

National Institute of Building Sciences

Provider Number: G168

Innovative Solutions for Post-Disaster Code Enforcement – Development of Sustainable Permitting, Inspections and Building Code Programs

TU4C: The Steps behind Building Resilience

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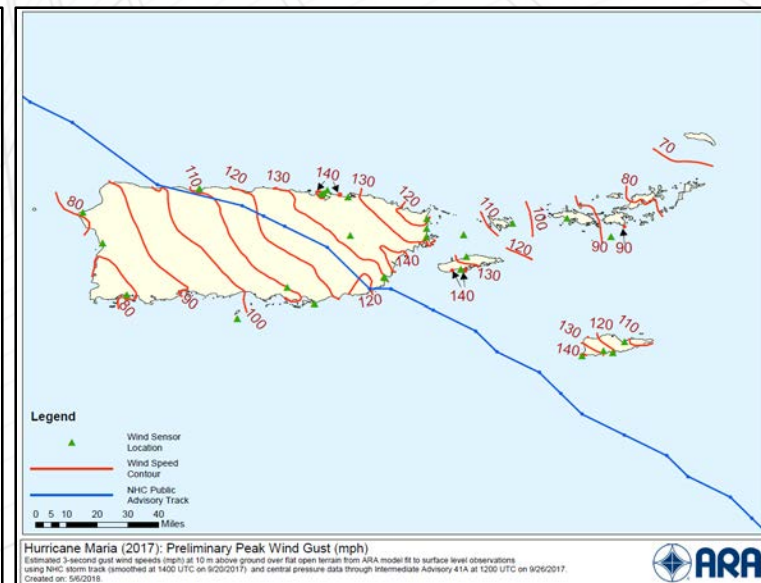
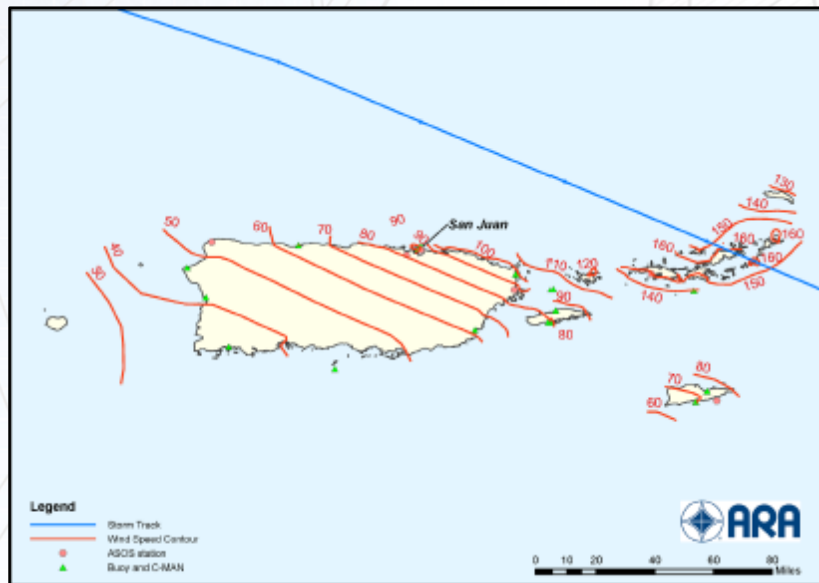
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January 8th, 2019

2017 Hurricanes in PR & USVI

- Hurricane Irma, September 6 (Category 5)
- Hurricane Maria, September 19 (Category 4-5)
- Damage from wind, wind-driven rain, some storm surge, and some non-coastal flooding



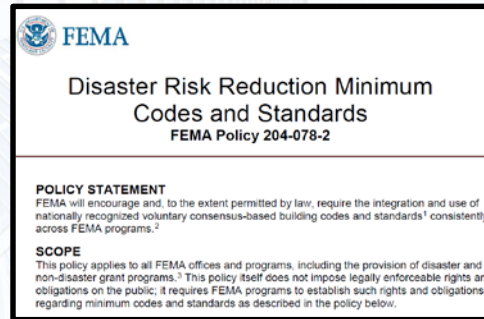
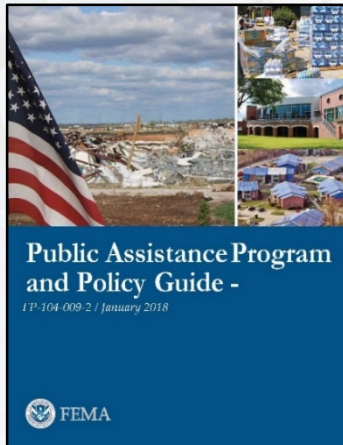
2017 Hurricane Season Shows Need for Code Enforcement

- Inadequate number of trained, certified building officials
- Reconstruction means surge in demand
- Shortcomings in building departments at time of event



FEMA Public Assistance Policy

- Minimum Codes and Standards



2. FEMA Required Minimum Codes and Standards

If the building is eligible for repair, replacement, or is being constructed as an improved or alternate project, ²³¹ FEMA generally requires that the Applicant incorporate the natural hazard-resistant codes and standards and related provisions referenced in the most recent published edition of the International Code Council's (ICC) International Building Code (IBC), International Existing Building Code (IEBC), or International Residential Code (IRC) into the building design and construction. ²³² This includes natural hazard-resistant provisions, such as tornado, wind, seismic, and flood as identified in the IBC, IEBC, or IRC regardless of the type of incident that caused the damage. In accordance with these codes and standards, the Risk Category of the eligible building determines the applicable tornado, wind, seismic, flood, snow, ice, and rain loads. ²³³ FEMA provides PA funding for the eligible increased cost associated with meeting these codes and standards at the cost-share for the disaster.

Generally, the IBC, IEBC, or IRC apply when a building:

- Is substantially damaged;²³⁴
- Suffered substantial structural damage;²³⁵ or
- Is eligible for replacement in accordance with 44 CFR part 206.226(f).²³⁶

The determination of whether a code or standard is triggered may be made by:

- A building official or inspector;
- The Recipient's or Applicant's registered design professional; or

- Disaster Recovery Reform Act (DRRA) of 2018
 - Building code enforcement & floodplain mgmt. (SD/SI) eligible under Stafford Act
 - Had been ineligible for reimbursement via EMAC

→ FEMA policies to ensure reconstruction is more resilient

Post-Disaster Building Code Support – Puerto Rico

HMGP

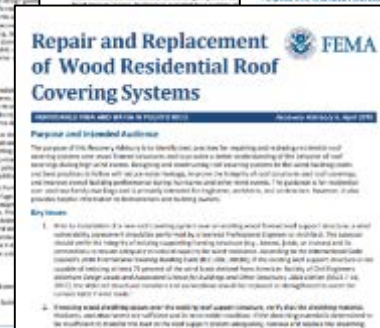
- Building code update (\$10M)
 - Adopted 2018 I-Codes with local amendments November 2018, publishing February 2019
- Code enforcement (\$79M)
 - More staff for PRPB & OGPe
 - Technology to increase permit/enforcement capacity
 - Robust training curriculum & outreach program
 - Better data collection & sharing among state agencies
 - Larger pool of experts in PR



Post-Disaster Building Code Support – Puerto Rico

Support to JFO

- MAT Report and six Recovery Advisories
- Building code update support (6 proposed amendments)
- Microzoning
- Cost & Constructibility Analysis
- Topographic Microzoning
- Training and SME Support
- Prescriptive Home Designs



Post-Disaster Building Code Support – USVI

- Hazard Mitigation Grant Program (HMGP)
 - \$7.3M total project cost
 - Mitigation for critical facilities
 - Update building codes and land use planning
 - Promote mitigation for public & private property
 - Promote hazard-resistant construction, esp. residential
 - Train design professionals and construction industry on hazard-resistant construction
- Emergency Management Assistance Compact (EMAC)
 - Interstate mutual aid compact
 - Implemented by state emergency mgmt. agencies



Post-Disaster Building Code Support – USVI

- Support to JFO/DPNR
 - *Construction Information for a Stronger Home, 4th Edition*
 - Develop prescriptive home designs
 - Ongoing SME support for JFO, DPNR, other requests and support
 - Support for Building Code update to 2018 I-Codes
 - Provide Building Science training activities for designers, contractors, and local officials













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MUNICIPIO DE SAN JUAN
CENTRO DE OPERACIONES DE EMERGENCIAS
CDE





27 10 2017



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Puerto Rico is...

13,790 km² (5,320 mi²)

- 8,870 km² (3,420 mi²) is land
- 4,921 km² (1,900 mi²) is water

Located 1,000 miles SE of Miami,
on the boundary of the
Caribbean and North American
plates

Five islands (three inhabited
year-round)

Elevation ranges from sea level
to 1,338 meters (4,390 feet)

Subject to hurricanes,
earthquakes, tsunamis,
landslides, flooding



Before 2017

Near-continuous recession since 1996

Severe economic crisis since 2014

- More than \$70B in debt
- 45% poverty rate
 - Child poverty rate of 56%
- 4.7% unemployment rate (2016)

Structural, demographic, health, social and infrastructure stresses as a result

Pre-Event Code and Enforcement



Puerto Rico Building Code (2011)

- 2009 I-Code with local amendments (including seismic)

Single permit application process became law in April 2017

Central government is largely responsible for code adoption, enforcement, and permitting

Autonomous municipalities and Authorized Professionals also have enforcement and permitting responsibilities

Pre-Event Code and Enforcement

Economic crisis
resulted in
significant cuts to
Central
Government
staffing and
resources for
building
inspections,
permitting, and
code enforcement

9 permitting auditors

11 compliance inspectors

48 permit staff

Year prior to
Irma/María:

12,364 construction permits

9,311 use permits

10,065 fire prevention certificates

10,083 health & safety certificates



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Informal Construction

Combination of a complicated permitting process and the economic crisis, combined with existing social norms, resulted in high percentage of informally constructed residential structures

Informal structures are constructed with no permit and are therefore not in compliance with applicable building codes

Current estimate: 85,000-90,000 informal structures



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2017 Hurricane Season

September 06, 2017: Hurricane Irma

Category 5 at landfall

160 km (100 mph) winds

2/3 of main island lost
power

September 20, 2017: Hurricane María

Category 4 at landfall

249 km (155 mph) winds

Storm surge of 3-9 feet

35 miles wide (the width
of the main island)

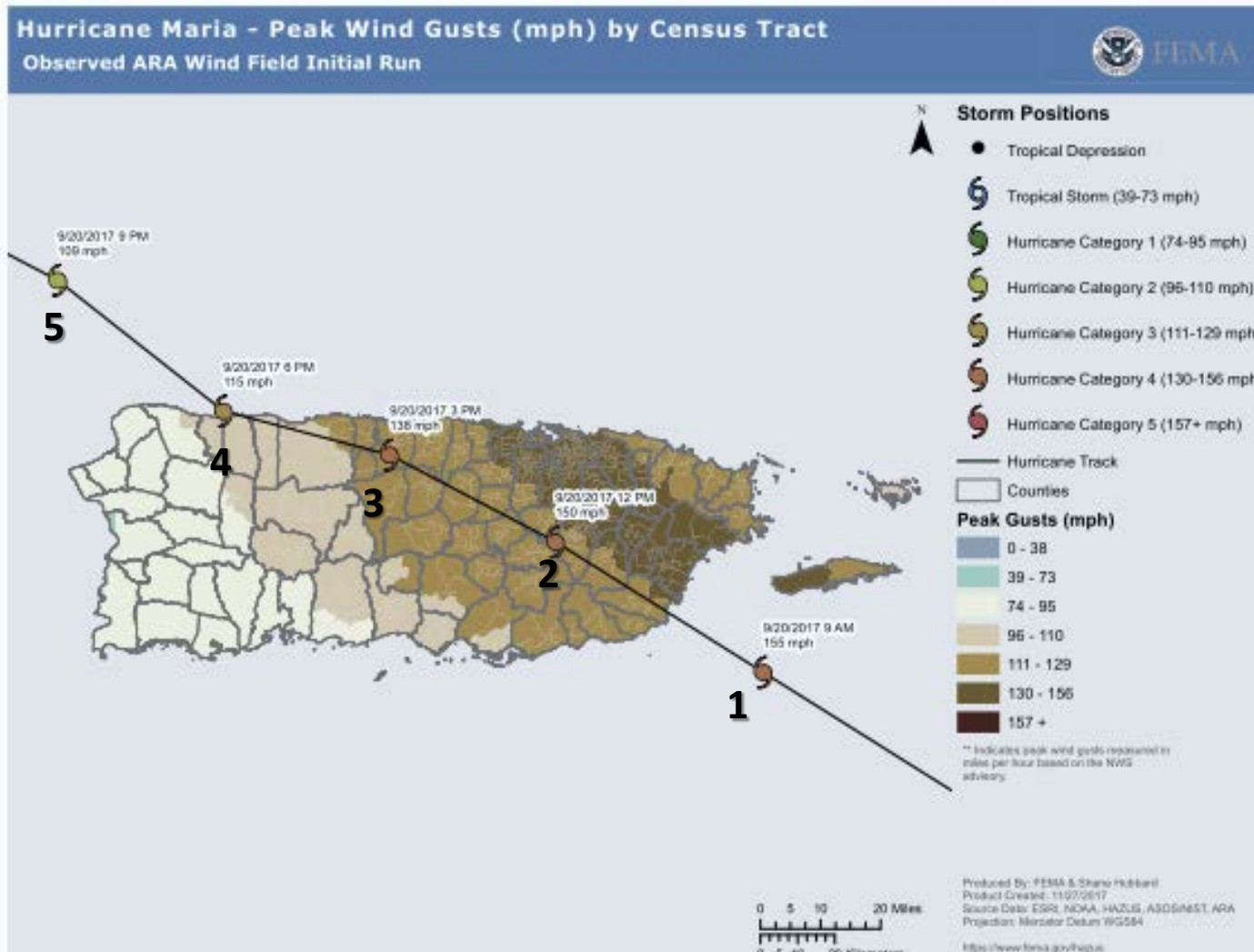


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Hurricane María



Hurricane María: The Numbers

River surges up to 47 feet

Localized flooding up to 38 inches

Estimated 40,000 landslides

64 immediate fatalities

Estimated additional 3,000 fatalities due to cascading storm impacts

Complete destruction of electrical grid

- Largest and longest blackout in history
- Temporary restoration and repairs complete in May 2018
- Grid remains fragile for years to come

Estimated 1,138,843 residential structures damaged or destroyed

- 65,000 Blue Roofs

All major transportation and supply chains damaged or destroyed

Estimated \$139B needed for recovery and reconstruction

Post-María Code Adoption

\$5.5M HMGP Code Adoption Support Grant

Committee review, amendment development, and adoption of 2018 i-Codes

Six local amendments, including:

- Corrosion protection (island-wide)
- SFHA documentation requirement
- 423.3 Storm shelters in critical facilities
- 423.4 Storm shelters for Group E Occupancy

2018 Puerto Rico Building Code adopted November 15, 2018

Post-María Code Enforcement

\$144M HMGP Code Enforcement Grant

- Significant increase in staff support (20 fold)
- Significant investment in technology support
- Establishment of robust training & outreach programs (public, professionals, legislature, judiciary)
- Increased data collection & sharing between agencies
- Increased pool of experts on-island, including 50 new CFMs

Goal: Support activities to create self-supporting code enforcement and permitting programs

Project timeline: 6 years

Largest and broadest FEMA-funded code enforcement project in HMGP history

Post-María Storm Water Regulations

Pre-María storm water regulations dated from 1975

\$400,000 HMGP Grant to re-model and update storm water regulations (island-wide)

Expected to be effective Summer 2019



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USVI Case Study

- U.S. Virgin Islands
 - St. Thomas
 - St. Croix
- Two Category 5 hurricanes in less than 15 days
- High-wind in excess 140-160 mph
- Significant rainfall
- Little storm surge damage



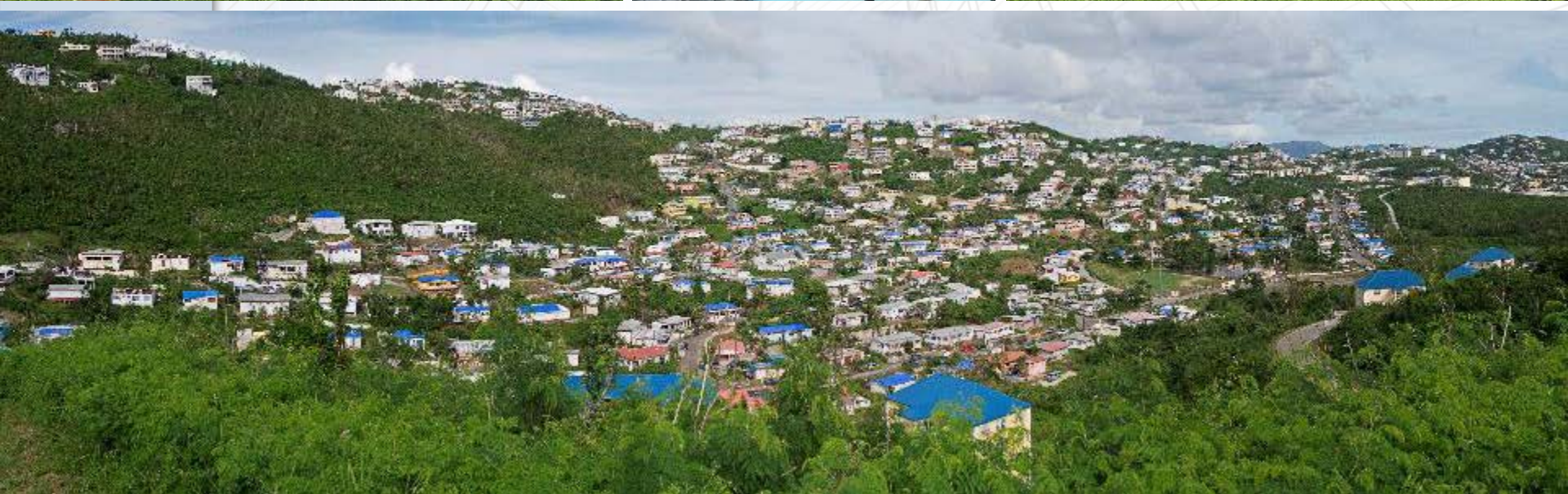
Mutual Aid Assistance Emergency Management Assistance Compact

- EMAC is an **all hazards - all disciplines mutual aid compact** that serves as the cornerstone of the nation's mutual aid system – ratified into law by Congress & enacted into law by each member state
- Implemented within the **State Emergency Management Agency** on behalf of the Governor of the State
- Offers assistance during **governor-declared** states of emergency or disaster





USVI Case Study



USVI Case Study

- **DPNR Building Department Needs Post-Disaster :**
 - Inspectors
 - Plan Reviewers
 - Permit Techs



USVI Case Study



USVI DPNR submits
formal Resource
Request to VITEMA



FEMA

FEMA All-Call
Announcements
To Membership
Organizations



ICC forwards All-Call
to Membership

ICC Inspectors &
their State EOC
Answer DPNR All-
Call



Reimbursement to
assisting States
through Advanced
Assistance HMGP
Funding



USVI Case Study

Resource Request - the broadcast for assistance

- Issued by USVI DPNR Building Department
- Broadcasted by VITEMA
- Used by state EOCs to help interested personnel deploy to USVI
- Contains unique ID Ex: #1306-RR-7432

EMAC Resource Description – USVI DPNR Building Inspections Immediate Needs (Mission Updated 3/1/18)

USVI DPNR is requesting individual or teams of building officials to assist in assessment of buildings impacted by Hurricane Maria and Irma. Team will perform residential/commercial plan review of all trades as well as perform building, electrical, plumbing, mechanical, and flood inspections in accordance with the 2018 International Codes, USVI Codes, USVI Stronger Home Guide, and ASCE 24 Flood Standard. **The most immediate need is for Plans Examiners.**

A total of 24 personnel spanning various positions is requested and detailed below. Deployment shall consist of three phases covering a three to four week timeframe in which approximately one-third of the personnel requested at each position will be needed to deploy. Personnel will be split between the districts St. Croix district and the St. Thomas and St. John districts. Requested deployment dates for each phase is as follows:

Phase 1*: 3/01/18 – 3/31/18; one-third of plans examiners, inspectors, coordinator staff plus Chief Building Official

*special immediate focus on plans reviewers, electrical inspectors and building inspectors. **Highest priority is plans examiners**

Phase 2: 4/01/18 – 4/30/18; one-third of plans examiners, inspectors, coordinator staff

Phase 3: 5/01/18 – 5/31/18; one-third of plans examiners, inspectors, coordinator staff

Each phase shall generally consist of a team of the following positions:

General Plans Examiner (2)
Senior Plans Examiner (2)
Building Inspector* (4)
Chief Building Inspector (2)
Chief Building Official (2) – only needed on phase 1

Electrical Inspector* (2)
Plumbing Inspector* (2)
Mechanical Inspector* (2)
Flood Code Inspector (2)
Special Inspector (2)

*Combination Inspectors are acceptable as long as capable of performing building, electrical, plumbing, and mechanical inspections

All personnel must have a copy of certificate in their specialty. Must have proof of credentials to perform requested duties.

Personnel will need to bring any equipment used in the regular performance of their job (e.g. tape measures, laser measuring device, digital cameras, tablets or laptops).

Working Conditions

Minimal – Very little infrastructure and support services.

2-3 temporary buildings or other alternate facilities fully equipped to serve as satellite permit offices for staff. Includes standard desks, furnishings, and desktop computers with networking.

Living Conditions

Lodging is self-sustaining. Coordinate with DPNR on any lodging limitations and/or preferred locations and districts.

Logistics

DPNR will have fleet vehicles for use or instructions for renting vehicles for use during deployment. It is recommended each person bring a functioning cellphone.

It is recommended paper or electronic code references (for each trade) be brought in case code books are unavailable or delayed from DPNR.

Health & Safety Concerns

Immunizations or vaccinations/environmental hazards exist/personal protective equipment (hardhats, boots, light hazmat (mold).

Special Instructions

Interested parties able to serve this mission shall make contact with your representative from ICC, AIA, NCSEA or other association **AND** your State Emergency Management Agency to let them know your availability and receive deployment orders.



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USVI Case Study

1) Reasoning & Personnel Types

- “USVI DPNR Building Department is requesting individuals or teams of building professionals capable of performing permit processing, buildings inspections, and plan review for structures impacted by Hurricanes Maria and Irma. Personnel will perform residential/commercial plan review of all trades as well as perform building, electrical, plumbing, mechanical, and flood inspections in accordance with the 2018 International Codes, USVI Codes, USVI Stronger Home Guide, and ASCE 24 Flood Standard.”



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Resource Request

2) Deployment Specifics

“Deployment shall consist of a **three to four week** timeframe. Personnel will be split between the St. Croix district and the St. Thomas and St. John districts.

Requested deployment dates are as follows:

6/1/18 – 8/31/18: Special immediate focus on Plan Reviewers (2), Electrical Inspectors (2), and Building Inspectors (2)

“Special Notice: any qualified individual , including individuals from multiple states, can be deployed to meet the needs of each phase. A **full team** from a single state is **not** necessary for the deployment of personnel needed by USVI DPNR”



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Resource Request

3) Requirements for Interested Personnel

- “Individuals interested in this mission should first **receive permission from their direct supervisor to participate** and then **contact your state EMAC Coordinator**, to respond to the request **(#1306-RR-7432).**”
- “**Must be employed by a municipal or county government agency.** Private sector entities are not yet reimbursable through EMAC in most states.”



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Resource Request

Requirements for Interested Personnel

- “All personnel must have a **copy of certificate in their specialty, proof of credentials** to perform request duties, and must be **physically able** to perform the required duties for each position.
 - **Plan Examiners** must have a current ICC Certification in Building, Plumbing, Mechanical or Electrical trades. Multi-licensed preferred.
 - **Inspectors** must have a current ICC Certification in Building, Plumbing, Mechanical or Electrical trades. Multi- licensed preferred.
 - **Permit Technicians/Coordinators** must have a current ICC Certification.”

Resource Request

Requirements for Interested Personnel

- “Personnel **MUST** be able to interpret and enforce the **2015/2018 International Codes**.
 - Bring paper or electronic ICC code references (for each trade)
 - Download USVI code and Stronger Home Guide prior to deployment
 - DPNR staff will orient you on local ordinances and processes”

Resource Request

Requirements for Interested Personnel

- “Each individual will be responsible to **coordinate their own air travel, rental car, accommodations and food.**
 - All personnel including plans examiners and permit technicians will need a vehicle to get from hotel accommodations to each permitting facility.”
- “Each **jurisdiction will be responsible** to keep the **required documentation to submit for reimbursement** directly to the USVI DPNR.”

Resource Request

Requirements for Interested Personnel

- “Each individual must bring their own work equipment.
 - Cell phone in the event 2-way radio equipment is not available.
 - PPE including rain and safety gear, hard hat, boots, flash light, sunscreen, etc.
 - Equipment used in regular performance of their job (e.g. tape measures, laser measuring devices, digital cameras, tablets and laptops)
- “Immunizations or vaccinations advised. Light Hazards (mold) may exist.”

Deployment Success

- Personnel Deployed: 10+
 - Arizona
 - Georgia
 - Maryland
 - Minnesota
- Types of Assistance Provided:
 - Building Inspections
 - Plan Review
 - Permit Tech.
- Reimbursement Success:
 - All states reported no issues with reimbursement



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Deployment Success



Minnesota team assisting DPNR Building Department

Deployment Success



Minnesota team assisting DPNR Building Department