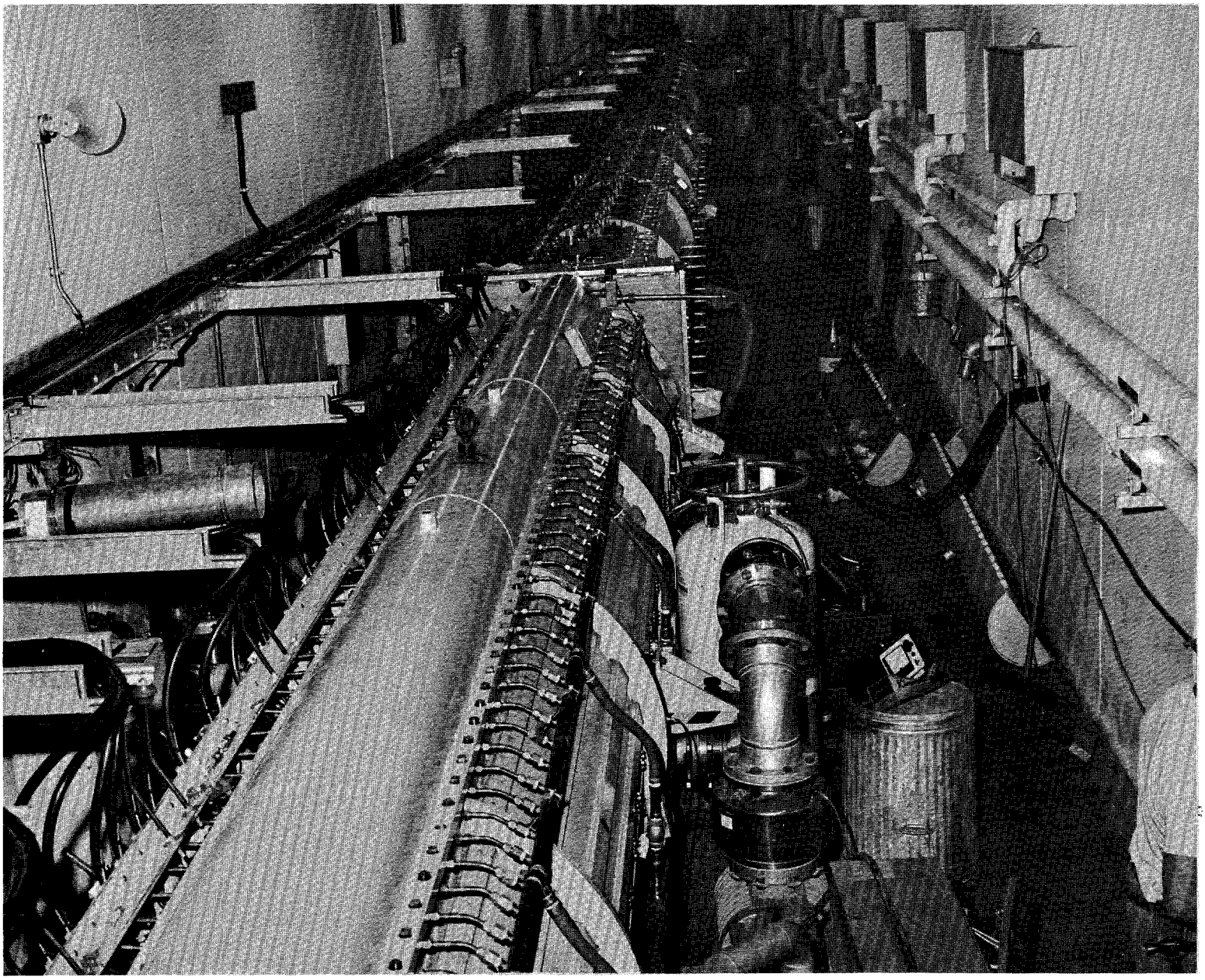
national accelerator laboratory FERMILAB-NAL-045

MONTHLY REPORT OF ACTIVITIES

July 31, 1970



66-MeV LINAC BEAM

Operated by Universities Research Association Inc. Under Contract with the United States Atomic Energy Commission

THE COVER: The cover photograph was taken looking down the Linac from the low-energy end. James Hogan and Max Palmer are standing between Tanks 2 and 3. Tank 4 is to the right, above the two men. Tank 5 can be seen in the distance.

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MONTHLY REPORT OF ACTIVITIES

F. T. Cole

July 31, 1970

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

Linac

1. 66-MeV Beam. A significant milestone was reached on July 30 when a proton beam was accelerated to 66 MeV, the highest energy yet achieved at the Laboratory. The beam was accelerated through the first three linac tanks, shown in the cover photograph. Measurements of beam properties are now in progress.

2. Construction Progress. Tank 4 is resting at the side of the tunnel while drift tubes are being aligned in Tank 5. All sections for Tanks 6, 7, and 8 have been delivered, and the last three sections for Tank 9 will be delivered shortly. Work is also proceeding on schedule on installation of the remaining rf systems. The next milestone will be to deliver 139-MeV protons to the Booster on October 1.

Booster

1. Production Measurements. The magnetic length of all booster magnets is being measured prior to their installation on modules. The relative error has been within $\pm 2 \times 10^{-4}$, which is within the tolerance for closed-orbit deviations.

2. Construction Progress. One fourth of the booster ring is installed and has been powered. Figure 1 is a recent photograph of the Booster Tunnel.

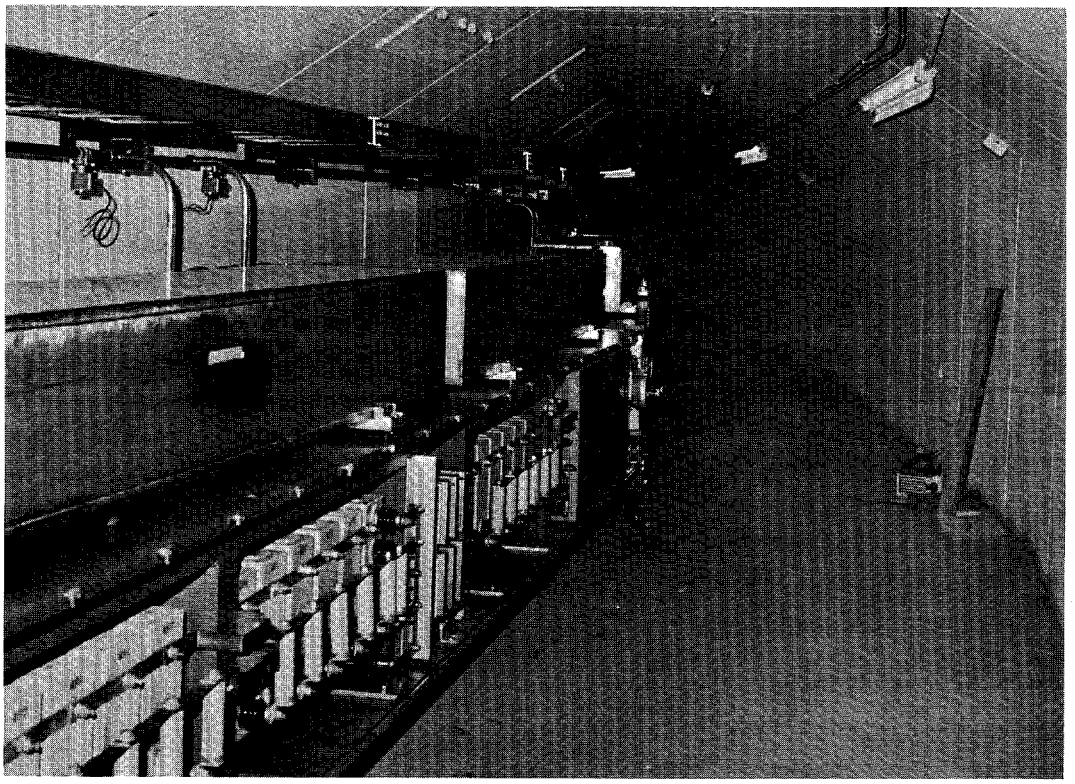

Fig. 1. The Booster Tunnel, with modules installed.

A component of the 200-MeV injection line has been controlled and adjusted through the computer system. It is expected that the entire injection line, part of which is shown in Fig. 2, will be under this control in the near future.

Main Accelerator

Construction Progress. The bending magnets of the first five cells of Superperiod A are in place. Figure 3 is a view looking in the beam direction. The quadrupoles are still being measured. A total of 100 magnets has now been completed. At this time, our own production of inner coils is well ahead of the outside fabricators' production of outer coils. Installation work is also going on in the first service building, SA-5.

Radio Frequency

Construction Progress. Figure 4 shows the first two booster rf cavities being taken into the Booster tunnel on July 24, which was exactly on the

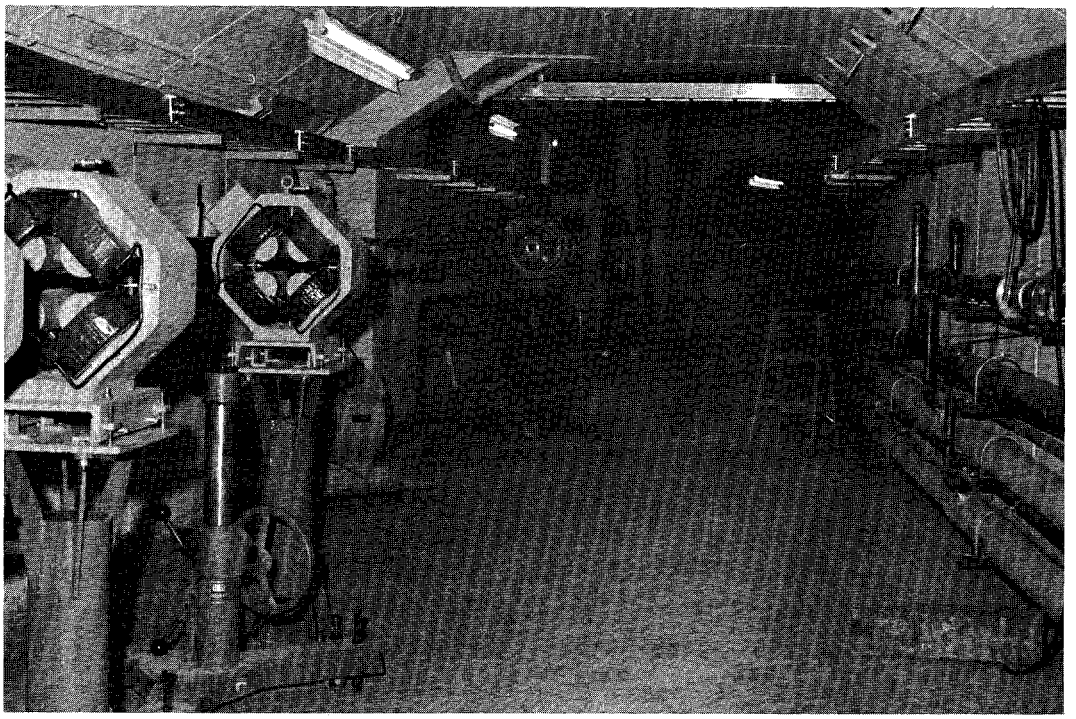

Fig. 2. The injection beam line in the Booster tunnel. A small incandescent bulb is hanging in the passage down from the Linac.

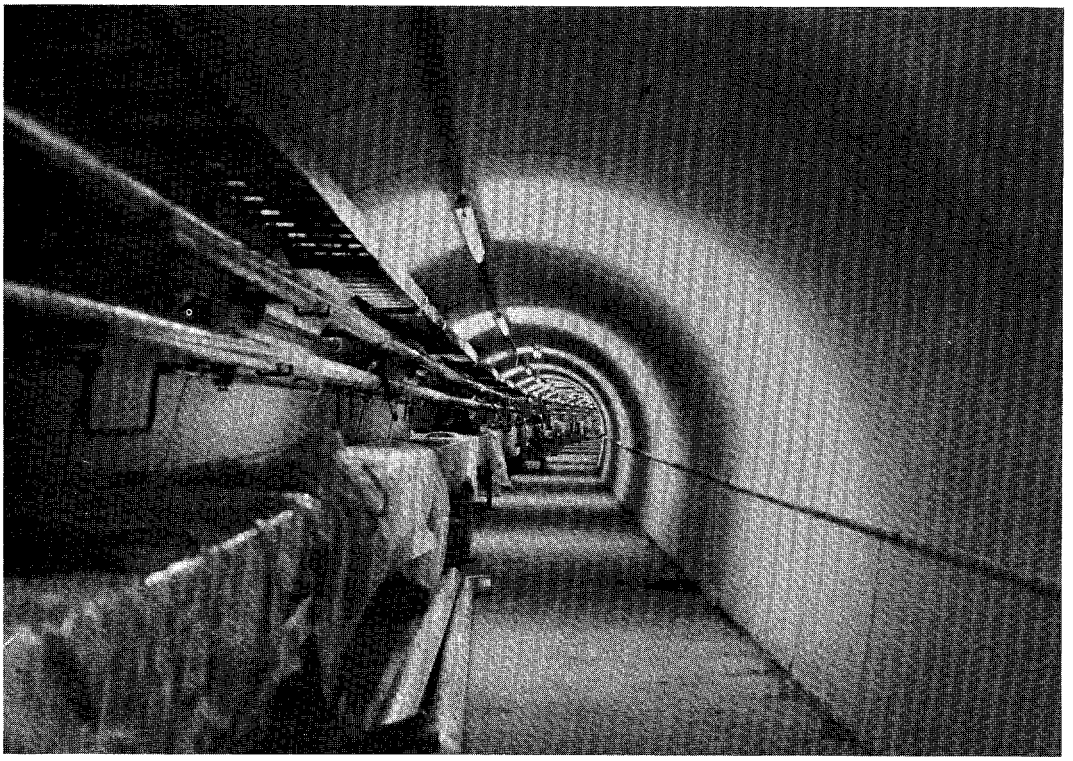

Fig. 3. The main-ring tunnel, taken from near the first service building.

schedule date for this milestone. These cavity systems will be tested in place shortly with frequency sweeping and high-power operation. In addition, deliveries of modulators, power supplies, tuners, and additional cavities are proceeding close to schedule. Tests of the first prototype main-accelerator cavity are still in progress in the laboratory in the Village.

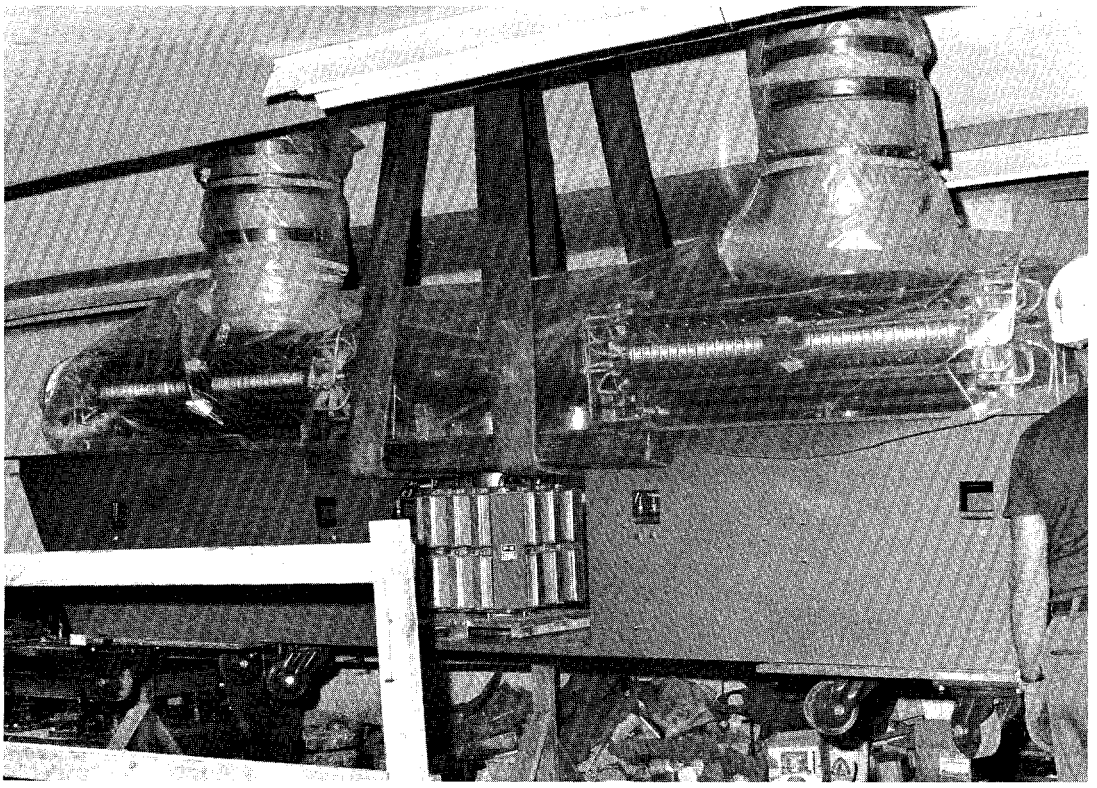

Fig. 4. Two Booster rf cavities on a girder being lowered through the hatch in the Cross Gallery on their way to the Booster.

Experimental Facilities

1. Summer Study. The Summer Study ended on July 24. The participants discussed beams and experiments in Area 2 and reviewed and criticized the design work on Area 1. It was a significant help to the participants to have available the proposals for experiments.

A more complete discussion of the Summer Study will be given in a

later monthly report. The approximately 45 reports written by the participants will also be published by the Laboratory as with previous Summer Studies.

2. Design Work. Title I on Area 2 has been completed and sent to the AEC. The most noteworthy difference from what has been described in previous reports is that there is no longer a separate target laboratory. There will be instead a target-servicing area with remote-manipulator capabilities located upstream of the target box.

The Experimental Facilities Section is also reviewing extensively the shielding in Area 1, in collaboration with the Radiation Physics Section, in order to define the shield length and to choose the location of the bubble chamber. This review is necessitated by the increase in Area 1 energy to 500 BeV.

Construction

1. Work began on the Proton Beam Enclosure. This work is shown in Figs. 5 and 6. The contract is 3% complete. Work is also in progress on the

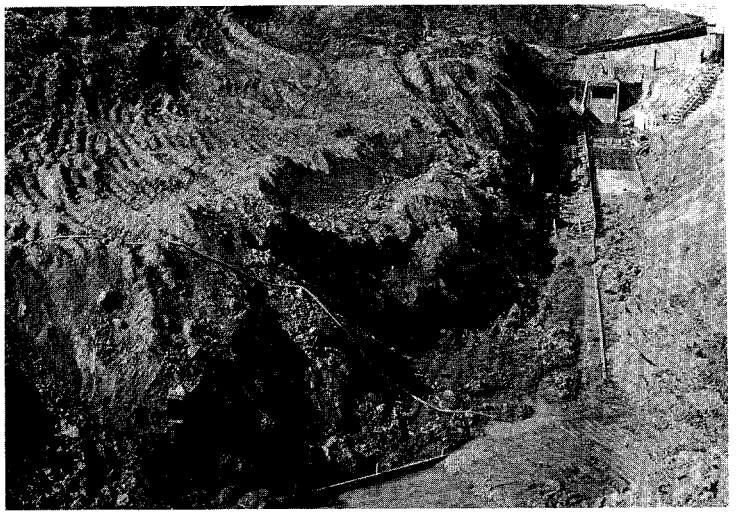

Fig. 5. Excavation for the Proton Beam Enclosure. The view is south toward the Transfer Hall. The Main Ring is to the left.

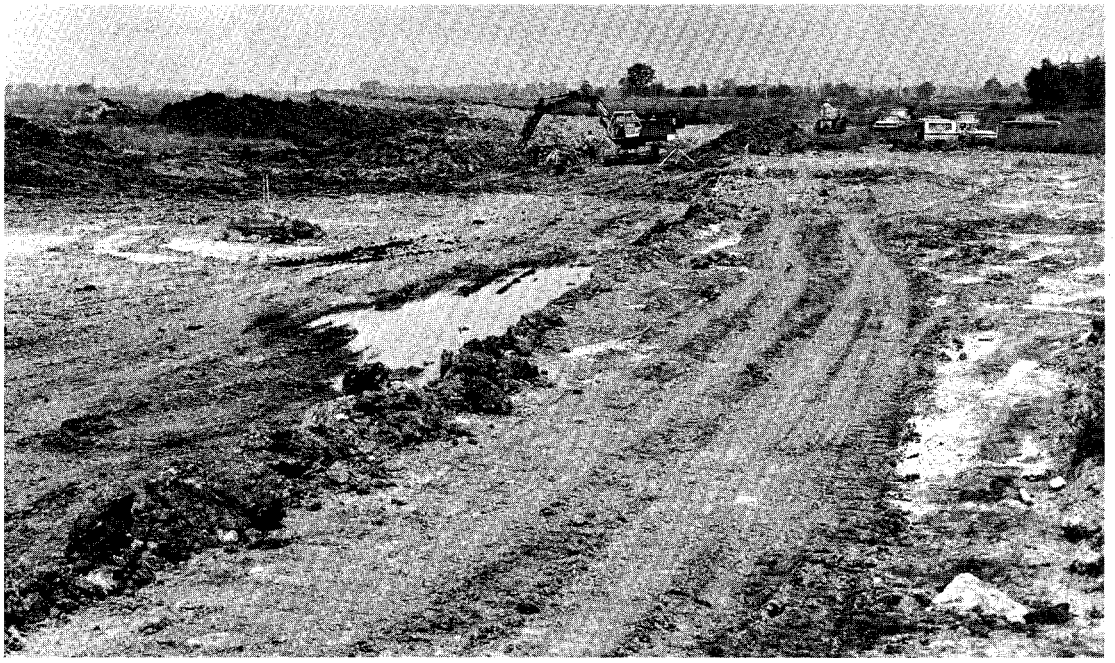

Fig. 6. Excavation for the Proton Beam Line beyond the Master Substation.

345-kV power line to the Substation. This work is 13% complete.

2. The Master Substation is shown in Fig. 7. It is 66% complete.

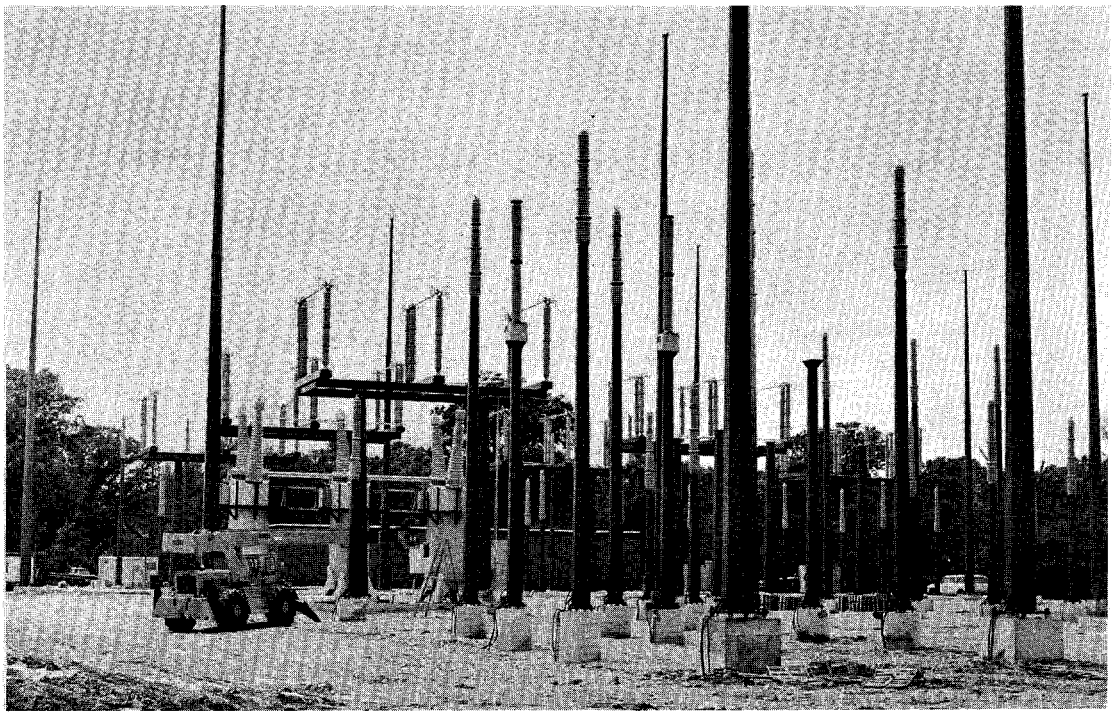

Fig. 7. The Master Substation.

3. The Central Utility Plant is 51% complete. On July 27, the Booster Pond was completed and its filling began. The scene is shown in Fig. 8.

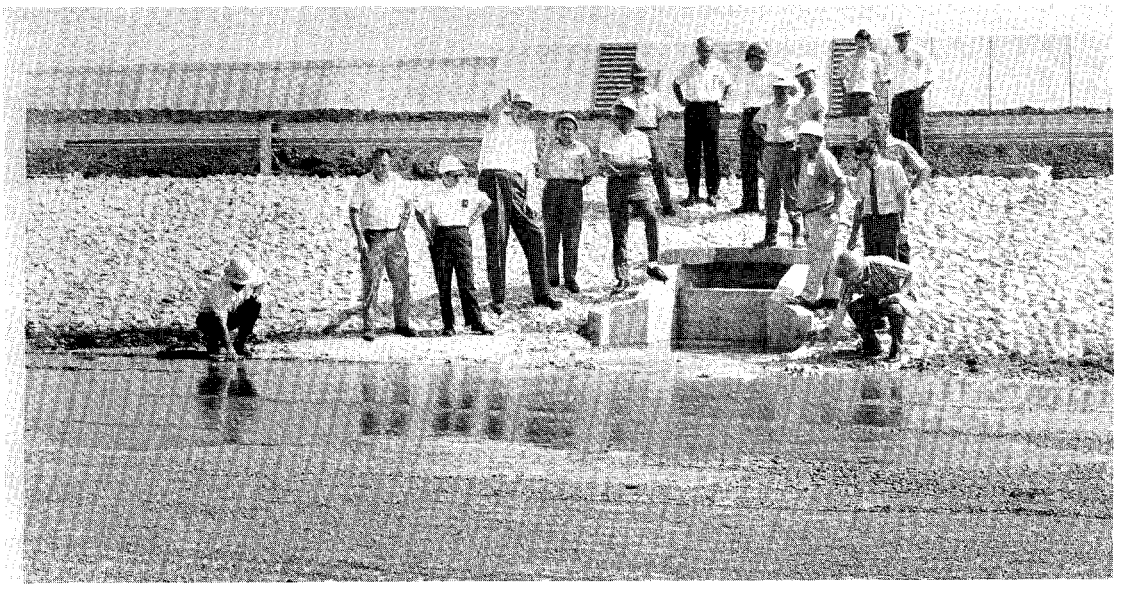

Fig. 8. "This is the Place!" The Booster pond begins to fill.

4. Phase I of the Main Accelerator is 84% complete, with work left to be done mainly on the service buildings. Figure 9 shows the Transfer Hall.

Fig. 9. The Transfer Hall, looking upstream. To the left of the handsome young man at the far end is the Main Ring. To his right is the 8-GeV Transfer Tunnel from the Booster.

Phase II is 35% complete, with the tunnel proceeding at a good rate. Work is also in progress on the RF Building in Straight Section F, shown in Fig. 10.

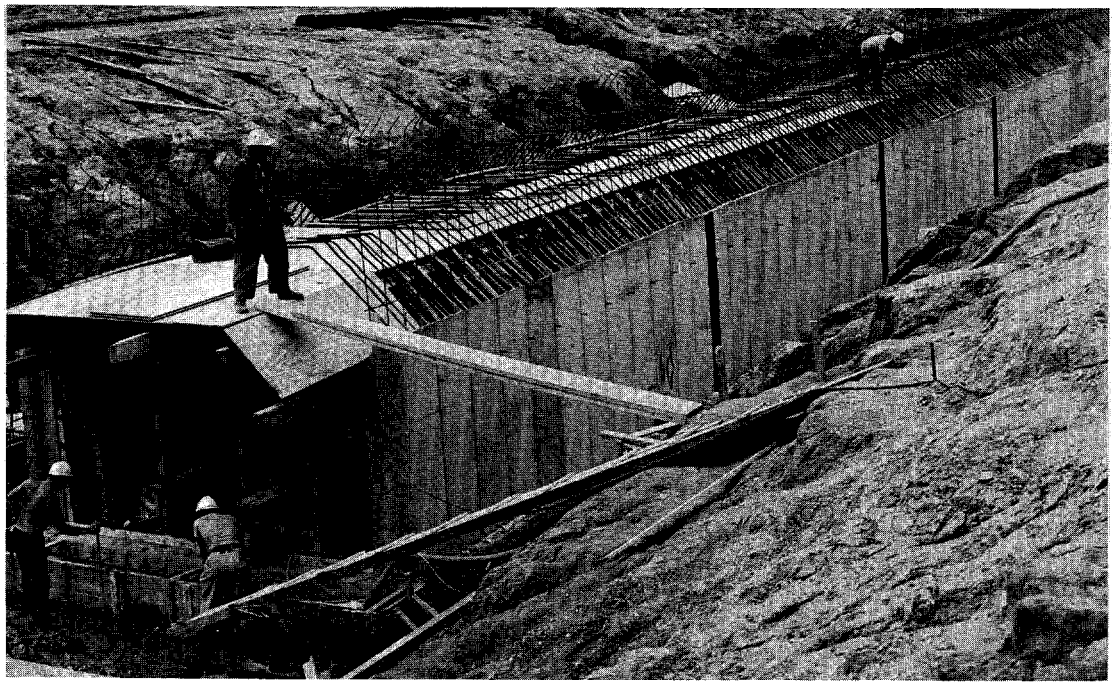

Fig. 10. Forming work in progress on the RF Building in Straight Section F.