



U.S. ARMY



US Army Corps
of Engineers®



AGENDA



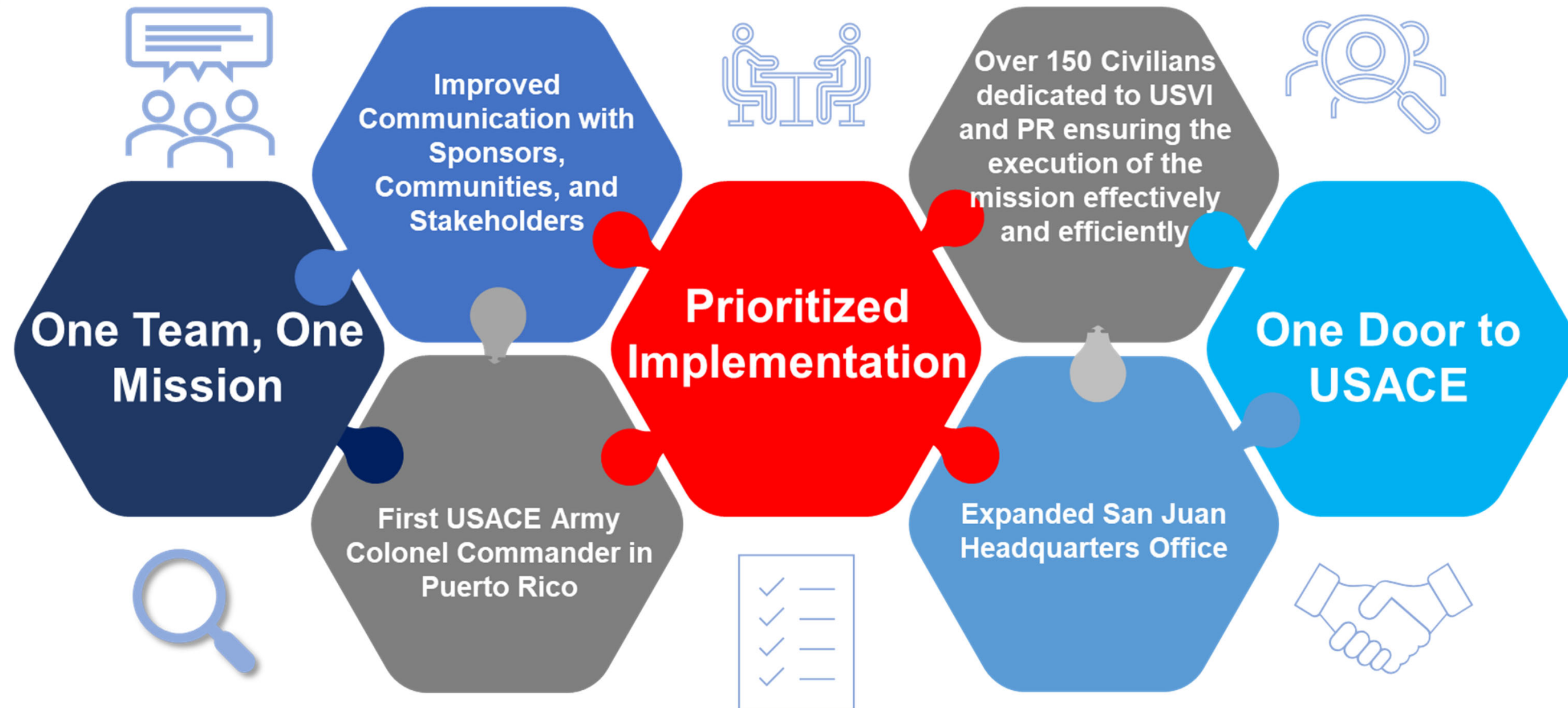
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- WELCOME AND INTRODUCTIONS
- TASK FORCE VIRGIN ISLANDS PUERTO RICO
- PROJECT OVERVIEW & VISION
- EXISTING CONDITIONS & IMPACTS
- RIO PUERTO NUEVO INDIVIDUAL CONTRACTS
- MOVING FORWARD WITH CHANGE



USACE TASK FORCE VIPR

Provides additional leadership bandwidth and focus on priority missions in USVI and PR





TF VIPR ENGAGEMENT IN PUERTO RICO



Program Value in Excess of >\$6B

Civil Works and Public Infrastructure (Approved Funding Levels*)

Rio Puerto Nuevo	\$1.585B
Rio de la Plata	\$485M
Rio Grande de Arecibo	\$174M
Caño Martin Peña	\$163.3M
Rio Culebrinas	\$40M
Rio Grande de Manati (Ciales)	\$14.8M
Rio Guayanilla	\$60.6/220M
Rio Guanajibo	\$107M
Rio Nigua at Salina	\$47.8M
San Juan Harbor	\$45.6M
Guajataca Dam	\$1B
PR Coastal Study	\$6.3M



Military and Work for Others (Active Construction)

PR National Guard Camp Santiago Joint Training Center	\$291M
FDA San Juan Facility	\$10M
Fort Buchanan Army Family Housing	\$31.9M
Fort Buchanan Antilles Middle School Replace HVAC	\$3.49M
Fort Buchanan Physical Fitness Facility	\$10.08M
Fort Buchanan Army Reserve Center Training Bldg	\$19.27M
Puerto Nuevo Army Reserve Center Energy Resilience	\$9.6M



Civil Works and Public Infrastructure



Military and Work for Others

*NOTE: Current cost estimates exceed approved funding levels on many projects.



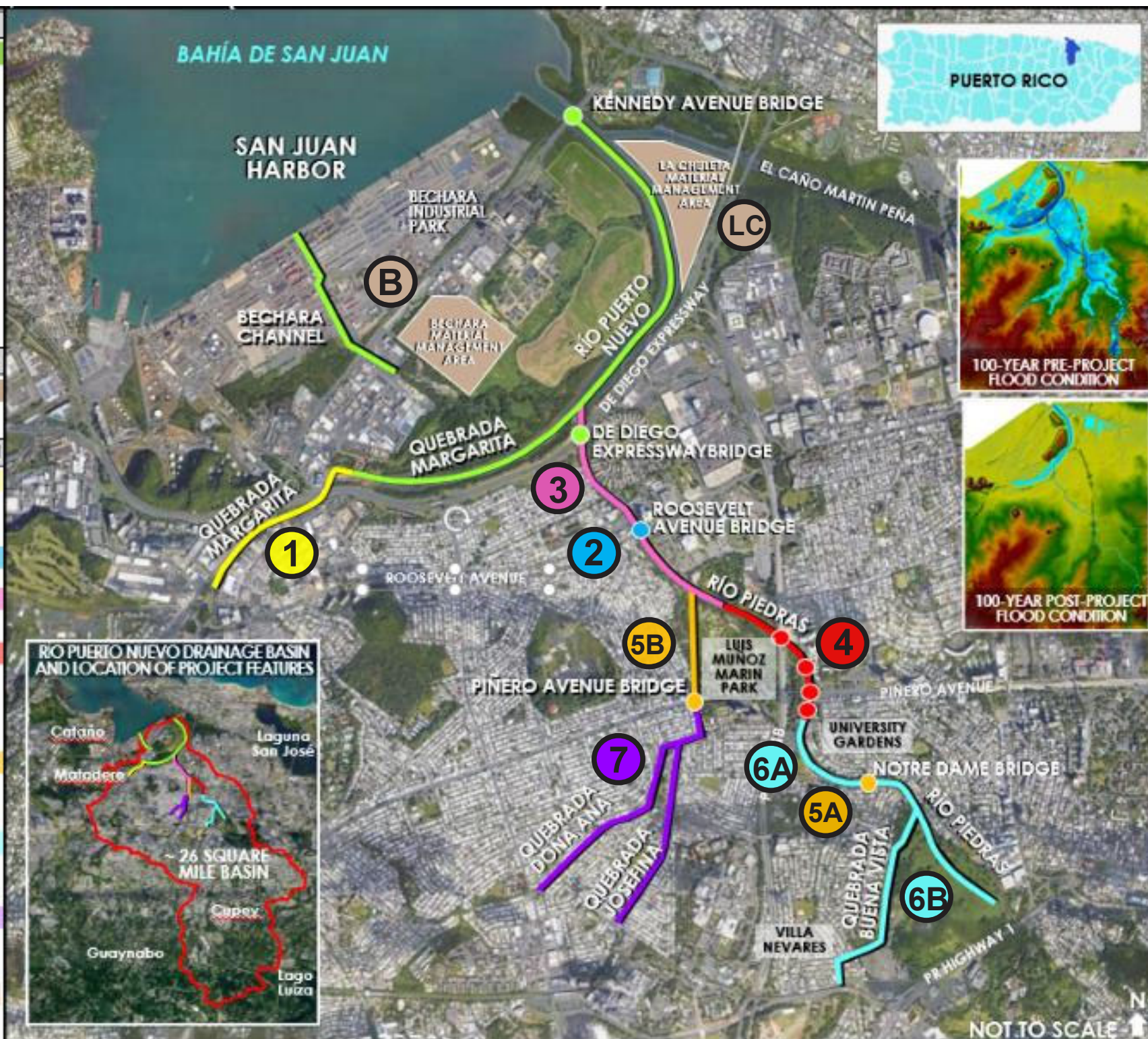
RIO PIEDRAS – EXISTING CONDITIONS



RIO PUERTO NUEVO OVERVIEW



COMPLETED (COST SHARED)
CONTRACTS 1, 1A, 2A/AR, 2AA, 2C1, 2D WALLS
STATUS: 2D Walls, last completed, was May 2022
AMOUNT: \$470M
- Kennedy Bridge seismic retrofit; 36-inch water line - First 1.3 miles of channel improvements - Quebrada Margarita channel excavation and confluence wall; lower Puerto Nuevo channel dredging - Bechara Channel secant pile wall box culvert; 90-inch sewer line modification; open channel work - De Diego Expressway Bridge abutments; east and west pier drill shaft reinforcement - Quebrada Margarita Stilling Basin - Construction of 350-foot left channel wall and 750-foot right channel wall at channel confluence.
ONGOING (SUPPLEMENTAL) CONSTRUCTION
CONTRACT - LA CHULETA
Upland Material Management Area (future capacity of ~350,000 cubic yards of material)
REMAINING (SUPPLEMENTAL) CONSTRUCTION
CONTRACT 1 UPPER MARGARITA CHANNEL
- Sewer line relocation - Construction of .63 miles of channel improvements at Upper Quebrada Margarita
CONTRACT 2 ROOSEVELT BRIDGE
Roosevelt Avenue Bridge replacement
CONTRACT 3 MAIN CHANNEL (RIO PIEDRAS)
- Channel walls 1.1 miles of Main Channel improvements
CONTRACT 4 LAS AMERICAS BRIDGES
- Channel, Stilling Basin and Bridge Replacements 4A-1: Las Americas Expressway Bridge 4A-2: Piñero Avenue Bridge East 4A-3: Northeast Access Ramp Bridge 4A-4: Southeast Access Ramp Bridge
CONTRACT 5 NOTRE DAME & W. PIÑERO BRIDGE
5A: Notre Dame Bridge replacement 5B: Piñero Avenue Bridge West replacement; Quebrada Josefina downstream to Rio Piedras
CONTRACT 6 MAIN CHANNEL / BUENA VISTA
1.75 miles of Rio Piedras channel improvements 4 bridges (2 new; 2 replacements) .80 miles channel diversion at Quebrada Buena Vista
CONTRACT 7 JOSEFINA & DOÑA ANA CHANNEL
10 bridge replacements 5000 LF. of Quebrada Josefina and 4400 LF. of Quebrada Doña Ana channel improvement
CONTRACT - BECHARA
Upland Material Management Area (future capacity of ~600,000 cubic yards of material)



Sponsor: PR Department of Natural and Environmental Resources (DNER)

Funding: Approved Current Working Estimate \$1,584,982,000 (funds available at HQUSACE), Current Cost Estimate (NOV 2022 Cost Estimate) \$3,595,668,000 (100% Federal)

Description and Status:

- Construction will be accomplished in 17 contracts. Six contracts have been completed and ten contracts are currently in design. Upcoming contracts to be awarded are Contract 2 in March 2024 and Contract 3 in Winter 2024. The project's construction completion is expected in 2033.
- This project was fully funded by the Bipartisan Budget Act of 2018 (BBA 2018), however current cost estimates exceed approved funding levels.

Updates:

- Team continues working with communities along Rio Piedras and Reparto Metropolitano. There has been significant progress made, with more to come.
- There is a heavy emphasis of Engineering with Nature on the design, collaboration with ERDC and continuing input from communities. Reduction of >30 acres of concrete from the project!

Construction Temporary Impacts:

- Minor temporary impacts to environment during construction
- Removal of trees to allow construction access
- Maintenance of traffic
- Temporary inconvenience

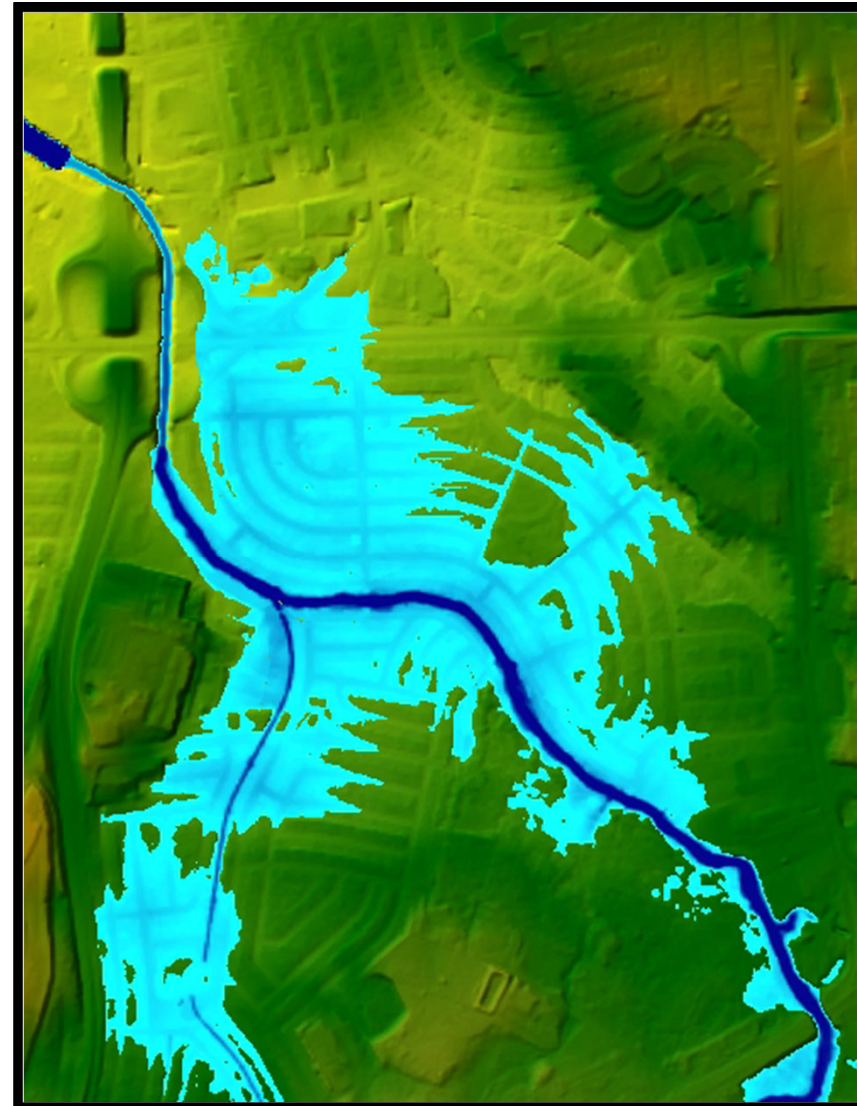


RIO PUERTO NUEVO – PRE PROJECT CONDITIONS

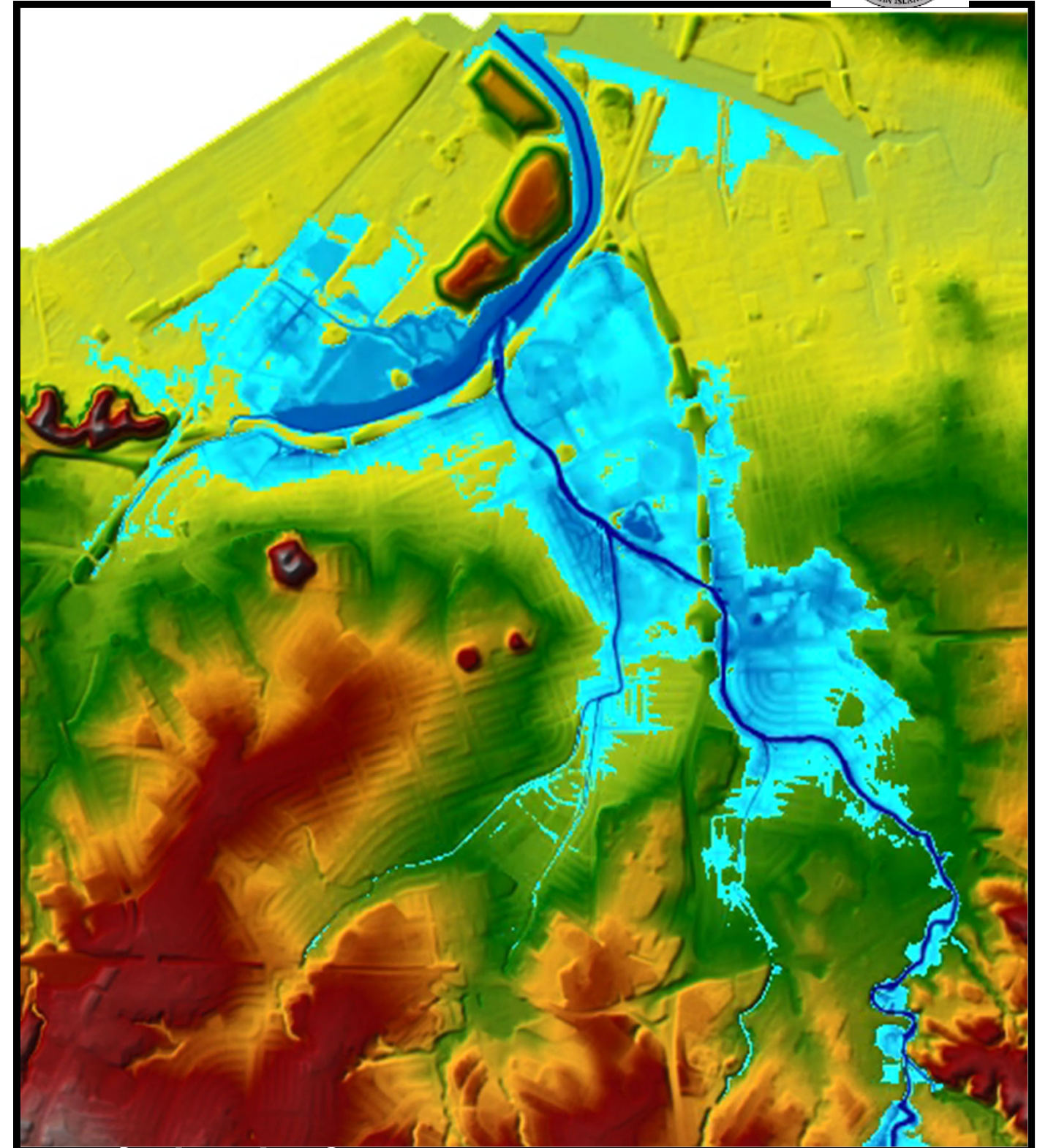


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- 26 square miles of highly urbanized, densely populated flood basin
- Existing channel overflows above 2-year storm event (bank full)
- Bank full refers to the water level stage that just begins to spill out of the channel into the floodplain.
- Bank full flows tend to occur frequently, on the average every two years (50% chance each year), its how the river form its channel; natural river process.



	Low lying areas
	High lying areas (above flood area)
	Higher elevated area
	Highest elevation in basin
	Shallow flooding area
	Heavier flooding area





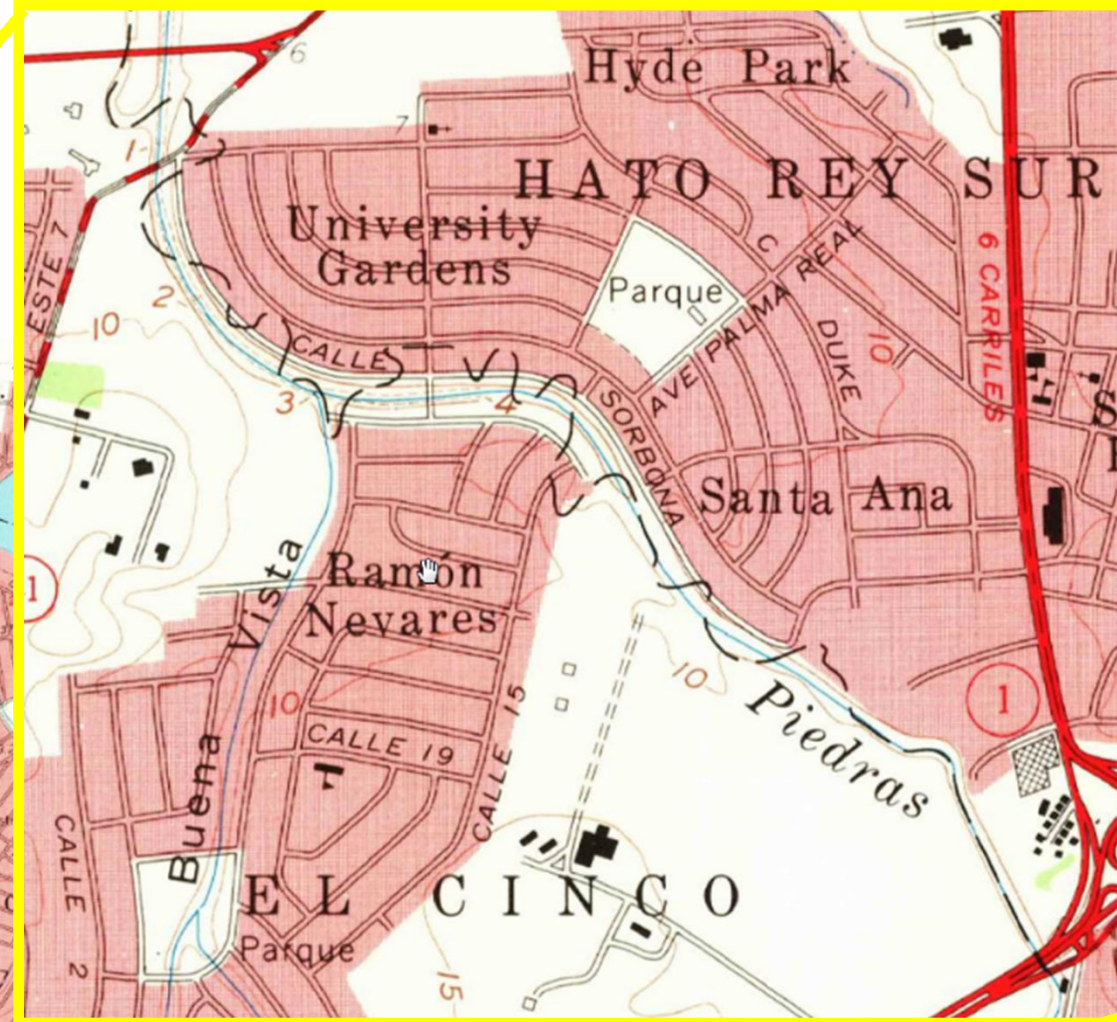
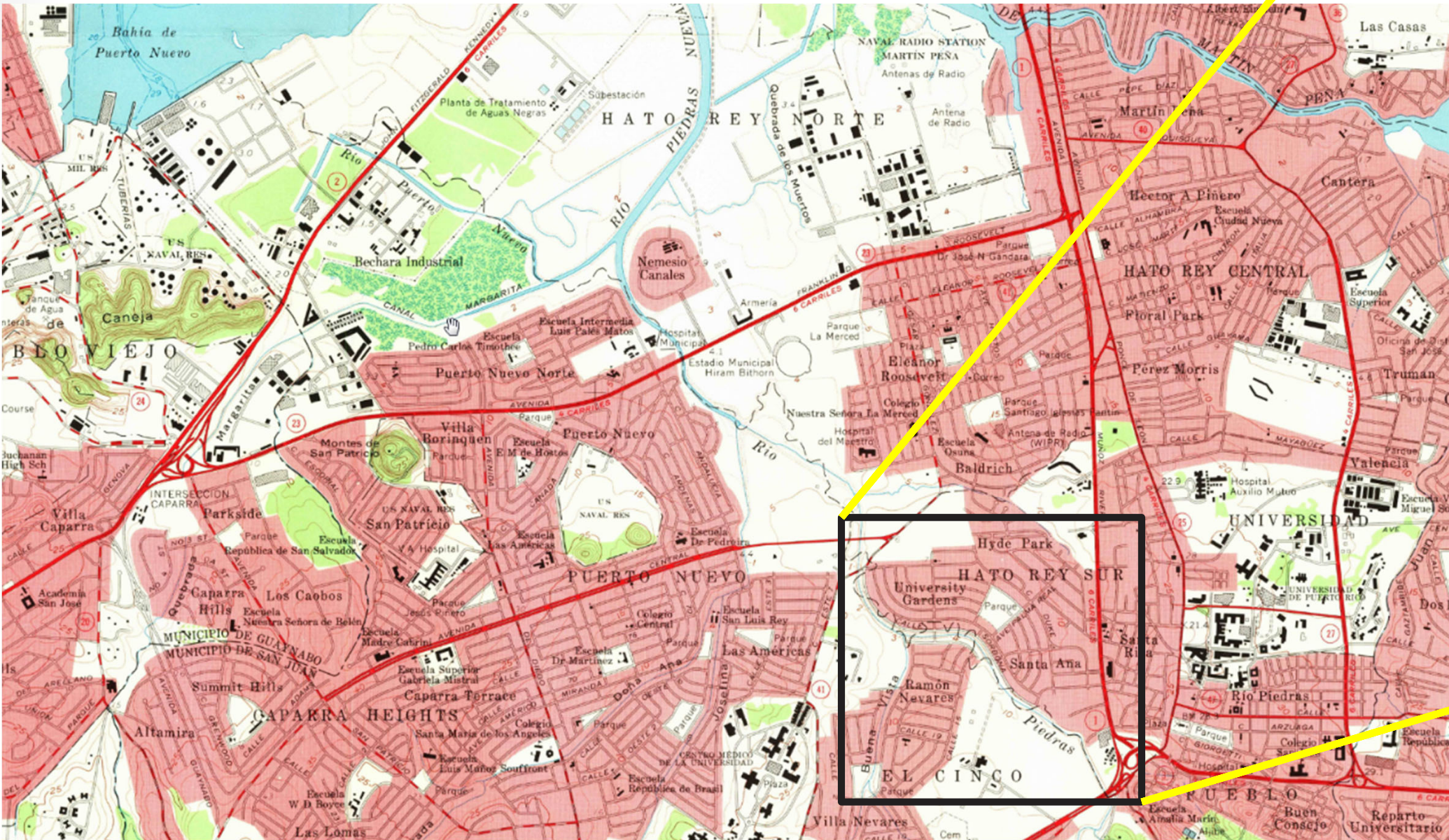
RPN CNT-6A/6B

RIO PIEDRAS/MAIN CHANNEL

DATED: 1963



- Rio Piedras was channelized in the 1950's-1960's
- Original meandering river was changed to a man-made channel once San Juan was developed and urbanized



Legend:



Channelized River



Original Natural River

RIO PUERTO NUEVO – IMPORTANCE OF PROJECT

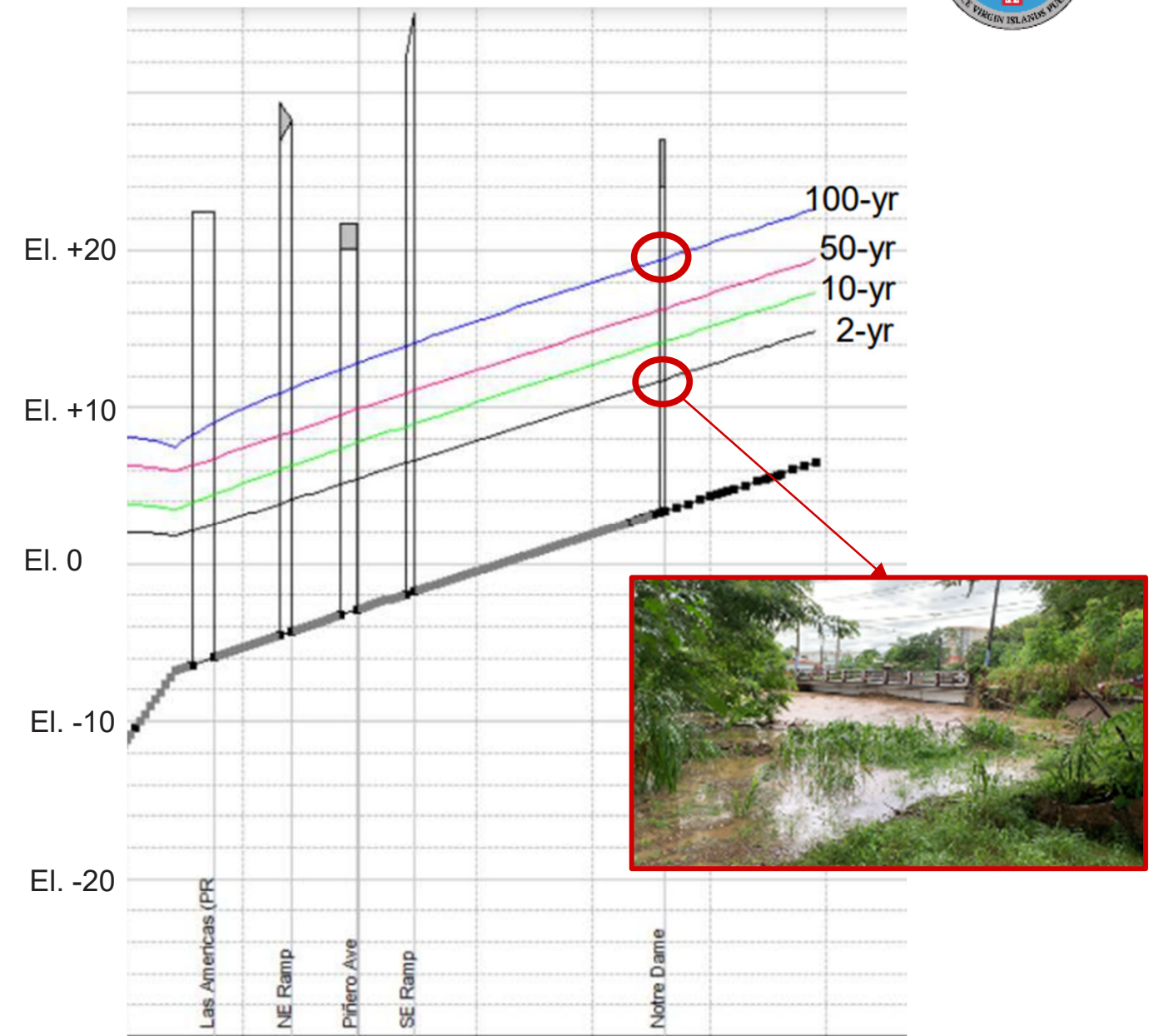


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Note: Video taken on corner of Calle Interamericana and Calle Oxford showing flooding of Rio Piedras during a 5 to 10-yr storm event from Hurricane Lenny on November 15-19, 2009.

Credit: https://www.youtube.com/watch?v=T_osfiDlaqA



Note: Profile above highlights Notre Dame Bridge flooding between recently seen 1-2 yr events (~10-ft water elevation) and a **100-year storm event which would increase flooding by an additional ~8-ft.**

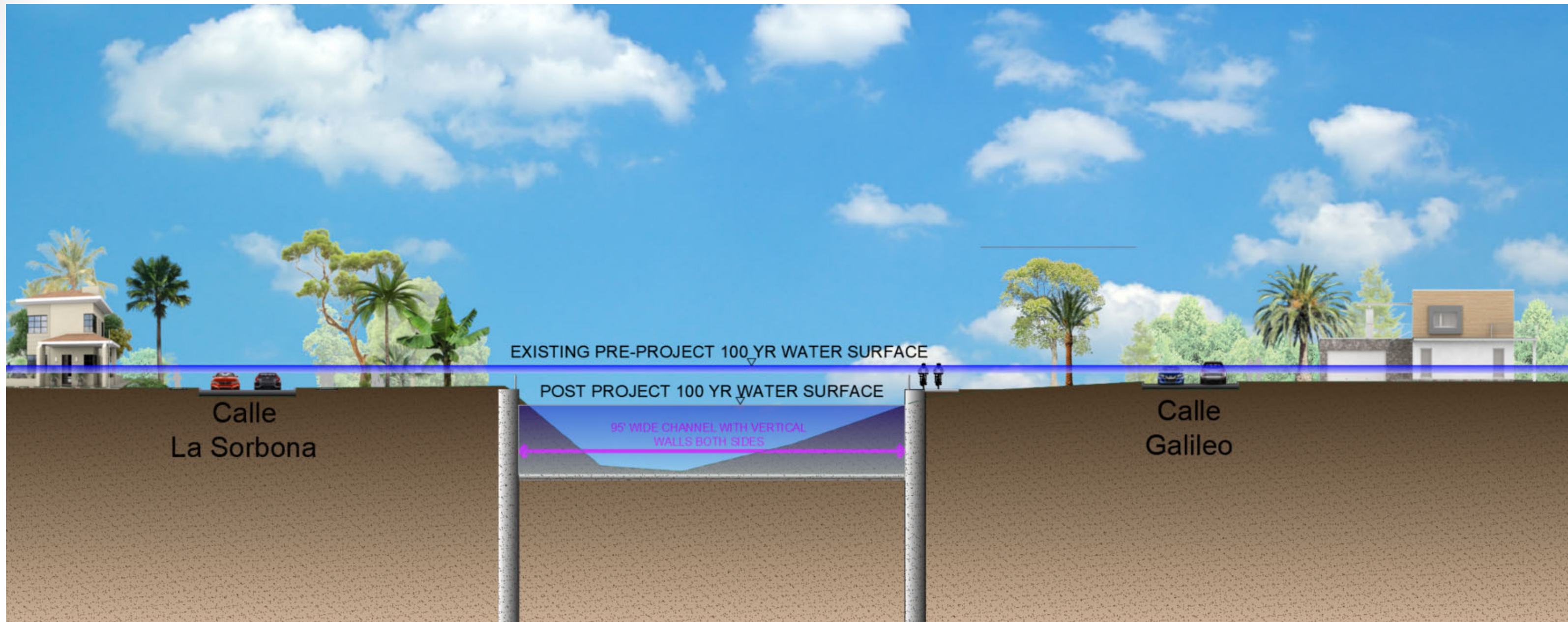


RIO PIEDRAS:

EXPECTED 100 YEAR FLOODING (1% CHANCE OF ANNUAL EXCEEDANCE)



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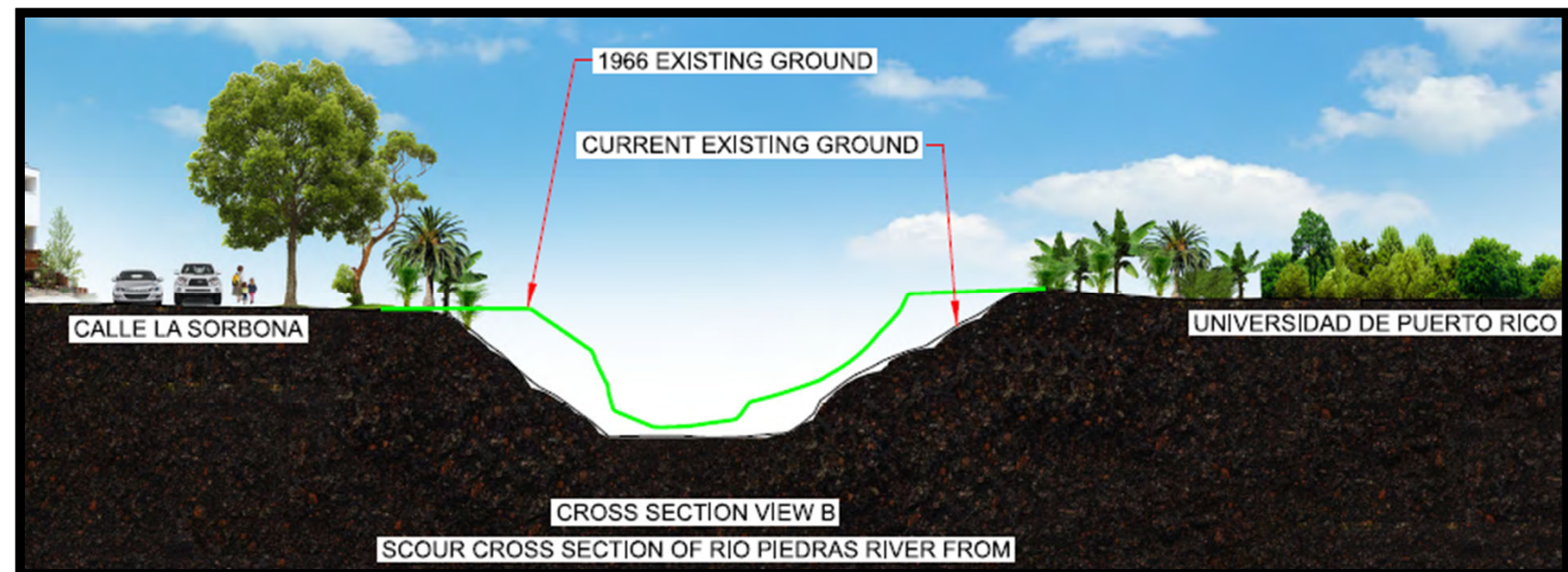
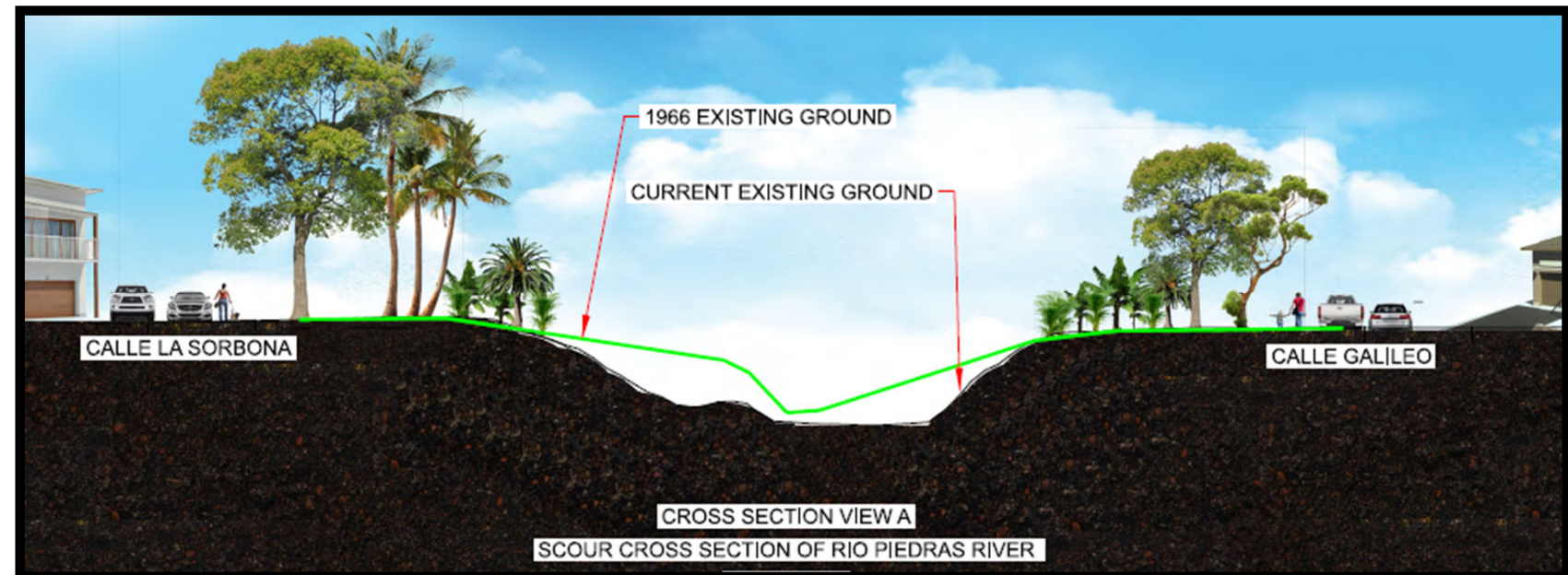
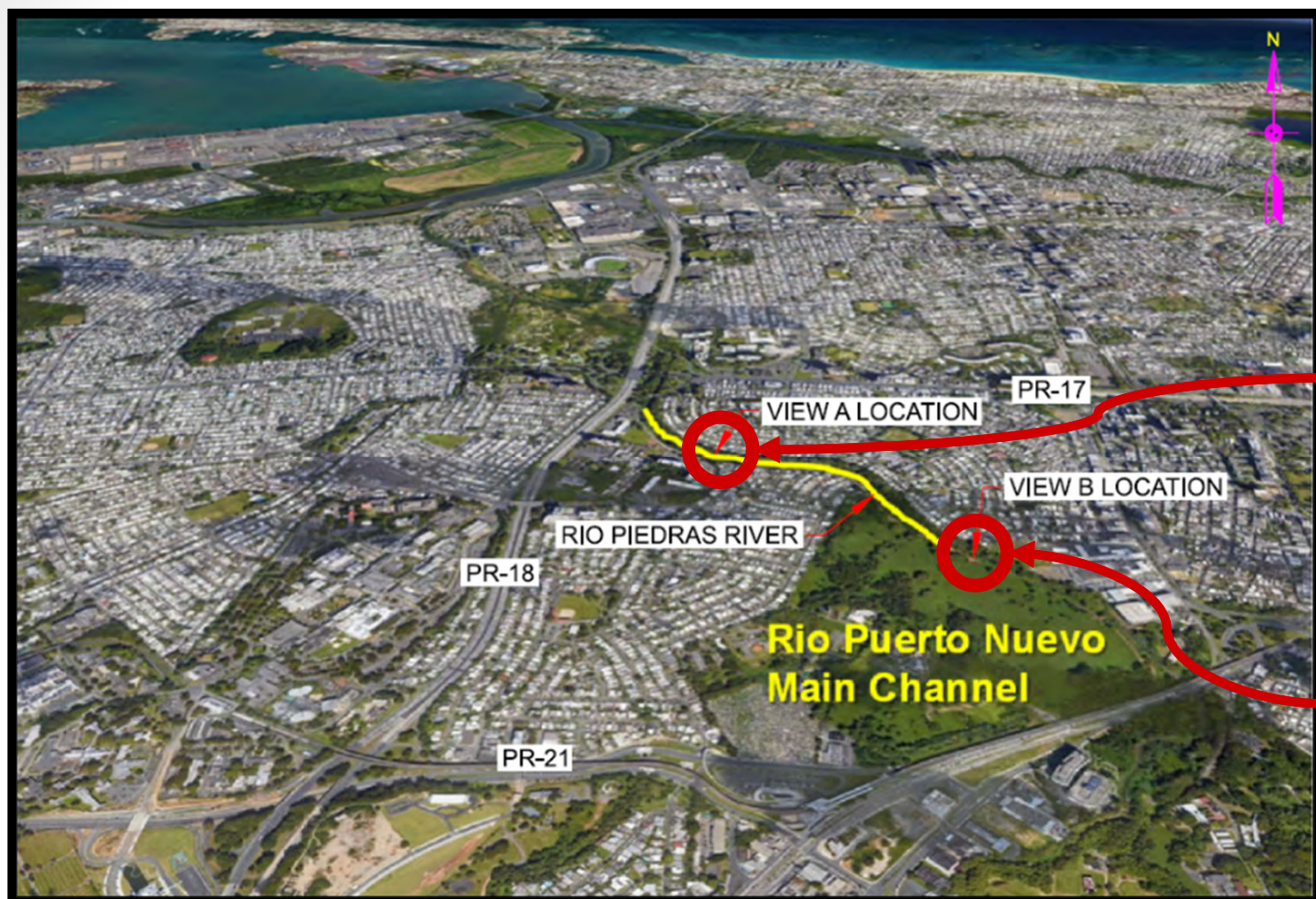




RIO PIEDRAS – HISTORICAL EROSION



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RIO PIEDRAS – HISTORICAL EROSION



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- Erosion of the banks continue at an accelerated rate
- Doing nothing risks more trees falling in to river on their own and higher risk of obstruction downstream

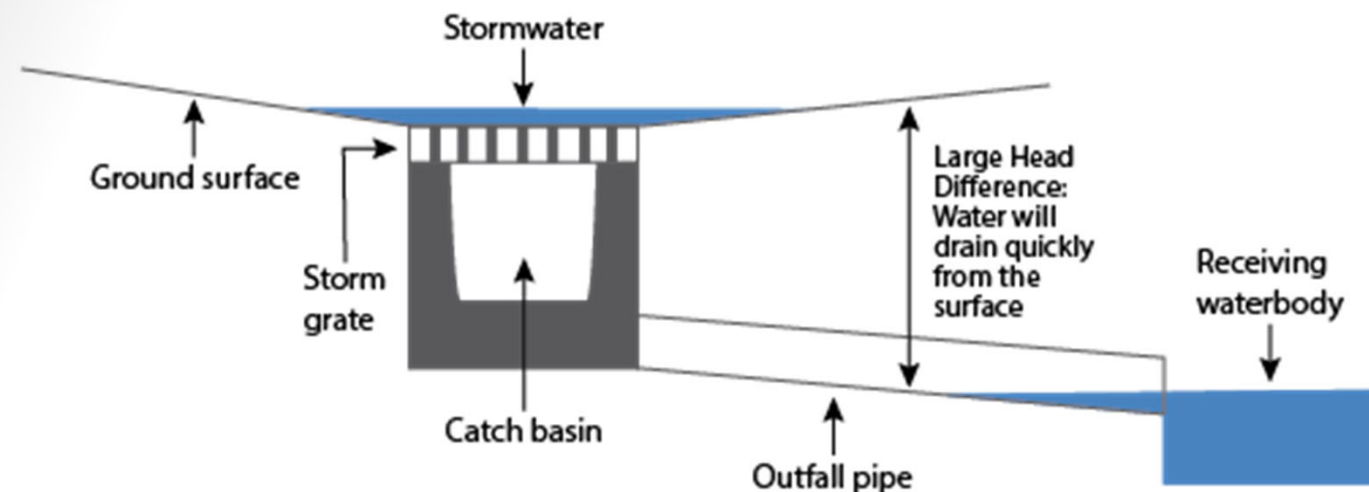


MUNICIPAL DRAINAGE VS RIVER FLOODING

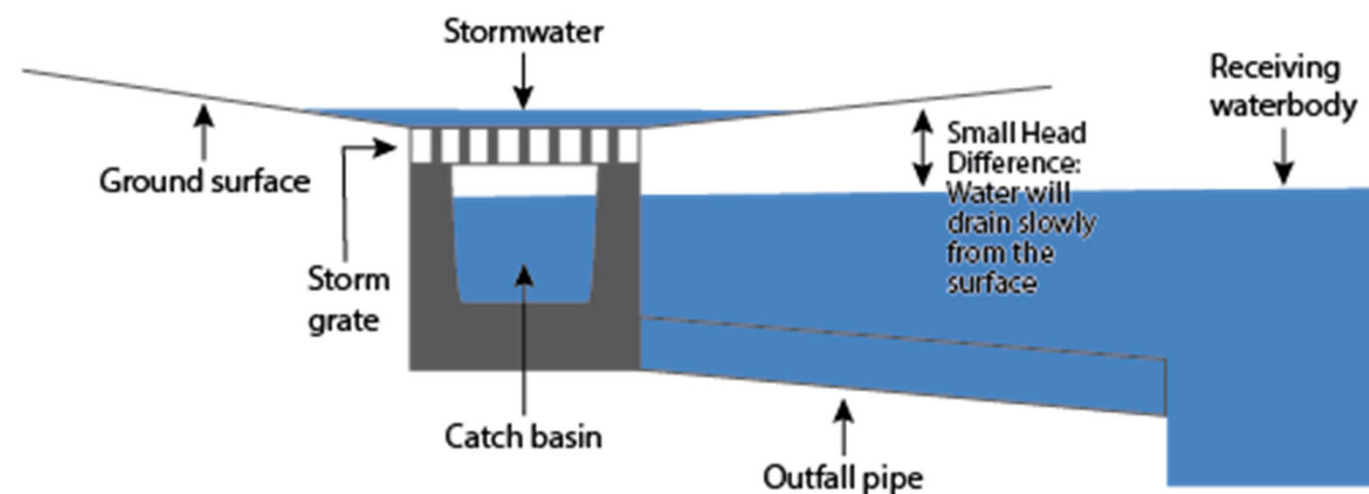


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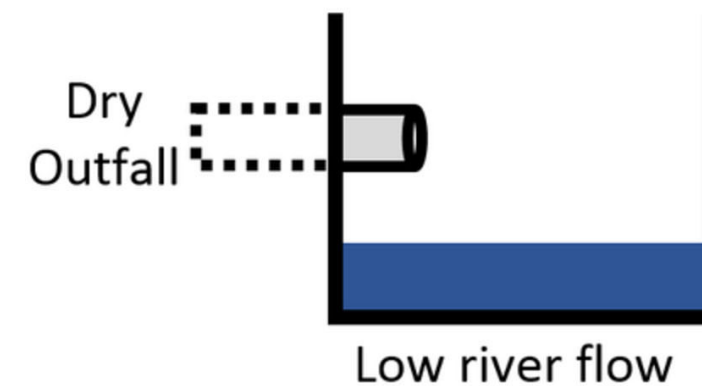
LOW TIDE SCENARIO



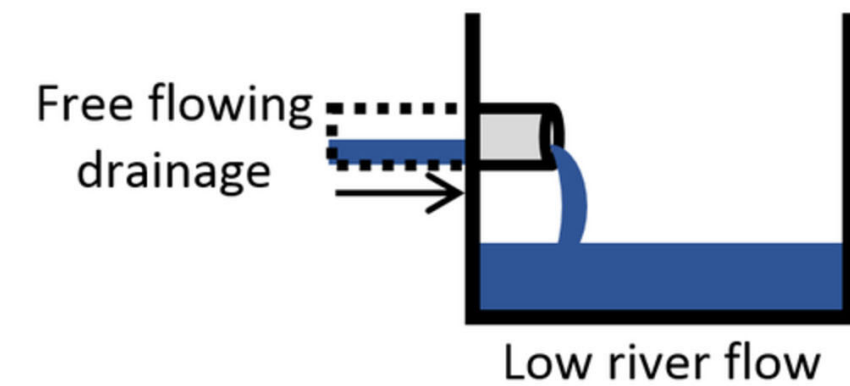
HIGH TIDE SCENARIO



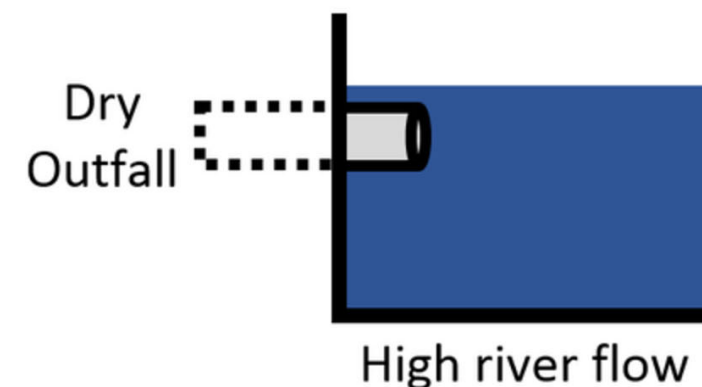
State 1a



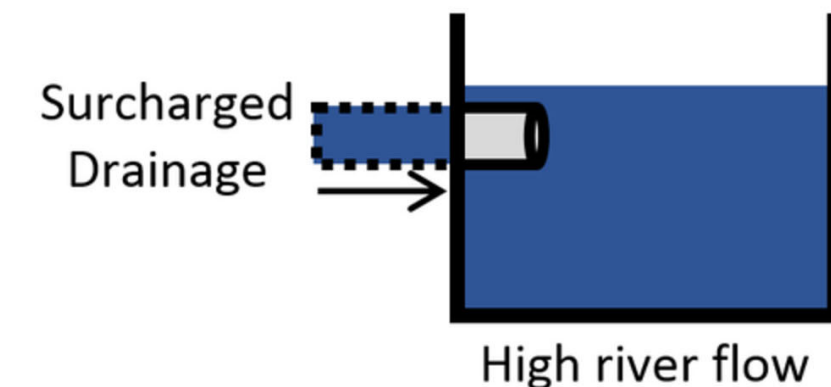
State 1b



State 2a



State 2b



Credit: <https://onlinelibrary.wiley.com/doi/full/10.1111/jfr3.12617>

- Replacement of drainage system along will not resolve the localized flooding. Drainage systems require an outlet.
- Proper capacity of rivers, tributaries are required for successful discharge of pluvial accumulation

Credit: <https://www.charleston-sc.gov/1999/High-Tides-Affect-Drainage-Systems>

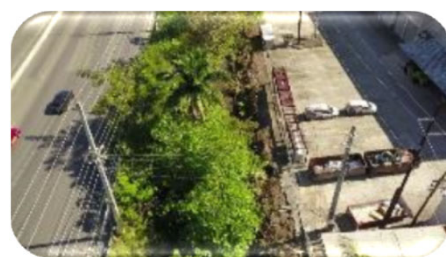


RIO PUERTO NUEVO – INDIVIDUAL CONTRACTS

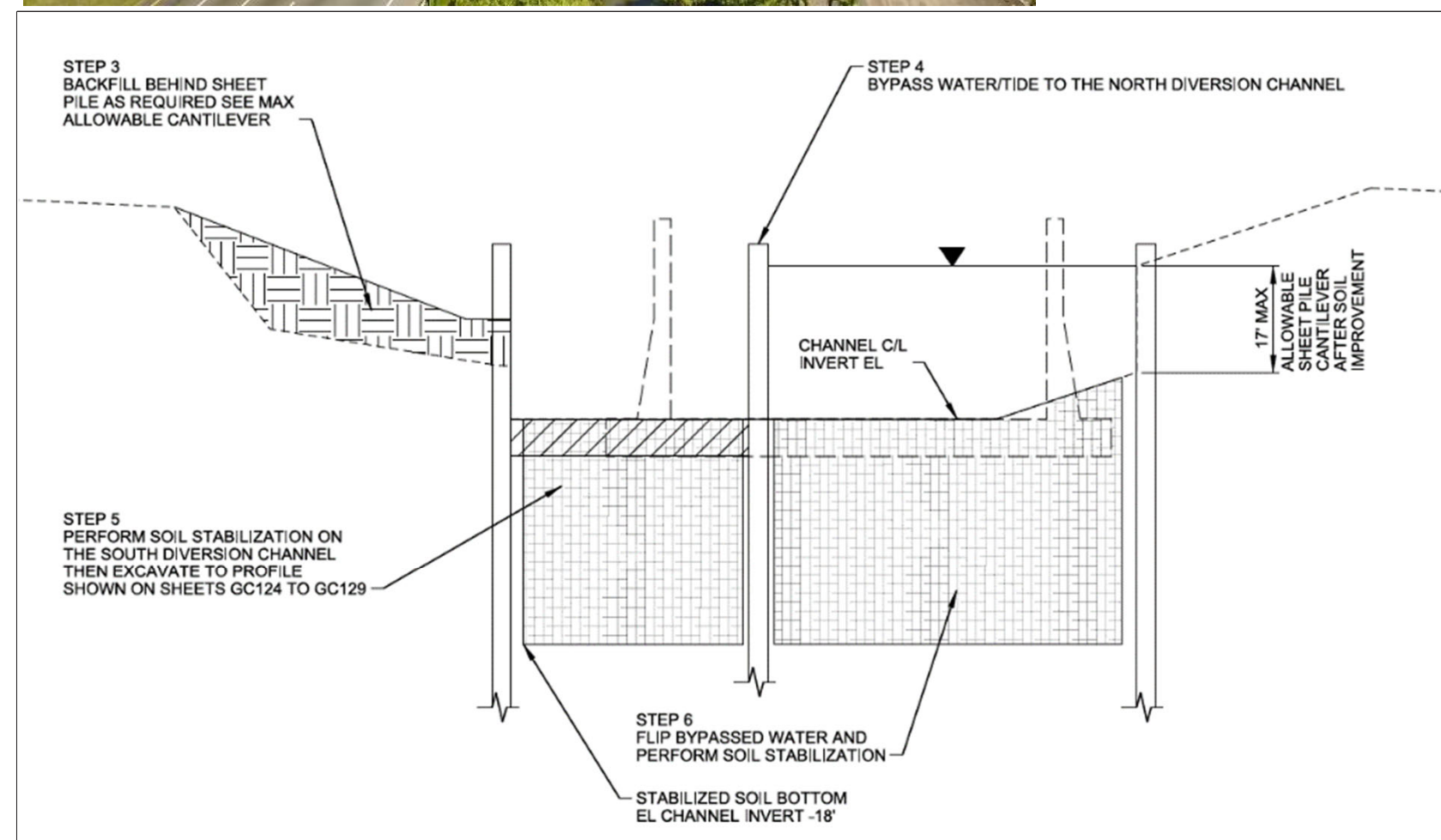
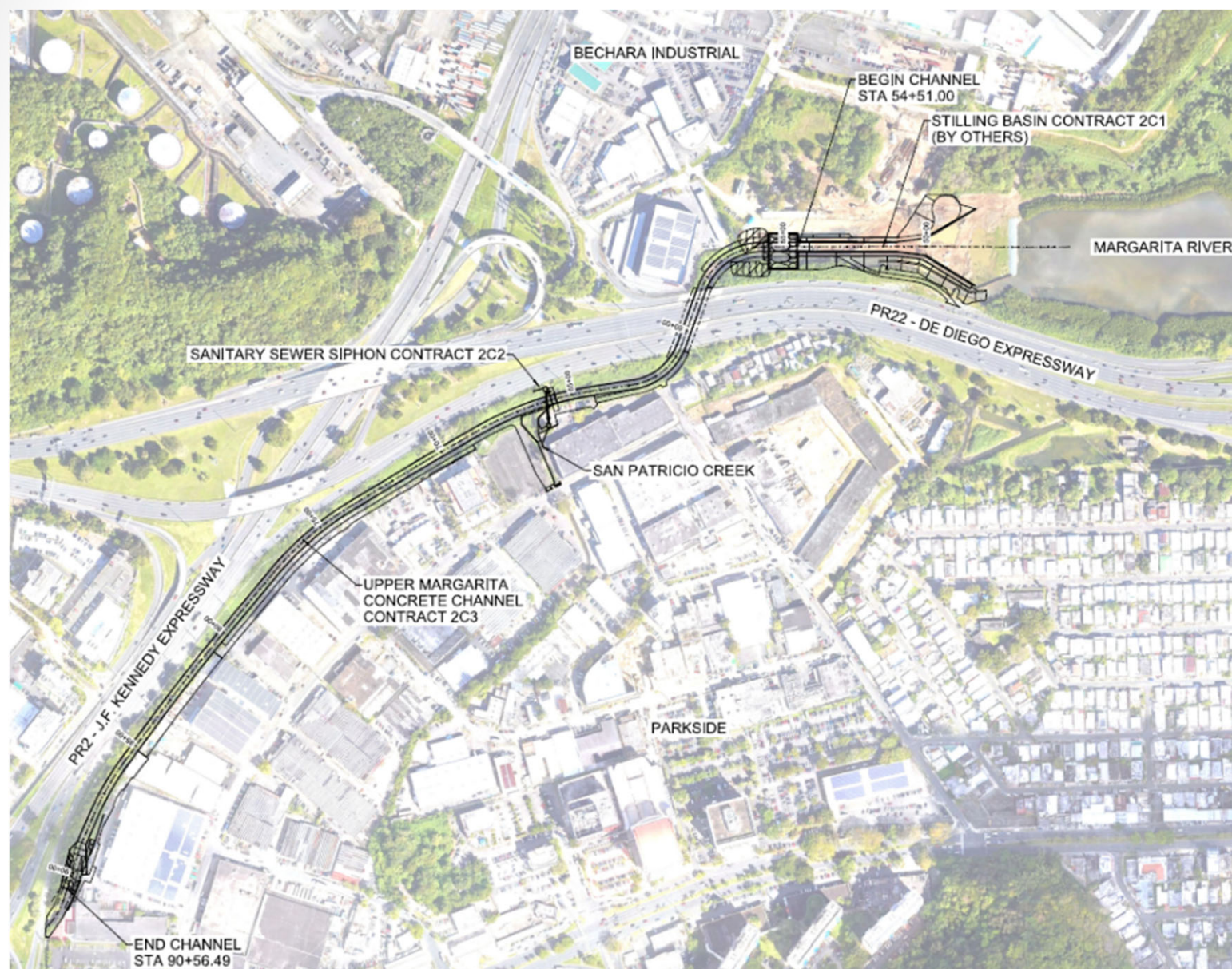


RPN CNT-1 UPPER MARGARITA CHANNEL

- Upper Margarita Channel (Sta. 56+00 to Sta. 89+60)
- Construction of concrete channel to tie to existing stilling basin
- Magnitude of Construction: \$100M to \$250M
- Period of Performance: 4.5 years



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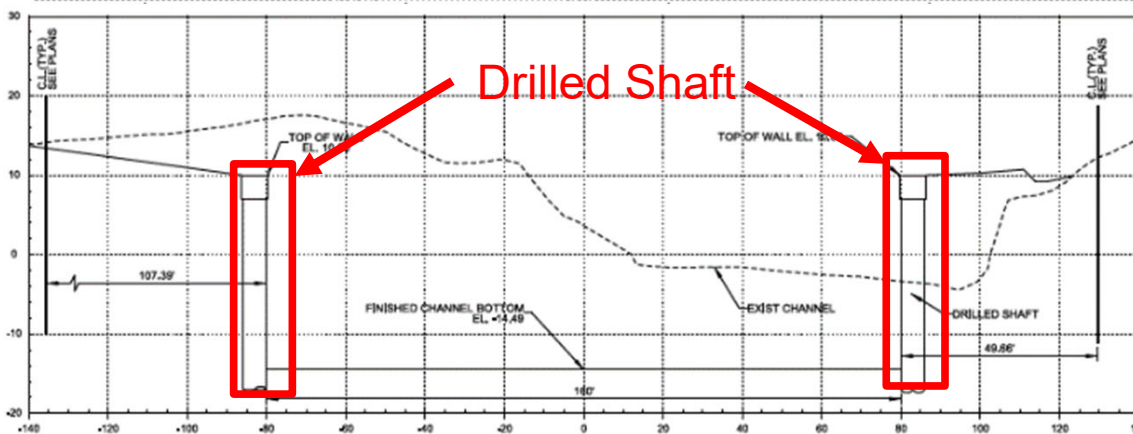
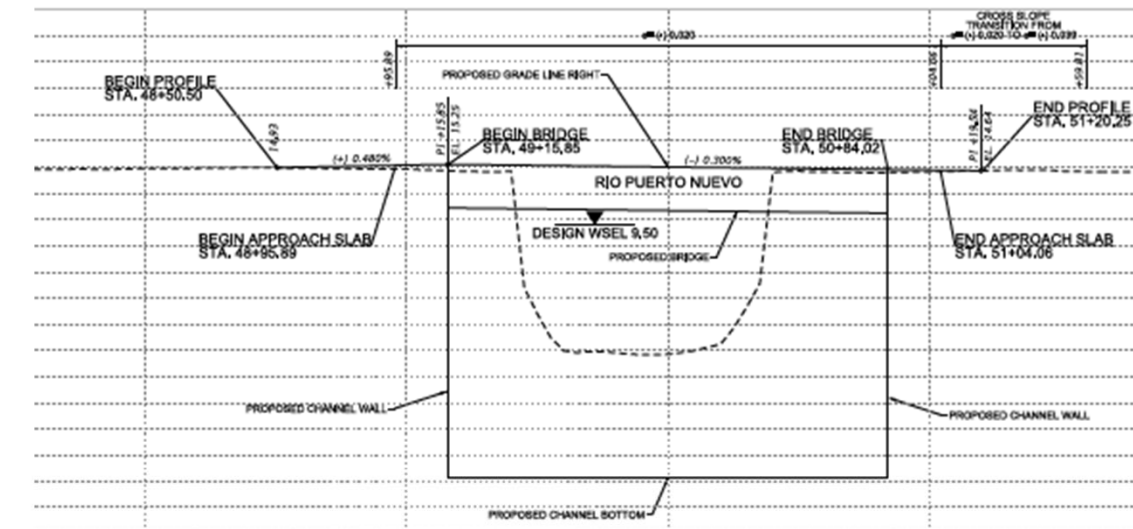
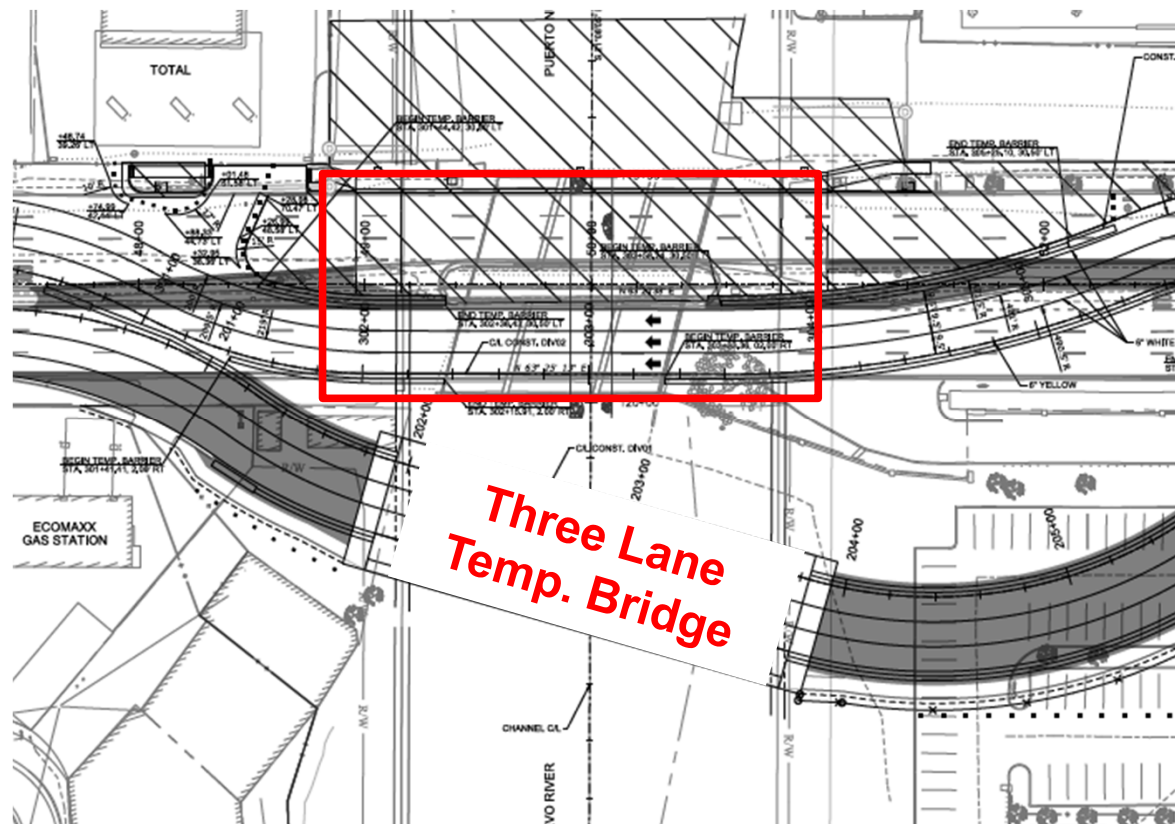
RPN CNT-2

ROOSEVELT AVE. BRIDGE

- Roosevelt Avenue Bridge with a temporary detour bridge construction
- Six-lane, pre-cast pre-stressed concrete beam bridge
- Magnitude of Construction: \$25M to \$100M
- Period of Performance: 4 years
- 110 Ea. six-foot diameter concrete-drilled shaft piles (~90 feet deep)
- 90 Ea. five-foot diameter concrete-drilled shaft piles (~90 feet deep)
- 19,000 cy of concrete
- 7,000 tons of reinforcing steel
- 119,000 cy of excavated material for disposal



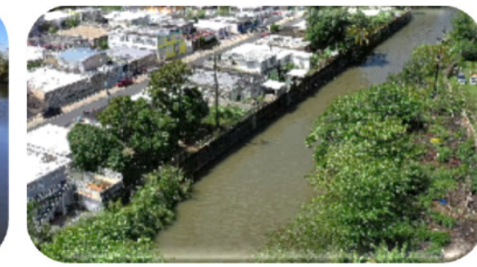
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RPN CNT-3

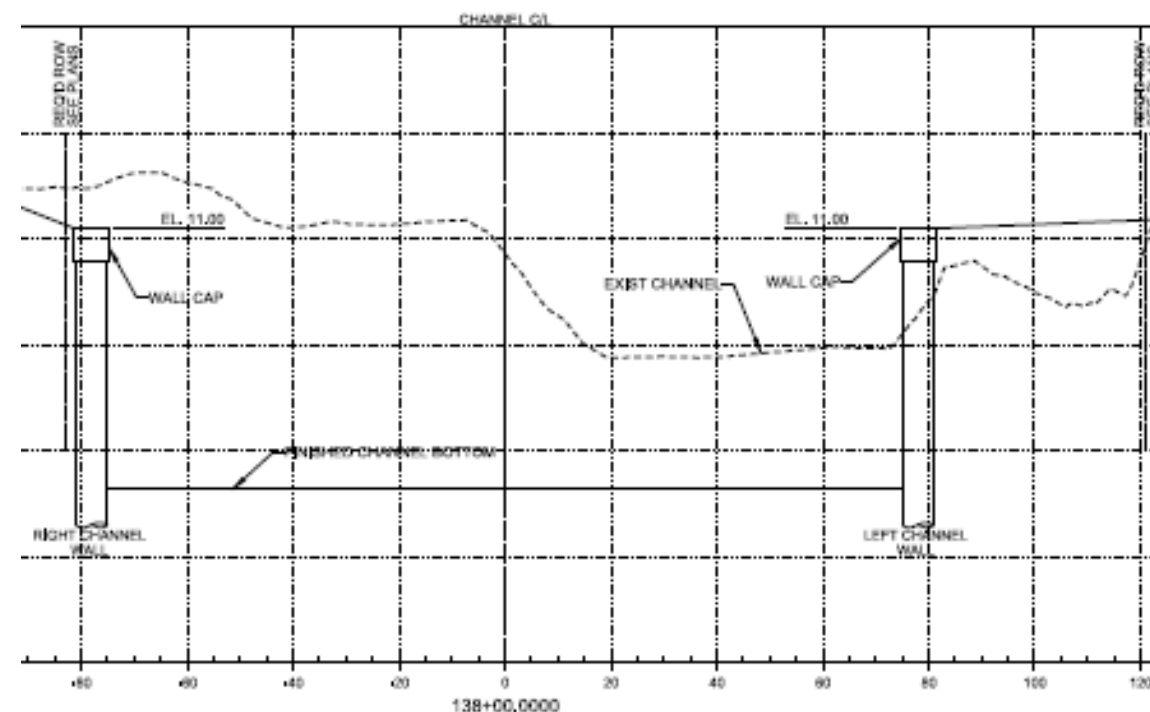
MAIN CHANNEL (RIO PIEDRAS)



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- Main Channel Walls, composite steel pipe pile/steel sheet pile walls
- Magnitude of Construction- \$250M to \$500M
- Period of Performance – 5 years
- Estimated Advertisement: Early 2024
- 1,600 6' Dia. Concrete Drill Shaft Piles (~80' deep)
- 142,000 CY of Concrete
- 32,000 TN of Reinforcing Steel
- 637,000 CY of excavated material to be disposed
- 83,000 CY of suitable fill

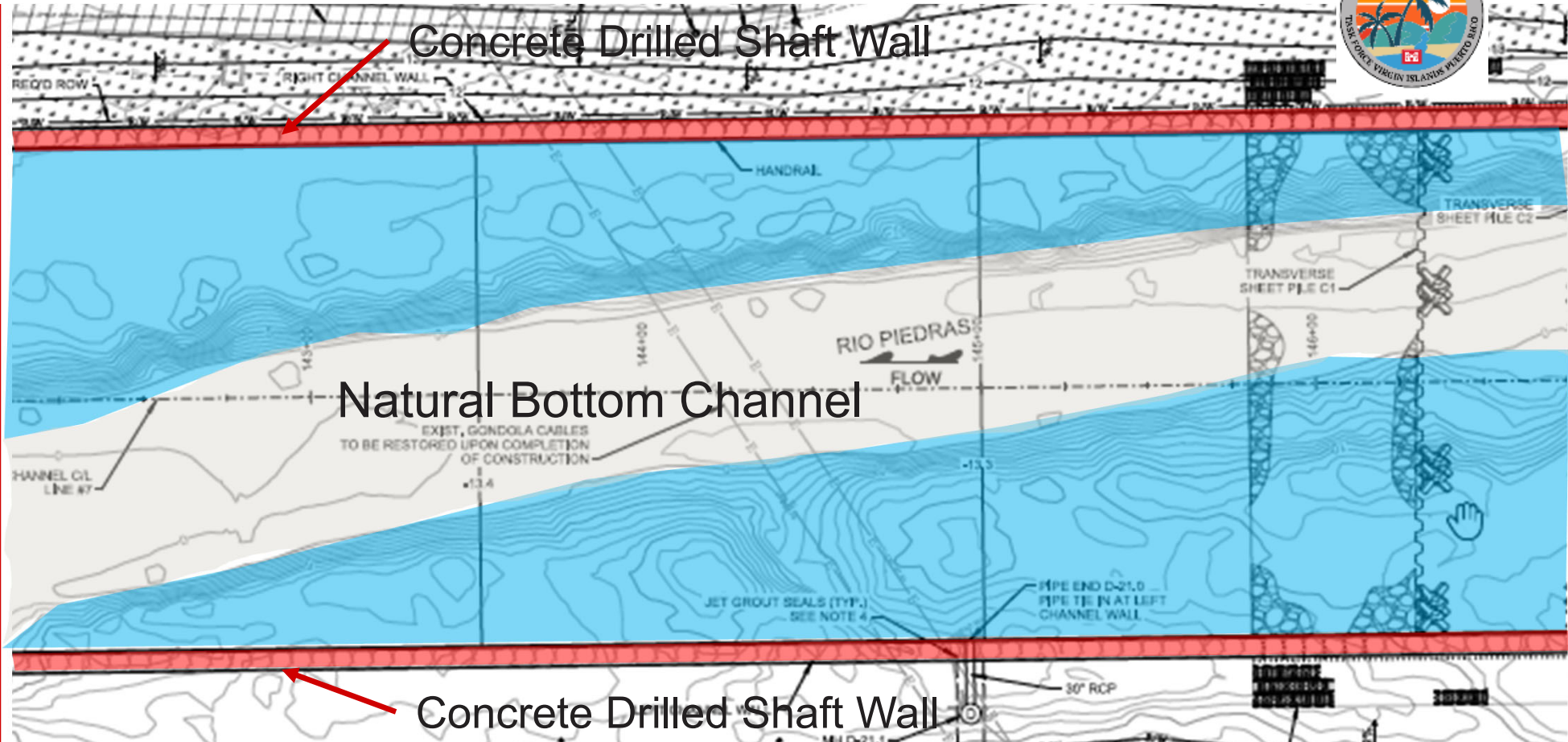


DESIGN UPDATES CHANGES TO CONTRACT 3

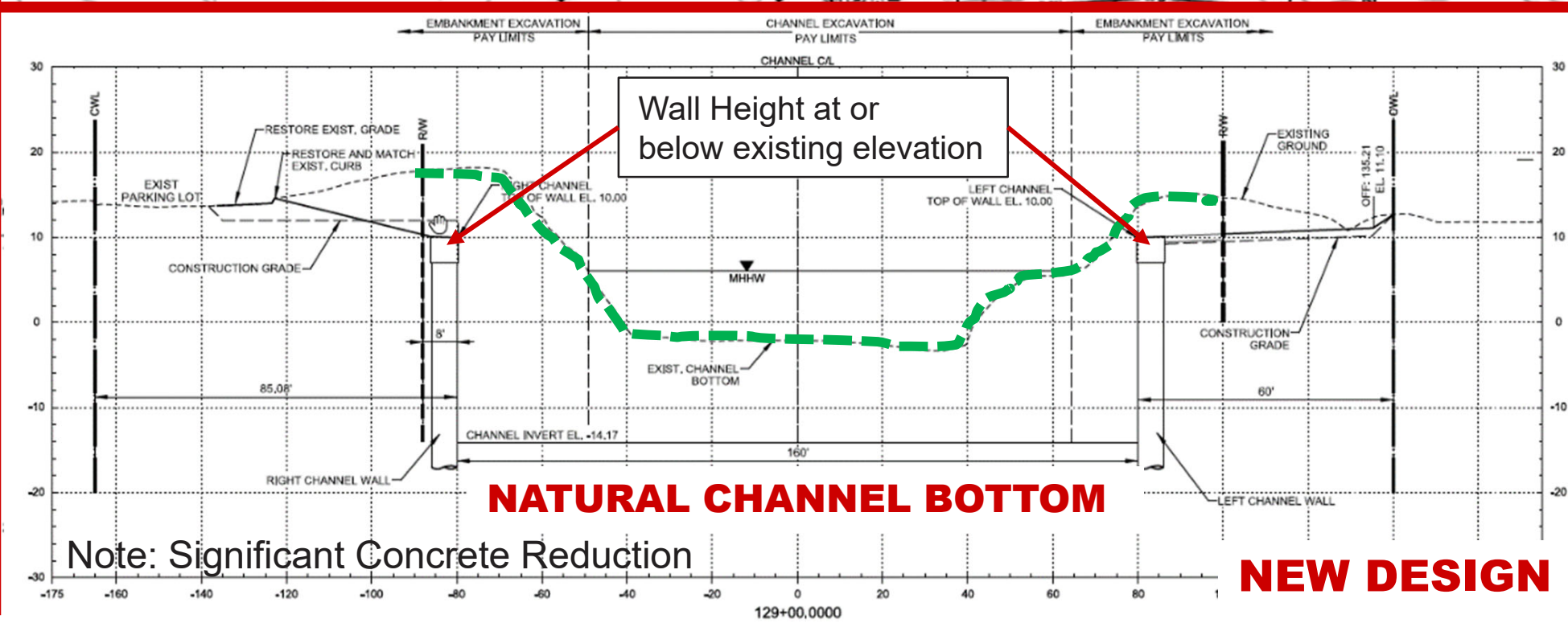
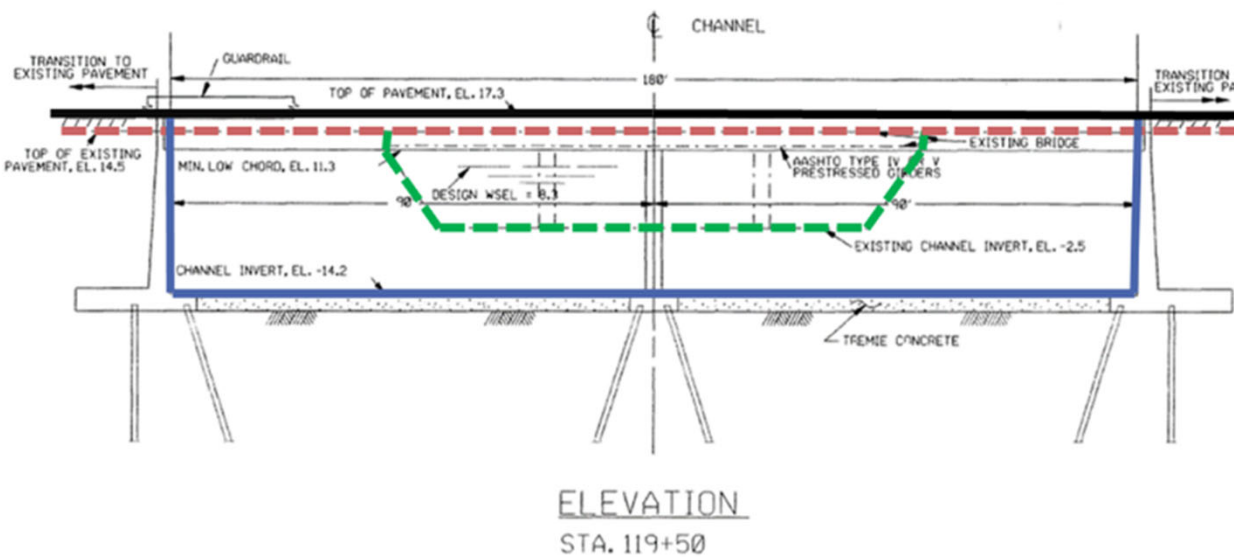


OLD DESIGN

**U-Frame
Concrete
Channel**



Concrete Drilled Shaft Wall



NATURAL CHANNEL BOTTOM

Note: Significant Concrete Reduction

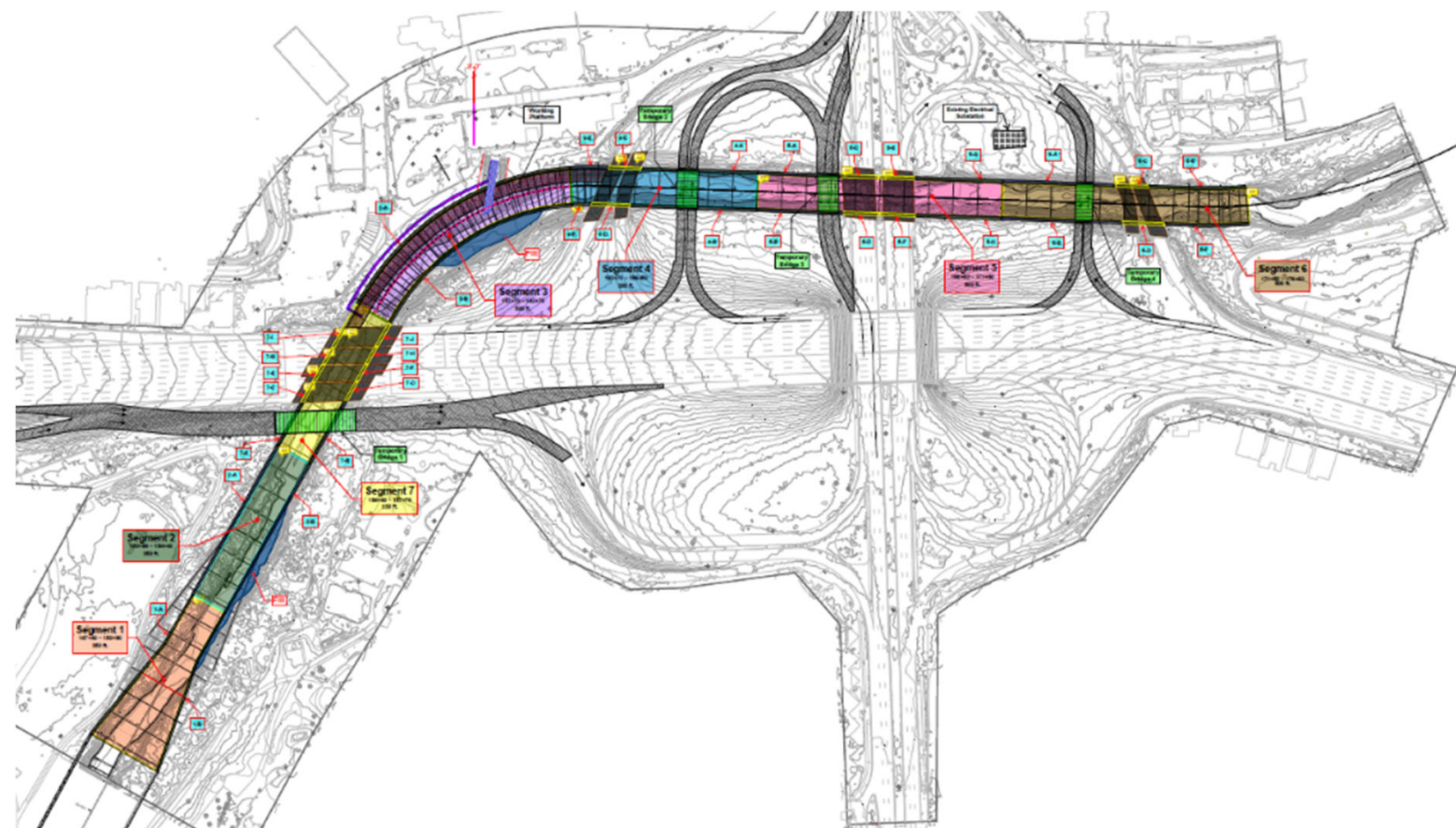
NEW DESIGN



RPN CNT-4 : LAS AMERICAS BRIDGES



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- Bridge replacement of four major existing bridges over the Piñero Avenue Interchange
 - 4A-1) Las Americas Expressway Bridge
 - 4A-2) Piñero Avenue Bridge East
 - 4A-3) NE Access Ramp Bridge
 - 4A-4) SE Access Ramp Bridge
- Concrete channel construction
- Magnitude of Construction: \$250M to \$500M
- Period of Performance: 5 years
- Significant Maintenance of traffic
- Six-foot diameter concrete drill shaft for bridge abutments and channel walls
- Channel bottom will be articulated concrete block mattresses (ACBM)
- Channel: 1,200 Ea. five-foot diameter concrete drilled shaft piles (~90 feet deep)



RIO PUERTO NUEVO – DESIGN UPDATES CHANGES TO CONTRACT 4



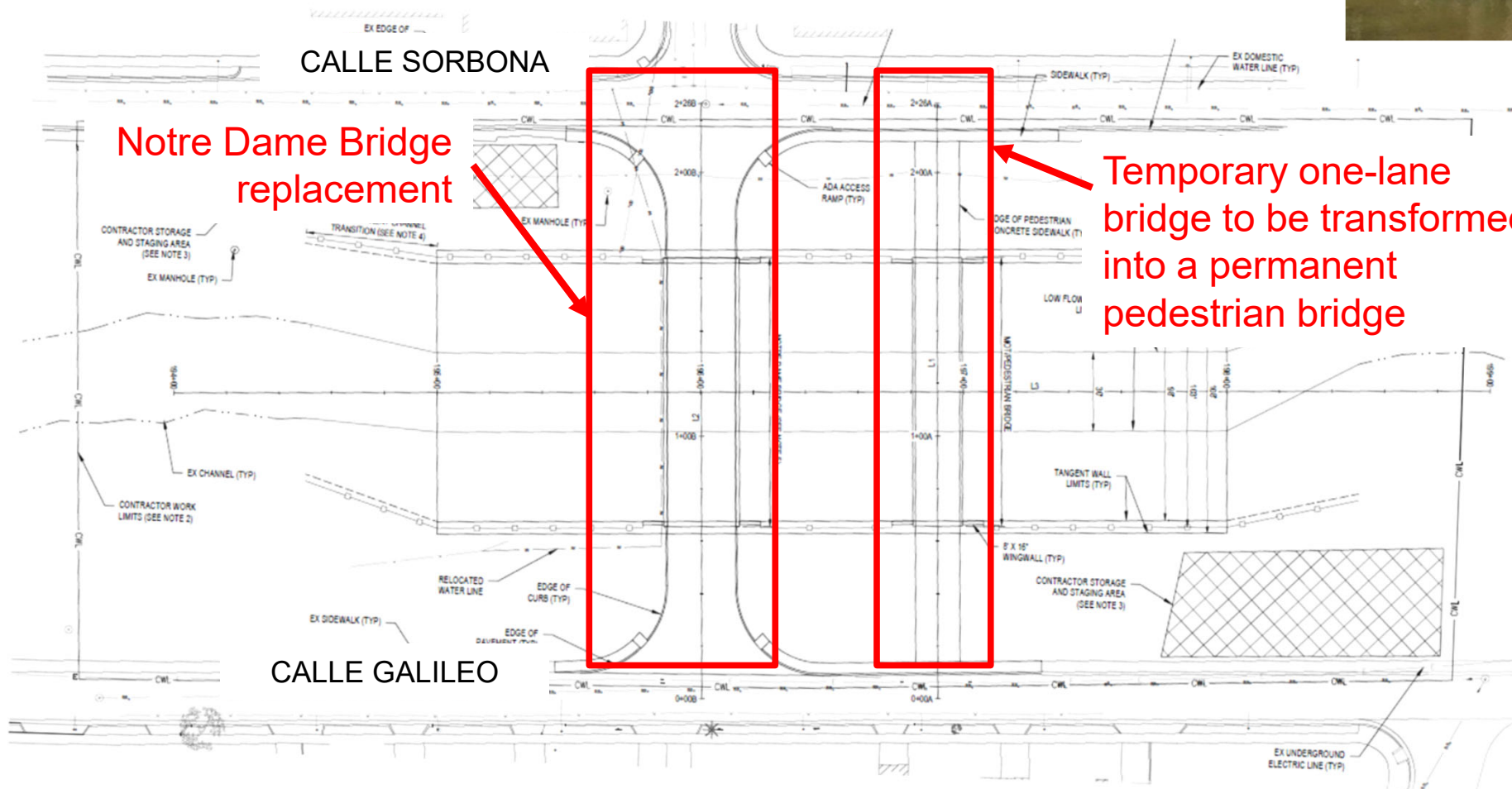


RPN CNT-5A : NOTRE DAME BRIDGE

- Notre Dame Bridge replacement
 - Channel works underneath bridge
 - Temporary one-lane bridge
 - Permanent pedestrian bridge
 - Maintenance of traffic through Calle Notre Dame
 - Magnitude of Construction: \$25M - \$100M
 - Period of Performance: 3 years
-
- Six-foot diameter concrete drill shaft for bridge abutments and channel walls
 - Channel bottom will be ACBM
 - 100 Ea. 6-foot dia. concrete drilled shaft piles (~106 feet deep)



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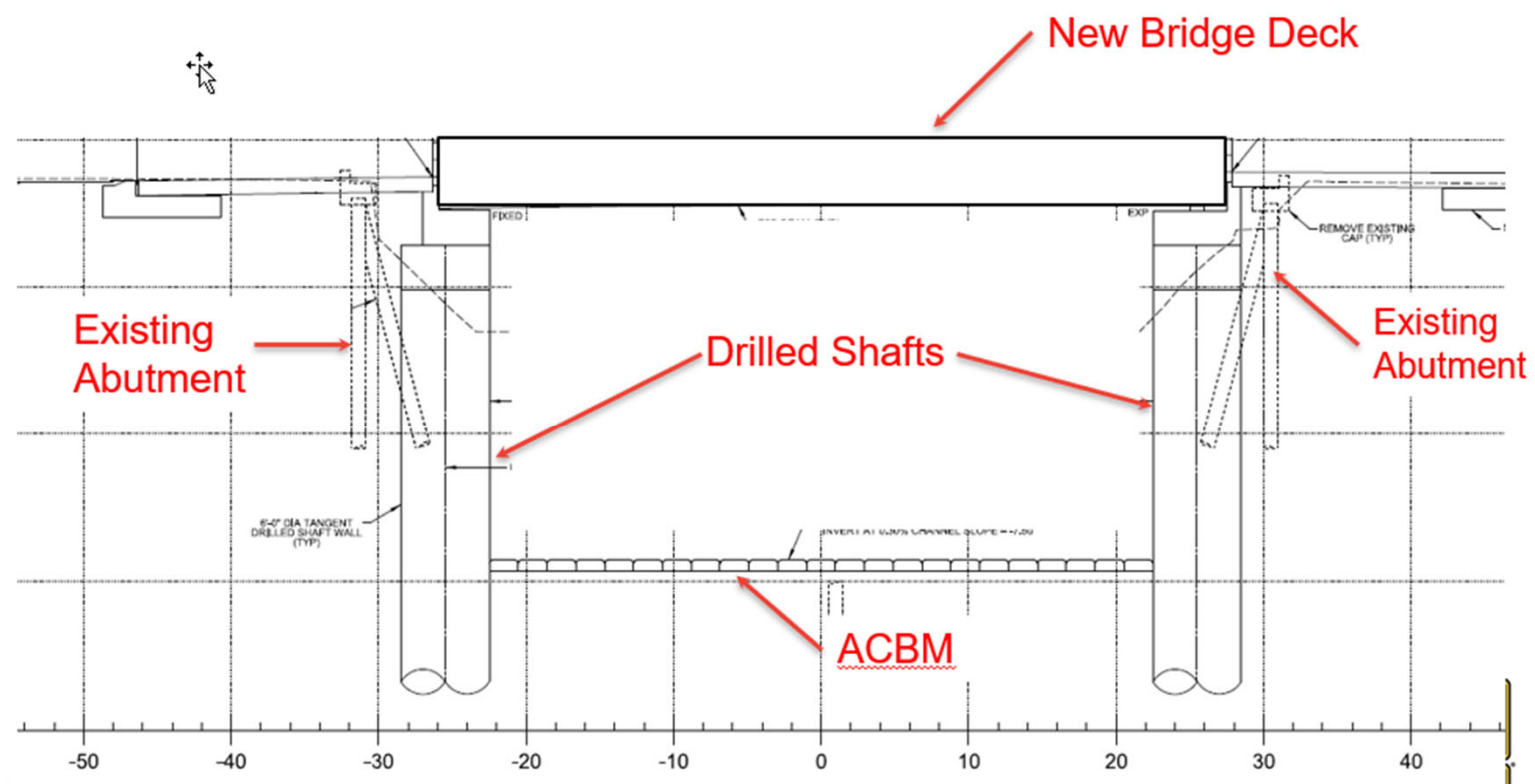
RPN CNT-5B: W. PIÑERO AVE. BRIDGE

- Piñero Avenue Bridge West replacement
- Channel works underneath bridge and downstream
- Maintenance of traffic on Piñero Avenue
- Magnitude of Construction: \$100M - \$250M
- Period of Performance: 5 years

- 200 Ea. five-foot diameter concrete drilled shaft piles (~90 feet deep)
- 52,000 cy of concrete
- 2,250 tons of reinforcing steel
- 76,000 cy of excavated material to be disposed
- 1,400 LCY of suitable fill
- 14,000 tons of steel sheet pile
- 102,000 square feet of ACBM



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RPN CNT-6A/6B

RIO PIEDRAS/MAIN CHANNEL



< 1-year storm event



13 Oct 2021 Notre Dame Bridge during flood waters from Rio Piedras. This is less than a 1-year (100% chance of occurring in a given year) storm event.

5-10-year storm event



Note: Video taken on property immediately south of Notre Dame Bridge showing flooding of Rio Piedras during a 5 to 10-yr storm event from Hurricane Lenny on November 15-19, 2009.



- Team has recommended work on CNT-6A as it is not affected by ecological corridor law.
- CNT-6B is critical and has approximately 11-13% of the overall project benefits in this area. Significant protection to Villa Nevares community.
- Areas that will be constructed in UPR land will have MINIMAL environmental impact and is being design to work WITH NATURE.
- Trees are currently falling in to Rio Piedras due to erosion and expected to continue.



RPN CNT-6A/6B

RIO PIEDRAS/MAIN CHANNEL



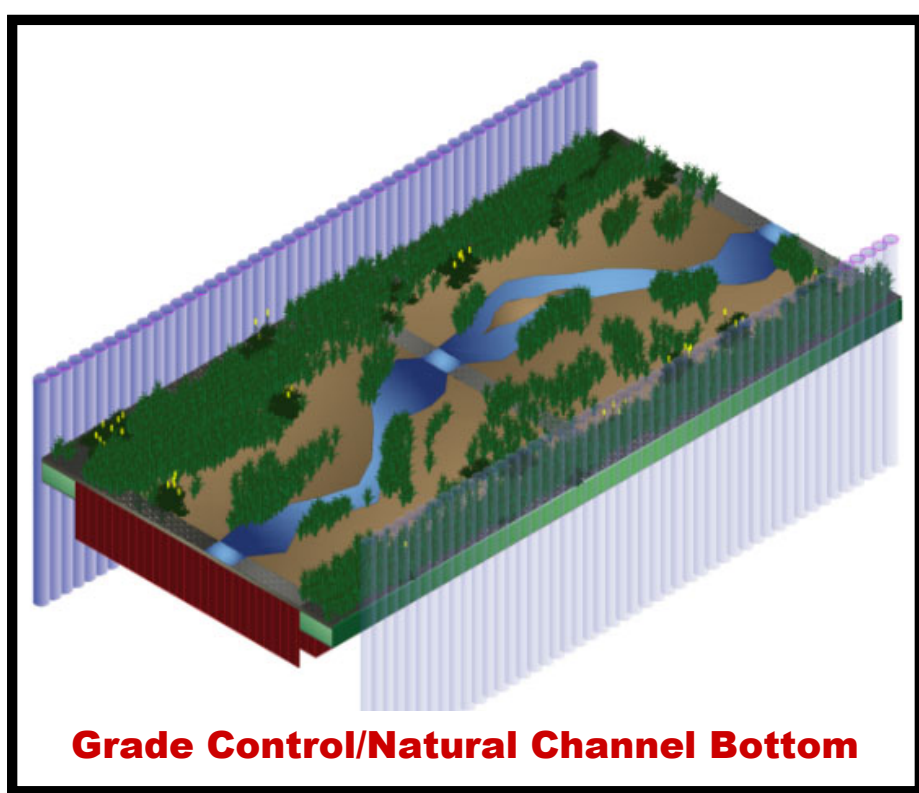
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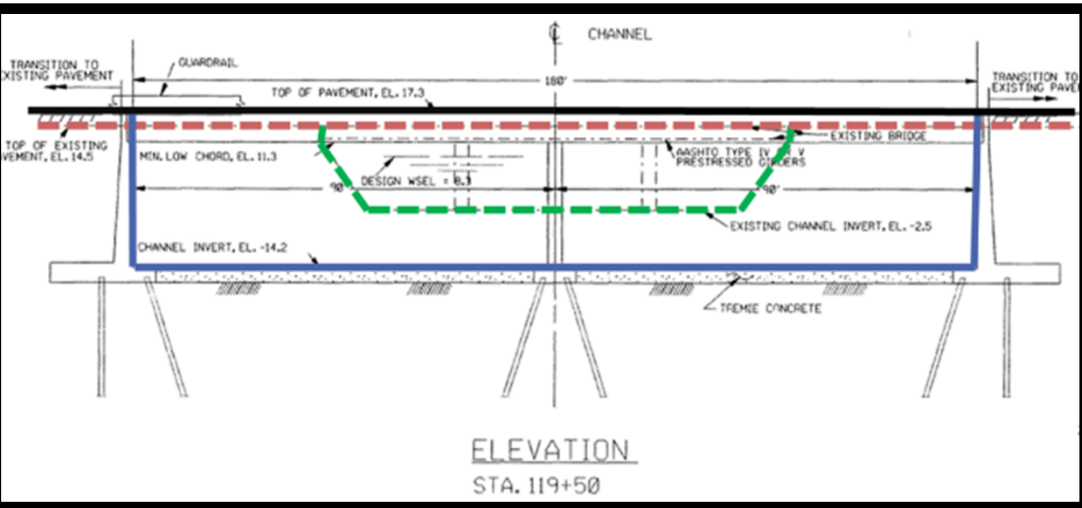
U-Frame Concrete Channel Bottom



**Articulated Concrete Block
Mattress Channel Bottom**



Grade Control/Natural Channel Bottom



OLD DESIGN 1991



DESIGN UPDATE 2021-2022





RPN CNT-7

JOSEFINA/DOÑA ANA CHANNEL



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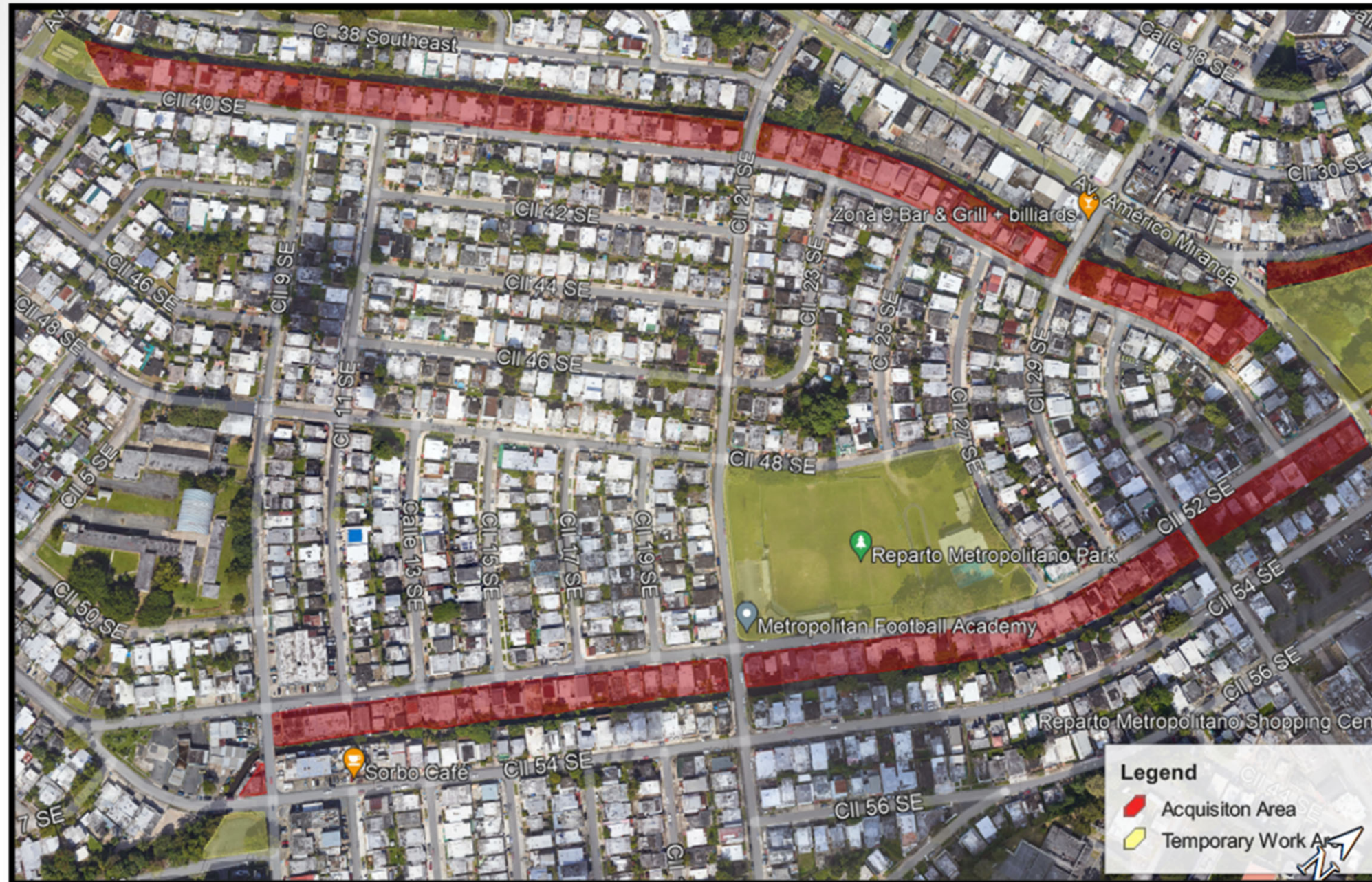


Figure 1. Project are south of Americo Miranda

Challenges: To successfully design our project, the channel must be constructed in the dry alongside the existing channel. This unfortunately necessitates the properties on one side of channel.



Figure 2: Rendering showing what new channel and new linear green belt/park will look like once construction completed in this area.



Figure 3: Example of actual construction similar to what the Josefin and Doña Ana Channels will look like upon completion.



RPN CNT-7 CURRENT CHANNEL CONDITIONS



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Figure 1: Image of existing conditions in Quebrada Josefina.

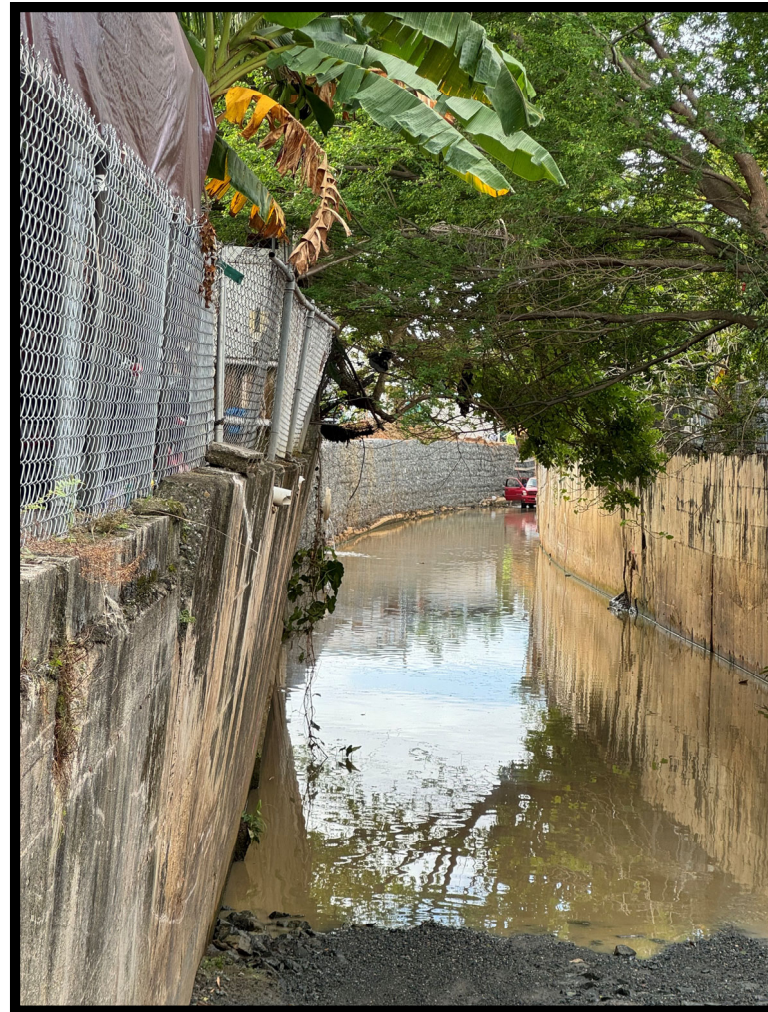


Figure 3: Image of impacts in Quebrada Josefina as a result of 27 October 2023 rain event.



Figure 4 and 5: Images of existing condition and repairs performed by MSJ due to impacts from 27 October 2023 rain event.



Figure 2: Image of existing conditions of Andalucia bridge.



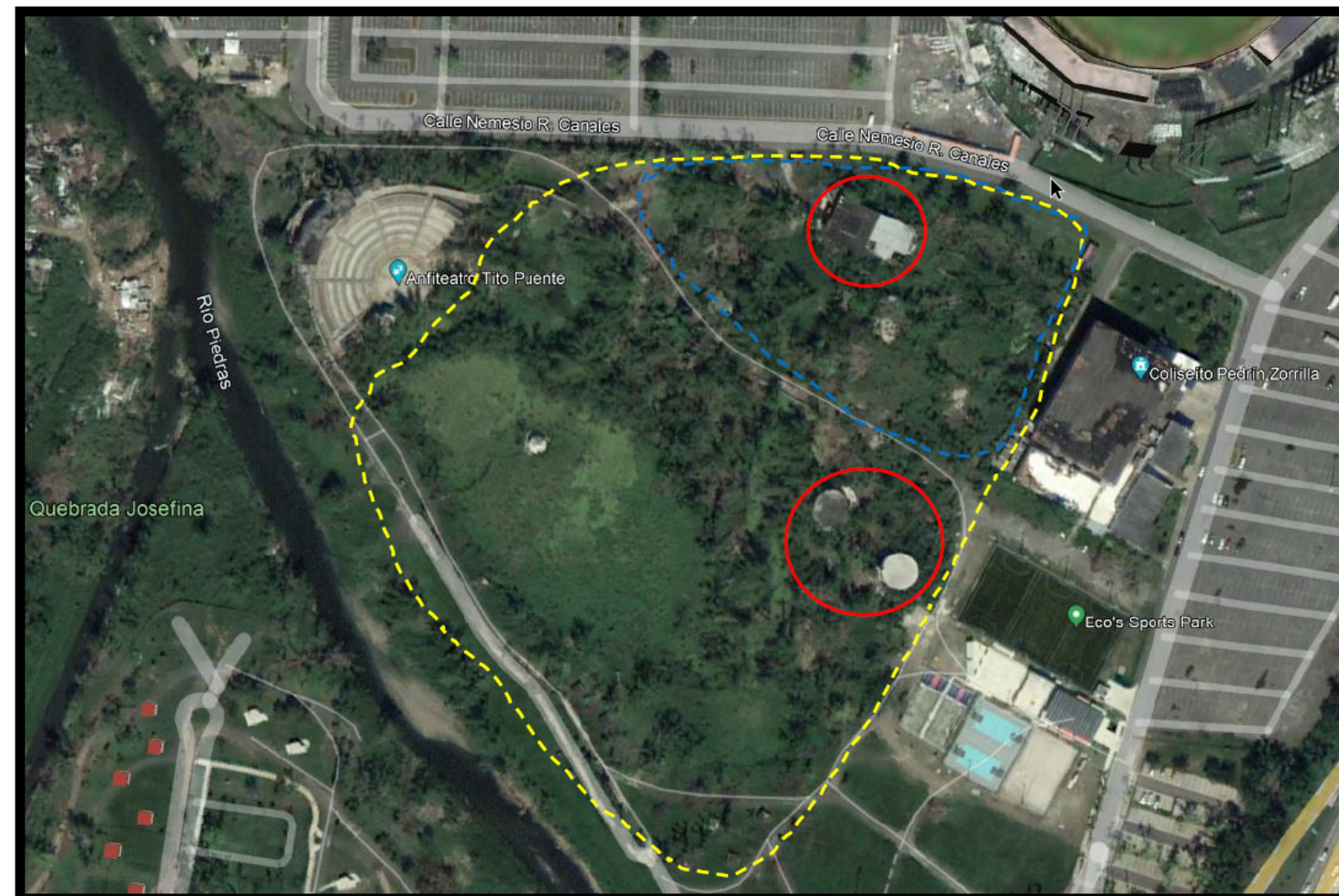
BECHARA MATERIAL MANAGEMENT AREA & LUIS MUÑOZ MARIN PARK POND



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Bechara Material Management Area



LMMP – Material Placement and Staging

- NEPA ongoing with Public Meeting upcoming
- Design nearing completion on Park
- Bechara Design award next month

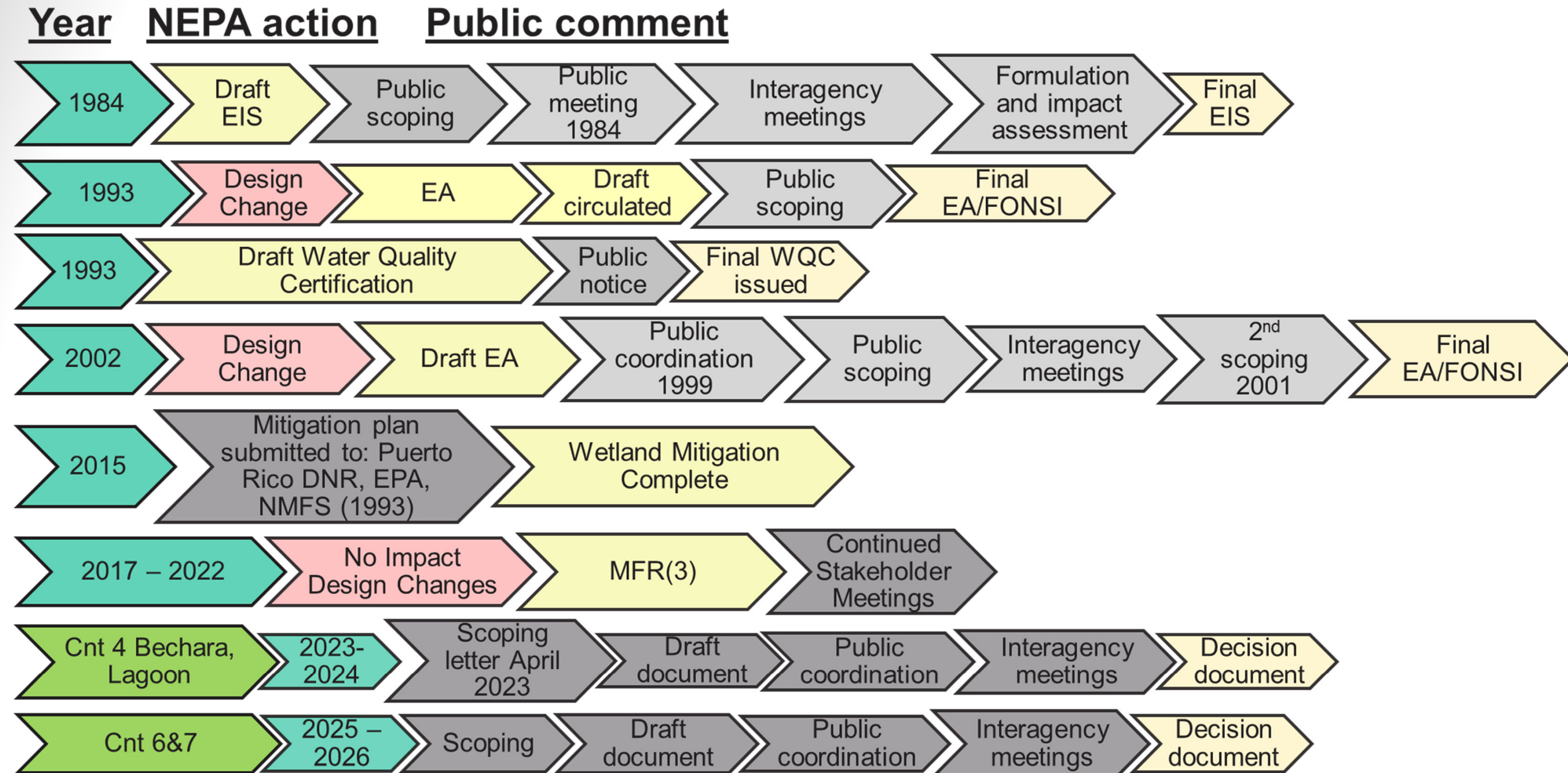


MOVING FORWARD WITH CHANGE

RIO PUERTO NUEVO – NEPA TIMELINE



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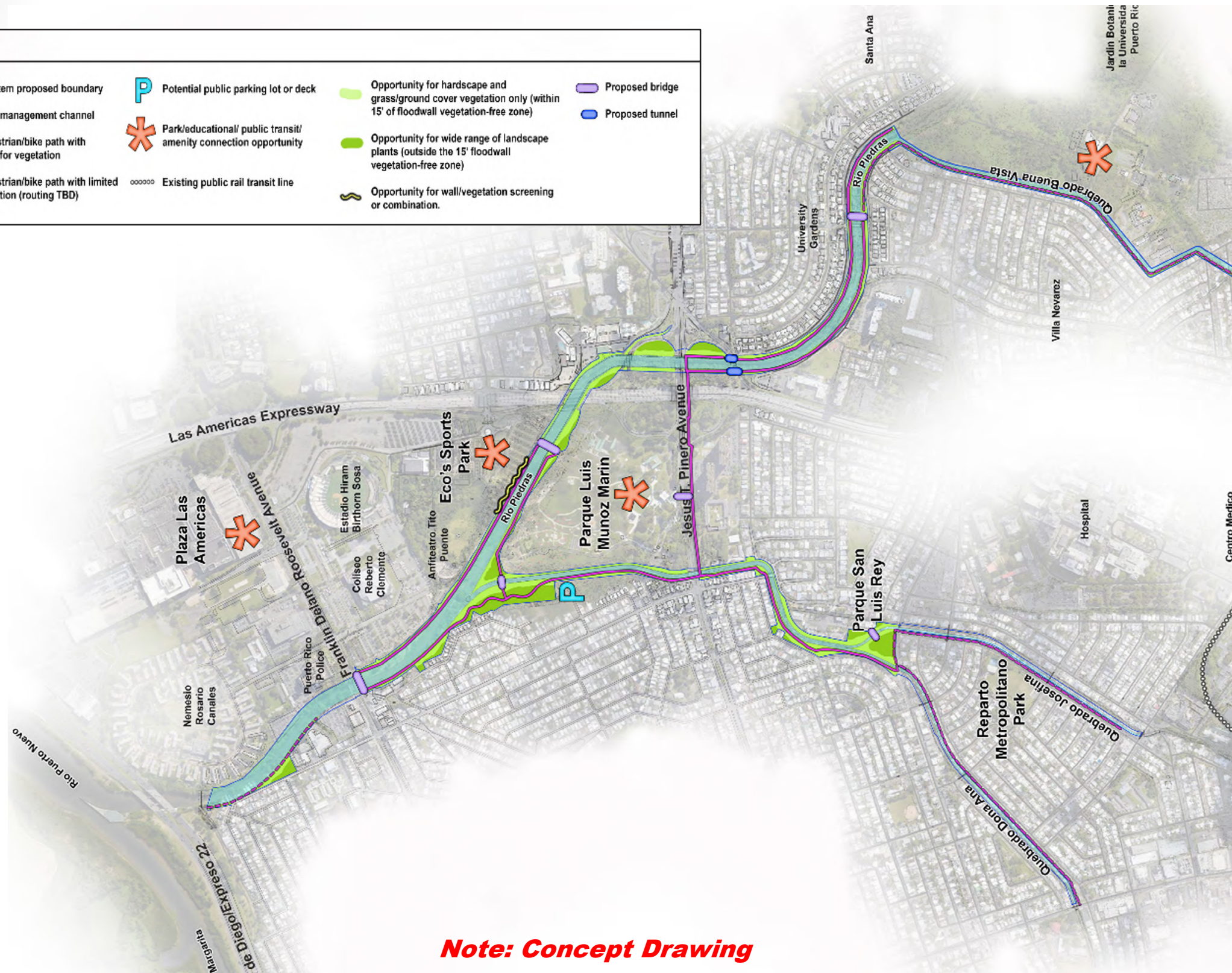


RIO PUERTO NUEVO – RECREATIONAL FEATURES



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LEGEND			
	Linear park system proposed boundary		Potential public parking lot or deck
	Proposed flood management channel		Park/educational/ public transit/ amenity connection opportunity
	Proposed pedestrian/bike path with potential space for vegetation		Opportunity for hardscape and grass/ground cover vegetation only (within 15' of floodwall vegetation-free zone)
	Proposed pedestrian/bike path with limited room for vegetation (routing TBD)		Opportunity for wide range of landscape plants (outside the 15' floodwall vegetation-free zone)
			Existing public rail transit line
			Opportunity for wall/vegetation screening or combination.
			Proposed bridge
			Proposed tunnel



Note: Concept Drawing

LINEAR PARK/BICYCLE PATH:

- Plans for a linear park and bike path that connects all communities adjacent to the project to the Luis Muñoz Marín Park.
 - Includes a path from Puerto Nuevo Norte (thru Roosevelt Avenue Bridge)
 - Includes linear park and paths from Reparto Metropolitano thru Piñero Avenue pedestrian crossing.
 - Includes a path from University of Puerto Rico through the Villa Nevares / Jardines Metropolitano / University Gardens areas, crossing over at Notre Dame Bridge
- Replanting of vegetation and trees equal in number to the ones removed (native, noninvasive species)
- One Service Bridge connecting both sides of park at the southern end of Luis Muñoz Marín Park



COMMUNITY ENGAGEMENT SUCCESSES / CHALLENGES



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SUCCESES:

- TRUST CONTINUING TO BE BUILT WITH COMMUNITIES!!!
- Team has spent the last 5 years continuously meeting with communities. (estimated 20-30 separate meetings)
- Input and Feedback from these meetings have been realized and directly improved design. “Results have been demonstrated”
- Collaboration with ERDC with strong emphasis on Engineering With Nature (EWN). “Director of ERDC visited project & pleased with progress”
- Significant reduction in concrete throughout Rio Piedras, eliminating majority of concrete channel bottom (30 acres) and additional reduction of 17 acres of concrete. “**Greener Project**”



CHALLENGES:

- Continue work with communities, local and state government in getting all the factual information regarding the project benefits
- Getting communities to recognize that their input and feedback is being incorporated with Nature Based solutions.
- Mutual Understanding of Engineering with Nature/Nature Based Designs.
- Continue providing scientific design information that is understand by all stakeholders. (technical & non-technical)





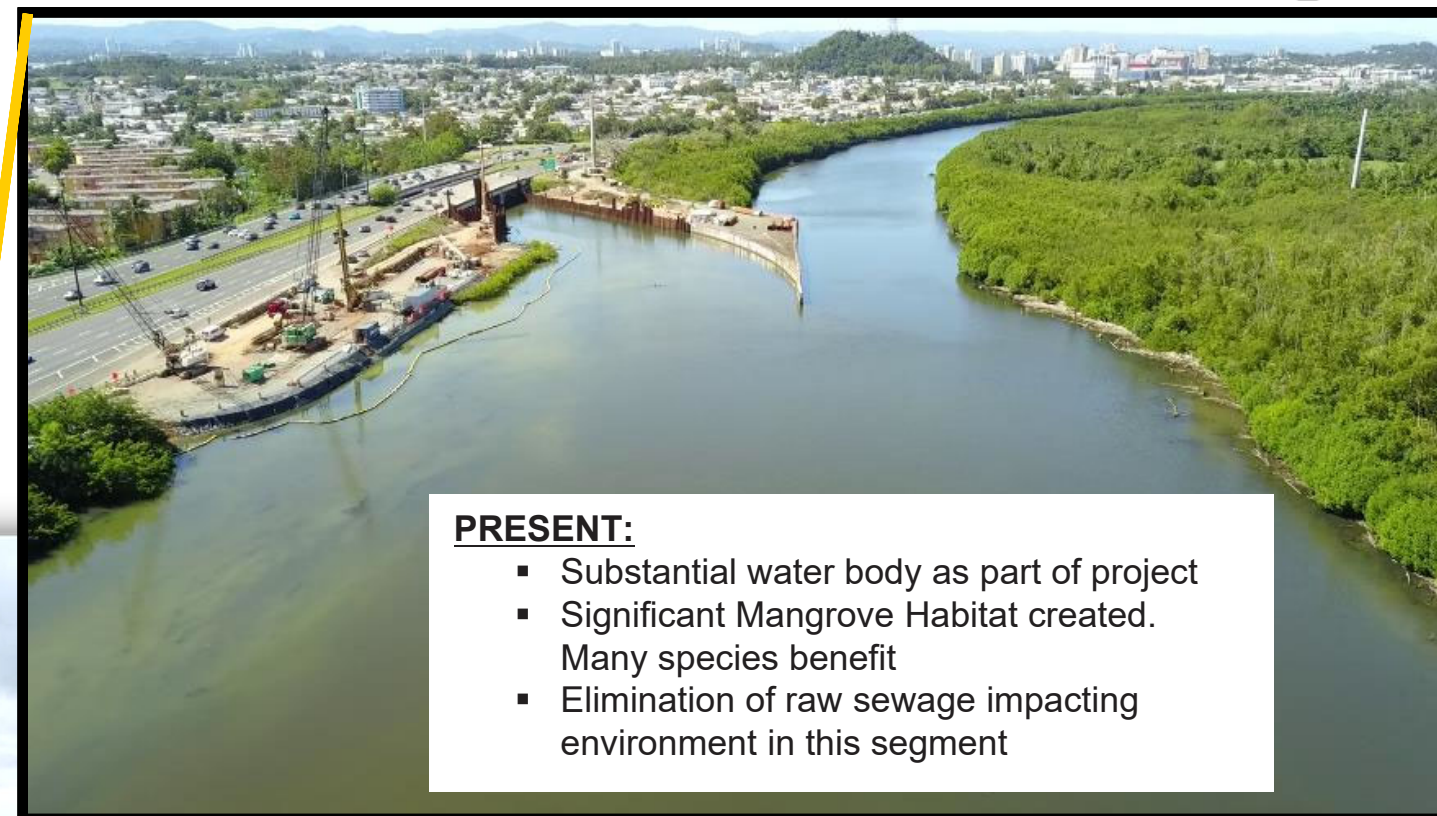
RIO PUERTO NUEVO: REALIZED BENEFITS FROM COMPLETED PROJECT



33

2000-2015

- Note little vegetation and narrow creek that existed prior to project
- Leaking Sanitary Sewer spilling raw sewage into San Juan Bay



PRESENT:

- Substantial water body as part of project
- Significant Mangrove Habitat created. Many species benefit
- Elimination of raw sewage impacting environment in this segment



Image U.S. Geological Survey

Google



PARTNERSHIP WITH MUNICIPIO DE SAN JUAN



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WHERE ARE WE NOW? / WHERE WILL WE BE?



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PURPOSE: The primary purpose of the authorized project is to improve human health and safety, and to provide additional incidental economic benefits (recreation, redevelopment, etc.) through flood risk management and reduction in damages to structures, contents, and transportation infrastructure within the Río Puerto Nuevo Basin.

EXISTING IMPACTS:

- Continued risk to health and safety of communities:
- Impacts to environment, economy, infrastructure and personal property
- Trees along the bank will continue to fall in and block river flow

CONSTRUCTION TEMPORARY IMPACTS:

- Minor temporary impacts to environment during construction
- Removal of Trees to allow construction access
- Maintenance of Traffic
- Temporary Inconvenience

BENEFITS:

- Significant reduction of flood risk to San Juan and communities adjacent to project
- Improved Infrastructure (new utilities, replaced sanitary sewer and electrical)
- Robust new bridges and roadways that are alongside project
- New Linear Parks and recreational areas adjacent to the project
- New landscaping and Native trees along project





CHALLENGES



36

Constructability (Means and Methods):

- Limited Space: Constructing flood walls under existing bridges with low overhead clearances, limited construction staging and access
- Water Diversion and Care: Working within the channel footprint along the rivers while maintaining existing flow
- Material Disposal and Hauling: Cut from the channel and disposal
- Traffic Control: Maintenance of traffic during construction in highly urban area.

Real Estate:

- Availability of housing for home relocation
- Public Perception over process

General:

- Coordination and close partnering with key Commonwealth Agencies
- Public push for minimal environmental impacts and nature based designs



QUESTIONS?

