B-1

RS
DAVID/LEON-PENNY
3/13/13

APPENDIX C
CODE CHANGE PROPOSAL
NORTH CAROLINA
BUILDING CODE COUNCIL

325 North Salisbury Street, Room 5_44
Raleigh, North Carolina 27603
(919) 647-0095
barry.gupton@ncdoi.gov

Petition for Rule Making

Item Number _____

Granted by BCC_____ **Adopted by BCC**_____ **Approved by RRC**_____
Denied by BCC X **Disapproved by BCC**_____ **Objection by RRC**_____
WILL NOT PROCEED

PROPONENT Bill Newns PHONE (252) 232 -6023.
REPRESENTING Currituck County
ADDRESS 153 Courthouse rd.
CITY Currituck STATE NC ZIP 27929
E-MAIL bill.newns@currituckcountync.gov FAX (252) 232-3470.

North Carolina State Building Code, Volume VII NCRC - Section R-202 (Definitions)

CHECK ONE:
[ ] Revise section to read as follows:
[ ] Add new section to read as follows:
[ ] Delete section and substitute the following.
[x] Delete section without substitution.

~~LINE THROUGH MATERIAL TO BE DELETED~~ UNDERLINE MATERIAL TO BE ADDED

Please type. Continue proposal or reason on plain paper attached to this form. See reverse side for instructions.

~~**FAMILY.** Family is an individual, two or more persons related by blood, marriage or law, or a group of not more than any five persons living together in a dwelling unit. Servants having common housekeeping facilities with a family consisting of an individual, or more persons related by blood, marriage or law, are a part of the family for this code.~~

Will this proposal change the cost of construction? Decrease [ ] Increase [ ] No [x]
Will this proposal increase the cost of a dwelling by $80 or more? Yes [ ] No [x]
Will this proposal affect Local or State funds? Local [ ] State [ ] No [x]
Will this proposal cause a substantial economic impact (≥ $1,000,000)? Yes [ ] No [x]
Non-Substantial - Provide an economic analysis including benefit/cost estimates.
Substantial - The economic analysis must also include 2-alternatives, time value of money and risk analysis.

REASON: This is a North Carolina definition that is not within the International Residential Code. Tourism is a driving force in North Carolinia reconized by the General Assembly. Vacation rental homes are being built with 12-20 + bedrooms often occupied by a group of more than 5 unrelated occupants (multiple unrelated families, college students, corporate gatherings etc). The NC Building Code Council has ruled that the size, number of bedrooms and participation in a vacation rental program does not change the USE from anything other than a single family dwelling. The definition leads to speculation that a single family dwelling that exceeds the limits set by this definition should have to meet standards set forth in Volume I NCBC. The definition should be deleted and the USE of the structure should be the determing factor in which volume of the building code should be applied. In this day and age we live in, the definition of a family should not be determined by the state building code.

Signature Bill Newns DATE: 11/17/17

B-2

CS
WAYNE/ERIC - GRANT
3/13/13

APPENDIX C
CODE CHANGE PROPOSAL
NORTH CAROLINA
BUILDING CODE COUNCIL

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Petition for Rule Making

Item Number _____

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Denied by BCC_____ Disapproved by BCC_____ Objection by RRC_____

PROPONENT Joe Gorza PHONE (252)435 -1010 .
REPRESENTING Space Walk of Currituck
ADDRESS 2325 Tulls Creek Road
CITY Moyock STATE NC ZIP 27958
E-MAIL spacewalkcnc@herecomesfun.com FAX ( ) - .

North Carolina State Building Code, Volume Fire Code - Section 105.6.43 & 2403.2

CHECK ONE:
[ ] Revise section to read as follows:
[x] Add new section to read as follows:
[ ] Delete section and substitute the following.
[ ] Delete section without substitution.

~~LINE THROUGH MATERIAL TO BE DELETED~~ UNDERLINE MATERIAL TO BE ADDED

Please type. Continue proposal or reason on plain paper attached to this form. See reverse side for instructions.

Exception #3 tents, membrane & air inflated structures associated with single family dwellings less than 800 sq. ft.

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REASON: Requiring permits for tents for smaller single family events such as birthday parties and weddings that often are only placed for a couple of hours are substancial in time and cost for a smaller business. It is also costly for municipalities to have staff inspect these structures on non work days or we are forced to erect them prior to the weekend in order for them to inspect.

All of our units inspected by the state each year by NCDOL - Elevator and Amusement Device Bureau at a cost of $100 per unit and a up to date COI on file before the state inspection takes place

Signature _____ DATE: 1/9/18

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 4/7/2017

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Eagan Insurance Agency, LLC 2629 N. Causeway Blvd. P. O. Box 8590 Metairie LA 70002	PHONE (A/C, No, Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A : Scottsdale Insurance Co.	
INSURED The Inflatable Zoo Inc DBA Space Walk 450 31st St. Kenner LA 70065	INSURER B :	
	INSURER C :	
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** 2016 Branches **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: X POLICY PRO-JECT LOC OTHER:			BCS0035358	5/15/2016	5/15/2017	EACH OCCURRENCE	$ 1,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 100,000
							MED EXP (Any one person)	$ EXCLUDED
							PERSONAL & ADV INJURY	$ 1,000,000
							GENERAL AGGREGATE	$ 2,000,000
							PRODUCTS - COMP/OP AGG	$ 2,000,000
								$
	AUTOMOBILE LIABILITY ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS HIRED AUTOS NON-OWNED AUTOS						COMBINED SINGLE LIMIT (Ea accident)	$
							BODILY INJURY (Per person)	$
							BODILY INJURY (Per accident)	$
							PROPERTY DAMAGE (Per accident)	$
								$
	UMBRELLA LIAB OCCUR EXCESS LIAB CLAIMS-MADE DED RETENTION $						EACH OCCURRENCE	$
							AGGREGATE	$
								$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y / N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A					PER STATUTE OTH-ER	
							E.L. EACH ACCIDENT	$
							E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER IS AN ADDITIONAL INSURED AS REQUIRED BY WRITTEN CONTRACT RESPECTS ATV BOUNCE-1, BASKETBALL JAM-1, BASKETBALL JAM-2, BLUE ANGEL BOUNCE-1, CAROLINA BLUE MODULAR-1, CASTLE-1, DISNEY PRINCESS2-1, LARGE PIRATE BOUNCE-1, MONSTER TRUCK-2, R/W/B MODULAR-1, SUPERMAN JUMP-1, WARRIOR DASH-1, 18' DOUBLE LANE SLIDE-1, 18' SLIDE-2, 40' OBSTACLE COURSE-1, 4n1 MODULAR-1, CASTLE MODULAR COMBO-1, CASTLE MODULAR COMBO-2, JUSTICE LEAGUE C4-1, MODULAR COMBO-1, PIRATE COMBO-1, PRINCESS CASTLE WET/DRY COMBO-1, RUSH EXPRESS A-1, RUSH EXPRESS B-1, SOCCER DARTS-1, SPORTS COMPLEX-1, TROPICAL W/D COMBO-1, WARRIOR DASH OBSTACLE CHALLENGE-1, WRECKING BALL-1, 21' RAMPAGE SLIDE-1, 22' FIRE AND ICE SLIDE-1, BIG

CERTIFICATE HOLDER

Space Walk of Currituck
Joe Gorza
2325 Tulls Creek Rd.
Moyock, NC 27958

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Clark Zelenka/KYRAF

APPENDIX C
CODE CHANGE PROPOSAL
NORTH CAROLINA
BUILDING CODE COUNCIL

325 North Salisbury Street, Room 5_44
Raleigh, North Carolina 27603
(919) 647-0095
barry.gupton@ncdoi.gov

B-3
RS - ACCEPTED
BCC - MEANS/KNIGHT GRANT
3/13/18

Petition for Rule Making

Granted by BCC ✓ Adopted by BCC _____ Item Number _____
Denied by BCC _____ Disapproved by BCC _____ Approved by RRC _____
Objection by RRC _____

PROPONENT RANDALL SHACKELFORD, P.E. PHONE (972)439-3029
REPRESENTING SIMPSON STRONG-TIE COMPANY
ADDRESS 2221 COUNTRY LANE
CITY McKINNEY STATE TX ZIP 75069
E-MAIL rshackelford@strongtie.com FAX (972)542-4139

North Carolina State Building Code, Volume RESIDENTIAL Section AM105.1

CHECK ONE:
[✓] Revise section to read as follows: [ ] Delete section and substitute the following.
[ ] Add new section to read as follows: [ ] Delete section without substitution.

~~LINE THROUGH MATERIAL TO BE DELETED~~ UNDERLINE MATERIAL TO BE ADDED

Please type. Continue proposal or reason on plain paper attached to this form. See reverse side for instructions.

SEE ATTACHED SHEET

Will this proposal change the cost of construction? Decrease [ ] Increase [ ] No [X]
Will this proposal increase the cost of a dwelling by $80 or more? Yes [ ] No [X]
Will this proposal affect Local or State funds? Local [ ] State [ ] No [X]
Will this proposal cause a substantial economic impact (≥ $1,000,000)? Yes [ ] No [X]
Non-Substantial - Provide an economic analysis including benefit/ cost estimates.
Substantial - The economic analysis must also include 2-alternatives, time value of money and risk analysis.

REASON:

SEE ATTACHED SHEET

Signature Randall Shackelford DATE: 1-30-18
Randall Shackelford Rev 3-13-18

BCC CODE CHANGES
FORM 3/ 14/ 17

Code Change to NC Residential Code Section AM105.1 – Version 3
3-13-18

AM105.1 General.
Girders shall bear directly on the support post with the post attached at top to prevent lateral displacement or be connected to the side of the posts ~~with two 5/8 inch (16 mm) hot dip galvanized bolts with nut and washer~~ with one of the methods shown in Table AM105.1. Girder support is permitted to be installed in accordance with Figure AM105.1(1) for top mount; Figure AM105.1(2) for side mount and Figure AM105.1(3) for split girders. See Figure AM105.1(4) for cantilevered girders.

Table AM105.1 Girder Connection to Side of Post

Maximum Girder Thickness		
Any	3" (Double 2X)	1-1/2" (Single 2X)
Two 5/8" diameter bolts[1]	Four 6" long screws[2]	Three 4" long screws[2]

1. Bolts shall be hot dip galvanized through bolts with nut and washer
2. Screws shall be hot dipped galvanized self-drilling screw fastener having a minimum diameter of 0.270", staggered so that the screws are not in a line, and having a minimum edge distance of 1-1/2 inches.

REASON:

There are several reasons for this proposal.

1. Builders throughout North Carolina have approached Simpson Strong-Tie with a request to provide a screw fastener that can be an alternate to a through bolt, and to find a way to get it approved through the code. Installing a through bolt is labor intensive, and some builders prefer to install self-drilling fasteners because it saves time, even if they have to install more fasteners.
2. Modern wood fastening design philosophy is to use more, smaller diameter fasteners rather than fewer, larger diameter fasteners. More, smaller diameter fasteners spread the load out to more of the wood area, and also offer additional redundancy in the case that one of the fasteners is not able to provide its entire design load.
3. New technology in fastener design and manufacture allows screw fasteners that have almost the same capacity as larger bolts. This proposal allows for that new technology.

JUSTIFICATION:
Fastener calculations using the American Wood Council Connection Capacity Calculator are provided. They show the following capacities for two 5/8" diameter bolts, loaded parallel to grain in the main member (post) and perpendicular to grain in the side member (girder). This will be the target load for the alternate.

	Allowable Shear Capacity for a Single 5/8" Bolt	
	Side Member 1-1/2" Thick	Side Member 3" Thick
One Bolt	563	718
Two Bolts	1126	1436

Check SDWH Timber-Hex HDG Screw:
Reference IAPMO UES Report Number 0192.

MODEL	FASTENER LENGTH, L (in.)	THREAD LENGTH, TL (in.)	ALLOWABLE SHEAR LOADS (lbf)					
			WOOD SIDE MEMBER THICKNESS (in.)					
			SP		DF		HF/SPF	
			1.5	3.0	1.5	3.0	1.5	3.0
SDWH27400G	4	3	505	-	440	-	400	-
SDWH27600G	6	3	505	545	440	545	400	450
SDWH27800G	8	3	570	675	440	675	430	595

Connection Geometry with reductions for multiple fasteners:

TABLE 23 – CONNECTION GEOMETRY FOR THE SDWH27G WOOD SCREWS[1,2]

CONDITION[1]		MINIMUM DISTANCE OR SPACING (in.)	Reduction Factor
Edge Distance	Perpendicular to grain loading	1 7/16	1.0
	Parallel to grain loading	1 1/2	1.0
End Distance	Perpendicular to grain loading	6	1.0
	Parallel to grain loading	8	1.0
Spacing	Between fasteners in a row	8	0.80
	Between non-staggered rows	4	0.89
	Between staggered rows	5/8	0.78

Check minimum load case of 1.5" side member with 505 pounds load for 4" screw.
Load for 3 = (505)(3)(0.78) = **1181** lbs.
Which is greater than the target of **1126** pounds. OK

Check load case of 3" side member with 545 pounds load with THREE screws.
Load for 3 = (545)(3)(0.78) = 1275
Which is LESS than the target load of 1436 lbs. No Good.

Check load case of 3" side member with 545 pounds load with FOUR screws.
Load for 4 = (545)(4)(0.78) = **1700.4** lbs.
Which is GREATER than the target load of **1436** lbs. OK.

Further Explanation of Cost of Construction:
Since this is just adding an OPTIONAL method, there will be no mandatory effect on the cost of construction. If the builder chooses, they can just continue to use bolts. No comparison has been made to the actual cost of the fasteners, however builders have told us they have significant labor savings using self-drilling screws rather than bolts.

Design Method	Allowable Stress Design (ASD)
Connection Type	Lateral loading
Fastener Type	Bolt
Loading Scenario	Single Shear - Wood Main Member
	Submit Initial Values

Main Member Type	Southern Pine
Main Member Thickness	3.5 in.
Main Member: Angle of Load to Grain	0
Side Member Type	Southern Pine
Side Member Thickness	1.5 in.
Side Member: Angle of Load to Grain	90
Fastener Diameter	5/8 in.
Load Duration Factor	C_D = 1.0
Wet Service Factor	C_M = 1.0
Temperature Factor	C_t = 1.0

Calculate Connection Capacity

Connection Yield Mode Descriptions | Limits of Use

Diaphragm Factor Help | Load Duration Factor Help | Technical Help

Show Printable View

Connection Yield Modes

Im	2691 lbs.
Is	609 lbs.
II	884 lbs.
IIIm	1093 lbs.
IIIs	563 lbs.
IV	780 lbs.

Adjusted ASD Capacity	**563 lbs.**

- Bolt bending yield strength of 45,000 psi is assumed.
- The Adjusted ASD Capacity is only applicable for bolts with adequate end distance, edge distance and spacing pe

While every effort has been made to insure the accuracy of the information presented, and special effort has been made tc information reflects the state-of-the-art, neither the American Wood Council nor its members assume any responsibility fo prepared from this on-line Connection Calculator. Those using this on-line Connection Calculator assume all liability fror

The Connection Calculator was designed and created by Cameron Knudson, Michael Dodson and David Pollock at Wash Support for development of the Connection Calculator was provided by American Wood Council

Design Method	Allowable Stress Design (ASD)
Connection Type	Lateral loading
Fastener Type	Bolt
Loading Scenario	Single Shear - Wood Main Member
	Submit Initial Values

Main Member Type	Southern Pine
Main Member Thickness	3.5 in.
Main Member: Angle of Load to Grain	0
Side Member Type	Southern Pine
Side Member Thickness	-- Other (in inches) -- 3
Side Member: Angle of Load to Grain	90
Fastener Diameter	5/8 in.
Load Duration Factor	C_D = 1.0
Wet Service Factor	C_M = 1.0
Temperature Factor	C_t = 1.0

Calculate Connection Capacity

Connection Yield Mode Descriptions | Limits of Use

Diaphragm Factor Help | Load Duration Factor Help | Technical Help

Show Printable View

Connection Yield Modes

Im	2691 lbs.
Is	1219 lbs.
II	904 lbs.
IIIm	1093 lbs.
IIIs	718 lbs.
IV	780 lbs.

Adjusted ASD Capacity	**718 lbs.**

- Bolt bending yield strength of 45,000 psi is assumed.
- The Adjusted ASD Capacity is only applicable for bolts with adequate end distance, edge distance and spacing pe

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The Connection Calculator was designed and created by Cameron Knudsen, Michael Dodson and David Pollock at Wash

PRACTICAL SOLUTIONS

solutions for the practicing structural engineer

Design of Bolted Connections per the 2015 NDS

By John "Buddy" Showalter, P.E.

This article provides an overview of a bolt design example utilizing the *American Wood Council's (AWC) 2015 National Design Specification® (NDS®) for Wood Construction.* Topics include connection design philosophies and behavior, an overview of 2015 NDS provisions related to bolt design including local stresses in fastener groups, and a detailed design example.

Connection Design Philosophies

Discussion of several important design philosophies should help designers better understand connection design for wood members. First, wood is anisotropic, meaning it has different strength properties in various directions: longitudinal, tangential, and radial. Wood is composed of elongated, round, or rectangular tube-like cells. A simple analogy is to imagine the cellular nature of wood as a bundle of drinking straws. When axial compression is applied, the "bundle" is strong longitudinally and connecting the ends, primarily for bearing, is very simple. The "bundle" can also develop considerable tensile strength. Therefore, aligning connections so that loads are transferred concentrically along the length of the wood member is the most efficient design philosophy. However, this is not always practical or possible.

Continuing the analogy, if the load is applied perpendicular to the longitudinal axis of the "bundle" in compression, the straws tend to crush because of the weaker cell walls relative to the axial direction. While capacities are more limited when wood is loaded in compression perpendicular to grain (versus parallel to grain), the limits for bearing conditions on the surface of wood members are deformation-based, not strength-based, and published design values can be increased for smaller bearing areas. Accordingly, dowel bearing strengths are higher relative to compression parallel or compression perpendicular to grain design values. However, dowel bearing strengths perpendicular to grain are lower relative to dowel bearing strengths parallel to grain for larger diameter (>¼ inch) fasteners (see *Table*).

When tension is applied perpendicular to grain, the "bundles" tend to separate. Low strength values for this property can be encountered in commercial grades of lumber. For this reason, no sawn lumber tension design values perpendicular to grain have been published in the NDS. Cautionary provisions have been provided to alert designers to avoid design configurations that induce tension perpendicular to grain stresses wherever possible. Connections where moderate to heavy loads are acting through the tension side of a bending member (see NDS Table 12.5.1C, footnote 2) should be avoided. These connections should be designed to ensure that perpendicular-to-grain loads are applied through the compression side of the bending member, either through direct connections or top-bearing connectors.

Second, wood connections are stronger when the load is spread out over a number of fasteners. Large concentrated loads should be avoided unless designed not to exceed wood's strength capabilities (e.g., net tension and shear). Spreading the load also builds in a degree of redundancy, which is useful in high wind or seismic events. To accomplish this, designers are advised to:

- Use small fasteners;
- Use multiple fasteners when possible; and
- Keep the scale of fasteners relative to the size of wood members being connected.

Third, as with other building materials, wood moves in response to environmental conditions. The main driver for this movement in wood is moisture. Allowances must be made to accommodate potential shrinkage and swelling, particularly in connections.

Dowel-Type Fasteners

Wood members connected with dowel-type fasteners are probably the most common mechanical connection type because they are effective at transferring loads while also being relatively straightforward and efficient to

Design values from 2015 NDS and 2015 NDS Supplement (psi).

No. 2 Southern Pine 2x12	Parallel to Grain	Perpendicular to Grain
Compression Design Value	1,250	565
Tension Design Value	450	No published values
Shear Design Value	175	n/a
Modulus of Elasticity	1,400,000	n/a
Dowel Bearing Strength for 1-inch diameter fastener	6,150	2,550

John "Buddy" Showalter is Vice President of Technology Transfer for the American Wood Council and serves as a member of the STRUCTURE magazine Editorial Board. He can be reached at ***bshowalter@awc.org.***

B-4

BS - ACCEPTED
BCC - MEADS/KNIGHT
3/13/18 GRANT

APPENDIX C
CODE CHANGE PROPOSAL
NORTH CAROLINA
BUILDING CODE COUNCIL

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Denied by BCC_____ Disapproved by BCC_____ Approved by RRC_____
Objection by RRC_____

PROPONENT RANDALL SHACKELFORD, P.E. PHONE (972)439-3029
REPRESENTING SIMPSON STRONG-TIE COMPANY
ADDRESS 2221 COUNTRY LANE
CITY McKINNEY STATE TX ZIP 75069
E-MAIL rshackelford@strongtie.com FAX (972)542-4139

North Carolina State Building Code, Volume RESIDENTIAL Section R4603.6

CHECK ONE:
[ ] Revise section to read as follows:
[ ] Add new section to read as follows:
[ ] Delete section and substitute the following.
[ ] Delete section without substitution.

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REASON:

SEE ATTACHED

Signature Randall Shackelford DATE: 1-30-18
Randall Shackelford Rev 3-13-18

BCC CODE CHANGES
FORM 3/ 14/ 17

Code Change to NC Residential Code Section R4603.6 Version 3 3-13-18

Note: Changes are to the 2018 Code Language

R4603.6 Tying and bracing of wood piles.

Beams and girders shall fully bear on pilings and butt joints shall occur over pilings. ~~If~~ Ssills, beams or girders ~~are~~ shall be attached to the piling ~~a minimum of two 5/8 inch (16 mm) galvanized steel bolts per beam member shall be through bolted~~ using either bolts or screws at each piling connection in accordance with Table R4603.6 and Figure R4~~5~~603.6 (a). When the piling is notched so that the cross-section is reduced below 50 percent or the girder is is top bearing, sills, beams or girders shall be attached using 3/16 × 4 × 18-inch (5 × 102 × 467 mm) hot dip galvanized straps, one each side, ~~bolted with two 5/8 inch (15.9 mm) galvanized through bolts~~ fastened top and bottom in accordance with either bolts or screws in accordance with Table R4603.6 and Figure R4603.6(b) and Figure R4~~5~~603.6(c). Where butt joints occur over the piling and screws are used, there shall be two straps on each side of the piling, having a minimum size of 3/16 by 2 by 18 inches (5 × 51 × 467 mm), with four self-drilling screws as described in each end.

Table R4603.6 Minimum Fastening of Beams and Girders to Pilings

Amount Piling is Notched	Beam/Girder Continuous		Beam/Girder Butt Joint	
	Bolts	Screws	Bolts	Screws
≤ 50%	two 5/8" bolts[2]	four screws[3]	four 5/8" bolts[2]	eight screws[3]
> 50%[1]	two 5/8" bolts[2]	four screws[3]	four 5/8" bolts[3]	eight screws

1. Where piling is notched over 50%, use strap as required in Section 4603.6. Install the specified number of bolts or screws in each end of the strap.
2. Bolts shall be 5/8" diameter hot dipped galvanized through bolts with nuts and washers.
3. Screws shall be 0.270" (6.9 mm) minimum in diameter, hot dipped galvanized to a minimum of A153, Class C, and having a minimum length of 4", and also shall be long enough to penetrate at least one inch through the remaining pile and into the girder.

R4603.6.1 Tying at corners. At corners, girders shall be connected to the pile with a minimum 3/16 × 4 × 18-inch (5 × 102 × 467 mm) hot dip galvanized strap bolted with two 5/8 inch (15.9 mm) galvanized through bolts on the exterior and a minimum L4 x 3/16 x 1'-6" (102 × 5 × 467 mm) galvanized steel angle bolted with two 5/8 inch (15.9 mm) galvanized through bolts on the interior in accordance with Figure R4603.6(d).

R4603.6.2 Bracing of Pilings. Bracing of pile foundations is required where the clear height from ground to sill, beam or girder exceeds 10 feet (3048 mm) or the dwelling is more than one story above piles. A line of X-bracing is defined as a row of piles with X-bracing provided in at least two bays. A line of X-bracing shall be provided at all exterior pile lines. Where the perimeter lines of X-bracing exceed 40 feet (12 192 mm), an additional line of X-bracing shall be provided near the center of the building. See Figure R4603.6(e). X-bracing shall be with 2 × 10s through bolted with two 3/4-inch (19.1 mm) bolts at each end. The code official is permitted to accept alternate bracing designs if they bear the seal of a registered design professional.

Revise Figures as follows:

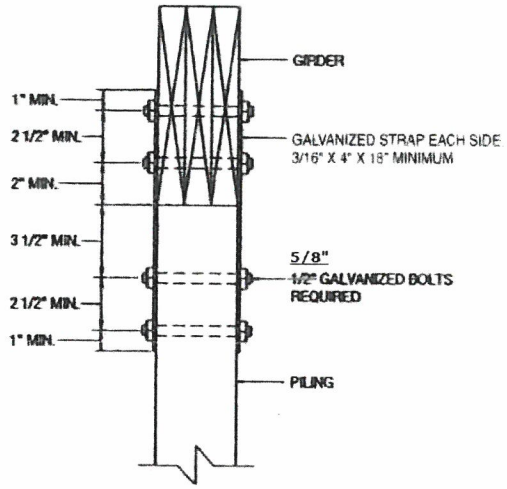

FIGURE R4603.6(b)
TOP MOUNTED GIRDER

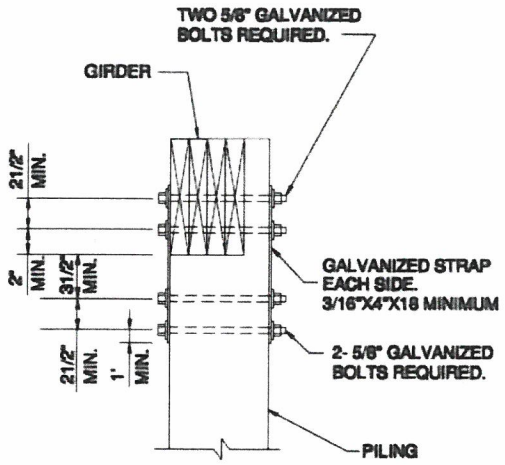

FIGURE R4603.6(c)
PILING NOTCHED MORE THAN 50%

REASON:
There are several reasons for this proposal.

1. Builders throughout North Carolina have approached Simpson Strong-Tie with a request to provide a screw fastener that can be an alternate to a through bolt, and to find a way to get it approved through the code. Installing a through bolt is labor intensive, and some builders prefer to install self-drilling fasteners because it saves time, even if they have to install more fasteners.
2. Modern wood fastening design philosophy is to use more, smaller diameter fasteners rather than fewer, larger diameter fasteners. More, smaller diameter fasteners spread the load out to more of the wood area, and also offer additional redundancy in the case that one of the fasteners is not able to provide its entire design load.
3. New technology in fastener design and manufacture allows screw fasteners that have almost the same capacity as larger bolts. This proposal allows for that new technology.
4. Some parts of this change correct items that appear to have been missed in writing new revisions for the 2018 North Carolina Building Code.
5. Some parts of this change are intended to clarify the requirements for tying beams to piles. The intent is not to change the actual requirements, just to clarify. For example, where the code currently says that there shall be two bolts "per beam member", that could be misinterpreted to require 8 bolts when there is a four-ply girder as shown in Figure R4603.6(c). My impression is that it means when the beam is spliced, there are two members and four bolts should be required, and when the beam is continuous, there is one member and two bolts are required.

JUSTIFICATON:
Calculations are provided using the American Wood Council Connection Calculator, for 5/8" through bolts with two steel side plates, for a main wood member thickness of both 6" and 7-1/2".

Both wood thicknesses resulted in a calculated bolt shear capacity of 1370 pounds per bolt.
So a steel plate with two bolts in each end would have a capacity of
(2)(1370) = 2740 lbs.

Checking against the capacity of the PSQ screwed piling strap, both the 4 by 18 version and the 2 by 18 version exceed a capacity of 2740 lbs.

Model No.	Ga.	Dimensions (in.)		Fasteners (Total)	Allowable Tension Loads (DF/SP)	Allowable Tension Loads (SPF/HF)	Code Ref.
		W	L		(160)	(160)	
PS218	7	2	18	(4) ¾" MB	1,740	1,385	180
PS418		4	18	(4) ¾" MB	1,740	1,385	
PS720		6¾	20	(8) ½" MB	3,075	2,645	
PSQ218		2	18	(8) SDWH27400G	2,815	2,420	170
PSQ418		4	18	(8) SDWH27400G	3,045	2,620	

Additional information on Cost Analysis.
Since this is just adding an option to the code, there is no mandatory increase or decrease in cost. However, some builders find that installing screw fasteners involves much less labor time than installing through bolts so there is some savings there. No cost analysis of bolts compared to screws has been attempted.

Design Method	Allowable Stress Design (ASD)
Connection Type	Lateral loading
Fastener Type	Bolt
Loading Scenario	Double Shear - Wood Main Member
Submit Initial Values	

Main Member Type	Southern Pine
Main Member Thickness	-- Other (in inches) -- 6
Main Member: Angle of Load to Grain	90
Side Member Type	Steel
Side Member Thickness	7 gage
Side Member: Angle of Load to Grain	0
Fastener Diameter	5/8 in.
Load Duration Factor	C_D = 1.0
Wet Service Factor	C_M = 1.0
Temperature Factor	C_t = 1.0

Calculate Connection Capacity

Connection Yield Mode Descriptions | Limits of Use

Diaphragm Factor Help | Load Duration Factor Help | Technical Help

Show Printable View

Connection Yield Modes

Im	2438 lbs.
Is	2768 lbs.
IIIs	1370 lbs.
IV	1880 lbs.

Adjusted ASD Capacity	**1370 lbs.**

- Bolt bending yield strength of 45,000 psi is assumed.
- The Adjusted ASD Capacity is only applicable for bolts with adequate end distance, edge distance and spacing pe
- ASTM A36 Steel is assumed for steel side members 1/4 in. thick, and ASTM A653 Grade 33 Steel is assumed for than 1/4 in. thick.

While every effort has been made to insure the accuracy of the information presented, and special effort has been made tc information reflects the state-of-the-art, neither the American Wood Council nor its members assume any responsibility f prepared from this on-line Connection Calculator. Those using this on-line Connection Calculator assume all liability fror

The Connection Calculator was designed and created by Cameron Knudson, Michael Dodson and David Pollock at Wash

Design Method	Allowable Stress Design (ASD)
Connection Type	Lateral loading
Fastener Type	Bolt
Loading Scenario	Double Shear - Wood Main Member
Submit Initial Values	

Main Member Type	Southern Pine
Main Member Thickness	7.5 in.
Main Member: Angle of Load to Grain	90
Side Member Type	Steel
Side Member Thickness	7 gage
Side Member: Angle of Load to Grain	0
Fastener Diameter	5/8 in.
Load Duration Factor	C_D = 1.0
Wet Service Factor	C_M = 1.0
Temperature Factor	C_t = 1.0

Calculate Connection Capacity

Connection Yield Mode Descriptions | Limits of Use

Diaphragm Factor Help | Load Duration Factor Help | Technical Help

Show Printable View

Connection Yield Modes

Im	3047 lbs.
Is	2768 lbs.
IIIs	1370 lbs.
IV	1880 lbs.

Adjusted ASD Capacity	**1370 lbs.**

- Bolt bending yield strength of 45,000 psi is assumed.
- The Adjusted ASD Capacity is only applicable for bolts with adequate end distance, edge distance and spacing pe
- ASTM A36 Steel is assumed for steel side members 1/4 in. thick, and ASTM A653 Grade 33 Steel is assumed for than 1/4 in. thick.

While every effort has been made to insure the accuracy of the information presented, and special effort has been made tc information reflects the state-of-the-art, neither the American Wood Council nor its members assume any responsibility f prepared from this on-line Connection Calculator. Those using this on-line Connection Calculator assume all liability fro

The Connection Calculator was designed and created by Cameron Knudson, Michael Dodson and David Pollock at Wash Support for development of the Connection Calculator was provided by American Wood Council.

PRACTICAL SOLUTIONS

solutions for the practicing structural engineer

Design of Bolted Connections per the 2015 NDS

By John "Buddy" Showalter, PE.

This article provides an overview of a bolt design example utilizing the *American Wood Council's (AWC) 2015 National Design Specification® (NDS®) for Wood Construction*. Topics include connection design philosophies and behavior, an overview of 2015 NDS provisions related to bolt design including local stresses in fastener groups, and a detailed design example.

Connection Design Philosophies

Discussion of several important design philosophies should help designers better understand connection design for wood members. First, wood is anisotropic, meaning it has different strength properties in various directions: longitudinal, tangential, and radial. Wood is composed of elongated, round, or rectangular tube-like cells. A simple analogy is to imagine the cellular nature of wood as a bundle of drinking straws. When axial compression is applied, the "bundle" is strong longitudinally and connecting the ends, primarily for bearing, is very simple. The "bundle" can also develop considerable tensile strength. Therefore, aligning connections so that loads are transferred concentrically along the length of the wood member is the most efficient design philosophy. However, this is not always practical or possible.

Continuing the analogy, if the load is applied perpendicular to the longitudinal axis of the "bundle" in compression, the straws tend to crush because of the weaker cell walls relative to the axial direction. While capacities are more limited when wood is loaded in compression perpendicular to grain (versus parallel to grain), the limits for bearing conditions on the surface of wood members are deformation-based, not strength-based, and published design values can be increased for smaller bearing areas. Accordingly, dowel bearing strengths are higher relative to compression parallel or compression perpendicular to grain design values. However, dowel bearing strengths perpendicular to grain are lower relative to dowel bearing strengths parallel to grain for larger diameter (>¼ inch) fasteners (see *Table*).

When tension is applied perpendicular to grain, the "bundles" tend to separate. Low strength values for this property can be encountered in commercial grades of lumber. For this reason, no sawn lumber tension design values perpendicular to grain have been published in the NDS. Cautionary provisions have been provided to alert designers to avoid design configurations that induce tension perpendicular to grain stresses wherever possible. Connections where moderate to heavy loads are acting through the tension side of a bending member (see NDS Table 12.5.1C, footnote 2) should be avoided. These connections should be designed to ensure that perpendicular-to-grain loads are applied through the compression side of the bending member, either through direct connections or top-bearing connectors.

Second, wood connections are stronger when the load is spread out over a number of fasteners. Large concentrated loads should be avoided unless designed not to exceed wood's strength capabilities (e.g., net tension and shear). Spreading the load also builds in a degree of redundancy, which is useful in high wind or seismic events. To accomplish this, designers are advised to:

- Use small fasteners;
- Use multiple fasteners when possible; and
- Keep the scale of fasteners relative to the size of wood members being connected.

Third, as with other building materials, wood moves in response to environmental conditions. The main driver for this movement in wood is moisture. Allowances must be made to accommodate potential shrinkage and swelling, particularly in connections.

Dowel-Type Fasteners

Wood members connected with dowel-type fasteners are probably the most common mechanical connection type because they are effective at transferring loads while also being relatively straightforward and efficient to

Design values from 2015 NDS and 2015 NDS Supplement (psi).

No. 2 Southern Pine 2x12	Parallel to Grain	Perpendicular to Grain
Compression Design Value	1,250	565
Tension Design Value	450	No published values
Shear Design Value	175	n/a
Modulus of Elasticity	1,400,000	n/a
Dowel Bearing Strength for 1-inch diameter fastener	6,150	2,550

John "Buddy" Showalter is Vice President of Technology Transfer for the American Wood Council and serves as a member of the STRUCTURE magazine Editorial Board. He can be reached at ***bshowalter@awc.org.***

B-5

CS-LEW/NO SECOND

BCC - NO ACTION

3/13/18

APPENDIX C
CODE CHANGE PROPOSAL
NORTH CAROLINA
BUILDING CODE COUNCIL

322 Chapanoke Road, Suite 200
Raleigh, North Carolina 27603
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barry.gupton@ncdoi.gov

Petition for Rule Making

Item Number _____

Granted by BCC _____ Adopted by BCC _____ Approved by RRC _____

Denied by BCC X Disapproved by BCC _____ Objection by RRC _____

NO ACTION

PROPONENT Jeffrey Mang (Hogan Lovells) PHONE (202) 637 - 8703

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North Carolina State Building Code, Volume 2018 NCECC - Section C501.1.1, C503.1, C503.3.1, Ch. 6 [CE]

CHECK ONE: [X] Revise section to read as follows: [ ] Delete section and substitute the following.
[ ] Add new section to read as follows: [ ] Delete section without substitution.

~~LINE THROUGH MATERIAL TO BE DELETED~~ UNDERLINE MATERIAL TO BE ADDED

Please type. Continue proposal or reason on plain paper attached to this form. See reverse side for instructions.

C501.1.1 Additions, alterations, or repairs: General.
Additions, alterations, or repairs to an existing building, building system or portion thereof shall comply with one of the following:

1. Section C502, C503 or C504.
2. The requirements of ANSI/ASHRAE/IESNA 90.1.
3. The 2009 NCECC if the building or structure received a certificate of occupancy prior to January 1, 2012, is not classified as Group R occupancy per the NC Building Code, and, in the case of an addition, the addition does not increase the building area of the existing building to more than one hundred fifty percent (150%) of the building area as it was in existence on December 31, 2011.

Unaltered portions of the existing building or building supply system shall not be required to comply with this code.

C503.1 General. Alterations to an existing building, building system or portion thereof shall ~~conform to~~ comply with the ~~provisions~~ requirements of this code as those provisions relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall not create an unsafe or hazardous condition or overload existing building systems.

~~Exception: Alterations complying with ANSI/ASHRAE/IESNA 90.1~~.

Exception: The following alterations to conditioned spaces need not comply with the requirements for new construction:

5. *Roof recover* ~~and roof replacement such that the existing building or structure is no less conforming to the provisions of this code than the existing building or structure was prior to the alteration~~.

C503.3.1 Roof replacement. Roof replacements shall comply with Table C402.1.3 or C402.1.4 where the existing roof assembly is part of the building thermal envelope and contains insulation entirely above the roof deck.

Chapter 6 [CE] Referenced Standards

NCECC		International Codes Council, Inc. 500 New Jersey Ave., N.W. Washington, D.C. 20005
Standard reference number	Title	Referenced in code section number
2009 NCECC	2009 North Carolina Energy Conservation Code	C501.1.1

Will this proposal change the cost of construction? Decrease [ ] Increase [ ] No [x]
Will this proposal increase the cost of a dwelling by $80 or more? Yes [ ] No [x]
Will this proposal affect Local or State funds? Local [ ] State [ ] No [x]
Will this proposal cause a substantial economic impact (≥ $1,000,000)? Yes [ ] No [x]
Non-Substantial - Provide an economic analysis including benefit/cost estimates.
Substantial - The economic analysis must also include 2-alternatives, time value of money and risk analysis.

REASON:

In June of 2017, the NC Building Code Council (BCC) approved the 2018 North Carolina Energy Conservation Code (NCECC), which replaced the 2012 NCECC. Although the new code is based on the 2015 IECC, the requirements for **commercial low-slope roof replacements** are eliminated under North Carolina's amended version. This change creates an overly broad and unnecessary exemption and it represents a significant weakening of the NCECC in comparison to previous versions (*i.e.,* both the 2012 and 2009 NCECC). Also, this change conflicts with the intent of a law the North Carolina General Assembly passed in 2014.

PIMA's code change proposal (contained here) would restore only the most cost-effective aspects of the requirements under the 2015 IECC model code for replacing a low-slope roof. The result would be a requirement that low-slope roof replacements have at least R-15 insulation, which has been common practice and a requirement in North Carolina for a long time. Also, PIMA's code change proposal would put in place language that better reflects a decision made by the North Carolina General Assembly in 2014.

This code change proposal is supported by the following organizations:

- **The Polyisocyanurate Insulation Manufacturers Association (PIMA)**
- **The Carolinas Roofing & Sheet Metal Contractors Association (CRSMCA)**
- **Southeast Energy Efficiency Alliance (SEEA)**
- **Responsible Energy Code Alliance (RECA)**

2014 Act: In 2014 the North Carolina General Assembly passed (and the Governor signed) H.B. 201, legislation that specifically addressed the issue of compliance with the energy code for alterations in existing buildings. Under this statute (codified at N.C.G.S. 143-139(b15)), the General Assembly decided that alterations in existing commercial buildings should comply with either the current code (which at the time was the 2012 NCECC) or the

weaker 2009 NCECC, depending on when the building was constructed and occupied. For buildings built and occupied prior to 2012, compliance with either code is at the building owner's discretion. For buildings built and occupied in 2012 or later, compliance with the current code is required. At the time of enactment, that code was the 2012 NCECC, which for roof replacements required insulation levels of R-25 or R-30, depending on the climate zone. These are the same R-values required for new buildings. The R-value required under the 2009 NCECC is R-15 for roofs on new buildings and for roof replacements. The General Assembly's intent was to align the R-value requirements for roof replacements with the R-value requirements that were in place at the time the building was first built (or at least at a level that has been common practice for a long time (i.e., R-15)). If the General Assembly had wanted to, they clearly could have provided building alterations with a complete exemption from the energy code (which is the effect of the 2018 NCECC with regard to roof replacements), but instead they decided to require a backstop of at least the weaker 2009 NCECC (for buildings built and occupied prior to 2012).

> ***N.C.G.S. 143-138(b15):*** *Exclusion from Energy Code Requirements for Existing Commercial Buildings. - The alteration of commercial buildings and structures that received a certificate of occupancy prior to January 1, 2012, may be subject to the rules pertaining to energy efficiency and energy conservation that were in effect on December 31, 2011. The addition to commercial buildings and structures that received a certificate of occupancy prior to January 1, 2012, may be subject to the rules pertaining to energy efficiency and energy conservation that were in effect on December 31, 2011, so long as the addition does not increase the building area of the existing commercial building or structure to more than one hundred fifty percent (150%) of the building area of the commercial building or structure as it was in existence on December 31, 2011. For the purpose of this subsection, the term "commercial buildings and structures" shall include all structures and buildings that are not classified as a Group R occupancy by the Building Code Council.*

2012 NCECC and Model Code Requirements: Under both the IECC and the International Building Code (IBC), there is a clear distinction between **roof replacements** (*i.e.,* an existing membrane is removed and replaced) and roof re-covers (*i.e.,* a new roof membrane is installed on top of an existing roof membrane). Under the IECC, roof re-covers and repairs do not trigger the energy code requirements. Roof replacements, however, do trigger the energy code and are required to meet the same prescriptive R-values required of new roofs, which for North Carolina under the 2015 IECC would be R-25 or R-30, depending on climate zone. However, due to legislation North Carolina enacted in 2014 (H.B. 201) the actual R-values requirements for roof replacements in North Carolina (and requirements for alterations generally) are much weaker. As discussed above, for commercial buildings built and occupied prior to 2012, this law exempts **all alterations** from the more stringent 2012 NCECC requirements, and instead requires compliance with the weaker 2009 NCECC. For roof replacements, this means that pre-2012 buildings may comply using only R-15 while newer buildings are required to use R-25 or R-30, depending on the climate zone.

The 2018 NCECC Changes: Changes to the 2015 IECC base code under the 2018 NCECC eliminates the distinction between roof replacements and roof re-covers for purposes of the energy code. This change ends any requirement for upgrading a roof's thermal performance when the membrane is replaced, even if there is no insulation in the existing roof. This basic requirement has been in the national model codes and the North Carolina codes for about 17 years and is common practice because adding insulation when the roof membrane is replaced is cost effective and relatively simple.

Explanation of PIMA's Proposed Amendment to Restore the Minimum Energy Code Requirements for Low-Slope Roofs: This proposed amendment would restore language related to roof replacements that was eliminated as part of the 2018 NCECC code update. The amendment would also incorporate relevant language and requirements from the 2014 NC legislation (i.e., H.B. 201) related to building alterations in pre-2012 buildings. This would preserve the basic requirement to maintain a minimum low-slope roof insulation value of R-15 when a roof is replaced. The proposed amendment would maintain the current exemptions for roof recovers and repairs and would make other changes intended to improve clarity.

Cost-Effectiveness: The most economical time to improve a roof's thermal performance is when the roof membrane is pulled off and replaced. However, under the 2018 NCECC, existing roofs with no or very little insulation will no longer have to upgrade to even an R-15 level when replaced. The potential energy waste under this scenario is significant. Based on calculations using National Roofing Contractors Association's (NRCA) *EnergyWise Roof Calculator* and RS Means construction cost estimates, the energy cost savings compared to the incremental upfront cost of increasing thermal performance from R-3 (1 inch of perlite) to R-15 (2.5 inches of Polyiso) is overwhelmingly positive, with simple payback periods ranging from about 3 to 4 years.

Energy Cost Savings & Simple Payback Periods of an R-15 vs. R-3 Roof in Raleigh, North Carolina

Roof Area (ft^2)	Typical of this Building Category	Annual Energy Savings of R-15 vs. R-3	Cost of Adding R-15	Simple Payback
5,500	Small Office	$1,962	$6,215	3.2 years
25,962	Stand-alone Retail	$7,821	$29,337	3.8 years
73,960	Primary School	$22,282	$83,575	3.8 years

NRCA *EnergyWise Roof Calculator* (Roof System Only, Gas Heating / Electric Cooling). Cost information based on RS Means Data.

Potential Energy Savings from Existing Buildings: The purpose of including alterations within the scope of the energy code is not just to maintain a building's current level of energy-efficiency, but to improve efficiency when parts of the building are replaced. Along with HVAC equipment, windows and lighting, roof replacements are one of the most common categories of building alterations and represent a significant opportunity for improving building energy performance. Approximately 3 billion square feet of commercial low-slope roofs are replaced or re-covered each year in the United States.

In summary: Building energy codes are necessary to ensure the spread of building energy efficiency measures and this is as true for building alterations as it is for new building construction. With respect to the North Carolina Energy Conservation Code:

- The General Assembly considered this issue in 2014 and decided to preserve minimum energy requirements for building alterations;
- The energy requirements for roof replacements are cost effective;
- In conjunction with the legislation enacted in 2014, restoring the 2015 IECC language related to roof replacements will require no greater effort then what has been common across the country (and in North Carolina) for more than 15 years;
- The change to the roof replacement requirements under the 2018 NCECC would unnecessarily foreclose an important opportunity to improve energy efficiency in existing buildings.

This proposal will not substantially increase the cost of construction. The requirements under this code change proposal are very similar to requirements under the previous 2012 NCECC.

B-6

CS – LEON/DAVID
DENIED

BCC – NO ACTION
3/13/18

APPENDIX C
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NORTH CAROLINA
BUILDING CODE COUNCIL

322 Chapanoke Road, Suite 200
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(919) 661-5880
barry.gupton@ncdoi.gov

Petition for Rule Making

Item Number _____

Granted by BCC _____ Adopted by BCC _____ Approved by RRC _____

Denied by BCC X NO ACTION Disapproved by BCC _____ Objection by RRC _____

PROPONENT Jeffrey Mang (Hogan Lovells) PHONE (202) 637 - 8703

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North Carolina State Building Code, Volume 2018 NCEBC - Section 101.12 and 708.1.1

CHECK ONE: [X] Revise section to read as follows: [ ] Delete section and substitute the following.
[ ] Add new section to read as follows: [ ] Delete section without substitution.

~~LINE THROUGH MATERIAL TO BE DELETED~~ UNDERLINE MATERIAL TO BE ADDED

Please type. Continue proposal or reason on plain paper attached to this form. See reverse side for instructions.

Amendments to the 2018 NC Existing Building Code

101.12 Energy conservation.
Additions, alterations, or repairs to an existing building, building system or portion thereof shall comply with this code or one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1.

2. The 2009 NCECC if the building or structure receive a certificate of occupancy prior to January 1, 2012, is not classified as Group R occupancy per the NC Building Code, and, in the case of an addition, the addition does not increase the building area of the existing building to more than one hundred fifty percent (150%) of the building area as it was in existence on December 31, 2011.

Per G.S. 143-138 (b18), no energy conservation code provisions shall apply to any structure for which the primary occupancy classification is Group F, S, or U. This exclusion shall apply to the entire building area.

708.1.1 Building envelope. Building envelope assemblies that are part of the *alteration* shall comply with Sections R402.1.2 or R402.1.4, Sections R402.2.1 through R402.2.15, R402.3.1, R402.3.2, R402.4.3 and R402.4.6 of the *North Carolina Energy Conservation Code* for *residential buildings* and Section C402 of the *North Carolina Energy Conservation Code* for *commercial buildings*.

Exceptions: The following *alterations* to conditioned spaces need not comply with the requirements for new construction:

1. Storm windows installed over existing fenestration.

2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are insulated. Roof systems requiring air space for ventilation shall retain the ventilation space required.

3. Construction where the existing roof, wall or floor cavity is not exposed.

4. Roof recover and ~~roof replacement such that the existing building or structure is no less conforming to the provisions of this code than the existing building or structure was prior to the *alteration.*~~ roof replacements shall comply with the Table C402.1.3 or C402.1.4 of the *North Carolina Energy Conservation Code* where the existing roof assembly is part of the building thermal envelope and contains insulation entirely above the roof deck.

5. Surface-applied window film installed on existing single pane fenestration assemblies to reduce solar heat gain.

6. Air barriers shall not be required for *roof recover* and roof replacement where the *alterations* or renovations to the building do not include *alterations*, renovations or *repairs* to the remainder of the building envelope.

7. *Alterations* that replace less than 50 percent of the luminaires in a space, provided that such *alterations* do not increase the installed interior lighting power.

8. For *commercial buildings*, replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.

Will this proposal change the cost of construction? Decrease [ ] Increase [ ] No [x]
Will this proposal increase the cost of a dwelling by $80 or more? Yes [ ] No [x]
Will this proposal affect Local or State funds? Local [ ] State [ ] No [x]
Will this proposal cause a substantial economic impact (≥ $1,000,000)? Yes [ ] No [x]
Non-Substantial - Provide an economic analysis including benefit/cost estimates.
Substantial - The economic analysis must also include 2-alternatives, time value of money and risk analysis.

REASON:

These are conforming amendments related to a proposed amendment submitted by Jeffrey Mang on behalf of PIMA to the 2018 NCECC related to roof replacements.

Signature _____ DATE: 3/9/2018

3/13/18
B-7
ACCEPT
RS – WAYNE/STEVE
CS – WAYNE/STEVE
BCC – WADE/RALPH
GRANT

APPENDIX C
CODE CHANGE PROPOSAL
NORTH CAROLINA
BUILDING CODE COUNCIL

322 Chapanoke Road, Suite 200
Raleigh, North Carolina 27603
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Petition for Rule Making

Item Number _____

Granted by BCC ✓ **Adopted by BCC**_____ **Approved by RRC**_____
Denied by BCC_____ **Disapproved by BCC**_____ **Objection by RRC**_____

PROPONENT Terry Cromer PHONE (336)382-1928 .
REPRESENTING NC Association of Electrical Contractor
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CITY Greensboro STATE NC ZIP 27407
E-MAIL terry@ncaec.us FAX (336) 854-7148 .

North Carolina State Building Code, Volume Electrical (2017) - Section All

CHECK ONE: [ ] Revise section to read as follows: [x] Delete section and substitute the following. [ ] Add new section to read as follows: [ ] Delete section without substitution.

~~LINE THROUGH MATERIAL TO BE DELETED~~ UNDERLINE MATERIAL TO BE ADDED

Please type. Continue proposal or reason on plain paper attached to this form. See reverse side for instructions.

See Attached.

Will this proposal change the cost of construction? Decrease [ ] Increase [ ] No [x]
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Will this proposal affect Local or State funds? Local [ ] State [ ] No [x]
Will this proposal cause a substantial economic impact (≥ $1,000,000)? Yes [ ] No [x]
Non-Substantial - Provide an economic analysis including benefit/cost estimates.
Substantial - The economic analysis must also include 2-alternatives, time value of money and risk analysis.

REASON:

Revising original text for allowing lighting fixtures in closet areas where storage is not reasonably feasible but not observed in the text of the current electrical code as an exception.

Signature Terry Cromer DATE: 3/9/2018

Amendment 410.2

Amend NEC 2017, page 267:

410.2 Definition.
Closet Storage Space. The volume bounded by the sides and back closet walls and planes extending from the closet floor vertically to a height of 1.8 m (6 ft) or to the highest clothes-hanging rod and parallel to the walls at a horizontal distance of 600 mm (24 in.) from the sides and back of the closet walls, respectively, and continuing vertically to the closet ceiling parallel to the walls at a horizontal distance of 300 mm (12 in.) or the width of the shelf, whichever is greater; for a closet that permits access to both sides of a hanging rod, this space includes the volume below the highest rod extending 300 mm (12 in.) on either side of the rod on a plane horizontal to the floor extending the entire length of the rod. See Figure 410.2.

Replace with:

410.2 Definition.
Closet Storage Space. The volume bounded by the sides and back closet walls and planes extending from the closet floor vertically to a height of 1.8 m (6 ft) or to the highest clothes-hanging rod and parallel to the walls at a horizontal distance of 600 mm (24 in.) from the sides and back of the closet walls, respectively, and continuing vertically to the closet ceiling parallel to the walls at a horizontal distance of 300 mm (12 in.) or the width of the shelf, whichever is greater; for a closet that permits access to both sides of a hanging rod, this space includes the volume below the highest rod extending 300 mm (12 in.) on either side of the rod on a plane horizontal to the floor extending the entire length of the rod. See Figure 410.2.

Exception:
Where a shelf is not present in the area of wall above the closet's entrance opening or doorway extending from the top of such opening or doorway vertically to the ceiling, including the area of ceiling extending perpendicular from the area of wall directly above the closet's entrance opening or doorway to a horizontal distance of 300 mm (12 in.) shall not be defined as closet storage space. See Figure 410.2 Exception.

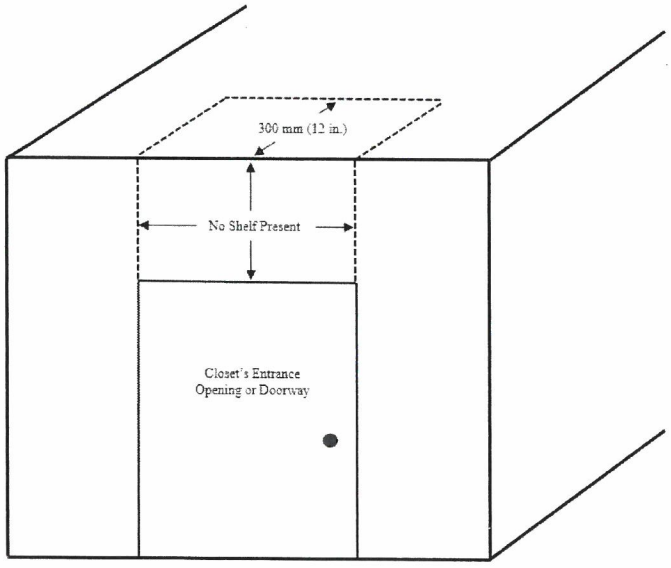

Figure 410.2 Exception Closet Storage Space Exception

3/13/18
B-E
ACCEPT
RS - WAYNE/STEVE
CS - WAYNE/STEVE
BCC - WADE/RALPH GRANT

APPENDIX C
CODE CHANGE PROPOSAL
NORTH CAROLINA
BUILDING CODE COUNCIL

322 Chapanoke Road, Suite 200
Raleigh, North Carolina 27603
(919) 661-5880
barry.gupton@ncdoi.gov

Petition for Rule Making

Granted by BCC ✓ Adopted by BCC_____ Item Number _____
Denied by BCC_____ Disapproved by BCC_____ Approved by RRC_____
Objection by RRC_____

PROPONENT Terry Cromer PHONE (336)382-1928 .
REPRESENTING NC Association of Electrical Contractor
ADDRESS 3707 Alliance Drive
CITY Greensboro STATE NC ZIP 27407
E-MAIL terry@ncaec.us FAX (336) 854-7148 .

North Carolina State Building Code, Volume 2017 Electrical - Section All

CHECK ONE: [ ] Revise section to read as follows: [x] Delete section and substitute the following. [ ] Add new section to read as follows: [ ] Delete section without substitution.

~~LINE THROUGH MATERIAL TO BE DELETED~~ UNDERLINE MATERIAL TO BE ADDED

Please type. Continue proposal or reason on plain paper attached to this form. See reverse side for instructions.

See Attached.

Will this proposal change the cost of construction? Decrease [ ] Increase [ ] No [x]
Will this proposal increase the cost of a dwelling by $80 or more? Yes [ ] No [x]
Will this proposal affect Local or State funds? Local [ ] State [ ] No [x]
Will this proposal cause a substantial economic impact (≥ $1,000,000)? Yes [ ] No [x]
Non-Substantial - Provide an economic analysis including benefit/cost estimates.
Substantial - The economic analysis must also include 2-alternatives, time value of money and risk analysis.

REASON:

Revising original text for allowing lighting fixtures in closet areas where storage is not reasonably feasible but not observed in the text of the current electrical code as an exception.

Signature Terry Cromer DATE: 2/9/2018

Amendment 410.16(C)

Amend NEC 2017, page 269:

410.16 Luminaires in Clothes Closets.
(C) Location. The minimum clearance between luminaires installed in clothes closets and the nearest point of a closet storage space shall be as follows:

(1) 300 mm (12 in.) for surface-mounted incandescent or LED luminaires with a completely enclosed light source installed on the wall above the door or on the ceiling.
(2) 150 mm (6 in.) for surface-mounted fluorescent luminaires installed on the wall above the door or on the ceiling.
(3) 150 mm (6 in.) for recessed incandescent or LED luminaires with a completely enclosed light source installed in the wall or the ceiling.
(4) 150 mm (6 in.) for recessed fluorescent luminaires installed in the wall or the ceiling.
(5) Surface-mounted fluorescent or LED luminaires shall be permitted to be installed within the closet storage space where identified for this use.

Replace with:

410.16 Luminaires in Clothes Closets.
(C) Location. The minimum clearance between luminaires installed in clothes closets and the nearest point of a closet storage space shall be as follows:

(1) 300 mm (12 in.) for surface-mounted incandescent or LED luminaires with a completely enclosed light source installed on the wall above the door or on the ceiling.
(2) 150 mm (6 in.) for surface-mounted fluorescent luminaires installed on the wall above the door or on the ceiling.
(3) 150 mm (6 in.) for recessed incandescent or LED luminaires with a completely enclosed light source installed in the wall or the ceiling.
(4) 150 mm (6 in.) for recessed fluorescent luminaires installed in the wall or the ceiling.
(5) Surface-mounted fluorescent or LED luminaires shall be permitted to be installed within the closet storage space where identified for this use.
(6) LED luminaires with a completely enclosed light source or fluorescent luminaires shall be permitted to be installed within the area defined in 410.2 Exception.

3/13/18 B-9

C5 – WAYNE/DANNY - ACCEPT

BCC – LEON/CONNER GRANT

APPENDIX C
CODE CHANGE PROPOSAL
NORTH CAROLINA
BUILDING CODE COUNCIL

325 North Salisbury Street, Room 5_44
Raleigh, North Carolina 27603
(919) 647-0095
barry.gupton@ncdoi.gov

Petition for Rule Making

Item Number _____

Granted by BCC ✓ **Adopted by BCC**_____ **Approved by RRC**_____
Denied by BCC_____ **Disapproved by BCC**_____ **Objection by RRC**_____

PROPONENT Jonathan Leonard PHONE (704) 336 - 8374 .
REPRESENTING North Carolina Fire Code Revisions Committee
ADDRESS 500 Dalton Ave
CITY Charlotte STATE NC ZIP 28206
E-MAIL jpleonard@ci.charlotte.nc.us FAX (704) 336 - 5190 .

North Carolina State Building Code, Volume Fire Code ~~2019~~ 2018 - Section 314.4

CHECK ONE:
[X] Revise section to read as follows:
[ ] Add new section to read as follows:
[ ] Delete section and substitute the following.
[ ] Delete section without substitution.

~~LINE THROUGH MATERIAL TO BE DELETED~~ UNDERLINE MATERIAL TO BE ADDED

Please type. Continue proposal or reason on plain paper attached to this form. See reverse side for instructions.

314.4 Vehicles. Liquid- or gas-fueled vehicles. boats or other motorcraft shall not be located indoors except as follows:
1. Batteries are disconnected.
   Exception: Alternative-Fueled vehicles in which manufacture prohibits disconnection of power supply
2. Fuel in fuel tanks does not exceed one-quarter tank or 5 gallons (19L) (whichever is least).
   Exception: Diesel fueled vehicles-maximum fuel amount permitted shall be 20 gallons.
3. Fuel tanks and fill openings are closed and sealed to prevent tampering and the release of vapors.
4. Vehicles, boats or other motorcraft equipment are not fueled or defueled within the building.

Will this proposal change the cost of construction? Decrease [ ] Increase [ ] No [X]
Will this proposal increase the cost of a dwelling by $80 or more? Yes [ ] No [X]
Will this proposal affect Local or State funds? Local [ ] State [ ] No [X]
Will this proposal cause a substantial economic impact (≥ $1,000,000)? Yes [ ] No [X]
Non-Substantial - Provide an economic analysis including benefit/cost estimates.
Substantial - The economic analysis must also include 2-alternatives, time value of money and risk analysis.

REASON: The fire code revision committee recognizes the the hazards associated with fuel types and new technologies have changed. These changes will allow the local fire code official the latitude needed to approved shows and displays for newer vehicles. In addition this change will also the fire code official to permit a higher amount of fuel for diesel powered vehicles.

Signature _____ DATE: 3/12/2018

3/13/18

B-10

ACCEPT

CS – WAYNE/ERIC

BCC – STEVE/WAYNE GRANT

APPENDIX C
CODE CHANGE PROPOSAL
NORTH CAROLINA
BUILDING CODE COUNCIL

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(919) 647-0095
barry.gupton@ncdoi.gov

Petition for Rule Making

Item Number _____

Granted by BCC ✓ **Adopted by BCC**_____ **Approved by RRC**_____
Denied by BCC_____ **Disapproved by BCC**_____ **Objection by RRC**_____

PROPONENT Jonathan Leonard PHONE (704) 336 - 8374 .
REPRESENTING North Carolina Fire Code Revisions Committee
ADDRESS 500 Dalton Ave
CITY Charlotte STATE NC ZIP 28206
E-MAIL jpleonard@ci.charlotte.nc.us FAX (704) 336 - 5190 .

North Carolina State Building Code, Volume Fire & Building ~~2019~~ 2018 - Section 1010.1.9.11

CHECK ONE:
- [X] Revise section to read as follows:
- [ ] Add new section to read as follows:
- [ ] Delete section and substitute the following.
- [ ] Delete section without substitution.

~~LINE THROUGH MATERIAL TO BE DELETED~~ UNDERLINE MATERIAL TO BE ADDED

Please type. Continue proposal or reason on plain paper attached to this form. See reverse side for instructions.

See Attached Documentation

Will this proposal change the cost of construction? Decrease [ ] Increase [ ] No [X]
Will this proposal increase the cost of a dwelling by $80 or more? Yes [ ] No [X]
Will this proposal affect Local or State funds? Local [ ] State [ ] No [X]
Will this proposal cause a substantial economic impact (≥ $1,000,000)? Yes [ ] No [X]

Non-Substantial - Provide an economic analysis including benefit/cost estimates.
Substantial - The economic analysis must also include 2-alternatives, time value of money and risk analysis.

REASON: Security of occupants and to prevent un-authorized personnel from entering floor in non-high rise buildings. Change all ready exist in the 2018 IFC

Signature _____ DATE: 3/12/2018

This is what will be in the new code. Exception 6 was added.

[BE] 1010.1.9.11 Stairway doors.
Interior stairway means of egress doors shall be openable from both sides without the use of a key or special knowledge or effort.

Exceptions:

1. Stairway discharge doors shall be openable from the egress side and shall only be locked from the opposite side.

2. This section shall not apply to doors arranged in accordance with Section 403.5.3 of the International Building Code.

3. ~~In stairways serving not more than four stories, doors are permitted to be locked from the side opposite the egress side, provided they are openable from the egress side and capable of being unlocked simultaneously without unlatching upon a signal from the fire command center, if present, or a signal by emergency personnel from a single location inside the main entrance to the building.~~

3. Stairway exit doors are permitted to be locked from the side opposite the egress side, provided that they are openable from the egress side and capable of being unlocked simultaneously without unlatching upon a signal from the fire command center, if present, or a signal by emergency personnel from a single location inside the main entrance to the building and upon activation of the fire alarm if present.

4. Stairway exit doors shall be openable from the egress side and shall only be locked from the opposite side in Group B, F, M and S occupancies where the only interior access to the tenant space is from a single exit stairway where permitted in Section 1006.3.2.

5. Stairway exit doors shall be openable from the egress side and shall only be locked from the opposite side in Group R-2 occupancies where the only interior access to the dwelling unit is from a single exit stairway where permitted in Section 1006.3.2.

6. ~~In other than highrise, stairways serving floors above a 3 hour horizontal building separation, doors are permitted to be locked from the side opposite the egress side, provided they are openable from the egress side and capable of being unlocked simultaneously without unlatching upon activation of the building fire alarm system.~~

c

3/13/18

B-11 DENIED

RS - LEON/STEVE

BCC - NO ACTION

APPENDIX C
CODE CHANGE PROPOSAL
NORTH CAROLINA
BUILDING CODE COUNCIL

322 Chapanoke Road, Suite 200
Raleigh, North Carolina 27603
(919) 661-5880
barry.gupton@ncdoi.gov

Petition for Rule Making

Item Number _____

Granted by BCC_____ Adopted by BCC_____ Approved by RRC_____

Denied by BCC_____ Disapproved by BCC_____ Objection by RRC_____

NO ACTION

PROPONENT Leon Skinner PHONE 919-996-2445

REPRESENTING City of Raleigh Development Services

ADDRESS One Exchange Plaza, Suite 504

CITY Raleigh STATE NC ZIP 27602-0590

E-MAIL leon.skinner@raleighnc.gov

FAX 919-516-2172

North Carolina State Building Code, Volume ~~2012~~ 2018 NC Residential Code - Section R-305.1 Exception 1

CHECK ONE:

[X] Revise section to read as follows:
[ ] Add new section to read as follows:
[ ] Delete section and substitute the following.
[ ] Delete section without substitution.

~~LINE THROUGH MATERIAL TO BE DELETED~~ UNDERLINE MATERIAL TO BE ADDED

Please type. Continue proposal or reason on plain paper attached to this form. See reverse side for instructions.

Revise Exception #1 (See below)

R305.1 Minimum height. Habitable space, hallways, bathrooms, toilet rooms, laundry rooms and portions of basements containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm).

Exceptions:

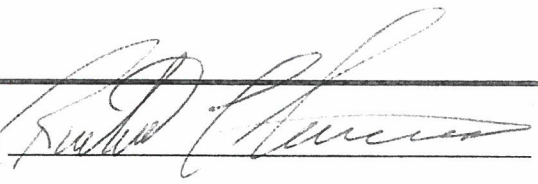
1. For rooms with sloped ceilings, at least 50 percent of the required floor area of the room must have a ceiling height of at least 7 feet (2134 mm), and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
   1.1 Where unfinished attics and/or storage areas meeting the requirements of exception #1 a minimum of one Emergency Escape and Rescue Openings meeting all the requirements of R-310 shall be installed.

Will this proposal change the cost of construction? Decrease [ ] Increase [X] No [ ]
Will this proposal increase the cost of a dwelling by $80 or more? Yes [ ] No [X]
Will this proposal affect Local or State funds? Local [ ] State [ ] No [X]

Will this proposal cause a substantial economic impact (≥ $1,000,000)? Yes [ ] No [X]
Non-Substantial - Provide an economic analysis including benefit/cost estimates.
Substantial - The economic analysis must also include 2-alternatives, time value of money and risk analysis.

REASON:

One of the main issues dealt with by local jurisition is when homeowner wants to finish an existing attic area into habitable space or put their home on the market and the attic was finished without permits. Based on full disclosure in real estate law they must provide a certificate of complainece for the work or sell the space as unhabitablespace which is a major cost difference per square foot. With the 2012 NCRC code change to section R-310 to include habitable attic with the requirements for providing Emergency Escape and Rescue Openings, it can be a major change in design and cost for the home owner. Based on my experience, many existing attic spaces have a gable end window installed. However, prior to 2012 code change, there were no window size requirements in existing attics to meet the requirements of R310.1.1. This could be a major expense to fix after the fact due to structure appearance and how to proceed if the home is brick veneer. This rule change would meet the requirements of the 2012 NCRC for Emergency Escape and would assist the homeowners in the event they wanted to finish the attic area. To evaluate cost difference I have priced a typical bathroom window with the same type bedroom meeting the R-310.1 requirements. The framing done at the time of home construction would be the same, if know prior to installation. We are only looking at a cost difference in the window size. The difference between a vinyl bathroom and bedroom window was an increase of $45.00, based on pricing from retailer Lowe's Home Improvements.

Signature  DATE: 3/12/2018