

University of Arizona: Continuing the Evolution of the Sustainable Built Environment

In complete concert with the University of Arizona's mission and the foundational pillars of its Never Settle Strategic Plan, UA sustainability programs through their engagement, innovation, partnering and synergy efforts, continue to maintain a peer leadership role by incorporating sustainability throughout the campus life experience. Building on the great successes already achieved, the University continues moving forward, implementing innovative sustainable practices that meet the need of the present without compromising the ability of future generations to meet their needs.

Here at the University of Arizona's Department of Planning, Design & Construction, we specifically focus on the built environment aspect of sustainability. We foster a balance that considers the elements of *well-designed, cost effective, operationally efficient, enduring quality and contextually responsive buildings* that utilize simple materials in creative and inspiring ways to complement and support the University's educational and sustainability mission.

Before the terms "sustainable" or "green" became widely

used, the University of Arizona was already innovating, designing and constructing high performance, energy efficient buildings intended to last 50 plus years. Reflecting our strong commitment

to balanced, sustainable design, we are continually developing and improving our nationally recognized design and construction standards which facilitate quality, sustainable buildings that:

- Reduce waste generation and pollution
- Enhance building occupant comfort, health, well-being and productivity
- Utilize appropriate Sonoran Desert design
- Reduce energy, water use and local infrastructure impact
- Maximize longevity and operational efficiency

To validate and metric these efforts, the University of Arizona registers its projects

with the U.S. Green Building Council to achieve LEED® certification. LEED (Leadership in Energy and Environmental Design), is a standardized, nationally-accepted benchmark for the design, construction and operation of high performance green buildings. To date, the University has a portfolio of seven LEED certified buildings—three certified at the *highest achievable* Platinum level, one of which —the Student Recreation Center



The Environmental & Natural Resources 2 Building

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The Health Sciences Education Building

Expansion—was the first LEED platinum university recreation facility in the country. We also have two buildings certified at Gold, two at Silver and five buildings that are either currently being designed or constructed which will achieve at least Silver certification. In recognition of its overall commitment to sustainability, the University of Arizona was named among the top “green” colleges in the country by both The Princeton Review and the Sierra Club in 2015.

Many significant examples of the sustainable built environment can be found and physically experienced across the University’s Tucson and Phoenix campuses. These cover a spectrum of building types that includes research, teaching, arts, sports, residences and recreation.

The Environmental & Natural Resources 2 Building (on track for LEED Platinum), supports the environmental mission through a fundamental response to our region, context, environment, sense of place and the special qualities of the Southwest and the Sonoran Desert. The project borrows from the iconic imagery of the southwest region: striking landforms of canyon and mesa; the dramatic play of light, shade and shadow; the painted sky of sunsets; desert monsoon, and highly adapted plants and animals.

ENR2 is a part of the University of Arizona’s ongoing and concerted effort to promote interdisciplinary research that focuses on Earth Science and Environmental Programs. A key goal of this facility is to establish an atmosphere for collaboration of scientific and interdisciplinary research which creates great opportunities for graduate students across multiple disciplines.

Many of the sustainable features of the building are passive systems that require little

if any assistance from non-renewable energy sources. These systems include configuring the building to respond to each exposure, as well as a central “canyon” courtyard that integrates exterior circulation and interaction space. Vertical metal fins and overhangs shade the building on the south façade and similar fins on the north address the less direct sun exposure. Minimal openings are located on the east and west where needed. The same shade elements are utilized within the canyon to create the effect of the curvilinear canyon wall. Substantial concrete walls, overhangs and structure provide both cool thermal mass and critical shade from the summer sun.

Active systems contribute to the sustainability of the facility to create a work environment that maximizes comfort, putting the occupants in control of temperature and lighting. Natural lighting along with highly efficient light fixtures, light level and occupancy controls facilitate this dynamic.

Water use is minimized through the use of waterless urinals, dual flush toilets and low flow/demand sensing faucets and, as a part of the building water harvesting effort, a 52,000 gallon underground holding/filtration tank is located on the south side of the building. During its construction, 1150 tons of recycled material was diverted from local landfills.

The Health Sciences Education Building (certified LEED Silver), located on the University’s Phoenix campus, draws its design inspiration from surrounding mountains and canyons and responds to local climactic conditions characterized by intense sunlight and extreme temperatures. Inspired by the iconic canyon formations found throughout Arizona, the façade reinterprets stratified earth layers as a



The Helen S. Schaefer Building

copper sunscreen protecting the building from direct solar exposure. The copper skin is formed, bent, pressed and perforated to create a visual connection to the surrounding mountain range. The “canyon” is the building’s central organizing element. Clad in burnished concrete building block to provide cool thermal mass and reflectivity, it is shaped to maximize self-shading, allowing light from, and visual connection to, the exterior. Defined by two academic wings and the “mixing bar”, this exterior space is protected overhead by a fabric structure and tempered with landscaping and semi-conditioned relief air. This relief air of the building is introduced at the first-floor level, cooling the space, as the ambient temperature can be well over 100 degrees Fahrenheit.

Mechanical and electrical systems are engineered to be highly efficient and easy to maintain. The canyon space, shaded from above and the sides, is made comfortable through the introduction of tempered building relief air which would normally have been exhausted to the roof of the building. Lighting is designed to be highly efficient and augmented wherever possible by controlled daylight. Interior materials selected were chosen for durability and beauty, as well as for their high-recycled content.

The Helen S. Schaefer Building, home of the Poetry Center, incorporates many elements which contribute to a sustainable built environment.

Both the vertical surfaces and the horizontal ground plane of the Poetry Center are protected from direct sunlight by an umbrella of broad and deep energy-saving roof overhangs. Keeping direct sun off the building exterior is one of the most effective ways of preventing heat gain and reducing cooling needs. The overhangs prevent solar gain to interior surfaces through glass, and prevent masonry and concrete from absorbing sun energy and re-radiating it throughout the day.

Well-protected exterior spaces surround the building and help to create a more temperate outdoor climate. This increases the useable square-footage of the building without the environmental impact of increased structure.

Much of the exterior of the building is constructed of glass which is unusual for desert construction. However, in every case,



The Sixth Street Residence Halls, Arbol de la Vida and Likins Hall

this glass is protected from direct sunlight by orientation, overhang, or obstruction. The building is situated in a directly north-south / east-west orientation allowing it to efficiently mitigate sun impact by using sun angles to its advantage.

Like other University of Arizona buildings, the mechanical and electrical systems are designed to be highly efficient and easy to maintain. Lower energy compact fluorescent lights are used wherever possible to reduce energy consumption and mitigate heat gained through lighting.

Interior glass partitions used throughout the building welcome protected natural light into the building and allow it to pass unobstructed through the majority of spaces within. This conveys maximum energy savings due to the reduced dependence on electrical lighting. In addition, it conveys the maximum health benefits of natural daylighting to all the building’s occupants.

The Sixth Street Residence Halls, Arbol de la Vida and Likins Hall (certified LEED Platinum), were the University of Arizona’s first residence halls to be LEED registered, and have achieved Platinum certification. The project is located on two separate sites and provides 1,088 new beds.

Land is a limited and finite resource at the University of Arizona campus, so the sites were developed with an urban approach to land utilization by maximizing building footprint and height. These new on-campus facilities also provide housing in proximity to open space, transportation, food service, academic and university facilities, and nearby businesses.

The landscape design uses plant materials that are appropriate for this region, and implements passive water harvesting techniques. Drought tolerant native species are used in the planting areas at the building perimeter, and mezzo-riparian species are used in the shaded courtyards. Passive water harvesting is achieved through site grading, which will slow runoff and augment plant watering, and a deep root watering system will pipe rain water below the soil to supplement the on-site absorption.

The project has a well-sealed, insulated envelope; strategically located building overhangs and awnings to maximize protection of the windows from the sun; and a north-south building orientation. The

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Scottsdale Investor Buys Galeria del Rio Apartments for \$19.3 Million

Scottsdale, Arizona based Rincon Partners and Virginia based Capital Square Holdings (Yogi Singh, Member), paid \$19,300,000 (\$191,089/unit) for the Galeria del Rio apartments located at 5132 N Prarie Clover Rd. The seller was Miramonte Homes (Ron Teaney, president). Galeria del Rio was built in 2014, and is a 101 unit property consisting of three- and four-bedroom units with attached two-car garages, and an average unit size of 1,573 SF. 3/24/16

Sale:
\$19,300,000;
\$191,089/
Unit

Buyer: Capital Square Holdings LLC (804) 290-7900

Seller: Miramonte Homes; NAI Horizon, Justin Lanne/Mike Chapman (520) 591-5188

Size:
101 Units

Private Investor Buys Mission Creek Apartments for \$8.5 Million

Private Investor Hung Tran, paid \$8,500,000 for the Mission Creek apartments located at 1451 W Ajo Way. The seller was Holualoa Companies (Michael Kasser, president), through their affiliate Holualoa Mission Creek, LLC. Mission Creek apartments was built in 1987, is a 200 unit property consisting of one- and two-bedroom units, with an average unit size of 580 SF. At the time of its sale, Mission Creek apartments was 97.5% occupied. This was an all cash transaction. 3/31/16

Sale:
\$8,500,000;
\$42,500/ Unit

Buyer: Hung Tran; Berkadia, John Laratta (303) 607-0025

Seller: Holualoa Companies; Berkadia, Art & Clint Wadlund (520) 299-7200

Size:
200 Units

Mattamy Homes Buys Civano Land for \$8.2 Million

The Tucson division of Mattamy Homes (Josh Robinson, president), paid \$8,200,000 for the 173 acre Civano Land Parcel located on the corner of Houghton Rd & Irvington Rd. The seller was the City of Tucson. Mattamy Homes plans on building a single family residential community, but their plans are not yet finalized. This was an all cash transaction. 3/29/16

Sale:
\$8,200,000;
\$47,398.84/
AC

Buyer: Mattamy Homes; Cantera Real Estate LLC, Thrac Paulette (520) 904-5055

Seller: City Of Tucson; CBRE, Ben Becker/Adam Becker (520) 323-5188

Size:
173 AC

California Investor Buys Walgreens for \$7.75 Million

Los Angeles, California based Bixby Bridge Capital (David Dunham, principal), through their affiliate RCK Properties, Inc., paid \$7,750,000 for the Walgreens located at 605 W Ajo Way. The seller was Shamie Development Company (Sam Shamie, founder), through their affiliate S & N Tucson, LLC. This Walgreens was built in 2003 and sits on 1.5 acres. 3/31/16

Sale:
\$7,750,000;
\$534.85/ SF

Buyer: Bixby Bridge Capital; RCK Properties Inc. (310) 839-3968

Seller: Shamie Development Company; SVN/ Net Lease Texas, Ali Chambers (214) 412-7626

Size:
14,490 SF

California Investor Buys Self-Storage Building for \$7.5 Million

Santa Monica, California based William Warren Group, Inc. (Clark Porter, president), through their affiliate 4555 N 1st SP, LLC., paid \$7,500,000 for the Foothills Self Storage located at 4555 N 1st Ave. The seller was 4555 N First Avenue Partners. Foothills Self Storage was built in 1997, and consists of 636 storage units with about 62,770 SF of rentable space. The property will be re-branded as Stor-Qwest Self Storage. At the time of its sale Foothills Self Storage was 95% occupied. 3/3/16

Sale:
\$7,500,000;
\$119.48/ SF

Buyer: William Warren Group, Inc. (310) 451-2130

Seller: 4555 N First Avenue Partners; Rein & Grosseohme, Bill Alter (602) 315-0771

Size:
62,770 SF

California Investor Buys San Simeon Apartments for \$3.74 Million

San Diego, California based The Corky McMillin Companies (Mark McMillin, president), through their affiliate San Simeon Apartments LLC., paid \$3,740,000 for the San Simeon apartments located at 6091 E Golf Links Rd. The seller was Corey Peterson through their affiliate San Simeon East Golf Links LLC. The San Simeon apartments were built in 1963 and has 70 units consisting of one, two, and three-bedroom units with an average unit size of 848 SF. At the time of its sale San Simeon apartments was 100% occupied. The property previously sold for \$3,465,000 (\$49,500/Unit) in August 2013. 3/18/16

Sale:
\$3,740,000;
\$53,429/ Unit

Buyer: The Corky McMillin Companies (619) 477-4117

Seller: Corey Petersen; Colliers International, Bill Hahn (602) 222-5105

Size:
70 Units

Californian Investor Buys Office Park for \$3.1 Million

Ontario, CA based Jian Ming Wu & Miao Zhen paid \$3,100,000 for three office properties located in the Continental Professional Plaza at 1131, 1141, & 1151 S La Canada Dr. The seller was Holualoa Companies (Michael Kasser, CEO), through their affiliate Holualoa GV Professional Plaza LLC. The properties were built in 1979 and renovated in 1999. The 7,878 SF office at 1131 S La Canada Dr. and was purchased at \$837,738. The 8,506 SF office at 1141 S La Canada Dr. was purchased at \$691,852. The 14,862 SF office at 1151 S La Canada Dr. was purchased at \$1,580,410. At the time of its sale these properties were 78% occupied. 3/3/16

Sale:
\$3,100,000;
\$99.21/ SF

Size:
31,246 SF

Buyer: Jian Ming Wu & Miao Zhen; Marcus & Millichap, Jeff Lin (909) 456-3486

Seller: Holualoa Companies; Jump Ventures, Inc., Jonathan Jump (520) 733-0007, et al.

Phoenix Developer Buys Downtown Industrial Land for \$1.65 Million

Phoenix, Arizona based Amerco Real Estate Company (Edward Shoen, president), buys industrial land for \$1,650,000, located at 450-460 N Freeway. The seller was First Family Company, LTD. (Joe Millstone, manager). This 3.88 acre land parcel is in Tucson's Central Business District and is entitled to the Government Property Lease Excise Tax District which waives property taxes for eight years if the developer increases the property's value by at least 100%. Amerco is a parent company of U-Haul and purchased the land for a new prototype mini-storage site. 3/23/16

Sale:
\$1,650,000;
\$425,257.73/
AC

Size:
3.88 AC

Buyer: Amerco Real Estate Company (602) 263-6555

Seller: First Family Company, LTD.; Millstone Investment & Dev. Co., Joseph Millstone (520) 906-8008

California Investor Buys Brake Max for \$1.6 Million

Castro Valley, California based Pasquini V & D Living Trust (Dennis Pasquini, trustee), paid \$1,600,000 for the Brake Max located at 2240 N Silverbell Rd. The seller was Brake Max Corporate, LLC. (Ray Pisciotta, president). This Brake Max was built in 2001, and sits on 0.7 acres. 3/14/16

Sale:
\$1,600,000;
\$292.83/ SF

Buyer: Pasquini V & D Living Trust, Dennis Pasquini

Seller: Brake Max Corporate, LLC.; Marcus & Millichap, Christopher Doty, (520) 687-6758, et al

Size:
5,464 SF

Phoenix Investor Buys Catalina Vista Apartments for \$1.55 Million

Phoenix, Arizona based Greenlite Holdings LLC. (Jonathan Lewis, manager) through their affiliate Catalina Vista 1 LLC., paid \$1,550,000 for the Catalina Vista Apartments located at 8550 E Old Spanish Trail. The seller was OST Holdings LLC. (Bernard Berk, member). Catalina Vistas is a 50 unit property that was built in 1971. Catalina Vistas consists of one-, two-, and three-bedroom units with an average size of 905 SF. The property sold previously for \$1,412,500 (\$28,250/Unit) in March 2002. 3/17/16

Sale:
\$1,550,000;
\$31,000/
Unit

Buyer: Catalina Vista 1 LLC.; Marcus & Millichap, Hamid Panahi (602) 687-6649

Seller: Bernard Berk; Marcus & Millichap, Hamid Panahi (602) 687-6649, et al.

Size:
50 Units

Tucson Investor Buys Car Wash Site for \$1.47 Million

Tucson, Arizona based Charles Schuetz paid \$1,470,000 for 1.24 acres of commercial land located on the corner of E Pusch View Ln and N 1st Ave. The seller was Cross Development Cc Oro Valley. The buyer intends to construct a two-story car wash with corporate office on the upper level. 3/22/16

Sale:
\$1,470,000;
\$1,189,512/
AC

Buyer: Charles Schuetz

Seller: Cross Development Cc Oro Valley LLC

Size:
1.24 AC

big deals

big deals

Tucson Resale Activity Summary								Tucson Luxury Market Activity Summary									
Year	Month	Active Listings	Units Sold	New Listings	Months Supply	Median Sales Price	Avg. DOM	Year	Month	Active Listings	Units Sold	Months' Supply	Median Sales Price	Avg. DOM	Avg. CDOM		
2015	April	5,487	1,383	2,161	4.0	\$167,500	66	2015	April	180	8	23	\$1,172,500	89	275		
	May	5,250	1,388	2,108	3.8	\$171,250	62		May	169	6	28	\$1,451,000	46	245		
	June	4,992	1,481	1,976	3.4	\$173,000	60		June	152	9	17	\$1,325,000	117	141		
	July	4,798	1,470	1,765	3.3	\$175,000	61		July	144	8	18	\$1,152,500	44	140		
	August	4,758	1,276	2,011	3.7	\$173,250	63		August	142	6	24	\$1,315,000	329	347		
	September	4,909	1,203	2,072	4.1	\$172,000	61		September	148	8	19	\$1,170,000	86	209		
	October	5,043	1,188	2,034	4.2	\$172,825	63		October	148	8	19	\$1,142,500	71	180		
	November	5,096	909	1,749	5.6	\$169,000	60		November	154	4	39	\$1,305,000	137	137		
	December	4,888	1,247	1,614	3.9	\$176,000	59		December	153	5	31	\$1,325,000	46	104		
	2016	January	5,095	965	2,373	5.3	\$169,000		66	2016	January	169	8	21	\$1,352,500	95	161
	February	5,078	1,055	2,208	4.8	\$168,900	65		February	187	4	47	\$1,411,250	137	50		
	March	4,802	1,480	2,259	3.2	\$177,050	57		March	188	5	38	\$1,200,000	77	616		
1 mo. change		-5%	40%	2%	-33%	5%	-12%	1 mo. change		1%	25%	-20%	-15%	-44%	1132%		
1 yr. change		-12%	7%	5%	-18%	6%	-14%	1 yr. change		4%	-38%	67%	2%	-13%	124%		

Source: TARMLS Source: TARMLS \$1+ million Sales

Canyon Pass at Dove Mountain Home Sells for \$1,500,000

Built in 2007, this 3,670 SF Contemporary style home is located on 2.06 acres in Canyon Pass at Dove Mountain. Originally listed in June 2014 for \$2,300,000, this home was on the MLS for a total of 612 days under three listings. Under this listing, this home sold for 75% of its listing price after 87 days on the market. 3/4/16

Listing Agent: Patty Howard, Long Realty Company
Selling Agent: Karin Radzewicz, Coldwell Banker Residential Brokerage

Sale:
\$1,500,000

Address:
14366 N Dove Canyon Pass
Marana, AZ 85658

Stone Canyon Home Sells for \$1,450,000

Built in 2014, this 4,360 SF Contemporary style home is located on 1.05 acres in Stone Canyon. Originally listed in January 2014 for \$1,660,000 this home was on the MLS for a total of 749 days under four listings. Under this listing, this home sold for 91% of its listing price after 105 days on the market. 3/3/16

Listing Agent: Oscar Ramirez, Long Realty Company
Selling Agent: Michael Oliver, Long Realty Company

Sale:
\$1,450,000

Address:
1302 W Twisted Mesquite Pl.
Oro Valley, AZ 85755

Ventana Canyon Estates Home Sells for \$1,200,000

Built in 2002, this 4,426 SF Contemporary style home is located on 1.21 acres in the Ventana Canyon Estates. Originally listed in November 2013 for \$2,700,000 this home was on the MLS for a total of 679 days under two listings. Under this listing, this home sold for 75% of its listing price after 85 days on the market. 3/11/16

Listing Agent: Bryan Durkin, Long Realty Company
Selling Agent: Joshua Waggoner, Long Realty Company

Sale:
\$1,200,000

Address:
6418 N Desert Wind Circle
Tucson, AZ 85750

Sabino Mountain Home Sells for \$1,155,000

Built in 2008, this 3,953 SF Contemporary style home is located on 1.01 acres in Sabino Mountain. Originally listed in November 2012 for \$1,436,000, this home was on the MLS for a total of 373 days under three listings. Under this listing, this home sold for 97% of its listing price after 1 day on the market. 3/24/16

Listing Agent: Robin Sue Kaiserman, Long Realty Company
Selling Agent: Lenny Bates, Long Realty Company

Sale:
\$1,155,000

Address:
4062 N Quail Canyon Dr.
Tucson, AZ 85750

Catalina Foothills Estate No. 10 Sells for \$1,000,000

Built in 2004, this 4,561 SF Mediterranean style home is located on 1.42 acres in Catalina Foothills Estates No. 10. Originally listed in March 2013 for \$1,250,000 this home was on the MLS for a total of 665 days under four listings. Under this listing, this home sold for 85% of its listing price after 108 days on the market. 3/31/16

Listing Agent: Rob Lamb, Long Realty Company
Selling Agent: Rob Lamb, Long Realty Company

Sale:
\$1,000,000

Address:
5120 N Hacienda
Del Sol Rd.
Tucson, AZ 85718



Old Main

orientation and awnings reduce heat load on the glass, and therefore reduce overall energy demand. High performance HVAC and lighting systems are continuously monitored through sophisticated software control algorithms that help optimize their operation and minimize the buildings heating, cooling and electrical energy use. Roof mounted solar thermal panels provide a significant portion of domestic hot water needs. To conserve water, low flow shower heads and lavatory faucets, as well as dual flush toilets, are used in the buildings. Each student room has a large window providing a generous amount of daylight, and the operable portion of the window will allow for direct ventilation if required.

Old Main (certified LEED Silver), was the University of Arizona’s original building and has served as the heart and soul of campus. Located in the center of the Mall and with long vistas to the east and west sides of campus, Old Main is certainly the most recognizable physical icon for the University of Arizona. After 122 years of use, the building’s envelope/structure, verandas and second floor had succumbed to the advances of age and weather penetration. The exterior unreinforced masonry columns settled and became worn and cracked. The wooden structural elements decayed and foundation walls spalled from wicked-in moisture. Fire protection and HVAC systems were well beyond their useful life. This project restored the building to its earlier conditions and prominence by fully respecting the historic character and fabric of the original building while creating modern function and safety, significantly extending the building’s useful life.

State-of-the-art efficient building systems were carefully woven into the building to preserve the original volumes and aesthetics while adding much needed functionality. Failing and unreinforced structural elements and systems were replaced and creative means were used to bring the building into compliance with modern building, safety and accessibility codes. During its renovation, almost 470 tons of recycled material was diverted from local landfills. The historic character of the building was restored, the years of decay reversed, and the useful life of the building was significantly extended for future generations. This historic icon will remain on the National Register of Historic Places as it was renovated and preserved in compliance with the Secretary of the Interior’s guidelines and administered by the State Historic Preservation Office.



The Lowell Stevens Football Facility

The Lowell Stevens Football Facility (certified LEED Gold), provides new state-of-the-art facilities and improvements that foster and support the heritage of Arizona Football. Its architectural character is all about connection; connecting the fans to their team, the alumni to the University, the team to their program, the stadium to the campus and the building to the environment. With its high degree of transparency, the building’s architecture seeks to engage all of these connections through the experience of form, rhythm, color, material and light. Daylight is maximized on the building’s north façade, utilizing an expanse of glass that enables natural light to permeate through the building.

Taking lessons learned from the portfolio of University buildings to the next level, the Lowell Stevens facility implements many sustainable attributes including high performance HVAC and lighting systems which are continuously monitored through sophisticated software control algorithms that help optimize the operation of the building’s heating, cooling and electrical systems and minimize energy use. Water use is also minimized through the use of waterless urinals, dual flush toilets and low flow/demand sensing faucets. During its construction, almost 4700 tons of recycled material was diverted from local landfills.

While very proud of the many sustainable achievements made to date, we embrace the opportunity to “Never Settle” and “Continue the Evolution of the Sustainable Built Environment” at the University of Arizona.

Ralph Banks, P.E. P.Eng. is the Director of Engineering, Design & Construction at the University’s department of Planning Design & Construction. He is a registered Engineer and LEED Accredited Professional. He can be contacted at rabanks@email.arizona.edu.



Most green building efforts and rating systems focus on new construction. But what about all of the existing buildings? There have been few options, but this may change with a 2030 District. 2030 Districts are private/public partnerships that form to renovate existing buildings and construct high-performance infill development and redevelopment with a common goal of reducing energy use, water use, and transportation emissions.

2030 DISTRICTS are in the vanguard of grassroots collaborative efforts to reduce energy use, water use, and transportation emissions by at least 50% by 2030 throughout a defined district. 2030 Districts are led by the private sector and bring property owners and managers together with local governments, businesses, and community stakeholders to provide a business model for urban sustainability through collaboration, leveraged financing, and shared resources. Together they benchmark, develop, and implement creative strategies, best practices, and verification methods for measuring progress towards a common goal: the energy use, water use and transportation emissions reduction targets called for by Architecture 2030 in their 2030 Challenge for Planning (See Box). There are 12 established districts and five emerging districts. One Established District, Albuquerque, and one Emerging District, Portland, are in the peer group of 10 cities that the MAP AZ Dashboard uses to bench mark Tucson.

What has happened so far?

Beginning early this year a group of interested people has been meeting on a bi-weekly basis to discuss the feasibility of a 2030 District. The group was established by one of the founders of the first 2030 District in Seattle. Discussions have included potential benefits, access to technical resources, possible district boundaries and more. Ongoing consultations with the 2030 District Network staff have guided the process. The prospective Tucson 2030 District has already received the attention of the U.S. Green Building Council (USGBC). The local Sonoran branch of the USGBC was able to bring in staff from the USGBC National office through the USGBC's ADVANCE initiative to help prepare a plan of action for the district and align goals, policies, procedures, and aspirations of all participating companies and organizations in order to avoid duplication, improve collaboration, and enhance the overall results.

The USGBC's ADVANCE initiative is a platform to help all communities and participants gain access to USGBC's professional network and resources. Volunteers guide community organizations in setting goals and implementing strategies to improve the energy, resource and health performance of their building or neighborhood. ADVANCE is a framework to make green building resources and expertise accessible to all, to advance social equity in the built environment and mainstream green building among new, under served and under-resourced audiences.

What's in it for my business, company or organization?

The opportunity to participate and collaborate in growing a new local business enterprise focused on achieving cost effective deep energy retrofits for buildings that can make the community more sustainable, resilient, productive and competitive. Specific benefits include:

- Access and transferability of USGBC ADVANCE resources and tools such as planning templates
- Models for the financial value of energy and water services
- Support from trained volunteers on any needed planning areas to

2030 DISTRICT GOALS:

Existing Buildings and Infrastructure Operations

- **Energy Use** A minimum District wide 20% reduction below the regional average by 2020, with incremental targets, reaching a 50% reduction by 2030.
- **Water Use** A minimum District wide 20% reduction in water consumption below regional averages by 2020, with incremental targets, reaching a 50% reduction by 2030.
- **CO₂e of Auto and Freight** A minimum 20% reduction below current regional averages by 2020, with incremental targets, reaching a 50% reduction by 2030.

New Buildings, Major Renovations And New Infrastructure

- **Energy Use** An immediate 70% reduction below the regional average, with incremental targets, reaching carbon neutral by 2030.
- **Water Use** An immediate 50% reduction in water consumption below current regional averages.
- **CO₂e of Auto and Freight** An immediate 50% reduction below current regional averages.

achieve goals, including trainings and workshops on green building planning areas and technical needs (i.e. ENERGY STAR Portfolio Manager)

- Opportunity to be a part of coalition efforts to seek out needed grant funding and in-kind donations
- Recognition for significant milestones and outcomes achieved related to 2030 District goals and efforts

What's next?

- A growing group of professional and community organizations and local property owners will continue to meet on a biweekly basis at noon at the YWCA in the Bonita neighborhood.
- The local USGBC Sonoran Branch is reviewing the successful USGBC Pittsburgh Chapter/2030 District as an ideal partnership model to consider
- A number of grant funding opportunities are being considered to be pursued as a formal coalition representing the Tucson ADVANCE Prospective 2030 District develops.

For more information, contact Michael Peel at mpeel@pima.edu.

Richard Franz-Under, Architect, LEED AP, is the Green Building Program Manager for Pima County Development Services and oversees the Regional Green Building Program and the LEED for Homes Program. He initiated and oversaw the design and construction of the first LEED building in Arizona during his tenure as Director of Facilities Planning for Pima Community College. He can be reached at (520) 740-6892 or via email at Rich.Franz-Under@dspd.pima.gov.



Energy-savings and occupant comfort begin with shady thinking in these two new buildings. They exemplify climate-responsive design by blocking direct sun before it penetrates the windows. These traditional concepts were forgotten by many with the advent of air conditioning and availability of cheap electricity. Fortunately, these concepts are trending back as electricity rates are poised to rise in 2017. The two “shady” projects recently completed in Tucson exemplify the traditional concepts of smart and climate-responsive design returning to the forefront of our design considerations.

Tucson Streetcar Maintenance and Storage Facility

Over 90% of the employees at the new, LEED Silver certified, Tucson Streetcar Maintenance and Storage Facility (MSF) in downtown Tucson enjoy shaded views and indirect daylight. Eliminating direct glare and heat gain not only provides a comfortable environment, it significantly reduces the cost of cooling the facility. The building includes separate zones for evaporative cooling and air conditioning to reduce cooling costs during the “shoulder seasons” of spring and fall. Lighting levels accommodate individual needs with flexible levels for day and night as well as user-controlled task lighting. High performance glazing is tinted for both energy efficiency and privacy for staff at night.



The overhangs of the Streetcar MSF facility effectively block the summer sun. Shielding buildings to minimize east-west solar gain and protect south-facing facades is a fundamental principle of southwestern design that many overlooked after the inexpensive and prevalent use of air conditioning. As electricity rates rise, regionally-conscious design with external shading components are essential again. Australia, with desert climates similar to that of the U.S. southwest, has required permanent, external shading over vulnerable glazing since 2007.



Environment and Natural Resources 2 (ENR2)

Students, researchers, and professors revel in the cool comfort of the University of Arizona’s new Environment & Natural Resources 2 (ENR2) building. Tracking LEED Platinum certification, the building was designed as a desert “slot canyon”, shaded from direct sun and ventilated with strategically positioned large diameter overhead fans positioned in outdoor circulation and meeting areas. The outdoor areas are also humidified by rain and with air conditioning condensate. Landscape irrigation and evapotranspiration provide additional cooling effects in these shaded outdoor spaces. Water drains through directed channels running through each floor to cisterns beneath the building and is pumped up to irrigate plants and landscaping.



Ventilation air slightly pressurizes the office spaces on the upper floors before being directed to the landscaped canyon decks. Controlled daylighting is supplemented by low level ambient and task lighting to keep lighting energy and corresponding cooling energy to a minimum. Chilled beam technology convects heating and cooling seasonally. Here, nearly 93% of occupants have access to views without discomfort.



Joyce J. Kelly, CxA+BE, CBCP, GGP, LEED BD+C, is a commissioning professional in the Facilities Solutions Group at GLHN Architects & Engineers, Inc. She facilitated LEED documentation on both the Tucson Streetcar Maintenance and Storage Facility and University of Arizona ENR2 projects. She can be reached at jkelly@glhn.com



There is a large void in the residential housing market across the United States, especially in Tucson. Entry-level housing supply is at an all time low, and now comes at a premium. Park Modern might be a new concept for Tucson, but this segment is growing quickly all across the country.

The median sales price for a home in the Tucson Metropolitan area is less than \$190,000. With slightly over 14,000 transactions on an annual basis, affordability is key. As a result, projects like Park Modern are gaining popularity. Infill development is a growing movement. There are few parcels left of this size within the city's main corridors, which means demolition, and assemblage could be the next wave.



Park Modern Interior Rendering

Park Modern began almost two years ago with the concept of providing a premium entry-level home within the existing urban core. It offers residential privacy with an organic sense of community. People who work and study at the University or Medical Center, couples and families looking for a quality first home, and retirees wanting to downsize to something new and close to the downtown culture, are among those who will be drawn to Park Modern.

Just two miles north of the University of Arizona, Park Modern is an assemblage of roughly 6.5 acres of entitled land from four separate property owners. Most of the property had been vacant for decades. The project is bisected by Tyndall Avenue, with Blackledge Drive to the south and Hedrick Drive to the north. Tyndall splits Phase One and Phase Two of the development. Phase One has been platted for 37 lots. The majority are single-family detached units with a small number of duplexed homes to achieve a yield of roughly 14 units per acre.

Park Modern offers a contemporary approach. There are no private gates or high walls around the entire project. Behind each home is a two-car garage and a private driveway. A belt of common area in front of the houses with a sidewalk to each home creates a communal environment. The external layout is intended to create social milieu which parallels the internal design of the homes.

There are three floor plans available ranging from 1,186sqft to 1,624sqft. Each home is highly customizable. As you walk in the front door, you immediately notice a great room with a high ceiling, a large kitchen that flows into the living area, a hidden staircase to the second floor, a sliding glass door to a private side yard, and standard finishes that include quartz counter tops and tile floors. All bedrooms are located on the second floor. Since each home has its own side yard, a zero lot line is utilized while maintaining privacy as no windows directly look into a neighboring yard.

Tucson's housing stock is old. With booms and busts over the past 100 years, new housing product has largely been developed in the suburbs. Tucson has expanded outward in all directions neglecting the urban core. Housing development and land prices are directly correlated. Historically, land has been cheaper to develop on the outskirts of town. To reverse this trend, certain economies of scale must be present. Important factors are land and development costs. The Park Modern site was optimum for this: mostly vacant, extremely flat, easily accessible utilities, and multiple parcels that could be acquired within an equitable ratio to the finished product.

Park Modern has been developed in conjunction with one of the top local builders. Pepper-Viner Homes, the six-time homebuilder of the year, has excelled at filling customers' demands and allowing them to individualize their product, supplying the highest level of service and finishes. Park Modern expands this tradition, offering exceptional standard features, setting this project above the competition. These additional features include 2x6 construction, high efficiency heating and cooling systems, and Nest thermostats. All homeowners are given an iPad mini to control the entire house. The iPad is also utilized during the contract signing, design, and build out period of the home, creating a seamless experience.

The entire living environment is imbued with this "smart home" concept. This feature has been a successful selling point. For instance, people love setting their home temperature while at work and accessing their front door mounted camera to see if a packages been delivered. Among the many "smart home" features is a gaming package for Xbox and built in Wi-Fi.

The subdivision officially opened for sales at the beginning of February 2016. Two model homes will be fully constructed by the end of May 2016. The subdivision will be completely paved out by the end of June. There are already a half-dozen homes being constructed, which will show the structure and feel of the community and give buyers a feel for this way of life.

Phase Two is in the planning stages. This next phase will consist of approximately 55 additional units. The same floor plans and layouts will be replicated on a slightly larger site. With almost a 100 new homes going into the Hedrick Acres neighborhood in the next four years, there is a dynamic shift occurring. Residents throughout the area have been entirely supportive of the project. The development team will bring the whole community into the fold through planning and build out. The communal environment will continue to develop as each resident moves in, culminating in a highly desirable community.

As projects like Park Modern take off in Tucson, it's thrilling to see the city's landscape evolve.

Michael Shiner is the managing partner of PSSW Investments LLC, developer of Park Modern. He is also the owner and designated broker of CXT Realty and has been a realtor since 2008. He can be reached at michael@cxtrealty.com.



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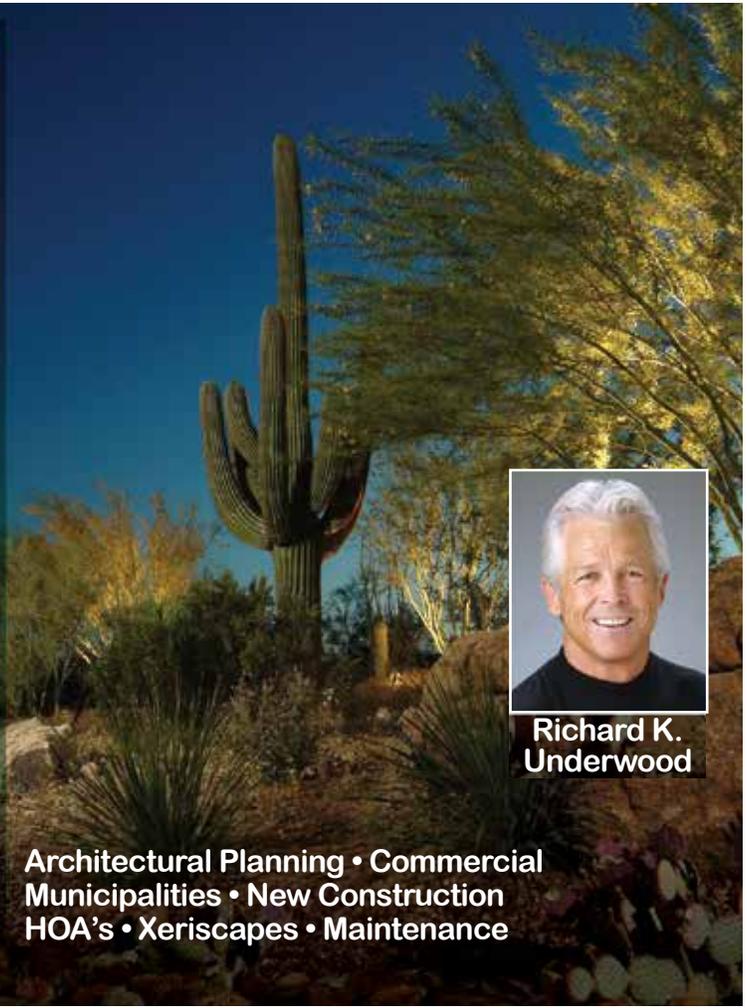
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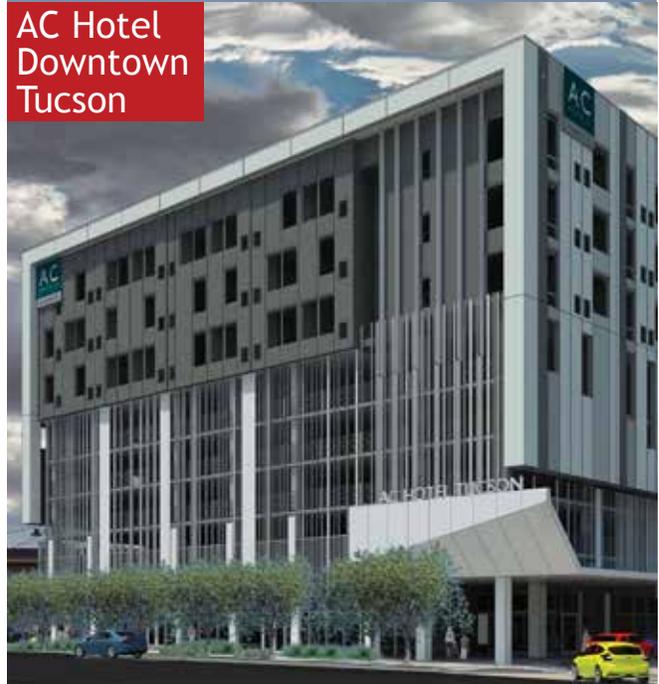
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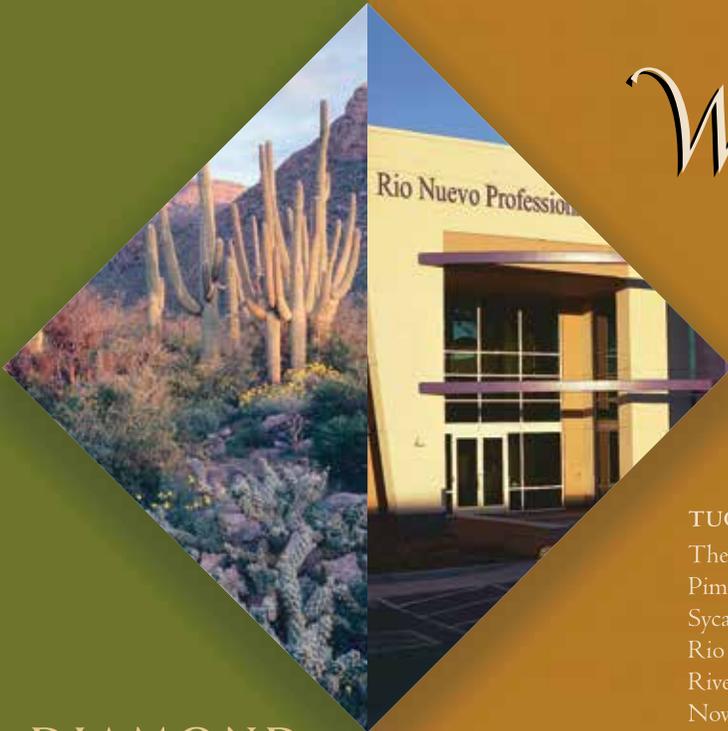
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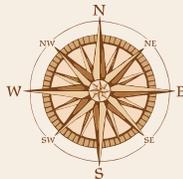
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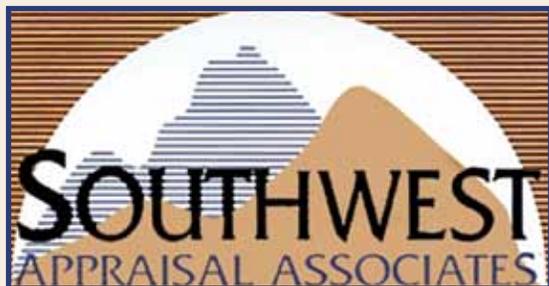
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The May 2013 *TREND* report included an article on the STAR Communities' national sustainability rating system, which Tucson and several other communities had begun to pilot. Since that time, not only has Tucson achieved a 4-STAR certification, but STAR Communities has just reached a total of fifty certified communities. This new milestone for STAR Communities makes it timely to reflect on how Tucson scored in comparison to the other forty-nine communities.

Of the fifty communities, four received the highest rating of 5 STARS. Tucson was one of nineteen 4-STAR communities, and the remaining twenty-seven communities came in at 3 STARS. In total, Tucson had the 11th highest score among all fifty communities. The only other Arizona communities currently rated are Chandler and Phoenix, both with 3-STAR certifications.

Across these seven focus areas, communities are rated specifically on how well they accomplish forty-four objectives. Under Built Environment, for example, communities are evaluated on seven objectives including Community Water Systems, Infill & Redevelopment, Transportation Choices, and Public Spaces.

Tucson's Top Scores

Tucson received perfect scores on six objectives: Business Retention & Development, Community Water Systems, Industrial Sector Resource Efficiency, Natural Resource Protection, Outdoor Air Quality, and Water in the Environment. Although there are many reasons why Tucson scored so well on these objectives, the work that was done as part of the Tucson-Pima County Water Infrastructure, Supply and Planning Study; Tucson Water's efforts to provide high-quality water to customers and their extensive water conservation programs; and the County's Sonoran Desert Conservation Plan stand out as reasons why the Tucson community is recognized as a leader in sustainability. Other areas where Tucson scores well (more than 90% of the maximum points) are: Active Living, Civil & Human Rights, Climate Adaptation, Human Services, and Safe Communities.

A community cannot get a perfect score on a STAR sustainability objective unless it meets the quantitative measures for that objective, such as high school graduation rates, percentage of residents commuting by bus, reductions in crime rates, or growth in number and size of businesses. However, even if a community is not meeting these quantitative measures, it can get credit for significant actions that help achieve that objective. An area where Tucson falls a bit short on measurable outcomes but succeeds well in action is Poverty Prevention & Alleviation. Due to the efforts of the City of Tucson and its partners, Tucson's 94% score on this objective is almost twice the average score for all fifty communities.

Although not quite reaching the 90% threshold, Tucson's scores were more than twice the average on the objectives of: Resource Efficient Public Infrastructure, Natural & Human Hazards, and Invasive Species. The City of Tucson's efforts to make public infrastructure as water and energy efficient as possible resulted in the high score in Resource Efficient Public Infrastructure. The high Natural & Human Hazards score is in large part as result of Tucson's location and geography, which don't expose the community to hazards such as tornadoes, hurricanes, and major earthquakes. Finally, Tucson scores well in Invasive Species due to the concerted and sustained effort of so many residents to eradicate buffelgrass, and the hazards it poses, from this community. All in all, Tucson received above average scores in thirty of the forty-four objectives (68%).

Tucson's Poorest Scores

There are a number of areas in which Tucson falls short relative to other communities, including: Waste Minimization, Transportation Choices, and Housing Affordability. The first two reflect choices the community makes on a daily basis. The amount of waste that is generated by residents and businesses is increasing, rather than declining, in spite of numerous recycling opportunities. Regarding Transportation Choices, too many residents drive to work alone (74.5%) versus biking and walking (6.3%) or taking transit (3.4%). Housing affordability factors in both housing and transportation costs. Tucson does not score well in this area due to the large percentage of households that spend more than 15% of their income on transportation, and more than 45% of their income on housing and transportation combined.

Some of the objectives where Tucson does poorly are areas where there is limited local control, such as: Educational Opportunity & Attainment, Greening the Energy Supply, and Green Market Development. According to the Arizona School Boards Association, "Arizona's per student ranking among states based on a combination of federal, local and state funding dropped from 34th in 1992 to 48th in 2013. Arizona students receive only 69.5 percent of the national per pupil average, when all funding sources are considered". Under Greening the Energy Supply and Green Market Development, Tucson Electric Power reported that in 2013 only 4.8% of the electricity that is consumed by Tucson came from renewable sources. Also factoring into these low scores is the extremely low percentage of alternative fuel vehicle ownership and rising per capita car ownership.

Finally, it is important to highlight three objectives where all fifty communities collectively did poorly (scoring less than 25% of the maximum points on average): Environmental Justice, Equitable Services & Access, and Quality Jobs & Living Wages. The first two of these objectives both require pre-requisite steps of detailed community mapping regarding inequities in communities, such as provision of facilities and services, or exposure to harmful water, soil, or air quality. Few communities have the resources to undertake that mapping and, without that step, communities could not qualify for many points. Quality Jobs & Living Wages looks at whether households are economically self-sufficient, and the relatively poor scores are symptomatic of the United States' growing divide between those with the highest incomes and those with the lowest incomes.

What is the take-away message? Tucson should be proud of a well-rounded and above-average performance on STAR Communities' sustainability rating system. Tucson scored above average in six of seven focus areas; 95% or better on at least one objective in six of the seven focus areas; perfectly (100%) on six objectives; well in areas vital to the health and prosperity of our community.

Leslie Ethen is the Planning and Sustainability Manager for the City of Tucson. She manages Tucson's climate change mitigation and adaptation planning efforts and the implementation of the City's voter-adopted general/sustainability plan, including the development and tracking of sustainability metrics. She can be reached at Leslie.Ethen@tucsonaz.gov.



Our mission at The Fairfax Companies is to divert waste from landfills by recycling as many materials as possible to create value-added products while offering green industry jobs. At three Tucson facilities, we strive for sustainability by providing construction debris recycling, roll-off and hauling services, green landscape debris recycling, and general recycling—a suite of services offered by few—if any—other facilities in our region. This privately owned business grew from what was once a sand and gravel operation in the 1980's into what is now an example of a sustainable recycling and landfill operation.

Some Tucsonans may refer to the Speedway Recycling and Landfill Facility as the “Speedway dump” at the end of Prudence Road, but this site offers far more than disposal. Contractors, landscapers, and homeowners alike visit the Speedway Facility six days a week for disposal services, but also to purchase materials such as concrete aggregate base (AB), fill dirt, screened fill, sand, organic compost, mulch, wood chips, rock, and much more. For example, AB is made from recycled concrete, crushed to Pima County and City of Tucson specifications for road base material, and is currently available for \$4/ton.

Construction and demolition work can create a significant amount of debris, but many waste materials created on job sites can be recycled. The Fairfax Companies accepts plastics, metals, cardboard, wood and lumber, and more. LEED documentation is available free of charge at the Speedway Facility, providing a record of each type of debris within an incoming load from a specific project. Incoming loads are manually sorted in order to extract as many recyclables as possible. (Mixed inert materials such as rock, block, asphalt, brick, dirt, roofing, etc. are accepted, but are not typically recyclable.) Sorted recyclable materials are processed, baled, and shipped locally or overseas for further handling and recycling. Other materials, such as white wood and lumber, can be processed locally and turned into value-added products. Recycled compressed firelogs and other alternative energy fuels are examples of these.

A testament to our level of commitment to sustainability, Fairfax collects many types of foam waste (including Styrofoam™) to be recycled using densifyer equipment, turning what was once a burden on landfill space into a valuable resource. Foam can be made of different types of poly-plastics but also includes a great deal of air, which could make transportation costly. However, many types of foam are accepted free of charge at the Speedway Recycling & Landfill Facility. Fairfax is looking for new opportunities to collect this nuisance material from schools and universities, manufacturing and retail businesses to transform foam into its more reduced form for recycling.

The Speedway Facility is also the central operations hub for Tank's Roll Off & Recycling (a division of The Fairfax Companies), serving Tucson with four sizes of roll offs and recently expanding to commercial compactor service for recyclables. Tank's Roll Off contracts with government agencies and serves local campuses of global companies. All materials are sorted and processed at the Speedway Facility, and Tank's Roll Off customers are given a discounted tipping fee. Special contractor pricing is available for 40-yard roll offs, incentivizing builders and others in the industry to

keep their projects local and green.

Speaking of green, landscape debris such as tree trimmings (referred to as “green waste”) are accepted for recycling at the Speedway Facility or the Ina Land Reclamation Facility. The Ina Facility, located on Ina Road near Interstate 10, is a large-scale composting operation, creating premium products called Tank's Green Stuff Organic & Natural Garden and Landscape Materials. Compost is nature's recycling program, and Tank's Green Stuff mimics that process using specialized equipment and techniques. Nearly 100,000 tons of green landscape debris are diverted from landfills each year at The Fairfax Companies, then making use of this valuable resource. Tank's Green Stuff adheres to stringent standards of the US Composting Council, and is verified for use in organic agriculture. The result is healthy products for people, plants, landscapes. The use of compost and mulch also conserves Tucson's most precious resource: water.

Tank's Green Stuff has provided Fairfax with a great way to give back to the community, by delivering compost and garden products to countless schools, community gardens, and non-profit organizations, and a percentage of bagged compost sales are donated to the Community Food Bank. The landscape products are available in bulk for pickup or delivery, but select materials are bagged and are available through many retailers in Southern Arizona. An organic general fertilizer is under testing and development, and will be released this year. In the near future, Tank's Green Stuff organic landscape products will be available in some mega-retail stores in 1-cubic-yard bulk totes, ideal for contractors or large projects.

The Fairfax Companies' diversity of products and services were made available in response to the specific waste streams and for the needs of our community. Tank's Roll Off & Recycling and Tank's Green Stuff provide those services and meet those needs. There are still great challenges and obstacles for recycling in Arizona, but with the efforts of The Fairfax Companies and other like-minded businesses as leaders in sustainability, we will see a greener future for Arizona.

Emily Rockey is the Director of Sales and Marketing at The Fairfax Companies. With a passion for recycling, she aims to develop connections with those in need of recycling services in a variety of industries to help create a more whole, sustainable community. She uses her background in plant sciences and public gardens to develop new Tank's Green Stuff landscape products for all types of users. She can be reached at Emily@ffxsite.net.



Just four years from its inception, Tech Parks Arizona celebrated the completion of Phase One of the Solar Zone at the UA Tech Park. The Solar Zone is a public-private partnership between the University of Arizona and Tucson Electric Power. The Solar Zone is one of the largest multi-technology solar testing and demonstration sites in the world. Phase One of the Solar Zone encompasses 165 acres of multi-technology solar panels generating 23 megawatts that are fed directly into the grid.

The Solar Zone provides researchers with invaluable data and the ability to evaluate various technologies as they perform side by side. Testing under identical operating conditions allows developers to determine when systems are most efficient and economical. University of Arizona researchers are testing everything from solar power forecasting to the environmental impact of solar energy installations.

The Solar Zone represents over \$120 million of investments into Pima County. The sun shines at “optimal radiance” approximately 85% of the year in Tucson allowing solar technologies to be tested effectively and thoroughly year-round.

The Solar Zone creates an integrated, multi-dimensional research center that fosters all elements of solar energy development including: generation and distribution; research and development; assembly and manufacturing; product development; testing and evaluation; workforce training; and public education and demonstration. To successfully compete with coal and oil-based energy and become a larger part of the overall energy mix, solar energy must become more efficient, consistent, and less costly.

Tech Parks Arizona continues to strive to achieve all of the above, creating a bridge between academia and industry through green technology innovations. The ability for many technologies to be tested and evaluated at the Solar Zone has allowed participating companies to access, modify, and improve the efficiency and potential impact of renewable energy.

Phase One

Representing the first milestone in the program, ten companies and organizations are participating in Phase One of the Solar Zone, testing and demonstrating a variety of solar technologies and systems. The site generates 23 megawatts of power, which is nearly twice the daily electrical consumption of the Tech Park, and enough to power the homes of more than 4,600 TEP residential customers for a year.

Each Solar Zone tenant has a 20-year agreement with TEP whereby TEP uses all solar power generated by the Solar Zone—which is fed directly into the grid—to expand its renewable energy resources in Southern Arizona.

All told, the Solar Zone houses 95,000 solar panels and more than 100 solar concentrators generating power. The participant companies who have systems installed include:

- Arzon Solar
- Cogenra Solar
- Duke Energy
- E.ON Climate and Renewables
- IBM
- REhnu
- Solon
- Tucson Electric Power
- Vail Academy and High School
- Washington Gas Energy Systems



The University of Arizona's Tech Park Solar Zone

Phase Two

Phase Two of the Solar Zone includes expanding research and development activities to focus on energy storage, grid optimization and micro grids, distributed solar systems, and integrated and embedded solar materials. The University of Arizona and Tech Parks Arizona are also exploring the deployment of solar energy in mining, agriculture, and defense and security systems.

As part of Phase Two, the UA Tech Park is opening an additional twenty-nine acres of land for testing and demonstration projects. Preliminary design for the first half of Phase Two tentatively includes a current proposal for an Energy Storage System (ESS) which is scheduled to be reviewed by the Arizona Corporation Commission at the May 2016 meeting. As noted by our partners, “the primary advantage of a storage system in the context of a large utility is often in its ability to very rapidly change power output levels, much faster than the proportional governor response rate of any conventional generation system. This naturally leads to the usage cases of an ESS being centered around short term balancing- type activities.” This means that the ESS would be utilized to “smooth out” fast changing demands on the system (i.e., weather related events), rather than to provide a long term change brought on by daily solar times.

This project has additional plans to support site which will range from 2–5 acres and can support up to 1 megawatt of power generation. Tech Parks Arizona and our Global Advantage Program are actively engaged with companies from all around the globe in search of new technologies which could be installed on a testing and evaluation level for this additional acreage.

Phase Two also includes plans for a public information and visitor plaza. This educational center will allow visitors to get up close to functional solar systems and learn about solar technology and its application. Public education about green technologies and the importance of sustainable energy is one of the goals of the Tech Park and Solar Zone which makes the visitors center an integral part of the University's educational outreach.

Patrick Murphy is Director of Planning, Facilities and Construction for Tech Parks Arizona. In this role he directs the design, construction, and maintenance of all facilities, as well as planning, allocating, and tracking space requirements and allocations for the Parks. He can be reached at pmurphy@uatechpark.org.



In the March 2010 issue of *TREND* report, an associate of my company wrote an article about how modern streetcar or light rail systems can impact real estate values. The article concluded that the street car (SunLink) “will likely increase nearby property values and lease rates, as anticipation for improved visibility and access becomes a reality. Furthermore, expect to see new development that would otherwise not have been completed without the streetcar...” Now that the street car has been operational for almost two years, I can analyze what has actually occurred in the SunLink corridor over the past few years.

First, as we are all aware, there are a number of projects (existing, under construction, and proposed) which have benefited from the streetcar being operational. Completed projects include San Agustin, One East Broadway, Herbert Residential, Rialto Block, Cadence, Illegal Pete’s, Plaza Centro, El Rio Health Center, Flats at Julian Drew, Gibson Court, and the student housing projects near Main Gate Square. Projects that are under construction include One West Broadway, AC Marriot, Stone Avenue Homes, Arizona Hotel, Downtown Motor Court, Rally Point Apartments and Cirrus Visual. In addition, there are number of other projects are planned along the streetcar line including Main Gate Hotel, Marist College, City Park, La Placita redevelopment, Hotel Euclid, One South Church (residential tower), plus many others. My analysis of what has occurred in the area over the past three years, in terms of new development, is unsurpassed in the recent history in the Central Business District (CBD) and extending to the U of A. This is all specifically related to the enhanced access and appeal of the area due to the modern streetcar being in place. It can be anticipated that there will be continuing demand for new services and properties in the CBD, 4th Avenue and Main Gate Square over time. Thus, the prediction as contained within the article six years ago has and is continuing to come to fruition.

Second, now that the streetcar line has been operational for almost two years, what has the impact been upon real estate pricing? It is obvious that the student housing market has shown price inflation over the past few years which is supported by the recent sale of the Level & Next projects near campus. But what has been the effect on existing commercial properties in the corridor? The following table reflects most of the sales for existing improved properties along the streetcar corridor over the past three years.

Analysis of these sales indicates that the activity level in this area has increased significantly over the past few years, there is no definitive trend in upward pricing over this time period. For example, in 2013 the Gus Taylor building sold for \$88.28/SF. Recently in February 2016 the Chicago Store sold for \$85.04/SF. These two buildings are adjacent and are similar in many aspects. Although they differ to some degree, this paired data set does not support change in pricing over this time period.

Of the 18 sales noted on the prior table, only five were in excess of \$100/SF. The two highest sales were for restaurant properties along 4th Avenue. These two sales were for about \$190/SF. The sale at \$100/SF was the purchase of a two-story office building by the 4th Avenue Food Coop. This property was in usable condition when purchased. The two other sales above \$100/SF reflected properties along East 9th Street. Both of these properties were in good condition or had been renovated. The balance of the sales shown sold for below \$100/SF, with an average sale price of \$76.54/SF. My observations are that for most existing, properties that have not been renovated, it appears that there has not been a recognizable change in most real estate pricing along the SunLink route for existing commercial facilities.

Further analysis of the sales indicates that there appears to be continuing demand for existing buildings along the route. The one major constraint on pricing is the increasing costs associated with renovation of those facilities. Discussions with Ron Schwabe of Peach Properties, Phil Lipman of Bright Properties, and Marcel Dabdoub of The Arizona Hotel all indicated that the costs associated with renovating a “historic” building can be similar to or more than new construction. Further, retail rental rates in most areas along the SunLink route are not yet sufficient to make redevelopment financially feasible. Thus, hampering the ability for commercial property prices to increase. The only way most projects have occurred along or near the streetcar route is with government assistance. The government assistance could be in the form of tax credits, GPLET, low interest bonds, etc. Only when there is an increase in rental rates along the route reflecting increased retail sales, would higher pricing for existing buildings occur.

Although there has been some increases in real estate pricing along the SunLink Corridor, my general perception is that the synergy necessary to support continued price appreciation for existing commercial properties

#	Date	Name	Type	Address	Gross Bldg. SF	Site Size SF	FAR	Sales Price		Built Year
								Amount	Per SF	
1	May-13	Gus Taylor	Two Story Retail Building	128 E Congress St	6,400	3,485	184%	\$565,000	\$88.28	1916
2	Jul-13	Arizona Hotel	Two Story Retail/Residential Bldg.	31 - 47 N 6th Ave	19,000	13,917	137%	\$1,350,000	\$71.05	1906
3	Aug-13	City High School	One & Two Story School Building	37 - 49 E Pennington	28,431	98,045	29%	\$1,800,000	\$63.31	1958
4	Nov-13	Tucson Blueprint	One & Two Story Office Building	537 - 545 N 6th Ave	16,791	98,045	17%	\$750,000	\$44.67	1945
5	Dec-13	Garages	One Story Auto Service	228 E 6th Street	2,867	4,400	65%	\$250,000	\$87.20	1950
6	Dec-13	Codac	One Story Office Building	17 S 5th Avenue	11,383	24,394	47%	\$900,000	\$79.07	1978
7	Feb-14	Garage/Lot	One Story Garage/Retail Facility	131 & 501-509 N 6th Ave	10,384	21,893	47%	\$850,000	\$81.86	1925
8	Jul-14	Food Coop	Two Story Office Building	721 N 4th Avenue	6,500	13,939	45%	\$650,000	\$100.00	1937
9	Jul-14	Rabinovitz Bldg.	Two Story Office Building	721 N 4th Avenue	13,285	21,144	63%	\$975,000	\$73.39	1937
10	Jan-15	Athens On 4th	Three Small Retail/Restaurant Bldgs.	500 N 4th Avenue	6,826	18,295	37%	\$1,300,000	\$190.45	1950
11	Mar-15	Gas Station	Single-Story Retail Building	802 N 4th Avenue	1,920	6,678	85%	\$368,000	\$191.67	1971
12	Mar-15	Rally Point	Two & Three Story Office Building	101 S Stone Avenue	19,696	7,083	278%	\$1,700,000	\$86.31	1935
13	Apr-15	Brings Mortuary	One & Two Story Commercial Bldg.	236 S Scott Avenue	13,845	22,002	63%	\$1,000,000	\$72.23	1928
14	Apr-15	H20	Three Story Commercial Bldg.	61 E Congress Street	5,104	3,472	147%	\$460,000	\$90.13	1920
15	Jul-15	N/A	Single-Story, Single Tenant Office Bldg.	435 E 9th Street	7,500	16,474	46%	\$800,000	\$106.67	1961
16	Sep-15	N/A	Single Story Office/Retail/Residential	214 N 3rd Avenue	5,794	10,698	54%	\$420,000	\$72.49	1917
17	Jan-16	N/A	Single-Story, Two Tenant Building	414 - 416 E 9th Street	3,000	3,872	77%	\$425,000	\$109.76	1926
18	Feb-16	Chicago Store	Two-Story Single Tenant Retail Bldg.	130 East Congress	21,755	9,958	218%	\$1,850,000	\$85.04	1916

Improved Sales in SunLink Corridor, 2013–2014

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The major US green building rating system, LEED, isn't growing; the green building revolution has stalled; no easy solutions are in sight. By 2015, LEED had certified *less than 1 percent* of commercial buildings and homes in the US during its first 15 years. Annual project registrations and certifications for LEED in the US are now fewer in number in 2015 than in 2010. It's time for a green building program that works for "the other 99 percent" and that has significant annual growth.

Figure I.1 compares LEED certifications with the total number of US commercial buildings; it shows that total project certifications at year-end 2015 amounted to *less than 1 percent of the US nonresidential building stock*. (In the residential sphere, the fraction was considerably less.)¹



Figure I.1. Total US Building Stock vs. LEED Certifications, End of 2015

We need a new way to rate buildings for their climate and environmental impacts. As the leading green building organization and largest rating system in the US as well as the largest in the world, the US Green Building Council and LEED have a special responsibility to engage in self-criticism and continuous improvement.

These concerns are not new, but they have taken on more urgency with the upcoming mandatory switch to a new version of LEED (LEEDv4) in October 2016. With most project teams content in knowing how to navigate through LEED 2009, despite its costs and complexities, LEEDv4 appears to be "a bug looking for a windshield."

That LEED is broken is not news; Randy Udall and Auden Schendler first raised the issue in 2005 with a provocative article, "LEED is Broken—Let's Fix It."² At the time, many LEED advocates, including me, dismissed issues raised by this article as reflecting growing pains for the LEED system. At the time, LEED was barely five years old and just getting started on the road to dominating the US market for commercial green buildings.

But their five main objections—LEED is too costly, project teams are too focused on gaining points and not on results that matter, LEED's energy modeling is fiendishly difficult, LEED's bureaucracy is crippling and LEED's advocates continually produce overblown benefit claims—remain drawbacks today.

Most experienced green building professionals would also agree that these same issues remain relevant in 2015. But there is a larger

problem: Green building rating systems have diverged greatly from building owners' and operators' core concerns, as these systems are designed to meet the needs of green idealists more than those of most market participants.

Green building advocates must abandon the approach they have taken for the past 25 years: comprehensive and overly technical criteria, multiple elaborate rating systems, large and cumbersome bureaucracies, high costs and inadequate focus on real long-term building performance. Instead, they need to embrace the technological revolution that has cut costs for communications by factors of not ten, not one hundred, but a thousand or more in the past 15 years.

Moore's Law, first enunciated in 1965, says that computing power doubles every 18 months; over time, unit costs for computing have fallen in a similar fashion.³ Consider this: Every six years, it's 16 times cheaper (and faster) to do the same task, every nine years 64 times cheaper! (Every 15 years, it's 16 x 64, or 1,024 times cheaper!) With the advent of mobile communications, social networks, the Internet of Things, big data analytics, cloud computing and global information systems, why should green building still be governed by concepts, systems and procedures developed in the 1990s "Dark Ages" of Internet 1.0?

This book's central thesis is that it's time for a serious debate about LEED's (and other systems') inadequacies in addressing a few key issues: combatting global climate change, addressing looming water scarcities and reducing resource waste.

The corollary is that it's time for green building leaders to develop a new model for certifying project design, construction and operations, one that is:

- **Smart:** technology-savvy and mobile-accessible
- **Simple:** so anyone can understand green building standards without specialized training and certification
- **Sustainable:** both in focusing on absolute performance as the best means for addressing climate change, and in accelerating building design and management's movement onto cloud-based platforms.

We don't need to abandon concerns about urban design, healthy buildings, or healthy building materials—but they belong in a separate system or systems. Future green building rating systems should focus ONLY on five Key Performance Indicators:

- Energy use
- Total carbon emissions
- Water use
- Waste minimization
- Ecological purchasing

Until we build most new buildings and retrofit most existing buildings according to dramatically higher standards for energy, carbon, water, waste generation and recycling, then all other considerations are window dressing.

After all, Nature doesn't care how much we *reduce* annual carbon emissions from unsustainably high levels. Nature only cares about *absolute* levels of carbon dioxide (and other greenhouse gases) in the atmosphere, about excessive water use that damages natural ecosystems and about waste that doesn't get recycled into something else.

It turns out that the solution is already staring us in the face: the technological revolution that has given us the mobile Internet, social media and Big Data analytics. With this revolution, we can start with the user's concerns and work toward creating a rating system (or systems) that enhances the user's experience.

How to proceed? Here's an example in one word: Uber.

In 2015, just five years after it started, Uber's latest financing round valued it at \$50 billion. What did Uber do? It took on a hundred-year-old urban transportation system—taxicabs—and created an easy-to-use smartphone app that revolutionized it, in the process challenging and upending a highly regulated, low-user-satisfaction industry.⁴ No one likes taxis, but if you land at any airport or stand on any street corner in any large city, they're usually the only curb-to-door service available.

What don't we like about taxis? They're not always available when and where you want them; they're hard to get during rush hour, rainstorms and at dinnertime; they are often dirty and uncomfortable; they are prone to occasional customer rip-offs; and they may not accept credit cards for payment. The taxi business' main beneficiaries are taxicab owners, not customers or even drivers.

Uber started with the idea that a ride-for-hire service could address these issues, utilize surplus labor and vehicles, enhance customer experiences and be profitable for all concerned—by using the phone we already carry in our pockets. Brilliant! I've used Uber's smartphone app

many times: I can track where the driver is at all times; I know I'm going to get a clean and comfortable car with a driver who knows the town; and I've already paid the fare and tip when I step into the vehicle.

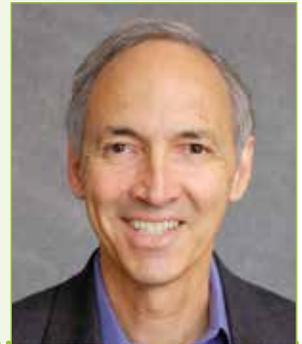
Uber is so disruptive that it has encountered stiff opposition from everyone profiting from the current system, including "progressive" politicians who are in hock to taxicab owners for campaign contributions, but it will succeed because it's focused on creating a superb user experience. By one account, nearly two million New York City residents have already downloaded the Uber app!⁵

Green building certification is ripe for the same disruptive treatment, but it's supremely unlikely that established organizations can or will upend their current revenue models to provide a far more user-friendly approach. It's time for new organizations and fresh thinking in green building. It's time to leave behind the current monastic, hair-shirt experience of LEED certification and create a fabulous user experience. It's time for Reinventing Green Building!

The excerpt is taken from Reinventing Green Building: Why Certification Systems Aren't Working and What We Can Do About It, by Jerry Yudelson, New Society Publishers, May 2016, and is reprinted here with permission.

- 1 2015 year-end results are projected from numbers reported in the LEED Project Directory as of October 31, 2015; details are in the Appendix, 2015 LEED Projects Update.
- 2 http://www.igreenbuild.com/cd_1706.aspx, accessed April 26, 2015.
- 3 <http://www.economist.com/blogs/economist-explains/2015/04/economist-explains-17>, accessed April 26, 2015.
- 4 <http://www.wsj.com/articles/uber-valued-at-more-than-50-billion-1438367457>, accessed August 2, 2015.
- 5 <http://www.nytimes.com/2015/07/23/nyregion/de-blasio-administration-dropping-plan-for-uber-cap-for-now.html>, accessed August 3, 2015.

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REALITY CHECK: THE MODERN STREET CAR AND ITS IMPACT ON PROPERTY VALUES

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has not yet been widespread. Isolated cases of increased rents and real estate pricing have occurred in the Main Gate Square area, along 4th Avenue, and at the east end of Congress Street, but most of the remaining areas along the route have yet to see any significant changes in real estate pricing. It is my belief that price appreciation along most of the street car route will occur once more of the new developments are completed, the downtown population continues to increase, and more Tucsonans become familiar with and utilize SunLink on a more regular basis.

Jim Bradley is the owner of AXIA Real Estate Appraisers and has been appraising commercial properties in Arizona for over 30 years. Jim can be reached at jbradley@axiaappraisers.com



Tucson is at a crossroads. Downtown is seeing a revival thanks to smart investments in transportation infrastructure, forward-thinking developers, new policies that support infill development, and a national trend of increased demand for urban, walkable living options driven by Millennials and Baby Boomers. From new restaurants to bustling sidewalks and Tucson's first downtown grocery store in decades, the changes are apparent to anyone who has spent time in downtown Tucson over the last several years.



Santa Monica Blvd. in West Hollywood

Elsewhere in Tucson, however, it's full speed ahead in the opposite direction. In April the Tucson City Council voted 5-1 to move forward with the acquisition of parcels along Broadway Blvd. to make way for a long-planned road-widening project. And in recent months, dozens of homes and businesses along Grant Road were demolished by the city to make way for additional lanes.

It's easy to think of these road-widening projects simply as transportation projects. And as a professor of transportation planning, I could bore you with details about inflated traffic projections, lane capacity versus intersection capacity, and the relationships between traffic speeds and pedestrian safety. But these projects are far more important to our community than their transportation impacts alone. They are at the core of what kind of city Tucson will be in the future.

Think of successful neighborhood commercial districts you may have visited along corridors like Mission Blvd. in San Diego, Hawthorne Blvd. in Portland, Santa Monica Blvd. in West Hollywood, or South Congress in Austin—places with a mix of shopping, restaurants, cafes, and other services people need. Places like these make you want to slow down and spend some time—and probably some money. They aren't on 7 or 8 lane arterials with 35 and 40 mile per hour speed limits where such opportunity becomes lost in the blur beyond the windshield of passing cars. They are located on busy streets, but they are not defined by them. Walkable neighborhood commercial districts like these have been shown to help increase property values in adjacent neighborhoods, cultivate small, locally owned businesses, foster civic pride, and make our communities more attractive to new residents, especially younger ones who are increasingly demanding such amenities.

Outside of downtown and a few small stretches mostly along the streetcar route, however, these small-scale, neighborhood-oriented commercial districts are missing from Tucson. There are pockets where

small business owners are trying to cultivate this sort of place. But sitting at outdoor patios at various taquerias, coffee shops, and pizza spots along Tucson's major streets while cars rush by at 40 miles per hour, it is difficult to not feel out of place. That hardy souls contend with the noise and exhaust to enjoy these outdoor amenities is evidence of demand that, given the opportunity to flourish, could be transformational for Tucson. Some of this demand will be met by changes happening downtown. But it would be a mistake to assume that demand for such amenities is limited to those wanting to live downtown. For many cities, including San Diego, Portland, Denver, Austin, Seattle and, increasingly, Phoenix, it has been changes in neighborhoods beyond their city centers that are driving the resurgence in economic development, community vitality, and civic pride.

The problem isn't just that streets like Grant and Broadway are being designed at a scale that does not support neighborhood commercial development. But due to the way transportation projects are funded in Tucson (much of it through the Regional Transportation Authority), there is very little money for roadway and streetscape improvements if they are not connected to road widening projects. This means that smaller arterials with the greatest potential for supporting vibrant, economically viable neighborhood commercial districts are being stifled by poor conditions and neglect.

The city should identify and invest in corridors that have the most potential to support the type of neighborhood-oriented commercial districts that will strengthen adjacent neighborhoods and the city as a whole. Grant Road and Broadway will be lost opportunities for this kind of development once they are widened (as will the hundreds of millions of dollars being spent on these and similar projects). But stretches of streets like Stone Avenue, 6th Avenue, 12th Avenue, 6th Street, and many other streets have the potential to be vibrant neighborhood-serving corridors that will enhance the entire city and secure our position as a place future generations of residents, entrepreneurs, and small businesses will want to call home.

Conversations about the future of Tucson should not be driven by the region's transportation needs, but rather by what will help Tucson achieve a future in which its residents, neighborhoods, and small businesses can thrive. To echo what I often tell my transportation planning students, we must first identify a desired future for Tucson and our neighborhoods, then plan for the transportation changes that will support that future. These conversations are far too important to the Tucson community to be driven by outdated traffic projections and transportation plans rooted in the 1950s.

Where is Tucson headed? We can't know for sure. But driving by at 40 miles per hour, I hope we're at least able to see the destination before we miss our turn.

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This year's sustainability issue features an in-depth look at the newly completed projects managed by the University of Arizona's Department of Planning, Design & Construction. These projects exemplify innovative design and construction practices in sustainable development. As Ralph Banks writes, "we specifically focus on the built environment aspect of sustainability. We foster a balance that considers the elements of well-designed, cost effective, operationally efficient, enduring quality and contextually responsive buildings that utilize simple materials in creative and inspiring ways to complement and support the University's educational and sustainability mission."

We have also included several other thought-provoking articles including Joyce Kelly's discussion of how man-made shade structures for work spaces can significantly lower utility bills and increase employee comfort, Emily Rockey's piece on the efforts of The Fairfax Companies "to divert waste from landfills by recycling as many materials as possible to create value-added products while offering green industry jobs", and Patrick Murphy's update on the successes at the UA Tech Park's Solar Zone.

We are also fortunate to include the insights of Arlie Adkins, Ph.D., a prominent transportation planning expert currently with the University of Arizona. In the wake of the recent decision regarding the Broadway Corridor, he writes that "the city should identify and invest in corridors that have the most potential to support the type of neighborhood-oriented commercial districts that will strengthen adjacent neighborhoods and the city as a whole." "Conversations about the future of Tucson should not be driven by the region's transportation needs, but rather by what will help Tucson achieve a future in which its residents, neighborhoods, and small businesses can thrive." Due to transportation funding mechanisms, there is little money for roadway and streetscape improvements if they are

not connected to road widening projects, leaving arterials with the greatest potential for supporting vibrant neighborhoods stifled by poor conditions and neglect.

By contrast, the streetcar route has seen a tremendous amount of investment that has been well-documented by the Downtown Tucson Partnership, among others. Jim Bradley's analysis of property values along the streetcar route concludes that "while the activity level in this area has increased significantly over the past few years, there is no definitive trend in upward pricing over this time period." He is optimistic that this trend will change and "price appreciation along most of the street car route will occur once more of the new developments are completed, the downtown population continues to increase, and more Tucsonans become familiar with and utilize SunLink on a more regular basis."

A big thanks to all the contributors to this year's sustainability issue. I am especially excited to see the success that Park Modern is experiencing so far. Michael Shiner and his team have done a fantastic job on this new infill community located just two miles north of the University of Arizona. I'm looking forward to seeing the completed models at the end of the month!



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