had taken upon the rails (Huddleston 1998:41).

For additional information on the history of the Winston Tunnel and its fan house, the reader should consult George W Fitch's *Our American Railroad's; The Way It Was* (1988) and *CGW Winston Tunnel and Its Ghost* (1984). Another excellent source is Jerry Huddleston's "The Hole in Stickney's Pocketbook—CGW's Winston Tunnel (1998).

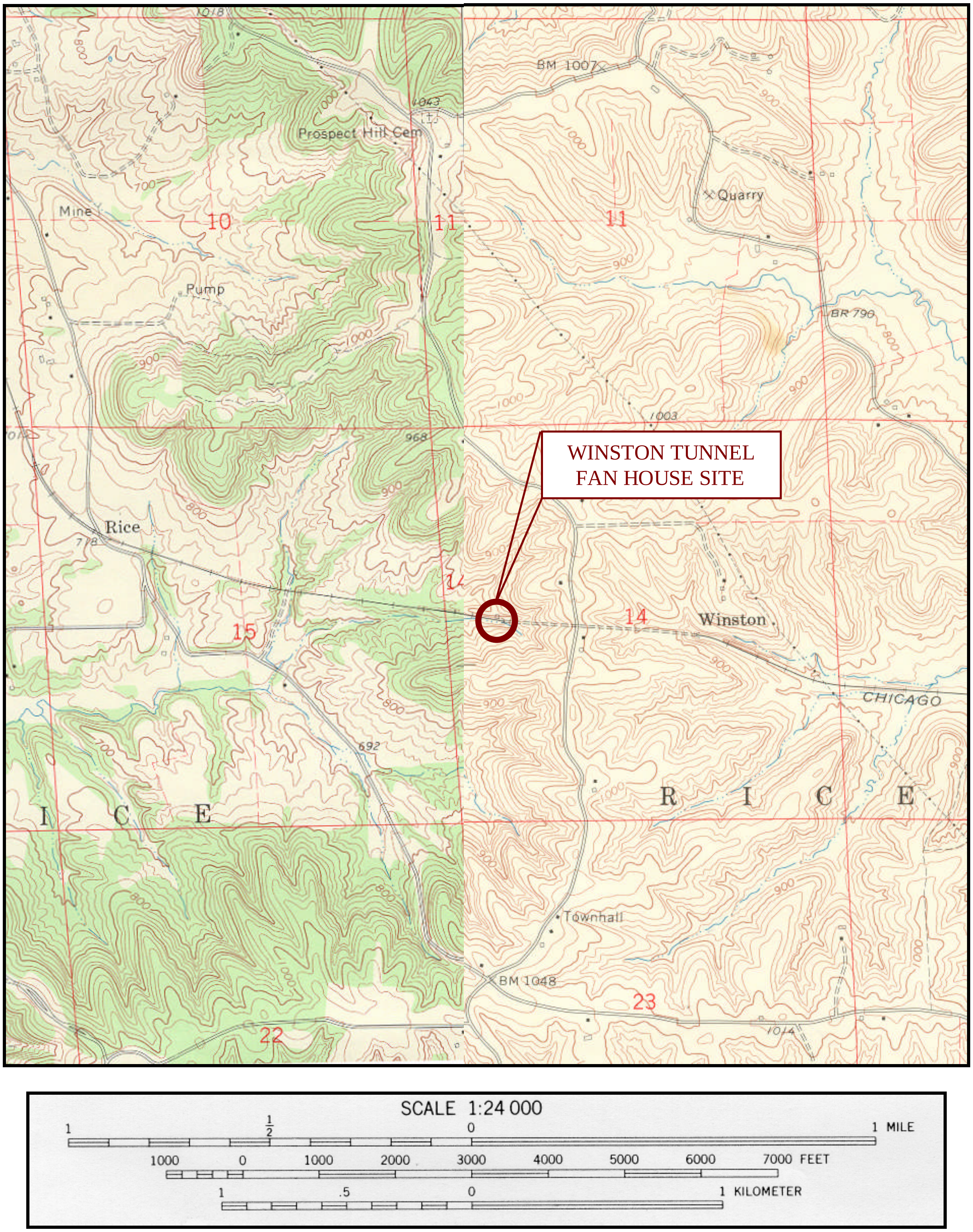


Figure 1. United States Geological Survey (USGS) topographic map showing the location of the Winston Tunnel Fan House (USGS 1968, 1975).

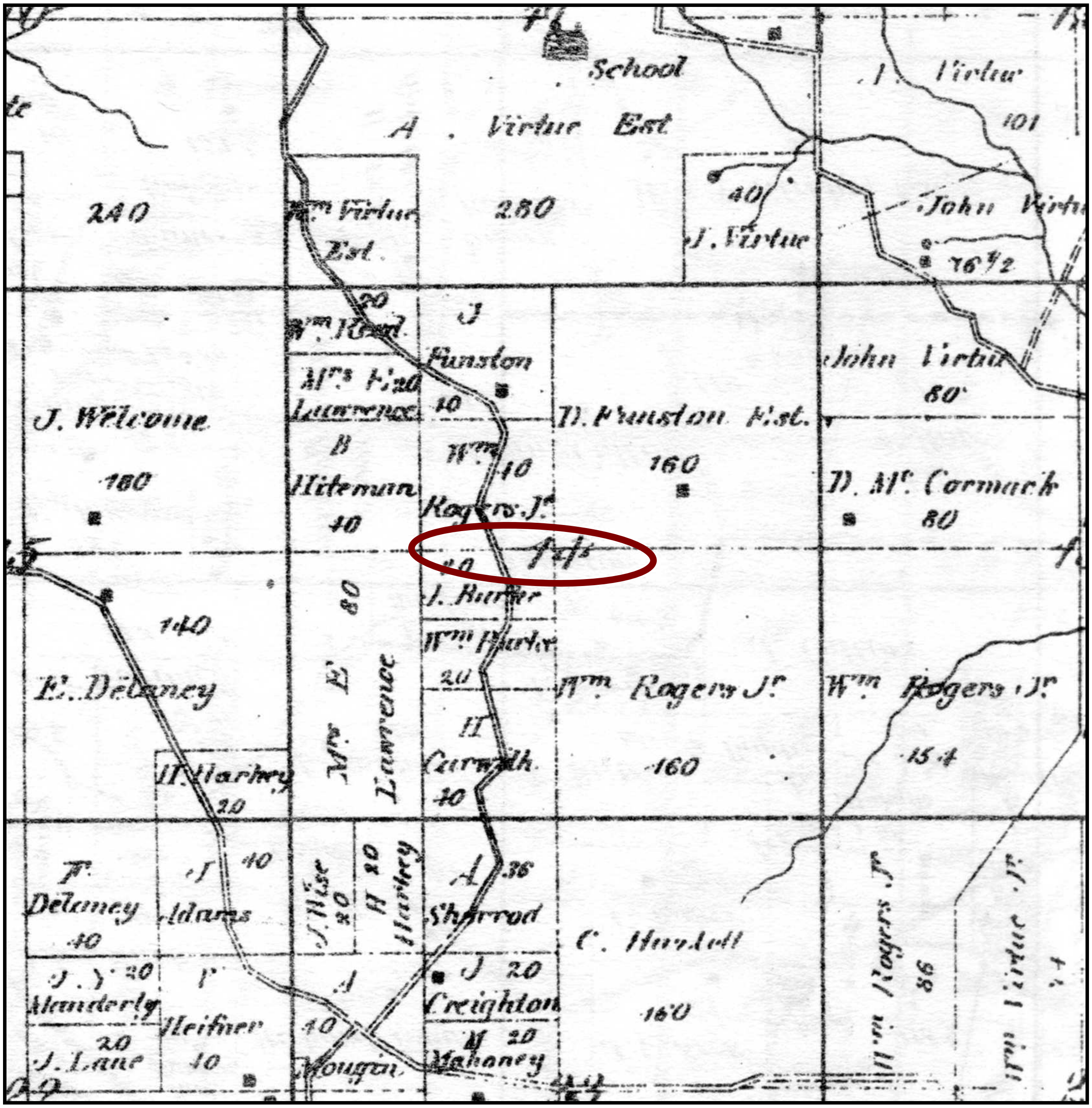


Figure 2. Detail of an 1872 plat map of Rice Township. The future site of the Winston Tunnel has been circled in red. Construction on the tunnel began 1886, fourteen years after the publication of this map. The road that passes through the tunnel site corresponds to modern-day Rocky Hill Road and follows a high ridge (Warner, Higgins, and Beers 1872:J).

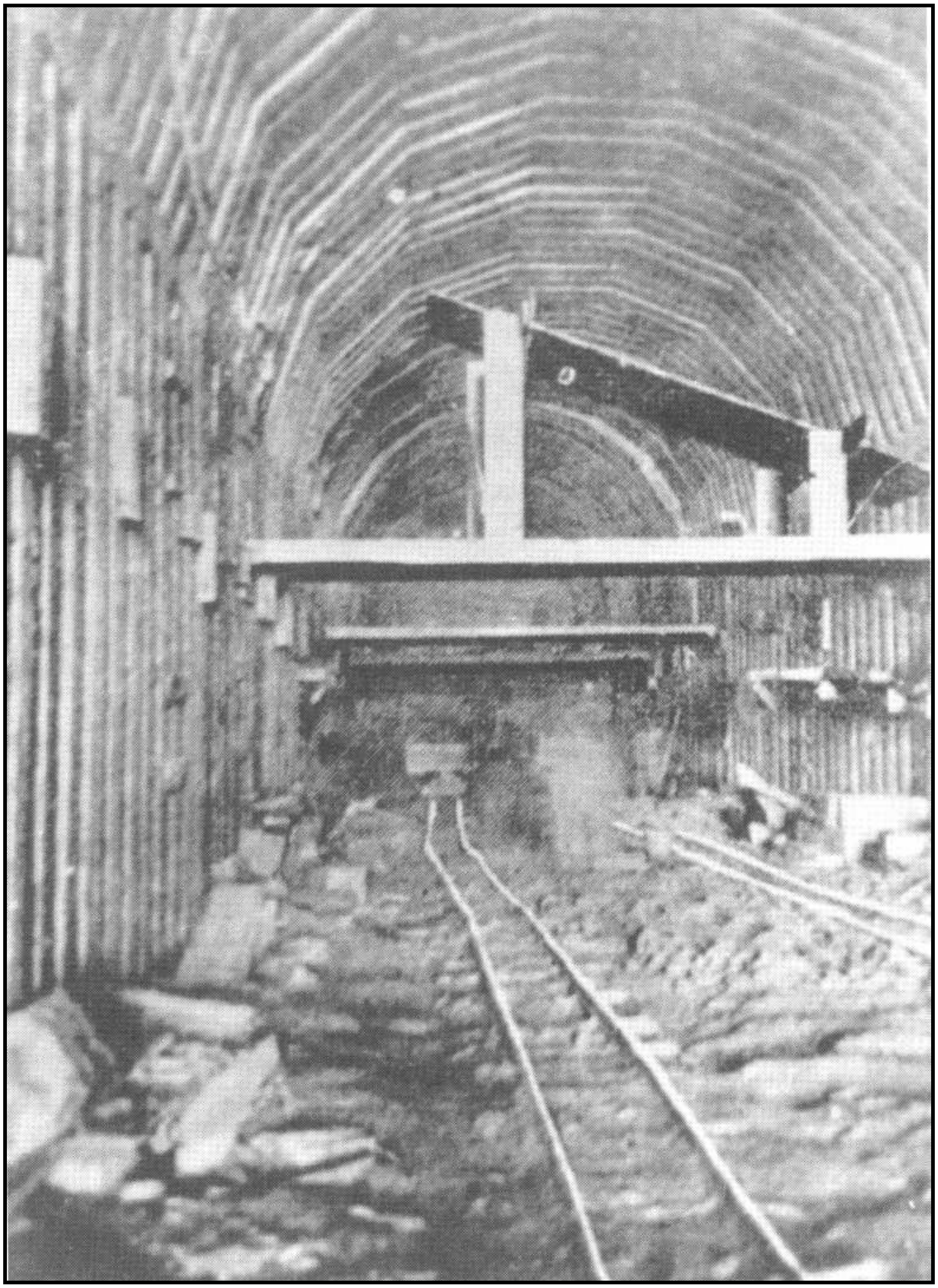


Figure 3. Interior view of the Winston Tunnel during the course of its construction in 1887. Note the heavy timbering originally used to line the tunnel (Huddleston 1998:42).

Figure 4. An 1887 photograph looking west down the Chicago Great Western Railroad towards Winston Station. The shed-roofed shacks shown to the left of the tracks are workers' "shanties" in which the laborers employed in the reconstruction of the tunnel lived. One of these shanties was known as "Gallagher's Hotel" and acquired a notorious reputation in the area (Huddleston 1998:42).

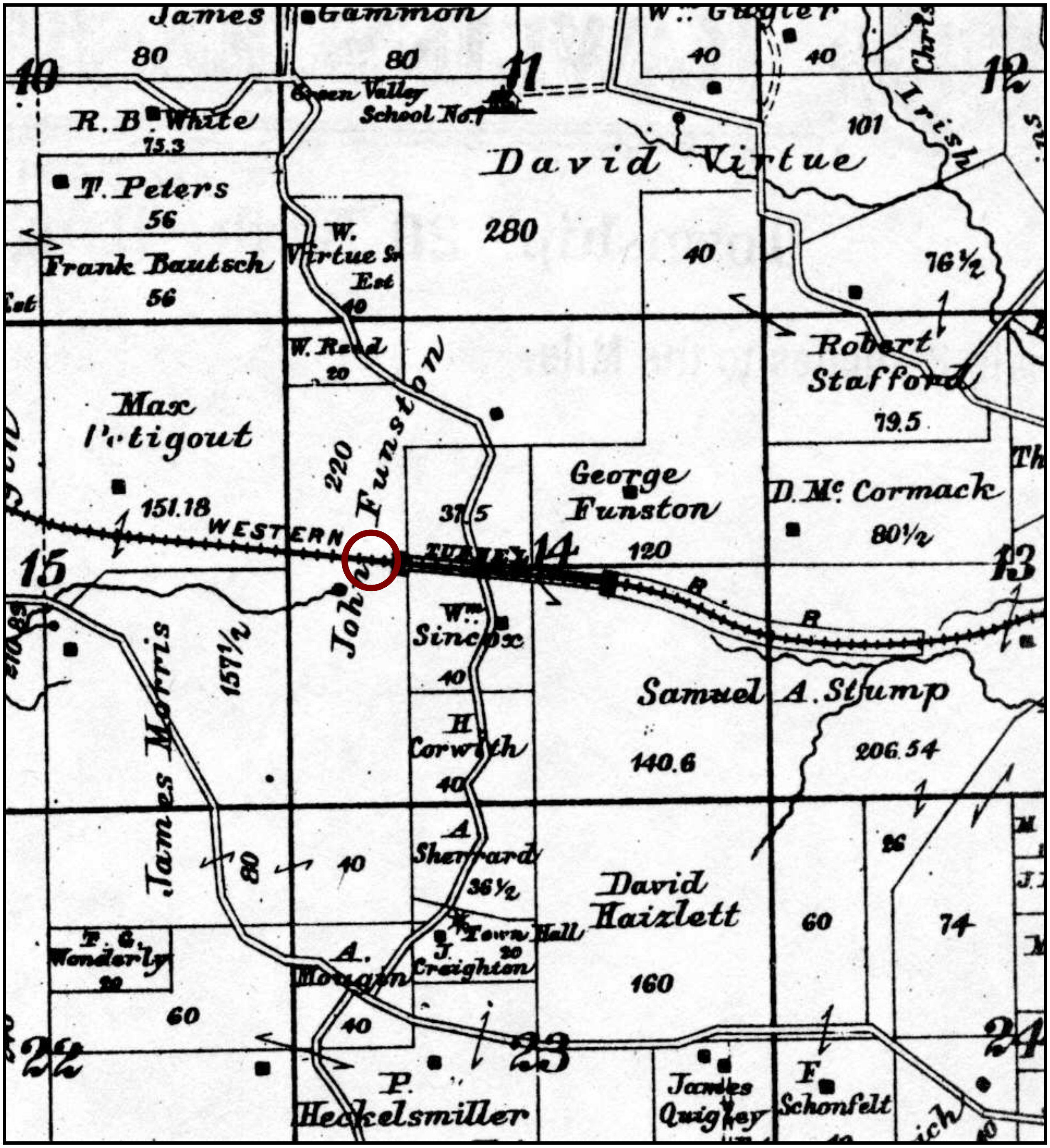


Figure 5. Detail of an 1893 plat map of Rice Township, showing the vicinity of the Winston Tunnel. The future site of the fan house complex has been circled in red (North West Publishing Company 1893:43).

Figure 6. Photograph of the east portal to the Winston Tunnel during the 1902 renovation. The brick-and-concrete facing on the portal had yet to be built (Huddleston 1998:42).

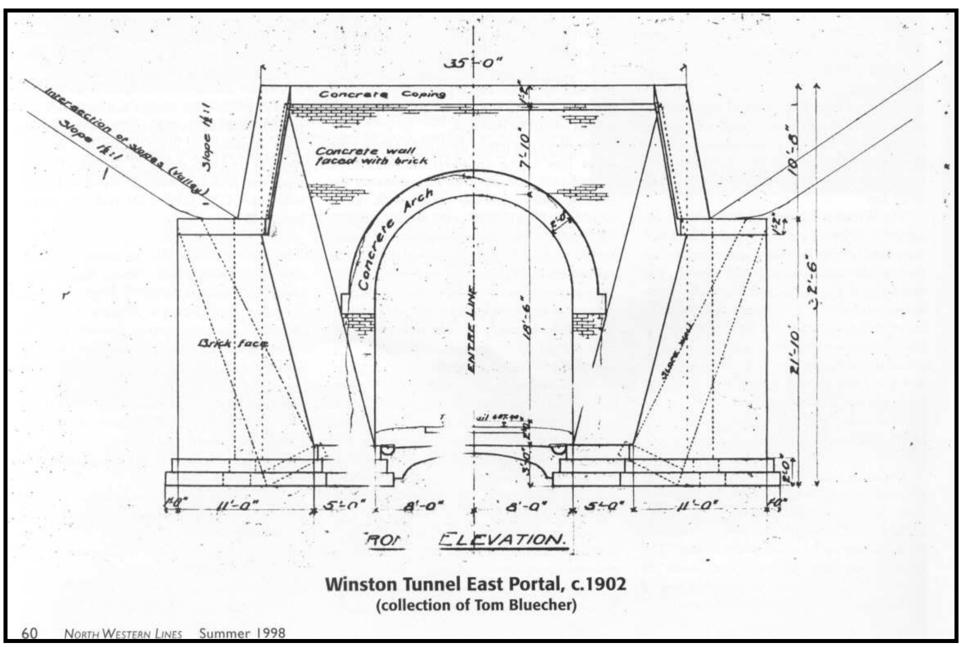


Figure 7. Elevation plan for the east portal to the Winston Tunnel. The portal was faced with brick and concrete was used for the arch and coping (Huddleston 1998:60).

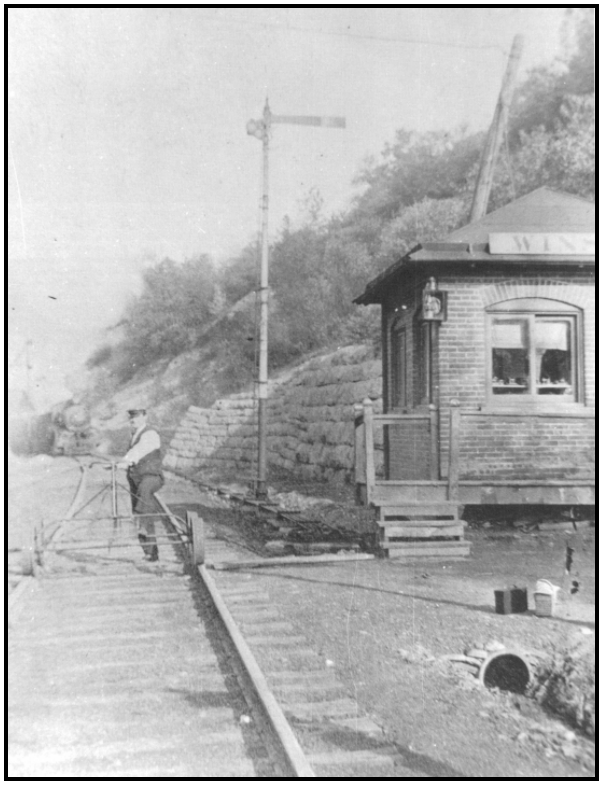


Figure 8. Undated (ca. 1910?) photograph of Winston Station, which was located at the east end of the Winston Tunnel. The train shown in the background has just left the tunnel (Huddleston 1998:46).

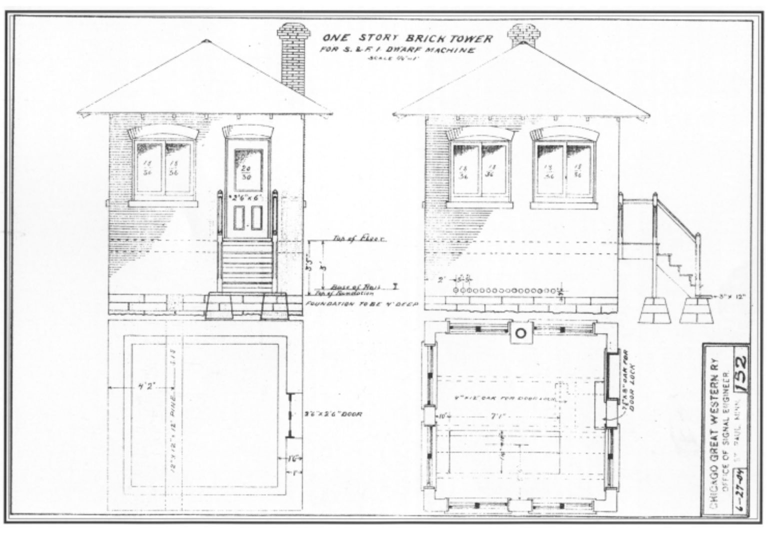


Figure 9. Elevation plans of the type of brick interlocking tower found at Winston Station (Pierson 2001:25).

Method of Ventilating R. R. Tunnels

Description of ventilating methods employed in the Weehawken tunnel of the West Shore R. R. The problems of railroad tunnel ventilation are somewhat different from those encountered in mines. The system here described has a large capacity and introduces a number of novel features unfamiliar to the colliery engineer.

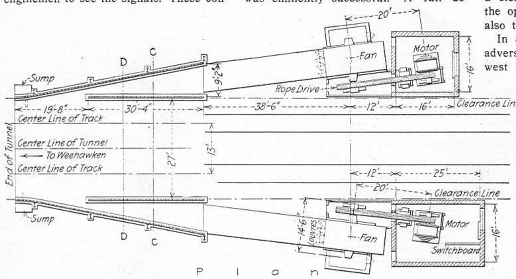
Note—Paper appearing in the "Railway Age Gazette, Aug. 9, 1912.

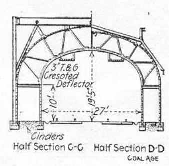
The West Shore has recently installed a Churchill system of ventilation at the west portal of the Weehawken tunnel, through the palisades between Weehawken and New Durham, N. J. The tunnel is a double-track bore 4225 ft. long and has a cross-section of 507 sq.ft. The width is 27 ft. and the height above the base of rail 19 ft. 6 in. All of the freight and passenger traffic of the West Shore and New York, Ontario & Western railways passes through this tunnel. This traffic had become so dense that the tunnel was practically never free from smoke.

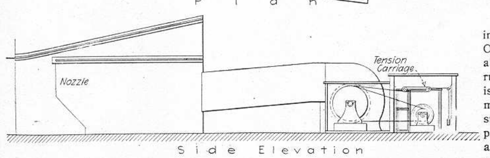
The result has been that aside from the annoyance to train crews and passengers resulting from the fouled condition of the atmosphere, innumerable delays resulted from the inability of the enginemen to see the signals. These conditions have been growing gradually worse, until it was decided that some system of ventilation was needed and the Churchill was finally selected.

The principle of this method is to surround the tunnel portal with a nozzle, through which air is blown into it. This entering air acting on the principle of an exhaust nozzle of a locomotive, entrains the air with which it comes in contact and creates a draft through the tunnel, carrying the smoke and foul air with it.

This system of ventilation was first applied to the Elkhorn, W. Va., tunnel of the Norfolk & Western, of which Mr. Churchill is chief engineer, and where it was eminently successful. A full description of this installation was published in the *Railroad Gazette* for May 10, 1901.







PLAN OF TUNNEL PORTAL, SHOWING LOCATION OF FANS AND NOZZLES, WITH ELEVATION OF ONE FAN AND NOZZLE

Results Obtained

The West Shore tunnel contains about 2,142,000 cu.ft. of air and two fans have been installed, each with a capacity of 275,000 cu.ft. of air per minute, or 550,000 cu.ft. for the two. This latter volume of air is delivered under a pressure of 1¼ oz. at the discharge orifice of tunnel nozzle when the two fan sets are operating together.

Under normal working conditions the tunnel will be cleared of smoke and gas in from 4 to 5 minutes, so that the induced current has a velocity through the section of from 10 to 12 miles per hour. This time, however, varies with atmospheric conditions, and damp, murky weather or a strong east wind blowing in at the east portal may have such a checking effect on the speed of the air that the time of clearing may be extended to from 10 to 12 or even 15 minutes.

At the Elkhorn tunnel on the Norfolk & Western there is an adverse grade in the direction of the flow of air, and it is customary to run the trains slower than the current, so that all smoke is swept on ahead of the locomotives and the engineman is at all times working in a clear atmosphere. When running in the opposite direction this is, of course, also the case.

In the West Shore tunnel where the adverse grade is only 0.3 per cent. going west no attention will be paid to this in the movement and operation of trains. Ordinarily a train will run through in about two minutes and will, therefore, run ahead of the smoke, and as the grade is favorable in the direction of the smoke movement there will be no danger of stalling in a bad atmosphere. In the opposite direction the locomotive runs against the current and is in clear air all of the time except as it happens to meet a train.

The fans are located about 100 ft. outside the west portal of the tunnel and on either side of the tracks in small buildings of reinforced concrete. The ducts between the fan housings and the nozzle are also to be constructed of reinforced concrete.

Description of the Plant

Each fan is driven by a rope drive leading from a pulley on the armature shaft of the motor. They revolve at a speed of 158 r.p.m., while the motors run at 600 r.p.m., the diameter of the two pulleys being 114 in. and 30 in., respectively. The outside diameter of the fans is 132 in. and the width of the blades at the periphery is 66 in. They deliver directly into air ducts leading to the nozzle, taking air through an inlet 134 in. in diameter and delivering through an outlet measuring 93x88 in.

The weight of each fan in working order without motor, duct or sheave, is about 14,000 lb. The overall width parallel to the shaft is 14 ft. 4 in. Each fan is inclosed in a heavy circular steel plate casing, and at the lowest part of the same there is a connection to the sewer so constructed as to avoid any leakage of air. The casing is also provided with an air-tight door, giving easy access to the interior. Each fan shaft, which is 6 in. in diameter, is provided with three bearings each of which has a length of four diameters.

The capacity of the fans is measured by Pitot tubes inserted in the ducts between the fans and the nozzles, which are in the straight section of the discharge.

The guaranteed efficiency of the fans is as follows:

Air, cu.ft. per min.	Pressure, oz. per sq.in.	Speed r.p.m.	Brake, hp. at fan pulley	Mechanical Efficiency
Only One Fan Unit Running.				
68,750	....	38	...	....
137,500	.10	75	30	45 per cent.
275,000	.35	145	215	50 per cent.
Two Fan Units Running				
137,500	....	38	...	....
275,000	0.35	75	35	45 per cent.
550,000	1.35	150	220	50 per cent.

In operation the fans run smoothly and without vibration.

This system was installed under the direction of George W. Kittredge, chief engineer; J. W. Pfau, engineer of construction, and R. E. Dougherty, district engineer of the New York Central; Chas. E. Churchill was consulting engineer; Watson-Flagg Engineering Co., contractors for fan houses, ducts and mechanical equipment; F. J. McCain Construction Co., contractors for erection of nozzle.

Mine Telephones

By J. O. Oliver*

It is not generally known how great is the importance of the telephone to the mining industry, connecting as it does in the modern mine, the various operating and working departments which often are located at great distances from one another. There is no other agency which brings together in a more satisfactory manner, these many departments. From a commercial standpoint, such a system becomes invaluable for executing immediately and accurately the many important daily orders from the various operating departments, such as the Superintendent's Office, the Engineering Department, etc., with the foremen and individuals located in the many sections of the plant, both on the surface and underground, these departments being often many miles apart.

The mining property which is making the greatest success today in these times of severe competition, is the one which adopts the most modern machinery and employs the latest and most efficient type of apparatus, with which to conduct the business. The operator as well as the mining engineer, are agreed that there is no more important factor at the collieries, than a reliable system of telephones.

The manner in which such a system should be installed, varies on account of the many conditions to be met and the character of the mine to be equipped. Generally speaking, where the property is of good size and where there are a number of shafts and levels, etc., to be connected, the establishment of an operator's switch-board is advisable. This equipment, as a rule, is located in the General Manager's office, and is under the control of a man of some experience, who is familiar with the operation and the conditions existing in mines.

From this switch-board, as a central point, the various offices of the building are connected, also the different buildings on the surface, such as the engine house, supply house, repair department, breaker, hospital, etc. Usually these points have their own private line, or in other words, one telephone station, connected to a pair of wires. A cable is run from this same central point, consisting of a number of pairs of wires, the size of which is to be determined by the number of instruments or stations, ultimately to be installed. This cable extends to the entrance of the mine or shaft opening, and thence to the inside; it is thoroughly weather-proofed in order to withstand dampness and the mine gases. This cable is often lead covered.

Following the slope or main entry, as the case may be, one or more pairs of wires are taken from the cable at the various levels thus allowing telephone stations to be located and connected at these points; in a like manner, additional instruments are located at points found advisable throughout the mine. The main cable continues on through the mine, dropping off a pair of wires here and there, as found advisable. In this connection, it might be well to state that it is not necessary to have a pair of wires for each telephone installed. On the contrary, it is common practice to connect a number of telephones to a single pair of wires, each station being called by a code of signals, such as one long ring for station one, two short rings for another, etc. There are often 10 to 20 stations thus connected to a single pair of wires. It is not advisable, however, to use more than 10 on any one circuit, or the line will be so busy that the service will be poor.

From a standpoint of safety, the modern telephone system is of supreme importance, regardless of whether the mine be of small or large proportions. It is not only often the means of preventing accidents, both to life and property, but when such do happen, it is invaluable in securing the help which is so necessary at such times. With a thoroughly well installed system of telephones, of a reliable type, especially designed and built for the severe conditions existing in mines, the Manager and Superintendent can rest assured that they have done everything in their power, to protect the lives of their men and the property of the company.

*112 N. Broad St., Philadelphia, Penn.

A Simple Method of Jacketing a Revolving Screen

By Benedict Shubert*

Very often in changing the product of a revolving screen, or in reducing the amount of screen space so as to pass more fine material over the screen, there is considerable delay caused by changing the screen plates or by putting on steel jacket plates.

A very simple method of jacketing a portion of the screen is to wrap it with manila rope. There is always a large amount of old manila rope lying around every mine and this can be quickly wrapped around any portion of the screens so as to close as much, or as little, of the openings as may be desirable. The rope can be wrapped quickly by fastening the rope at one point and then starting and revolving the screen slowly, allowing the rope to wrap itself around the screen cloth.

This method is quick and simple and the materials are always at hand.

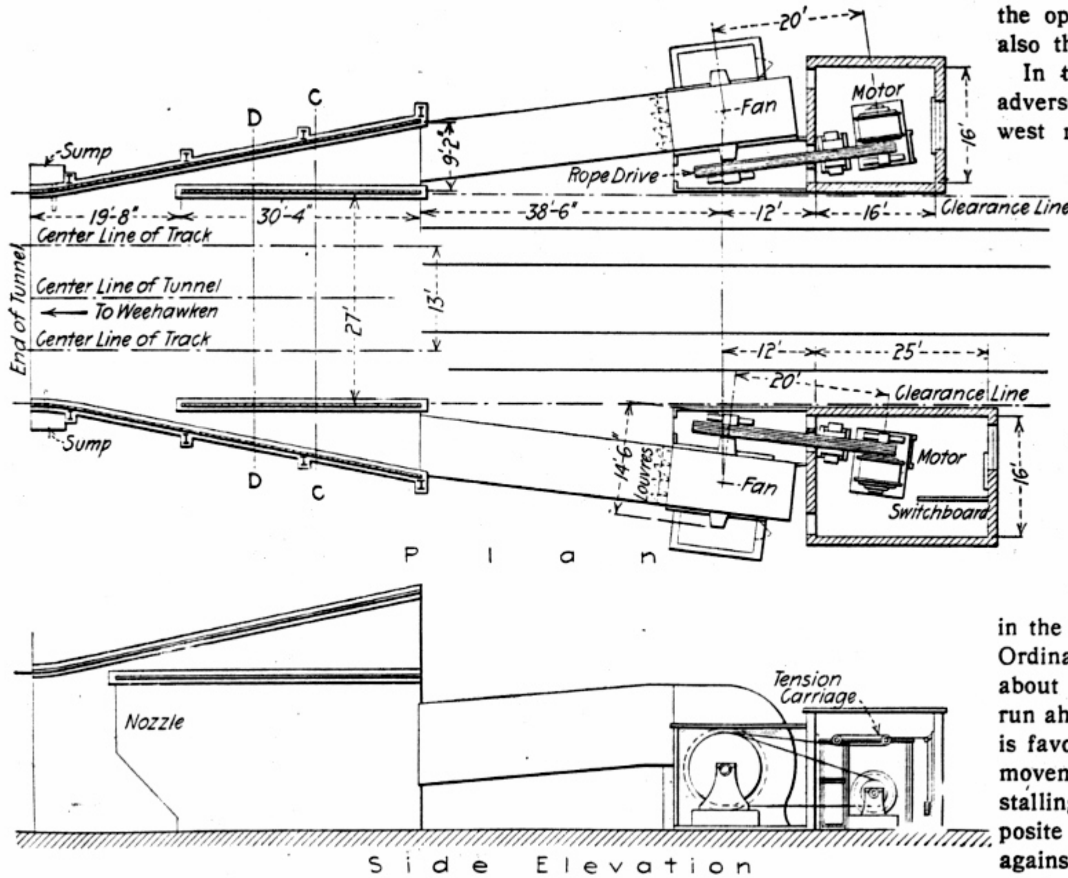
Cost of Coal

In figuring the cost of operation of a steam power plant for a large cotton mill in New England, Lockwood, Greene & Co., architects and engineers for industrial plants, Boston, recently have placed the cost of coal at just 75 per cent. of the total direct operating cost, exclusive of capital charges. The figures given for one year's operation are as follows: Coal, \$32,985; labor, \$6893; oil, waste and supplies, \$4100, making a total of \$43,978.

Air-dried peat is an excellent fuel not only for domestic purposes, but also for power production. In the peat gas producer it has given excellent results. Peat yields a fine nonclinking ash that easily passes through a grate.

*Boston Building, Denver, Colo.

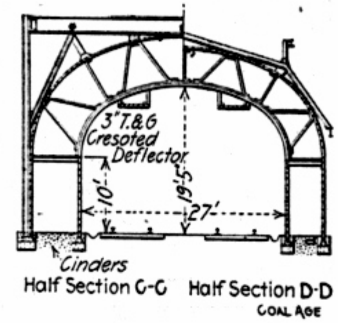
Figure 10. The type of ventilation system installed at the Winston Tunnel was featured in an article published in the August 31, 1912 edition of *Coal Age* magazine. The article, pictured above, describes the system as applied to a railroad tunnel in Weehawken, New Jersey (*Coal Age* 1912:289-290).



PLAN OF TUNNEL PORTAL, SHOWING LOCATION OF FANS AND NOZZLES, WITH ELEVATION OF ONE FAN AND NOZZLE

the opposite direction this is, of course, also the case.

In the West Shore tunnel where the adverse grade is only 0.3 per cent. going west no attention will be paid to this



in the movement and operation of trains. Ordinarily a train will run through in about two minutes and will, therefore, run ahead of the smoke, and as the grade is favorable in the direction of the smoke movement there will be no danger of stalling in a bad atmosphere. In the opposite direction the locomotive runs against the current and is in clear air all of the time except as it happens to meet a train.

The fans are located about 100 ft. out-

Figure 11. Detail from the previous figure, showing the design for the ventilation plant of the West Shore Tunnel in Weehawken, New Jersey (*Coal Age* 1912:289-290).

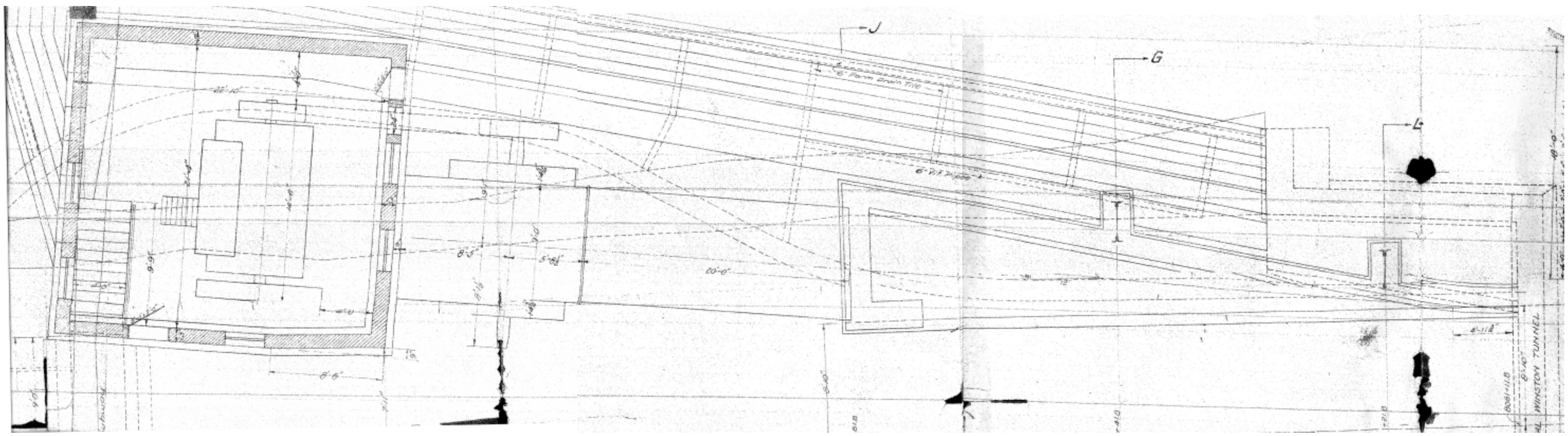


Figure 12. Plans for the ventilation station at the Winston Tunnel, showing the northern half of the facility originally proposed. Moving from left to right, the plans show the engine house, fan, and nozzle or cowling. The west portal to the tunnel appears on the far right. The ventilation station eventually built would be similar to this but with important differences, particularly in respect to the engine house (Chicago Great Western 1912).

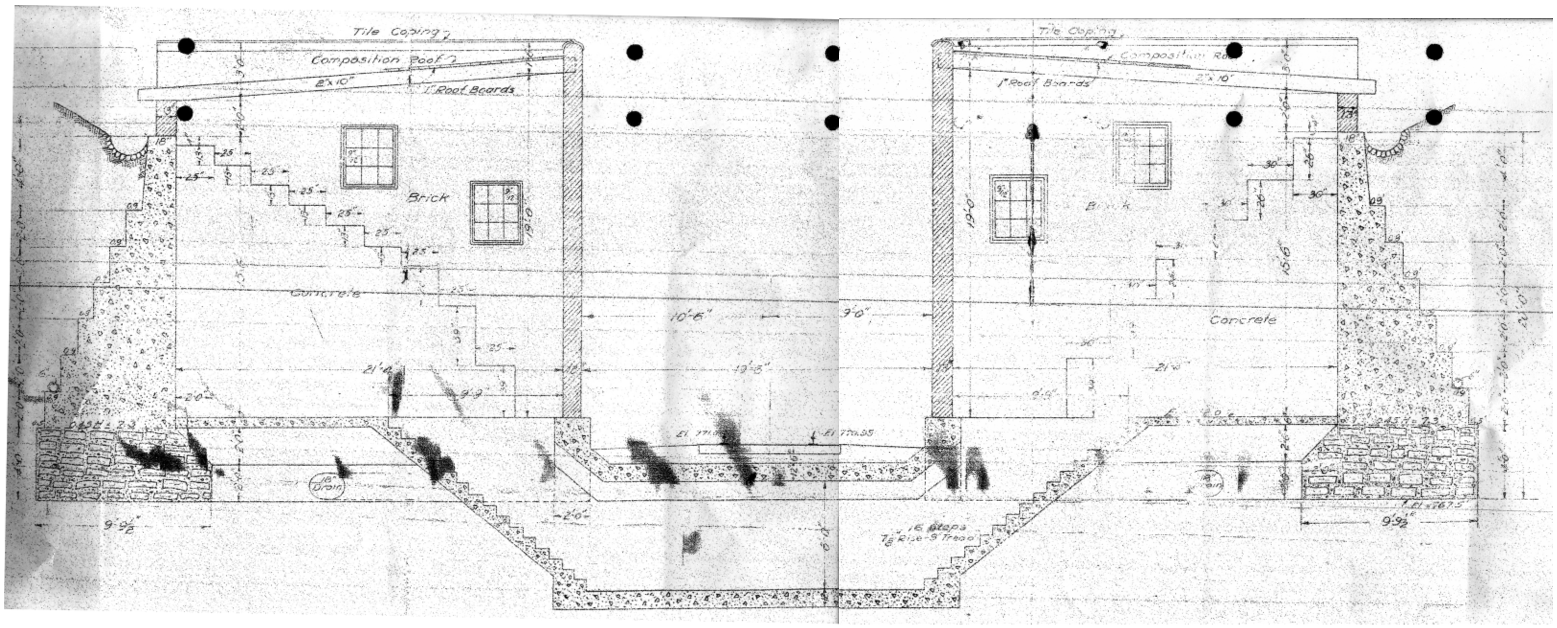


Figure 13. Section view through the two proposed fan engine houses. Note the "subway" running beneath the railroad tracks between the two buildings (Chicago Great Western 1912).

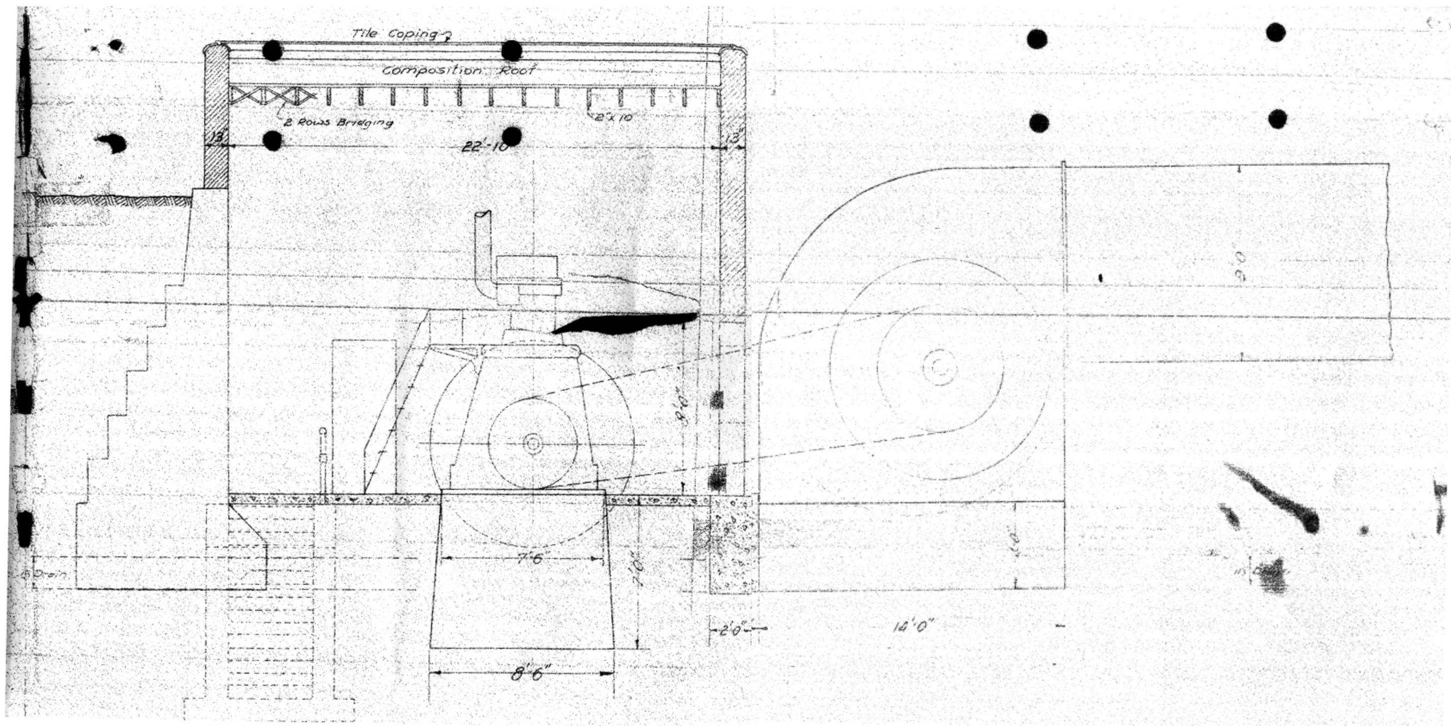


Figure 14. Sectional view showing the relationship between the fan and fan engine (Chicago Great Western 1912).

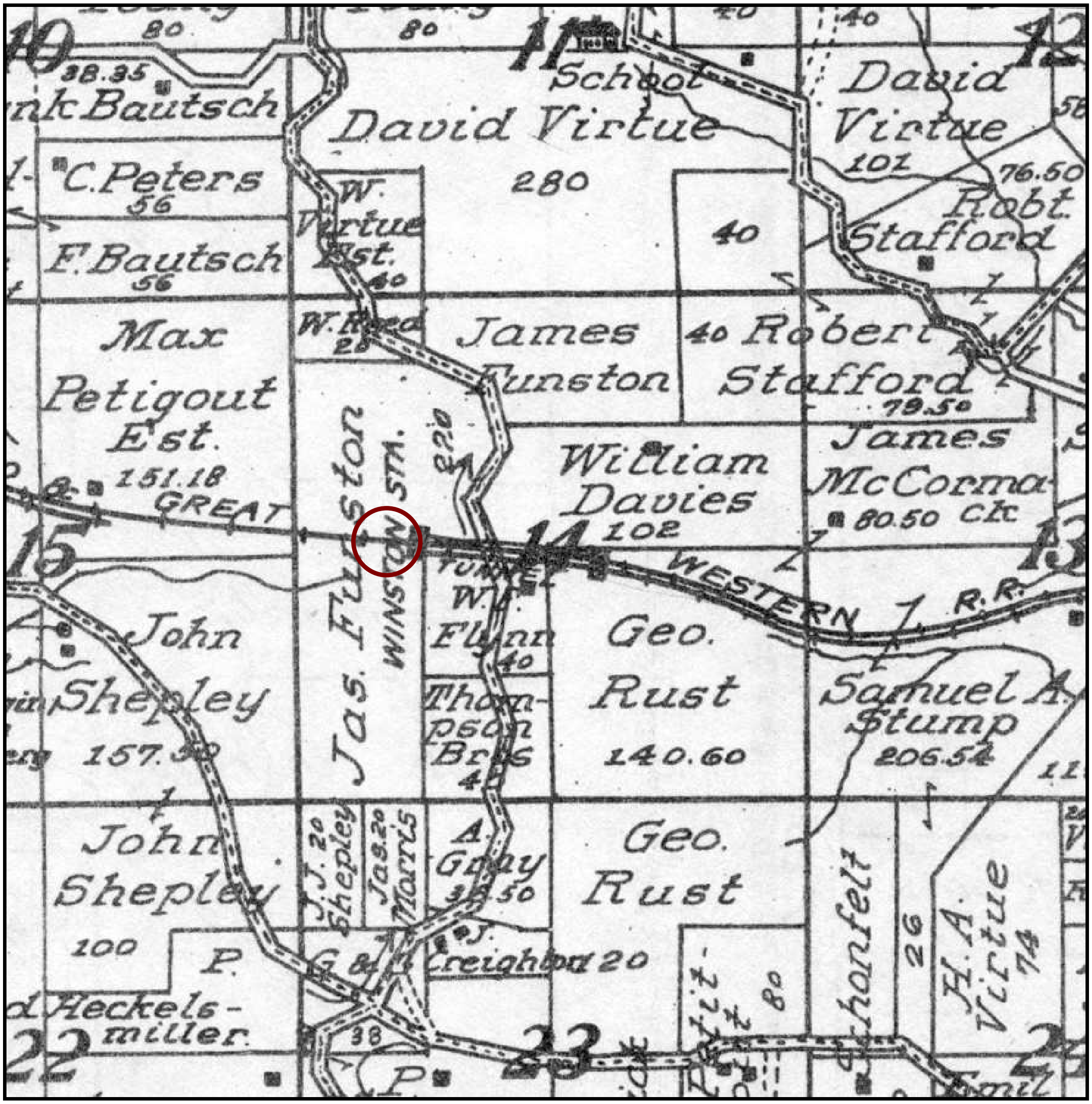


Figure 15. Detail of a 1913 plat map of Rice Township, showing the vicinity around the Winston Tunnel. The site of the fan house complex has been circled in red (Ogle 1913:63).

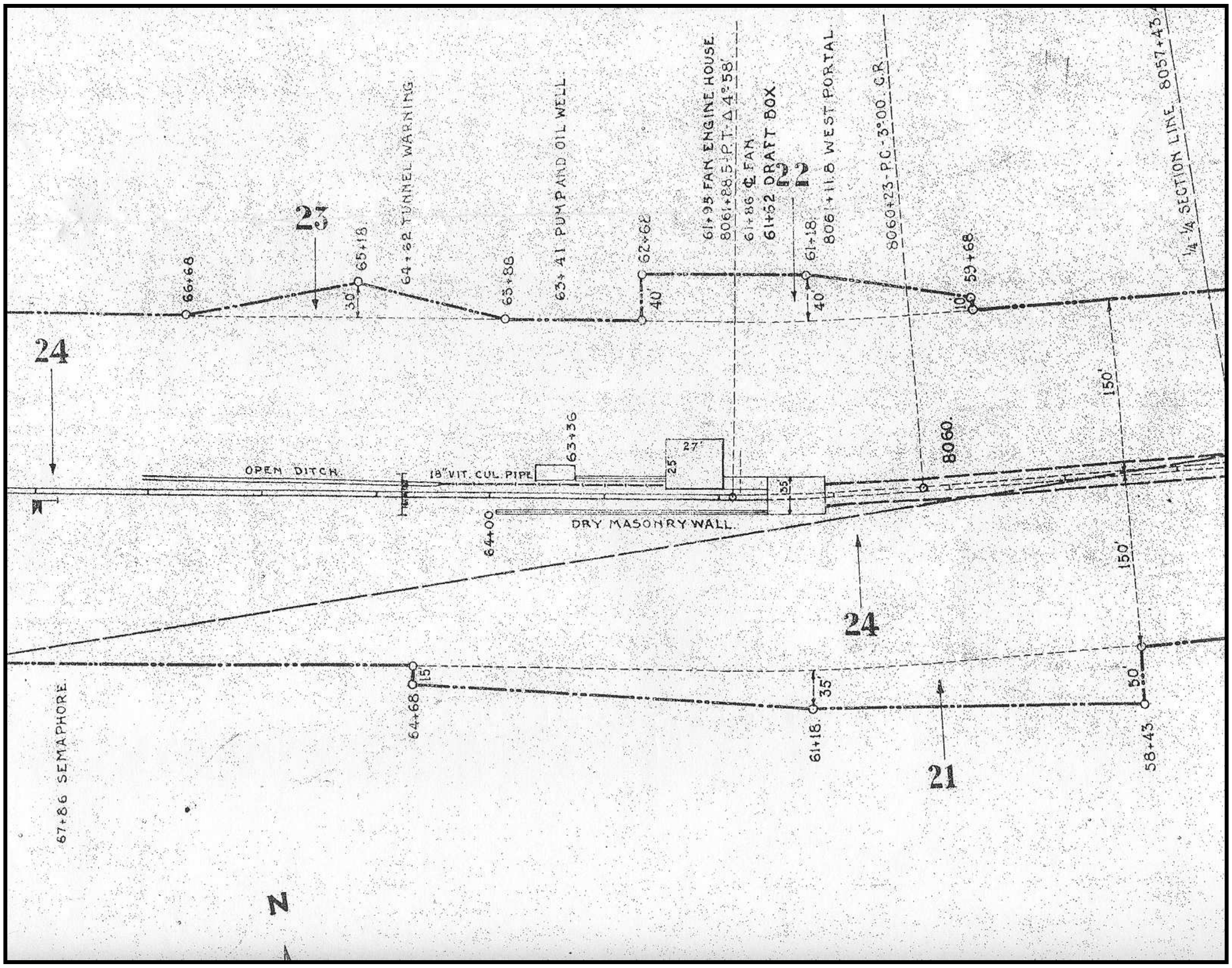


Figure 16. Detail from a 1916 Chicago Great Western station map, showing the ventilation station at Winston Tunnel. Buildings and structural features are indicated in the margins (Chicago Great Western 1916).

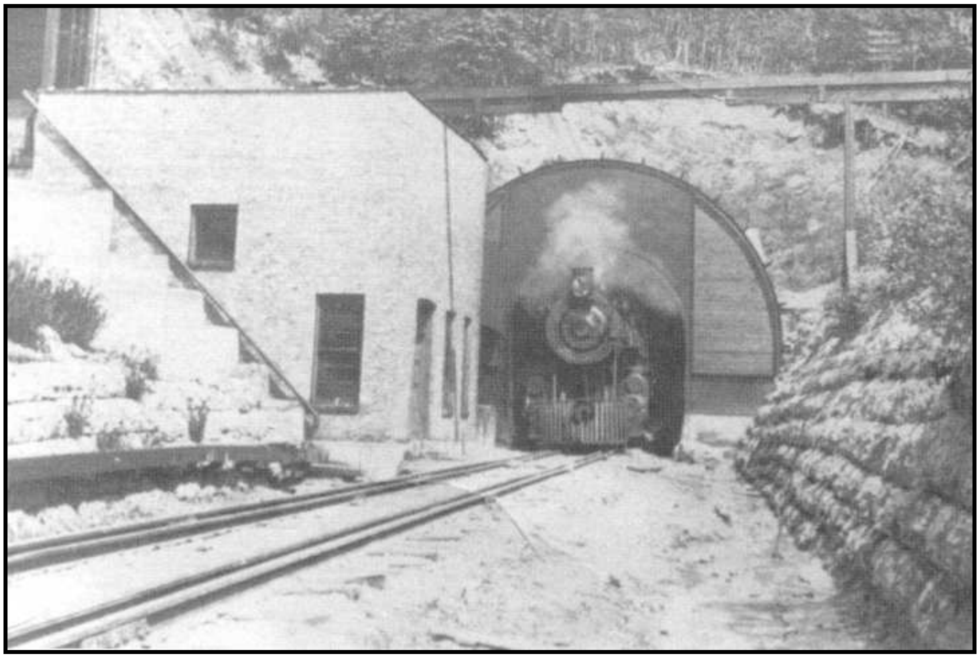


Figure 17. Early photograph of the fan house at the west portal to the Winston Tunnel. This photograph shows the fan house as originally constructed. Although Huddleston (1998:43) dates this view to ca. 1910, it could not have been taken until 1912 at the earliest.

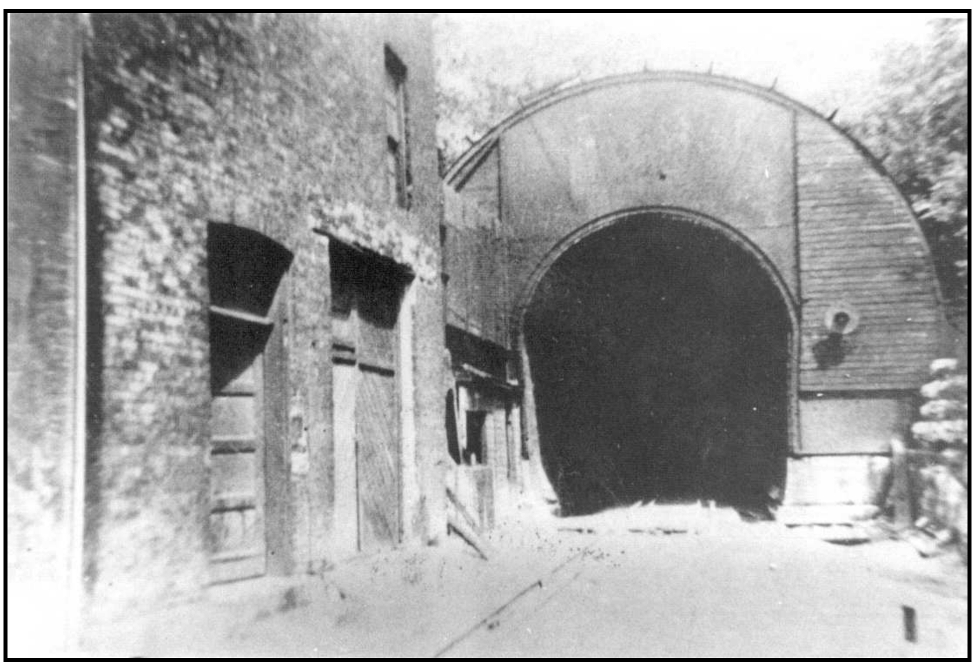


Figure 18. Closer view of the brick fan house. By this date, an addition had been added onto the south end of the fan house. Also, two original window openings had been converted into a wide freight door (compare to previous figure). Note the steel-frame nozzle around the tunnel portal (Huddleston 1998:53).

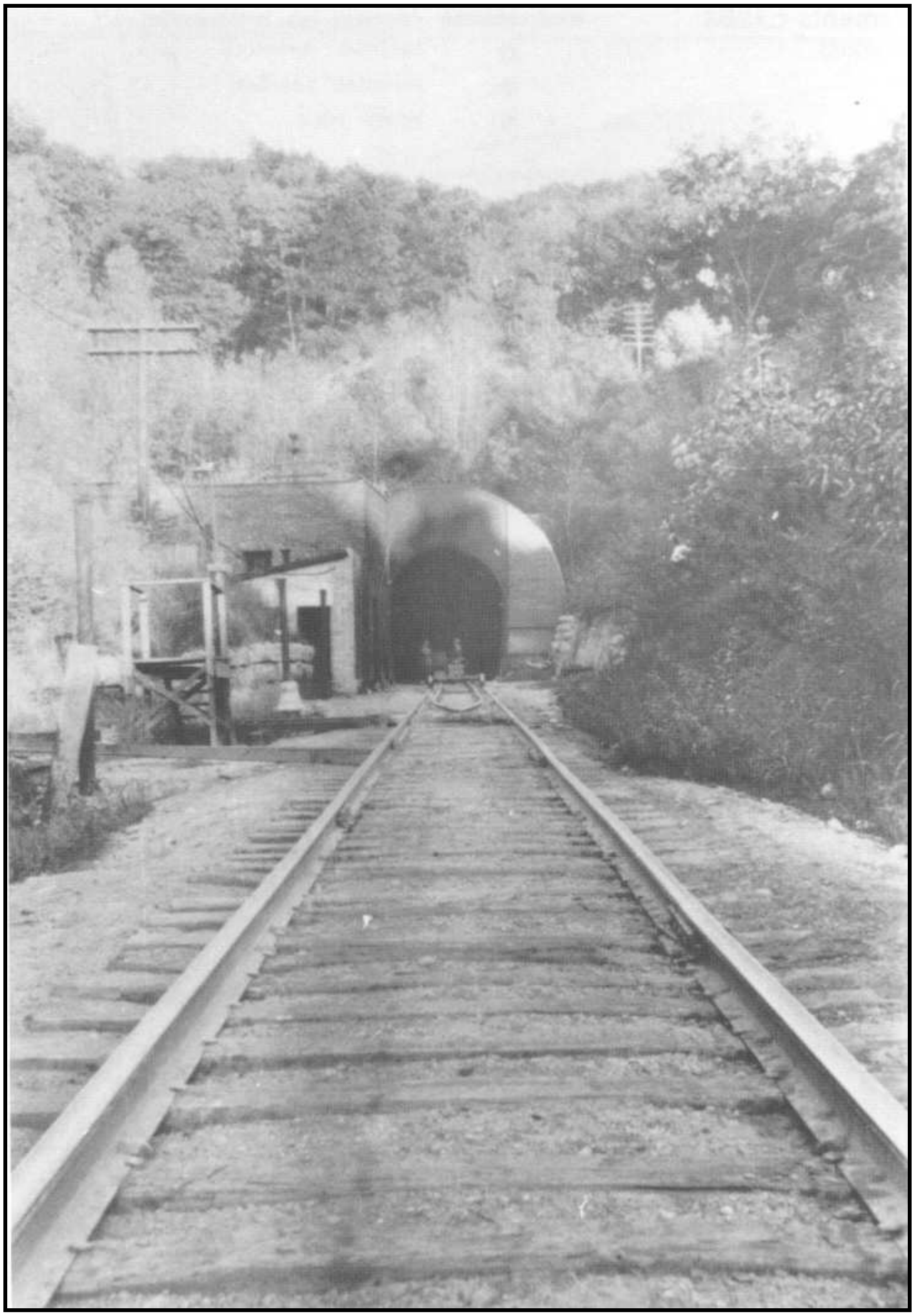


Figure 19. Undated photograph looking east toward the fan house and west portal to the Winston Tunnel. By this date, the fan house complex had assumed its present configuration (Huddleston 1998:47).

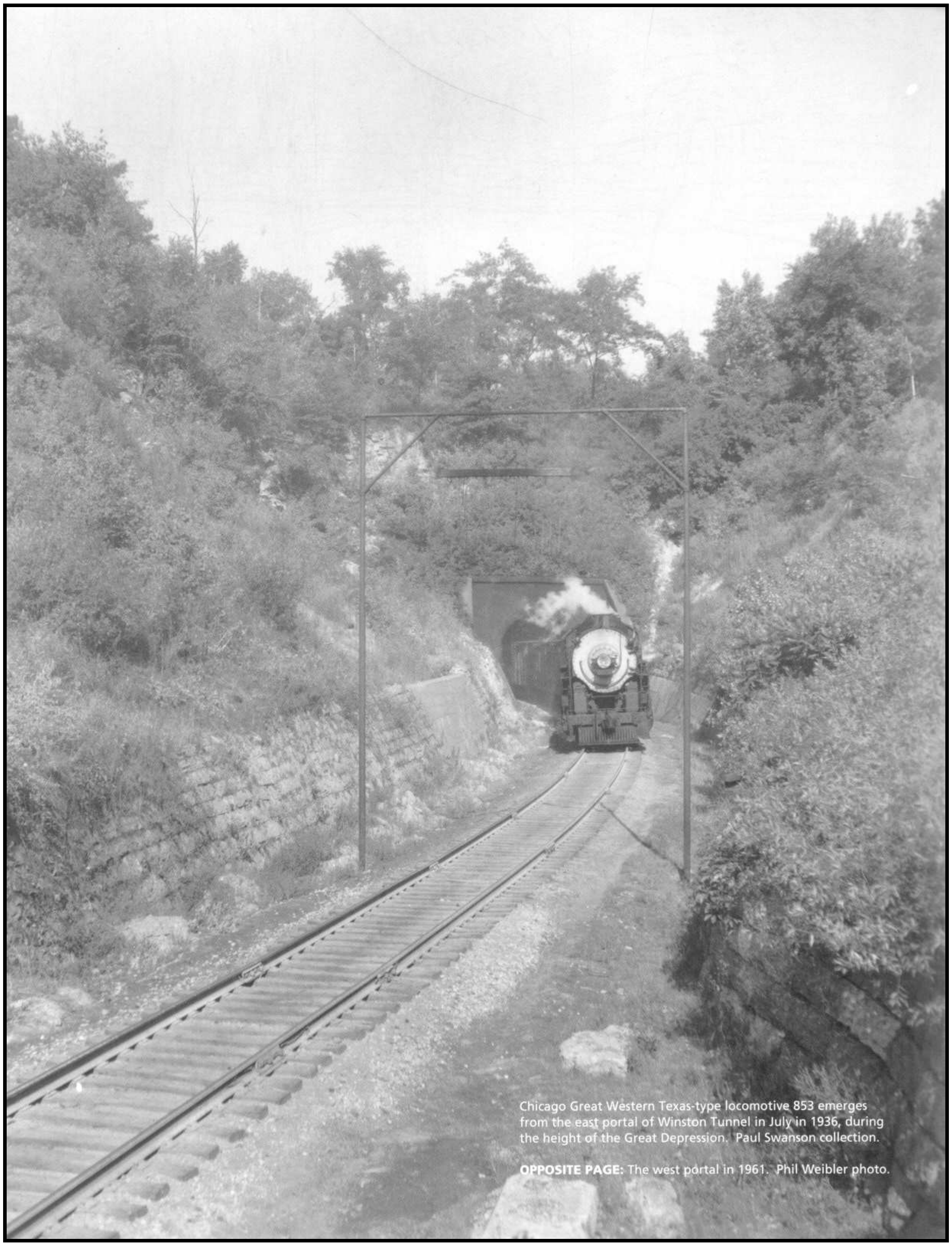


Figure 20. A 1935 photograph of a Chicago Great Western locomotive exiting the east portal of the Winston Tunnel (Huddleston 1998:41).

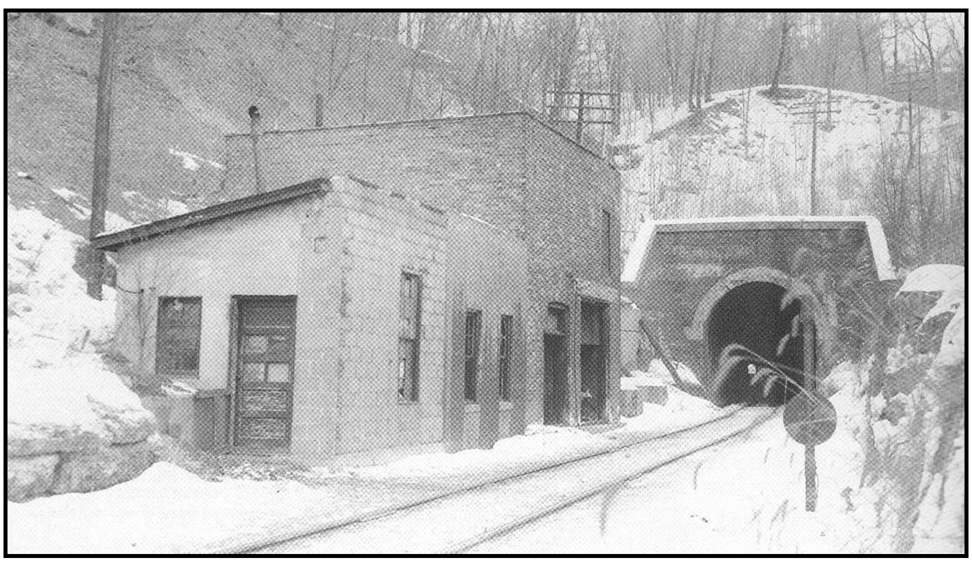


Figure 21. (TOP) The site of Winston Station in 1961, looking from the hillside above the east portal to the Winston Tunnel (Huddleston 1998:55). (BOTTOM) View of the abandoned fan house complex in 1961, looking northeast (Huddleston 1998:56)

Figure 22. Another view of the fan house complex in 1961, looking northwest. The concrete foundations and failing retaining wall in the foreground mark the former location of the ventilation fan (Huddleston 1998:56)

Figure 23. View of the fan house in 1966 (Huddleston 1998:57).

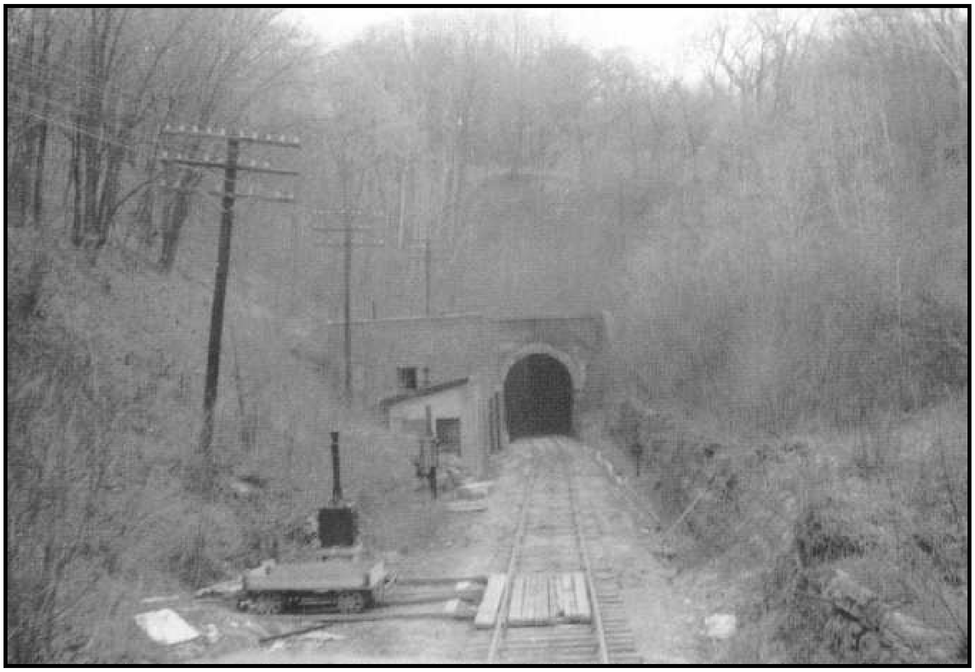


Figure 24. View of the fan house complex in 1968, three years before the rail line passing it finally was abandoned. Note the hand cart in the foreground (Huddleston 1998:58).

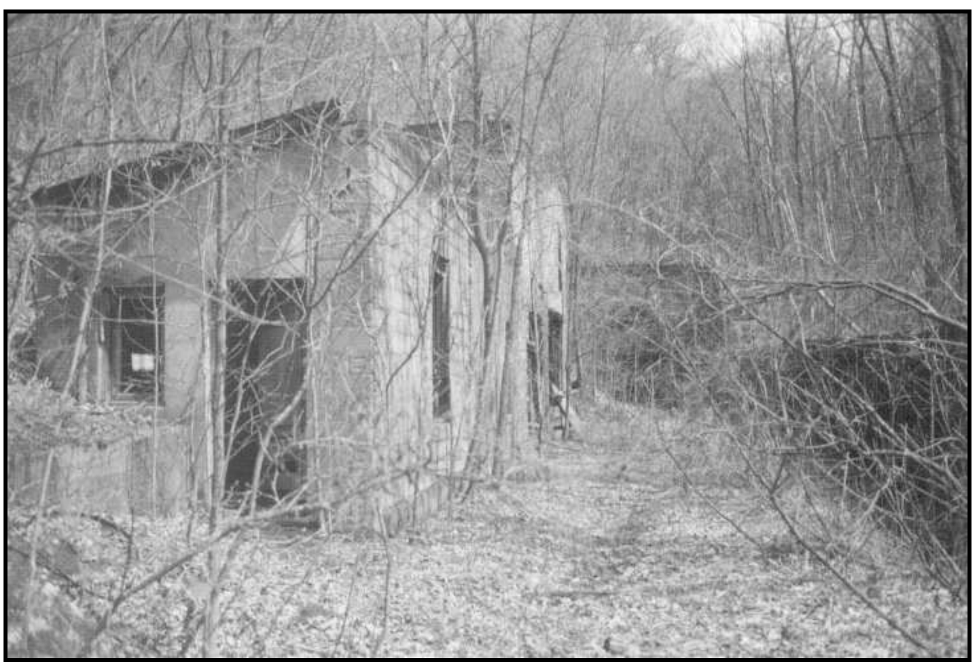


Figure 25. View of the building complex in 1990 (Huddleston 1998:59).

PHYSICAL DESCRIPTION

The Winston Tunnel Fan House complex has seen considerable change through time. As originally constructed, complex consisted of an engine room, a fan, and cowling, which were aligned linearly to one another and connected directly to the tunnel. The engine room was a one-room, 1-½-story, flat-roofed brick structure that housed the engine powering the ventilation fan. The building measured 25'-0" (north/south) by 27'-0" (east-west) on the exterior and had 13" walls (three bricks thick). The foundations were of poured concrete, and concrete also was used for those portions of the east, west, and south walls that were built back against the hillside. On its south elevation, the engine room had a standard-sized entrance door and two windows. The west and east elevation also had two windows, which were stepped up from one another on account of slope. According to the 1918 ICC Bureau of Valuation report, the floor on the interior originally was covered with No. 2 "Barr" paving brick, while the walls and ceilings were left unfinished. The roof was constructed with 2"x12" rafters set 1'-6" on-center, over which was laid 1- ½" tongue-and-groove sheathing and four plies of asbestos roofing (Interstate Commerce Commission 1918). Much of the interior was taken up by the large 170 h.p. diesel engine. The belt running between the engine and fan passed through an opening in the east wall of the room. Fuel for the engine was pumped through a pipe from a subsurface oil tank located west of the fan house, and while water (for cooling it) was drawn from wood storage tanks (measuring 6'x6'x4') located on the hillside directly behind, and above, the building. Two large steel tanks were located in the northwest corner of the room; these possibly were used to hold fuel oil. Later on, the openings in the south walls of the engine room were significantly modified: the original entrance was widened to 6'-4" and double doors were added; the two windows removed and replaced by a wide freight door; and a completely new window was added on the upper level.

At some point, possibly during the 1920s, two one-story, shed-roofed additions were constructed on the west side of the original fan house. The first addition measured 16'-2"x17'-8" on the exterior and had concrete walls that were stuccoed. There were two windows on the south elevation and possibly an exterior doorway on the west. The addition was connected to the engine room by means of an interior doorway created out of an original window opening. There was a raised concrete pad with metal tie-downs in the center of the room, and in the southeast corner there was a hatch, which opened into a sub-floor flue that extended beyond the east and west walls of the addition. A 2'-8" tall steel standpipe was located adjacent to the hatch. The flue also branched off to point just beyond the south wall of the addition, where there was another hatch, adjacent to which was a drain running off a second pipe (possibly for a hand pump?). Another water pipe extended through the north wall of the room; this originated at a well located on hillside behind the fan house. We believe that this addition functioned as a pump room, and that the concrete pad was intended to support either a fuel or water pump originally. The sub-floor flue likely was used as a chase for the fuel and/or water pipes servicing the fan engine. The original water storage tanks presumably were replaced when the pump room was constructed and a well was excavated on site. The pump room also had two stove flues in its roof over the years.

The second addition measured 11’-10” (north/south) by 14’-10,” was constructed of concrete block, and had a single room on its interior. It had one window on its south side and a window and a door on the west. Unlike the other two rooms in the fan house, this chamber had its walls finished out with wainscoting. The room is suspected to have served as an office for the staff manning the ventilation station. There is evidence of a telephone having once hung on the south wall.

The ventilation fan sat on an independent concrete foundation directly adjacent to the engine room had a metal housing, but otherwise had no superstructure above it. The hillside behind the fan was cut and held back with concrete retaining wall. A steel and frame nozzle extended for approximately 50’ between the fan and west portal to the tunnel. The nozzle, fan, and fan engine were all removed from the site after the ventilation system ceased operations. The concrete retaining wall has since collapsed, and much of the fan foundations are covered with overburden.

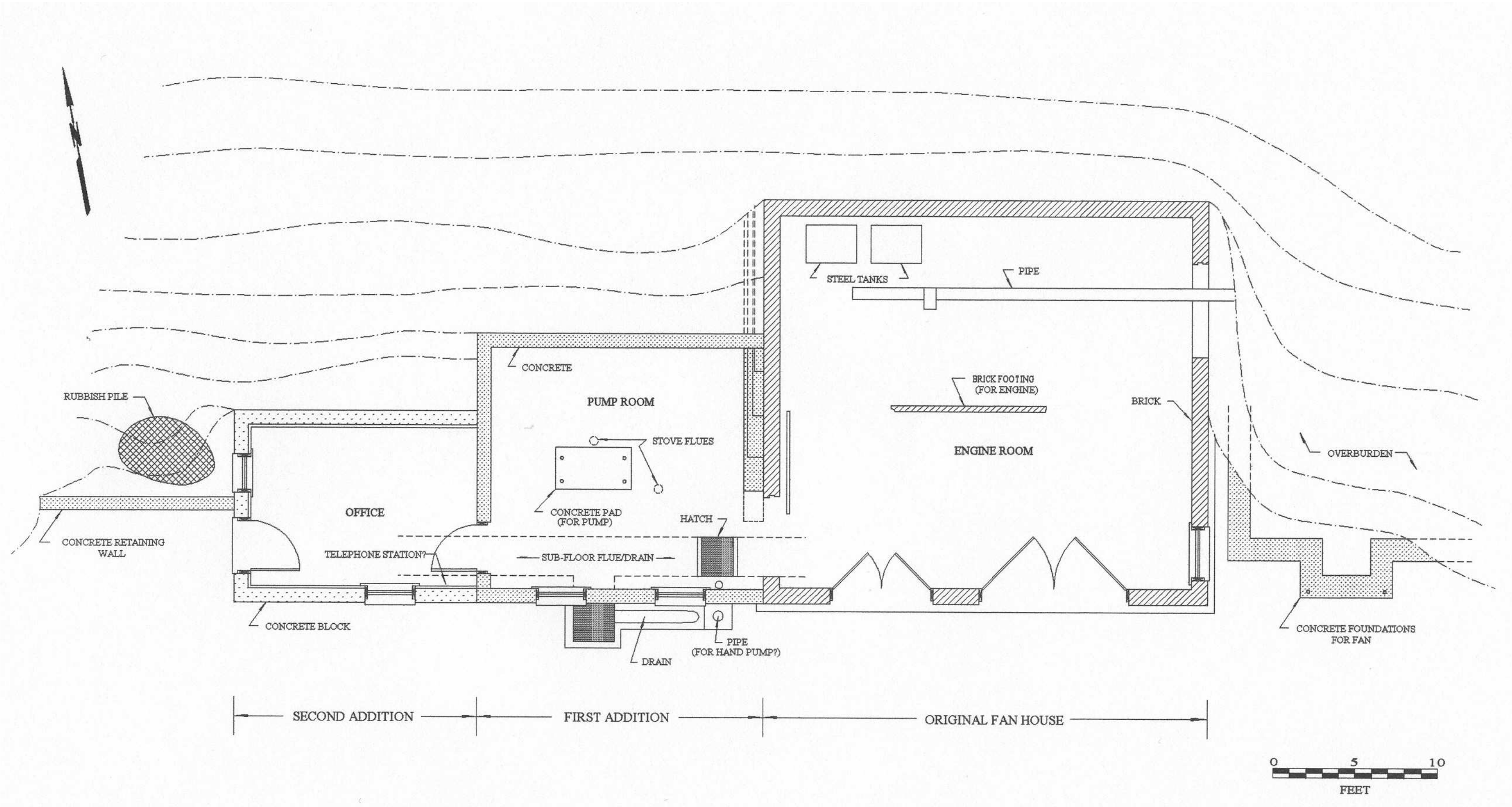


Figure 26. Floor plan of the Winston Tunnel Fan House, showing existing conditions (FRR 2003).

Figure 27. View of the west portal to the Winston Tunnel, as it appears today (FRR April 2003).

Figure 28. View of the fan house complex, looking northeast towards the tunnel (FRR April 2003).

Figure 29. View of the fan house, looking northwest. The original engine room appears in the foreground (FRR April 2003).

Figure 30. The ventilation fan has been removed from the site, and all that remains are the concrete foundations on which it sat (FRR April 2003).

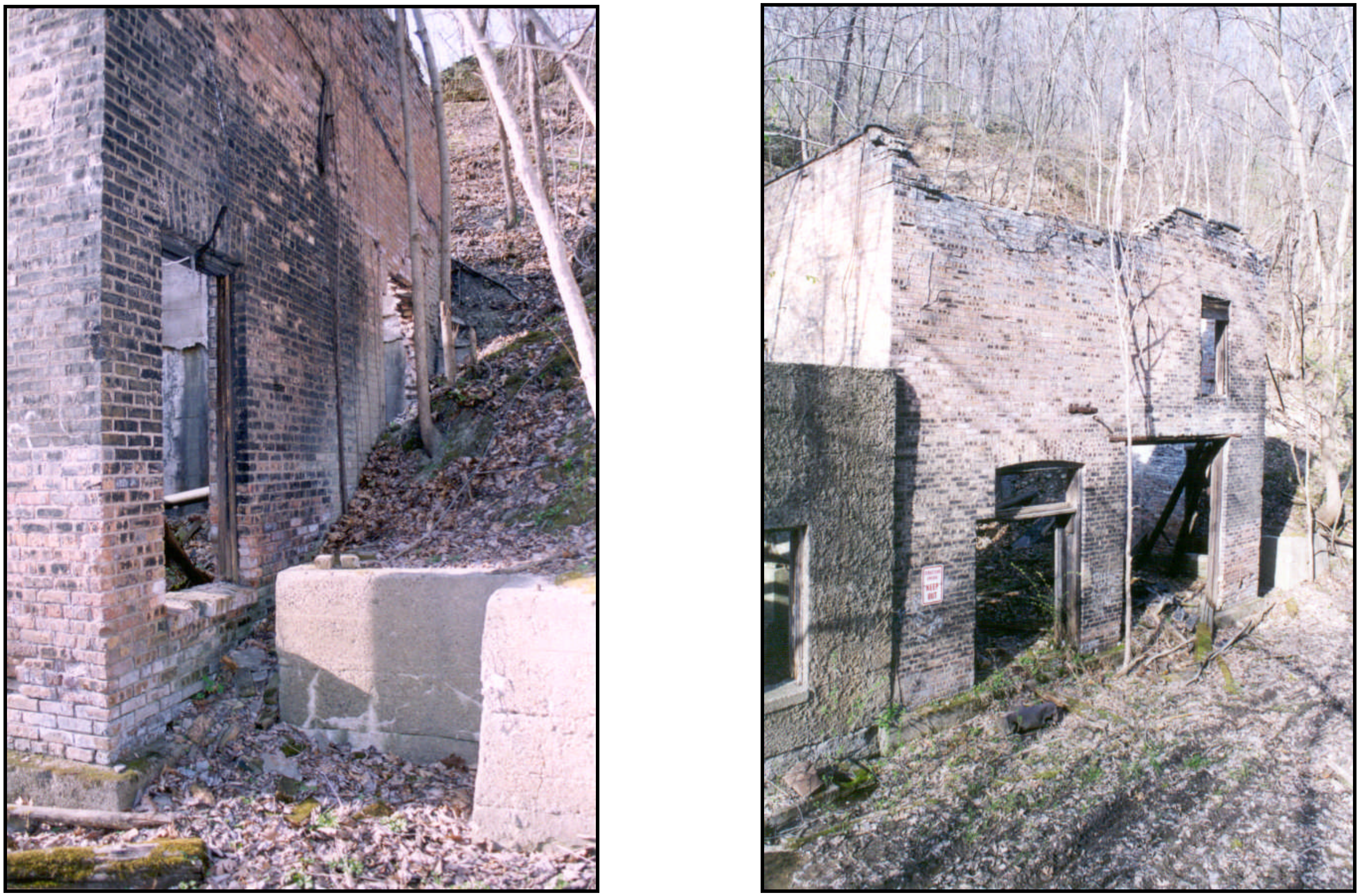


Figure 31. (LEFT) View of the east elevation of the engine room, showing its relationship to the fan foundations. (RIGHT) View of the south elevation of the engine room (FRR April 2003).

Figure 32. Exterior (LEFT) and interior (RIGHT) views of the original entrance to the engine room. This doorway was widened early in the twentieth century. Note the fanlight above the door (FRR April 2003).

Figure 33. (LEFT) The wide freight door and upper-level window shown here represent modifications to the engine room. (RIGHT) View of the northwest corner of the engine room, showing the large (fuel?) tanks located here. The engine has been removed (FRR April 2003).

Figure 34. View of the east side of the engine room, showing the collapsed section of wall where the fan belt formerly passed through. The function of the large pipe lying across the room is not known (FRR April 2003).

Figure 35. Interior view of the first addition to the fan house complex, looking east. This room is believed to have been used as a pump room. The concrete pad in the foreground possibly supported a water or fuel pump originally (FRR April 2003).

Figure 36. (LEFT) View of the stepped concrete foundation on the west side of the engine room. Note the sliding door. (RIGHT) View of the sub-floor flue that extends beneath the fan house complex (FRR April 2003).

Figure 37. View of the drain and pipe located on the south side of the first addition. These may have been associated with a hand pump originally. Also note the stuccoed concrete walls of the addition (FRR April 2003)

Figure 38. Interior view of the second addition to the fan house, looking west. This room is believed to have served as an office. Note the wainscoting applied to the walls (FRR April 2003).

Figure 39. The fan house has suffered from both vandalism and decay since its abandonment in 1948. (TOP) Graffiti inscribed on the wainscoting in the office addition. (BOTTOM) View of the deteriorated roofs over the office and pump room additions (FRR April 2003).

Figure 40. The dry-laid masonry wall constructed as a part of the 1902 tunnel renovation largely remains intact along the south side of the rail bed, opposite from the fan house. It is a contributing feature to the site (FRR April 2003).

Figure 41. The top to a concrete-lined well located behind the fan-house complex (FRR April 2003).

Figure 42. A steel fuel tank buried by overburden (FRR April 2003).

Like all historical properties, the significance of the Winston Tunnel Fan House ultimately is determined by its eligibility to the National Register of Historic Places. Eligibility to the National Register of Historic Places is based on four broad criteria that are defined by the National Park Service and used to guide the evaluation process. These criteria state that, "the quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and"

> A) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> B) that are associated with the lives of persons significant to our past; or
>
> C) that embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose component may lack individual distinction; or
>
> D) that have yielded, or may be likely to yield, information important in prehistory or history.

Historic properties can be assessed as being National Register eligible both individually and—where appropriate—as part of a historic district. We will consider the Winston Tunnel Fan House's eligibility in both respects. Generically speaking, a property such as the fan house potentially presents an excellent candidate for individual nomination to the National Register under both Criterion C (architecture) and D (archaeology). The original section of the facility was based on the Churchill ventilation system,[3] which was a specialized engineering design specifically adapted to long railroad tunnels. Although a number of other such ventilation stations are known to have been constructed around the country (such as the two previously mentioned in the text), the fact that they were required for very long tunnels would have made them relatively scarce. This was certainly true of Illinois, where only a handful of the railroad tunnels were ever constructed.[4] The Winston Tunnel is the longest of these tunnels in the state and—to our knowledge—is the only one to be equipped with a ventilating station. Hence, the

[3] While the complex's design clearly was based on the Churchill ventilation system, there is no evidence of Charles Churchill having been involved in the project.

[4] One other railroad tunnel is located in East Dubuque, Illinois and used in the approach to the Illinois Central's bridge across the Mississippi River. Another tunnel is located at Tunnel Hill, Johnson County, in southern Illinois. This tunnel was constructed by the Vincennes and Cairo Railroad in the 1870s and originally extended for 843 feet. In 1929, however, a section of the tunnel collapsed, causing it to be shorted by 300 feet. The tunnel is now part of the Tunnel Hill State Trail and is owned by the Illinois Department of Natural Resources (IDNR 2002). There also are several other tunnels in southern Illinois, located along the Illinois Central Railroad. None of these tunnels are known to have been equipped with ventilation stations.

Winston Tunnel Fan House is the lone example of this building type in Illinois, and is indicative of railroad engineering and technological innovation during the early twentieth century. The fan house's potential eligibility under Criterion D relates to its information it can provide regarding the design of, and activity areas within, this particular building type. Although engineering drawings do exist for the facility, they are only *proposed* plans and do not show the complex as ultimately constructed. For example, the original plans called for a dual ventilation system, with two fans and engine rooms; only a single fan and engine were ever installed on site, however. Moreover, we do not have plans for any of the later modifications and additions to the building. Historic photographs provide a visual depiction of the changes through time, but only on the exterior. No interior photographs of the complex are known to exist. In the absence of such archival materials, the standing structure itself—and the materials within it—represents an extremely valuable source of information.

In addition to historical significance, however, National Register eligibility is based on integrity. The National Register recognizes seven aspects to integrity: location, design, setting, materials, workmanship, feeling, and association. The fan house retains good integrity of location, setting, and association. It remains at its original location, and the setting around it has changed little since its construction. Equally important, the fan house's association and relationship to the railroad grade and the Winston Tunnel remains clear, in spite of the fact that the rail line is no longer active. Aspects of workmanship, materials, and design also are evident. The walls of the fan engine room, and those of the pump room and office additions remain standing, and the window and door openings are intact (although most of the doors and windows sash have been removed). Footings also are present in the engine and pump rooms, and at the site of the fan, indicating the location of original equipment. The interior detailing within the building complex is limited, but this is not surprising considering the complex's utilitarian function. On the other hand, the wholesale removal of the mechanical systems has severely compromised the fan house's integrity of materials, workmanship, design, and feeling. The fan, fan engine, and nozzle (or cowling) represented a significant part of the building complex, and, indeed, these features were the most potent and obvious symbols of the facility's use and function. But they have been removed, along with ancillary equipment such as fuel and water pumps, and there is little to distinguish the fan house complex from other abandoned railroad buildings to the casual observer unfamiliar with its original purpose.

Viewed **individually**, the Winston Tunnel Fan House does not retain sufficient integrity to be listed on the National Register of Historic Places under either Criterion C or D. While admittedly representative of a unique building type, we feel that the complex has lost too much of its physical fabric to warrant such as a designation. Nor is it considered eligible under Criteria A and B, since it is not associated with a significant historical event/pattern or person of note.

In addition to being assessed for its National Register eligibility on an individual basis, a historic property also may be assessed as part of a larger site or historic district. While not applicable to all properties, this can be done when there is a concentration of sites, buildings, structures, and objects with a historic linkage. This most certainly applies to the fan house, which is part of a cluster of resources linked to the construction and operation of the Winston Tunnel. In discussing the significance of the Winston Tunnel, Daryl Watson, executive director of the Galena/Jo Daviess County Historical Society and Museum, notes: "The Winston Tunnel was an engineering marvel, but one which almost bankrupt the line and ultimately helped lead to its abandonment. While the line passed through several states, the section through Jo Daviess County—with the tunnel—was by far the most difficult and challenging. It was the longest railroad tunnel ever built in Illinois. Local significance also is enhanced by the Elizabeth depot, just a few miles east of the tunnel and now listed on the National Register of Historic Places" (Watson 2000). The tunnel represented a linchpin in the Chicago Great Western's main route through Illinois and involved extraordinary efforts on the part of the railroad to first build and then maintain and operate. Although sections of its roof have collapsed, the Winston Tunnel appears to retain excellent historic integrity overall, meeting all seven of the aspects of integrity previously mentioned. Both portals to the tunnel remain intact, as do the railroad grade passing through it and the dry-laid stone retaining walls flanking it. Other resources potentially associated with the tunnel include the shantytown (the site of Gallagher's Hotel) occupied by workers during the construction of the tunnel, and Winston Station, which began its history as a flag station and later was developed into a small depot. Although the buildings associated with these two sites have been razed, subsurface archaeological features may be present that could contribute to our understanding of the tunnel's initial construction and subsequent operation. Other features included with a potential district might include the railroad grade, stone retaining walls lining the approach to the tunnel, and the fan house.

Although the National Park Service has not produced a National Register bulletin relating specifically to railroads, Bulletin 42—*Guidelines for Identifying, Evaluating, and Registering Historic Mining Properties*—provides guidance that can be applied to other industrial properties. The bulletin recognizes that such properties are more likely to be abandoned and in poor repair than other properties. Equipment may have been salvaged and removed from the site and buildings left in ruins.

> Although these individual components may appear to lack distinction, the combined impact of these separate components may enable the property to convey the collective image of a historically significant mining operation. In essence, the whole of this property will be greater than the sum of its parts. In such cases, a mining property may be judged to have integrity as a system even though individual components of the system have deteriorated over time (Noble and Soude 1992:19).

Although integrity remains important, the fact that certain buildings may be missing some components (such as the roof, doors, windows, and equipment) does not compromise the integrity of the system as a whole. "If clear physical evidence of a complete system remains intact, deterioration of individual aspects of the system may not eliminate the overall integrity of the resource" (Noble and Spude 1992:19, 21).

The National Register guidelines indicate that a "contributing site, building, structure, or object adds to the historical associations, historic architectural qualities, or archaeological values for which a property is significant; a noncontributing site, building, structure, or object does not." They also define a contributing resource as one that was present during the period of time that the property achieved its significance, relates to the documented significance of the property, and possesses historical integrity or is capable of yielding important information relevant to the significance of the property (Townsend, Sprinkle, and Knoerl 1993:11). A property does not have to be eligible to the National Register individually in order to be considered a contributing resource, although it may be.

While the Winston Tunnel Fan House admittedly has lost some integrity—enough to make it ineligible for individual nomination to the National Register—we nonetheless feel that the property retains sufficient integrity to be a contributing element to a possible historic district centered on the Winston Tunnel. The fan house complex was constructed specifically to ventilate the tunnel and was an integral part of its operation from circa 1912-1916 to 1948. The mere fact that the ventilation station was needed at the site speaks volumes about the challenges posed by the tunnel. Enough of the facility remains intact to illustrate the system associated with the tunnel's operation.

It is important to note, however, that no National Register district has been defined around the Winston Tunnel. As many of the documented properties lie on private property adjacent to state lands, no formal assessment has been made of the other resources discussed above as potentially contributing to a district, and we do not know their integrity or information potential. Several of the resources—the shantytown and Winston Station, for instance—actually lie on private and are not accessible. As such, we are not able to make a formal assessment of a Winston Tunnel Historic District.

Whatever the future of the Winston Tunnel Fan House may be, we feel that the documentation package included within this report—including scaled floor plan, physical description, and 35mm photographs—is complete and that no further fieldwork on the complex is warranted. We also have considerable information on the original equipment installed in the facility, via the ICC Bureau of Valuation records. One area of archival research that might be pursued in the future is the investigation of local newspapers—particularly those published in Galena—in order to determine a more precise date of construction for the fan house, as well for the later additions. These articles might also provide some information regarding the engineer in charge of construction.

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