2017-2018 ACSA/AISC STEEL DESIGN STUDENT COMPETITION

AFFORDABLE HOUSING
Category I

OPEN
Category II

$14,000
in cash prizes

AMERICAN INSTITUTE OF STEEL CONSTRUCTION

ASSOCIATION OF COLLEGIATE SCHOOLS OF ARCHITECTURE

SCHEDULE

MARCH 28, 2018	REGISTRATION DEADLINE (FREE)
MAY 23, 2018	SUBMISSION DEADLINE
SUMMER 2018	WINNERS ANNOUNCED
FALL 2018	PUBLICATION OF SUMMARY BOOK

Image Credits: Han Meng & Ka U La, Woodbury University, Faculty: Gerard Smulevich, Project: Disposed Housing
2007-2008 Steel Design Student Competition, Category I: Assembling Housing - Third Place

INTRODUCTION

The Association of Collegiate Schools of Architecture (ACSA) is pleased to announce the **18th Annual Steel Design Student Competition** for the 2017-2018 academic year. Administered by the Association of Collegiate Schools of Architecture (ACSA) and sponsored by the American Institute of Steel Construction (AISC), the program is intended to challenge students, working individually or in teams, to explore a variety of design issues related to the use of steel in design and construction. Steel must be used as the primary structural material and contain at least one space that requires long-span steel structure, with special emphasis placed on innovation in steel design.

THE OPPORTUNITY

The 2017-2018 Steel Design Student Competition will offer architecture students the opportunity to compete in two separate categories:

Category I **AFFORDABLE HOUSING**
Challenges architecture students to design AFFORDABLE HOUSING in an urban context of the student's and sponsoring faculty's selection.

Category II **OPEN**
Offers architecture students the opportunity to select a site and building program using steel as the primary material. This competition category permits the greatest amount of flexibility for any building type.

Students may not enter both categories of the competition.

The competition allows students to explore the many varied functional and aesthetic uses for steel as a building material. Steel is an ideal material for multi-story housing because it offers the greatest strength to weight ratio and can be designed systematically as a kit of parts or prefabricated to allow for quicker construction times and less labor, thus reducing the cost of construction. Housing built with steel is potentially more flexible and adaptable to allow for diversity of family structures and changing family needs over time.

STRUCTURAL STEEL

Structural steel offers a number of benefits in building design including the capacity to bear great loads in tension and compression, high resiliency and performance under harsh and difficult conditions, (e.g., earthquakes and hurricanes) and the ability to span great distances with minimum material. Steel can be shaped by many processes, ranging from standard rolled sections to custom castings and digitally generated components. It can be prefabricated and delivered for site assembly, and it can be erected quickly under almost any weather condition to meet tight construction schedules. Similarly, steel's wide use for building cladding highlights its durability, technical capabilities and aesthetic versatility.

COMPETITION ORGANIZERS

Administrative Organization

The Association of Collegiate Schools of Architecture is a nonprofit, membership association founded in 1912 to advance the quality of architectural education. The school membership in ACSA has grown from 10 charter members to over 250 schools in several membership categories. These include full membership for all accredited programs in the United States and government-sanctioned schools in Canada, candidate membership for schools seeking accreditation, and affiliate membership for schools for two-year and international programs. Through these schools, over 5,000 architecture faculty members are represented. In addition, over 500 supporting members composed of architecture firms, product associations and individuals add to the breadth of interest and support of ACSA goals. ACSA provides a major forum for ideas on the leading edge of architectural thought. Issues that will affect the architectural profession in the future are being examined today in ACSA member schools.

Sponsor

The American Institute of Steel Construction (AISC), headquartered in Chicago, is a non-profit technical institute and trade association established in 1921 to serve the structural steel design community and construction industry in the United States. AISC's mission is to make structural steel the material of choice by being the leader in structural-steel-related technical and market-building activities, including: specification and code development, research, education, technical assistance, quality certification, standardization, and market development. AISC has a long tradition of more than 90 years of service to the steel construction industry providing timely and reliable information.

Membership to AISC is free to university faculty and full time students, and AISC membership provides valuable benefits. Information can be found at *www.aisc.org/universityprograms*.

CRITERIA FOR JUDGING

Criteria for the judging of submissions will include: creative use of structural steel in the design solution, successful response of the design to its surrounding context, and successful response to basic architectural concepts such as human activity needs, structural integrity, and coherence of architectural vocabulary.

Submissions must clearly represent the selected program. In addressing the specific issues of the design challenge, submissions must clearly demonstrate the design solution's response to the following requirements:

- An elegant expressive understanding of the material–steel–deployed with maximum innovative potential with a minimum of one long-span space
- A strong conceptual strategy translated into a coherent integrated design proposal
- An articulate mastery of formal concepts and aesthetic values
- A compelling response to the physical and cultural context of the scheme
- A mature awareness and innovative approach to sustainability as a convergence of social, economic and environmental issues
- A thorough appreciation of human needs and social responsibilities

Image Credits: Kevin Herhusky, California Polytechnic State University, Project: The Public Factory: Rebuilding an industrial-icon of Detroit's past in order to galvanize its future.2016-2017 Steel Design Student Competition, Category II: Open - First Place

AFFORDABLE HOUSING

Category I

OVERVIEW

The 2017-2018 Steel Design Student Competition is socially oriented to challenge students to design affordable multi-family housing in an urban context.

The need for affordable housing types is on the rise. Populations are moving back to the city, realizing the cost of living, required commuting, and range of quality-of-life options afforded by living near the urban core. Not only for those who have a choice to live in denser environments, but also for low-income populations, housing must be affordable. Today's housing problems are difficult, but architects are in a unique place to envision innovative solutions to the housing crisis that affects so many.

Steel is an ideal material for affordable multi-story housing because it offers the greatest strength to weight ratio and can be designed systematically as a kit of parts or prefabricated to allow for quicker construction times and less labor, thus reducing the cost of construction. Housing built with steel is potentially more flexible and adaptable to allow for diversity of family structures and changing family needs over time.

SITE

The site for the competition is the choice of the student and/or faculty sponsor. It is required, however, for the site to be in a dense urban context, close to public transportation and city amenities. Submissions will be required to explain graphically or otherwise the site selection and strategy.

CONSTRUCTION TYPE

The design project must be conceived in structural steel construction. A strategy should be considered that evaluates a method for reducing overall construction cost for the affordable housing project in steel using innovative methods of structure, fabrication, and construction.

AFFORDABLE HOUSING

Category I

THE PROGRAM

Mixed-use multifamily housing should respect the ethnically and economically diverse urban fabric. The program is to design a new steel building structure and must meet a minimum of eight levels in height. The design must consider the life cycle of the building, mixed income units, residential support spaces and mixed-use spaces.

The functional and programmatic requirements for the residential space outlined below must be met at a minimum. The area allocations, however, are suggestions only and may be altered. Solutions should observe the total gross square footage, within a range of plus or minus ten percent.

Residential Space Allocation

Residential Units		
3 bedroom units	10 @ 1,500 sq. ft.	= 15,000 square feet
2 bedroom units	15 @ 1,000 sq. ft.	= 15,000 square feet
1 bedroom units	15 @ 600 sq. ft.	= 9,000 square feet
Live / Work units	10 @ 1,500 sq. ft.	= 15,000 square feet

Additional Residential Support Spaces

Lobby	1,500 square feet
Office	500 square feet
Exercise Room	1,000 square feet
Mail Room	300 square feet
Loading Dock/Waste	700 square feet
Total Square Feet for Residence	58,000 square feet

Mixed-use Space Allocation

The mixed-use function space should be built on the demands of the city and site selected. Below is a list of possible mixed-used functions with space allocations. Students and/or faculty sponsors can choose from the list below or determine from the demands of the chosen site.

Large Retail	1 @ 20,000 sq. ft.	= 20,000 square feet
Small Retail	10 @ 1500 sq. ft.	= 15,000 square feet
Restaurant	2 @ 5000 sq. ft.	= 10,000 square feet
Office Units	4 @ 1500 sq. ft.	= 6,000 square feet
Recreation	1 @ 5000 sq. ft.	= 5,000 square feet
Total Square Feet for Mixed-use		56,000 square feet
Total Gross Square Feet		114,000 square feet
Total Net Square Feet Plus 10% Allowance For mechanical areas, circulation, structure, etc.		**125,400 square feet**

OVERVIEW

The ACSA/AISC 2017-2018 Steel Design Student Competition offers architecture students the opportunity to participate in an open competition with limited restrictions. This category will allow the students (with the approval of the sponsoring faculty member) to select a site and building program.

- The Category II program should be of equal complexity as the Category I program.
- Students entering Category II must submit a written building program along with the online submission in the Program Edits (copy/paste text box).

Restrictions

To enter the open competition students may select any building occupancy other than residential.

Students may not enter both categories of the competition.

Image Credits: John Sayegh & Samantha Sowell, University of Tennessee-Knoxville, Project: Rhizome Terminal
2016-2017 Steel Design Student Competition, Category I: Museum - Honorable Mention

DESIGN GUIDELINES **(Category I & Category II)**

USE OF STEEL

Steel must be used as the primary structural material with special emphasis and understanding of a steel bracing system exposing the material's slenderness, grace and transparency. Design proposals must contain at least one space that requires long-span steel structure, with special emphasis placed on innovation in steel design and an awareness of the bracing system incorporated in the design proposal.

For a proposed steel building, there are many different correct designs for a structure to carry gravity loads to the foundation or resist lateral loads. Understanding limitations and potentialities of steel as a material can improve the architectural design transforming weaknesses into strengths. Among many steel structural systems designed to resist lateral loads in steel structures, steel-braced frames are one of the most widely used in multistoried buildings. These frames are primarily placed in vertically aligned spans and allow obtaining a great increase of stiffness with a minimal added weight. Additionally, bracings can provide an increase in stability of the structure with lateral loading and help reduce lateral displacement significantly.

Traditionally, steel braces have been used in a concentric braced frame (CBFs) configuration, consisting of diagonal braces located in the plane of the frame. This system is the most common for medium-rise structures because it provides the same strength in both directions. In fact, both ends of the brace join at the end points of other framing members to form a truss, creating a stiff frame. CBFs may be arranged in several different configurations – such as X, V, inverted V or one-directional diagonal bracing, and single or multi-level bracing – and the bracing members may be designed to act in tension or compression or both. However, braces can interfere with architectural features and many architects have been experimenting with different results (*IBM Building, Pittsburgh. Architect: Curtis and Davis; Hancock Building, Chicago. Architect: Fazlur Rahman Kahn, Bruce Graham; Hearst Tower, NYC. Architect: Norman Foster (Foster and Partners*).

One solution to the architectural constraints is offered by eccentrically braced frames (EBFs). They provide the same advantages as CBFs but greater flexibility with architectural openings. Eccentric bracing consists of diagonal braces located in the plane of the frame where one or both ends of the brace do not join at the end points of other framing members. The system essentially combines the features of a moment frame and a concentrically braced frame, while providing excellent ductility for high-seismic regions of the country. The eccentric connection to the frame means an eccentric brace transfers lateral forces via shear either to another brace or to a vertical column. Architects have designed several eccentrically braced frames for prominent buildings in the United States from the 1960's through the 1980's (*i.e, Office of LeMessurier Consultants*). For these structures, designed prior to modern seismic provisions, eccentric bracing was the most efficient means to developing a stiff lateral system that accommodated the architectural program (http://www.lemessurier.com/work). However, more innovative designs have recently fully utilized the EBFs potentials (*i.e. Fujisawa project, Tokyo, Japan, Architect: Richard Rogers*). Among the many, the Sierra Bonita Affordable Housing project in West Hollywood, California by TIGHE Architecture represents a good example of how EBFs can be implemented in the architectural design process. This five story mixed-use affordable housing project features a courtyard with an eccentric brace frame core as a fundamental structural design component.

These newly evolving EBFs systems should be investigated more in terms of their structural and economic feasibility. The challenge for the *next generation of buildings* will be to make EBFs an adaptive structural system that responds to possible changes in occupancy levels and demands of site conditions. The complexities involved in the design should justify the continued construction within the constraint of limited resources providing innovative design solutions. Whether using EBFs or another structural system, the most compelling proposals will inevitably integrate the use of steel into the design of the project at multiple levels, from primary structure to building envelope and tectonic details. The project should be developed with an integrative approach to the innovative use of building materials and systems—spatial, structural, environmental and enclosure.

DESIGN GUIDELINES **(Category I & Category II)**

CODE INFORMATION
Refer to the International Building Code and the local zoning ordinance for information on parking requirements, height restrictions, set-backs, easements, flood, egress and fire containment. All proposals must be designed to meet requirements for accessibility; for guidelines, refer to the Americans with Disabilities Act and the principles of Universal Design.

CRITERIA FOR JUDGING
Submissions must clearly represent the selected program. In addressing the specific issues of the design challenge, submissions must clearly demonstrate the design solution's response to the following requirements:

- An elegant expressive understanding of the material–steel–deployed with maximum innovative potential with a minimum of one long-span space
- A strong conceptual strategy translated into a coherent integrated design proposal
- An articulate mastery of formal concepts and aesthetic values
- A compelling response to the physical and cultural context of the scheme
- A mature awareness and innovative approach to sustainability as a convergence of social, economic and environmental issues
- A thorough appreciation of human needs and social responsibilities

REQUIRED SUBMISSION DOCUMENTS
Submissions must include (but are not limited to) the following required drawings:
- Three-dimensional representations - in the form of axonometrics, perspectives showing the proposal in its context, montages and/or physical model photographs – to illustrate the character of the project;
- Site plan showing proposal in its context of surrounding buildings and topography, together with details of access/circulation;
- Building/site sections sufficient to show site context and major spatial and program elements;
- Floor plans to show program elements, spatial adjacencies and navigation strategies;
- Large scale drawing(s), either orthographic or three dimensional, illustrating:
    - the use and detailing of steel for building structure and/or envelope
    - integrated design

Submissions must include:
- Completed online registration including all team members and faculty sponsors,
- Four (4) digital boards at 20" x 20" in a grid format,
- A design essay or abstract (300 words maximum),
- Program summary diagram/text of spaces and areas (300 words maximum).

The names of student participants, their schools and faculty sponsors must NOT appear on the boards, abstract, program summary, or in the file name.

Incomplete or undocumented entries will be disqualified. All drawings should be presented at a scale appropriate to the design solution and include a graphic scale. The site plan should include a north arrow.

RESOURCES **(Category I & Category II)**

An intention of all ACSA competitions is to make students aware that research is a fundamental element of any design solution. Students are encouraged to research material properties and methods of steel construction, as well as precedent projects that demonstrate innovative use of structural steel.

Steel Construction References

1. AISC website: www.aisc.org
2. *Modern Steel Construction*: This authoritative monthly magazine is made available online free of charge. This magazine covers the use of fabricated structural steel in the variety of structural types. It presents information on the newest and most advanced applications of structural steel in a wide range of structures. Issues of Modern Steel Construction (1996 - Present) are available online. Visit www. modernsteel.com to view them
3. Terri Meyer Boake. *Understanding Steel Design: An Architectural Design Manual*. (Birkhäuser 2013)
4. John Fernandez. *Material Architecture*. (Spon Press, 2006)
5. Victoria Bell and Patrick Rand. *Materials for Design 2*. (Princeton Architectural Press, 2014)
6. Shulitz, Habermann, Sobek. *Steel Construction Manual*. (Birkhäuser Basel 2000)
7. Annette LeCuyer. *Steel and Beyond*. (Birkhäuser Basel 2003)
8. Lyall, Sutherland. *Remarkable Structure: Engineering today's Innovative Buildings*. (Princeton Architectural Press, 2002)
9. James Ambrose, *Simplified Design of Steel Structures*. (Wiley Press, 1997)

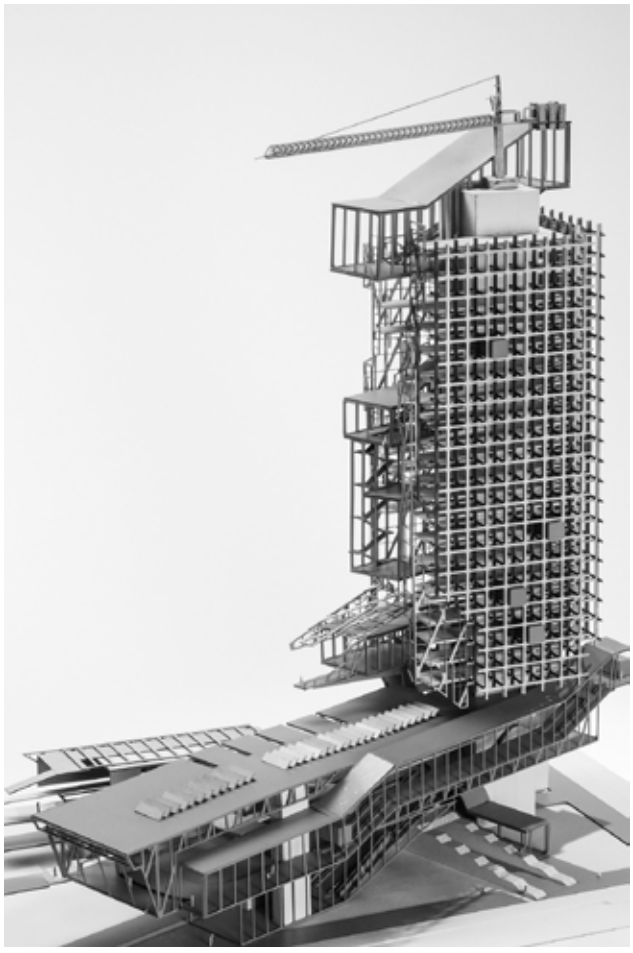

Image Credits: Kevin Herhusky, California Polytechnic State University,
Project: The Public Factory,
.2016-2017 Steel Design Student Competition, Category II: Open - First Place

COMPETITION GUIDELINES **(Category I & Category II)**

SCHEDULE

March 28, 2018	Registration Deadline (free registration)
May 23, 2018	Submission Deadline
Summer 2018	Winners Announced
Fall 2018	Publication of Summary Book

AWARDS

First, second, and third prizes will be awarded in each of the two categories, in addition to a selected number of honorable mentions, at the discretion of the jury. Winners and their faculty sponsors will be notified of the competition results directly. A list of winning projects will be posted on the ACSA web site at www.acsa-arch.org and the AISC web site at www.aisc.org. A total of $14,000 will be distributed in the following manner:

Category I AFFODABLE HOUSING

First Prize	
Student	$2,500
Faculty Sponsor	$1,000
Second Prize	
Student	$1,500
Faculty Sponsor	$750
Third Prize	
Student	$750
Faculty Sponsor	$500

Category II OPEN

First Prize	
Student	$2,500
Faculty Sponsor	$1,000
Second Prize	
Student	$1,500
Faculty Sponsor	$750
Third Prize	
Student	$750
Faculty Sponsor	$500

ELIGIBILITY

Because the support of AISC is largely derived from steel companies whose markets are mainly in the U.S., the competition is open to students from ACSA Full and Candidate Member Schools from the U.S. and Canada, as well as ACSA Affiliate Members Schools from the U.S., Canada, and Mexico only.

The competition is open to upper level students (third year or above, including graduate students). All student entrants are required to work under the direction of a faculty sponsor. Entries will be accepted for individual as well as teams. Teams must be limited to a maximum of five students. Submissions should be principally the product of work in a design studio or related class.

REGISTRATION

A faculty sponsor is required to enroll students online (available at www.acsa-arch.org) by March 28, 2018. Registration can be done for your entire studio or for each individual student or team of students participating. Students or teams wishing to enter the competition on their own must have a faculty sponsor, who should complete the registration. There is no entry or submission fee to participate in the competition. Each registered student and faculty sponsor will receive a confirmation email that will include information on how the student(s) will upload final submissions online. Please add the email address competitions@acsa-arch.org to your address book to ensure that you receive all emails regarding your submission.

During registration the faculty will have the ability to add students, add teams, assign students to teams, and add additional faculty sponsors. Registration is required by March 28, 2018, but can be changed, edited, and added to until a student starts a final submission; then the registration is no longer editable.

COMPETITION GUIDELINES **(Category I & Category II)**

FACULTY RESPONSIBILITY

The administration of the competition at each institution is left to the discretion of the faculty within the guidelines set forth in this document. Work on the competition should be structured over the course of one semester during the 2017-2018 academic year.

Each faculty sponsor is expected to develop a system to evaluate the students' work using the criteria set forth in this program. The evaluation process should be an integral part of the design process, encouraging students to scrutinize their work in a manner similar to that of the jury.

DIGITAL SUBMISSION FORMAT

Submissions must be presented on **four 20" x 20" digital boards**. All boards are required to be uploaded through the ACSA website as Portable Document Format (PDF) or image (JPEG) files. **The names of student participants, their schools, or faculty sponsors, must NOT appear on the boards, or in the project title or project title file name(s).**

DESIGN ESSAY or ABSTRACT

A brief essay, 300 words maximum, is required as part of the submission describing the most important concepts of the design project. Keep in mind that the presentation should graphically convey the design solution and context, and not rely on the design essay to convey a basic understanding of the project. The names of student participants, their schools, or faculty sponsors, must NOT appear in the design essay. This abstract is included in the final online submission, completed by the student(s) in a simple copy/paste text box.

PROGRAM SUMMARY

A program summary diagram/text of spaces and areas is required as part of the submission. All interior and exterior spaces are to be included; total net and gross areas are required.

ONLINE PROJECT SUBMISSION

The student is required to submit the final entries that must be uploaded through the ACSA Competition website at www.acsa-arch.org by 11:59 pm, Pacific Time, on May 23, 2018. If the submission is from a team of students, all student team members will have the ability to upload the digital files. Once the final submit button is pressed no additional edits, uploads, or changes can be made. You may "save" your submission and return to complete. Please note: The submission is not complete until the "complete this submission" button has been pressed. For team projects, each member of team projects may submit the final project, but each project should be submitted only once. Once the final submission is uploaded and submitted, each student will receive a confirmation email notification.

The final submission upload must contain the following:

- Completed online registration including all team members and faculty sponsors,
- Each of the four 20"x20" boards uploaded individually as a high resolution Portable Document Format (PDF) or image (JPEG) file,
- A design essay or abstract,
- A program summary.

Winning projects will be required to submit high-resolution original files/images for use in competition publications and exhibit materials. By uploading your files, you agree that the Association of Collegiate Schools of Architecture (ACSA) has the rights to use your winning submission, images and materials in a summary publication, online and in promotional and exhibition resources. ACSA will attribute authorship of the winning design to you, your team, faculty and affiliation. Additionally, you hereby warrant that the submission is original and that you are the author(s) of the submission.

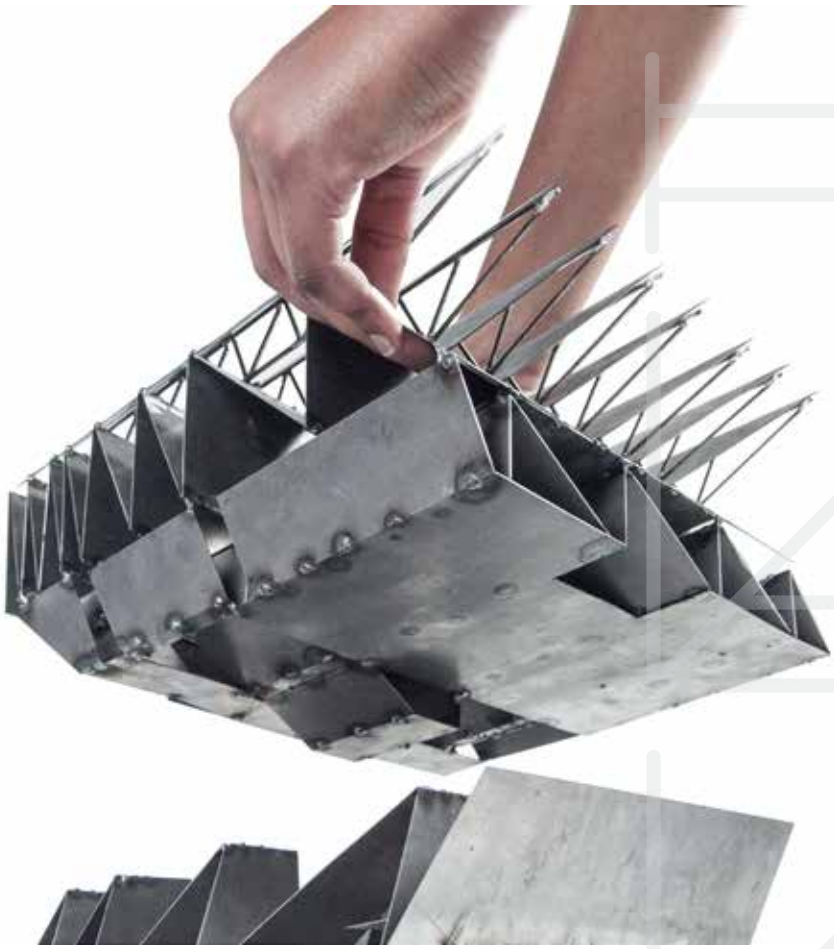

Image Credits: Justin Foo, Cornell University, Project: Museum of the 20th Century: Programmatic Folds
2016-2017 Steel Design Student Competition, Category I: Museum - First Place

FOR MORE INFORMATION

Program updates, including information on jury members as they are confirmed, may be found on the ACSA web site at www.acsa-arch.org/competitions.

Additional questions on the competition program and submissions should be addressed to:

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