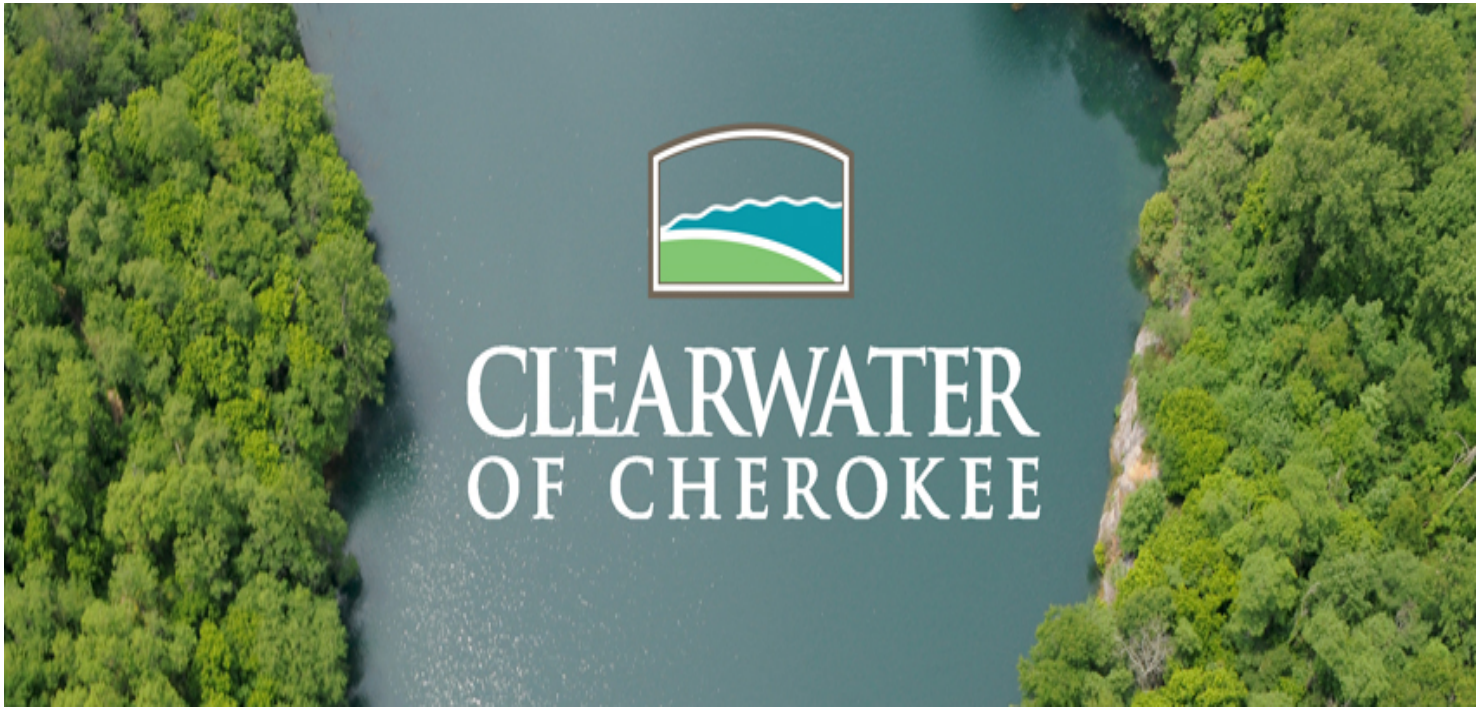
Water Centric City of the Future

Ecological Engineering Opportunity

Exclusive Marketing Agent



Carroll Properties Corporation

- As the Exclusive Agent, we have explored the options for economic activities on this unique land form including Bottled or Mineral Water, Distillery, Wet Process Manufacturing, Social Entrepreneurs, Investors and Developers.

- While there is money targeting Sustainable and Socially Responsible Projects the concept for this land has not been fully developed.

International Water Congress

- In September I attended the International Water Association, World Water Congress in Montreal. This gathering brought the experts from corporate, social and academic sources.

- A two day interactive workshop was held on Cities of the Future with an emphasis on the harmonization and re-engineering of scarce natural resources, water and sanitation in lower and middle income countries.

Who are the Role Models Today

- I presented the opportunity to the convener's for creating a new city centered around water.
- A colleague from South Africa came to me and said "It is time for the developed world to embrace a sustainable model before trying to export it to developing countries!"
- This goal is beyond my personal capabilities.

Potential Project Partners

- Vladimir Novotny, Northeastern U, Boston, co-author of Water Centric Sustainable Communities, planning, retrofitting and building the next urban environment.
- Veolia Water, consults with Wet Process Manufacturers
- ITT Water, with key water staff in Charlotte, NC
- CH2M Hill, offices in Spartanburg and Charlotte, world leaders in major water projects, instrumental in Zero Carbon, Masdar, UAE
- GE Water and Process Technologies
- IBM Big Green Innovations seeking projects
- Bank of America board chair requested information

Engineering Studies Completed

- In 2002 Cherokee County considered a need for this water and conducted comprehensive engineering studies which we have available

  (they did not see a use for the water in the foreseeable future)

- Environmental Assessments were conducted

- Water quality, quantity, valuation is measured

“Worlds Largest Private Water”

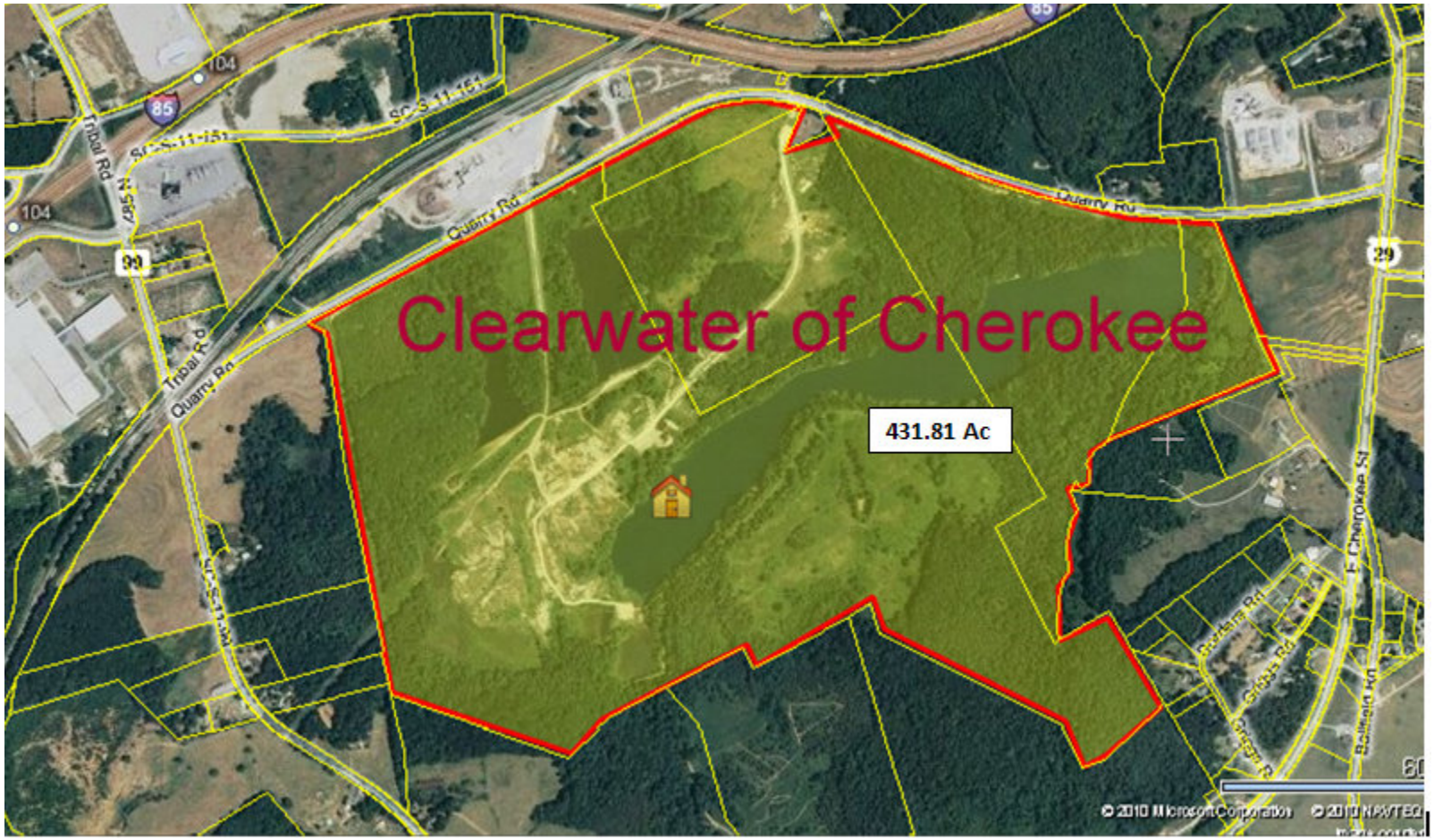
- Susan Marks, author of Aqua Crisis (2009) has offered this brand which was tested in Montreal with the experts without challenge.
- President, International Bottled Water Assn. “SC Riparian Laws allow Private Ownership”
- A Natural Opportunity for Vision to Reality

Limestone Quarry and Raw Site

Platform for Sustainability

- This unique landform offers the palate for creating a new urban environmental system
- The 4400 foot long quarry with depths to 200 feet hosts nearly 2 Billion Gallons of Water
- Consulting Engineers estimate a recharge rate of 5-10 Million Gallons Per Day

I-85+ Norfolk Southern + Site



Location, Location, Location

- 30 Miles to Charlotte-Douglas Airport
- 200 Miles to Port of Charleston
- Interstate 85 is ¼ mile
- Two interchange corners are assembled for manufacturing with all utilities available
- Site is expandable and has natural geographic boundaries
- Animal husbandry and farming exist in the area to support Organic Urban Living

Roadbeds remain from Mining

Water Vistas/Whitaker Mountain

Research Opportunities Abound

- Smarter Cities will thrive, generate more jobs and stimulate innovation and entrepreneurs
- Emerging Technologies offer challenges to the status quo in addressing energy, water, nutrient recovery, rainwater management, as well as agriculture and aquaculture.
- Health and environmental impacts of urbanization can be measured and monitored

Stakeholders seek Collaboration

- IWA Cities of the Future seeks to address

  - Optimization of design and operation in the built environment
  - To implement new, superefficient systems to allow reuse and energy recovery at the margins of the built environment
  - To systematically remodel built environment to achieve significantly higher levels of system efficiency, technology and design

Hierarchy of Urban Systems

- Buildings
- Transportation
- Energy
- Water
- Ecosystems, natural systems
- Energy
- Goods and solid waste

List of Layers for Site or EcoCity

- Costs
- Energy and carbon emissions
- Infrastructure
- Physical sites: topography, water/rain/sunlight, wind, geothermal
- Land use: usage, zones, etc.

Integrated Urban Activities

- Population/occupancy
- People movement
- Energy consumption
- Water consumption
- Economic, rental revenues
- Goods movement
- Used water and solids disposal
- Water reclamation and recycle
- Energy recovery and renewable production
- Nutrient management

Holistic Organic Approach

- Animal husbandry
- Food production/preparation/preservation
- Greenhouse growing for productivity
- Technology infrastructure
- Land use
- Wellness initiatives
- Socialization opportunities
- Socially responsible organic living

Building Infrastructure Systems

- Green High-Performance Buildings
- Population Density-building heights
- Carbon Emissions

Transportation System Options

- Public trains and busses
- Automobile-Electric, Hybrid, Solar
- Walking, Biking, Trails

Water Systems

- Linear regional or closed-loop cluster-wide
- Surface or subsurface drainage
- Nutrient Management
- Carbon and methane production and emissions

Water Ecology Cluster

- Smart Water Metering Infrastructure
- Biological Sensors for Water Sources
- Water-Biosolids-Energy Nexus

Associated Technologies

- Water Footprinting
- Water Law/Economics
- Fluid turbulence in flow fields
- Terrestrial-aquatic linkages from climate

Ecosystem Health Indicators

- Reproductive physiology of fish, amphibians
- Biological Tools for water quality surveillance
- Harmonization of environmental performance
- Aquatic system inputs in urbanization

Aquaculture Research

- Aquatic Eco System Interactions
- Plankton Ecology
- Aquatic Biogeochemical Modeling
- Biomineralization risks of aquatic organisms

Energy Systems

- Smart grid management controls
- Solar, wind, geothermal, used water
- Organic solids, combustible trash
- Energy for buildings

Energy Recovery

- Energy used by water and water infrastructure (water reclamation, reuse plants, or pumping)
- Hydraulic energy recovery

Ecosystems, Natural Systems

- Interconnectivity
- Hydrology, water flow availability or shortage
- Pollution
- Ecotones and floodplains

Goods and Solid Waste

- Virtual water and energy consumption
- Life-cycle benefits and costs
- Recycling and Waste Exchange Innovation

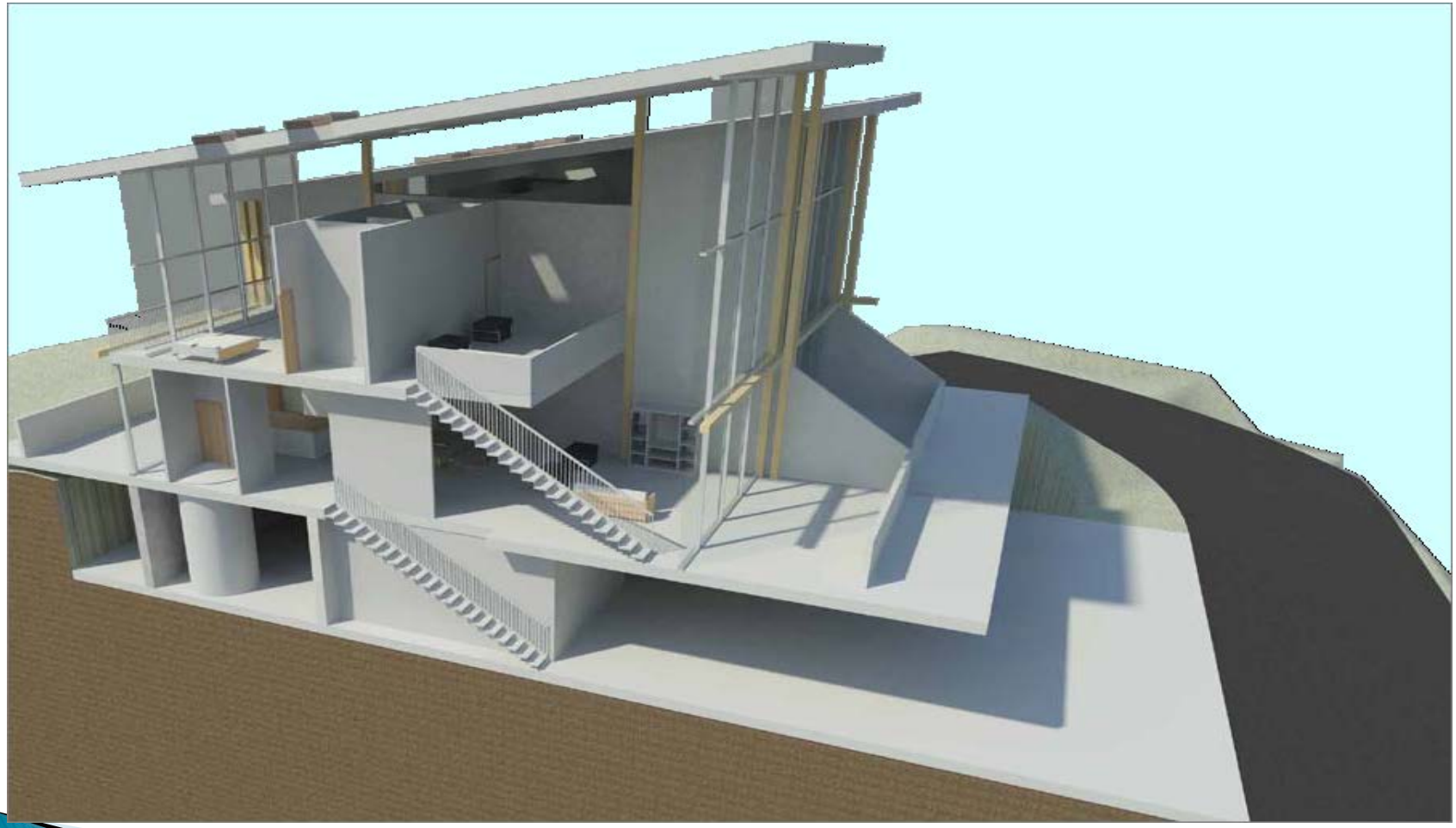
Invitation to Participate

- Institutions may see a clear path for strategic targeted research opportunities
- Corporations may see a role to collaborate in Best Practices for Green Infrastructure
- Legislators may see leadership worth support

Clemson University

- 3C studio at Clemson School of Architecture
  - "…develop concepts and design solutions for the Clearwater project which aims to be a water-concentric, sustainable community in Blacksburg, SC." – Charles Kane, 3C instructor

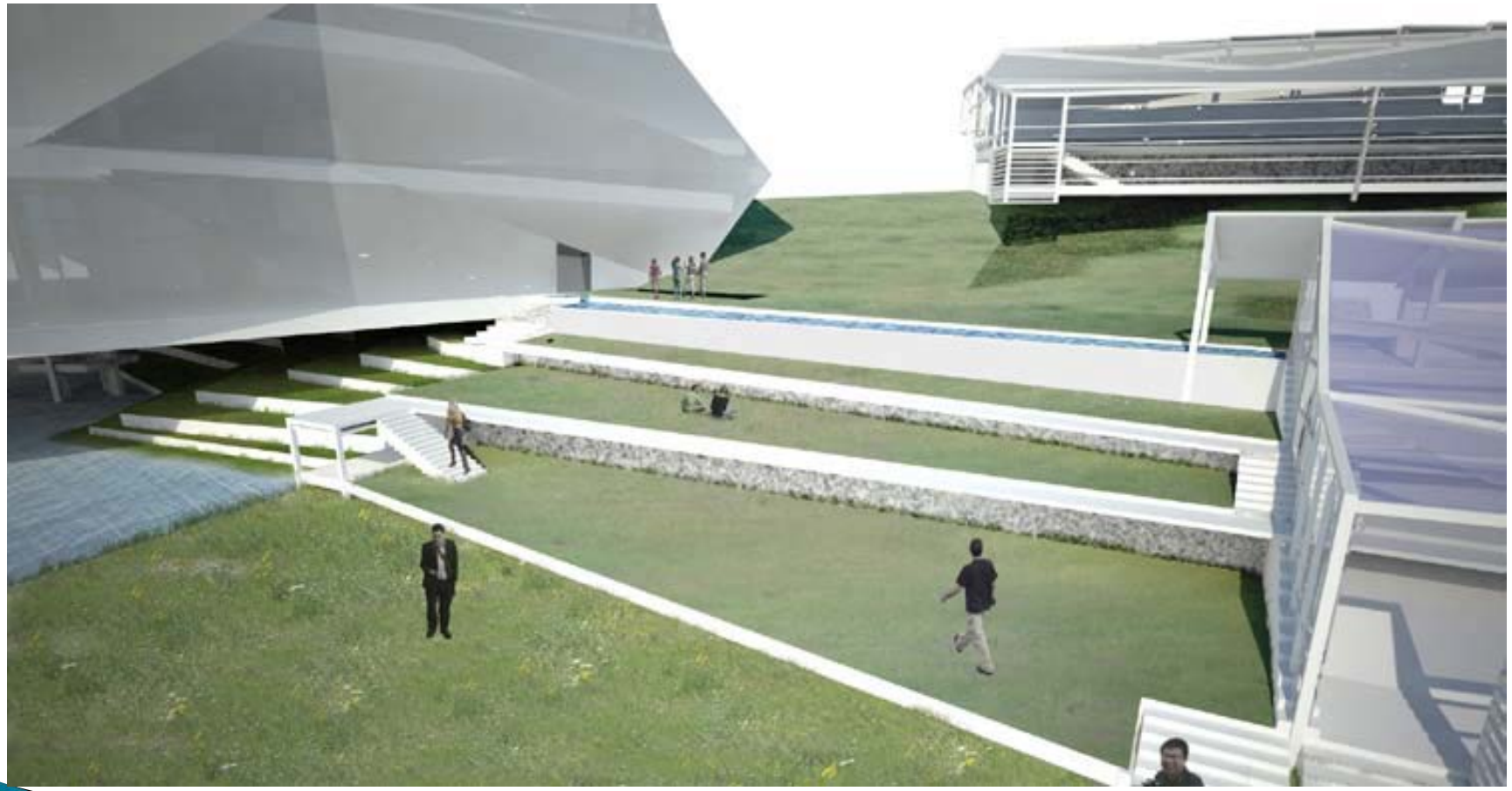
Clearwater Organic Research Enterprise



International Collaboration for Opportunities with Nature

Agricultural Ribbon of Clearwater

Universal Joint



CPC and 3C Bridging the Future

Next: Stakeholder Think Tank?

- We are seeking a host for an Interdisciplinary Think Tank to establish key stakeholders, roles, and the way forward.

- Respectfully,

Elizabeth C. Belenchia, CCIM, SIOR, RICS
President, Carroll Properties Corporation
Sustainable Real Estate Solutions since 1976
864-949-5250 ecb@cpcindustrial.com