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STATE PROCUREMENT OFFICE NOTICE & REQUEST FOR SOLE SOURCE

1. TO: Chief Procurement Officer
2. FROM: Dept. Business, Economic Dev. & Tourism/Office of Planning
Department/Division/Agency

Pursuant to §103D-306, HRS, and Subchapter 9, Chapter 3-122, HAR, the Department requests sole source approval to purchase the following:

3. Description of goods, services, or construction:

The services involve the development of wind speed mapping for the County of Maui. For details, please see Exhibit A, attached hereto.

4. Vendor Name: Martin & Chock, Inc.

Address: 1132 Bishop Street, Suite 1550
Honolulu, Hawaii 96813

5. Price:

\$250,000

6. Term of Contract:
(mm/dd/yyyy)

From: 01/01/2007

To: 04/30/2008

7. Prior Sole Source Ref No.

8. Feature: The good, service, or construction has the following unique features, characteristics, or capabilities:

A new and unique methodology to model hurricane wind speeds and topographic effects was developed by Martin & Chock through NASA-sponsored hurricane risk projects. For details, please see Exhibit A, attached hereto.

9. Essential features. How the unique features, characteristics, or capabilities are essential for the agency to accomplish its work:

The risk analysis and probabilistic studies conducted or being conducted in Honolulu, Kauai, and the Big Island all utilize the Chock wind speed-up methodology. State and county government agencies involved in hurricane hazard mitigation have come to a consensus that a uniform technical framework - a single methodology - is necessary to plan and respond effectively and efficiently when there is a hurricane event. For details, please see Exhibit A, attached hereto.

11. Alternate source. The following other possible sources for the good, service, or construction were investigated but do not meet our needs because:

The federal agencies dealing with hurricane hazard mitigation indicate that the available software, HAZUS-US, cannot provide the necessary mapping. The consensus and science-based hazard mitigation plans of the state indicate the need for this project, using the Chock methodology. For more details, please see Exhibit A, attached hereto. In addition, the Maui Department of Public Works and Environmental Management and the State Civil Defense Agency, each of which will implement parts of the work being conducted, request that the Chock methodology be utilized in the interest of public health, safety, and welfare. For more details, please see Exhibits B and C, attached hereto.

12. Direct any inquiries to:
Department: DBEDT
Contact Name/Title: Ann Ogata-Deal/Planner

13 Phone Number:
587-2804
Fax Number:
587-2824

Expenditure may be processed with a purchase order: Yes No If no, a contract must be executed and funds certified.

Agency shall ensure adherence to applicable administrative and statutory requirements.

14. *I certify that the information provided above is to the best of my knowledge, true, correct and that the goods, services, or construction are available through only one source.*



OCT 18 2006

Department Head

Date

Reserved for SPO Use Only

15 Date Notice Posted: 10/20/2006

Submit written objections to this intent to issue a sole source contract within seven calendar days or as otherwise allowed from the above posted date to: Chief Procurement Officer
State Procurement Office
P.O. Box 119
Honolulu, Hawaii 96810-0119

16. Chief Procurement Officer's comments:

17.

APPROVED DISAPPROVED NO ACTION REQUIRED

Ann S. Fugh 10/27/06
Chief Procurement Officer Date

**Additional Information for Notice & Request for Sole Source
Wind Speed Mapping for the County of Maui**

3. Description of goods, services, or construction:

The International Building Code (IBC) that will replace the code now used in the County of Maui introduces a new topographic factor and a wind directionality factor that in their current formulations will not give accurate results in Hawaii. This would lead to a high probability of incorrect design unless several customized map products are prepared for Maui County's building code. Future implementation of the IBC in Hawaii requires an evaluation of the wind topographic and directionality factors. Significant improvements in wind hazard mitigation can be accomplished through the development of this particular methodology for wind speed-up mapping in local building codes and risk assessments. A *uniform* design standard of protection for hurricane hazard would then be defined in the County of Maui that will be consistent with the standards now being implemented by this sole source vendor in the building codes of the City & County of Honolulu, and the counties of Hawaii and Kauai.

Development of New Wind Speed Mapping for the County of Maui:

- A. Numerical simulation of wind flow and acceleration for the County of Maui using Computational Fluid Dynamics (CFD) to develop wind speed data.
 - 1. The height and size of the mountains of Maui is the subject of this investigation to quantify their impact on wind speed-up using mesoscale computational fluid dynamic (CFD) numerical simulations. A CFD model will be run initially for the entire island for 16 directions in a "coarse" spatial resolution mode. The resulting output will be a set of velocities near the ground on a 5 km square grid. This will result in several hundred locations over the island where mean wind speed, peak gust, and direction are predicted numerically. A byproduct will be vertical profiles of wind speed and direction at each of these grid locations for each of the 16 wind directions to establish the effect of large land masses on altering wind flow direction.
 - 2. CFD analysis will begin with the coarse solutions and focus down to a "fine" grid with about 0.5 km spacing horizontally, and finer vertical grid spacing near the surface, at selected locations to obtain the local influence of smaller terrain details.
- B. Wind Tunnel tests for validation of CFD results at selected locations using 2 scales of models for 16 wind directions with velocity point measurements and profile measurements.
- C. Applying any necessary modification to the existing method for wind speed-up prediction previously used for Honolulu.
- D. Using spatial data analysis techniques and methodologies developed during a previous applied research sole source project undertaken for the City & County of Honolulu, prepare map products to enable adoption of the 2006 IBC and the 2006 International Residential Code by the County of Maui, including:

1. Risk-consistent basic design wind speed for Maui, Molokai, and Lanai.
 2. Probabilistic wind speed hazard contour mapping incorporating topographic effects appropriate for structural design specification.
 3. Incorporation of directionality weighting of probability of critical wind orientation appropriate for code adoption.
 4. Incorporation of Exposure Category wind profile adjustments related to terrain roughness / land use, to be validated by additional wind speed vertical profile measurements in the wind-tunnel.
 5. Development of an effective wind speed map for use within the prescriptive high-wind construction standards of the International Residential Code (IRC) for designating the wind speeds establishing prescriptive requirements.
- E. Final deliverables to consist of enabling code amendments and GIS-based design wind speed mapping products for Maui, Molokai, and Lanai.

8. Feature. The good, service, or construction has the following unique features, characteristics, or capabilities:

NASA-sponsored hurricane risk projects performed by Martin & Chock, Inc. produced new methodologies pertaining to modeling of hurricane wind speeds and topographic effects. To determine speedup factors for Oahu and Kauai, terrain models of portions of the island terrain were constructed and tested in the wind tunnel. Wind speedups or reductions were measured at several hundred locations. Then a unique phenomenological modeling technique was formulated to fit the measured data. The wind-tunnel data, analysis techniques, and numerical modeling were uniquely developed by Martin & Chock, Inc. and equivalent model output and mapping are not available elsewhere.

For the island of Maui, the existing topographic wind speed-up techniques used for Oahu and Kauai may not fully capture the wind flow over the terrain of the island of Maui due to the larger-scale (mesoscale) impact of Haleakala and the West Maui Mountains. The height of the terrain is sufficient and the area of the island is large enough that the effects of atmospheric Coriolis acceleration and thermal stability effects may have a significant impact on the wind flow over and around this high terrain. In addition, mesoscale orographic channeling of wind between the two mountains is an additional phenomenon that needs to be considered. Consequently, the phenomenological modeling used by Martin & Chock may need to be extended for application in this type of island terrain. The height and size of the former shield volcanoes on the island require additional investigation to quantify their impact on wind speed-up using state-of-the art mesoscale computational fluid dynamic (CFD) numerical simulations, wind-tunnel tests, and then applying any necessary modification to the existing empirical method. This study will also include windfield vectoring to establish the effect of large land masses on altering wind flow direction. Future implementation of the IBC by Maui County requires an evaluation of the wind topographic and directionality factors. This work will also incorporate data products for Lanai and Molokai so that coverage is provided of those islands in Maui County with urban and agricultural zoning.

The project will produce several needed technical data products so that the state-of-the-art research data results captured in the project can be used in design applications, in a way that completely addresses the requirements of the International Building Code. The wind design parameters for the Maui Building Code will be determined through probabilistic analysis to provide a level of safety consistent with wind load exceedence probabilities of the national ASCE-7 standard. The necessary maps will be utilized with a customized design procedure in conjunction with the latest analysis of hurricane probabilities to furnish wind speed design criteria with a uniform ultimate return period throughout the County of Maui.

9. Essential features. How the unique features, characteristics, or capabilities are essential for the agency to accomplish its work:

The Chock Wind Speed-up methodology has been used to formulate the building code wind standards for Honolulu and will be used under separately-funded projects for Kauai and Hawaii counties, taking into account all the relevant factors of hurricane probabilities, terrain, and topographic features using wind-tunnel testing to develop a comprehensive database of wind effects. Because hurricanes are typically multi-county disasters, it is essential that all counties approach the risk through mapping and building regulations that are implemented with a common technical basis and procedure. State and county emergency planning and operations and building design professionals need to have a product line with a common technical framework, mapping convention, and building regulation basis in order to consistently plan and respond to the hurricane risk from island to island. The Chock methodology is the only one that can provide this consistency.

Maui's current building code does not include *any* design requirements for amplified winds caused by topography. The IBC that will replace the current building code introduces a new topographic factor and a wind directionality factor that will not give accurate results considering the topography of Maui. This would lead to a high probability of incorrect design unless several customized map products are prepared for the Maui building code. The new wind code would then achieve a uniform level of protection for hurricane hazard in structural design that will be consistent with the standards developed by this vendor for Oahu and being developed by this vendor for Kauai and Hawaii. Benefits include explicit quantification of wind-hazard and its mitigation through the identification of severe-wind environments for planners and building designers that will significantly improve building performance.

Determination of the wind hazard in topographically affected critical facility sites is essential for pre-disaster planning and emergency operations planning. Criteria for critical facility use and any necessary mitigation can then be objectively established and evaluated for priority, thereby optimizing the effectiveness of any retrofits. The overall effort will support CZM's goals to implement effective public safety planning and mitigation of coastal hazards.

11. Alternate source. The following other possible sources for the good, service, or construction were investigated but do not meet our needs because:

The nature of the work is of specialized research involving a unique combined knowledge of structural engineering, wind engineering, and probability and statistical techniques used in risk analysis. It is noted that the State of Hawaii Multi-Hazard Science Advisory Committee to the State Civil Defense Hazard Mitigation Forum has found that the Federal Emergency Management Agency (FEMA) HAZUS MH (Hazards U.S. Multi-Hazard) software does not produce the necessary mapping for this application, based on a technical review and correspondence with the FEMA and National Institute of Building Sciences (NIBS) HAZUS Project Managers. Moreover, the Maui Department of Public Works and Environmental Management, who will implement the wind speed mapping and building code provisions, requests that only the Chock methodology be used, for statewide consistency in hurricane risk protection and health, safety, and welfare. See, Exhibit B attached to this Request for Sole Source. The Chock methodology is also strongly supported by the State Civil Defense Agency. See, Exhibit C attached to this Request for Sole Source. It is thus necessary that this work be performed by the originator of the customized wind database, numerical terrain analysis, and predictive modeling techniques, which is Martin & Chock.

The Hawaii Geographic Information Coordinating Council I-Plan (July 29, 2003), which reflects the collaboration of federal, state, county and local agencies, academia, the private and not-for-profit sector GIS subject matter experts, identified a high priority natural hazard data need as “Completion of the High Wind modeling for Maui and Hawaii and refinement of the model for Kauai, using the Chock Speed-up Methodology.” The data analysis techniques and numerical modeling were uniquely developed by the sole source vendor, and the work has been peer-reviewed and accepted for publication in a major scientific journal (Journal of Wind Engineering and Industrial Aerodynamics). Numerous federal, state, and county agencies have been periodically briefed on this methodology since 2000, including the National Weather Service Central Pacific Hurricane Center, State Civil Defense and professional societies such as the Structural Engineers Association of Hawaii, and the American Society of Civil Engineers, the American Meteorological Society, and the American Institute of Architects.

ALAN M. ARAKAWA
Mayor

MILTON M. ARAKAWA, A.I.C.P.
Director

MICHAEL M. MIYAMOTO
Deputy Director



RALPH M. NAGAMINE, L.S., P.E.
Development Services Administration

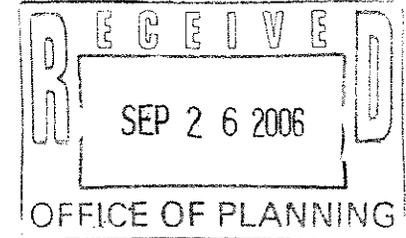
DAVID TAYLOR, P.E.
Wastewater Reclamation Division

CARY YAMASHITA, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

TRACY TAKAMINE, P.E.
Solid Waste Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND ENVIRONMENTAL MANAGEMENT
DEVELOPMENT SERVICES ADMINISTRATION
250 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793
September 22, 2006



Ms. Laura H. Thielen, Director
Office of Planning
Department of Business, Economic
Development and Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Ms. Thielen:

The Department of Public Works and Environmental Management of the County of Maui strongly supports the development of wind speed maps for the County of Maui. This mapping has been identified as a high priority project in the State of Hawaii Multi-Hazard Mitigation Plan and the Hawaii I-Plan for Spatial Data (sponsored by the Hawaii Geographic Information Coordinating Council).

The winds, torrential rains, flash flooding, and storm surge that are caused by hurricanes can affect multiple islands and counties in a single-storm event. Consistent wind (hurricane) simulation and loss estimation systems, as well as consistent building design provisions, will be of clear benefit to public health, safety, and welfare. Consistently acquired data will enable uniformity in state and county-wide emergency operations planning and response, and will enable risk-consistent, state and county-wide planning exercises.

Martin & Chock, Inc. recently completed a wind hazard assessment and mapping study for the City and County of Honolulu. The results of that study have been translated and incorporated into the International Building Code and International Residential Code, and are on the brink of introduction to the Honolulu City Council. Wind speed studies utilizing the Martin & Chock methodology are ongoing in the counties of Kauai and Hawaii. In order to achieve a consistent system for wind hazard estimation statewide, it is necessary to utilize the Martin & Chock methodology, which is proprietary.

Thus, the only methodology that the County of Maui will accept for this project is the Martin & Chock methodology since we desire statewide consistency. We request that this project be carried out using the Martin & Chock methodology.

Sincerely,

A handwritten signature in cursive script that reads "Milton M. Arakawa".

Milton M. Arakawa, A.I.C.P.
Director of Public Works
and Environmental Management

RMN

P:\State of Hawaii\Department of Business, Economic Development and Tourism\Wind Speed Study.wpd

c: Ann Ogata-Deal, Hawaii Coastal Zone Management Program

Exhibit No. B

LINDA LINGLE
GOVERNOR

MAJOR GENERAL ROBERT G. F. LEE
DIRECTOR OF CIVIL DEFENSE

EDWARD T. TEIXEIRA
VICE DIRECTOR OF CIVIL DEFENSE



PHONE (808) 733-4300
FAX (808) 733-4287

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

August 31, 2006

Ms. Laura H. Thielen, Director
Office of Planning
Department of Business, Economic
Development and Tourism
P. O. Box 2359
Honolulu, Hawaii 96804

Dear Ms. Thielen:

Maui County Wind Speed and Building Code Amendment Project

Wind speed mapping has been identified as a high priority project in the State of Hawaii Multi-Hazard Mitigation Plan and the Hawaii I-Plan for Spatial Data (sponsored by the Hawaii Geographic Information Coordinating Council). That said, we strongly support this important initiative for Maui County.

During a large single-storm event, damaging winds are likely to affect several counties concurrently. Consistent wind (hurricane) simulation and loss estimation systems, as well as consistent building design provisions, will prove to be of great benefit to public health, safety, and welfare. Consistently acquired data will enable uniformity in statewide emergency operations planning and response, and will enable risk-consistent, statewide planning exercises.

Martin & Chock, Inc., recently completed a wind hazard assessment and mapping study for the City and County of Honolulu. The results of that study have been translated and incorporated into International Building Code and International Residential Code, Oahu-specific building code amendments soon to be submitted to the Honolulu City Council. Congruent projects are ongoing in the counties of Kauai and Hawaii, utilizing the Martin & Chock methodology. In order to achieve a consistent system for wind hazard estimation statewide, the County of Maui is being encouraged to utilize the Martin & Chock methodology, which is proprietary.

We strongly recommend that the Martin & Chock methodology be utilized for the Maui Wind Speed and Building Code Project.

If you have any questions, please contact Ms. Faye Chambers, at 733-4300 ext. 555.

Sincerely,


EDWARD T. TEIXEIRA
Vice Director of Civil Defense

cc Ann Ogata-Deal, Hawaii Coastal Zone Management Program

Exhibit No. C