



MONTHLY REPORT OF ACTIVITIES

March 31, 1970



THE MAIN-ACCELERATOR PROTOTYPE OPERATES



Forthcoming Meetings at the Laboratory

April 1 and 3	T. C. Lee
April 2	A. Pais
April 10-11	Annual NAL Users Meeting
April 16, 23, 30, May 7	S. L. Adler
June 22-July 24	Summer Study
Sept. 28-Oct. 2	Proton Linear Accelerator Conference

THE COVER: The prototype of the main accelerator. This shows the arrangement of the magnet bases, piping, and current buses, and cable trays.

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March 31, 1970

Abstract: This report summarizes the activities of the National Accelerator Laboratory in March, 1970.

General

1. Prototype Operation. Successful operation of the prototype cell of the Main Accelerator was achieved on March 13, a week ahead of schedule. The magnet system was pulsed to the 200-BeV field level at the design repetition rate. The cover is a recent photograph of the prototype, which is installed in the prototype tunnel in the Laboratory Village. Further details of the operation are given under "Main Accelerator" below.
2. Proposals for Experiments. The first formal call has been issued by the Laboratory for proposals for experiments with the 200-BeV proton beam. The call was sent to all members of the NAL Users Organization. These experiments will begin by 1972.
3. Users Meeting. The annual meeting of the NAL Users Organization will be held at the Laboratory on April 10 and 11. Interested physicists are invited to attend.
4. Construction Progress. Construction has proceeded rapidly in the fine weather through most of March. Some highlights of individual projects, embellished by recently taken aerial photographs, are:
 - a. Booster Enclosure. The West Gallery is moving ahead and will be finished and occupied by the Laboratory early in April. Structural work on

the East Gallery is almost complete. Figure 1 shows the progress from the air. The entire contract is 76% complete.

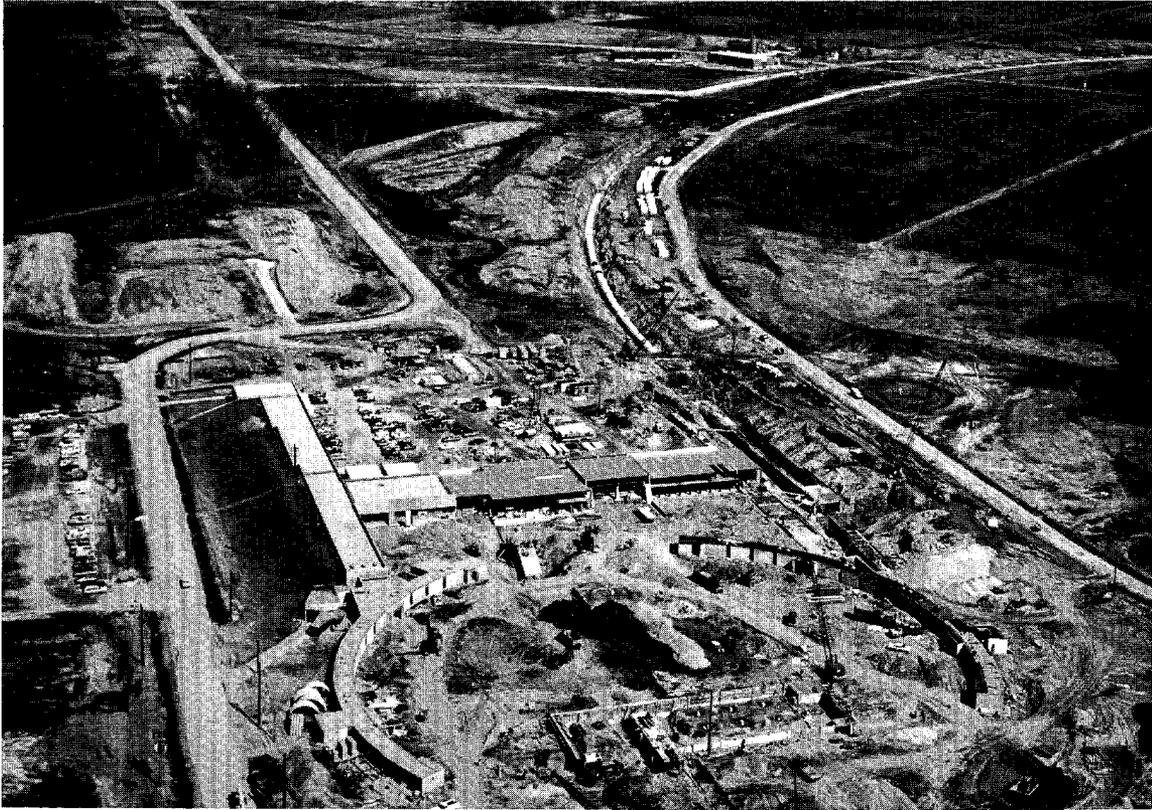


Fig. 1. The injection area from the air. Road A is at the left. The completed structure of the Booster West Gallery is in the foreground; the Linac Building and Cross Gallery are beyond. The East Gallery, partly roofed, and the West Gallery circle the foundation of the Central Utility Plant. The Transfer Hall, Main Ring and Ring Road are to the right. The Industrial Area is in the distance.

b. Cross Gallery. Roofing has been completed and beneficial occupancy taken on the vehicle access way to the Booster. This contract is also 76% complete. It is also shown in Fig. 1.

c. Central Utility Plant. Structural work is under way, as can be seen in Fig. 1. The contract is 13% complete.

d. Main-Ring Enclosure.

(i) Phase I. Approximately 900 feet of the precast sections of

the first one-fifth of the ring have been placed. This work is shown in Fig. 2.



Fig. 2. Tunnel sections of the Main-Ring Enclosure being placed.

Most of the reinforcing steel and forms for the walls of the Transfer Hall have also been completed. Figure 3 is a closer view of the Transfer Hall and Gallery from the air, and Fig. 4 shows the Transfer Hall from the ground. The entire contract is 41% complete.

(ii) Phase II. Excavation work has begun on the remaining four-fifths of the enclosure. This contract is 4% complete. Figure 5 shows the entire main ring from the air.

e. Industrial Buildings. The first building is closed in. This contract is 54% complete.



Fig. 3. The Transfer Hall and Transfer Gallery from the air.

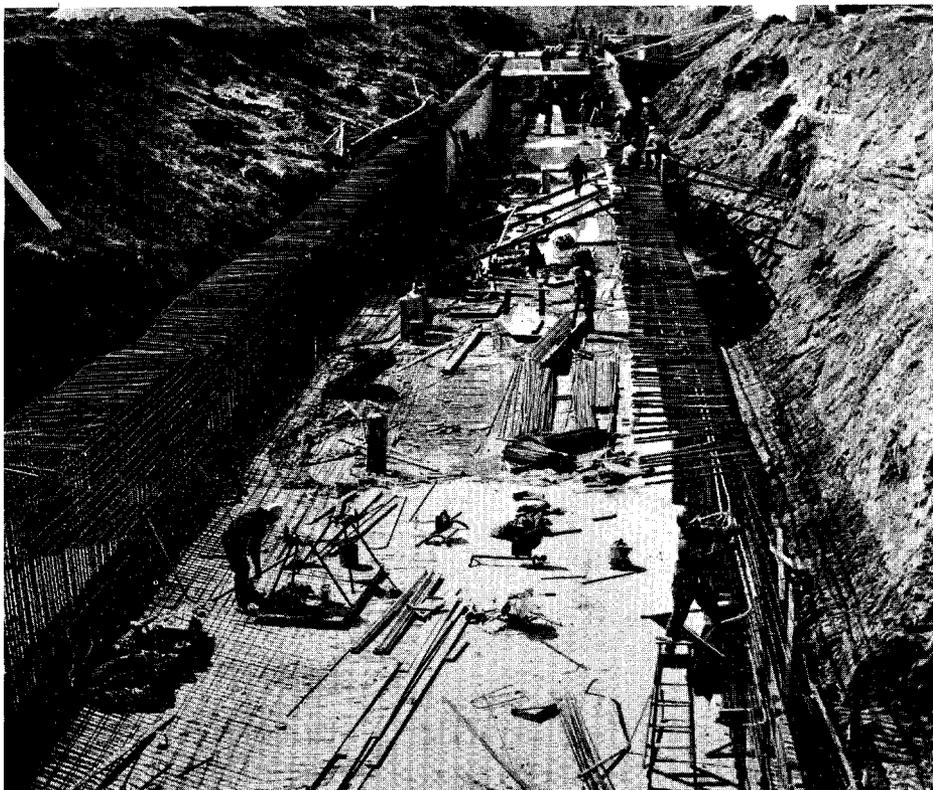


Fig. 4. Reinforcing steel for the walls of the Transfer Hall.



Fig. 5. An aerial view of the construction site. This photograph (somewhat obscured by haze) was taken from an altitude of 3000 ft. The contractor's yard for Phase II of the Main Ring is at the left. The injection area is at the far side of the ring. Eola Road, with the precasting plant on it, is in front of the ring. The Industrial Area is beside the ring at the far right and the Master Substation just above it at the junction of Roads A and B. The City of Batavia is beyond the site at the right of the photograph.

f. Master Substation. Foundation work is nearing completion. The contract is 28% complete.

g. New Contracts. Contracts have been awarded for the procurement of the second and third 345-kV transformers. Thus all the transformers for the master substation are now under contract. The contracts are for approximately \$560,000. A contract has also been awarded for the second water well.

5. Appointments. Helen Edwards has been appointed Associate Section Leader of the Booster Section.

The press of Main-Accelerator activities has forced Ernest Malamud to

relinquish his role as head of the Controls Task Team. The Director, Robert Wilson, has taken over this work with the assistance of Donald Edwards.

6. Laboratory Staff. On March 31, the Laboratory has 653 employees, including 134 scientists and engineers.

Linac

1. Preaccelerator. The Haefely high-voltage set has achieved a voltage of 870 kV. The accelerating column and ion source have been installed and beam tests are beginning.

2. First Tank. Drift-tube realignment has been completed and the accelerating fields have been remeasured and adjusted to within $\pm 1\%$ of the calculated values. The rf system has undergone remodeling to make it identical to the other systems. It has been operated at a peak power level of 2.5 megawatts into a resistive load.

3. Other Tanks. All sections of tanks 2 and 3 have been received. Tank sections 2A and 2B have been successfully welded. The complete tank 2 is scheduled to be moved to the permanent building on April 10.

Booster

Approximately 12 girders are being assembled in the Village. All the energy-storage capacitors have now been delivered. Tests of the first magnet power supply have been successfully carried out at the fabricator's plant in Great Britain. The 200-MeV spectrometer has been installed in the Linac Building extension. It is shown in Fig. 6.

Main Accelerator

The successful operation of the prototype cell (ahead of schedule) is an

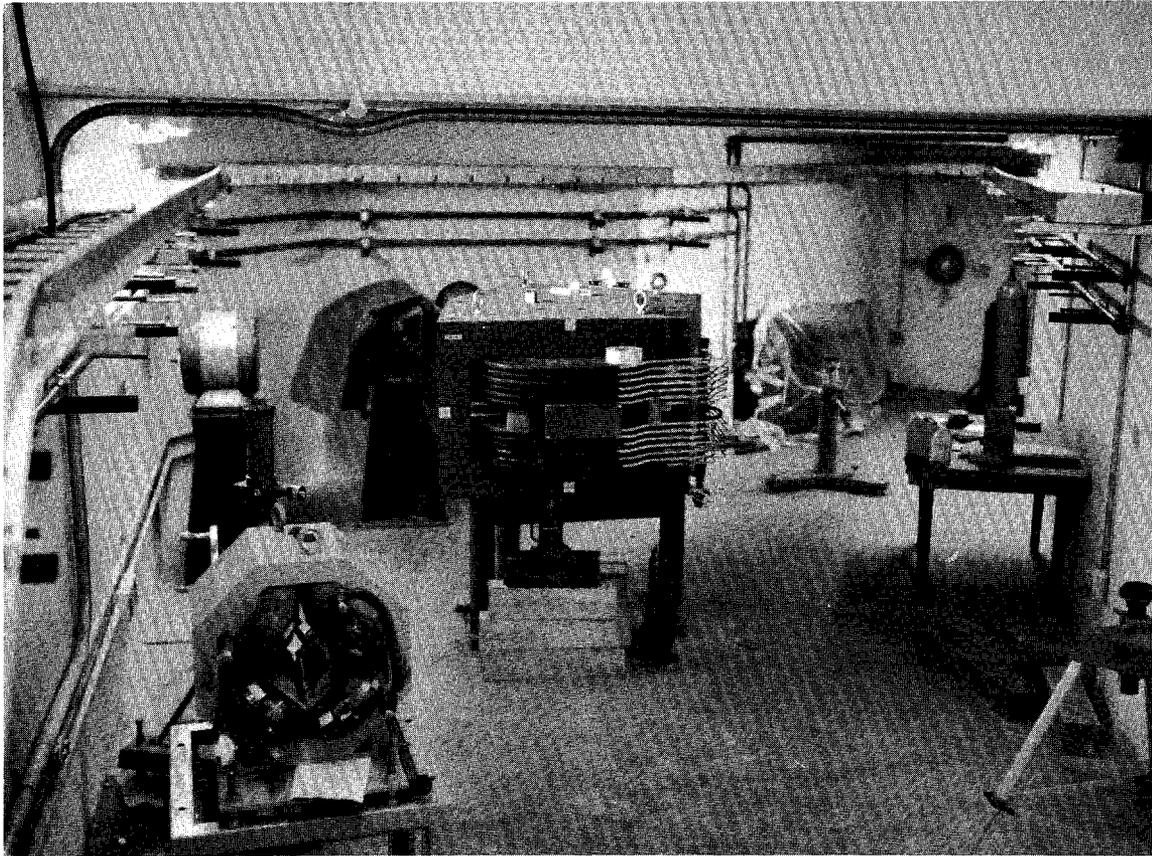


Fig. 6. The Linac Extension, with the spectrometer in place. To its right and behind covered with a plastic sheet, is the beam hole leading down to the Booster.

important experimental demonstration of many design features of the main accelerator. An addition to the demonstration of the general properties of the magnets and magnet power supply, the design of the vacuum system, the computer control of the power supply, the use of the magnet-handling vehicle, the magnet-alignment system, and the production methods and schedules for magnets were all successfully tested. Tests of a number of other design features are now in progress.

Individual bending magnets have been successfully pulsed to 22.5 kilo-gauss, a field corresponding to proton energy of 500 BeV. The entire cell

has not been pulsed to this field level because adequate power has not yet been available.

Production work on magnets is beginning to move rapidly. Stacking fixtures and assembly tables are now on hand. Contracts have been awarded for the entire production run of laminations.

Experimental Facilities

The studies of plans for experimental areas by Laboratory Task Forces have been completed. A "Design Report on Experimental Facilities" is in preparation, bringing together all this work. The substance of this report will be presented at the Users Meeting on April 10-11. Completion of the printing of the report is scheduled for early May.

A well-attended Workshop on Area 1 was held on March 13. This area is centered on neutrino beams; it will also have muon and rf-separated beams. Bubble-chamber plans and ideas for counter experiments were discussed.

Engineering design of Area 2 is in progress, based on 6 secondary beam lines and their branches. Detailed optical design of the beam lines has begun.