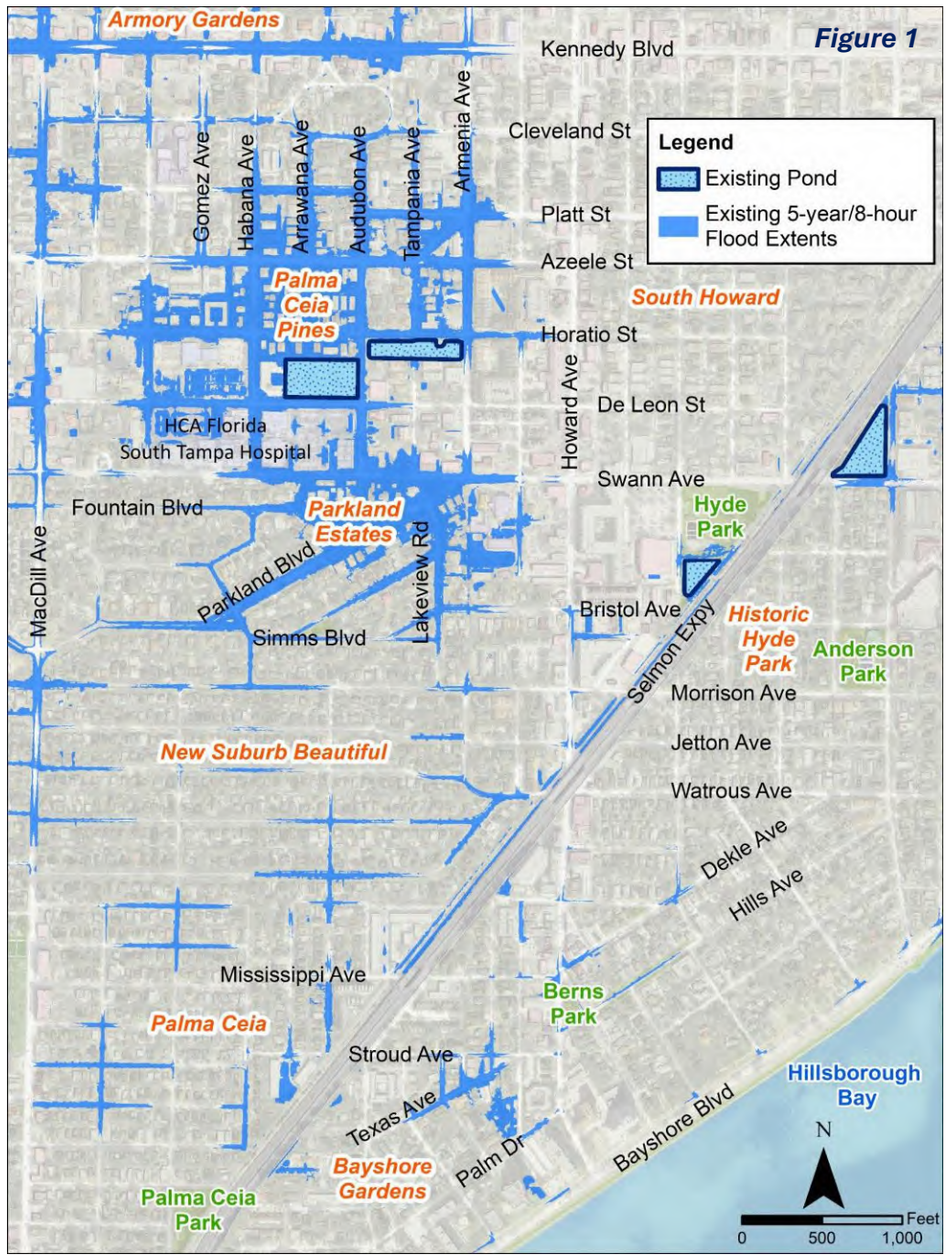
City of Tampa

South Howard Flood Relief & Streetscape Project

Findings from Analysis of Alternative Projects

Project Overview



The Parkland Estates and Palma Ceia Pines neighborhoods of South Tampa have experienced severe and widespread flooding for decades due to the area's topography and antiquated stormwater infrastructure which conveys excess runoff produced by rainfall several miles to both Old Tampa Bay and Hillsborough Bay. **This flooding results in significant property damage and renders roadways impassible around Health Corporation of America (HCA) Florida South Tampa Hospital, jeopardizing the health, safety, and welfare of the public during heavy rainfall events.**

The topography of this area forms a large bowl, which includes the central and eastern portions of Parkland Estates and Palma Ceia Pines, bounded to the north and south by W Kennedy Blvd and W Morrison Ave, respectively, and to the east and west by S Armenia Ave and S MacDill Ave, respectively. This topographic bowl's existing stormwater infrastructure (primarily underground pipes and structures) currently drains to three separate outfalls into the bay. The stormwater infrastructure is aging and severely undersized by current design standards to handle the present-day development density. Due to these deficiencies, low-lying roadways and land within these neighborhoods flood when the stormwater infrastructure is overwhelmed by heavy rainfall.

Before analyzing potential alternative solutions, ensuring that the existing conditions hydrologic and hydraulic (H&H) model simulates known flooding events is essential. A detailed H&H model update was performed by this project's design-build team, Kimmins Contracting (builder) and AtkinsRéalis (designer). This effort began by building upon the City's Upper Peninsula Watershed model and the planning-level feasibility study performed by an engineering consulting firm, JMT. AtkinsRéalis reviewed in detail the JMT feasibility study, along with the area's current H&H conditions, to develop a comprehensive and updated revised existing conditions model (RECM) that accurately reflects flooding within Parkland Estates and Palma Ceia Pines along with surrounding neighborhoods within the study area. This RECM serves as an appropriate tool to analyze the new conveyance system needed to meet the project's flood reduction goals.

Figure 1 to the left shows predicted flood extents for the 5-year/8-hour design storm (5.3 inches of rainfall over an 8-hour period) for model update area in the existing condition. The design goal is a flood reduction alternative that reduces flood stages for the 5-year/8-hour design storm event (5.3 inches of rainfall) to the extent that roadways are passable (a maximum of 4 inches of water depth over the lowest edge of pavement).

<u>The H&H model analysis performed as part of this study led to the following conclusions:</u>

- **A new large stormwater conveyance system is needed** to move millions of gallons of stormwater runoff from this study's primary area of focus into Hillsborough Bay to effectively reduce flooding in Parkland Estates and Palma Ceia Pines.
- **A regional storage alternative** of adequate size and depth to manage the modeled flood volumes **is not feasible** given the region's natural topography, lack of available real estate, extremely large volumes of stormwater, and anticipated groundwater conditions.
- **A gravity system is preferred over a pump station and force main outfall** because it significantly reduces operation and maintenance costs, along with risk of the system failing when it is needed most – during severe storm events, such as Hurricane Milton. In addition, it is difficult for pumping systems to keep up with the large volume of runoff anticipated in severe rainfall events.
- **A pump station that can generate the discharge flow rates needed** to achieve the project's goal would require a pressurized outfall pipe that is similar size to the recommended gravity alternative which **will result in similar impacts to stakeholders along the project route.**
- Given the ground elevations within the project corridors (generally 15 to 21 feet above sea level**), a gravity system will still be hydraulically effective during high tides and moderate storm surge events.** In fact, the SHFR models already assume a conservative and constant tidal stage of 2.0 (ft, NAVD88) in the design storm simulations, which is about a foot higher than a normal high tide (Mean Higher-High Water elevation is 0.96 (ft, NAVD88) for Ballast Point, Station 8726639, per NOAA).

The following pages summarize the feasibility of the additional alternative solutions and project routes studied for the South Howard Flood Relief & Streetscape Project, and provide relevant data that supports comparative route analysis and ultimate recommendation:

Alternative 1 - S Howard Avenue Gravity System

Alternative 2 - W Swann Avenue Gravity System

Alternative 3 - Ponds within Parkland Estates and Palma Ceia Pines, no new outfall

Alternative 4 - Parkland Estates Pump Station

Alternative 5 - Hyde Park Softball Field Pump Station

Alternative 6 - Conveyance System along CSX Railroad

Alternative 1
S Howard Ave Gravity System

Description of Alternative:

Alternative 1 is the recommended solution, consisting of a 10'x10' box culvert trunkline along South Howard Ave from Bayshore Blvd to W Swann Ave, continuing west along W Swann Ave, and north along S Audubon Ave to the existing AMI stormwater detention pond between W De Leon St and W Horatio St. The box culvert will serve as the new primary outfall for this pond. **Figure 2 to the left provides a map of this alternative.**

Key Benefits of Alternative:

- This is the **shortest feasible route between Parkland Estates and Hillsborough Bay** and minimizes the cost and duration of construction in comparison to other alternatives.
- **Hydraulically more effective than a gravity system along other routes.**
- **The existing 5'x10' box culvert along S Howard Ave beneath the CSX railroad and Selmon Expressway is already in place and can be used.** The existing culvert will be supplemented by a parallel 60-inch pipe to be installed via microtunnel for additional hydraulic capacity. (A geotechnical investigation was performed on May 5th, 2025, by AREHNA Engineering, Inc. and ground penetrating radar (GPR) was used by ECHO UES, Inc. in December of 2025 to locate the existing 5'x10' box culvert)
- **The existing three 4'x6' box culverts beneath Bayshore Blvd at S Howard Ave, and their discharge point into Hillsborough Bay will be used and are sufficient to meet the flood reduction goal.** No additional pipe or box culvert is proposed to discharge into the bay, avoiding construction of a new outfall and the need to relocate the existing 48" force main along Bayshore Blvd. This will also simplify the permitting process and expedite construction.
- Use of the existing outfall avoids extended closure of Bayshore Blvd's northbound lanes
- The box culvert system will receive stormwater discharge from the Selmon Expressway at two locations: S Howard Ave's intersection with W Watrous Ave and S Howard Ave's intersection with W Bristol Ave. **This partnership is expected to provide at least $11M in project funding.**
- High ground elevations approaching Bayshore Blvd along S Howard Ave allow a large box culvert system to be constructed higher relative to the bay, creating less of a hydraulic sump condition than alternative routes like W Swann Ave.
- More attainable CSX permit because this alternative can meet the project's flood reduction goal using the CSX maximum allowable casing size (72") beneath the railroad, contrary to the other alternatives
- **A gravity system is passive and requires far less maintenance (especially a culvert of this size) than a pump station alternative.**

Key Concerns with Alternative:

- Construction will bring temporary impacts to residents, businesses, and commuters along S Howard Ave and a portion of W Swann Ave between S Howard Ave and S Audubon Ave.

Additional Notes Regarding the Alternative:

To further demonstrate the hydraulic efficiency of the proposed project during storm surge events, the proposed conditions model was simulated with a constant Tampa Bay water surface elevation of 8.0 (ft, NAVD88), which is estimated peak surge elevation observed throughout Tampa Bay during Hurricane Helene in 2024 according to NOAA tide gauge data. The flood reduction benefits observed in that model simulation are extremely significant, showing that even when Hillsborough Bay is at a surge elevation of 8 feet, the proposed project **still reduces peak stages in Parkland Estates by approximately 3 feet during a 5-year/8-hour rainfall event. This occurs even while Bayshore Blvd is fully submerged by the bay** at S Howard Ave. This is because 7 feet or more of hydraulic head, which can be thought of as energy available to push water through the culvert, is enough to force a large volume of stormwater runoff from Parkland Estates into the elevated bay in a relatively short amount of time.

Alternative 2
W Swann Ave Gravity System

Figure 3

Description of Alternative:

Alternative 2 consists of a 10'x10' box culvert trunkline along W Swann Ave between Hillsborough Bay and S Audubon Ave, and north along S Audubon Ave to the existing AMI stormwater detention pond between W De Leon St and W Horatio St. The box culvert will serve as the new primary outfall for this pond. **Figure 3 above provides a map of this alternative.**

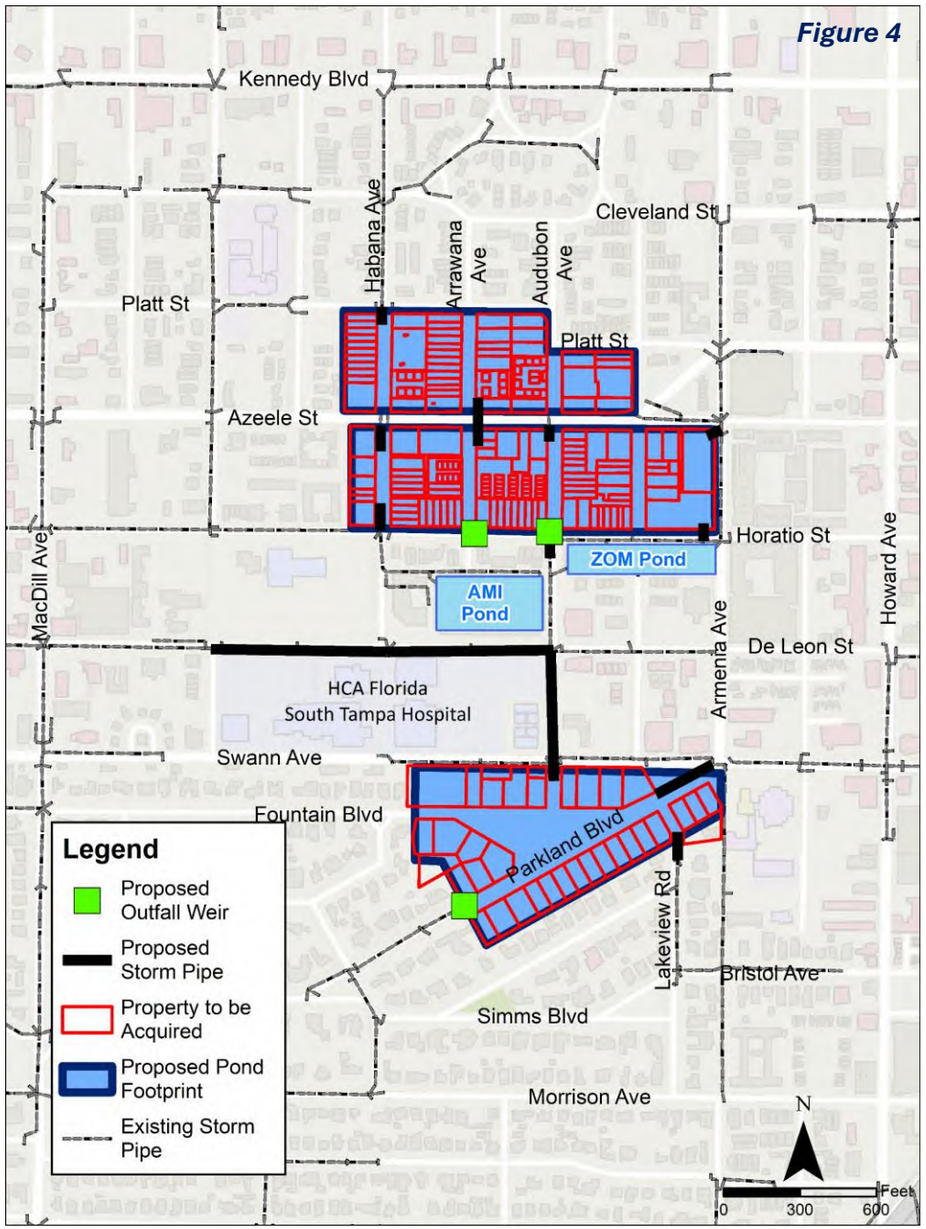
Key Benefits of Alternative:

- A gravity system is passive and requires far less maintenance (especially a culvert of this size) than a pump station alternative.

Key Concerns with Alternative:

- **Temporary impacts to businesses and residents are not eliminated**, just transferred to another group of stakeholders along W Swann Ave between S Howard Ave and Bayshore Blvd.
- **30% longer route to the bay** (additional 1300 LF of large box culvert and full corridor reconstruction increases cost and duration of construction significantly)
- **Extends anticipated duration of construction by 1 to 2 years** due to increased length and complex utility conflicts, most notably the 48" sanitary sewer force main at W Swann Ave and S Rome Ave, which handles roughly 30% of the City's sewage. The Swann/Rome intersection could be closed for 4 to 5 months to address this conflict. More complex permitting requirements for new outfall at Bayshore Blvd could delay start of construction in comparison to Alternative 1.
- **The existing 96" diameter steel casing beneath CSX that protects a 43"x68" elliptical reinforced concrete pipe (ERCP) cannot move**, so there is only room for one new stormwater pipe via microtunnel installation. A higher construction cost to achieve the same flood reduction drives down the benefit-cost ratio of the project in comparison to the recommended alternative.
- Using the existing 43"x68" storm pipe beneath the railroad has minimal impacts on the 5-year storm peak stages in Parkland Estates. This is because the shallow pipe's elevation is too high to provide significant hydraulic benefit to Parkland Estates and Palma Ceia Pines and would not even flow full during the peak of the 5-year design storm. It would be recommended to leave the existing pipe and casing in place to continue to convey stormwater runoff to the Swann Pond for treatment, as a separate parallel system along W Swann Ave.
- **The Bayshore Blvd northbound lane and the on ramp to Davis Islands will be closed for likely 2-3 months for outfall construction.**
- Potential vertical relocation of 30" reclaimed water main needed near the S Rome Ave intersection, increasing construction cost and extending duration in that area.
- Box culvert needs to be installed at a lower elevation than it would on S Howard Ave to stay underneath existing stormwater pipes entering the Swann Pond, to ensure that large volumes of runoff that currently receive treatment from the pond continue to do so, as required by the pond's issued permit from SWFWMD.
- **It will be difficult to provide both connection points for the proposed THEA system, jeopardizing $11M or more in project funding.**
- CSX permitting is more complicated (increasing project cost and duration) due to the need for a larger microtunnel pipe, which exceeds the CSX allowable casing size of 72" (a 108" casing around a 96" pipe would be needed to meet the flood reduction goal).
- Project will be delayed for new data collection and public involvement campaign with new group of stakeholders (including Hyde Park Village, Hyde Park residents, W Swann Ave businesses).

Alternative 3
Ponds within Parkland Estates and Palma Ceia Pines



Description of Alternative:

Alternative 3 consists of three hydraulically connected stormwater detention ponds within the lowest portions of Parkland Estates and Palma Ceia Pines that provide enough storage for runoff to meet the project's flood reduction goal without constructing a new conveyance system to Hillsborough Bay. **Figure 4 to the left provides a map of this alternative.** While this alternative is clearly not feasible or justifiable, it demonstrates the magnitude of detention ponds needed to mitigate the flooding without constructing a new outfall. **The combined ponds would need to store over 70 acre-ft of stormwater runoff above the normal water surface.**

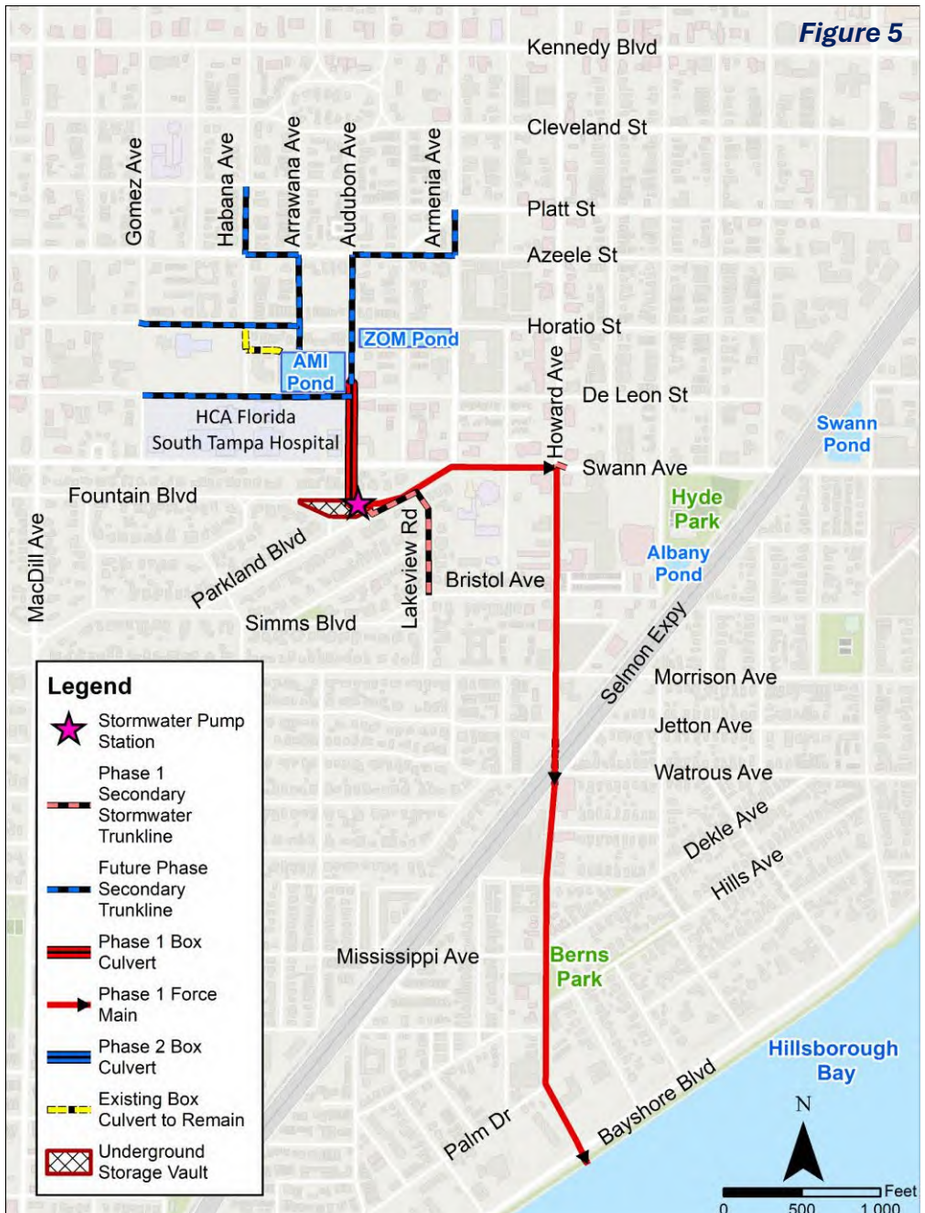
Key Benefits of Alternative:

- Does not require a new conveyance system to Hillsborough Bay, and does not impact S Howard Ave, eliminating coordination and permitting with CSX and significantly reducing impacts on businesses on S Howard Ave.
- Provides treatment of stormwater runoff

Key Concerns with Alternative:

- **This would require eminent domain to purchase 232 properties. The estimated combined property values alone exceed $150M and would be accompanied by significant legal fees and construction costs.**
- **Eminent domain cannot be used when there are viable, feasible alternatives (Alternative 1)**
- **Displaces hundreds of Palma Ceia Pines and Parkland Estates residents**
- **Loss of future tax revenue from 232 properties**
- A limited solution without a new outfall, leaving little room for additional runoff from future drainage improvement projects in the future.
- More long-term maintenance needs in comparison to Alternatives 1 and 2

Alternative 4
Parkland Estates Pump Station



Description of Alternative:

Alternative 4 consists of **a large 600-CFS capacity stormwater pump station in Parkland Estates**, located within open space between W Fountain Blvd and W Parkland Blvd at S Audubon Ave. This pump station would need to discharge through a **10-foot diameter force main pipe that outfalls into Hillsborough Bay**. The pump station is supplemented by a 0.5-acre underground storage vault that stores runoff before it is pumped to the bay. **Figure 5 to the left provides a map of this alternative.**

Key Benefits of Alternative:

- Force main installation does not have to be constructed as deep as gravity system with equivalent capacity

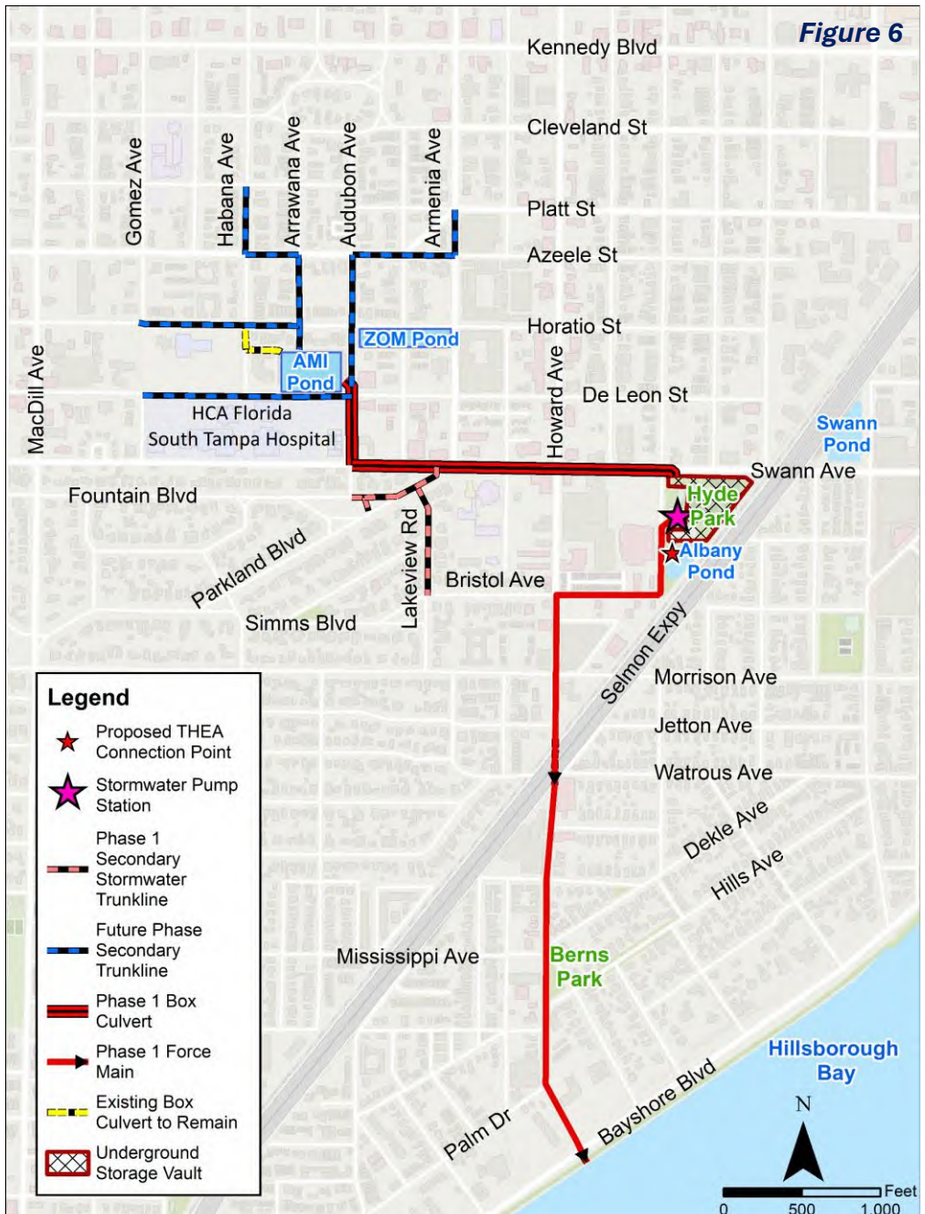
Key Concerns with Alternative:

- **Significant operation and maintenance costs, power consumption**
- Much higher risk of failure during significant rainfall events due to loss of power or mechanical issues
- **Large box culvert is still needed to bring runoff from Palma Ceia Pines into Parkland Estates**
- Force main outfall eliminates opportunity for additional flood relief downstream of the pump station through smaller projects that could tap into a new gravity system
- A 0.5-acre underground vault up to 20 feet deep and a 30-foot deep wet well for the pumps will be challenging to construct within a confined, highly residential area
- Large pump station footprint that includes electrical components and backup power generators which need to be protected 4-5 feet above existing ground would come with permanent noise and aesthetic impacts to the Parkland Estates neighborhood
- **A 10-foot diameter force main will need to be constructed between the pump station and Hillsborough Bay** bringing similar temporary construction impacts to residents and businesses along the project corridor
- Runoff along the force main's reconstructed corridor will not be able to drain into the new system, eliminating an opportunity to improve drainage along S Howard Ave and its connecting side streets.
- **It will be difficult to provide both connection points for the proposed THEA system, jeopardizing $11M or more in project funding**
- CSX permitting is more complicated (increasing project cost and duration) due to the need for a larger microtunnel pipe, which exceeds the CSX allowable casing size of 72".

Additional Notes Regarding the Alternative:

Because of significant operation and maintenance costs and risk of failure during severe storm events when they are most needed, stormwater pump stations should be considered a "last resort" solution to drainage issues. They are commonly used when there is a lack of sufficient hydraulic head (change in elevation between upstream and downstream water surfaces of a conveyance system) for a gravity system to work effectively. This is applicable on some barrier islands or places like Louisiana, where ground elevations are not much higher than the nearby ocean or other large receiving water body. This is not the case here – even the lowest elevations in Parkland Estates are over 15 feet higher than Hillsborough Bay. The recommended solution for this project is a passive, low maintenance system that lets gravity do the work, rather than a power intensive collection of pumps. During Hurricanes Helene and Milton last year, several pump systems failed throughout the Tampa Bay area due to loss of power and failure of backup power systems, leading to increased flooding and sewage spills. **Figure below shows an example of 10-foot diameter pipe, to provide a visual of the size of the required force main.**

Alternative 5
Hyde Park Softball Field Pump Station



Description of Alternative:

Using the park on the south side of W Swann Ave between S Albany Ave and the CSX railroad to construct a massive underground storage vault for stormwater runoff would allow for a smaller stormwater pump station than Alternative 4, but it would not eliminate the need for a new outfall to Hillsborough Bay. **A 300-CFS capacity pump station and a 7-foot diameter main pipe into Hillsborough Bay** along with a 3-acre underground storage vault would be needed to meet the LOS goal. **Figure 6 to the left provides a map of this alternative.**

Key Benefits of Alternative:

- Force main installation does not have to be constructed as deep as gravity system with equivalent capacity

Key Concerns with Alternative:

- **Significant operation and maintenance costs, power consumption**
- Much higher risk of failure during significant rainfall events due to loss of power or mechanical issues
- **3000 LF of large box culvert still needed to bring runoff from Palma Ceia Pines along W Swann Ave to the park**
- Force main outfall eliminates opportunity for additional flood relief downstream of the pump station through smaller projects that could tap into a new gravity system
- A 3-acre vault up to 25 feet deep and a 30-foot deep wet well for the pumps will be challenging to construct. It is a massive undertaking that will increase duration and cost of construction
- **A 7-foot diameter force main will need to be constructed** between the pump station and Hillsborough Bay bringing similar temporary construction impacts to residents and businesses along the project corridor
- Runoff along the force main's reconstructed corridor will not be able to drain into the new system, eliminating an opportunity to improve drainage along S Howard Ave and its connecting side streets.
- **It will be difficult to provide both connection points for the proposed THEA system, jeopardizing $11M or more in project funding**
- CSX permitting is more complicated (increasing project cost and duration) due to the need for a larger microtunnel pipe, which exceeds the CSX allowable casing size of 72".
- Using W Swann Ave as an alternative route for the force main results in similar concerns as those discussed for Project Alternative 2.

Alternative 6
Conveyance System along CSX Railroad

Description of Alternative:

Alternative 6 uses the area alongside the CSX railroad and Selmon Expressway as a corridor for the new stormwater conveyance system. Because of the significant right of way and constructability challenges, along with the significantly increased route length, this is not a feasible alternative. **Figure 7** to the left provides a map of this alternative.

Key Benefits of Alternative:

- Reduces impacts to S Howard Ave residents, businesses, and commuters

Key Concerns with Alternative:

- **Construction would need to stay 25' away from center of the railroad track. This leaves roughly 10 to 12 feet of width available to work and install any infrastructure between the Selmon Expressway and CSX's property – not nearly enough space to install a conveyance system with adequate capacity.**
- A new box culvert or force main would need to cross beneath the railroad at some point. There is not enough space between the railroad and the Selmon Expressway for a microtunnel's receiving pit.
- The Hyde Park softball field at W Swann Ave and S Albany Ave would not feasibly provide enough storage to eliminate the need for a new outfall to Hillsborough Bay, as discussed previously
- **The existing conveyance system would need to be upsized and lowered significantly to provide hydraulic benefit and flood relief to Parkland Estates and Palma Ceia Pines**
- The conveyance capacity of the existing pipes that connect this ditch beneath several crossing roadways is just a small fraction of what would be required, so pumping the stormwater to the existing ditch system to overcome the gravity challenge would not work.
- **80% increase in length** of new conveyance system in comparison to Alternative 1, which reduces hydraulic efficiency and significantly increases cost and duration of construction
- **The existing outfalls at Rubideaux Street are already overwhelmed during major rainfall events and cannot handle this additional discharge. They would need to be upsized significantly to avoid adverse flooding impacts to Palma Ceia and Bayshore Gardens.**
- This alternative realistically would require demolishing and reconstructing the railroad, which is not a feasible option. This would require CSX to abandon their active railroad and donate or sell their property to the City.