Granby Tower 515 Granby Street Norfolk Virginia



Justin Pennycoff Construction Management Technical Assignment #1 Faculty Advisor: Dr. Riley October 5, 2007

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## **Executive Summary**

This technical report gives an overview of the construction management process for the Granby Tower project in Norfolk, Virginia. The total time for construction is approximately 863 days in duration. In this report the following can be found: a summary schedule, a summary of the main building systems throughout the building, a cost evaluation, a site plan show the existing conditions, local conditions such as typical construction methods used in the area, information about the owner, the project delivery method, and a staffing plan employed by the General Contractor/Construction Manager.

When complete this building will be the tallest in Norfolk at 450 ft. tall (31 stories). Not only will it be the tallest building in Norfolk but it will be the second tallest building in the state of Virginia. With the project being in downtown Norfolk site congestion can be a big issue. Not only is it congest near the site, it is congested on the site where the building will take up the majority of site leaving a very limited amount of space for lay down areas and shakeout areas.

### Project Schedule Summary

(Please refer to schedule on the following page.)

#### Foundation

The foundation for Granby Tower consists of deep mat foundations with pre-stressed concrete piles. There are 1233 piles in all throughout the foundation of the building. Approximately one month after the start of driving the piles the mat foundation begins. The slab-on-grade for the parking garage and retail structure is started first.

#### Structural

The structural system is mainly cast in place concrete with post-tensioned slabs. This make up the structure for the majority of the building. However there is some wood framed construction in the retail areas and the town homes. The structural sequence starts with the parking garage and the retail areas is started first. As this is completed the remaining floors are constructed.

#### Finishes

Once the MEP trades are finished on a certain level finishing can begin. Once again the finishes start in the lower level and move upwards as construction is being completed. This process can take a very long time since a lot of coordination is required and there are many inspections that take place to make sure everything is done correctly before the units are complete. The private living units are the first to be completed then the public spaces are completed.

1 1 2 1 3 1	Task Name	Duration			January	May	Sep	tem .	January	May	Septern	January	May	Septem	Januar
	Obtain foundation permit	21 days	Mon 10/23/06				IT								
3	Obtain building permit	1	Mon 12/11/06	•											
	Site preparation	324 days	Mon 10/2/06												
4 11	Notice to proceed	0 days	Mon 7/2/07				2								
5 🔳	Construct concrete foundations	407 days	Mon 9/17/07												
5 🎹	Foundation for parking garage and retail structure	e 43 days	Mon 12/3/07												
7 🎫	Construct tower levels 1-11	280 days	Wed 3/5/08												
3 🔳	Construct levels 12-21	250 days	Mon 7/14/08				i i	- i						i	i
9 🛅	Construct levels 22-31	260 days	Frl 10/17/08												
0 1	Systems test/startup first occupancy	20 days	Mon 6/15/09												
1 💷	Occupancy floors 1-11	0 days	Frl 7/10/09										• 7	/10	
2 1	Occupancy floors 12-21	0 days	Wed 9/9/09											🔶 9/9	
3 🎫	Systems test/startup second occupancy	0 days	Thu 9/10/09											le 9/10	
4 11	Erect level 32	57 days	Mon 1/19/09												
5 🎫	MEP level 32	105 days	Wed 4/8/09									1			
5 📅	Erect level 33	50 days	Wed 1/28/09												
7	Sitework/landscaping	80 days	Mon 3/23/09												
в 🎫	MEP level 33	110 days	Wed 4/8/09											•	
9 🖬	Erect spire	40 days?	Wed 4/22/09									1		1	
) 🎫	Occupancy floors 22-31	0 days	Thu 11/12/09											↓ ↓ 1	
1 💷	Systems test/startup final occupancy	0 days	Thu 11/12/09												
2 🏗	Substantial completeion	0 days	Thu 11/12/09											↓ ⊕ 1	1/12
roject: Projec late: Thu 10/4	ct Schedule Summary Task 4/07 Progress		Milestone Summary Project Summ	ary S			,			s 🚍 itone 🗇					

Figure 1- Project Schedule

## **Building Systems Summary**

Yes	No	Work Scope	If yes, address these questions / issues
X		Demolition Required?	Types of materials, lead paint, or asbestos?
X		Structural Steel Frame	Type of bracing, composite slab?, crane size / type / location(s)
X		Cast in Place Concrete	Horiz. And Vert. Formwork types, concrete placement methods
<u>L</u>	X	Precast Concrete	Casting location, connection methods, crane size / type / location (s)
$\checkmark$		Mechanical System	Mech. room locations, system type, types of distribution systems, types of fire suppression
×		Electrical System	Size/ capacity, redundancy
X		Masonry	Load bearing or veneer, connection details, scaffolding
K		Curtain wall	Materials included, construction methods, design responsibility
X		Support of Excavation	Type of excavation support system, dewatering system, permanent vs. temporary

<u>Demolition</u>: Some demolition was required before construction could begin. There were two one to two story buildings located within the construction limits. The property also consisted of a paved parking area.

<u>Structural Steel Frame</u>: Consists of structural tubing, w-shapes, other rolled plates/shapes, connection bolts, and anchor rods. Connections consist of shear connections and fillet welds.

<u>Cast in Place Concrete</u>: Vertical formwork was used for this part of the project. Concrete was placed via direct pour for the bottom floors and via chute for the upper floors.

<u>Mechanical System</u>: The mechanical rooms are located on the top two floors of the building. The main mechanical system is a four pipe system. Some fans and air-conditioning units are located on the roof.

<u>Electrical System</u>: Riser system has sub panels every three floors. Units run on 120A208V circuits while the equipment runs on 277A/480V circuits. Has a 500KW diesel emergency generator.

<u>Masonry</u>: Hollow load-bearing masonry units shall conform to ASTM C 90 and be made ith lightweight aggregate.

<u>Curtain Wall</u>: The façade is comprised of a curtain wall system with metal panels. The curtain wall will be hand set for most of the skin and the part that is to be constructed as the store front will be constructed in place. The façade will also contain operable aluminum framed windows.

<u>Support of Excavation</u>: Dewatering could arise as an issue as construction progresses. The groundwater on site can fluctuate, causing the issue of not knowing whether or not dewatering is completely necessary.

## **Project Cost Evaluation**

Actual Building Construction Cost

- \$110,030,520
- At 717,233 sq.ft \$153.41/sq.ft

Total Project Cost

- \$180,000,000
- At 717,233 sq.ft \$250.96/sq.ft

Major Building Systems Costs

- Mechanical/Plumbing Systems
  - o \$17,631,324
  - o \$24.58/sq.ft
- Electrical System
  - o \$7,969,594
  - o \$11.11/sq.ft
- Structural System
  - o \$30,542,142
  - o \$42.58/sq.ft

D4 Parametric Cost Analysis (refer to Appendix A)

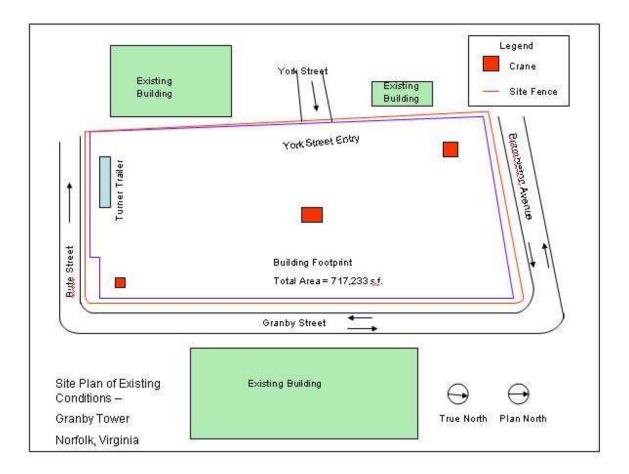
- \$118.43/sq.ft
- \$84,941,052 total cost

2007 RS Means Square Foot Estimate (refer to Appendix B)

- Used a M.030 apartment, 8-24 story
- \$141.65/sq.ft
- Location factor for Norfolk, Virginia: 0.88
- \$124.65/sq.ft with change for location
- \$89,404,528 total cost

The main reason why there is such a big difference between the actual costs and the ones determined by RS Means and D4 is because neither one has an estimate for a mixed use building such as Granby Tower. I compared it with an apartment building using RS Means and a condominium us D4, because the majority of the building is comprised of townhouses and condominiums. Also they don't consider as much of the details that would be taken into consideration when comprising an estimate.

## Site Plan



## Local Conditions

#### Regional Construction:

In the Norfolk, Virginia area deep foundations are a preferred method of construction. This is true because of the soil conditions in the area. Norfolk is very close to the Chesapeake Bay and the soil allows for settling.

#### Soil/Subsurface Water Conditions:

There are four different layers of soil on site. The first layer consists of clay with varying amounts of silt and sand. The second layer consists of sand with varying amounts of silt and clay. The third layer consists of clay with varying amounts of silt, sand, and marine shell fragments. The fourth and final layer consists of sand with varying amounts of silt, clay and marine shell fragments. There are also paving and fill material near the soil surface above the previous four layers of soil. However these materials vary throughout the site and are inconsistent. They include asphalt paving, concrete paving; the types of fill include a very loose to medium dense sand and soft clay with varying amounts of silt, clay, construction debris, and organics. As mentioned above these materials change throughout the site, however the four layers of soil are consistent throughout the site. The groundwater table is six to seven feet below grade.

#### Recycling/Tipping Fees:

Recycling fees in the Norfolk area are about \$11.20 for a 95 gallon container. The tipping fees for waste materials differ depending on what the material is. Yard waste taken to the Norfolk Transfer Station is \$39/ton. Solid waste is only accepted at the regional landfill. Construction and demolition waste is \$7.25/cy.

#### Parking:

Parking can be an issue since the construction is taking place in downtown Norfolk; however there are several parking garages in the area. Also there is meter parking along the street.

## **Client Information**

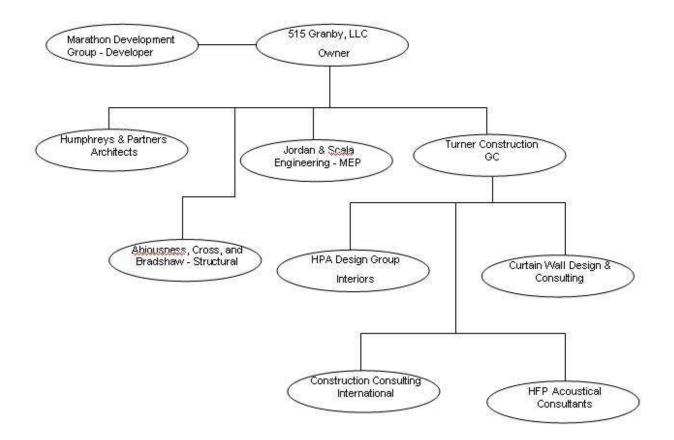
The owner of this project is 515 Granby, LLC. While they are the owner Marathon Development Group Inc. is the developer. Marathon has been involved in restoring historic landmarks in the area. Not only do they restore historic landmarks their goal is to provide a unique living experience for homeowners. They are building this building to give people a chance to live in a historic neighborhood in the largest building in Norfolk and the second largest in the state of Virginia.

Cost and schedule are a concern for the owner as they are on most any project. The owner wants the project to be done on time and on budget. Maintaining schedule is very critical for this project since approximately half of the 311 condominiums units have already been sold, so it is very critical that this project is completed on time. If the building is not finished on time the people who have already bought condominiums will most likely back and the owner will loose a good amount of money. The same can be said about staying within budget. If the project comes in over budget and the owner has to pay for it, most likely they will have to raise the price of the condominiums to make their money back. This could irritate buyers and will either keep people from buying or will force others to back out.

The keys to completing this project to the owner's satisfaction would be for it to be done on time and under budget. The owner will also expect quality work, these condominiums and town homes aren't exactly cheap. People are paying for a quality product and expect to get one in return.

## Project Delivery Method

Turner Construction was hired for this project under a Guaranteed Maximum Price (GMP).

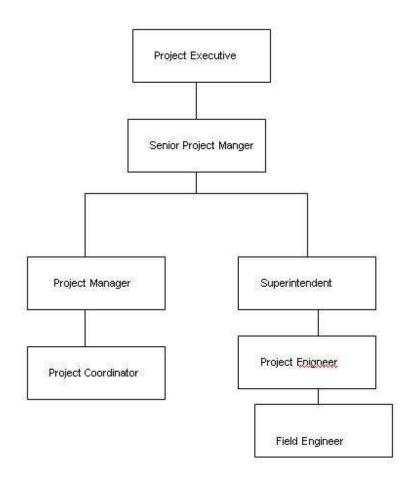


Contract types

- Contracts with owner
  - Humphreys and Partners Architect (Architect)
    - Lump sum
  - o Abiousness, Cross, and Bradshaw (Structural Engineer)
    - Lump sum
  - o Jordan and Scala Engineering (MEP Engineer)
    - Lump sum
  - Turner Construction (General Contractor/CM)
    - Guaranteed maximum price (GMP)
- Contracts with GC
  - HPA Design Group (Interior Subcontractor)
    - Lump sum
  - o Curtain Wall Design and Consulting (Curtain wall Subcontractor)
    - Lump sum
  - Construction Consulting International (Waterproofing Subcontractor)
     Lump sum
  - o HFP Acoustical Consultants (Acoustics Subcontractor)
    - Lump sum

## Staffing Plan

The following is the (assumed) staffing plan for the Granby Tower project for Turner Construction. Staff was determined based on class experience and work experience. Will update and make correction when information is received.



# Appendix A (D4 Cost Estimate)

⁼riday, October 5, 2007

## Estimate of Probable Cost

Pag

New York Concerning	d - Se	p 2007 - VA - N	orfolk		
	Prepared By:		Prepared For:		
	Fax: Building Sq. Size: 717233 Bid Date: 11/1/2003 No. of fuildings: 4 No. of buildings: 1 Project Height: 50.8 1st Floor Height: 11.8 1st Floor Size: 15000		Site Sq. Size: Building use: Foundation: Exterior Walls: Interior Walls: Roof Type: Floor Type: Project Type:	, Fax: 435600 Residential PIL PRE MAS BUP CON NEW	
Division		Percent		Sq. Cost	Amount
00	Bidding Requirements Permits	<b>0.31</b> 0.31		<b>0.37</b> 0.37	<b>263,893</b> 263,893
01	General Requirements Builder's Risk Insurance Building Permit Fees Change Orders Contractor's Fee Equipment Tools Field Labor, Safety, Clean-up Field Supervision General Conditions General Requirements Insurance (General Condition Items) MEP Consulting Fees MOT, Traffic Control Temporary Utilities Trash Removal/Hoisting	14.29 0.12 0.43 3.18 3.41 0.14 1.29 1.15 1.14 1.56 0.42 0.63 0.20 0.39 0.23		<b>16.83</b> 0.14 0.51 3.75 4.01 0.16 1.52 1.35 1.34 1.84 0.49 0.74 0.24 0.45 0.27	<b>12,070,788</b> 102,625 366,518 2,686,167 2,877,167 118,019 1,092,224 967,608 963,200 1,319,465 354,788 532,624 168,598 326,204
03	Concrete 2nd FI Post Tension-1st FI Columns 3rd FI Post Tension-2nd FI Columns 4th FI Post Tension-3rd FI Columns Architectural Precast North Elevati	<b>36.01</b> 4.25 4.25 4.25		<b>42.41</b> 5.01 5.01 5.01	<b>30,417,09</b> 3,591,87 3,591,87 3,591,87
	on Architectural Precast South Elevati on Architectural Precast West Elevatio n Elevator Shaft Pile Caps/Foundations Retaining Wall Roof Post Tension-4th FI Columns Slab-On-Grade Stair Enclosures/Shear Wall	2.60 2.60 6.77 0.69 3.47 0.31 4.25 1.24 1.30		3.07 3.07 7.97 0.82 4.09 0.37 5.01 1.46 1.53	2,199,108 2,199,108 5,719,14 586,428 2,932,144 263,893 3,591,87 1,050,206 1,099,554
04	Masonry Masonry	<b>1.04</b> 1.04		<b>1.23</b> 1.23	<b>879,64</b> : 879,64:
05	Metals Exterior Handrails Metal Stairs (2) Misc. Metals Roof HVAC Screen Wall	<b>3.38</b> 1.52 1.13 0.03 0.69		<b>3.98</b> 1.79 1.33 0.04 0.82	<b>2,855,17</b> 6 1,286,478 952,947 29,32 586,429
06	Wood & Plastics Closets Millwork/Countertops Rough Carpentry-Blocking Wood Trim/Base	<b>3.54</b> 0.22 2.60 0.46 0.26		<b>4.17</b> 0.26 3.07 0.54 0.30	<b>2,992,25</b> 185,458 2,199,108 389,979 217,712
07	Thermal & Moisture Protection Balcony Coatings	<b>2.32</b> 0.29		<b>2.73</b> 0.34	<b>1,957,71</b> 244,10

Friday, October	5, 2007			1	Page 2
	Dampproofing/Caulking Modified Bituminous Roof System	0.49 1.54	0.58 1.81	416,218 1,297,401	
08	Doors & Windows Aluminum Windows & Doors Doors, Frames & Hardware Mirrors	<b>4.72</b> 2.67 1.63 0.12	<b>5.56</b> 3.15 1.92 0.14	<b>3,991,088</b> 2,256,725 1,375,176 102,625	
	Shower Doors	0.30	0.36	256,563	
09	Finishes Carpet/VCT Drywall Floor Topping Metal Studs/Drywall/Plaster Painting Special Coating - Stain Stone Flooring Tile Wood Floor	<b>15.89</b> 1.08 4.06 0.38 4.76 2.60 0.12 0.14 0.78 1.95	<b>18.71</b> 1.27 4.78 0.45 5.61 3.07 0.15 0.17 0.92 2.30	<b>13,420,117</b> 908,965 3,430,609 322,536 4,024,368 2,199,108 105,191 120,277 659,732 1,649,331	
10	Specialties Entrance Canopy Fire Extinguishers Lockers Mailboxes Signage Toilet Accessories	0.57 0.09 0.02 0.03 0.07 0.09 0.27	0.67 0.10 0.02 0.04 0.08 0.10 0.32	<b>477,940</b> 73,304 15,394 26,389 58,643 73,304 230,906	
11	Equipment Appliances	<b>1.28</b> 1.28	<b>1.50</b> 1.50	<b>1,079,029</b> 1,079,029	
12	Furnishings Garage Entrance Door Trash Chute	<b>0.33</b> 0.23 0.10	<b>0.39</b> 0.28 0.11	<b>278,480</b> 197,920 80,561	
14	Conveying Systems Elevator System	<b>0.95</b> 0.95	<b>1.12</b> 1.12	<b>806,706</b> 806,706	
15	Mechanical Fire Protection Fixtures HVAC/Ductwork/Piping Plumbing	<b>8.93</b> 1.29 0.43 3.73 3.48	<b>10.52</b> 1.51 0.51 4.39 4.10	<b>7,544,407</b> 1,086,359 366,518 3,152,055 2,939,475	
16	Electrical CATV/Audio/Music Distribution Panels Electrical Fire Alarm Panel Boards Rough-In/Wire/Conduit	6.44 0.17 0.26 3.75 0.17 0.26 1.82	<b>7.58</b> 0.20 0.31 4.42 0.20 0.31 2.15	<b>5,439,025</b> 146,607 219,911 3,167,449 146,607 219,911 1,538,540	
Total	Building Costs	100.00	117.78	84,473,362	
02	Site Work Asphalt Pavement/Striping Auger Cast Piling Building Demolition Chain Link Fence Concrete Sidewalks/Curbs Dewatering System Earthwork Gravity Wall Landscape Irrigation Utilities	<b>100.00</b> 7.87 38.20 4.89 0.79 3.67 5.77 6.82 1.84 6.56 23.60	1.07 0.08 0.41 0.05 0.01 0.04 0.06 0.07 0.02 0.07 0.25	<b>467,689</b> 36,793 178,649 22,873 3,709 17,170 26,982 31,887 8,585 30,661 110,380	
Total	Non-Building Costs	100.00	1.07	467,689	
Total	Project Costs			84,941,052	

# Appendix B (RS Means Cost Data)



osts per square fo	ot of floor are		110000	129000	145000	170000	200000	275000	400000	600000
	S.F. Area	95000	112000			480	510	530	570	630
Exterior Wall	LF. Perimeter	345	171.85	406	442					141.65
		175.45		167.65	165.75	162.55	158.95	151.90	145.95	
ibbed Precast	Steel Frame		159.50	155.60	153.75	150.65	147.30	140.60	135.05	131.00
Concrete Panel	R/Conc. Frame	163.05				145.10	142.05	136.25	131.30	127.75
	Steel Frame	156.40	153.15	149.60	147.85			137.95	133.10	129.55
Face Brick with	R/Conc. Frame	158.00	154.70	151.15	149.50	146.70	143.70			
Concrete Block Back-up		147.35	144,50	141.70	140.25	138.00	135.65	131.35	127.75	125.10
Stucco on	Steel Frame	147.33	And South States		141,85	139.65	137.35	133.10	129.50	126.90
Concrete Block	R/Conc. Frame	148.90	146.05	143.30	141,05	107.00	101111			
			7 70	6.75	5.95	5.05	4.35	3.05	2.15	1.40
Perimeter Adj., Add or Deduct	Per 100 L.F.	9.20	7.70			2.25	2.05	1.50	1.15	.80
	Per 1 Ft.	3.05	2.75	2.65	2.45	2.23	2.00	1.00		
Story Hgt. Adį., Add or Deduct	101111	r Basement, ada	\$ 29 70 per	square foot o	f basement a	rea				

The above costs were calculated using the basic specifications shown on the facing page. These costs should be adjusted where necessary for design alternatives and owner's requirements. Reported completed project costs, for this type of structure, range from \$74.05 to \$173.85 per S.F.

#### **Common additives**

	1.000	Description	Unit	\$ Cost
Unit	S Cost	Closed Circuit Surveillance, One station	Each Each	1675 910
Each Each Each Each	370 - 1875 1825 - 1975 600 - 2050 1650 - 2250	Elevators, Electric passenger, 10 stops 3000# capacity 4000# capacity 5000# capacity Additional stop, add	Each Each Each Each	270,500 273,000 278,000 7675
Each Each Each Each	225 - 720 225 - 720 1450 - 4000 4300	Emergency Lighting, 25 watt, battery operated Lead battery Nickel cadmium	Each Each	265 770 820
Each Each Each	5125 575 - 725 560 - 870 580 - 1125	Dryer, gas, 16 lb. capacity 30 lb. capacity Washer, 4 cycle Commerciai	Each Each Each Each	3525 995 1400
Each Each Each Each	161 - 281 242 - 980 465 - 1225 520 - 670	Smoke Detectors Ceiling type Duct type	Each Each	171 440
	Each Each Each Each Each Each Each Each	Each         370 - 1875           Each         1825 - 1975           Each         600 - 2050           Each         1650 - 2250           Each         325 - 820           Each         225 - 720           Each         4300           Each         5125           Each         5125           Each         5125           Each         560 - 870           Each         560 - 870           Each         560 - 870           Each         560 - 125           Each         242 - 80           Each         242 - 80           Each         250 - 670	Closed Circuit Surveillance, One station         Camera and monitor         Each       370 - 1875         For additional camera stations, add         Each       1825 - 1975         Bach       1650 - 2050         4000# capacity         Each       360 - 2050         4000# capacity         Each       325 - 820         Additional stop, add         Each       225 - 720         Emergency Lighting, 25 watt, battery operated         Each       3125         Each       3125         Each       5125         Chryer, gas, 16 lb. capacity         Each       560 - 870         Chryer, gas, 16 lb. capacity         Each       560 - 870         Cach       580 - 1125         Each       580 - 1125         Each       242 - 980         Each       242 - 980         Each       242 - 980         Each       56 - 1225         Duct type       Each         Each       320 - 670	Unit     S Cost     Description       Closed Circuit Surveillance, One station     Each       Each     370 - 1875     For additional camera stations, add       Each     1825 - 1975     Elevators, Electric passenger, 10 stops       Each     600 - 2050     4000# capacity       Each     1650 - 2250     5000# capacity       Each     325 - 820     Additional stop, add       Each     1450 - 4000     Ice apacity       Each     14300     Nickei cadmium       Each     5125     Orver, gas, 16 lb, capacity     Each       Each     5125     Orver, gas, 16 lb, capacity     Each       Each     580 - 1125     Commercial     Each       Each     580 - 1125     Commercial     Each       Each     242 - 980     Calling type     Each       Each     242 - 980     Calling type     Each       Each     250 - 670     Calling type     Each       Each     5225     Duct type     Each

Important: See the Reference Section for Location Facto

# Justin Pennycoff Construction Management

STATE/ZIP         CITY         Residential         Commercial         STATE/ZIP           PRCINIA 200221         Fairta:         1.02         93         CANADIAN FACTORS (reflect Canadian currency)           Algorithm         1.04         93         Algorithm         1.14         1.11           200221         Arington         1.06         94         Algorithm         1.14         1.11           2022         Alexandria         1.06         94         Base         Fort McMuray         1.09         1.07           2022         Fredericksburg         .95         .88         Breading         1.00         1.07           20225         Fredericksburg         .95         .88         Breading         1.00         1.07           2026         Winchester         .90         .86         Breading         1.00         1.07           20232         Richmond         1.01         .80         Red Deer         1.10         1.06           203232         Rotrobact         .92         .86         .87         1.08         1.09           236         Portsmouth         .92         .86         .87         1.08         1.09           237         Portsmouth         .92	ocation	Factors			CTATE /7ID	CITY	Residentia	Commercia
NUME         Arright of the second secon	STATE/ZIP	CITY	Residentia!	Commercial			rrency)	
Construction         Calibration         Calibration <thcalibration< th=""> <thcalibration< th=""></thcalibration<></thcalibration<>	VIRGINIA	T-14	1.02	.93		s (roneer -		
Apple         Perturbultin         Apple         Base of the second sec		Arlington	1.04	.93	ALBERTA			1.12
Apple         Perturbultin         Apple         Base of the second sec	223		.95	.89			1.09	
Appendix         Particuluit         Appendix	224-22-	Winchester		.89			1.09	1.07
Appendix         Particuluit         Appendix	227	Harrisonburg	.90	.86		Medicine Hat	1.10	
Appendix         Particuluit         Appendix	229		1.01					
And Perturbation         Add Set         Both         Perturbation         Final Set         Perturbation         Final Set         Perturbation         Final Set	233-235	Nortolk Newport News	1.01	.88	BRITISH COLUMBIA	I Kamloops		1.09
Hatsi         #4         Bat         Instruction         Box Corr         Box Co	236 237	Portsmouth	.92	.89			1.09	1.10
Hatsi         #4         Bat         Instruction         Box Corr         Box Co	238	Farmville	.91	.82			1.03	1.04
Place         Place         Add	240-241		.86	.82	MANITOBA		1.06	1.01
243         Guindor m         85         31         New BRUNSWICK           Washington         Section         1.05         1.02         1.04         97         96         97         96           Section         1.00         1.01         1.02         1.02         1.03         1.02         1.03         1.02         1.04         1.02         1.04         1.05         1.02         1.04         1.05         1.02         1.06         1.05         1.02         1.06         1.05         1.02         1.06         1.05         1.00         1.05         1.00	243	Pulaski	.84 .93	.85		Brandon Portage la Prairie	1.06	1.01
22e         Dues         102         104         105         96           WASINGTON 60:081,957         Seattlet         1.00         1.03         1.03         1.03         1.03         1.03         1.03         1.05         99         96           60:081,957         Seattlet         1.01         1.03         1.03         1.03         1.05         99         96           985         Wenctover         98         1.01         1.03         1.03         1.00	245	Lynchburg					1.05	1.00
WASHINGTON BIOLIDE         South Information Biologic Biologi	246	Grundy	.0%		NEW BRUNSWICK	Dothurst	.97	
Bits         Event         1.05         1.03         1.03           983.964         Opmoser         1.01         1.01         1.02           983.964         Opmoser         93         95         Sart.John         1.05         1.00           983.964         Yeaknes         93         95         Sart.John         1.05         1.00           983.964         Stockare         93         95         Sart.John         1.05         1.00           983.964         Stockare         93         95         Sart.John         1.05         1.00           993.97         95         Sart.John         1.05         1.00         1.00         1.00           994.925         Carston         97         95         Sart.John         1.00         1.00           255.257         Humington         1.00         1.00         1.00         1.00         1.00           255.257         Humington         92         95         93 <td>WASHINGTON 980-981-987</td> <td>Seattle</td> <td></td> <td></td> <td></td> <td>Dalhousie</td> <td>.97</td> <td>.99</td>	WASHINGTON 980-981-987	Seattle				Dalhousie	.97	.99
Bigstorm         Opymain         1.01         1.02         New Safe         92         1.00           Self         Wancuver         93         1.96         1.00         1.00         1.00           Self         Wancuver         93         1.96         1.00         1.00         1.00           Self         Self         Self         1.01         1.00         1.00         1.00           Self         Self         Self         Self         Self         Self         1.00         1.00           Self         Self         Self         Self         Self         Self         1.00         1.00           Self	982		1.01	1.03			.98	
Bits         Wendthing         Bits         NEWFOUNDLAND         Corner Brook         99         99           993         Garston         37         395         NeWFOUNDLAND         Corner Brook         99         99           893         Carston         37         395         NorthWest TERRTORES         1.01         1.00           893         Carston         39         395         NorthWest TERRTORES         1.00         1.03           893         Carston         39         395         NOVA SCOTIA         Darmauth         1.00         1.03           824         Lewetbarg         39         95         96         90         99         99           254         Partmauth         1.00         1.03         1.00         1.00         1.03           254         Partmauth         1.00         1.00         1.00         1.00         1.00           255         Dartharron         92         96         93         96         96         96           265         Carston         1.00         1.00         1.00         1.00         1.00           265         Carston         92         95         93         96         92 <t< td=""><td>985</td><td>Olympia</td><td>.98</td><td>1.02</td><td></td><td></td><td></td><td></td></t<>	985	Olympia	.98	1.02				
399 993 993 993 994         Spokene         397 995         395 995         Attraction         Corner Brook 100         Corner Brook 100         100           WEST VIRGINIA 227,246         Bendfall         38         395         NORTHWEST TERRITORES 100         1.00         1.00           VEST VIRGINIA 227,246         Bendfall         38         395         NORTHWEST TERRITORES 100         1.00         1.00           227,246         Contrestion         397         355         NORTHWEST TERRITORES 100         1.00         1.00           255,257         Humington         1.01         .99 <td></td> <td>Wenatchee</td> <td>.93</td> <td>.98</td> <td></td> <td></td> <td></td> <td></td>		Wenatchee	.93	.98				
North-WEST VIRGINIA 274,248         Buchesite Biology         Biology         Biology         I.10         1.08           WEST VIRGINIA 252,523         Lewsburg         35         95         95         1.00         1.00         1.01           252,525         Charleston         36         90         93         1.00         1.00         1.01           255,257         Backhey         90         93         1.00         1.00         1.00           255,257         Backhey         90         93         1.00         1.00         1.00           265         Buckhannon         .52         96         0         93         1.00         1.00           265         Buckhannon         .52         96         0         1.00         1.00         1.00           265         Cassaway         38         93         96         1.00         1.11         1.11         1.12         1.11         1.12         1.11         1.12         1.11         1.12         1.12         1.12         1.12         1.12         1.12         1.11         1.12         1.11         1.11         1.11         1.11         1.11         1.11         1.11         1.11         1.11         1.12 <td>989</td> <td>Spokane</td> <td>.99</td> <td>.95</td> <td>NEWFOUNDLAND</td> <td>Corner Brook</td> <td></td> <td></td>	989	Spokane	.99	.95	NEWFOUNDLAND	Corner Brook		
VEST VIRGINIA 247248         Budefield         98         92           243         Lewisburg         97         35         1.0         1.08           20223         Contractive Humington         1.01         399         1.00         1.01           253.62         Backmannon         352         96         1.00         1.03           261         Partersburg         32         96         1.00         1.03           262         Backmannon         322         96         1.00         1.00           263         Backmannon         322         96         1.00         1.00           265         Morganown         502         96         1.00         1.00           265         Morganown         502         96         1.00         1.00           266         Morganown         502         96         1.00         1.00           266         Morganown         502         96         1.01         1.02         1.01           267         Roome         1.02         1.00         1.02         1.00         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01 </td <td>993</td> <td></td> <td>.97</td> <td></td> <td></td> <td></td> <td>1.04</td> <td></td>	993		.97				1.04	
27.248         Buehelic         102         103           225         Charleston         97         95           250, 253         Charleston         101         99           252, 257         Hontisburg         101         99           256, 257         Hontisburg         101         99           256, 257         Hontisburg         92         366           256, 257         Buckhanon         92         366           256, 257         Buckhanon         92         366           256, 257         Buckhanon         92         366           265         Gassaway         92         366           265         Gassaway         93         93           266         Gassaway         93         93           267         Bronney         98         93           267         Romsona         1.07         1.02           268         Petersburg         90         94           Wisconsin         1.04         1.00         Conwal         1.19         1.11           101         Parane         1.02         1.00         Dawa         1.10           102         Loncon         1.02				80	NORTHWEST TER	RITORIES   Yellowknife	1.10	1.08
253/256         Beckley         93/2         95/2         96/2	247-248		.88 .89	.92	NOVA SCOTIA		1.00	1.01
252.259         Beckley         933         67           260         Wreeling         932         96           261         Parkersburg         932         96           262         Buckhamon         933         96           263         Derksburg         933         96           265         Gassaway         92         95           266         Gassaway         92         95           267         Rommey         98         93           267         Rommey         98         93           250.522         Miwaukee         107         1.02           250.532         Kenosha         102         1.00           253         Balott         1.00         98           533         Balott         1.00         99           534         Bacter         99         97           533         Lancaster         99         97           544         Minesula         95         94           545         Jaccaster         99         94           5445         Lancaster         99         94           5447         Eau Care         98         97      <	250-253	Charleston	.97	.90			1.02	1.03
208         Petersburg         .90         .94         Kingston         1.12         1.06           WISCONSIN         533.532         Miwaukee         1.07         1.02         1.00         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         0         1.02         1.00         0         9.8         1.02         1.00         0         9.8         1.02         1.00         0 <td>255-257</td> <td>Huntington</td> <td>1.01</td> <td>.93</td> <td></td> <td>New Glasgow</td> <td>.99</td> <td>.99</td>	255-257	Huntington	1.01	.93		New Glasgow	.99	.99
208         Petersburg         .90         .94         Kingston         1.12         1.06           WISCONSIN         533.532         Miwaukee         1.07         1.02         1.00         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         0         1.02         1.00         0         9.8         1.02         1.00         0         9.8         1.02         1.00         0 <td></td> <td>Wheeling</td> <td>.93</td> <td>.97</td> <td></td> <td></td> <td>1.00</td> <td>1.00</td>		Wheeling	.93	.97			1.00	1.00
208         Petersburg         .90         .94         Kingston         1.12         1.06           WISCONSIN         533.532         Miwaukee         1.07         1.02         1.00         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         0         1.02         1.00         0         9.8         1.02         1.00         0         9.8         1.02         1.00         0 <td>261</td> <td></td> <td>.92</td> <td>.96</td> <td>ONTARIO</td> <td></td> <td>1.17</td> <td></td>	261		.92	.96	ONTARIO		1.17	
208         Petersburg         .90         .94         Kingston         1.12         1.06           WISCONSIN         100         1.00         1.00         1.00         1.01         1.01         1.01           533         Kenosna         1.02         1.00         98         1.11         1.11         1.11           534         Racme         1.00         98         0'shawa         1.15         1.10           535         Beloit         1.00         98         0'shawa         1.15         1.10           533         Lancaster         37         94         0'shawa         1.15         1.10           538         Lancaster         37         94         Samia         1.09         1.05           540         Nerkhmed         1.00         97         5'stime         1.09         1.05           544         Wausau         35         .94         .95         .94         .95         .94         .95         .94         .96         .114         1.06           544         Rhinelander         .95         .94         .95         .94         .96         .94         .96         .94         .96         .94         .96	263-264	Clarksburg	.92	.96			1.19	
208         Petersburg         .90         .94         Kingston         1.12         1.06           WISCONSIN         533.532         Miwaukee         1.07         1.02         1.00         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         1.01         0         1.02         1.00         0         9.8         1.02         1.00         0         9.8         1.02         1.00         0 <td>266</td> <td>Gassaway</td> <td>.92</td> <td>.93</td> <td></td> <td>Cornwall</td> <td>1.19</td> <td>1.14</td>	266	Gassaway	.92	.93		Cornwall	1.19	1.14
WISCONSIN         Miwaukee         1.07         1.02         London         1.12         1.10           530         Sample         1.04         1.00         1.00         0shawa         1.17         1.11           531         Racine         1.00         .98         0shawa         1.17         1.11           533         Beloit         1.99         .97         .94         0shawa         1.15         1.10           533         Lancaster         .97         .94         Same         1.09         1.05           533         Lancaster         .96         .95         .94         Same         1.19         1.13           540         New Richmond         1.00         .97         .94         Same         1.09         1.06           544         Wausu         .95         .96         .97         Tunder Bay         1.14         1.06           544         Rinelander         .95         .96         .97         .94         .96         .94         .96         .94         .96         .94         .96         .96         .94         .96         .94         .96         .96         .94         .96         .96         .96         .96	267		.90	.94		Kingston	1.11	1.06
530.532       Minwalkee       1.07       1.00         531       Kenosha       1.04       1.00         533       Beloit       1.00       98         533       Beloit       1.00       98         533       Beloit       1.00       98         533       Beloit       1.00       98         533       Beloit       1.00       99         533       Lancaster       96       95         539       Portage       96       95         539       Portage       96       95         540       New Richmond       1.00       96         544       Wausau       95       96         546       La Crosse       94       95         546       La Crosse       94       95         547       Eau Clare       98       97         548       Superior       .95       .96         549       Oshkosh       .95       .94         821       Yellowstone Nat. Pk.       .75       .82         822       Rawins       .76       .83       .83         822       Rawins       .75       .82       .84       .	WISCONSIN		1.07	1.02		London		1.10
534         Nachne         1.00         98         Outswould         1.15         1.10           535         Beloit         1.00         99         97         94         Peterborough         1.16         1.10           537         Madison         .99         .94         Samia         1.19         1.15         1.10           538         Portage         .96         .95         .95         Subbury         1.09         1.05           540         New Richmond         1.00         .97         .94         Subbury         1.09         1.05           544         Warsau         .95         .94         .94         .97         .14         1.06           545         Rhinelander         .95         .96         .96         .97         .114         1.06           546         La Crosse         .94         .97         .94         .96         .96         .96         .96           547         Eau Claire         .98         .98         .97         .94         .96         .94         .96           548         Superior         .99         .98         .98         .94         .96         .94         .96			1.04	1.00		Oshawa	1.17	
337         Madison         99         97         94         Peterborough         1.19         1.13           538         Lancaster         96         .95         Sarnia         Sarnia         1.09         1.05           539         Portage         .96         .95         Sarnia         Sarnia         1.09         1.06           541         Green Bay         1.01         .97         .94         Sarnia         Sarnia         1.09         1.06           544         Wausau         .95         .96         .94         Windsor         1.14         1.06           544         Wausau         .95         .96         .94         .95         .96         .94         Windsor         1.14         1.06           547         Eau Clare         .98         .97         .94         .95         .96         .94         .95         .96           547         Eau Clare         .98         .94         .95         .96         .94         .95         .96           549         Oshkosh         .95         .94         .96         .94         .96         .94         .96           821         Wreatind         .75         .82         <	534	Racine		.98		Ottawa Owen Sound	1.15	
338         Diricities         96         95         95         100	537	Madison	.99	.94		Peterborough	1.19	1.13
540       New Refinition       1.00       9.97       1.01 and 0.05       1.20       1.44         541-543       Green Bay       9.95       .96       1.14       1.06         544       Wausau       .95       .96       Windsor       1.14       1.06         546       La Crosse       .94       .95       .96       Windsor       1.14       1.06         547       Eau Clare       .98       .97       .98       .98       .94       .96       .94       .96         549       Oshkosh       .95       .94       .96       .94       .96       .94       .96         820       Cheyenne       .84       .86       .95       .94       .96       .94       .96         821       Yellowstone Nat. Pk.       .75       .82       .94       .96       .118       1.06         821       Weatland       .75       .82       .94       .117       1.16         822       Wheatland       .75       .82       .94       .117       1.06         823       Rawtins       .75       .83       .94       .96       .94       .96         825       Rverton       .74 <td< td=""><td></td><td>Portage</td><td>.96</td><td>.95</td><td></td><td>Sudbury</td><td></td><td>1.06</td></td<>		Portage	.96	.95		Sudbury		1.06
544     Wausau     393     .96     Windsor     .44       544     Rhinelander     .93     .96     Windsor     .44       546     La Crosse     .94     .97     .96     Orarlotterown     .95     .96       547     Eau Clare     .98     .97     .98     .97     .98     .94     .96       548     Superior     .99     .98     .94     .96     .94     .96       WYOMING     B20     Charlotterown     .95     .94     .96       820     Cheyenne     .84     .86     .06     .1.8     1.06       821     Yellowstone Nat. Pk.     .75     .82     .1.18     1.06       821     Westland     .75     .82     .1.16     1.06       823     Rawlins     .75     .83     .1.17     1.06       823     Riverton     .74     .81     .04     .1.17     1.01       825     Riverton     .74     .81     .94     .94     .94       827     Newcastle     .74     .81     .94     .94     .94       829,831     Rock Springs     .79     .83     .94     .96     .95       829,831     Rock Springs     .79 <td>540</td> <td>Green Bay</td> <td>1.01</td> <td>.97</td> <td></td> <td>Toronto</td> <td>1.20</td> <td></td>	540	Green Bay	1.01	.97		Toronto	1.20	
546         La Crosse         .94         .93         PRINCE EDWARD ISLAND         .95         .96           547         Eau Claire         .98         .98         .98         .98         .94         .96         .94           548         Superior         .99         .98         .94         .96         .94         .96         .94           WYOMING         .95         .94         .96         .94         .96         .94         .96         .94           820         Cheyenne         .95         .94         .96	544		.95				1.1-7	
348         Osikosit         .95         .94         QUEBEC         Cap-de-la-Madeleine         1.18         1.06           WYOMING         820         Chevenne         .84         .86         .06         .06         .06           820         Vellowstone Nat. Pk.         .75         .82         .06         .06         .06           821         Vellowstone Nat. Pk.         .75         .82         .08         .06         .06           822         Wheatland         .75         .82         .06         .06         .06           823         Rawlins         .76         .83         .08         .08         .06           824         Worland         .74         .81         .06         .04         .06           825         Riverton         .74         .81         .06         Sherbroke         1.17         1.06           827         Newcastle         .74         .81         .06         Sherbroke         1.18         .06           828         Sheridan         .84         .84         .06         .06         .06           829-831         Rock Springs         .79         .83         .06         .97         .97 <tr< td=""><td>546</td><td>La Crosse</td><td>.94</td><td>.95</td><td>PRINCE EDWAR</td><td>Charlottetown</td><td></td><td>.96</td></tr<>	546	La Crosse	.94	.95	PRINCE EDWAR	Charlottetown		.96
WYONING 820         Cheyenne         34         .86         QUEBEC         Cap-de-la-Madeleine         1.18         1.06           820         Yellowstone Nat. Pk.         .75         .82	548	Superior	.99 .95			Summerside	.94	100
822         Wheatland         .76         .83         Gatmeau         1.77         1.00           823         Rawins         .76         .83         1.21         1.11         1.01           824         Worland         .75         .81         Montreal         1.21         1.11           825         Rwerton         .74         .81         Quebec         1.22         1.06           826         Casper         .78         .83         Sherbrooke         1.17         1.06           827         Newcastle         .74         .81         Trois Riveres         1.18         1.06           827         Sheridan         .80         .84         .81         Trois Riveres         1.18         1.06           828         Sheridan         .90         .83         .84         .99         .95           829-831         Rock Springs         .79         .83         .90         .97         .97           829-831         Rock Springs         .79         .83         .90         .96         .98           Regina         .99         .96         .98         .97         .97         .97           Saskatoon         .97         .97		Control		07	QUEBEC	Cap-de-la-Madeleir	1.18	1.06 1.06
822         Wheatland         .76         .83         Gatmeau         1.77         1.00           823         Rawins         .76         .83         1.21         1.11         1.01           824         Worland         .75         .81         Montreal         1.21         1.11           825         Rwerton         .74         .81         Quebec         1.22         1.06           826         Casper         .78         .83         Sherbrooke         1.17         1.06           827         Newcastle         .74         .81         Trois Riveres         1.18         1.06           827         Sheridan         .80         .84         .81         Trois Riveres         1.18         1.06           828         Sheridan         .90         .83         .84         .99         .95           829-831         Rock Springs         .79         .83         .90         .97         .97           829-831         Rock Springs         .79         .83         .90         .96         .98           Regina         .99         .96         .98         .97         .97         .97           Saskatoon         .97         .97	820	Cheyenne Vallowstone Nat P	.84 .75	.85		Charlesbourg	1.10	1.08
825         Riverton         .78         .83           826         Casper         .78         .81           827         Newcastle         .74         .81           828         Sheridan         .84           829-831         Rock Springs         .79         .83	821	Wheatland	.75	.82 .83		Gatineau	1.17	1.06
825         Riverton         .78         .83           826         Casper         .78         .81           827         Newcastle         .74         .81           828         Sheridan         .84           829-831         Rock Springs         .79         .83	823 824	Worland	.75	.81		Montreal	1.21	1.11
Prince Albert	825	Riverton	.74 .78	.83		Sherbrooke	1.17	1.06
Prince Albert	827	Newcastle	.74	.81 .84		Trois Rivieres	1.10	
Prince Albert	828 829-831		.79	.83	SASKATCHEW	AN Moose law	.97	.97
Saskatoon						Prince Albert	.96	.98
VIIKON						Saskatoon	.97	.97
I VIIKIIN I					MINON			.96

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