Who We Are

- Independent, third-party roofing and waterproofing consultant
- Serving educational, institutional, governmental and private sector clients throughout the US, Canada and Mexico.
- Established in 1999
What We Do

- Perform roof condition assessments
- Develop roof O&M plans
- Develop repair or replacement scope of work and preliminary opinions of cost
- Prepare bidding and construction documents
- Assist with bidding
- Perform construction phase project management and construction administration services through project closeout

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What We Do

- Perform periodic, daily, part-time or full-time construction observation for conformance with Contract Documents
- Perform forensic roof leak investigations
- Perform non-destructive roof moisture surveys
- Perform roof hail/wind damage assessments
- Provide roof litigation technical assistance

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Why We Are Here

To provide you with some insight on how we perform roof inspections, in general, at the four standard levels described in the NABIE Standard of Practice.

NABIE Standard of Practice

Adopted December 12, 2011

Effective March 1, 2012
Levels A-D

- LEVEL A – VISUAL INSPECTION
- LEVEL B – FUNCTIONAL INSPECTION
- LEVEL C – SPECIALIZED INSPECTION
- LEVEL D – REMEDIAL DESIGN AND REPAIR

LEVEL A - VISUAL INSPECTION

Visual inspection of specified systems and components in a representative manner from locations accessible to ordinary users; results and conclusions presented in verbal or written summary.
LEVEL B – FUNCTIONAL INSPECTION

Level A plus more detailed observation, documentation by written report, may require accessing areas normally not accessible to ordinary users. Results and conclusions presented in written report bearing the official seal of the Building Inspection Engineer (BIE). Deficiencies are listed and subjective opinions regarding serviceability or need for repair provided in report. Major items restricted from inspection or outside the expertise of the BIE shall be listed. Report may contain limitations and recommendations for further evaluation as deemed necessary by the BIE.

LEVEL C - SPECIALIZED INSPECTION

Level B plus more comprehensive evaluation of specified systems or components, using specialized equipment, historical research, functional testing, analysis or other tasks deemed necessary by the Building Inspection Engineer. May require invasive techniques, material removal or destructive testing.
LEVEL D - REMEDIAL DESIGN AND REPAIR

Level C plus design or detailed consideration of repair options or improvements generally beyond the scope of Building Inspection. Written reports may include working drawings or detailed specifications.

LEVEL A – VISUAL INSPECTION

Questions to ask, information to gather before getting on the roof:

- Who is most familiar with the roofs? (Usually the person with all the keys).
- Are there any active leaks?
- Has there been a history of leaks?
- Do you have copies of roof repair invoices?
- Can we review your maintenance logs/work order logs for current/past roof maintenance history?
LEVEL A – VISUAL INSPECTION

Determine Roof Type/Classification:

- Low-Sloped Roof Systems
  - Asphalt or Coal Tar Pitch BUR
    - Smooth surfaced, gravel surfacing, pavers
  - Modified Bitumen
    - Smooth surfaced, granule surfaced
  - Single-Ply
    - TPO, PVC, EPDM
  - Sprayed Polyurethane Foam
  - IRMA
  - Garden Roof
  - Metal

- Steep-Sloped Roof Systems
  - Metal
    - Architectural or Structural
    - Solid Deck or Purlins
    - Insulation above the deck or draped over purlins
    - Insulation on ceiling or within cathedral ceiling plenum
    - Single-locked, double-locked or snap-locked
    - Surface fastened
    - Galvanized, Galvalume, Pre-Finished Galvanized
    - Copper
    - Aluminum, Pre-Finished Aluminum
LEVEL A – VISUAL INSPECTION

➢ Determine Roof Type/Classification
  ◆ Steep-Sloped Roof Systems
    ■ Shingles
      ◆ Asphalt
      ◆ Composition
      ◆ 3-Tab
    ■ Metal
    ■ Slate
    ■ Wood shakes and shingles
    ■ Tile
      ◆ Clay
      ◆ Concrete

LEVEL A – VISUAL INSPECTION

➢ What we look for:
  ◆ Drainage efficiency – is the water getting off the roof?
  ◆ Ponding?
LEVEL A – VISUAL INSPECTION

What we look for:

- Number and type of rooftop A/C units
  - Package units
    - Down discharge
    - Side discharge
    - Curb supported
    - Structural stand
LEVEL A – VISUAL INSPECTION

What we look for:

- Split systems
- Support type
  - Wood sleepers
  - Non-wood sleepers
  - Concrete pad
  - PPH
LEVEL A – VISUAL INSPECTION

What we look for:

- Split systems
  - Utility Connections
  - Roof Penetrations
LEVEL A – VISUAL INSPECTION

► What we look for:
  • Roof material age/condition
  • Looks can be deceiving or not
LEVEL B – FUNCTIONAL INSPECTION

Before getting on the roof:

- Review aerial photographs
- Exterior elevations - signs of water stains, streaks on exterior walls
- Exterior elevations – roof drainage features
- Locations of active/previous leaks
- Underside of deck – indications of rust, deterioration, roof leaks
LEVEL B – FUNCTIONAL INSPECTION

Where does/should the water go?

- Off the edge – check embedded edge metal lap joints
- Gutters and downspouts – drain efficiently, ponding
- Roof drains – strainers missing, mismatched strainers, strainers full of debris
- Edge scuppers – notorious for ponding, inefficient drainage
LEVEL B – FUNCTIONAL INSPECTION

- Through-wall scuppers – debris reduces efficiency
- Secondary emergency overflow provisions
- Ponding
LEVEL B – FUNCTIONAL INSPECTION

➤ The devil is in the details

- Roofing material laps/joints
- Terminations, area dividers, expansion joints
- Horizontal to vertical transitions (base flashings)
- Rooftop equipment
- Rooftop piping
- Adjacent wall/parapet wall watertightness
LEVEL B – FUNCTIONAL INSPECTION

- Roof hatch safety rails
- Skylight fall protection guards
- Others?
LEVEL C – SPECIALIZED INSPECTION

→ Destructive testing:
- Core cuts (minimum of 1 per roof area, plus 1 additional sample per 10,000 square feet of roof area)
- Number of plies in multi-ply system
- Width of overlap at membrane laps
- Thickness and type of coverboard
- Thickness and type of insulation
- More than one roof?

LEVEL C – SPECIALIZED INSPECTION

- Deck type
- Verification of non-destructive roof moisture testing, wet is wet, dry is dry
LEVEL C – SPECIALIZED INSPECTION

- Non-destructive roof moisture surveys
  - Infrared camera
  - Electrical impedance meters
  - Nuclear gauges
  - Electronic leak detection
LEVEL C – SPECIALIZED INSPECTION

Functional Testing

- Fastener pull-out resistance (Com-Ten)
- Exposed fastener vacuum tester (Wallace Sales Company)
- Roof surface elevation survey
LEVEL C – SPECIALIZED INSPECTION

→ Code Compliance

- Energy conservation code – meets current code for R-value, reflectivity?
- Plumbing code – roof drains and scupper openings sized to meet current code?
- Plumbing code - secondary emergency overflow drainage provided, required?
LEVEL D – REMEDIAL DESIGN AND REPAIR

Documentation

- Roof overall dimensions, slope
- Roof drains - number, location and diameter
- Through-wall scuppers - number, location and dimensions
- Gutter dimensions
- Gutter downspouts - number, location and dimensions
- Parapet wall dimensions - height and width, all elevations

LEVEL D – REMEDIAL DESIGN AND REPAIR

- Rooftop equipment - number, type, location and condition
- Rooftop equipment - curb size, base flashing height
- Rooftop equipment – number, type and location of abandoned, non-functional equipment
- Rooftop piping: location, elevation above finished roof, support type and spacing
LEVEL D – REMEDIAL DESIGN AND REPAIR

- Determine if Licensed Structural Engineer required to assess existing roof framing structure or deck
- Determine if Licensed MEP Engineer required to assess rooftop MEP equipment.
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[Image of a brick building with a metal door]

[Image of a close-up of the base of the metal door, showing signs of wear and tear]

[Image of a close-up of the base of the building, showing deterioration of the asphalt and underlying materials]
LEVEL D – REMEDIAL DESIGN AND REPAIR

Destructive testing:
- Core cuts
- Edge conditions - wood blocking type and thickness, deck termination assembly/condition
- Wall substrate at parapet walls/rise walls
- Masonry wall weeps covered over during reroofing?
- Wall and edge conditions below clerestory windows
LEVEL D – REMEDIAL DESIGN AND REPAIR

- Location and type of through-wall flashing, true through-wall or saw-cut reglet?
- True roof expansion joint or roof area divider?
- Roof expansion joint continuous or discontinuous at parapet walls?

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### LEVEL D – REMEDIAL DESIGN AND REPAIR

**Functional Testing**
- Fastener pull-out resistance (Com-Ten)
- Exposed fastener vacuum tester (Wallace Sales Company)
- Roof surface elevation survey
- Coating adhesion testing

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**Drawings, Specifications, Bidding Documents**
- Jim Whitten Roof Consultants, LLC + Tejas Design, PLLC joint venture.