HOME AND BUILDING INSPECTION

HOME AND BUILDING INSPECTION SCOPE OF WORK IN PUERTO RICO

NABIE ANNUAL CONFERENCE-2014
WESTIN HOTEL AT DALLAS-FORT WORTH
IRVIN, TEXAS
2/22/2014

AUTHOR: DR. JUAN F. CHARLES, PE, F-NAFE, CBIE, CFEI, CPE, PPL, PA
HOME AND BUILDING INSPECTION
SCOPE OF WORK IN PUERTO RICO

- INTRODUCTION
- THE BEST WAY FOR HOME INSPECTION
- OBJECTIVES
- HOME AND BUILDING INSPECTION DEFINITIONS
INTRODUCTION

The home and building inspection outcome depends on an assignment scope of work and the professionalism to judge soundness based on visual evidence.

The experience and training are crucial elements for the effectiveness and accuracy during the identification of defects and causes based on visual observations and techniques that help to determine defect’s in order to recommend corrective actions and cost of repairs.

Professional engineer engaged in building inspection shall be able to utilize a systematic inspection process in order to assure that most amount of defects are correctly found and identified.
OBJECTIVES OF THIS PRESENTATION

This presentation objectives will be mostly focused in:
• To provide an overview of the inspection process in Puerto Rico.
• To identify and discuss common building defects and corrective action.
• To provide an overview of action plan preparation during storm season.
OBJECTIVES OF THIS PRESENTATION

To analyze how detrimental condition affect building condition and it’s functional utility

To discuss the difference and similarity between inspection report and expert report and how a professional engineer could be violating the code of ethic.
THE BEST WAY FOR HOME AND BUILDING INSPECTION

What is the best way to perform a home or building inspection in professional manner?

The best way to practice the home and building inspection is utilizing a systematic and proof method that allows that all findings are properly identified and classified for further analysis and correcting actions.

ESTABLISHING THE SCOPE OF WORK IS ESSENTIAL IMPORTANT
SCOPE OF WORK TYPICAL INSPECTION

Determine the condition of entire building:
industrial, commercial or residential dwelling

Examination of the current condition of the entire dwelling: home inspection

Examination of the observable code violations

Examination of all observable safety hazard
SCOPE OF WORK TYPICAL INSPECTION

Examination of all observable environmental detrimental condition: internal or external: Flood, Mold and insect examination, Soil, noise, traffic, abandoned house and vacant lot adjacent to the subject and access
SCOPE OF WORK TYPICAL INSPECTION

Existence of lead painting, for alert only

Asbestos examination or determination, for alert only

ADA compliance, most time for commercial and institutional building only
SPECIALIZE INSPECTION

Fire protection
Sick building assessment
Ventilation and cooling
Building code compliance
Building premises risk analysis
EXPERT WITNESS

Cause & origin of defects

Sick building investigation and analysis

Construction compliance: drawing and specifications and code and standard

Laboratory of testing material

Structural analysis (invasive explorative process for cause determination)

Hidden defect investigation and analysis for root cause determination
The objective of a home inspection is to provide the client the result of fact and findings base on a visual inspection.

This Law specifically regulated the inspection requirement for Real Estate transaction in the case that a Real Estate Agent is engage. All parties must be aware of property condition before the mortgage process with a mortgage bank is financing the loan.

A written report must be submitted.
HOME INSPECTION AS PER 93 LAW OF MAY 16, 2006

BUILDING IDENTIFICATION

Client identification:
Intended user
Intended used
Public Record Number
Plot number
Tax ID number
Public record identifications
Physical address
GPS & lambert coordinate
Location map and Plat map
HOME INSPECTION AS PER 93 LAW OF MAY 16, 2006

CODE & STANDARD AND LEGAL REQUIREMENTS:

Accessibility (Code & legal) - UBC-97, IBC-2009

Electrical (Code) - NEC 70

Zoning according to Regulation # 4 & LAW 161 of 2011 and the latest amended, LAW 151-2014

- Encroachment
- Area easement
- Eminent Domain

Building Code: UBC-97, IBC-2009

- Electrical Code
- Mechanical Code

Zoning compliance:

Living area Vs site area

Front, lateral & rear patios
HOME INSPECTION AS PER LA 93 OF MAY 16, 2006

FIELD DATA AND LEGAL DOCUMENT

Type: 
date of built: 
Materials: 
um. of story: 
Number of unit: 
Legal Permit: original Use: Residential, Commercial, Industrial, Mixing, or other
Water meter: 
Electrical meter: ( at least the last 6 months must be required for analysis and reported)

Building description: type of construction material, style, uses, zoning, and legal issues.
Existing damages, obsolesces, life expectancy and an itemized list of categorized defects:
Cosmetic and curable
Physical Curable
HOME INSPECTION AS PER LA 93 OF MAY 16, 2006

Physical Incurable
Safety hazard
Utilities: water, electricity and sewage system availability
Environmental issues
Structural issues
Others detrimental conditions
Itemized cost
Summary of defective items with estimated cost and a statement for soundness, obsolescence and safety of the property base only in the visual inspection.
Narrative final statement about the findings should be the final step of the assignment
BUILDING INSPECTION ENGINEERING

BUILDING INSPECTION ENGINEERING:

The building inspection engineering can be performed based on the type of property or building and the building characteristics.

INDUSTRIAL

COMMERCIAL

HOME- RESIDENTIAL DWELLING

SPECIALIZE AREAS: roof only, soil condition, mechanical system, electrical system, code compliance, fire prevention, sanitary compliance, etc.
BASE ON CLIENT REQUIREMENTS

BASED ON CLIENT REQUIREMENTS:

BUILDING INSPECTOR ( VISUAL INSPECTION ONLY )

SPECIALIZE AREAS AS STATED IN PREVIOUS PAGE CONDITION

EXPERT WITNESS
PROFESSIONAL CREDENTIAL

PROFESSIONAL CREDENTIAL:

Licensed Professional Engineer, PE
Licensed Professional Architect
With Special Training and is Certified for an Accredited Organization, such NABIE Specialized and License Technician:

1. AC Technician, certified by the stated
2. Licensed Electrician, certified by the stated
3. Certified Asbestos Technician, certified by EPA
4. Certified Mold Technician. Certified by EPA & HUD
5. Environmental Technician, certified by EPA
6. Master Plumbing, Licensed by the state
7. Licensed Insect Control Technician, Licensed by the AHJ in PR

COLLEGE OF ENGINEERS AND LAND SURVEYORS- CIAPR IS THE GATE KEEPER FOR PROFESSIONAL PRACTICE IN PUERTO RICO BASED ON MY BOOK
INSPECTION PROCESS

EXTERIOR:

GROUND AND LANDSCAPING: CONDITION: soil, sub-soil, topography, etc.
PATIOS: CONDITION AND CHARACTERISTICS
FENCES: MATERIAL, CODE AND CONDITION
RETAINING WALL: TYPE, MATERIAL AND CONDITION
PAVED AREA: MATERIAL AND CONDITION
DRAINAGE: CODE, CONDITION
INSPECTION PROCESS

BUILDING COMPONENTS MUST BE INSPECTED FROM OUTSIDE: INSIDE BASED ON MY EXPERIENCE:

`WALLS AND OVERHANG
DOORS AND WINDOWS
ATTACHED ACCESSORIES
FOUNDATION, FOOTING
BALCONY AND DECK AND PORCH
BUILDING ENVELOPES (BUILDING SYSTEM)

BUILDING ENVELOPES (BUILDING SYSTEM):

EXTERIOR WALLS

ROOF (SPECIAL ATTENTION MUST BE PUT ON THE FLAT ROOF)

FAÇADE

FASCIA AND SIDING
BUILDING SAFETY & HEALTH

BUILDING SAFETY AND HEALTH

ACCESSIBILITY: CODE, CONDITION

ELECTRICAL HAZARD ( EXTERIOR )

LEAD PAINTING ( ENVIRONMENTAL )

ASBESTOS ( ENVIRONMENTAL )

ADA ACT ( IGUAL OPPORTUNITY ACT- 1990 )

STRUCTURAL HAZARD ( EXTERIOR )
SITE, SOIL AND CHARACTERISTICS

GRADING AND DRAINAGE:

The grading and the drainage around the property are generally matters of great importance for the building exterior inspection. Grading must have a pitch away from the perimeter of the building not less than ½ inch per foot in all four directions. Landscaping, trees, and grading improvement, such as paved areas, driveways, fences and retaining walls required special attention in order to detect any ground or soil detrimental conditions which could be the cause for most home and building defects, especially for concrete building.

SOIL CHARACTERISTICS AND CONDITION IS THE MOST IMPORTANT FACTOR FOR HOME AND BUILDING SOUNDNESS
FOOTING AND FOUNDATION:

The foundation along with the soil load capacity are fundamental to support the structure which is capable to withstand all typical forces; wind, dead weight, seismic, dynamic load, weather variation (hot & cold).

Foundation is describe for type of material: reinforce concrete, filled concrete block in stacked, and foundation walls.

Description must include type of foundation: foundation walls, slab on grade, the condition of foundation and common defect found, such as cracks, movement, settlement, water seepage, etc.
FOOTING AND FOUNDATION

MOST COMMON DEFECTS ARE:

Walls cracks
Basement cracks due to hydrostatic pressure
Displacement of concrete block walls
Horizontal cracks
Rotational settlement
Differential Settlement
Bowed concrete wall
Heaving soil
Cracks in the masonry foundation walls
Footing cracks

SOIL IS THE MOST IMPORTANT FACTOR IN THIS SECTION
EXTERIOR MOST COMMON DEFECTS:

MOST COMMON DEFECTS:

Common defects or Deficiencies for exterior
Balcony without railing (safety hazards)
Exterior stair step & railing (safety hazards)
Driveway service walk

Settling cradles
Unleveled of service walks, Patio, Driveways and holes in the Landscaping

Trees affecting foundations
High trees to close to the building
Infected trees

Grading services walks/driveways Pitch/crack/Settled/Unleveled

Spalling concrete
Pitched in to the foundation
Unsealed asphalt Driveways
Wet patios settled
Grading and Drainage with negative drain pitch to foundation
Retaining walls (excessive pressure behind them)
Presence of high trees planted at nearby the building foundation
3 steps stairway without railing
Lack of railing in porch above 30"
Excessive gap between balustrades (safety issues)
SOIL CONDITION

Geotechnical issues:
Is the condition of the soil itself: compacting, slopes, drainage, tunneling and retaining walls and patios.
Settlement (Structures built on unconsolidated material) Differential Settlement - Tends to produces greatest damage to structure improvement due to organic soil and ground water.

Geotechnical problems: Natural & Man made.
SOIL CONDITIONS

Geotechnical problems:

Natural

Expansive soils
Subsidence of unstable soils
Slope creep and Slope instability

Man Made

Construction on un-supported soil
Un-compacted soils
Improper construction
Leaking pipes under the foundation
Inadequate drainage
Retaining walls when site require it
SOIL CONDITION

MOST COMMON DETRIMENTAL FACTORS:
EROSION
EXPANSIVE SOIL
SULFATES CORROSIVES
SLOPE MOVEMENT
LANDSLIDES
SLOPE FAILURE
SUBSIDENCE
CREEP
STEEP SLOPE
Most common defects due to soil condition are:
Structure defects due to soil
Cracks in walls
Doors and windows going out of point
Cracks in foundation
Cracks in driveways, porch or garage
Sinking foundation
Differential settled displacement
Erosion, ground water, creep, slope failure, etc.
ROOF INSPECTION- EXTERIOR

ROOF INSPECTION:

After a deep visual inspection of the outside part of the building is it recommended that the next step is to continue to the roof. The several component which must take into consideration are: additional load placed on the roof, roof framing and type, roof material (concrete) skylights, drainages, vent pipe, treatment, apparent condition, life expectancy, pitch, and workmanship and quality control of the process.

The roof is one of the most important parts of a building, during the inspection process it is required that the surface be carefully inspected to detect: cracks, unleveled, concavity, lack of drainage, none compliance pitch, roof remaining life, actual or newest roof protection applied.
ROOF INSPECTION - EXTERIOR

THE MOST COMMON DEFECTS:

Improper Pitch or no pitch
Lack of drainage
Poor location of drainage
Unleveled surface
Cold joint that allow water penetration from outside to interior.

Alligatoring syndrome surface that allow water accumulated bellow the deteriorate material,
Concavity and convexity
Cracks that water filtration into the structure
Obstruction
Type of support elements, sometime they provide a good place for other supported element.
GUTTER AND DOWNSPOUTS

The gutters and downspouts for home and building are the element utilized for water drainage to keep water discharged out away from the structure. It is recommended that the downspouts be outfitted with good long extension buried lines so water discharged out and around to the area of the building, but not to go inside of the foundation.

Obstruction in gutter and downspouts can be contributing with rapid accumulation of rain water on the roof.
PLUMBING AND SEWER SYSTEM

Plumbing and sewer system:

Plumbing & Sewer System
The sewage in a building or home is normally connected to the community public systems in urban area, but in most of the suburban areas there is a lack of public system. Due to this fact it is required the provision of septic tank. This component must considered as part of the soil and the plumbing system like walls and other structural components.
PLUMBING AND SEWER SYSTEM

Plumbing and sewer system:

The main components of a sewer and septic tank area: tank and sewer pipe in the ground and the sanitary components within the bathroom of the building or the home, such as: bathtub, lavatories, sink, stub, connected directly to discharge in the sewage piping with a siphon or intermediate component which avoid odor and insect get into the home or the building. In some place within the site there must exist a cleanup cap and venting pipe at each bathroom. In the case of septic tank, it is important to identify it exact location from the site limit and from the house foundation, also must be identified the numbers of chamber and required the owner (seller) to provide copy of permit from the health or sanitary authority.
PLUMBING AND SEWER SYSTEM

SEPTIC TANK
Capacity by Code (plumbing code)
Number of chamber (Health requirement)
Location (FHA & Local requirement) 5’ from site limit & 10’ from foundation minimum
Certification from health authority

The most Common defects in this system are:
Under capacity tank
Septic tank with only one chamber for solid and liquid
Collapse of main pipe due to trees root obstruction.
Venting obstruction
Slow drainage from bath tub / stub
Plumbing and Sewer System

Inspection of Plumbing System

Identify water linear material: Galvanized, cooper polypropylene, PVC
Identify water meter location and actual reading and Inspect for code accomplishment.

Water meter, Water pipes
Shut off valves location
Piping material
Electrical water heater & solar
Drain, wastes & vent pipe
Hose bibs
Water treatment unit: water softener
Water cistern (tank) capacity
PLUMBING AND SEWER SYSTEM

Common defects:

Undersize capacity of septic tank
One chamber for solid & liquid
Failure to accomplish the minimum requirement
Fail to provide Certification
Unknown location
Located at settled area
Affected by trees root
Under flood level a flooding area
Additional enclosed area built on the top of the septic tank
Poor construction and material
Poor discharging pitch
Cracks in galvanized water vent pipes
Improper turn offs
Inadequate cross connections
Low water pressure at plumbing line
Lack of relief valve and does exist,
Rusty burner corner
Water entry piping not visible
Pipes leaking
Valve broken / missing
INSPECTION PROCESS: INTERIOR

INTERIOR INSPECTION PROCEDURES:

Start walking around

Prepare a non-scale sketch

Identified all defects and put reference point in the sketch.
Layer or multiple sketches are recommended when areas must be compared with other or must be utilized to compare with a reference area.
NON SCALE SKETCH

It is very important to prepare as many sketch as necessary in order to match:

Defect/condition exact location and photo in order to help the reader to understand the report.
ROOF AND CEILING

LEFT (ROOF). FROM EXTERIOR

RIGHT CEILING. FROM INSIDE

SPOT OF WATER

CRACK

CRACKS

SPOT OF WATER

REAR PREtil

LATERAL PREtil

CENTER LINE
KITCHEN AREA

Run water while testing electrical- CFGI
Check for wires under the sink
Burned marks and chips on countertops
Misadjusted drawers and cabinet doors
Ceiling & wall, counter top Floor cabinet
Wall cabinet
Plumbing system: pipe, fixtures and faucets
Electrical system, Ventilation system and
Sink and P-trap for leaking
KITCHEN AREA

MOST COMMON DEFECTS:
Others defect are:
Water penetration around the countertop
Leakage from faucets
Slow sink drainage due to pipe obstruction
Interchange of house material for hot and cold water
Extractor malfunctioning
Low pressure in water line
Broken sink and leaking
P-trap obstruction /or leaking
The exterior of the building generally is concrete block, reinforce concrete, masonry, and some rarely wood and metal sidings. The exterior mostly is built to protect the entire structure from rain water, moisture and air infiltration on any condition that could negatively affect the livability or the utilization of such building.

Common defects:

- Crack in the walls
- De-lamination
- Painting deterioration
- Lack of painting or poor painting
- Unvented bathroom
- Accumulation of humidity at the floor perimeter
- Lack of plastering
- Doors projection and trim installation
- Fences, Gates and operator defectives and
- Plastering and cracks, and painting pilling down
GARAGE/ CARPORT

Exterior wall
Type of construction
Materials
Ventilation
Construction
Floor
Walls
Doors, operator and gate
When the interior of the building is accessed in order to perform an inspection, the first step is to start looking the ceiling in order to make any connection with the findings at the roof and the ground.

SOME BASIC TOOLS:

It is required that a flashlight, caliper, magnifier, meter, and telescoping mirror are utilized in order to proceed with a systematic inspection process made to the complex system in the interior of a building.

Typical interior inspection required that the inspector verify:
Ceilings, walls and floor covered
Building elements: beam, column
Partition, Closets,
Stairways, steps, and railings
Kitchen components
Doors and windows
Ceiling and walls must be describe, indicating type of material, existing damages, and general condition. The following are the most common defects:
De-lamination
Cracks
Filtration, humidity and mold
Exposed bars
Painting pilling down
Plastering pilling down, concrete de-lamination
INTERIOR INSPECTION

WINDOWS AND DOORS

Complete description of doors and windows from and interior doors, windows, its types according to type of material and design and style, sizes, quantities, qualities, operational conditions and apparent condition must be reported.
The electrical system is the energy supply and energy transformed of the house or the building. Electrical current is the flow of electrons along a conductor such as a copper wire. The electrons are produced by a generator or battery that forces electrons to follow the conductors to an appliance such as a microwave, TV, computer, light-bulb, radio, AC unit, etc.

This flow occurs in a circuit that is compose of service line to a utility pole transformer, service drop (overhead or underground), service mast, service entrance, meter, raceway, disconnectors, grounding, service equipment, them to panel board circuit, circuit breaker, ground fault, breaker, wire, switches, interrupters, junction boxes and outlets, ground fault circuit interrupter CFCI

The normal main breaker for a typical house is controlled by 200 amp, 240 volt.
ELECTRICAL APPLIANCES & COMPONENTS

RANGE
REFRIGERATOR
LIGHTING
OUTLETS
MICROWAVE
LAUNDRY AND BATHROOM
HVAC
GARAGE DOOR OPERATOR
OTHERS
ELECTRICAL SYSTEM COMPONENTS:
Important facts on the electrical system are:
Component manufacturer, brand name, type, serial number, and class.
Number of circuit Breaker Breakdown
CFG1 circuits for: Kitchen, Bathroom, Laundry must be check for CFG1 receptacles.
Receptacle distribution and installation must be in compliance with code and standard.
Wiring size according amperage must be properly installed.
Wiring to garage door operator must be properly done.
ELECTRICAL SYSTEMS

Most Common defects of the electrical system:
Open function box
Broken wire, exposure wire, open receptacle
Unprotected function
Loses or lack of ground
Two 20 amp circuit at 240 volts
Lack CFCI circuit in the following areas: Kitchen, whirlpool, bathroom walls, and laundry area, nonmetallic shielded wiring along near foundation wall and failures switches
Installation of Improper wire sizes and ground
Switches, receptacles, outlets and receptacle fixtures operate all G.F.C.I test devices and outlets by water faille on missing
Over size fuser / breaker for wire size
Uncover boxes
Exposes wired
Main panel not grounded
Reverse polarity / open grounder by water failed
Extension cord wiring
Wiring place into concrete without conduit
Ungrounded panel
Panel located under drains
Panel with no turns offs system.
INSPECTION REPORT

NARRATIVE IS WRITTEN IN PARAGRAPH FORM AND REFLECTS THE INSPECTOR OBSERVATION AND OPINION OF THE CONDITION OF A SUBJECT BUILDING.

NARRATIVE REPORT WITH CHECKLIST OR RATING SYSTEM AND NARRATIVE REPORT COMBINED WITH A CHECKLIST OR RATING SYSTEM REPORT THAT MORE FULLY EXPLAINS THE INSPECTOR’S OBSERVATION OF THE BUILDING.

CHECKLIST REPORT, A SYSTEMATIC ITEMIZATION OF THE VARIOUS COMPONENTS OF A PROPERTY THAT IS ORGANIZE INTO SECTION THAT ALLOYS THE INSPECTOR TO CHECK OF INSPECTED PROPERLY COMPONENTS AND COMMENT FOR AN SPECIFIC PROBLEM.

Any one the above described report forms must begin with the scope of work and they follow any systematic method choice by the inspector. However we have been using this procedure successfully for the past 8 years.
SUMMARY OF REPORT CONTENT

SITE/ SOIL
FOUNDATION
BUILDING ENVELOPES
ROOF SYSTEM AND CONTENT
EXTERIOR COMPONENTS
INTERIOR COMPONENTS: KITCHEN, BATHROOM, OTHER ROOMS
PLUMBING AND SEWER SYSTEMS
ELECTRICAL SYSTEM
APPLIANCES

SUMMARY OF FINDINGS

COSMETIC DEFECTS ITEMS
REPLACEABLE ITEMS
REPAIRABLE ITEMS
NON REPAIRABLE ITEMS
SAFETY AND HEALTH ITEMS
DEFERRED MAINTENANCE ITEMS
STRUCTURAL ITEMS
OBsolete ITEMS

TOTAL COST OF: REPLACE AND REPLACED ITEMS FOR FURTHER ANALYSIS.
THANKS FOR YOUR PATIENT AN LETTING ME TO TALK TO YOU

THIS IS TIME TO ASK QUESTIONS AND MAKE COMMENTS

DR. JUAN F. CHARLES, PE, CBIE, PPL, F-NAFE

ANY COMMENTS: Charless@Caribe.net