



Waggonner & Ball Architects
with Sherwood Design Engineers
and Carbo Landscape Architects

MIRABEAU WATER GARDEN

November 30, 2016

GENTILLY RESILIENCE DISTRICT

NDRC Framework

Blue-Green Corridors

Pontilly
Neighborhood

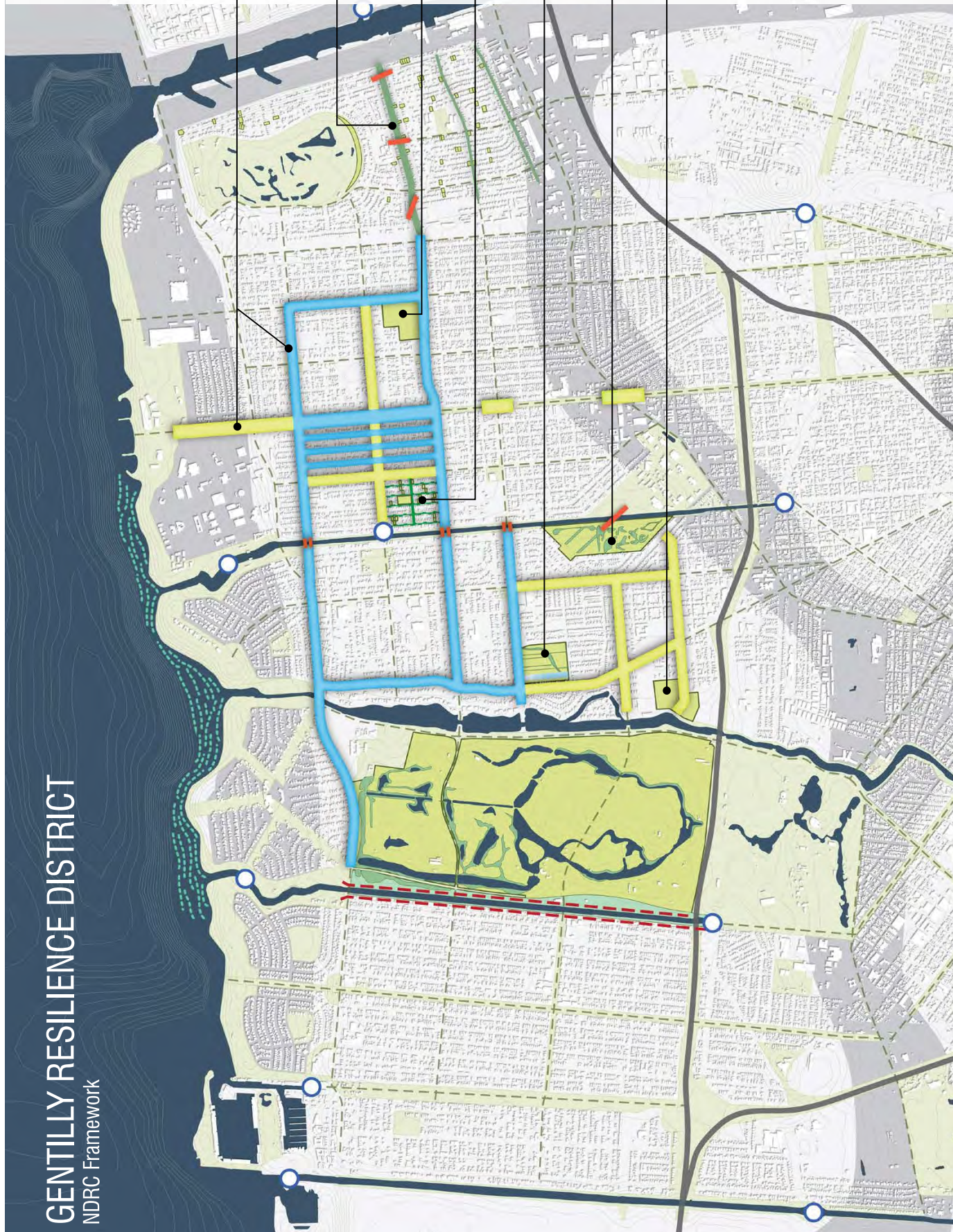
Milne Campus

St. Anthony Green
Streets

**Mirabeau
Water Garden**

Dillard Wetland

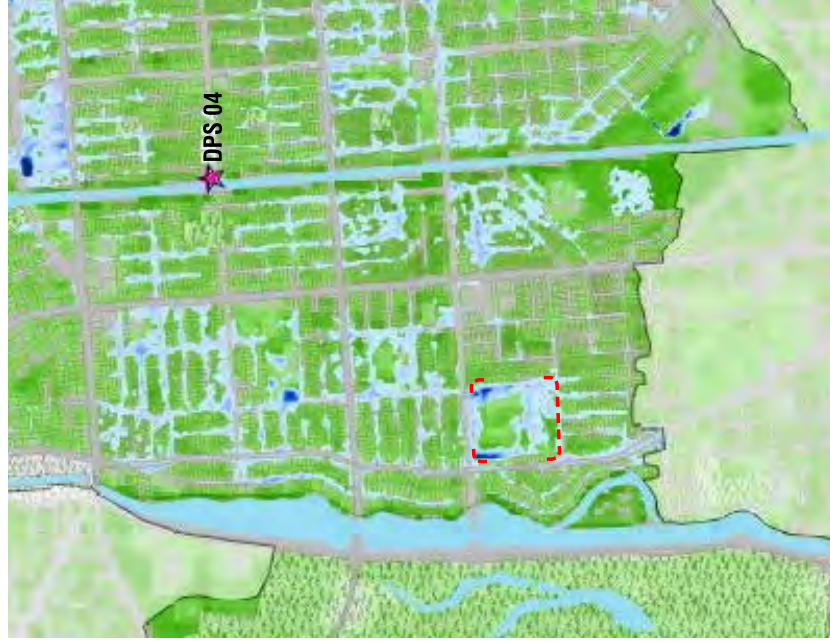
St. Bernard
Neighborhood Campus



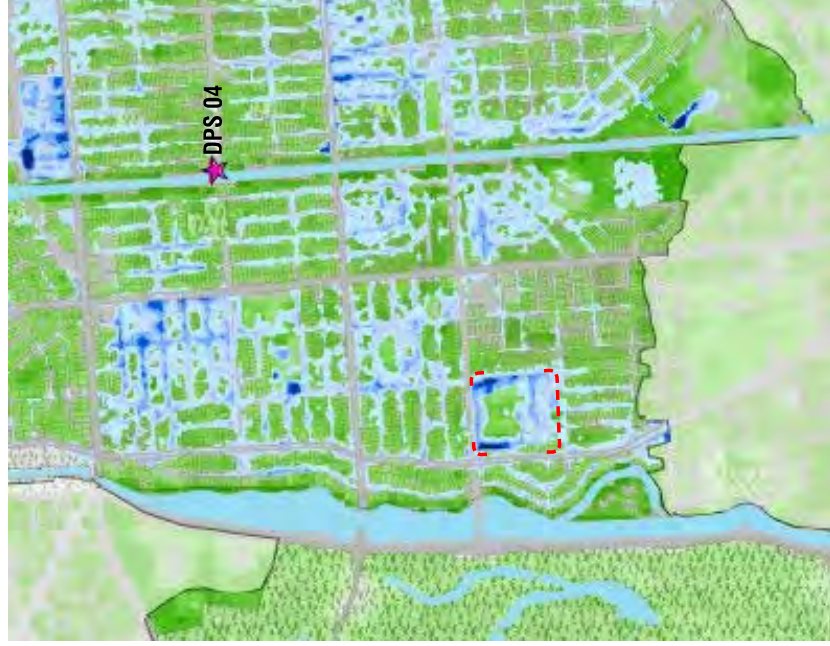
PROBLEM

Existing Flooding - DPS 04 Service Area

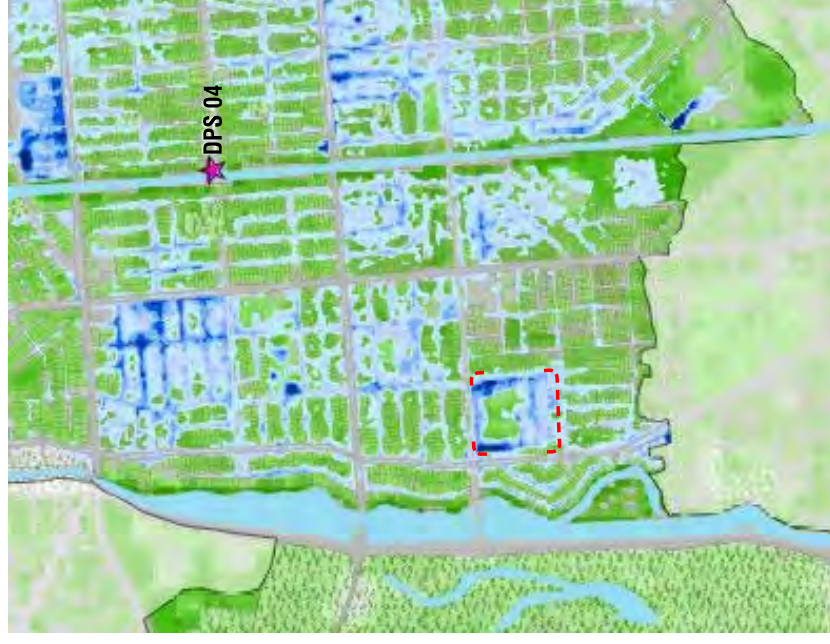
2-Year Storm



5-Year Storm



10-Year Storm



Depth (Ft)

< 0.5

0.5 - 1

1 - 1.5

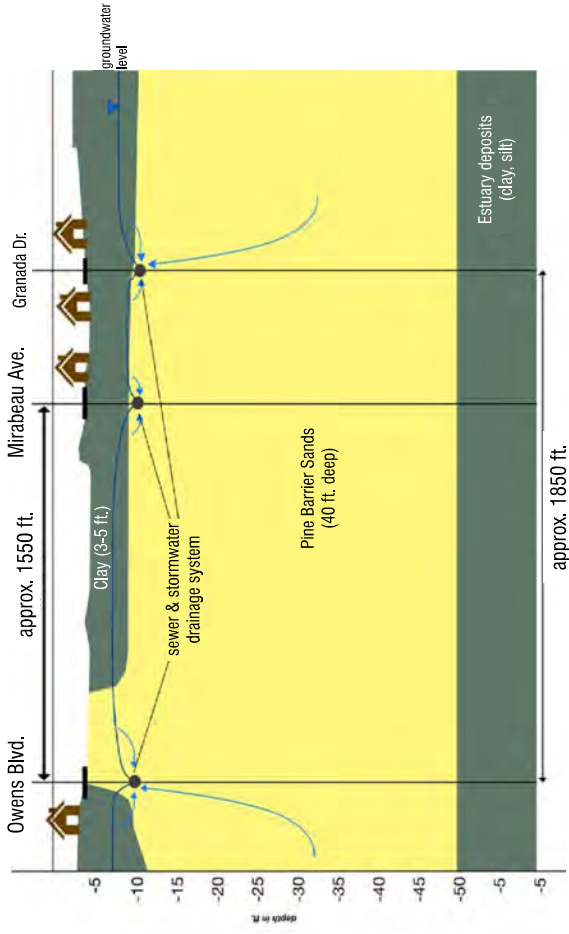
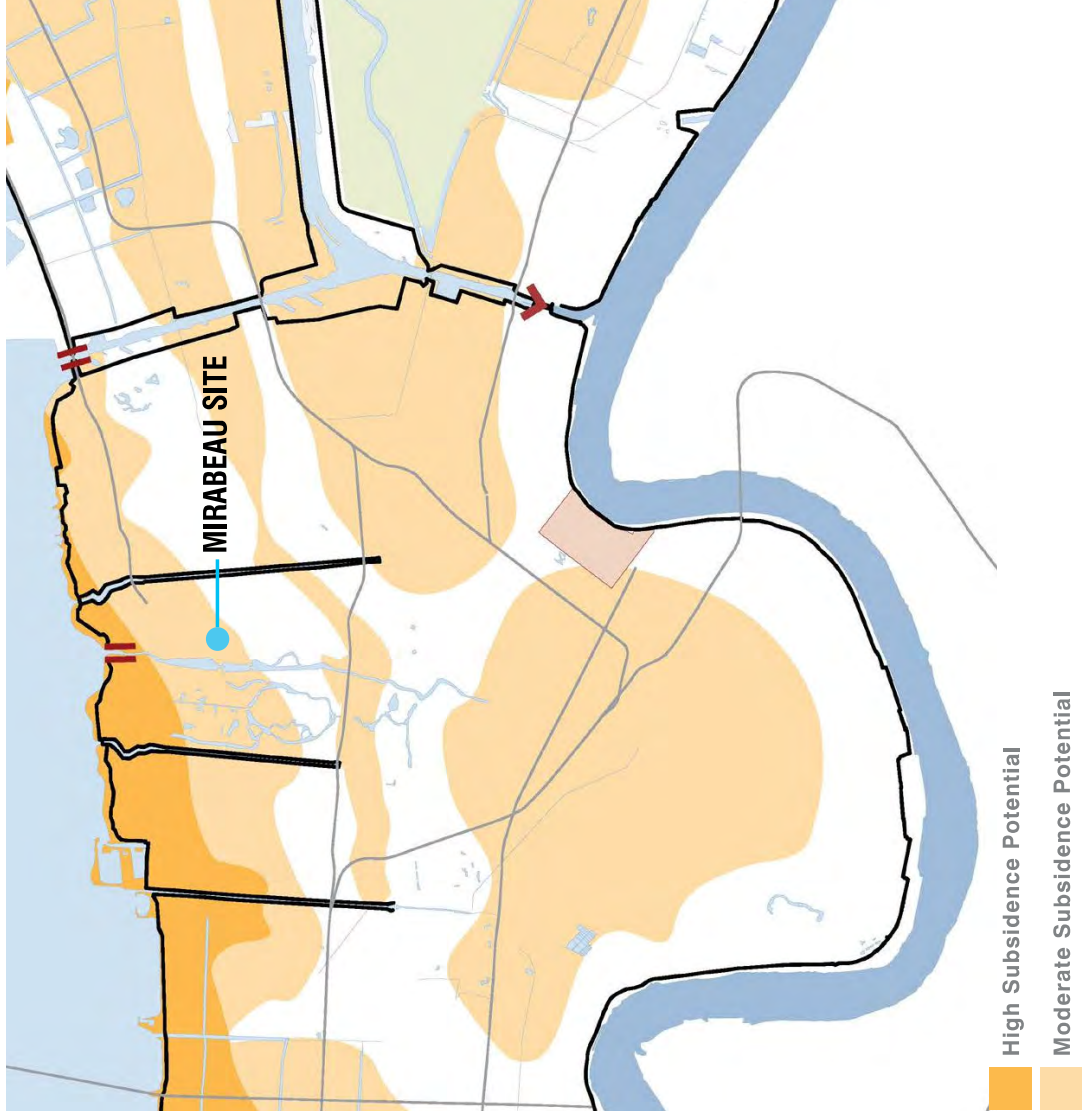
1.5 - 2

> 2

PROBLEM

District & Neighborhood Issues Identified

Subsidence



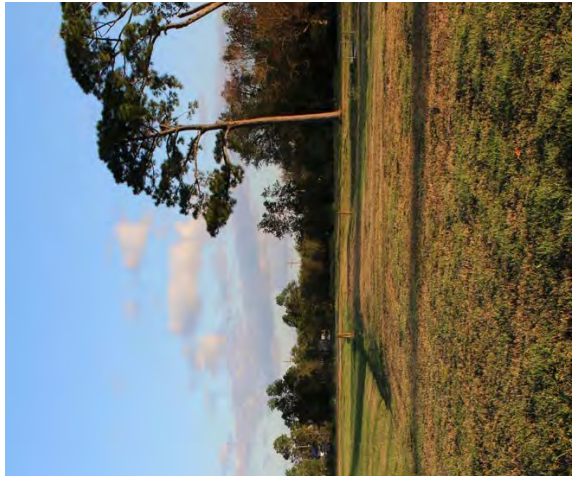
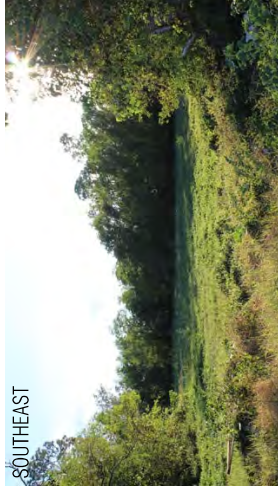
Subsidence-damaged House on Mirabeau Avenue



Subsidence-caused Street Damage on Owens Boulevard

MIRABEAU SITE

Existing Conditions

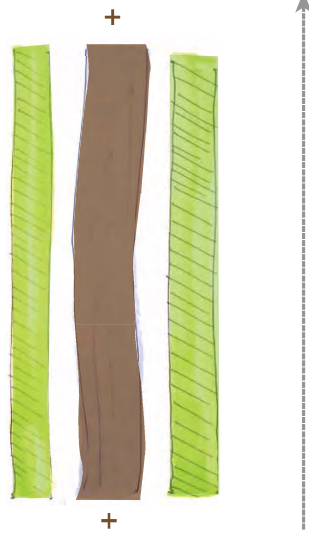


MIRABEAU OBJECTIVES

HMGP & NDR Funding

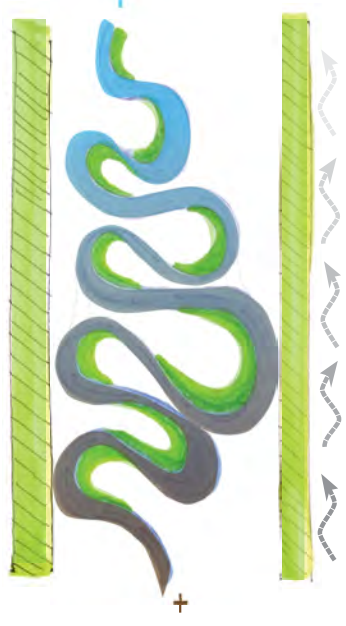
HAZARD MITIGATION GRANT PROGRAM

- Reduce localized street flooding
- Reduce flooding damages to private and public structures
- Reduce traffic delays due to roadway flooding
- Meet min. Benefit Cost Ratio of 1:1



HUD NATIONAL DISASTER RESILIENCE

- Reduce localized street flooding
- Control subsidence
- Improve water quality
- Add aesthetic value to the neighborhood
- Improve quality of life for residents
- Provide replicable model

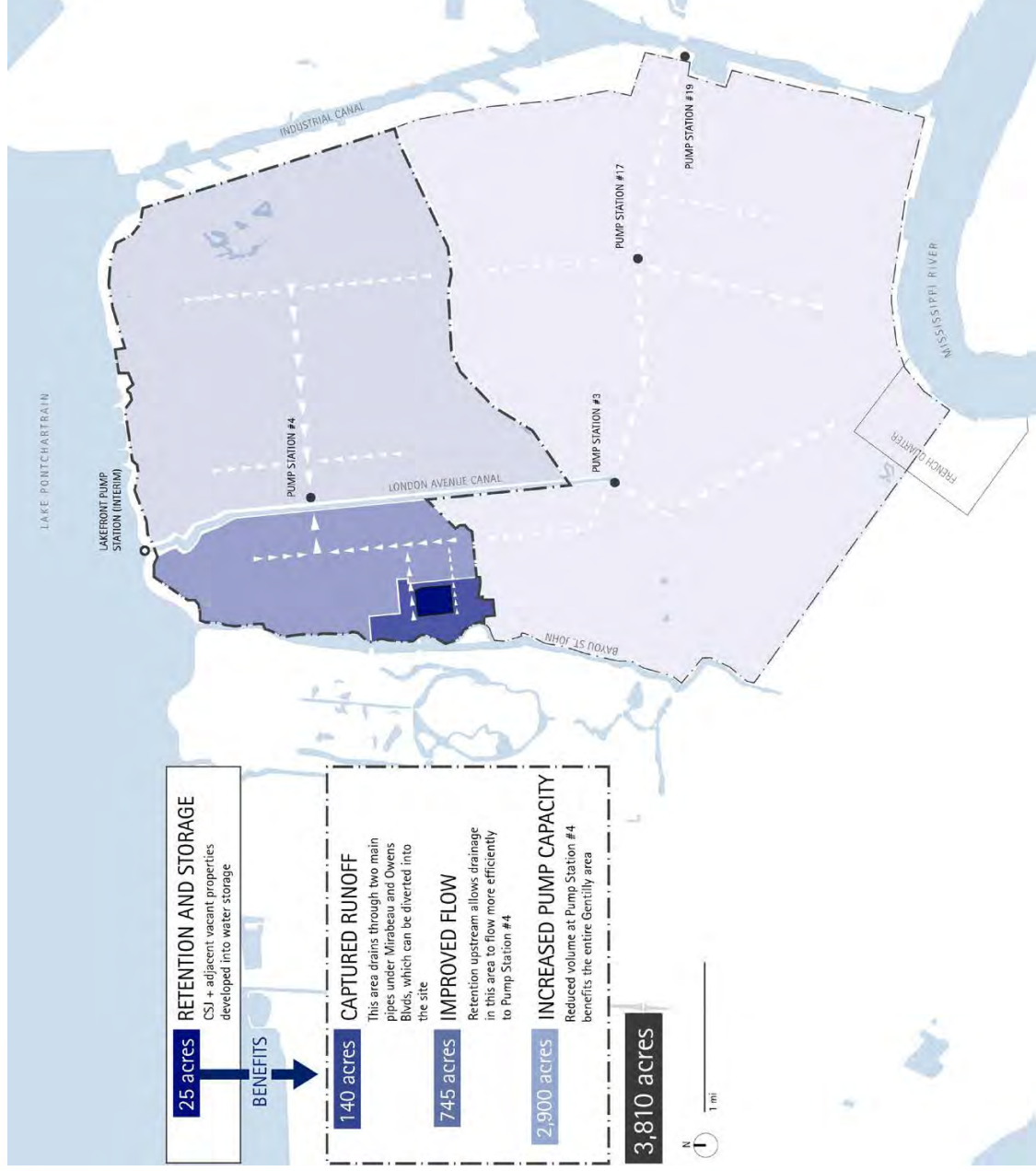


MIRABEAU IMPACT AREA

Drainage Analysis



DRAINAGE FLOWS



DRAINAGE IMPACT

MIRABEAU ECOLOGY

Tree Inventory and Evaluation



- Live Oak Trees (19"-32" line of ten)
- Live Oak Trees (22"-70" grove of eight)
- Elm Tree
- Lemon Tree
- Cypress Trees
- Pecan Tree
- Golden Rain Tree
- Pine Trees
- Live Oak Trees (21"-32" line of three)
- Pine Trees
- Sweet Gum
- Pine Trees
- Maple Tree

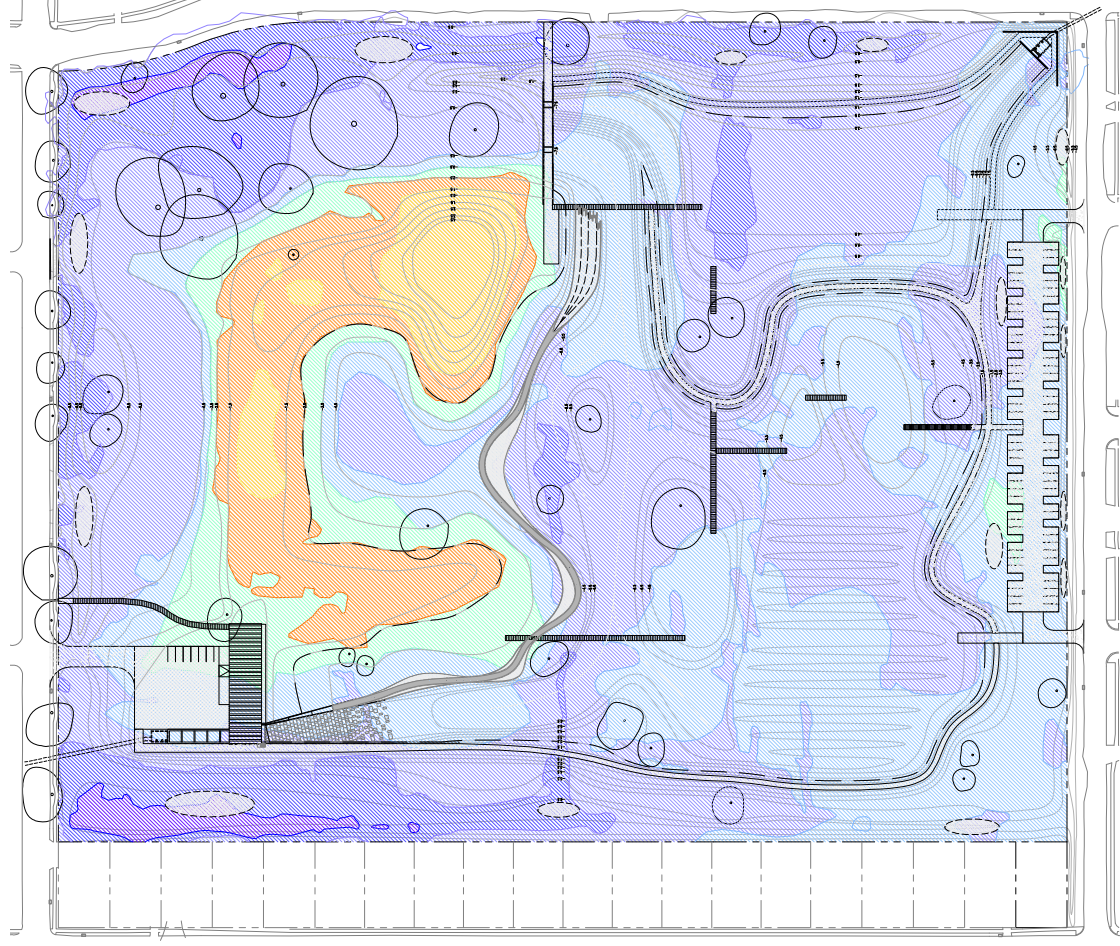
LEGEND

- Full Clearing
- Level 1 Selective Removal
- Level 2 Selective Removal
- Trees To Be Removed



MIRABEAU SURVEY

Topographic Analysis



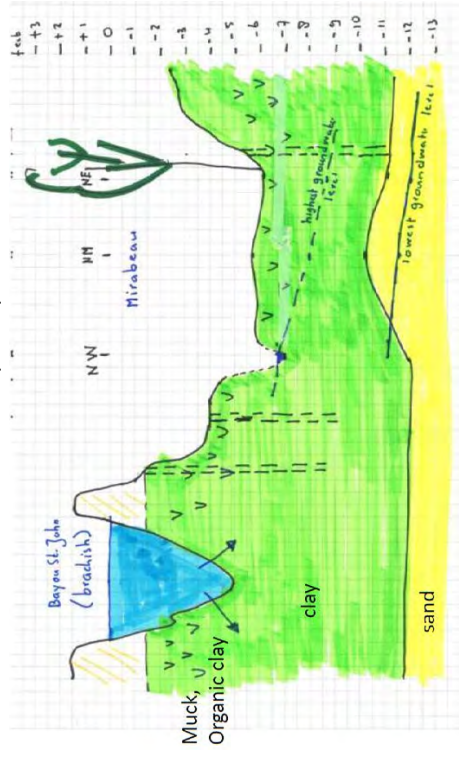
Existing -1.5 Feet
Existing -2.5 Feet
Existing -3.5 Feet

Existing -4.5 Feet
Existing -5.5 Feet
Existing -6.5 Feet

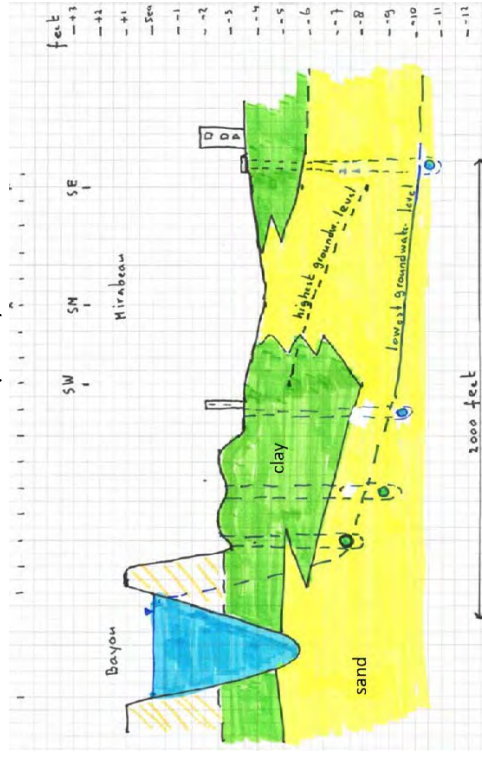
MIRABEAU GEOHYDROLOGY

Soils Analysis

W-E TRANSECT SECTION AT MIRABEAU AVE (NORTH)



W-E TRANSECT SECTION AT OWEN STREET (SOUTH)



CLAY LAYER THICKNESS (FEET) BASED ON FEMA'S ARCHAEOLOGICAL SOIL ASSESSMENT



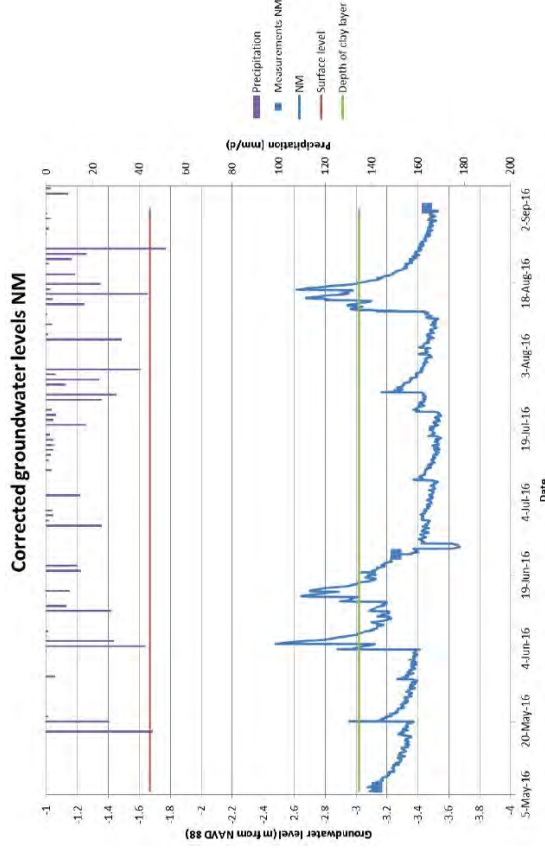
MIRABEAU GEOHYDROLOGY

Groundwater Analysis

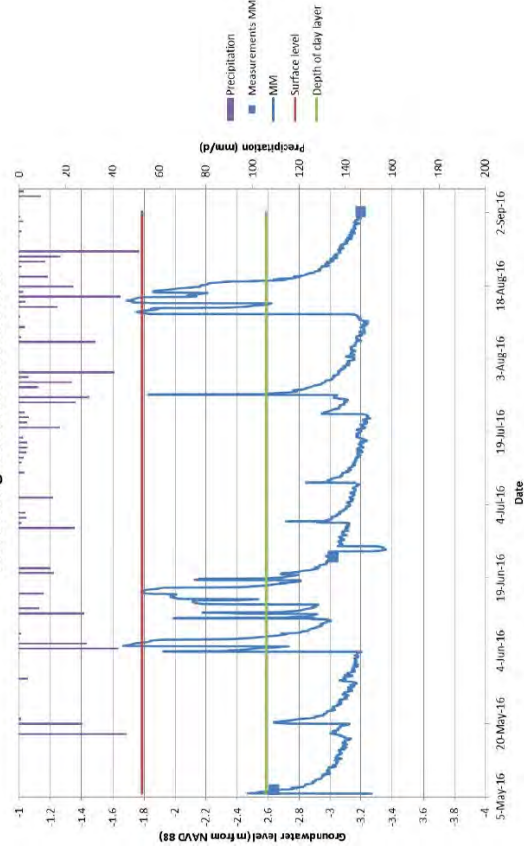
GROUNDWATER MONITORING NETWORK & WATER LEVEL CONTOURS IN FEET BELOW SEA LEVEL



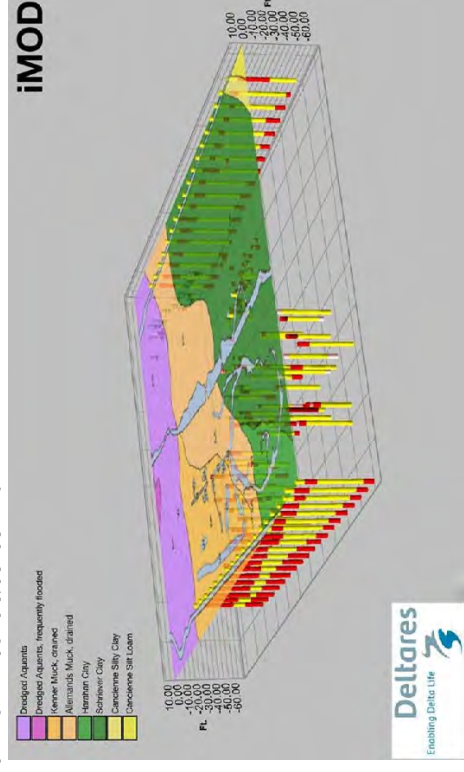
DIVER READINGS EXAMPLES



Corrected groundwater levels MM



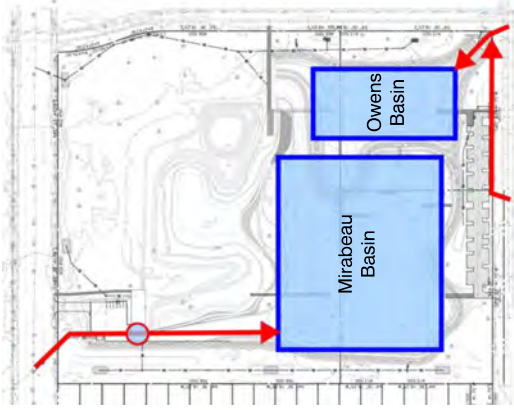
3D MODEL - SOILS & SUBSURFACE



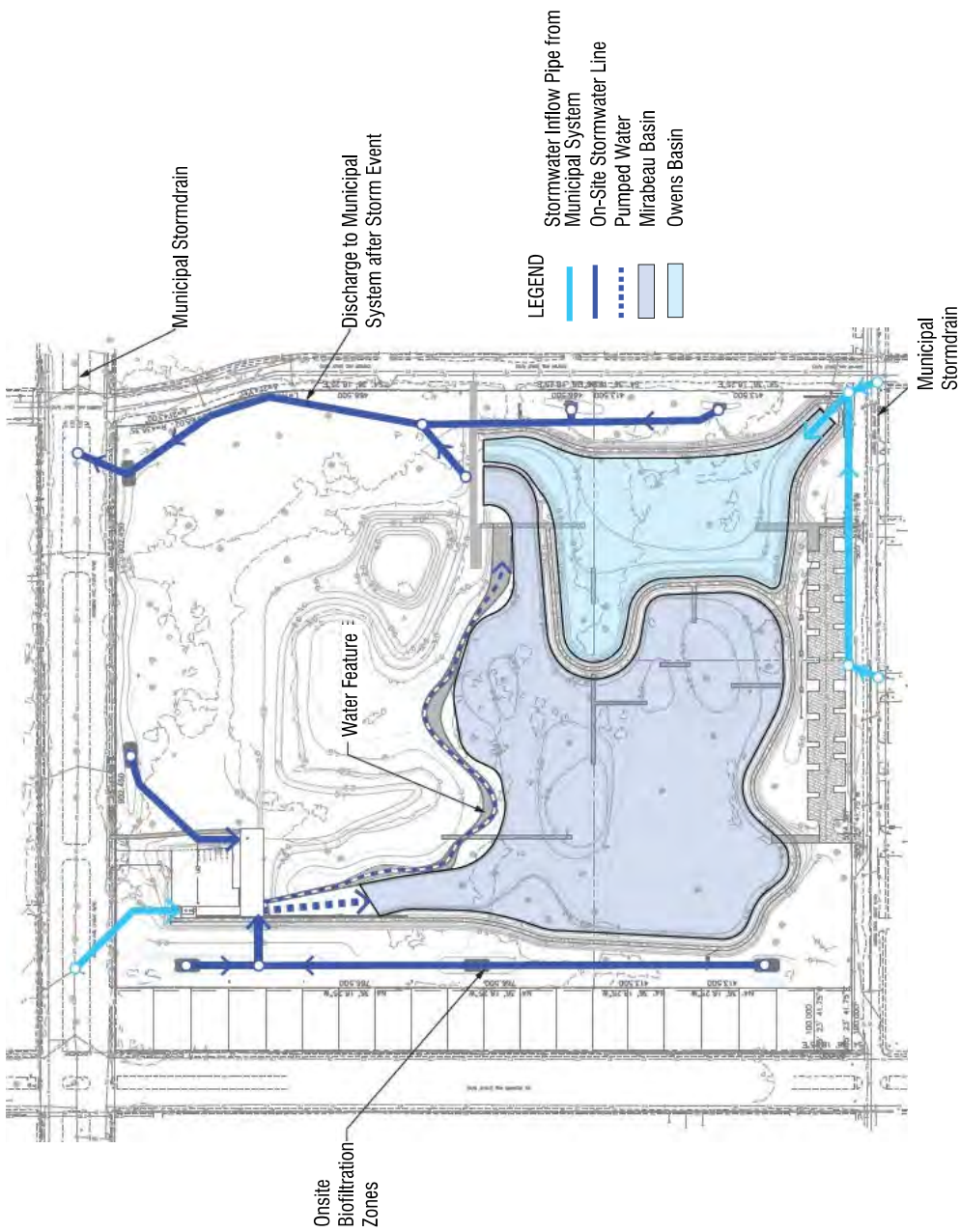
MIRABEAU HYDRAULICS

Engineering Analysis

**Max. Capacity:
10M Gallons**
Stormwater gets
pumped into pond



**Max. Capacity:
2M Gallons**
Stormwater flows
into pond via gravity



MIRABEAU HYDRAULICS

Water Flow Analysis

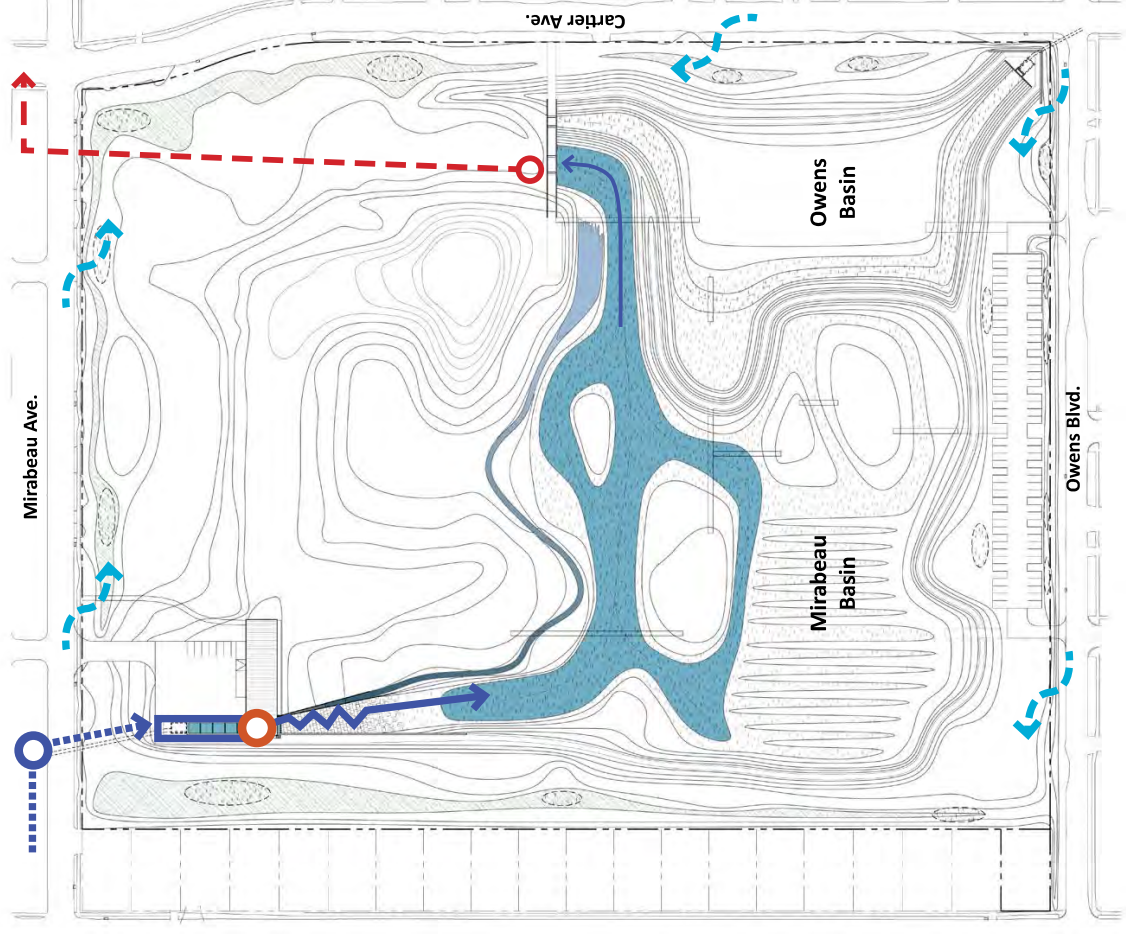
Typical Storm: 1 to 3 inch Events

Mirabeau Pump:

0.33 to 2.12 Million Gallons

44,000 to 280,000 Cubic Feet

- Stormwater from the municipal drainage system is conveyed by pipe from Mirabeau Avenue by gravity through a trash and sediment separating forebay to a wet well, where it is pumped at a rate of 20 CFS into the Mirabeau detention basin.
- Perimeter swales capture runoff from surrounding streets and biofiltration zones filter and percolate it into the water table.
- Permeable pavers and gravel surfaces help to capture and infiltrate runoff from the site.
- The north weir structure slowly discharges the Mirabeau basin water back into the municipal drainage system.



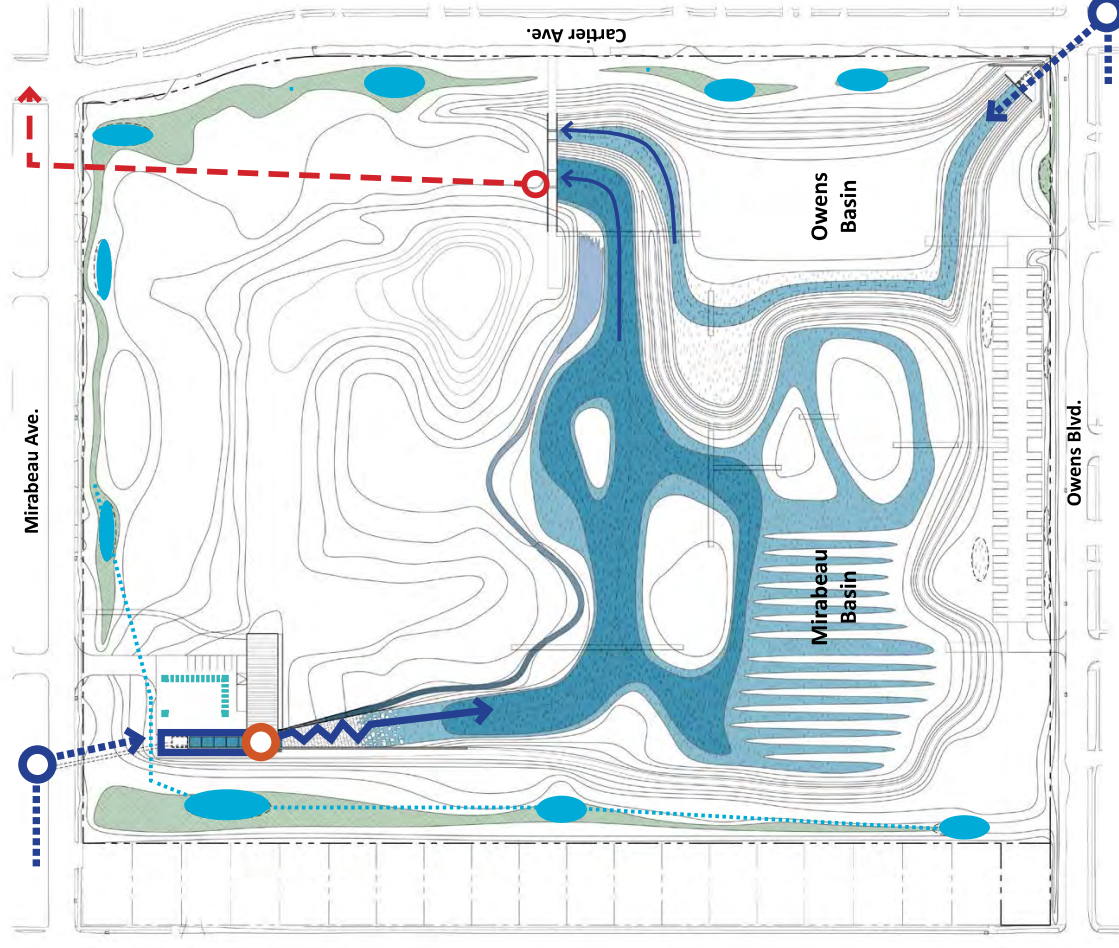
Water Flow Analysis

Mirabeau Pump:

Owens Intake:

- In larger storm events, there is enough water pressure head in the Owens Blvd and Cartier Ave drainage pipes to begin to fill the Owens Basin, while the pump continues to fill the Mirabeau Basin.

- Biofiltration zones and overflow catch basins in the perimeter swales are connected with underdrains to a subsurface cistern. The cistern provides a source for both irrigation water during dry periods and for a recirculating water flow through the site.
- Both weir structures slowly discharge the basins water back into the municipal drainage system.



MIRABEAU HYDRAULICS

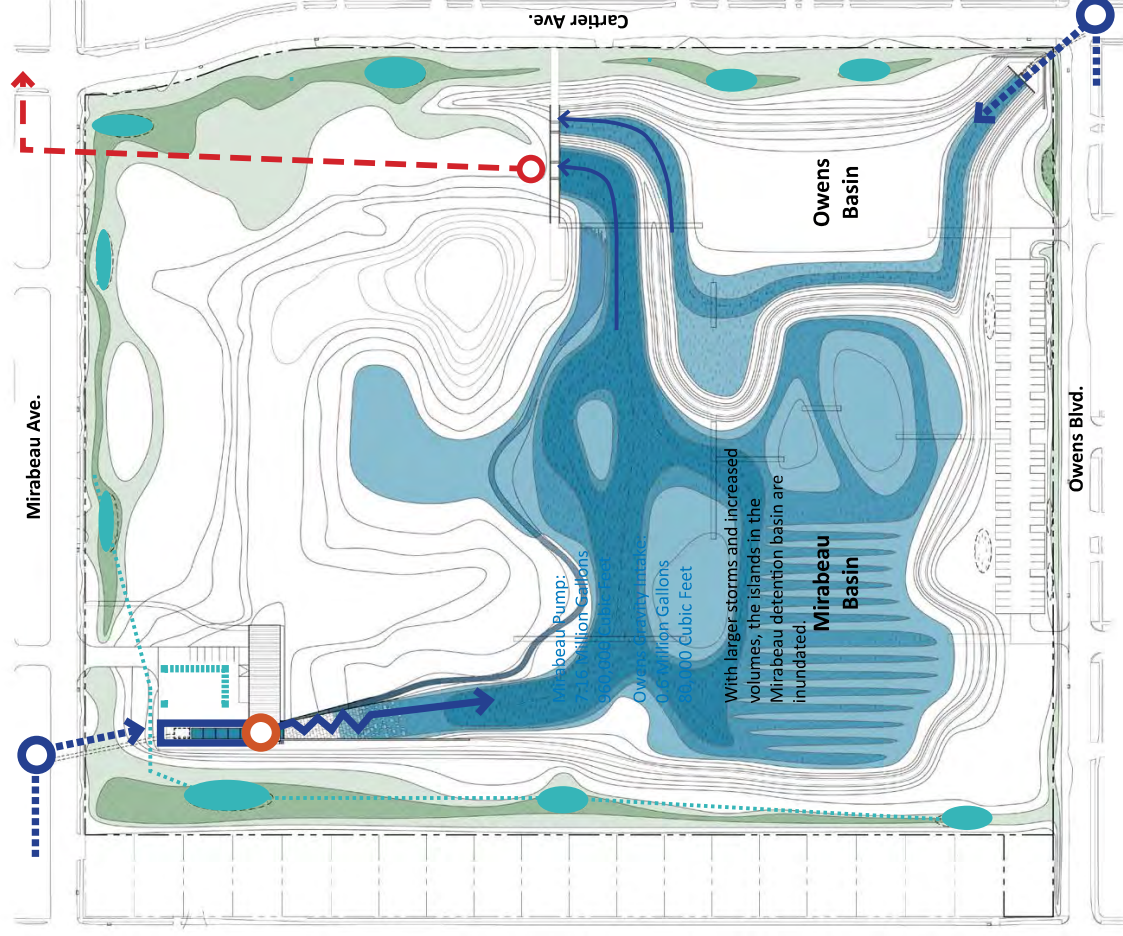
Water Flow Analysis

2-Year Storm

Mirabeau Pump:
7.16 Million Gallons
960,000 Cubic Feet

Owens Gravity Intake:
0.6 Million Gallons
80,000 Cubic Feet

- With larger storms and increased volumes, the islands in the Mirabeau detention basin are inundated.
- Both weir structures slowly discharge the water in both basins back into the municipal drainage system.



MIRABEAU HYDRAULICS

Water Flow Analysis

10-Year Storm

Mirabeau Pump:

11.3 Million Gallons

1.5 Million Cubic Feet

Owens Gravity Intake:

0.98 Million Gallons

130,000 Cubic Feet

- In 10 year storm events, the water pressure head fills the Owens Basin to its maximum height of -3.5 feet, after which water from the Mirabeau basin pump overtops the dividing berm and continues to fill the site. The Mirabeau Basin pump shuts off when the flood volume reaches a maximum height of -2.5 feet. An additional one foot of freeboard provides a safety factor.
- An overflow structure in the north weir provides a discharge path in case the system is overfilled.
- Both weir structures slowly discharge the basins water back into the municipal drainage system.



BENEFITS

Existing and Post-Project Flooding

10-Year Storm Event: 40% Flood Reduction



Existing Condition

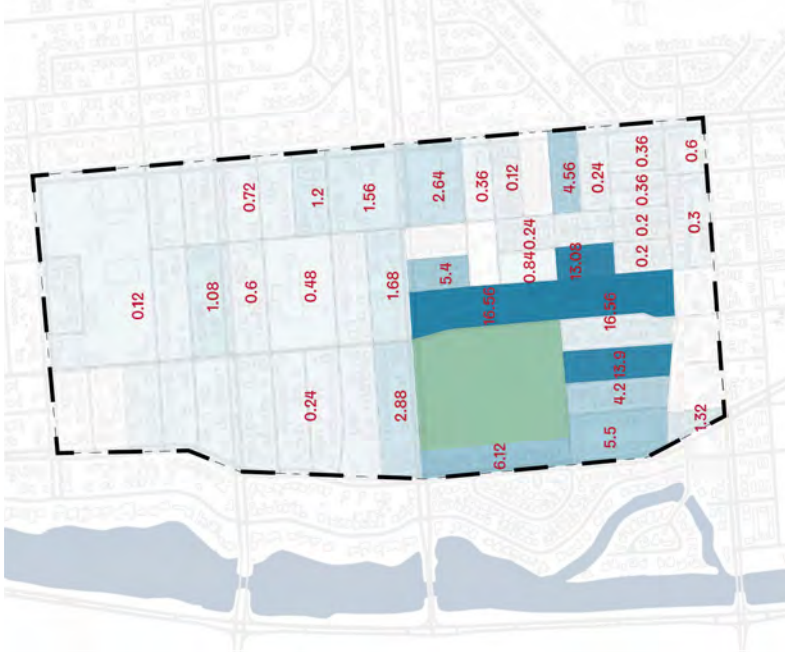


Post-Project Condition

BENEFITS

Block Count of Beneficiary Area

Reduced Flooding and Increased Capacity within Existing Drainage System



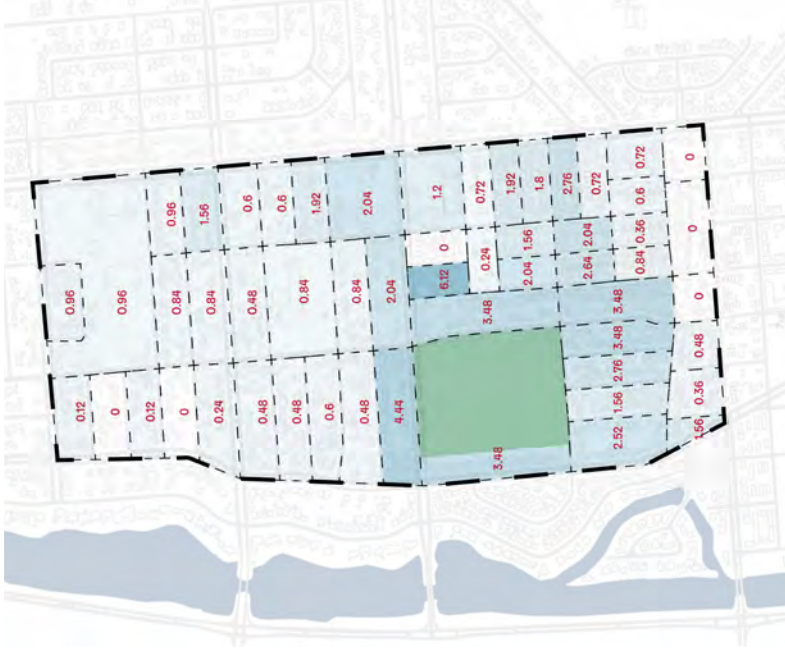
2-Year Storm

Flood Stage Reductions (inches)



5-Year Storm

Flood Stage Reductions (inches)



10-Year Storm

Flood Stage Reductions (inches)

MIRABEAU LANDSCAPE

Planting Zones & Sections



MIRABEAU LANDSCAPE

Plant Examples



UPLAND FOREST



FLORIDA ANISE



CHERRYBARK OAK



BOTTOMLAND FOREST



BALD CYPRESS



DIARF PALMETTO



SWAMP AZALEA



UPLAND MEADOW



EASTERN GAMAGRASS



CLASPING CONEFLOWER



WETLAND MEADOW



MARSH BLAZING STAR



SOFT RUSH



AQUATIC: SHORELINE



LOUISIANA IRIS



AQUATIC: SHALLOW, MID, DEEP MARSH



SOUTHERN SWAMP LILY



SOUTHERN WAXY SEDGE



VIRGINIA WILLOW



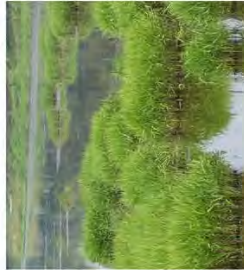
SOUTHERN WAX MYRTLE



SPIKE RUSH



BULLTONGUE ARROWHEAD



MAIDENCANE

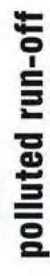


PICKERELWEED



BULRUSH

Water Filtration



DESIGN INSPIRATION

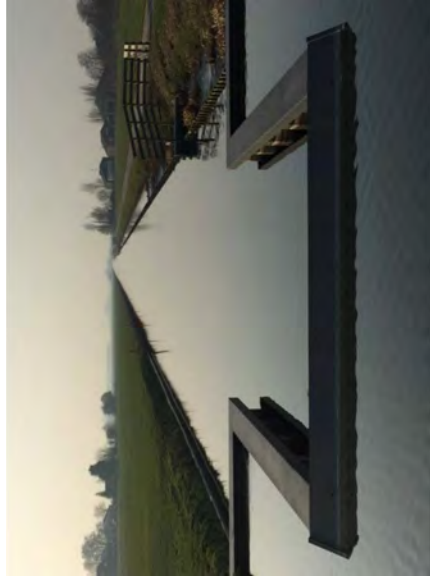
Hold / Move / Filter



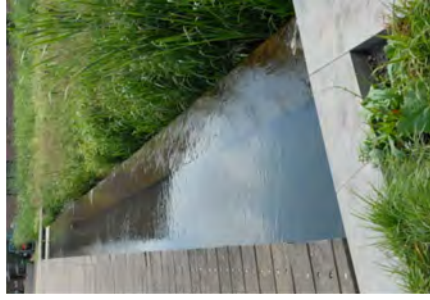
Renaissance Park, Chattanooga



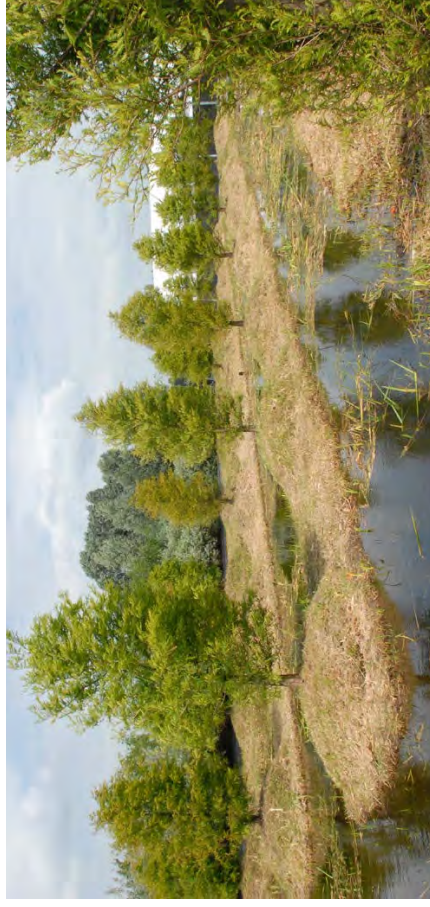
Hans Tavsens Park, Copenhagen



Weir and Canal, Netherlands



Westerpark, Amsterdam



Watergraafsmeer Polder, Amsterdam

DESIGN INSPIRATION

Engage / Play / Learn



Westerpark, Amsterdam



Seonyundo Park, Korea



Water Playground, Netherlands



Westerpark, Amsterdam



Fazenda Vargem Grande, Sao Paulo



Westerpark, Amsterdam



Middleton Place, Charleston



Chapultepec Park, Mexico City

MIRABEAU VISION

Dry Condition



TYPICAL RAIN STORM



HEAVY RAIN STORM

2-Year Event



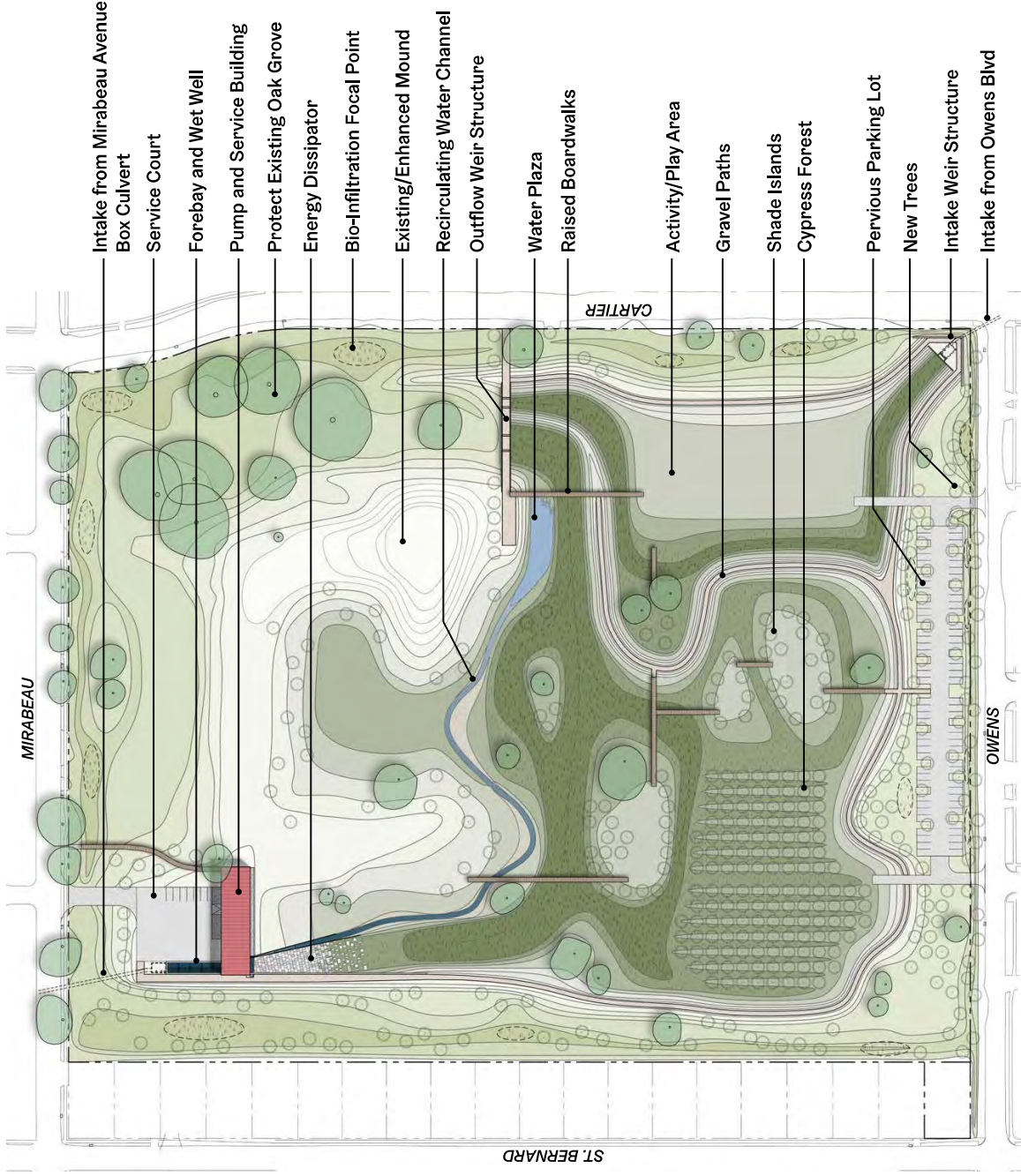
EXTREME RAIN STORM

10-Year Event



MIRABEAU WATER GARDEN

Site Plan - 60% Design



HMGP Budget: \$12.5M

Interventions:

- drainage diversion into detention basin
- perimeter bioswales
- water treatment
- pervious parking
- subsurface storage

**Water Storage Capacity:
12 Million Gallons**

Key Benefits:

- 60% flood reduction from 2-year storm
- 40% flood reduction from 10-yr storm
- recreation
- environmental education

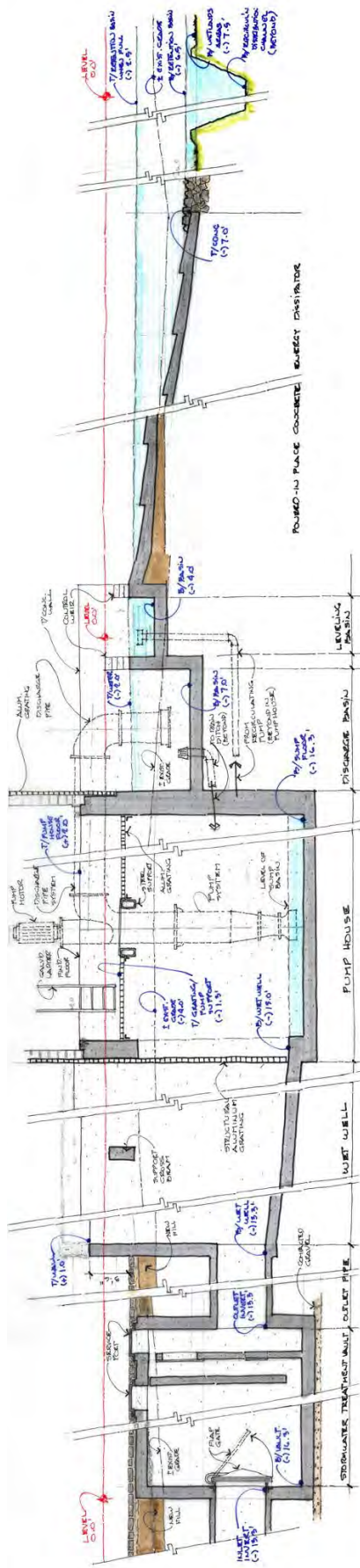
30% Benefit Cost Ratio:

2.4 : 1

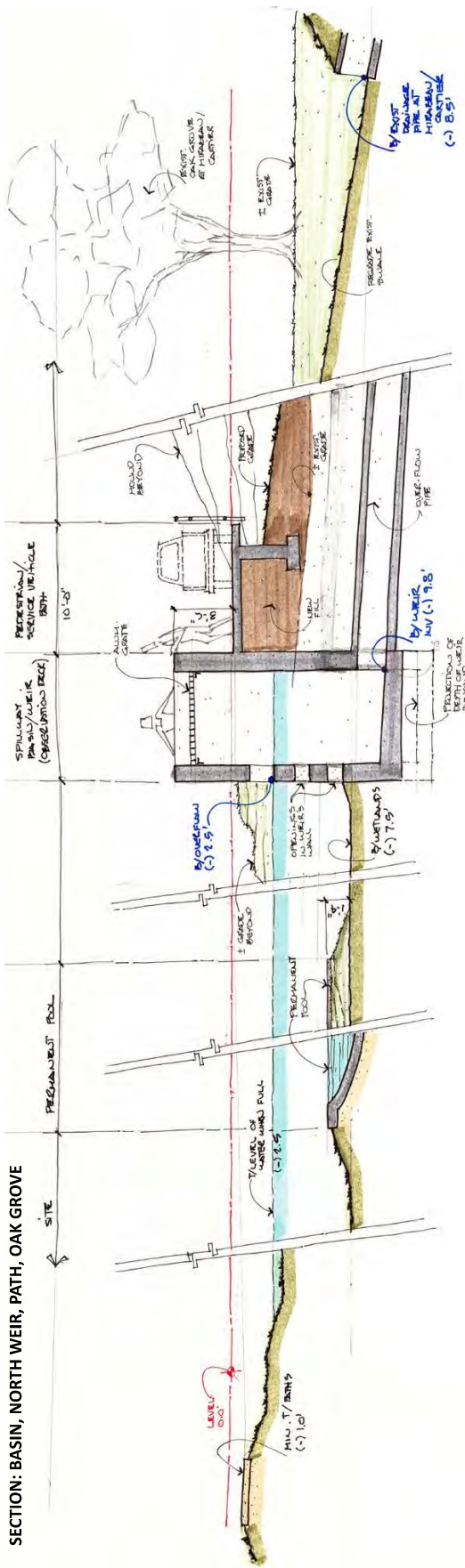
MIRABEAU WATER GARDEN

Sections - 60% Design

SECTION: FOREBAY, WET WELL, PUMP HOUSE, LEVELING BASIN, ENERGY DISSIPATOR



SECTION: BASIN, NORTH WEIR, PATH, OAK GROVE

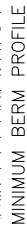


Sections - 60% Design

[illegible]

A hand-drawn site plan of a park area, oriented vertically. The plan is divided into several distinct zones and features, with dimensions and labels in Hindi and English. At the top, there is a 'MOUND' area with a 'PATH' and a 'POSSIBLE' area. Below this is a 'WATERALY AREA' containing a 'SOUNDING OF STORMWATER' structure. The central part of the plan shows a 'WATERALY AREA' with a 'SOUNDING OF STORMWATER' structure. The bottom section includes a 'WATERALY AREA' with a 'SOUNDING OF STORMWATER' structure. Dimensions are given in feet (ft) and meters (m). The plan also shows a 'WATERALY AREA' with a 'SOUNDING OF STORMWATER' structure.

Sections - 60% Design

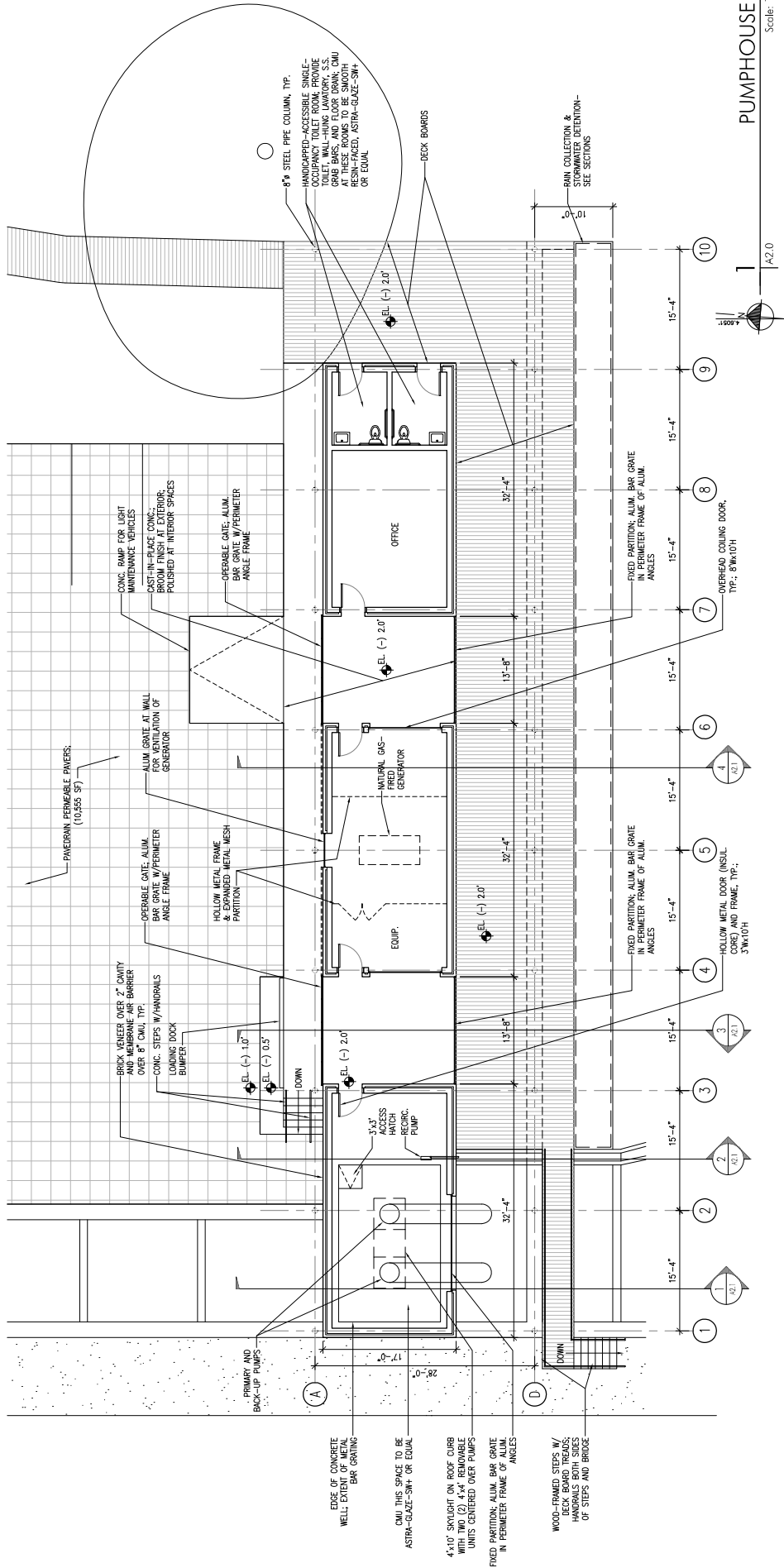


3 MINIMUM BERM PROFILE, TYPICAL



MIRABEAU WATER GARDEN

Pumphouse Plan - 30% Design

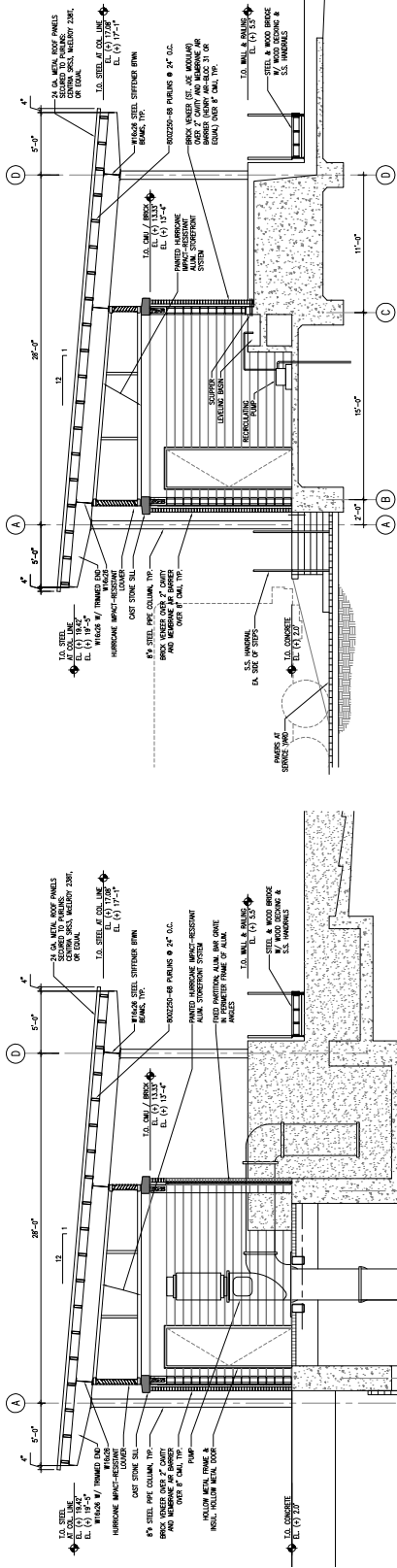


PUMPHOUSE PLAN

Scale: 1/8" = 1'-0"

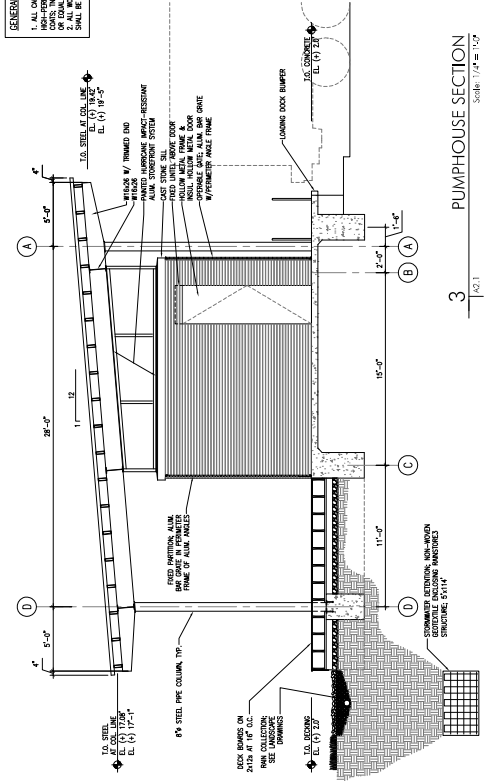
MIRABEAU WATER GARDEN

Pumphouse Sections - 30% Design

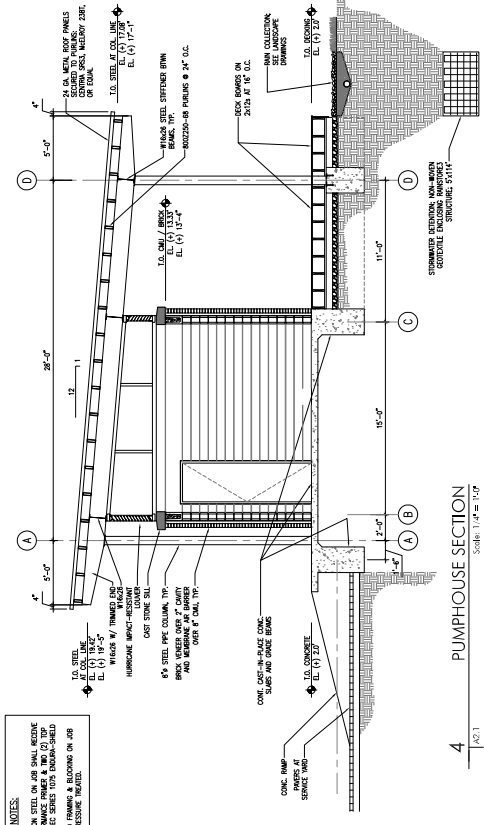


1 PUMPHOUSE SECTION
Scale: 1/4" = 1'-0"

2 PUMPHOUSE SECTION
Scale: 1/4" = 1'-0"



3 PUMPHOUSE SECTION
Scale: 1/4" = 1'-0"

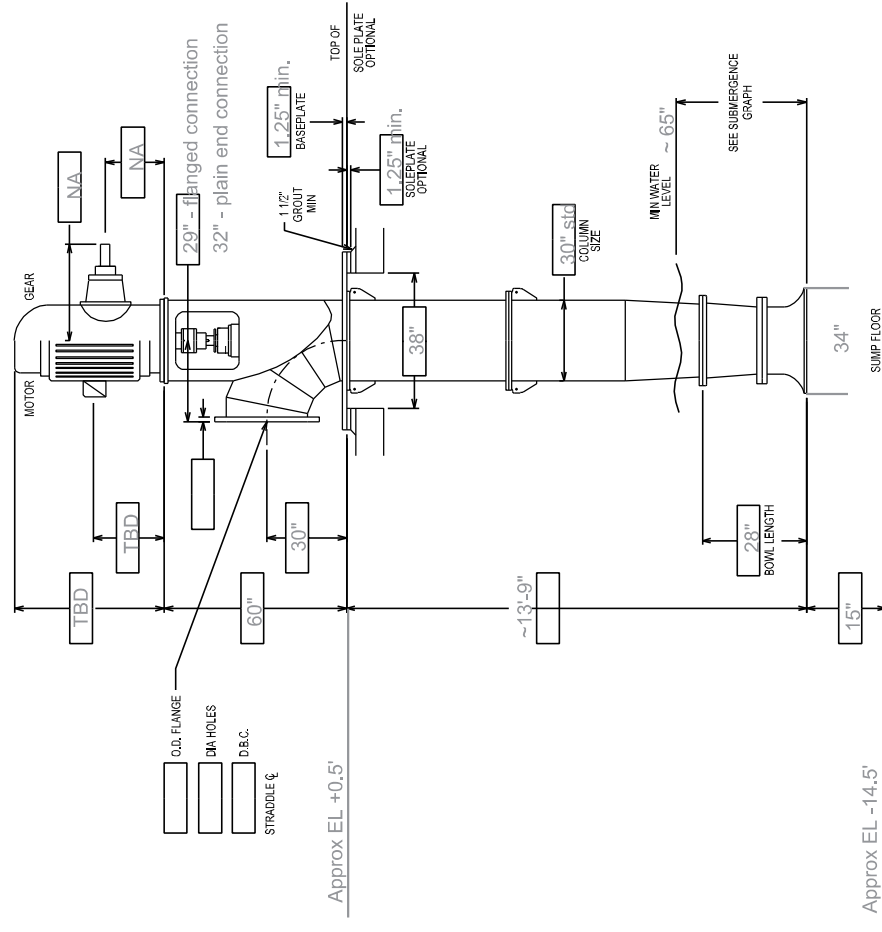


4 PUMPHOUSE SECTION
Scale: 1/4" = 1'-0"

- GENERAL NOTES
1. ALL CARBON STEEL ON JOB SHALL RECEIVE AN ANTI-RUST COATING. COATING SHALL BE APPLIED TO ALL EXPOSED SURFACES. COATING SHALL BE PRESSURE TREATED.
 2. ALL WOOD FRAMING & BLOCKING ON JOB SHALL BE PRESSURE TREATED.

Draft Plan

Draft Plan



21 OCTOBER 2016

Mirabeau Water Garden

Operations and Maintenance Plan

Operations and Maintenance Plan

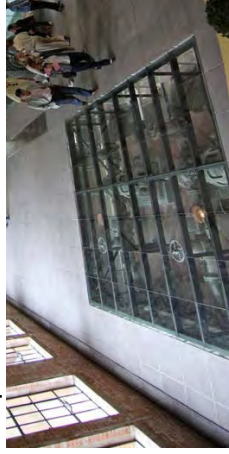
WAGGONER & BALL
ARCHITECTURE/ENVIRONMENT
2200 PRYTANIA ST
NEW ORLEANS, LA 70130
504 524 5308
WBARCHITECTS.COM

MIRABEAU WATER GARDEN

Water Storage

EXAMPLES/INSPIRATION

Pumphouse



Water Runnel & Plaza
(recirculating water feature)



ST. BERNARD



Dry Detention Basins (temporary water storage)



MIRABEAU WATER GARDEN

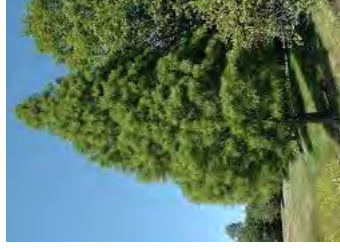
Perimeter Buffering

EXAMPLES/INSPIRATION

Perimeter Bioswale



Perimeter Trees (aquatic shade trees)



MIRABEAU WATER GARDEN

Forested Areas

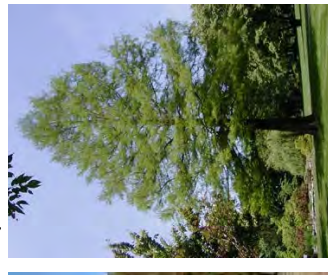
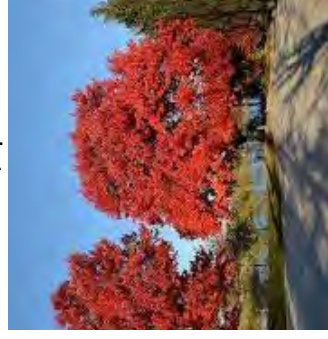


EXAMPLES/INSPIRATION

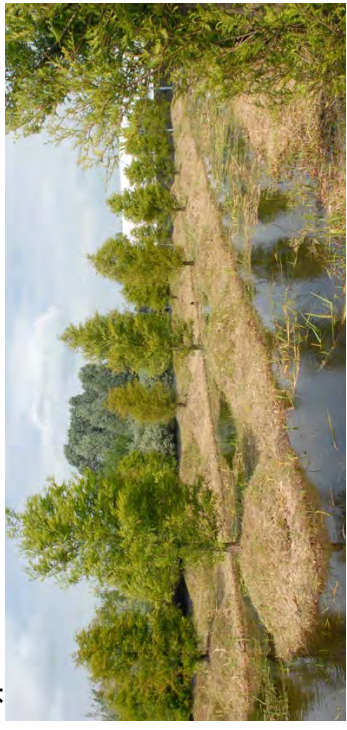
Sacred Oak Grove



Shade Islands (aquatic shade trees)



Cypress Forest



MIRABEAU WATER GARDEN

Open Area Potential - NDR Program



EXAMPLES/INSPIRATION

Lawn (potential landscaped entry to future education pavilion)

Bowl Landform (potential amphitheater)



Mound (potential stepped landform or play mound)

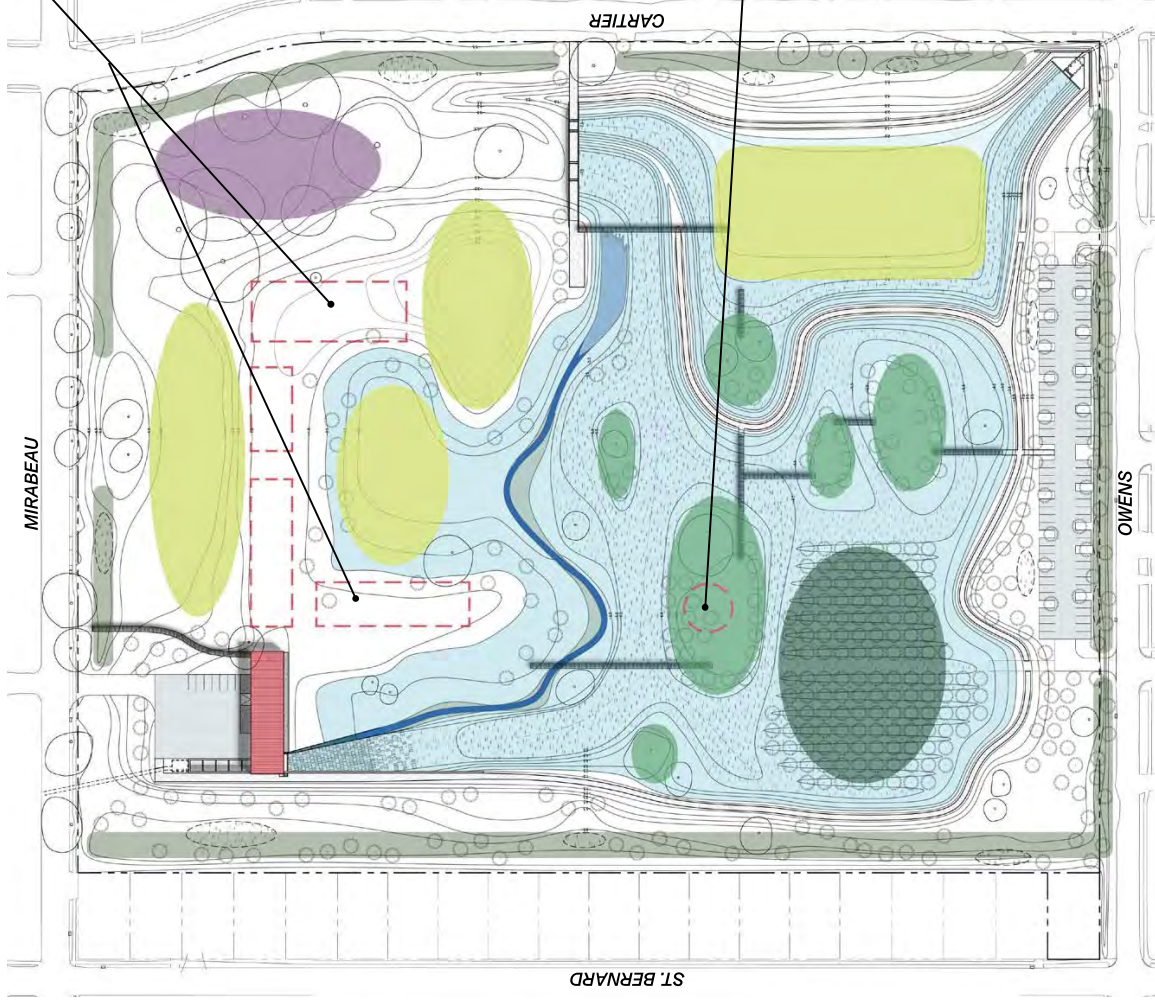


Open Field (potential play area)



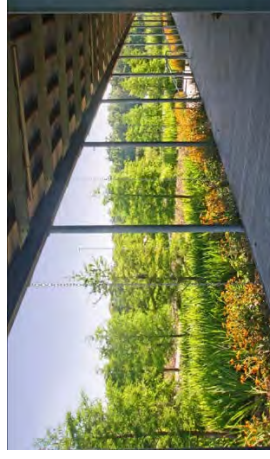
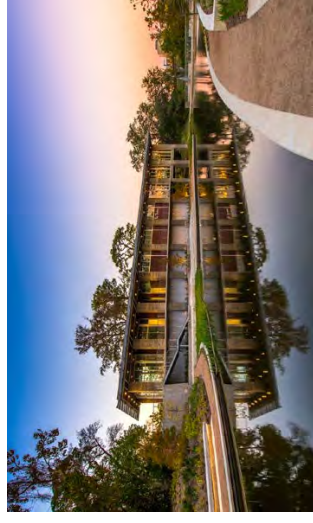
MIRABEAU WATER GARDEN

Potential Building Sites - NDR Program



EXAMPLES/INSPIRATION

Potential Buildings

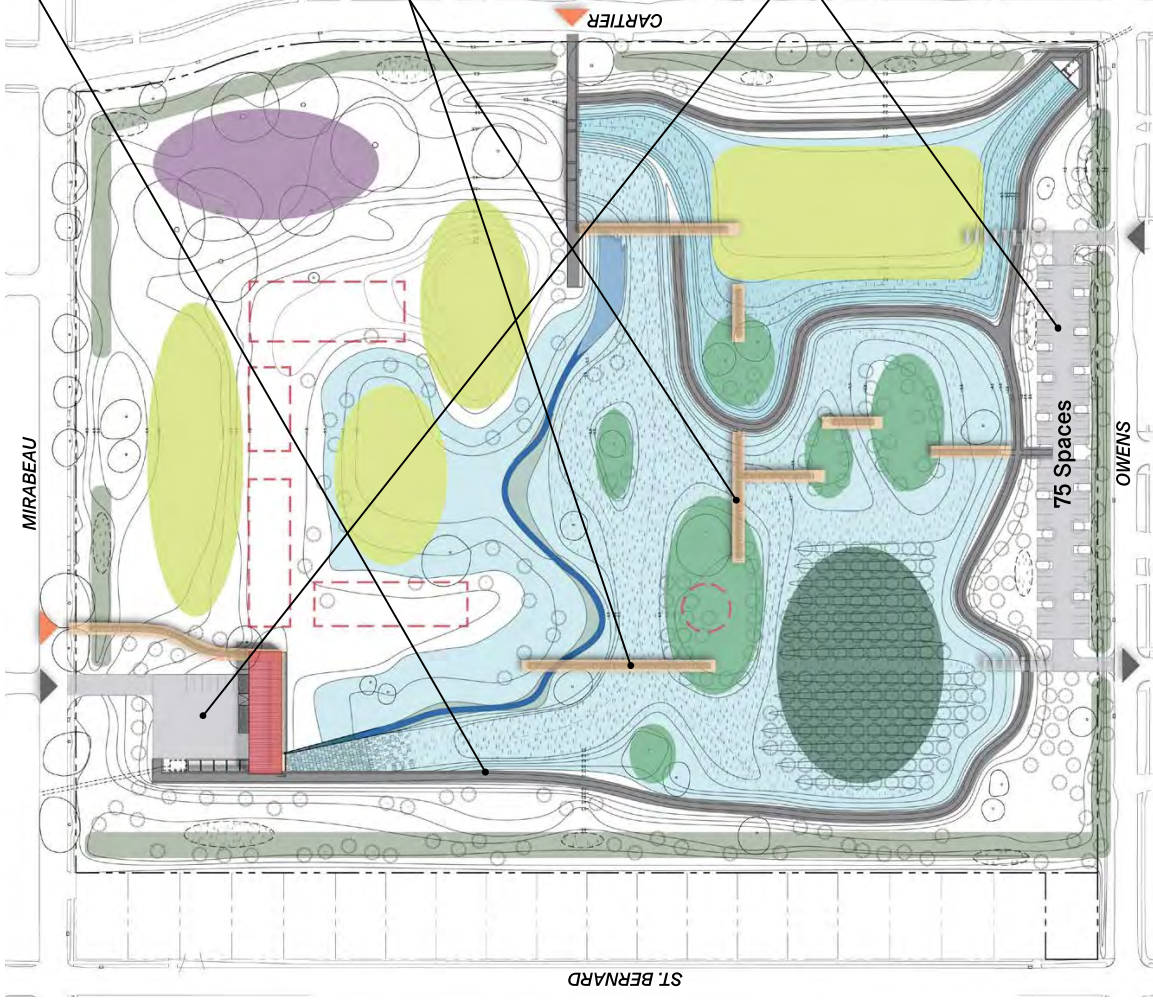


Potential Pavilions



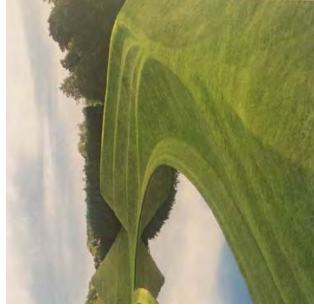
MIRABEAU WATER GARDEN

Circulation & Parking

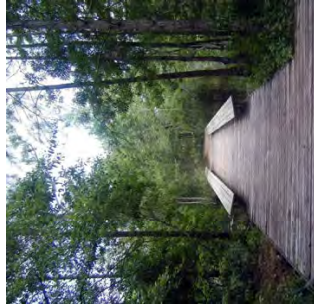


EXAMPLES/INSPIRATION

Berm & Pathways



Boardwalks & Bridges

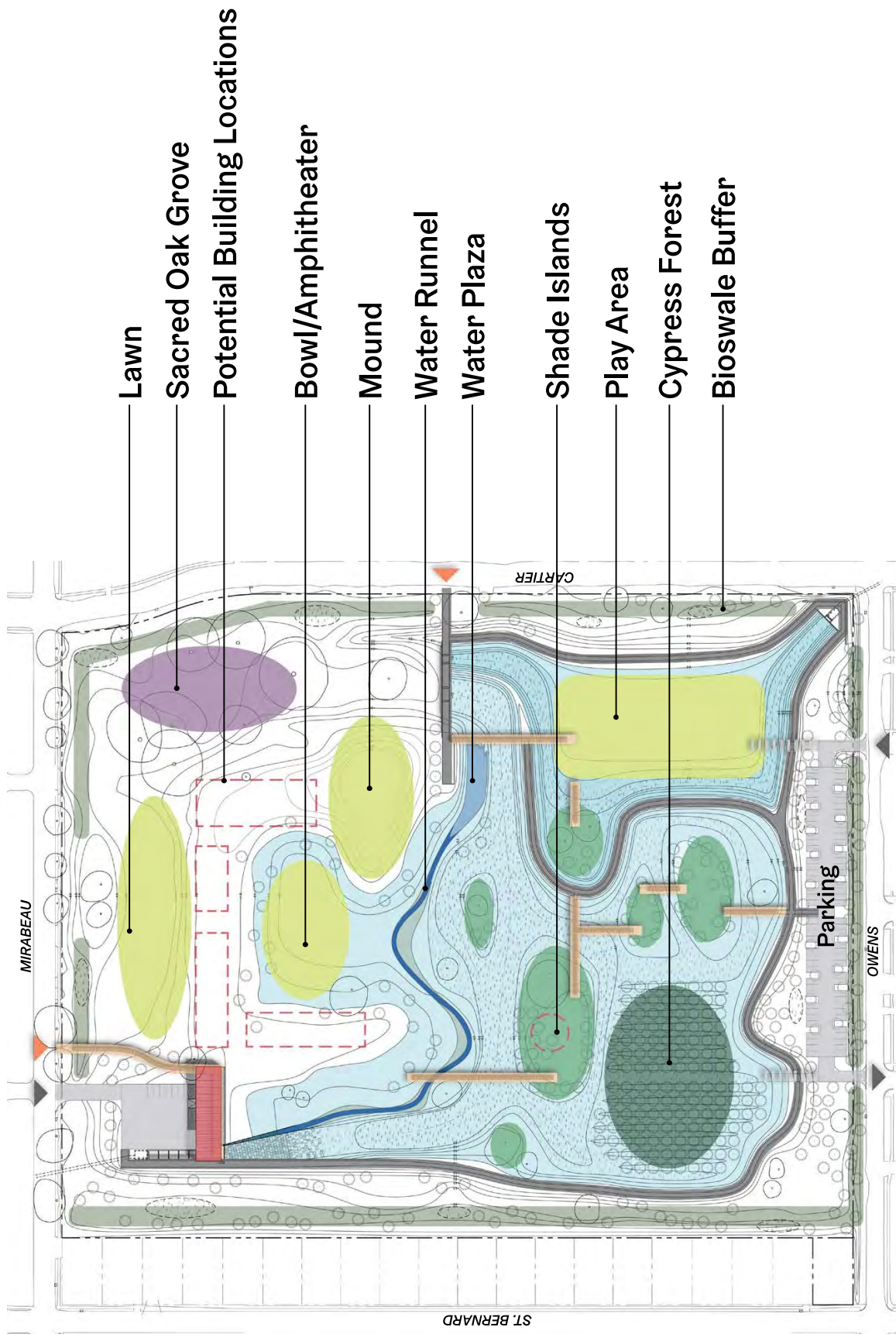


Service Area & Public Parking



MIRABEAU WATER GARDEN

Program Diagram



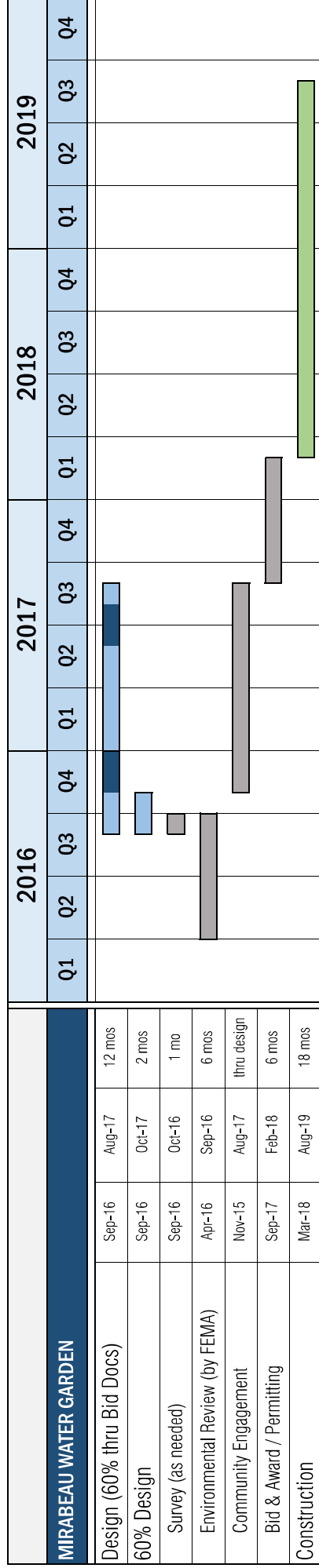
What We Heard

NEXT STEPS

- Benefit Cost Analysis
- FEMA & City Approval
- Community Engagement
- Geotechnical Analysis and Report
- Soils & Subsurface 3D Model Completion
- NDR-Funded Program Development

PROJECT SCHEDULE

PROJECT SCHEDULE November 30, 2016



- Design
- Design
- Client Review Period
- Other Design Services
- Construction