DRAFT

Full Scale Wind Load Testing of Aluminum Screen Enclosures

Presented to the

Florida Building Commission
State of Florida Department of Business and Professional Regulation

by

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1. Issues

The letter from Joe Belcher on behalf of the Aluminum Association of Florida (AAF) describes the project (see Appendix). FBC Staff requested that we provide third-party technical input, witness testing, and provide a final review of the report.

Dr. Sungmoon Jung, Assistant Professor of Civil and Environmental Engineering at Florida State University, will provide primary consultation with support from UF. Dr. Jung was selected based on his research experience in this area. More information on this work may be found in:

- J. Lewis, S. Jung and P. Mtenga (2013), Performance of screen enclosures under repeated loading cycles, ASCE Journal of Performance of Constructed Facilities, v 27, p 415-423
- M. Schellhammer and S. Jung (2012), Assessment of aluminum screen enclosure connections subjected to strong winds, Engineering Structures, v 43, p 78-87

2. Relevant Sections of the Code (and related documents)

- 1622.1.2, Florida Building Code—Building
- Guide to Aluminum Construction in High Wind Areas

3. Statement of Work

- Provide consultation to AAF on the experimental design
- Witness testing at the IBHS Research Center
- Interpret results, determine if the problem requires action (or not), and produce a report that explains the results and implications for the Code

4. Points of Contact for the Project

- TBD

5. Budget

Table 1. Budget

Budget	Amount
Salaries	$13,863.80
Fringe Benefits	$3,051.91
Equipment	$0.00
Utilities	$0.00
Travel	$2,500.00
Misc. (Payment to AAF)	$50,000.00
Indirect costs	$1,691.57
TOTAL	$71,107.29

The miscellaneous cost is the $50,000 payment to cover the cost of testing at IBHS testing facility or a third party testing facility.

Research personnel time and will be reported and certified using a “loaded” rate computed from the following table. Note that the indirect cost shown in Table 1 is computed from the indirect cost in Table 2 + the indirect cost associated with the travel and miscellaneous categories.

Table 2. Breakdown of the hourly compensation rate

Person	Hours	Hourly Rate	Fringe	IDC	Total
F. Masters	80	$70.07	$18.43	$8.85	$7,787.86
S. Jung	160	$48.80	$8.58	$5.74	$10,098.88
Admin Asst	20	$22.51	$10.24	$3.28	$720.55

6. Deliverables

- A report providing technical information on the problem background, results and implications to the Code submitted to the Program Manager by June 15, 2014
- A breakdown of the number of hours or partial hours, in increments of fifteen (15) minutes, of work performed and a brief description of the work performed. The Contractor agrees to provide any additional documentation requested by the Department to satisfy audit requirements

7. Appendix: Letter from AAF

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JDB CODE SERVICES, INC.

Date: September 20, 2013

Florida Building Commission
C/O Mo Madani, DBPR
1940 North Monroe Street
Tallahassee, FL 32399

Subject: Aluminum Association of Florida (AAF) Request for Funding for Full Scale Wind Testing of Aluminum Screen Enclosures

Dear Florida Building Commission:

Please consider this a request for funding for an important research project related to the wind resistance of screen enclosures as defined by the Florida Building Code. During the August meetings at Fort Lauderdale the Florida Building Commission (Commission) adopted a definition for the term "research" as follows:

> "An important and necessary endeavor that aimed at studying specific code related issue(s)/topics for the purpose of providing solutions to a specific problem or future code change(s) directed at improving the implementation and enforcement of the FBC. The issue to be researched must be fully understood (i.e. with clear purpose and goals); clearly defined with specific scope of work/approach; and within budget."

This is to provide data on the research approach for the requested project funding and how the outcomes will be used to improve the Florida Building Code (FBC). The Aluminum Association of Florida requests up to $50,000.00 for full scale testing of the wind resistance of screen enclosures.

Purpose of the Project. The purpose of the project is to evaluate current methods for designing and constructing screen enclosures as defined by the Florida Building Code. Past storms identified problems with engineered screen enclosures in high wind events. The AAF addressed the problems by sponsoring scale model wind tunnel testing at Clemson University and Virginia Polytechnic Institute and State University, hosting a year long series of meetings of contractors and engineers involved in the design of such structures, performing extensive

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engineering analysis, developing the Guide to Aluminum Construction in High Wind Areas (Guide), and proposing the Guide for adoption as a prescriptive standard in the Florida Building Code.

The industry is requesting assistance to continue this important work by testing the efficacy of the Guide and to evaluate a sample of popular engineering currently employed in designing and building a common structure found throughout Florida. The specific goal of the project is to increase knowledge regarding the materials and methods of design and construction of screen enclosures using the adopted Guide and using commonly available engineering. Since span lengths and performance of connections are key and have to be evaluated at full-scale, the project needs to test a specimen large enough to embody these features at full-scale.

Scope of the Project. The research proposal is to erect two full scale screen enclosures attached to a host structure and test them at a predetermined wind speed. The enclosures will be tested separately using a uniform wind that follows an open country mean profile with typical small scale turbulence.

Methodology.

1. Estimated time for the project is seven days.
2. AAF will obtain construction documents for a project which has received a building permit based on a submitted engineered design. The source of the documents, contractor, and engineer involved will remain confidential.
3. The design will be for a 130 mph wind speed for Exposure Category C for a screen enclosure with an insect screen roof a maximum of 24 ft. x 40 ft. by 10 ft. with a mansard style roof .
4. AAF will prepare construction documents for the same configuration and parameters for size, height, wind speed, and exposure in accordance with the Guide.
5. AAF will provide all materials, transportation of materials, skilled technicians for the construction, and supervision of the construction.
6.
7. AAF will provide personnel to conduct post-test evaluations
8. A facility of sufficient size capable of performing full scale tests is necessary.
9. The facility responsibilities are:
    a. Provide a host structure,
    b. Provide a foundation system.
    c. Provide and area outside the testing lab where the enclosures can be built.
    d. Provide a means of transporting the structures to the testing lab.
    e. Capable of generating a uniform wind that follows an open country mean profile with typical small scale turbulence of 125-130 mph..

f. Provide sensors on beams to record deflection.
g. The ability to vary the wind direction.
h. The ability to halt and re-start the wind testing.
i. Provide a safe area for viewing the tests.
j. Provide video records of the tests.
k. Provide clean-up post-test.

10. The cost for the testing facility is not to exceed $16,800.00 per day for two days of testing.
11. Funds are requested to cover construction costs estimated at a maximum of $9,000.00.
12. AAF estimates the value of the materials and labor contribution to the project to be $16,000.00.
13. The data generated by the testing will be used to:
    a. Verify or invalidate current practices.
    b. As indicated by test results, AAF will modify existing provisions of the Guide and submit for adoption into the Florida Building Code.
    c. AAF will explore the use of the data gleaned from the tests to develop provisions for retrofitting existing screen enclosures to improve their ability to withstand high winds.
    d. Advise the Florida Engineering community of the results of the testing.

Thanking you in advance for your consideration in this matter.

Respectfully submitted,

Joseph D. Belcher

Cc: David Johns, President AAF
David W. Miller, Chairman, AAF Technical Committee