



CITY REPORT 2015

EL PASO





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"We are honored and excited to work toward a more sustainable future for the City of El Paso. As our community continues to grow and evolve, it is imperative that we give the utmost attention to designing, developing and financing these initiatives to ensure the economic viability of this city."

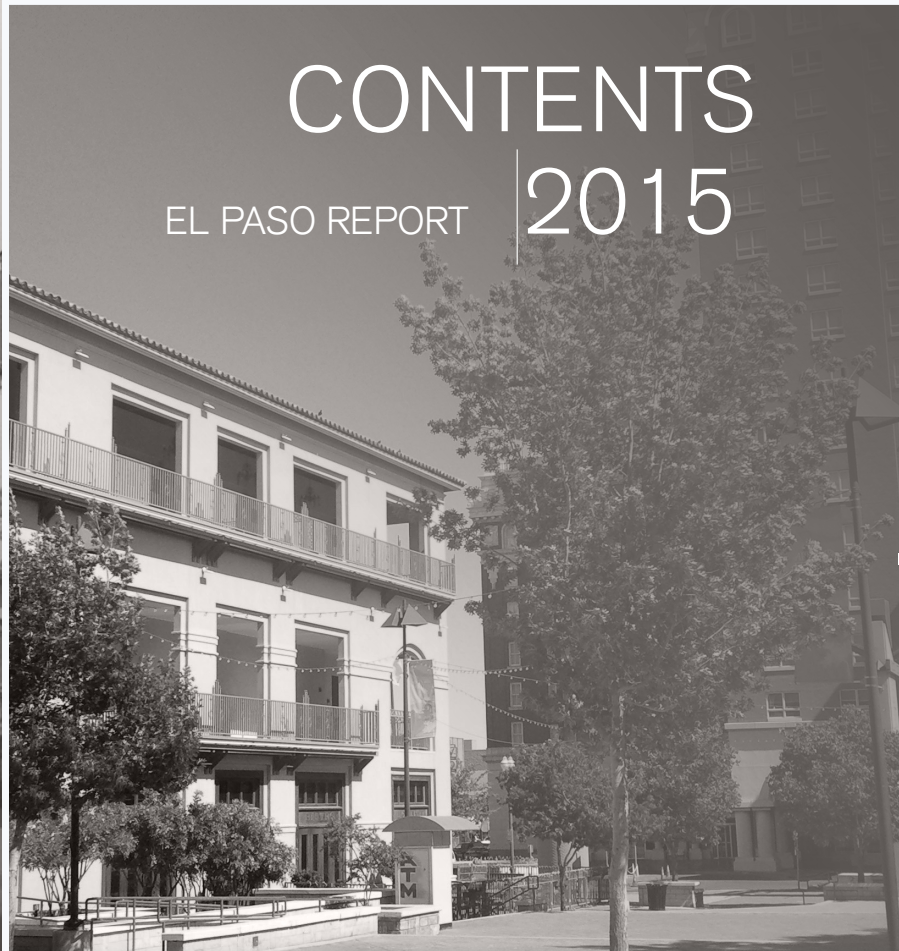
Mayor John Cook, City of El Paso (2013)



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Introduction

An essential quality of resilient systems is the ability to continuously improve. Most city infrastructure systems today epitomize the opposite trait, system upgrades occur as a patchwork of band-aids using familiar approaches rather than strategically leap-frogging to better technologies. One of the most important barriers to implementing these more resilient infrastructure upgrades is the inability to test new technologies in real systems, such as utility water pipes, power lines, or telecommunication networks, and validate modeled performance improvements.

Currently, municipal governments are making the best use of increasingly strained public resources to upgrade critical infrastructure. However, most lack access to best-available technologies based on limited opportunities to "try before buying" through conventional procurement processes. Often the same opaque contracting, permitting, and regulatory processes that limit public sector innovation also stymie private companies. Companies that face multi-year environmental permitting and review processes often set-up testing sites in friendly R&D environments and avoid communities that have the greatest infrastructure upgrade needs.

Corporations and those who invest in the most cutting edge technologies are doing everything possible, including traveling to places like Israel that advanced technology incubation support systems, to access in-system demonstration sites and prove that technologies work. The City of El Paso can take advantage of this corporate interest and willingness-to-pay by attracting and facilitating private investment in a local technology demonstration district.

Like many cities, El Paso currently owns properties that are underutilized. These sites pose redevelopment challenges for traditional real estate developers, but they offer significant opportunities to create underground and surface resilient infrastructure improvements. By developing these sites as technology demonstration spaces - styled as outdoor museum exhibits - with integrated surface and sub-surface green infrastructure upgrades, the City can take an alternative approach to attracting leading companies from around the world and promoting sustainable economic growth.

Overview

Out of necessity - with only 8.4 inches of rain per year on average - El Paso has become a national, and international, leader on water reuse and conservation practices. The City of El Paso is also in the midst of an exciting revitalization, building on local strengths – the city has increased investments in sustainability programs, expanded incentives for productive industrial and commercial development, and recently announced a new Clean Energy Incubator hosted by the University of Texas at El Paso.

Looking to build on this local momentum, the City has identified an area that was recently rezoned through the City's SmartCode Title 21- which enables and incentivizes walkable, mixed use, and compact places - to serve as an innovation district. Based on the Airport's master planning efforts, the proposed innovation district can integrate space for commercial, retail and hotel use with office and industrial development, open park space, and a Science and Technology Park to facilitate testing and evaluation of defense related products. In addition, the area is co-located with the El Paso Water Utilities (EPWU) Desalination Plant, featuring an interactive TechH2O educational center and a planned brine treatment facility that would treat and prepare the concentrate produced from the desalination process for sale.

To catalyze innovation district development in the short-term, the City can collaborate with local and national partners to design a series of sites that feature demonstration space for innovative water-energy-nexus technologies. In doing so, the City of El Paso can engage the public in broader innovation district development, encourage public-private partnerships and economic development; educate residents and businesses; and train students in cutting edge technologies related to the energy and water nexus.

Opportunity

The proposed Innovation District brings together elements from various technology demonstration models currently in use around the world, including trade shows (installation contracts and agreements); incubators and accelerators (sponsorship, first-look financing, and venture fund structures); and museums (education, curation and management systems). What makes the proposed district unique relative to these other models are the links to existing infrastructure systems (in-situ/utility connections) and the specific focus on municipal innovation in evaluating and procuring resilience solutions at scale.



Instead of the empty land surrounding El Paso International Airport, Butterfield Gold Course and the Kay Bailey Hutchinson Desalination Plant, picture a vibrant outdoor space featuring a set of interactive technology demonstration sites - where students can watch wastewater turn into energy and more importantly learn how to build, operate, and maintain similar systems. Imagine museum quality exhibits near the Airport where students can actively test and evaluate cutting edge technologies connected to local utility systems - tracking data, measuring environmental performance and building transferable engineering management skills. Picture sites where major corporations can test and evaluate new commercial technologies for deployment to municipalities and the United States Armed Forces. El Paso can design this new type of resilience district to support community resilience and student development while engaging leading private companies in local economic development, workforce training, and job creation.

Relevant Models

The RE.invest proposed Innovation District brings together elements from several other types of technology hubs. Below are three examples of innovation centers from around the world that highlight parallel approaches to demonstrating, prototyping, incubating, and/or accelerating specific companies or projects.

- **New Lab**
<http://newlab.com>: Located in an old shipyard at Brooklyn's Navy Yard, New Lab provides physical office space and shared access to highly capital-intensive manufacturing equipment that early-stage entrepreneurs and start-up companies need to prototype and test manufactured products and processes. New Lab's model is based on its non-traditional combination of shared equipment and collaborative design/work space, where innovators can access traditionally hard-to-find tools and equipment, like 3D printers, welding facilities and machining tools, without absorbing the capital costs and risks individually. Similar to New Lab, El Paso's Innovation District could allow early-stage companies to access complex systems and network connections; showcase and demonstrate new technologies in a safe, curated, public space; and offer a unique opportunity for larger water and energy companies to demonstrate performance at a utility-scale.
- **San Jose Environmental Innovation Center**
<http://www.sanjoseca.gov/DocumentCenter/View/28291>: The City of San Jose recently transformed an underutilized municipally-owned property into a productive economic and social technology demonstration hub. The City maintains ownership of the site and collects lease fees through a separate non-profit "commercialization catalyst" called Prospect Silicon Valley. Large corporations, including BMW, Applied Materials, Wells Fargo Bank, Denso and Siemens, sponsor this non-profit entity. Prospect Silicon Valley works directly with incubators, accelerators, investors and corporations and provides SJEIC space for validating green technologies. El Paso's Innovation District could go beyond providing workspace and basic tools - which can be offered through UTEP's Clean Energy Incubator - to provide in-situ connections that allow companies to show economic and environmental performance over time for a real site (versus lab) and encourage performance-based system-wide resilient infrastructure upgrades.
- **Portland Innovation Park**
http://www.bre.co.uk/filelibrary/Innovation_Park/Brochure_sections/US_Innovation_Park_-_Call_for_national_and_international_suppliers.pdf: In collaboration with British company BRE, the Portland Development Commission is currently in the process of

designing a sustainable construction and building materials demonstration space. The Portland Innovation Park is structured by partnering with corporate entities looking to showcase products and services within a physical space, while quantifying costs and performance in an open data environment. Like Portland's model, El Paso's Innovation District could engage a core of strategic corporate and demonstrator partners and emphasize performance data collection.

- **Danish Outdoor Lighting Lab**
<http://www.lightinglab.dk/UK/>: The Hersted neighborhood in Copenhagen participated in a new platform, the Danish Outdoor Lighting Lab or DOLL, to help develop future LED-lighting solutions. DOLL's aim is to create energy efficiency and intelligent indoor and outdoor lighting solutions, while generating jobs in the local community and beyond. By serving as a living lab, residents, businesses and municipal decision-makers can test and experience different kinds of lighting solutions. In total, 25 companies have set up side-by-side demonstrations of technologies related to more efficient lighting, from physical lights to different sensor systems and power supplies. The Danish Outdoor Lighting Lab's partners with corporate entities looking to showcase products and services within a physical outdoor space, while facilitating end-user interaction for eventual scale and distribution. El Paso's Innovation District could provide a similar outdoor user experience for both "shoppers" and residents.

Site Design & Planning

Building on those place-based models from Brooklyn, Copenhagen, Portland and San Jose, the city identified land near the Airport, Butterfield Golf Course and the Kay Bailey Hutchinson Deslination Plant as an ideal location for siting the proposed Innovation District. Utilizing this nearly 50-acre parcel could provide significant benefit to projected private sector partners and the city alike. A description of these extensive benefits is described below.

Leverage existing El Paso Water Utilities (EPWU) investment: Beyond building the inland desalination plant on site, EPWU established the Tech20 Center to provide education and training that fosters understanding and appreciation of total water management in the Chihuahuan Desert. At present, the area already is known locally as a water technology hub and the indoor facilities could be used in future for Innovation District hosted events.

Access for technology demonstrators: Engaging municipal utility customers more directly is one of the major incentives for demonstrators looking to participate in an Innovation District structure. Co-locating with the desalination plant significantly increases that access in addition to making the Innovation District more attractive to a set of technology demonstrators looking

to test the viability of renewable energies that bring down the cost of water production.

Support broader development plans: The City is already working with a set of partners to explore the development of a 150-acre Global Reach Science and Technology Park near the airport and the desalination plant. Strategically, this site would provide support to the existing regional manufacturing base, the Army Test and Evaluation Command and the Brigade Modernization Command. While this development is planned for the future, the Innovation District installation nearby would help to strengthen this area's appeal as a RDD&D (research, design, development and demonstration) hub for the military, El Paso, and the broader region.

Based on guidance from the City of El Paso and the University of Texas at El Paso, to facilitate the Innovation District development, the RE.invest team recommended the following site development criteria:

- **Maximize education and interaction opportunities.**

In an effort to make the space productive for companies, students, and the community-at-large, all demonstration sites should include robust educational and interactive components. Demonstrators should be required to provide not only the installation, but also collaborate with site planners to ensure educational components are sufficient. In addition, UTEP has identified a series of engineering courses that could link directly with the technology demonstrations and data produced to enhance coursework.

- **Prioritize a mix of short-term prototype and longer-term installation demonstrations.**

In an effort to match the City's desire to attract

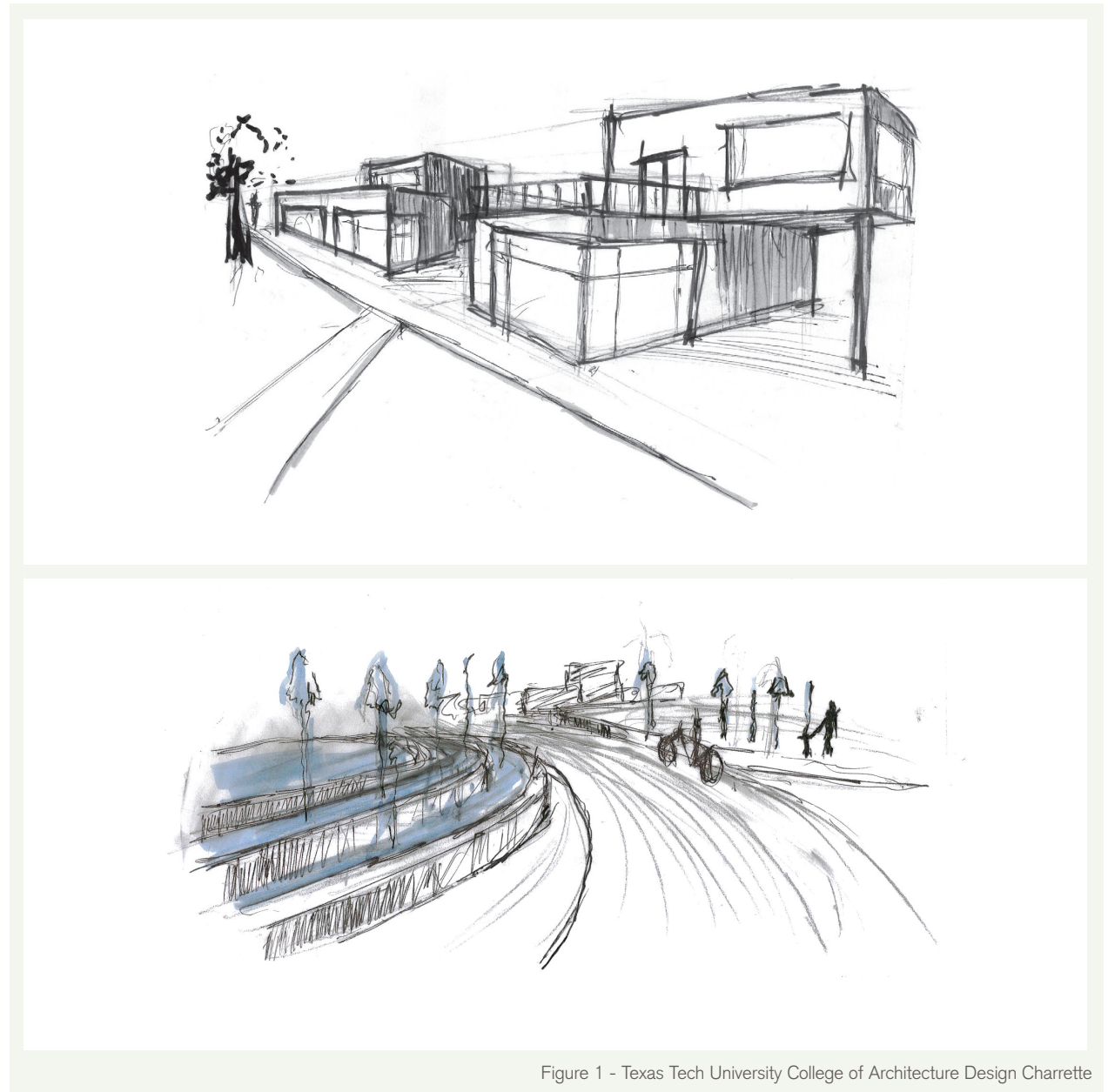


Figure 1 - Texas Tech University College of Architecture Design Charrette

both cutting edge technologies and more established companies, the structure should prioritize an equal mix of temporary prototype and longer-term demonstrations. In an effort to minimize costs while maximizing value for demonstrators, initial outreach could prioritize prototypes demonstrating freestanding technology systems that display real performance data. In-system demonstration should remain an option should on-site hookups be available particularly in the case of energy production and water production technologies that will only withdraw from the utility systems. Initial site designs should include specifications for the space available (footprint) for technology demonstration along with power availability for each demonstration platform. Ideally each site could accommodate 5-10 technology demonstrations.

- **Maximize green stormwater infrastructure.** Site design should prioritize green infrastructure upgrades along the edges and throughout the Innovation District. In addition to demonstrating the value of these flood mitigation techniques on-site, these infrastructure upgrades should beautify the area in support of broader redevelopment goals. The types of stormwater practices the city prefers to utilize include:
 - o Rain garden and rainwater harvesting system for capturing stormwater runoff
 - o Structured arroyos, drainage canals, street grading, and other systems to reduce stormwater impacts in street right of ways
 - o Tree pits, tree trenches, bioswales and permeable pavement to increase stormwater infiltration directly into the ground
 - o Direct use of stormwater runoff for irrigation, bathroom facilities, and outdoor amenities
- **Address Environmental Conditions.** Based on the location of the site-safety, and liability concerns should be taken into consideration. In addition, the RE.invest Team recommended exploring the viability of utilizing shipping containers to house individual technology demonstrations as a part of the site design. This option would protect installations from potential weather-related damage and vandalism and provide a consistent design standard for demonstrators, while connecting the design aesthetic to a local economic engine.
- **Facilitate Workforce Development.** The proposed Innovation District should support local workforce development efforts. Long-term site development should integrate spaces for not only testing technologies but also serving as an active skills lab for use by the City and UTEP. For example, the site plans could include space for testing various porous pavement options that the city could procure while also facilitating small-scale and repetitive installation, operations and maintenance training.

Technology Priorities

In an effort to address overburdened water supplies and ensure long-term resilience, El Paso and its neighbors have been forced to think more creatively about conservation and water production. Building on local experience with inland desalination, a joint project of El Paso Water Utilities and Ft. Bliss, local opportunities including significant renewable energy potential, and local needs to diversify water supply - the proposed Innovation District would focus on the water and energy nexus, and how innovation in the sector could significantly expand water supply in arid environments. Examples of the types of technologies that would be prioritized for demonstration are included below.

- **Concentrate Enhanced Recovery Reverse Osmosis (CERRO):** This technology increases the efficiency of desalination using a novel process for mitigating scale formation. CERRO has been tested at the KBH desalination plant and will be evaluated and implemented in the Lower Valley in El Paso.
- **Zero Discharge Desalination (ZDD):** This technology is capable of 98% efficiency and can produce saleable byproducts, both of which reduce the environmental impact of disposal and decrease the cost of desalination. Additionally, most of the power required for ZDD is DC power, so incorporation of renewable energy is attractive for reducing environmental and cost impacts from desalination.
- **Photovoltaic-Thermal (PV-T) System for Desalination:** This technology cools photovoltaic panels with brackish water, which improves the efficiency of the PV panels and decreases desalination energy consumption.
- **Enhanced Evaporation:** High recovery techniques such as CERRO and ZDD have a small volume of waste with all of the salts removed in the desalination process. This waste stream could be disposed of using enhanced evaporation techniques to reduce the size and cost of waste disposal.
- **Direct Potable and Non-potable Reuse:** El Paso Water Utilities is a leader in piloting direct potable and non-potable water reuse, which reduces wastewater discharges and recycles water for a second use. Technologies intended to support water reuse could be prioritized.
- **Reclaimed Water Application for Landscaping and Golf Courses:** A significant portion of Fort Bliss's water supply is used to water golf courses with potable water. Technologies intended to demonstrate a solution for maintaining high-value space (such as the Butterfield Golf Course) with reclaimed water could be prioritized.

Legal and Management Framework

Beyond site specific planning, the RE.invest team worked to define the key legal and operational elements required to create an Innovation District management framework with clear roles for various types of partners.

Timeframe & Transfer

The Innovation District approach outlined in this report can be applied to either temporary or permanent installations and technology demonstrations. In the case of El Paso, the RE.invest team recommended establishing a 3-year timeframe for the initial land use. This timeframe would allow a sufficient length of time to set-up and test a suite of technologies, without locking all participating entities into a long-term management structure or transferring the site permanently to a new use. After three years, all parties would have an option to disband, adjust and/or extend the Innovation District for future years to accommodate new or rotating exhibits. Should the Innovation District be extended, remaining participants would be required to secure additional funds. Below is a projected timeline for Year 1:

- Q1 : Confirm roles/responsibilities of all partners, including developing partnership agreements, raising initial funds, and drafting site/demonstration lease contracts.
- Q2/Q3 : Fundraise for construction phase; procure Innovation District design/build firm; confirm ownership scenario; and cultivate demonstrators.

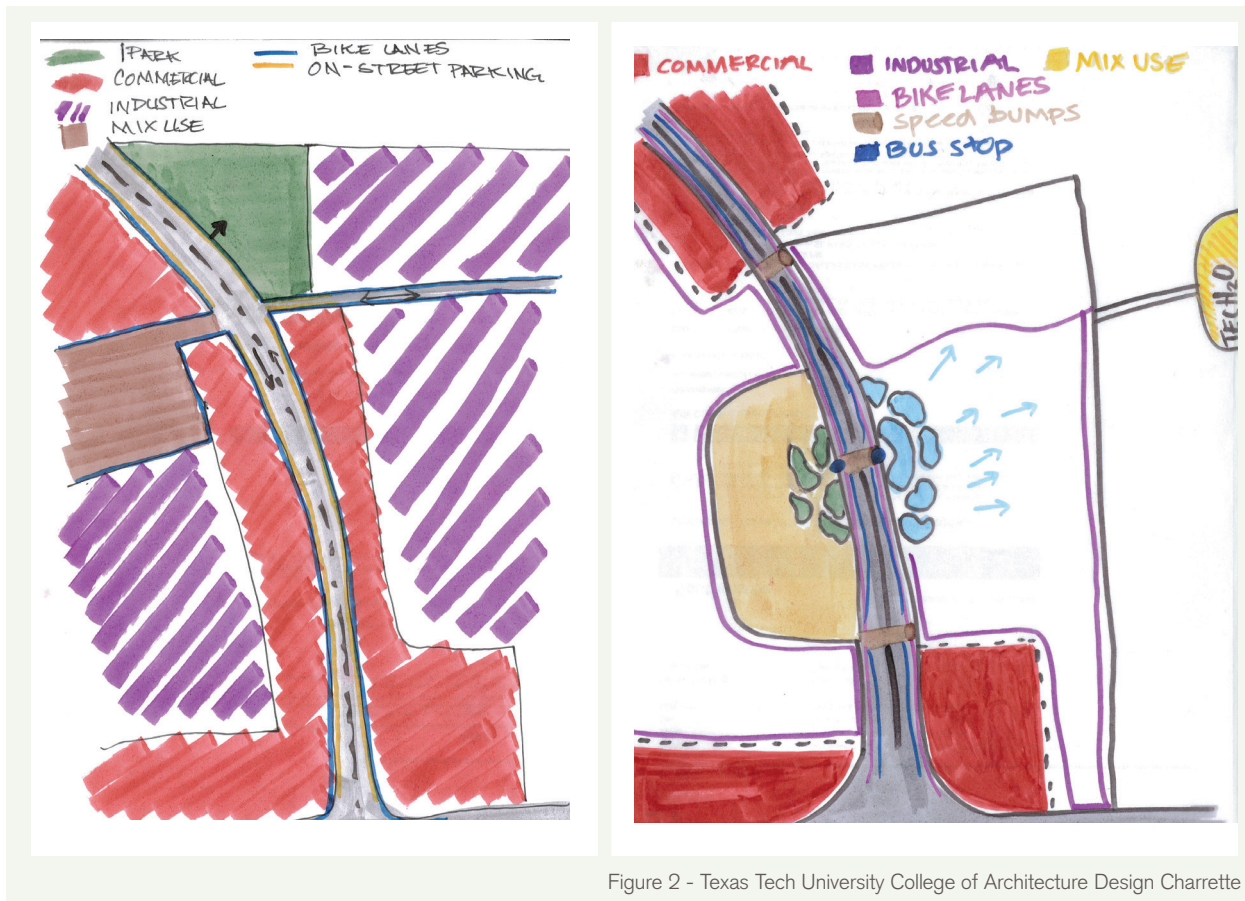


Figure 2 - Texas Tech University College of Architecture Design Charrette

- Q4 : Sign land transfer lease/agreement (upon completion of any required site cleanup); begin Innovation District construction; hire local manager; coordinate launch.
- Q1 Year 2: El Paso Innovation District launch and use

Management Responsibilities

In order to ensure success of the proposed Innovation District, the RE.invest team recommends that management of the site be separated into local and national responsibilities.

At the local level, a part- or full-time Innovation District manager should be seated within a local partner organization, such as UTEP or The Hub. This manager should be contracted with funds from sponsors and demonstrators. The local Innovation District Manager would have authority over an independent Innovation District funding account, and ultimately be responsible for Innovation District operations, maintenance and engagement. This means that the Innovation District Manager would execute contracts with local contractors (e.g. landscape architects, maintenance staff) to oversee construction, exhibit installation, and ongoing operations and maintenance. The Innovation District Manager would also be responsible for coordinating with local partners, national sponsors, and demonstrators. In addition, the Innovation District Manager would also be encouraged to build community events that leverage the Innovation District, including workforce development programming, events, tours, and the like.

Pending corporate support, a designated national entity would support all local Innovation District Managers and curate demonstrators and/or sponsors companies for the first 3-years. The national entity would include representatives from all national and international partners including site designers and sponsors companies. In addition to ensuring consistent design standards across Innovation District sites as they develop, the national entity would be responsible for coordinating a quarterly meeting and an annual event that brings together local, national and international Innovation District partners. This entity would also identify additional cities for future Innovation District development.

Beyond the parties directly engaged in the Innovation District, local partners including the City of El Paso, the University of Texas at El Paso, the El Paso Water Utilities and The Hub of Human Innovation would all maintain interests in the success of a local Innovation District and therefore play important roles in supporting the local manager.

Land Ownership & Liability

The parcels of land in El Paso being considered for Innovation District development are currently either Airport-owned or Fort Bliss-owned. The RE.invest team developed two ownership scenarios, described in simplified terms below, for local consideration. All scenarios are consistent with local law but will depend on the final parcels identified for use, and are being explored further based on partner preferences.

One option is for the Airport or Fort Bliss to sign a short-term low cost lease with a designated national entity or a local partner, for example, The Hub or UTEP. In this scenario, liability for the site would transfer to the lessee.

A second option is for the Airport or Fort Bliss to sign a short-term low cost lease with the City itself, the City would then be responsible for leasing a portion of the land to a designated national entity or leasing sites directly to Innovation District demonstrators. In this option, the City would maintain liability for the site development.

Both options provide an ownership stop-gap to facilitate the develop of an Innovation District in the short-term. Beyond the first 3-years, the Innovation District management can be integrated into a Development Authority designed to support broader redevelopment goals.

Contract Innovations

In order to ensure that the Innovation District provides not only aesthetic and economic development benefits, but also potentially a financial benefit to the City, the RE.invest team recommended that all leases and land use contracts include a clause to ensure that a percentage of the funds collected in excess of operating costs can be funneled into a City account to support local economic development programming, park operations and maintenance or broader green infrastructure upgrades in the area. In addition, lease contracts with demonstrators should include a clause that ensures a small, and yet to be determined, percentage of any sale that results from Innovation District demonstration follow a similar allocation formula, such as 50% towards Innovation District functions and 50% towards a City set-aside.

For example, if operating costs in Year 2 are \$450,000 and a combination of sponsorship fees, lease fees and a portion of sales bring in \$1,200,000 – then the agreement would ensure that 50% of the \$750,000 in excess of Innovation District operations would be invested back into Innovation District functions (i.e. events, online resources, etc.) and 50% - or \$375,000 - would be put into a City account to support pre-defined municipal activities.

In short, this model creates a new way to facilitate private investment in City programs and priorities, particularly in traditionally underserved communities.

Implementation Strategy

Corporate Engagement & Partnerships

Unlike other incubators and accelerators—Innovation Districts are designed to provide water, energy, waste, monitoring/controls, and financial technology companies with the ability to showcase and demonstrate new techniques and products in a safe curated public space and to facilitate direct access to municipal consumers. By letting companies showcase products and services, while publicly quantifying costs and performance, the Innovation District model is intended to simultaneously streamline municipal procurement and traditional corporate customer acquisition processes for leading green and resilience focused companies and technologies.

The El Paso Innovation District was designed to lower the barriers to market entry for companies seeking to demonstrate the value of new cross-sectoral technologies in-system without extreme transactions costs, such as the hassle of coordinating multi-year reviews across energy and water sector utilities. In doing so, the El Paso Innovation District could serve as a platform for any company seeking to prove commercial viability of cross-cutting technologies; promote innovative resilient infrastructure solutions; or more strategically source acquisition of innovative start-ups.

Through the process of developing engineering and design options in all eight RE.invest partner cities, the RE.invest team engaged in discussions with a wide range of companies interested in specific technology demonstration and investment opportunities. Below are several categories of target private sector partners for potential Innovation Districts based on current market needs in El Paso.

Emerging Technology Providers

The companies that most directly benefit from a public space that provides in-situ demonstration are start-ups or small companies developing municipal solutions. Opportunities range from testing emerging water, wastewater, and water/energy nexus technologies to showcasing energy generation and storage systems and smart meters, sensors, monitors & cloud IT evaluation platforms. Because acquisition of municipal customers is both time and resource intensive, especially for new companies that sell environmental technology and infrastructure products, the Innovation District model offers a pathway to reduce customer costs and timeframes.

Corporate Research & Development Departments

Benefits to larger companies with robust research and development departments are

two-fold. First, like their smaller peers, larger companies are also looking for opportunities to pilot innovative technologies. Beyond demonstration and testing rights, these companies also have the chance to build a more strategic acquisition pipeline by gaining first look rights to emerging environmental technology and infrastructure products that get positive reviews from municipal customers.

Venture Capital Investors

Unlike the previous categories of private sector partners, the Innovation District model offers a way for venture capital (VC) investors to increase the likelihood of success (uptake of products and technologies) of their existing portfolio companies in municipal markets. Similar to how VCs currently support early-stage incubators and/or accelerators, the Innovation Districts provide a later-stage opportunity to evaluate product-market fit and assess the viability of long-lived technologies within municipal procurement cycles.

In all of these categories, the Innovation District model is structured so contributing sponsors can engage at different levels, with tiered branding opportunities, demonstration rights, and curation opportunities to select demonstrators in El Paso and other Innovation Districts. acquisition costs and timeframes.

Local, National & Global Engagement

The Innovation District model is likely to be most successful at first in US markets like El Paso that are committed to supporting innovation and developing an economic cluster focused on energy and water technologies. But the model does not need to be exclusive to the US; cities around the world face the same challenges of rebuilding aging infrastructure systems and designing new systems to meet the needs of rapidly urbanizing areas. Making effective temporary use of underutilized land and building public-private partnerships to support long-term infrastructure improvement has potential global value.

For that reason, the partners have identified ways that in future the proposed El Paso Innovation District can expect to engage in local, national and international collaboration.

Local Engagement

Because of the unique set of investments the city and private developers are making in the area, the Innovation District in El Paso could serve as a hub for education and workforce development. The Innovation District could actively support the existing Tech20 Center, University of Texas at El Paso programming – especially for their engineering students and as

stepping stone for the companies spinning out of the new Clean Energy Incubator – The Hub of Human Innovation, and the proposed business park development. Functionally, the Innovation District could host events, coordinate workshops and serve as an example of tangible innovation in the region.

National Engagement

The Innovation District model is also being explored in other RE.invest partner cities. While each park has a different focus based on local priorities and competitive advantages, together the set of parks provide a broad vision for the future of municipal resilience solutions. By coordinating these Innovation Districts through a national entity, each participating city can connect through annual meetings and Innovation District sponsored events, facilitating knowledge transfer. In addition, cities hosting Innovation Districts can serve as a regional showrooms and anchors for peer cities facing similar resilience challenges that are also looking to procure innovative solutions.

Global Engagement

An Innovation District is a physical demonstration and testing site for innovative infrastructure systems and technologies -- everything from desalinization plants powered by renewable energy technologies to seawalls and recycled water systems -- on underutilized parcels of land. The benefit of those Innovation Districts is two-fold, first companies that have a hard time accessing municipal clients can have a more direct line of communication and municipal decision-makers can “try before buying” infrastructure products. Another product of the RE.invest Initiative is the Adaptation Atlas (www.adaptationatlas.com), a tool intended to bridge the gap between climate impact science and on-the-ground solutions by mapping resilient infrastructure and technology projects from cities around the world. The Innovation District implementation strategy described in this report offers cities like El Paso an opportunity to serve as a physical resilience showroom. To complement these types of showrooms, the Adaptation Atlas is designed as an online catalogue or showcase for cities from around the world seeking resilience solutions. The Atlas is intended to serve as a mechanism for facilitating dissemination of Innovation District technology innovations and performance data, and help cities like El Paso attract additional rounds of sponsors and demonstrators for future phases of development.



Innovations

To help catalyze local economic development, the City of El Paso can consider collaborating with local and national partners to structure the RE.invest proposed Innovation District model in a way that supports local priorities while continuing to expand the City's leadership in cultivating innovation and investing in long-term resilience.

- Leverage underutilized parcels of land for outdoor museum-style technology demonstrations and exhibits
 - Test renewable energy systems that could decrease the high electricity costs of inland desalination
 - Feature green infrastructure flood management products to increase regional uptake of best management practices
 - Enable better environmental performance data collection from in-situ installations
- Incentivize corporate investment in local resilience building and catalyze local economic development by creating new innovation districts
 - Leverage planned development and public expenditures on green and open space to generate greater private investment interest in the region
 - Connect local procurement decisions to global innovation in environmental technology markets
 - Use innovative contracting structures to ensure that corporate demonstrations generate public benefits and revenues, as allowed under local procurement rules and regulations