

## NECESSITY OF ENGINEERING SUPERVISION

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location of a road and to design and construct the necessary culverts and bridges, but he should have such scientific knowledge as would enable him to maintain it in the most economical manner. This means a thorough technical training and years of practical experience.

Road construction and maintenance require of the engineer qualifications of just as high order as would be demanded in the case of an engineer required to supervise the construction of railways and canals, for the problems to be solved are exactly analogous. Thomas Adams, of the Commission of Conservation, states that "road planning and engineering is a highly skilled profession and millions of dollars are wasted in the attempt to save money that should be used to employ good men to design the location and construction of roads." Scientific determination of the proper location of a road involves a knowledge of the road-building value of various kinds of soils, and the design of sub-drainage requires familiarity with certain geological features, hence it is evident that the road supervisor requires a very liberal education.

### Permanent Road Supervisors Needed

During the past year several municipalities in Saskatchewan for the first time employed engineers to supervise their road construction. Sherwood municipality has led the way in appointing a road supervisor at an annual salary, and the writer is confident that in the near future the ratepayers of the various municipalities will realize that so long as municipal councillors rotate in office from year to year, their services as road supervisors consist of a series of experiments by which they gain their experience at the expense of the people. If there is need for a permanent secretary-treasurer, there is still greater need for a permanent road supervisor, possessing the necessary technical training to enable him to locate, construct and maintain public highways in an efficient manner.

### Road Supervisors Should Be Trained Engineers

It is true that there are many good road builders who have not graduated from technical schools, but these are exceptional and their experience is restricted to a narrow line of work, and their usefulness is curtailed by their limited education. Outside the range of their experience they have to depend on analogy and in so far as their education is incomplete they lack in efficiency. In the opinion of the writer, a thorough technical education is primarily necessary to properly equip a man as a road designer and builder. A general knowledge of the principles of engineering practice can be obtained by field experience, but an education obtained in this manner has certain restrictions to which reference has already been made. Having received a technical education preferably by a systematic course of training in an engineering school, years of practical experience on highway work is desirable, if not essential, to produce the proper balance between theory and practice. The personal characteristics of the individual largely determine his prominence in this as in any other profession, but generally speaking, it may be said that road supervisors should be engineers first and highway engineers afterwards.

If repairs are to be made to the Gatineau Point Bridge at Hull, P.Q., the work will have to be done by the city, as the city clerk has been notified by the Department of Public Works of Canada that the department does not propose to contribute toward its repair.

## REINFORCED CONCRETE FOR SHIP CONSTRUCTION\*

By Major Maurice Denny, A.M.I.N.A.

SO long as the efficiency of a mercantile marine is judged by its dividend-earning capacity in free competition, so long will the choice of material for the construction of its units depend on economic considerations.

Up to the present, for the general trader, steel has proved to be the material which gives the greatest return for capital invested, and no material inferior in this respect will permanently displace steel from this position.

In the abnormal circumstances now prevailing, however, when free commercial competition is suspended, it is not necessary to examine the suitability of a material solely from the monetary point of view, and any substance which swells the volume of tonnage by drawing on fresh sources of labor and material has a chance to prove its

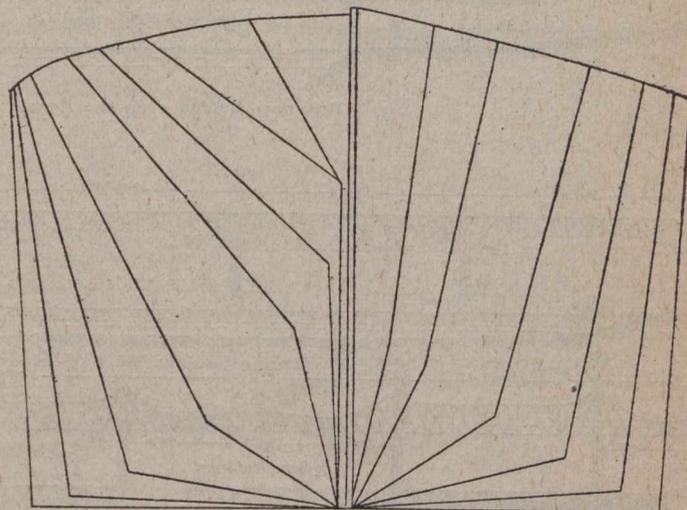


Fig. No. 1

merit on technical grounds alone. Reinforced concrete at once suggests itself as an alternative to steel, its suitability for general structural purposes being everywhere evident on land; and its application to floating structures being no longer entirely novel.

For all structures such as beams, reinforced concrete is particularly suitable, the steel taking tension and the concrete bearing compression. As almost every part of a ship's structure may be considered to be a beam under load, reinforced concrete is therefore not fundamentally unsuited to ship construction. When it is added that the use of reinforced concrete makes practically no demand on the class of labor and material used for steel ship-building, the justification for its trial is sufficient, and, in these times, overwhelming.

Experience has proved that steel embedded in concrete is completely protected from corrosion. The principal source of deterioration in a steel ship is consequently removed, and the saving of steel shown in comparing a reinforced concrete vessel with a steel ship of the same dimensions must be partly credited to this fact.

The repairing of local damage in a reinforced concrete ship would seem to be a relatively simple matter. So soon as sufficient concrete and steel in way of the damage has been removed to allow of an adequate "scarph" between

\*Abstracted from a paper read before the Spring Meeting of the Institution of Naval Architects, 1918.