

CASE STUDY #3

"A SUSTAINABLE SITE & BUILDING"

Macy Brannan, Kiana Fannin, & Chase Muchow



MCALLEN MAIN LIBRARY

- Located in **McAllen, TX**
- Architects: **MSR Design**
- **120,000** sq. ft.
- Completed in **2011**
- **Largest single story library** in the US
- **Awards:**
 - AIA Honor Award for Interior Architecture
 - ALA/IIDA Library Interior Design Awards: Best Overall
 - Best Category (Public Libraries over 30,000 sq. ft.)
 - AIA Minnesota Honor Award
 - IIDA Northland Chapter FAB Award





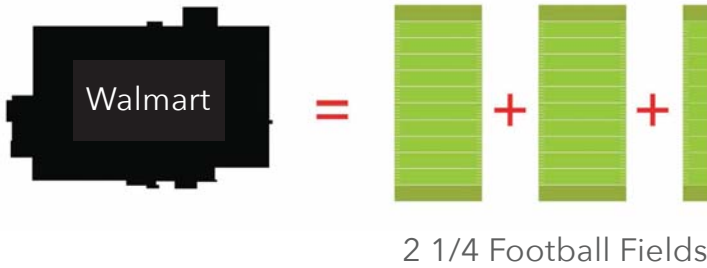
SUSTAINABLE FEATURES ADAPTIVE REUSE

Abandoned 1980's Walmart

Working with the **existing structure** instead of tearing it down & sending it to a landfill

Relocation of the library to this location proved to be a substantially great **investment** & boosted local commerce

In the first month, library cards increased **23x** that of the same month from the previous year & account updates increased by **2,000%**



"...the greenest building is one that already exists..."

- *archdaily on the McAllen Main Library*



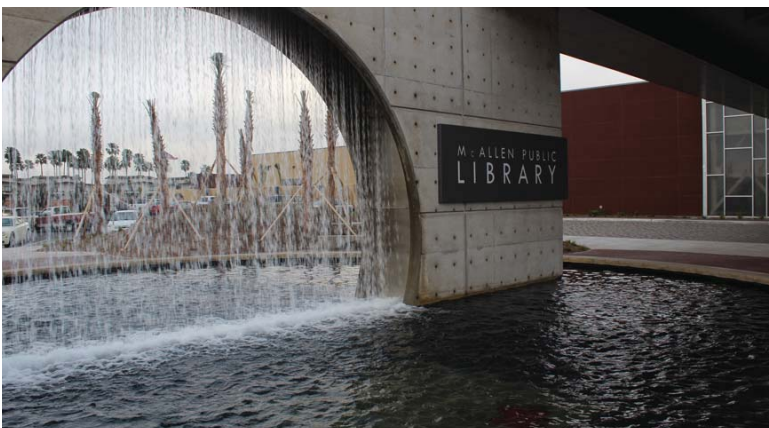
SUSTAINABLE FEATURES WATER

Addition of **green space** within site reduces the impervious area from 90% to 67%

Stormwater system minimizes stream velocities, erosion, & discharge into the city storm sewer system

High efficiency fixtures inside (e.g., dual-flush toilets & low-flow faucets) result in potable & wastewater **savings** in excess of **40%**

Condensate recovery system collects & pumps water to the **cooling towers** at the central plant, saving an additional estimated **180,000 gal/year**





SUSTAINABLE FEATURES MATERIALS

Building, finishes, & furnishings were selected to **keep materials & toxins out of the waste stream**

Low VOC paints, **glue-free adhesive** carpet tiles

Carpet tiles cover **75%** of floor area, contain between **60-80% recycled** context, which are durable, easy to maintain, easy to replace, & **recyclable**

Furnishings chosen for their **highly recycled context & recyclability** (e.g. study chairs contain 80% recycled aluminum, 100% recyclable, others made from 111 recycled plastic bottles per chair)



SUSTAINABLE FEATURES ENERGY

Designed in accordance with the **Advanced Energy Design Guide** to achieve a minimum **30% energy savings**

Equipment technologies include the most **efficient chillers** on the market with VFDs & frictionless magnetic bearings

Building automation systems optimize conservation by tracking performance, monitoring usage trends, & minimizing wasteful operation

Lighting typically accounts for **40%-55%** of total energy consumption, so the design team incorporated daylight harvesting, LED systems, & occupancy sensors



MALCOLM WELLS' CHECKLIST

Project:		degeneration							sustainability							regeneration								
		-100	-75	-50	-25	0	25	50	75	100														
		always	usually	sometimes	a bit	balances	a bit	sometimes	usually	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		

Not good for the site...

negative score 2200 possible	positive score 2200 possible
-375	925
final score: 550	

MALCOLM WELLS' CHECKLIST - THE SITE

Project:		degeneration							sustainability							regeneration								
		-100	-75	-50	-25	0	25	50	75	100														
		always	usually	sometimes	a bit	balances	a bit	sometimes	usually	always														
the site	pollutes air																					cleans air		
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negative score 2200 possible	positive score 2200 possible
-375	925
final score: 550	

- Air | -50**
 Automobiles & site maintenance pollute air, & insufficient amount of native vegetation to clean air
- Water | -75**
 Lack of collection, retention, & filtering of stormwater runoff from parking lot
- Rainwater | -75**
 System minimizes stream velocities, erosion, & discharge into city storm sewer system, but does not store rainwater
- Food Production | -100**
 Small cafe off the main entry, & has to transport in all of it's products, none are produced on site
- Soil | -50**
 Lack of on-site water filtration & redirection leads to erosion, although mitigating this problem has been attempted

MALCOLM WELLS' CHECKLIST - THE SITE

Project:		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
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	is ugly																			is beautiful

negative score 2200 possible	positive score 2200 possible
-375	925
final score:	
550	

- **Wastes | 0**
Avoided construction waste, because building is adaptive reuse, & it doesn't deal with on-site waste
- **Wildlife Habitat | 25**
Original building likely destroyed wildlife habitat, but an attempt to provide local vegetation has been made
- **Energy | -25**
Energy is imported for safety & maintenance needs
- **Transportation | 0**
Located on two major bus routes & is pedestrian & bike friendly, but received a WalkScore of 45
- **Local Weather | 25**
Water feature east of the building entry could potentially mitigate heat entering the building by providing cool breezes

MALCOLM WELLS' CHECKLIST - THE BUILDING

Project:		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
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negative score 2200 possible	positive score 2200 possible
-375	925
final score:	
550	

- **Daylight | 75**
Natural daylighting during the daytime through the use of light shelves & skylights
- **Heating | 25**
Climate calls for few heating periods
- **Cooling | 75**
Exterior chill tower is connected to (2) high efficiency chillers within the building, & shading strategies
- **Maintenance | 75**
Low maintenance AC system, building systems with remote access & control, & durable facade
- **User Comfort | 75**
Building automation systems track performance for user comfort
- **Circulation | 100**
Single story with a central spine way-finding system

MALCOLM WELLS' CHECKLIST - THE BUILDING

		Project:																			
		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	●	●	●	●	●					
	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	●	●	●	●	●						
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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 2200 possible			positive score 2200 possible																
		-375			925																
		final score:		550																	

Indoor Air Quality | 25

Finishes & furnishings were chosen based on their lack of harmful toxins (e.g. low VOC paints, glue free adhesives for carpet tiles, etc.), unfortunately books emit VOCs

Materials | 75

Building materials & furnishings chosen based on their recyclability

Recyclability | 75

Most of the building, materials, & furnishings are recyclable

Regeneration | 100

The building has proven that it has the ability to adapt already & could adapt again in the future

Neighbor | 100

It provides a positive atmosphere within a community that struggles with violence, & was also a smart financial move

Aesthetics | 75

Modern adaptation of an 80's "ghostbox" building & won awards for the interior design

LEED CHECKLIST

LEED 2009 for New Construction and Major Renovations Project Checklist					Project Name Date				
16 0 0 Sustainable Sites Possible Points: 26					Materials and Resources, Continued				
1	Y	Prereq 1	Construction Activity Pollution Prevention	1	2	Y	Credit 4	Recycled Content	1 to 2
5	0	Credit 11	Site Selection	5	1	Y	Credit 5	Regional Materials	1 to 2
6	0	Credit 2	Development Density and Community Connectivity	6	1	Y	Credit 6	Rapidly Renewable Materials	1
1	0	Credit 3	Brownfield Redevelopment	1	1	Y	Credit 7	Certified Wood	1
4	0	Credit 4.1	Alternative Transportation—Public Transportation Access	4	13	0	0	Indoor Environmental Quality	Possible Points: 15
1	0	Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1	Y	Y	Prereq 1	Minimum Indoor Air Quality Performance	0
0	0	Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	0	Y	Y	Prereq 2	Environmental Tobacco Smoke (ETS) Control	0
2	0	Credit 4.4	Alternative Transportation—Parking Capacity	2	1	Y	Credit 1	Outdoor Air Delivery Monitoring	1
0	0	Credit 5.1	Site Development—Protect or Restore Habitat	0	1	Y	Credit 2	Increased Ventilation	1
1	0	Credit 5.2	Site Development—Maximize Open Space	1	1	Y	Credit 3.1	Construction IAQ Management Plan—During Construction	1
0	0	Credit 6.1	Stormwater Design—Quantity Control	0	1	0	Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
0	0	Credit 6.2	Stormwater Design—Quality Control	0	1	Y	Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
0	0	Credit 7.1	Heat Island Effect—Non-roof	0	1	Y	Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
0	0	Credit 7.2	Heat Island Effect—Roof	0	1	Y	Credit 4.3	Low-Emitting Materials—Flooring Systems	1
0	0	Credit 8	Light Pollution Reduction	0	1	Y	Credit 4.4	Low-Emitting Materials—Composite Wood and AgriFiber Products	1
2	0	0	Water Efficiency	Possible Points: 10	1	Y	Credit 5	Indoor Chemical and Pollutant Source Control	1
2	0	Prereq 1	Water Use Reduction—20% Reduction	2	1	Y	Credit 6.2	Controllability of Systems—Lighting	1
0	0	Credit 11	Water Efficient Landscaping	2 to 4	1	Y	Credit 7.1	Thermal Comfort—Design	1
0	0	Credit 12	Innovative Wastewater Technologies	2	1	Y	Credit 7.2	Thermal Comfort—Verification	1
2	0	Credit 13	Water Use Reduction	2 to 4	1	Y	Credit 8.1	Daylight and Views—Daylight	1
21	0	0	Energy and Atmosphere	Possible Points: 35	1	Y	Credit 8.2	Daylight and Views—Views	1
0	Y	Prereq 1	Fundamental Commissioning of Building Energy Systems	0	5	0	0	Innovation and Design Process	Possible Points: 6
0	Y	Prereq 2	Minimum Energy Performance	0	1	Y	Credit 1.1	Innovation in Design: Specific Title	1
0	Y	Prereq 3	Fundamental Refrigerant Management	0	1	Y	Credit 1.2	Innovation in Design: Specific Title	1
19	0	Credit 1	Optimize Energy Performance	1 to 19	1	Y	Credit 1.3	Innovation in Design: Specific Title	1
0	0	Credit 2	On-Site Renewable Energy	1 to 7	1	Y	Credit 1.4	Innovation in Design: Specific Title	1
0	0	Credit 3	Enhanced Commissioning	2	1	Y	Credit 1.5	Innovation in Design: Specific Title	1
2	0	Credit 4	Enhanced Refrigerant Management	2	0	0	Credit 2	LEED Accredited Professional	1
0	0	Credit 15	Measurement and Verification	3	4	0	0	Regional Priority Credits	Possible Points: 4
0	0	Credit 6	Green Power	2	1	Y	Credit 1.1	Regional Priority: Specific Credit	1
13	0	0	Materials and Resources	Possible Points: 14	0	Y	Credit 1.2	Regional Priority: Specific Credit	1
3	Y	Prereq 1	Storage and Collection of Recyclables	3	1	Y	Credit 1.3	Regional Priority: Specific Credit	1
1	Y	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3	1	Y	Credit 1.4	Regional Priority: Specific Credit	1
1	Y	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1	1	Y	Credit 1.4	Regional Priority: Specific Credit	1
2	Y	Credit 2	Construction Waste Management	1 to 2	74	0	0	Total	Possible Points: 110
2	Y	Credit 3	Materials Reuse	1 to 2					

LEED Gold Certification

74 / 110 Points

Not bad, but improvements
could be made...

REDESIGN PROPOSAL

- **Issue(s)** - Users' **reliance** on the **automobile** to get to the site is substantial, & there is a **lack** of **incentive/encouragement** to find other means of transportation
- **Proposal(s)** - **Priority parking** for electric & carpool vehicles, more covered **bike storage**, integrated **pedestrian & bike paths**:
 - Encourages more people to find different means of transportation, such as carpooling, walking, & biking



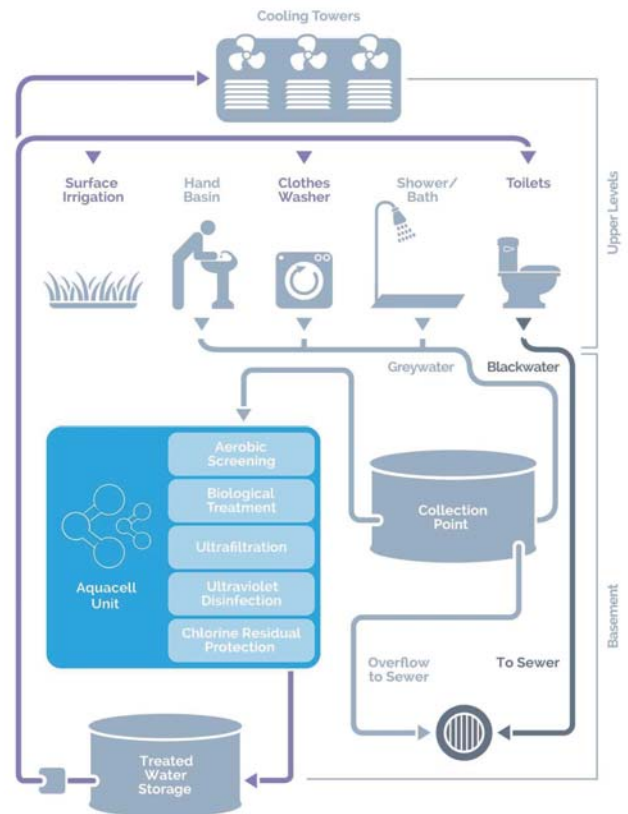
REDESIGN PROPOSAL

- **Issue(s)** - Site **imports** all **food** products, & there is an inadequate **wildlife habitat**
- **Proposal(s)** - Large scale **community garden & wildlife habitat**:
 - Becomes a teaching opportunity for young users & members of the community
 - Provides exports of zero kilometer foods
 - A true wildlife habitat could enhance the current "Dewey Park"



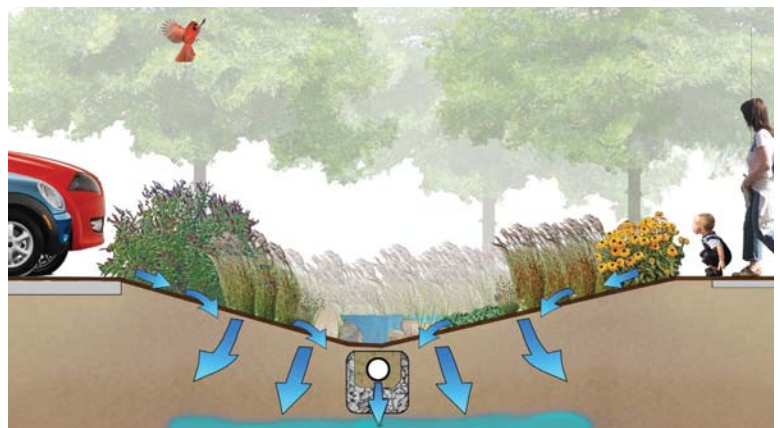
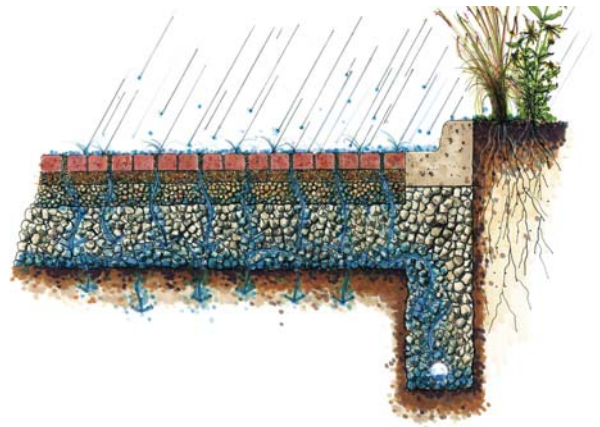
REDESIGN PROPOSAL

- **Issue(s)** - Water being imported is more than necessary, due to lack of water reuse or recycling
- **Proposal(s)** - Grey water recycling:
 - By filtering & reusing sink water it would lessen the amount of water being imported
 - Water could be reused for toilets, as well as excess being used for irrigation



REDESIGN PROPOSAL

- **Issue(s)** - Current system only slows down velocity of stormwater being sent to city sewer, & there is polluted soil & erosion being caused from runoff
- **Proposal(s)** - Site retention bioswales, & permeable paving for parking lot:
 - Would lessen discharge into city sewer, & the overflow that is sent off-site would be filtered
 - Help with issue of erosion
 - Reduces heat island effect



REDESIGN PROPOSAL

- **Issue(s) - Imports** more energy than necessary
- **Proposal(s) - Photovoltaics** on roof:
 - Large flat roof provides an opportunity to integrate a substantial amount of PVs
 - Excess energy could be exported back to the grid
 - Integrating with cool roof will help alleviate heat island effect on the roof
 - Other unique options could be found



REDESIGN - MALCOLM WELLS' CHECKLIST

Redesign focused heavily on improving the site.
Point increase from **550** to **1625**. Increase of **1075** points!

		degeneration			sustainability			regeneration		
		-100 always	-75 usually	-50 sometimes	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 2200 possible 0	positive score 2200 possible 1625
final score: 1625	

REDESIGN - LEED CHECKLIST

Redesign focused heavily on improving the site.
Point increase from **74** to **96**. Increase of **22** points!

LEED 2009 for New Construction and Major Renovations				Project Name				
Project Checklist				Date				
Sustainable Sites Possible Points: 26				Materials and Resources, Continued				
Y	1	Prereq 1	Construction Activity Pollution Prevention	2	1	Cr04 4	Recycled Content	1 to 2
1	5	Cr04 1	Site Selection	1	1	Cr04 5	Regional Materials	1 to 2
0	0	Cr04 2	Development Density and Community Connectivity	5	1	Cr04 6	Rapidly Renewable Materials	1
0	0	Cr04 3	Brownfield Redevelopment	1	1	Cr04 7	Certified Wood	1
6	6	Cr04 4.1	Alternative Transportation—Public Transportation Access	6	1			
1	1	Cr04 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1	1			
0	0	Cr04 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3				
2	2	Cr04 4.4	Alternative Transportation—Parking Capacity	2				
1	1	Cr04 5.1	Site Development—Protect or Restore Habitat	1				
1	1	Cr04 5.2	Site Development—Maximize Open Space	1				
1	1	Cr04 6.1	Stormwater Design—Quantity Control	1				
1	1	Cr04 6.2	Stormwater Design—Quality Control	1				
1	1	Cr04 7.1	Heat Island Effect—Non-roof	1				
1	1	Cr04 7.2	Heat Island Effect—Roof	1				
0	0	Cr04 8	Light Pollution Reduction	1				
Water Efficiency Possible Points: 10				Indoor Environmental Quality Possible Points: 15				
Y	4	Prereq 1	Water Use Reduction—20% Reduction	2	1	Cr04 1	Minimum Indoor Air Quality Performance	0
2	2	Cr04 1	Water Efficient Landscaping	2 to 4	1	Cr04 2	Environmental Tobacco Smoke (ETS) Control	0
4	4	Cr04 2	Innovative Wastewater Technologies	2	1	Cr04 3	Outdoor Air Delivery Monitoring	1
0	0	Cr04 3	Water Use Reduction	2 to 4	1	Cr04 4	Increased Ventilation	1
Energy and Atmosphere Possible Points: 25				Regional Priority Credits Possible Points: 4				
Y	19	Prereq 1	Fundamental Commissioning of Building Energy Systems	0	1	Cr04 1.1	Innovation in Design: Specific Title	1
Y	7	Prereq 2	Minimum Energy Performance	1 to 19	1	Cr04 1.2	Innovation in Design: Specific Title	1
0	0	Prereq 3	Fundamental Refrigerant Management	1 to 7	1	Cr04 1.3	Innovation in Design: Specific Title	1
1	1	Cr04 1	Optimize Energy Performance	1 to 19	1	Cr04 1.4	Innovation in Design: Specific Title	1
0	0	Cr04 2	On-Site Renewable Energy	2	1	Cr04 1.5	Innovation in Design: Specific Title	1
2	2	Cr04 3	Enhanced Commissioning	2	1	Cr04 2	LEED Accredited Professional	1
0	0	Cr04 4	Enhanced Refrigerant Management	2	1			
0	0	Cr04 5	Measurement and Verification	3	0			
1	1	Cr04 6	Green Power	2				
Materials and Resources Possible Points: 14				Innovation and Design Process Possible Points: 6				
Y	3	Prereq 1	Storage and Collection of Recyclables	0	1	Cr04 1.1	Regional Priority: Specific Credit	1
1	1	Cr04 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3	1	Cr04 1.2	Regional Priority: Specific Credit	1
1	1	Cr04 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1	1	Cr04 1.3	Regional Priority: Specific Credit	1
2	2	Cr04 2	Construction Waste Management	1 to 2	1	Cr04 1.4	Regional Priority: Specific Credit	1
2	2	Cr04 3	Materials Reuse	1 to 2				
Total Possible Points: 110				Total Possible Points: 110				
				Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110				

LEED Platinum Certification
96 / 110 Points

CONCLUSION

The **aftermath** of the abandoned **Walmart** had a substantial **impact** on the sustainability of the **site**.

Changes such as: **encouraging** other means of **transportation**, implementation of a **community garden & wildlife habitat**, **grey water reuse & recycling**, **bioswales & permeable paving**, & integration of **photovoltaics** can improve overall sustainability.

By making these changes we were able to achieve an increase of **1075** points in the Malcolm Well's Checklist & also an increase of **22** points in the LEED Checklist.

These changes could potentially take the McAllen Main Library from LEED Gold to **LEED Platinum** & push the building closer to becoming **net zero**.

