

DESIGN CRITERIA REPORT
FOR THE
ACCELERATOR HOUSING STRUCTURE

REPORT TO SLAC NO. ABA-45
STANFORD UNIVERSITY SUBCONTRACT S-128
UNDER AEC CONTRACT AT(04-3)-363

SLAC AHO 1991-012B14

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I. INTRODUCTION

This report lists the design criteria to be utilized in performing Title I design for the Accelerator Housing structure. The structure includes the main housing from Station 0+00 to Station 100+00, the west end injector from Station -(2+00) to Station 0+00, the intermediate injector station, the equipment chamber, the beam take-off facility, the waveguide penetration, and the personnel accessways.

II. DESIGN CRITERIA

General

The facilities included in this report are the concrete structures and their pertinent services, penetrations, and subsurface drainage. Not included are the excavations and fill placement for the housing foundations, placement of shielding fill, and cross drainage culverts. The design criteria for foundation grading and cross drainage was submitted in report ABA-42, dated March 26, 1962. The design criteria report for placement of shielding fill is scheduled to be completed by June 15, 1962.

Accelerator Housing Structure (see attached sketch)

1. The alignment, grades and elevations will be determined under the category "Foundation Grading and Cross Drainage". This design criteria was issued in the report, ABA-42, dated March 26, 1962.

2. The structure will be rectangular with an inside width of 11 feet and an inside height of 10 feet.

3. At least 35 feet of shielding earth or its equivalent will be placed over the accelerator.

4. For general layout purposes, the longitudinal centerline of the housing will be 12' - 3" north of the longitudinal centerline of the Klystron Gallery. The Klystron Gallery will be centered on the top of the 90-foot wide shielding fill.

5. The 10,000-foot length will be divided into thirty sectors—each 333' - 4" long.

6. Interior drainage and exterior subsurface drainage will be monitored at the outfall to determine if special retention provisions should be made before release.

Personnel Accessways (See attached sketch)

1. One accessway will be provided in each sector and will project horizontally at a 30 degree back-angle from the accelerator housing. Entry will be provided by a vertical shaft from the Klystron Gallery level to the horizontal passageway.

2. The horizontal passageway, $3\frac{1}{2}$ feet wide by 8 feet high, will allow movement of personnel and provide space for ducts, conduits, etc., as required.

3. A radiation trap at the end of the horizontal passageway will extend six feet beyond the vertical access shaft.

4. The access shaft, approximately $3\frac{1}{2}$ feet by 4 feet, will provide space for vertical ladders, piping, ducts, and for hoisting tools and other small equipment items.

5. The accelerator housing will be sealed by the hatch cover at the top of the vertical well. An interlocked door will be provided at the top of the well.

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West End Injector Station

1. Housing will be provided by extending accelerator housing at least 200 feet west of Station 0+00. More than 200 feet will be provided if found feasible.

2. A movable shielding door will be provided at the portal. Shielding thickness of door will be equivalent to 10 feet of concrete. Door will overlap sides, top and bottom of portal opening.

3. Shielding fill over portal will be at least 10 feet thick.

4. Portal will be as unobtrusive as possible.

Intermediate Beam Injector Station

1. An injector station will be provided at about the one-third point along the accelerator housing and as close to the beam take-off point as radiation and space conditions will permit.

2. Injection will be made at a 45 degree angle. Injection passages will consist of a 36-inch pipe. The grade of the pipe will be such that the injector tube will not require a vertical bend at its junction with the accelerator.

3. An 8' x 8' equipment chamber, 10 feet high will be provided to house injector equipment. The access structure will be located adjacent to the equipment chamber and access can be made vertically from the Klystron Gallery level or horizontally from beyond the shielding fill limits. The vertical access appears to be the more favorable scheme as access will be above high water levels of the proposed San Francisquito Creek Flood Control Dam reservoir. Ship's ladders and a 6-foot by 12-foot unobstructed vertical space would be provided in the vertical access shaft.

4. Injector equipment chambers will be separated from the accelerator housing and the beam take-off facility by at least 35 feet of earth shielding or its equivalent.

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Equipment Chamber

1. The accelerator housing will be widened to 20 feet (without columns) for a length of 150 feet at about the two-thirds point. The widening will be on the south side.
2. Access to the chamber will be by means of a vertical shaft offset from the accelerator housing. The shaft need not be at any minimum distance from the accelerator housing. The horizontal passageway (offset) will be 6 feet wide and 8 feet high (inside dimensions) and will project at a 30 degree back-angle from the west end of the widened section. Fairly heavy removable shielding will be provided.
3. The vertical shaft will extend up to the top of the shielding fill at Klystron Gallery floor level. Ship's ladders will provide means of climbing up and down the shaft and an unobstructed 6-foot by 12-foot vertical space will be utilized for hoisting equipment.
4. Additional shielding (over that provided by 35 feet of earthfill) of perhaps 5 feet of heavy material such as iron ore or heavy concrete will be provided over the widened section.

Beam Take-Off Facility

1. The entire structure will not be completed at this time. It will be planned so that the complete facility can be finished at some future date with a minimum of downtime for the accelerator. In the meantime, it will provide access for installation work.
2. Location will be at Station 29+00 along the accelerator and on the south side. Location will be planned so that the future target area, 150 feet by 300 feet will be in terrain that can reasonably provide the shielding requirements. The back end of the yard will be as far as feasible from the lease boundary line.

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3. The deflection structure will be 15 feet wide and 10 feet high (inside dimensions) and will have a longitudinal grade commensurate with the accelerator grade. Its angle with the accelerator housing will be 45 degrees.

4. The accelerator housing will be widened on the south side to a total width of 20 feet (without columns) for a distance of 150 feet at the deflection structure junction. This widening will extend 100 feet west of the intersection of where the southeast wall of the deflection structure meets the south wall of the widened housing section.

5. Additional shielding (over that provided by 35 feet of earthfill) of 5 feet of heavy material such as iron ore or heavy concrete will be provided over the structure in the proximity of the deflection.

6. Temporary concrete blocks or earth backfill will shield the exposed opening.

Waveguide Penetrations

1. Sixteen penetrations for each sector (total of 480 for 10,000 feet) will be provided.

2. The inside diameter of the penetration (tube) will be $27\frac{1}{2}$ inches.

3. The centerline of the penetrations will be 4 feet 3 inches south of the housing centerline and will be located longitudinal as shown on SLAC drawing SK 860-040-R1 dated 4/19/62.

Ventilation, Heating, and Dehumidification

1. Leakage of air to or from the accelerator will be minimized. The seal will be located at the top hatch of the vertical well in the personnel accessways.

2. Air will be completely changed in the housing in at least 10 minutes and will be discharged to atmosphere through a vertical duct at high velocity.

3. Purge fan installations will be incorporated in each personnel accessway structure. Fans will be interlocked so as to prevent operation until the decay period after beam turn-off has elapsed. Motor operated dampers will open when fan is running and close to seal the duct when fan is turned off.

4. Fans and dampers will be individually controllable from stations near the accessway served. The same station will also control fans and dampers for the two adjacent accessways.

5. Injector stations will be ventilated and slightly pressurized with filtered air. An air seal to cut-off drafts will be provided between the injector chamber and the accelerator housing. Absolute tightness is not required. Air barriers will be capable of withstanding pressure differentials of 2 psi.

6. Spot heating in the housing will be provided by portable electric heaters using convenience outlets.

7. Dehumidification is not required for present construction. Facilities will be planned for future installation of equipment and ductwork if dehumidification is necessary.

Electrical

1. There will be 15 footcandles of general illumination provided from surface mounted incandescent fixtures.

2. Convenience receptacles will be spaced at 50 foot (maximum) intervals.

3. The required power for lighting and receptacles will be supplied from the Klystron Gallery. The power and controls for the ventilating fans will also be located in the Klystron Gallery.

4. Wiring will be made by mounting mineral insulated cable on the concrete surfaces. Alternative materials that are not particularly sensitive to radiation will be considered.

5. Reinforcing steel will be bonded to the grounding system at one point for each bar. Receptacle circuits will be grounded.

Utility Instrumentation

1. Permanent telephone service will be provided for the injector and beam take-off facilities. Temporary phone service will be provided for the Accelerator Housing until the intercommunication system is available (by SLAC). Local lines assigned to the end station areas will be used for this service. Conduit and junction boxes only will be provided for the telephone, intercommunication and public address systems.

2. A rate of rise fire detection system will be provided on a sector basis. The permanent installation of the detection units will be in the Klystron Gallery.

3. One penetration with four conduits for the above services will be located at each sector. Consideration will be made for installing these conduits in the waveguide pipe along with the accelerator instrumentation.

4. The detection units will be temporarily located in the Accelerator Housing during installation of the accelerator tube and prior to completion of the parallel portion of the Klystron Gallery.

Embedded Metal Items

No embedded metal items will be provided other than such miscellaneous metal required at doors, hatches, ladders, and waveguide tubes. All other

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items to be attached to the concrete surfaces will be made after the housing concrete is placed and will be fastened by means of studs (Ramset) driven into the concrete or other suitable methods.

Additional Utility Penetrations

Additional penetrations between the Accelerator Housing and Klystron Gallery will be provided as required for ABA services.

Measurements for Elevations

Elevations within the housing can be checked after construction by a level survey through the housing and through the personnel accessways to bench marks located outside. This precludes checking during operation of the machine.

Painting and Dampproofing

The interior walls of the housings will not be painted.

Dampproofing compound will be applied on the exterior surfaces of all underground walls and roof slabs except in zones of heavy groundwater where a dampproofing membrane will be applied.

III. ADVANCE SKETCHES

ABA will prepare sketches for SLAC's review and approval before inclusion in Title I report, showing general arrangements, functional dimensions and other requirements according to the design criteria included in this report. Prompt replies on these advance sketches will insure that the Title I report will conform to SLAC's requirements and that it will be completed on schedule.

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IV. DESIGN AND CONSTRUCTION SCHEDULE

<u>Event</u>	<u>Date</u>	<u>Time</u>
Submitted rough draft design criteria	5/4/62	
Received comments from SLAC on rough draft design criteria	5/14/62	
Submit design criteria	5/21/62	
Design criteria review and approval by SLAC	5/21 -5/25/62	1 week
Title I	5/25 -7/27/62	9 weeks
Title I review and approval by SLAC	7/27 -8/10/62	2 weeks
Title II design	8/10 -12/28/62	20 weeks
Title II review and approval by SLAC	12/28/62 -1/11/63	* 2 weeks
Title II revised	1/11 -1/18/63	1 week
Title II reproduced	1/18 - 1/25/63	1 week
Title II final review by SLAC	1/18 -2/1/63	* 2 weeks
Title II bid	2/1 -3/1/63	4 weeks
Bid analysis	3/1 -3/15/63	2 weeks
Award construction contract	3/15/63	
Construction		10.5 months

* Per latest SLAC approval procedures

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