usual for the Resident Engineer to be located at the job. At the tunnel the supervisory staff consisted of the Assistant Engineer in Charge, one overseer for each tunnel (who also had construction work to supervise), and one foreman for each face, although three shifts were engaged on each face. The supervision of the Resident Engineer at Wanganui was not of great value, owing to his lack of tunnelling experience. This was known to the District Engineer and to Head Office, as in the early stages he had asked in writing for a competent engineer in charge, citing his lack of experience in support of his request. One of the overseers was only in an acting capacity, being a foreman acting as sub-overseer. For a period of six months there was no overseer on Turakina Tunnel; part of his duties in theory being carried out by an Engineer's Assistant who, however, had had no tunnelling experience at all.

In the opinion of the Inquiry, there should have been an Assistant Engineer or an Engineer's Assistant on the tunnel construction, the overseers should have been free from all duties other than tunnel supervision, and there should have been two foremen for each face.

The responsibility for ensuring adequate supervisory staff must rest largely with the District Engineer. He himself had many other duties over a wide district, and therefore his only means of protecting himself and of ensuring a completely satisfactory result was by personally making sure of the adequacy of supervision.

In this case, too, some responsibility should fall on the Resident Engineer, but his lack of experience, known to the District Engineer, would limit the value of his opinion.

The District Engineer should to some extent be able to rely on the Assistant Engineer in charge asking for further supervisory staff if he considered it necessary, but in this instance an Assistant Engineer was appointed who, while able to carry out efficiently instructions received, was nevertheless not strong on the technical side, and this would be known to the District Engineer.

The effect of the lack of engineering assistance was that the Assistant Engineer in charge had too much detail to do, with the result that he was unable to give the detailed supervision to the actual tunnel work. Things happened in the tunnel of which he was not aware.

It should be stated that the lack of specifications and the absence of proper instruction had a serious effect on the supervision in that there was considerable variation and substantive lack of understanding of what was expected of overseers and foremen.

Although the main responsibility under this heading must thus be allocated to the District Engineer, in the opinion of the Committee, Head Office cannot escape its share for seeing that the supervisory staff was adequate to ensure performance up to requirements demanded. The Head Office representative challenged in this respect was the Inspecting Engineer. Obviously if supervisory staff is insufficient, then adequate supervision cannot be maintained.

The Committee cannot understand how any members of the supervisory staff could fail to observe or be aware of the following matters:—

(*a*) The change in the class of country from what was stated to be expected:
(*b*) The boarding-up in front of the "C" legs and at one part into the arch also:
(*c*) Failure to get concrete behind the caps and completely fill the arch:
(*d*) Carrying on with the placing of concrete in the afternoon shift without a foreman present.

(5) *Generally to assess the degree of culpability attaching to officers and employees of the Public Works Department for their acts of omission and commission in the execution of the job.*

After fullest consideration the Inquiry has reached the conclusion that a substantial degree of culpability must rest on Head Office, this attaching particularly to the Inspecting Engineer, Mr. Sharp. The main headings under which he was at fault may be summarized as follows:—

(*a*) Approval of type of tunnel without proper preliminary investigation as to whether mechanization could be carried out on the lines intended.
NOTE.—This was claimed to be the primary reason for adoption of the particular section.

(*b*) Failure to maintain a proper record of important decisions made and of instructions given.
(*c*) Failure to send proper plans and specifications to ensure that proper strength of concrete was provided, and failure to give specific instructions concerning the thickening of wall if country was not so suitable as was anticipated.
(*d*) When the country was subsequently found by Inspecting Engineer to be different from anticipations, in not seeing that strength was increased proportionately.
NOTE.—As the result of one of his instructions a reduction of strength resulted instead of an increase.

(*e*) Issuing instructions for the adoption of the type of timbering shown on timbering plan, which in terms of the plan itself did not permit of filling the crown with the plant made available.
(*f*) Failure to be fully apprised of what was being experienced in the tunnel and of adjusting matters accordingly.
(*g*) Failure to take adequate steps to ascertain causes of the cracks at an early stage and to apply remedial measures.