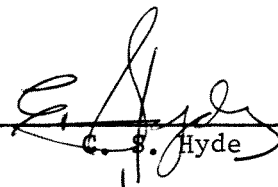
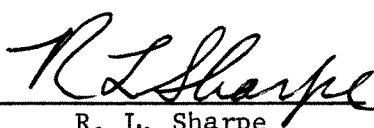


TITLE I REPORT
FOR
DATA ASSEMBLY BUILDING ADDITION

REPORT TO STANFORD LINEAR ACCELERATOR CENTER - ABA NO. 105
STANFORD UNIVERSITY SUBCONTRACT S-136
UNDER AEC CONTRACT AT(04-3)-400

SLAC AHO 1991-012B14

Submitted by:  Approved by: 
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September 1965

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I. INTRODUCTION

A. SCOPE

This report presents the Title I design for an addition to the existing Data Assembly Building (Building 505 A). Included are a general description of the work, outline specifications, schedule of work, a preliminary construction cost estimate, and preliminary and schematic drawings for the addition. The work described herein covers the building structure, mechanical and electrical services, and provisions for functional requirements.

B. CRITERIA

The basic criteria for this addition to Building 505A were defined in "Design Criteria Report for an Addition to the Data Assembly Building", dated September, 1965. Modifications and additional criteria were established during the Title I design periods by means of SLAC memoranda and meetings.

All design work will conform to U. S. Atomic Energy Commission Manual, Chapter 6000 and the codes and standards listed therein. In addition, health and safety standards developed for this project by SLAC will be used wherever appropriate.

Soils investigation work was conducted prior to construction of other existing buildings adjacent to the area for this addition. The records and data available obviate the need for additional investigation, therefore none is planned for this work.

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II. BASIS FOR DESIGN

A. GENERAL

The entire facility, the existing portion plus the addition, is to provide office and work space for 26 full-time Beam Switchyard operators and technicians and to house 90 double computer racks, complete with attendant toilet, power supply and mechanical spaces.

The addition will be approximately 100 feet long by 30 feet wide, located along the south side and for the full length of the existing building.

Refer to Drawing No. SK-505-165, dated September 30, 1965, included with this report, for a schematic presentation of the addition work.

B. BUILDING UTILIZATION

The existing facility is a one-story structure enclosing approximately 5000 square feet and is divided functionally into a power supply room, control room (rack area) and toilet-utility core. The major components of the existing mechanical equipment are located in the attic space above the toilet-utility core with the cooling unit component set on an exterior concrete pad at the west side of the building. The existing control room provides a computer floor area for about 30 computer racks. No office areas were provided in the original program.

The addition described herein will provide an additional 3000 square feet (nominal) of enclosed area on one floor. Functionally, the addition will be used for expansion of the original activities, except that an office area has been incorporated. The toilet-utility area has been appropriately enlarged and combined with the existing facilities.

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The interior of the addition is divided and utilized as follows:

1. Office Area - 1200 square feet (nominal) - consists of one finished area, at the easterly portion of the addition, with resilient flooring, painted gypsum wallboard perimeter walls and an acoustic tile ceiling. Lighting and air outlets are to be placed in a modular arrangement for future subdivision of this area into offices by SLAC after completion of the contract work.
2. Control Room - 1440 square feet (nominal) - consists of one finished area south of the existing control area, with computer floor, painted gypsum wallboard perimeter walls and painted exposed overhead structure. A 2-foot deep plenum space below the computer floor has been incorporated to facilitate distribution of the cooling air through this plenum to the computer racks.
3. Laboratory - 170 square feet (nominal) - consists of one finished room similar to the office area, except that a suspended wood subfloor has been used to facilitate duct runs supplying air to the plenum below the computer floor, and the ceiling will be painted wallboard.
4. Toilet-Utility Area - consisting of Women's and Men's toilet rooms and a Mechanical Room. The existing Women's Room is to remain as is, with one lavatory and one water closet. The Men's Room, a portion of which is within the existing building, has been rearranged to provide two lavatories, two urinals and two water closets. The Mechanical Room, located entirely within the addition, provides space for the major components of the air conditioning system and also provides space for a water heater, service sink and janitorial supply shelving, necessarily removed by the rearrangement of the existing Men's Room.

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C. ARCHITECTURAL DESIGN

The existing building, which reflects the architectural vocabulary established for this type of structure at the center, has a structural steel frame, with the columns concealed from the exterior by fluted vertical metal siding, and does not have windows nor a roof overhang.

The exterior of the addition will be in keeping with the existing portion, with the exception that some windows will be provided to the south and east of the new office areas. These windows will be arranged and styled to be in keeping with the fenestration of other buildings at the site. The exterior will be painted throughout, using the established colors.

D. SITE UTILIZATION

The construction site was graded and paved under the Beam Switchyard Utilities and Site Improvements contract (ABA 600-Z-1), though not specifically prepared for this addition. There are no provisions for parking at the existing building.

The addition work will include development of parking for approximately 22 cars in the area to the south of the building addition. The work will include extending the existing paving southward 40 feet, more or less, (66 feet minimum from the south wall of the addition) and providing attendant parking bumpers and painted lines.

Other site areas adjacent to this addition will not be changed by work under this contract, except necessary corrections to grades to maintain proper surface drainage.

E. UTILITIES

Domestic water, sanitary sewers, electrical duct banks and power service up to the existing building were installed under the Beam Switchyard

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Utilities and Site Improvements contract (ABA 600-Z-1). The north-south laterals of these existing utilities enter the existing building from the south, hence lay under the building addition location.

The addition work will include necessary revisions to these water and sewer laterals. No changes are to be made in the electrical duct banks as the foundation work includes provisions for spanning these locations.

Air conditioning and electrical demands and requirements within this addition are presented and discussed under Section III - OUTLINE SPECIFICATIONS of this report.

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III. OUTLINE SPECIFICATIONS

A. DESIGN FACTORS

For the purpose of establishing structural criteria and material qualities, using the Uniform Building Code, 1964⁴ Edition, the Data Assembly Building has been analyzed as follows:

	<u>Classification</u>	<u>UBC Reference</u>	
Occupancy	Group F-2	1101	✓
Type of Construction	Type IV-N	2101	✓
Fire Zone	Zone III	1604	✓
Area, existing & addition:			
Allowable -	9,000 S.F.	Table 5-C	✓
Actual -	8,000 S.F.	--	
Allowable increase -	Not needed	506	✓
No. of Stories:			
Allowable -	2	Table 5-D	✓
Actual -	1	--	

B. CIVIL

Site preparation will include necessary removal of existing paving within the perimeter of the building addition, including portions outside the building as necessary to adjust grade elevations for proper surface drainage.

Excavation will be unclassified.

Backfills will be made using appropriate earth materials and compacted to 95% where under the structure or roadways.

Moderate regrading of the areas east and south of the addition will be included.

Roadway repair and parking area paving will match the existing paving in the vicinity - consisting of 6" aggregate base course and double seal coat.

Standard redwood header boards, concrete parking bumpers and painted parking lines will be included as required.

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No major changes to local utility systems will be required, except that modifications to connecting laterals will be included as described under Part II - BASIS FOR DESIGN, Section E. - UTILITIES.

C. STRUCTURE

Foundations for the addition will be concrete, consisting of spread footings with piers for columns and rectangular grade beams for interconnecting the footings at the building perimeter.

Structural floors and subfloors will be concrete slabs over aggregate base course on grade.

Concrete and reinforcing will match the quality specified for the original portion.

The structural frame will be steel, consisting of columns, girders purlins and attendant bracing, designed to match the appearance of the existing framing.

The existing steel frame will be utilized to support a portion of the addition, namely, the existing south line of columns will be used to carry the north ends of the new steel girders.

Preliminary structural analysis indicates that the existing framing must be modified in order to integrate with the addition. This will be accomplished by:

1. The addition of diagonal stiffener plates at the girder to column connections of the existing north line of columns; and
2. The addition of flat web stiffeners to the upper third of the south line of existing columns.

Structural steel framing will be fabricated using ASTM A 36 steel in standard rolled shapes.

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D. ROOF

The new roof assembly will consist of metal decking, roof insulation and built-up composition roofing. Materials consistent with the existing work will be specified.

E. WALLS

Exterior walls will consist of metal siding to match the pattern of existing siding, supported on steel sub-framing, and with non-bearing wood stud furring, batt insulation and gypsum wallboard finish on the interior side.

F. PARTITIONS

Interior partitions will be standard wood stud and gypsum wallboard construction. All partitions will have batt insulation to aid sound control.

G. FLOORS

The Control Room floor will be a modular Computer Floor system to match or closely approximate the existing portion, consisting of removable metal panels supported on adjustable post devices. The structural floor will be depressed two feet to achieve a plenum for air supply to the computers as well as serving as a cable space. In addition, the existing north-south utility trench will be continued as a depression in the structural floor below the computer floor.

The Laboratory and Mechanical Room floors will be wood joist and plywood construction. The structural floor will be depressed three feet six inches to achieve sufficient space for the required air ducts supplying air to the computer floor plenum.

At the office and toilet area, the structural slabs on grade will receive the indicated finishes.

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H. CEILINGS

The ceiling above the Control Room will be the exposed structural frame and metal decking.

At other areas, ceilings will be suspended, consisting of wood joists and furring with gypsum wallboard on the under side.

Above the Laboratory and at limited locations above the Office Area, plywood subfloors will be provided as necessary for mechanical equipment.

I. WINDOWS

Exterior sash will be fixed aluminum frames, similar to existing units at other structures, glazed with standard clear sheet glass, and provided with "kool-shade" type screens on the outside.

J. DOORS

Exterior doors will be hollow metal, and interior communicating doors will be wood veneer. All doors will be flush design, painted and set in hollow metal frames.

K. INTERIOR FINISHES

Floors:	Computer Floor	Vinyl Tile
	Toilet	Ceramic Tile
	Elsewhere	Vinyl-Asbestos Tile
Walls:	Toilet Wainscot	Ceramic Tile
	Gypsum Wallboard	Paint
Ceilings:	Office Area	Acoustic Tile
	Gypsum Wallboard	Paint
	Exposed Structure	Paint

L. AIR CONDITIONING

Air conditioning will be provided for the addition to maintain a temperature of 75° F, plus or minus 2° in the Office, Control Room and Laboratory areas.

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The existing air conditioning system will be modified by installing additional heating capacity sufficient to satisfy all normal heating and outside air requirements for the entire Control Room.

The new air conditioning systems will be the chilled water type and have been selected, in lieu of the previously used direct expansion type, for reasons of greater efficiency, savings in cost, including savings in the cost of control systems, and savings in space, all of which are important factors in meeting the building program and cooling load requirements as outlined in SLAC criteria.

A summary of the air conditioning loads is as follows:

1) Cooling Load Supply:

New 30 ton chilled water unit plus the modified existing 15 ton DX unit = 560,000 BTUH, total.

2) Room Cooling Loads, including lights, conduction and outside air = 204,000 BTUH, total.

3) Maximum Allowable Cooling Load per Rack:

Cooling load supply less room cooling loads = 356,000 BTUH, or 585 watts per rack for the 180 single racks.

All chilled water for the new air conditioning systems will be supplied from one chiller unit, located on an exterior slab on grade adjacent to the existing exterior compressor unit.

Cooling for the Control Room will be supplied from a built-up air handling system with the fan located in the Mechanical Room. The fan will be supported on a steel frame resting on the depressed structural slab to achieve isolation from the adjacent floor systems. Air will be supplied to the computer floor plenum through ducts below the suspended laboratory floor. The air will pass up through the computer racks and

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discharge into the Control Room, and return to the air unit via a high-wall grille in the west wall of the Control Room. Manual dampers will be provided in this system to permit use of 100% outside air in the event of a chiller unit breakdown.

Air conditioning for the Offices will consist of three similar systems, one each for Offices with south exposure, Offices with east exposure, and Offices without exterior exposure. Electric heating coils will be provided for each of these systems. The air handling units and ductwork will be located above the suspended office area ceiling and the air to and from these units will be through ceiling registers and grilles located in a modular arrangement throughout the office area.

Air conditioning for the Laboratory will be a separate system, similar to that described above for the offices. The air handling unit will be located in the attic space directly above the Laboratory.

The existing exhaust system will be modified to serve the toilet-utility areas.

M. PLUMBING

Plumbing fixtures in the existing Women's toilet will remain unchanged. Those in the existing Men's toilet and Janitor space will be rearranged as previously described, and new fixtures added to match the existing units. The existing water and waste systems will be modified and extended accordingly.

N. ELECTRICAL

Electrical power for the addition will be distributed as indicated by the "Simplified Single-Line Diagram" included herewith on page 14, and supplied by connecting to the existing Control Center and Lighting Panel B located in the Power Supply Room.

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The existing 480/277 volt, 3 phase, 4 wire control center will be modified by additions to utilize the existing spare space.

The existing Lighting Panel B will be modified, subject to a detailed study under Title II work, by either of the following methods:

- 1) Utilize the existing blank breaker spaces by modifying to receive 6 new circuit breakers. This may require modification of the panel bus; or
- 2) Utilize the spare breaker space by adding sub-feed breakers to serve a new sub-panel, to which new outlet and lighting circuits would be connected.

The power required for the building addition will utilize all existing spare spaces in the Control Center and Lighting Panel B. Any other future additions requiring power for motors, power and convenience outlets or lighting will require additional power centers or panels.

Power to building equipment will be provided in accordance with project standards. Power for computer service and other power outlets will be included as determined by SLAC under Title II work.

Lighting for the Control Room will be incandescent type illumination, designed and arranged for 30 foot candles, all to match the existing Control Room lighting.

Lighting for Laboratory and Offices areas will be fluorescent type, at 50 foot candles.

All lighting will be controlled by local wall switches.

Convenience outlets for 120 volt, 20 ampere plug-in service will be provided at 10 foot centers throughout the Control Room, Laboratory and Office area.

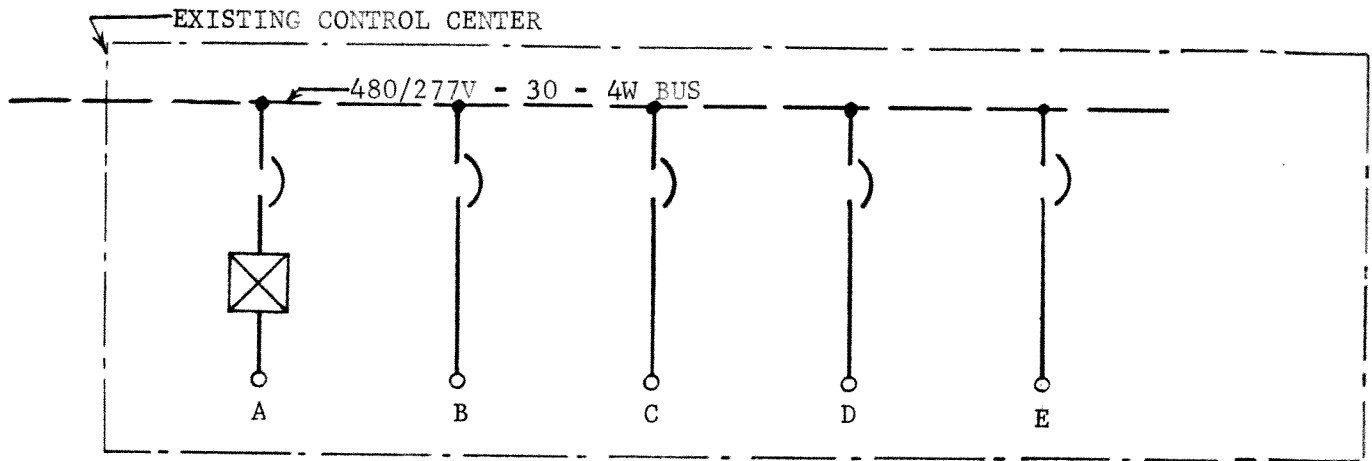
The existing grounding system will be extended into the addition in accordance with project standards.

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The existing fire alarm system will be extended into the addition. Detectors will be products of combustion type and placed in locations similar to the existing building.

Telephone outlets and conduit with pull wires will be included and located as determined by SLAC during Title II work.

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SIMPLIFIED SINGLE-LINE DIAGRAM

A CIRCUITS

- 1 - Chiller
- 1 - Air Conditioning

B CIRCUITS

- 5 - Duct heaters

C CIRCUIT

- 1 - Duct heater size change

D CIRCUIT

- 1 - 277 V Lighting

E CIRCUIT

- 480 V Receptacles as required

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IV. CONSTRUCTION PROCEDURES

A. GENERAL

The existing building will be occupied and in use during the construction of the addition. The discussion below outlines provisions necessary for the safety and security of the existing operations and continuity of service to the users, as well as providing for contractor operations. More specific details and schedules for these provisions will be developed during the Title II phase of the design work.

B. TEMPORARY WORK

Shortly after start of work, a temporary partition will be erected along the north side of the existing south row of building columns, will consist of wood framing, waterproof sheeting and plywood, and will be arranged to allow the contractor to execute the work with minimum interference to or from occupant activities. The exterior metal siding and stud wall will have to be removed at this time. The temporary partition will be offset at the westerly end and positioned to separate the existing Men's toilet area from other existing areas. This will leave the existing Women's toilet in use and accessible from the existing areas.

C. SHUT-DOWN OF UTILITIES

The toilet areas will be shut-down during two periods of construction; once at an early date when the outside water and sanitary services are modified and reconnected, and later when toilet room and other plumbing fixtures are installed and connected.

A portion of the existing electrical service may require a brief shut-down late in the construction period for tie-in of the new power, lighting and receptacle circuits.

D. CONSTRUCTION WORK AT EXISTING AREAS

As described elsewhere in this report, certain modifications to the existing steel framing must be made. To accomplish this, the contractor must have access to all existing column locations at about the time the new steel frame is erected. This work involves torch cutting and welding.

After erection of the steel frame and new metal roofing and siding, the east-west temporary partition will be removed. The easterly portion of the Power Supply Room will be exposed to contractor activities during erection of the new permanent partition along this line. Provision will be included to erect this partition from the Office Area side. However, access through the Power Supply Room will be required for erecting gypsum board, finishing and painting.

Electrical and fire-alarm tie-in work by the Contractor will require access to the panel area through the Power Supply Room.

E. DEMOLITION

To provide unobstructed access through the plenum below the existing and new computer floors, the top of the existing south foundation wall will be removed above the level of the structural slab under the existing computer floor. This will occur for entire east-west length of the computer floor area, except at the footing piers of the existing columns. This type of demolition work in close proximity of the computer area may cause considerable nuisance.

F. MODIFICATIONS TO SLAC INSTALLATIONS

Computer racks have been installed by SLAC in the existing Control Room, the north row of which form a separation between the existing Control Room and Power Supply Room. In this line of racks, grilles have been installed in the cabinets that, under conditions of the mechanical system as proposed under this report, would allow passage of air from the Control Room to the

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Power Supply Room. Therefore, as part of SLAC work, these grilles must be removed or blanked off and new openings provided such that air will pass from the computer floor plenum, through the rack cabinet, and out into the Control Room.

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V. SCHEDULE

Title I Preliminary Draft Submittal	6 October	1965	1078
Title I Preliminary Draft Review	18 October	1965	1086
Title I Report Submittal	25 October	1965	1091
Title I Report Review and Approval	5 November	1965	1100
Title II 50% Submittal	10 December	1965	1124
Title II 90% Submittal	29 December	1965	1136
Title II Review and Approval	11 January	1966	1144
Title II Revisions, Ready for Bid	24 January	1966	1153
Bid Opening	15 February	1966	1169
Notice to Proceed	15 March	1966	1188
Construction Complete	28 June	1966	1262

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VI. PRELIMINARY COST ESTIMATE

<u>ITEM</u>	<u>ITEM COST</u>	<u>TOTAL COST</u>
<u>Structure</u>		
Earthwork	\$ 700	
Concrete	7,000	
Structural Steel	10,000	
Miscellaneous Metal	5,200	
Metal Siding and Decking	4,500	
Sheet Metal & Louvers	800	
Roofing	1,800	
Doors & Frames	600	
Windows	2,300	
Carpentry & General Work	1,000	
Drywalls and Ceiling	4,400	
Flooring	1,400	
Computer Floor	11,000	
Painting	2,900	
Building Accessories	700	
Building Equipment	1,700	
		\$56,000
<u>Mechanical</u>		
Air Conditioning	\$25,500	\$25,500
Plumbing and Piping	4,000	4,000
		\$29,500
<u>Electrical</u>		
Lighting, Power & Fire Alarm System		\$11,000
		<u>\$96,500</u>
<u>TOTAL BUILDING ADDITION</u>		
		<u>\$96,500</u>
<u>A.C. Paving & Patch-Up Work</u>		\$ 3,000
<u>Modifications to Existing Structure</u>		
Structure Demolition & Removals	\$ 3,000	
Relocating Mechanical Equipment, Plumbing & Piping Work	3,500	
Electrical Revisions	1,000	
		\$ 7,500
<u>TOTAL, MODIFICATIONS</u>		
		\$ 7,500
<u>TOTAL COST OF DATA ASSEMBLY BUILDING ADDITION</u>		<u>\$107,000</u>

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VII. DRAWING LIST

Drawing Number	Date	Title
SK-505-165	30 Sept. 65	DATA ASSEMBLY BUILDING ADDITION Plans, Elevations & Sections

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