CRB RCA VicRoads

Materials and Research Departments

1929 – 2001

Compiled by

Dom Meadley

2021

INTRODUCTION

Over the 6000 years of the history of road building, the use of imported material, whether it be from nearby or from areas remote from the road, has been been the keystone of the road.

This was recognized right from the start of the Country Roads Board in 1913 and the *First Annual Report* of the Country Boards of 1914 provides great detail for the requirements for road making materials.

The emphasis placed on such materials and their use has been continued throughout the history of the Country Roads Board (CRB), the Road Construction Authority (RCA), VicRoads, GeoPave and Department of Transport as we know it today.

The importance placed by the various road authorities on construction materials and the naturally occurring rock and soil upon which roads and connecting bridges are built is reflected in the early establishment of laboratories, the formation of Materials Research Division (M.R.D) in 1929 and now the continuing role of the Pavement Geotech and Materials Engineering in the Department of Transport.

This book includes the story of the development of the Materials Technology Department and its precursors which includes the essential elements of organisation, people, achievements and failures and its future role in road building into the twenty first century.

In considering to whom I could dedicate this work, I thought of the many people who had influenced my career in the CRB/VicRoads. I had been so fortunate to be surrounded by dedicated professionals and other staff who were so willing to share their knowledge and support over the 37 years of my time at Materials.

In the early days, Alf Gawith, Bill Sherwin and Emil Horbelt were so willing to help this young experimental officer in understanding the work and the materials we were working with. Barry Bromham encouraged me and taught me how to plan and perform research in a systematic way and John Hanks spent numerous hours in trying to get me to understand statistics. Later Bob Barron and Roy Gilmour provided the encouragement to join Standard Australia committees and guided me through the path of sound methodology.

David Currie, Peter Lowe and John Bethune, as Materials Research Engineers offered considerable support even though I was much further down the ranks.

In the years at Burwood, I so enjoyed the support and friendly encouragement shown to me by both Bob Meggs and Lance Midgley as we careered down the path of commercialisation to GeoPave and development of electronic systems to better manage our work. I had a fellow support in Ray Batty who provided all his slef-learnt computer knowledge to support his effort.

The friendly support I received from Lance Midgley during my severe illness in 1999 was just an true example of how so many people in Materials cared for each other and encouraged us all to achieve what was best for the Victorian community,

Unfortunately Lance has suffered a severe injury himself and I dedicate this booklet to him to offer the same encouragement towards recovery as he gave to me in times of hardship.

I had commenced work on a proposed history in 1999 and considered I would complete it after I retired in 2002. However, another job and lots of travel have interrupted the long task and my ambitious endeavour. In 2020, COVID-19 put a stop to my wanderings and I returned to the task in August 2020. My focus also changed from writing a history to more gathering together as much information as I could from my accumulated archives from my days at Materials.

Rather than having a hardcopy for everyone, I intend to place this in the cloud for other former staff who may wish to add their recollections and memorabilia.

Dom Meadley

Chapter 1

The Formative Years

The level at which the first board members placed road making materials is reflected in over seven pages of the First Annual Report of the Country Roads Board of 1914 [1].

Very little is known of the people who first performed the testing, but the First Annual Report states.

While the best test of a road stone is its wearing qualities under actual conditions, experiments to ascertain its value in this way may take years and extensive experiments with a stone of unknown quality might prove costly. Laboratory tests of road materials are therefore of great value in affording an accurate indication of the suitability of a stone for traffic purposes of a variable nature. If under the laboratory tests enumerated, a stone exhibits similar qualities to that observed in a stone which has proved suitable under actual traffic conditions, it may be predicted with some degree of confidence that the stone under test will also prove suitable under the same conditions.

The Melbourne University authorities are co-operating with the Board in the matter of testing materials. They are giving the same terms that they grant to other State Engineering Departments, namely, that all tests shall be carried out free of charge.

The Board will this have the effective use of the testing plant at the Engineering School, which plant consists of 100,000 lbs, testing machine, cement testing plant schlerescope, and they are now constructing an abrasion machine, which will shortly be finished. There is also another testing plant on order, and the systematic investigation of road materials and its cementitious value, together with asphaltic substances, can be undertaken.

It is the Board's intention, as soon as practicable, to enter upon this research work. Samples of stone ... include all text from Report.... a plant is incurred [2]

Little is recorded in those early years but Harry George recalled:

In those days with the CRB barely 10 years old, it was a tiny organisation. The total staff was probably about 50. Arthur Callaway was Chief Engineer. A. Kelso and Don Darwin in charge of bridge design and construction, John Mathieson in charge of Metropolitan projects and testing of materials[3].

It was not until 1929 that the research work and the laboratory became a regular feature in the annual reports. This is most likely due to the fact that the work was performed as part of the function of other engineers rather than being assigned specifically to be the sole responsibility of one person.

It was in this year that the foundations of Materials Research Division were laid.

The greater space available in the new office building has made it possible to provide better facilities for laboratory work, and both routine materials tests and research work aiming at the use of new or improvement of known materials has now been placed on a satisfactory basis. The laboratory is in charge of a University graduate, and new apparatus has been installed, with the result that tests which were formerly carried out by outside bodies are now carried out in the Board's laboratory, at a considerable saving of both time and cost. What is of more importance, the work is under continuous control of the Board's senior officers, and the research work can be more definitely correlated with field experience.

Amongst the most important researches which have been carried out during the year have been investigations aiming at the extension of the use of local tars, and the determination of the most suitable tests for estimating the behaviour of sub-grade soils and natural or artificial sand clays.

For routine tests simple mechanical devices have been installed to facilitate the work, and large numbers of tests of material, such as gravel, road metal, concrete aggregates, bitumens, tars, road oils, &c., are constantly being carried out.

The road material testing laboratory of the University has special machines for making many tests, and it is not considered economical for the Board to install such machines when the University laboratory is available, and for these tests materials are sent to the University.[4]

The University graduate referred to in this report was Alf Gawith who was to spend his total career of 41 years with the Country Roads Board involved in materials testing and Materials Research Division.

It is not certain whether the laboratory performed all the research work, but a number of important tasks were carried out in those early years within the organisation that were taken up later by Materials Research Division, if not at that time.

Roughometer Records.—The last annual report referred to records made of the relative roughness of various roads by means of an instrument fitted to one of the Board's cars. The roughometer is bolted to the engine block of the car and measures the total movement, in the vertical direction only, between the engine and the front axle due to flexure of the springs while travelling over any length of road. It was fitted to a Morris Cowley car used principally in routine inspection work, travelling about 1,300 miles a month. Unfortunately the readings were not consistent, as it was found that if a survey of a section of road was repeated after a period of some months the results indicated a considerably greater change than had obviously taken place. As the instrument itself appeared to act perfectly the cause of the inconsistency was looked for in the other factors which influenced the readings.

Some of these are:-

1. *Velocity of travel along the road.*
2. *Pressure of air in tyres.*
3. *Ratio of sprung to unsprung weight.*

4. Elastic constants of springs.
5. Friction in the springs and at their supports.

Items 1, 2, and 3 can be controlled with a fair degree of accuracy, 4 is thought to be a function of age and use, but 5 is, with ordinary laminated springs, very variable depending on the amount of oil and rust between the leaves.

In order to eliminate this variable an old model "T" Ford car was purchased at a cost of £15 for use exclusively on this work and fitted with helical springs in front instead of the conventional laminated springs. The springs as constructed proved too stiff, but rather than get new ones made the front of the chassis was loaded up with two 100-lb. pigs of lead. These made the riding quality of the car about normal and also by increasing the sprung dead weight will considerably reduce the effect of small changes of live weight. The car was also fitted with an odometer reading to 0.001 mile, accurate to about one-half of one per cent. This is very necessary as it is frequently desirable to check up short lengths of construction work, and as the readings have to be reduced to "units per mile" a small error in distance affects the result appreciably.

The annual reports reinforced the importance of laboratory work as indicated from this 1932 extract.

LABORATORY WORK.

The importance of the work carried out in the Board's testing laboratory has grown very considerably during the years. The distribution of available funds over an ever-increasing mileage, the increase in the use of local materials from different parts of the State, and the development of new methods of construction involving different manufactured products and new items of plant, are among the factors which have contributed to this increase in work. Not only has the increase affected the number of routine tests of materials submitted by tenderers and materials taken from works in progress, but much experiment has been necessary in order to decide the processes most suitable for treatment of various new materials and to establish the new tests required to specify those materials. The experimental work has, of course, been coordinated with actual construction of various experimental lengths of road.

The importance of the sub-grade in road construction has also received increased attention. A large amount of work has been done on this subject in other countries and particularly in the United States of America, and use has been made of the publications from the latter source and in particular of the various methods of test and the technique of the tests and apparatus devised. Full particulars of these have been obtained, so research work carried out in this country will follow on and be comparable with the large amount of research work carried out and described by such authorities as the Bureau of Public Roads of Washington. While no systematic series of tests of Victorian soil has yet been undertaken, those which have been carried out in particular cases have proved of very great value in aiding the Engineer's judgment of particular soils in special jobs. In this as in all research work, there is no doubt that very great savings can be effected by ascertaining with greater accuracy the physical properties of the materials which are used.

The following summary indicates the nature and extent of the work carried laboratory for twelve months ended 30th June, 1932:-

Tests	No.
Tests on samples of gravel and metal submitted by tenderers or from current contracts	700
Tests on refined tar produced by the bitural process	370
Tests on samples from suppliers' works for bituminous materials, by arc and distillation methods 80	80
Tests on tenderers' samples of bituminous materials prior to acceptance of contract	150
Special tests on fluxing of various bituminous materials	100
Soil samples tested 70 *Note.*—Each sample requires several individual tests.	70
Mixing concrete test cylinders with materials from bridge contracts 20	20
Experimental research on paint, timber, apparatus and new methods of tests	110
TOTAL	1600

Not only were references made to the work of the laboratory, but often detail of the work done was included in the reports

Soil Analysis.—Further work has been done during the year on the highly important subject of subgrade investigation, although unfortunately staff has not been available to carry out the programme originally planned. Some changes in methods have been made. The Bouyoucos method of mechanical analysis by means of hydrometers has been substituted for the Schone elutriator, and is giving results that are generally sufficiently accurate, while much more quickly obtained than by the standard Pipette method. Samples of soils were very kindly sent by the Bureau of Public Roads of America, together with the test results obtained by their experienced operators and machines. These will be checked in the Board's laboratory, and will form a basis of comparison of test results.[7]

Since the advent of the motor vehicle, more and more attention is being given to constructing durable roads at lower cost, with a view to securing longer lengths of highways that will be serviceable throughout the year.

Research is an important factor in deciding on the design of a roadway and on the type of surfacing that will best serve the needs of traffic at the lowest possible cost.

The work done in the laboratory, equipped at the Board's Office for the testing of materials, has been of great advantage in the work of roadbuilding in this State. Continuous research carried on in the laboratory in the testing of soils and roadmaking materials has resulted in the utilization of only such materials as have been proved suitable for the purpose, and at the same time the work has contributed in no small degree to the reduction in construction costs. In the research work, considerable savings can be made by ascertaining accurately the suitability of materials in different localities for particular works.

On this subject, Mr. Arthur M. Hyde, Secretary of Agriculture of the United States America at the convention of the American Association of Highway Officials held in November last, speaking for his Department as director of federal activities and expenditures for highway development, stated that in dealing with the great national subject of highway improvement, he could suggest nothing and could ask nothing of greater significance than that every Highway Department shall dedicate itself to a greater and farther-reaching programme of research, both economical and physical, than it has ever undertaken in the past, that it is not contradictory to state that as the funds for the highway programme decrease, the greater should be the funds devoted to investigational reviewing and research and that, through the disclosures, the correct policies of management and technical standards shall be constantly adjusted to the needs.

Having in mind the importance of research bearing directly on the road problem, and the wide field for investigation, the Board hopes in the near future to be in a position to extend the scope of this Branch of its work.

The Board placed some emphasis on the number of samples processed and tests

Year	Samples	Tests
1933	1,750	2,475 [9]
1935	1,684	3,073 [10]
1936	1,999	3,152 [11]
1937	2,140	3,385 [12]
1938	1,912	3,232 [13]
1939	2,185	3,680 [14]
1943	831	1,660 [15]
1944	1,028	4,599 [16]
1945	2,522	6,715 [17]

Testing and equipment listed in CRB Annual Reports

1932 - Automatically controlled constant temp water bath
1934 - Development of relationship between soil constants and performance
1934 - Roughometer
1935 - Testing of test fabrics
1937 - Rosedale bridge foundations and embankments
1938 - Stabilisation - Salt
1938 - Design of concrete mixes
1939 - Correlation between lab tests and field behaviour established

Achievements listed in CRB Annual Reports

1929 - Extension of the use of local materials
1929 - Estimation of the behaviour of sub-grade soils and natural or artificial clays
1930 - Wear of grader blades
1931 - Roughometer
1932 - Sub-grades, testing, tar, bituminous, soils, paint, timber, soil analysis using the hydrometer method adopted
1933 - Weather test for tar, consistency tests for tar and for bituminous mixtures
1933 - Capilliary viscometer – benzol hot extractor for determining binder content
1934 - Deane and Stark apparatus for measuring water content of tars and bitumens
1935 - Hutchinson thermostat
1936 - Los Angeles Abrasion Loss machine
1937 - Soil compression apparatus - Terghazi type (consolidometer)
1937 - apparatus for taking undisturbed samples
1937 - Proctor compaction and soil penetration apparatus
1937 - Hveem stabilometer
1939 - Weathering tests on binders
1939 - Adhesion of Binder to Stone
1943 - Bearing capacity - plate bearing tests using an Army tank transporter
1943 - Cement stabilisation - particularly for airports
1943 - 3rd mobile lab purchased for use in NT
1943 - design of bituminous and sand asphalt
1944 - Core-cutter for determining field density of soil (OMC and MDD)
1945 - CRB test - testing machine was designed and assembled by lab staff

The Board kept tight control on its funds and was proud of its achievements in financial management.

The total expenditure incurred on testing and research, including the purchase of new equipment and the salaries of officers engaged exclusively on this work was only £2.508 or .13 per cent of the total expenditure on work carried out under the Board's control during the financial year. [13]

As well as tests which were normally associated with road building, other demands were made on the laboratory.

In addition, tests were carried out on tent fabrics, [times have changed] *and on mixtures of cut-back, bitumen and aggregate taken from road surfaces in an endeavour to ascertain the rate of loss of volatile material [*a problem that still taxes our minds today with a research and development proposal to use micro-penetration tests]. [10]

Purchases of new equipment and changes to the laboratory were all reported meticulously.

Improved facilities have been made available in the laboratory by enlarging the area previously in use, and by the installation of additional equipment as, for instance, a Hutchinson thermostat, the use of which will effect a considerable saving time, with consequent economy in the testing of tars, oils, &c. [10]

The laboratory did not work in isolation as Harry George recalled:

All of the original Divisional Engineers were, amongst other duties, busily engaged in developing and experimenting in low-cost type flexible pavements. In Central District and at Stawell fine crushed rock pavements were being laid. Harold Wood was successfully utilising gravels blended with loam. Sand-clay pavements in Bendigo district were being used where crushed rock and gravels were in short supply. In Warrnambool, Hugh Cochrane was successfully using scoria and other volcanic material and also experimenting with modified macadam. All these types of pavements were being tested in the Materials Research Division under the guidance of Alf Gawith and Harold Loxton, and later Keith Moody.

'Professor Nimbus', [did Fred believe that his head was in the clouds?] as Alf Gawith was lovingly dubbed by Fred Oldfield, was not always readily accepted by engineers in the field. In reality, his work in setting standards for quality control of materials and compaction standards of sub-grades and pavements was of utmost importance. Based on Californian practice he developed a rational method of design for flexible pavements.[18]

Early reports stressed the use of construction materials but, in 1937 and 1939, the first mention was made of work on investigations into bridge foundations and embankments.

The construction of a large embankment for the approaches to the Rosedale bridge has provided an opportunity to obtain information which will be useful on this and other banks which it may be necessary to construct in the future.

Platforms were constructed on the natural surface on which the bank is being built. The settlement of these platforms has been determined from time to time by boring through the bank. (Rosedale bridge has been the subject of considerable interest to MTD engineers this year as it is being widened.) ...

In order to estimate when the settlement of the foundations of the bank are complete, well points have been installed in the soil under the bank, and at a point some distance from the upstream toe of the bank. ...

... To make laboratory tests of the settlement phenomena at Rosedale and other soils, a soil compression apparatus of the Terghazi type has been installed in the laboratory. The sample is compressed by hanging weights, which load the upper of the two porous plates between which the sample is confined in brass ring, and the compression under each load is measured by an Ames dial. Permeability can also be measured by the apparatus, a matter of importance where an embankment is subject to saturation by floods. Apparatus for taking undisturbed samples of soil has also been obtained. [19]

The first mention of measurement of field density, work which predominated the 1970s and 1980s was made in 1937 also:

In order to control the consolidation of the bank, a Proctor soil compaction and penetration apparatus was obtained. The apparatus is designed to measure the change in density and consistency to which soil may be brought with changing moisture content, and to find the "optimum" moisture content, at which the maximum density is produced by a specific amount of compaction. ...

In the field the weight per cubic foot of consolidated material was determined by excavating a hole in the filling, weighing the material removed, and filling the hole with sand, the weight per cubic foot of which had been determined. ... [19]

... During the year, the Board has had in hand several important bridge works, and the method for the design of concrete mixes mentioned in the last report, has been used with gratifying results, consistently high strength of concrete has been achieved.

Special researches have also been carried out on bridge foundations to determine the safe loads which can be applied. The Board's laboratory is equipped with special apparatus for that type of work and advantage has also been taken of this by other Government authorities for whom the Board carried out special soil investigations during the year.[20]

The laboratory was located in the Exhibition Buildings and it appears that it was spread among a number of buildings.

The first laboratory accommodation to Mr. Gawith was the converted Parliamentary kitchen in the Exhibition Buildings. [21]

John Pittard recalling life at the Exhibition Buildings said:

We owned, I think, two long huts and some other buildings in which were housed the country Bridge Section and part of Plans and Surveys, Traffic & Location and various bits of Alf Gawith's Laboratory. It was a rare old joint.[22]

It is difficult to determine the number of staff involved in the work of the Division but the reports during the war indicate chronic staff problems which were not unique to M.R.D.

Owing to the shortage of suitable senior scientific personnel it has been necessary to carry on the Board's laboratory work with an unbalanced staff, most of whom do not possess the qualifications which in normal times would be regarded as essential.[23]

In the construction of both roads and bridges, an ever increasing application of research is becoming necessary. Before the war the testing division of the engineering branch comprised of a total of five officers, whilst at present the total number is ten, and to cope with the investigation work which is essential to the efficient undertaking of the Board's future programme of work, further increases in this staff are urgently required.

One senior engineer has recently resigned from this section to join a Commonwealth Department, and the loss of a highly qualified and experienced officers from this field is a serious one.[24]

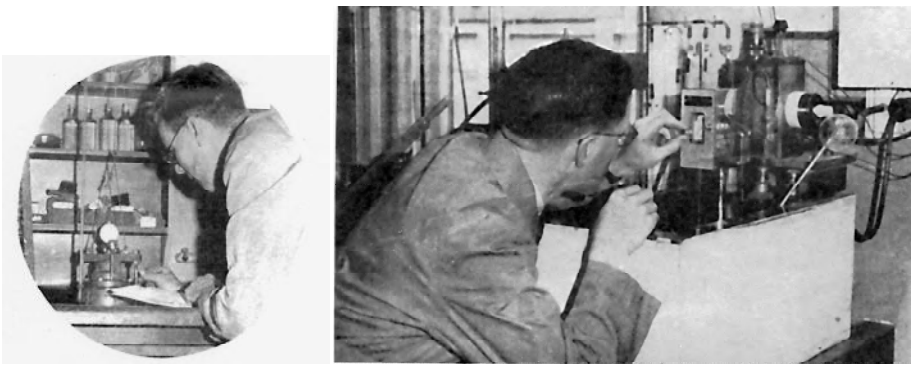
Apparently the shortage of staff did not dampen the enthusiasm of those left and under the leadership of Alf Gawith. They continued to pursue advances in technology and materials as well as significantly contributing to the war effort at home.

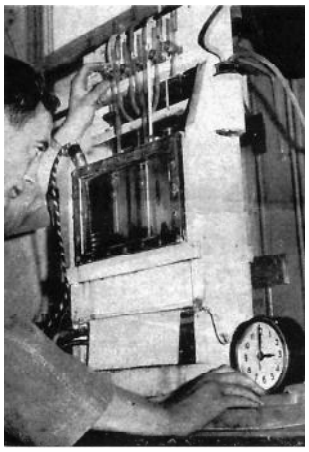
During the war years, a large programme of testing and investigation, especially of foundation soils and gravelly materials intended for use as pavements, has been carried out in the Board's laboratory in connection with the design and construction of roads and runways in Victoria and in the Northern Territory where these works were constructed under the Board's direction on behalf of the Allied Works Council. Tests were also carried out on samples submitted by the Allied Works Council in connexion with its programme of works in all other States. A tentative design method for the design of flexible pavements developed by the Board's engineers using the data chiefly from U.S.A. has been referred to in previous annual reports of the Board, and further details are included in the Chief Engineer's report. The Board's laboratory staff has contributed very largely to the application of this method of design to Australian conditions.[24]

No longer was the Exhibition the only venue for the Division's work as they developed mobile laboratories, the precursors of today's testing vehicles and the site laboratories of the 1970s and 1980s.

Two mobile laboratories have been extensively used to assist the engineers in charge of reconstruction of distressed sections of road in the design of new pavements required, whilst there have been detailed field investigations of the condition of sections where the failures have occurred, in an endeavour to accumulate data for the more general aspects of this research.[24]

After the war, the work and size of the laboratory increased and we are fortunate that the official records can be expanded upon by the reminiscences of those who served both short and long terms in Materials Research Division.





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Chapter 2

Recollections of Exhibition Building Days

Harold Gray (horticultural officer) when seeking a job with the CRB in 1950 spoke to Mr Matheson (Deputy Chief Engineer) who said "Try Alfie Gawith". Bob Gooch, who later became ADE Warrnambool, was in the laboratory; he was one of six in the lab at that stage and had been waiting to get into bridges for a long time but Mr Gawith wouldn't let him go until he got a replacement. I was that replacement and I don't think Bob Gooch has ever forgiven me for being his replacement. Just a bloke who had come on off the street and asked for a job, and being classified as suitable to replace Bob Gooch! Bob and I remain firm friends to this day.

... Despite the fact I was a laboratory assistant, below who in those there was nobody in the Board and Harry Gray was of DE status, above which there was only the Deputy Chief engineer, the chief Engineer and the Board and the Highways Engineer, Harry Gray and I discovered we read the same books.

... Every so often the laboratory would be dead for work; with no work around idle hands found mischief. We used to have door sills about 3 inches high and water used to flow. We would be throwing buckets of water at each other and turning the hoses on and we flooded this laboratory building one day right to the door sill. Alfie came over from his office and took one step in, and splash! His only words were "Mmmm seems to be a little damp today. I think somebody might get an auger and drill a hole or two in the floor."

There was a little bit of friction between one chap who was a Tobruk rat and suffered badly from the cold and we had a Canadian cleaner who used to go through like the Arctic wind off the Canadian tundra, leaving doors open and everything. The Tobruk fellow nailed up the doors one day but it didn't stop our Canadian man. He just got his axe out and dismantled the doors with his axe. That was in the lab.

J.H. (Tom) Russell, former Chairman of the CRB and RCA remembers:

When I was back [from the Northern Territory] I worked in the laboratory for a while. Alf Gawith was the king of the laboratory and Cedarholme was the chemist. He would always sit at his bench, puffing his pipe, looking at the bitumen bubbling away. It wasn't until years later I realised he was nipping the metho at the same time. Eventually he disappeared from the scene. Out in the back we would do all the soil tests; plasticity index and plastic limits and gradings, etc. and I can remember we would have great water fights. We would take the jet out of the sprays [barber sprays] that added water to the soil and when Alf Gawith wasn't looking we would have great water fights. We did our work at the same time. One person, Jim Alfa [Alford] was employed in there; he came off a bituminous surface treatment plant with some injury and he was put in the laboratory. We soon taught Jim how to do all the tests for us while we supervised him. There was another person called Duncan Cameron, who later went into the Education Department. He was always conducting romances with some of the office girls. You could always hear Alf Gawith's

muffled steps coming down towards the laboratory and by the time he got there, everything was orderly and everyone was working hard.

Notes from John Hanks

Staff in 1951
Alf Gawith, Ian Cederholme (chemistry), Keith Solomon (Soils), John Hanks, John Scala Tom Horsfield, Leon Bolton, Ken McArthur, Jim Alford, Bob Purtle, Roy Connaughton, Brian Francis, Ivor, Harold (the cleaner)

Assistants to Alf
Hugh Bubb, Bruce Foster, John Scala, Keith Moody, David Currie

Engineers seconded from Chief Engineer's Dept
Harold Gray, Bob Gooch, Ian Hay, Ken Scott, Dave Nicholson, Albert Winnett, George Pearson, Tom Russell

Tom Horsfield recalls his 31 years with Materials Research Department

I joined the CRB on 1st April I951.

In the preceding years I had been doing a Commonwealth Reconstruction Training Course during which I had matriculated and scraped through thefirst year of a Science Degree at the Melbourne University. Unfortunately, in the years 1948 — 1950 I had severe eye trouble which led to two corneal grafts and I was so fed up with the lack of progress with my degree that I opted out in early I951. I was sent by the University Appointments Board to discuss the prospects of a job with the CRB, which had an opening in their soils laboratory. In those days, Head Office and the laboratories were located in the Exhibition Buildings in Carlton.

As I recall, the laboratory staff when I joined consisted of:

Alf Gawith as head of the section which ultimately was to become known as the Materials Research Division.
Mr Cederholme (initials forgotten) as the Chemist.
Keith Solomon was the Engineer in charge of the Soils Laboratory.
John Hanks and John Scala, who were physicists.

At that time it was felt that Keith Solomon, a very keen and capable young engineer, could much better spend his time in the field and not have the day to day running of the soils laboratory to deal with is where I came in - as Laboratory Foreman. My tasks included receipt and logging of all samples to be tested in the soils laboratory, allocation of testing, preparation of test reports and nominal control of the laboratory assistants.

I also did a lot of field testing which, in those days, almost entirely dealt with determining the reason for failures of existing pavements and the rectification thereof. The first steps in these determinations consisted of recording the location of the test site and the existing condition of the pavement at the site, then digging a hole with a jack-hammer,

crowbar, pick, shovel and finally, with a soil auger. The depth at which a change in the material occurred was noted as were the depths at which samples were taken for testing and for moisture content.

Our vehicle fleet at that time consisted of two utes, an old Willys and a newer Standard Vanguard. Neither were equipped with so much as a heater and I recall a trip back from Traralgon in the Vanguard in cold and rainy conditions when I had to have the driver's side window wound all the way down to avoid severe fogging of the windscreen. Brian Francis in the passenger seat dam near froze.

The history of what was to become the Materials Research Division is full of the development of devices used to investigate the naturally occurring soils and gravels, the artificially created pavement materials, the condition of existing pavements and the development of the test methods for the best use of these devices.

In 1951, the resistance to penetration of the subsoil was measured by using a Proctor needle which was a spring loaded device shaped like a bicycle pump but with a steel rod onto the end of which could be screwed caps with faces of different areas. The next step in the determination of subgrade in-situ bearing value was taken with the development of the Static Cone penetrometer. This device incorporated a rack mounted vertically on a vehicle, a monkey mounted on the rack was advanced by turning a four spoked handle, so forcing a rod, at the lower end of which was a steel cone, into the subgrade. The resistance to penetration was measured by the deflection caused to a proving ring.

Static cone penetrometer


Scala dynamic cone penetrometer

The static cone penetrometer was a very important and long lived means of determining subgrade conditions and assisted materially in the design of pavement depths. John Scala was responsible for the setting up of the equipment and for the interpretation of test data obtained. A major benefit to the lab. assistants who used the device in the field was that a new vehicle had to be obtained which would be sufficiently weighty to provide the necessary reaction load. And so we got the magnificent - for those days - lnternational

AR 110 van. More comfortable, more powerful and better handling than either of the utes and, for that matter, the Holden and Ford cars which we were later to obtain.

For a time we continued to use the Proctor needle but we also put into use the Dynamic Cone penetrometer, the results from which were used in conjunction with those from the static cone. The dynamic cone device was simply a dumbbell shaped weight which slid down a steel rod, the length of drop being controlled by fixed collars and a steel cone at the bottom of the vertically positioned rod was forced into the subgrade. The number of blows taken to force the cone into the soil over a defined distance - usually one inch - was recorded. Giving results that were not as dependable as the static cone, the dynamic cone had the advantage that it could be carried by hand onto terrain were a vehicle could not go. A modification using a much larger weight than the standard 20 lb was subsequently used by head geologist Tony Bartlett in the investigation stages for the Phillip Island bridge. Tony used a row boat for access to the sites.

[Tony's description in his posh English voice of removing this device from the ground only to squash a private part of his anatomy always brought an enormous laugh and grimace of pain by the male audience.]

In the early l950's, the only means of measuring the condition of existing pavements, as distinct from the subgrade, was by using the in-situ California Bearing Ratio test. In this test, a surcharge load was placed on the layer to be tested and a large diameter (3 inch, if memory serves me correctly) flat surfaced needle was very slowly forced into the surface. The required force was generally very high as was the required reaction load.

Enter the 'Pie Cart'. This rig was an old semi trailer with the body resembling a furniture van. In the centre of the floor a large hole had been cut; above the hole was mounted a very strongly built and braced rack with a similar monkey set up to that of the static cone which forced the needle into the pavement. The main problem with this device was the length of time taken to set up on site, anything from 1 to 2 hours. Ernie Jones and I used the equipment to investigate a railway platform pavement at Spencer Street goods yard and the pavement condition on the Western Highway just east of Horsham.

The 'Pie Cart' was put to much more use as a deep sounding cone device. In this mode the simple steel rod carrying the penetration needle was replaced by drilling rods in which the inner rod carrying the penetration cone was surrounded by an outer casing and the plain cone of the static penetrometer was replaced by a cone which carried a strain gauge. This use of strain gauges meant the resistance to penetration was actually measured at the bottom of the hole instead of at the rack, although the readings were taken inside the van from electrical impulses carried from the cone up through the casing by wire.

Subsequently, a petrol-engined motor replaced the man power used to lower and raise the rod and casing.

Towards the end of the investigation, a breakage occurred in both rod and casing a few feet below ground level. What would seem an easy job to locate the top of the 100 or so feet of rod still in the ground proved to be very difficult and it was surmised that the top of the rod had whipped when break age occurred; it certainly wasn't anywhere near where it was expected. An Army type mine detector was borrowed - this was before the days of the proliferation of metal detectors - but the site was alongside the South Melbourne tramway line. I can't recall whether we ever did recover the rod, casing and cone, I expect we did. [The Pie Cart was replaced by the CPT vehicle in about 1966]

Another new piece of investigative equipment was the Benkelman beam. This was used to determine the amount of deflection of a sealed pavement under a known load which was provided by the twin rear wheels of a heavily weighted truck (usually a large concrete block provided sufficient additional weight to the truck). The equipment was placed on the road so that the front end of a pivoted arm was resting on the pavement surface, a dial gauge zeroed and the truck was slowly driven forward over and beyond the front end of the pivoted arm and the reading of maximum deflection was taken. Again John Scala was the leading light in working the machine up for use and in the interpretation of the results obtained. One of its first trials was on the Western Highway in the vicinity of Braybrook in the year 1956.

All of the above testing equipment was used on existing roads or the site of a proposed road. The only testing which was done at that time on roads during construction was density testing, determination of moisture content and some checking of materials brought to the job. Density testing, which was done to ascertain that the required amount of compaction had been achieved, was the most important. In those days and for many years thereafter, the only methods used to determine density were: the Sand Replacement method in the case of pavement materials - in which material was excavated from a hole dug and the volume of the hole determined by refilling it with a carefully prepared sand whose pouring density had been calibrated - and, in the ease of subgrades, by driving a steel cylinder of known internal volume into the soil (Core Cutter method).

As the CRB became engaged in bigger and bigger jobs the testing laboratory was required to do more and more construction control testing and this lead to the establishment of on-site laboratories manned by one or more laboratory assistants who were detached from Head Office laboratory for the duration of the job. The first of these was at the site of the Avalon airstrip near Geelong and the laboratory assistant who went there was Brian Francis. Brian was subsequently to go to an on-site laboratory on the Bacchus Marsh By-pass before going to Horsham Division lab.

With the boom in major road construction involving long lengths of highway duplication and town By-passes that was to follow, on-site labs became a common situation but in the fifties this was some time away. But the rapid increase in the requirement for testing soon necessitated the establishment of laboratories in country centres and the

training of testing staff. Eventually all eight country divisions got their own testing laboratories and in all cases the laboratory assistant in charge was given a thorough training at the Head Office laboratory.

In reminiscing about my years with the CRB, I find it easier to do this for the years 1951 to 1960 when we were at the Exhibition Buildings before we moved to Drummond Street. The people that were present when I started I have already named; those that came afterwards but before our move I can well recall but not the order of their arrival. Because there were fewer of them and not because they were of more importance to me personally, I commence with the 'Commissioned Officers' or graduates.

For a brief period, Alf had an Assistant or a Deputy by name of Bruce Foster who had that wonderful knack of being able to get those beneath him to do anything for him. I recall Bruce calling me over to see him in his office one day and telling me that there had been complaints about bad language emanating from the laboratory. Of course I could immediately see the seriousness of the situation and agreed wholeheartedly that something would have to be done, whereupon Bruce politely informed me that the complaint had been directed against me.

I would like to say that from that time onward I was never to swear out loud but my natural honesty forbids. Still, there were no more complaints of that nature against me, not that I heard of anyway. Unfortunately, by nature, Bruce was over qualified for the job as it existed at that time and did not stay very long.

John Hanks possessed the best mind I have had close contact with. What impressed me so much about John was his ability to work out any obtuse problem from first principles - as they tried to teach me at the university but with only moderate success. He was good enough to represent Australia at chess. In my first few years, John would spend all day checking over all worksheets for errors of sense and calculation; we often wondered how he could be content to do such a repetitive task. His other major function was to design concrete mixes and many is the time when he and the then Bridge Engineer, 'Paddy' O'Donnell , who was later to become Chairman of the Board, would argue the merits of a particular mix that was being churned just outside my office and many are the small bets that John won from Paddy as a result of how the mix would turn out.

John was in his element as a consultant. With his knowledge, his basic approach and his perseverance, he made the ideal teacher although never was his perseverance more apparent than when he was explaining just how South Melbourne, who had been beaten by 6 or 8 goals on the previous Saturday, had actually been the better team on the day. Most people who were at the Exhibition would remember the spectacle of John, arriving late in the morning as was his wont, unfolding his lanky frame from the inside of his tiny Renault parked at the end of the laboratory hut - the Renault was so short it was the only car that would fit in that position.

The main similarities between the two Johns, Hanks and Scala, were that they were both very capable and, in an age of rapid growth in the function of the laboratory, they contributed highly to the increasing esteem in which the 'mud - doctors' came to be viewed. Clever in most things, their most obvious fault lay in their choice of football teams, they both supported South Melbourne.

Harold Taskis replaced Ian Cederholme as the Chemist and Barry Russell took over concrete mix design and testing. I think that Tony Bartlett, who got the Geology Section of the M.R.D. up and running, arrived soon alter the move to Drummond Street. Bob Barron, who took over the job of control of the burgeoning soils laboratory, arrived just after the move. Again at about the time of the move to Drummond Street, Keith Moody was appointed to the job of Assistant Materials Research Engineer.

As for the Laboratory Assistants, their numbers also started to increase although there was quite a lot of coming and going. Those that I can remember as definitely being at the Exhibition Buildings were:

Jim Alford, Leon Bolton, Vivien Douglas, Brian Francis, Alex Galimbertie, Warren Guthrie, Frank Hamzie, Emil Horbelt, Ernie Jones, Leo Jurka, Peter Konings, Harold Masters, David Newbegin, Ollie O'Flynn, Stan Pashallis, Al Pitzen, Bob Purtle, Mif. Roberts, Joe Rush, Bill Weeden. I think Bill Sherwin came after the move.

The replacement for Harold the cleaner was Ernie Jones, whose abilities, in particular as a driver, were too valuable for him to remain as a cleaner and Ernie became one of the operators. His place as cleaner was then filled by the inimitable George Whittam who eventually became a Lab. Assistant

I think of all the soils laboratory crew, the ones who come more readily to mind are Mif Roberts and Michael Tamas. Mif appeared to be convinced that the American FBI or some other group were after her and she refused to be in the laboratory whenever anyone had a camera. Her antipathy to cameras was so great that the pranksters could not resist the temptation and a photo of Mif was duly taken and taped to the outside of the saw-tooth window light above ceiling height where Mif couldn't help but see it but could not get to it to take it down. [Emil Horbelt has admitted he was the culprit later, but never to Tom.]

Exercising all the authority I could conjure up, I demanded that the perpetrator of this rather cruel joke own up and bring the offending photo down. All to no avail, I had to clamber up on the outside of the building and do the job myself.

Michael Tamas was quite special. I can still see him washing a grading at the sink, stool tilted back, feet up on the sink, one arm draped languidly over the washing sieve and a faraway look on his face. To give Mike his due, he was a great cook. During a period when the soils lab was snowed under with work and two nights a week overtime were being worked, the evening meal was something of a problem as the only locally accessible providers of food were the pubs, which I didn't favour.

Mike, who was at that time working in the Chem. Laboratory, solved my problem by producing a small portion of food he had brought with him. However as time passed Mike became more and more ambitious and was soon producing the most appetizing Hungarian Goulash I have ever eaten. Unfortunately, the goulash smelled as appetizing as it tasted and this most attractive smell permeated nearby offices quite unconnected with the laboratory. Since the powers that be weren't getting anything more than the smell, the order soon came down that this heinous practice must cease forthwith. I still don't think

I've ever tasted anything better than Mike Tamas's goulash.

Two of the more active practical jokers were the Cockney 'twins' Joe Rush and Bill Weeden. In those years English immigrants were often baited and became defensive as a result. Although there was a very mixed bag of nationalities in the laboratory at that time there were no clashes on this account except perhaps between Harold Masters and the Joe Rush / Bill Weeden enclave. Harold was inclined to boast to the other two that he and his antecedents were true Australians and, following this line of thought, Harold one day announced that his great grandmother was a 'free' settler. To which Joe Rush inquired 'was she free or just reasonable?', which remark made Harold very unhappy indeed.

Another born and bred Australian, David Newbegin, had been pursuing an ecclesiastical degree before deciding that the Church was not for him. Having just dropped out of the course and looking elsewhere for a career, David joined the soils laboratory staff. Almost at once he was tested by Joe and Bill but David was made of stronger stuff and took the good natured kidding very well. David subsequently left the Board and became a private
consultant in concrete design, forming his own business which continues to this day.

Leo Jurka came from Latvia. He was as strong as a bull and yet a gentle man. Leo's main worry was his weak eyesight. Extremely keen to do well in his new country, as were all of our large batch of New Australians, Leo made friends with all who came in contact with him and was highly regarded in our section. Leo left the Board to take what he expected to be a more rewarding job with the hydro-electric scheme in Tasmania but after some years there he returned and eventually became the E.O. in charge of the Geelong Divisional laboratory.

Emil Horbelt came from Bavaria and was equally well liked. As with Leo Jurka, ex Italian Alex Galimbertie, ex Hungarian Michael Tamas, ex Frenchman Frank Hamzie, ex Londoners Joe Rush and Bill Weeden and Peter Konings (I forget where Peter came from originally, may also have been Latvia), Emil started at the bottom in the soils lab. There were none better than Emil and he stayed with the M.R.D. until his retirement going from one important position to the next and always doing the job well.

As with all others in the Division who did not have a degree there was always going to be an end to how far up the ladder Emil could progress, he did as well as anybody with that handicap.

Brian Francis was another popular member of our ranks. Starting at about the same time as myself, Brian did every job that there was to do and got a thorough grounding in soil testing as a result. With this grounding and his reliability, and being a bachelor, Brian was an obvious choice for field work and was the first of our on-site lab. technicians. Not keen to remain in Melbourne, Brian spent most of his time in charge of the Horsham Division laboratory.

I must also mention Al Pitzen as one who I remember. Al was from the USA and, with his dry wit and his laconic drawl, Al amused me with his various stories, generally to do with his family, Unfortunately, Al did not spend much time with us.

John Nugent Hanks spent 45 years with M.R.D., his first and only employment.

John recalls - I was interviewed by the Chief Engineer, Deputy Chief Engineer and Alf Gawith which was par for the course in those days. I had been unemployed since graduating from Sydney University in December 1945 and was desperate to gain employment quickly. I had been offered a job with the Commonwealth Government in Canberra (then in its infancy) but I preferred to get a job in Melbourne. At the end of the interview, I asked the Chief Engineer when I would find out the result. On receiving the reply that it would take a number of weeks, I explained my situation and, much to their surprise, I asked for an immediate answer. They huddled together and they gave me the good news. I started the next week.

It was amazing that the story was much the same when John reached the age of 65 and was forced to retire. He had to get his own way and was determined to achieve 45 years of service - a personal goal since he had achieved another goal in the Board , that of the longest serving person who had been employed as a graduate, it is thought. John claimed he had a number of tasks to complete prior to finally taking his leave. Bob Meggs, the newly appointed Manager Materials Technology Department, was at his wits' end as John's office was needed by other Departments. No matter how John was cajoled, Bob could not move him. It was not until some months later that Bob discovered that John was determined to achieve the 45 years - after which he reluctantly left.

John was well known for his sports coat - was it the one in which he is pictured in the 1955-56 Chief Engineer's Report? It never seemed to change.

John was very frugal but the stock market crash of 1987 caught him unawares. He took Bob Barron to task for organising a training course and visit to the regions at the time for his inattention to the market and subsequent paper losses.

John's long service with M.R.D. also had its disadvantages as many discovered his slight eccentricities which lead to a few harmless practical jokes.

John was always a late starter, and even when he did sign on in his early career he found it difficult to avoid the late-comers red line. Prior to the introduction of flexitime, he was not required to sign on, due to his classification. When flexi-clocks were introduced, John became a victim of his passion for numbers.

At the end of the day, when he decided to leave, he would pack his bags and head down to the flexi-clock to turn it off. He would wait at the clock until it clicked to a zero or a five on the last (second) decimal place of an hour. Others observed this and, one day, altered his clock so that there were two 1s instead of a zero. For a few weeks, John was convinced that his reactions were slow as he could never catch the zero. Did compassion finally come to the perpetrators of that dreadful deed?

He developed the habit of weighing himself each day and we often wondered if he purchased the platform scales for the experiments John Szendroe was carrying out or he needed it for his daily routine. Unfortunately for John, the scales were metric and each day he had to

convert the metric values to stones and pounds. The concrete laboratory was in the possession of a FACIT mechanical calculator which was the level of technology which John would tolerate. John would invade the concrete cylinder testing laboratory, right at its busiest time, to perform his daily calculations. Although we had had electronic calculators for years, John would not use them. We finally forced his hand by hiding the FACIT - much to his disgust- John entered the electronic era. The basic calculator was as far as he got - thank goodness "a computer on every desk" arrived after his retirement.

The staff in the concrete laboratory periodically amused themselves by developing schemes to make the platform scales read differently by taping stones, washers, etc. to the base or the balance scale. They then punted on how long it would take John to discover the offending addition.

In 1988, when the platform scales were disposed of (they only had one use - weighing John), John decided to climb on to the CBR testing machine to weigh himself. This was quite a sight in itself-this tall gangling body climbing up on to the Shimadzu whilst avoiding the greasy drive threads. How did he convert kilo newtons to stones and pounds?

John was best known for his obsession with South Melbourne Football Club (later the Swans). No doubt he developed this allegiance when he first joined M.R.D. from Sydney and South Melbourne was in its prime. Beware of Mondays if South won. John would know every kick, handball, umpiring decision for and against and have his own opinions on best players, etc. The best way to avoid his Monday discussions was to pretend to know nothing about football or to barrack for Collingwood. In the late 1980s, the Swans reached the finals and, when they lost, a sign was posted on his office door early on Monday morning, C'mon the 'Roys. John really flipped and tore the sign down immediately and proclaimed it was the most dastardly act anybody could do.

Chapter 3

KEW LABORATORY

In November 1964, the laboratory moved to Kew from its temporary accommodation at Drummond Street, Carlton. It had been there since 1960 in the old Hoadley's Chocolate Factory, which was less than satisfactory but it had more room than the Exhibition Buildings.

Alf Gawith has set out the design and then left it to Keith Moody to provide the details and overall supervision of the establishment of this new building, designed specifically as a laboratory but it could be also transformed into a hospital in the case of emergency, so the story goes.

It was a great opportunity to introduce much needed equipment and to replace some of the old worn out machinery and some photographs of that equipment and the laboratory spaces are detailed in this chapter.

The building incorporated some special spaces such as the concrete fog room, the steel testing laboratory, a mechanical workshop, dust extraction systems, air conditioning and sample disposal chutes from floor 2 to the lower ground floor where it could be dropped directly into trucks. It also contained a strong room floor area with a crane mechanism to be able to lift large test items and for testing of significant loadings for steel beams and a scale model bridge.

The laboratories were fitted out with durable bench tops, even stainless steel for the bitumen test area to enable adequate cleaning. Fume cupboards which vented to the roof were installed in the chemistry, bitumen and asphalt laboratories on the second floor. Even the noisy equipment such as stone crushers and the Los Angles Abrasion Loss machine had a special room on the lower ground floor.

All the new building was kept spotlessly clean by the cleaners such as Sam Sammut, Bill Kingsland, Jim Gosney, Fred Nicholls, Jim Bourke, Jean Hoelter and the Eileen Walsh who had a career change from being a tea lady to concentrate on helping our social lives as well as keep the laboratories clean.

Siberia was the nick-name for the soils preparation area and every new testing staff member was placed in "Siberia" for at least one month under the guidance of Emil Horbelt and John Szendroe to learn about soils, aggregates and their preparation.

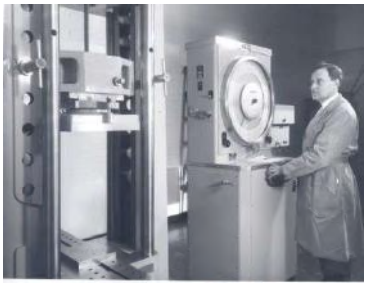
When I joined the CRB in 1965, the move had been completed and most staff had settled in to their new home and had quite a bit of pride in their laboratories and became quite territorial at times.

There was a directory and instruction booklet for all staff in the building.

Ernie Haslett – Retroflectometer

Gas Chromatograph

Antony Rees- Marshall

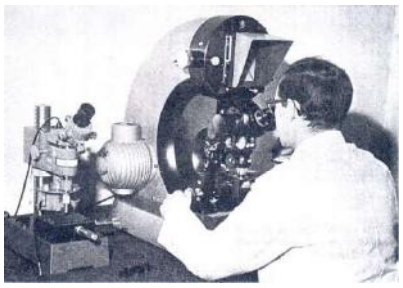


Vic Vucic – 100t Avery

Wally Knight -200t Amsler

Asphalt Compaction and Mixing

Elmer Nyoeger cutting rock



Roy Gilmour – metallurgy mscope

Barry Russell – hardness tester

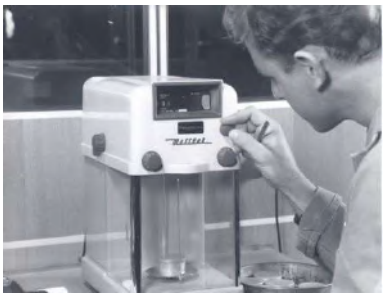
Bruce Woollard- LA Machine

Barry Russell – Impact Tester

Elmer Nyoeger- Petrography

Vivienne Douglas
Taber Abraser

Rod Binks George Bobbin
Paul Low Tim OLeary

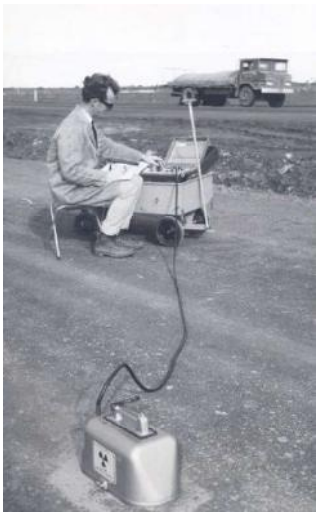


John Jobson
Mettler electric balance

Assan Seismograph

Soils Laboratory 1
SE shaker and PIs at benc

Workshop – Graeme Briant
at rear Joe Goldyn, George Kingsland



Viatec nuclear
density gauge

Gus Veismanis
triaxial testing

Plate 12—The Deflectograph in the testing mode.

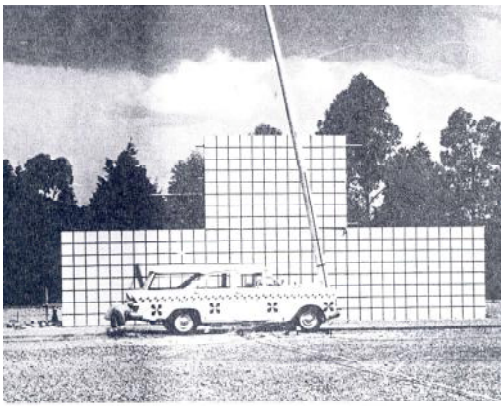
Berliot Deflectometer

Kew Asphalt Laboratory 1996

Kew CBR Laboratory 1996

Kew Soils Preparation Laboratory 1996

Kew Triaxial Laboratory 1996



Car crashing into slip-base pole

Research and Development was a significant part of the work in Kew and in 1987, John Bethune provided a brief summary of the work in R&D by Materials Research Division.

ALFRED HENRY GAWITH

Curriculum Vitae - 1970

Educated at Wesley College and Melbourne University.

Joined the Country Roads Board in May 1929 as an assistant engineer with the duties of Testing Officer.

Introduced the use of tests for absolute viscosity to define the consistency of tars and bituminous materials.

In 1953 established a laboratory at Tennant Creek for testing gravel and bitumen used on the road from Alice Springs to Larrimah.

Introduced the use of the California-Bearing Ratio test and developed correlations between simple soil tests and the California Bearing Ratio.

Adapted the California Bearing Ratio design method to suit
Victorian conditions.

Visited Europe and England for the Board in 1948 and was appointed Materials Research Engineer on his return.

Devised cone penetrometers for rapid determination of the California Bearing ratio in the field.

Introduced the Sand Equivalent test to tho work of the Country Roads Board.

Was responsible for the basic design of the present Country Roads Board laboratory.

Has been a member of the Materials Research Committee of the National Association of Australian Road Authorities since its inception.

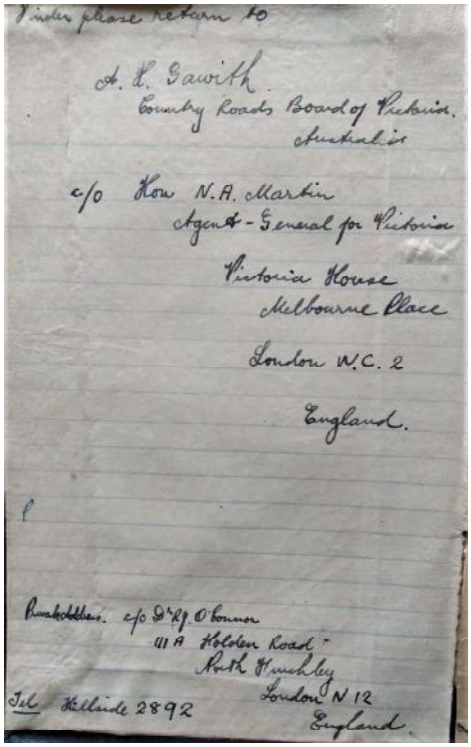
Has been Chairman of the committee (CH 25) for the Standards Association of Australia that deals with bituminous materials.

Has been a member of committees of the Australian Road Research Board dealing with compaction and with bituminous materials.

Has published a number of papers relating to road materials.

Holds the degree of Master of Civil Engineering of Melbourne University and is a Fellow of the Institution of Engineers, Australia.

Alf's slide rules


Under please Return to

A. H. Gawith
Country Roads Board of Victoria.
Australia

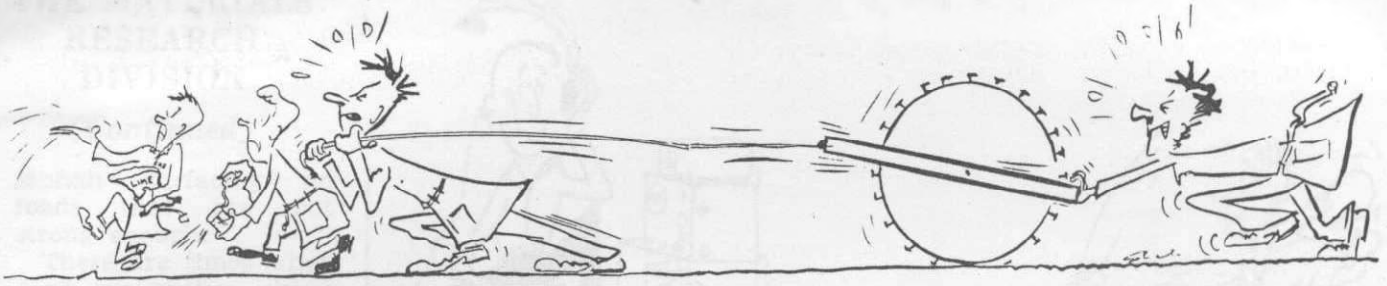
c/o Hon N.A. Martin
Agent-General for Victoria
Victoria House
Melbourne Place
London W.C. 2
England.

Remember c/o D'Ry. O'Connor
111A Holden Road
North Finchley
London N12
Tel. Hillside 2892
England.

Front page of Alf's overseas note book

Chairman Paddy O'Donnell on Alf's retirement

The Materials Research Division



WHAT IS IT AND WHAT DOES IT DO?

By A. H. GAWITH

IT all started in the Titles Office in a very small room, which also served for preparing the office tea, and the present Chairman of the Traffic Commission was the one and only member of the staff.

Near the end of 1928 the officers of the Board moved to the Exhibition Building and here the laboratory occupied a much larger "back room" with some benches, a few sieves and some gear for testing bitumen and otherwise a good deal of empty space.

The usual changes of staff occurred, a well known City Engineer becoming the "staff", followed shortly by the new director of the Commonwealth Bureau of Roads and the ex-Roads and Aerodromes Engineer of the Department of Supply and the Department of Works—at least those are the positions they now occupy or have occupied.

As is the habit of laboratories, empty space soon became choked with equipment or staff and during the 1939-45 war extra space was required for testing soils for air strips throughout Victoria. An asbestos cement annexe was built and some WRAAF's were added to the staff.

Later, when the war was over, two ex-army galvanised iron huts were acquired in addition and were occupied for some years until the inevitable operation of Parkinson's law, or the increase of work, this time in other sections of the Board's activities, sent the laboratory out into the wilds of Carlton.

Here a vacant chocolate factory was acquired, and portion altered for use as a drawing office and the remainder converted into a laboratory. After several years in this location the existence of the Division was probably quite unknown to or forgotten by most of the other members of the Board's staff.

Finally progress caught up with the area and the Division and the laboratory had to be moved back into close proximity to the Head Office in Denmark Street, Kew.

The building the Division now occupies has been designed as a laboratory for the specific purpose of testing materials and housing related activities.

So what goes on inside it?

The greater volume of work is concerned with the testing of the soils, gravels and the like that go to make up a pavement.

Here John Hanks applies his knowledge of chess to the design of new pavements after Howard Friee has had so many holes dug in old ones that they are no longer of much use anyway.

Samples of soil from the subgrade of the road are collected by field parties who dig through the old road and measure the strength of the soil by means of cone penetrometers which they force into the ground.

From these tests and from testing the samples which they bring back into the laboratory the thickness of pavement required for the particular traffic density can be determined.

Some people, of course, do not like so many holes being dug in their roads (and Joe Rush does not much like digging them) and to find the strength of the road without breaking it up there is the Benkelman Beam apparatus which measures the deflection of a pavement when a wheel load of 9000 pounds passes over it.

Some of the strange looking yellow vehicles that are parked in the cutting are used for this purpose and "heavy vehicle" driver Charlie Caughlin has a lot of practice in slow driving.

This test is used to upset the schemes of engineers who want to put

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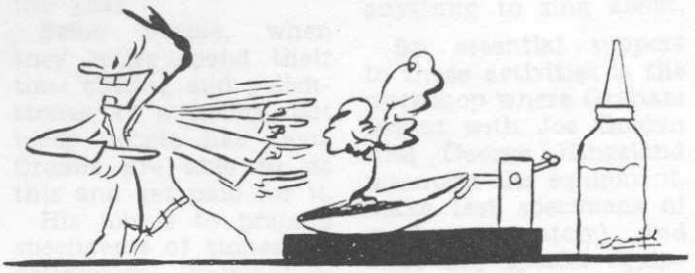

THE MATERIALS RESEARCH DIVISION

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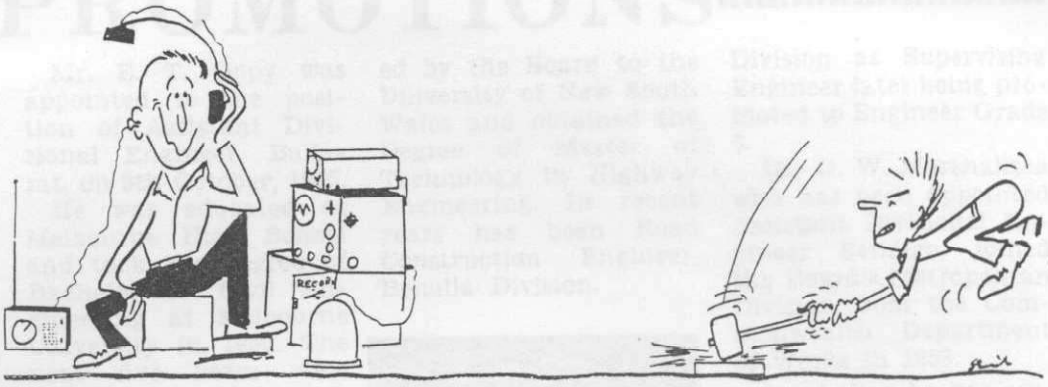


asphalt surfacing on roads that are not strong enough.

There are times when deep exploration, either to find if the rock in a cutting can be ripped or if it will be necessary to use explosives. Or perhaps the road has to cross a deep morass or the foundations of a bridge have to be investigated.

Tony Bartlett and his fellow geologists are equipped to make seismic or resistivity surveys of cuttings and foundations whether on land or at sea (he being a naval type).

They have a boring plant which can take undisturbed samples of soil at considerable depths, can carry out diamond drilling of rock, and can make in place tests of penetration resistance or vane shear strength.

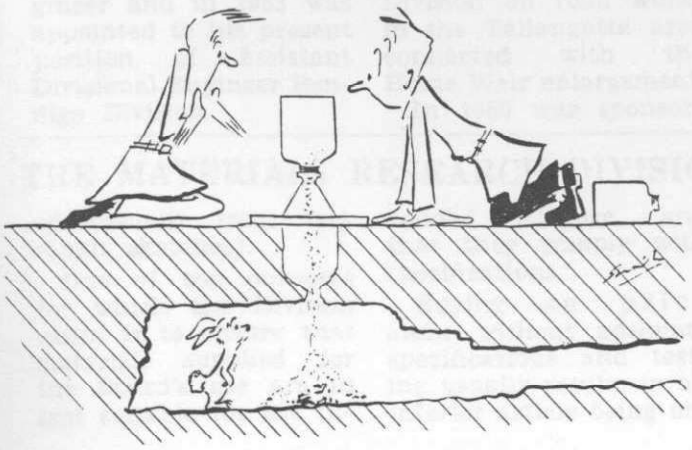
When John Brandenberg brings his samples back to the laboratory Kelvin York and Ian LePage determine the shear strength and coefficient of consolidation, and from this Dave Buultjens can estimate the settlement of embankments, with the help of a complicated programme in Fortran II.

So far we have been thinking about the information needed for the design of roads; but when they come to be built the Materials Research Division is concerned with the quality of the materials used.

Engineers bring in samples of soil, crushed rock, gravel or BST aggregate supplied to their jobs (or at least they should) to Bob Barron. John Szendroe conducts the sample store, complete with form guide (er Progress board) and the only Compactus filing system owned by the Board.

Here two experienced farmers Jim Fowler and Peter Read find out whether the samples would be better for growing potatoes than for building roads.

However the Division does not always wait for samples to come in to it—Ollie O'Flynn with the aid of Mike Tamas and his clerks of works keeps a very watchful eye on the activities of the plants making asphaltic concrete or cement stablized materials.



Trained staff are also available to act as inspectors to check compaction of earthworks or of pavements and on some of this work nuclear moisture and density equipment is being tried.

At times when twenty or so people are out on field jobs the place begins to look deserted.

From the earlier days a major activity has been to control supplies of bitumen which are purchased. (Roy Freeman and Vic Weldon have this job and during the "spraying season" in particular daily samples are obtained from refinery tanks, rail cars and from hot mix plants.

Some thousands of these samples are checked for "penetration" and viscosity as well as other properties throughout the year.

Some people, when they retire spend their time cutting and polishstones as a hobby, but lucky people like Doug Cromie are able to do this and get paid for it.

His job is to prepare speciments of stones for petrological examination to establish whether the stone is sound or is likely to deteriorate in service.

It has been found in the U.S.A., South Africa and New Zealand that basic rocks in which the minerals have become altered are likely to break down after a few years service in a road.

While the Division has long been in a position to do tensile strength tests on steel, it is now equipped for impact, hardness and bending tests as well and with the appointment of Roy Gilmour as metallurgist, is able to carry out metallurgical examination of welds.

Another regular line of work is the design of concrete mixes, the making of trial cylinders and compression testing of cylinders sent in from jobs.

Here Barry Russell and his colleagues handle some 8000 cylinders per year and earn a little money for the Board by testing for some municipalities. Anthony Rees does not think the paper work is anything to sing about.

An essential support to these activities is the workshop where Graham Briant with Joe Goldyn and George Kingsland maintain the equipment, make test specimens of steel (accurately) and build any special equipment that may be want-

Continued on Page 15

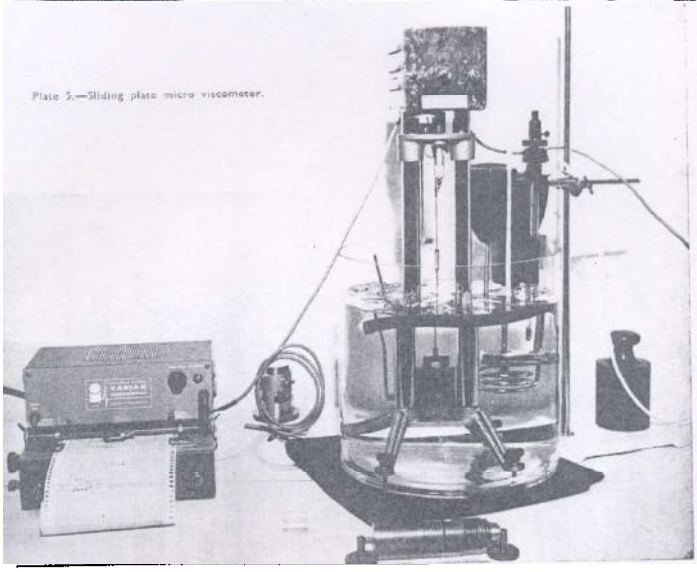


Plate 5.—Sliding plate micro viscometer.

THE MATERIALS RESEARCH DIVISION *(Continued*

ed (usually from very rough sketches).

One of the purposes for which the Division exists is to ensure that materials supplied for the Board's use are in fact suitable for the intended purpose, and that they comply with specifications.

Buying on price alone without adequate specifications and testing usually results in an inferior article being obtained whether it be a road or a tin of paint.

Research directed to the establishment of suitable specification limits and test methods is constantly being undertaken.

since 1953 and now holds the rank of major with the 22nd Construction Regiment.

His outside interests include membership of Traralgon Rostrum, Junior Chamber and State and High School committees.

MREs, AMREs and John Hanks in 1991

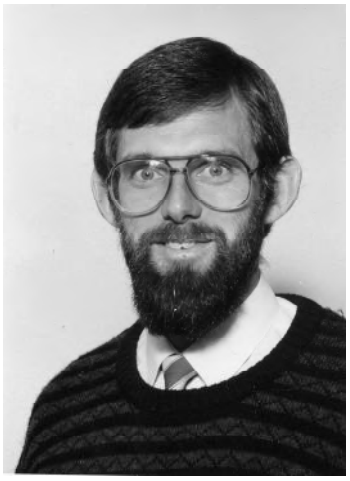
L to R Colin Roy, David Currie, Bob Meggs, John Hanks, Peter Lowe,
John Bethune, Keith Moody, John Scala

Materials Research Division in 1970s with David Currie and Peter Lowe

Materials Research Division Staff in 1990 with Bob Meggs and Colin Roy

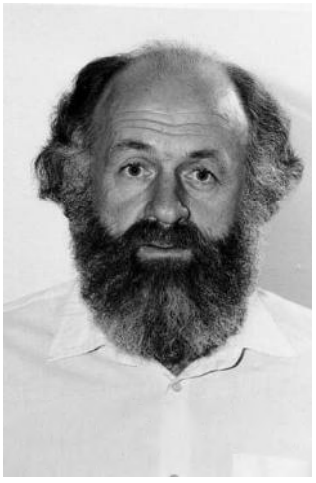
Leaders in MRD 1990

Alan Griffiths

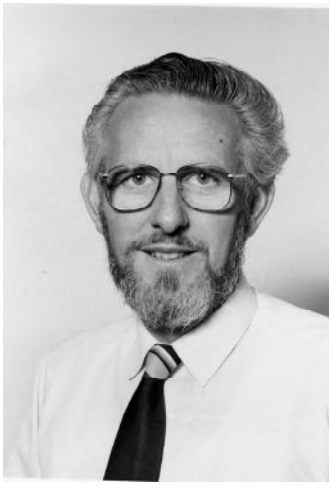


Andrew Walker

Arie Meydan

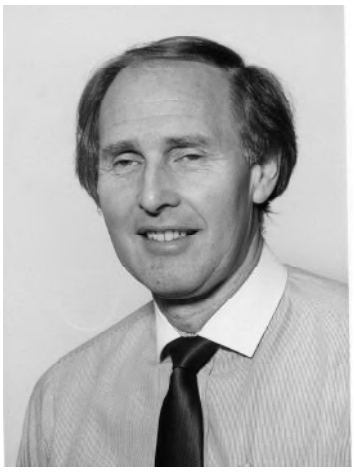


Barry Bromham

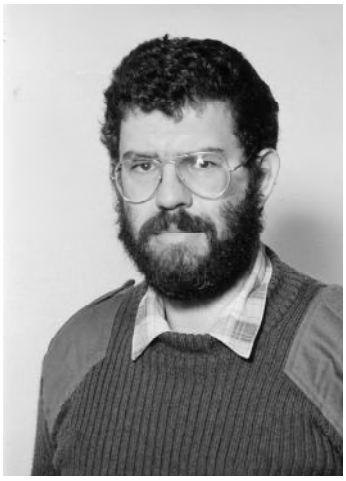


Barry Fielding

Bob Barron



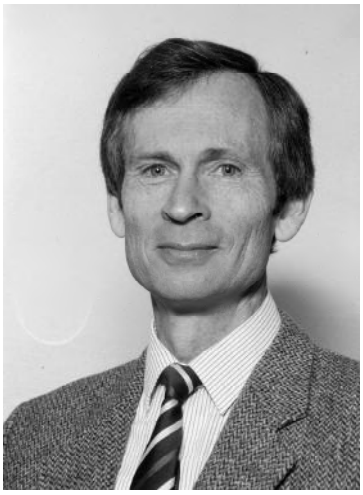
David Capon



David Manley

Dom Meadley

Geoff Jameson

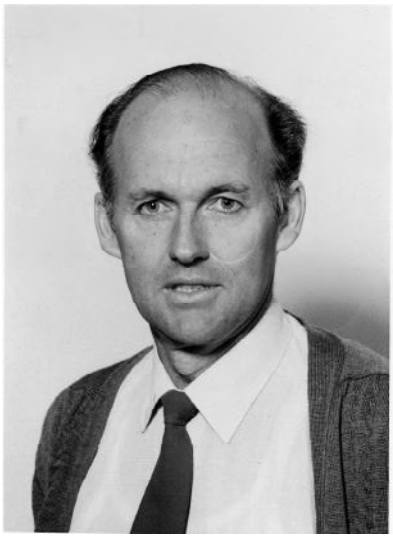


Jim Holden

John Foote

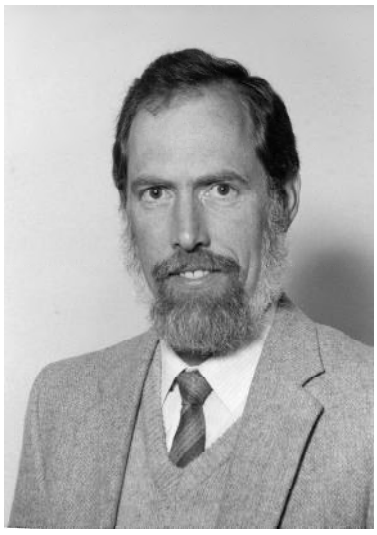
John Hart

John Jobson



Kel York

Max Arthur



Peter McDonald

Tom Flintoff

Chapter 4

Our Life at Kew

It was not all work and we often had a bit of fun involving condoms/explosives/water and social events

Condoms, believe it or not were an essential part of testing soils in that they provided a waterproof membrane to enable us to perform triaxial compression tests. In the days before the "safe sex" campaign, they were only available at chemists and all the men felt embarrassed to ask the young ladies in attendance when buying them. To make things worse we often needed them by the dozens, so we would pick the most conservative person we could find to go to purchase them. Poor old Freddie Nichols, the cleaner, nearly died of apoplexy when he was asked and was so embarrassed that he could not even use the word "condom" when telling us to go and buy the "* things" ourselves.

During the testing for the Phillip Island Bridge, Tony Bartlett also required a large supply of condoms to protect the geophones which were placed in the sea.

Explosives were often used during geophysical investigations and although no one was ever hurt a few dangerous incidents can be related by Tony Bartlett, after setting up the geophones at San Remo.

Water. It is only in recent days the water fights have become a thing of the past. Is it that we are all too old today with no young blood?

Water was an attraction to all even those who achieved the highest rank in the CRB. Tom Russell who spent about 12 months in the lab after the war said, "Out in the back ... we would have great water fights". Harold Gray, later Roadside Dev. Engineer) who joined the lab in 1951, described the ultimate drenching.

When the lab moved to Drummond Street, water was still an integral part of our testing life. Ken Mitchell remembered the lads squishy water through the wall dividing the labs.

The Kew lab was a lot more elaborate but the barbers sprays were irresistible and occasional battles would break out in the PI laboratories 2 and 3 but usually the nozzles were kept on.

However, the cleaner's cupboard behind the male toilets provided access to the rear of the cisterns. Many a wet backside was experienced when we were in the mood for hi-jinx.

Alf Gawith issued a memo banning the reading of newspapers during the morning and afternoon tea breaks. Doug Dick, an enthusiastic Collingwood supporter, could not wait till lunch time to read all about the Saturday game. Each Monday at about 10.00 a.m. he would grab *The Sun* and sit quietly on the toilet and read the reports. Unfortunately for him, the cistern was fired off by the lads and Doug's trousers got a drenching.

Noise Laurie Hudson was an expert at frightening the PI operators as they were busy working on the soils. He would take the aluminium top of the Rotap sieve shakers, spin it on its edge and then walk out of the room. The sudden clatter of the top falling onto the floor would make everyone jump.

Workshop gifts The workshop developed considerable expertise in preparing retirement presents appropriate to the work. When a large branch fell from a tree at the north side of the building, Graeme Briant salvaged it and prepared timber bases for the trophies. Barry Bromham received a partial concrete cylinder placed on the timber, Bob Barron, Elmer Nyoeger and Dom Meadley were presented with various parts of machines mounted on the timber.

Presents

When I first joined in 1965, salaries were relatively poor and there was a resignation almost every week. There seemed to be a collection every day for resignations, marriages, children, etc. Alfred Gawith finally issued an edict that no presentations were to be made to persons who resigned who had less than five years service.

The presentations did not only go the one-way. Bob Dunker gave Bill Sherwin a farewell present which he did not find for quite a few days. Bill had arranged a series of trays

containing aggregate from various quarries for weathering on the building roof. The inspection following Bob's departure revealed a garden of beans sprouting from each tray.

Characters

John Szendroe (later Sandrow) was a rather serious fellow, so the youngsters amongst us thought he needed a good morning tea snack. We mixed up some plasticity tests soils with cement and baked it the drying ovens. They looked so like biscuits that John immediately grabbed one. It was a joy to watch his face change.

On another occasion, John was surprised when he returned to complete his liquid limit test that the spatula could not be extracted from the soil in the bowl. A young blood decided a little cement added to the soil would make our day a little more exciting.

Vic Vucic, another post war refugee, was a favourite with the young engineers who were interested in horse racing. Joe Bordonaro, who owned a couple of racing dogs, found his time in the metal testing laboratory most rewarding. Vic also had a few "tall stories" to tell particularly regarding his involvement in diplomatic relations with King Peter of Yugoslavia.

At one time a number of former farmers were employed, Bill Sherwin, Jim Fowler, Peter Read and Jack Kenny, to name just some. Their affinity for the land appeared to be a great asset in soil testing. Bill spent most of his career working with asphalt, (Keith) Peter Read branched out into research into skid resistance but Jim Fowler spent his whole career in the PI labs training most new staff some of whom are still performing PIs today.

Lloyd Lawson was a former rear-gunner who was involved in many a sortie over Germany. Bill Sherwin, who was involved with tanks in WWII and Lloyd would exchange the banter between Air Force and Army during the war using some words that cannot be included here. However, it usually ended up in having a few grogs together at the "Skinny Dog" (The Greyhound Hotel, Kew).

Testing of soils, particularly non-cohesive soils, could be a bit messy at times. Lloyd Lawson muttered under his breath, "I have not got enough soil to do the shrinkage test". Laurie Hudson claimed, "If you clean up the mess on the floor you would have enough for five shrinkage moulds". As Laurie rapidly fled, the remaining soil pat spread itself all over the window of the fish bowl, Bob Barron's office. Lloyd spent some time cleaning the window under Bob's watchful eye.

Anthony Rees' field work

I joined the then Materials Research Division of the Country Roads Board in 1962 when it was still located at Drummond Street in Carlton.

Having left an office job I was looking forward to a challenge in a very different field — hopefully one which occasionally gave me an opportunity to see something of the countryside.

As a trainee experimental officer I commenced in one of the soil laboratories where a substantial apprenticeship was served before one could expect to progress to any sort of outdoor road material testing. Gradings, P.I. tests, etc, all had to be mastered first.

The supervisor of the soil laboratories was Tom Horsfield. Tom suffered from severe headaches at times and had rather an uncertain temper, so it was with some surprise to us 'dirt doctors' that he entered Lab 1 with a smile one day and asked if anyone would like to do some field work. The invitation had also been issued to the other soil laboratories, and I and Tim Ferguson from Lab 2 eagerly volunteered. Tom asked that we finish the tests we were doing and see him in his office for further instructions.

It was almost unheard of for someone as inexperienced as myself to get the chance to do field work. Tim Ferguson had been with the organisation for longer, but field workers generally did not come from Labs 1 and 2. So it was not without some anticipation that Tim and I later presented ourselves at Tom's office door. "Ah," said Tom, smirking, "the 'field workers'", and handed us each a shovel with instructions go out the back of the building and clean a drain that had become blocked.

The drain was an open one and quite long, so we had plenty of time to reflect on the old armed forces adage 'Never volunteer for anything'.

Subsequently I travelled all over Victoria involved in a wide range of tests on and for roads and bridges, but my first experience of 'field work' is etched in my memory.

Deflection testing

Dave Simpson must have had wonderful persistence as he managed the Benkelman Beam and Deflectograph testing for over 15 years travelling all over the state. He also took his intrepid team to Western and South Australia.

Dave was a very careful fellow and took road safety very seriously, so much so, that at one time the deflectograph was so overloaded with safety signs, cones and other equipment that the axle load on the deflectograph exceeded the maximum permissible.

Cone penetrometer testing

Dave Capon's pride and joy was the Cone Penetrometer Vehicle (CPT). It was a six-wheel drive army truck that was very slow in getting from place to place. IT was fitted with hydraulic rams which pushed the cone with extension rods into the ground whilst measuring end forces and side friction.

One day, the team was rather concerned when the end forces suddenly dropped off so they raced outside and wow behold here was the end cone poking out behind the truck.

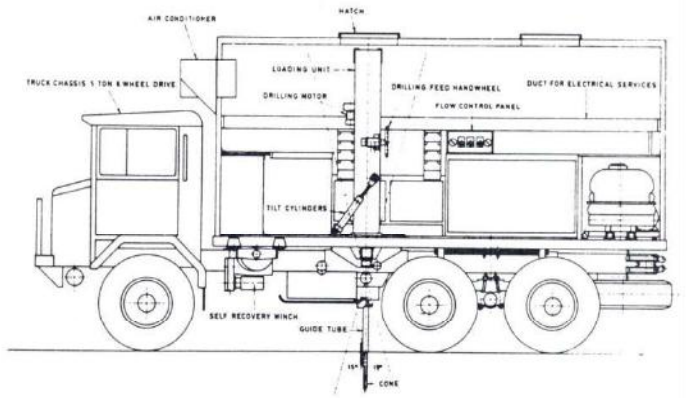


Figure 7—Layout of the Penetrometer Testing Vehicle.

Plate 8—Penetrometer Testing Vehicle during trials at the Army's Monegeeta proving ground.

Love and Marriage

Joyce (Scott) and Max Arthur

Ruth (Hillbrick) and Keith Robinson - Keith left to take over the family business and later married Ruth. Ruth took a VDP in the early nineties and very soon after they had their first child.

Emina (Fazlic) and Graeme Newman. Emina took a VDP and Graeme remains with VicRoasa

Alice (Oxenbauer) and Ray Batty - the best kept secret

Maggie (Goddard) and Peter Hillard - Maggie had a severe illness and Peter decided to head for the bush to get away from the city smog. Maggie and Peter have settled sown on the N.S.W. south east coast.

Jennie and Dave Manley both took VDPs

Deaths in Service

Harold Masters died of a heart attack at home.

Neil Quinn died of cancer after having had his voice box removed. Neil spent his last years in the PI laboratories after having spent his earlier years as a Clerk Works at asphalt, quarry and concrete plants.

Peter Colgrave died of cancer after a continual battle for many years. As Peter had been ill for some time, his superannuation was insufficient to look after his family. A collection which amounted to over $4000 was made. This was one of the highlights of M.R.D.

Peter holds the record for the most Plasticity Index (PIs) performed in a day.

Oshana (George) Gewargis was killed in a car accident whilst on the way home from a trip to Sydney

Sam Plesiotis - Sam spent many years in the Geotechnical Section and finally ended up as the Section Leader. He had suffered severe illness which kept him in hospital and at home for almost two years. He returned to work and to on the work of PDA with great gusto before he was appointed Section Leader. Very soon afterwards, his illness returned and he died very suddenly.

Social Life

There was no doubt many staff enjoyed the big events with plenty of food, many of which were arranged by our intrepid tea lady, and later laboratory cleaner at Kew, Eileen Walsh.

Lee Scott kept a photograph record of many of the events and a few of those photographs are included in this work.

Australia Day and the Melbourne Cup Day provided a genuine excuse for a good feast. Christmas in July and international food days were also on the agenda. Many a retiree dinner was held at a restaurant and of course the end of the year Christmas parties were all on Eileen's menu.

Eileen Walsh at one of her outside barbecues

John Bethune starts the Kew cup race

Marie Kek, Jean McCarthy, Maureen Black and Joan Gilmer

Bill Sherwin

Geoff Jameson
Maggie Goddard

Lee Scott

Betsie (Michael Betts)

Andrew Walker, Geoff Jameson

Maggie Goddard, Roy Gilmour

Lee Scott, Sam Maccarone
Mark Hughes, Andrew Walker

Tom Flintoff, Ivan Haustorfer
Felicity Finlayson

Bill Pinches
Albert Haslett

Anne Matthews

Lucy Auff

Maria and Simon Ecclestone

Doug Cromie, Dave Manley
Graeme Newman, John Jobson

David Dawes, Ben Munforte

David Veith
Jim Holden

John Bethune
Barry Bromham

John Sandrow
retires

Simone Servais kisses JS
Jean McCarthy

Bev and Barry Bromham
with Bob Barron

Peter Balfe, Joe Goldyn
Alan Muir

Lee Scott and Gray Scott

Ilona, Teleky, Roy Gilmour
Jean McCarthy, Jean Hoelter

International Luncheon

Christmas 1981 Geoff Jameson, Lucy Auff
Sam Maccarone, Kathy Renic, Oshana Gewargis,
Simone Servais, Tony Babos
Lee Scott, Jean Hoelter, Norm Carter (rear)

Eileen retires in 1994

EILEEN WALSH

- shoes too big to be filled

Sadly Eileen Walsh left VicRoads after 20 years service.

Eileen joined the organisation after many years service teaching silver service. Her background would be of no surprise to those who know her well. She was famous for her catering skills.

Eileen was responsible for all those memorable social occasions put on by the Materials Building, but, enjoyed by many others.

"I didn't mind what job I did as long as it was in Materials," Eileen said.

She said, "I spent all of my time in the organisation working in the materials building, and I spent one year working for Head Office, but, from the Materials Building."

According to former colleagues Ray Stokes and Rob Weatherson, "Eileen was a jack of all trades."

Ray and Rob said, "She always had a flexi on Friday 13th, but told people she wasn't really superstitious and always wore green on March 17th, St. Patrick's day."

Eileen told *Roadlines* "my most memorable occasion was the first Christmas party that helped arrange with Peter Lowe and Roy Gilmore. It was at Alan Muir's (Retired Ex-VicRoads) place in Kew. He and his wife had beautiful grounds and 120 people attended. The thing that sticks in my mind was that it started raining and everyone just stayed and enjoyed themselves."

Rob said, "she always insisted that everyone start the week with a clean and white coat".

Bob Meggs said, "Eileen always had a wealth of jokes which she would share with her colleagues at lunch time."

Eileen plans to spend her retirement with her family and intends to visit Ireland next year.

Most people would agree that Eileen was one lady who loved a party and certainly knows how to throw one.

■ ***Eileen helping to serve people at farewell function for her.***

■ ***Below Eileen with some of her colleagues.***

CHESS

On 1 June this year, our chess club was engaged in a serious battle with a visiting team from the CSIRO Division of Chemicals and Polymers. Unfortunately we went down 5:4.

Arie Meyden said "It was our sixth encounter with CSIRO over the last ten years so it seems that our club can do with an injection of new talent!"

At the beginning of October, the cub started the 1993 Club and Open Chess Tournament which is being played in the Materials Technology Department Cafeteria in Kew during lunchtimes. Any budding Bobby Fisher, Boris Spassky, Nigel Short or Gary Kasparov who can devote one lunchtime a week to chess is welcome to join in this thoroughly enjoyable competition. For more details contact Arie Meydan on Ext. 2543.

■ *VicRoads Chess Club Members.*

Arie Meydan 2nd from left, Russell Brown 2nd from left in rear

The golfer champions Jim Kemp and David Tilley

Chapter 5

The Move to Burwood East

In 1987, Materials Branch, as it was known then, occupied all floors of the laboratory building except for a small area on the 3rd floor occupied by Asphalt Division.

The merger of Materials and Asphalt to form Materials and Asphalt Branch and the subsequent staff reductions involved considerable change in accommodation particularly for the laboratories. By mid-1988 we occupied five floors of the building. Further staff reductions and pressure for use of the 3rd floor led to even more space reductions and by 1992 we had vacated the 3rd floor and our accommodation was considered to be rather tight. Further movement in the building would have involved considerable changes due to the presence of fixed laboratory equipment on the 2nd floor.

Staff numbers continued to reduce and due to lack of work caused by handing much of it to contractors via quality system contracts, the chemistry, bitumen and delineation laboratories had closed leaving some vacant space on the 2nd floor. Others already had taken the north-west office space on this floor.

We thought as a group that the shrinkage of space had stopped and that any plan to move Materials Technology Department would be too expensive. Banking on this we were taken by surprise when it was announced in August 1995 that we were the hot contender to be one of the departments joining Metro SE at Tally Ho.

I was assigned the task to investigate the possibility in relation to best use of space. After much soul-searching discussion, it appeared that the bulk of MTD could move but our workshops and major testing machines could not be accommodated at East Burwood.

Early in September 1995, the decision was made. MTD was to move to Tally Ho with Plant & Supply Department. We were allocated 700 sq m for office space and 600 sq m for laboratory space with about 60 sq m storage space. We had to squeeze what was currently placed in 4000 sq m into about 1350 sq m. The challenge was taken and various scenarios were developed as each group sought space. However, starting with a new building with quite a different shape, considerable efficiencies were made.

Multiple changes were proposed as soon as individual spaces were allocated but by October we finally decided on a floor plan; the line had been drawn.

A joint union-management consultative group discussed other major issue such as re-accommodation allowances, facilities and various HR matters. This group consisted of representatives for all departments who were to occupy the building.

The move was greeted by most with great enthusiasm as they would now work closer to home. Those in the western and northern suburbs were definitely disadvantaged

but when the move was made all moved and those disadvantaged were paid a re-accommodation allowance to help with the fares.

The rebuilding of a laboratory is no easy task particularly in a building where we were not the owners. We had a tight schedule to develop plans, build the building, outfit it and move in by 30 June 1996. Thanks to the co-operation of staff, the method of construction and strong support this was achieved.

Construction of a new lab of the size proposed was quite complicated as all special infrastructure such as benches, cupboards, exhausts, compressed air, plumbing and special electrical fittings had to be included early in the contract.

The tightest schedule was fit-out which had to be completed in six weeks. Benches had to be made, cupboards fitted, equipment moved and everything made operational. To compound the issue much high priority needed to be given to the building of a state-of-the-art Registration and Licensing Office in the building and the office accommodation.

Daily/hourly supervision of the fit-out was required to co-ordinate the trades and to make sure everything was put into the right place. At Kew, decommissioning of benches and equipment had to be made so that they could be moved. In all, about four weeks of lab work was lost, although people could not work properly for about six weeks.

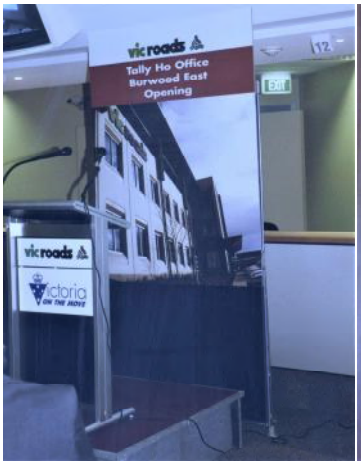
This was quite a different story to that of the move from Carlton to Kew.

The office move was a lot easier! It was suggested that 10-12 posting boxes of material was all that could be accommodated; a matter of clearing out what was not needed, archiving and packing. Despite all warnings, most packed too much with Russell Brown achieving the most with 42 boxes but I suspect Lance Midgley and Fred Andrews - Phaedonos would have exceeded that number but much was moved to their home garages first and has filtered back to Burwood East over time.

After a couple of years, Plant Branch and areas from Metro South East Region took over the space of the geotechnical laboratory which was then squeezed into the soils and asphalt areas. Further space reduction was made when the workshop moved from Kew into the core photographic area. Later the workshop was closed.

On the first floor, Metro South East Region spread its tentacles and took over the south part of the Materials area and the space in 2020 now remains so much reduced from the first move in 1996.

As I left VicRoads in 2002, I will leave it to others to relate more about Burwood East and any future moves of this important facility which provided me with fortunate career whilst there and at my current occupations working for the National Association of Testing Authorities, Australia.



Asphalt Lab at Burwood East

Geotechnical Lab at Burwood East

Soils Lab (south) at Burwood East

Soils Lab (north) at Burwood East

Standards Australia

Materials Departments have contributed significantly over the years to the development of its own methods and of national standards.

Significant contributions were made from the early years with Alf Gawith being Chairman of the Committee CH25 for bitumen and tar.

Alf Gawith, Bob Barron and Dom Meadley have represented CRB/VicRoads and NAASRA/Austroads on the Soils Committee CE/009

Barry Bromham, Barry Fielding, Dom Meadley, Max Arthur, Bob Body, Andrew Walker, Fred Andrew-Phaedonis, Harold Taskis, Arie Meydan and many others have contributed significantly to a number of other committees with Standards Australia.

The expertise developed in Materials Divisions has contributed significantly to Australia's Technical Infrastructure not only in NATA and Standards Australia but with many other professional committees and with numerous published papers.

NATA Accreditation

The Country Roads Board was an early adopter of Laboratory Accreditation was assigned accreditation Numbers 21 for Mechanical Testing and 22 for Chemical Testing on 5 February 1951 just 4 years after the first laboratories were accredited.

At one stage VicRoads had 18 accredited facilities under the guidance of Materials Branch, including Construction Materials, Chemical, Optics and Radiometry, Non-Destructive and Biological Testing. This also included the 8 regional laboratories and a number of field testing laboratories.

In the 2000s, GeoPave became accredited for Inspection of Welding, Coatings and Concrete Manufacturing.

Today only the Construction Materials and Inspection accreditations remain.

NAAT has contributed significantly in NATAs volunteer technical assessments and in its advisory committees.

Peter Lowe was a state representative on NATA's peak advisory group and Roy Gilmour, Allan Griffiths and Dom Meadley became chairpersons of relevant advisory committees.

In 2001, GeoPave celebrated 50 years of accreditation with an afternoon tea and presentations by Miranda Douglas, Director, Technical Services and Steve Brown Manager, Geopave.


GEOPAVE
50
years
NATA


50
NATA