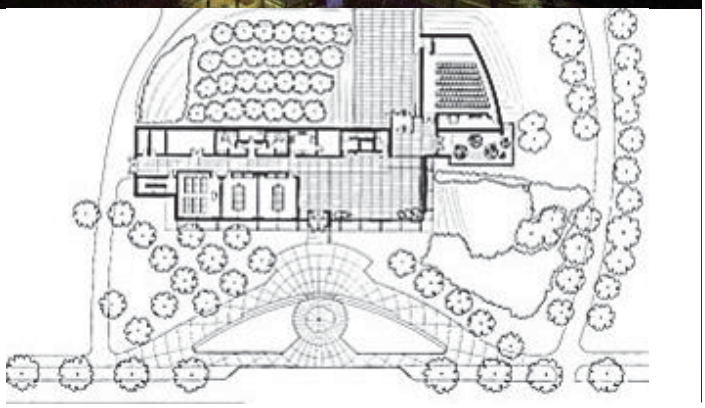
CASE STUDY #3

A sustainable site & design- *ADAM LEWIS CENTER*

ANDREW HENDRICKSON, FRANCISCO VARGAS & NICK BUCKLEY

Adam Lewis center

- The *Adam Lewis Center*
- LOCATION: Oberlin, Ohio
- BUILDING USE: Classrooms, offices, atrium, & auditorium
- TOTAL SQUARE FOOTAGE: 13,600 sqft
- Completed January 2001



Sustainability Features Water

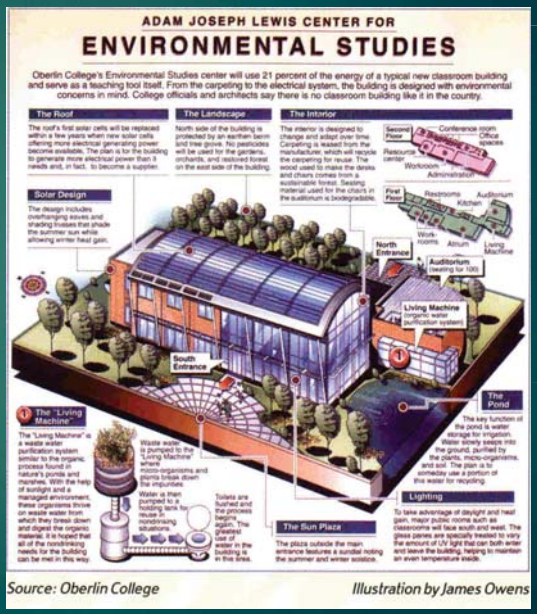
Living Machine

- Filters all grey water generated within building, and reuses it in urinals and toilets.
- Uses a combination of microbes, plants, and insects to treat water.
- Is used as a education tool for students.
- Provides tranquil garden environment for students.

Onsite Pond

- Captures onsite rain water run off, and irrigation runoff.
- Provides proper ecology to safely filter runoff before it seeps into the soil.

ENVIROMENTALLY GREEN BUILDING



Sustainability Features Energy

Solar energy

4,000 sq. ft of PV panels

Supply 45 kilowatts

Interconnected to the grid

Lighting

Compact fluorescent bulbs

Expansive south facing windows

Motion sensors

Light sensors

Heating

Closed loops ground water heat pump

Radiant floor heating

Elongated east west axis

High natural ventilation

Sustainability Features Site

- Small orchard of 50 pear and apple trees
- Terraced berm on the north side
- Extensive cistern and drain system to collect storm water.
- Paths, Benches, and rock garden make social gathering space.

Malcolm well's checklist

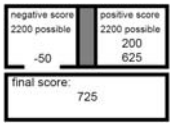
	degeneration	-100 always	-75 usually	-50 sometimes	-25 a bit	0 balances	25 a bit	50 sometimes	75 usually	100 always	regeneration
the site	pollutes air						■	■			cleans air
	pollutes water						■	■	■		cleans water
	wastes rainwater						■	■	■		stores rainwater
	consumes food						■	■			produces food
	destroys rich soil						■	■	■		creates rich soil
	dumps wastes unused						■				consumes wastes
	destroys wildlife habitat						■	■	■		provides wildlife habitat
	imports energy						■				exports energy
	requires fuel-powered transportation			■	■						requires human-powered transportation
	intensifies local weather					■					moderates local weather
the building	excludes daylight						■	■	■		uses daylight
	uses mechanical heating						■	■	■		uses passive heating
	uses mechanical cooling						■	■	■		uses passive cooling
	needs cleaning and repair						■				maintains itself
	produces human discomfort						■	■	■		provides human comfort
	uses fuel-powered circulation						■				uses human-powered circulation
	pollutes indoor air						■	■			creates pure indoor air
	is built of virgin materials						■	■			is built of recycled materials
	cannot be recycled						■	■			can be recycled
	serves as an icon for the apocalypse						■				serves as an icon for regeneration
	is a bad neighbor						■	■			is a good neighbor
	is ugly						■	■			is beautiful

negative score	positive score
2200 possible	2200 possible
-50	200 625

final score: 725

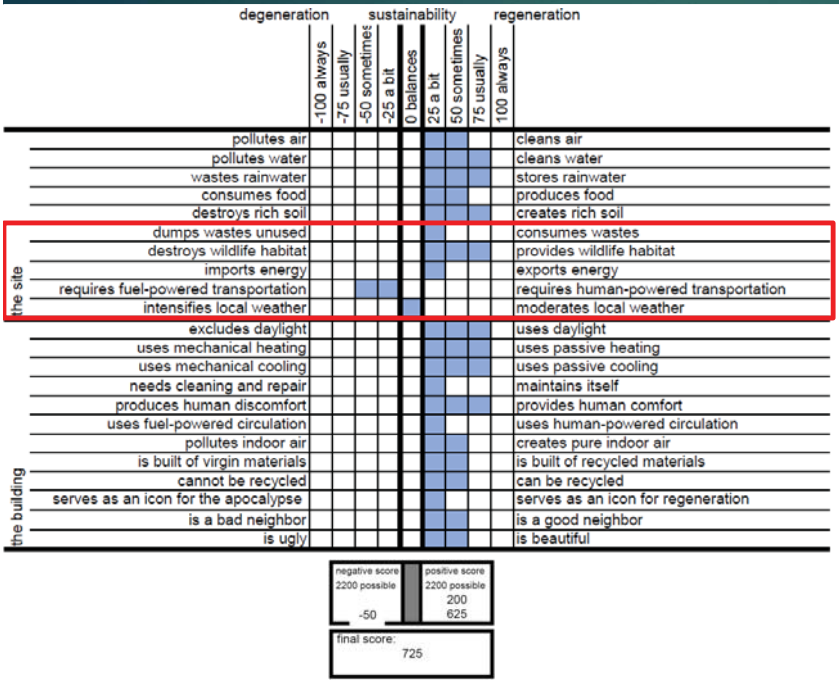
Malcolm well's checklist - SITE

	degeneration	-100 always	-75 usually	-50 sometimes	-25 a bit	0 balances	25 a bit	50 sometimes	75 usually	100 always	regeneration
the site	pollutes air						■	■			cleans air
	pollutes water						■	■	■		cleans water
	wastes rainwater						■	■	■		stores rainwater
	consumes food						■	■			produces food
	destroys rich soil						■	■	■		creates rich soil
	dumps wastes unused						■				consumes wastes
	destroys wildlife habitat						■	■	■		provides wildlife habitat
	imports energy						■				exports energy
	requires fuel-powered transportation			■	■						requires human-powered transportation
	intensifies local weather					■					moderates local weather
the building	excludes daylight						■	■	■		uses daylight
	uses mechanical heating						■	■	■		uses passive heating
	uses mechanical cooling						■	■	■		uses passive cooling
	needs cleaning and repair						■				maintains itself
	produces human discomfort						■	■	■		provides human comfort
	uses fuel-powered circulation						■				uses human-powered circulation
	pollutes indoor air						■	■			creates pure indoor air
	is built of virgin materials						■	■			is built of recycled materials
	cannot be recycled						■	■			can be recycled
	serves as an icon for the apocalypse						■				serves as an icon for regeneration
	is a bad neighbor						■	■			is a good neighbor
	is ugly						■	■			is beautiful



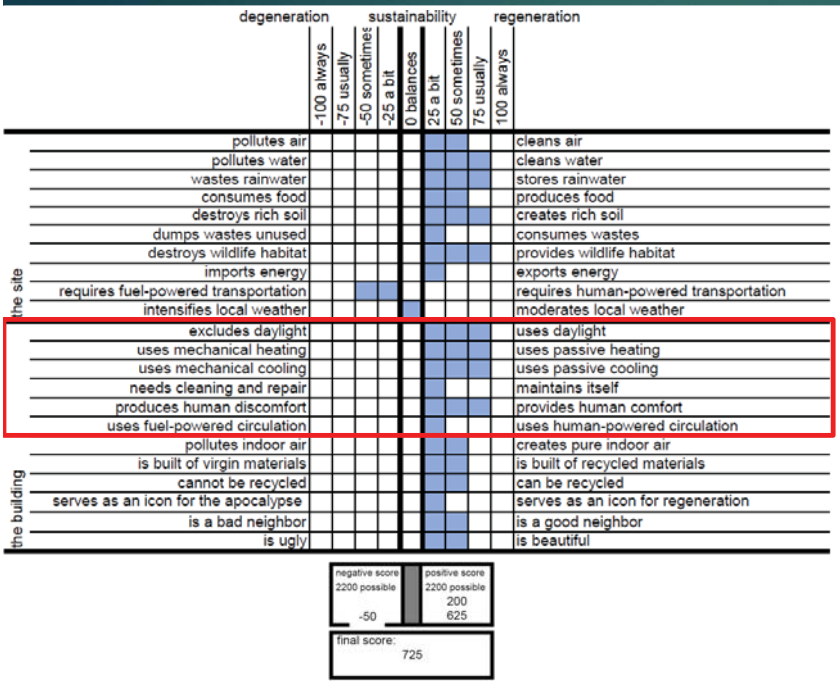
- **Air / +50**
  The amount of green vegetation on site helps keep the air clean.
- **Water / +75**
  There's a retention pond on site that cleans all the water on site.
- **Rainwater / +75**
  The same pond is used to retain the fresh rainwater.
- **Food / +50**
  There's on site food grown on site.

Malcolm well's checklist - SITE



- **Waste / +25**
  There is a small amount of waste added to the local vegetation.
- **Wildlife / +75**
  The green space was used to recreate wildlife habitat.
- **Energy / +25**
  The PV's on the roof are only used to power the main building.
- **Transportation / -50**
  The main transportation for the school is busses for transportation.
- **Weather / +0**
  The green space combined with the pollution doesn't effect anything.

Malcolm well's checklist - BUILDING



- **Waste / +25**
  There is a small amount of waste added to the local vegetation.
- **Wildlife / +75**
  The green space was used to recreate wildlife habitat.
- **Energy / +25**
  The PV's on the roof are only used to power the main building.
- **Transportation / -50**
  The main transportation for the school is busses for transportation.
- **Weather / +0**
  The green space combined with the pollution doesn't effect anything.

Malcolm well's checklist - BUILDING

	degeneration				sustainability				regeneration	
	-100 always	-75 usually	-50 sometimes	-25 a bit	0 balances	25 a bit	50 sometimes	75 usually	100 always	
the site	pollutes air									cleans air
	pollutes water									cleans water
	wastes rainwater									stores rainwater
	consumes food									produces food
	destroys rich soil									creates rich soil
	dumps wastes unused									consumes wastes
	destroys wildlife habitat									provides wildlife habitat
	imports energy									exports energy
	requires fuel-powered transportation									requires human-powered transportation
	intensifies local weather									moderates local weather
the building	excludes daylight									uses daylight
	uses mechanical heating									uses passive heating
	uses mechanical cooling									uses passive cooling
	needs cleaning and repair									maintains itself
	produces human discomfort									provides human comfort
	uses fuel-powered circulation									uses human-powered circulation
	pollutes indoor air									creates pure indoor air
	is built of virgin materials									is built of recycled materials
	cannot be recycled									can be recycled
	serves as an icon for the apocalypse									serves as an icon for regeneration
	is a bad neighbor									is a good neighbor
	is ugly									is beautiful

negative score	positive score
2200 possible	2200 possible
-50	200 625

final score: 725

- **AIR / +50**
  THERE IS VEGETATION ON THE INSIDE OF THE BUILDING CLEANING THE AIR.
- **MATERIALS / +50**
  A LARGE AMOUNT OF THE MATERIALS WERE USED OF RECYCLED MATERIALS.
- **RECYCLED / +50**
  THE CURRENT BUILDING MATERIALS CAN BE SOMEWHAT RECYCLED.
- **REGENERATION / +25**
  THE BUILDING IS INNOVATIVE AND CAN BE A GOOD EXAMPLE FOR OTHERS.
- **NEIGHBOR / +50**
  THE BUILDING IS NICE FOR THE PEOPLE AROUND IT AND IS GREEN.
- **BEAUTIFUL / +50**
  THE BUILDING IS MODERN AND UNIQUE.

LEED checklist

LEED v4 for BD+C: Schools
Project Checklist

Project Name:
Date:

Y	?	N			
1			Credit	Integrative Process	1

9	7	4	Location and Transportation	15
	5		Credit	LEED for Neighborhood Development Location 15
1			Credit	Sensitive Land Protection 1
		2	Credit	High Priority Site 2
4	1		Credit	Surrounding Density and Diverse Uses 5
3	1		Credit	Access to Quality Transit 4
1			Credit	Bicycle Facilities 1
		1	Credit	Reduced Parking Footprint 1
		1	Credit	Green Vehicles 1

9	3	0	Sustainable Sites	12
Y			Prereq	Construction Activity Pollution Prevention Required
Y			Prereq	Environmental Site Assessment Required
1			Credit	Site Assessment 1
2			Credit	Site Development - Protect or Restore Habitat 2
1			Credit	Open Space 1
2	1		Credit	Rainwater Management 3
2			Credit	Heat Island Reduction 2
	1		Credit	Light Pollution Reduction 1
	1		Credit	Site Master Plan 1
1			Credit	Joint Use of Facilities 1

5	4	3	Water Efficiency	12
Y			Prereq	Outdoor Water Use Reduction Required
Y			Prereq	Indoor Water Use Reduction Required
Y			Prereq	Building-Level Water Metering Required
1	1		Credit	Outdoor Water Use Reduction 2
4	2	1	Credit	Indoor Water Use Reduction 7
		2	Credit	Cooling Tower Water Use 2
	1		Credit	Water Metering 1

16	11	4	Energy and Atmosphere	31
Y			Prereq	Fundamental Commissioning and Verification Required
Y			Prereq	Minimum Energy Performance Required
Y			Prereq	Building-Level Energy Metering Required
Y			Prereq	Fundamental Refrigerant Management Required
2	1	3	Credit	Enhanced Commissioning 6
10	6		Credit	Optimize Energy Performance 16
1			Credit	Advanced Energy Metering 1
	2		Credit	Demand Response 2
2	1		Credit	Renewable Energy Production 3
		1	Credit	Enhanced Refrigerant Management 1

5	8	0	Materials and Resources	13
Y			Prereq	Storage and Collection of Recyclables Required
Y			Prereq	Construction and Demolition Waste Management Planning Required
3	2		Credit	Building Life-Cycle Impact Reduction 5
	2		Credit	Building Product Disclosure and Optimization - Environmental Product Declarations 2
1	1		Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials 2
1	1		Credit	Building Product Disclosure and Optimization - Material Ingredients 2
	2		Credit	Construction and Demolition Waste Management 2

11	4	1	Indoor Environmental Quality	16
Y			Prereq	Minimum Indoor Air Quality Performance Required
Y			Prereq	Environmental Tobacco Smoke Control Required
Y			Prereq	Minimum Acoustic Performance Required
2			Credit	Enhanced Indoor Air Quality Strategies 2
2	1		Credit	Low-Emitting Materials 3
	1		Credit	Construction Indoor Air Quality Management Plan 1
2			Credit	Indoor Air Quality Assessment 2
	1		Credit	Thermal Comfort 1
2			Credit	Interior Lighting 2
3			Credit	Daylight 3
	1		Credit	Quality Views 1
		1	Credit	Acoustic Performance 1

4	2	0	Innovation	6
3	2		Credit	Innovation 5
1			Credit	LEED Accredited Professional 1

0	4	0	Regional Priority	4
	1		Credit	Regional Priority: Specific Credit 1
	1		Credit	Regional Priority: Specific Credit 1
	1		Credit	Regional Priority: Specific Credit 1
	1		Credit	Regional Priority: Specific Credit 1

60	43	12	TOTALS	Possible Points: 110

Certified: 40 to 49 points, Silver: 50 to 59 points, Gold: 60 to 79 points, Platinum: 80 to 110

LEED GOLD CERTIFICATION
60/110

IMPROVEMENTS NEED TO BE MADE.

Redesign Ideas

Reduce Vehicular traffic

Provide sculptural bike racks

Improve bike paths to building

Wind Turbines

Vertical turbines could be used as learning aid.

Vertical turbines would not create noise pollution.

Could provide alternative supply of sustainable energy.

Improved Natural Ventilation

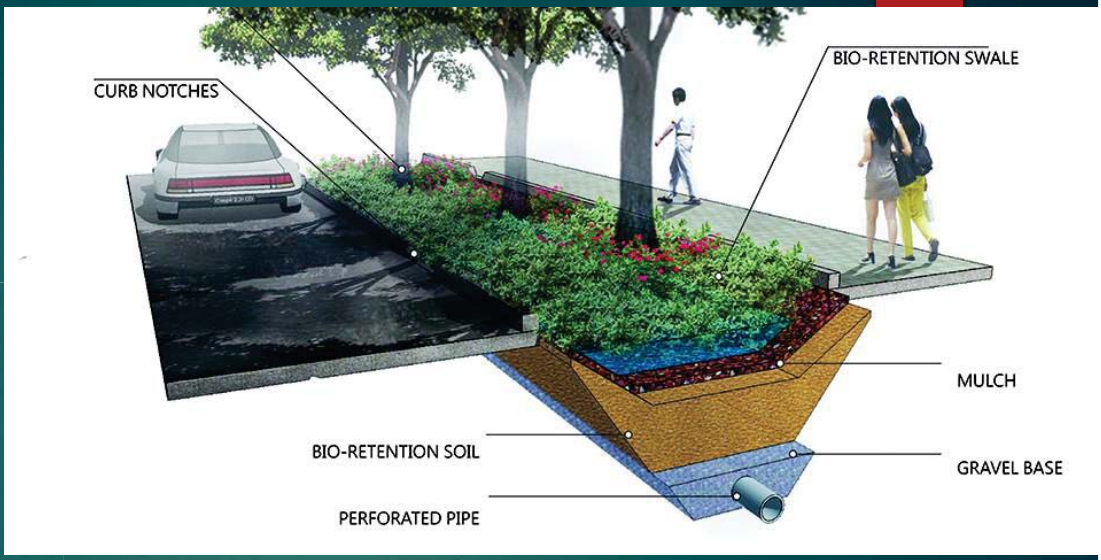
By adding lower operable windows people could add ventilation to adjust for their comfort.

Increased ventilation would improve indoor air quality.

Redesign Proposal

-Issue - The site is already efficient with water using, gray water toilets, cisterns, storm water collection, and the living machine. However, that is all onsite what about the surrounding area?

-Proposal – Bioswale to collect and filter water from sidewalks and road.



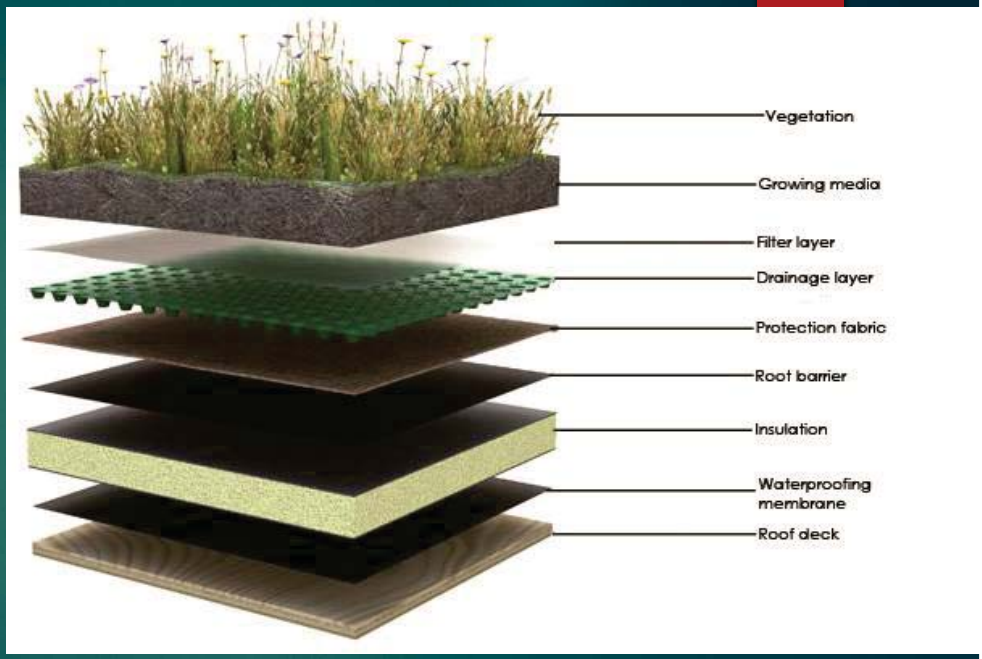
Bioswale will divert 987,000 gallons of runoff annually

(road surface 200'x22') = 4400 sqft x (36" of rain annually/12" per ft) = 132000x7.82 gallons per cubic ft

Redesign Proposal

-Issue – The living machine already has cisterns to capture rainwater but amount of water collected can be improved.

-Proposal – Green roof to collect water not captured by cistern.



Green roof will capture and additional 18,700 gallons of storm water

(roof surface 40'x20') = 800 sqft x (36" of rain annually/12" per ft) = 2400 x 7.82 gallons per cubic ft

Redesign Proposal

-Issue – The average US city gets 26 inches of snow per year. Oberlin, OH gets 44 inches. Snow and ice can cause complications for pedestrians. When snow melts water collection can be an issue.

-Proposal – Use solar roads to keep walkways clear of snow and ice. They can also be used to store water and create energy.

SURFACE FEATURES	SOLAR ROADWAYS	CONCRETE	ASPHALT
Flat place to walk and drive	●	●	●
Provides parking	●	●	●
Provides traction	●	●	●
Doesn't soften at high temperatures	●	●	
Generates energy	●		
Intelligent	●		
LED lights for lines and signage	●		
Remains snow/ice free	●		
Impervious to potholes	●		
Can protect animals	●		
Modular for faster maintenance	●		
Requires no paint	●		
Aesthetic benefits	●		
Has ROI	●		
Facilitates energy independence	●		
Can charge EVs with clean energy	●		
Water can be stored, treated or moved	●		
Provides a "home" for cables, wires	●		
Can provide emergency warning system	●		
Expandable Technology Package	●		

250ft of solar road can produce 3,000Kwh in 6 months, that's enough to power a home for a year.

Malcolm well's checklist - REVISED

	degeneration	-100 always	-75 usually	-50 sometimes	-25 a bit	0 balances	25 a bit	50 sometimes	75 usually	100 always	regeneration
the site	pollutes air										cleans air
	pollutes water										cleans water
	wastes rainwater										stores rainwater
	consumes food										produces food
	destroys rich soil										creates rich soil
	dumps wastes unused										consumes wastes
	destroys wildlife habitat										provides wildlife habitat
	imports energy										exports energy
	requires fuel-powered transportation										requires human-powered transportation
	intensifies local weather										moderates local weather
the building	excludes daylight										uses daylight
	uses mechanical heating										uses passive heating
	uses mechanical cooling										uses passive cooling
	needs cleaning and repair										maintains itself
	produces human discomfort										provides human comfort
	uses fuel-powered circulation										uses human-powered circulation
	pollutes indoor air										creates pure indoor air
	is built of virgin materials										is built of recycled materials
	cannot be recycled										can be recycled
	serves as an icon for the apocalypse										serves as an icon for regeneration
	is a bad neighbor										is a good neighbor
	is ugly										is beautiful

negative score	positive score
2200 possible	2200 possible
200	725
625	950

final score:

- The improvements made were both on the site and the building.
- The numbers went from **725** to **1,675.**
- This is a **950** point increases from the original design.

LEED checklist revised

LEED v4 for BD+C: Schools
Project Checklist

Project Name:
Date:

Y	?	N				
1			Credit	Integrative Process		1
22	8	0	**Location and Transportation**			15
10	5		Credit	LEED for Neighborhood Development Location		15
1			Credit	Sensitive Land Protection		1
	2		Credit	High Priority Site		2
4	1		Credit	Surrounding Density and Diverse Uses		5
4	0		Credit	Access to Quality Transit		4
1			Credit	Bicycle Facilities		1
1			Credit	Reduced Parking Footprint		1
1			Credit	Green Vehicles		1
10	2	0	**Sustainable Sites**			12
Y			Prereq	Construction Activity Pollution Prevention		Required
Y			Prereq	Environmental Site Assessment		Required
1			Credit	Site Assessment		1
2			Credit	Site Development - Protect or Restore Habitat		2
1			Credit	Open Space		1
3	0		Credit	Rainwater Management		3
2			Credit	Heat Island Reduction		2
	1		Credit	Light Pollution Reduction		1
	1		Credit	Site Master Plan		1
1			Credit	Joint Use of Facilities		1
10	0	2	**Water Efficiency**			12
Y			Prereq	Outdoor Water Use Reduction		Required
Y			Prereq	Indoor Water Use Reduction		Required
Y			Prereq	Building-Level Water Metering		Required
2	0		Credit	Outdoor Water Use Reduction		2
7	0	0	Credit	Indoor Water Use Reduction		7
		2	Credit	Cooling Tower Water Use		2
1	0		Credit	Water Metering		1
23	5	3	**Energy and Atmosphere**			31
Y			Prereq	Fundamental Commissioning and Verification		Required
Y			Prereq	Minimum Energy Performance		Required
Y			Prereq	Building-Level Energy Metering		Required
Y			Prereq	Fundamental Refrigerant Management		Required
3	1	2	Credit	Enhanced Commissioning		6
13	3		Credit	Optimize Energy Performance		16
1			Credit	Advanced Energy Metering		1
1	1		Credit	Demand Response		2
3	0		Credit	Renewable Energy Production		3
		1	Credit	Enhanced Refrigerant Management		1
6	7	0	**Materials and Resources**			13
Y			Prereq	Storage and Collection of Recyclables		Required
Y			Prereq	Construction and Demolition Waste Management Planning		Required
4	1		Credit	Building Life-Cycle Impact Reduction		5
	2		Credit	Building Product Disclosure and Optimization - Environmental Product Declarations		2
1	1		Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials		2
1	1		Credit	Building Product Disclosure and Optimization - Material Ingredients		2
	2		Credit	Construction and Demolition Waste Management		2
14	1	1	**Indoor Environmental Quality**			16
Y			Prereq	Minimum Indoor Air Quality Performance		Required
Y			Prereq	Environmental Tobacco Smoke Control		Required
Y			Prereq	Minimum Acoustic Performance		Required
2			Credit	Enhanced Indoor Air Quality Strategies		2
2	1		Credit	Low-Emitting Materials		3
1	0		Credit	Construction Indoor Air Quality Management Plan		1
2			Credit	Indoor Air Quality Assessment		2
1	0		Credit	Thermal Comfort		1
2			Credit	Interior Lighting		2
3			Credit	Daylight		3
1	0		Credit	Quality Views		1
		1	Credit	Acoustic Performance		1
5	1	0	**Innovation**			6
4	1		Credit	Innovation		5
1			Credit	LEED Accredited Professional		1
0	4	0	**Regional Priority**			4
	1		Credit	Regional Priority: Specific Credit		1
	1		Credit	Regional Priority: Specific Credit		1
	1		Credit	Regional Priority: Specific Credit		1
	1		Credit	Regional Priority: Specific Credit		1
91	28	6	**TOTALS**		**Possible Points:**	110

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

We improved the building and went from:

LEED Gold certification
60/110

-to-

LEED Platinum certification
91/110

Improvement of 31 points

CONCLUSION

- The Adam Lewis Center was a good building in it's day but was in need of improvements.

- Redesign Proposals:
- Reduce Vehicular traffic
- Wind Turbines
- Improve natural ventilation
- Bioswale
- Green roof
- Solar roads

- the Malcom Well's Checklist numbers went from **725** to **1,675.**
- this is a **950** point increases from the original design.

- The LEED certification went from **LEED Gold 60/110 to LEED Platinum certification 91/110.**
- This is an improvement of **31 points.**

- **If we implement these sustainable measures we can take an already green building to the next level.**