

TEAM LAS VEGAS

PRESENTS

*Sinatra*  
LIVING

JURY NARRATIVES

08.10.17



# UNIVERSITY OF NEVADA LAS VEGAS

U.S. Department of Energy Solar Decathlon 2017  
Jury Deliverables

## NASKO BALAKTCHIEV

Project Manager  
naskobalaktchiev@gmail.com  
702 426 9598

## ADAM BETEMEDHIN

Project Engineer  
adambetemedhin@gmail.com  
702 480 0579

# FOREWARD

Life begins when you start living passionately.

We designed a home that helps you live passionately by embracing every moment, simplifying your life, and giving you freedom. Sinatra Living is an energy-efficient and health-conscious home for active aging citizens of Las Vegas and beyond.

**U.S. Department of Energy Solar Decathlon 2017 — Team Las Vegas**

Howard R. Hughes College of Engineering

University of Nevada, Las Vegas, Box 454005

4505 S. Maryland Parkway

Las Vegas, NV 89154-4005

[unlvsd.com](http://unlvsd.com)

# TABLE OF CONTENTS

# 1

## MARKET POTENTIAL

Market Potential  
Livability  
Cost Effectiveness

# 2

## COMMUNICATIONS

Target Audience & Goals  
Marketing Strategy  
Outreach & Education  
Brand Identity  
Public Exhibition Materials

# 3

## ARCHITECTURE

Design Approach  
Implementation  
Document Process  
Visualization

# 4

## ENGINEERING

Design Approach  
Building Envelope  
Mechanical HVAC  
Solar Thermal  
Electrical Systems  
Plumbing Systems  
Automation

# 5

## INNOVATION

Home Automation  
Mechanical Pod  
HEPA Filter + PCM  
Electrical Systems Backup  
Architectural Partition  
VR/AR

# 6

## WATER

Context  
Conservation  
Reuse  
Landscaping



## MARKET POTENTIAL

**As a popular destination for retirement, Las Vegas, Nevada in the past 20 years has built expansive housing communities for its aging population.**

The potential to live in one's own home and within their own community comfortably, safely and independently, regardless of age or ability is what Sinatra living strives to embrace.

# MARKET POTENTIAL

## Problem Seeking

### Las Vegas, Nevada

Here in Las Vegas, there are over half a million people who range from **45 to 65 years old**. In the United States, we can expect over 45% of households to have someone over 55 or older by 2020. This is something we expect—improved technology and healthcare will result in longer lifespans. By 2059, the average life span will be 84 years old, 5 years greater than in 2009. As a result, **over 20% of the U.S. population will be over 65 by 2050.**

In the coming decades, the need for housing for aging individuals will only increase. Those individuals will want to still live active and healthy lifestyles. Many of them will be technology-savvy, because of the higher use of technology in past decades. They care about helping the environment, with the increased news of climate change.

## Q: How do we address these needs for this expanding market?

the people

**45%** of households will have someone 55 or older by 2020.

### life expectancy

is steadily rising as healthcare & technology improve over the decades.	<b>1950</b>	68.9 years
	<b>2009</b>	79.2 years
	<b>2050</b>	82.9 years
	<b>2059</b>	84.0 years

Over **20%** of the US population will be over 65 by 2050.



MelLife Marketing Mature Institute

## Introducing Sinatra Living

### Market Scenario

We designed our home for active-aging individuals who are 45-65 years old, living here, in Las Vegas. We envision a home for a married couple, who are ready to start their post-occupational life. They are still working jobs, with a household income of \$100k, and are preparing for retirement.

Their lifestyle focuses on healthy, active living. Now that their kids are out of the house, their priorities are different. They're thinking about downsizing, further lowering their expenses, and focusing on living passionately.

### Market Feedback

Early on, getting market feedback and validation was a key step in our process. Instead of generalizing what our focus groups said, here's their exact, written feedback. This specific set of feedback happened during a presentation to AARP Nevada.

the needs



3/4 over 65 will require some form of long-term care.



2/5 will reside in a nursing home.

2000

2050

People 18-64



People 64+

By 2050, the ratio of people to take care of people 65 and older will be half as much.

## Impact on U.S.

Sinatra Living, designed for Las Vegas residents, includes many modular components. Our hope is that the systems we designed to go into the home can integrate into any other home in the nation.

The star module in our home is our integrated mechanical pod. We've designed it to be a key component that we hope will allow clean energy to enter homes around the nation. In a nutshell, the mechanical pod alone will be able to generate over 2,500 kWh of energy, per year. This clean energy can provide domestic hot water and radiant heating, for any home.

Our team also developed a home automation system, complete with a mobile app. The app provides an easy-to-use and comprehensive way to learn about the home. The insights the app provides the homeowner a better understanding of the energy use, at a glance. Our product integrates into many 3rd party hardware, and would be a plug & play home automation app.

## Affordable, Clean Energy

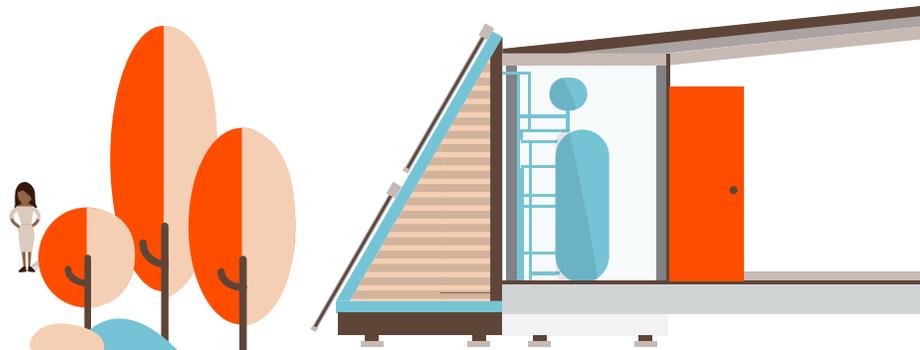
Above all, sustainability is the biggest value of the home. Everything integrated into the home has cost saving benefits. Either it decreases the cost to build the home, or it saves money while living in the home, or both.

Monocrystalline Photovoltaic Panels, paired with a Tesla Power Wall are our main sustainability feature. Our PV captures energy throughout the day, and our battery storage uses it during peak times. This saves money by not using power from the grid, when electricity is the most expensive.

A solar thermal unit generates domestic hot water for the home. This reduces a large electrical load of the PV system. Having a dedicated way to heat water gives us more energy resources to work with.

Grey Water Reuse collects water from the kitchen, shower and washer. All of the collected water gets filtered for watering the plants around the home. Using this system saves up to 9000 gallons of water a year.

The Phase Change Material system reduces air conditioning costs with smart heating & cooling. We take fresh air from outside, store it's heat energy, and reuse it when needed. Doing this allows us to use the air conditioning less, further reducing costs.

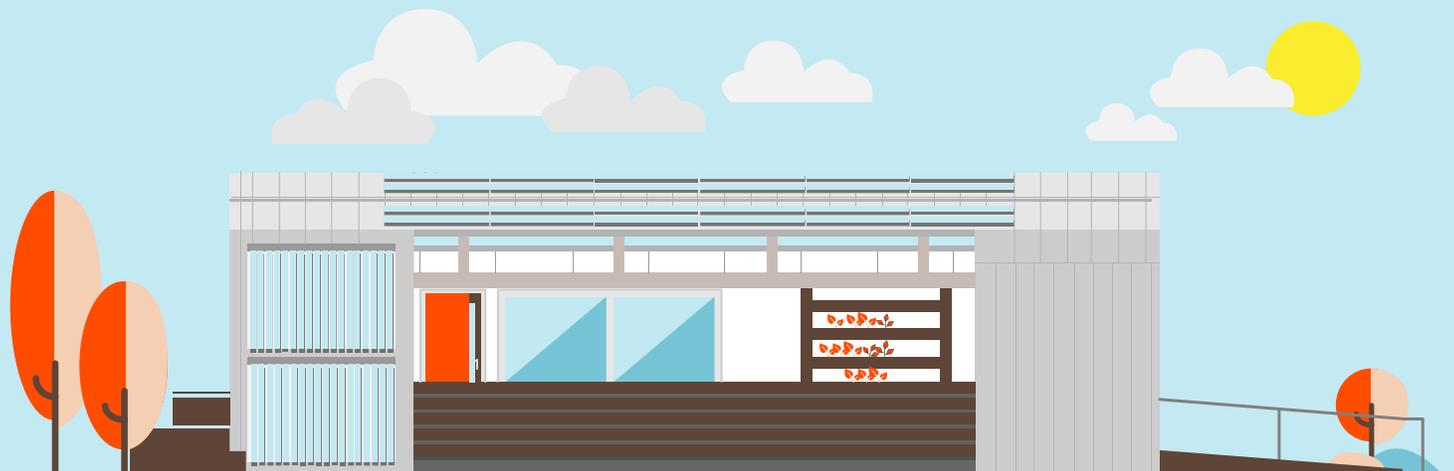


# LIVABILITY

## Exterior

### Outdoor Deck

A spacious deck surrounding the home gets shade from automatic shades and overhangs. With almost 300 days of sunshine a year, this is essential to the outdoor experience. Having all this shade encourages residents to spend more time outdoors. One thing essential to our target market is more fresh air and exposure to natural vitamins. The openness helps with the flow between indoors and outdoors, when entertaining guests.



# Interior

## Defining Spaces

We divide the home into social spaces and private areas. Social spaces are open and connected to one another—encouraging socialization. Private spaces allow for reduced sensory stimulation and privacy.

## Lighting Design

Sinatra Living takes advantage of ample natural daylighting in almost every space.

Circadian rhythm is a biological cycle that regulates physical, mental, and behavioral changes. It responds to the light and darkness in an individual's environment. (Cite: the National Institute of General Medical Sciences)

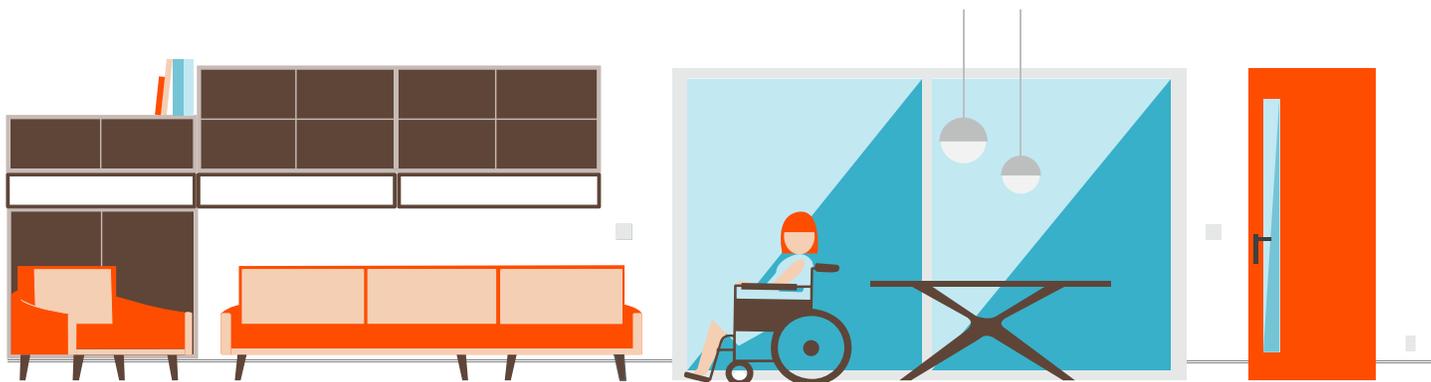
Important bodily functions depend on it—sleep wake cycles, hormone release, and temperature. With a natural and healthy rhythm, the home design can prevent many disorders. Our design tries to lower obesity, diabetes, depression and other seasonal affective disorders. It is often found a these are all agitated by an abnormal rhythm.

## Preventing Falls

In the U.S., falls are the leading cause of injury-related visits to the ER. They are also the primary cause of accidental deaths in people over 65. (cite: American Academy of Family Physicians)

Proper lighting levels in each area of the home also assists with preventing falls. Introducing contrast between all horizontal and vertical surfaces make it easier see depth.

Good lighting and contrast allows individuals to process where corners, edges, steps are. This helps individuals think faster and move without effort through their surroundings.



# Interior

## Social Module

Our social module acts as a space for food preparation, dining, and the main living space. The goal of the area is to create a social space for entertainment and dining, in an open and relaxed way. The design prevents isolation in the social space, to ensure more human interaction. Doing so helps the individual's social health

-  **Flex**
-  **Bedroom**
-  **Social Module**
-  **Bathroom**



## Kitchen

Food preparation is a breeze with our full featured kitchen. Equipped with Energy Star appliances, we help save money and energy usage. Our induction cooktop stays cool to the touch, even if left on accident.

One great dynamic feature of the kitchen is the adjust countertop and upper cabinets. Its incorporation is key when designing a universally accessible space. For example, someone can sit or stand while preparing food. Depending on what's most comfortable, they can raise or lower the countertop.

## Dining

Sinatra Living's dining area sits 8 people around an oval table. While great for entertaining and dinner parties, an oval table is key to the design intent. Round tables allows guests to gravitate toward the center of the table. Doing so reduces the amount people have to turn to talk to others. As we age, our movements stiffen. Angling your head and neck can make socializing around a table uncomfortable. Our goal is to design an environment for easy, enjoyable, and comfortable living.

## Living

Moving into our living area, our entertainment system includes storage, memorabilia, and multimedia. Depending on the individuals are feeling, they can sit in a sofa or armchair. Armchairs are much easier for the individual when getting up from seated position. Our sofa provides ample group seating and lounge space.

# Interior

## Flex Space

Our living room leads straight into the flex room, a multifunctional space. Sinatra Living's design ensures a small home does not equate to minimal space. Office space, guest bedroom, or personal space—the flex room has you covered. Our goal is to let the occupant have flexibility, without having to add extra square footage.

## Bath

Sinatra Living's bathroom is accessible from both the flex space and the bedroom. Our design allows the bathroom to have both a public and a private entrance. Two entrances help by reducing the distance an occupant would need to travel to use the bathroom. This is helpful, especially for those with poor mobility, bladder, or bowel problems.

## Bedroom

Finally, we walk into the bedroom, the most intimate space in the home. This room is the most quiet and restful space. The bedroom contains a modern open closet system. It's hassle free and easily accessible in a wheelchair. The daylighting in the bedroom enforces natural circadian rhythms. The north facing windows allow for diffuse daylighting in the morning and during the day. Radiant flooring, found throughout the home, is crucial for the bedroom. We add comfort for bare feet in colder months of the year. This improves blood circulation for our occupants.



# COST EFFECTIVENESS

## Market Analysis

According to the National Association of Home Builders:

Seventy-five percent of remodelers report an increase in inquiries related to aging in place. The NAHB predicts that aging in place remodeling market to be \$20-\$25 billion. That's about 10 percent of the \$214 billion home improvement industry.

According to the MetLife Mature Marketing Institute:

Ninety-one percent of pre-retirees age 50 to 65 responded that they want to live in their own homes in retirement. Of that group, 49 percent want to stay in their current homes, and 38 percent want to move to new homes.

## Competitors

	Aging In Place	Energy Efficient	Water Efficient	Sustainable features	Home Automation	Amenities	Average Price
Sinatra Living	x	x	x	x	x		\$420,000
Toll Brothers	x	x	x			x	\$450,000
Pardee Homes		x	x	x	x		\$300,000
Bezeal Homes		x	x				\$270,000
KB Homes		x	x			x	\$255,000

Care Type	Monthly NV Avg. Cost	Monthly Nat. Avg. Cost	Annual NV Avg. Cost	Monthly Nat. Avg. Cost
Home Healthcare (8hrs per week)	\$750	\$693	\$9000	\$8316
Adult Day Care (Weekends Only)	\$1506	\$1492	\$18,072	\$17,904
Assisted Living	\$3238	\$3600	\$38,856	\$43,200
Homemaker Services (44hrs per week)	\$4004	\$3721	\$48,048	\$44,652
Home Health Care (44hrs per week)	\$4124	\$3813	\$49,488	\$45,756
Nursing Home (Semi-private double occupancy room for one person)	\$7178	\$6692	\$86,136	\$80,304
Nursing Home (Private single occupancy room for one peron)	\$8213	\$7604	\$98,556	\$91,248
Sinatra Living (bankrate.com)	\$2700	\$—	\$32,400	\$—
Single Family Home (bankrate.com)	\$1600	\$2000	\$19,200	\$24,000

*Sinatra*  
LIVING

SD2017 Team Las Vegas Cost Estimate, UNIFORMAT II		Done by: Kalewalani Bancaco 8.6.2017			GFA		2,000.00	
LEVEL 2 GROUP ELEMENTS		RATIO	ELEMENT				COST PER	%
LEVEL 3 ELEMENTS		QTY/GFA	QUANTITY	UNIT	RATE	COST	UNIT GFA	
<b>A</b>	<b>SUB STRUCTURE</b>					<b>\$2,622.32</b>	<b>1.31</b>	<b>0.63%</b>
<b>A10</b>	<b>FOUNDATIONS</b>					<b>\$2,622.32</b>	<b>1.31</b>	<b>0.63%</b>
A1010	STANDARD FOUNDATIONS- PIERS AND PAD	0.04	80	SF	\$17.00	\$1,360.00	0.68	0.33%
A1020	SPECIAL FOUNDATIONS- TIE DOWNS	0.06	124	LF	\$10.18	\$1,262.32	0.63	0.30%
A1030	SLAB ON GRADE	-	-	-	-	-	-	
<b>A20</b>	<b>BASEMENT CONSTRUCTION</b>							
A2010	BASEMENT EXCAVATION	-	-	-	-	-	-	
A2020	BASEMENT WALLS	-	-	-	-	-	-	
<b>B</b>	<b>SHELL</b>					<b>\$209,575.12</b>	<b>104.79</b>	<b>50.47%</b>
<b>B10</b>	<b>SUPERSTRUCTURE</b>					<b>\$107,044.50</b>	<b>53.52</b>	<b>25.78%</b>
B1010	FLOOR CONSTRUCTION- CHASSIS AND DECK	0.96	1920	SF	\$54.30	\$104,256.00	52.13	25.11%
B1030	SUBFLOOR CONSTRUCTION	0.49	975	SF	\$2.86	\$2,788.50	1.39	0.67%
<b>B20</b>	<b>EXTERIOR ENCLOSURE</b>					<b>\$42,534.46</b>	<b>21.27</b>	<b>10.24%</b>
B2010	EXTERIOR WALLS	1.36	2728	SF	\$4.52	\$12,330.56	6.17	2.97%
B2020	EXTERIOR WINDOWS	0.04	86	SF	\$92.65	\$7,967.90	3.98	1.92%
B2030	EXTERIOR DOORS	0.12	240	SF	\$92.65	\$22,236.00	11.12	5.35%
<b>B30</b>	<b>ROOFING</b>					<b>\$59,996.16</b>	<b>30.00</b>	<b>14.45%</b>
B3010	ROOF COVERINGS	1.01	2016	SF	\$29.76	\$59,996.16	30.00	14.45%
B3020	ROOF OPENINGS	-	-	-	-	-	-	
<b>C</b>	<b>INTERIORS</b>					<b>\$25,990.44</b>	<b>13.00</b>	<b>6.26%</b>
<b>C10</b>	<b>INTERIOR CONSTRUCTION</b>					<b>\$4,530.62</b>	<b>2.27</b>	<b>1.09%</b>
C1010	PARTITIONS	0.02	48	SF	\$2.14	\$102.72	0.05	0.02%
C1020	INTERIOR DOORS		2	EA	\$713.95	\$1,427.90	0.71	0.34%
C1030	FITTINGS		1	LOT	\$3,000.00	\$3,000.00	1.50	0.72%
<b>C20</b>	<b>STAIRS</b>							
C2010	STAIR CONSTRUCTION	-	-	-	-	-	-	
C2020	STAIR FINISHES	-	-	-	-	-	-	
<b>C30</b>	<b>INTERIOR FINISHES</b>					<b>\$21,459.82</b>	<b>10.73</b>	<b>5.17%</b>
C3010	WALL FINISHES	1.36	2728	SF	\$5.14	\$14,021.92	7.01	3.38%
C3020	FLOOR FINISHES	0.36	720	SF	\$5.55	\$3,996.00	2.00	0.96%
C3030	CEILING FINISHES	0.39	770	SF	\$4.47	\$3,441.90	1.72	0.83%
<b>D</b>	<b>SERVICES</b>					<b>\$126,359.72</b>	<b>63.18</b>	<b>30.43%</b>
<b>D10</b>	<b>CONVEYING</b>							
D1010	ELEVATORS AND LIIFTS	-	-	-	-	-	-	
D1020	ESCALATORS AND MOVING WALKS	-	-	-	-	-	-	
D1090	OTHER CONVEYING SYSTEMS	-	-	-	-	-	-	
<b>D20</b>	<b>PLUMBING</b>					<b>\$85,160.00</b>	<b>42.58</b>	<b>20.51%</b>
D2010	PLUMBING FIXTURES							
D2020	DOMESTIC WATER DISTRIBUTION							
D2030	SANITARY WASTE			From Quote				
D2040	RAIN WATER DRAINAGE							
D2090	OTHER PLUMBING SYSTEMS - RADIANT							
<b>D30</b>	<b>HVAC</b>					<b>\$12,386.00</b>	<b>6.19</b>	<b>2.98%</b>
D3010	ENERGY SUPPLY							
D3020	HEAT GENERATING SYSTEM							
D3030	COOLING GENERATING SYSTEM							
D3040	DISTRIBUTION SYSTEMS			From Quote				
D3050	TERMINAL AND PACKAGE							
D3060	CONTROLS AND INSTRUMENTATION							
D3070	SYSTEMS TESTING AND BALANCE							
D3090	OTHER HVAC SYSTEMS AND EQUIP							
<b>D40</b>	<b>FIRE PROTECTION</b>					<b>See Plumbing</b>		
D4010	SPRINKLERS							
D4020	STANDPIPES			From Quote				
D4030	FIRE PROTECTION SPECIALTIES							
D4090	OTHER FIRE PROTECTION SYSTEMS							
<b>D50</b>	<b>ELECTRICAL</b>					<b>\$28,813.72</b>	<b>14.41</b>	<b>6.94%</b>
D5010	ELECTRICAL SERVICE AND DISTRIBUTION							
D5020	LIGHTING AND BRANCH WIRING			From Quote				
D5030	COMMUNICATIONS AND SECURITY							
D5090	OTHER ELECTRICAL SYSTEMS							
<b>E</b>	<b>EQUIPMENT AND FURNISHINGS</b>					<b>\$39,442.00</b>	<b>19.72</b>	<b>9.50%</b>
<b>E10</b>	<b>EQUIPMENT</b>					<b>\$2,500.00</b>	<b>1.25</b>	<b>0.60%</b>
E1010	COMMERCIAL EQUIPMENT- FORKLIFT		1	MONTH	\$2,500.00	\$2,500.00	1.25	0.60%

SD2017 Team Las Vegas Cost Estimate, UNIFORMAT II		Done by: Kalewalani Bancaco 8.6.2017			GFA		2,000.00	
LEVEL 2 GROUP ELEMENTS		RATIO	ELEMENT			COST PER	%	
LEVEL 3 ELEMENTS		QTY/GFA	QUANTITY	UNIT	RATE	COST	UNIT GFA	
E1020	INSTITUTIONAL EQUIPMENT	-	-	-	-	-	-	
E1030	VEHICULAR EQUIPMENT	-	-	-	-	-	-	
E1090	OTHER EQUIPMENT	-	-	-	-	-	-	
<b>E20</b>	<b>FURNISHINGS</b>					<b>\$36,942.00</b>	<b>18.47</b>	<b>8.90%</b>
E2010	FIXED FURNISHINGS- CASEWORK AND BASELIFT		1	FIX	\$36,942.00	\$36,942.00	18.47	8.90%
E2020	MOVABLE FURNISHINGS	-	-	-	-	-	-	
<b>F</b>	<b>SPECIAL CONSTRUCTION</b>					<b>\$11,265.00</b>	<b>5.63</b>	<b>2.71%</b>
F10	SPECIAL CONSTRUCTION					\$11,265.00	5.63	2.71%
F1010	SPECIAL STRUCTURES- CHARGING STATION, RAILINGS, ETC		1	FIX	\$11,265.00	\$11,265.00	5.63	2.71%
F1020	INTEGRATED CONSTRUCTION	-	-	-	-	-	-	
F1030	SPECIAL CONSTRUCTION SYSTEMS	-	-	-	-	-	-	
F1040	SPECIAL FACILITIES	-	-	-	-	-	-	
F1050	SPECIAL CONTROLS AND INSTRUMENTATION	-	-	-	-	-	-	
<b>F20</b>	<b>SELECTIVE BUILDING CONSTRUCTION</b>							
F2010	BUILDING ELEMENTS DEMOLITION	-	-	-	-	-	-	
F2020	HAZARDOUS COMPONENTS ABATEMENT	-	-	-	-	-	-	
					<b>TOTAL</b>	<b>\$415,254.60</b>		100.00%