

# Sustainable Development Infrastructure

# B o n n y O a k s

Chattanooga Tennessee

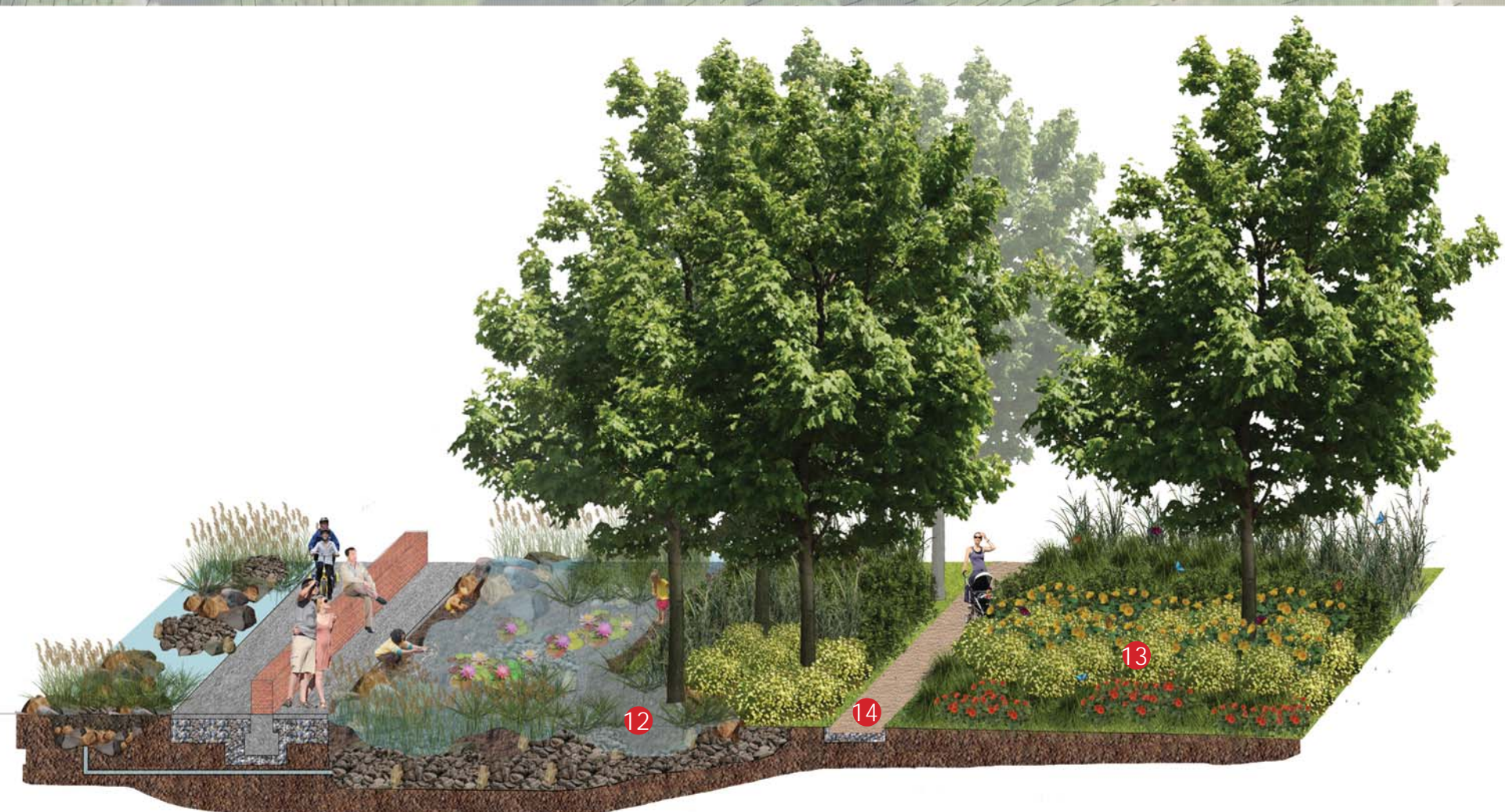
BUILDING ONE			BUILDING TWO		
24	1-Story	Live/Work Units	47	1-Story	Units (Courtyard Side)
10	1-Story	Garden Flats	12	1-Story	Flats (River Side)
14	2-Story	Units	12	2-Story	Units (River Side)
48	Total Units		7	2-Story	Townhomes (Drive)
			78	Total Units	



- 1 Courtyard for live work units.
- 2 Lower level parking and on-site recycling center
- 3 Green roof/ rooftop garden
- 4 Water silo and aqueduct system (contains all roof drainage)
- 5 Urban food forest in raised bed systems
- 6 Green wall creates living vertical panel
- 7 Private patio space for residential units
- 8 On site soil building (compost facility)
- 9 Food forest and landscape irrigated from water silos
- 10 Bridge over aqueduct overflow pool

- 11 Water sculpture
- 12 Bioretention with interaction forebay
- 13 Restored woodlands and meadow edge
- 14 Natural surface trail
- 15 Greenway connection (multi use trail)
- 16 Destination node on greenway with public art and educational signage
- 17 Existing greenway
- 18 Watercraft launch, kayak rental, and creek access
- 19 Pedestrian crossing with stamped concrete
- 20 Infiltration trench with adjacent porous pavers for on street parking

- 21 Planter box to treat stormwater in median
- 22 Public art in retail plaza
- 23 Restaurant to anchor building corner
- 24 Kayak and coffee shop and open air farmer market
- 25 Potential bus stop location for future route
- 26 Potential future light rail connection compatible with freight routes



BIORETENTION WITH INTERACTIVE FOREBAY AND RESTORED WOODLANDS/MEADOW



GREEN INFRASTRUCTURE ON PRIVATE ACCESS STREET



CENTRAL PLAZA WITH AQUEDUCT AND URBAN FOOD FOREST

NORTH/SOUTH SECTION VIEW THROUGH BUILDINGS

EAST/WEST SECTION VIEW THROUGH PLAZA

EAST/WEST SECTION VIEW TO CREEK

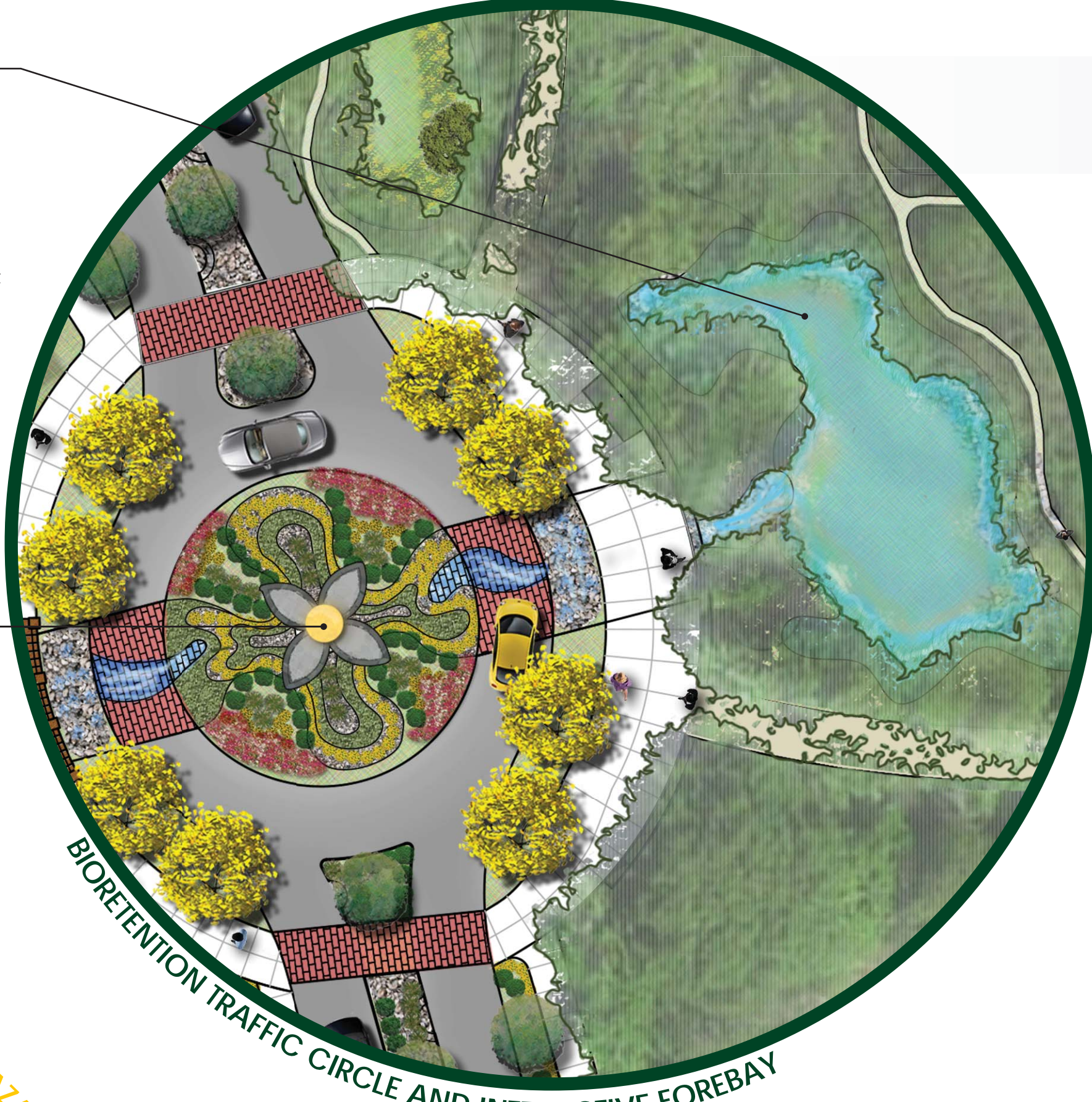
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## B o n n y O a k s

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STREET PERSPECTIVE FROM BONNY OAKS DRIVE



BIORETENTION TRAFFIC CIRCLE AND INTERACTIVE FOREBAY

**Green roofs/rooftop gardens**

- Vegetated surface retains stormwater
- Plant material cools roof surface and improves micro-climate
- Roof space becomes prime overlook and societal gathering space
- Green roof extends life of roofing material and saves energy in the heating and cooling structure

**Traffic circle with bioretention and water gauge sculpture**

- Cleans water
- Adds plants/biodiversity
- Artistic focal point for Bonny Oaks Development
- Improved connection for bikes and pedestrians
- Traffic calming is achieved with stamped pavers
- Simulating water movement under the roadway



LIVE/WORK PLAZA AND GREEN INFRASTRUCTURE STREETSCAPE

**Work/live residential units and corner restaurant/local boutique retail plaza**

- Mixed-use promotes the opportunity for a "live, work, & play" environment all within walking distance
- The local economy is stimulated with investment dollars
- A sense of community is strengthened with public gathering space

**Green infrastructure integrated into streetscape**

- Cleans water with porous pavers and infiltration trench
- Adds plants/biodiversity and shades hard surfaces
- Promotes pedestrian and bicycle use with multi-use trail and bicycle transit station
- On-street parking, medians, and concrete stamped crosswalks promote traffic calming
- Streetscape becomes a visual enhancement for the community



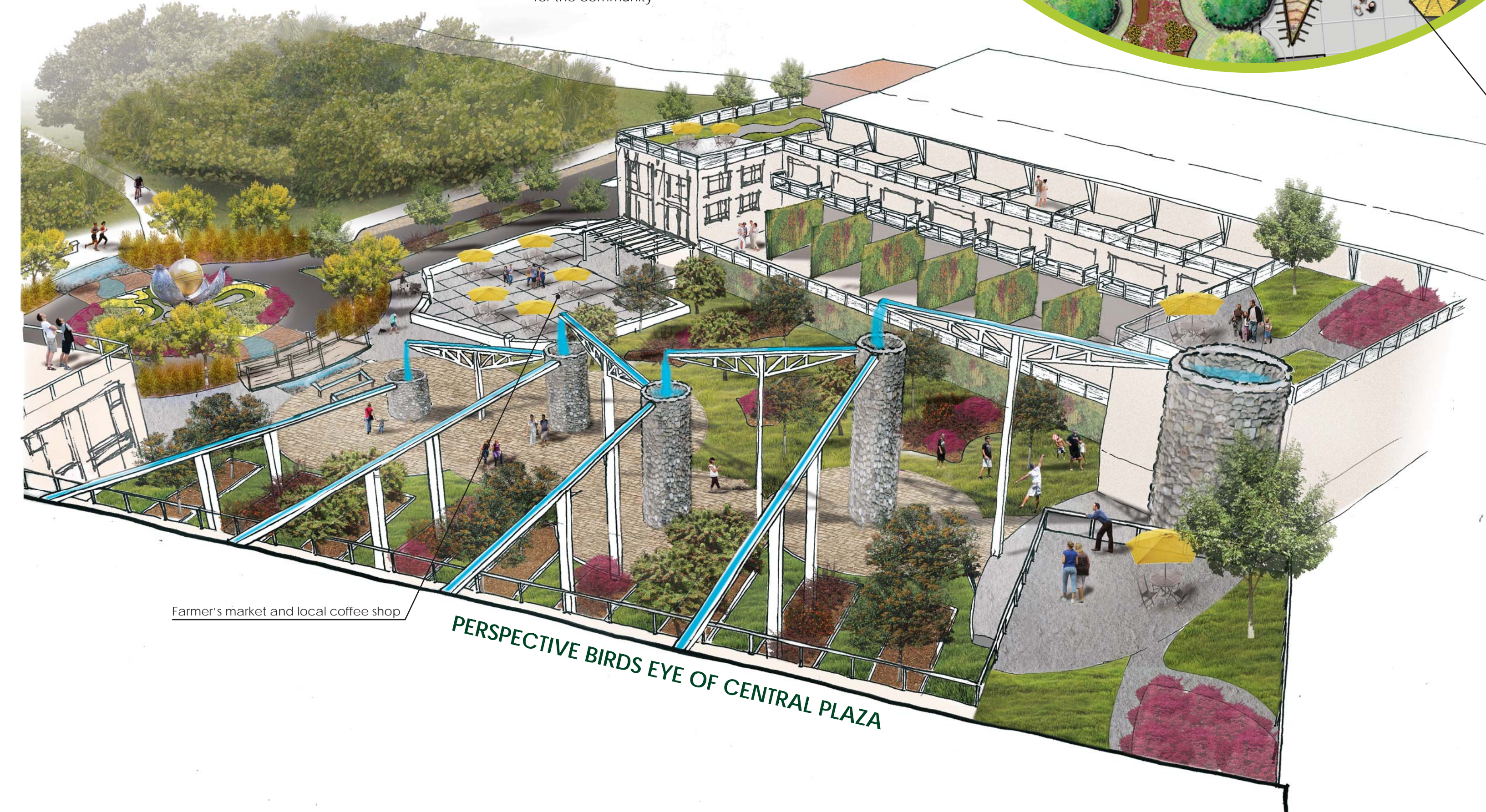
URBAN FOOD FOREST AND FARMER'S MARKET PLAZA

**Urban food forest**

- Residents have opportunity to grow food
- Farmer's Market provides economic outlet
- Harvested rainwater used for irrigation

**Water silo and aqueduct system**

- Aqueduct becomes community focal point
- Harvest rainwater for reuse and provides opportunities to clean stormwater
- Dynamic view of system for public education opportunities



FARMER'S MARKET AND LOCAL COFFEE SHOP  
PERSPECTIVE BIRDS EYE OF CENTRAL PLAZA

**Bonny Oaks** is a 6 acre mixed-use development site fronting Bonny Oaks Drive to the south, South Chickamauga Creek and greenway to the east, undeveloped land to the north, and an active railroad line to the west. It combines the opportunities for 140 condominium and townhome multifamily residential units, live work office units, commercial retail and restaurant development, an urban food forest, and restored meadows and groves of woodland. It also links to surrounding recreational opportunities and multi-modal transportation options. By using a model of sustainable infrastructure for the Bonny Oaks Development we create an exciting high density development that embraces multiple functions including:

**Management of storm water with green infrastructure** ————— **200,000 Gallons Of Rainwater Harvested**  
In Cisterns & Aqueducts

The Bonny Oaks development uses green infrastructure and a strong design expression to move stormwater through a series of interconnected water quality tools on the site. The treatment starts with rooftop gardens that function as usable outdoor space for the residents. Hard surface areas on the roof are captured through gutter systems and transferred to a large stone cistern that serves as a focal point for the community. The large stone cistern is further connected through an aqueduct that feeds into water silos placed in the central plaza between buildings. Water stored in the silos is utilized for irrigation and reclaimed grey water use in the buildings. Overflow from the aqueduct system and surface runoff from the plaza and streets is then captured in a series of porous pavers, infiltration trenches, and bioretention. The last downstream treatment of water is achieved with dispersion into restored meadows and woodlands which act as a large buffer zone between the development and the South Chickamauga Creek. The implementation of all these tools results in a complete on site treatment of storm water for a 1.6" rainfall event greatly reducing the need for large inlets, pipes and concrete gutters and channels.

**Enhanced environmental quality** ————— **96,000 S.F. Of Restored Meadow & Woodlands**  
Using Native Plants

The Bonny Oaks development integrates into the natural environment around it and enhances the outdoor experience of its residents and visitors. Restored woodlands and wildflower meadows envelope the edge of the project and act as a water quality buffer to the South Chickamauga Creek. Biodiversity is increased with the establishment of native and drought tolerant plants and wildlife habitat throughout the project, giving a home to beneficial birds, insects, and soil micro-organisms. Canopy trees, infiltration trenches, bioretention ponds, and rooftop gardens provide shade and transpiration to clean the water and air and reduce the impact of the urban heat island (increased temperatures found in areas predominantly covered with concrete and asphalt.) Healthy, organic food is grown on site with raised agricultural beds that utilize rainwater harvested from surrounding rooftops and soil composted from on-site waste. This reduces the cost and environmental impact of transporting food long distances.

**Improved multi-modal transportation** ————— **4.0 Miles Of Hiking, Biking, & Paddling**  
Sterchi Farm Section Of Greenway

Bonny Oaks is connected to several means of multi-modal transportation opportunities. Good connection to the county arterial highway (TN 153) is within a half mile of the site. The majority of automobiles are parked in lower level garages, allowing for pedestrian plaza and green space to surround proposed buildings. Traffic calming is achieved with vegetated medians and pedestrian crossings. A traffic circle slows down the travel of automobiles through the site and functions as an artistic water gauge. With the South Chickamauga Creek greenway adjacent to the site, there are pedestrian, bicycle, and watercraft modes of transportation available to residents of Bonny Oaks development, providing a long distance connection all the way to the heart of downtown Chattanooga. These modes of transportation also serve to bring people from the surrounding communities to the commercial establishments mixed into the property. Additional recreational and health benefits are found in the pedestrian pathways and bicycle routes designed into the site and connecting to its surrounding environment.

**Promoting community and public education** ————— **5 New Ways To Look At Rain**  
Aqueduct, Terraced Rain Garden, Interactive Forebay, Porous Streetscape, Street Planter

Green infrastructure creates beautiful and functional spaces. People connect to beautiful spaces. This connection becomes an important part of the sustainability of a space. When people care about a space they will maintain it and steward its resources. The Bonny Oaks development has beautiful and functional spaces that encourage community interaction and commerce. The site is designed to move from an area of public commerce along Bonnie Oaks Drive into an open air community market and traffic circle. The traffic circle functions as a focal point to connect greenway, private street and plaza. Interaction with environmental features throughout the site create ample opportunity for educational and recreational experiences.

**Economic benefits** ————— **21,470 S.F. Of Vibrant Commercial Space**  
Retail/Office/Outdoor Market

Investment in the green infrastructure creates market value for the Bonny Oaks property. Some of that market value comes from the increased interest in investors to purchase or lease property that is framed by aesthetically pleasing landscape and a clean environment. Market value also comes from the reduction of energy demands for sustainably designed buildings and reduction of domestic water use from the benefits of harvesting rainwater on site. By implementing a high density of mixed use development the infrastructure cost of roads and utilities per unit is greatly reduced. Stormwater fee assessments for commercial properties can be decreased due to reduced impact on regional stormwater facilities. Residents of Bonny Oaks will benefit economically from on-site food production, reduced travel costs and energy demands, and increased recreational and health options.