WABO/SEAW Liaison Committee Washington Association of Building Officials & Structural Engineers Association of Washington	**WHITE PAPER 3-2006**

Title: Guideline for Determining Wind Loads on Structures – Use of SEAW's "*Handbook to a* Rapid-Solutions Methodology™ *for Wind Design*"	**Date: December, 2006**
Abstract: This white paper is intended to establish a uniform acceptance for using SEAW's *Rapid-Solutions Methodology*™ (The *RSM*) for Wind Design of Buildings.	**Steering Committee Members:** *MaryKate Martin* *Mark D'Amato* *Jerry Barbera* *Ade Bright* *Charlie Griffes* *Peter Hart* *Dave Saunders* *Jon Siu*

Committee Mission Statement:

- *Improve communications between the public jurisdictions that administer building codes and the engineering design community that prepares construction documents.*
- *Improve consistency and quality of engineering submittals and project reviews.*
- *Build consensus between the engineering design community and building officials with regard to code interpretation and submittal requirements.*

I. INTRODUCTION:

One of the main purposes for the formation of the Structural Engineers Association of Washington (SEAW) Wind Engineering Committee which was formed in 1992, was to consider simplifying the determination of wind loads for the general practitioners – be they design engineers, governmental organizations, material suppliers or contractors. The committee believes that the science and technology of wind engineering must be made clear as possible for those willing to study and understand it.

However, wind load determination for the design of buildings and other structures in the code has become a more complicated procedure since the publication of the 2000 International Building Code (IBC) with its base document ASCE 7. Thus the SEAW Wind Engineering Committee has developed the *Rapid-Solutions Methodogy*™, or *RSM* procedure to simplify and to clarify the IBC & ASCE 7 provisions.

II. RECOMMENDATIONS/GUIDELINES:

The SEAW *RSM*-03 "Handbook of a *Rapid-Solutions Methodology*™ of Wind Design"[1] is merely a simplification of the ASCE 7-02, Method 2 for Rigid Buildings. Therefore, the committee recommends that SEAW *RSM*-03 be accepted as an alternative design procedure throughout Washington State in accordance with IBC Section 104.11.

Buildings as described below in item numbers 1 through 4 and all of their components and cladding can be designed for the wind effects determined in accordance with the RSM. It should be noted, for numbers 1-3, these limitations for design are the same as the limitations for the current IBC and ASCE 7 provisions as found in Sections 6.5.1 and 6.5.2 of ASCE 7. For buildings taller than 400 feet the procedure should not be used.

1. The building has no unusual geometrical irregularity in spatial form.
2. The building does not have response characteristics making it subject to across-wind loading, vortex shedding, nor does it have a site location for which channeling effects or buffeting in the wake of upwind obstructions warrant special consideration.
3. The building does not have an unusual shape or flexible response characteristics that may warrant the use of a wind tunnel study.
4. Buildings greater than 400 feet in height.

III. COMMENTARY:

The *Rapid Solutions Methodolgy*™ for Wind Design (*RSM*) consists of a simplification of the ASCE 7, Procedure # 2 and the "Analytical Method for Rigid Buildings" which governs buildings of all heights, contained in Section 6.5.12.2.1 of that document. The ASCE 7 procedure and the RSM simplification do not contain any limitations on their height, shape, site, or roof style, if the building is "rigid".

The *RSM* is indeed a rapid, graphical, and comprehensive approach to the determination of wind loads that follows the same engineering principles given in the ASCE 7 standard. In effect, the *RSM* is a reformatting and consolidation of the ASCE 7 Analytical Method for greater ease of use. The main feature of this technique is the use of only one simplified equation to determine

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[1] *SEAW RSM-03* is published by the **Applied Technology Council**, 201 Redwood Shores Parkway, Suite # 240, Redwood City, California 94065; (650) 595-1542; Please refer to the following links for more information:

http://www.atcouncil.org/. From there go to the bottom of the screen for the publications and then click on the brown-colored writing at the end of the description. Follow the directions from their to see the book's information

Information can also be obtained from the **International Code Council**, and the **Washington Association of Building Officials** at the following links:

ICC: http://www.iccsafe.org/e/category.html. Then link to, "Engineering", "Structural Engineering", and "Wind."

WABO: http://wabo.org/bookstore.htm. Then link to, "Download WABO Bookstore Catalog," and go to Page 9, under "Engineering/Technical References"

the pressures for both the Main Wind Force Resisting System (MWFRS) and for the Components and Cladding.

The *RSM* procedure combines the wind pressures on various surfaces of a building or building-like structure that can be combined algebraically into one coefficient. The combining of these factors and the assumption of the ordinary values of K_t and K_d are the main simplifications for the *RSM*.

As with any simplifications of a design method as complicated as the ASCE 7 Procedure # 2, some variance in the results occur between the original and the *RSM* procedures. These variations have been calculated and result in a difference of up to 3% of the "exact" Procedure # 2 results and are typically on the conservative side from those obtained in ASCE 7. The calculated values, however, are considered adequate for design and are much smaller than the variances between the ASCE 7 design values for Methods # 1 and # 2 and the actual "true" wind pressures.

IV. CURRENT REGULATIONS:

The current building code for the State of Washington is the 2003 International Building Code (IBC) and the referenced standard for winds loads is the SEI/ASCE 7-02, Minimum Design Loads for Buildings and Other Structures (ASCE 7) published by the American Society of Civil Engineers.

The wind load provisions are contained within Chapter 16 of the IBC and Chapter 6 of the ASCE 7 standard. The IBC states the "Wind loads on every building or structure shall be determined in accordance with Section 6 of ASCE 7" and grants certain exceptions. One of these exceptions is "Wind loads determined by the provisions of Section 1609.6", referencing the IBC itself. The provisions of Section 1609.6 are simplifications of the ASCE 7 Low Rise Building Design procedure contained in Section 6.5.12.2.2. However, there are many limitations placed on the use of this procedure, which limits its scope of applicability.