PDHonline Course C818 (12 PDH)

AUTOBAHN: Das Road

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2020

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AUTOBAHN

Das Road

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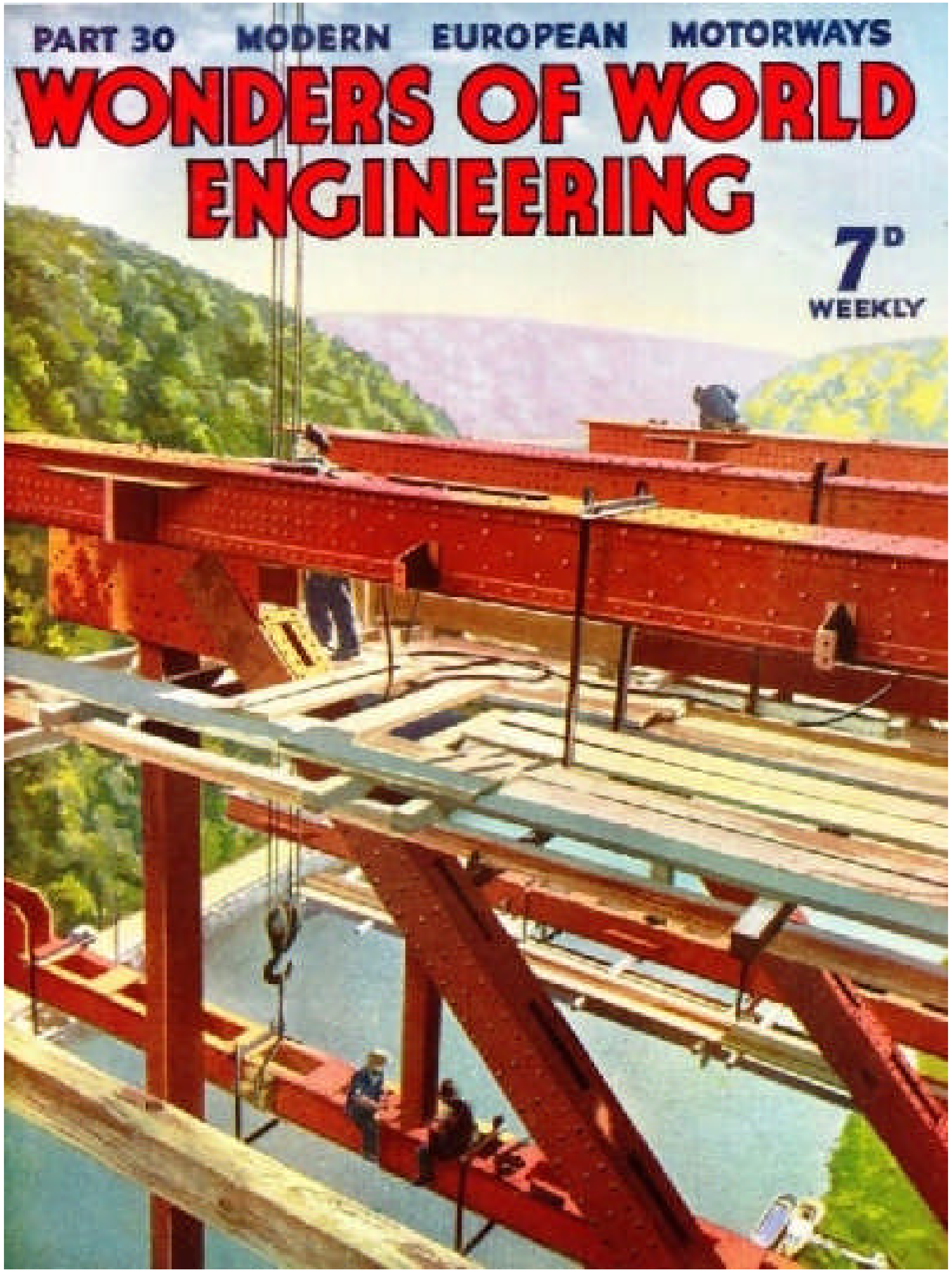
Part 1

Motorways of Germany

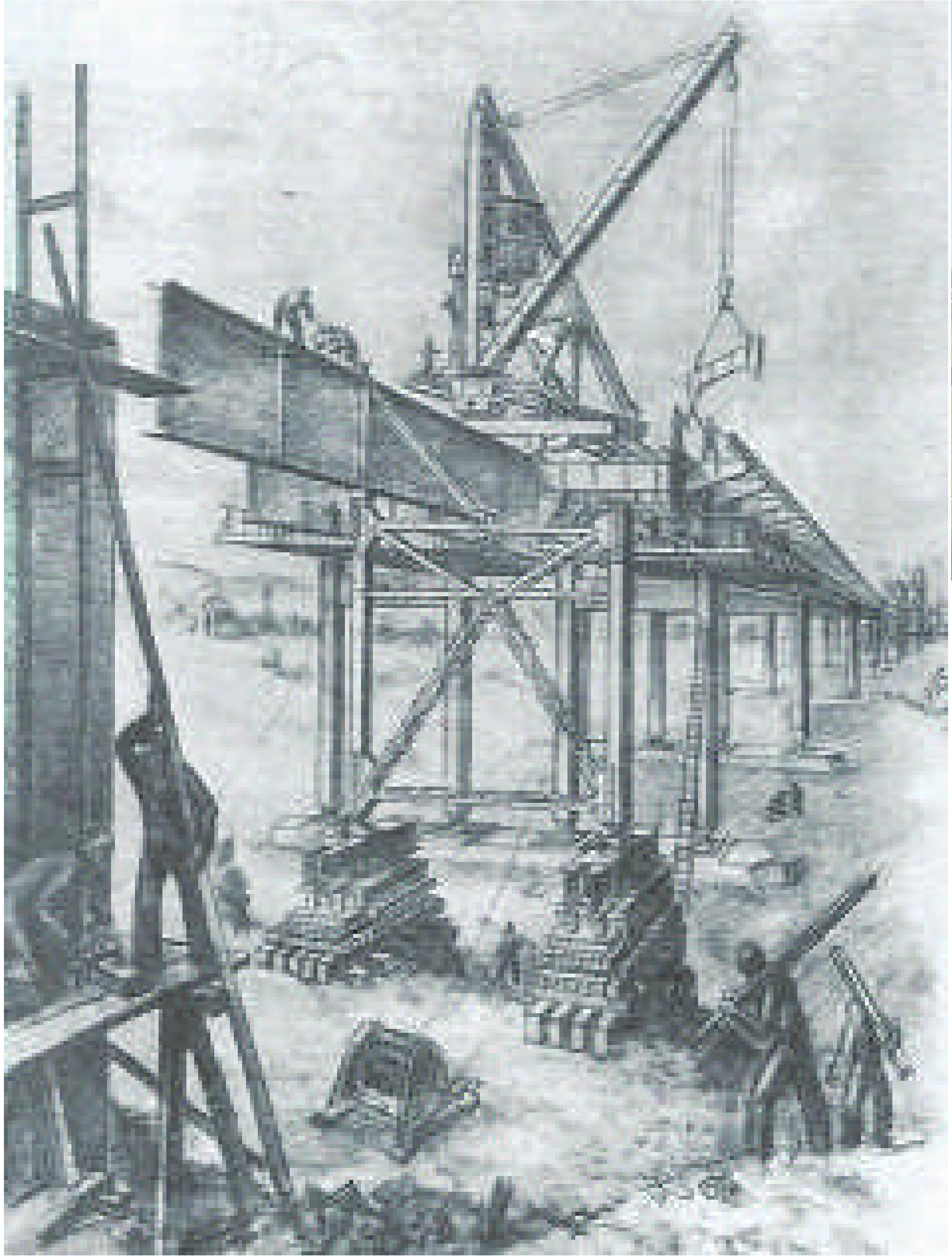
Autobahnen



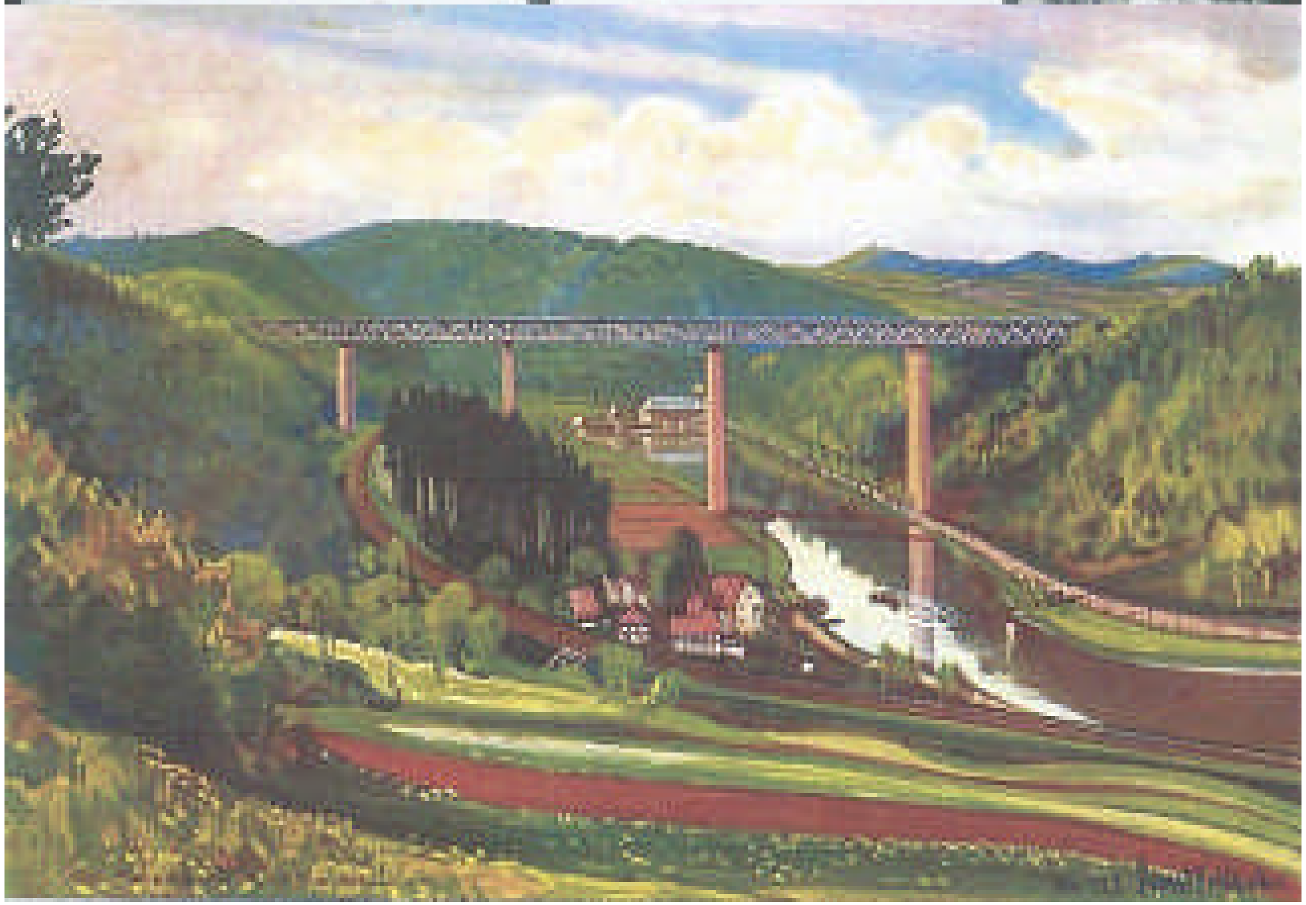
"Nearly 1,000 miles of great new express motorways, or Autobahnen, as they are called, have in recent years been built in Germany. Ingenious flying and burrowing junctions have been built to assist the flow of traffic. This chapter, by Dr. Karl Kruger, of Berlin, describes how the great German motorways are changing the face of the land. The scheme involves many major engineering works, such as the building of bridges and viaducts, the excavation of cuttings and the making of embankments…"

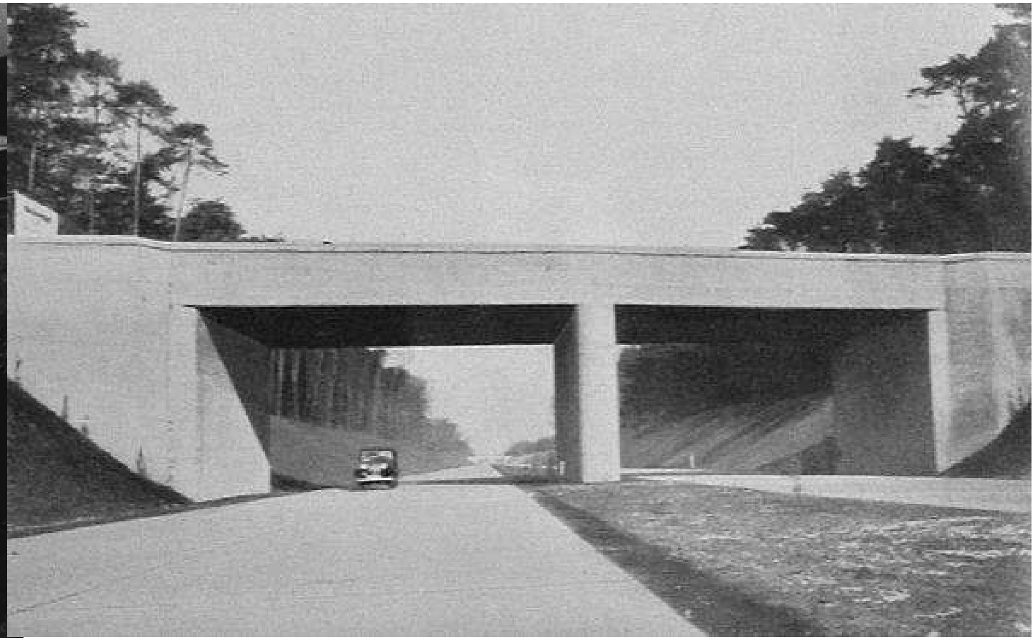
Wonders of World Engineering, **September 1937**

<u>Left</u>: "Cover shows erection of steel girders for the bridge across the River Werra"



<u>Above</u>: caption: "Ursel-bach Viaduct"
<u>Left</u>: caption: "Study pf the construction of Ursel-bach Viaduct , 1936"





<u>Top Left</u>: caption: "Bridge over the Saale between Hirschberg, Thuringia and Rudolphstein, Upper Franconia, with viewing platform visible in foreground"

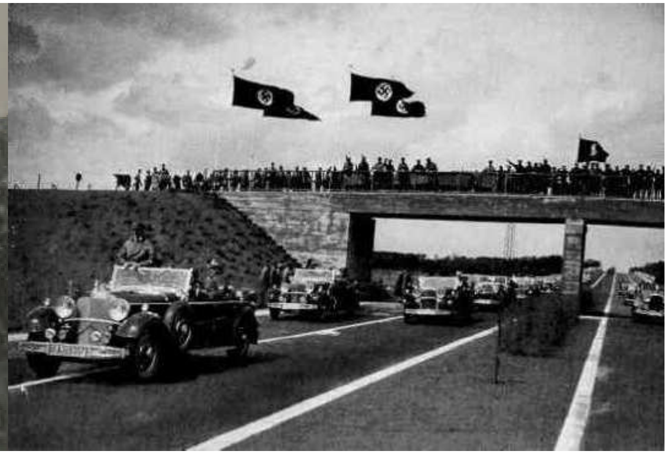
<u>Top Right</u>: "Picture of an overpass on the Reichsautobahn (RAB) between Frankfurt and Darmstadt"

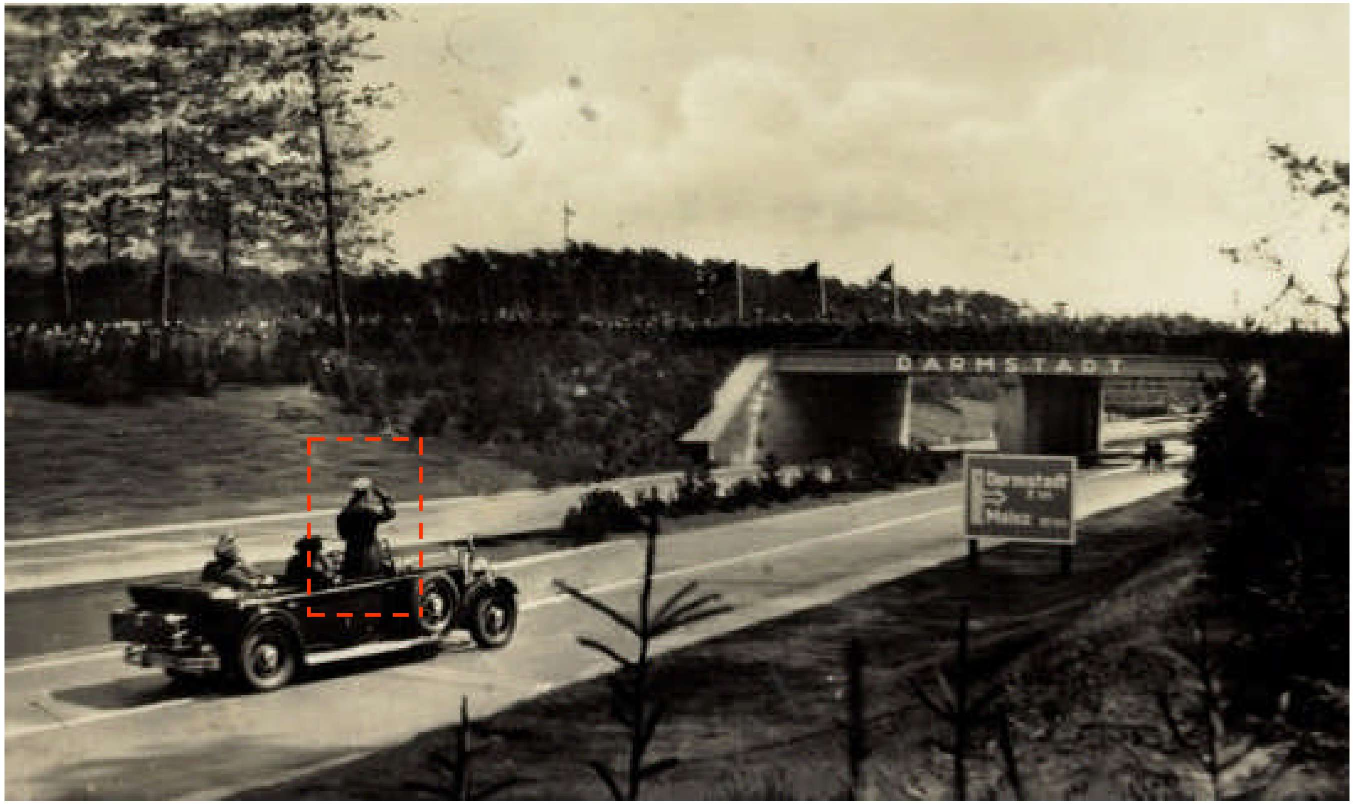
<u>Left</u>: caption: "New Reichsautobahn near Breslau"


Frankfurt M. Süd

<u>Above</u>: caption: "Opening of a motorway section in 1938"
<u>Left</u>: caption: "Reichsautobahn work site near Berlin, April 1936"



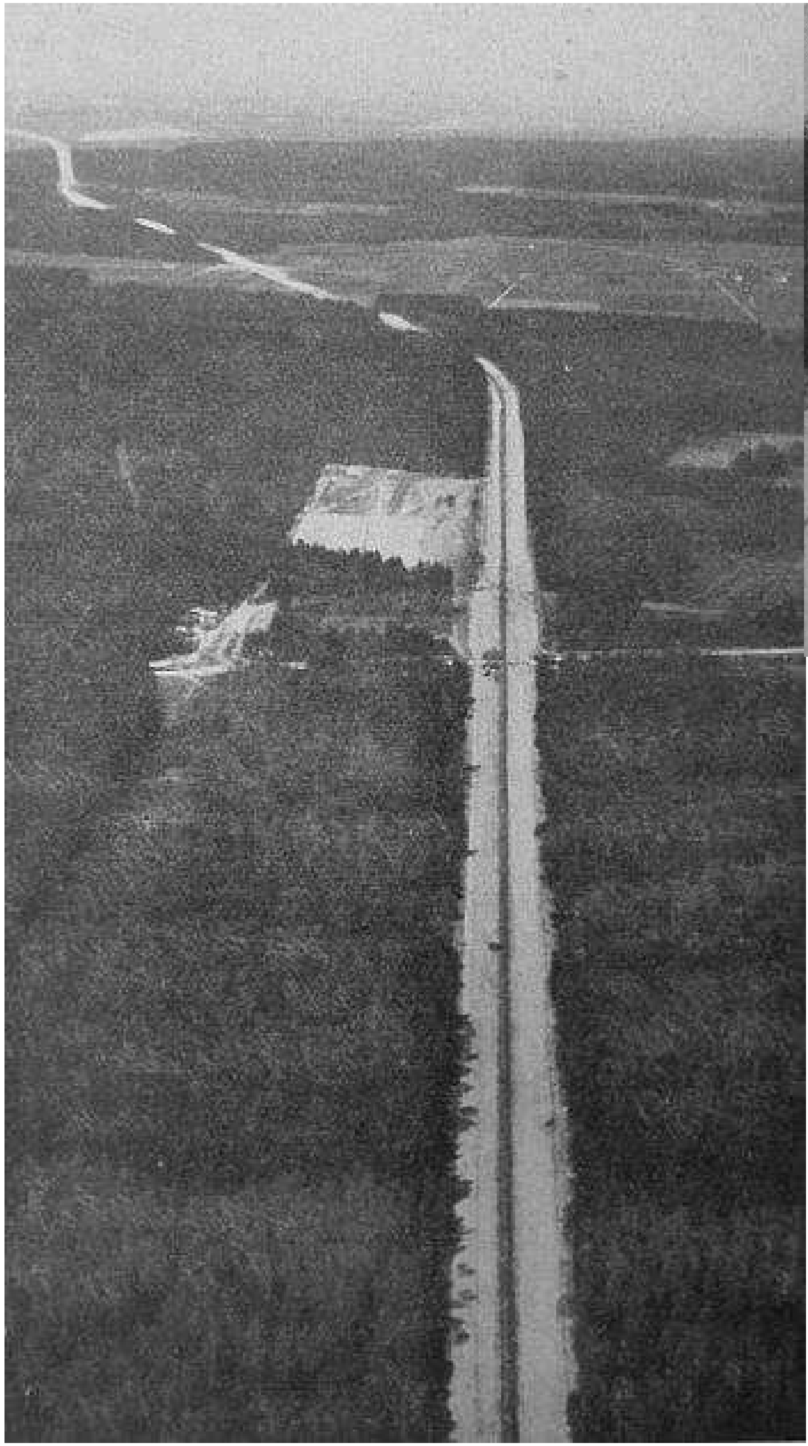


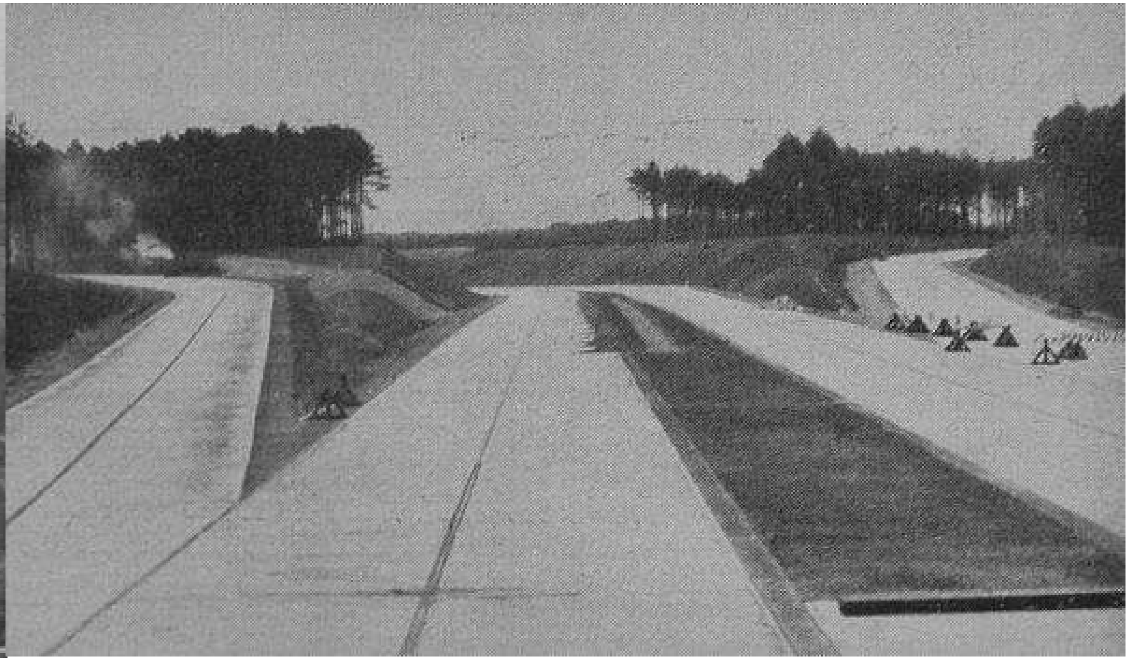

DARMSTADT
Darmstadt
Mainz

Speed & Safety

"…In all countries there is a movement for the amelioration of roads, to keep pace with the ever-increasing speed and density of motor traffic. Not only are existing roads being straightened and widened, but express highways, reserved for motor vehicles, are being built also…"

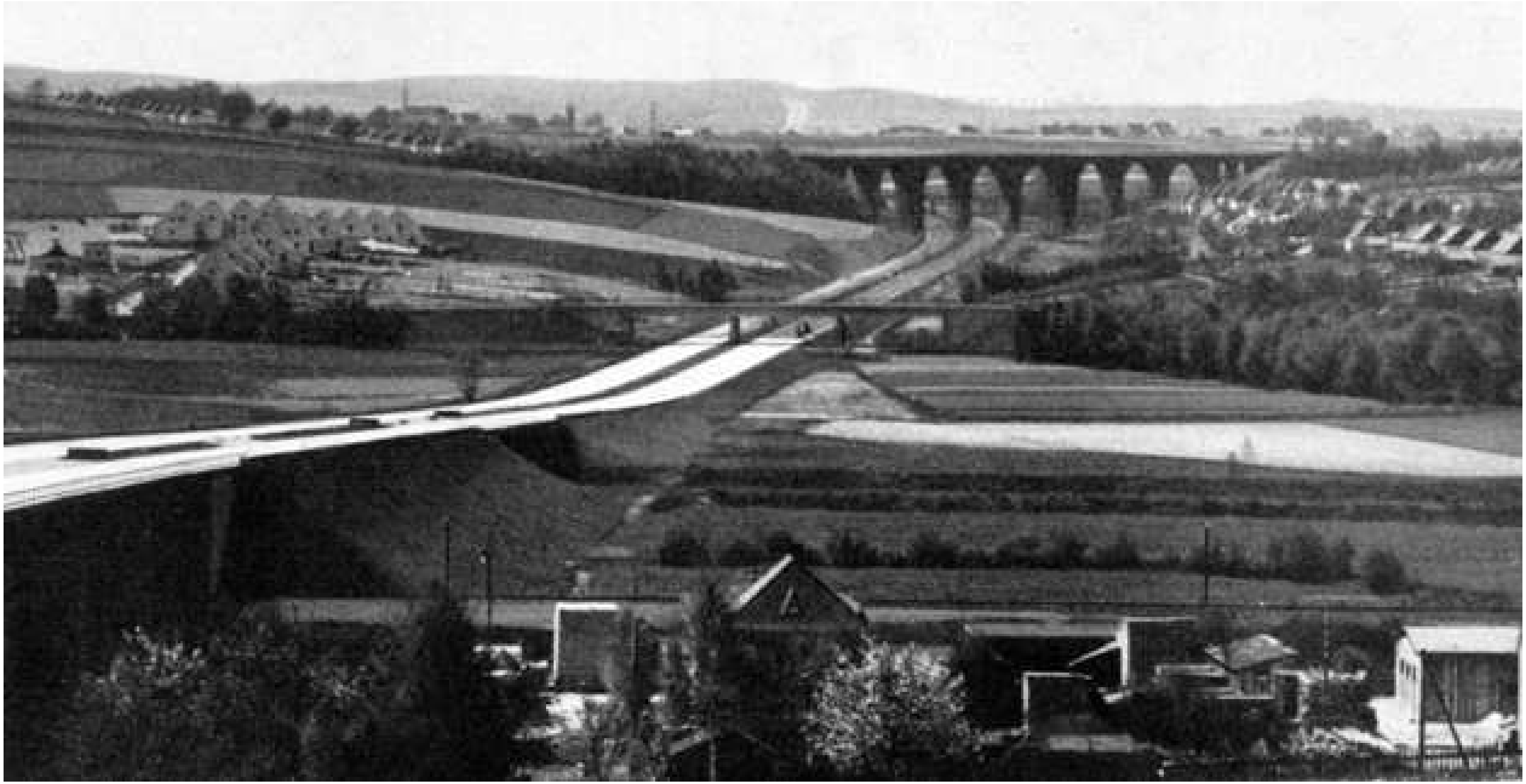
***Wonders of World Engineering,* September 1937**





<u>Above</u>: caption: “Brandenburger triangle shortly before being finished in 1936. Today its part of the Berlin Ring Highway”

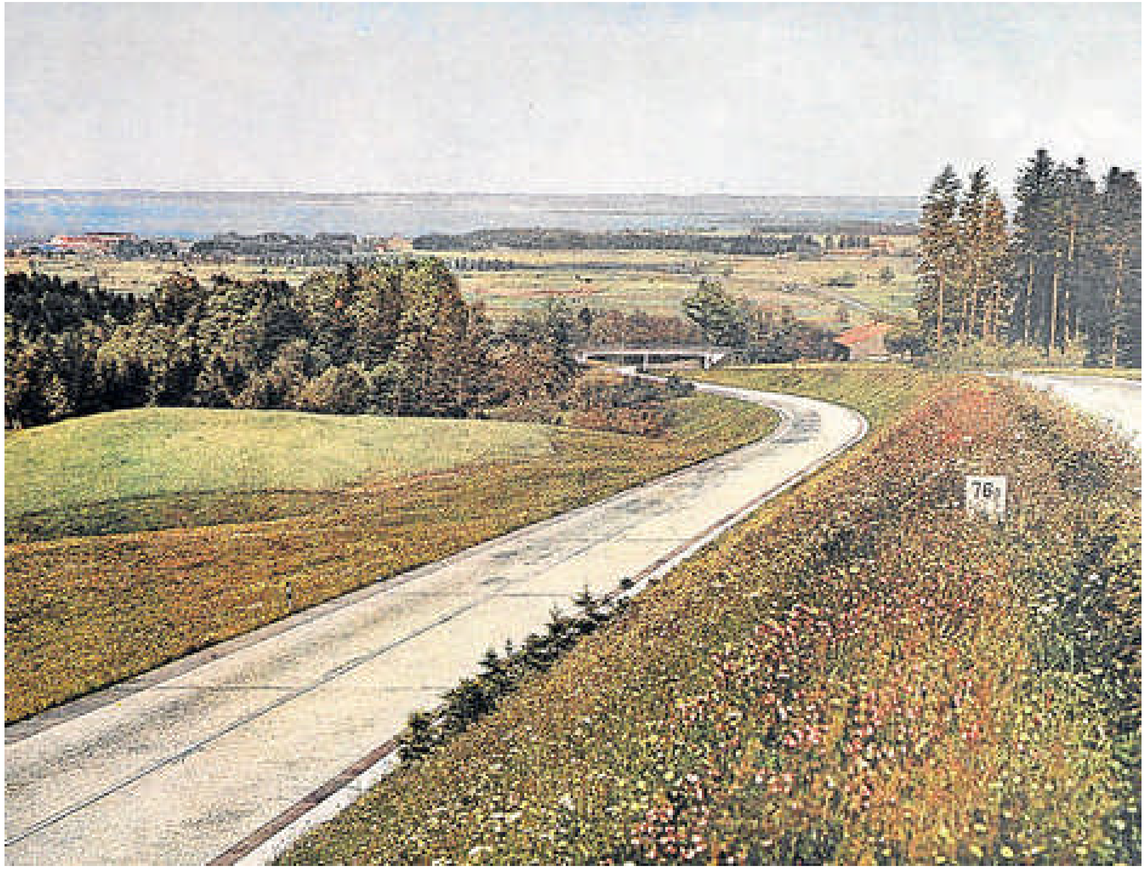
<u>Left</u>: caption: “Construction of Reichsautobahn Munich-Salzburg in Hofoldinger Forest southeast of Munich in May 1934”

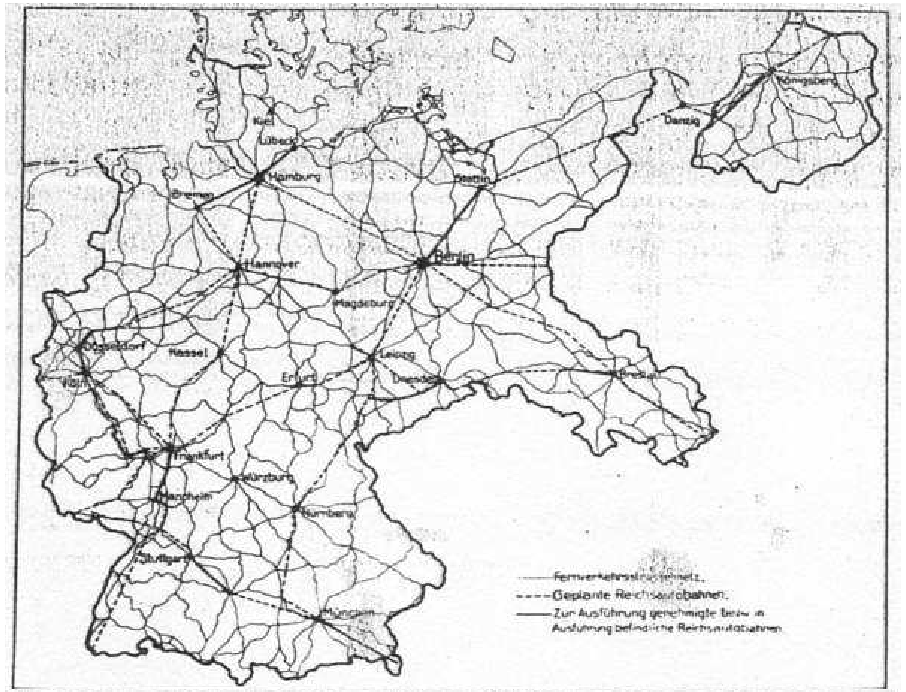


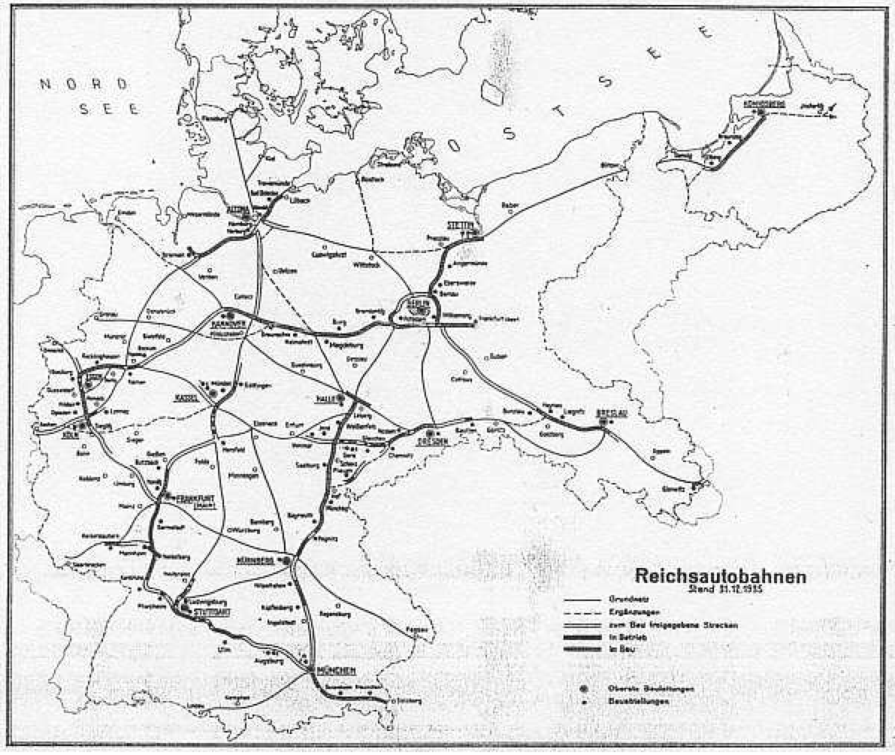
"…In no country have there been more striking developments than in Germany. Nearly 1,000 miles of motor-ways have been built in recent years. As will be seen from the map…these motorways extend north, south, east and west…"

***Wonders of World Engineering*, September 1937**


Mannheim Reichsautobahn Die schönste Einfahrt Deutschlands





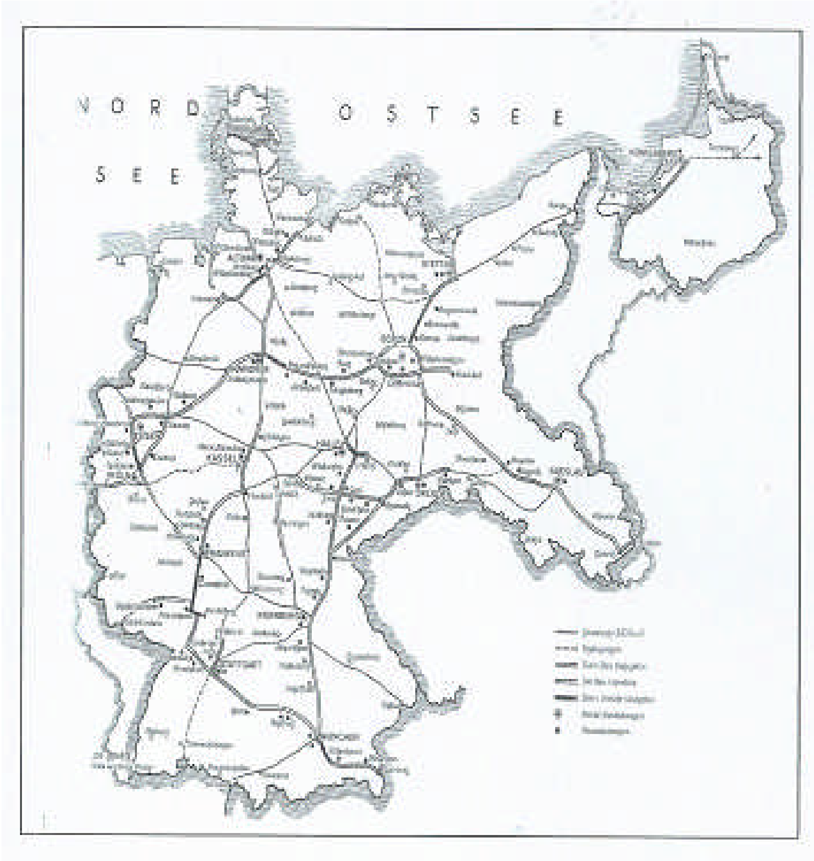


<u>Above</u>: caption: “Reicsautobahnen 1000 kilometers completed commem-orative plaque, 1936”
<u>Top Left</u>: caption: “The ‘Urnetz’ of the ‘Reichsautobahnen’ as of January 1934”
<u>Bottom Left</u>: caption: “The extended network ‘Reichsautobahnen’ & the expansion of the state, late 1935”

On May 19th 1935, the first Autobahn section (22 km) between Frankfurt and Darmstadt opened to traffic. In September 1936, the completion of the first 1K km was celebrated. Each year, the motorway network was to grow by about 1K km, but this occurred only from 1936 to 1938.

Track development of the "Reichsautobahnen"		
Stand end	***km***	***Dev. Km***
1935	108	108
1936	979	1087
1937	923	2010
1938	1036	3046
1939	255	3301
1940	436	3737
1941	90	3827
1942	34	3861
1943	35	3896
Total	3896	

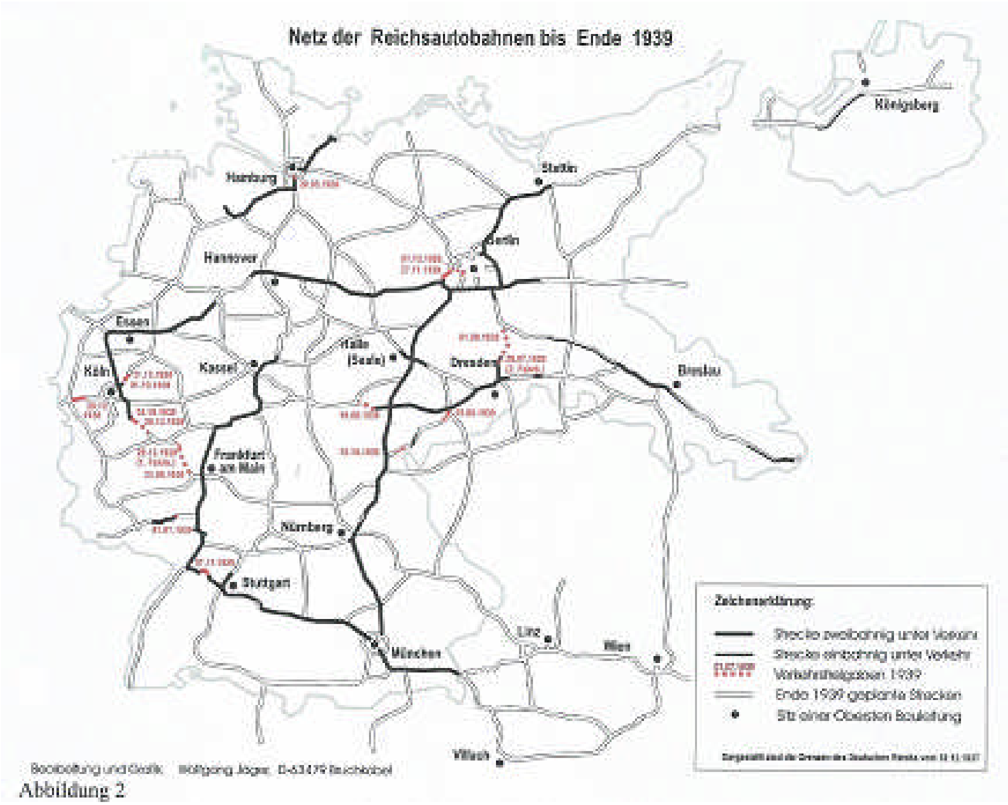
By 1939, material and manpower resources were being diverted from road construction as war clouds gathered, resulting in a rapid and sustained decline in construction. Soon after the outbreak of war, foreign workers and POWs were used for labor. Even so, maintaining progress of the work was difficult. When construction was discontinued at the end of 1941, the "Reichsautobahnen" had reached a total length of 3,827 km.



Left: caption: “Status of construction work on the Reich Autobahn in May 1936”
Right: caption: “A Network of Motorways is being built for fast motor traffic in Germany. This map shows the roads that have been planned and those that were completed or under construction in 1937. Nearly 1,000 miles of double carriageways had been completed in that year. They included roads between Berlin and Stettin, Lubeck and Bremmen, Konigsberg and Elbing, Hanover and Berlin, Cologne and Duisburg, Geissen, Frankfurt, Mannheim and Karlsruhe have been linked, and in 1937 the whole of the extension through Stuttgart, Augsburg and Munich to the Austrian frontier at Berchtesgaden was either under construction or completed. Breslau, Dresden, Leipzig and Bayreuth stand on completed portions of the great network and links in every direction are under construction.”

From 1936, when the first 1K km was achieved, a commemorative pin was issued (left), with the goal to build 1K km of Autobahn each proceeding year. There was another commemorative pin issued to mark the construction of 2K km in 1937 (middle). In fact, Herr Hitler officiated the ceremony commemorating the event in front of 2K construction workers. In 1938, the 3K km pin was issued (right). However, about 9.5% of the carriageway was single lane. In 1939, only 255 km was constructed but road building increased in 1940 to 446 km. By 1943 the Autobahn network stood at a total of 3,858 km (although 14% was single carriageway).


2000 KILOMETER
REICHS-
AUTOBAHN
DEZEMBER 1937

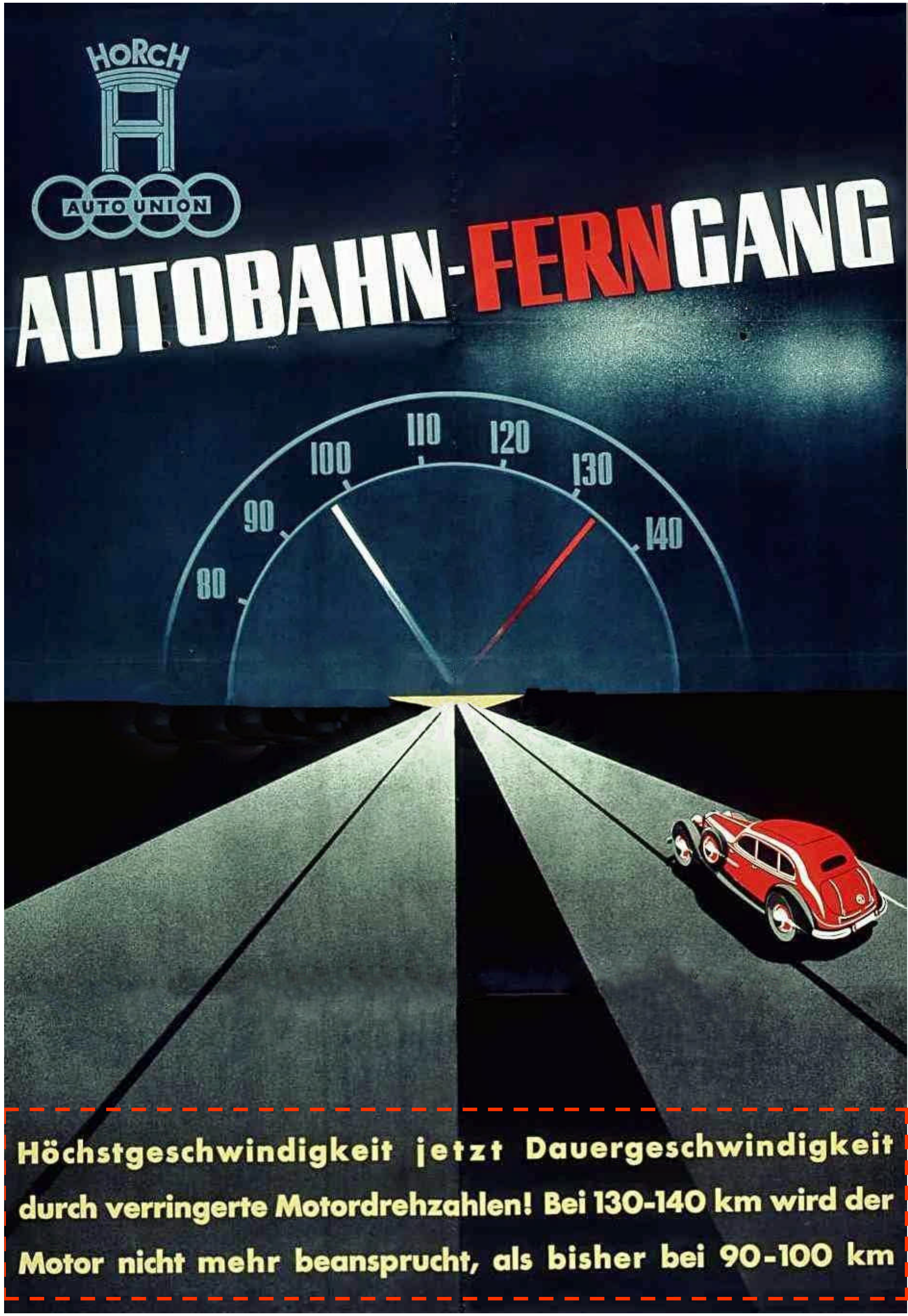


When construction was stopped at the end of 1941, of the 3,827 kilometers of completed highway segments, approximately 80% was surfaced in concrete, 10% paved and the remaining 10% surfaced with asphalt. This compared to approximately 565 kilometers of concrete-surfaced roads in Germany in 1933. Some stretches were completed only in one direction (in some low-traffic areas - particularly in Thuringia and Silesia, this was pre-planned).

<u>Left</u>: caption: “Network of Reich highways by the end of 1939”

<u>Right</u>: caption: “State of the construction work on the Reich Autobahn in August 1941”


88 km Halle Leipzig
351 km Nürnberg
498 km München

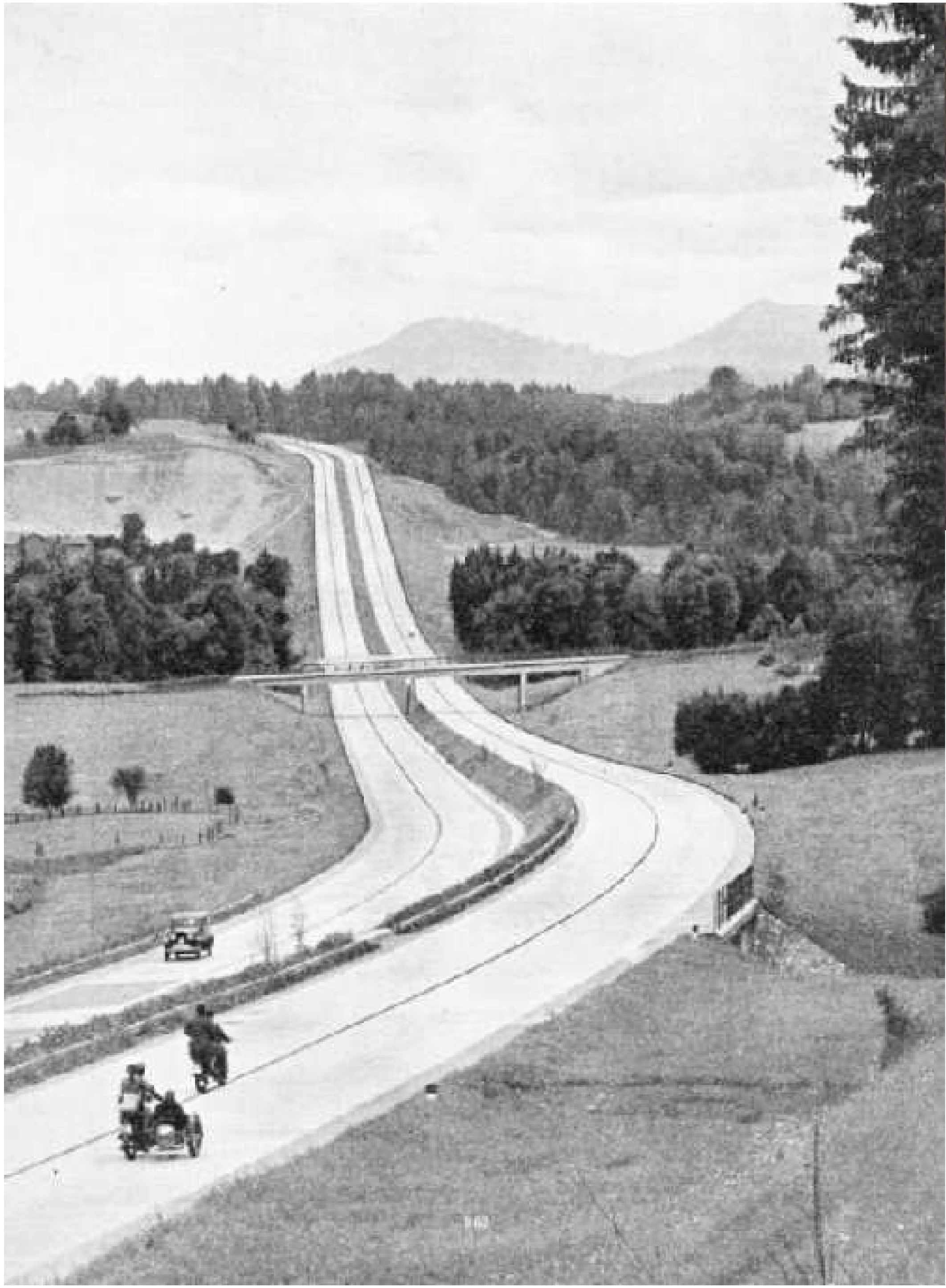


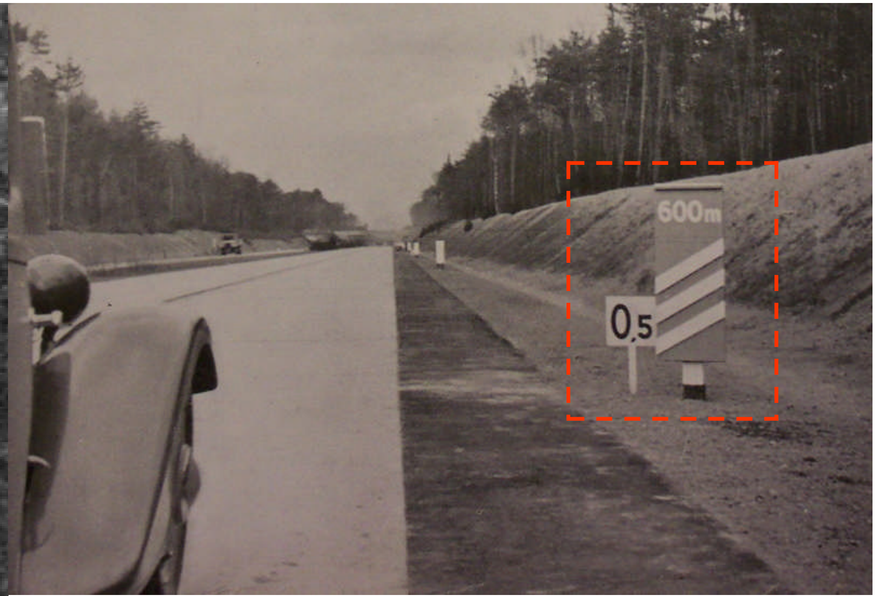
"…In each of these roads a central strip separates opposing streams of traffic and level crossings are eliminated by ingenious systems of road junctions. Speeds as high as 150 miles an hour can be att-ained with safety…"

***Wonders of World Engineering,* Sept-ember 1937**

<u>Above</u>: caption: "Graphic 'Keep right except to pass' sign"

<u>Left</u>: caption: "Reduced engine revs allow the car can travel at hig-her speeds that are less stressful for the motor"

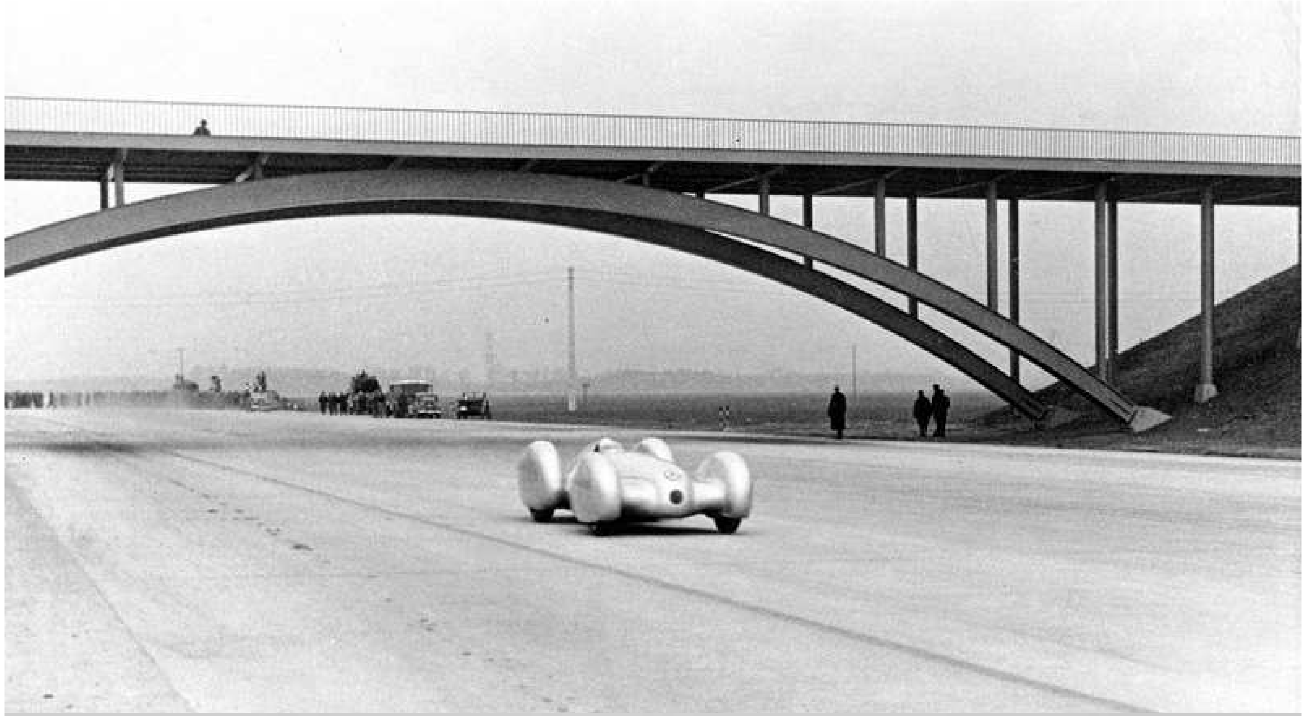




Above: caption: "Kilometer post and 600-m countdown marker (originally the countdown to each exit was in 200-m increments)"

Left: caption: "Double Carriageways are universal on the German motorways. The strip between the two tracks is generally 16 ft. 6 in. wide. Each track is 24 ft. 6 in. wide. The roads are designed for speed, so there are no level crossings or ordinary intersections, and corners are banked. The photograph shows a portion of the motorway between Munich and Berchtes-gaden, in South Germany, on the Austrian frontier."

The specifications for the Autobahnen were based on those developed by "Ha-FraBA." They were designed as four-lane limited-access highways, with a central median, road surfaces in each direction normally 24-meters (79-feet) wide (widened on some major segments immediately before the war), surfaced in concrete. There were no shoulders. In addition to having no intersections, the route was to limit grades as much as possible, to no more than 8%, and curves were to fall within a range of 600-meters (660-yards) and 1,800-meters (2K-yards) in radius. One segment just south of Dessau (of roughly 10 km in length) was designed for speed record attempts (the *Dessauer Rennstrecke*) and had six lanes.

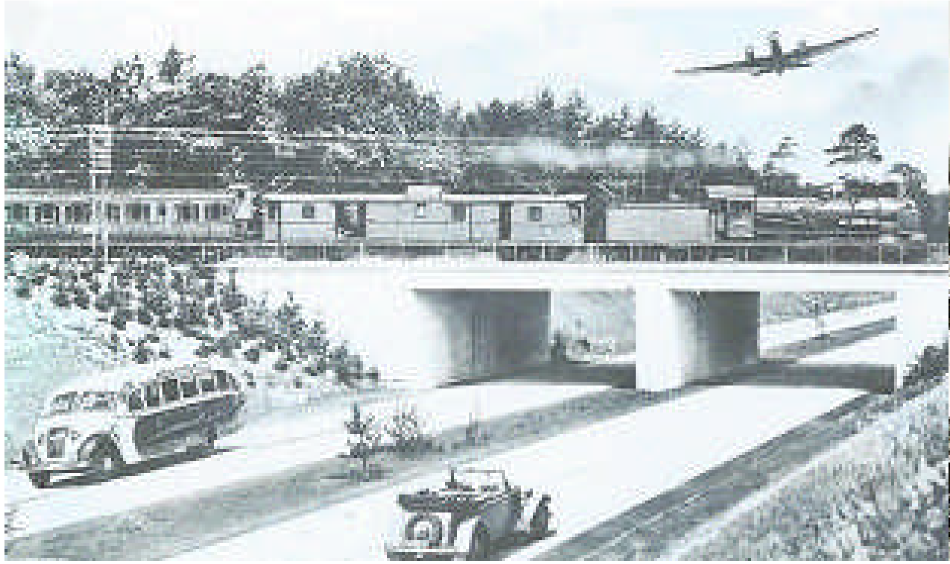


Of National Importance

"…Even in backward regions the authorities are bound to improve the roads, for not only the convenience of the public but also economic considerations demand the modernizations of streets and highways, as well as adequate realignment in the interests of safe driving. Relatively high consumption of motor spirit and lubricating oil, rapid depreciation or even fatal accidents may be due the bad lay-out and imperfect maintenance of a country's road. Thus the question has become one of National importance…"

Wonders of World Engineering,
September 1937

Autobahnen Macht Frei



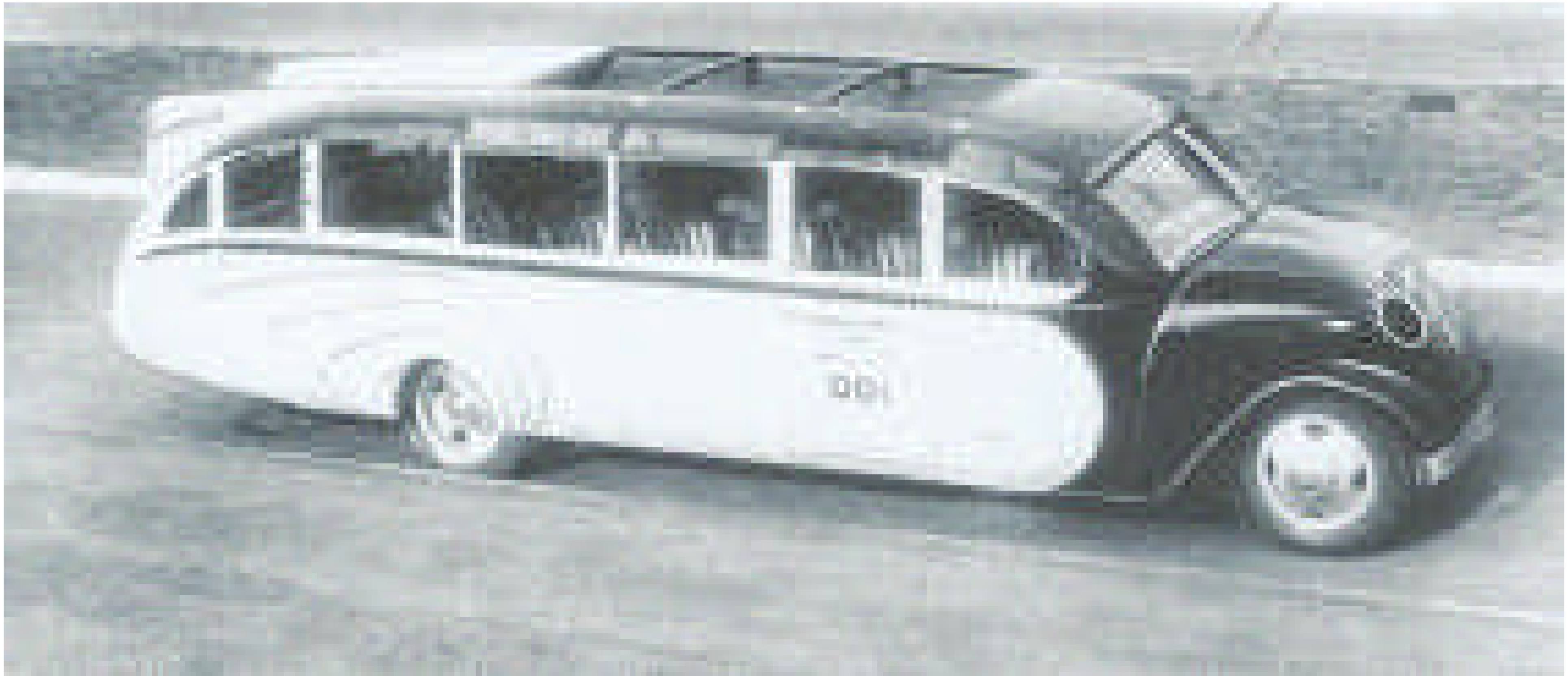
"…It does not usually pay to build express highways in regions sparsely populated and poor in natural resources, though the existence of good roads tends to induce the inhabitants to improve their standard of living. Peasants get into touch with hitherto unattainable markets; financiers become inclined to develop the country wherever possible. The distance between town and country decreases; the poorest farmer longs to participate in the amenities of town life, and he will work and produce more and more until he can buy a cycle, a motor cycle and finally a motor car. It is the ideal of the youth everywhere in the world today to sit at the steering wheel of a car, probably a car of his own…"

***Wonders of World Engineering,* September 1937**

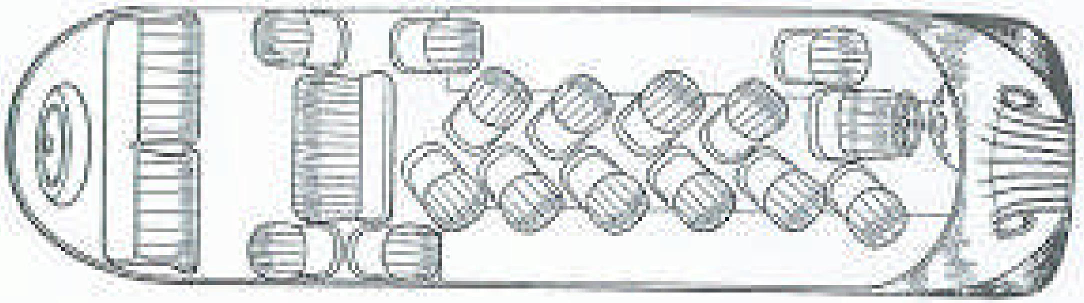
Left: caption: "Frankfurt-Darmstadt Autobahn (4 forms of transportation shown)"

Right: caption: "Airport (Flughafen Rhein-Main) and Autobahn, looking south-west (before 1937)"

<u>Above</u>: caption: “A Henschel bus in front of the Schloss Neuenstein”
<u>Left</u>: caption: “Advertising Poster for Reichsbahn bus rides”

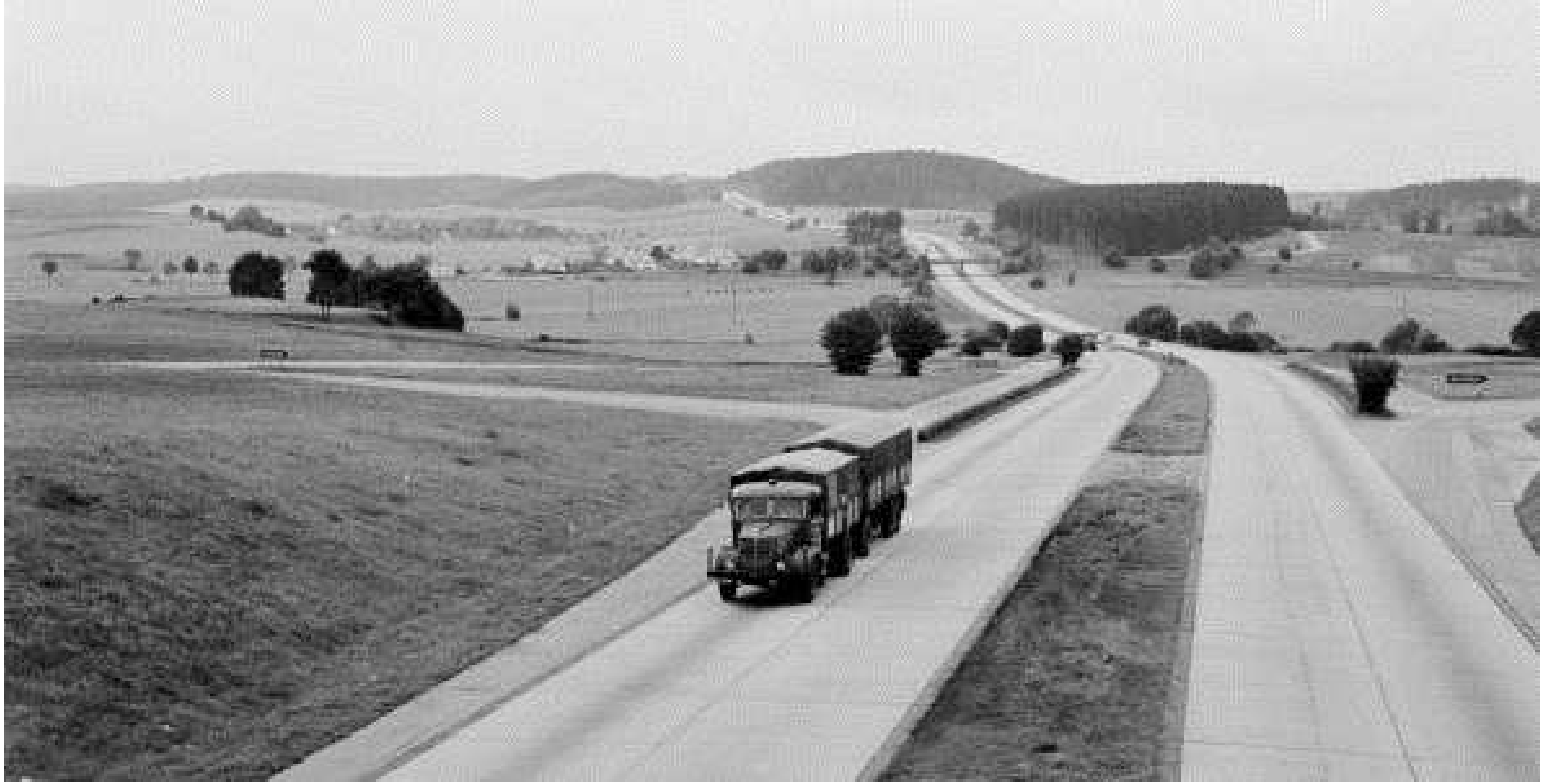


<u>Above</u>: caption: "A streamlined bus on the motorways"
<u>Left</u>: caption: "The express bus on the Autobahnbus timetable"



<u>Top</u>: caption: “Interiors of the streamline bus model Opel / Ludewig”
<u>Bottom</u>: caption: “Sketch of the interior of the long-distance bus and coach model Opel / Ludewig. The passenger seats are fish-spined outwards.”

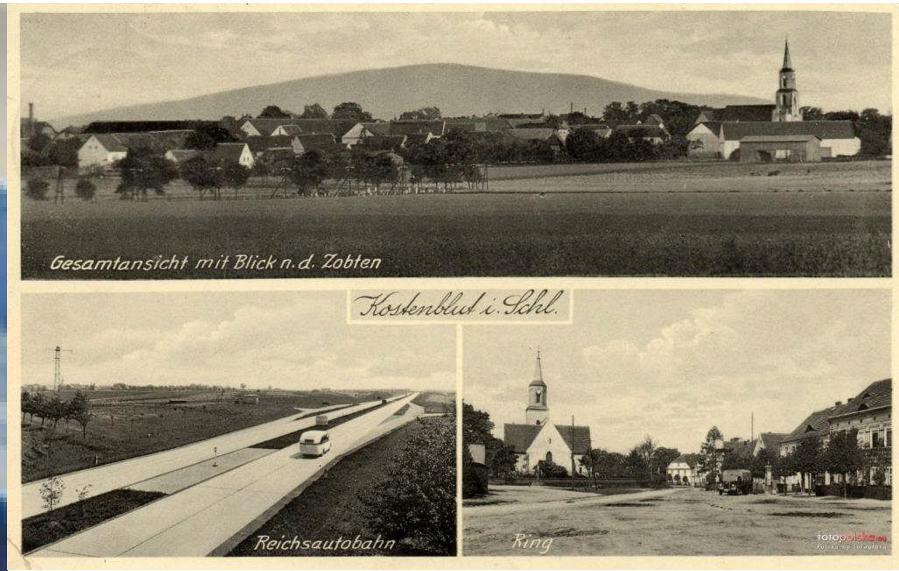
Market-to-Market



"…Farm-to-market traffic covers only one part of the problem. The exchanges of goods between the industrial centers is also of importance. The lorry offers special facilities in the way of door-to-door conveyance of goods between the factories and the buyers. Mass transport, however, will probably never leave the railways, especially when the railway administrations modernize their rolling stock and goods depots…"

***Wonders of World Engineering,* September 1937**

The Tourist Trade



"…The motor tourist has become a factor of prime importance. The money spent by motorists visiting a foreign country has its effect, as an invisible export, on that country's finances. No Government, therefore, can afford to neglect such a prolific source of revenue…"

***Wonders of World Engineering*, September 1937**



Brücke über die Mangfall
Reichsautobahn
Winterhilfswerk
25
15 · Deutsche Reichspost · 15
G. FRITZ

20/20 Foresight

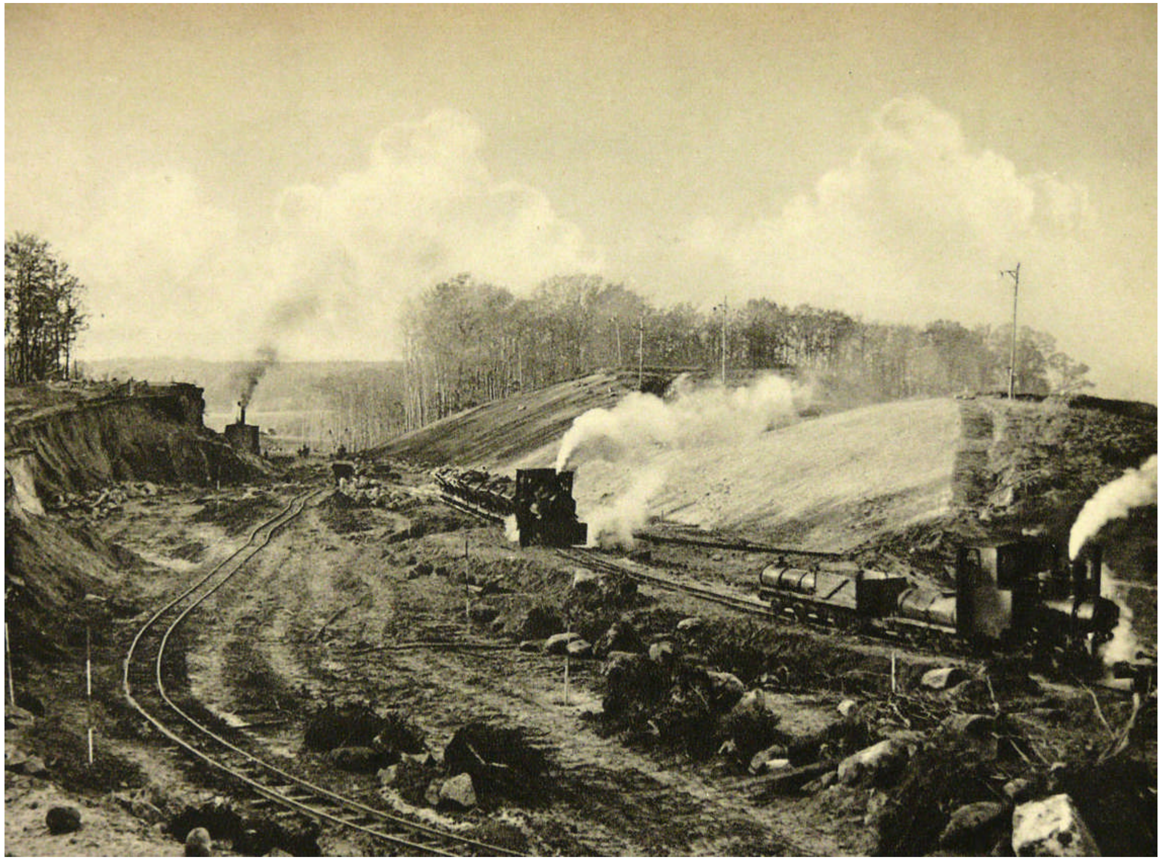
"…When planning new roads the authorities have to consider the probable quantity of products which agricultural and mining will transport in present and future years, the movement of settlers and tourists, and the distribution of industrial products in the country…"

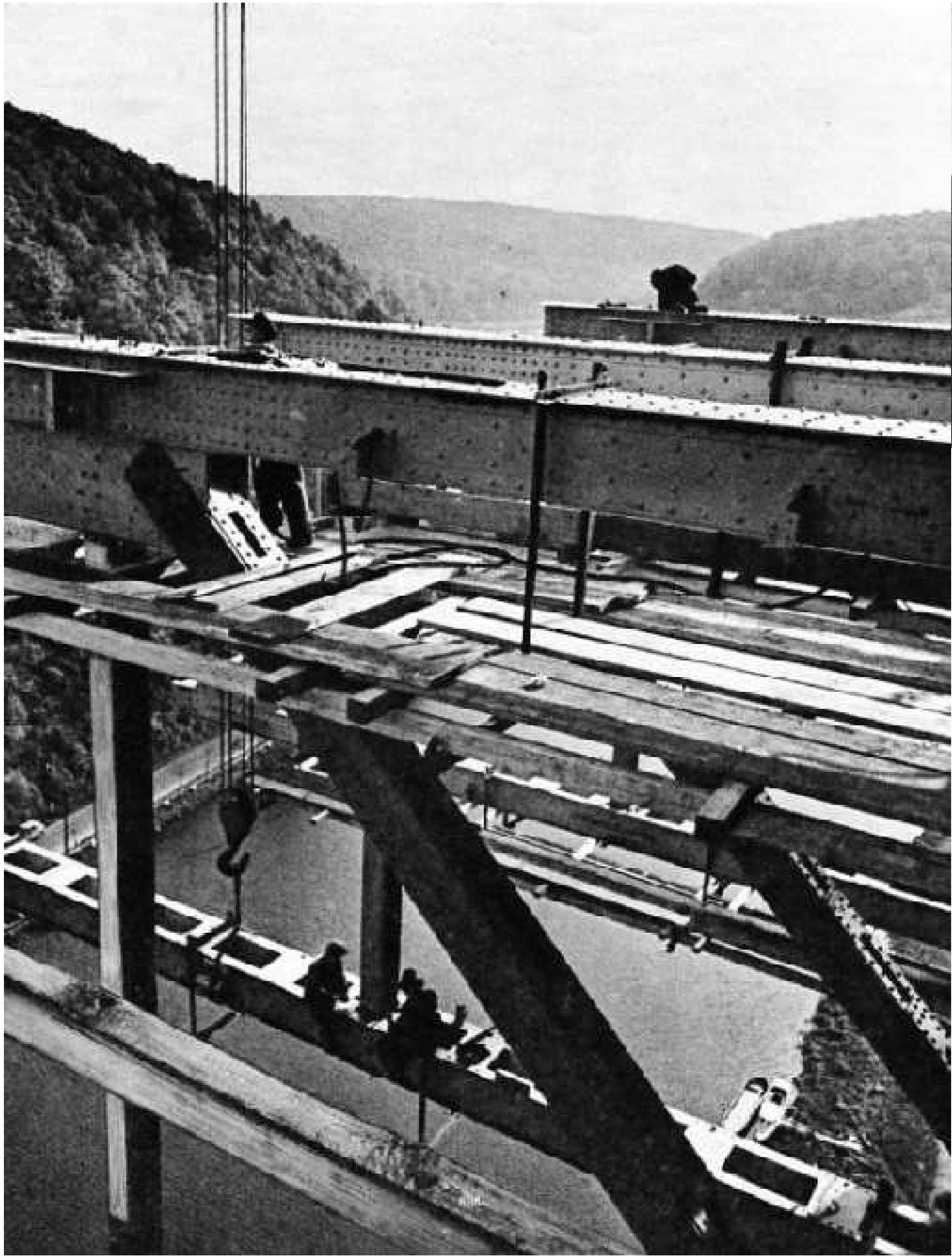
***Wonders of World Engineering,* September 1937**

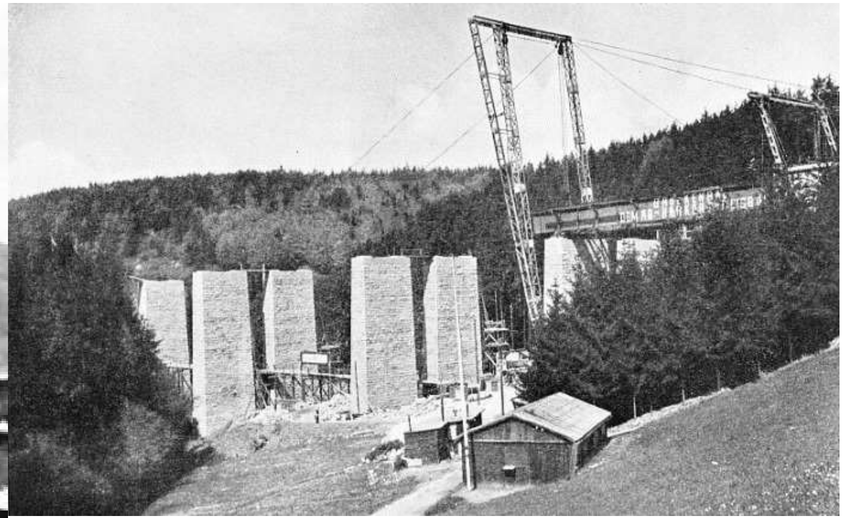
A Deutschmark's Worth

"…The layout of roads depends on geographical factors, though dense traffic would justify the building of costly bridges, the penetration of swamps, or the boring of tunnels through mountain ranges. If one car or lorry has to consume a shilling's worth more petrol by taking a circuitous route instead of a direct thoroughfare, 500 motors daily would waste over £9,000 in a year. Even if a new road, with its bridges and viaducts, replacing the old and longer road, were to last only ten years, the sum of £90,000 could be economically spent on its construction. This calculation takes no account of probable increase of traffic…"

***Wonders of World Engineering*, September 1937**



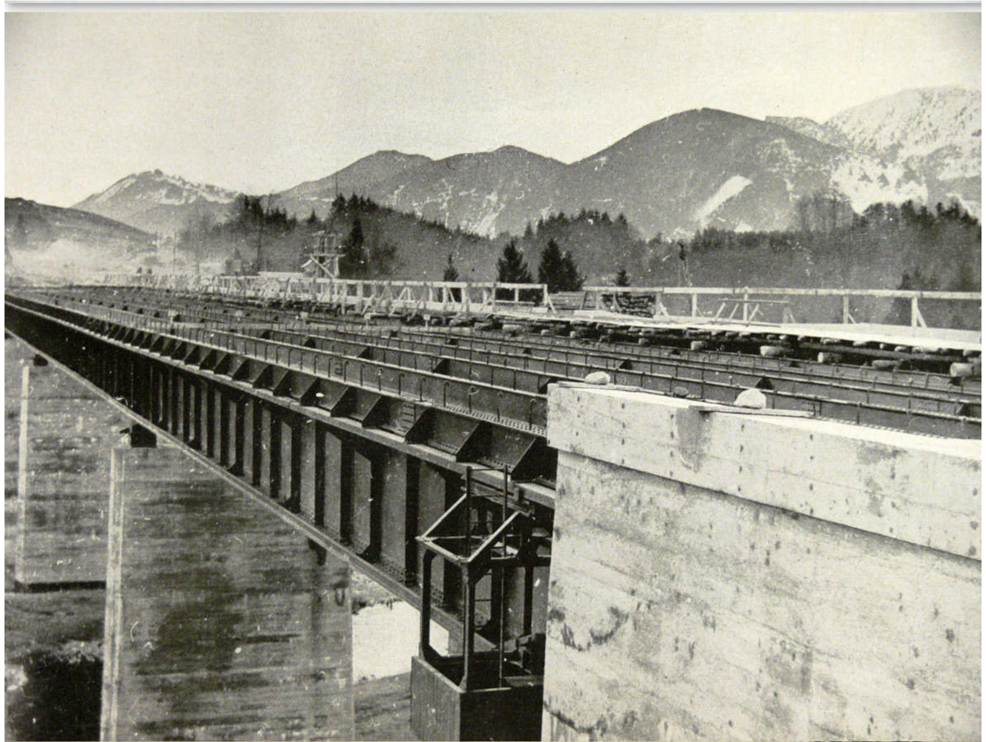


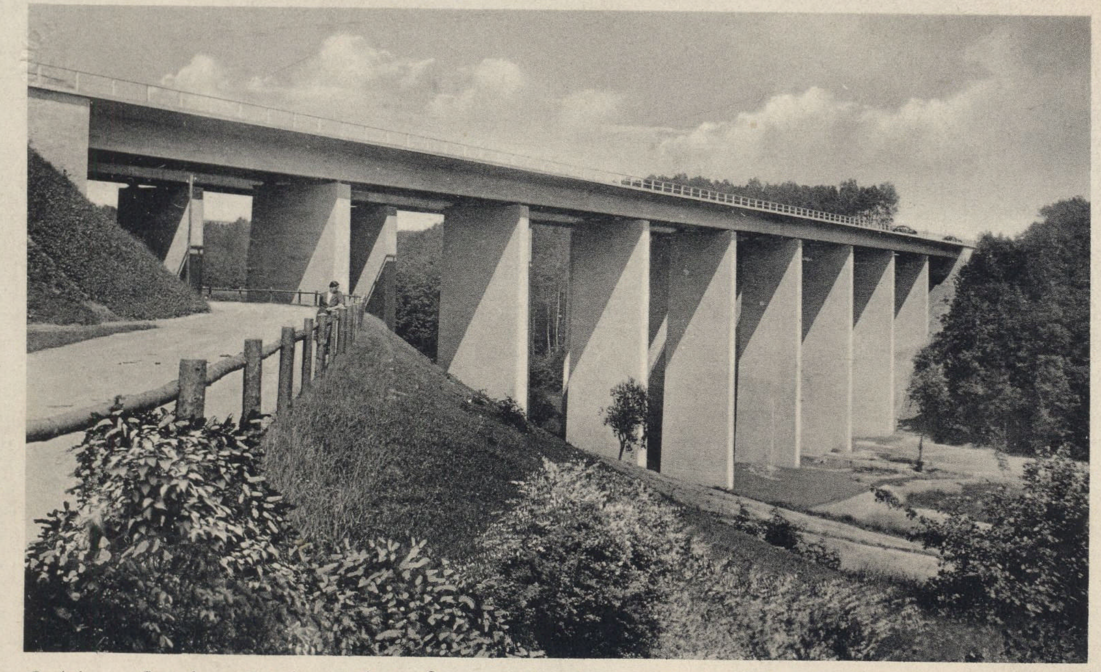


__Above__: caption: “Bridge-Building for the new motorways of Germany has given employment to thousands of men in steelworks and associated industries. The new roads have involved the building of numerous bridges and viaducts across rivers and valleys. Where possible the natural stone of the district has been used for bridges and masonry piers so that they will harmonize with the scenery.”

__Left__: caption: “Across the River Werra, near Eisenach, in central Germany, a high steel-girder bridge carries the *Autobahn*. The photograph shows one of the massive girders being placed in position.”

<u>Above</u>: "A8 Munich-Salzburg Autobahn bridge 1936)"
<u>Left</u>: caption: "Massive Steel Girders carry the dual carriage-ways of the German *Autobahnen* across valleys and low-lying country, to eliminate detours and to afford more direct routes for long-distance motor transport. It is calculated that the cost of these bridges and viaducts is amply covered by the saving of fuel which would otherwise be wasted by deviations from the direct route."





Podelsatz - Brücke. Reichsautobahn Dresden - Franfurt a. M. bei Stadtroda i. Thür. (Länge 220 m. Höhe 34 m)

Die größte Reichsautobahnbrücke über die Freiberger Mulde bei Siebenlehn/Nossen i. Sa.

Das imposante Brückenbauwerk, bestehend aus 5 Massivpfeiler und 2 Widerlager, hat eine Länge von 403 m, eine Breite von 24 m, eine Höhe von 72 m und wurde 1935/36 in 112000 Tagewerken geschaffen. Die Stahlkonstruktion hat allein ein Gewicht von etwa 3000 Tonnen, während insgesamt 67000 Tonnen Bausloffe benötigt wurden. Sie ist in ihrer kühnen, schlanken Bauweise als ein Meisterwerk der Technik zu bezeichnen, das sich dem ganzen Landschaftsbild harmonisch anpaßt.

<u>Above</u>: caption: “The Waschmuhltal Bridge for Autobahn A6 at Kaisers-lautern was built to a design by Fritz Todt and Paul Bonatz”

Financieering

The *Reichsautobahn* was, initially, to be financed by a road-use tax, but in 1936 this was rejected and, instead, fuel taxes were raised on car owners. In addition, the National Railway and National Bank provided loans. However, approximately 60% of the financing came from the *Reichsanstalt fur Arbeits-vermittlung und Arbeitslosenversicherung* (German Government Employment Department). By the end of WWII, total costs were 6.5 billion Reichsmarks, of which 4.6 billion RM was still owed (nearly 74%) to the employment department. Costs were inflated by the aesthetic requirements imposed by the German Government, shortages of raw materials, the need to repair work that had been, under time pressure, executed poorly and by the initial failure to include in the cost estimates connector roads between the Autobahns and existing roads.

Suffer Not the Competition

“…An important factor in road planning is the competition between road and rail. In some instances the existing rail-ways cannot suffer the competition of cars and lorries and will close down. On the other hand, new roads, especially those serving as feeder roads to the railway stations, will help to increase the railway traffic. The German Government is claimed to be the first to have elaborated plans for the future of motors and motor traffic. It was the personal idea of Herr Adolf Hitler to create a network of motorways combining the results of technical research and of economic and geo-graphical investigations…”

***Wonders of World Engineering*, September 1937**

Best Solution

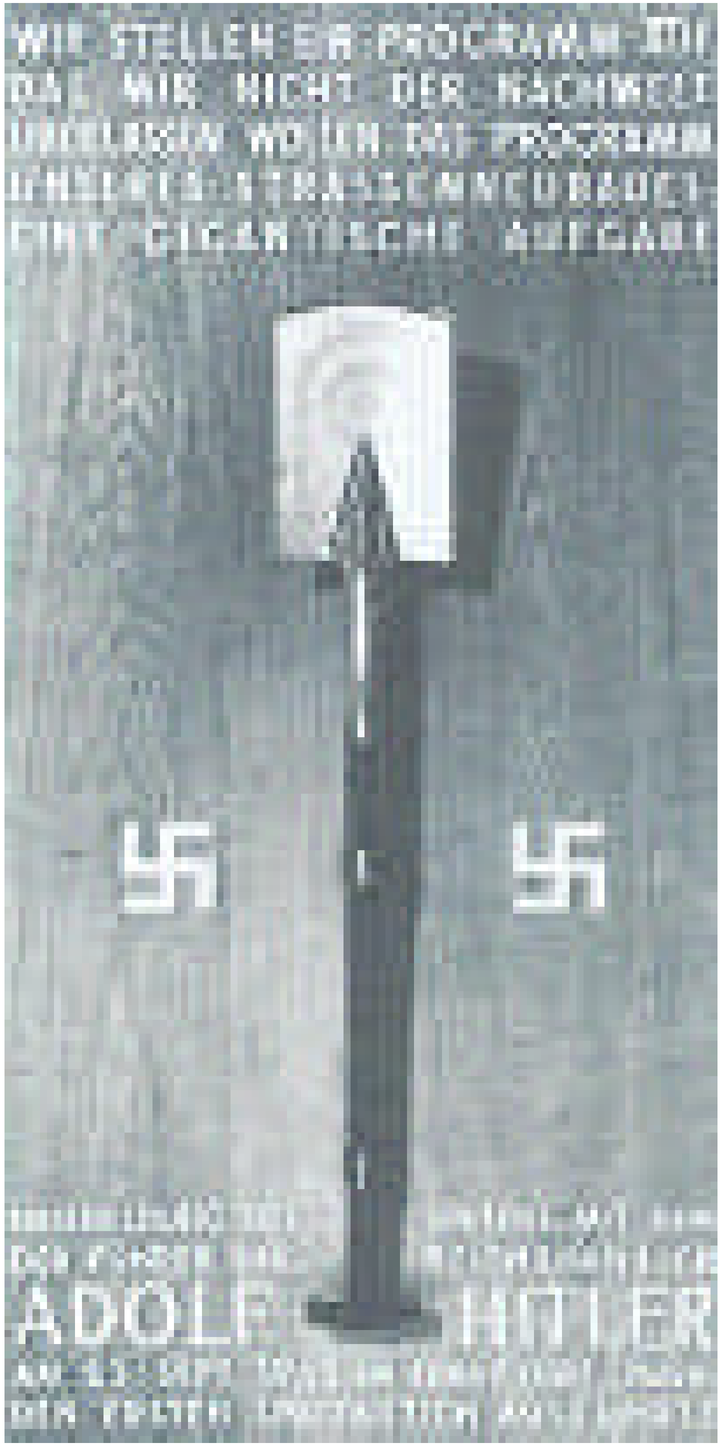
"…The Chancellor wished to promote motor traffic as far as possible, and allowed for a considerable increase in the speed and number of cars and lorries. Having motored thousands of miles in all parts of Germany, he was well aware of the former bad condition of German roads. He realized that short-sighted repair work would be of little use, and that new construction offered the best solution…"

Wonders of World Engineering, **September 1937**

<u>Left</u>: caption: "Hitler's first groundbreaking ceremony"


23.9.1933 Erster Spatenstich
23.9.1936 1000 km Autobahn fertig
Postkarte
Deutsche
6 + 4
Winterhilfswerk
Reichspost

Deutschland Uber Alles



"…Germany and Italy had already planned motorways since 1925, and American express highways were in existence, but the new German road system was to be unique in its technical details as well as its general layout…"

Wonders of World Engineering, **September 1937**

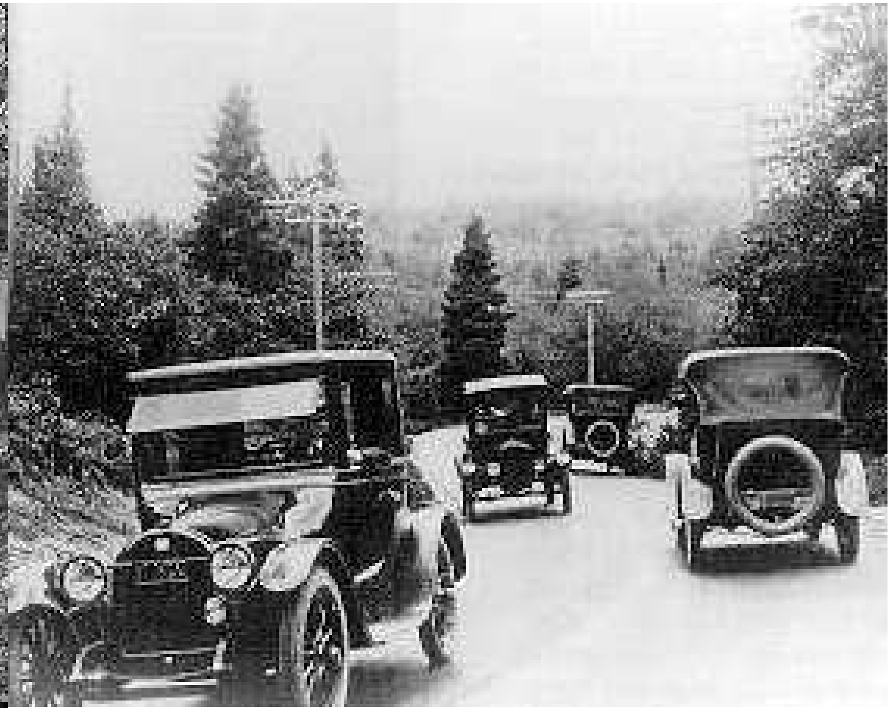
<u>Left</u>: caption: "Replica of the spade with which the kingdom of highway construction began"

"We have reached a point in our development where we can no longer ignore the needs of traffic flowing from the main highways into and through cities and from feeder roads to the main highways…We pay for good roads whether we have them or not"

T.H. MacDonald, **Chief – BPR Chief, ca. 1935**

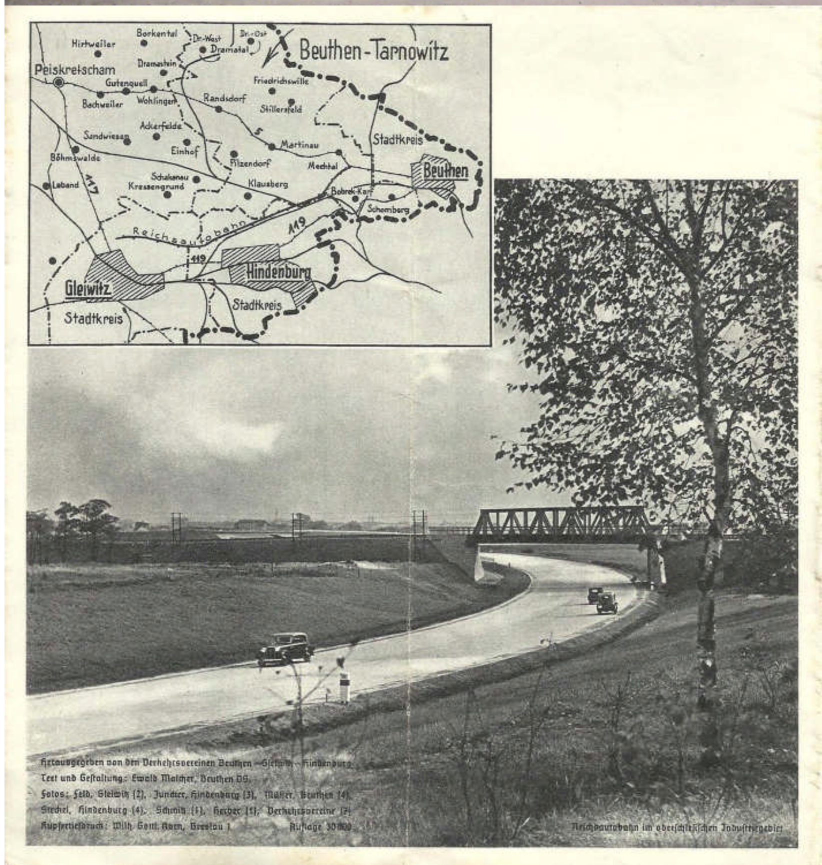
RE: In 1919, *Thomas H. MacDonald* was appointed to head the U.S. *Bureau of Public Roads* (BPR). He ably lead the agency for 34 years (1919-1953)

Left: in May 1918, the first issue of BPR's *Public Roads* magazine was published



<u>Top Left</u>: caption: “Dirt, and muddy, roads were still common in the 1930s”
<u>Top Right</u>: caption: “The first center line on a rural, state highway was painted between Marquette and Ishpeming, Mich., in 1917”
<u>Top</u>: caption: “1933 - Dr. Fritz Todt, the ‘Inspector General for German Roadways’ pointing to Berlin”

Transcontinental Traffic



"…The planning of a network comprising great thoroughfares from east to west and from north to south was also to be of fundamental importance to transcontinental traffic, which the central situation of Germany in the heart of Europe attracted in large numbers…"

Wonders of World Engineering, **September 1937**

<u>Top Left</u>: caption: "Direction signs for the Cologne-Bonn Autobahn"

<u>Top Right</u>: caption: "Final advance direction sign for Langen/Morfelden, Frankfurt-Darmstadt Autobahn"

<u>Left</u>: caption: "Section of Autobahn in Eastern Germany"

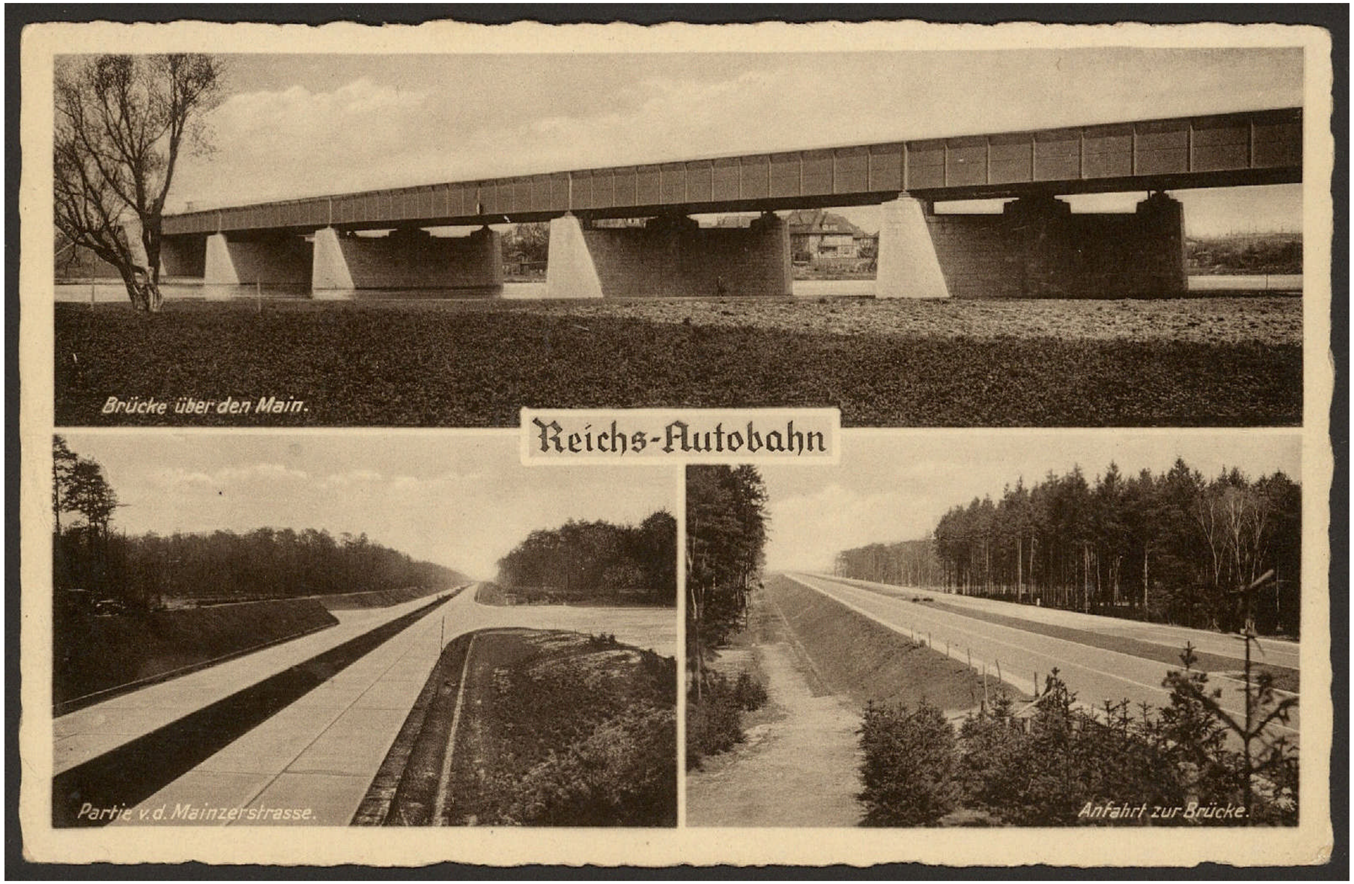
Part 2

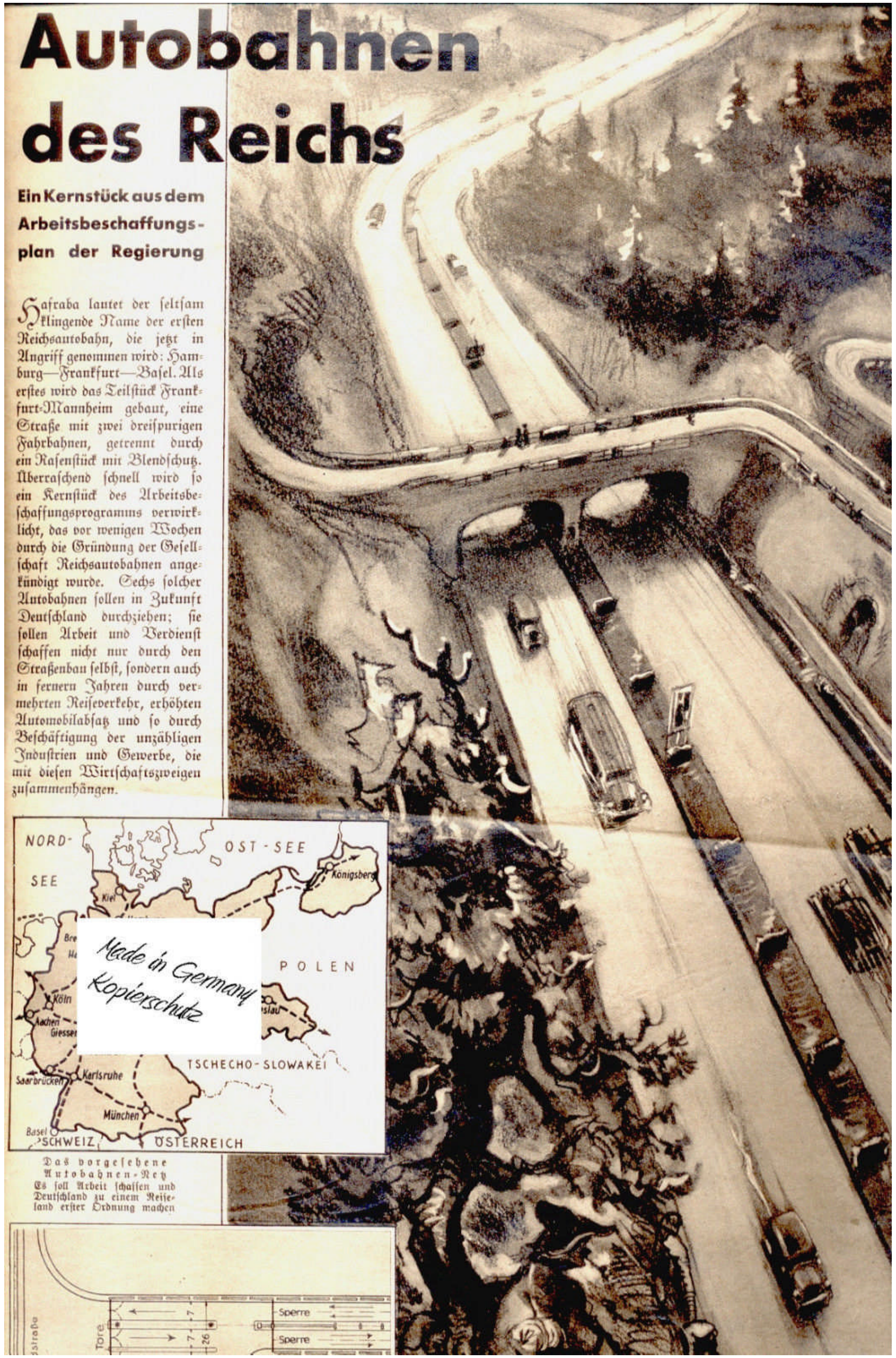
Build It and They Will Drive

Connectivity

"…Because of the former bad condition of the general road system, the number of motor vehicles in Germany was relatively low - only one car for every hundred inhabitants. Therefore the building of better roads was especially calculated to promote an increase of internal motor traffic in Germany Since the opening of nearly 1,000 miles of motorways in Germany the number of private cars and lorries has greatly increased. The general road system has been improved also. The motorways are not isolated, but are connected with numerous feeders with the country roads…"

***Wonders of World Engineering,* September 1937**


Brücke über den Main.
Reichs-Autobahn
Partie v. d. Mainzerstrasse.
Anfahrt zur Brücke.



Autobahnen des Reichs

Ein Kernstück aus dem Arbeitsbeschaffungs-plan der Regierung

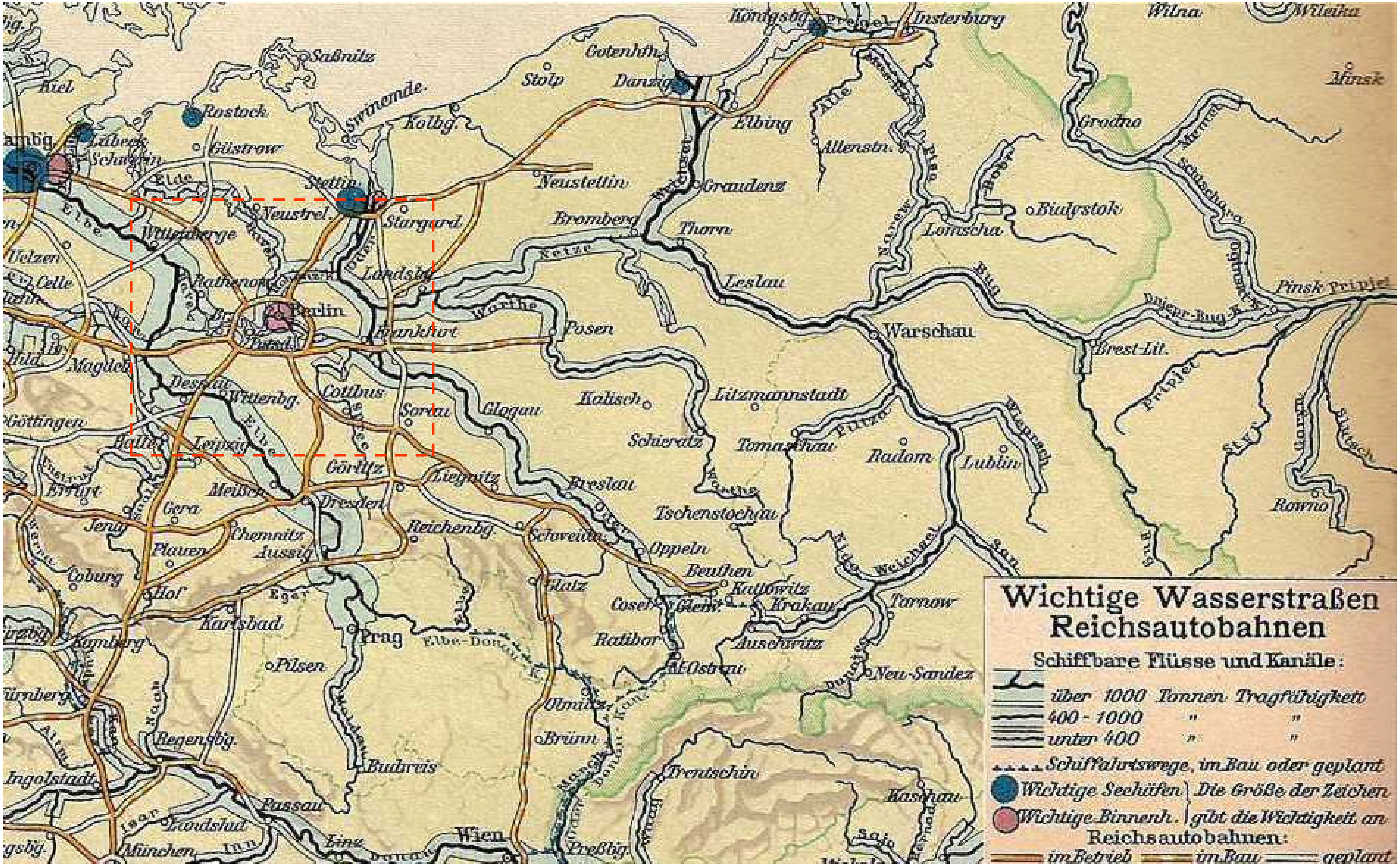
Hafraba lautet der seltsam klingende Name der ersten Reichsautobahn, die jetzt in Angriff genommen wird: Hamburg—Frankfurt—Basel. Als erstes wird das Teilstück Frankfurt-Mannheim gebaut, eine Straße mit zwei dreispurigen Fahrbahnen, getrennt durch ein Rasenstück mit Blendschutz. Überraschend schnell wird so ein Kernstück des Arbeitsbeschaffungsprogramms verwirklicht, das vor wenigen Wochen durch die Gründung der Gesellschaft Reichsautobahnen angekündigt wurde. Sechs solcher Autobahnen sollen in Zukunft Deutschland durchziehen; sie sollen Arbeit und Verdienst schaffen nicht nur durch den Straßenbau selbst, sondern auch in fernern Jahren durch vermehrten Reiseverkehr, erhöhten Automobilabsatz und so durch Beschäftigung der unzähligen Industrien und Gewerbe, die mit diesen Wirtschaftszweigen zusammenhängen.

Das vorgesehene Autobahnen-Netz
Es soll Arbeit schaffen und Deutschland zu einem Reiseland erster Ordnung machen

"…The planning of the network not only had in view the traffic between industrial centers, harbors, mining and agricultural regions, but also envisaged areas not yet fully opened to traffic. Germany has about 50,000 communities, of which only 12,000 have railway connections. The motorways have therefore been planned with an eye on these neglected areas…"

Wonders of World Engineering, **September 1937**

RE: the network as planned had three east-west highways, two north-south and diagonal connections between Berlin, Hamburg and Breslau

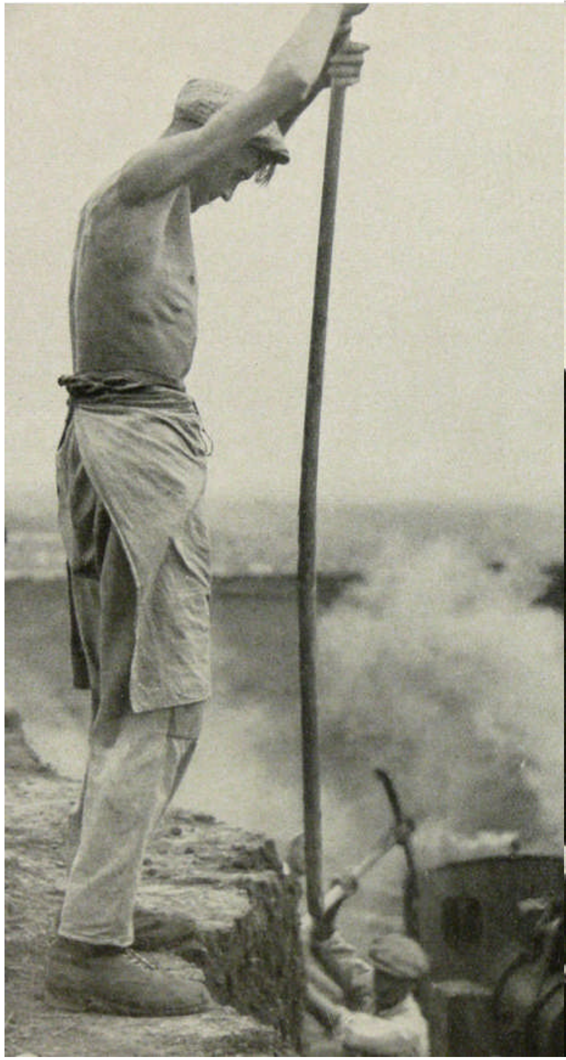


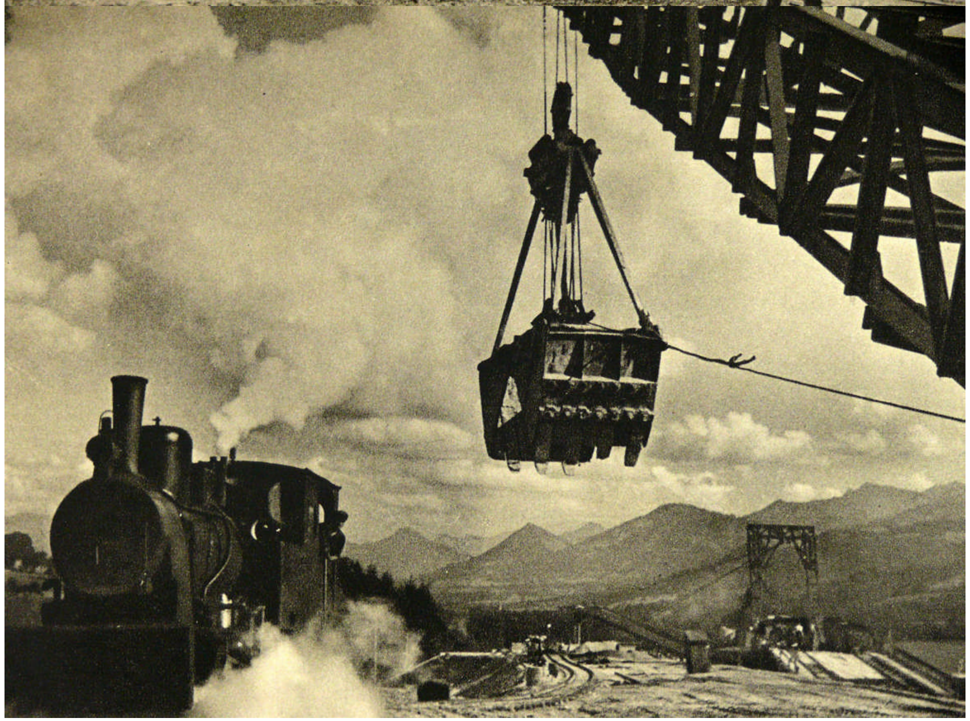
<u>Above</u>: caption: “Important Waterways & Highways, published September 1943” (the vicinity of Berlin highlighted)

Make Work

"…The motorway program in Germany forms an important part of the labor scheme in combating unemployment. About 100,000 men have found new jobs on the motorways, and another 150,000 have been able to work on the building of bridges, in quarries, steelworks, factories and associated industries…"

***Wonders of World Engineering*, September 1937**

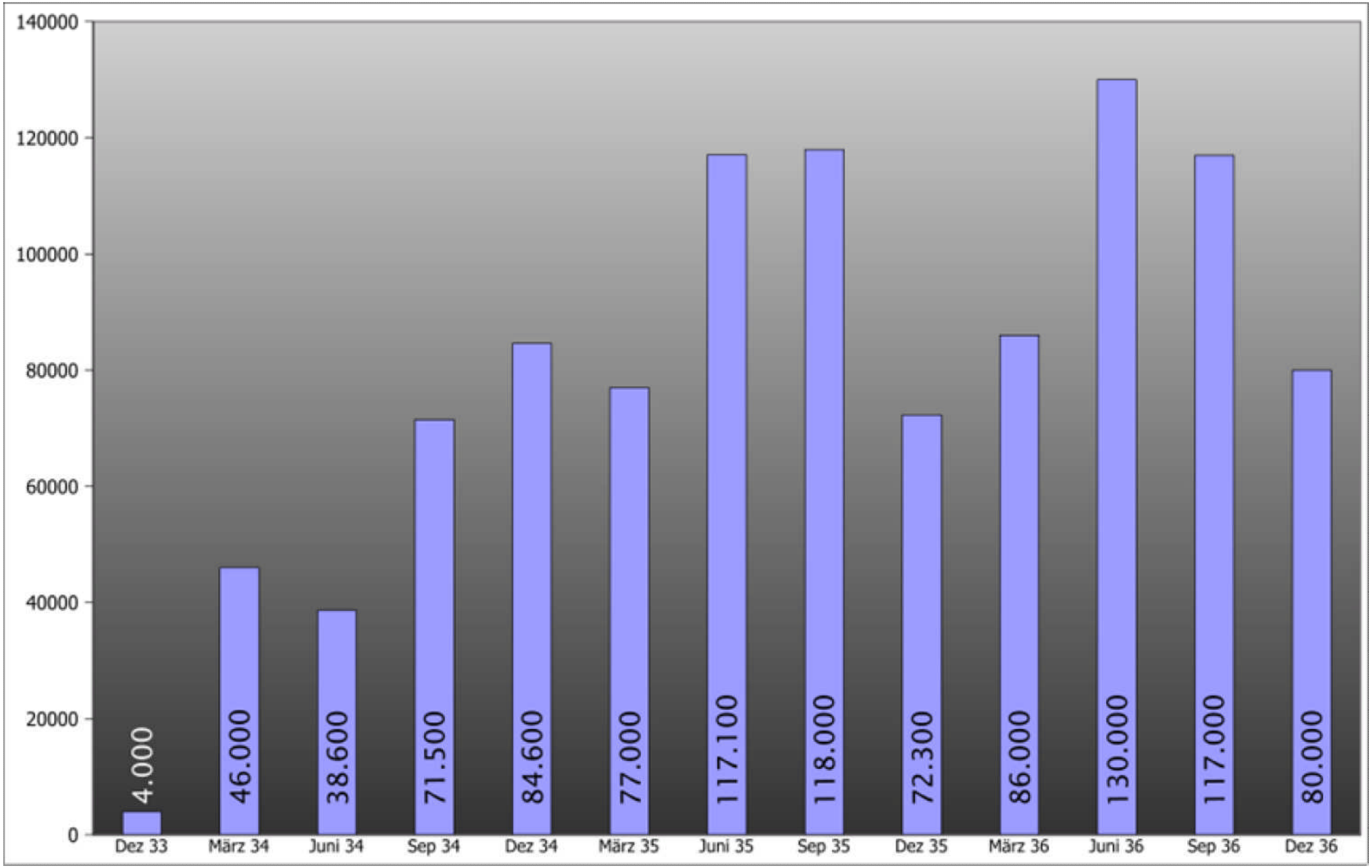


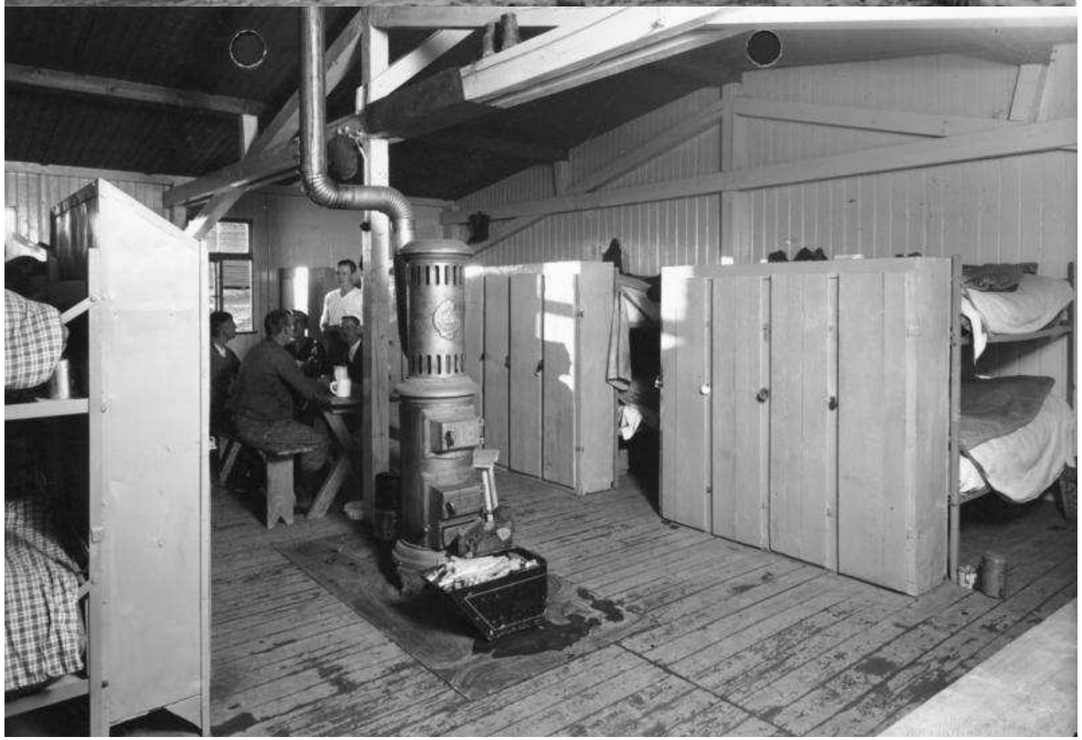



<u>Above</u>: caption: "March of the workers through Frankfurt on the Scharnhorststrasse (today Baseler Strasse)"

<u>Left</u>: caption: "Moving in Karlsruhe on March 21, 1934"



<u>Above</u>: caption: "Workers employed directly in Reichsautobahn construction per quarter, Dec. 1933 through Dec. 1936"



Safety First

"…The German Government's aims embody the suggestions of practical motorists as well as the advise of technical experts, the object being to build motorways which offer the greatest margin of safety in all conditions of traffic…"

Wonders of World Engineering, **September 1937**

RE: the term "Autobahn" was first coined in 1928 by *Kurt Kaftan* – HaFraBa's head of public relations. The word also was used as the title of the organization's official magazine.

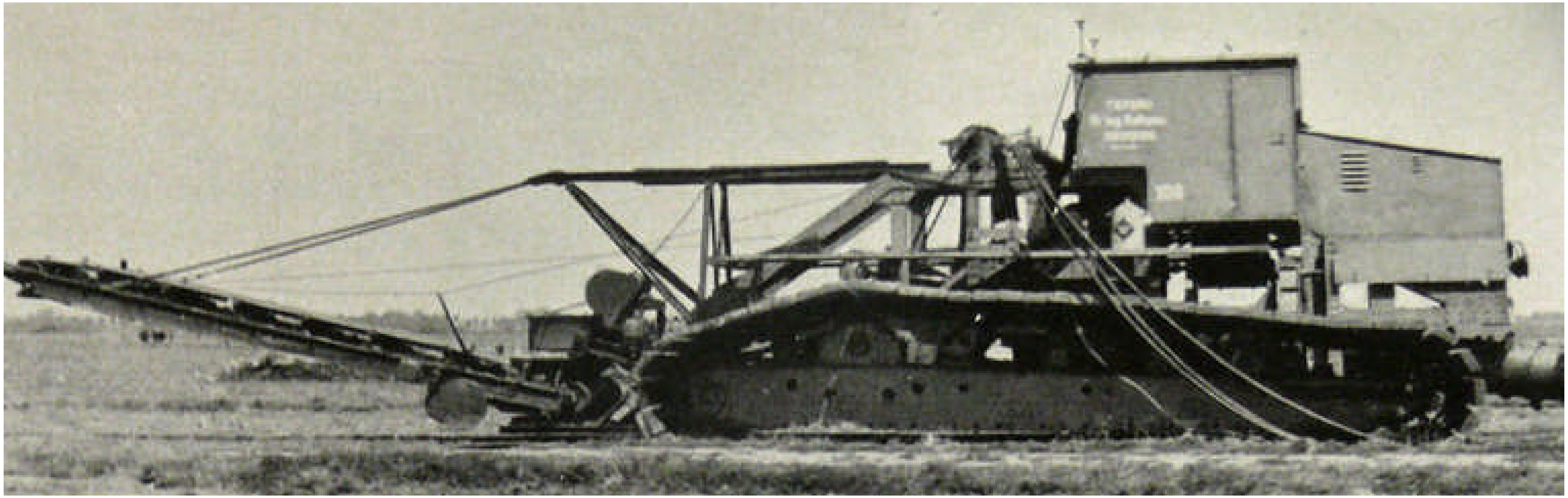
Left: caption: "Adolf Hitler observes work-in-progress on a new German Autobahn"

No Such Defect

"…Special attention has been given to the preparation of foundations. It has sometimes happened that a newly-made road will, after some months, suffer from the effects of sub-sidence. The German authorities are determined that no such defect shall develop on their motorways. Geologists and soil specialists have been asked to ascertain the bearing capacity of the subsoil and to give practical hints. Soil testing in connection with laboratory work has been adopted in many instances…"

***Wonders of World Engineering*, September 1937**

Good Vibrations



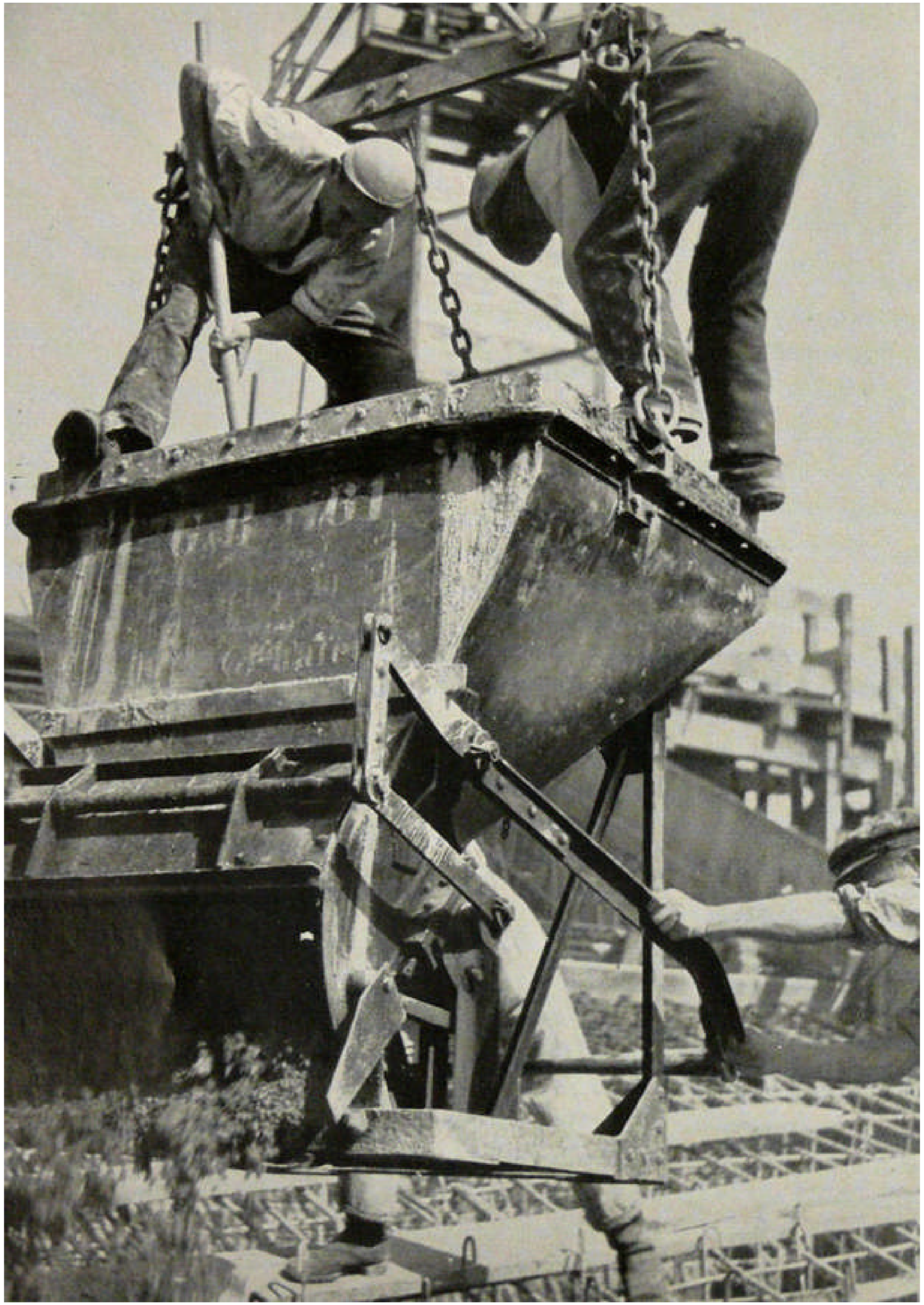
"…Use has been made of such devices as vibrating and tamping machines to obtain compact subsoil. The vibrating machines are used to transmit oscillation through the subsoil, and seismographic readings are taken at various distances from the scene of operations. The tamping machines vibrate the concrete laid on the road bed. Oscillations up to 4,000 blows a minute compact the concrete and expel superfluous water; the same apparatus accurately levels the surface…"

***Wonders of World Engineering,* September 1937**

A Marked Preference

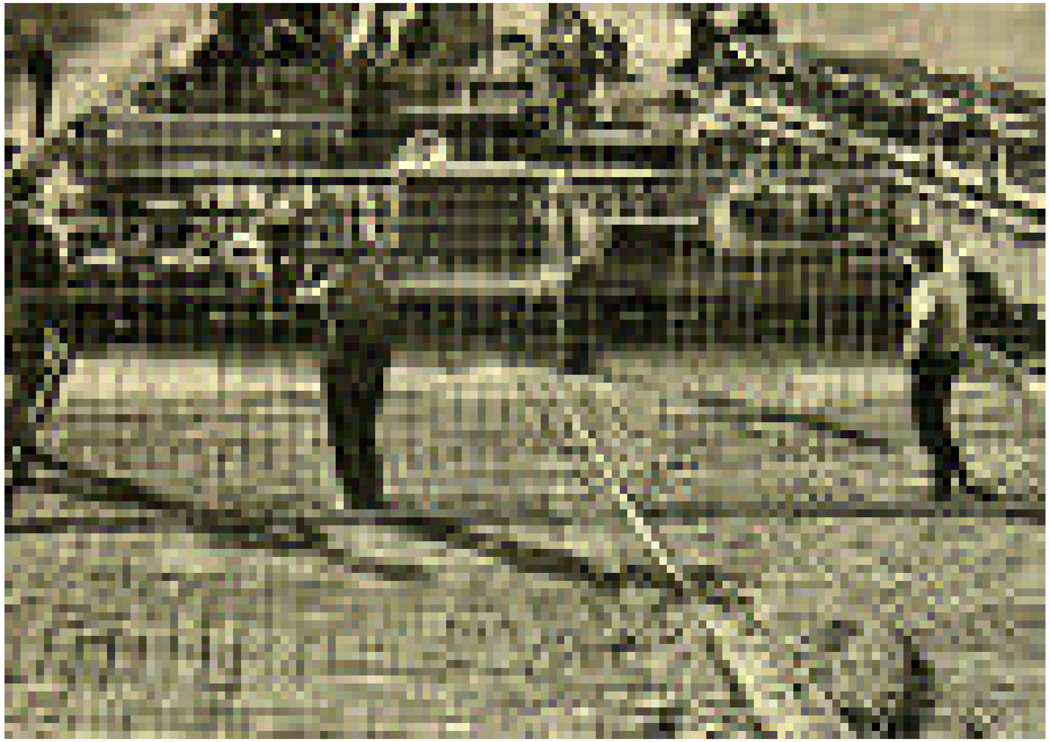
"…Excavated material is deposited in layers varying in thickness from 1 ft. 6 in. to 3 ft. 6 in. Consolidation of the ground, when filled, is effected by the use of drop hammers or consolidating machines in which four hammers operate side by side…"

Wonders of World Engineering, **September 1937**



"…In over 90 percent of the new roads concrete is used throughout. Bituminous surfacing and small stone setts are used for the remainder. Several reasons have been given for this marked preference for concrete. It is claimed that concrete roads are safer, cheaper to maintain, and provide smoother running surfaces than roads made up of any other material…"

***Wonders of World Engineering*, September 1937**



"…When concrete construction has been adopted, the builders have used reinforced concrete slabs. The slabs have a thick-ness of 8 in. to 10 in., and the steel mesh reinforcement is 4 lbs. to the square yard. The standard chemical content of the concrete is 528 lbs. to the cubic yard…"

Wonders of World Engineering, **September 1937**

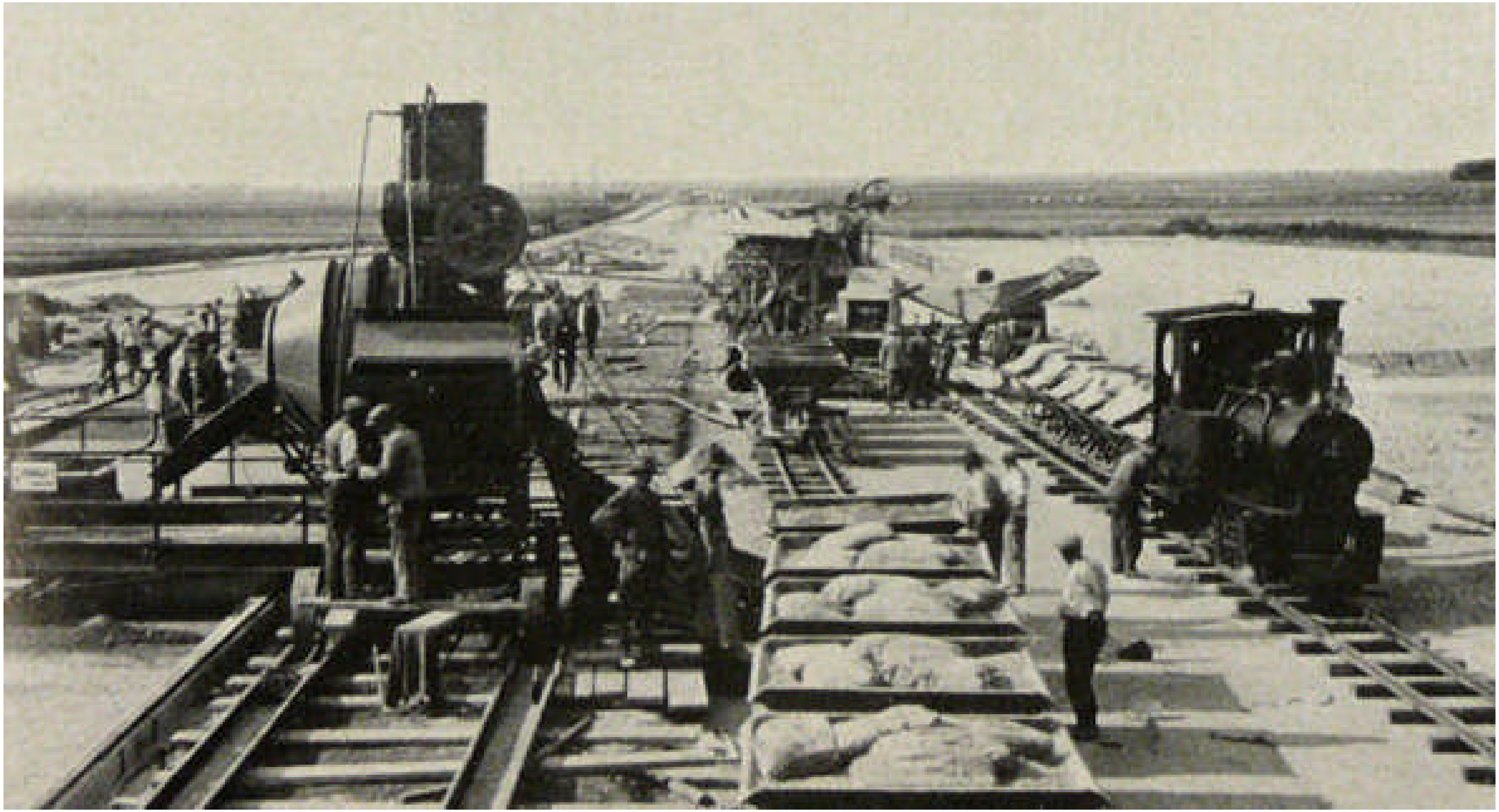
Of Uniform Quality

"…In the early days of construction the concrete was laid in two courses of different grades. The upper course was of better quality than the lower course. It was, however, soon found desirable to change this method, and the roads are now generally built with single courses, of uniform quality. Transverse joints are spaced at intervals varying from 26 feet to 65 feet, to suit varying conditions in different parts of the country…"
Wonders of World Engineering, **September 1937**

Road Work

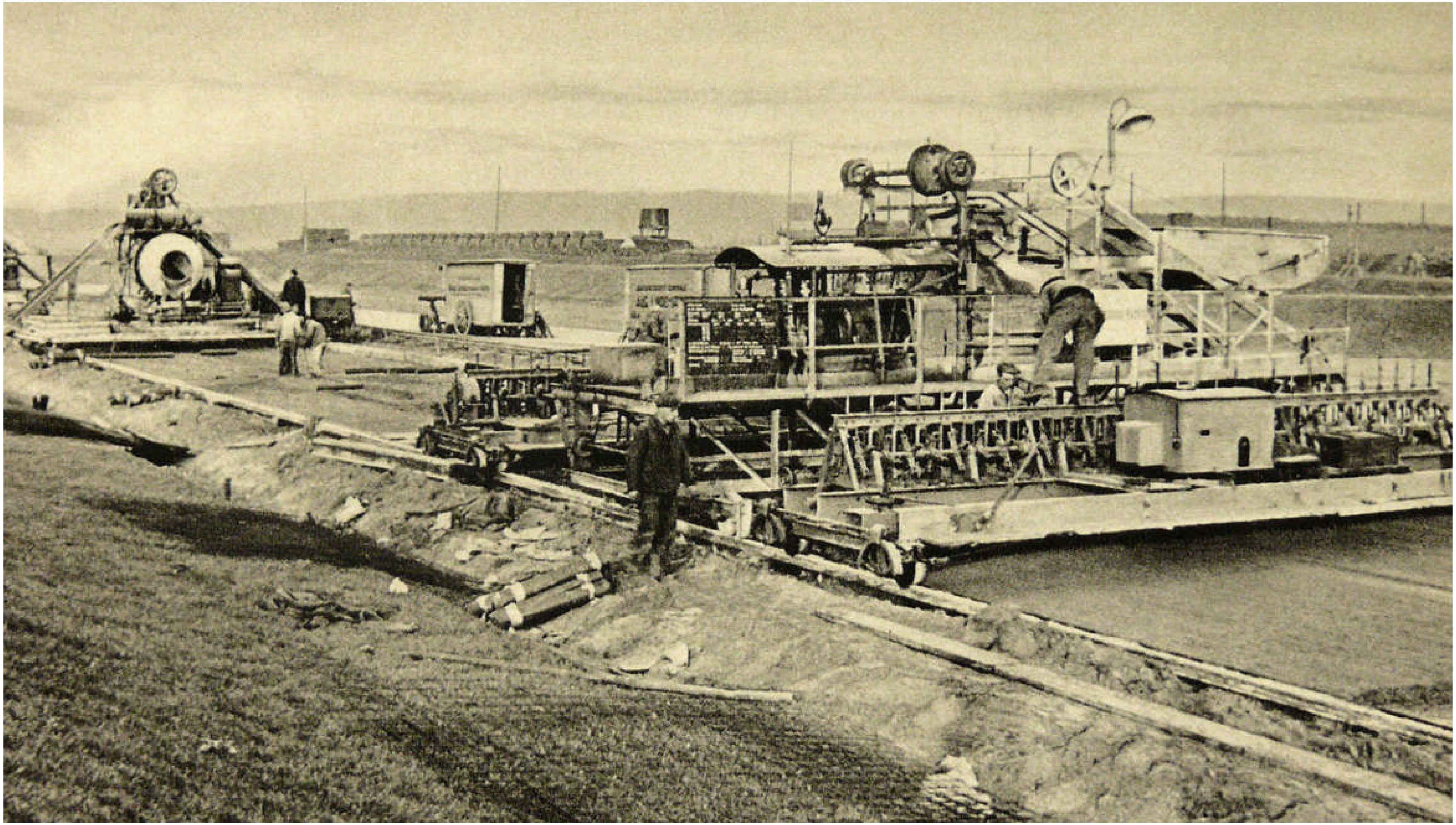
"…The concrete is laid on waterproof paper. After that the work is done by machines spanning the track and running on rails on either side. The rails are laid on the verges…For this reason the verges are – as a rule – the first part of the tracks to be built…"

***Wonders of World Engineering,* September 1937**



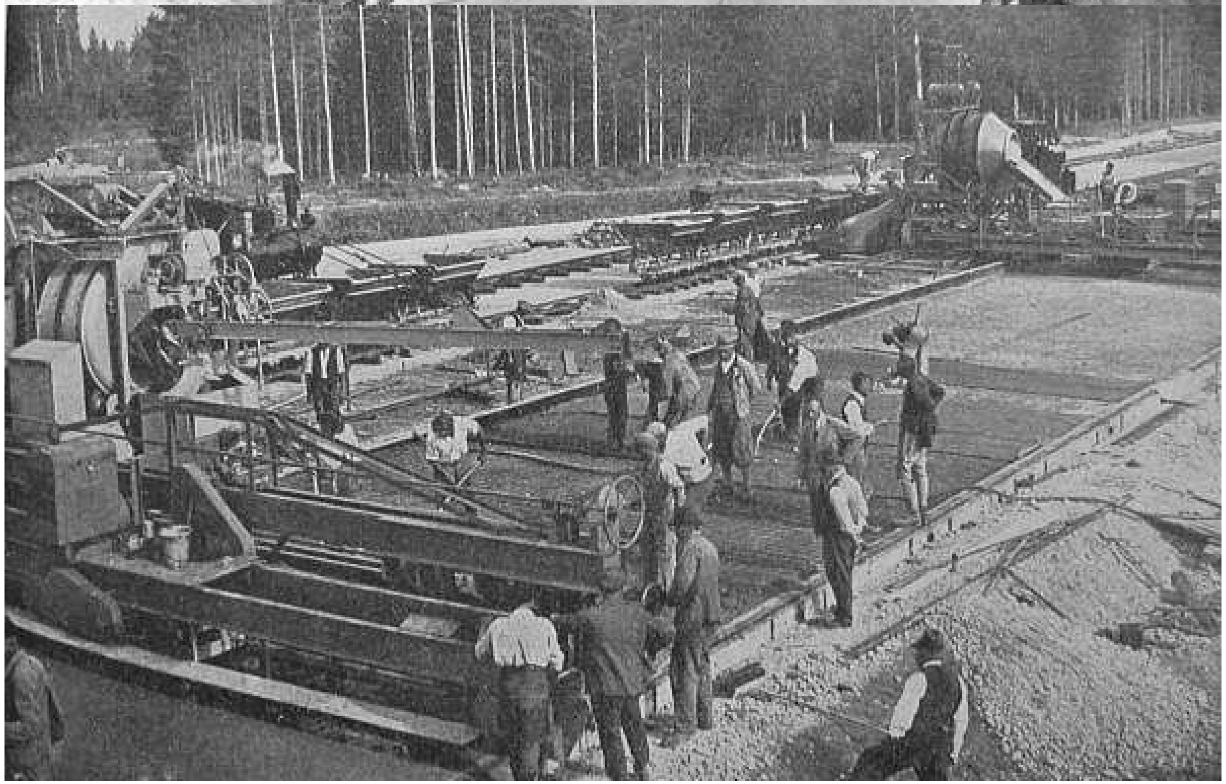
"…The aggregate and cement are mixed to the appropriate quality at a mixing plant, and then brought to the scene of the work by skips drawn by a locomotive running on the rails which have been laid on the verges. The mixer delivers the material into distributor buckets, which deposit the concrete where it is required…"

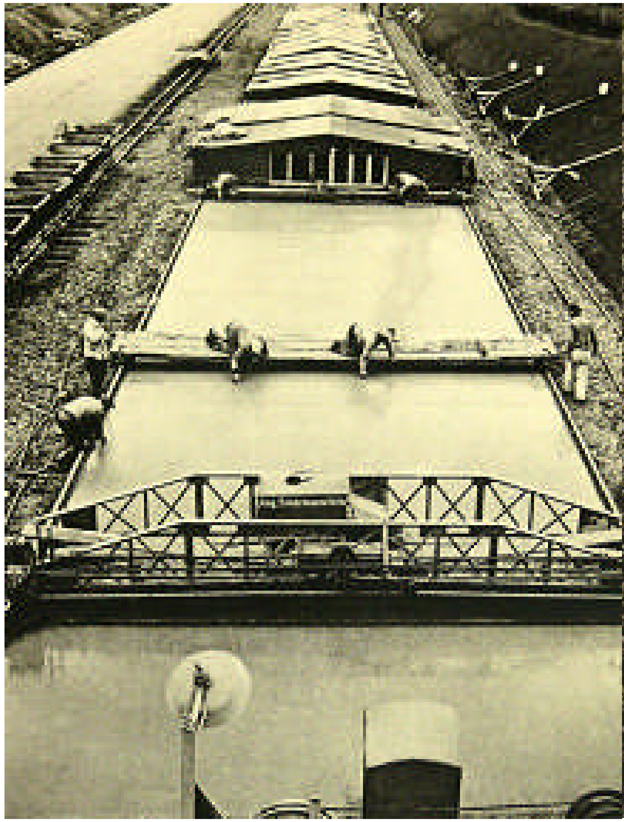
***Wonders of World Engineering*, September 1937**



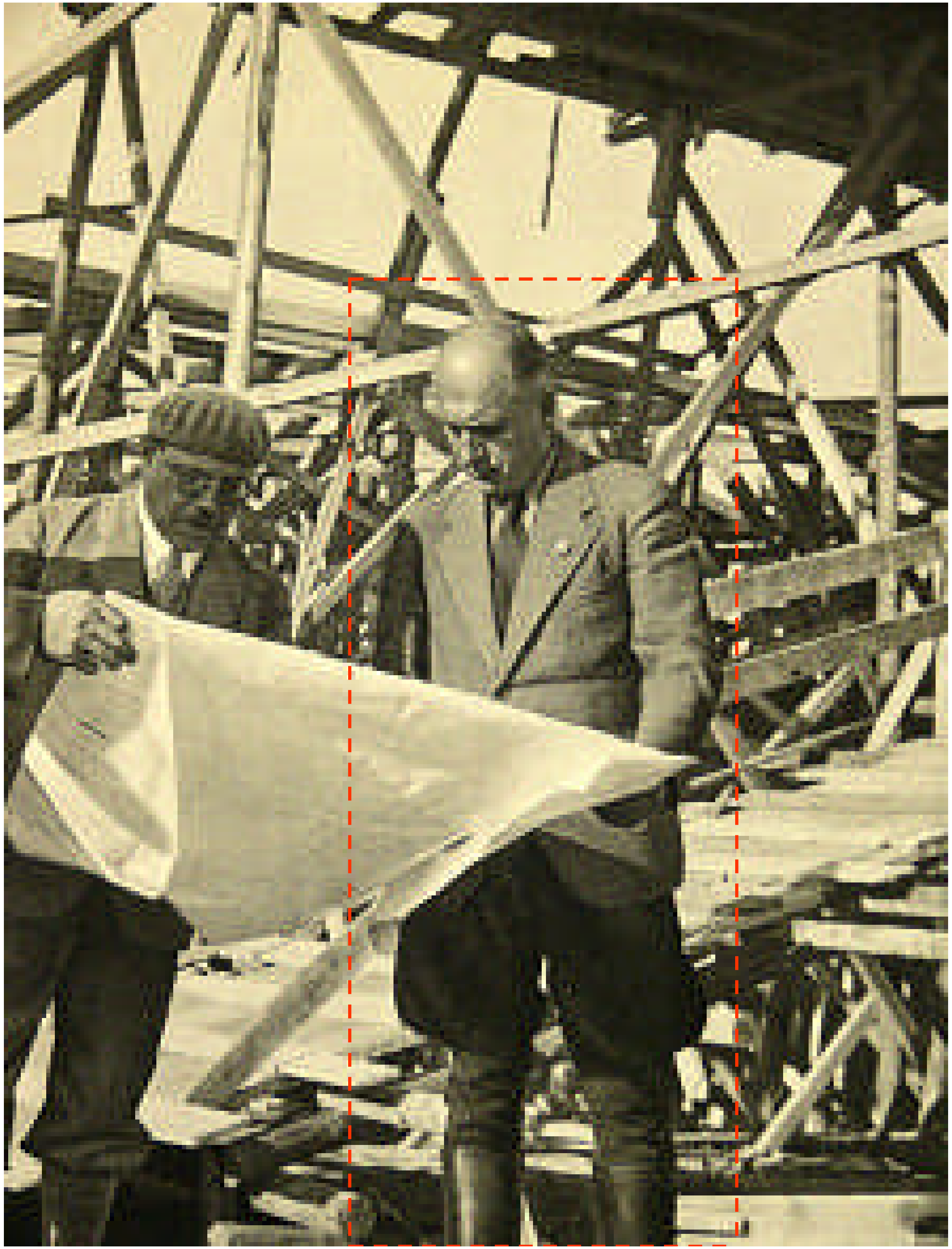
"…Next the surface finisher comes into play. This machine levels the surface, tamps and vibrates it. Virtually the whole of the work is done by mechanical means. The newly laid concrete is protected from the effects of sun and rain by canvas screens until it has set. It is then kept wet for a period of three to four weeks by wet sand, canvas or other means…"

***Wonders of World Engineering,* September 1937**





The Stipulation



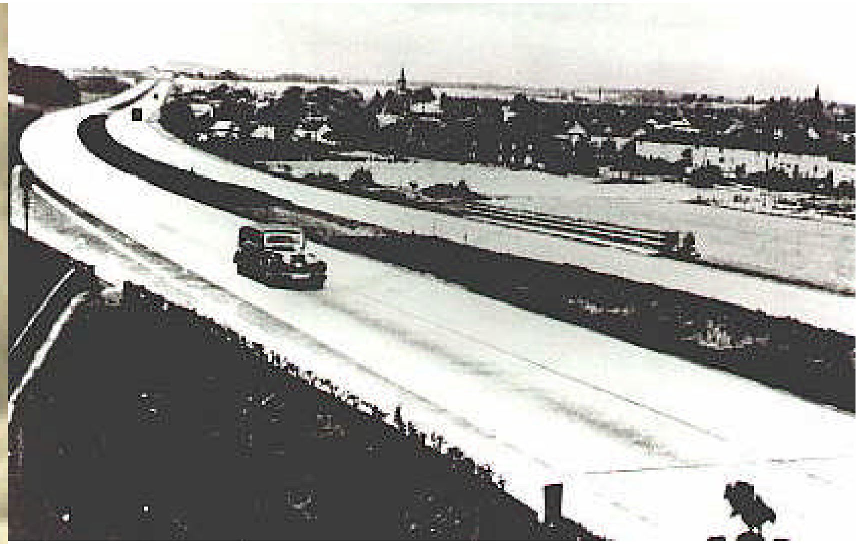
"…The Inspector-General of German Roads, who is the administrator of the entire German road network, including all kinds of motorways, has stipulated that the irregularities of surface shall never exceed 5/32 in. for every 12 feet. In view of this stipulation, a machine has been devised for detecting irregularities; this machine records its results on an autographic diagram…"

***Wonders of World Engineering*, September 1937**

<u>Left</u>: *Fritz Todt,* IG (at right)

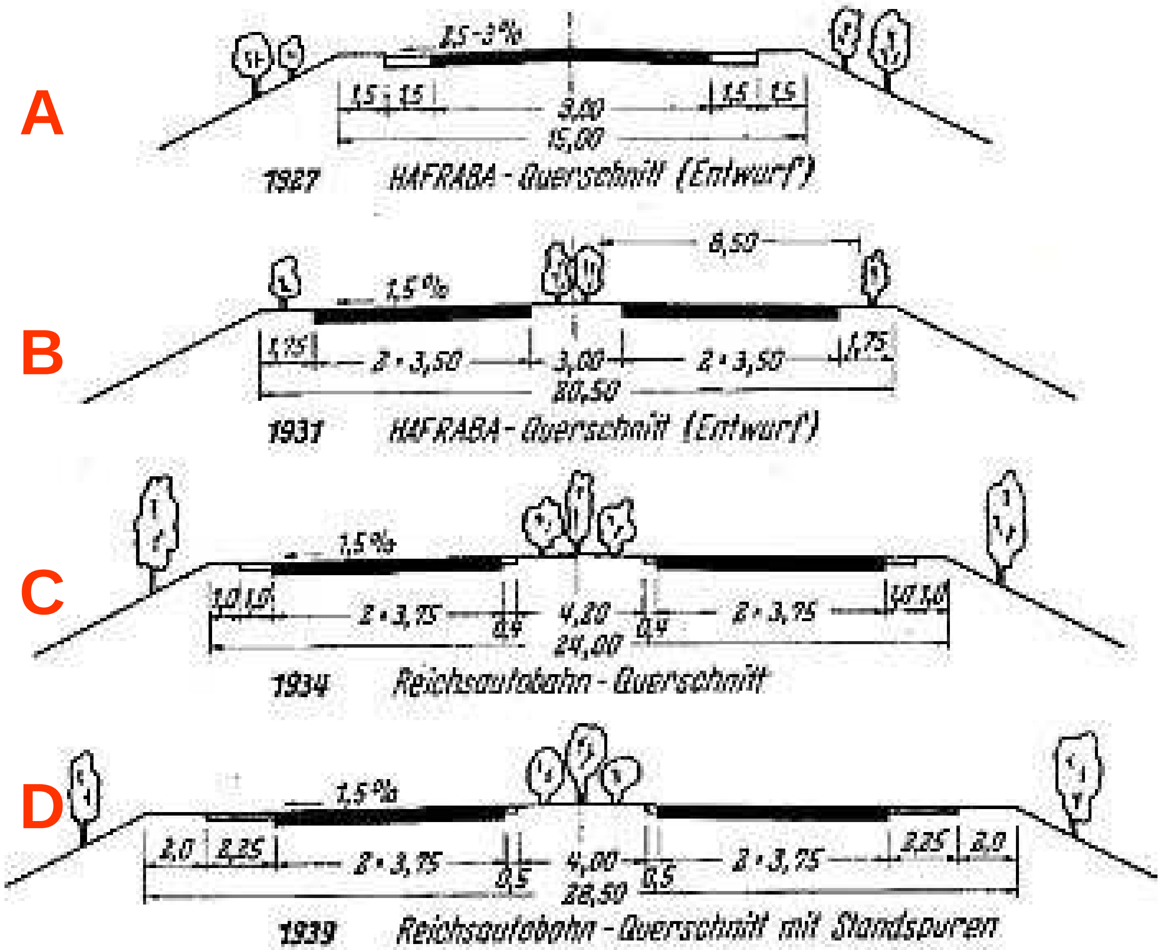
Left: caption: "Dr. - Ing. Fritz Todt (1891-1942)." Through the "Act Amending the conditions of Reichsautobahen" and the "Third Implementing Regulation" (July 1938), Doctor-Engineer *Fritz Todt* was elected Chairman of the Board of the *Reichsautobahnen Company.* As "Inspector General for German Roads," Todt had far-ranging powers, fully supported by the *National Socialist* (a/k/a "Nazi") Government of Germany.

A Divided Highway



"…The cross-section of the motorways has been planned according to the experience of motorists. The roads are divided into two tracks, each 24 ft. 6 in. wide. The road surface has a camber of 1½ percent. The tracks are separated by a central strip of 16 ft. 6 in. This strip makes for safety, especially in view of the dazzling effect of head-lamps…"

Wonders of World Engineering, **September 1937**



As in other countries (i.e. Italy), at first Autobahn carriageways were provided without center separation (A). Later, a 3-meter wide center median (cross-section B - for low-traffic limits and mountain ranges) was provided. By 1931, two separate carriageways were planned, each with two carriageways. For the first realized *Reichsautobahnen* (C), the lane width was increased to 3.75 meters, (narrow paved verges were also provided). By 1939, fixed shoulders were wide enough for parked/disabled vehicles (D) without protruding into the traffic carriageways.

"…The edges of the central strip are covered with grass. The middle portion, about 10 feet wide, is planted with hedges and shrubs. To make room for cars which have to stop for repairs or other reasons the verges have been metalled for a width of about 3 ft. 3 in. The outer part of the verges, about 1 ft. 6 in. wide, may be used for hedges, lamp-posts or mile-stones…"

Wonders of World Engineering,
September 1937

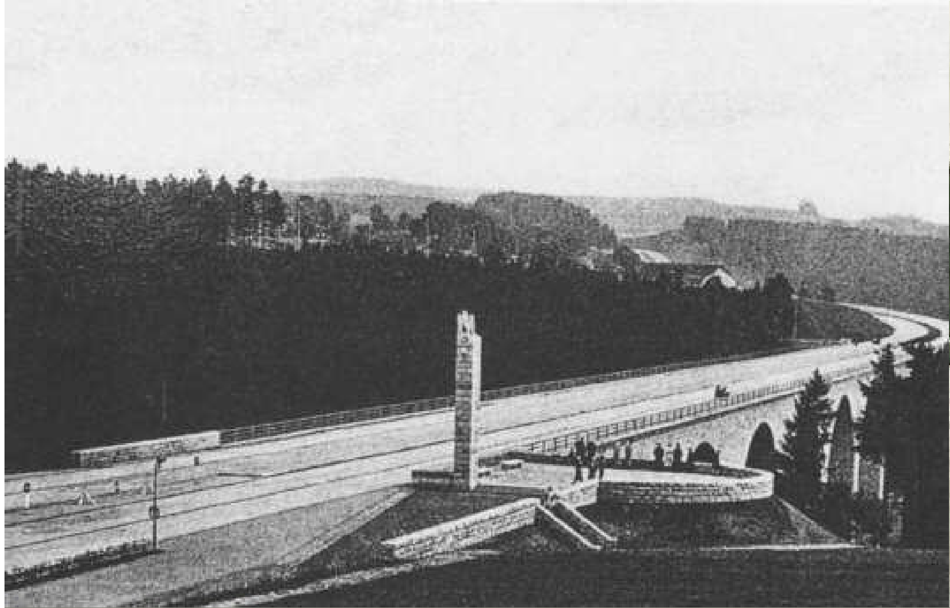

Reichs-Auto-Bahn Frankfurt – Darmstadt – Mannheim

Name Recognition

"…This cross-section is of unique type - so much so that the German name of 'Autobahn,' in the same way as the Italian expression 'Autostrada,' has become familiar in other countries. On the 'Autobahnen,' the curves have been laid out for speeds of 150 miles an hour; moreover, the camber of the roadways and the carefully engineered gradients permit the attainment of the highest speeds with safety…"

Wonders of World Engineering, **September 1937**

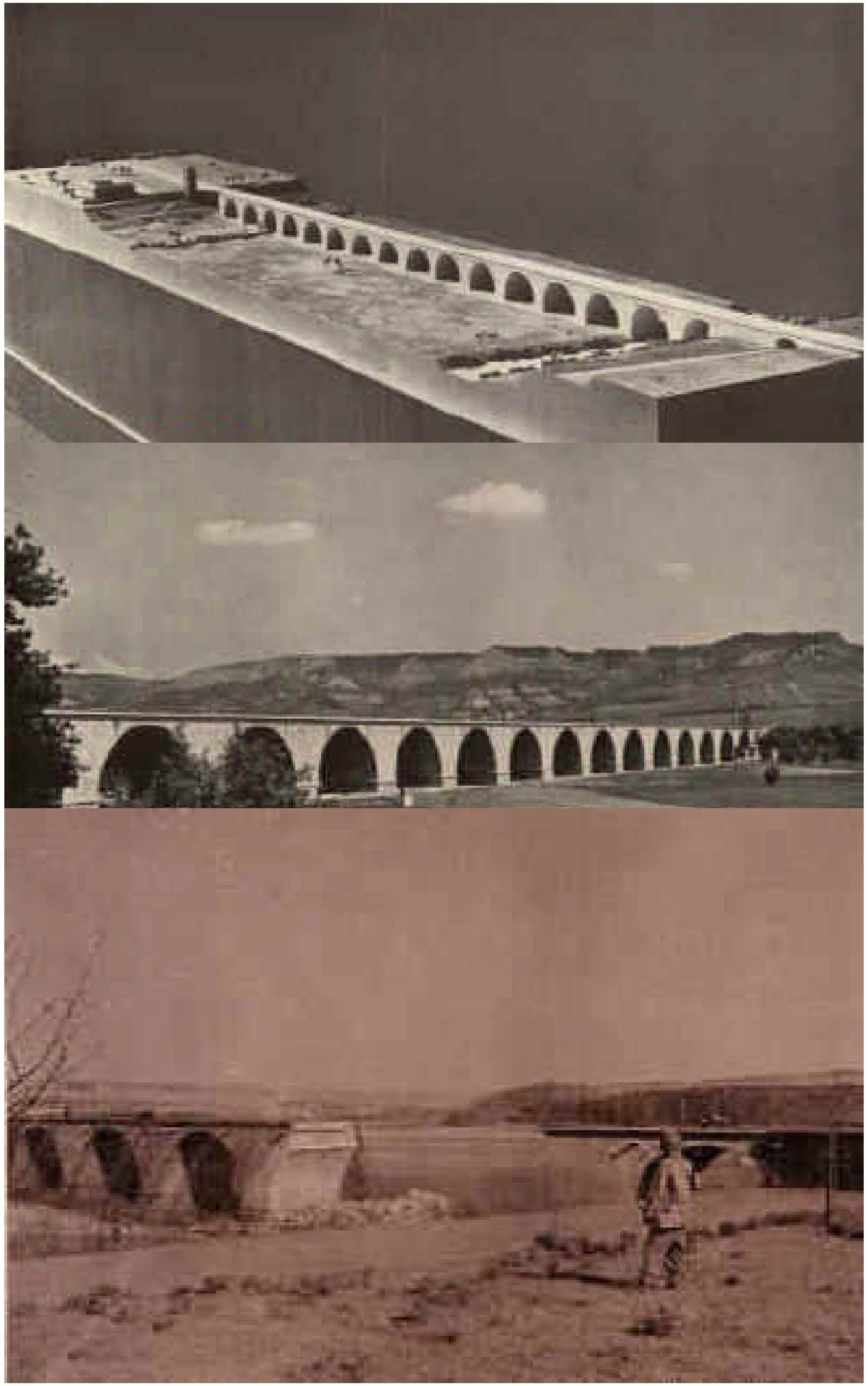
<u>Left</u>: this 1930s tourist poster was based on an actual scene on the *Berlin-Munich Autobahn* (A9) bridge spanning the *Saale River* (on the boundary of the German States of Thuringen and Bayern (Bavaria). It was the site of a Nazi monument; a tall stone pylon topped by a *Reichsadler* (eagle) with swastika (highlighted).



<u>Top Left</u>: a view of the monument site from a position on an adjacent hillside

<u>Top Right</u>: the site remains much the same today, minus the pylon and eagle, but it's no longer a scenic overlook for Autobahn traffic

<u>Left</u>: artist's concept of the site. Behind the monument was a small picnic area. The stone pylon's base remains as does the entrance to the stone stairway.

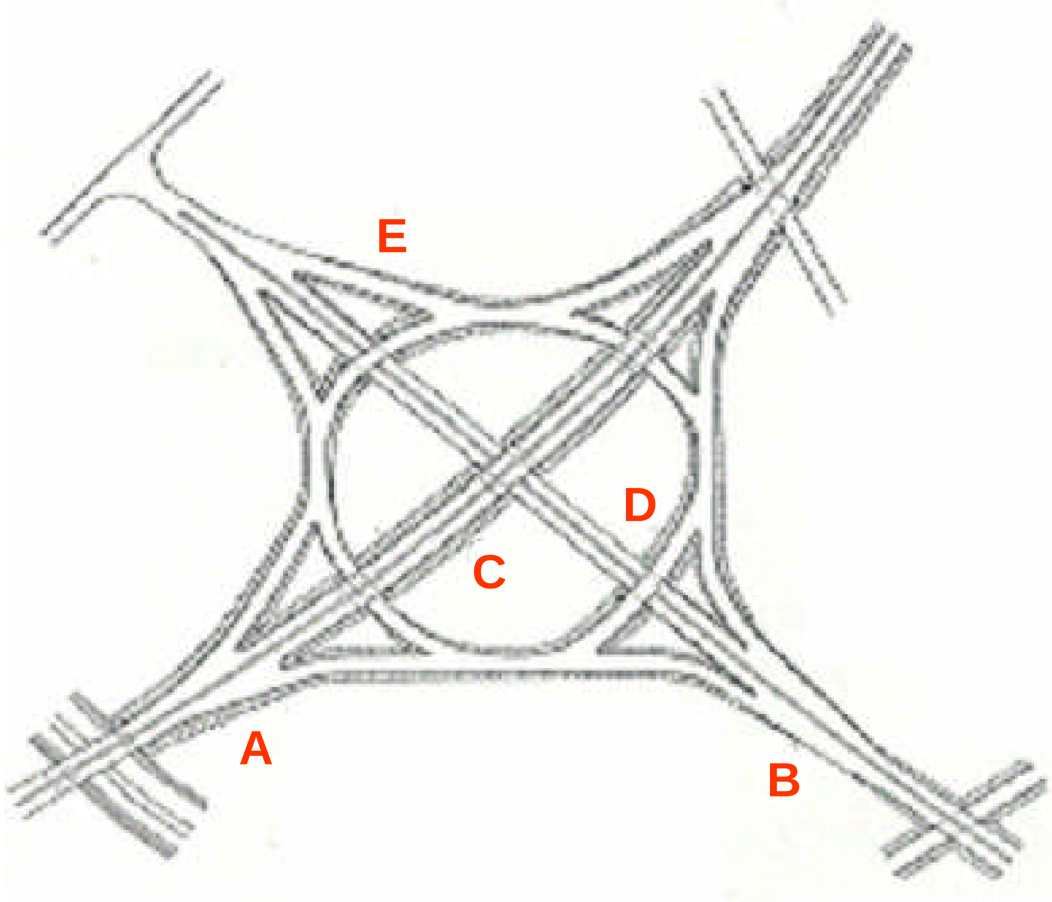


<u>Top</u>: one of the longest bridges in the Autobahn system was that crossing the *Valley of the Saale River* south of Jena (on the current *Autobahn A4*). The view shows an architectural model of the bridge.
<u>Middle</u>: the *Jena Brucke* (bri-dge) in 1938
<u>Bottom</u>: a GI inspects a de-stroyed section of the Jena Brucke that was blown-up by retreating German forces in April 1945

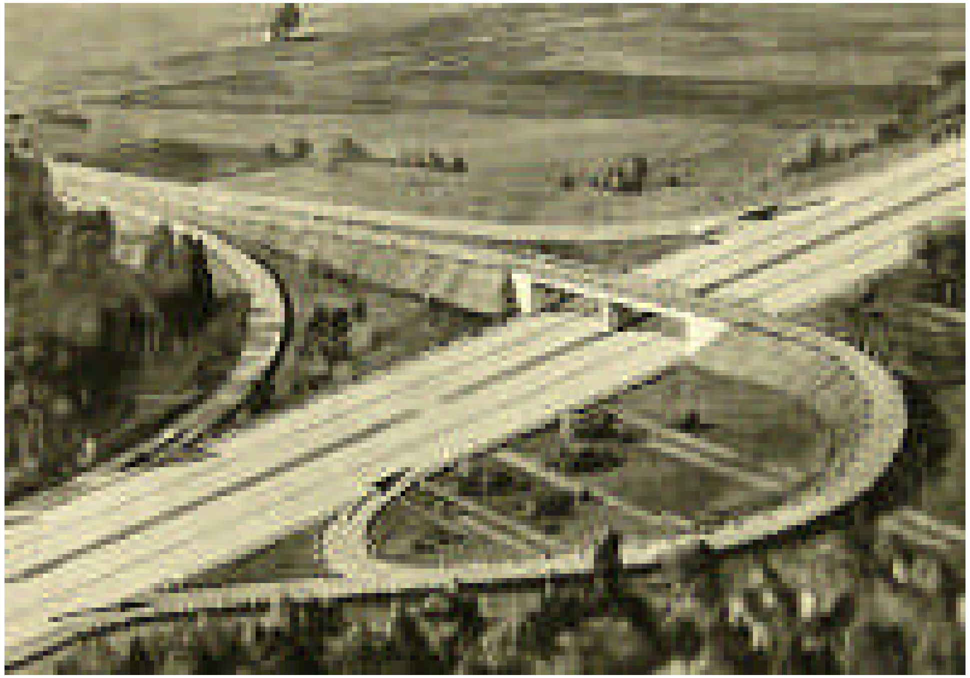
Not **on the Level**

“…One of the most striking features of the German motor-ways is that there are no level crossings. The driver need not fear the sudden appearance of another vehicle. Even the approaches from other roads have been in such a manner that the car entering the Autobahn can filter into traffic only at an acute angle…”

***Wonders of World Engineering*, September 1937**



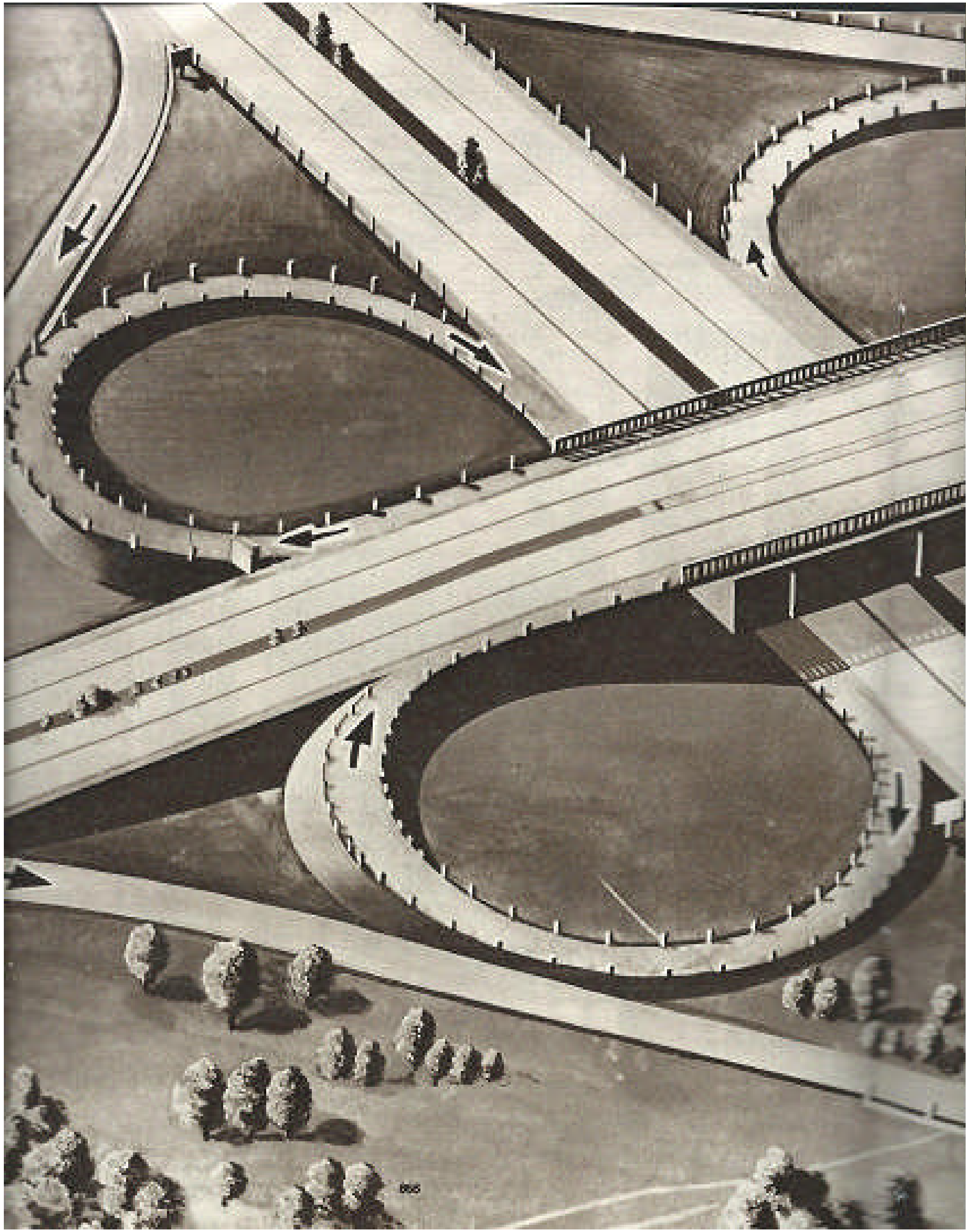
Above: caption: "Plan of a Road Intersection on the German motorway system. Vehicles wishing to turn right from A proceed down the spur road to B. Traffic wishing to turn left from one main road at A proceed down the same spur road but turn left to D, across the second main road, continues to bear left under the motorway it was on originally, and then bears right to E. Through traffic proceeds directly from A to C and is carried across the second main road and the spur roads by the bridges. Thus no streams of traffic meet or cross on the level."



"…Several types of one- and two-sided junctions eliminating level crossings have been developed. Cars can never meet cars going in the opposite direction. On these structures it is also possible to turn into the left carriageway (in Germany the rule of the road is to drive on the right)…"

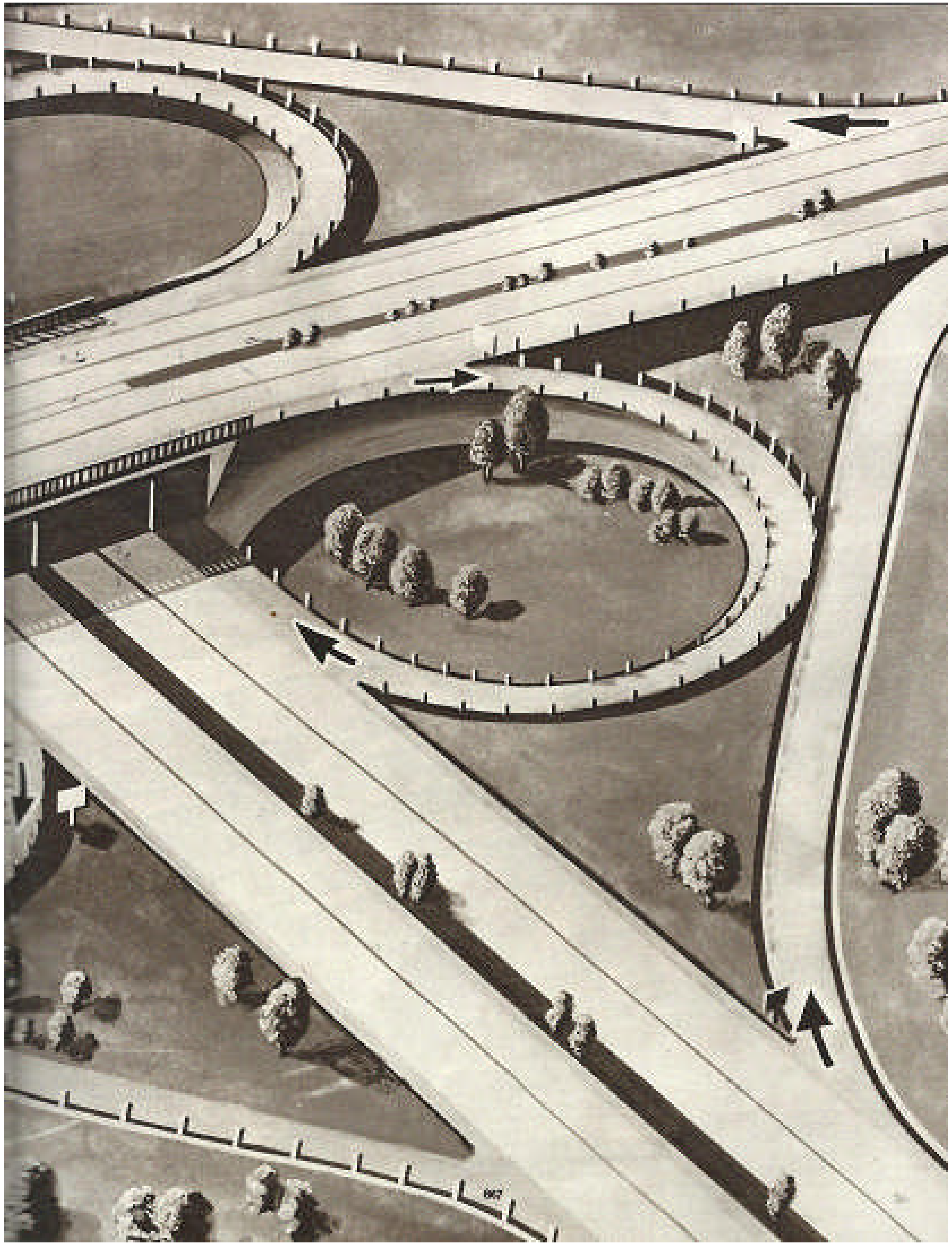
***Wonders of World Engineering,* September 1937**

Above: caption: “Flying junction or Bifurcation on a German motorway. Traffic for Frankfurt-on-Main proceeds straight ahead up the incline and across the bridge. Traffic for Mannheim bears right, along the spur road and under the Frankfurt road. In over 90 percent of the new roads concrete is used throughout. Bituminous surfacing or stone setts are used for the remainder.”



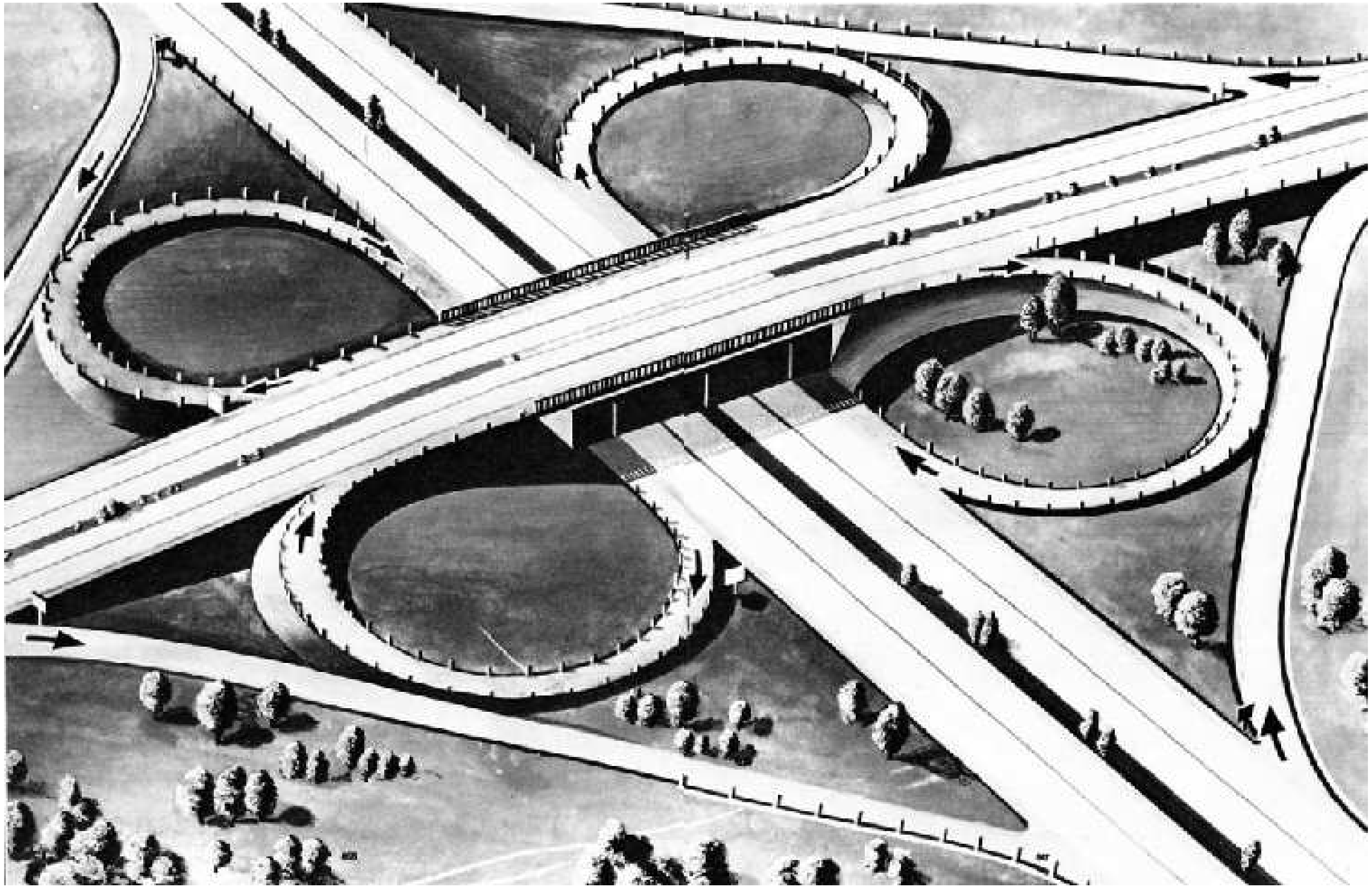
"…The photogravure illustration shows the general arrangement of one of these specially designed road intersections. In this instance the east-west route crosses the north-south route by means of a viaduct. Vehicles wishing to turn to the right from one road to another do so by means of spur roads laid at acute angles…"

***Wonders of World Engineering*, September 1937**



"…As traffic drives along the right-hand side of the road, a right-hand turn is a simple matter. A left-hand turn, however, is made by a form of flying junction. Traffic which is traveling in an easterly direction and wishes to join the north-south route in a northerly direction ignores the first spur road, passing along the viaduct over the north-south road and then turning to the right down one of the curved spur roads. This road turns through three-quarters of a circle and joins the northerly route at an oblique angle to the same direction as the northbound traffic…"

***Wonders of World Engineering,* September 1937**

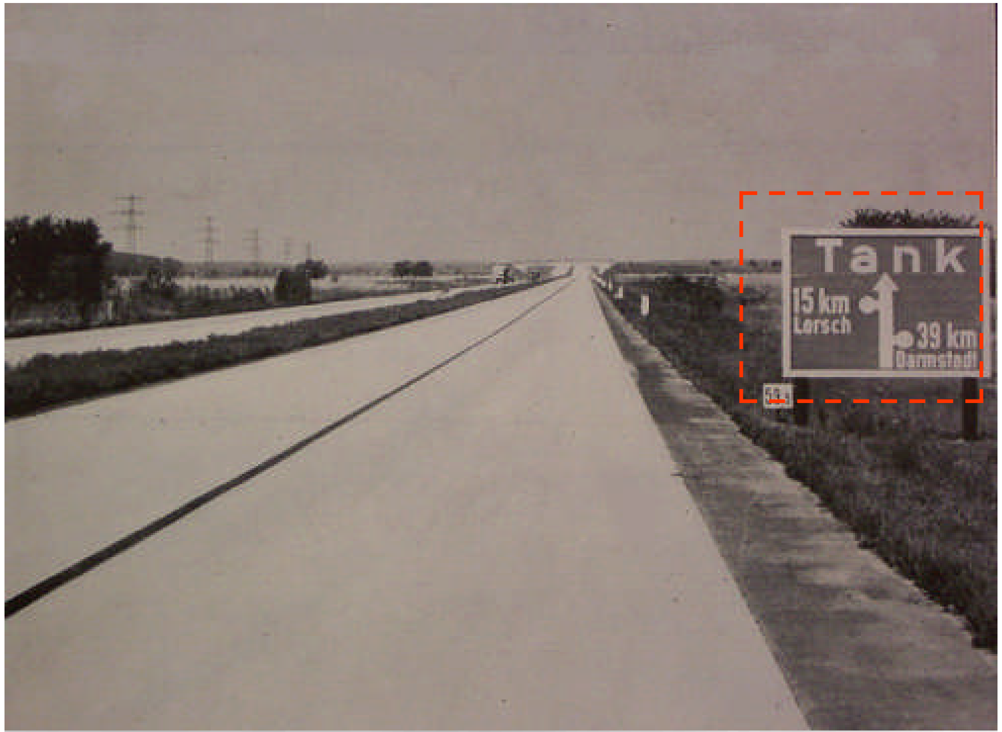


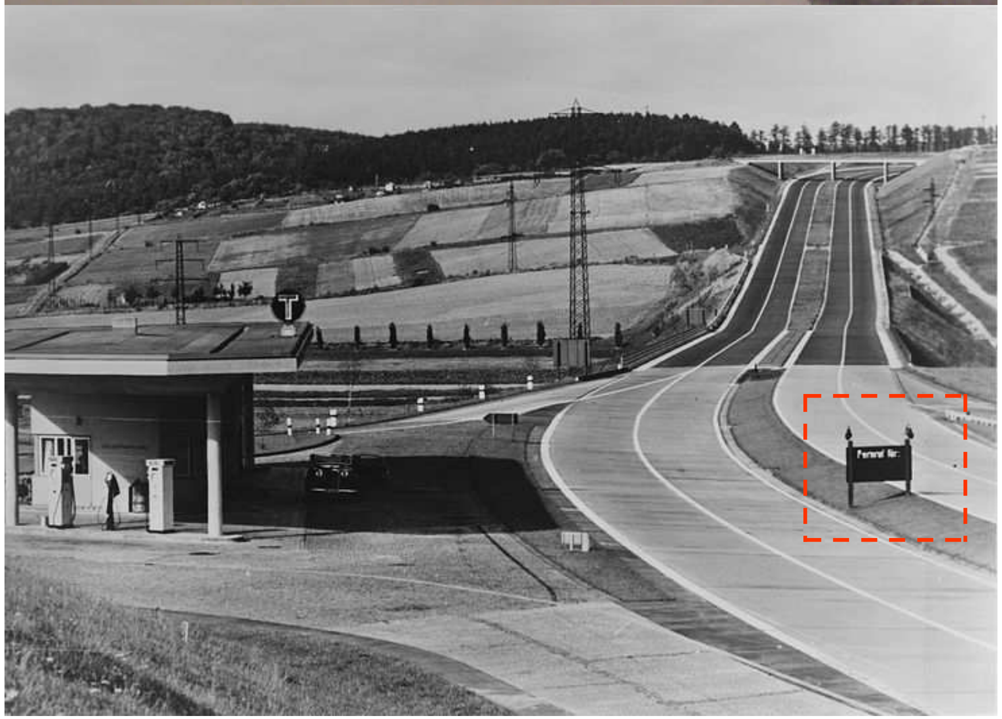
__Above__: caption: “Four-Ways Intersections on the German *Autobahn* system have been designed so that no two streams of traffic have to meet or cross at any point on the same plane. The drawing shows a typical intersection. The direct east-west route is carried over the north-south route by a viaduct. From the approaches to the viaduct, spur roads lead down to join the north-south route. Traffic in Germany travels on the right-hand side of the highway, so that these spur roads provide only for right-hand turns. When it is desired to turn to the left, vehicles on, say, the north-south road pass under the elevated road, then turn right into a curved spur road which leads round, through three-quarters of a circle, up to the east-west road; the vehicles thus join the new route in the same direction as the east-west or west-east traffic. Similar curved spur roads are provided for traffic on the east-west route which desires to make a left-hand turn on to the lower, or north-south route.”

“…The same kind of spur road is provided for traffic traveling in each of the four directions. Natural obstacles, such as rivers and railways, add to the complications of building these ingenious intersections, for additional bridgework is necessary on some of the spur roads…”

Wonders of World Engineering, **September 1937**

Planned in Advance





"…Filling stations, repair shops, hotels and the like are being built at numerous places. Any road facility which might be required has been planned in advance…"

***Wonders of World Engineering,* September 1937**

<u>Top</u>: caption: "Advance sign for *Tankstellen* (services)"

<u>Bottom</u>: caption: "Early Reichs-autobahn filling station, in the triangle formed by the exit and access ramps, with notice board in the median to inform drivers of telephone messages"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ORLEN

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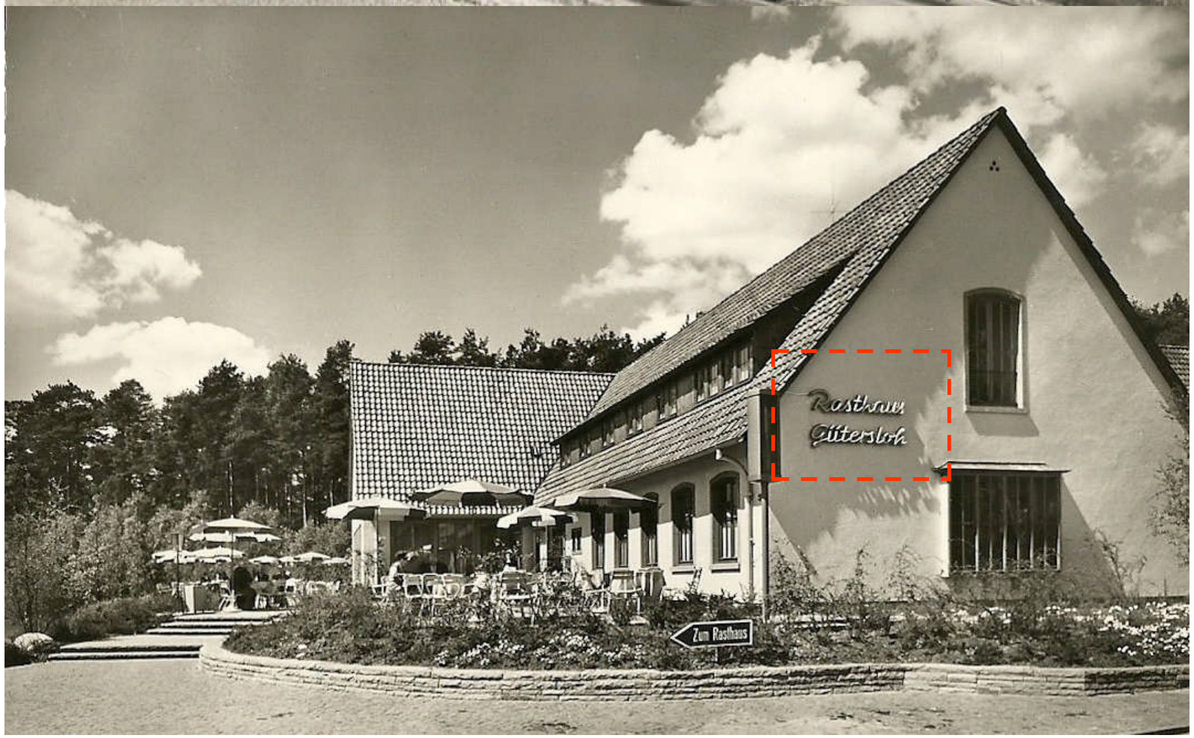
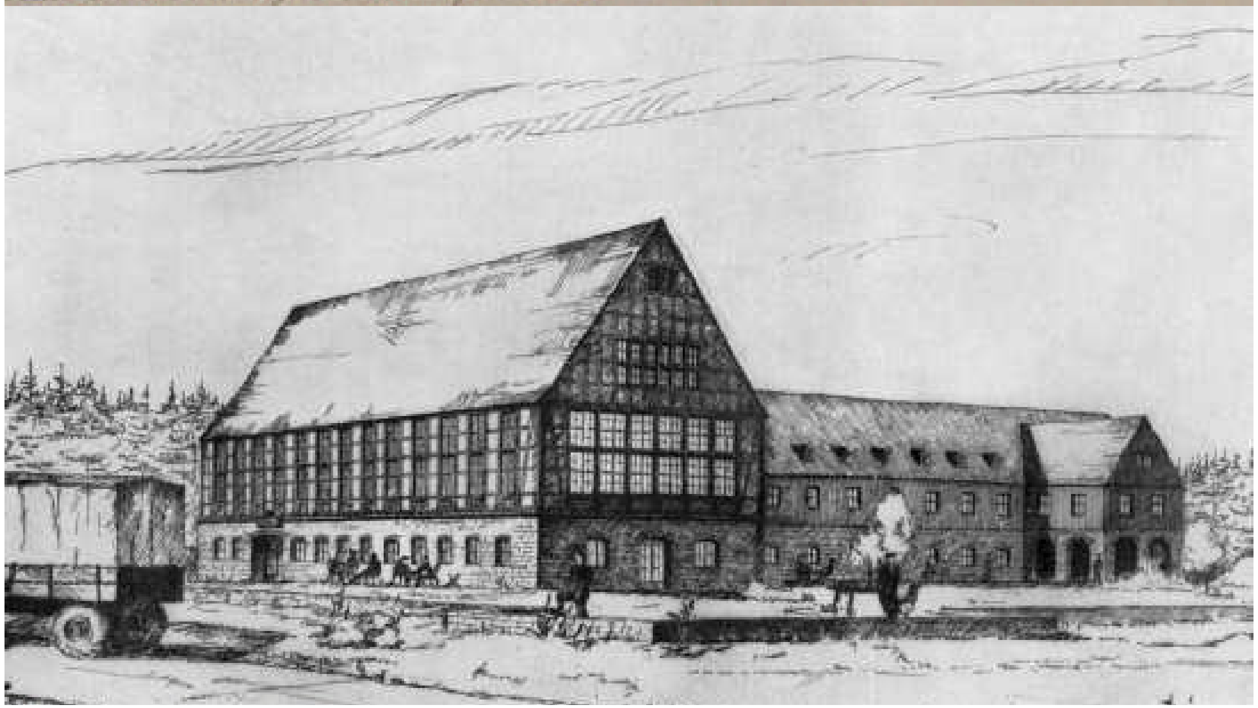

Rasthaus
Gütersloh
Zum Rasthaus

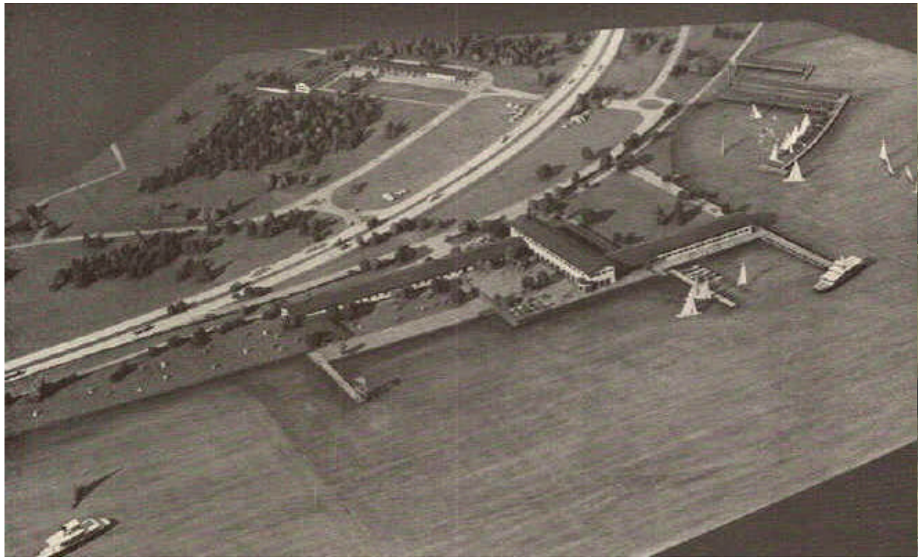


<u>Left T&B</u>: one of the earliest rest stations on the *Reichsautobahn* system, complete with restaurant and hotel, was built at the intersection of Autobahn/s A4 and A9 at Hermsdorf (top), in Thuringen (1937-38). The complex continues to serve the same function today. The final configuration was somewhat different from the architect’s conceptual rendering (bottom).

The showpiece aesthetic stretch of the Reichsautobahn was the *Irschenberg* on the Autobahn from Munich to the Austrian border, where instead of passing through the valley the highway was routed in a curving path up the hill to the summit, from which there was a full view of the Alps to the south (a rest stop was located there). The Irschenberg Autobahn segment was one of those that limited the usefulness of the highways for freight transport and with the increase in traffic after the war, it became a notorious bottleneck and accident site (many such segments have been straightened and, in some cases, the highway has been relocated). This entire 125 km (78 miles) segment epitomizes planning to maximize aesthetic appreciation of the landscape. *Fritz Todt*, who was credited with choosing the route, described it as an orchestrated experience culminating in the surprise view of the *Chiemsee*, where: “anyone who has a proper feel for this landscape…turns off the motor and silently glides down the three-kilometer-long slope to the southern shore of the lake, where a bathing beach, parking places, or the inn invite you to stay and rest.”

<u>Above</u>: caption: “Motorway painting: ‘Motorway in Irschenberg’ by Wolf Panizza”

Rasthaus Chiemsee

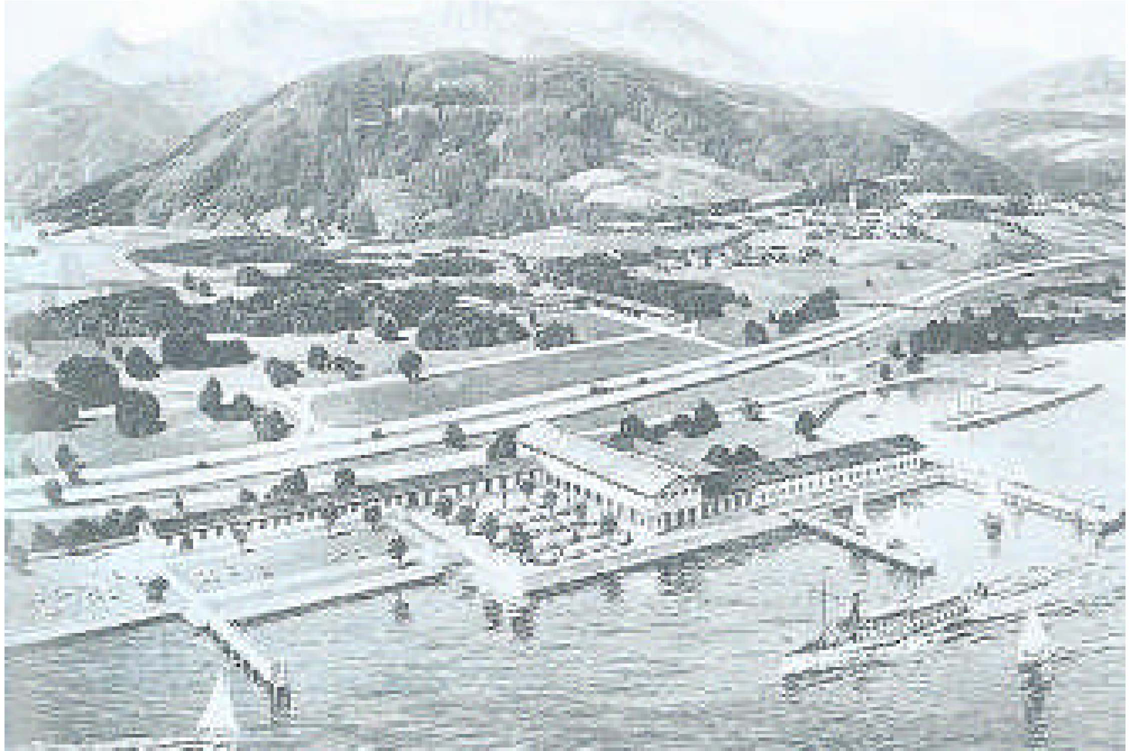
 

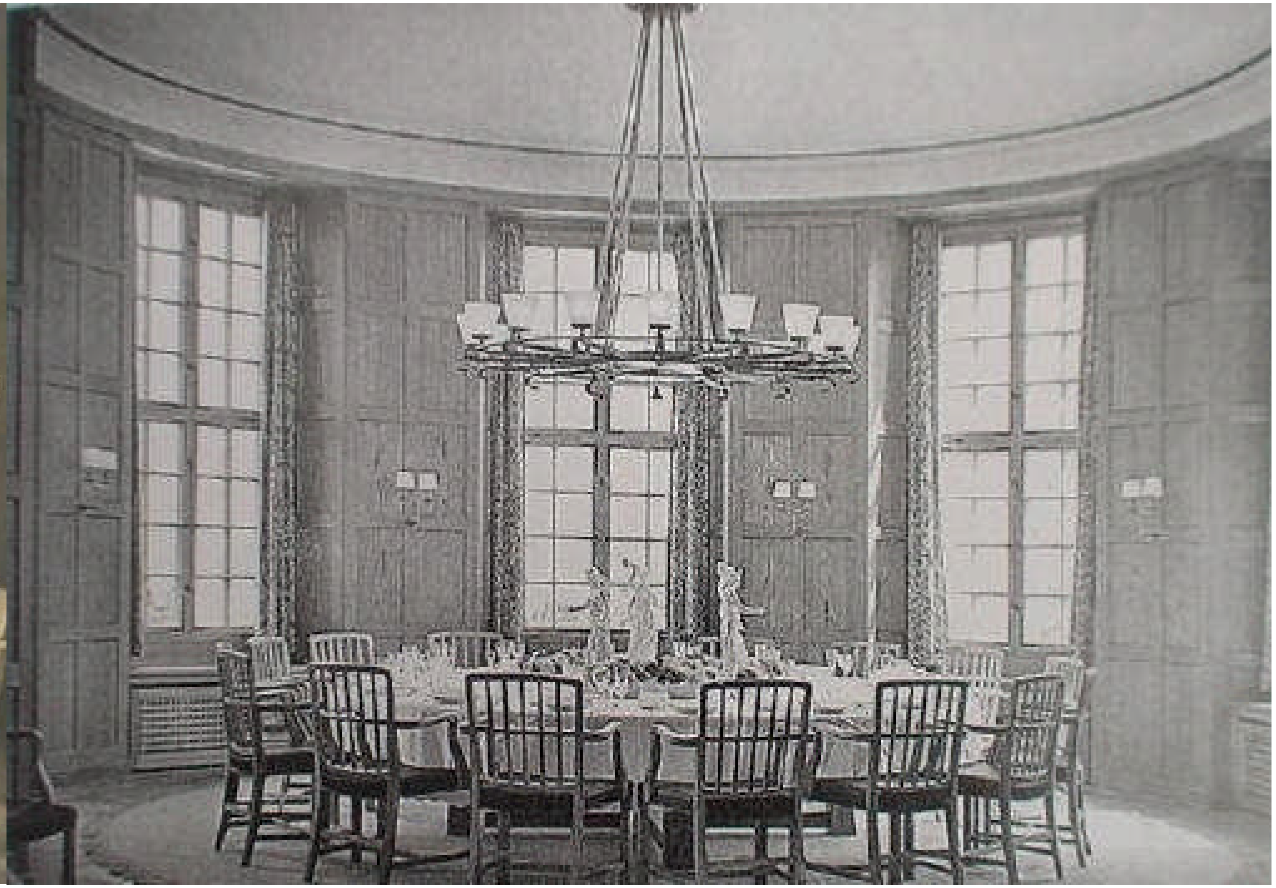
Chiemsee **is a large resort lake in southern Bavaria which was chosen by Hitler to be the site of the first "Rasthaus" (Rest House) on the Autobahn system. The first Autobahn was the route between Munich and Salzburg (since Hitler traveled this way often en route to his private home on the** ***Obersalzberg*****). The German Fuhrer wanted the best for this Autobahn, including a route that passed by the shores of** ***Chiemsee Lake*****. Despite the engineering and construction difficulties involved, a large Rasthaus complex was built directly on the shore of the lake, which opened in 1938. This complex served its intended function for only a few years, before being used as a hospital during WWII.**

<u>Left</u>: caption: "Architectural model of the Chiemsee Rasthaus complex. The main building was on the lake shore, with associated buildings on the other side of the Autobahn.

<u>Right</u>: caption: "Autobahn passes Rest House on the shores of Chiemsee Lake"

<u>Above</u>: caption: "Views of the Rasthaus from the lakeside, ca. 1939"
<u>Left</u>: caption: "A winter scene of the Chiemsee Rasthaus"



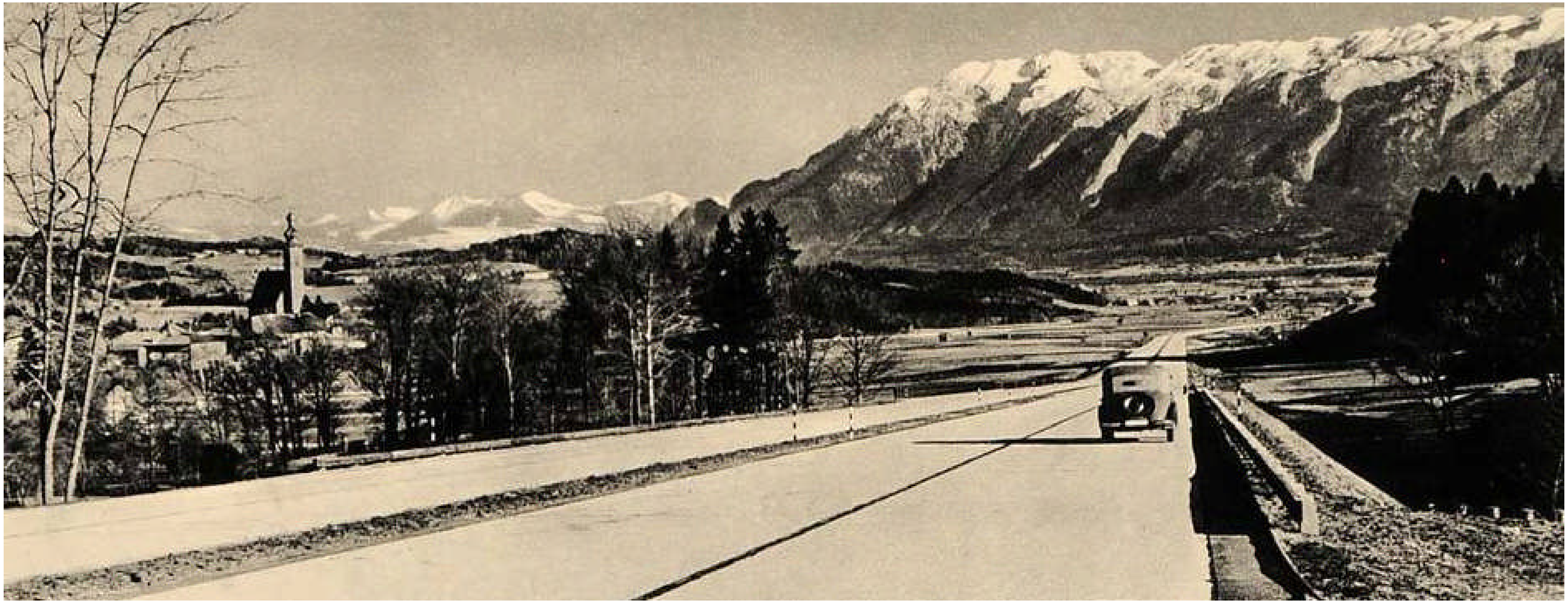


Above: caption: “Neville Chamberlain (center, between Herbert von Dirksen and Joachim von Ribbentrop) at the Chiemsee rest stop on September 15, 1938, returning from his meeting with Hitler at the Obersalzberg that led to the Munich Agreement”
Left: caption: “Hitler visits with his adjutants and staff, Chiemsee Resthouse”


München 79km
Chiemsee 1km
Bernau 3 km
Ausfahrt
B.I.

Following the end of the WWII, the *Chiemsee Resthouse* complex was taken over by the U.S. Army and for many years served as the *Lake Hotel*, part of the *U.S. Armed Forces Recreation Center* (AFRC) at Chiemsee. However, the AFRC closed its Chiemsee facilities in September 2003 and, following its return to the German Government, the facilities remained closed to the public for several years. In the fall of 2011, a health clinic was opened in the partially renovated main building. The interior was broken up into offices and the complex is now closed to the general public.

Agreeable to its Users



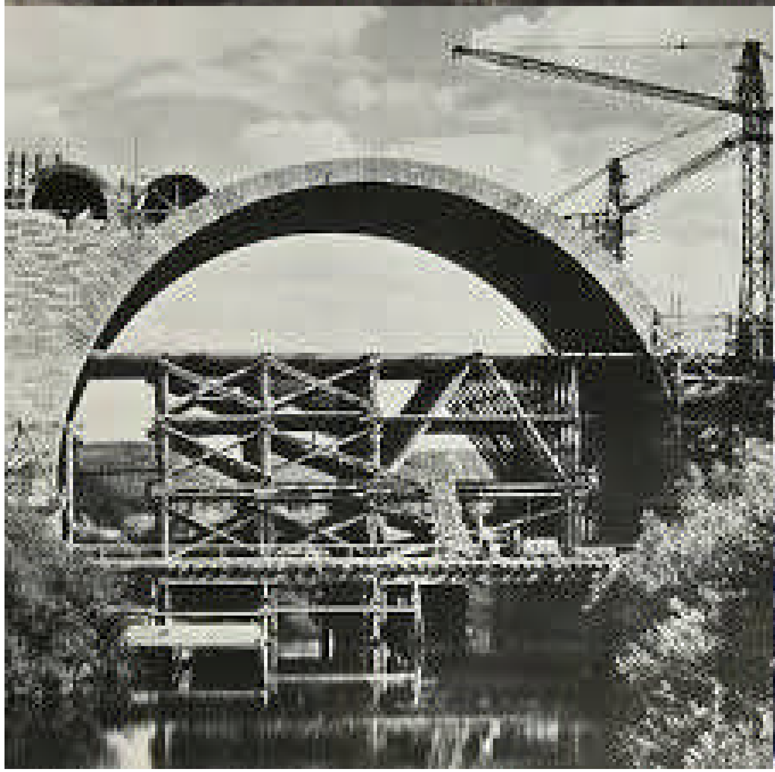
"…Great care has been taken in preserving the amenities of the landscape. Gardening experts have been invited to assist in planning the road and to suggest suitable kinds of trees, shrubs and plants. Fine old trees preserved whenever possible. The principle of making scenic roads is now applied to all German streets and highways. The aim is for the road of the future not only to be safe, but agreeable to its users…"

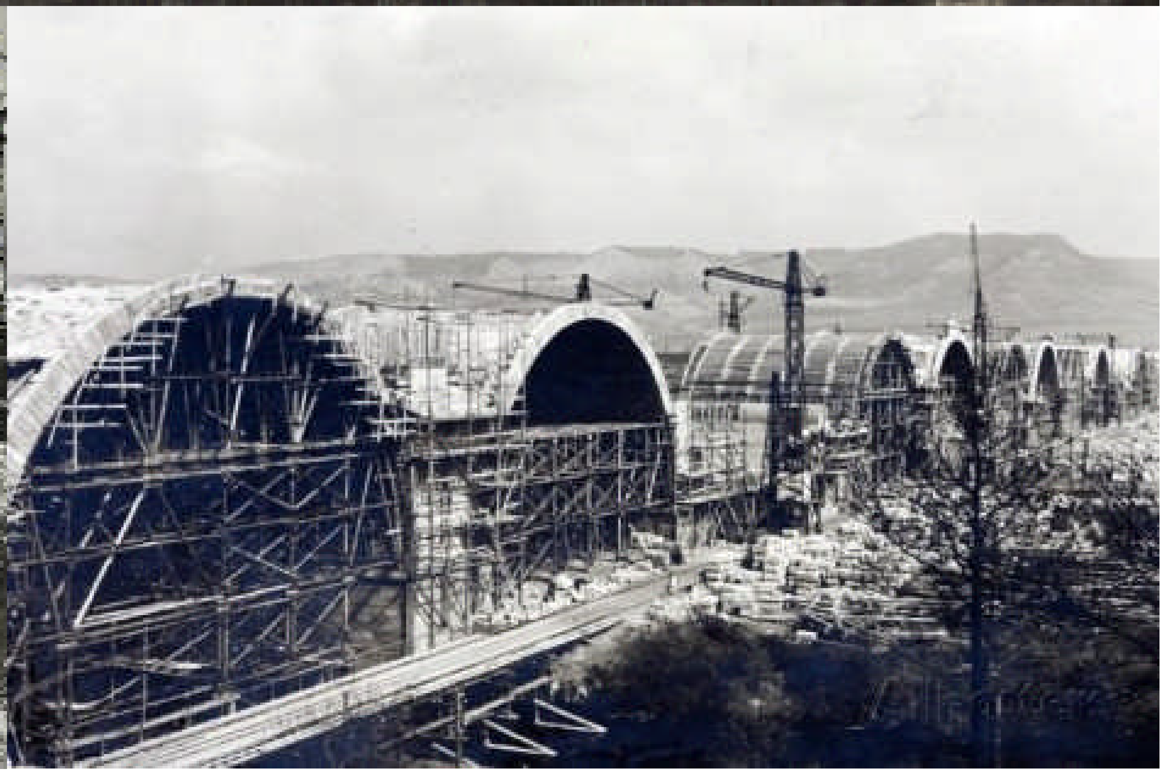
***Wonders of World Engineering*, September 1937**

Scenic Effects

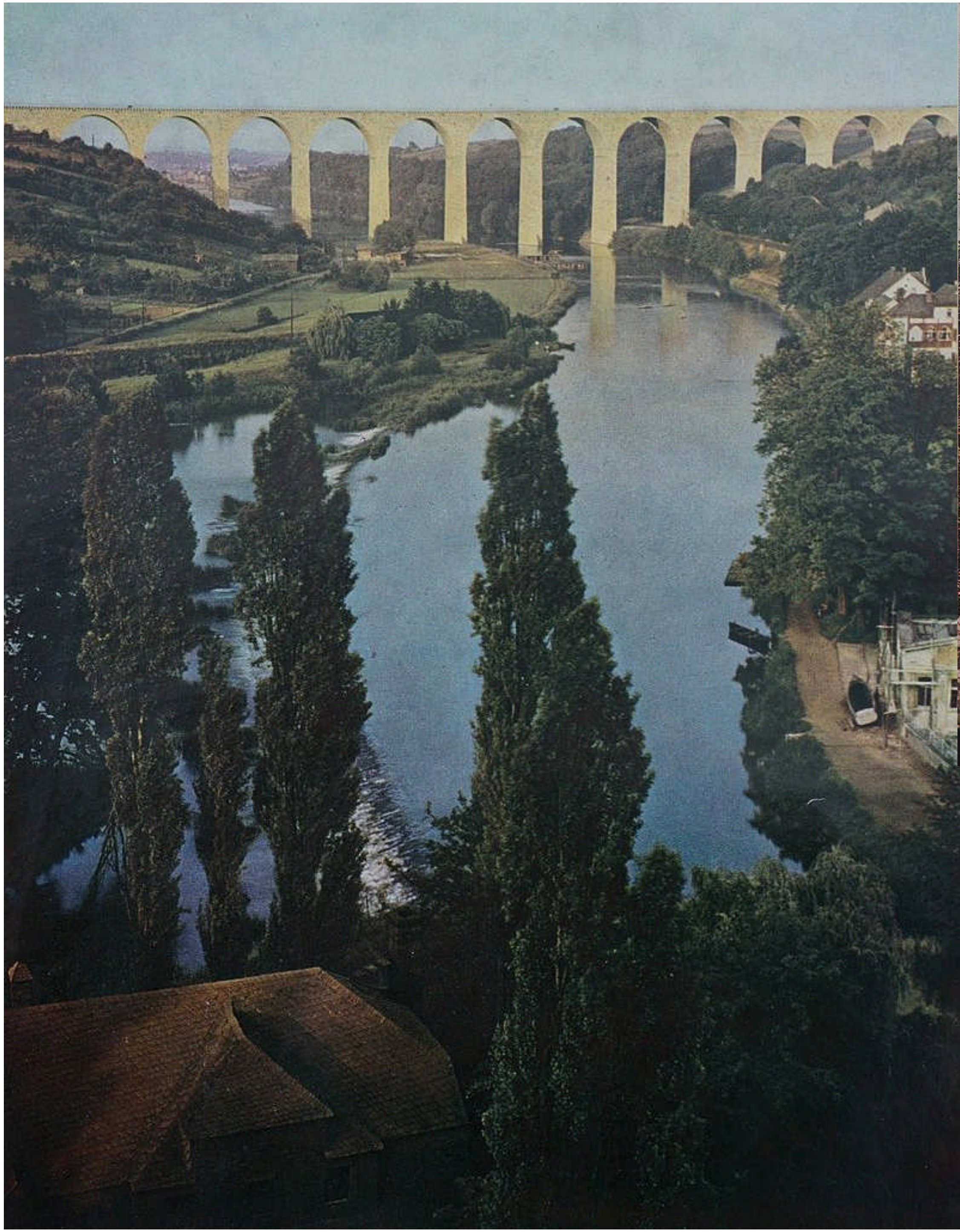
"…With a view to preserving the landscape, the authorities have preferred to use natural stone in bridge building. This has a further advantage, as Germany is relatively poor in Iron. The tendency to use natural stone for scenic effect is becoming more and more popular in all branches of civil engineering. Thus the Autobahn work has indirectly influenced general architecture…"

***Wonders of World Engineering*, September 1937**





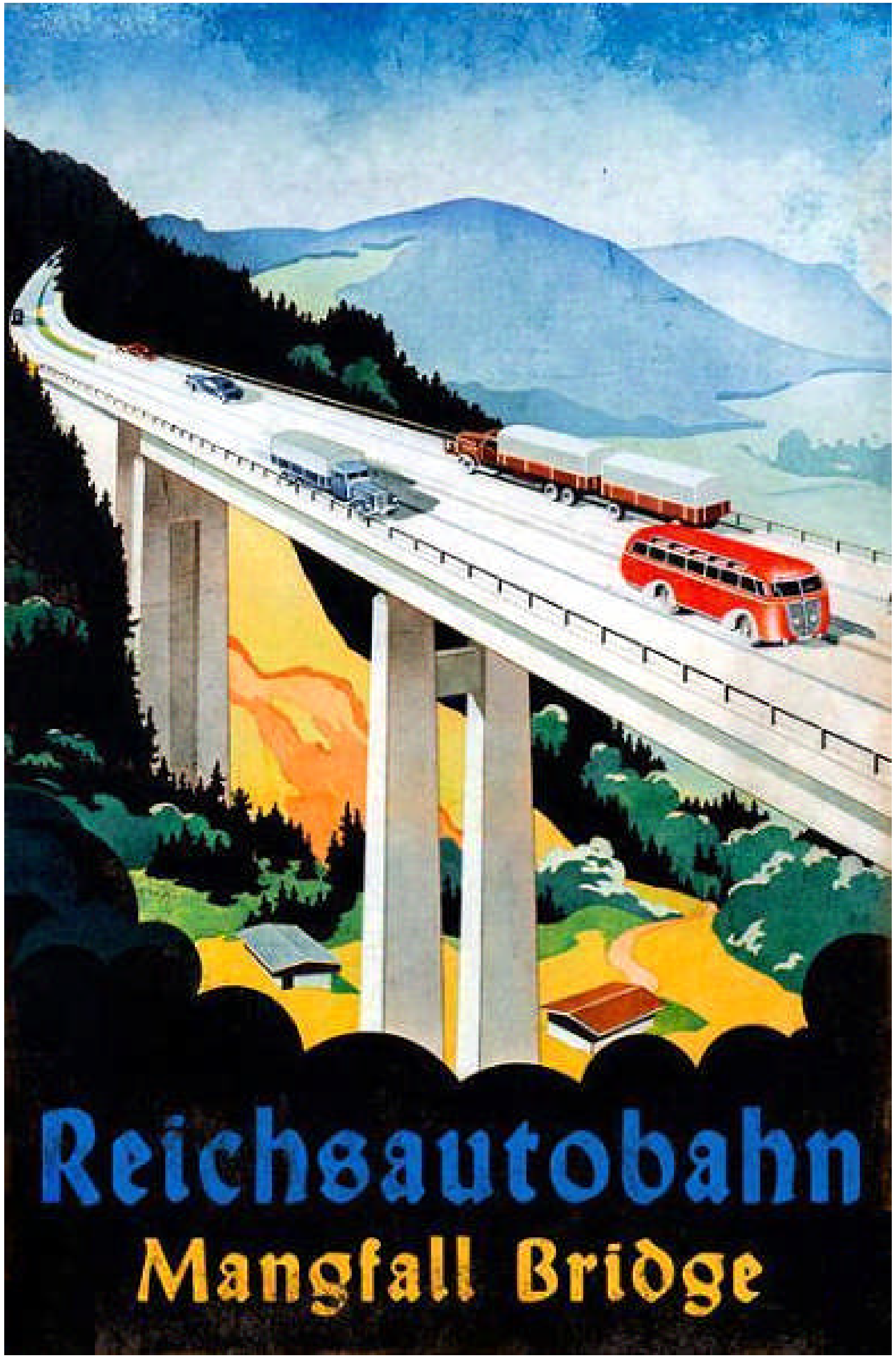
<u>Above</u>: caption: "Saale River Reichaautobahn Bridge at Goshwitz"



<u>Above</u>: caption: “The Reichs-autobahn as part of the beauty of Germany: 1942 photograph of the viaducts at the Dracken-steiner Hang”
<u>Left</u>: caption: “1942 publicity photograph of the Lahn Valley and the new bridge across it”


Reichsautobahn: Felsentunnel am Drackensteiner Hang


Reichsautobahn Stuttgart-Ulm. Impferlochbrücke mit Drackenstein

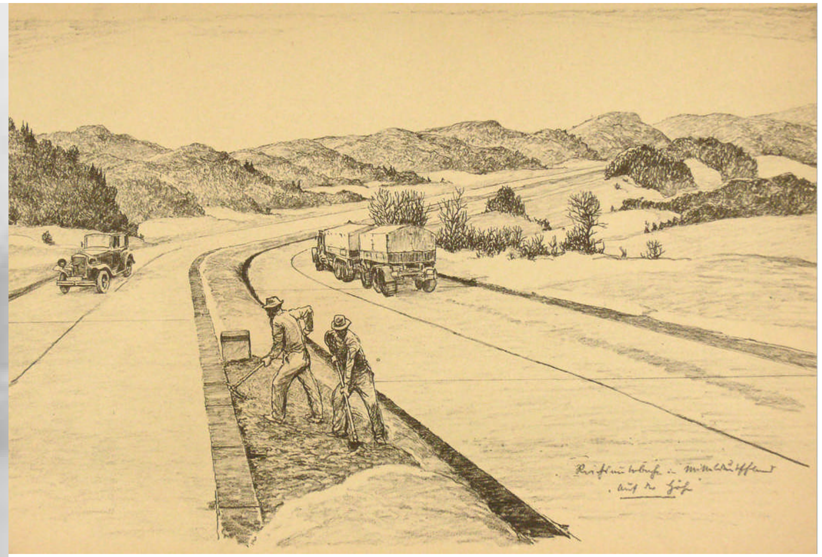


"…The Mangfall Bridge crosses the deep valley of the river and is carried on two gigantic intermediate buttresses, 60 meters high above the bottom of the valley, supporting an iron structure nearly 300 meters in length, with a maximum span of 108 meters. The bridge over the Inn, on the other hand, is built in the wide expanse of the Inn Valley, from which beautiful views of the magnificent alpine scenery farther upstream may be seen, and consists of a low, reinforced concrete structure of tremendous strength, but nevertheless of pleasing lines, with a large number of openings throughout its total length of 265 meters…"

***Dr. Fritz Todt*, Inspector General of the German Road System**

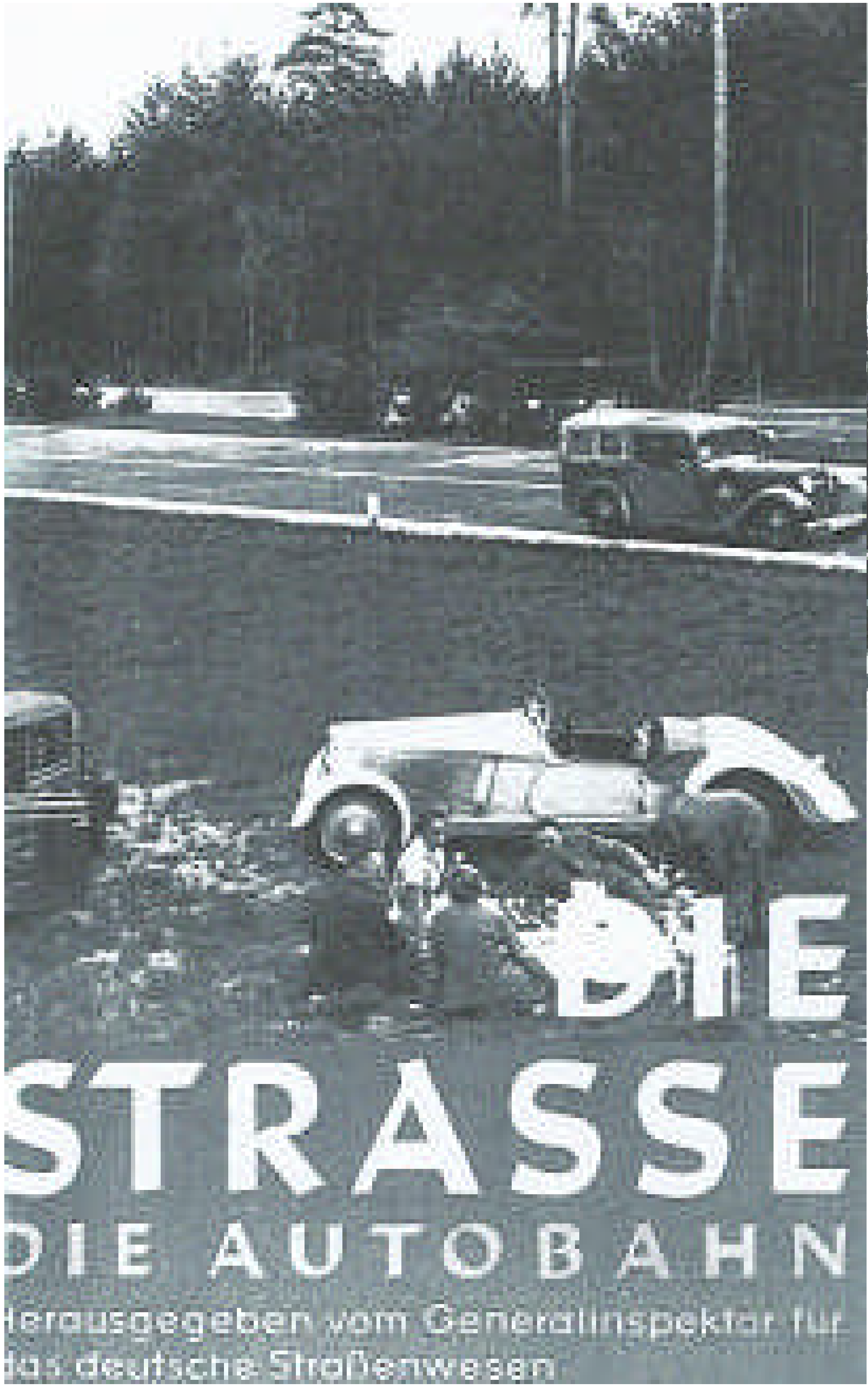
RE: excerpt from speech given at the *Seventh International Road Congress* which was held in Munich, Germany, in early September 1934. Dr. Todt emphasized "the historical significance of road building."

<u>Above & Left</u>: the bridge over the *Mangfall River Valley* (southeast of Munich) was the first long-length bridge in the Autobahn system (above). The Autobahn between Munich and Salzburg was important to Hitler since he traveled the route often, passing through that part of Germany he had adopted as his home (*Oberbayern* or *Upper Bavaria*). Hitler took a special interest in the *Mangfallbrucke*, which was 330-meters long and 68-meters high. At left, Hitler visits the nearly-completed bridge in the summer of 1935. The bridge was blown-up in April 1945, but rebuilt (with a third py-lon added to each support, to widen the roadway).

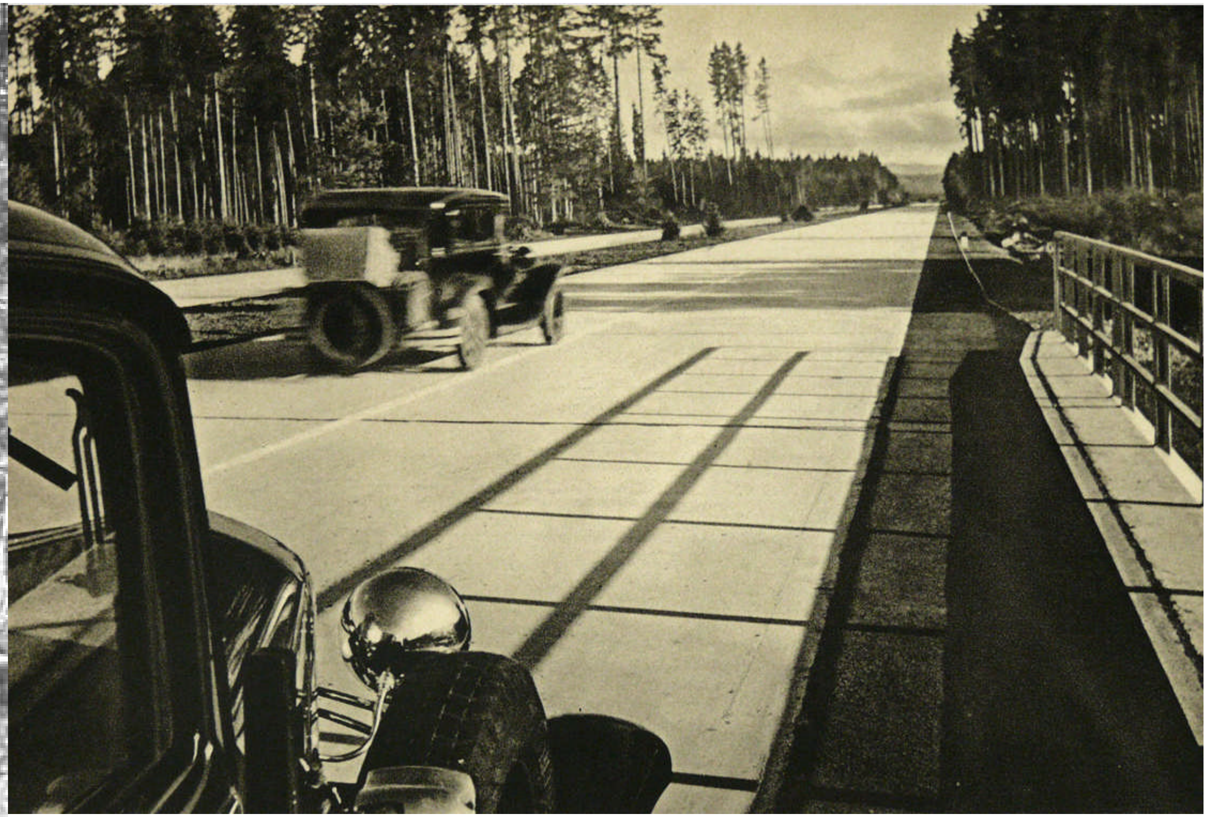


"…It is relatively easy to build beautiful roads in mountainous districts. In the plains also every effort is being made to plant groups of trees and hedges here and there to improve the outlook. Only indigenous trees and shrubs are planted. The landscape gardeners also try to cultivate plants, otherwise dying out…"

***Wonders of World Engineering*, September 1937**



<u>Above</u>: caption: “View from the south fork to Kassel (propaganda photo)”
<u>Left</u>: caption: “Propaganda photo from the picnic on the highway”

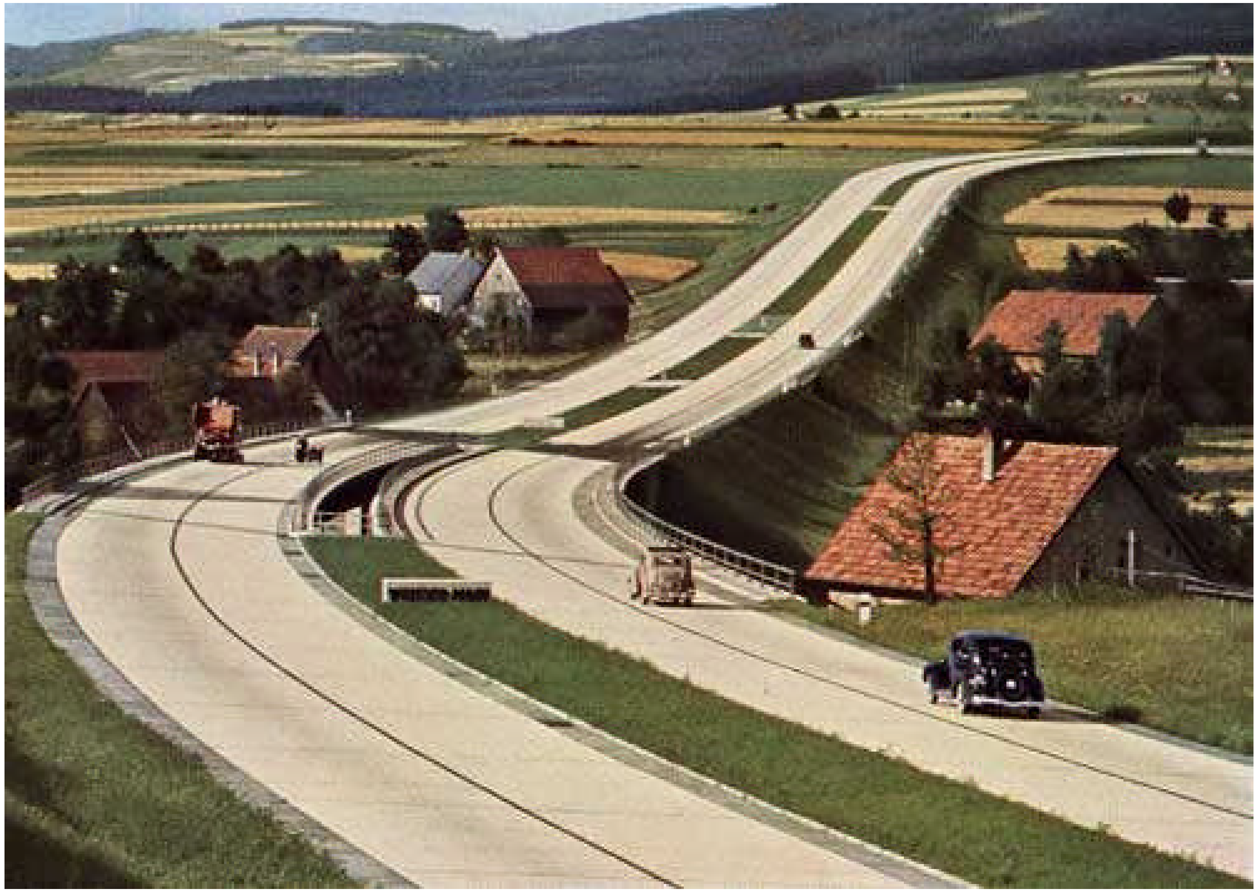



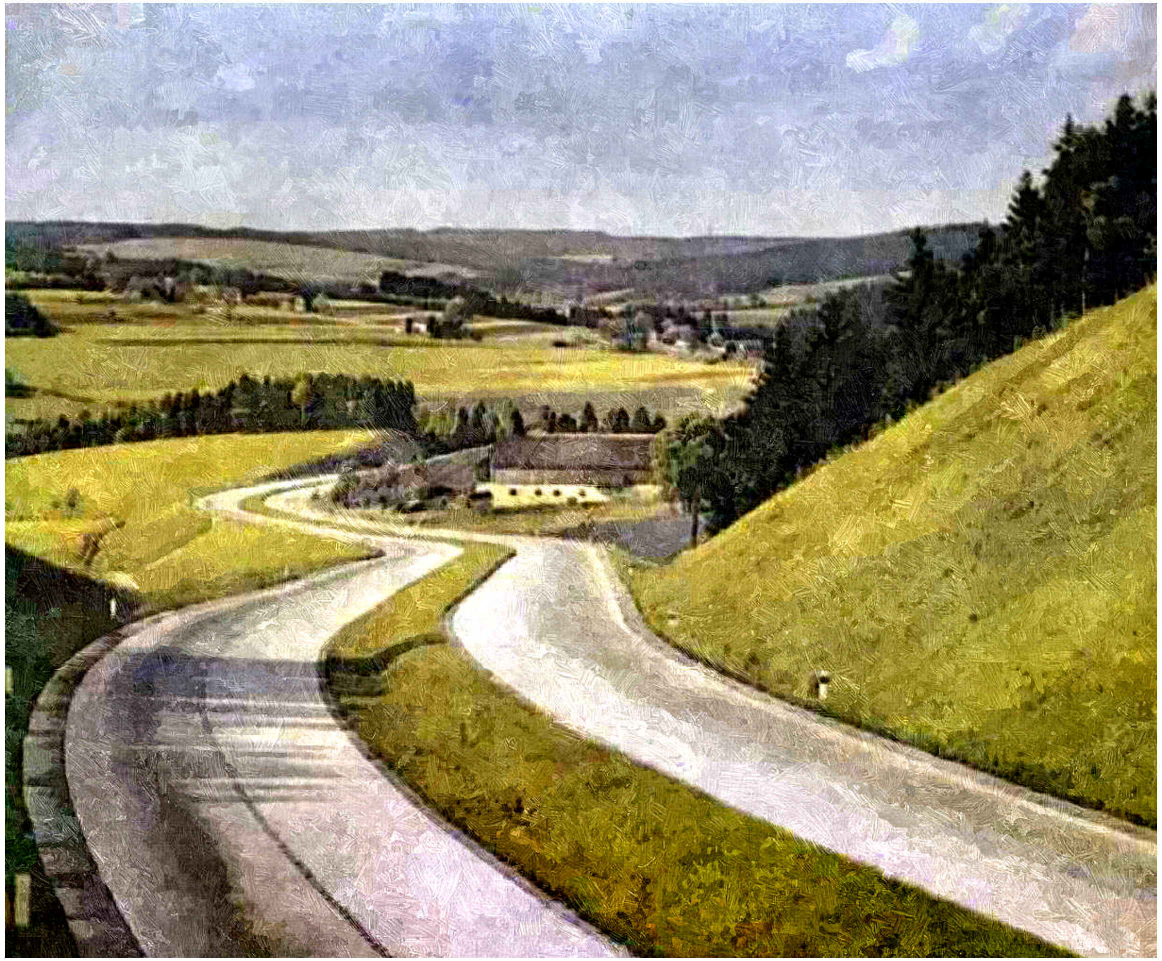
Curve Rhythm

"…It has been said that straight ribbons such as the modern motorways cannot be considered beautiful. But safety has to be put first in building such roads. The engineer puts curves as often as he can, to guard against fatigue on the part of the drivers; well planned surroundings will also be of assistance."

***Wonders of World Engineering*, September 1937**

Above: caption: “The Reichs-autobahn as ‘wielding street’”
Left: caption: “The route of the National Motor Highways was always freely chosen and it could have been laid in end-less straight stretches. But no! Graceful curves have been built into it so that the motorist will never become tired or fall asleep at the steering-wheel because of the monotony of an undeviating, straight roadway.”





Part 3

The Glory That Was Rome

First Impressions

"Unfortunately, those who travel afar within this kingdom soon become disillusioned if ever any such aspiration had entered their minds. It is a little difficult to believe, when traversing some of the country highways, that we are traveling in the land which possessed, and possesses still, the oldest and most famous of roads - the Appian Way, commenced in 312 B.C…"

***Percy F. Martin,* Correspondent for *British Roads and Road Construction* magazine**

RE: commenting on Italy's great Roman heritage in 1923. In the mid-1920s, modern highway supporters around the world could point to Fascist Italy where the government of Prime Minister *Benito Mussolini* was developing *Autostrada* - a network of limited-access, toll highways. Mussolini had taken office in 1922 with a goal of restoring Italy to the glory of ancient Rome, one aspect of which was to build a modern version of the Roman road/bridge network that linked together its vast empire.

"It has often been said that the Roman roads were built for purely strategic purposes, and without doubt they were of great service to the rapid movement of the legions. It must not be forgotten, however, that this gigantic network of roads was first developed when the empire did not have to be conquered any more but already existed. The Roman roads must have been of at least as great importance from an administrative point of view as from a military point of view. In connection with the marvelous network of roads a first-class postal service was maintained which had its part in the administration of the roads. The roads were the means to convey the political will of the government to the furthest corners of the empire in the shortest time…"

***Dr. Fritz Todt*, General Inspector of the German Road System**

RE: excerpt from speech given at the *Seventh International Road Congress* which was held in Munich, Germany, in early September 1934. Dr. Todt emphasized "the historical significance of road building."

The Fifth Congress

On Sept. 6-10th 1926, highway engineers from around the world had an opportunity to see the new *Autostrada* (motor-way) when the *Permanent International Association of Road Congresses* (established in 1908) held its *Fifth International Road Con-gress* in Milan and Rome. In a session on "Special Roads Reserved for Motor Traffic," Italy's *Franceso La Farina* and *Alberto Depetrini* (divisional chiefs in the *Ministry of Public Works*) presented a paper on the Autostrada. They explained that the *Italian Touring Club* had suggested such roads after WWI. However, initially, engineers did not think conditions were favorable. The pre-war macadamized inter-city roads were worn out by wartime traffic, but the nation's small number of motor vehicles and their limited use for com-mercial shipments did not appear to warrant roads built exclusively for motor traffic. That view changed as traffic grew (as it did in the U.S. and elsewhere) from just a few thousand vehicles before the war to an ever increas-ing amount (with a growing number of trucks).

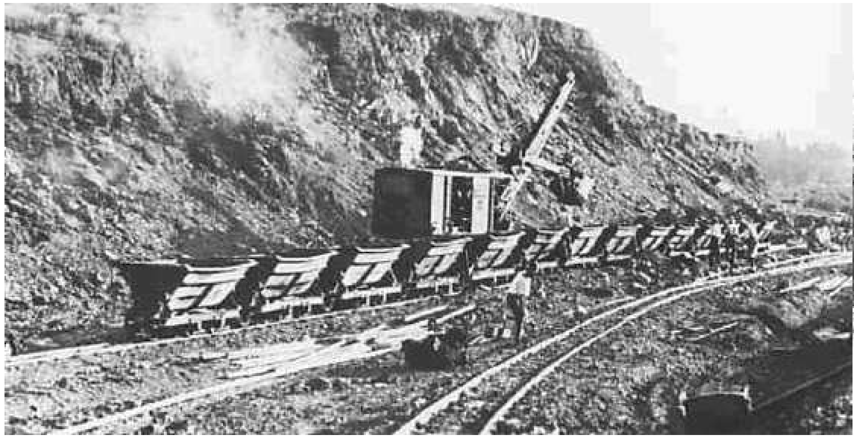
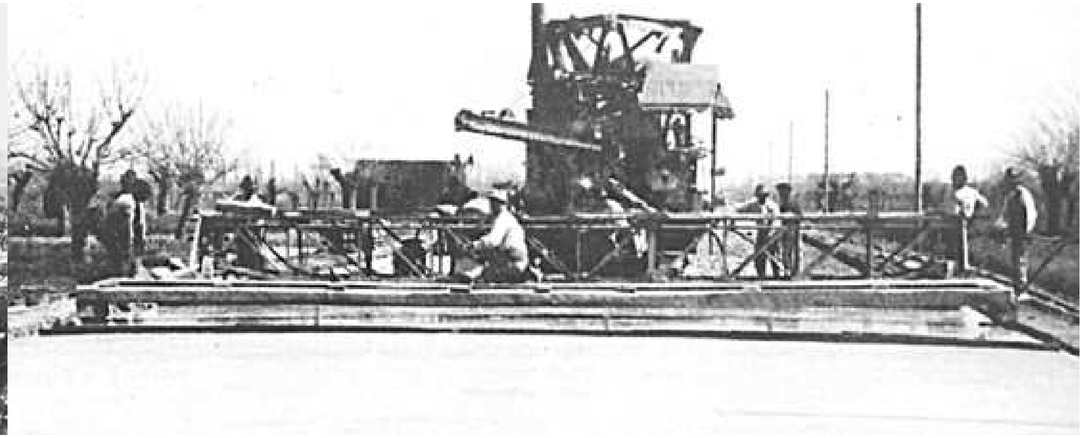
"This consists of some 83 kilometers as to length, and connects Milan with the lakes at Como, Varese and Maggiore. The principal idea, however, is to create special roads avoiding populous centers so as to allow of high speeds begin obtained by mechanically-driven vehicles. In the construction a concrete base is being used, and asphalt, in the laying of which the Italians are, and always have been, considered facile princeps. The material employed comprises a substance composed of bitumen and finely-graded mineral matter, mixed by machinery, as well as that found in neighboring quarries or natural deposits. 'Made' asphalt does not contain stone of a size larger than will pass through a hole ¼-inch square, and when artificially compounded it is sometimes termed 'mastic' asphalt. The width of the Milan-Lakes road varies from 8 to 12-meters, with a pathway 2-meters wide for cycles…"

Percy F. Martin, **Correspondent for** ***British Roads and Road Construction*** **magazine**

RE: as early as 1921, the Italian government had been alleviating unemployment by providing work on roads and bridges for which purpose a sum of 61 million lire had been authorized, principally in connection with the construction and repair of municipal carriage roads and mountain mule-paths. When Mussolini took office, the government began to focus on the construction of special roadways exclusively for automobiles. The project began in 1923.

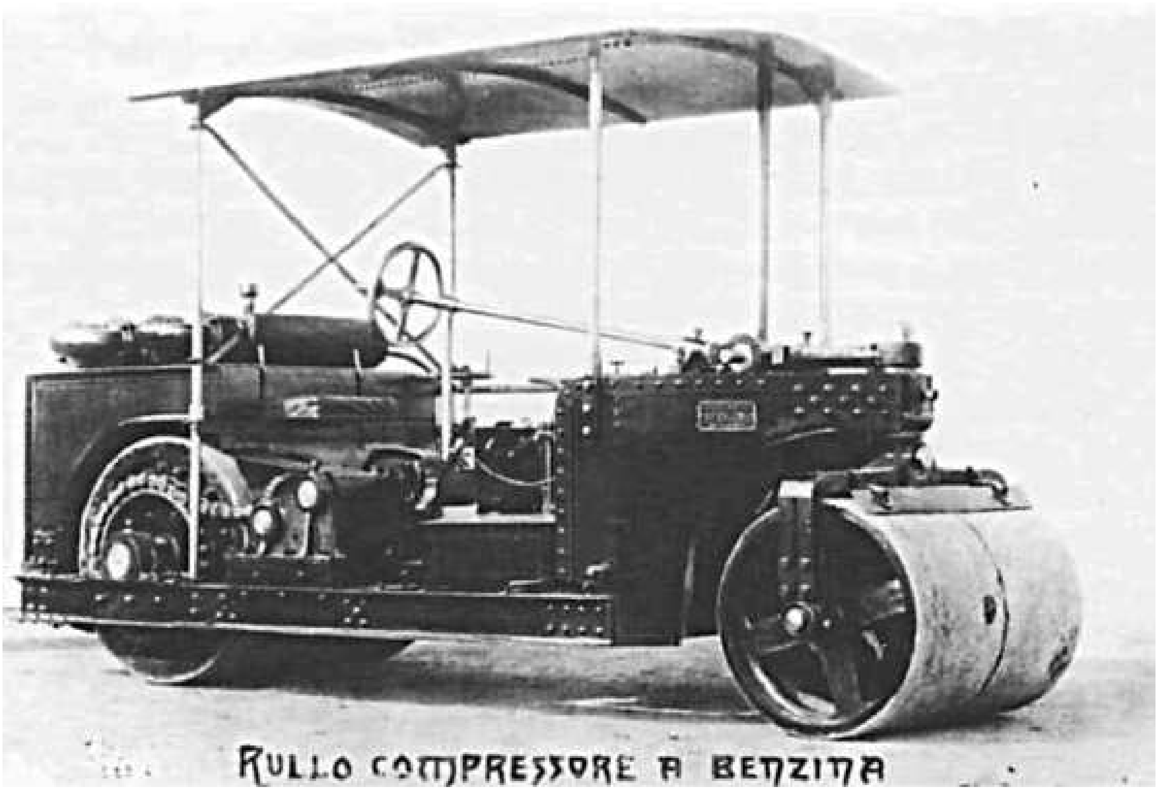
While the authorities were trying to restore pre-war macadamized roads, the *Italian Touring Club* became the main advocate of the bold ideas of engineer *Piero Puricelli,* favoring the immediate commencement of construction for the new roads. It submitted a draft law to establish an autonomous authority to start the construction of the first Italian motor road. Under this model, the Italian Government would award concessions to private companies that would issue bonds (to pay for construction) and charge tolls (to retire the bonds and cover operating and maintenance expenses). The *Societa Anonima Autostrade* (with Puricelli as Chief Engineer and Director) won the Government concession on December 1st 1923 for the *Milano-Laghi Autostrada*. To ensure safe, rapid movement, Puricelli designed the road to avoid inhabited centers. He also eliminated at-grade crossings and included curves and gradients designed for speed. Opposing lanes of traffic were not separated by a median (a feature added in later years)

Construction work officially began in March 1923 and proceeded very swiftly. The first leg was inaugurated in September 1924 while the last section was opened in September 1925. The company was founded in January 1922 with the publication of a report in which Chief Engineer *Piero Puricelli* described in detail his project, including costs of the work. It immediately found considerable support from the *Italian Touring Club* and the *Automobile Club of Milan*, which promoted the creation of a committee to support and promote the work. The rise to power of Mussolini, eager (after the *March on Rome*, in October 1922) to find opportunities to consolidate the power of the *Fascist Party*, accelerated events so that by the beginning of December 1922, the *Ministry of Public Works* could award the concession for the construction of a road network: "reserved exclusively for vehicles with resilient wheels."

<u>Left</u>: caption: “For the construction 219 cubic-meters of cement and about two million cubic-meters of earth were handled. The total cost of the work was about £90 million, about 20% more than the estimated cost.”

<u>Right</u>: caption: “The route was characterized by long straights (the longest of 18 km), from a few curves with a radius not less than 400 m from slopes not greater than 3%. The floor was made of high strength concrete, with sheets of thicknesses from 18 to 20 cm. The packaging and the drafting of concrete was through five large concrete mixers, type Koehring-Paving, bought in the U.S., which could produce 1200 cubic-meters per day of conglom-erate.”



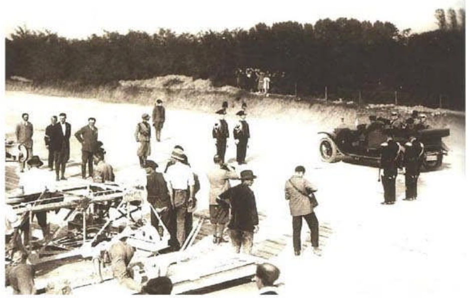
RULLO COMPRESSORE A BENZINA

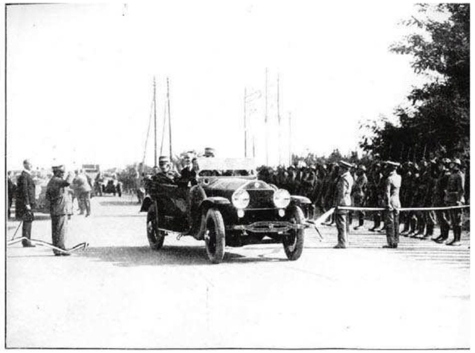
The idea was born in the spring of 1921 when *Piero Puricelli,* during an interview with the president of the *Touring Club of Milan*. However, to a road network reserved for the transit of motor vehicles began to discussed in during the *First International Road Congress*, held in Paris in October 1908 (above). Though the *Avis Circuit* (1913) in Germany and the *Long Island Motor Parkway* preceded it, Piero Puricelli was the first person to come up with the idea to build a road dedicated exclusively to the new motor vehicles.

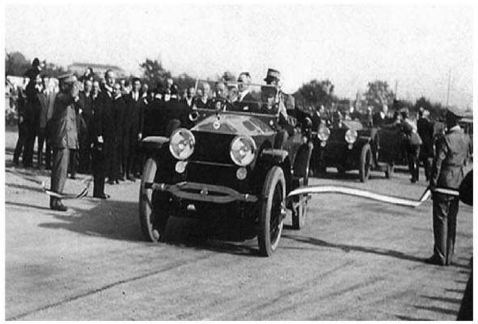
<u>Left</u>: magazine cover featuring *King Victor Emanuel III* inaugurating the Milano-Laghi Autostrada – Sept. 21st 1924

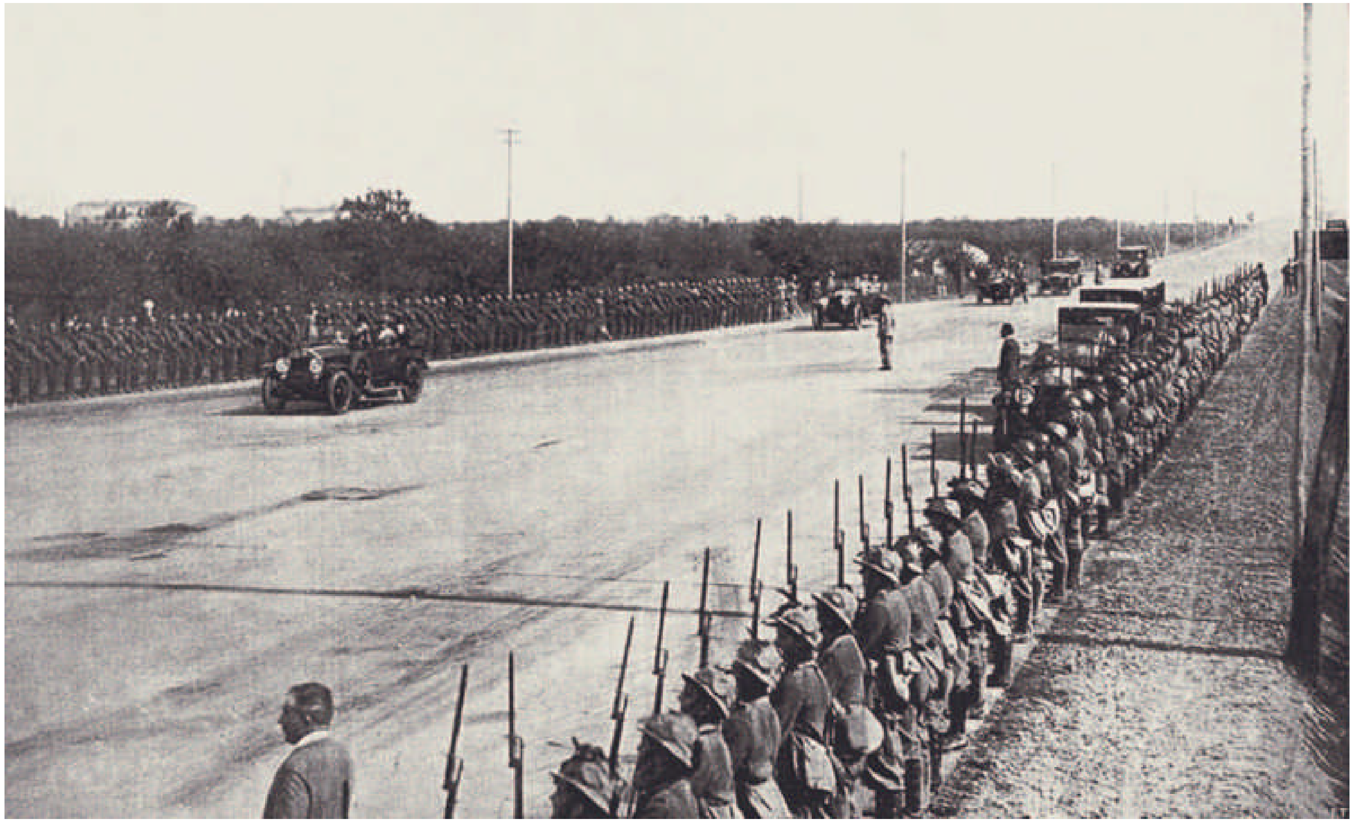
21 Settembre 1924

Il Re Vittorio Emanuele III e l'ing. Piero Puricelli, conte di Lomnago, inaugurano la Milano-Varese, prima AUTOSTRADA del mondo.









<u>Above</u>: caption: “The King and Queen open the inaugural parade that cuts the ribbon for the Milano-Laghi Autostrada, September 21, 1924”

<u>Left</u>: caption: “September 21, 1924: King Vittorio Emanuel III and engineer Piero Puricelli inaugurate the Milan-Varese, the world’s first highway”

<u>Above</u>: caption: "Entrance to motorway toll, Milano-Laghi Autostrada." The first route, between Milan and Varese (in the northern lakes area) was designed by *Peiro Puricelli*. When it opened on September 21st 1924 (becoming the world's first highway), there were only +/- 85K motor vehicles in Italy, mostly in Lombardy (the main means of transport was the bicycle).

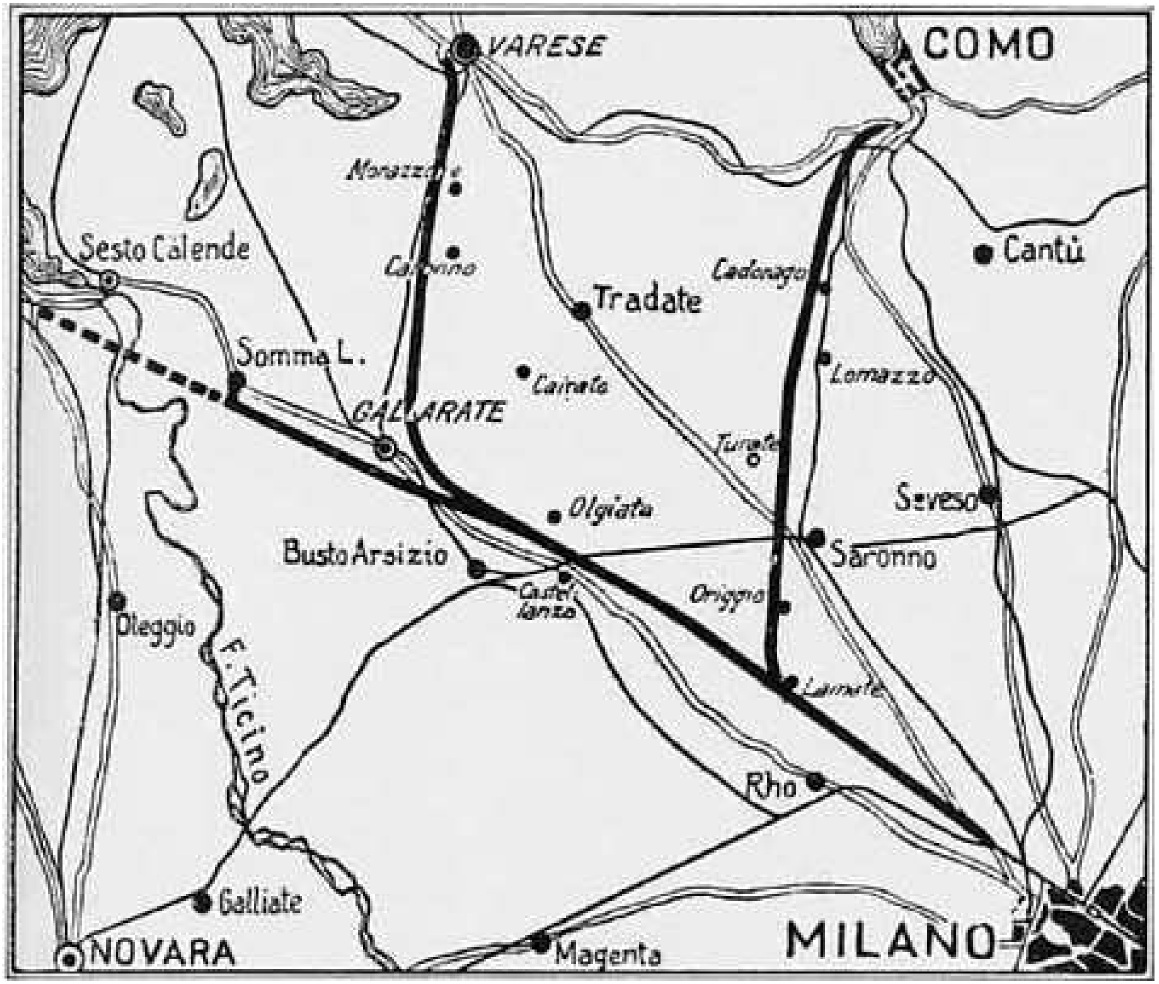
<u>Left</u>: caption: "Piero Puricelli (1883-1951), Count of Lomnago, attended the ETH Zurich where he graduated in engineering in 1905"

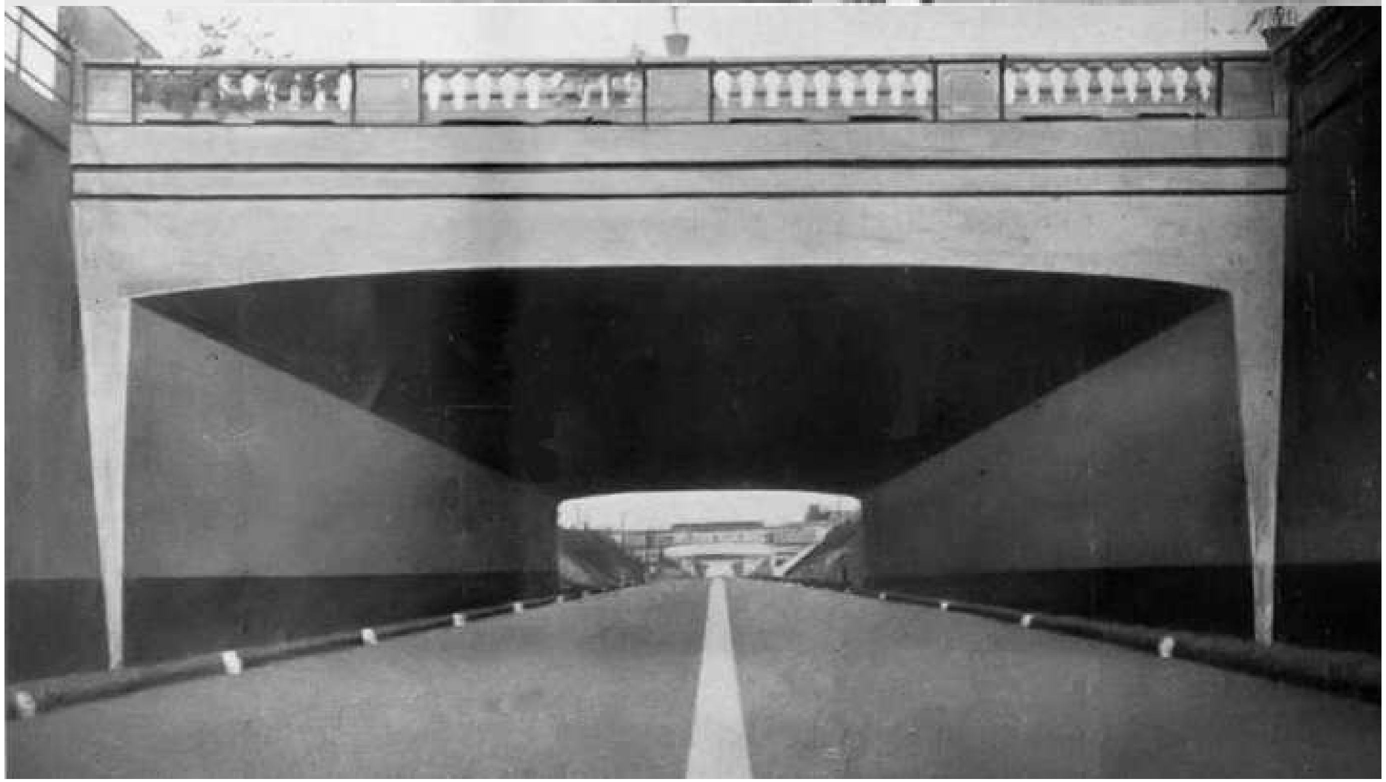
“The work is being carried out for the account of a limited liability company, which has been formed for the purpose, and which, until a sinking-fund has been established, is authorized to levy tolls on all automobiles, motor-cycles, and cycles using the roads. When the Milan thoroughfare is completed and finally opened to traffic, two additional and similar highways will be commenced, one from Milan to Venice and the other from Milan to Genoa.”

Percy F. Martin, **Correspondent for** ***British Roads and Road Construction*** **magazine**

<u>Left</u>: caption: “After Lainate, the path branched off in a trunk direct to Como and one direct to Gallarate, where it was a further bifurcation for Varese and Sesto Calende.”

<u>Right</u>: caption: “There were only two lanes, one for each direction, for the total width of the carriageway to Gallarate, 14 meters, 10 of which paved; in other sections the width was reduced to 11 meters, including 8 paved. The street was entered through a complex of 17 toll stations and 100 km of new feeder roads.”


VARESE
COMO
Sesto Calende
Cadorago
Cantù
Tradate
Somma L.
Cairate
Lomazzo
GALLARATE
Seveso
Olgiate
Busto Arsizio
Saronno
Origgio
Oleggio
F. Ticino
Rho
Galliate
NOVARA
Magenta
MILANO



The *Milan-Lakes Autostrada* was the first, but in a few years additional projects helped maintain the primacy of the Milan main hub. Construction of the *Milan-Bergamo Autostrada* - the second Autostrada in the *Lombardy Region* (entrance, above left) began in June 1925 and was opened to traffic in September 1927. The work was the first stretch of motorway passing through *Pedealpina* (foothills), connecting Turin to Trieste (map, right). Like Milan-Lakes, its high construction cost (£54 million) resulted in its being taken over by the state (in 1938).

"This is the program which is being developed in Italy to supply our country with a network of motor roads which are urgently required on account of the development of motor traffic and the imperfect condition of the ordinary road arteries, but it is to be hoped that the network of motor roads will be developed still further, so as to form an organic network with large meshes to provide for and absorb the greater part of the motor traffic which is at present using the ordinary roads for sports, commercial and industrial purposes."

***Fifth International Road Congress* (September 1926)**

RE: concessions were awarded for several additional Autostrada. The motor road from Milan to Bergamo was under construction, with additional motor roads planned for Naples-Salerno, Rome-Colli Laziali, Milan-Turin (with a branch to Biella) and Genoa-Ventimiglia.

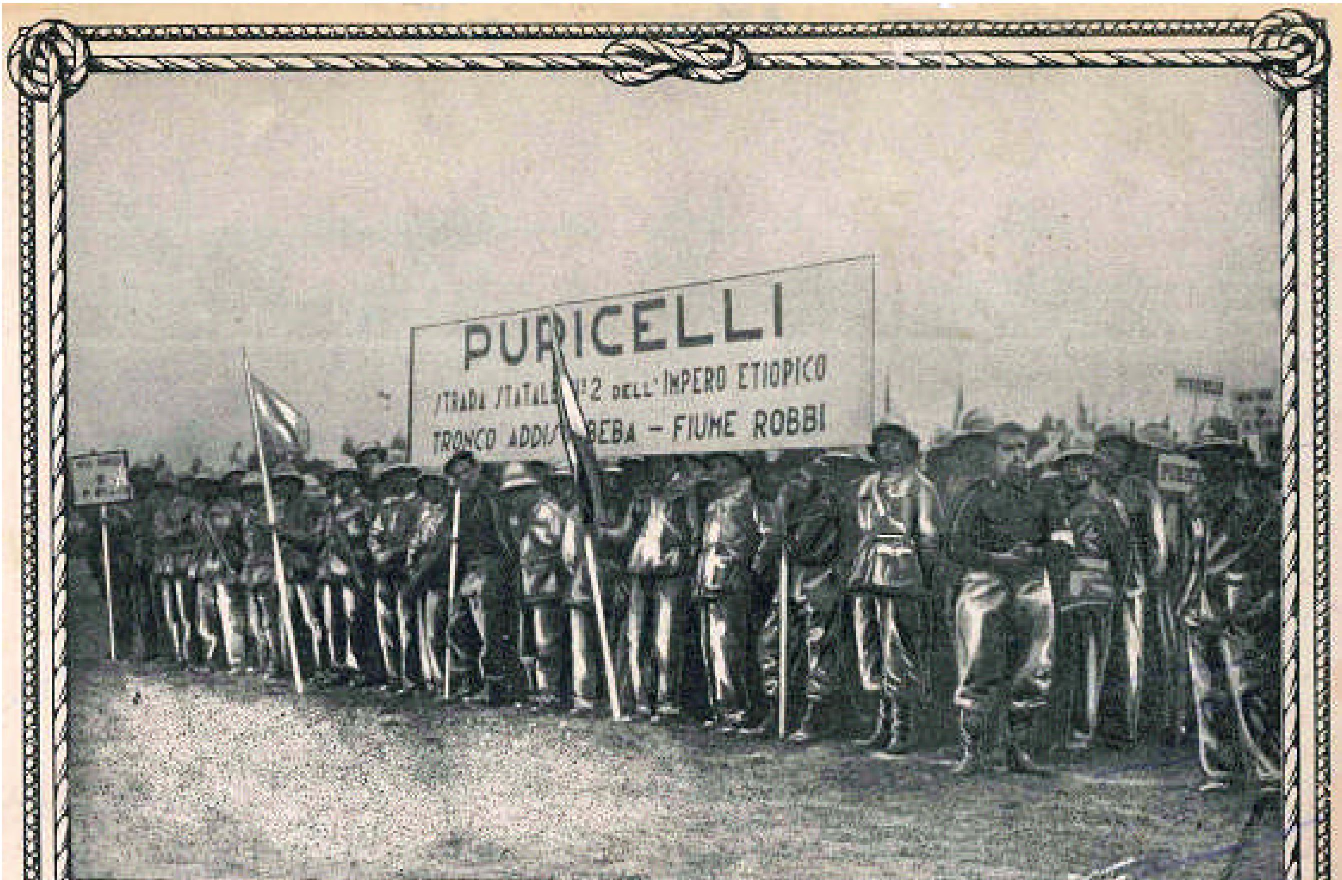
<u>Above</u>: caption: "One of the toll accesses to Milan-Lakes." The Autostrada eliminated most intersections by passing over or under intersecting roads. Where crossroads provided access, a guard was posted to manage a swinging gate (the guard determined when safe entry was permitted). Lanes were not marked and narrow unpaved shoulders on either side of the pavement were flanked by earth barriers two to four-feet high.

<u>Above</u>: the construction of the *Turin-Milan Autostrada* occurred in the years 1930-32. Its route was significantly longer than its predecessors (about 125 km) thus, it had a much higher cost. However, a significant portion of the capital required was provided by state and local grants. The subsidies (along with a higher volume of traffic) allowed the company that built it (*Anonymous Society Autostrada Torino-Milano*) to remain independent of the Italian Government.

"…serve the general interests and the economic and social progress of the whole nation, they do not fulfill all the essential requirements of a public service from which everybody derives advantage, and to which all should therefore contribute…serve only a certain class…Therefore, it would not be fair to require all taxpayers to contribute to the cost of work which only benefits a certain section of the public…the construction of motor roads should therefore be left to private enterprise…"

***Fifth International Road Congress* (September 1926)**

RE: the Italian Government granted a concession to a company (usually the originator of the scheme) for a motor road and provided technical specifications and other contract details. Financial assistance typically involved bond guarantees.



L'ESERCITO DEL LAVORO
PASSATO IN RIVISTA DA S. E. GRAZIANI

“After leaving Monza it took but a few minutes to reach the main entrance to the Milan-Lakes ‘Autostrade’ or motor-way. Here a stay was made to enable the visitors to examine the organization at the head office for the levy of tolls, to see the service in actual working and to study the elaborate telephone system for linking up the various sub-stations. Their interest in a delightful excursion in the brilliant sunshine having been greatly stimulated by these experiences the visitors proceeded along the far stretching Motor-way which on the way from Milan to Varese passes through a busy industrial district and also affords magnificent views. To complete a most successful day a garden party was given in the beautiful park of the Villa Morosini at Varese by the ‘Autostrade’ Association. On the return journey the last rays of the setting sun accompanied the excursionists back to Milan where they alighted full of admiration for the great engineering achievements they had been enabled to see and feeling that the memory of so delightful a day would long linger in their minds.”

Fifth International Road Congress **(September 1926)**

RE: on September 9th 1926, approximately 1,700 participants of the *Fifth International Road Congress* took a field-trip to see the *Milano-Laghi Autostrada*. After lunch at the *Monza Racing Track* (organized by Puricelli) the caravan headed for the Autostrada.

Automoblism

The final three days of the *Fifth International Road Congress* took place in the *National Museum* on the *Capitoline Hill* in Rome. Mussolini delivered the final address to the gathering. He pointed out that closing the congress in Rome was appropriate because Rome "had in antiquity an enormous network of roads." He said the main issues of the congress; the best pavement, design of roadways for high speeds and "how to control the development and systematization of modern cities in the interest of traffic, and vice-versa," were "questions indigenous to our age." He added that he appreciated the contributions of each participating country to the discussion of these subjects. He closed by saying the congress was "an essential contribution to the progress of all civilized nations."

"Italy has a great road problem to solve; new roads necessary to promote her agricultural life, to facilitate her commerce, and finally arteries necessary for international tourism in order to render her beauties accessible. She possesses, moreover, a conspicuous road patrimony formed during many centuries by the work of countless generations…The Fascist Government since 1923 has arranged for a road reform which distinguishes clearly greater from lesser viability, co-ordinates between them the arteries of great traffic into an organic system and allots to the provinces a greater share of viability under the control of the larger public organizations suitable technically and administratively for this function…The Congress has justly recognized a principle common to all nations and all roads, that of the need of coordinating with the results of road census, the construction of new roads and the methods of maintenance of existing roads. The future action of the Italian State in connection with viability will be carried out on this basis. Italy's answer to the discussion of the opportuness of creating special roads reserved for automobile traffic has been given by accomplished facts. The autoroad from Milan to Laghi has been opened some time ago. Concessions have been granted for those from Milan to Bergamo and from Naples to Salerno while those from Turin to Milan, Rome to Ostia and San Remo to the French frontier are being studied. Automobilism has created various problems of systematization of the existing large roads, the necessity of correcting and augmenting the road network to adapt it to its needs."

Benito Mussolini, **Premier of italy**

RE: speech given to the *Fifth International Road Congress,* September 1926

The American POV

"Here is an opportunity to do a big, basic work, such as comes to few in the course of a lifetime. The individual who fails to vision the importance of the task has no moral right to hold a position of authority in its performance."

***T.H. MacDonald*, BPR Chief (December 1921)**

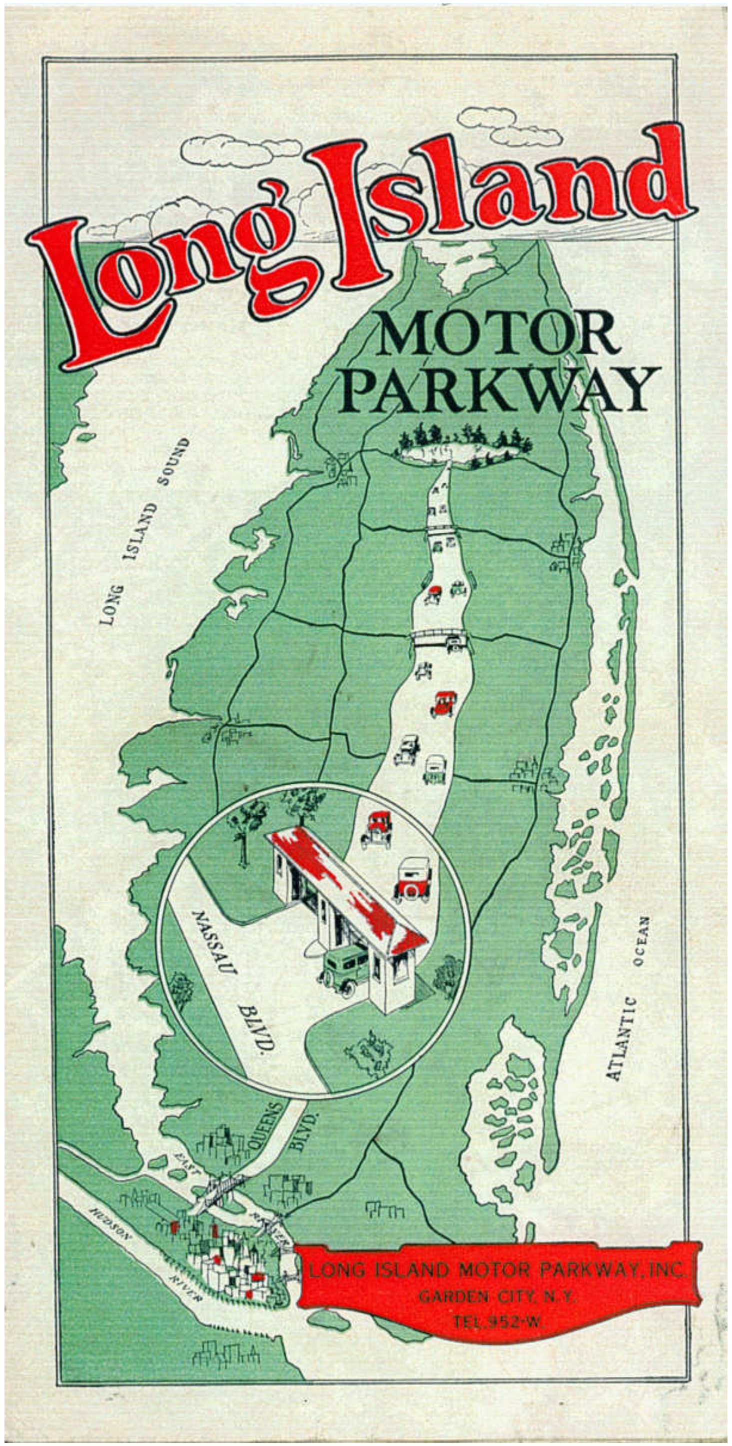
Left: BPR Chief T.H. MacDonald was one of those who had observed the *Milan-to-Laghi Autostrada* while he was attending the *Fifth International Road Congress* in Sept. 1926

"...The aim of American highway engineers is to develop a system of highways each part of which will be improved to a degree consistent with the traffic demands…This practice has crystallized into a well defined policy, known as the stage-construction principle, in accordance with which an unimproved road carrying, initially, a light traffic is improved in the first instance by grading and draining, and subsequently, as traffic grows by the addition, first, of a gravel or other cheap surface, and, subsequently, by the superposition of a pavement to which the original cheap surface serves as a sub-base. In each stage full provision is made for the requirements of a subsequent improvement. The grades and drainage structures originally constructed are designed to be adequate for, or readily convertible to the purposes of the ultimate improvement, which, also is contemplated and provided for in the initial surfacing. In this way each stage in the improvement suffices to meet the demands of a growing traffic at several stages of the growth and each preliminary stage becomes the basis for the subsequent improvement…"

T.H. MacDonald, **BPR Chief (September 1926)**

The Motor Parkway

During the conference's discussion of special roads, BPR Chief MacDonald explained that motor vehicle registrations in the U.S. were increasing at a rate of 2 to 3 million per year. With horse-drawn traffic a negligible percentage of the whole, the needs of motor traffic must be given primary consideration in the design of even the most lightly traveled road. In his opinion, adapting road projects to traffic needs, beginning with low traffic volumes while, at the same time, preparing for increased traffic, was the most logical course of action. For the time being, the primary consideration was the maintenance of roads with a smooth and relatively dustless surface for the loads using it.

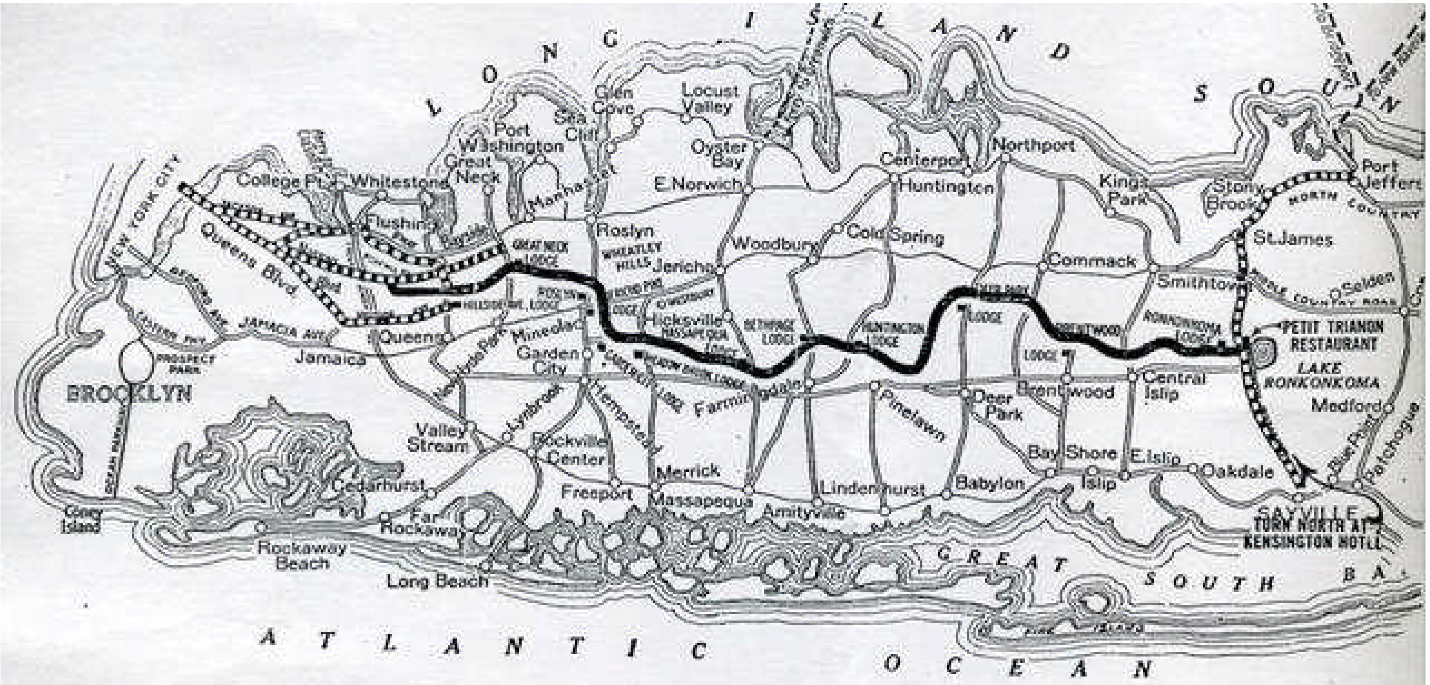


"Built in 1904 as the course for the first Vanderbilt Cup Race, this highway, 42½ miles in length has since been maintained by a private corporation as an exclusive motor road, the use of which is restricted to those who pay the company's tolls. This road was conceived and built at a time when the public roads were not adequate for motor travel and when the normal traffic consisted largely of vehicles drawn by horses that were still unaccustomed to motor vehicles. Under these conditions the road performed a useful service."

***T.H. MacDonald,* BPR Chief (September 1926)**

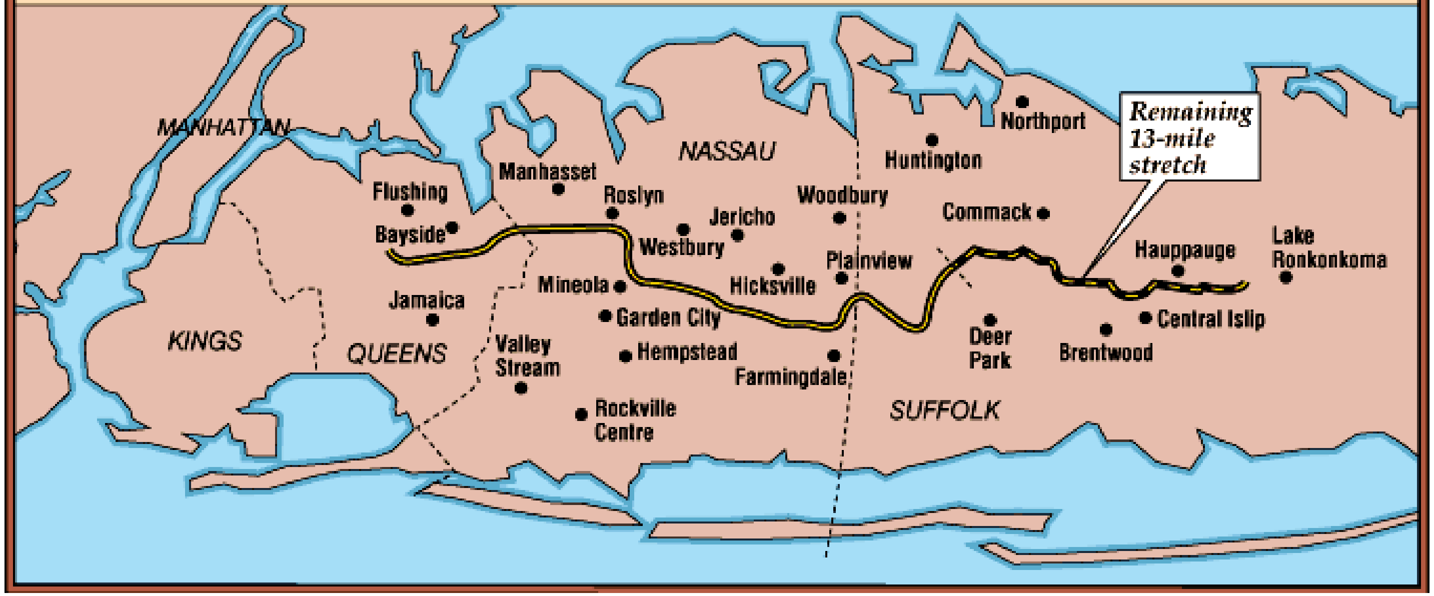
RE: with horse-drawn vehicles such a small percentage of traffic, roads of all types were designed with the motor vehicle in mind but not for their exclusive use. MacDonald sited as an example the *Long Island Motor Parkway* of 1908.

<u>Left</u>: caption: "1929 LIMP brochure." The LIMP was a 45 mile private right-of-way for automobiles with its western entry 12 miles from NYC and its eastern terminus at *Lake Ronkonkoma*



The Motor Parkway

In 1938, William K. Vanderbilt II turned his Motor Parkway over to Queens, Nassau and Suffolk in lieu of back taxes. The longest stretch of parkway remaining is 13 miles in Suffolk; smaller pieces remain elsewhere – on bike trails, in backyards and behind shopping centers. Here's how Vanderbilt's Motor Parkway looked in the late 1920s:




MOTOR PARKWAY ENTRANCE
50 MILE DRIVE – 40 CEN


MOTOR PARKWAY ENTRANCE
NEW YORK-BKLYN
TRI-BORO BRIDGE
LAKE
RONKONKOM

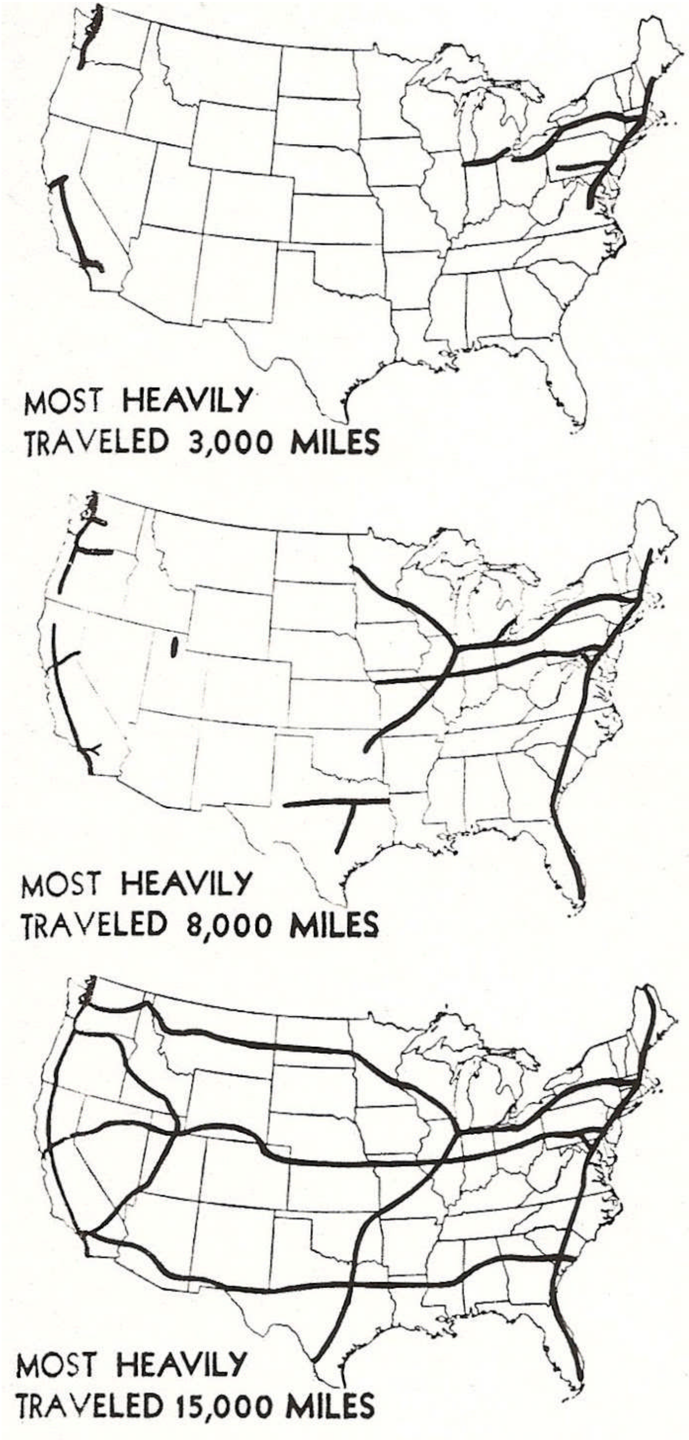

TOWN OF
HUNTINGTON
LONG ISLAND
MOTOR PARKWAY
FIRST CONCRETE, LIMITED
ACCESS HIGHWAY. BUILT BY W.
K. VANDERBILT; A. PARDINGTON,
ENGINEER 1908-1910
ERECTED
1973

Observations

"…In most instances the main State roads now enter the cities and through traffic must, perforce, pass through the city streets to reach the continuation of the highway at the opposite side of the city. This situation has already become intolerable in a number of places, not only because of the further congestion of the already over-crowded city streets but also because of the difficulty which strangers experience in finding their way to the proper highway exit. The remedy in this case is being found in the construction of belt-line or bypass highways encircling the cities."

***T.H. MacDonald,* BPR Chief (September 1926)**

RE: MacDonald concluded his presentation to the Congress by pointing out that cities also were experiencing congestion that required special treatment. He stated that the biggest problem was "the intermixture of fast and slow-moving motor traffic," especially slow-moving trucks and "the motorist whose conception of caution is extremely slow driving." He further explained that most main roads are two-way roads, eighteen or twenty feet wide. Where traffic volumes were low or moderate, passing of slower moving vehicles was not a problem, but when volumes were higher in both directions, "queues are rapidly formed headed by the slow-moving vehicle," resulting in congestion.



At the time of the 1926 Conference, only a few sections of the U.S. were experiencing heavy traffic volumes on intercity roads. Connecticut was building a "36-foot highway" between New York City and New Haven to relieve congestion on the *Boston Post Road*. The *State of New Jersey* was working on a 13-mile highway between the *Holland Vehicular Tunnel* entrance to New York and the cities of Jersey City, Newark and Elizabeth (a/k/a "Pulaski Skyway"). This road, MacDonald indicated, would eventually stretch to Philadelphia. *Wayne County* in Michigan was developing "so called super-highway plans" as the beginning of an improvement that would eventually reach Chicago while California was considering a plan to acquire a 100-foot right-of-way from Los Angeles to San Francisco, with the central 30-feet to be devoted to traffic moving at speeds as high as 50 mph.

Left: caption: "Study of U.S. Bureau of Public Roads of Average Daily Traffic Volume"


"THE PULASKI SKYWAY" ROUTE 25, THE WORLD'S LONGEST HIGH LEVEL VIADUCT
BETWEEN NEWARK AND JERSEY CITY, N. J.
Courtesy N. J. State Highway Dept.

Death Before Taxes

"…great admiration for the talent of M. Puricelli who has built these roads…We take our hats off to M. Puricelli and his collaborators…we are therefore of opinion that it would be difficult to deduce from so short an experience any definite conclusions as regards the economic effects of such roads, the solidity of their foundations and also their social consequences…our Parliament has hitherto refused to sanction them…various road authorities…are averse to the idea of roads where tolls are levied by private undertakings…"

***W. Rees Jeffreys*, British Representative to the *Fifth International Road Congress* (September 1926)**

RE: during the Fifth Congress' general discussion of *Special Roads Reserved for Motor Traffic*, delegates from many countries addressed the Congress on draft conclusions justifying construction of motorways, the appropriate authorities for their initiation and construction, financial arrangements (i.e. tolls) and traffic/operation regulations. Many delegates expressed their admiration for the Milano-Laghi Autosrada and Piero Puricelli's contributions to it, but the representatives from Great Britain and the United States were more cautious, considering that by September 1926 the motor way had only been in operation for two years. In Great Britain, construction of for-profit public roads by private enterprise was particularly loathsome to politicians. As such, Britain could not agree with the draft conclusions, however, they did not oppose them. The delegation therefore abstained from voting on them.

"…During a period of 5 or 6 years, we had to spend annually a thousand million dollars on roads and especially on new roads. This was only a beginning; we have to keep going ahead, and never know when we have done enough, for the more roads develop, the more the number of vehicles increases. Your conception of a motorway, in Italy, was a real dream, as it coordinated with the fact that the network of your other roads was finished and complete, whereas at that time we were only beginning to construct narrow roads, and widened them subsequently, built tracks for fast traffic, eliminating danger and taking the steps necessary for separating fast and slow traffic..."

***T.H. MacDonald,* BPR Chief (September 1926)**

RE: MacDonald, speaking for the American delegation, agreed with Jeffreys. However, he felt somewhat embarrassed since he believed wholeheartedly that the report on the conclusions under consideration was deserving of praise. The problem was the significant differences between Italy and the U.S. With more than 20 million motor cars in use by 1926, the U.S. faced the challenge of improving roads throughout a vast country to meet an ever growing need.

“…we must now have pecuniary resources appropriate to our situation, and consequently we do not wish to support a conception which might cause the public to say: ‘We won’t pay any more taxes; we will rely on private enterprise’…We want tax resources to be spread over the mass of users in the country, especially for the construction of new roads, and we consequently want everyone to have free access to these roads, from all points of view, without creating private roadways. We do not want, in building roads whose special purpose is to serve fairly great distances and are to be reserved for special users, to have the appearance of competing with railroads, for the motor car should help the railway and not supplant it…”

***T.H. MacDonald,* BPR Chief (September 1926)**

RE: MacDonald did not disagree with the “technical conception” of Italy’s motor roads, rather, he did have to consider the different financial situations of the two countries. The U.S. could support the report’s conclusions provided the technical question be kept apart from the financial one. In the end, the U.S, along with Great Britain, would be the only countries abstaining from voting on the report.

"It depends clearly on the economic conditions of their countries. I had hoped to forestall their abstention by pointing out several times the great interest there may be for all countries in a special regime for motorways. I do not think that the lack of sufficient experience should prevent our adopting principles and guiding lines because, if every initiative had to await results already acquired, they would never come to light and be stillborn…The objecting to levying tolls on motorways does not seem to me to hold water, as it is a question of a tax that drivers would gladly pay, whilst the remainder of the ordinary roads would remain free. The fact of ordinary roads in Great Britain being in good condition is not sufficient lesson for rejecting motorways, for it is the traffic system applied to the latter, and the discipline enforced on it, which constitutes the essential interest in it…I hope that in the near future they will also be supporters of motorways. America and Great Britain, with their great economic possibilities, could also accomplish this idea and go on further."

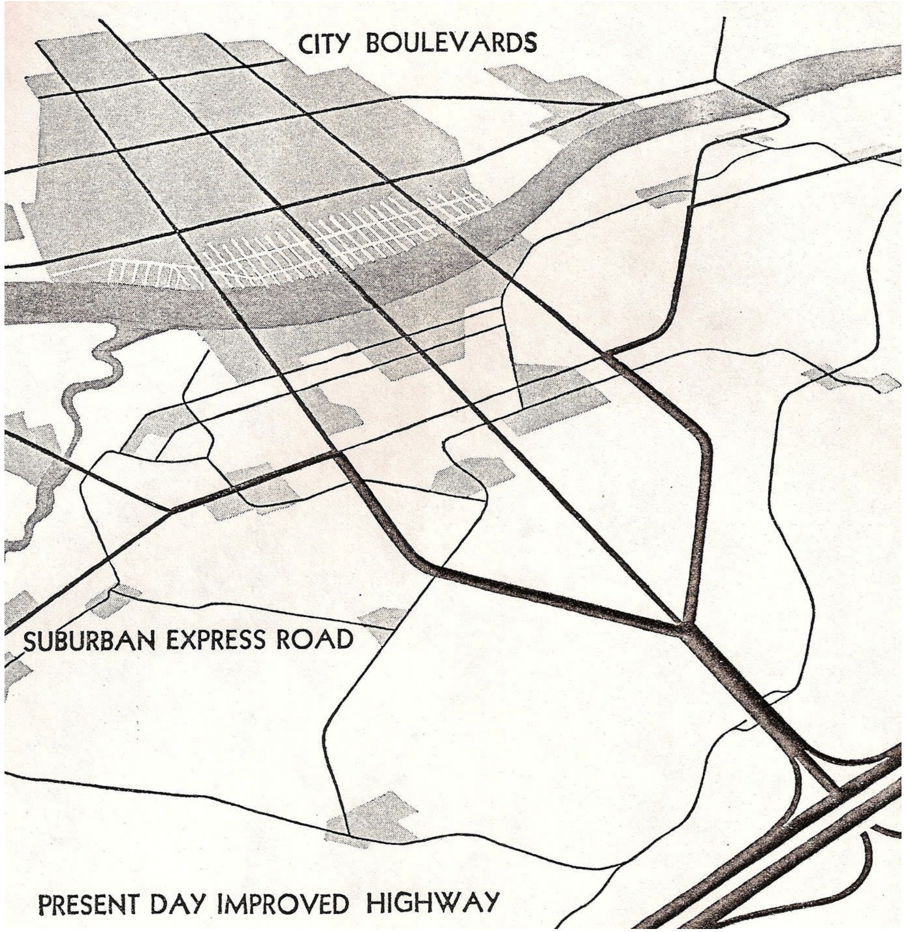
C.M. Isacco*, Director General - *Italian Ministry of Public Works

Going Continental

"…Puricelli's ambitions were much broader. His ultimate goal was to go continental. In a conversation with professor Robert F.E. Otzen in 1925, he had stated that the real aim of his plans was a European road network. At the end of a booklet published on the occasion of the opening of the Autostrada from Milan to Bergamo (September 20, 1927) a map showed the contours of the future European motorway network as expected by Puricelli. The core of the future network connected Germany, France, Italy and the Alps, with smaller isolated networks in Belgium and Span and single motorways from Dusseldorf to Cologne and London to Brighton…"

***Frank Schipper,* Author**

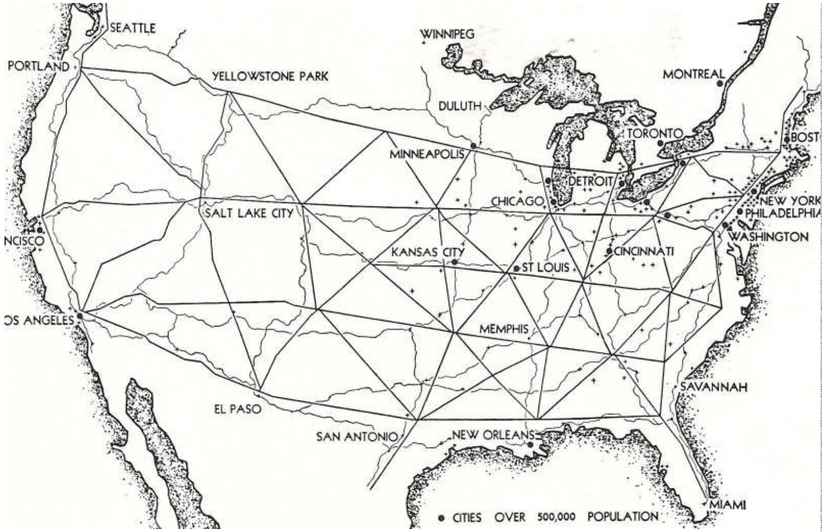
RE: since Puricelli's map did not take political factors into consideration, Schipper considered the map to be impractical. Even so, Puricelli's vision was comparable to the ideas of the American road advocates who had long favored a network of interconnected superhighways.

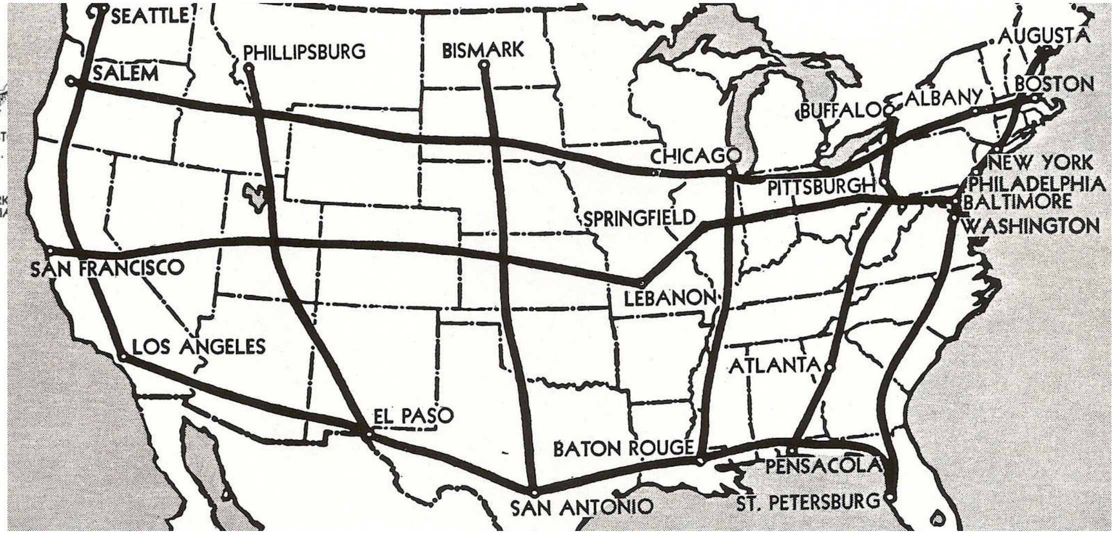


"…Contrary to accepted practice, the motorways must not be laid down using cities as their terminal points, nor must they be allowed to infringe on city boundaries or the city proper…While express motorways must be designed to carry fast, long-distance traffic, no existing roads need be scrapped. The country's 1940 roads will continue to carry local traffic, and their usefulness will be enhanced by connection with the new motorways…"

RE: excerpt from *Magic Motorways* (1939) by *Norman Bel Geddes*

Left: caption: "Motorway Feeder to City. The illustration demonstrates how Geddes visualized connections between cities and the new superhighway system."



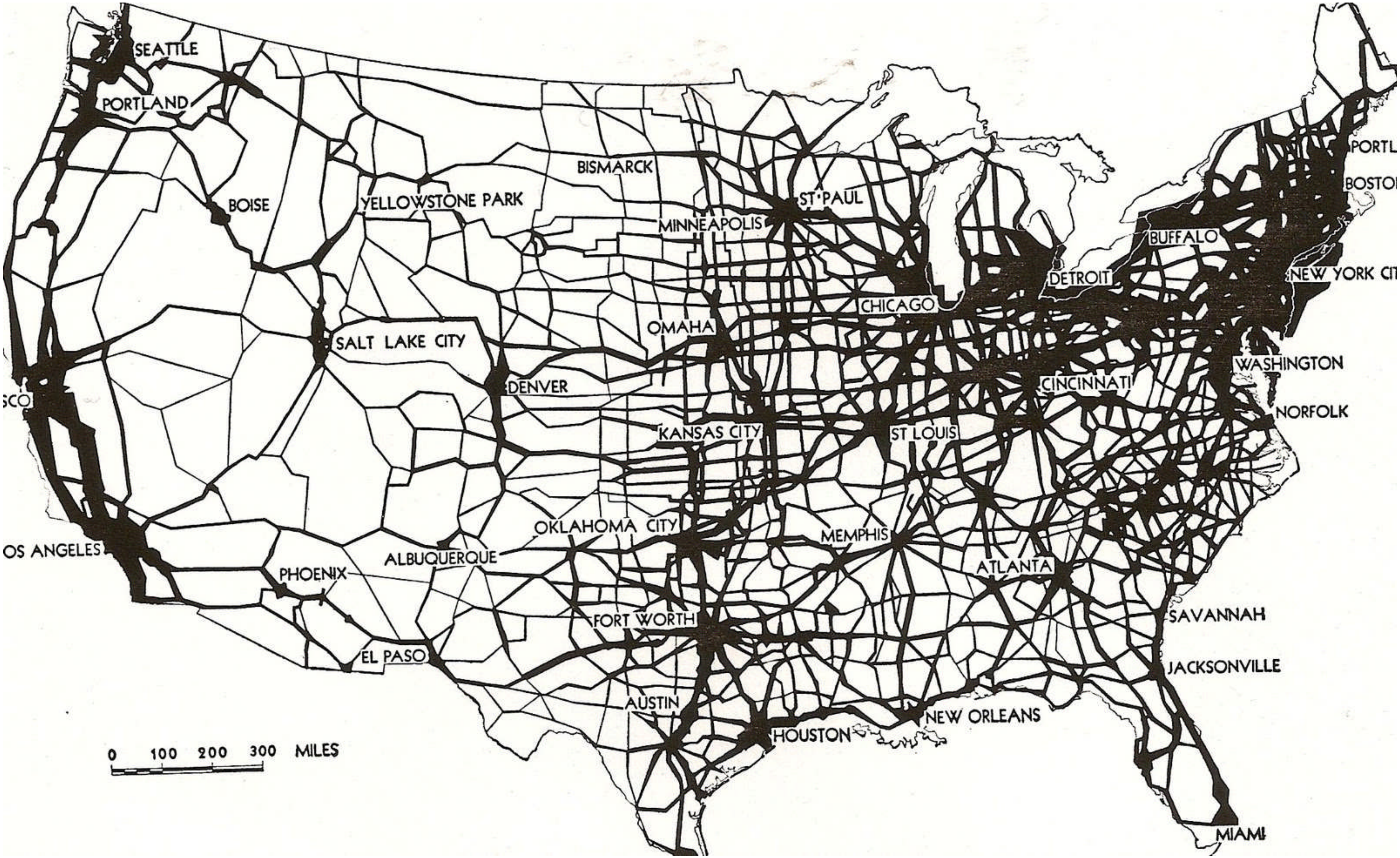


"…The plan (shown on the map) is based on a relatively brief, preliminary study…Its design sums up the basic requirements of such a comprehensive plan. See how directly the lines lead from one region to another. Notice that a direct route connects Seattle and El Paso - making possible uninterrupted travel from the northwest tip of the United States to the southernmost section…Nowhere do the cities connect the motorways, although they are all fairly close to them…Traffic moves in almost a straight line from Boston to New Orleans without passing a single city. Yet no city of over 100,000 is more than 50 miles from a motorway and most of them are half that distance. Look at the northernmost motorway, which runs east-west across the top ties of states…It avoids Grand Rapids by 35 miles, and makes straight for Lake Michigan. At this point the lake is 50 miles wide. Never mind. There is no let-down on the motorway. It shoots directly across the lake on a long bridge…"

RE: excerpt from *Magic Motorways* (1939) by *Norman Bel Geddes*

<u>Left</u>: caption: "A national motorway plan (1939)"

<u>Right</u>: caption: "Senator Bulkley's plan for superhighways – 1938"



<u>Above</u>: caption: "Traffic Flow Volume - based on Study by U.S. Bureau of Public Roads (1939)"

"…Europe is still regarding the motor vehicle as a luxury rather than a general public utility. European engineers believe the motor vehicle will have a big future but the public does not…Here is a toll road reserved exclusively for motor traffic, built by private capital under state franchise to extend for fifty years. It is laid over an entirely new right-of-way, without intersections at grade, no speed limit, ample width, concrete pavement with bituminous skin coat, easy curves, superelevated. In fact every provision is made for fast traffic between termini…"

***T.H. MacDonald,* BPR Chief**

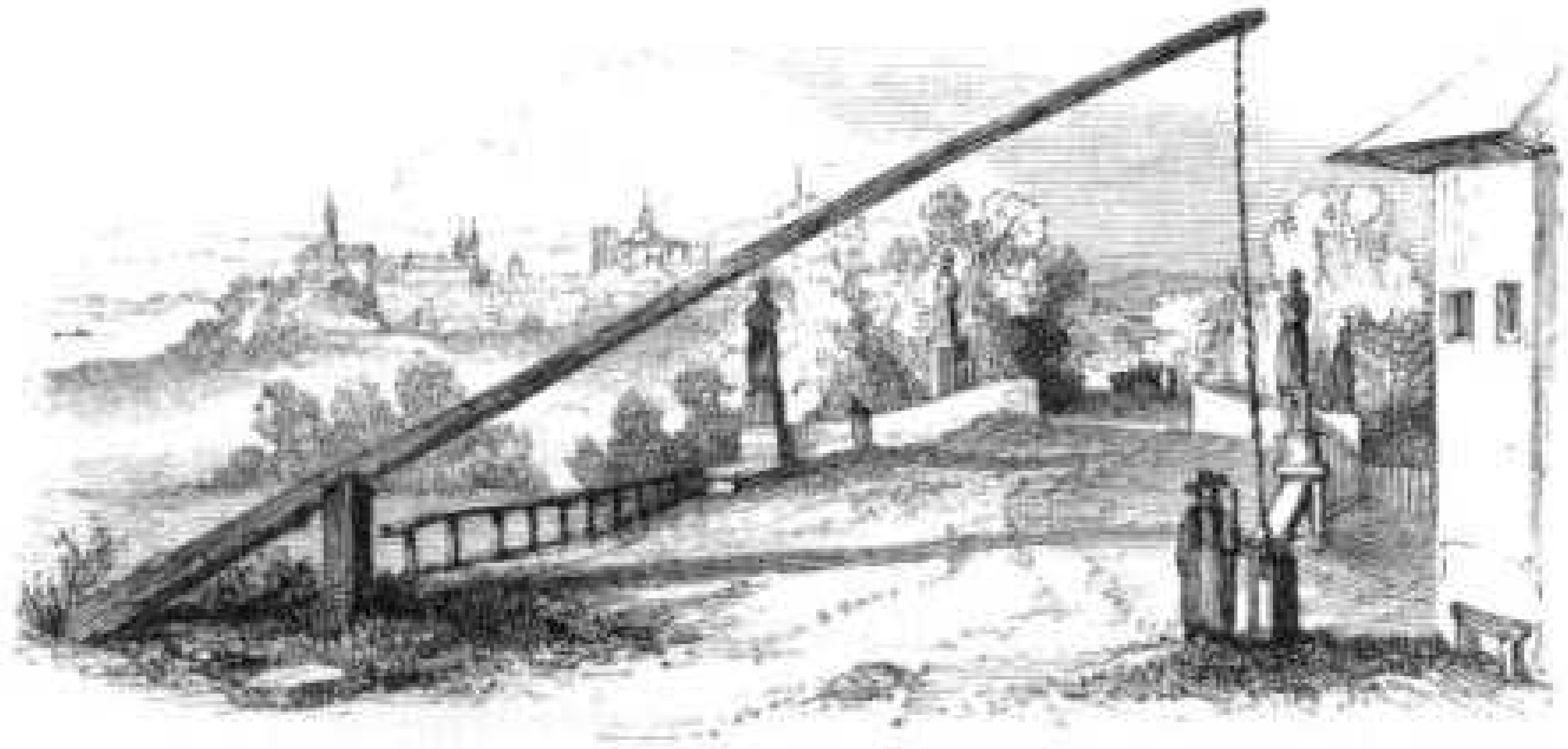
RE: upon his return, MacDonald discussed the activities of the *Fifth International Road Congress* in an article appearing in the October 28th 1926 issue of *Engineering News-Record* (ENR), describing the differences between the U.S. and European nations

The Right to Pass

"…When this dual aspect was presented…both the English and the United States delegations found themselves in a somewhat embarrassing position. All the traditions of English speaking people demand freedom of the highways. They are opposed to any conception of the highway which involves the exclusion of any kind or type of traffic that may demand service. To them the earliest meaning of the highway was not a physical thing but rather a right - the right to pass. The toll feature is not so foreign to our traditions since toll roads have been somewhat widely used during our past history; but the old method of collecting tolls at toll gates has served its purpose, speaking generally, and is no longer favored…"

***T.H. MacDonald,* BPR Chief (October 1926)**

RE: the main issues raised in Milan that prompted MacDonald to abstain on the conclusions was the socialistic policy of granting private franchises for toll roads exclusively for motor vehicles. However, since the Autostrada was so new, MacDonald hoped to see additional financial information in a few years time before drawing conclusions.



In the *Middle Ages*, a spiked barrier would sometimes be placed on a road or bridge to protect against sudden attack. The barrier would have to be turned to allow passage. The Middle English word for such a barrier was *turnepike.* This word was formed from the verb *turnen,* meaning “to turn,” and the noun *pike,* meaning “a sharp-tipped weapon.” With a slight change in spelling, *turnpike* later came to be used as the word for a simple gate placed across a road (above). In order to pass through the turnpike, travelers would have to pay a fee or toll. A road on which these tollgates were found was called a *turnpike road.* Such a road in time became known simply as a *turnpike.*

"…the engineering conception of the plan was courageous and highly representative of the best practice in the design of modern motor roads...This brief discussion does scant justice to a really remarkable development. The conditions are exceptional and while scarcely affording proof of the soundness of the principle of the 'Autostrade' for general application, as here worked out the result is one of which the Italian people may well be proud, and they are. The whole project certainly reflects great credit upon those who carried it through…"

***T.H. MacDonald,* BPR Chief (October 1926)**

RE: despite his reservations concerning financing, MacDonald acknowledged that had the report been limited to design issues, both the U.S. and Great Britain would have readily endorsed the report rather than abstaining on its vote

Public Convenience, Private Gain

"Of all the subjects discussed, the one which created the sole controversy was that growing out of the Autostrada from Milan to the Italian lakes. These roads have been built by private capital, guaranteed by the government, and travel on them is subject to toll which is in turn subject to recapture in part by the government. The result has been the construction of some 70 kilometers of high type road over which cars move as rapidly as 100 miles per hour. Junction points are guarded by watchmen and by gates…The danger is that the public will demand that roads be built this way rather than through taxes. Such a policy is likely to have two disastrous reactions; first - a public convenience and necessity will be made a matter for private gain; second, in concentrating attention upon a few miles of high-type roads, there will be a tendency to neglect the feeder roads which are essential to local development. While accepting the engineering practice, the United States delegation felt that the financial policy could not be admitted by our officials…"

Pyke Johnson, National Automobile Chamber of Congress

RE: excerpt from a November 1st 1926 article appearing in *Western Highways Builder*. Johnson, a close associate of MacDonald's throughout his long tenure at BPR, was part of the U.S. delegation to the *Fifth International Road Congress*.

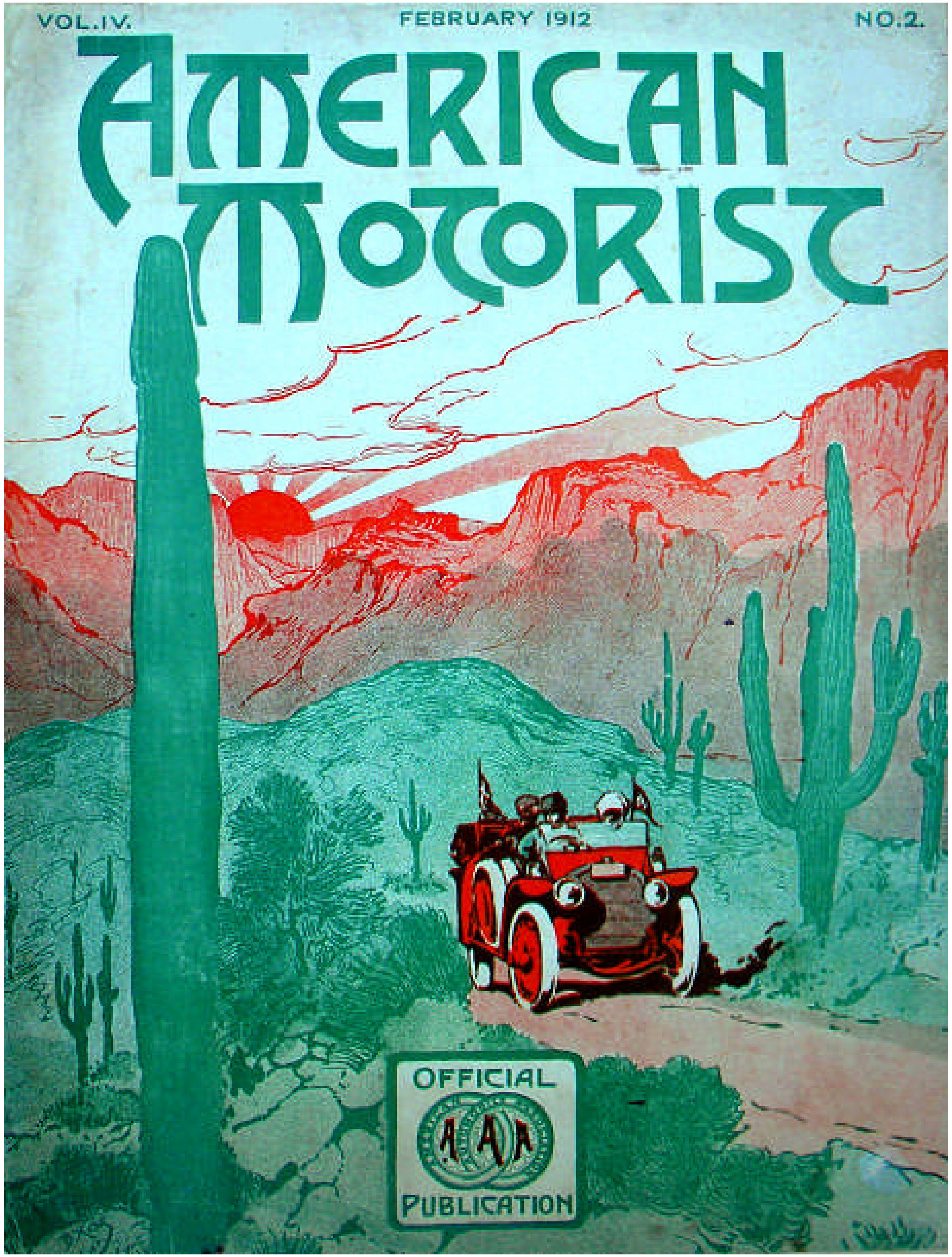
Hurry Up and Wait

"The time seems to be about prime for the development of express roads in all parts of this country and in all parts of the world where the automobile has made the building of super highways imperative…we hear talk of overhead roads and subways or of through and express roads where high speeds can be maintained with viaducts at the intersections and no doubt these super roads are on their way but who can tell when they will arrive…we will wait for the development of the super highway until such time as we are a little more ready for it, if one might say that the need does not make us ready now…In the first place we are not ready to finance such highways. Italy jumped 'way ahead of the miles when they constructed the Auto Strada or allowed it to be constructed. Now the Italian people have a taste of modern highways and that without the bitter after effects of taxation and they are going to want the same pleasant smack to all the feeder roads which obviously cannot be built in the way the Auto Strada was built. We, in this country, will not consider such express roads compatible with the other attributes of a free people if they are built and operated as toll roads or a private enterprise. And when the voice of the people is raised up as it has been recently over other means of financing ordinary highway construction and the completion of essential and imperative State highway systems, how are we going to build the super highways?"

***Western Highways Builder*, November 1926**

RE: observations of the magazine's editor (after attending the Milan Congress in September)

IL Duce Has Spoken



"…to have 40,000 miles of new motor highways, by far the most ambitious road program ever undertaken by any European nation…The Duce has spoken. And in this, as in other things, there is no reason to doubt that he will make his dream come true. For he sees much profit in it as well as glory and he believes that the undying lure of Italy for the tourist will be enhanced as the years and the roads march on."

American Motorist, **December 1928**

RE: on September 19th 1928, the *World Motor Congress* took place in Rome. After the Congress, *Cortlandt Field Bishop*, Chair of the *AAA's Foreign Relations Committee,* secured an interview with Mussolini, (a/k/a "IL Duce"). Bishop was accompanied by Major *Stenson Cook* (of AAA's British counterpart). They met with Mussolini at the *Palazzo Chiggi*. He reported the results in the AAA magazine's December issue.

"…The Duce stated his intention to initiate a great road-building plan for Italy that would, within five years, make all parts of the country accessible by car. Fifty thousand men are to be engaged in working out this program - the largest road building project ever undertaken by any government. When complete, Italy will have 40,000 miles of fine, wide, automobile roadways, without grade-crossings, with all curves banked, the surface dust-proof, leading to favorite tourist objectives throughout the length and breadth of that classic country. With an eye to the early encouragement of visitors to France, the first route to be completed will be that leading from Nice in the French Riviera to Rome. Work on this has already been started. One feature of recent Italian road building is the 150 mile stretch of the Auto Strada near Milan. This parkway is a toll road, the curves are all scientifically banked and there are no grade-crossings. No official speed limit has been set, but motorists are requested not to exceed 70 miles per hour. The Auto Strada has proven popular and it rather looks as if the express toll highway would become an important feature of the Italian transport system…"

***American Motorist*, December 1928**

On an American Note

"…Our interview ended on an American note - Mussolini asking about our highway conditions at home. He expressed amazement at the number of passenger cars owned in America and admiration for the splendid work of the American Automobile Association in attracting to its membership close to a million car owners."

***American Motorist,* December 1928**

<u>Left</u>: caption: "Autostrada Bergamo-Milano: Vintage Italian Poster for Lampo, 1930"

Worthy of Praise

“Well paved roads connecting all principal Italian cities, and without road-level intersections, is the highway future assured motorists in Italy. This system of ‘auto-strada,’ as they are called, is not a dream to be consummated just before the arrival of the millennium, for a good portion has already been built and other links are under construction…Through this toll system and method of semi-private control Italy is getting highway benefits that could be attained in no other way. The Italian highway requirement is so great, as it is in other countries, that private capital was necessarily called into play. American motorists who have traveled over the several sections of the autostrada now in service declare that the toll charges are more than vindicated through the comfort and convenience, the safety of driving at high speed and through the lessened strain on the car.”

***Engineer & Contractor*, October 1928**

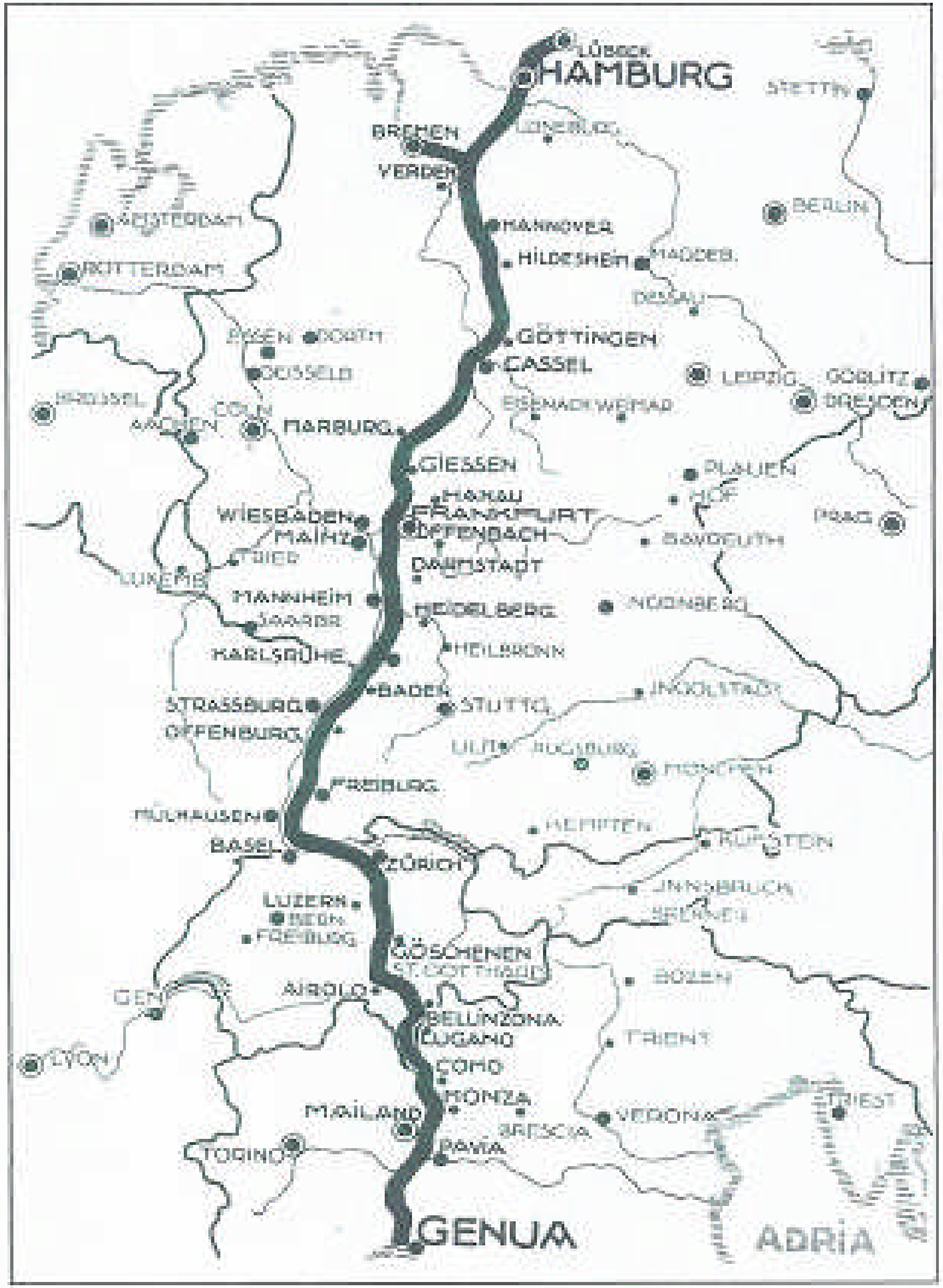
RE: as America concentrated on building a network of two-lane paved roads, road builders and their advocates continued to watch the Italian expansion of its Autostrada with great interest and admiration

Although BPR Chief MacDonald was suitably impressed by the engineering aspects of the Italian *Autostrada*, he did not see it as a role model for the United States. His views reflected concerns about the promoters of motorway networks and/or transcontinental superhighways in the U.S. In the mid-1920s, MacDonald did not believe such highway networks were justified either by traffic volume/s or potential economic returns. His views on Germany's *Autobahnen* would be very similar.

<u>Left</u>: caption: "Italy's Autostrade"

Part 4

Object Lesson



In the 1930s, Adolf Hitler, like Mussolini a decade earlier, was giving American highway engineers an object-lesson in the latest thinking about modern highways. The initial idea for the ‘Reichsautobahnen’ (National Auto Roads) can be traced to the 1920s, when Germany’s *Weimar Republic* began planning a motor highway network inspired by Italy’s *Autostrada*.

<u>Left</u>: caption: “The planned north-south Autobahn route with extension to Genoa”

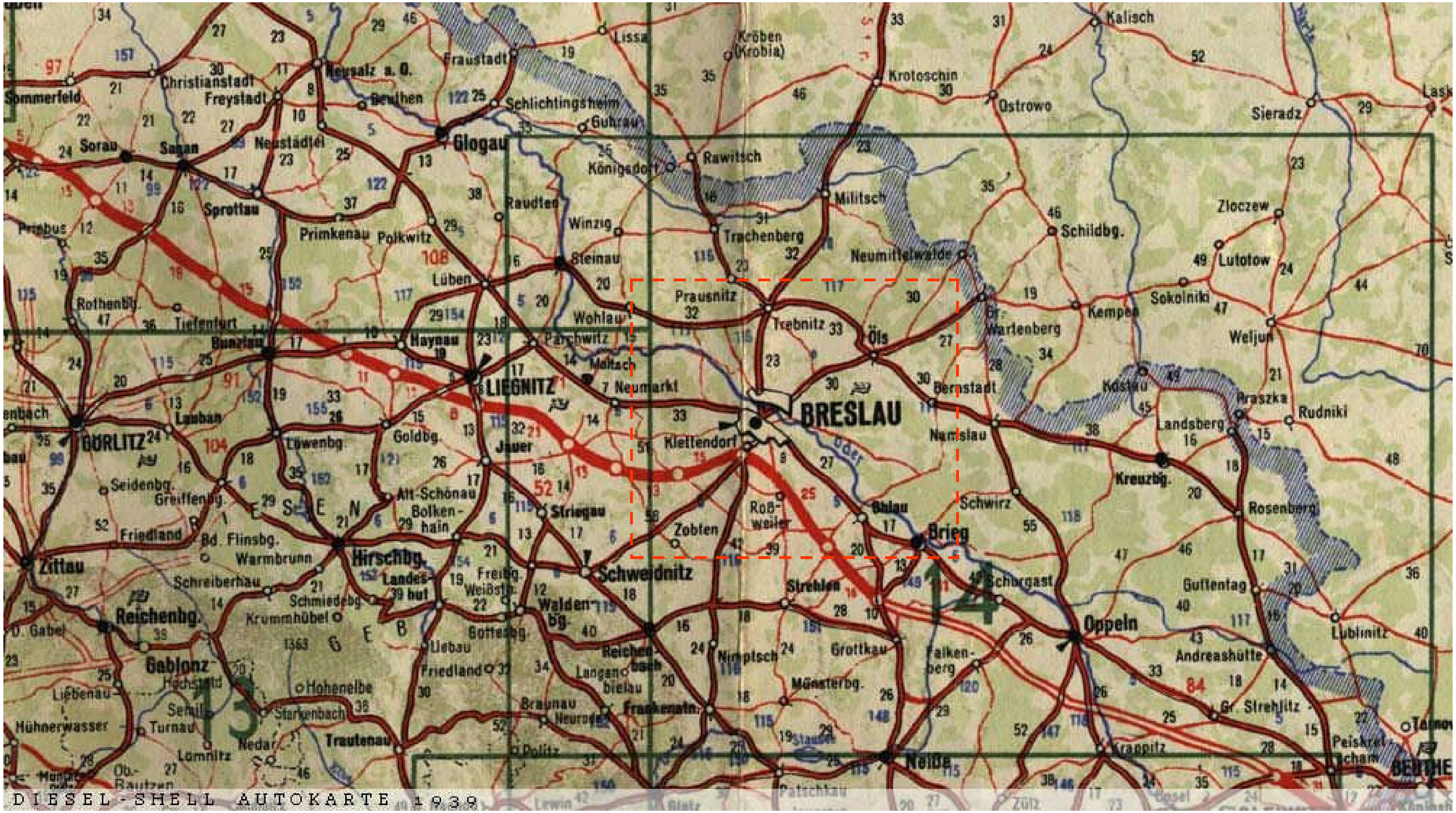
In November 1926, *Willy Hof*, chairman of the *German Chamber of Commerce*, formed the *Association for the Planning of the Hanseatic Cities-Frankfurt-Basel Motorway* to plan Germany's highway system. Initially, the association followed Italy's example by planning a motor vehicle-only toll network, with rest stops along the right-of-way for motorist services. However, German law prevented any such tolls being placed on new motorways. In 1928, the association first used "Autobahn" to describe the proposed highways. The network, as planned, had three east-west motor highways:

- **Between the Ruhr and Berlin (via Hanover);**
- **Between the Southwest and Munich (via Stuttgart) and between the Main-Neckar region, and;**
- **Between Breslau (via Erfurt) and Leipzig.**

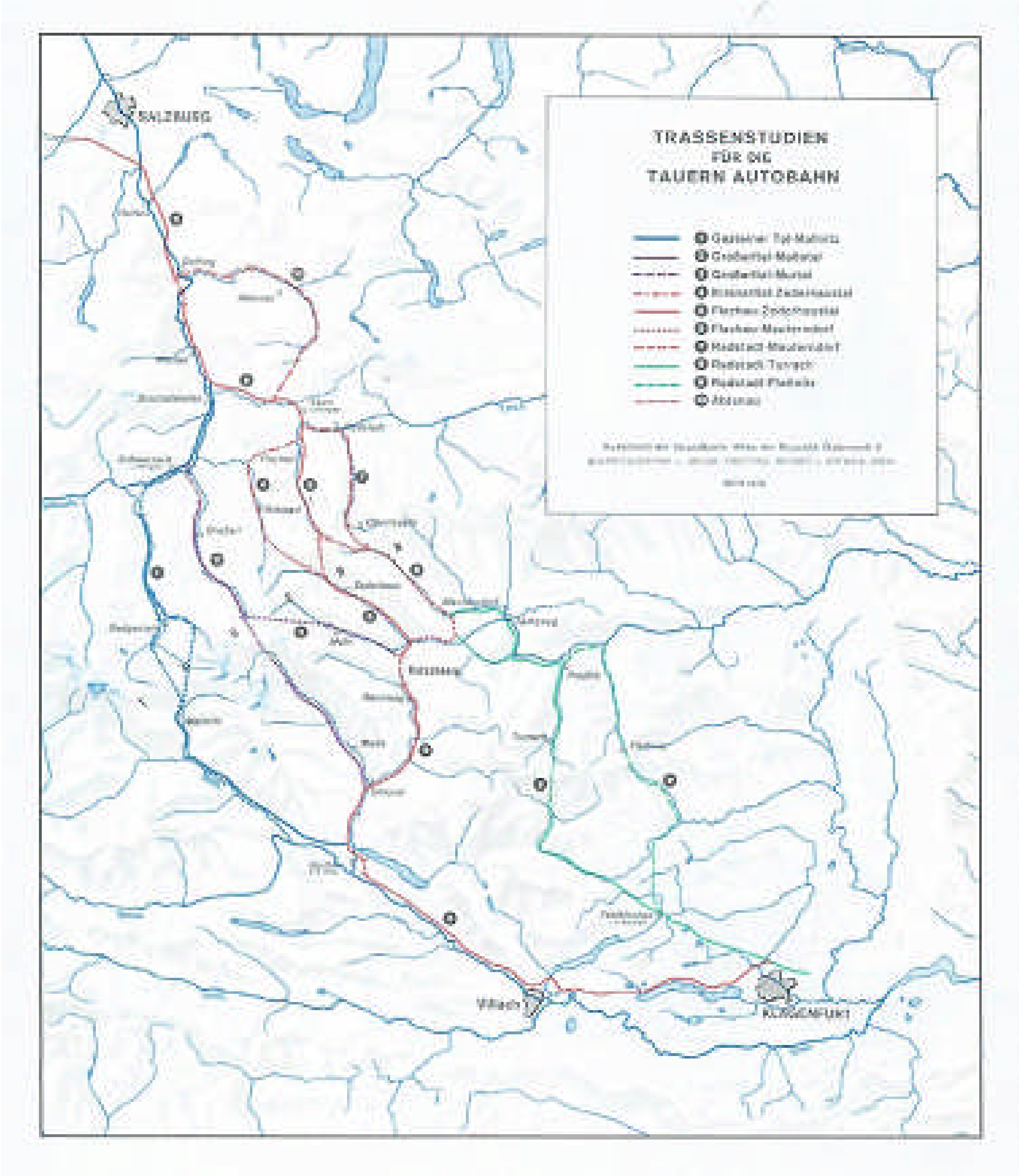
Two north-south motor hoghways:

- **Between the Hanseatic cities and Basel (via Frankfurt), and;**
- **Between Konigsberg and Munich (via Stettin - now Szczecin, in Poland), Berlin and Nuremberg.**

As well, diagonal connections between Berlin, Hamburg and Breslau were planned.



Above: caption: “Map of May 1939, showing current and u/c stretches of RAB 9 near Breslau”



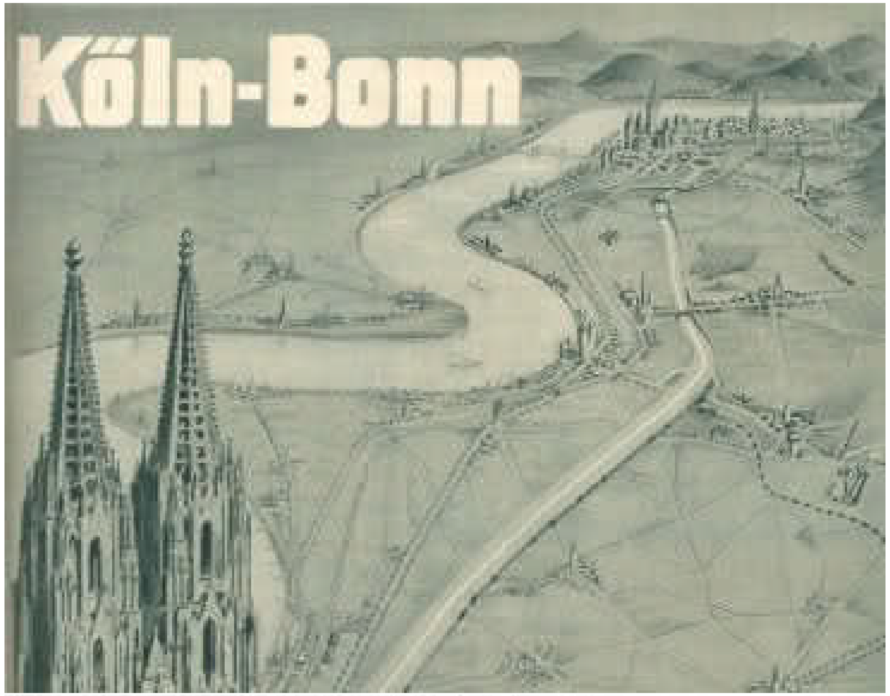
<u>Left</u>: caption: "Path study for the Tauern motorway, 1938"

Roads of the Future

"This is how the roads of the future will look!"

Konrad Adenauer, **Mayor of Cologne (August 1932)**

RE: also in 1928, planning began for the limited-access highway between Aachen and Cologne. Construction started in October 1929, as the Depression began spreading across Europe. In an effort to create jobs, initially very few machines were used in favor of human labor. The road opened on August 6th 1932. It was the first "Autobahn" connecting two cities (Cologne and Bonn). It was 12-meters wide and had no at-grade intersections, but was not divided (above). The *Auto-mobil-Verkehrs-und-Ubungstrasse* (*Automobile Traffic and Practice Road*) or AVUS, in Berlin, opened in 1921.



Until 1929, the worldwide economic crisis and the resulting lack of capital meant that it was impossible to build motorways in Germany. The country was struggling with mass unemployment, hyperinflation and the payment of reparations for the *First World War* (per the *Treaty of Versailles*). *Konrad Adenauer*, Mayor of Cologne (Koln), managed to finance and construct the first crossroads-free motorway in 1932 (now the A555, between Cologne and Bonn). The road was 20 km long and the speed limit was 120 km/h (most cars at the time could only achieve 60 km/h). The Cologne region was said to have the highest volume of traffic in the country.

<u>Top</u>: caption: "July 20, 1932: Cover of ADAC-Motorwelt (Germany and Europe's largest automobile club)"

<u>Bottom</u>: caption: "Koln-Bonn Autobahn"

Shortly after coming to power in January 1933, Hitler officially opened (in *South Hessen*) what was meant to be the first part of the extensive *Reichsautobahnen* network, ignoring the fact that Cologne Mayor *Konrad Adenauer* had stolen the limelight by opening the first city-to-city Autobahn between Cologne and Bonn in 1932, before Hitler came to power in Germany. To solve the publicity problem, the Nazi Party immediately reclassified that four-lane, undivided motorway as a "country road." Berlin also had a four-lane freeway (AVUS) but it was easier to dismiss because it wasn't part of the general transportation network. In 1937, a median was added to the Cologne-Bonn Autobahn thus bringing it up to national standards.

<u>Above</u>: caption: "The first European motorway junction (1932)"
<u>Top Left</u>: "Cologne-Bonn Auto-bahn, 1932" (undivided road-way)
<u>Bottom Left</u>: caption: "Colog-ne-Bonn Autobahn, 1937" (median added)

An Elitist Fantasy (?)

“In his 14 years of political struggle for Germany, the Fuhrer used almost exclusively motor vehicles during his travels, and got to know German roads south, east, north, and west as almost no other man did, traveling an estimated 500,000 - 600,000 km (310,694 - 372,832 miles), thus having traveled at least a dozen times around. In his travels, Hitler had the opportunity to learn about road networks, and out of this knowledge came the idea to build a connecting net of roads.”

German Highways **(NAZI Party Publication), 1937**

RE: in 1927, the *Association for the Planning of the Hanseatic Cities-Frankfurt-Basel Motorway* drew plans for a 13,670-mile highway network. Faced with a growing economic crisis, the *German Reichstag* voted the plan down in July 1930. The *National Socialist Party*, which dominated the Reichstag, viewed the proposal as “an elitist fantasy, since the nation had so few motorists and cars.” After Hitler became Chancellor of the German Reich (on January 30th 1933, he reversed the Reichstag’s 1930 decision.

As a result of the reversal, a plethora of photographs, paintings and books were hastily produced to reflect the revised history of Hitler and the Nazi party's stance on public road building. In truth, the Nazis originally opposed what would amount to 8K miles of roads spanning the country, branding the proposed freeways "luxury roads for plutocrats." Even the *National Automotive Industry Association* (which approved of four-lane highways skirting cities) protested the creation of an Autobahn because it feared that the expansion of inner-city and regional routes would give a boost to mass motorization. Opposition was also intended to placate the powerful railroad monopoly (Nazi Party officials were concerned that railroad executives would resent and strike back against the new, unwanted competition).

Mein Kampf

"As in earlier times, when roads had been made for horse and wagon, and tracks laid for railroads, now roads must be built for automobiles"

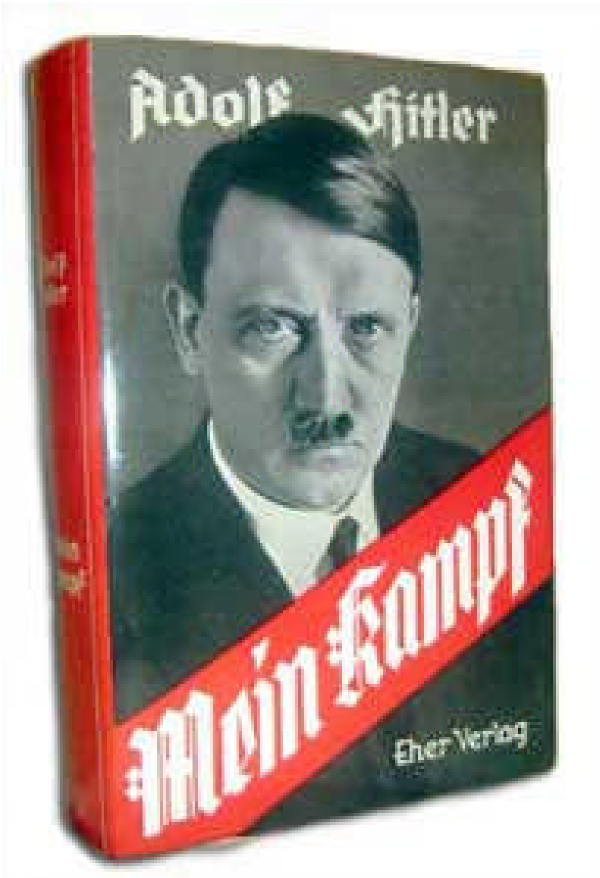
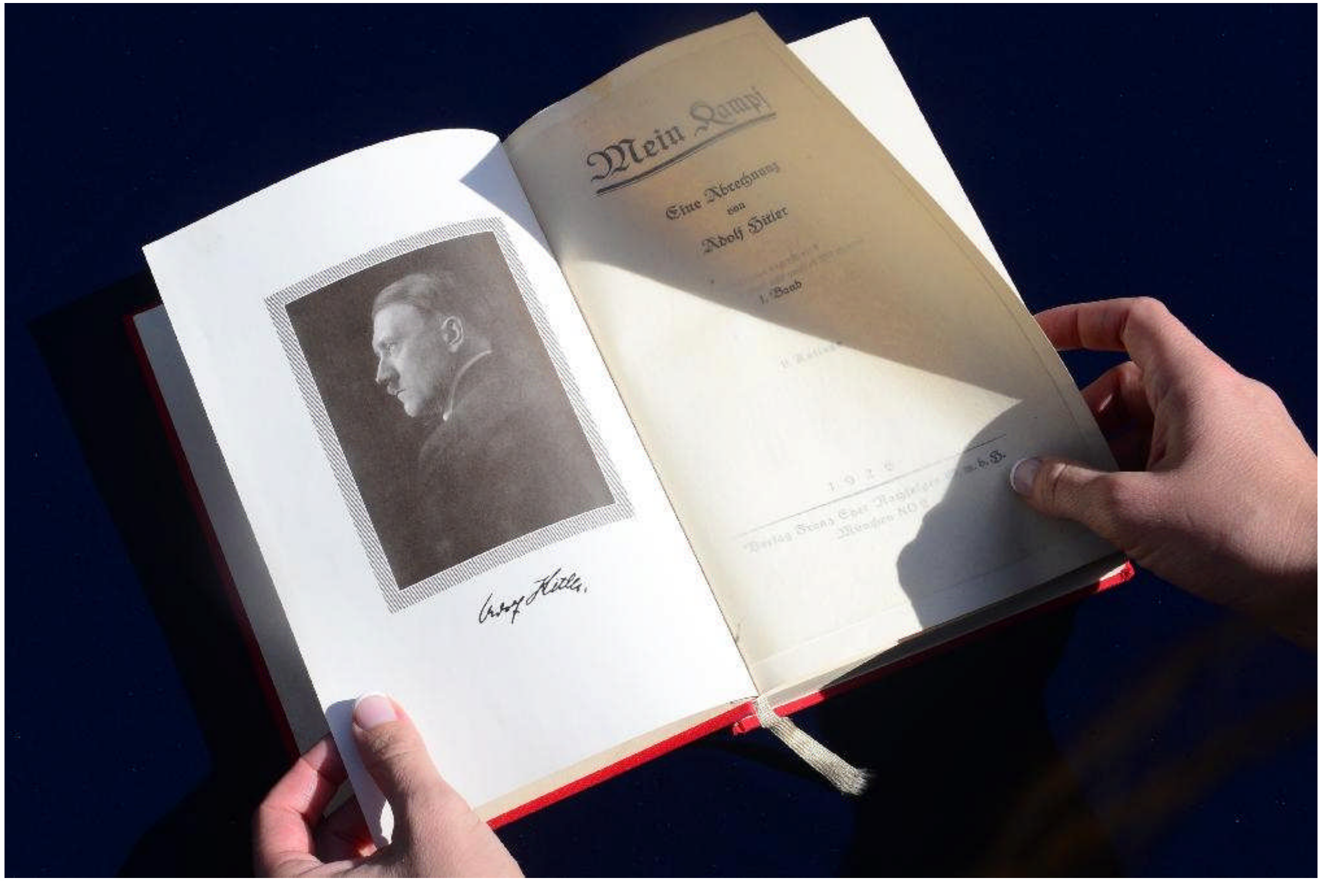
***Adolf Hitler*, Chancellor of Germany**

RE: excerpt from speech given on February 11th 1933, two weeks after taking office, at the *International Automobile and Motorcycle Show* in Berlin

"We are developing a program for the construction of new roads, a gigantic undertaking that will need millions. We will remove any opposition! It will help reduce unemployment."

***Adolf Hitler*, Chancellor of Germany**

RE: excerpt from speech given on May 1st 1933 at Berlin's *Tempelhofer Field.* In June 1933, Hitler secured a law creating the *Reich Autobahn Agency* (RAB). It was headed by *Dr. Julius Dorpmuller*, but Hitler appointed *Dr. Fritz Todt* as *General Inspector of the German Road System*. Dr. Todt would be in charge of planning and construction.


Adolf Hitler
Mein Kampf
Eher Verlag

Mein Kampf
Eine Abrechnung
von
Adolf Hitler
1. Band

The Streets of Adolf Hitler

“The perfect combination of Nazi ideologue and effective engineer”

***Anson Rabinbach,* Historian**

RE: *Dr. Fritz Todt.* By the mid-1930s, the view that, while imprisoned and writing *Mein Kampf,* Hitler “opened a map of our fatherland on his knees and envisaged his Reich’s Autobahn being a part of it” (as poet *Herybert Menzel* wrote) had become state doctrine. Even today many still believe Adolf Hitler’s sole redeeming quality was acting as chief promoter/enabler Germany’s modern highway network. In fact, the National Socialists steered collective memory for their own gain. Any dissenting views were suppressed and people were told to agree with the narrative that Herr Hitler had conceived the idea back in 1924 while serving a jail sentence for sedition. Fritz Todt, Hitler’s Autobahn planner, sent letters to anyone who publicly disagreed reminding them that the Reich’s Autobahns were solely “Adolf Hitler’s roads” and encouraged recipients to view the note as a warning, not merely a rebuke.

DIE STRASSE

6. JAHRGANG NR. 8 2. APRILHEFT 1938

DIE STRASSEN DES FÜHRERS

Deutschland!

Verwundert sahst Du, wie tausend schaffende Hände
Dir Wunden schlugen und wühlten in Deinem Gebreit,
Verwundert hörtest Du klirrende Spaten und Lärm im Gelände,
Hämmergepoch und Gestampf zerriß Deine Einsamkeit.
Schwindelhoch wuchsen Pfeiler aus Stein und aus Stahl,
Alten Straßen baute man Brücken und künftige Wege,
Überwölbte die Flüsse und übermochte die Schräge
Der Berge und stieß in stolzer Windung zu Tal.

Deutschland!

Wie schrecktest Du jäh aus der Stille,
Standest mit staunenden Wäldern am Saum
Des wachsenden Werkes!
Siehe, ein kraftvoller Wille
Gab den Befehl. Nicht Willkür störte den Traum
Von Flur und Gefilde.
Siehe, aus blutenden Wunden
Wurden die Straßen, wuchsen, ein schimmerndes Band,
Begrünt die Ufer, wuchsen zu einem Stück
Lebender Landschaft. Was Wille gewollt, was die Hand
Geschaffen, wurde Dir, Deutschland, ein großes Glück.
Sieh, die Gefährte, auf sicheren Bahnen hinlaufend,
Lassen die Meilen schrumpfen, verwandeln die Tage in Stunden!
Siehe, die Heimat zur großen Gemeinschaft sich runden!
Höre den Pulsschlag der Arbeit, höre ihn, brausend!

Deutschland!

Siehe die Straßen des Führers
Leiten Dich stolz in das nächste Jahrtausend!

Thilo Scheller

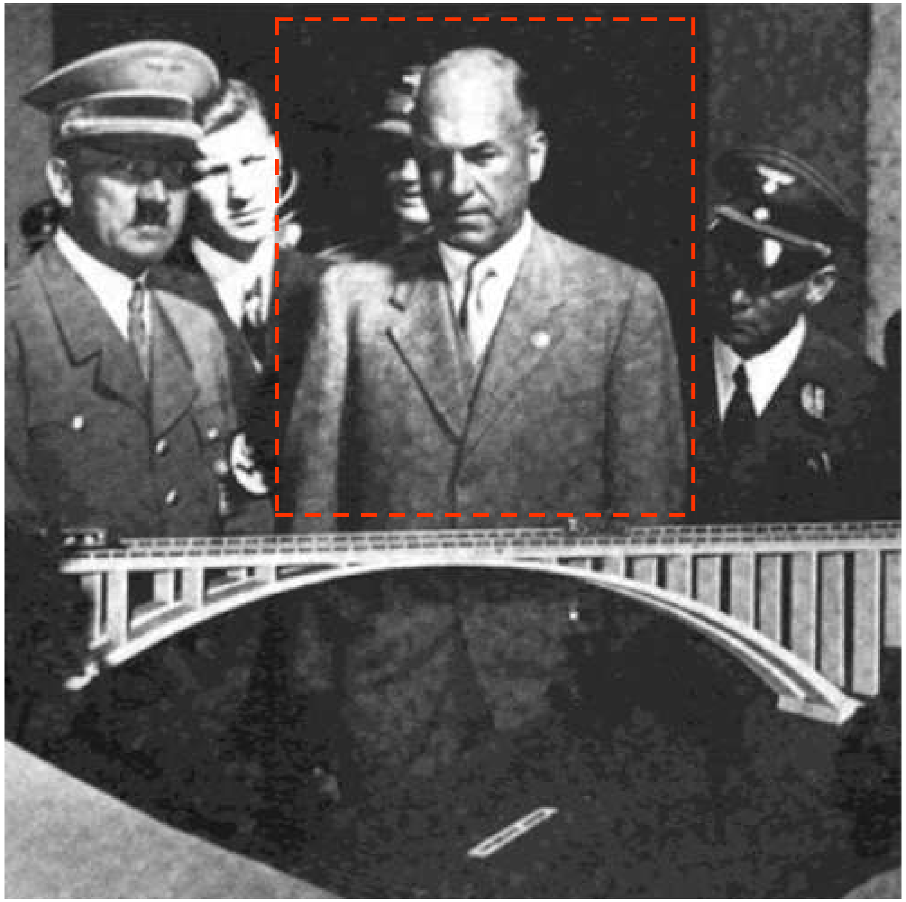
Above: caption: "Announcement of the exhibition 'The streets of Adolf Hitler' in Linz"
Left: caption: "Motorway poetry in honor of the 'Streets of the Fuhrer'"

A desire grew and became command
and galloped to the future target.
Glad drew the columns of workers
Now work roars bright choir.
From north to south, from east to west
grows the plant, is strong and firm.
The Fuhrer streets draw pride
by field and heath, moor and forest.
A plan vastly, will shape
banishes defiantly the force of nature;
a work of peace, community band,
going forward through strong German land.
The spade flashes, the hammer roars,
pickaxes hiss in the background.
The front closes with his fist the covenant;
a German miracle is known here.
And everyone who was serving here,
created with the new fatherland.

Reichsautobahnen* by *Julius Bansmer

HaFraBa

For Hitler and the Nazi Party, the greater challenge would be concealment of the long-standing plans for Germany's modern highway network - and the Nazis' past opposition to such a scheme. Plans had been made by an association dubbed "HaFraBa" which included advocates from the transport department, businessmen, civil engineering concerns, cement firms and "interested others," all of whom had campaigned for an Autobahn network to connect Germany's *Hanseatic* cities (via Frankfurt to Basel) as far back as 1926. The Nazis worked tirelessly to reconcile their earlier rejection of the Autobahn concept with their subsequent hijacking of it. Newspapers wrote that HaFraBa "was motivated solely by capitalist and Jewish interests" (before 1933) and that everything had been "dominated by thoughts of profit." Hitler went so far as to remove the board chairman of the HaFraBa, a German-Jew named *Ludwig Landmann*, boasting that he had removed the "Jewish Power Broker."



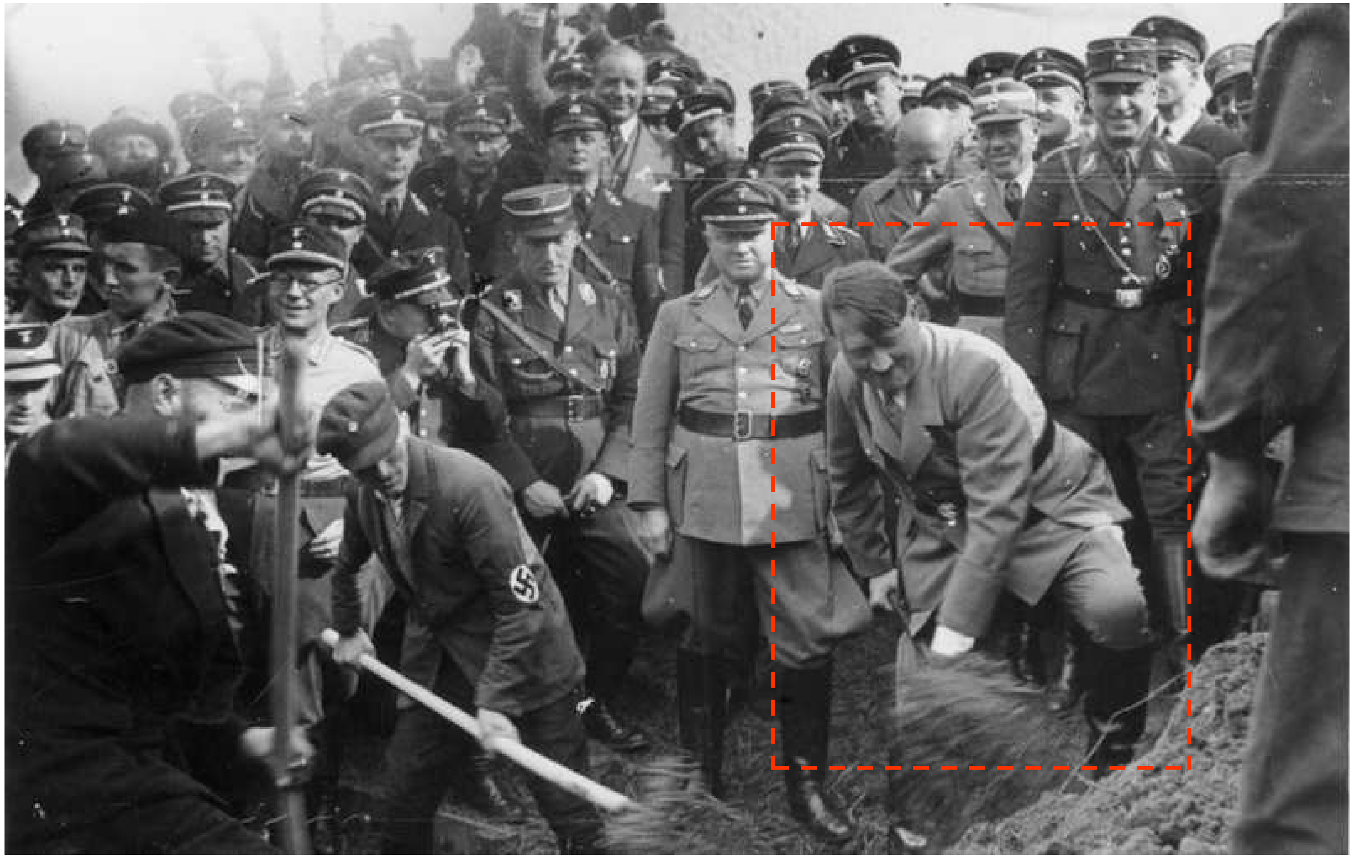
Fritz Todt **was born in 1891 in Pforzheim, Baden, Germany. He studied at the *Technische Hochschule* (College of Technology) until joining the army after the outbreak of war in August 1914. After the war, he completed his studies (in 1920) and worked for an engineering firm, eventually specializing in road surfacing. His doctoral dissertation, completed in 1931, was on "The Causes of Defects of Asphalt (Blacktop) on Roads" (a/k/a "Reasons for Paving Mistakes of Roads Paved with Tar and Asphalt"). He would have the final say on every aspect of the new road system.**

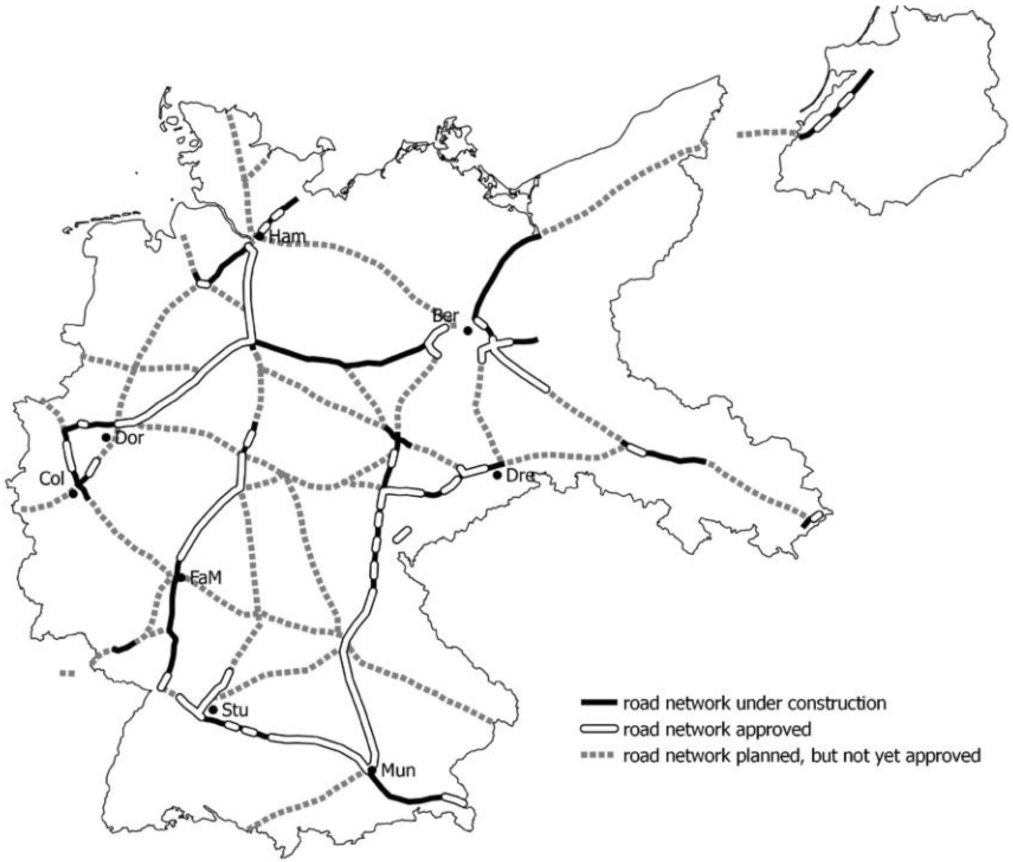
Left: Hitler (left) and Dr. Todt (center) study a model of an arch-type Autobahn bridge

“Today we stand at the threshold of a tremendous task. Its significance not only for German transportation, but, in the broadest sense, for the German economy, too, will come to be appreciated in full only in the course of future decades. We are now beginning to build a new artery for traffic!...I know that this gigantic project is only conceivable given the cooperation of many; that this project could never have evolved had the realization of its greatness and the will to turn it into reality not seized hold of so many, all the way from the Cabinet and Reich government, up to the German Reichsbank and the German Reichsbahn…In my view, the most productive way of leading the German people back into the process of work is to once again get German industry going by means of great and monumental projects. In taking on a difficult task today…you are ensuring that hundreds of thousands more will receive work in the factories and workshops by virtue of your increased buying power. It is our goal to slowly increase the buying power of the masses, and thus to provide orders to the centers of production, and get German industry off the ground again.”

Adolf Hitler, **Chancellor of Germany (09/23/1933)**

RE: by September 1933, 30K workers were ready to begin work. Hitler initiated the work near *Frankfurt am Main* on September 23rd 1933, turning the first spade of dirt.





Dr. Todt's position meant that he was not just creating the Autobahns, but improving the entire German road system. There were basically three different classes of roads:

- **National Roads;**
- **First Class Roads, and;**
- **Second Class Roads.**

There were also the small country roads that linked a host of communities across the land. Repair and reconstruction of existing roads was to be undertaken alongside the construction of new roads.

<u>Above</u>: caption: "German Highway Network by 1934"

Roads of the Fuhrer

“…Germany’s impressive road network partly inspired the Interstate Highway System that changed the shape of American cities (for better and worse). It also might have hastened Hitler’s rise to power. That’s the conclusion reached by economists Nico Voigtlaender of UCLA and Hans-Joachim Voth of University of Zurich in a fascinating new working paper on the Autobahn’s role in the Nazi regime. By analyzing voting records between November 1933 and August 1934 alongside highway patterns, Voigtlaender and Voth found that any opposition to Hitler swung in his favor significantly faster in areas where the Autobahn was being built than elsewhere. With the country still recovering from the Great Depression, Germans might have seen the new roads as a sign the Hitler regime could jumpstart the economy…”

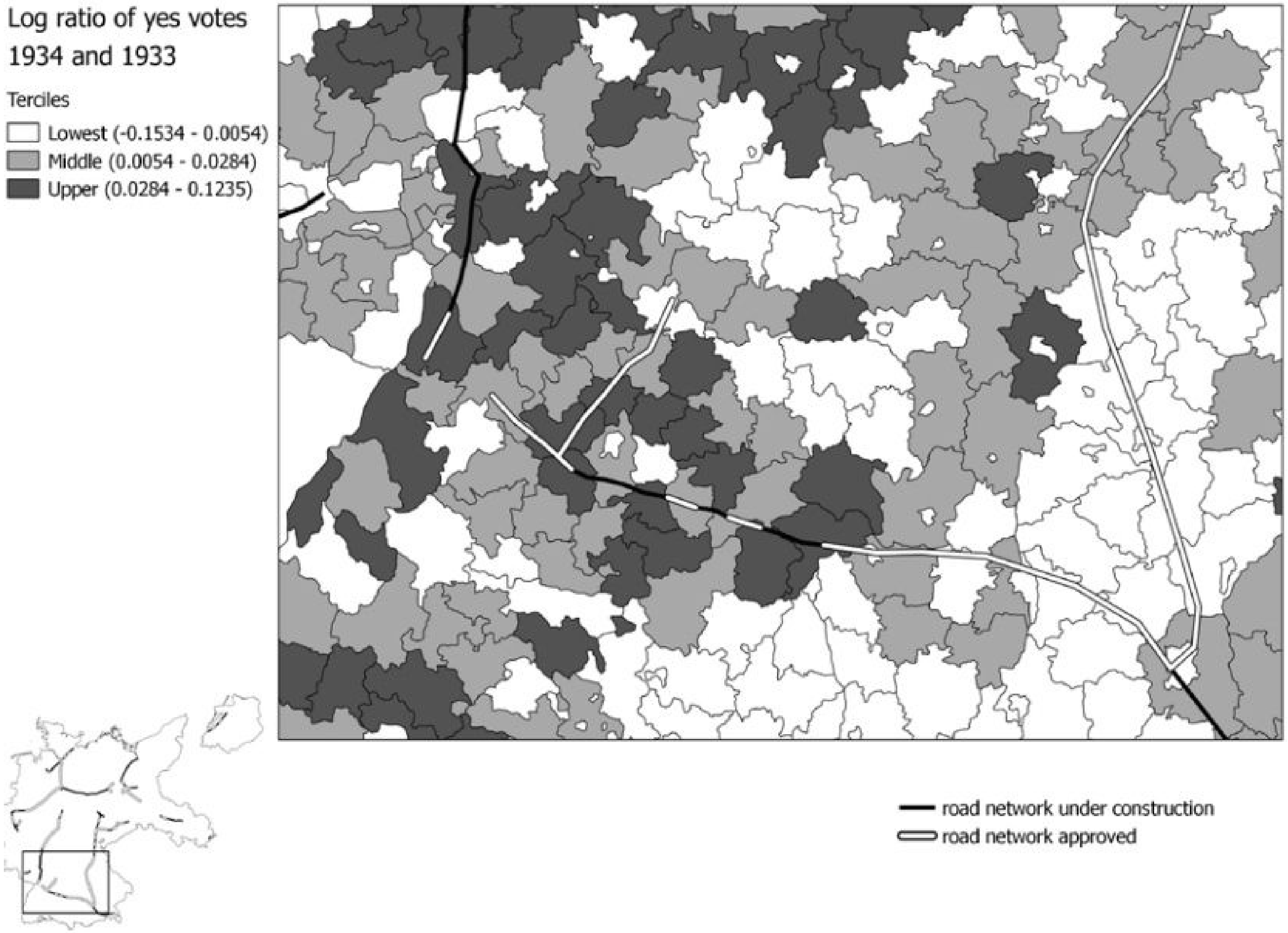
Citylab.com, June 6th 2014

"…'We find strong evidence for changes in voting behavior in one of the most salient examples of infrastructure spending,' Voigtlaender tells CityLab. 'Also, we show this in a context of attracting votes from the opposition - i.e., people who were hardest to convince.' As Hitler rose to power in 1933, he wanted to show that his government could get things done in a way the Weimar government had not. Building the Autobahn was the perfect demonstration. Hitler himself broke ground on the highway system in September 1933 - telling the crowd to 'get to work' - and within a year construction was underway in 11 major corridors. The propaganda that followed referred to 'roads of the Fuhrer' as a way of connecting highway completion with an effective Nazi regime…" 281

Citylab.com, June 6th 2014

"…Voigtlaender and Voth studied the effect of this infra-structure program by looking at results from two votes around this time: a parliamentary election in <u>November 1933</u>, and a referendum to make Hitler supreme leader in <u>August 1934</u>. Neither election was a free one. Storm troopers loomed over polling stations and coerced voters. But opposition did still exist. More than a quarter of Hamburg and Berlin voters rejected Nazi candidates in the '33 election, and nearly a quarter of Aachen voters cast 'no' at the '34 ballot. Pairing voting records for 901 counties with the geography of the emerging road network revealed clear disparities in pro-Nazi voting shifts during this 9-month stretch. While votes against the regime declined by 1.6 percent on average, opposition votes declined by 2.4 percent in precincts near Autobahn construction. Put another way, those living near a new high-way were quicker to acquiesce to Nazi rule…"

Citylab.com, June 6th 2014



"…The map above shows that areas where the road was being built (black lines) tended to align with bigger swings in 'yes' voting (the darker the district, the bigger the swing in Nazi approval)…"

Citylab.com, June 6th 2014

<u>Above</u>: caption: "Shift in Favor of the NS Regime between Nov. '33 and Aug. '34"

"…As a further check on their conclusions, Voigtlaender and Voth went back to the elections of March 1933, the last semi-free elections of the era. Votes against the Nazis in that election were 'nearly identical' in the two focus areas (53.8 to 53.3 percent with and without construction). But between then and August 1934, Nazi opposition fell by 15 percent in areas outside the Autobahn's developing footprint, and fell by 25 percent in areas within it. Voigtlaender and Voth conclude: 'We find that electoral opposition to the nascent dictatorship declined significantly in districts traversed by the Autobahn. This effect is much bigger after November 1933 than before, in line with spending patterns over time. There is a clear gradient to the collapse in opposition - the further away from the highways a district was, the smaller the reduction in opposition'…"

Citylab.com, June 6th 2014

"…It's not hard to imagine how things might have unfolded. Road workers spent money at local shops, generating optimism in both the economy and the new government. At a wider scale, the regime showcased the Autobahn as a sign of its ability to guide Germany back toward global prominence. Interestingly, write the researchers, that favorable impr-ession was largely an illusion. The Autobahn failed to stimulate as much employment as it promised; instead of putting 600,000 Germans to work, it employed just 125,000 at its peak. Car ownership was also very low in the early 1930s, limiting any immediate benefits of living near a road. In all likelihood, economic recovery was on its way with or without the project. 'Germans often believe that highway construction was the only bright spot of the Nazi regime,' says Voigtlaender. 'Our interpretation is that this is based on a misinterpretation of the Autobahn's true economic effect.' While the Autobahn might have helped Hitler consolidate power more quickly, his eventual claim on that power was inevitable even at the time."

Citylab.com, June 6th 2014

The New Germany

"…it is a mere coincidence that this Congress is now being held at a time when you, Gentlemen, are already in a position to get a clear idea as to the road system as well as to the general situation in Germany in the second year of the National Socialist revolution…to judge things clearly and objectively…and to see for themselves what this new Germany has achieved in particular in the field in which they are specially interested…a more correct idea of the new Germany than that which exists at present in the world in general...a system under which fully responsible men assisted by the advice of specialists in various branches take quick decisions which are not watered down by lengthy parliamentary discussion…the construction of motor roads has been begun in such an astonishingly short time after Hitler's taking over of the government…"

Reichminister Hess

RE: excerpt from speech given at the opening of the *Seventh International Road Congress* on September 3rd 1934 in Munich, Germany. As far as Hess was concerned, the presence of international road experts in Germany was "a happy coincidence" given the change of policy towards road building of the new *National Socialist* Government

Two Principles

"…German road building is very largely guided by two principles. In the first place modern traffic requires that roads should be kept in the best possible state of repair corresponding to modern technical developments, while secondly the provision of employment is the other idea which finds its expression in the German road building program. Traffic requirements and, as far as possible, regard to aesthetic considerations, both as regards the effect of the road on the landscape and the effect of the landscape on the road user, are the deciding factors in the laying out of the new roads in Germany. Their technical construction and their technical qualities are adapted to the economic necessities and the traffic requirements of the moment, due account being taken of probable developments…"

Reichminister Hess

RE: excerpt from speech given at the opening of the *Seventh International Road Congress* on September 3rd 1934 in Munich, Germany

"…The planning of our modern German roads is closely connected with the efforts directed towards the consolidation for centuries of the political unity the Reich achieved through National Socialism. The network or [sic] roads which is about to come into existence in Germany fulfills from the traffic point of view also the condition of Reich unity which was the objective of the struggles of two patriots who were not fully understood by their contemporaries, viz. Friedrich Luders with his plan for a network of German roads in 1779 and Friedrich List with his plan for a German railway system in the first half of the nineteenth century. Both of these men realized already at that time what we today are putting into practice, namely, that correctly planned roadways are like firm bands making an indissoluble unity of a people and the territory given to it by Nature and Providence. In our opinion roads have not only material and practical value, they are not only the expression of the standard of development of German technique, science and economy, they have beyond that become again a political-historical document of our period on the strength of which future generations will judge us."

Reichminister Hess

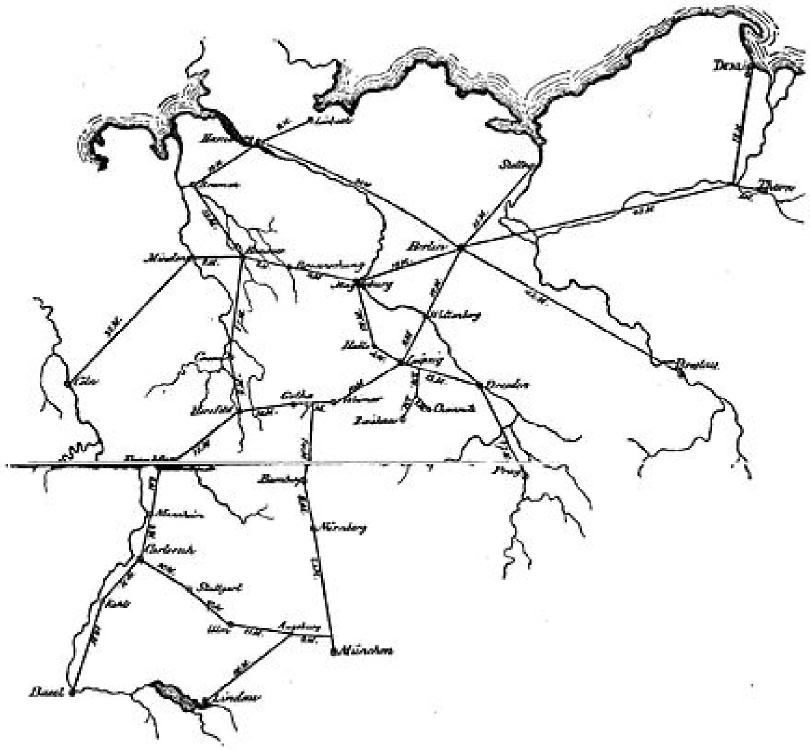
RE: excerpt from speech given at the opening of the *Seventh International Road Congress* on September 3rd 1934 in Munich, Germany

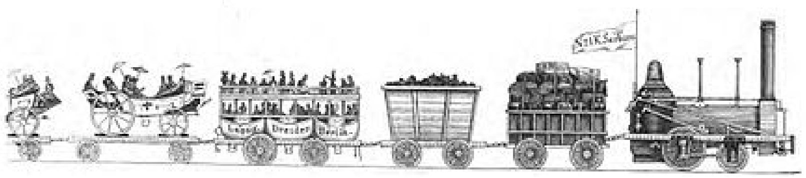
Genesis

The genesis of economic development in the German States came with the railroad revolution in the 1840s, which opened up new markets for local products, created a pool of middle managers, increased the demand for engineers, architects and skilled machinists and stimulated investments in coal and iron. Political disunity of three dozen disparate States and a pervasive conservatism made it difficult to build railways in the 1830s. However, by the 1840s, trunk lines did link the major cities. Each German state was responsible for the lines within its own borders. In 1833, economist *Friedrich List* delineated his concept for a German railway network and in 1841, he outlined the many benefits/advantages to be derived from the development of such a railway system (national defense/identity, economic stimulus etc.). Lacking a technological base at first, the Germans imported their engineering and hardware from Great Britain, but quickly learned the skills needed to operate and expand the railways. In many cities, the new railway shops were the centers of technological awareness and training thus, by 1850, Germany was self-sufficient in meeting the demands of railroad construction and the railways were a major impetus for the growth of the new steel industry. Observers found that even as late as 1890, their engineering was inferior to Britain's. However, German unification in 1870 stimulated consolidation, nationalization into state-owned companies and further rapid growth. Unlike the situation in France, the goal was support of industrialization resulting in heavy lines crisscrossing the Ruhr and other industrial districts, providing good connections to the major ports of Hamburg and Bremen. By 1880, Germany had 9,400 locomotives pulling 43K passengers and 30K tons of freight per day, well ahead of their continental rival, France.


FRIEDRICH
LIST
1789-1846


FRIEDRICH LIST 1789-1846
POLITIKER UND VOLKSWIRTSCHAFTLER
Deutsche Bundespost
170
1989





Re-Employment

"…Unless we mobilize the millions of our unemployed for practical work, unless we give them wages and bread there will be an amount of labor idle which, economically speaking consumes without being able to produce…Over and above the purely material aspects there is one thing which must not be overlooked, namely the inestimable psychological effect which the re-employment of such a large number of un-employed is bound to produce upon the men concerned…"

Reichminister Hess

RE: excerpt from speech given at the opening of the *Seventh International Road Congress* on September 3rd 1934 in Munich, Germany. From the day work on the "Adolf Hitler Strasse" ("Roads of Adolf Hitler") began on September 23rd 1933, the project had employed 150K workers as well as 200K workers employed by supply firms (i.e. steel, concrete etc.). Hess acknowledged criticism from abroad "for investing our money in large internal projects such as the motor roads instead of meeting our debt obligations." However, he did not see the two questions; employment and debt, as directly related. Nazi Party ideologues went to great lengths to emphasize the Autobahn's "sociopolitical" benefits, not least of which was creating jobs for Germany's eight-million unemployed.


DR
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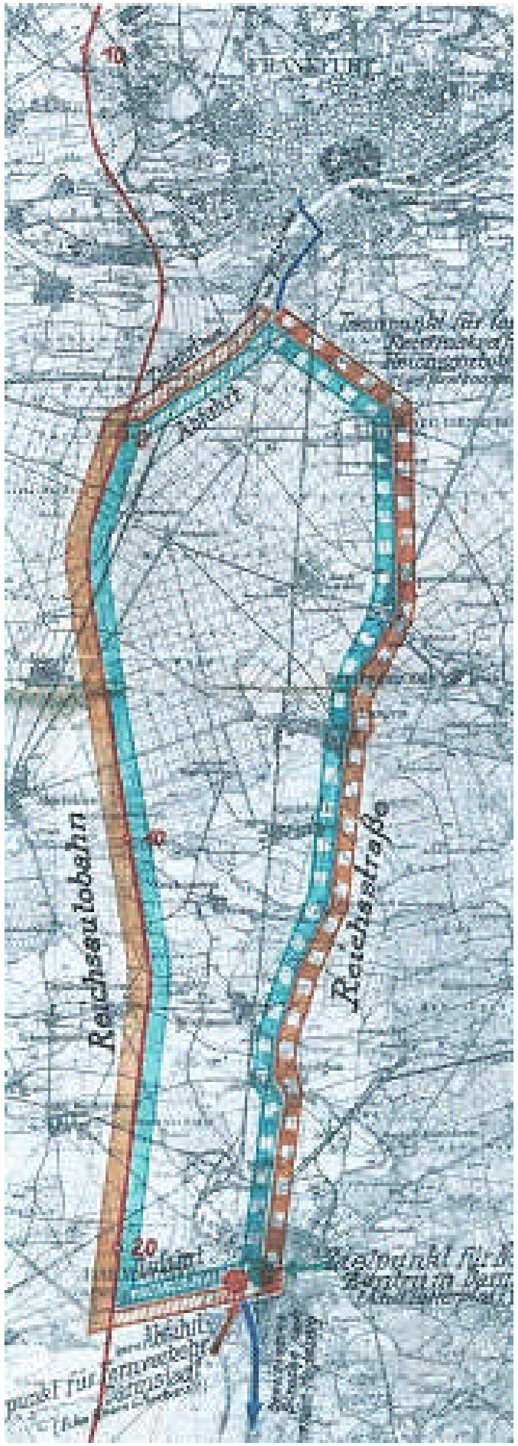
The Best Sense of the Word



"…comparatively low wages…if higher wages were paid, the gigantic project which is financed out of sums raised from the whole nation could not be carried through at all so that those who have now work would be unemployed and exposed to still worse conditions of life. The construction of motor roads is thus socialism in the best sense of the word…"

Reichminister Hess

RE: excerpt from speech given at the opening of the *Seventh International Road Congress* on September 3rd 1934 in Munich, Germany. Hess emphasized the point that the low wages paid the Autobahn workers reflected the small amount of public funds available to the German Government, at the time.

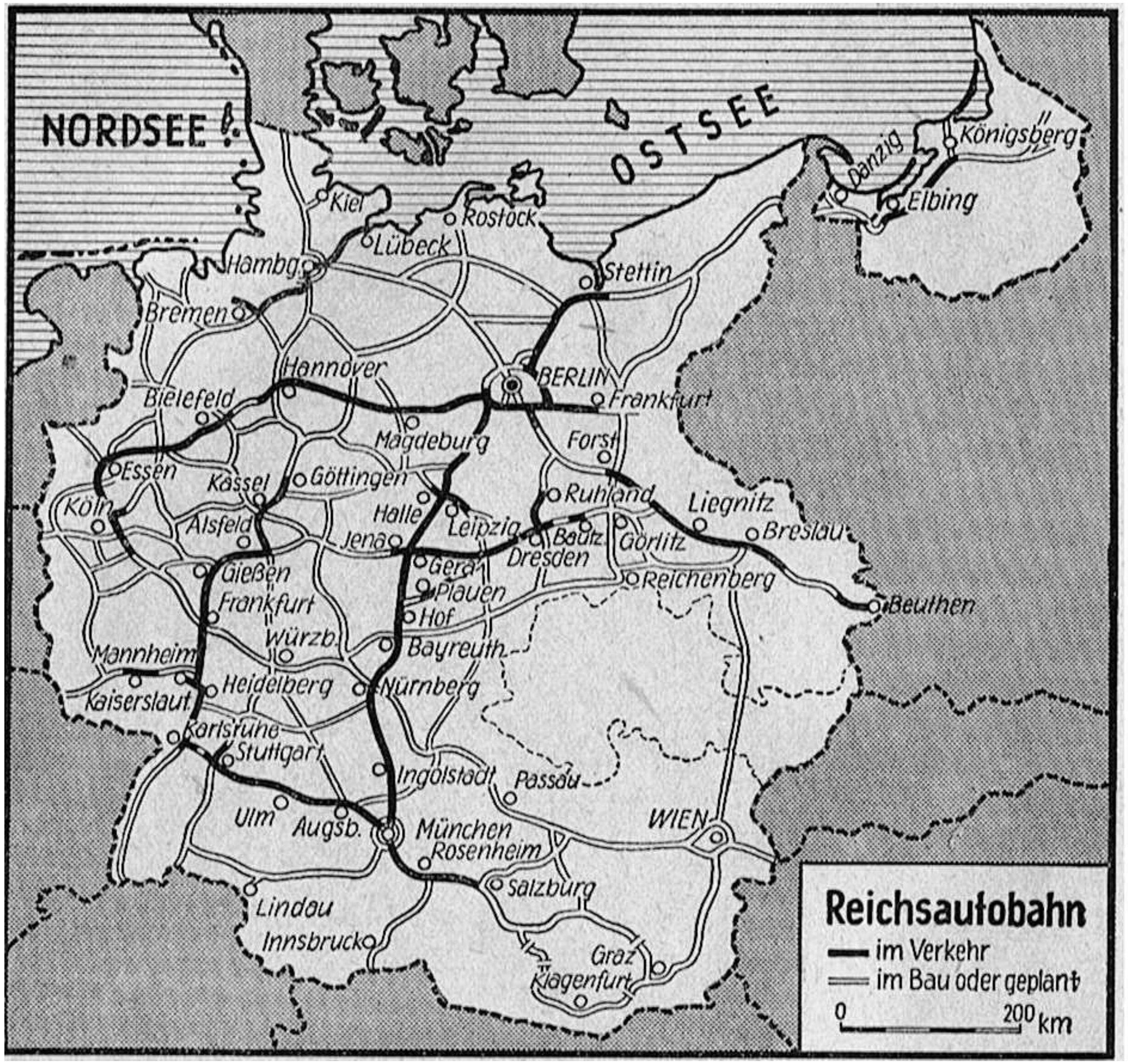
<u>Left</u>: caption: "The Frankfurt-Darmstadt motorway (near Frankfurt)"

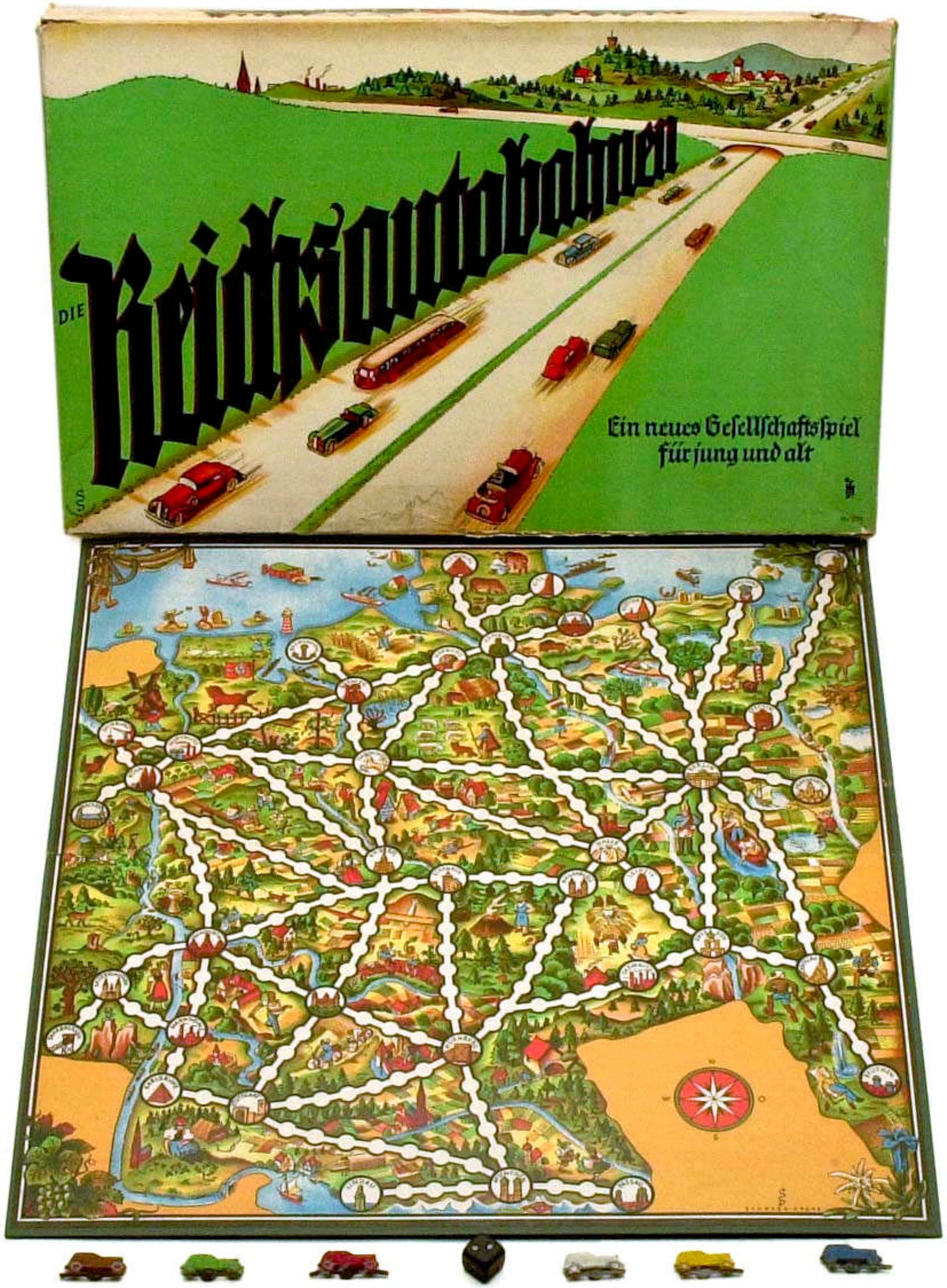
An Essential Task of the State

"…The American development is a clear example that modern road construction is an essential task of the State and of how the solidity of a State is reflected today in its road system…According to the plans of our Leader and Chancellor Germany is making important and decisive progress in road-building. She is not contenting herself with the construction of individual motor roads between important traffic centers but is constructing a compact net of motor roads for extensive overland traffic, with a total length of about 7,000 kilometers. The meshes of this network cover the whole of Germany and its roads connect the most distant economic districts. The daily radius of action of private cars and lorries will, with this system of purely motor roads, be at least twice as great as it was on the roads which existed up to now. The Reich motor roads are no longer a mere project. They are being constructed in fifty parts of the Reich. The first sections will be opened to traffic in the course of this year…."

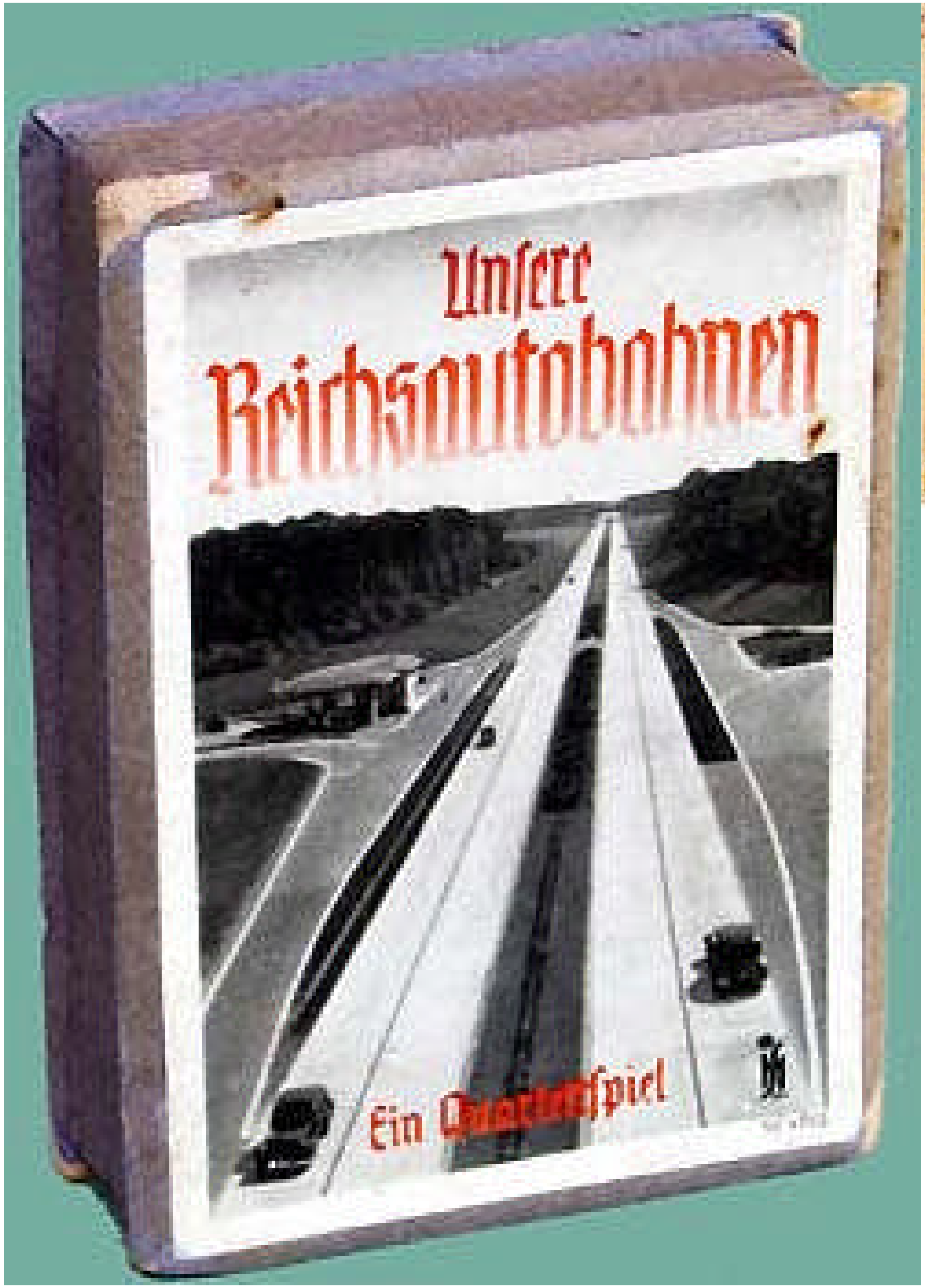
Dr. Fritz Todt, **General Inspector of the German Road System**

RE: excerpt from speech given at the opening of the ***Seventh International Road Congress*** **on September 3rd 1934 in Munich, Germany**

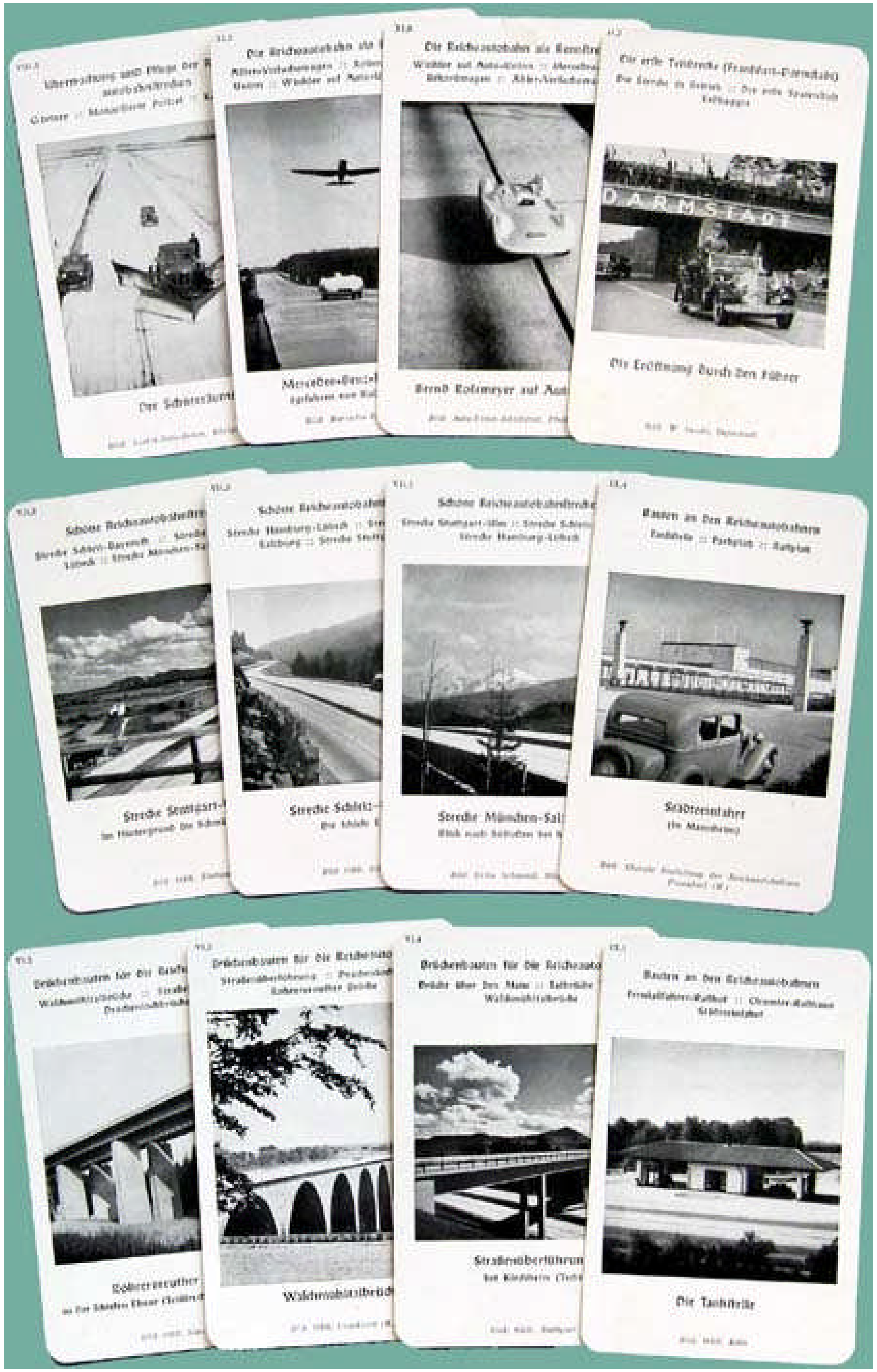

NORDSEE
OSTSEE
Kiel
Rostock
Lübeck
Hambg.
Bremen
Stettin
Danzig
Königsberg
Elbing
BERLIN
Frankfurt
Hannover
Bielefeld
Magdeburg
Forst
Essen
Kassel
Göttingen
Ruhland
Liegnitz
Köln
Halle
Alsfeld
Leipzig
Bautz
Görlitz
Breslau
Jena
Dresden
Gießen
Gera
Reichenberg
Plauen
Frankfurt
Hof
Beuthen
Würzb.
Bayreuth
Mannheim
Heidelberg
Nürnberg
Kaiserslaut.
Karlsruhe
Stuttgart
Ingolstadt
Passau
Ulm
Augsb.
München
Rosenheim
WIEN
Salzburg
Lindau
Innsbruck
Graz
Klagenfurt
Reichsautobahn
im Verkehr
im Bau oder geplant
0
200 km



Above: cover of ca. 1939 German board game entitled: "Auf der Reichsautobahn durch Grossdeutschland" (On the Reichautobahn of Greater Germany)
Left: ca. 1938 board game depicting the Third Reich's program for the construction and use of the *Reichsautobahnen.* The game highlights various routes of the Autobahn and ease of travel between German cities.

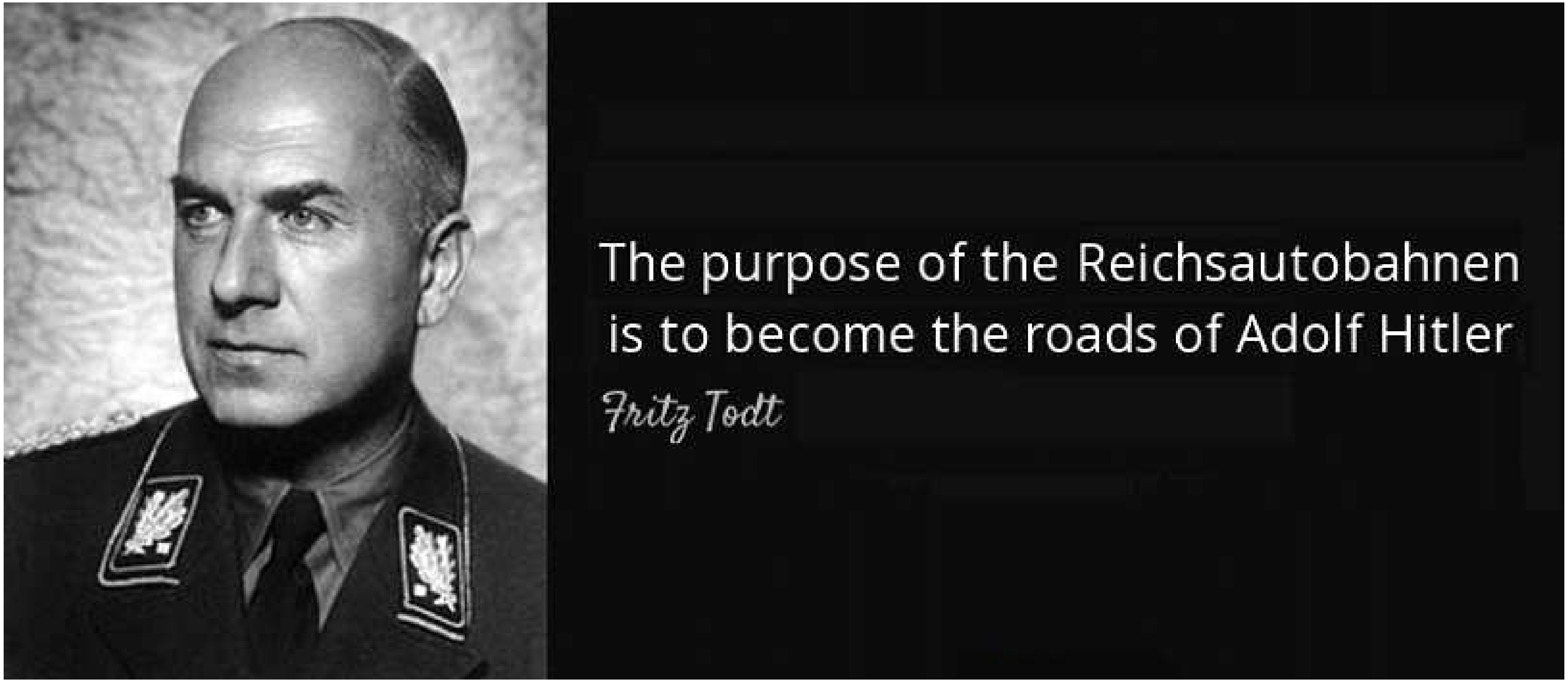


<u>Above</u>: caption: "RAB-highway Game 1938"
<u>Left</u>: example of the popular *Quartettspiel* (card game) called "Unsere Reichsautobahnen'' (Our State Motor Roads)



<u>Left</u>: the 42 cards (each 1&3/8-inches thick) were divided into 12 sets of 4. So-called "Quartet" card games were very popular with the civilian population of Nazi Germany. Each of the cards in the set shows a photograph of a scene on the *Reichsautobahn* (with an explanatory caption). The photograph on the cover of the box showed a stretch of Autobahn with exits for a gasoline filling station and a rest area.

Cult of Personality



"…Very often triumphs of culture and especially of road building were bound up with the name of a great historical personality who led the nation. The roads of Napoleon are famous far beyond the frontiers of France; the name of Mussolini is closely connected with road-construction in Italy, and we call our roads, and especially the Reich motor roads, the roads of Adolf Hitler, for it is to his creative spirit, his initiative and his energy that we owe them and he is taking an active and vital interest in them. The very special interest which the head of the German State is taking in road building can be seen from the fact that our central Reich Office for road-building is the only central authority in Germany which is placed directly under the personal authority of the Chancellor…"

Dr. Fritz Todt, **General Inspector of the German Road System**

RE: excerpt from speech given at the opening of the *Seventh International Road Congress* on September 3rd 1934 in Munich, Germany

Dual Purpose

"…And history teaches us still one more lesson. Road-making is a work of peace even when the roads were originally made for other purposes. (The peaceful mission which the road has to fulfill always gets the upper hand in the end as against other purposes for which roads may be used."

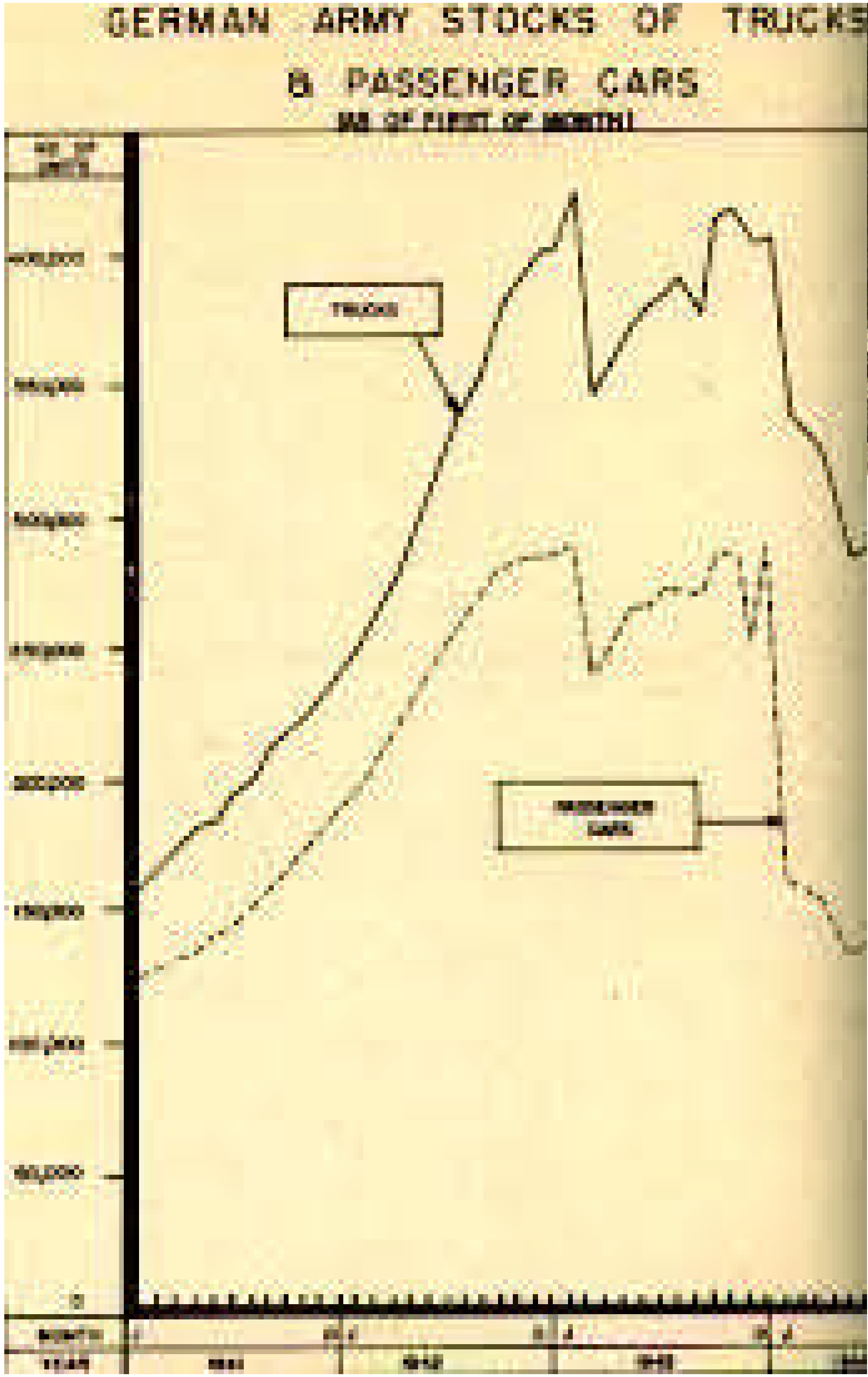
Dr. Fritz Todt, **General Inspector of the German Road System**

RE: excerpt from speech given at the opening of the *Seventh International Road Congress* on September 3rd 1934 in Munich, Germany

"…The bulk of the German Army of World War II was largely supplied by wagon trains, even to the end, and its infantry marched or rode trains or even used bicycles…"

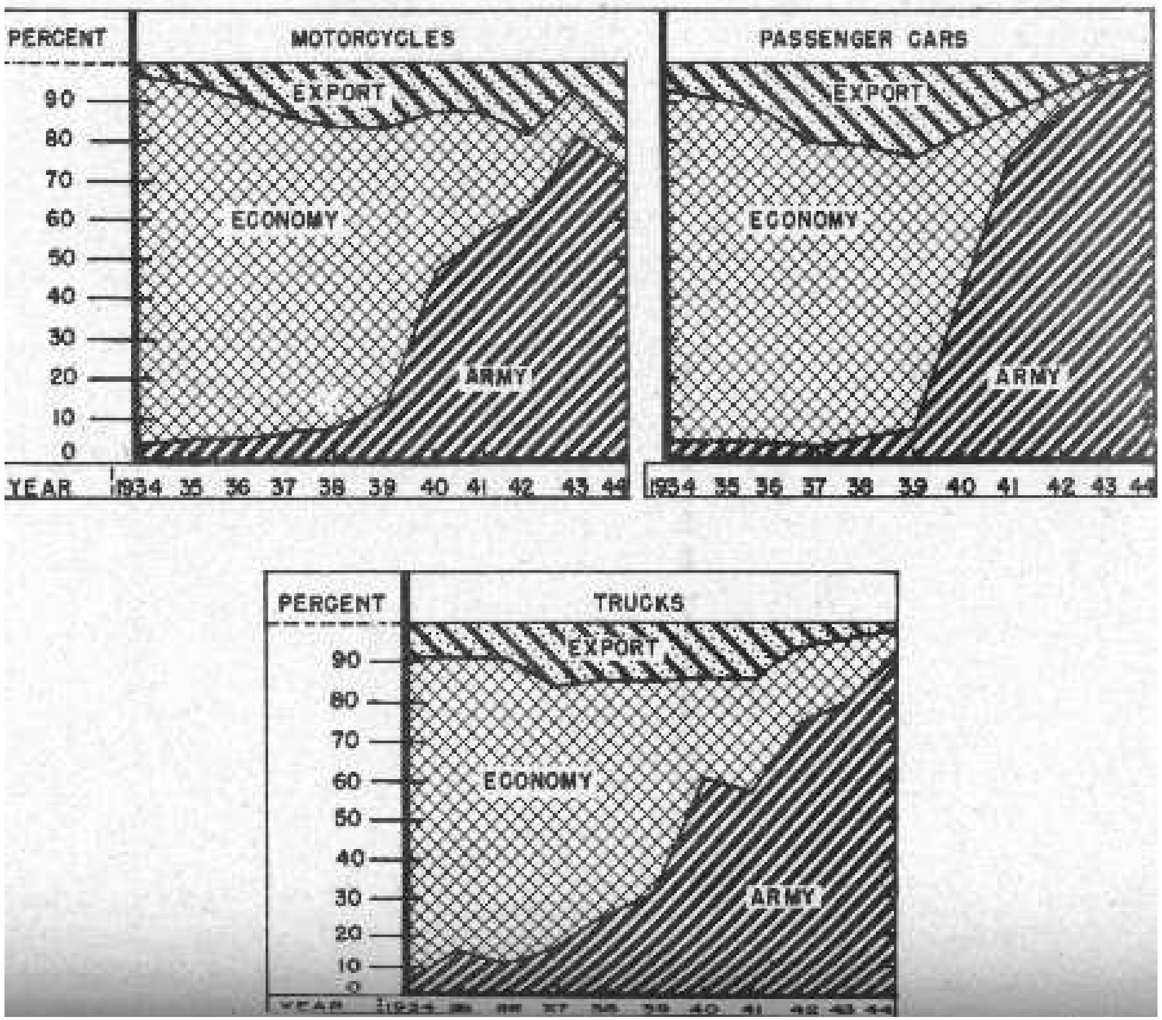
***David P. Colley,* Historian**

RE: in an internal report, *Fritz Todt* advised Hitler that the Autobahn would enable "an army of 300,000 men in 100,000 requisitioned vehicles to advance from the eastern to the western border of the Reich" within 36 hours. A number of documents allude to the military importance of a network of wide, congestion-free roads, but some historians dis-agree, claiming that military considerations were invoked simply to make the plans seem more important.



At the outset of WWII in Europe, the German Autobahn network proved to be a key asset to Germany during the German *Blitzkrieg* (“Lightning War”), early in the war. The efficient Autobahnen also enhanced Germany’s ability to fight on two fronts. Despite these early advantages, Germany had initiated the war before it had the industrial base to support its military over the long-haul. The critical absence of plants that could be converted to military production was one of the fatal flaws of the German war effort. In fact, the *Wehrmacht* (German Army) had to employ 2.8 million horses during the war to support its mechanized divisions.

DISTRIBUTION OF MOTOR VEHICLES



Once the U.S. entered the war, the German transport-vehicle deficiency was acc-entuated because America had the industrial base to produce 3-million trucks for the war effort. Trucks, often operated by the Afr-ican-American troops of the *Red Ball Express*, were the key to supplying ad-vancing troops as they closed in on the Rhine. By the time Allied forces rea-ched Western Germany, they were taking full adv-antage of the Auto-bahn.


851
TRK 12


"After crossing the Rhine and getting into the areas of Germany served by the Autobahn…our maintenance diffic-ulties were over. Nearly all through traffic used the Autobahn and no maintenance on that system was required."

E.F. Koch, **U.S. Army Engineer**

RE: Koch, a *Public Roads Administration* (PRA) employee before the war, traversed the Autobahn in 1944-45 as a Highway and Bridge Engineer with the U.S. Ninth Army. He and his engineering unit spent the unusually cold winter of '44-45 maintaining roads in Belgium, Luxembourg and the Netherlands that, after the pounding of military vehicles and the thaw in early 1945, were in terrible shape. However, conditions changed for the better when they reached Germany in early 1945.

"After seeing the autobahns of modern Germany and knowing the asset those highways were to the Germans, I decided, as President, to put an emphasis on this kind of road building…The old convoy had started me thinking about good, two-lane highways, but Germany had made me see the wisdom of broader ribbons across the land."

D.D. Eisenhower

RE: in 1919, as a 29yo Army Colonel, "Ike" had volunteered as an observer on a cross-country convoy of Army trucks. It made a lasting impression, as did Germany's Autobahn.

A Bird’s Eye View

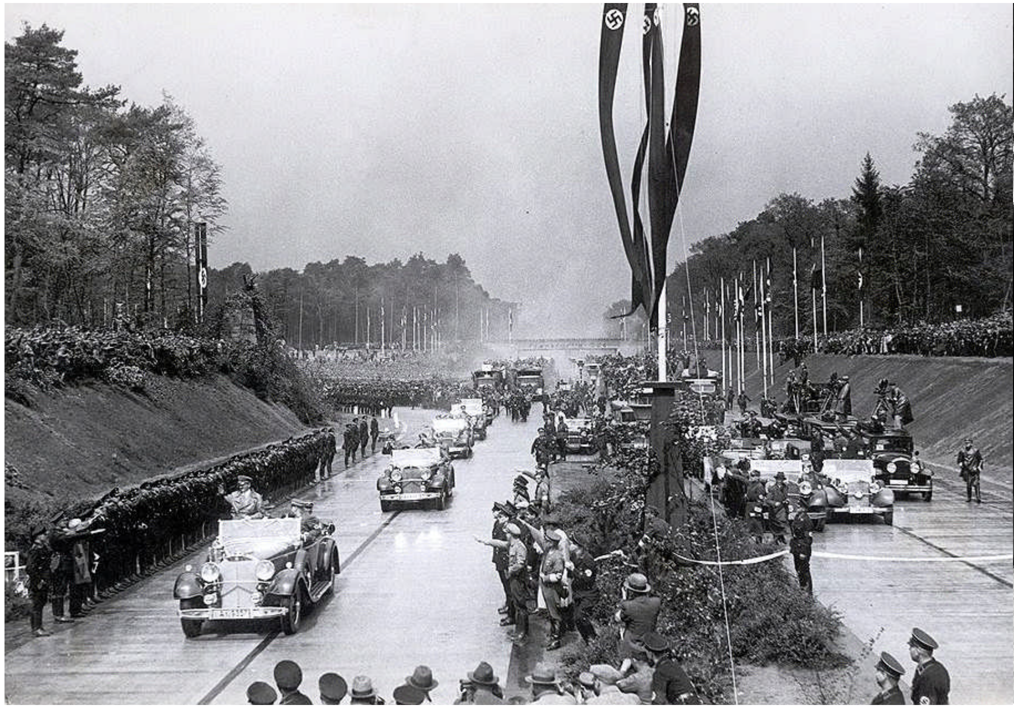
“…Owing to the limited accommodation of the airship, the tour was divided into two parts; those taking part in the first tour enjoyed the experience of setting out with the airship in the early hours of the morning while it was still dark, from its hangar at Friedrischshafen, the flight in the growing light over the hills of the Neckar and the sight of the lines of the new Motor Roads standing out clearly on the natural map of the country unfolding beneath the airship as she flew towards Frankfort on Main. The second party flew over the beautiful Rhine Valley from Frankfort on Main to Cologne; during this flight they saw sections of the Motor Road both in the Rhine valley and the Rhenish industrial area, and also during the remainder of the journey eastwards, via Hanover, before the airship again turned southwards towards Frankfort on Main. The Airship then made a wide detour as far as Darmstadt, during which the passengers were afforded a view of what was so far the most interesting part of the new Motor Roads…”

RE: excerpt from the *Report of the Proceedings of the Seventh International Road Congress.* Dr. Todt invited fifty of “the most highly qualified representatives of the different countries” for a special tour on the Zeppelin airship *Graf Zeppelin*. The tour, he said, offered “an opportunity during an air trip of studying the ‘Roads of Adolf Hitler’, the Reich Motor Roads, from a bird’s eye view.”

"The keynote of these tours was a trip in one of the regime's huge Zeppelins, where visitors, comfortably seated in the wicker chairs of the passenger lounge, gazed out the windows as the pride of Germany floated majestically along above the track of the new roads, their sleek, concrete ribbons slicing through quiet, flowered meadows, dotted with half-timbered farm houses and barns, or through fairytale fir forests."

RE: excerpt from *Open Road: A Celebration of the American Highway.* As work on the *Reichsautobahnen* progressed through the 1930s, every American highway engineer and/or government official who could arrange to do so visited Germany to see the Autobahns. As with the *Seventh International Road Congress* (1934), visiting dignitaries were given the grand overview via airship.

America's Response



"Today's ceremonies took the form of a huge outdoor demonstration, with half a million spectators flanking the new road all the way to Darmstadt. Herr Hitler's car led a procession of motor cars estimated to be nine miles long. The procession included 200 motor lorries carrying 6,000 workers engaged in building the road since September 1933, when Chancellor Hitler cut the first sod on the new completed section…At the first milestone Herr Hitler's car cut through a ribbon strung across the road and the highway was pronounced open for traffic…When Darmstadt was reached Herr Hitler got out of his car and reviewed the parade of lorries carrying the road builders who had a place of honor in the procession."

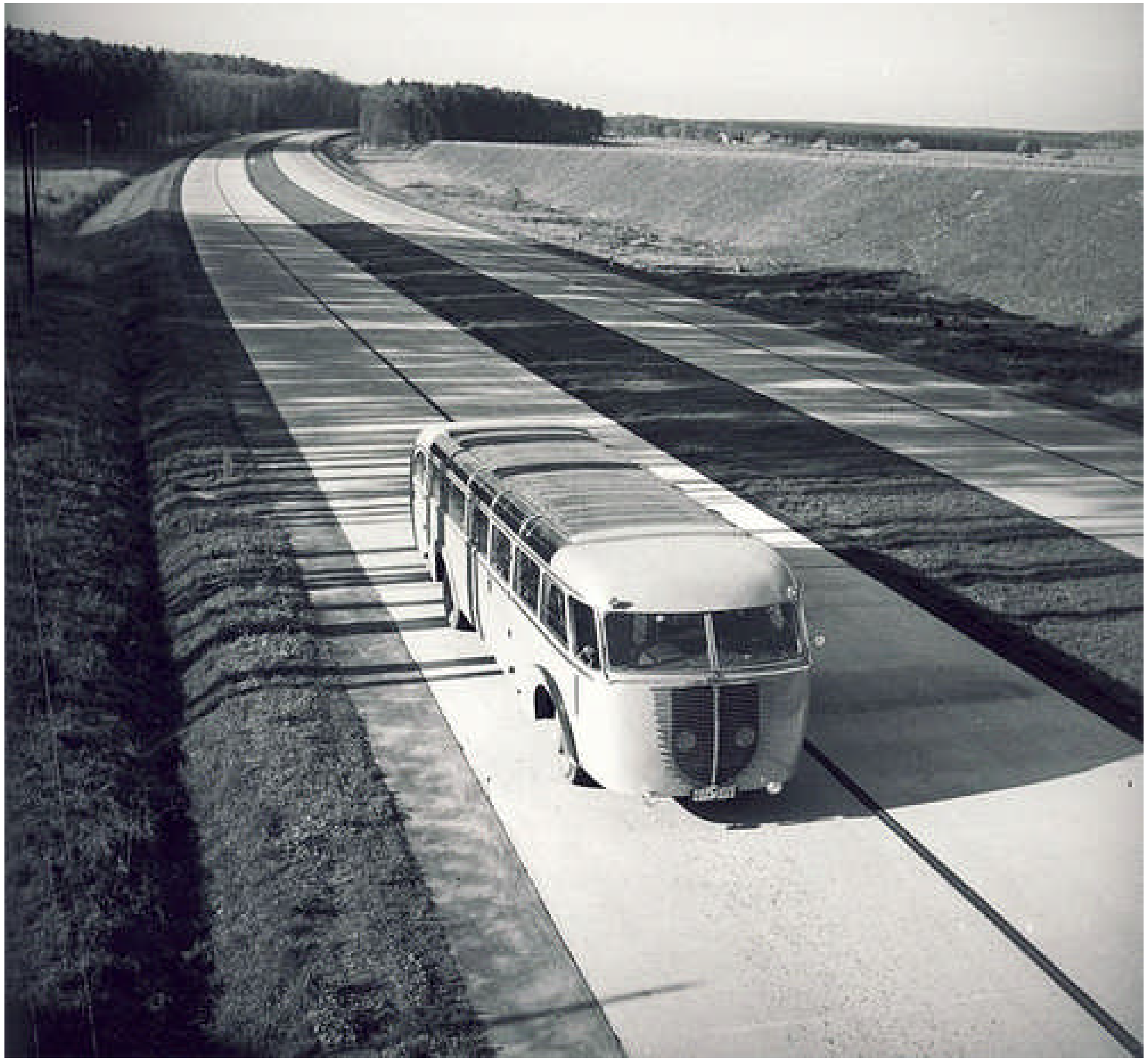
***The New York Times,* May 20th 1935**

RE: the first Autobahn segment; a 14-mile stretch connecting Frankfurt and Darmstadt, was opened on May 19th 1935. It was part of the *Hamburg-Frankfurt-Basle* Motorway.

574 · REICHSAUTOBAHNEN (OBERSTE BAULEITUNG)
Eröffnung der ersten Reichsautobahnstrecke Frankfurt am Main–Darmstadt am 19. Mai 1935 – Inauguration of the first section of motorway on May 19th, 1935, between Frankfurt on Main and Darmstadt – Inauguration du premier tronçon d'autoroute entre Francfort/M. et Darmstadt le 19 mai 1935.

<u>Above</u>: in May 1935, with the opening of the first Autobahn, the *Deutsche Reichsbahn* (German Empire Railway) started a bus service on the growing Autobahn network which, by 1939, comprised 3,300 km. The illustration above includes a timetable for the service between Dresden and Plauen.
<u>Left T&B</u>: caption (English): "Inauguration of the first section of motorway on May 19th 1935, between Frankfurt on Main and Darmstadt"


Langen-Mörfelden



Suitably Impressed

"…<u>were</u> until recently the best in the world, for in the last year the Reichs-autobahn in Germany has made such strides that in quality of design all American efforts, despite the titanic efforts of the Public Works program, are hopelessly lagging behind, and the new German roads have far surpassed even the Italian autostrade equivalents…"

***The American Magazine of Art,* April 1936**

RE: *Frederick Albert Gutheim*, a city planner, urban historian, architectural critic and professor was studying at the *University of Chicago* when he examined the Autobahns, first-hand. He was also an editor of *The American Magazine of Art*, for which he wrote an insightful article about his observations. He was suitably Impressed.

"…The design of the Autobahn is uniform for its entire length. It consists of two roomy single-way concrete highways, so well separated by a planted green strip that there is no possibility of head-on collisions or headlight glare from on-coming cars. To either side considerable strips of land of varying width are preserved as integral parts of the scheme, preventing access to the roadway and possessing definite aesthetic advantages. Entrance to the Autobahn is possible only at designated stations, about twenty miles apart, where toll is paid for the distance to be traveled (the project is self-liquidating). There are no intersecting roads since all crossings are separated by over-and under-passes. The prohibition of access, save at designated and controlled points, and the permanent wide green strips separating and flanking the roads are a satisfactory guarantee that no ribbon building will be possible - nor will there be any attraction to do so since no advantage to landlords would result without access. Finally, all towns are by-passed; and passed not at several hundred yards but often at several miles from their furthermost edge."

***The American Magazine of Art,* 1936**

By the time Germany invaded Poland on September 1st 1939, 1,864 miles of the Autobahn network had been completed. Todt added 497 miles from 1938 to 1941, but with the exigencies of war, road construction diminished significantly. On December 3rd 1941, Todt stopped all construction as all building activity within the confines of the *Third Reich* proper ceased (by decree of the Fuhrer). *Dr. Fritz Todt*, the mastermind and driving force of the *Reichsautobahn*, died in an airplane crash on February 2nd 1942.

"…The office records show that practically every country in the world has sent technical advisors to Germany to acquaint themselves with this development. There is outstanding interest in observing what can be accomplished when a far-flung highway program can go forward without any decentralization of control and without delays incident to the acq-uisition of rights-of-way and under conditions where influence on the selection of route may be disregarded if it hampers the attainment of broad objectives. All of this meant that the express roads would make possible much indirect employment. With one-third of the system in use the results have exceeded expectations: The output of the automobile industry has doubled in less than two years and motor car registrations have increased from 661,800 in 1933 to 945,000 in 1936…"

***Engineering News-Record,* July 1937**

RE: ENR reporter *Paul Wooton* visited Germany for the *Leipzig Fair* in 1937. While in Germany, he "took special pains" to travel on the new roads and meet with autobahn officials. In fact, interest was so great that visiting engineers and others had to make special arrangements to tour the office of the *Inspector General of Roads* in Berlin.

Down the Road

"The new roads consist of two double-lane highways, each 25 feet wide, with opposing streams of traffic completely separated. Beyond these traffic lanes are adequate shoulders and a gradual slope to a drainage system. Railroad grade crossings and highway grade crossings have been completely eliminated with a majority of the intersecting roads being carried over the right-of-way of the new system by a most modern type of overpass construction. All curves are super-elevated and the surface finish of the pavement is non-skid…Pedestrians, bicyclists and animals are excluded from the highways and no advertisements or billboards can be erected by the roadside. Efforts are being made to retain and to enhance the beauty of the landscape. There is no speed limit in Germany. The roads are designed for speeds from 80 to 100 miles per hour, according to the topography of the country…Whether or not it be true that these roads were constructed primarily for military purposes, it is most certainly true that they provide the German people with innumerable peacetime commercial, industrial, social and cultural benefits."

Road Builders' News, **August 1938**

RE: ***Charles M. Upham*****, the** ***American Road Builders Association*** **(ARBA) Engineer-Director, visited Germany in 1938 and reported his observations in his** ***Down the Road*** **column in ARBA's magazine**

"…do not demand or justify the immediate construction of a complete superhighway system like that in Germany…A system of American superhighways could not be constructed in a few years but could be designed, laid out and some sections constructed in locations where traffic is heavy and congested and a super-road is particularly needed. If this policy is followed, superhighways can be constructed when the need arises and this country will, in the future possibly ten, twenty or even forty years from now - be provided with a system of highways that will adequately and economically care for the increased traffic demands that are bound to come."

***Road Builders' News,* August 1938**

Part 5

Hitler Always Does

Modernity in a Medieval Setting

"Visit Germany this year! A modern people in a medieval setting! The mind turns nouns and adjectives over and over like pieces in a picture puzzle, trying to fit them into their true pattern…six lanes wide…but the great highways are almost empty…Put 65 million Americans in an area two-thirds the size of Texas and their automobiles would fill the highways as New York crowds its crosstown streets. In Germany, on the contrary, the one place where an American can draw a breath and feel free from the press of people is on those great highways known as autobahns…as modern as any New York parkway, and much better than Mussolini's boasted autostrades…"

***The New York Times*, November 1937**

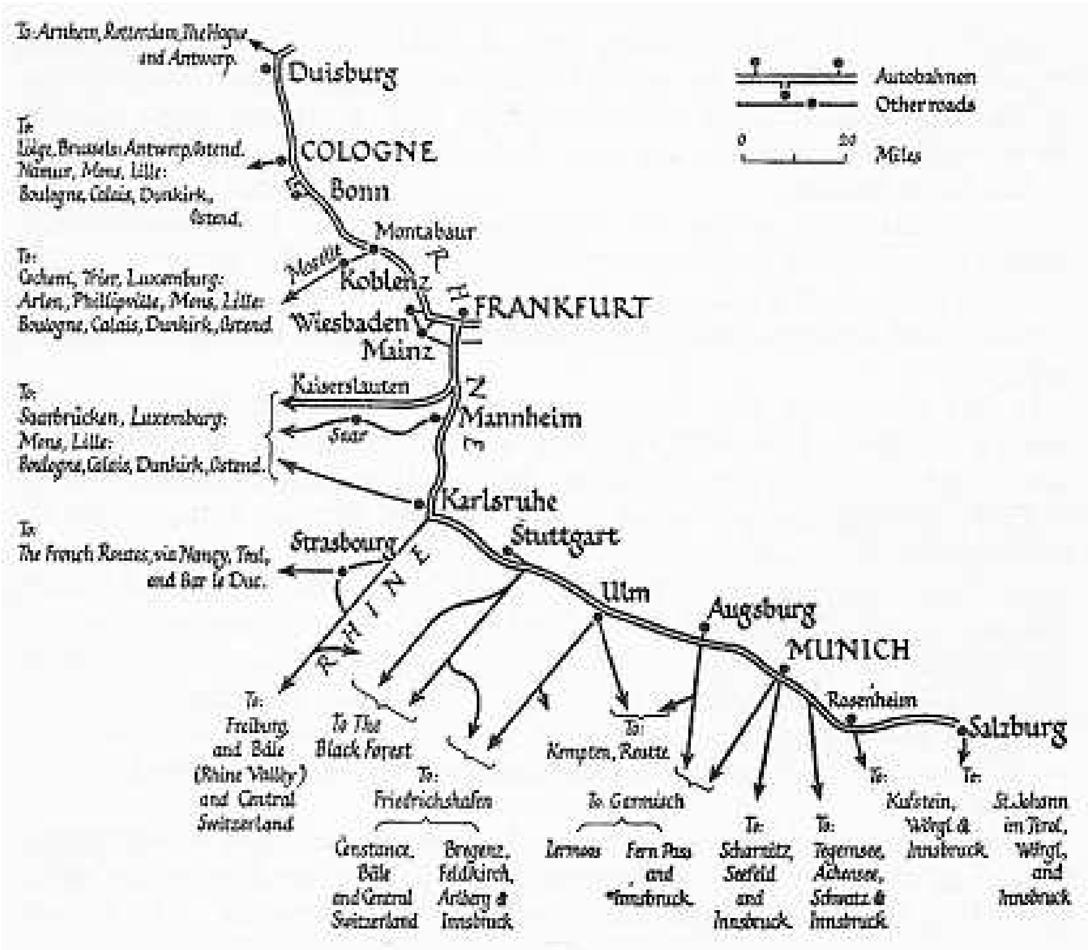
RE: a day after FDR urged Congress to cutback highway funding for budgetary reasons, the NYT published a travel feature, written by *Mildred Adams,* about her visit to Germany. She began the article with a quote from a German travel poster.

Left: ca. 1930s German travel poster

"…They avoid towns and have comparatively few entrances and exits. They are free from signs, except those indicating feeder roads, and those that carry the outline of a stag in glass to warn night travelers of the danger of deer straying out from the forest. They are open to trucks and motor cycles as well as to pleasure cars, and, unlike Mussolini's autostrades, they charge no toll…They should be extremely useful for the rapid transport of troops and military supplies…"

***The New York Times*, November 1937**


Auf 1200 m



"…This road is very convenient for Americans spending the Summer at Innsbruck or Salzburg, and many of them speak with envy and admiration of a country which builds such wide, straight highways and places no limit on speed. 'You can go ninety miles an hour. Hitler always does,' they say…"

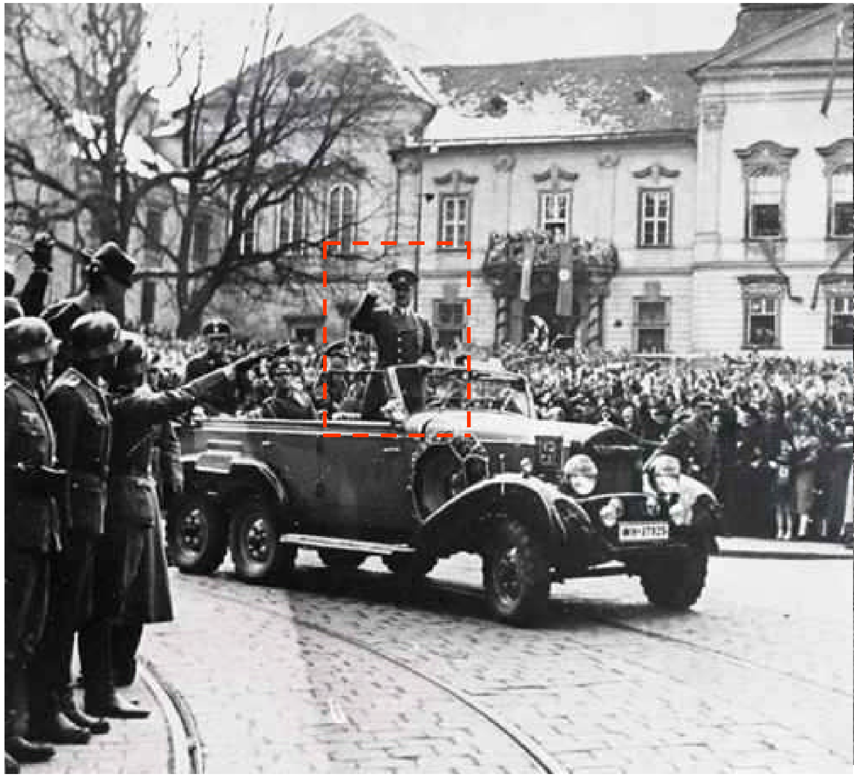
***The New York Times*, November 1937**

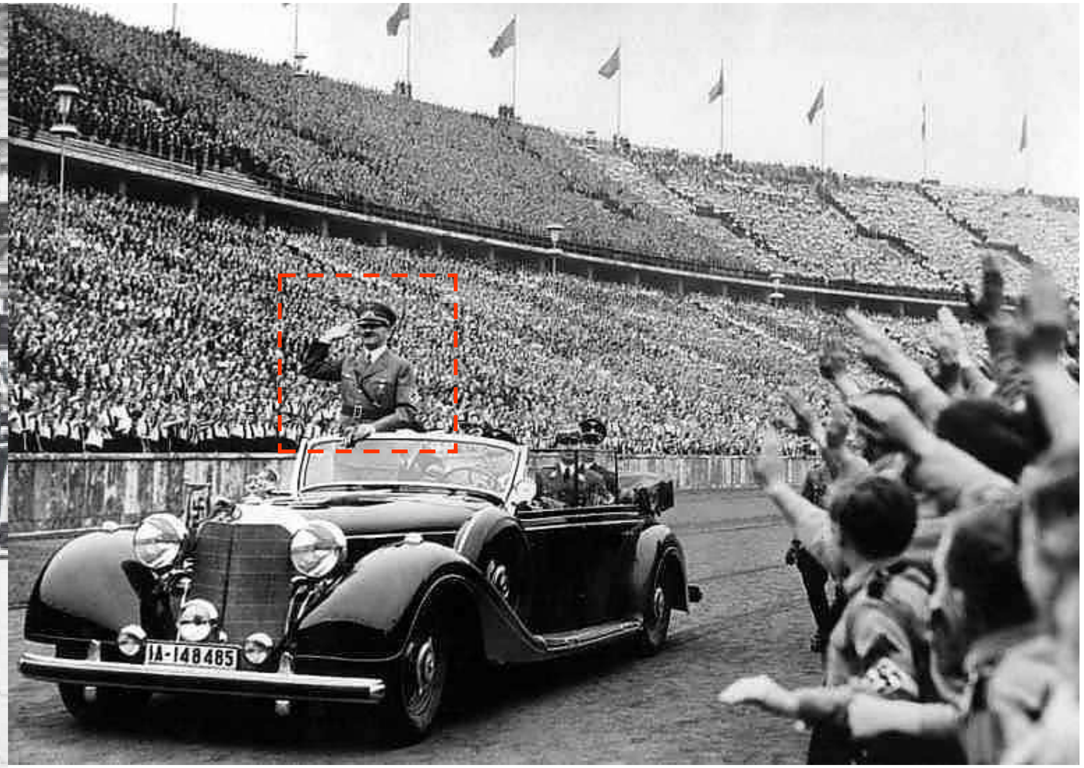
<u>Left</u>: caption: "The German Autobahn Route and the connecting links with the passes in the Alpine areas." The Autobahn connected Munich with Hitler's retreat at *Berchtesgaden,* as well as the Austrian frontier

A Perfect Symbol of Power

“The time was 1941. The world was ablaze with World War II. While the countries around Germany fell under the crushing boot of the Nazi Storm Troopers, the people of Berlin - beyond earshot of the bombs and cannon fire - were brainwashed by a megalomaniac into believing that das Fatherland was invincible. To convince them, great legions of goose-stepping infantry thumped rhythmic beats through the city’s streets, while overhead hummed seemingly endless squadrons of aircraft. There were tanks and artillery, trumpets, flags, and generals; and of course, there were columns of mammoth black limousines filled with the Nazi high command. Leading this splendid pageant in one of the shiny cars equipped with 1¼ -inch thick bulletproof glass and heavy armor plating, the madman alone maintained a singular identity over the throbbing, faceless masses of human beings. In a screaming voice, he reported magnificent victories and promised that the Reichstag would soon hold the whole civilized world under its rule. Adolf Hitler thus presented a perfect symbol of unlimited power…”

***Beau* magazine, June 1966**

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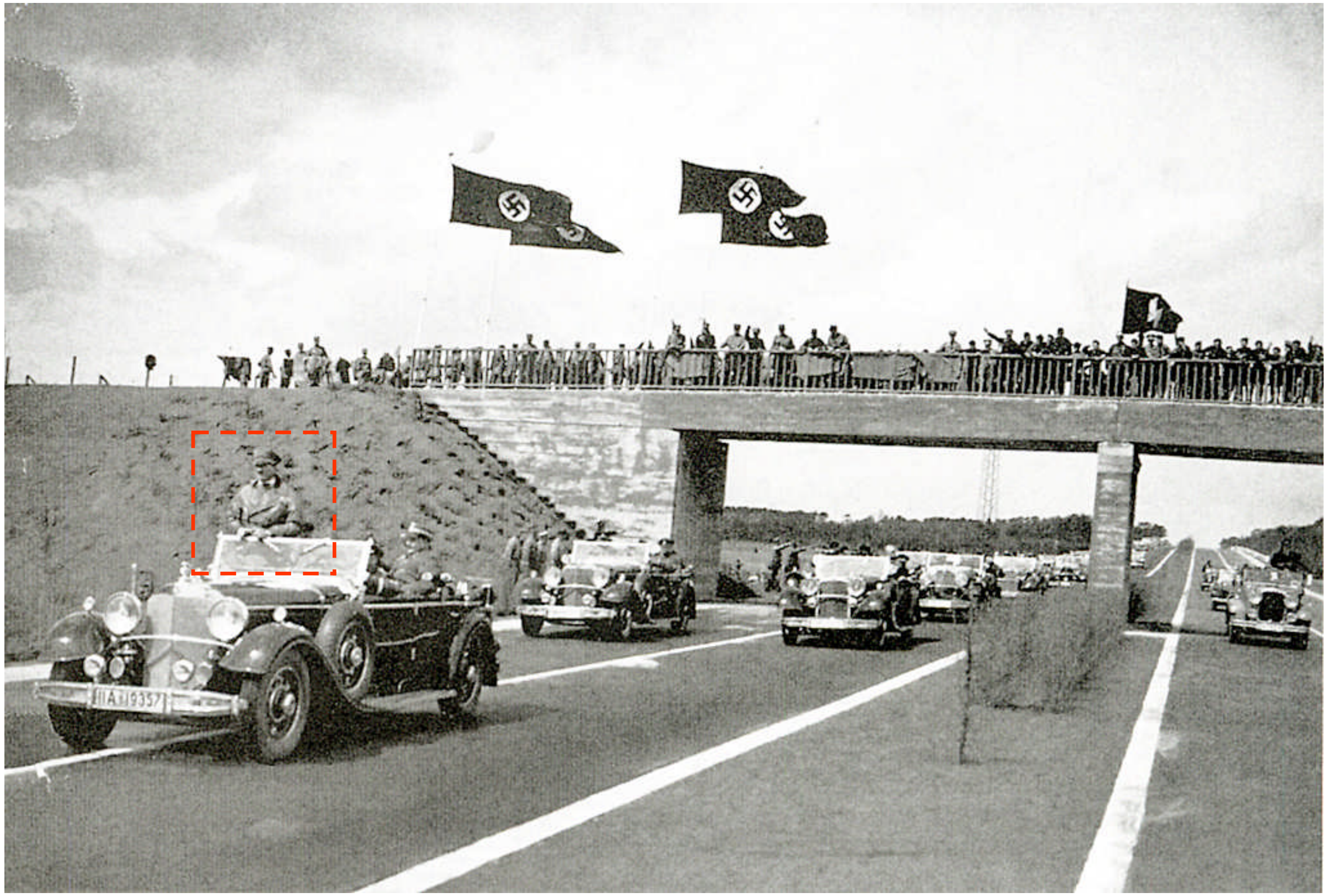


BUILT IN LIMITED NUMBERS, GROSSER MERCEDES WAS BRUTE AND BEAUTY OF THE AUTOBAHN

"D" CABRIOLET

PULLMAN LIMOUSINE

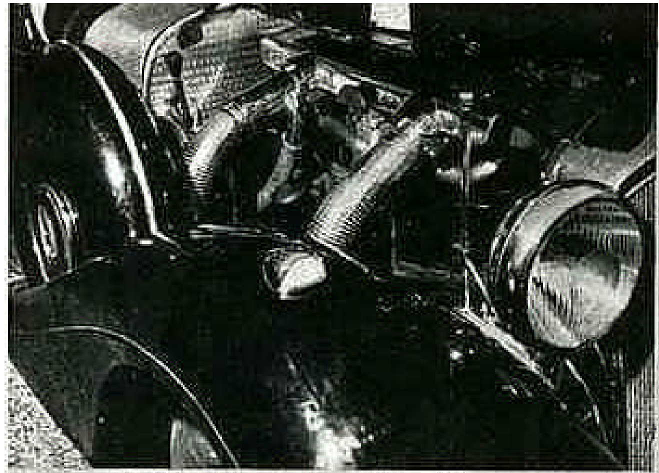
"F" SEDAN

"F" CABRIOLET

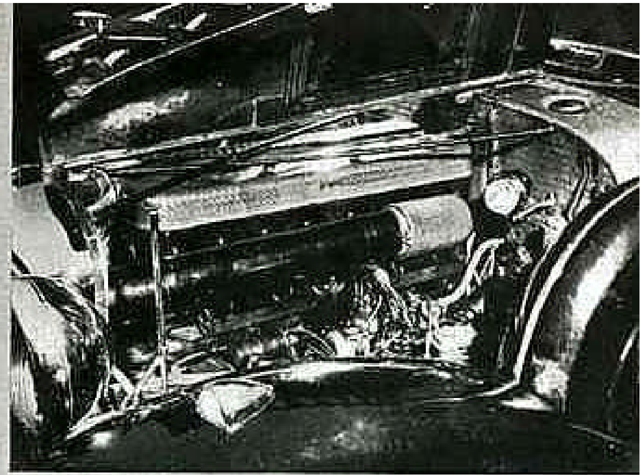
APPEARING in 1937 catalog, Mercedes-Benz listed four standard models of Grosser. Pullman Limousine (top right) was Hitler's choice for state occasions; buddy Hermann Goering drove "D" Cabriolet (top left).

"…A Mercedes-Berz 'Grosser' 770 (or 7.7 liter displacement) with a top speed of 135 mph…With the supercharger, the Grosser's push-rod actuated overhead valve straight engine develops 230 brake horsepower…The transmission has five speeds forward with overdrive, and synchromesh on the second to fifth gears. The ignition is a dual system with two spark plugs per cylinder. An auxiliary ignition liming control is located at the center of the steering wheel. The carburetor is dual with a thermostatically heat controlled twin intake mani-fold. Twin chrome-plated flexible exhaust pipes lead out directly from the hood. In addition In the special equipment designed to get the Grossers moving, Mercedes also designed special brakes to slop it. The four-wheel hydraulic service brakes have two positively anchored internal expanding shoes in ribbed drums. The brake pedal actuates two independent mailer cylinders, one for the front and the other for the rear brakes. An automatic vacuum power booster minimizes the foot pressure required to roll the car to a stop. The suspension is unusually interesting, being the only instance where Mercedes has used the De Dion type rear end on a passenger car. This system is properly termed semi-independent suspension, for the rear wheels are located at the ends of a non-driving rear axle (De Dion tube), while the differential is mounted to the frame. Pivoted half-axles then drive the rear wheels through universal joints. Coil springs on each wheel - plus dual action hydraulic shock absorbers - thus provided Hitler with a cushiony ride as he sped over roads in the Bavarian Alps…"

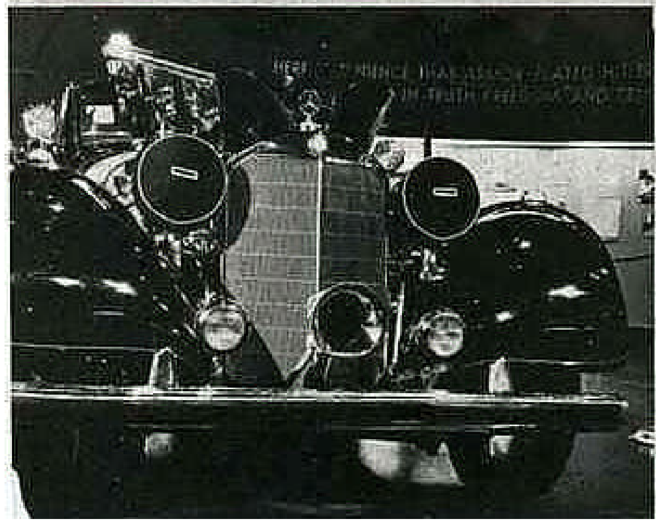
***Beau* magazine, June 1966**



TWIN exhausts (above) are chrome-plated.



IGNITION system has two plugs per cylinder.



Specifications of Hitler's Mercedes

MODEL
Grosser Mercedes 770
Net weight .... 7500 lbs.
Armor .... 2000 lbs.
Fuel oil, coolant .. 500 lbs.
Total weight .. 10,000 lbs.

ENGINE
230-hp valve-in-head eight with supercharger.

TRANSMISSION
5-speed overdrive, synchromesh 2nd-5th gears.

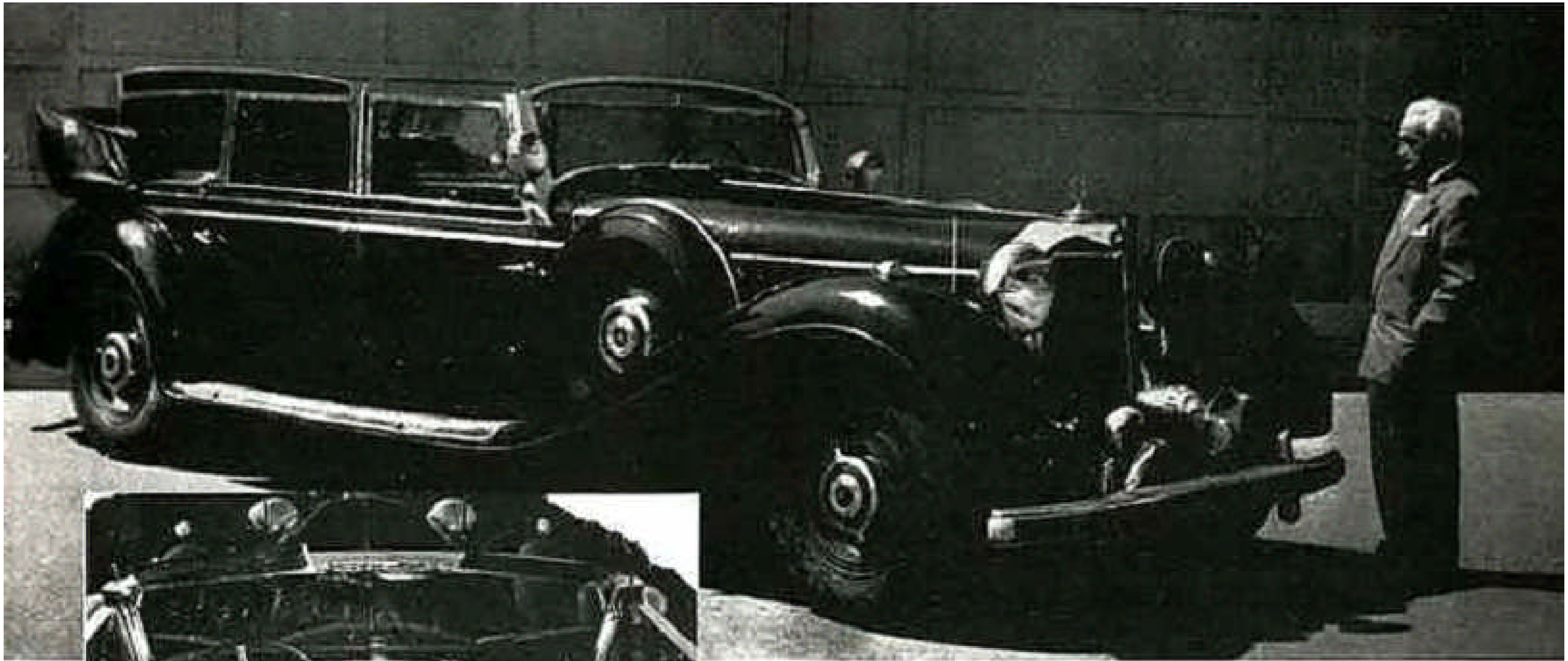
DIMENSIONS
Overall length .. 236¼ in.
Wheelbase ...... 153 in.
Overall width ... 81½ in.
Overall height .... 71 in.
Turning radius ... 29.6 ft.
Tire size 8.25-17

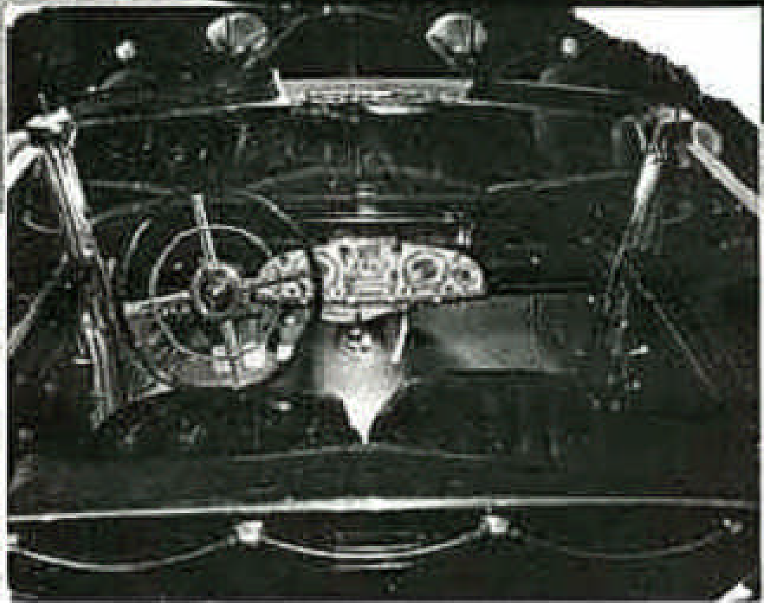
CAPACITIES
Coolant .... 7.93 gal.
Gas tank ..... 51.55 gal.
Gas reserve .... 5.28 gal.
Crankcase oil .... 9.5 qt.

HOODED headlamps (left) were used for driving in blackouts. Car has 13 lights, 13 keys, 13 compartments.

"…To further insure Hitler's comfort, every possible convenience was built into the ear. The right front seat has folding left and right arm rests for der Fuhrer, and the seat itself folds up to allow standing for parade reviewing. On the inside of the right front door, the built-in pistol case is padded to the contours of a Luger. All six side windows and the windshield roll up and down with heavy-duty mechanisms, and a real leather-covered armor plate shield can be cranked up behind the back scat to provide almost all-around protection. But the convertible top is ordinary canvas, lined with mohair, that would not stop a bean-shooter pellet…This whole five-ton rig, including 2,000 pounds of armor plate and over 56 gallons of gasoline, rides on 8.25-17 tires and gets about eight miles per gallon…"

***Beau* magazine, June 1966**





"…The dashboard, with over 40 instruments, switches, dials, and levers, includes full accessories: tachometer, heater, defroster, radio, and pop-nut turn signals which are illuminated with red lights. Under the hood there is a convenience light for the mechanic and a tool box consisting of a set of felt-pad-ded drawers which contain an assortment of nearly 100 items for emergency road re-pairs. A heavy-duty jack fits into four special mounting pads on both sides of the chassis…"

Beau **magazine, June 1966**

"…By the time Hitler gained control of the Reichstag in 1934, the Grosser was ready for him. He could stand on the car's special jump seat for hours on end before the Nazi party conventions in Nuremberg, secure in the knowledge that his rolling reviewing stand was as handsome and fine a piece of machinery as could be found in the world - a fitting pedestal for der Fuhrer of a rapidly burgeoning military power…Hitler's personal Grosser was used mostly on state occasions, especially as a parade car in which be could ride around the Nuremberg square in style…"

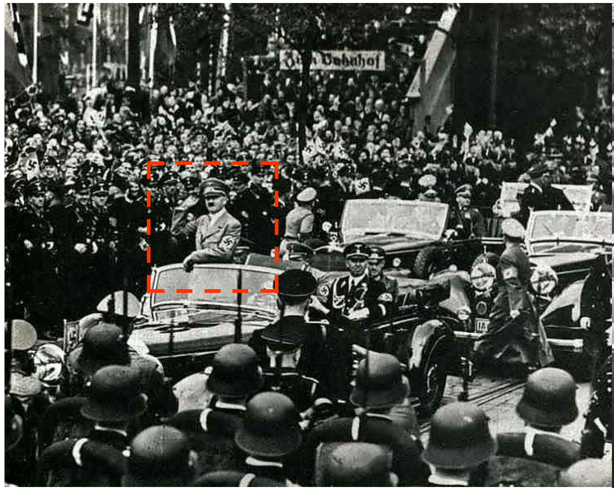
***Beau* magazine, June 1966**

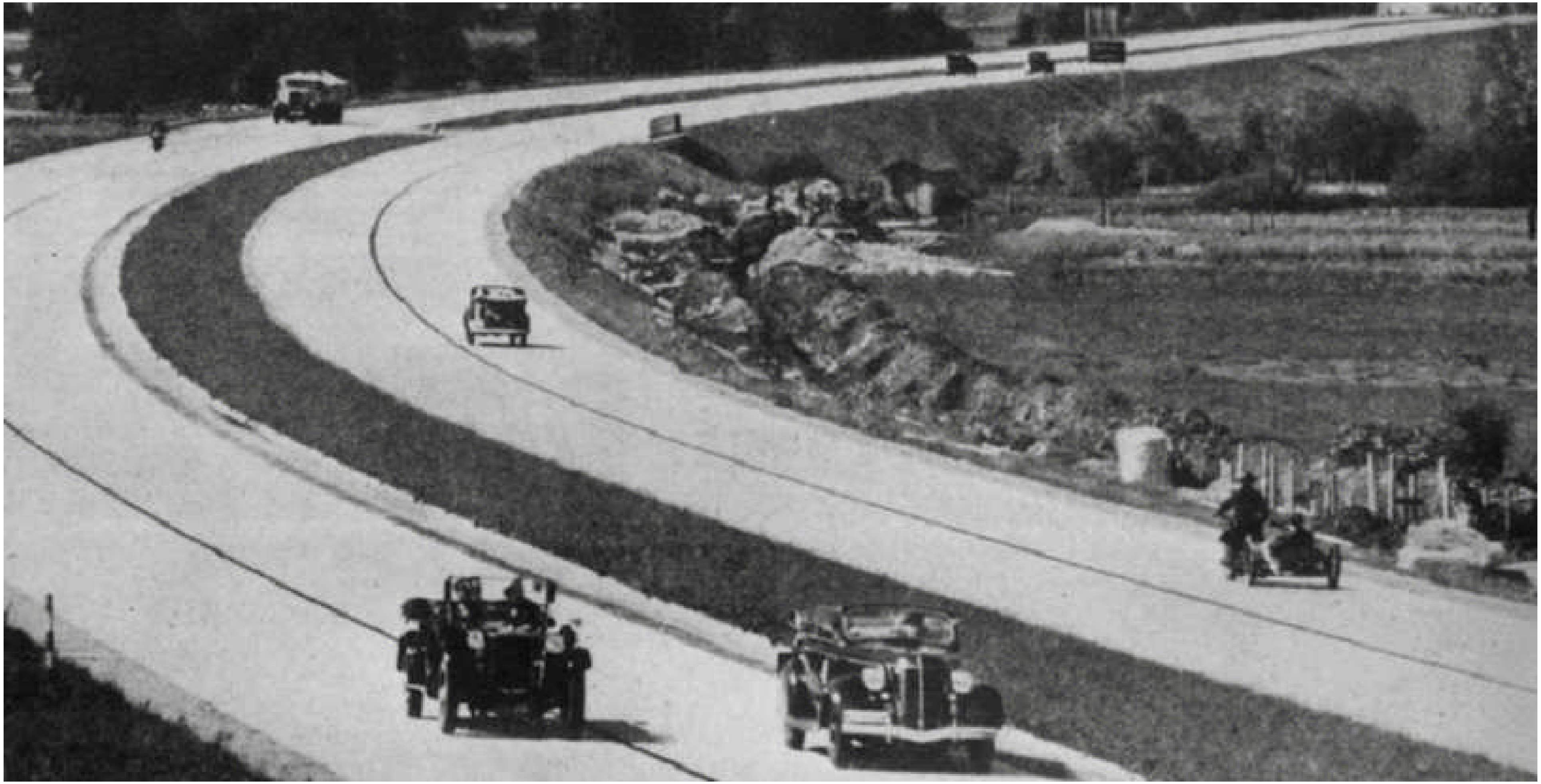
<u>Left</u>: Hitler on parade in his Mercedes-Benz "Grosser" 770

HITLER'S PERSONAL PARADE CAR

MANUFACTURED 1942

1. 400 HP. engine
2. 20 cell tires
3. 40 m/m bullet-proof windows
4. Hitler's seat, raised 13 cm. higher
5. Hitler's foot rest, raised 13 cm. higher
6. Aluminum parts to lighten the car
7. Spare wheels, used to protect the engine
8. Electro-magnetic circuit blocking the doors
9. Manganese-treated armoured plating
10. 300 litre gasoline tank
11. Nickel-silver radiator
12. Hitler's personal flag
13. Overall 18 m/m armour plating
14. Weight when empty, 4780 kgs.





"…There are not many cars like that in Germany, and most of those that are big enough for any such speed carry foreign licenses or are filled with officers in uniform. German civilians who can afford to travel in such style affect a pomp and ceremony reminiscent of the early Nineteen Hundreds, when touring required a wardrobe all its own…"

***The New York Times*, November 1937**

RE: in his Mercedes limousine, Herr Hitler thoroughly enjoyed speeding past other vehicles (especially those that were American-made)

The New York Times Magazine

MAY 30 1937

Section 8

WHERE HITLER DREAMS AND PLANS

At the Berghof on a Bavarian Peak He Lives Simply, Yet His Retreat Is Closely Guarded

"Here, amid gorgeous mountain scenery, not in set conferences but in informal walks and talks, Hitler mulls over new ideas for the application of his ideology."

The photograph at top shows Berchtesgaden. Times Wide World and Nesmith.

By OTTO D. TOLISCHUS

BERLIN.

GERMANY is administered from Berlin, capital of the Third Reich. It is inspired and spurred onward from Munich, capital of the National Socialist movement. But it is ruled from a mountain top—the mountain on which Fuehrer and Reich Chancellor Adolf Hitler has built himself a lofty country residence where he spends the larger part of his time and to which he always retires to ponder events and to make those fateful decisions that so often startle the world.

Der Berghof, as this residence is now called, is rapidly becoming a place of German destiny. Here, more than 3,000 feet above sea level and 1,400 feet above Berchtesgaden, in the southeasternmost tip of Bavaria and only two miles away from his native Austria, Hitler takes refuge from the clamor of Berlin that irritates him and from the daily grist of routine paper work that stifles him. Here, amid the most gorgeous mountain scenery to be found in Germany, not in set conferences, but in informal walks and talks with his closest collaborators and with chosen representatives from all walks of German life, he mulls over new ideas for the practical application of his National Socialist ideology that later find expression in pontifical speeches and pronouncements at National Socialist festivals or party gatherings.

And here, in the solemn solitude of a higher region, where frozen mountain peaks symbolize the eternal pattern of this world that yet changes in appearance with the constant change of atmospheric moods, and where the little things of everyday life below seem to drop away to let the essentials come out in all the clearer relief, the man who has assumed sole responsibility for a nation of 67,000,000 finds the strength to continue on his self-imposed mission.

However, the presence of the head of a mighty nation is already transforming the rustic and unsophisticated simplicity of the place and is giving it—more sensed than seen—a formidable and a martial air.

BERCHTESGADEN — which means mansion of the Goddess Berchta—was once a little-known spa of less than 4,000 inhabitants. Because of its beauty it was always patronized by the Bavarian royal family and Hitler likewise selected it as a place of recreation while still a struggling party leader. With a company of friends to which belonged his early mentor, the poet, Dietrich Eckart; his erstwhile foreign press chief, Dr. Ernst Hanfstaengl, and Max Amann, his publisher and now head of the Reich Press Chamber, Hitler used to spend many pleasant hours in Berchtesgaden, especially in the Platterhof Inn which has now been absorbed as part of the Berghof estate; and the time had by all was so pleasant that some of his more puritanical followers protested. But here also he wrote the second and more substantial part of his book, "Mein Kampf," following his release from imprisonment after the Munich putsch.

Now Berchtesgaden is rapidly turning into a miniature national capital. A speedy motor road has been built to it from Munich and a private airport is being constructed on the Rossfeld, near Hitler's residence. A special building has been erected to house a branch of the Reich Chancellery, because, as State Secretary Dr. Hans Heinrich Lammers explained at its dedication early this year, "the Fuehrer is always on duty, even when on vacation." New homes are being built for the staff of officials and new barracks have gone up for the guarding garrison. This garrison, incidentally, consists not of army troops but of Hitler's own body guard, recruited from the "SS," from which is also recruited the Gestapo, or secret State police. Despite efforts of the army generals to abolish the body guard as a semi-independent military unit, Hitler insists on keeping it.

IN the same way the Berghof has grown from a little mountain chalet into a stately manor house on a large estate. Originally it was little more than a mountain cottage, furnished in the rustic but

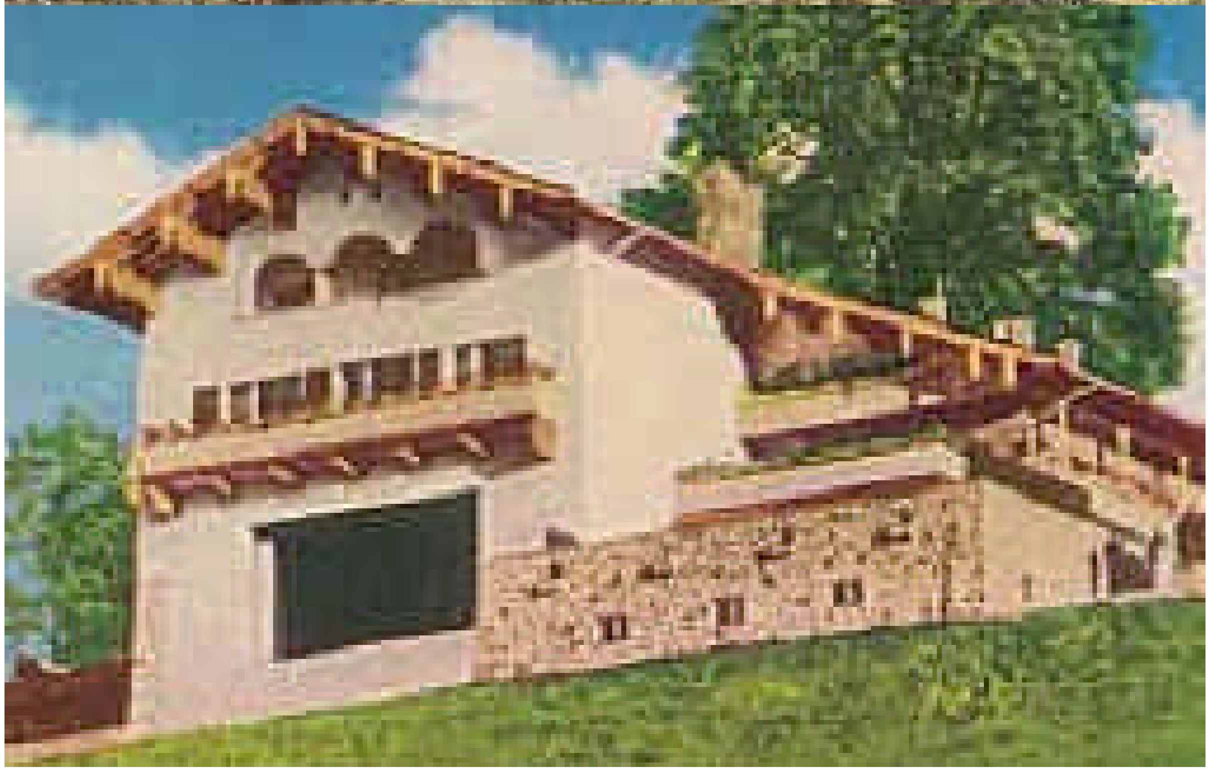
"…However, der Fuhrer had been known - from time to lime - to take the wheel from his chauffeur. Erich Kempka, and drive himself to his mountaintop retreat in Berchtesgaden. It seems Hitler got exhilarating kicks from the sense of power he achieved by lead-footing this gas-eating behemoth. On such occasions, he reportedly gave propaganda chief Joseph Goebbels the shakes by throttling up and over 100 mph, As a result, Goebbels would often go out of his way to avoid riding with his Fuhrer - a fright which can be all the more appreciated when you remember that Goebbels was so devoted to Hitler that he murdered his six children and committed suicide with his wife in order to die by Hitler's side in 1945…"

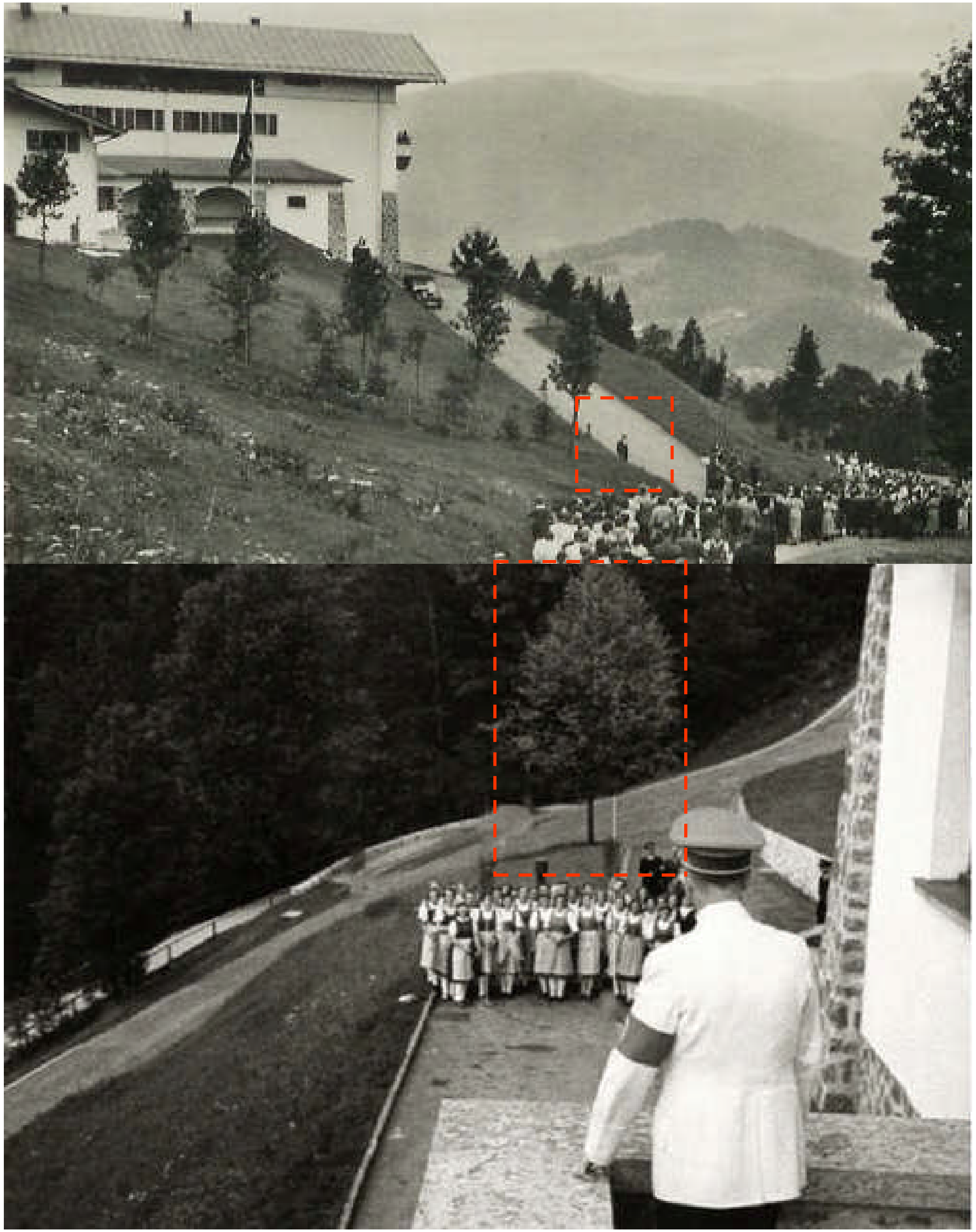
***Beau* magazine, June 1966**

Left: cover of the May 30th 1937 *New York Times Magazine* (featuring *Berchtesgaden*)

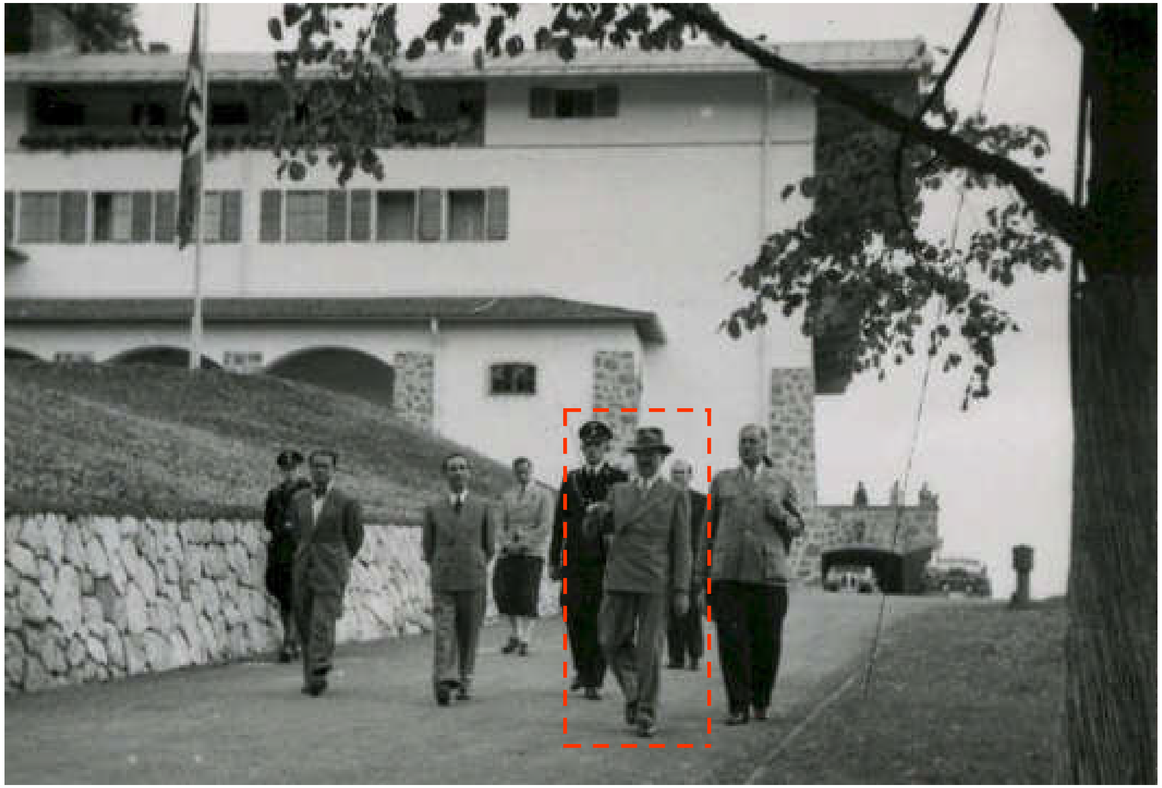
The Eagle's Nest

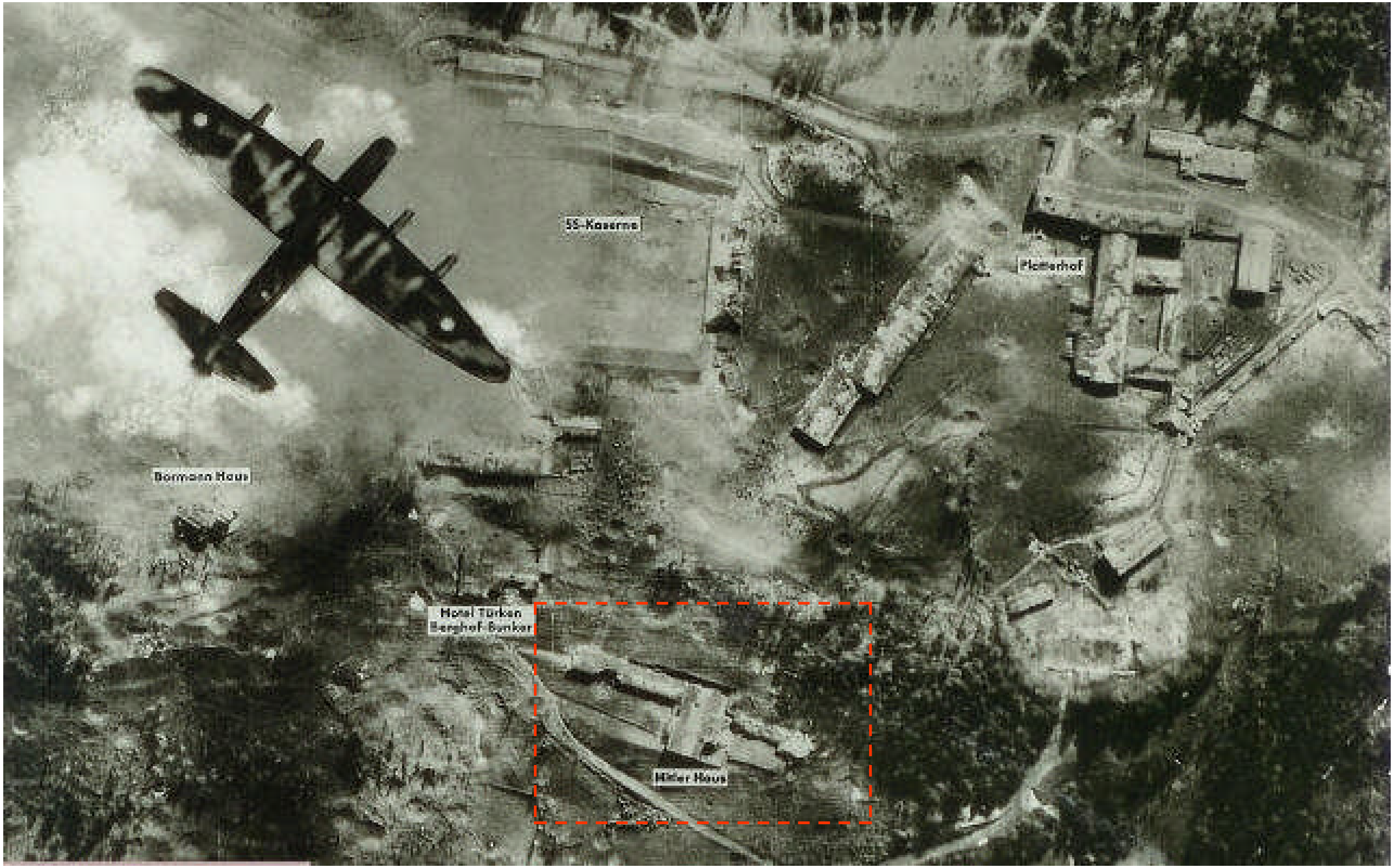
<u>Left T&B</u>: to befit the head of state of a re-surgent Germany, plans were made to remodel *Haus Wachenfeld* in 1935. The 1936 work (top) actually involved a total conversion, with large masonry additions of a main house, an additional wing and an enlarged garage. Further work took place in 1938 (bottom).





<u>Left T&B</u>: before the out-break of WWII, Hitler often greeted crowds of visitors to *Haus Wachenfeld* and the *Berghof* from the end of his driveway, either standing in the drive or on the retaining wall next to the road (high-lighted, top). These public “march past” reviews often lasted for hours. In June 1937. Hitler complained to *Martin Bormann* about the lack of shade on the hot summer days. Bormann im-mediately procured a mature linden tree from Munich and had it planted near the end of the driveway (bottom, high-lighted).





<u>Above</u>: the *Berghof* was heavily damaged during the RAF bombing raid on 25 April 1945. This photo, taken from a Lancaster bomber during the raid, shows most of the main *Obersalzberg* complex. The Berghof appears at the bottom, showing at least two direct bomb hits.

<u>Above</u>: this aerial reconnaissance photo taken shortly after the bombing shows the damage to the immediate *Berghof* area. The east wing suffered a direct hit, and another bomb hit between the Adjutancy and the *Haus Wachenfeld* part.
<u>Left</u>: departing SS troops set the Berghof on fire on 4 May 1945, burning away the wooden parts and severely damaging the rest of the building

L‘Chaim

"…But Hermann Goering, who also drove often with Hitler, apparently shared the fascination for the powerful auto. He encouraged Hitler to drive fast and use the supercharger to take maximum advantage of the car's speed. However, quite the opposite of Goebbels, Goering refused to die with der Fuhrer and, in the end, deserted him…"

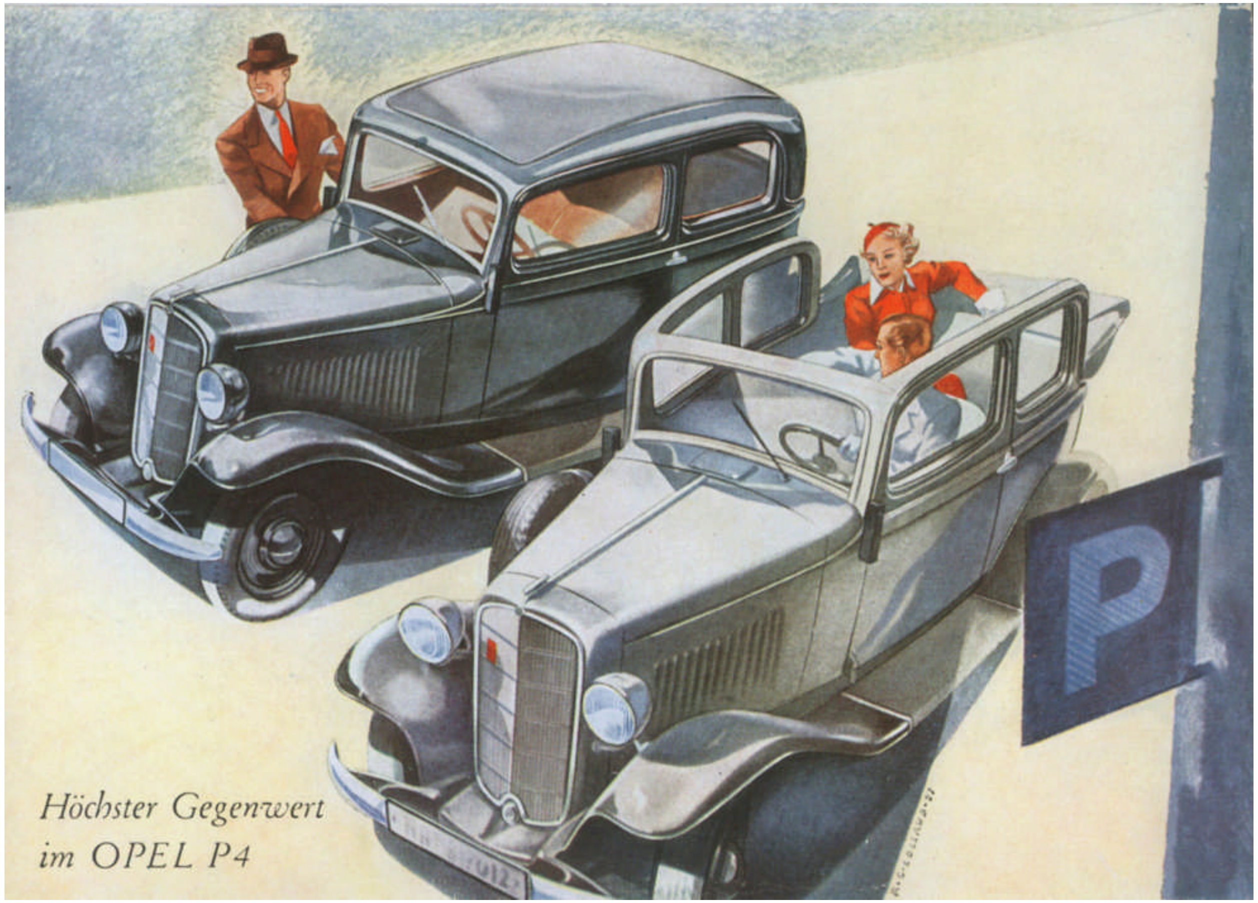
***Beau* magazine, June 1966**

On the Other Hand…

"…The most popular car in Germany is rather like a baby carriage with an engine the size of a roast beef tucked under its neat hood. It has four speeds, and it will run thirty miles to the gallon of gasoline, but it will not climb hills in high, and you are warned that it will not go more than seventy kilometers an hour without danger of burning out bearings. Neither in this nor on the even more popular and less expensive motor bicycles does the average man race up and down the autobahn at ninety miles an hours…"

***The New York Times*, November 1937**

RE: in the early 1920s, *Opel* became the first German car manufacturer to in-corporate a mass production assembly line in the building of their automobiles. *Opel* led the way for motorized transportation to become not just a means for the rich, but a reliable way for people of all classes to travel. By 1928, Opel had a 37.5% market share in Germany and was also the nation's largest automobile exporter. In March 1929, *General Motors* bought 80% of the company, increasing this to 100% in 1931. Based on the popular *Opel P4* model, in 1935 Opel became the first German car manufacturer to produce over 100K vehicles in a single year. The selling price was a mere 1,650 Deutshmarks and included a 23 hp, 1.1 liter four-cylinder engine with a top speed of 85 km/h (53 mph). By 1937, with 130,267 cars produced, Opel's *Russelsheim* plant was Europe's top car plant in terms of output, while ranking seventh worldwide.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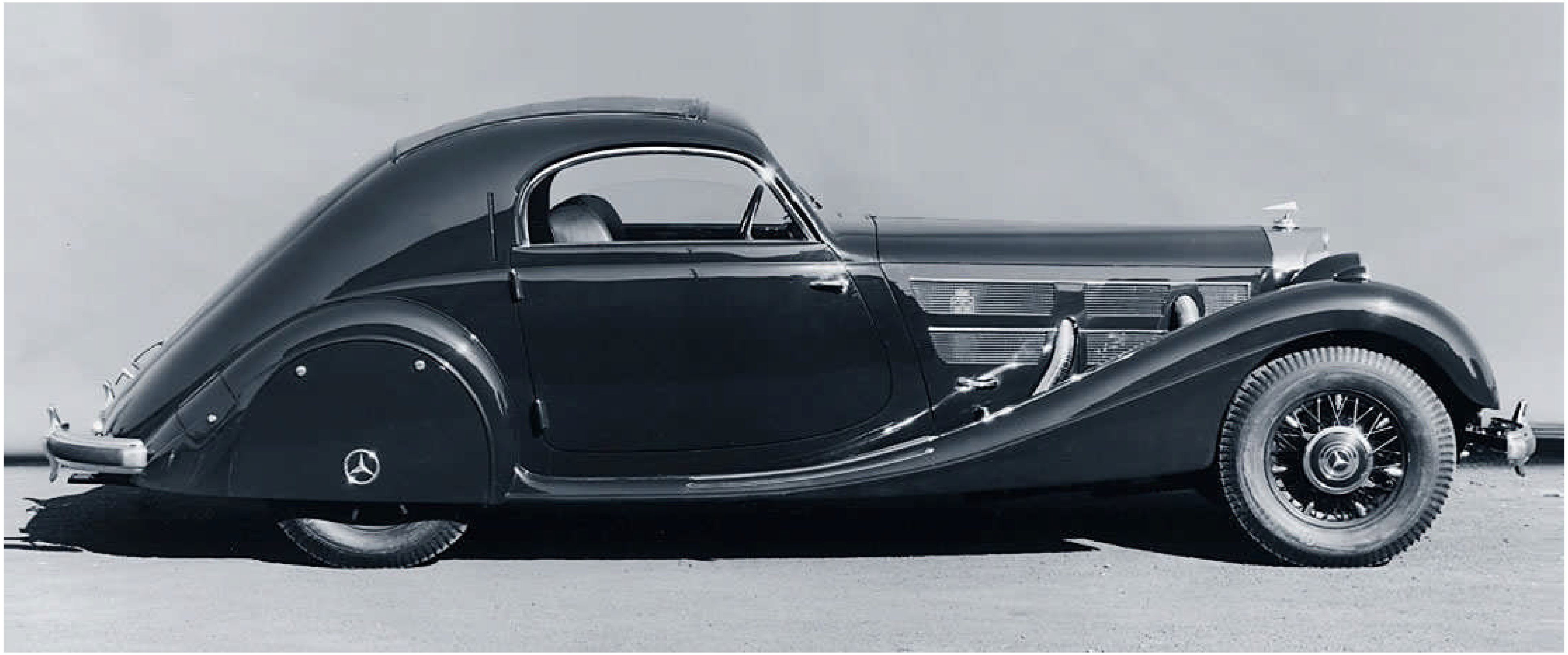
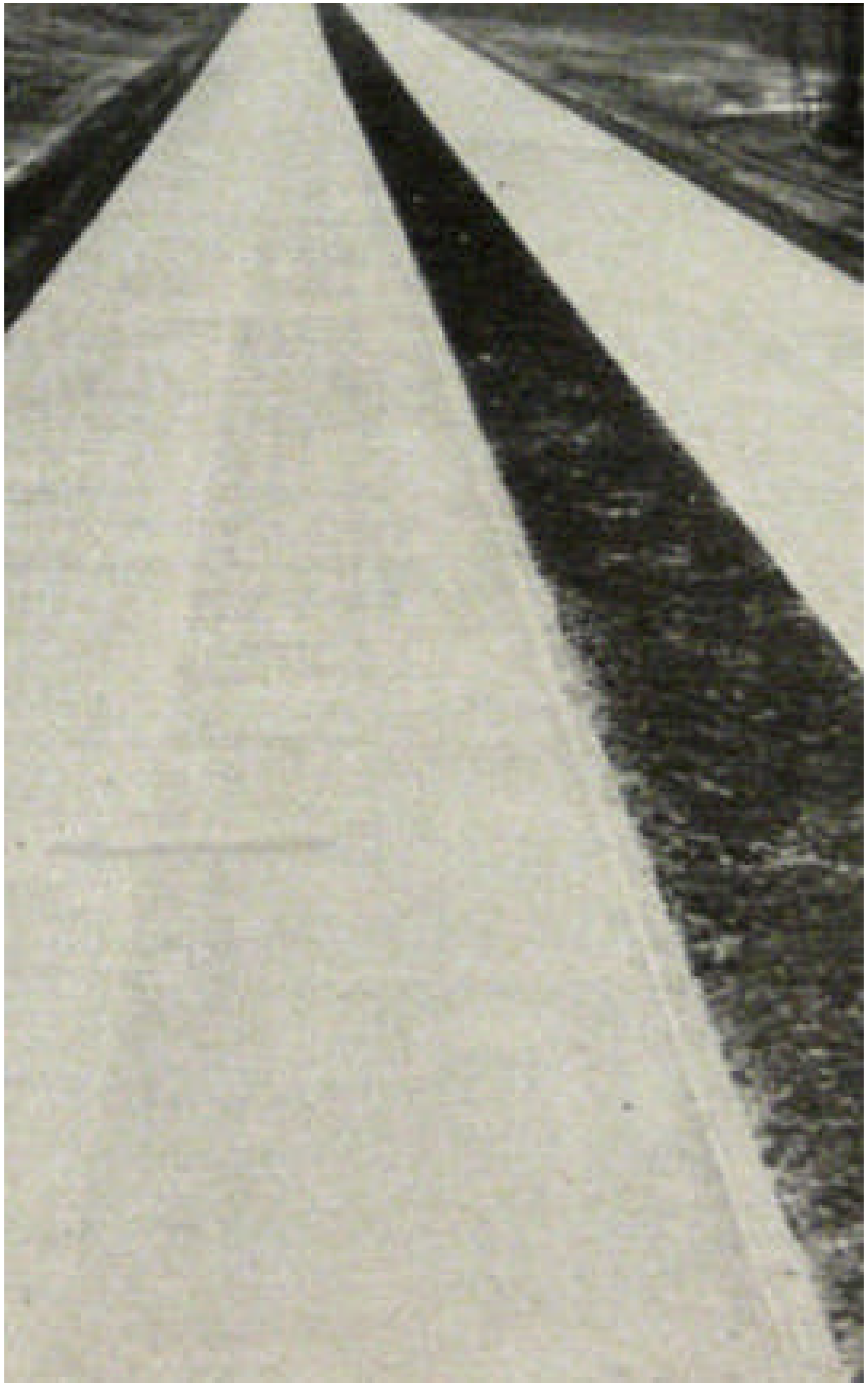
Autobahning-in-Style



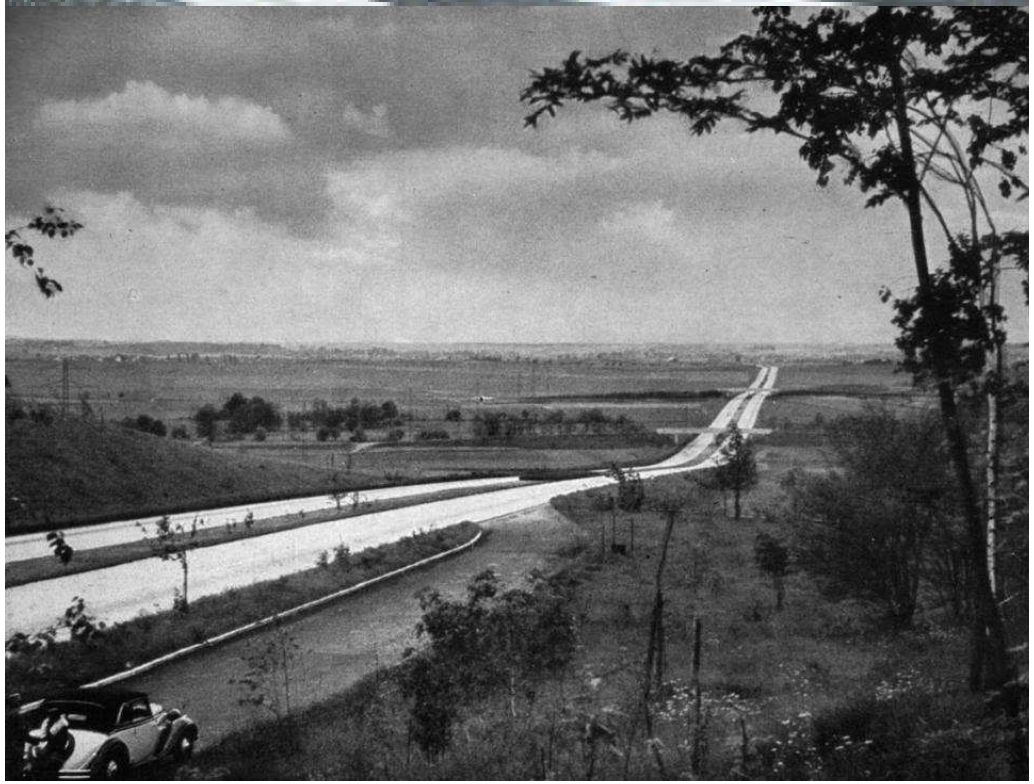
<u>Above</u>: caption: “540 K ‘Autobahn-Kurier’ was the only one of its kind built.” In the 1930s, the supercharged cars from *Mercedes-Benz* eclipsed all other powerful and refined cars of the age. They launched a new era in automotive engineering. Captains of industry, politicians, celebrities, artists and athletes - the people driving supercharged Mercedes cars in those days - opted for the most advanced engineering and the most refined design. In short, for the best cars in the world. It was a distinction to be able to drive such a car. *<u>D</u>aimler-<u>M</u>otoren-<u>G</u>esellschaft* (DMG) used the valuable experience gained from the super-charging of aircraft engines for boosting the power of motorcar engines after WWI, setting a new performance standard/category. From 1930 on, the supercharger was also used (in acoustically damped form) in the brand’s famous eight-cylinder cars: the Mercedes-Benz 380, the 500 K and 540 K. Each individual car was manufactured by hand, often precisely to the wishes and ideas of customers, such as this “Autobahn-Courier.”



"…As a matter of fact, the autobahns seem astonishingly empty. Even in the crowded Rhine Valley, with moving produce cluttering all the little roads, there will be stretch after stretch of highway where the long white ribbons run out to an empty horizon with no car in sight…Germany has not yet acquired the habit of long-distance road travel…live on what they raise, and any surplus customarily goes to the city by train…has less than a million automobiles…"

***The New York Times*, November 1937**

RE: Germany's population was 65 million in 1937



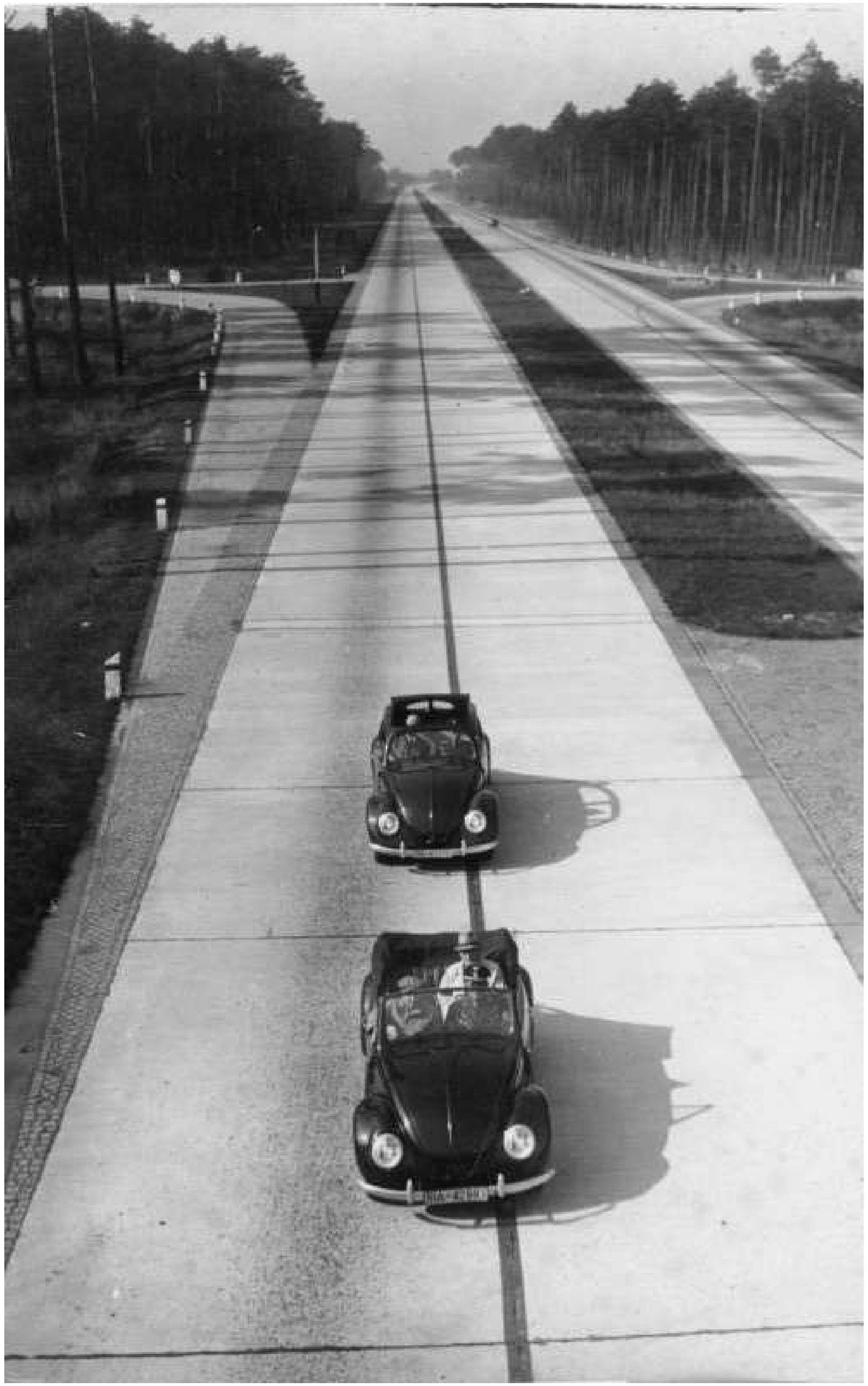

München-Reichsgrenze
Reichsautobahn
Winterhilfswerk
3
2 · Deutsche Reichspost · 2
G.FRITZ

The People’s Car

"There can be no triumph of National Socialism without radio, sound films, and motor cars…Simple, reliable economical transportation is needed. We must have a real car for the German people. A nation is no longer distinguished by the length of its railroads, but by the length of its highways So long as the motor remains only a means of transportation for especially privileged circles, it is with bitter feelings that we see millions of honest, hard working, and capable fellow men whose opportunities in life are already limited, cut off from the use of a vehicle…would be a special source of yet unknown happiness to them, particularly on Sundays and holidays…"

***Adolf Hitler,* Chancellor of Germany**

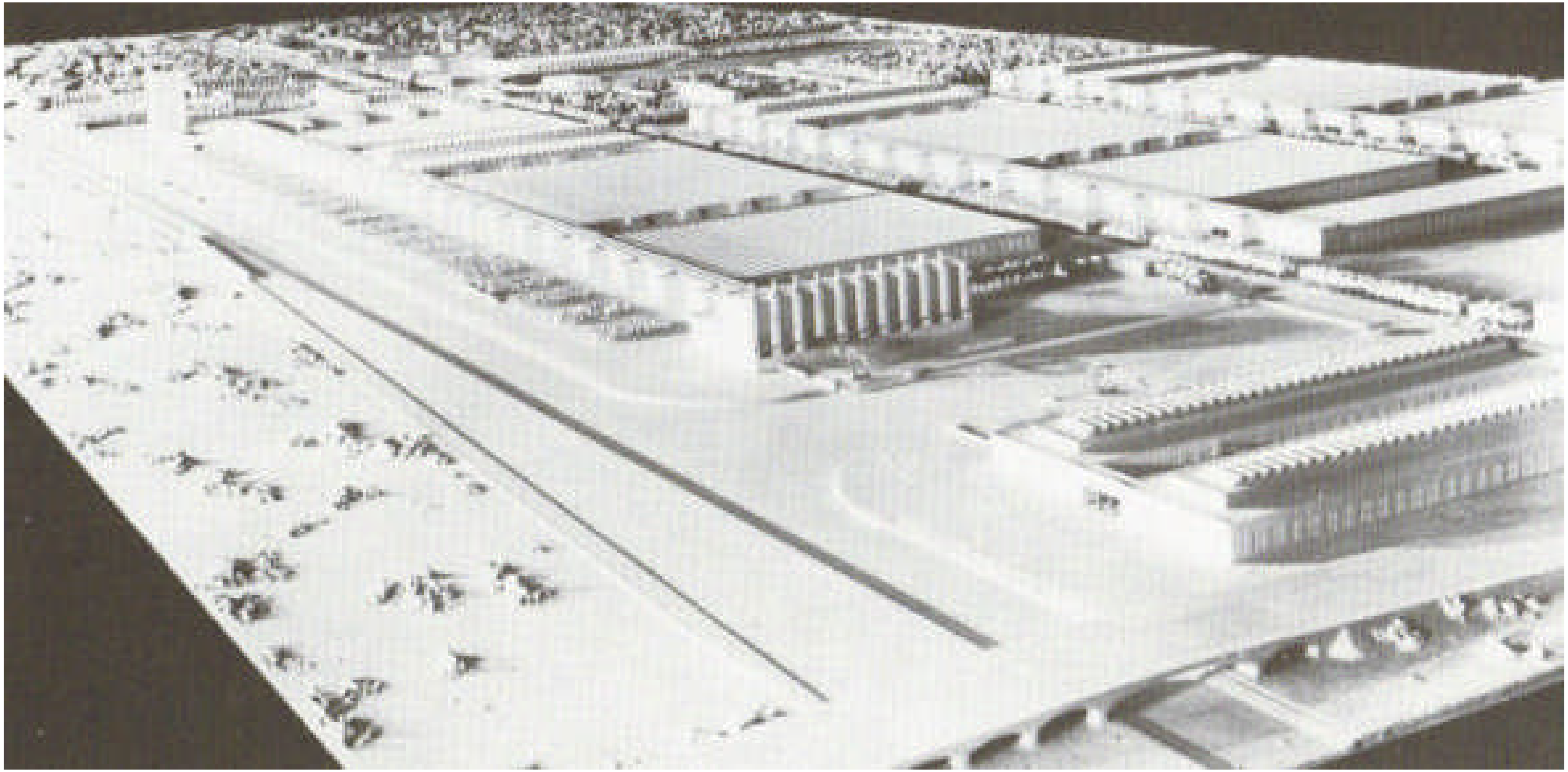
RE: excerpts from speech given in early 1933 at the *Berlin Auto Show*. Though visitors were impressed by the Autobahn, most couldn't help noticing how few cars actually were using them. Only the wealthy and/or powerful in Germany could afford automobiles. At the time. Hitler highlighted this problem in his speech. Hitler intended to provide a small, affordable "people's car" (Volkswagen) that, in time, would fill the Autobahnen with the traffic it was designed to handle.



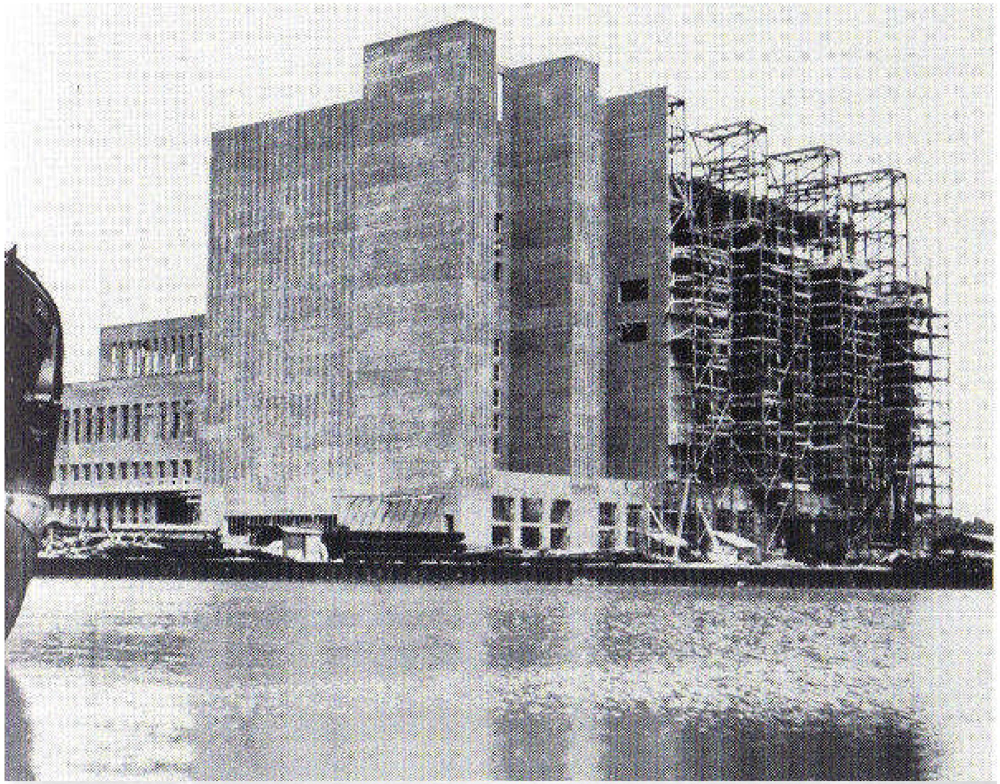
Dr. Ferdinand Porsche **completed design of the "People's Car" in 1938. That autumn, the *Nazi Party Labor Organization* completed some construction on an assembly plant at Wolfsburg. In Hitler's full-employment economy, however, construction was delayed by the lack of workers. At Hitler's request, Mussolini immediately provided 1K unemployed workers to Wolfsburg (and more, as needed). Over 360K Germans paid in full or in installments in advance of production. However, in August 1939, Hitler ordered Dr. Porsche to switch the Wolfsburg plant to production of military vehicles based on the Volkswagen. With Czechoslovakia and Austria under German control and German troops ready to move into Poland, military needs would have to take priority. In the end, none of the purchasers received a Volkswagen - or a refund.**

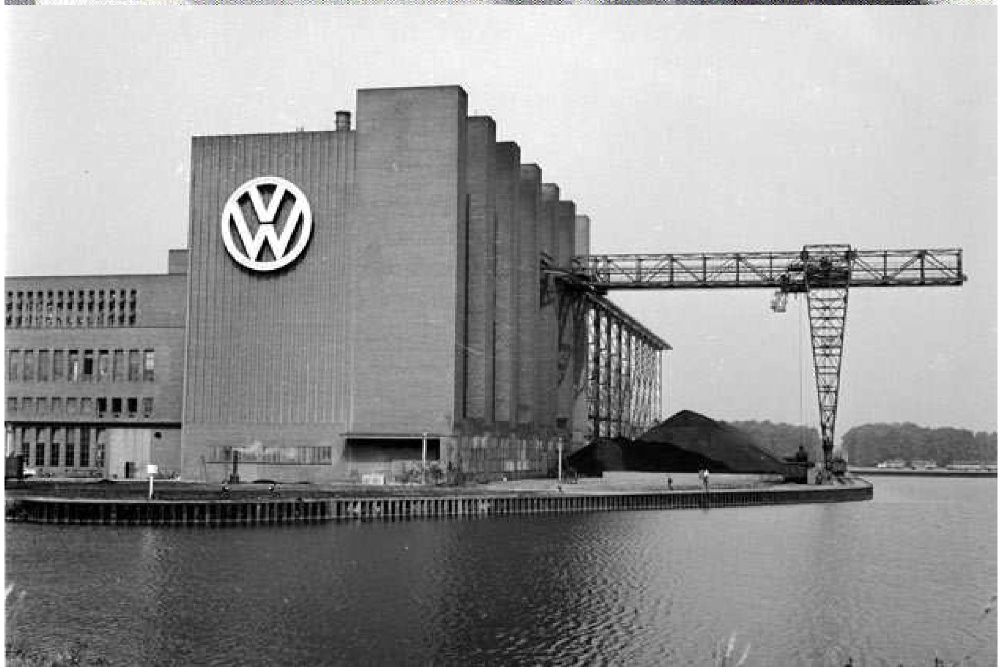
<u>Left</u>: caption: "Autobahn view with two Volkswagens: propaganda photo celebrating 10 years of Nazi achievements, January 1943"

<u>Above</u>: caption: "Germany, February 1939, Three Volkswagen cars on the Reichsautobahn"



<u>Above</u>: caption: “Model of the Volkswagen Factory as proposed in the 1930s.” In May 1937, the German Government established a company to build Ferdinand Porsche’s *Volkswagen*. The Name of the company was *Gesellschaft zur Vorbereitung des Deutschen Volkswagens* (“Society for the preparation of the German Volkswagen”). The *German Labor Front* (DAF) - the only labor organization allowed in Nazi Germany, would finance the project. The location of the factory was in the *Lower Saxony* area, near the village of Fallersleben. An unpopulated area at the time, the location provided easy access to roads, rail and the *Mittelland Canal*. The factory was well furnished with American-made machine tools and equipment sourced by Porsche during his visits to the U.S. in 1936/37.





"It can only be said with profound sadness that, in the present age of civilization, the ordinary hard-working citizen is still unable to afford a car, a means of up-to-date transport and a source of enjoyment in the leisure hours. One must have courage to face problems and what cannot be solved within one year may become an established fact within ten years…"

Adolf Hitler, **Chancellor of Germany**

RE: excerpt from a March 3rd 1934 speech given at the *Berlin International Automobile and Motorcycle Show.* Whereas Germany had intended to build the highways first and the vehicles second, America had the vehicles and no clear plan for building the highway network where they could be put to proper use.

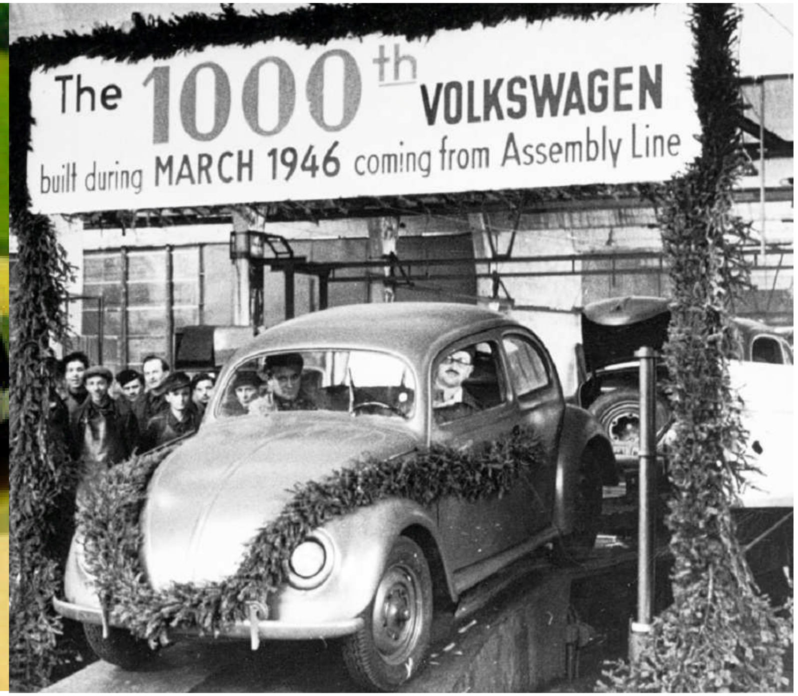

GRUNDSTEINLEGUNG
DES VOLKSWAGENWERKES MAI 1938

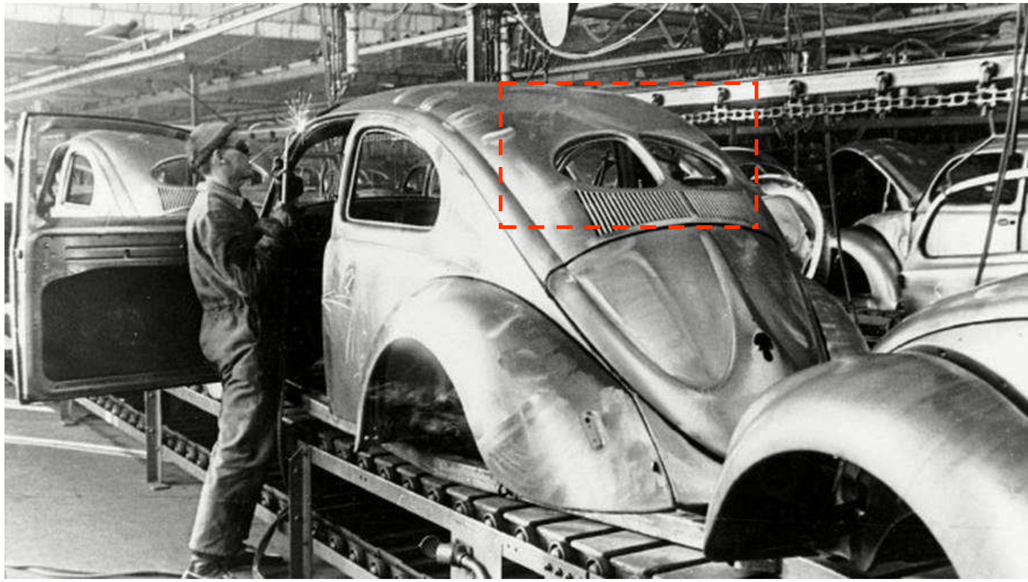
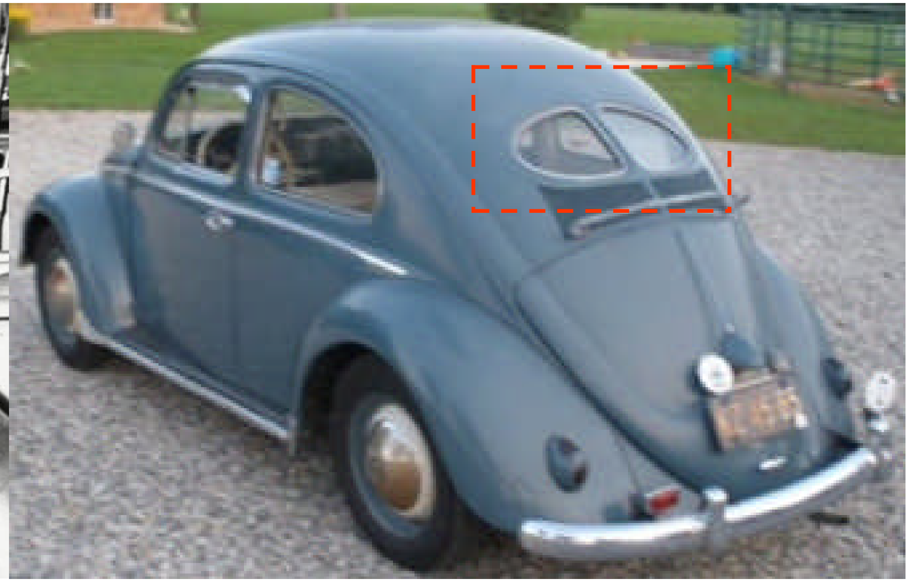
The *Volkswagen Beetle* was intended to provide cheap transportation for the working class masses of Germany. Though originally designed in the 1930s (introduced in 1939), mass production of the VW Beetle was impacted by the outbreak of WWII in September 1939 (the limited production was taken over by the *Luftwaffe* at the start of the war) thus, the bulk of the initial production runs went to high ranking Nazi officials. Not until the conclusion of the war would the VW Beetle be mass produced. With its small size and rear-mounted engine, the VW Beetle was designed for economical travel on the Autobahn. As it eventually gained popularity in the U.S. (especially with college students in the 1960s), it was seen as a compact, fuel-efficient alternative to the “Yank-Tanks” that were popular in America in the immediate post-WWII years.


SPARKARTE
KdF-Wagen

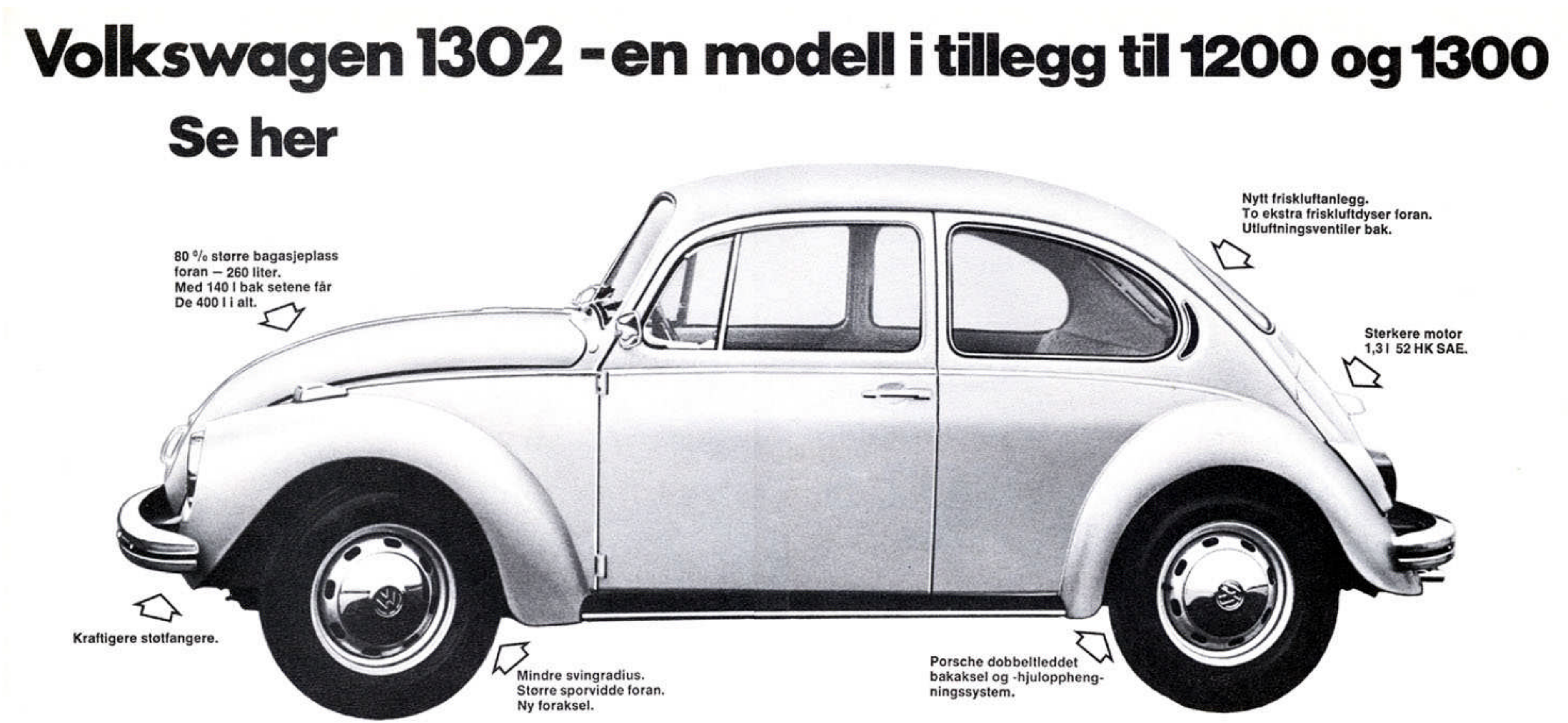

©1962 VOLKSWAGEN OF AMERICA, INC.
And if you run out of gas, it's easy to push.
See?
We think of everything.
Getting a Volkswagen to the side of the road is a pushover.
It's a little surprising that VW owners don't run out of gas more often.
A figure like 32 miles to the gallon can make you a little hazy about when you last filled up.
And you spend so little time in gas stations, there are almost no reminders.
You'll probably never need oil between changes, for example.
You'll never need water or anti-freeze because the engine is air-cooled.
40,000 miles on a set of tires won't break any Volkswagen records.
And repairs are few and far between.
So this year we've installed a gas gauge to help you remember.
But we haven't taken all the fun away.
You still have to remember to look at it.



The original design was for a car with a top speed of 62 mph (99km/h), that would transport two adults and three children (left) and not cost more than $130. Hitler also had plans for the styling of the Volkswagen, he is reputed to have said: “It should look like a Beetle, you have to look to nature to find out what streamlining is.” In 1946, a total of 7,677 Volkswagens were built (right) and in 1947, production rose to 8,987. By 1948, production had increased more than two-fold, to 19,244 units. Various changes were made to the VW Beetle over the interceding years including the removal of the split rear window to a small oval shape and in 1953 engine size was increased. In August 1955 VW Beetle production reached one million.

The *Volkswagen Beetle* that has come to be known as the "Zwitter" was only produced from October 1952 through March 1953 (left). Its short production run makes it particularly rare and, therefore, collectible. A *Zwitter* is easily distinguished by its split rear window (typical of the early models), but has the redesigned dashboard more commonly seen in the oval rear window version of the VW Beetle (as opposed to the dual glove compartments of the regular split window models). In 1953, VW did away the split rear window and replaced it with with a single oval window to improve rear view visibility.



Over the years, larger engines were fitted to VW Beetles, but the biggest redesigns were made between 1970 and 1973. The "1302 Beetle" (above) was designed to overcome criticism of the Beetle's small engine capacity, while the 1303 had an increased curved windscreen, shorter hood and a plastic padded dashboard. The VW Beetle reached it's highest ever production total in 1969 when it sold 1,076,897 cars, but after 1971 production fell dramatically. In 1974, for the first time in its history, VW lost millions on Beetle production thus, it switched its focus to the new *Golf* model. The most famous VW Beetle was "Herbie" - a 1963 Beetle which was the main character in the 1968 Disney film *The Love Bug*.
In the film, Herbie had a mind of its own and was capable of driving itself, even going so far as to compete in races.


WALT DISNEY
PRODUCTIONS'
The LOVE BUG
U
Herbie's dashing debut
–he roars to stardom
and captures your heart!
53
HERBIE
29
12
starring
DEAN JONES · MICHELLE LEE · DAVID TOMLINSON · BUDDY HACKETT
AS TENNESSEE STEINMETZ
Screenplay by BILL WALSH & DON Da GRADI
Produced by BILL WALSH · Directed by ROBERT STEVENSON
©WALT DISNEY PRODUCTIONS 1979

Similar But Different

"…The highways which have been completed are wonderful examples of the best modern road Building The road from Munich to Salzburg in Austria is one of the most delightful drives of the world. It parallels the foothills of the Bavarian Alps and runs through a farming country that has been so well tended that it presents the appearance of a finished landscape as far as the eye can see on either side…"

T.H. MacDonald, **BPR Chief**

RE: after viewing the Autobahn in 1936, MacDonald reported his impressions in a speech to the *American Automobile Association* (AAA) on Nov. 20th 1936. He was impressed that the Germans were able to build on entirely new right-of-ways (laws in the U.S. made that difficult). On the other hand, he felt that the roads were being built ahead of demand, violating his economic principles. Furthermore, Autobahns by-passed cities, which was where the U.S. was experiencing its greatest traffic problems. Also, the central government was building the roads, whereas longstanding practice in the U.S. was one of Federal-State cooperation.

“…The system of German roads is being built in advance of, and to promote the development of, highway transportation. In the United States the situation is just the reverse. Highway builders are proceeding on the principle that the utilization of the highways must produce directly the revenues with which to finance their construction. As long as the United States adheres to this method of financing, the building of super-highways must be limited to areas where the present and prospective traffic will justify it…From the developments abroad and in the United States, one can conclude that superhighways will be created, but only in the vicinity of metropolitan areas, for relieving traffic congestion within those areas and for connecting those that are separated by relatively short distances….”

***T.H. MacDonald,* BPR Chief**

RE: excerpt from a 1937 speech to the *American Society of Civil Engineers* (ASCE). Although MacDonald saw a need for such highways in the United States, he believed that the contrasts between German and American needs meant that a comparable American road network should be developed along different lines. Reserving judgment, he wanted the data before drawing conclusions about highway needs. The gathering of the data was underway, made possible by the “Survey” provision of the *Hayden-Cartwright Act.*

Second to None

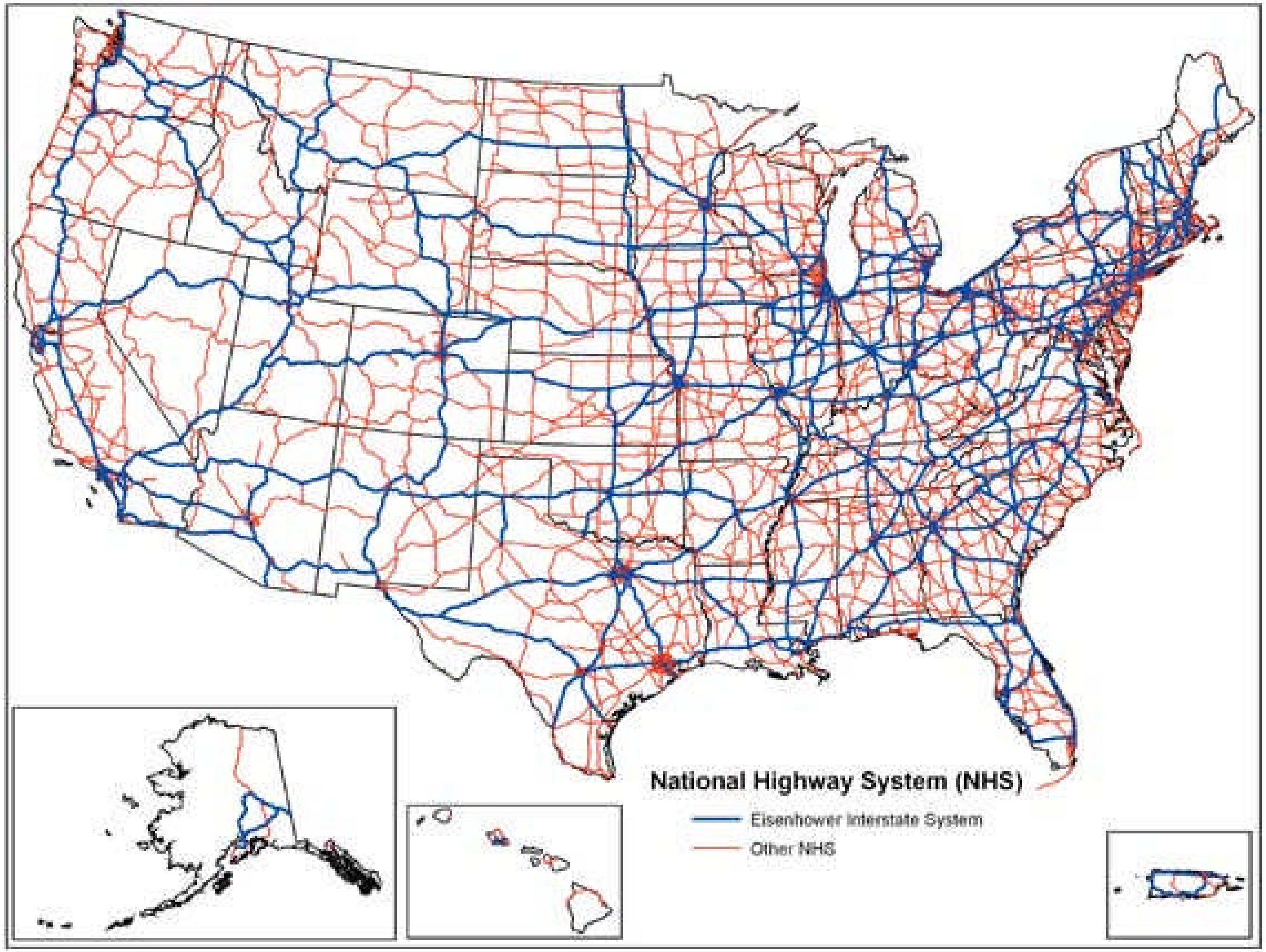
“When I think of super-highways, I think of Germany, for, regardless of what we think of him as a man, we must give Fuhrer Hitler credit for building a system of superhighways in his country which are second to none in the world to-day…The super-highways will become very important assets to that nation in the event of another war in Europe. In the meantime, however, they are providing the German people with innumerable peacetime commercial, industrial, social and cultural benefits…should have a highway system second to none…not an idle boast for us to say that we can do better anything that Germany can do well…In this way we will be able to attain, in the next decade or so, the beginnings of a system of highways and superhighways which will be adequate for the needs of our country.”

Wilburn Cartwright, **Chairman - House Committee on Roads**

RE: excerpts from a December 1938 address to the *American Association of State Highway Officials* (AASHO) annual meeting (he had been to Germany during the summer of 1938). He came back a believer in a superhighway system for America.


ROUTES TO BE ADDED TO
THE NATIONAL SYSTEM OF INTERSTATE AND DEFENSE HIGHWAYS
Ogden
Salt Lake City
Omaha
Kansas City
St Louis
Oklahoma City
Baton Rouge
LEGEND


THIS IS THE FIRST PROJECT
IN THE UNITED STATES
COMPLETED UNDER PROVISIONS OF THE NEW
FEDERAL AID HIGHWAY ACT OF 1956
EIGHT MILES CONCRETE PAVEMENT ON US-40
INTERSTATE ROUTE NO. 1
STATE HIGHWAY COMMISSION OF KANSAS


National Highway System (NHS)
Eisenhower Interstate System
Other NHS


EISENHOWER
INTERSTATE
SYSTEM


EISENHOWER
INTERSTATE
SYSTEM


EISENHOWER
INTERSTATE
SYSTEM
DEDICATED TO
PRESIDENT DWIGHT D.
EISENHOWER WHOSE
WISDOM AND FORESIGHT
LAUNCHED THE INTERSTATE
HIGHWAY SYSTEM IN
AMERICA, "THE GREATEST
TRANSPORTATION MIRACLE
OF ALL TIMES . . . "
WAYNE SHACKELFORD.

Part 6

The Roads of Tomorrow

The Superhighway of Tomorrow

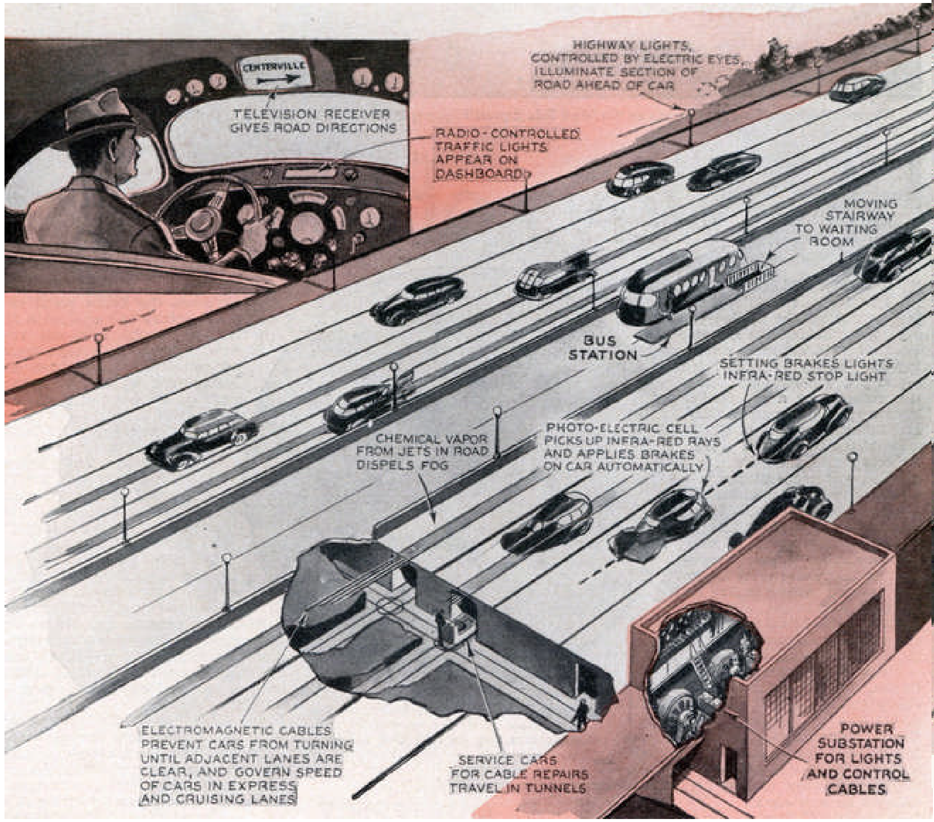
"…What will transcontinental touring be like, say, fifty years from now? Recently Dr. Miller McClintock, director of the Harvard University Bureau for Street Traffic Research - the man who is recognized as the nation's foremost authority on traffic problems - gave a startling preview of the momentous changes he sees ahead. Rear-end collisions, he foresees, will be made impossible by a new expedient. Pushing down the brake pedal on a car of the future will operate a stop light that emits infra-red rays. These invisible light rays, picked up and distinguished from ordinary light by a photo-electric cell on the front of a following car, will energize an electric circuit and apply its brakes automatically. Electric cables, buried beneath the pavements of superhighways, will govern the movement of cars. One set of electromagnetic impulses will control the car's speed. Another set will lock its steering gear against any attempt to make a dangerous turn from one lane to another. Eventually, the cable system may even be adapted to take over steering altogether - allowing the driver to release the wheel, sit back, and make himself comfortable until he chooses to switch back again to manual control. At night, the super-highways will light up of their own accord, section by section, as a car travels over them. 'Electric eyes' spaced along the road will turn on the glare-less illumination whenever a car passes, shutting it off at other times to conserve electricity..."

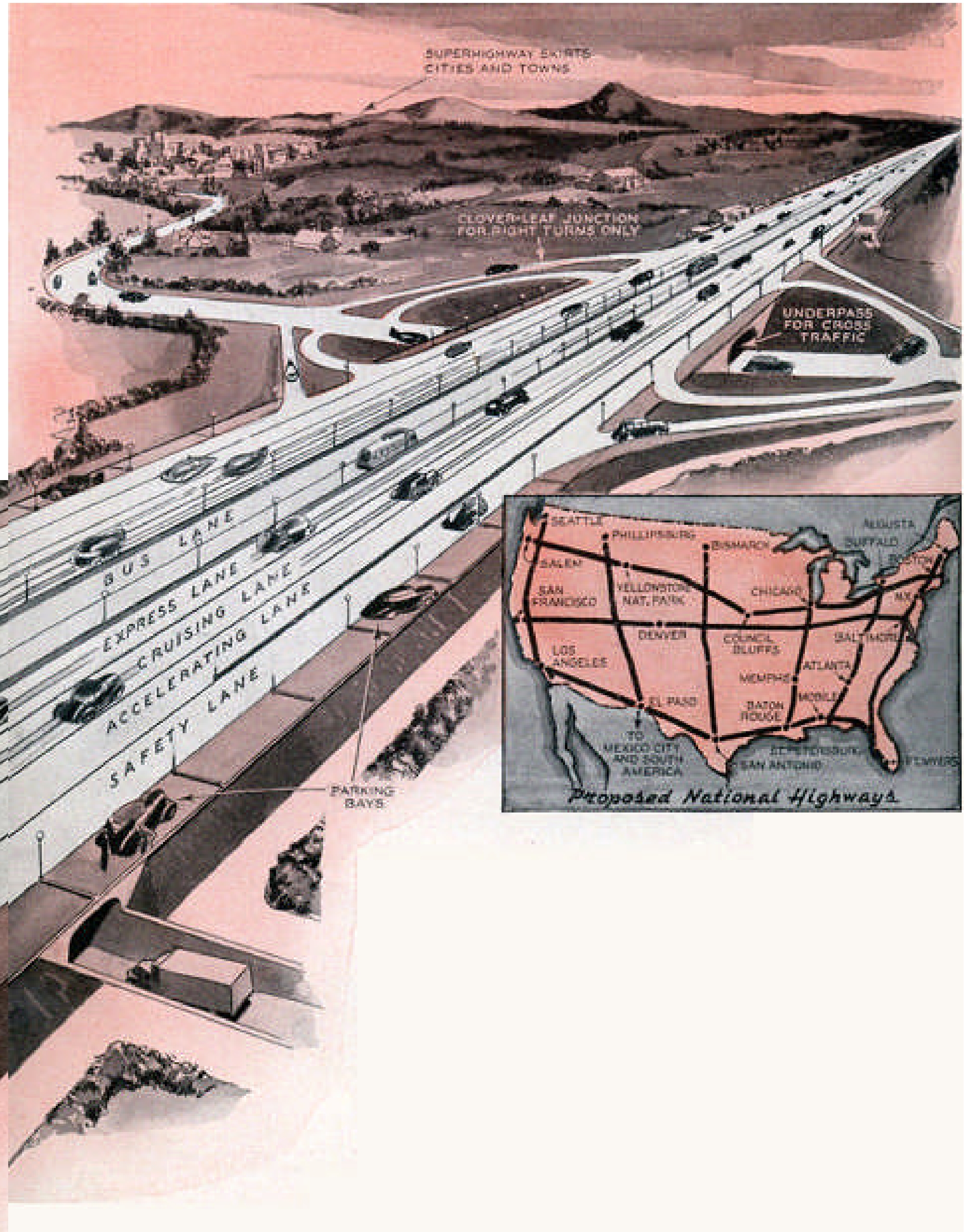
Popular Science, **May 1938**

“…Imagine a typical section of this superhighway of the future. Straight as a shaft of light, ten or more broad lanes of concrete stretch across the countryside, passing around cities and towns, bridging railroads, canals, and crossroads. Streamline busses roar along a center strip that splits the speedway, separating streams of private cars traveling in both directions. For cars moving at different speeds, each one-way pavement is divided into separate safety, accelerating, cruising, and express lanes…”

***Popular Science,* May 1938**

Caption: "This is how traffic experts envisage the superhighway of to-morrow. Careful design, and an elab-orate system of electrical safety de-vices, will enable heavy streams of vehicles to move with a minimum of danger even at high speed."





"…Hop into a 1988-model car and take an imaginary spin down one of these amazing foolproof roads. Perhaps you arrived at the transcontinental artery by plane, swooping down on one of the concrete flight strips lining the boulevard, or settling to an automatic, radio-controlled landing on a spacious airport built close to a major highway intersection. Driving up the cloverleaf approach onto the elevated highway, you glide first into the slow-speed safety lane, edge over into the accelerating strip, and turn the steering wheel to swing into the cruising lane. But nothing happens. Your car refuses to respond to the wheel, and suddenly you learn why as another automobile whips by on your left at sixty miles an hour. Suspended in service tunnels below the pavement, cables operating on an electromagnetic principle control a mechanism attached to the steering gear to prevent the car from turning left until the adjacent cruising lane is free from traffic for a safe distance…"

***Popular Science,* May 1938**

<u>Above</u>: caption: "Cloverleaf intersection, like this one on the West Side Express Highway in New York City, will be a feature of tomorrow's highways"

"…You try the wheel again. This time the car swings over into the cruising lane and immediately picks up speed. You haven't stepped on the gas, but the speedometer needle creeps steadily upward and freezes on the sixty mark. A second set of buried electromagnetic cables is taking over control of your speed, since cars in the cruising lane must go no more and no less than sixty miles an hour. But other automobiles are still flying past you on the express lane to your left. Now you swing the wheel over, confident that the car will respond only if turning is safe. In the express lane, your speed automatically steps up to the 100-mile-an-hour limit. Fifty yards of special nonskid pavement flies by underneath your car every second. Unless you switch back to a slower lane, you can maintain that pace hour after hour, for you'll never see a traffic light, a railroad crossing, a street intersection, or even a curve sharp enough to slow you down. At twilight, overhead lamps will bathe the road in light. Sleet cannot form on the chemically coated windshield of the car. If you run into fog, chemical vapor escaping from tiny jets in the roadway will clear a lane of visibility. So your top speed of 100 miles an hour is also your average speed - fast enough to let you have breakfast in New York, lunch in Ohio, dinner in Iowa, and a midnight snack not far from the Colorado state line…"

***Popular Science,* May 1938**

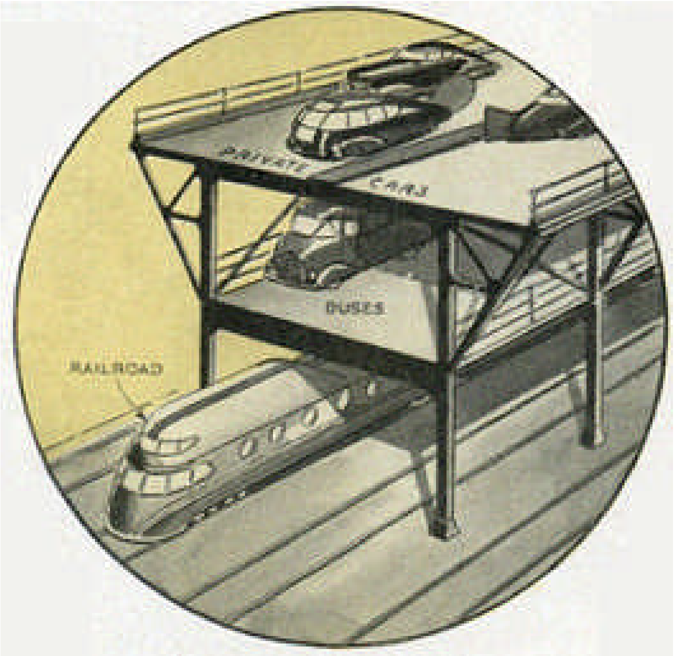
"…As your car eats up the miles in the express lane, you notice on your left a steel barrier that divides you from the broad two-way center lane reserved for express bus traffic. Built into the middle of this bus roadway at the outskirts of cities and towns, and at railroad and route junctions, are station platforms, served by moving stairways from waiting rooms below. Here passengers change from interstate busses to local lines to be whisked into cities and towns adjacent to the main highway. Still farther to the left, traffic is speeding along at a controlled pace in the duplicate one-way road section for cars traveling in the opposite direction. But as you marvel at the efficient handling, safety, and speed of this 1988 traffic, it suddenly dawns on you that this superhighway has no roadside markers, no painted warnings on the pavement, not even a signpost to direct you along the route. You search in vain for any of the familiar signs that in 1938 were almost as much a part of the highway as the paving – 'Sharp Curve,' 'Winding Road,' 'Steep Hill' - these signs, and the necessity for them, have disappeared from main routes years ago…"

Popular Science, **May 1938**

How Will I Know?

"…'But how do I find my way around?' you ask your guide. 'How do I know where to turn off for Middletown or Centerville? Is every motorist a mind reader these days?' Your guide smiles and suggests that you swing off the traveled lanes and nose into one of the parking bays that line the shoulder of the road. 'Take a look at that dashboard,' he advises as you pull up to a stop out of the stream of traffic. At first glance you spot a few of the familiar dials and instruments - speedometer, fuel gauge, ammeter. After a little study you figure out a few of the others – tach-ometer, tire-pressure gauge, engine-temperature meter. But what is that row of colored lights, and what is that white screen just over the windshield? 'Since the old days when all cars had gear-shifts and burned gasoline for fuel,' he explains, 'science has stripped the welter of directional and warning signs off the highway and put the essential ones right on the dashboard of each car. At 100 miles an hour, roadside markers would be no more legible than hen tracks, anyway.' The law now requires every automobile to be equipped with standard, pre-tuned, ultra-short-wave radio and television units. On small four-lane side roads, traffic sig-nals are indicated by the colored lights here on the panel. 'Miles before you reach any superhighway junction,' your guide continues, 'your television set picks up the junction transmitter. All you have to do is glance at the viewing screen to find out where the crossroads will take you and how far it is to the next turn-off. And in case you get confused somehow, it's simply a matter of throwing that switch lever to put you in two-way radio communication with highway-patrol headquarters. They'll tell you where you are, how far it is in hours and minutes to your destin-ation, and where to make the correct turn off the highway'…"

Popular Science, **May 1938**



"…In congested areas, you find out, highways are built on elevated structures over railroad lines. The top deck is reserved for private cars, while busses run on a lower level, and streamline trains race along on the tracks beneath. Train passengers transfer at metropolitan terminals to bus platforms for transportation to local stations in city suburbs and villages…"

***Popular Science,* May 1938**

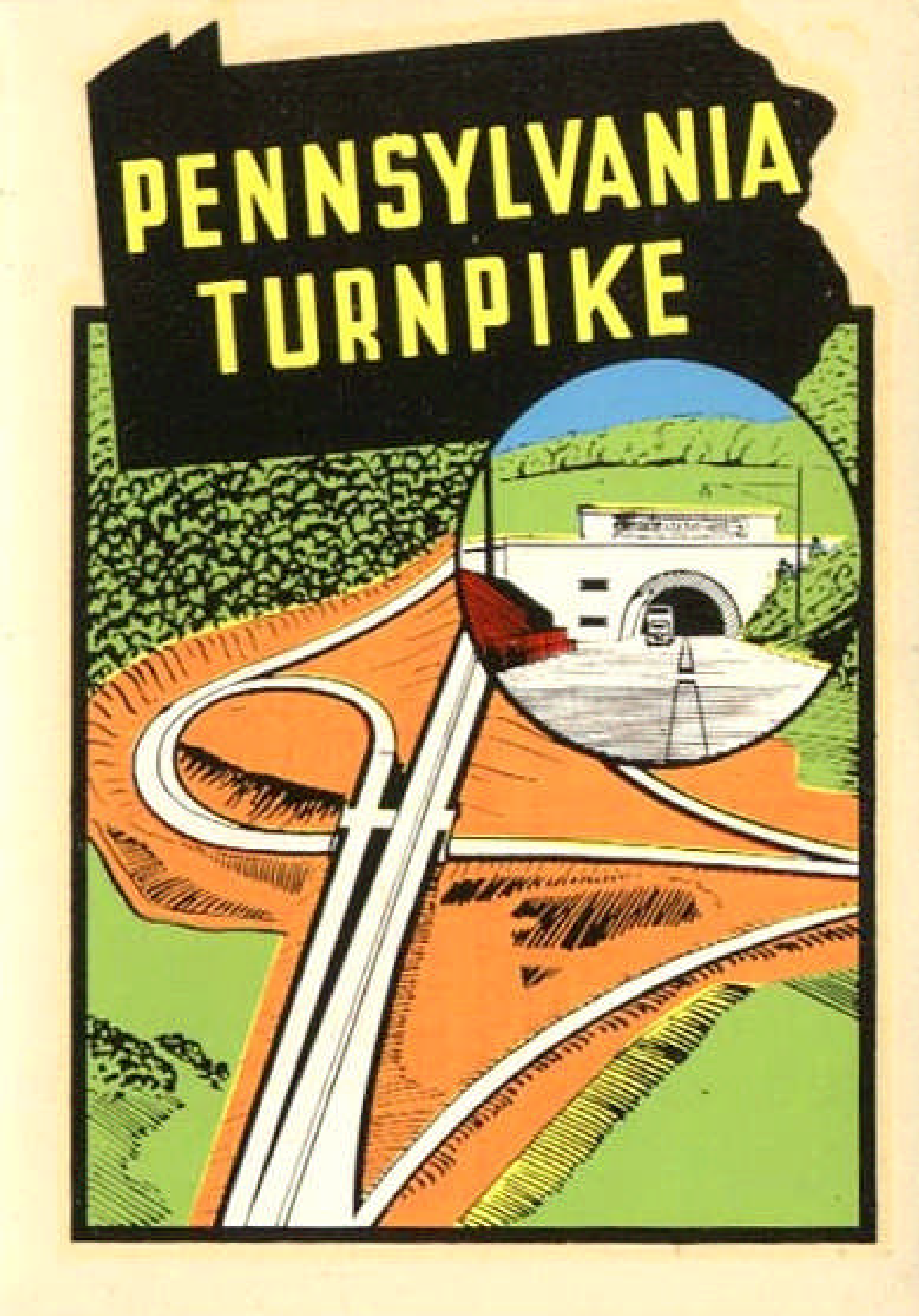
Left: caption: "In congested areas, double-deck roadways with separate levels for commercial and pleasure cars may be built over railroads"

Pointing the Way

“…Traffic experts realize that a superhighway similar to the one just described must eventually be constructed - not only to handle an ever-increasing volume of vehicular traffic, but also to end the highway slaughter that in the last fifteen years has taken almost twice as many lives as the total lost in all the wars the United States has fought since the founding of the Republic. Accident statistics show that in many cases the driver is at fault, but the great majority of crashes can be traced ultimately to the roads over which we drive. Better, safer highways are a vital necessity, and extensive road-development programs, now being pushed by state as well as Federal authorities, may lead toward the high-speed superhighways of the future. Already the State of Pennsylvania is pointing the way by authorizing the construction of what has been called the greatest road engineering project ever undertaken in the United States - a 164-mile, $80,000,000 toll boulevard stretching through the Allegheny Mountains from Harrisburg to Pittsburgh…”

***Popular Science,* May 1938**

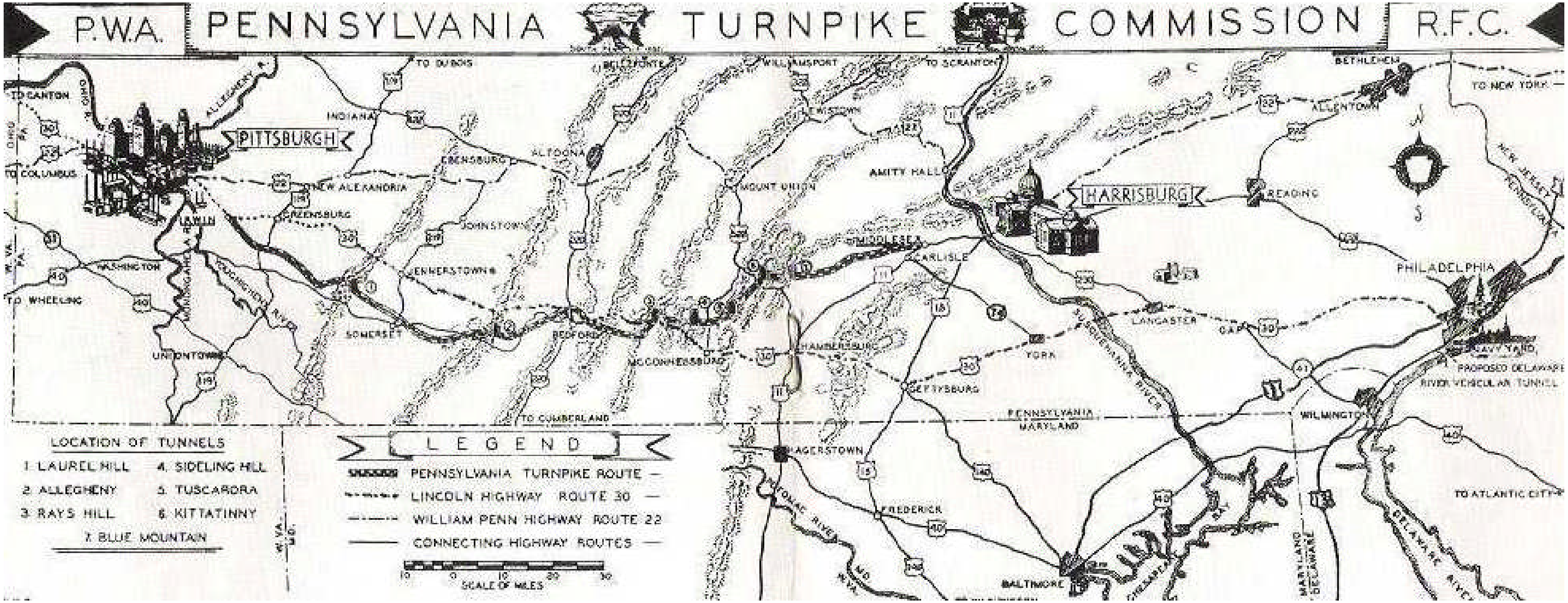
America’s Superhighway



"Embodying the most modern principles of express highway design, the 160-mile Pennsylvania Turnpike connecting Pittsburgh and Harrisburg offers the motorist a route from the eastern seaboard to the west that is free from crossroads, stop-lights and steep grades. As a consequence, it is America's first highway on which full performance of today's automobiles can be realized…"

***Popular Mechanics,* March 1941**

RE: the original roadway was 160 miles long; running from Irwin (east of Pittsburgh) to Middlesex (west of Harrisburg) The *Pennsylvania Turnpike* was the first roadway in the U.S. that had no cross streets, no railroad crossings and no traffic lights over its entire length. In 1940, this was revolutionary.



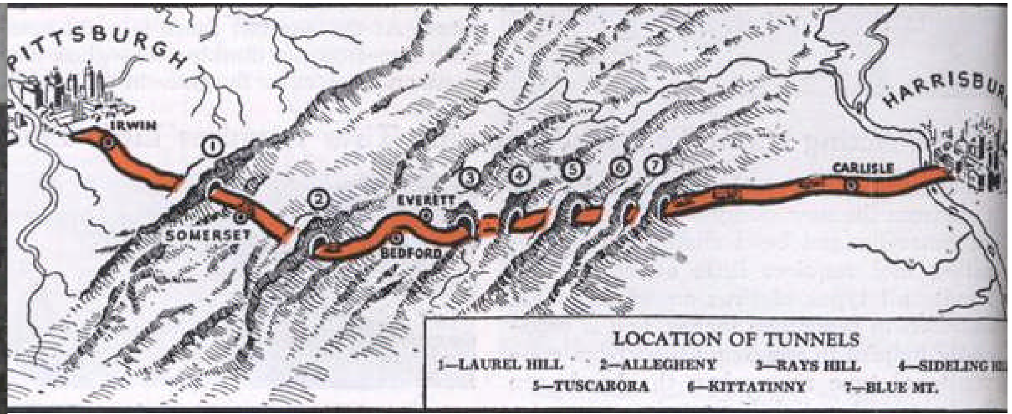
"…The proposed route will follow a $10,000,000 railroad right of way, hacked out of the forests in the 1880's, and on which not one length of track has ever been laid. Built during a bitter feud between rival railroad interests, and abandoned after they concluded a truce, the unused roadbed runs through nine rock tunnels along its route for a total tunnel length of more than seven miles. Engineers' reports indicate the startling advantages the toll road will have over present traffic routes through the mountains and suggest some of the features that may be expected in future superhighways. From Harrisburg west to Pittsburgh, cars now have to climb nine-percent grades for a total of 13,880-feet. Over the new boulevard, cars will ascend a total of only 3,940-feet up grades that never exceed three percent. The route will eliminate four railroad and twenty-six highway grade crossings. Three quarters of its length will be entirely free from curves. On one straightaway, motorists will drive for forty miles without meeting a single bend in the road…"

***Popular Science,* May 1938**

Ground breaking ceremonies were held on October 27th 1938, on a farm in *Cumberland County*. Nine months later, the entire PT was under contract. Concrete paving began in August 1939, however, inclement weather (in early 1940) prevented paving. By the spring of 1940, only thirteen miles of roadway had a concrete surface. As summer approached, the rate of completion increased to as much as 3.5 miles per day. Progress in the tunnels was much slower than for the surface roadway and varied from about eleven to thirty-six feet per day (depending upon the amount and hardness of the rock encountered). None of the original 1885 *Vanderbilt Tunnels* had been "holed through" to completion (the *Kittatinny Mountain Tunnel* was most nearly holed through with 550-feet remaining to be excavated, but was problematic so it was not holed through first). The first tunnel to be holed through was the shortest: *Ray's Hill,* occurring on January 22nd 1940. Consideration was given to building an eighth tunnel through *Clear Ridge* (east of Everett), however, it was decided to dig a 150-foot-deep cut instead. At the time, it was the deepest highway cut in the U.S. and required the removal of approximately 1.1 million cubic yards of rock. Dubbed "Little Panama," the amount of rock taken out of the *Clear Ridge Cut* paled in comparison to the more than 200 million tons excavated for the *Panama Canal*.

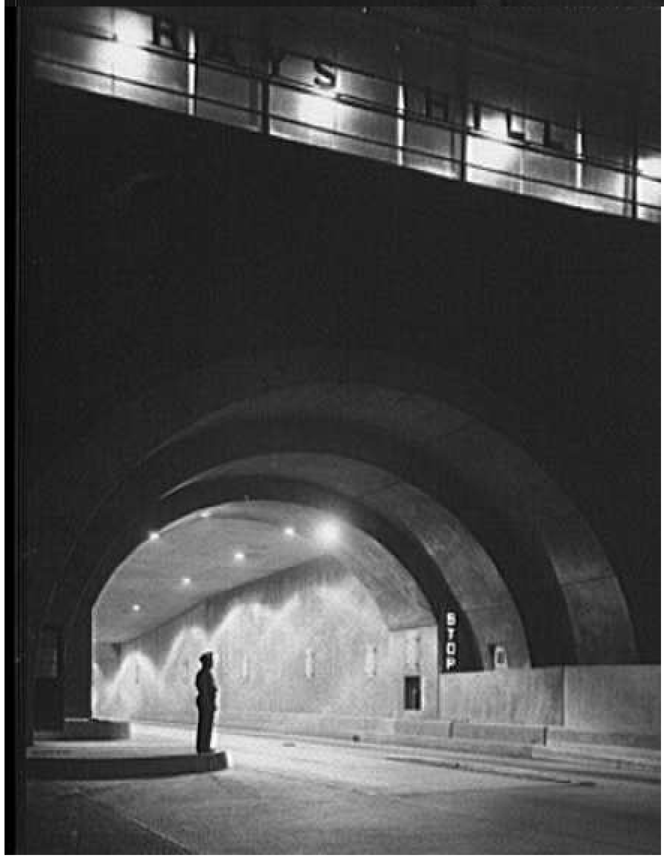
<u>Above</u>: caption: “Carving out a section of roadbed for the Pennsylvania Turnpike, 1939”

<u>Left</u>: caption: “The Tuscarora Tunnel was one of six uncompleted 19th Century tunnels used to build the PA turnpike”



One of the hallmarks of the original PT were the seven mountain tunnels. They were the most impressive and conspicuous features of the PT having a combined length of nearly seven miles. The use of these tunnels cut the cumulative climb between Pittsburgh and Harrisburg from nearly 14K-feet (traveling on *U.S. Route 30*) to under 4K-feet. The tunnels had large ventilation fans at each portal (*Ray's Hill*, the shortest of the PT's tunnels, had ventilation fans at only one portal).

Left: caption: "Tuscarora Tunnel Portal approach"

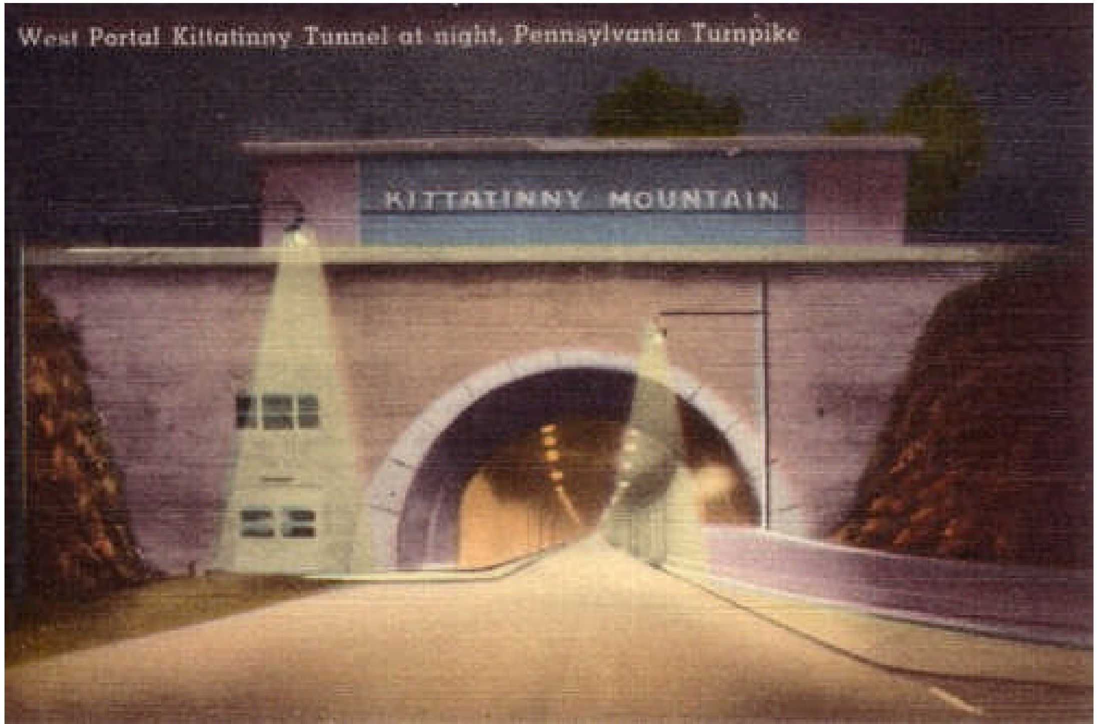


"…the interiors of the tunnels are bathed in the blue-green light of mercury lamps, and white light from incandescent lamps illuminates buildings at the interchanges…"

***Popular Mechanics,* March 1941**

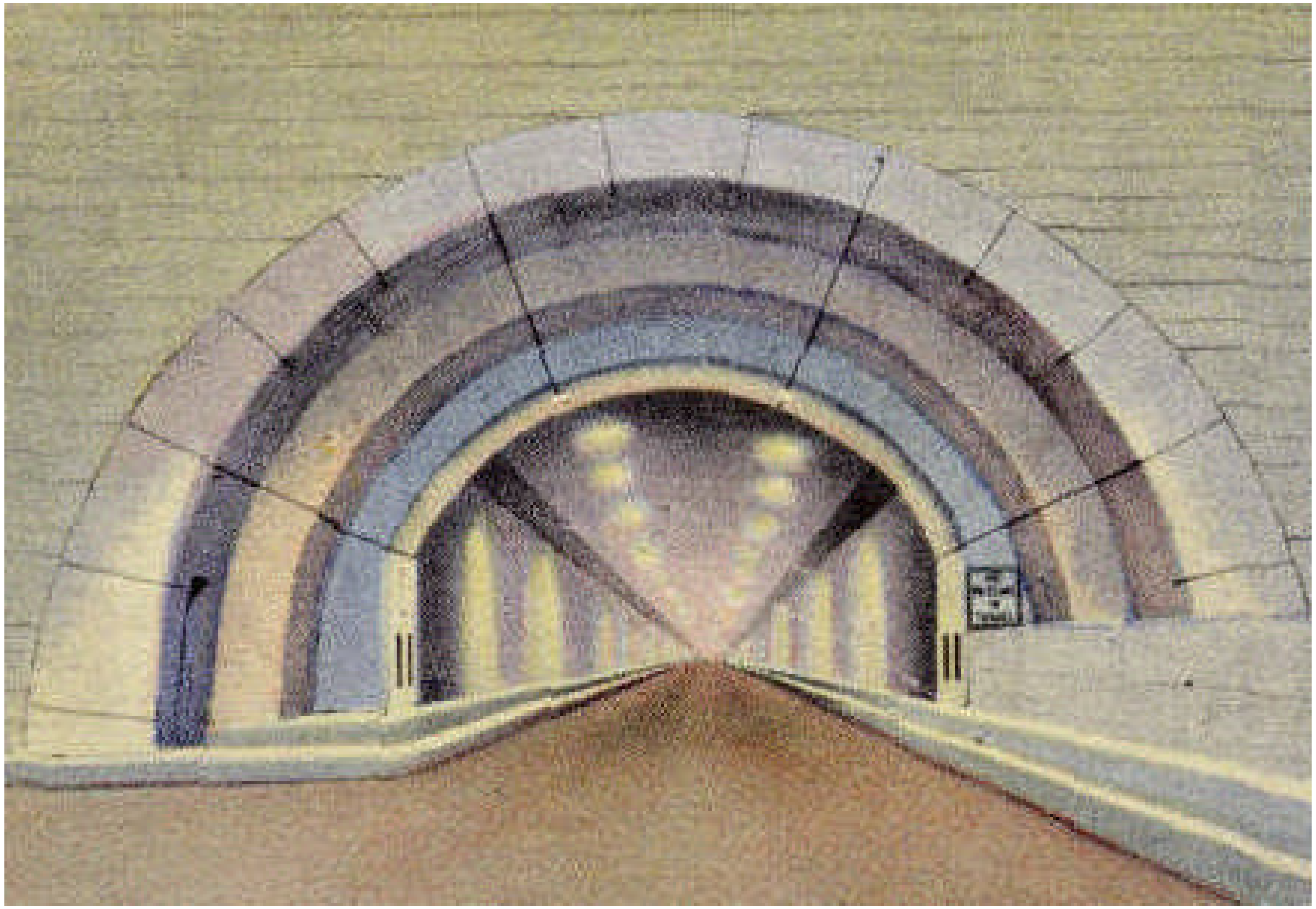
<u>Left T&B</u>: "Portal entrance to Ray's Hill Tunnel at night"

<u>Top Right</u>: caption: "Leaving tunnel on Pennsylvania Turnpike. Lighting is blue-green from mercury lights designed by Westinghouse."


West Portal Kittatinny Tunnel at night, Pennsylvania Turnpike
KITTATINNY MOUNTAIN


One of the Tunnels on Pennsylvania Turnpike "America's Super Highway"

"We came through the tunnels. The lights make them like a fairy land"
PT Motorist
RE: inscription on the back of a postcard (ca. 1940)



The PT would include:

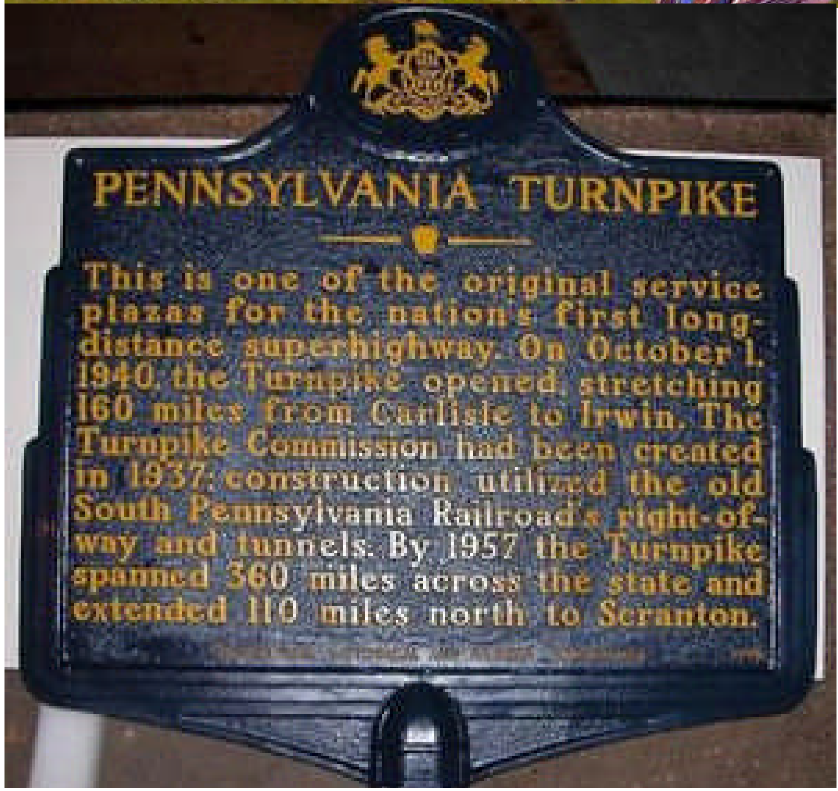
• **160 miles of four-lane, all concrete highway from Middlesex, in *Cumberland County* (15 miles west of Harrisburg) to *Irwin,* in *Westmoreland County* (20 miles east of Pittsburgh);**

• **Seven two-lane tunnels totaling 6.7 miles in length (six were former *South Pennsylvania RR* (SPRR) tunnels. Two other former SPRR tunnels were bypassed with open cuts;**

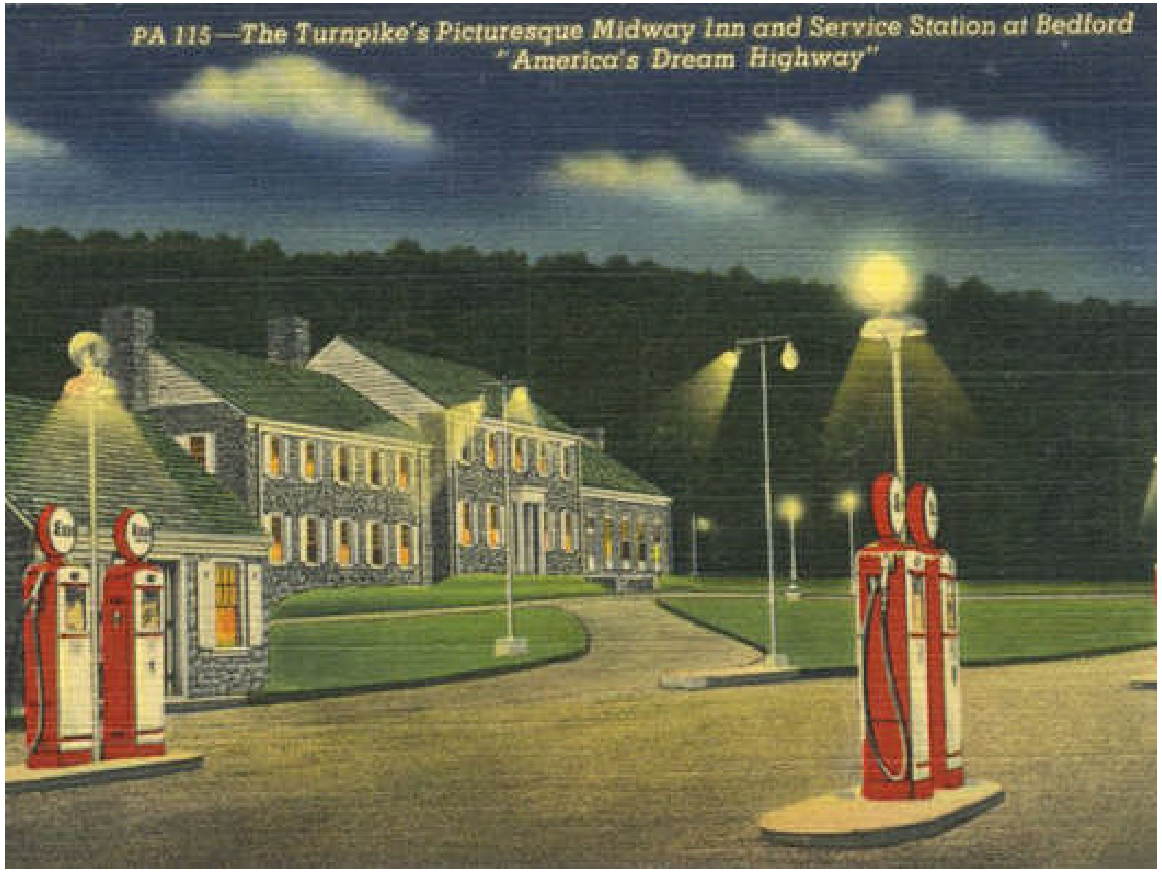
• **Eleven interchanges with toll booths, and;**

• **Ten service plazas, located 25 to 30 miles apart where the traveler could eat and/or purchase gasoline.**

Following the example of the *Autobahn*, the PT planners used regional architecture in the form of early PA stone houses for the service plazas. *Standard Oil of Pennsylvania* operated the gas stations while *Howard Johnson's* operated the dining areas and gift shops.



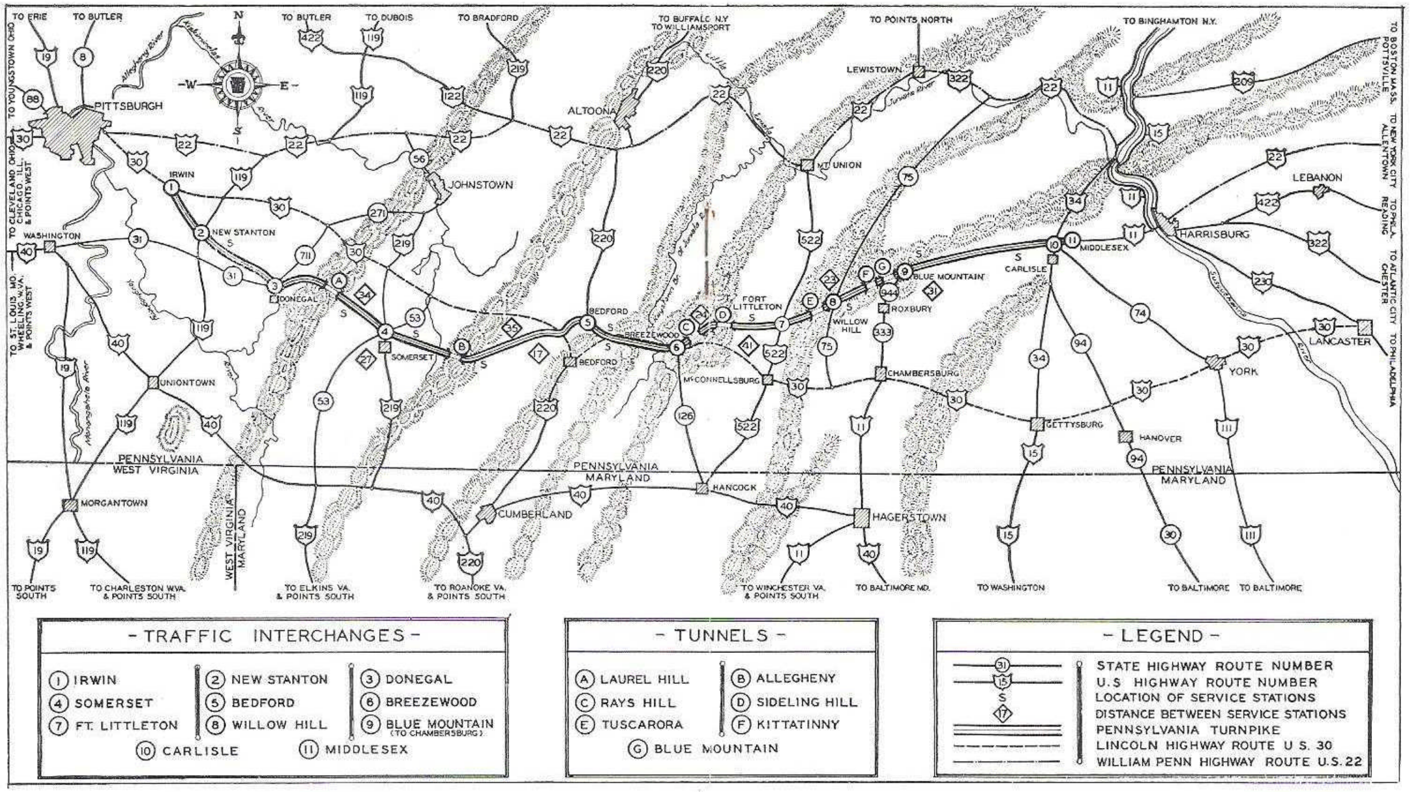
Top Left: *Sideling Hill Service Plaza* (present day)
Top Right: *New Stanton Service Plaza* (ca. 1941)
Left: Historic Route Marker (at service area)


PA 115—The Turnpike's Picturesque Midway Inn and Service Station at Bedford
"America's Dream Highway"

“The Pennsylvania Turnpike will meet one of the country’s greatest needs – safe and rapid motor transportation through the Appalachian Mountains. Furthermore, actual savings in money will be made possible for all who use it. And money savings naturally appeal to owners and operators of motor cars. This is primarily significant in the operation and maintenance of trucks. On the present highways it is sometimes necessary to transfer heavy freight loads to specially equipped high-powered trucks for the trip over the mountains. Much of the trip also must be made in second or low gear. On the Turnpike, however, the heaviest modern truck will travel the entire 160 miles in high gear. Seventy trucking companies interviewed by the Commission’s Traffic Engineers agreed that substantial monetary savings will result from the Turnpike in the following particulars:

- *Safe operation at higher speeds in all kinds of weather;*
- *Reduced fuel cost;*
- *Reduced tire cost (because of lower grades and reduced breaking effort);*
- *Reduced maintenance cost (because of lower grades and reduced curves, with resulting lessening of strain on transmission, brakes and engine);*
- *Utilization of lower powered trucks for the same payload and of increased payload for present size of unit;*
- *Saving of time ranging from two to six hours per trip between Harrisburg and Pittsburgh;*
- *Reduction of accidents with corresponding saving in insurance rates;*
- *Trucks and other slow moving vehicles will use the outside lane.”*

Pennsylvania Turnpike Commission **(1940)**



FARE SCHEDULE

Vehicle Type: PASSENGER CARS

LIGHT TRUCKS
Allowable Gross Weight: Up to 7,000 lbs.
Penna. License Class: R, S
Full Length Fare: $1.50
Full Length Round Trip Fare for Passenger Cars Without Trailers: $2.25

CLASS 2

INTERCHANGE	Irwin	New Stanton	Donegal	Somerset	Bedford	Breezewood	Ft. Littleton	Willow Hill	Blue Mt.	Carlisle
NEW STANTON	.10									
DONEGAL	.25	.15								
SOMERSET	.40	.35	.20							
BEDFORD	.75	.70	.55	35						
BREEZEWOOD	.90	.85	.70	.50	.15					
FT. LITTLETON	1.10	1.05	.90	.70	.35	.20				
WILLOW HILL	1.20	1.15	1.00	.80	.50	.35	.15			
BLUE MT.	1.30	1.25	1.10	.90	.60	.45	.25	.10		
CARLISLE	1.50	1.45	1.30	1.10	.80	.65	.45	.30	.20	
MIDDLESEX	1.50	1.45	1.30	1.15	.85	.70	.50	.35	.25	.10

VEHICLE TYPE	ALLOWABLE GROSS WEIGHT	PA. LICENSE CLASS	FULL LENGTH FARE*
Medium Trucks	7,000–15,000 lbs.	T, U, RZ, SZ	$3.00
Heavy Trucks	15,001–19,000 lbs.	V, TZ	$4.00
Heavy Trucks	19,001–24,000 lbs.	W, UZ	$4.50
Heavy Trucks	24,001–30,000 lbs.	Y, Z, VZ	$5.00
Heavy Trucks and Tractor Trucks with Semi-Trailers	30,001–32,000 lbs.	WZ	$6.00
Heavy Trucks and Tractor Trucks with Semi-Trailers	32,001–45,000 lbs.	YZ, ZZ	$7.50
Trucks and Full Trailers	45,001–62,000 lbs.	(No Letters)	$10.00

*Truck Fares for all intermediate points is on a mileage basis.

For Further Information Write the Pennsylvania Turnpike Commission, Harrisburg, Pa.

"…While there will be some monetary savings in the operation of passenger cars, the principal reason why such motorists will use the Turnpike is because of the added convenience, safety and comfort as well as saving in time. The Turnpike will eliminate 90 percent of all causes of accidents - no head-on collisions, no side-swiping, no grade crossings or intersections, no striking of pedestrians or stationary objects along the right-of-way. Hazards of snow, ice and fog now found on roads over the mountains at nearly all seasons of the year are practically eliminated on the superhighway. The Turnpike is above flood levels, thus insuring access to and from Pittsburgh in event of recurrence of disastrous floods."

***Pennsylvania Turnpike Commission* (1940)**

RE: the *Pennsylvania Turnpike* officially opened on October 1st 1940. Highway engineers had always designed highways with flat curves to discourage speeding. For the PT, long sweeping curves provided ample room for high speeds and safe stopping distances. Easy grades would also allow year-round use of the PT.


SPEED
LIMIT
70
MILES

Highlights and Interesting Facts on

PENNSYLVANIA'S SUPER-HIGHWAY

LENGTH: From Irwin to Middlesex, 160 miles, represents a reduction in mileage over existing routes, and will result in considerable saving of time and convenience to the traveler, through 7 miles of tunnels in the entire route, 4½ miles of which were excavated by the Old South Penn Railroad from 1881–1885.

TYPE OF ROADWAY: Modern four-lane concrete highway, with east-west traffic separated by a 10-foot center parkway. Width of each traffic lane is 12 feet. The highway carries throughout its length divided dual-lane roadways of 24-foot width; except in tunnels, where the roadway section reduces to two 11½ ft. traffic lanes. One-way traffic will serve to insure safety, comfort and speed to all users.

GRADES AND CURVES: Maximum ascending grades throughout entire length of highway does not exceed 3 per cent. Besides a considerable saving in time, trucks will be assured greater safety and less mechanical faults by the use of these low grades, especially when traveling down-hill. Curves, averaging about one to a mile, are limited to about 4 degrees with only a couple at six degrees having a radius of 955 feet and permitting maximum sight distance.

CROSSINGS: There are no railroad or highway crossings at grade anywhere along the route. At selected points, ramps are constructed permitting motorists to enter or leave the super-highway with freedom and safety. Toll houses are constructed near these locations off the highway at (1) Irwin, (2) New Stanton, (3) Somerset, (4) Bedford, (5) Breezewood, (6) Fort Littleton, (7) Willowhill, (8) Blue Mountain, (9) Carlisle, and (10) Middlesex.

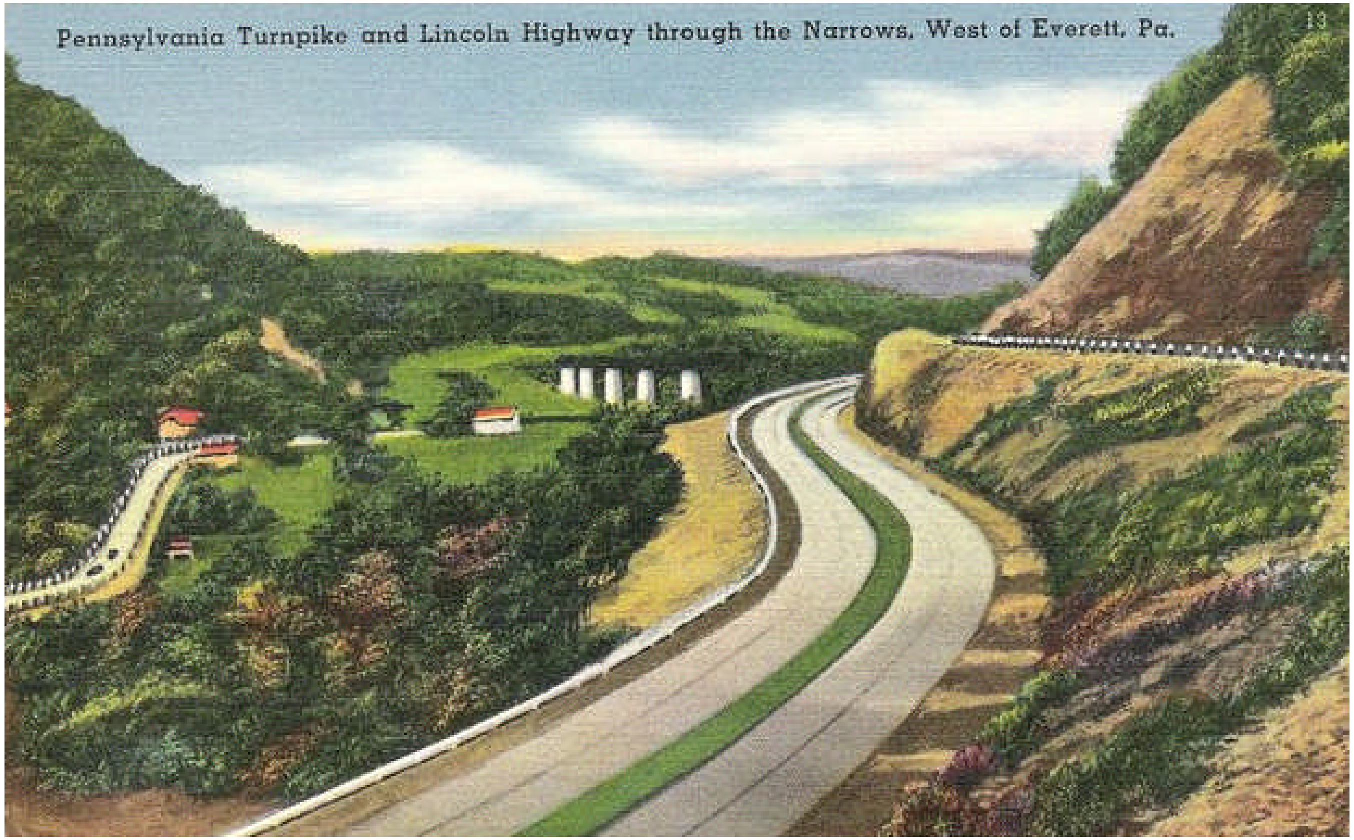
DESCRIPTION AND LOCATION: Beginning at Middlesex, 13 miles west of Harrisburg, the route of the Turnpike passes through the southern portion of the state piercing the Alleghenies with eight tunnels, by-passing all towns, and reaching its western terminus at Irwin, 15 miles east of Pittsburgh. The super-highway is located, where possible, on the southern and western slopes of the hills, thereby receiving maximum benefit of sunshine which will facilitate traveling in adverse weather conditions such as snow, ice, rain, and fog. This serves to reduce maintenance cost, especially snow removal and cindering in icy weather.

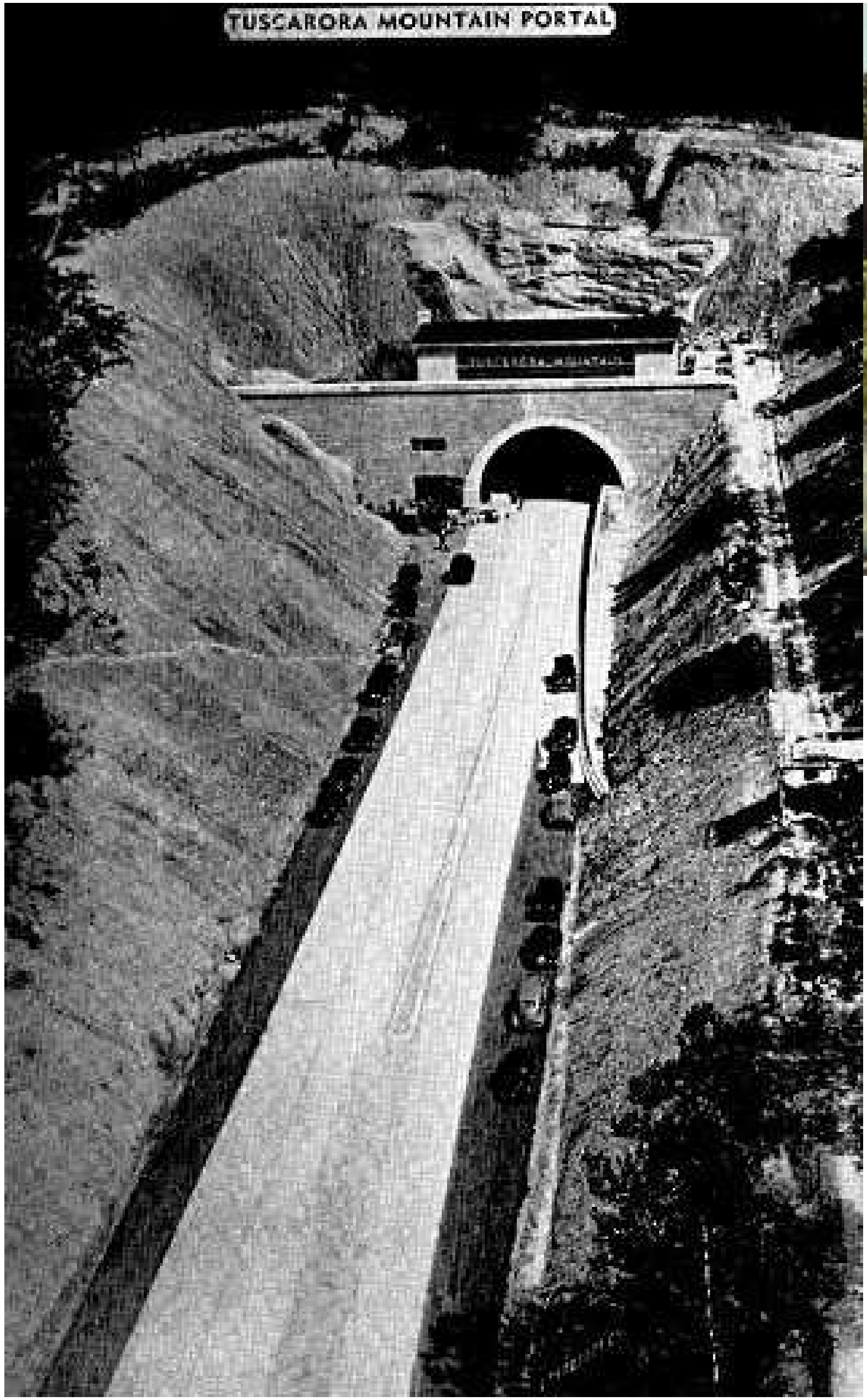
EMPLOYMENT: Thousands of men were given employment by the super-highway project, not only in construction, but in the manifold industries which contribute to road building. In materials alone, the project required 770,000 tons of sand, 1,200,000 tons of stone, 50,000 tons of steel, and 392,000 tons of cement. The project accounts for 51,345 man years of direct and indirect employment. Most productive labor was hired by the contractors through the Re-employment Offices affiliated with the State Bureau of Unemployment Compensation.

COST: The super-highway cost roundly $61,100,000. It was financed by a grant of the P. W. A. for $26,100,000, and $35,000,000 in Turnpike Revenue Bonds purchased by the R. F. C., thus placing no burden on the State funds that are earmarked for improvements and construction of existing highways. Through the tolls charged the highway will in time pay for itself, and become the property of the State.

The design of the PT featured:

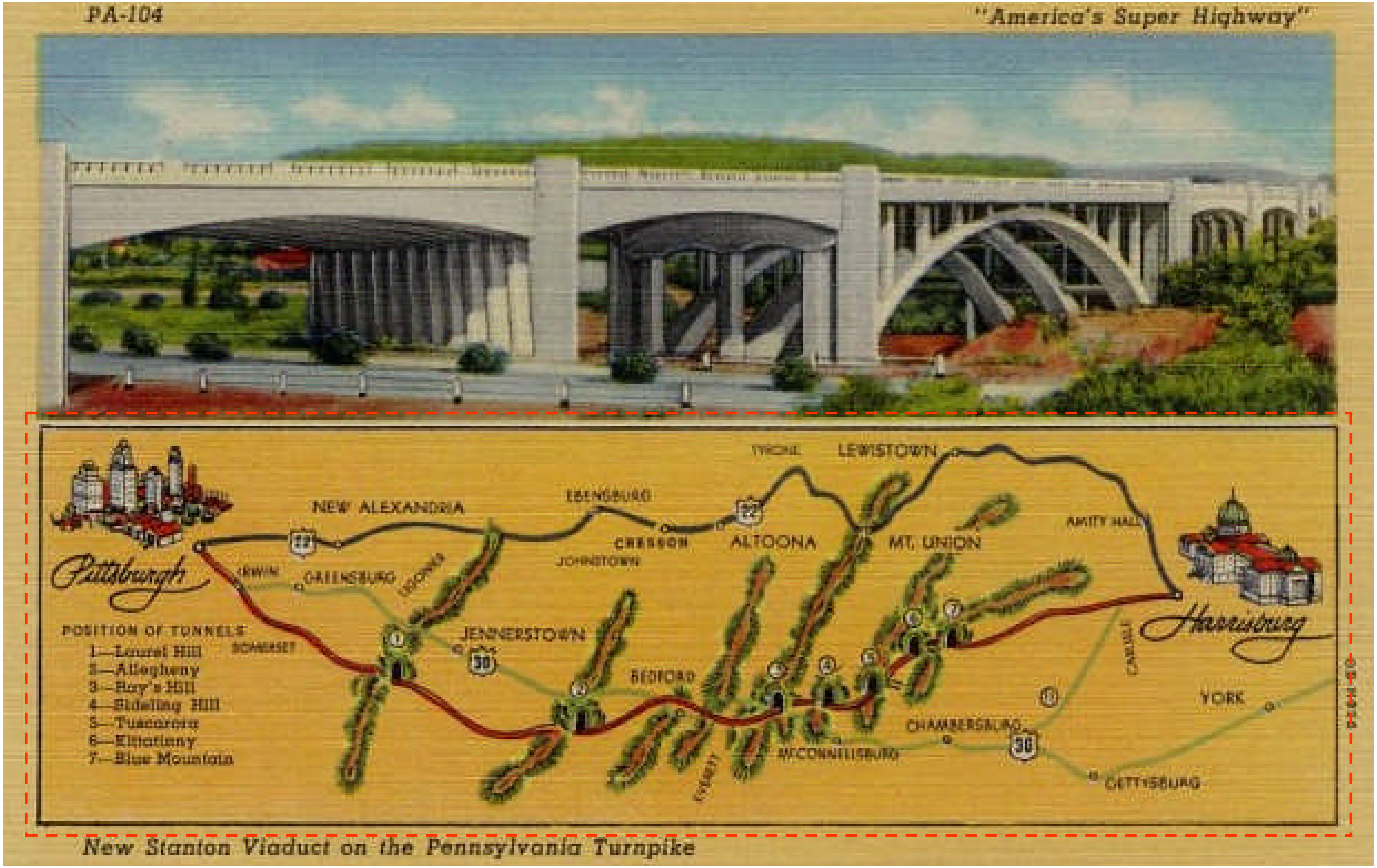
- **A right-of-way width of 200-feet;**
- **A four-lane (two in each direction) divided configuration, with 12-foot wide concrete traffic lanes, a 10-foot wide median strip and ten-foot wide berms (shoulders);**
- **A maximum grade of 3% (3-feet of climb for every 100-feet of forward travel). By comparison, on the old two-lane *William Penn* (US 22) and *Lincoln Highway/s* (US 30), hills as steep as 9% to 12% were encountered;**
- **Maximum curvature of six-degrees (most curves were three or four-degrees) with substantial "Superelevation" (banking) on curves;**
- **Limited access design (with 1,200-foot long entrance and exit ramps) and eleven interchanges;**
- **Ten service plazas located along the right-of-way for traveler convenience;**
- **A minimum 600-foot sight distance from motorist to traffic ahead, and;**
- **No cross streets, traffic signals, driveways or railroad grade crossings (all vehicular and/or pedestrian traffic would travel under or over the PT).**


Pennsylvania Turnpike and Lincoln Highway through the Narrows, West of Everett, Pa.
13



<u>Above</u>: caption: "The PA turn-pike immediately caught the public's imagination. Here cars pass through an original toll booth."

<u>Left</u>: caption: "Western Portal of Tuscarora Tunnel shortly before the opening of the Turnpike in 1940"



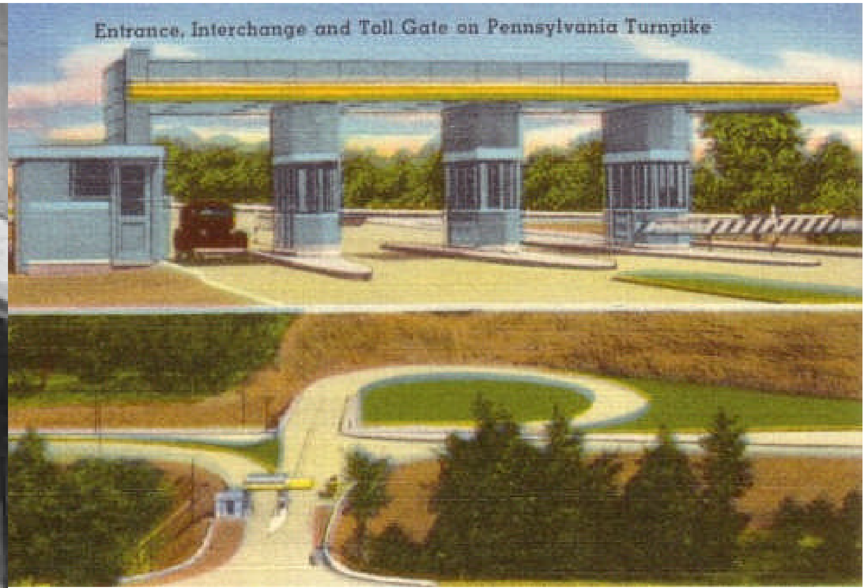
<u>Above</u>: ca. 1950 postcard shows the original seven PT tunnels. West-to-East (left-to-right) they were: *Laurel Hill*, *Allegheny*, *Rays Hill*, *Side-ing Hill, Tuscarora, Kittatinny* and *Blue Mountain*.

turnpike **(n.) early 15c., "spiked road barrier used for defense," from *turn* + *pike* (n.2) "shaft." Sense transferred to "horizontal cross of timber, turning on a vertical pin" (1540s), which were used to bar horses from foot roads. This led to the sense of "barrier to stop passage until a toll is paid" (1670s). Meaning "road with a toll gate" is from 1748, shortening of *turnpike road* (1745).**

Online Etymology Dictionary

A toll road, also known as a *turnpike* or *tollway*, is a public or private roadway for which a fee (or *toll*) is assessed for passage. It is a form of road pricing typically implemented to help recuperate the cost of road construction and maintenance, which (on public roads) amounts to a form of taxation.

Wikipedia



"…A toll of $1.50 is charged for the 160-mile run."
Popular Mechanics, **March 1941**
Above: caption: "Entrance Interchange and Toll Gate on Pennsylvania Turnpike"
Left: caption: "An interstate trucker pays his toll on the new Pennsylvania Turnpike"

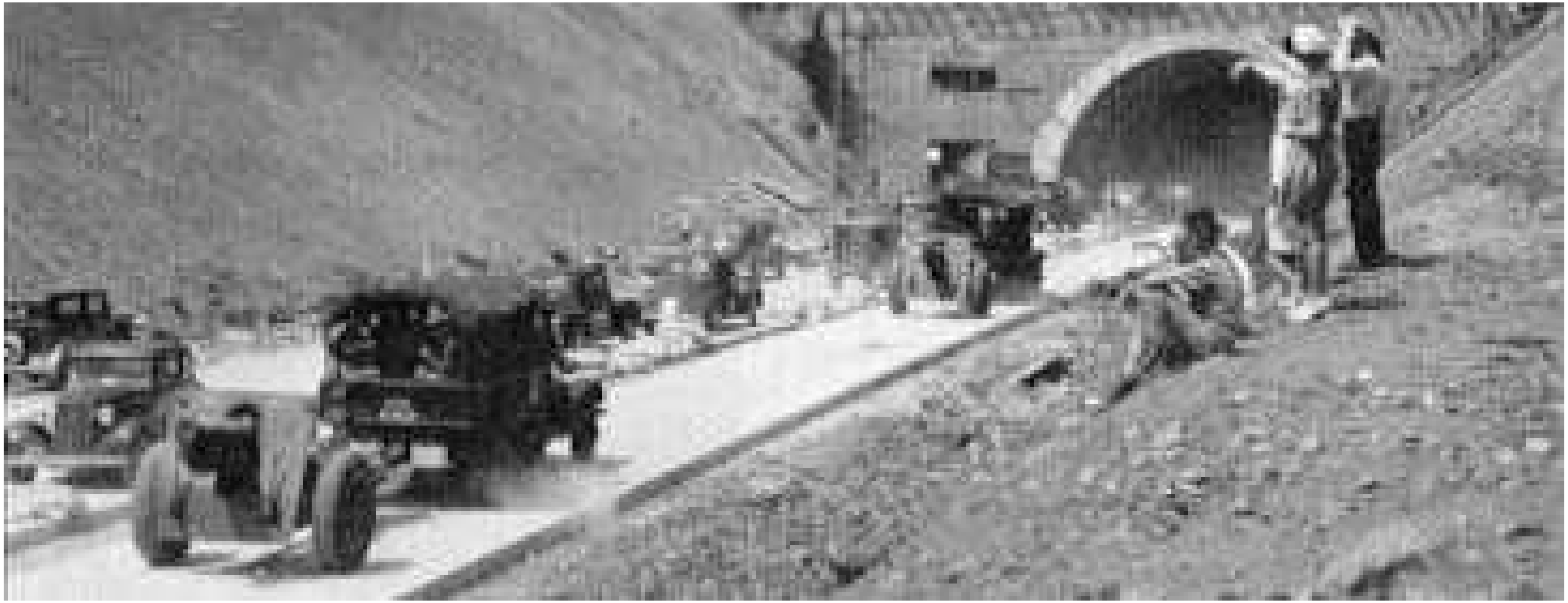
Whether or not the PT could generate enough revenues from the collection of tolls was the subject of debate prior to its opening. The PTC estimated that 1.3 million vehicles per year would use the new road while critics made estimates as low as 260K vehicles per year. Using the PT cut the normal 5.5 hour trip between Harrisburg and Pittsburgh to about 2.5 hours and, from the very beginning, the tremendous advantage in time savings generated traffic volume much greater than the Turnpike's planners envisioned, in spite of the tolls. Traffic the first few days the PT was open averaged about 6K vehicles per day. Sunday, October 6th 1940 was the first opportunity many people had to drive on the new road and the PTC was not prepared to handle the onslaught of people wanting to take advantage of that opportunity. Traffic was backed up for miles at some of the interchanges while toll booth attendants tried to collect tolls and return change. The traffic tie-ups were finally broken around 11:00 P.M. that evening after 27K vehicles used the new highway during the day. In the aftermath, the PTC added temporary toll booths at the interchanges. The following Sunday, 30K vehicles used the PT, but this time without the traffic jams experienced the previous weekend.


PITTSBURGH

Initially, the PT had no speed limit. However, during the first several months of operation after opening, it became obvious that relying on the common sense of the average motorist was a fool's errand. Thus, in April 1941, a speed limit of 70 mph was imposed (the speed limit in the tunnels was 35 mph). Even with the imposed speed limit, the advantages of the PT over the other two main routes: State Route 22 and U.S. Route 30 (***Lincoln Highway***) were obvious to most.

<u>Above</u>: caption: "The PA turnpike immediately caught the public's imagination. Here cars pass through an original toll booth."

Important in National Defense



"…Important in national defense is the fact that the two twenty-four-foot lanes of the turnpike permit easy movement of motorized troops. Its structure is sufficient to carry the ten-wheeled anti-aircraft guns, which are among the heaviest of mobile military equipment…"

Popular Mechanics, **March 1941**

RE: the PT had been open for slightly over a year when the U.S. was drawn into WWII in December 1941. For the next four years, the volume of traffic on the PT was drastically reduced (as was traffic elsewhere) during the war due to gas rationing. Because of the strategic value of the PT, special details of state troopers were stationed at the tunnel portals to stop and question any suspicious vehicles/persons from entering. In fact, vehicular traffic was so scarce during the war years that families were observed picnicking in the median of the roadway.

<u>Above</u>: caption: "National Guard maneuvers over the Turnpike on August 6, 1940"

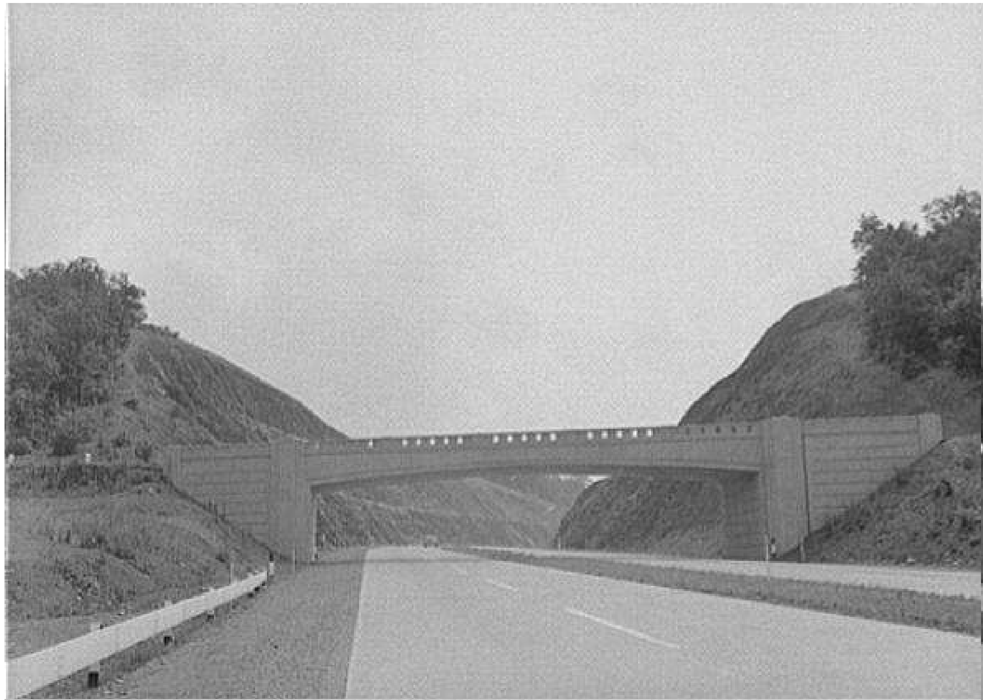
Until construction officially commenced in late October 1938, the PTC relied on funds provided by the Federal Government, the State Highway Department and loans from private citizens/industry. Initially, Chief Engineer *Samuel W. Marshall* supervised a staff of 115 engineers. By the beginning of 1939 the engineering staff had mushroomed to +1,100. This expansion of staff was necessary to meet the Federal Government's deadline for completion and the seasonal construction cycle. Contingent upon the approval of the PWA's (*Public Works Administration*) $29 million grant to the PTC was a May 1st 1940 date of "substantial completion" (an amendment would later change this date to June 1st 1940). Although the PT's planners envisioned a three-to-four year construction period, the PWA requirement meant that the PTC had just twenty months to complete the superhighway.

Design

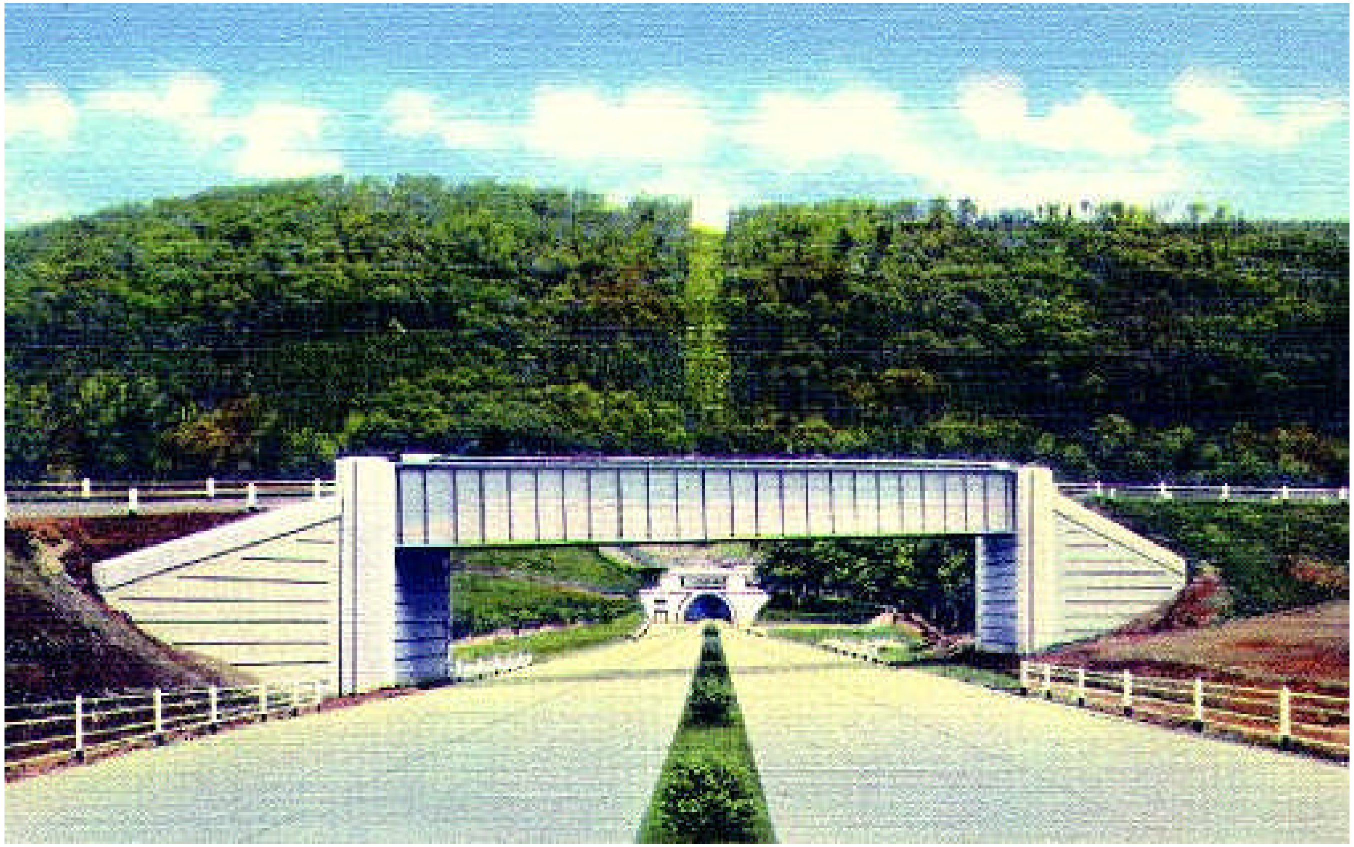
"Unlike the existing highway systems of the United States, in which design standards fluctuate every few miles, depending on the date of construction, the Turnpike will have the same design characteristics throughout its 160-mile length. Every effort has been directed towards securing uniform and consistent operating conditions for the motorist. In fact, the design was attacked from the viewpoint of motor-car operation and the frailty of the driver, rather from that of the difficulty of the terrain and method of construction. This policy of design, based on vehicle operation, is relatively new."

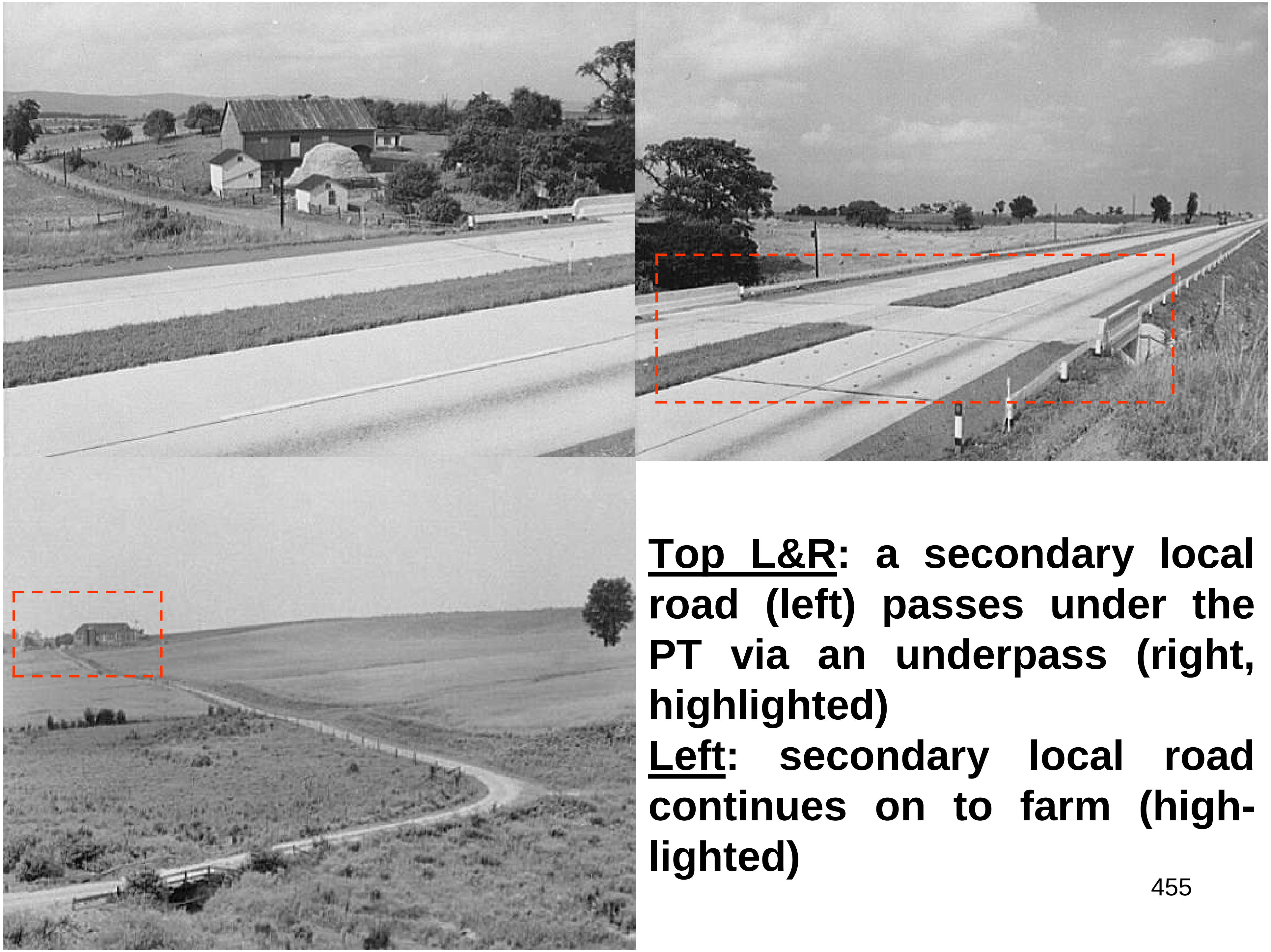
Charles Noble, **PTC Design Engineer**

RE: excerpt from an article Noble authored which appeared in the July 1940 issue of *Civil Engineering* magazine. Noble emphasized the "continuous design task" of creating a modern highway from Irwin to Carlisle, PA. Noble later served as Chief Engineer of the *New Jersey Highway Dept*. and the *New Jersey Turnpike Authority* (NJTA).



<u>Above & Left</u>: typical PT overpasses

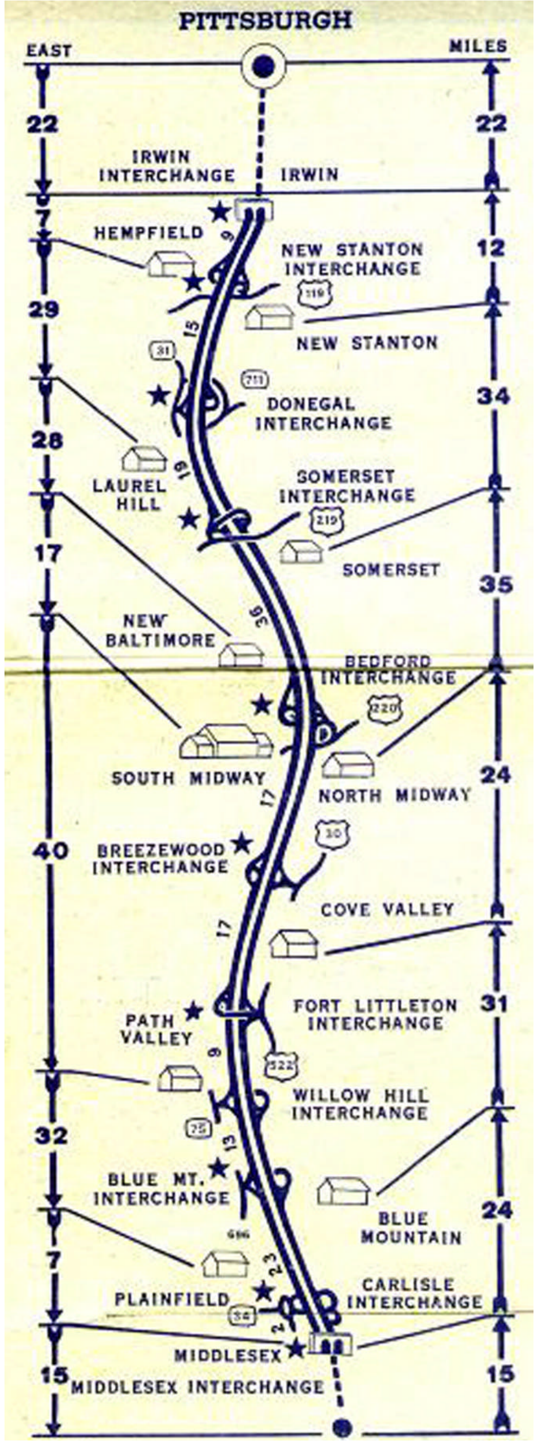




<u>Top L&R</u>: a secondary local road (left) passes under the PT via an underpass (right, highlighted)
<u>Left</u>: secondary local road continues on to farm (high-lighted)

<u>Top Left</u>: a gentle grade on the PT
<u>Top Right</u>: a banked curve on the PT
<u>Left</u>: straightaway on the PT

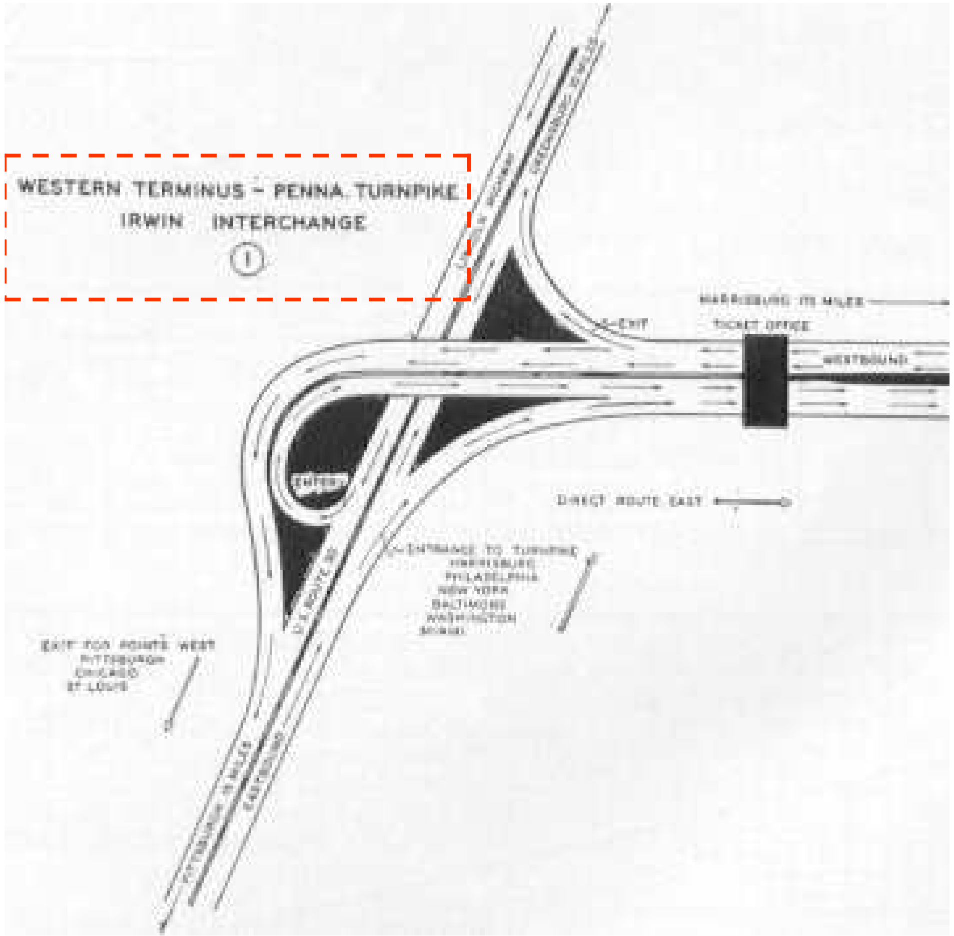
Interchanges



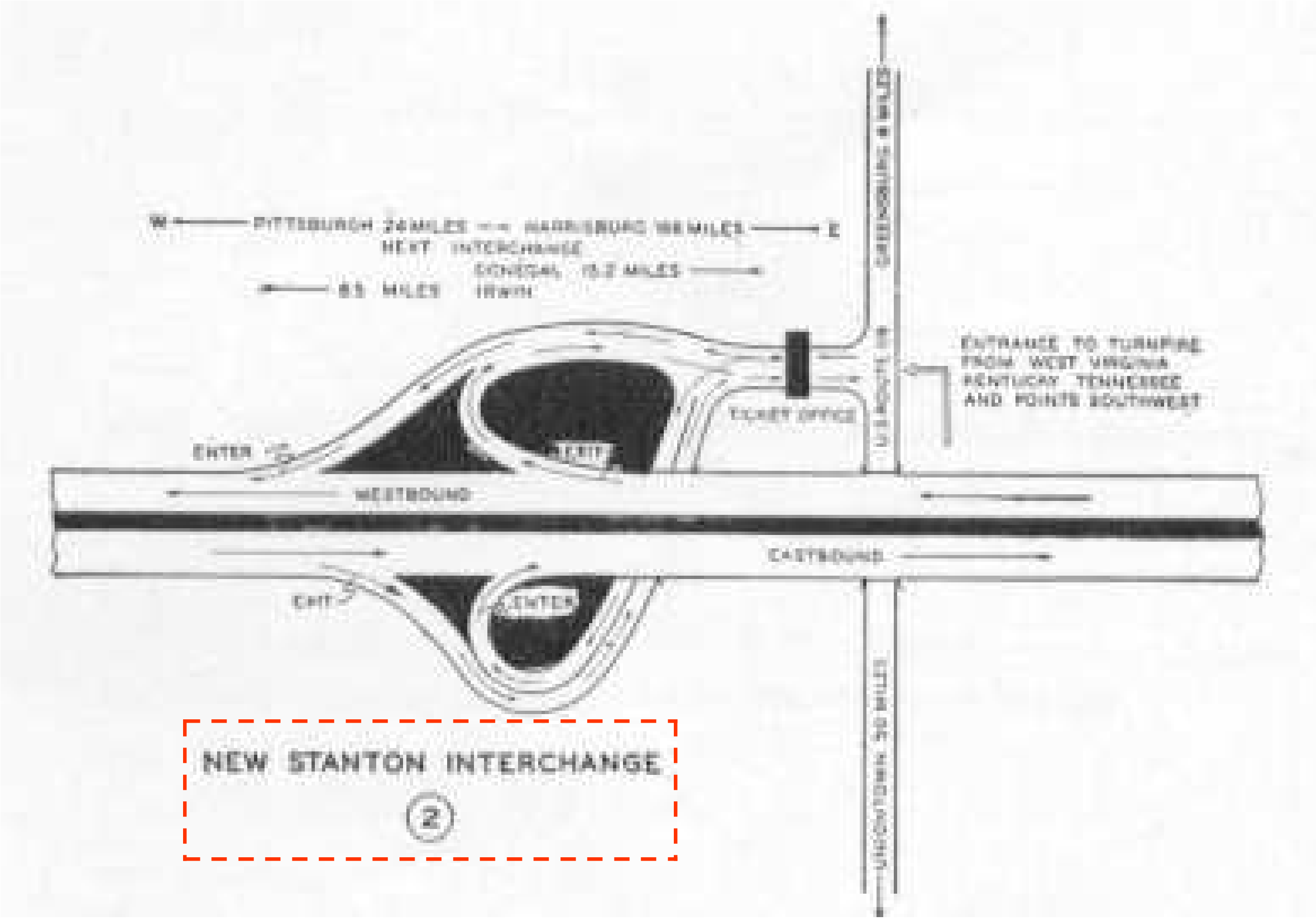
The eleven interchanges were strategically located at selected points along the route. From West (Pittsburgh, top) to East (Harrisburg, bottom), they were located at:

- **Irwin;**
- **New Stanton;**
- **Donegal;**
- **Somerset;**
- **Bedford;**
- **Breezewood;**
- **Fort Littleton;**
- **Willow Hill;**
- **Blue Mountain;**
- **Carlisle, and;**
- **Middlesex**

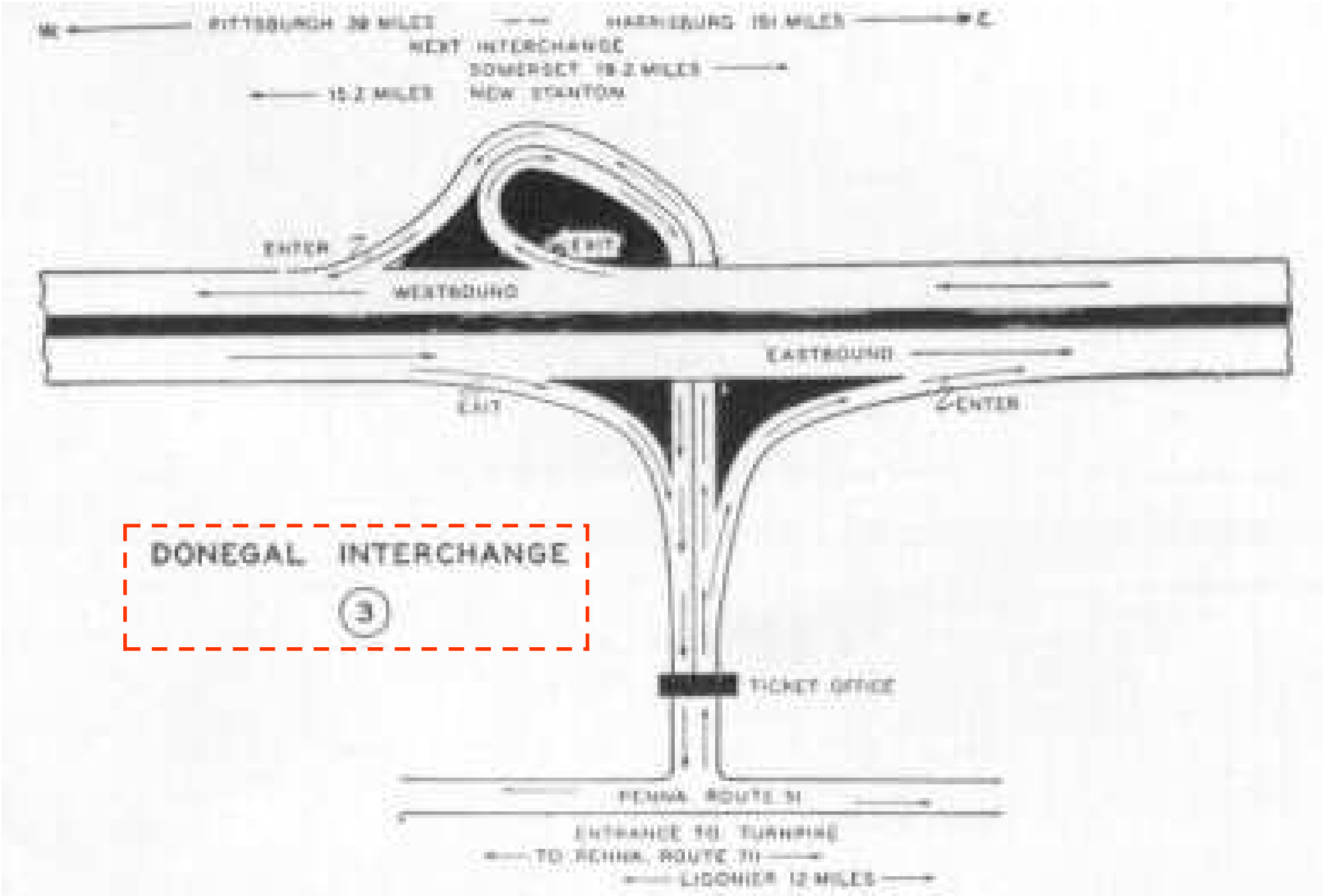
<u>Left</u>: caption: "Interchange Location Map"



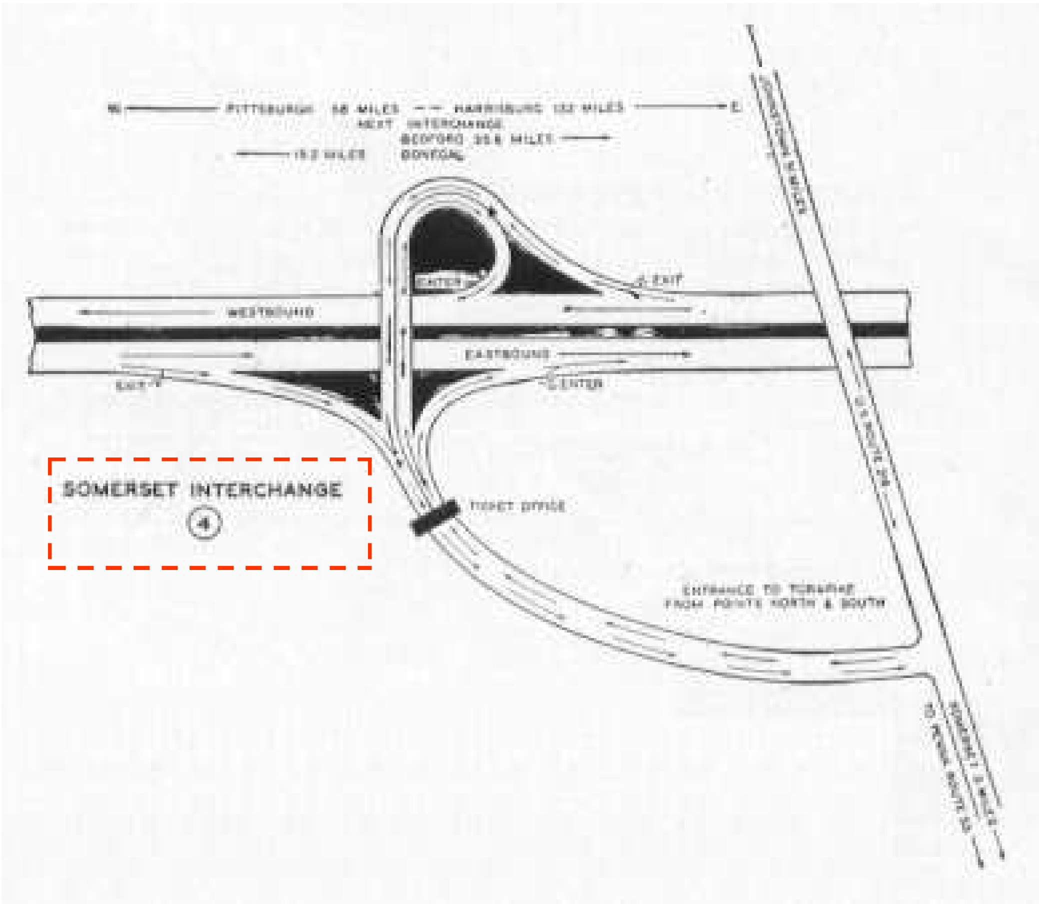
<u>Left</u>: caption: "Western Terminus – Penna. Turnpike: Irwin Interchange (1): This Interchange makes a direct connection with U.S. Route No. 30 (Lincoln Highway). Traffic to and from the Turnpike for points of destination are shown by the directional arrows. The ticket office at the western terminus is located directly across the Turnpike proper on six traffic lanes. All other ticket offices, except at Carlisle Interchange, are located off the Turnpike on spur lanes provided for entrance and exit (MILE 0)."



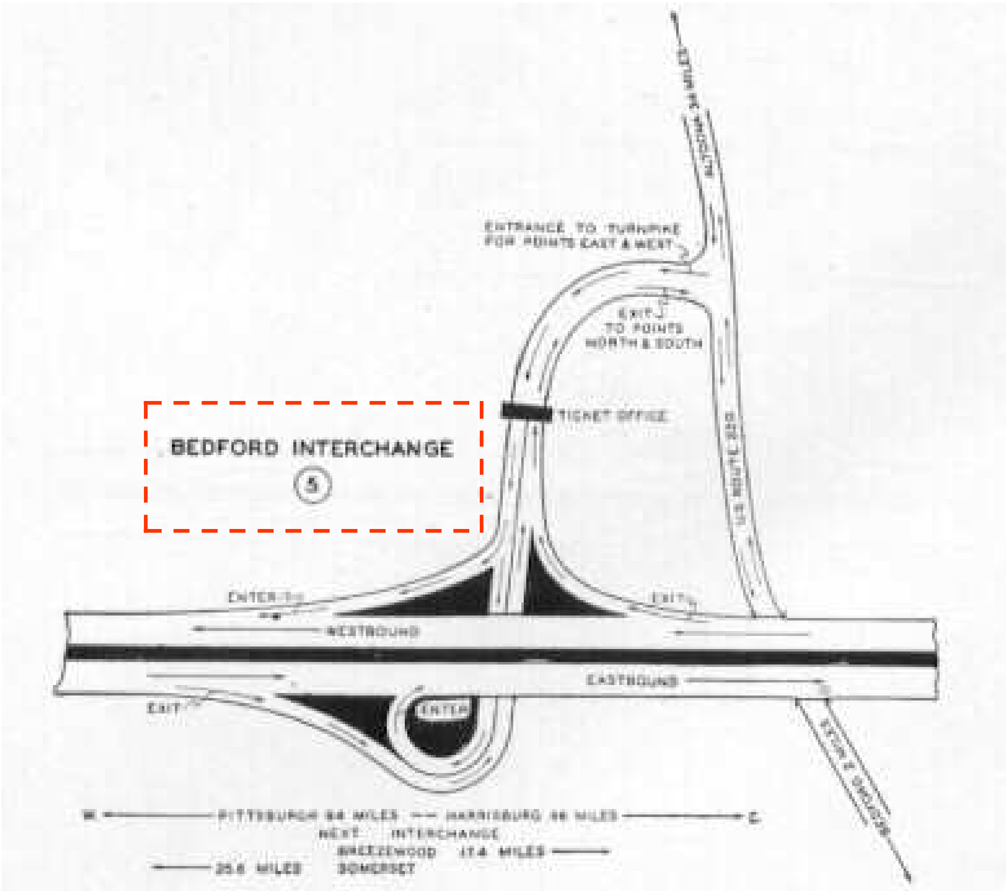
Above: caption: "New Stanton Interchange (2): This Interchange, being located on the heavily traveled U.S. No. 119, will serve to expedite traffic east and west across Pennsylvania from southwest to the east and vice-versa. Note ticket office is off the Turnpike proper. Follow directional arrows for correct guidance (MILE 8)."



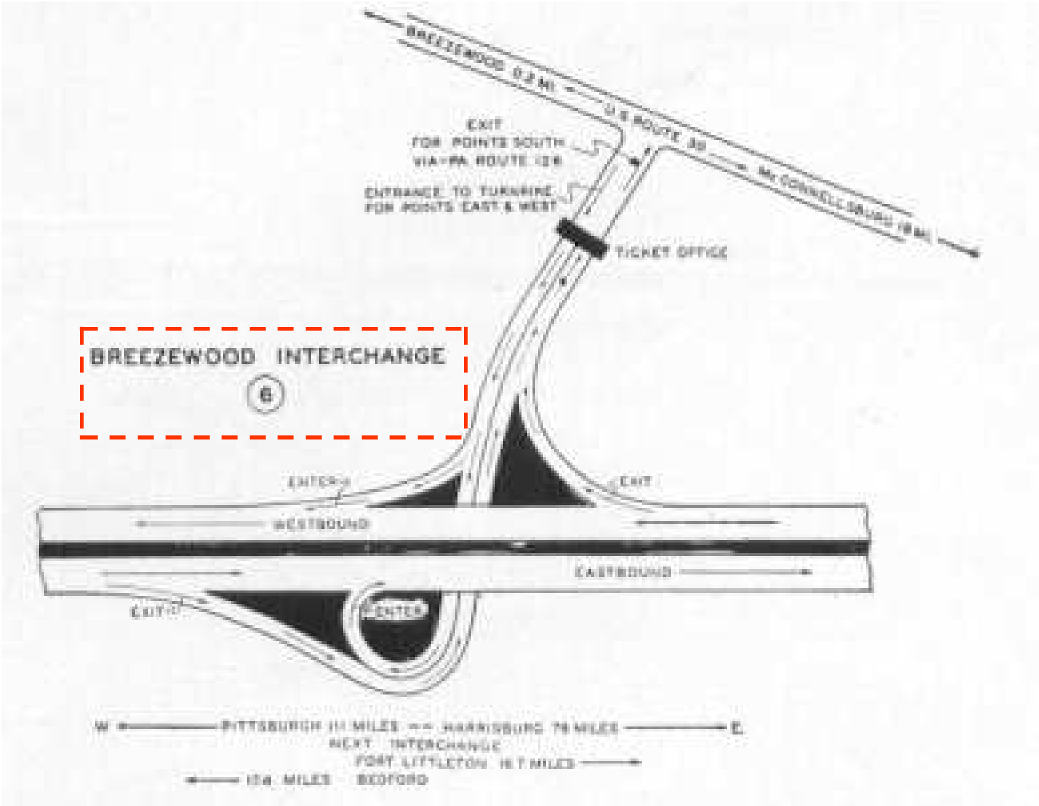
<u>Above</u>: **caption: "Donegal Interchange (3): This Interchange being located in a mountainous region and in the heart of a vacation-land serves as a direct connection to the nationally known town of Ligonier twelve miles north of this point. The annual Rolling Rock Horse Show is held in this community (MILE 24)."**



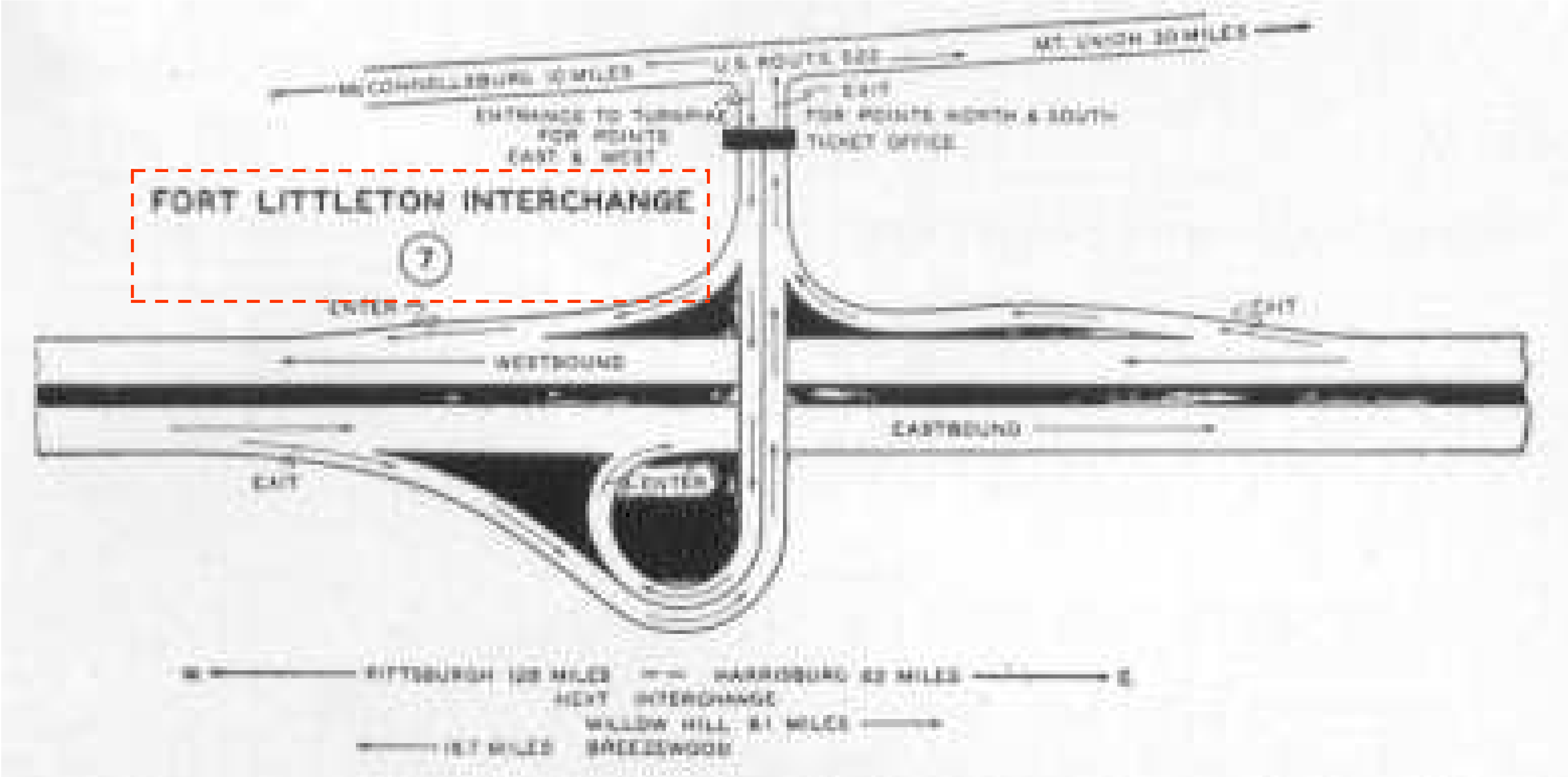
Left: caption: “Somerset Interchange (4): Somerset Interchange is located north and adjacent to the town and will serve as a direct connection to north-south traffic traveling on U.S. Route No. 219. Directional arrows point out destinations and mileage from the Interchange (MILE 43).”



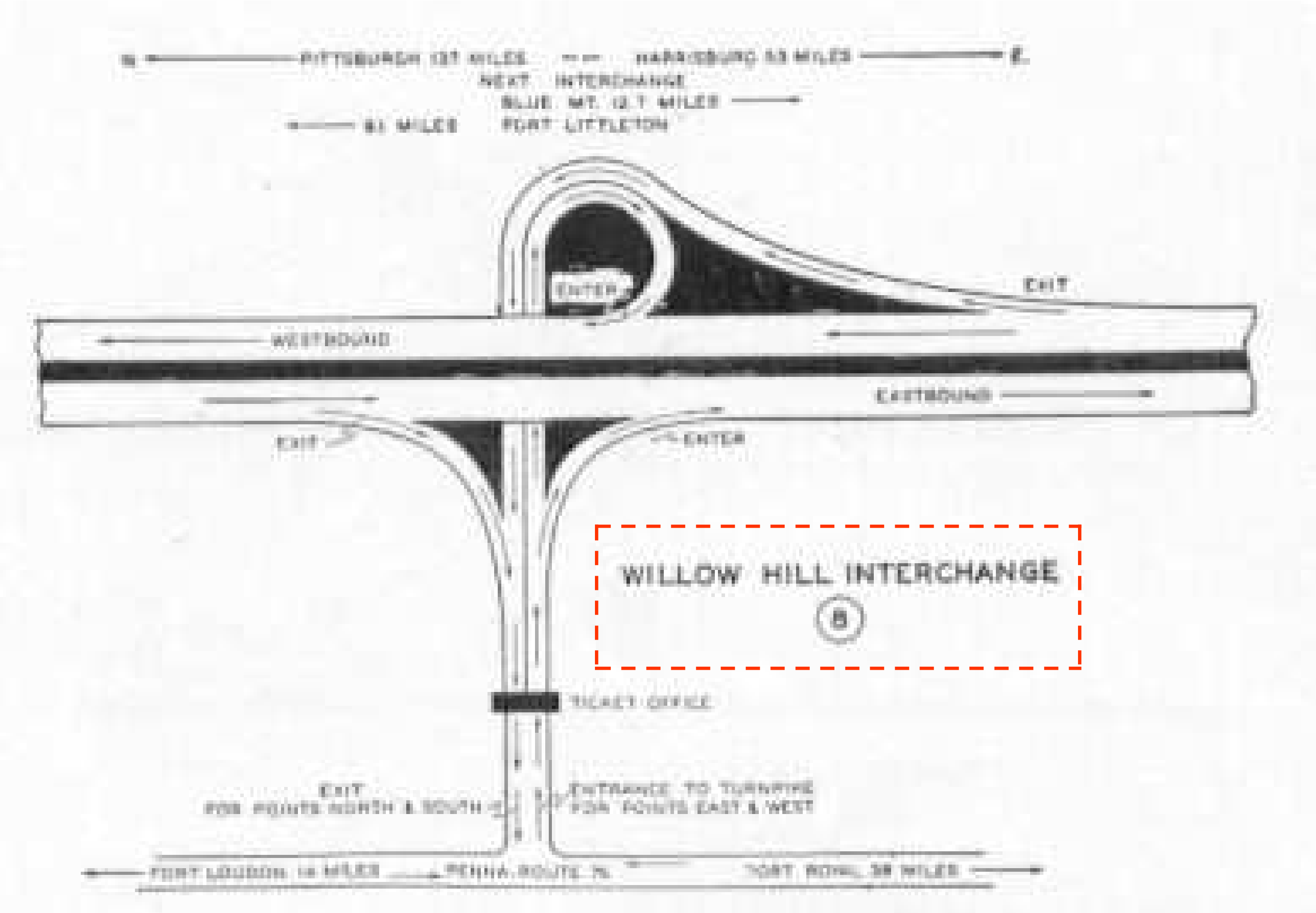
<u>Left</u>: caption: "Bedford Interchange (5): The Interchange is located at the mid-point between Harrisburg and Pittsburgh. It makes a direct connection to the heavily traveled U.S. Route No. 220 for north-south traffic and is only two miles north of the nationally known town of Bedford (considerable traffic will flow from the south through Bedford to this Interchange for east-west destinations) (MILE 79)."



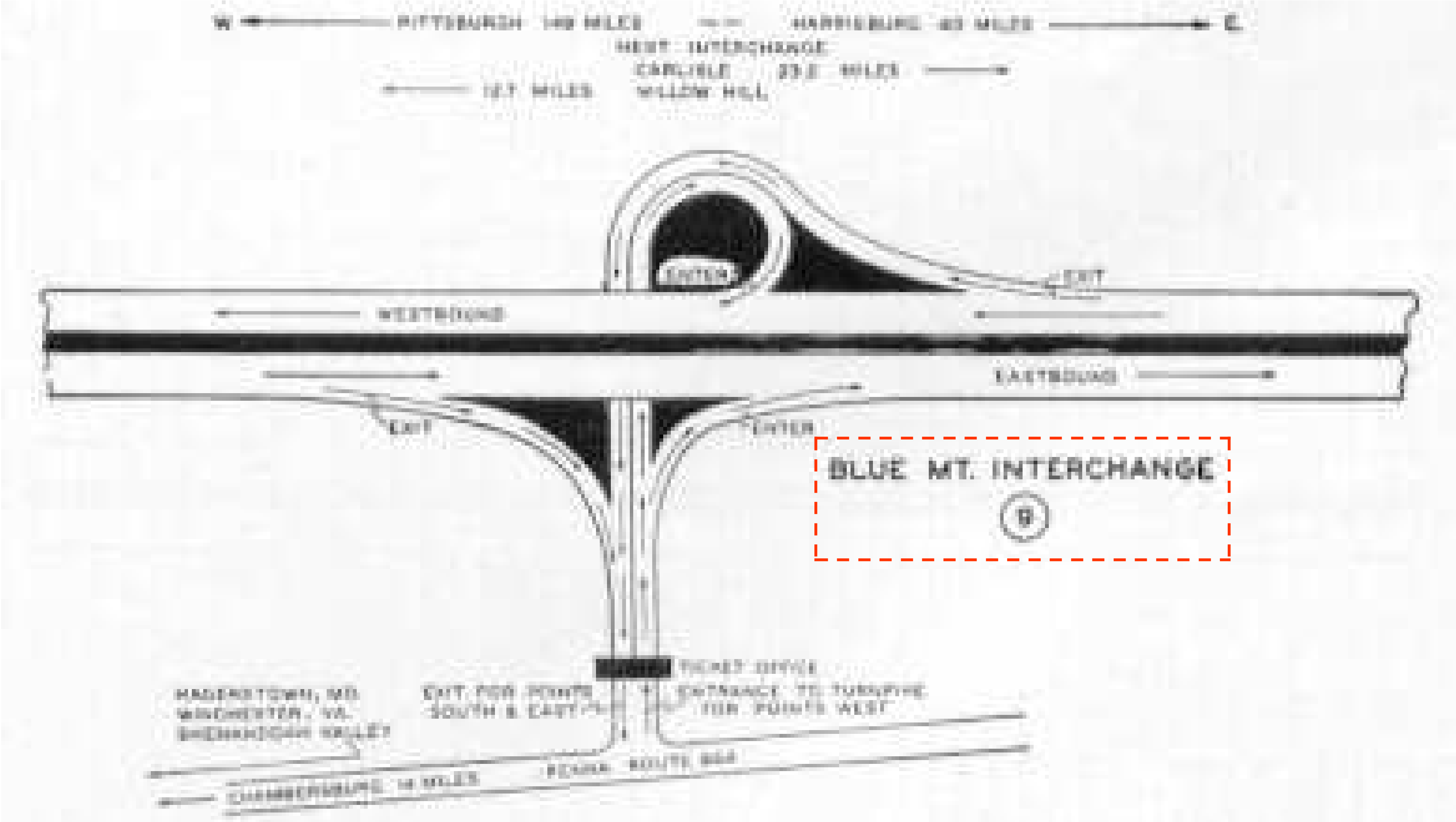
<u>Left</u>: **caption: "Breezewood Interchange (6): The Interchange is conveniently located with a direct connection to the Lincoln Highway – U.S. Route No. 30. It will absorb and discharge a considerable volume of traffic using Pa. Route No. 126, which leads directly south into Maryland and Virginia, as well as from the normal flow of traffic on the Lincoln Highway proper (MILE 96)."**



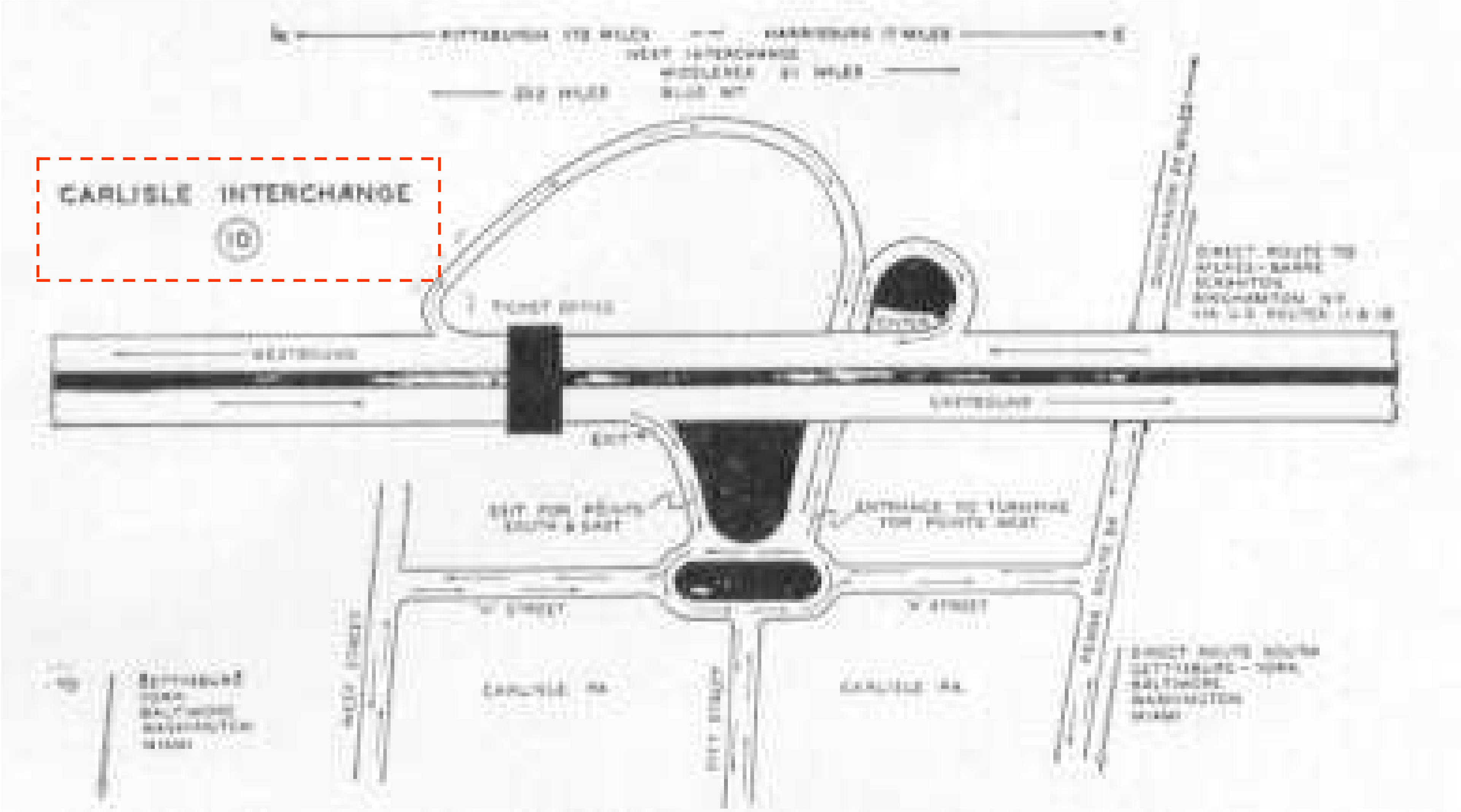
<u>Above</u>: caption: “Fort Littleton Interchange (7): The above traffic facility located near Ft. Littleton on U.S. Route No. 522 will serve a north-south influx of traffic desiring direct connections with east-west destinations. It is anticipated that considerable hauling of coal from the famous Broad Top Coal Fields will use this Interchange for east-west distribution (MILE 115).”



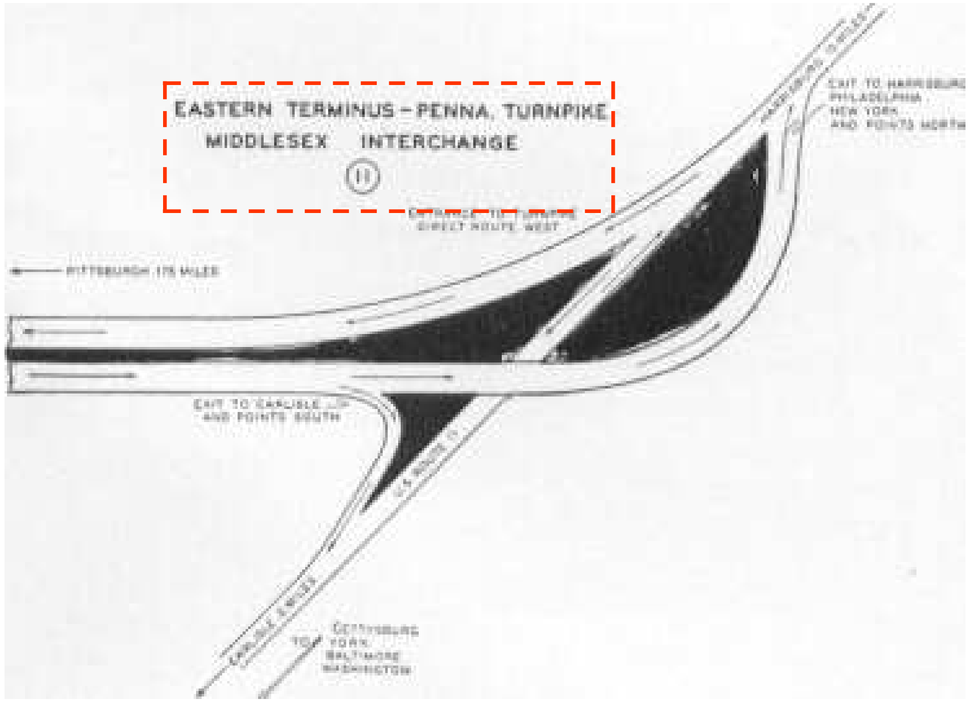
<u>Above</u>: caption: “Willow Hill Interchange (8): The Willow Hill Interchange is provided to serve several connecting valleys through this area, which, during various seasons of the year receives a great amount of tourist travel on Pennsyl-vania Route No. 75 (MILE 124).”



<u>Above</u>: caption: "Blue MT. Interchange (9): Blue Mountain Interchange is located two miles east of the Blue Mountain Tunnel, making a direct connection with Pennsylvania Route No. 944, for points south by way of the Shenandoah Valley, and traffic from routes such as the Lincoln Highway passing through Chambersburg, which is only fourteen miles south of the Interchange (MILE 134)."



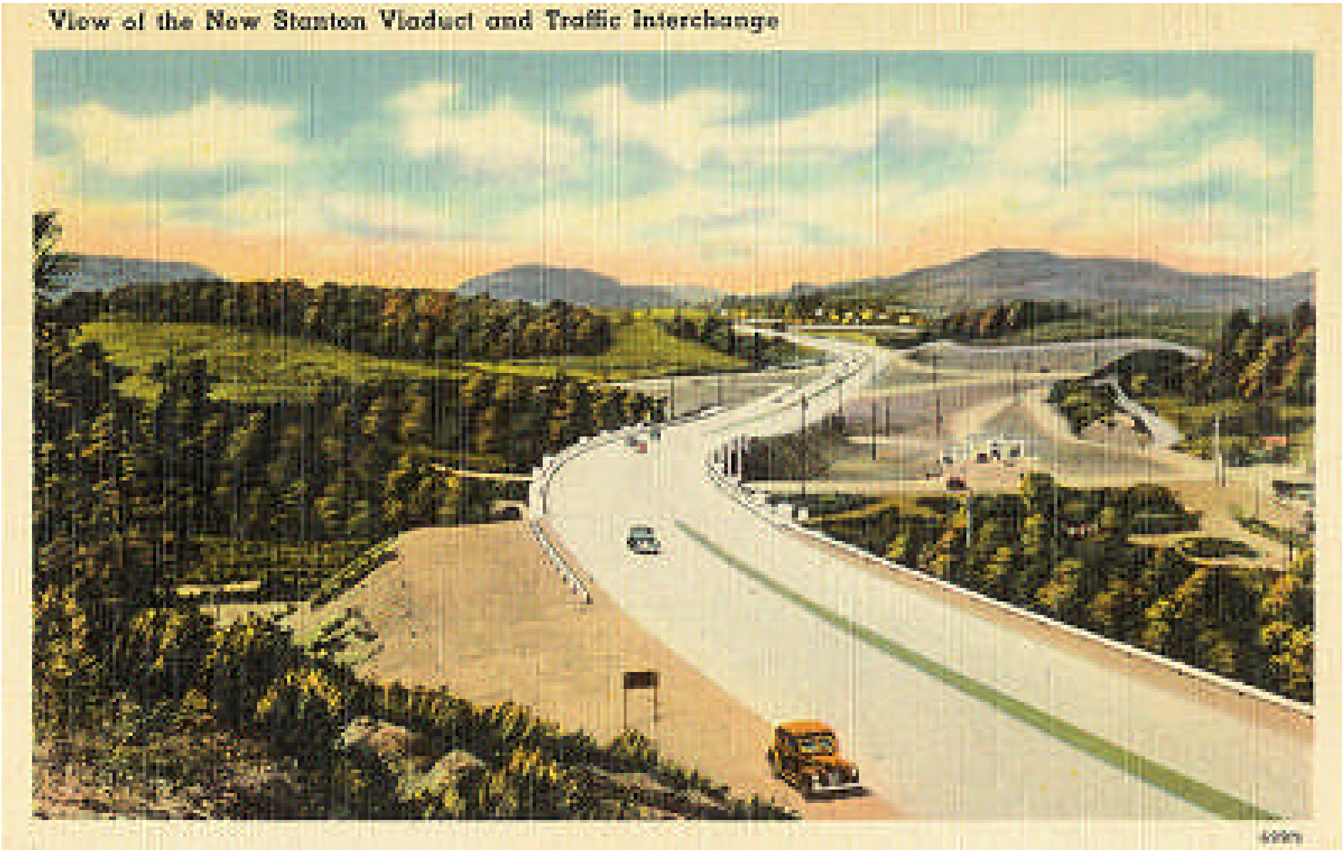
<u>Above</u>: caption: “Carlisle Interchange (10): This Interchange is located north and adjacent to the historic town of Carlisle which in reality is the gateway to the west for traffic from all points east, as shown above. The 4-lane ticket office is located directly across the Turnpike proper, as is the ticket office at Irwin. Traffic desiring to proceed westward from this Interchange will follow the directional arrows as noted (MILE 157).”

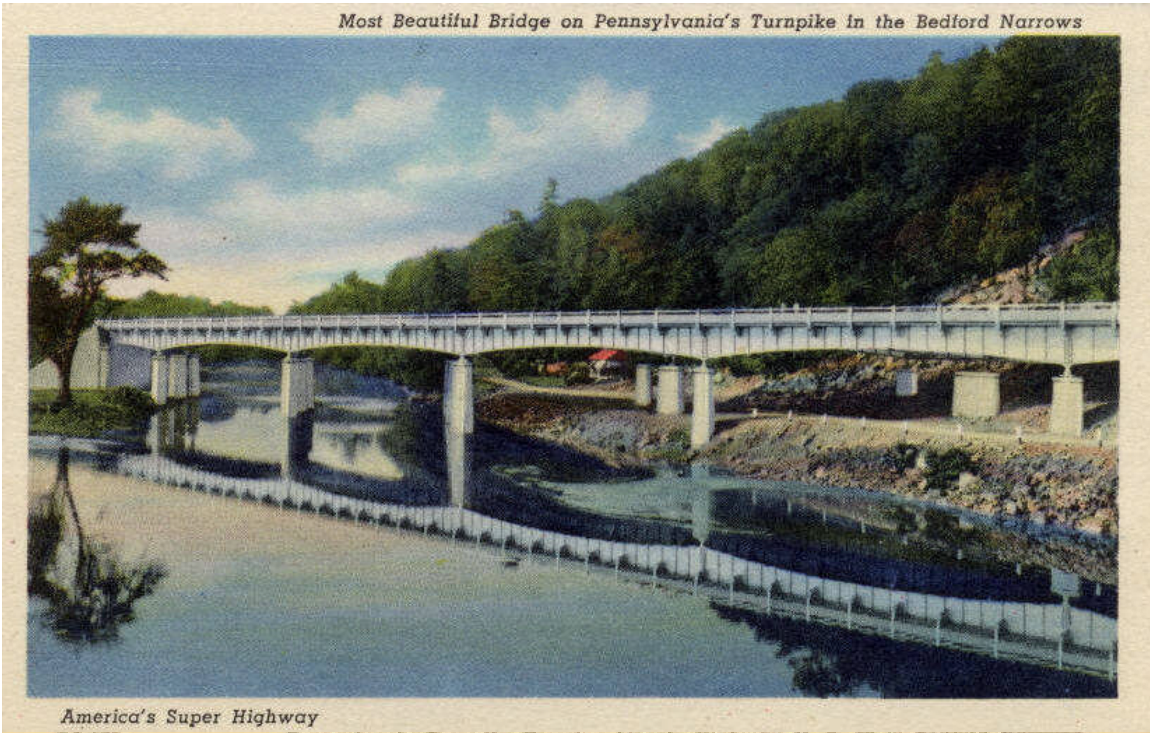


<u>Left</u>: caption: "Eastern Terminus – Penns Turnpike: Middlesex Interchange: The present eastern terminus of the Pennsylvania Turnpike is located at Middlesex, just two miles beyond the Carlisle Interchange, making a direct connection with U.S. Route No 11 for points north and east, as shown. No ticket booth was provided for this Interchange due to the close proximity to Carlisle. When the Turnpike is extended to Philadelphia this Interchange may be eliminated. The foresight and discretion shown by the Commission in its planning will prove economical (MILE 160)."

Besides mountain tunnels, the PT had over 300 bridges and culverts. The longest of these was just east of the *New Stanton Interchange*. The *New Stanton Viaduct* was a graceful curved bridge over 600-feet long. One of the requirements of the federal grants was that the PT be substantially complete by June 29th 1940. As spring turned into summer, it was rumored that President Roosevelt would be on hand to open the highway on July 4th, but that date came and went without the road being completed (mainly due to bad weather).

Above: *New Stanton Viaduct/Interchange* (ca. 1940)


View of the New Stanton Viaduct and Traffic Interchange


Most Beautiful Bridge on Pennsylvania's Turnpike in the Bedford Narrows
America's Super Highway


PA-102
Pennsylvania Turnpike Crossing Lincoln Highway U. S. 30 in Bedford Narrows

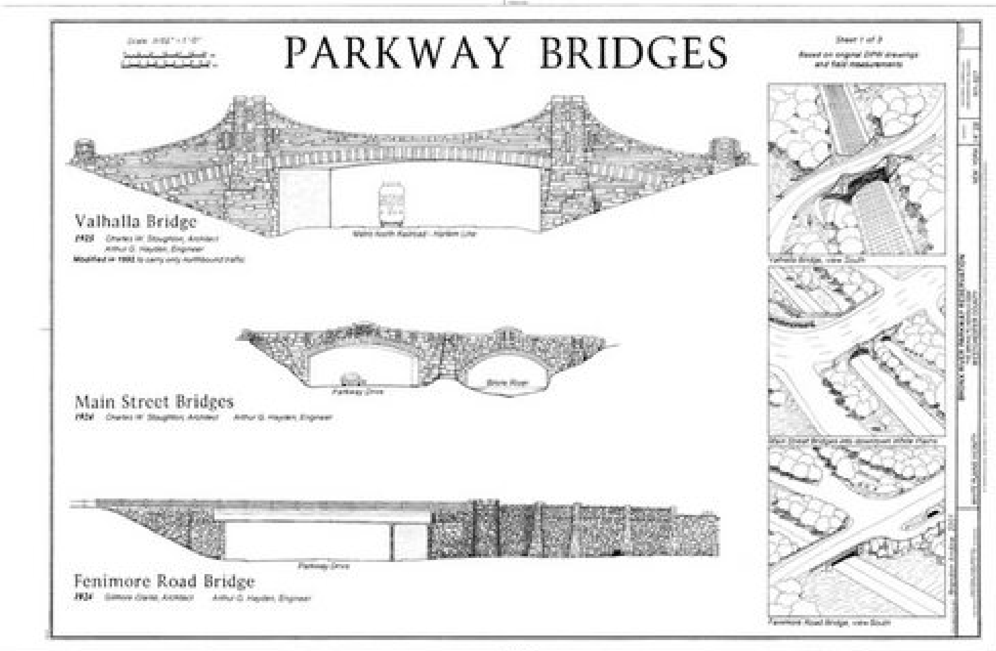
First Link in the Chain

"…Ultimately, the Pennsylvania toll road may serve as one link in the transcontinental chain of highways proposed by Senator Bulkley and now being studied by a committee. This whole Federal network would also operate under a toll system, scaled to the rate of about one tenth of a cent a passenger mile, in addition to a flat fee of twenty-five cents for each car entering the highway. Thus you would pay a quarter to get on the boulevard at New York and ninety cents to drive the 900 miles to Chicago, if you were alone in the car. Federal police would man the toll gates and patrol the road. Since every car would be required to stop at toll stations, authorities could bar intoxicated drivers, check licenses, halt automobiles considered unsafe to drive, and enforce uniform traffic regulations - a procedure that might result in one nationwide code of traffic laws and regulations that would apply in every state in the Union. These road-building developments indicate that the superhighway of the future is definitely on the way. No one can predict exactly what it will be like, but experts are confident that a modern Rip Van Winkle would wake up twenty years from now rubbing his eyes in amazement at the sight of streamline cars racing along broad, divided highways of concrete with a speed and a margin of safety far beyond his wildest dreams."

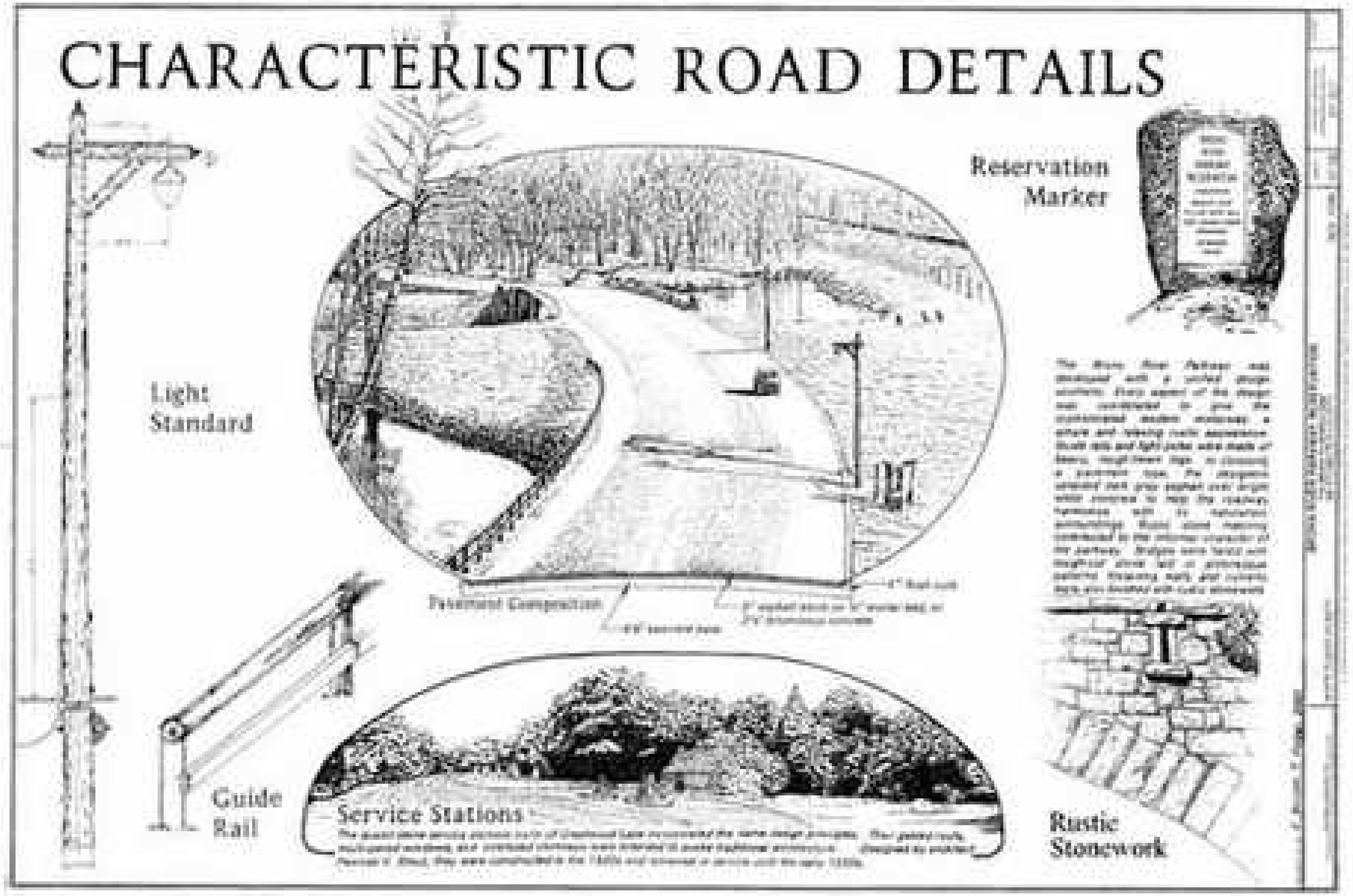
Popular Science, **May 1938**


MAP OF PENNSYLVANIA TURNPIKE SHOWING CONNECTING ROUTES
TRAFFIC INTERCHANGES
1 IRWIN
2 NEW STANTON
3 DONEGAL
4 SOMERSET
5 BEDFORD
6 BREEZEWOOD
7 FT. LITTLETON
8 WILLOW HILL
9 BLUE MOUNTAIN
10 CARLISLE
11 MIDDLESEX
TUNNELS
A LAUREL HILL
B ALLEGHENY
C RAYS HILL
D SIDELING HILL
E TUSCARORA
F KITTATINNY
G BLUE MOUNTAIN
LEGEND
STATE HIGHWAY ROUTE NUMBER
U. S. HIGHWAY ROUTE NUMBER
PENNSYLVANIA TURNPIKE
LINCOLN HIGHWAY ROUTE U. S. 30
WILLIAM PENN HIGHWAY ROUTE U. S. 22
PITTSBURGH
HARRISBURG
America's Super Highway

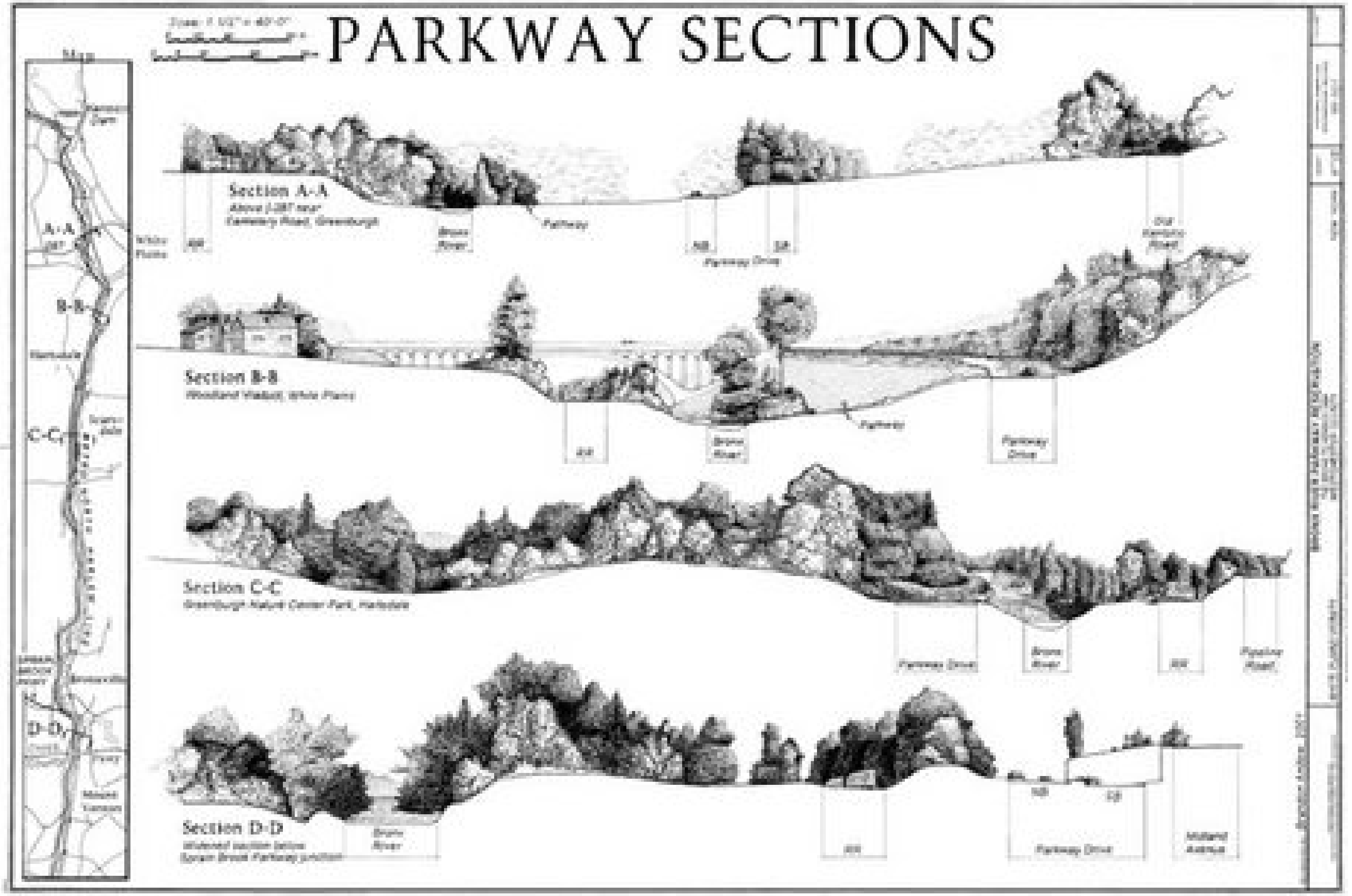
More Than A Motorway



From its inception, the *Bronx River Parkway* was meant to be more than a motorway. The *Bronx Parkway Commission* conceived it to be an attractive linear park, following the river valley, full of attractive scenery and recreational opportunities which would appeal to a wide range of tastes.

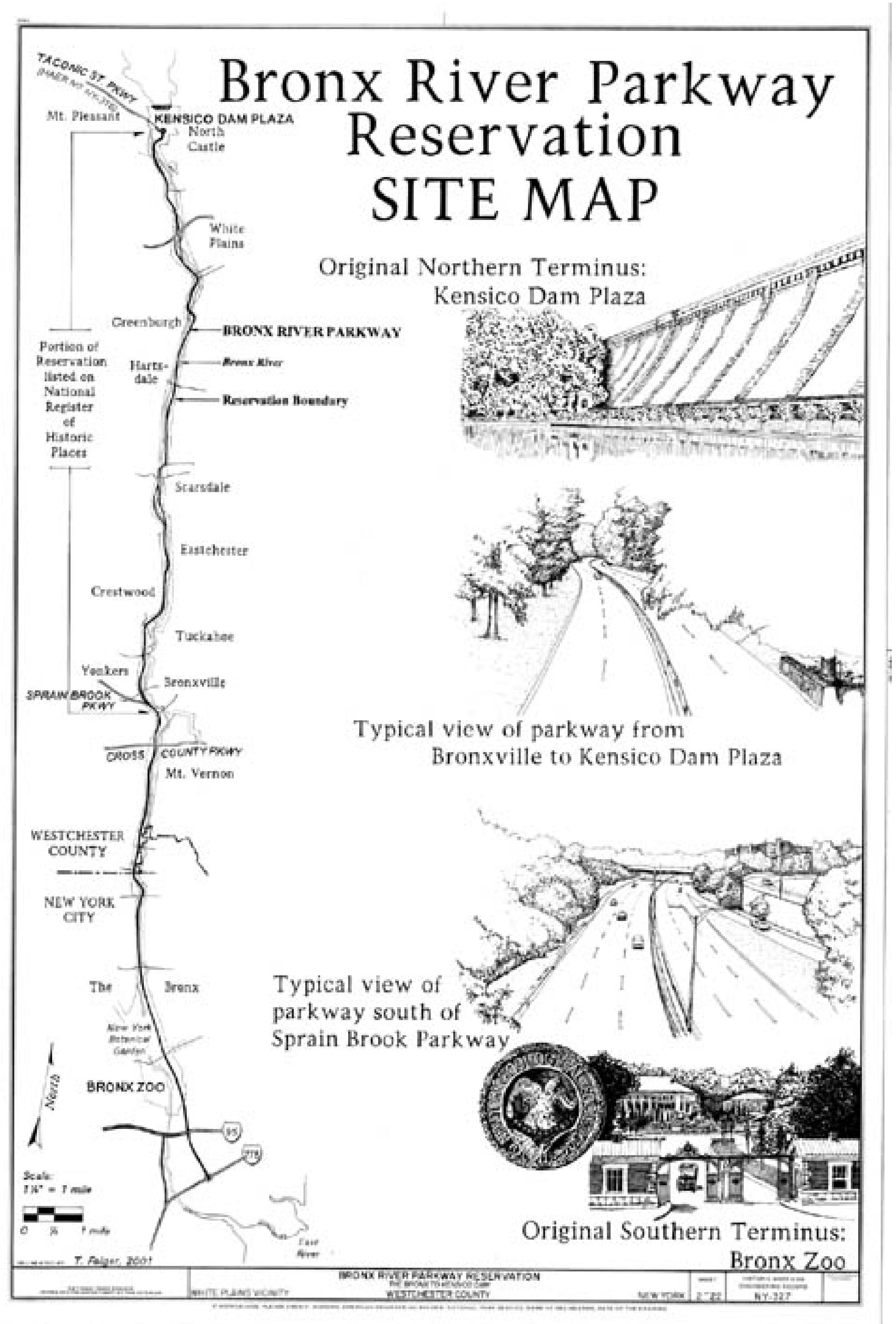

CHARACTERISTIC ROAD DETAILS
Reservation Marker
Light Standard
Pavement Composition
Guide Rail
Service Stations
Rustic Stonework

<u>Above</u>: caption: "An early view of the Bronx River Parkway. Notice the lack of a median"
<u>Left</u>: caption: "The Palmer Road exit for Bronxville on the Bronx River Parkway"


PARKWAY SECTIONS
Map
A-A
B-B
C-C
D-D
White Plains
Section A-A
Parkway
Section B-B
Woodland Viaduct, White Plains
Section C-C
Greenburgh Nature Center Park, Hartsdale
Parkway Drive
Section D-D
Widened section below
Sprain Brook Parkway junction
Bronx River
Parkway Drive



<u>Above L&R</u>: caption: "The park along the river"
<u>Left</u>: caption: "Swimming in the river"



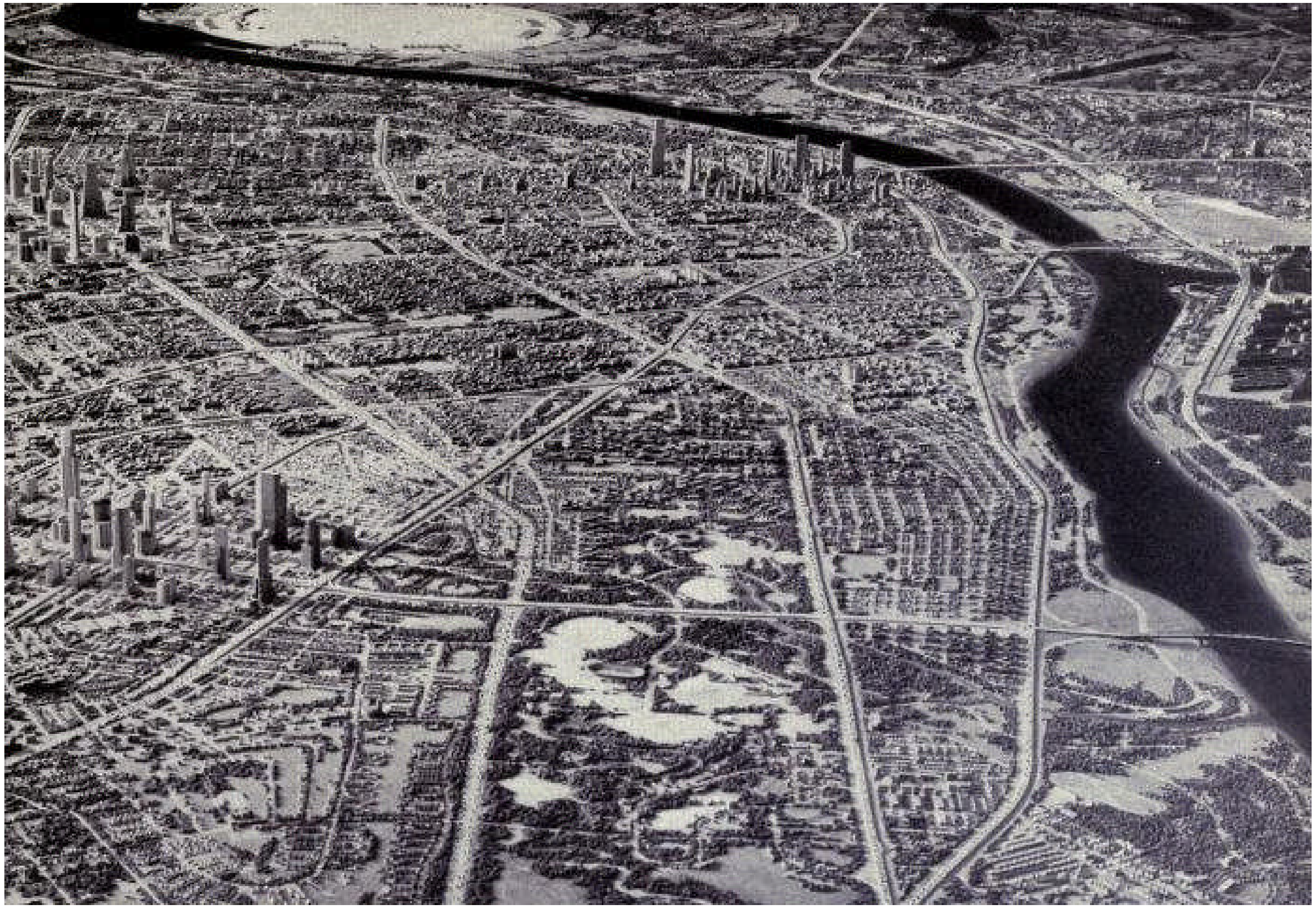
Although the PT was widely admired from its conception, completion and use by the motoring public, many of its design elements were not original. In fact, a fifteen-mile portion of the *Bronx River Parkway* (1927) in New York's *Westchester County* (the oldest Parkway in the U.S.) and Germany's famous *Autobahn* already were setting high standards for modern highway design. In effect, they were linear parks designed for the motoring public. Of course, if you wanted to glimpse the future of highway transportation in these United States, there was always General Motors' *Futurama* exhibit at the *1939/40 New York World's Fair,* which was held in the *Flushing Meadow* (a former ash dump).

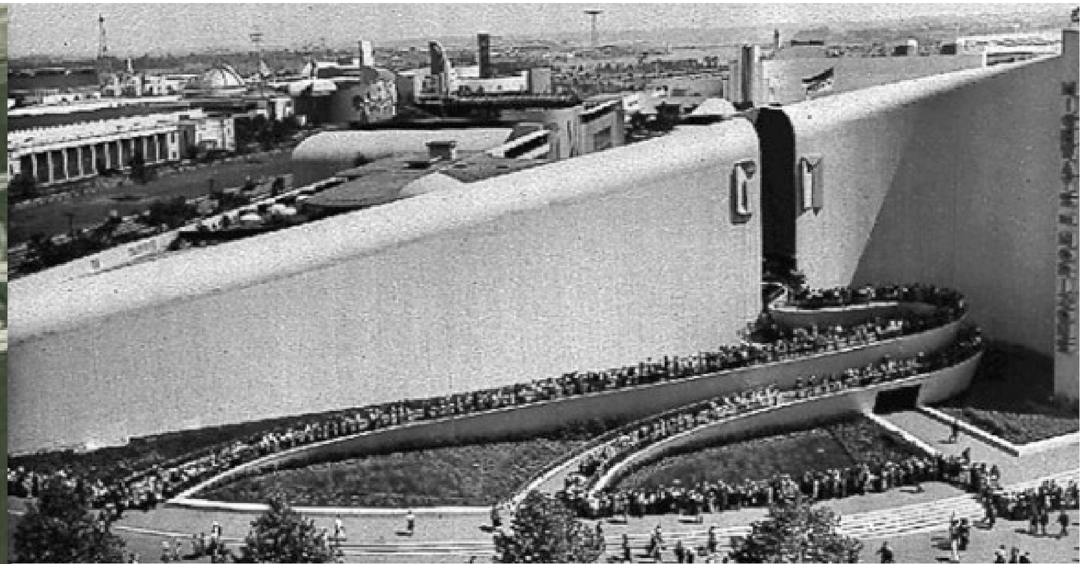
Inventing the Future

“If you want to predict the future, you must invent the future”
***Alan Kay,* Futurist**

"…General Motors bids you welcome to the HIGHWAYS AND HORIZONS exhibit at the New York World's Fair. The history of American roads is the history of our civilization as it marched westward from the Atlantic to the Pacific - roadways forging ever onward through mountain, desert and forest barriers, leaving in their wake great thriving cities, industrial centers and prosperous farms. General Motors salutes the men who pioneered these roads. General Motors salutes the United States Bureau of Public Roads - the highway officials of our states, the traffic administrators of our cities and the individuals and organizations everywhere who are contributing so importantly to highway progress for the future…While much has been accomplished in improving our highways, actually in many sections today's traffic is moving on roadways designed for yesterday. With the continued improvement of the motorcar and its ever-increasing contribution to our daily lives, our highways must be improved and expanded…"

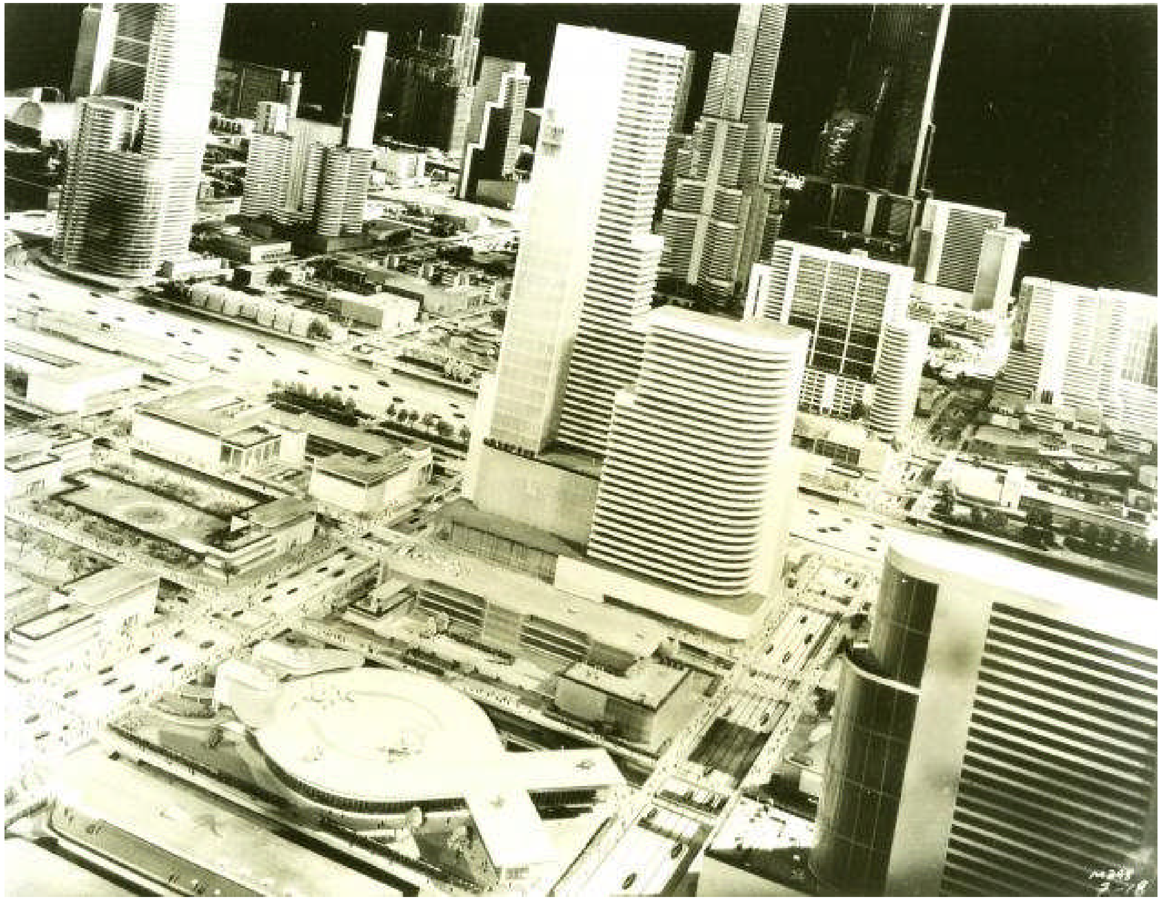
RE: excerpt from the narration of the "Highways and Horizons" exhibit

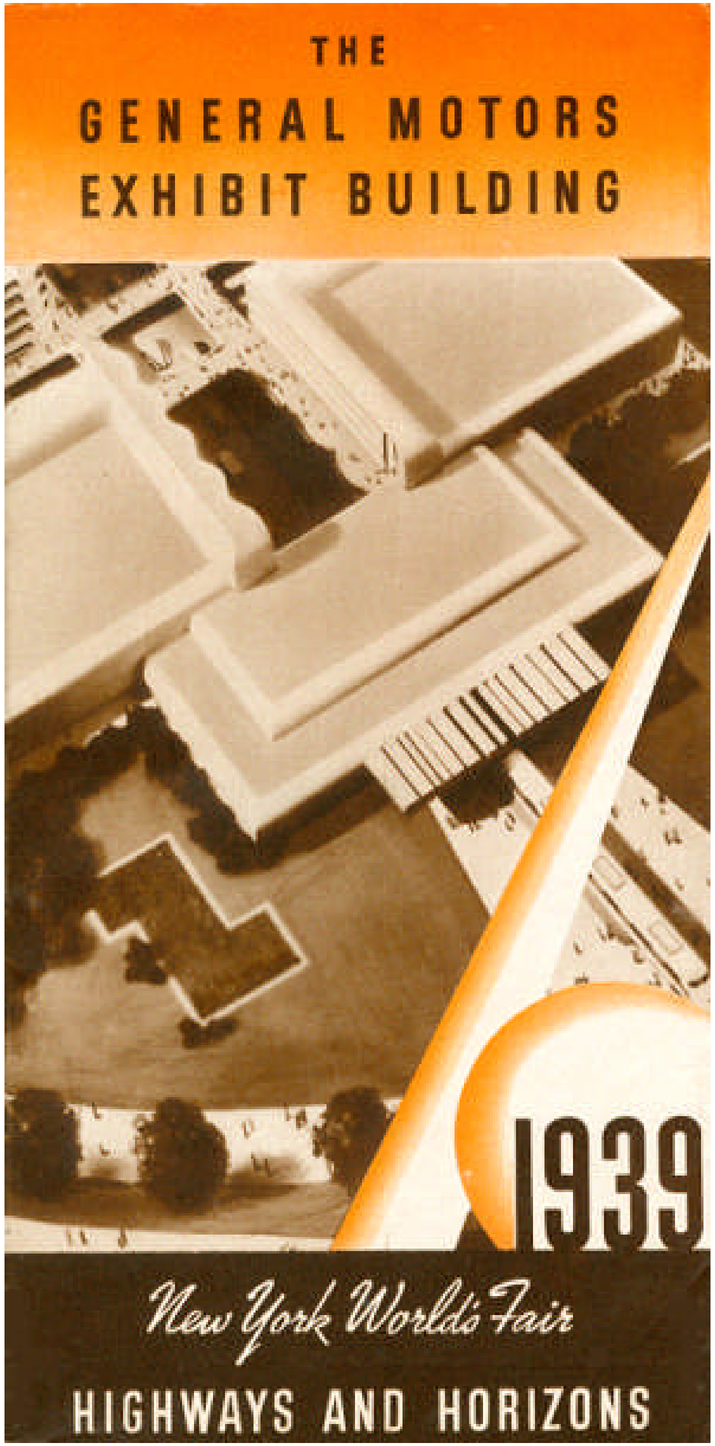




“Five million people saw the Futurama of the General Motors Highways and Horizons Exhibit at the New York World’s Fair during the summer of 1939. In long queues that often stretched more than a mile, from 5,000 to 15,000 men, women and children at a time, stood, all day long every day, under the hot sun and in the rain, waiting more than an hour for their turn to get a sixteen-minute glimpse at the motorways of the world of to-morrow. There have been hit shows and sporting events in the past which had waiting lines for a few days, but never before had there been a line as long as this, renewing itself continuously, month after month, as there was every day of the fair…”

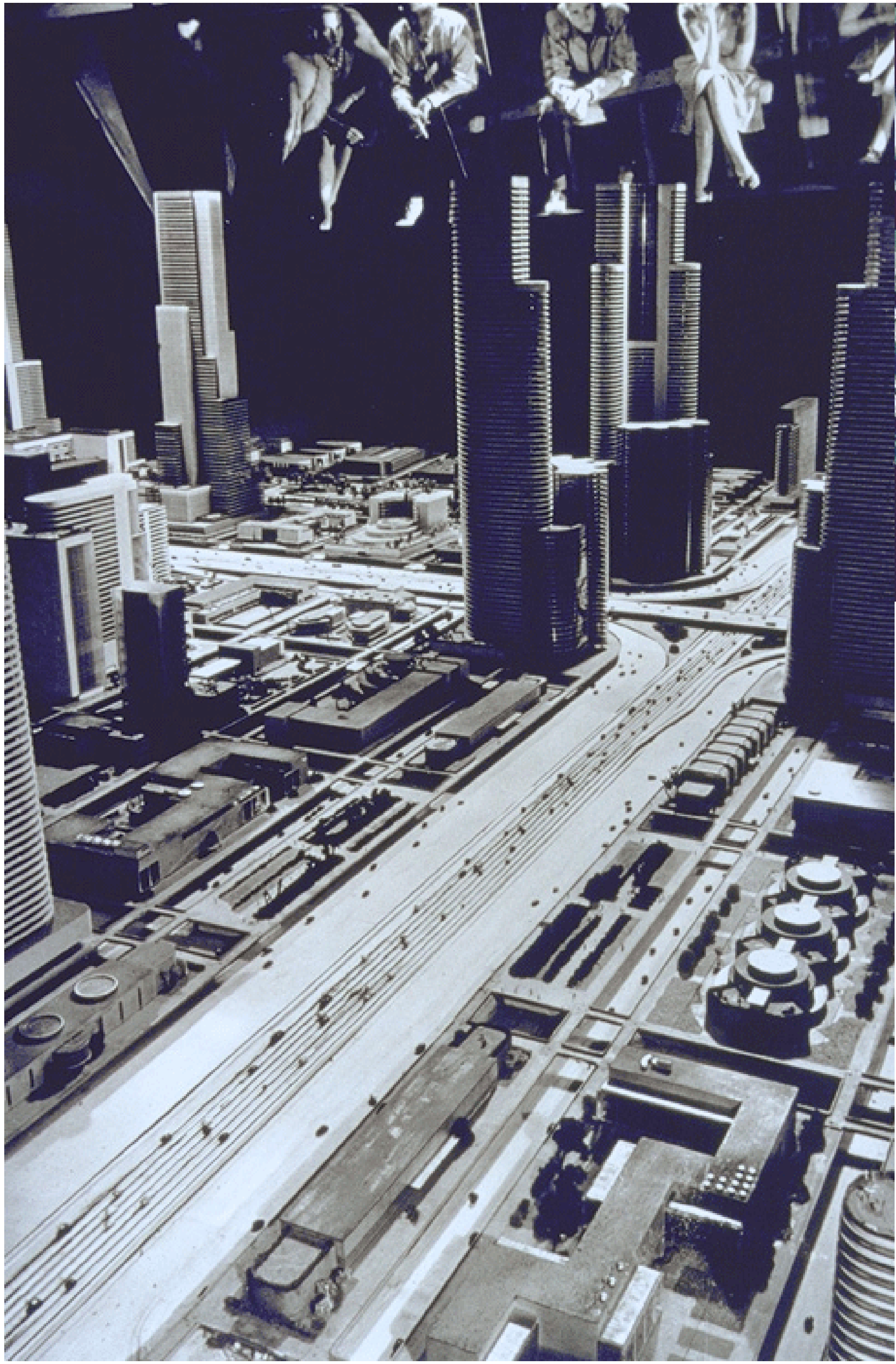
RE: excerpt from *Magic Motorways* (1940) by *Norman Bel Geddes*





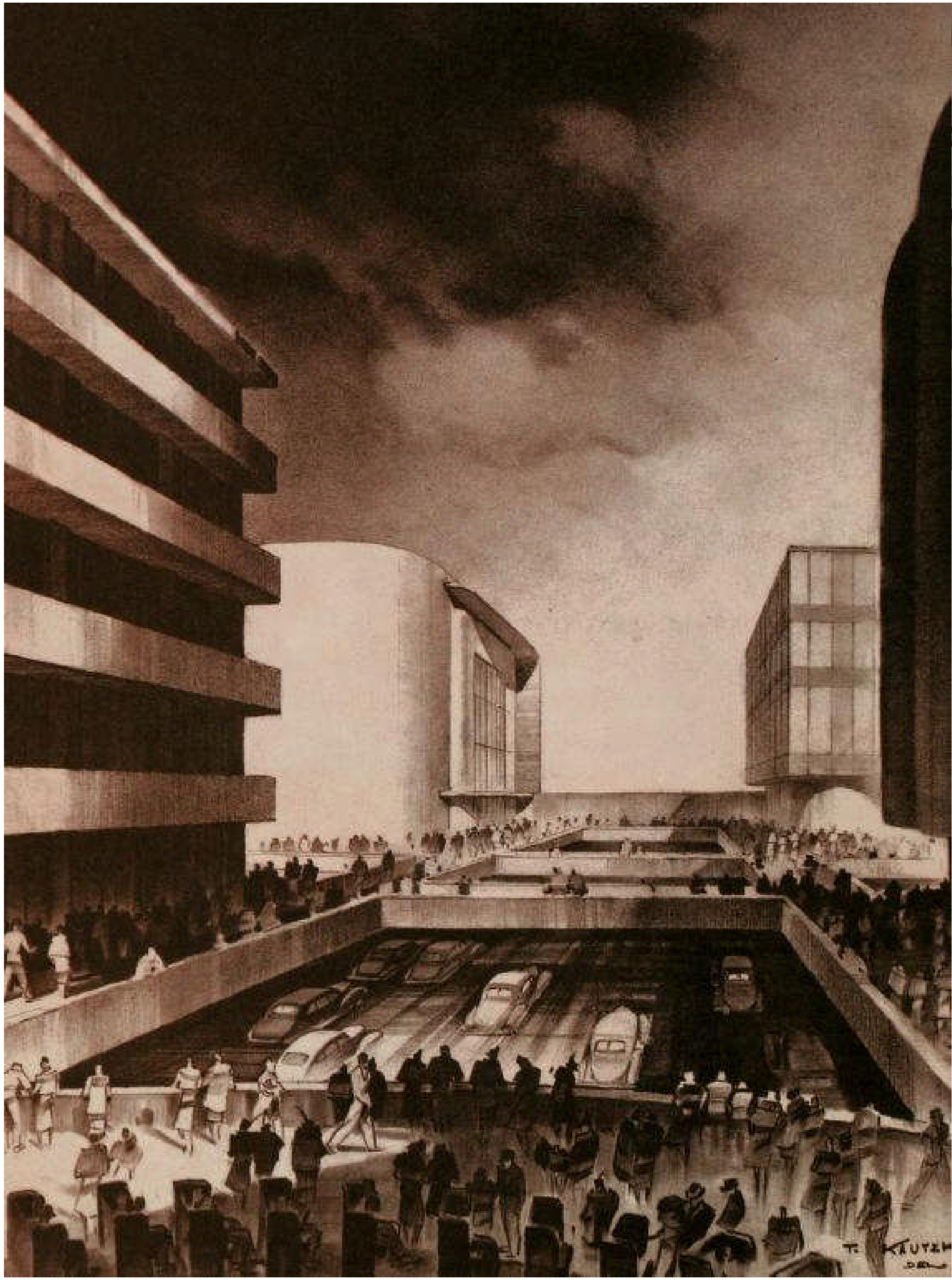
"…There are few barriers left, and people, once days apart, are now within easy reach of one another. The future will see a still greater realization of this conquest of mankind over nature's distances. The necessity for a far-reaching and planned expansion of America's highway system is not due chiefly to the fact that the motor vehicle is already operating well below its capacity to serve. Getting in and out of, or passing through, a large city have long been a tremendous handicap to the efficiency of the motorcar. A few express, or super-arterial, highways have done something to bring about a better correlation between city and rural systems at their meeting point, and by-passes, or circumferential highways, have eliminated many delays to so-called through traffic…"

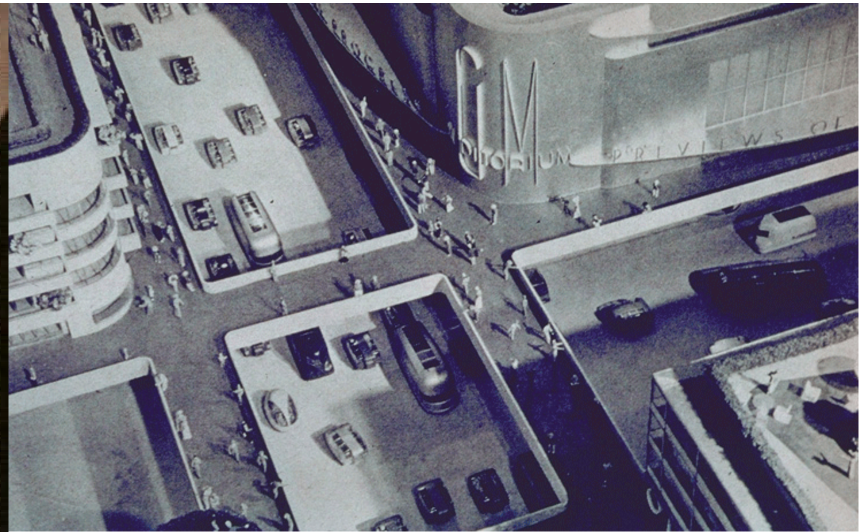
RE: excerpt from GM's *Highways and Horizons* brochure



"…Imagine being suddenly transported twenty years into the future!...to the heart of a great city!...in the year 1960! This seems to happen to you as you stand in the City of the Future, heart of the General Motors exhibit building, Highways and Horizons. It IS 1960 – broad elevated sidewalks extend a full block in two directions, while below the city streets are filled with motor vehicles…wonders not of tomorrow, but of the world today…"

RE: excerpt from GM's *Highway's and Horizons* brochure





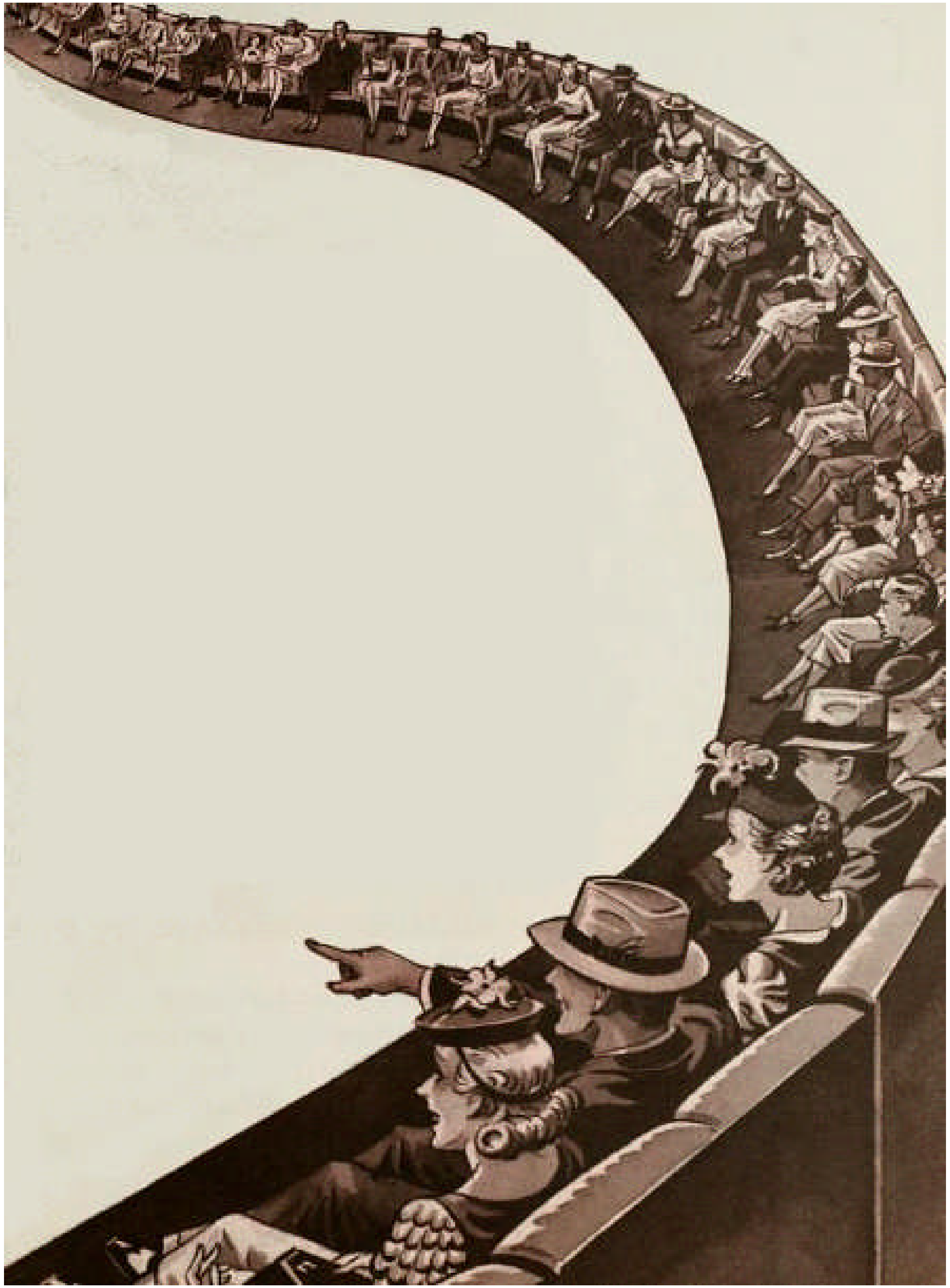
“Future city street of 1960 completely separates autos and pedestrians. Sidewalks and show windows are at the second-story level. Cars drive from ground roadways to great parking spaces under buildings. The roofs of the low-lying buildings are parks and restaurants. Model auditorium is where General Motors plans to be selling cars in the city of 1960.”

***LIFE* magazine, June 1939**


PREVIEW

"…We are satisfied with the mere possession of the automobile, and fail to make use of its full potentialities. Many of us do not realize that our cars can reliably do up to eighty-five miles an hour, but that the average speed of motor traffic in the United States is twenty miles an hour; that although our cars have been designed for efficiency and economy, the loss due to traffic congestion in New York City alone is a million dollars a day; that although our cars have been designed for safety, there is a death toll on American roads today of almost four lives every hour, ninety every single day, 2,700 a month, and 32,400 a year! Until recently, we have been told that the cure for these paradoxes lies in hit-or-miss, spasmodic road 'improvements' and catchy safety slogans. But we are due to open our eyes any day now, and demand a comprehensive, basic solution to a comprehensive, basic problem…"

RE: excerpt from *Magic Motorways* (1940) by *Norman Bel Geddes*

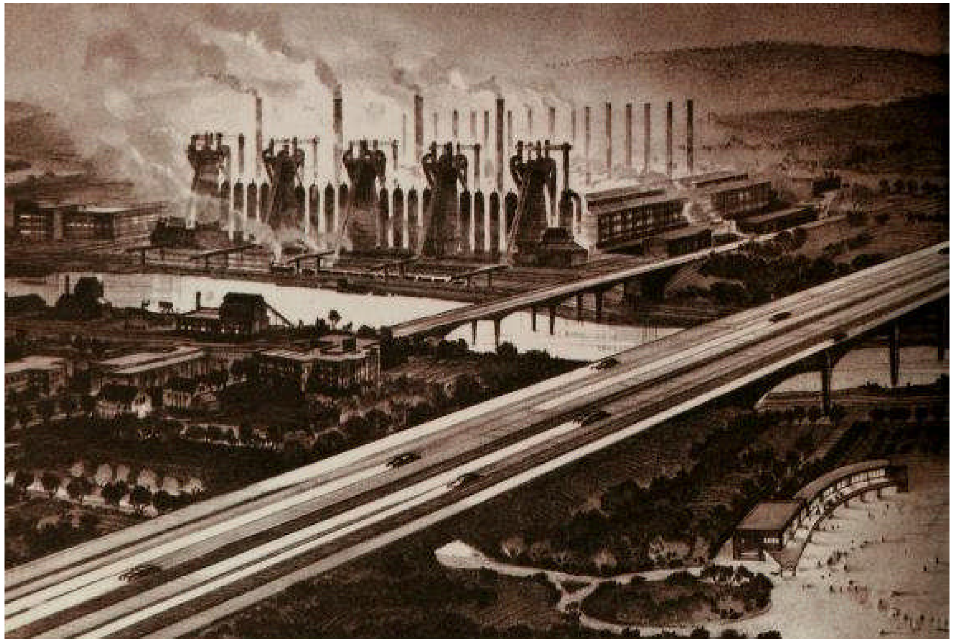


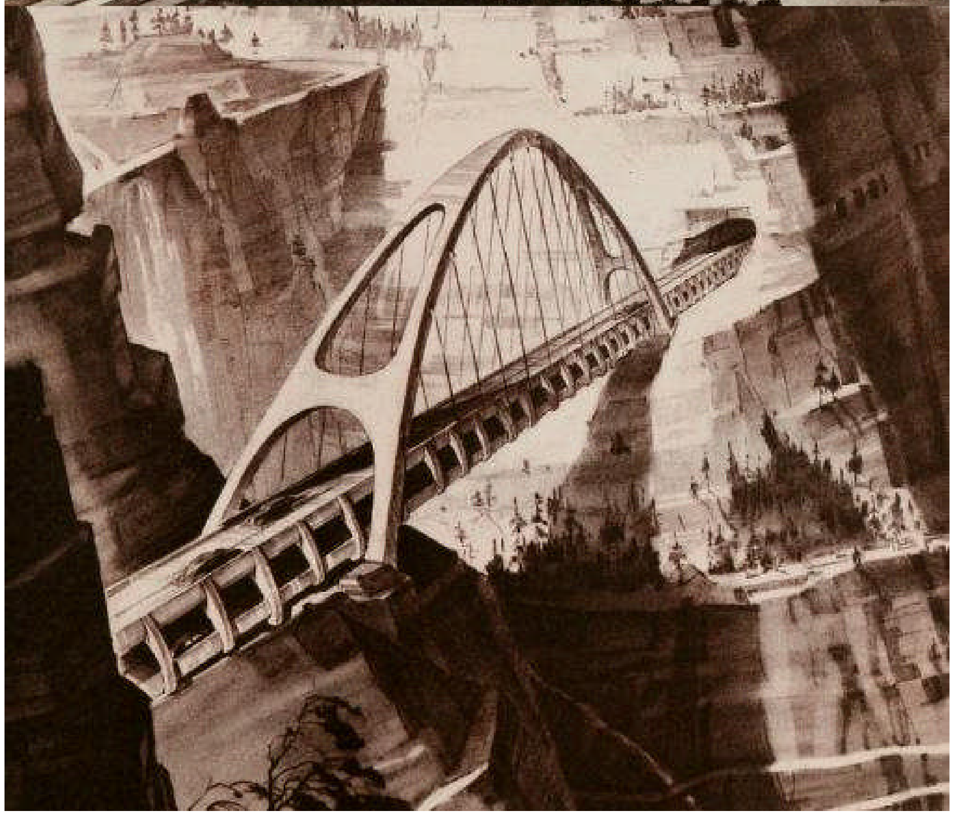
"…Much of the initial appeal of the Futurama was due to its imaginative quality. But the rea-son that its popularity never diminished was that its bold-ness was based on soundness. The plan it presented appealed to the practical engineer as much as to the idle day-dre-amer. The motorways which it featured were not only desir-able, but practical, As each spe-ctator rode around the model in his comfortable, upholstered ar-mchair, he listened to a des-cription of it in a voice which came from a small speaker built into the back of the chair…"

RE: excerpt from *Magic Motorways* (1940) by *Norman Bel Geddes*

"…The green extended widths show the increased traffic flow estimated by 1960. During the next twenty years motor traffic on some of our main highways is expected to increase by as much as 100 percent - particularly in and about metropolitan areas. The number of motorcars by 1960 may reach from between 35,000,000 to 38,000,000. Anticipating this, highway officials and engineers are constantly at work on ways and means to improve our future highways…" 499

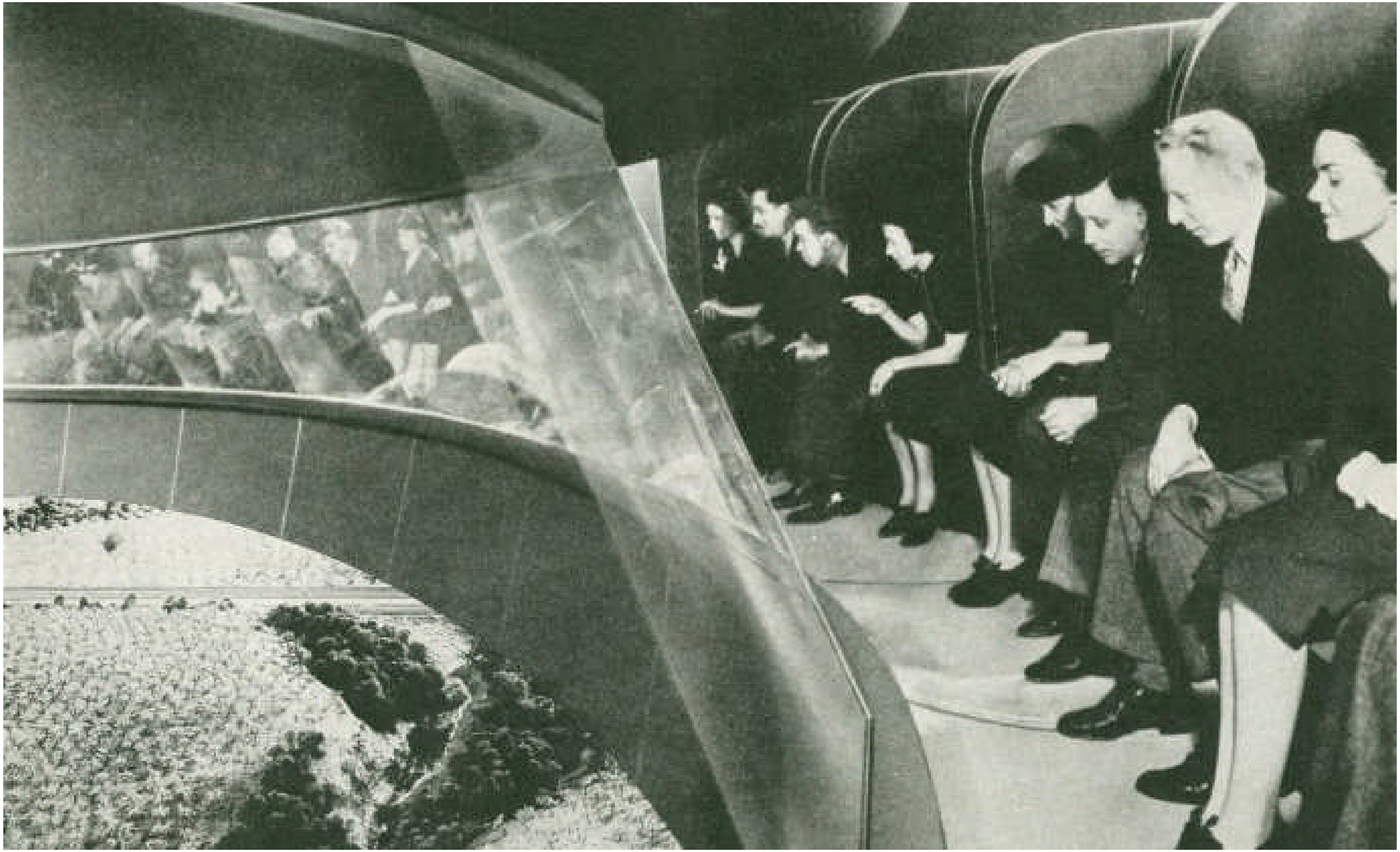
RE: excerpt from the narration of the *Highways and Horizons* exhibit





"…This recorded description synchronized with the movement of the chairs and explained the main features of what was passing before the spectator's eyes. It directed his attention to the great arterial highways which were segregated into different speed lanes and which looked so different from the roads today. It pointed out the overpasses, high-speed intersections and wide bridges over which tear-drop motor cars whisked by at a hundred miles an hour. It commented in passing on the surrounding scenery, the planned cities, decentralized communities and experimental farms. But it did not describe in detail how any of this was to be accomplished. It did not explain how the highway system worked. It could not dwell at length on any specific points of interest because of the short time available…"

RE: excerpt from *Magic Motorways* (1940) by *Norman Bel Geddes*



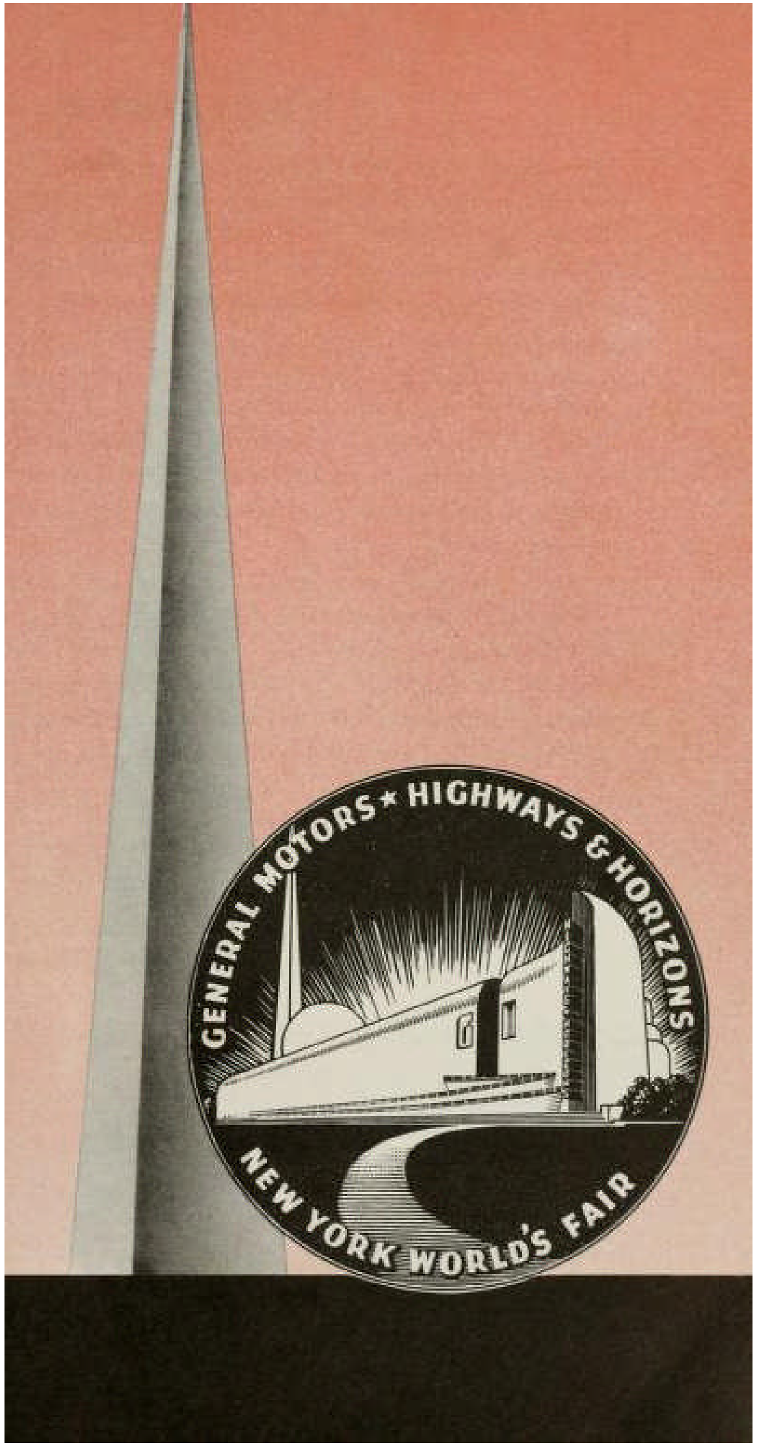
"…One of the best ways to make a solution understandable to everybody is to make it visual, to dramatize it. The Futurama did just this: it was a visual dramatization of a solution to the complex tangle of American roadways…"

RE: excerpt from *Magic Motorways* (1940) by *Norman Bel Geddes*

"…Starting from the facts of congestion, confusion, waste and accidents, we have gone through analysis and blueprints until we have come out on the other side with an over-all plan. We have come out with transcontinental roads built for a maximum of one hundred and a minimum of fifty miles an hour. We have come out with cars that are automatically controlled, which can be driven safely even with the driver's hands off the wheel. We have discovered that people could be driving from San Francisco to New York in twenty-four hours if roads were properly designed…"

RE: excerpt from *Magic Motorways* (1940) by *Norman Bel Geddes*

<u>Left</u>: caption: "Non-cloverleaf interchange"



"…The people who conduct polls to find out why other people do things, and the editorial writers, newspaper men and columnists who report daily on the doings of the human race, all had their theory as to why the Futurama was the most popular show of any Fair in history. And most of them agreed that the explanation was really very simple: All of these thousands of people who stood in line ride in motor cars and therefore are harassed by the daily task of getting from one place to another, by the nuisances of inter-sectional jams, narrow, congested bottle-necks, dangerous night driving, annoying policemen's whistles, honking horns, blinking traffic lights, confusing highway signs, and irritating traffic re-gulations; they are appalled by the daily toll of highway accidents and deaths; and they are eager to find a sensible way out of this planless, suicidal mess. The Futurama gave them a dra-matic and graphic solution to a problem which they all faced…"

RE: excerpt from *Magic Motorways* (1940) by *Norman Bel Geddes*

"…There was much to see, and no time to see it. There was much to explain, and no time to explain it. Millions of people, by waiting patiently for their turn in the chairs, demonstrated that the prospects of America's future concern them. They showed that the problems of transportation vitally interest them. But there was no time to satisfy their interest fully. They saw the world of tomorrow lying invitingly before them - a world that looked like Utopia and that did not seem to have a very close relation to the world they knew. But they weren't let in on the secret of how it had developed; they weren't told how it worked…"

RE: excerpt *Magic Motorways* (1940) by *Norman Bel Geddes*

"…As all those who saw it know, the Futurama is a large-scale model representing almost every type of terrain in America and illustrating how a motorway system may be laid down over the entire country - across mountains, over rivers and lakes, through cities and past towns - never deviating from a direct course and always adhering to the four basic principles of highway design: safety, comfort, speed and economy. The motorways which stretch across the model are exact replicas, in small scale, of motorways which may be built in America in the near future. They are designed to make collisions impossible and to eliminate completely traffic congestion. Particular features of the motorways may perhaps be improved on, details of future road construction and engineering may differ, but the design of these motorways has been carefully and thoroughly worked out and is suggestive of probable future developments…"

RE: excerpt from *Magic Motorways* (1940)
by *Norman Bel Geddes*

The Real Trouble

"…The real trouble with American highways is the simple fact that they are not designed for the traffic they bear. The automobile has advanced in much greater strides than have roads. It has attained a far greater point of perfection. Automobiles are in no way responsible for our traffic problem. The entire responsibility lies in the faulty roads, which are behind the times. When the horse was discarded, the winding roads over which he joggled were not discarded with him. The automobile inherited them. Some of them have been 'improved' from time to time, but their basic features have remained unchanged. The result of pushing motor cars out over these old roads was at first simply a mild havoc and runaway horses, but later, the Traffic Problem. Today we are still rebuilding old roads that were constructed for another vehicle, instead of starting to build special roads for the special needs of the automobile. This simple fact is the key to the whole present-day traffic problem…"

RE: excerpt from *Magic Motorways* (1940) by *Norman Bel Geddes*

<u>Above</u>: upon exiting the *Futurama* exhibit, visitors received a button with the simple inscription: *I Have Seen the Future*


I
HAVE SEEN
THE
FUTURE

Part 7

Blood & Soil

Die Reichsautobahnen

Principles of Design, Construction and Traffic Control

Edited by Volk and Reich Verlag
on behalf of the Inspector General
of the German Roads

1 9 3 8

Volk und Reich Verlag Berlin

The Administration

I. Under the former system of the Reich the roads have been administered by the states and their regional departments (provinces, counties, communities). The road administration was consequently split, and especially road maintenance work had been distributed amongst various authorities without organic scheme, and in spite of individual progress, the technical design of the roads was not uniform (see section of road surface map of long distance roads, 1932). The National Socialist State has fundamentally changed the situation, first by the autobahn scheme and secondly by the reorganization of road administration.

The Reich has taken charge of the legislation as well as of the supervision of road administration. The supreme officer is the Inspector General of German Roads who is placed directly under the Fuehrer and Chancellor of the Reich. The Fuehrer has taken upon himself the ministerial responsibility of the entire road problem. Indeed, during the period of struggle before the National Socialist Revolution the Fuehrer traversed Germany in innumerable rides to an extent perhaps unequalled by any other man; therefore he knows best the importance of roads for the steadily increasing motorization of traffic, which is the integral part of his own economic program.

The existing roads are divided into Reich Roads (long distance main arteries) and highways of the first and second class (highways of regional importance). The administration of the Reich Roads has been transferred to the States and Prussian provinces already being responsible for managing roads of class I. The Reich puts the financial means at their disposal and issues the principal orders. The Inspector General of the German roads supervises the roads of all classes.

II. For the construction of the Autobahn net the Reich has formed by the law of June 27, 1933, the special undertaking of "Reichsautobahnen" being founded as a subsidiary of the German Railway Company with a base capital of 50 million Marks. The Company has the monopoly in building and managing the autobahn and the appertinent buildings so as filling stations, workshops, loading ramps, inns, advertisements etc.

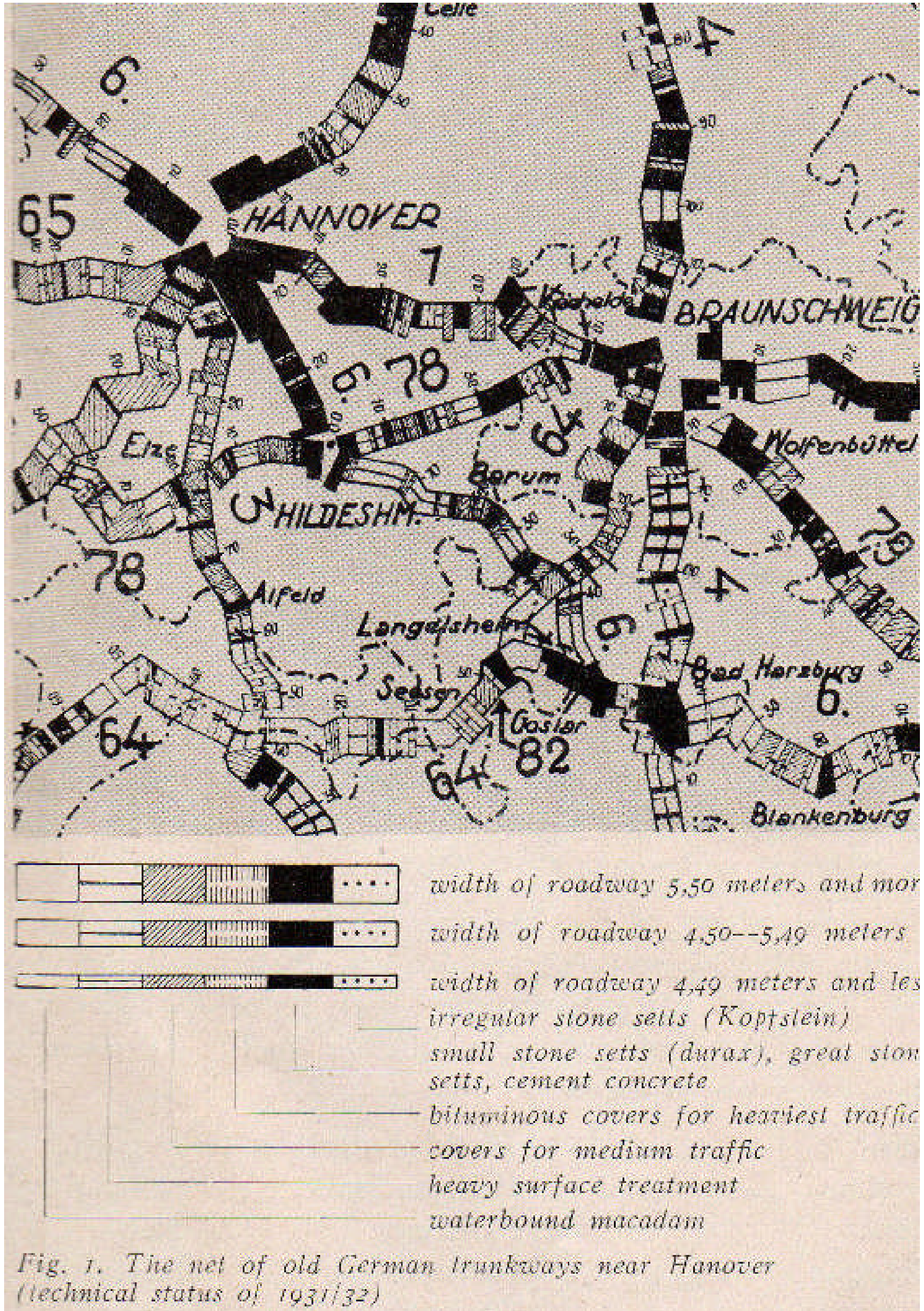


Fig. 1. ***The net of old German trunkways near Hanover (technical status 1931/32)***

For the execution of the project the Reich has reserved the authoritative right of collaboration and supervision. The Inspector General determines the lay-out and the technical design of the autobahns and stipulates the schemes of construction. Therefore he directs the planning of an entire net and regulates the technical side of the design and construction according to the demands of motorized traffic and the progress of road engineering.

The preparatory work has been done under the supervision of the Inspector General through the special Committee for Preparing the Autobahn Work (Gezuvor) which had been joined by all authorities and industrial undertakings being interested in autobahn work to organize the laying out of the entire net quickly by a private and mobile association without being bound to wait for the complete organization of the Reichsautobahnen Company.

After having dissolved the Gezuvor, the Inspector General decided upon the authority (Main Construction Office of the Reich Autobahn or the main road office of a state or a Prussian province) which has to do the preparatory work. Under consideration of these preparations the Inspector General gives the permission to finally design the varying sections of the autobahn. The plans prepared will be controlled by the country police offices, in Prussia by the Administrators. These officers have to comply with the public interest, e.g. by observing the conditions of roads, rivers, canals, electricity, gas and water feeders, railways and tramways possibly affected by crossing the autobahns; they publicly lay out the plans, accept protests and give their opinion on the matter in question. The Inspector General has the final decision on all questions of planning and lay out. He approves and determines the plans and progress of construction.

Land for the autobahns is acquired through normal purchase. If the proprietors refuse to sell, the Reichsautobahnen Company has the right of appropriation. But in order to take great care of the proprietors severely affected, and to distribute upon several shoulders the disadvantage of surrender of land, e.g. with regard to cutting up of property, difficulties of conducting through the use of bypasses etc., the necessary pieces of ground can be purchased by filed-clearing process, i.e. besides the ground immediately affected further pieces in the proximity are considered for joint assessment and mutual exchange; new roads and ditches will be laid out.

Moreover the influence of the Reich has been secured through the general right of control over the Reichsautobahnen Company (Ordinance of 23. 1. 1935, Reichsgeswizblatt II p.37). Also this control is administered in essential points by the Inspector General. The economic affairs of the Company are examined by the Rechnungshot of the Reich (Financial Control Board).

III. The Reichsautobahnen Company are an independent administrative unit of public law the organization of which is regulated by the statute based upon the prescriptions of the Autobahn Law. In its original form the Reichsautobahnen Company was represented by a General Council and the Board of Directors in a similar manner to the German Reich Railway Company. In consequence of the reorganization of the Railways the main administration office of which has been transferred to the Reich Ministry of Transport, the organization of the "Reichsautobahnen" undertaking has been changed in the meantime by concentrating measures as to the chief administration (Law of June 1st 1938 concerning the reorganization of the Reichsautobahnen, Reich geselzblatt p. 207, including comments). Accordingly then there are two administrative bodies, the Board of Directors and the Advisory Council.

The Board of Directors is the supreme administrative be representing the “Reichsautobahnen” judicially as well as in common affairs. The Inspector General of the German Roads is in the chair. Members of the Board are furthermore one or several persons nominated by the Fuehrer and Chancellor of the Reich. The German Railways must be represented by one member.

The Advisory Council has to advise the Board of Directors in all especially important questions. The Reich Minister of Transport is a member and at the same time chairman of the Council which consists of seven members. The other members are nominated for three years by the Government of the Reich. The offices of the "Reichsautobahnen" Company are authorities of the Reich. Mostly officials of the German Railways have been appointed to these offices. The autobahn administration is greatly profiting through this active collaboration from this highly experienced organization with its technical and economic institutions of the Railways.

The field offices of the "Reichsautobahnen" are the Main Construction Offices (OBR's) which are created according to the demands of circumstances and supplied with the necessary technical and administrative staffs. At present time there are 17 OBR's:

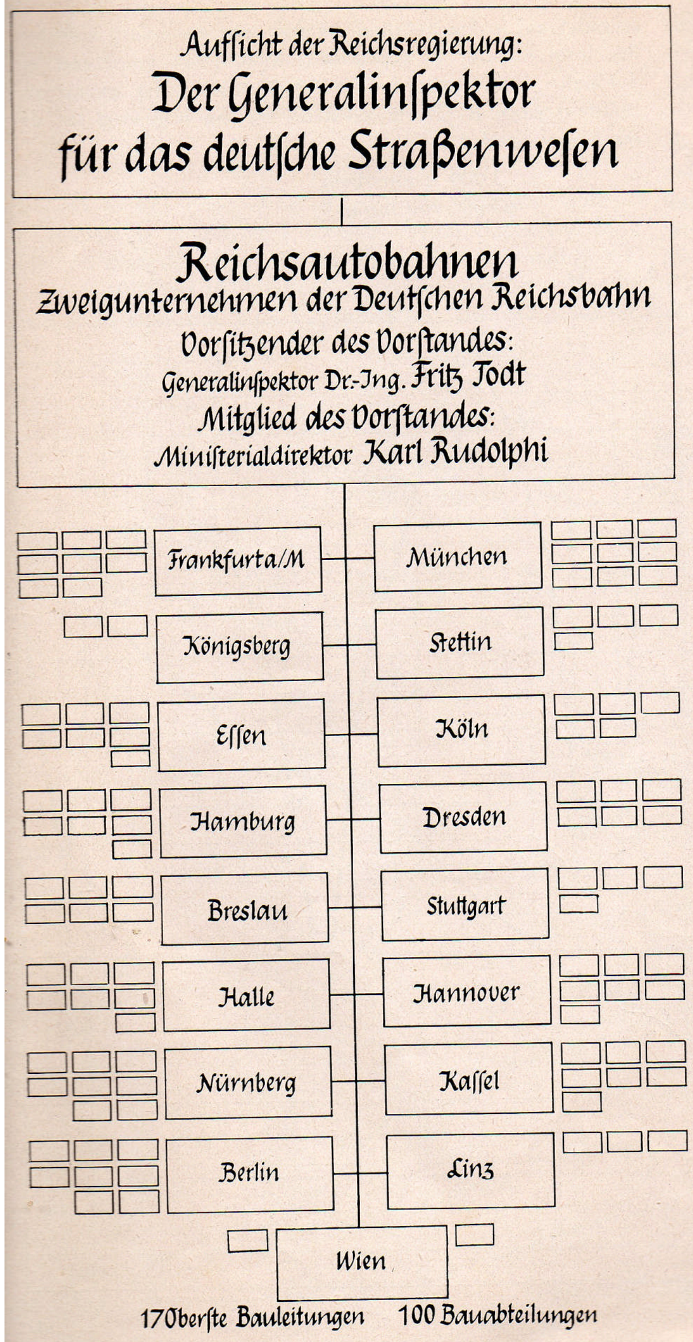
Berlin	Frankfurt on Main	Munich
Breslau	Helle on Saale	Nuremberg
Cassel	Hamburg	Stettin
Cologne	Hanover	Stuttgart
Dresden	Konigsberg	Vienna
Essen on Ruhr	Linz (Danube)	

Each Main Construction Office is divided into regional district offices (refer to graph on organization p. 5) supervising the regional and local field construction work. The main net of the autobahns including the lines planned in former Austria amounts to 11,000 kms (6,835 miles). On April 1st 1938, the following sections were:

open to traffic	2,026 kms
under construction	1,707 kms
under permission of construction (lay-out definite and ready for construction)	2,120 kms

On these sections 3,942 bridges and culverts are completed and 1,022 under construction.

Fig. 2. Organisation of "Reichsautobahnen". August 1938.



17 Main Construction Offices und 100 Line Divisions

OBR. Berlin in:
Wilhelmshagen
Frankfurt/O.
Potsdam
Lichtenrade
Belzig
Kottbus
Lübben
Senftenberg

OBR. Breslau in:
Breslau
Gleiwitz
Bunzlau
Sagan
Forst
Brieg

OBR. Dresden in:
Chemnitz
Dresden
Zwickau
Plauen/Vogtl.
Bautzen
Görlitz

OBR. Essen in:
Duisburg
Kamen
Recklinghausen
Beckum
Hagen
Schwerte
Soest

OBR. Frankfurt a.M. in:
Frankfurt/Main
Karlsruhe
Kaiserslautern
Butzbach
Alsfeld
Würzburg
Limburg
Diez/Lahn

OBR. Halle a.d.S. in:
Halle/Saale
Gera
Jena
Erfurt
Dessau
Bernburg
Sangerhausen

OBR. Hamburg in:
Hamburg-Harburg 1
Bremen
Bad Oldesloe
Hamburg-Wandsbek
Hamburg-Harburg 2
Soltau
Wittenburg/Mecklenburg

OBR. Hannover in:
Hannover 1
Braunschweig
Magdeburg
Bielefeld
Bückeburg
Bad Oeynhausen
Hannover 2

OBR. Kassel in:
Göttingen
Kassel-Bettenhausen
Kassel-Wilhelmshöhe
Hersfeld
Eisenach
Fulda
Meiningen

OBR. Köln in:
Opladen
Remscheid-Lennep
Köln 1
Köln 2
Köln-Rheinbrücke

OBR. Königsberg Pr. in:
Elbing
Königsberg/Pr.

OBR. München in:
München-Ost
Augsburg-Ost
Augsburg-West
München-West
Geisenfeld
Regensburg
Salzburg
Passau
Kammer-Schörfling

OBR. Nürnberg in:
Münchberg
Bayreuth
Nürnberg
Pegnitz
Hilpoltstein/Mittelfranken
Kipfenberg/Mittelfranken
Bamberg
Altdorf bei Nürnberg

OBR. Stettin in:
Eberswalde
Neuruppin
Ludwigslust
Pritzwalk

OBR. Stuttgart in:
Stuttgart
Ulm
Ludwigsburg
Pforzheim

OBR. Linz in:
Linz
Wels
Neumarkt

OBR. Wien in:
Mödling
St. Pölten

5

Fig. 2. *Organization of "Reichsautobahnen," August 1938*

The work done is shown by graphs. Including the additional employment in the building material and machinery industry the total number of those who have been employed in auto-bahn work amounts to 250,000 men. The extent of building work is clearly revealed by the following list of machinery used:

3,000 locomotives
50,000 rail lorries
3,500 kms field rails
1,000 concrete machinery plants
110 larger finishers

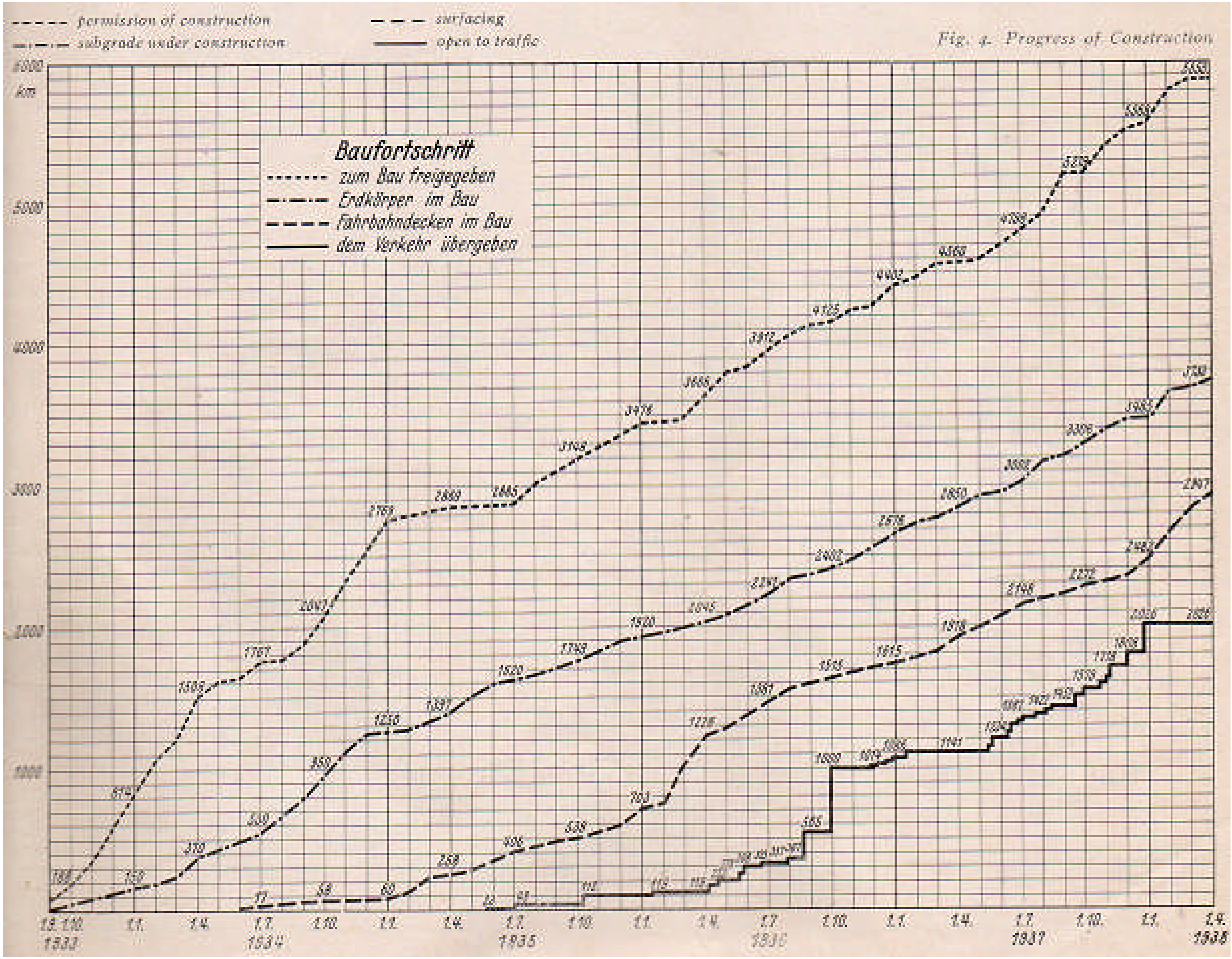


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Fig. 4. ***Progress of Construction***

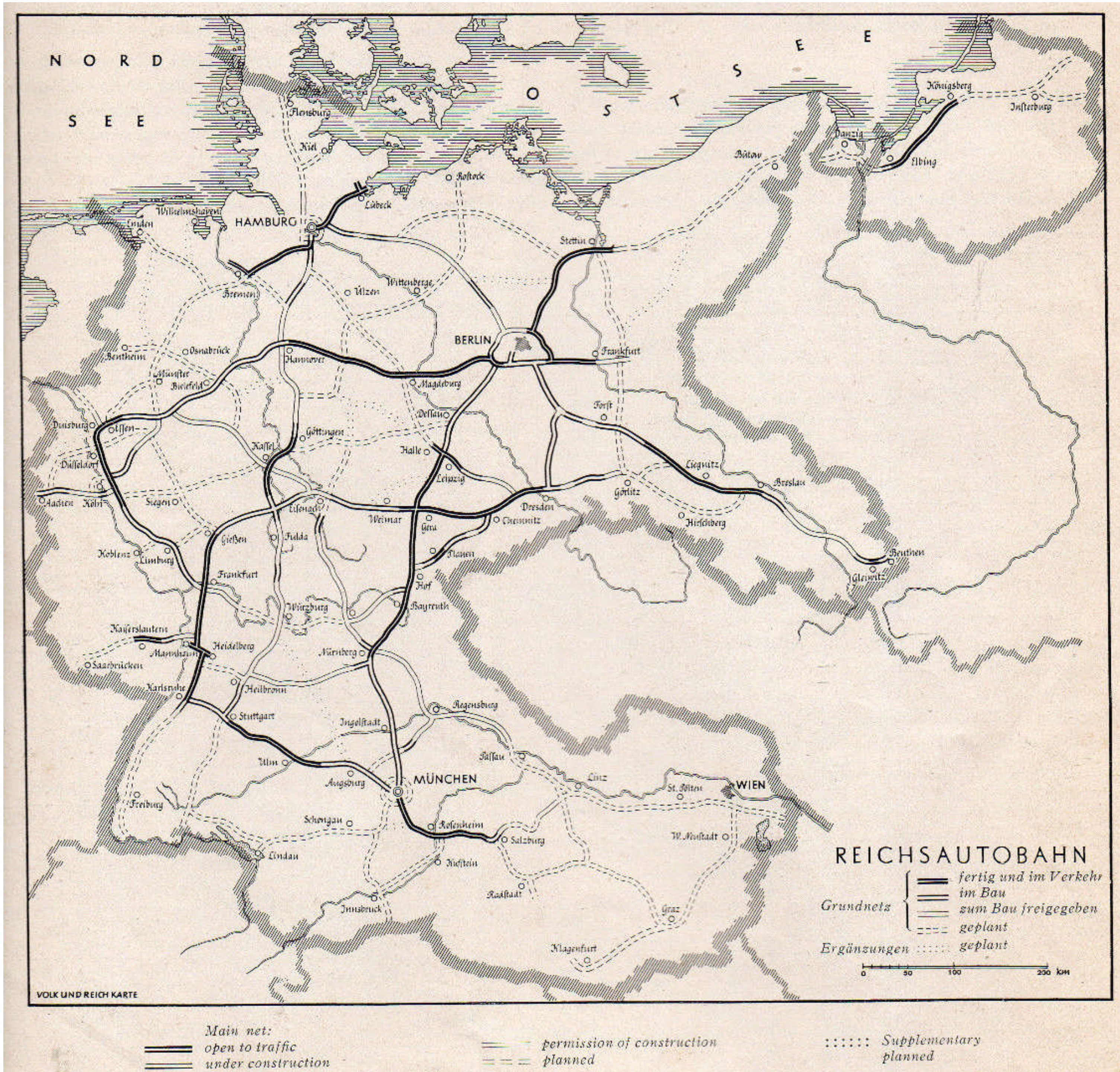


Fig.5. ***Map of German Autobahns on August 15th 1938***

IV. Besides its economic value to traffic the autobahn work is an important employment scheme having decisively contributed towards fighting the enormous unemployment of the years 1932 and 1933 not only by absorbing labor directly and indirectly, but also by stimulating the entire motor industry and motor traffic. The distress among the unemployed is documented by the fact that before the National Socialism had seized the power of government, one third of all Germans being able to work had no income.

The success of the autobahn scheme in reducing unemployment provides the most important source for the financing of the project. 35% of the sums expended for autobahn work would have been otherwise paid for unemployment relief. 25-30% return to the Treasury in the form of additional taxes and revenues. Therefore the Reich has only to grant 35-40% of building costs more than if the autobahns would not have been built. In order to mobilize the means at once, the Reich has financed the work through a recliscant credit offered by the Reich Bank, in addition to the initial capital granted by the former German Railway Company. This capital has been already partially transformed to long term loans.

In the meantime the Reich began to finance the construction work by direct Reich taxes and custom revenues. At first the commercial far distance traffic of goods and the industrial traffic had been bound to pay conveyance taxes which hitherto only the Railways had to pay. Since December 1st 1936 by ordinance of the Reich Minister of Finance and the Reich Minister of Economics on new changes of custom tariffs and the mineral oil tax of November 1936, an increase of tax on the gasoline and benzole had been fixed by 4 Marks per 50 kgs, and of the mineral oil balance tax by 5 Marks per 50 kgs. This measure had been supplemented by the proportional adaptation of Diesel oil taxes. It had been prevented, however, that the cost paid by the consumer per liter of light motor spirit could increase anyhow by more than 0.04 Marks.

On the principle, the final financing of the Reich autobahn is based upon indirect contributions of the motor users who especially take advantage of the autobahn. It had been renounced for levying autobahn users fees. By these special taxes the interests and amortization of building costs could be granted.

V. In addition to the proper lines directly and exclusively serving the through traffic, the autobahn facilities especially serve the standing vehicles. Most frequently parking and stopping places are found. On the contrary to existing roads, which permit to a sufficient degree parking of cars without special buildings either at approaching roads or especially in the towns and villages where the cars could even take gasoline in the street, the autobahn traffic cannot suffer any resting vehicles on the lanes. Therefore parking places are built at short regular distances along the motorway. Touring traffic demands resting places at beauty spots with all facilities necessary for this kind of traffic.

Seats and ground for picnicking and so on must be found there. As many tourists searching recreation to increasing extent use buses, some points are prepared for mass traffic. Well equipped resting places as built, e.g. where water suitable for bathing places is found along the autobahn. Typical mass resting places of this kind are in some cases supplied with buildings.

In combination with the resting places or sometimes in connection with other facilities or even independently passenger stations for scheduled bus traffic with access to the public are planned. In consideration of the actual traffic of this kind they have been arranged only in a few cases and are built relatively plain. But as a great development of the scheduled bus lines is to be expected, the importance of these facilities will soon increase.

Very carefully the planning of filling stations on the autobahns had to be carried through, as in comparison to normal Reich roads quite new points of view had to be considered. The peculiarity of autobahn traffic demanded the concentration of the entire organization of filling service. Therefore the Autobahn Motor Spirit Ltd. (Reichsautobahn-Krallstuff-Gesellschaft m.b.H.) had been founded with the exclusive right (granted by the Reichsautobahnen Company) to manage all the filling stations on the autobahns. The filling stations are planned at distances of about 30 to 40 kms along the lines. Formerly the lane triangles in the access structures have been preferred for the erection of the stations, as not only the through traffic, but the arriving and leaving vehicle could be served hereby.

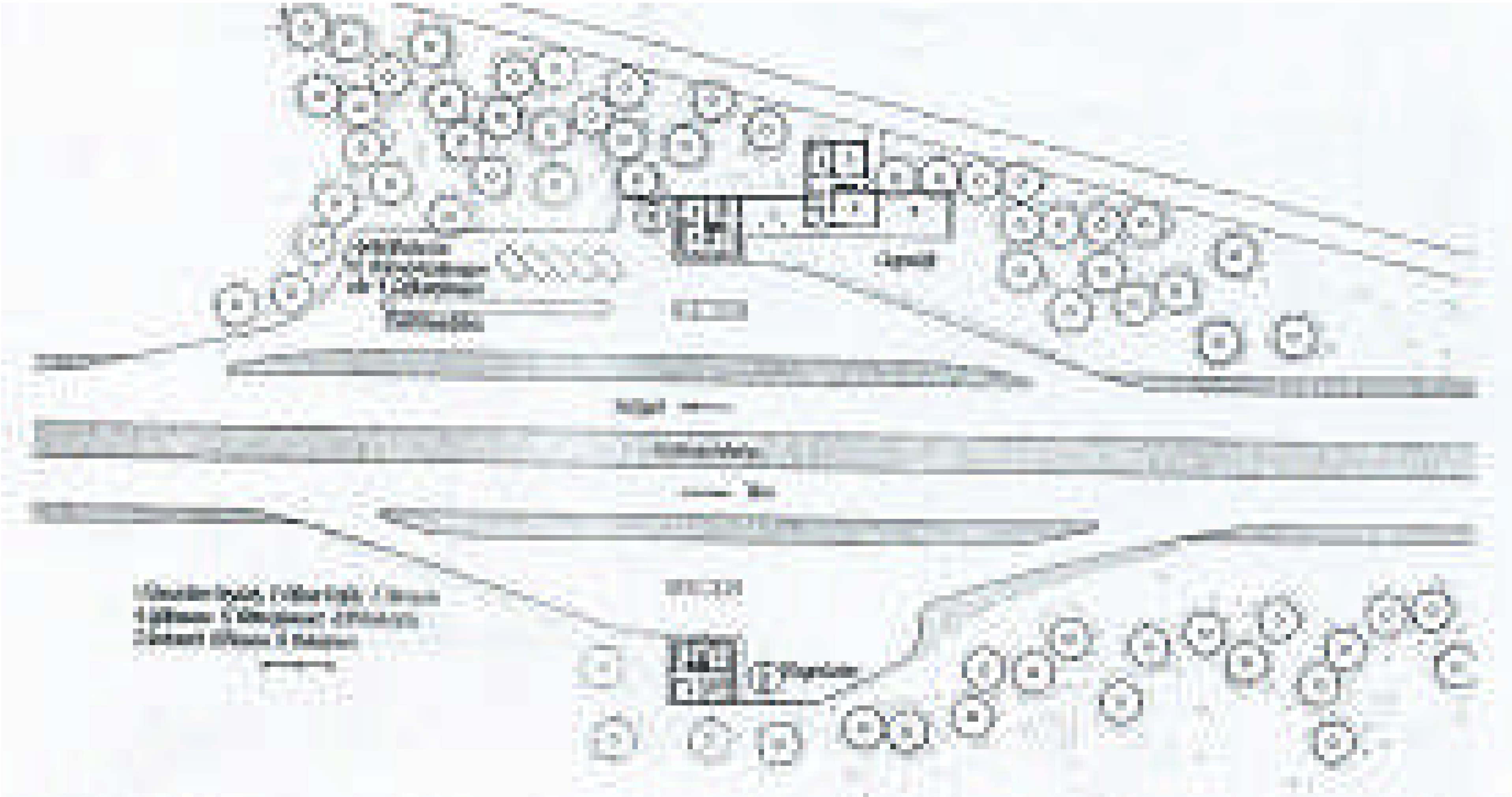


Fig. 6. ***Filling Stations; stopping places***

However, as the demands of traffic architecture and aesthetics could be better served when the station is outside the access structure, the position of a straight section is preferred. In this case the station is mostly serving both sides of the road. It is not necessary to install complete plants at each side; it is sufficient to have on the one side of the roadway so called good-weather-islands without the entire filling equipment.

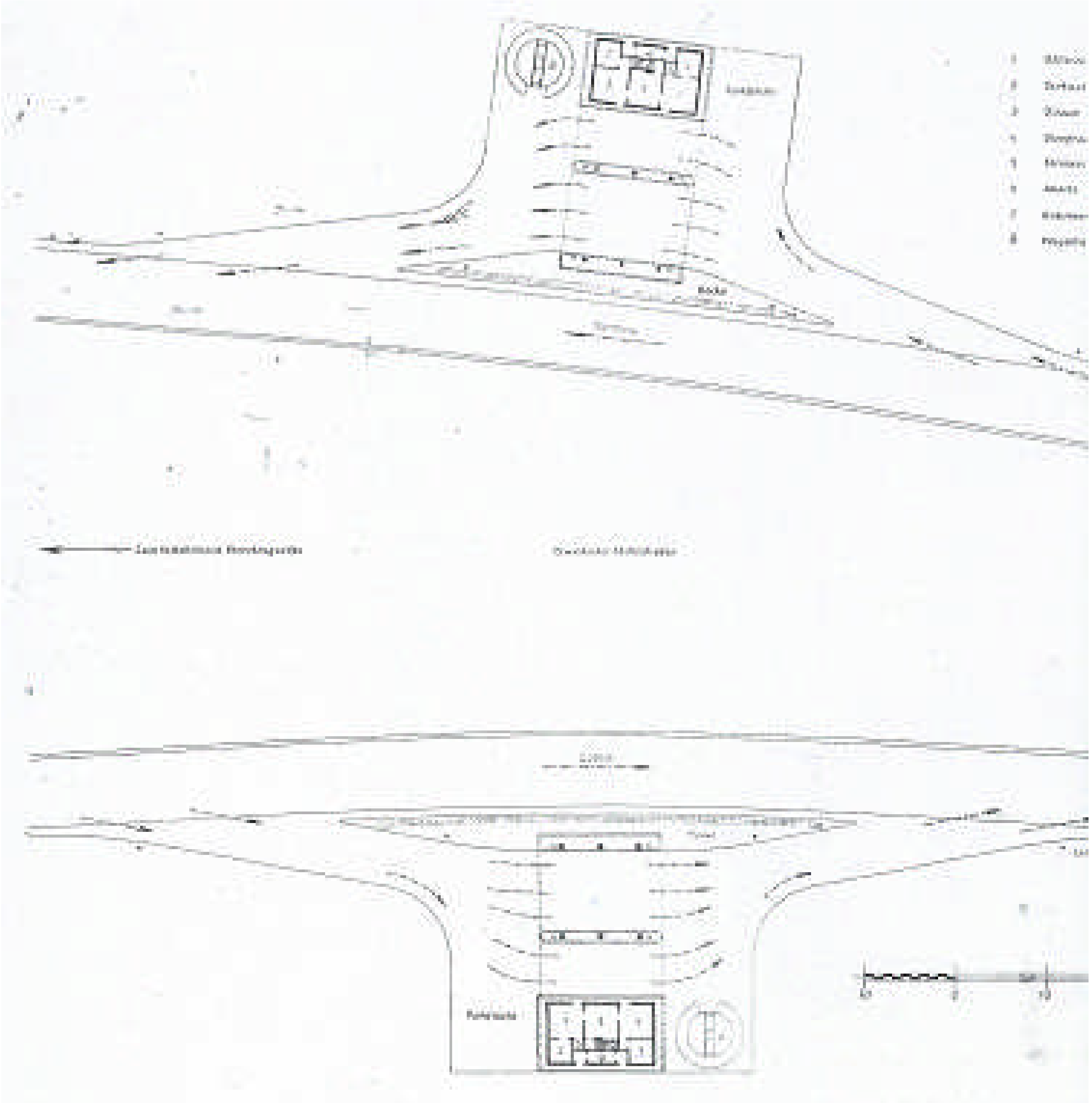


Fig. 7. ***Double-sided scheme of filling station at open autobahn line; near Hamburg***

Generally all the autobahn filling stations are not only filled for selling motor spirit but for general service; they have facilities not only at the disposal of the clientele, but to every road user. All filling stations contain a social room, public telephone as well as washing rooms and WC’s. Moreover the driver can get information about repairing shops as well as snow and surface conditions of other roads. The stations forward private messages to or from the road user and each of them can give first aid at accidents. With regard to the long distance capacities and the peculiarities of communication of heavy load vehicles, Diesel oil tanks are only necessary at a few stations.

Indeed, the filling stations with their multifold service facilities have become traffic bases; in greater distances additionally along the lines and at important points typical mass resting places are created. First the proper rest-houses serve the professional road user and especially the driver of long distance trucks. These places are arranged at distances of about 150 kms; such points are preferred from which several autobahn lines can be served.

As to architectural designs these kinds of rest-houses with their social and sleeping equipment are especially installed for far distance drivers. For other guests additional rooms are built, in many cases the rooms can alternately be used for commercial as well as touring traffic. The houses have mostly two-bedrooms. Moreover there are rooms for other guests and emergency shelter for mass traffic as possible in occasional bus traffic. Naturally the rest-houses are equipped with washing and shower bath installations not only serving the night guest.

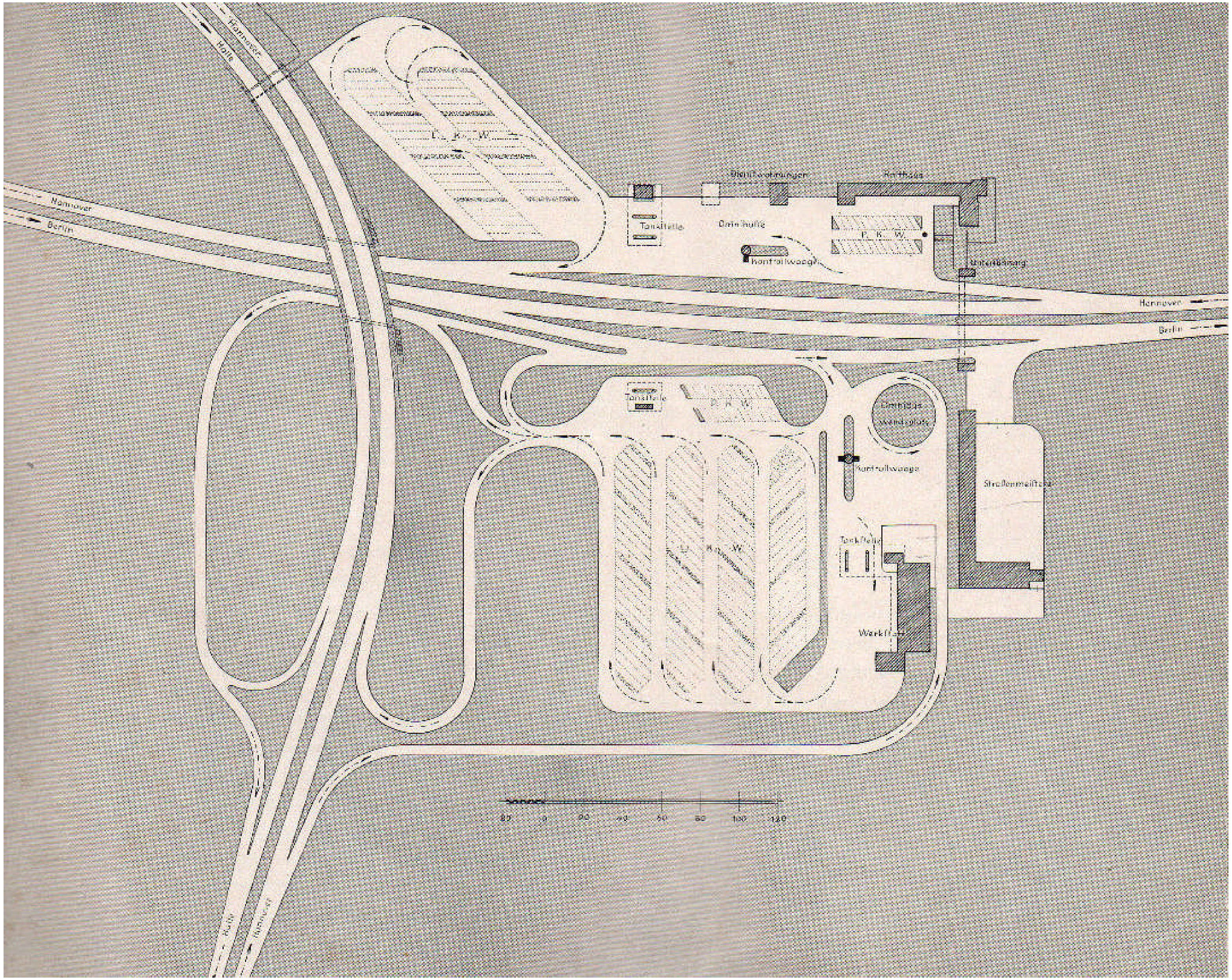


Fig. 8. ***Service station of autobahn line near Olvenstedt. Rest-house, filling station, repairing shop, control office, maintenance post (surfaced area and roadway are white)***

Special attention is paid for the parking of cars at the guest rest-houses. The number of truck trains parking at the same time may amount to 100; for any train about 100 square meters of parking space without the necessary entry way must be calculated. Besides the filling stations where at the large houses sell motor spirit as well as regular Diesel oil, greater repairing shops are built here. For the control of commercial vehicles carried through the Reich Association for Motor Lorry Traffic, special control buildings with weighing scales are constructed.

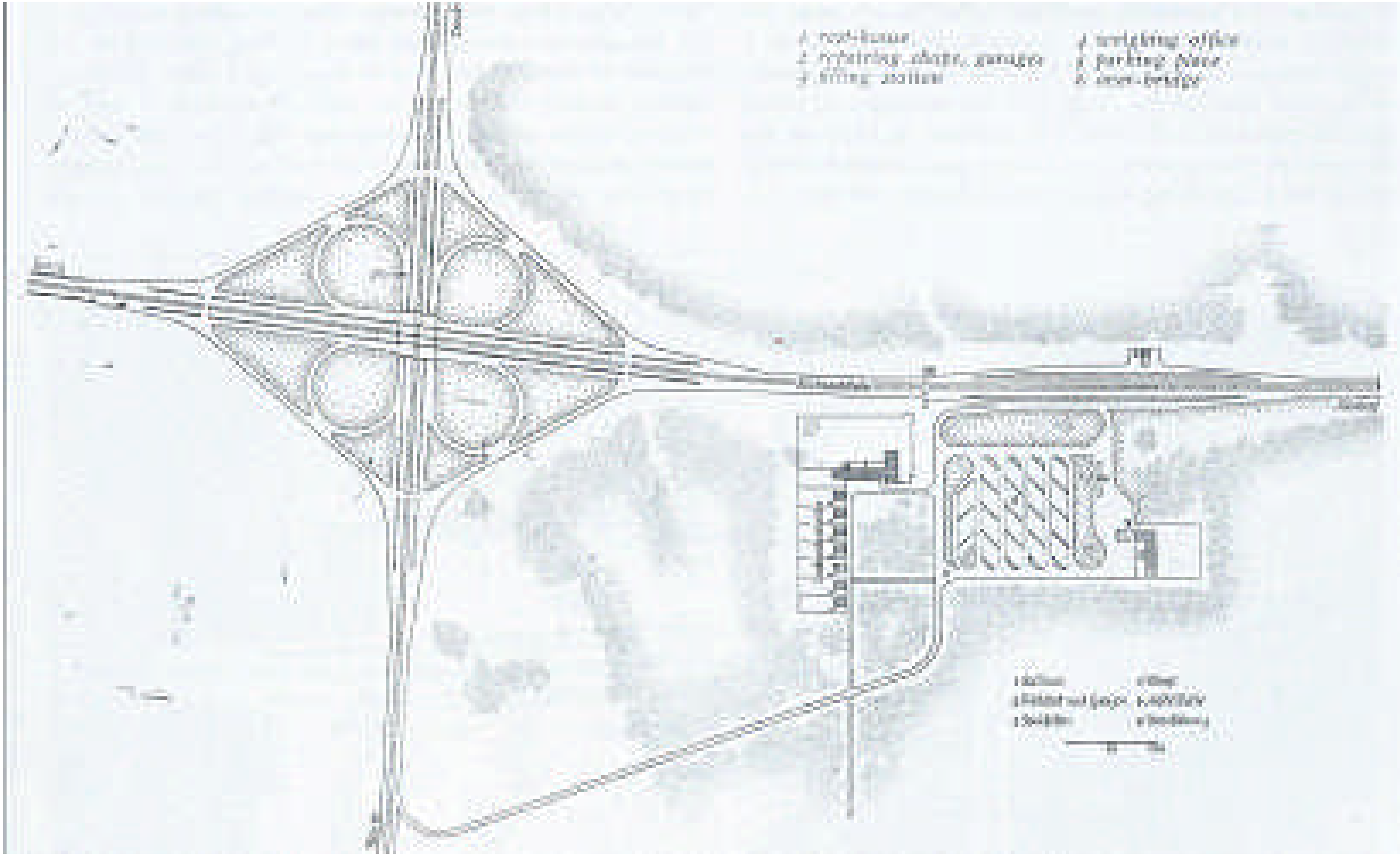


Fig. 9. ***Rest-house near crossing of two autobahns***

Besides these typical resting houses mostly serving commercial traffic, inns for the touring traffic are built at beauty spots. Their architecture entirely depends on the local conditions. The size of these inns can become considerable such as the autobahn hotel on the Lake Chiem in the Bavarian Alps region.

Buildings which do not serve the road user, but road control and road maintenance, are the road survey houses being built at distances of 60 to 80 km along the autobahn lines. Besides the offices and dwelling rooms for the officials as well as the rooms for the workmen the buildings contain garages for the up-keep of vehicles and machinery used for road maintenance such as lorries, snow removers, road cleaners, chippings distributors etc.

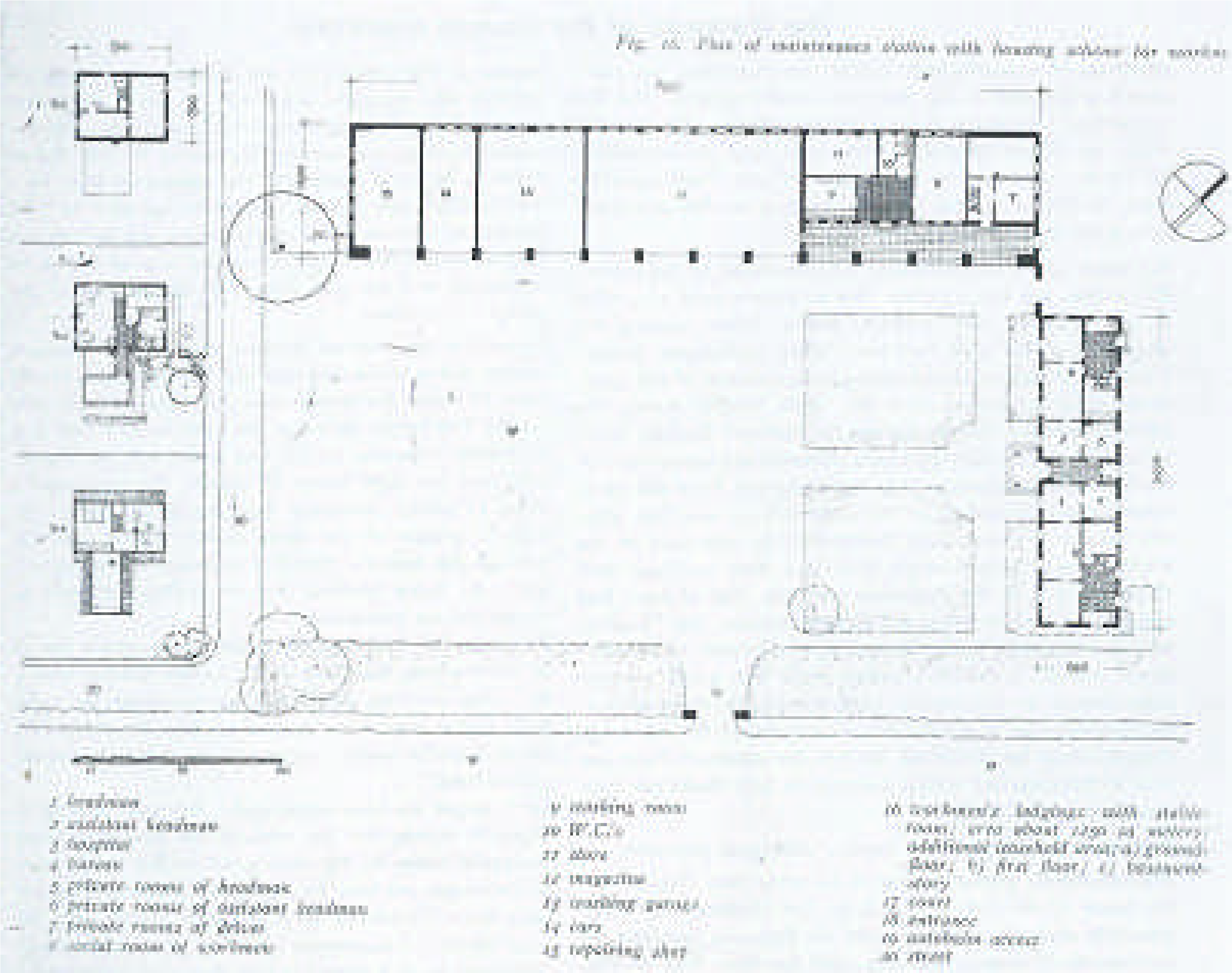


Fig. 10. ***Plan of maintenance station with housing scheme for workmen***

In the winter of 1936/37 a road news service has been organized rapidly conveying the news by radio and leaflets about the conditions on the autobahns and Reich roads under atmospheric troubles (e.g. snow-fall, glazed frost and floods). These short explanations show that the road facilities are necessary especially with respect to undisturbed high speed traffic on the Reich Autobahn.

The Workmen of the German Autobahns

Abolition of unemployment was at the beginning the paramount catch-word of the National Socialist activity. The first stupendous measure was the autobahn scheme. On May 1st 1933, the Fuhrer proclaimed the plan, and on September 23rd of the same year he turned the first sod. Twelve months later, 80,000 men were directly working on the Autobahn jobs (refer to diagram p. 6)

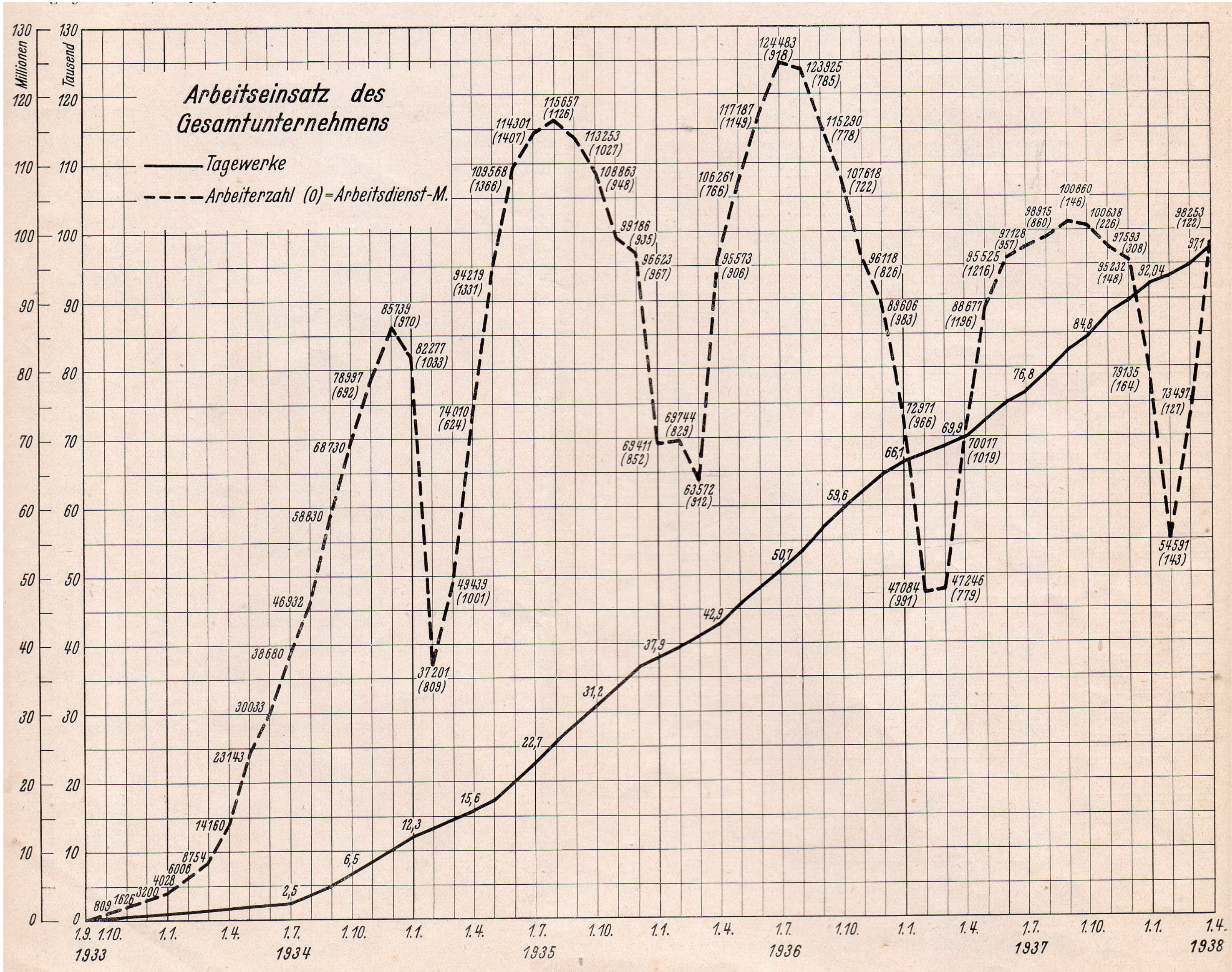


Fig. 3. ***Rate of employment. Number of working days and workmen (incl. Labor Service)***

The hands wanted in Autobahn work are hired by the Labor Office from any trade center. The wages are paid according to the generally valid building tariffs. When starting the work, the actual tariff had been used unchanged, though it had come into existence through agreements of the organizations of employers and the Trade Unions during the years of severest distress before the National Socialist revolution. The wages were regionally different and varied according to kind of profession.

The application of these old tariffs caused great difficulties on the autobahns, as one line often cut through different tariff districts. Only one part of the workers were of local origin and came from the local tariff districts. Many, at the beginning probably most of them, had been taken from the cities and distress regions. The “Trustees of Labor” jointly with the Inspector General of German Roads issued the so-called section tariffs with a new average wage based on the various local wages. In the course of the development of the Reich tariff agreement the low wage districts could be abolished; so that the minimum wage per hour of the un-skilled worker amounts to 0.50 Marks per hour according to the tariff.

The worker, however, gets various additional payments: The extraneous worker having to go more than 10 kms from his home to the job is aided by the distance fee which generally amounts to half a Mark for distances between ten and twenty kilometers and one Mark for more than 20 kms. The conveying of the workers from the central housing regions to their job is carried out by extra railway trains or by special buses, so that the worker in his regular work does not remain from home longer than 12 hours daily. The distance fee generally covers at least the fare of the conveyance, but often yields a surplus, if, e.g., the man uses his cycle or his motorcycle.

If the local conditions demand a long transport, the worker must leave his family and search a new dwelling in the proximity of the working place. But the housing near the building site is generally very limited in relation to a greater number of men; mostly the few facilities are already taken by workers who regularly work with the same contractors who appear at first for preparing the building site. For the other workers camps are erected according to the demand. In order to facilitate financially the separation from his family, the laborer gets a daily separation fee of 1 to 1.50 Mark per day in addition to his regular wage and his free dwelling. This separation fee is paid to married men as well as to those unmarried workers who live with relatives whom they are obliged to support.

To enable the married workers to visit their families, they receive every two weeks free-fare railway tickets for distances over 15 kms; unmarried men get these tickets every six weeks. For longer distances the right for free-fare is granted in greater intervals; at 500 kms and more the married men will have the right every 10 weeks, the unmarried worker every 13 weeks. Moreover there are possibilities to do home trips in groups at low fares of 0.01 Marks per kilometer through the National Socialist community "Strength through joy." By these facilities the connection between men and family can be preserved.

The open air work on the building site spoils the clothing of the workers; therefore at the Labor Offices one can ask for cheap clothing which may be paid back by installments. In a similar way many contractors provide cycles. The National Socialist welfare organizations give considerable assistance here.

Tariff wages are hour wages only. But according to National Socialist conception the reward for the work cannot be measured alone by the time spent on the work; in addition to the wages per hour the additional piece-of-work payments have been introduced as a premium system. The tariff per hour remains independent from the attainment reward. The additional wage is based on free agreements between masters and men, but the authorities, as well as the German Labor Front give their assistance.

There are experiences to state the hour-wage being the base for calculating the premium. The additional wages can easily amount to 30% of the wage per hour. To avoid exaggerations a maximum limit has been stated. The attainment addition has been introduced for certain kinds of work, e.g. earth work performed by hand. As unemployment nearly disappeared, mechanization of all working processes became necessary; therefore the special fees vary according to quality and difficulty of work. The classification of the workers according to the tariff will depend more and more on progress of work; it happens frequently, that a so called "unskilled" worker having special abilities for some work, can get the wage of skilled workers and even machinists.

Who by industrious work performs his duty, wants recreation anf furlough. The worker of the building industry had often to change his job, and therefore often lost his paid furlough times. The presupposition of furlough was a long time employment in the same firm; the worker could often not enjoy this free time when he did not reach the minimum time of employment either because of the kind of work, or through the ill-will of the contractor. Now furlough stamps have been introduced which the contractor regularly has to register; hereby the German worker is independently assured of furlough in spite of changes of jobs. The married worker over the age of 25 will be paid e.g. 6 free days for every 48 working weeks. Juveniles and older men get longer furlough. The payment for festival days falling in the week is regulated for all trades in the entire Reich.

Regular working time on the jobs of the autobahn amounts to 96 hours per two weeks. The peculiarities of work often demand hours in excess, which are rewarded by increased hour wages. For common excess hours a supplement of 20% is paid, for festival work 50% and holiday festival work even 100% and for night work 10%.

In winter atmospherical influences shorten the regular work time; thus the worker would suffer serious losses of wages; construction work would be impacted because the worker would not always be at hand and would even accept other kinds of work. On the autobahn building sites the so called bad-weather-tariff guarantees the wages for at least 36 hours per week in independence of the real working time. If bad weather forces the complete conclusion of the job, the worker will be dismissed "because of cessation of work caused by unfavorable weather"; in this case the legal relief of the Labor Offices begins immediately.

The old building trade tariff of the pre-national-socialist time included the daily notice; this fact leads to serious reduction of the economic resistance and the good will of the laborers. Therefore as soon as the worst unemployment was surmounted, the three-days-notice principle had been introduced in building trade: an important step towards real National Socialism.

Conclusively it may be stated that the income of the workers of the building trade, which was based upon the old tariffs of the pre-national-socialist time was improved according to National Socialist principles by social supplements and increased by the creation of peace in work supplements. Moreover the stability of income has been secured by special measures of the tariff policy like bad-weather regulations and notice terms, as well as by the gigantic task which the building industry faces thanks to the planning of the Fuehrer.

Also the working conditions had to be improved. One had got accustomed to consider the building sites as temporary working places and all welfare measures as superfluous. Now the principle of “beauty of work” had been propagated also for the building sites. The regulations of the Inspector General for the German Roads changed the appearance of the working and dwelling places of the autobahn workers successively and steadily.

The up-keep of the health of the workers demands special measures on the jobs; here the men can get regular medical attention. In case of sickness the sick-relief-organizations care for the sick worker and his family according to legal specifications. The professional unions of the building trade have to prevent accidents by all means and to see that an injured worker is restored to health. If the consequences of an accident do not permit the re-employment in the original branch of profession, the man will be trained for another profession.

When building work started on the autobahn, the paramount aim was to give employment to as many men as possible. Therefore at first machinery work had to be limited; earth movements by machinery had to be even prohibited. Already in the year 1937 the conditions were absolutely changed and now we face the necessity to limit any hand work in any process of labor, i.e. to replace hands by machinery. Here is a fundamental new conception of National Socialism that both men and machinery have to be used to their greatest capacity. Therefore the endeavor is remarkable to distribute the necessary working days over the entire year. Herewith the building industry will lose its character as a seasonal trade. To train necessary juveniles special training places have been installed; the Inspector General for the German Roads has created the standard type.

In the beginning of autobahn work the workers had to dwell near the newly erected jobs in scarcely populated areas under pre-revolutionary conditions. It must be remembered in what a disciplined manner our workers then used to live under antiquated conditions only in order to enable the beginning of work on a large scale.

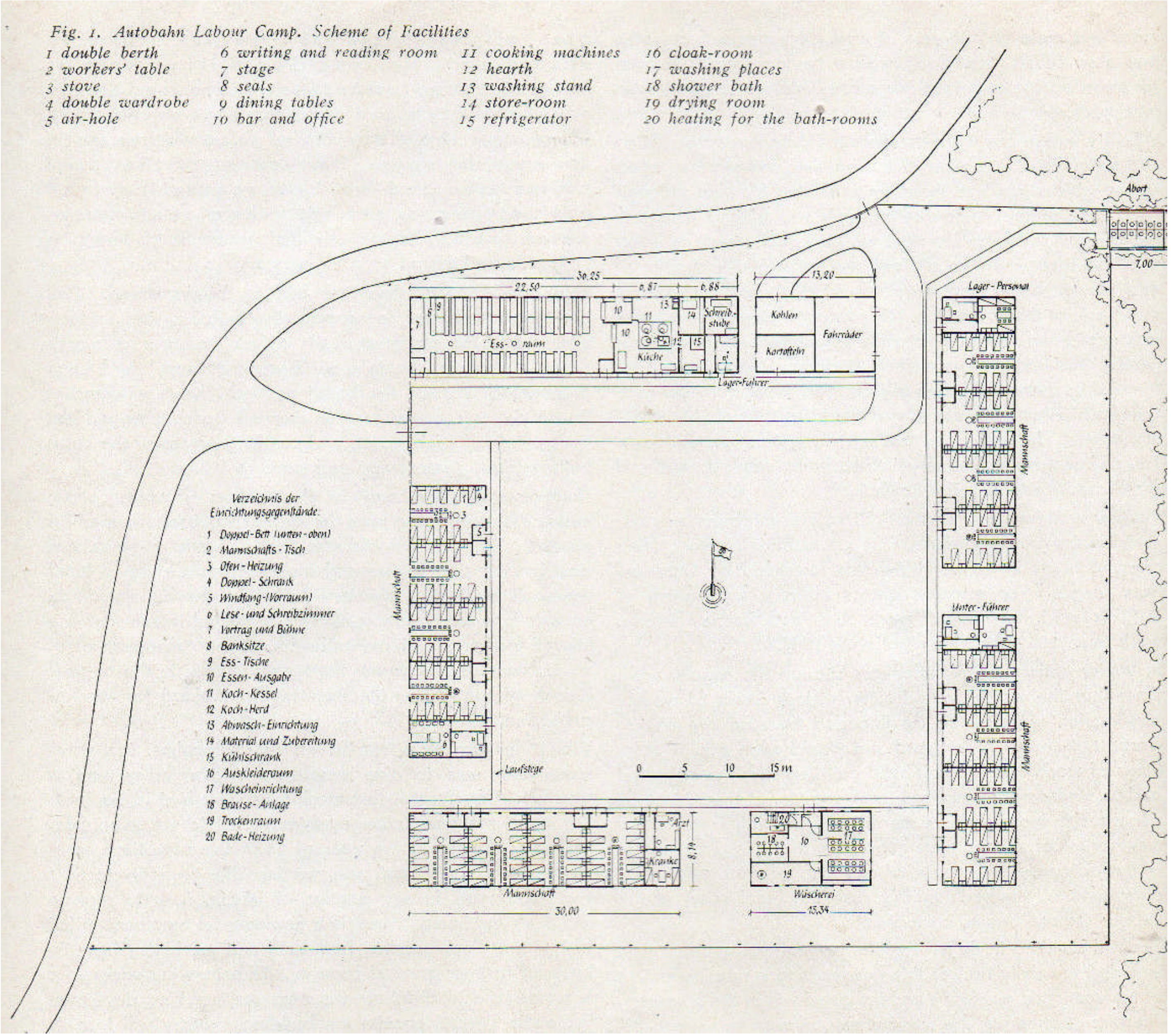


Fig. 1. ***Autobahn Labor Camp. Scheme of Facilities***

To give dwelling facilities to those who work far from their families, the barrack camps well experienced by the Reich Labor Service have been erected near the various autobahn building sites. About 60,000 berths are at disposal on the autobahn lines. Nearly one half of the workers dwell in these camps.

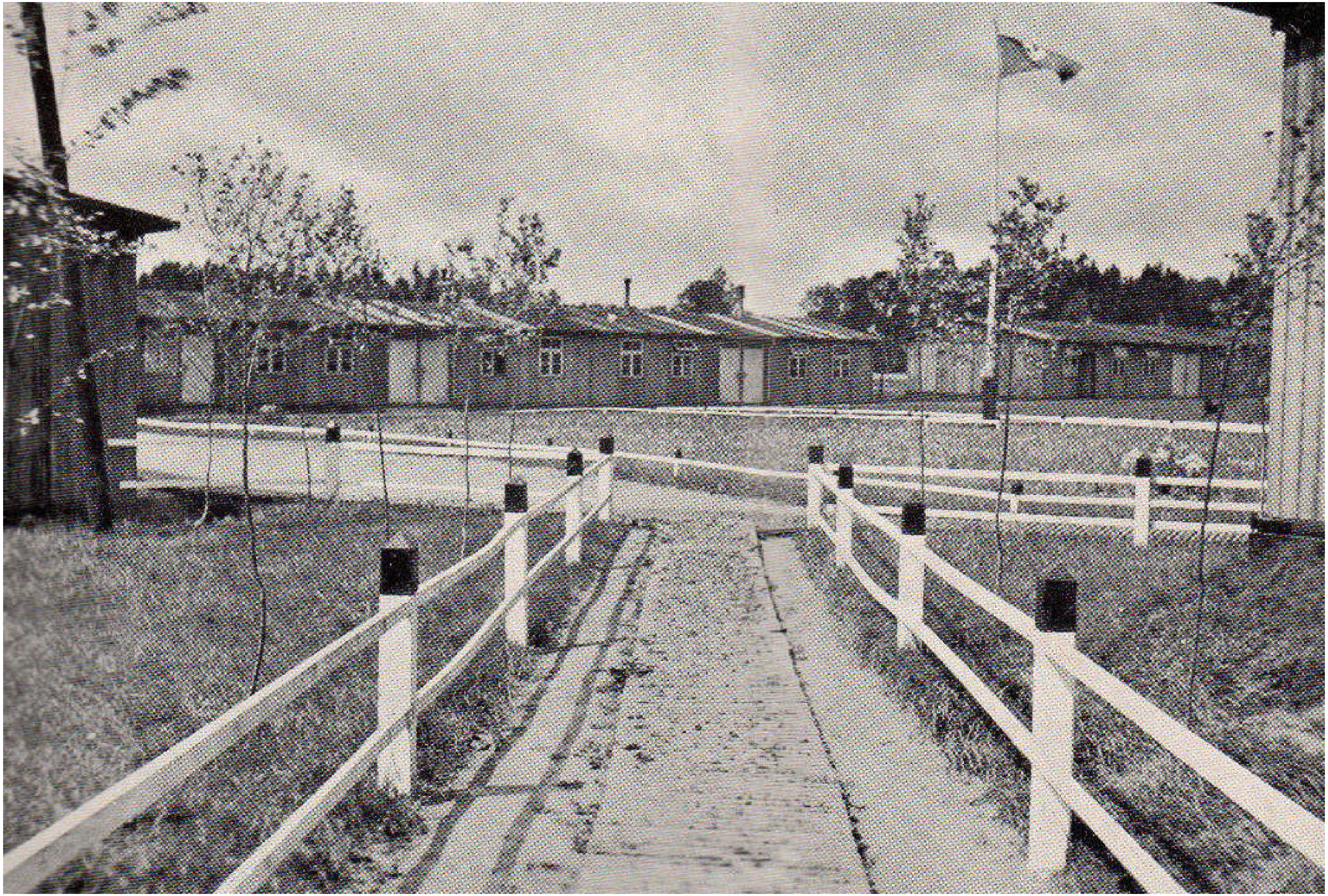


Fig. 2. ***View into inner court of Labor Camp near an autobahn working place. Eastern Prussia***

The buildings of a dwelling camp are arranged around a courtyard of about 35 x 100 meters. The sleeping rooms can take 18 men each. Everyone has his own bed, his wardrobe, his chair and his seat at the table. During winter-time the stoves will be heated. Generally 4 of these rooms form a barrack. The kitchen is quite a modern large-type kitchen being provided with pantry, cellars and a big electric re-frigerator. The management of the kitchen like the entire camp is run at the cost of the contractor; the worker does not need to pay for anything. The expenses are limited to an average full board fee of about 1.10 Marks.

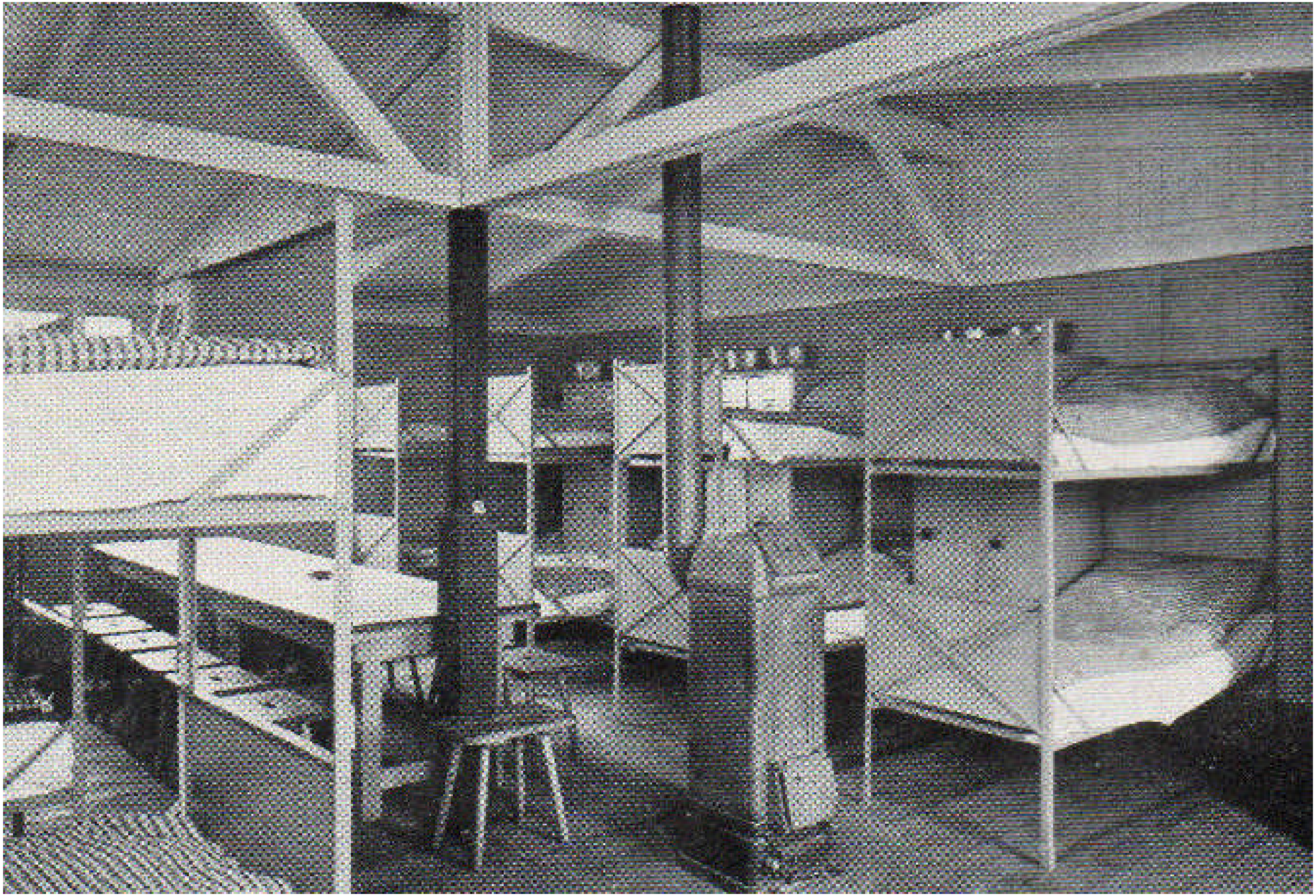


Fig. 3. ***Sleeping Room with Heating***

Fig. 5. ***Camp Kitchen***

Under the same roof with the kitchen, the social room is arranged. Here each camp member has again a seat at the table to take the meals. After cessation of work the worker may spend time in the community of comrades at leisure. In each camp there is a sufficient number of papers and journals as well as radio. Chessboards etc. can be found here. Wireless provides music and connects the national community outside and the camp together. Numerous ambulant libraries supply the camp library which is also found in most camps.

Fig. 6. ***Social and Dining Room***

Special care has been paid to washing has been paid to washing facilities. Running hot and cold water is at disposal. Shower baths permit the cleaning and refreshment of the whole body. The camp has its own drying room for drying wet labor clothing and a room to be used as a laundry.

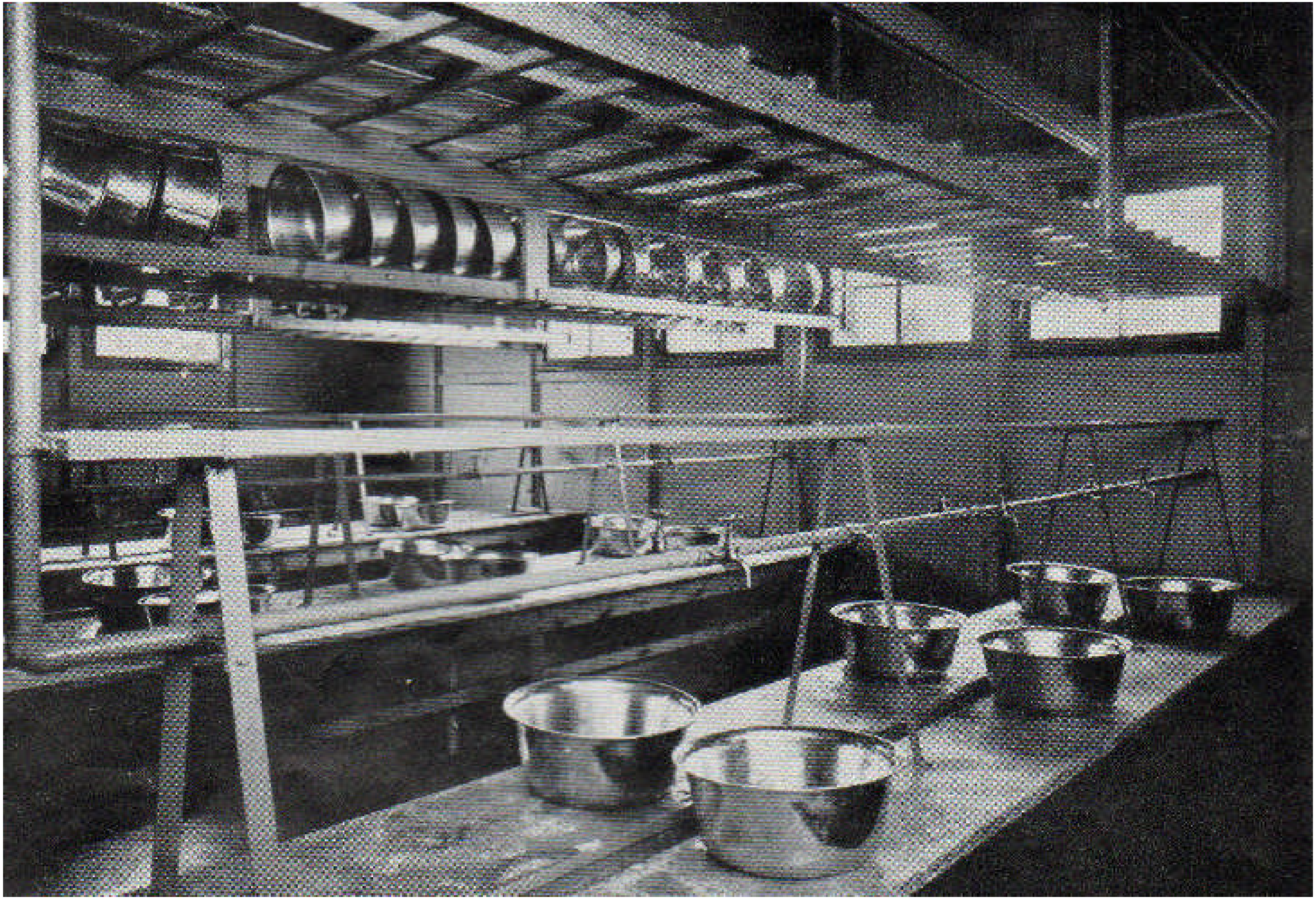


Fig. 4. ***Washing Room***

Furthermore some small rooms have been built in the camp for special purposes, e.g. the camp administration and the supply room, the sanitary room and hospital, moreover a reading and writing room for those who like to sit separated from the others. Of course, hygienically good WC's have been built.

In all the camps the best presupposition for the advantageous guidance of the workers' community has been created under the Senior of the camp, representing the boss during the leisure time. It is his duty to take care for the happiness and health and the practical application of the catchword of "Strength through joy." He is responsible for the workers who should feel at home in the camp. He stays permanently in the camp and participates in the living of the camp community, he knows about the causes of the workers' sorrows and will successfully work for improvement. An assistant manages the administrative questions. In normal camps of 216 men, 10 further men are at his disposal in the kitchen, for cleaning and as machinists.

The use of leisure time demands special attention in the camp. The German Labor Front has opened a section “Reichsautobahn” in its National Socialist community “Strength through joy” which organizes the use of leisure time of the autobahn workers. Talks and talkies, as well as gay and earnest evening entertainments are given in the social room. The army and the labor service as well as the party give assistance in the musical entertainments.

Highly appreciated is the “Autobahn Stage” which performs real plays. The “Strength through joy” entertainments have proved the sentiments of culture of the German worker and have refuted the error that hard working men are not able to appreciate art. It is impressive how happy these workers can become through these entertainments. Besides the entertainments arranged by the German Labor Front, the workers are united during the get-together meetings, may they live in the camp or not. It has become a good custom that the officials of the administration join these meetings and prove the comradeship of a big undertaking.

Hard work on the roadway jobs does not only demand intellectual entertainment but also sports as a balance to the use of only certain groups of muscles. Lawn games and boxing are in fashion. Also in this respect “Strength through joy” gives assistance. The community of the camp is extended to the environment. The inhabitants of the surrounding villages like to join in the entertainments as guests.

At the top of the camp the flag of the Third Reich admonishing to National Socialist living. The camps of the autobahn are the germ cells of the new feeling of community on the working places. The spirit fostered here did not only influence the working camps, but the entire country. The members of the camps mostly coming from the towns must have village life. Rural and urban population of various regional origin begin to understand each other. Already here the autobahns begin to weld together entirely different men to a German unity.

The jobs of the autobahns are the standard working-place of the Third Reich. The National Socialist theory of work and labor is continuously put into practice. We face the beginning of a development which will bring greatest realization of the high ideals of professional life. The economic presupposition has been conceived, the men must incorporate the ideal. When the autobahn sections are opened to traffic the workers themselves motor over their piece of work. Here the union of leadership and workman community reveals itself most strongly under the creator of the stupendous scheme, its first worker Adolf Hitler.

Principles
of
Autobahn Design

1. Adaptation to morphology.

To adapt the autobahn design to the natural morphologic forms, the design is classified into three groups.

1. In lowlands without considerable obstacles

rounding of vertical curves	rise:	$H_k \geqq$	16 000 meters
	fall:	$H_w \geqq$	8 000 "
radii of curvature		$R \geqq$	1 800 "
			(1 200 ")
maximum slope		$n \leqq$	4%
formula of speed factor		$V_1 =$	160 kms/h

2. In hilly regions, with many obstacles

rounding of vertical curves	rise:	$H_k =$	9 000 meters
	fall:	$H_w =$	5 000 "
			(3 000 ")
radii of curvature		$R \geqq$	1 000 "
			(800 ")
maximum slope		$n =$	6%
formula of speed factor		$V_2 =$	140 kms/h

3. In mountainous regions

rounding of vertical curves	rise:	$H_k =$	5 000 meters
	fall:	$H_w =$	3 000 "
			(1 000 ")
radii of curvature		$R \geqq$	600 "
			(400 ")
maximum slope		$n =$	7% (8%)
speed factor		$V_3 =$	120 kms/h

The Inspector General for the German Roads issued on March 23rd 1937 the following regulations for the lay-out of autobahns; this “Bauanweisung Nr. 3” contains in a dense form all the data which are to be dealt with. The indicated limits may be reduced in exceptional cases to the values given in brackets.

This classification has, besides the adaptation to the morphologic conditions, also the purpose of assuring conformity of slopes, curves and visibility for long distances. If the class is to be changed on the line sections designed according to the different classes must not be too short. The transitions to a lower class should reveal themselves to the driver through change of landscape or density of settlement. Transitions must be sloping and gradual; so that sections of one class must not be suddenly followed by the lower class without interpolation of intermediate values. In the three groups there is no limit to higher values which are even desirable. The lowest values are to be used when the line can be laid out in a more economic manner or with a better landscaping effect. Under given conditions, the lowest value of rounding off vertical slopes, necessary according to morphological conditions, is fundamental for the classification of the section.

2. Rounding off vertical curves

The value of vertical curvature chosen with respect to morphology determines the distance of visibility in one direction of traffic. The space to bring running cars to a standstill before sudden obstacles indirectly depends on vertical or horizontal sight distance and determines maximum speed reasonable on the section.

Fig. 1 shows the relations between rounding off curves, sight distance, stopping space and speed. The sight distance in its dependence on the radius of curvation is drawn to the left, the theoretical speed to the right. Stopping space equals sight distance: the theoretically reasonable speed can be calculated by the stopping space under consideration of the friction value “f” which decreases with increasing speed; it is different in the three groups. In class 1 the value f is calculated and used at 0.40, in class 2 at 0.45 and in 3 at 0.50.

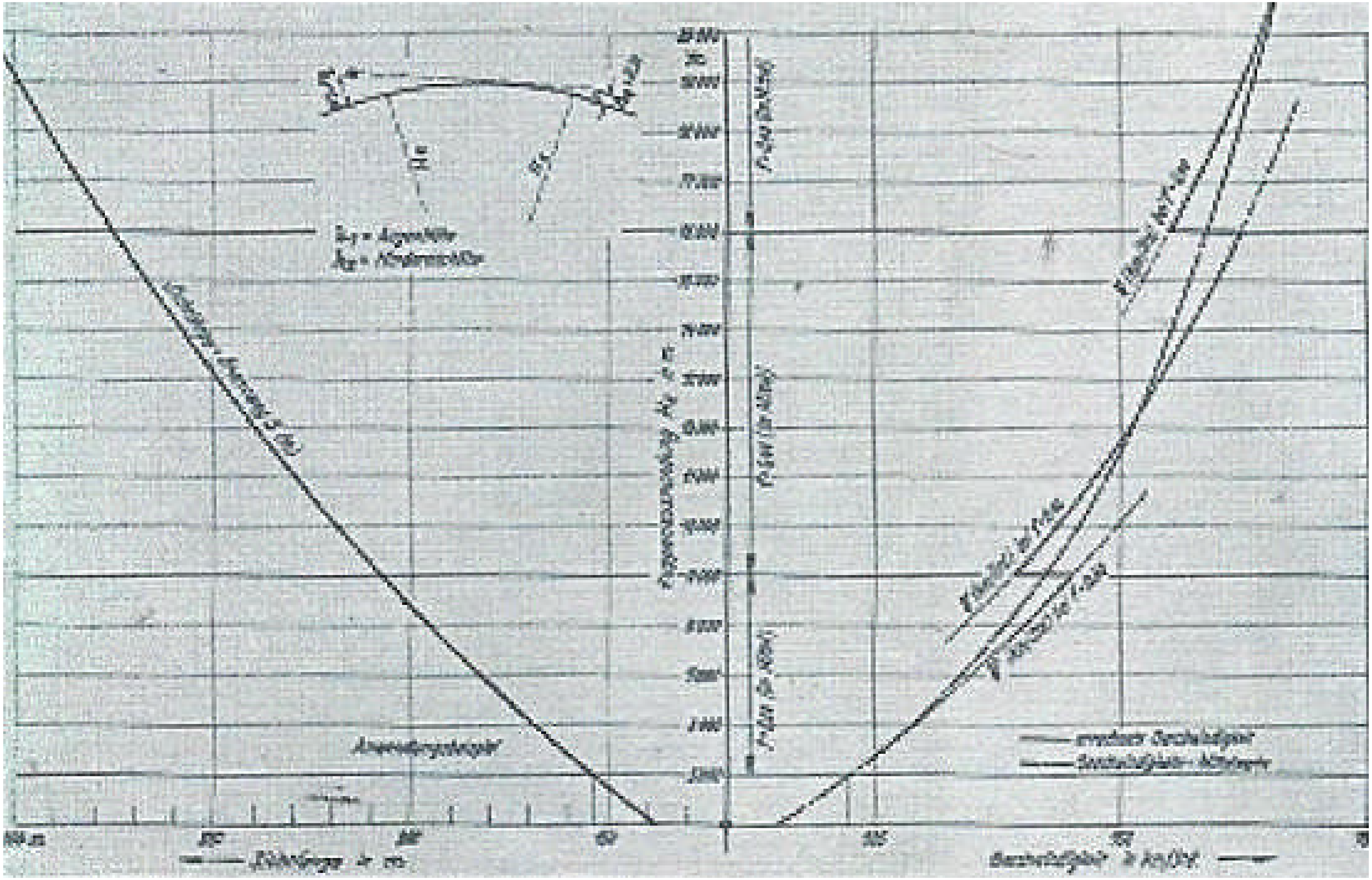


Fig. 1. ***Relations between rounding of curves, sight distance, stopping space and speed***

In figure 1 the three different values of "f" yielded the three speed curves which are summed up to an average curve (-- - -- - --). Speed values in figure 1 are only of theoretical value. They are only used as factors to balance rounding off curves, radii of curvature, cross-fall in curves and so on, when designing a section of an autobahn line.

The limit for rounding off curves in a certain section should not be chosen too closely according to an unfavorable curve, but because of its influence on the other elements of design it should be considered with respect to average conditions. If necessary, these low limits of curvature may be still reduced in curves which are situated between sections with long and considerable slopes forcing the driver to slow down. In sloping sections the small changes of gradient should be especially rounded at a radius as great as possible.

3. Calculation and design of curvature

a) Radius of curvature

Generally the radius being most favorable in adapting the line to morphology should be used. The smallest allowable radius is determined in part 1 for each class. In exceptional cases dealt with under 3 c (gradient) and 3 d (arcs of transition) it may be necessary to use a greater radius than given in part 1.

b) cross-fall

On principle all curves are built withy the cross-fall towards the inner side of the curve. The minimum measure of cross-fall in curves amounts to n = 0.02 (2%), the maximum to n = 0.08 (8%). The cross-fall has to counteract against the centrifugal force of the car running in the circle and ought to be calculated at

$$n = \frac{V^2}{127\ R}$$

As this demand results in values for the superelevation n which cannot be applied practically, a small utilization of the force moving to the side (friction) should take place in order to transfer the centrifugal force to the road surface. The value of this side force to be used is low at great radii and high speeds in mountainous regions. The maximum value occurs at the smallest radius of R = 400 meters with one fifth of the car weight.

The necessary cross-fall calculated in this manner is given for all the usual radii of the three classes of design showing in figure 2 the smaller radii of curvature separately. Curves of equal radius get different cross-fall in the various classes with regard to the theoretically and actually different speeds in lowlands and mountains. On the principle full percentage figures are to be used as given in the stairs line of figure 2. The allowable maximum of the cross-fall is bound to limitations indicated in the following part 3 c.

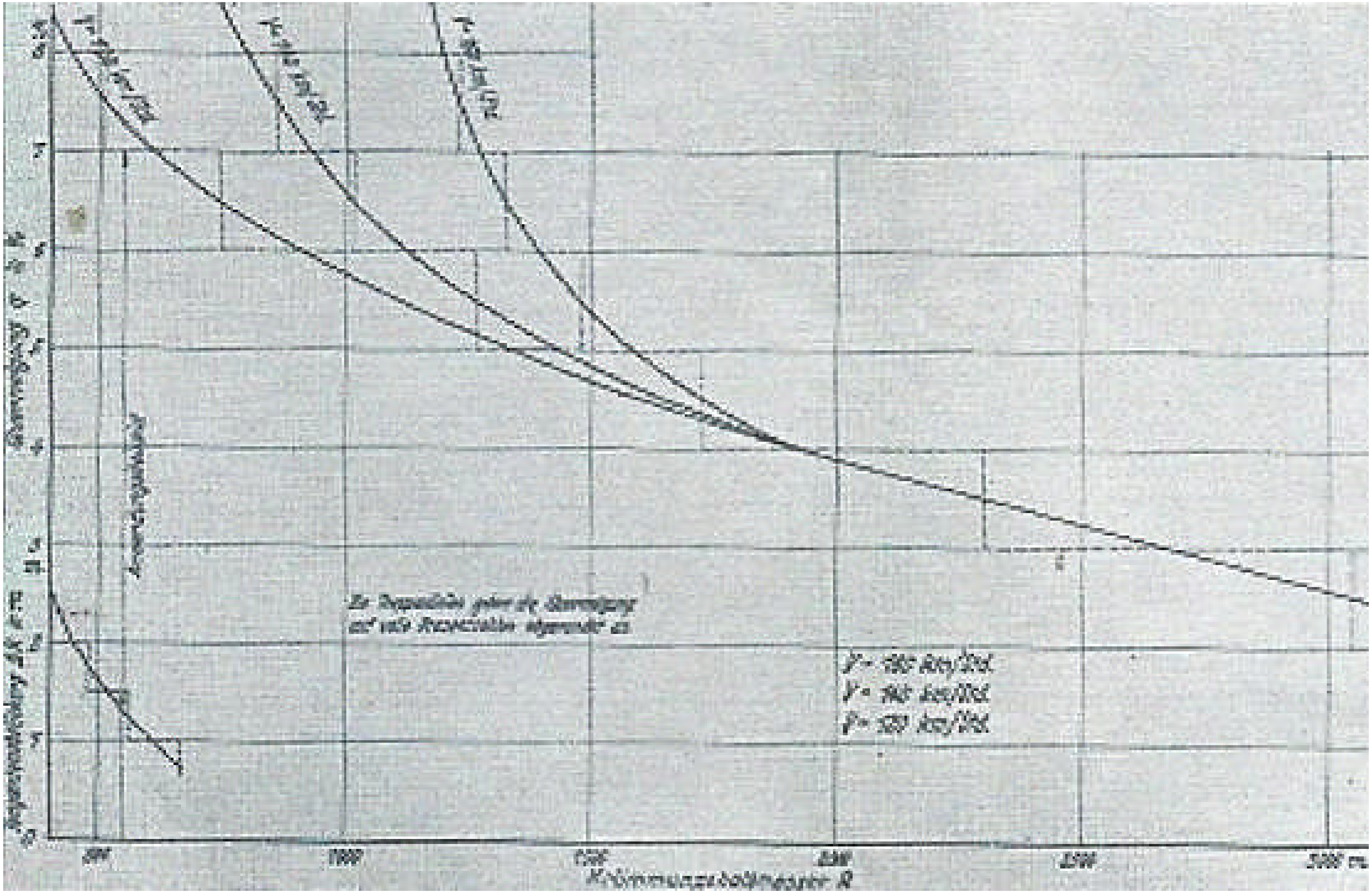


Fig. 2. ***Cross-fall in curves***

c) Considerations of the oblique grade

The maximum gradient of the road surface depends on the longitudinal slope of the line as well as on the cross-fall, and is directed towards an oblique line situated in the angle between longitudinal and transversal gradient, or axis respectively (refer to drawing on figure 3). If the longitudinal slope amounts to n and the transversal fall to q, the oblique grade amounts to

$$S = \sqrt{n^2 + q^2}$$

The oblique grade must exceed $s = 0.09$ (9%). If the longitudinal gradient is given by n, the cross-fall must not exceed in a curve of this section the limit of $q = S_2 - N_2$ ($s = 0.09$). Figure 3 shows the relations between longitudinal and transversal grades for the allowable oblique grade of $s = 0.09$. It may be derived, e.g. that on a slope of $n = 0.06$ no greater cross-grade than $q = 0.07$ can be applied, in this case only a radius can be used which does not demand a greater cross-fall than $q = 0.07$ (cf. part 3 a)

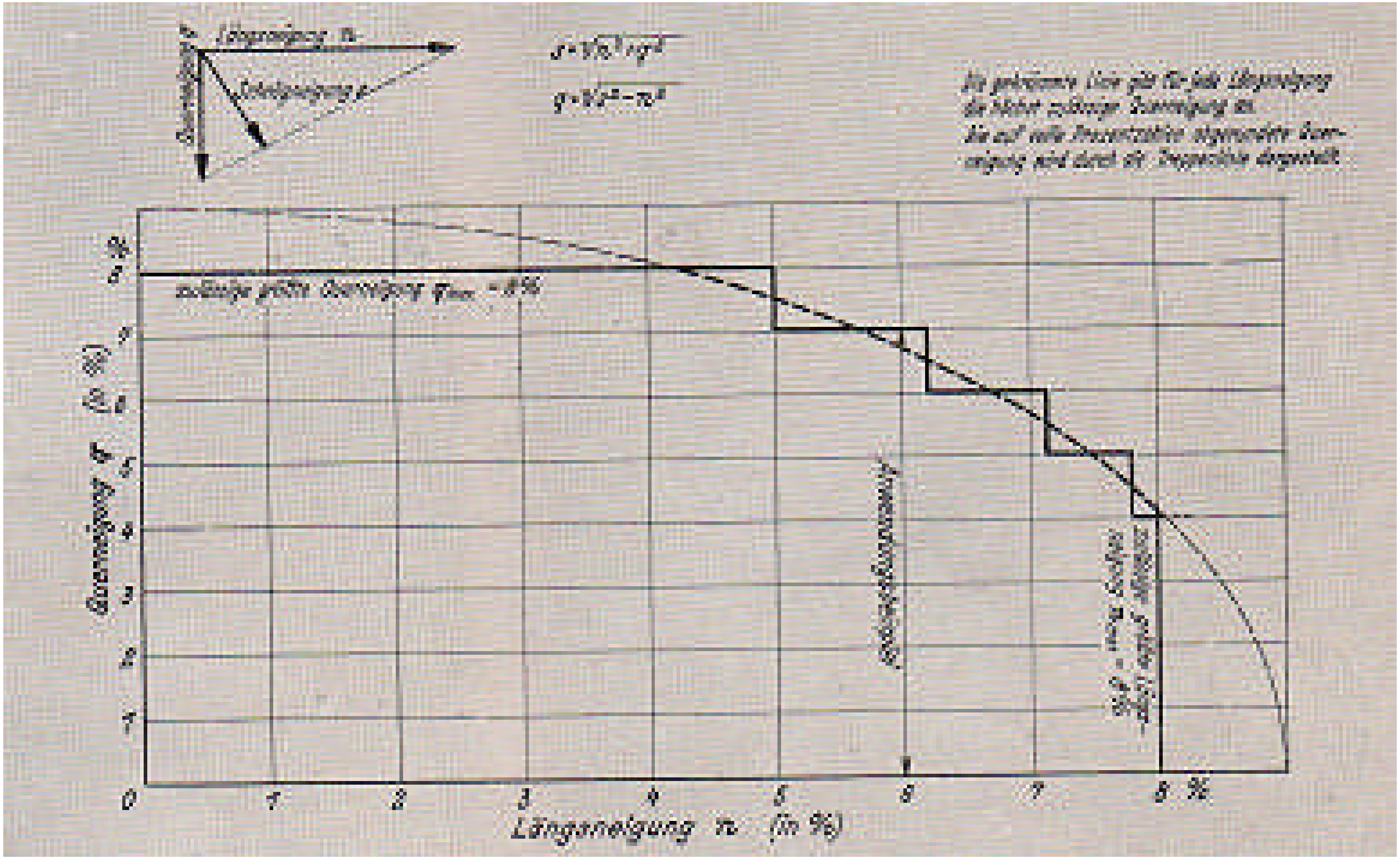


Fig. 3. ***Limits of the longitudinal gradient and cross-fall by maximum oblique gradient of 9%***

d) Road widening and transition arcs

In curves of relatively straight lines the roadways are never widened on the principle. Transition arcs are built only in curves of a radius between 400 to 550 meters; therefore radii of 600 meters and more will not get transition arcs.

The transition arcs of curves R = 400 to 550 meters are constructed as circular arcs with double radius (2 R) of the main arc according to table 4. The value of the necessary tangent leaving ($\triangle R$) is given on figure 2 for the radii in question of R = 400 to 550 indicated on the stairs line.

radius of curvature	R (meters)	400	450	500	550
tangent leaving	$\triangle R$ (meters)	2,50	2,00	1,50	1,50

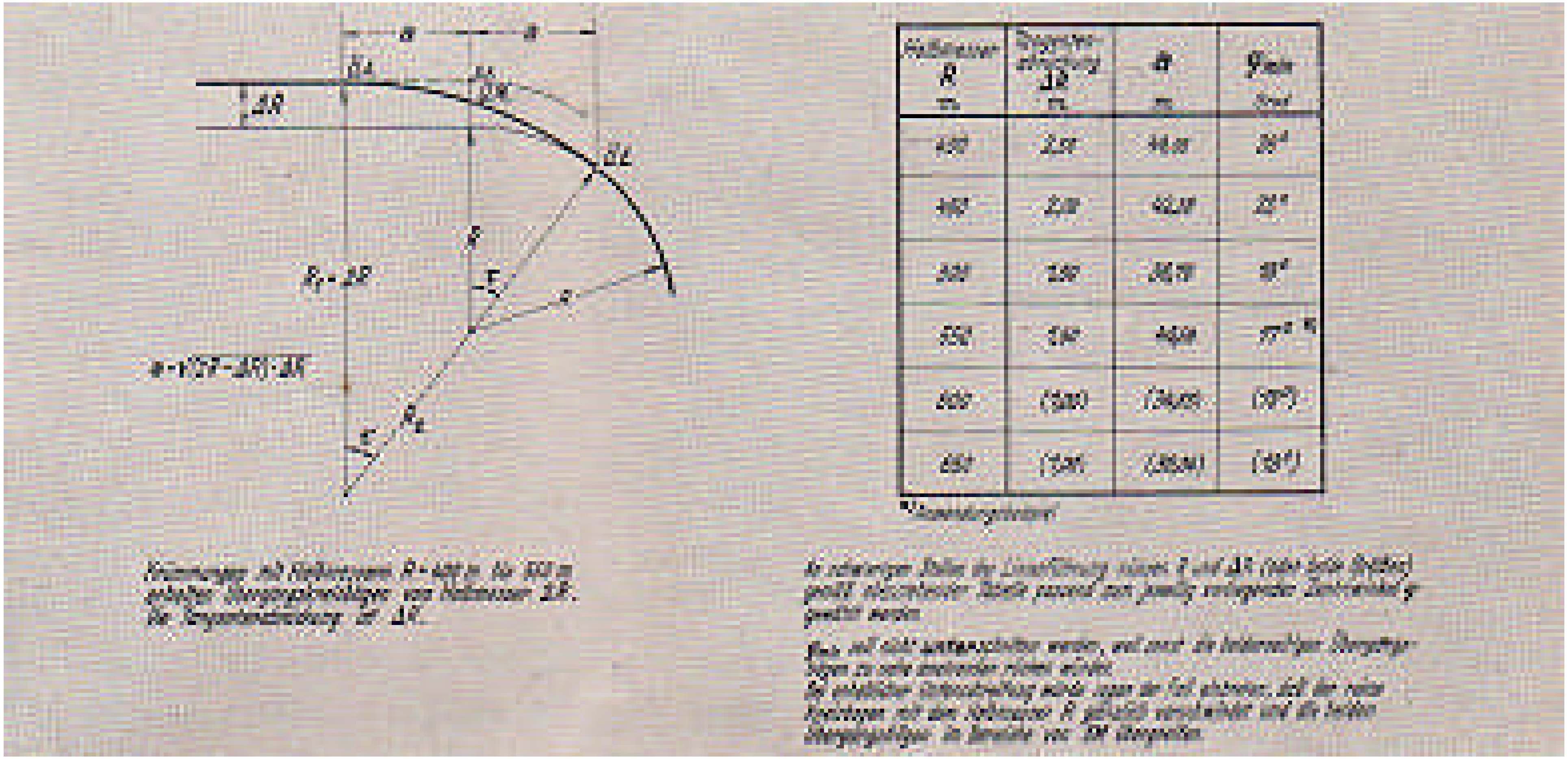


Fig. 4. ***Design of transition arcs***

e) Ramps for making the cross-fall in curves

The cross-fall of curves should already be met in its full value at the beginning as well as at the end of the arc. The transition of cross-fall is made with a ramp grade generally of 1:200 at the outer edge of the roadway. In transversal grades $\geq$ 7% the ramp grade, if necessary, may be increased to 1:160 in class 3 to reduce the length of the ramp. In curves with transition arcs the ramp grade should be designed independent of length of the arc between points which would indicate, without the interpolation of transition arcs, the beginning and end of the arc.

When making the ramps to get the cross-fall in the curves, the lowering of the inner edges of the curve of both roadways must be avoided. The ramp design is planned on the principle by turning the cross-section around the inner edge of each roadway which is situated towards the center of the curve. In this respect the edge of the roadway is determined by the line between roadway and shoulder strip. The transitions in the outer edge of the roadway at the beginning and the end of the ramp system must be rounded off by circular arc the radius of which should be at least 500 meters.

f) Straight sections between reverse curves

The minimum length of straight sections between reverse curves (5-bends) will result from the length of the ramps being necessary according to part 3 c or eventually from the lengths of the transition arcs, if their beginning is situated within the exit ramp. It is allowable to connect directly the ramps or transition arcs of both curves without any straight section between. In this case the length of the straight sections between the end of an arc R_1 and beginning of the arc of the next curve R_2 equals the sums of the length of the ramps of both curves $1_1 + 1_2$ or the length of the two transition arcs.

g) Straight lines between curves of the same sense

In short straight lines between curves of the same sense, the cross-fall of both roadways is kept in the same direction of grade as in the following line. If the straight line is longer than the sum of both according to the ramps described in part 3 e, the cross-fall in the straight line may be reduced. If the straight is longer than the five-fold length of the one ramp, the cross-fall may be designed according to the normal cross-section with roof-like cross-fall from the green verge in the middle towards both shoulders.

h) Improvement of visibility

To bring cars to stand-still before obstacles, on the road line at any point, the presupposition is adequate range of sight at the length of the braking space (part 2 and figure 1). The slope of cutting, abutments of bridges, shrubs etc. must be in a sufficient distance from the roadway. The stopping space is measured as the length of the arc in the center line of the right wheel track of the inner lane. The chord between the beginning and end of the stopping space at any point is the line of sight to be cleared.

“Landscaping” of Highways and Autobahns in Germany

The Inspector General of German Roads demands strictly that the lay-out of new highways and autobahns should never spoil the scenic aspects, but on the contrary contribute to the increasing beauty of our country. The traveler should not only use the road in order to speed up for traversing distances in the shortest time, but to fully enjoy the scenery of the regions passed through.

1. Extent of work. Therefore highways and autobahns and the roads in general should be “landscaped” in the following manner:

a) The impression of hills and valleys, forests and plains has to be accented by the adequate lay-out of the road as an harmonious part of the landscape.

b) The road user should be able to enjoy the beautiful road in the same degree as he is enjoying the scenery.

These general points are to be completed by the following special ones:

c) The forms of artificial earth-work should correspond with the natural morphology. Old forms should be restored if desirable, embankments and cuttings must be rounded off, ditches and trenches avoided if possible.

d) Road side planting is to be based on botanic considerations of the trees, herbs and grasses; only plants which would originally flourish in the region in natural harmony with climate and soil should be used on the road-side.

e) Great care during construction work has to be paid to the preservation of larger trees and shrubs already fully grown.

f) Native soil and turf is to be re-used carefully and economically.

2. Principles of form. High speed of motor cars seems to merge the impression even of diverse forms of landscape. Constructive forms should therefore emphasize to the traveler the general aspect of the region as a natural unit. Traveling, however, is an adventure of movement. Rhythm and change of successive forms of landscape, the transition of wide and narrow river-beds, hills and low-lands, curves and straight lines, plains and woods must be carefully considered.

3. Travel and rest. Parking and resting places will be encountered alongside roads and especially Autobahns. In the shade of forest trees, on the banks of rivers, on lookout points of hilly and mountainous regions the traveler will find parking facilities for one or several cars, and a nice resting place can be often reached by a foot-path.

4. Road building and its cultural side. In our age of rapid technical development in which Germany like other countries, is living, material greediness suppresses the sense of natural beauty as well as the feeling of responsibility towards harmony of building design. The new road builder has to promote the sense of the natural value of the smallest and the largest structures, and hereby adequate idealism in building work.

5. Organization. The engineer should be trained to such a high degree that his knowledge and practice in road design and road construction as well as his feeling of art and nature really permits the very “landscaping” of his work. Education of this kind has been neglected in Germany; this must be made good in due course of time. Each State and provincial Building Department has now to train a fit engineer for advisory work in landscaping.

There are a lot of tasks demanding botanic, biologic and gardening knowledge, and, moreover, good artistic taste. The Main Construction Offices and Line Divisions of the Autobahns collaborate with private architects for aesthetic road design, so called “Landschaftsanwalte.” The majority of these experts of road-side gardening are gardening experts by profession. In many cases forest experts with modern training in biology are consulted to advantage.

The advisory activity of special gardening experts in road service is considered indispensable until road engineers have gathered sufficient practice in this new task of road side improvement. The number of such experts, of course, is still limited, as the field is relatively new. But even in the future their collaboration will remain necessary in problems which are difficult to solve.

The Inspector General of German Roads has edited notes ("Merkblatt") containing particulars of all these problems:

Merkblatt Nr. 1. Landscaping of Autobahns (Die landschaltliche Eingliederung der Reichsautobahnen).

Merkblatt Nr. 2. Problems of Form Giving (Gestallungsaufgaben)

Soil Mechanics in German Autobahn Work

Numerous failures in German road construction work especially in post-war times are due to the fact that the problems of subsoil had been neglected in comparison to the development of modern surfacing, in spite of the sudden increase of road traffic and wheel loads. In recognition of this deficiency and in consideration of the principle that the foundation of the road is just as important for the duration of a road as the foundation of any other civil engineering work, the Inspector General of the German Roads has paid full attention to the influence of soil research in autobahn work.

Soon after his nomination in 1933, the Inspector General started by asking the road administrations of the German States and Prussian provinces to investigate the subsoil conditions of good and bad roads and to compile the experience and the various measures. At the same time, the development of soil testing methods fit for German conditions had been promoted. For the construction of the autobahns it had been decreed, in addition to the purely geological investigation of the traced area, to test the soil as well as building material by physical methods.

In the year of 1934, each Main Construction Office opened testing laboratories of its own to carry out necessary mechanical soil testing. The soil experts of the autobahn administration as well as country and provincial departments were given the opportunity of attending theoretical and practical training courses on soil mechanics and its application.

Since from time to time discussions had been arranged to exchange experience of the various laboratories and to promote new tasks. This was the main condition for uniform soil work on all the lines of the German Autobahn net. Today the various soil testing laboratories are acting nearly independently; in exceptional cases only, the collaboration of the main research stations and the soil laboratories will be applied for.

The field laboratories have the task of testing the sub-soil before construction will be started and to control the practical work and the value of methods. The first field test consists of testing drilling and digging results, as well as studying open excavations and existing buildings. If more detailed investigations of the soil strata seem to be necessary, as far as possible samples of soil in its original and undisturbed condition will be taken. In the laboratories, the physical test figures of the soil samples will be stated to consider the quality of the various soils and so permit proposals as to building method. If necessary, the original lay-out will be changed in its position and height until a satisfying solution has been found.

A special danger for the high class surfaces of the autobahn are the so called frost upheavals which a few years ago had been still considered unavoidable in common road work. By application of German and foreign experiences and immediate utilization of current research work, the German autobahn could be nearly entirely saved from the detrimental frost upheavals. The strata of the road body down to the whole or partial depth of frost influence are replaced by sand and gravel; under certain conditions longitudinal drainage and interspersed layers are the most used protective measures (fig. 1). The presupposition for full success is the utmost accuracy of work.

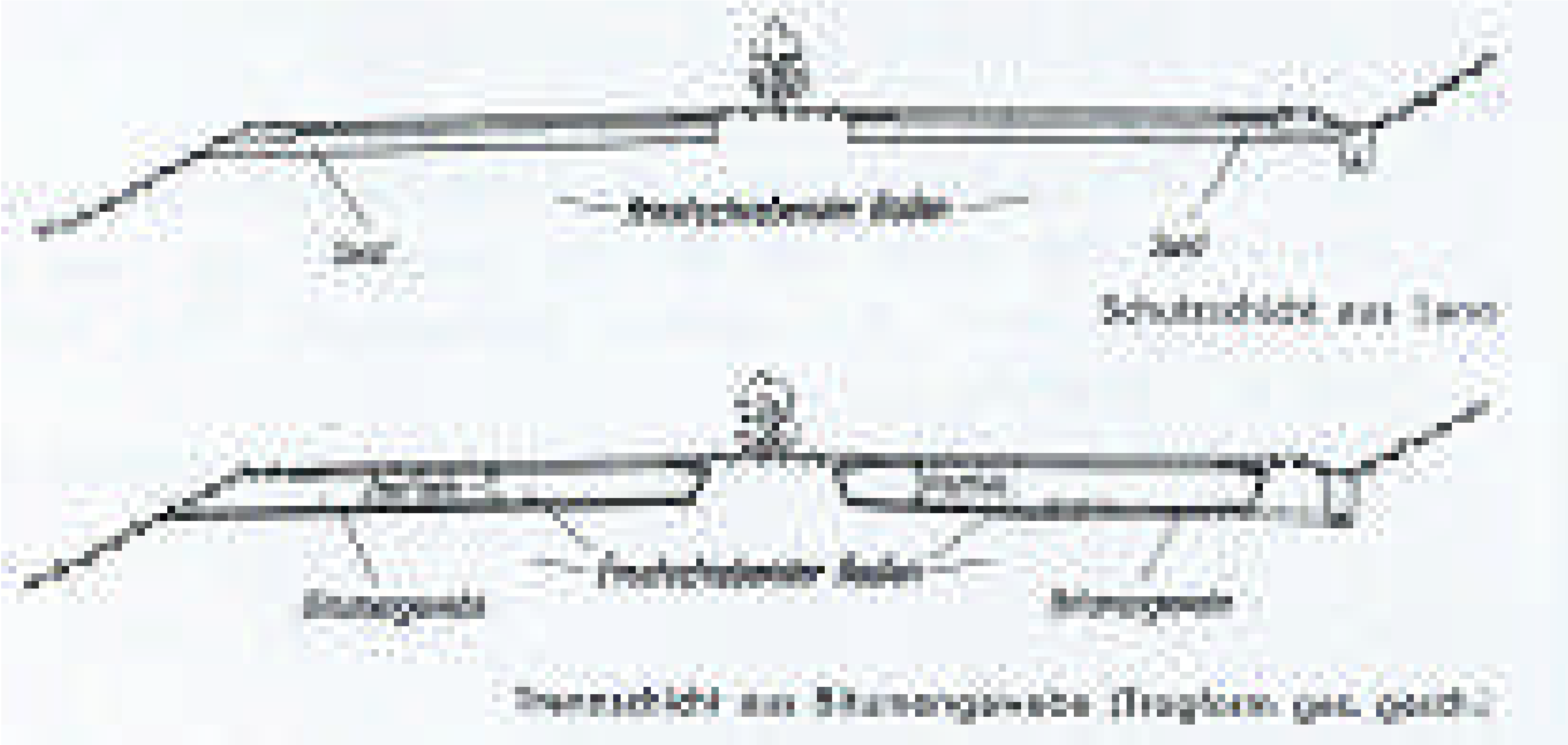


Fig. 1. ***Autobahn cross-section; protective measures against front-upheavals; sand layer and bituminous textile layers (trough shape patented)***

Soil consolidation is paramount for dams which will be put under traffic after relatively short time with a final surfacing. The problem of most effective and at the same time most economic method of dam consolidation has been cleared by a series of investigations. To avoid greater settlement of the embankment in the proximity of buildings, today most soils are compressed in thin layers successively by tamping or rolling.

Also in recent years a simple method of replacing soft soils e.g. moat and swamp, has been developed by blasting soil (fig. 2). The explosive has to drive all the soft swampy and moory ground under the fill; the sand fill can now sink immediately upon the stratum underneath, thus having greater supporting power.

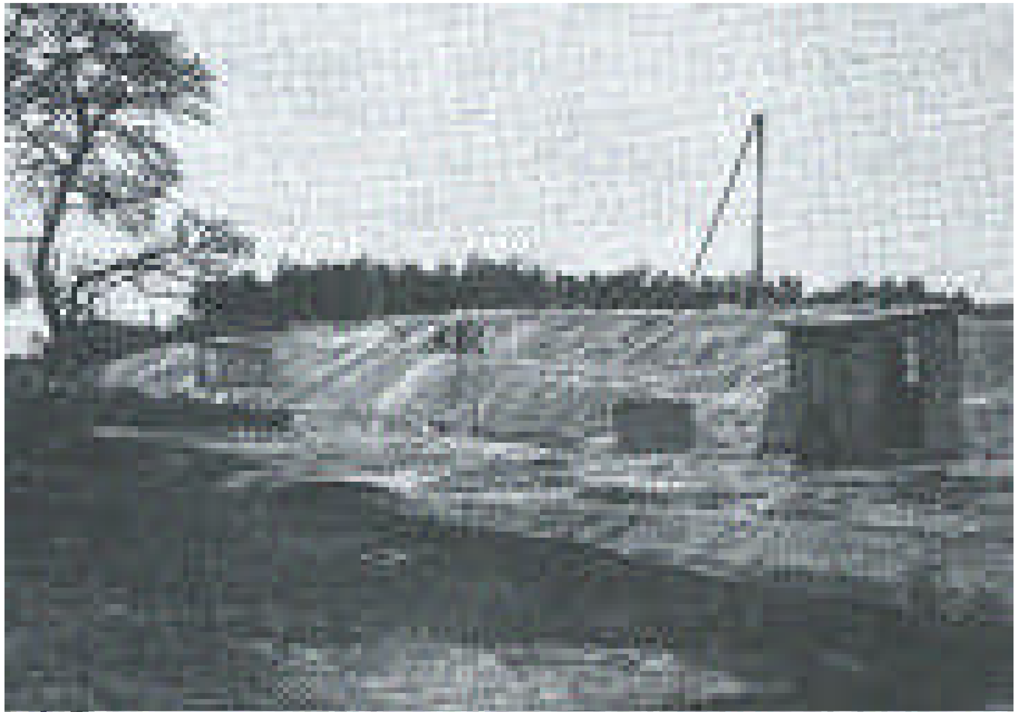


Fig. 2. ***Swamp blasting; sand fill before explosion***

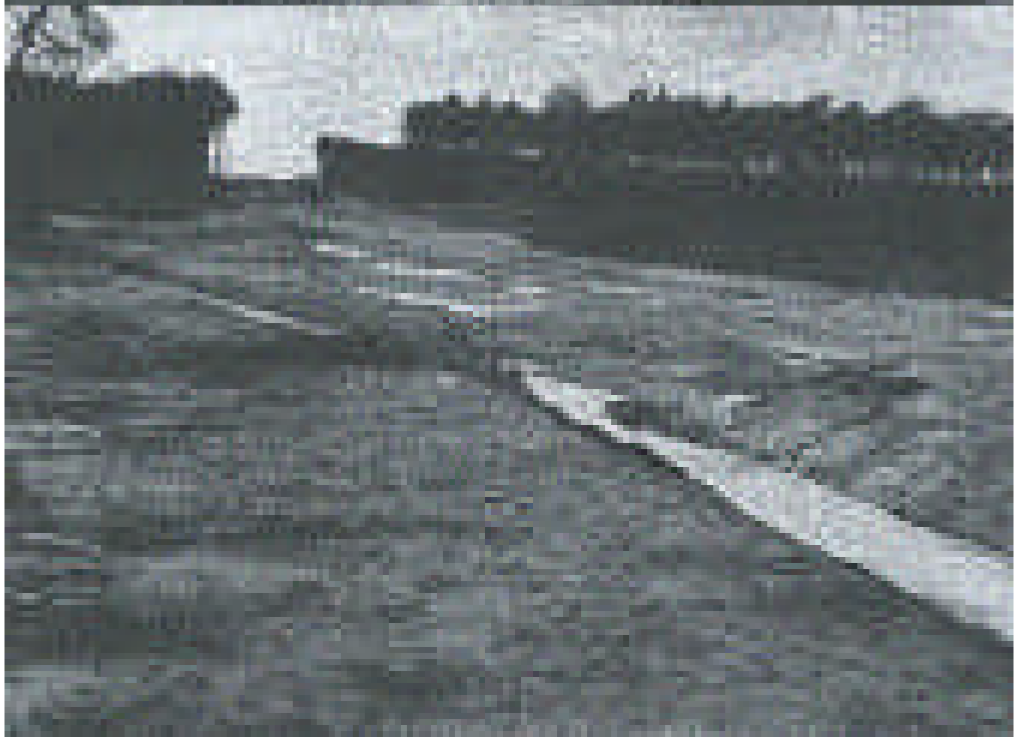


Fig. 3. ***Swamp blasting; after explosion***

Since application of soil research work on the construction of the German autobahn net and on German roads in general, only a few years have passed. There is no longer any doubt that the utilization science was a great success and finally yielded considerable diminution of failures in spite of apparently greater spending of labor and material.

Construction
of
Surfaces

The German Autobahn consist of two carriageways, 7.50 meters wide, generally separated by green strips of 3.5 to 5 meters. Each carriageway shows cross-fall slope of 1.5% in straight sections; at both shoulders strips have been de-signed amounting to 0.4 meters at the inner side along the green strip, and to 1 meter at the outer sides (refer to cross-section, fig. 1). On main lines with dense traffic the outer strips get a stopping space width of 2.25 meters (fig. 2)

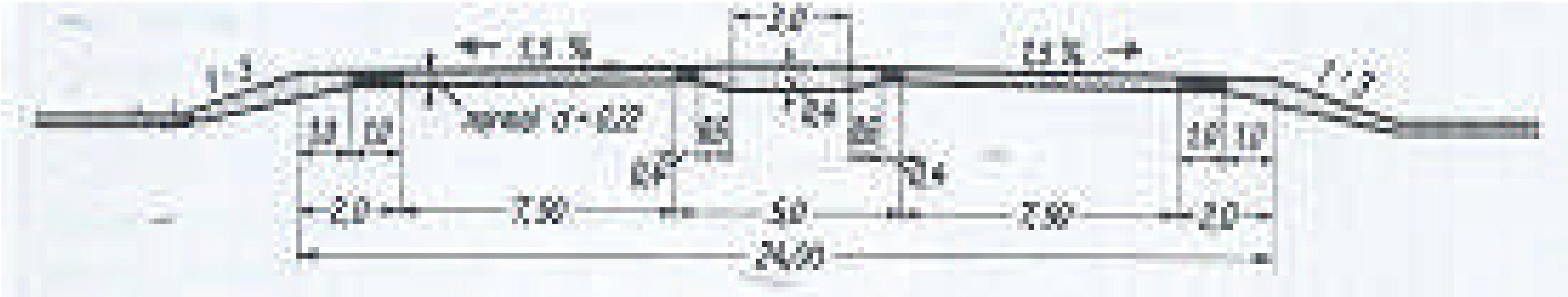


Fig. 1. *Cross-section of straight autobahn line; concrete surface*

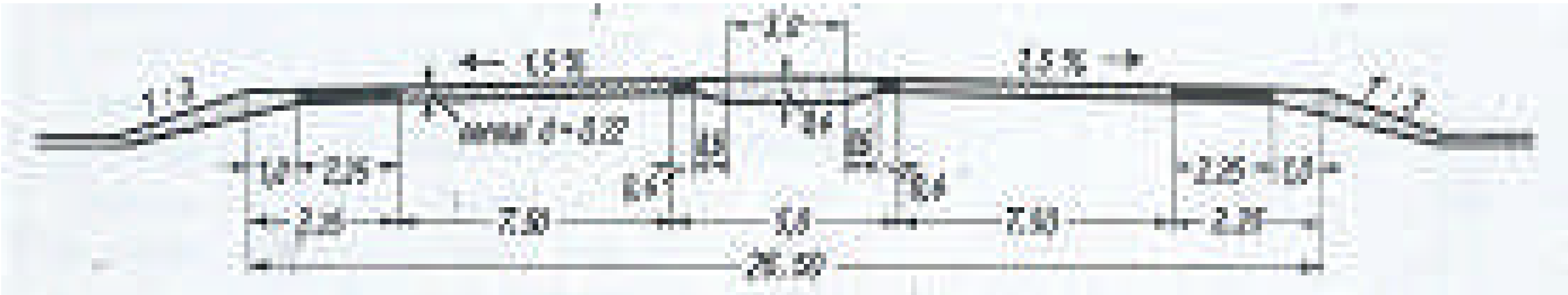


Fig. 2. *Widened cross-section for main lines*

On July 10th 1934, construction of the Autobahn surfaces had been started on the section between Frankfurt on Main and Darmstadt. Figure 4 shows the following progress in laying surfaces up to January 1st 1938. Cement concrete amounts to 89.5%, bituminous surfaces to 7.1% and small stone sets to 3.8%.

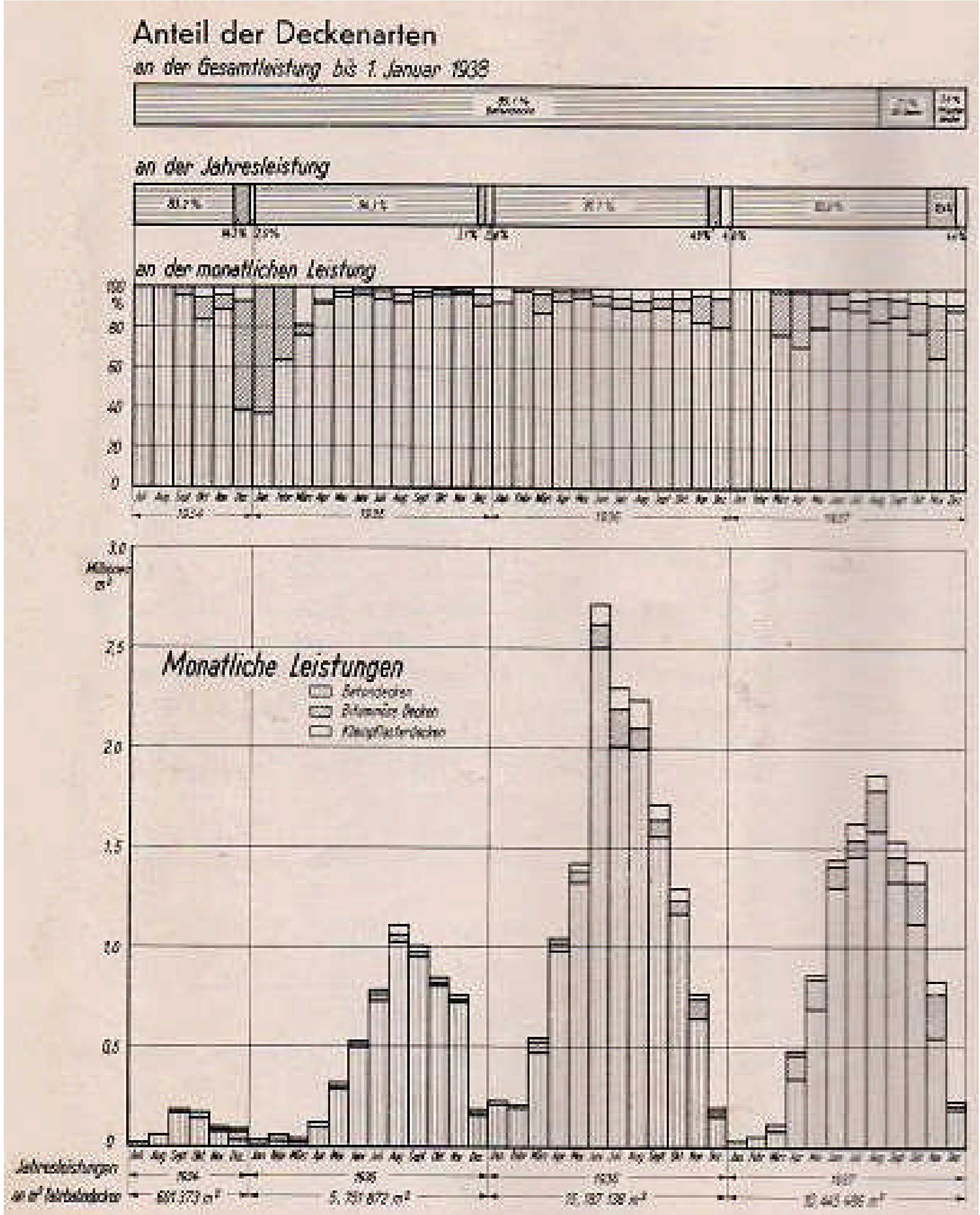


Fig. 4. ***Progress of surfacing (annually; monthly; up to January 1st 1938; percentage of concrete and bituminous surfaces, small stone sets)***

A. Concrete surfaces

1. Design of construction

The thickness of the cement concrete slabs is normally 22 cms, up to 25 cms on bad subgrade or high dams. To avoid irregular crevices, the surfaces are divided by longitudinal joints in the middle of the carriageways and transversal joints in an angle of 90 degrees. The transversal as well as longitudinal joints are mostly made as expansion joint, though in the last time, for the longitudinal so called dummy joints (pseudo joints) are preferred.

The distances of the transversal joints depend on the carrying properties of the subsoil, the height of the dams and the lay-out (straight line or curve), and generally amount from 10 to 15 meters. In exceptionally unfavorable cases, e.g. at bridge approaches, the distance will be reduced to 6 meters.

Iron mesh reinforcement is considered not to be necessary to increase the resistance of surfacing when soil conditions are homogenous and when the thickness of the slabs is sufficient. Only when cracking has to be avoided, even mats of 2.5 kgs per square meter are laid, in a few cases in uneven position at the edges of the slabs, about 5 to 7 cms under the surface.

Since a long time, generally dowel-pins are used to increase carrying capacity of the slabs at the transversal joints and to keep the slabs in equal horizon. Fig. 3 shows dowelling of transversal joints; the same process is applied at transversal joints when irregular consolidation or lifting is to be considered, as well as in all curves with a radius of 600 meters or less. Transversal dummy joints are strengthened in the same manner.

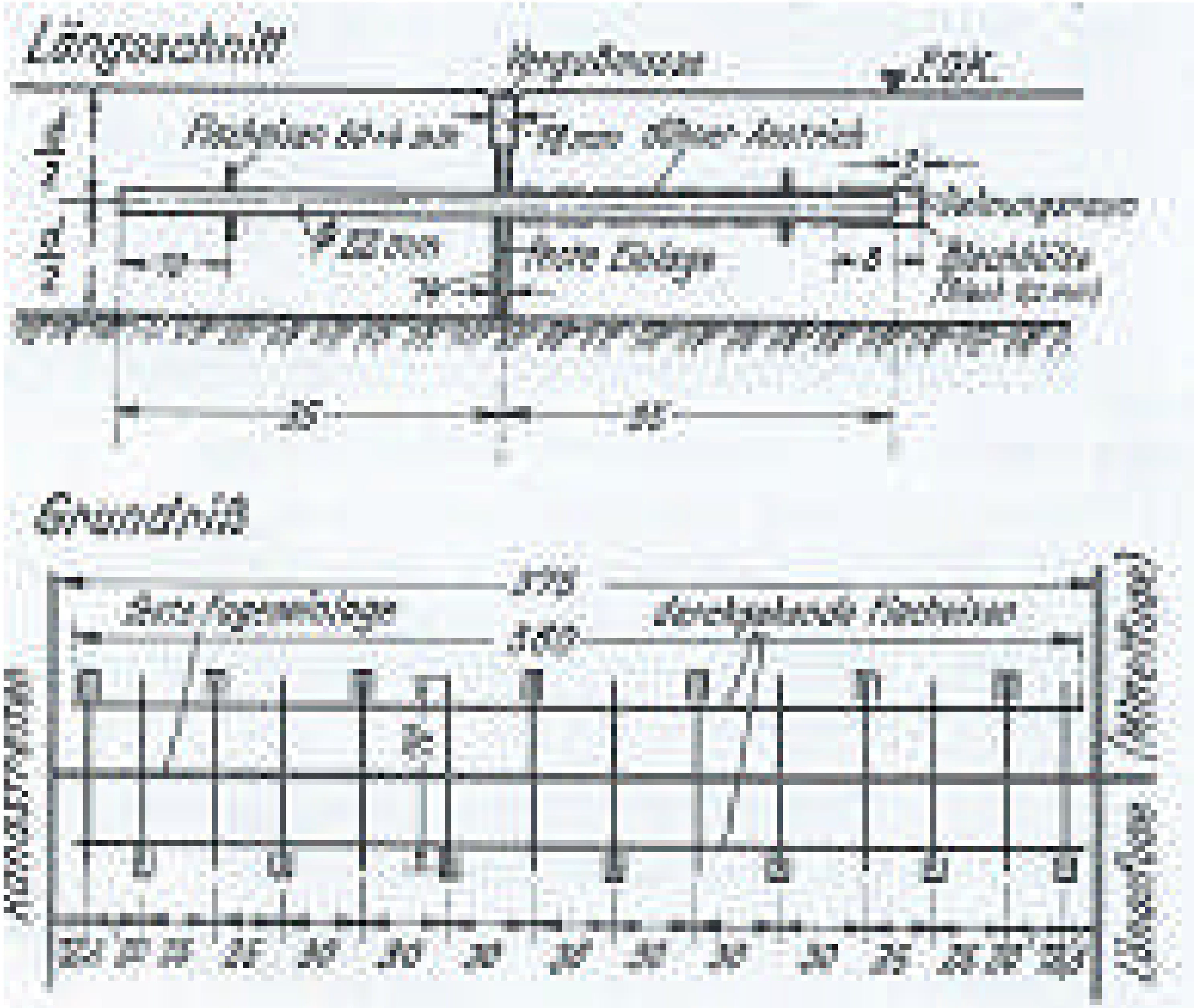


Fig. 3. ***Standard dowelling of transversal joints***

2. Methods of Construction

There are two fundamental methods:
a) one-cover method; for the entire height, the same mixture is used;
b) two-layer concrete; the cover consists of a wearing course of 5 to 7 cms made with chippings. Laid on a base-course of gravel concrete. The amount of cement is the same in both layers.

3. Mixing and laying

Mixtures. Mixing of aggregate is on the principle accomplished in a stationary, well situated plant. The weighing batches are fixed either right under the bunkers, but mostly under smaller elevated bins, which permit permanent discharging into trucks underneath (fig. 5).

Fig. 5. *Distribution of material at station with elevated bins*

Generally these bins which are loaded by cranes, conveyor belts and bucket elevators contain an amount sufficient for a few hours only, the bunkers for at least 3 days to permit uninterrupted progress of work. The aggregate is made from 3 to 4 grades; each stone grade must be stored in separate bins and bunkers.

The mixture of the concrete has to be based upon the minimum values of crushing and bending strength which must be proved by normal tests. The amount of cement per cubic meter of the prepared concrete at least amounts to 300 kgs of cement. Common German standard cements complying with special demands of quality are used. The cement is added according to weight in the manner that one unit of the mixing machine is made with full bags only.

b) Subgrade and paper covers. The subgrade is prepared with an accuracy of 5 cms per meter; it has to be well consolidated. This surface is leveled to 1 cm per meter. On non-consistent soils the covers are laid as a rule without any intermediary layer on the subgrade, whereas on consistent soil, however, a sand stratum is spread to keep cleanliness.

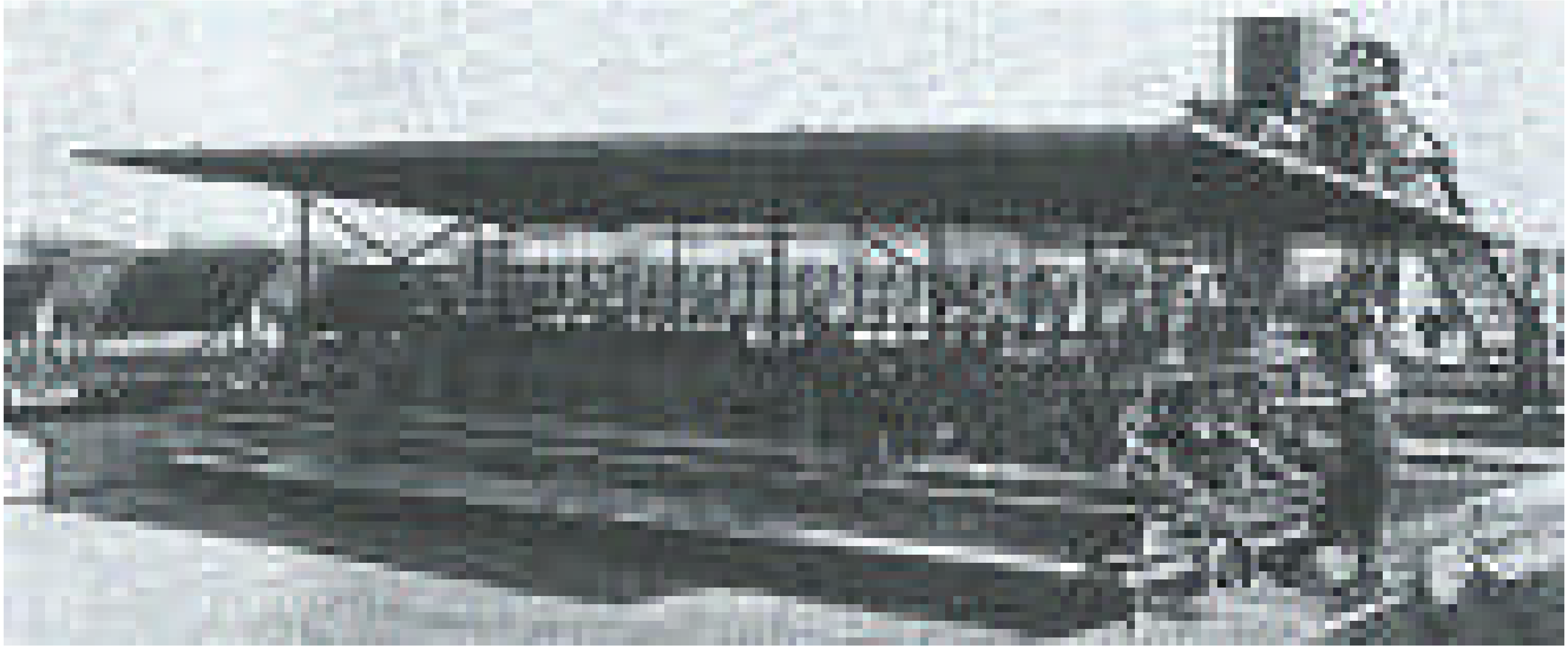
Immediately before surfacing, the subgrade will be consolidated once more with a subgrade finisher which must have at least one tamping wood. The subgrade prepared in this manner will be controlled with regard to even cross-section, and covered with layers of paper of 150 to 189 grams weight per square meter in order to yield an absolutely even and closed sub-surface of the main layers without any irregularities on the subgrade.

c) Covering and side rails. As the surfacing machinery is moved like a bridge over the road body, rails are laid upon the covering of the sides. This covering is either made by side beams of concrete to be laid before or by iron-forms to close the edges of the concrete. As rails mostly crane irons or even railway rails are applied.

d) Charging and distribution of concrete mixture. The preparation of concrete is accomplished in transportable mixing machines of 750 to 1,500 liters running immediately on the job. For the one-layer or two-layer method, in both cases the distribution takes place in two turns in order to get good consolidation of the concrete, especially at the sub-surface (fig. 6).

<u>Above</u>: Fig. 6. ***Two-layer concrete surfacing***

On all the building places the concrete is distributed by means of distributing bins spreading the mass in equal height upon the paper cover. These bins are either connected with the mixing plant or mounted upon special bridges running with motors of their own. The distributing buckets are filled mostly immediately on the mixing machine by free fall, in some cases by means of a short conveyor belt.



e) Consolidation of concrete and finishing of surface. Principally always finishing machines are applied which consolidate the concrete as well as level the surface. These finishers also run like bridges over the job. The finishing method is different; consolidation is got by tamping, beating or vibration in combination with pressure (fig. 7).

Above: Fig. 7. ***Hammer finisher on autobahn***

To improve the roughness of the surface and to remove the cement laitance resulting from finishing, the freshly made surface is cleaned with broad brooms moved transversally.

f) Making of joints. The transversal joints which have to permit the temperature changes of length of the slabs without difficulty are generally made as full joints of a width 18 to 20 cms. When reducing the areas to 10 meters length, one or two dummy points may be interpolated between the full joints.

As laying of concrete in two layers is preferred, also the making of joints takes place in two turns. The joints of the under-layer are filled with fresh wood boards saturated with water; before distributing the second layer, the upper joint enclosure is fixed. Enclosures which must be extracted from the fresh concrete are no more allowed, only such methods which permit the extraction from the hardened concrete. Hollow joint bars (Wieland method) are preferred which are coated with bitumen by dipping the bars into a bitumen bath before laying (fig. 8).

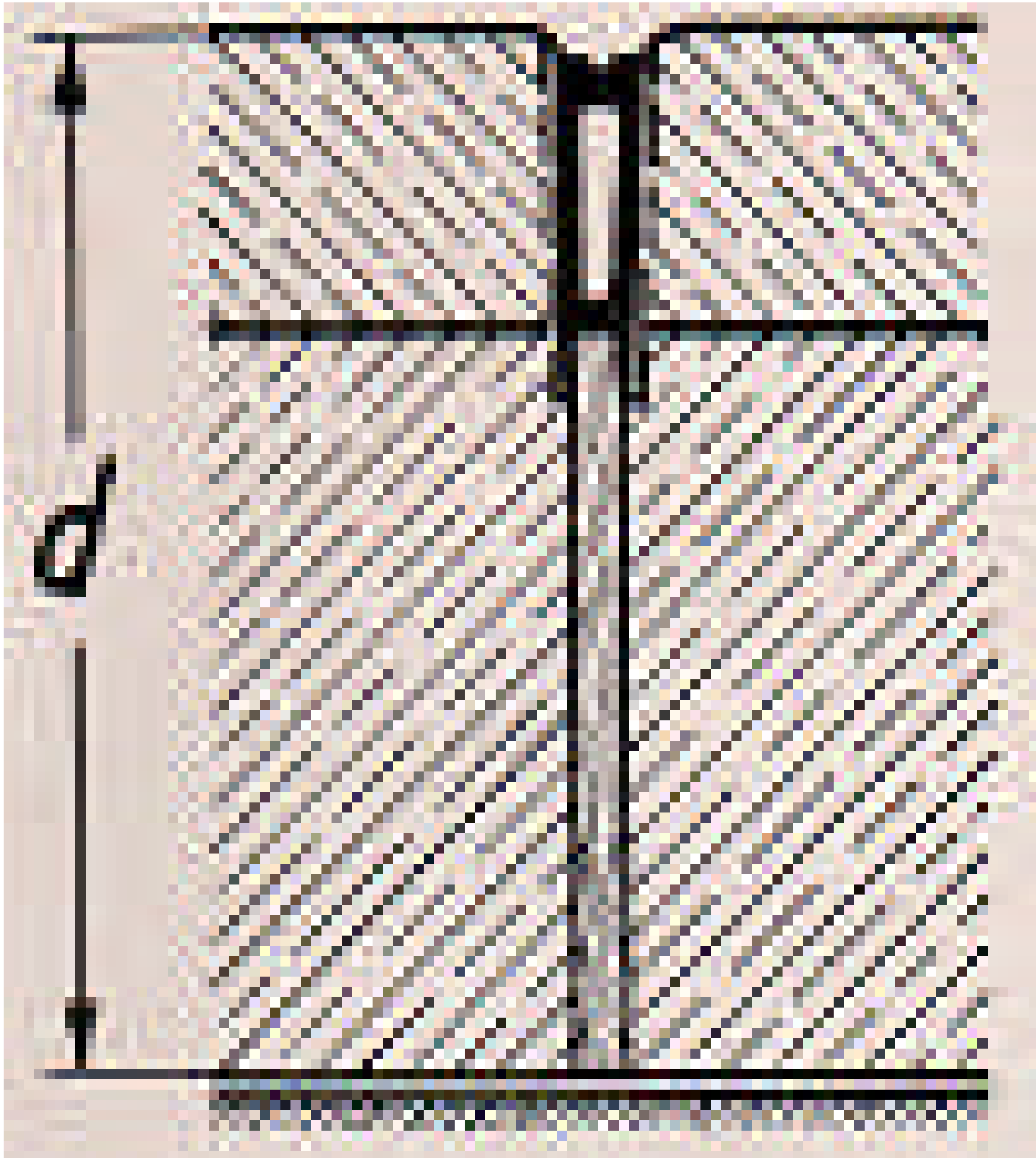


Fig. 8. ***Wieland method for preparing concrete joints***

After consolidating the surface, only the joint edges are cleaned in the fresh concrete without moving the joint bars. Only when the concrete is absolutely hardened, steam is passed into the hollow bars, the bitumen cover at both sides softens and permits an easy lifting of the irons, the upper joint is made with wooden boards which must be cleared by chisels to the necessary depth when concrete has hardened. The upper dummy joints are mostly procured in the fresh concrete by interpolation of wood or iron bars, in a few cases by beating. The cutting of dummy joints with special machines is applied only in exceptional cases for economic reasons. The filling of the upper joints is accomplished by caulking with a special bituminous joint filling mass.

g) Curing. The concrete surface is protected immediately after its construction by movable screens against a too strong drying up through wind or sun-rays and against rain. At least for the laying in one working shift, low protective tents have to follow continually on the job. These tents are closed on all sides, and subdivided still transversally from 30 to 40 meters to keep an isolating air mass over the completed surface (fig. 9).

<u>Above</u>: Fig. 9. ***Moving of protective tents***

After the tents, the concrete is covered for one week with straw and rush mats and always kept moist; afterwards, up to 3 or 4 weeks, sprinkler carts perpetually moisten the surface. Figures 10 and 11 illustrate the application of various machinery and tools on a surfacing job.

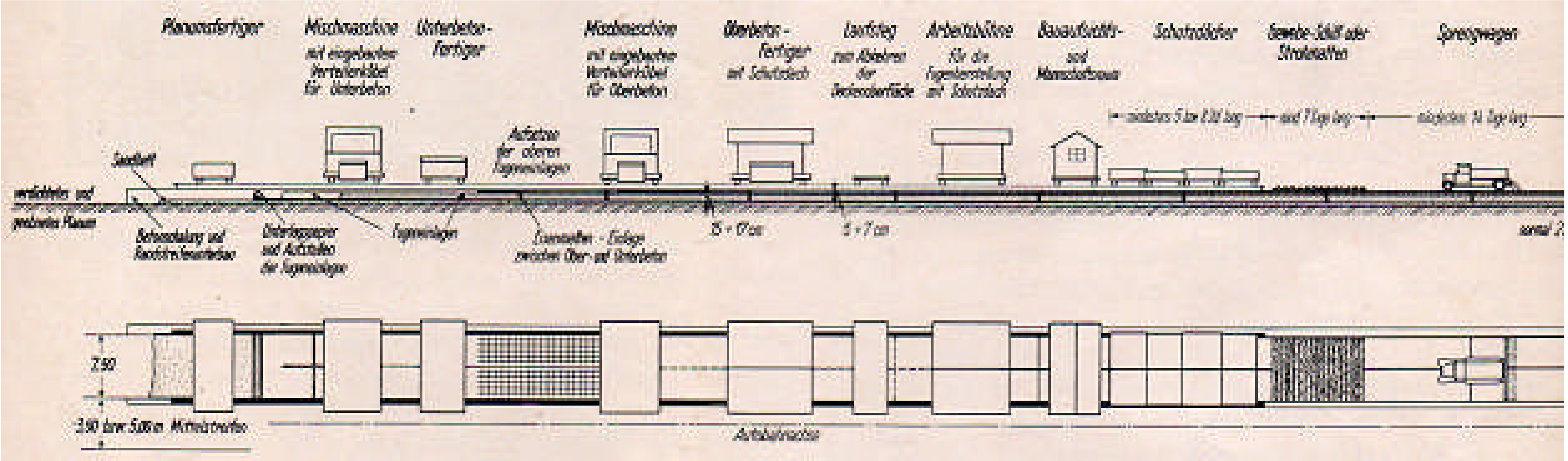


Fig. 10. ***Scheme of construction of two-layer concrete***

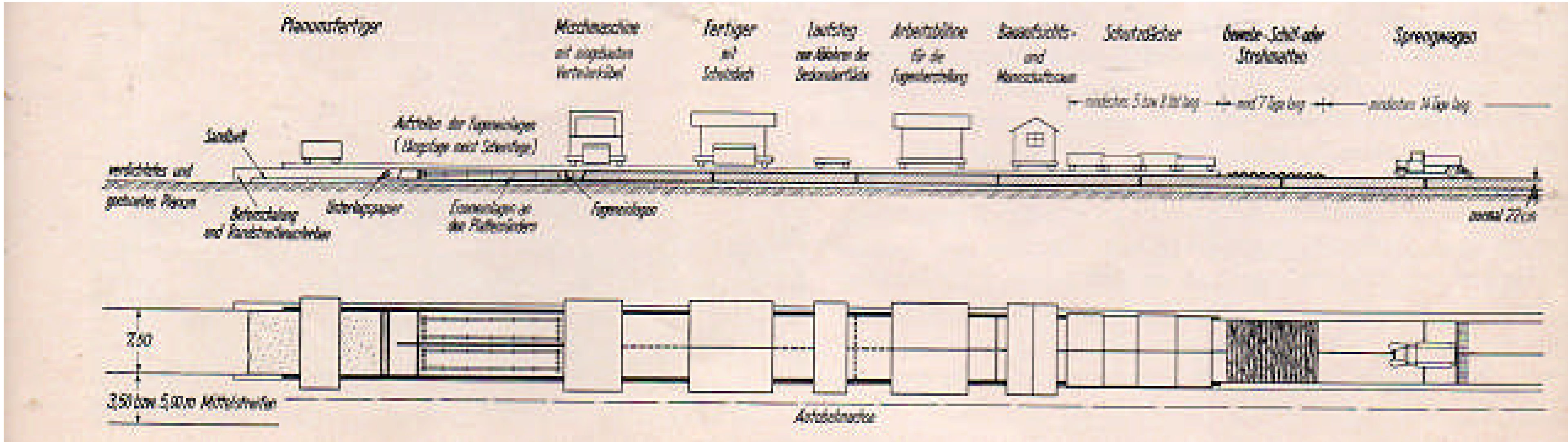


Fig. 11. ***Scheme of construction of one-layer concrete***

h) Evenness. High demands are made as to the evenness of the surface. Unevenness of more than 4 mms on 4 meters is not allowed and must be removed by grinding machines. Moreover the permitted irregularity of the evenness may only occur on gradual slopes.

Considering the development in the construction work of concrete carriageways on the German Autobahns since July 1934, up to today we can state essential progress in all branches and particulars. The development is by far not yet finished; but the endeavor to increase output and progress as well as quality will steadily lead to further improvements.

B. Bituminous covers

The bituminous covers consist of carrying subgrade and bituminous covering

1. Foundation

The foundation consists either of big irregular stone sets with a layer of broken stone, or of cement concrete. The big irregular stone pyramids of 20 to 23 cms height are laid over the entire width of roadway including the side strips. The edge of the pyramid area gets good stones of kerb type or large stone set type. Particular attention is applied to the correct placing and the following filling with pure sharp sand.

To make the side strips which have to carry the side rails for the surfacing machinery, 11 to 12 cms concrete is immediately laid upon the stone pyramids in which sand and loam are replaced by chippings precoated with either tar or bitumen. This kind of stone fundament will be only laid upon such sections which suffer from soil movements or lack of water.

Generally, however, fundaments are made with cement concrete, having a greater carrying capacity and yielding a better leveled subgrade than big irregular stone setting. The underlayer of the concrete will be made 17 to 20 cms thick according to the height of the embankment or the bearing value of the subsoil. The amount of cement is at least 250 kgms per cubic meter.

For mixing and application of concrete, the same specific-ations as already mentioned under A (concrete surfaces) are in use. Transversal expansion joints will be arranged in distances of 6 to 10 meters. The joints will be dowelled at uncertain subsoil conditions. With regard to the short length of the slabs, the longitudinal joint is omitted. The finished surface of the under-laying concrete will be roughened to yield a better sticking of the bituminous cover upon it.

2. Bituminous surface

The bituminous cover is laid either on stone foundation or on concrete in a strength of at least 6 cms. It consists of binder of 3 cms and a surface cover of 3 cms. According to the binding medium, the following mixtures are applied:

a) asphaltic concrete,

b) tar asphalt concrete,

c) hard mastic asphalt.

The hard mastic asphalt will be only sometimes laid under bridges. It is distributed either in two layers totaling 4 to 5 cms or an under-layer of an asphalt binder of 3 cms is laid under the thin mastic asphalt.

The bituminous mixtures under a) and b) are composed in such a manner that they will always remain even and skid-proof which will be obtained by adding 50 percent (weight) of best and well graded chippings to the mass of sand and filler in order to get a course which is poor in voids and can be well consolidated.

The addition of bitumen and tar depends on the kind of aggregate, it amounts to generally 6 to 8 percent weight. The use of closed vans isolated against loss of heat, permits the distribution of hot mixtures which must be carefully prevented from quick cooling. For consolidating the covers special tamping finishers as well as rollers are applied (fig. 12).

Fig. 12. ***Consolidating of bituminous surfaces by roller and vibration finisher***

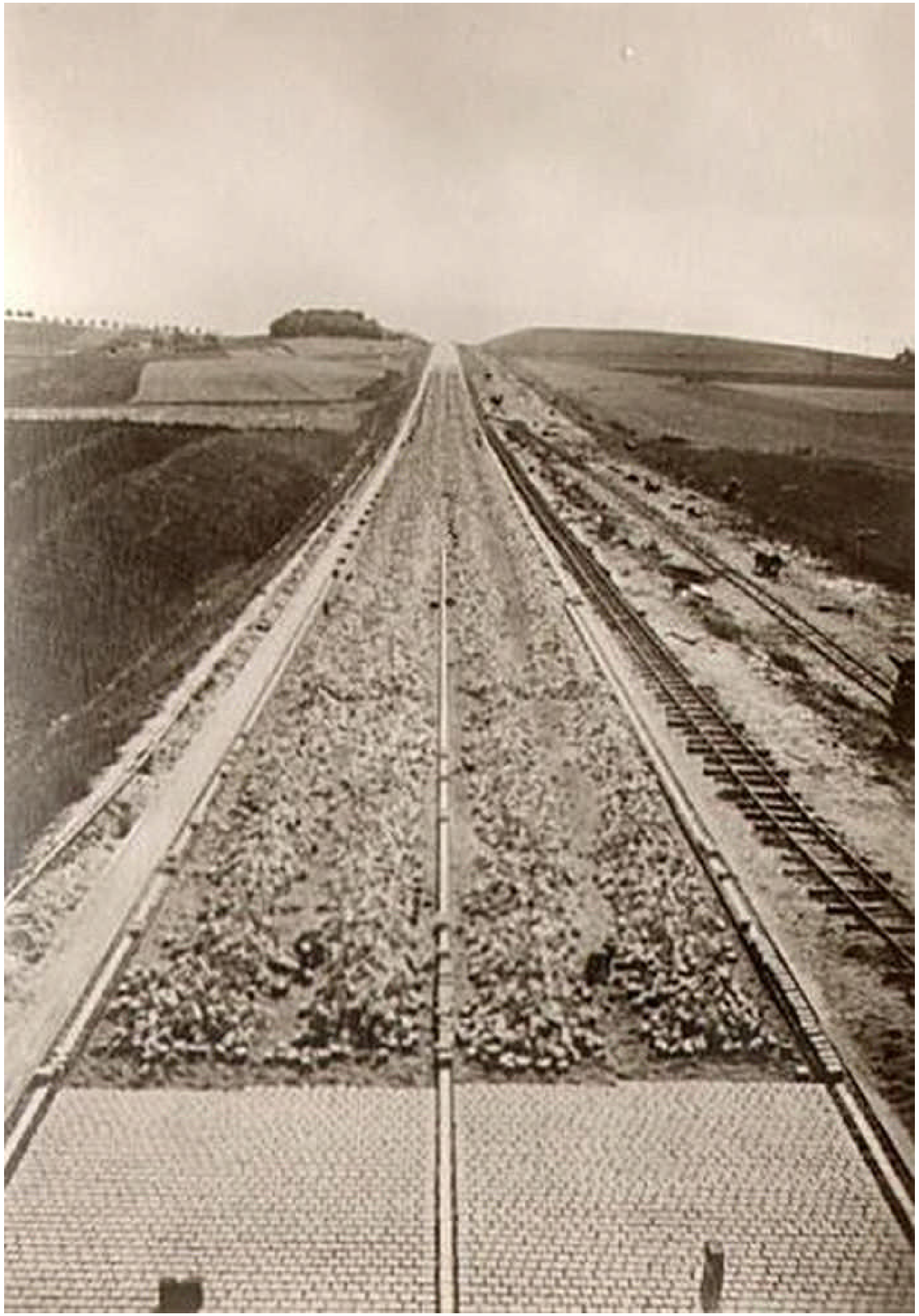
The bituminous layers, with exception of the mastic asphalt, often receive a treatment of void closing with hydrophobic matters. Mixtures of stone flour and milled pitch or also tar sands (grade 0 to 2 mms) are used. As to the evenness of the finished bituminous surface the same accuracy is demanded as for concrete layers (see under A).

C. Small stone sets

The percentage of small stone set surfaces is relatively small on the autobahn sections already completed or under construction. The application of stone sets is limited to narrow curves or to upward slopes. The small stone set sections, like bituminous parts, consist of the bearing foundation and the sets proper.

1. Foundation

As to the foundation of small stone sets surfaces, the same rules are valid as for bituminous covers (see part B), except the fact that the distances of the transversal joints are considerably greater in the concrete foundation than under bituminous sections.



2. The sets surface

The small stone sets are laid on sand strata 2 to 2.5 cms thick (in consolidated status). Only perfectly rectangular sets with even head must be used; the height of the sets is between 9 and 11 cms. The arrangement of the sets depends on the local prevailing style, either in straight lines, or segments or any other arrangement.

Left: *Cobblestone Autobahn*

Joints of about 5 to 7 mms are wanted. After ramming, the joints will be filled by a filling mass, i.e. with bituminous sand or with a cement trass mortar. When applying the latter rigid joint mass, expansion joints in a distance of 10 to 12 meters are arranged according to the local conditions; these joints are filled with a bituminous mixture.

<u>Above</u>: ***During construction, mid 1930's. Note that small trains where used to bring materials.***

The separation of tracks is marked by arranging traffic sign sets along the middle line of the 7.5 meters wide roadway. The Mansfeld Copper Works in Central Germany cast special slag stones (side length 16 cms) having got interpolated a white strip of cement in the middle. In wet as well as dry weather these stones can be recognized by the drivers.

D. Side strips

The side strips will be strengthened to carry wheel loads. Moreover they have to prevent penetration of rain water immediately at the road edge where it might soften the soil and erode the slopes. These strips indicate the roadway edge to the drivers, as the color of the surface will be made different.

The fundament of the strips is concrete, generally with a content of 150 to 200 kgms cement per cubic meter. Mastic asphalt of 2 cms covers the surface. Along bituminous layers light colored chippings are pressed into the mastic side strips. Nowadays one tries to make the side strips completely of concrete and to add a black color to the concrete of the upper layer. Along bituminous roadways the concrete keeps its natural color. Like on concrete carriageways, the side strips are intersected by transversal joints to avoid irregular cracking.

Design
of
Access Structures, Bifurcations
and
Crossings

Amongst the special structures of the German autobahns the construction of accesses, bifurcations and crossings deserve particular attention.

1. Access schemes

The access systems connect the autobahns with other common roads and will be arranged where important feeder roads cross or touch the autobahn line. The spacing of these junctions depends on the traffic density of the area passed through; on the average 10 kms are normal. Like the bifurcations and crossings the access systems have been designed at lowest points of the main lines and not at the tops in order to permit good view over the guidance of traffic in these systems. Double and single sided junctions are to be dealt with.

1. Double-sided access systems

These are the standard designs and generally consist of two access ramps on each side of the autobahn. Grade crossing of traffic has to be avoided under all conditions; crossings on the feeder-roads may be admitted. According to the importance of traffic in the access region, it will be decided upon I or II class system. First class accesses are designed for speeds up to 40 kms per hour, and second class structures for speeds up to 30 kms per hour; the radius and the length of both transition curves and transition ramps as well as the percentage of cross-fall will be calculated for these speeds.

a) I class access structures (fig. 1). As figure 1 shows, the both-sided access systems are designed quite symmetrically; the layout of these forst class structures for speeds up to 40 kms does not allow smaller radii than 50 meters.

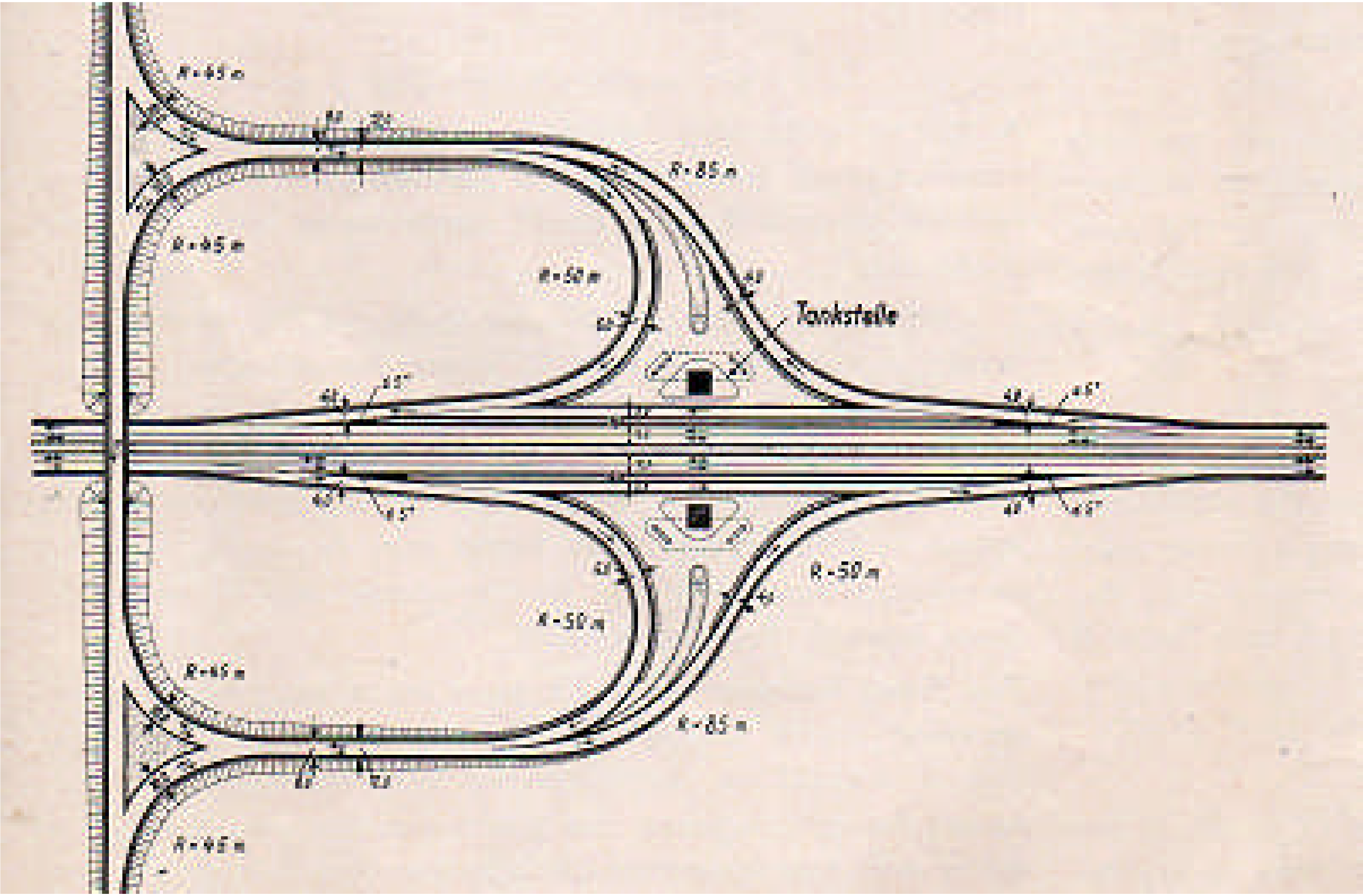


Fig. 1. ***Double-sided access structure, Class I (calculated for speed of 40 kms per hour)***

As for particulars of design it had to be considered that the safety of entering or leaving the autobahn is paramount. Therefore the access ramp is not built closely to the motor-way, but transitions have been designed running for 100 meters parallel and in the same height to the straight auto-bahn before the entrance and after the exit; both transition sections are separated only from the autobahn by a narrow green strip stretching along the entire length of the access. The angle of access generally amounts to 5 degrees.

With regard to cars leaving the autobahn the following points have been decisive. The separation of leaving cars from the through traffic has to take place as slowly as possible, so as to avoid any danger to the high speed through traffic; the driver himself must take sufficient time and space to reduce speed slowly before entering the narrow curves of the access ramp.

Similar conditions will be met by entering cars. The cars must assimilate themselves slowly into the through-traffic after having carefully made sure of clear distance ahead, and increase their speed to that of the quick autobahn vehicle.

The form of the separation island (green strip) between ramps and autobahn line is not equal to accesses to and from the autobahn; the green strip (at the “down ramp”) is shorter to permit cars having missed the exit still to leave the motorway.

Conditions at the “up-ramp” are other: the greenstrip will be prolonged as far as possible to prevent any early turning of the cars on the autobahn proper.

Besides the long stretched separation island between the exit and the entrance of the autobahn, another triangle island is situated at the bifurcation of access line and exit line. The triangle island is not combined with the separation island, but both islands are separated by a third lane running in the continuation of the exit lane and along the access lane.

This direct connection of both exit and access lanes shows the advantage that cars having left the autobahn by mistake can return without any dangerous turning on the branch road at the end of the access system. A further advantage of the third lane is the opportunity of the installation of filling stations and parking places. On the triangle island rounded by the three lanes, it is easy to erect a filling station to meet the demands of traffic. The grades of the ramp generally correspond to the grades at the tributary roads. Accesses of first class generally have no grades higher than 4%.

b) II class accesses (fig. 2). As the access structures of the type mentioned above are relatively expensive, but as a certain minimum number of junctions on an autobahn section cannot be abandoned for reasons of traffic in addition to these first class accesses for dense traffic, furthermore accesses for medium and weak traffic (second class) are planned.

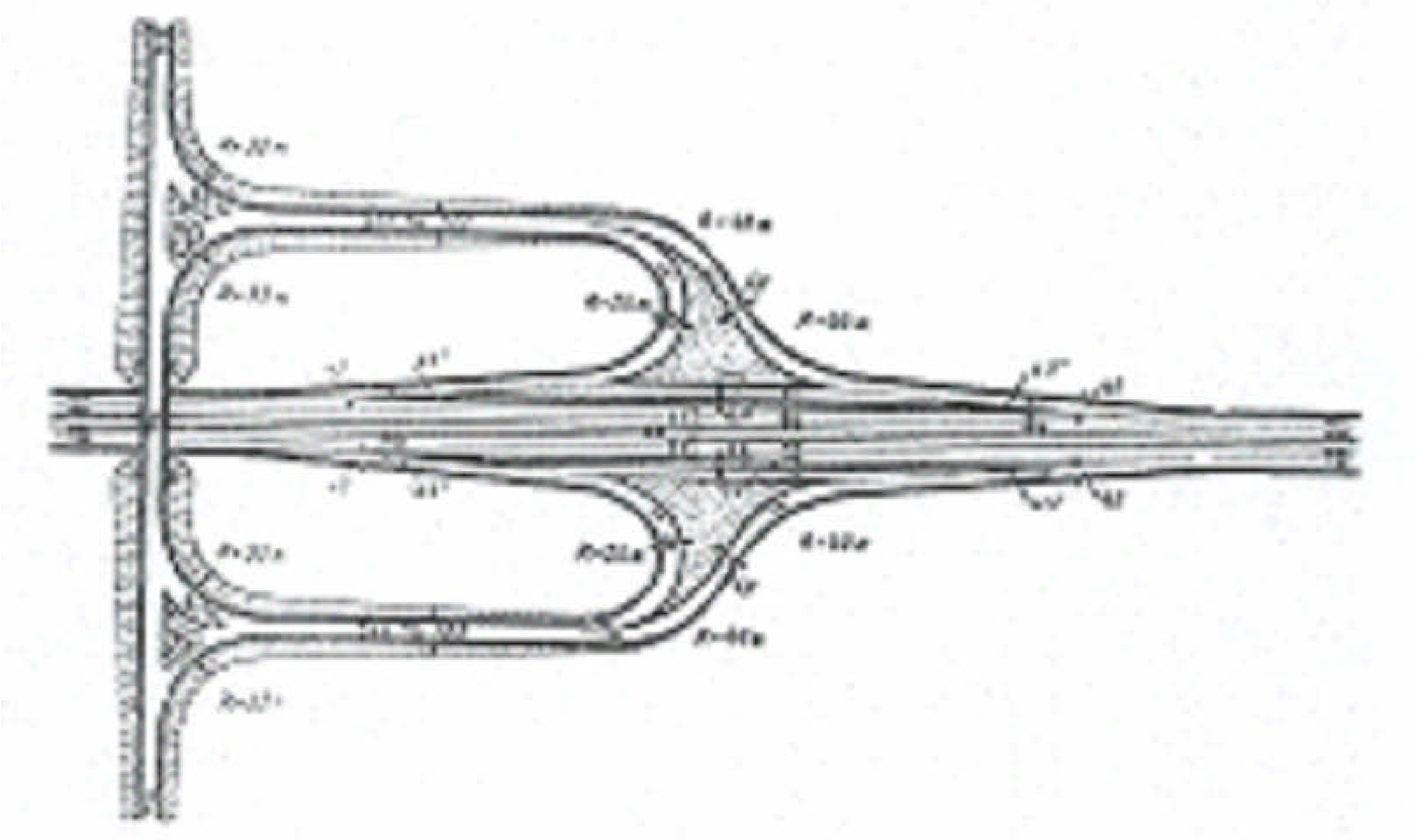


Fig. 1. ***Double-sided access structure, Class II (calculated for speed of 30 kms per hour)***

The principles of the design of I class accesses are also transferred in particular to the access structures of II class; only grades and curvature have been changed. The radii have been reduced to 25 meters according to the access speed of only 30 kms per hour. The grade limits of the access ramps have been increased to 7%.

2. One-sided access structures (fig. 3)

One-sided accesses will be constructed when the access can be designed for one side only, if, e.g. the main feeder road does not cross the autobahn, but is only approaching the motorway, or if the tributary road can approach only through a further by-road because of existing building schemes, or if railway grade crossings, harbors, rivers and local morpho-logic conditions prevent the double access.

The design has been called trumpet junction (fig. 3), as the access opposite to the side of the feeder road is accomplished through a curve widened like a trumpet. The design in particular is elaborated according to the principles used for double-sided accesses. With regard to the better view of the traffic on the structure, the trumpet bend will be laid on the exit side, if the traffic is equally dense in both directions; the lay-out corresponds in this case with fig. 3.

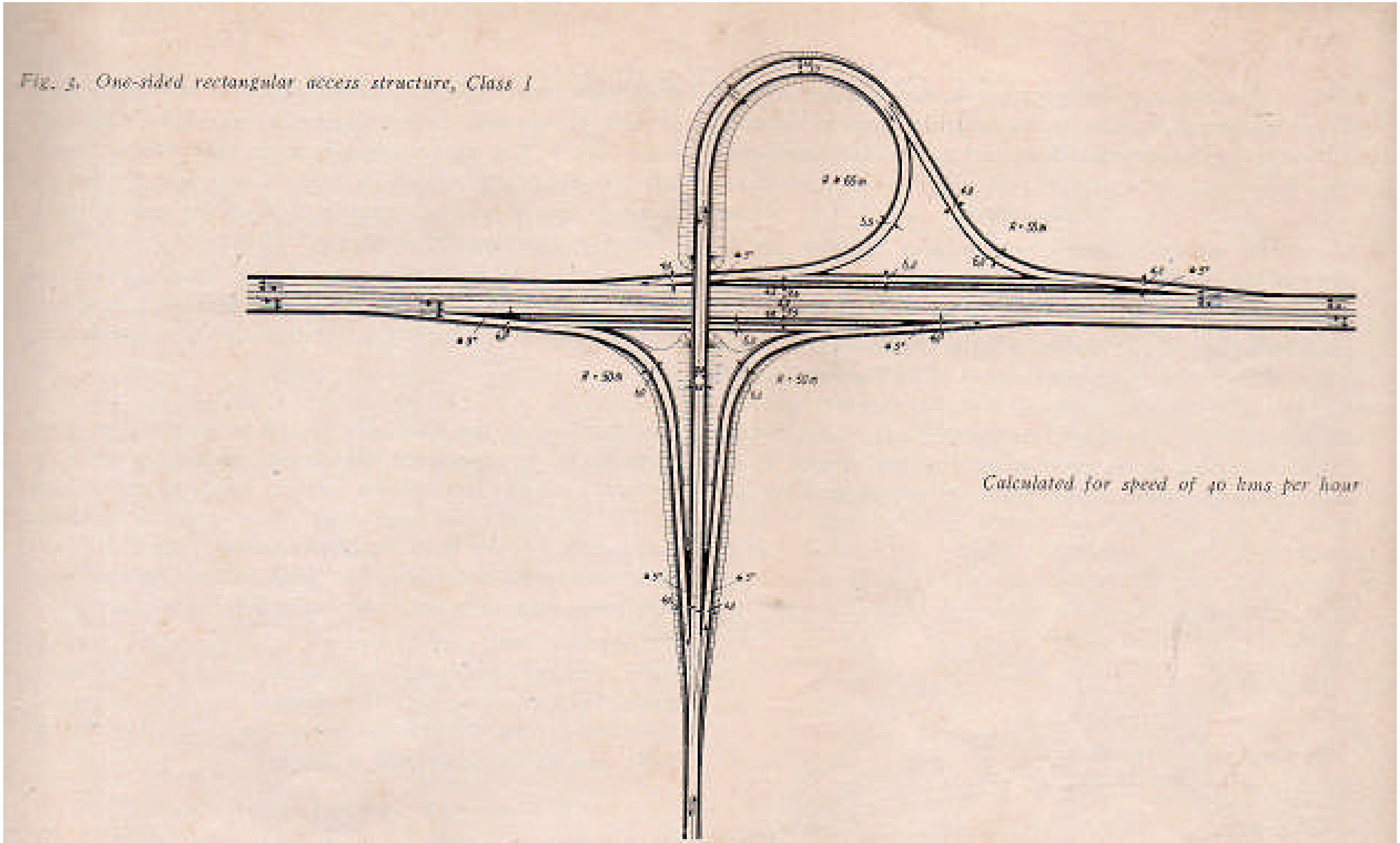
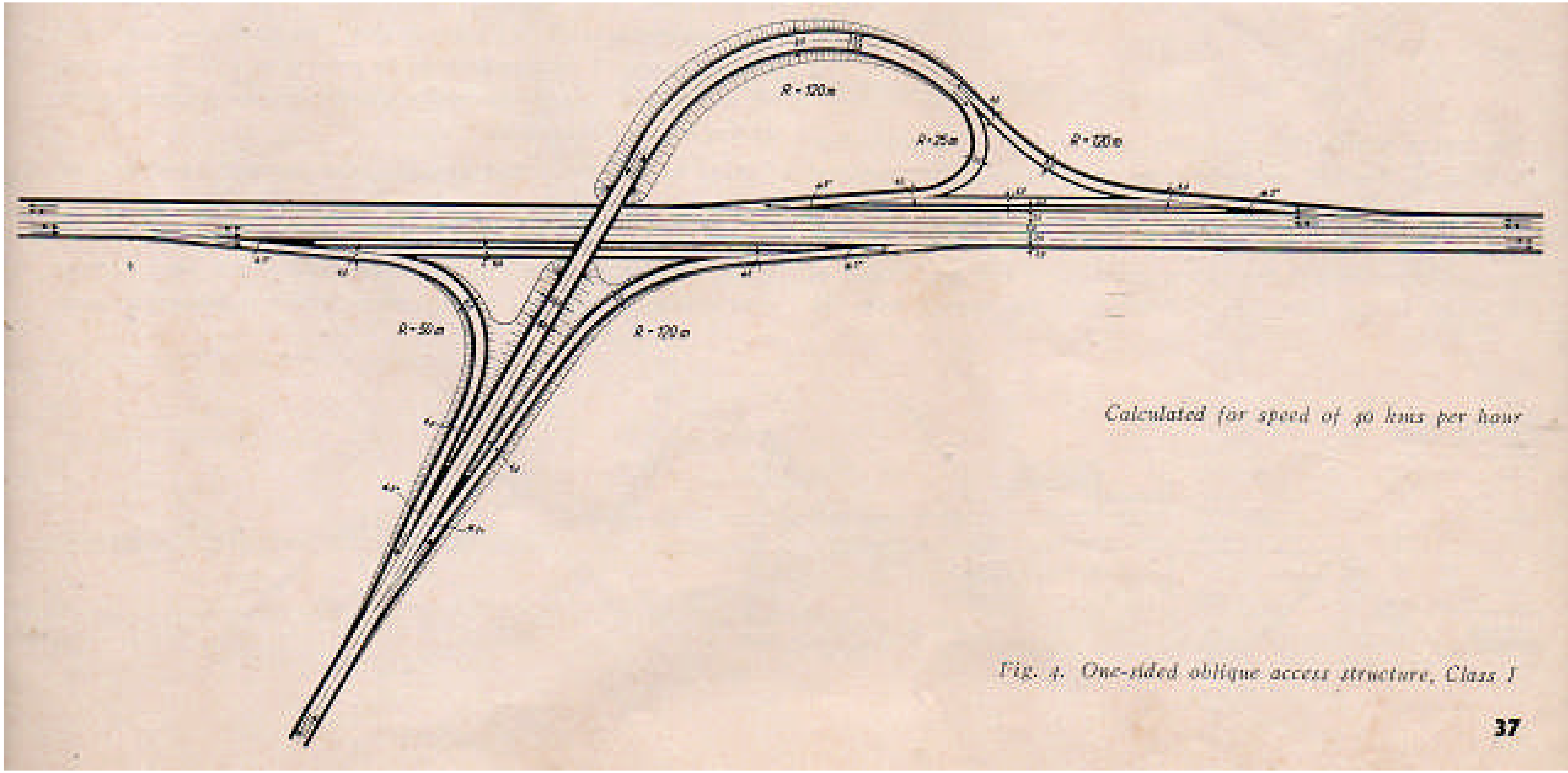


Fig. 3. ***One-sided rectangular access structure, Class I (calculated for speed of 40 kms per hour)***



If one-sided dense corner traffic is prevalent and space is lacking, the trumpet bend will be placed on the side of the densest corner traffic and designed according to figure 4.

<u>Above</u>: Fig. 4. *One-sided oblique access structure, Class I (calculated for speed of 40 kms per hour)*

3. Town entrances (fig. 5 and 6)

A special kind of accesses has to be constructed, if the terminus of an autobahn line is situated before a frontier or harbor town without a direct continuation into another net.

The transition is reached by distributing traffic at the same level by round-abouts (fig. 5) where the autobahn as well as all other roads and streets run into. It is advantageous to place the round-about in such a manner that the driver arriving on the autobahn can view the structure and reduce speed in time. It has been found very favorable steadily to enlarge the green strip in the middle and to arrange the slope towards the round-about.

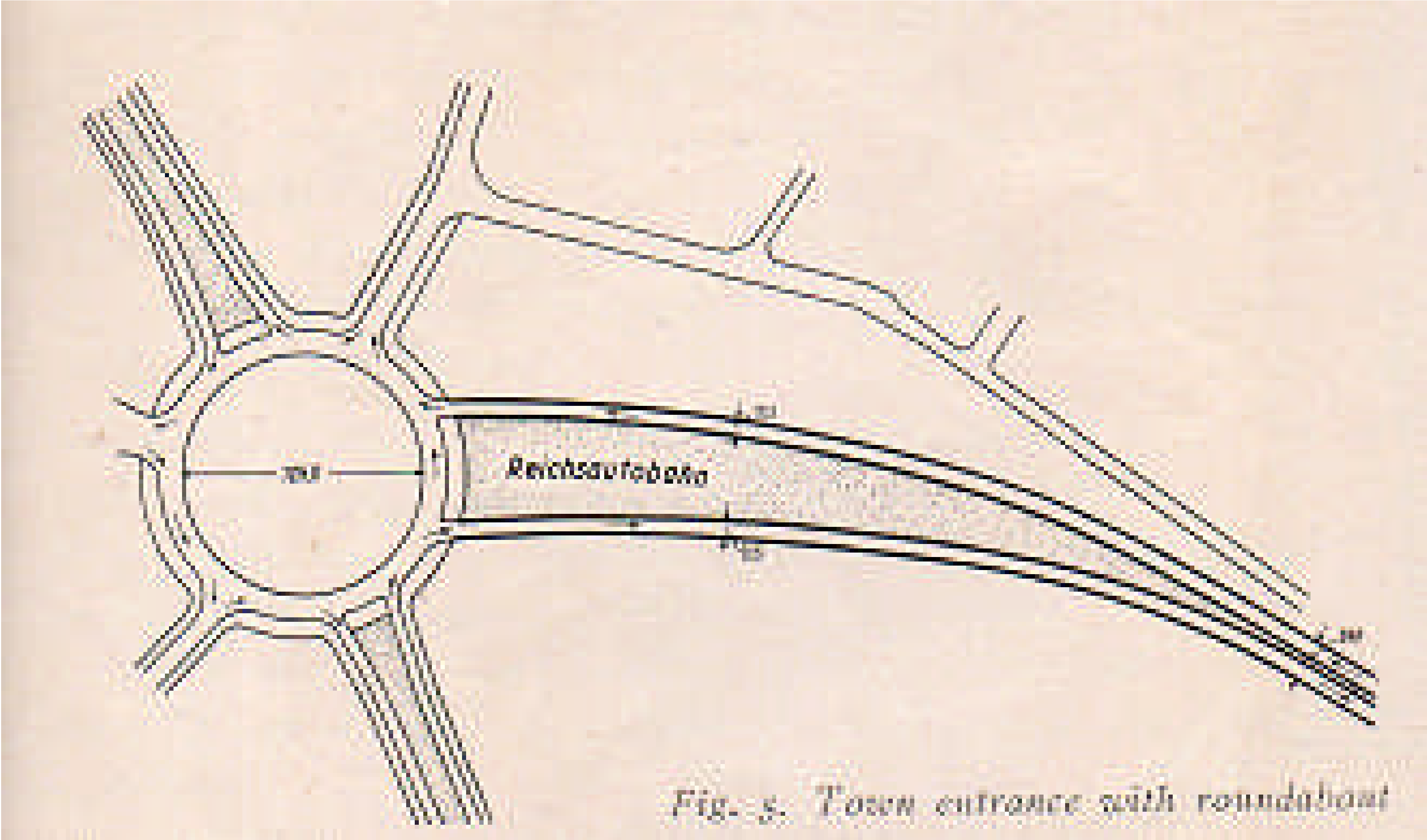


Fig. 5. Town entrance with roundabout

Fig. 5. ***Town entrance with roundabout***

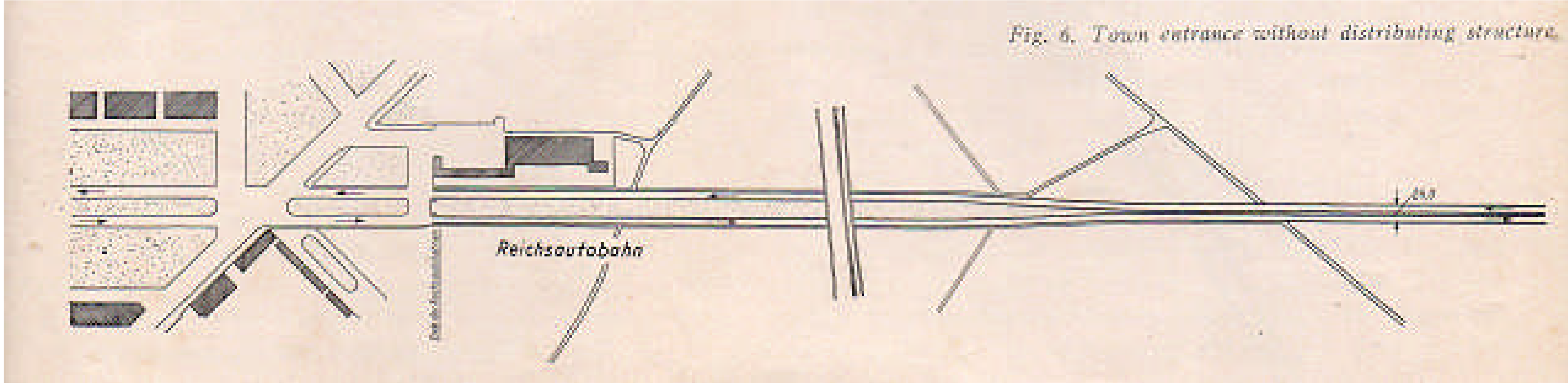


Fig. 6. *Town entrance without distributing structure*

The direct transition of traffic from the autobahn into urban or other streets without the interpolation of a round-about (fig. 6) cannot be recommended with exception of cases when the prolongation has been constructed as a broad artery with two separated carriageways and if the transversal traffic at the terminus of the autobahn is small. Also in these cases it is necessary by appropriate architectural or gardening designs to emphasize the actual terminus of the autobahn in order to show the driver the end of the speed-way.

II. Bifurcations

Bifurcations are built when one autobahn branches off the other at an angle. It was the principle for the lay-out to eliminate in any case grade crossings of two traffic directions; moreover the character of the normal cross section had to be kept unchanged. Also on the bifurcation systems the high speed to be used on straight main lines should be maintained without danger.

Therefore it had to be considered that the turning to the other motorway should take place to the right only; also the entry should be possible only from the right. Any turning to the left or entry from the left must be avoided with regard to dangerous crossing of inner lane used for overtaking slower cars. The accesses and exits have been arranged accordingly; the driver must not have any doubt as to which is the main line and which is the branch line.

To permit easy assimilating in or out of traffic, sufficiently long stretches for slowing down or speeding up will be designed. According to the importance of corner traffic the structures can be varied with regard to reduced speed at the branch corners. Thus it will be possible to keep the area of such bifurcation structures within economically reasonable limits.

In proportion to the traffic either being equally dense on both branches of the triangle system, or if the traffic flow will preponderate in one branch, the trumpet structure is preferred.

1. Triangle system (fig. 7)

This structure is the best solution of a junction, as here elements of laying-out for the corner connections with the straight autobahn line can be applied which permit speeds of 100 kms per hour and more. It is applied therefore everywhere, if the traffic is approximately equal in both directions of the main line. This kind of junction has been built near Mannheim and near Karlsruhe.

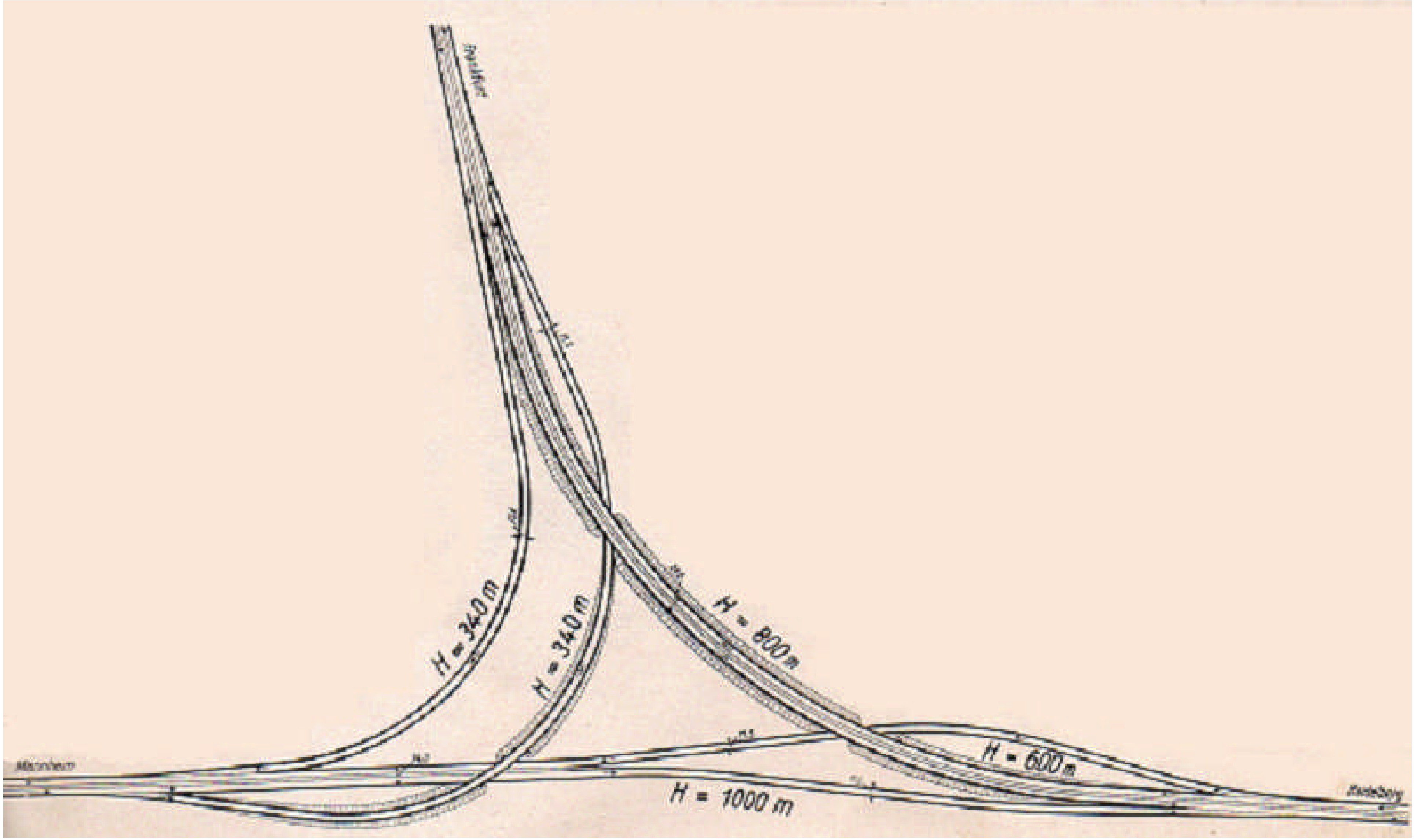


Fig. 7. ***Autobahn bifurcation Triangle at Mannheim***

The disadvantage of this structure is an economic one, as three crossing structures, even at comparatively acute angle, become necessary. The demand for building area is considerable; this solution can be justified only when denser traffic can be expected in the future.

<u>Left</u>: ***Motorway access in the City of Mannheim***

<u>Right</u>: ***Entrance to the motorway at Mannheim, 1935***

2. The trumpet solution (fig. 8)

In all cases, when traffic is heavy only in one direction, the less expensive and less complicated “trumpet structure” will be designed. It corresponds in its principles with the lay-out of one-sided access system naturally under consideration of the larger dimensions.

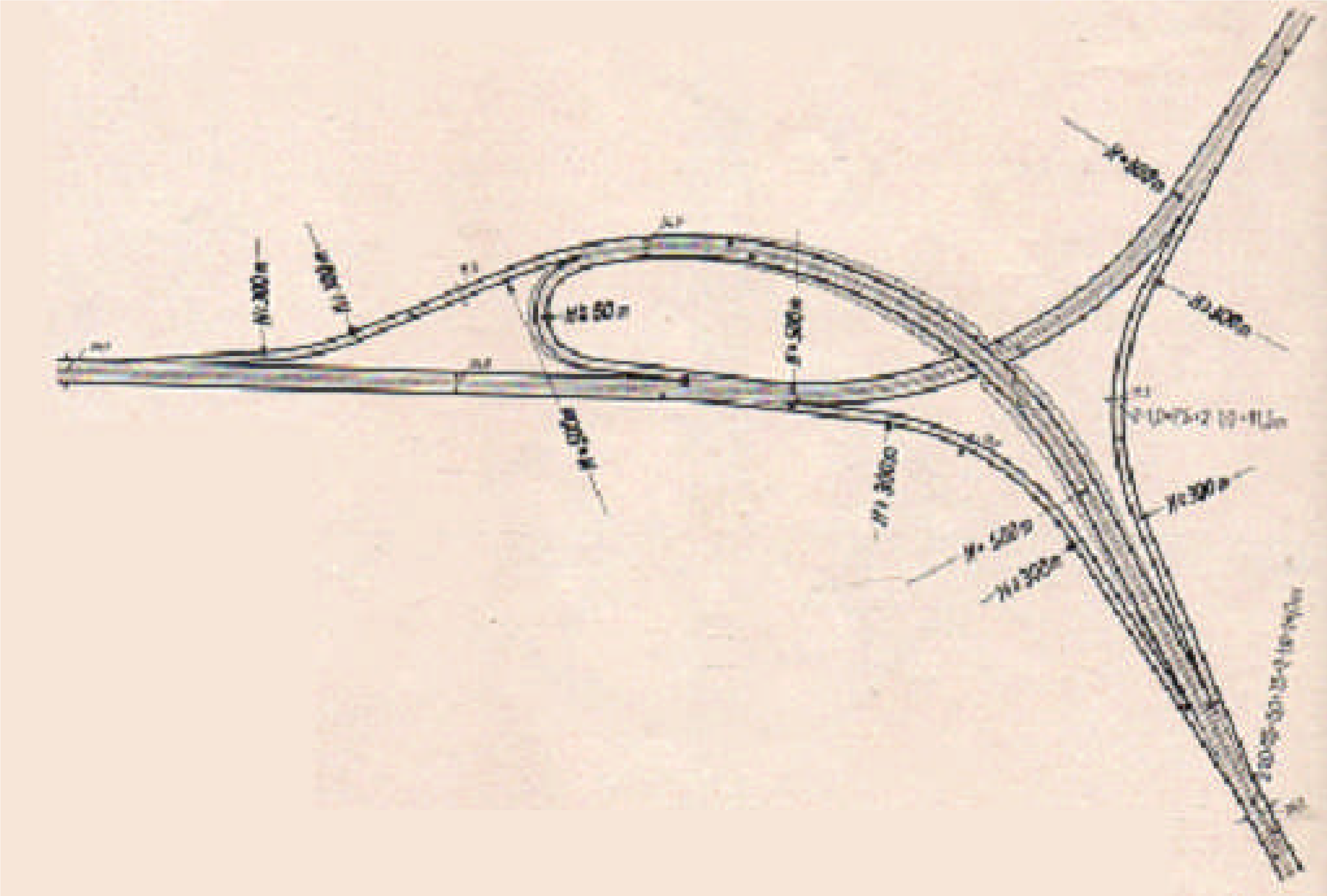


Fig. 8. ***Autobahn bifurcation in form of a "Trumpet"***

Similar to the one-sided accesses, the trumpet bend will be constructed towards the direction of the densest corner traffic. Here is an advantage that the direction of the main traffic will profit from the maximum radii and a very slender line diagram. Only the weak corner traffic is bound to pass through the relatively small radii of 50-75 meters. The latter solution is to be applied especially when the trumpet is used by traffic branching off the main line.

The main advantage of this structure in comparison with the triangle scheme is the considerable reduction of area needed; only one single bridge structure becomes necessary, the crossing angle of which is relatively obtuse. It is a disadvantage that the speed within the trumpet bend must be reduced to 50 or even 40 kms per hour.

This scheme is under construction at several places of the autobahn net; greatest progress was met on the "Berlin Ring" where two structures, the so called Brandenburg Triangle in the West and the Stettin Triangle in the North East are already open to traffic.

III. Crossing schemes

Crossing schemes will have to be designed when two autobahns cross each other more or less at right angles. As the through-traffic in the directions of both autobahns will be generally prevalent in comparison with corner traffic, it was a fundamental demand not to hinder through-traffic in any way, whilst corner traffic had to use curves having smaller radii.

1. Four-leaf-clover-scheme (fig. 9)

The so-called double-eight or the four-leaf-clover-scheme will be designed when the two autobahns approximately cross at right angles. It has the advantage in comparison with all other solutions that it shows a simple and clear lay-out; only one crossing scheme becomes necessary. There are no grade crossings in the one or other direction; Entries and exits of traffic only occur from or to the right. The transition from one autobahn to the other line can be made without difficulties over short transition ramps.

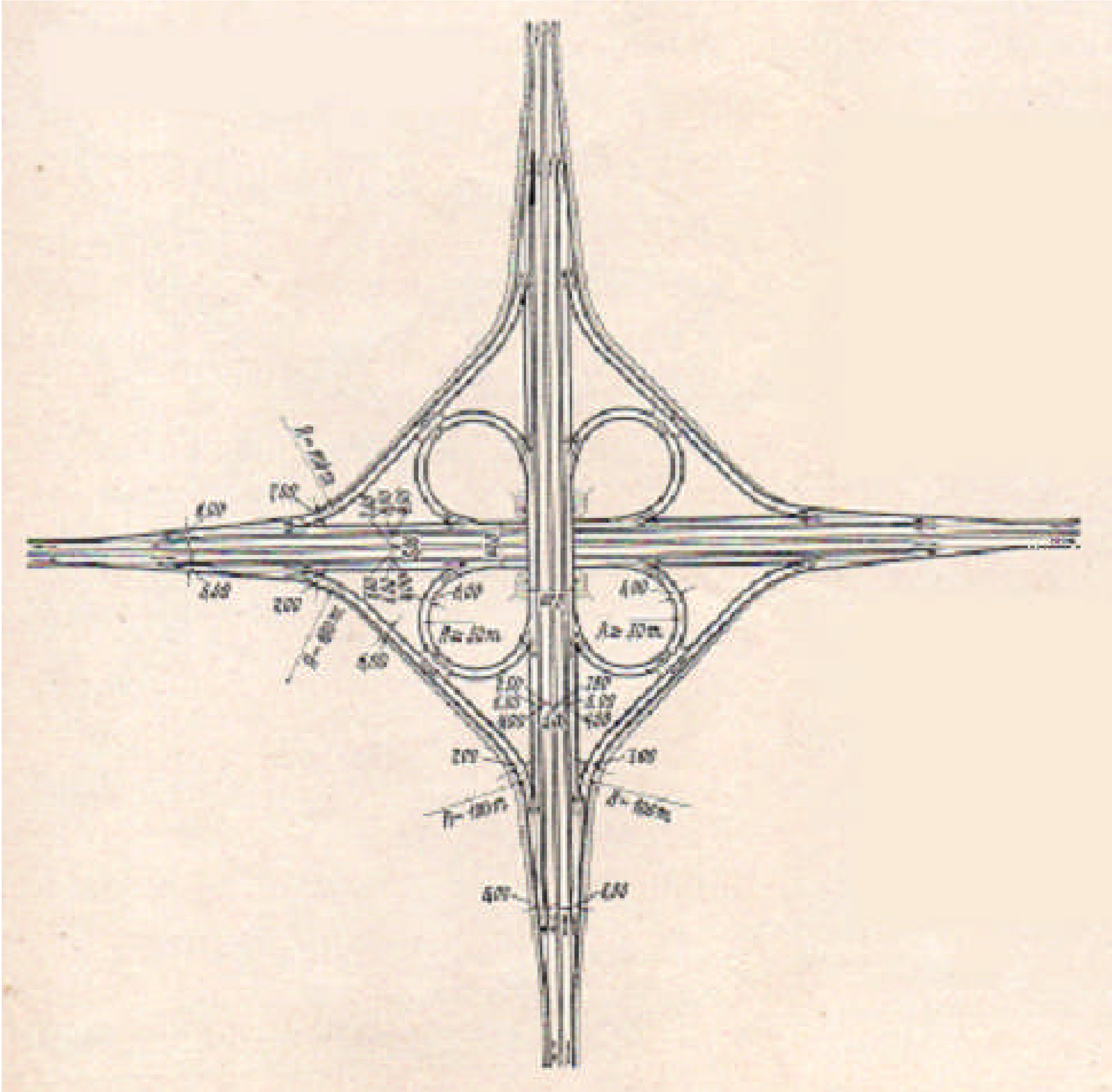


Fig. 9. ***Autobahn crossing scheme in form of "clover-leaf"***

The traffic to the right encounters wide curves with radii of not less than 100 meters; the traffic to the left, however, has to run through three quadrants at radii of 50 to 75 meters. The corner traffic, similar to the trumpet scheme, has to suffer from speed reduction down to 40 and 50 kms per hour. In order to avoid dangers to traffic on the through autobahn, by this slowing down of speed, in both directions special parallel lanes have been designed where the changes of speed may take place. On these parallel lanes crossing by filtering through must be carried out which must be considered between the various runs of the left-corner-traffic on the double-eight.

Four-leaf-clover-structures have been opened near Schkeuditz between Halle and Leipsic, and near Hermsdorf, both on the autobahn Berlin-Munich; double-eights are under construction near Nuremberg, Frankfort-on-Main, Cassel and Hamm in Westfalia.

2. Giant Roundabouts (fig. 10)

The roundabout structure has been constructed only once, near Leverkusen at the crossing of the autobahn Cologne-Dusseldorf with the autobahn Dorlmund-Wuuppertal-Aachen.

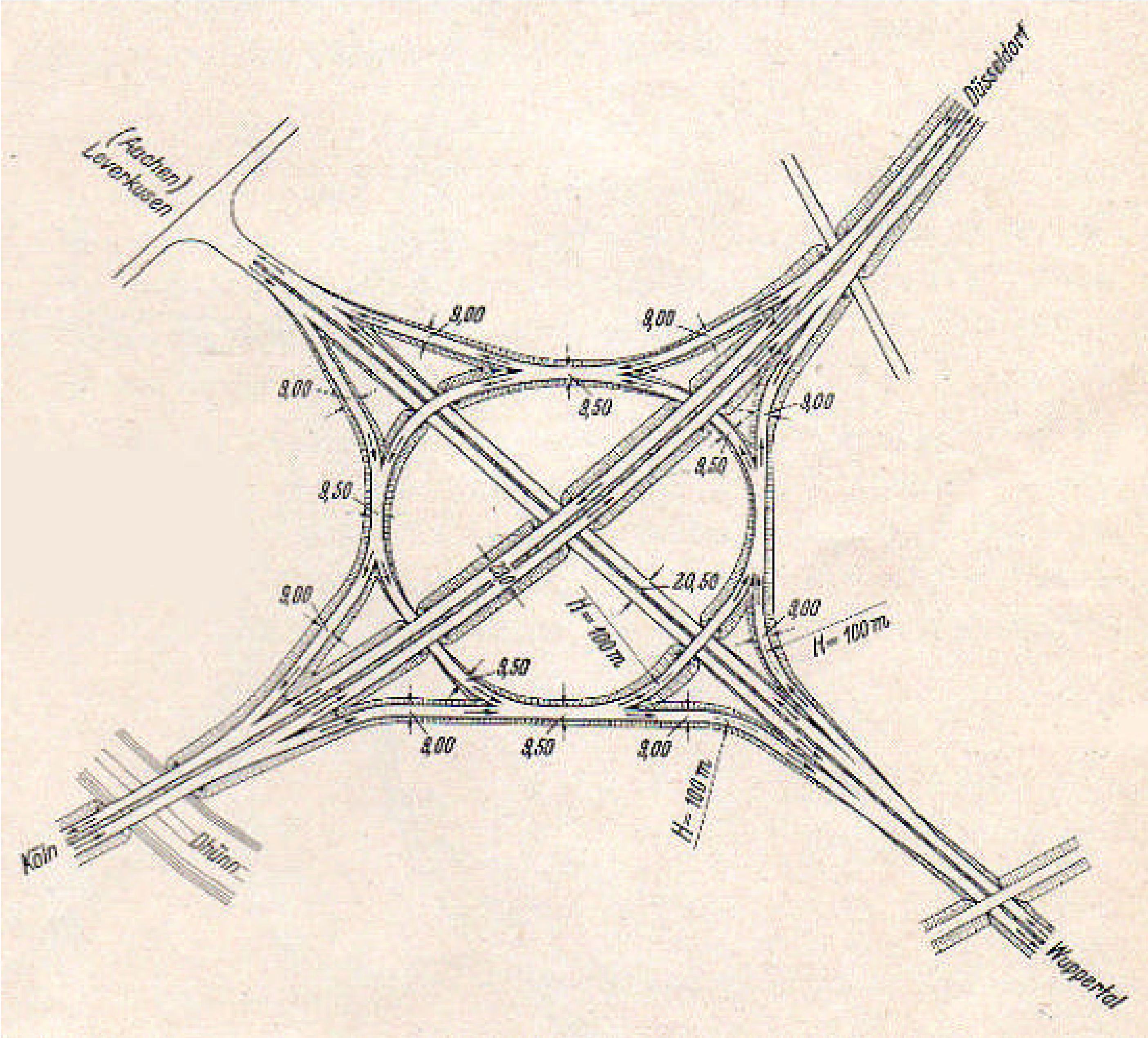


Fig. 10. ***Autobahn crossing. Roundabout***

This giant roundabout has been constructed over the cross of the two straight through running lines with the minimum radius of 100 meters. The transition from one autobahn to the other motorway will take place in circular traffic. In spite of the greater radius of the roundabout in comparison with the double-eight (clover) scheme, one cannot calculate with higher speeds due to the various filtering of vehicles through the traffic flow on the roundabout.

The cloverleaf shows only one crossing structure, the round-about, however. Four bridge schemes more, in order to guide the circular lanes of the roundabout over the crossing autobahns; therefore this solution will be applied in exceptional cases only.

3. Line solution

If the two autobahns do not cross at more or less right angles, but at a delicately acute angle, or if the corner traffic equals the through-traffic, the so-called line scheme will be preferred instead of the clover-leaf or the roundabout solutions. Numerous proposals have been already made for its development. In the German autobahn net it has been planned once as a trial in the form of a combined access structure (triangle and trumpet scheme).

Development of Traffic on the German Autobahn

From the opening day onwards on the various sections of the autobahns, the number of vehicles is regularly stated on some days of the month to get superficial statistical data of the traffic at hazard varying from day to day.

Figure 1 illustrates the result of a special continual counting on the motorway Munich-Salzburg near Ramersdorf, it shows that the number of cars fluctuates from day to day according to the weather, season and several other circumstances. Many sections show peak-hours at the week-ends, that is between Saturday noontime and Monday morning.

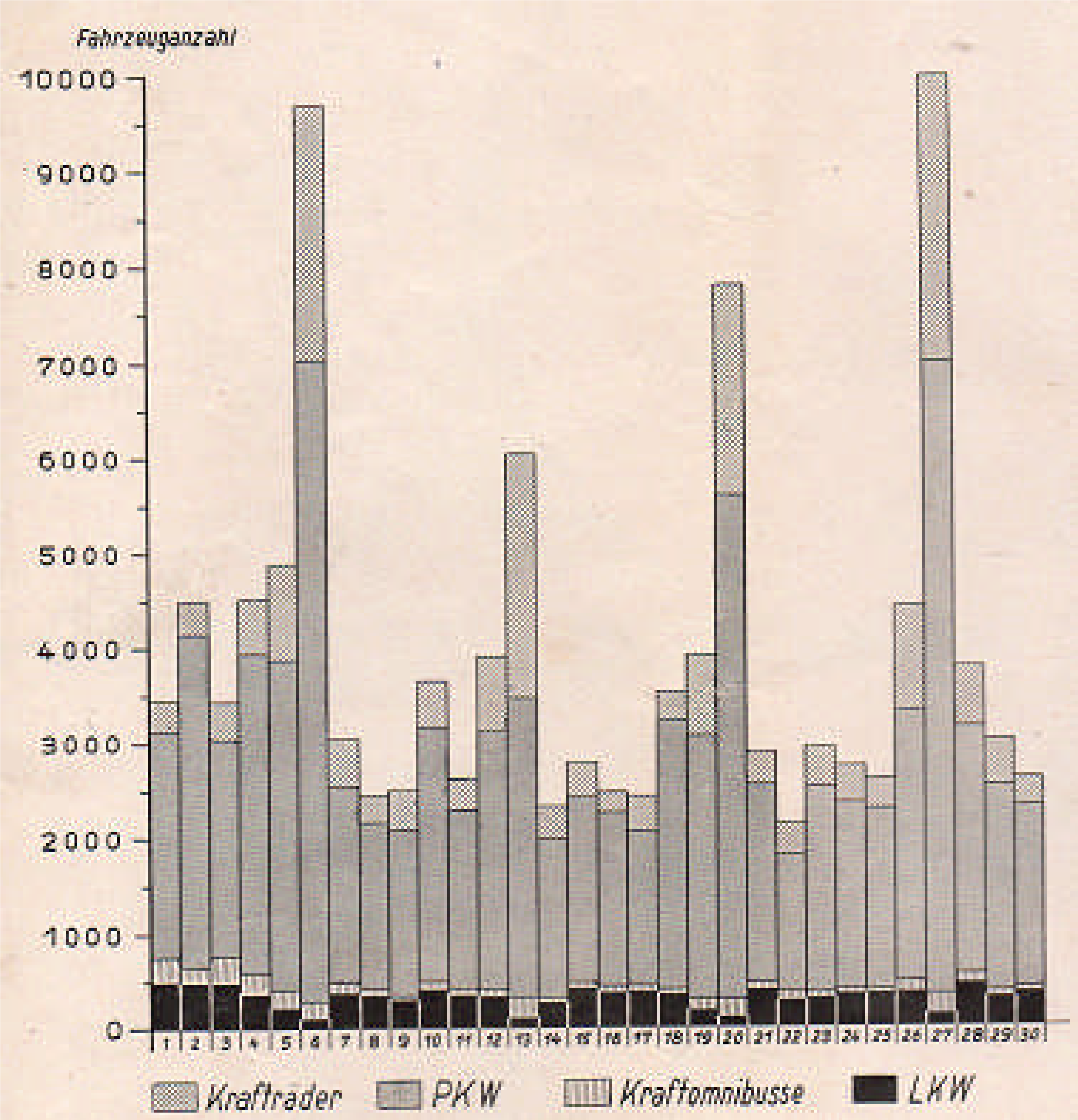


Fig. 1. ***Traffic statistics of autobahn Munich - Salzburg near Ramersdorf, June 1937. Number of motor cycles, cars, buses, motor lorries***

The weekly and seasonal fluctuations of traffic greatly depend on the geographical situation and character of a line as figure 2 proves regarding the motorway Berlin-Stettin being an eminent touring artery, and figure 3 for the line from Berlin to the Ruhr industrial region as being preferred by commercial conveyance of goods.

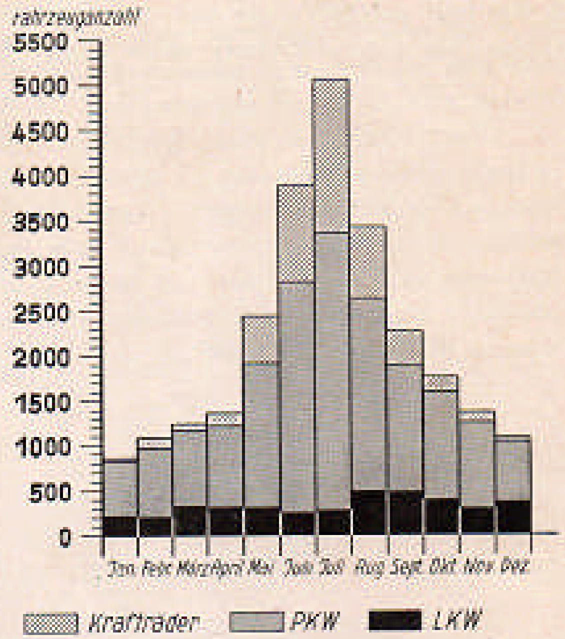


Fig. 2. ***Daily average near Eberstealde on autobahn Berlin – Stettin, Jan. - Dec. 1937. Number of vehicles (motor cycles, cars and motor lorries).***

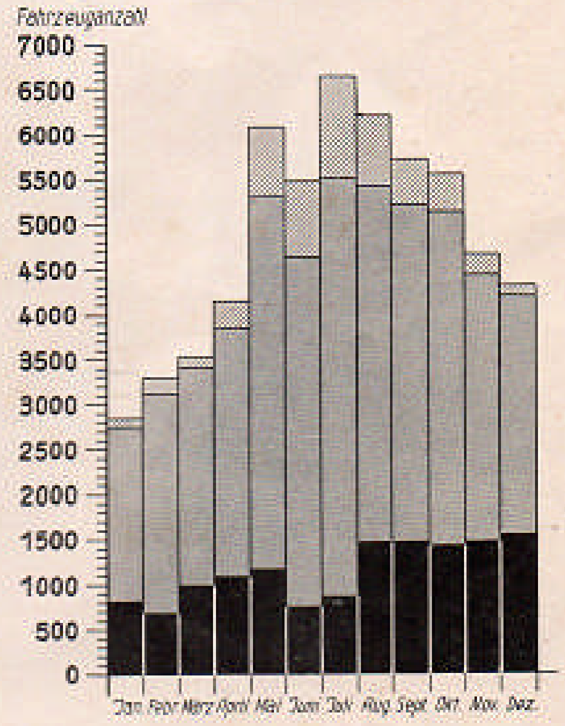


Fig. 3. ***Daily average near Cologne – Opladen on autobahn Cologne – Oberhausen, Jan. – Dec. 1937.***

The percentage of goods traffic also varies according to the character of the line; it amounts, e.g., during summer season only to 5-10% between Munich and Salzburg. Hamburg and Lubeck, or Berlin and Stettin; 40-60% have been stated on other lines such as Berlin-Hanover, and Frankfort-Mannheim. The number of goods traffic remains relatively steady throughout the year; sometimes it is even greater in autumn and winter than in summer.

Figure 4 shows the amount of traffic in July 1937 on the entire motorway net then open to traffic. According to the season, cars were prevailing. Short, unconnected sections, such as near Beuthen (in Silesia), Stuttgart and Ulm in South Western Germany, first had at the commencement only very little traffic which, however, considerably increased with the connecting up of the separate sections to longer through-lines (see figure 5; Dresden-Meerane line).

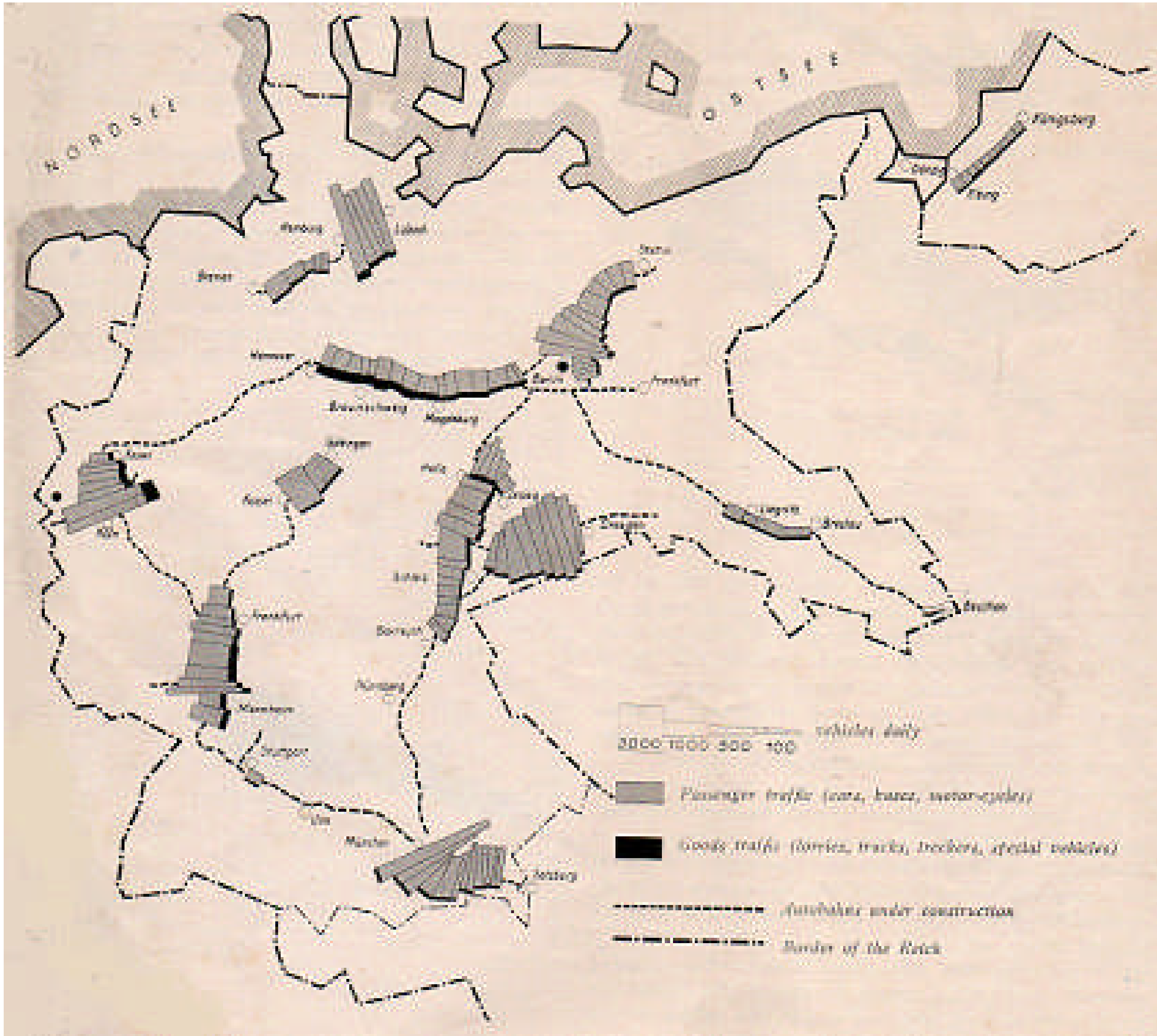


Fig. 4. ***Daily average of traffic on the entire German Autobahn net in July 1937***

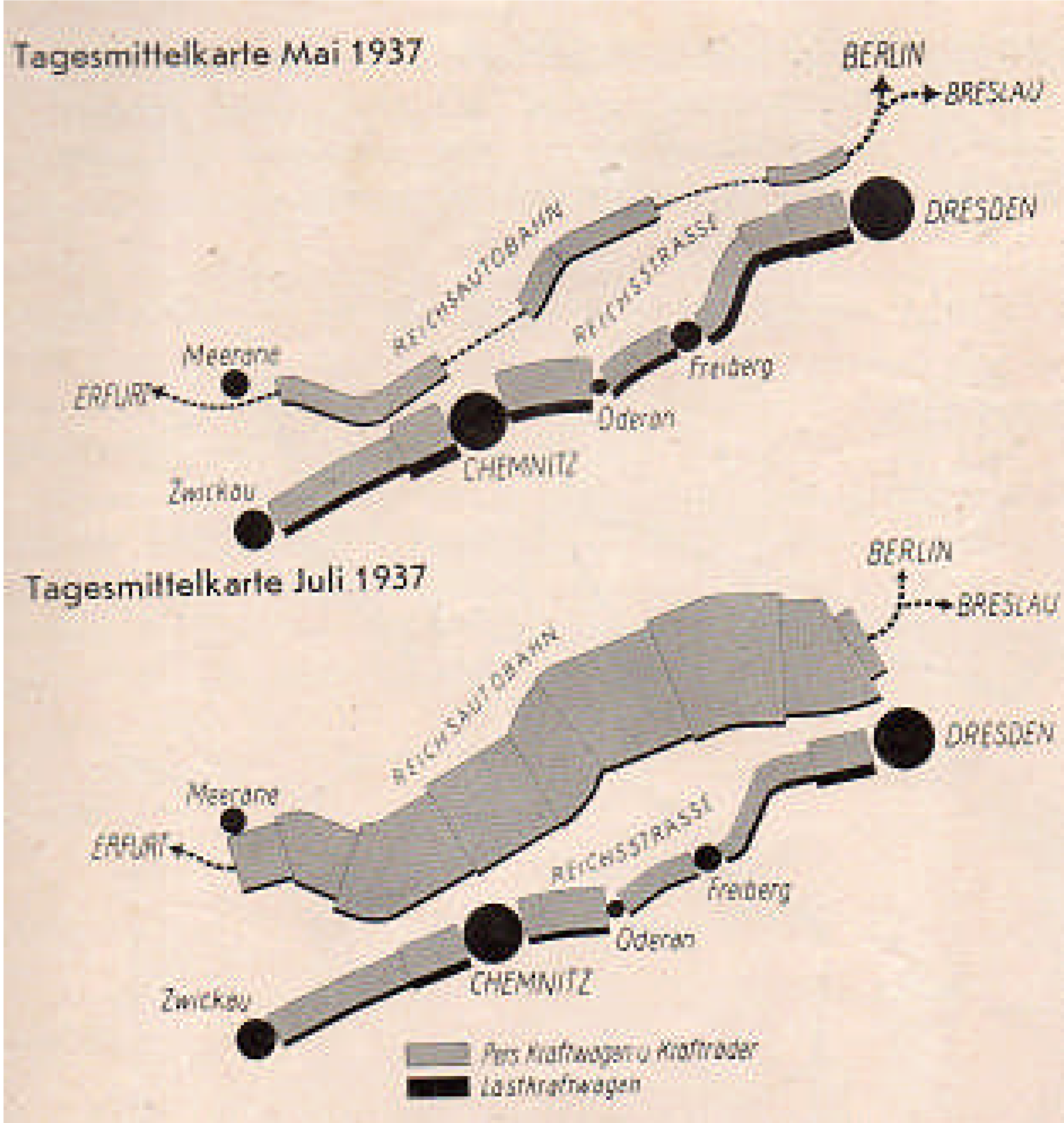


Fig. 5. ***Comparison of daily traffic between the Autobahn Dresden – Chemnitz and the Reich Road 173. Increase of traffic after completion of through-lines (Daily average of May and July 1937) cars and motor cycles; lorries.***

Sudden increase of traffic can be safely expected also on all those lines which have been opened for some time when feeder-roads are added. In this respect, the existing statistics show only a small proportion of the future traffic of the entire net if completed in due course of time; furthermore the steady motorization in Germany will enormously contribute to the upward trend.

As far as peak-days have been stated, which depend generally to a certain degree on chance, the figures are considerable and are surpassed only by the number of cars in overland-traffic on densely used main roads in the United States of America. Figures of 12,000 to 15,000 vehicles per day (24 hours) are not exceptional on some sections; during the Whitsuntide of 1937, 20,000 to 30,000 motors have been stated at several places of the Reich in 2½ days.

But the utmost capacity of the cross-section of the German motorways is by no means attained, even not during the peak-hours of such dense traffic on these record days. The density of traffic to the extent which has been observed already now on the autobahns, would be absolutely unthinkable on highways of the former type; congestions and slowing down would be unavoidable.

The traffic on the autobahns moves without interruptions and interference, so that the probability of accidents with reference to same density of traffic on old-type highways now only amounts to one fifth down to one sixth. Naturally also here those accidents caused by unexpected accumulation of extraordinary conditions, i.e. force majeure or negligence of drivers, of course, are inevitable even on super-highways.

The number of cars and lorries remaining on the main and rural roads is still considerable, especially in the proximity of large towns; in this case, however, it consists only of short-distance traffic which stops after a few miles.

Figure 6 illustrates an additional counting of lorries classified according to places of departure and destination, and to weight of load. The counting station on the Reich road in the Southwest of Berlin showed quite considerable traffic, but nearly exclusively short-distance conveyance whereas the past in close vicinity on the autobahn stated mostly long-distance traffic especially to Western Germany.

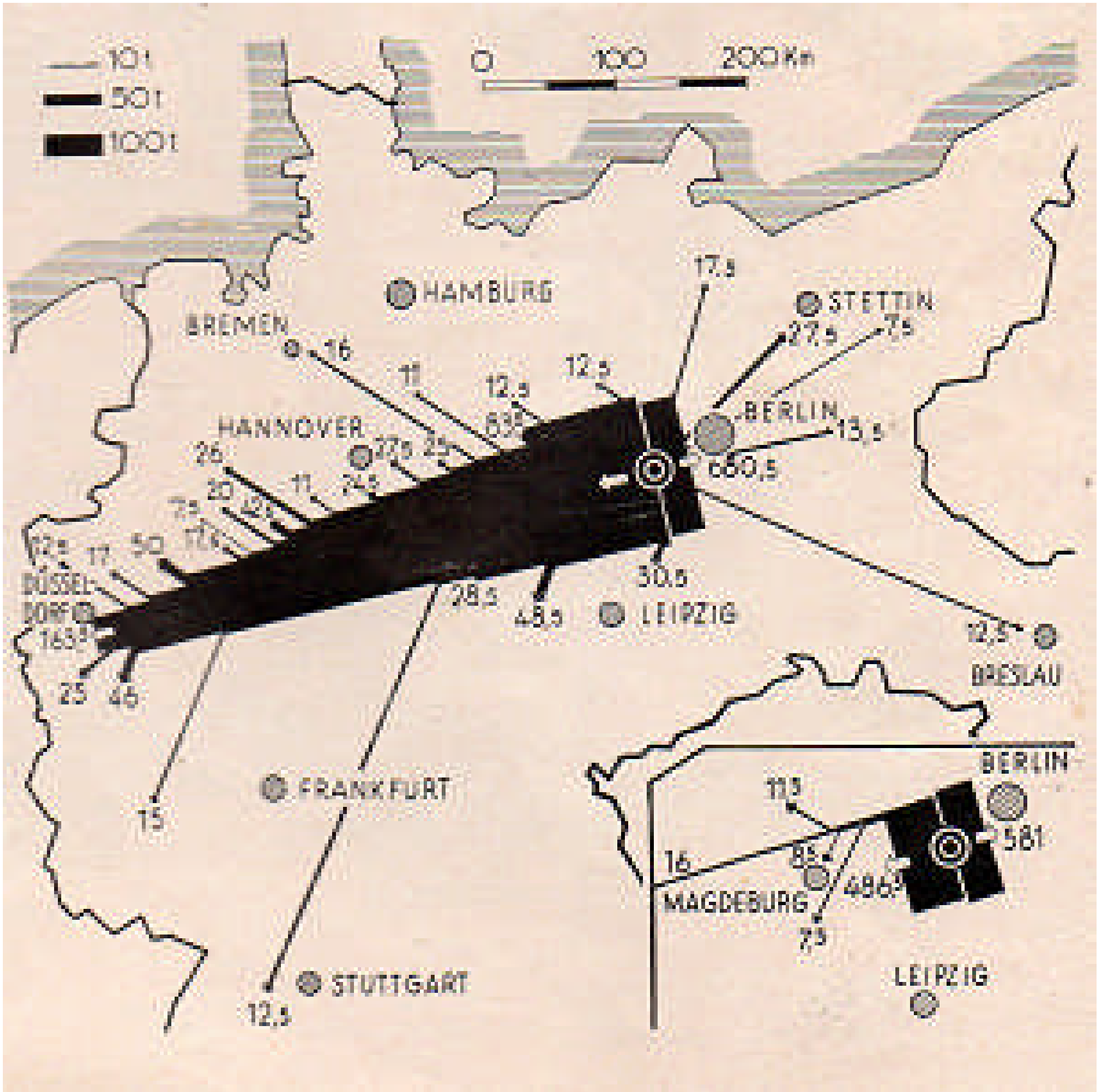


Fig. 6. ***Goods traffic according to distances; Oct. 2nd – 3rd 1936. Main map: counting station No. 41 near Werder on autobahn Berlin-Magdeburg. Small map (same scale): counting station No. 140 near Brandenburg on Reich Road No. 1.***

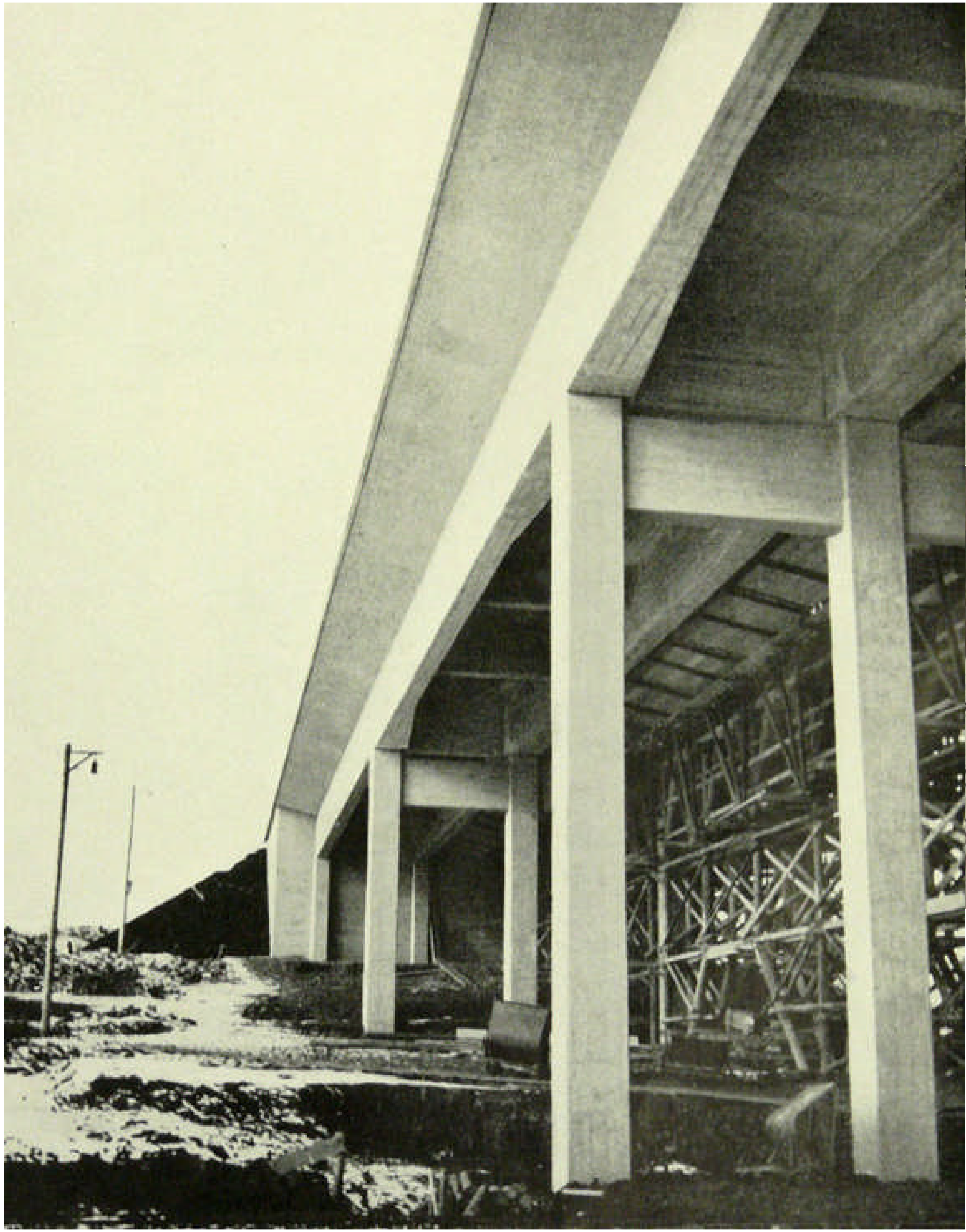
This the autobahns yield separation of traffic; they absorb especially long-distance traffic which is increasing and speeding-up; the general main-road and rural net will be partly unburdened. The speed of medium- and long-distance transportation will steadily become higher with the completion of the autobahn lines in progress of construction. Long sections, e.g. between Leipsic to Nuremberg are used by bus lines which already now run just as fast, or even faster than the scheduled express trains.

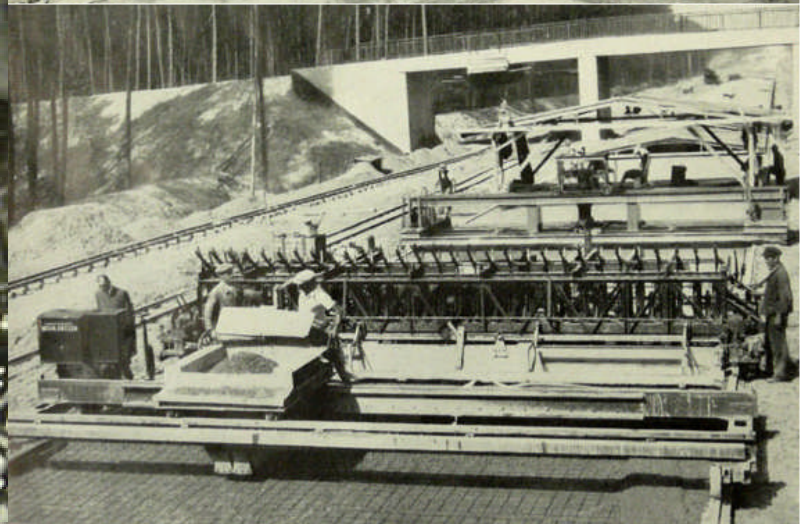
For medium sized and large cars and even for the new "people's car" the time-distances within the Reich will greatly decrease soon; long-distance traffic still in its beginning will thus use with its loads more and more the German Autobahn.

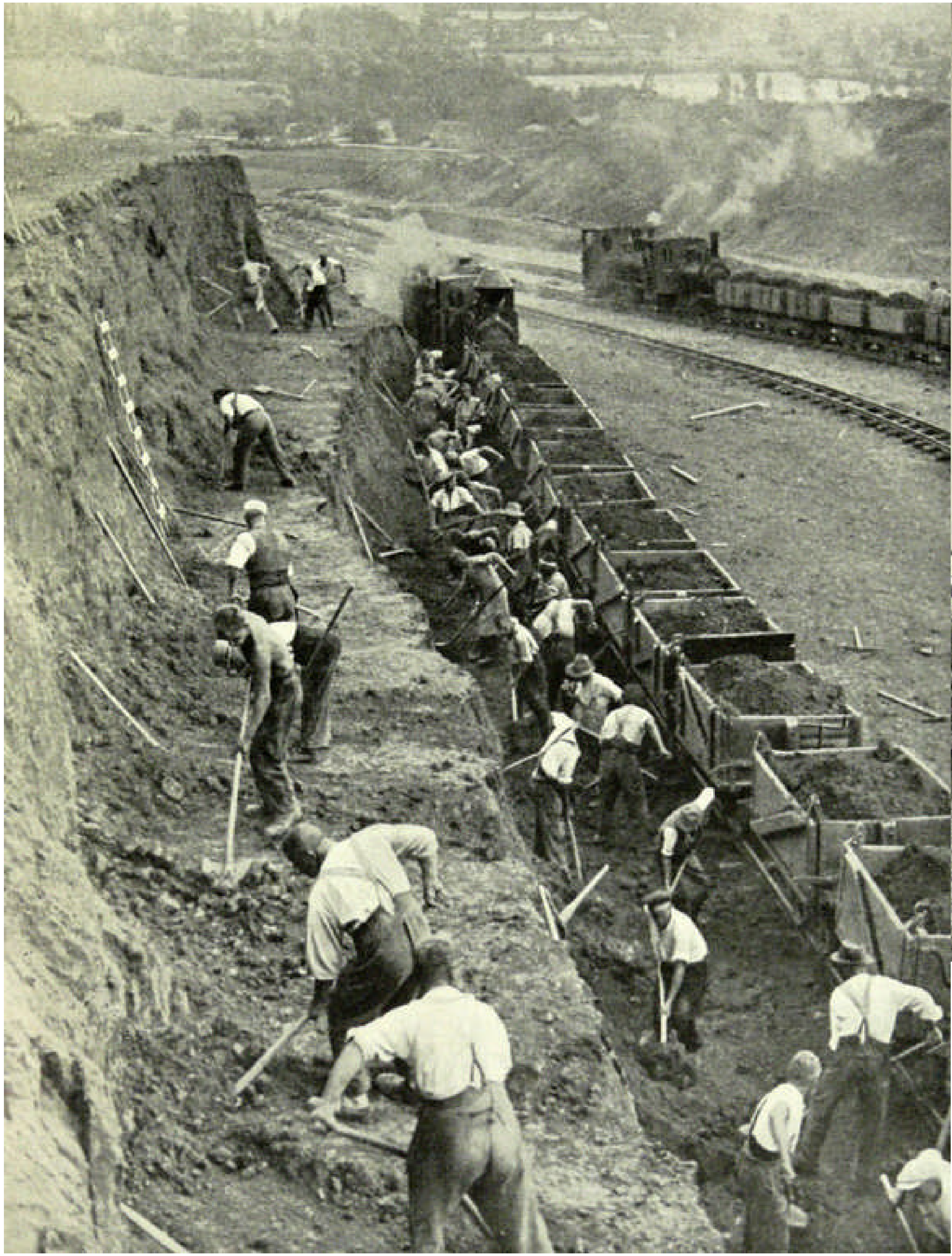
Part 8

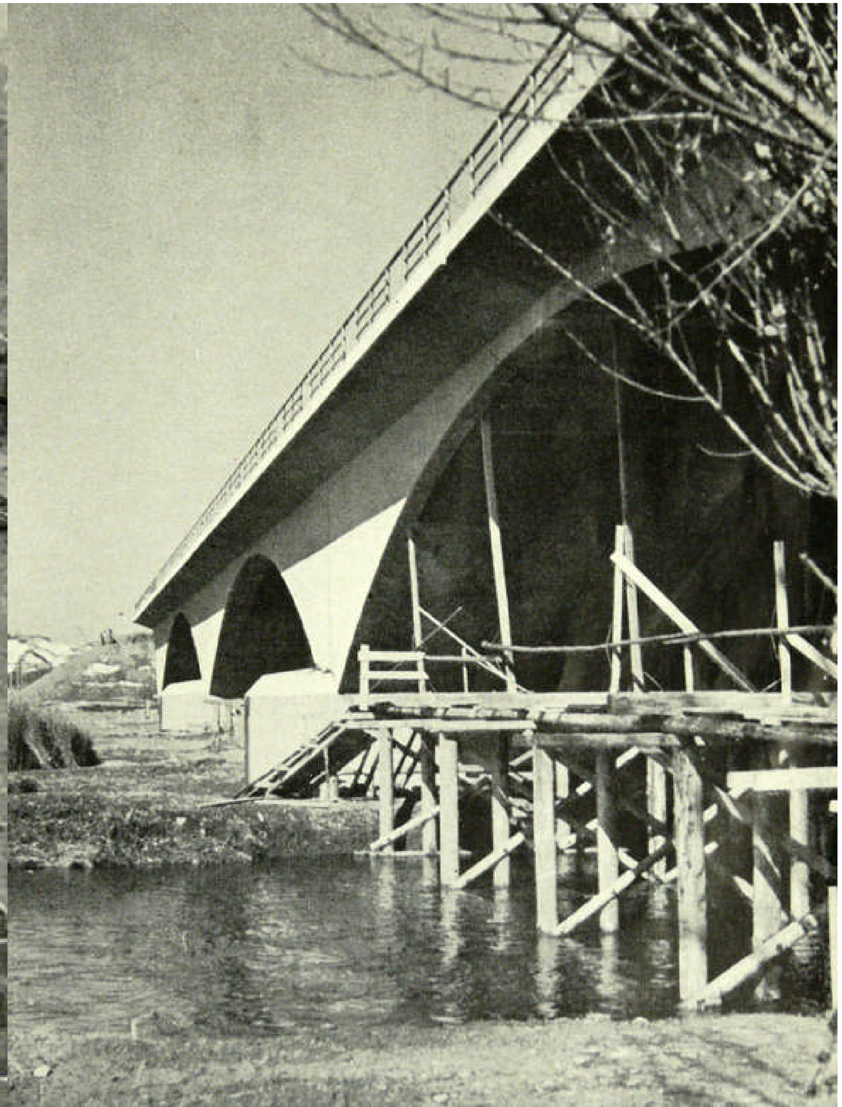
Construction Chronology
(1934-1938)

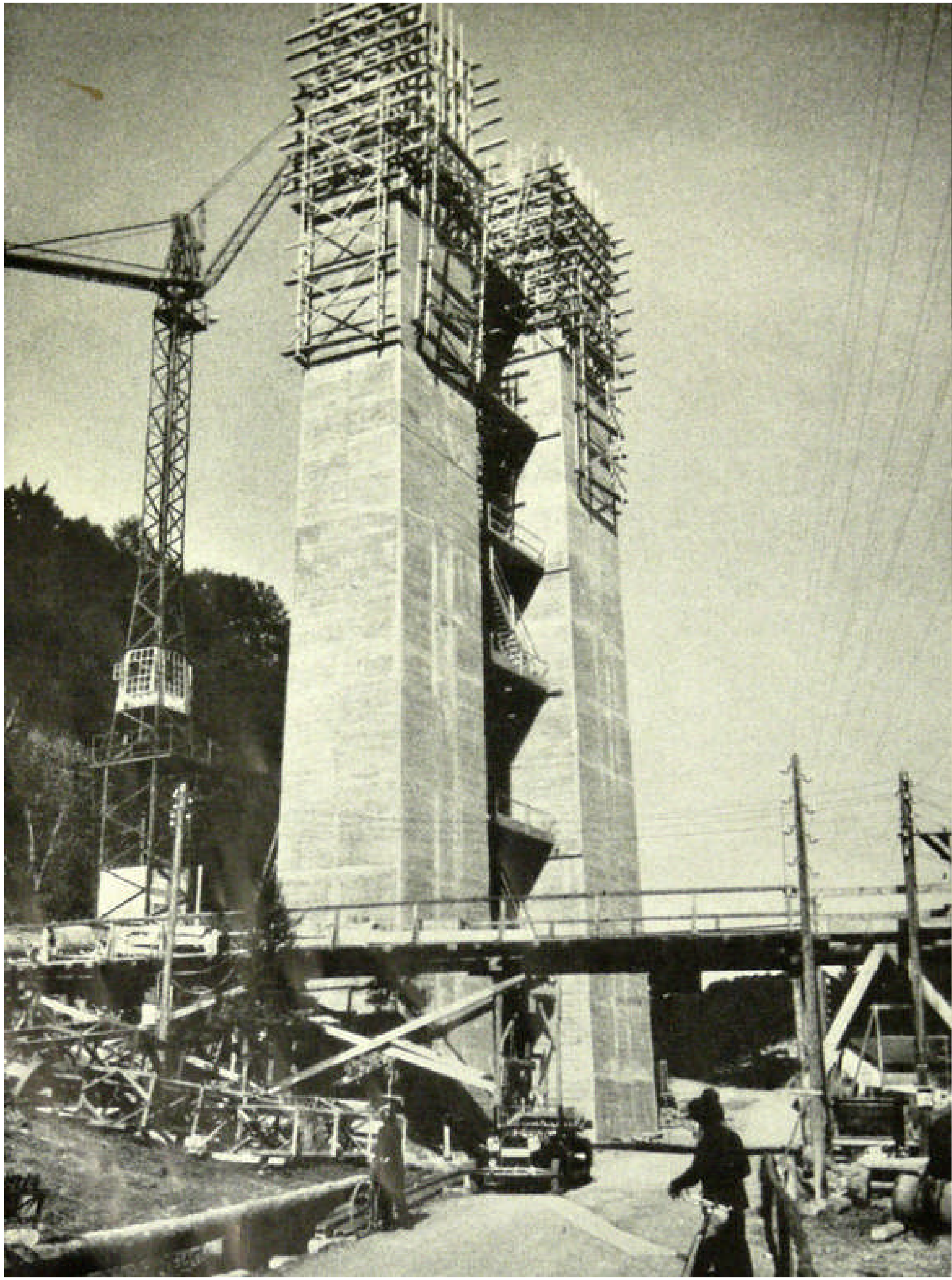
(Two Years of Work on German Highways)

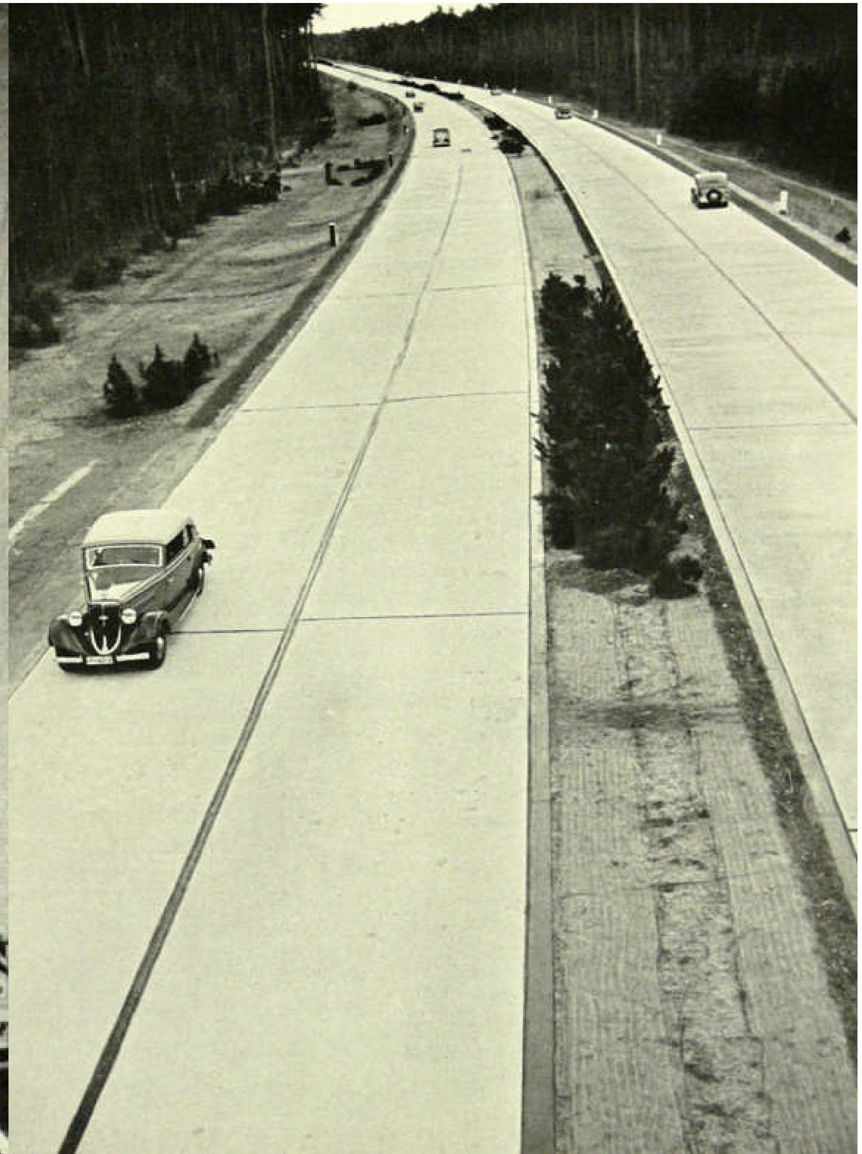


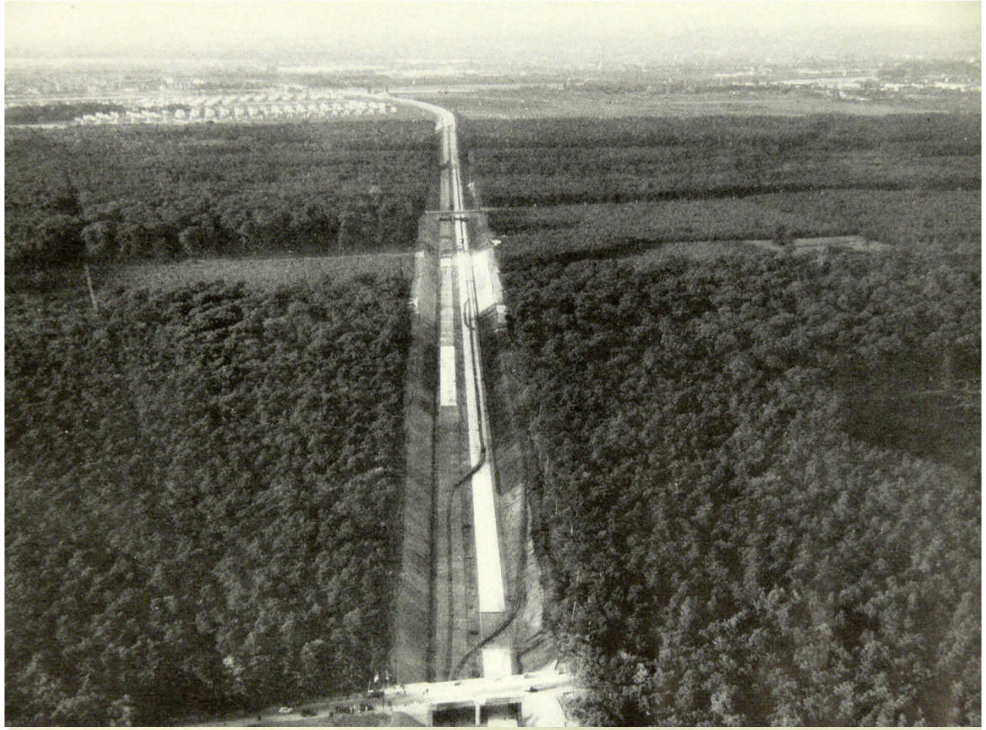


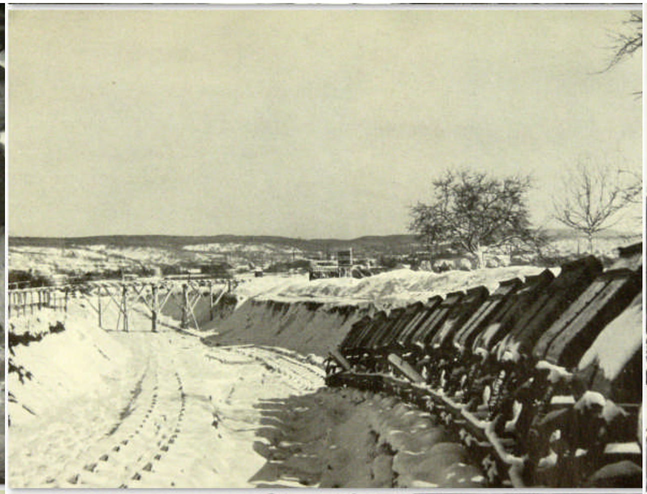
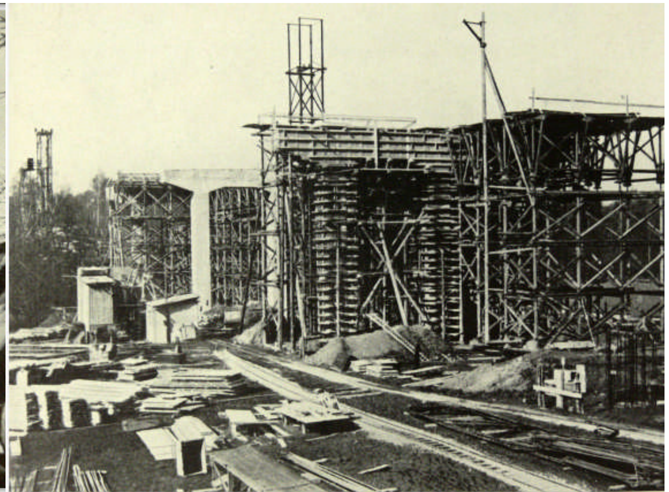
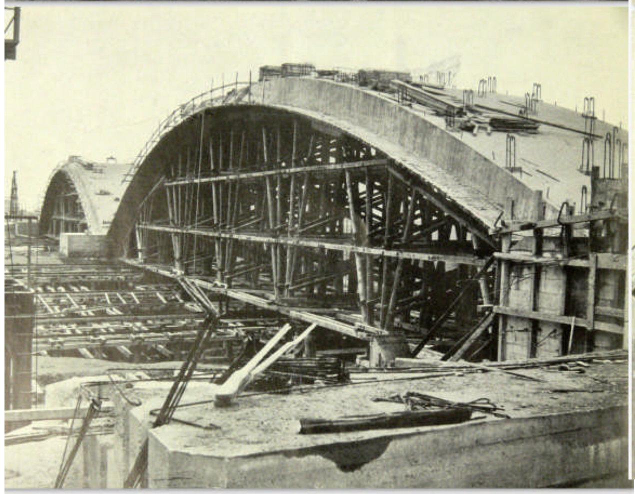


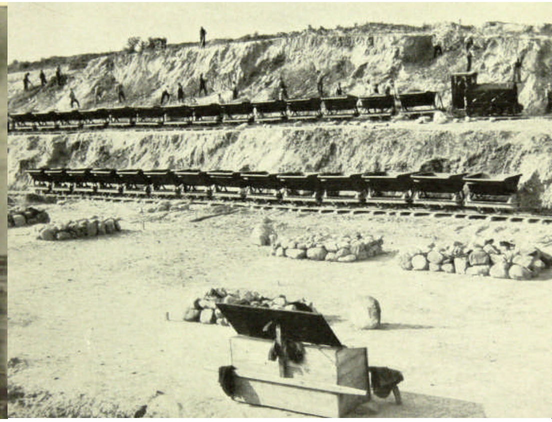
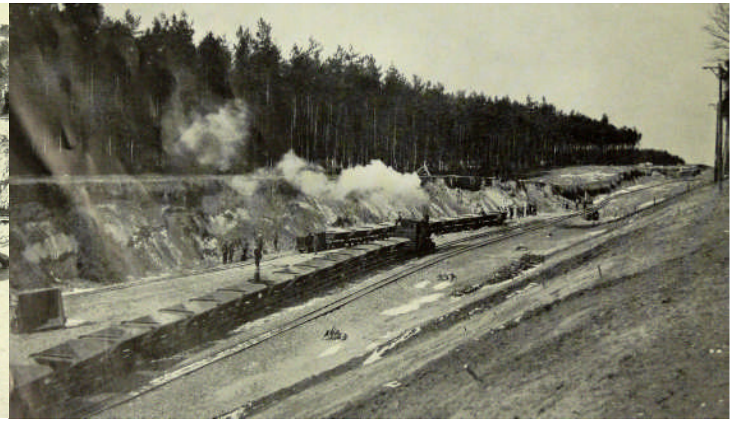


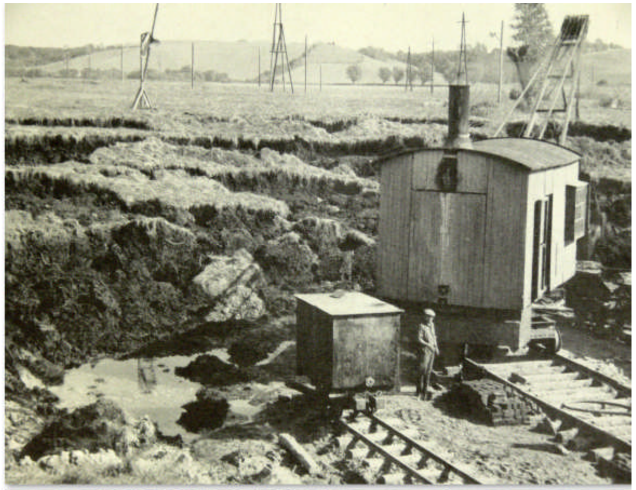


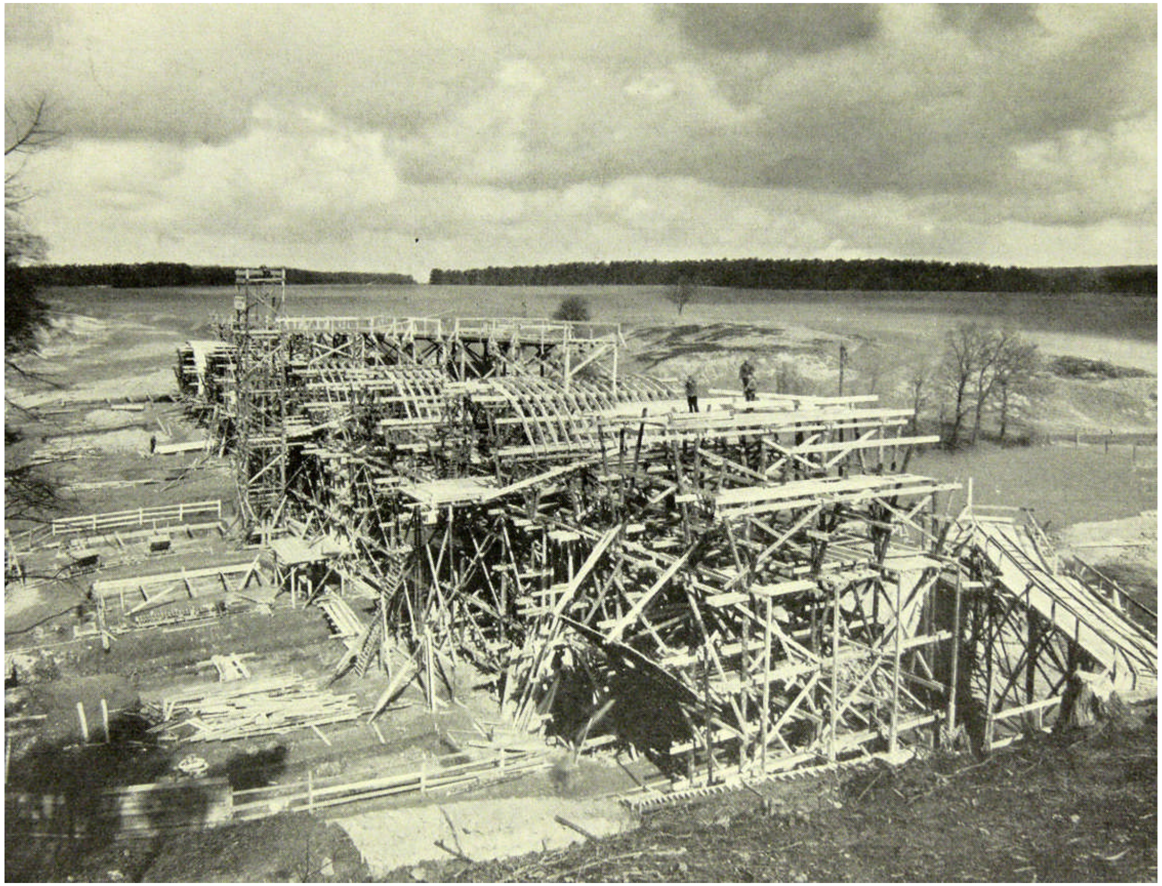


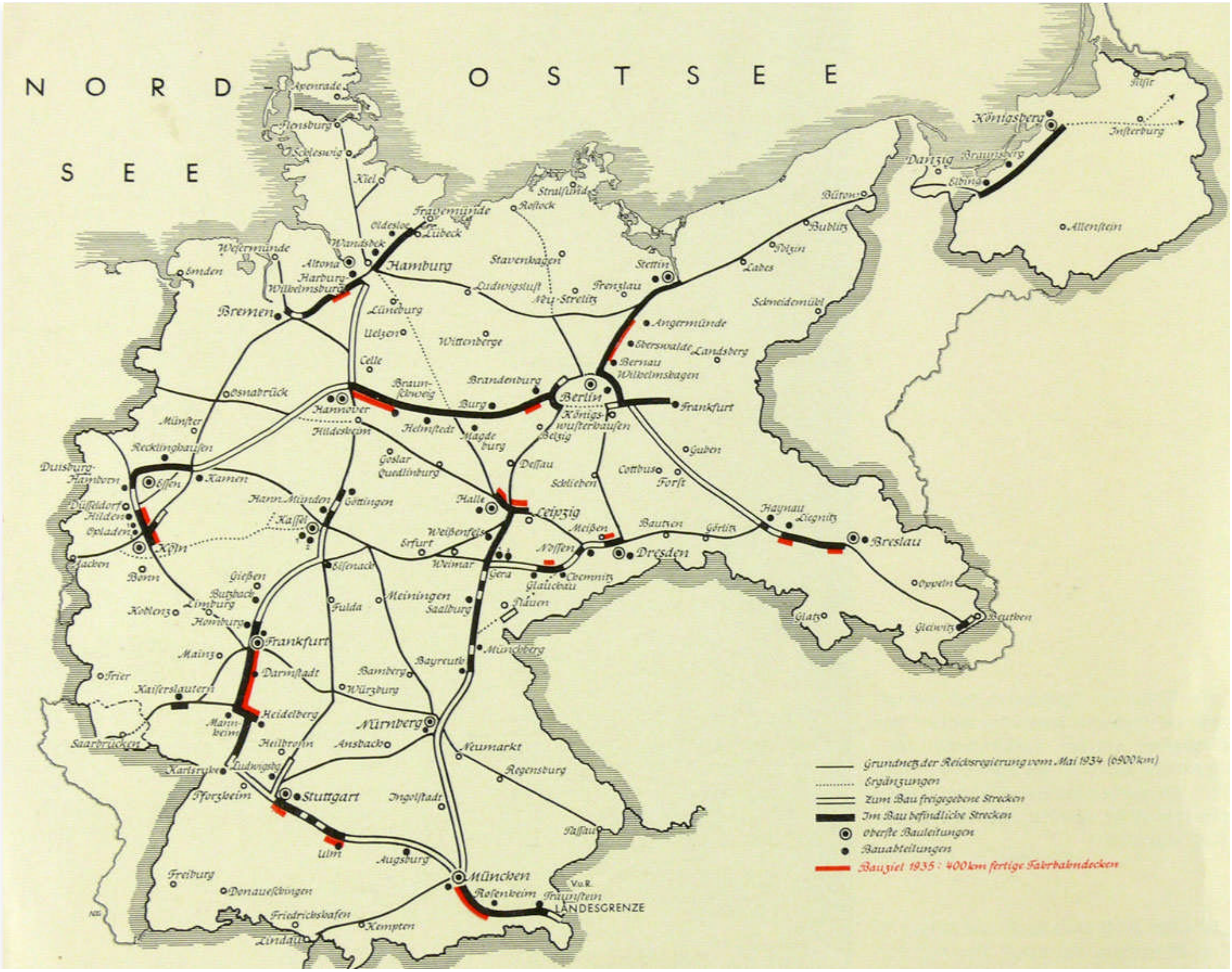


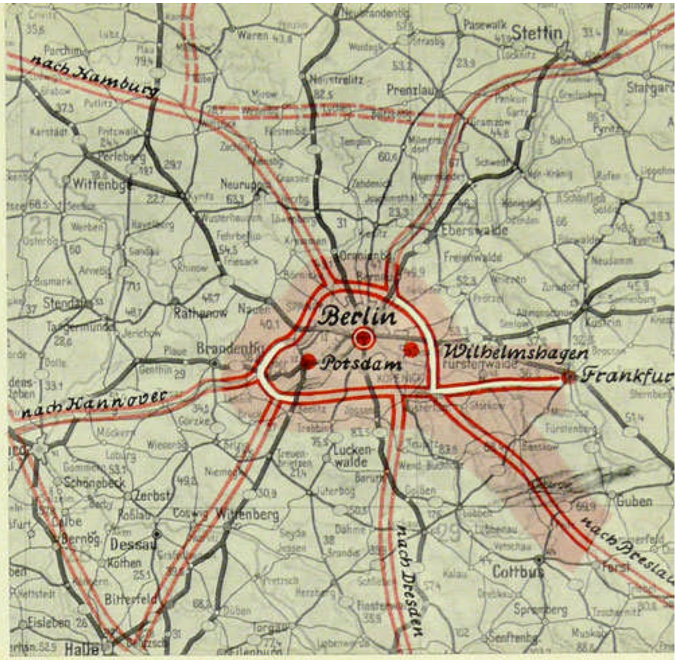





NORD-SEE
OSTSEE
Königsberg
Danzig
Hamburg
Lübeck
Bremen
Stettin
Berlin
Frankfurt
Hannover
Braunschweig
Magdeburg
Halle
Leipzig
Dresden
Breslau
Essen
Köln
Kassel
Frankfurt
Heidelberg
Mannheim
Nürnberg
Stuttgart
Ulm
Augsburg
München
Rosenheim
LANDESGRENZE
Grundnetz der Reichsregierung vom Mai 1934 (6900 km)
Ergänzungen
Zum Bau freigegebene Strecken
Im Bau befindliche Strecken
oberste Bauleitungen
Bauabteilungen
Bauziel 1935: 400 km fertige Fahrbahndecken

Oberste Bauleitung Berlin

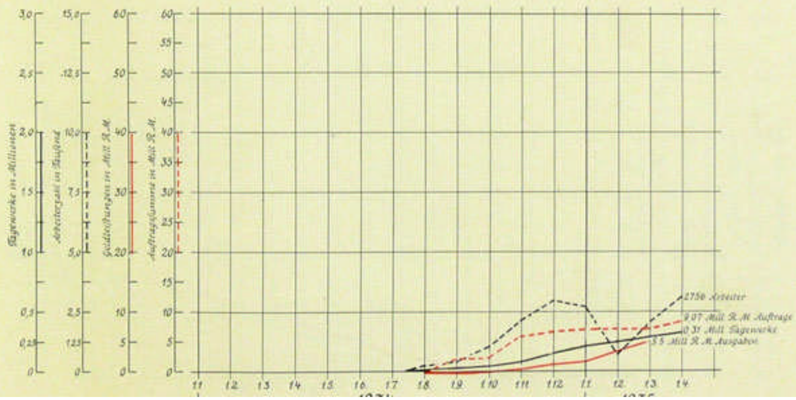
Leiter: Stadtoberbaurat Usinger
Bauabteilungen in:
Wilhelmshagen — Potsdam — Frankfurt (Oder)
Beamte und Angestellte: 223
Errichtet: 15. Juli 1934



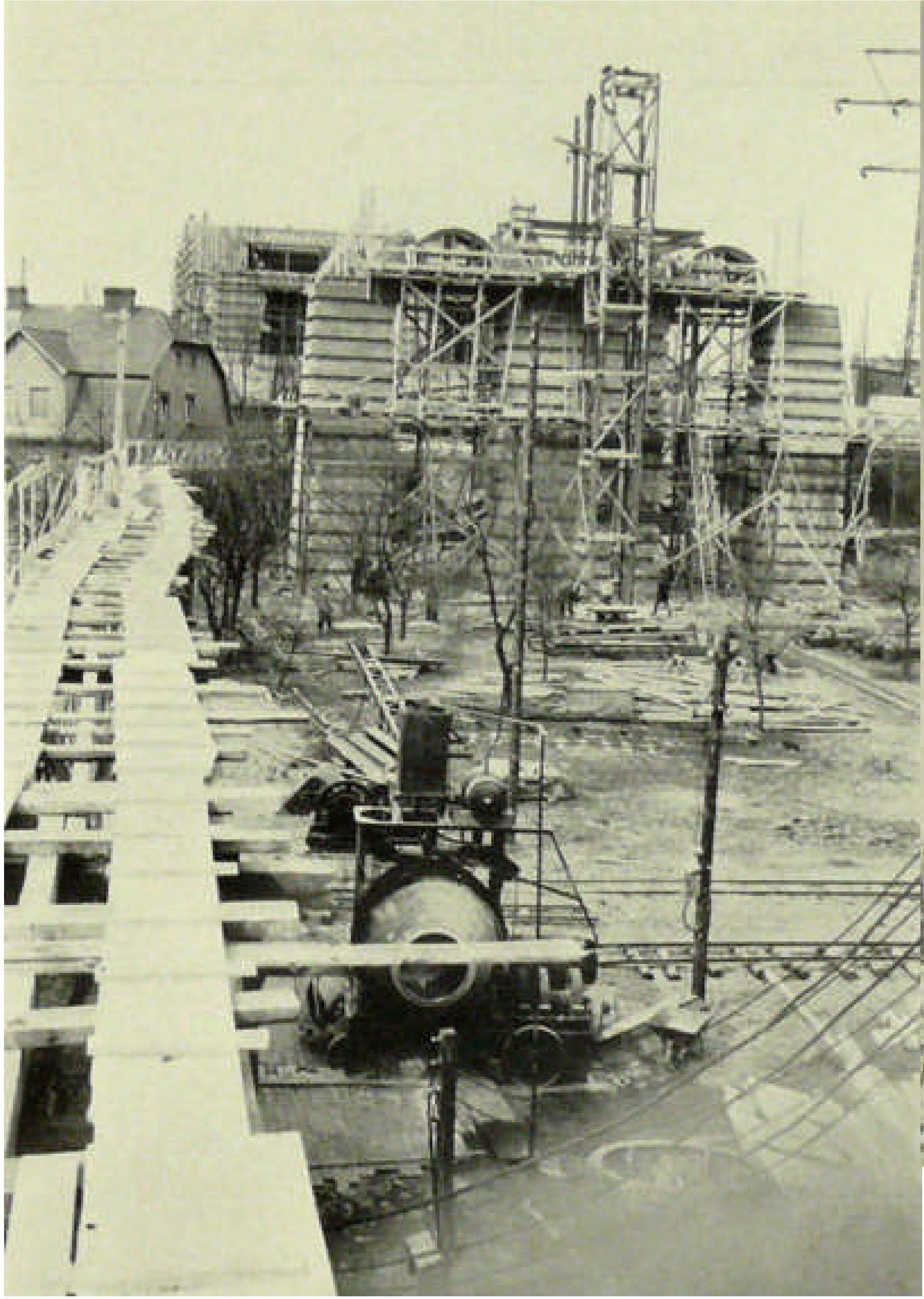
Derzeitiger Arbeitsbereich der OBK
Grundnetz
Ergänzungen
Im Bau
Oberste Bauleitung
Bauabteilung

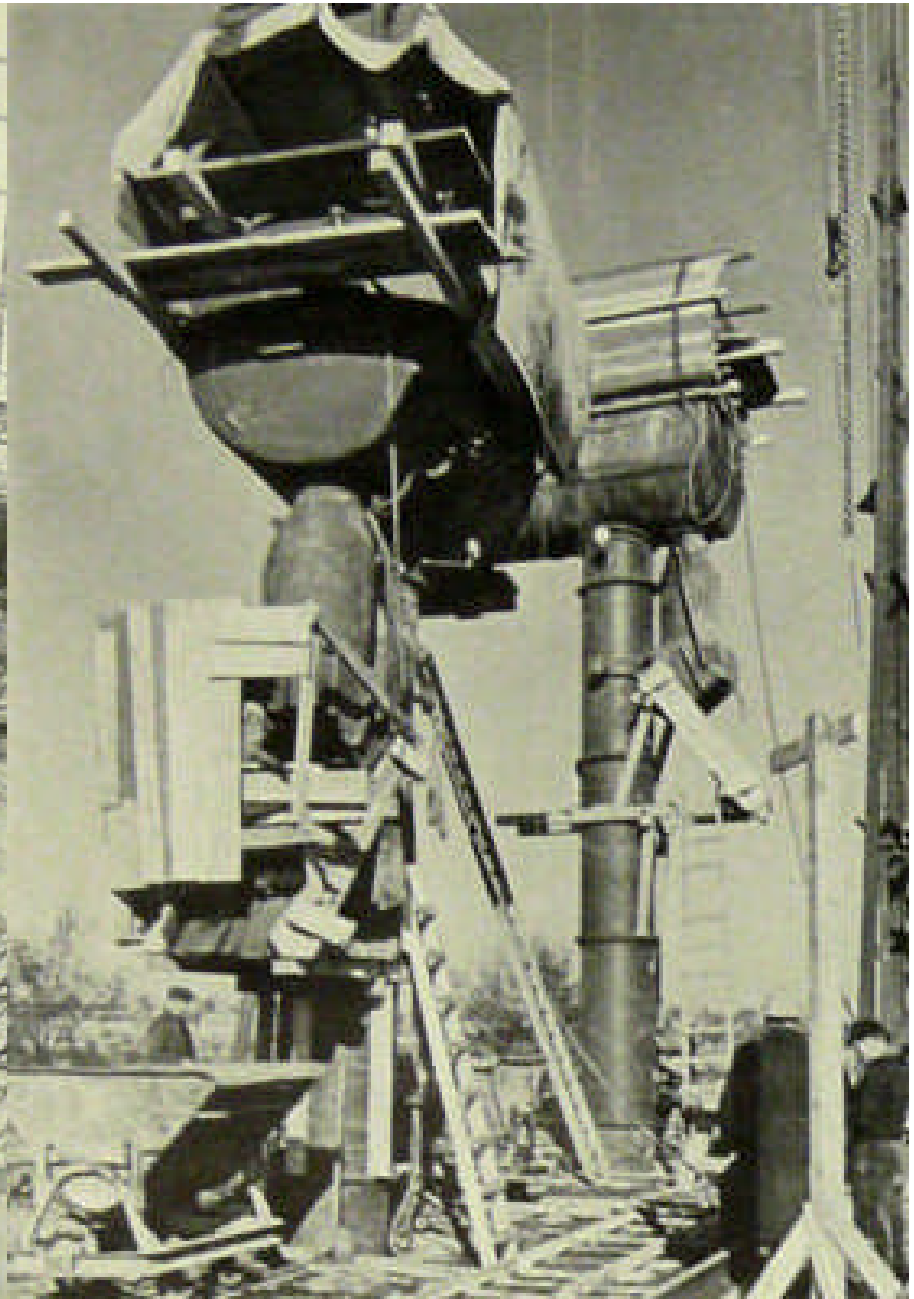
Unterlage: Ausschnitt aus der Continental-Autokarte: Deutschland 1:1 50

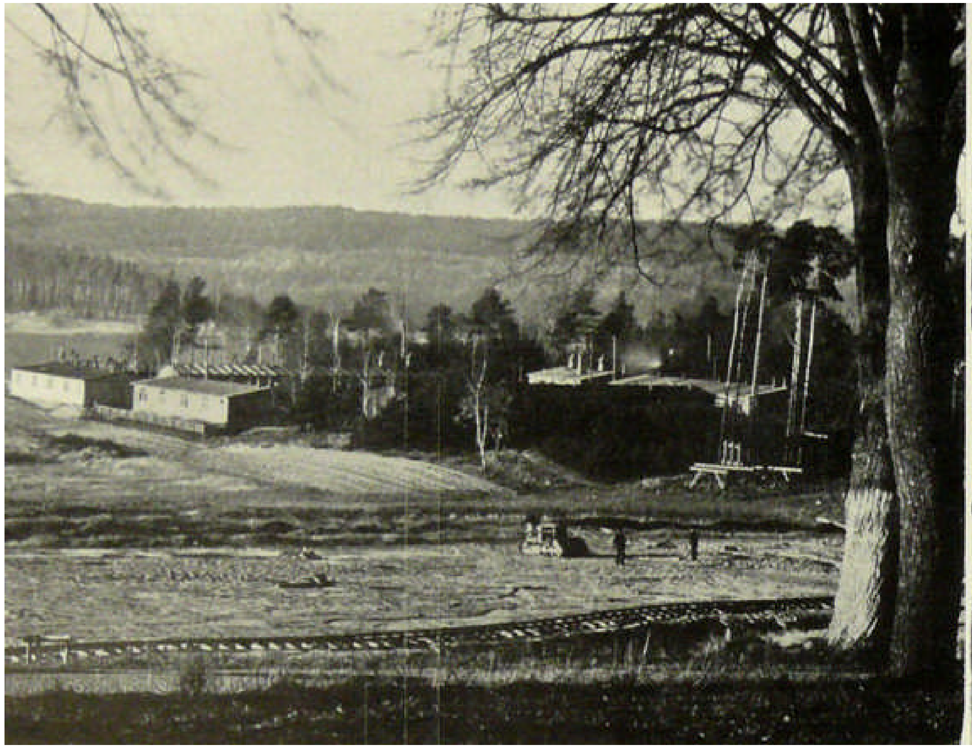
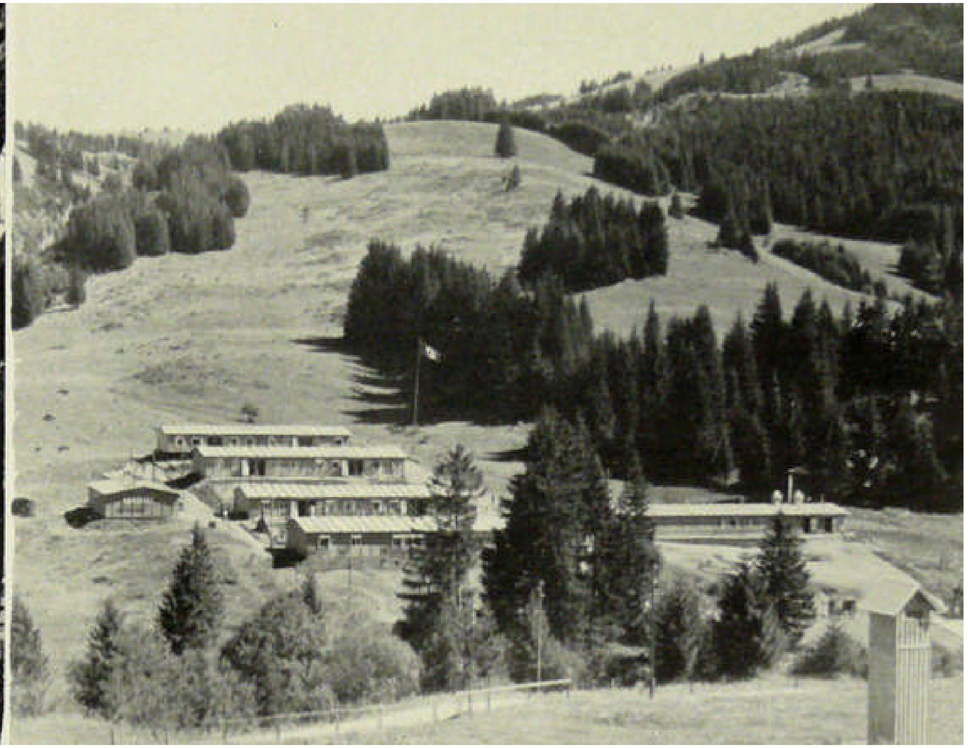
Leistungsbericht

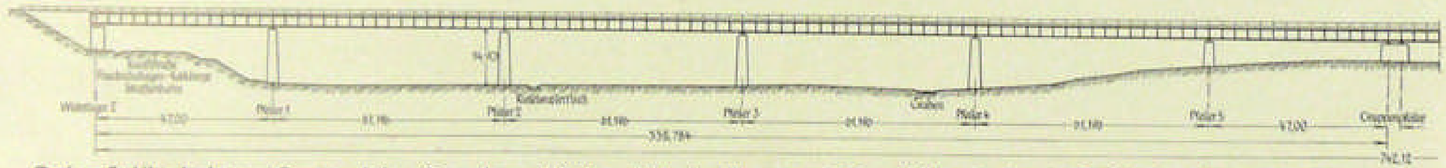


(Three Years of Work on German Highways)





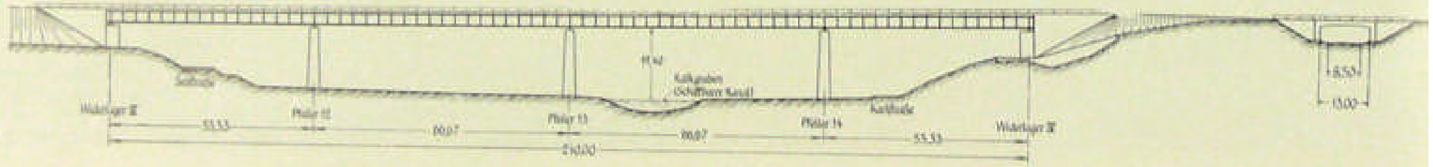



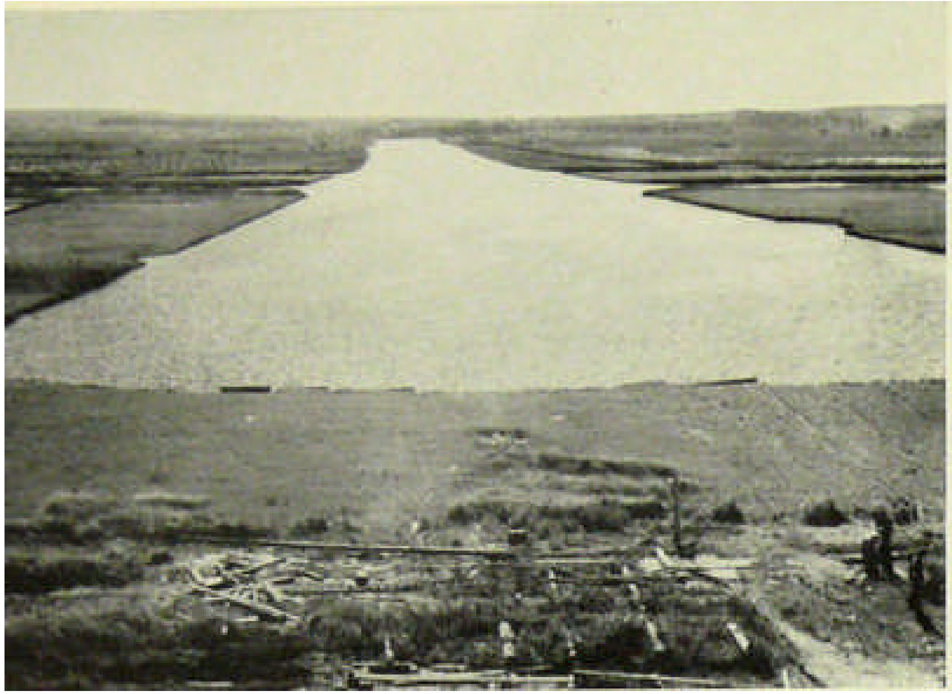


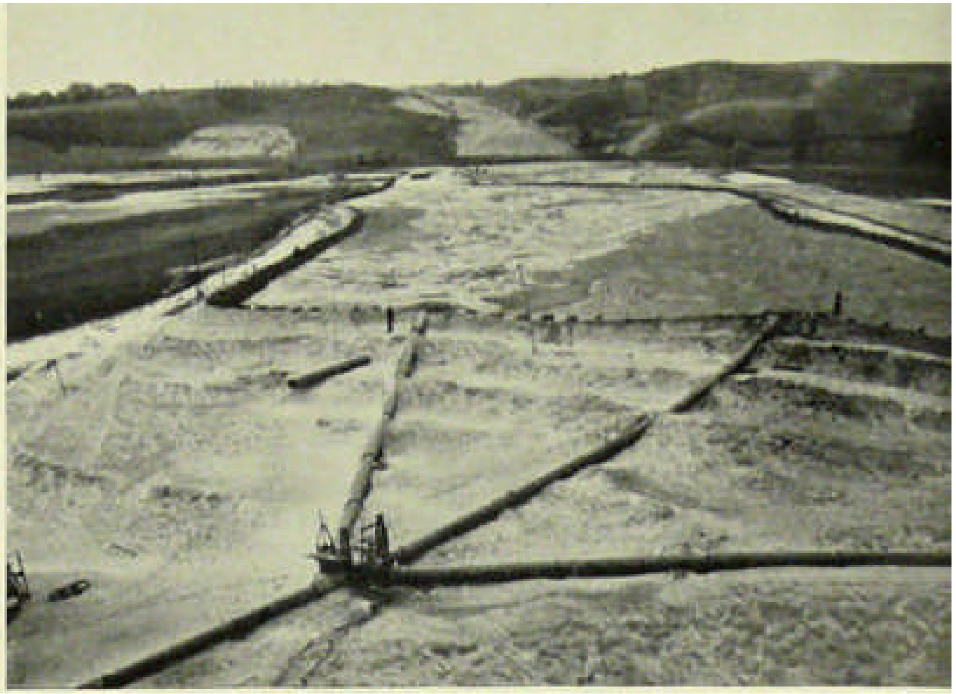
Größere Stahlbrücke bis zum Gruppenpfeiler. Gesamtlänge 742,12 m. Höhe der Hauptträger 2,80 m. Pfeilerstärke bei den Stahlbrücken oben 7,20 m, Pfeileranzug 35:1

Kleinere Stahlbrücke. Gesamtlänge 240,00 m. Höhe der Hauptträger 3,00 m

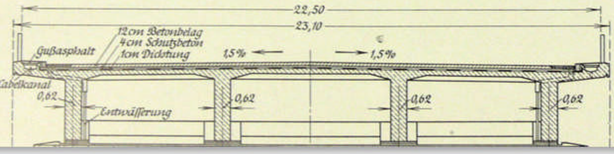
Eisenbetonbauwerk



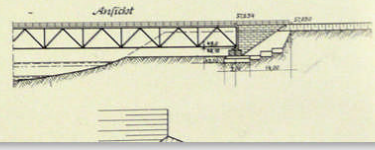


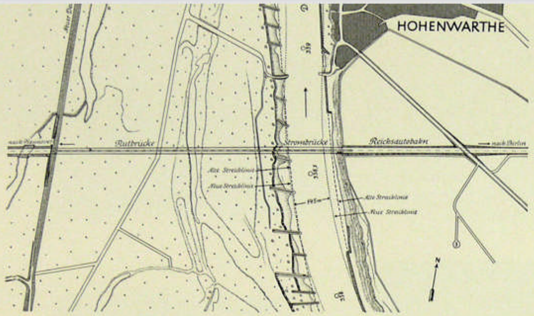


Schnitt durch die Eisenbetonüberbrückung der Flutöffnungen mit Ansicht eines Pfeilers



Anordnung des östlichen Endwiderlagers



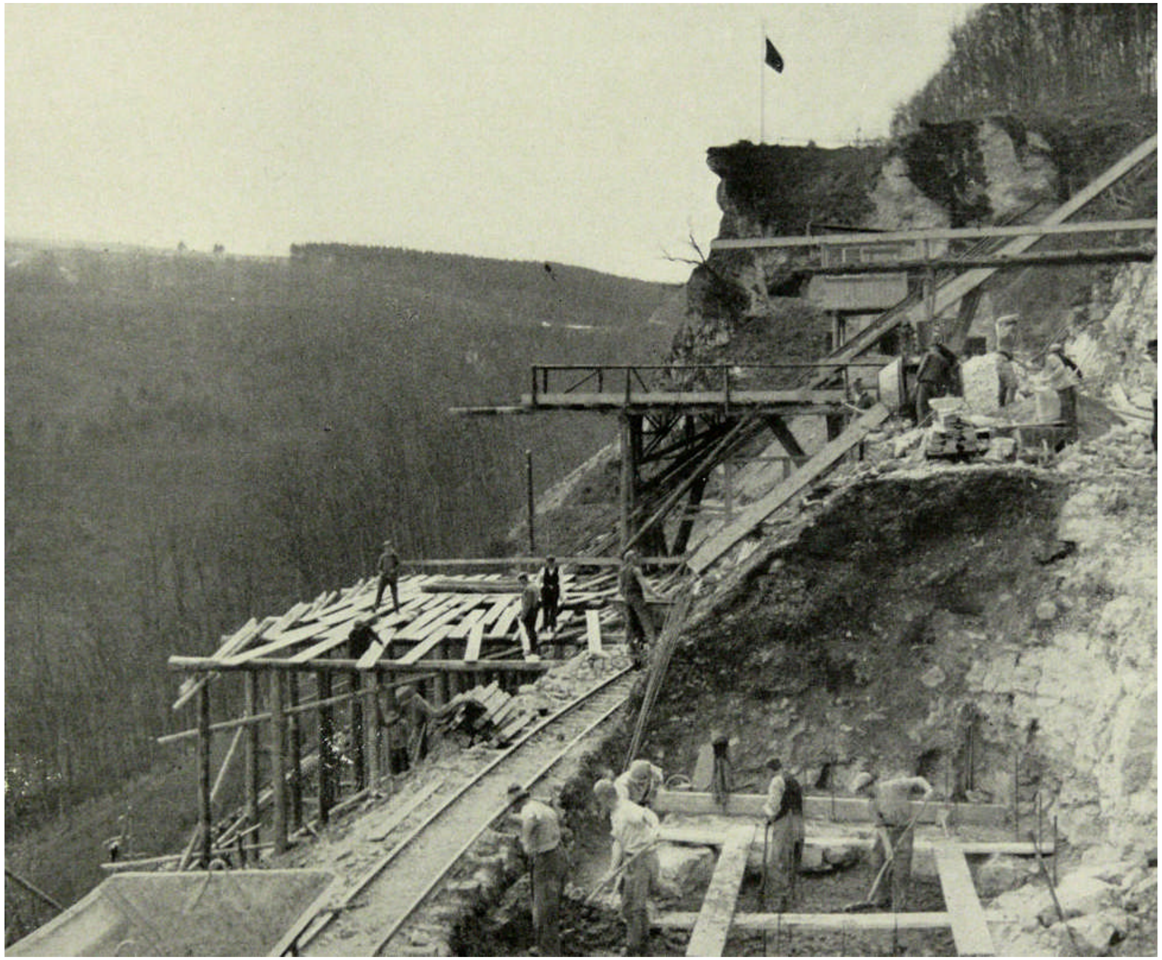


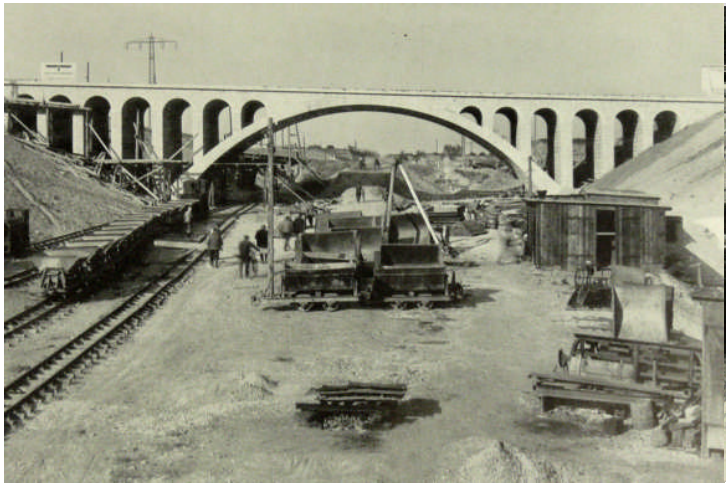
Lageplan der Elbebrücke

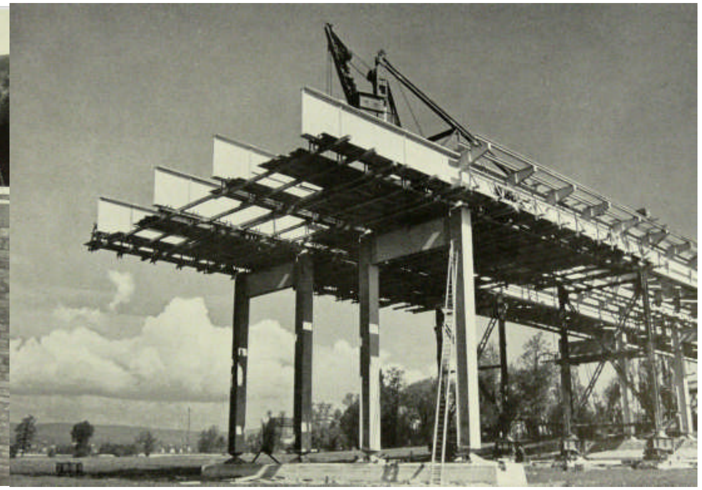
Der Bau der Elbebrücke bei Hohenwarthe erforderte:
an Stahlkonstruktion rund 4200 t
an Beton des Grundmauerwerks rund 12 042 m³
an eisernen Spundbohlen rund 1326 t
an Eisenbeton der Pfeiler rund 12 036 m³
an Eisenbeton der Fahrbahn rund 14 410 m³

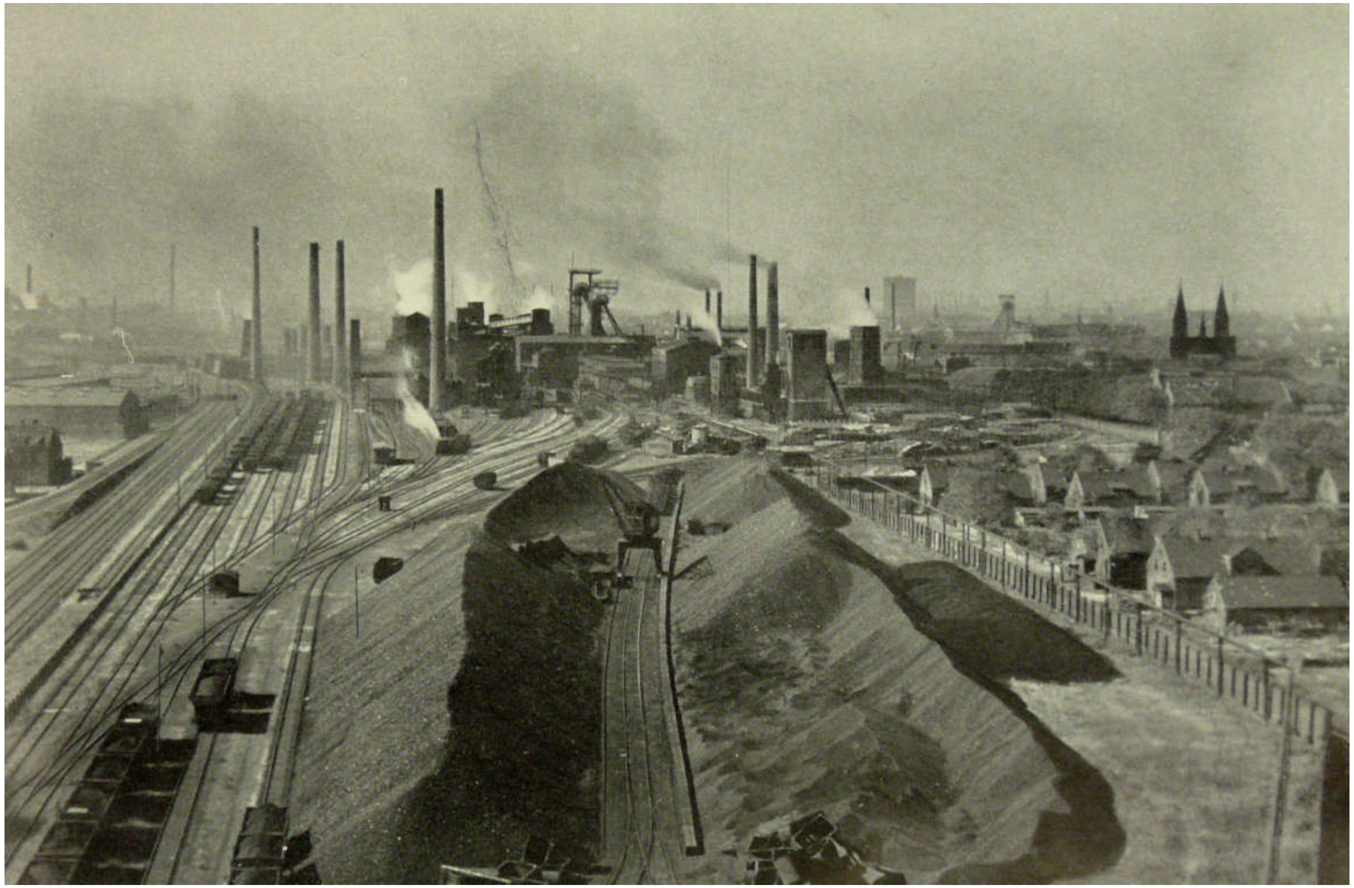
Blick über die Pfeiler der Flutbrücke. Baustelle im Frühjahr 1936

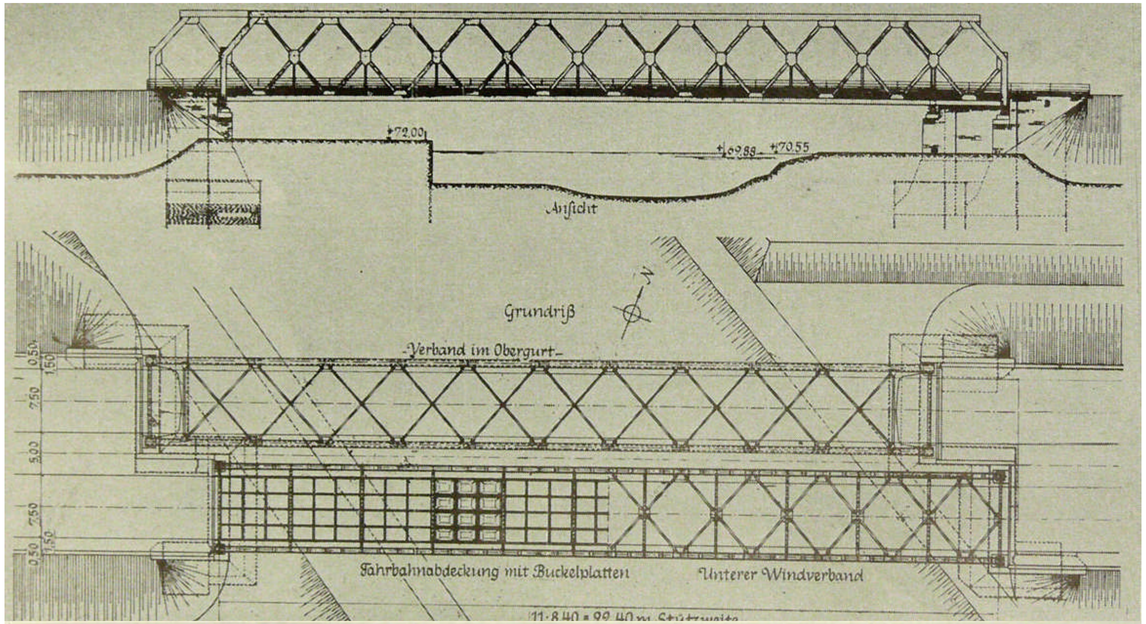


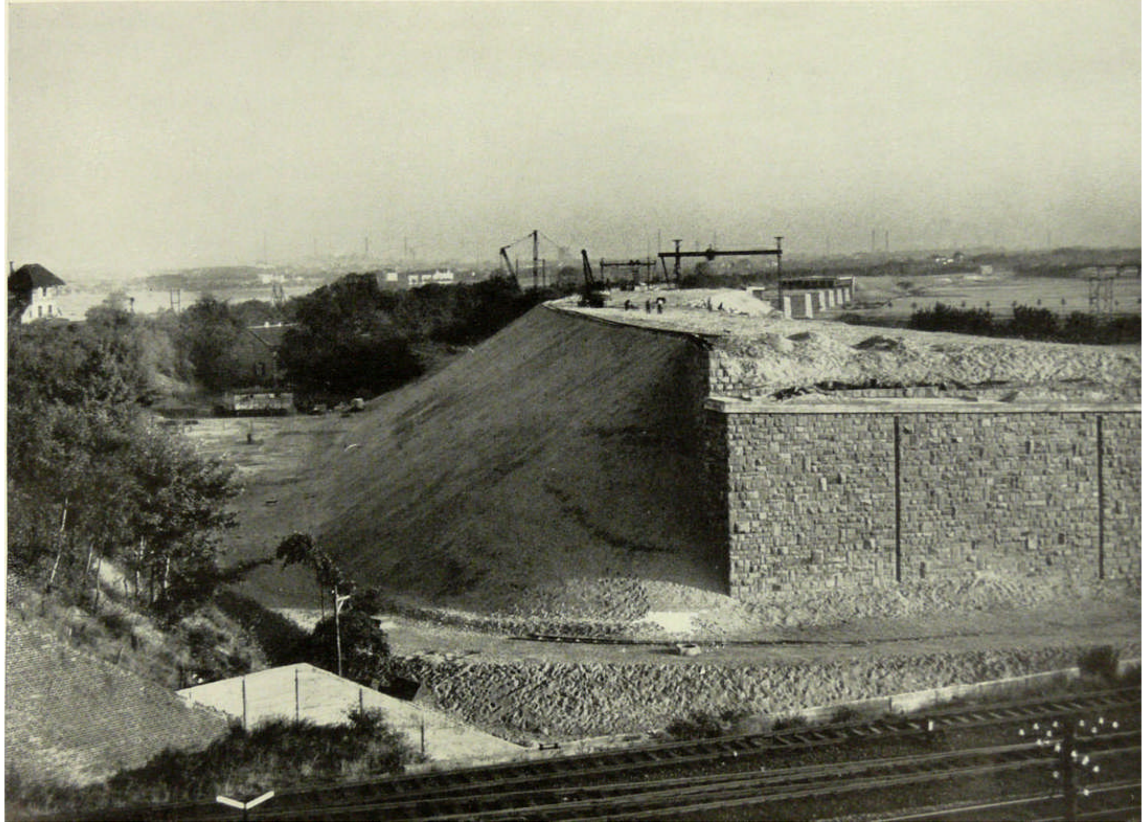


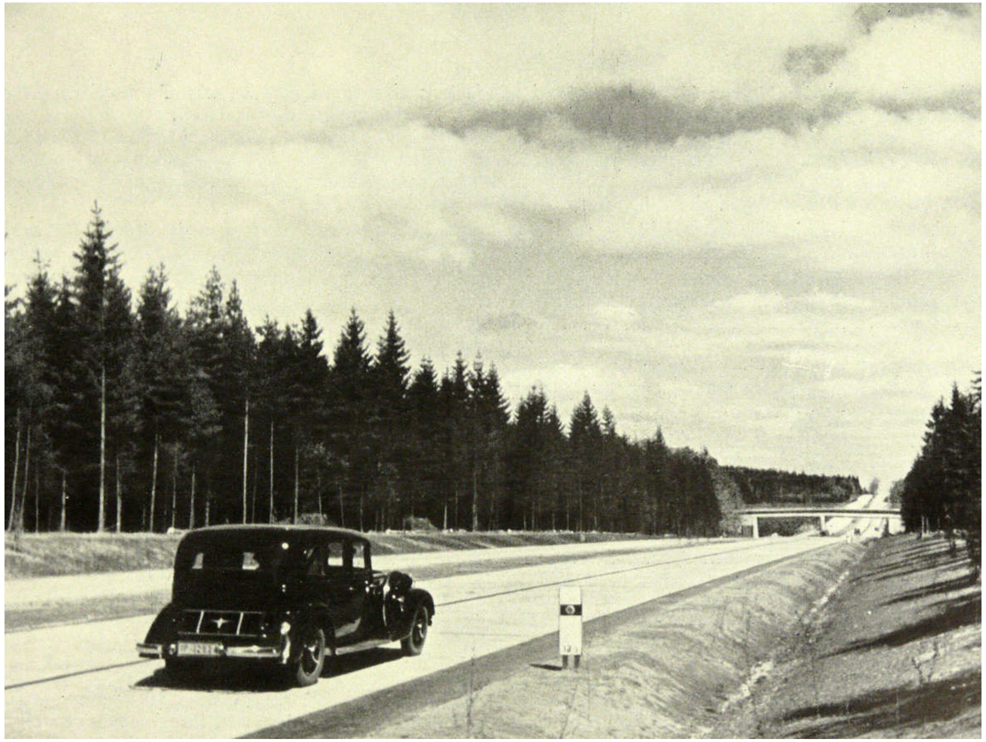




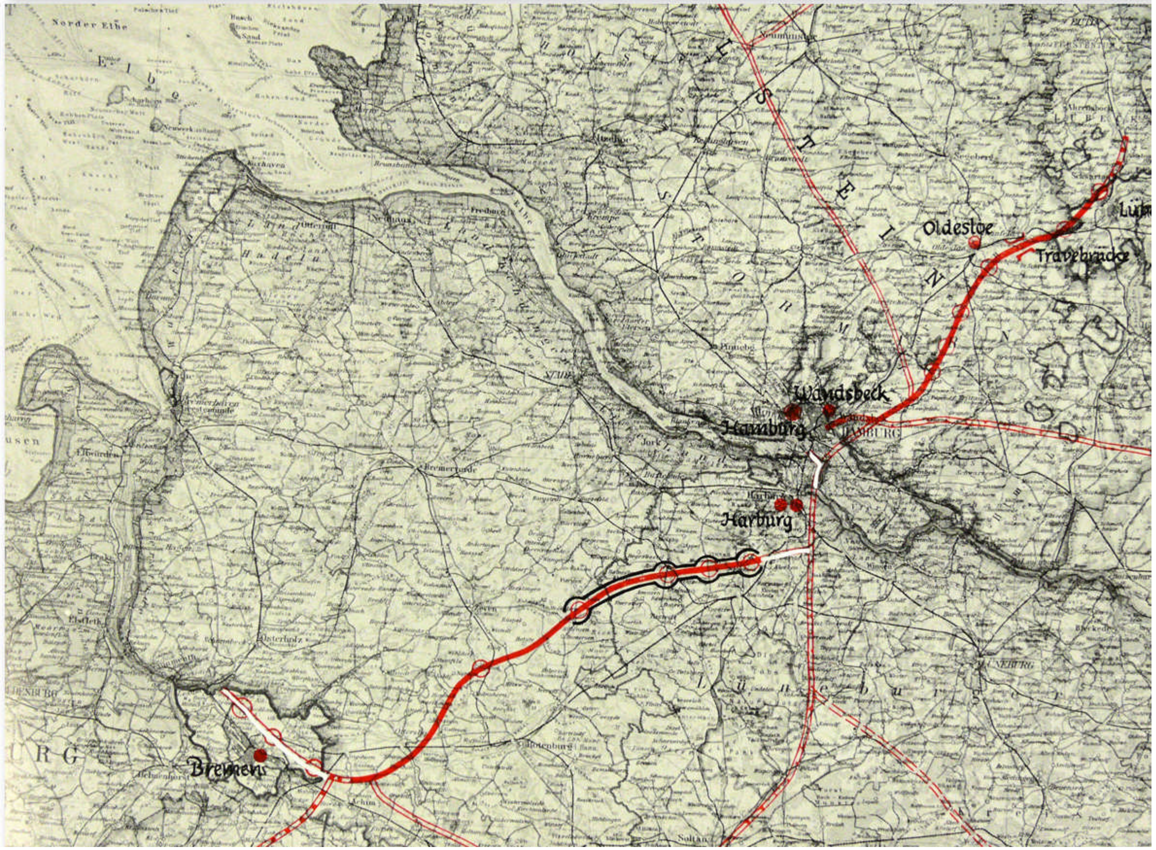



+72,00
+69,88
+70,55
Ansicht
Grundriß
Verband im Obergurt
Fahrbahnabdeckung mit Buckelplatten
Unterer Windverband

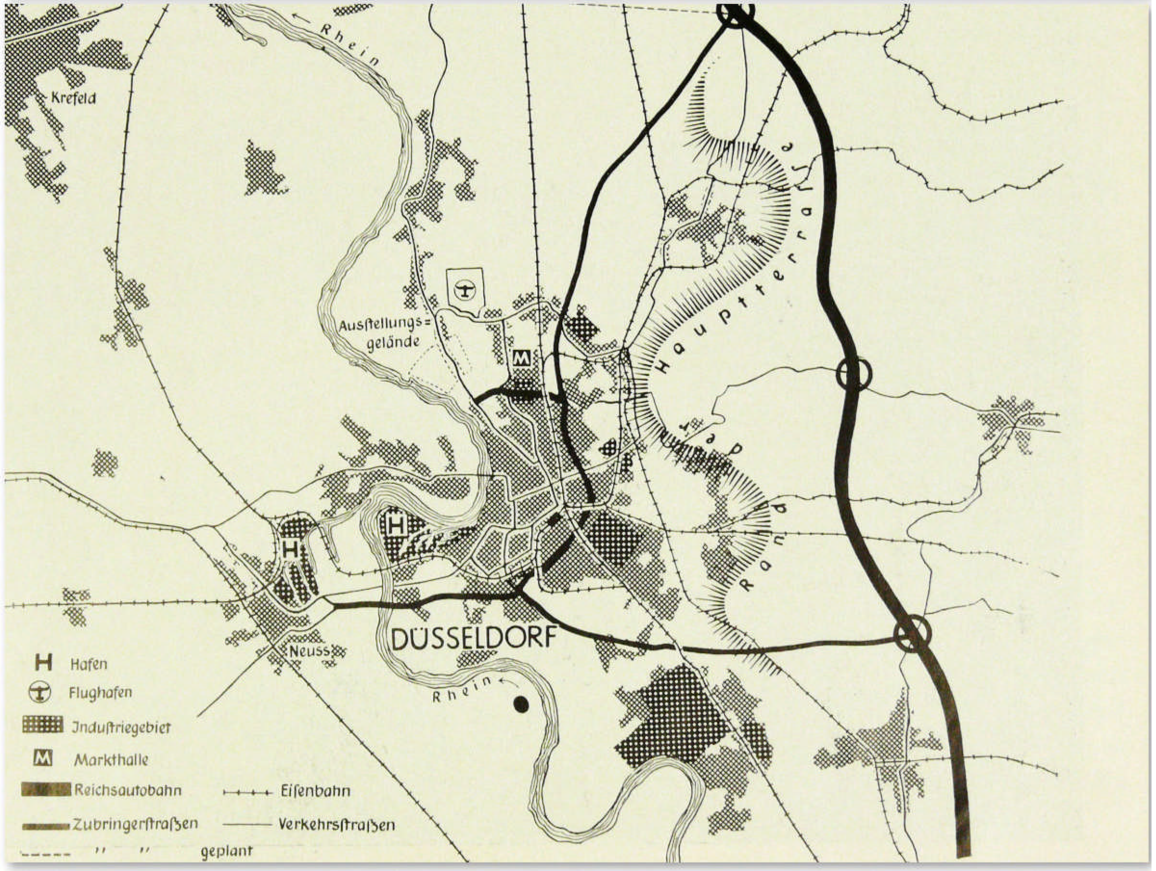




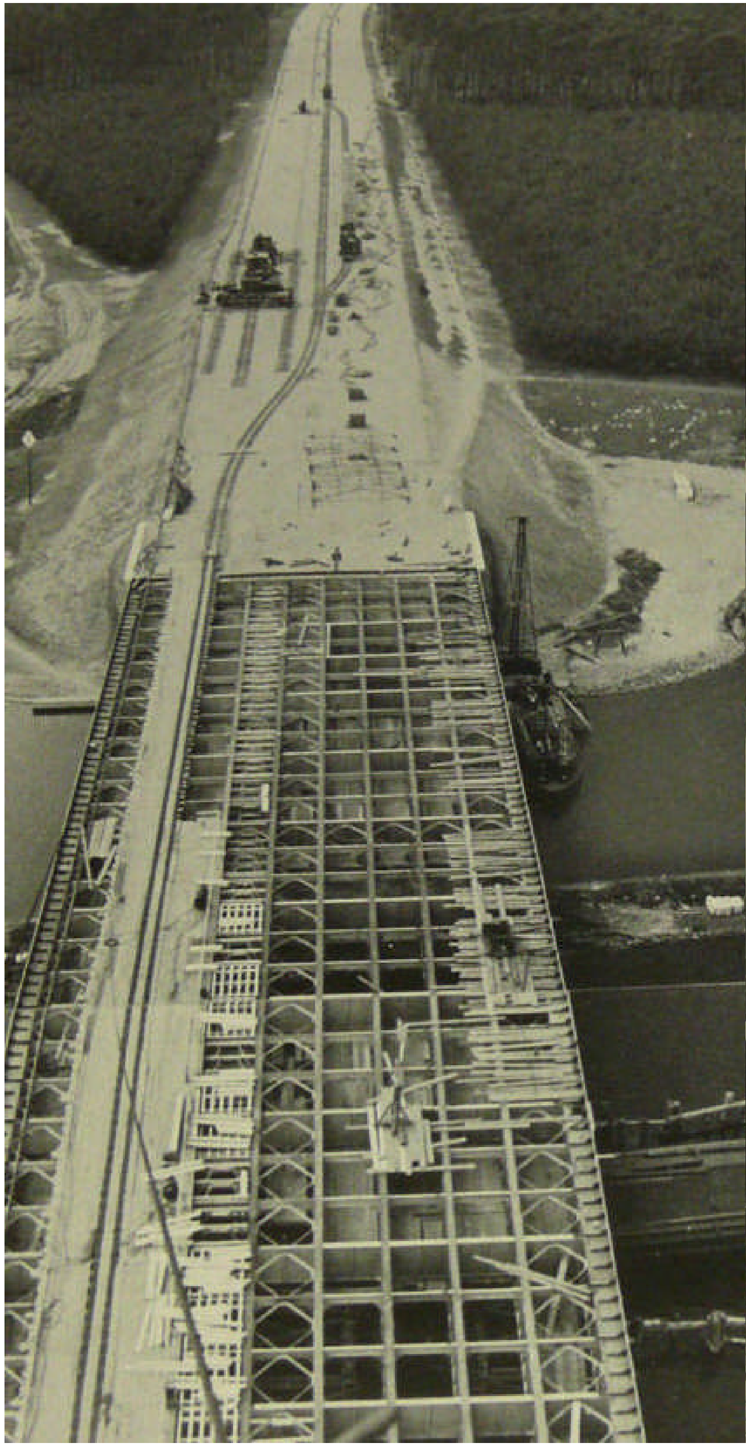
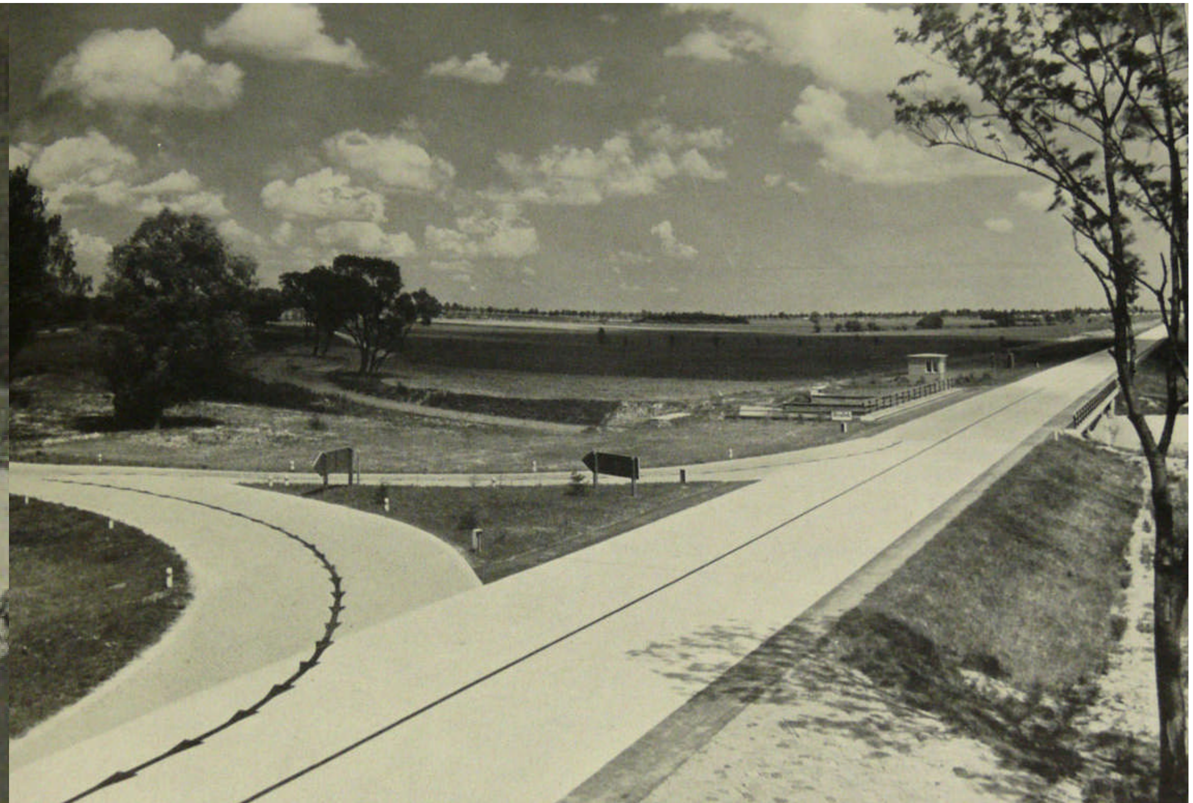
Das erste Teilstück der Reichsautobahn Berlin—Hannover wurde am 5. April 1936 durch Generalinspektor Dr. Todt zwischen Braunschweig und Lehrte eröffnet. Die erste Fahrt über die Strecke.

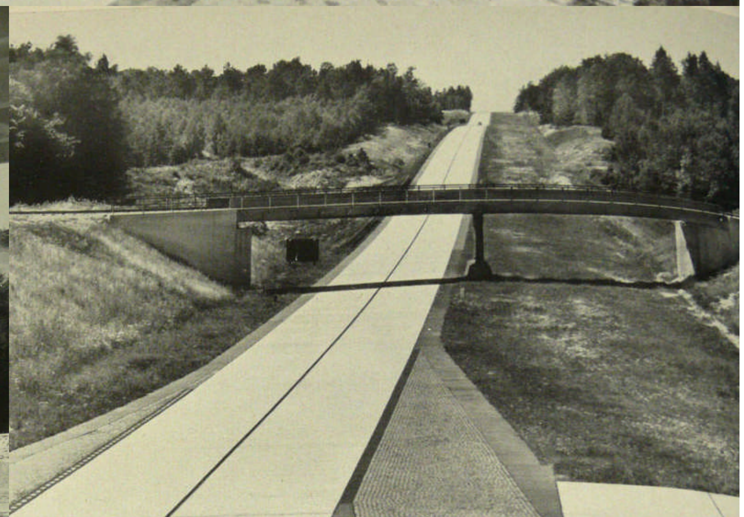


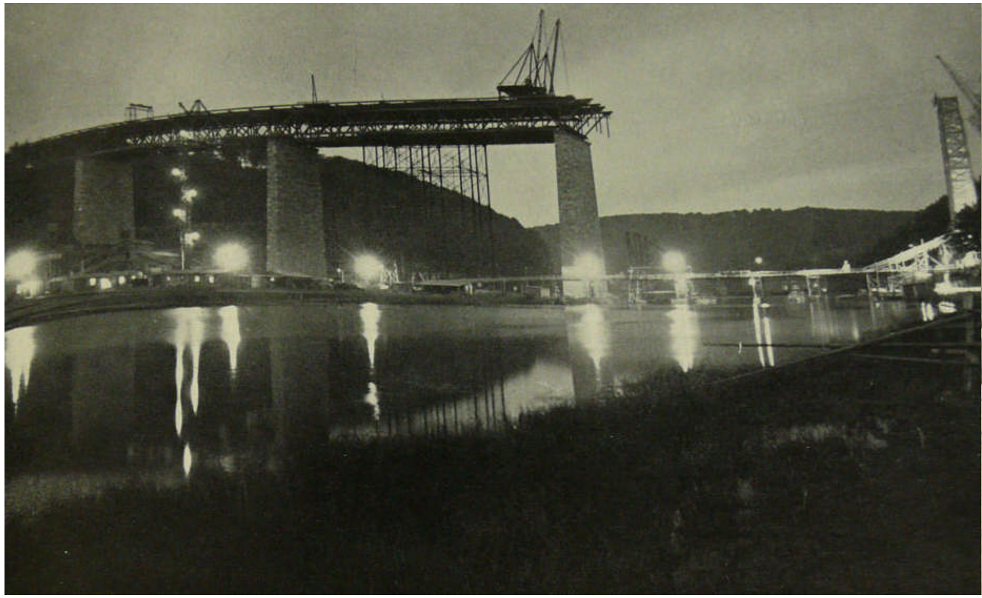
Damm der Reichsautobahn nach dem Austritt aus dem Kaiserbergeinschnitt mit Blick auf das Ruhrtal. Im Vordergrund das nördliche Widerlager der Kaiserbergbrücke

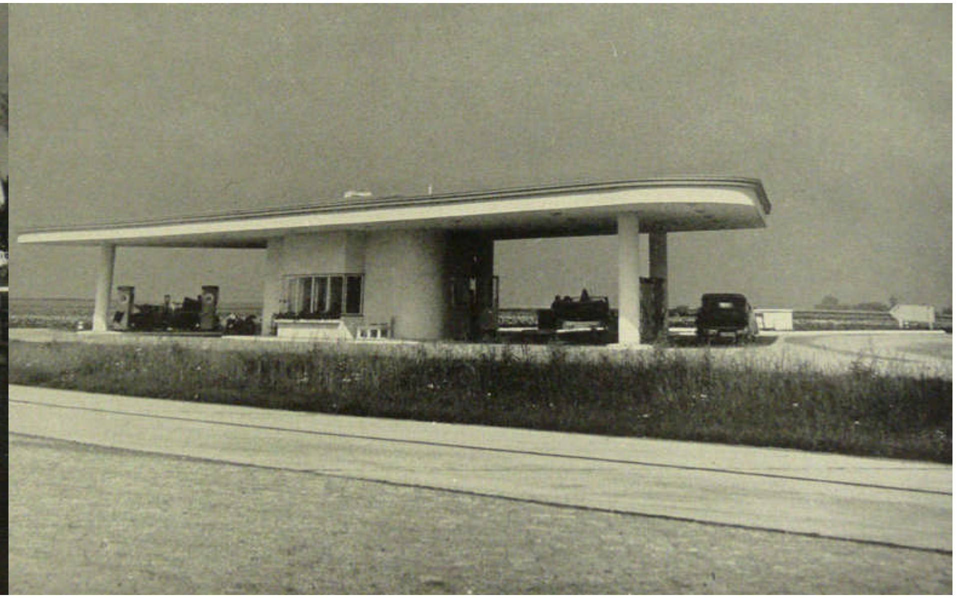


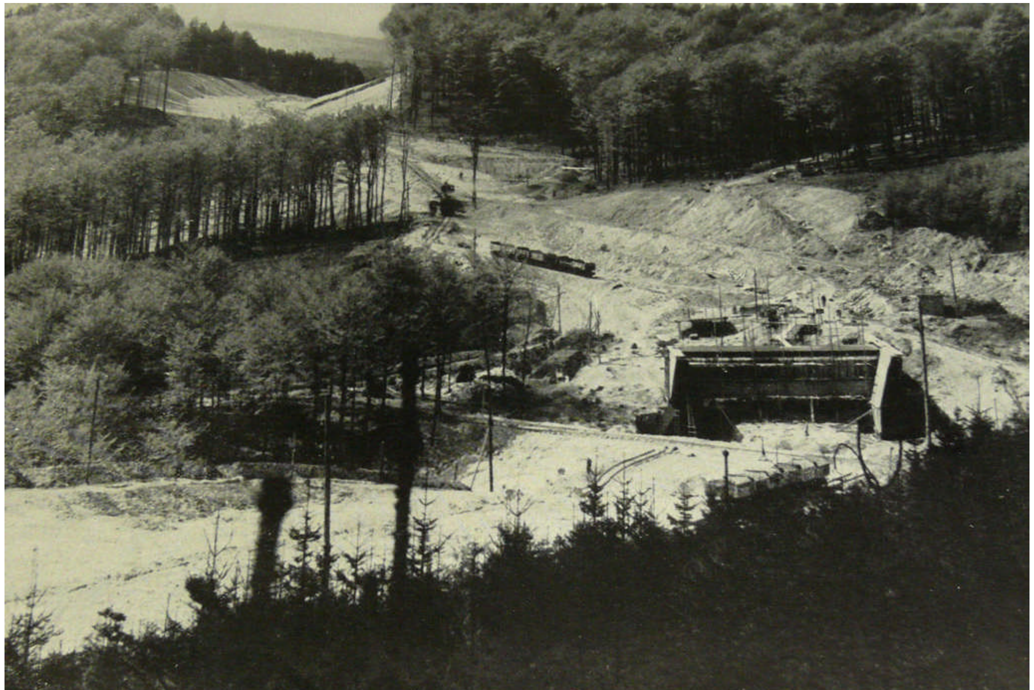
(Four Years of Work on German Highways)

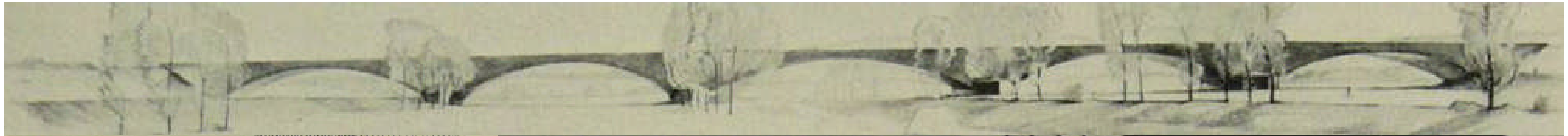



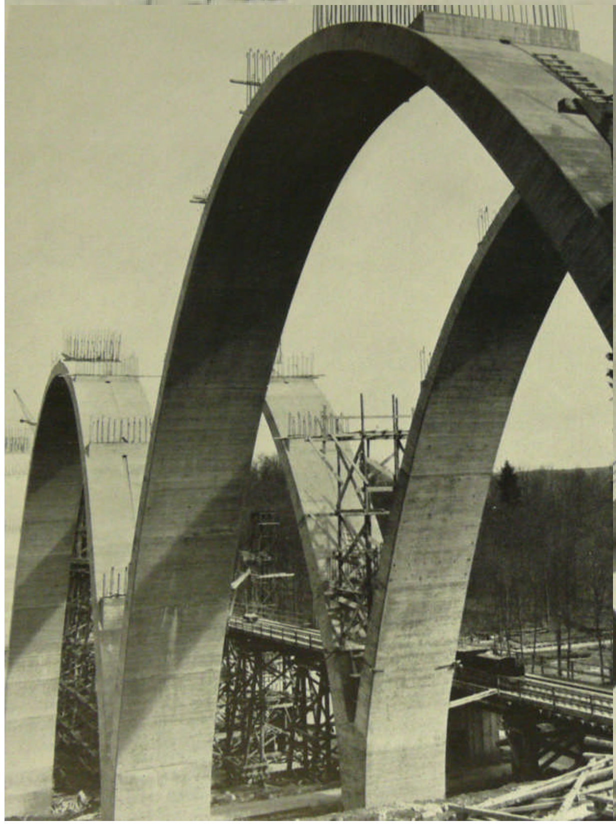


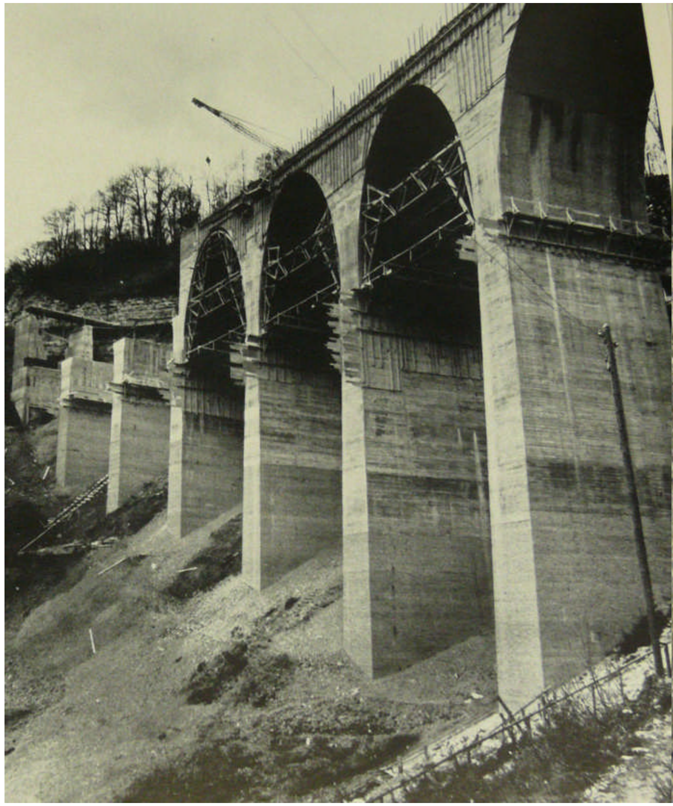
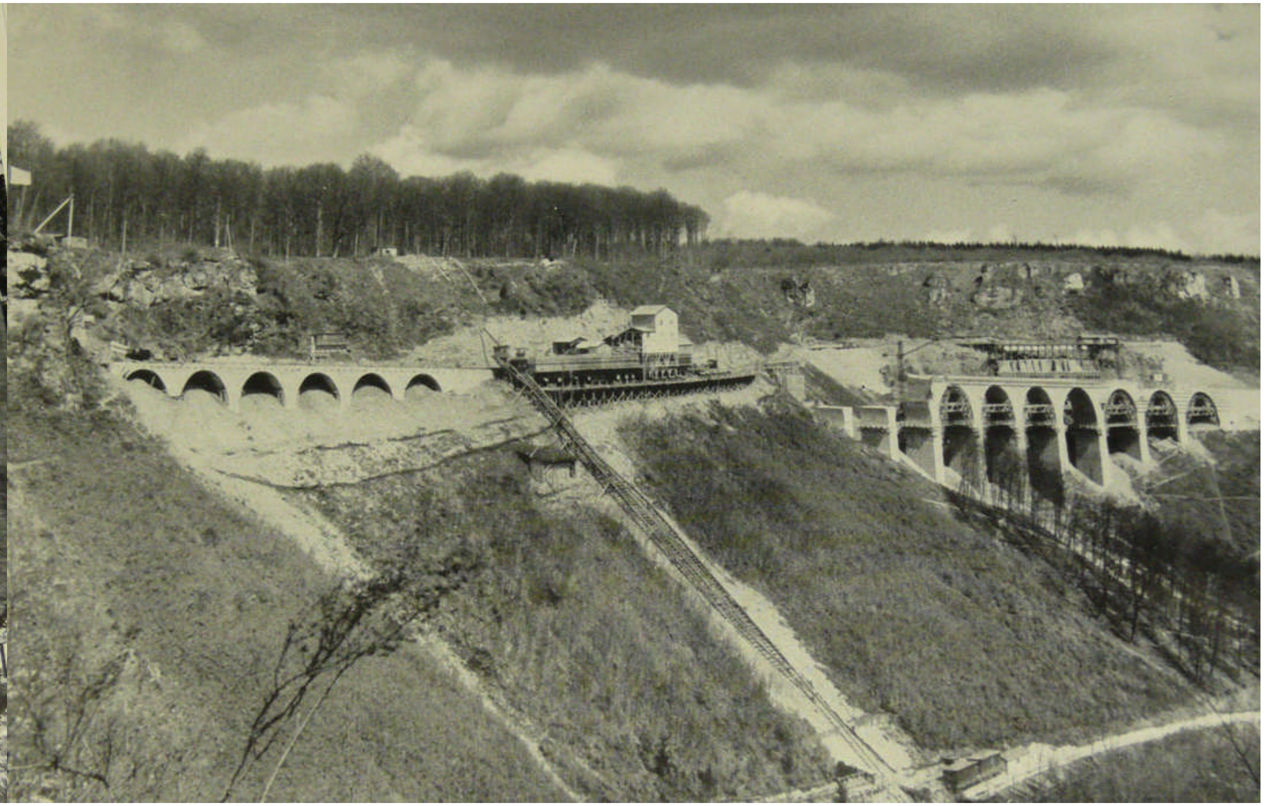


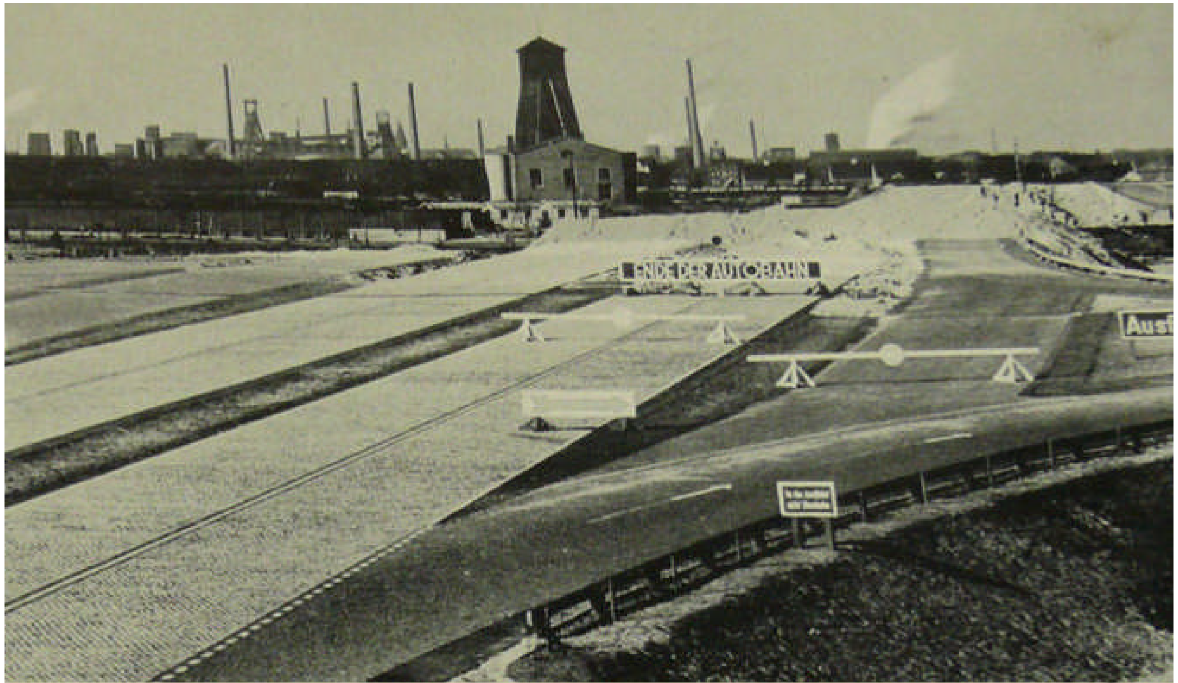


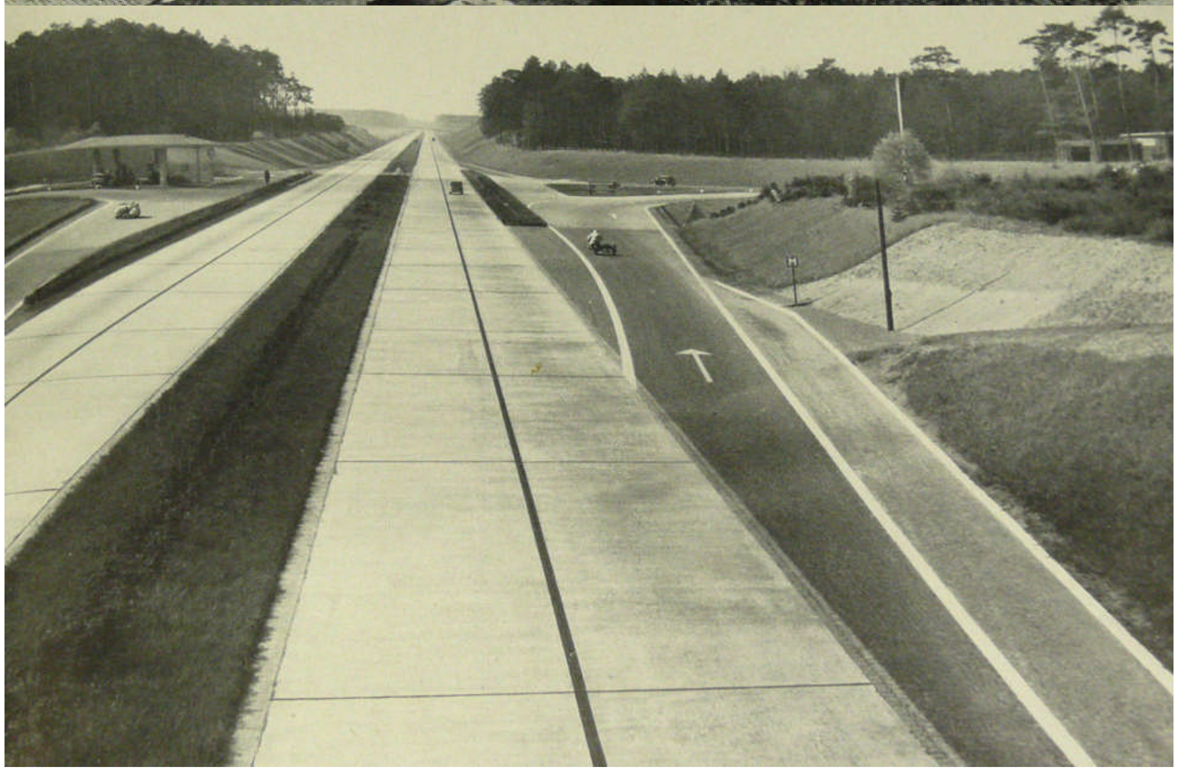




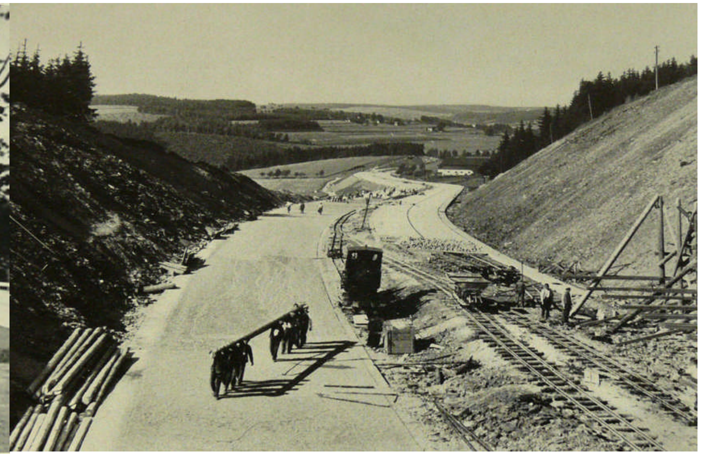


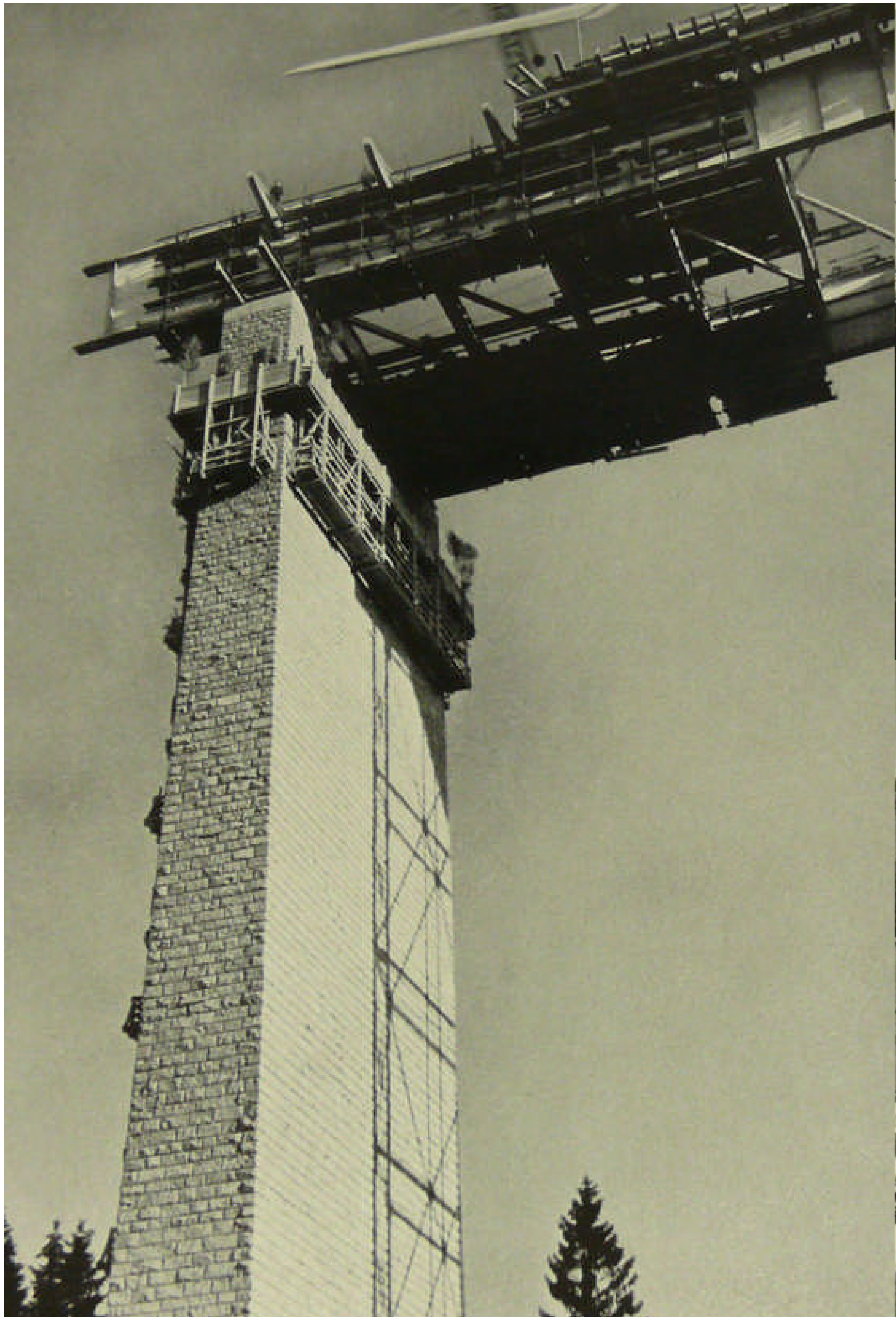



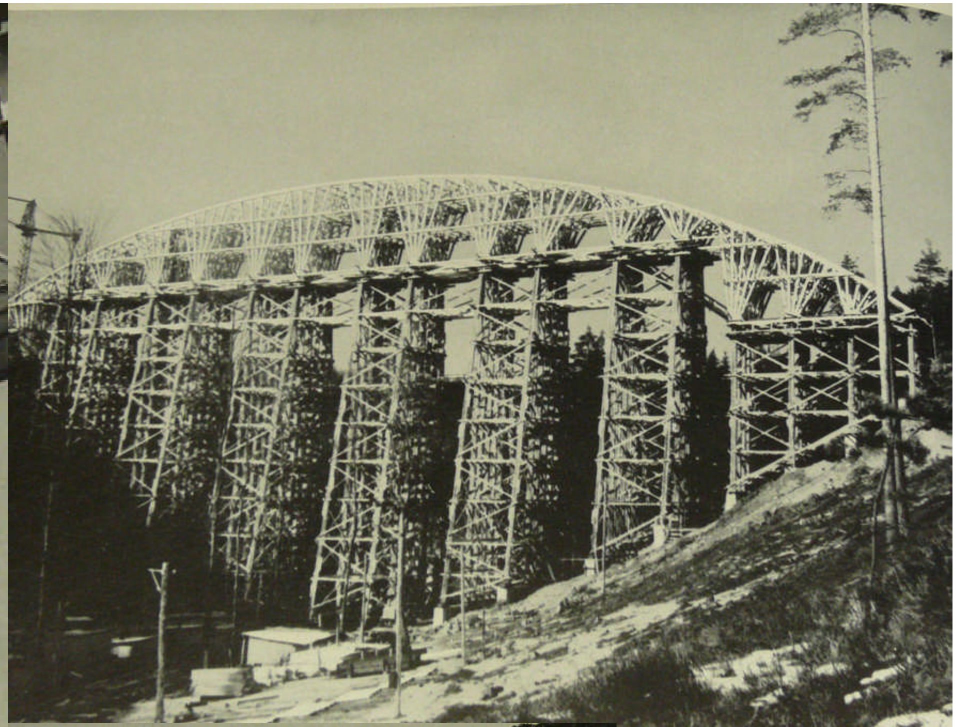

ENDE DER AUTOBAHN

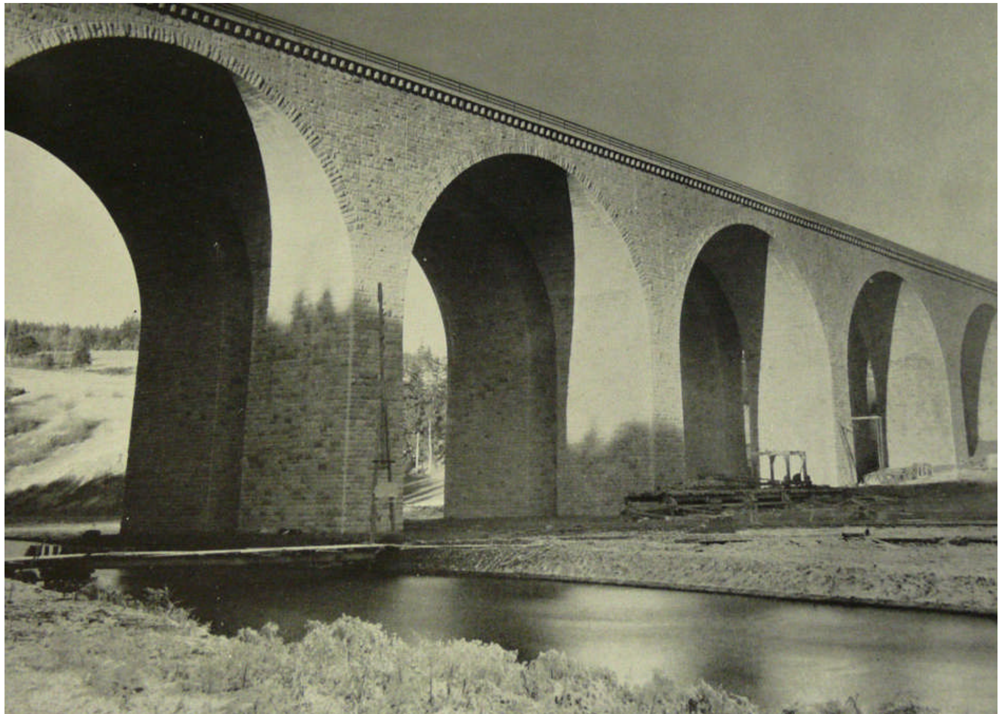


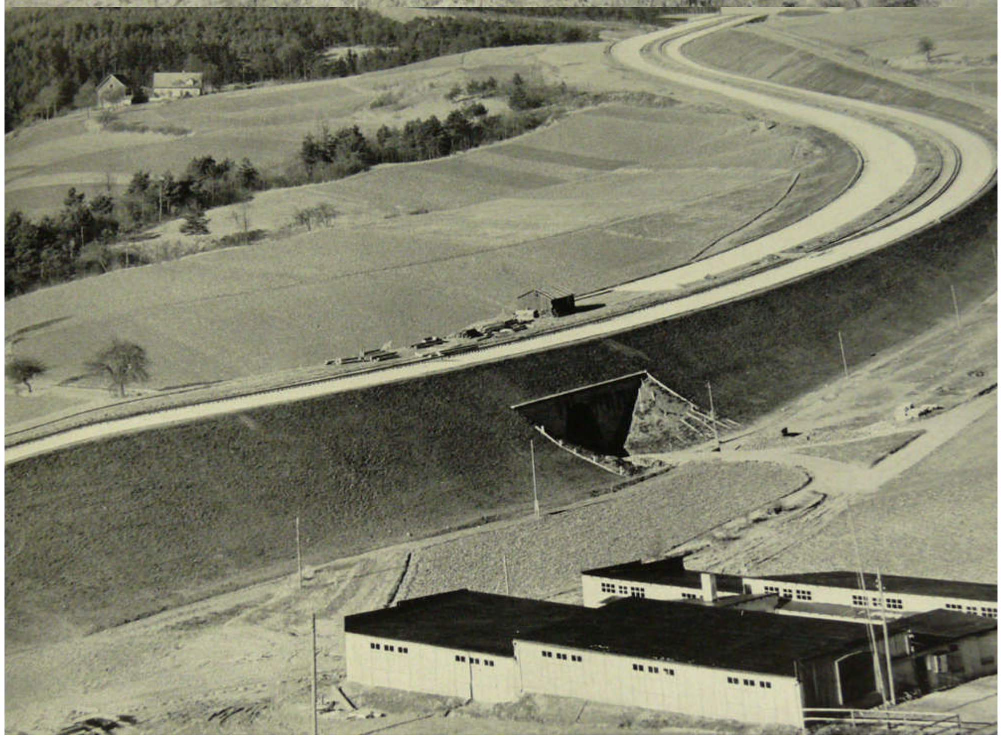

Schleizer Seenplatte

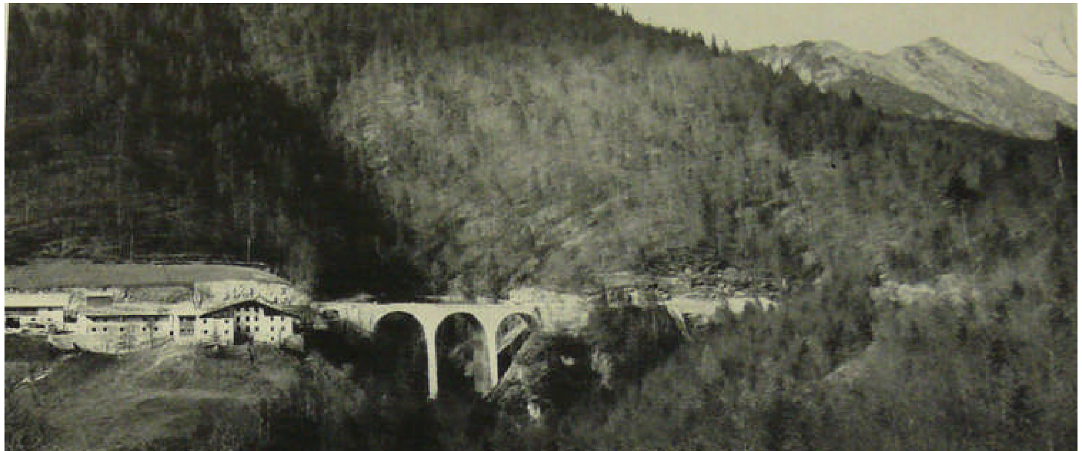


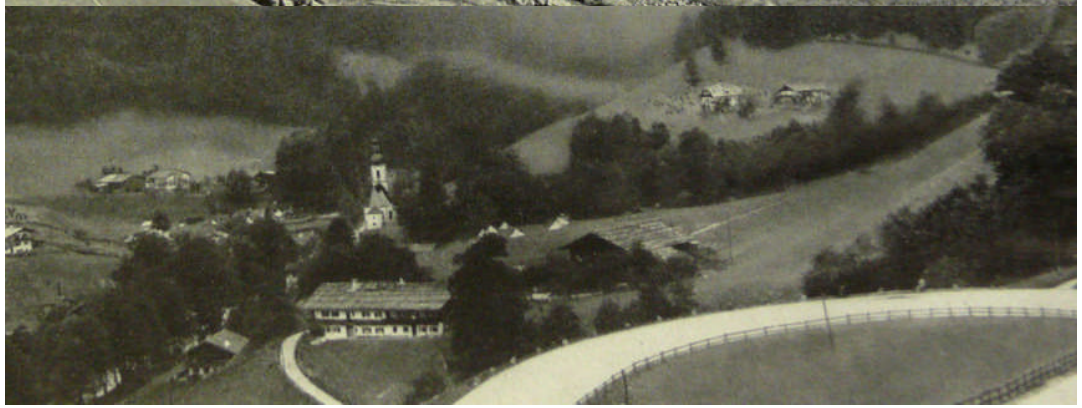






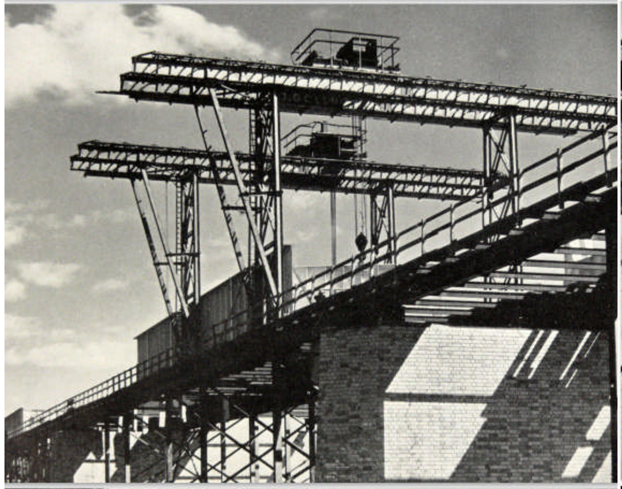
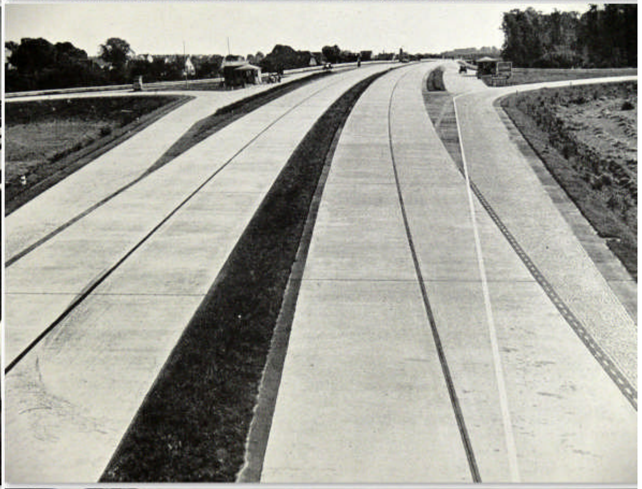
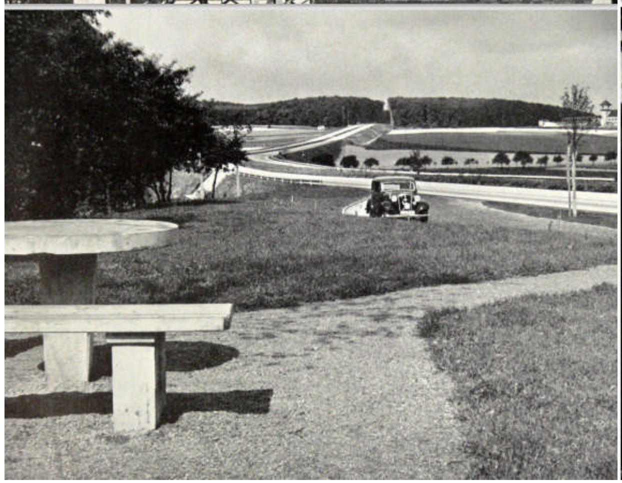


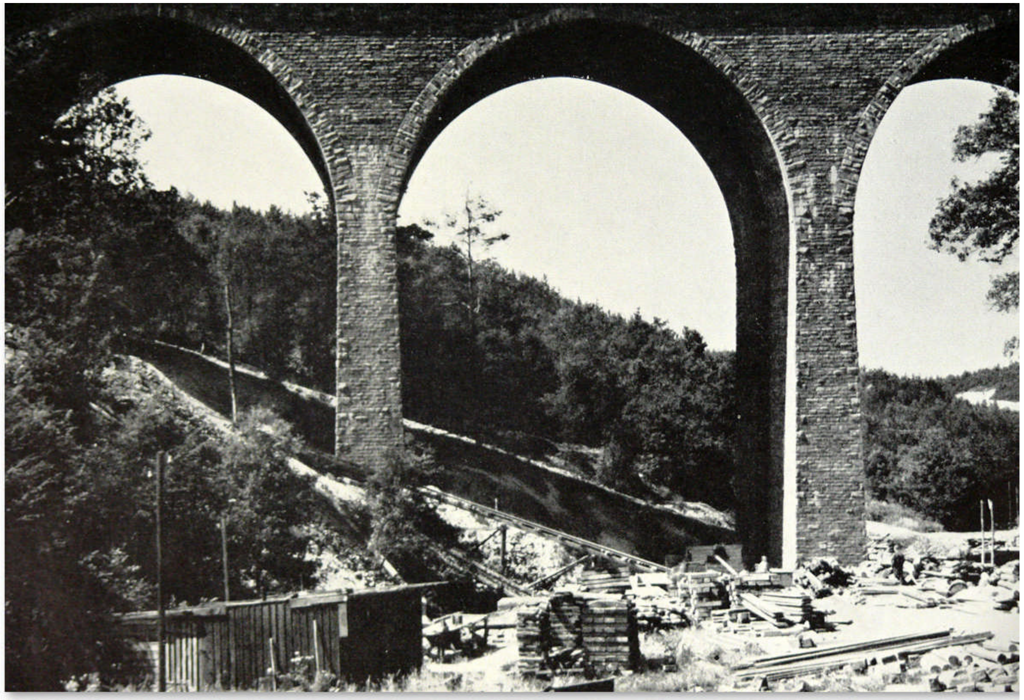


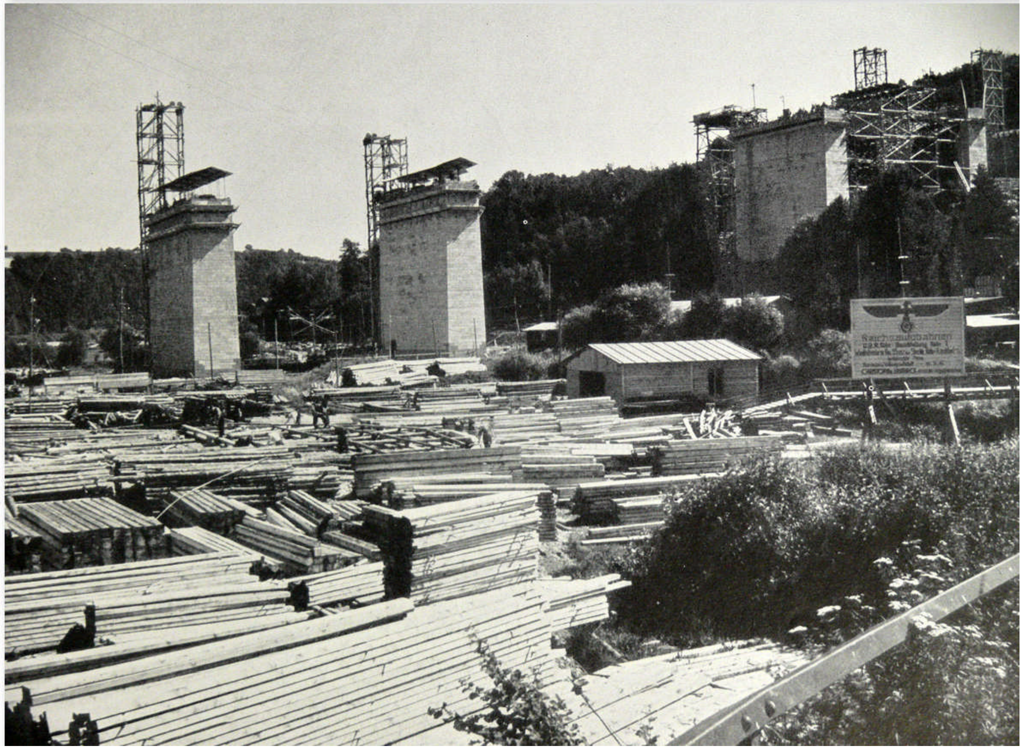


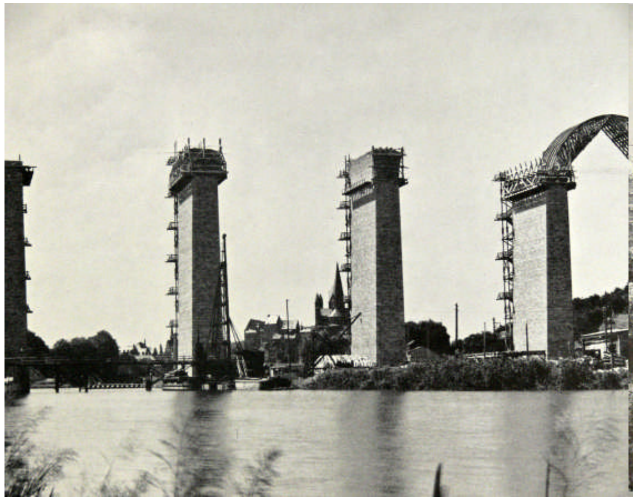
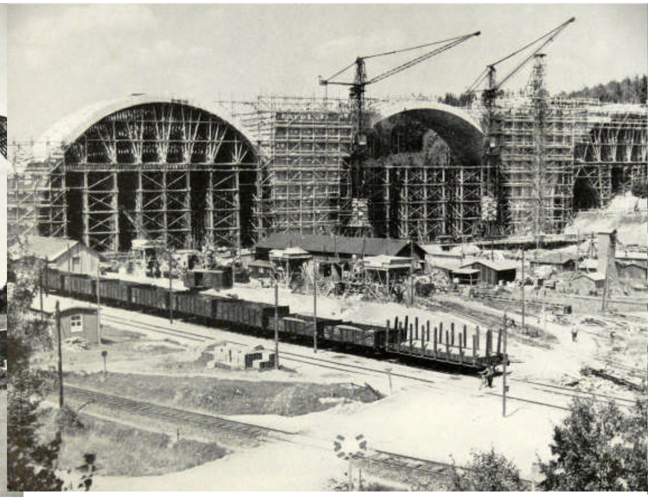
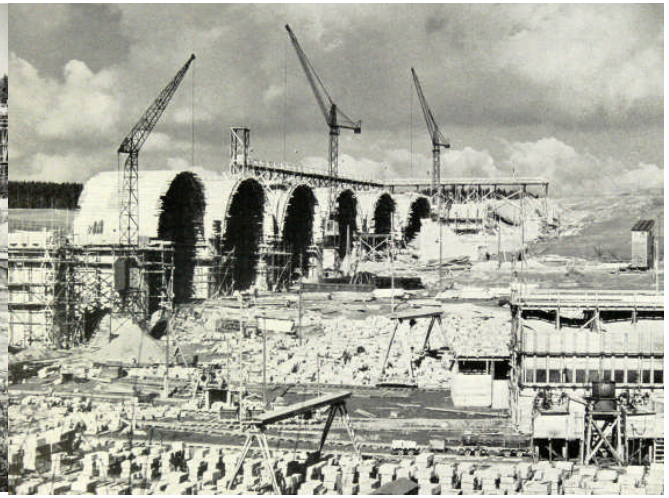
(Five Years of Work on German Highways)

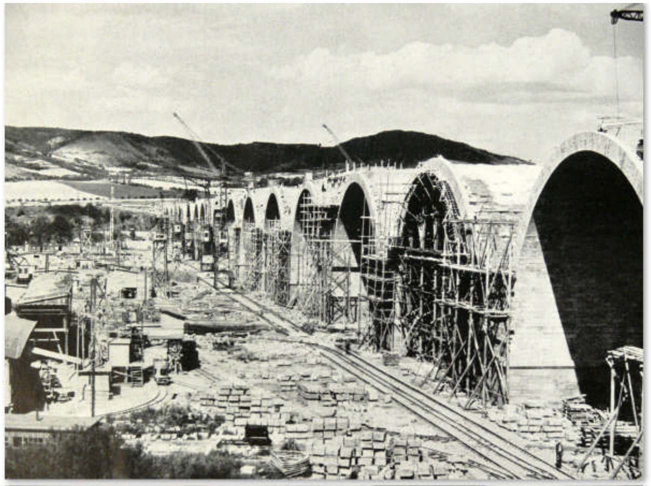
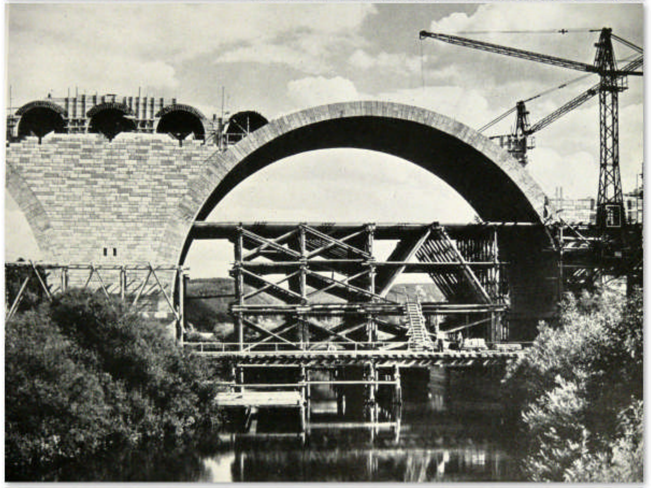
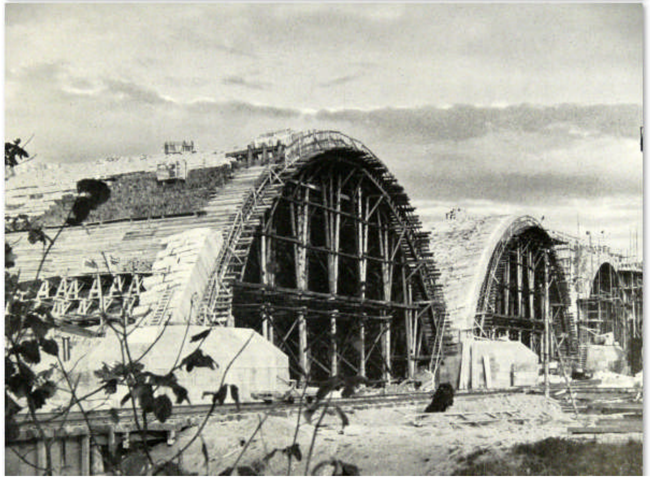


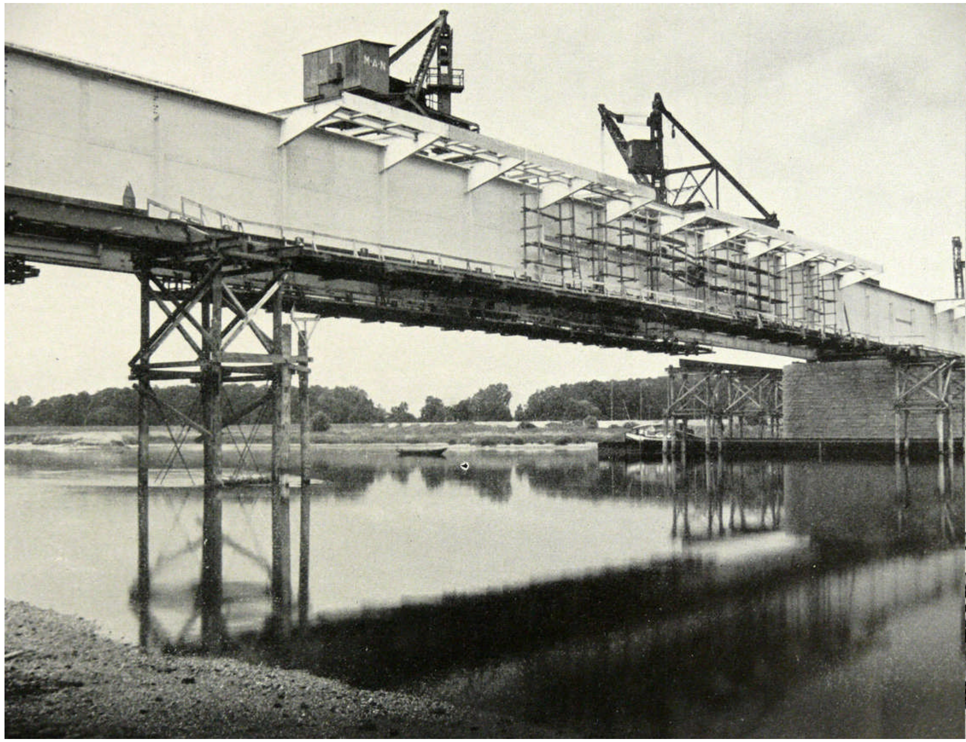




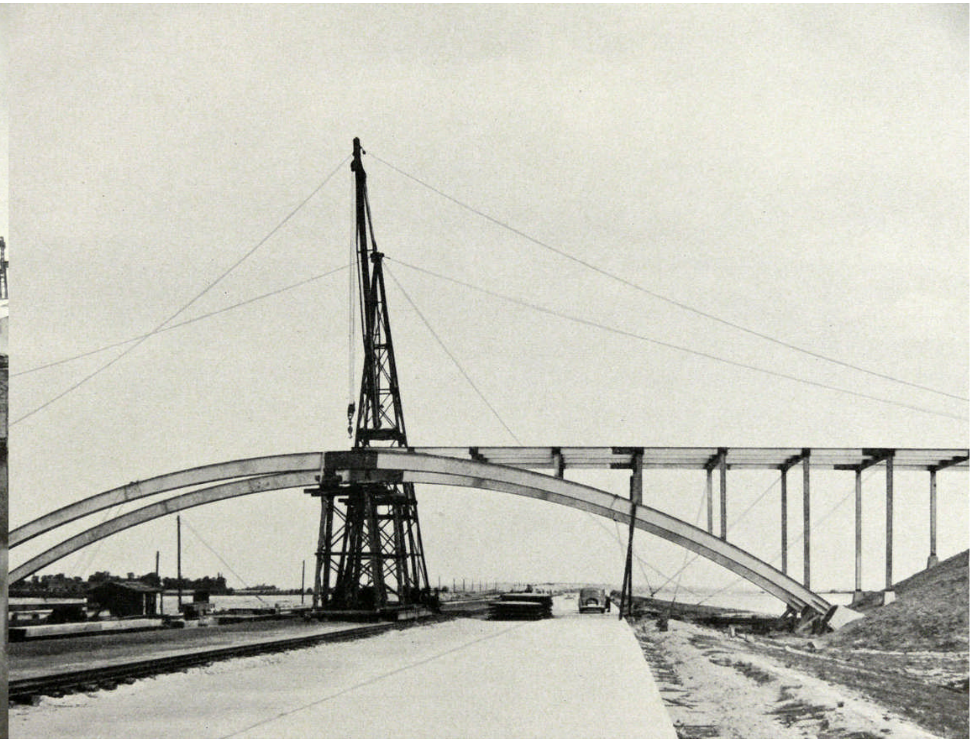



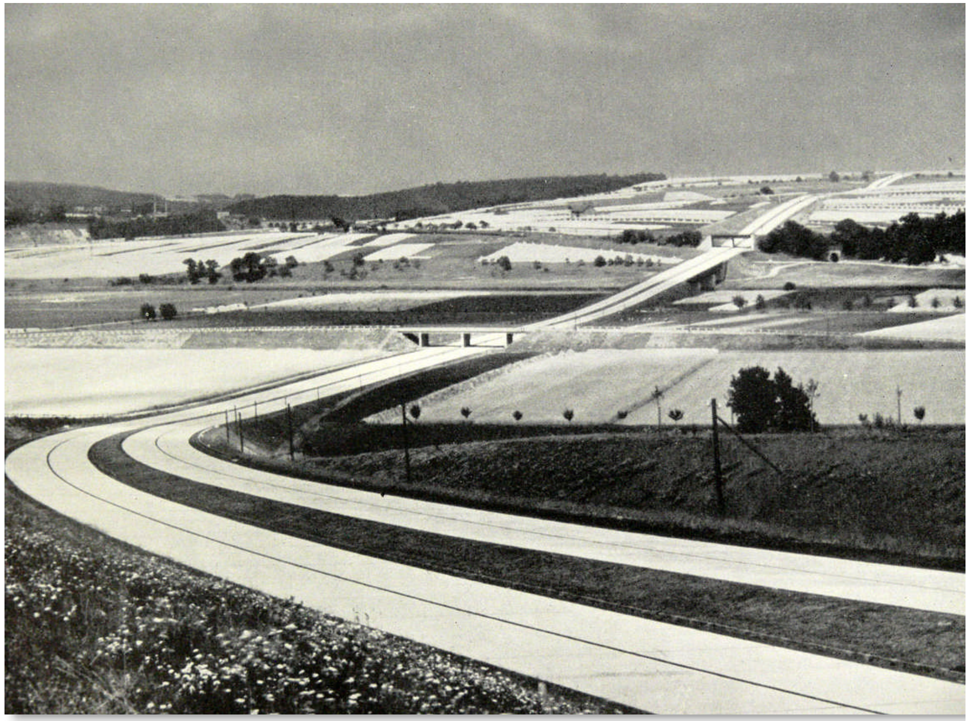


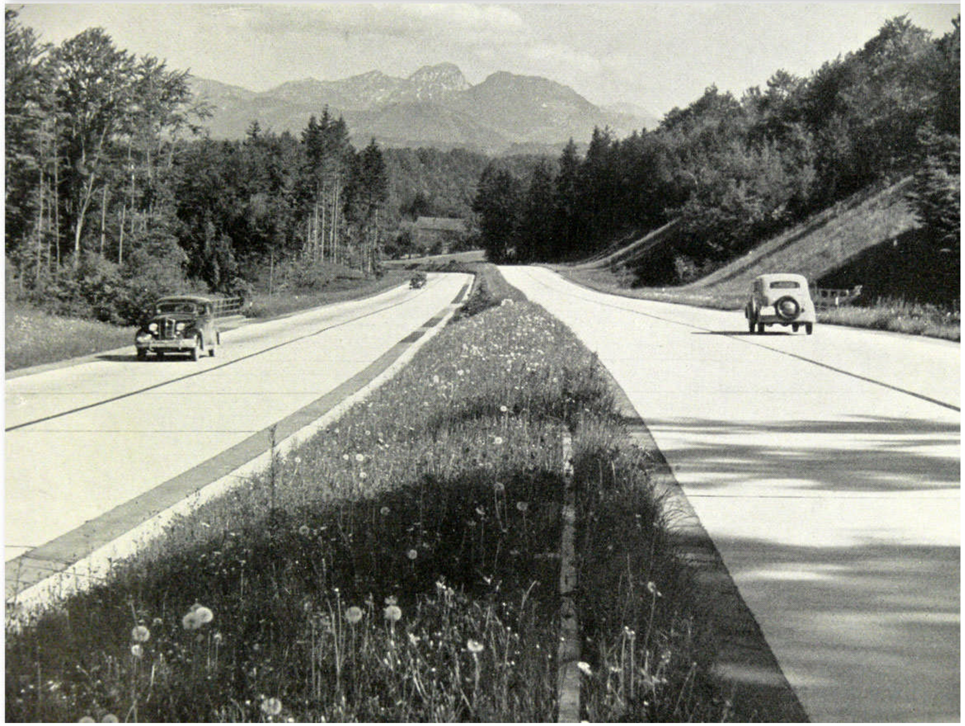




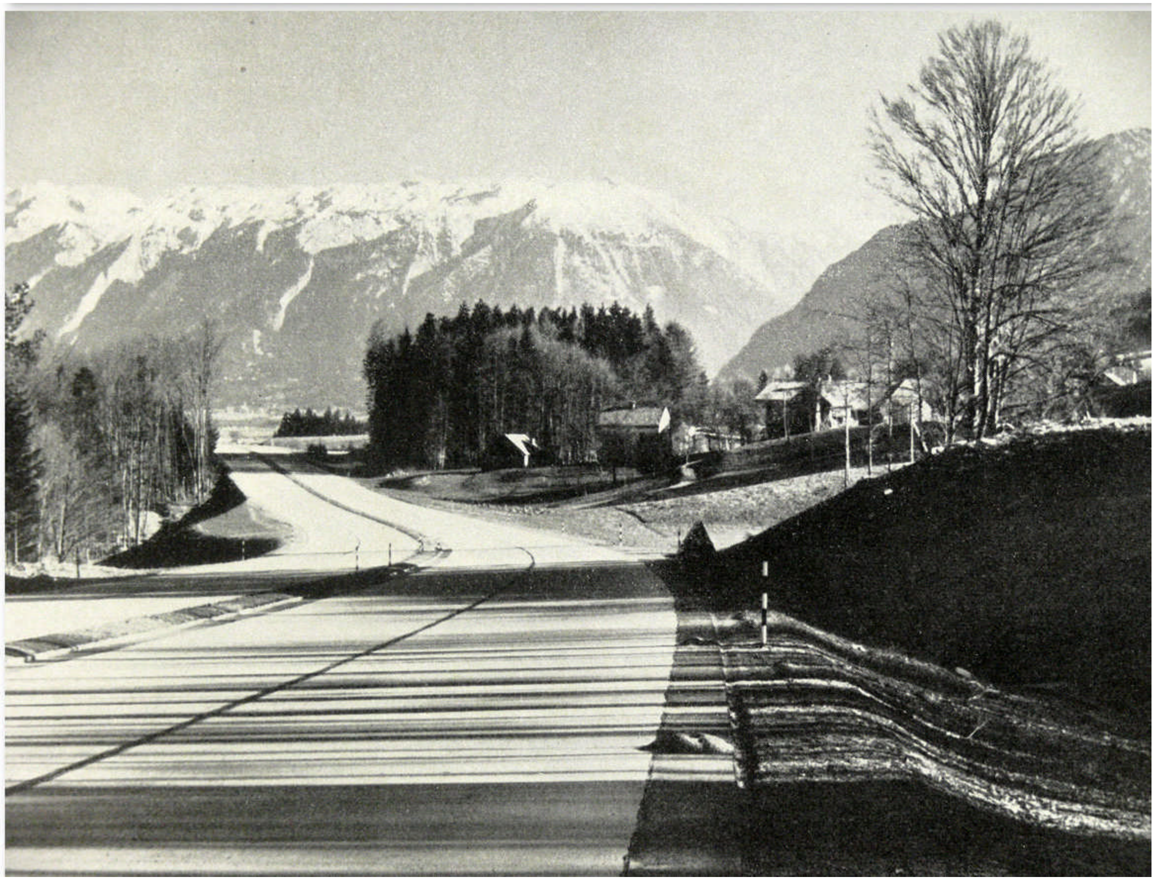














Part 9

Motorways of West Germany

A Growth in Traffic

“West Germany is building more highways a year than any other country except the United States and Canada. For an annual expenditure of well over $1 billion the Federal Republic is getting over 300 miles of new, fast trunk roads a year, including nearly 100 miles of autobahnen…”

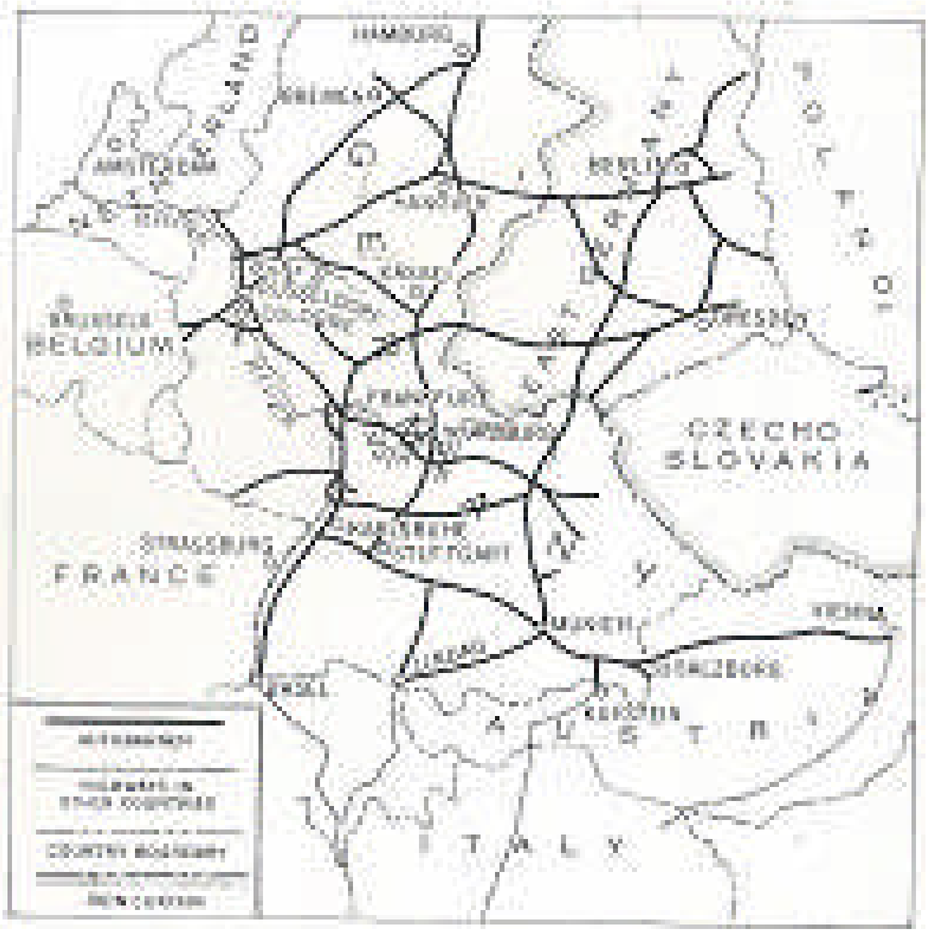
The Military Engineer, **May-June 1962**

"…Apart from the obvious strategic value of the new high-ways, there are several pressing non-military requirements for the roads, the most urgent of which is the increasing number of new trucks and automobiles using German roads. For example, in 1952, the number of vehicles licensed to use German highways was well under 3,000,000. By 1958, it had increased to over 7,000,000, a growth in traffic of 161 percent, while it is estimated that the figure will reach nearly 10,-000,000 by the end of 1962…"

***The Military Engineer*, May-June 1962**

Above: caption: "Stuttgart-Frankfurt Autobahn at Junction with Expressway to Baden-Baden"

Germany Divided



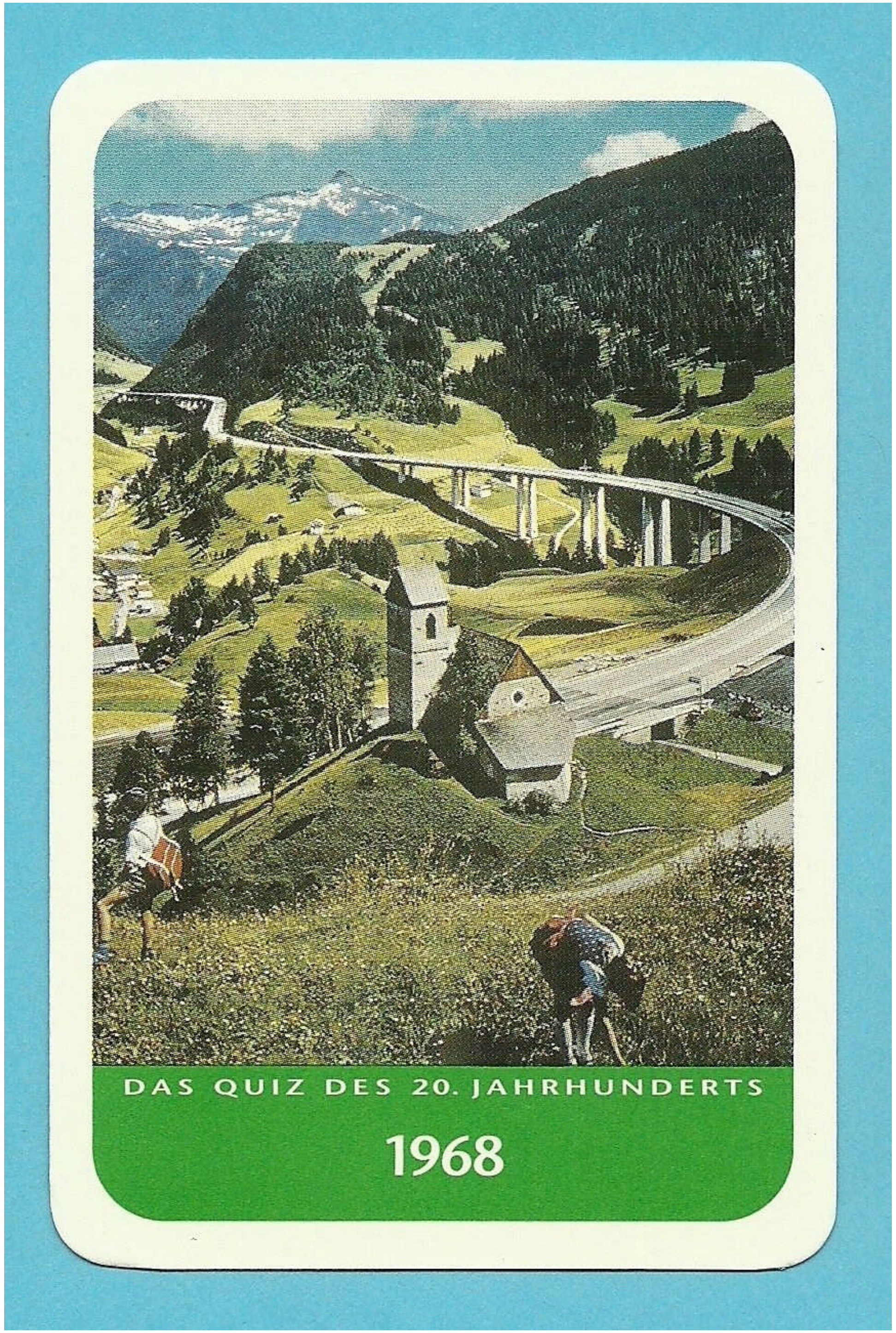
"…The main axes of the basic autobahn system, built before World War II under the Nazi regime, were east to west for obvious strategic reasons. With Germany divided, the east traffic has lost much of its importance, while the north-south traffic has had to use inferior roads, although its volume and importance is now probably greater than all the traffic in other directions…"

***The Military Engineer*, May-June 1962**

<u>Above</u>: caption: "Autobahn Network" (ca. 1962)

Europa Highways

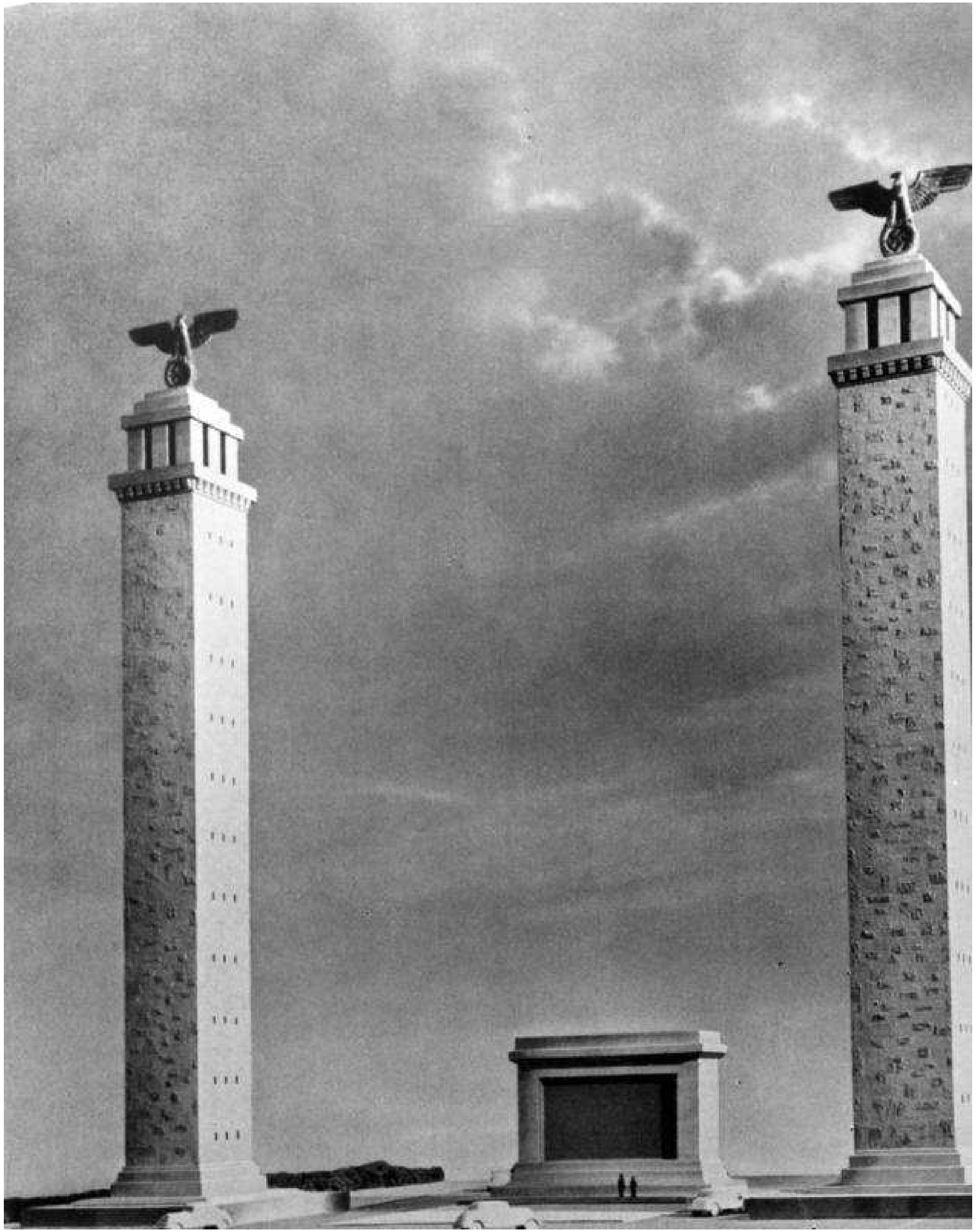
"…The additional highway system, begun in 1955, constitutes chiefly the provision of north-south links and stretches needed to join the network to main frontier crossing points…"
***The Military Engineer*, May-June 1962**



"…When completed, by about 1963, it will be possible to drive on 'Europa Highways' from Hamburg, Lubeck, and Bremen in the north to Basel, Switzerland, and Vienna, Austria, in the south. Also, with the completion of the Europa Bridge, on the new Austrian autobahn through the Brenner Pass (the only all-the-year-round passage across the Alps), there will be a through link with the Italian autostrada system…"

The Military Engineer, **May-June 1962**

<u>Left</u>: caption: "Autobahn Brenner Pass Germany



<u>Left</u>**: caption: "Model of autobahn gateway designed by Albert Speer for the Austrian frontier near Salzburg (1936)"**

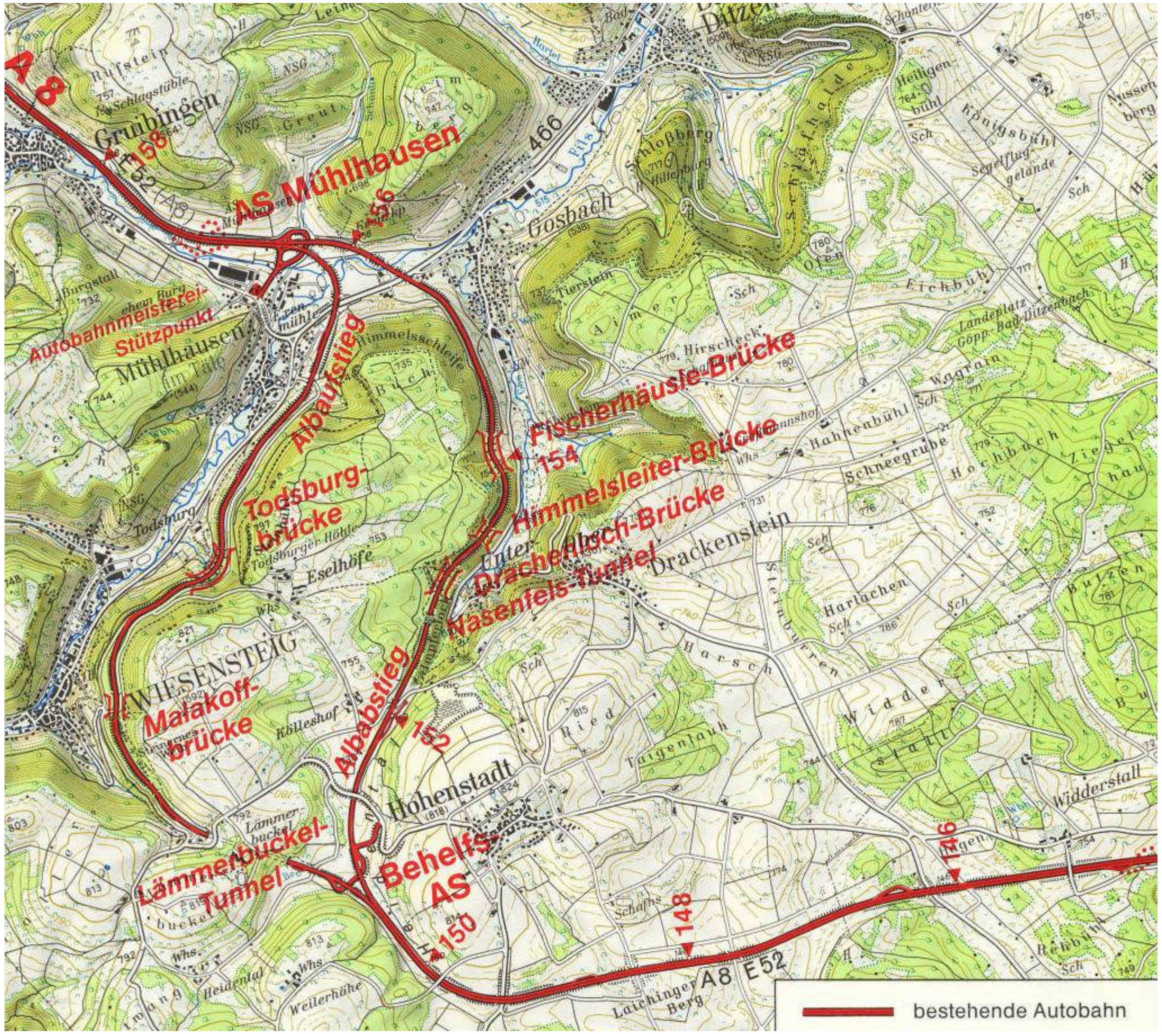
<u>Above</u>: caption: “Motorway painting: ‘Motorway near Salzburg’ by Ernst Hube”

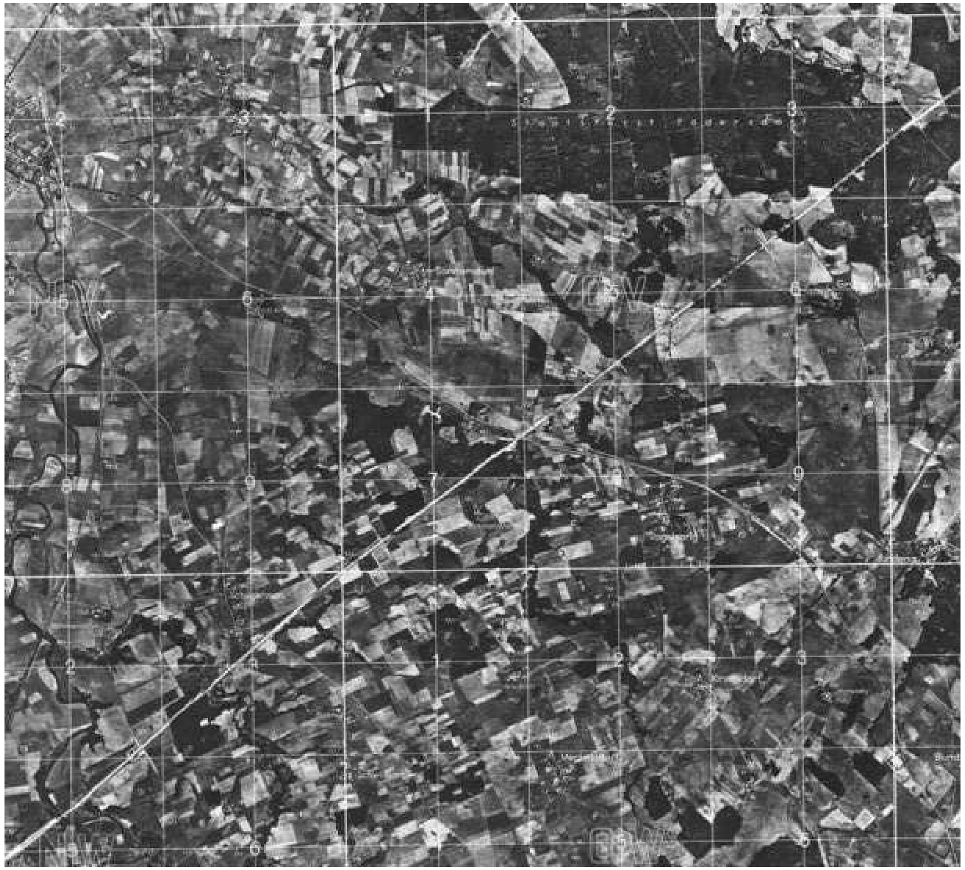
The *Drackensteiner Hang* is a mountainside in the *Swabian Alps* at Kirchheim unter Teck in Baden-Wurttemberg, Germany. *Bundesautobahn 8* (between Stuttgart and Ulm) divides into separate north and southbound routes on either side of the peak. The two halves of the autobahn each traverse one tunnel and a series of viaducts designed by *Paul Bonatz* and built for the *Reichsautobahn*. The bridges were all destroyed in WWII, but were rebuilt after the war (the route in one direction was completed in the 1950s).

<u>Left</u>: caption: “Relief panorama of Bundesautobahn 8 routes at the Drackensteiner Hang”

<u>Right</u>: caption: “Aerial view of one half of the autobahn, above Wiesensteig”


Reichsautobahn Stuttgart-Ulm.
Am Drachensteiner Hang


A 8
158
AS Mühlhausen
156
Autobahnmeisterei-Stützpunkt
Albaufstieg
Fischerhäusle-Brücke
154
Himmelsleiter-Brücke
Todsburg-brücke
Drachenloch-Brücke
Nasenfels-Tunnel
Malakoff-brücke
Albabstieg
Lämmerbuckel-Tunnel
Behelfs-AS
150
148
146
A8 E52
bestehende Autobahn



"…By 1963, the autobahnen (now amounting to some 1,500 miles), will have been more than doubled in length since World War II ended in 1945. The high cost, partly due to improved construction, is one reason for the slow rate of progress compared with that of Hitler's original autobahnen system built between 1933 and 1939…"

The Military Engineer, **May-June 1962**

Left: caption: "Reichsautobahn east of Braniewo (Braunsberg), aerial photo from September 1935"

Modern Methods

"…Included in the modern methods of autobahn construction are huge road-paving machines which mix, lay, and level the concrete for a full dual-roadway at the rate of 150 feet a day…"

***The Military Engineer,* May-June 1962**

"…Hitler was able to make use of his forced labor corps, re-cruited from the unemployed of Germany and paid only a pittance. Present day const-ruction teams are paid at pre-vailing labor rates…"

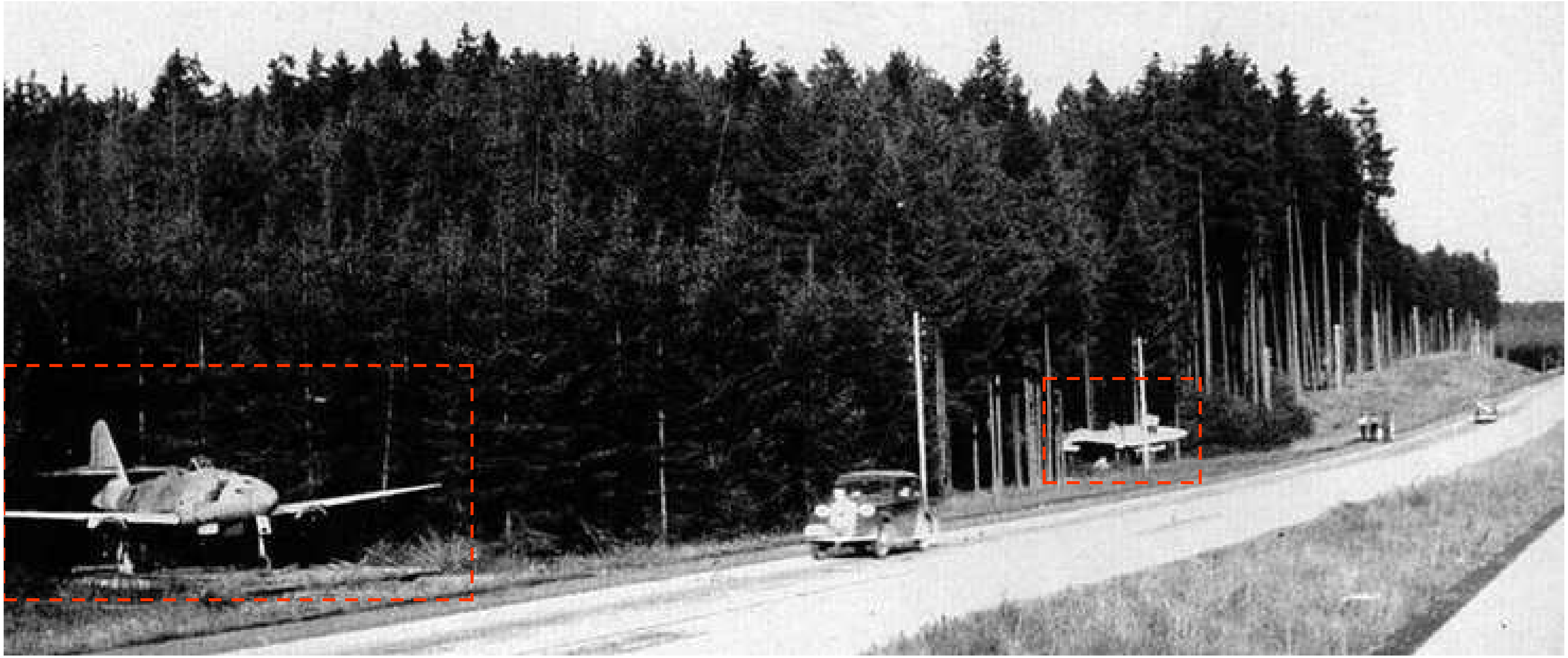
***The Military Engineer,* May-June 1962**

Left: caption: "Autobahn workers maintaining guard rail along median strip"

"…Where a mile of autobahn before the war cost an average of $360,000 the corresponding amount today is $1,070,000. The latter figure applies mainly to rural areas. In highly industrial areas such as the Ruhr, a mile of new autobahn costs up to $3,600,000…"

***The Military Engineer,* May-June 1962**

Not the Only Problem



"…New construction is not the only problem. Because of increasing traffic and long use, the original autobahnen (in parts now nearly 30 years old) are rapidly wearing out. In the Ruhr and Rhine-Main areas, where roads were heavily used during World War II and also suffered considerable damage from Allied bombing, it was estimated two years ago that about 85 percent of the system was in urgent need of repair. The cost of repairs averages about $400,000 a mile and the total bill for the more important repairs is some $300,000,000…"

***The Military Engineer,* May-June 1962**

<u>Above</u>: caption: "ME 262 Jet Fighters concealed along the autobahn in 1945"

<u>Above</u>: caption: "Bridge pillars for Hamburg - Berlin autobahn left incomplete, near Hagenow, Mecklenburg-Vorpommern, in the former GDR"

<u>Left</u>: caption: "Black colored roadways as camouflage from enemy fire aerial reconnaissance"

"…These reconstruction works, of which there were twelve of varying extent between Cologne and Dusseldorf alone in the recent six months' period, mean that one side has to be closed and the autobahn then ceases to be faster than any other ordinary trunk highway…"

***The Military Engineer,* May-June 1962**

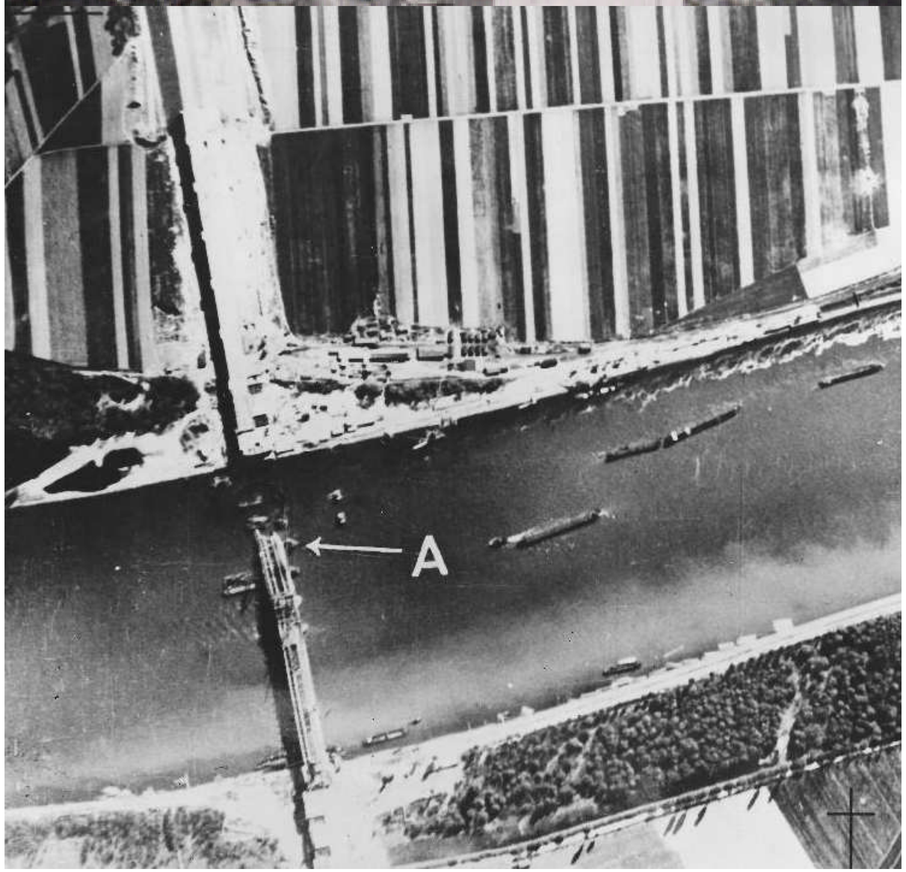
Natural Prime Targets

"…Another big reconstruction task has been the rebuilding of more than 500 bridges which carry the Nazi-built autobahnen over rivers and valleys. These bridges were naturally prime targets for Allied bombers between 1939 and 1945…"

The Military Engineer, **May-June 1962**

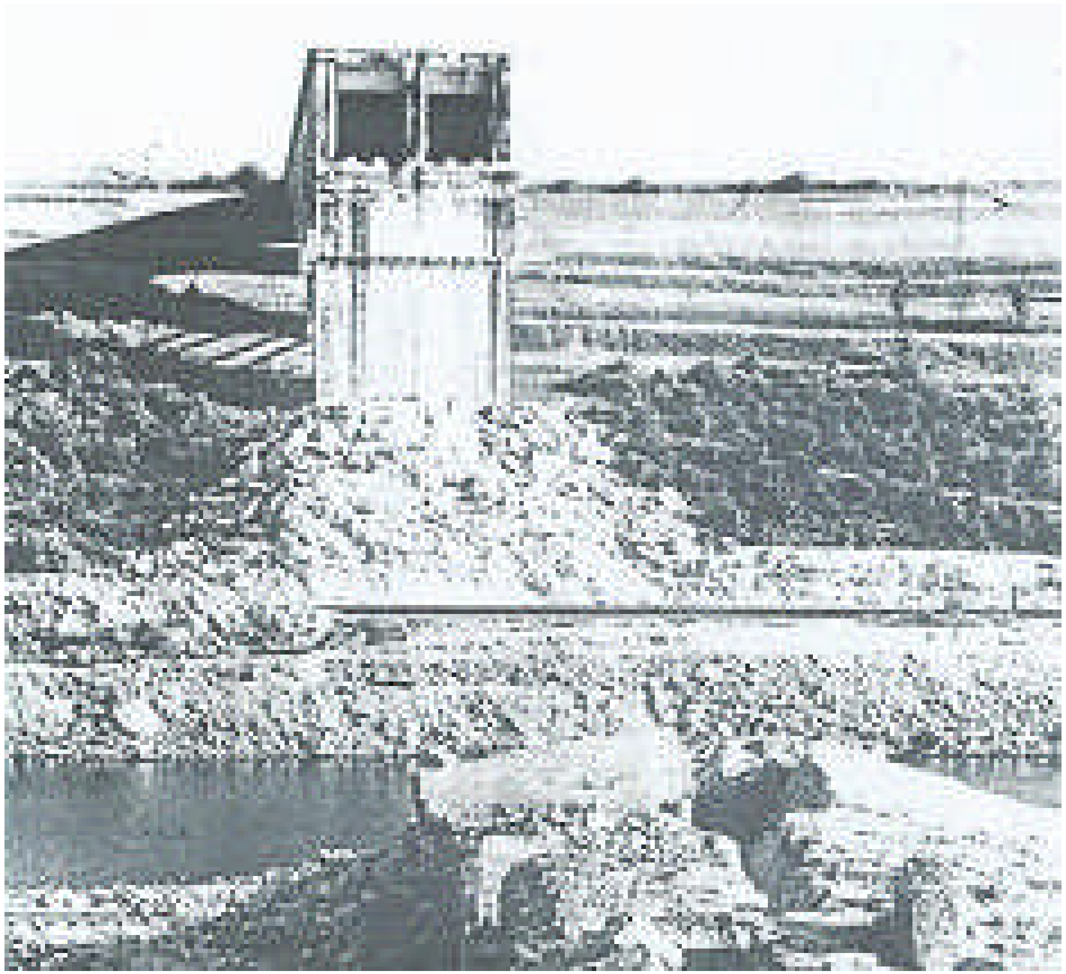
<u>Left</u>: caption: "Stretch between Cologne and Aachen"

<u>Right</u>: caption: "New Autobahn bridge over the River Werra near Kassel. The original bridge was flat, but it was rebuilt with a slightly upward curve so that the highway would form a continuous curve over the bridge and up the hillside."

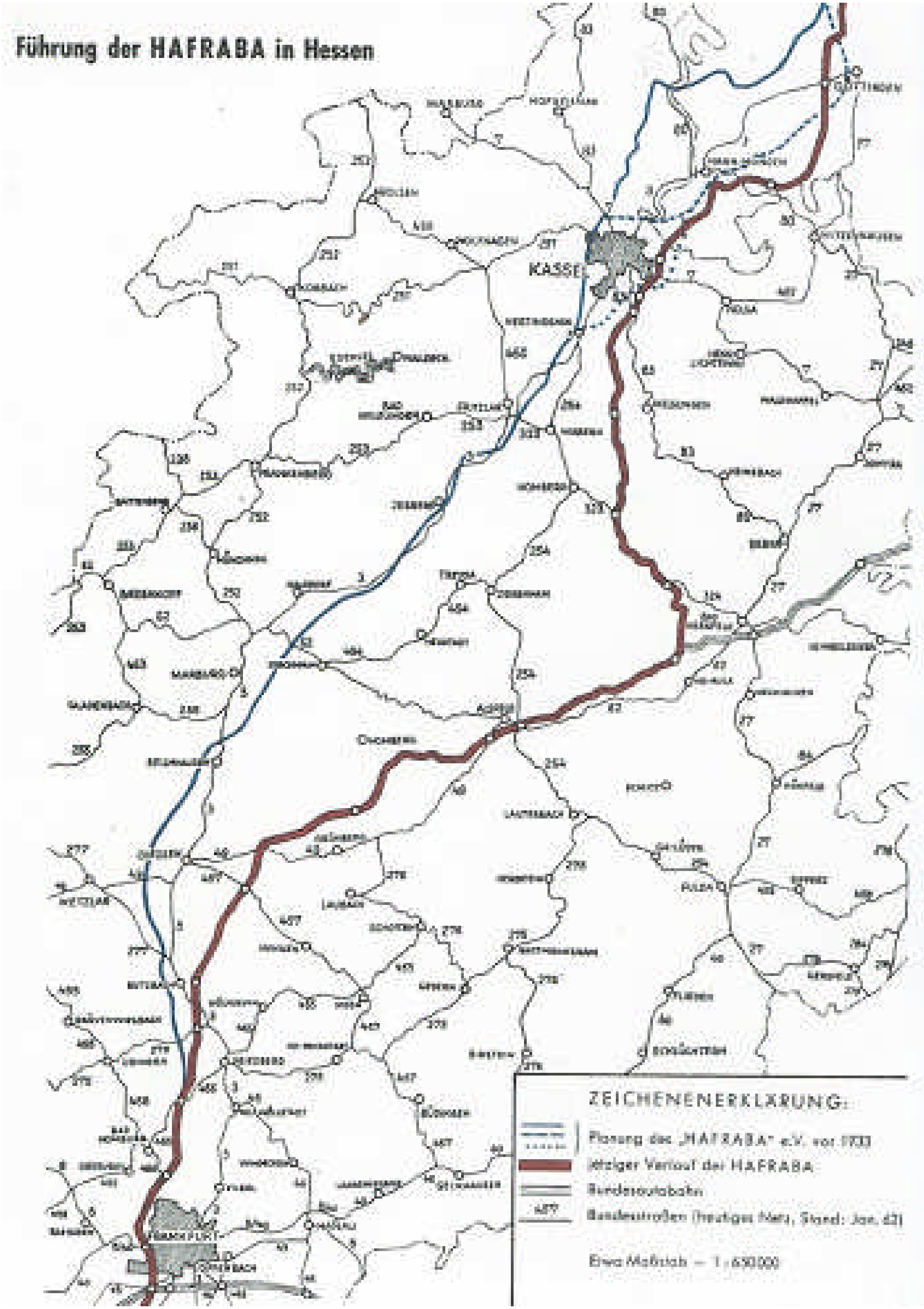


<u>Top</u>: caption: "Autobahn Viaduct destroyed by bombing"
<u>Bottom</u>: caption: "This excellent photograph was taken by an aircraft of Bomber Command ands shows the Autobahn Bridge near Mannheim extensively damaged after a raid by the Royal Air Force. The last span of the two span Autobahn Bridge has been demolished and has fallen into the river at its East embankment. The West end of the span is obstructing the normal river traffic and operations are in progress to remove the obstruction.


9414



Highway Envy



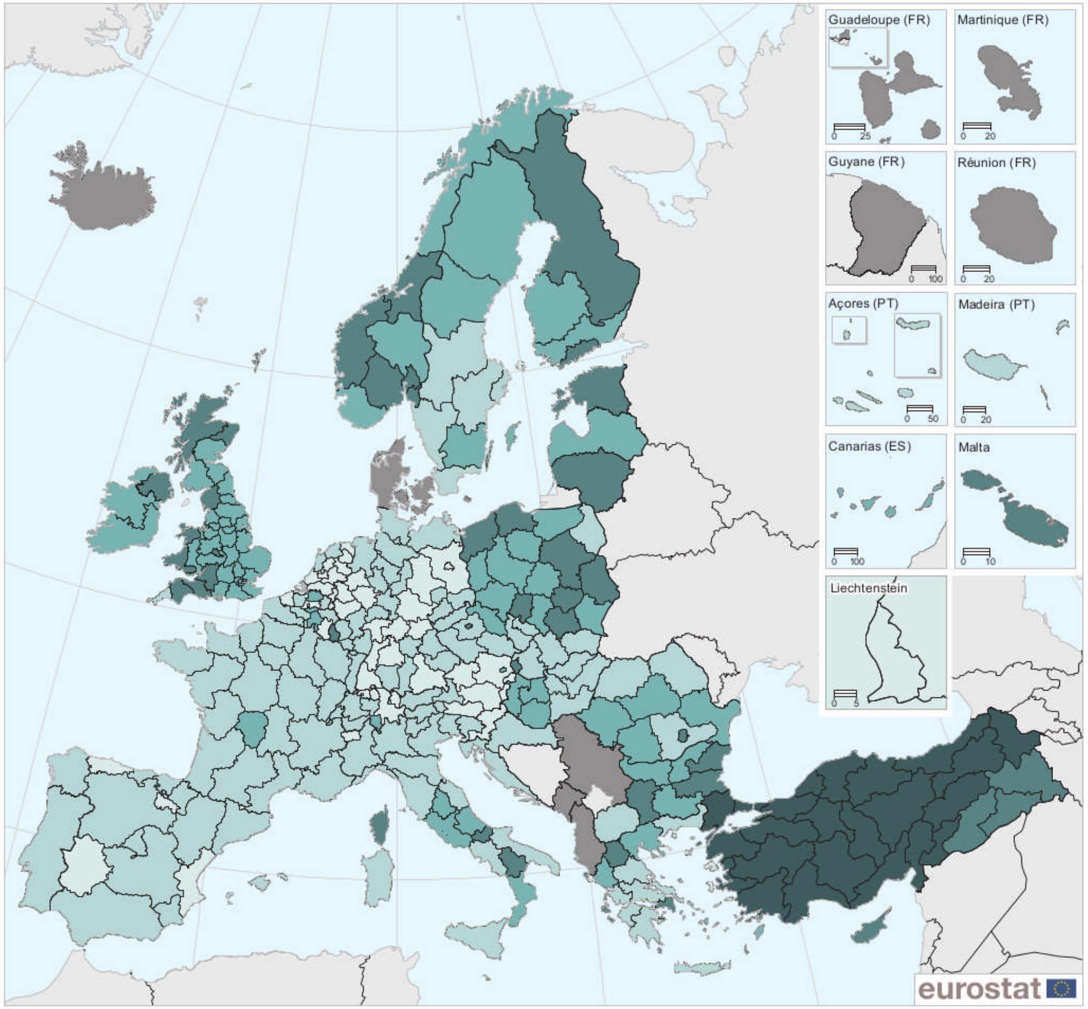
"…Despite these handi-caps, West Germany is con-solidating its autobahn lead and acquiring a highway system which is the envy of every other country in Eur-ope…"

***The Military Engineer,* May-June 1962**

<u>Left</u>: caption: "Hafraba line in Hesse, taken from: Federal Min-ister of Transport (eds.): HAF-RABA - Motorways Hanseatic cities - Frankfurt - Basel, const-ruction Verlag, Wiesbaden and Berlin 1962, p. 99"

All-Europe Averages

Equipment rate for public transport vehicles (motor coaches, buses and trolleybuses), by NUTS level 2 region, 2013 (¹)
(number of public transport vehicles per 1 000 inhabitants)



(number of public transport vehicles per 1 000 inhabitants)
EU = 1.7

- < 1
- 1 – < 2
- 2 – < 3
- 3 – < 6
- >= 6
- Data not available

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
Cartography: Eurostat — GISCO, 05/2015

0 200 400 600 800 km

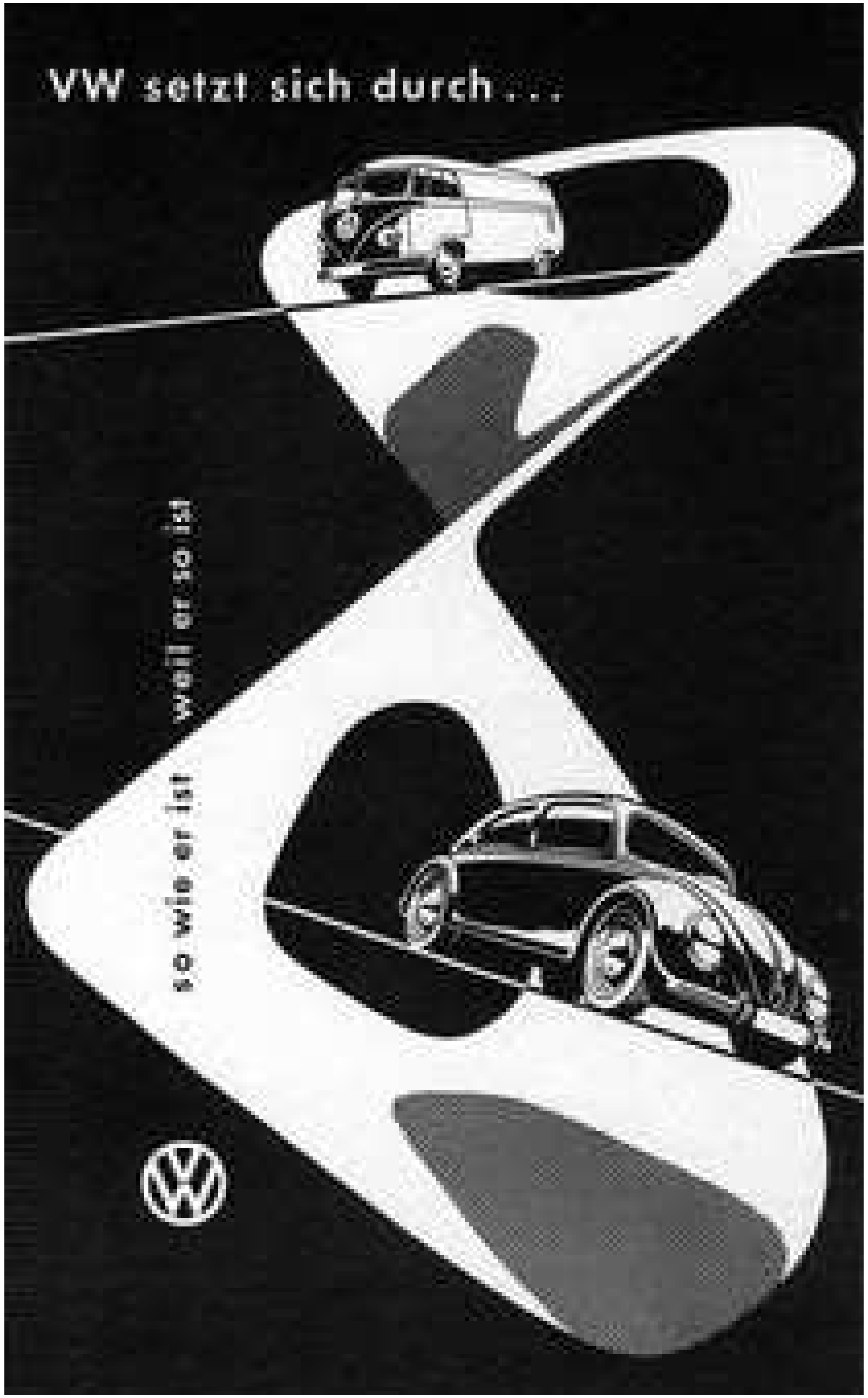
(¹) EU: estimate based on latest available data (excluding Denmark). Portugal: only available at national level. Luxembourg and the former Yugoslav Republic of Macedonia: 2012. Sweden: 2011. Greece: provisional.

Source: Eurostat (online data codes: tran_r_vehst and demo_r_pjanaggr3)

"…One thing that is helping the Germans improve their highway system is the fact that Germany, although one of the most important producers of automotive vehicles in Western Europe, is still substantially below the European average in motorization. In the last year for which comprehensive figures are available, Germans stood ninth in use of trucks and buses, with 13 per 1,000 inhabitants, against an all-Europe average of 10 per 1,000; with automobiles, Germany stood eighth, with 44 per 1,000 inhabitants, as compared with the European average of 56 per 1,000…"

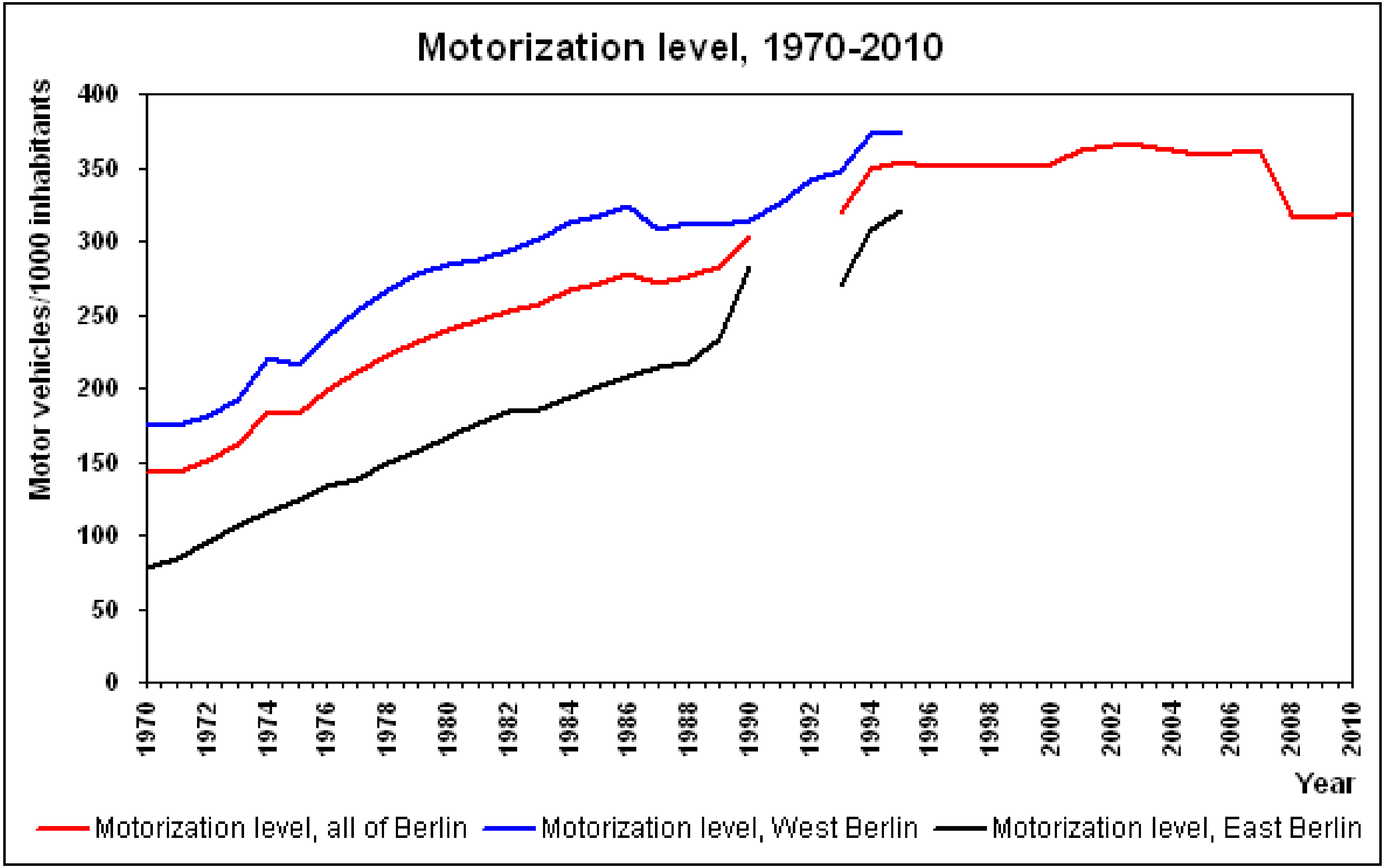
The Military Engineer, **May-June 1962**

Left: caption: "Equipment rate for public transport vehicles (motor coaches, buses and trolleybuses), by NUTS level 2 region, 2013 (number of public transport vehicles per 1,000 inhabitants)"



"…It was only in the two-wheeled field that Germany exceeded the average, with 48 motorcycles and mopeds per 1,000 population against the all-European average of 37. But since 1957, there has been a marked falling-off in two-wheeler registrations, with an increase in small family cars, notably the Volkswagen…"

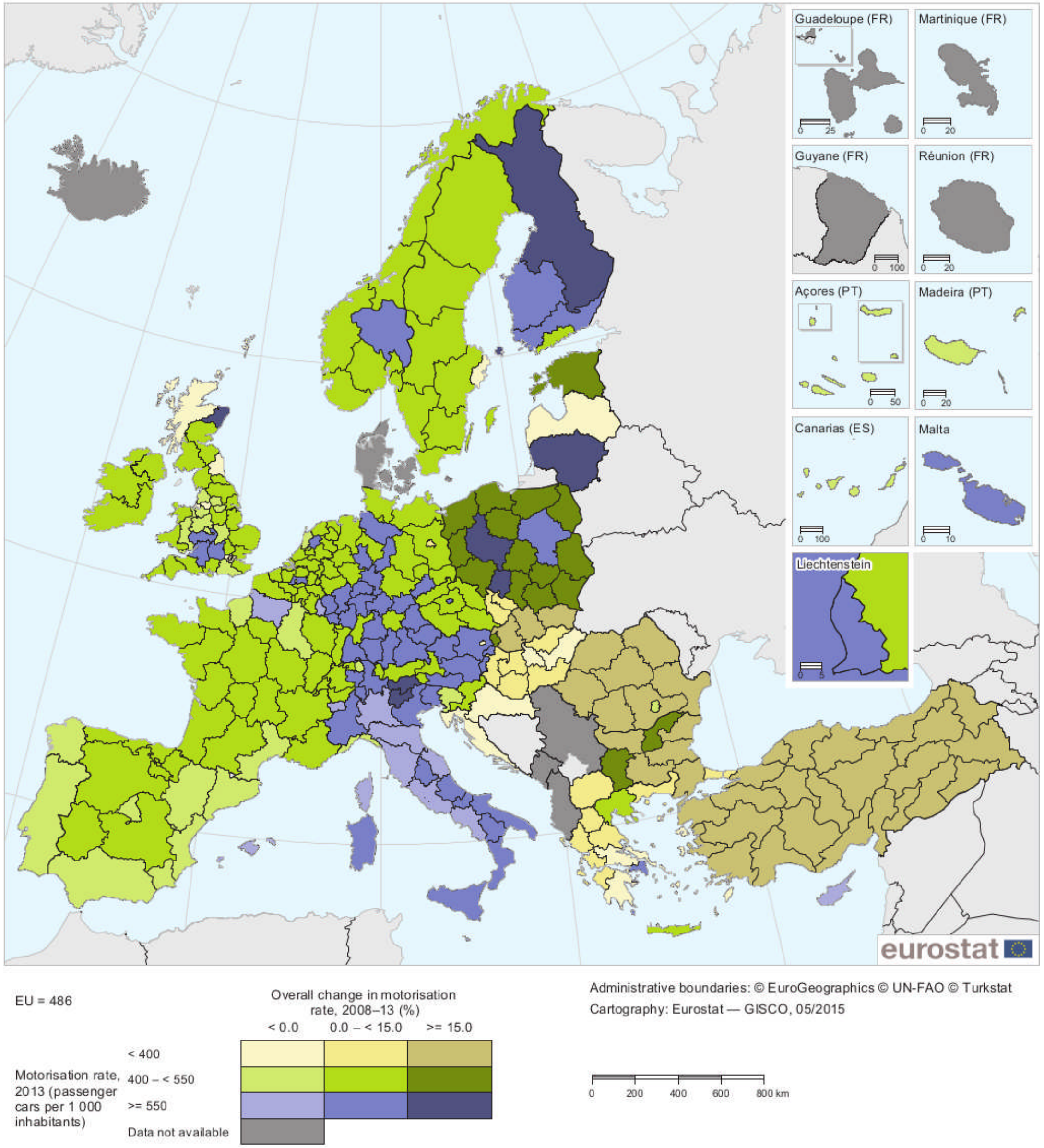
***The Military Engineer*, May-June 1962**



<u>Above</u>: caption: "Motorization Level in Berlin, 1970 – 2009"

Advantage: Autobahn

Motorisation rate and changes in motorisation rate, by NUTS level 2 region, 2008–13 (¹)
(number of passenger cars per 1 000 inhabitants in 2013, % overall change in motorisation rate from 2008–13)



(¹) EU: estimate based on latest available data (excluding Denmark). Portugal: only available at national level. Greece and Luxembourg: motorisation rate, 2012 instead of 2013 and change in motorisation rate, 2008–12 instead of 2008–13. Portugal: motorisation rate, 2012 instead of 2013 and change in motorisation rate, 2010–12 instead of 2008–13. Sweden: motorisation rate, 2011 instead of 2013 and change in motorisation rate, 2008–11 instead of 2008–13. Sachsen-Anhalt (DEE0) and Schleswig-Holstein (DEF0): change in motorisation rate, 2012–13. Greece: provisional.

Source: Eurostat (online data codes: tran_r_vehst and road_eqs_carhab)

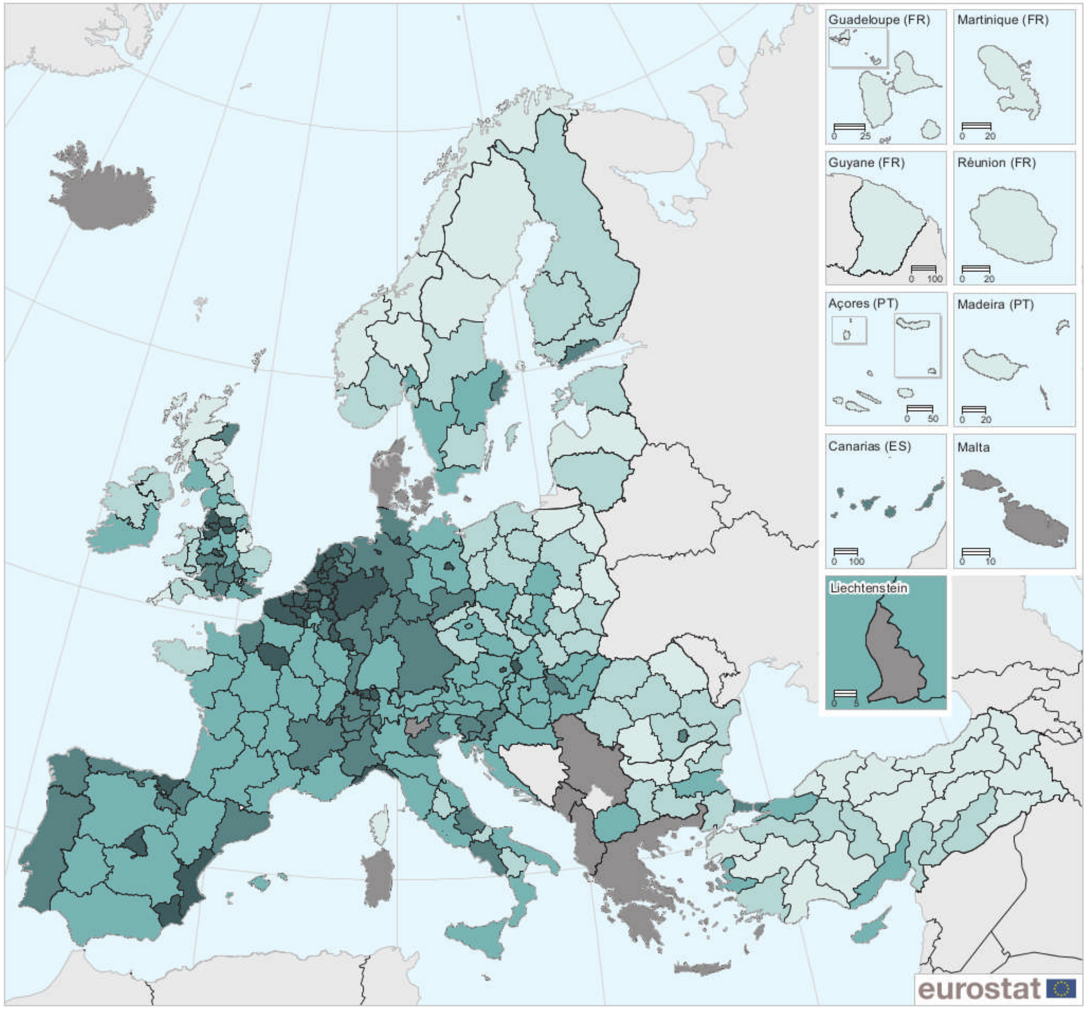
"…This comparatively low density of traffic has made it much easier for German highway engineers to go steadily ahead with their work, instead of being constantly badgered, as they are in Great Britain and a number of European countries, by too many vehicles using too few roads…"

The Military Engineer, **May-June 1962**

<u>Left</u>: caption: "Motorization rate and changes in motorization rate, by NUTS level 2 region, 2008–13 (number of passenger cars per 1,000 inhabitants in 2013, percent overall change in motorization rate from 2008–13)"


Ausfahrt

Density of motorways, by NUTS level 2 region, 2013 (¹)
(km per 1 000 km² of total area)



(km per 1 000 km² of total area)

EU = 16.6

- < 1
- 1 – < 10
- 10 – < 30
- 30 – < 50
- >= 50
- Data not available

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
Cartography: Eurostat — GISCO, 05/2015

0 200 400 600 800 km

(¹) EU: estimate based on latest available data (excluding Denmark, Greece and Malta). Germany: only available for NUTS level 1 regions. Portugal: only available at national level. Italy, Luxembourg, the United Kingdom, Norway and the former Yugoslav Republic of Macedonia: 2012. Slovenia: 2011.

Source: Eurostat (online data codes: tran_r_net, road_if_motorwa and demo_r_d3area)

"…The present project, scheduled for completion by 1963, is one part of a much larger plan to accommodate the estimated heavy increase in motorization in West Germany by 1975. At least an increase of 270 percent in the number of automobiles on the highways is envisioned by 1975, and a 130 percent increase in the number of trucks and buses…"

The Military Engineer, **May-June 1962**

<u>Left</u>: caption: "Density of motorways, by NUTS level 2 region, 2013 (km per 1,000 km² of total area)


CHRISTOPHORUS
SICHER MEHR ERLEBEN

Bundesautobahnen

"…The autobahnen are only a small part of the German highway system, but the present expansion is planned in such a way that every mile of autobahn will be an integrated part of the whole. The autobahnen and Federal highways (the main roads catering to intercity traffic and carrying slightly less important or speedy than that using the autobahnen) are the only two sets of highways administered by the Federal Government of West Germany. Present mileage is approximately: Autobahnen, 1,500 miles; Federal highways, 15,000…"

***The Military Engineer,* May-June 1962**

RE: at the end of WWII, the Autobahn network totaled 2,128 km. Construction on new sections started again in 1953, with 144 km added between 1953 and 1958, bringing the total to 2,272 km. Starting in 1959, the *Federal Republic of West Germany* began Autobahn expansion in earnest by embarking on a series of four-year plans that expanded the "Bundesautobahnen" system to 3,076 km by 1964.


Hamburg
Hannover
Kassel
Dortmund
Berlin
Dresden
Erfurt
Bad Hersfeld

"…Closely linked with the Federal system is a network of 35,000 miles of first-class and 30,500 miles of second-class highways operated by the states which make up the West German Federal Republic…"

***The Military Engineer,* May-June 1962**

RE: major additions to the *Bundesautobahn* network followed during the next two decades and the system reached 4,110 km in 1970; 5,258 km in 1973; 6,207 km in 1976; 7,029 km in 1979 and 8,080 km in 1984. A new series of five-year plans, with the goal of putting an Autobahn entrance within 10 km of any point in Germany, had expanded the network to over 8,800 km by 1990.

Deutschland United

The reunification of Germany in 1990 put the 10 KM plan on hold as the West German Federal Government focused on absorbing and upgrading the poorly maintained Autobahns it inherited from East Germany. The incorporation of those East German Autobahns put the total Autobahn network at almost 11K km in 1992. Until 2000, the Autobahn was the world's second largest superhighway system, second only to the U.S. Interstate System. Currently, the Autobahn network is the world's fourth largest superhighway system in the world (after China, the U.S. and Spain).

<u>Left</u>: caption: "Map of the present-day Autobahn"

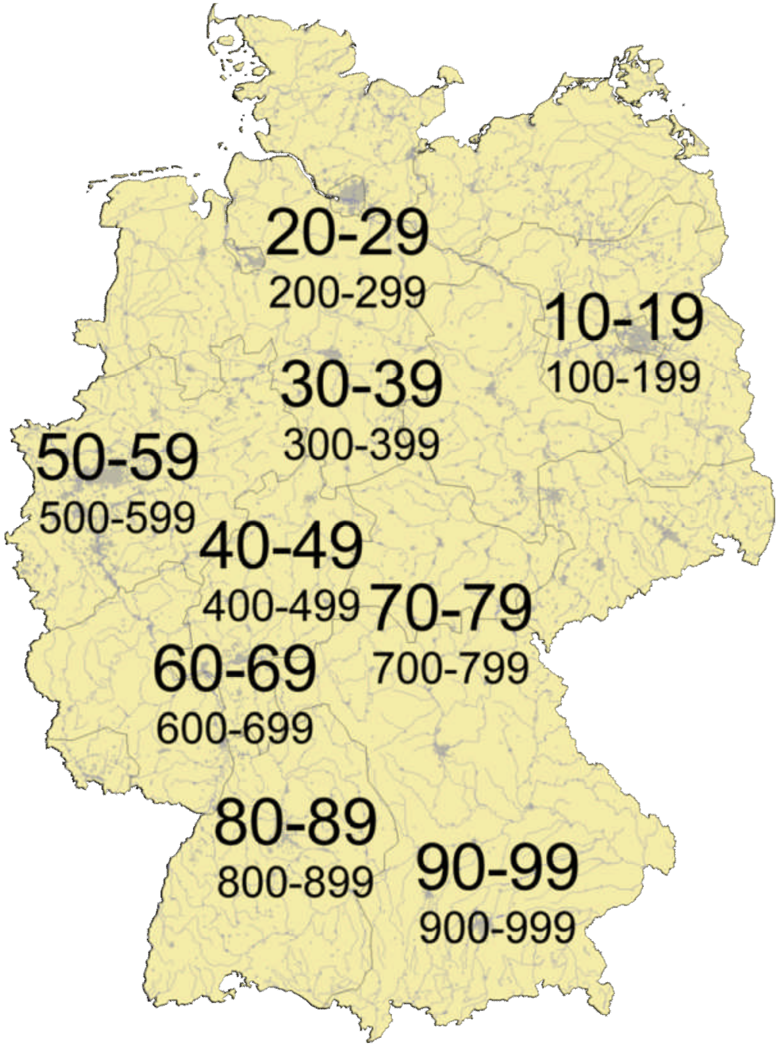
Like their *Autostrada* counterparts, early Autobahns were rather crude by modern standards. Newer West German Autobahns had, for many years, featured 3.75-meter-wide lanes, shoulders, landscaped medians with crash barriers, frequent roadside emergency phones and ample, well-adorned service areas. After reunification, the German government expedited upgrading of the old East German Autobahns in a series of "German Unity Transport Projects." Additions to the unified network increased the total to 11,515 km in the millenium year 2000 and 11,712 km by the end of 2001. By mid-2004, the program was over two-thirds complete with about 850 km upgraded and/or newly-built Autobahns (12,044 km by year's end). By 2007, there was 12,531 km inclusive in the unified Autobahn network.

When Germany was re-unified in 1989, the Autobahns of East Germany were in virtually the same condition as they were in 1945, exhibiting severe design deficiencies as well as inadequate signage, infrequent (and often non-functional) emergency telephones (located in the center median) and service areas consisting of a dilapidated roadhouse next to a wayside.

Left: caption: “An East-German ‘Autobahn’”

The general rule for modern Autobahn design is to provide for unimpeded, high-speed traffic flow. Aside from unimproved older segments, most Autobahns feature the following design elements:

- **Two, three, or occasionally four lanes per direction. Lanes on rural sections are generally 3.75-meters wide except the left lane of newer three lane segments (3.5-meters wide). On urban sections, all lanes are 3.5 meters wide;**
- **A landscaped "green" median 3.5 or 4-meters wide (3-meters in urban areas). A double-sided guardrail runs down the middle. Blinders are often used on curves. Some newer sections have concrete barriers instead of green medians;**
- **Outside emergency shoulders and long acceleration and deceleration lanes;**
- **Full grade-separation and access control, generally provided by half cloverleaf inter-changes at exits and full cloverleafs or directional interchanges at Autobahn cross-ings. Interchanges are generally well-spaced, sometimes exceeding 30 km between them;**
- **Grades of 4% or less. Climbing lanes are provided on most steep grades;**
- **Gentle and well-banked curves;**
- **Freeze-resistant concrete or bituminous surface;**
- **Roadbed and surface typically measuring about 75-cm (30-inches) in thickness;**
- **Reflector guide posts at 50-meter intervals;**
- **Frequent parking areas, often equipped with toilet facilities;**
- **Extensive and ample service areas featuring fuel stations, restaurants, and hotels;**
- **Automated traffic and weather monitoring and electronic signs providing dynamic speed limits and/or advance warning of congestion, accidents, construction, and fog;**
- **Emergency telephones at 2 km intervals;**
- **Pre-signed detour routes to facilitate emergency closures;**
- **Standardized signage, and;**
- **Wildlife protection fencing, crossover tunnels and "green bridges."**



The current autobahn numbering system in use in Germany was introduced in 1974. All autobahns are named by using the capital letter A (for "Autobahn") followed by a blank and a number (i.e. "A8"). The main German Autobahns (long-distance) have a single digit number. Shorter autobahns that are of regional importance (i.e. intercity) have a double digit number (i.e. "A24" - connecting Berlin and Hamburg). There are also some very short Autobahns built for local traffic (i.e. "ring roads") that usually have three digits for numbering (i.e. the "A555" - from Cologne to Bonn). The first digit used is similar to the system outlined, depending on the region. East-west routes are always even-numbered, north-south routes are always odd-numbered. The north-south Autobahns are generally numbered using odd numbers from west-to-east (i.e. the more easterly roads are given higher numbers). Similarly, the east-west routes are numbered using even numbers from north (lower numbers) to south (higher numbers).

Left: caption: "Pattern of autobahns 10 to 999"

Connectivity

"…Finally, there is the vast network of 64,500 miles of un-classified roads, which are the charge of the various urban and rural communities. Plans are now being prepared for the expansion of these roads on a ten-year basis, to become 'feeders' to the autobahnen. The expansion of this part of the German highway system is expected to cost $3.6 billion…"

***The Military Engineer,* May-June 1962**

"…In addition to the interurban road projects, the city streets, where traffic density is naturally greatest, have to be improved so that their traffic from and to the autobahnen and other interurban highways will not be delayed. Already many of the big cities have begun extensive schemes for the construction of streets, which are estimated to cost nearly $6 billion…"

***The Military Engineer*, May-June 1962**

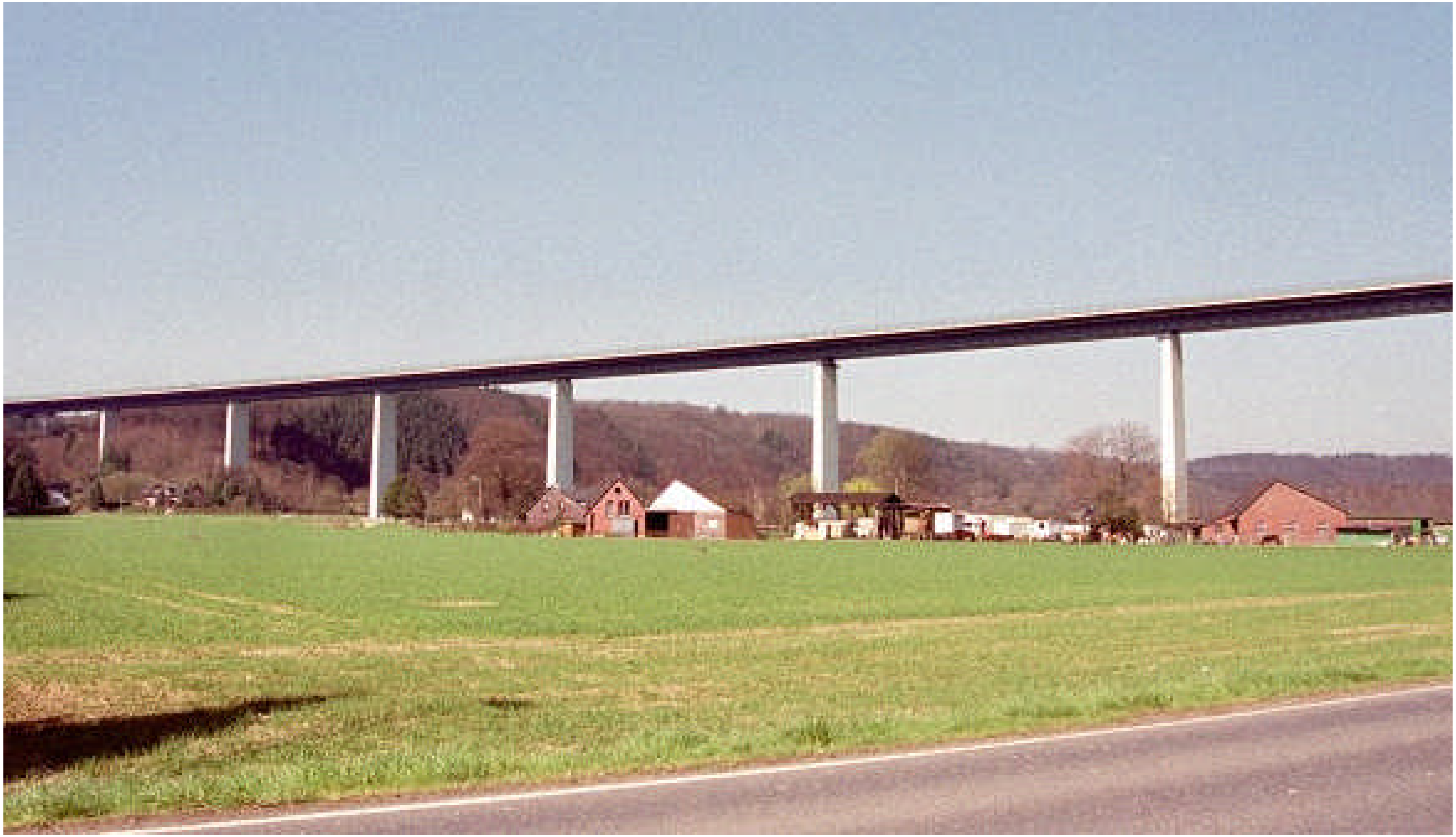
<u>Above</u>: caption: "New Expressway Being Built Through the Center of West Berlin. The tunnel leads under the main shopping streets.

Financing the Future

"…The over-all costs of the highway construction program now in hand total $14.28 billion. At the present level of construction, the entire cost of the Federal scheme is being met by the taxes on automotive fuels and vehicles. But, to cover the elaborate plans for the future, the Federal Government is working out a new highway-financing law which will raise $480,000,000 a year, and will divide and expand the original ten-year plan into three plans. This will enable the Government to conduct a program of long-term highway construction continuously. Each four-year plan will correspond with the period of legislature of the Federal Parliament, and thus avoid any disturbing influences of the elections on the highway program…"

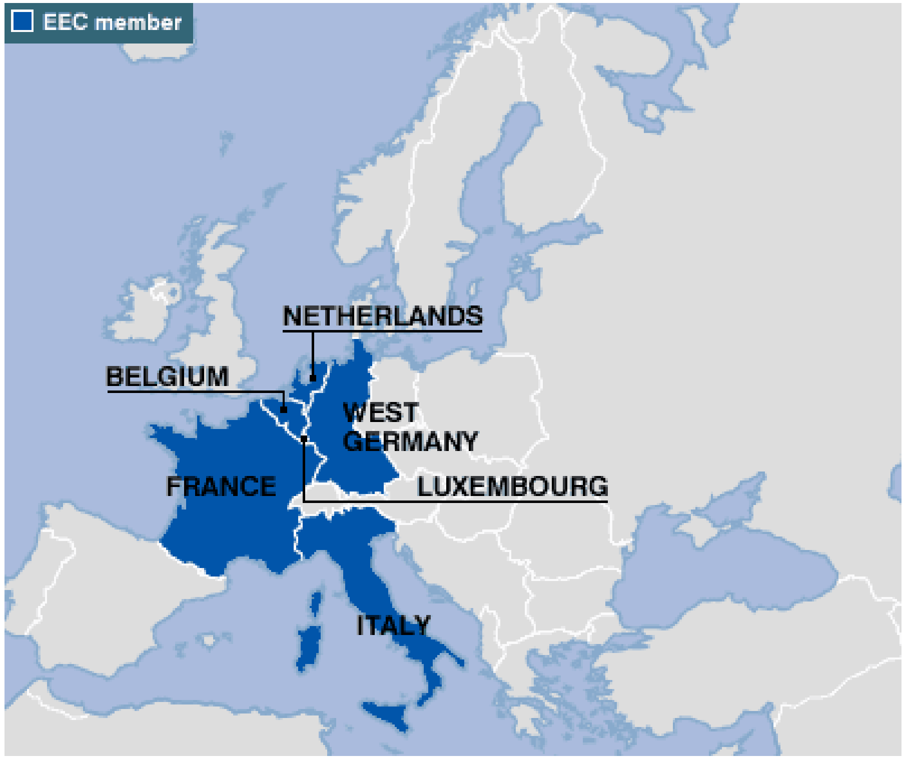
The Military Engineer, **May-June 1962**

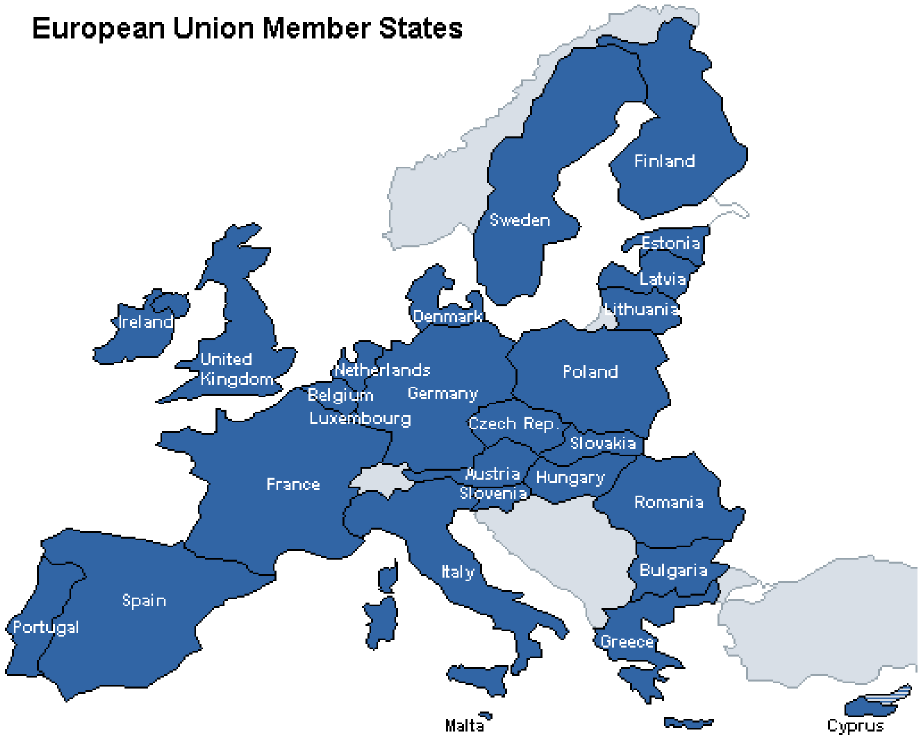
<u>Top</u>: caption: “Railroad for Materials Transport to Site. The light railroad is taken up and moved to the next section, as each 4-mile stretch is completed.”
<u>Bottom</u>: caption: “Elevated Section of Autobahn at Neanderthal. A viaduct carrying the Ruhr autobahn across a wide valley 15 miles north of Cologne.”



<u>Above</u>: caption: “Ruhrtalbrucke Mintard (Mintard Viaduct). Beginning of work: 15 August 1963; Completion: 1966. Steel box girder bridge. Main span: 126 m; height: 65 m; number of spans: 19; total length: 830 m. Location: Essen, North Rhine-Westphalia, Germany. Part of the A52 Autobahn. Cost of construction: 48,600,000 Marks.”

A United States of Europe (?)





"…The present existing and planned autobahnen will provide West Germany with a comprehensive network of high-speed roads both for internal traffic and to serve the rapidly increasing international traffic which has resulted from the introduction of the European Common market…"

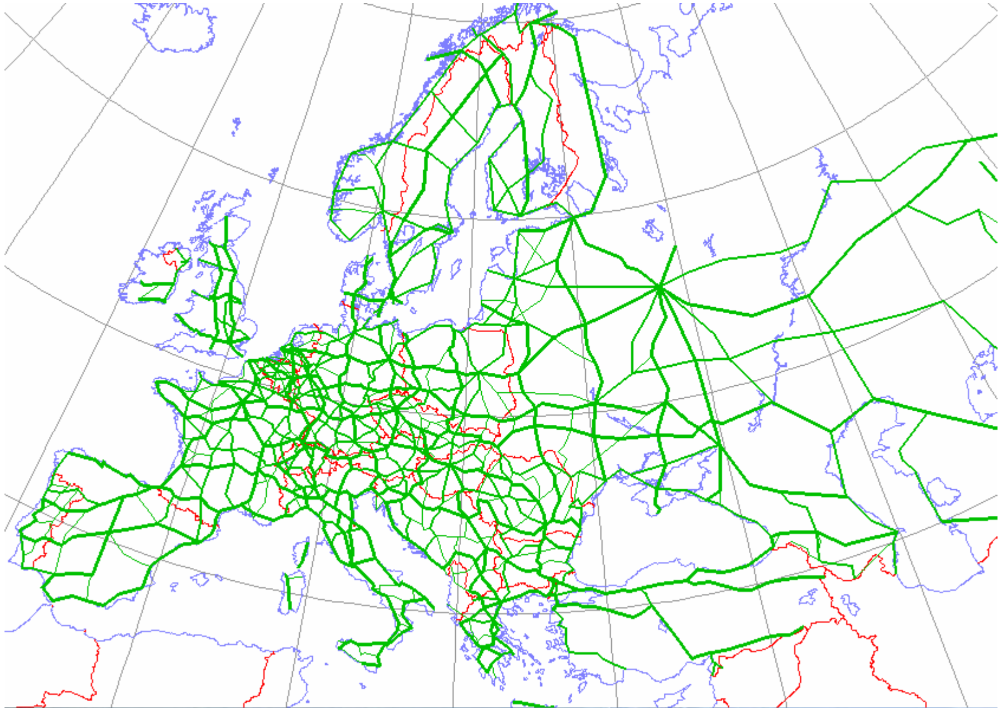
The Military Engineer, **May-June 1962**

<u>Above L&R</u>: in 1957, six countries (Map, left) signed the *Treaty of Rome* thus creating the *<u>E</u>uropean <u>E</u>conomic <u>C</u>ommunity* (EEC) or "Common Market." It would allow people, goods and services to move unhindered across national borders. Ultimately, the EEC lead to the creation of the *<u>E</u>uropean <u>U</u>nion* (EU), at right

North, South, East & West

"…Hitler's original autobahnen naturally embraced the whole of the country that was the Third Reich, thus including the the highways through Hanover to Berlin, from Frankfurt to Dresden, and Stuttgart to Munich. Although the east-west traffic has dwindled because of the division of the country, the western sections of these autobahnen provide valuable links with the highway systems of France, Holland, and Belgium…"

***The Military Engineer,* May-June 1962**



The *International E-road Network* is a numbering system for roads in Europe developed by the *<u>U</u>nited <u>N</u>ations <u>E</u>conomic <u>C</u>ommission for <u>E</u>urope* (UNECE). The network is numbered from "E1" up and its roads cross national borders. It also reaches Central Asian countries (i.e. Kyrgyzstan) since they are members of the UNECE. In most countries, roads carry the European route designation beside national road numbers. Other countries have roads with exclusive European route signage (i.e. E18) while others (i.e. England) show no routes at all. Other continents have similar international road networks. (i.e. the *Pan-American Highway, Trans-African Highway Network* and the *Asian Highway Network*).

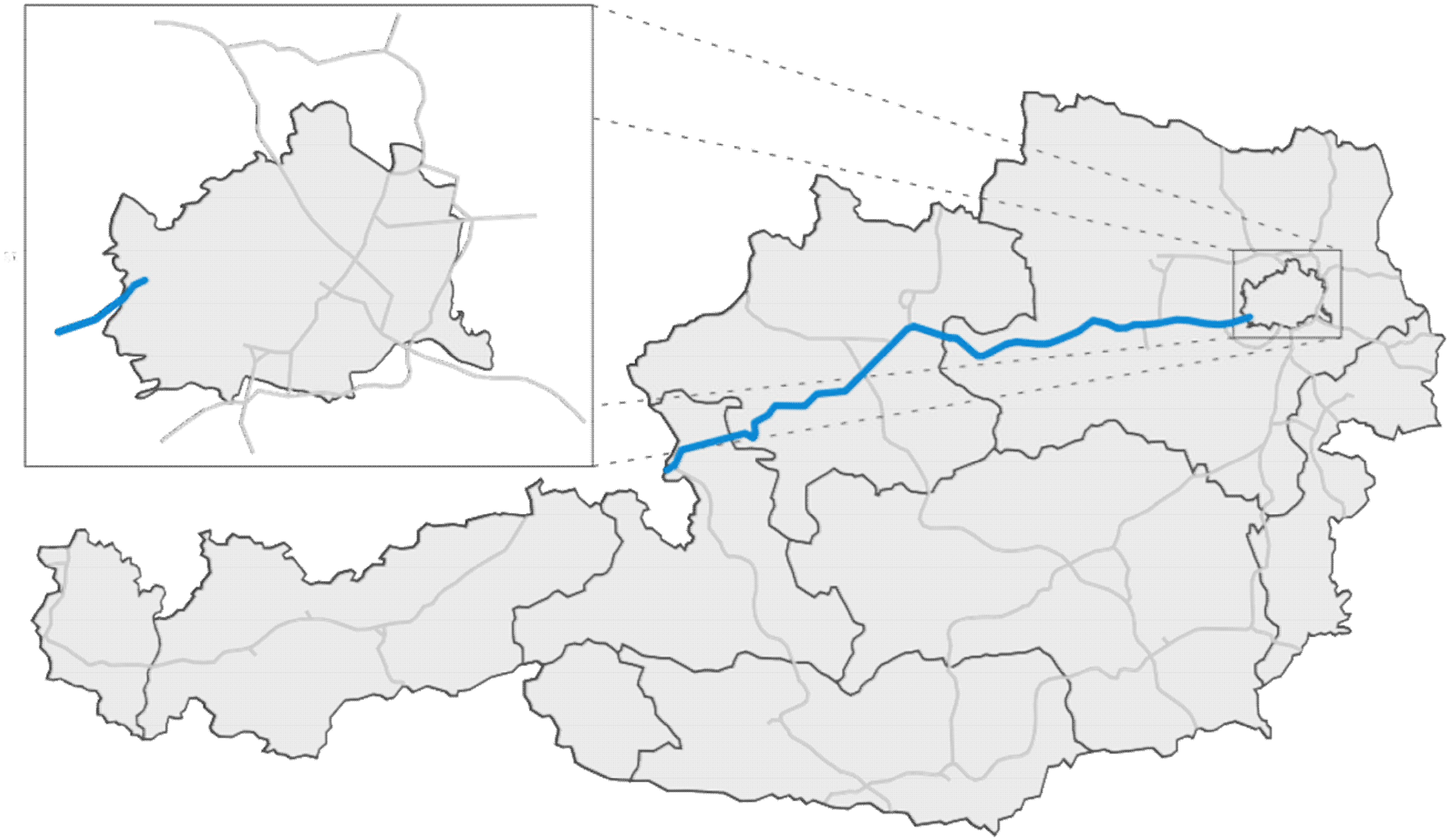
<u>Top</u>: caption: "E-Road Network over 1990 borders"

<u>Bottom</u>: caption: "Intersection of E42 and E451 near Frankfurt Airport"

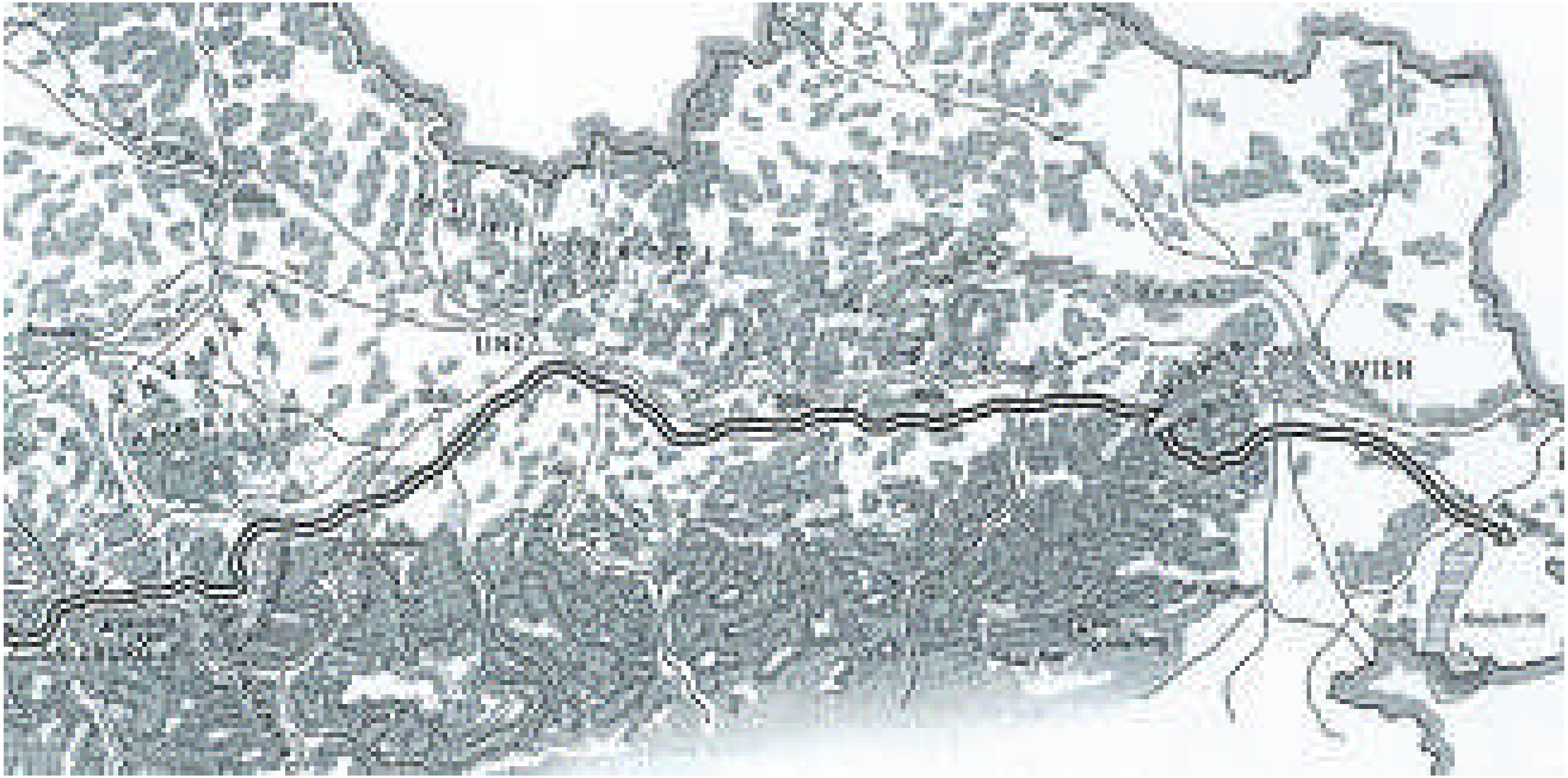
"…The new autobahnen, with a link south of Karlsruhe to Basel (for western Switzerland), from Munich eastwards to Kufstein (for the new Brenner Pass autobahn to Italy) and from Munich to Salzburg (for Vienna), are probably the most important, international highways ever conceived. Their value to European industry will be immense, while their strategic importance, in the case of a prolonged war, can equally be imagined."

***The Military Engineer,* May-June 1962**

Auslander Autobahns

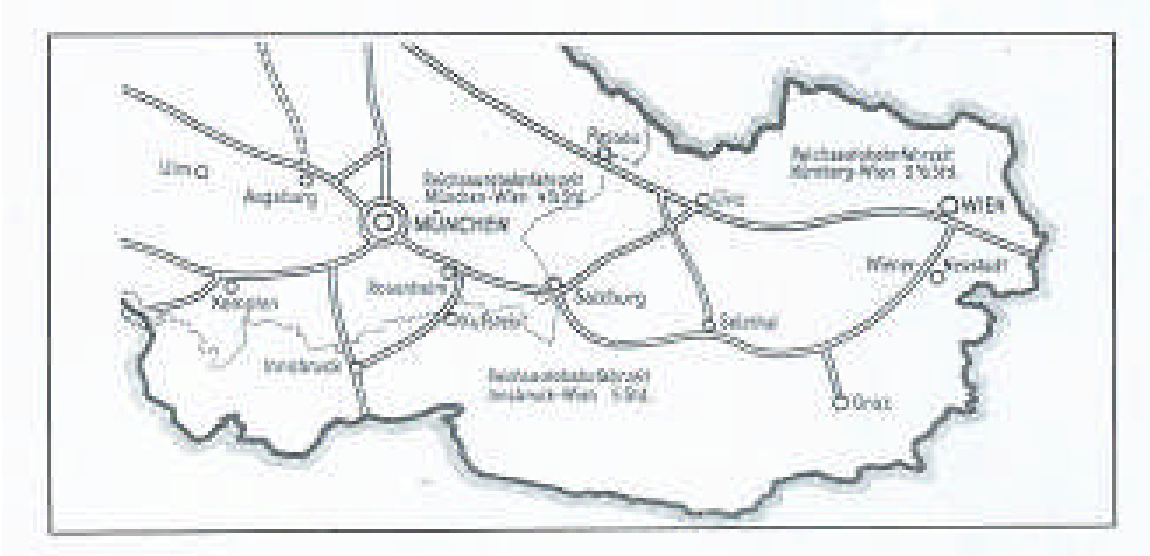


The *West Autobahn* (A1 - from Wals, near Salzburg, to Vienna) was the first Autobahn to be built in Austria (map, above), originating from plans drawn up for the *Reichsautobahn* system. Construction began shortly after the *Anschluss* (annexation of Austria in March 1938). Completed in 1967, today it runs from the outskirts of Vienna via Linz to Salzburg, where it joins the German *Bundesautobahn 8* (A8) at the Walserberg border crossing. The A1 is Austria's main east-west thoroughfare and part of the major European routes E55 and E60.



<u>Above</u>: caption: "The planned route of the line 'West-autobahn' 1938: Contrary to today's route leads through the Salzkammergut west of Lake Attersee and southwest of Vienna through the Vienna Woods"

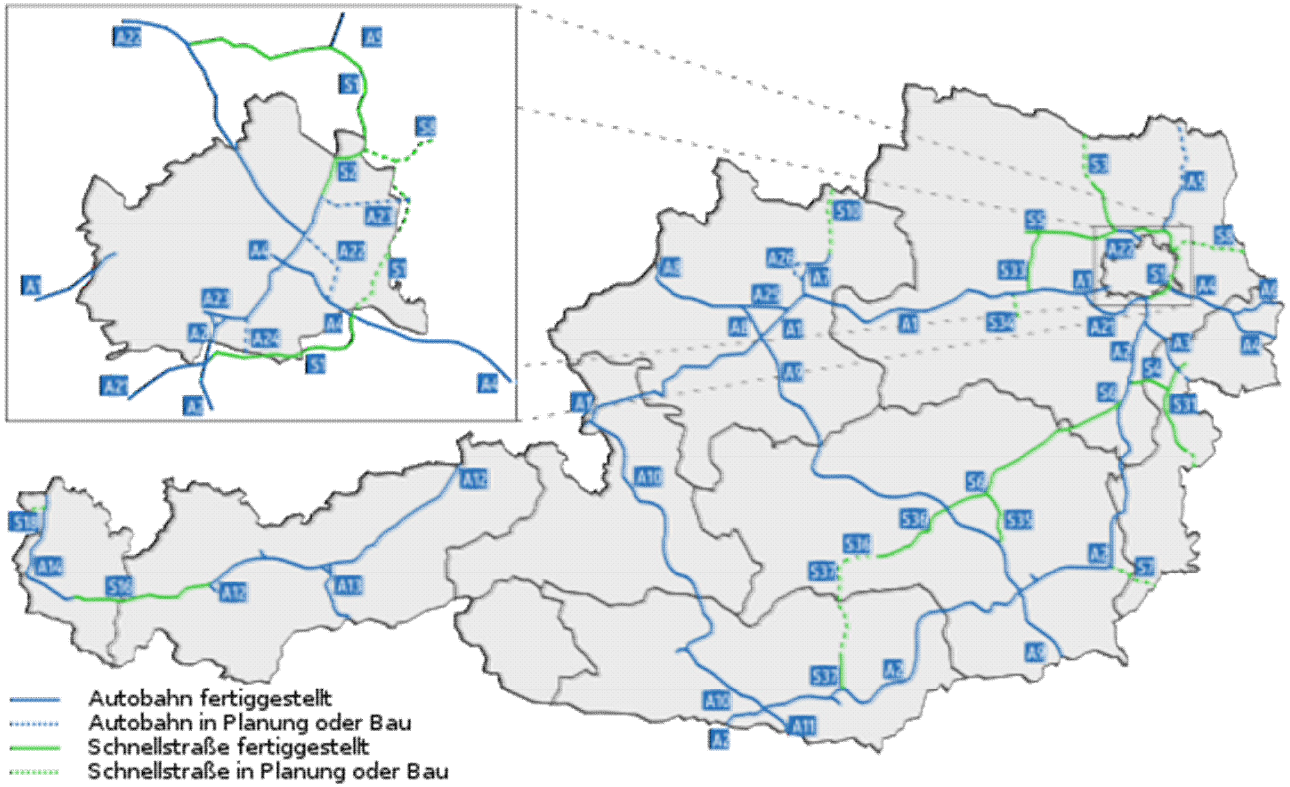

Above L&R: caption: “7 April 1938: Hitler turns the first sod at Walserberg, at Hitler’s left is Fritz Todt.” The construction of the first two sections (near Salzburg) started a few weeks after the Anschluss (the Nazi regime had long before set up plans for an eastern continuation of *Reichsautobahn 26* from Munich to Salzburg (present-day A8) towards Linz and Vienna in what was to become the German *Ostmark* (“Eastern March” - the name used by Nazi propaganda to replace that of the formerly independent *Federal State of Austria*). It extended the *Reichsautobahn 26* from Munich. However, only 16.8 km (including the branch-off of the planned *Tauern Autobahn*) was opened to the public (on September 13th 1941). Only two sections around Salzburg (with a total length of 12.5 km) were opened to traffic when work was discontinued the following year and was not resumed until 1955.



<u>Above</u>: caption: "Plans for the kingdom of highway network in the 'Ostmark' in the spring of 1938"

<u>Above</u>: caption: "Plans for the kingdom of highway network in the 'Ostmark' in August 1941"

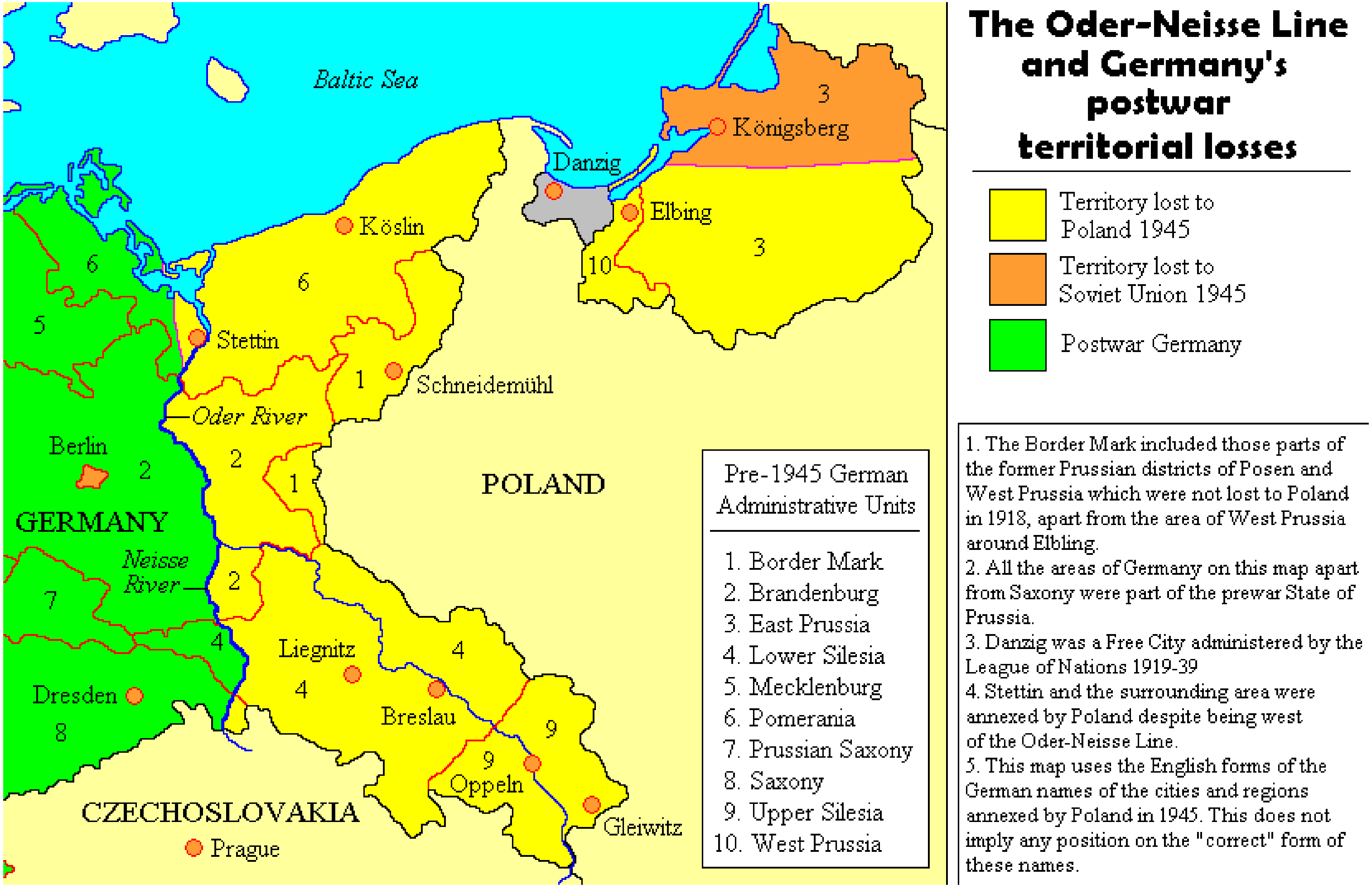
After the war, the interrupted construction work on the third section to Eugendorf was finished. Nevertheless, the further continuation could not be resumed under Allied occupation. Between 1947 and 1965, the completed sections northwest of Salzburg were used as a racing track (a/k/a “Little AVUS” - the site of an annual motorcycle race, later called *Grand Prix of Austria*). The construction of the A1 continued upon the signing of the *Austrian State Treaty* in 1955. The first post-war section (up to Mondsee, in Upper Austria) was opened in 1958, the route from Salzburg to Vienna was completed with the opening of the last segment at Amstetten in 1967.



Finishing work (near Strengberg, on the border between Upper and Lower Austria and of parts between Lambach and Vocklabruck, in Upper Austria) was completed in the 1970s. In Vienna, the *West Autobahn* intersects with the *B1 Wiener Strasse* highway in the *Hietzing District* (plans for a continuation to the city beltway were never carried out). Traffic significantly increased after the fall of the *Iron Curtain* in 1989 and the 2004 enlargement of the *European Union*. The *West Autobahn* joins the German A8 at the Walserberg border crossing. The A1 is Austria's main east-west thoroughfare and part of the major European routes E55 and E60.

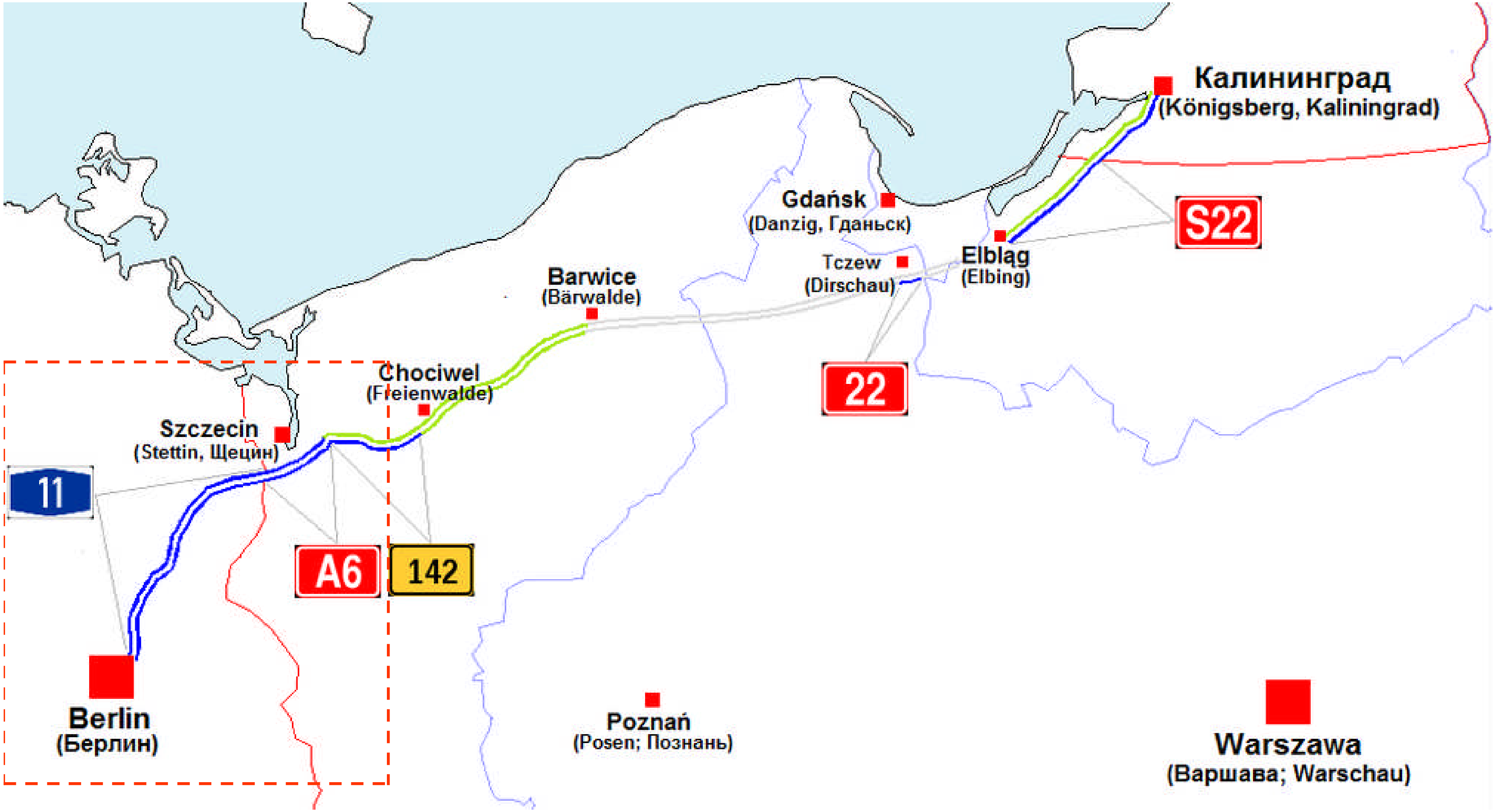
<u>Above</u>: caption: "Map of the Austrian Autobahn and Schnellstrasse system. Blue = Autobahn, Green = Schnellstrassee, Dotted = planned or under construction."

Top Left: caption: “Stein-hausl junction”
Top Right: caption: “A1 near Eugendorf”
Left: caption: “Walserberg border crossing”



Sections of the former German *Reichsautobahn* network in the former eastern territories of Germany became parts of Poland and/or the Soviet Union with the implementation of the *Oder-Neisse Line* (above) after WWII.

<u>Left</u>: caption: “A4 over-pass near Wrocław with Russianinscription: ***Водрузим над Берлином знамя победы*** **(Hoisted the banner of victory over Berlin) from the time the Soviet army marching on Berlin in 1945.”**



<u>Above</u>: parts of the planned Autobahn from Berlin to Konigsberg (a/k/a "Berlinka") were completed as far as Stettin (Szczecin) in September 1936. After the war, they were incorporated as the *A6 Autostrada* of the Polish motorway network.


GDAŃSK
Koszalin
Elbląg
Suwałki
OLSZTYN
SZCZECIN
Grudziądz
Łomża
BIAŁYSTOK
Piła
BYDGOSZCZ
TORUŃ
GORZÓW WLKP.
POZNAŃ
Świecko
Konin
WARSZAWA
Siedlce
ZIELONA GÓRA
Kukuryki
Leszno
ŁÓDŹ
Sieradz
Olszyna
Radom
Legnica
Piotrków Trybunalski
Chełm
LUBLIN
Jędrzychowice
WROCŁAW
Zamość
Częstochowa
KIELCE
OPOLE
KATOWICE
RZESZÓW
KRAKÓW
Tarnów
Korczowa
Gorzyczki
Bielsko-Biała
Krosno
Rabka
S6
S3
S22
A1
S11
S51
S61
S19
S10
A6
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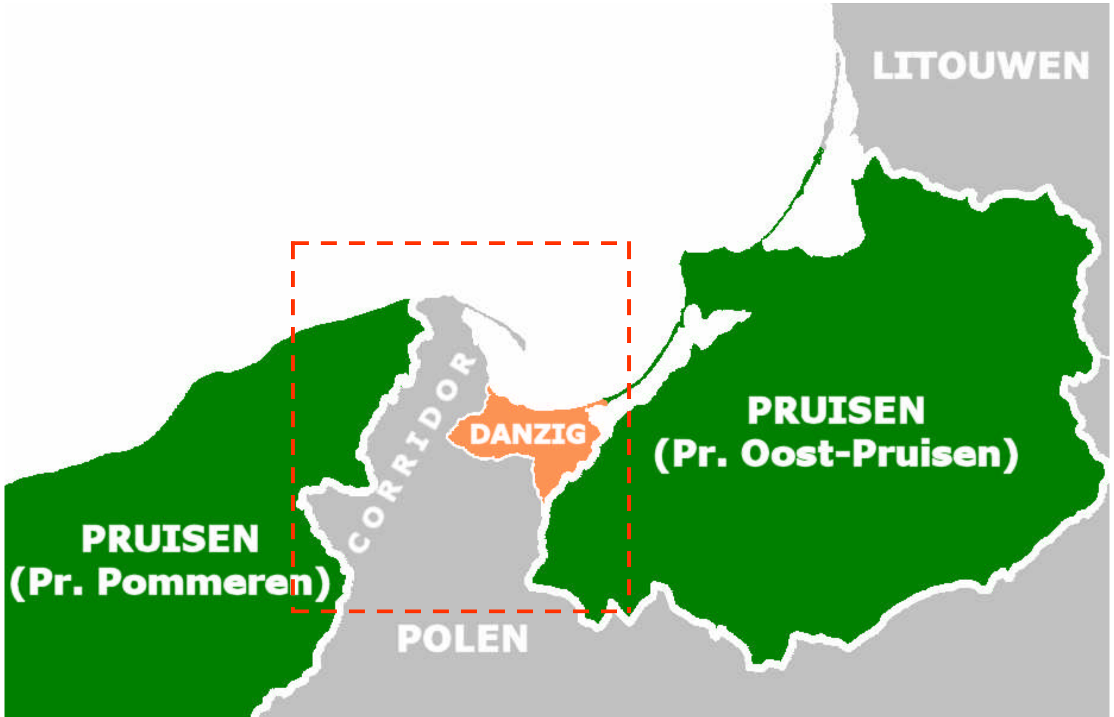
S74
A1
S1
S69



<u>Above L&R</u>: single-vehicle sect-ion of the *Berlinka* east of the former "Polish Corridor" (high-lighted, left) and the *Free City of Danzig* opened in 1938. Today, it forms the Polish *S22 Express-way* from Elblag (Elbing) to the border with the Russian Kalin-ingrad Oblast (highlighted, right).

<u>Left</u>: caption: "Stretch of S22 in Poland, east of Elblag

Also in September 1936, a section from Breslau (Wrocław) to Liegnitz (Legnica) in Silesia was inaugurated, which today is part of the Polish *A4 Autostrada* (left), followed by the (single vehicle) *Reichsautobahn 9* from Bunzlau (Bolesławiec) to Sagan (Zagan) the next year, today part of the Polish *A18 Autostrada* (highlighted, right)

<u>Above</u>: caption: “The Reichsautobahn bridge on the river Pasleka (former Passarga) was finished in 1935 and it was the longest bridge (over 350 m) on the panned highway from Berlin to Krolewiec. Not long ago, there were to see only pillars from the bridge.”

After the German occupation of Czechoslovakia, plans for a motorway connecting Breslau with Vienna via Brno (Brunn) in the "Protectorate of Bohemia and Moravia" (left) were carried out from 1939 until construction work discontinued in 1942. A section of the former *Strecke 88* near Brno is today part of the *R52 Expressway* of the Czech Republic.

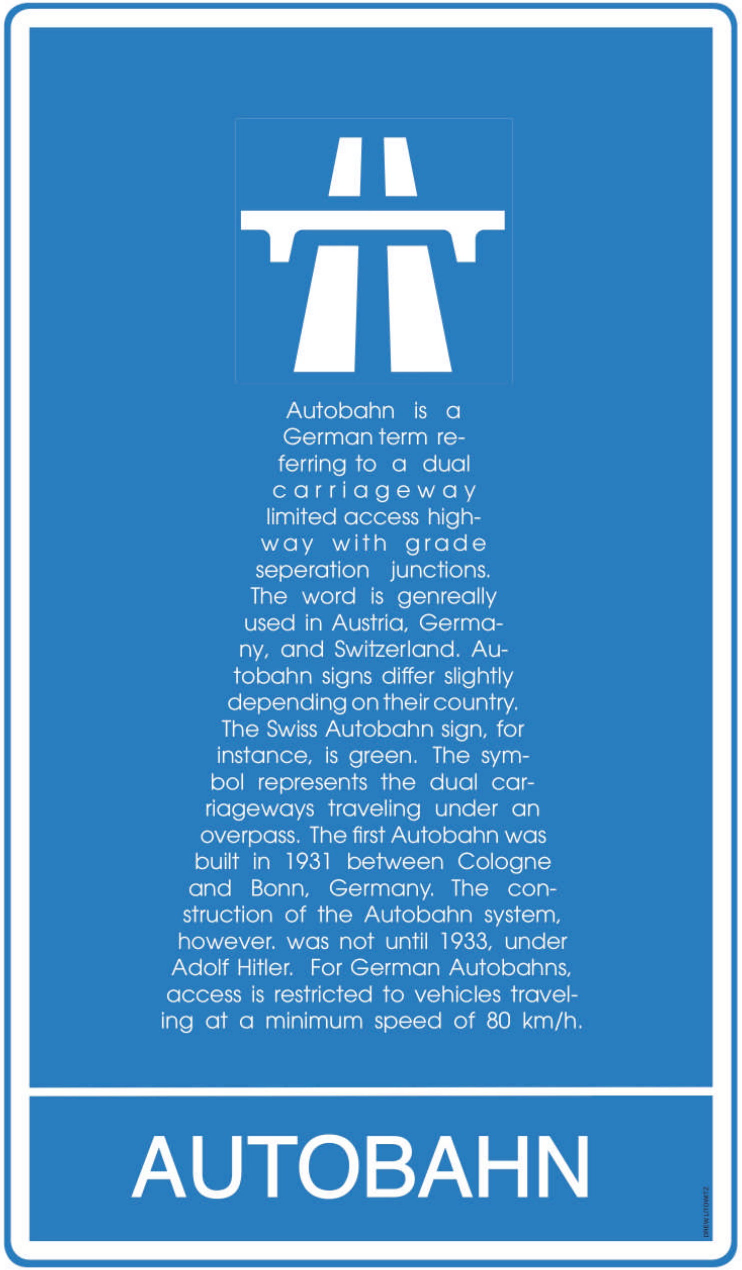
By 2013, Germany's Autobahn network had a total length of about 12,845 km. Starting in 2009, Germany embarked on a large-scale widening and rehabilitation project; expanding the lane count of many of its major arterial routes (i.e. A5, in the southwest and A8, running east-west.) Most sections of Germany's autobahns are modern, containing two or three and sometimes four lanes in addition to an emergency lane (hard shoulder). Some other sections remain with their two original lanes and no emergency lane.

<u>Above</u>: caption: "This autobahn has three separated lanes in each direction and an emergency lane"

Part 10

The Need for Speed

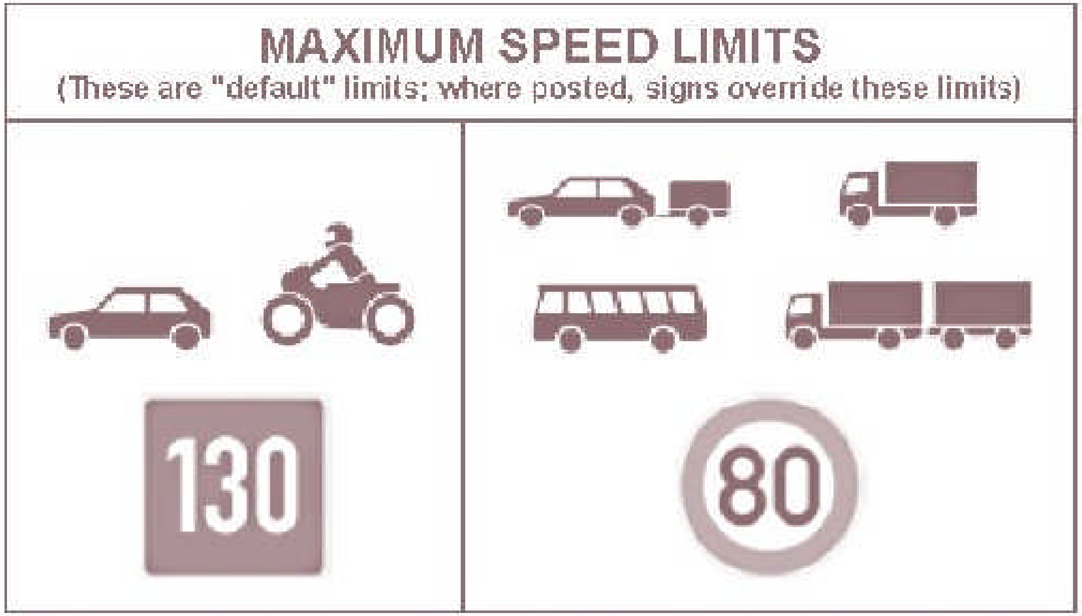
Culture Shock



"Along with bier, bratwurst and unlikeable Formula 1 drivers, it is one of Germany's main cultural identifiers. It is often mentioned in hushed, reverential tones by motoring enthusiasts and looked at with a mix of awe and terror by outsiders. The autobahn…"

The West Australian, **September 2013**

RE: Germany's world-famous Autobahns are known for being among the few public roads in the world without blanket speed limits for cars and motorbikes. Therefore, the Autobahnen are an important part of German culture and national identity.



Certain limits are imposed on some classes of vehicles:

• **60 km/h (37 mph):** Buses carrying standing passengers / Motorcycles pulling trailers;
• **80 km/h (50 mph):** Vehicles with maximum allowed weight exceeding 3.5 tons (except passenger cars) / Passenger cars and trucks with trailers / Buses;
• **100 km/h (62 mph):** Passenger cars pulling trailers certified for 100 km/h / Buses certified for 100 km/h not towing trailers.

Additionally, speed limits are posted at most on and off-ramps and interchanges and other danger points (i.e. sections under const-ruction)

"…if you get the chance and you're a driver not easily rattled, it's well worth it as it is an eye-opening experience of just how efficiently roads can operate. On some drives, you may only encounter bursts of a few kilometers of autobahn driving and sometimes you have to travel slower than you'd like because of roadworks or traffic congestion. But when you do see an autobahn sign (a speed limit sign with two lines through it), it's certainly an experience…"

***The West Australian,* September 2013**

RE: except at construction sites, the general speed limits (where they apply) are usually between 100 km/h (62 mph) and 130 km/h (81 mph). Construction sites usually have a speed limit of 80 km/h (50 mph) but the limit may be as low as 60 km/h (37 mph) or, in very rare cases, 40 km/h (25 mph). Certain stretches of Autobahn have lower speed limits during wet weather while other areas have a speed limit of 120 km/h (75 mph) in order to reduce noise pollution during overnight hours (typically 10pm – 6am) or because of increased traffic during the daytime (6am – 8pm).

Richtgeschwindigkeit

Where no general limit is required, the advisory speed limit is 130 km/h (81 mph), referred to in German as the *Richtgeschwindigkeit* (the advisory speed is not enforceable). However, being involved in an accident when driving at higher speeds can lead to the driver being deemed at least partially responsible due to "increased operating danger" (*Erhohte Betriebsgefahr*).

<u>Left</u>: caption: "On the autobahns there is an advisory speed limit (*Richtgeschwindigkeit*) of 130 km/h (unless otherwise regulated by signs)"

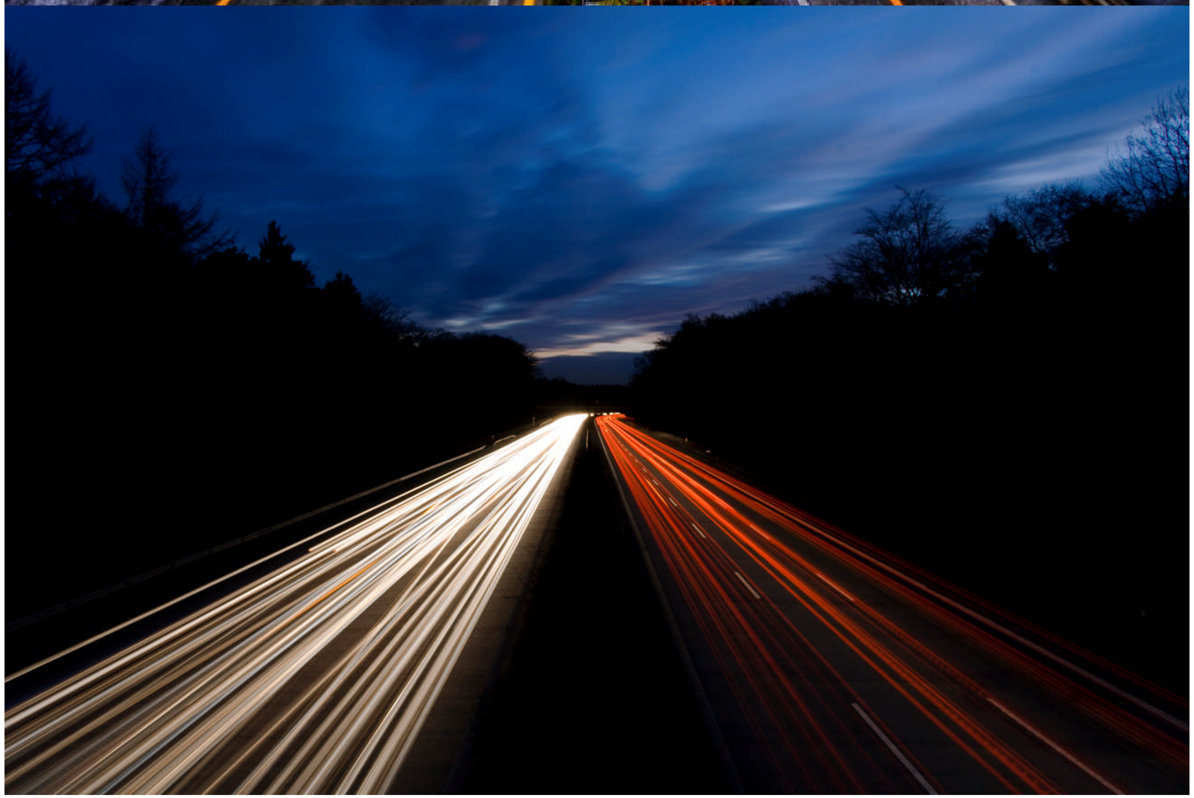

130


130

They Know How to Drive

"…As you first climb up to a rapid speed it does feel odd, as if you're definitely doing something illegal. Not having a whole lot of experience driving on the right-hand side of the road certainly doesn't help. And then, things start to become easier. You're still concentrating at a much-heightened level and looking a lot further down the road than you otherwise would. As everyone is traveling at a similar speed, it is remarkable how quickly 150 km/h can feel pedestrian after sitting on 190 km/h for a few clicks. You find yourself spending a lot more time checking mirrors, as the speck roughly a kilometer behind you can very quickly turn into a BMW whizzing past you at 250 km/h…"

***The West Australian*, September 2013**



"…Nevertheless, it all works seamlessly and soon enough, a 200 km or so trip is wrapped up in well under two hours…the key is the strict obedience placed on the rules by German drivers. In short, they know how to drive…"

***The West Australian,* September 2013**

<u>Left</u>: caption: the "limits no longer apply" (*Ende aller Streckenverbote*) sign, indicating a return to the default speed, while lifting all other limits as well (all limits are indicated by round signs with red border)

Americans Aren’t

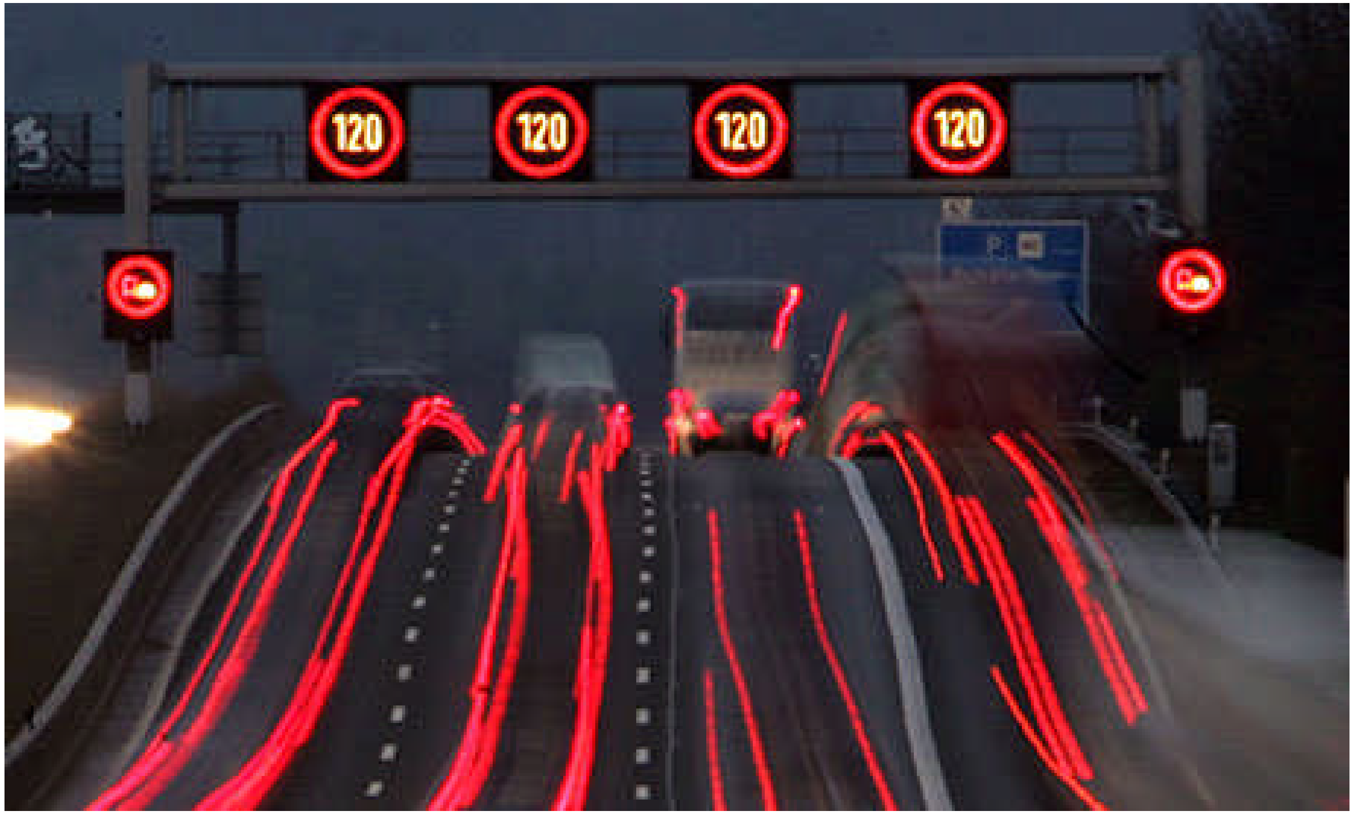
"It's difficult to get a driver's license in the united Germany. For instance, would-be auto pilots have to take formal courses in high-speed car control, because the way cars behave above 90 mph (a lighter front end being part of the dynamics) is radically different. 'I had no idea it could be this hard,' said Karen, an American trying to get licensed in Germany. There are 14 required theory lessons and at least a dozen driving sessions. The bottom line is that German drivers are well-schooled in handling no-speed-limit high-ways; Americans, unfortunately, aren't."

***mnn.com,* May 2015**

Dynamic Guidance

Some speed limits were imposed on the Autobahn to reduce pollution and noise. Limits can also be temporarily put into place through dynamic traffic guidance systems that display the according message. More than half of the total length of the German Autobahn network has no speed limit, about one third has a permanent limit, and the remaining parts have a temporary or conditional limit.

<u>Above</u>: caption: “Dynamic traffic signs on an Autobahn”


120
120
120
120

Gentlemen’s Agreement

"…Even those doing 250 km/h will move out of the far left lane where possible. Everyone knows to check their mirrors multiple times before changing lanes to overtake…their ability to merge makes you almost weep with joy…"

***The West Australian,* September 2013**

"…the Autobahn is indeed a high-speed road but, it also has general speed limits of 100 km/h (62 mph), 120 km/h (74.5 mph), 130 km/h (81 mph) at junctions or in dangerous and under-construction areas. Nevertheless, there are several points without speed limits for cars and motorcycles…What's interesting is that some people are pretty disappointed when they first drive on the Autobahn. Most of them imagine it as a large highway, with trillions of lanes (OK, not that many, but you got the point) that lets you drive insanely fast. Well, the Autobahn looks just like any other highway, with emergency phones, road signs and friendly drivers…"

***Autoevolution.com,* November 2010**

"…Another thing worth mentioning is the 250 km/h maximum speed limit most large German automakers implemented on their vehicles which, according to various sources, was especially introduced due to the risk of tire failures or dangerous maneuvers made by inexperienced drivers at very high speeds. Nevertheless, speeds exceeding 300 km/h are often seen on the Autobahn, as owners of aftermarket and customized models travel to Germany especially to test their cars on the highway…"

***Autoevolution.com,* November 2010**

RE: some German cars (with powerful engines) can reach speeds of well over 300 km/h (190 mph). Major German car manufacturers (with the exception of *Porsche*) follow a *Gentlemen's Agreement* by electronically limiting the top speeds of their cars (with the exception of some top of the range models or engines) to 250 km/h (155 mph). These limiters can be deactivated thus, speeds up to 300 km/h can be attained. However, due to traffic conditions, such speeds are generally not attainable. In fact, most unlimited sections of the Autobahn are located outside densely populated areas.


POLIZEI
POLIZEI


14:36
TV: DTV
BR-alpha
6°c
km/h
rpm x 1000

“…Despite the fact that it is usually known as a no-speed-limit highway, the Autobahn is mostly based on dynamic street regulations that change the maximum allowed speed by a number of factors, including weather, traffic conditions and vehicle type. In short terms, the dynamic speed limits vary between 80 and 130 km/h (50-80 mph) but can go as low as 60 km/h (37 mph) in construction zones. In addition, the authorities have also imposed a set of new rules during nighttime and rain for all types of vehicles. However, there’s always the recommended speed of 130 km/h (81 mph) even in areas without specific speed regulations. An interesting aspect is that in case a driver exceeds this limit and is involved in a car accident, he may become responsible for all damages even if he’s not the one causing the crash. Vehicles with maximum speeds lower that 60 km/h are strictly prohibited on the Autobahn. This is why certain carmakers designed new models with top speeds rated at 62 km/h, just to gain access to the freeway and travel across Germany faster than on regular roads…”

***Autoevolution.com*, November 2010**

Vehicles with a top speed less than 60 km/h (37 mph) such as quads, low-end microcars and agricultural/construction equipment are not allowed to use the Autobahn, nor are motorcycles and scooters with low engine capacity regardless of top speed (mainly applicable to mopeds which are typically limited to 25 or 45 km/h). To comply with this limit, heavy-duty trucks in Germany (i.e. mobile cranes, tank transporters etc.) often have a maximum design speed of 62 km/h (39 mph), usually denoted by a round black-on-white sign with “62” on it along with flashing orange beacons to warn approaching cars that they are traveling slowly. There is no general minimum speed, but drivers are not allowed to drive at an unnecessarily low speed as this would lead to significant traffic disturbance and an increased collision risk.


30 km/h
40 km/h
50 km/h
60 km/h
70 km/h
80 km/h
90 km/h
100 km/h
110 km/h
120 km/h
130 km/h

There are five main types of roads in Germany with the following speed limits:

Type of Road	Speed Limit
• Motorway	Variable – 80 mph (130km/h) suggested
• Dual Carriageways	Variable – 80 mph (130km/h) suggested
• Single Carriageways	62 mph (100 km/h)
• Built-up Areas	31 mph (50 km/h)
• Residential Areas	19 mph (30 km/h)

Germans are some of the best drivers in the world and have to pass a rigorous test in order to get their driving license thus, they take their driving very seriously (no student drivers are allowed on the Autobahn and the minimum age to attain a drivers license is 18yo). The only vehicles permitted on the Autobahn are those that can sustain 60 km/h (35mph) on the flat.

Drivers must keep to the right and, if not otherwise indicated, give way to traffic coming from the right. Slow moving vehicles must always move to the right and faster vehicles may pass on the left only. However, there is an exception to this rule: when both lanes are moving under 60km/h (35mph) drivers can pass on the right, but no faster than 20km/h (12 mph) than the traffic in the left lane. The Autobahnpolizei can fine a driver for going too fast on the Autobahn if they deem them to be traveling too fast for the driving conditions. Many German towns and cities are low emission zones (*Umweltzone*). In order to drive through the area without risking a fine, cars are required to display an environmental zone sticker to indicate that the car complies with emissions regulations. In the winter, by law, vehicles must have winter or all-season tires (the Autobahnpolizei will fine a driver caught driving on summer tires during the winter season).

It’s Not Flawless

"…With our vast lengths of highway, some people may think Australia would be the perfect place for no speed limit sections. It'd certainly make that boring part of Forrest Highway south of Perth a lot more riveting. After a few days, I too was starting to think such a system would be great at home. But I discovered it's not flawless…"

***The West Australian,* September 2013**

"…Traveling at such speed will chew through the fuel in most cars and such concentration leaves you fatigued. Accidents do still happen and there is no terror you'll experience while behind the wheel as sharp as that you feel while sitting north of 200 km/h and thinking the guy in the next lane in front of you is going to suddenly change lanes…"

***The West Australian,* September 2013**

RE: in 2013, Germany's Autobahns carried 31% of motorized road traffic while accounting for only 13% of traffic deaths. The Autobahn fatality rate of 1.9 deaths per billion-travel-kilometers compared favorably with the 4.7 rate on urban streets and 6.6 rate on rural roads.

"…Paradoxically and contrary to what you may expect from such a high-speed road, the Autobahn is way safer than other roads, according to figures provided by the German authorities. For example, in 2005 there were 'only' 662 accidents on the highway compared to 4,699 on other roads…"

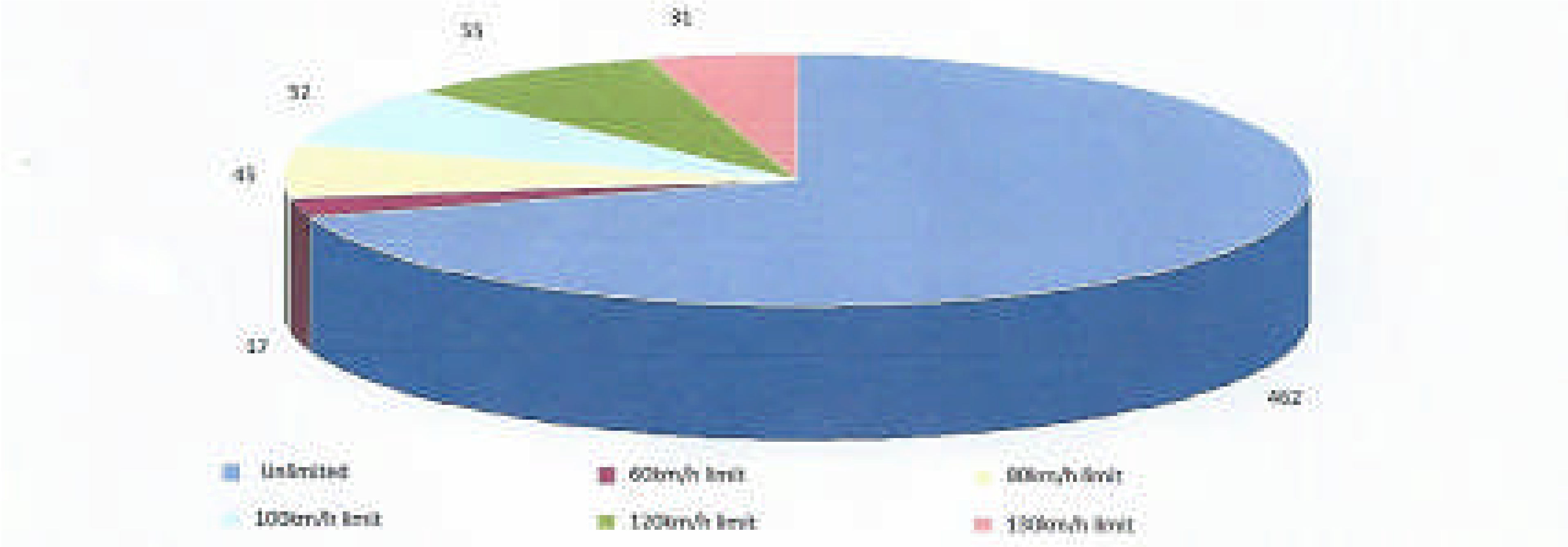
Autoevolution.com, **November 2010**

Left: caption: "Wrecked vehicles piled into each other on Autobahn A31 after a multiple collision caused by thick fog near Heek, northern Germany, 19 November 2011. Three people lost their lives and 35 others were injured, some seriously. A total of 52 vehicles were involved in the accident."


COE FE 214

"…And such figures occur despite the fact that the Autobahn is one of the most crowded roads in central Europe. Statistics show that in 2004, vehicles traveling across Germany on the highway made approximately 218.9 billion kilometers, with 50,000 motorists entering the Autobahn every day. Unfortunately, this can only lead to traffic jams which are pretty natural for Germans especially on Fridays and Sundays and in under-construction areas…"

***Autoevolution.com*, November 2010**



"…One argument used in favor of the status quo is that a similar proportion of deaths on the motorways in Germany occur on sections without speed limits as on sections with limits. According to the German Statistics Agency, of the 645 road deaths that occurred on motorways in 2006, 441 or 67% occurred on motorway sections without limits. This is consistent with the figures from the previous year, 2005, when 662 deaths occurred on motorways, 462 (70%) of them on unlimited sections (fig. 3)…"

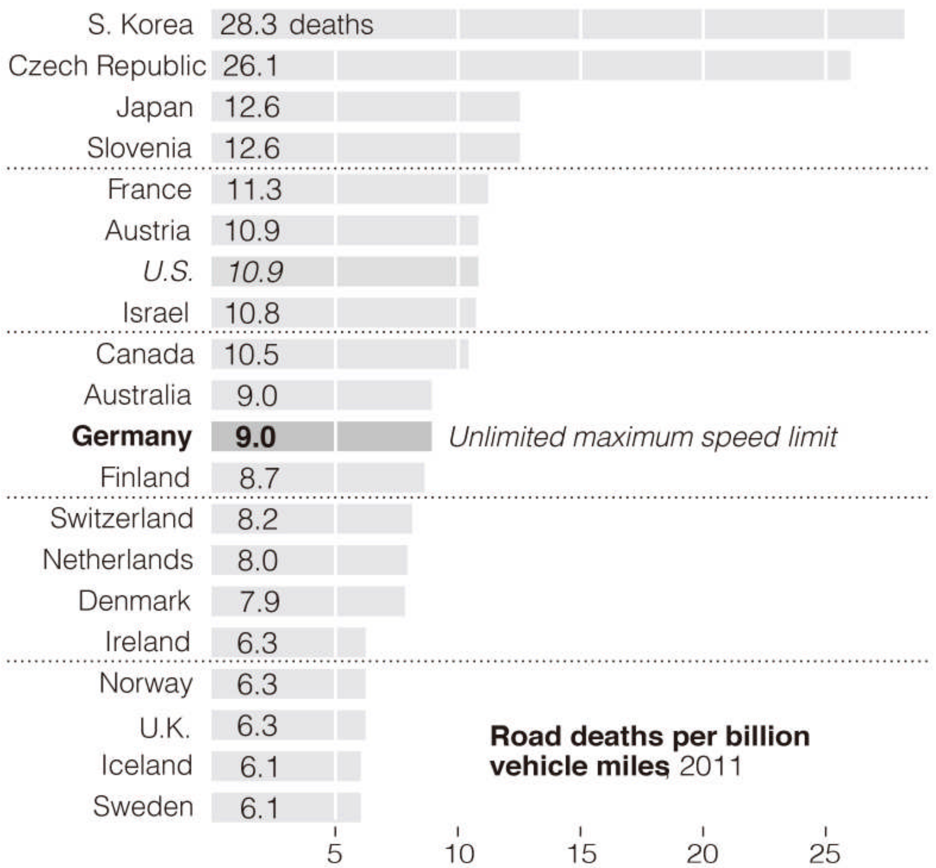
European Trade Safety Council **(ETSC)**

RE: excerpt from the *ETSC Speed Fact Sheet 1* (2008)

Above: caption: "Figure 3: Deaths on the Autobahn for 2005 by speed limit at accident sites (Deutsche Hochschule der Polizei)

Road fatalities in Germany

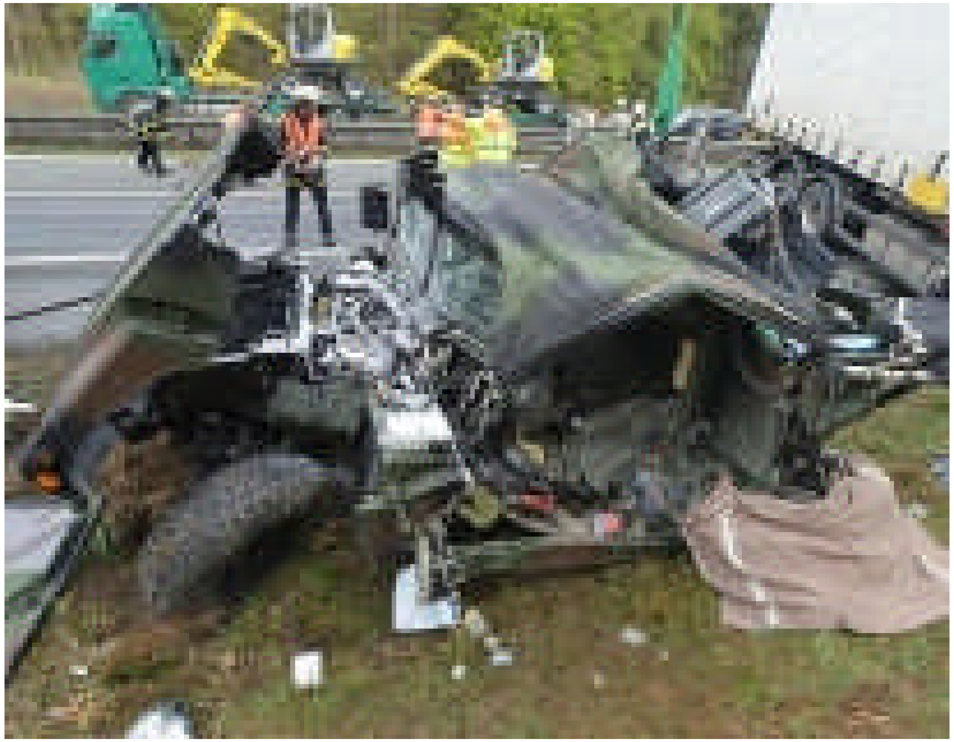
Despite the unlimited speeds on parts of German roadways deaths there rank toward the middle of comparable nations.



Note: Canada, Denmark data from 2010

Source: Police recorded data via International Transit Forum-OECD THE WASHINGTON POS

Between 1970 and 2010, overall German road fatalities decreased by almost 80% (from 19,193 to 3,648). Over the same time period, Autobahn deaths halved from 945 to 430 deaths. Statistics for 2013 show total German traffic deaths declined to their lowest count ever recorded (3,340). The *Federal Statistical Office* attributed the general decline to harsh winter weather that delayed the start of the motorcycle-riding season. However, Autobahn deaths increased (over 2012 counts) from 387 to 428. In 2014, total German fatalities rose slightly (to 3,377) while Autobahn deaths dropped to 375.



<u>Left</u>: caption: “A U.S. Army Humvee lies in shambles after it was struck by a civilian truck on the autobahn near Bamberg, Germany, on Tuesday. A U.S. soldier was killed and five others were injured. The truck driver, from Nuremberg, was slightly injured” (April 2012)

“…*Talking about the Autobahn can take forever so, as a conclusion, here are some of the most important facts regarding the German highway:*

- **There are two different emergency phone types on the highway (older ones with covers and handle and newer ones with external speaker-phones);**
- **An English-speaking dispatcher is always available for emergency calls;**
- **All direction signs on the Autobahn are white on blue;**
- **The Autobahn has more than 700 service centers open 24 hours a day;**
- **Passing on the right side of the highway is strictly prohibited;**
- **Stopping, turning and parking are strictly forbidden, except for emergencies;**
- **In case of an accident motorists must move to the emergency lane and place a reflective warning triangle 200 meters behind the scene of the accident;**
- **During traffic jams, motorists in the left lane must move to the left as much as possible while those on the right must move to right in order to allow emergency vehicles to pass;**
- **The last vehicles in a traffic jam must turn on their hazard lights in order to warn approaching motorists to slow down;**
- **The Autobahn is made of freeze-resistant concrete, and;**
- **The emergency phones are installed every 2 kilometers.”**

***Autoevolution.com,* November 2010**

<u>Above</u>: caption: “Road kilometer sign German federal motorway ‘Autobahn 6,’ km 565.0 near Mannheim”

<u>Left</u>: caption: “Emergency telephone”

Freie Fahrt fur Freie Burger

"…However, in reality, it took an army of people to construct carriageways good enough to handle such driving and the Germans have had the system for decades. More so, it is doubtful many countries would have drivers capable of having such a network at their disposal without it turning into a terrifying free for all…"

The West Australian, **September 2013**

RE: German national speed limits have a historical association with wartime restrictions and deprivations, the Nazi era and the Soviet era in East Germany. "Free driving for free citizens" ("Freie fahrt fur freie burger"), a slogan promoted by the *German Auto Club* since the 1970s, is a popular among those opposing Autobahn speed restrictions.

“The speed limit in Germany has a similar status as the right to bear arms in the American debate...A speed limit will be at some point reality here, and soon we will be able not imagine ourselves without it. It’s like the smoking ban in restaurants”
Tarek Al-Wazir, **German Green Party**

RE: the *Weimar Republic* had no federally required speed limits. The A555 (between Bonn and Cologne) had a 120 km/h (75 mph) limit when it opened in 1932. In October 1939, the Nazi Party instituted the first national maximum speed limit; speeds decreased to 80 km/h (50 mph) in order to conserve gasoline for the war effort. After the war, the four *Allied Occupation Zones* (OCZ) established their own speed limits until the divided East German and West German Republic/s were established in 1949 (initially, Nazi-era speed limits were restored in both East and West Germany). In December 1952, the West German legislature voted to abolish all national speed limits, seeing them as Nazi relics, reverting to State-level decisions. National limits were re-established incrementally. The 50 km/h (31 mph) urban limit was enacted in 1956, effective in 1957. The 100 km/h (62 mph) limit on rural roads (except Autobahns) became effective in 1972.

Just prior to the 1973 oil crisis, Germany, Switzerland and Austria all had no general speed restriction on their Autobahn networks. During the crisis, Germany imposed temporary speed restrictions (i.e. 100 km/h or 62 mph on Autobahns, effective November 13th 1973). The 100 km/h limit (championed by Transportation Minister *Lauritz Lauritzen*) lasted 111 days. Austria and Switzerland imposed permanent 130 km/h (81 mph) limits after the crisis. However, after the crisis eased in 1974, the upper house of the *West German Parliament* (controlled by conservative parties) successfully resisted the imposition of a permanent mandatory limit supported by Chancellor *Willy Brandt*. The upper house insisted on a 130 km/h (81 mph) recommended limit until a thorough study of the effects of a mandatory limit could be conducted. Accordingly, the *Federal Highway Research Institute* (FHRI) conducted a multiple-year experiment, switching between mandatory and recommended limits on two test stretches of autobahn. In the final report (issued in 1977), the FHRI stated the mandatory speed limit could reduce the Autobahn death toll but there would be economic impacts thus, a political decision had to be made due to the trade-offs involved. At that time, the Federal Government declined to impose a mandatory limit. The fatality rate trend on the German Autobahn mirrored those of other nations' motorways that imposed a general speed limit.

"…So no, it probably would not be best for us if no speed limits were somehow made law. Still, it is nice to fantasize about a world where down south is barely an hour away..."

***The West Australian,* September 2013**

RE: in 2012, the leading cause of German Autobahn accidents was "excessive speed (for conditions)." A total of 6,587 "speed related" crashes claimed the lives of 179 people, representing almost half (46.3%) of 387 Autobahn fatalities that year. However, "excessive speed" does not mean that a speed limit has been exceeded, but that police determined at least one party traveled too fast for existing road or weather conditions. On German Autobahns, 22 people died per 1K injury crashes (a lower rate than the 29 deaths per 1,000 injury accidents on conventional rural roads, which in turn is five times higher than the risk on urban roads). Speeds are higher on rural roads and Autobahns than on urban roads, increasing the severity potential of a crash.

Nein, Danke!

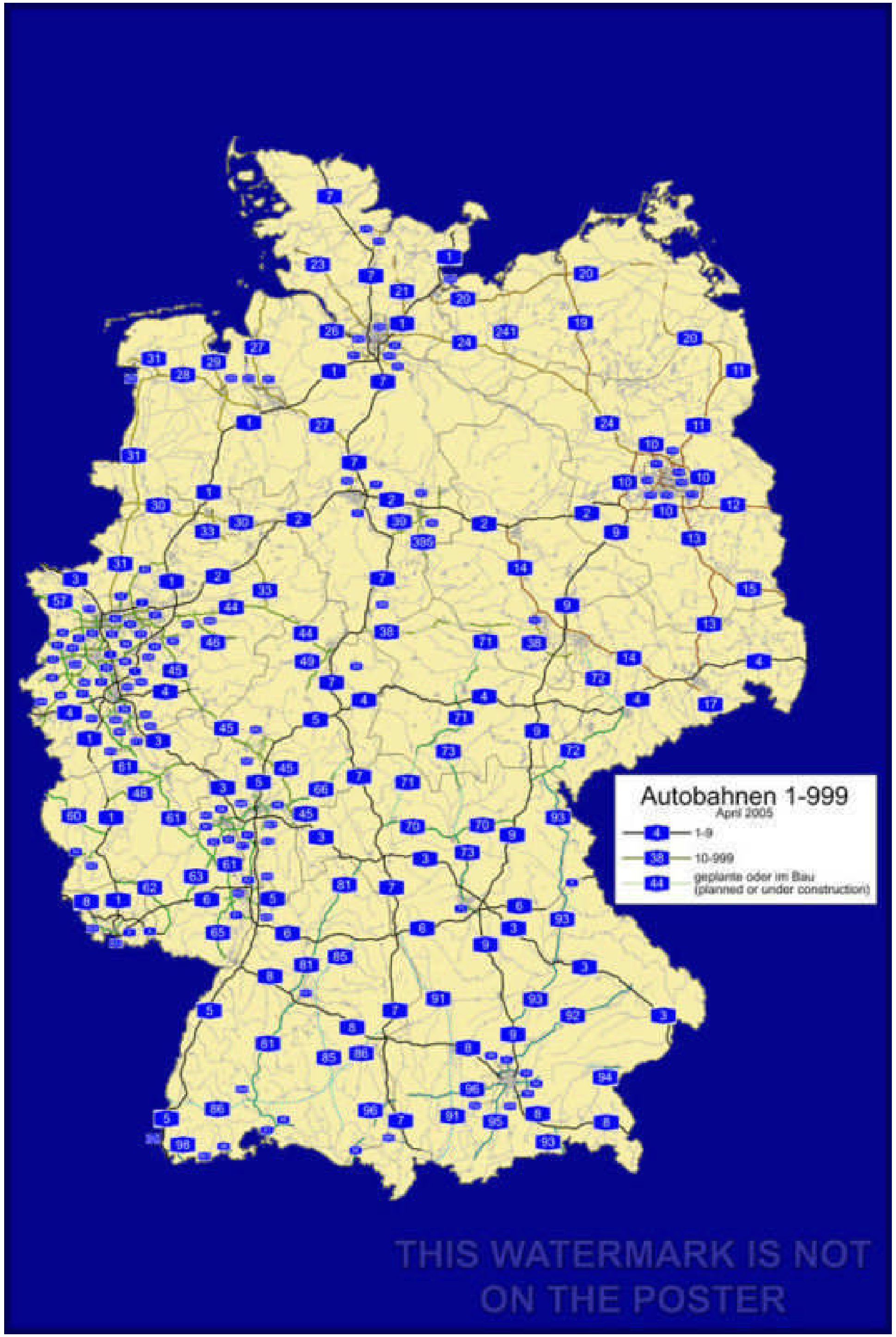
"While shooting the film Cloud Atlas in Germany in 2011, actor Tom Hanks asked the car maker Volkswagen for a camper van to take out onto the country's interstate highway system known as the Autobahn. 'No matter how fast you're driving in Germany, someone is always driving faster than you,' Hanks later told David Letterman on late night television. In a VW van, this is especially probable. The German 'Autobahn' has long been the envy of speed demons the world over for its clean, well-maintained constitution - and for the fact that some 60 percent of its long, flat stretches have no official speed limit…"

***ZDNet.com*, June 2013**

"…While motorway speed limits are a matter for national governments, the absence of a mandatory speed limit on much of the Autobahn network in Germany affects other citizens of Europe. For example the size, economic and cultural importance, and central location of Germany mean that its Autobahn network is used extensively by citizens of other European countries. These many drivers from outside Germany encounter unfamiliar conditions under which even when they are driving as fast as is allowed in their home country, they can be approached from the rear at high closing speeds. Citizens of other European countries look forward to the debate in Germany being resolved in favor of a mandatory speed limit throughout the German Autobahn network…"

European Trade Safety Council **(ETSC)**

RE: excerpt from the *ETSC Speed Fact Sheet 1* (2008)



"…With its central geographical situation Germany is one of the major crossroads of Europe and borders 10 countries (Poland, The Czech Republic, Austria, Liechtenstein, Switzerland, Luxembourg, Belgium, Netherlands, Denmark, and France). One can therefore ask whether unlimited motorways in Germany do not influence the behavior of drivers most prone to speeding when they cross over to neighboring countries. This is a legitimate question within a continent that knows no borders, and should be investigated further by appropriate studies…"

***E**uropean **T**rade **S**afety **C**ouncil* **(ETSC)**
RE: excerpt from the *ETSC Speed Fact Sheet 1* (2008)
Left: caption: "Autobehnen 1-999"

The Right to Bear…Speed (?)

"…Debates about the safety and practicality of speed-limit-less highways in Germany have resurfaced since the 1970s, and a 2010 poll even suggested the public might be ready to revisit the emotionally complex issue - which has been compared to the gun control conflict in the U.S. But when center-left politician Sigmar Gabriel voiced his support for a blanket speed limit of 120 kph (75 mph) in early May, his own social democratic (SPD) party cringed…"

***ZDNet.com*, June 2013**

"…'This conversation is about 20 years old now,' the SPD's candidate for German chancellor Peer Steinbrueck told German TV station WDR. 'I'm not interested in reactivating it: We have applied speed limits to most of the country's infrastructure, and I don't think it's time to reignite this discussion'…"

***ZDNet.com*, June 2013**

RE: in the mid-1980s, acid rain and sudden forest destruction renewed debate on whether or not a general speed limit should be imposed on Autobahns. Since a car's fuel consumption increases with its speed (and fuel conservation is a key element in reducing air pollution), environmentalists argued that enforcing limits of 100 km/h (62 mph) limit on Autobahns and 80 km/h (50 mph) on rural roads would save lives as well as the forests. As well, reducing the annual death toll by 30% (250 lives) on Autobahns and 15% (1K lives) on rural roads (the German motor vehicle death toll was about 10K in the mid-1980s). The Federal Government sponsored a large-scale experiment with a 100 km/h (62 mph) speed limit in order to measure the impact of reduced speeds on emissions and compliance. With the results in, once again the Federal Government declined to impose a mandatory limit, deciding the modest measured emission reduction would have no meaningful effect on forest loss. By 1987, all restrictions on test sections had been removed, even in Hesse where the state government was controlled by a far-left "red-green" coalition.

Autofahrernation

In 1993, the Social Democratic-Green Party coalition controlling the *State of Hesse* experimented with a 90 km/h (56 mph) limit on Autobahns and 80 km/h (50 mph) on other rural roads. These limits were attempts to reduce ozone pollution. During his term of office (1998 to 2005) as Chancellor of Germany, *Gerhard Schroder* opposed an Autobahn speed limit, famously referring to Germany as an *Autofahrernation* ("Nation of Drivers").

If a Bear Can, Why Can’t a German?

"Members of one of Germany's governing parties on Saturday backed a proposal to introduce a speed limit on highways, a measure that would revoke a cherished freedom in this rule-bound country and was likely to be met with resistance…Many stretches of German autobahn have no speed limits. However, the current surge in concern over carbon dioxide emissions has put that tradition under renewed scrutiny…"

***CBSNEWS.com*, October 28th 2007**

<u>Above</u>: caption: “Protesters representing the German Traffic Club hold up road signs supporting a speed limit of 120 km per hour outside the Chancellery, March 27, 2007 in Berlin, Germany. Politicians and citizens groups in Germany are debating whether to introduce a speed limit for German highways in order to reduce CO2 emissions and reduce traffic accident deaths. Germany currently has no speed limit of many of its highways.”

***"…Saturday's decision has no binding effect on government policy, and the party's conservative coalition partners, including Chancellor Angela Merkel, have regularly rejected calls for an overall speed limit. Leading Social Democrats - including Environment Minister Sigmar Gabriel and Transport Minister Wolfgang Tiefensee - also have questioned the logic of speed limits. Gabriel has argued that they would reduce incentives for manufacturers to produce more environment-friendly engines*…"**

***CBSNEWS.com,* October 28th 2007**

RE: in October 2007, at a party congress held by the *Social Democratic Party of Germany*, delegates narrowly approved a proposal to introduce a blanket speed limit of 130 km/h (81 mph) on all German Autobahns. While this initiative is primarily a part of the SPD's general strategic outline for the future and, according to practices, not necessarily meant to affect immediate government policy, the proposal had stirred up a debate once again. Germany's Chancellor *Angela Merkel* (elected in 2005) and leading cabinet members expressed outspoken disapproval of such a measure.

“In Germany, the introduction of a national speed limit for motorways has been on the political agenda of different road safety and environmental groups for decades. However, the debate has gathered pace over the past year. The SPD, one of the main coalition partners in the German government, supported a motion to introduce such a limit at their Party conference in October 2007. Yet immediately after this came an announcement by the Chancellor Merkel that she would not back such a legislative proposal. Instead she called for drivers to take their own responsibility and pointed to the progress made in the recent reduction in deaths on Germany’s roads…”

***E**uropean **T**rade **S**afety **C**ouncil* **(ETSC)**

RE: excerpt from the *ETSC Speed Fact Sheet 1* (2008)

"A decision by the German state of Bremen to install a speed limit on a portion of the famed Autobahn, has turned the spotlight on an international carbon emissions debate. It's long been known that driving above the speed limit can decrease fuel efficiency - going 75 mph in a 60 mph zone can increase your fuel use by as much as 20 percent -but only now are we beginning to see a push in some areas to use lower speed limits to curb carbon emissions. Bremen, which is governed by a coalition of Social Democrats and Greens, adopted a speed limit of 120 kilometers per hour, which translates to about 75 mph…"

HybridCARS.com, **April 2008**

"…Driven speeds on motorways in particular are well above the optimum level for fuel efficiency (Anable et al., 2006). A number of studies have demonstrated that lowering speed limits on motorways is an effective tool to bring down CO2 emissions. For example, it has been calculated that a 120 and 100 km/h speed limit on German motorways would reduce CO2 emissions from cars on motorways by 10% and 20% respectively (Umweltbundesamt, 2003).The International Energy Agency also identified the temporary reduction of motorway speed limits to 90 km/h as a low cost measure that can lead to 'large oil savings' to respond to energy crisis. In an earlier report on 'saving oil and reducing CO2 emissions from transport,' the IEA also recommended a general lowering of motorway speed limits that would not be restricted in time…"

European Trade Safety Council **(ETSC)**

RE: excerpt from the *ETSC Speed Fact Sheet 1* (2008)

In 2008, the Social Democratic-Green Party coalition controlling Germany's smallest State (the paired city-state of Bremen and Bremerhaven) imposed a 120 km/h (75 mph) limit on its last 11 kilometers (6.8 miles) of speed-unlimited Autobahn in hopes of leading other German States to do likewise.

"…The European Commission has been considering a continental speed limit that could drastically cut emissions from driving, especially on roads like the Autobahn, where many stretches of road have no speed limit whatsoever. Such a move would almost certainly spark an outcry in Germany, which is notorious for its fast roads and high performance vehicles…"

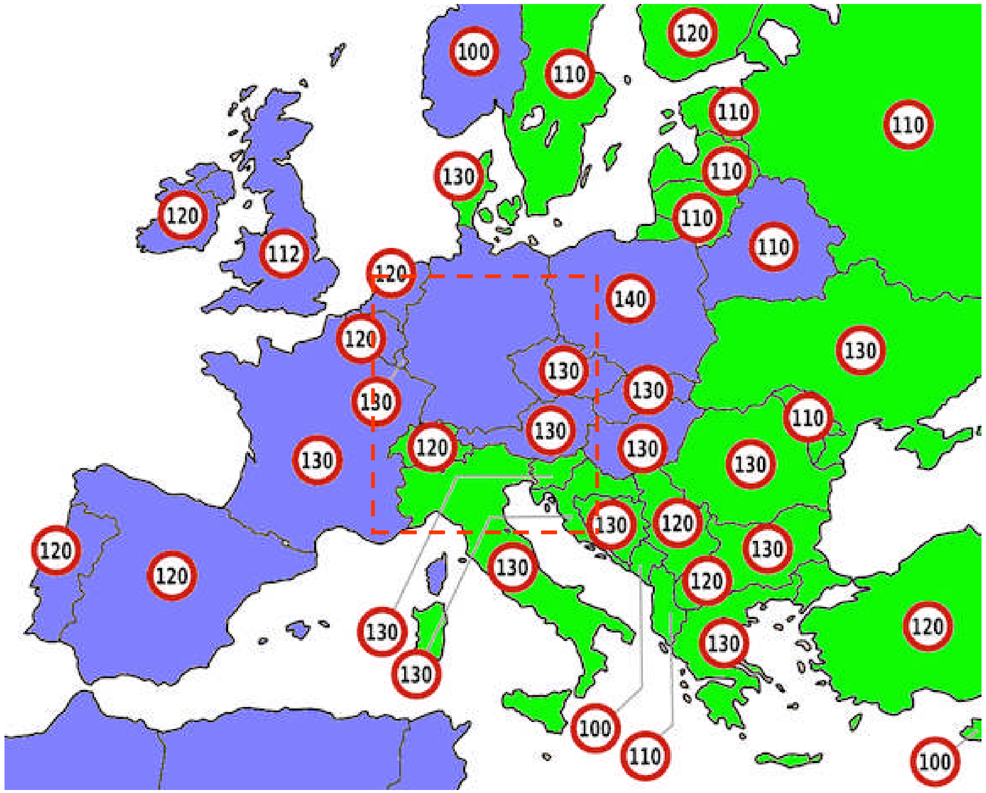
***HybridCARS.com,* April 2008**

"…In the wake of the 1973 Arab oil embargo, the Nixon administration lowered the speed limit to 55 mph, a move that was very unpopular. Jimmy Carter's plea for Americans to 'obey the speed limits, and (set their) thermostats to save fuel,' in the famous nationally televised 'malaise' speech, was met with similar derision. Whether the climate change crisis has motivated enough citizens to change their thinking on these issues remains to be seen, and will likely determine whether or not policies like the one instituted in Bremen find their way across the Atlantic."

***HybridCARS.com,* April 2008**

"…In a country where the auto industry controls some 29 percent of the manufacturing market, high-performance car makers like BMW, Audi, Volkswagen and Mercedes have come to rule more than the hearts of Germany's many motor fanatics: The industry and its lobby are undeniably influential. Mercedes has long supplied the taxi industry with the vast majority of its ivory-tinted, diesel-powered vehicles. And the proverbial 'arms race' between makers of ever faster, more powerful car models has been accused of driving up the size - and with it the environ-mental burden - of the European automobile industry standard…"

***ZDNet.com*, June 2013**



"…'A speed limit in Germany would end the worldwide 'trade war' over faster cars, while clearing the way for the entry of lighter, more efficient models into the market,' German environmental mobility group VCD said in support of a blanket speed limit for Germany's highways…"

***ZDNet.com*, June 2013**

<u>Left</u>: caption: "Germany: the only European country without a maximum speed limit"

"…But the country's influential Green Party - long concerned about the environmental implications of speed-limitless roads - pointed to even more immediate benefits: Some studies estimate as much as 2.3 million tons of CO2 emissions could be saved per year by capping Autobahn speeds at 120 kph, it argues. According to the data, the carbon cut would amount to shutting down a mid-sized coal power plant over the same time period…"

***ZDNet.com*, June 2013**

RE: in 2011, the first ever "Green" minister-president of any German state; *Winfried Kretschmann* of Baden-Wurttemberg, initially argued for a similar, state-level 120 km/h (75 mph) limit. However, Baden-Wurttemberg is an important location for the German motor industry, including the headquarters of *Daimler AG* and *Porsche*. Ultimately, the ruling coalition decided against a state-level limit on its 675 km (419 miles) of speed-unlimited roads, arguing for a nationwide speed limit instead.

"…But Andreas Holzer of Germany's largest auto club, ADAC, told Smart-Planet he sees greenhouse gases as a global problem: 'The whole of German automobile traffic accounts for 12 percent of our CO2 emissions, with only a third of that on the Autobahn, and nearly half of Autobahn traffic already adhering to speed limits. The move just wouldn't be significant enough to justify.' Statistical estimates of the drop in emissions vary, ranging anywhere from 0.3 to 9 percent with a 120 kph speed cap…"

***ZDNet.com*, June 2013**

In 2014, the conservative-liberal ruling coalition of Saxony confirmed its rejection of a general speed limit on Autobahns, instead advocating dynamic traffic controls where appropriate. Between 2010 and 2014, in the *State of Hesse*, Transportation Minister/s *Dieter Posch* and his successor *Florian Rentsch* (both members of the *Free Democratic Party*) removed or raised speed limits on several sections of Autobahn following regular five-year reviews of speed limit effectiveness (some sections just prior to the installation of *Tarek Al-Wazir* (Green Party) as Transportation Minister in January 2014.

Lies, Damn Lies and Statistics

"…The environment hasn't been speed-limit supporters' only concern: Traffic accidents at speeds above 130 kmh are frequently deadly, and the argument exists that a cap would invariably reduce the number of deaths. But Holzer pointed to statistics, which show a disproportionately low number of traffic fatalities occur on the Autobahn. 'The most fatal accidents occur on smaller state roads with speed limits,' Holzer said. 'The Autobahn accounts for about one third of road traffic in Germany, but it only makes up 10.7 percent of fatal traffic accidents and 7.3 percent of overall accidents'…"

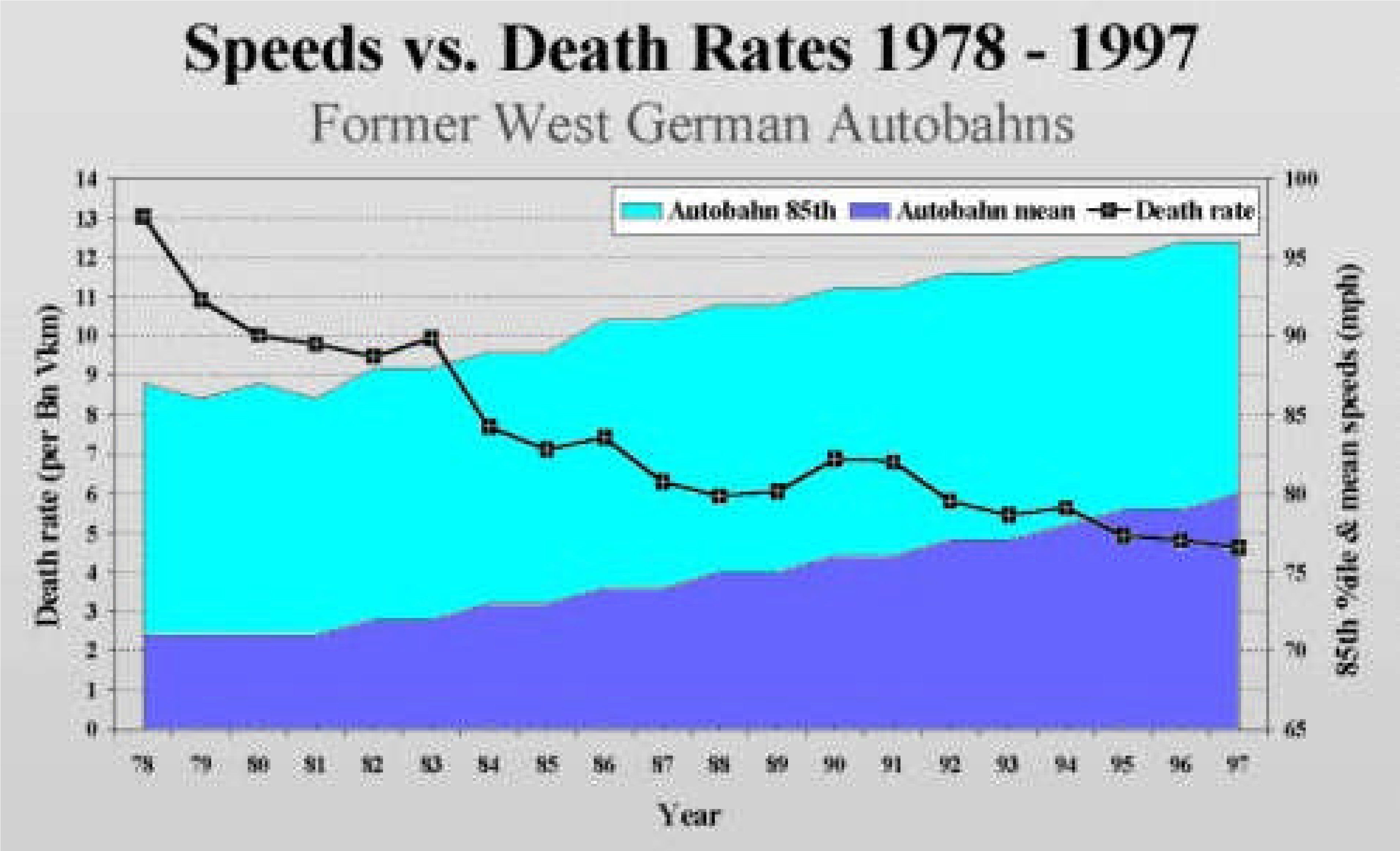
***ZDNet.com*, June 2013**

RE: In 2015, the left-green coalition government of Thuringia declared that a general Autobahn limit was a Federal matter; Thuringia would not unilaterally impose a general Statewide limit, although the Thuringian environmental minister had recommended a 120 km/h (75 mph) limit.

"…A report by Auto Club Europa (ACE), however, shows that 39.7 percent of all fatal accidents on both speed-regulated and non-regulated portions of the Autobahn were caused by speeding. Nonetheless, the overall number of fatalities on the Autobahn sunk by nearly 27 percent between 2000 and 2009, with the downward trend continuing through 2012. The public remains generally fickle on the issue: Surveys from 2007 and 2010 saw the majority of Germans supporting the implementation of a 120 kph speed limit, but by early 2012, there seemed to be a change of heart. Der Spiegel's current online poll shows 45 percent of readers in favor of a 120 kmH speed limit, with 55 percent against the measure."

***ZDNet.com*, June 2013**

RE: there are many differences between countries in their geography, economy, traffic growth, highway system size, degree of urbanization and motorization, etc. All mitigating factors must be taken into consideration when making comparisons based on statistical data.



<u>Above</u>: caption: "The chart above illustrates the counterintuitive point that speed is not necessarily dangerous. The data clearly shows average German Autobahn speeds rising and fatalities declining simultaneously and consistently over a twenty year period."

"…The relationship between speed and road accidents has been studied extensively and is very clear: the higher the speed, the greater the probability of a crash and the severity of crashes. All review studies indicate that:

• Small changes in mean speeds can be expected to result in much larger changes in crash outcomes.

• Severe crashes (resulting in serious injuries and deaths) are much more sensitive to speed changes than crashes in general.

While the risk linked to speed varies from road types to road type, an empirically verified model shows that on average, a modest percentage reduction in the mean speed of traffic will lead to a twofold percentage reduction in injury accidents, a threefold percentage reduction in injury accidents and a fourfold percentage reduction in fatal accidents (Aarts and van Schagen 2006, based on Nilsson 1982). So, for example, a 1% reduction in mean speeds on a given road leads to a 2% reduction in injury accidents, a 3% reduction in serious injury accidents and a 4% reduction in deaths. It follows from the high risk associated with speed that reductions in driving speeds (even apparently minor ones) will make an important contribution to reducing the number and improving the outcome of road accidents…"

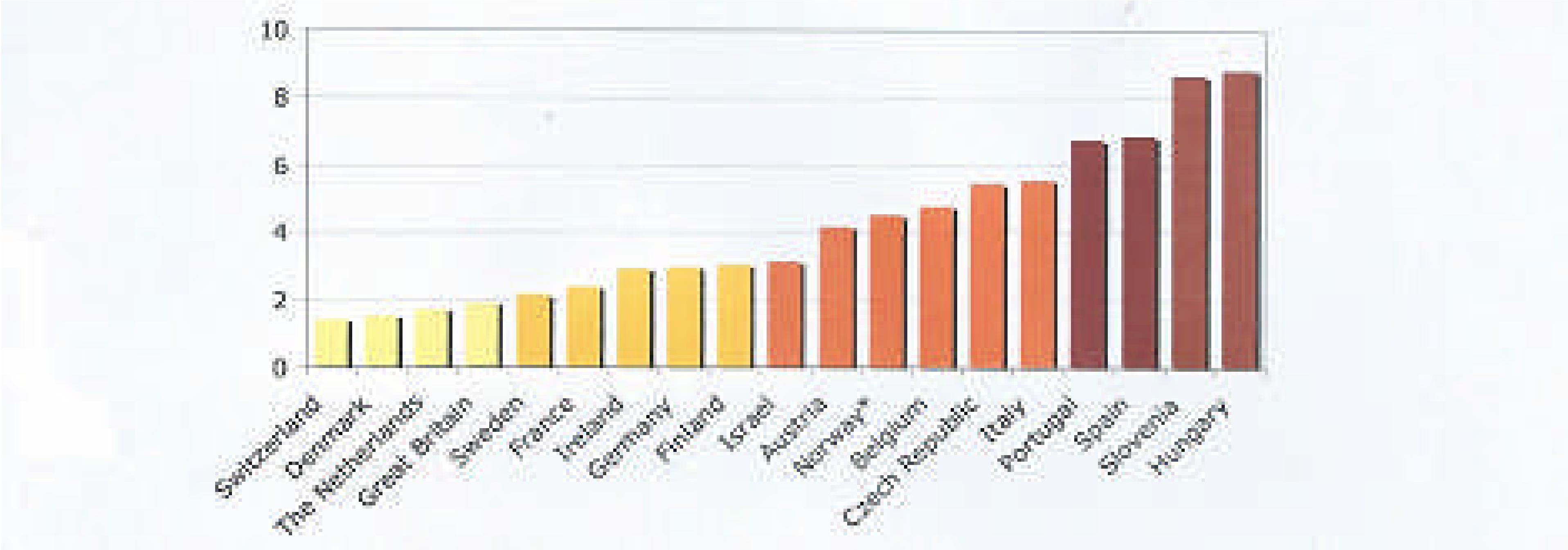
European Trade Safety Council **(ETSC)**

RE: excerpt from the *ETSC Speed Fact Sheet 1* (2008)

"…German motorways are amongst the most safely engineered roads in Europe. However, in terms of deaths per billion vehicles kms driven on motorways, Germany ranks eight in 2006 out of the European countries for which there is data (see figure 4 and Annex 1 for details of Germany's progression from 1997 to 2006)…"

European Trade Safety Council **(ETSC)**

RE: excerpt from the *ETSC Speed Fact Sheet 1* (2008)



<u>Above</u>: caption: "Figure 4: Number of deaths on motorways per billion km in 2006 * NO 2005 (the rate for NO is based on few deaths per year and is therefore subject to wide fluctuation) source: ETSC PIN and IRTAD"

Parameters of Passenger Car Speeds		1982	1987	1992
Mean Speed	km/h	112.3	117.2	120.4
V85 Speed	km/h	139.2	145.1	148.2
% Vehicles over 130 KM/H	%	25.0	31.3	35.9

<u>Above</u>: caption: "Table 1: Development of speeds on the entire Autobahn network until 1992 (West-Germany only)"

"…Comparability of this indicator between countries depends on the quality of their estimates of vehicle kms driven on the motorways. A number of factors influencing fatal accidents on motorways also vary between countries (quality of car fleet; efficiency of rescue system, seat-belt wearing rates and so on) and are likely to have an impact on the accidents rates and outcomes on motorways. Nevertheless, this indicator is a widely used comparator of safety1. It is interesting to note that Germany has improved its rate by a yearly average percentage reduction of 5% since 1997 (Annex 1). However, other countries have improved at a faster rate. France for example has improved by an average yearly percentage reduction of 7% since 1997 (Annex 1). Switzerland, a front-runner in terms of enforcing speed limits, has achieved the highest reduction rates. On the other hand Austria, with similar road infra-structure conditions and permanent speed limits on motorways, shows a poorer safety performance than Germany. Germany remains a rather good performer in terms of motorway safety but this indicator shows that there is room for improvement…"

European Trade Safety Council **(ETSC)**

RE: excerpt from the *ETSC Speed Fact Sheet 1* (2008)

In Conclusion

"…The data available indicates that Germany can make further progress in terms of motorway safety. The best measure is probably to lower vehicle speeds, given that other factors such as the quality of vehicles and infrastructure are relatively good in Germany. Reducing speed, unquestionably identified as a basic risk factor in road safety work, is a widely effective policy instrument to achieve casualty reductions. An early conclusion in favor of a mandatory limit through the Autobahn network is therefore to be hoped for, but in case the debate is further prolonged, measurement of mean speeds on German motorways is needed to determine current levels and whether these are tending to rise. Further evidence could also be sought to contribute to this debate; in particular the calculation of speed differentials on unlimited motorway sections; studies investigating the cross-border impact of unlimited motorways; and studies indicating whether speed generalization applies to Germany to determine whether speed limits on the Autobahn can have a positive impact on compliance with speed limits on the rest of the network. In the meantime, empirical evidence indicates that all instances of introduced speed limits on German motorways have caused very large casualty reductions."

European Trade Safety Council **(ETSC)**

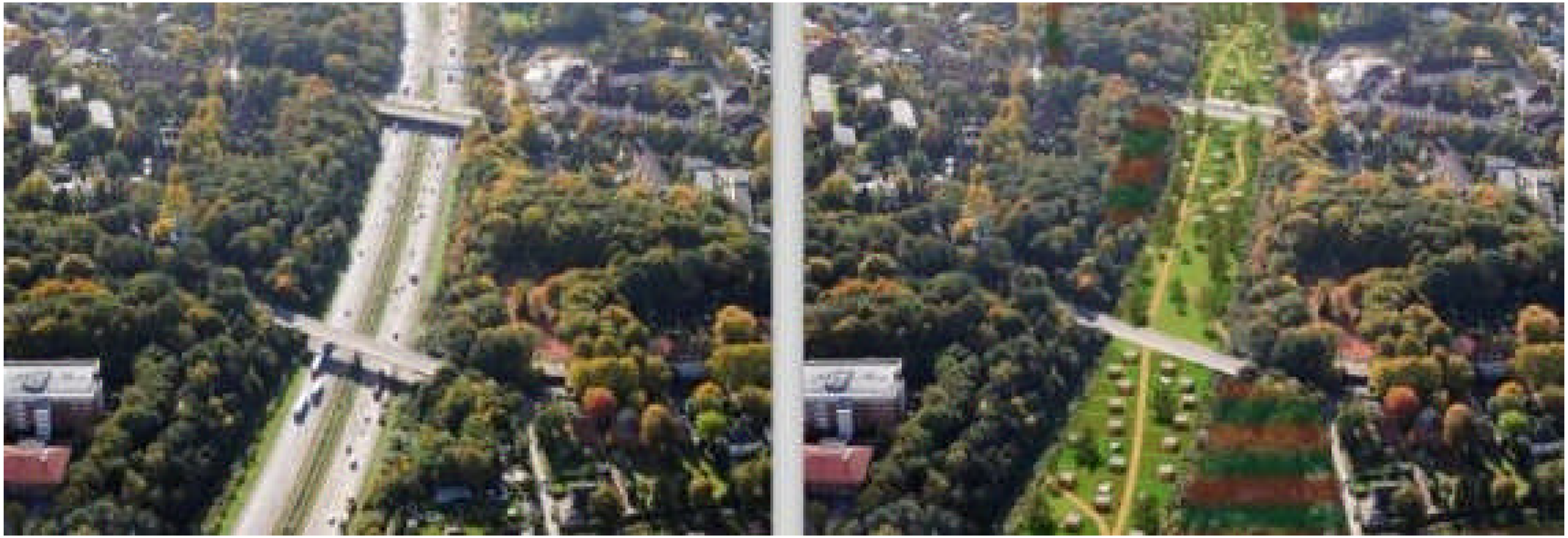
RE: excerpt from the *ETSC Speed Fact Sheet 1* (2008)


SPEED
LIMIT?
NO

Part 11

Autobahn for Everyone

Hamburg Hideaway



"When the A7 highway was first built in Hamburg, Germany, it sliced the city in half. Now a few divided neighborhoods are starting to be stitched back together, as the city begins construction on three new parks that will fully cover parts of the autobahn…"

***fastcoexist.com,* January 2015**

<u>Above</u>: caption: "A current photo of the A7 autobahn through Hamburg, Germany (left) next to an artist's rendering of what the expressway will look like once the greenway canopy is built (right). Neighborhoods divided by the road for more than thirty years will be reunited by the public park space."

"…Connecting Austria, Germany and Denmark, Autobahn A7 is the longest motorway in Germany and one of the most important North-South links between Scandinavia and central Europe. When it was constructed, some 30 years ago, however, the highway divided the city of Hamburg, separating three districts and driving people away from the area…"

***fastcoexist.com,* January 2015**

RE: at 963 km long, the *Bundesautobahn 7*, (A7) is the longest German Autobahn network. The longest national motorway in Europe, the more than 500-mile long A7 bisects Germany between east and west and connects the country with Denmark, to the north, and Austria, to the south. With over 150K vehicles using it daily, it is also a major source of both noise and air pollution as well.

"…With traffic expected to rise to 165,000 cars daily in 2025, the city had to face the problem of increasing noise pollution. The solution came from the office of POLA landscape architects in Berlin who proposed turning sections of the highway into covered tunnels, reducing the noise to almost nothing, providing new green spaces, and reuniting the neighborhoods…"

***bigthink.com,* January 2015**

"…As traffic keeps getting worse, the city realized that it had to find a way to keep the noise in the area low enough to meet national laws for noise pollution. Since simple walls wouldn't be enough, they decided to turn sections of the road into covered tunnels. The design can reduce noise in surrounding neighborhoods to almost nothing…"

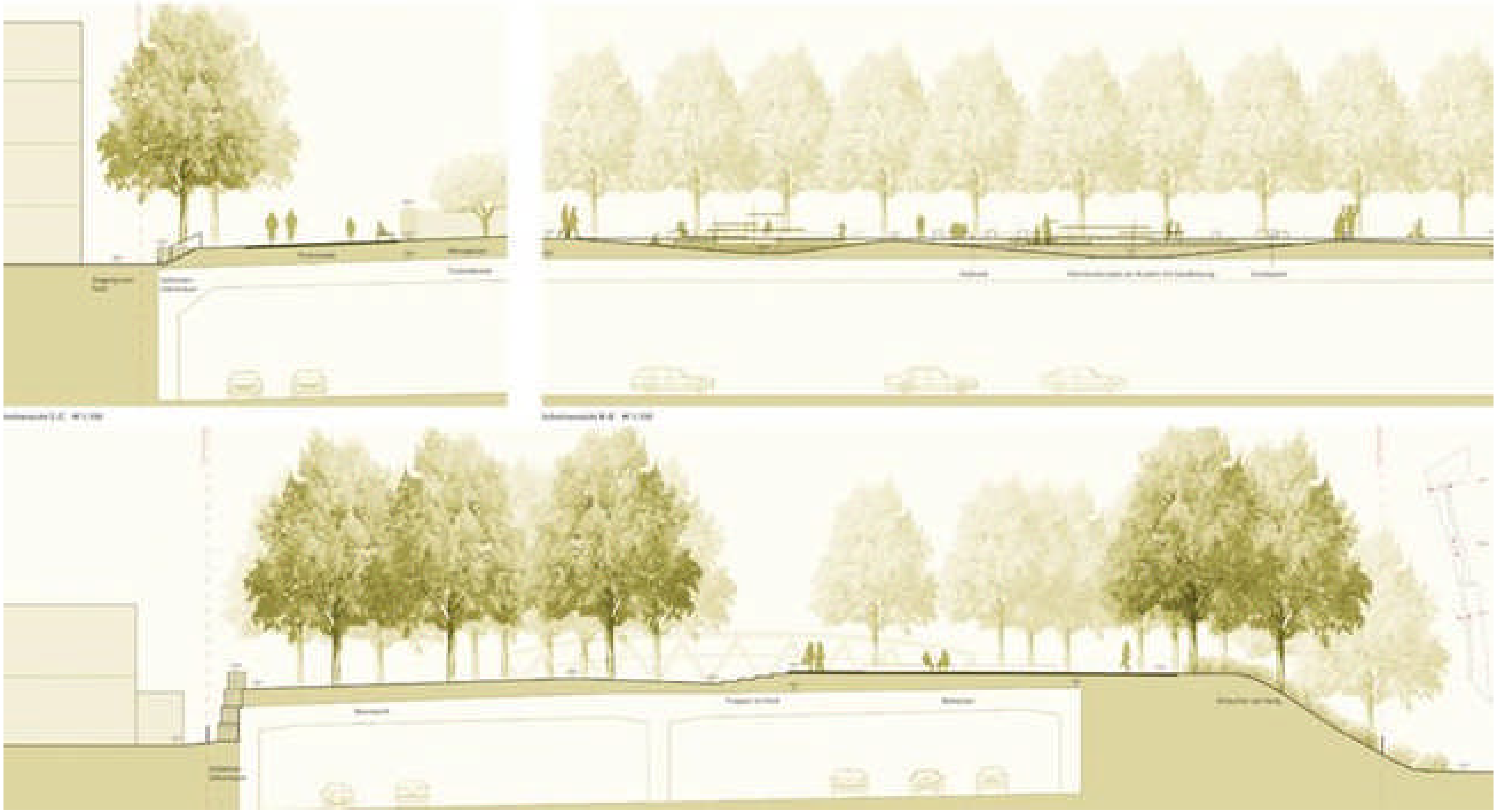
***fastcoexist.com,* January 2015**

RE: each new cover will stretch over a small length of highway and create a new park, with open meadows, woods, bike paths, community gardens and tree-lined squares. In total, the roofs will cover over two miles and create over sixty acres of new green space.

"…The construction will expand the highway to up to 8 lanes in certain areas and then cover them with a 10-foot thick canopy, capable of supporting full-grown trees. The covers will be built in sections and will cumulatively stretch for three miles…"

***bigthink.com,* January 2015**

RE: the project will also mean that Hamburg – with a rapidly growing population - will be able to construct nearly 2K residential apartments (the city's expectations are that the project will attract new residents to the formerly undesirable area). The A7 Cover Project in Hamburg is not the only covered roadway in Germany (i.e. Dusseldorf and Munich), but it will be the largest when completed.



<u>Above</u>: the 10-foot thick canopy (capable of sustaining full-grown trees) will connect Hamburg's *Schnelson District*, down to *Stellingen* and ending in the *Bahrenfeld District*. In the Schnelsen District, the quarter-mile stretch will have a tree-lined promenade to offset the noise from the six lanes of traffic underneath. The Bahrenfeld District will have the longest canopy with about 1,700 new residential apartments built on it, as well as parks and trails.

"…Of course, the project raises another question: Is it better to turn a highway into a tunnel or get rid of it completely? As other cities start to repair neighborhoods torn apart by urban highways, some are taking those highways out and building better public transportation. Citizens of Hamburg aren't likely to stop driving anytime soon. Still, the new parks will make it easier to choose to walk or bike across town - and will eventually link up with the city's 'green network,' a plan to cover as much as 40% of the urban area in parks connected by trails…"

fastcoexist.com, **January 2015**

EUROPEAN
GREEN CAPITAL

An initiative of the
European Commission

"Imagine that there now is a big, loud gap in the city, about 70 to 100 meters wide, with cars, dirt, noise, day in day out, 24/7/365. After that building is finished there will be parks, gardens, quietness, bird songs, fresh air. And the parts of the city in the west and the east of the autobahn will be reunited again."

***Reinhard Schier, Ministry of Urban Development & Environment* (Hamburg)**

RE: the *Hamburg Autobahn Cover Project* is expected to be completed by 2022 at a cost of around $1 billion, mostly funded by the Federal Government. It's part of the *European Green Capital* program, which each year recognizes a new city for accomplishments in environmental sustainability.

The Last Hitlerbahn

"The last surviving stretch of German autobahn built under Hitler is set to disappear, almost 80 years after it was first constructed. The four-kilometer stretch of road on the A11, north east of Berlin in the state of Brandenburg, dates from 1936 and was part of Hitler's massive motorway building program of the 'Reichsautobahn'…"

thelocal.de, **September 2013**

<u>Above</u>: caption: "Planned route between Stettin and Konigsberg (according to West Prussian newspaper)"

"…Newspaper the Welt am Sonntag reported that the road survived Nazism and Communism and despite some repair work is still the original stretch from the 1930s. But drivers have had enough of the cracks and potholes on the route which links Berlin to the Polish city of Szczecin. Frank Gotzmann, director of the nearby town of Gartz, told the newspaper: 'The condition of the motorway is unbearable. Everyone drives carefully on it'…"

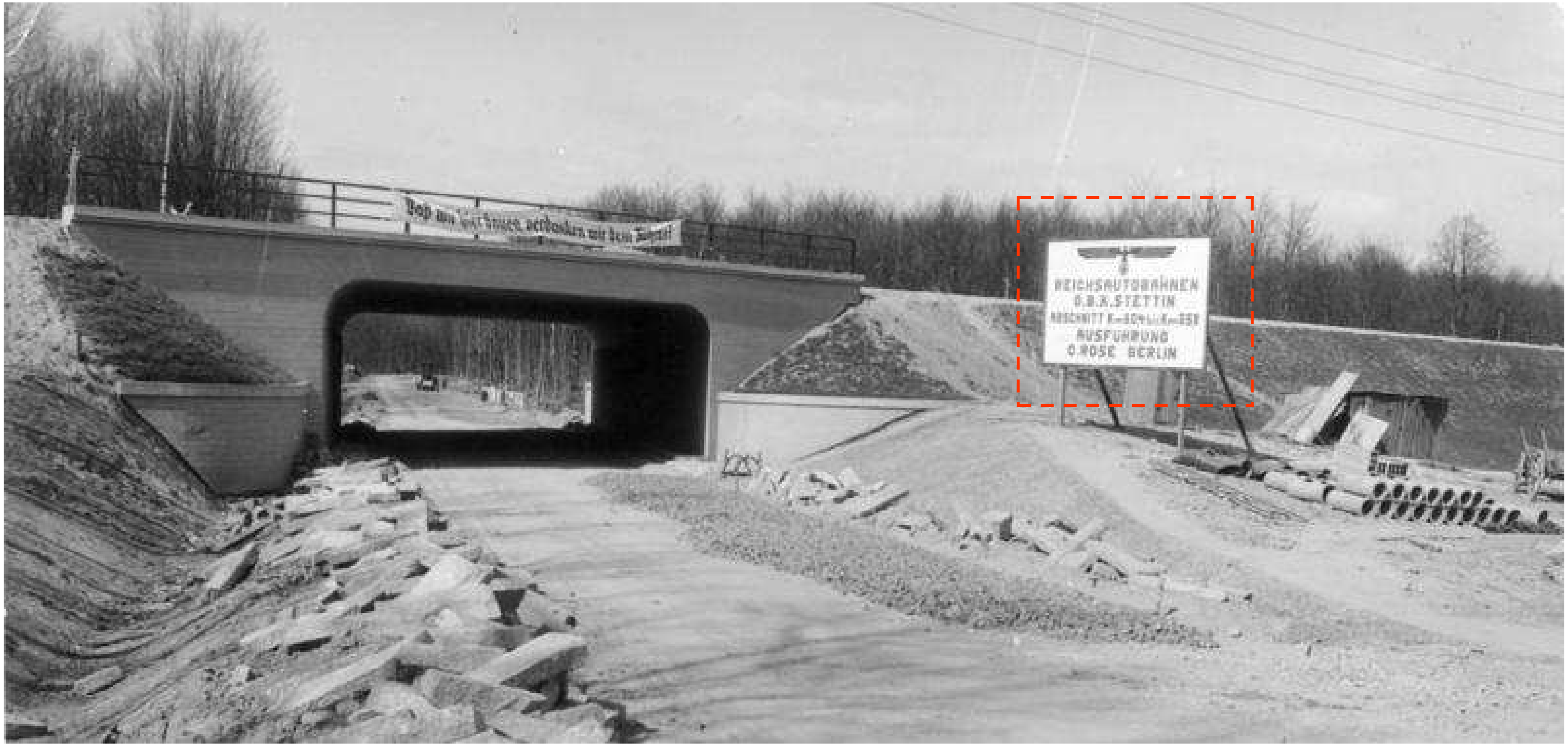
thelocal.de, **Sept. 2013**

"…In 2016 the road will be 80 years old, so 'maybe Unesco will make it a world heritage site,' he joked. The road was laid using 25-metre-long concrete slabs. These are too long, said Reinhard Arndt, member of a motorway history club. The slabs are cracking under the weight of the traffic as well as the weather. But Arndt said the stretch of road was his favorite because of the history and the country-side, the Welt am Sonntag reported. Renovation is planned for 2015 if the money can be found. Five bridges on the A11 also need rebuilding which date from the 1930s."

***thelocal.de,* September 2013**

“The stretch of the Berlin-Szczecin (Stettin) A11 between junctions five and four, Uckermark-Schmolln, is still the original concrete strip surface laid in 1936. It was announced last year that this section would be renovated next year ‘if funds could be found.’ The surface is now so rough speed is limited to 80 kmh and, characteristcally, there is no hard shoulder. There are also five original bridges in need of repair. However, Helmut Schneider from the Arbeitsgemeinschaft Autobahngeschichte (Autobahn History Association) told @DriveEurope this week the work on the northbound lanes has been postponed until 2017 and on the opposite carriageway until the year after. The surface will not be broken up and taken away. Like the rest of the A11 - and many other autobahns - the original road will be buried under a new layer of asphalt…”

driveeuropenews.com, **April 2014**



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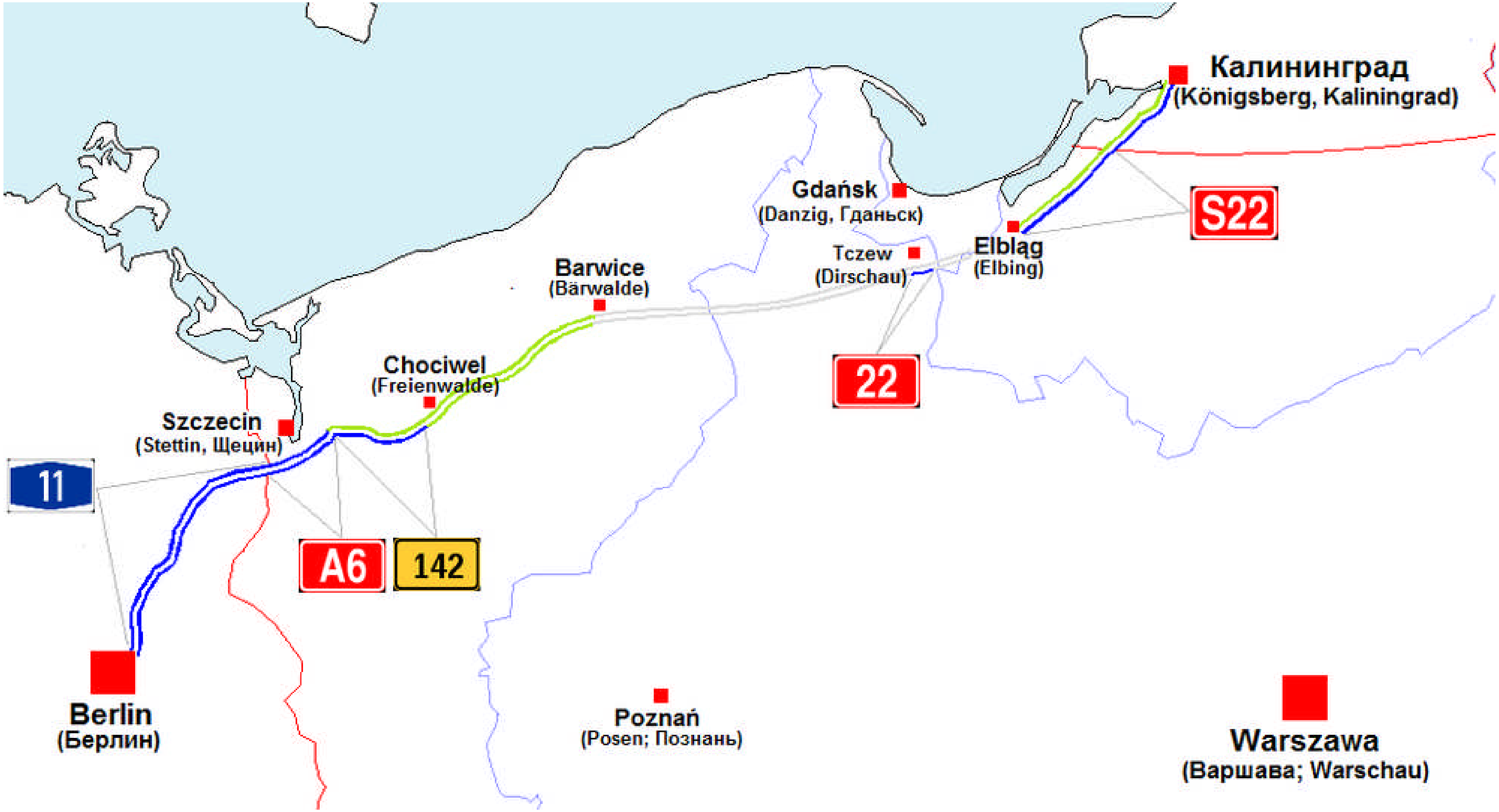
***driveeuropenews.com,* April 2014**



"…Opened in 1936, known as Berlinka, A11 was to connect Berlin and Konigsberg (now Russian Kaliningrad) though the Polish government objected to the road across its territory and it was never completed…"

driveeuropenews.com, **April 2014**

"…Apart from some single lane sections in east Poland, the only four lane stretch is between Berlin and Stettin. Outside of Germany, the A18 - between the Polish A4 (Wroclaw) and the German A15 at Cottbus - still has the original surface of the former Reichsautobahn 9 Berlin-Breslau (Wroclaw), but only the southbound carriageway…"

***driveeuropenews.com,* April 2014**

"…Inside the German border the only other stretch of original autobahn is the A6 near Kaiserslautern though this section is now behind the perimeter of the U.S. Ramstein Airforce base perimeter and off limits to the general public."

driveeuropenews.com, **April 2014**

Fun Fun Fun

“No! Someone else told me that they (the misinterpreters) thought the way we speak in German, ‘Fahren,’ which means driving, sounds like the English word, ‘fun.’ 'Fahren fahren fahren,’ 'fun fun fun.' That is wrong. But it works. Driving is fun. We had no speed limit on the autobahn, we could race through the highways, through the Alps, so yes, fahren fahren fahren, fun fun fun. But it wasn’t anything to do with the Beach Boys! We used to drive a lot, we used to listen to the sound of driving, the wind, passing cars and lorries, the rain, every moment the sounds around you are changing, and the idea was to rebuild those sounds on the synth.”

***Wolfgang Flur* (of the band *Kraftwerk*)**

RE: “Autobahn” is a song by the German electronic band *Kraftwerk*, composed by band members *Ralf Hutter* and *Florian Schneider.* It was the band’s first track to use sung lyrics. Recorded in 1974, the song was meant to capture the feel of driving on a the German motorway. The lyrics of the song are in German, the main refrain being “Wir fahren fahren fahren auf der Autobahn” (“We drive drive drive on the Autobahn”). The chorus was often mistaken for the English phrase “Fun fun fun on the Autobahn” and thought to be a reference to the 1964 *Beach Boys* song “Fun, Fun, Fun.” Unlike many of the band’s most popular songs, “Auto-bahn” was never released in any other language except German.


6003 436
PHILIPS
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KRAFTWERK
AUTOBAHN
MORGENSPAZIERGANG

Embodying the Idea

"…There is more or less discussion in which the term 'super-highways' is used without any adequate definition of what is intended by this term. Perhaps, it is more frequently used in connection with a very limited number of transcontinental highways designed for high speed and with multiple-lane roadways to carry traffic from coast to coast. The German system of super-highways embodies this idea…"

T.H. MacDonald, **BPR Director (1936)**


Hannover
Frankfurt
Marburg
Kassel 7 km