

# Barriers to Implementing Green Infrastructure in Development Projects



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# What is Green Infrastructure

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Bioswales

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Green Roofs

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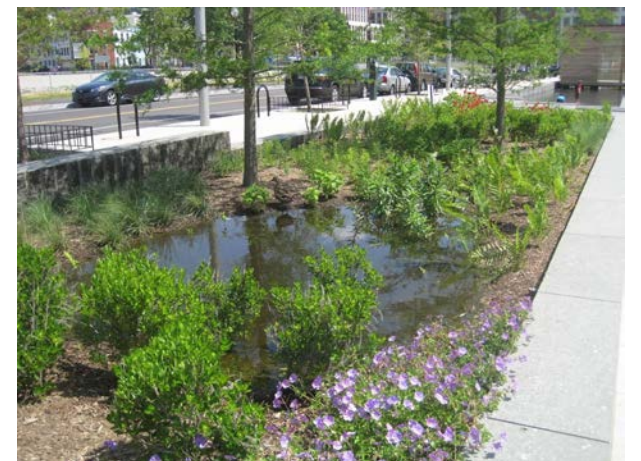
Pervious Pavement

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Rain Gardens

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Rain Barrels





*Green Infrastructure - Any engineering intervention that uses vegetation, soils and natural processes to manage water and create healthier built environments for people and the natural resources that sustain them.*





*Gray Infrastructure – A network of water retention and purification infrastructure (such as pipes, ditches, swales, culverts, and retention ponds) meant to slow the flow of stormwater during rain events to prevent flooding and reduce the amount of pollutants entering waterways.*



# Benefits of Green Infrastructure

Storm Water Management

Reduced Heat Impacts

Increased Biodiversity

Air & Water Quality

Mitigate Impacts of Climate Change

Healthy and Sustainable Communities



# Green Infrastructure

Provides Economic, Social and Environmental  
Benefits to the Community



# What are barriers to green infrastructure?

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# Legal and Regulatory Barriers

## Potential Barrier

- Resistance to New Rules
- Perceived Adverse Impacts to Property Owners
- Overly Prescriptive & Inflexible
- Conflicting Rules



## Potential Solution

- Outreach to Stakeholders
- Maintain Local Control
  - Vs. State Control
- Prioritize Property Rights
- Use Cost Benefit Analysis
  - Life Cycle Costs
  - Positive Impact on Community
- Audit Regulations



Acceptance and Implementation is  
depedenant on the leadership,  
knowledge and support of local officals

# Financial Barriers

## Potential Benefits

- Perception of Higher Costs
- Low Priority Compared to Other Construction Elements
- Uncertainty of Operational and Maintenance Costs

## Potential Solutions

- Emphasize that GI has Multiple Benefits
- Explain Avoided Costs of GI
- Consider Use of Incentives
- Resiliency Benefits to GI





# Community or Institutional Barriers

## Potential Barrier

- Unfamiliarity with Green Infrastructure
- Lack of Trust in Science/Technology Behind GI
- Public Knowledge and Perceptions
- Resistance to Change
- Lack of Understanding by Leadership
  - Political, Administrators, Developers/Builders, Designers

## Potential Solution

- Develop Education, Training and Outreach Programs
- Assess and Revise Regulations
- Stakeholder Participation
  - Sponsor events
- Pilot Projects



# Other Barriers to Use of Green Infrastructure

- Price (perception?)
  - Initial Costs Compared to Gray Infrastructure Solution
- Prejudice for Existing Methods
- Conflicting Interests
- Construction Techniques
  - Excavation, soil removal, and soil compaction
- Environmental Justice and Inequality
  - Typically in well-to-do neighborhoods, in poorer neighborhoods
- Corporate Prototype Designs

# Top 5 Barriers to Implementing Green Infrastructure on Residential Sites (HBA 2017 Report)

- Regulator Lack of Experience
- Limited Flexibility in Approval Process
- Project Costs More Than Traditional Gray Infrastructure
- Lack of Homebuyer Demand for GI
- Lack of Standardized Protocols and Technical Specifications




# Top 5 Incentives to Implementing Green Infrastructure (HBA 2017 Study)

- Fast Track Permitting
- Permit Fee Reduction
- Density Bonuses
- Fee-in-lieu Programs
  
- Not favored
  - Green Award Programs
  - Training programs
  - Stormwater Credit Trading

# Tools for Assessment of Barriers

- Audit Tools for Local Codes and Ordinances
  - Better Site Design Code and Ordinance Worksheet
  - EPA Water Quality Score Card
  - EPA Webcasts
- Amend Development Codes and Regulations
  - Integrate Green Infrastructure Principals
  - Add Language that Provides Flexibility for GI
- Develop Design Guidelines
- EPA Web Site - <https://www.epa.gov/green-infrastructure/build-green-infrastructure>



## Revising Local Codes to Facilitate Low Impact Development

*Creating LID–Local Development Code Connections Will Assist With Implementation*

**Barrier Busters Fact Sheet Series**

Many municipalities now view low impact development (LID)—also known as green stormwater infrastructure—as an essential stormwater management tool. LID practices are designed to capture, filter and infiltrate runoff onsite using soils, vegetation and other media. So, why aren't rain gardens and vegetated swales popping up in every small city and town? Because complex local development codes, developed over decades, frequently stand in the way. Fortunately, a comprehensive review of local development codes can identify where and how the codes should be adjusted to work in tandem with and facilitate the use of LID.


### What's the Problem?

**FAQ**

Don't development codes prevent the use of LID?

**Barrier Busted!**  
Review of local codes can identify and remove obstacles to LID.

EPA's LID Barrier Busters fact sheet series... helping to overcome misperceptions that can block adoption of LID in your community



# Let's Change Directions – The Planner's Perspective

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- Planning and Zoning Barriers
- A More Broad View of Green
- Do We Need a Paradigm Shift?
- Generally Green – not just Infrastructure





# A Planner's View of Green – Main Themes

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- Green is a State of Mind
  - Approach to solutions, requires practice and action
- It's Like a Green Onion
  - Lots of Layers
- We Need to Look for Green Everywhere
  - Politics, Attitudes, Funding, Regulations, Practices



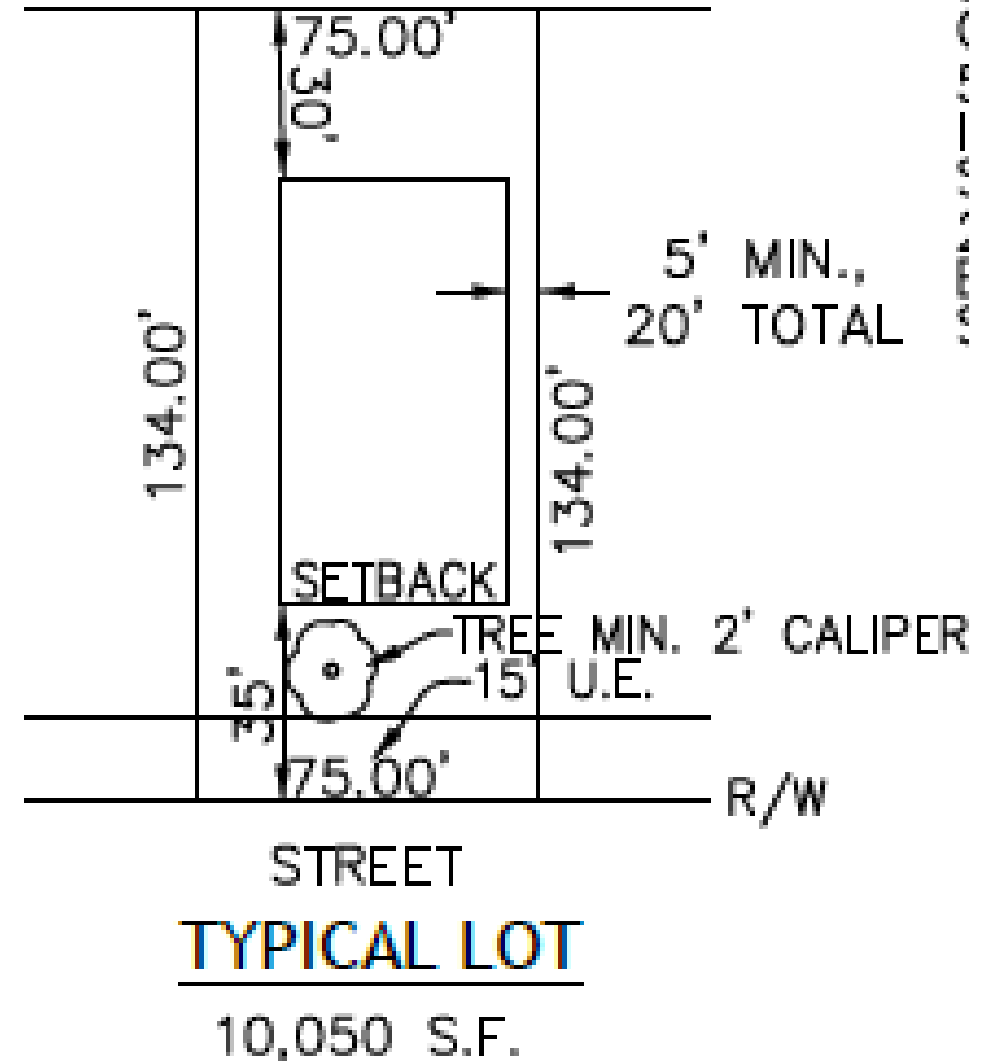
# Basic Zoning Restrictions Can Be Anti-Green

## Potential Obstacles

- Density
- Minimum Lot Sizes
- Minimum Lot Widths
- Yard Requirements

## Possible Solutions

- Planned Development Zoning
- TND
- Conservation Zoning
- Other Flexible Zoning



# Shifts in Attitudes About Density

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- “It would be really awesome if our land use allowed some townhomes. Now we’re talking about 24 to 30 units.” Councilman Reggie Harris said.
- “The question is if...we had flexibility in our zoning and land use policies...It’s entirely possible this would have been 30 to 40 homes on the same amount of acreage.” [Councilman Greg] Landsman said.

From the Cincinnati Business Courier:

<https://www.bizjournals.com/cincinnati/news/2022/06/08/avondale-subdivision-approval-coming.html>

## **New residential subdivision in Avondale set for approval**

Jun 8, 2022, 6:28am EDT

Cincinnati City Council is set to give final approval today to a new single-family subdivision in Avondale, agreeing to spend at least \$1 million to build a new road to the homes that will be on Alaska Avenue.

Council members considered the nearly \$7 million project at two



# Utility Standard As Barriers

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- Generally Require Minimum Utility Line Separations
  - Water and Sewer – 10 foot separation
- Generally Created for Suburban Lot Situations
- 15 to 20 Foot Utility Easements Around Property
  - Sometimes Split Along Property Lines
- Roof Downspout Connections – to Gray Infrastructure
- Market for Smaller Lot Housing
  - Narrow Lots and Open Space
  - Efficient Use of Land
- Adopt Alternate Standards





UPDATE PARKING	DATE

STATE OF OHIO  
 JAMES H. WATSON  
 46066  
 REGISTERED PROFESSIONAL ENGINEER  
*James H. Watson*

**BILLINGSLEY**  
**SECTIONS 6 & 7**  
**FINAL DEVELOPMENT PLAN & IMPROVEMENT PLAN**  
 MILITARY SURVEY NO. 4455 & NO. 5958  
 BATAVIA TOWNSHIP  
 CLERMONT COUNTY, OHIO



## WATER MAIN CROSSING SEWERS

AT CROSSINGS, WATER MAINS SHALL HAVE A MINIMUM VERTICAL DISTANCE OF 18 INCHES FROM STORM AND SANITARY SEWERS. ONE FULL LENGTH OF WATER MAIN SHALL BE LOCATED SO THAT JOINTS ARE AS FAR FROM THE STORM AND SANITARY SEWERS AS POSSIBLE.





# Green Up Idea

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- Establish “Model” Green Regulations and Ordinances
  - Subdivision Regulations
  - Engineering Standards
  - Utility Design Standards
- Engage Stakeholders
- Optional – Not Mandatory?
- Equity Issue



# Zoning Design Conflicts with Green

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- Requiring Curbing Around Parking Areas
  - Conflicts with Natural Drainage Flow
  - Use of Bioswales
- How and When to Require Pervious/Permeable Pavement
- Requiring/Allowing Long Planting Strips in Parking Lots
  - Natural Drainage Swales and Paths



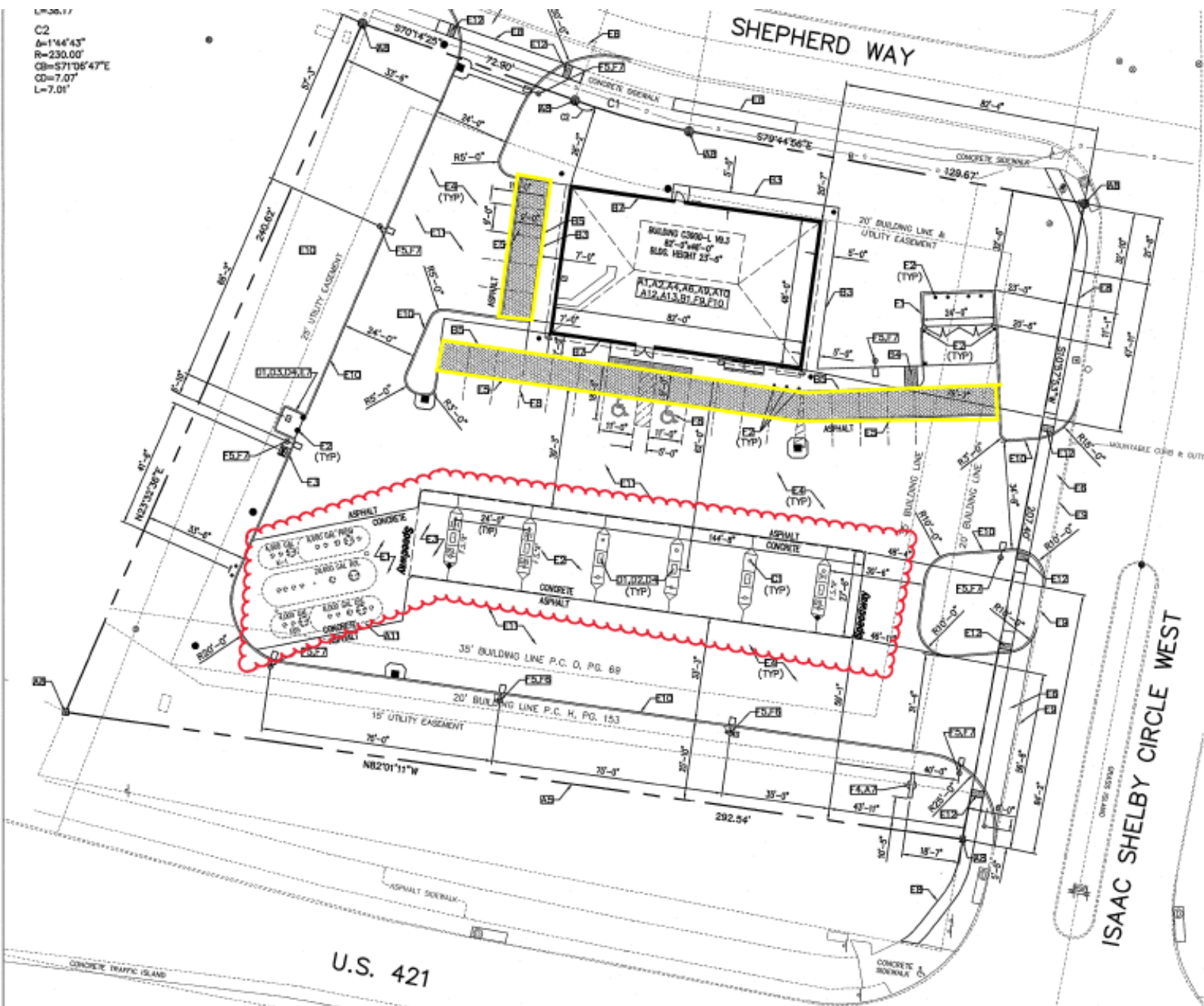
## 10.046 Parking Surface

All parking surfaces shall be constructed to meet the following standards:

- A. Parking Surfaces located on properties within the Suburban Area denoted in the Franklin County Subdivision and Site Plan Regulations shall conform to the following standards:
  1. All facilities devoted to off-street parking for more than 15 spaces as required under this article shall be of a paved surface construction such as plant mix asphalt, penetrating asphalt, concrete paving, pervious concrete, pervious and impervious pavers (to standard for vehicular traffic), and/or permeable grid vegetative or stone systems not to include gravel. Main aisles of the parking lot may be required to be asphalt or concrete when deemed necessary by the Planning Director or Engineering Official.
    - a. A minimum of 25% of the parking spaces of parking areas that provide more than 15 spaces shall be provided using permeable or pervious pavement options.
    - b. When 50% or more of the parking spaces of parking areas that provide more than 15 spaces are constructed utilizing permeable or pervious pavement options the minimum number of spaces required by Article 10.02 may be reduced up to 10%.
    - c. When 100% of the parking spaces of parking areas more than 15 spaces are constructed utilizing permeable or pervious pavement options the minimum number of spaces required by Article 10.02 may be reduced up to 15%.
  2. The parking lot shall be drained to eliminate surface water.



L=26.17  
 C2  
 Δ=1°44'43"  
 R=230.00'  
 CB=571°06'47"E  
 CD=7.07'  
 L=7.01'



= PERMEABLE PAVEMENT AREA  
 (SEE DETAIL SHEET 100108-CP-1)

**PERMEABLE PAVEMENT CALCULATIONS**

REQUIRED SPACES = 5.25  
 REQUIRED AREA = 850.50 S.F.

PROVIDED SPACES = 12.6  
 PROVIDED AREA = 2036.73 S.F.



# “Sea of Parking” – We Can Control That, Right?

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- Communities are Reducing or Eliminating Minimum Parking Standards
  - In Specific Districts
  - Some Citywide
- Fewer Parking Spaces = Reduced Development Costs
- Less Pavement = Reduced Storm Water Management
- Encourage Residential & Commercial Development
- Cost of Parking Spaces
  - \$5,000 per surface space; \$50,000 per structured parking space
- Interior Parking Area Landscaping

# Movement to Reduce Parking Standards

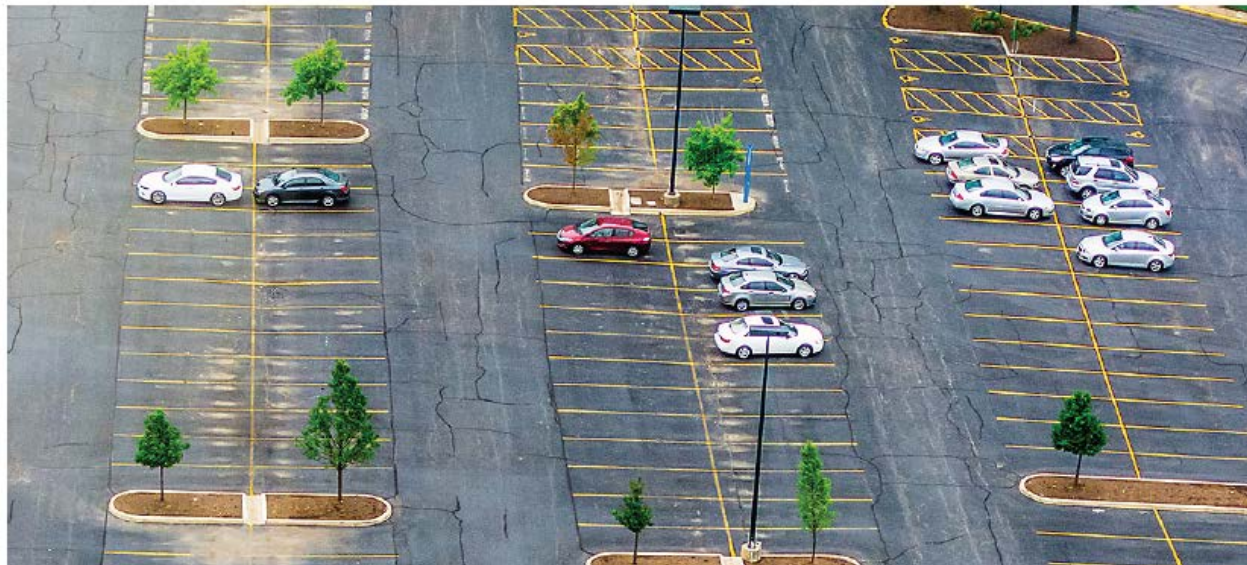
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## A Business Case for Dropping Parking Minimums

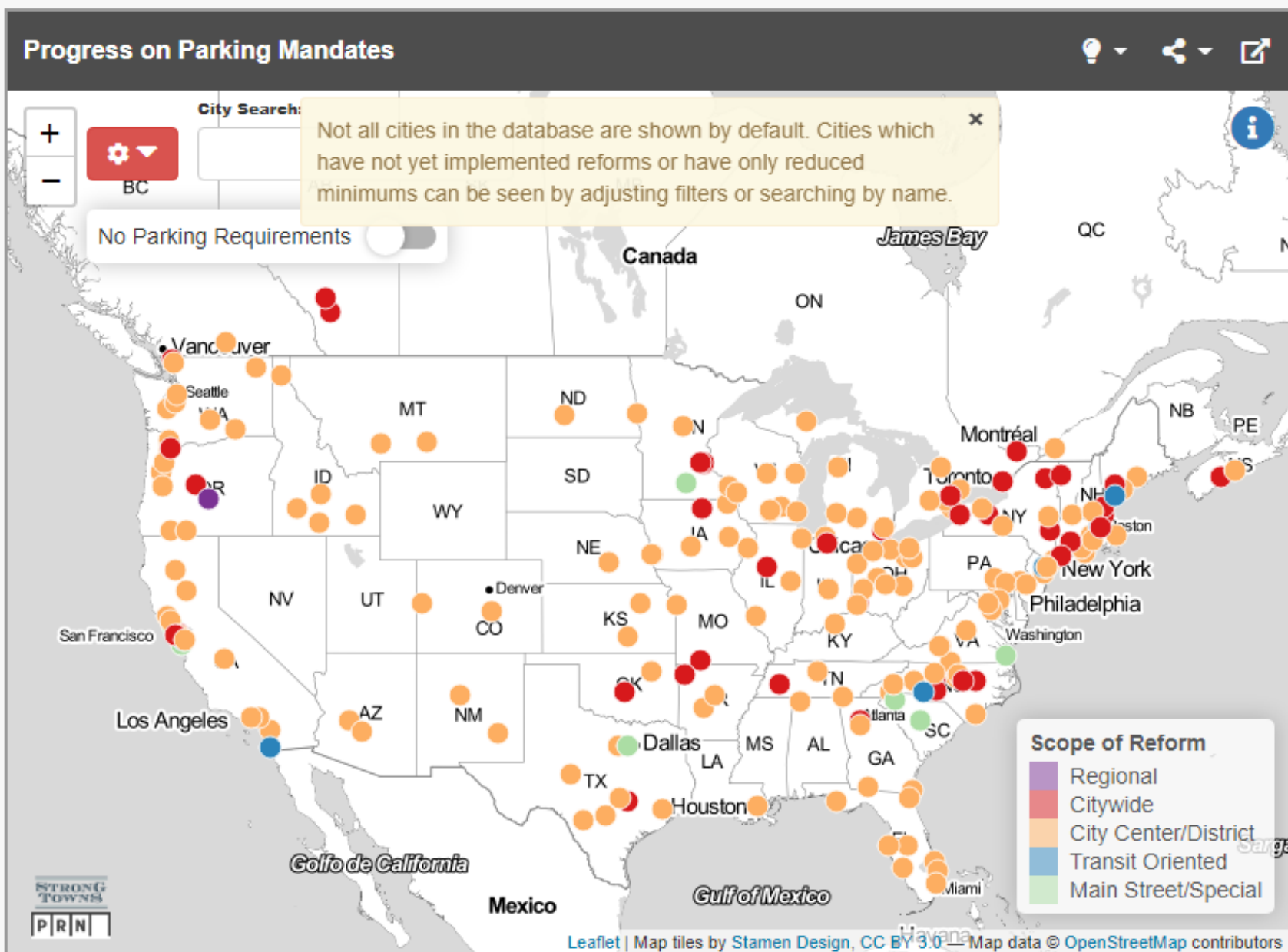
*In the smallest of towns and the biggest of cities, these new zoning reform policies help boost small businesses, promote housing development, and put people over parking.*

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[INNOVATIONS \(/PLANNING/SECTION/INNOVATIONS/\) PARKING](#)



# Parking Reforms in Big and Small Towns



# Reduce Parking Requirements

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- Community reduced parking for senior housing from 2 per unit to 1; 90 bed unit built
- 2 spaces per barber chair – only 1 customer in a chair at a time...
- Parking minimums MAY increase usage of cars and increase green house gas emissions
- Allow market-based decisions parking supply and demand
- Possible increase in affordable housing developments and mixed-use developments
- Generally – reduced parking requirements = increased development
- Be Flexibility in the approach = Don't apply to all types of Development – be targeted
  - Commercial only first, mixed uses, senior housing, downtown areas, transit areas.
- Reduce the number of Parking Variances

# Implement Parking Maximums

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- Limit on How Many Spaces a New Development Can Provide

**F. Adjustments to Required Parking:** The applicant for all uses except single-family and two-family dwellings may vary from the optimal number of parking spaces in accordance with the following provisions. See Illustration 5.8.

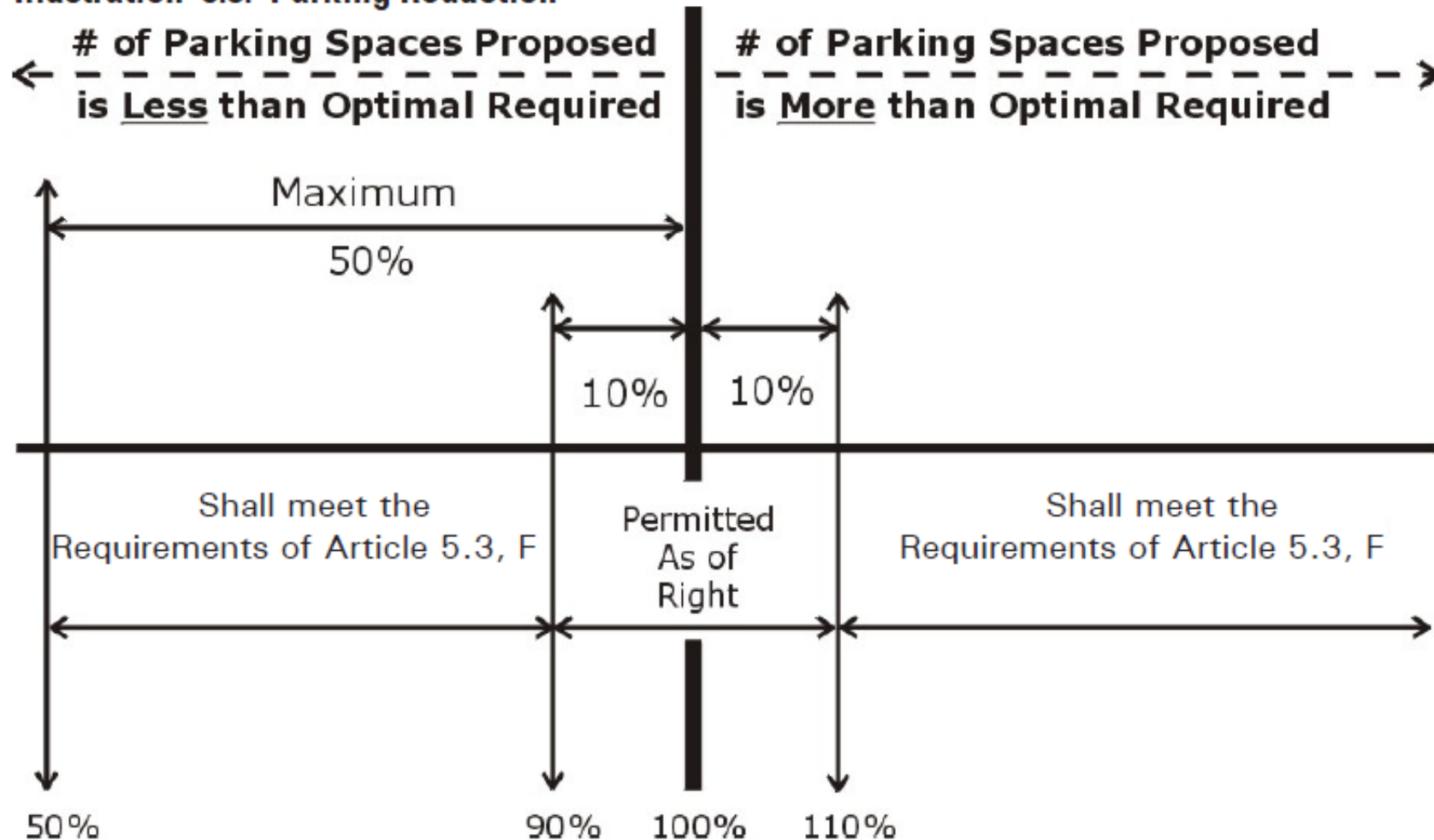
1. Parking Spaces in Excess of Optimal Number of Spaces
  - a. The applicant may provide a number of spaces equal to the optimal number of spaces or up to ten (10) percent more as of right.
  - b. The Director of Planning and Zoning may permit a number of spaces in excess of ten (10) percent of the optimal number of required spaces. The applicant shall be required to demonstrate a need for the additional spaces and shall meet the additional landscaping regulations set forth in [Article 5.3.L.5](#).
2. Parking Spaces Less than the Optimal Number of Spaces
  - a. The applicant may provide a number of spaces equal to the optimal number of spaces or up to ten (10) percent less as of right.

- b. The Director of Planning and Zoning may permit a total reduction of up to a maximum of fifty (50) percent of the optimal number of spaces upon compliance with all other subs of this . Ten (10) percent of the spaces may be reduced as of right in accordance with [Article 5.3.F](#) but the remaining percentage, with a maximum reduction of fifty (50) percent of the spaces may be permitted only if the applicant complies with one or more of the following:
  - i. The provision of off-site parking spaces, shared parking spaces, shadow parking spaces, or an approved alternative as defined in [Article 5.3.G](#) is equal to the requested reduction in optimal number of spaces.
  - ii. A reduction of up to ten (10) percent of the optimal number of spaces may be permitted provided that one access point to the adjacent street with the highest traffic capacity is closed. This ten (10) percent shall be a portion of the maximum fifty (50) percent reduction allowed in [Article 5.3.F](#).



# Allow Flexibility in Parking Regulation

Illustration 5.8: Parking Reduction



# What about Alternate Fuels?

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- Electric Vehicle Charging Stations
  - Do you have any regulations?
- Other Alternate Fuels – LNG and CNG
  - Diesel Alternate



## How to Capitalize on E-Vehicle Adoption

EV charging can create opportunities to roll out amenities and product offerings that keep customers engaged, and spending money, while they wait.

**Joseph Bona & James Owens**



The question of how electrification will play out for the convenience store industry is taking on increasing importance.



# Zoning Conflicts with Solar and Wind

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- Many Zoning Regulations are Still “Silent” on the Issue
- Commercial vs. Residential Uses
- Large Scale Farms
- Different Standards



## **7.29 SMALL WIND ENERGY CONSERVATION SYSTEMS**

It is the purpose of these regulations to allow the safe, effective and efficient use of small wind energy conservation systems installed to reduce the on-site consumption of utility supplied electricity while continuing to provide adjoining properties protection from any undesirable effects of such installation. Small wind energy conservation systems shall be considered accessory uses and shall be subject to Conditional Use approval by the Board of Zoning Appeals unless the lot on which they are located is three (3) acres or more. The following shall be minimum requirements for all small wind energy systems:

Batavia Township Zoning Resolution

April 1, 2022

## **7.30 SOLAR PANELS**

It is the purpose of this regulation to allow the safe, effective and efficient use of solar panels installed to reduce the on-site consumption of utility supplied electricity while continuing to provide adjoining properties protection from any undesirable effects of such installation. Solar panels shall be considered accessory uses, and shall be permitted as of right if attached or located on the roof or wall of a building that lie flat on the surface or not more than six inches from the surface, and are exempt from obtaining a Zoning Certificate. Other installations of solar panels shall be subject to Conditional Use approval by the Board of Zoning Appeals. Setbacks and guidelines shall be as follows:

- A. The solar panels detached from the principle structure shall not be located in the front or side yard.
- B. Sound produced by any solar facility under normal operating conditions, as measure from the property line, shall not exceed the noise regulations per Section

Batavia Township Zoning Resolution

April 1, 2022



# Other Green Topics to Consider

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- Ridesharing Land Uses
- Delivery Economy
  - Truck Parking and Fueling
  - Delivery Zones
  - UPS Testing Bike Delivery Vehicles
- Tree Preservation Ordinances
- Riparian Corridor Setbacks
- Impervious Surface Ratio Limits
- LEED Standards
- Implications of WFH Economy
- Sidewalk Policies



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