MAIN STREET GREEN INFRASTRUCTURE, ANNAPOLIS

PRESENTATION #3

CAMPION HRUBY
LANDSCAPE ARCHITECTS

27 FEBRUARY 2019

MEETING 1

JANUARY 16, 2019

- INTRO TO THE PROBLEM
- IDENTIFY ISSUES & POTENTIAL SOLUTIONS
- INITIAL FEEDBACK

CHLA REVISIONS

MEETING 2

JANUARY 2019

- APPLYING SOLUTIONS TO THE PROBLEMS ON MAIN STREET
- ADDITIONAL FEEDBACK

CHLA REVISIONS

MEETING 3

FEBRUARY 2019

- FINAL PRESENTATION
- RENDERINGS

MEETING 1 & 2 RECAP

CHESAPEAKE BAY TRUST G3 GRANT TYPES / PROCESS

CONCEPTUAL PLAN PHASE

EVALUATE CONDITIONS
RENDERINGS
CONCEPTUAL PLANS
PUBLIC MEETINGS

ENGINEERED DESIGN PHASE

STORMWATER CALCULATIONS
ENGINEERED PLANS
ENGINEERED DETAILS
BIDDING/CONSTRUCTION DOCUMENTS

IMPLEMENTATION PHASE

CONSTRUCTION COSTS

THE PROBLEM

- INCREASED WATER VOLUME CAUSED BY RAIN & FLOODING AT CITY DOCK
- POLLUTANTS ENTERING CHESAPEAKE BAY WATERSHED
- CURRENT CONDITIONS DO NOT MEET STATE STORMWATER MANAGEMENT GUIDELINES

GOAL

- CONCEPTUALIZE GREEN INFRASTRUCTURE SOLUTIONS THAT WILL BE EFFECTIVE AND APPROPRIATE FOR HISTORIC MAIN STREET AND OTHER PARTS OF THE HISTORIC DISTRICT.

OBJECTIVES

- DEFINE THE ENVIRONMENTAL ISSUES THAT AFFECT MAIN STREET.
- EXPLORE APPROPRIATE GREEN INFRASTRUCTURE APPLICATIONS & BENEFITS AND GATHER FEEDBACK.
- PROVIDE A VISION FOR A GREENER MAIN STREET.

BENEFITS OF GREEN INFRASTRUCTURE

WATER
- IMPROVED WATER QUALITY
- REDUCED FLOODING & SLOWS DOWN DISCHARGE
- GROUNDWATER RECHARGE
- LOWER CAPITAL IMPROVEMENT COSTS

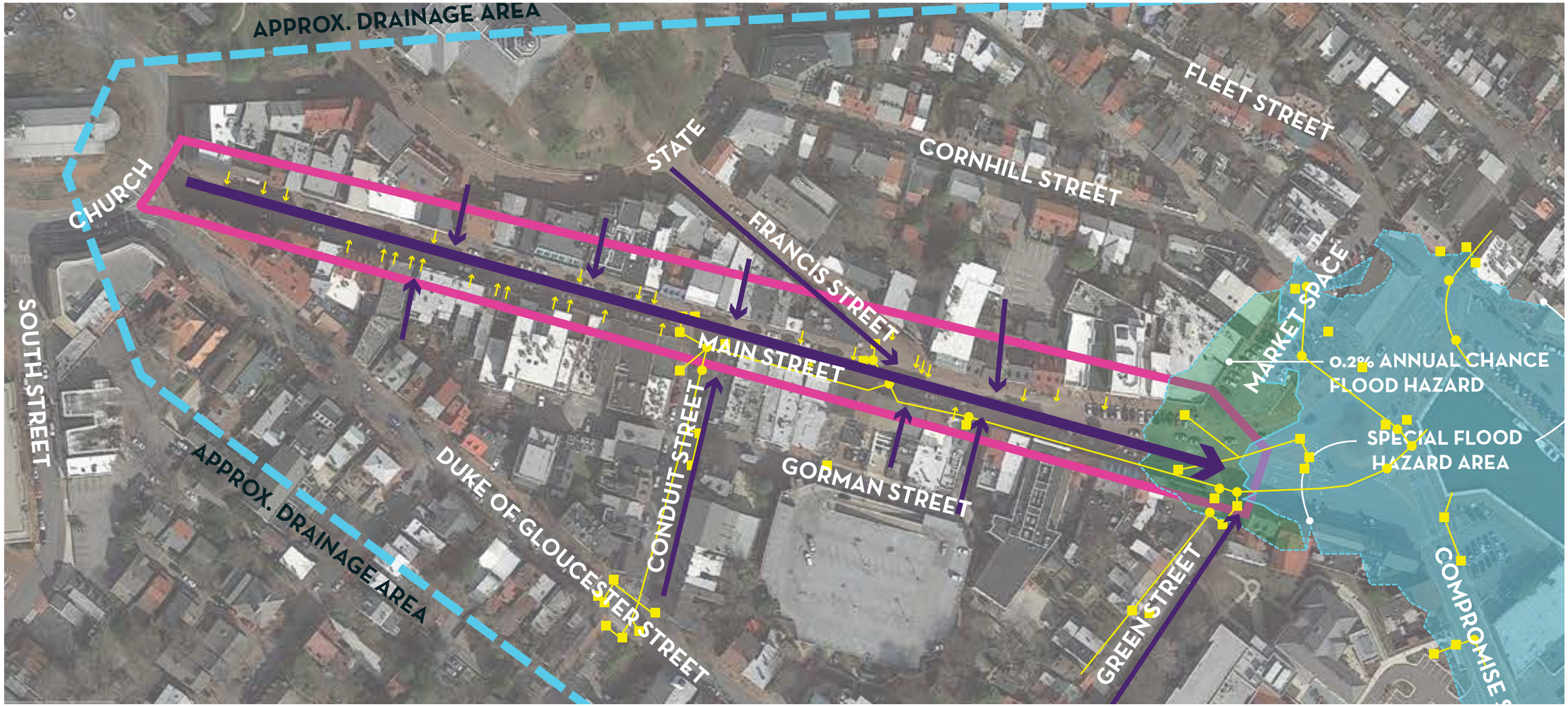
AIR
- IMPROVED AIR QUALITY
- CARBON SEQUESTRATION

ENERGY
- REDUCED AIR TEMPERATURES
- REDUCE ENERGY USE IN BUILDINGS

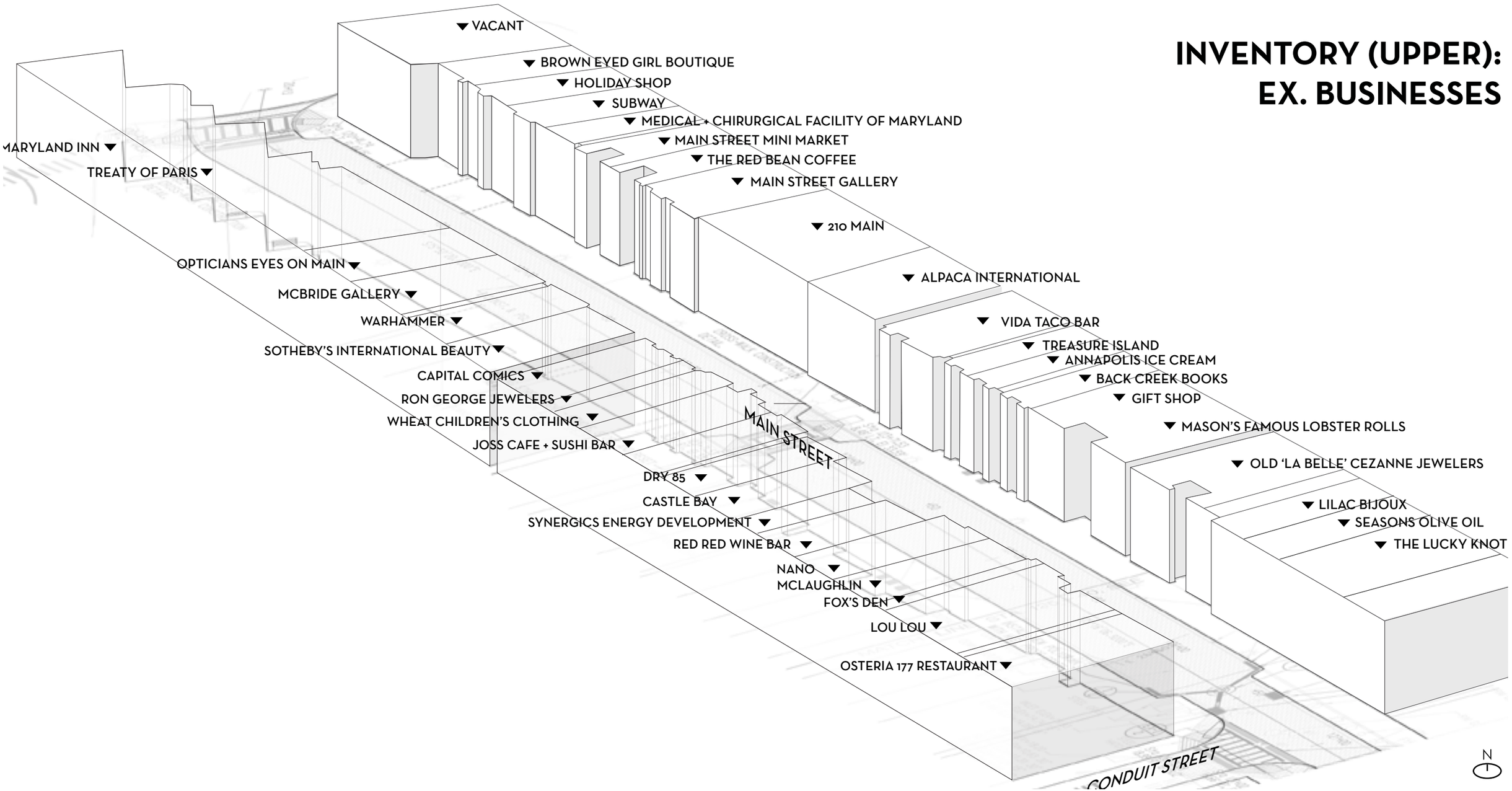
WILDLIFE
- NEW HABITAT FOR FAUNA
- REDUCED SEDIMENT IN ADJACENT WATERWAYS
- HABITAT CONNECTIVITY

COMMUNITY
- INCREASED PROPERTY VALUES
- INCREASED RETAIL SPENDING
- ADDITIONAL RECREATIONAL SPACE
- INCREASED COMMUNITY HEALTH

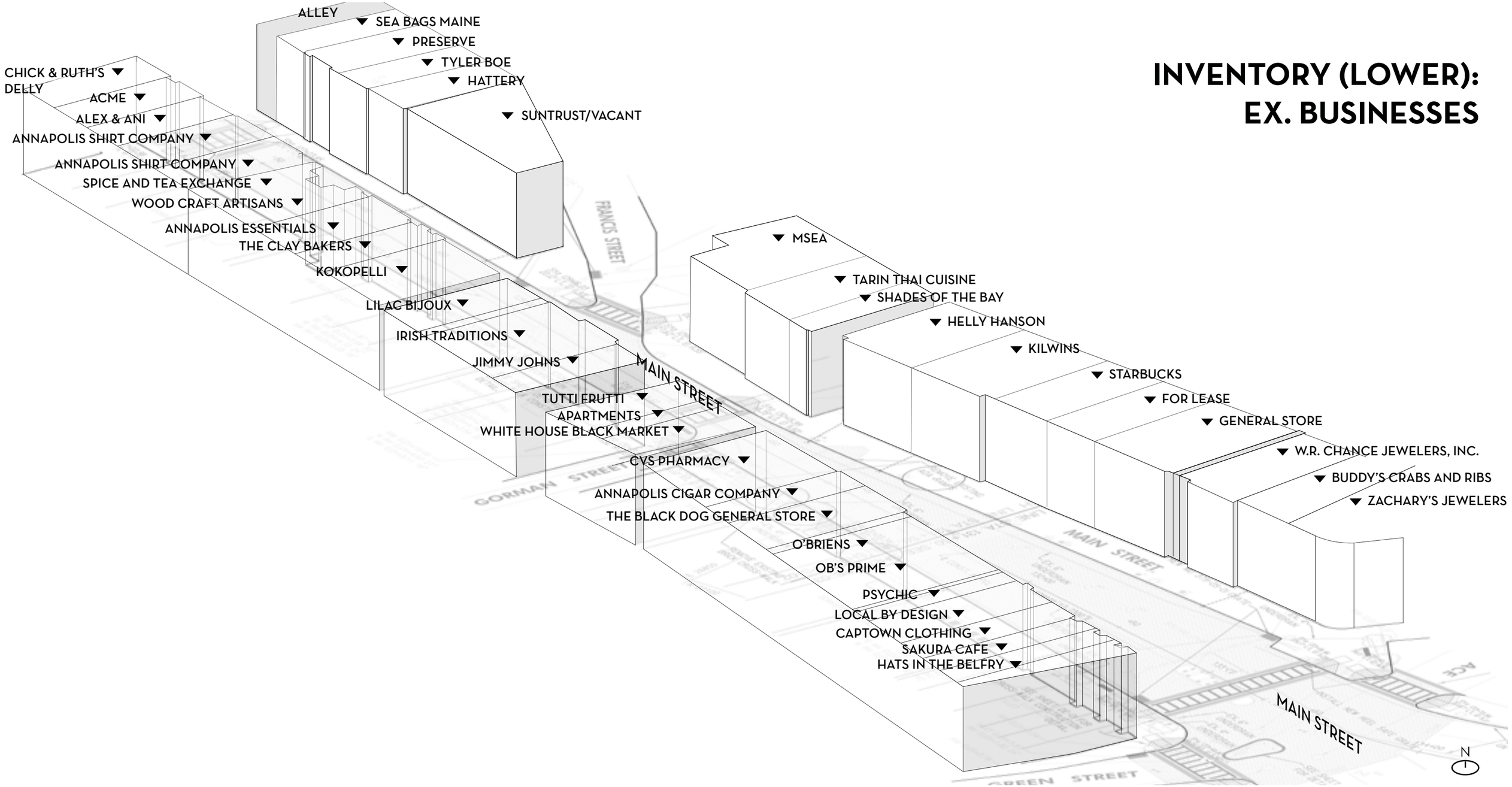
SOURCE: ENVIRONMENTAL PROTECTION AGENCY


APPROX. DRAINAGE AREA
FLEET STREET
CORNHILL STREET
STATE
FRANCIS STREET
CHURCH
SOUTH STREET
MAIN STREET
MARKET SPACE
0.2% ANNUAL CHANCE FLOOD HAZARD
SPECIAL FLOOD HAZARD AREA
CONDUIT STREET
GORMAN STREET
DUKE OF GLOUCESTER STREET
APPROX. DRAINAGE AREA
GREEN STREET
COMPROMISE

INVENTORY (UPPER): EX. BUSINESSES

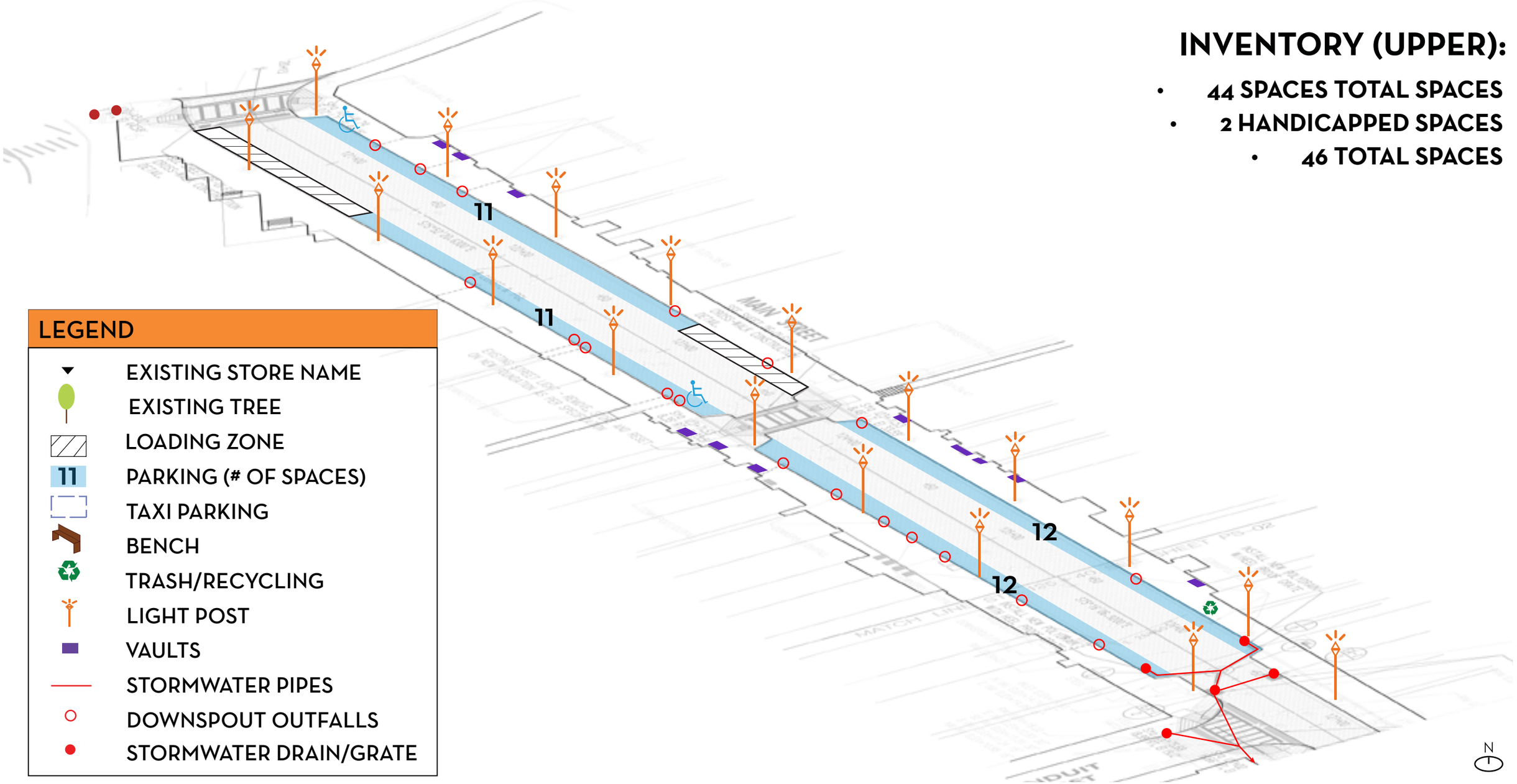


INVENTORY (LOWER): EX. BUSINESSES



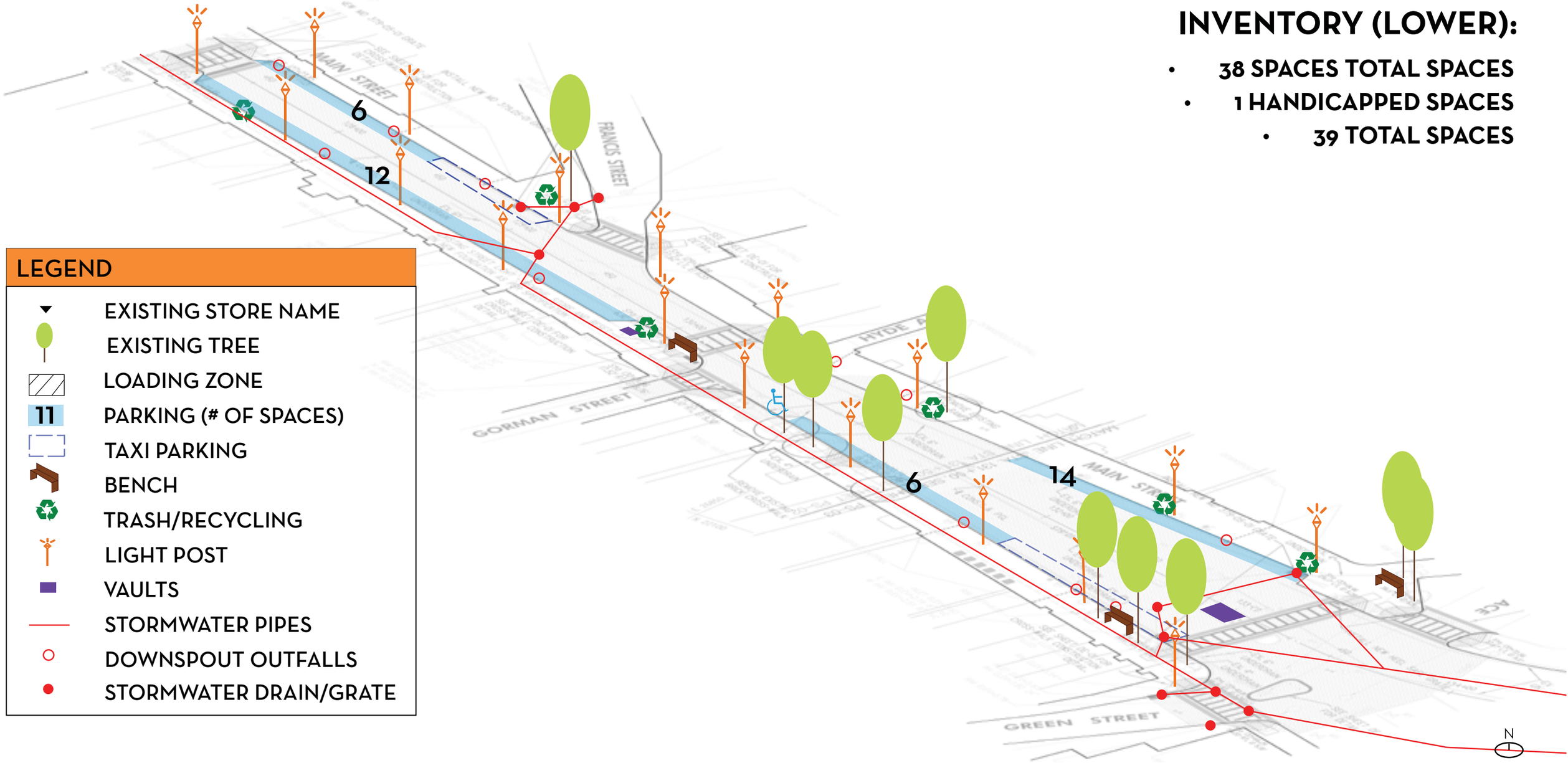
INVENTORY (UPPER):

- 44 SPACES TOTAL SPACES
- 2 HANDICAPPED SPACES
- 46 TOTAL SPACES



INVENTORY (LOWER):

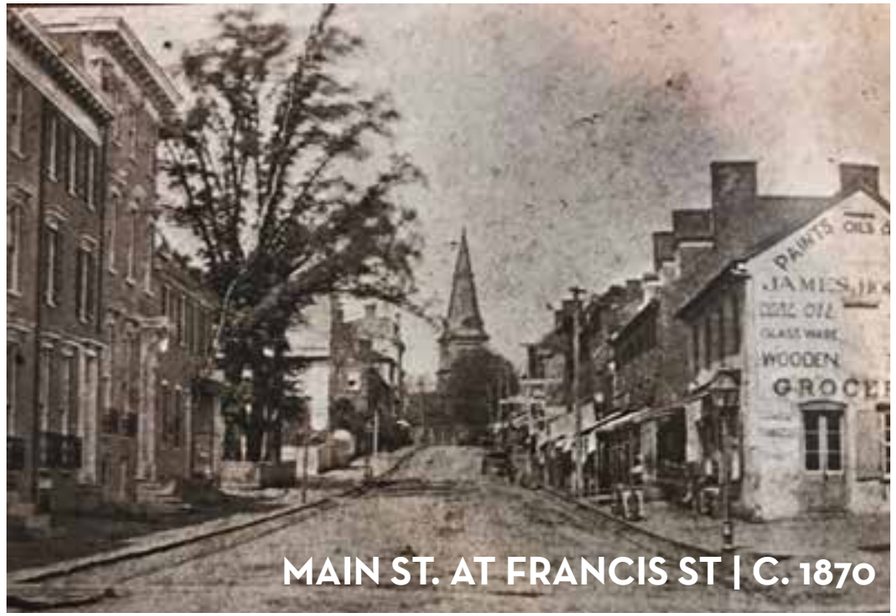
- 38 SPACES TOTAL SPACES
- 1 HANDICAPPED SPACES
- 39 TOTAL SPACES



LEGEND

- EXISTING STORE NAME
- EXISTING TREE
- LOADING ZONE
- 11 PARKING (# OF SPACES)
- TAXI PARKING
- BENCH
- TRASH/RECYCLING
- LIGHT POST
- VAULTS
- STORMWATER PIPES
- DOWNSPOUT OUTFALLS
- STORMWATER DRAIN/GRATE

HURRICANE HAZEL | 1954



MAIN ST. AT FRANCIS ST | C. 1870

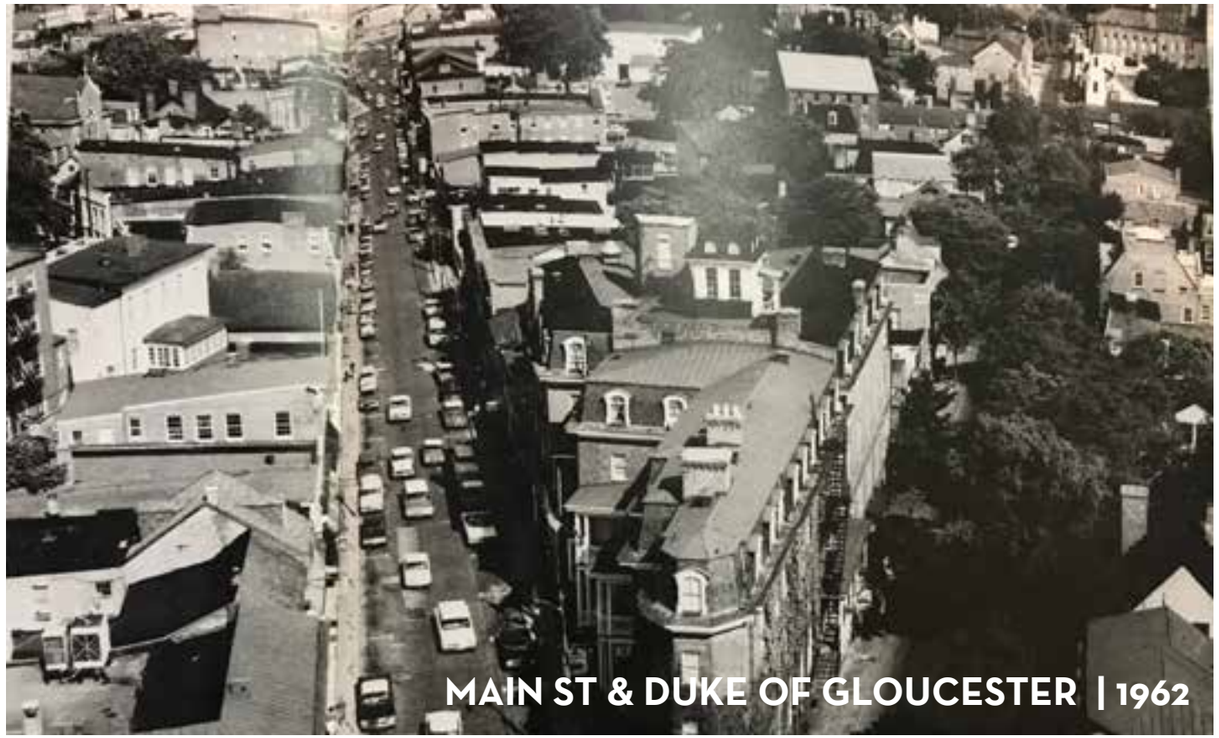
MAIN ST. FROM CHURCH CIR | 1890

MAIN ST | 1899

MAIN ST | 1929

MAIN ST | 1948

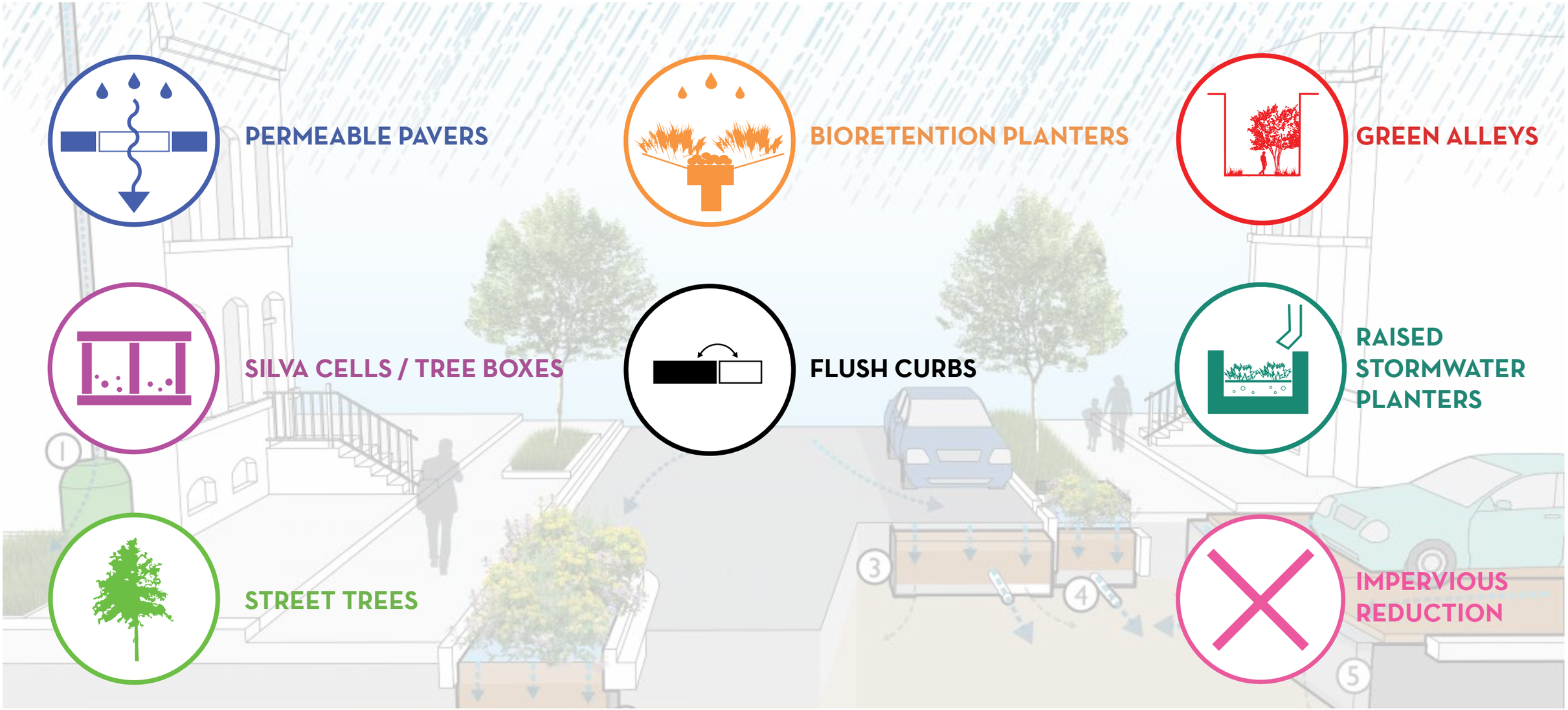
MAIN ST | 1885



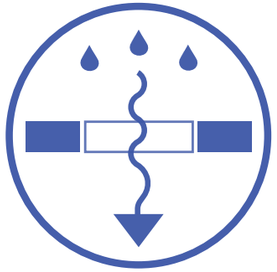
MAIN ST & DUKE OF GLOUCESTER | 1962

GREEN INFRASTRUCTURE TOOLKIT

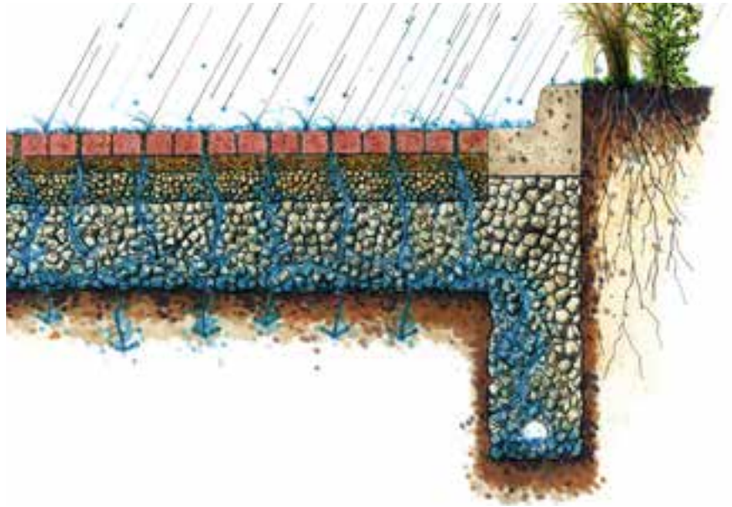
IT'S WHAT YOU DON'T SEE THAT DOES THE REAL WORK

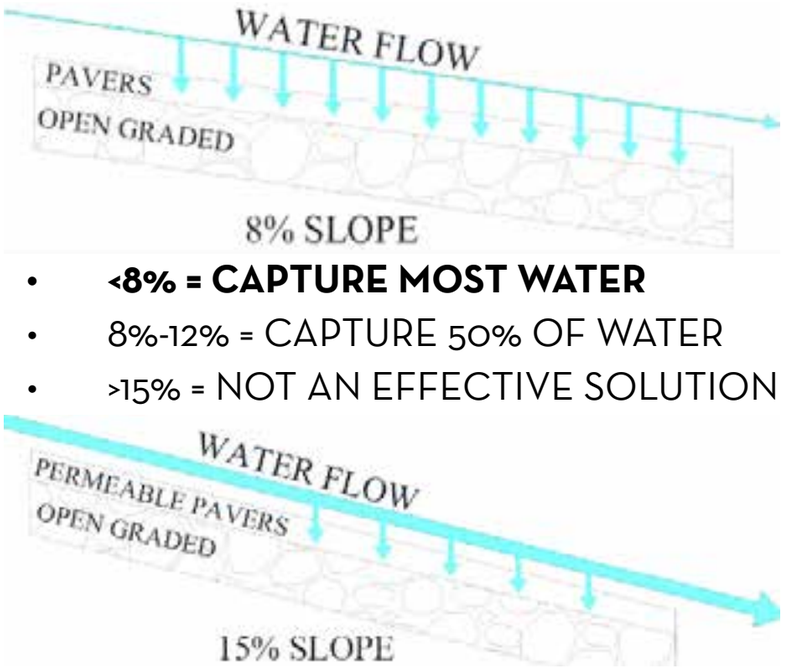


GREEN INFRASTRUCTURE TOOLKIT: PERMEABLE PAVERS



- PROVIDE STORAGE SPACE FOR WATER
- FILTER CONTAMINANTS/MICROBES DECOMPOSE POLLUTANTS
- REDUCE ICE FORMATION & THE AMOUNT OF SALT NEEDED
- ALLOW BIOCHAR TO BE INCORPORATED INTO THE GRAVEL LAYER
- MAIN STREET = < 5% SLOPE, ENTIRE LENGTH

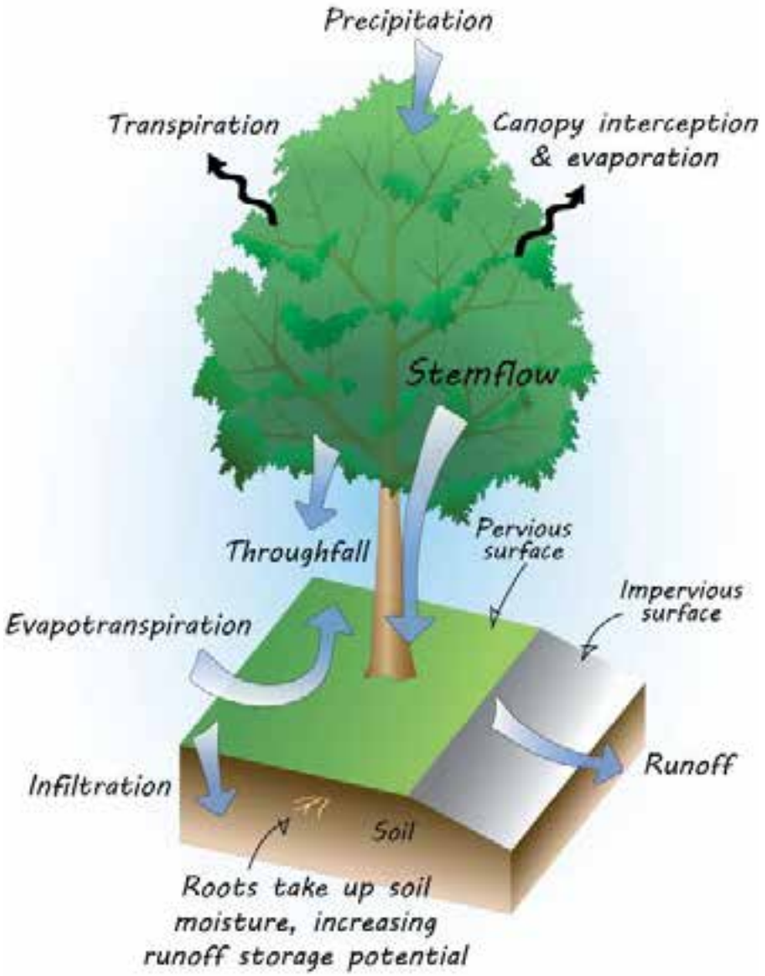




- **<8% = CAPTURE MOST WATER**
- 8%-12% = CAPTURE 50% OF WATER
- >15% = NOT AN EFFECTIVE SOLUTION

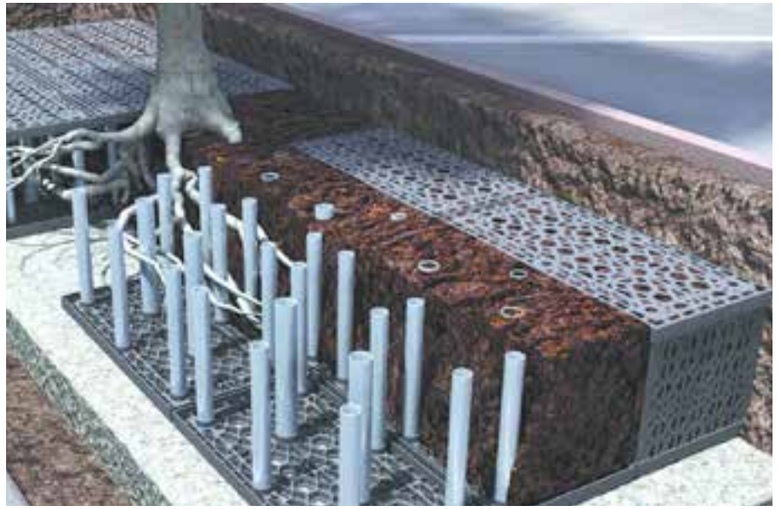
GREEN INFRASTRUCTURE TOOLKIT: STREET TREES

- REDUCE RUNOFF THROUGH EVAPOTRANSPIRATION & ABSORB CO^2
- TRANSFORM POLLUTANTS INTO LESS HARMFUL SUBSTANCES
- 9-12% INCREASE IN CONSUMER SPENDING (WOLF, K.L. 2005)



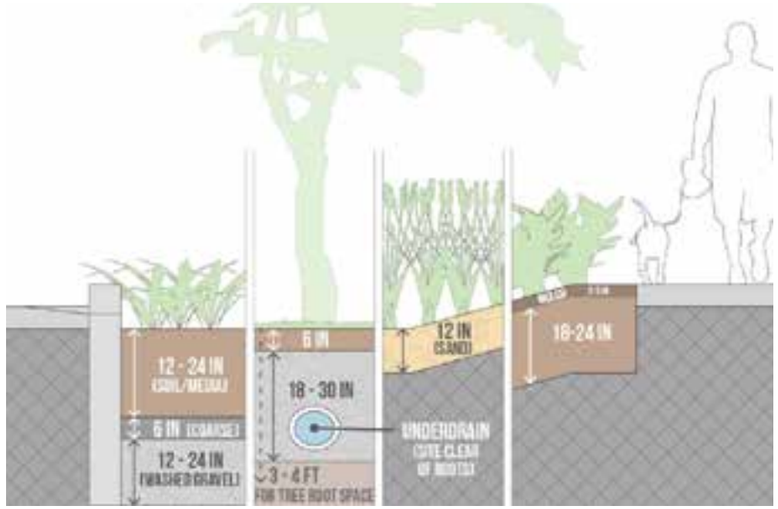
GREEN INFRASTRUCTURE TOOLKIT: SILVA CELLS / TREE BOXES

- PROVIDE UNCOMPACTED SOIL VOLUME FOR TREES
- PROVIDE UNDERGROUND STORMWATER MANAGEMENT
- IMPROVE WATER QUALITY (97.6% MOTOR OIL REMOVAL)
- REDUCE PEAK STORMWATER OVERFLOW

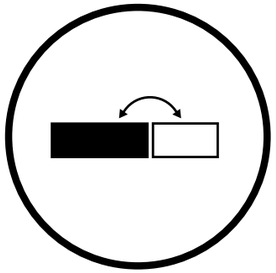


GREEN INFRASTRUCTURE TOOLKIT: BIORETENTION PLANTINGS

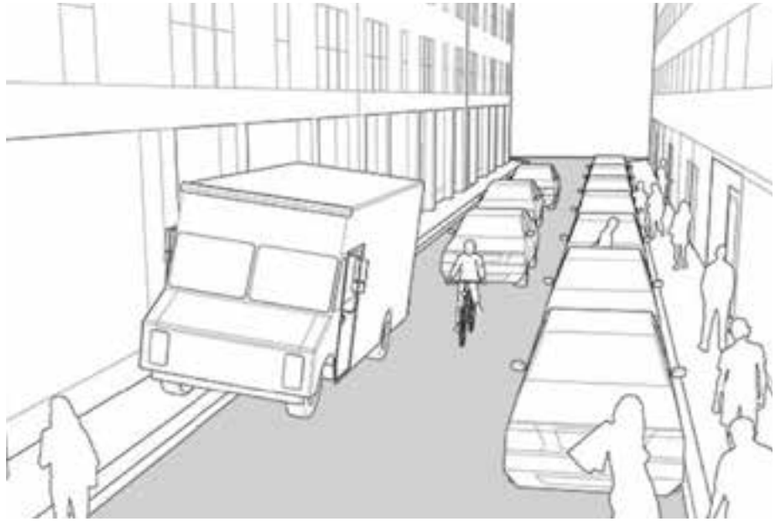
- REDUCE TEMPERATURES IN URBAN ENVIRONMENT
- REDUCE NUTRIENT POLLUTION
- INCREASE HABITAT FOR URBAN WILDLIFE AND INSECTS
- AESTHETICALLY PLEASING & CAN INCREASE PROPERTY VALUES



GREEN INFRASTRUCTURE TOOLKIT: FLUSH CURBS

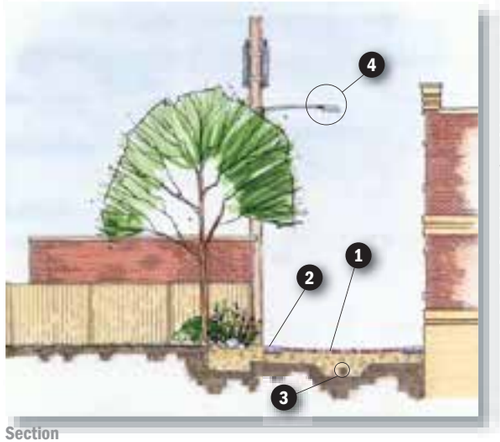


- ALSO CALLED A “WOONERF.” PROVIDE FLEXIBLE SPACE THAT ACCOMMODATES CARS, PARKING, & PEOPLE
- PEDESTRIANS HAVE PRIORITY OVER CARS
- GIVE EXTRA 6” OF STORAGE SPACE FOR STORMWATER
- PROVIDE MORE SPACE FOR STREET TREES



GREEN INFRASTRUCTURE TOOLKIT: GREEN ALLEYS

- COMBINATION OF OTHER TOOLKIT ITEMS
- CAN UTILIZE RECYCLED MATERIALS IN BASE LAYERS
- HIGH ALBEDO MATERIALS CAN REDUCE HEAT ISLAND EFFECT
- CAPTURE STORMWATER BEFORE IT ENTERS ADJACENT STREETS



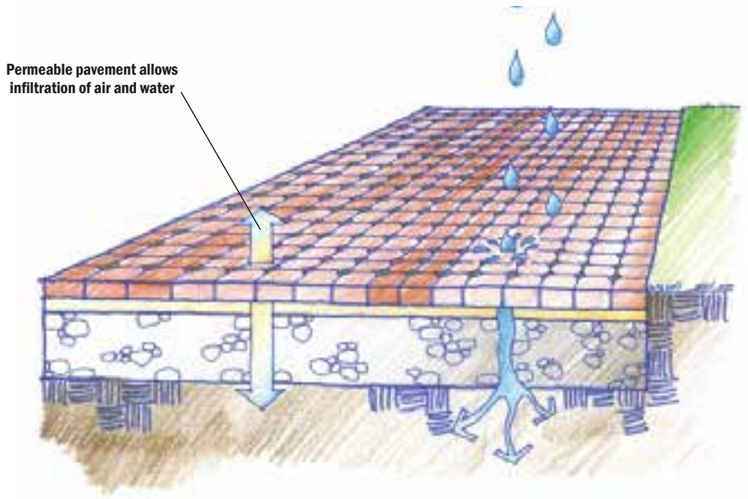
Section

1 Permeable pavement material (permeable asphalt, permeable concrete, or permeable pavers)

2 High albedo concrete paving with recycled aggregate and slag

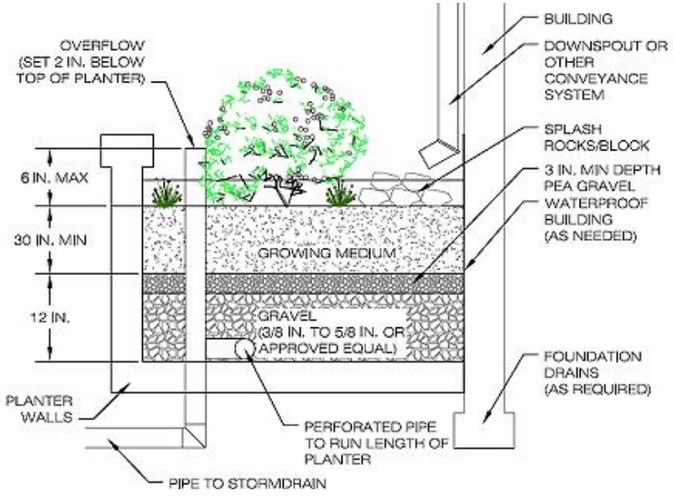
3 Optional pipe under drain

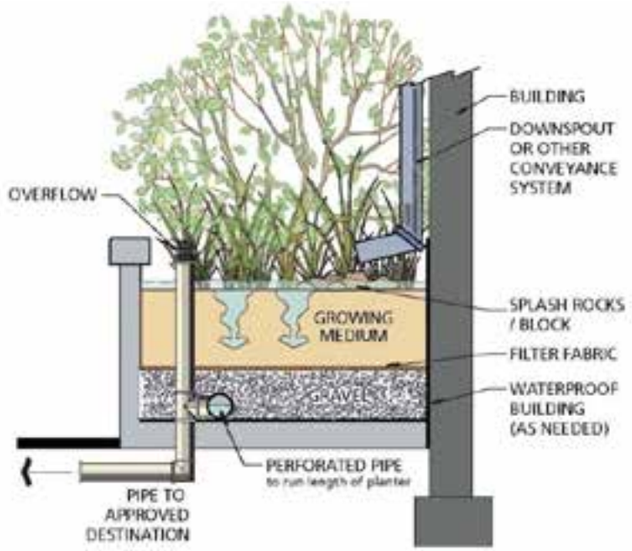
4 Energy efficient dark sky compliant light fixture



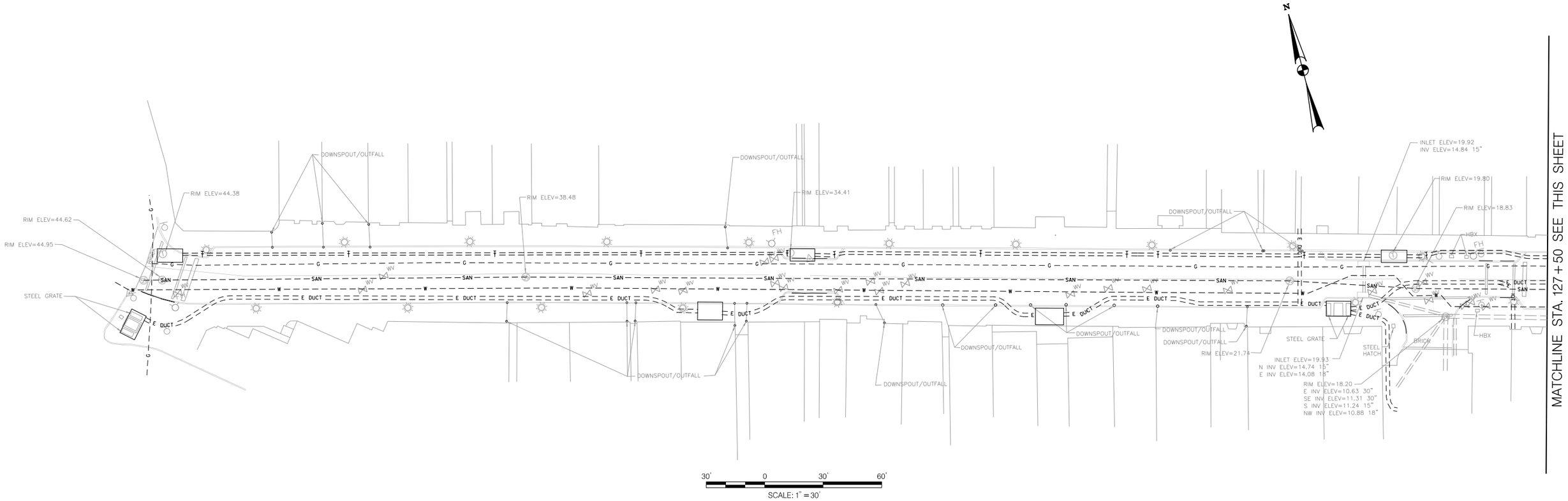
GREEN INFRASTRUCTURE TOOLKIT: RAISED STORMWATER PLANTERS

- SMALL, CONTAINED VEGETATED AREA THAT TREATS STORMWATER
- REDUCE RUNOFF VOLUME, FLOW RATE, & TEMPERATURE
- INCREASE GROUNDWATER INFILTRATION & RECHARGE
- FLEXIBLE / REQUIRE LIMITED SPACE

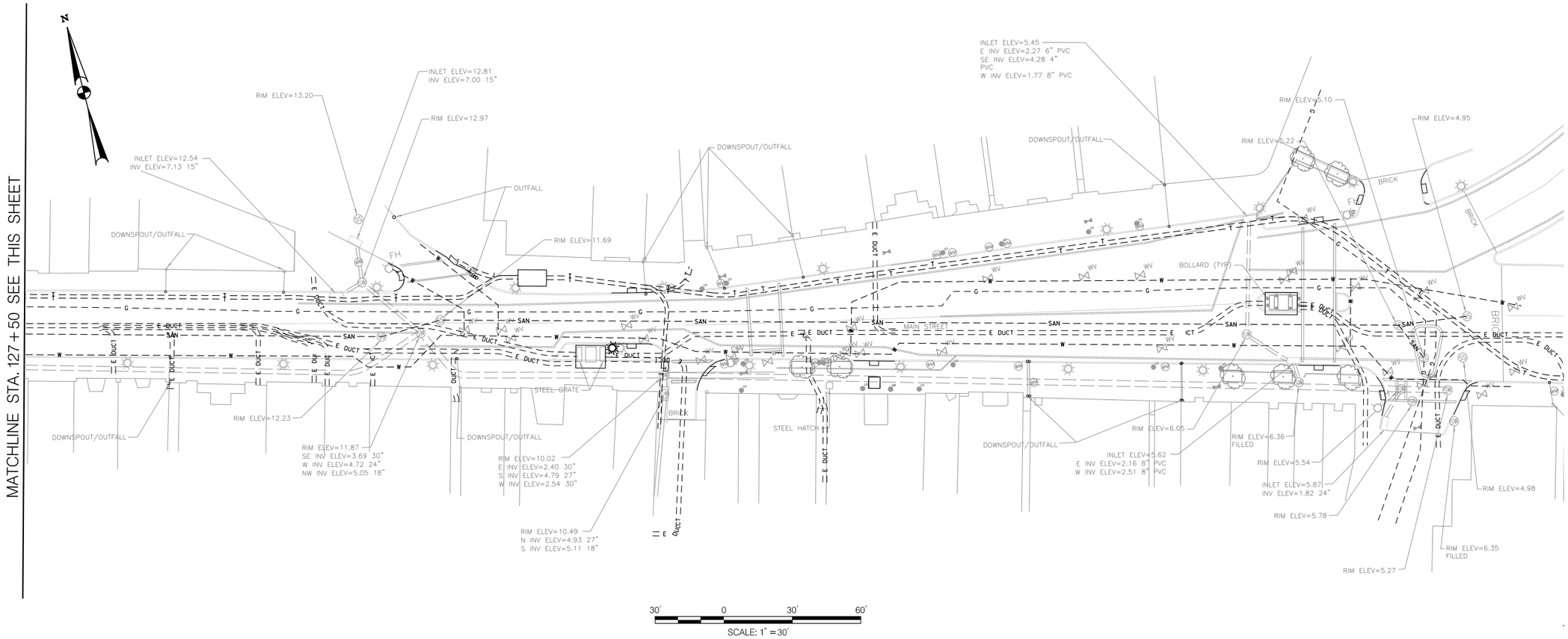




EXISTING UNDERGROUND INFRASTRUCTURE (UPPER)

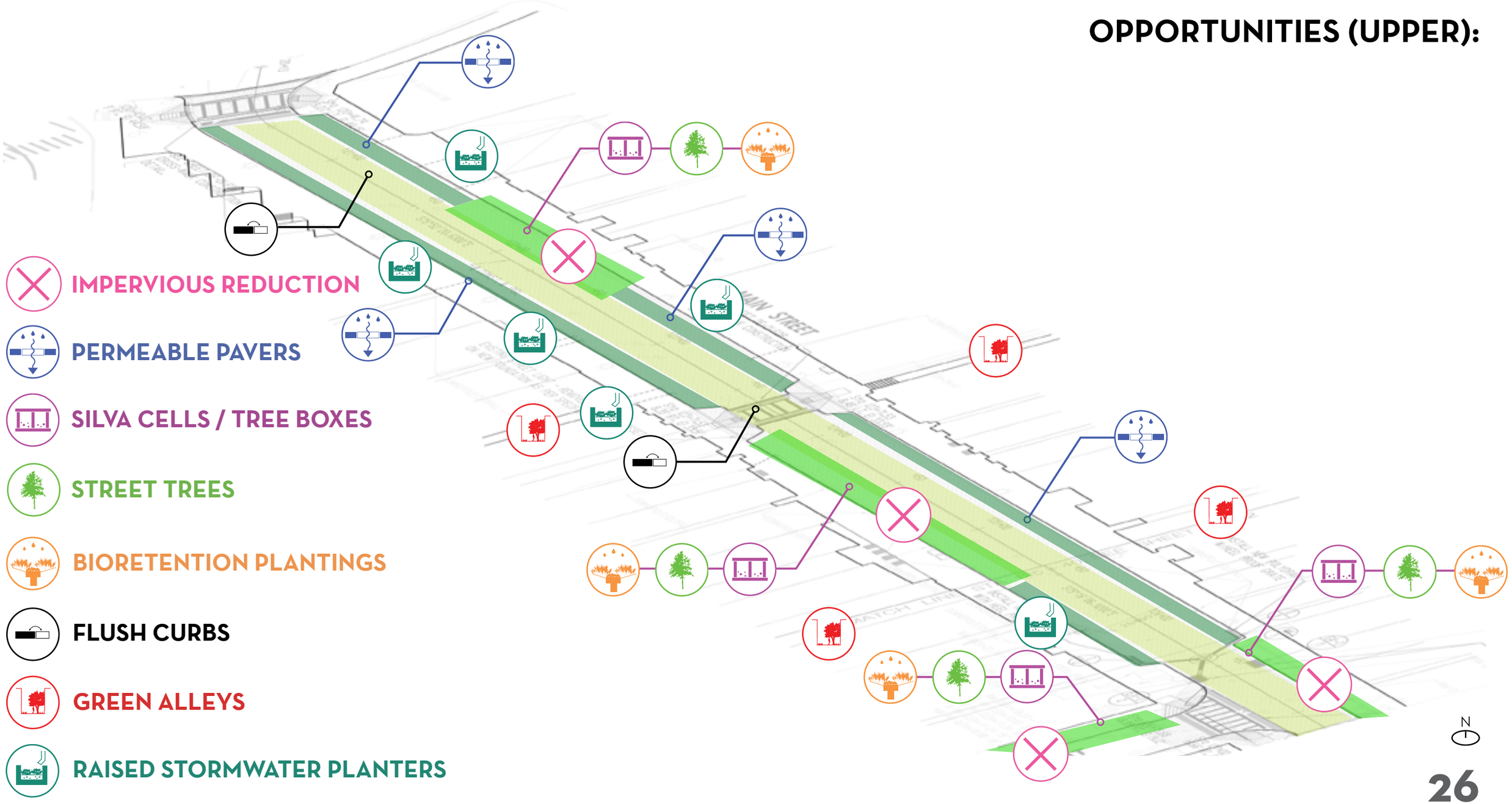


EXISTING UNDERGROUND INFRASTRUCTURE (LOWER)

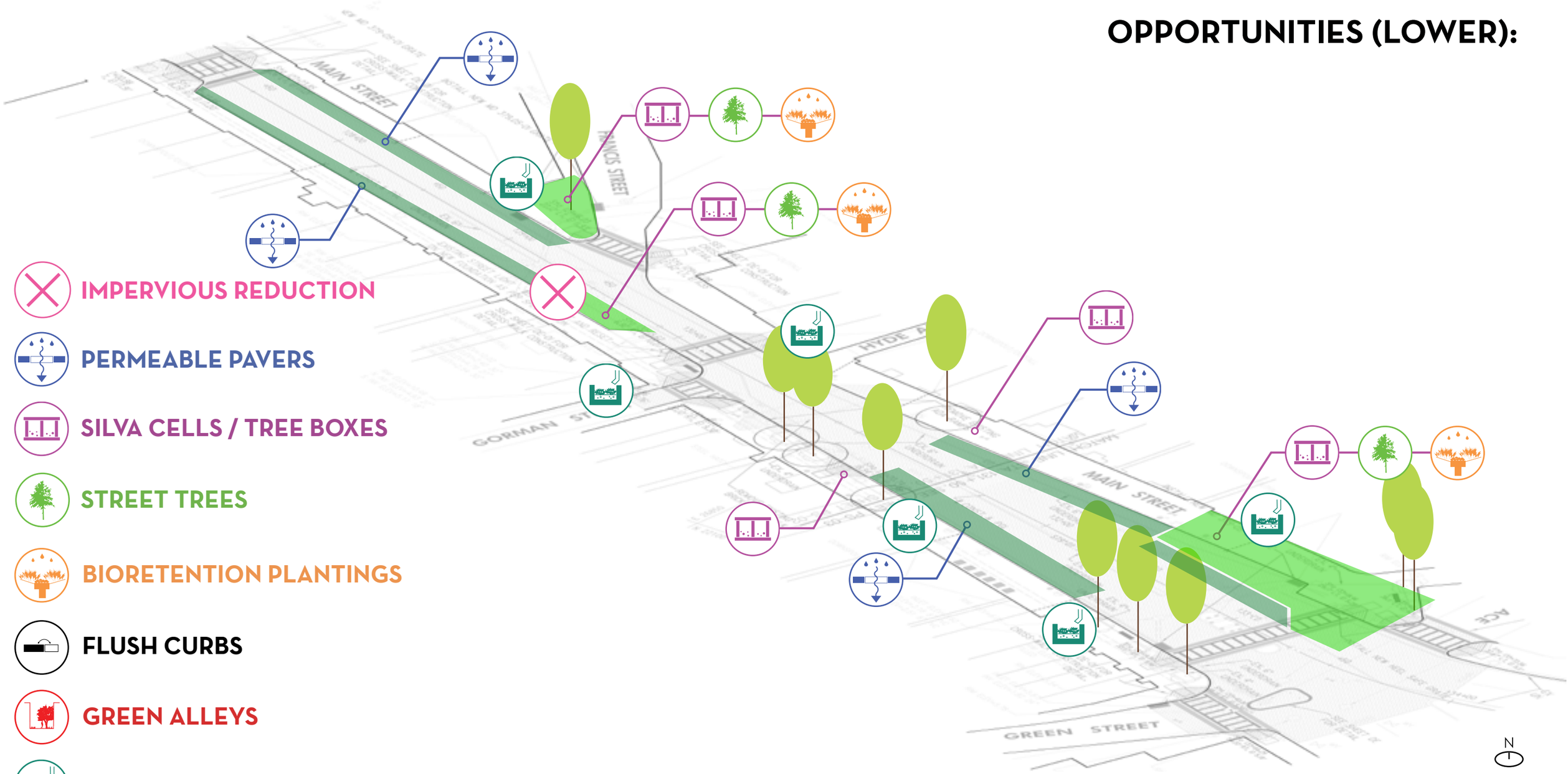


OPPORTUNITIES FOR MAIN STREET, ANNAPOLIS

OPPORTUNITIES (UPPER):



OPPORTUNITIES (LOWER):



- IMPERVIOUS REDUCTION
- PERMEABLE PAVERS
- SILVA CELLS / TREE BOXES
- STREET TREES
- BIORETENTION PLANTINGS
- FLUSH CURBS
- GREEN ALLEYS
- RAISED STORMWATER PLANTERS

MEETING 3

FEBRUARY 27, 2019

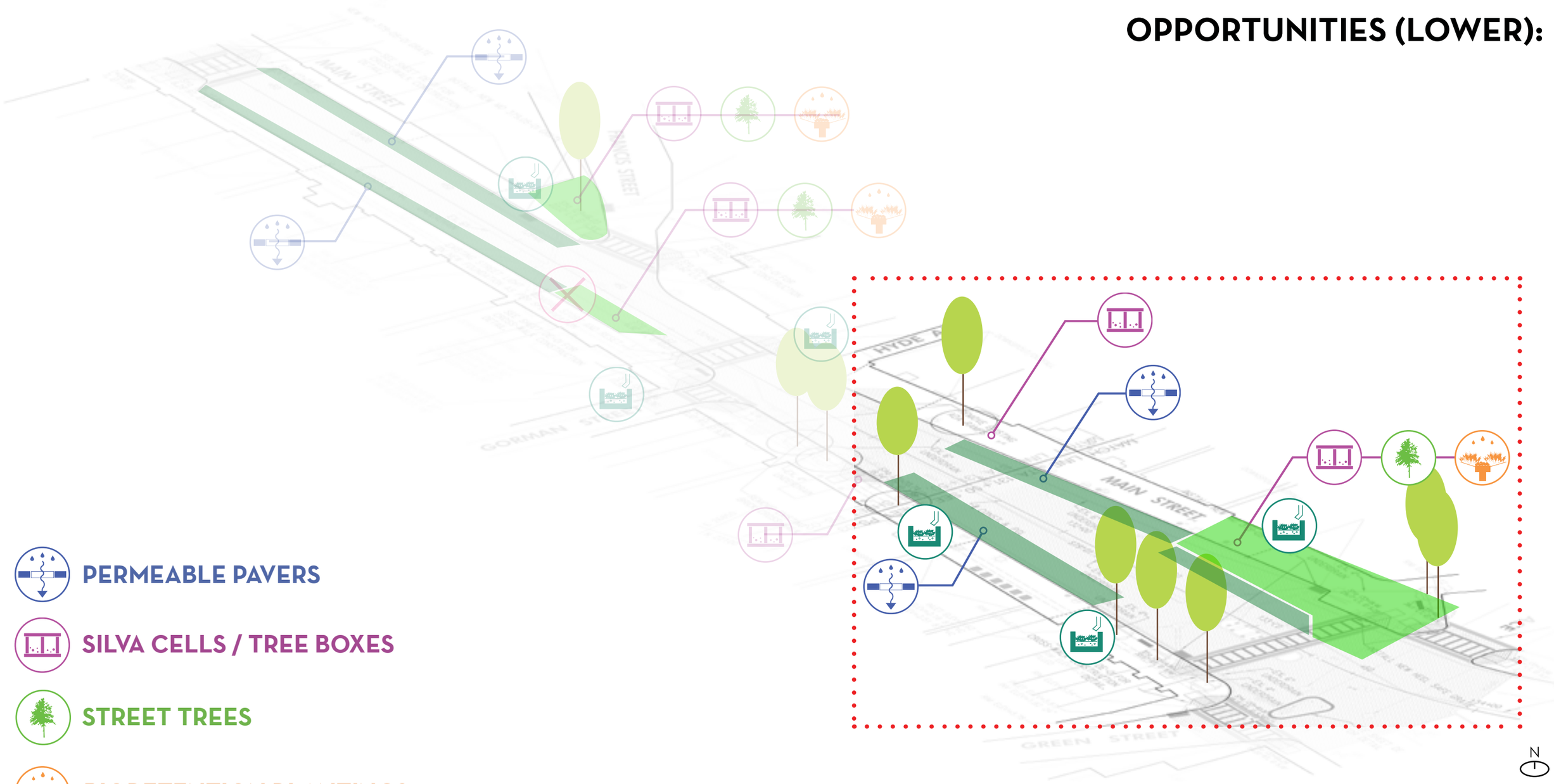
AGENDA:

- SUMMARIZE MEETING #2
- WHAT ARE THE OPPORTUNITIES FOR MAIN ST.?
- REVIEW (3) FOCUS AREAS WHERE THE TOOLKIT IS APPLIED
- PRESENT CONCEPTUAL BEFORE/AFTER RENDERINGS AT (3) LOCATIONS ON MAIN STREET
- REVIEW GREEN INFRASTRUCTURE CONCEPTUAL MASTERPLAN
- Q&A FROM ATTENDEES

- GOALS FOR MEETING 3:

1. REVIEW MEETING #2 FEEDBACK
2. SEE HOW GREEN INFRASTRUCTURE COULD BE APPLIED ON MAIN STREET
3. REVIEW THE PROS AND CONS OF THE CONCEPTUAL MASTERPLAN INTERVENTIONS
4. LISTEN TO FEEDBACK AND CONCERNS

OPPORTUNITIES (LOWER):

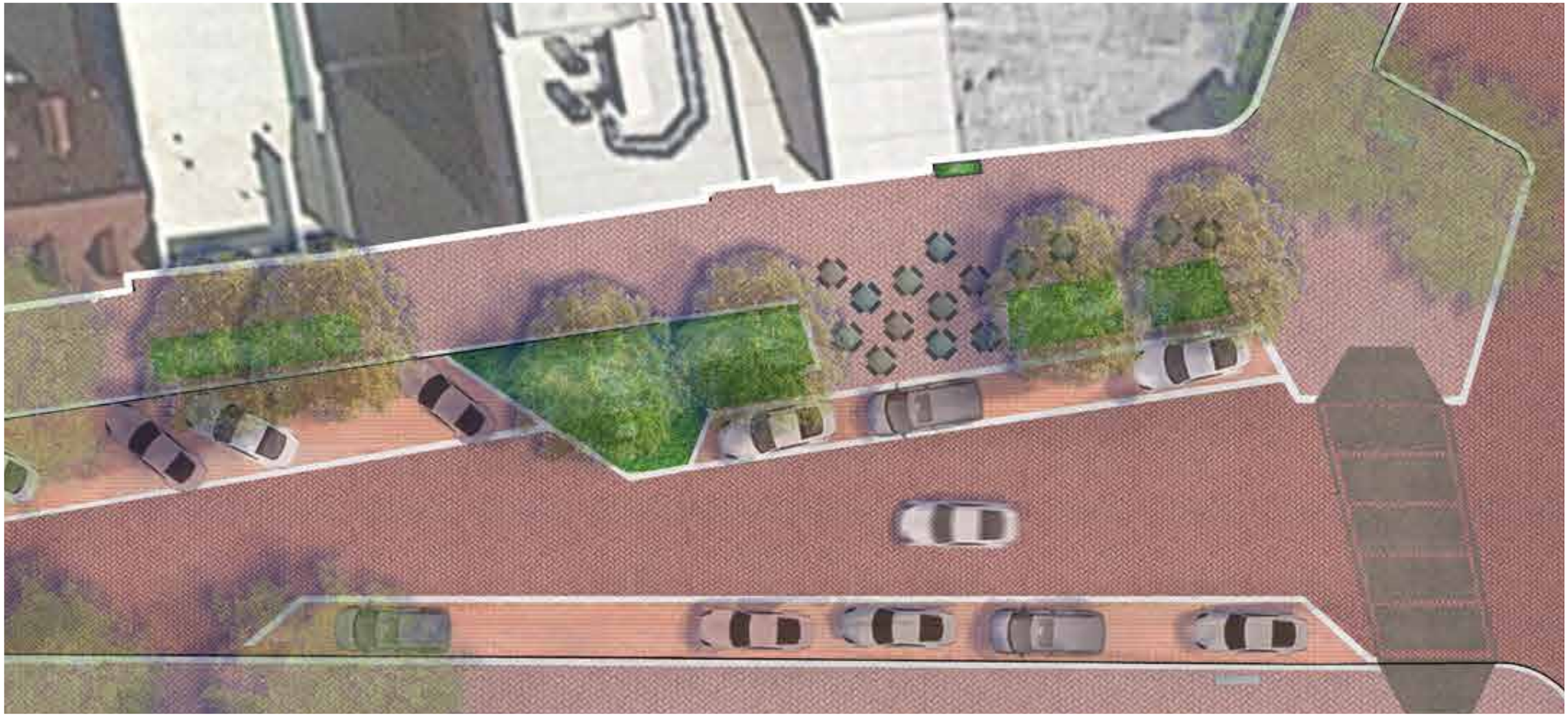


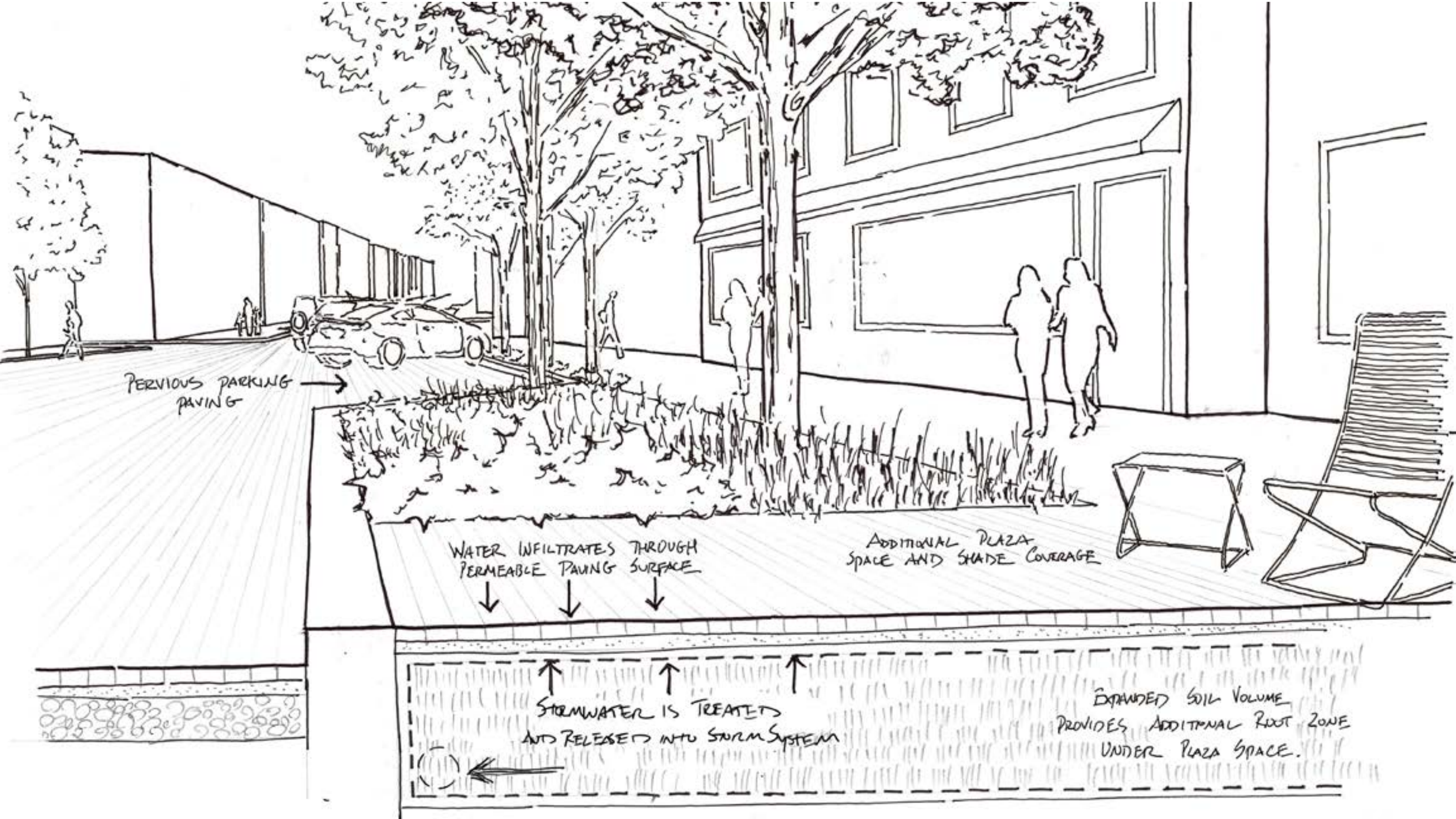
PERMEABLE PAVERS

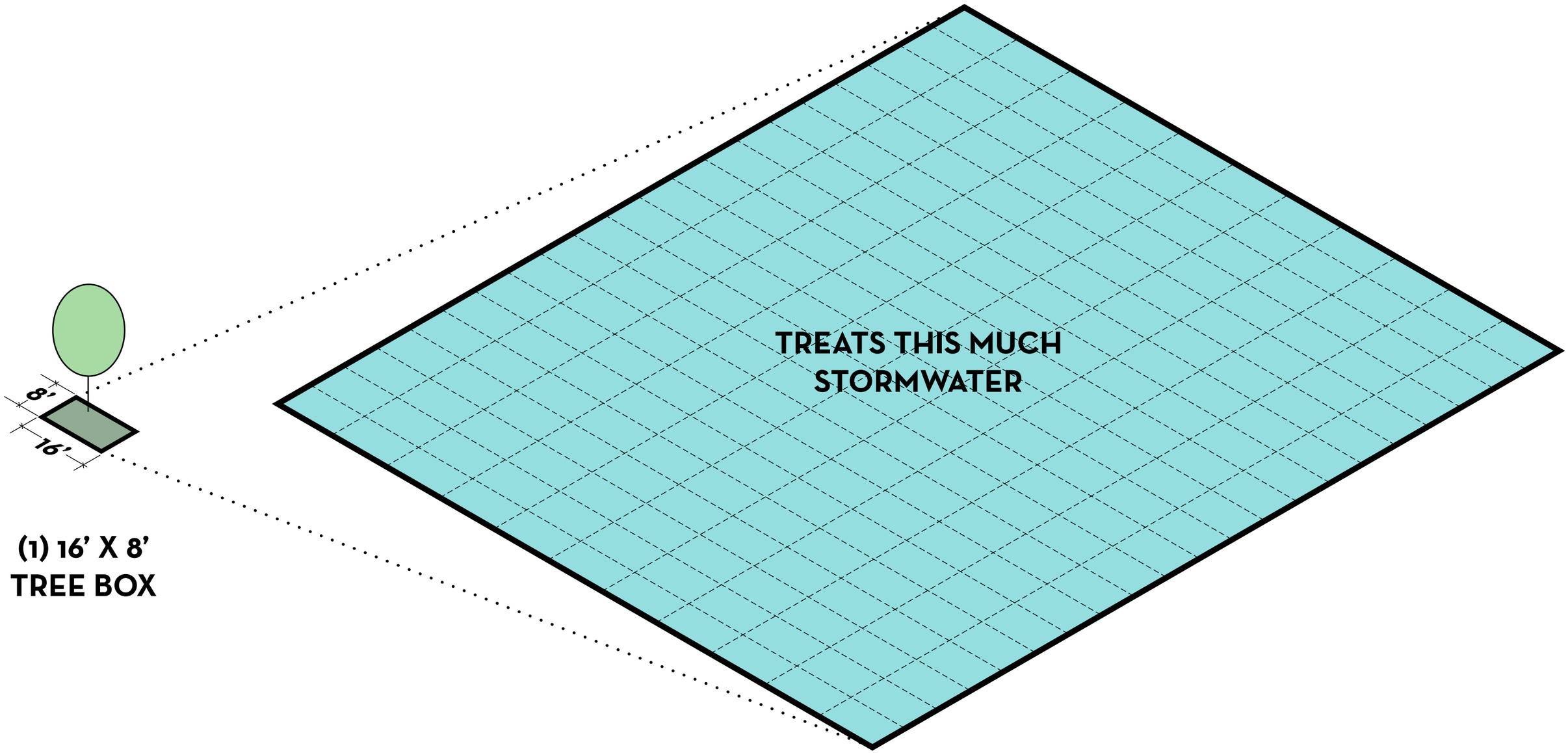
SILVA CELLS / TREE BOXES

STREET TREES

BIORETENTION PLANTINGS




PERVIOUS PARKING PAVING
WATER INFILTRATES THROUGH PERMEABLE PAVING SURFACE
ADDITIONAL PLAZA SPACE AND SHADE COVERAGE
STORMWATER IS TREATED AND RELEASED INTO STORM SYSTEM
EXPANDED SOIL VOLUME PROVIDES ADDITIONAL ROOT ZONE UNDER PLAZA SPACE.



(1) 16' X 8'
TREE BOX

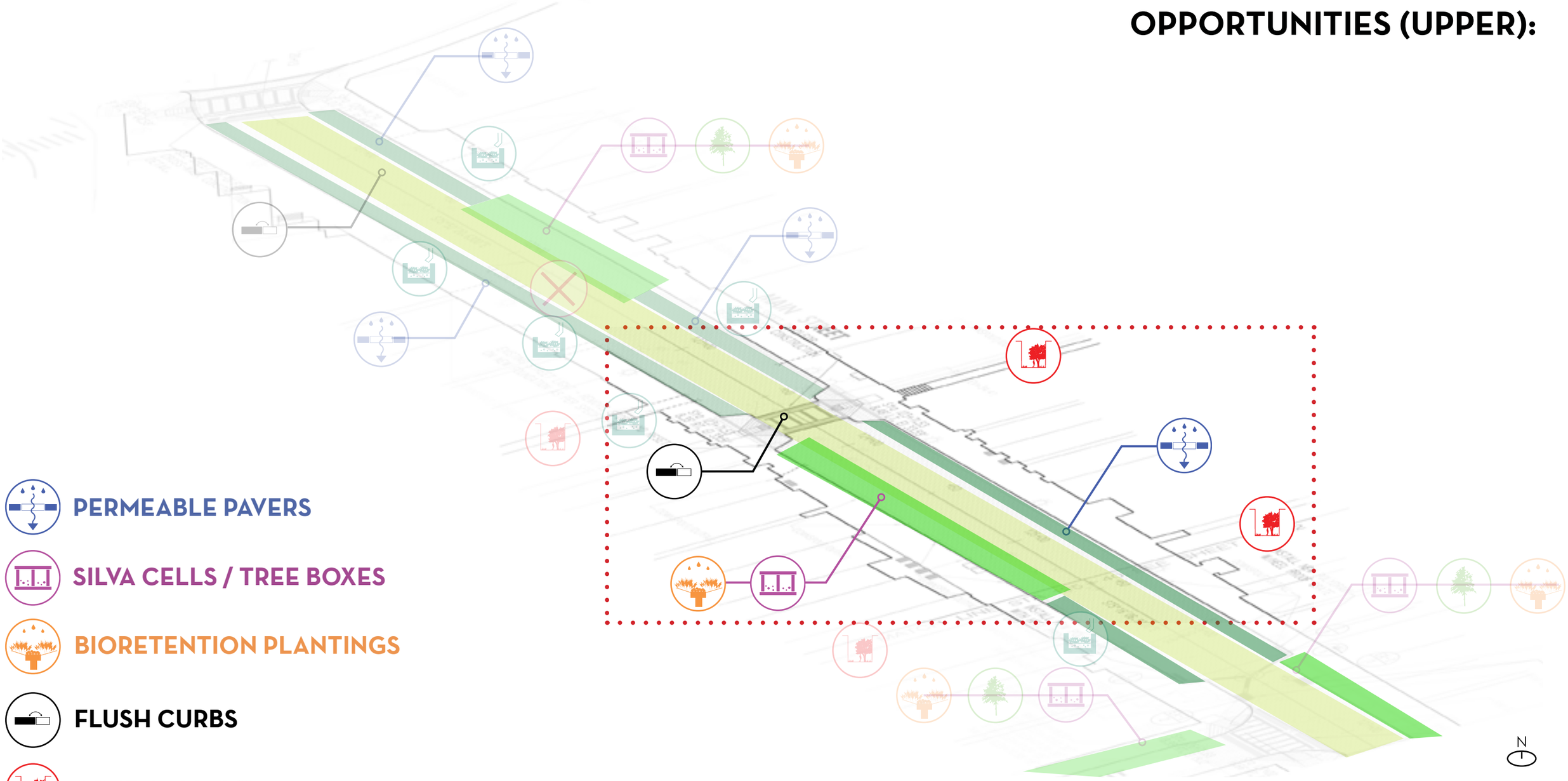
AARON LEE GOODMAN
ZACHARY'S JEWELERS
Dining Upstairs
Main St & Pier Views

BUILDING
Dining Upstairs

+ 6 STREET TREES
+ SHADE COVERAGE ALONG SOUTH SIDE
+ 8,000 FT³ SOIL VOLUME
+ 3,200 FT² PERVIOUS PARKING PAVING
+ 750 FT² BIORETENTION PLANTING
+ 1,200 FT² PLAZA PAVING
+ 18 BISTRO TABLES
- 1 PARKING SPACE

AREA OF WATER TREATED (FOR QUALITY) - 150,000 FT²

OPPORTUNITIES (UPPER):



PERMEABLE PAVERS

SILVA CELLS / TREE BOXES

BIORETENTION PLANTINGS

FLUSH CURBS

GREEN ALLEYS

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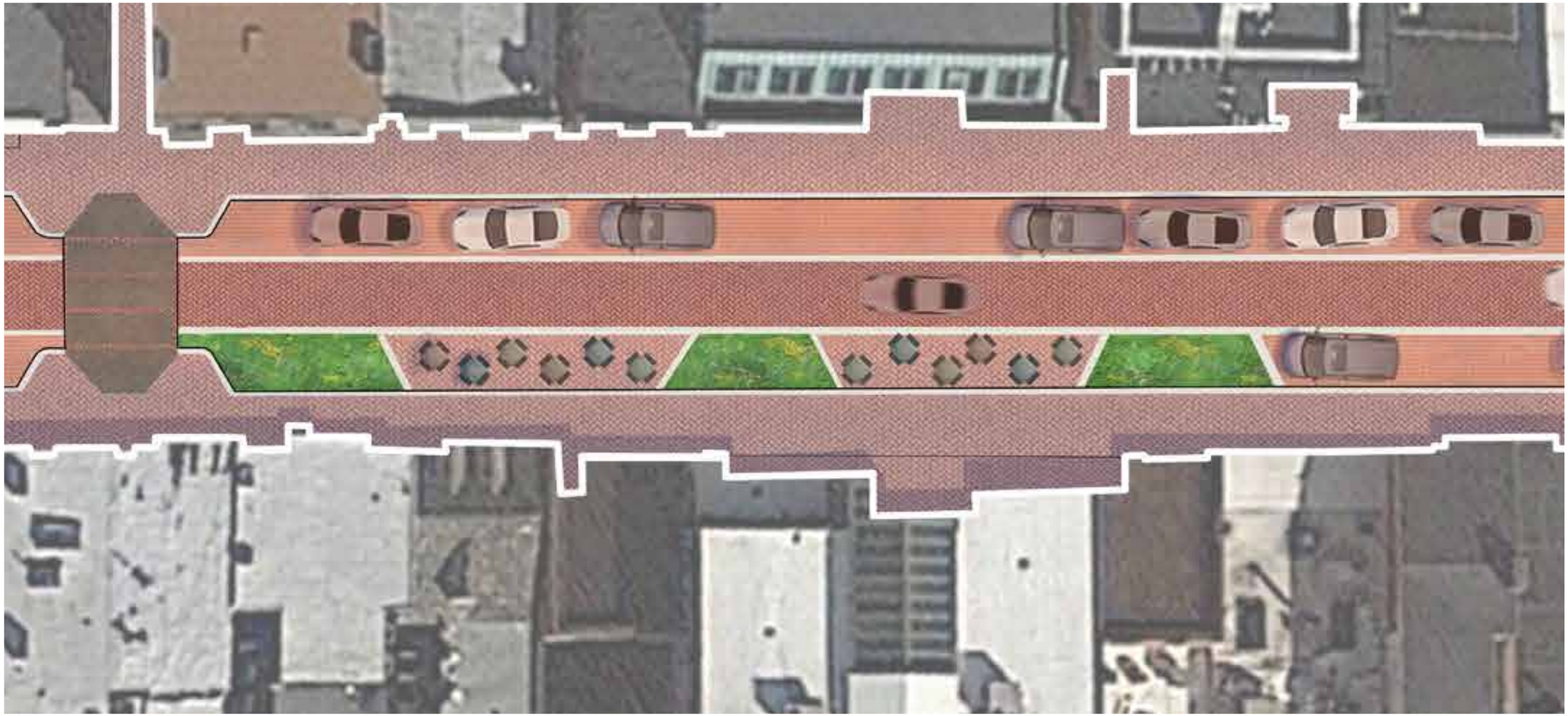
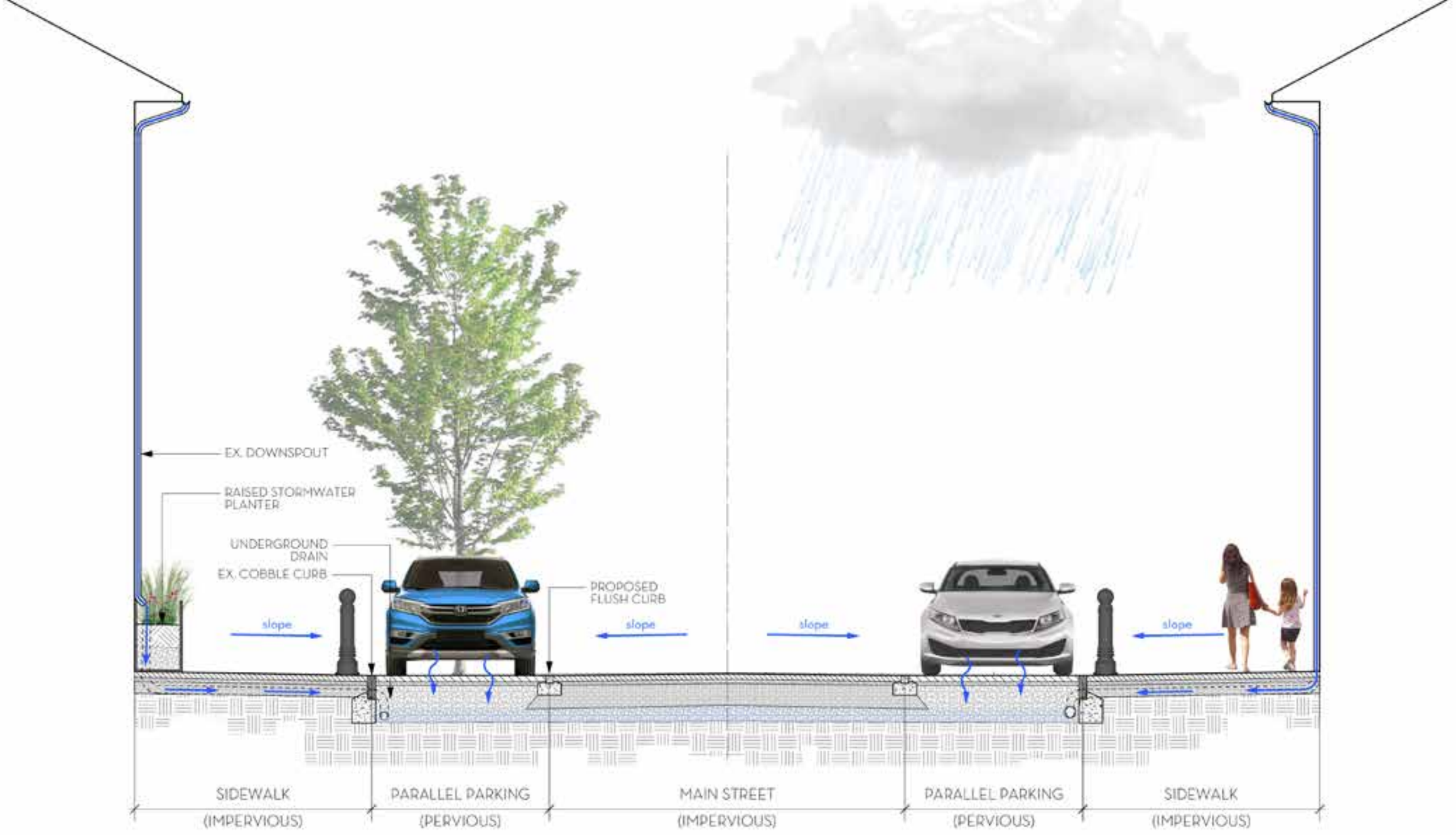


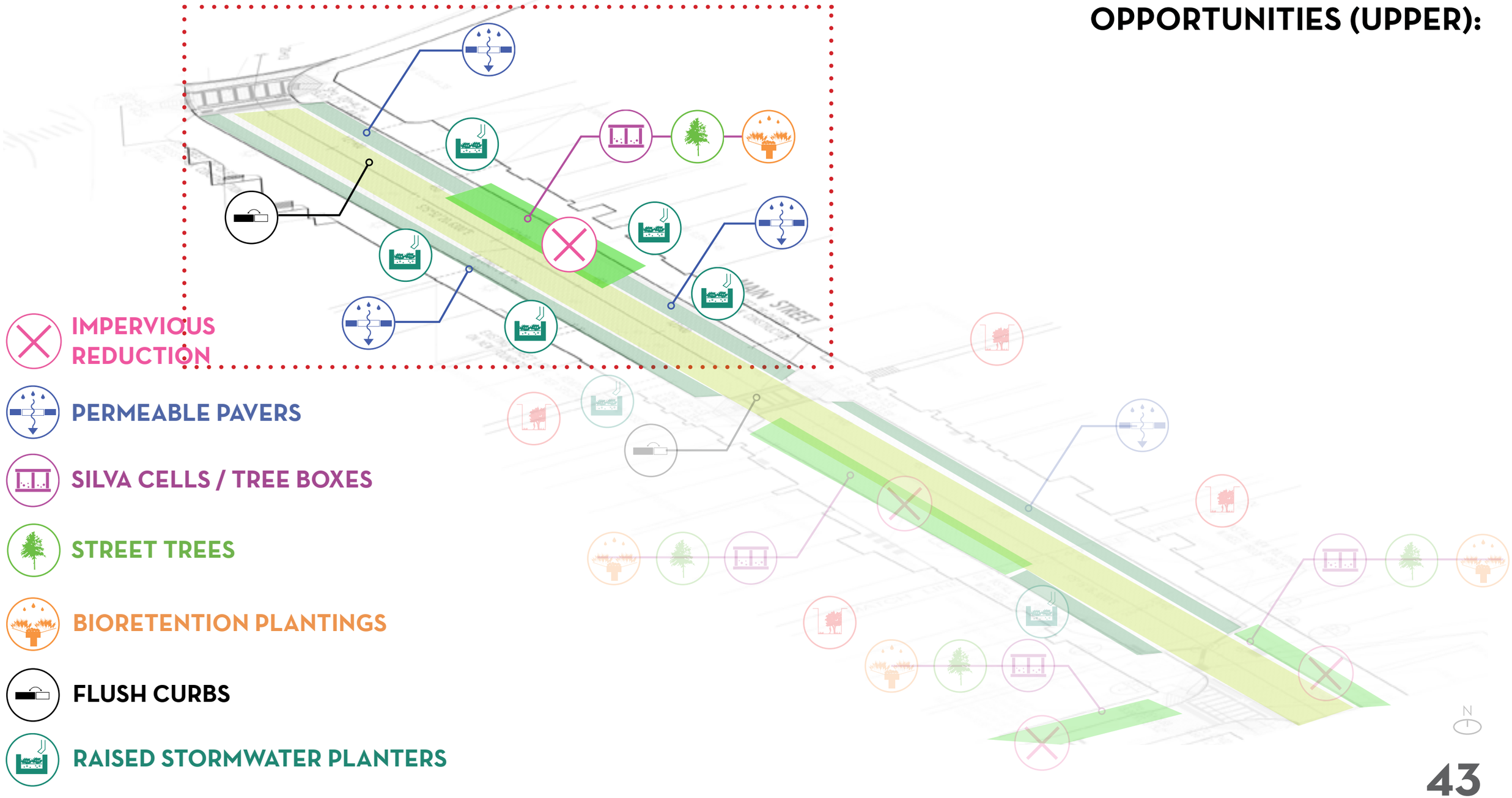

EX. DOWNSPOUT
RAISED STORMWATER PLANTER
UNDERGROUND DRAIN
EX. COBBLE CURB
PROPOSED FLUSH CURB
slope
slope
slope
slope
SIDEWALK
(IMPERVIOUS)
PARALLEL PARKING
(PERVIOUS)
MAIN STREET
(IMPERVIOUS)
PARALLEL PARKING
(PERVIOUS)
SIDEWALK
(IMPERVIOUS)

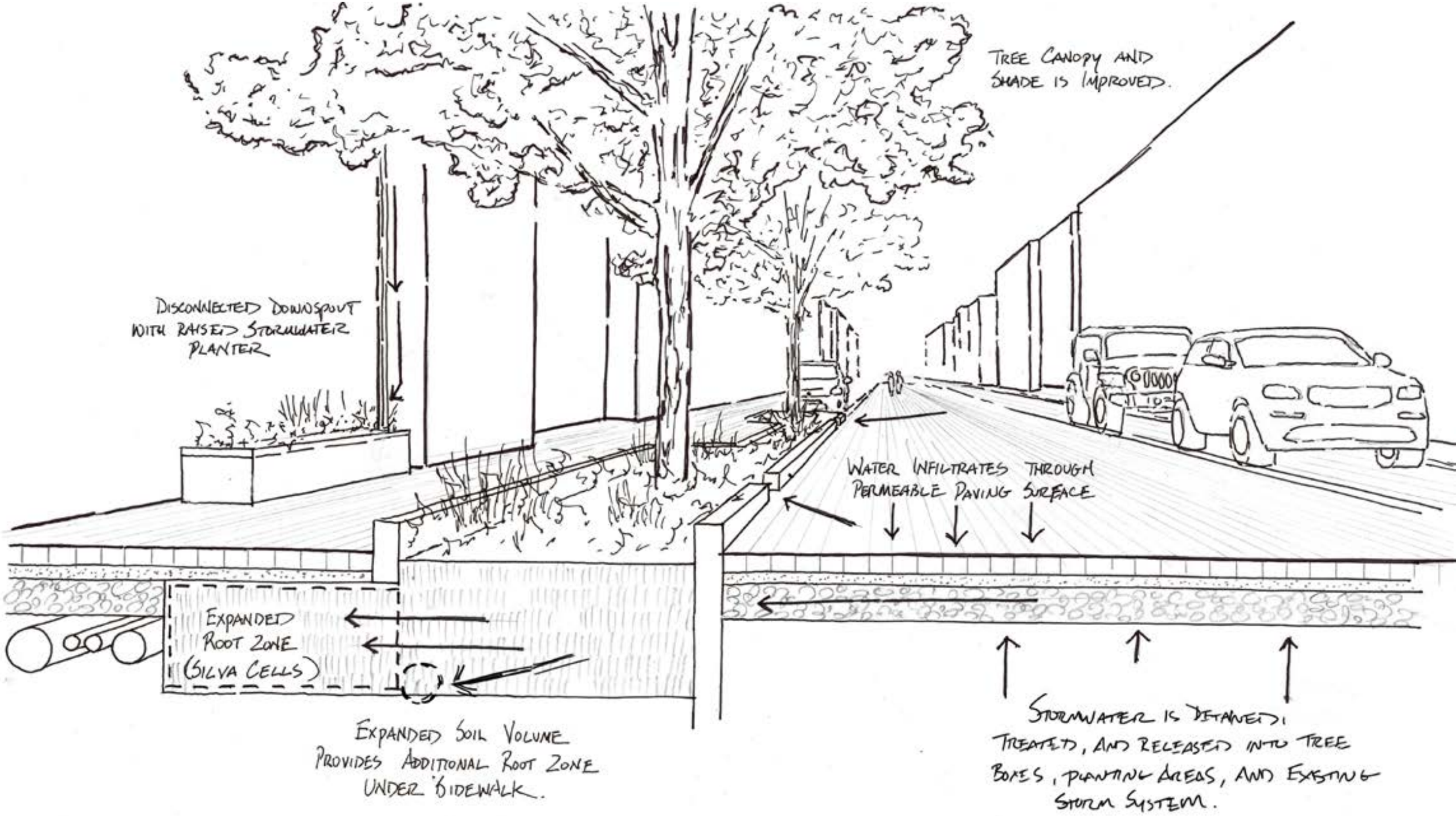
SUSHI
JOSS CAFE

SUSHI

+ 800 PERENNIALS/GRASSES/GROUNDCOVERS
+ 2,400 FT^3 SOIL VOLUME
+ 400 FT^2 BIORETENTION PLANTING
+ 1,200 FT^2 PLAZA PAVING
+ 12 BISTRO TABLES
- 8 PARKING SPACES

OPPORTUNITIES (UPPER):




TREE CANOPY AND SHADE IS IMPROVED.
DISCONNECTED DOWNSPOUT WITH RAISED STORMWATER PLANTER
WATER INFILTRATES THROUGH PERMEABLE PAVING SURFACE
EXPANDED ROOT ZONE (SILVA CELLS)
EXPANDED SOIL VOLUME PROVIDES ADDITIONAL ROOT ZONE UNDER SIDEWALK.
STORMWATER IS DETAINED, TREATED, AND RELEASED INTO TREE BOXES, PLANTING AREAS, AND EXISTING STORM SYSTEM.

THE
MARYLAND
INN

THE
MARYLAND
INN

+ 3 STREET TREES
+ SHADE COVERAGE ALONG SOUTH SIDE
+ 3000 FT³ SOIL VOLUME
+ 750 FT² BIORETENTION PLANTING
+ 125 FT² PLAZA PAVING
+ 4 BISTRO TABLES
- 4 PARKING SPACES
THE MARYLAND INN

STREET TREE OPTIONS

Acer rubrum 'Armstrong'
Armstrong Red Maple
Height: 50 ft.-60 ft.
Spread: 15 ft.-25 ft.
Bloom Time:
Misc.: Red fall color

Acer rubrum 'Bowhall'
Bowhall Red Maple
Height: 40 ft.-50 ft.
Spread: 15 ft.-25 ft.
Bloom Time: May.-Apr.
Misc.: Red fall color

Carpinus caroliniana
American Hornbeam
Height: 20 ft.-35 ft.
Spread: 20 ft.-35 ft.
Bloom Time: February
Misc.:

Ulmus americana
American Elm
Height: 60 ft.-80 ft.
Spread: 40 ft.-70 ft.
Bloom Time: Mar.-Apr.
Misc.: Yellow/orange fall color

CONCEPTUAL MASTERPLAN (UPPER)

CONCEPTUAL MASTERPLAN (LOWER)

CASE STUDIES

LANCASTER BREWING COMPANY | LANCASTER, PA

CHURCH STREET | BURLINGTON, VT

WHARF | WASHINGTON, DC

Q & A

mainstreet@campionhruby.com