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PHYSICS BUILDING RENOVATION

PROJECT NO.: 950446

UNIVERSITY of CALIFORNIA RIVERSIDE

DETAILED PROJECT PROGRAM

APRIL 2003

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TABLE OF CONTENTS

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TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

1.1 PROJECT DESCRIPTION

The *UCR Physics Building* is an instructional and research facility of 55,559 ASF/94,808 OGSF that was constructed in 1965. The proposed Physics Building Renovation project will renovate 14,283 ASF within the Physics Building to provide additional modern laboratory and support facilities to support state-of-the art research and instructional programs for the *Department of Physics* and the *Institute of Geophysics and Planetary Physics* (IGPP). The renovations are deemed necessary to accommodate program growth within the departments of Physics and IGPP. Underutilized space will be transposed to achieve high efficiency and maximum utilization of the renovated space. Adjacencies will be created to foster synergies within research programs. To realize these goals, the scope of work will included (1) relocating the machine shop to the obsolete magnet lab, (2) creating research laboratories within the vacated machine shop space, (3) adding a mezzanine to the obsolete high bay Plasma Laboratory, thereby creating an additional 1,822 ASF of research and faculty support space.

The primary objectives of the Physics Building Renovation project are as follows:

- To replace existing outmoded and unsafe instructional and research space with new, state-of-the-art facilities.
- To create a generic, adaptable space that responds to changing technological and functional requirements for the *Department of Physics*, the *Institute of GeoPhysics and Planetary Physics* and other future uses as determined by the College of Natural and Agricultural Sciences.
- To encourage and support safe, high quality academic instructional and research programs.
- To provide a building which creates synergies between students and faculty and welcomes visitors.
- To delineate an integrated phasing plan for the renovation of the Physics Building.
- To reduce energy use and promote conservation in compliance with Title 24.

1.2 PLANNING PROCESS

The planning team met with a committee of representatives from the Department of Physics, the Institute for Geophysics and Planetary Physics, the Offices of Capital and Physical Planning, Design and Construction, the College of Natural and Agricultural Sciences (CNAS) Dean's Office to explore program requirements, site impacts, conceptual building organizations and improvements to the building interior.

The Detailed Project Program (DPP) has been developed as the initial step in the design process. It represents a comprehensive summary of programmatic information and a detailed description of departmental and campus requirements for the Physics Building Renovation project to date. The program is an assessment of the spatial and functional requirements for the group of individuals who will work within the building. In addition to delineating and

quantifying the spaces to be included in the building, the program is intended to reflect the goals and philosophies of those entities to be housed in the facility, the concepts for how those individuals will function in those spaces and to identify important issues that should be considered during the design of the building.

1.3 BUDGET AND SCHEDULE

A preliminary statement of cost for the project has been developed for the Physics Building Renovation project. The direct construction cost is estimated to be $2,605,000.00 excluding soft costs and escalation beyond February 2003.

The Detailed Project Program was completed in February of 2003. Construction of the project is expected to proceed in the 2005-2006 budget year.

2.1 BACKGROUND

University of California, Riverside (UCR)

The University of California, Riverside, is a 1,106-acre campus located three miles east of downtown Riverside in Southern California's rapidly growing "Inland Empire" region, once center of the citrus growing industry. Most academic activities occur within the 576-acre campus area east of the I-215/SR-60 freeway, with the remaining 530 acres west of the freeway used for agricultural research and support programs.

The campus has experienced significant growth over the past decade. Since the 1991-92 academic year, student enrollment at UCR has grown from a headcount of 8,620 to 13,239 in 2001-02 (a 54% increase). Current projections indicate a further major increase to 21,379 students by the year 2010-11.

The University of California, Riverside, consists of three colleges and two professional schools: the Anderson Graduate School of Management; the Graduate School of Education; the College of Natural and Agricultural Sciences; the College of Humanities, Arts, and Social Sciences; and the Bourns College of Engineering. The College of Natural and Agricultural Sciences (CNAS) comprised of 57 acres is situated on the east side of the campus. The CNAS precinct defines the eastern portion of the Carillon Mall and serves as the transition from the geometric, orthogonal campus grid to the organic foothills, arroyo flood control zone, and botanical gardens to the east.

CNAS

Many of the CNAS buildings are antiquated, ranging in age from 30 to more than 60 years, and are not suitable for twenty-first century science. The CNAS has its origins in the Citrus Experiment Station, which was established in 1906. The station moved to the Riverside campus site in 1918, where it achieved a reputation as a leading research institution in studies of citrus and subtropical horticulture. In 1948, the UCR campus was initially envisioned as a small liberal arts college adjacent to the Citrus Experiment Station. Classes began in 1955, and in 1959, UCR was declared a general campus of the University of California system. The campus developed rapidly to the north and west of the Citrus Experiment Station with the expansion and diversification of programs that followed in the 1960s. The College of Agriculture was established in 1960, and eventually through mergers with various disciplines became the present College of Natural and Agricultural Sciences in 1974. The CNAS is unique to the UC system in its integration of biological, agricultural and physical sciences within a single college.

The College of Natural and Agricultural Sciences is made up of thirteen departments and two organized research units. These units are as follows:

- Biochemistry
- Biology
- Botany and Plant Sciences
- Chemistry
- Earth Sciences

- Entomology
- Mathematics
- Nematology
- Cell Biology and Neurosciences
- Physics
- Plant Pathology
- Environmental Sciences
- Statistics
- Citrus Research Center - Agricultural Experiment Station
- Institute of Geophysics and Planetary Physics (IGPP)

Increases in enrollment and faculty have resulted in a campus-wide shortage of facilities. Enrollment growth in the college is expected to keep pace with the rapid growth projected for the campus as a whole.

2.2 THE PLANNING PROCESS

To address the rapid growth of the UCR campus, a Long Range Development Plan (LRDP) was completed in 1990 and adopted by the Regents of the University of California. The campus is currently updating the LDRP.

Long Range Development Plan

An LRDP is a comprehensive plan that guides the development of future facilities in the University of California system. The 1990 LRDP for the University of California, Riverside identified the physical development needed to achieve the academic goals of the campus through the year 2005-06 with a projected student population of 18,050. The LRDP is currently under revision, when complete it will reflect a projected student population of 25,000 by 2015.

An Environmental Impact Report (EIR) was also prepared. The LRDP EIR examines the environmental effects of the LRDP and, together, these two documents present a detailed account of past planning, existing conditions and land uses, the proposed land uses, and mitigation recommendations.

Master Space Plan/Precinct Plan

The LRDP defines a precinct as "the area within which all research, teaching, and office space for each college or school will be provided". In June 1995, two companion planning documents for the College of Natural and Agricultural Sciences were completed and adopted by the campus: the Master Space Plan and the Precinct Plan. These documents were "intended to provide the college with a framework for development, circulation and open space that satisfies projected space needs, supports the College's research and educational mission and contributes to the campus quality of life and environment".

During the preparation of the CNAS Master Space Plan, an evaluation of all structures within the College of Natural and Agricultural Sciences was undertaken. The consulting team that prepared the CNAS Master Space Plan visually examined the structures and reviewed previous reports compiled by consultants for UCR.

Planning and Design Guidelines

In addition to the documents described above, the building and site designs must be responsive to the campus standards. These design and planning guidelines are set forth in the following documents:

- Campus Design Guidelines (1996)
- Campus Landscape Master Plan (1996)

2.3 EVALUATION OF EXISTING CONDITIONS

In the 1995 *CNAS Master Space Plan*, an evaluation of the Physics Building existing conditions was performed. The following UC Corporate Equipment and Facilities System Building Condition Code was assigned to the building:

> Needs major updating without change of function, i.e., installation of new heating systems, lighting, floor tile, or other functionally related structural or mechanical building elements, or to comply with fire code.

During the preparation of the DPP for the Physics Renovation project, record drawings of the building and site were reviewed and an additional assessment was performed by visual observation. The following existing conditions were documented:

Architectural

GENERAL

The exterior of this three-story brick and concrete building is in good condition and may require only minor renovation. The main entry does not conform to the disabled accessibility codes and should be brought into conformance. The main entry's terrazzo flooring is in good condition, as is the 12" x 12" acoustical ceiling. These areas may require only minor refinishing. All other corridors are in fair condition but the Vinyl Asbestos Tile (VAT) flooring and the 12" x 12" acoustical tiles should be replaced. Most of the walls are in fair condition and will require minor repair and patching. All walls should be painted. This building has adequate floor-to-floor space and good overall service distribution. It can be remodeled for reuse to a limited extent.

MATERIALS AND FINISHES

Floor

Primary flooring materials are exposed concrete or vinyl asbestos tile (VAT). Since the VAT is an asbestos containing material, it must be removed to be in compliance with campus standards. New vinyl composition tile (VCT) can be installed in circulation areas, storage rooms and offices. In wet laboratories, corrosion resistant, seamless vinyl flooring would be preferable. In offices, classrooms, dry labs or less

intensive wet labs used for teaching, VCT would be an acceptable flooring material. Exposed concrete floors should be sealed.

Walls

There are several types of wall materials and finishes in the existing building. The materials and finishes include:

- Structural brick with plaster and paint.
- Exposed concrete
- Concrete with plaster finish and paint
- Steel studs with plaster finish
- Glazed ceramic tile

The existing walls are generally in good condition and will require only patching and repainting. New non-structural walls should be constructed of steel studs with gypsum board and a painted finish. Walls and wall finishes typically extend from the floor to the bottom of the floor deck or roof since the existing spaces have no ceilings. Asbestos containing material has been identified in wall plaster in the Machine Shop. The existing wall/floor base is a topset rubber base. Where new flooring replaces the existing VAT, the existing base should be removed and a new topset rubber base installed. If sheet vinyl is installed, a coved sheet vinyl base should be installed.

Ceilings

The existing spaces that are to be renovated as part of the Physics Renovation project have no ceilings and the structure is exposed as are the utility piping, mechanical ductwork, electrical conduit and light fixtures. In the Plasma Lab, paint on the ceiling is peeling which may indicate water penetration. In the Magnet Lab peeling paint on the ceiling was also observed as well as major cracks in the ceiling. Repair of this damage should be included in the renovation although the project scope and budget do not include replacement of the roofs. It would be preferable to maintain the exposed system in the laboratory and shop areas for accessibility and economy. The office areas will have suspended gypsum board or acoustical ceilings.

The existing corridor ceilings adjacent to the Shop and the Plasma Lab are acoustical tile mounted on a suspended plaster ceiling. Should the renovation require work in the adjacent corridors, these ceilings should be repaired.

Windows and Frames

The existing window system in the machine shop is a steel, center pivot, hinged hopper system. These windows should be permanently fixed in a closed position at the completion of the renovation to ensure that pressurization of the new labs can be maintained. The Plasma Lab has no windows. An existing roof hatch will be replaced to create a skylight . The Magnet Lab has small fixed steel sash windows which will not be altered.

Doors and Hardware

Existing corridor doors are typically solid core wood with a birch face veneer and natural stain and lacquer finish. The doors are in fair condition, and typically do not have a fire rating label as this was not a requirement at the time of construction. All doors onto corridors require a 20-minute fire rating label. Laboratories using chemicals in the building require a 1-hour fire rating label. All laboratories over 200 square feet require a second exit to meet code requirements. Existing door hardware consists of door knobs which are not in compliance with handicap accessibility requirements. In addition, most doors do not have the required 18-inch clearance between the wall and the strike surface. The doors, frames, and hardware sets will need to be replaced during the renovation.

Structural

The Physics Building was constructed in 1965 and is actually three buildings joined by a bridge.

SOUTH BUILDING

The South Building is a three-story bearing wall structure with steel and concrete gravity framing. The roof consists of metal deck that spans between steel beams and girders. The steel framing is supported by exterior bearing walls and interior steel columns. The second and third floors are typically concrete pan joists that span to the exterior bearing walls and to the interior concrete girders. The interior concrete girders span to concrete columns that are supported by spread footings. The typical foundation is a slab-on-grade with conventional, continuous wall footings. The lateral force resisting system for the South Building typically consists of concrete and masonry shear walls.

NORTH BUILDING

The North Building is a two-story bearing wall structure with steel and concrete gravity framing. The typical roof of the two-story portion of the North Building consists of metal deck that spans between steel beams and girders. The steel framing is supported by bearing walls and interior steel columns. The second level of the two-story portion and the roof of the one-story portion of the structure consist of concrete pan joists that are supported by bearing walls and interior concrete girders. The interior girders span between the bearing walls and steel columns that are supported by spread footings. The typical foundation is a slab-on-grade with conventional continuous wall footings. The lateral force resisting system for the North Building consists of multiple concrete and masonry shear walls in each direction.

CENTER BUILDING

The center building is a one-story reinforced masonry bearing wall structure. The roof is metal deck that is supported by steel beams. The steel beams bear on the masonry walls that are supported by conventional continuous wall footings. The lateral force resisting system consists of masonry shear walls. The foundation is a slab-on-grade with wall footings.

SEISMIC ASSESSMENT

Since 1978, the University of California has relied on a seismic hazard identification and prioritization methodology developed in cooperation with Degenkolb Engineers, as the basis for its seismic rehabilitation planning. The ratings assigned by Degenkolb are confirmed based upon additional studies. University buildings are given one of four ratings representing a range of potential life hazards: *Good, Fair, Poor,* or *Very Poor*. University policy requires that priority for rehabilitation be given to the *Poor* and *Very Poor* buildings.

The Primary Building Evaluation contained in the CNAS Master Space Plan gave the Physics Building a rating of "Very Poor" and recommended that the structure be remodeled. In 1997, Nabih Youssef and Associates Structural Engineers developed a plan to seismically upgrade the building. The seismic retrofit work recommended in the report has been completed. Recent changes in seismic codes require that additional mitigation work be undertaken.

The 1997 seismic mitigation work was designed based on the FEMA 178 standard. In January of 1998, a new standard, FEMA 310, was adopted. Because of the adoption of this new standard, Degenkolb Engineers was asked in November 2002 to reevaluate the Physics Building. The Physics Building was evaluated in accordance with the ASCE 31 requirements for life-safety performance. These evaluations were based on the original and upgrade drawings for each structure. The seismic impact from the proposed installation of a floor slab at the second floor level in the North Building was also evaluated.

The ASCE 31 document is a standard and the successor to the "prestandard" FEMA 310. FEMA 310 was developed in response to earthquake lessons learned in the 1990's and was the successor to FEMA 178. FEMA 310 included the "introduction of multiple performance levels, improved guidance for areas of moderate and low seismicity, and newly identified weak links in buildings." ASCE 31 slightly modified FEMA 310 and was adopted as a consensus document that represents the most current thinking of structural engineering practice. ASCE 31 represents the "state of the art" and should be considered the latest version of FEMA 310 and FEMA 178.

Because of the numerous different lateral force-resisting systems employed in the South Building and North Building, the structures may not be classified as a specific building type according to ASCE 31. Therefore, the general structural and supplemental checklists were completed to accurately evaluate the structures.

The Center Building located in the courtyard formed by the South and North Building is classified as Building Type 13, Reinforced Masonry Bearing Wall Buildings with Flexible Diaphragm.

Despite previous structural upgrades, deficiencies still exist that prevent the North and the South Building from being classified as either Life Safe or Fair per ASCE 31 or the UC Seismic Criteria, respectively.

Although mitigation was performed in the 1997 seismic upgrades, the South Building has a seismic deficiency associated with the discontinuous shear wall and the inadequate uplift strength in the columns supporting the wall and inadequate strength in the diaphragm to transfer the lateral loads from the wall. Also, the tension only rods installed on the third level appear to be ineffective and exhibit insufficient strength under the ASCE 31 design level seismic event. Finally, the flexible diaphragm in the South Building does not have sufficient lines or lateral resistance; however, the extent of mitigation required would be determined only after a field survey of the existing conditions.

The North Building has two seismic deficiencies associated with the fan pit south of grid line J. First, there does not appear to be an adequate load path to transfer the diaphragm lateral load through the fan pit to the existing masonry wall. And secondly, the diaphragm does not have chord elements where the edge of the diaphragm abuts the fan pit.

The proposed floor slab addition at the second level of the high bay lab in the North Building does not appear to introduce any structural deficiencies given the schematic options presented by Houghton & Partners Incorporated.

Mechanical

The project will renovate four areas in the Physics Building. Three areas are on the Ground Floor and the fourth area is on the First Floor. Existing and planned use of these areas are as follows:

SPACE	FLOOR	WING	EXISTING USE	PLANNED USE
1	Ground	South	Machine Shop	Laboratory
2	Ground	Center	Plasma Lab	Laboratory
3	Ground	North	Magnet Lab	Machine Shop
4	First	Center	OTB*	Offices

* Open to Space Below

Work Areas 1 and 2 are presently served by HVAC System S-2 located in Mechanical Room 17 on the Ground Floor. System S-2 is a 100% outdoor air, dual duct, constant volume system utilizing individual hot and cold duct automatic dampers (in lieu of

standard mixing boxes) in order to provide space temperature control for all rooms served. The HVAC requirements for the planned use (Laboratory) of Area 1 far exceed the capacity available for the existing Machine Shop. The Planned Use (Laboratory) of Area 2 is approximately equal to the existing capacity for this space (Plasma Lab). Since the existing S-2 system is a constant volume type, Areas 1 and 2 as presently configured cannot support variable air volume fume exhaust systems. The recently renovated central fume exhaust system for this building was designed to accommodate variable volume fume hoods. The HVAC System S-2 needs to be replaced with a variable volume type system in order to meet the planned use supply air capacity and variable volume fume exhaust requirements of these renovated areas.

Work Area 3 is presently served by HVAC System S-6 located in Mechanical Room 94 on the Ground Floor. System S-6 is a 100% outdoor air, multizone constant volume system utilizing automatic hot and cold duct zone dampers at the air handling unit. The HVAC requirements for the Planned Use (Machine Shop) of Area 3 is far exceeded by the Magnet Lab capacity. Fume hood exhaust in this Area is not an issue. System S-5 does not have to be replaced or changed to any great extent to meet the requirements of the Planned Use of this area.

Work Area 4, when renovated would not be served by any existing HVAC System. As previously described, adjacent areas are served by HVAC System S-2. System S-2 needs to be replaced and changed because of Areas 1 and 2. Therefore, the capacity and configuration of the new System S-2 can be such to accommodate the Planned Use of Area 4.

Plumbing

Work Area 1 requires the following piped services to be provided and has existing services of sufficient capacity as noted:

SERVICE	REQUIRED	EXISTING
Lab Vacuum	Yes	No (see note 1)
Lab Air, 15 psig	Yes	No (see note 1)
Compressed Air, 100 psig	Yes	Yes (see note 2)
Natural Gas	Yes	Yes (see note 2)
Cold Water	Yes	No (see note 3)
Hot Water	Yes	No (see note 3)
Industrial Cold Water	Yes	No (see note 1)
Industrial Hot Water	Yes	No (see note 1)
Process Cooling Supply	Yes	Yes (see note 2)
Process Cooling Return	Yes	Yes (see note 2)
Acid Waste and Vent	Yes	No (see note 4)
Sanitary Waste and Vent	No	Yes (see note 5)

Notes:

1. Service is not available in the existing space but is available in sufficient capacity from utility servicing existing laboratory space on south side of ground floor south wing corridor.

2. Service is available in existing space in sufficient capacity.

3. Service is not available in existing space but is available in sufficient capacity from utility servicing other portions of the building.

4. Service is not available in existing space but is available in sufficient capacity from utility servicing other portions of the building. Installation of new acid waste in this area will require saw cutting of existing floor.

5. Service is available but not required. Existing service must be capped off in this area.

Work Area 2 requires the following piped services to be provided and has existing services of sufficient capacity as noted:

SERVICE	REQUIRED	EXISTING
Lab Vacuum	Yes	Yes (see note 1)
Lab Air, 15 psig	Yes	Yes (see note 1)
Compressed Air, 100 psig	Yes	Yes (see note 1)
Natural Gas	Yes	Yes (see note 1)
Cold Water	Yes	No (see note 2)
Hot Water	Yes	No (see note 2)
Industrial Cold Water	Yes	Yes (see note 1)
Industrial Hot Water	Yes	Yes (see note 1)
Process Cooling Supply	Yes	Yes (see note 1)
Process Cooling Return	Yes	Yes (see note 1)
Acid Waste and Vent	Yes	Yes (see note 3)
Sanitary Waste and Vent	No	No

Notes:

1. Service is available in existing space in sufficient capacity.

2. Service is not available in existing space but is available in sufficient capacity from utility servicing other portions of the building.

3. Service is available in existing space but will require some saw cutting of existing floor.

4. Service is available but not required. Existing service must be capped off in this area.

Work Area 3 requires the following piped services to be provided and has existing services of sufficient capacity as noted:

SERVICE	REQUIRED	EXISTING
Lab Vacuum	Yes	Yes (see note 1)
Lab Air, 15 psig	No	Yes (see note 2)
Compressed Air, 100 psig	Yes	Yes (see note 1)
Natural Gas	Yes	Yes (see note 1)
Cold Water	Yes	No (see note 3)
Hot Water	No	No
Industrial Cold Water	Yes	Yes (see note 1)
Industrial Hot Water	Yes	Yes (see note 1)
Process Cooling Supply	Yes	Yes (see note 1)
Process Cooling Return	Yes	Yes (see note 1)
Acid Waste and Vent	No	Yes (see note 4)
Sanitary Waste and Vent	Yes	Yes (see note 5)

Notes:

1. Service is available in existing space in sufficient capacity.
2. Service is not available but not required and must be capped off.
3. Service is not available in existing space but is available in sufficient capacity from utility servicing other portions of the building.
4. Service is not required but can be used for sanitary waste and vent or capped off where not reused.
5. Service is required but not available. Can use existing acid waste and vent system but installation will require some saw cutting of floor.

Work Area 4 requires no piped utility systems and none exist in this area.

Fire Protection

Existing

The Physics Building does not have a hydraulically calculated automatic fire sprinkler system.

Electrical

ELECTRICAL DISTRIBUTION

Existing

A 4.16kV circuit in conduit runs in the utility tunnel to feed three transformers in the Physics Building. Two of the transformers are PCB type having capacities of 750 Kva and 300 Kva. The third transformer is dry type with a capacity of 500 Kva. Transformers provide 208Y/120V service to the building. The system is to be upgraded to 12 kV - 480Y/277V at some time in the future under a separate project. Existing service has the capacity to handle loads in Work Areas 1 through 4.

EMERGENCY POWER

Existing

The existing emergency power system consists of a 480V feed from a 150 Kva natural gas generator set. Loads in the Physics Building served by the existing system are the fire alarm system, and exit lighting system. The existing generator also serves the emergency power system for the Geology Building through a 100 amp transfer switch. There is insufficient capacity to adequately provide emergency power for the Physics and Geology Buildings when additional egress lighting and lab exhaust systems are added to the emergency power system.

FIRE ALARM SYSTEM

Existing

The existing fire alarm system is mainly comprised of non-coded manual pull stations and single station detectors. The Simplex 4020 fire alarm control panel (FACP) was installed recently and is in excellent condition.

LIGHTING SYSTEMS

Existing

The existing lighting system is retrofitted pendant, recessed, and surface mounted fluorescent fixtures. In selected areas, surface and pendant mounted incandescent fixtures were fitted with PL type fluorescent retrofit kits. Some pendant mounted egg crate fixtures are without reflectors to produce direct/indirect lighting. The configuration of existing lighting in labs may not provide the most efficient distribution of light for the new lab layout.

2.4 CNAS PROJECT GOALS AND OBJECTIVES

In the process of developing a comprehensive space plan that will permit the College to meet enrollment and research objectives through at least the 10-year planning horizon ending 2010-11, the following key planning goals and principals have been adopted:

1. Major renovation projects will facilitate multi-disciplinary uses, enabling the College to optimize allocations of space based on contemporary trends in teaching and research.

2. Planning standards for determining the amount of space required for various disciplines will be based upon an analysis of best practices for research and teaching requirements.

3. To the extent possible, allocation of space will permit departments of the College to utilize space to achieve greater operational efficiency for teaching, research, administration and support functions.

4. Major renovations will be designed to adapt to changes in program demands and research and teaching methodologies.

5. CNAS facilities must be designed to the highest standards of quality to attract and retain students and faculty, and obtain external sources of financial support, including private benefactors and community and business strategic alliances.

6. The planning process for projects will provide a baseline of data and a framework for future long-term development.

2.5 SPECIFIC PROJECT OBJECTIVES

During the development of the Detailed Project Program, specific design objectives were identified which represent opportunities and challenges for the final design of the renovation project. They are summarized as follows:

1. Organization should foster disciplinary interaction, even between laboratories which may be located on different floors.

2. Instructional laboratories should be separated from research laboratories in order to segregate traffic, building systems, and code related occupancies (where applicable).

3. Research laboratory floors should be designed to be efficient, flexible, and minimize unnecessary travel between support space, yet create accessible shared/reassignable support space.

4. A strong relationship between the laboratories and the faculty offices should be maintained.

5. Public entrances to the building should be easily identified from the exterior.

6. Spaces with greater public functions should be located on or near the ground floor.

7. Circulation patterns should be straightforward and clearly identified.

8. Vertical circulation should be easily found and convenient to use.

9. Corridors and doorways should be sized to accommodate movement of large pieces of equipment and should create an environment different from that of the labs. This may be accomplished through the use of light, color, and materials. In addition, lab entries should be grouped and recessed into the labs, creating secondary spaces within the corridors accentuating the entry experience.

10. Security requirements for the labs must be maintained, but interaction and movement through the building should be encouraged.

11. Casual interaction should be encouraged by including spaces which are inviting, and that are strategically located at natural meeting places within the plan.

12. Natural and artificial lighting should be carefully coordinated with the specific function of each space.

13. The building and laboratories should be adaptable to the changes in technology and science, through a modular laboratory design.

3 SITE LOCATION

3.1 SITE LOCATION

The site of the Physics Building is identified in the Precinct Plan for the College of Natural and Agricultural Sciences, and in the 1999 CNAS master planning efforts as the Earth and Environmental Sciences Development zone. With its companion document the CNAS Master Space Plan, the Precinct Plan outlines a masterplan for the phased, long-range development of academic programs and the facilities which will support them.

This section of the Detailed Project Program summarizes available information on existing conditions and future planning which will influence construction on the existing site. Its purpose is to identify the influences which may affect the program and design of the proposed Physics Building Renovation and to provide direction to the architectural design team in the final planning and design phases of the project.

3.2 CAMPUS PLANNING CONTEXT

The Precinct Plan for the College of Natural and Agricultural Sciences describes a pattern of buildings, circulation and open space to be developed as the college renovates and expands its space to accommodate projected growth to 2010-11 and beyond. The design concepts in the plan propose an extension from the existing campus system to the foothills on the east of buildings arranged to "define orthogonal malls" incorporating courtyards.

The CNAS Precinct Plan identifies the primary physical planning goals for the college. Goals for the precinct include:

General Planning Guidelines

- Development in a more dense, compact pattern to minimize walking distances, encourage interaction through siting of buildings and open space;
- Develop a more distinct and cohesive visual image which relates to the College's historic roots in the Citrus Experiment Station;
- Develop a hierarchy of pedestrian routes, open spaces and landmarks for orientation;
- Tie the precinct together;
- Provide safe, convenient access to all parts of the precinct;
- Preserve the natural hillside and drainages which define the outer edge of the precinct;
- Create a transition within the precinct from the natural landscape to the parklike landscape of the campus core.

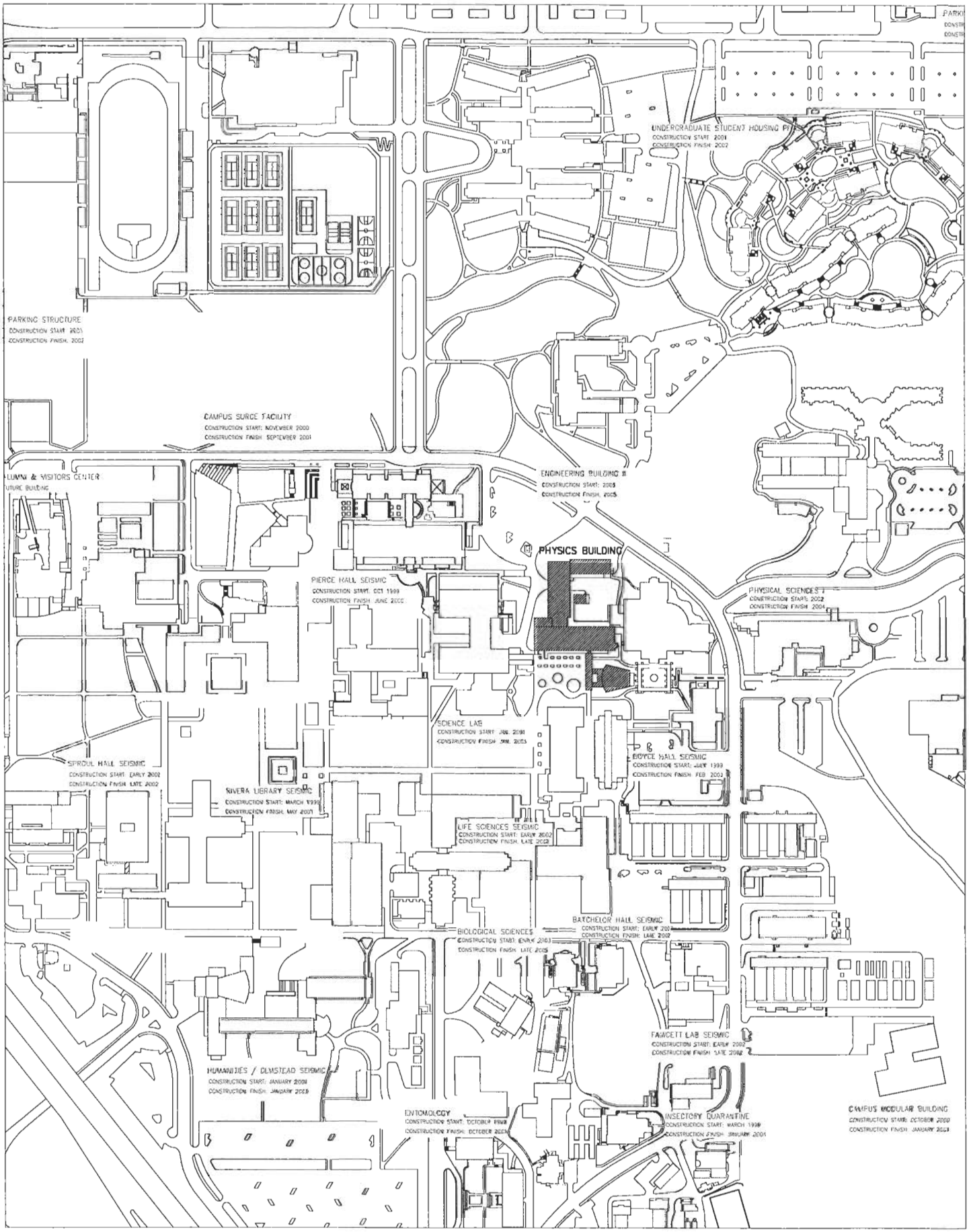
It is important that these general planning guidelines for the CNAS Precinct guide the planning of the Physics Building Renovation project.

Specific Planning Guidelines

The CNAS Precinct Plan also identified a more specific set of design concepts intended to serve as a framework for the physical development of the college. Those concepts which relate to the Physics Building Renovation are summarized as follows:

- Maintain and reinforce the existing orthogonal grid of buildings and malls.
- Strengthen the definition of campus malls/walks by siting walls and arcades along a consistent setback line to clearly delineate edges of malls.
- Continue to develop the network of small building related courtyards enclosed within development as a contrast to the large, campus-scale open spaces of the malls.
- Allow taller buildings and more dense development in the center of "blocks" between malls; step buildings up in height with increasing distance from malls and walks. Reduce heights in the southeastern foothills to maintain views between the campus and the hillsides.
- Develop a research zone surrounding the core, where sites for research units are interlaced with fingers of natural open space and or naturalized transition plantings.
- Extend malls, walks, passages and view corridors outward from the park-like landscape of the campus core to semi-natural landscapes within the precinct, such as Picnic Hill, and to the precinct perimeter beyond to connect with surrounding natural open spaces such as the Botanic Gardens, hills and arroyo system.
- Extend the system of "passages" connecting through buildings, arcades, and courtyards as a shady, enclosed alternative to the campus malls for circulation through the precinct.
- Landscape malls and walks as relatively linear corridors lined with walls, arcades and alleys of trees for shade.
- Landscape the meandering "passages" through courtyards and buildings with an informal, rich garden landscape.
- Identify small plazas to serve as focal points and centers of activity within each neighborhood.
- Include courtyards in buildings or groups of buildings wherever possible. Connect vertical circulation into courtyards to encourage chance meetings between users.

Implementation of the goals and objectives of the CNAS Precinct Plan will be essential to the successful completion of the Physics Building Renovation project and to the future development of the Earth Sciences/Environmental Sciences sub-precinct.


PARKING STRUCTURE
CONSTRUCTION START: 2001
CONSTRUCTION FINISH: 2002
CAMPUS SERVICE FACILITY
CONSTRUCTION START: NOVEMBER 2000
CONSTRUCTION FINISH: SEPTEMBER 2001
UNDERGRADUATE STUDENT HOUSING PH
CONSTRUCTION START: 2001
CONSTRUCTION FINISH: 2002
ENGINEERING BUILDING II
CONSTRUCTION START: 2003
CONSTRUCTION FINISH: 2005
PHYSICS BUILDING
PIERCE HALL SEISMIC
CONSTRUCTION START: OCT 1999
CONSTRUCTION FINISH: JUNE 2002
PHYSICAL SCIENCES
CONSTRUCTION START: 2002
CONSTRUCTION FINISH: 2004
SCIENCE LAB
CONSTRUCTION START: JAN. 2001
CONSTRUCTION FINISH: JAN. 2003
SPROUL HALL SEISMIC
CONSTRUCTION START: EARLY 2002
CONSTRUCTION FINISH: LATE 2002
RIVERA LIBRARY SEISMIC
CONSTRUCTION START: MARCH 1999
CONSTRUCTION FINISH: MAY 2001
BOYCE HALL SEISMIC
CONSTRUCTION START: JULY 1999
CONSTRUCTION FINISH: FEB 2002
LIFE SCIENCES SEISMIC
CONSTRUCTION START: EARLY 2002
CONSTRUCTION FINISH: LATE 2002
BIOLOGICAL SCIENCES
CONSTRUCTION START: EARLY 2003
CONSTRUCTION FINISH: LATE 2005
BATCHELOR HALL SEISMIC
CONSTRUCTION START: EARLY 2002
CONSTRUCTION FINISH: LATE 2002
FAWCETT LAB SEISMIC
CONSTRUCTION START: EARLY 2002
CONSTRUCTION FINISH: LATE 2002
HUMANITIES / OLMSTEAD SEISMIC
CONSTRUCTION START: JANUARY 2001
CONSTRUCTION FINISH: JANUARY 2003
ENTOMOLOGY
CONSTRUCTION START: OCTOBER 1998
CONSTRUCTION FINISH: OCTOBER 2002
INSECTORY QUARANTINE
CONSTRUCTION START: MARCH 1999
CONSTRUCTION FINISH: JANUARY 2001
CAMPUS MODULAR BUILDING
CONSTRUCTION START: OCTOBER 2000
CONSTRUCTION FINISH: JANUARY 2001

4 PROJECT SCOPE

4.1 DEPARTMENTAL NEEDS

Currently the Physics Department and the Institute for Geophysics and Planetary Physics (IGPP) are faced with a serious condition brought about by a critical short fall in the availability of suitable space. Over the next three years, the Physics Building must address the demands for space in the following three areas:

- ***Teaching space*** - based on the latest campus prospectus for enrollment growth in the Physics service courses to accommodate the growth in the Bourns College of Engineering (BCOE), Physical Sciences, and Life Sciences will necessitate adding additional class labs.

- ***Research lab space*** - several new experimental faculty are currently being recruited in the areas of Condensed Matter Physics, High Energy Physics, Nanophysics, Astrophysics, etc. Currently the college is unable to address the space needs for these appointments.

- ***Machine Shop Consolidation*** - currently both the departments of Chemistry and Physics maintain machine shops in their respective buildings (i.e. Pierce Hall and Physics buildings). Chemistry will vacate its current building in 2005 when the department moves to the new Physical Sciences building. Subsequently, at such time the College plans to merge both shops into one modern facility housed in the Physics building. This decision is predicated on the proximity to the new Physical Sciences Building.

Subsequent to an analysis of current and future program requirements, a number of physical changes are necessary to improve the utilization of the Physics building. These changes, once executed, will alleviate a portion of the immediate program pressure for this building.

4.2 SCOPE OF WORK

The Physics Building Renovation project will include the following scope of work:

- Infill of the existing two story Plasma lab #1117 (1,822 a.s.f.). The infill provides for a net addition of 1,822 a.s.f. of dry research/teaching space.

- Refurbishing the magnet lab #1153, 1155, 1155A, 1155B, 1155C, and 1156 (5,798 a.s.f.) to facilitate the consolidation of both Chemistry and Physics shops.

- Physics Machine shop retrofit - #1028, 1028A, 1028C, 1052, 1060, and 1060A (4,337 a.s.f.) into new research labs.

In summary, the scope of the renovation comprises 14,263 a.s.f., thus generating 1,822 a.s.f. of new research and teaching space. Diagrams and drawings included in this section of the DPP illustrate the scope of the Physics Building Renovation project.

Architectural

PROJECT AREAS OF WORK

Plasma Lab

Ground Floor

Remove all abandoned/obsolete equipment and furnishings. Reconfigure the space for new research labs, including benches, casework, and fumehoods as per the enclosed Room Design Criteria and drawings. New structural steel to support the upper floor should be fire-proofed to meet code requirements using drywall encapsulation or Tenemec paint. The underside of the metal deck should be left exposed with finish paint.

First Floor

Remove all abandoned/obsolete equipment and items in the high-bay space including the steel catwalk. Install a new steel structure, metal deck and concrete slab to support the upper level. The new area should be configured to accommodate offices as per the enclosed Room Design Criteria and drawings. The existing 12' X 20' roof hatch should be removed and a new skylight installed over the opening.

Magnet Lab

After the space is vacated, all existing equipment and furnishings should be removed and all non structural walls should be demolished. The remaining shell space should be reconfigured to accommodate the equipment from the existing Physics and Chemistry machine shops as per the enclosed Room Design Criteria and drawings. The overhead crane in the Physics Machine Shop should also be relocated.

Machine Shop

After the space is vacated, all remaining equipment and furnishings should be relocated or removed. The space should be reconfigured to accommodate six (6) research labs as per the enclosed Room Design Criteria and drawings.

Structural

In order to bring both the South and North Buildings up to an ASCE 31 Life Safe classification, it is recommended that the following deficiencies be mitigated. To accomplish this, new elements and the upgrading of existing elements would be required. A summary for each building is included below.

SOUTH BUILDING

To mitigate the shear wall discontinuities on the east side of the South Building, additional strengthening of the concrete columns that support these walls is recommended.

Strengthening could be achieved through concrete encasement of the three columns located on grid line 13 with sufficient dowels into the existing footing. Additionally, a new full height concrete shear wall located near the center of the structure on gridline 8 would greatly reduce the demand on the discontinuous shear wall on gridline 13. By reducing the demand on line 13 and thus reducing the uplift forces on the columns supporting the walls on line 13, the extent of work associated with the columns may be reduced. Additionally, reducing the demands on line 13 by installing a new shear wall on line 8 will reduce the force that needs to be transferred through the diaphragm between lines 13 and 14. Strengthening of the diaphragm would then appear to not be required. Finally, by constructing the new shear wall in the north-south direction where the tension only rod bracing is located on gridline 8, the deficiencies associated with the bracing could be resolved.

A field survey of the small portion of the South Building that provides access between the North and South Buildings is required to verify if mitigation of the diaphragm is necessary. The field survey would include an investigation of the diaphragm chords. If the diaphragm chords are found deficient, either the chords would have to be strengthened or a new concrete shear wall would have to be installed along line E.

NORTH BUILDING

To mitigate the diaphragm deficiencies associated with the large fan pit located south of grid line J, a new chord element along the western edge of the fan pit should be installed. Additionally, bracing along the western edge of the diaphragm is needed to transfer the lateral loads to the masonry wall located on line 16.

CENTER BUILDING

No mitigation is recommended for the Center Building.

Electrical

SUMMARY

- Demolish and replace all Work Area 1 through 3 panelboards. Provide a new panelboard for Work Area 4.
- Replace all lighting with high efficiency fluorescent lighting Work Areas 1 through 3. Provide lighting with high efficiency fluorescent lighting in Work Area 4.
- Provide emergency power and fire alarm system extensions as described below.

ELECTRICAL DISTRIBUTION

- Provide secondary conduit and cabling from existing switchboard to new panelboards

feeding Work Areas 1 through 4.

EMERGENCY POWER

- Disconnect and remove the existing emergency power system.
- A dedicated emergency generator, transfer switch, and switchboard to distribute power to all life safety and other critical loads in Geology will be provided for that facility. Therefore, the existing Physics Building generator will be sufficient in capacity to handle the fire alarm system, exit and egress lighting system, lab exhaust system (running at reduced speed), and other critical receptacle loads in this facility.

FIRE ALARM SYSTEM

Provide a fire alarm system in Work Areas 1 through 4 compatible with the existing Simplex 4020 fire alarm control panel (FACP). The fire alarm system must comply with NFPA and ADA requirements and consist of manual pull stations, combination audio/visual alarms, strobes, and single station detectors. Provide heat detectors, smoke detectors and duct detectors as necessary. Device location will be coordinated with the University's Fire Marshal. Install all fire alarm wiring in conduit.

LIGHTING SYSTEMS

- Disconnect and remove all lighting in Work Areas 1, 2 and 3. Provide an energy efficient lighting system for all four work areas in compliance with California Title 24.
- Provide UL-listed, energy-efficient fluorescent type lighting fixtures. Equip fluorescent fixtures with T-8 lamps and electronic ballasts. For all spaces exceeding 100 square feet, provide bi-level switching. Offices and other appropriate areas will include occupancy sensor switching. Task oriented lighting will be provided for under counter applications, and dimming systems as determined by the architect.
- Emergency lighting will consist of unswitched general lighting fixtures for egress illumination, and exit sign lighting connected to the standby power system. Egress lighting will include an adequate number of fixtures to provide one foot-candle of illumination along the path of egress, including access and discharge to egress.
- Exit signs shall be an edge-lit red, ceiling mount, recessed, housing with arrows as required, powered by long life light emitting diodes (LEDs).
- Proposed Light Fixture Schedule

AREA SERVED	FIXTURE DESCRIPTION
• Machine Room • Offices • Laboratory/general • Laboratory/bench task • Exit Sign Lighting	Open reflector fluorescent surface or pendant Parabolic reflector fluorescent recessed Direct/Indirect fluorescent Lensed fluorescent individually switched LED Type Exit Sign

- See appendix for detailed Electrical Basis of Design.

Mechanical

SUMMARY

- Summer-Winter air conditioning shall be provided for each renovated area.
- Renovated Areas 1, 2, and 4 shall be served by a new System S-2. This new system shall consist of a variable volume air handling unit consisting of new fan, chilled water coil, heating coil, filters, and variable frequency drive. Areas 1 and 2 air distribution systems shall be changed to remove the hot and cold ducts serving these areas and replaced with new supply air ducts with venturi type, variable air volume terminal devices with reheat coils for each room served. A variable volume air exhaust system utilizing venturi type devices shall be added for Areas 1 and 2 for fume hood and general room exhaust. New exhaust systems shall be connected to the recently installed variable volume central fume exhaust system. Existing heating hot water piping system shall be extended to serve the new reheat coils. Area 4 shall be provided with a new dual duct air temperature zone. All other areas presently served by System S-2 shall be retrofitted by removing the existing automatic control dampers in the hot and cold ducts serving each zone and replacing them with new variable air volume type, mixing boxes. A new Direct Digital Control System shall be installed for the new S-2 System and shall be tied to the existing campus wide control system network.
- Renovated Area 3 shall be served by existing System S-6, which shall require no physical modifications. The air distribution system shall require rebalancing to accommodate the reduced capacity requirements of Area 3.

ENVIRONMENTAL DESIGN CONDITIONS

- The following criteria will be used for sizing the systems:
  - Outdoor Ambient Design Conditions:
  - Summer (mean 1%): 115°F dB, 74°F mwB

Winter (99%): 30°F dB

- Note: Weather data is based on input from UCR Physical Plant.

VENTILATION AIR REQUIREMENTS

- Outdoor air for ventilation will be based on the American Society of Heating Ventilation and Air Conditioning Engineers (ASHRAE) Standard 62-1989, Ventilation for Acceptable Indoor Air Quality. Prior to completion of the project, the outdoor air quantities will be measured and balanced to meet the design requirements.

- Outside air will be provided from new air handling unit with 30% prefilters and 95% efficient final filters.

ENERGY USE AND CONSERVATION

- The Energy Efficiency Standard, Title 24, will be used to set the minimum performance requirements of this installation.

CONTROLS

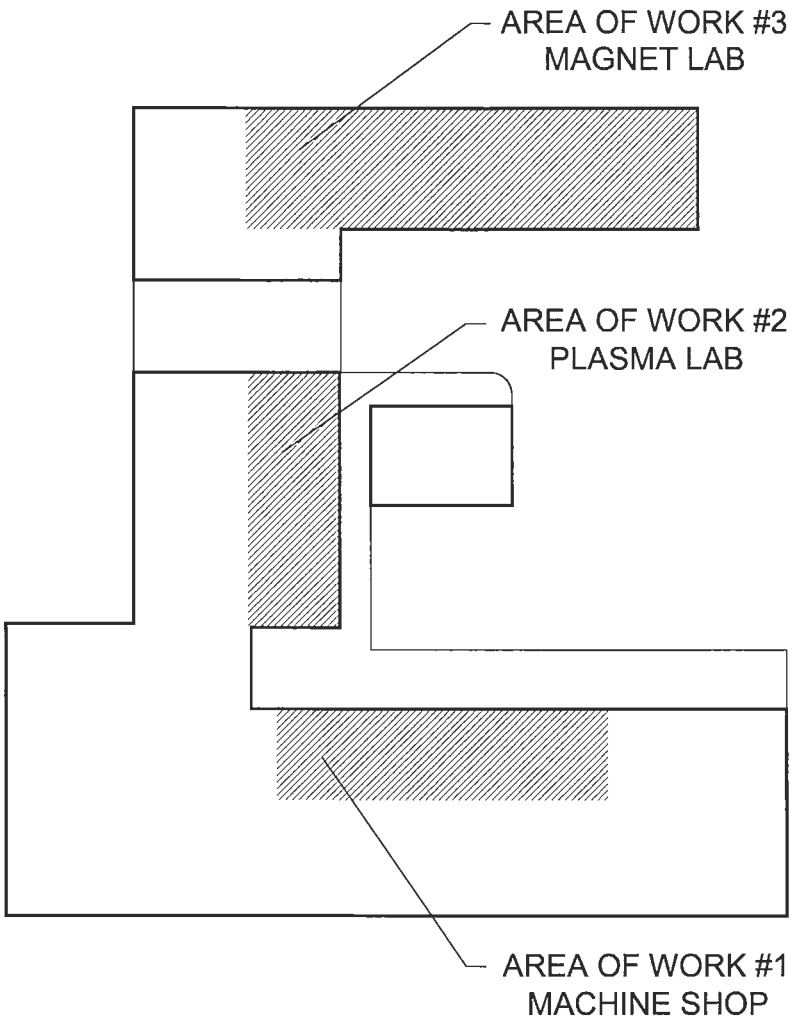
- An electronic direct digital control (DDC) system shall incorporate stand alone, remote control of the central plant building.

- The controls will automatically operate the HVAC system and provide the necessary change-over commands for the occupied and non-occupied temperature and ventilation schedules. The system shall provide the necessary monitoring, alarm, and bypass for efficient energy management.

- See appendix for detailed Mechanical Basis of Design.

Plumbing

- See appendix for detailed Plumbing Basis of Design.

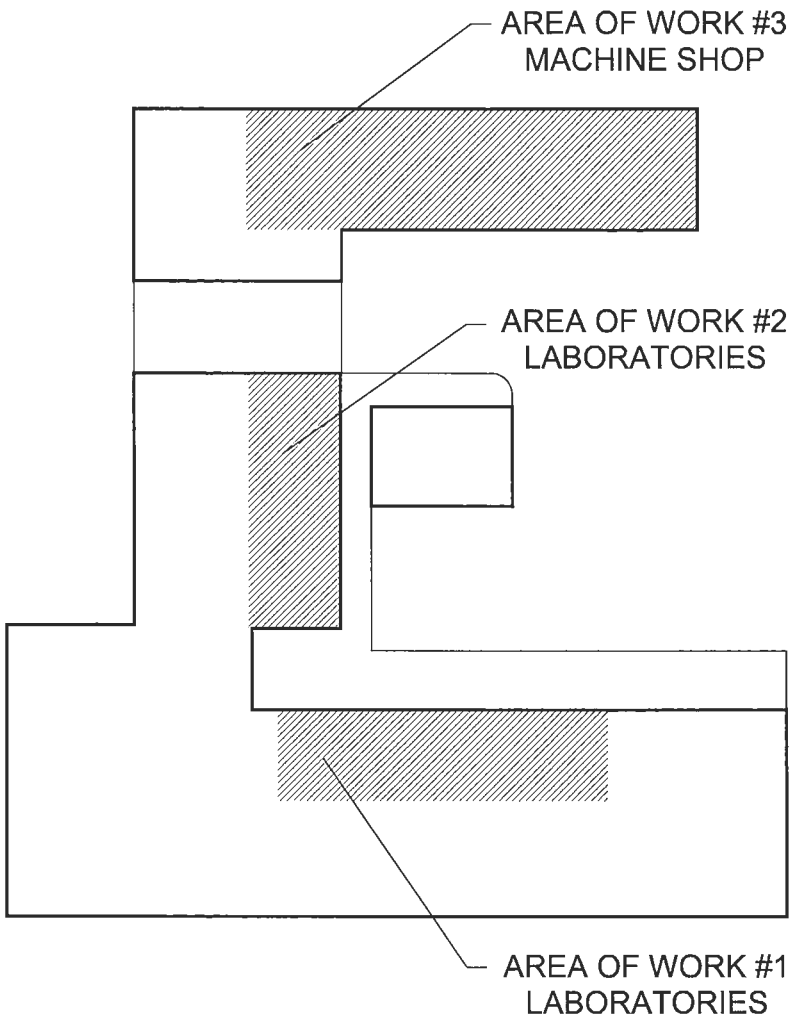


KEY PLAN - EXISTING

NOT TO SCALE

NORTH

PHYSICS BUILDING GROUND FLOOR



KEY PLAN - PROPOSED

NOT TO SCALE

NORTH

PHYSICS BUILDING GROUND FLOOR

ROOM DESIGN CRITERIA CHECKLIST

jlp

UCR PHYSICS/GEOLOGY BUILDINGS RENOVATION

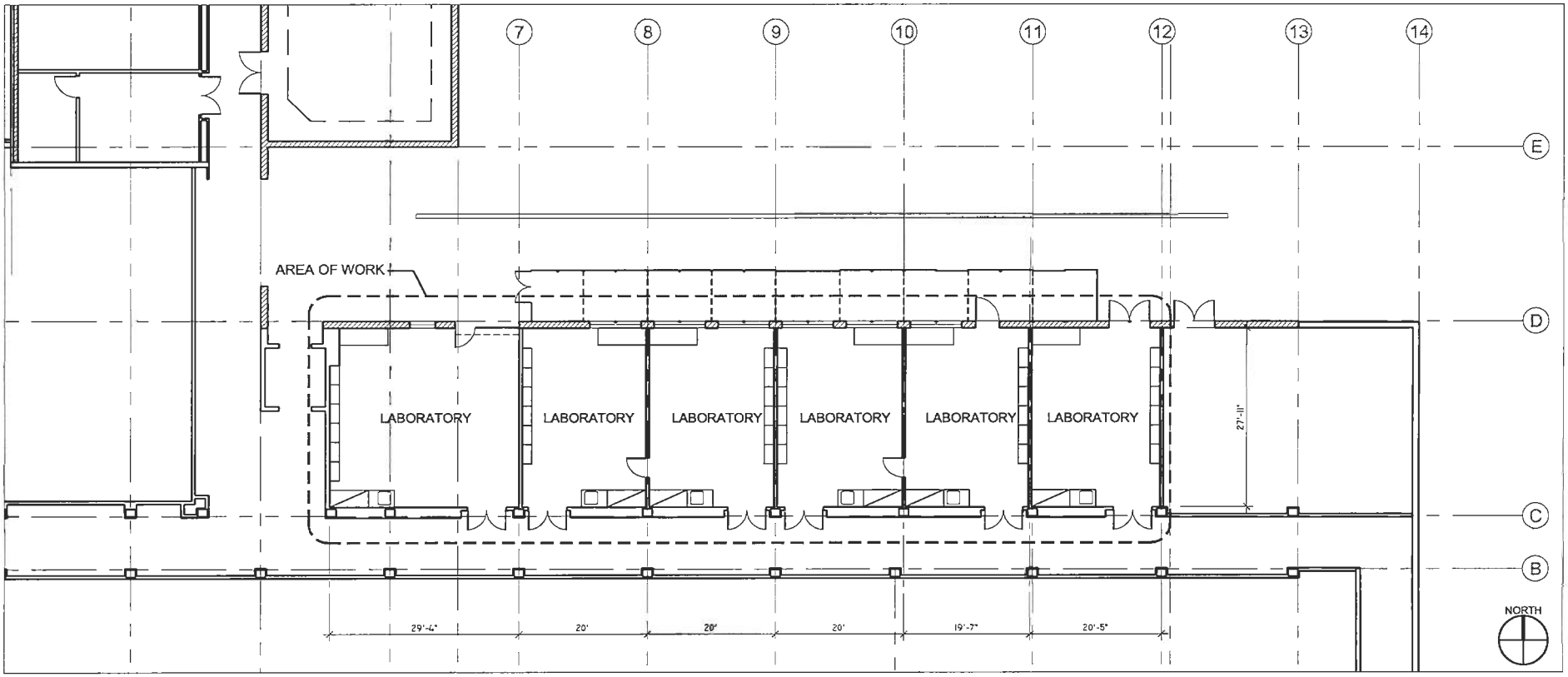
UCR No. 950446/JLP No. 02-02.1

ROOM NAME	PHYSICS RESEARCH LABORATORY (GENERIC)
ROOM NUMBER	TBD
ASSIGNABLE AREA	500 ASF
PLANNED USE	PHYSICS RESEARCH

UTILIZATION	
occupied hours/day	
operation hours/day	24
MECHANICAL	
temperature (70°F-73°F ± 2°F)	X
humidity ambient	
humidity controlled	
min. air changes/hour	6
positive air pressure	
negative air pressure	X
100% exhaust	X
return air	
HEPA filter supply	
HEPA filter Exhaust air	
EXHAUST/CLEAN AIR EQUIPMENT	
chemical fume hood	6'-0"/ 1000 ASF
radioisotope fume hood	
canopy hood	
snorkel exhaust	
laminar flow hood	
exhaust manifold connection	
biological safety cabinet	
low slotted exhaust	
PLUMBING/PIPING	
lab vacuum - VAC	X
lab air, 15 psig - LA	X
compressed air, 100 psig - A	X
lab gas - LG	X
carbon dioxide - C02	
cylinder gas, inert	X
cylinder gas, toxic/flammable	X
potable water - CW, HW	X
industrial water - ICW, IHW	X
deionized water - DI	
steam, condensate - MPS, CD	
cooling water - CWS/R	X
safety shower/eyewash - SS	X
drench hose - DH	
floor drain - FD	X
floor sink - FS	X
ELECTRICAL	
120V, 20A, 1 phase	X
208V, 30A, 1 phase	X
208V, 30A, 3 phase	X
480V, 3 phase	X
isolated ground outlet	X
dedicated circuit	TBD
standby emergency pwr tele otlt	TBD
LAN/WAN outlet	TBD
inuse light	TBD
lighting level (fc)	50-75
darkenable	

EQUIPMENT	
vibration sensitive	X
light sensitive	
vibration producing	
heat producing	X
noise producing	X
GROUP 1 EQUIPMENT	
autoclave	
glassware washer	
glassware dryer	
GROUP 2 EQUIPMENT	
HAZARDOUS STORAGE	
flammables	X
corrosives	X
toxics	
carcinogens	
radioisotopes	
explosives	
unstable materials	
water reactive materials	
chemical waste	
radioisotope waste	
biological waste	
FIXED/LABORATORY MATERIALS	
wood casework	TBD
metal casework	TBD
stainless steel casework	
plastic laminate casework	
epoxy resin tops	TBD
stainless steel tops	
plastic laminate tops	
epoxy resin sinks	
stainless steel sinks	TBD
SECURITY	
pushbutton combination lock	
swipe card lock	X
INTERIORS	
FLOOR	
vinyl composition tile	
welded sheet vinyl	X
resinous, troweled	
concrete, paint/seal	
carpet	
ceramic tile	
other	
BASE	
integral with floor	X
resilient	
other	

PARTITIONS	
gypsum board, paint	X
gypsum board, epoxy	
gypsum board, wall cover	
CMU, paint	
ceramic tile	
other	
acoustical insulation	
wall protection	
CEILING	
ceiling height	
suspended acoustical panel	
vinyl-faced panel	
gypsum board, paint	
gypsum board, epoxy	
exposed	X
DOORS	
3'-6" x 7'-0"	
3'-0" x 7'-0"	double
1'-6" x 7'-0"	
other	
light-tight rotating door	
vision panel	
gasketing	
natural daylight	
natural daylight	
view windows to:	
FURNISHINGS	
COMMUNICATIONS	
dual channel raceway	X
SPECIAL NEEDS	
moveable partitions	X

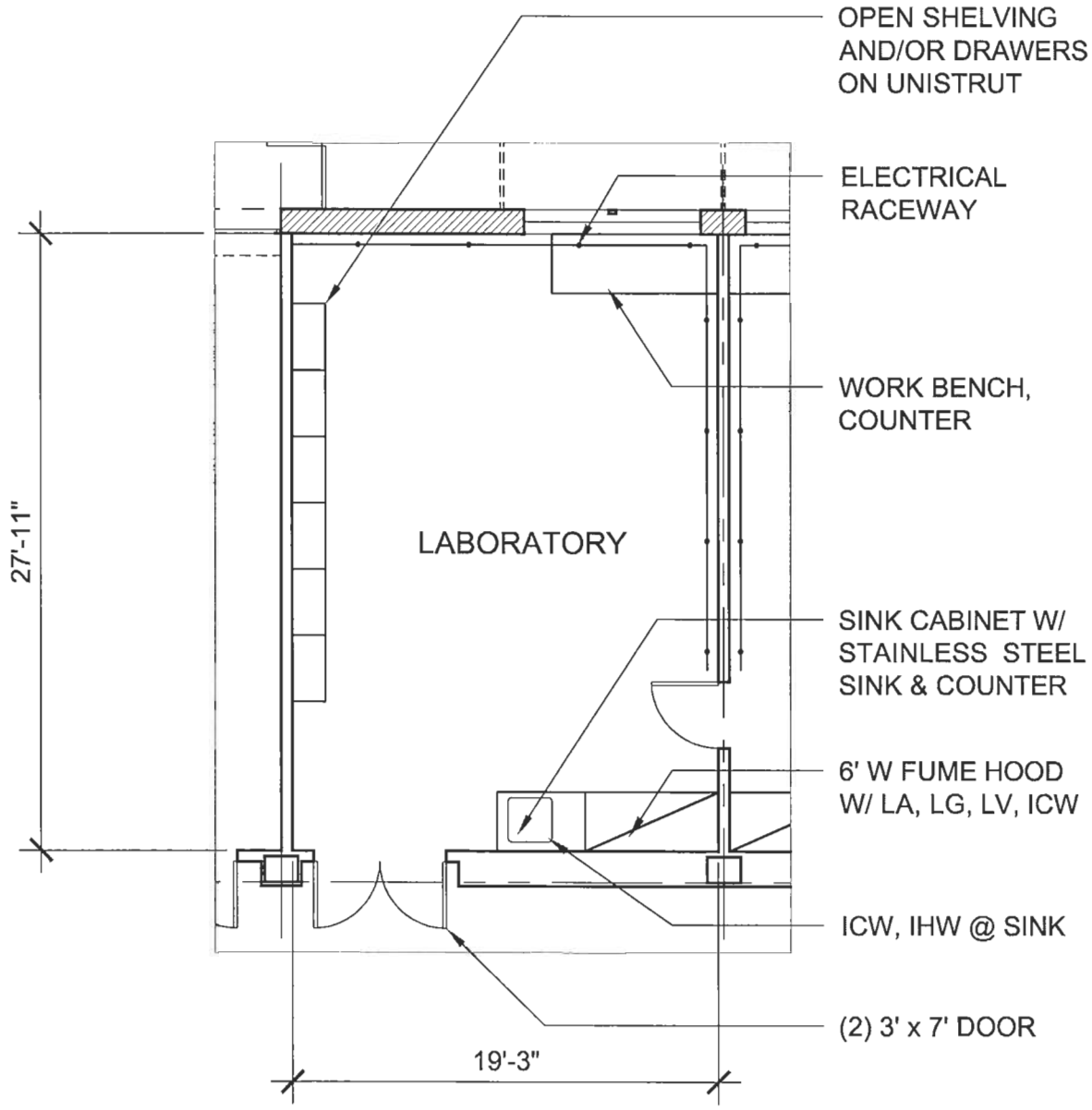


GROUND FLOOR PLAN - AREA OF WORK #1
PHYSICS BUILDING

0' 2' 5' 10' 20'

JLP ARCHITECTS, INC
ARCHITECTS PLANNERS CONSULTANTS

JANUARY 29, 2003

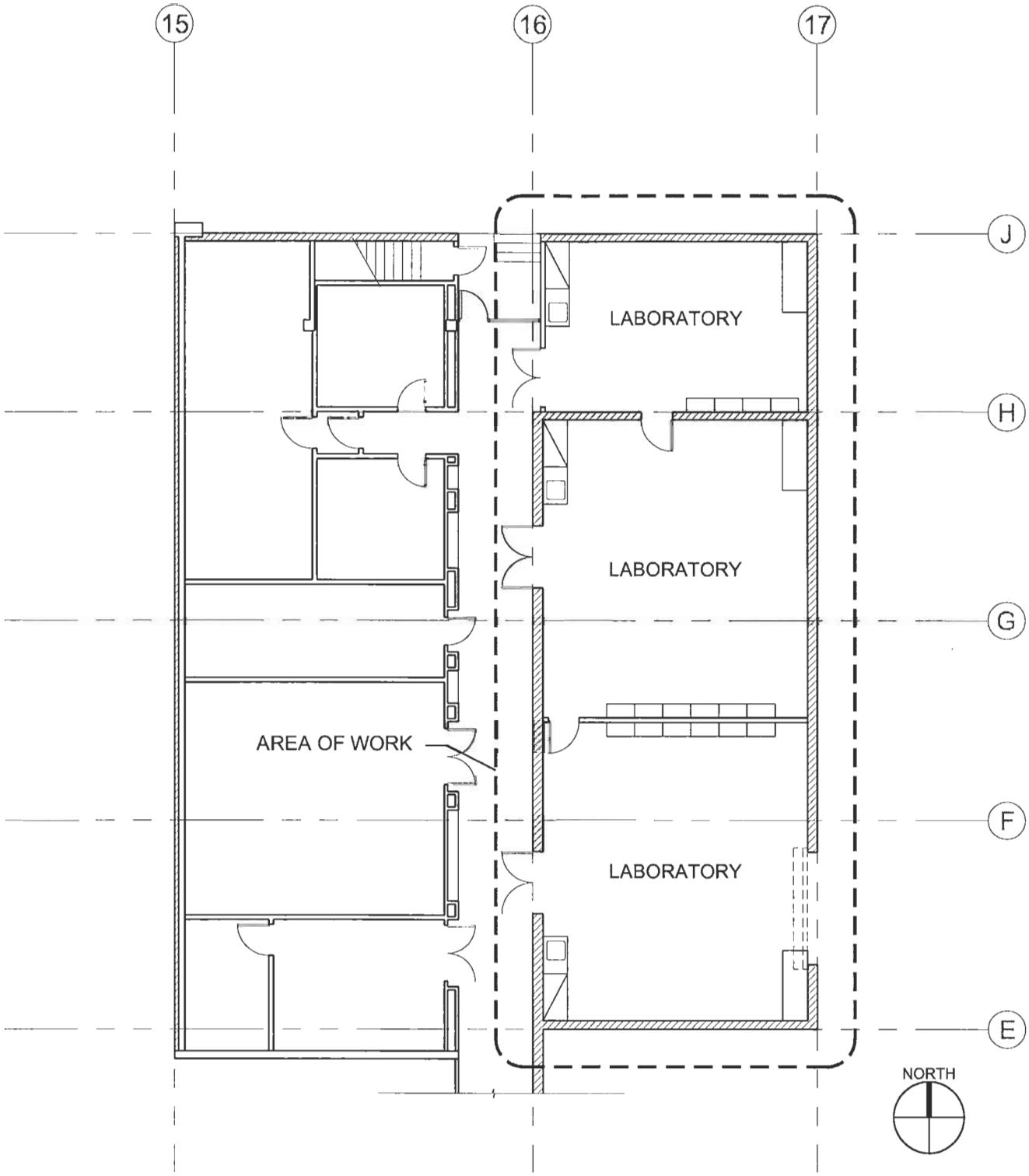


RESEARCH LABORATORY (GENERIC)
PHYSICS BUILDING

SCALE: 1/8" = 1'-0"

JLP ARCHITECTS, INC
ARCHITECTS PLANNERS CONSULTANTS

FEBRUARY 25, 2003

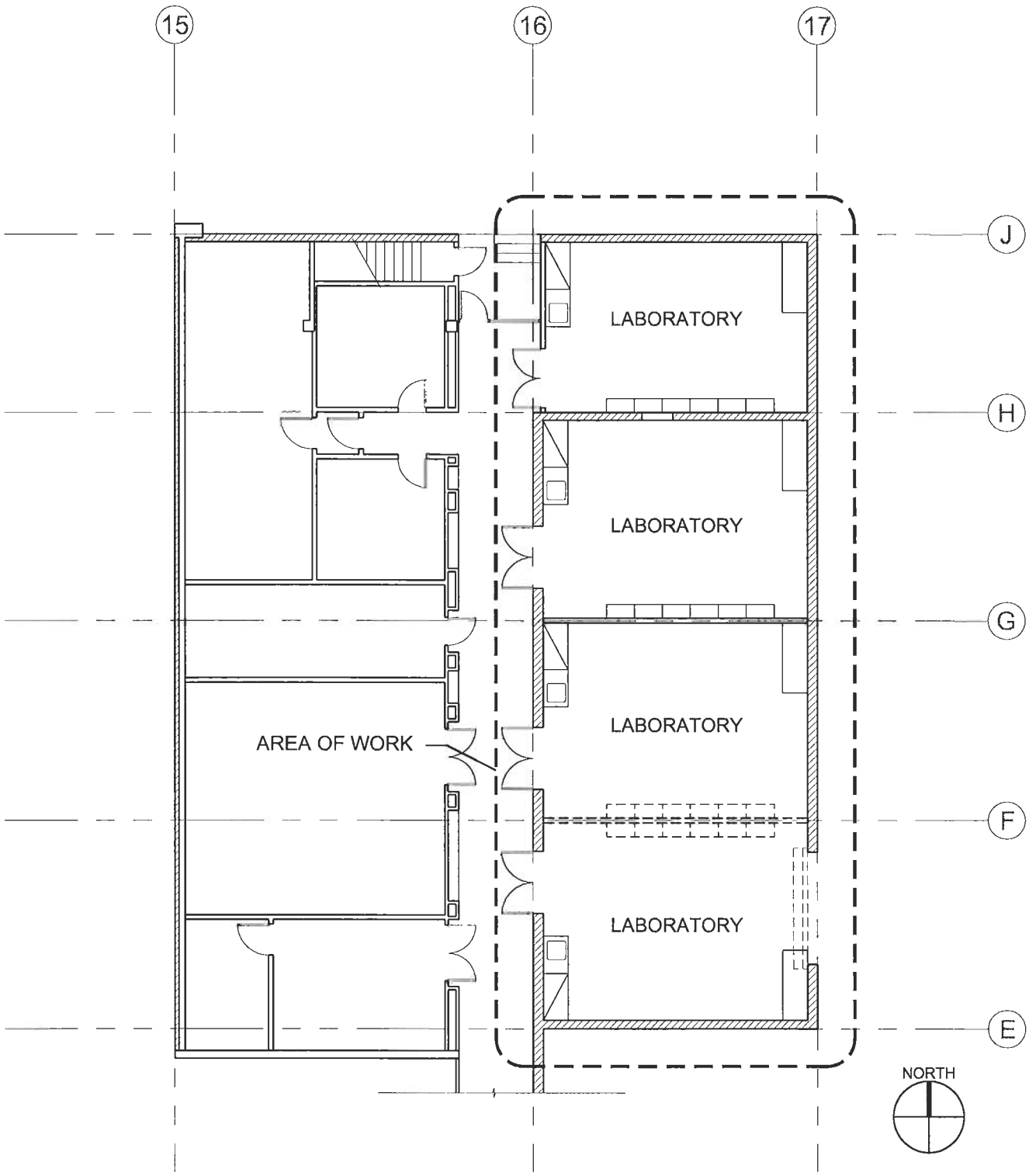


GROUND FLOOR - AREA OF WORK #2, SCHEME A
PHYSICS BUILDING

SCALE: 1/16" = 1'-0"

JLP ARCHITECTS, INC
ARCHITECTS PLANNERS CONSULTANTS

JANUARY 8, 2003



GROUND FLOOR - AREA OF WORK #2, SCHEME B
PHYSICS BUILDING

SCALE: 1/16" = 1'-0"

JLP ARCHITECTS, INC
ARCHITECTS PLANNERS CONSULTANTS

DECEMBER 18, 2002

ROOM DESIGN CRITERIA CHECKLIST

jlp

UCR PHYSICS/GEOLOGY BUILDINGS RENOVATION

UCR No. 950446/JLP No. 02-02.1

ROOM NAME	MACHINE SHOP
ROOM NUMBER	TBD
ASSIGNABLE AREA	5,798 ASF
PLANNED USE	SHOP

UTILIZATION

occupied hours/day	12
operation hours/day	12

MECHANICAL

temperature (70°F-73°F ± 2°F)	X
humidity ambient	X
humidity controlled	
min. air changes/hour	6
positive air pressure	
negative air pressure	
100% exhaust	
return air	
HEPA filter supply	
HEPA filter Exhaust air	

EXHAUST/CLEAN AIR EQUIPMENT

chemical fume hood	
radioisotope fume hood	
canopy hood	
snorkel exhaust	
laminar flow hood	
exhaust manifold connection	
biological safety cabinet	
low slotted exhaust	

PLUMBING/PIPING

lab vacuum - VAC	X
lab air, 15 psig - LA	
compressed air, 100 psig - A	X
lab gas - LG	
carbon dioxide - C02	
cylinder gas, inert	
cylinder gas, toxic/flammable	X
potable water - CW, HW	
industrial water - ICW, IHW	X
deionized water - DI	
steam, condensate - MPS, CD	
cooling water - CWS/R	
safety shower/eyewash - SS	X
drench hose - DH	
floor drain - FD	X
floor sink - FS	

ELECTRICAL

120V, 20A, 1 phase	X
208V, 30A, 1 phase	X
208V, 30A, 3 phase	X
480V, 3 phase	X
isolated ground outlet	X
dedicated circuit	TBD
standby emergency pwr tele otlt	TBD
LAN/WAN outlet	TBD
inuse light	
lighting level (fc)	50-75
darkenable	

EQUIPMENT

vibration sensitive	
light sensitive	
vibration producing	X
heat producing	X
noise producing	X
GROUP 1 EQUIPMENT	
autoclave	
glassware washer	
glassware dryer	
GROUP 2 EQUIPMENT	

HAZARDOUS STORAGE

flammables	X
corrosives	X
toxics	X
carcinogens	
radioisotopes	
explosives	
unstable materials	
water reactive materials	
chemical waste	
radioisotope waste	
biological waste	

FIXED/LABORATORY MATERIALS

wood casework	
metal casework	
stainless steel casework	
plastic laminate casework	
epoxy resin tops	
stainless steel tops	
plastic laminate tops	
epoxy resin sinks	
stainless steel sinks	

SECURITY

pushbutton combination lock	
swipe card lock	X

INTERIORS

FLOOR	
vinyl composition tile	
welded sheet vinyl	
resinous, troweled	
concrete, paint/seal	X
carpet	
ceramic tile	
other	
BASE	
integral with floor	
resilient	
other	

PARTITIONS

gypsum board, paint	X
gypsum board, epoxy	
gypsum board, wall cover	
CMU, paint	
ceramic tile	
other	
acoustical insulation	
wall protection	

CEILING

ceiling height	
suspended acoustical panel	
vinyl-faced panel	
gypsum board, paint	
gypsum board, epoxy	
exposed	X

DOORS

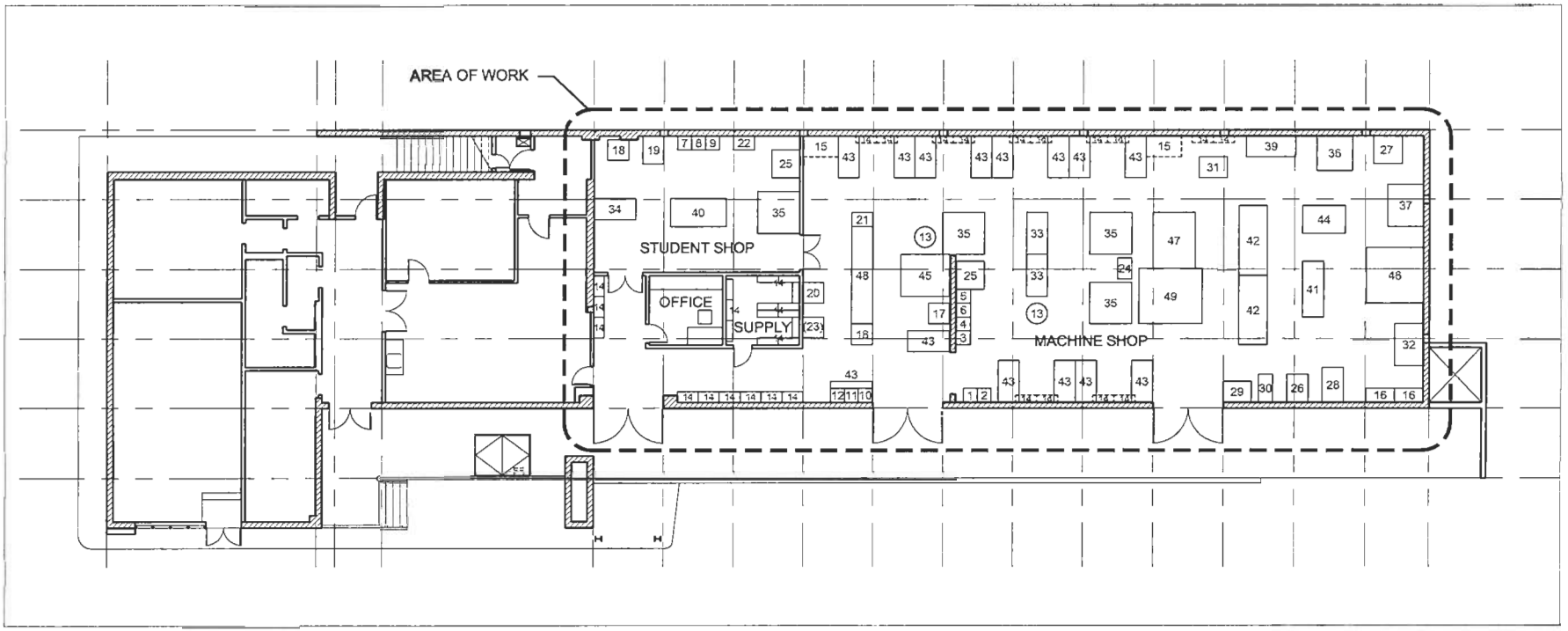
3'-6" x 7'-0"	double
3'-0" x 7'-0"	
1'-6" x 7'-0"	
other	
light-tight rotating door	
vision panel	
gasketing	
natural daylight	
natural daylight	
view windows to:	

FURNISHINGS

TBD

COMMUNICATIONS

SPECIAL NEEDS



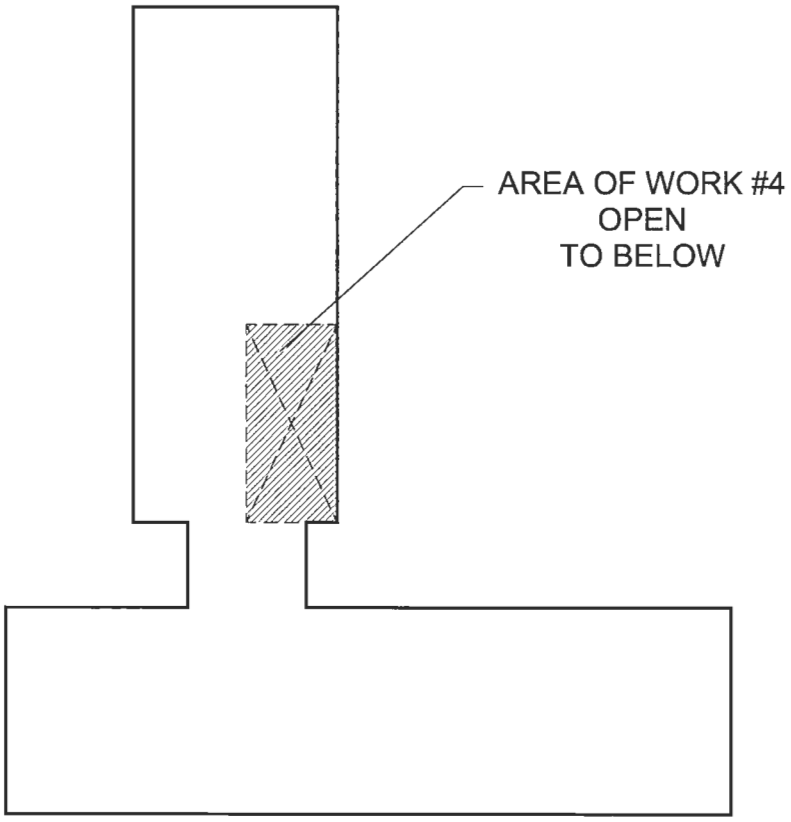
1. FLOOR MOUNTED VISE
2. DELTA GRINDER
3. CADET GRINDER
4. BALDOR GRINDER / DEBURR
5. ROCKWELL GRINDER/BELT/DISC
6. BALDOR BELT SANDER
7. MILWAUKEE DIE FILER
8. WHITNEY NOTCHER
9. LASEY HAND LAPPER
10. LEONARD GRINDER/LAPPER
11. BROWN RADIUS GRINDER
12. F.DECKEL COMP. GRINDER
13. TURN TABLE STORAGE RACK
14. TOOL SUPPLY CABINETS
15. TOOLING CABINET
16. FIRE CABINET
17. ROTARY PUNCH
18. DELTA DRILL PRESS
19. WELDER
20. BECKROY FINGER BREAK
21. O'NEILL SHEET METAL ROLLER
22. ZEP CLEANING TANK
23. BRAZING CART
24. GLASS CUTTER
25. DO-ALL SAW
26. GREENARD ARBOR PRESS
27. HEAT TREAT FURNACE
28. RADIAL ARM SAW
29. RAMCO HYDRO PRESS
30. FOOT PUNCH
31. GRANITE TABLE
32. B & S SURFACE GRINDER
33. HARDINGE LATHE
34. CINTI LATHE
35. VERTICAL MILL
(INDIANA, TREE-2, SHARP)
36. KELCO SAND BLASTER
37. TOOL GRINDER
38. KALAMAZOO DROP SAW
39. AGIETROM E.D.M.
40. WELDING TABLE
41. STEEL TABLE
42. MONARCH LATHE
43. WORK BENCH
44. GRANITE TABLE
45. DO ALL SAW (L)
46. RADIAL ARM DRILL
47. CINCINNATI HORIZONTAL MILL
48. CHICAGO BEND BRAKE
49. PEXTO SHEAR

GROUND FLOOR PLAN - AREA OF WORK # 3
PHYSICS BUILDING

0' 2' 5' 10' 20'

JLP ARCHITECTS, INC
ARCHITECTS PLANNERS CONSULTANTS

FEBRUARY 25, 2003

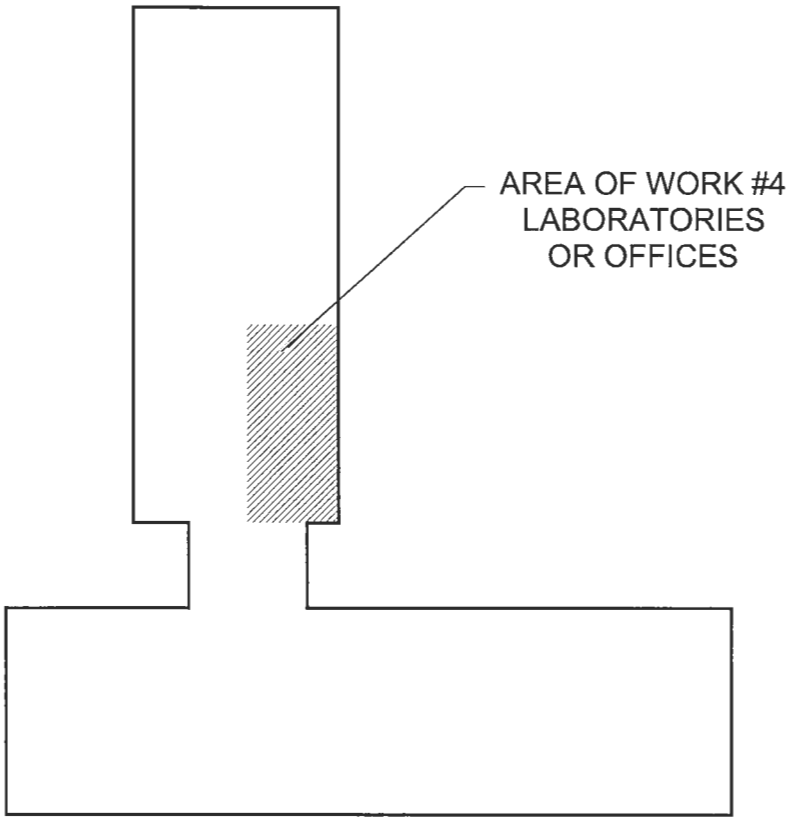


KEY PLAN - EXISTING

NOT TO SCALE

NORTH

PHYSICS BUILDING FIRST FLOOR



KEY PLAN - PROPOSED

NOT TO SCALE

NORTH

PHYSICS BUILDING FIRST FLOOR

ROOM DESIGN CRITERIA CHECKLIST

jlp

UCR PHYSICS/GEOLOGY BUILDINGS RENOVATION

UCR No. 950446/JLP No. 02-02.1

ROOM NAME	PHYSICS FACULTY OFFICE
ROOM NUMBER	TBD
ASSIGNABLE AREA	135 ASF
PLANNED USE	OFFICE

UTILIZATION

occupied hours/day	+12
operation hours/day	+12

MECHANICAL

temperature (70°F-73°F ± 2°F)	X
humidity ambient	X
humidity controlled	
min. air changes/hour	
positive air pressure	
negative air pressure	
100% exhaust	
return air	
HEPA filter supply	
HEPA filter Exhaust air	

EXHAUST/CLEAN AIR EQUIPMENT

chemical fume hood	
radioisotope fume hood	
canopy hood	
snorkel exhaust	
laminar flow hood	
exhaust manifold connection	
biological safety cabinet	
low slotted exhaust	

PLUMBING/PIPING

lab vacuum - VAC	
lab air, 15 psig - LA	
compressed air, 100 psig - A	
lab gas - LG	
carbon dioxide - C02	
cylinder gas, inert	
cylinder gas, toxic/flammable	
potable water - CW, HW	
industrial water - ICW, IHW	
deionized water - DI	
steam, condensate - MPS, CD	
cooling water - CWS/R	
safety shower/eyewash - SS	
drench hose - DH	
floor drain - FD	
floor sink - FS	

ELECTRICAL

120V, 20A, 1 phase	X
208V, 30A, 1 phase	
208V, 30A, 3 phase	
480V, 3 phase	
isolated ground outlet	
dedicated circuit	
standby emergency pwr tele otlt	
LAN/WAN outlet	X
inuse light	
lighting level (fc)	50
darkenable	

EQUIPMENT

vibration sensitive	
light sensitive	
vibration producing	
heat producing	
noise producing	
GROUP 1 EQUIPMENT	
autoclave	
glassware washer	
glassware dryer	
GROUP 2 EQUIPMENT	
	computer
	printer

HAZARDOUS STORAGE

flammables	
corrosives	
toxics	
carcinogens	
radioisotopes	
explosives	
unstable materials	
water reactive materials	
chemical waste	
radioisotope waste	
biological waste	

FIXED/LABORATORY MATERIALS

wood casework	
metal casework	
stainless steel casework	
plastic laminate casework	
epoxy resin tops	
stainless steel tops	
plastic laminate tops	
epoxy resin sinks	
stainless steel sinks	

SECURITY

pushbutton combination lock	
swipe card lock	X

INTERIORS

FLOOR	
vinyl composition tile	X
welded sheet vinyl	
resinous, troweled	
concrete, paint/seal	
carpet	
ceramic tile	
other	
BASE	
integral with floor	X
resilient	
other	

PARTITIONS

gypsum board, paint	X
gypsum board, epoxy	
gypsum board, wall cover	
CMU, paint	
ceramic tile	
other	
acoustical insulation	
wall protection	

CEILING

ceiling height	8'-0"
suspended acoustical panel	X
vinyl-faced panel	
gypsum board, paint	X
gypsum board, epoxy	
exposed	

DOORS

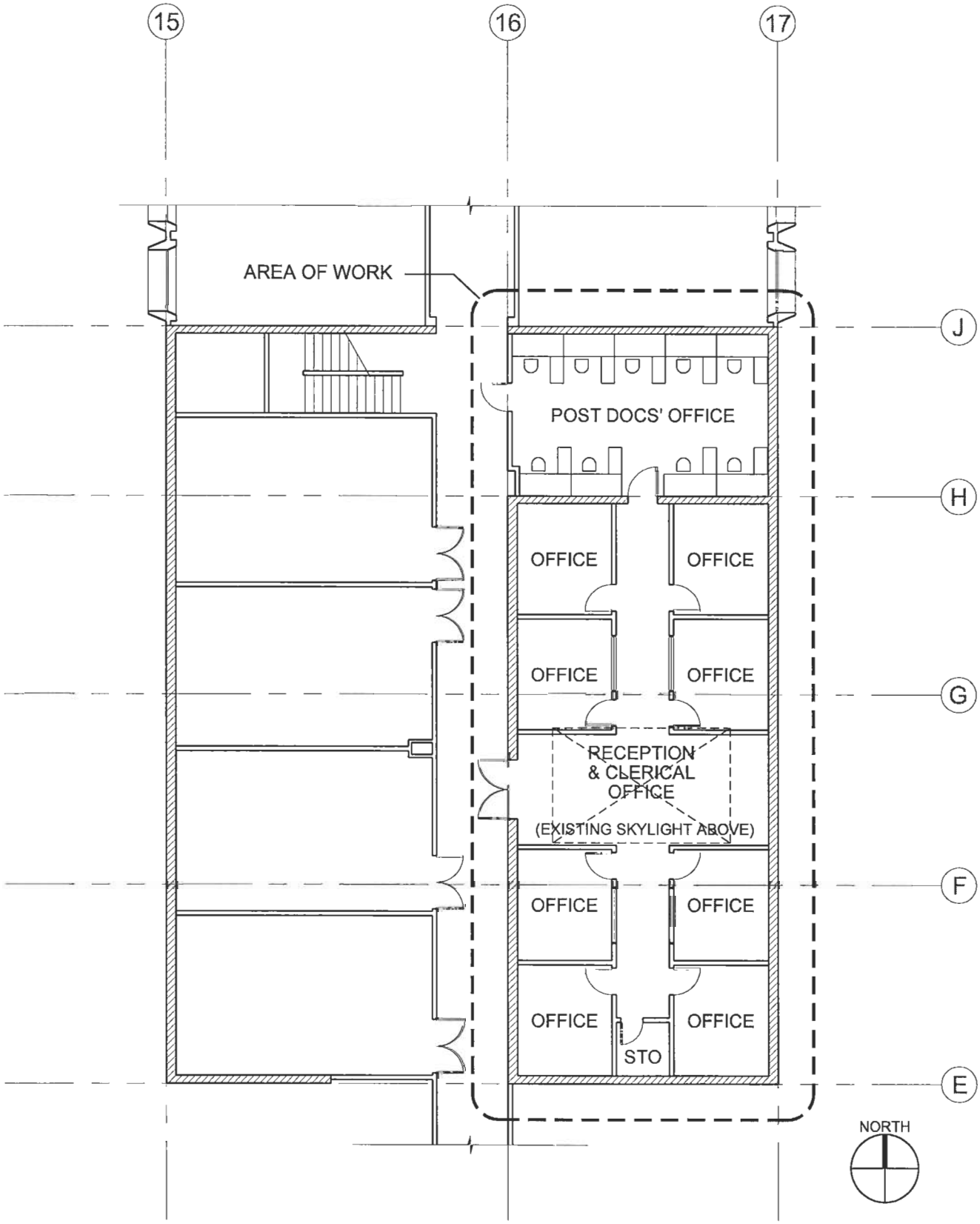
3'-6" x 7'-0"	
3'-0" x 7'-0"	
1'-6" x 7'-0"	
other	
light-tight rotating door	
vision panel	
gasketing	
natural daylight	
natural daylight	
view windows to:	

FURNISHINGS

COMMUNICATIONS

	voice
	data

SPECIAL NEEDS

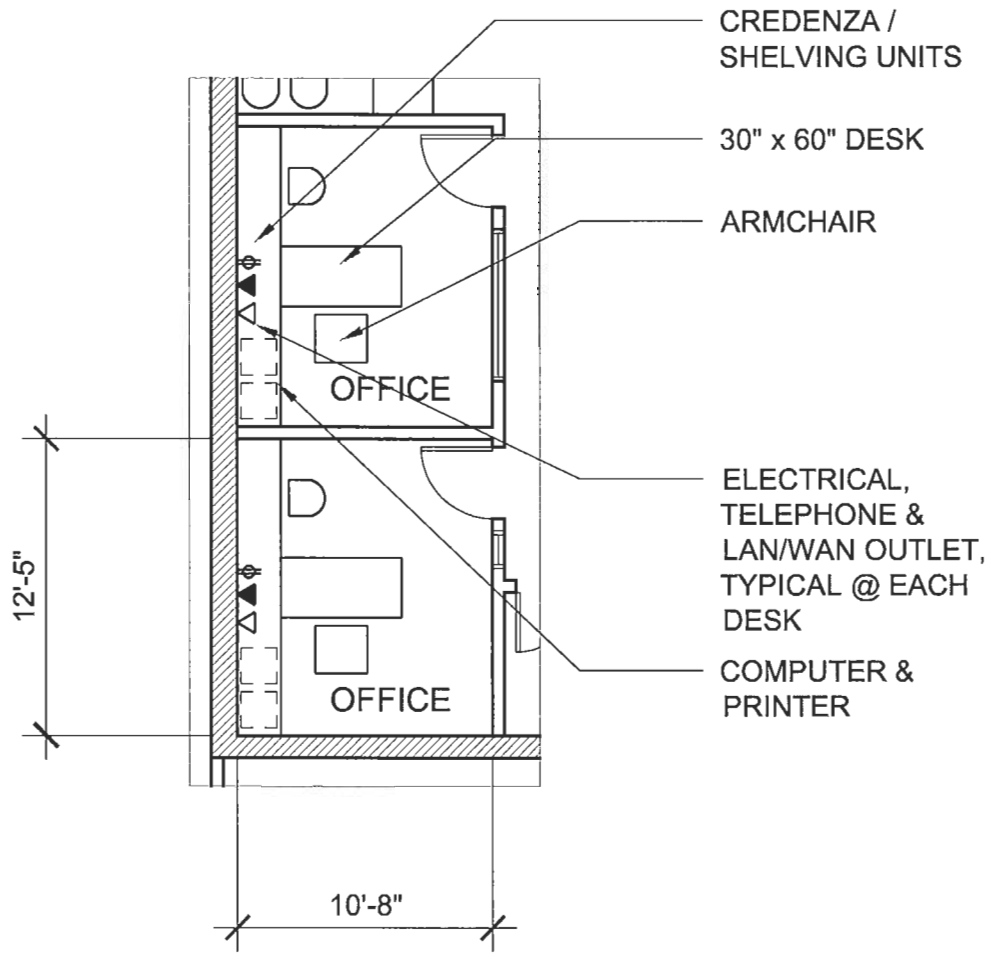


FIRST FLOOR - AREA OF WORK #4, SCHEME C
PHYSICS BUILDING

SCALE: 1/16" = 1'-0"

JLP ARCHITECTS, INC
ARCHITECTS PLANNERS CONSULTANTS

JANUARY 29, 2002



FACULTY OFFICE
PHYSICS BUILDING

SCALE: 1/8" = 1'-0"

JLP ARCHITECTS, INC
ARCHITECTS PLANNERS CONSULTANTS

FEBRUARY 5, 2003

ROOM DESIGN CRITERIA CHECKLIST

jlp

UCR PHYSICS/GEOLOGY BUILDINGS RENOVATION

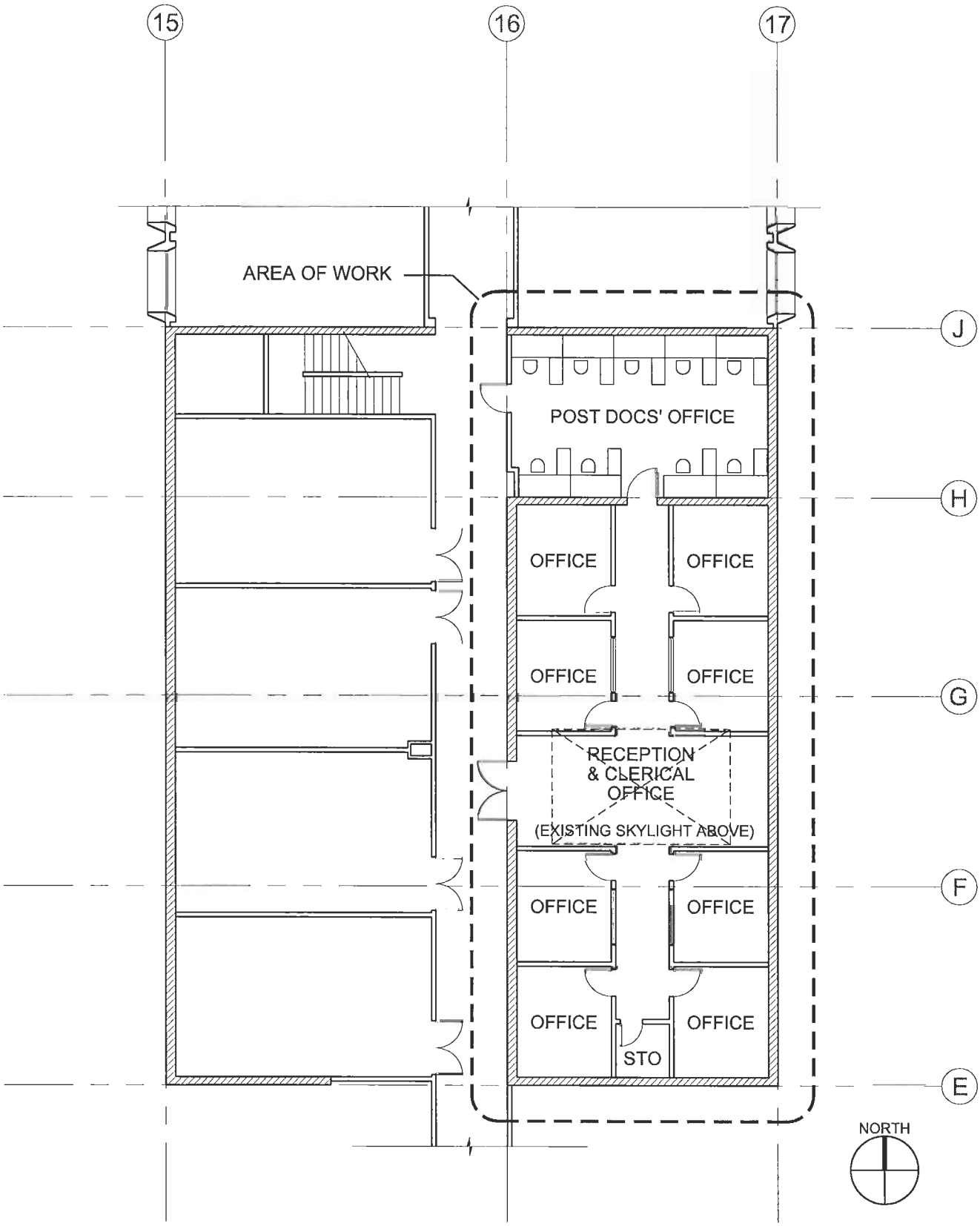
UCR No. 950446/JLP No. 02-02.1

ROOM NAME	POSTDOCTORAL FELLOW OFFICE
ROOM NUMBER	TBD
ASSIGNABLE AREA	
PLANNED USE	OFFICE

UTILIZATION	
occupied hours/day	+12
operation hours/day	+12
MECHANICAL	
temperature (70°F-73°F ± 2°F)	X
humidity ambient	X
humidity controlled	
min. air changes/hour	
positive air pressure	
negative air pressure	
100% exhaust	
return air	
HEPA filter supply	
HEPA filter Exhaust air	
EXHAUST/CLEAN AIR EQUIPMENT	
chemical fume hood	
radioisotope fume hood	
canopy hood	
snorkel exhaust	
laminar flow hood	
exhaust manifold connection	
biological safety cabinet	
low slotted exhaust	
PLUMBING/PIPING	
lab vacuum - VAC	
lab air, 15 psig - LA	
compressed air, 100 psig - A	
lab gas - LG	
carbon dioxide - C02	
cylinder gas, inert	
cylinder gas, toxic/flammable	
potable water - CW, HW	
industrial water - ICW, IHW	
deionized water - DI	
steam, condensate - MPS, CD	
cooling water - CWS/R	
safety shower/eyewash - SS	
drench hose - DH	
floor drain - FD	
floor sink - FS	
ELECTRICAL	
120V, 20A, 1 phase	X
208V, 30A, 1 phase	
208V, 30A, 3 phase	
480V, 3 phase	
isolated ground outlet	
dedicated circuit	
standby emergency pwr tele otlt	
LAN/WAN outlet	X
inuse light	
lighting level (fc)	50
darkenable	

EQUIPMENT	
vibration sensitive	
light sensitive	
vibration producing	
heat producing	
noise producing	
GROUP 1 EQUIPMENT	
autoclave	
glassware washer	
glassware dryer	
GROUP 2 EQUIPMENT	
	computer
	printer
HAZARDOUS STORAGE	
flammables	
corrosives	
toxics	
carcinogens	
radioisotopes	
explosives	
unstable materials	
water reactive materials	
chemical waste	
radioisotope waste	
biological waste	
FIXED/LABORATORY MATERIALS	
wood casework	
metal casework	
stainless steel casework	
plastic laminate casework	
epoxy resin tops	
stainless steel tops	
plastic laminate tops	
epoxy resin sinks	
stainless steel sinks	
SECURITY	
pushbutton combination lock	
swipe card lock	X
INTERIORS	
FLOOR	
vinyl composition tile	X
welded sheet vinyl	
resinous, troweled	
concrete, paint/seal	
carpet	
ceramic tile	
other	
BASE	
integral with floor	X
resilient	
other	

PARTITIONS	
gypsum board, paint	X
gypsum board, epoxy	
gypsum board, wall cover	
CMU, paint	
ceramic tile	
other	
acoustical insulation	
wall protection	
CEILING	
ceiling height	8'-0"
suspended acoustical panel	
vinyl-faced panel	
gypsum board, paint	X
gypsum board, epoxy	
exposed	
DOORS	
3'-6" x 7'-0"	
3'-0" x 7'-0"	X
1'-6" x 7'-0"	
other	
light-tight rotating door	
vision panel	
gasketing	
natural daylight	
natural daylight	
view windows to:	
FURNISHINGS	
COMMUNICATIONS	
	voice
	data
SPECIAL NEEDS	

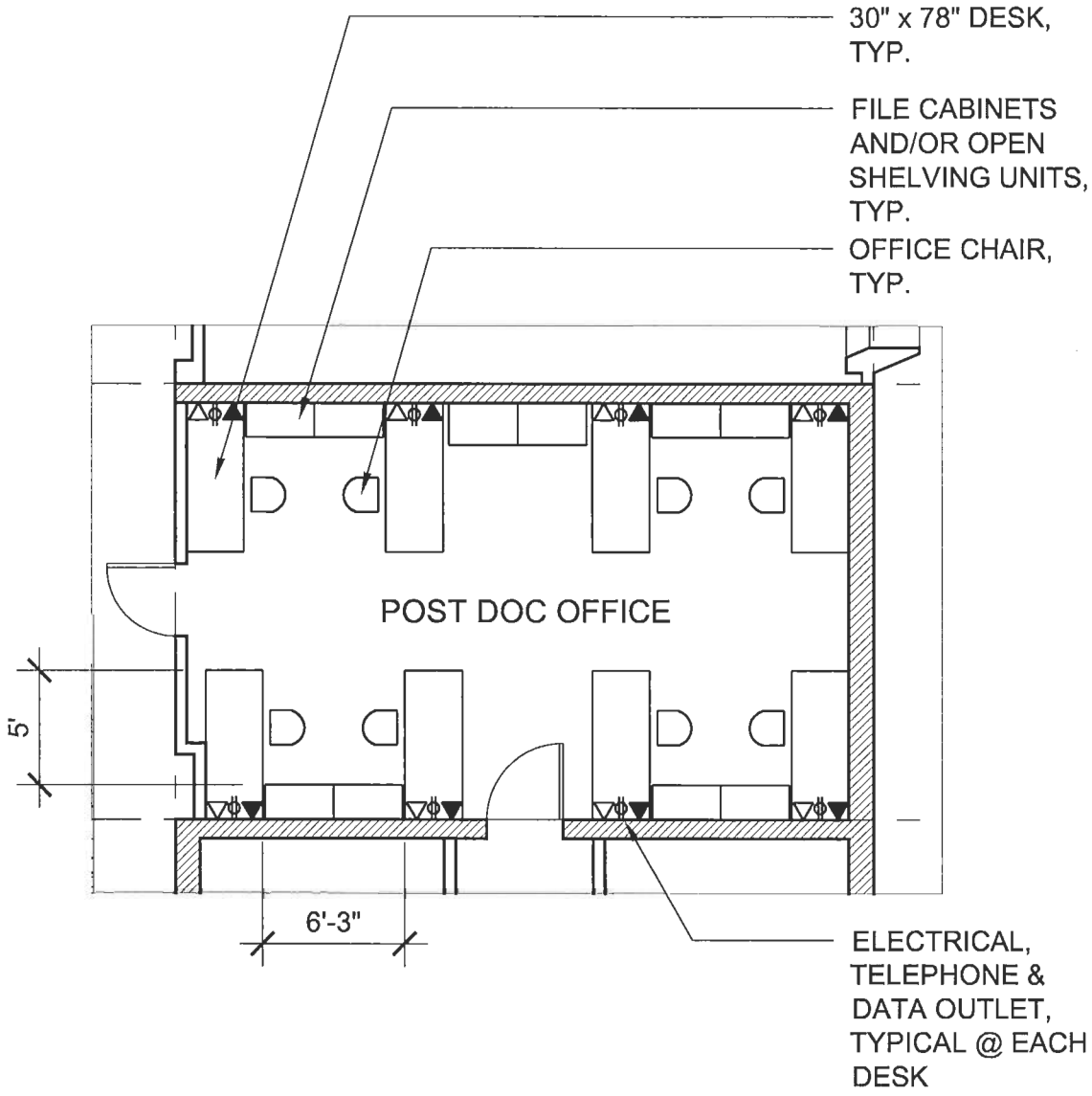


FIRST FLOOR - AREA OF WORK #4, SCHEME C
PHYSICS BUILDING

SCALE: 1/16" = 1'-0"

JLP ARCHITECTS, INC
ARCHITECTS PLANNERS CONSULTANTS

JANUARY 29, 2002



POST DOCTORAL FELLOW OFFICE
PHYSICS BUILDING

SCALE: 1/8" = 1'-0"

JLP ARCHITECTS, INC
ARCHITECTS PLANNERS CONSULTANTS

FEBRURARY 5, 2003

ROOM DESIGN CRITERIA CHECKLIST

jlp

UCR PHYSICS/GEOLOGY BUILDINGS RENOVATION

UCR No. 950446/JLP No. 02-02.1

ROOM NAME	PHYSICS INSTRUCTIONAL LABORATORY
ROOM NUMBER	TBD
ASSIGNABLE AREA	600 ASF
PLANNED USE	UNDERGRADUATE INSTRUCTION

UTILIZATION

occupied hours/day	12
operation hours/day	12

MECHANICAL

temperature (70°F-73°F ± 2°F)	X
humidity ambient	X
humidity controlled	
min. air changes/hour	6
positive air pressure	
negative air pressure	
100% exhaust	
return air	
HEPA filter supply	
HEPA filter Exhaust air	

EXHAUST/CLEAN AIR EQUIPMENT

chemical fume hood	
radioisotope fume hood	
canopy hood	
snorkel exhaust	
laminar flow hood	
exhaust manifold connection	
biological safety cabinet	
low slotted exhaust	

PLUMBING/PIPING

lab vacuum - VAC	
lab air, 15 psig - LA	
compressed air, 100 psig - A	
lab gas - LG	
carbon dioxide - C02	
cylinder gas, inert	
cylinder gas, toxic/flammable	
potable water - CW, HW	
industrial water - ICW, IHW	
deionized water - DI	
steam, condensate - MPS, CD	
cooling water - CWS/R	
safety shower/eyewash - SS	
drench hose - DH	
floor drain - FD	
floor sink - FS	

ELECTRICAL

120V, 20A, 1 phase	X
208V, 30A, 1 phase	X
208V, 30A, 3 phase	X
480V, 3 phase	X
isolated ground outlet	
dedicated circuit	
standby emergency pwr tele otlt	
LAN/WAN outlet	X
inuse light	
lighting level (fc)	50-75
darkenable	

EQUIPMENT

vibration sensitive	
light sensitive	
vibration producing	
heat producing	
noise producing	
GROUP 1 EQUIPMENT	
autoclave	
glassware washer	
glassware dryer	
GROUP 2 EQUIPMENT	

HAZARDOUS STORAGE

flammables	
corrosives	
toxics	
carcinogens	
radioisotopes	
explosives	
unstable materials	
water reactive materials	
chemical waste	
radioisotope waste	
biological waste	

FIXED/LABORATORY MATERIALS

wood casework	X
metal casework	
stainless steel casework	
plastic laminate casework	
epoxy resin tops	
stainless steel tops	
plastic laminate tops	
epoxy resin sinks	
stainless steel sinks	

SECURITY

pushbutton combination lock	
swipe card lock	X

INTERIORS

FLOOR	
vinyl composition tile	X
welded sheet vinyl	
resinous, troweled	
concrete, paint/seal	
carpet	
ceramic tile	
other	
BASE	
integral with floor	X
resilient	
other	

PARTITIONS

gypsum board, paint	X
gypsum board, epoxy	
gypsum board, wall cover	
CMU, paint	
ceramic tile	
other	
acoustical insulation	
wall protection	

CEILING

ceiling height	
suspended acoustical panel	
vinyl-faced panel	
gypsum board, paint	
gypsum board, epoxy	
exposed	X

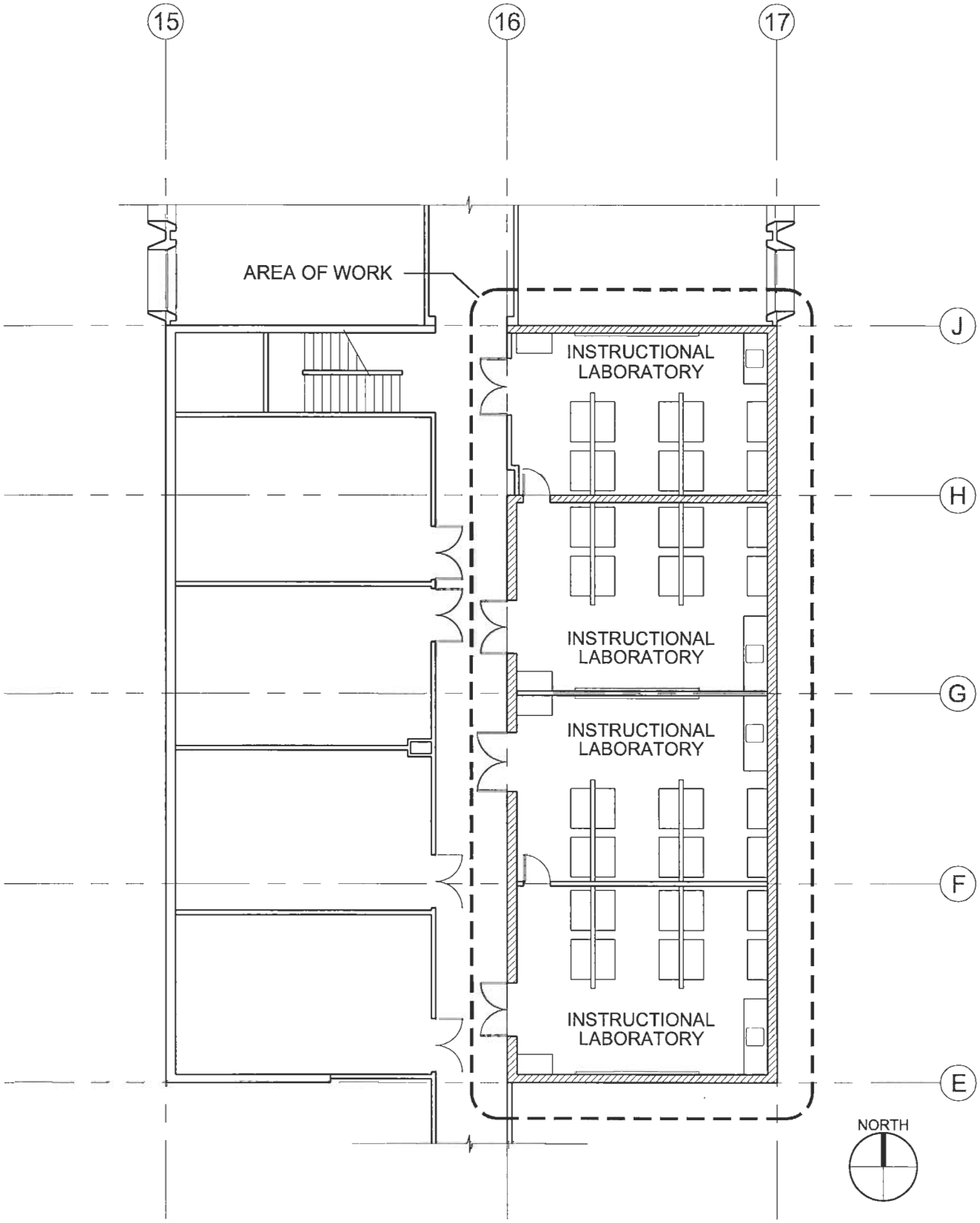
DOORS

3'-6" x 7'-0"	
3'-0" x 7'-0"	double
1'-6" x 7'-0"	
other	
light-tight rotating door	
vision panel	X
gasketing	
natural daylight	
natural daylight	
view windows to:	

FURNISHINGS

COMMUNICATIONS

SPECIAL NEEDS

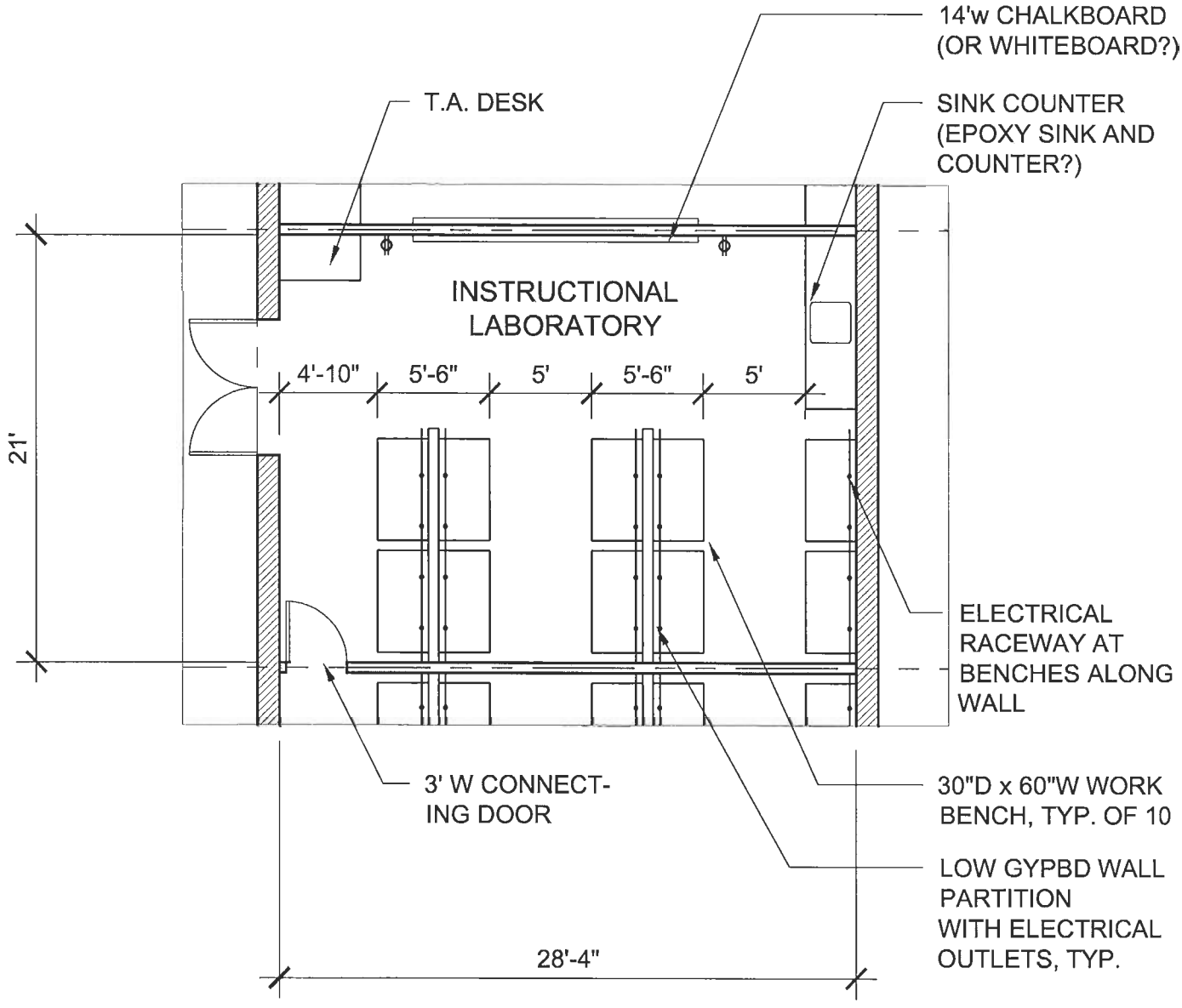


FIRST FLOOR - AREA OF WORK #4, SCHEME D
PHYSICS BUILDING

SCALE: 1/16" = 1'-0"

JLP ARCHITECTS, INC
ARCHITECTS PLANNERS CONSULTANTS

JANUARY 22, 2003



INSTRUCTIONAL LABORATORY
PHYSICS BUILDING

SCALE: 1/8" = 1'-0"

JLP ARCHITECTS, INC
ARCHITECTS PLANNERS CONSULTANTS

FEBRUARY 5, 2003

5.1 OVERVIEW

The Physics Building Renovation project will provide approximately 14,265 assignable square feet (ASF) of new research labs, lab support, office space for the Department of Physics and the Institute of Geophysics and Planetary Physics.

This section of the Detailed Project Program provides a summary of the program elements to be included in the proposed Physics Building Renovation project. The summary includes a listing of space categories and associated net assignable areas.

5.2 PROGRAM WORKLOAD

Concurrent with the development of the modular approach to the building renovation, workload projections were developed for the Department of Physics.

DEPARTMENT	ACTUAL 2001-02	OCCUP. GEOLOGY PHYSICS 2006-07	2 YEARS POST - OCCUP. 2008-09	% GROWTH 2001-02 to 2008-09
Physics				
• Faculty (FTE)	27.20	35.29	38.38	41%
• Other Faculty (FTE)	0.00	0.00	0.00	
• PostDoo (Headcount)	17.00	24.00	26.00	53%
• Teaching Assistant	11.41	13.67	14.28	25%

5.3 MASTER SPACE LIST

SPACE CATEGORIES	ROOM CODE
Instructional Space	
• General Assignment Class Rooms	110
• Instructional Labs	260
• Services & Support Areas	265
• Instructional Computer Labs	270
Office & Office Support Space	
• Academic Office	310
• Other Office	320
• Office Service	335
• Conference	340

Research Lab & Lab Support Space

- Basic & Applied Research Labs (wet or dry) 210
- Research Computer Labs 210
- Services & Support Areas 225
- Scholarly Activity 250
- Graduate Student Office 211

The following spaces are included as part of the gross square footage of the building and were considered when distributing the program within the ground floor and first floor:

- Circulation - Stairs, Elevators & Corridors
- Lobby
- Public Restrooms
- Communications Closets
- Electrical Closets
- Janitor Closets
- Loading Dock

5.4 SPACE STANDARDS

- Physics Building Basic Planning Module 500 ASF
- Faculty Office 135 ASF
- Post Doctoral Fellows 60 ASF/PD
- Teaching Assistants 40 ASF/TA
- Graduate Student Research Assistant 50 ASF/GS

5.5 EXISTING SPACE SUMMARY

SPACE	ASF	GSF
• ***Physics Machine Shop***		
1028 Machine Shop	2,489	
1028A Shop Office	119	
1028C Shop Tool Room	209	
1052 Welding Room	579	
1060 Student Shop	697	
1060A Shop Service	240	
SUBTOTAL:	***4,333***	***7,471***
• ***Plasma Lab***		
1117 Plasma Lab	1,822	
1133 Research Lab (2nd Floor)	504	
SUBTOTAL:	***2,326***	***4,010***

SPACE		ASF	GSF
• ***Magnet Lab***			
1151 Microfabrication Facility		572	
1151A Microfabrication Facility		275	
1151B Microfabrication Facility		92	
1153 Magnet Lab		1,567	
1155 Magnet Lab		145	
1155A Magnet Lab		84	
1155B Magnet Lab		620	
1155C Magnet Lab		2092	
1156 Class Lab Service		338	
	SUBTOTAL:	***5,785***	***9,974***
	TOTAL EXISTING SPACE:	***12,444***	***21,455***

5.6 PROPOSED SPACE SUMMARY

SPACE		ASF	GSF
• ***Research Labs***			
Existing Shop Existing Plasma Lab	>	9,131	
• ***Offices***			
New Plasma Lab (2nd Floor)		1,906	
• ***Support***			
Shop (Existing Magnet Lab)		3,224	
	SUBTOTAL:	***14,265***	***24,595***

NOEL J. FEARON Associates Inc.

Construction Cost Consultants

23323 Los Codona Avenue, Torrance CA 90505

Telephone : 310) 378-0595

Fax : 310) 378-2035

CONSTRUCTION BUDGET COST ESTIMATE

for

RENOVATIONS TO PHYSICS BUILDING

at

UNIVERSITY of CALIFORNIA at RIVERSIDE

10-Apr-03

BASIS OF THE COST ESTIMATE

		Dated	*Received*
Drawings: Architectural:	As-built record drawing set for Physics Building	17-Jul-63	05-Feb-03
	JLP sketch floor plans for renovated areas	29-Jan-03	05-Feb-03
Meetings and discussions:	Site visit and photographic record, 05/23/02	07-Feb-03	
Other documentation:	Draft structural assessment by Degenkolb Engineers	17-Dec-02	
	Draft basis of MEP design by Bechard Long & Associates	17-Feb-03	
	E-mail UCR/JLP Architects	27-Jan-03	

PRICING BASIS

Bidding: Assumed that the work will be competitively bid by at least **three** competent contractors.

Labor costs: Assumed that prevailing wage conditions **WILL** apply to this project.

Line item pricing: Estimate line items are priced as "Subcontractor net price to General Contractor", including Subcontractor's overhead, profit and sales tax as appropriate. Allowances for General Contractor overhead and fee are added to the Subcontractor cost subtotal.

Cost escalation: Estimate line items are priced at current market rates, including allowance for cost escalation during construction. **NO** allowance is added on the estimate summary page for escalation to the anticipated bid date for the project.

Premium cost allowances: **No** allowance included for premium time working.

Construction schedule: Overall construction period of 15-18 months assumed for the scope of work indicated.

SCOPE OF WORK INCLUDED

Physics - Work Area # 1 : Conversion of existing machine shop to Physics laboratories

Work Area # 2 : Conversion of existing Plasma Lab. To typical Physics laboratories; Infill floor structure to high-bay area, and construction of new office space at first floor level.

Work Area # 3 : Conversion of existing Magnet Lab to machine shop

Seismic mitigation : Retrofitting new reinforced concrete full height shear walls, column encasement, chord element and bracing to roof structure; associated demolition. Modification and repair work.

Physics Building Infrastructure: Electrical infrastructure upgrades - per electrical engineering consultant's estimate

EXCLUSIONS

General : Professional design, testing, inspection and construction management fees
Permit fees normally paid directly by Owner
Legal and financing costs
Fire and all-risk insurance
Work outside the scope of work area indicated
Handling, removal or replacement of Owner's existing furniture, fittings and equipment

Project specific : Costs of relocation and temporary accommodation for occupants of the existing building
Loose furniture and fittings
Specialist laboratory equipment - Sterilizers, glasswashers, bio-safety cabinets, warm rooms, cold rooms and freezers
Telephone, data audio/visual and public address/paging equipment and installations, unless specifically called out herein.
Cost escalation beyond construction mid-point of January 2007, other than escalation during construction

SUMMARY OF FLOOR AREAS

Net impacted floor areas to inside face of enclosing walls

	SF	
Work Area # 1 - Laboratories	4,337	
Work Area # 2 - Labs. & Offices	4,148	
Work Area # 3 - Machine Shop	5,798	
Physics Renovation work areas:	14,283	NSF
Existing Physics Building	94,808	GSF

NJF Associates Inc.

CONSTRUCTION BUDGET COST ESTIMATE
PROJECT HARD COSTS SUMMARY

				2003 costs	2006/2007 costs
1	Physics Building Renovations		$/SF	$,000	$,000
1.1	Machine Shop to Labs Conversion	4,337 SF	178.00	771	864
1.2	Plasma Lab. To Labs & Offices	4,148 SF	193.00	802	898
1.3	Magnet Lab to Machine Shop	5,798 SF	77.00	449	503
1.4	Seismic upgrades	94,808 SF	6.10	581	651
1.5	Budget for electrical infrastructure upgrades, excluding replacement of existing main service and switchboard - per consultant's report 02/24/03	94,808 SF	0.60	60	67
	Total for Physics Renovations:	94,808 SF	28.00	**$2,663**	**$2,983**

Note: Escalation allowance of 12% included to anticipated mid-point of construction at say Jan-2007

NJF Associates Inc.

CONSTRUCTION BUDGET COST ESTIMATE

PHYSICS BUILDING

FUNCTIONAL COST SUMMARY

Approximate net impacted floor area:

	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop		Seismic Mitigation work	
	4,337 SF		*4,148 SF*		*5,798 SF*		*94,808 SF*	
	$,000	$/GSF	$,000	$/GSF	$,000	$/GSF	$,000	$/GSF
01 Foundations								
1.10 Standard Foundations	0	0.00	0	0.00	0	0.00	0	0.00
1.20 Special Foundations	0	0.00	0	0.00	0	0.00	29	0.31
02 Substructure								
2.10 Slab on grade	16	3.69	7	1.69	36	6.21	25	0.26
2.20 Basement construction	0	0.00	0	0.00	0	0.00	0	0.00
03 Superstructure								
3.10 Structural frame	2	0.46	2	0.48	2	0.34	222	2.34
3.20 Upper Floor structures	3	0.69	47	11.33	16	2.76	0	0.00
3.30 Roof structures	0	0.00	0	0.00	0	0.00	17	0.18
3.40 Stair construction	0	0.00	0	0.00	0	0.00	0	0.00
04 Exterior Closure								
4.10 Exterior walls and doors	14	3.23	8	1.93	9	1.55	0	0.00
4.20 Exterior glazed elements	0	0.00	0	0.00	0	0.00	0	0.00
05 Roofing								
5.10 Roof Finish	1	0.23	7	1.69	12	2.07	13	0.14
5.20 Skylights	0	0.00	21	5.06	0	0.00	0	0.00
06 Interior construction								
6.10 Interior Partitions	46	10.61	61	14.71	13	2.24	120	1.27
6.20 Interior Finishes	29	6.69	31	7.47	17	2.93	0	0.00
6.30 Specialties	138	31.82	106	25.55	36	6.21	0	0.00
07 Conveying systems	0	0.00	0	0.00	22	3.79	0	0.00

Continued....

CONSTRUCTION BUDGET COST ESTIMATE

PHYSICS BUILDING

FUNCTIONAL COST SUMMARY	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop		Seismic Mitigation work	
Approximate net impacted floor area:	*4,337 SF*		*4,148 SF*		*5,798 SF*		*94,808 SF*	
	$,000	$/GSF	$,000	$/GSF	$,000	$/GSF	$,000	$/GSF
08 Mechanical Installations								
8.10 Plumbing	66	15.22	33	7.96	25	4.31	3	0.03
8.20 Heating, ventilation & A/C	174	40.12	190	45.81	27	4.66	0	0.00
8.30 Fire Protection	0	0.00	0	0.00	0	0.00	0	0.00
09 Electrical Installations								
9.10 Distribution and branch wiring	30	6.92	28	6.75	81	13.97	3	0.03
9.20 Lighting	29	6.69	35	8.44	17	2.93	4	0.04
9.30 Special electrical systems	0	0.00	0	0.00	0	0.00	0	0.00
9.40 Communication systems	28	6.46	23	5.54	14	2.41	0	0.00
10 Equipment	0	0.00	0	0.00	0	0.00	0	0.00
11 Sitework								
11.10 Site preparation and demolitions	25	5.76	26	6.27	23	3.97	17	0.18
11.20 Site improvements	0	0.00	0	0.00	0	0.00		0.00
11.30 Site utilities	0	0.00	0	0.00	0	0.00		0.00
11.40 Work outside the site boundary	0	0.00	0	0.00	0	0.00		0.00
SUBTOTAL	**$601**	***$138.58***	**$625**	***$150.68***	**$350**	***$60.37***	**$453**	***$4.78***
General Conditions, Bonds, Insurances 10.0%	60	13.83	63	15.19	35	6.04	45	0.47
General Contractor's Fee 6.0%	40	9.22	41	9.88	23	3.97	30	0.32
Design Contingency 10.0%	70	16.14	73	17.60	41	7.07	53	0.56
Escalation allowance 0.0%	0	0.00	0	0.00	0	0.00	0	0.00
TOTAL at Jan/Mar 2003 costs	**$771**	***$177.77***	**$802**	***$193.35***	**$449**	***$77.44***	**$581**	***$6.13***

NJF Associates Inc.

RENOVATIONS TO PHYSICS BUILDING	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
01 FOUNDATIONS								
1.10 Standard Foundations								
Assumed no work								
				$0		**$0**		**$0**
1.20 Special Foundations								
Assumed no work								
				$0		**$0**		**$0**
02 SUBSTRUCTURE								
2.10 Slab on grade								
Allowance for levelling and miscellaneous minor repairs to existing slabs on grade	SF	1.25	3,650	**4,563**	2,375	**2,969**	4,500	**5,625**
Sawcut, remove and replace sections of slab on grade for new under floor utilities; including waterproof membrane - allow	LF	45.00	250	**11,250**	100	**4,500**	300	**13,500**
Reinforced concrete bases, curbs and hold down bolts for specialist equipment - allow	EA	250.00		**0**		**0**	66	**16,500**
				$15,813		**$7,469**		**$35,625**

RENOVATIONS TO PHYSICS BUILDING	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
2.20 Basement construction								
No work								
				$0		**$0**		**$0**
03 SUPERSTRUCTURE								
3.10 Structural frame								
Budget allowance for miscellaneous minor modifications to existing structural walls and framing for new equipment	SF	0.50	4,337	**2,169**	4,148	**2,074**	4,500	**2,250**
				$2,169		**$2,074**		**$2,250**
3.20 Upper Floor structures								
Allowance for levelling and miscellaneous minor repairs to existing upper floor slabs	SF	1.25		**0**	500	**625**		**0**
Concrete curbs to new interior walls to Labs - allow	LF	17.50	110	**1,925**	30	**525**		**0**
Core drilling and sawcutting small openings in existing floors and walls - allow	EA	125.00	12	**1,500**	6	**750**	10	**1,250**

RENOVATIONS TO PHYSICS BUILDING	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
Infill floor structure to provide new office spaces at First floor level in Work area # 2	SF	25.00		**0**	1,800	**45,000**		**0**
Infill floor structure to existing magnet pit in Work area # 3	SF	18.00		**0**		**0**	820	**14,760**
				$3,425		**$46,900**		**$16,010**
3.30 Roof structures								
Flat roofs Assumed no work in this section - see seismic mitigation work				**0**		**0**		**0**
				$0		**$0**		**$0**
3.40 Stair construction								
No work								
				$0		**$0**		**$0**

RENOVATIONS TO PHYSICS BUILDING		Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
				Quantity	$	*Quantity*	*$*	*Quantity*	*$*
04 EXTERIOR CLOSURE									
4.10	Exterior walls and doors								
	Work to existing exterior walls								
	Sawcut and form new exterior door openings in existing structural walls; remove debris - per door leaf	#	EA	1,500.00	2	**3,000**		**0**		**0**
	Infill wall construction to existing loading door openings; tie in to existing structure; exterior finish to match existing	#	SF	45.00		**0**	180	**8,100**		**0**
	Exterior doors - allow								
	Hollow metal or solid core wood doors and metal frames, painted; exterior locking hardware - per door leaf		EA	975.00	3	**2,925**		**0**	6	**5,850**
	Prefinished aluminum framed storefront glazing and single door to replace rolling door in Work area # 1 - approx. 10'x8'		EA	5,500.00	1	**5,500**		**0**		**0**
	Card-key access locking hardware to exterior doors - allow		EA	1,000.00	3	**3,000**		**0**	3	**3,000**
	Exterior railings and guardrails									
	Assumed no work					**0**		**0**		**0**
						$14,425		**$8,100**		**$8,850**

RENOVATIONS TO PHYSICS BUILDING	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
4.20 Exterior glazed elements								
Windows								
Assumed no work				**0**		**0**		**0**
				$0		**$0**		**$0**
05 ROOFING								
5.10 Roof Finish								
Flat roofing								
Allow for miscellaneous repairs to existing roofing and insulation materials, in connection with new roof penetrations and deferred maintenance work	SF	2.50		**0**	2,400	**6,000**	4,500	**11,250**
Roofing trims and sheetmetal								
Included above				**0**		**0**		**0**
Caulking and sealants								
Caulking and firestopping generally; per SF net floor area	SF	0.20	4,337	**867**	4,148	**830**	4,500	**900**
				$867		**$6,830**		**$12,150**

RENOVATIONS TO PHYSICS BUILDING	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
5.20 Skylights								
Budget allowance for new prefabricated custom skylight at the existing removable roof panels over Work area # 2 - allow	SF	75.00		**0**	275	**20,625**		**0**
				$0		**$20,625**		**$0**
06 INTERIOR CONSTRUCTION								
6.10 Interior Partitions								
New interior non-structural walls in Lab. Areas; average 14'-15' high; LB metal stud construction with blocking for casework and equipment attachments	LF	112.00	120	**13,440**	28	**3,136**		**0**
Metal stud framed non-rated office partition walls; water-resistant gypsum board surface finish both sides, painted; blocking for fixture attachments at two levels; average 12' high - allow	LF	65.00		**0**	198	**12,870**	40	**2,600**
Furring to existing walls and columns; water-resistant gypsum board surface finish one side, painted - average 10' high	LF	25.00		**0**	280	**7,000**		**0**

RENOVATIONS TO PHYSICS BUILDING		Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
				Quantity	$	*Quantity*	*$*	*Quantity*	*$*
Work to existing interior walls									
Patch, refinish and repaint existing walls and columns		SF	1.25	3,600	**4,500**	3,500	**4,375**	4,000	**5,000**
Sawcut and form new interior door openings in existing structural walls; remove debris - per door leaf	#	EA	1,500.00	10	**15,000**	6	**9,000**		**0**
Interior doors									
New solid core wood doors and metal frames, painted; interior hardware - per door leaf		EA	950.00	14	**13,300**	20	**19,000**	5	**4,750**
Security hardware, per leaf - allow		EA	900.00		**0**		**0**	1	**900**
Interior glazing									
Allowance for borrowed light panels and sidelights to office walls in work area # 2, first floor		SF	36.00		**0**	160	**5,760**		**0**
Interior railings and guardrails									
Assumed no work					**0**		**0**		**0**
					$46,240		**$61,141**		**$13,250**

RENOVATIONS TO PHYSICS BUILDING	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
6.20 Interior Finishes								
Floors								
Allowance for floor finishes and bases								
Laboratories	SF	6.25	3,650	**22,813**	2,300	**14,375**		**0**
Offices	SF	3.50		**0**	2,300	**8,050**		**0**
Machine Shop	SF	2.00		**0**		**0**	4,500	**9,000**
Walls								
Assumed no applied wall finishes				**0**		**0**		**0**
Ceilings								
Suspended acoustical tile ceiling finish; including drop bulkheads at transition to exposed soffits	SF	3.00		**0**	1,650	**4,950**		**0**
Clean and repaint exposed structural deck soffits	SF	0.90	6,700	**6,030**	4,000	**3,600**	8,500	**7,650**
				$28,843		**$30,975**		**$16,650**

RENOVATIONS TO PHYSICS BUILDING	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
6.30 Specialties								
Protective guards, barriers and bumpers								
Bumper rails and chair rails - allow	LF	16.00	100	**1,600**	100	**1,600**	150	**2,400**
Corner guards - allow	EA	150.00	4	**600**		**0**	10	**1,500**
Toilet compartments and accessories								
No work								
Shelving and millwork								
Miscellaneous shelving, millwork and trims - allowance per floor area	SF	0.20	4,337	**867**	4,148	**830**	4,500	**900**
Non-Lab. Areas:								
Counters, cabinets and casework								
Typical offices and workrooms :								
Allow for high quality laminate finish casework								
Counters and supports	LF	80.00		**0**	100	**8,000**	6	**480**
- base cabinets	LF	150.00		**0**	65	**9,750**	6	**900**
- wall cabinets	LF	110.00		**0**	80	**8,800**	4	**440**
- bookcase	LF	200.00		**0**	20	**4,000**		**0**
Marker boards and display boards- allow	EA	275.00		**0**	10	**2,750**	2	**550**
Signage and bulletin boards								
Allowance for interior signage and directories	SF	0.25	4,337	**1,084**	4,148	**1,037**	4,500	**1,125**
Window treatments								
Blinds to windows and sidelights - allow	EA	200.00	5	**1,000**		**0**		**0**

RENOVATIONS TO PHYSICS BUILDING	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
Miscellaneous specialties								
Fire extinguishers, lockers, entrance floor mats etc. - allow	SF	0.15	4,337	**651**	4,148	**622**	4,500	**675**
Laboratory areas - budget allowances								
Counters, cabinets and casework								
Epoxy counter tops, 30" - 36" wide	LF	116.00	72	**8,352**	37	**4,292**		**0**
Base cabinets, wood; including doors, shelves and drawers	LF	200.00	72	**14,400**	37	**7,400**		**0**
Wall cabinets, glass front	LF	160.00	15	**2,400**	23	**3,680**		**0**
Solvent storage shelving along room dividing walls; 2 & 3 tier; seismic edge rails	LF	80.00	108	**8,640**	54	**4,320**		**0**
"Unistrut" support racking to walls - allow	LF	12.00	600	**7,200**	300	**3,600**		**0**
- to structural soffits - allow	LF	15.00	200	**3,000**	100	**1,500**		**0**
Laboratory equipment								
Cylinder racks, per cylinder - allow	EA	75.00	18	**1,350**	9	**675**		**0**
Gas manifold and controls	EA	450.00	6	**2,700**	3	**1,350**		**0**
Drying racks - allow	EA	500.00	6	**3,000**	3	**1,500**		**0**
Chemical fume hoods and solvent storage base cabinet - allow	LF	1,350.00	24	**32,400**	12	**16,200**		**0**
Laminar flow/ Perchloric fume hoods - allow	LF	2,000.00	12	**24,000**	6	**12,000**		**0**
Miscellaneous small equipment - allow per Lab. Room	EA	500.00	6	**3,000**	3	**1,500**		**0**

RENOVATIONS TO PHYSICS BUILDING	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
Laboratory plumbing fixtures - budget allowance								
Laboratory sink, epoxy resin; acid resistant waste and trap	EA	600.00	12	**7,200**	6	**3,600**		**0**
Cup sink and waste	EA	400.00	6	**2,400**	3	**1,200**		**0**
Emergency shower & eyewash	EA	1,200.00	6	**7,200**	3	**3,600**		**0**
Utility service outlets, counter mounted - allow 1 per 4 LF of counter	EA	130.00	18	**2,340**	9	**1,170**		**0**
Built-in specialist laboratory equipment - budget allowance								
Sterilizers, glassware washers and dryers				***Excluded***		***Excluded***		***Excluded***
Bio-safety cabinets and flammable storage cabinets				***Excluded***		***Excluded***		***Excluded***
Warm rooms, cold rooms and freezers				***Excluded***		***Excluded***		***Excluded***
Miscellaneous equipment and supports - budget allowance per Lab. Room	EA	500.00	6	**3,000**	3	**1,500**		**0**
Machine Shop - budget allowances								
Miscellaneous counters, cabinets and casework - allow	LF	300.00		**0**		**0**	40	**12,000**
Materials racking and storage shelving, fixed - allow	LF	250.00		**0**		**0**	60	**15,000**
				$138,384		**$106,476**		**$35,970**

RENOVATIONS TO PHYSICS BUILDING

	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
07 CONVEYING SYSTEMS								
Cranes and hoists								
Budget for relocation of the existing 2 Ton bridge crane and track from Work area # 1 to Work area # 3; reinstall and reconnect	EA	12,000		**0**		**0**	1	**12,000**
Structural steel supports and footings for crane track - allow	LF	100.00		**0**		**0**	100	**10,000**
				$0		**$0**		**$22,000**
08 MECHANICAL INSTALLATIONS								
8.10 Plumbing								
Plumbing fixtures and equipment, including service, waste and vent pipework - allow								
Floor drains and sinks	EA	1,100.00		**0**		**0**	8	**8,800**
Hose bibbs - allow	EA	250.00	6	**1,500**	3	**750**	6	**1,500**
HW heat exchanger, expansion tank and circulating pumps	EA	3,500.00		**0**		**0**		**0**

RENOVATIONS TO PHYSICS BUILDING	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
Laboratory plumbing installations - service, waste and vent pipework and connections only								
Work area # 1:								
Laboratory plumbing fixtures	EA	1,250.00	24	**30,000**				**0**
Fume hood fixtures - allow	EA	1,250.00	6	**7,500**				**0**
Fixed equipment services - allow	EA	1,000.00	6	**6,000**				**0**
- acid resistant drainage piping - allow	LF	27.50	300	**8,250**				**0**
For wet utility service outlets, counter mounted - allow	EA	500.00	6	**3,000**				**0**
Work area # 2:								
Laboratory plumbing fixtures	EA	750.00		**0**	12	**15,000**		**0**
Fume hood fixtures - allow	EA	750.00		**0**	3	**3,750**		**0**
Fixed equipment services - allow	EA	600.00		**0**	3	**3,000**		**0**
- acid resistant drainage piping - allow	LF	27.50		**0**	150	**4,125**		**0**
For wet utility service outlets, counter mounted - allow	EA	350.00		**0**	3	**1,500**		**0**
Laboratory process piping and systems; compressed air, vacuum, natural gas, deionized water, process gases - allow per outlet	EA	250.00	12	**3,000**	6	**1,500**		**0**
Machine Shop plumbing installations - service, waste and vent pipework and connections only								
Water and drainage to fixed equipment items - allow	EA	850.00		**0**		**0**	10	**8,500**

RENOVATIONS TO PHYSICS BUILDING	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
Roof drainage installation								
Allowance for modifications to existing roof and condensate drains and downpipes for new room layouts	EA	750.00	4	**3,000**	2	**1,500**	4	**3,000**
Fuel gas distribution - allow	LF	10.00	200	**2,000**	100	**1,000**	300	**3,000**
Automatic seismic shut-off valve	EA	650.00	1	**650**	1	**650**	1	**650**
Demolition								
Disconnect and remove existing plumbing fixtures and piping	EA	165.00	5	**825**		**0**		**0**
Cap off redundant services	EA	100.00	5	**500**		**0**		**0**
				$66,225		**$32,775**		**$25,450**
8.20 Heating, ventilation and air conditioning								
Budget allowances for new and replacement HVAC variable air volume installations; including fume exhaust ventilation								
Laboratory spaces	SF	46.00	3,650	**167,900**	2,300	**105,800**		**0**
Offices	SF	14.00		**0**	2,300	**32,200**		**0**
Machine Shop - modifications to existing system	SF	6.00		**0**		**0**	4,500	**27,000**

RENOVATIONS TO PHYSICS BUILDING

		Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
				Quantity	$	*Quantity*	*$*	*Quantity*	*$*
	Demolition								
	Disconnect and remove existing equipment, ducting and piping	SF	1.50	4,337	**6,506**	4,148	**6,222**		**0**
	Allowance for relocating existing main Process and HHW/CHW insulated pipe runs in conflict with the new infill floor structure in Work area # 2 - approx. 6", 8" & 10" diameter	LF	120.00		**0**	380	**45,600**		**0**
	Controls, instrumentation and balancing								
	Allow for full DDC control system, integrated with fume hood operation; linkage to campus EMS; testing and balancing				***Included***		***Included***		***Included***
					$174,406		**$189,822**		**$27,000**
8.30	Fire Protection								
	No work				**$0**		**$0**		**$0**

RENOVATIONS TO PHYSICS BUILDING

	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
09 ELECTRICAL INSTALLATIONS								
9.10 Distribution and branch wiring								
Main power and distribution								
Electrical infrastructure upgrades for the Physics Building - included in the Project Summary								
Distribution and sub-distribution panelboards, transformers and feeders to serve the renovated areas- allow	EA	6,500.00	2	**13,000**	2	**13,000**	4	**26,000**
Machine and equipment power								
Fixed power connections and starters, 2P & 3P - allow	EA	450.00	10	**4,500**	6	**2,700**	66	**29,700**
3P busbar raceway for Machine Shop - allow	LF	85.00		**0**		**0**	260	**22,100**
Convenience power								
General service receptacles, including conduit and wiring								
Office spaces - allow 1 per 75 SF	EA	125.00		**0**	36	**4,500**		**0**
Laboratories - allow 1 per 40 SF	EA	135.00	90	**12,150**	58	**7,830**		**0**
Machine Shop - allow 1 per 200 SF	EA	135.00		**0**		**0**	22	**2,970**
				$29,650		**$28,030**		**$80,770**

RENOVATIONS TO PHYSICS BUILDING	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
9.20 Lighting								
Lighting installation								
Lighting fixtures including conduit, wiring and switching								
Interior fixtures generally in Lab areas - allow 1 per 60 SF average	EA	350.00	62	**21,700**	40	**14,000**		**0**
- in Office areas, parabolic fluorescent recessed - allow 1 per 60 SF average	EA	325.00		**0**	40	**13,000**		**0**
- in Machine Shop - allow 1 per 100 SF average	EA	275.00		**0**		**0**	45	**12,375**
Emergency and exit lights - allow	EA	300.00	12	**3,600**	14	**4,200**	6	**1,800**
Lighting switches and controls								
Switch, conduit and wiring - allow	EA	100.00	12	**1,200**	14	**1,400**	7	**700**
Lighting control panel - allow	EA	2,000.00	1	**2,000**	1	**2,000**	1	**2,000**
				$28,500		**$34,600**		**$16,875**
9.30 Special electrical systems								
Emergency and uninterruptible power								
Emergency generator system				***Excluded***		***Excluded***		***Excluded***
				$0		**$0**		**$0**

RENOVATIONS TO PHYSICS BUILDING

	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
9.40 Communication systems								
Telephone and communications								
Telephone/data patch panel	EA	800.00	1	**800**	1	**800**	1	**800**
Backboards	EA	200.00	1	**200**	1	**200**	1	**200**
Cable tray raceway - allow	LF	35.00	300	**10,500**	175	**6,125**	150	**5,250**
Telephone and data outlets including conduit stub-ups into ceiling plenum, and wiring to terminal boards								
Telephone/data outlets in Labs., wall mounted - allow 4 per Lab.	EA	175.00	24	**4,200**	12	**2,100**		**0**
- floor pedestal mounted - 1 per Lab.	EA	400.00	6	**2,400**	3	**1,200**		**0**
Composite telephone/data/fiber optic outlets in Labs. - allow 1 per Lab.	EA	600.00	6	**3,600**	3	**1,800**		**0**
Telephone/data outlets in Offices - allow 1 per 75 SF	EA	175.00		**0**	30	**5,250**		**0**
Machine Shop - allow	EA	175.00		**0**		**0**	10	**1,750**
Fire alarm system								
Fire alarm system, connected to existing control panel and annunciators - budget	SF	1.40	4,337	**6,072**	4,148	**5,807**	4,500	**6,300**
Security installations								
Access control and monitoring installation - assumed by Owner				***Excluded***		***Excluded***		***Excluded***
				$27,772		**$23,282**		**$14,300**

RENOVATIONS TO PHYSICS BUILDING	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
10 EQUIPMENT								
No work								
				$0		**$0**		**$0**
11 SITEWORK								
11.10 Site preparation and demolitions								
Interior demolitions and removal of debris								
General demolition of non-load bearing interior walls, doors, finishes and fixtures	SF	2.25	4,337	**9,758**	4,148	**9,333**	4,500	**10,125**
Removal of existing fixed and unfixed equipment and furniture - assumed by Owner				***Excluded***		***Excluded***		***Excluded***
Work area # 1:								
Dismantle existing 2 Ton bridge hoist and track, for relocation	EA	3,500.00	1	**3,500**		**0**		**0**
Work area # 2:								
Dismantle and remove existing gantry walkway and railings	SF	3.00		**0**	530	**1,590**		**0**
Remove roll-up door and supports	EA	850.00		**0**	1	**850**		**0**
Cut away roofing and insulation; break out existing removable roof panels and remove from site	SF	10.00		**0**	240	**2,400**		**0**
- wall finishes, allow	SF	0.75		**0**		**0**		**0**

RENOVATIONS TO PHYSICS BUILDING	Unit	U/price $	Work Area # 1 - Laboratories		Work Area # 2 - Labs. & Offices		Work Area # 3 - Machine Shop	
			Quantity	$	*Quantity*	*$*	*Quantity*	*$*
Budget allowance for removal of hazardous materials	SF	2.00	4,337	**8,674**	4,148	**8,296**	4,500	**9,000**
Protection of existing facilities								
Allowance for protection of existing retained structures and finishes adjoining renovated areas	SF	0.75	4,337	**3,253**	4,148	**3,111**	4,500	**3,375**
				$25,185		**$25,580**		**$22,500**
11.20 Site improvements								
No work								
				$0		**$0**		**$0**
11.30 Site Utilities								
Assumed no work								
				$0		**$0**		**$0**
11.40 Work outside the boundary of the site								
Assumed no work								
				$0		**$0**		**$0**

PHYSICS BUILDING - SEISMIC MITIGATION	*Quantity*	*Unit*	*U/price* $	*Assembly Subtotal* $	*Total* $
01 FOUNDATIONS					$
1.10 Standard Foundations					
No work					
					$0
1.20 Special foundations					$
Footings to shear walls within the existing building structure					
Allowance for foundations and underpinning work in connection with new seismic mitigation work	24	CY	1,200.00		28,800
					$28,800
02 SUBSTRUCTURE					
2.10 Slab on grade					$
Work to existing floor slabs at new footings	750	SF	33.40		25,050
Sawcut existing slab	250	LF	5.00	1,250	
Break up existing slab and dispose of debris	750	SF	6.50	4,875	
Hand excavation, backfill and disposal	90	CY	120.00	10,800	
Reinforced concrete slab and base in repairs - assume 5" thick	750	SF	7.50	5,625	
Dowel and joint to existing slabs	250	LF	10.00	2,500	
					$25,050
2.20 Basement construction					$
No work					
					$0

PHYSICS BUILDING - SEISMIC MITIGATION	Quantity	Unit	U/price $	Assembly Subtotal $	Total $
03 SUPERSTRUCTURE					
3.10 Structural frame					$
Budget allowance for concrete encasement or fiber wrap of existing structural columns	26	CY	1,500.00		39,000
Retrofitted reinforced concrete or shotcrete structural shear walls	3,100	SF	58.87		182,500
Reinforced concrete or shotcrete structural shear walls - typical 12" thick	3,100	LF	55.00	170,500	
Tie new shear wall into existing structure	200	LF	30.00	6,000	
Chord elements & tie beams - allow	60	LF	100.00	6,000	
					$221,500
3.20 Upper Floor structures					$
No work					
					$0
3.30 Roof structures					$
Work to fan pit at North wing roof level					
Chord elements & tie beams - allow	100	LF	150.00		15,000
Tie new tie beams into existing structure	6	EA	250.00		1,500
					$16,500
3.40 Stair construction					$
No work					
					$0
04 EXTERIOR CLOSURE					
4.10 Exterior walls and doors					$
No work					
					$0

PHYSICS BUILDING - SEISMIC MITIGATION	Quantity	Unit	U/price $	Assembly Subtotal $	Total $
4.20 Exterior glazed elements					$
No work					
					$0
05 ROOFING					
5.10 Roof Finish					$
Flat roofing Allow for repairs to existing roofing, insulation and sheet metal work in connection with seismic mitigation work	1,900	SF	7.00		13,300
					$13,300
5.20 Skylights					$
No work					
					$0
06 INTERIOR CONSTRUCTION					
6.10 Interior Partitions					$
Budget allowance for work to existing interiors in connection with seismic mitigation work; including modifications and repairs to partition walls, doors, finishes etc. - allow per SF of impacted floor area	6,000	SF	20.00		120,000
					$120,000
6.20 Interior Finishes					$
Included in Section 6.10 above					
					$0

PHYSICS BUILDING - SEISMIC MITIGATION	Quantity	Unit	U/price $	Assembly Subtotal $	Total $
6.30 Specialties					$
Included in Section 6.10 above					
					$0
07 CONVEYING SYSTEMS					$
No work					
					$0
08 MECHANICAL INSTALLATIONS					
8.10 Plumbing					$
Roof drainage installation					
Allowance for modifications to existing roof and condensate drains and downpipes at new seismic work	4	EA	750.00		3,000
					$3,000
8.20 Heating, ventilation and air conditioning					$
No work					
					$0
8.30 Fire Protection					$
No work					
					$0

PHYSICS BUILDING - SEISMIC MITIGATION	Quantity	Unit	U/price $	Assembly Subtotal $	Total $
09 ELECTRICAL INSTALLATIONS					
9.10 Distribution and branch wiring					$
Main power and distribution Assumed no work					
Convenience power Allowance for relocation of existing receptacles and power outlets in conflict with new shear walls etc.	15	EA	200.00		3,000
					$3,000
9.20 Lighting					$
Lighting installation Allowance for relocation of existing lighting fixtures, switching etc., in conflict with new shear walls etc.	15	EA	250.00		3,750
					$3,750
9.30 Special electrical systems					$
Emergency and uninterruptible power No work					
					$0
9.40 Communication systems					$
Assumed no work					
					$0
10 EQUIPMENT					$
No work					
					$0

PHYSICS BUILDING - SEISMIC MITIGATION	*Quantity*	*Unit*	*U/price* $	*Assembly Subtotal* $	*Total* $
11 SITEWORK					
11.10 Site preparation and demolitions					$
Interior demolitions and removal of debris General demolition of interior walls, finishes and fixtures in conflict with seismic mitigation work; preparation of existing surfaces for joint with new shear walls etc. - allow	6,000	SF	1.25		7,500
Budget allowance for mitigation or removal of hazardous materials	6,000	SF	0.50		3,000
Protection of existing facilities Allowance for protection of existing retained structures and finishes	6,000	SF	1.00		6,000
					$16,500

7.0 CODES AND REGULATIONS

General

Various codes and regulatory agencies will have jurisdiction over the proposed renovation of the Physics Building. Complying with these codes and agency requirements will have a significant effect on the future operation of the building and the construction requirements for the renovation.

Codes and Regulatory Agencies

The following list includes various codes, ordinances, regulations, industry organizations and federal, state and local agencies that are applicable to the renovation of the Physics Building:

1. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
2. American National Standards Institute (ANSI)
3. American Society for Testing and Materials (ASTM)
4. Americans with Disabilities Act (ADA)
5. California Occupational Safety and Health Act (Cal OSHA)
6. California Environmental Protection Agency (EPA)
7. California Building Code (CBC) and standards
8. California office of the State Architect (OSA) Handicap Compliance Unit
9. California Administrative Code (CAC) Title 8, 9, 10, 20, 24, 25
10. National Electric Code (NEC)
11. National Fire Protection Association (NFPA)
12. Sheet Metal and Air Conditioning Contractor National Association (SMACNA)
13. South Coast Air Quality Management District (SCAQMD)
14. State Fire Marshal (SFM)
15. Underwriters Laboratories (UL)
16. Uniform Fire Code (UFC) and standards
17. Uniform Plumbing Code (UPC)
18. Uniform Mechanical Code (UMC)

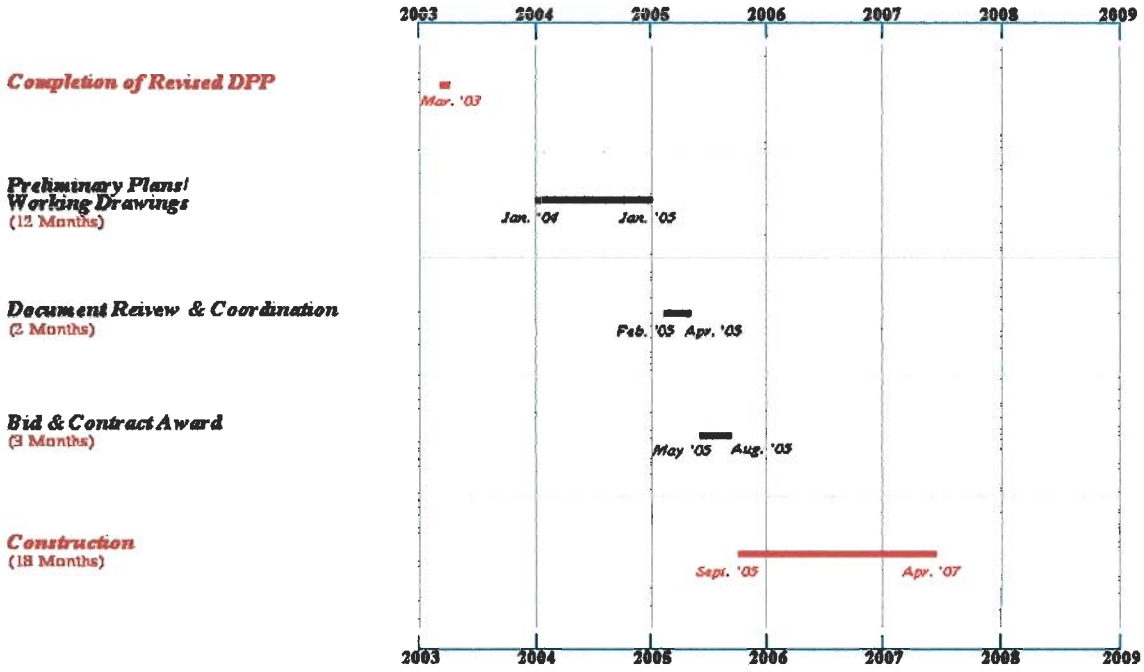
Building Code Analysis

Based on the requirements of Table 3-A in the California Building Code, the existing Physics Building operates under both Occupancy Group B (educational purposes) and Occupancy Group A-3 (assembly room). Maintaining the B occupancy group for the laboratories requires chemical and gas quantities to be within the limits of Table 9-A, 3-D and 9-B, 3-E of the California Building Code. If quantities exceed those limits, the facility will be classified as an H occupancy. Based on Table 5-B of the Uniform Building Code, the Physics Building is of Construction Type II F.R.. All renovation concepts assume the Physics Building will be used for general office and less intensive research laboratories. These uses will probably not involve large quantities of chemicals and consequently the building operation will remain a B-Occupancy and not an H-Occupancy.

8 PRELIMINARY SCHEDULE

8.0 PRELIMINARY SCHEDULE

UCR PHYSICS BUILDING RENOVATION
JLP #01-03.1/UCR #950446



11 ADDENDUM

11.1 Executive Summary

The Detailed Project Program for the *Geology Building Renovation* project was completed in August of 2001. At that time, the direct construction cost of the project was estimated to be $21.3 million excluding soft costs and escalation beyond September 2004. Only $5.0 million of state funding had been earmarked for the project in the 2004-2005 budget year. As a consequence, an alternative plan for the phased implementation of the project was developed. Four (4) separate construction phases were identified with completion of the final phase in December of 2009.

In the fall of 2002, $11,560,000.00 in state funding was earmarked for the project in the 2005-06 budget year. Consequently, the project scope has been revised. Construction is expected to proceed in 2005-06 and be completed within eighteen (18) months.

11.2 Revised Project Scope

The *Geology Building Renovation* project will include the following specific scope:

- **Completion of HVAC Upgrades** (Unfinished deferred maintenance work)
  - Demolition of ductwork, fan coil units, and vertical fumehood exhausts.
  - Installation of branch ducting, diffusers and controls.
  - Installation of new fumehood exhaust ducts from labs to the roof.
  - Hazardous materials abatement.

- **Completion of Building System Upgrades**
  - Upgrade of 12KV electrical service
  - Replacement of windows and sunshades
  - Replacement of HVAC systems to the labs
  - Replacement of electrical services to the labs
  - Replacement of plumbing services to the labs and restrooms
  - Fire protection: installation of an automatic fire protection system, fire riser, FDC alarm, and backflow preventor
  - Seismic enhancement
  - Replacement of interior partitions, doors, and finishes as required by the systems upgrade work
  - Replacement of functional equipment (restrooms)
  - ADA upgrades
  - Hazardous materials abatement

- **Geology Building Renovations**
  - Renovation of the second floor to accommodate the *Department of Environmental Sciences*
  - Renovation of the first floor/center wing to accommodate departmental offices for the *Department of Earth Sciences* and *Institute of GeoPhysics* and *Planetary Physics (IGPP)*
  - Renovation of area of the first floor/south wing vacated by the departmental offices for research labs

11.3 Project Scope Eliminated

The following scope items previously included in the *Geology Building Renovation* project have been eliminated:

- Construction of a new stair, elevator, and shaft adjacent to the north wing.
- Renovation of the remaining area of the first floor (future project).
- Renovation of the basement (future project).
- Renovation of the subbasement.
- ADA upgrades to the existing elevator (to the completed as a separate project).

11.4 Project Phasing

PHASE 1 - SECOND FLOOR	ASF	GSF
• Renovate Center Wing	2,800	
• Renovate North Wing	8,120	
• Renovate South Wing	9,068	
SUBTOTAL	*19,988*	*33,313*
PHASE II - FIRST FLOOR	**ASF**	**GSF**
• Renovate Center Wing	2,400	
• Renovate North Wing (partial)	2,624	
SUBTOTAL	*5,024*	*8,373*
TOTAL RENOVATED SPACE	*25,012*	*41,686*

* Building systems upgrade work 56,043 GSF to proceed independently

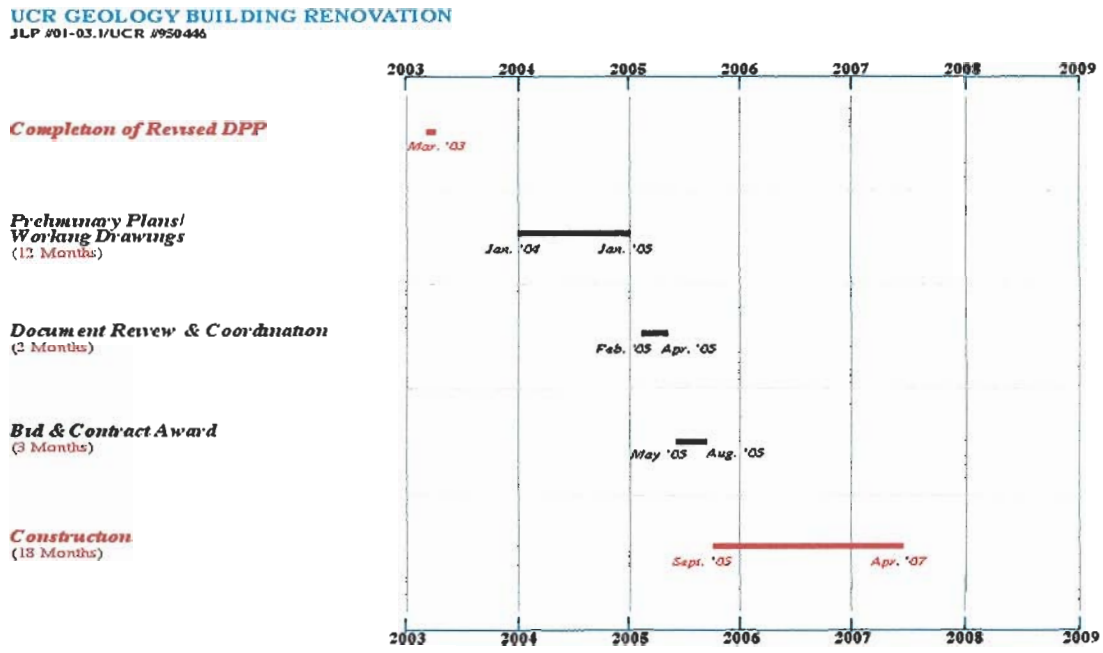
11.5 Project Budget

The construction cost for the *Geology Building Renovations* in March 2003 dollars is estimated to be as follows:

• Completion of HVAC Upgrades	$1,085,000.00
• Completion of Building System Upgrades	$550,000.00
- Center Wing	$489,000.00
- South Wing	$1,266,000.00
- North Wing	$4,043,000.00
• Geology Building Renovations	$4,127,000.00
• *Project Total*	*$11,560,000.00*

11.6 Project Schedule

The following is the anticipated schedule for the *Geology Building Renovation* project is as follows:



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CONSTRUCTION BUDGET COST ESTIMATE

for

RENOVATIONS TO GEOLOGY BUILDING

at

UNIVERSITY of CALIFORNIA at RIVERSIDE

11-Mar-03

CONSTRUCTION BUDGET COST ESTIMATE
PROJECT HARD COSTS SUMMARY

				2003 costs	2006/2007 costs
1 Geology Building Renovations			$/SF	$,000	$,000
1.1 Deferred maintenance completion (per UCR memo 01/27/03)				1,085	1,085
1.2 Budget allowances for system upgrades:					
Electrical (per consultant's estimate)				550	616
Building and systems					
Center Wing	16,300	OGSF	30.00	489	548
South Wing	21,100	OGSF	60.00	1,266	1,418
North Wing	53,900	OGSF	75.00	4,043	4,528
1.3 Completion of Geology Renovations				4,127	4,752
Total for Geology Renovations:	91,300	SF	127.00	**$11,560**	**$12,947**

Note: Escalation allowance of 12% included to anticipated mid-point of construction at say Jan-2007

NJF Associates Inc.