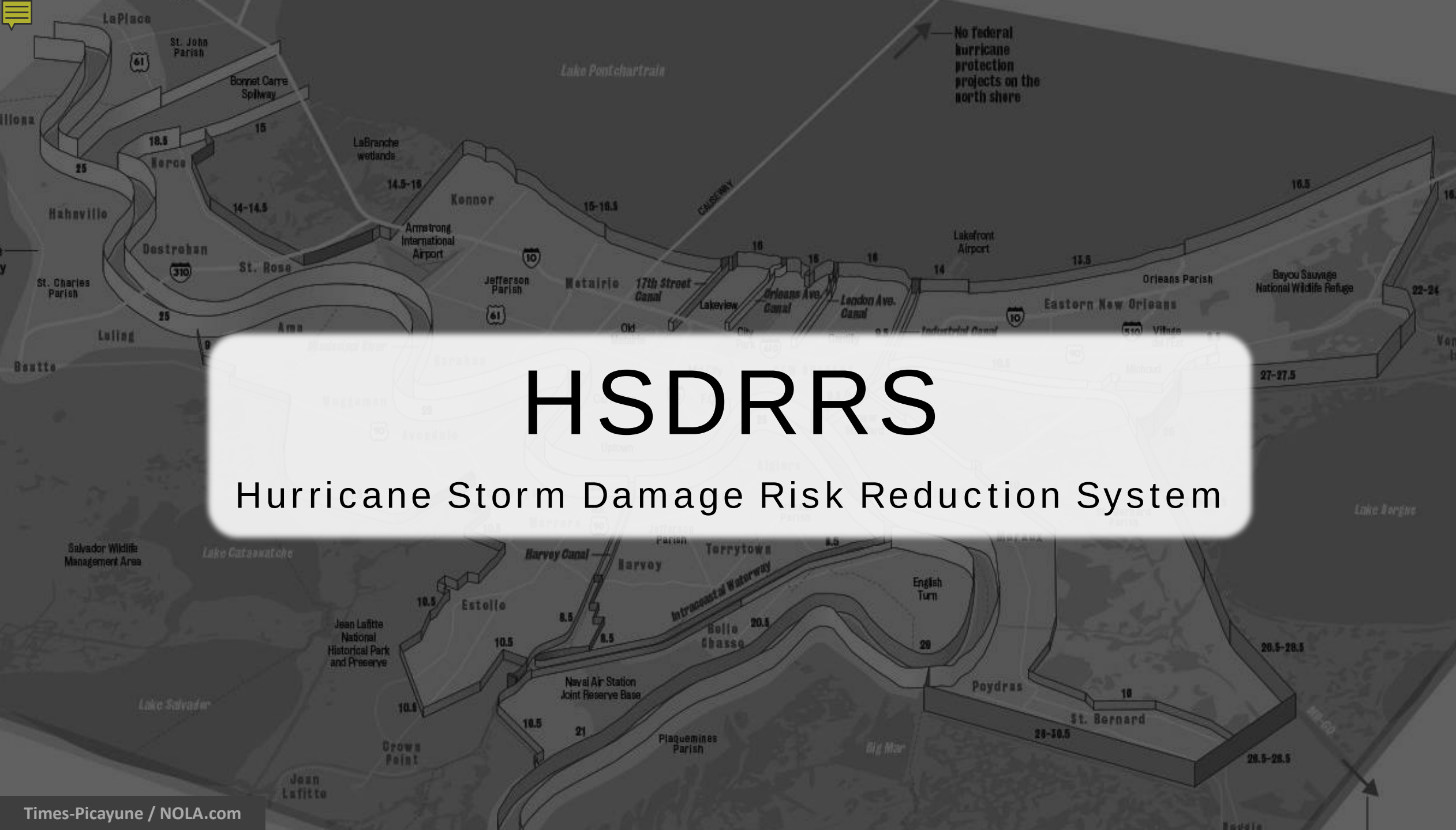
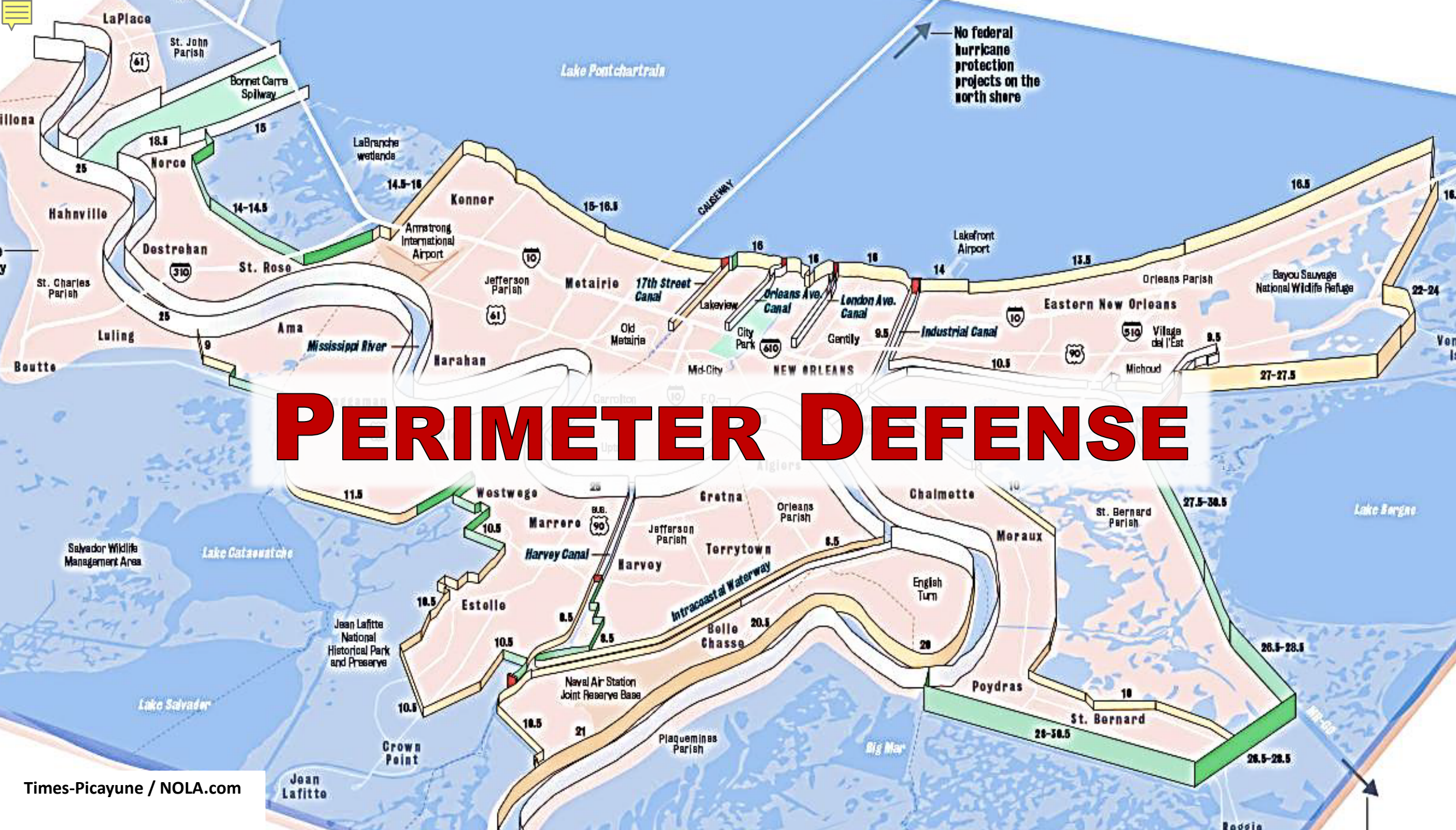



# HSDRRS

## Hurricane Storm Damage Risk Reduction System

Times-Picayune / NOLA.com



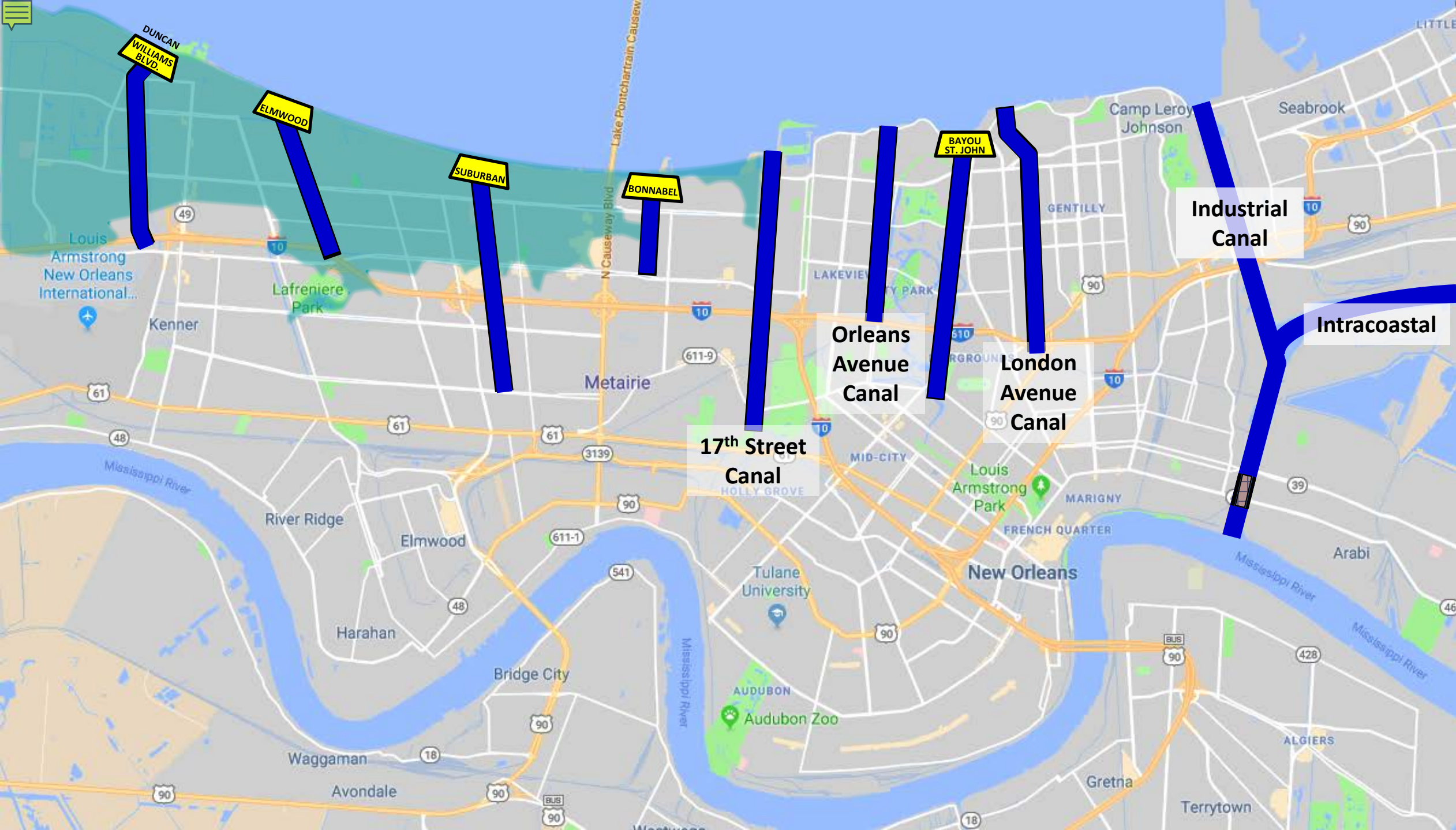

# PERIMETER DEFENSE

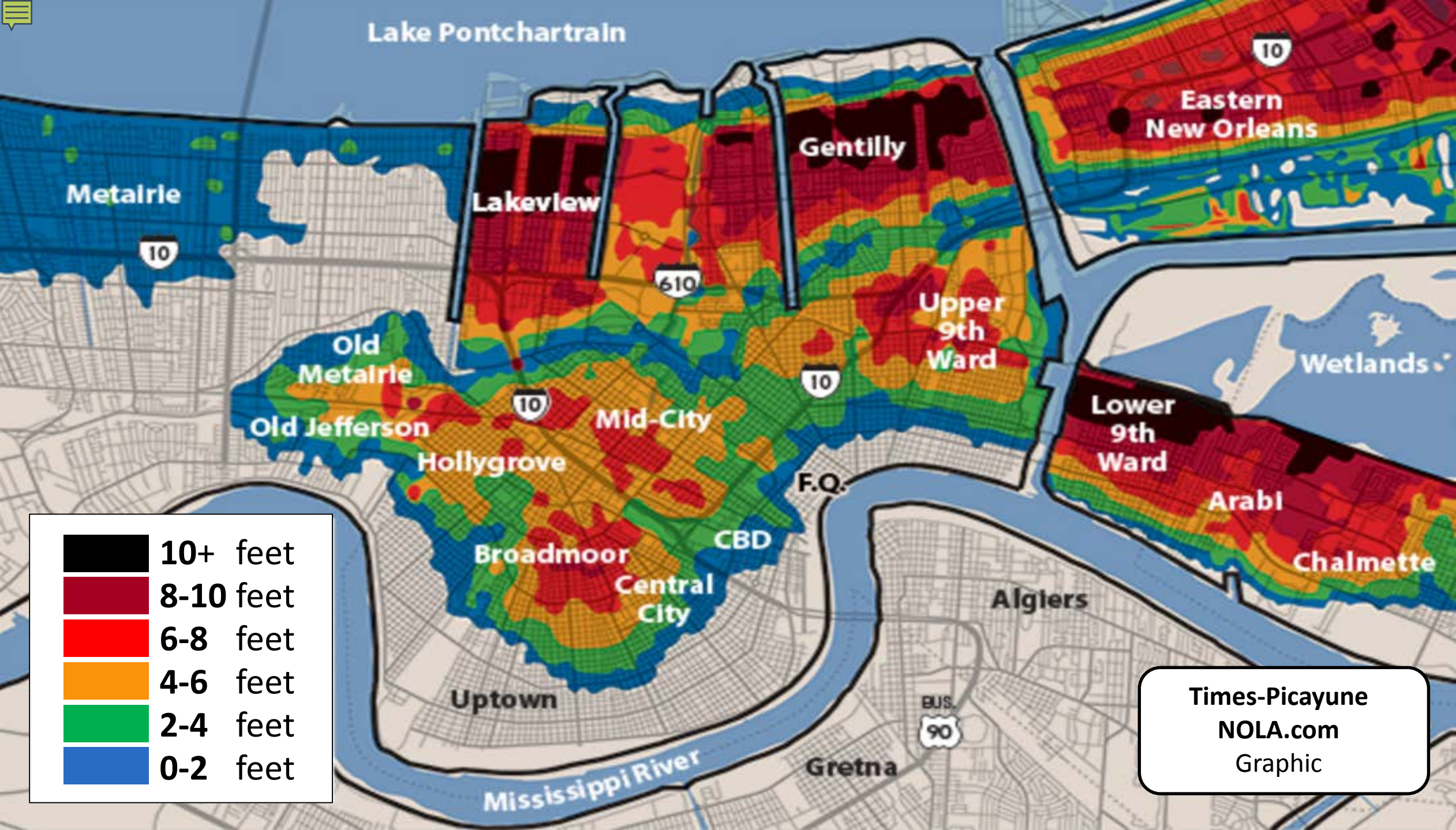
Times-Picayune / NOLA.com

Industrial Canal
Intracoastal
Orleans Avenue Canal
London Avenue Canal
17th Street Canal
Lake Pontchartrain Causeway
N Causeway Blvd
Louis Armstrong New Orleans International...
Kenner
Lafreniere Park
Metairie
River Ridge
Elmwood
Harahan
Bridge City
Waggaman
Avondale
Tulane University
New Orleans
Louis Armstrong Park
FRENCH QUARTER
MID-CITY
MARIGNY
HOLLY GROVE
AUDUBON
Audubon Zoo
Mississippi River
Camp Leroy Johnson
Seabrook
GENTILLY
Arabi
Gretna
Terrytown
ALGIERS

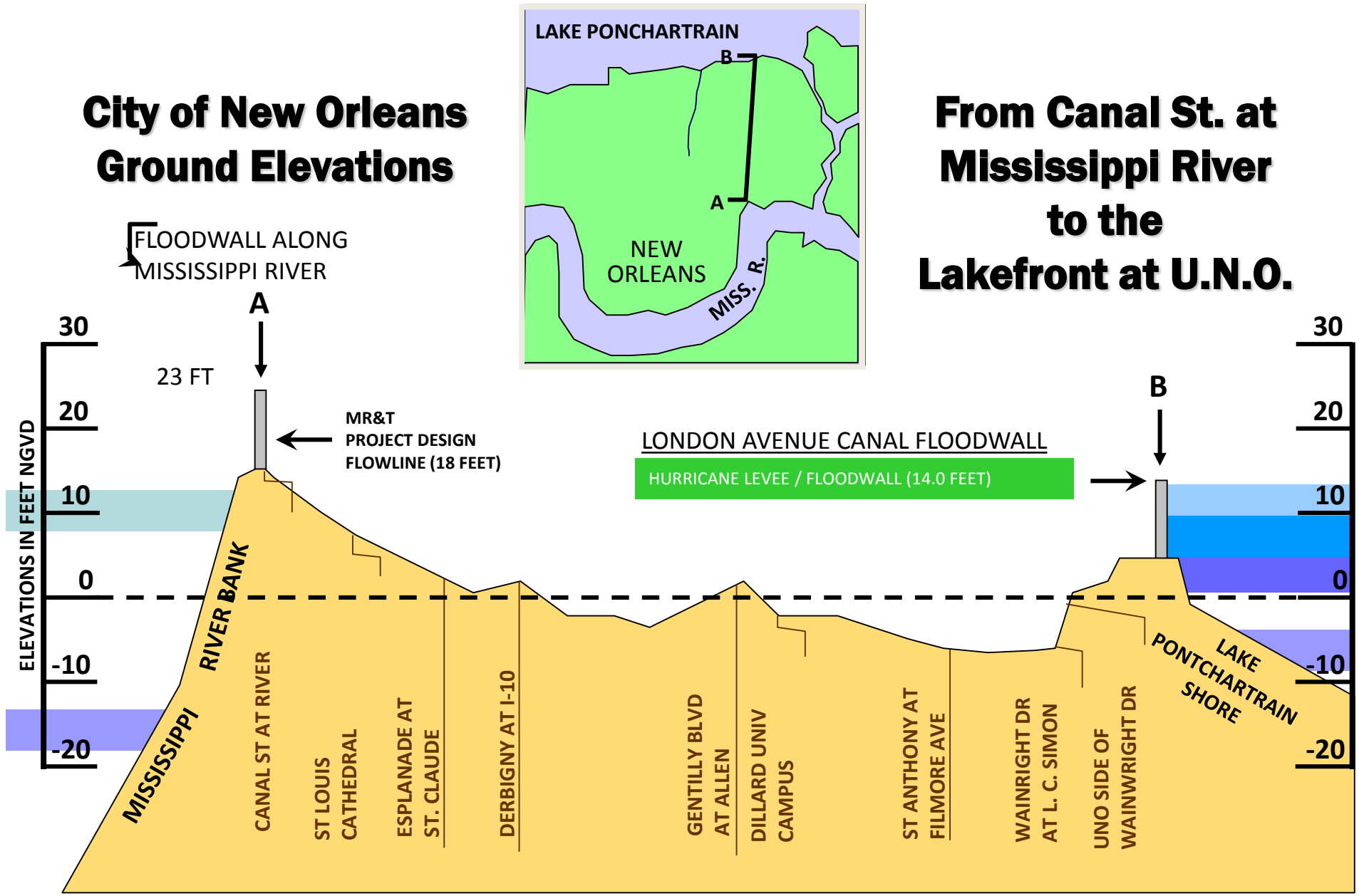
17th Street Canal
Orleans Avenue Canal
London Avenue Canal
Industrial Canal
Intracoastal
Lake Pontchartrain Causeway
N Causeway Blvd
Louis Armstrong New Orleans International...
Kenner
Lafreniere Park
Metairie
River Ridge
Elmwood
Harahan
Bridge City
Waggaman
Avondale
Mississippi River
Tulane University
Audubon Zoo
New Orleans
Louis Armstrong Park
FRENCH QUARTER
MARIGNY
Camp Leroy Johnson
Seabrook
GENTILLY
Arabi
Gretna
Terrytown
ALGIERS

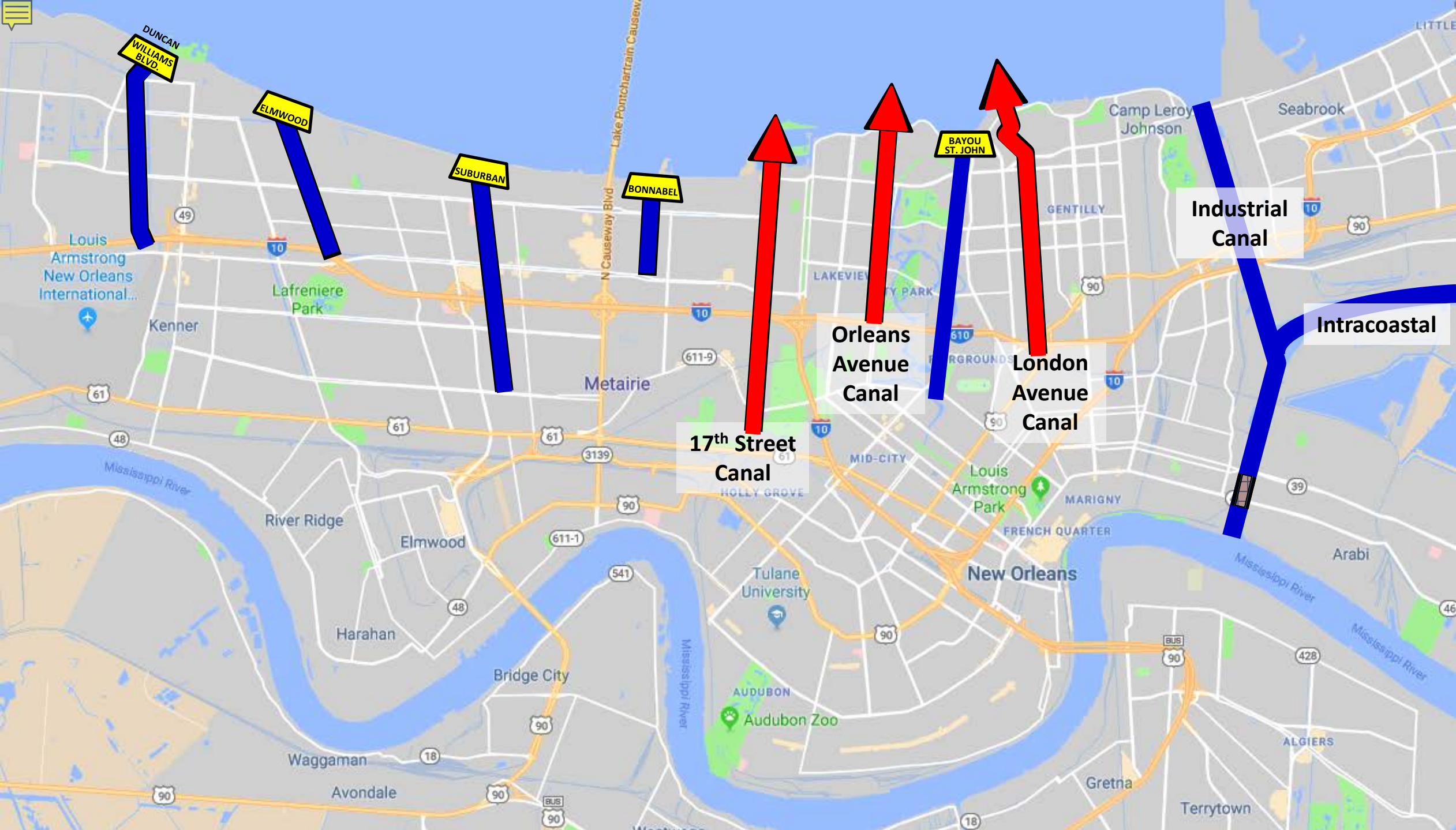
DUNCAN
WILLIAMS BLVD.
ELMWOOD
SUBURBAN
BONNABEL
BAYOU ST. JOHN
Industrial Canal
Intracoastal
Orleans Avenue Canal
London Avenue Canal
17th Street Canal
Lake Pontchartrain Causeway
N Causeway Blvd
Louis Armstrong New Orleans International...
Kenner
Lafreniere Park
Metairie
LAKEVIEW
GENTILLY
Camp Leroy Johnson
Seabrook
MID-CITY
HOLLY GROVE
Louis Armstrong Park
MARIGNY
FRENCH QUARTER
New Orleans
Arabi
River Ridge
Elmwood
Harahan
Bridge City
Tulane University
AUDUBON
Audubon Zoo
Waggaman
Avondale
Gretna
Terrytown
ALGIERS
Mississippi River


DUNCAN
WILLIAMS BLVD.
ELMWOOD
SUBURBAN
BONNABEL
BAYOU ST. JOHN
Industrial Canal
Intracoastal
Orleans Avenue Canal
London Avenue Canal
17th Street Canal
Lake Pontchartrain Causeway
N Causeway Blvd
Louis Armstrong New Orleans International...
Kenner
Lafreniere Park
Metairie
LAKEVIEW
GENTILLY
Camp Leroy Johnson
Seabrook
MID-CITY
HOLLY GROVE
Louis Armstrong Park
MARIGNY
FRENCH QUARTER
New Orleans
Arabi
River Ridge
Elmwood
Harahan
Bridge City
Tulane University
AUDUBON
Audubon Zoo
Waggaman
Avondale
Gretna
Terrytown
ALGIERS
Mississippi River

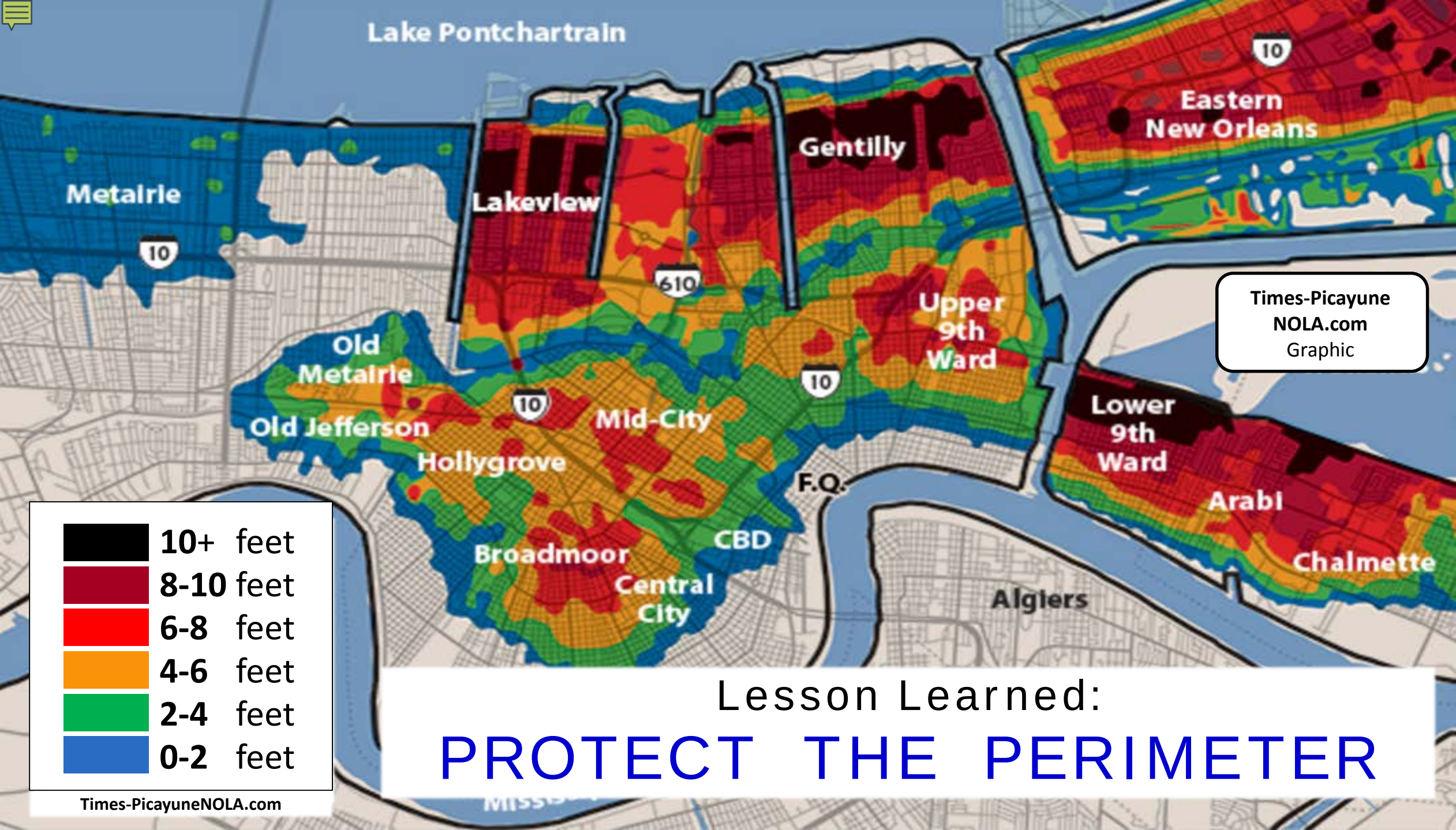

Lake Pontchartrain
Metairie
10
Lakeview
610
Gentilly
10
Eastern New Orleans
Upper 9th Ward
Old Metairie
Old Jefferson
10
Mid-City
Hollygrove
10
Wetlands
Lower 9th Ward
F.Q.
Arabi
Chalmette
CBD
Broadmoor
Central City
Algiers
Uptown
BUS. 90
Gretna
Mississippi River
10+ feet
8-10 feet
6-8 feet
4-6 feet
2-4 feet
0-2 feet
Times-Picayune
NOLA.com
Graphic

# New Orleans Topography




DUNCAN
WILLIAMS BLVD.
ELMWOOD
SUBURBAN
BONNABEL
BAYOU ST. JOHN
Lake Pontchartrain Causeway
N Causeway Blvd
17th Street Canal
Orleans Avenue Canal
London Avenue Canal
Industrial Canal
Intracoastal
Louis Armstrong New Orleans International...
Kenner
Lafreniere Park
Metairie
LAKEVIEW
GENTILLY
Camp Leroy Johnson
Seabrook
MID-CITY
HOLLY GROVE
Louis Armstrong Park
MARIGNY
FRENCH QUARTER
New Orleans
Arabi
River Ridge
Elmwood
Harahan
Bridge City
Tulane University
AUDUBON
Audubon Zoo
Waggaman
Avondale
Gretna
Terrytown
ALGIERS
Mississippi River

DUNCAN
WILLIAMS BLVD.
ELMWOOD
SUBURBAN
BONNABEL
BAYOU ST. JOHN
17th Street Canal
Orleans Avenue Canal
London Avenue Canal
Industrial Canal
Intracoastal
Louis Armstrong New Orleans International...
Kenner
Lafreniere Park
Metairie
N Causeway Blvd
GENTILLY
LAKEVIEW
PARK
FAIRGROUNDS
MID-CITY
HOLLY GROVE
Louis Armstrong Park
MARIGNY
FRENCH QUARTER
New Orleans
Camp Leroy Johnson
Seabrook
Arabi
River Ridge
Elmwood
Harahan
Bridge City
Tulane University
AUDUBON
Audubon Zoo
Waggaman
Avondale
Gretna
Terrytown
ALGIERS
Mississippi River


Lake Pontchartrain
Metairie
10
Lakeview
610
Gentilly
10
Eastern New Orleans
Upper 9th Ward
Times-Picayune
NOLA.com
Graphic
Old Metairie
Old Jefferson
10
Mid-City
Hollygrove
10
Lower 9th Ward
Arabi
Chalmette
F.Q.
CBD
Broadmoor
Central City
Algiers
10+ feet
8-10 feet
6-8 feet
4-6 feet
2-4 feet
0-2 feet
Times-PicayuneNOLA.com
Lesson Learned:
PROTECT THE PERIMETER

# Permanent Canal Closures & Pump Stations

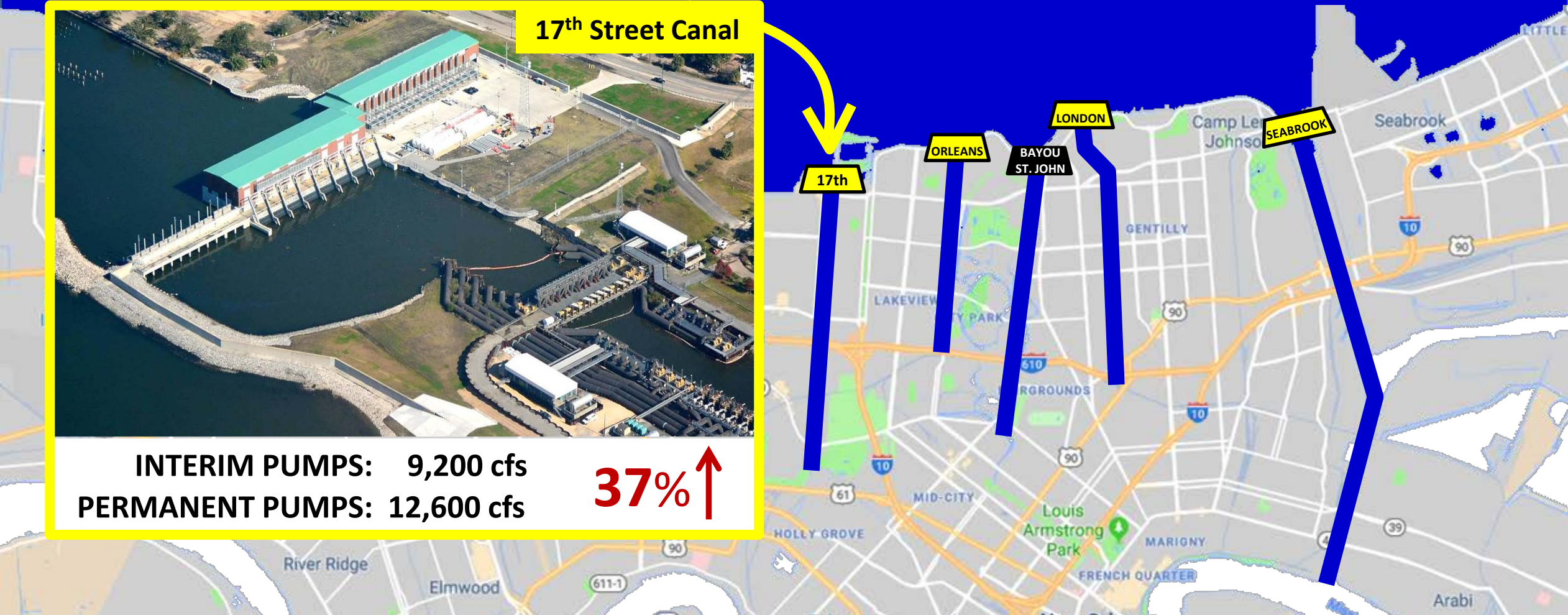


**17th Street Canal**

**INTERIM PUMPS: 9,200 cfs**

**PERMANENT PUMPS: 12,600 cfs**

**37% ↑**

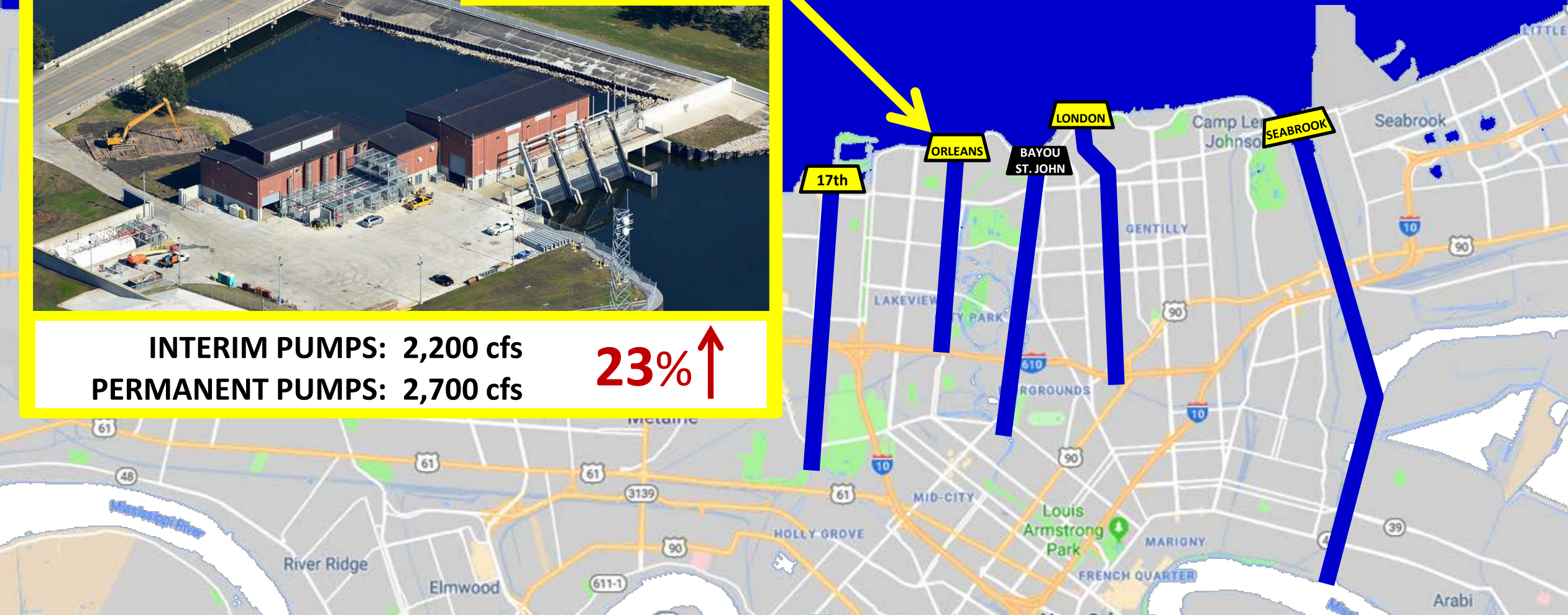


# Permanent Canal Closures & Pump Stations

**Orleans Avenue Canal**

**INTERIM PUMPS: 2,200 cfs**
**PERMANENT PUMPS: 2,700 cfs**

**23%↑**



# Permanent Canal Closures & Pump Stations

**London Avenue Canal**

**INTERIM PUMPS: 5,200 cfs**

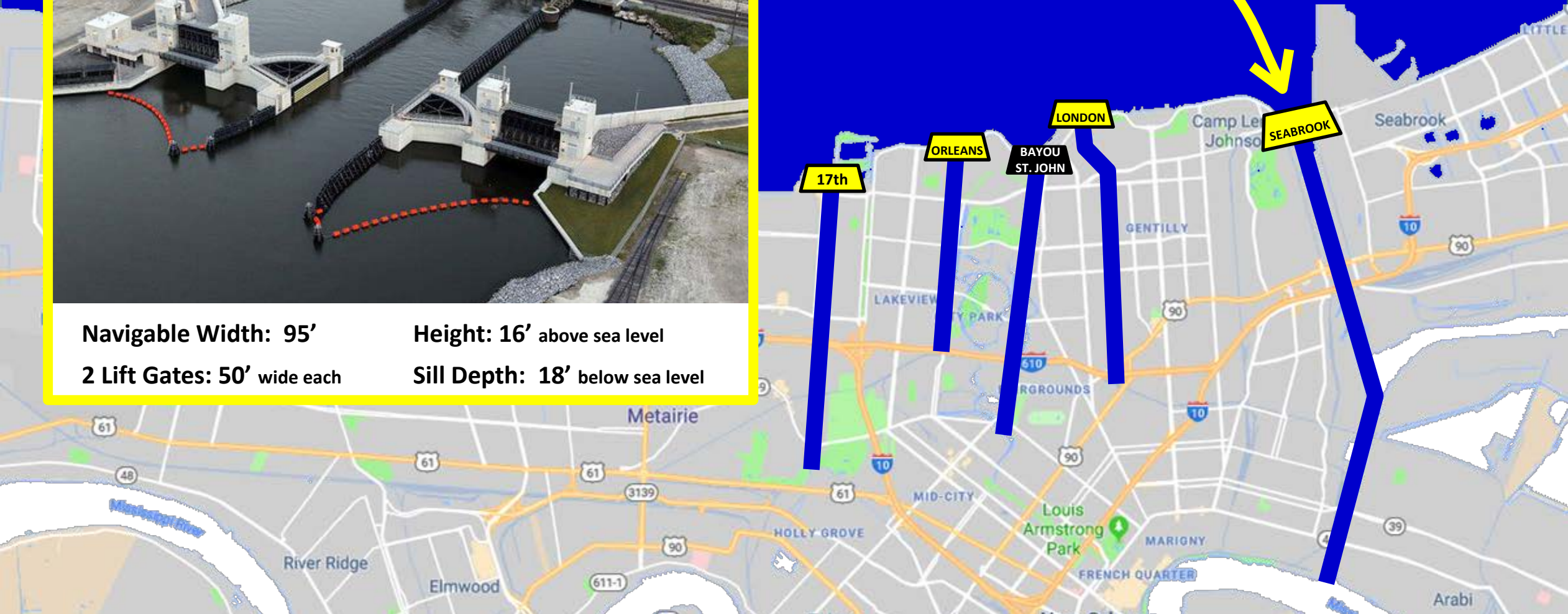
**PERMANENT PUMPS: 9,000 cfs**

**73% ↑**

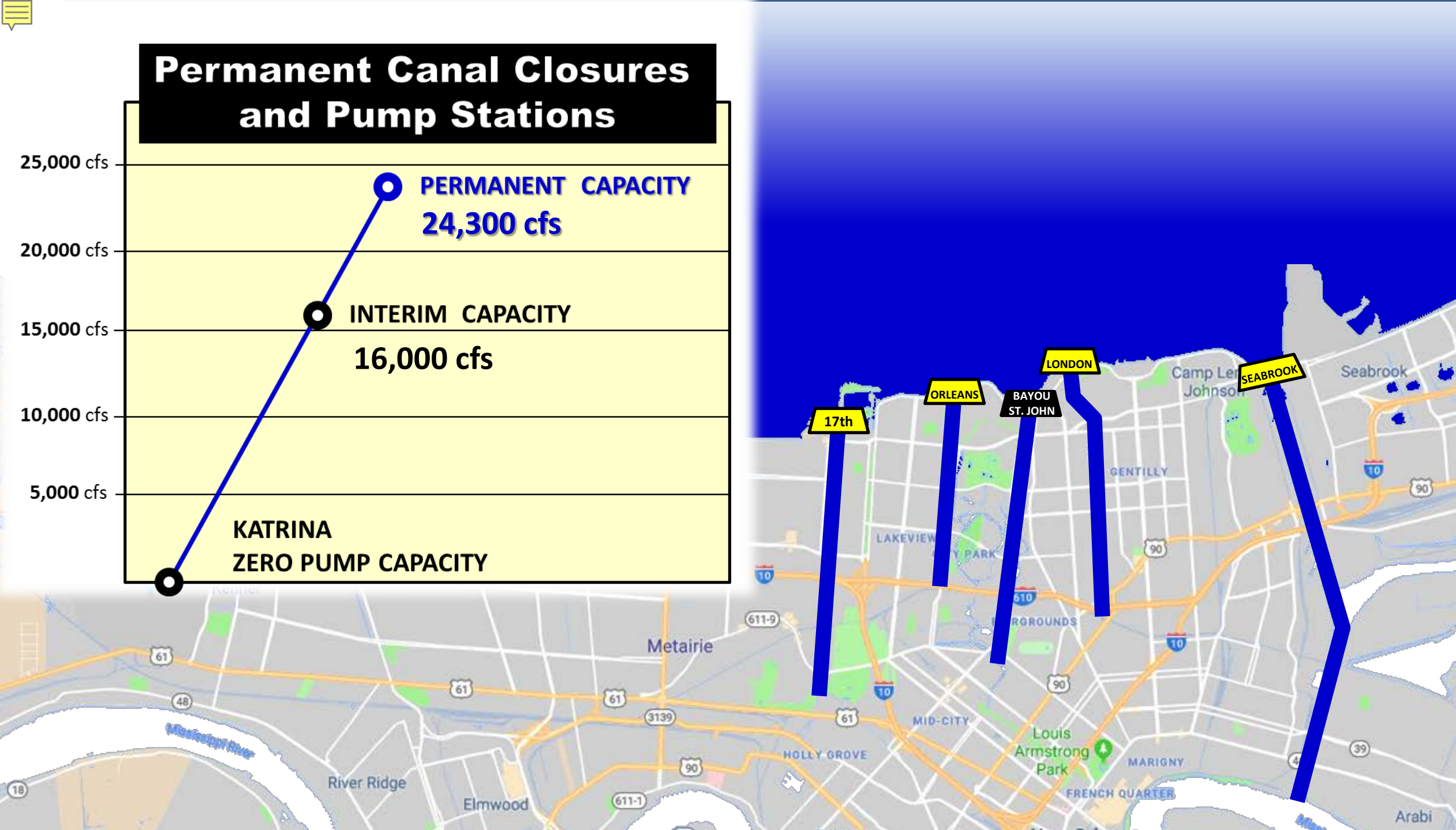
# Permanent Canal Closures & Pump Stations

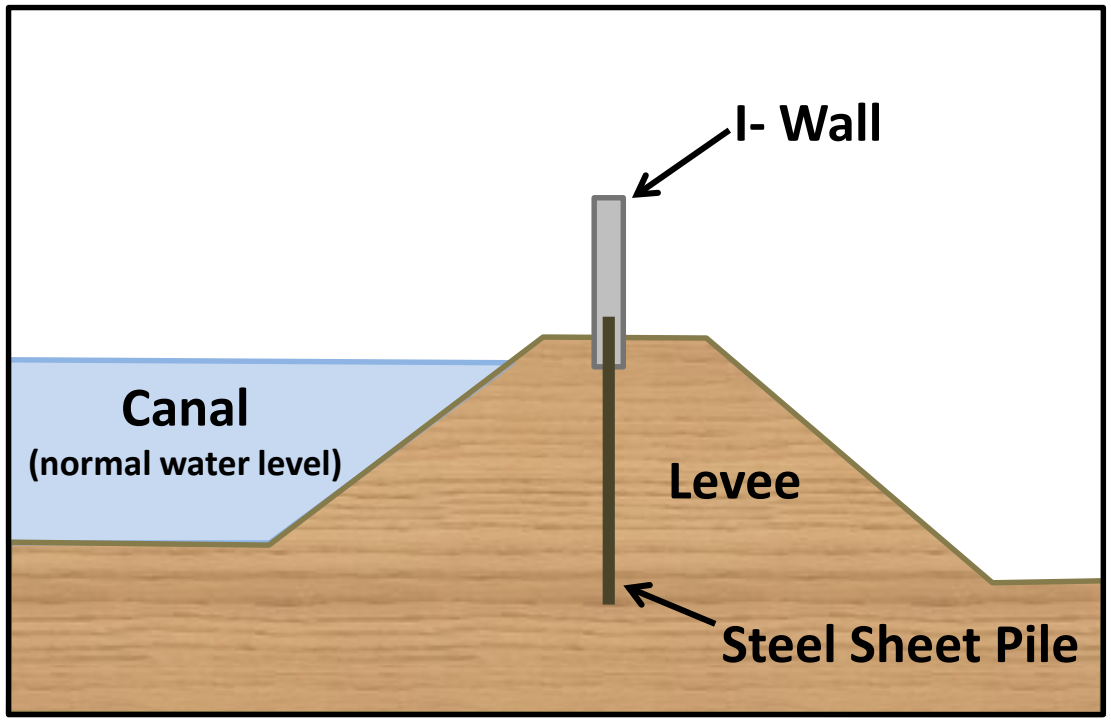
SEABROOK

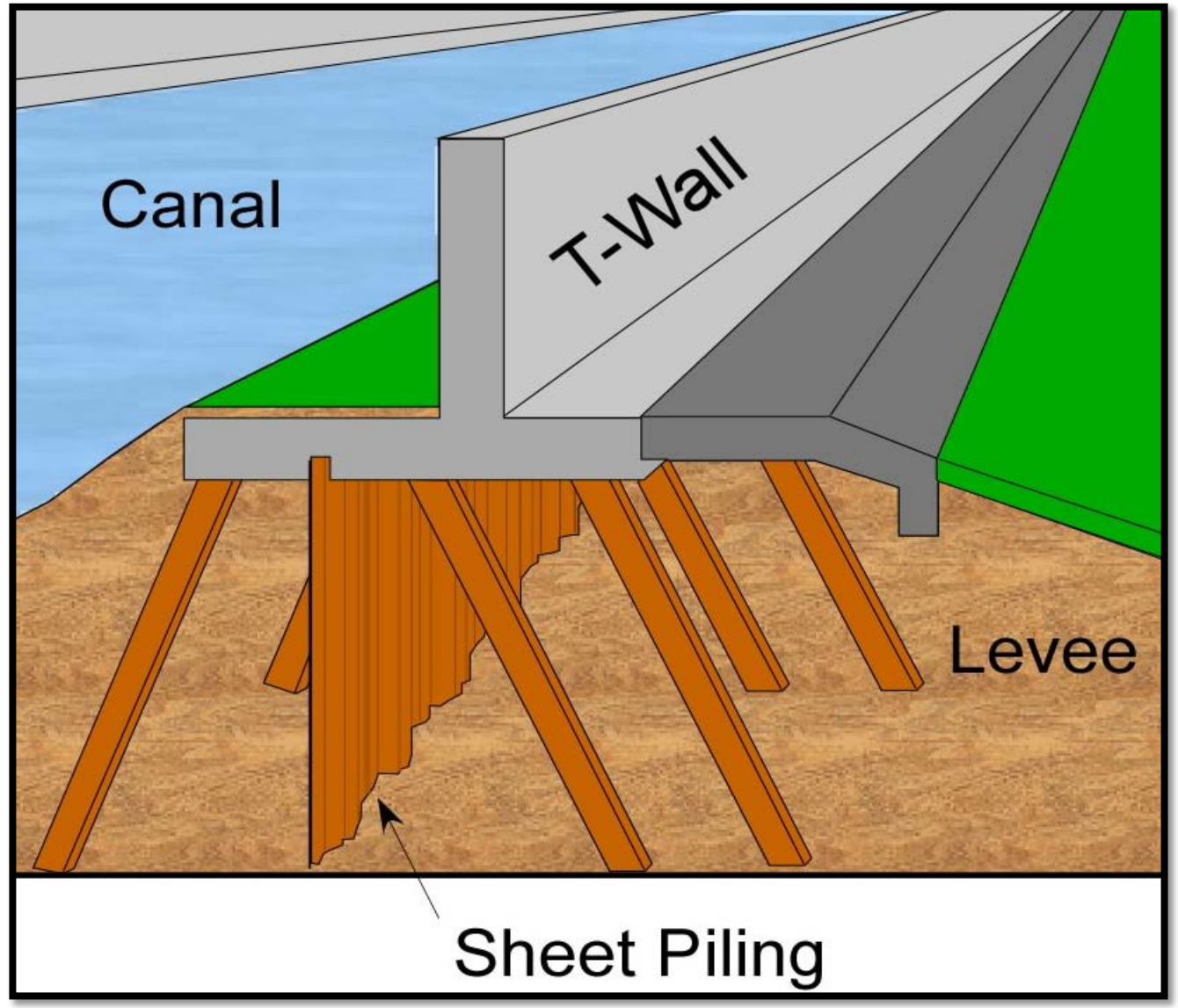
Navigable Width: 95’
Height: 16’ above sea level
2 Lift Gates: 50’ wide each
Sill Depth: 18’ below sea level



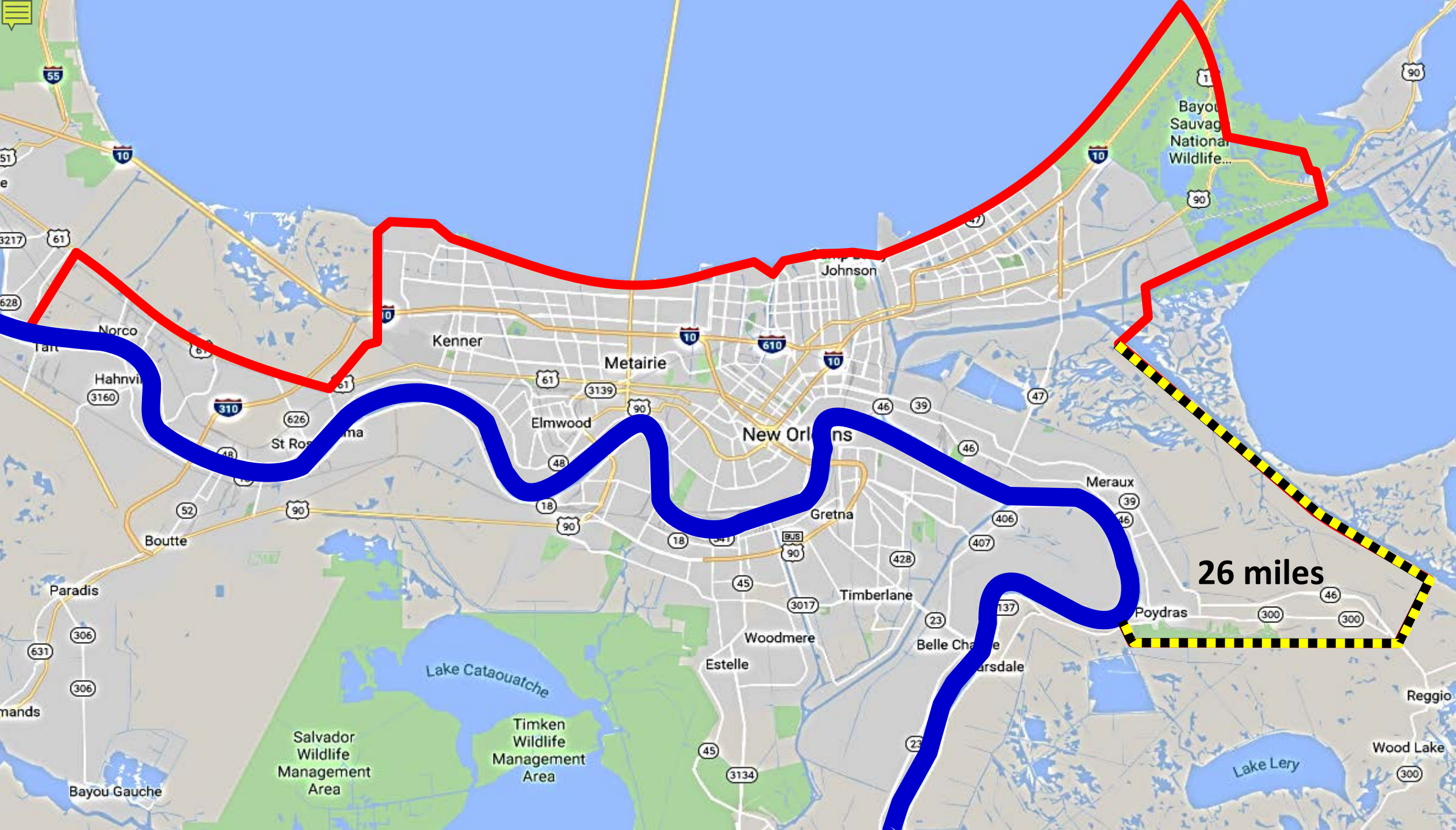
# Permanent Canal Closures and Pump Stations




I- Wall
Canal
(normal water level)
Levee
Steel Sheet Pile


Canal
T-Wall
Levee
Sheet Piling

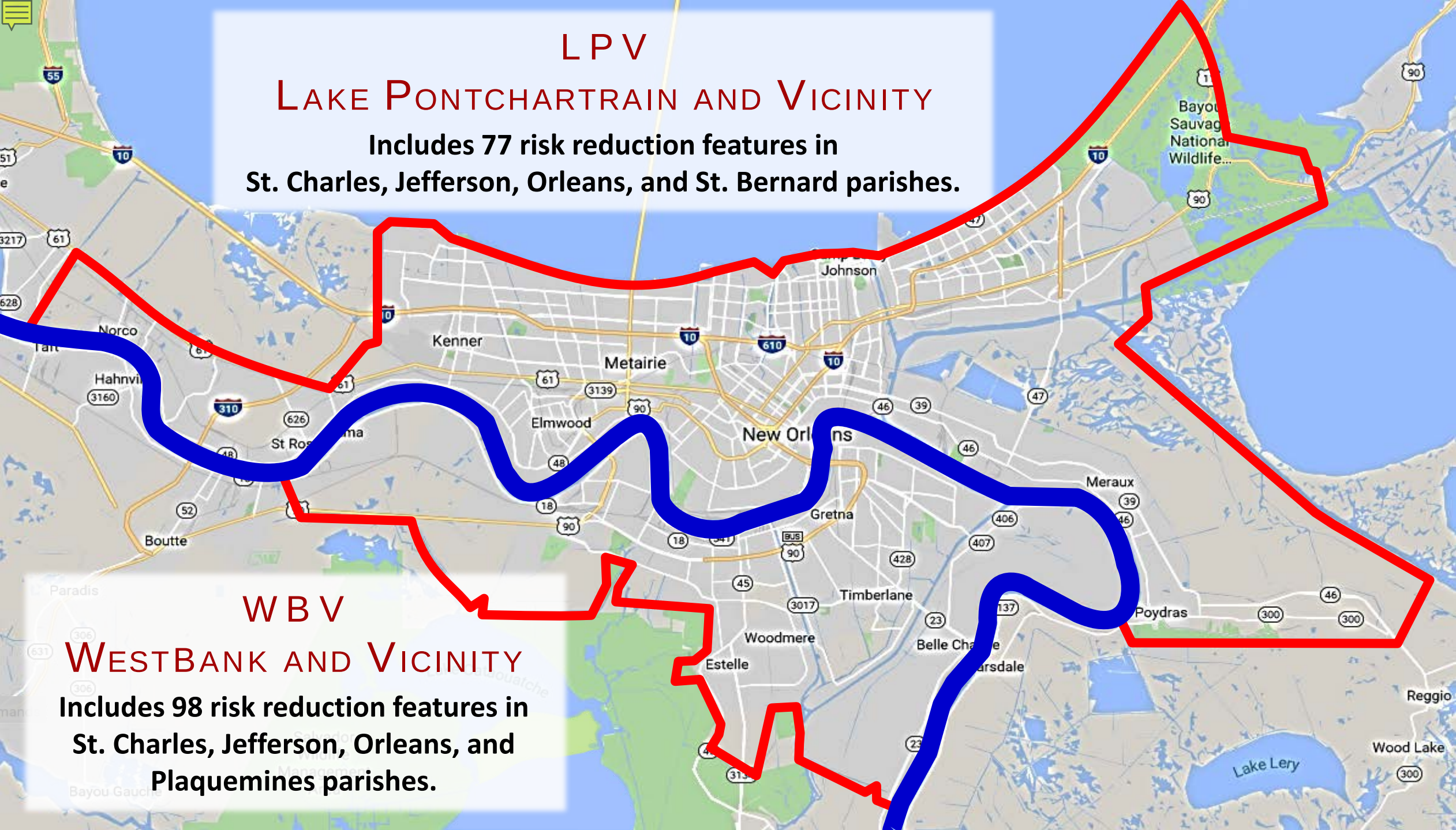
AFTER
Katrina
BEFORE
Katrina

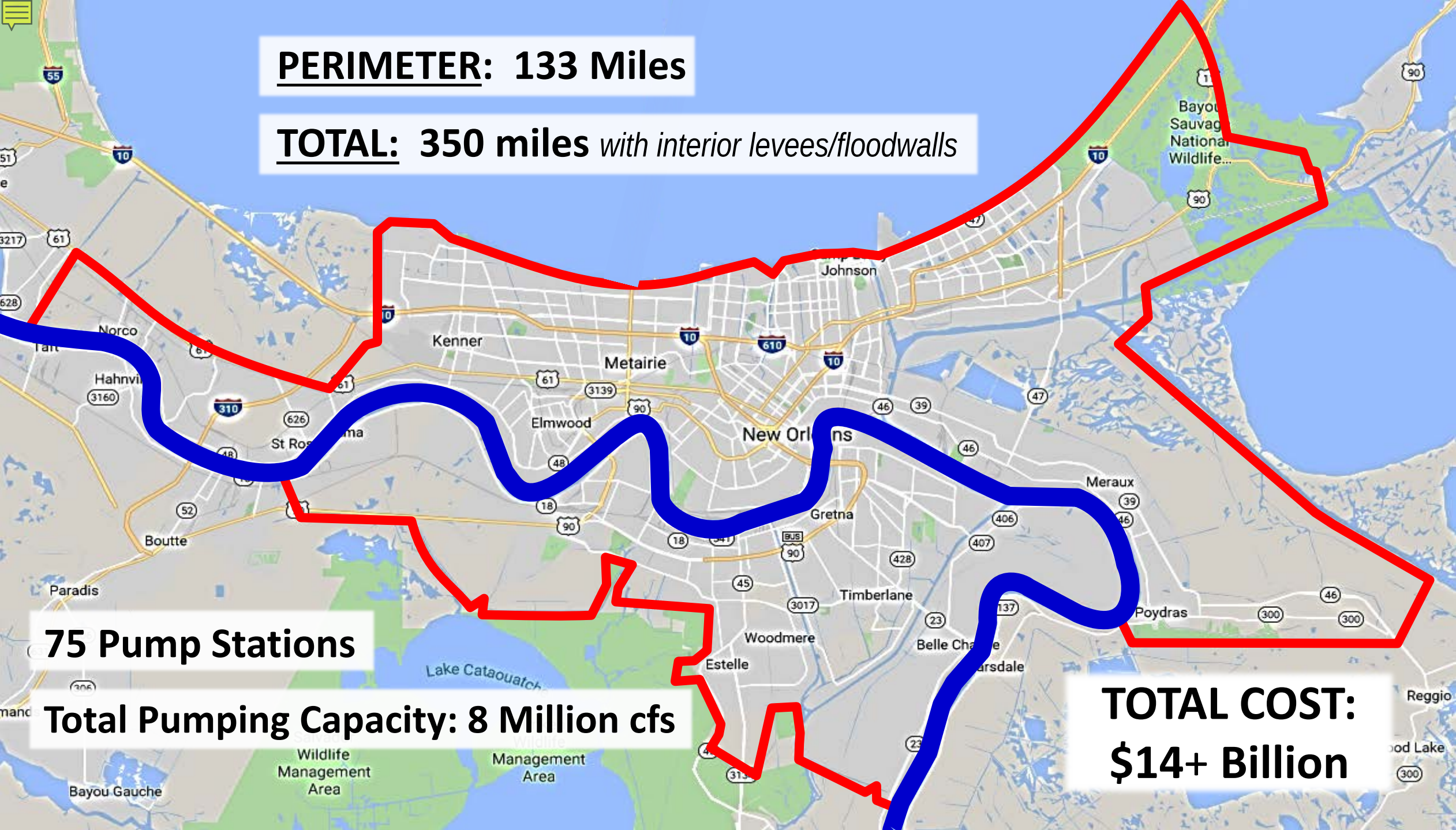

26 miles
Norco
Kenner
Metairie
Johnson
Elmwood
New Orleans
Meraux
Gretna
Boutte
Paradis
Timberlane
Woodmere
Estelle
Poydras
Belle Chasse
Lake Cataouatche
Salvador Wildlife Management Area
Timken Wildlife Management Area
Bayou Gauche
Lake Lery
Wood Lake
Reggio

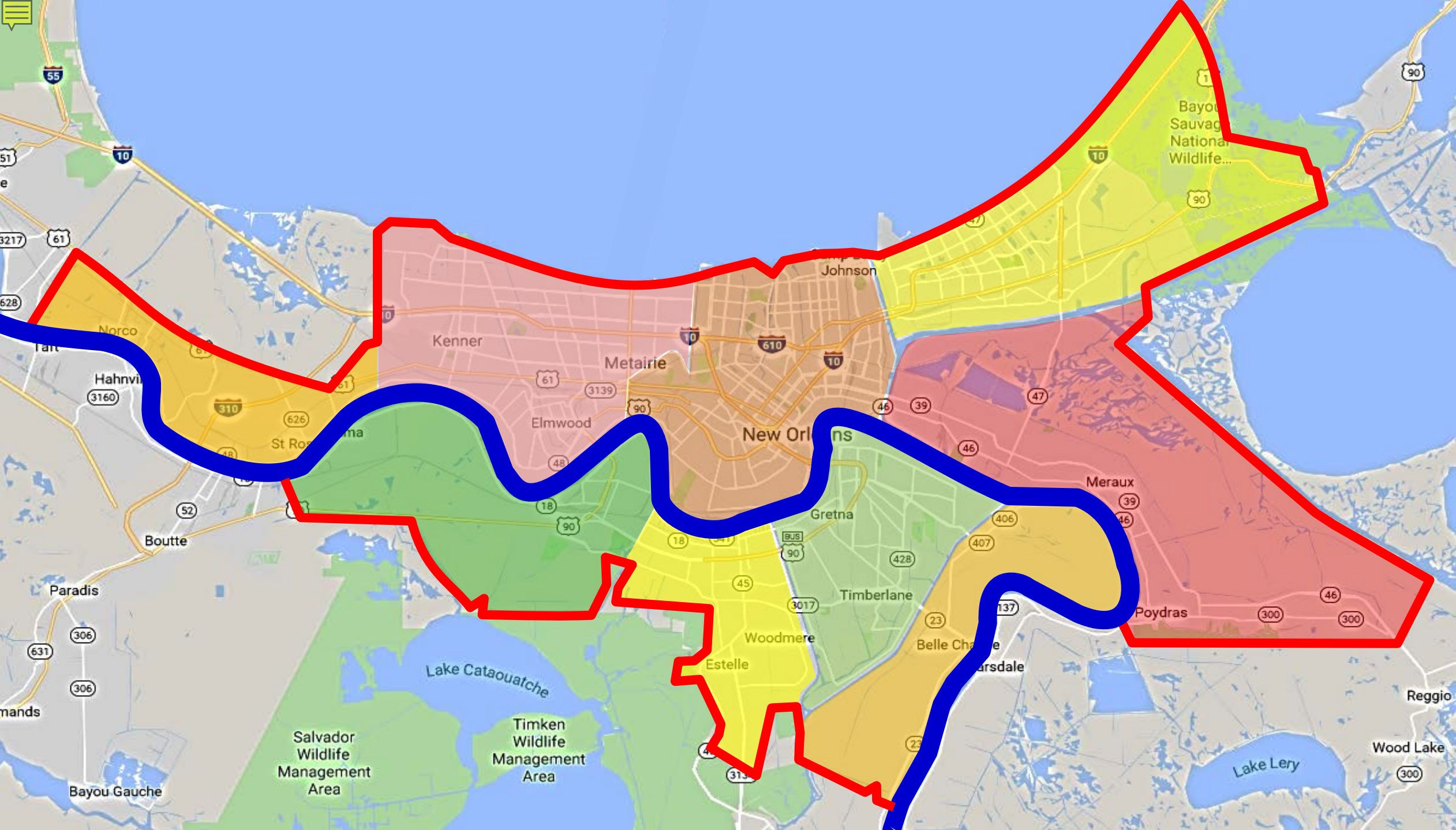
# LPV

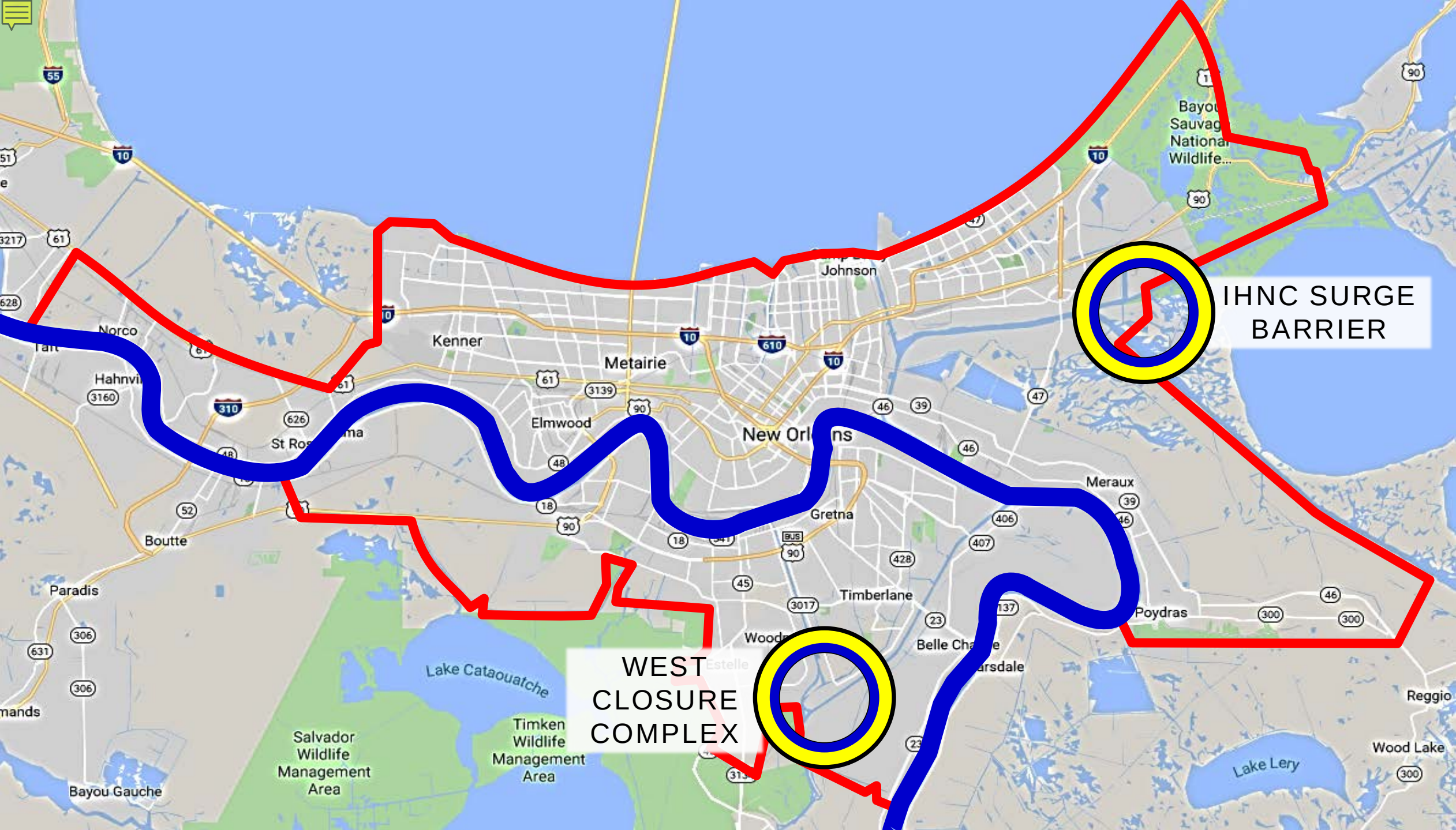
## Lake Pontchartrain and Vicinity

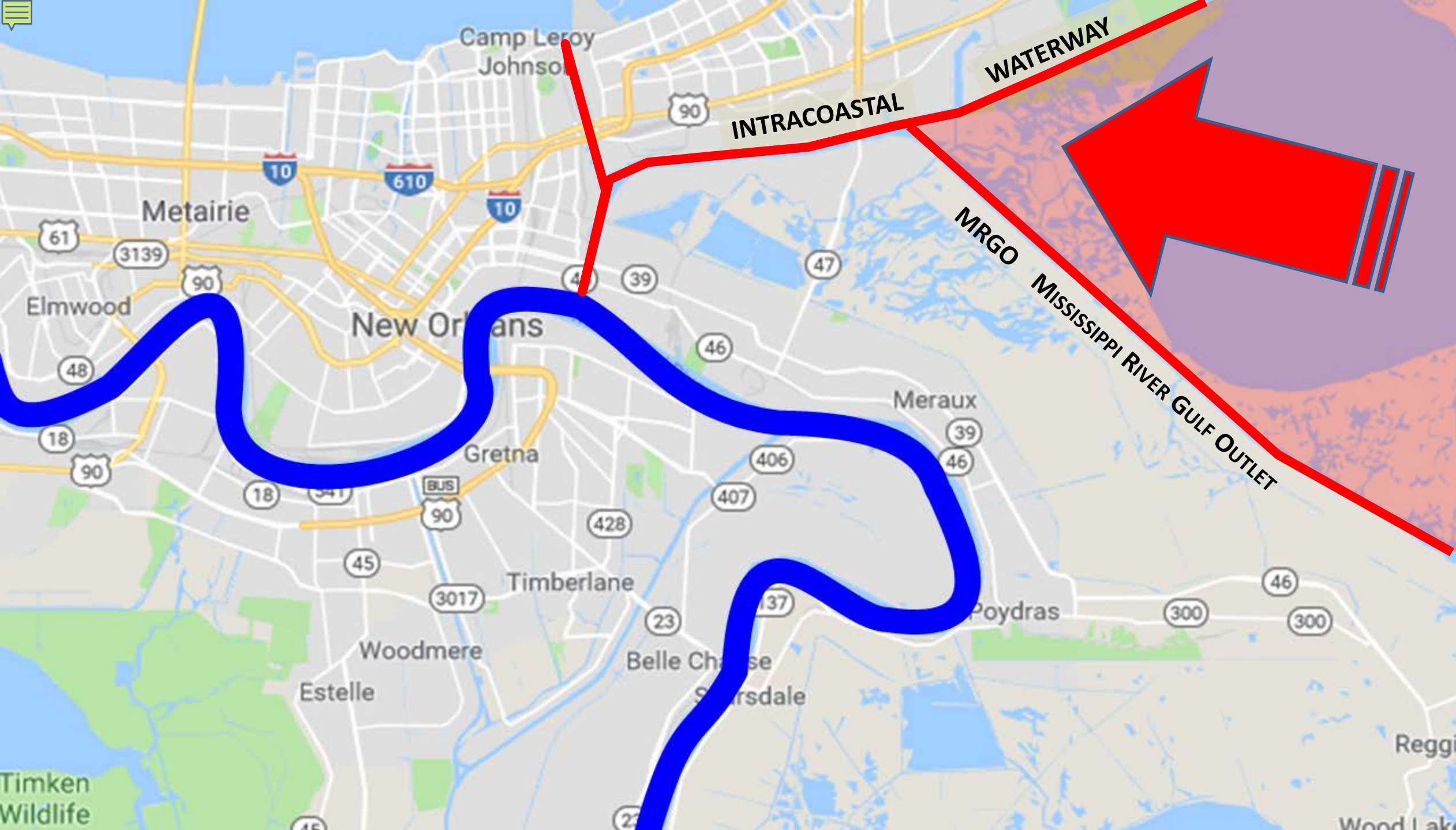
**Includes 77 risk reduction features in**
**St. Charles, Jefferson, Orleans, and St. Bernard parishes.**


LPV
Lake Pontchartrain and Vicinity
Includes 77 risk reduction features in
St. Charles, Jefferson, Orleans, and St. Bernard parishes.
WBV
WestBank and Vicinity
Includes 98 risk reduction features in
St. Charles, Jefferson, Orleans, and
Plaquemines parishes.
Norco
Kenner
Metairie
Johnson
Elmwood
Gretna
Meraux
Poydras
Timberlane
Woodmere
Estelle
Boutte
Lake Lery
Wood Lake

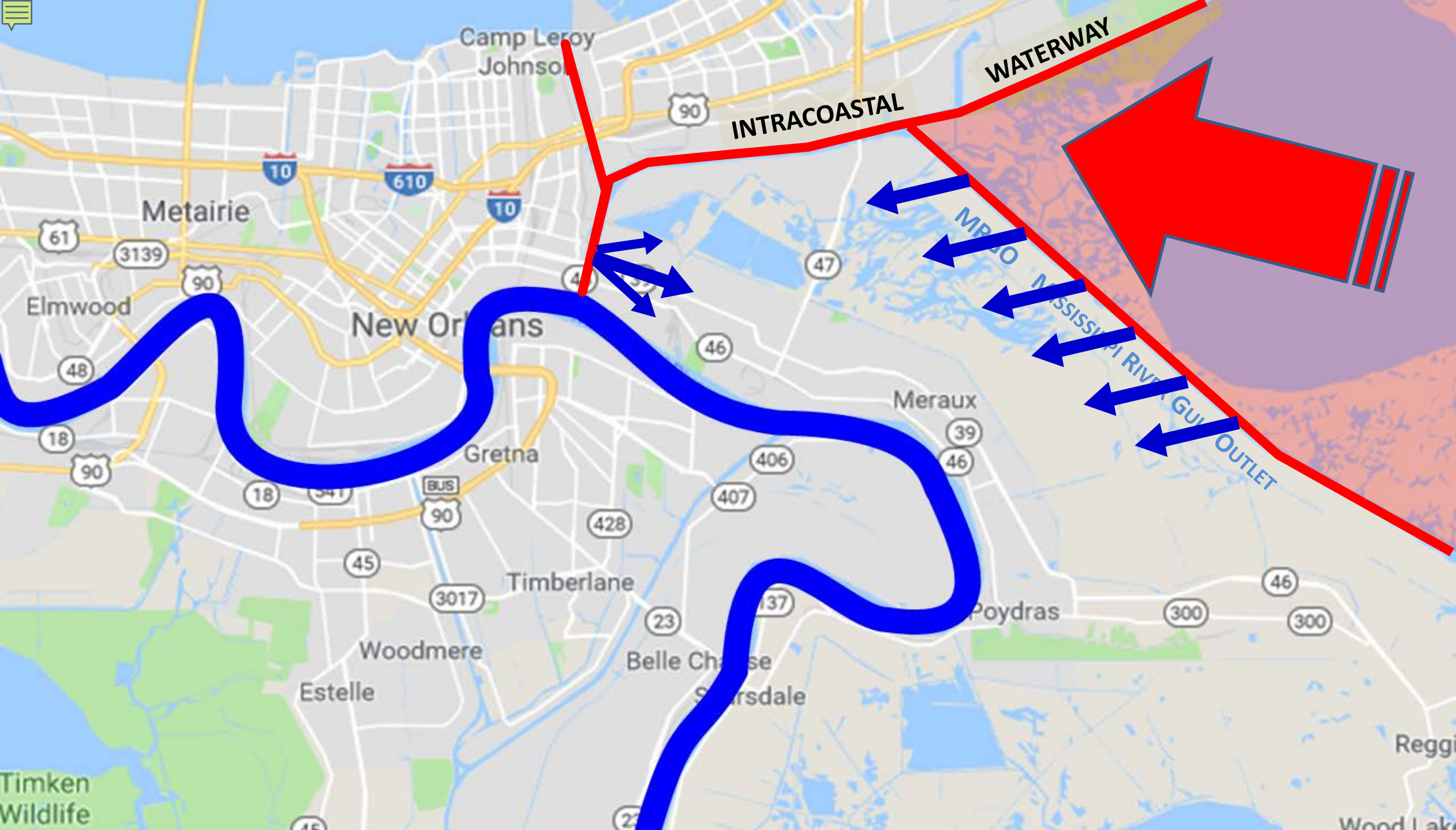

PERIMETER: 133 Miles
TOTAL: 350 miles with interior levees/floodwalls
75 Pump Stations
Total Pumping Capacity: 8 Million cfs
TOTAL COST:
$14+ Billion
Kenner
Metairie
Elmwood
New Orleans
Johnson
Norco
Hahnville
Boutte
Paradis
Gretna
Timberlane
Woodmere
Estelle
Belle Chasse
Meraux
Poydras
Lake Cataouatche
Wildlife Management Area
Wildlife Management Area
Bayou Gauche

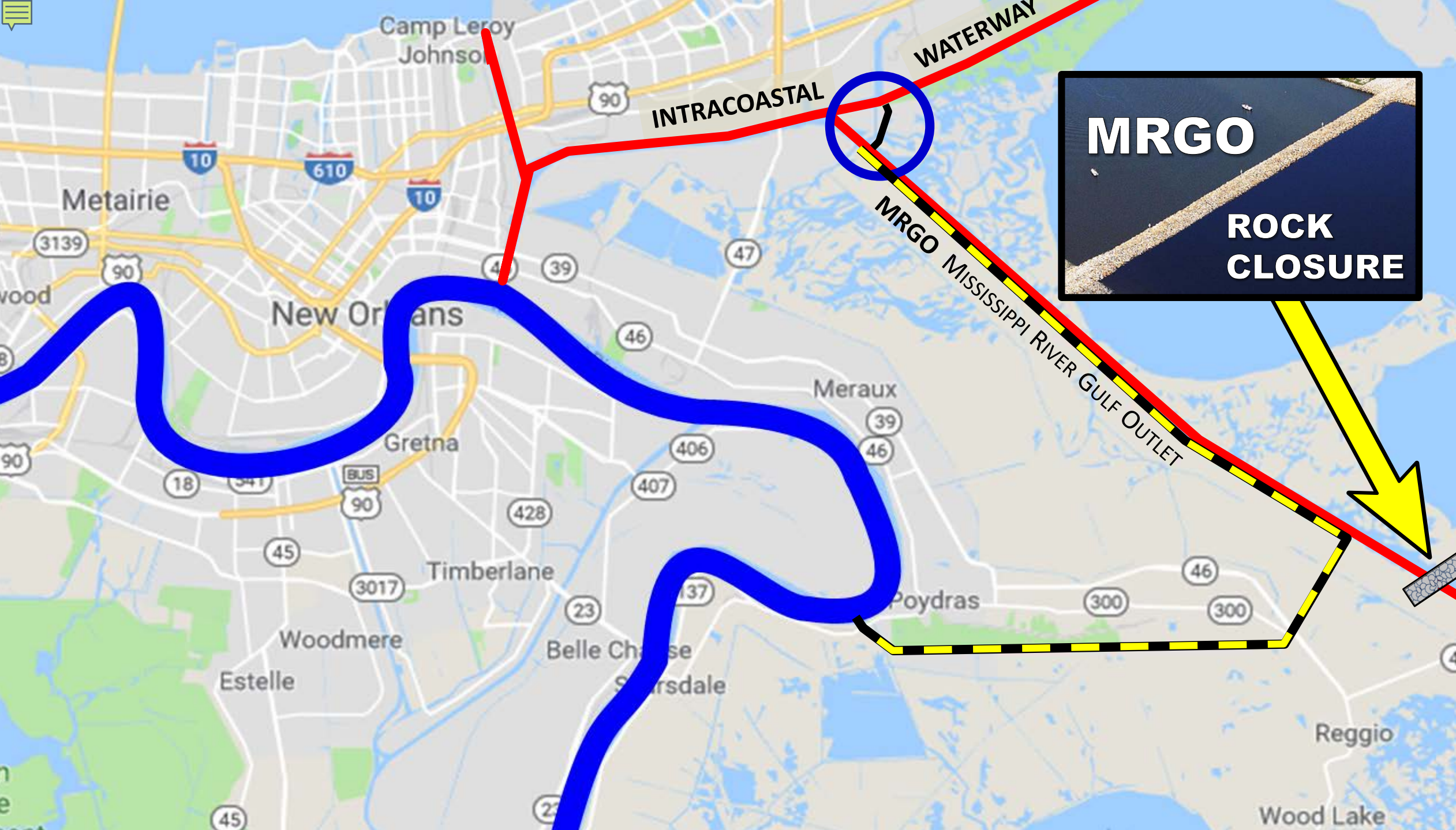

Norco
Kenner
Metairie
Johnson
Elmwood
New Orleans
Meraux
Gretna
Timberlane
Poydras
Boutte
Paradis
Woodmere
Estelle
Belle Chasse
Lake Cataouatche
Salvador Wildlife Management Area
Timken Wildlife Management Area
Bayou Gauche
Lake Lery
Wood Lake
Reggio


IHNC SURGE BARRIER
WEST CLOSURE COMPLEX
Kenner
Metairie
Elmwood
New Orleans
Johnson
Gretna
Timberlane
Meraux
Poydras
Belle Chasse
Boutte
Paradis
Norco
Hahnville
St Rose
Lake Cataouatche
Salvador Wildlife Management Area
Timken Wildlife Management Area
Bayou Gauche
Lake Lery
Wood Lake
Reggio
Bayou Sauvage National Wildlife...

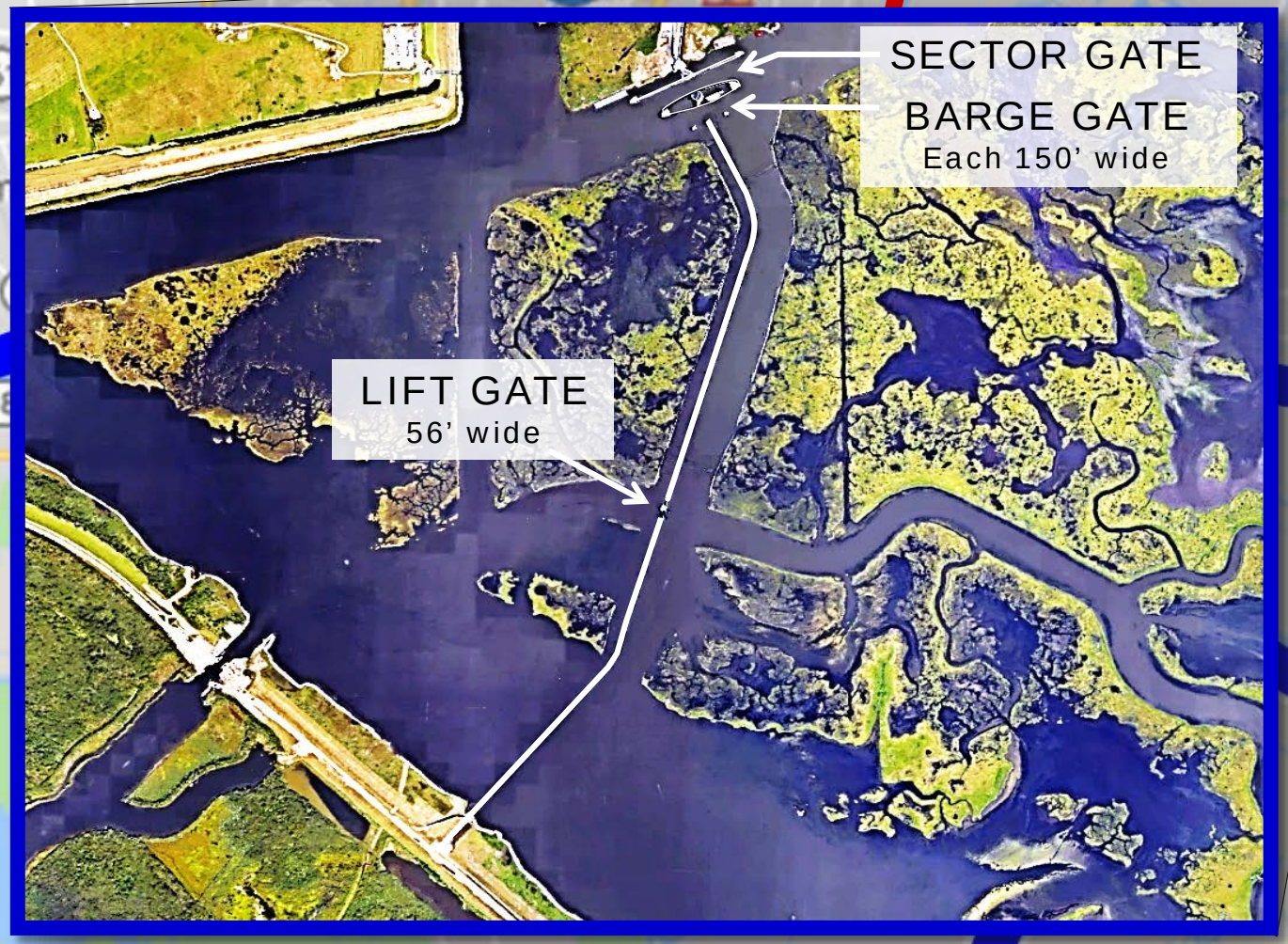


INTRACOASTAL WATERWAY
MRGO
MISSISSIPPI RIVER GULF OUTLET
Camp Leroy Johnson
Metairie
Elmwood
New Orleans
Gretna
Meraux
Timberlane
Woodmere
Estelle
Belle Chasse
Poydras
Timken Wildlife


INTRACOASTAL
WATERWAY
Camp Leroy Johnson
Metairie
Elmwood
New Orleans
Gretna
Timberlane
Woodmere
Estelle
Belle Chasse
Meraux
Poydras
Timken Wildlife
10
610
90
61
3139
48
18
341
BUS
45
3017
47
46
406
407
428
39
23
137
300



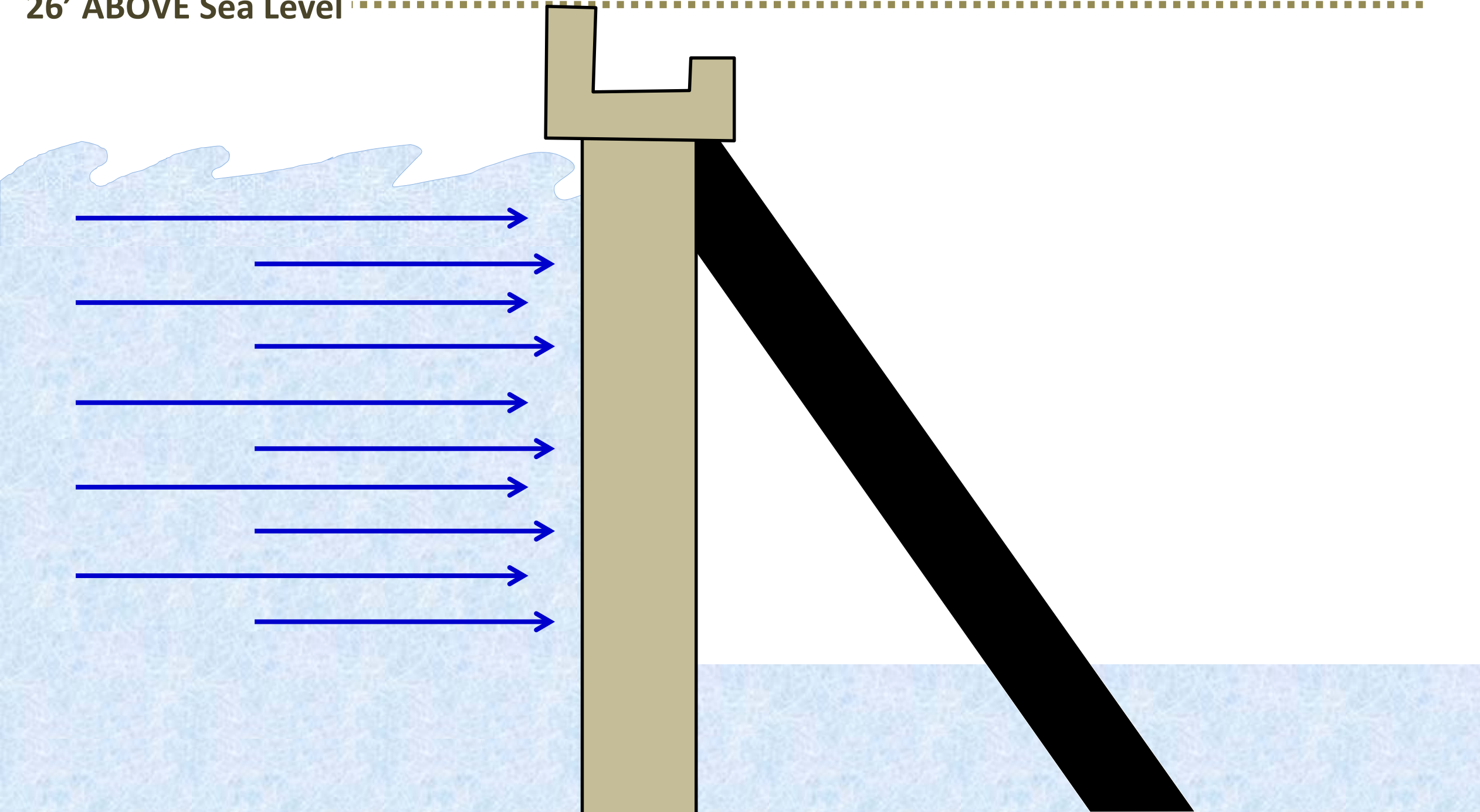
MRGO
ROCK CLOSURE
INTRACOASTAL WATERWAY
MRGO MISSISSIPPI RIVER GULF OUTLET
Camp Leroy Johnson
Metairie
New Orleans
Gretna
Timberlane
Woodmere
Estelle
Belle Chasse
Meraux
Poydras
Reggio
Wood Lake

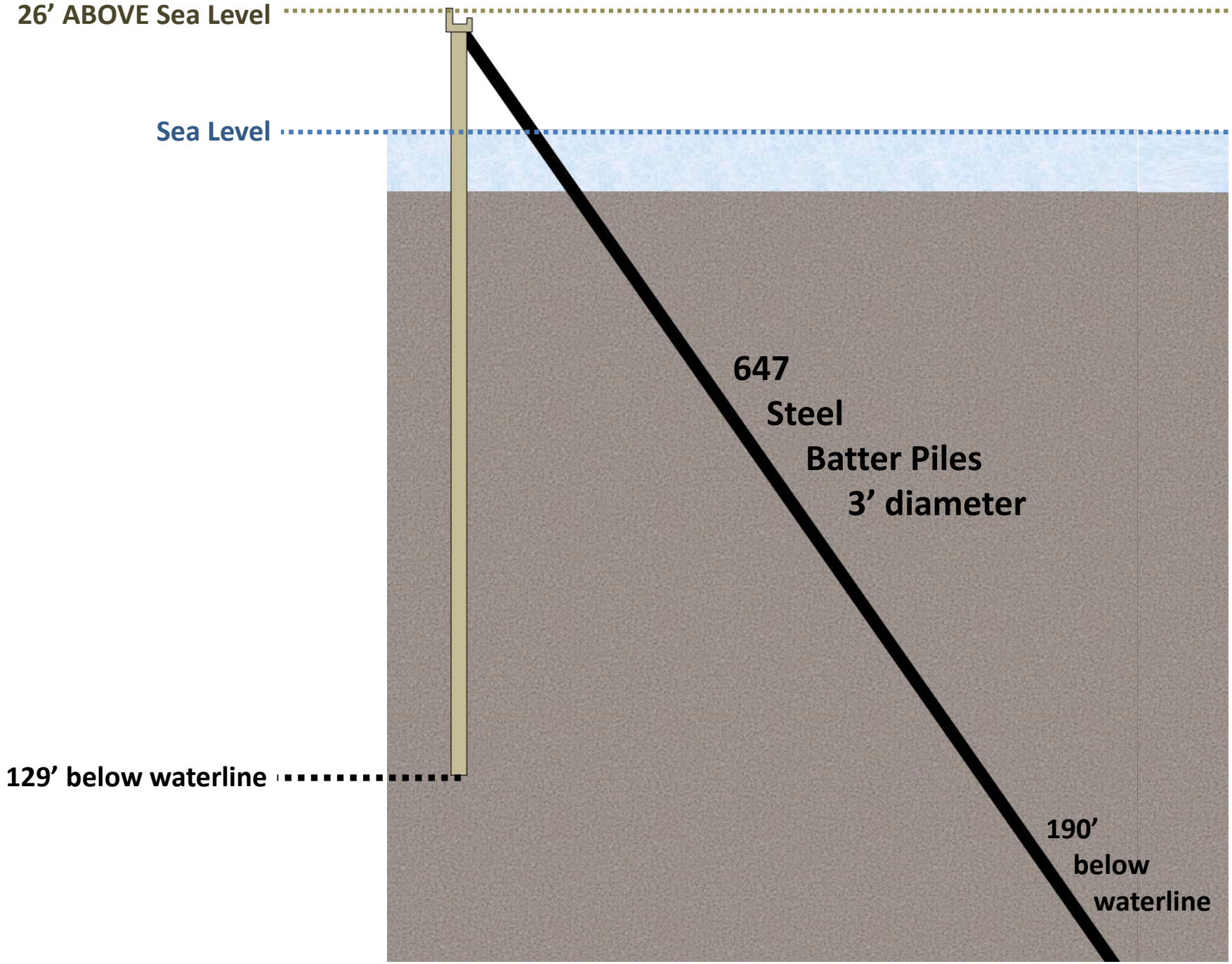



**COST:**
**~$1.1 Billion**

Largest continuous surge barrier
in the world: 1.8 miles
647 BATTER PILES
248’ long – 3’ diameter
1,271 Concrete Cylinder Piles (144’ long - 66” diameter)
2,512 Closure Piles (60’ long - 18” X 18”)

26’ ABOVE Sea Level

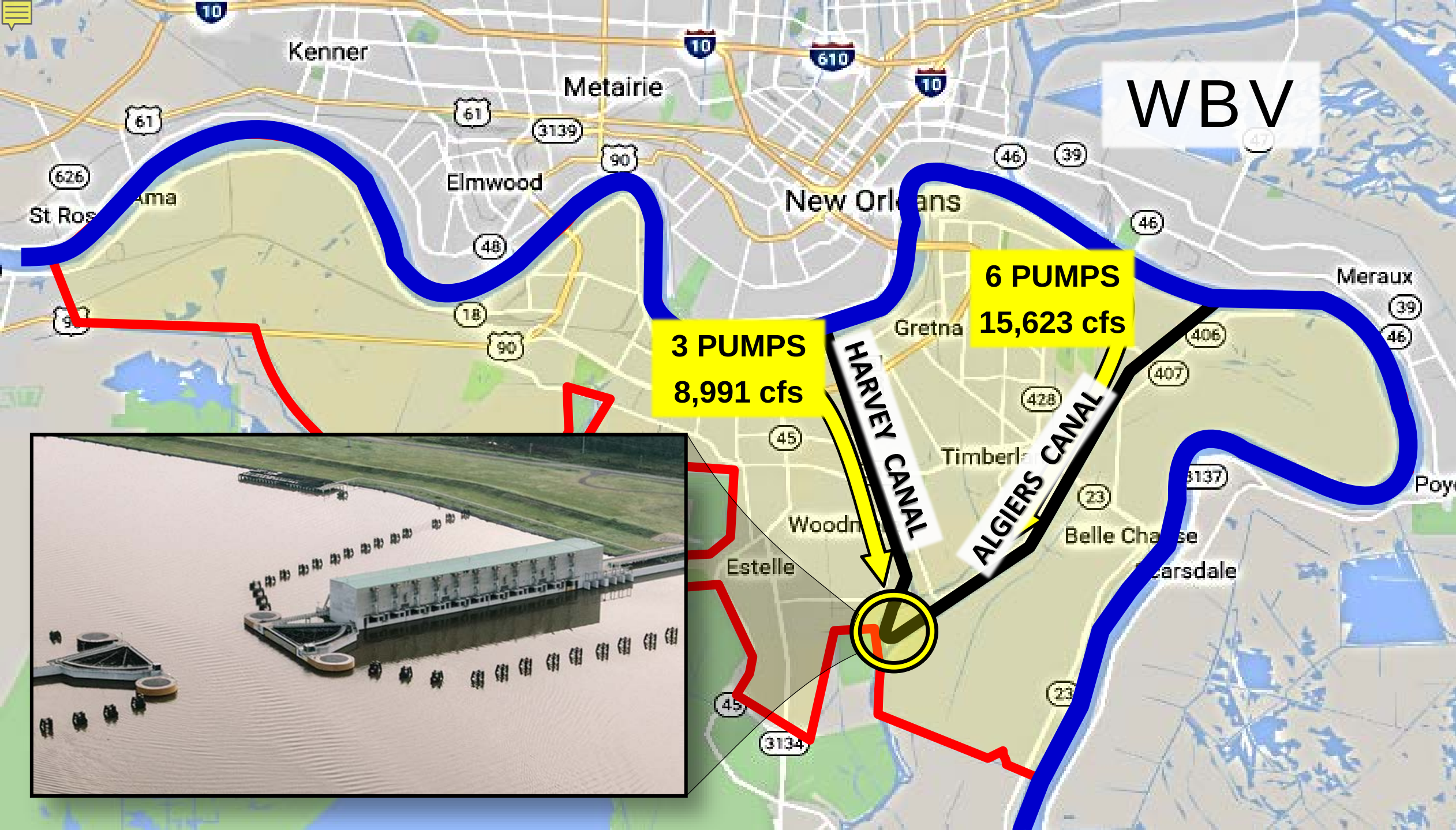



26’ ABOVE Sea Level
Sea Level
647
Steel
Batter Piles
3’ diameter
129’ below waterline
190’
below
waterline

# VIDEO OF SURGE BARRIER

https://www.floodauthority.org/videos/

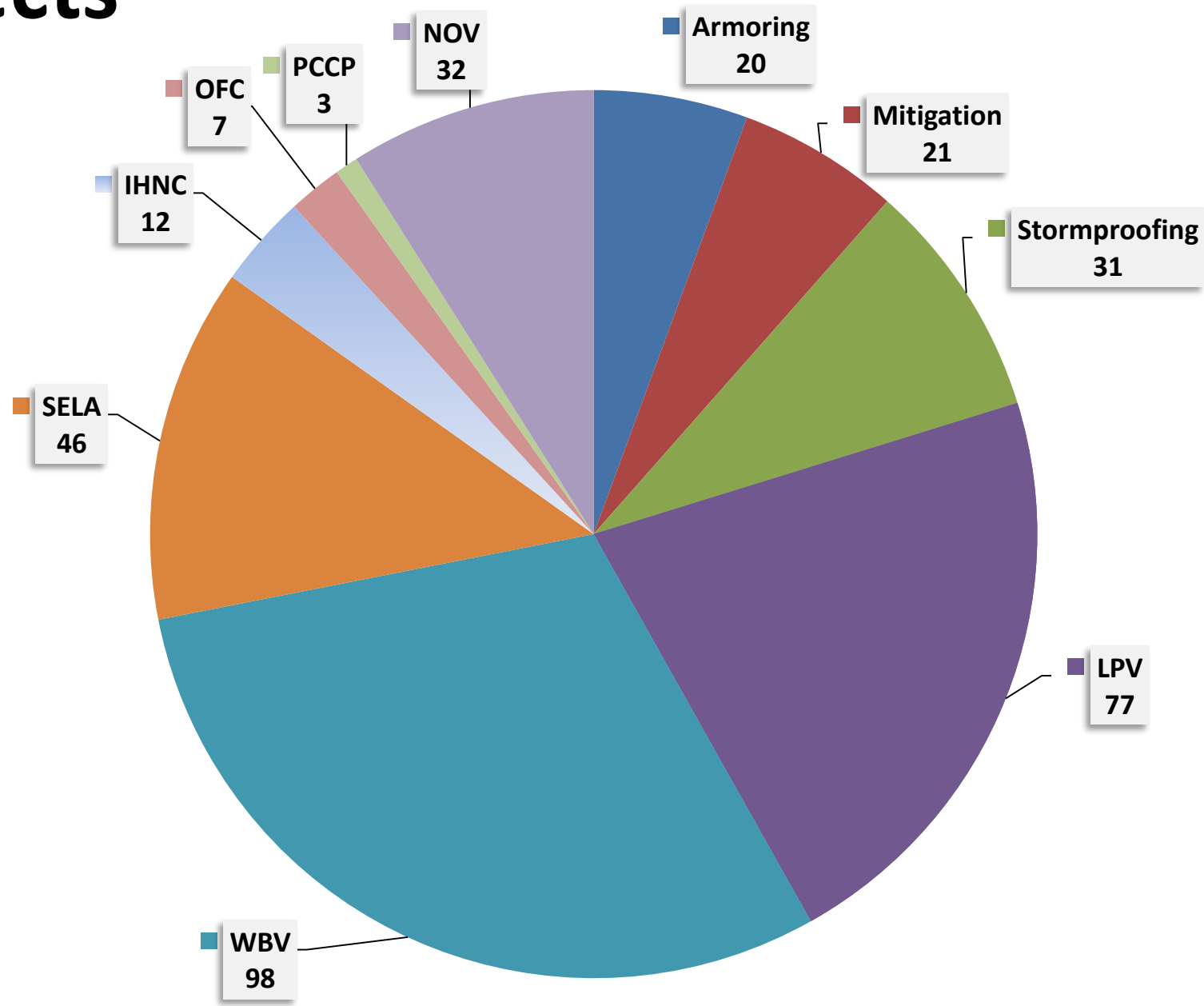
WBV
Kenner
Metairie
Elmwood
New Orleans
Gretna
Meraux
Timberlane
Woodmere
Estelle
Belle Chasse
Carsdale
Lake Cataouatche
Timken Wildlife Management Area
Salvador Wildlife Management Area
St Ros
Ama
10
610
61
3139
90
626
48
18
541
BUS
46
39
406
407
428
45
3017
23
3137
3134


WBV
Kenner
Metairie
Elmwood
New Orleans
Gretna
Meraux
Timberlane
Woodmere
Estelle
Belle Chasse
Pearsdale
3 PUMPS
8,991 cfs
6 PUMPS
15,623 cfs
HARVEY CANAL
ALGIERS CANAL

WEST
CLOSURE
COMPLEX
Removed more than 25 miles of levees
and floodwalls from direct surge impact
11 PUMPS
Total HP: 60,000
-- 225' ---
32' Tall
5 Sluice Gates
16' X 16'
WCC COST:
~ $1 Billion

Largest
Pump Station
in the World
CAPACITY:
19,426 cfs
1,165,560 cf/minute

# 356 Projects



COASTAL PROTECTION AND RESTORATION AUTHORITY
CPRA