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THE EFFICIENCY OF THE SWISS CIVIL ENGINEERING CONTRACTORS

By B. ZANOLARI, Engineer ETH, Berne

*This is the first of two articles on Swiss engineering to appear in the
"Swiss Observer" by courtesy of "Swiss Industry and Trade"*

The second half of the nineteenth century saw a rapid development in civil engineering activity in Switzerland. Within a few decades the numerous railway companies had created a network covering the entire country. Urban areas and remote rural districts were connected by the new railways, which also linked Switzerland's internal system to those of other countries. Thus all at once the prospects for the transition from an agricultural to an industrial economy were decisively improved.

It was the civil engineers who by this means prepared the way for Swiss industrialisation. The civil engineering industry can therefore claim to be the primary or key industry, as it alone is able to modify a country's infrastructure. In spite of this, civil engineering is generally less newsworthy than, for instance, the watch, chemical or mechanical engineering industries. This is possibly because many people regard the existence of an efficient civil engineering industry as an inevitable law of nature. Was it not Swiss enterprise and technical skill which, more than eighty years ago, built the 15-kilometre-long Gotthard Tunnel, at that time by far the longest ever attempted? Indeed, the whole construction of the Gotthard line, requiring 80 tunnels and more than 300 major bridges, was an engineering achievement that astonished the world. This skill and knowledge has been not only preserved by the present generation of Swiss engineers, but extended and refined to cope with the diverse problems and increasing complexity of modern construction techniques.

Men of vision in the Federal Government and the cantons have always helped engineering firms to obtain highly qualified technical staff by the establishment of an institute of technology in German-speaking Switzerland and another in the French-speaking area, as well as technical schools throughout the country. The civil engineering departments of the Swiss Federal Institute of Technology in Zurich and the Institute of Technology of the University of Lausanne provide an unrivalled technical education for future consulting engineers and civil engineering contractors. The technical colleges of Winterthur, Biel, Burgdorf, Fribourg, Geneva, Lugano and Lucerne turn out civil engineers of an academic standard equal to that of graduates of the German technical universities. These educational opportunities for the higher ranks of the profession are supplemented by evening technical schools at Zurich, Lucerne and Berne. In view of the fact that certain parts of the country are still without a technical school in the

vicinity, plans are being studied for establishing additional schools at Windisch, Muttensz, Buchs, Olten and Rapperswil, and some of these will be realised in the near future. This rich endowment of efficient teaching establishments has enabled large numbers of earnest, keen young men with an excellent technical training to embark on careers in civil engineering firms. As mature engineers with practical experience behind them, they are then in a position to supervise the execution of difficult construction projects or to direct up-to-date, efficient contracting firms.

This is also essential for Switzerland, where there is more building activity than almost anywhere else in the world. Proof of this assertion is provided by statistics of Portland cement consumption per head of population, which was 658 kg for Switzerland in 1961, while the corresponding figures for our neighbours were: West Germany 460 kg, Austria 432 kg, Italy 356 kg, France 315 kg. The consumption per head in Great Britain was 260 kg and in the USA 300 kg.

The large numbers of new buildings and constructions in Switzerland testify to the efficiency, technical ability and reliability of our civil engineering contractors. The most important works have been hydro-electric schemes, the greatest achievements being, naturally, in the Alpine regions; for example, the construction of dams, the driving of water tunnels totalling about 900 kilometres, and the excavation of underground power stations. (The length of tunnels just quoted is equal to the distance from London to Milan.) In the field of artificial lake construction the most impressive feats are the Grande Dixence, the highest gravity dam in the world, whose height of 284 metres rivals that of the Eiffel Tower (300 metres); the Mauvoisin dam, one of the biggest arch dams ever built, which required two million cubic metres of concrete; and the largest rockfill dam in Europe, at Göschenalp, which has a maximum height of 155 metres, a maximum width of 700 metres at the base, and a volume of 9 million cubic metres. (The Mattmark dam, at present under construction in the Valais, will have a volume of about one million cubic metres greater than this.)

For some years work has been proceeding on the construction of so-called "national roads", forming a network of motorways covering the whole country. Together with the projected new main roads these modern arterial roads will total some 4,500 kilometres by the

middle of the 1970's, including 60 kilometres of tunnels. Detailed plans have also been prepared for a 15-kilometre-long double lane road tunnel through the Gotthard and a double-track railway tunnel through the base of the Gotthard massif with a length of 45 kilometres. All this represents a huge financial effort for our small country and especially for the Swiss civil engineering industry. Certain important sections of these roads have already been opened to traffic. A notable work is the Weinland Bridge spanning the River Thur between Winterthur and Schaffhausen — technically and aesthetically a perfect example of prestressed concrete construction.

The intercontinental airports of Zurich-Kloten and Geneva-Cointrin provide two further examples of work for the improvement of communications carried out during the last decade; they are still in process of expansion. Further important fields of Swiss civil engineering activity are hydraulic engineering (especially at Basle Docks, and the Jura groundwater correction scheme), pile-driving and sheet piling works. Innumerable excavations for buildings, cofferdams, pile foundations and pile rows in Switzerland and abroad bear witness to the great skill of Swiss firms in this speciality.

At the turn of the century Swiss contractors began to carry out work abroad. This considerable foreign activity was badly hit by the two world wars and by the general economic depression of the thirties. In addition, the continuing prosperity at home during recent years has unfortunately induced many firms to reduce their export business. But this is a temporary condition. The majority of the hydro-electric schemes will have been completed in ten or twelve years from now. By that time about four-fifths of the network of national roads and main roads will be finished. A great mass of technical know-how, ability and experience will then be available for other work, together with a large amount of building plant and machinery. Some of this industrial potential will be applied to the construction of roads, railways, airports, power stations and factories, etc., in the developing countries. To make this possible, the efficiency of the Swiss civil engineering industry and its technical staff must become known all over the world. Finally, in this time of abundance of work in Switzerland, our contracting firms must obtain increasing numbers of orders from foreign clients.

SWISS ELECTORATE AGREES TO GOVERNMENT'S POLICY

As was announced in a previous issue, the Swiss electorate went to the poll in a nationwide Referendum on Sunday, 28th February. The Government's measures to curb inflation, which were taken a year ago, had to be submitted to the popular vote, before they could be continued for another year. By their acceptance, the citizens have given support to the Government — "The Times" calls it a vote of confidence. The measures concerning credit, investment, foreign capital and building construction were grouped in two categories for the purpose of polling. The first, credits, was accepted by 526,616 to 385,750, with the Valais, Ticino, the Grisons and Baselstadt rejecting the proposed continuation.

The same Cantons rejected the second group, restriction on construction, and they were joined by Nidwalden, Baselland, Appenzell and Zug. This group was accepted by 507,728 to 406,299 voters.

Details of the voting in the different Cantons and a report on the pre-Referendum campaign will be given in a future issue of the "Swiss Observer". [A.T.S.]

RECENT DEATHS IN SWITZERLAND

The following deaths have been reported from Switzerland recently:

- Dr. Karl Sartorius (74), Basle, lawyer, Secretary of the Basle Education Department from 1915-18, from 1923 to 1958 Director of the "Basler Nachrichten" and the printing works "Zum Basler Berichtshaus", active in Swiss and international newspaper publishing associations, member of the board of the Agence Télégraphique Suisse, great champion of freedom for the press.
- Ella Bürgin (82), Basle, well-known artist who lived in Paris.
- Bernhard Nigg (78), Davos, former administrator of the Grison Cantonal Bank, well-known personality in ski-ing circles and pioneer in route marking.
- Albert Murith (48), Fribourg, lawyer, former President of the District Court of Greyerz, since 1956 Fribourg solicitor general.
- Dr. A. Starobinski (70), Geneva, originally Polish, but studied in Geneva where he became laboratory chief of the Cantonal Hospital and the Institute of Hygiene; influential personality in the Geneva Jewish community.
- Ernst Enderlin (75), Buehler (AR), former President of the Appenzell Ausserrhoden High Court of Justice and member of the Cantonal Council.
- Dipl. Ing. François de Lorient (54), Berne, since 1937 in the service of the Swiss Broadcasting Corporation (Radio Schweiz), chief of technical service and, since 1st January 1964, Vice-Chairman.
- Paul E. Métraux (86), Lausanne, since 1904 pastor of the following communities: Villarzel, Montreux, Chailly-Lausanne and Bursins (Rolle). For ten years Editor of the "Semeur Vaudois".
- Ernst Bollinger (63), Buerglen (TG), over thirty years with the "Kammgarnspinnerei" which he managed since last November; for many years Chairman of the "Sekundarschulvorsteherchaft".
- Dr. Alfred Schmid (75), St. Gall, keeper of the Municipal Archives, teacher and historian.
- Franz Brozincevic (66), Wetzikon (Zch), head of a firm of lorry constructors founded by his father in 1904, manufacturer of the well-known make of "FBW".
- Jeanne Clouzot, Geneva, for over forty years film critic of the Journal de Genève.
- Dr. Werner Kunz (70), s-Chanf (Upper Engadine), former teacher at the Lyceum Alpinum at Zuoz, one of the founders of the Oberengadin S.K.V. which he presided for decades; member of the Grisons Parliament.

[A.T.S.]

MEDICAL SUPPLY FAIR

The Fifth International Trade Fair for Medical and Hospital Supply (IFAS) will take place from 18th-22nd March 1965 at Zurich's Congress House. Trade quarters greatly appreciate this Exhibition and again expect a representative cross section through the most important branches of Medical and Hospital supply. Modern equipment and instruments will be on show as well as long tested devices created for the well-being of the sick.

[S.N.T.O.]