



# *Space & Experimental Architecture Programs*

**SICSA**  
 Sasakawa International  
 Center for Space Architecture  
 Gerald D. Hines  
 College of Architecture  
 University of Houston

## SICSA Background

*SICSA's endowment and other self-generated revenues support its teaching programs within the University of Houston's Gerald D. Hines College of Architecture.*

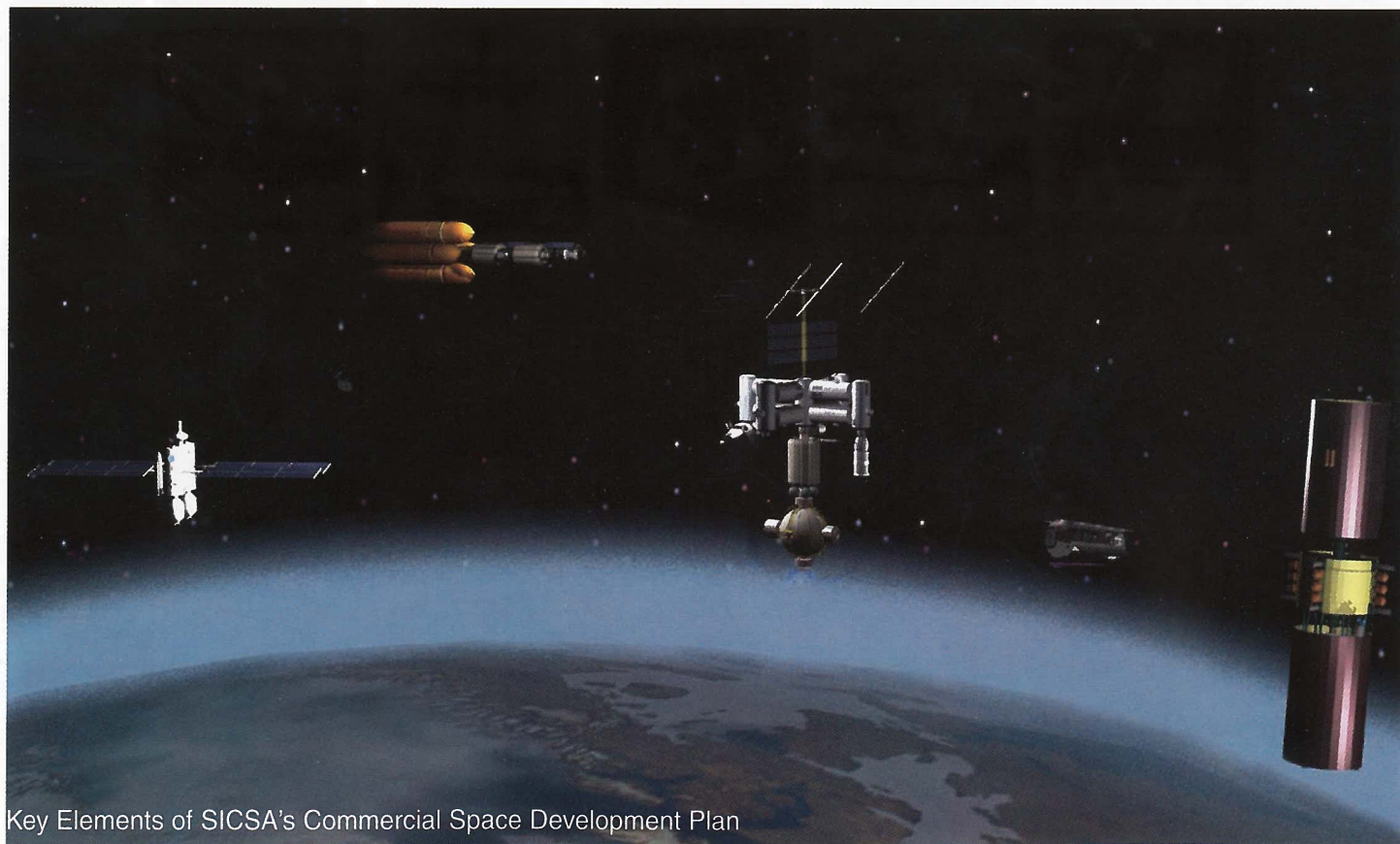
*The organization draws upon vast technical information resources that are available in the Houston area.*

*SICSA is a leading academic center in the field of space architecture and applies space lessons to address architectural needs on Earth.*

The *Sasakawa International Center for Space Architecture (SICSA)* is a unique research, design, and teaching entity within the University of Houston's Gerald D. Hines College of Architecture. SICSA was founded in 1987 with a \$3 million gift provided by the Japan Shipbuilding Industry Foundation. The organization's mission is to plan and to implement programs that will advance peaceful and beneficial uses of space and space technology. SICSA also pursues planning and design for difficult and extreme environments on Earth that can benefit from advanced approaches, systems and applications that are revealed through space investigations and concepts.

SICSA's location in Houston, a major global space technology and trade center, is ideal. This setting affords convenient access to diverse information resources and collaboration opportunities afforded by the NASA Johnson Space Center, local aerospace companies, major research institutions, and commercial technology enterprises in the city and region.

SICSA is internationally recognized for its leadership in the field of space architecture. Many program graduates have embarked upon productive and rewarding careers with aerospace organizations throughout the world. NASA has awarded certificates of appreciation to SICSA for significant achievements contributing to its advanced design initiatives. SICSA and its work have been featured in numerous popular magazines, professional publications, and public media broadcasts in many countries.



Key Elements of SICSA's Commercial Space Development Plan

## Undergraduate and Graduate Programs

*Undergraduates can participate in the SICSA program during their fourth and fifth years of study.*

*Challenging design studio projects supplemented by topical seminars constitute the core curriculum.*

*Graduate students holding a professional architecture degree can complete SICSA-sponsored courses in two semesters.*

SICSA sponsors educational programs for upper division undergraduate students and graduate students with interests in space and experimental architecture. Selected undergraduates who enter these programs during their fourth year of study in the College of Architecture pursue Earth-based projects which typically pose special technical and environment challenges. Many of these five credit hour design courses qualify as comprehensive studios within the College's curriculum. All undergraduates are required to complete at least one studio course with this advanced designation.

Many fourth year participants continue in the SICSA program throughout their remaining undergraduate studies, and are joined by other new fifth year students. Fifth year studies typically address space and other extreme environments that require an emphasis on a practical and innovative problem-solving approaches. Special topic seminars are offered to supplement the core design studios.

Selected graduate applicants holding a professional degree in architecture from accredited colleges and universities can earn a Master of Architecture degree with a specialization in space and experimental architecture upon completion of 32 credit hours of study which includes two six-hour design studios. Accepted graduate students seeking a Master of Architecture degree who do not hold a professional architecture degree may enter SICSA studios during the final year of their minimum 72 credit hours of study.

## Planned M.S.-Space Architecture Program

Subject to necessary University of Houston and Texas Higher Education Coordinating Board approvals, SICSA and the College of Architecture propose to expand their graduate education role to add a *Master of Science in Space Architecture* degree program. This new program is primarily being planned in response to known interests of non-architect professionals from NASA and aerospace corporations who wish to pursue advanced space architecture research and design studies. The program will be also available to working professionals holding an undergraduate architectural degree.

As with current Bachelor and Master of Architecture programs offered to those who plan to practice as professional architects, design studios and supporting seminars will comprise the M.S. Space Architecture core curriculum. These two types of courses will constitute at least 24 of the 30 credit hour degree requirements. The remaining credits may be earned either by completing a fifth semester design studio and seminar, elective courses and independent study projects, or a thesis. Elective courses may be drawn from a rich variety of offerings within the Gerald D. Hines College of Architecture and other colleges at the University of Houston.

The M.S.-Space Architecture program will be integrated and coordinated with activities associated with the other SICSA-sponsored programs to optimize "cross fertilization" benefits. Many of these shared experiences will involve ambitious interdisciplinary team research, planning and design projects.

*The M.S.-Space Architecture program responds to interests of non-architect aerospace professionals wishing to broaden their knowledge.*

*Part-time students will be able to complete the 30 hour program over five semesters while retaining their current jobs.*

*Design studios and seminars will emphasize interdisciplinary projects.*

## Space Architecture

*Space architecture entails comprehensive planning, design, and analysis of missions and facilities.*

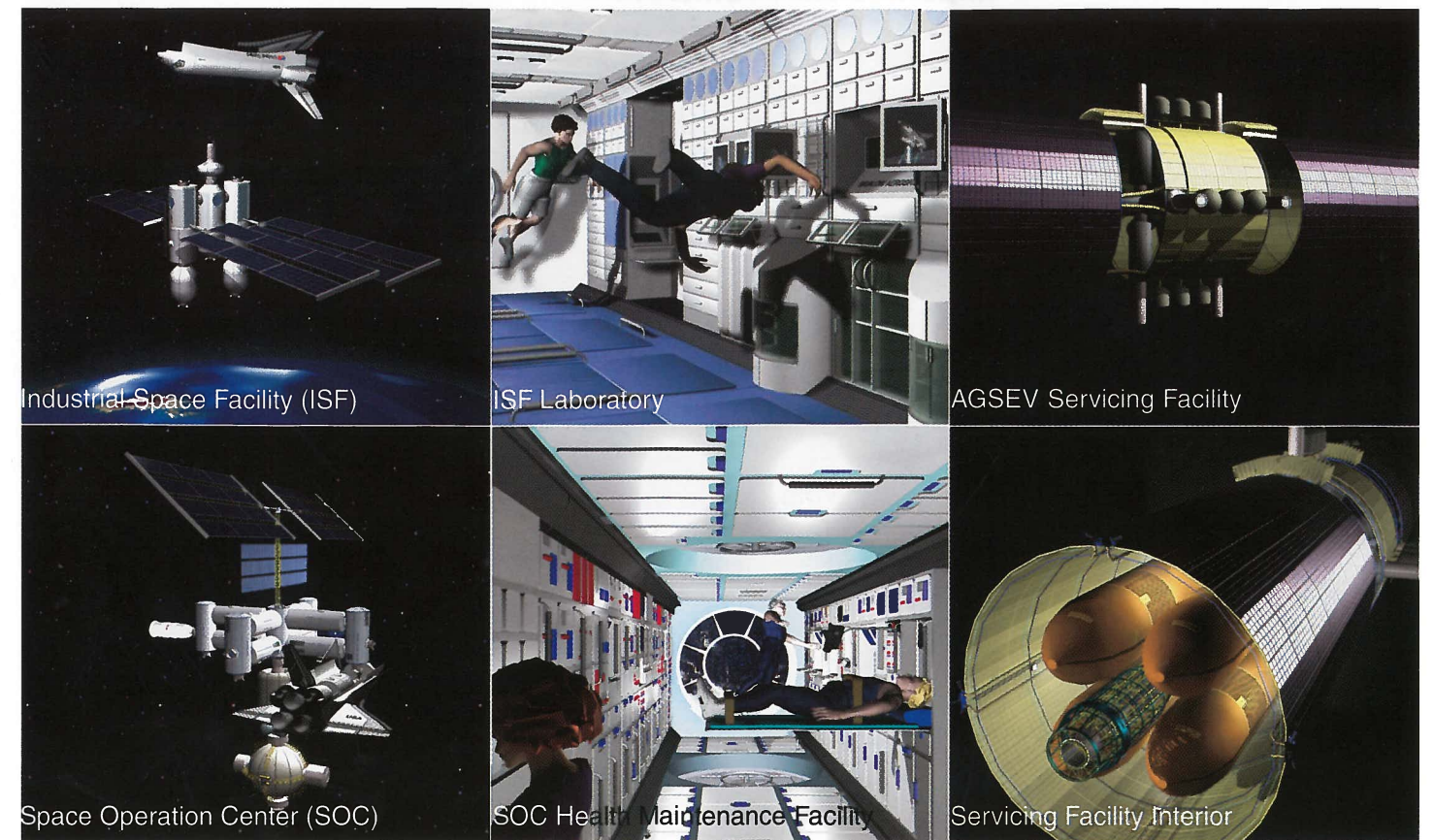
*Launch economy, assembly efficiency, system reliability, safety, and human performance are vital considerations.*

*SICSA's projects address many types of space facilities, applications, and sponsor priorities.*

SICSA applies a very comprehensive scope of activities to the practice of space architecture. Important roles include mission planning, conceptualization of orbital and planetary structures and assembly processes, and design of habitats to optimize human safety, comfort, adaptation, and productivity.

Space architecture differs from terrestrial architecture in many significant ways. For example, weightless and reduced-gravity conditions influence most aspects of habitat design and use. Material and equipment mass must be minimized as much as possible to control launch costs. Reliability and maintainability of all systems under hazardous and difficult conditions are vital. Safeguards must be provided to protect spacecraft and inhabitants from meteorites and radiation. Also, facilities must be designed to optimize use of severely volume-limited habitat interiors.

SICSA's projects address a wide range of space facility types, applications, development priorities, and sponsor interests. Representative projects have included: habitability studies involving the development and use of SICSA's *Closed Environment Laboratory* that was established with support from NASA, Grumman Space Systems, and the Texas Space Grant Consortium; Lunar and Mars habitat planning in connection with the NASA/USRA University Advanced Research Program; and planning for space tourism supported by a gift from the owner of a national hotel chain.



## Commercial Space Development Planning

Private satellite communication ventures and launch services demonstrate enormous revenues and benefits to everyday life that can result from commercial space initiatives. Future advancements in propulsion systems and other launch vehicle technologies can be expected to reduce the costs of access to space, affording new opportunities for profitable and rewarding enterprises beyond Earth.

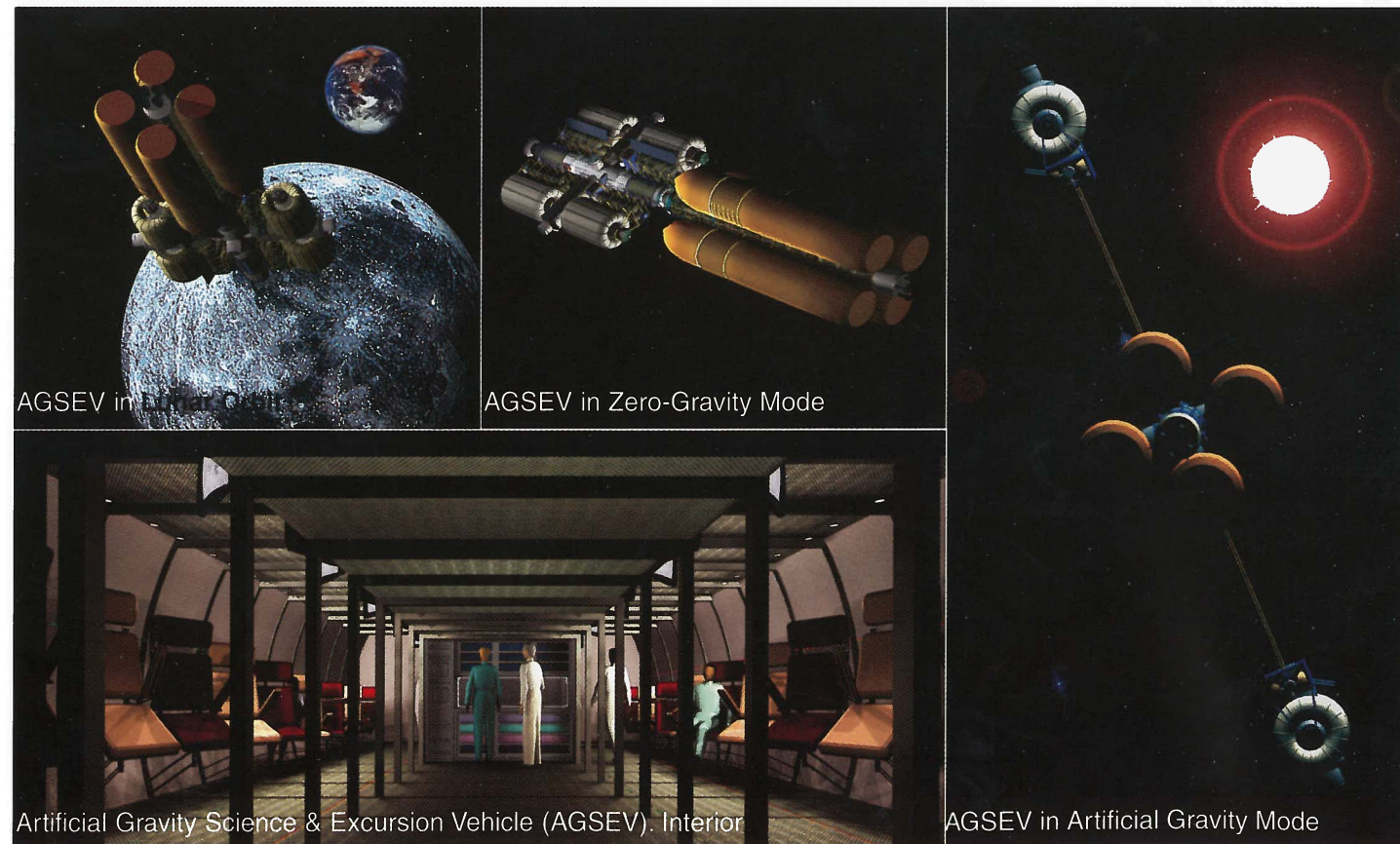
SICSA is undertaking a comprehensive, long-range commercial space development planning and design initiative. The ultimate goal is to conceptualize an evolutionary sequence of enterprises to provide a broad, integrated infrastructure of space facilities and services. This plan will ultimately include planetary voyages and settlements.

The space development scenario commences with an orbiting *Industrial Space Facility (ISF)*, which will take advantage of microgravity and vacuum conditions for materials research and production. A second orbiting habitat, the *Space Operations Center (SOC)* will function initially as a *Space Media Laboratory (SML)*, and later be expanded to offer tourist lodging and crew accommodations. An *Artificial Gravity Science and Excursion Vehicle (AGSEV)* will carry passengers from the SOC to Lunar or Mars orbit and back. An orbiting *Construction and Servicing Facility (CSF)* will provide maintenance and refueling capabilities. AGSEV elements may also potentially be used as Lunar/planetary habitats.

*Commercial satellite and launch industries are precursors of future space enterprises.*

*SICSA is exploring new opportunities and requirements for space commercialization.*

*Possibilities include materials research and processing, orbital media labs, tourism, and Lunar/Mars voyages and settlements.*



## Experimental Architecture

*SICSA applies space lessons and technologies to solve problems on Earth.*

*New developments and unique environments present special design challenges.*

*Spaceports can support commercial space development initiatives.*

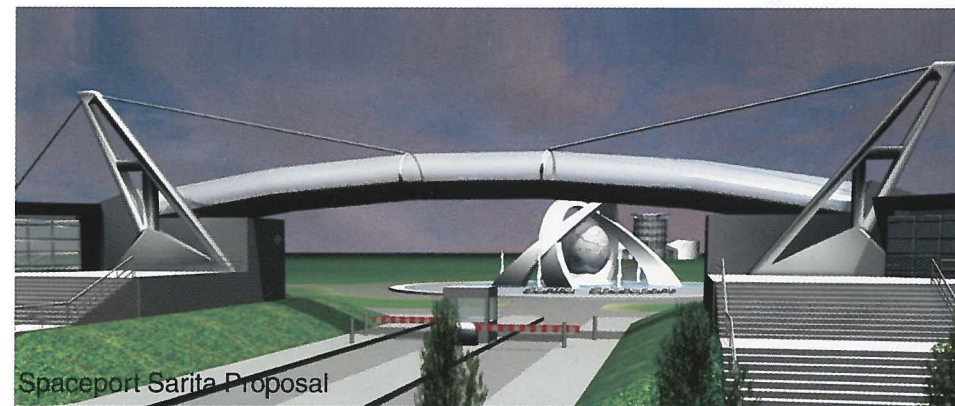
*Extreme environments on Earth mirror some conditions in space.*

Many lessons from space architecture can be applied to address important planning and design challenges on Earth. Common priorities include: energy conservation; materials science; construction systems; and means to optimize human adaptation and performance under difficult and often dangerous conditions.

Some SICSA projects respond to technological and social developments that create needs for new or improved types of facilities. Others address environments and uses that pose special problems due to their unusual and extreme nature.

SICSA is providing master planning and design support to the Texas Aerospace Commission and various regional and local public and private organizations that are working to promote the creation of a commercial spaceport in Texas. Such a development will support the operations of advanced reusable launch vehicles that can reduce space transportation costs, a goal that will facilitate objectives of SICSA's commercial space development planning.

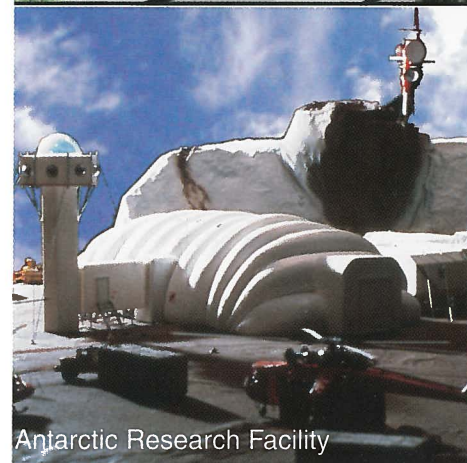
Other SICSA interests include projects that involve remote settings that present difficult living and working conditions. Representative examples are Antarctic bases, offshore and underwater habitats, and housing for people displaced by natural and man-made disasters.



Spaceport Sarita Proposal



Space Sciences & Tourism Center



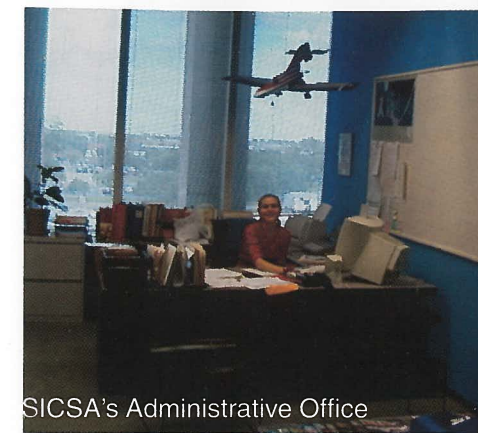
Antarctic Research Facility



Ocean Development Complex



Submersible Ocean Research Facility



SICSA's Administrative Office



Concept Visualization Laboratory



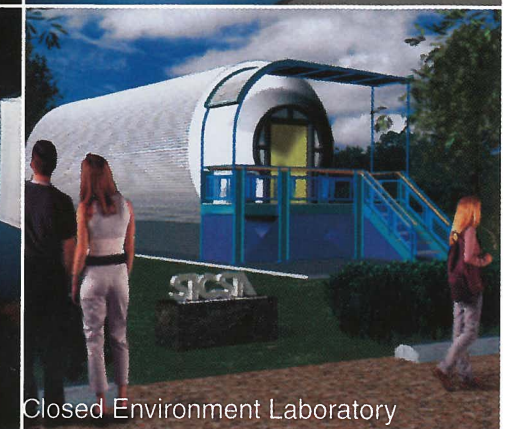
SICSA Exhibition Space



SICSA's Conference Room



SICSA Project Display



Closed Environment Laboratory

## SICSA's Facilities and Resources

SICSA enjoys outstanding accommodations for its research, design, and teaching programs within the prominent Gerald D. Hines College of Architecture building. These facilities include several faculty/staff offices, an administrative office, a spacious conference room, seminar rooms, a *Concept Visualization Laboratory* (computing center), a library, and a model shop. SICSA's computing, library, and model shop resources are supplemented by facilities provided by the College of Architecture and the University of Houston main campus for general faculty and student use. The College also has an auditorium for lectures and large events, a teleconference center, and numerous exhibition spaces.

SICSA has developed and maintains a habitable space station-sized *Closed Environment Laboratory* that is located adjacent to the College of Architecture building. Its purpose is to study relationships between physical design features and the abilities of inhabitants to adapt and perform during long-term space, polar, and underwater experiences. The construction of this facility has been made possible through contributions valued at approximately \$500,000. Donors include the NASA Johnson Space Center, Grumman Space Systems, the Texas Space Grant Consortium, Pittsburgh Corning, the University of Houston, and SICSA. This development initiative was the subject of a NASA-sponsored television production titled *Together Towards Tomorrow* for the *NASA Select* program series, and was featured as an example of a successful public-private-institutional partnership.

*Spacious offices and meeting rooms support faculty, administrative, and teaching functions.*

*A Concept Visualization Laboratory contains SICSA's advanced and constantly expanding computing resources.*

*Development of SICSA's habitable space station module-sized design and research lab exemplifies public-private cooperation.*

## Application Information

*Applications for SICSA program participation must be approved by the Gerald D. Hines College of Architecture.*

*A copy of personal, academic and work background information should be sent to SICSA's Director.*

*Prospective students are encouraged to visit and to observe SICSA's activities and environment.*

Prospective students who wish to participate in SICSA's graduate programs should submit their applications and supporting materials to:

Director of Graduate Studies  
University of Houston  
Gerald D. Hines College of Architecture  
122 College of Architecture Bldg  
Houston, TX 77204-4000

All application documentation should be received by the College of Architecture either by October 1st for Spring entrance, or by February 1st for Fall entrance. Applicants are also encouraged to write a letter to SICSA's Director, Larry Bell, regarding their special interests and goals, educational backgrounds, and work experience in addition to applications submitted to the College for formal review.

Prospective students are welcome to visit our facilities to experience our activities and environment first hand. Such visits should preferably occur when classes are in session to enable discussions with current students. Advance notice of visit plans will facilitate meeting arrangements with SICSA and other College faculty and staff. Visits can also provide opportunities to tour the University of Houston campus, to investigate housing options, and to experience the vitality of Houston and its surrounding areas.



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