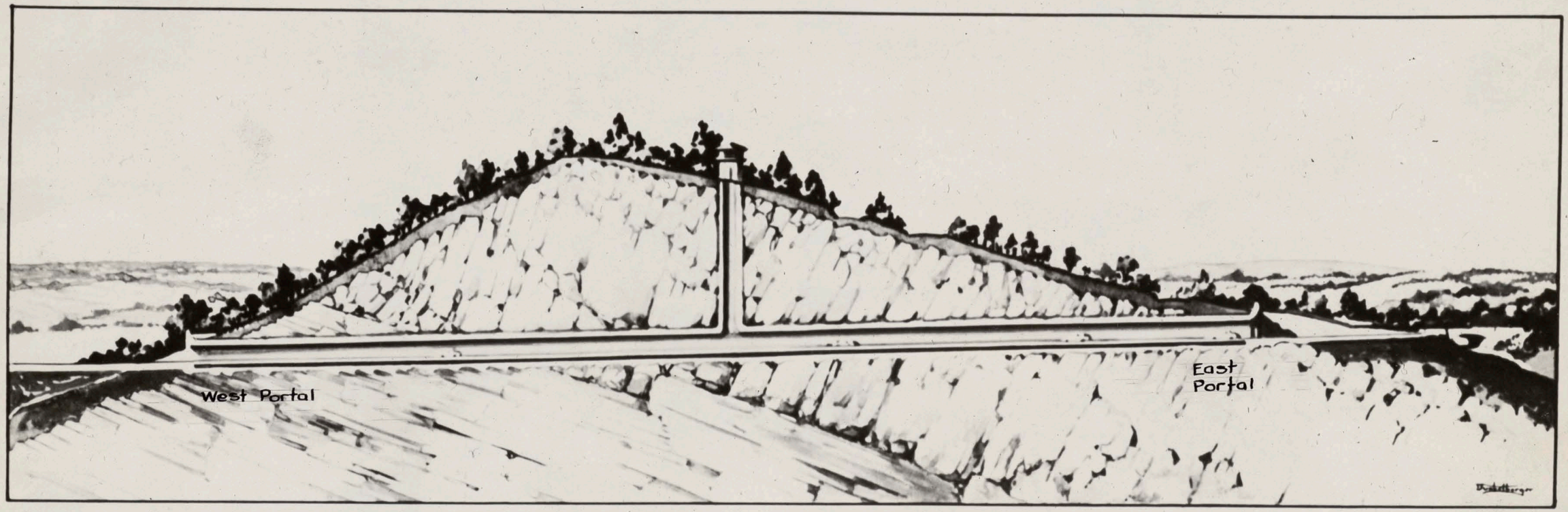
The
West Rock Tunnel
On The
Wilbur Cross Parkway
New Haven
1948 1949

Compiled By
Connecticut State Highway Department
G. Albert Hill, Commissioner
1950



LONGITUDINAL TUNNEL SECTION - WILBUR CROSS PARKWAY - WEST ROCK, NEW HAVEN CT.

WEST ROCK TUNNEL

WILBUR CROSS PARKWAY

CONNECTICUT

Preliminary Studies

Connecticut's West Rock Tunnel, the costliest of 69 Wilbur Cross Parkway projects, is the state's first vehicular tunnel. Consisting of twin bores 1200 feet in length, it carries divided traffic lanes through West Rock, New Haven, about 200 feet below the summit of the ridge. Work on the $2,000,000 project was started in March 1948. The facility was opened to traffic on November 1, 1949.

Preliminary studies of projected lines for the Wilbur Cross Parkway through the New Haven area were begun in the late 1930's under former Highway Commissioner William J. Cox. The problem which faced the engineers at that time was to project a line as near New Haven as possible and at the same time avoid the plentiful rock formations in the area. Several lines were run but none met all of the requirements. A route west of the "Rock" through the Bethany gap was too far inland to serve as a New Haven - Hartford facility. East of the ridge the alignment was poor, and much property damage was involved. Exhaustive studies indicated that the cost of the shortest line, through West Rock, was very close to the cost of the best alternate. Consultants engaged by the highway department in 1940 determined that a tunnel through West Rock would save $100,000 in right-of-way as compared with any route around the ridge, would be shorter and would be less costly to maintain. It was also found that the line through the Rock would be seven-tenths of a mile shorter than the shortest alternate line, a saving pre-destined to meet with the approval of the traveling public. It was also determined that a right-of-way easement for this location was obtainable from the New Haven Park Department.

After a tunnel was decided upon a contract was let for five test borings to determine the character of the rock. One hole was bored at the summit to a point 222.6 feet below the proposed grade. This showed hard trap rock for the entire depth. Other bores disclosed similar trap rock, except at the approximate location of the west end of the tunnel, where 19 feet of sandstone was encountered. It was, however, below tunnel grade except at the face of the mountain.

Connecticut trap rock is a fine grained, hard igneous rock, very homogeneous through-out. Geologically called diabase or delerite its chief minerals are plagioclose feldspar and sugite. It has a hardness of six on the geological scale. Two-inch diameter samples showed many fine seams from 0° to 30° from the horizontal though the majority were about 15° from the vertical. Recovery was measured and was found in practically all instances to be above 90%.

After this information was obtained the consultants submitted plans for the study of three possible schemes:

1. Twin bore tunnels, each 26 feet 6 inches wide.
2. Single bore tunnel, 52 feet 6 inches wide, traffic separated by a 3-foot raised center strip.
3. Single bore tunnel, half of the first scheme.

Number three was eliminated as insufficient for traffic needs.

Number one proved less expensive than number two and the most economical method of providing for four lanes of traffic.

At this stage of the studies the advent of World War II caused temporary abandonment of further consideration of the project.

Preparations for Construction

In 1945, the highway department bridge design section began preparation of working drawings. In addition a traffic analysis was made which further strengthened the decision to proceed with plans for a tunnel. It

was estimated that traffic using the tunnel in 1950 would equal some 13,000 cars per day.

Subsequently the firm of Parsons, Brinckerhoff, Hogan and MacDonald was engaged to proceed with the tunnel design. The final plans called for a twin bore tunnel, 1,200 feet in length with bores 63 feet center to center, 23-foot roadways flanked by curbs 2 feet 6 inches wide and tile lined sidewalls. The portal construction was designed for cantilever reinforced counterfort walls, having circular arches of ashlar and dimensional stone masonry, with quick transitions to the vertical sidewalls and parabolic arch inside tunnel.

Bids on the project were requested in December 1947 and were opened on the 22nd of that month. There were seven bidders for the work, the lowest being L. G. Defelice & Son of North Haven, Connecticut joined with the Gull Contracting Company of New York. This contracting combination was awarded the contract for the tunnel in January 1948 on the basis of their bid of $1,934,203.

Work Started

Work was started at the break-up of the severe winter of March 10th, 1948.

The contractor's first step was to clear a place to work and open up the portal faces preparatory to drilling, firing and excavating the actual tubes. Pay lines for unclassified, portal and tunnel excavation were vertical construction lines established on the plans. The contractor elected to excavate to a slope line that would stand beyond the established vertical pay lines. This meant additional excavation of some 27,000 cubic yards of earth and loose stones at the west portal and some 14,000 cubic yards of the same material at the east portal. All of this material to be replaced at his expense before completion of the contract.

The tunnel was designed on an ascending 3% grade west to east. The contractor began work at the west portal since that was the lower grade. This was to prevent a head of water accumulating later in the working face

as boring progressed. Also, about 85% of the tunnel excavation was destined for the fill on the west approach.

While excavating the overburden, etc., the contractor also engaged in setting up a plant. This installation at the west portal included a battery of four 500 and four 315 cubic-foot compressors and air receiving tank. Also a blacksmith shop, carpenter shop, 20-foot x 30-foot steel building for general repair shop, fuel tanks and pumps. A building was constructed for the miners, and was equipped with lockers, showers and inside plumbing facilities. Temporary transformers were installed to supply a 2,400-volt current.

For drilling purposes the contractor built drill jumbos on two Linn half-tracks. The jumbo frames were erected so that the two units could be dovetailed to make one unit. Two vertical lines of steel columns were set up on bottom crossbeams. Three platform levels were then built upon cross-beams carried by these columns. The lower and middle levels were built with cantilever platforms on each side and the top level consisted of a canti-lever sliding platform on the inside only, inasmuch as the rough tunnel contours would not permit the use of an outside platform. Thus, four levels were used for drilling the tunnels with four drifters working the ground level and the first and second platform levels and two drifters on the top level. These drifters were so hung on the jumbo that by adjustment any area of the tunnel face could be readily drilled.

Air, water and lights were hooked to the jumbos after the two com-ponent rigs were in place. It was necessary to install a 2 1/2-inch aux-iliary electric pump to boost the water pressure from the main to the drifters.

Payment Lines

The specifications stated that the arbitrarily determined location of the rock portals should not be interpreted to indicate that the top of the

rock at the portals would be found at such elevations that it would bridge the tunnel bores. Therefore the contractor was advised to make his own determination as to the location of such rock-bridging conditions.

"A" and "B" lines were set up on the contract plans and in the specifications as reference lines in the typical sections of shaft and bores.

The "A" line was the line of minimum thickness of concrete lining in the shaft tunnels, and concrete walls and footings in the tunnel portals within which no rock would be permitted to remain.

The "B" line de-limited the rock excavation to be paid for. This "B" line was fixed and shown on the shaft, tunnel and portal sections on the plans, and was generally 6 inches outside of the "A" line.

Hence the "A" line represented the construction line and "B" the payment line.

The contractor proceeded in May to drill vertical line holes 4 inches on center along the "A" lines of open cut section for both tunnels at the west portal. By June, he was blasting and mucking out these areas, muck being hauled and placed for approach fill.

Late in June, the cut and cover or open cut sections of both tunnels at the west portal were completed. The jumbos were moved into place at the north tunnel face to drill the first round. A full face method of operation was adopted again, line holes 4 inches on center were drilled but this time horizontally on the "A" line.

Drilling and Excavating Details

On June 21, the first round, made up of some 162 line holes 12 feet deep and 89 firing holes, 4 1/2 feet deep in the north tunnel were completed. These were fired in three separate shots, the first a wedge shot near the center of the heading, the second, the remaining portion of tunnel below the spring line of the arch. The arch section was third. The pull obtained from this firing was four feet. After excavating the blown rock,

steel arch ribs, sills and columns were set on 2-foot centers.

The columns consisted of 8-inch flanged beams sharply leveled at the arch line and plated at the top to meet the thrust plates of the heavier 8-inch beams that were to span the tunnel roof. These frames were to remain as a permanent part of the tunnel structure. On July 1st, 1948 the south tunnel was drilled and the same procedure followed.

Work in both tunnels was pushed simultaneously, and borings in both headings were kept about equidistant from the portals. Driving operations were handled by two shifts of two crews each, one crew operating in one shaft, drilling, loading and blasting a round while the second crew scaled, excavated and set and blocked steel frames in the other shaft.

Each drilling crew was made up of twelve drillers (miners), twelve muckers, two scaling miners and one nipper and shifter or heading boss. The twelve miners loaded and fired the rounds drilled under the supervision of the walking boss. Each mucking crew employed a shovel and operator, oiler, bulldozer and operator, three dump trucks, a safety miner and two laborers.

In drilling, the two drill carriages or jumbos were used side by side, working against the face of the heading. At the beginning of the project, conventional rock bits were used, but only 3 to 8 inches could be drilled per bit in the tough trap rock. A change was made to Carboloy 2-inch bits which proved good for about 300 feet of rock per bit. From 55 to 75 holes were drilled for a blast, using nine delays.

At the start of each tunnel, as previously described, a 4-foot round was drilled. This was increased to 8 feet and finally to 12 and 13 feet. The latter depth of holes was generally used throughout, resulting in an average pull of 11 to 12 feet. This was achieved in both headings each day. Hercules Gelamite No. 2X dynamite was used, and approximately 2.3 to 2.9 pounds were required to remove one cubic yard of rock. This was considerably lower than anticipated, as in many similar cases from 4 to 6 pounds

are needed per cubic yard.

With few exceptions the steel ribs or frames were set on 6-foot centers. This spacing was maintained throughout practically the entire length of both tunnels. The 8-inch ribs and arch sections were fabricated in a steel plant and shipped to the job ready for erection. The vertical members were erected on footings of 4-inch by 10-inch timber sections, while the arch pieces were bolted in place from the drill jumbos, each jumbo being equipped with an Air Tugger Hoist for this purpose. Any questionable places in the rock perifery were blocked and shored with heavy timbers. Three by ten-inch temporary lagging was placed between the lower flanges of the arch steel as protection to the men against any rock that might air slack or fall from vibration or other causes.

The headings were lighted by reflectors attached to extension cords. At the beginning of the work, these expensive light reflectors were shot-up so frequently by the blasting that the contractor replaced them with ordinary aluminum kitchen dish pans. A couple of light bulbs were placed in each pan. This arrangement gave most satisfactory results, since the aluminum pans had excellent reflecting qualities, and at the same time withstood flying rock very well.

Temporary Ventilation

A 30-inch metal ventilating line was installed in each bore suspended at a height of about 7 feet above the tunnel floor. The two lines came together outside the west portal to form a Y. At the base of this Y a blower with a 36-inch reversible fan was installed which was capable of supplying 13,000 cubic feet of air at 2 1/2 pounds pressure. On each side of this reversible blower auxiliary blowers with 30-inch fans were installed. These produced 10,000 cubic feet of air. With this ventilating system, foul air was speedily drawn from the tunnel after each blast. Then the system was reversed and the auxiliary fans forced fresh air into the headings. The

main blower was powered from a 2,300 volt line, while the auxiliaries operated on 440-volt current.

East Portal

While progress was being made in the west bores work had started at the east portal. Overburden material had been removed, cut and cover sections line-holed and blasted to predetermined tunnel-heading locations. Portal footings were blasted out and excavated. A temporary culvert was installed to carry an adjacent brook so that the contractor might stockpile excavated material to be moved later through the tunnel and used in completing the west approach fill.

Working thus from both ends of the tunnel, the contractor holed through with the final blast on November 8.

Ventilating Shaft

With this work accomplished, blasting and drilling operations were centered around the shaft for the permanent ventilation of the tunnels. The ventilating shaft resembles a great concrete flue, containing four 6-foot diameter, vertical openings. The structural work is supported on a steel frame built at about the level of the tunnel ceilings. The shaft is located midway between the portals, with a control room at its base between the two bores. From the top of the shaft to the roof of the control room is approximately 180 feet. An octagonal-shaped house is built atop the shaft to exhaust foul air. This structure is faced with random-ashlar stone and is fitted with aluminum louvres. The ventilating shaft is lined with concrete from top to bottom and houses four, 6-foot diameter, steel ducts.

The permanent ventilating system consists of two fans for each tunnel. These are located in the control room. The fans will exhaust foul air from the tunnels and blow it up the shaft which, provided with four separate ducts, will prevent the air from short-circuiting from one fan back through another fan to the tunnel.

The ventilating fan motors are controlled by means of carbon monoxide detector systems. In each tunnel there are two ventilation controls located at the quarter points in the length of the tunnel, and one combination analyzer and recorder located in the central control room. This gives three points of control for each tunnel. If the carbon monoxide content of the air in either tunnel increases above the setting on the controls a fan in that tunnel will start. If there is a further increase in the C.O. content the other fans will start and tunnel traffic lights will turn to red. The analyzer is capable of detecting as little as one part of deadly gas in a million parts of air.

These ventilating fans are 72 inches in diameter, of the "axial flow" pressure type and are connected directly to electric motors. Each fan will exceed 82,500 feet per minute capacity of 5/8-inch static pressure with a top speed of not more than 10,000 feet per minute. The motors are 25 horsepower, 220-volt, splash-proof type. The fan rotors are cast aluminum with integrally cast blades.

Concrete Tunnel Lining

Side wall and arch stagings for the concrete placement were steel. The framework was assembled on the project, made up of four sections, each 200 feet in length. The stagings rode on rails set on the tunnel safety curbs, the center frame held in place by screw bolts previously placed in the curbs. From this center frame the wall and arch sections were hung and jacked into place by horizontal and vertical jacks. In place, each unit fully assembled allowed placing of 80 feet of side wall, both sides, or 80 feet of entire arch for a depth of 9 1/2 feet from the top of the safety curb to the spring line of the arch. The walls were subsequently faced with glazed tile. The side wall forms in the area where tile was placed had vertical welded beads 1/4-inch in diameter, spaced 4 inches on center for better bond in setting the tile.

Concrete was placed by means of a one cubic yard pneumatic gun.

Aggregate was batched from the plant to single drum paver, mixed and dumped directly into the gun. The gun was set up on sleds attached to the air receiver tank. Air for the tank was furnished by two 500 cubic-foot compressors outside of the tunnels. With the concrete in the gun, the press-weld chamber holding the mix was sealed off by air locked doors. Under 80 pounds of air per square inch the concrete was shot through a 6-inch metal pipe into place. In some instances the concrete was forced a distance of 800 feet in 35 seconds.

Control of water proved a major advantage in placing concrete by use of the gun. Slumps averaged 2 1/4 inches and less. Six cylinders were made for testing each day's placement. It was pre-determined there should be 400 pounds per square inch concrete in the side walls and 600 pounds per square inch concrete in the arch before stripping the forms. Two test cylinders were broken forty-eight hours after the first pour. Results were so good that the time was cut to forty hours. Strength at forty-eight hours was as high as 1,190 pounds per square inch. All breaks at forty hours were better than 550 pounds per square inch and averaged 880 pounds. Seven day breaks of the concrete averaged well over 2,000 pounds per square inch. These breaks enabled the contractor to get three side wall pours or 240 feet of tunnel-side per week.

The pavement placed throughout the tunnel extended 50 feet outside of the portal walls at each end. It is eight-inch reinforced concrete from curb to curb with a 1/4-inch premoulded, expansion joint at each curb. The pavement was placed on a broken stone base which filled the space between the rock and subgrade surface. This provides for sub-drainage from beneath the pavement into intermitently-placed four-inch weep holes which are connected to 15-inch diameter culverts. The pavement has a cross slope of 1/8-inch per foot with 5/8-inch cross slope for the outside 2 feet sloping to the right of traffic direction. Ramp drains were installed for the full width of each pavement and 25 feet inside of each portal face.

The portals are random ashlar for which pink granite was used. All dimension ring stones, quoins and turrets and the stone for the walls of the portals were cut and shaped at the quarry.

Tunnel Lighting

The tunnel lighting system has been designed to meet both day and night conditions with luminaires located on the center line of the roof throughout the length of each bore. For general illumination, 300 watt luminaires are spaced on thirty foot centers with closer centering used in each entering hundred feet. An electric eye provides approximately two foot candles of light on the roadway at all times. Caution and stop lights are installed for emergency use at stations within the tunnels and fire extinguishers are located in wall niches at equal intervals. Removal of any extinguisher will automatically change the lights in the tunnel concerned, to caution, and start a ventilating fan in the control room.

Safety Measures

During construction of the tunnels safety precautions were enforced. The inside of the tunnels were brilliantly lighted so that the workers could see during all operations. No one was allowed to enter the tunnel without a "hard hat". When a blast was shot, the shift boss was the last man to step to safety and the first to examine the results before allowing the men to return to work. Periodic safety inspections were made by both representatives of the contractor's insurance company, and by the Safety Engineer of the highway department. Department of Labor inspectors also visited the site and made recommendations for safe operations. The contractor maintained a well-equipped first aid room on location for the duration of the job. During the period of tunneling, a doctor was available at all times. One life was lost throughout the course of the entire project.

WEST ROCK TUNNEL

Scale of Miles

1 0 1 2 3 4 5

West Rock, New Haven prior to the start of construction of the tunnel in March 1948. This view across the West River shows the west side of the "Rock" and the notch which marks the approximate center line of the twin bores.

Close up of the notch on west side of West Rock prior to construction showing brush-cleared center line of tunnels.

Beginning of operations at the west portal included the removal of earth overburden and loose rock to expose the solid rock face. In this view excavated material has been deposited (foreground) to approximately the required parkway grade.

Wagon drills are being operated in this view of the west portal preparatory to blasting rock to portal line. At top of picture, survey targets mark the center line between the twin tunnels and the center lines of both bores.

Drill rigs on Linn half-tracks provide for the simultaneous operation of 14 drills in this view of southeast bore. Drilling, blasting and excavating alternated between the bores as required as work in each tube progressed uniformly around the clock.

After the first blast in the southwest bore a gasoline-powered shovel moved in to excavate the material. Arch drill-holes may be seen above the open section of the bore.

Close-up of the back of the shovel as it progresses inward beneath some 150 feet of trap rock overhead.

Blown rock was removed from tunnel bores in "Dumptors". These were short-wheel-based carriers, each capable of hauling a load of six cubic yards and having equal forward and reverse speeds. The one shown in this view of the west portals is returning to the bore after dumping its load.


LORAIN
8


LORAIN

Removal of trees, brush and earth to uncover the rock at the site of the east tunnel portals, as shown in this view, was begun in July as tunneling progressed in the west bores.

Drill platforms were used to erect steel arch ribs which were installed as work in the bores progressed. This is view in south bore looking in from west portal.

View of permanent steel side-posts supporting arch ribs in south bore.

Rock face at east portal showing first pair of arch ribs in place.

The "hole-through" or final blast in the north tube was detonated on November 8, 1948. In this view smoke from the blast may be seen arising from within the tube. This is at the east portal.

Appearance of the south tube at the time of the "hole-through" in its twin. This view from east to west shows the permanent steel arch ribs and their supporting members in place.

The final blast on November 8, 1948 was attended by brief ceremonies at which Governor James C. Shannon was the principal speaker. Photo shows him about to throw the switch which set off the final charge of dynamite.

State Highway Commissioner, G. Albert Hill was also a speaker at the "hole-through" ceremony. His praise of the work done thus far was tempered by his regret that one life had been forfeited during the course of tunneling through.

This view of the east portals in May 1949, shows progress on the construction of a bridge to eventually carry the parkway over Wintergreen Avenue and Wintergreen Brook. The structure, built by the Brunalli Construction Company of Southington, Connecticut, has a span of 70 feet and is of the "open-well" type.

In this view of the south bore, workmen on traveling platform are placing reinforcing steel prior to concreting the arch ceiling. Specially-designed platform frame travels on side curbs.

Tunnel drainage system included 15" reinforced concrete pipe imbedded beneath pavement. In this photo workman is calking joint in pipe. Opening near his right hand is for connection of drain pipe of lesser diameter.

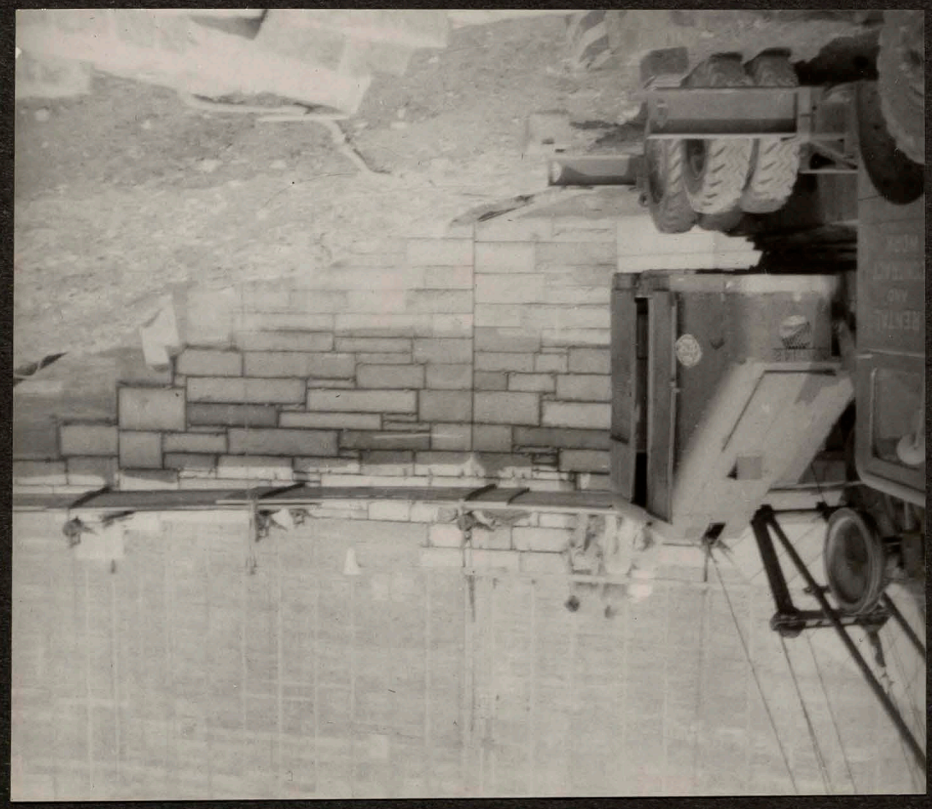
In this view the drainage pipe is emerging from the south bore at the west portal.

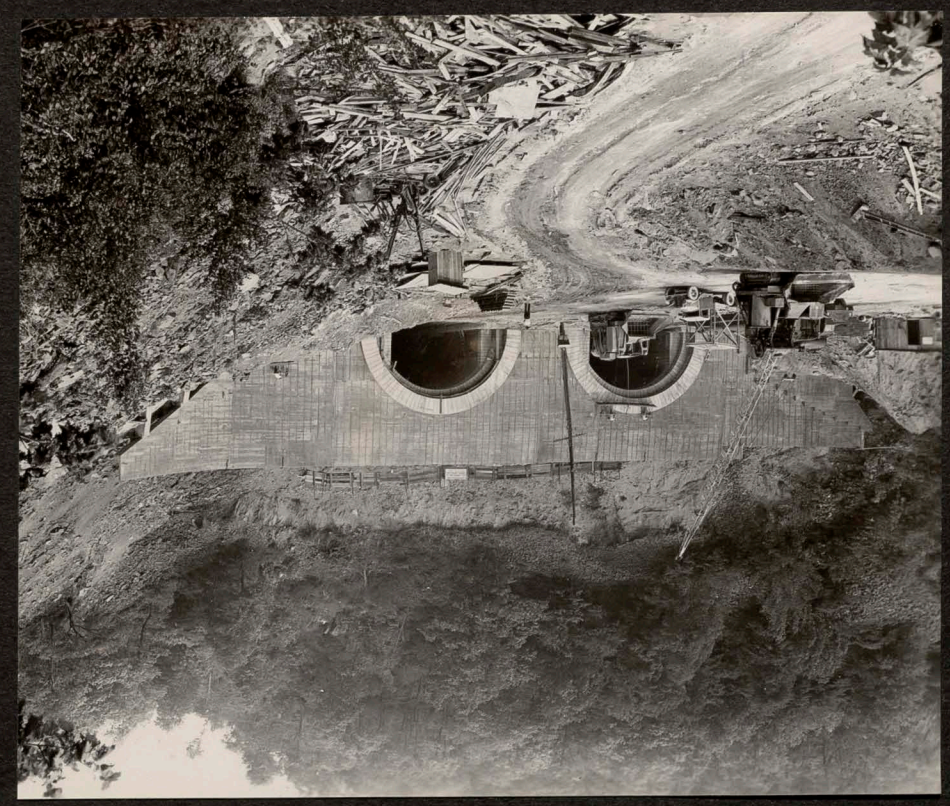
In this view of the west portal area some of the concrete footing (foreground) for the retaining wall has been poured. South bore arch forms are in place at temporarily-open section of tunnel.

This view of the area between the west portals shows the steel reinforcing bars, already imbedded in the concrete footing. These will take care of the stresses in the concrete retaining wall to be poured later. In the foreground, granite facestones are stocked for subsequent use.

In this photo of the west portals the concrete retaining wall has been poured and the forms stripped. The arch-ring face stones have also been set in place. These stones as well as those with which the wall will be faced are commercial "pink" granite.

In this close-up of the west portal wall, masons are setting stone facing. Gasoline crane, left foreground hoists stones into approximate position.



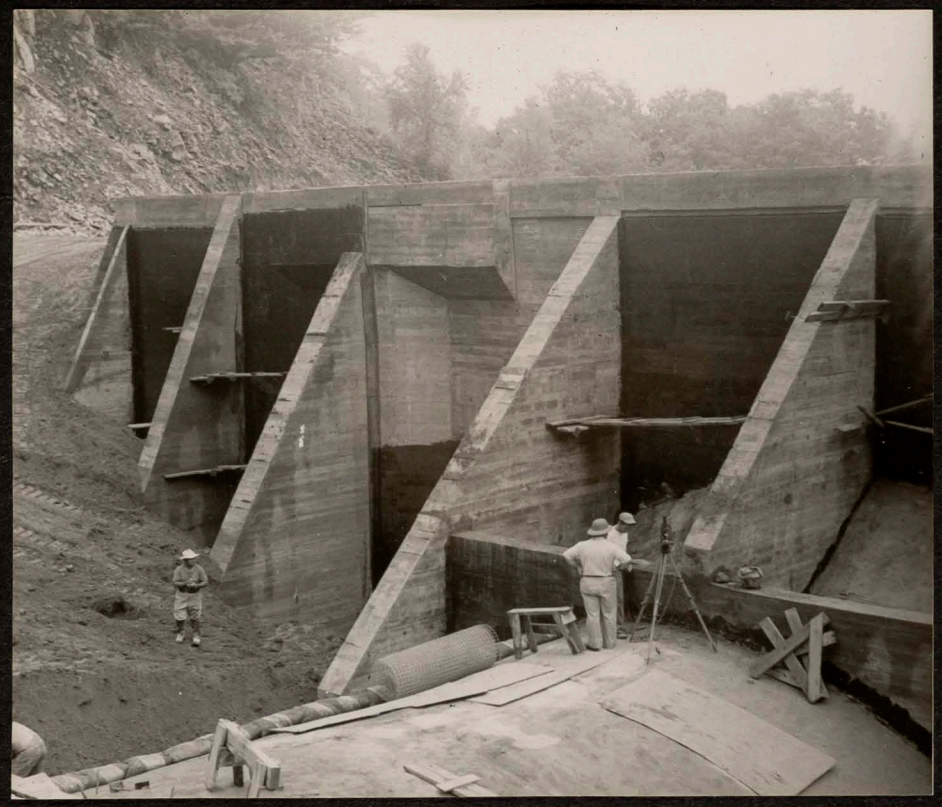


Rear view of the west portal retaining wall showing the supporting counterfort walls. Engineers with transit are standing atop the barrel of the north tunnel.

In this view of the rear of the west portal, gravel-filled sacks are being stacked against the outside of the north tunnel roof to provide drainage for the back-fill material which will be superimposed thereon.

Cross corridor between tunnels in which control room will be installed. The room will house the four ventilating fans and equipment for controlling lights and traffic signals.

Interior view of north tunnel showing tile walls and concreted roof. Roadway has not yet been paved.

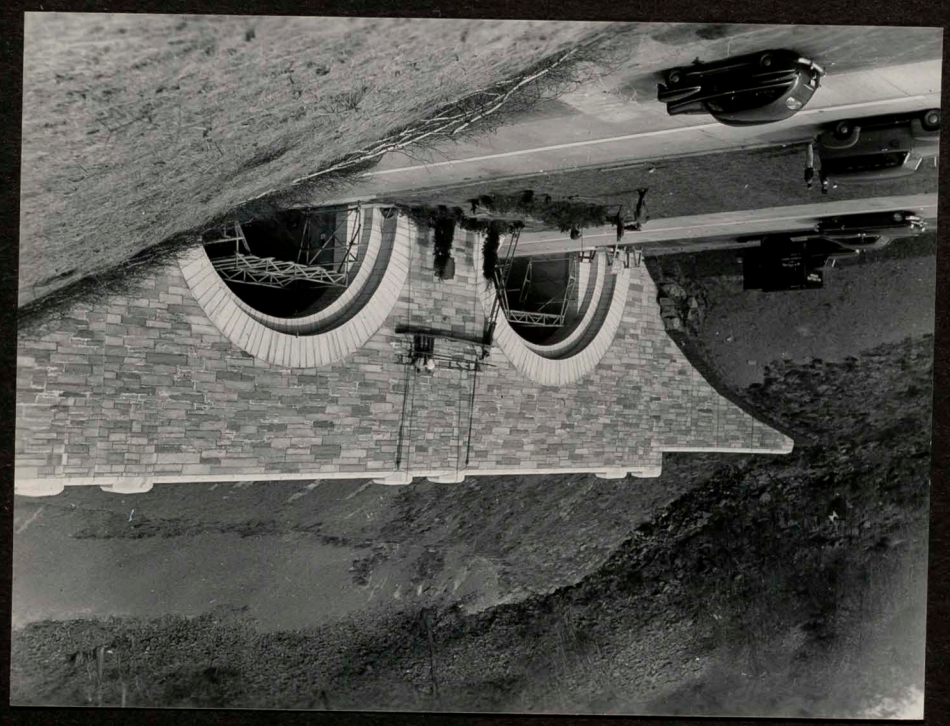


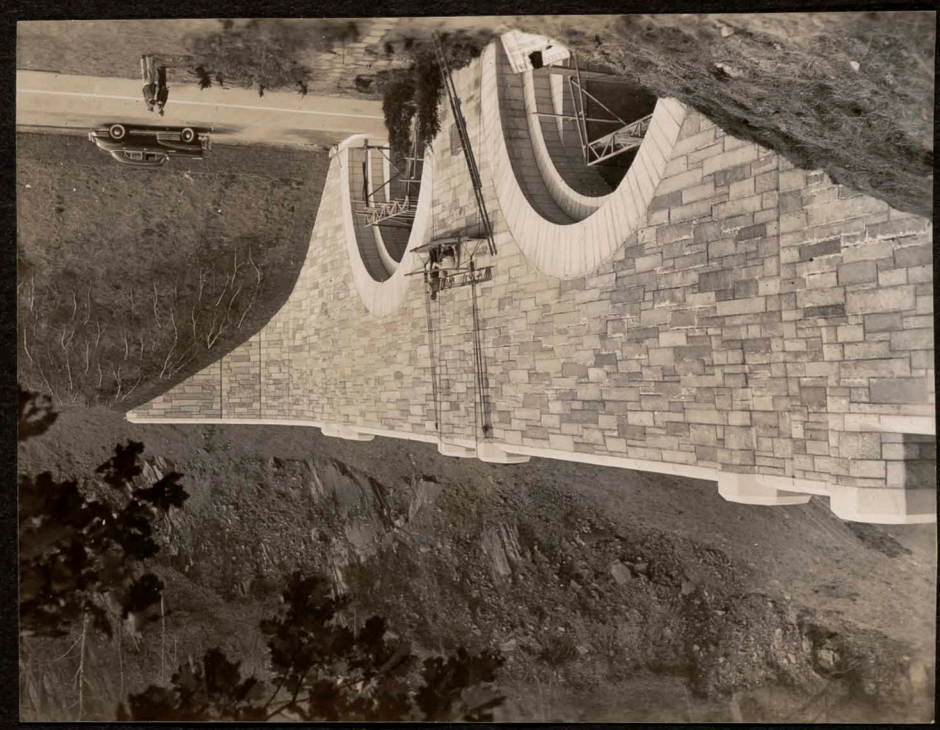
West portals from the north side showing completed random-ashlar stone facing on the retaining wall. Workmen on scaffold are erecting the 15-inch high bronze inscription "West Rock".

West portals from the south side of parkway. Slopes have been loamed, seeded and mulched to provide rapid grass cover.

West portals and a section of the dual-lane Wilbur Cross parkway nearing the completion stage in September 1949. Over the top of the notch may be seen another section of the parkway in Hamden.

The east portals in September 1949, showing (above) West Rock's Baldwin Parkway being restored. In the foreground the bridge over Wintergreen Avenue is completed.





The last two links in the Wilbur Cross Parkway and the West Rock Tunnel were opened to traffic Nobember 1, 1949. In accepting the facility for the people of the state Governor Chester Bowles (at microphones) said that the opening of the parkway marked the completion of "the most important highway project in the history of our state." Seated behind the governor in the photo are, left to right, former Highway Commissioner, William J. Cox; Lt. Gov. William T. Carroll; Cornelius F Mulvihill, State Commissioner of Motor Vehicles; State Treasurer, Joseph A. Adorno; Francis V. Matera, Deputy Commissioner, Massachusetts Department of Public Works; and Connecticut State Highway Commissioner G. Albert Hill.

Addressing the guests at the dedication ceremonies, Commissioner Hill (at microphones) complimented his predecessor, William J. Cox during whose regime plans for the tunnel were instigated. He also remarked that the parkway was "a fitting memorial to one of our greatest compatriots, Wilbur L. Cross." (Unidentified in preceding photo, extreme left, former governor Raymond E. Baldwin.)

Flanked left and right by Wilbur Cross Jr. (also with shears) and S. Avery Cross, sons of former Governor Wilbur L. Cross for whom the parkway was named, Governor Bowles cuts the ribbon opening the tunnel and the entire parkway to traffic.

Following the ribbon cutting, the ceremonies moved to the west portal where Mrs. G. Albert Hill, wife of the highway commissioner, unveiled a bronze plaque bearing the names of officials connected with the project.


WAVZ

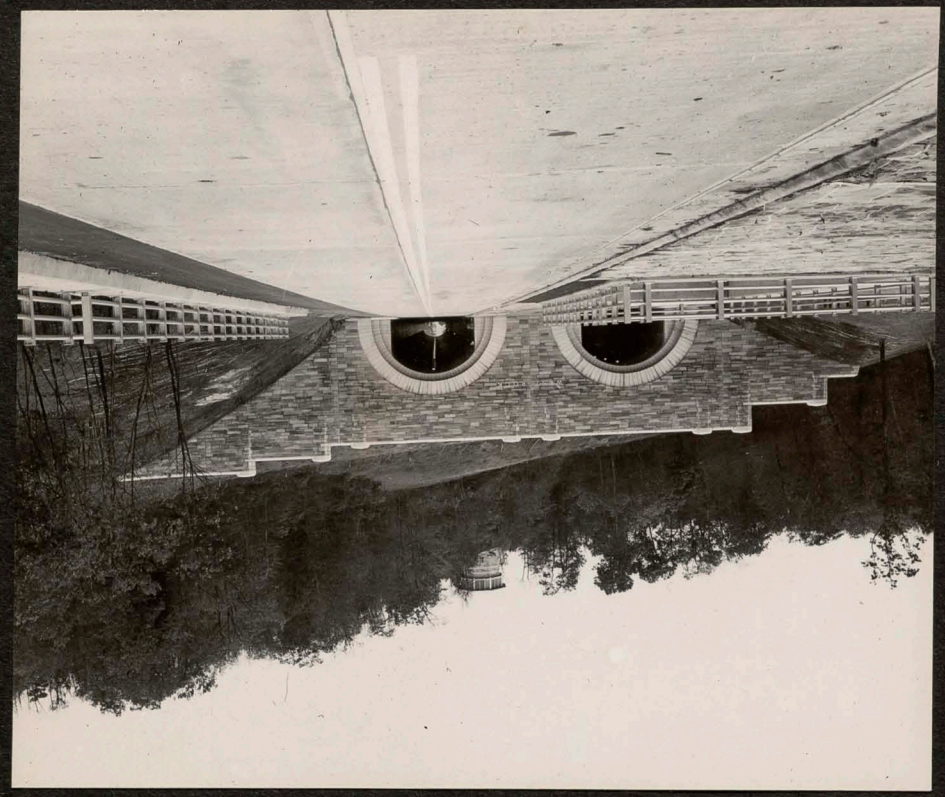

WAVZ

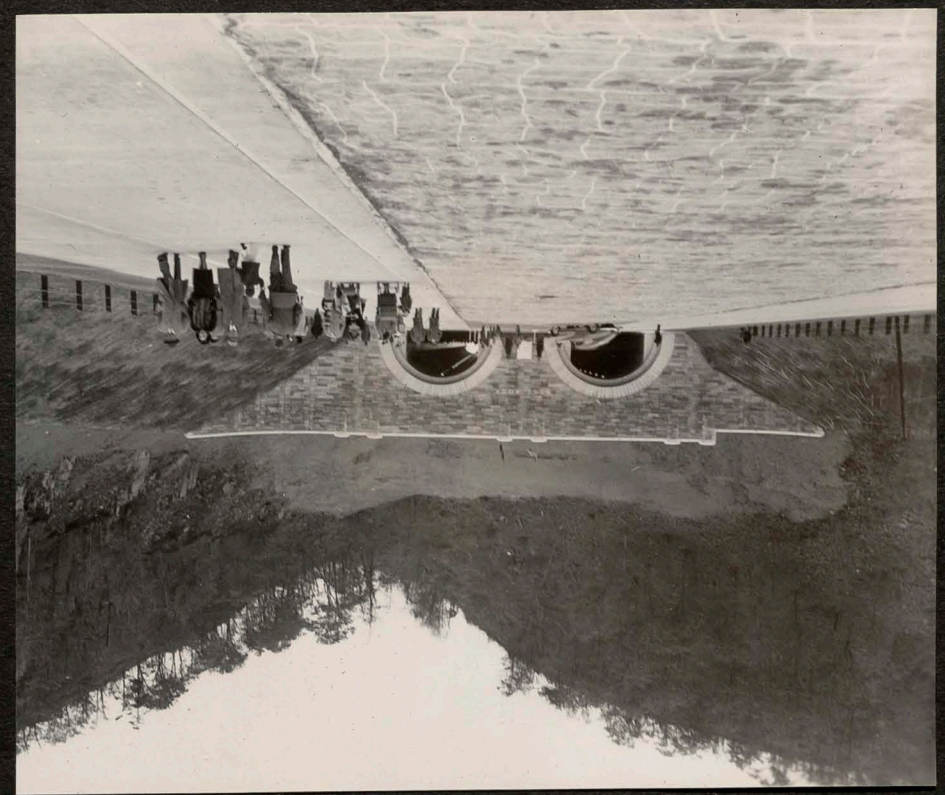
Close-up of bronze plaque listing the four governors and two highway commissioners during whose terms in office the tunnel was planned and constructed. The inscription on the tablet beneath the plaque reads, "This tablet is placed in memory of Frederick Meade who lost his life July 3, 1948 during the construction of these tunnels." The middle initial "J" in the name of former governor James C. Shannon was later corrected.

The ground area adjacent to the wall which bears the plaque had been landscaped and planted by highway department landscape forces as shown in this photo.

The west portals on November 1, 1949. Pedestrians inspected the tunnel prior to the opening of the facility to traffic.

East portals on November 1, 1949. In this view the ventilating shaft house may be seen atop the "Rock".






WEST ROCK TUNNEL

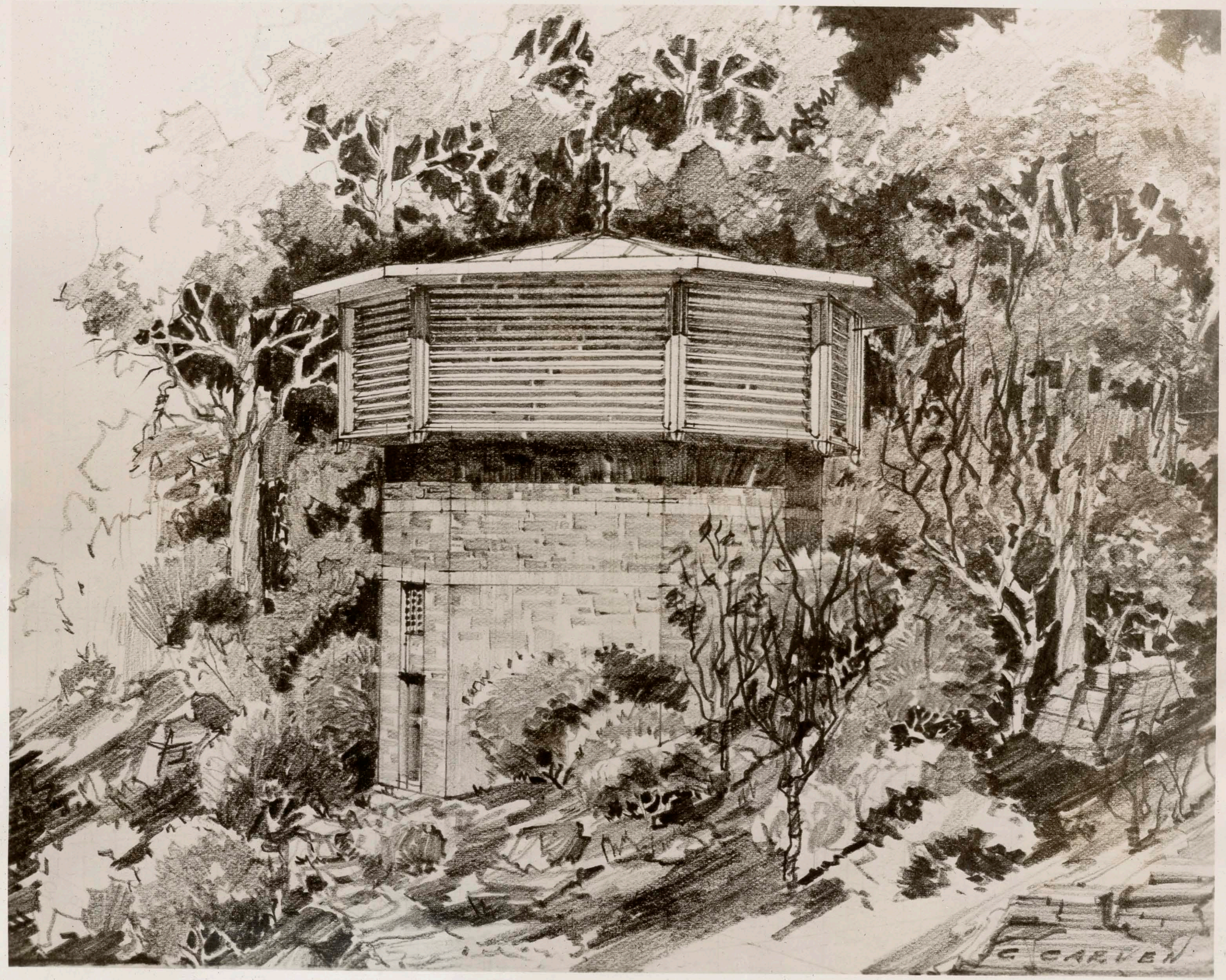

WEST ROCK TUNNEL
CONSTRUCTED UNDER THE SUPERVISION
OF THE
CONNECTICUT STATE HIGHWAY DEPARTMENT
COMPLETED — NOVEMBER 1949
GOVERNORS
RAYMOND E BALDWIN JAMES L McCONAUGHY
WILBERT SNOW JAMES J SHANNON
CHESTER BOWLES
HIGHWAY COMMISSIONERS
WILLIAM J COX G ALBERT HILL
DEPUTY HIGHWAY COMMISSIONER
ARTHUR W LUESHER ROY E JOLSTENSEN
CONSULTING ENGINEERS
PARSONS BRINCKERHOFF HALL AND MACDONALD
CONTRACTORS
CIVIL CONSTRUCTION CO.INC AND L.E. PELLETIER & ASSOCIATES JOINT VENTURE

View of the Wilbur Cross Parkway from the east portal. Cheesecloth-covered, center median strip has been loamed and seeded. In background the Woodin Street, Hamden overpass carries traffic over the parkway.

This is the view which greets the motorist from within the New York-bound lane of the twin tunnels. From the top of the hill in the background a new view of the city of New Haven may be had.

Air view of the Wilbur Cross Parkway southerly from West Rock showing the Conn. 69 traffic interchange in foreground. At the right of center an entrance to the parkway from Conn. 67 is also shown.

Air view of Wilbur Cross Parkway and West Rock Tunnel (background) looking toward Hamden. Building to right of and slightly forward from the tunnel is the highway department's Pond Lily Service Building, completed just prior to opening of tunnel to traffic. The building is headquarters for district three. This photo also shows the Conn. 67 & 69 traffic interchange.



Sketch of Ventilating Shaft House