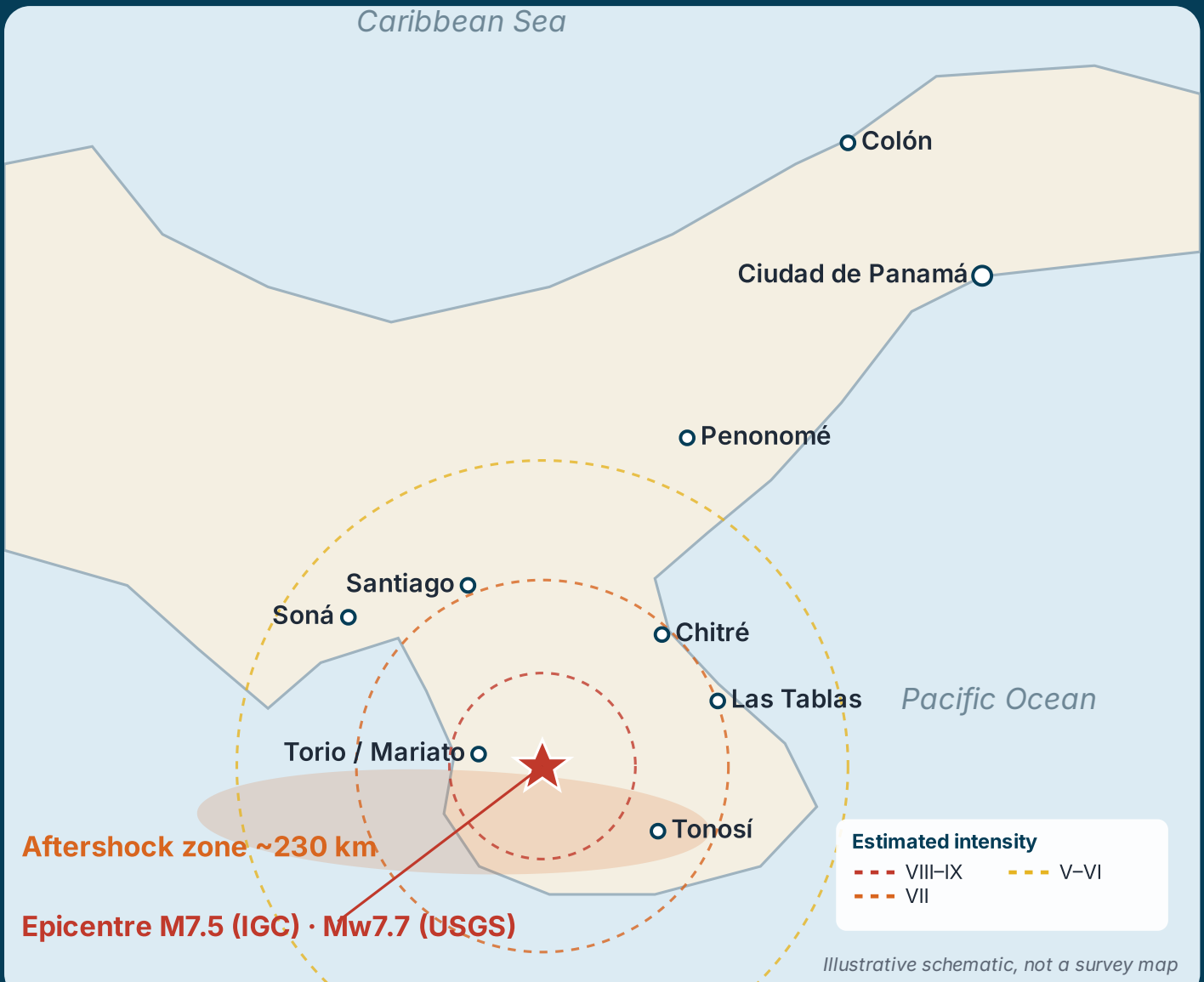




9 · 10 · 2026 · 12:56 · AZUERO

Panama Earthquake, 9 October 2026

Independent analysis: data, consequences, root causes, governance gaps and how to build for the next earthquake

7.5 / 7.7

Magnitude IGC / USGS

1,293

homes assessed*

~619

schools*

0

deaths

Mw 7.7USGS ^[1]**305**aftershocks in 56 h (IGC)
^[4]**27**mild/moderate injuries ^[24]**1–10 %**of GDP in losses (USGS
model) ^[1]**1 A historic quake, in the "least bad" place.**

Mw 7.7 (USGS) / M7.5 (IGC-UP), shallow (~12.6 km), on the Azuero-Soná fault: the largest ever recorded in Panama ^[1,18]. It struck at midday in a rural area, which limited casualties ^[3].

2 Zero deaths does not mean zero risk.

Over 1,200 homes assessed, ~619 schools, hospitals, 13+ churches, hotels and 14+ bridges damaged ^[6,25,14]. USGS estimates losses of 1–10 % of GDP ^[1,29].

3 Modern held; old and informal suffered.

High-rises and the Canal bridges performed well; damage concentrated in unconfined masonry, historic churches and homes built without technical supervision ^[12,17].

4 The code regulates design, not construction.

REP-2021 is modern, but there is no construction-execution code or systematic inspection; homes built before 1985–1994 never had seismic design ^[12,13].

5 The warnings were on the table.

In June 2026 the IGC asked for an early-warning system (US\$1.5–3 M); 13 of 63 seismographs were out of service and Google's alert was not enabled ^[20,21,22].

6 Fast at the top, slow on the ground.

State of emergency and US\$100 M within 24 h, yet communities such as Torio were cut off and blocked the road demanding aid ^[10,34]; official counts changed daily (142→426→840→910→1,293 homes).

All figures are preliminary and come from the public sources cited. Technical causes of specific collapses have not been published by the authorities and remain "under evaluation". This document does not replace an assessment by a licensed engineer.

03

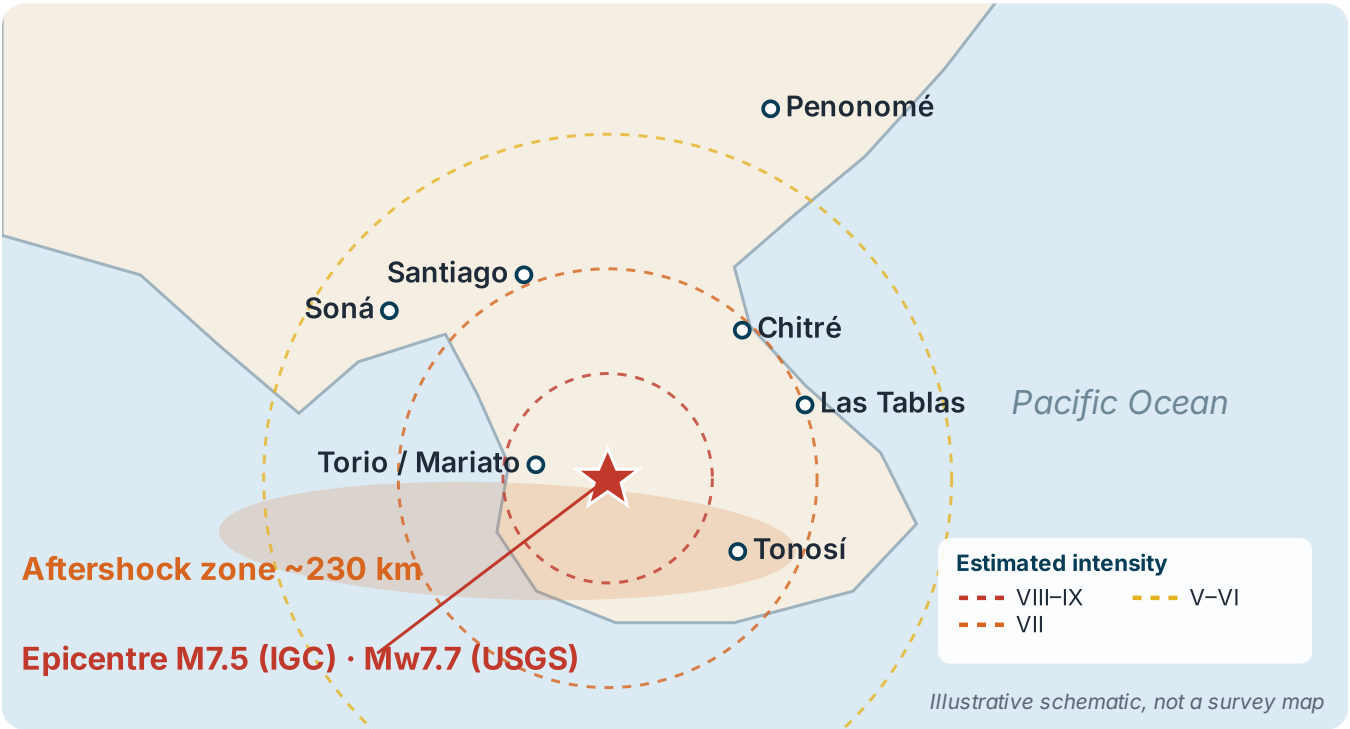
The earthquake

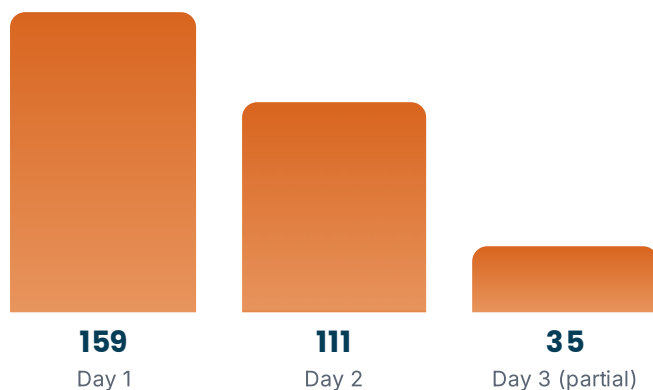
Date & time	9 Oct 2026 · 12:56 local (17:56 UTC) ^[1]
Magnitude	Mw 7.7 (USGS; preliminary 8.0 → 7.6 → 7.7) · M7.5 (IGC-UP; preliminary 7.2) ^[1]
Depth	12.6 km (USGS) · ~4 km (IGC, preliminary): shallow event ^[1]
Epicentre	7.587 N, 80.769 W · 12 km WSW of Pitaloza Arriba (Herrera); ~39 km W of Tonosí ^[2]
Mechanism	Left-lateral strike-slip; bilateral rupture ~100 km+ ^[3]
Fault	Azuero-Soná fault system (IGC); possible offshore segment ^[18]
Max intensity	MMI IX (violent); ~4.6 M people at MMI V–VIII; ~194,000 at VIII–IX ^[1]
Largest aftershock	Mw 6.6 at 15:25 (MMI VIII); 4 aftershocks > M6 in the first 11 h ^[2]

Panama sits on the small Panama microplate, between the Cocos, Nazca, Caribbean and South American plates. Its southern edge, the South Panama Deformed Belt, moves about 20–25 mm/yr left-laterally; the Azuero-Soná fault is one of its main splays.^[2,1]

IGC director Néstor Luque said the fault "had accumulated pressure for a long time". No recurrence period or maximum magnitude has been published for this system — a critical knowledge gap for the code.^[18]

Why two magnitudes? Each agency uses different networks, scales and methods and revises as data arrive. The IGC published 7.2, then 7.5; USGS went from 8.0 to 7.7. How that difference was communicated caused confusion in the first hours.



Aftershock sequence (IGC-UP)^[4]

305 aftershocks in 56 h detected automatically; mean magnitude fell from 4.7 to 4.0. The four aftershocks above M6 occurred in the first 11 hours. The total will grow as analysts review smaller events.

What comes next



According to the USGS forecast cited by Earthquake Insights, an M6+ aftershock within a year is likely and there is a 24 % chance of an M7+ event. Activity may last weeks or months.^[3,5]

Implication: damaged buildings (yellow/red) should not be occupied until evaluated; a strong aftershock can complete a collapse already started.

Earthquakes that shaped Panama

Year	Area	M	Impact
1882	Golfo de San Blas / Colón	~7.9	Tsunami in San Blas; damage to Panama's Cathedral and Cabildo; uncertain death toll ^[38]
1913	Azuero (Tonosí)	6.6–6.9	Same fault system as 2026; destroyed the Macaracas church tower ^[18]
1934	Puerto Armuelles	7.4–7.7	Damage to the pier and David; local tsunami ^[38]
1991	Limón (CR) / Bocas del Toro	7.6	23 dead and 559 injured in Panama; >5,500 displaced ^[37]
2003	Puerto Armuelles	6.5	2 dead; damage to roads and homes ^[38]
2026	Azuero (Herrera / Los Santos)	7.5 IGC · 7.7 USGS	Largest earthquake recorded in Panama; 0 deaths; >1,200 homes assessed ^[1]



The 1913 earthquake occurred on the same fault system and destroyed the Macaracas church tower. 113 years later, churches in the same region lost their towers again: the hazard was known.^[18,26]

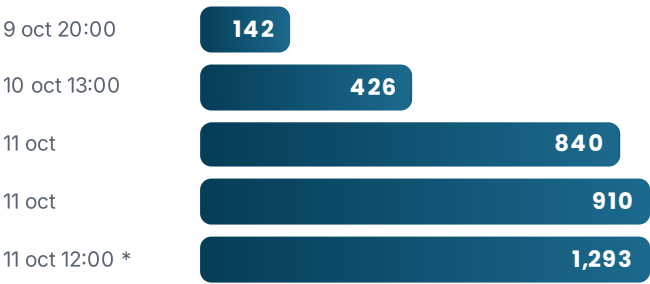
05

Damage by province

Breakdown from SINAPROC Official Communiqué No. 7 (11 Oct 2026, 12:00). Figures keep rising as teams reach isolated communities. ^[6,2]

Province	Homes	Schools	Health	Other
Los Santos	421	35	4	5 hotels · 28 public bldgs · 1 bridge
Veraguas	305+	192	8	3 churches · 9+ bridges · 9 road sections
Coclé	229	32	2	6 hotels · 10 churches · 1 footbridge
Herrera	206	91	3	5 churches · 4 road sections · 1 landslide
Chiriquí	75	87	2	10 total losses · water tank collapsed
Panamá	4 PH	43	—	minor damage
Colón	7 + 19 multifam.	12	1	municipal market · 1 bridge
Panamá Oeste	21	18	3	3 churches
Bocas del Toro	8	25	—	
Darién	1	15	1	
Ngäbe-Buglé / Guna Yala	—	21 / 9	—	indigenous regions

Homes: a number that changed every day



* 1,293 = homes assessed (not all damaged). Sources: SINAPROC via Wikipedia, Infobae, Telemetro, Retén Chiriquí. ^[8,7,6]

People

27

injured (Coclé 17, Los Santos 6, P. Oeste 2, Herrera 1, Veraguas 1) ^[2]

2,130+

affected people (10 Oct) ^[8]

~800

in shelters: Veraguas 310, Colón 257, Los Santos 210, Coclé 30 ^[6]

~300

evacuated from Isla Cañas on tsunami alert ^[24]



Heritage

At least 13 churches badly damaged; the tower of San Atanasio (Historic Monument since 1938) lost its top level and one tower of Penonomé Cathedral collapsed ^[25,26,27].



Hotels & tourism

Partial collapse of Hotel Dos Continentes (Penonomé) and of a hotel building in Playa Venao; 11+ hotels affected in Coclé and Los Santos ^[15,2]. Causes: under evaluation.



Education

From 188 to ~619 schools damaged depending on the cut-off; classes suspended nationwide for inspection ^[11,6].



Health

Hospitals partially damaged in Los Santos (4), Herrera (3), Coclé (2); precautionary evacuation of 40+ patients from the old maternity ward of Hospital Santo Tomás ^[6].



Roads & bridges

4–5 km of badly damaged road at Torio (Mariato); 8 bridges in Soná and 6+ in Mariato; Arenas, El Cacao and Quebro without road access ^[14,2].



Water & power

Water tank collapsed and treatment plant cracked in Chiriquí; power cuts in six provinces; Veraguas communities without water or internet ^[6,2].



Public buildings

Partial collapse of one side of the Coclé Governor's office; 28 public buildings affected in Los Santos alone ^[12,6].



Economy

USGS PAGER: red alert for losses (1–10 % of GDP ≈ US\$0.95–9.5 bn, computed with GDP ~US\$95 bn). The Canal, Cobre Panamá and Tocumen kept or resumed operations ^[1,29].



No authority has yet published the technical cause of the hotel, church or public-building collapses. This analysis describes vulnerability patterns, not individual liability: each case is "under evaluation".

● worked ● risk / pending ● failed

- 12:56 ● Main shock Mw 7.7 / M7.5. Felt by ~4.5 M people. ^[2]
- 13:02 ● Tsunami warning (NWS/PTWC) for Panama, Colombia, Ecuador and Central America; ~300 evacuated from Isla Cañas. ^[2]
- 13:00–15:00 ● Building evacuations in the capital; Tocumen suspends flights for checks. ^[2]
- 14:40 ● Tsunami threat ended (19:40 UTC). ^[36]
- 15:25 ● Mw 6.6 aftershock (MMI VIII). ^[2]
- 9 Oct 20:00 ● First tally: 142 homes, 188 schools, 27 injured. ^[2]
- 10 Oct ● National state of emergency; up to US\$100 M. US deploys a DART + 2 USAR teams (20 people) within 24 h and US\$5 M. ^[8]
- 10–11 Oct ● Home counts: 426 → 840 → 910; school count goes from 188 to 419 and 619. ^[7]
- 11 Oct ● Torio residents block the road: "supplies have not arrived"; Arenas, El Cacao and Quebro without road access. ^[10]
- 11 Oct ● ~26 t of aid airlifted (SENAN, SOUTHCOM); MOP moves machinery to Torio. ^[10]
- 11–12 Oct ● Structural inspections postponed until aftershocks ease; classes suspended. ^[35]

Local time (UTC–5). Further support: IFRC/Red Cross, Israel (water and food); the EU offered help upon request. ^[33,31,32]

✓ What worked

Zero reported deaths^[24]

High-rises and Canal bridges without damage forcing closure^[12,11]

The Canal, Cobre Panamá and the airport kept or resumed operations^[29]

Tsunami alert and precautionary evacuation within minutes (Isla Cañas)^[2,24]

State of emergency and funds within 24 h; fast international aid^[8,31]

The IGC published daily aftershock reports^[4]

✗ What failed

Aid did not reach isolated communities for 48 h (Torio, Macaracas, Tonosí, Los Pozos, Pesé)^[10]

Centralised distribution; legislators ask for municipal involvement^[34]

Conflicting home and school counts across institutions and days^[7,6]

Confusing magnitude messaging (7.2 → 7.5 vs 7.7) in the first hours

No public rapid-inspection protocol (green/yellow/red tags) in the first 72 h^[35]

No early warning: the public had not a single second of notice^[23,22]



Fair assessment: Panama was lucky with the time and place of the quake, and its code for tall buildings worked. The failures were not of modern engineering, but of what the code never reached (old and informal buildings) and of post-event "last-mile" logistics.

Three lessons

1

Luck is not a plan

The same quake at 3 a.m. or under a city would have ended differently.

2

The code works where it is applied

Buildings designed to modern REP held; the challenge is bringing the code to homes, schools and heritage.

3

Response is won with data and the last mile

A single dashboard and local logistics matter as much as funds.



1 • Buildings older than the code

Until 1985 there was no mandatory code, and REP-84 required no formal seismic design for single-family homes. Many homes and churches in the interior predate 1984^[12,17].



2 • Unsupervised self-construction

"A large part of the population lives in houses built without technical supervision or with risky modifications" (Prof. Ramiro Vargas, UTP). Up to 41 % of metro-area housing was produced informally (IDB, 2014 data)^[12,40].



3 • Unconfined masonry

Block, adobe or rubble walls without tie-columns or bond beams: stiff and brittle. Vargas names the lack of confinement — especially bond beams — as the main vulnerability of homes^[17].



4 • The code covers design, not construction

REP defines how to design, but no code governs how works are executed and there is no systematic inspection (architect Carlos A. Solís)^[12].



5 • Maintenance and corrosion

"The maintenance culture in Panama is almost non-existent" (Solís). School projects stalled since 2013; corroded steel loses section and bond before the quake^[12,16].



6 • Soils, slopes and knowledge

No vulnerability or microzonation maps combining faults and soils; no published recurrence period for the Azuero-Soná fault^[17,18].

Evolution of the Panama Structural Code (REP)^[12,39]

1976

SPIA code — reference only (not mandatory)

1985

REP-84 (G.O. 23 Jan 1985): mandatory, but no formal seismic design for single-family homes

1994

REP-94: stricter on homes; local seismic data

2004

REP-2004: instruments in buildings >15 floors or >5,000 m²

2014

REP-2014: Limón & Pedro Miguel faults; ASCE 7 format

2023

REP-2021 in force since 30 Apr 2023 (JTIA Res. 020-2022); performance Annex 1 postponed



Earthquake early warning

June 2026: the IGC "urges" an early-warning system (US\$1.5–3 M investment). August 2026: Panama seeks to enable Google's Android alert, still "not available in this region". On 9 October none existed ^[20,22,23].



Incomplete seismic network

The IGC runs 63 seismographs but only 50 were active: ~20 % of the network out of service ^[21].



Schools without maintenance

La Prensa documented classrooms "at risk of collapse"; school infrastructure projects stalled since 2013 and maintenance completed in only 173 schools ^[16].



Unreinforced heritage

MiCultura had announced a restoration plan for historic sites in Los Santos and Herrera; there is no record it was executed before the quake. San Atanasio has been a Historic Monument since 1938 ^[28,27].



The 1913 precedent

The same fault system produced an M6.6–6.9 quake with damage in Azuero in 1913; no recurrence assessment or regional plan was published ^[18].



Performance-based design annex

Annex 1 of REP-2021 (performance-based seismic design) was postponed and amended (JTIA Res. 017-2023 and 023-2023) ^[39].



Scale of the problem: an early-warning network cost US\$1.5–3 M, versus US\$100 M in the emergency fund alone and modelled losses of US\$1–9 bn. ^[20,8,1]

Construction and regulation

No execution code or inspection

The code regulates design; nobody systematically verifies that construction matches the design.

Single-family homes off the radar

For decades houses required no seismic design; self-construction still has no mandatory technical assistance.

Essential buildings not assessed

Schools, hospitals and public buildings without a seismic inventory or a funded retrofit programme.

Heritage without a retrofit plan

Churches protected by law since 1938 with no structural intervention.

No vulnerability maps

No microzonation or soil/fault maps to guide permits.

Organisation after the event

Last mile

Airlifts and announcements, yet isolated communities without supplies for 48 h.

Data

Each institution reported different figures; there was no single public dashboard.

Science communication

Different magnitudes without clear explanation; official accounts struggled to post.

Post-event inspection

No public rapid-tagging protocol; checks were postponed because of aftershocks.

Local governments

Centralised distribution; municipalities, who know the territory, given little role.

Based on: La Prensa, Infobae, Eco TV, Panamá América (UTP), Telemetro, Retén Chiriquí. Causes of specific collapses remain under official evaluation. ^[12,10,34,17,7,6]

0–3 months Response and assessment	3–18 months Safe reconstruction	18+ months Structural prevention
National rapid-inspection protocol with green/yellow/red tags (ATC-20 style) and brigades of licensed engineers (JTIA, SPIA, UTP)	Rebuild only with plans and supervision: subsidies tied to confined masonry or approved systems	IGC's own early-warning network (US\$1.5–3 M) and strong-motion network
Single public dashboard of damage, shelters and aid, updated daily	Construction-execution and inspection code (complementing REP-2021) with mandatory inspections of foundations, reinforcement and pours	Seismic microzonation and soil/fault vulnerability maps for the main cities
Last-mile logistics with municipalities, community boards and pre-assigned air routes	Free standard plan kits for seismic-resistant single-family homes	Funded retrofit programme for schools, hospitals and heritage
Assess every school, hospital and essential building in the affected area before reopening	Enable Google's alert and repair the 13 inactive seismographs	Parametric/catastrophe housing insurance and tax incentives for retrofit
Emergency shoring of damaged heritage	Seismic inventory of schools and hospitals with risk-based prioritisation	Recurrence study of the Azuero-Soná fault and integration into REP

Who should do what

SINAPROC Coordination, single damage & shelter dashboard	MIVIOT Housing census, reconstruction, execution code	JTIA / SPIA REP, professional licensing, inspection brigades	Municipalities Permits, site inspection, local logistics
MEDUCA · MINSA Inventory and retrofit of schools and hospitals	IGC-UP Seismic network, early warning, fault study	MiCultura Shoring and retrofit of heritage	MEF Contingent instruments and insurance



Funding already available: besides the emergency fund (US\$100 M), Panama holds contingent instruments — an IDB line with US\$300 M for earthquakes and floods, a World Bank CAT DDO (US\$32 M available) and a US\$48 M parametric insurance.^[30,8]

For engineers, architects and builders

- Design to the current REP-2021 and document soil assumptions
- Require cylinder tests (C31/C39) at every pour and rebar certificates (A615/A706)
- Detail stirrups, seismic hooks and laps; avoid "soft storeys" and short columns
- Assess existing buildings against the code they were designed with (UTP)
- For repairs: crack injection, column jacketing and wall confinement with a signed design

Composite materials (GFRP, e.g. ASTM D7957 / ACI 440.11-22): useful for durability and crack control in slabs on grade, pavements, foundations and coastal works. They are not used in primary seismic force-resisting systems, because they have no ductile yield.

Material standards that must be required

ASTM A615 / A706	Deformed steel rebar; A706 = weldable, ductile steel for seismic zones
ASTM C94	Ready-mixed concrete: batching, transport and delivery
ASTM C31 / C39	Making and curing cylinders / compressive strength test
ASTM C143	Slump: on-site water control
ASTM C90 / C129	Load-bearing / non-load-bearing concrete masonry units
ACI 318 · REP-2021	Reinforced concrete design and seismic loads (ASCE 7 format)

Slabs, floors and pavements



UNREINFORCED

one wide crack that opens as the ground moves



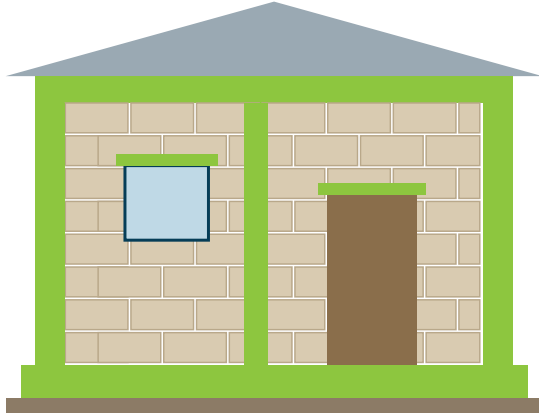
WITH MESH (steel or GFRP)

fine, distributed cracks — the slab keeps working

ACI 318 requires minimum shrinkage-and-temperature reinforcement in structural slabs; ACI 360 guides slabs on ground.

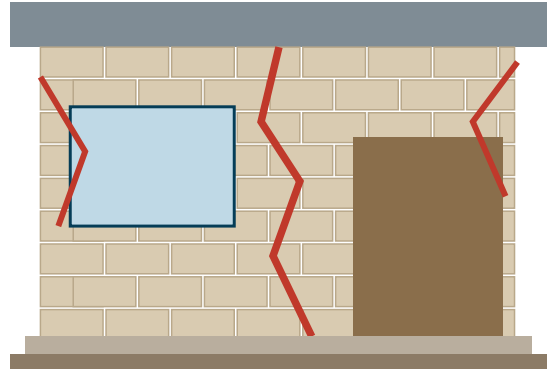
Most damage to homes in the interior follows the same pattern: block walls without tie-columns or bond beams. Well-built confined masonry is affordable and proven in Latin American earthquakes.^[17]

CORRECT · confined masonry



- 1 Continuous bond beam (ring beam)
- 2 Tie-columns at corners and opening edges
- 3 Continuous foundation beam
- 4 Small, symmetric openings with lintels
- 5 Light, well-anchored roof

WRONG · unconfined masonry



- 1 No bond beam: the roof pushes walls apart
- 2 No tie-columns: walls split at corners
- 3 Large openings close to corners
- 4 Hollow block with no reinforcement or grout
- 5 Heavy slab/roof on weak walls



Golden rule: every wall must be "framed" by reinforced concrete — foundation beam below, tie-columns at the ends and at door and window edges, and a bond beam on top, all connected like a box.

Before buying or renting: ask for the year of construction and permit, request the signed structural drawings and, for buildings, the maintenance history. Buildings older than 1994 deserve a professional assessment.

Checklist: 10 rules for a safe home

1

Hire a licensed engineer or architect (JTIA) and get the municipal permit

2

Study the site: avoid slopes, fills, riverbanks and mangroves

3

Simple, symmetric (rectangular) plan; avoid L or T shapes without joints

4

Continuous foundation beam under every wall

5

Tie-columns at corners, wall intersections and opening edges

6

Continuous bond beam on top of every wall, connected to the columns

7

Small openings, away from corners, with lintels

8

Certified deformed rebar (ASTM A615/A706) and well-cured concrete $\geq 210 \text{ kg/cm}^2$ (~21 MPa)

9

Light roof, well anchored to the bond beam; avoid heavy tanks on the roof

10

Do not extend or add storeys without a new structural design

If your home already exists: look for diagonal wall cracks, separation between walls and columns, and corner cracks. When in doubt, request a professional assessment before moving back in.

A rapid tagging system (such as California's ATC-20, used across Latin America) lets authorities decide within hours which buildings can be used, saving lives during aftershocks and ordering reconstruction.

GREEN

INSPECTED

Use allowed. Minor or no structural damage.

YELLOW

RESTRICTED USE

Limited entry (retrieve belongings). Moderate damage: detailed evaluation required.

RED

UNSAFE

Do not enter. Risk of collapse or falling elements. Demolish or retrofit with a design.

What to do after an earthquake

- Do not re-enter a building with diagonal cracks, damaged columns or visible tilt
- Shut off gas and power if there is damage; check elevated water tanks
- Stay away from façades, balconies, church towers and loose walls during aftershocks
- Photograph the damage for insurance and for the MIVIOT census
- Request an inspection from SINAPROC, the municipality or a licensed engineer



Panamanian engineers (SPIA) warn: the absence of visible cracks does not guarantee structural safety. Check columns, slabs, beams, balconies, façades, gas lines and reserve tanks.^[11]

Family plan: prepare for the next aftershock

Water and food

3 days per person

Torch and radio

with spare batteries

First-aid kit & medicines

and document copies

Meeting point

agreed, outside the house

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All figures are preliminary and come from the public sources cited. Technical causes of specific collapses have not been published by the authorities and remain "under evaluation". This document does not replace an assessment by a licensed engineer.