



# **Lawrenceville Allegheny Riverfront Responsible Growth District Plan Summary**

**Pittsburgh, PA**  
December 2015

# Outline

- Overall Framework
- Transportation Opportunities
- Open Space Opportunities
- Funding & Implementation Opportunities
- District Energy Concepts

# Project Scope

- Engage major property owners in Lawrenceville from 31<sup>st</sup> to 48<sup>th</sup> Streets to document an achievable strategy for Lawrenceville
- Establish areas for collaboration between the development proposals
- Prepare a Plan Update that integrates the current proposed development
- Consider how to improve perpendicular connections extending inboard from the River into the neighborhoods
- Incorporate infrastructure and mobility improvements that can potentially integrate into the Mayor's Complete Streets Plan
- Improve linkages to other neighborhoods
- Create a development typology for the District representing national and international best-practices for auto-free, live-work lifestyles

# Project Goals

- **Align private market interests with neighborhood and city objectives on large scale transformative development sites**
- **Advance high quality design and sustainability efforts in these developments**
- **Create strong transportation linkages, and improved public spaces between the Butler street Corridor and the Allegheny River and between Lawrenceville and surrounding neighborhoods**
- **Integrate best management practices in storm water control and facilitate the installation of green infrastructure where appropriate**
- **Create best practice models of development, including a suite of innovative financial tools and vision for shared district energy got for designated planning area**




# Existing Conditions: Street network and rail corridors



# Overall Framework

# Potential Development Projects

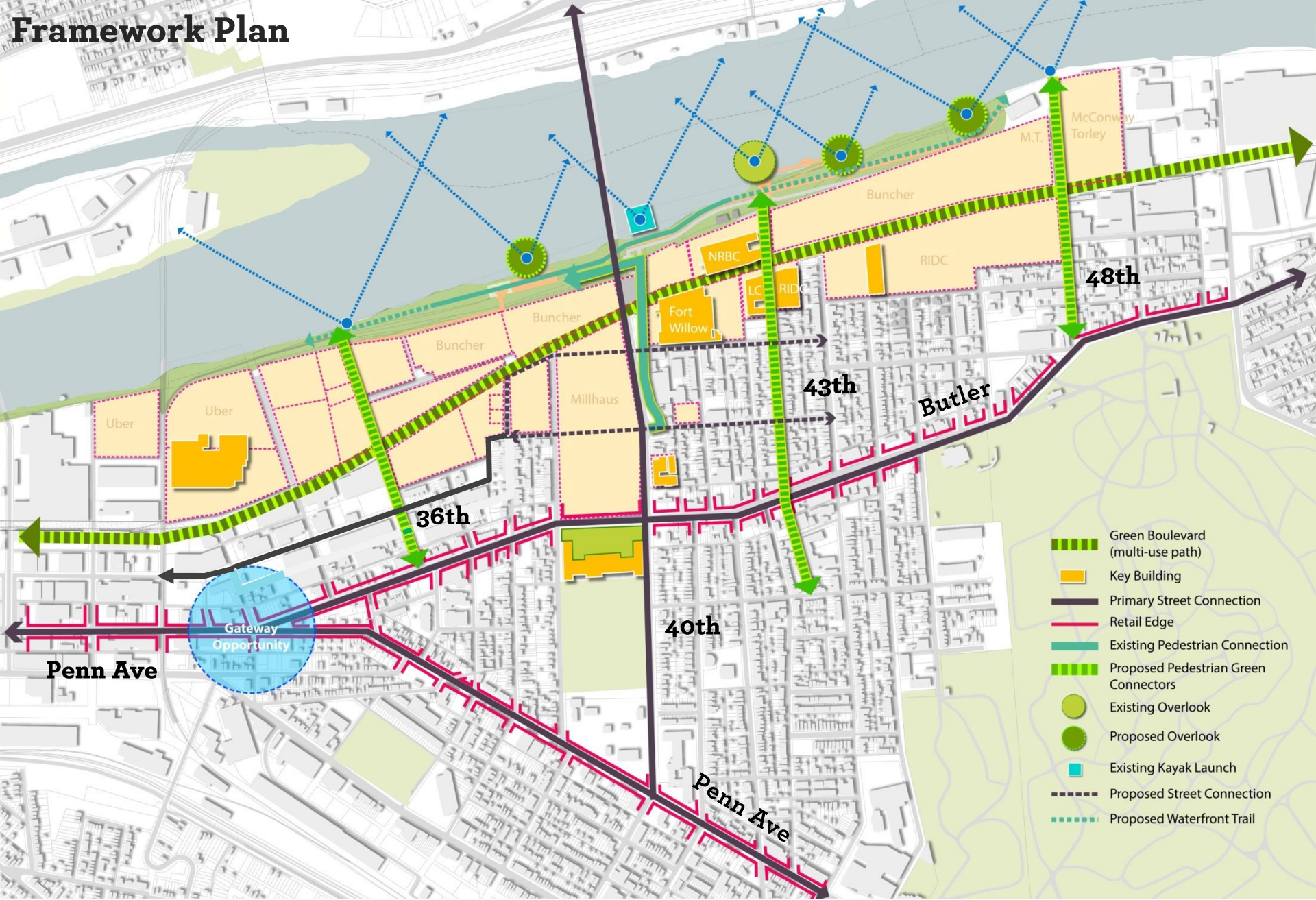


-  Proposed Buildings
-  Proposed Green Boulevard (Multi-Use Path)
-  Retail Street

0 100' 200' 400'



# Framework Plan

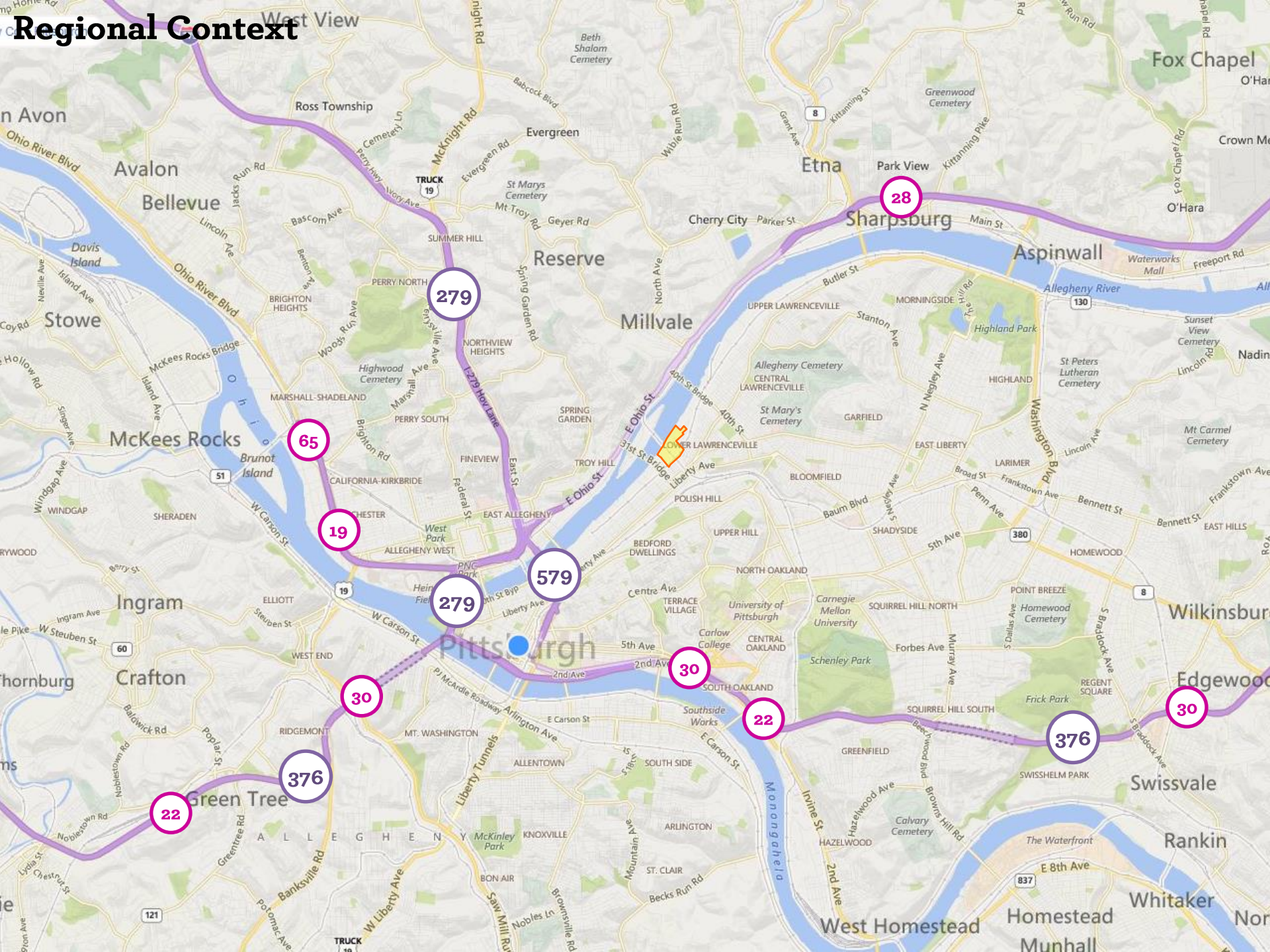


- Green Boulevard (multi-use path)
- Key Building
- Primary Street Connection
- Retail Edge
- Existing Pedestrian Connection
- Proposed Pedestrian Green Connectors
- Existing Overlook
- Proposed Overlook
- Existing Kayak Launch
- Proposed Street Connection
- Proposed Waterfront Trail



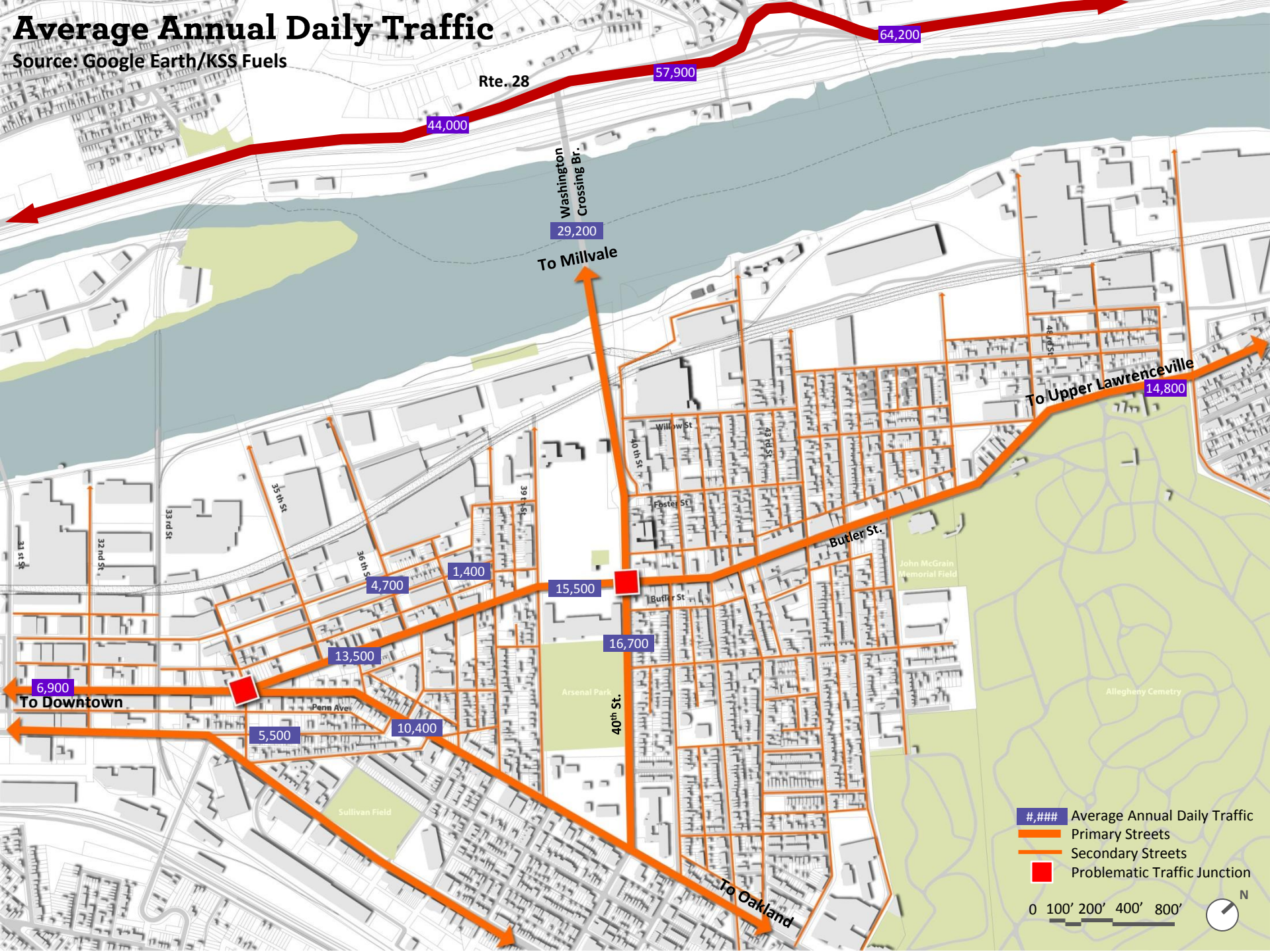
# Transportation Opportunities

# Regional Context



# Average Annual Daily Traffic

Source: Google Earth/KSS Fuels

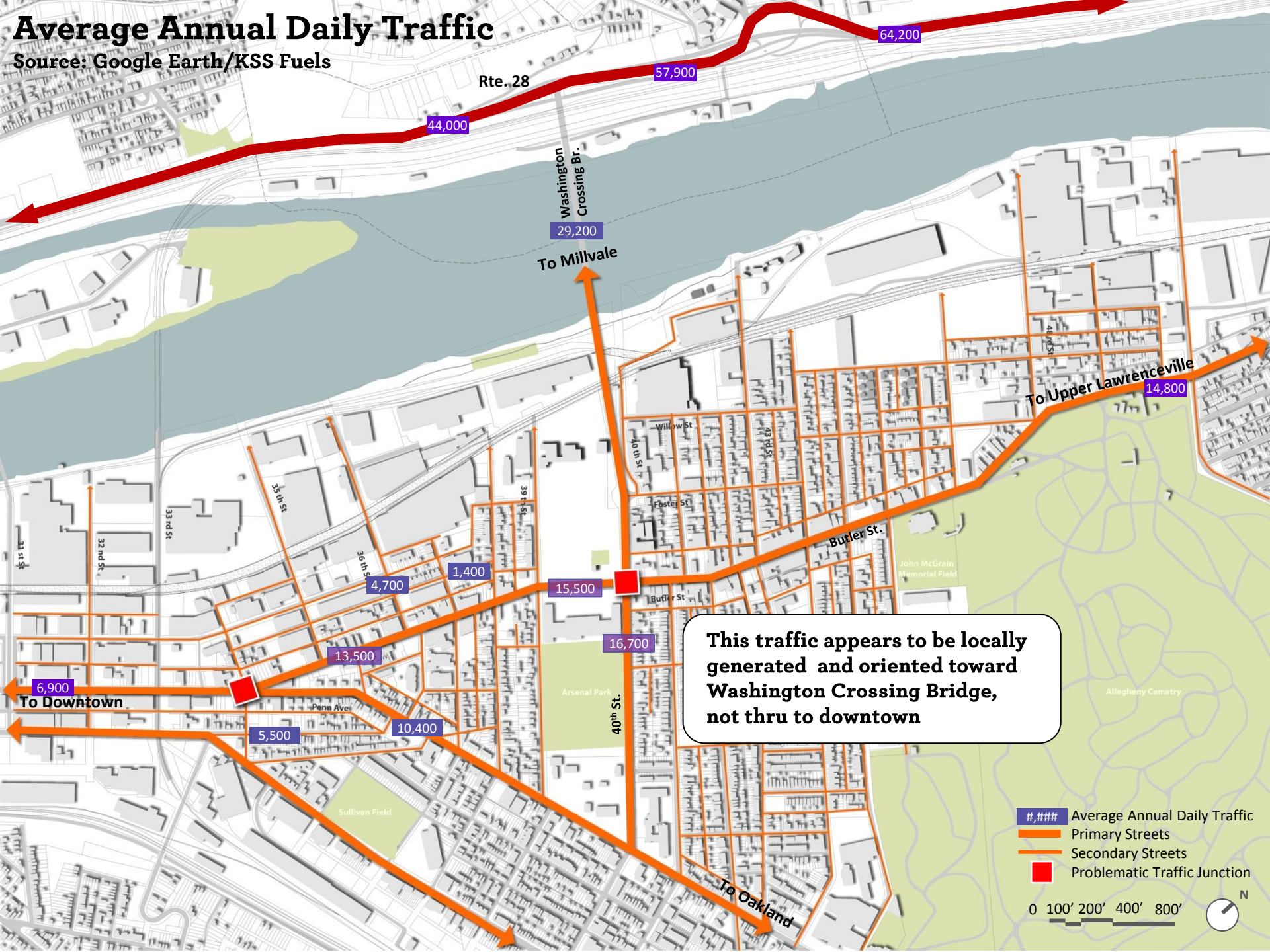


- #,### Average Annual Daily Traffic
- Primary Streets
- Secondary Streets
- Problematic Traffic Junction



# Average Annual Daily Traffic

Source: Google Earth/KSS Fuels



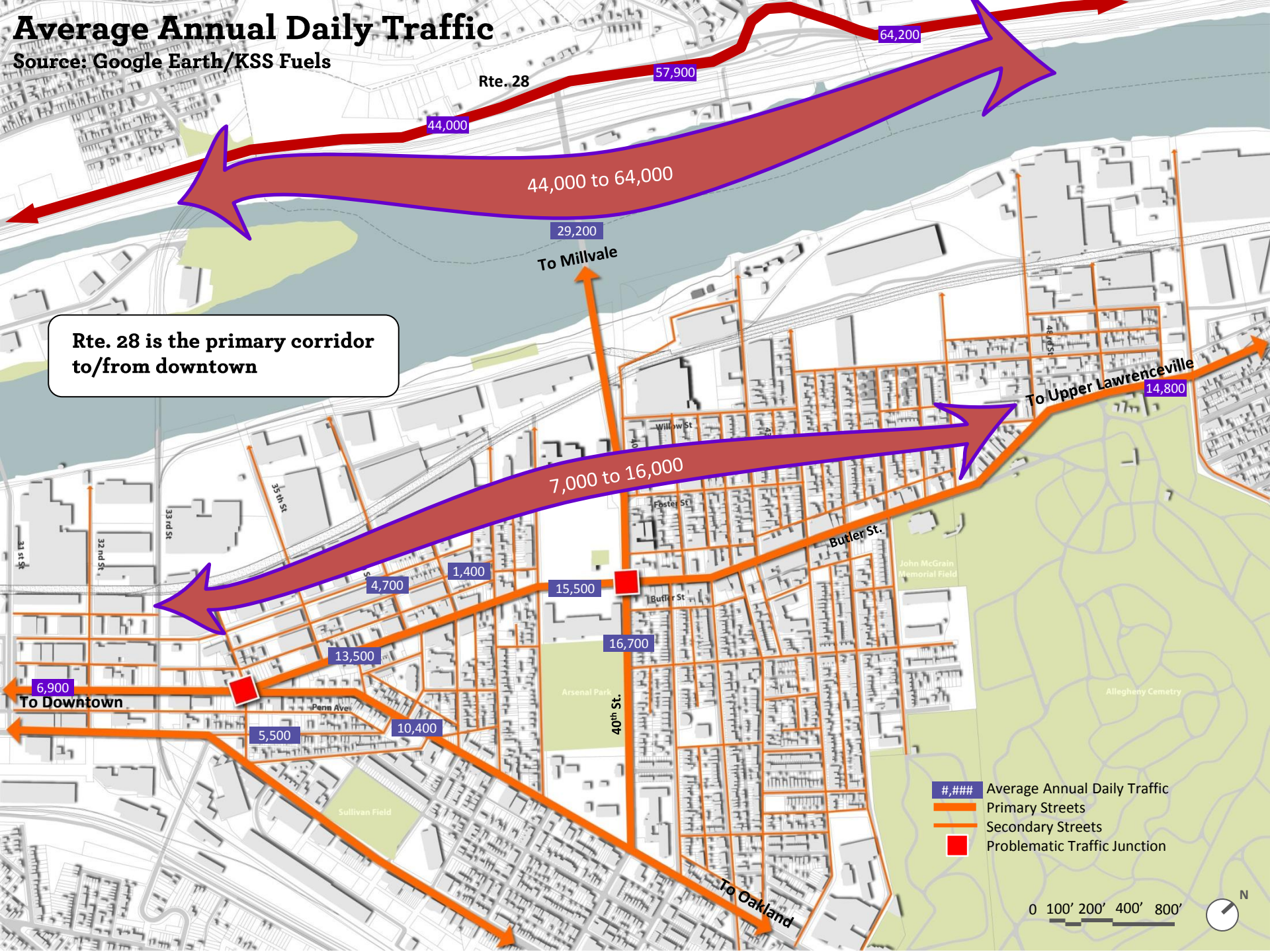
**This traffic appears to be locally generated and oriented toward Washington Crossing Bridge, not thru to downtown**

- #,### Average Annual Daily Traffic
- Orange line Primary Streets
- Light orange line Secondary Streets
- Red square Problematic Traffic Junction



# Average Annual Daily Traffic

Source: Google Earth/KSS Fuels

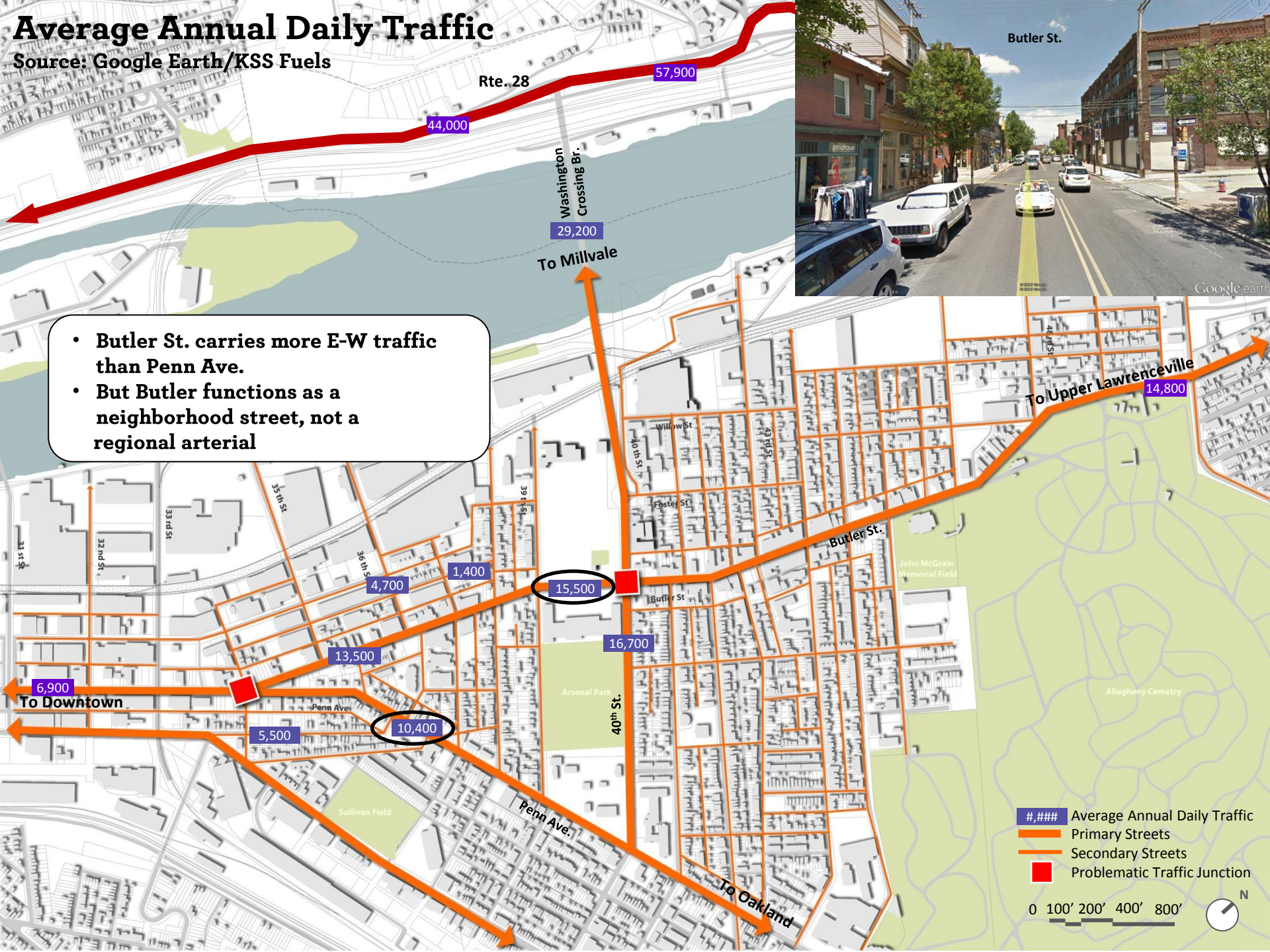


Rte. 28 is the primary corridor to/from downtown

- #,### Average Annual Daily Traffic
- Orange line Primary Streets
- Light orange line Secondary Streets
- Red square Problematic Traffic Junction

# Average Annual Daily Traffic

Source: Google Earth/KSS Fuels



- Butler St. carries more E-W traffic than Penn Ave.
- But Butler functions as a neighborhood street, not a regional arterial



To Upper Lawrenceville

#,### Average Annual Daily Traffic

Primary Streets

Secondary Streets

Problematic Traffic Junction

0 100' 200' 400' 800'

N

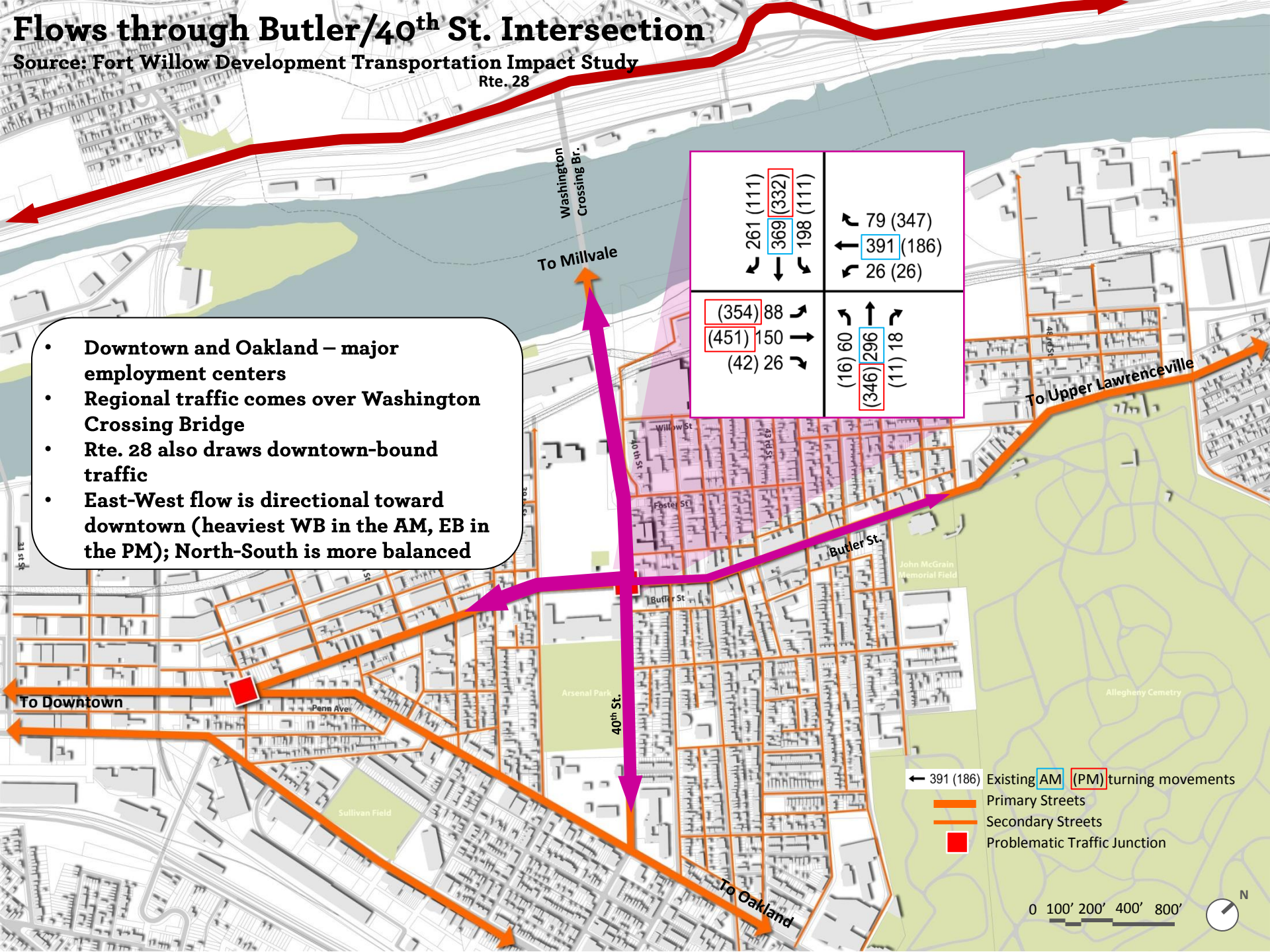
# Flows through Butler/40<sup>th</sup> St. Intersection

Source: Fort Willow Development Transportation Impact Study

Rte. 28

- Downtown and Oakland – major employment centers
- Regional traffic comes over Washington Crossing Bridge
- Rte. 28 also draws downtown-bound traffic
- East-West flow is directional toward downtown (heaviest WB in the AM, EB in the PM); North-South is more balanced

261 (111) ↙    ↘ ↕    ↕ 369 (332) ↕    ↕ 198 (111)	↻ 79 (347) ↕ 391 (186) ↻ 26 (26)
(354) 88 ↻ (451) 150 ↕ (42) 26 ↻	↻ (16) 60 ↕ (346) 296 ↻ (11) 18



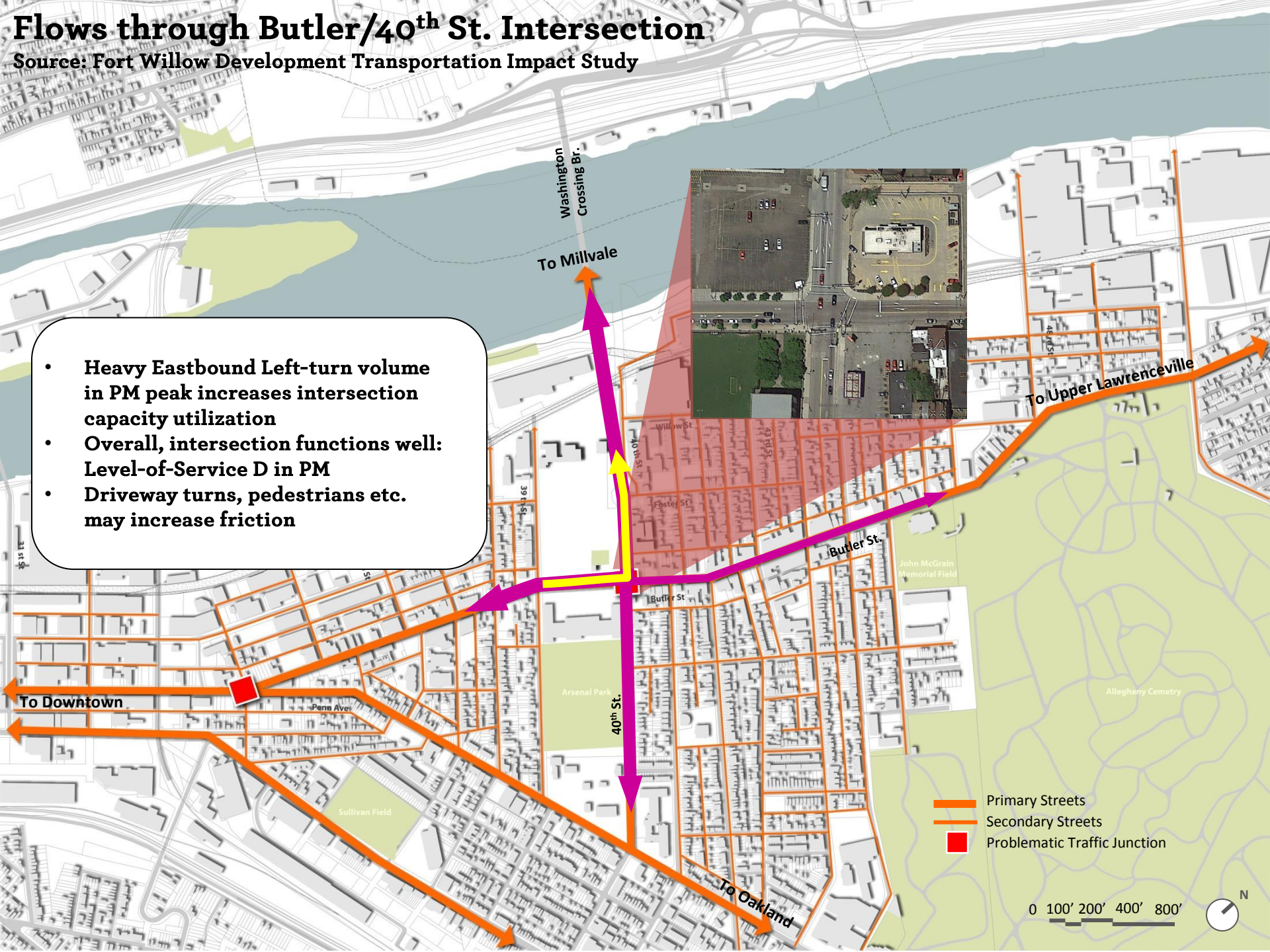
← 391 (186) Existing AM (PM) turning movements  
 — Primary Streets  
 — Secondary Streets  
 ■ Problematic Traffic Junction



# Flows through Butler/40<sup>th</sup> St. Intersection

Source: Fort Willow Development Transportation Impact Study

- Heavy Eastbound Left-turn volume in PM peak increases intersection capacity utilization
- Overall, intersection functions well: Level-of-Service D in PM
- Driveway turns, pedestrians etc. may increase friction



Primary Streets  
Secondary Streets  
Problematic Traffic Junction





# 40<sup>th</sup>/Butler Projected Traffic Operations, 2019

## HCM Signalized Intersection Capacity Analysis 1: 40th Street & Butler Street

5/7/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑		↔	↑	↔	↔	↑	↔	↔	↑	↔
Volume (vph)	375	460	43	31	196	354	16	362	11	113	340	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	9	9	9	9	9	9	9	9	9	10	10	10
Grade (%)		1%			-2%			-6%			2%	
Total Lost time (s)	5.0	5.0			5.0	5.0	5.0	6.0		5.0	6.0	6.0
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	0.98	1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99			1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1567	1627			1625	1439	1671	1727		1634	1721	1492
Flt Permitted	0.43	1.00			0.87	1.00	0.29	1.00		0.16	1.00	1.00
Satd. Flow (perm)	717	1627			1418	1439	508	1727		268	1721	1492
Peak-hour factor, PHF	0.97	0.89	0.81	0.81	0.89	0.91	0.80	0.95	0.83	0.96	0.89	0.84
Adj. Flow (vph)	367	517	53	38	220	369	20	381	13	118	382	136
RTOR Reduction (vph)	0	0	0	0	0	209	0	0	0	0	0	75
Lane Group Flow (vph)	367	570	0	0	258	180	20	394	0	118	382	61
Confl. Peds. (#/hr)	46		22	22		46	6		12	12		6
Confl. Bikes (#/hr)			8			4			1			
Heavy Vehicles (%)	1%	2%	7%	12%	4%	2%	0%	1%	10%	2%	2%	0%
Turn Type	pm+pt	NA		Perm	NA	Prot	pm+pt	NA		pm+pt	NA	Prot
Protected Phases	5	2			6	6	3	8		7	4	4
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	72.0	72.0			44.6	44.6	33.8	31.0		42.2	35.2	35.2
Effective Green, g (s)	72.0	72.0			44.6	44.6	33.8	31.0		42.2	35.2	35.2
Actuated g/C Ratio	0.57	0.57			0.35	0.35	0.27	0.25		0.33	0.28	0.28
Clearance Time (s)	5.0	5.0			5.0	5.0	5.0	6.0		5.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	560	929			501	509	162	424		165	480	416
v/s Ratio Prot	c0.12	0.35				0.13	0.00	c0.23		c0.04	0.22	0.04
v/s Ratio Perm	c0.27				0.18		0.03			0.20		
v/c Ratio	0.69	0.61			0.51	0.35	0.12	0.93		0.72	0.80	0.15
Uniform Delay, d1	16.6	17.8			32.2	30.1	35.0	46.4		32.8	42.1	34.1
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.7	3.0			3.8	1.9	0.3	26.5		13.7	8.9	0.2
Delay (s)	20.2	20.8			35.9	32.0	35.3	73.0		46.6	50.9	34.3
Level of Service	C	C			D	C	D	E		D	D	C
Approach Delay (s)		20.6			33.6			71.1			46.6	
Approach LOS		C			C			E			D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			37.9		HCM 2000 Level of Service						<b>D</b>	
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			126.0		Sum of lost time (s)				21.0			
Intersection Capacity Utilization			95.9%		ICU Level of Service				F			
Analysis Period (min)			15									
c Critical Lane Group												

• LOS 'D' is ideal for urban peak periods

# Millhaus Trip Generation & Distribution

Sources: Strada LLC, ITE Trip Generation Manual, Fort Willow Development Transportation Impact Study (distribution)



- Millhaus project would add about 80 trips to Butler St. in the AM peak hour; 110 in the PM
- Might tip Butler/40<sup>th</sup> St. intersection to LOS E in PM (undesirable)

Millhaus Trip Generation, per ITE Manual 7th Edition

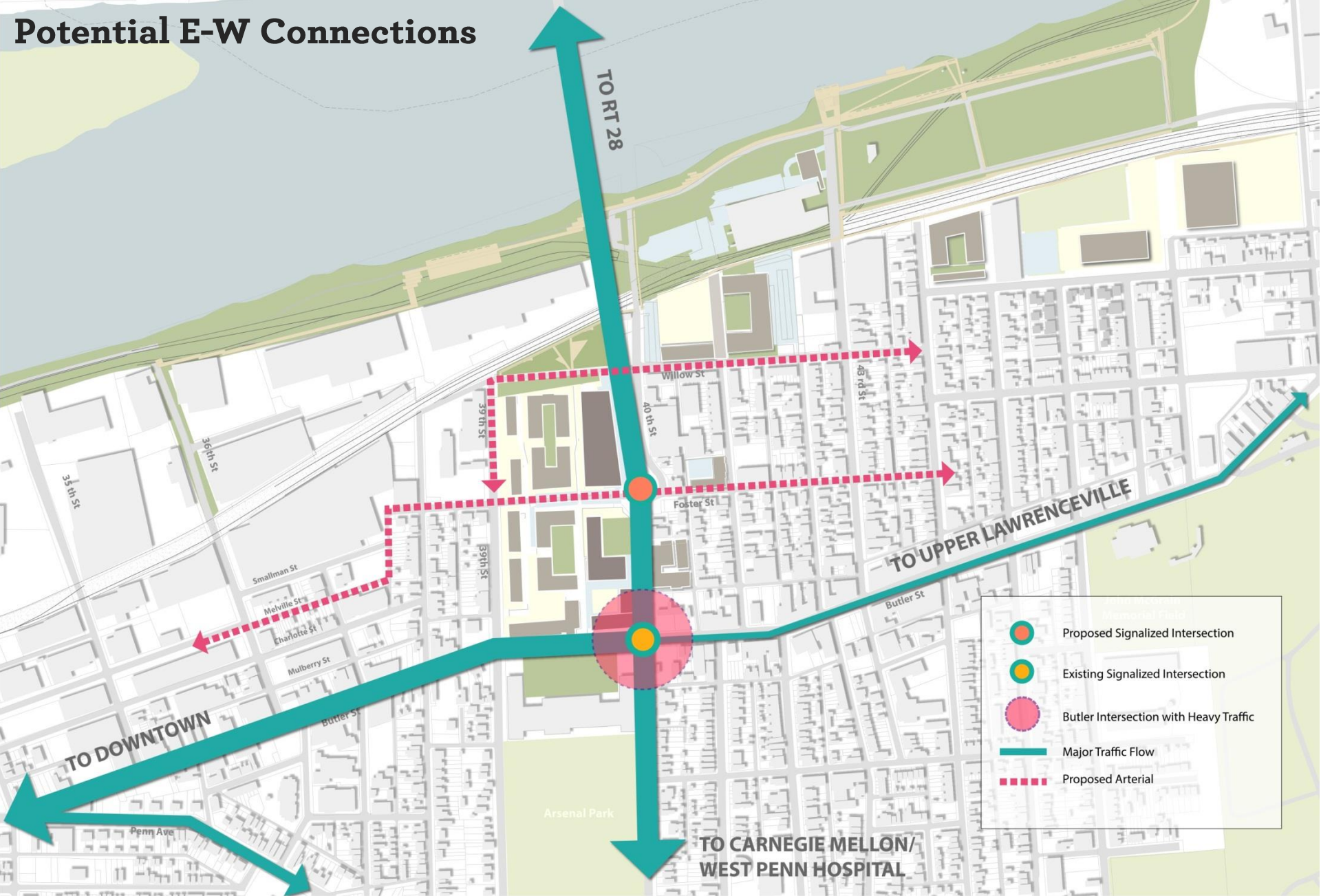
Land Uses	kgsf or du	LUC #	Trips/unit AM Peak	AM Trips	AM% out	AM in	AM out	Trips/unit PM Peak
townhome/condominium	650 du	230	0.44	286	83%	49	237	0.52
neighborhood commercial	15 kgsf	814	2.71	41	56%	18	23	6.84

PM Trips	PM% out	PM in	PM out	Trips/unit Weekday	Weekday Trips
338	33%	226	112	5.86	3,809
103	52%	49	53	44.32	665

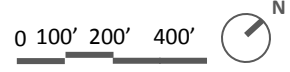
# Observations

- **Primary employment centers – trip attractors – are Downtown and Oakland (U. Pittsburgh, hospitals, Carnegie Mellon)**
- **Connection of Foster St. across 40<sup>th</sup> St. would have a minor effect on Butler St. traffic, might divert some local traffic and relieve congestion in Butler corridor**
- **Foster/40<sup>th</sup> St./40<sup>th</sup> St. Bridge intersection would need to be redesigned to allow extension of Foster St.**
- **Millhaus development parking access should be located away from Butler to avoid driveways and conflicts near the Butler/40<sup>th</sup> St. intersection.**

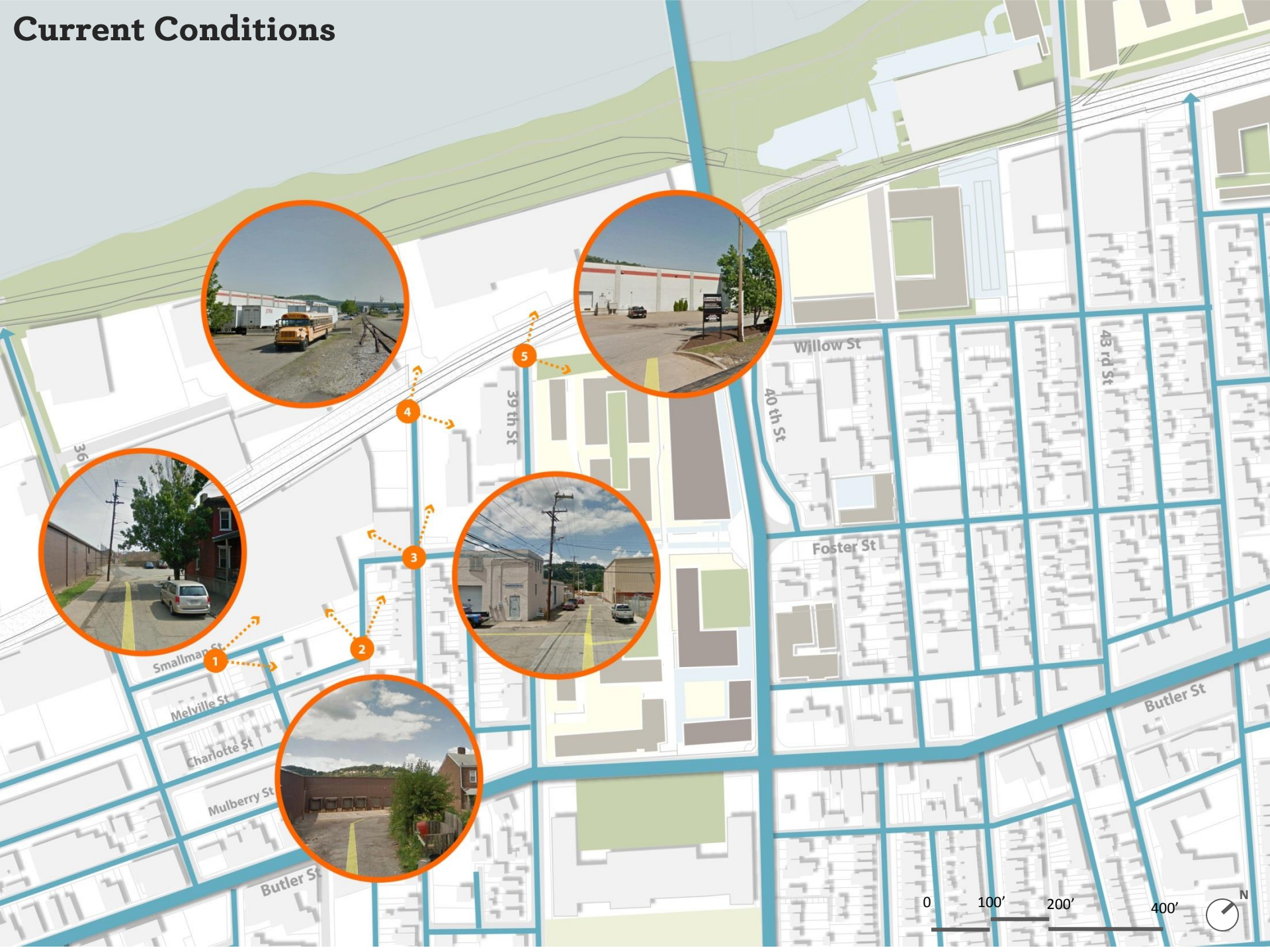
# Potential E-W Connections



**Proposed E-W Connection of Foster and Willow to provide for better street grid connectivity. Foster Street will continue onto Smallman Street to better connect to Downtown, easing the traffic problems on Butler Street**

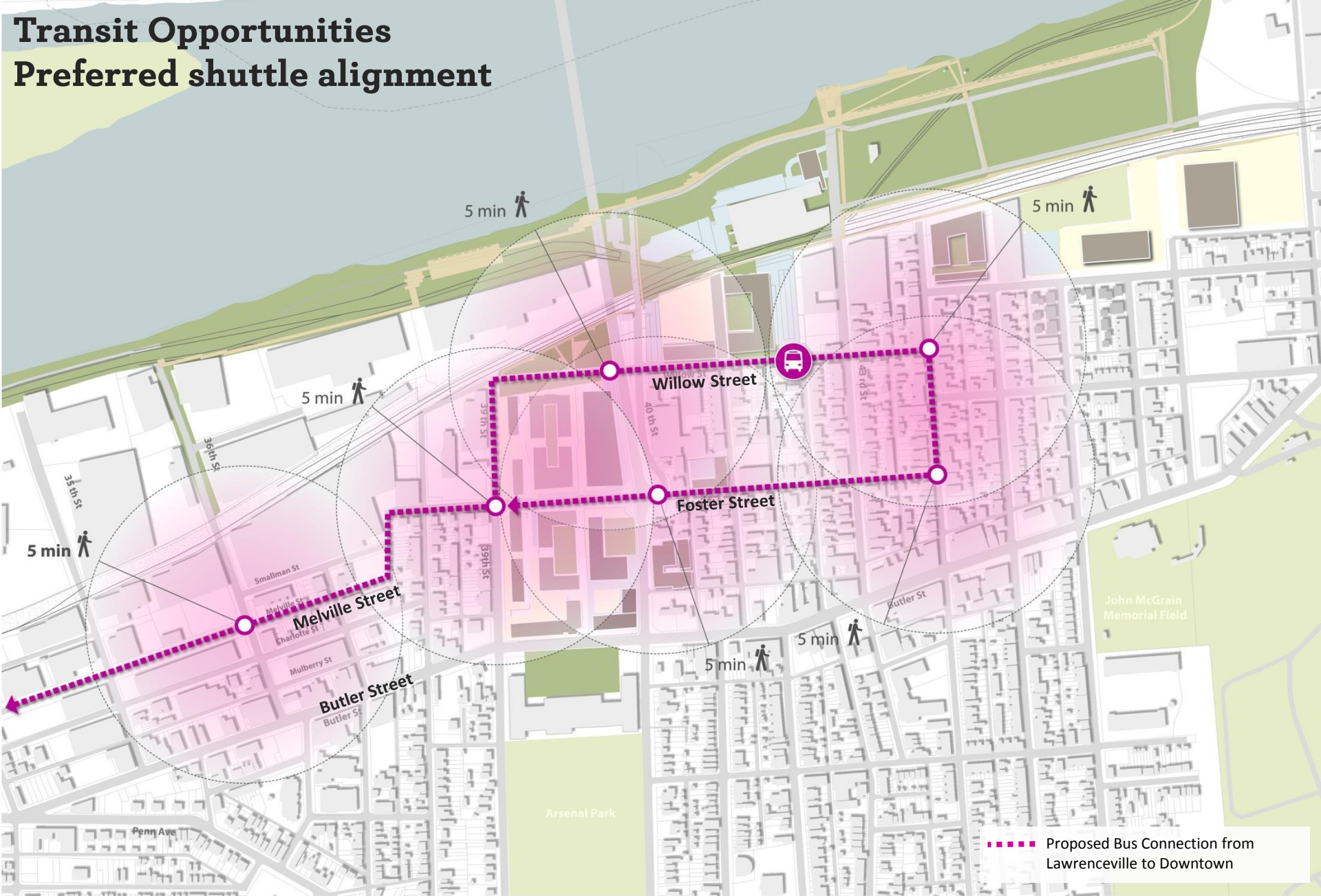


# Current Conditions



# Transit Opportunities

## Preferred shuttle alignment



**Propose Bus Connection through Melville, Willow and Foster for better connectivity to Downtown and ease major traffic away from Butler Street**

0 100' 200' 400'



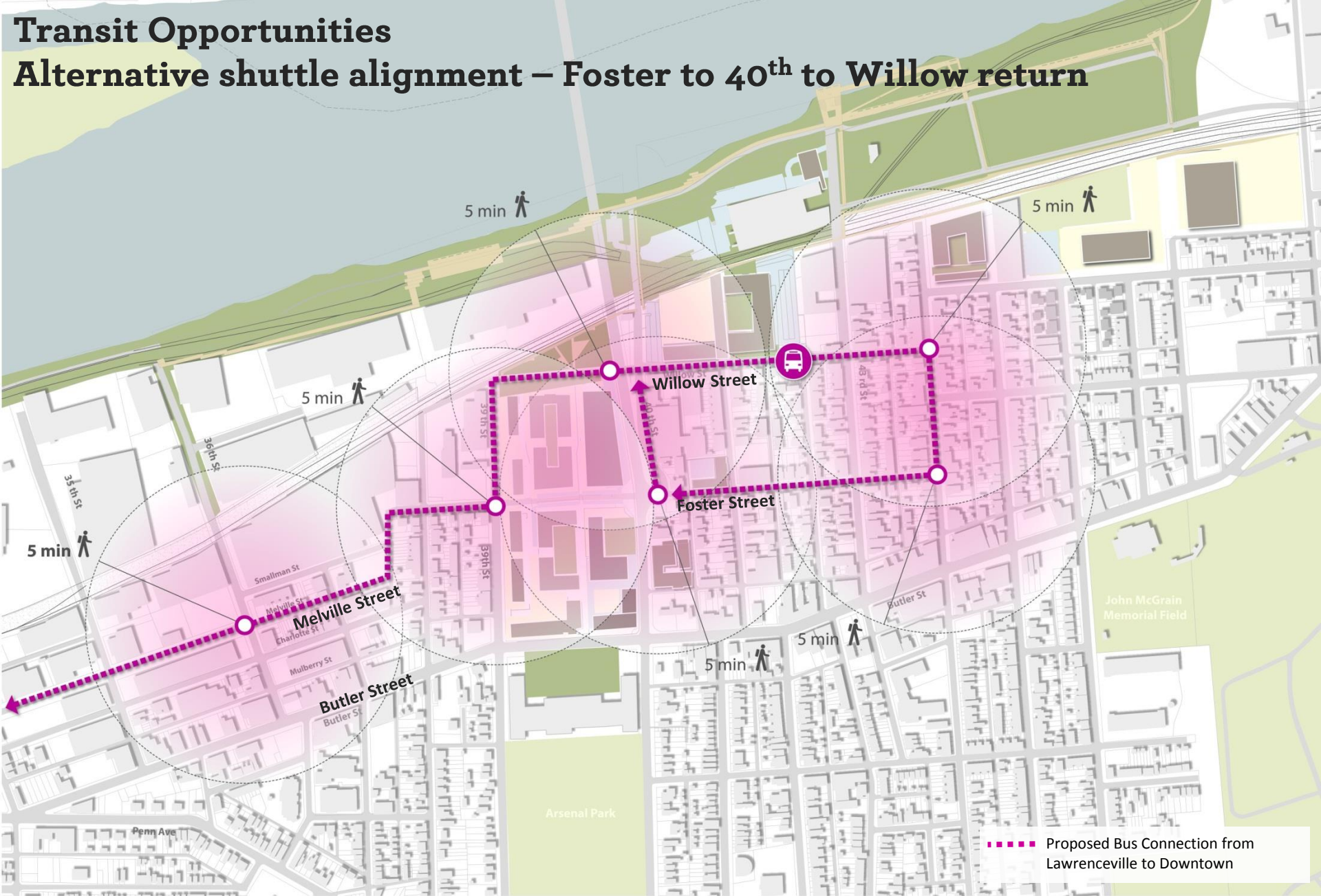
# Transit Opportunities

## Preferred shuttle alignment



# Transit Opportunities

## Alternative shuttle alignment – Foster to 40<sup>th</sup> to Willow return



Propose Bus Connection through Melville, Willow, Foster and back to Willow for better connectivity to Downtown and ease major traffic away from Butler Street



# Parking Opportunities

## Proposed Garage

@ Willow & 40<sup>th</sup>  
41,000 sf / lvl  
5 lvls  
205,000 gsf

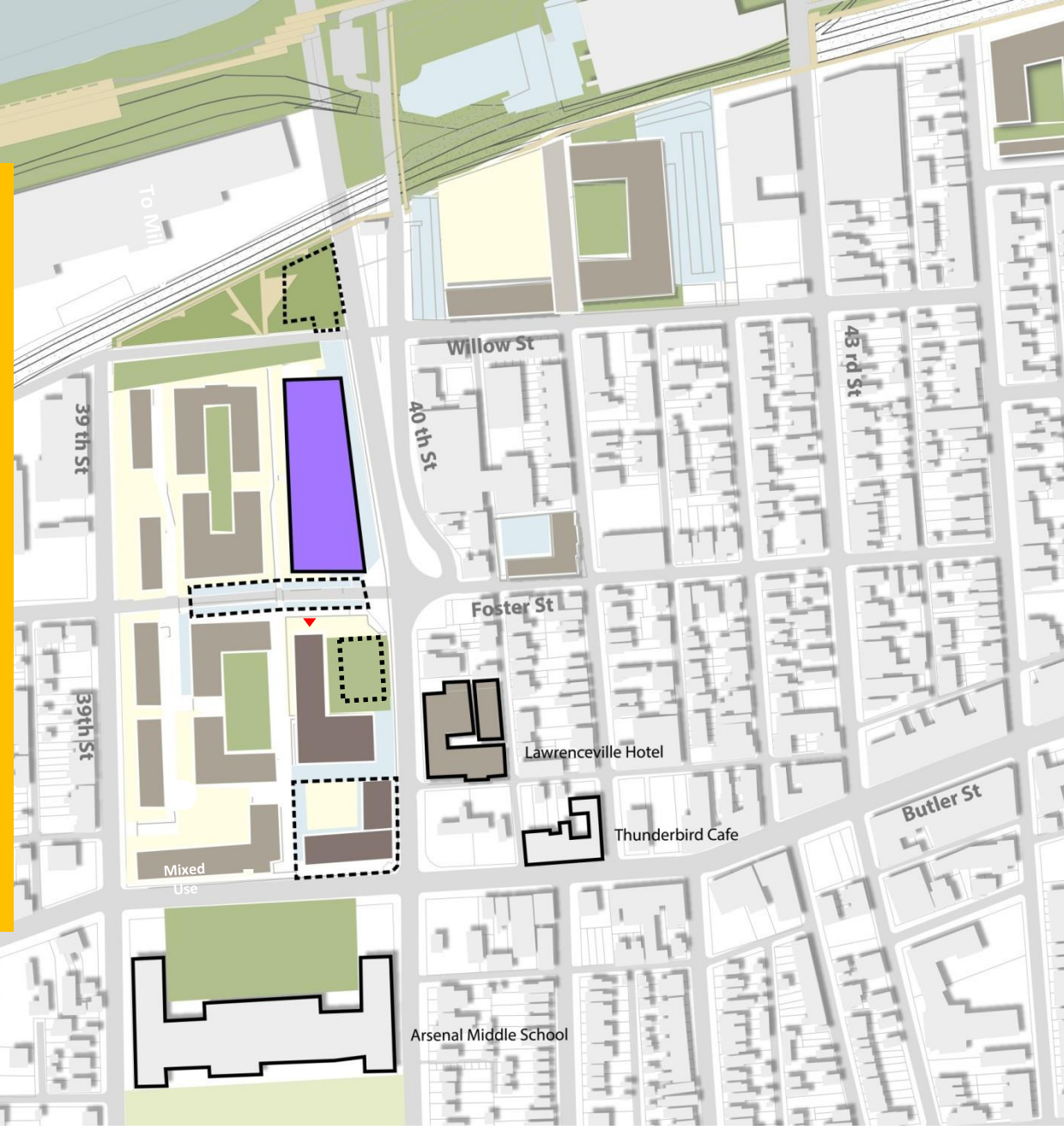
~624 space capacity

### Potential uses

- 20 sp Arsenal Middle School
- 75 sp Thunderbird Café
- 90\* sp Lawrenceville Hotel
- 230 sp Displaced from Millhaus
- 415 sp

209 spaces available  
(District retail / Park & Ride)

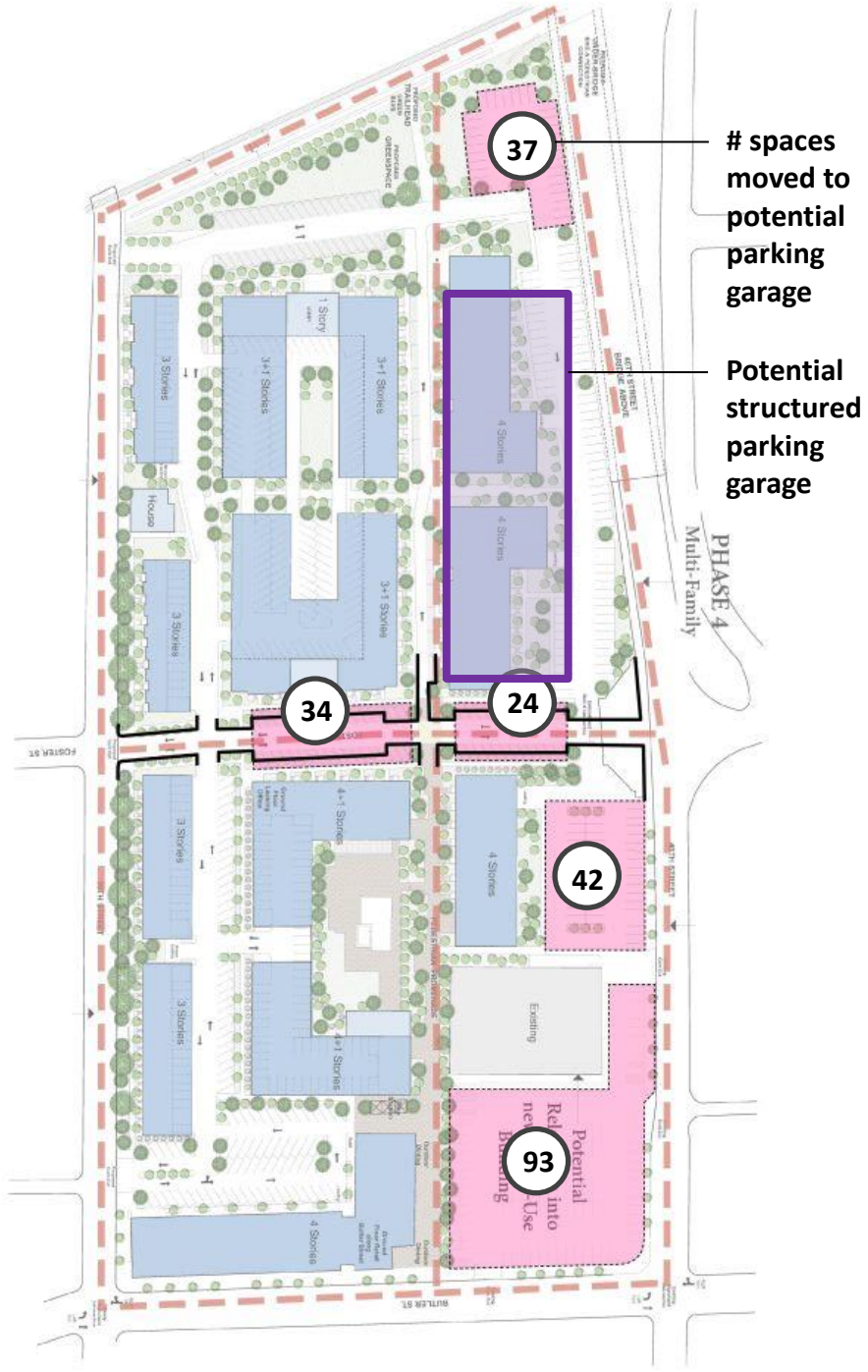
\* Current proposal to valet 90 cars off site (@ Buncher) and provide 55 spaces on-site. Total demand ~ 125 spaces.



Propose Parking Garage at 40<sup>th</sup> and Willow to support parking demands from surrounding uses as well as from Millhaus Development. Ground level convenience retail possible to front the pedestrian core proposed within the Millhaus Development.



# Millhaus Proposed Parking



37

# spaces moved to potential parking garage

Potential structured parking garage

34

24

42

93

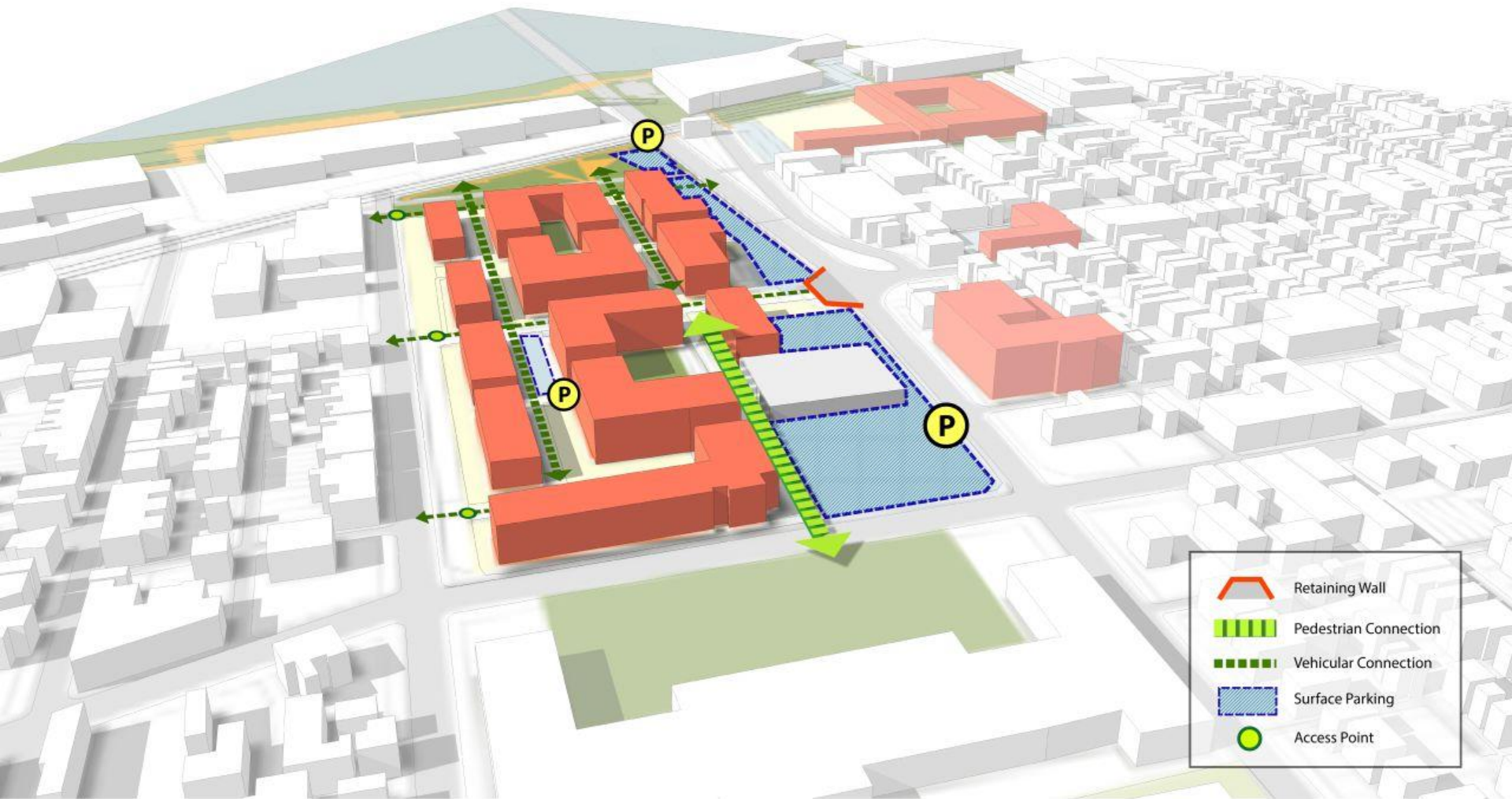
PHASE 4  
Multi-Family

Existing  
Potential Use into new Building

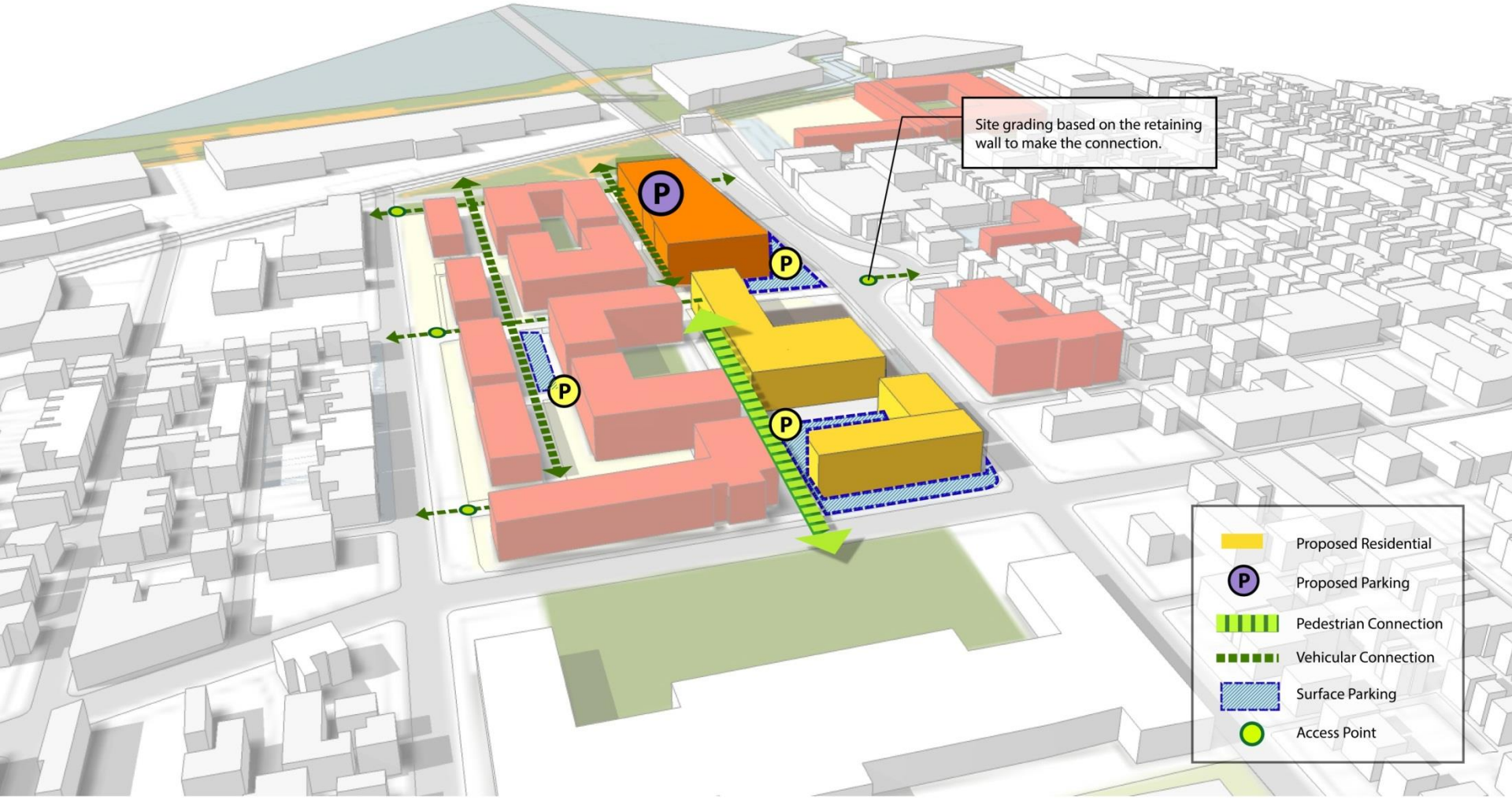
FOSTER ST

BULLER ST

# Proposed Development on Millhaus Site

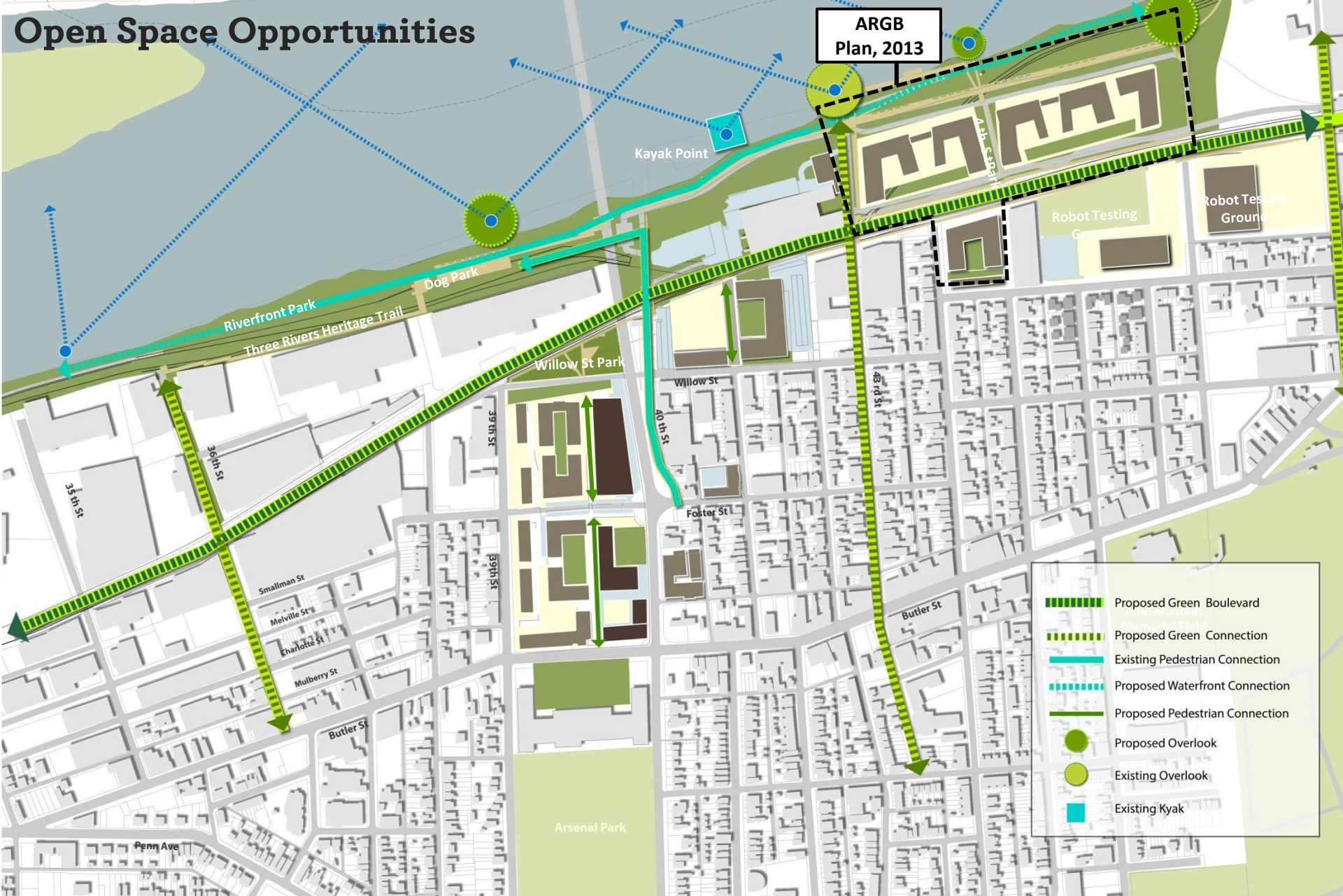


# Recommendations on Proposed Development on Millhaus Site

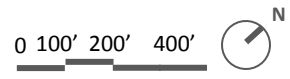


# Open Space Plan

# Open Space Opportunities



**Proposed Riverfront Green Space, extend the existing Three Rivers heritage Trail, and establish Perpendicular Green Connections from the Neighborhood onto the River. Willow St Park, 45<sup>th</sup> St park and Robot Testing Ground could add program and points of interest along the Green Boulevard. Propose Overlooks at the River at the termination of the Perpendicular Green Connections from the Neighborhood.**

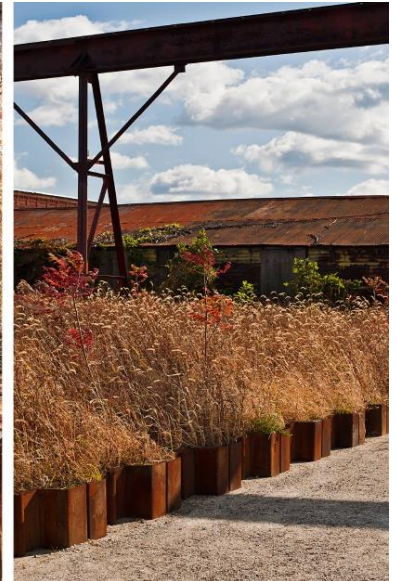
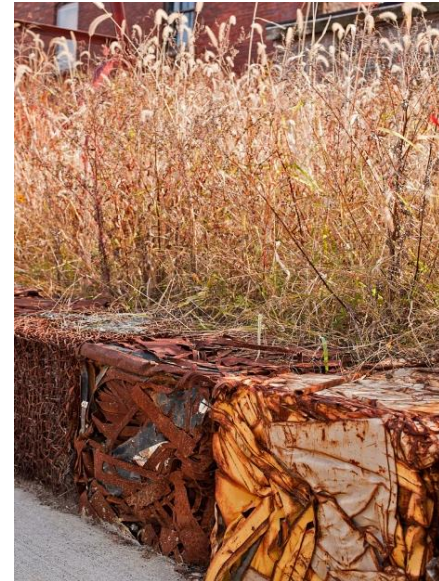


# Site Design Opportunities



Arsenal Park

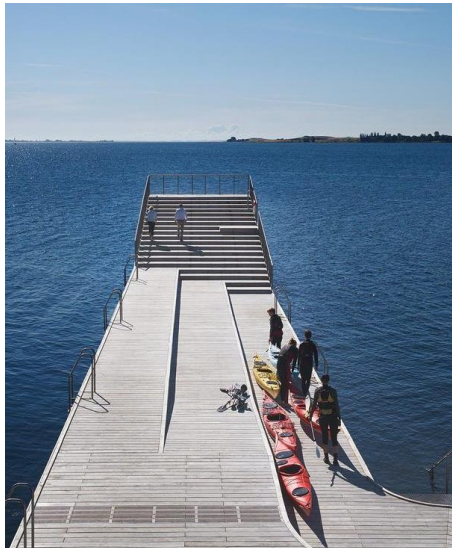
# Site Design Concepts



Materials- Contemporary Steel, Layered Concrete, Aztec Gold



# Site Design Concepts



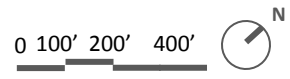
Riverfront Overlooks, Industrial Lighting

# Open Space Plan

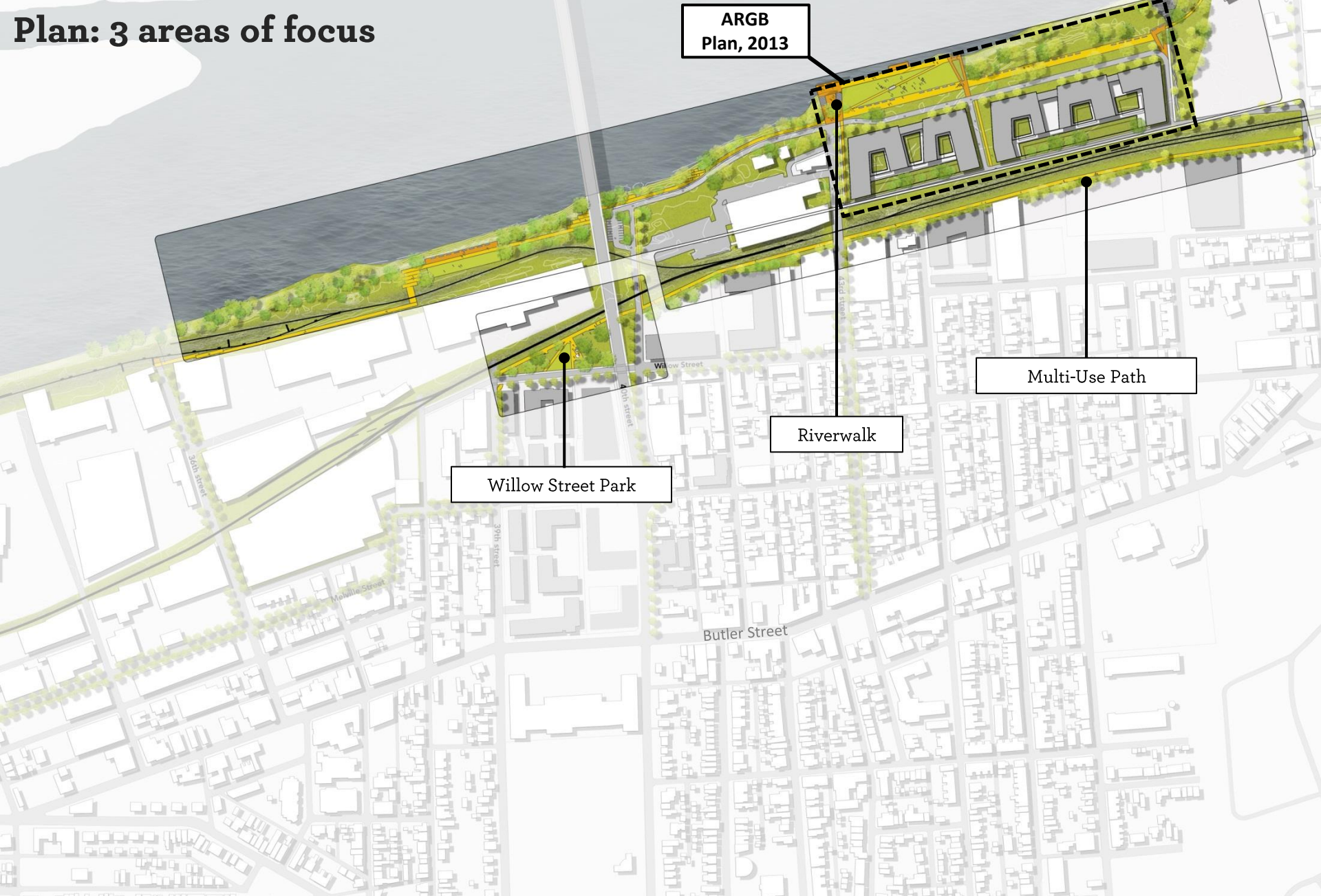
ARGB  
Plan, 2013



The plan focuses on 3 key areas. The Multi-Use Path, Riverwalk and Willow Street Park



# Plan: 3 areas of focus



ARGB  
Plan, 2013

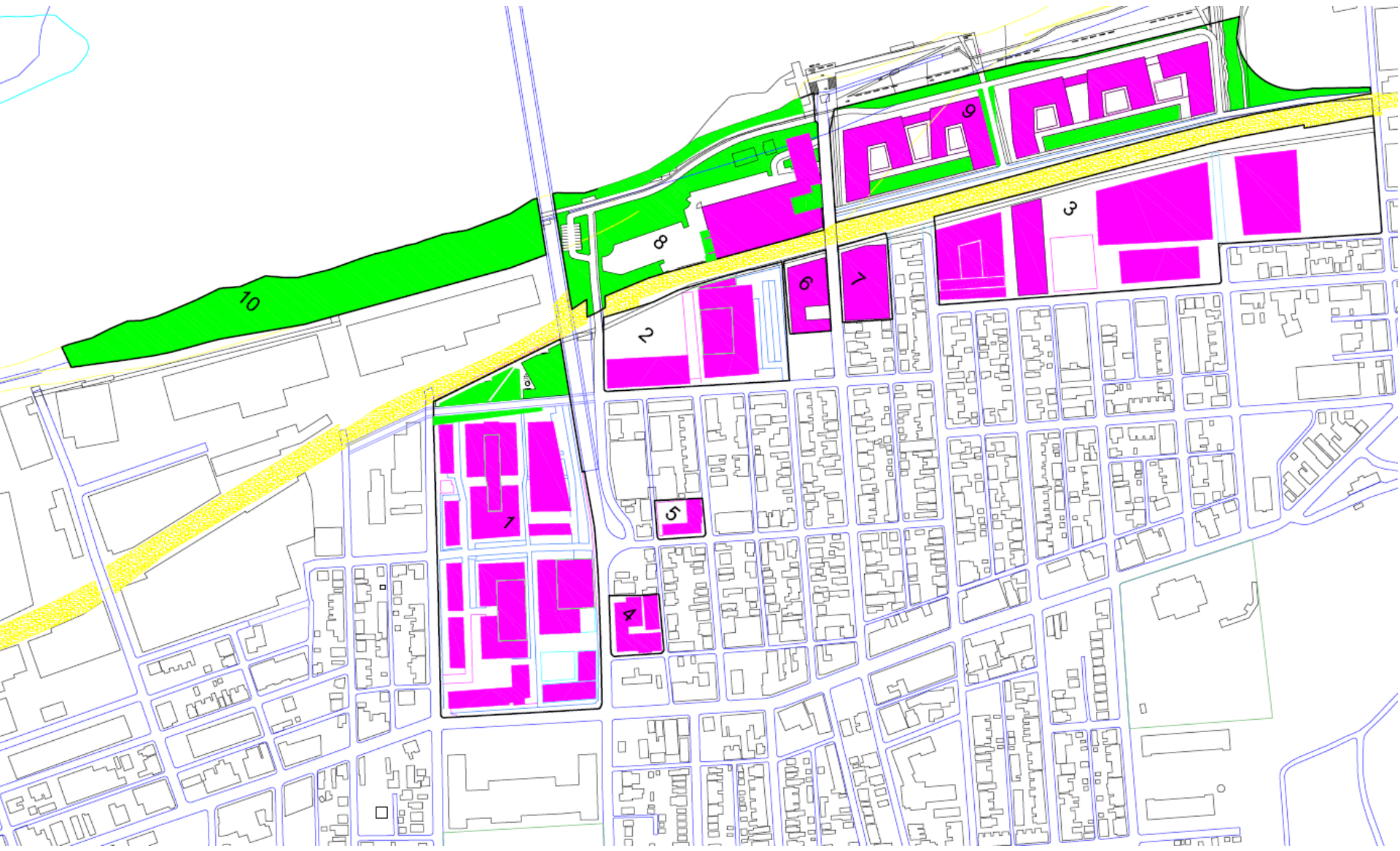
Multi-Use Path

Riverwalk

Willow Street Park

The plan focuses on 3 key areas. The Multi-Use Path, Riverwalk and Willow Street Park

# Stormwater Infrastructure Opportunities



Stormwater improvements were evaluated based on replacing existing gray infrastructure on parcels with green infrastructure Best Management Practices (BMP's; parcels for following calculations.)

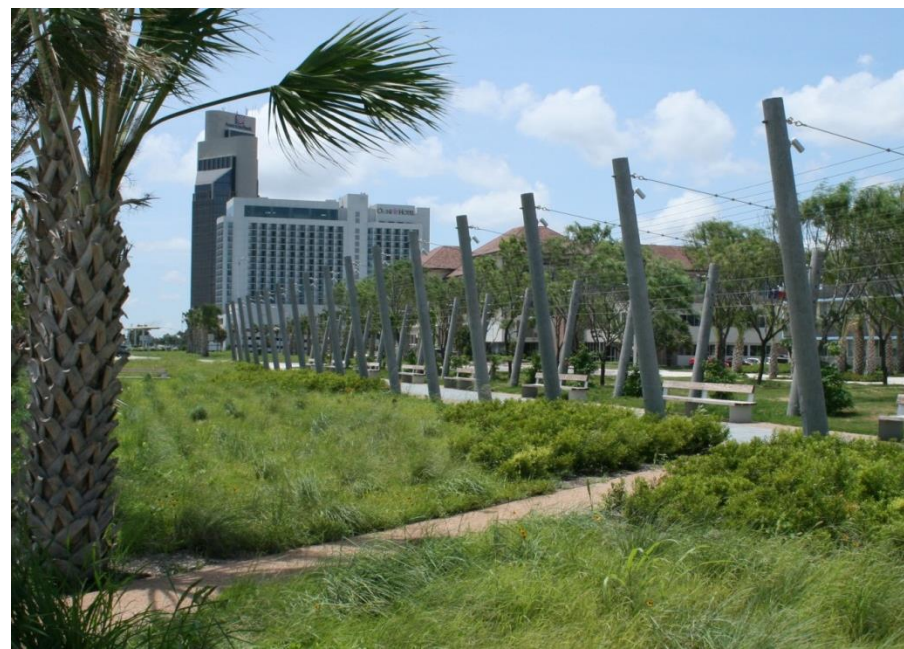


# Green Infrastructure Opportunities

Bioswales



Porous paving



Green Roof

# Stormwater Infrastructure Opportunities

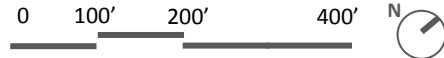
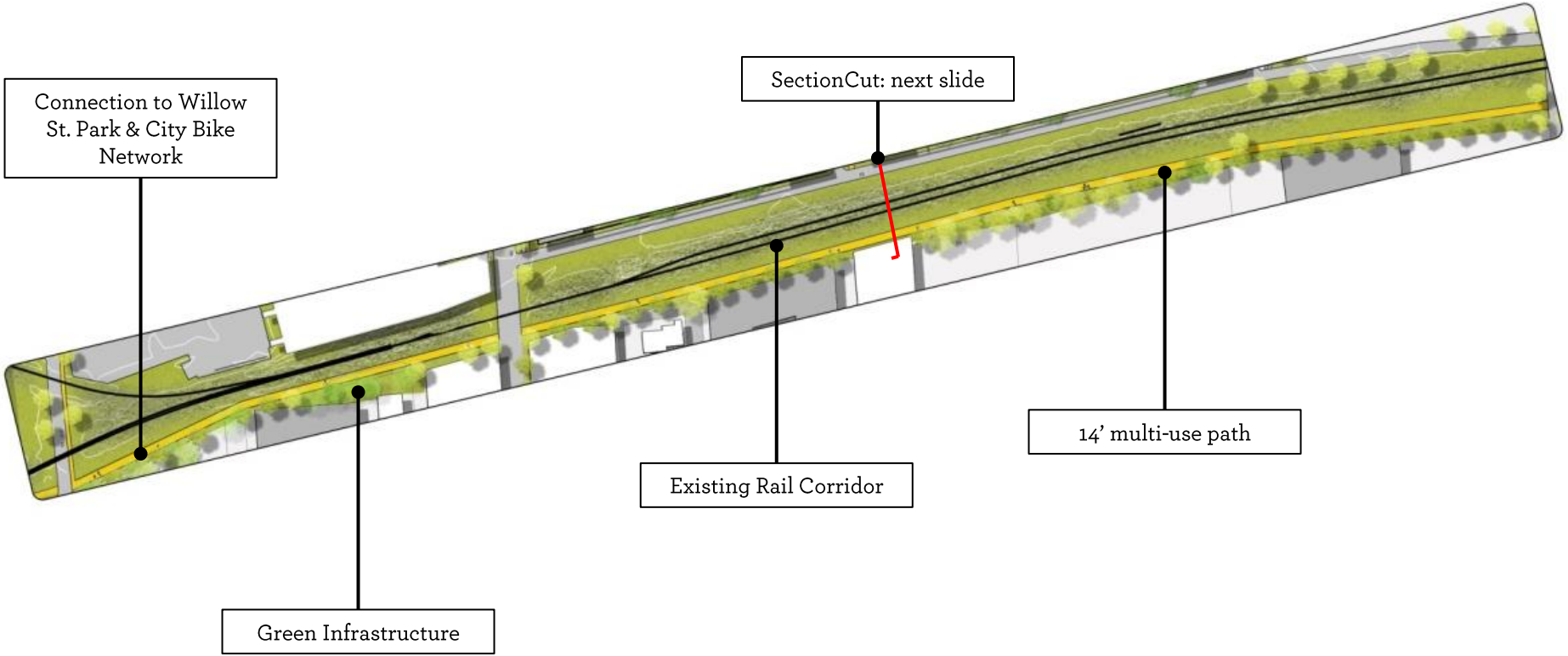
Parcel	Total Area (sf)	Typical Development			Development With BMPs				
		98	79	98	84	98	80	98	79
		Landscape	Landscape	Paving (sf)	Green Roof	Porous	Porous	Porous	Landscape
		Roof (sf)	(sf)		(sf)	Roof (sf)	Paving (sf)	Paving (sf)	(sf)
1	609,164	258,892	42,538	307,734	194,169	64,723	153,867	153,867	42,538
2	208,185	84,431		123,754	63,323	21,108	61,877	61,877	
3	580,763	255,579		325,184	191,684	63,895	162,592	162,592	
4	35,557	23,696		11,861	17,772	5,924	5,931	5,931	
5	21,466	8,241		13,225	6,181	2,060	6,613	6,613	
6	37,574	27,209		10,365	20,407	6,802	5,183	5,183	
7	47,005	37,291		9,714	27,968	9,323	4,857	4,857	
8	363,770	77,900	157,960	127,910	58,425	19,475	63,955	63,955	157,960
9	536,492	157,503	106,923	272,066	118,128	39,376	136,033	136,033	106,923
10	256,834		256,834	-	-	-	-	-	256,834

2-YR Storm	Parcel	1	2	3	4	5	6	7	8	9	10	Total
Runoff Volume (cf)	Typical Development	102,714	38,071	106,504	6,534	3,920	6,882	8,625	41,208	78,452	12,720	405,630
	Development with BMPs	65,427	23,566	65,776	4,008	2,439	4,269	5,314	29,664	54,624	12,720	267,807
Peak Flow (cfs)	Typical Development	49.45	17.65	49.25	3.02	1.82	3.19	3.99	21.87	39.61	6.77	197
	Development with BMPs	34.95	12.5	34.91	2.14	1.29	2.26	2.83	16.13	29.33	6.77	143.11

10-YR Storm	Parcel	1	2	3	4	5	6	7	8	9	10	Total
Runoff Volume (cf)	Typical Development	162,958	58,588	163,481	10,019	6,055	10,585	13,242	74,618	130,941	29,664	660,152
	Development with BMPs	120,400	42,689	119,093	7,275	4,400	7,710	9,627	1	102,192	29,664	443,050
Peak Flow (cfs)	Typical Development	76.48	26.73	74.57	4.57	2.76	4.82	6.04	38.33	63.92	16.16	314
	Development with BMPs	62.36	21.93	61.19	3.75	2.26	3.96	4.95	31.66	53.29	16.16	261.51

**Utilizing green infrastructure (assuming 75% green roof/25% standard roof and 50% of paving converted to porous paving), the 2-year storm results in a 36% stormwater reduction for the 2-year storm and a 35% stormwater reduction for the 10-year storm. Utilizing green infrastructure, the average decrease in peak flow for the 2-year storm is 28% and for the 10-year storm is 18%.**

# Multi-Use Path



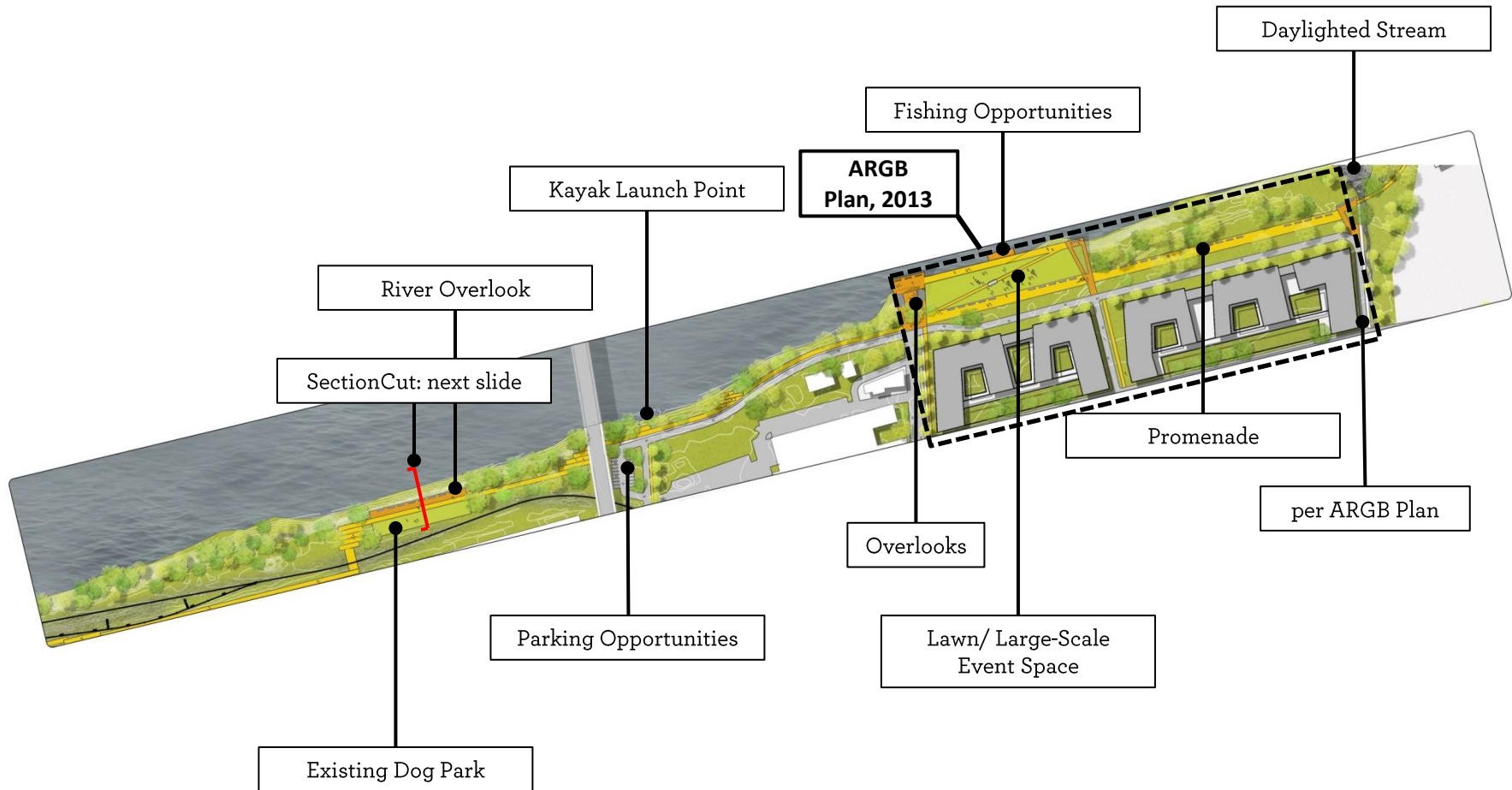
# Multi-Use Path



Sited along the existing rail corridor, the path acts as a green unified urban corridor for cyclists and pedestrians.



# Riverwalk



0 100' 200' 400'



# Riverwalk



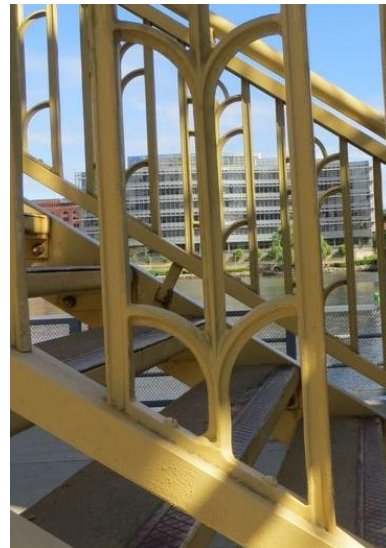
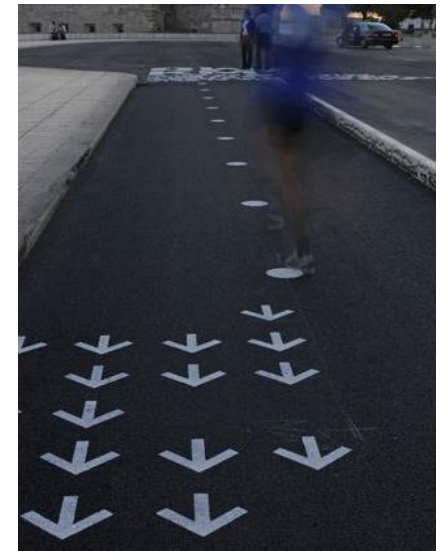
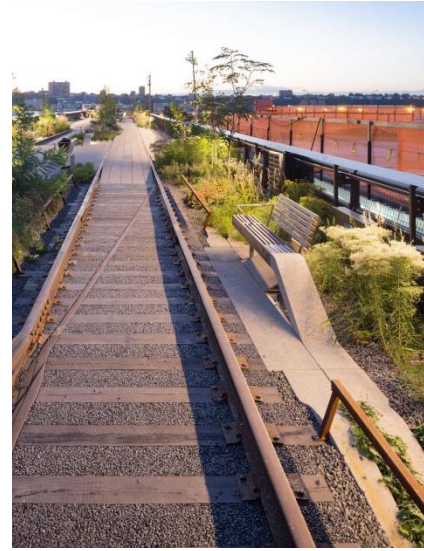
Existing Dog Park  
(Barnard Dog Run)

Multi-Use Path

River overlook

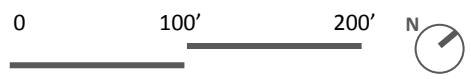
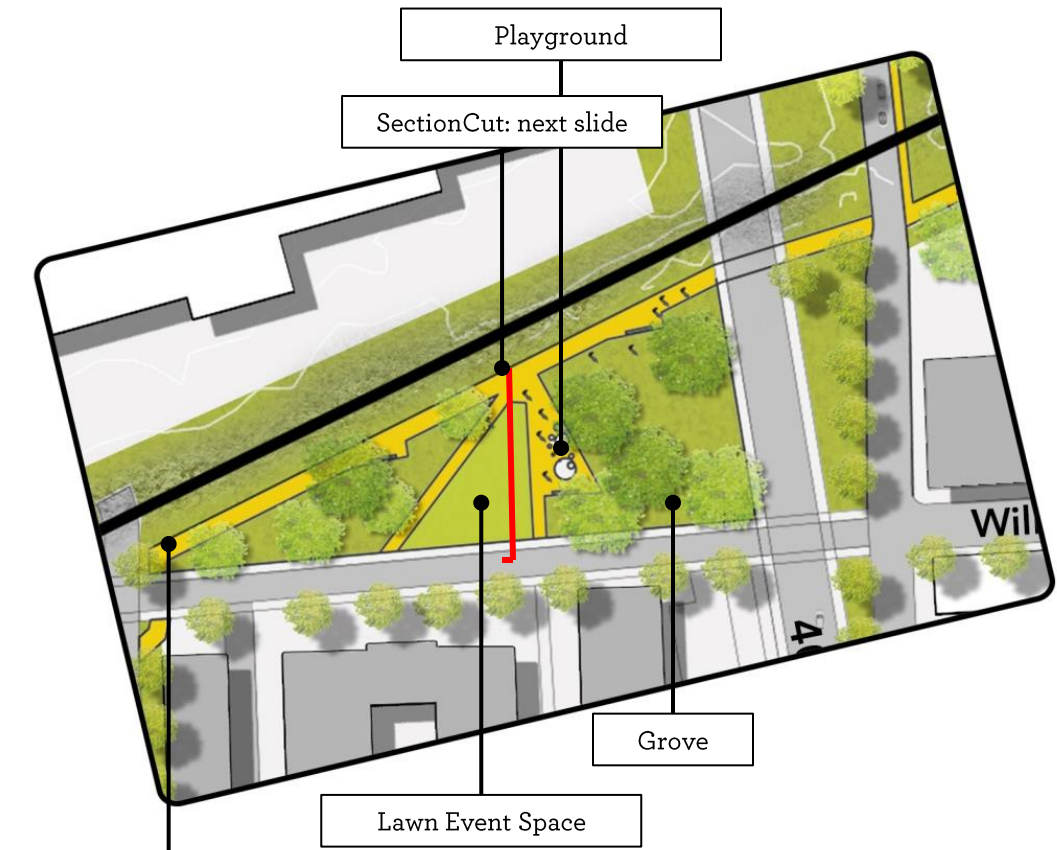
**Focus on connection toward the rivers edge. Overlooks and programmed zones promote activity.**

# Riverwalk: Design Concepts



**Focus on industrial character/ materiality as a continuous design/ path, while incorporating big bold graphics in Pittsburgh Aztec gold.**

# Willow Street park



# Willow Street Park



# Funding & Next Steps

# Economic Benefits of Planned Development

Utilizing the methodology for the Three Rivers Park Economic Impact Analysis prepared by Sasaki for Riverlife in 2015, Sasaki prepared a similar analysis of the development in Lawrenceville to understand the fiscal benefits of planned developments, whether they generate enough value to justify public investments, and to guide development strategies for funding.

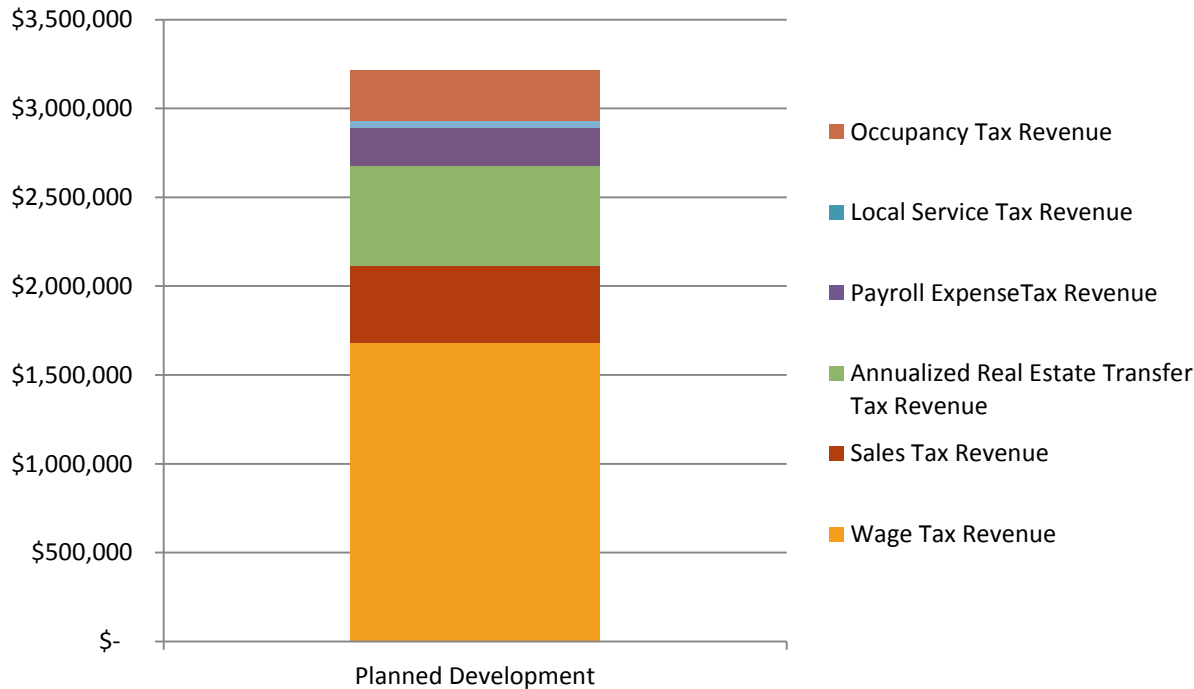
The Three Rivers Park study demonstrated an approximately 20:1 Return on Investment (ROI) for investments catalyzed by riverfront improvements in Three Rivers Park (\$2.58 billion catalyzed by \$129 million invested). The study also demonstrated property values along the riverfront appreciated nearly twice as much as property values citywide between 2001-2013 (60% to 32%).

The analysis looked at:

- Wage Tax Revenue
- Sales Tax Revenue
- Annualized Real Estate Transfer Tax Revenue
- Payroll Expense Tax Revenue
- Local Service Tax Revenue
- Occupancy Tax Revenue

# Economic Benefits of Planned Development

Wage Tax Revenue	\$	1,680,288
Sales Tax Revenue	\$	436,800
Annualized Real Estate Transfer Tax Revenue	\$	559,390
Payroll Expense Tax Revenue	\$	214,170
Local Service Tax Revenue	\$	36,816
Occupancy Tax Revenue	\$	285,266
TOTAL	\$	3,212,729



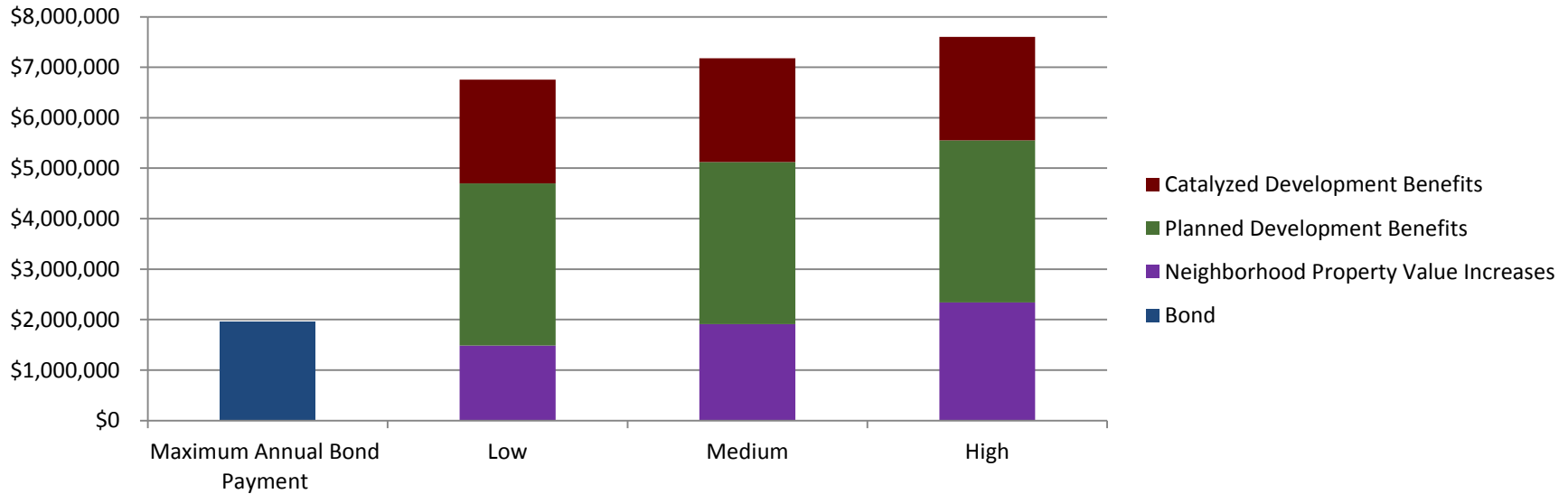
While the developments in Lawrenceville are already planned, the economic benefits of the proposed developments will generate approximately \$3.2 million annually.



# Combined Benefit: Planned Development Plus Public Realm Improvement

	Maximum Annual Bond Payment	Low	Medium	High
Bond	\$1,951,543*			
Neighborhood Property Value Increases		\$ 1,487,546	\$ 1,912,560	\$ 2,337,573
Planned Development Benefits		\$ 3,212,729	\$ 3,212,729	\$ 3,212,729
Catalyzed Development Benefits		\$ 2,054,433	\$ 2,054,433	\$ 2,054,433

\*Assumes \$30M bond for improvements



The developments planned in Lawrenceville generate enough economic benefits to offset the cost of annual bond payments for a \$30 million public bond that could be used for District improvements, such as parking, utilities, open space, or other improvements. The spin-off benefits will also help increase neighborhood property values and catalyze other development that will generate enough economic benefits to offset the cost of an additional \$3.5 to \$4.4 million in annual bond payments

# Economic Benefits of Planned Development

**While the economic benefits of the proposed developments in Lawrenceville demonstrate they will create enough value to support public funding, Pittsburgh, like many cities in the US, is still recovering from the impacts of the 2008 Recession.**

**Similar to the Three Rivers Park Economic Impact Analysis, funding strategies were evaluated and recommendations were made to create a multi-pronged funding strategy that utilizes self-financing through private development value creation; federal, state, and local and tax dollars; and private contributions for Lawrenceville by engaging private developers, foundations, individuals and corporations in campaign fundraising activities.**

# Preferred Funding Strategy

## RECOMMENDATION 1:

As demonstrated with the preliminary economic benefits in Lawrenceville, **pursue a TIF designation** focusing on the ability to capture redevelopment of industrial properties. Funds to be used for infrastructure upgrades including shuttle, parking structure, multi-purpose path, parks, and streetscape improvements.

**TARGET \$15-25 M**

# Preferred Funding Strategy

## RECOMMENDATION 2:

**Solicit private contributions for Lawrenceville.** Develop case for support by highlighting mobility and open space improvements, and engage private developers, foundations, individuals and corporations in campaign fundraising activities. Explore opportunities and challenges with naming and donor recognition plans in public spaces.

**TARGET \$10-20M**

# Preferred Funding Strategy

## RECOMMENDATION 3:

Pursue PennDOT ACT 89 Multimodal Program funds for the transportation focused elements of Lawrenceville. This would provide up to 70% funding, with a 30% local match. Given the other awards, \$2.5 M is likely a good target, so would not likely contribute 70% toward the project, unless dedicated toward the Multi-purpose Path. In addition, partners should explore PA Infrastructure Bank as a complimentary opportunity

**TARGET \$2.5 M**

# Preferred Funding Strategy

## RECOMMENDATION 4:

Pursue stormwater funds for improvements that can support the broader CSO consent decree investments

**TARGET \$5 M**

# Summary – Capital Funding

## Targets:

Rec 1

TIF (primary)

\$15-25M

Rec 2

Private Match (primary)  
(developers, foundations,  
individuals, corporations)

\$10-20M

Rec 3

ACT 89 (primary)  
and  
TIGER (secondary)

\$2.5M

Rec 3

CSO (primary)

\$5M

# Preferred Funding Strategy

## RECOMMENDATION 5 - MAINTENANCE:

In addition to existing sources of operating support, Lawrenceville should advocate for the establishment of a **Voluntary Assessment District**, whereby nearby property owners voluntarily pay into a fund to help support programming and maintenance, as well as other functions that promote a safe and clean environment. Given past challenges, this should be focused on creating a District where there is support.

**TARGET:** Revenue to offset approximately 25% of annual maintenance and stewardship costs.



# Other Potential Funding Sources

## Allegheny Riverfront Green Boulevard Project Funding Sources, 2013

Table 3. Near-Term Funding Matrix

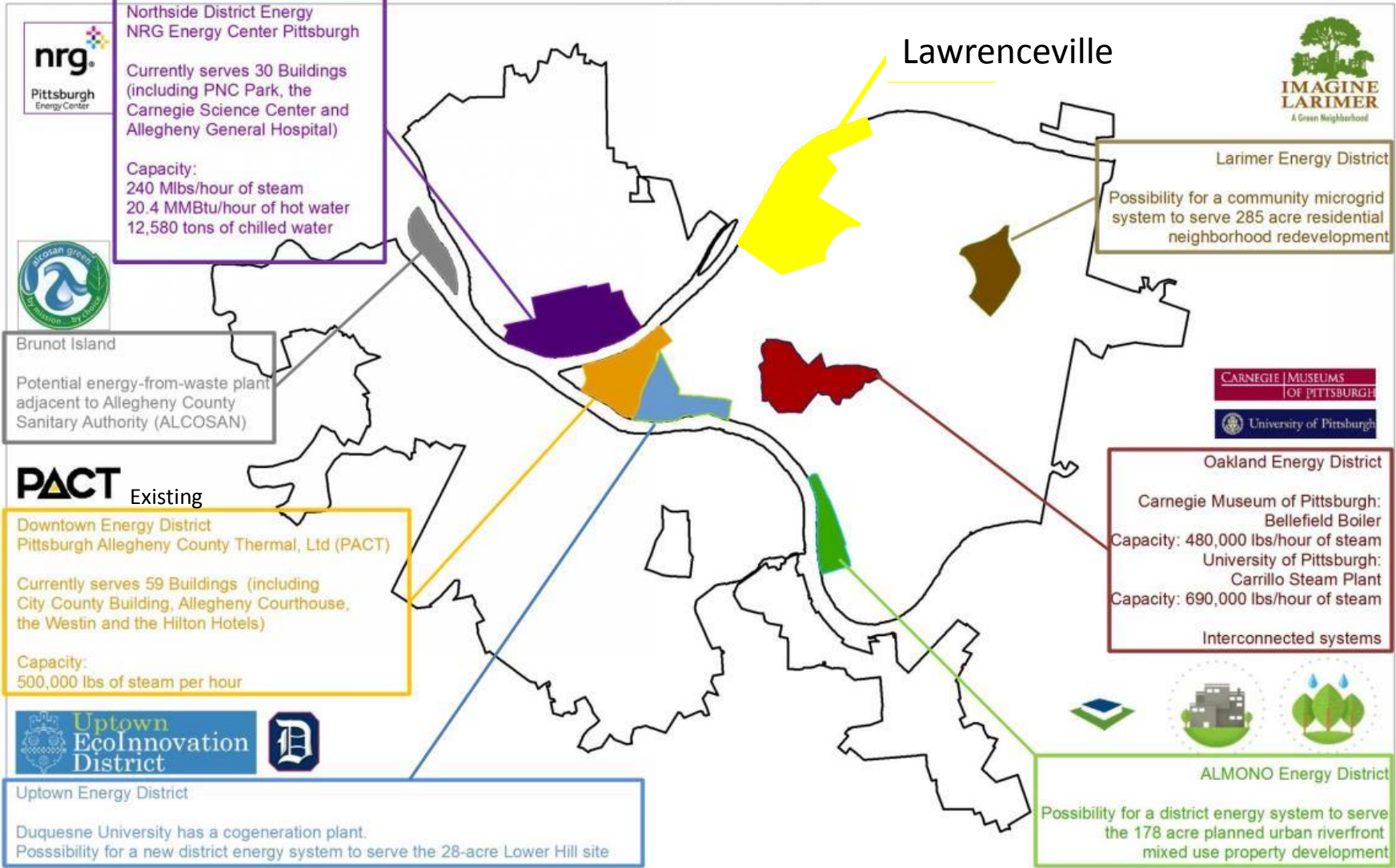
Funding Sources	Near Term Projects (Uses)			
	Phase I Waterfront Park (43rd St. Landing)	Green Boulevard	Riverfront Drive (43rd to 45th St.)	43 <sup>rd</sup> Street-Butler to Riverfront
Tax Increment Financing		★★★	★★★	★★★
Federal Land & Water Conservation Fund	★★			
Brownfields Economic Development Initiative	★★	★★		
Boating Infrastructure Grant	★★			
Coldwater Heritage Partnership	★	★★		
Heritage Park Grants	★			
Community Grants	★		★★	
River Conservation Grants	★★			
Rails to Trails Grants	★			
PA Recreational Trails Program Grants	★★			
Transportation Community & System Preservation		★★★	★★★	★★★
Corporate Sponsorships	★★			

Note: Scale represents Easy= 3 stars, Moderate= 2 stars and Difficult= 1 star for access to funding by project type

Source: Partners for Economic Solutions, 2012.

# District Energy/Sustainability Concepts

# District Energy in Pittsburgh, PA



## Existing

**Northside District Energy**  
 NRG Energy Center Pittsburgh

Currently serves 30 Buildings (including PNC Park, the Carnegie Science Center and Allegheny General Hospital)

Capacity:  
 240 Mlbs/hour of steam  
 20.4 MMBtu/hour of hot water  
 12,580 tons of chilled water



**Brunot Island**

Potential energy-from-waste plant adjacent to Allegheny County Sanitary Authority (ALCOSAN)

## PACT Existing

**Downtown Energy District**  
 Pittsburgh Allegheny County Thermal, Ltd (PACT)

Currently serves 59 Buildings (including City County Building, Allegheny Courthouse, the Westin and the Hilton Hotels)

Capacity:  
 500,000 lbs of steam per hour



**Uptown Energy District**

Duquesne University has a cogeneration plant.  
 Possibility for a new district energy system to serve the 28-acre Lower Hill site

## Lawrenceville

**Larimer Energy District**

Possibility for a community microgrid system to serve 285 acre residential neighborhood redevelopment



**Oakland Energy District**

Carnegie Museum of Pittsburgh:  
 Bellefield Boiler  
 Capacity: 480,000 lbs/hour of steam  
 University of Pittsburgh:  
 Carrillo Steam Plant  
 Capacity: 690,000 lbs/hour of steam

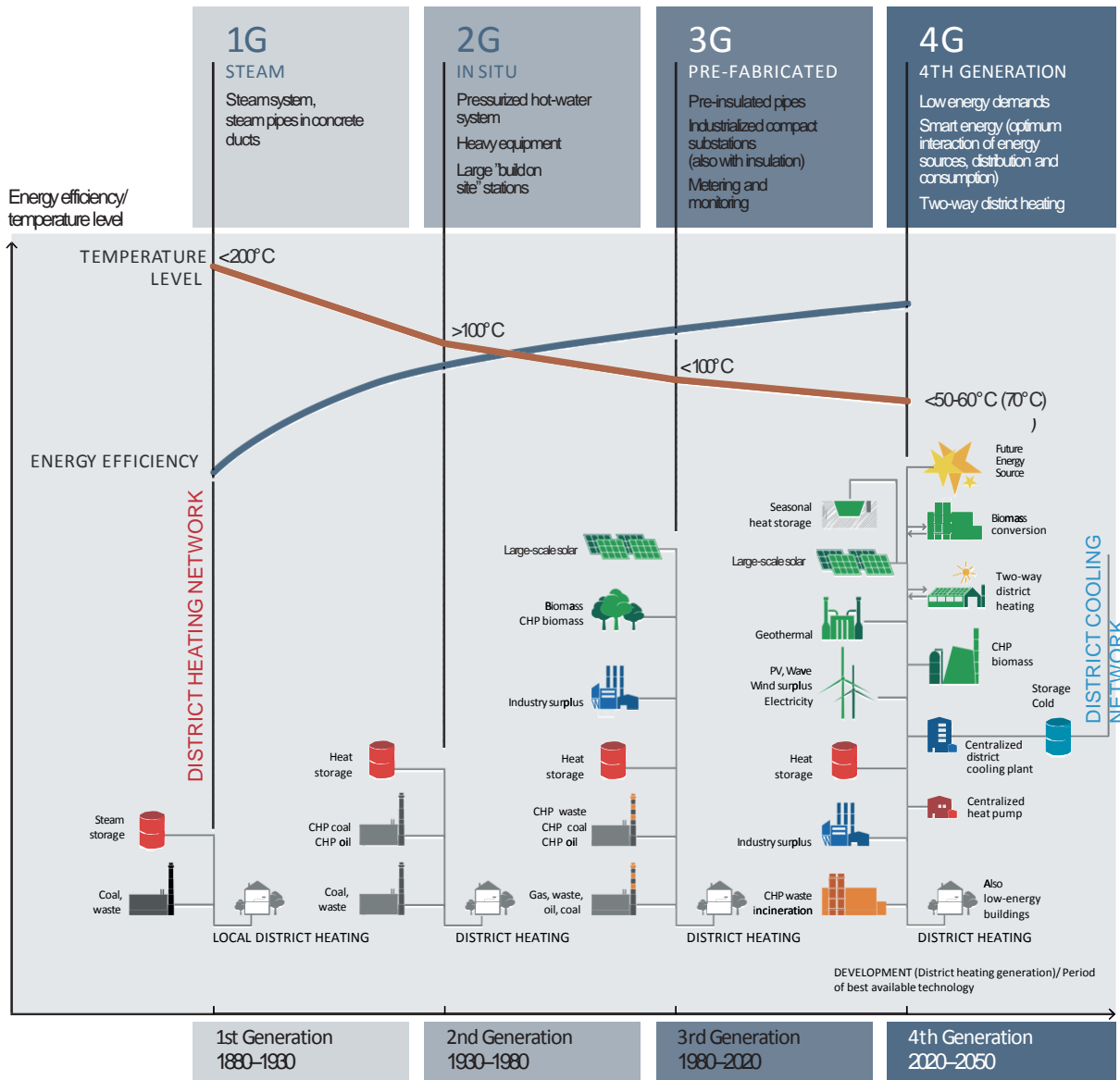
Interconnected systems



**ALMONO Energy District**

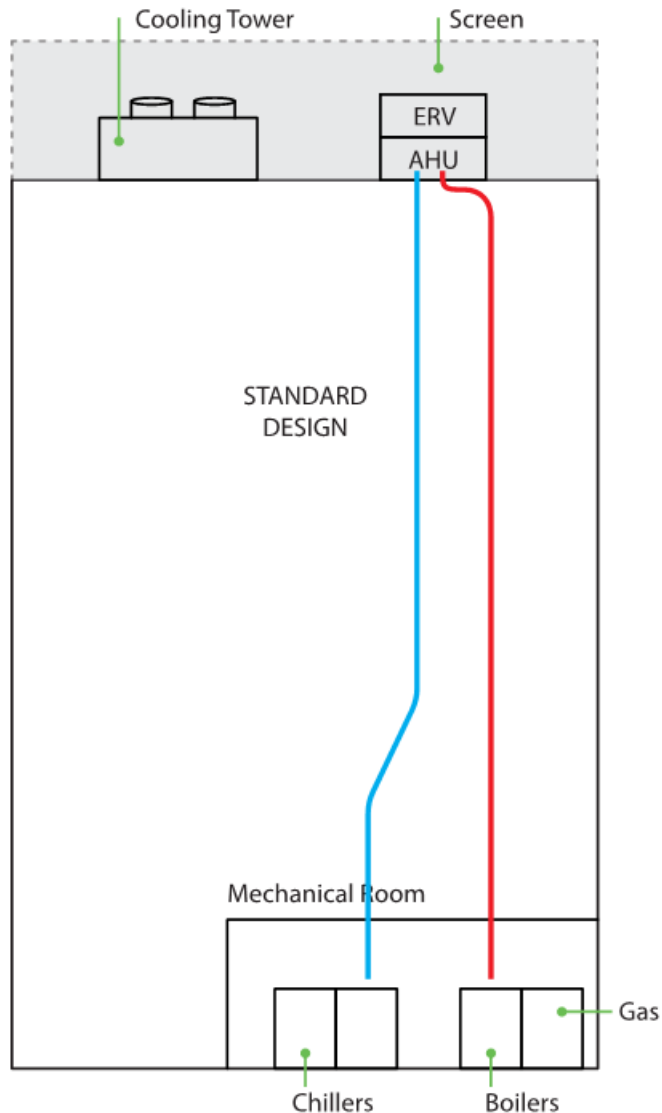
Possibility for a district energy system to serve the 178 acre planned urban riverfront mixed use property development

# Historical Development of District Energy



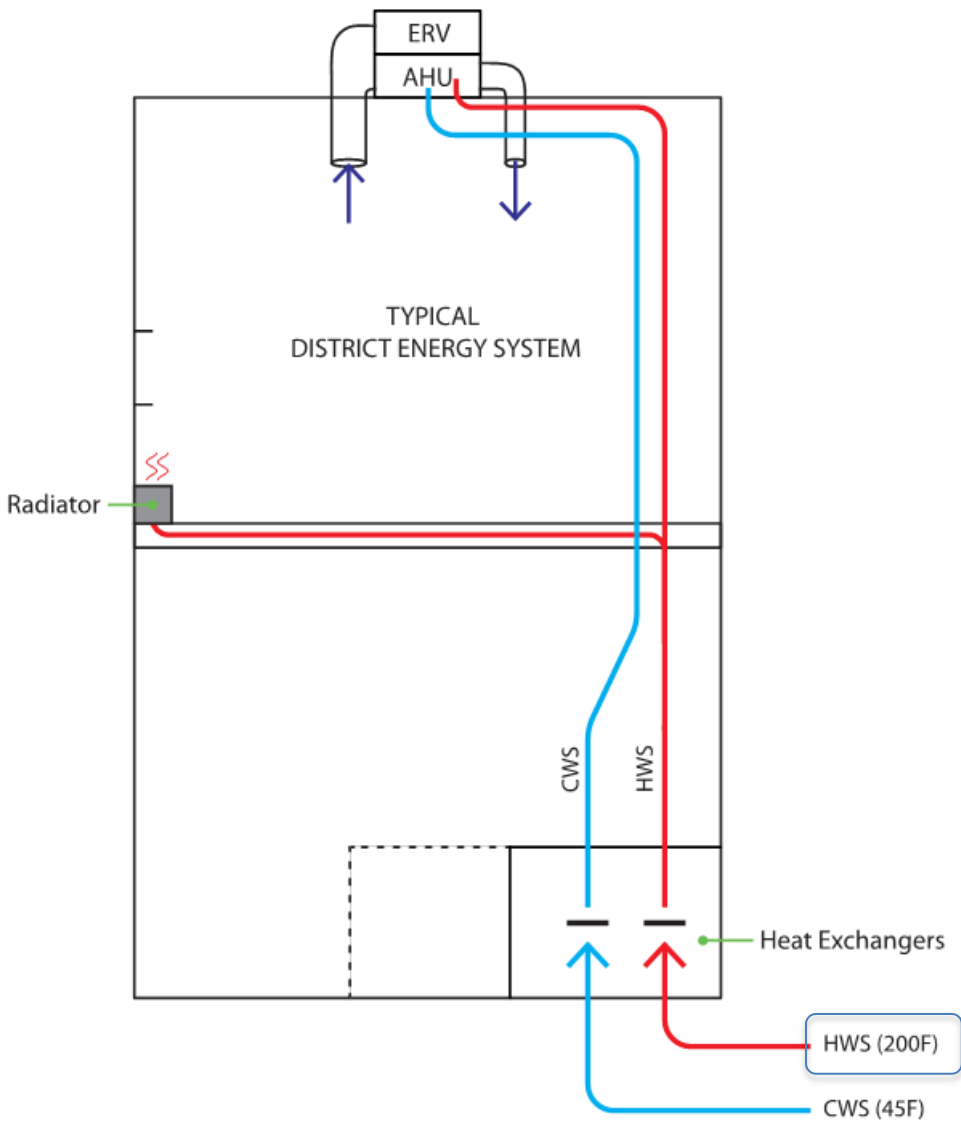
Source: Aalborg University and Danfoss District Energy, 2014

# Typical Building Design



- Gas Boilers for Hot Water
- Electric Chillers and Cooling Towers for Chilled water
- Each building has stand alone equipment sized for peak condition
- Buildings are connected only by electric grid
- Little opportunity for waste heat recovery

# Typical District Energy System



## Environmental Benefits

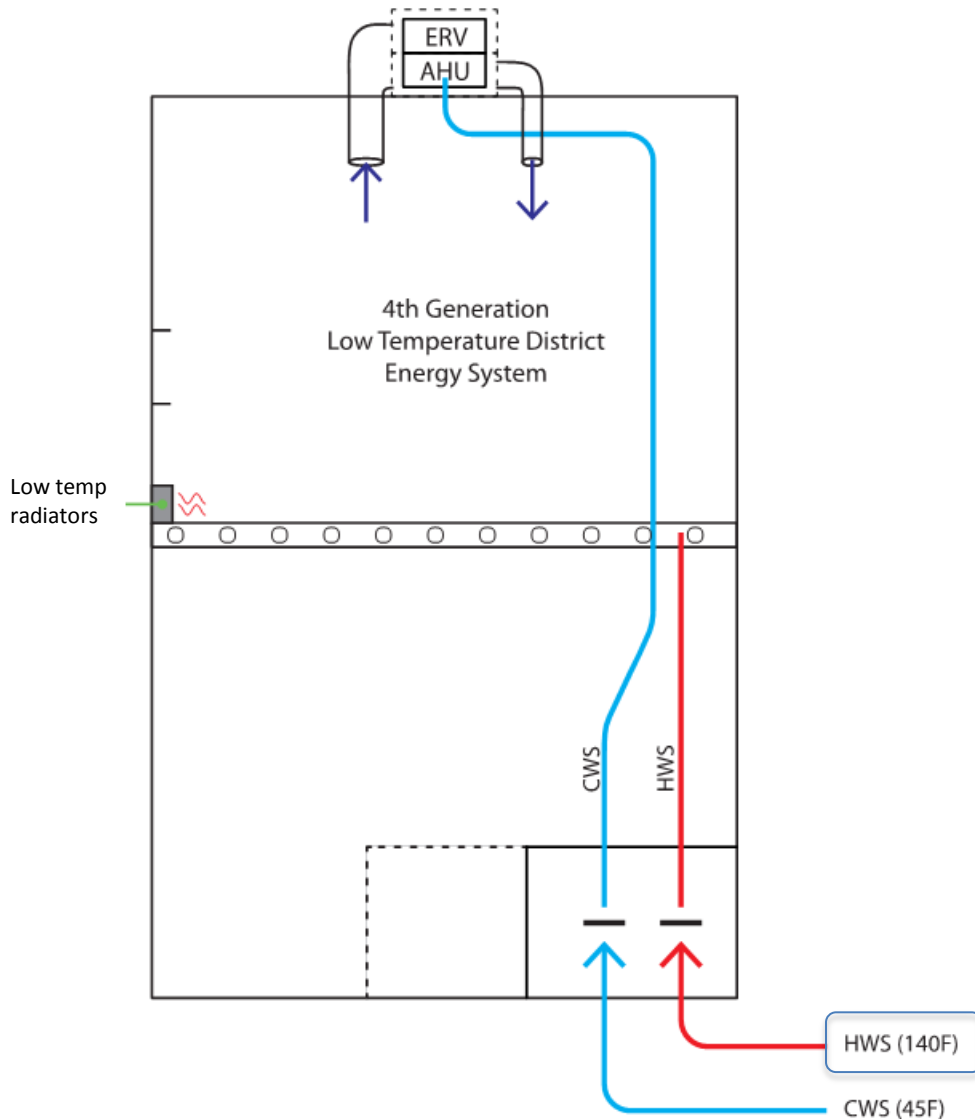
- Improved energy efficiency
- Waste heat recovery options (high temp)
- Increased Reliability
- Decreased life-cycle costs
- Lower Emissions
- Better use of capital

## Building Considerations

- More usable SF
- Lower development cost
- Lower energy and maintenance cost

- Potential Sources:
- CHP – gas
  - Biomass
  - Waste Incineration
  - Industry waste heat (high temp)

# 4<sup>th</sup> Generation Low-Temp District Energy System



## Environmental Benefits

- Even higher energy efficiency
- Ability to capture waste heat (low-temp)
- Multiple renewable energy sources
- Low distribution losses
- Smart Energy System

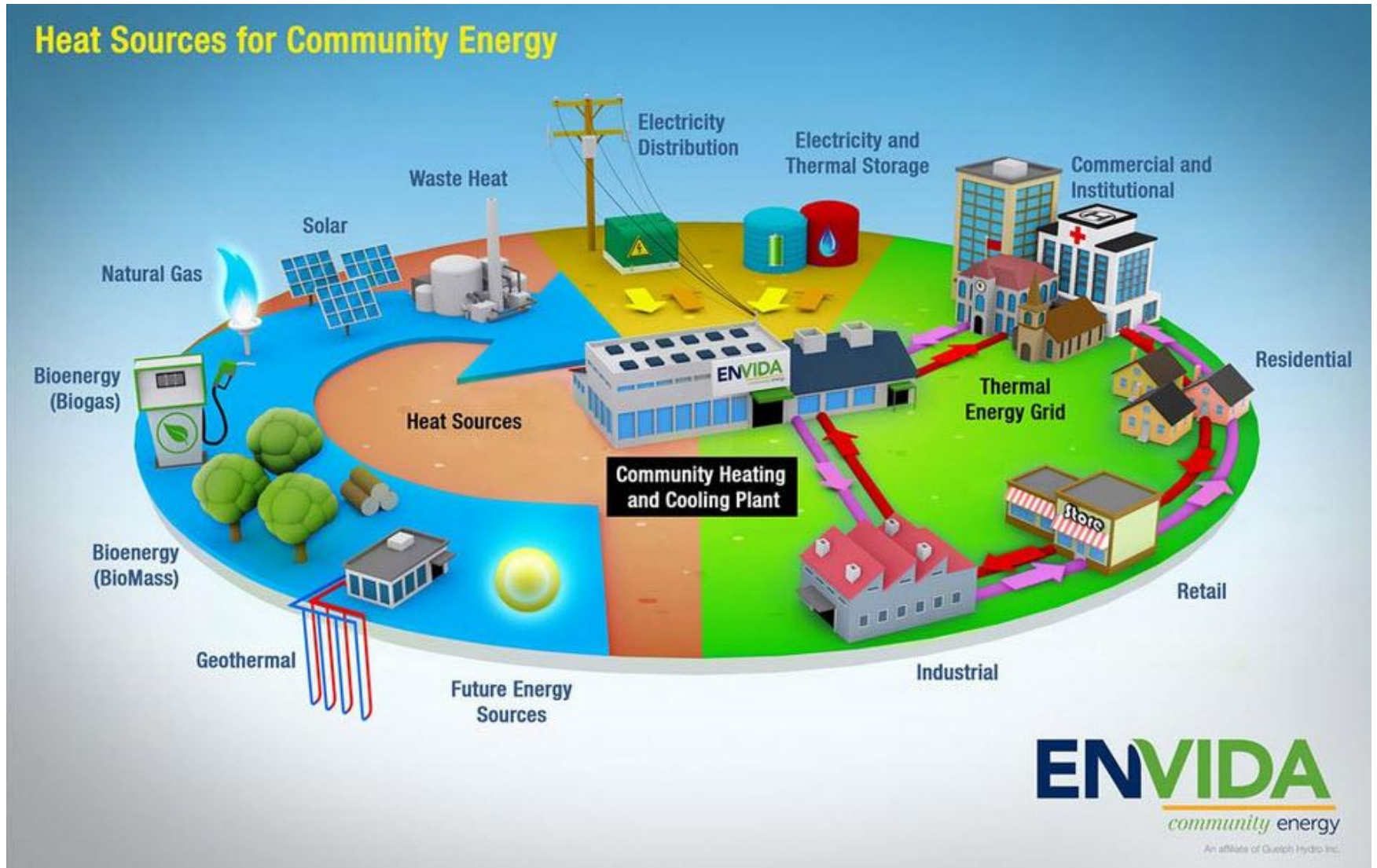
## Building Consideration

- Low Temp hot water supply
- Peak sizing
- Envelope Improvements
- Peak booster boiler
- Low Temp Radiant systems

## Potential Sources:

- Geothermal
- River Heating/Cooling
- Solar hot water
- Recycled waste heat (low temp)
- Heat pumps

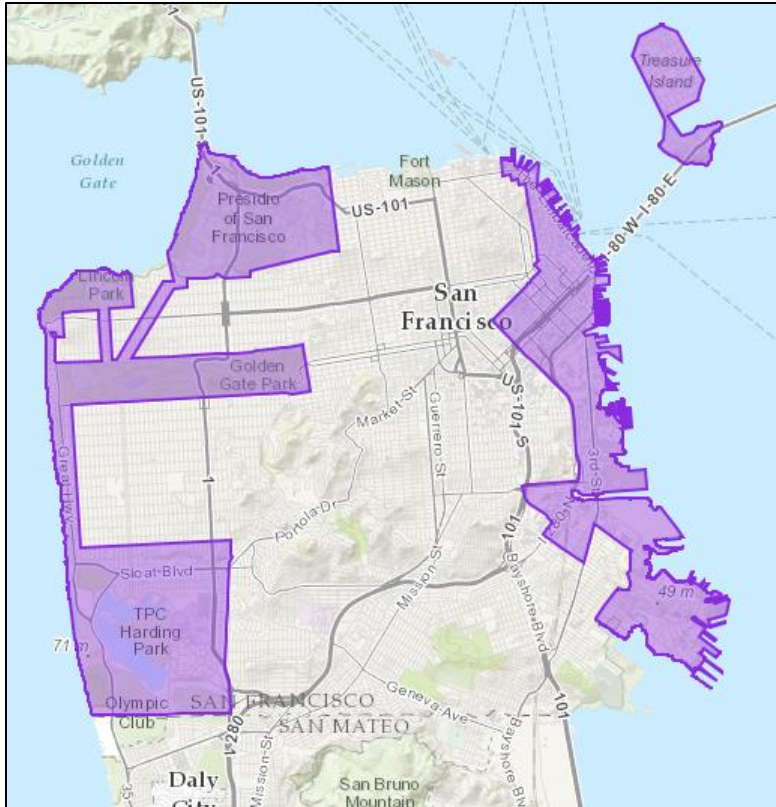
# Heat Sources for Community Energy





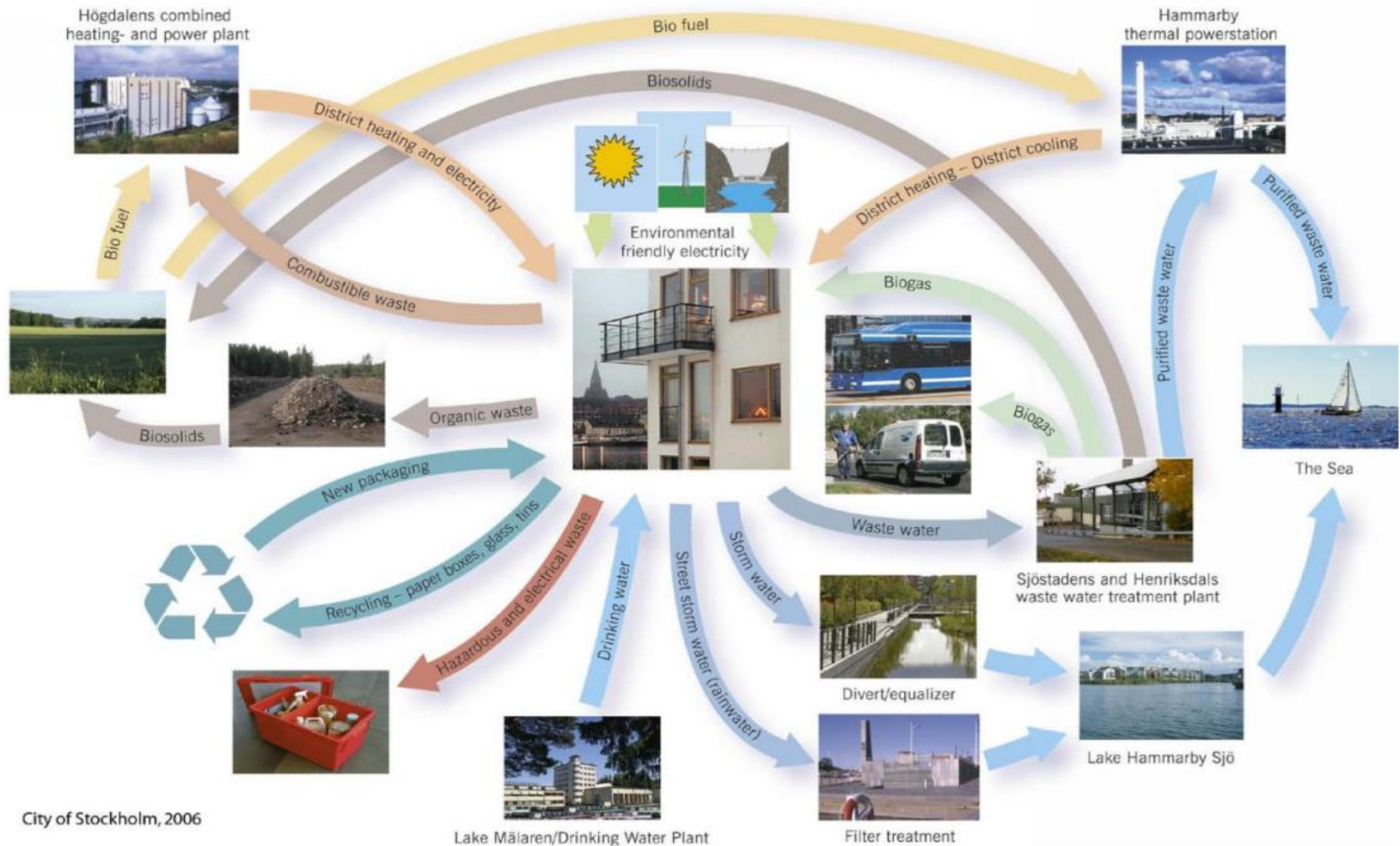
# District Greywater Example

- San Francisco



- Purple Pipe zones
- Greywater supply district
- Capture Rainwater/ Stormwater
- Stormwater tax?
- Water savings = energy savings
- Centralized water storage and filtration
- Reduce demand on city stormwater system
- Aim to keep 100% of rainwater onsite
- Stormwater reuse for cooling towers

# Sustainable District Elements



City of Stockholm, 2006

Lake Mälaren/Drinking Water Plant

Filter treatment

# District Wide Environmental Programs

## Living Community Challenge

Living community challenge projects have their own ‘utility,’ generating their own energy and processing their own waste.

## LEED for Neighborhood Development

Focuses on high levels of walkability, a sense of place, and social cohesion. It encourages strategies that conserve resources, protecting natural areas, and facilitate connections to the surrounding community.

## Sustainable SITES Initiative

Foster a transformation in land design and development practices to bring the essential importance of ecosystem services to the forefront of decision-making and implementation.

## EcoDistricts

A new model of public-private partnership that emphasizes innovation and deployment of district-scale best practices to create the neighborhoods of the future - resilient, vibrant, resource efficient and just.

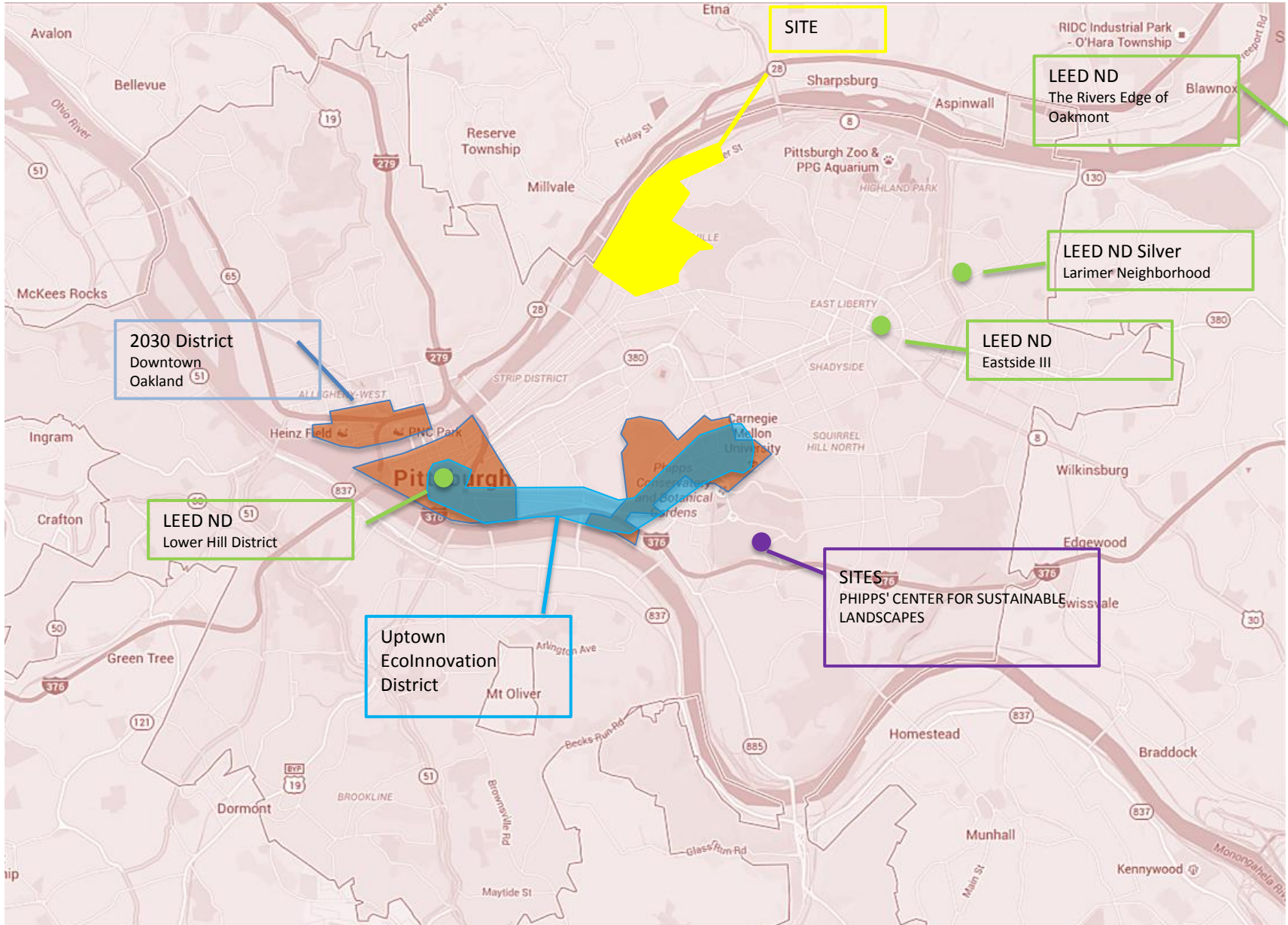
## 2030 Districts

Designated urban areas committed to meeting the energy, water, and transportation emissions reduction targets of the 2030 Challenge for Planning.

## Uptown EcoInnovation District

A Plan that is environmentally and economically innovative and enhance equitable land use, mobility, energy, and infrastructure that will embody sustainability in all aspects of development; both people and place.

# Pittsburgh Area District Environmental Programs



# City of Malmö

- Malmö, Sweden

ENERGY SOURCE (100% Renewable)

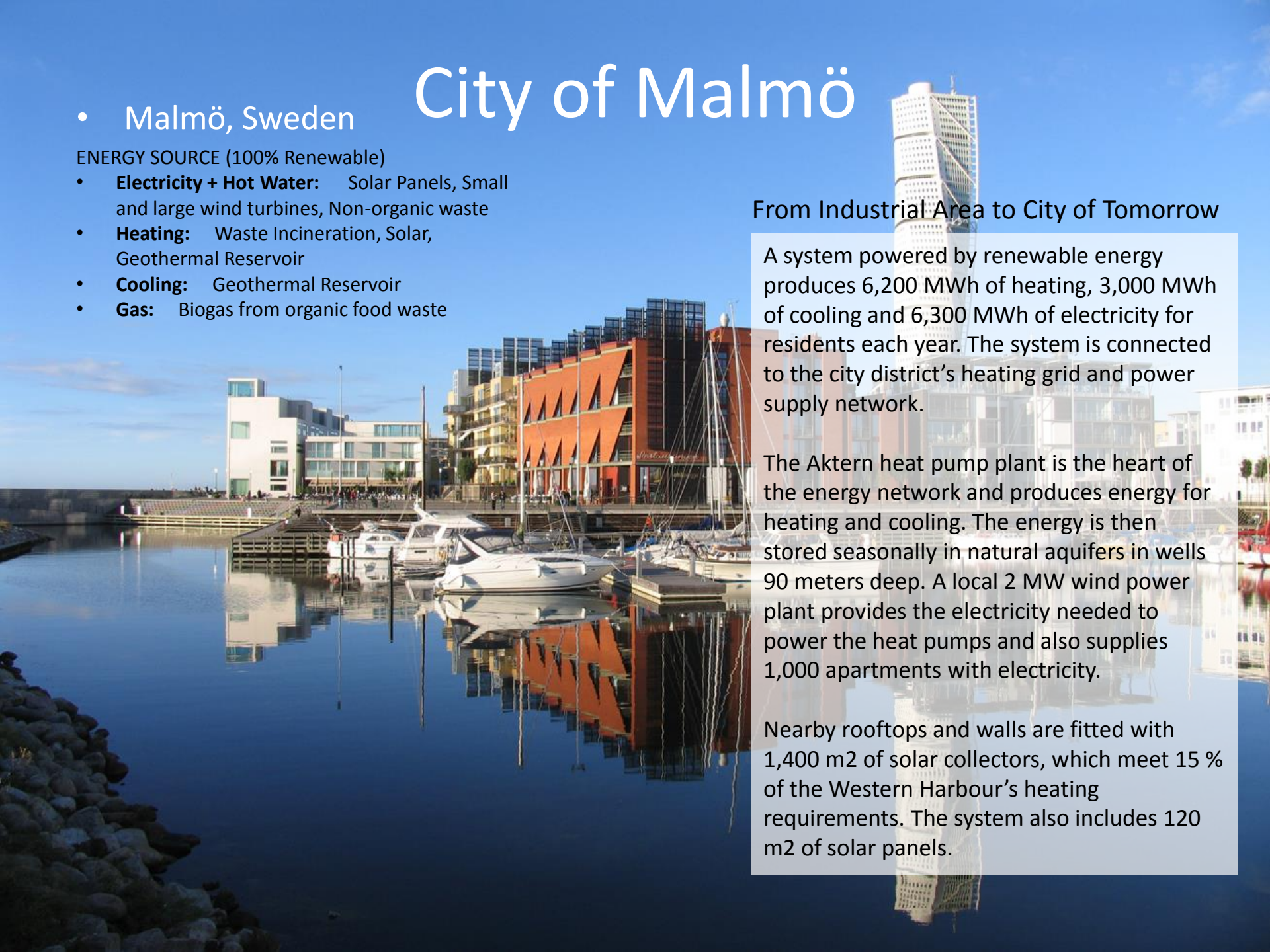
- **Electricity + Hot Water:** Solar Panels, Small and large wind turbines, Non-organic waste
- **Heating:** Waste Incineration, Solar, Geothermal Reservoir
- **Cooling:** Geothermal Reservoir
- **Gas:** Biogas from organic food waste

## From Industrial Area to City of Tomorrow

A system powered by renewable energy produces 6,200 MWh of heating, 3,000 MWh of cooling and 6,300 MWh of electricity for residents each year. The system is connected to the city district's heating grid and power supply network.

The Aktern heat pump plant is the heart of the energy network and produces energy for heating and cooling. The energy is then stored seasonally in natural aquifers in wells 90 meters deep. A local 2 MW wind power plant provides the electricity needed to power the heat pumps and also supplies 1,000 apartments with electricity.

Nearby rooftops and walls are fitted with 1,400 m<sup>2</sup> of solar collectors, which meet 15 % of the Western Harbour's heating requirements. The system also includes 120 m<sup>2</sup> of solar panels.





# Dockside Green



- Victoria, British Columbia, Canada

## ENERGY SOURCE

- **Heat + Hot Water:** Biomass (waste wood), Heat recovery from wastewater treatment
- **Electricity:** Hydropower
- **Cooling:** Cold water from municipal supply

## THE GREENEST NEIGHBORHOOD

The Dockside Green District Energy Plant, operated by Corix Utilities, is intended to generate high efficient heat and hot water for every Dockside Green resident and tenant.

This is achieved through either the burning of locally sourced, low-cost biomass fuel sources (sawmill and wood waste), or natural gas. The plant was built with the capacity to supply the entire Dockside Green development (1.3 million sq.ft.).

The plant recovers heat from sewage, bathwater, and dishwater.

# Findings & Next Steps

## Initial Findings

Initial research determined that there appears to be significant potential for implementing a high performance district wide energy distribution system in Lawrenceville. There appears to be sufficient and diverse energy loads in close proximity to support such a system. Concerns and questions about timing are noted, but we believe a phased implementation approach is possible to develop.

## Recommended Next Steps

1. Conduct a pre-feasibility study. The pre-feasibility study will analyze all the available possible sources and uses of energy in the district, map the area to determine efficient distribution systems, determine critical stakeholders required to initiate the project, review the timing of the developments and determine if phased implementation is feasible.
2. Determine ownership/ funding/ management options.
3. Conduct a full feasibility study to evaluate all associated costs, sources and funding structures.
4. Contract with a design/ build entity to initiate the project.
5. In addition or concurrent with these steps we would recommend evaluating the feasibility of LEED Neighborhood Development. The direction to pursue LEED ND may have some design implications for the existing development projects.