Engineering Brunswickan

VOL. 70 FREDERICTON, N. B., WEDNESDAY, FEBRUARY 21, 1951 No. 15

NOMINATIONS SPARSE FOR S. R. C. ELECTIONS

Engineer and Artsman in Presidential Race

A two-way race for the presidency of the Students' Representative Council had developed as nominations for campus offices closed on Saturday evening. Don McPhail, junior Arts, and this year's treasurer of the SRC, is to oppose Raymond Roy, intermediate Engineer business manager of the Brunswickan and active in several other campus organizations for the top campus executive post. The elections are to be held on Friday, March 2.

Sparse nominating resulted in no less than ten elections by acclamation among the more than 35 offices to be filled in the polling.

Among those positions filled by acclamation are the positions of secretary of the SRC; Senior class president, vice-president, and secretary-treasurer; similar offices in the intermediate class; and vice-president and co-ed rep. in the junior class.

Thus far there have been no nominations for AAA secretary, NFCUS chairman, or for any of the class positions in the sophomore class of next year. Some confusion has arisen in the positions of SRC second vice-president and AAA vice-president, with the only nominee in each case being Marg Vermeeren.

A listing of the nominees for the various posts follows:

For SRC President — Don McPhail, Ray Roy.
For SRC Vice-President —
For SRC 2nd Vice President —
For SRC Treasurer —
For SRC Secretary — Robert Sansom (Elected)
For AAA President — John Currie, Walter Fleet, John Little, Sandy Valentine
For AAA Vice-President —
For AAA Secretary —
For NFCUS Chairman —
For Senior Class President — George Shaw (elected)
For Senior Class Vice-President — Audrey Baird (elected)
For Senior Class Sect.-Treas. — Cynthia Balch
For Senior Class Co-Ed Rep. — Barbara Bell, Jeanette Webb
For Senior Class SRC Reps. (3) — Bill Barrett, Jim Coster, Howie Boucher, Archie Menzies, Hubert Whalen, Roy Wright, Dave York.
For Intermediate Class President — Robert Spurway (elected)
For Intermediate Class Vice-President — George Elliott (elected)
For Intermediate Class Sect.-Treas. — Peter J. Murphy (elected)
For Intermediate Class SRC Reps. (4) — Carmen Bliss, Dave Fair, John MacTavish, Lawrence Nairn, W. C. Stevens, Tom Myles.
For Junior Class President — Paul Collins, Eric Godwin
For Junior Class Vice-Jres. — Judy Waterson (elected)
For Junior Class Sect.-Treas. — John Burch, Loretta Dodds
For Junior Class Co-ed Rep. — Noreen Donahoe (elected)
For Junior Class SRC Reps. (3) — Dick Ballance, Eric Garland, Bob Neill, Donald Pyne, Bud White

The deadline for nominations for all Sophomore Class Officers and for the offices above where no nominations appear has been extended to 12 noon, Saturday, February 24, 1951.

Dr. E. O. Turner converses with Mr. J. R. Feeney, Chief Engineer in charge of construction, N.B.E.P.C. Mr. Feeney had just ended his lecture on the Tobique River Power Project addressed to members of the Engineering Society at their February 6 meeting.

POWER IN NEW BRUNSWICK

As guest speaker at the last meeting of the Engineering Society, Mr. J. R. Feeney, Chief Engineer in charge of Construction for the New Brunswick Electric Power Commission, delivered an informative lecture on the Tobique River Power Project. The meeting, held on Tuesday evening, February 6 in room J-10 of the Civil Engineering Building, was opened by the president, Harry Swinnard, who immediately called on Mr. Feeney to address the group.

Mr. Feeney began his address by stating that there could never be a surplus of power. He pointed out that as soon as power was developed in an area industry rushed in to absorb this new energy. In New Brunswick there are two means of producing electrical energy — one, by steam and the second, by water power. Mr. Feeney argued that producing electric power by hydraulic means was by far the cheaper method. He advanced a good deal of statistical data to support his argument.

The main dam and power house of this project will be situated at the mouth of the Tobique River near Perth. The river at this point has the natural capacity to produce 44000 HP but a system capable of producing 27000 HP is to be installed, obtaining this capacity by using an average head of 80 feet. The new source of power will be combined with the other power plants in New Brunswick in a grid system so as to supply the province with power as economically as possible.

Mr. Feeney added that even the fish in the river had been considered when plans for the project were drawn up. A special fish ladder has been incorporated in the dam which will allow salmon to return to the head waters of the Tobique during the spawning season. Special waterwheels with a wide clearance between blades are to be used to allow the fish safe passage on their annual trip down the river.

Following the address a very short business meeting was held after which the majority of members repaired to Mrs. Bailey's Tuck Shop for lunch.

Take Top Positions

During the past year two members of the Engineering staff have been elected to high offices in the national and provincial engineering bodies.

Dean E. O. Turner was elected a Vice-President of the Engineering Institute of Canada, and was installed in office at the Annual meeting of the Institute at Toronto in July. Dean Turner took part in an open panel discussion on Engineering Education at the Toronto meeting. The American Society of Civil Engineers met jointly with the Institute on this occasion.

Prof. J. H. Moore was elected President of the New Brunswick Association of Professional Engineers at Saint John in January. The New Brunswick Association will be host to the other Associations at the meeting of the Dominion Council in Saint John in April. **A meeting is planned in Fredericton while the Dominion Council is in session.**

Editor Resigns

Resignation of the Editor-in-Chief of the Brunswickan was tendered and officially accepted at last Wednesday night's SRC meeting. Al Warner, who has held the post for roughly a year, told the Council, in filing the resignation, the "step was not taken without consideration; and that due to pressure of studies, the step was unavoidable." Official thanks and regrets of the Council were expressed to the outgoing editor by Aulder Gerow.

The post now becomes vacant. A three-man committee to seek a successor to the post was set up by the Council on the advice of Mr. Warner. It is composed of Aulder Gerow, Jim McAdam and Mr. Warner. The committee has issued a new call for applications for the post, and will conduct a public meeting on Wednesday afternoon at 2 p.m. in the Geology lecture room of the Forestry building to consider the matter.

Applications should be handed to Jim McAdam, the committee said.

Farewell to Professor Hoyt

The intermediate class of Electrical Engineers gave their official farewell to Professor D. P. Hoyt at a dinner sponsored in his honor at the Windsor Hotel, Friday evening, February 9. Prof. Hoyt has left his position on the faculty of Electrical Engineering at U.N.B. to take advantage of an opportunity to work for the National Research Council.

In his thanks to the class for their consideration, Prof. Hoyt (Smiley to the boys) expressed a deep sorrow to be leaving Fredericton and the Hill. His association, he stated, both with the faculty and the students had been, in the years spent with them, a pleasant and gratifying one. He would always carry with him, he added, a fond memory of his years spent up the hill both as a student and a professor.

The entire faculty was present at the dinner. Dr. Baird, as well as his colleagues Profs. Dineen and Collier, each in turn expressed their sorrow in seeing Prof. Hoyt leave. Chuck Joudrey, who spoke for the students, said that Dr. Baird's comments simply mirrored the feelings of the students who had known Prof. Hoyt. He added that, speaking for all the students, he had always found Prof. Hoyt a most understanding and helpful educator.

The dinner, a turkey and scallops affair, was held in a jovial atmosphere which seemed to belie its purpose. The evening terminated with a toast to the guest of honor and the mutual telling of pleasant stories and reminiscences.

Dry Dock is Unique

The second field trip of the Engineering Society for this academic year took about thirty engineers to the Port City on Thursday, January 26. Travelling by chartered bus, the engineers visited two of Saint John's leading industries.

On arriving in Saint John, the visiting crew proceeded to the Anderson Brick and Tile works where they were conducted through the plant by the Chief Engineer, Mr. Wienand. Mr. Wienand revealed and explained the entire brick-making process from the time the clay or shale is found and dug to the final loading and freighting of the brick and tile. As he explained each step of the process, he led the group to that part of the plant where the step mentioned was being carried on. The inside of a brick kiln was shown to the party during the process. The heat used in making bricks days before could still be felt in the walls of the kiln.

After dinner the visitors were welcomed at the Saint John Dry Dock by Mr. Andrew Watt, chief draughtsman for this company. A thorough tour of the dock, its power installation, and of the steel construction plant was afforded the group. The dock is among the largest in the world being second in size, in Canada, only to the dock in Esquimalt. However, the Saint John Dry Dock is capable of housing the biggest ships built and is equipped with facilities to keep these ships on a sea-going basis while they are in dock being repaired. It is equipped with sewage disposal, fresh water, and electric power units which it can pipe directly to the ship.

During the evening, the students were privileged to attend a banquet held jointly by the Engineering Institute of Canada (St. John branch) and the New Brunswick Association of Professional Engineers. It was at this banquet that the majority of the students learned that Professor Harry Moore of U.N.B. had been elected the Association's new president for the coming year. An early departure from Saint John concluded the trip which will probably be the last one for this term.

Thanks!

Thanks are due to Alf Warner and his former staff for their kind help in producing this edition of the Brunswickan.

THE ENGINEERING BRUNSWICKAN

THE BRUNSWICKAN · FROM UP THE HILL

Established 1867

The Yearly Journal of Current News and Prosaic Literature of the University of New Brunswick

Member Canadian University Press

Authorized as second-class mail, Post Office Dept., Ottawa

Brunswickan Office: "O" Hut, Campus,

Honorary Chief Engineer — Rt. Hon. Lord Beaverbrook

Chief Engineer.....Ray Roy EE '52
Assistant Engineer.....Arnold Duke EE '53
Foreman, Sports Field.....Hugh Whalen CE '52
Chief Design Engineer.....Harry Swinnard EE '52
Pictorial and Landscape Director.....Grant Locke CE '52
Draughtman.....Noreen Donahue CE '54
General Labourers.....Stan Jobb, Mary Shackleton, Mary Louise O'Brien, Steve Branch, Betty Lou Vincent, Doug King, Agnes Simcock, Joan Goodfellow, Bernie Scott, Frank Walton, John Russell, Jim Crocket, Ted Cleland, Ed Lowery and Stig Harvor, Mac Babin and Dick Snow.

BUSINESS STAFF

Bookkeeper.....Fingers Roy CA '87

VOL. 70 FREDERICTON, N. B., FEBRUARY 21, 1951 No. 15

Faith of the Engineer

I AM AN ENGINEER. In my profession I take deep pride, but without vainglory; to it I owe solemn obligations that I am eager to fulfill.

As an Engineer, I will participate in none but honest enterprise. To him that has engaged my services, as employer or client, I will give the utmost of performance and fidelity.

When needed, my skill and knowledge shall be given without reservation for the public good. From special capacity springs the obligation to use it well in the service of humanity; and I accept the challange that this implies.

Jealous of the high repute of my calling, I will strive to protect the interests and the good name of any engineer that I know to be deserving; but I will not shrink, should duty dictate, from disclosing the truth regarding anyone that, by unscrupulous act, has shown himself unworthy of the profession.

Since the Age of Stone, human progress has been conditioned by the genius of my professional forbears. By them have been rendered usable to mankind Nature's vast resources of material and energy. By them have been vitalized and turned to practical account the principles of science and the revelations of technology. Except for this heritage of accumulated experience, my efforts would be feeble. I dedicate myself to the dissemination of enginering knowledge, and especially to the instruction of younger members of my profession in all its arts and traditions.

To my fellows I pledge, in the same full measure I ask of them, integrity and fair dealing, tolerance and respect, and devotion to the standards and the dignity of our profession; with the consciousness, always, that our special expertness carries with it the obligation to serve humanity with complete sincerity.

From Engineers' Council for Professional Development.

* * * * *

The foregoing admittdely is idealistic, but only by setting a certain ideal standard is it possible to attain anything near perfection. Like the Hippocratic Oath to a medical graduate, the Faith of the Engineer may stand as a guide for the engineering graduate. There is no doubt that human nature will keep the engineer from mastering thoroughly the ideologies outlined in his credo. There is plentiful evidence to support this, evidence which is sometimes publicized to an extent which can only harm the reputation of the engineer. Unlike those in two other leading professions, medicine and law, engineering malpractices are usually brought to the public eye by the press and radio because of their relative importance to so many people.

Empirical and derived formulae which have been tested, tried, and proved since the practical beginnings of engineering can make no mistakes. The mistakes are the responsibilities of the man, the engineer. But these must be mistakes, they must not be unscrupulous deeds. To prevent the malpractices the engineer must have instilled in him a desire to do a 'service to humanity' as quoted from the foregoing. By studying and understanding and practicing this credo, or any other worthy guide, the engineer can hope to imbue within himself a true desire to serve humanity and as a result to become proud of his profession.

In order to establish himself firmly as a professional the engineer must acquire first of all the status of a professional. It is pertinent to notice that our professionals, such as the clergyman, the architect, the medical doctor, have as their primary aim the improvement of mankind's living conditions both physically and spiritually. Apparently, then, to acquire the status of a professional it is first necessary to devote one's efforts towards the betterment of humanity. This in conjunction with his contemporaries in other professional fields the engineer must strive to serve humanity and make this world a better place to live in. He can accomplish this by keeping in mind the Faith of the Engineer. In this way he will earn his title as professional and eventually become universally recognized as such.

Esprit de Corps . . . . . A Need

This is engineering week. To some that means a Wassail, to others the Formal Dance, but to a number of under-graduate engineers this week is no different from any other.

It is the hope of the Engineering Society that in this edition of the Brunswickan the under-graduate engineer may be made aware of the fact that there is more to enginering than knowing moduli constants and LRC circuits. There is what is known as pride in one's profession. After reading the report by John Fisher in this issue, take stock of your own "esprit de corps".

To all engineering students, and others where possible, we extend the invitation to join with us in celebrating Engineering Week.

H. S.

Engineering, A Profession

By Dr. A. F. Baird
Dean of Applied Science

It is in recent years only that Engineering has become a profession. This is a recognition of the fact that our applications of science in this modern world have become so tricky and involved that the handy man of a hundred years ago is entirely inadequate. In medicine years ago the doctor was one who was skillful in bleeding. The sign of their skill is still retained in the red ribbon in the barber's pole. His place today is a bit different, but exemplifies no greater change than that required in Engineering knowledge.

One result of this has been the establishment of Associations of Professional Engineers. There are eight of them in Canada, one in each province excepting Prince Edward Island and Newfoundland. They are in each instance groups of engineers who have been given legal powers by the government of the Province concerned, and determine who may practice engineering legally and call himself an engineer. This should be known by all students taking engineering courses. Even after you have completed your engineering courses and are graduated, before you may undertake responsibile engineering practice on your own, you must have applied for admission, been accepted, and registered as a Professional Engineer in the Province where you wish to practice.

The New Brunswick Act which came into force about 1920 is in the main similar to the Acts in force in the other Provinces. It should be noted that the associations are not unions, and their applications to the various legislatures were not based on any claims for protection of its own members, but from the standpoint of the protection of the public.

I have said that the Engineering Acts in the different provinces are, in the main, similar. There does extist still some differences regarding entrance requirements and training to qualify. In 1935 the Associations agreed to set up a National Council, called the Dominion Council of Professional Engineers, and on which each association is represented. It has no legal status but is simply a co-ordinating body charged with the responsibility of smoothing out dif-

(Continued on Page Seven)

Maintain Your Enthusiasm

By Dr. E. O. Turner
Dean of Engineering

In times of stress and uncertainty it is reassuring to contemplate any evidence of good cheer. At this time young Engineers in particular should be greatly encouraged to know that their services will be vitally needed, and very much in demand in the years immediately ahead. Surveys have been carried out by the E.C.P.D. (Engineers 'Council for Profesional Development), the Engineering Institute of Canada, and the Department of Labour at Ottawa, and all reports indicate a distinct shortage of trained Engineers as early as 1953. These surveys were started B. K. (before Korea) so it is probable that national defence requirements will make the situation even more acute. Even last Fall it was impossible for us here at U.N.B. to find available graduates for good openings at that time.

Whatever is ahead for us therefore, will require all of our efforts. During last summer I encountered an infectious bit of enthusiasm, presenting a very good morale builder for us all. For many years I have been a member of the Oak Hill Country Club near Boston. It is our custom to invite once each year, the members of the Boston Red Sox Baseball Club of the American League, for luncheon, dinner and a round of golf at the Club. It was my good fortune last summed to be matched with Bill Goodman, leading batter of the American League, and probably the finest all around player of his generation. As many of you know, Bill played every position for the Red Sox last season excepting the two battery positions, an unprecedented feat. In the course of our round, which by the way he insisted on extending to 27 holes, I asked him what position on the team he really preferred. In his soft southern drawl he replied, "Ah don't care where Ah play so long as we win". This young fellow, weighing only 158 pounds, saw three years tough service in the South Pacific during the last war, and even now has trouble gripping his bat, due to a jungle infection in his hands. But as attested by his reply, no-one ever possessed a finer team spirit.

Whatever calls are made upon us in the days ahead, if we follow Bill's simple and self-sacrificing formula for generous service, we should have no trouble in maintaining our esprit de corps.

Letters To The Editor

An Open letter to the Students:

The Editor of the Brunswickan has resigned. In an explanation tendered with his resignation to the Students' Representative Council last week, Mr. Warner made it clear that pressure of studies made the move absolutely necessary. The paper is at present without an editor.

We, the students, are faced with this question: Is the Brunswickan worthy of our continued support? We have supported it with funds from the S.R.C., from your levy, but it has not been supported by enthusiastic student participation. The students have been almost willing to read the paper, but practical contributions have been in large degree lacking, or wholly individual.

The case stated plainly is this: The students as a body are very willing to have a student paper, but not to work for it.

Are we going to continue with the Brunswickan?

The issues this year have been of a high quality; but that quality has been achieved by the labour of a much overworked minority. The Brunswickan does not only require a new editor but an entirely new and enthusiastic editorial staff. The position of editor is one of considerable status, but implies much responsibility. With renewed student interest, however, the duties of an editor need not be overly weighty, nor need the quality of the paper lapse.

It is not an exaggeration to say that this is a very real crisis. If an editor if not procured within the next week, the future of the Brunswickan for the remainder of the college year is non-existent. Although it will certainly be resumed, for it is in many respects indispensable, it will become increasingly difficult to re-institute it as time passes.

The college community becomes decidedly inferior in the absence of a student publication. We are convinced that our campus is worthy of a weekly, although at many times it may appear that proper persons to publish it are lacking. The University of New Brunswick has supported a student paper longer than any other Canadian University, as our mast-head announces.

There will be a meeting open to all students to consider the facts presented in this letter. It amounts to this: Do you as students, want the Brunswickan to remain a part of our student activities? The meeting will be held Wednesday at 2 p.m. in the Geology lecture room of the Forestry Building. Any applications for the position of Brunswickan editor may be given to Jim McAdam, vice-president of the Students' Representative Council, or presented at this meeting.

The Brunswickan Committee,
The Students' Representative Council.

The Student Engineer

I stood on the bridge at midnight,
A simple Pratt truss span,
My fingers were held fixed ended.
In the clasp of my dear love, Anne.
While I there surveyed her
(Ah but my love was fair)
A diagonal wind load suddenly
Caused tensile stress in her hair.
I said, "Wilt thou measure with me
the chart of Life's unknown road?"
And my heart by reciprocation
Set up an impact load.
"Thou art the illumination of my life
I pray thee do not dim it"
The joy when she softly whispered "Yes"
Exceeded my elastic limit.

—Adapted from the Minnesota Technolog.

e and self-sacrificing
generous service, we
no trouble in main-
esprit de corps.

ts To The Editor

ter to the Students:

or of the Brunswickan
d. In an explanation
ith his resignation to
s' Representative Coun-
k, Mr. Warner made it
ressure of studies made
absolutely necessary.
s at present without an

tudents, are faced with
n: Is the Brunswickan
our continued support?
upported it with funds
.R.C., from your levy,
not been supported by
student participation.
ts have been almost
read the paper, but
ontributions have been
gree lacking, or wholly

stated plainly is this:
ts as a body are very
have a student paper,
work for it.
going to continue with
rickan?
es this year have been
uality; but that quality
hieved by the labour of
erworked minority. The
n does not only require
or but an entirely new
iastic editorial staff.
on of editor is one of
e status, but implies
onsibility. With renew-
interest, however, the
n editor need not be
ghty, nor need the qual-
paper lapse.
an exaggeration to say
s a very real crisis. If
if not procured within
veek, the future of the
an for the remainder of
year is non-existent. Al-
will certainly be resum-
is in many respects in-
e, it will become increas-
cult to re-institute it as
s.
ege community becomes
inferior in the absence
nt publication. We are
that our campus is
a weekly, although at
es it may appear that
rsons to publish it are
The University of New
has supported a student
ger than any other Cana-
ersity, as our mast-head

ill be a meeting open to
ts to consider the facts
in this letter. It amounts
o you as students, want
wickan to remain a part
udent activities? The
vill be held Wednesday
in the Geology lecture
he Forestry Building. Any
ns for the position of
kan editor may be given
cAdam, vice-president of
nts' Representative Coun-
esented at this meeting.

Brunswickan Committee,
Students' Representative
eil.

Student Engineer

n the bridge at midnight,
le Pratt truss span,
s were held fixed ended,
clasp of my dear love,

here surveyed her
t my love was fair)
al wind load suddenly
tensile stress in her hair.
Wilt thou measure with me
art of Life's unknown
?"
heart by reciprocation
an impact load.
rt the illumination of my

thee do not dim it"
when she softly whispered
"
led my elastic limit.
apted from the Minnesota
Technolog.

A Report On
The Alaska Highway

(By Murdock Whitcomb)

Editor's Note: This is not necessarily the prize winning technical paper. Of all the papers entered in the Technical Paper Contest; this one was thought to have the widest interest range and has been published for this reason.

I have travelled the fifteen hundred miles of the Alaska Highway northwest from Dawson Creek, British Columbia to Fairbanks, Alaska. It is more than just fifteen hundred miles of road; fifteen hundred miles of great engineering achievement, the gateway to Alaska, the lifeline of the north, and the nucleus of a rapidly growing Canadian Northwest. With these ideas in mind, let us look more closely at this Alaska Highway. Let us see what it is, where it is, and what it means to Canada, and to us as Canadians.

The Alaska Highway was first built during 1942 by United States Army Engineers as an overland lifeline to relieve Alaska from the war time hazards of shipping. The highway followed a line which enabled it to link up the chain of airfields in the Northwest Staging Route at Fort Saint John, Fort Nelson, Watson Lake, and Whitehorse. These airfields had been built by the Canadian Government in 1941.

On November 20th, 1942, some 250 soldiers, civilians and Royal Canadian Mounted Police watched officials from Alaska and Canada cut the ribbon stretched across the frozen road at "Soldier's Summit". On this windswept hill opposite milepost 1061, Kluane Lake, the ceremony of the opening of the Alcan Highway, as it was then called, brought to a climax an epic of roadbuilding achievement begun only eight months before. The actual breaking through the first connecting of the various sections of the road took place at milepost 588, where a tiny bridge crosses Contact Creek, and where a faded and disintegrating sign is the only memorial.

During 1943, the then primitive highway was turned over to civilian contractors to make a sturdy military highway for heavy traffic. This meant widening, gravelling, replacing of primitive log bridges with structures of steel, and rerouting and straightening the road at many points. In all, some 15,000 men, in addition to those of the U. S. Army, were employed, using heavy modern road building equipment. The cost has been estimated at $138,000,000. It was, almost certainly, much more.

In April, 1946, the section of the Alaska Highway in the Yukon, and in British Columbia was turned over to the Canadian Government and, although traffic over it had to be restricted at first, owing to the lack of facilities and accommodation for tourists, it is now open to all.

Contrary to public opinion, the Alaska Highway does not start at Edmonton, but at Dawson Creek five hundred miles to the north west of it in British Columbia. Dawson Creek is mile "O", and at each mile on the highway there is a milepost indicating the mileage. Whitehorse is mile 918, and Fairbanks, Alaska, the northern terminus is mile 1523. The names of many places on the highway are merely milepost numbers. This may be a bit confusing at first but with familiarity the practice becomes quite commonplace, and greatly simplifies the calculations of distance.

The first hundred miles of the highway lie mainly in a region of gently rolling land similar to that of the foothills of the Rockies. Around Dawson Creek this land is quite fertile, and one should take a good look, because from here to Alaska, hardly a cultivated plant is to be seen.

At mile 35, the highway crosses the Peace River, and here is located the longest suspension bridge on the highway (2130 feet). The graceful steel span cost $4,000,000 and is a marvel to behold in the untamed country surrounding it.

Continuing northward, at mile 49, one comes to Fort Saint John, the most northerly incorporated town on the Canadian part of the highway. Fort Saint John was established in 1806 as a trading post for the Sikanni Indians, and since then, particularly with the coming of the Alaska Highway, has grown to be an important community.

From Blueberry Lodge, mile 101 to Fort Nelson, mile 300, the highway winds through a mountainous region offering impressive scenery. Very steep grades offered many problems along this stretch during construction days and the accident rate here was very high. In places the roadway is built along the sides of mountains, and looking from the road one sees practically nothing below. There is not a guard rail in the entire length of the highway.

At mile 296, the highway crosses the Muskwa River on a 970 foot steel bridge. This bridge is the lowest point on the highway, having an elevation of 1,000 feet, and at the present time the piers are undergoing extensive repairs. The swift flow of water, combined with the high spring flood level of the river had seriously worn away the banks, and at one end, one of the piers had started to slip out toward the middle of the river.

Fort Nelson is at mile 300, and here is located a modern R.C.A.F. Base. Having this base, and being about a day's drive from Dawson Creek, Fort Nelson has become one of the main centres on the highway. Here can be seen the old settlement of Fort Nelson, where the original Hudson's Bay Company buildings, erected in 1800, still stand.

Leaving Fort Nelson, the highway veers to the west, entering an extremely wild section of the north Canadian Rockies, through which it winds for the next two hundred miles. At milepost 340 begins a steep, fourteen mile climb over Steamboat Mountain, and at milepost 392 is the highest point on the highway with an elevation of 4,250 feet (only one hundred miles beyond the Muskwa River, 1000 feet above sea level).

From milepost 455, the highway winds for nine miles along the shore of Muncho Lake. Here is one of the most beautiful mountain lakes in the world. The side of the lake along which the highway was to run consisted of a perpendicular mountain, which was blasted away to make room for the highway. This is quite a dangerous section of the road, and it is not uncommon to find two and three foot boulders from somewhere high in the mountains lying on the roadway.

At mile 496 is the Liard River and a suspension bridge. This bridge is the second longest on the highway, a $2,800,000, 1143 foot span similar to that of the Peace River Bridge at mile 35.

The first crossing into the Yukon Territory is at mile 627, and for the next fifty or sixty miles the highway winds along the border continually crossing it. This is again rolling country, but it is quite different from the terrain around Dawson Creek. The growth is very scrubby, and the country seems to be more desolate than along any other part of the highway. Here one can go for miles without seeing even so much as a trapper's cabin. Every once in a while there is a deserted construction camp which seems only to add to the solitude.

At mile 837 is an abandoned cut-off, the Canol Road, to Norman Wells — the wartime oilfield on the McKenzie River. This cut-off paralleled the pipeline constructed during the wartime emergency to convey crude oil to the refinery at Whitehorse. The road is now closed to traffic, and it is said that when construction and maintenance crews left at the end of the war they abandoned almost everything.

Milepost 918 is at Whitehorse; once a frontier town with a pre-war population of three hundred, it has greatly benefited by the advent of the Alaska Highway, and the activity of wartime construction. As the major supply point for the construction of the highway and the movement of war material, Whitehorse experienced an unprecedented boom during 1942, which has since levelled off to leave Whitehorse a typical northern town.

The road over the next one hundred miles is very good, and its condition is similar to that of any other unpaved road in Canada. At mile 1016 is Haines Junction, and from here the Haines cut-off stretches 158 miles to the southwest to Haines, ocean terminus of the Haines Highway. At one point on this road, the highway runs along a high plateau, and in winter, the wind blows the snow here

(Continued on Page Seven)

Electrical's inspecting transformer banks and switchboard at the Fraser Paper Mill in Newcastle, N. B., during the engineer's first Field trip last fall. Left to right: Jack White, Maurice Cyr, Ross Wetmore, Don Prendergast, and Doug Stewart.

The Story of JOE KAISER

On July 27th last, friends and fellow students throughout the province were shocked and saddened to hear of the tragic death the day before of Joe Kaiser. Joe had just completed his third year in Civil Engineering at U.N.B.

This is his story. It is assembled from the newspaper reports and from the memories of those who knew him and worked with him during his short but eventful life. Above all it is a true story.

Joe was born in Saint John, N. B. on June 21st, 1923, the younger of two sons. His father was a seafaring man and Joe knew little of the so-called "happy normal family life" from the beginning. His father's work did not permit him much time at home with his family.

Times were hard during the depression years in Saint John, as elsewhere. Joe began early to earn his way in the world by selling newspapers on the street-corners. Perhaps it was here, too, that Joe began to acquire his determination and courage in the face of great odds. He often found it necessary to battle with older and tougher newsboys to prevent them from forcing him out of his own territory.

While Joe was still a small boy his father was lost at sea. His mother sent him to the St. Patrick's Industrial School near Saint John until she too died a few years later. Joe's older brother continued to support him for a time. Then the brother was killed while working in a stone quarry. Joe, now about thirteen, and starting in the seventh grade, was faced with the choice of accepting charity or being "forced out" working for a farmer for his board and clothing.

Joe elected to go to work and was sent to a farmer in a small community far up the Saint John River valley. Here he was ill-treated and neglected, and finally wrote his priest in Saint John of his difficulties. He was given permission to go to another farm in a different part of the province. This was a happier home and Joe remained there for some time before returning to Saint John to work at the dry docks. In Saint John, he renewed his acquaintance with two lads, brothers whom he had first met at the Industrial School. The boys and their mother made him one of the family, and for the rest of his life this was home to Joe.

Then came World War II and, in 1940, Joe felt it was time to get in uniform and began haunting recruiting offices only to be turned down over and over again because he was underweight. But Joe was never easily turned aside from the chosen path. The recruiting officers' resistance was finally worn down and Joe was accepted by the army though he was warned that his chances of getting overseas were non-existent.

In 1943, however, Joe went overseas with the R.C.A.M.C. as a medical orderly. He landed in Normandy on D-Day with the invasion forces. Here he helped to care for the wounded on the beaches, through France, Belgium, Holland and in Germany where he remained for a time with a hospital unit.

After his repatriation to Canada Joe learned of the rehabilitation plan for the veterans, whereby they might complete and further their education. He determined to go to university to study for a degree in engineering.

D.V.A. officials, on learning of his meager education, tried to discourage this ambition and offered instead courses in manual training or mechanics. Once again, Joe was adamant and in the fall of '46 he arrived at C. V. T., Millidgeville to study for the junior matriculation examinations.

Less than a year later Joe registered at U.N.B. and began his first year in Civil Engineering.

In July, 1950, with three years of university in the past and only two more between his goal, that coveted degree, he was working as an instrument man on a road building project near Moncton when his amazing progress was halted by a crushing blow from the bucket on a power shovel.

This is the end of Joe's story; but there will never be an end to the qualities that made him what he was. For Joe was an embodiment of determination and pluck. He was small only in stature. Throughout his life he met with and rose above adverse circumstances. He was a great guy.

Mother (entering room unexpectedly): "Well, I never . . ."

Daughter: "But mother, you must have."

U.N.B. Advances to N.B.-P.E.I. Hockey Finals

Whips Mt. A. 2-1 at Sackville

(By Frank Walton)

Last Friday night at Allison Gardens in Sackville the UNB Senior Varsity hockey squad downed the Mount Allison equad 2-1 to gain the right to enter the N.B.-P.E.I. Intercollegiate Hockey Finals against St. Thomas University who beat out St. Dunstan's 16-9 in a similar series. The first game of the championship round will be played at the York Arena here this Thursday night with the return game in Chatham the following week.

The game itself was a close checking affair with the Marshmen playing a more steady game than they played here in the opener. With the return of Bob MacMichael to the lineup, Mt. A. were able to check Varsity more closely and succeeded in breaking up most of the UNB plays at center ice before they could get started. The UNB players, irritated by the brand of hockey played by the Tantramar team, were given ten of the seventeen penalties handed out by referees James and Fullerton. Art Lorimer of UNB was the bad man of the game drawing four minor penalties while Ralph Donkin of Varsity and Bob MacMichael of Mt. A. each spent six minutes in the cooler.

UNB opened the scoring early in the first period when George Kennedy connected on a pass from Jack Elliott. Two minutes later Ian Colquhoun passed to Art Lorimer who produced Varsity's second goal. Mt. A. completed the scoring when Kneal beat MacLellan after taking a pass from Wayne Pendleton. The teams then settled down to a deliberate style of play, slowing the game down considerably. The shots on goal were pretty well even with UNB goaler Clyde MacLellan making 25 stops while Irving in the Mount Allison cage handled 24 shots successfully.

At the fifteen minute mark of the third period, Fred Henderson of Mt. A. severely injured his knee in falling to the ice after taking a check from Varsity defenceman Ian Colquhoun. He had to be carried from the ice and was not able to return to the game.

Lineups:

U.N.B.: Goal, MacLellan; defence, Wagar, Ouellette; centre, Ketch; wings, Lorimer, Louis; subs, Hallet, Colquhoun, Thompson, Donkin, Kenney, Kennedy, Elliott, Wilson.

Mt. A.: Goal, Irving; defence, Pringle, Crowe; centre, Eastman; wings, Henderson, Duffy; subs, Fraser, MacMichael, Smith, Pendleton, Kneal, Matheson, MacKinnan, Russell.

Referees: James, Fullerton.

Summary: First period, scoring, 1, UNB, Kennedy (Elliott) 4:01; 2, UNB, Lorimer (Colquhoun) 6:11; 3, Mt. A., Kneal, (Pendleton) 8:12. Penalties, Matheson, MacMichael Wilson, Lorimer, Donkin.

Second period, scoring, none. Penalties, Lorimer (2), Donkin, MacMichael (2), Russell, Duffy.

Third period, scoring, none. Penalties, Ouellette, Donkin, Thompson, Pringle, Lorimer.

Intramural Hoop

The intramural basketball league has finally wound up with Residence B Faculty ending up in a tie position for the leadership of the A section while in the B section the Flashy Frosh won very easily with five wins and no losses. The playoffs will be delayed a week, however due to the Maritime Intercollegiate Badminton Meet which will take place all day Wednesday at the gym. The playoffs are scheduled to get underway on the 28th of February.

The crucial games in the A section were the ones between the Kigmies and the Faculty and the contest between the Residence B and the Artscience. The Faculty beat out the Kigmies for the number one spot by defeating them 43-34. The losers were led by Ken

(Continued on Page Eight)

Engineers Star In Hockey

The ALL STAR ENGINEER hockey team had an impressive line-up this year. Although the foresters won (it is rumored that they had "Rocket" Richard in their line-up) the engineers fought the battle of the century.

Some of the Engineers who starred in this big event are:

Ron Ketch varsity centre. A sophomore C.E. from Fredericton, a lad with plenty of dry humour whose favorite expression is "It must have been beans."

Tim Bliss, varsity leftwing. A sophomore C.E. from Fredericton. He earned the name "Mission Successful Bliss" on the Quebec trip. Tim is now with the Caps and we hope stars with them as he did with us. Tim is also a former Maritime Intercollegiate Tennis Champ.

Ralph Donkin, varsity leftwing. A junior C.E. from Saint John, he should be down in Madison Square Gardens introducing the pugilists before the fights. He has an accent strictly from the Bronx.

Jack Thompson, varsity centre. An intermediate C.E. from Fredericton. He picked up quite a few French expressions but that pronunciation is strictly Slobovian. Jack also has been one of the big guns of the Varsity Rugger Team, for the past three years.

George Kennedy, varsity centre. An intermediate C.E. from Saint John, "Our fair haired boy" didn't waste much time when he arrived in Newcastle. He takes a course in typing at the business college . . . that's one way of meeting them, eh George?

Ian Colquhoun, varsity defence. An intermediate C.E. from Valleyfield, Que. He nearly fell over when he saw a dog team whiz by in Quebec City. He is quite an interpreter . . . listening patiently and then calls to Reme, "You better talk to this fellow." Ian also starred on the varsity Canadian Footbali team for the last two seasons.

Bob Bliss, varsity rightwing. An intermediate E.E. from Fredericton. A pretty quiet lad although he was beaming like an airport beacon at Porte St. Jean.

"Punchy" Walker goalkeeper. Recently turned pro with the Caps. Known to his classmates as O.O. H.B. he is expected to strengthen the team defensively.

With the Engineers in Basketball

Engineers are also prominent in the Varsity Basketball Team where the following appear in the line-up:

Bob Smith . . . "Smitty" is the 6'2" centre of the senior varsity who is always among the top scorers. He is playing his fourth year of varsity basketball and is an Intermediate Civil.

Eric Garland . . . Eric is a sophomore civil and is playing his first year with senior varsity. A 5'10½" forward, he comes to U.N.B.'s Basketball team from Moncton High.

Sterling Shephard . . . "Shep", a Junior Civil is another first year member of senior varsity. A 6'1" guard, he is one of the boys from the Miramichi.

On the boxing team the Engineers are represented by:

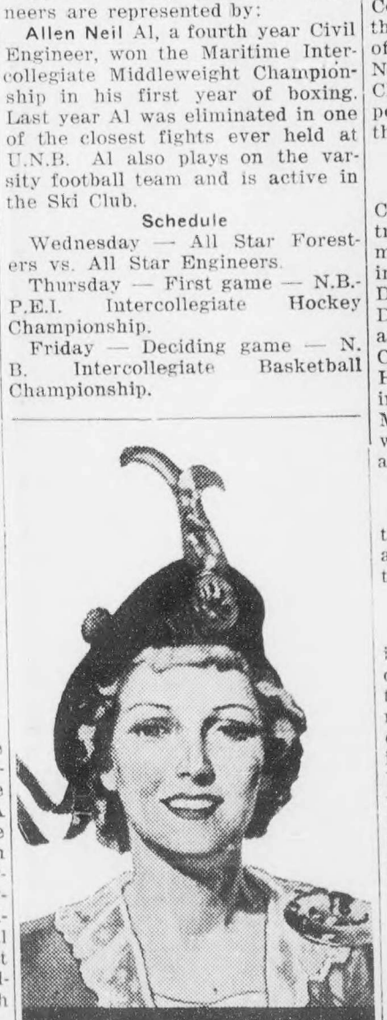
Allen Neil Al, a fourth year Civil Engineer, won the Maritime Intercollegiate Middleweight Championship in his first year of boxing. Last year Al was eliminated in one of the closest fights ever held at U.N.B. Al also plays on the varsity football team and is active in the Ski Club.

Schedule

Wednesday — All Star Foresters vs. All Star Engineers.

Thursday — First game — N.B.-P.E.I. Intercollegiate Hockey Championship.

Friday — Deciding game — N. B. Intercollegiate Basketball Championship.



Sports Notices

The UNB Senior Varsity cagers will be at home to the Garnet and Gold hoopsters this coming Saturday night at the Lady Beaverbrook Gymnasium. This will be the second game of a home and home series for the New Brunswick Intercollegiate Basketball Championship. The Red and Black won last Friday at Sackville but only by a narrow one point margin so the game this Saturday night be a thriller. Turn out to support your team.

The Red and Black hockey squad will be hosts to St. Thomas College this Thursday evening at the York Arena for the first game of a home and home series for the NB-PEI Intercollegiate Hockey Championship. St. Thomas whipped St. Dunstan's 16-9 to get into the finals.

Does your name start with Don? Chances are if it does and you tried out for the swim team, you made it. This year's squad consisting of eight members has five Dons on it. Team members are: Don Biggs, Don Gregg, Don Macaulay, Don Fowler, Don Bell, Bob Coke, Bob MacLean and Wendall Halsall. These boys will be leaving in the near future for the Maritime Intercollegite swim meet which is to be held on March 8th, at Acadia University.

Acadia will also be the scene of the Maritime Intercollegiate Track and Field Meet. It will be held there on the 12th of May.

The Lady Beaverbrook Gymnasium will once again be the scene of the annual New Brunswick Interscholastic Basketball Tournament. The tournament will be held on March 1, 2 and 3. The defending champions are Fredericton High School. However, strong entries are expected from Saint John High School and Saint John Vocational School. U.N.B. student passes will be honoured on Thursday and Friday afternoons only.

Gets Support

The Ski Club has received some unexpected support in its bid to enter the Canadian Intercollegiate Ski Meet at Ottawa today. The help, in the form of one hundred dollars, came from Bill Murray, former member of the U.N.B. Ski Team now skiing in Vancouver and at other points on the west coast. Needless to say the generous offer has come too late.

Streaks, Ghosts Win Intramural Hockey League

Regular play in the intramural hockey league has finished with the Silver Streaks winning the A section while the Alexander Ghosts ended up on top in the B section. The playoffs began last Monday.

The Silver Streaks ended up with unblemished record by winning over the Freshman Dodgers 11-3 to finish with three wins and no defeats. The Frosh were completely dazed by the fast skating Streaks who didn't appear to exert themselves in racking up their impressive win. The winners were led by Hyslop who accounted for 4 goals. He was followed by Craig, Titus and Menzies who each scored twice while McAdam notched the other Streak goal. The scorers for the Dodgers were MacFarlane, Dee and Bleakney.

The second place team in the A section is the Intermediate Foresters who won a surprisingly easy win over the Freshman Cardinals to the tune of 7-0. The Foresters' sole defeat was suffered at the hands of the Streaks who edged them 2-1. In the game with the Cardinals the Foresters were led by Haswell and Chisholm who scored two goals apiece. Bushell, Sewell and Wintle accounted for the remaining goals each scoring once.

The winners of the B section, the Alexander Ghosts didn't play last week but they automatically gained the number one spot as they were four points ahead of the nearest rivals, the Soph. Combines and the second and fourth year Engineers. The second place in the B section is jointly held by the Soph Combines and the Residence. The Sophs moved into the number two position by virtue of their narrow win over the third and fourth year Civils. The Combines managed to stave off a last period attack by the Civils and come out on top 3-2. Prime was top man for the Sophs as he notched two counters while Cochrane accounted for the other goal for the winners. For the Civils Burtt scored once as did Goodin. In the other B section game the Residence beat out the second and fourth year Engineers by a 5-2 count. By virtue of this win the Residence displaced the Engineers from second place in the league. Previously both teams had been tied for the number two spot but the Residence now moves into a tie with the Soph. Combines for second position. The Residence were led to victory by Bleakney

(Continued on Page Eight)

Finals

Intramural
ue

ers of the B section, der Ghosts didn't play but they automatically number one spot as they oints ahead of the near- the Soph. Combines and and fourth year Engi- e second place in the B ointly held by the Soph and the Residence. The ed into the number two virtue of their narrow ie third and fourth year e Combines managed to last period attack by the come out on top 3-2. top man for the Sophs hed two counters while accounted for the other he winners. For the tt scored once as did n the other B section Residence beat out the l fourth year Engineers ount. By virtue of this esidence displaced the from second place in the reviously both teams had for the number two spot esidence now moves into the Soph. Combines for osition. The Residence to victory by Bleakney

nued on Page Eight)

Varsity Cagers Down Mount Allison, 54-53

First of Two Game Series

(By Ed Lowery)

Last Friday the UNB basketball squad journeyed to the swamps to meet the Mt. A. hoopsters in the first game of a two game, total point series for the N. B. championship. In a closely fought game, UNB barely managed to edge out a win, beating Mt. A. 54-53.

The game was very rough with a total of 52 fouls being called by referees Bud White and Al Robinson. Twenty-seven fouls went to UNB who completed eight of them while the Garnet and Gold completed seven of their twenty-five free throws. Three Mt. A. players fouled out during the game, Stothart, who fouled out during the first half and Goss and Mills during the second. Buchan and Hanusiak fouled out for UNB during the second half.

UNB opened the scoring early in the game when Hanusiask tipped in a rebound from a foul shot. The scoring was very close during the first half and the half ended in a 24-24 tie.

The play became much roughter in the second half. Tempers flared several times as the players did not like the calls of the referee or the attitude of the opposing team. A double technical foul was called but neither team completed the foul shot.

UNB built up an 11 point lead during the last quarter with three minutes to go. However, Mt. A. put in a spurt and nearly went ahead but UNB managed to end the game with a slim one point lead.

High scoring honours for the game were divided between Harry Baxter of Mt. A. and John Little of UNB, each with 17 points. Ward of Mt. A. and Smith of UNB were second with 11 points apiece. Tuttle copped third place with 10 points.

The return game game will be played here at UNB on Saturday evening. The Varsity should find the going a little easier on their larger home court. At Mt. A. the small court and the low ceiling hampered their play somewhat.

Lineups:

UNB: Boulton 4, Stairs, Miller 4, Garland, Smith 11, Little 17, Hanusiak 8, Shephard, Buchan 3, Glass 7.

Mt. A.: Mills 9, Ward 11, Stothart, Rawlins 3, Hargreaves, Nicholson, Tuttle 10, Baxter 17, Goss 1, McConnel 2.

Skiing with the Engineers

(To be taken with a large grain of salt).

The history of skiing at U.N.B. has always been dominated by the outstanding exploits of those men of action — "The Engineers". Indeed the transformation of a pleasant wooded New Brunswick hillside into a smooth ski-hill is an engineering feat in itself. But do these worthy people stop here?—Most definitely No. They have added to what Nature has provided, first a twenty metre ski jump and more recently a six thousand cubic foot bungalow which they lovingly refer to as a "chalet". This project, although not fully completed, has reached the point where it is comfortably habitable.

Now I'll admit that the engineers did not do this work alone. The foresters, artsmen and science students assisted in whatever way they could. Foresters proved useful for chopping firewood and other menial chores usually associated with lumberjacks. The science people, on one or two occasions, carried water for the workers. A useful outlet for an artsman's ability (??) was never found so they usually just sat around and gazed in open-mouthed wonderment at the marvels being performed by those masterminds "The Engineers".

Apart from their engineering accomplishments, the Engineers do pretty well when the snow falls. Last year the Intramural Skiing crown was won by the Engineers. This year so far snow conditions have hampered the running of Intramural races, but if snow ever does fall, you can be sure that the Engineers will be in there sliding.

Engineers on this years Varstiy Ski Teams are — Dick Smith, Dick Ballance, Stig Harvor and Dave Ballantyne representing the Civils and Bob Neill, a Mechanical. Other skiing engineers worthy of mention are Allan Neill, Sandy Valentine, Alan Mitchell, Hubie Whalen, Pete Collis and Dick Hobart.

The absence of Electricals in this list is no oversight. They're just waiting to see if the new telephone system can be hooked up before they offer their most able assistance.

Co-Eds Swamp the Atomettes 43-27

The UNB Co-eds swamped the Edmundston Atomettes by a convincing 43-27 score at the gym last Saturday evening. The Red and Black started slowly, missing quite a few very easy shots and making some poor passes. At the half the Atomettes led UNB by a 16-14 count. However in the second half the Co-eds really came to life and displayed some remarkable shooting. UNB held the Edmundston quintet scoreless in the third quarter while scoring 14 points themselves. The scoring in the fourth quarter was more even but UNB had the edge and won easily by a final score of 43-27.

The outstanding performer of the contest was Jackie Vey of the Red and Black who accounted for 22 points. Most of her points were scored on driving lay-ups as the Atomettes couldn't seem to guard the Red and Black's fast moving forward. Peggie Stewart followed with 9 counters for UNB. For the Atomettes, Daigle was high scorer accounting for 11 points all of which were scored in the first half. Clark, Vermeeren and MacKenzie were the standouts for UNB from the defensive point of view. Despite the height advantage enjoyed by the Atomettes this trio got their share of rebounds and held down the Edmundston forward line very well, particularly in the second half.

Lineups:

U. N. B.—Stewart 9, Horsnell 6, Vey 22, Brown 2, Waterson 4, Scribner, MacKenzie, Vermeeren, Goodfellow and Clark.

Edmundston Atomettes—Dunphy 8, G. Gauvin, Renault 6, Lajoie 2, Daigle 11, Dupont, Fourner, M. Gauvin, Marney.

Hoopsters Lose to Majors 42-31

(By Ed Lowery)

After playing a tiring game in Mt. A. Friday evening, UNB Varsity journeyed to Saint John to meet the Marcus Majors in a return game in the Saint John High School Gymnasium on Saturday evening. UNB came out on the low end of a 42-31 count. However, the Red and Black won the total points series by one point 77-76, having taken the first game at Fredericton 46-34.

The game was even rougher than the Mt. A. game, the referee failing to call many of the fouls. The Majors led at half time 19-10.

Seely and Goodwin were high point getters for the Majors with 20 and 10 points respectively. Smith was high point man for UNB with 9 points.

Lineups:

UNB: Boulton 2, Stairs, Miller 6, Garland, Smith 9, Little 4, Hanusiak 4, Buchan 3, Glass 3.

Saint John Marcus Majors: Seely 20, Goodwin 10, Eastman 4, Fitzpatrick 5, MacDonald 3, Hanson.

To Hold Dance

A decision to hold the Annual Spring House Dance on Friday night, March 2, was announced by the social committee of the Lady Beaverbrook Residence. Last December members of the Lady Beaverbrook Residence Society held their annual pre-Christmas Formal, when upwards of 60 couples were in attendance.

ESTIMATE OF EXPENDITURES

arising from
roads at the University of New Brunswick
Fredericton, N. B.
Prepared and checked by S. Harvor

Note: The listed expenditures are those incurred by students, faculty, and administration during the seasons of autumn and spring.

I. DAILY EXPENDITURES:

1.	Personal	
	A. Shoe polish — 400 pairs @ $0.003	$ 1.20
2.	Bicycles and Motorcycles	
	A. Depletion from shock — 25 @ $0.02	0.50
3.	Automobiles	
	A. Wear on shock absorbers — 50 cars @ $0.03	1.50
	B. Extra gasoline consumption (1st and 2nd gear) — 1¼ gallons @ $0.42	0.53
	C. General depletion from shock effect — 50 cars @ $0.05	2.50
	D. Washing bills — 2 cars @ $1.50	3.00
		$ 9.23

II. WEEKLY EXPENDITURES:

1.	Personal	
	A. Cleaning bills	
	5 pairs of trousers @ $0.60	3.00
	1 skirt @ $0.50	0.50
	4 raincoats @ $0.75	3.00
2.	Repair work	
	A. Transporting and dumping of ashes and other surfacing materials — 40 man-hours @ $0.70	28.00
	B. Grading of road — 30 man-hours @ $0.70	21.00
	C. Replacing culverts and cleaning ditches — Lump sum	15.00
3.	Intangibles	
	A. Quarrels ending in breaking furniture etc. because of frayed tempers caused by road conditions — Lump sum	5.62
	B. Time spent in discussing road conditions (Time is money) — 750 person @ 5 minutes, 62.5 hours — 62.5 hours @ $0.60	37.50
		$ 113.62

III. TOTAL YEARLY EXPENDITURES:

(Note: autumn and spring, 150 days)

1.	For items (I) 1, 2, 3, 150 days @ $9.23	1,384.50
2.	For items (II) 1, 2, 3, 22 weeks @ $113.62	2,499.64
	Total	$ 3,884.14

IV. PROPOSED EXPENDITURE

1. Paving — ¾ mile @ $25,000.00 per mile 18,750.00

V. CONCLUSION

Every 4.828 years the students, faculty, and administration of the University of New Brunswick pay a sum equivalent to the cost of paving the campus roads.

"The Engineers"

By Alan Sullivan

The ways of the Lord be manifold:
He had fashioned divers men
To fret the earth for a little space with labour, laughter and tears,
To strut in the light till the world forgot and buried them deep — and then
The Lord He stiffened His good right arm and fashioned the Engineers.

Where the naked ribs of the liner curve, and the straining rivets whine,
Where the plunging crosshead spatters the oil in the incandescent's glare,
Where the clanging coal scoop swings in the gloom, and the blistering clinkers shine,
Behold him — cool as an iceberg's foot — the Slave and the Master there.

When you come to the end of the old known land, to the far horizon's rim,
To the raw, crude plain where the uplands lift and the mountains clamber sheer,
The small, wise men of the ledger halt, and the call goes forth for him
Who laughs at the everlasting hills — the Master, the Engineer.

By lathe and chisel, by hammer and forge he is shaping the things that be,
He has harnessed the stream to his dynamo, he has said to the tides: "Beware!"
He grubs in the echoing womb of the earth, and walks on the floor of the sea,
And rides athwart of the thundercloud in the hollow caves of the air:

Smooth and silent and very sure, he fingers the locking switch
Where the yellow copper is glutted with death as it gleams on the marble wall,
And he turns on his heel when the red lamps wink, to balance his power and pitch
Through the murk of the throbbing canyon streets the might of a waterfall:

He weighs the world and the eye of a fly, and he measures the light of a star,
And plays with a key at the end of a wire till the slumbering cities hear,
He whispers low and cradles his words on the curve of a waxen jar
That the bottom of the earth may list to the voice of the Engineer:

With a ray for an eye, his fingers pry till infinities lie revealed,
Till the cosmic atom be bent and broke in microcosmic stress:
And he flings its wave when the elements rave and the high storms are unsealed,
While his cable crawls where the stardust falls in the deep sea's loneliness.

He has come to grips with eternal truth, and he dallies not with lies,
He has ravished his mind of its small conceits, and he knows not how to shirk:
For the Thing — the ultimate perfect Thing — is glimmering in his eyes,
And a voice — a small, reiterant voice —is whispering: "Will it work?"

When we win at last to the end of the trail, to the step of the Golden Gate,
We shall see a fellow in overalls, and he'll probably stop and peer
To see how the Gate is hung, and then — if we only watch and wait—
We shall notice him oiling the golden hinge — the Beggar — the Engineer.

Courtesy The Engineer Journal.

SLIDE RULERS . .

By John Fisher

This article, one of many radio talks by John Fisher, Canada's wandering reporter, is published by permission of the CBC and Mr. Fisher.

The nobs on doors, the shapes of cans, the slope of a road, the collar button, the light switch, the gasolene, the airplanes, trains and cars — even the shoes upon which we walk and the beds in which we sleep come to us from these: "SLIDE RULERS".

There was no big light in the sky this night. The big hook of Father Time had reached up and pulled down the moon. Even the stars had taken the pledge of total abstinence. A night beside the ocean, so dark it seemed black — black except for the thick gooey gray that seemed to hang from the sky and come up from the ground. The weatherman would mutter something about heavy fog conditions and mariners out at sea would curse the elements and praise man and modern eyes of radar which can see through nights like this. The Atlantic coast had a muffled look, even the sounds of natures. As each person walked that night he seemed to make his own channel through the fog — much like a man walking through a bank of snow, only this stuff was soupy and maddening in its softness. And street lights seemed smaller than a firefly's glow, and outside the ocean was groaning on the shore; outside further she rose and fell and on her back moved the heels of economics. And there on the shore we could hear the slow steady growl of the fog horn, as if in courtesy to this invention of mans, the fog lifted its curtain long enough to let the low tones slip through. Mournful and steady it growled, and as I listened to its protest, I wondered about this invention. Who did invent the fog horn, anyway? Who gave the world of shipping this blessing — this one voice which speaks when night is black and dark? Had Robert Foulis been born in any other country, his name would live in the classroom and museum, but the inventor of the fog horn was a Canadian, and in Canada we seem to forget our distinguished sons. The fog horn was invented partly by accident, and partly because its inventor was a student — always curious.

It was a dark foggy night when Robert Foulis was walking along the streets of Saint John, New Brunswick. He couldn't see a thing in front of him, but as he neared his house he could hear his daughter practising the scales on the piano. At least it sounded like the scales, but right beside the house he found differently — she was actually playing a musical composition. How strange, he thought, that in the fog he heard only certain notes. He asked his daughter to play the same thing over and over. Then he took out his watch and counted off so many feet. He listened, he moved further away, he listened. Again it was only the low tones that came through the fog. Robert Foulis knew he had discovered something. He had — the foghorn. It was not long before the whole marine world rendered thanks and their blessings to this Canadian inventor who died a poor man. From his simple idea, engineering has made the fog horn a principle of water travel.

The light switch on the wall, the knob on the door, the cap on the bottle — the wonders of science and the simple things we take for granted — all had to be engineered; all had to be invented first. How great is our debt in society to the inventor and the professional engineer who makes the wonders usuable and practical.

Last week when in Halifx, I met my old friend, Ira P. MacNab, who is President of the Dominion Association of Professional Engineers. Next year he will be head of the Engineering Institute of Canada. Ira MacNab, who has worked as an engineer in Venezula, Mexico, the United States and parts of Canada, believes that no country in the world holds greater opportunity for the professional engineer than Canada. He believes the day of the young engineer leaving this country the day after graduation are finished for good. There is no greater indication of the new developments in Canada than a survey of the engineers being turned out by Canadian universities.

We are turning out nearly five times as many as we did before the war and yet there is still a great shortage of engineers. Before the war we thought 800 engineers a year was pretty terrific. This spring more than 10,000 new professional engineers have come forward to help with the building of Canada — not alone in the dazzling shows of Shipshaw, Welland, Labrador, Pipelines, Steep Rock, power projects, Chalk River — yes they serve here, but the great service is behind the scenes, in the factories and assembly lines which keep us strong. Canada, in the eyes of an enemy can never be rated for the number of troops she can raise, but she is known for her engineering, for the strength of the industrial front. In that line we are a front ranking power. Modern industry is geared to science and the engineers are the cogs in that alignment. From farm implement makers to toy manufacturers, from airplane factories to flour mills — they all need the special talent of the professional engineers.

You will note that I am using the word 'professional' engineers. The various associations in Canada have been trying to have the word professional adopted in general use. They want to draw a distinction to the man who runs the locomotive and the university graduate in engineering. Some of the big Canadian companies such as Shawinigan, Consolidated, Ontario Hydro, will have hundreds of professional engineers employed. One big company which manufactures light bulbs and motors and things electrical told me that out of every 27 employees, one is a professional engineer. And as industry grows more and more complex and the bonds with the world of science are tighter and tighter, the more we will depend on the engineer. Behind the Iron Curtain, today, they put tremendous emphasis on the engineer. The dictators behind the Curtain know what modern wars and indeed a high standard of peace are won and maintained by the power of the industrial front.

Last year I met a high school graduate who wanted to study engineering. Several people advised against it — they told him there were too many engineers being turned out of college. I believe these cautious folk are wrong. This country is moving so fast we find ourselves acutely short of professional engineers. And besides, today, Canada is in the world engineering market. We are now big exporters of engineering brains to India, Mexico, South America, Greece, Israel and all over the free world. The other day I met a Canadian professional engineer just back from Casablanca, Morocco. The project had been designed in Canada and supervised by Canadians. The ancient lead zinc mine in the Atlas Mountains, worked by the Romans 2000 years ago is now being reopened and developed by French-American capital, but the mining machinery, the shaft house and mill, the grinders, crushers were designed by Canadians.

The biggest mine hoist in all North America is a freight elevator which will lift ore for the International Nickel Company at Sudbury. I noticed a little item in the paper about it recently. It was built by John Bertram and Sons Company in Dundas, Ontario. A little notice in the paper, but a Canadian enginering job employing hundreds of men — the building of a freight elevator which will haul to the surface 500 tons of ore an hour. Now imagine how busy the industries of this country will be in the building of a railroad in Labrador. Imagine the indirect benefits which will come to industry when we start moving ten million tons of iron ore a year. And think of what will happen when we complete the oil pipeline . . . run it right to Montreal. Hear too, the talk of a natural gas pipeline to Montreal from Alberta . . . plans for a huge aluminum development in British Columbia . . . another nickel company in Manitoba . . . big uranium works in Saskatchewan . . . enormour power developments in Ontario and Quebec is fairly panting with development these days. Even in the Maritimes there is steady growth. In Newfoundland they of course, hold part of the rich ace card of Labrador. As the Honorable C. D. Howe, himself a professional engineer, said the other day —this is no country for pessimists. It certainly is an engineer's dream —for we are still largely undeveloped. The more big spectacular engineering jobs we have, the more we will need smaller unsung ones in the plants. And there are some spectacular ones in addition to the mountain tunnels, Welland Canal, Quebec Bridge, Polymer at Sarnia and so on.

One of the most thrilling engineering accomplishments is at Port Arthur where the box cars from the Prairies are emptied. The car rolls in, a giant machine reaches forward, grabs the box car, lifts it, tilts, spills the grain out swoosh. And to make sure it is completely unloaded, it tilts the box car end to end. At Cornwall they built an automatic rayon plant where 5000 separate filaments of thread are created from nozzles no thicker than a lead pencil.

Another intriguing invention, I saw this summer when guest of the Ontario Northland Railway. We stopped at Cobalt to inspect the silver mines. Now each mine requires great quantities of compressed air to drive the drills. Compressing air is expensive. About 40 years ago when Cobalt was the biggest silver camp in the world, a Toronto engineer developed a scheme to produce air for nothing. He took the principle of the kitchen sink. Have you ever noticed how the water swirls around the little screened drain in your sink. It creats a suction and pulls the water down. Sometimes it goes down with a gurgle. Well, this Toronto engineer dammed up the Montreal River. Above the rapids here there is quite a drop in the river. Under his dam he placed two cylinders with holes in them like a kitchen drain. Only the holes led to pipes which went straight down. As the water from the dam swirled over these cylinders, it was sucked down and went

(Continued on Page Seven)

hicker than a lead pen-

intriguing invention, I
ummer when guest of
Northland Railway
d at Cobalt to inspect
nines. Now each mine
reat quantities of com-
to drive the drills.
g air is expensive.
years ago when Cobalt
ggest silver camp in the
Toronto engineer devel-
eme to produce air for
He took the principle of
sink. Have you ever
w the water swirls
little screened drain
k. It creats a suction
he water down. Some-
es down with a gurgle.
Toronto engineer dam-
Montreal River. Above
here there is quite a
river. Under his dam
wo cylinders with holes
e a kitchen drain. Only
ed to pipes which went
wn. As the water from
wirled over these cylin-
s sucked down and went
ued on Page Seven)

An obvious atmosphere of conviviality is indicated by the above photo of several engineers partaking in the refreshments served at the Stag Party. The party was held last fall at the Alex Canteen. Left to right: Ray Power, John Burrows, Ross Wetmore, "Perk" Perkins, Bert Dunphy, Don Pyne, and Earl Morris.

A Report on

(continued from page three)

to such an extent that it is almost impossible to find the road, let alone to keep it open. The Haines Highway was constructed to bring supplies over to the Alaska Highway from the ocean during its construction, and is still used for this purpose.

From Haines Junction, following the Alaska Highway still to the north west, one comes to another high plateau, the Kluane Lake Region, and finally into the permafrost area around mile 1110.

At mile 1130 the highway spans the Donjek River by means of seven trestles. At the present time, the Army is constructing a seven span steel bridge. This bridge has been under construction for several years, and its completion is not expected for some years to come. Progress is slow because one of the purposes of the construction of this bridge is to give practical experience in bridge building to Army personnel. Also, because it is in the permafrost area many unprecedented holdups have occurred. When completed, the bridge will not only provide a better crossing of the Donjek River, but will have cut out several miles of bad, twisting highway.

It is well known that construction in permafrost areas is much more difficult than in ground which alternately freezes and thaws. In most places the permafrost is covered by an insulating muskeg. If this muskeg is removed, the ground under it thaws upon exposure to the sun, and the result is a soupy mud on which it is impossible to erect even the smallest building and expect it to last. There have been cases where tons of gravel have been placed on thawed permafrost and never seen again. To date, the most satisfactory method of construction on permafrost is to leave the muskeg, and build on it.

Between the Donjek River and the Alaska border the highway is almost entirely built on permafrost and is not as good a road as it was in the south. However, it is continually being maintained and repaired where necessary, and is always open to traffic.

The Alaska border is at mile 1221, and from here to Fairbanks the highway is maintained by the Alaska Road Commission. The quality of the road is much the same as on the Canadian end. It is interesting to note that in the summer of 1949, the Americans hard-topped a section of the highway in Alaska, which was still in good condition in the summer of 1950, having survived the severe winter and spring thaw without serious damage. It must be remembered however, that this paved section was almost wholly over flat country and it would not be an indication of the success of paving in Canada. The highway in Canada is in a much more mountainous region and there would be nothing to warrant the cost of paving. The unpaved road is excellent, and on a par with many paved roads elsewhere.

At the present time, the highway in Canada is maintained by the Canadian Army Engineers, and comes under the name of the North West Highway System, with headquarters in Whitehorse. Under the Highway Maintenance Establishment, a sub-section of the Highway System, are about twenty maintenance camps spaced at intervals along the highway. In most cases civilians are employed here, and in charge of each camp is a camp foreman. It is the job of these camps to keep the highway in repair and open to traffic twelve months of the year. The road is continually being gravelled and graded during the summer months. In many places a decomposed granite is used for the wearing course, which produces an excellent surface. About the only fault with the road in summer is the dust.

During the winter months, snow removal is the major problem, and this job keeps the maintenance camps busy from October until April. In the winter, the snow on the highway in many places freezes to such a low temperature that many people say the driving is better than in the summer. Also, it is dust free.

The Army is continually improving the highway where possible, and trying to eliminate many bad curves and hills. It is quite possible that it is several miles shorter now than when the mileposts were first installed, but changing these would lead to such a state of confusion that it is more advantageous to leave them as is.

We have seen the route of the Alaska Highway, its quality, and some of its history. In closing, let us take a brief look at its possible future, and the meaning of this future to Canada.

There is really little point in mentioning the quantity of untouched resources in the north. Seismographic crews are sounding for oil all along the highway since it lies in the great petroleum belt that stretches from Texas to the Arctic. There are great quantities of pulpwood and water power going to waste. Mountains of copper, lead, coal, iron and other ores. There lies a fortune, greater than the gold found in the Klondike rush of '98, and the medium of discovery is the Alaska Highway. The Yukon is waiting for the day that the highway will undoubtedly bring its economic boom, and when this day comes, much of the credit for it should go to the Alaska Highway. The Alcan Pioneers, the men who built the road, put it this way:

"We lend you the road, we who made it,
And bright may its victories burn."

Doctor: "Mrs. Brown, I have good news for you."
Patient: "But my name is Miss Brown."
Doctor: "Well, Miss Brown, I have bad news for you."

Those who think our jokes are poor would straightaway change their views, could they compare the ones we print with the ones we could not use.

"I heard your brother went to Florida with his girl".
"Yes he went south to Tampa with her."

Slide Rulers

(Continued from Page Six)

rushing through the pipes at tremendous pressure. The air in those pipes was compressed and later tapped. There is enough pressure to carry the air 12 miles in pipes and at the other end enough pressure to supply a dozen silver mines. A terrific invention which has saved the mining companies millions of dollars, and yet so few people know anything about it.

Today in Labrador they are building a railway. Someday they will turn the iron ore of this bleak land into iron and steel, and someday we will unknowingly touch it when it has become an automobile, a bridge, a typewriters, a fence, a combine, or even a needle. And even at this primary stage, before the tracks are down, the engineer almost to the ounce, can tell the amount of earth that must be moved, the rock that must be blasted. The unknowns have become knowns by the application of the slide rule.

The blueprint of modern civilization was drawn by the professional engineer. Too often we see him as a tough square jawed boss on the construction job. Too often we see him with chin etched against the setting sun or perched on the skeleton of a skyscraper. We forget that some engineers live by furnaces and beside tubes. There are civil, mechanical, forestry, electrical, metallurgical, mining, hydraulic aeronautical and others —each in his own way contributing to society, each entitled to carry after his name the letters P. Eng. — Professional Engineer — just as a doctor has M.D., a nurse R.N., a lawyer K.C., a veteranian D.V.M. — so when you see the letters P. Eng. after a man's name you will know that it stands for the professional engineer — the man behind the convenience — the unseen helpers. When we flick a switch, step on a starter, walk on a sidewalk, drive a car, pick up a phone, turn on a tap, pull open a drawer, listen to the radio, or even open a can, we are doing something made possible by the blueprint boys — the moulders of the modern ways.

No country stands to gain more from professional engineers than this, our own Canada. In a country of space, riches, power and position, tomorrow the slide rule boys will really paper the country with blueprints.

Mankind has known many rulers —groups of rulers, rulers for good and for bad, but never was there such a hopeful, peaceful and yet so influential a group as the "SLIDE RULERS".

Engineering . . .

(Continued from Page Two)

ficulties by negotiation, between the provincial bodies. It has no legal status because under the B. N.A. Act, the practice of Engineering is a provincial matter, over which the Dominion Government has no control. A provincial association does not have to agree to any of its suggestions unless it sees fit to do so.

The Dominion Council meets annually and this year it meets in St. John, on 3rd, 4th, 5th of April. It is already planned that they will come to Fredericton as the guests of members of the New Brunswick Professional Association at one of its district meetings. This will be a dinner meeting at the Beaverbrook Hotel and to this meeting engineering students at the University will be invited — to the dinner, if they have the price — if not, to the after dinner meeting to hear the speakers.

I have spoken of the legal control of responsible engineering practice, but there are other associations which have no such legal requirements but are of great benefit to an engineer's career and contacts. In Canada the outstanding one is the Engineering Institute with headquarters in Montreal and branches in nearly all the Provinces. Then there is the American Institute of Electrical Engineers, with Canadian headquarters also in Montreal and branches in nearly all the large industrial centres of Canada. Membership in these is purely voluntary but they give fellowship and a bond of friendship in the profession.

Co-ed: "I'll stand on my head or bust!"

Gym Instructor: "Never mind, just stand on your head."

Two (slightly oiled) Meds were walking home the other night and passed a window where the curtains had not been drawn.

1st Med: "That girl isn't exactly modest, is she?"

2nd Med: "No, but she certainly is retiring."

Prof. T. F. McIlwraith, Speaker at Founders' Day Celebration

A colourful academic procession marked the opening of the annual Founder's Day celebration, held in the Memorial Hall, Monday evening, February 19. Included in the program, which commemorated the granting of the first charter to the College of New Brunswick in 1800, was the annual quit-rent payment, a presentation of the "Story of U. N. B.", and an address delivered by Prof. T. F. McIlwraith, M.A., F.R.S.C.

The relationship of cultural differences to inter-societal frictions was the theme of the address delivered by Professor McIlwraith, who is Head of the Department of Anthropology at the University of Toronto, and Associate Director of the Royal Ontario Museum.

On behalf of His Majesty, New Brunswick's Lieutenant Governor, Hon. D. L. MacLaren received the traditional quit-rent from President A. W. Trueman in a solemn ceremony.

The original land grant to the College of New Brunswick in July, 1800, provided that a "yearly quit-rent of one Farthing for every hundred acres hereby granted . . ." be paid "yearly thereafter forever." This annual payment has been continued and each Founder's Day, the Crown receives its ancient due.

Introduced by Dr. Trueman, Professor McIlwraith prefaced his address by expressing regret at the absence of Dr. A. G. Bailey, Dean of Arts, who was unable to be present due to illness. Prof. McIlwraith lauded Dr. Bailey's writings saying that they are an important contribution to the field of anthropology.

Prof. McIlwraith said that as an anthropologist he was more interested in studying living cultures and races than those which are dead. He emphasized that it is cultural rather than racial differences which are the bases of friction between societies, showing by examples from history that these cultural differences have been and are still the major determinant.

The audience of students, faculty and senate members, and friends of the University were given the opportunity to hear a recorded presentation of "The Story of U. N. B." the first program prepared by University Radio Productions. This radio drama was written by Albert Tunis, Prof. of Sociology, and was produced by Mr. Alvin Shaw. The original broadcast was made on December 6, 1950, over Radio Station CFNB, and was the first in a series of radio programs completely written and produced by the faculty and students of the University.

U. R. P.'s historical drama, "The Story of U. N. B." took the place of a faculty playlette and was very well received.

The Founder's Day celebration, designed to commemoration the transforming of the Fredericton Academy of Liberal Arts and Sciences into the College of New Brunswick, on February 12, 1800, was held in honour of "those who with faith and vision plotted our course a century and a half ago.

Exhibits Highlight Engineers' Formal

The engineers present their biggest social effort of the year next Friday evening at the Lord Beaverbrook Hotel in the form of their annual Engineers' Formal. The Ball, long established as one of the leading social events of the year, will feature the music of the Criterions and a variety of engineering exhibits from all three faculties.

At press time only the Electrical Faculty was able to supply a description of its proposed exhibits. The main exhibit will be a "sex analyser" — a marvel in engineering achievement which will determine the sex of any person which utters a word or two in its "ear". An artificial and model transmission line and a television receiver built and designed for and by Canadians will also be included among the exhibits.

With the sale of tickets progressing favorably it is expected that a large if not record crowd will attend the affair. Contrary to popular opinion the dance is not exclusive. Any and all students are welcome proclaims the Social Committee.

Wassail Tonight

Tonight, at the Alex Canteen, the engineers will hold their annual Wassail. Beginning with a lunch, probably followed by a few words from the faculty guests, the event is expected to develop along the lines of the Stag Party held at the same location last fall.

Social Committee head A. Ross "Punchy" Walker plans to have lunch begun at approximately 6:30 p.m. Refreshments will be served. It is difficult to estimate the time at which the event will end.

Intramural

(Continued from Page Four)

Clark per usual while Joe Church was top man for the winners with 11 counters. The Residence B team needed a win over the Artscience squad in order to tie the Faculty for the top spot in the section. The Residence B boys left no doubt as to their superiority as they swamped the Artscience 46-28 in a very ragged game. Ben Baldwin led the winners with 20 points while Al Nakash followed with 17 counters. In the other A section game the Foresters edged past the Residence A team by a 38-33 count. Bob McLaggan led the Foresters with 16 points and Stu Vaudry was top man for the Residence scoring 14 counters.

Silver Streaks

(Continued from Page Four)

and and Morris who each scored twice while the other counter was scored by Tompkins. For the losers Risteen and McBeth each scored once.

Last term's playoffs were won by the Intermediate Foresters who defeated the Silver Streaks in the finals by a 7-4 count. This term the Streaks seemed to have had a little the better of the Foresters, not only in beating them out for the league leadership but also in defeating them in the single encounter of the two teams. If neither of these teams are upset on their way to the finals of the playoffs, the contest between them should prove to be a thrilling one.

Standings:

A Section

	W	L	T	P
Silver Streaks	3	0	0	6
Inter. Foresters	2	1	0	4
Frosh Cards	1	2	0	2
Frosh Dodgers	0	3	0	0

B Section

	W	L	T	P
Alex Ghosts	3	1	0	7
Soph. Combines	2	2	0	5
Residence	3	1	0	5
Engineers 2, 4	2	2	0	3
Civils 3, 4	0	4	0	0

Top Seven A Section

Player	Team	G	A	P
Haswell,	Inter. For.	5	1	6
McAdam,	Silver Streaks	2	4	6
Hyslop,	Silver Streaks	5	1	6
Stewart,	Frosh Card.	1	5	6
Menzies,	Silver Streaks	3	3	6
Craig,	Silver Streaks	4	0	4
MacDonald,	Frosh Card.	3	1	4

Top Seven B Section

Player	Team	G	A	P
Fletcher,	Alex Ghosts	7	3	10
Hallett,	Eng. 2, 4	3	4	7
Sewel,	Alex. Ghosts	4	3	7
Thompson,	Alex. Ghosts	4	3	7
Boyle,	Residence	4	1	5
Risteen,	Eng. 2, 4	4	1	5
Dee,	Eng. 2, 4	2	2	4