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The Foundation for The Gator Nation

Evaluation of the Cost Impact of Florida's Specific Changes to 2015 I-Codes "Prescriptive Code Changes"

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Research Team

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- Graduate Students

ISSUES

- The proposed research assesses the cost impact of Florida's Specific Changes to 2015 I-Codes that are prescriptive in nature and that have the potential of adding cost to construction.

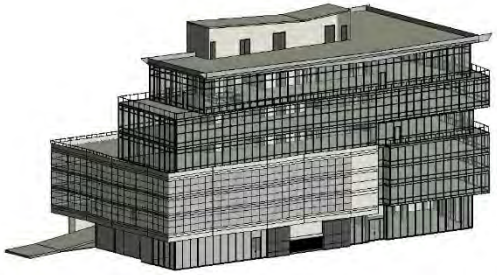
STATEMENT OF WORK

- **1. Review/analyze the Florida's specific changes to the 2015 I – Codes to identify those code changes/ provisions that are prescriptive in nature and have the potential of adding cost to construction.**

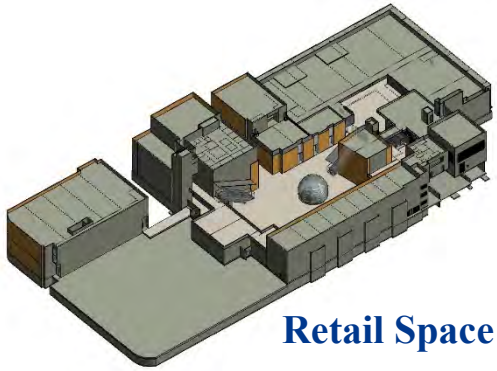
STATEMENT OF WORK

- **2. Use the standard set of baseline residential and commercial building designs previously used to evaluate the I-Codes prescriptive changes to estimate the potential cost of Florida's specific changes.**
  - **Develop modified building information models**
  - **Generate material quantity surveys**

Building Information Models



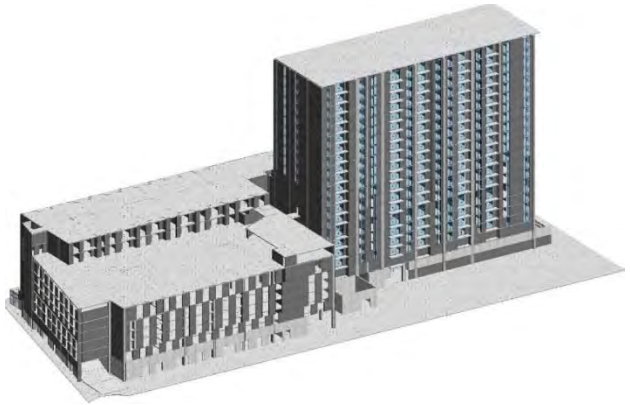
Small Office



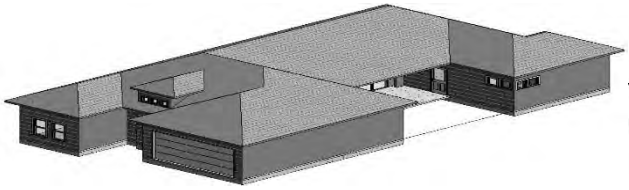
Retail Space

Small Hotel

Elementary School



Mid-Rise Apartments



1-story Residence

2-story Residence

STATEMENT OF WORK

- 3. Estimating the additional construction cost of those provisions that are not covered under (2) using good engineering judgment and feedback from general contractors and consulting engineers.
  - Generate cost estimates
  - Perform overall cost impact analysis

DELIVERABLES

- A report providing technical information on the problem background, results and cost implications of the prescriptive Code changes.
- An analysis of individual code changes will also be provided in the Appendix.

Florida Specific Changes to 2015 IMC Cost Impact Disclaimer - Probable Construction Costs Opinions

Assumptions

- This Estimate is not a guarantee of Final Bid Cost or of Final Project Cost.
- This is an Opinion of Probable Cost of Mechanical, Electrical, and Piping (MEP) Systems for the proposed buildings.
- The estimate was compiled using documents provided by various sources.
- The estimate is representative of average unit pricing and labor from historical job costs of similar type, cost and labor data from Mechanical Contractors Association of America (MCAA), CostWorks 2015 Qtr. 2 (Change Date and Qtr) by R.S. Means Company Inc, National Electrical Contractors Association (NECA) and Sheet Metal Estimating by Wendes.
- The subcontractor unit rates include the subcontractor's overhead and profit, unless otherwise stated.
- The mark-ups included in the unit prices cover the cost of field overhead, home office overhead and profit, and range from 15% to 25% of the costs of a particular item.
- Since we have no control over the cost of labor, material and equipment, or the contractor's method of carrying out the work and determining the price, or over competitive bidding or market conditions, this opinion of probable construction cost provided is made on the basis of experience and qualifications. This opinion represents our best judgment as professional construction consultants with the Construction Industry. However, we cannot and do not guarantee that proposals, bids or the construction cost will not vary from the opinions of probable cost in this estimate.

Florida Specific Changes to 2015 IMC Cost Impact Disclaimer - Probable Construction Costs Opinions

General Assumptions:

- "Allowances" are considered to be an allotted sum of money for a particular system or scope of work for which sufficient detail is not available to determine a definitive cost.
- These cost allowances are included to project a final cost to include labor, material, equipment and any subcontractor costs.
- The owner receives the savings for any amount under the allowance and is at risk for any amount over the allowance.
- The estimate is in today's dollars, and has been adjusted to the local area.
- This estimate does not include any fees or permits.
- This estimate is intended to reflect construction costs only.
- This estimate is intended to reflect normal construction schedules only.
- Variations in material costs, labor efficiencies, wage rates, union practices, and bid climate will effect final costs.
- Workers will report to the actual job site.
- Materials delivered to the actual job site will need to be scheduled.
- No premium or overtime has been included.
- No General Construction costs have been included.
- All utilities have sufficient capacity for the added loads.

Excerpts – Florida Specific Changes to 2015 IMC Cost Impact Analysis

APPENDIX D - Table 4. Florida Specific Changes to the 2015 I-Codes- Mechanical Cost Impact Analysis		
CODE CHANGE #	FLORIDA SPECIFIC CHANGES TO 2015 IMC SUMMARY	ESTIMATED AMOUNT*
M7010	Allows in Section 603.7 for an alternative material, foil-faced fiberglass duct in garages that does not compromise fire protection or allow harmful gases to penetrate the dwelling.	Reduces cost of installation and materials up to $1,000 or more.
M7011	Eliminates in Section 606 duplication of Smoke Detectors in both the supply and return side of air distribution systems and other changes to be in compliance with the Florida Fire Code.	Cost savings of $500 - $2000 per system.

*For prescriptive Code changes only.

Excerpts – Florida Specific Changes to 2015 IMC Cost Impact Analysis

APPENDIX D - Table 4. Florida Specific Changes to the 2015 I-Codes- Mechanical Cost Impact Analysis		
CODE CHANGE #	FLORIDA SPECIFIC CHANGES TO 2015 IMC SUMMARY	ESTIMATED AMOUNT*
M6819 (Residential)	Modify in Section 303.4 air changes triggering whole house mechanical ventilation to less than 3.	Cost reduction if not required to install whole-house mechanical ventilation.
M7015 (Residential)	Exempts in Section R1411.8 the use of locking caps on refrigerant ports on residential outside equipment if the port is inside the cabinet and not generally accessible.	Cost savings of up to $100.
M7019 (Residential)	Changes in Section R1503.2 the ground clearance for PVC outside pipe from 1" to 8" above grade to allow space for connection of a vent cap or hood when installing a downdraft range vent.	May Decrease install cost of downdraft range vent by $100-$200 per dwelling.

*For prescriptive Code changes only.

Building Information Models and Associated Cost Impacts

Table B1. Summary I-Codes Changes Cost Impact Comparison				
	Building Type	***2012 I-Codes***	***2015 I-Codes***	**Change in Cost**
1	*Small Office*	$ 10,920,905	$ 11,446,962	**4.82%**
2	*Retail*	$ 23,396,814	$ 24,025,125	**2.69%**
3	*Elementary School*	$ 7,802,722	$ 8,446,532	**8.25%**
4	*Small Hotel*	$ 6,947,121	$ 7,628,069	**9.80%**
5	*Mid-Rise Apartment*	$ 36,076,878	$ 40,518,001	**12.31%**
6	*1-Story Residence*	$ 217,807	$ 238,972	**9.72%**
7	*2-Story Residence*	$ 316,621	$ 348,566	**10.09%**
			Average Change in Cost (Entire Sample):	8.24%

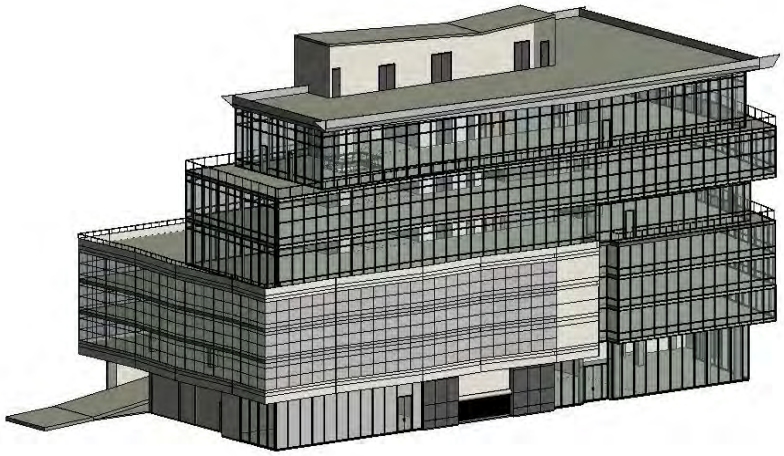
Building Information Models and Associated Cost Impacts

Table B2. Summary I-Codes Changes Cost Impact Comparison				
	Building Type	***2012 I-Codes***	***2015 I-Codes + FL Specific Changes***	**Change in Cost**
1	*Small Office*	$ 10,920,905	$ 11,974,429	**9.65%**
2	*Retail*	$ 23,396,814	$ 25,489,407	**8.94%**
3	*Elementary School*	$ 7,802,722	$ 8,869,639	**13.67%**
4	*Small Hotel*	$ 6,947,121	$ 7,996,754	**15.11%**
5	*Mid-Rise Apartment*	$ 36,076,878	$ 42,408,259	**17.55%**
6	*1-Story Residence*	$ 217,807	$ 238,370	**9.44%**
7	*2-Story Residence*	$ 316,621	$ 348,118	**9.95%**
			Average Change in Cost (Entire Sample):	12.04%

Building Information Models and Associated Cost Impacts

Table B3. Summary I-Codes Changes Cost Impact Comparison								
	Building Type	*2015 I-Codes*	*2015 I-Codes + FL Specific Changes*	Difference in Cost	Change in Cost	After 80% Insurance Rebate for LPS	
						Difference in Cost	Change in Cost
1	*Small Office*	$ 11,446,962	$ 11,974,429	$ 526,467	**4.61%**	$186,531	**1.61%**
2	*Retail*	$ 24,025,125	$ 25,489,407	$ 1,464,282	**6.09%**	$448,924	**1.86%**
3	*Elementary School*	$ 8,446,532	$8,869,639	$ 423,107	**5.01%**	$166,603	**2.02%**
4	*Small Hotel*	$ 7,628,069	$7,996,754	$ 368,685	**4.83%**	$214,933	**2.94%**
5	*Mid-Rise Apartment*	$ 40,518,001	$ 2,408,259	$ 1,890,258	**4.67%**	$75,644	**0.19%**
6	*1-Story Residence*	$ 238,972	$ 238,370	($602)	**-0.98%**		
7	*2-Story Residence*	$ 348,566	$ 348,118	($448)	**-0.13%**		

SMALL OFFICE BUILDING COST COMPARISON



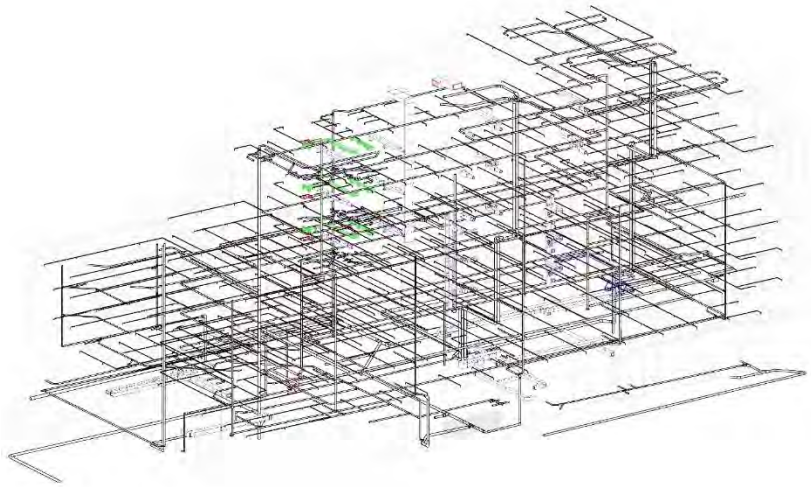
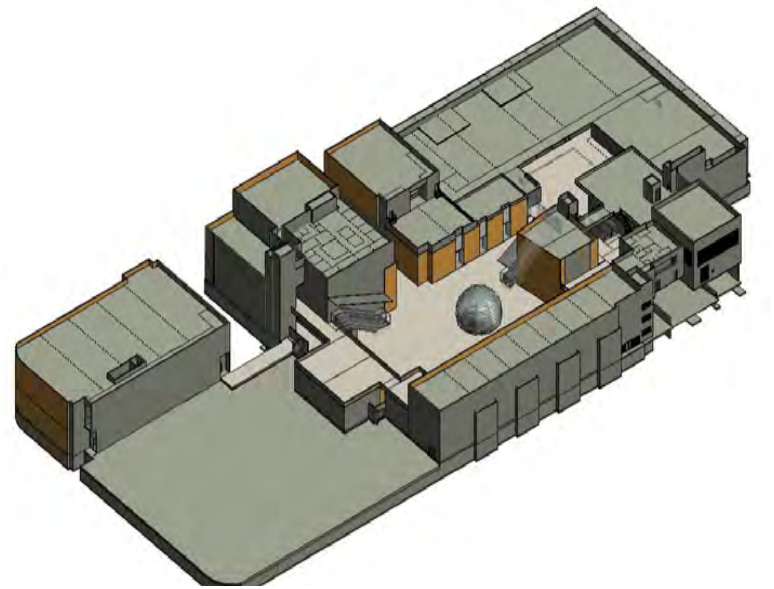


	Table A-1. SMALL OFFICE BUILDING (138,715 SF) COST COMPARISON			
	ASTM Uniformat II Levels	*2012 I-Codes*	*2015 I-Codes*	*2015 I-Codes +FL Specific Changes*
A.	Substructure	$ 310,352	$ 310,352	$ 321,690
	A10 - Foundations	$ 310,352	$ 310,352	$ 321,690
	A20 - Basement Constr.	$ -	$ -	$ -
B.	Shell	$ 4,772,801	$ 4,772,801	$ 4,773,816
	B10 - Superstructure	$ 2,914,531	$ 2,914,531	$ 2,914,531
	B20 - Exterior Enclosure	$ 1,824,162	$ 1,824,162	$ 1,825,177
	B30 - Roofing	$ 34,108	$ 34,108	$ 34,108
C.	Interiors	$ 1,089,086	$ 1,089,086	$ 1,089,086
	C10 - Interior Construction	$ 308,211	$ 308,211	$ 308,211
	C20 - Stairs	$ 199,908	$ 199,908	$ 199,908
	C30 - Interior Finishes	$ 580,966	$ 580,966	$ 580,966
D.	Services	$ 4,748,667	$ 5,274,724	$ 5,789,838
	D10 - Conveying	$ 728,036	$ 728,036	$ 728,036
	D20 - Plumbing	$ 302,556	$ 302,556	$ 302,556
	D30 - HVAC	$ 65,318	$ 170,743	$ 170,743
	D40 - Fire Protection	$ 1,868,315	$ 1,873,315	$ 1,873,315
	D50 - Electrical	$ 1,784,443	$ 2,200,075	$ 2,715,188
E.	Equipment & Furnishings	$ -	$ -	$ -
F.	Special Construction	$ -	$ -	$ -
G.	Building Sitework	$ -	$ -	$ -
	Total Cost	$ 10,920,905	$ 11,446,962	$ 11,974,429

RETAIL SPACE COST COMPARISON



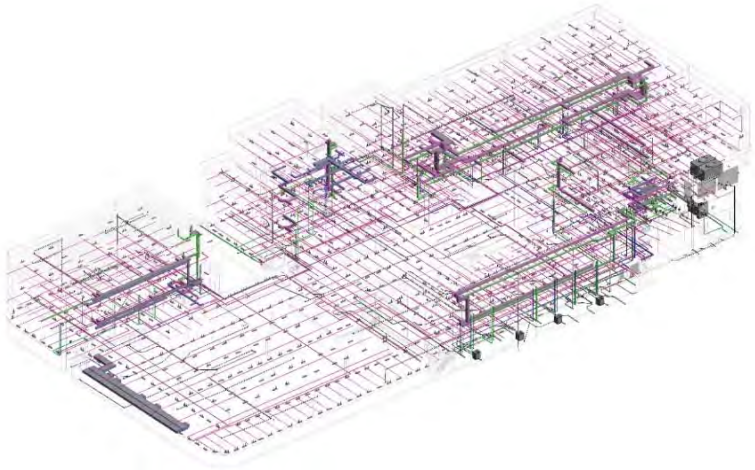
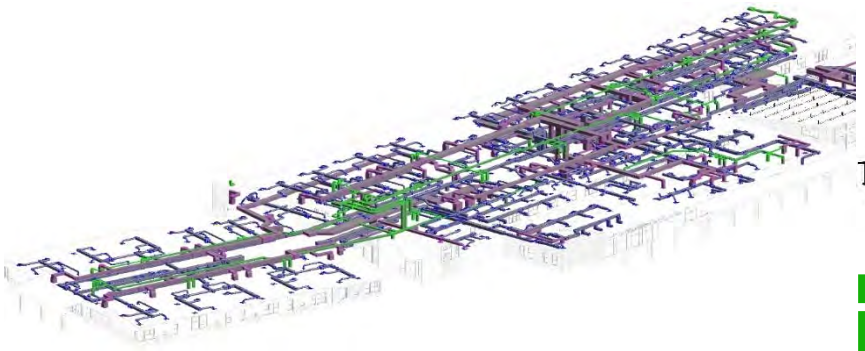


	Table B-1. RETAIL SPACE (409,933SF) COST COMPARISON			
	ASTM Uniformat II Levels	*2012 I-Codes*	*2015 I-Codes*	*2015 I-Codes +FL Specific Changes*
A.	Substructure	**$ 2,255,246**	**$ 2,255,246**	**$ 2,558,734**
	A10 - Foundations	$ 2,255,246	$ 2,255,246	$ 2,558,734
	A20 - Basement Constr.	$ -	$ -	$ -
B.	Shell	**$ 10,897,059**	**$ 10,897,059**	**$ 10,977,723**
	B10 - Superstructure	$ 9,041,350	$ 9,041,350	$ 9,041,350
	B20 - Exterior Enclosure	$ 1,770,425	$ 1,770,425	$ 1,851,089
	B30 - Roofing	$ 85,283	$ 85,283	$ 85,283
C.	Interiors	**$ 1,424,925**	**$ 1,424,925**	**$ 1,424,925**
	C10 – Interior Constr.	$ 411,821	$ 411,821	$ 411,821
	C20 - Stairs	$ 443,168	$ 443,168	$ 443,168
	C30 - Interior Finishes	$ 569,936	$ 569,936	$ 569,936
D.	Services	**$ 8,819,585**	**$ 9,447,896**	**$ 10,528,027**
	D10 - Conveying	$ 853,948	$ 853,948	$ 853,948
	D20 - Plumbing	$ 974,524	$ 982,908	$ 982,908
	D30 - HVAC	$ 698,993	$ 951,202	$ 950,202
	D40 - Fire Protection	$ 5,987,616	$ 5,992,616	$ 5,992,616
	D50 - Electrical	$ 304,504	$ 667,222	$ 1,748,353
E.	Equipment & Furnishings	**$ -**	**$ -**	**$ -**
F.	Special Construction	**$ -**	**$ -**	**$ -**
G.	Building Sitework	**$ -**	**$ -**	**$ -**
	Total Cost	**$ 23,396,814**	**$ 24,025,125**	**$ 25,489,407**

ELEMENTARY SCHOOL COST COMPARISON



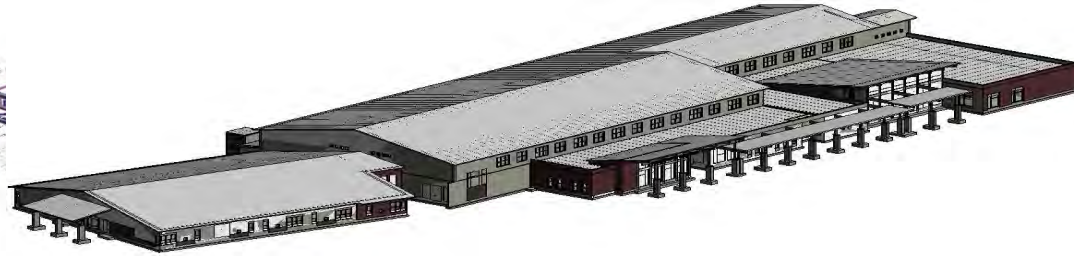
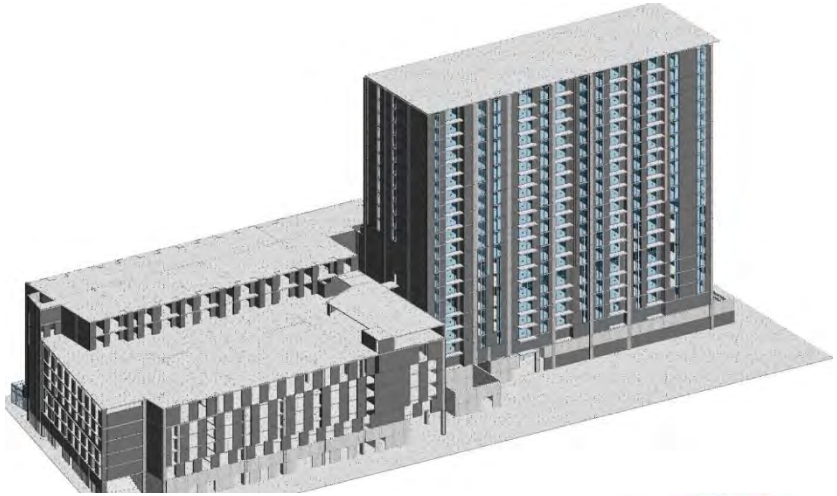


	Table C-1. ELEMENTARY SCHOOL (90,726 SF) COST COMPARISON			
	ASTM Uniformat II Levels	*2012 I-Codes*	*2015 I-Codes*	*2015 I-Codes +FL Specific Changes*
A.	Substructure	**$ 700,228**	**$ 700,228**	**$ 743,241**
	A10 - Foundations	$ 700,228	$ 700,228	$ 743,241
	A20 - Basement Constr.	$ -	$ -	$ -
B.	Shell	**$ 3,737,916**	**$ 3,737,916**	**$ 3,737,916**
	B10 - Superstructure	$ 1,636,810	$ 1,636,810	$ 1,636,810
	B20 - Exterior Enclosure	$ 1,260,650	$ 1,260,650	$ 1,260,650
	B30 - Roofing	$ 840,456	$ 840,456	$ 840,456
C.	Interiors	**$ 1,276,392**	**$ 1,276,392**	**$ 1,276,392**
	C10 - Interior Constr.	$ 584,401	$ 584,401	$ 584,401
	C20 - Stairs	$ 79,310	$ 79,310	$ 79,310
	C30 - Interior Finishes	$ 612,681	$ 612,681	$ 612,681
D.	Services	**$ 2,088,186**	**$ 2,731,996**	**$ 2,970,565**
	D10 - Conveying	$ 64,985	$ 64,985	$ 64,985
	D20 - Plumbing	$ 634,069	$ 634,069	$ 634,069
	D30 - HVAC	$ 317,914	$ 719,128	$ 719,128
	D40 - Fire Protection	$ 607,906	$ 612,906	$ 612,906
	D50 - Electrical	$ 463,313	$ 700,909	$ 1,081,003
E.	Equipment & Furnishings	**$ -**	**$ -**	**$ -**
F.	Special Construction	**$ -**	**$ -**	**$ -**
G.	Building Sitework	**$ -**	**$ -**	**$ -**
	Total Cost	**$ 7,802,722**	**$ 8,446,532**	**$ 8,869,639**

SMALL HOTEL COST COMPARISON

	Table D-1. SMALL HOTEL (72,024 SF) COST COMPARISON			
	ASTM Uniformat II Levels	*2012 I-Codes*	*2015 I-Codes*	*2015 I-Code +FL Specific Changes*
A.	Substructure	**$ 260,286**	**$ 260,286**	**$ 278,388**
	A10 - Foundations	$ 260,286	$ 260,286	$ 278,388
	A20 - Basement Constr.	$ -	$ -	$ -
B.	Shell	**$ 1,980,038**	**$ 1,980,038**	**$ 1,987,358**
	B10 - Superstructure	$ 1,098,060	$ 1,098,060	$ 1,098,060
	B20 - Exterior Enclosure	$ 808,987	$ 808,987	$ 816,307
	B30 - Roofing	$ 72,991	$ 72,991	$ 72,991
C.	Interiors	**$ 1,416,588**	**$ 1,416,588**	**$ 1,416,588**
	C10 – Interior Constr.	$ 802,456	$ 802,456	$ 802,456
	C20 - Stairs	$ 64,134	$ 64,134	$ 64,134
	C30 - Interior Finishes	$ 549,998	$ 549,998	$ 549,998
D.	Services	**$ 3,290,208**	**$ 3,971,156**	**$ 4,314,419**
	D10 - Conveying	$ 165,710	$ 165,710	$ 165,710
	D20 - Plumbing	$ 553,339	$ 553,339	$ 553,339
	D30 - HVAC	$ 979,430	$ 1,162,767	$ 1,162,767
	D40 - Fire Protection	$ 865,972	$ 870,972	$ 870,972
	D50 - Electrical	$ 725,758	$ 1,218,368	$ 1,561,631
E.	Equipment & Furnishings	**$ -**	**$ -**	**$ -**
F.	Special Construction	**$ -**	**$ -**	**$ -**
G.	Building Sitework	**$ -**	**$ -**	**$ -**
	Total Cost	**$ 6,947,121**	**$ 7,628,069**	**$ 7,996,754**

MID-RISE APARTMENT BUILDING COST COMPARISON



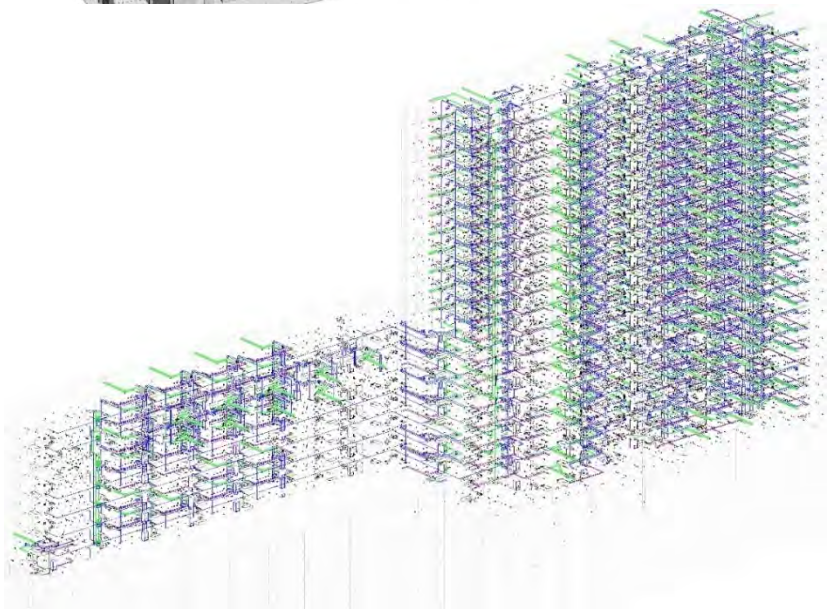
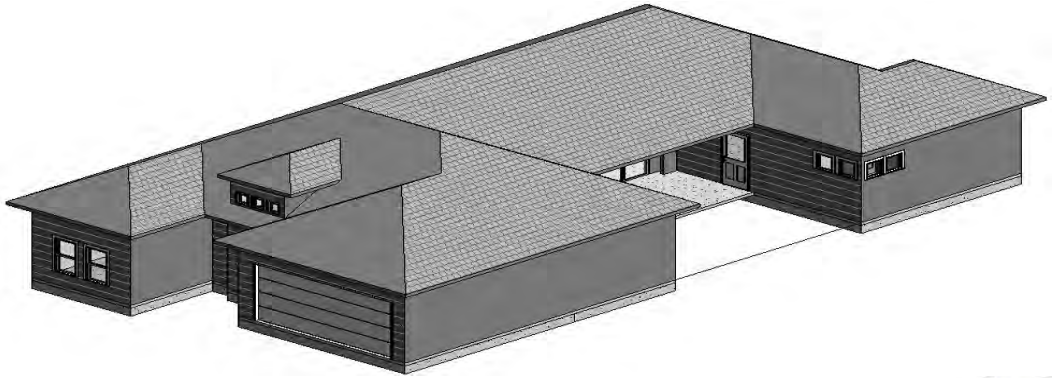


	Table E-1. MID-RISE APARTMENT BUILDING (589,555 SF) COST COMPARISON			
	ASTM Uniformat II Levels	*2012 I-Codes*	*2015 I-Codes*	*2015 I-Code +FL Specific Changes*
A.	Substructure	**$ 1,498,735**	**$ 1,498,735**	**$ 1,545,295**
	A10 - Foundations	$ 1,498,735	$ 1,498,735	$ 1,545,295
	A20 - Basement Constr.	$ -	$ -	$ -
B.	Shell	**$ 12,849,079**	**$ 12,849,079**	**$ 12,870,467**
	B10 - Superstructure	$ 10,084,546	$ 10,084,546	$ 10,105,934
	B20 - Exterior Enclosure	$ 2,693,593	$ 2,693,593	$ 2,693,593
	B30 - Roofing	$ 70,940	$ 70,940	$ 70,940
C.	Interiors	**$ 8,145,259**	**$ 7,354,169**	**$ 7,354,169**
	C10 – Interior Constr.	$ 2,300,013	$ 2,300,013	$ 2,300,013
	C20 - Stairs	$ 64,001	$ 64,001	$ 64,001
	C30 - Interior Finishes	$ 4,990,156	$ 4,990,156	$ 4,990,156
D.	Services	**$14,374,895**	**$ 18,816,017**	**$ 20,638,327**
	D10 - Conveying	$ 1,456,072	$ 1,456,072	$ 1,456,072
	D20 - Plumbing	$ 5,983,803	$ 7,440,747	$ 7,440,747
	D30 - HVAC	$ 2,332,483	$ 3,642,044	$ 3,641,044
	D40 - Fire Protection	$ 181,170	$ 236,170	$ 236,170
	D50 - Electrical	$ 4,421,366	$ 6,040,985	$ 7,864,295
E.	Equipment & Furnishings	**$ -**	**$ -**	**$ -**
F.	Special Construction	**$ -**	**$ -**	**$ -**
G.	Building Sitework	**$ -**	**$ -**	**$ -**
	Total Cost	**$36,867,967**	**$ 40,293,514**	**$ 41,980,629**

1-STORY RESIDENCE COST COMPARISON



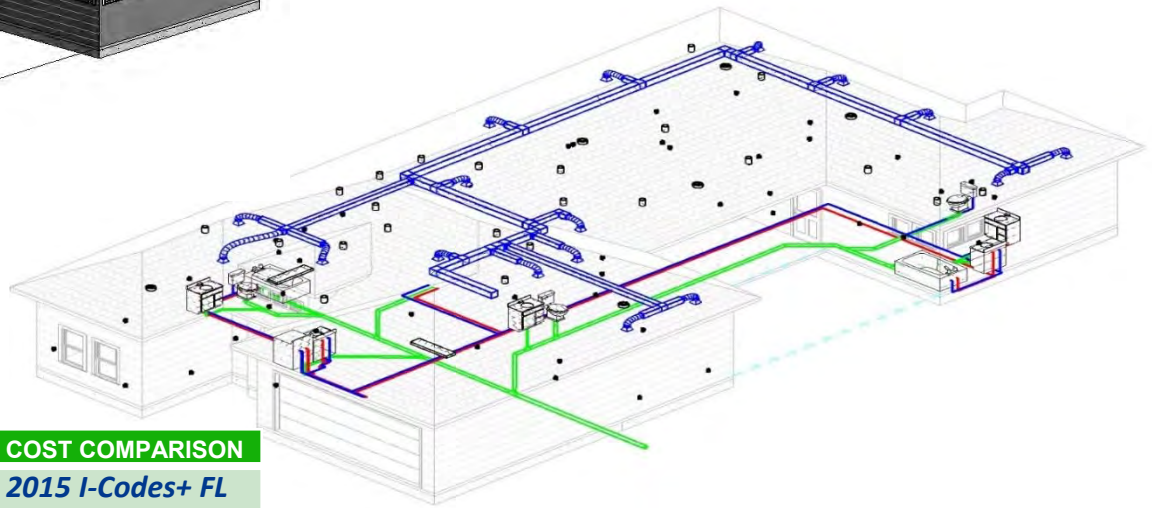
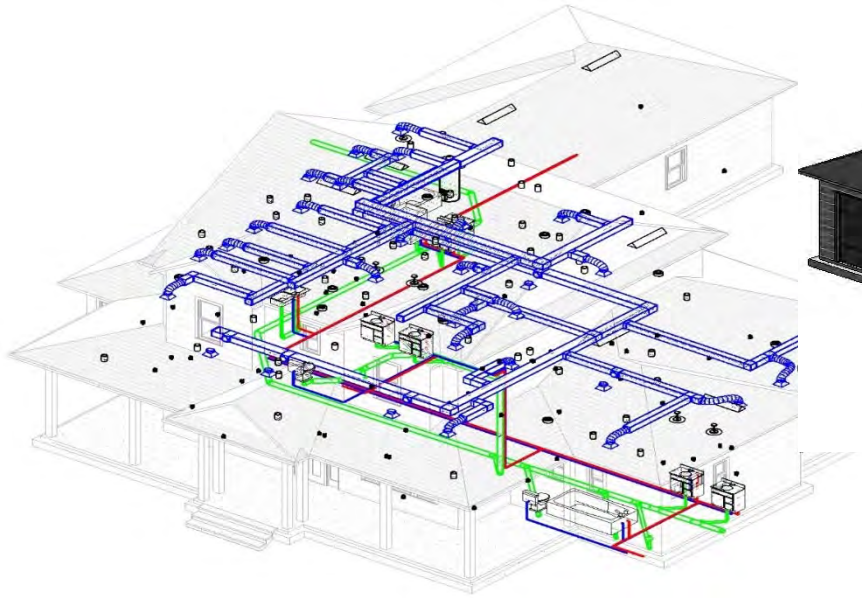


Table F-1. 1-STORY RESIDENCE (2242 SF LIVING; 385 SF GARAGE) COST COMPARISON

	2012 I-Codes	2015 I-Codes	2015 I-Codes+ FL Specific Changes
Site Work	$ -	$ -	$ -
Foundations	$ 15,719	$ 15,719	$ 17,312
Framing	$ 41,260	$ 41,260	$ 41,260
Exterior Walls	$ 40,084	$ 40,084	$ 40,084
Roofing	$ 18,782	$ 18,782	$ 18,782
Interiors	$ 32,642	$ 32,642	$ 32,642
Specialties	$ -	$ -	$ -
Mechanical	$ 56,482	$ 76,595	$ 75.595
Electrical	$ 12,837	$ 13,890	$ 12,695
Total Cost	**$ 217,807**	**$ 238,972**	**$ 238,370**

2-STORY RESIDENCE COST COMPARISON



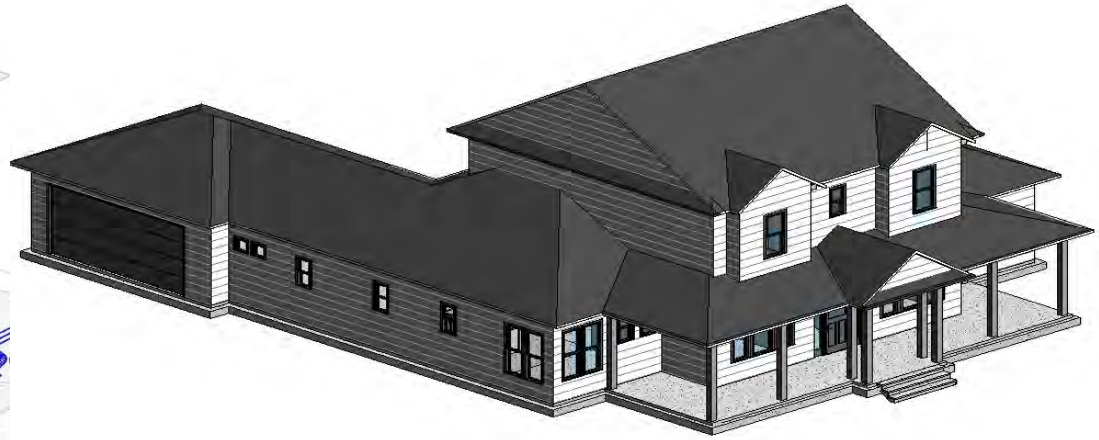


Table G-1. 2-STORY RESIDENCE (4459 SF LIVING; 521 SF GARAGE) COST SUMMARY				
		2012 I-Codes	*2015 I-Codes*	*2015 I-Codes+ FL Specific Changes*
1	Site Work	$ -	$ -	$ -
2	Foundations	$ 28,776	$ 28,776	$ 31,071
3	Framing	$ 40,309	$ 40,309	$ 40,309
4	Exterior Walls	$ 58,812	$ 58,812	$ 58,812
5	Roofing	$ 27,578	$ 27,578	$ 27,578
6	Interiors	$ 67,536	$ 67,536	$ 67,536
7	Specialties	$ 1,431	$ 3,291	$ 3,291
8	Mechanical	$ 68,704	$ 98,789	$ 97,789
9	Electrical	$ 23,475	$ 23,475	$ 21,732
	Total Cost	**$ 316,621**	**$ 348,566**	**$ 348,118**

FUTURE WORK

- Future research should focus on the **use of the developed models and estimates to evaluate future code changes**.
- Conduct **workshops** to introduce and encourage designers, builders and other code change petitioners **to use the models** to prospectively evaluate the cost impact of their proposed code changes.
- Model **other type of buildings** to develop an even more diverse set of code change cost impact benchmark building models.

QUESTIONS ?