

INFRASTRUCTURE NEEDS ASSESSMENT

CITY OF ALBUQUERQUE

SUPPORTING REPORT INFORMING THE UPDATE
OF THE ROUTE 66 ACTION PLAN

CENTRAL AVENUE

ALBUQUERQUE RAPID TRANSIT

CRABTREE GROUP, INC.

PROFESSIONAL ENGINEERS

INTRODUCTION

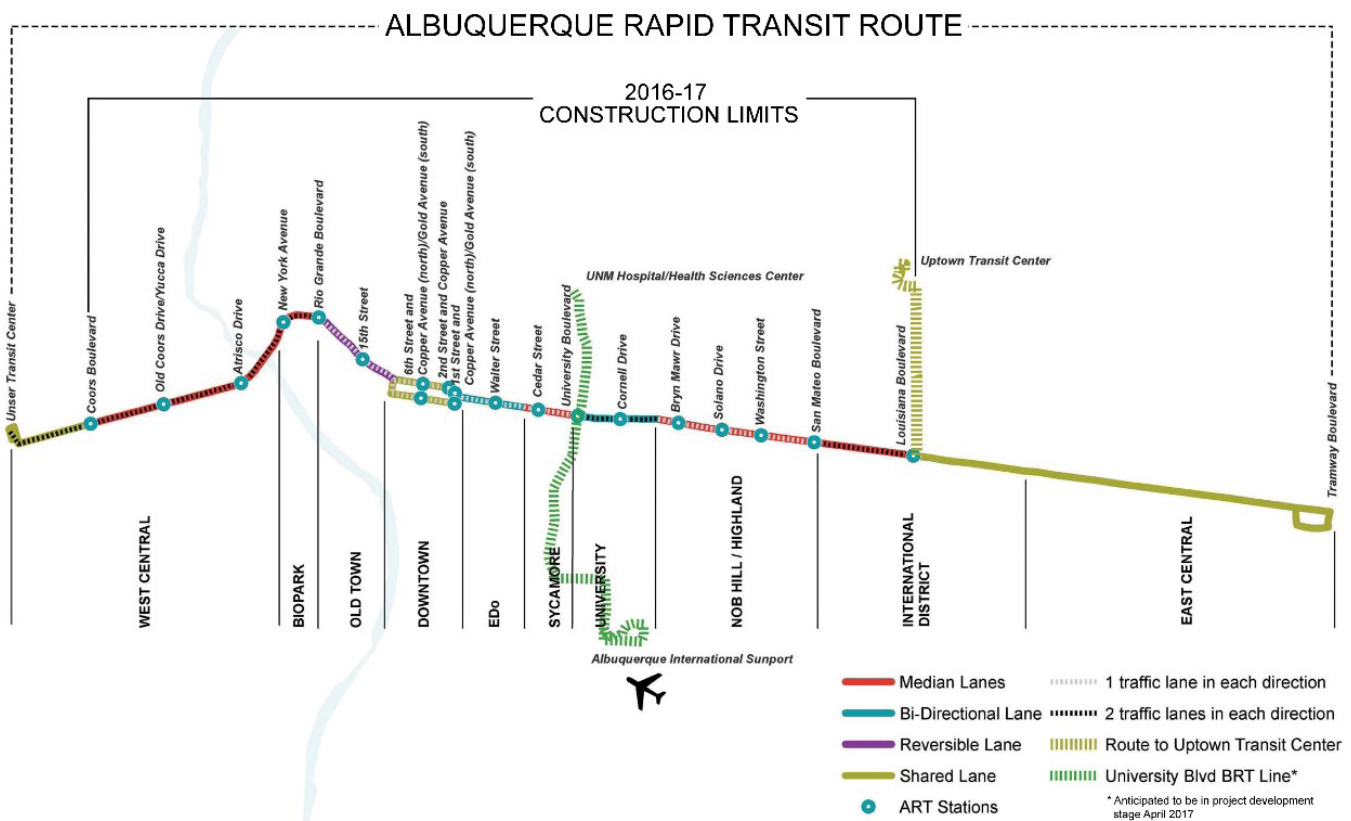
INFRASTRUCTURE NEEDS ASSESSMENT

REPORT GOALS

The goal of this report is to assist the City of Albuquerque in addressing Central Avenue infrastructure needs over the next ten years to encourage economic growth and to prepare for growth challenges. The new development stimulated by Albuquerque Rapid Transit could be expected to exert pressure on existing municipal water, sewer, power, gas, telecom and street systems and, in some cases, infrastructure expansion

may be necessary to support or encourage current and anticipated growth. Growth nodes along the Central Corridor receive this high-level infrastructure assessment by the Crabtree Group, Inc (CGI) professional engineering team to identify needs and prioritize infrastructure improvements. City of Albuquerque Economic Development Department contracted with CGI to provide this technical expertise regarding

municipal infrastructure in this report, with future development projections estimated by the Center for Neighborhood Technologies (CNT). This report includes conceptual infrastructure inventory, growth projections, and needs assessment for infrastructure improvements. The information used to prepare this assessment was compiled by CGI and CNT previous to and during Workshop Week in March 2017.



ALBUQUERQUE RAPID TRANSIT Project Alignment and Stations

TRANSIT CORRIDOR OVERVIEW

Albuquerque's planning agencies and civic leaders have long recognized a need to invest in public transportation that will drive adjustments in the region's land use patterns in order to ameliorate traffic congestion, improve air quality, increase the region's attraction to skilled professionals and innovative firms, increase workers' access to jobs and residents' access to services that can improve health and quality of life. Other regions around the nation have invested in fixed guideway transit systems in order to achieve similar goals.

The proposed Albuquerque Rapid Transit (ART) is a bus rapid transit (BRT) system that will incorporate virtually all of the features that transit-oriented development studies have shown are characteristic of transit systems that meet regional goals, particularly for economic development.

- + The technical features of the ART – including its permanent stations, pre-boarding fare system, dedicated lanes, signal priority, and service schedule – ensure speed, reliability, and convenience for its customers.
- + The ART route – virtually the entire length of Central Avenue – connects relatively dense residential neighborhoods to centers of employment, vital services, and entertainment.
- + In combination the ART's technical characteristics and route will provide reliable accessibility to other transit services, including multiple north-south bus routes.
- + The ART will make a basic contribution to numerous local government and institutional plans to revitalize Albuquerque's economy and protect its environment, including the Preferred

- Scenario for the regional Long Range Transportation Plan, the expansion of the UNM Hospital and campus, ABQ the Plan, Innovate ABQ, STC.UNM (UNM technology transfer non-profit organization), the Downtown ABQ Mainstreet Initiative and the Downtown 2025 Sector Development Plan.
- + The private market has shown its readiness to invest in the ART corridor through some 17 mixed-use, multifamily building, or commercial projects that have been built in the corridor within the last four years, with at least 12 additional projects proposed. Several developers of these projects have expressed their expectation that the ART will make an important contribution to the success of their investments.



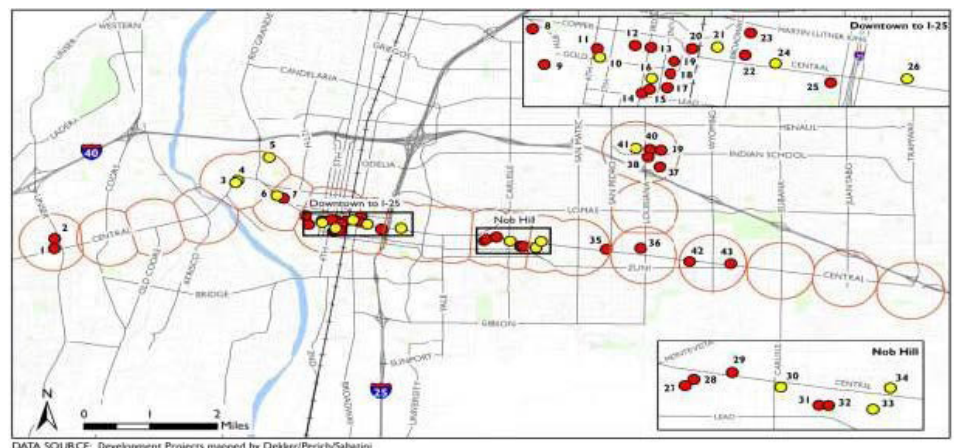
CURRENT AND PLANNED DEVELOPMENT

In light of the above facts, the Center for Neighborhood Technology (CNT) conservatively projects that the ART will stimulate the redevelopment of 80% of the vacant or severely under-utilized real estate parcels within a 5/8 mile radius of its Central Avenue route. In this projection CNT anticipates that the type of uses to which these properties will be redeveloped will mirror current land use in the same station areas. CNT also expects that the level of intensity to which these properties will be redeveloped will correspond to the middle range of intensity for fixed guideway transit station areas

with these types of land use, per data on hundreds of station areas analyzed by the Center for Transit Oriented Development. These projected developments could occur over a period as brief as 10 or as long as 20 years, depending largely on local government decisions regarding the implementation of the ART. The results of these projections are summarized in the following table. CNT estimates that the total anticipated growth at each Station Type would be divided by the number of stations to estimate the 10-year growth at each station.

STATION TYPE	NEW RESIDENTS	NEW RES. UNITS	NEW OFFICE JOBS	NEW RETAIL JOBS
Urban	2,169	1,146	5,108	1,664
Avg. per Station	310	164	730	238
Transitional	3,003	1,444	573	502
Avg. per Station	429	206	82	72
Suburban	12,263	4,690	432	1,313
Avg. per Station	1226	469	43	131
Total	17,435	7,280	6,113	3,479

Proposed TOD projects are in yellow, in progress TOD projects are in red.



WATER DEMANDS

POTABLE WATER ASSESSMENT AND IMPROVEMENT RECOMMENDATIONS

The water system is owned and operated by the Albuquerque and Bernalillo County Water Utility Authority (ABCWUA). In the Infrastructure Working Group meeting held on March 10, 2017 ABCWUA were informed of the expected future growth along the corridor and they responded that ABCWUA has no concerns about servicing the expected new development simply by reviewing and responding to the development applications as they come in, on an individual basis.

ABCWUA representatives stated that their urban water and wastewater systems were very robust and redundant such that redevelopment along the corridor would be easily accommodated. In some cases a water or sewer main may need to be upgraded based on the development application, but they do not expect that it would be significant. This viewpoint may be supported by the fact that most of the Central Avenue corridor was, in the past, more vibrant than it is today.

Albuquerque's drinking water comes from two sources: the aquifer beneath the city, and San Juan-Chama surface water which

is imported from the Colorado River basin into the Rio Grande Basin from the headwaters of the San Juan River in southern Colorado. With no agricultural use or major water-using industries, the majority of the Water Authority's supply goes to Albuquerque residents' homes and the offices where they work.

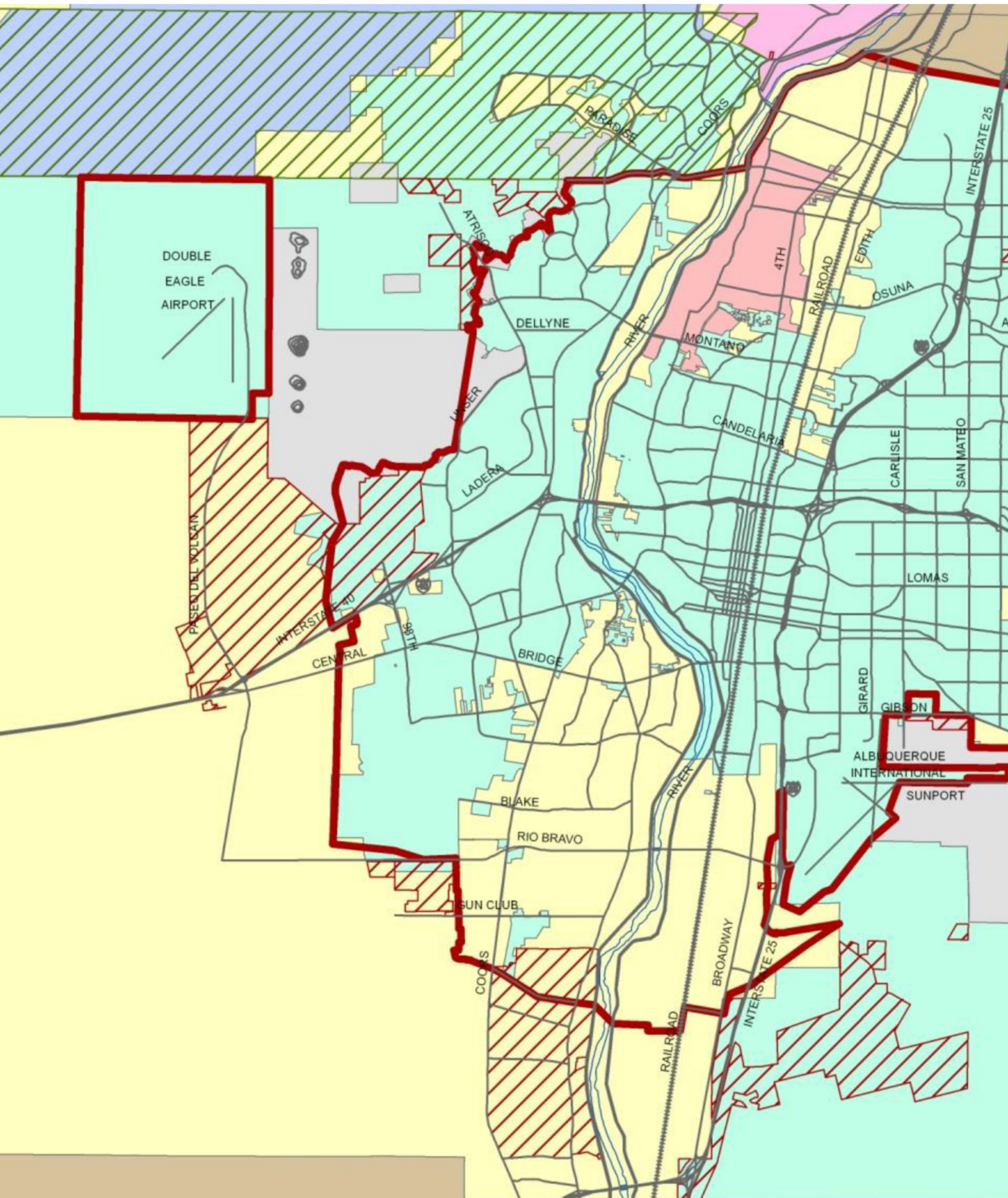
Until 2008, nearly all of the Water Authority's some 100,000 acre-feet (ac-ft) of water used each year was pumped from a network of 90 wells. The wells are grouped in 26 well fields across the metropolitan area, each with its own chlorination treatment system to ensure the water meets safe drinking water standards. The Water Authority has permits from the New Mexico Office of the State Engineer (NMOSE) allowing the Water Utility over time to pump 165,000 ac-ft per year (afy) of water, well above current pumping levels. This permitted right is critical to ensuring the reliability of the community's future water supply with the potential fluctuations that are anticipated with climate variability.

Additionally, the Water Authority also has a right to use of surface water through the

San Juan-Chama (SJC) Project and other sources. This right dates from the City of Albuquerque's purchase from the federal government of 48,200 afy of SJC Project water in 1965. The Water Authority's water rights portfolio also includes rights to so-called "native" surface water as a result of rights granted by the State when it began managing Rio Grande Basin water supplies in the 1950s. Albuquerque also has purchased additional surface water rights from Rio Grande Valley farmers over the years. Together, these native surface water rights total 26,390 afy.

The Water Authority treats approximately 90 million gallons per day of surface water. The estimated value of the Water Authority's portfolio of water rights is \$1.1 billion.

The Water Authority currently has over 200,000 customer accounts, representing over 550,000 water users. The authority maintains 62 water storage reserves (for both potable and water reuse) along with over 3,130 miles of water supply pipeline, while operating a 5 million gallon per day arsenic removal treatment plant.





WATER SUPPLY, DISTRIBUTION AND STORAGE RECOMMENDATIONS

A larger concern may be the age of the existing pipes, and the need to replace them as they exceed their life cycle. For example, prior to the construction of Central Avenue ART, the ABCWUA had \$30 million in replacements scheduled, but only accomplished \$10 million prior to the ART construction, meaning that pipe replacements will be taking place in the years following completion of ART improvements. Actions to support water supply, distribution, and storage issues:

1. A full-membership Infrastructure Working Group meeting should be held monthly to coordinate demand loads, applications, and construction schedules.
2. A test model should be conducted for each of the development area types (Downtown, Transitional, Suburban) to analyze the infrastructure needs for those three development types and amounts to confirm that the "response-to-development-applications" protocol is sufficient to serve the anticipated needs of the ART corridor growth rates.

WASTEWATER

SYSTEM ASSESSMENT AND IMPROVEMENT RECOMMENDATIONS

EXISTING SYSTEM DESCRIPTION

The wastewater collection and treatment system is owned and operated by the Albuquerque and Bernalillo County Water Utility Authority (ABCWUA). In the Infrastructure Working Group meeting held on March 10, 2017 ABCWUA were informed of the expected future growth along the corridor and they responded that ABCWUA has no concerns about servicing the expected new development simply by reviewing and responding to the development applications as they come in, on an individual basis. ABCWUA representatives stated that their urban water and wastewater systems were very robust and redundant such that redevelopment along the corridor would be easily accommodated. In some cases a water or sewer main may need to be upgraded based on the development application, but they do not expect that it would be significant. This viewpoint may be supported by the fact that most of the Central Avenue corridor was, in the past, more vibrant than it is today.

WASTEWATER COLLECTION AND TREATMENT SYSTEM IMPROVEMENT RECOMMENDATIONS

A larger concern may be the age of the existing pipes, and the need to replace them as they exceed their life cycle. For example, prior to the construction of Central Ave ART the ABCWUA had \$30 million in replacements scheduled, but only accomplished \$10 million prior to the ART construction, meaning that pipe replacements will be taking place in the years following completion of ART improvements. Actions to support wastewater issues:

1. A full-membership Infrastructure Working Group meeting should be held monthly to coordinate demand loads, applications, and construction schedules.
2. A test model should be conducted for the each of the development area types (Downtown, Transitional, Suburban) to analyze the infrastructure needs for those three development types and amounts to confirm that the "response-to-development-applications" protocol is sufficient to serve the anticipated needs of the ART corridor growth rates.

STORMWATER

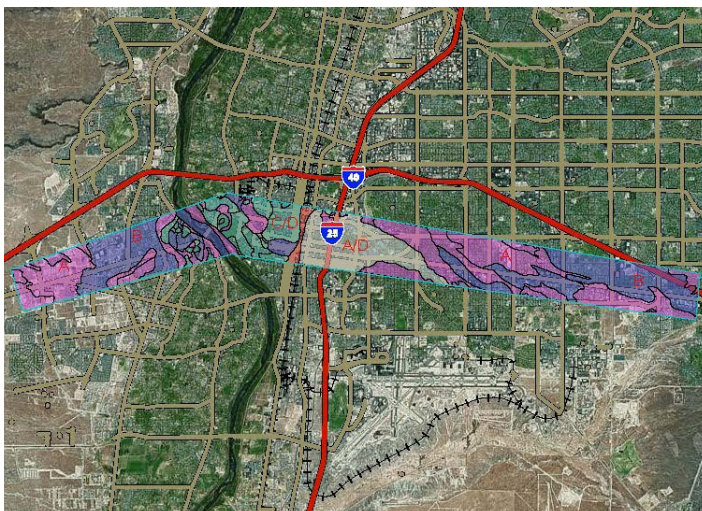
SYSTEM ASSESSMENT AND IMPROVEMENT RECOMMENDATIONS

EXISTING SYSTEM DESCRIPTION

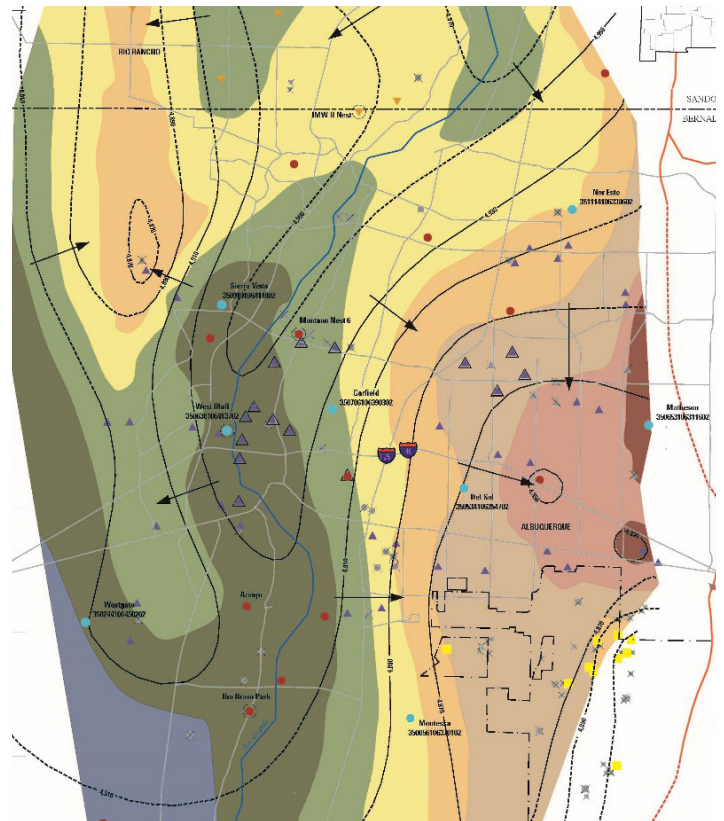
The average annual precipitation for Albuquerque is comparatively low at 9.45 inches, with the most rainfall occurring July through October. The record single day rainfall was 2.35 inches. The 90th percentile rainfall amount is 0.44 inches. The FEMA flood zones map below indicates flooding in the downtown at and near the Central Avenue crossing of the railroad tracks.



The soil types vary throughout the city, but are mostly Hydrologic Group A/B along Central Ave. (USDA NRCS map below), which percolate well and are conducive to green infrastructure practices. Soils are rated A to D with A having the highest infiltration rates.



The USGS has studied the aquifer, as mapped below, and found that drawdowns have been reduced since the 2008 introduction of diversions from the San Juan-Chama Water Project, but the aquifer has not been restored to historical levels. This would indicate that green infrastructure and other rainwater management techniques that utilize infiltration could help to restore the aquifer as well as reduce flooding.



Estimated drawdown, in feet, predevelopment to 2012
Areas underlying dashed contour are approximate



USGS estimated 2012
potentiometric surface and
drawdown, predevelopment
to 2012, Albuquerque metro-
politan area, Central NM.

GREEN STREETS



TREE POCKETS RETROFIT, CONCEPT PLAN DEVELOPED FOR REINVENT PHOENIX (URBAN ADVANTAGE AND CRABTREE GROUP INC. FOR CITY OF PHOENIX)

STORMWATER PROJECTED DEMANDS

The Central Avenue Corridor is a redevelopment area in which most parcels have been built out. The general pattern of development each side of Central and sometimes several blocks each side of Central, consisted of what is often called a pave-pipe-and-dump pattern in which rooftops and paved parking lots covering most of the lot, and the runoff was directed to the street and thence to inlets and pipes that eventually dumped into the river.

This is a worst-case scenario rainwater runoff pattern of development that can very easily be improved upon through redevelopment. In general, the redevelopment of the Central Avenue corridor should not put any increased demand on the storm drainage system and can, in fact, improve the conditions as described below in the recommendations.

STORMWATER SYSTEM IMPROVEMENT RECOMMENDATIONS

RAINWATER MANAGEMENT IN THE CORRIDOR: Flooding occurs in the central corridor, especially at the railroad undercrossing. The flooding is caused by the impervious surfaces that have been added to the upstream tributary over the past decades. Most of the development was done without attention to onsite or neighborhood rainwater treatment facilities. A number of rainwater interventions could help to alleviate flooding, enhance the livability, and replenish the aquifer. These procedures are often called LID (Low Impact Development) or Green Infrastructure. Here are some recommended rainwater treatment practices for the ABQ Central Corridor.



TREE ZIPPERS, PROJECT INSTALLATION, CARLTON LANDING, IN EUFAULA, OKLAHOMA

TREE POCKETS can be installed between parking spaces in the parking lanes on streets, as seen in the image to the top left. Simply sawcut the tree pocket, scoop out a hole, and fill it with soil and a tree. Leave the existing curb and gutter in place, and leave openings so the gutter rainwater can flow into and fill up the tree pocket, and then flow out at the lower end. The tree pockets help to define the outdoor room of the street, help to shade and cool the paving and parked cars and sidewalks, and absorb rainwater for tree evapo-transpiration while allowing for infiltration that will help replenish the aquifer.

TREE ZIPPERS can be installed in parking lanes by sawcutting the entire strip of parking, scooping it out and replacing with soils, trees, and pervious pavers. Unlike tree pockets, a tree zipper has a smaller planting well, but pervious pavers in the parking lane to increase stormwater capture. Rainwater enters the pervious pavers from the street surface and gutter flow and is absorbed by the trees and soils. Like tree pockets, tree zippers help to define the outdoor room of the street, help to shade and cool the paving and parked cars and sidewalks, and absorb rainwater for tree evapo-transpiration while allowing for infiltration that will help replenish the aquifer.

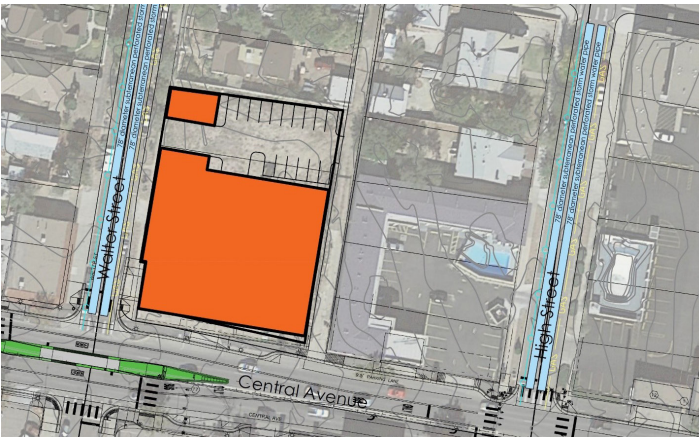
SIMPLE GREEN STREET is a slight modification of an existing street curb and adjacent planting area. A portion of curb can either be replaced with a depressed top-of-curb section, or the curb face can be simply core-drilled. See images on following page. Both modifications allow rainwater to pass to the adjacent planting area, which has been slightly excavated and re-landscaped to accept the rainwater run-off. This landscaped area can be planted with indigenous, drought-tolerant landscaping and a permeable surface to allow the rainwater to re-enter the aquifer.



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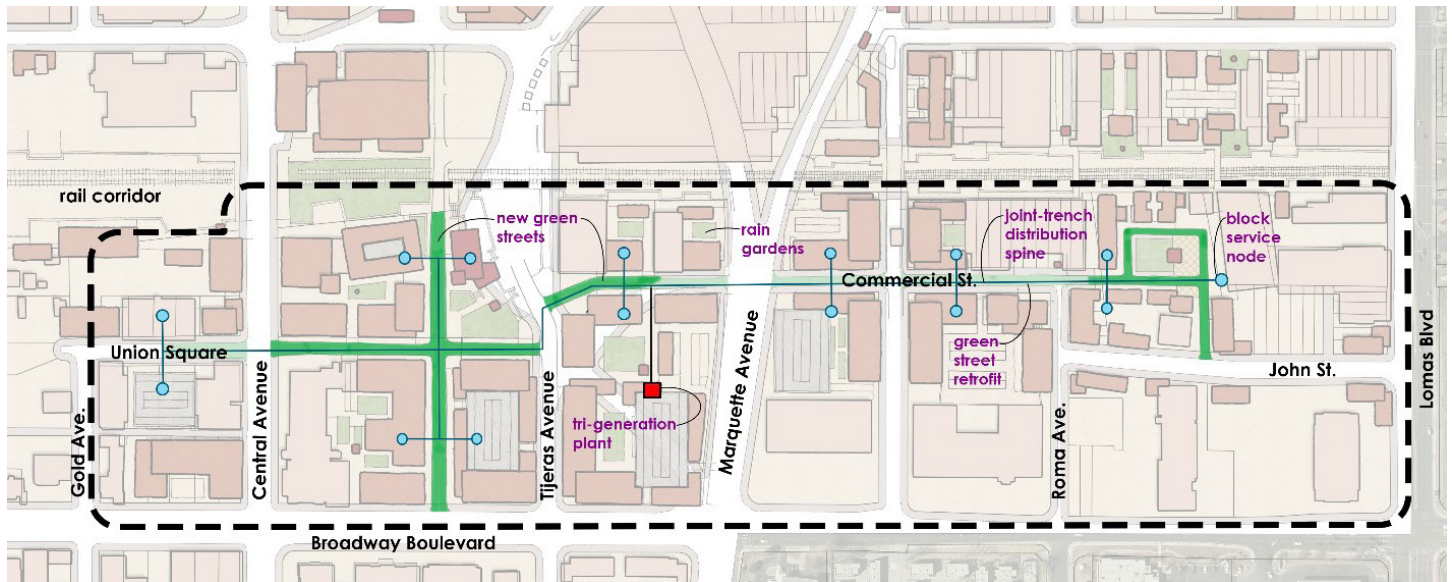
GREEN INFRASTRUCTURE PROVIDES NOT ONLY THE MUCH NEEDED **AQUIFER RECHARGE**, BUT ALSO CLEANS DIRTY STORMWATER BEFORE IT CAN POLLUTE THE RIO GRANDE AND OTHER RECEIVING WATERWAYS. IN ADDITION TO WATER QUALITY AND STORMWATER MANAGEMENT BENEFITS, GREEN STREETS BRING A DOSE OF NATURE INTO URBAN PLACES AND HELP MAKE WALKABLE, LIVABLE NEIGHBORHOODS. LOOKING AT SUCCESSFUL METHODS FROM OTHER CITIES CAN HELP INSPIRE LOCAL EFFORTS.

01 Core-Drilled Curb. Example of a core-drilled curb face, allowing stormwater from the curb and gutter to feed directly into adjacent drought tolerant landscaping in Tucson, Arizona.

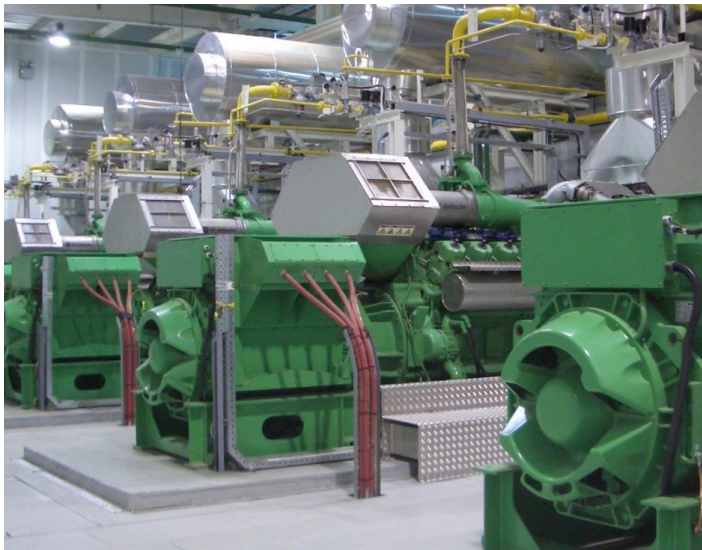
03 Car and People Park. The ABQ Downs fairgrounds racetrack has a massive parking lot in the infield. Some stormwater treatment is in place by the parking lot, but recommendation is to scoop out the parking lot in a shallow bowl and replace the asphalt with trees, grass and pervious pavers. A 5-foot depression would provide 100 acre-feet of detention/retention with a place for cars *and* people.

02 Depressed Curb. Example of a depressed curb section Simple Green Street in Portland, Oregon. See description of method on previous page.

04 Pervious Pavers can be used on parking lots as an enhanced surface that provides filtering, infiltration and storage of rainwater runoff. In-Street Detention Storage can be used to detain rainwater runoff and release it slowly after the peak flows to reduce flooding downstream. Some streets in the area have room in the center of the street and are conveniently located for this rainwater treatment.



05



06

05 EcoDistrict. The proposed four block Innovate ABQ development project in EDo is perfectly poised to anchor a larger twelve city block EcoDistrict. Such districts take a multi-faceted approach to energy production, while utilizing all the various Green Infrastructure elements mentioned earlier. At the heart of the EcoDistrict is a high-efficiency gas turbine complex that will produce electricity for all the buildings in the district. The waste heat from the turbines will be captured to provide building heating during the winter and cooling during the summer. The conduits for the power, hot water, and chilled water pipes will be placed in a joint-trench running down a refurbished central thoroughfare – along portions of Union Square and Commercial Streets – to distribute these essential utilities to all buildings within the district.



07

06 The size of the high-efficiency gas turbine facility is quite small and can easily fit within a conventional building footprint. Where distribution lines run along new portions of streets a green street assembly is possible, taking the form of a set of Tree Zippers along the on-street parallel parking areas, with the joint-trench running under the permeable pavers. Where the joint-trench is run along existing portions of streets, the retrofitting of Tree Pockets is possible. Rain garden plazas can provide treatment and storage for buildings.

07 Electrical power supplied by gas turbines will be supplemented with roof-top photovoltaic installations. These panels can help reduce the peak demand for electricity during the summer months, and thus extend the operational lifespan of the gas turbines.

POWER AND GAS

ASSESSMENT AND IMPROVEMENT RECOMMENDATIONS

POWER SUPPLY IMPROVEMENT RECOMMENDATIONS

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GAS SUPPLY DEMANDS

The gas supply system is owned and operated by New Mexico Gas Company (NMGCO). In the Infrastructure Working Group meeting held on March 10, 2017 NMGCO were informed of the expected future growth along the corridor and they responded that NMGCO has no concerns about servicing the expected new development simply by reviewing and responding to the development applications as they come in, on an individual basis. NMGCO representatives stated that their urban gas supply systems were robust and redundant such that redevelopment along the corridor would be easily accommodated. In some cases a gas main may need to be upgraded based on the development application, but they do not expect that it would be significant. This viewpoint may be supported by the fact that most of the Central Avenue corridor was, in the past, more vibrant than it is today.

GAS SUPPLY IMPROVEMENT RECOMMENDATIONS

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TELECOMMUNICATIONS SYSTEM

The telecommunications systems in the area are owned and operated by Level3, Comcast, and CenturyLink. No telecommunications representatives attended the March 10th, 2017 Infrastructure Working Group meeting.

STREETS

ASSESSMENT AND IMPROVEMENT RECOMMENDATIONS

STREET ASSESSMENT

The streets within the Central corridor (5/8 mile each side of Central Avenue) are generally good. The network grid forming the existing block structure supports a more intensive urbanism. There are some neighborhoods that are lacking in street trees, many of the drive lanes are a couple of feet too wide, and some of the sidewalks are narrow.

STREET SYSTEM DEMANDS

The streets within the ART corridor could be expected to experience a mode shift of fewer vehicles to more transit, pedestrians and bikes due to the ART transit project.

STREET SYSTEM RECOMMENDED IMPROVEMENTS

The report for the Central Avenue Corridor design initiative contains many recommendations for street retrofits in each station area that should be considered and implemented in the capital improvement plans by the Municipal Development Department. The recommendations include green street retrofits, wider sidewalks, parking lane striping, conversion of one-way streets, and bike network upgrades.

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