



WISSINOMING PARK

RESTORING HISTORY THROUGH GREEN STORMWATER INFRASTRUCTURE

SESWA'S 17TH ANNUAL REGIONAL STORMWATER CONFERENCE : OCTOBER 7, 2022

PRESENTED BY: ANDREW BIRMINGHAM, PE

AGENDA

- PROJECT PURPOSE
- HISTORICAL BACKGROUND
- PROJECT LIMITS / OVERVIEW
- SITE CONSIDERATIONS
- DESIGN APPROACH
- CONSTRUCTION CONSIDERATIONS / PHOTOS
- CONCLUSION



PROJECT TEAM



Reconsidered
Ground



PROJECT PURPOSE

To align with PWD's Green City, Clean Waters (GCCW) program by providing reductions in combined sewer overflows (CSOs) through the creation of a significant number of Greened Acres (GAs) by directing stormwater from the surrounding neighborhood into green infrastructure within the park.

- Greened Acre (GA) = 1" rainfall managed from 1 acre of impervious drainage area
- **1 GA = ~27,000 gallons or 5 tanker trucks**
- First flush runoff (up to 2" rainfall depth)
- Treat, detain, slow-release
- Advance objectives of GCCW
- Integrate with park setting



HISTORICAL BACKGROUND

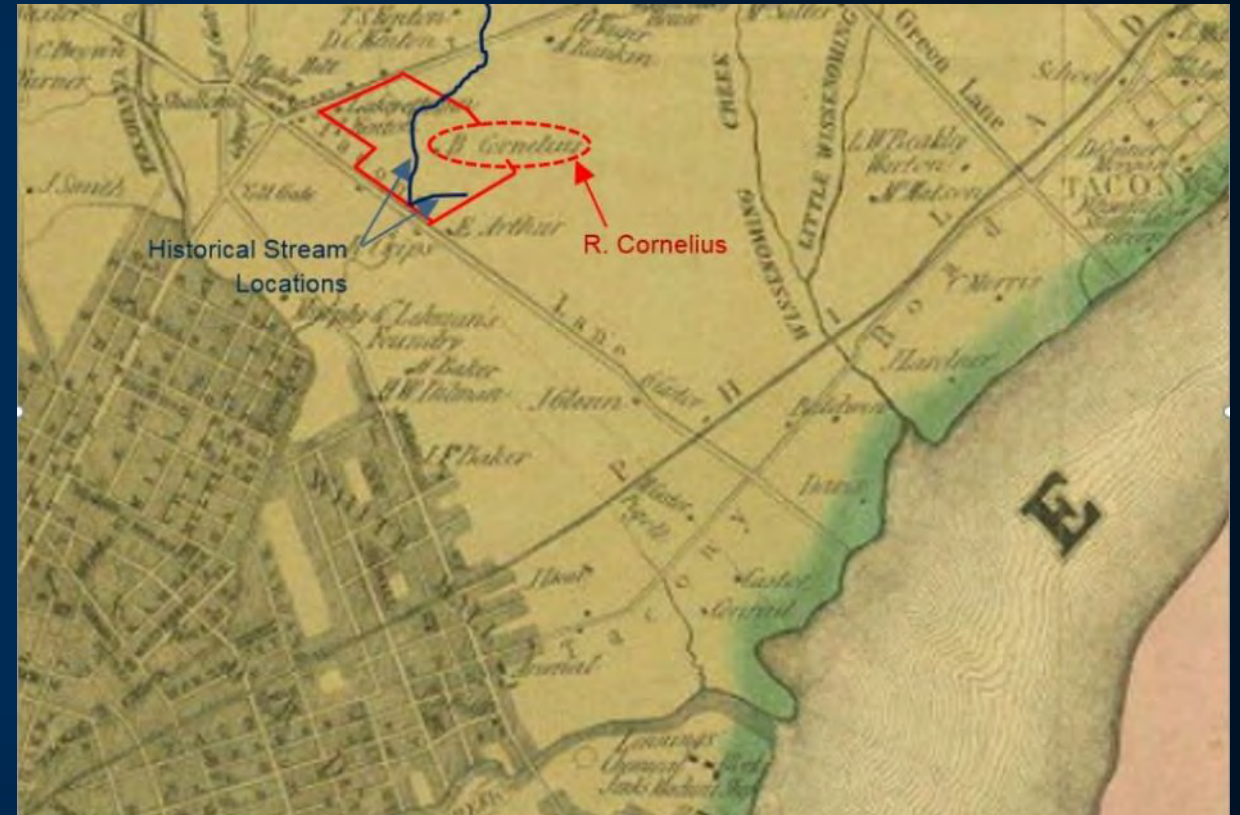
- Robert Cornelius
- 80-acre purchase in 1852
- Estate originally known as "Lawndale"
- Philadelphia countryside: originally broken up into large privately owned tracts



"Lawndale" – Residence of Robert Cornelius. Now Wissinoming Park; house no longer present.
(Credit: Frankford Historical Society)

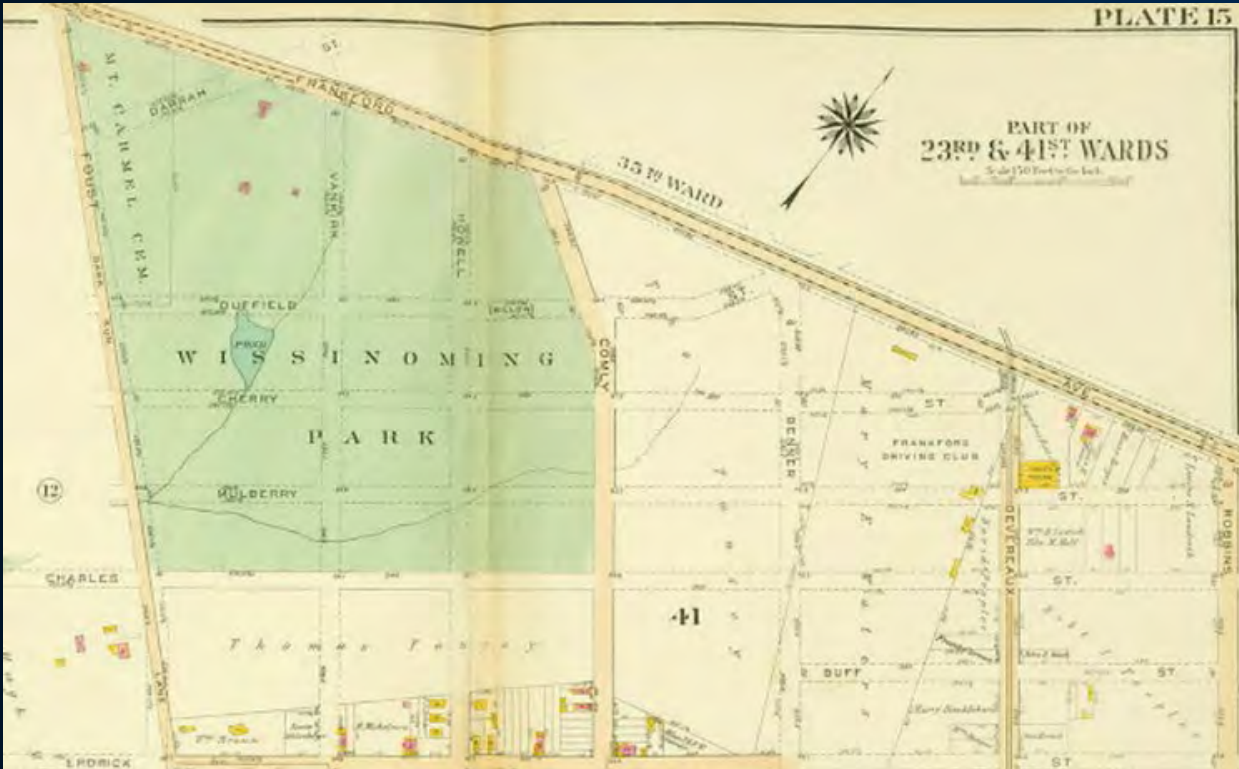
HISTORICAL BACKGROUND

- 2 headwater streams
 - Tributaries to Little Tacony Creek
 - Dam constructed on northern tributary to form pond
 - Southern tributary flowed freely
- Landscaping focus
 - Rare trees imported from all over the world



Historical stream locations and record of Robert Cornelius's estate.
(Credit: R.L. Barnes, "New Map of the Consolidated City of Philadelphia," 1855)

HISTORICAL BACKGROUND



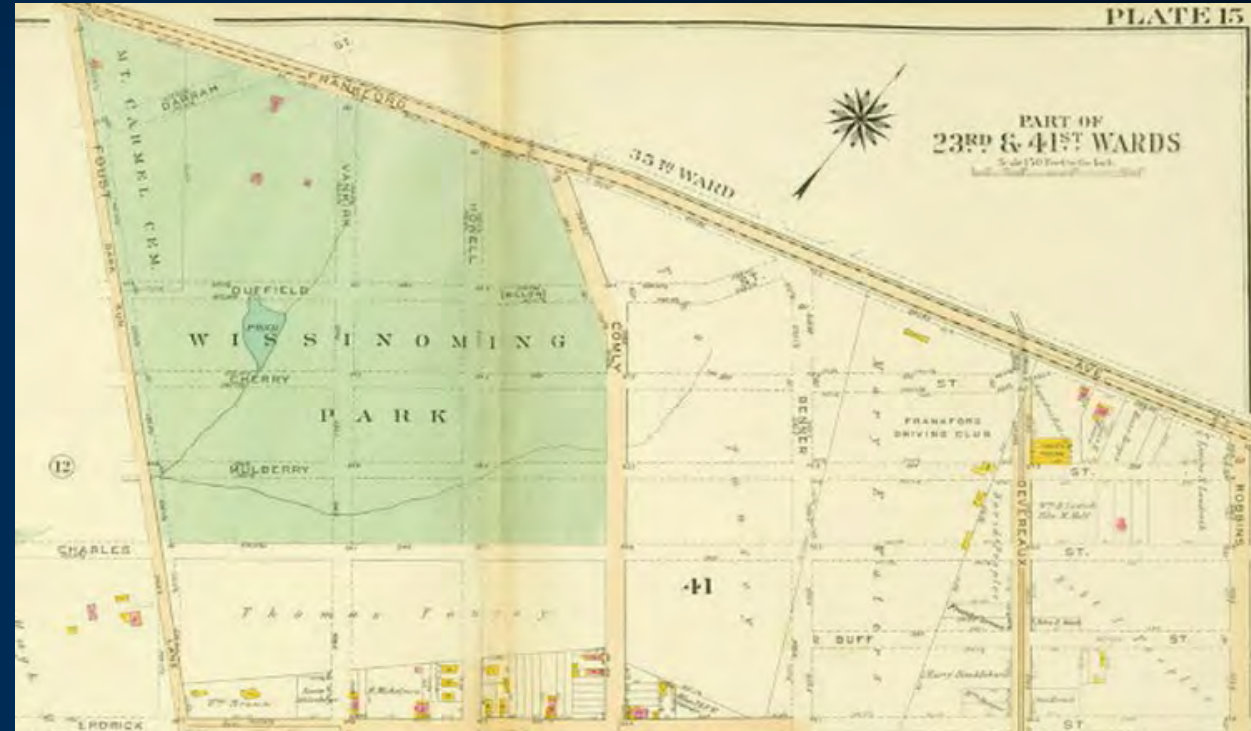
Historical layout of Wissinoming Park, showing historical stream and pond locations.
(Credit: G.W. Bromley & Co., "Atlas of the City of Philadelphia, 23rd & 41st Wards," 1920)



Historical pond on northern tributary in Wissinoming Park
(Credit: Frankford Historical Society)

- 1920, City purchased 40-acres for "Wissinoming Park"
- Pond (northern tributary) was beloved asset
- Spring (southern tributary) used by residents until 1950

HISTORICAL BACKGROUND



Historical layout of Wissinoming Park, showing historical stream and pond locations.
(Credit: G.W. Bromley & Co., "Atlas of the City of Philadelphia, 23rd & 41st Wards," 1920)
and Google Earth (2019).

- Streams buried / diverted into combined sewer system
- Late-90's: pond was filled
- Recreation fields / rinks
- Impervious areas

HISTORICAL BACKGROUND



Google Earth (2019)



Historical layout of Wissinoming Park, showing historical stream and pond locations. (Credit: G.W. Bromley & Co., "Atlas of the City of Philadelphia, 23rd & 41st Wards," 1920) and Google Earth (2019).

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PROJECT LIMITS / OVERVIEW

NEIGHBORHOOD

- DA = 20 acres (Impervious)
- Combined Sewers
- Public Right-of-Way
- Alleyways

PARK

- DA = 15 acres (Pervious)
- Recreation Areas/Open Space
- Historical Streams



Approximate outline of drainage area to be directed into GSI at Wissinoming Park.

PROJECT LIMITS / OVERVIEW



OMG Inlet



City Inlet (#2)



Typical alleyway configuration in surrounding neighborhood



Ponding adjacent to curb ramps at the corner of Van Kirk and Charles Streets

NEIGHBORHOOD

- Alleyways
- Clogged / Old Inlets
- Ponding / Standing Water Observed

PROJECT LIMITS / OVERVIEW



Typical yard inlet within park



Standing water and poor drainage immediately south of the soccer field



Outlet control structure located at low-point of hockey rink and basketball courts

PARK

- Existing flood structure
- Open space w/ yard inlets
- Poor drainage / standing water observed

SITE CONSIDERATIONS

NEIGHBORHOOD

- Green Sewer / Connections
- ADA Compliance
- Utilities
- Flat Grades
- Disconnection Approach

PARK

- Poor infiltration / shallow groundwater
- Trees & species diversity
- Recreational uses
- Trails & access ("social trails")
- Aesthetics
- Safety



Uprooted tree in existing swale with signs of mottled soil around its roots and standing water



Existing swale bottom consists of an abundance of invasive vegetation

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"Social trail" leading from adjacent street corner into park.

DESIGN APPROACH

SMP 1: SLOPING WETLAND

- Existing Swale (Historical Stream)
- Sloping Wetland Complex
 - w/ upland rain garden
- Wetland Berms
- Forebays
- No-Mow Meadow “Edge Condition”
- Manages 540,000 gallons of runoff (20 GA)



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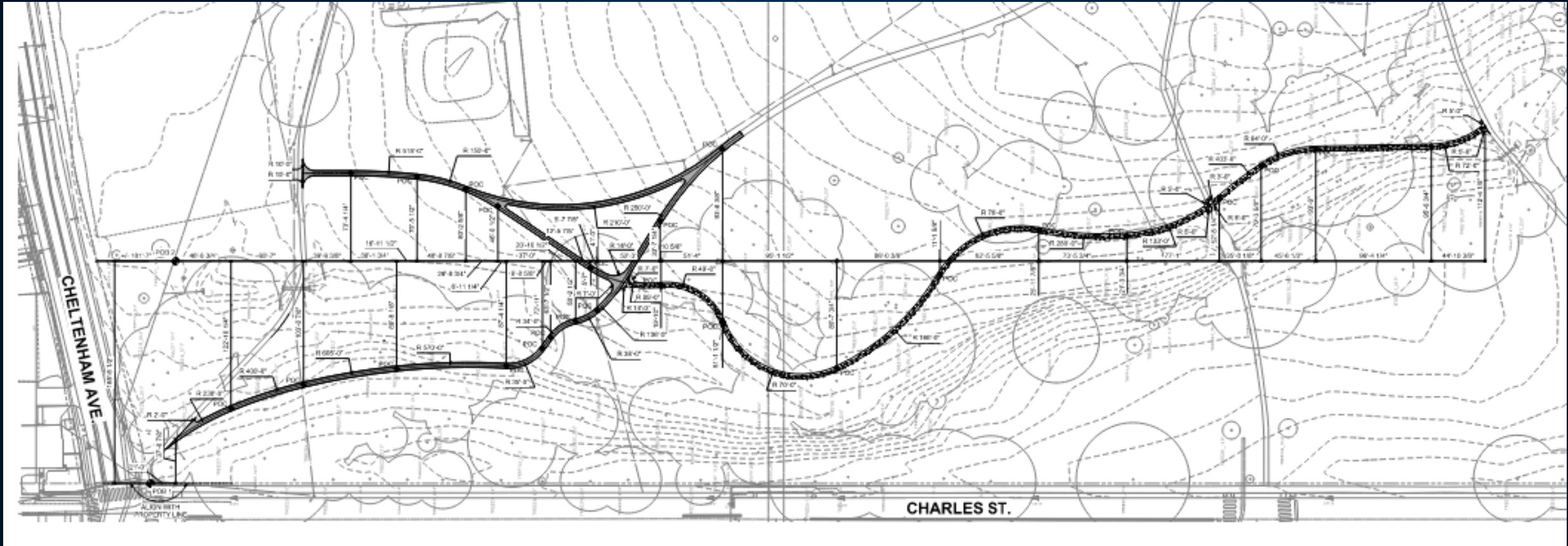
SMP 1: SLOPING WETLAND



SMP 1: Sloping Wetland Complex Rendering

DESIGN APPROACH

SMP 1: SLOPING WETLAND



SMP 1: Trail Improvements Plan

COORDINATION

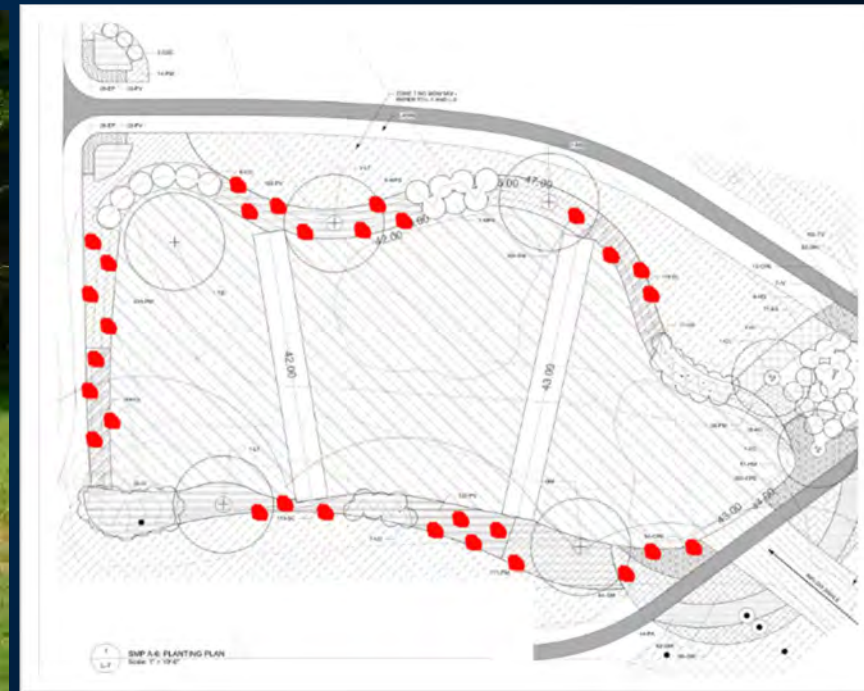
SMP 1: SLOPING WETLAND

COMMUNITY OUTREACH

- Open Space Areas
- Trees / Meadows
- ATV Access (Boulders)
- Site Safety/ Pedestrian Access



Open space area near Comly & Charles



Proposed boulder locations to inhibit ATV access within sloping wetland complex

COORDINATION

SMP 1: SLOPING WETLAND

TREE IMPACTS

- Diverse, historically significant, mature species
- Avoided or minimized impacts to unique species/specimens (Bald Cypress, Beech grove, Red Oaks, etc.)
- Removed non-native species & unhealthy trees (White Ash)
 - Close coordination with city arborists
 - Critical root zone delineations
 - Hydrologic considerations
 - 1:1 replacement ratio




Mature Bald Cypress identified to be saved

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Design of GSI at Wissinoming Park
Tree Impact Summary

Introduction:

The following tree removals were determined during multiple tree inspections conducted by the Philadelphia Water Department (PWD), Philadelphia Parks & Recreation (PPR), and Design Team. The proposed SMPs were modified to the greatest extent possible to avoid specific mature, native tree impacts identified by PPR while maximizing Greened-Acre stormwater treatment. The proposed landscaping plan will augment this natural area by planting a variety of native tree species identified

Results:

Existing Tree Removals			Proposed Tree Plantings	
Type	Quantity	Reason	Type	Quantity
Alder	1	Design	American Hornbeam	3
Beech	4	Health (1) Design (3)	American Sycamore	2
Black Cherry	7	Health (1) Design (6)	Bald Cypress	11
Black Locust	2	Design	Blackgum	5
Boxelder	3	Design (2) Other (1)	Burr Oak	8
Catalpa	9	Design	Eastern Redbud	9
Mulberry	7	Design (1) Other (6)	Flowering Dogwood	2
Norway Maple	3	Health (1) Design (2)	River Birch	2
Pin Oak	1	Design	Serviceberry	6
Princess Tree	1	Other	Sweetbay Magnolia	6
Red Oak	4	Health (2) Design (2)	Sweetgum	2
River Birch	1	Design	Tulip Tree	8
Silver Maple	1	Design	Willow Oak	3
Sycamore	1	Design		
Tulip Poplar	1	Design		
Unknown	3	Health (2) Design (1)		
White Ash	17	Health		
<hr/>			<hr/>	
	<i>Sub-Total</i>	<i>Health</i>		
	22			
	<i>Sub-Total</i>	<i>Design</i>		
	34			
	<i>Sub-Total</i>	<i>Other</i>		
	8			
	<hr/> <i>Total</i>		<i>Total</i>	<hr/> 67

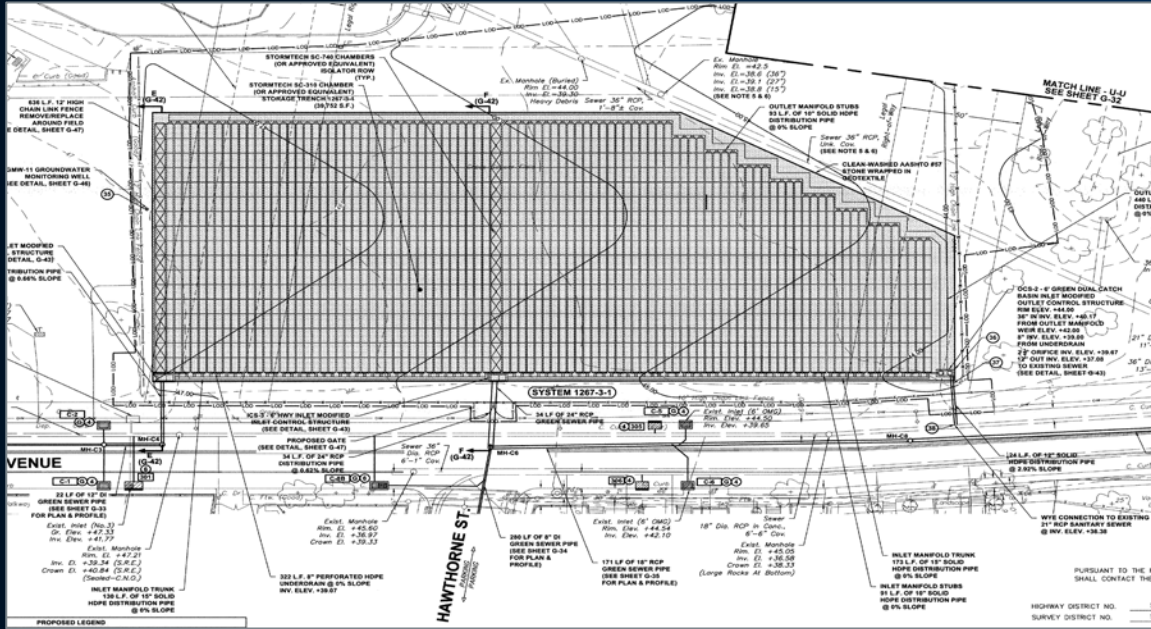
Reasoning Explained:

- Health - Dead or dying
- Design - Unavoidable design conflict
- Other - Other site/design consideration, pest control, allergens, invasive species, etc.

Tree Impact Summary
Page 1

DESIGN APPROACH

SMP 2 & 3: STORAGE CHAMBERS



SMP 3: Underground storage chamber layout



SMP 3: Construction of underground storage chambers beneath soccer field

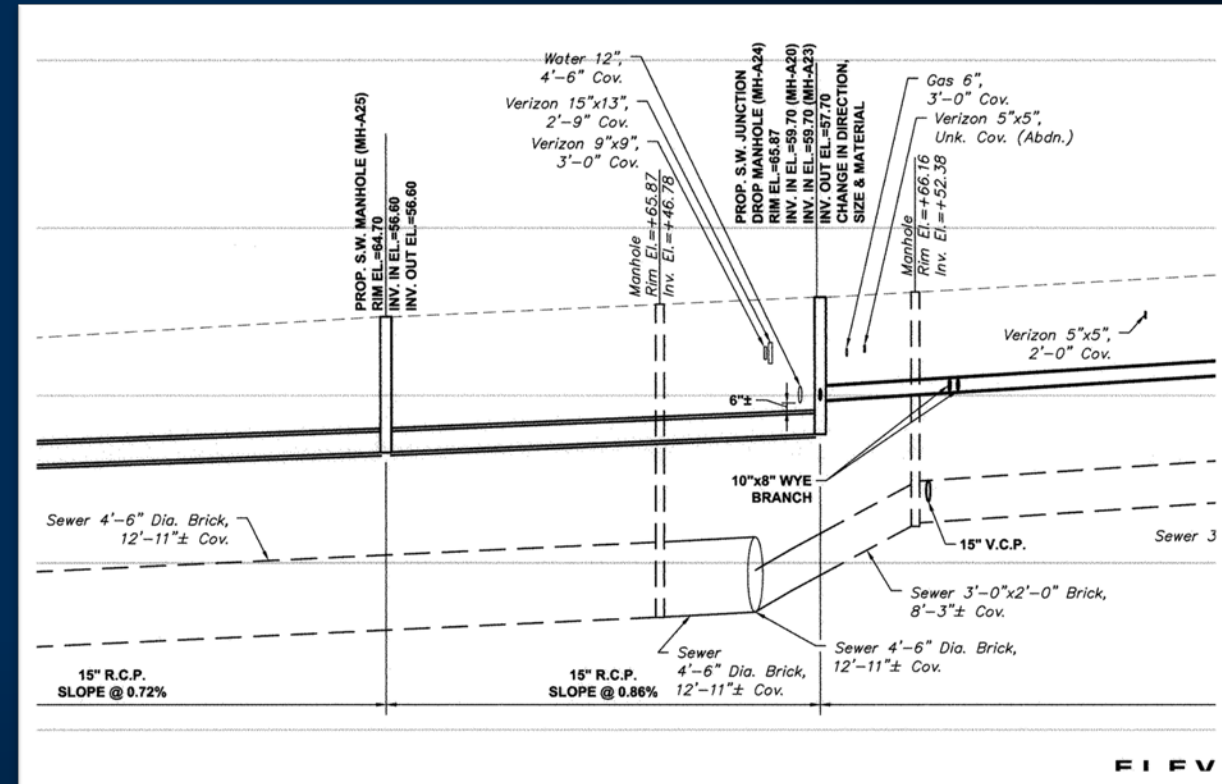
- Existing Sports Fields (Baseball and Soccer)
- Underground Slow-Release Detention Storage Chambers
- Manages 513,000 gallons of runoff (19 GA)

COORDINATION

SMP 2 & 3: STORAGE CHAMBERS

UTILITY / EXTERNAL COORDINATION

- Water, Electric, Gas, Communications
- Public Transportation – paved-over trolley rails
- Streets Department – ADA ramps and TP&A (paving letter)
- Parks & Recreation – park operator
- Department of Transportation
 - Highway Occupancy Permit
- Department of Environmental Protection
 - Erosion & Sediment Control / NPDES



Green sewer pipe profile showing utility avoidance

CONSTRUCTION CONSIDERATIONS/ LESSONS LEARNED

REPURPOSING ON-SITE MATERIALS

- Excess Cut to Level Playing Surface
- Reduced Construction Costs (Hauling / Disposal)
- Improved Community Asset

Also...

- Excavated Boulders Repurposed



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CONSTRUCTION CONSIDERATIONS/ LESSONS LEARNED



CONSTRUCTION MATERIAL AVAILABILITY

- COVID-19 Pandemic
- Schedule Considerations
- Imbricated Rock (High Demand)
- Modular Blocks (Mimics Natural Look)

CONSTRUCTION CONSIDERATIONS/ LESSONS LEARNED

STORAGE CHAMBERS / STONE STORAGE

- Maximize Storage Volume
- Reduce Long-Term Maintenance Costs
- Prevent Clogging & Complete Failure of Stone Storage Trench



An aerial photograph of a multi-lane highway. On the right side of the highway, several cars are visible, moving away from the viewer. On the left side, there is a body of water with a textured surface. The entire image is overlaid with a dark blue gradient, and a white rectangular border frames the central text.

CONSTRUCTION
SMP 1: SLOPING WETLAND






























An aerial photograph of a multi-lane highway with several cars driving. To the left of the highway is a large body of water. The image is overlaid with a dark blue gradient and a white rectangular border around the text.

CONSTRUCTION

SMP 2 & 3: STORAGE CHAMBERS













CONCLUSION

Wissinoming Park GSI

..the "Crown Jewel" of the Green City, Clean Waters program..



~20 times the size of the average GSI Improvement



44 Existing Inlets Replaced



452 Native Shrubs
21,000 Native Herbaceous Plants



31 ADA Ramps
2 Reconstructed Athletic Fields



QUESTIONS

THIS PROJECT DIRECTLY REMOVES 1.1 MILLION GALLONS OF STORMWATER RUNOFF FROM THE COMBINED SEWER SYSTEM THAT COULD OTHERWISE DISCHARGE INTO THE DELAWARE RIVER.



***IT WOULD TAKE
200 TANKER TRUCKS
TO HOLD 1.1 MILLION
GALLONS OF WATER!***

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