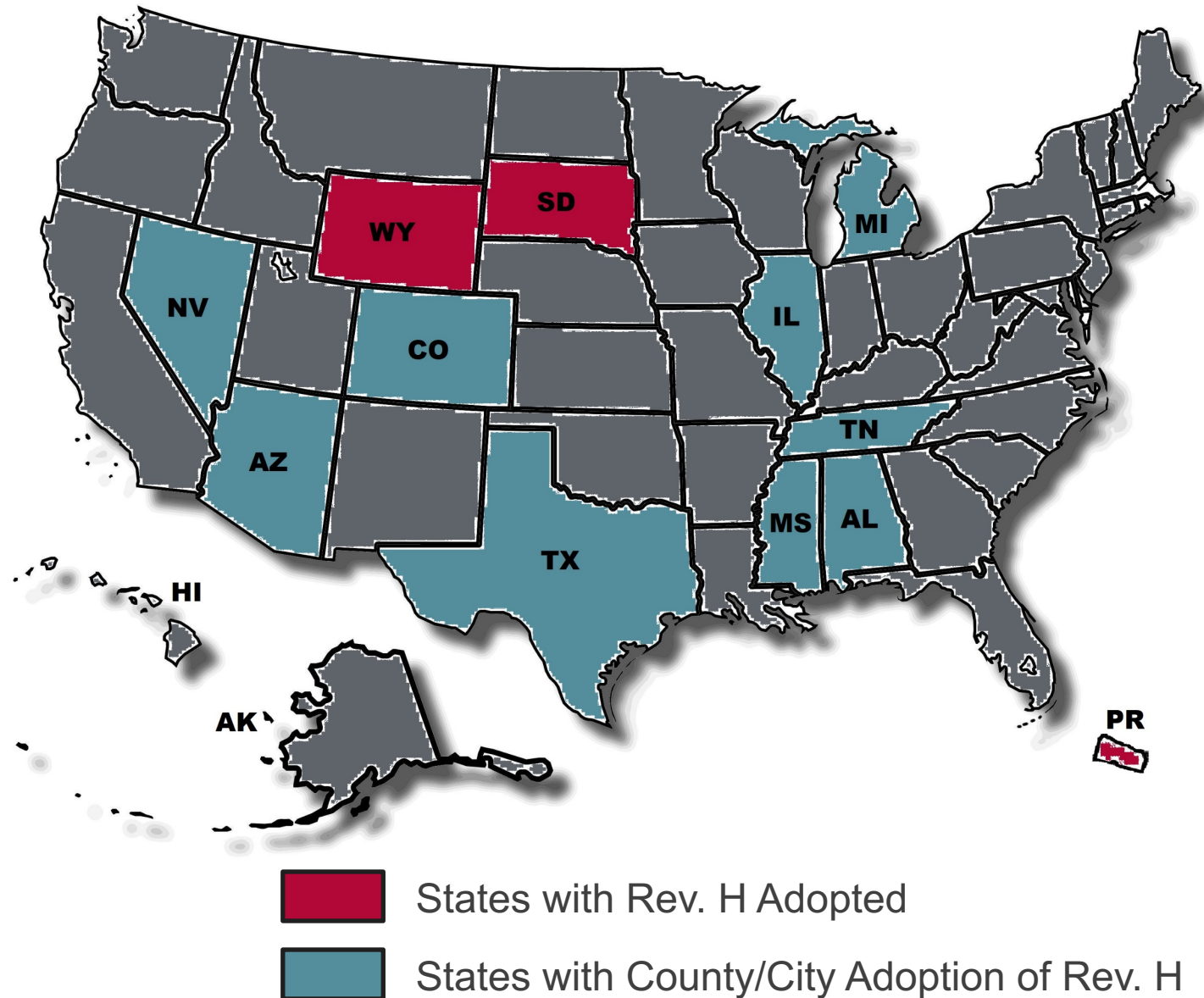


Rev. H Overview

Rev. H Adoption Overview

- Effective January 1, 2018
- Referenced in 2018 IBC



Panel Introductions



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Overview of Changes

Capacity Effects	Topic
▲	<u>Allowable Capacities & Grandfathering</u>
▼	<u>Anchor Rods & Grout Consideration</u>
▲	<u>Angle Strengths</u>
▬	<u>Corrosion Control Standards</u>
▬	<u>Drone Usage</u>
▲	<u>Ground Elevation Factor</u>
▲	<u>Modification Factor / Reliability Factor</u>

Capacity Effects	Topic
▬	<u>Mount Analysis</u>
▬	<u>Risk Category & Site Hardening</u>
▼	<u>Rooftop Converging Wind</u>
▲	<u>Topographic Factor</u>
▬	<u>Verification Inspections</u>
▬	<u>Wind Direction Probability & Clean Poles</u>
▲	<u>Wind Speeds</u>

Allowable Capacities / Grandfathering

Code Location: Section 15

Criteria (one of following):

- Maximum Stress = 105%
- Current vs. Original Design $\leq 5\%$
- Current vs. Structural Design Upgrade $\leq 5\%$ Increase



How is it applied:

1. Baseline Analysis in Rev. H
2. Current Analysis in Rev. H
3. Compare against one another to ensure $\leq 5\%$ deviation

Impact:

105% codified

Limit upgrades to established structures

Angle Strengths

Code Location: Section 4.5.4.2

Criteria:

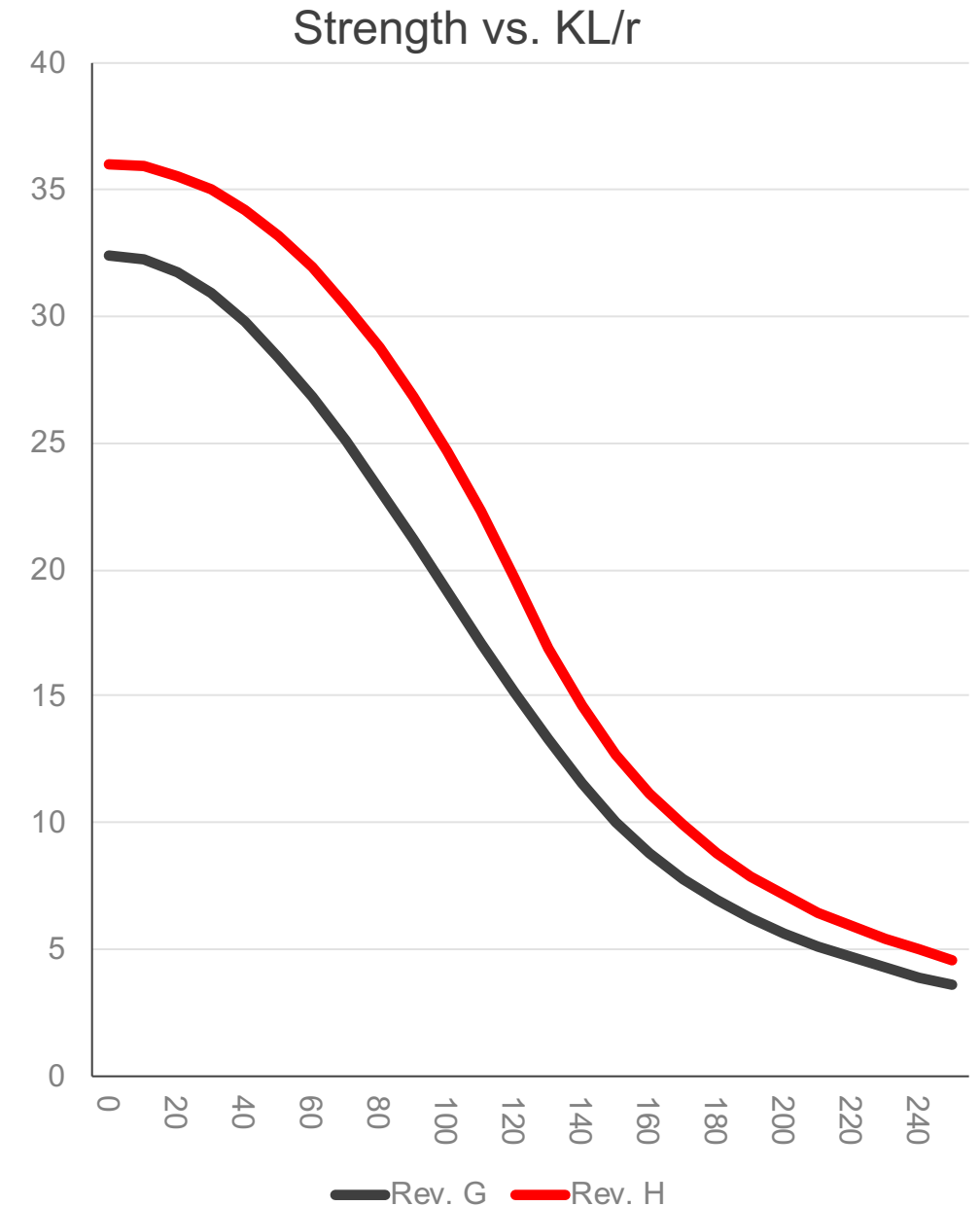
- Updated angle strength derivation
- ASCE10-15

How is it applied:

- Replaces typical AISC equations

Impact:

- 11% increase for short members
- 30% increase for intermediate members
- 27% increase for long members



Anchor Rod & Grout

Code Location: Section 4.9.9, Annex Q

Criteria:

- Assessment of anchor rods as load carrying member
- Not similar to a fastener



How it is applied:

- Anchor rods assessed considering multiple loadings and rod projections
- Grout impacts differently
- Greater emphasis on threaded diameter and combined loading

Impact:

- Potential increase in anchor rod usages
- Installation and grout details critical

Corrosion Control

Code Location: Annexes A14.4 & H

Criteria:

- Steel in contact with soil
- Focus on guyed anchor rods



How is it applied:

- Owner controlled
- Site specific assessment

Impact:

- Awareness of anchor condition
- Safety

Drones

Code Location: Annex J

Criteria:

- Use of UAV to replace climbing tower and land survey
- LIDAR (Light Detection and Ranging)
- Photogrammetry



How is it applied:

- Drone with camera or laser technology
- Data measured and processed
- Desired information provided

Impact:

- Improved or limited data and consistency
- Improved safety
- Cost and availability

Ground Elevation Factor

Code Location: Section 2.6.8 / Table 2-6

Criteria:

- **NEW** Ground Elevation Factor (K_e)
- Based on tower base height above sea level

How is it applied:

- Factor per below table used to reduce wind pressure

Ground Elevation, z_s		Ground Elevation Factor K_e
Feet	Meters	
< 0	< 0	1.00
0	0	1.00
1000	305	0.96
2000	610	0.93
3000	914	0.90
4000	1219	0.86
5000	1524	0.83
6000	1829	0.80
> 6000	> 1829	Refer to 2.6.8

Impact:

- Some high level terrain towers (i.e. Denver) can receive > 15% additional capacity

Modification Factor / Reliability Factor

Code Location: Annex S

Criteria:

- Risk Category II
- Less stringent loading
- Mandatory inspections and repair
- Not applicable to new structures



How is it applied:

- 0.95 factor applied to wind loads
- 0.85 factor applied to ice thickness

Impact:

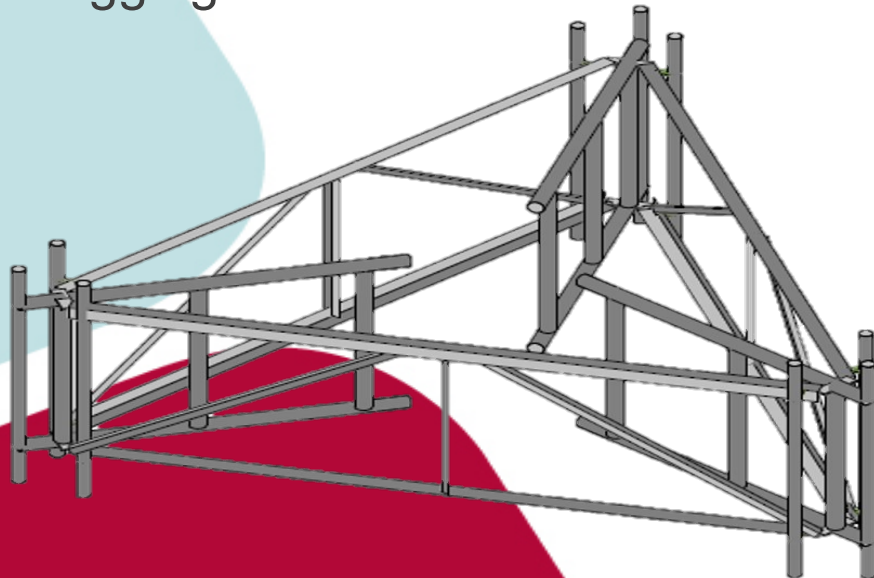
- 5% demand reduction, MP and SST
- 5 – 20% demand reduction, GT
- Inspection planning
- Maintenance remediation

Mounts Analysis

Code Location: Section 16.0

Criteria:

- New standardized mount analysis methods and procedures.
- Prescribed Loads
 - 250lbs / 500lbs at specific location
 - Rigging Plans



How is it applied:

- All equipment additions on mount require structural analysis unless:

Less than 5% increase from Original Design or
Last Structural Modification

-OR-

Changed conditions are within documented
capacity

Impact:

- More consistent analysis
- Safer Structures
- Many new mounts / mount mods

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Risk Category

Code Location: Section 2.2, Table 2-1

Criteria:

- Structure Class → Risk Category
- Matches IBC

How is it applied:

- Windspeed and Importance Factors increase/decrease design loads for wind, ice and seismic

Impact:

- Clarity between Categories
- Hardened Network defined



Rooftop Converging Wind

Code Location: Section 2.6.7 / Annex A.2.6.7

Criteria:

- **NEW** Ground Elevation Factor (K_s)
- Accounts for wind speed up over isolated tall buildings (>50' or >50' of surrounding buildings)

How is it applied:

- Factor in wind pressure calculation

Impact:

- Increase in demand of some rooftop structures for tall and/or isolated buildings
- 5%-30% potential increase for qualifying structures



Topographic Factor

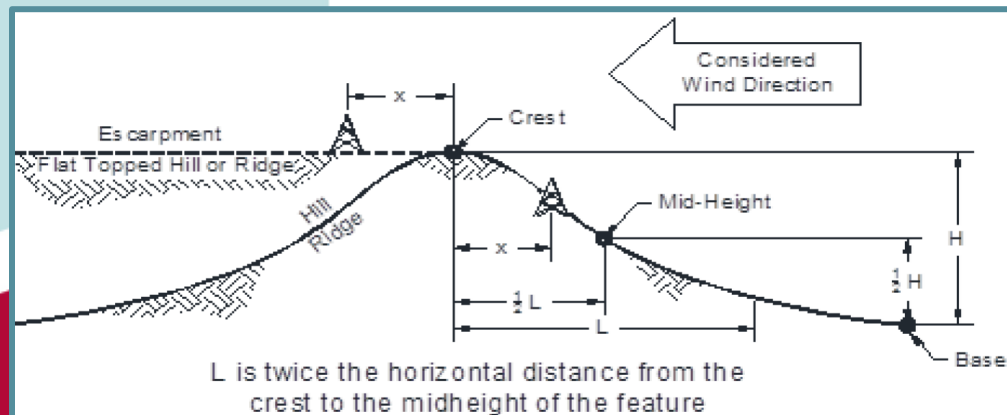
Code Location: Section 2.6.6, Figure 2-1, A.2.2.6

Criteria:

- Rev H contains (3) methods of Topographic evaluation:

Method	Type	Notes
1	Simplified	Similar to formal Rev. G method
2	Rigorous	Adopts SEAW-RSM-03. What many engineers were already doing under Rev. G. Just made more formal.
3	Site-Specific	Requires recognized published literature and/or research

How is it applied:



Impact:

- More accurate analysis → Less Conservative

Verification Inspections

Code Location: Annex N & Annex O

Criteria:

Inspections & Observations before, during and after construction for:

- New Site Builds
- Tower Modifications



How is it applied:

Engineering documents to have required checklists within per code which may include:

- Material Test Reports
- Weld Inspections
- Foundation (rebar & concrete) Inspections
- Anchor Rod Inspections & Pull Tests
- Member Size Verification
- Member Connection Verification
- Climbing Facilities Inspection

Impact:

- Potential higher cost through construction for those currently not performing
- Safer structures with a higher integrity

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Wind Direction Probability Factor

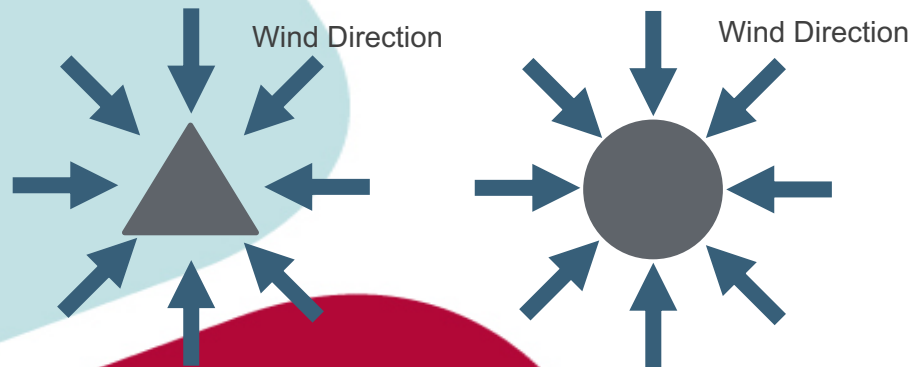
Code Location: Section 2.6.11 / Table 2-2

Criteria:

- Existing factor (K_d) but with an adjustment:

Concealment Poles

0.95 in Rev. G → 1.0 in Rev. H



How is it applied:

- Factor in wind pressure calculation

Impact:

- Reduces capacity of concealment poles by 5%
Note: Canceled out by “drag factor” changes on clean poles

Clean Poles – Drag Factors

Code Location: Table 2-8b

Criteria

- Wind Force Coefficients (C_f)
- Table contains new values for structures without linear appurtenances

How is it applied:

- Applied to projected area calculations → Reduces footprint

Impact:

- “Bare” poles receive some potentially substantial additional capacity based upon shape:

Pole Shape	% Reduction
Round	25
18-Sided	3
16-Sided	13
12-Sided	15
8-Sided	0

Wind Speeds

Code Location: Annex B

Criteria:

- ASCE7-16 Wind Maps
- 300 / 700 / 1700 / 3000 year recurrence
- Hurricane and thunderstorm updates



How is it applied:

- Different windspeeds used at same geographic location based on Risk Category

Impact:

- 90%+ of US receives wind speed reduction, up to 30%
- Inland Florida wind speeds slight increase
- Improved assessment of risk