ACADEMIC

Poster Session

Wednesday, November 6 – 2:00 pm-3:00 pm ET

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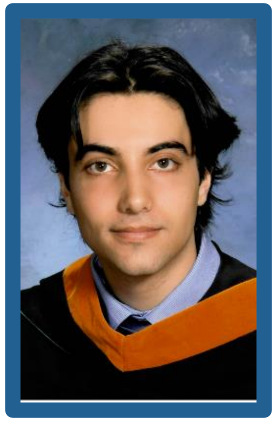
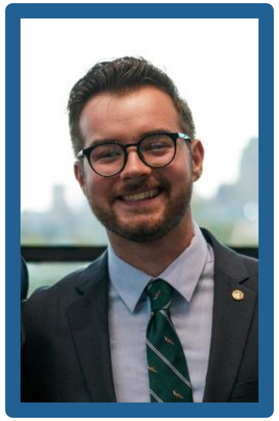
107th Street Pier & Bobby Wagner Walk Restoration

Stevens Institute of Technology

PRESENTERS



Stephen Crocco



Caden Stott

CONTRIBUTORS: Jacob Wills, Joey Meditz

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107th Street Pier and Bobby Wagner Walkway Restoration

Stephen Crocco, Joseph Meditz, Caden Stott, Jacob Wills
Department of Civil, Environmental, and Ocean Engineering: Prof. Weina Meng, PhD
Stantec: Katherine Hansen, EIT, ENV SP (MS '23); Greg Cavanaugh, PE (BE '16, ME '16); Bill Gilroy, PE (BE '18, ME '19)

PROJECT OVERVIEW

This project is located on the Bobby Wagner Walkway, a section of the Manhattan Waterfront along the East River. Currently, the poor conditions of the site have left significant portions closed off to the public due to the lack of structural integrity. The proposed innovative design consists of reconstructing the esplanade and pier at an elevation raised 5 ft above the existing grade to account for projected sea-level rise, with a design life estimated to 2100. Where feasible, separated pedestrian and bicycle paths are included to promote multimodal transportation options. Stormwater measures are provided along the esplanade to collect and treat runoff, decreasing pollutants released off-site. The proposed redesign of the 107th Street Pier is ADA compliant and provides quality open public space for the residents of East Harlem.

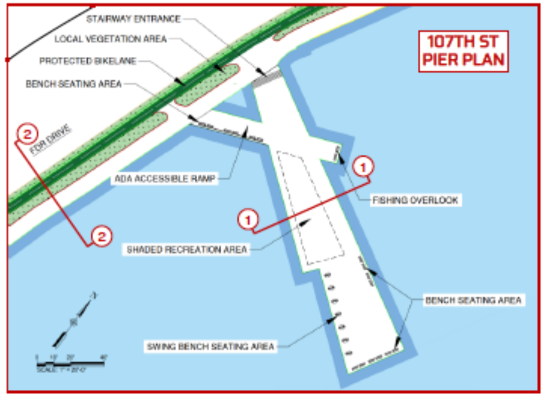
CODES & STANDARDS

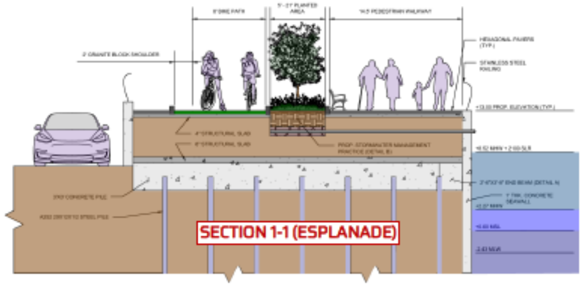
Local Regulations	NYC Climate Resiliency Design Guidelines
	NYC Stormwater Manual
State Regulations	NY State Building Code
National Regulations	ASCE 7/NYCBC - Minimum Design Loads
	ANSI/AISC/ACI
	Unified Facilities Criteria for Piers and Wharves

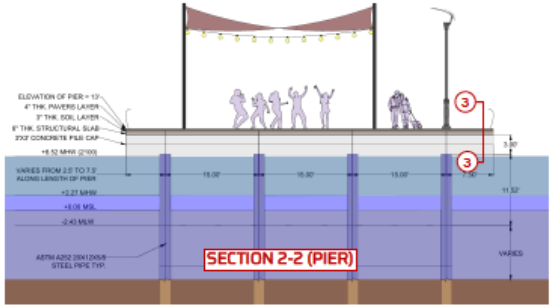
PROJECT SCHEDULE (SPRING)

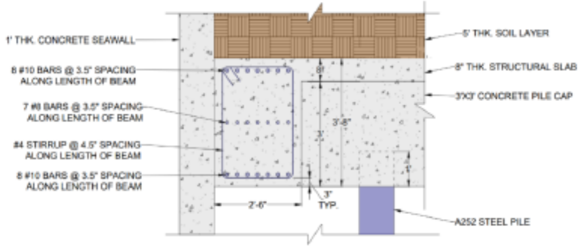
Task	2/17 - 3/1	3/2 - 3/15	3/16 - 3/29	3/30 - 4/12	4/13 - 4/26
Marine Structural Repair					
Improve Resiliency of Site					
Enlivening Esplanade					
Landscape Architecture					

PROPOSED SITE LAYOUT

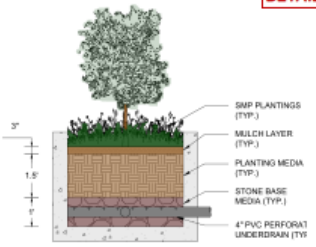




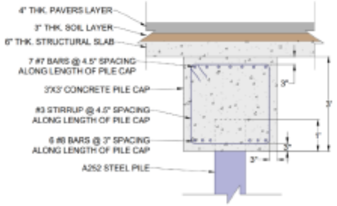




DETAIL A (END BEAM)



DETAIL B (PLANTER)



SECTION 3-3 (PILE CAP)

Stormwater Planter Design	
SMP #	Retention Volume (cf)
1	4046
2	4110
3	5796
4	5099
5	5112

Load combinations using strength design

1.4(D+F)
1.2(D+F)+1.6(L+H)+0.5(Lr or S or R) ← Controls for Vert.
1.2(D+F)+1.6(Lr or S or R)+1.6H+(f1L or 0.5W)
1.2(D+F)+1.0W+f1L+1.6H+0.5(Lr or S or R)
1.2(D+F)+1.0E+f1L+1.6H+f2S ← Controls for Lat.
0.9D+1.0W+1.6H
0.9(D+F)+1.0E+1.6H

STRUCTURAL CALCS

Pile Utilization						
	L. Pier Pile		S. Pier Pile		Esplanade Pile	
	Qty.	Unit	Qty.	Unit	Qty.	Unit
Req'd Axial Strength (Pu)	160.4	k	68.3	k	312.4	k
Design Axial Strength (ϕPn)	720	k	250	k	959	k
Req'd Moment Strength (Mu)	367	k-ft	98.4	k-ft	302.3	k-ft
Design Axial Strength (ϕMn)	558	k-ft	143	k-ft	649	k-ft
Flex.+Comp. Limit	0.807		0.885		0.74	
Deflection Limit	1.75	in	1	in	1	in
Actual Deflection	0.437	in	0.954	in	0.659	in

Loading Schedule								
			L. Pier Pile		S. Pier Pile		Esplanade Pile	
Load	Dir.	Reference	Qty.	Unit	Qty.	Unit	Qty.	Unit
Dead	Vert.	UFC Design P&W Table 3-1	Self Weight		Self Weight		Self Weight	
Live	Vert.	NYCBC Table 1607.1	300	psf	300	psf	300	psf
Snow	Vert.	ASCE 7-22 Figure 7.2-1	20	psf	20	psf	20	psf
Wind	Lat.	ASCE 7-22 Chapter 26	26.6	psf	26.6	psf	26.6	psf
Flood	Lat.	ASCE 7-22 5.4.4.1	0.691	k/pile	0.415	k/pile	0.415	k/pile
Eq	Lat.	ASCE 7-22 12.8.1	5.72	k/pile	2.54	k/pile	22.48	k/pile

Stephen Crocco (sccrocco@stevens.edu) and Caden Stott (cstott@stevens.edu)

Assessing Climate Change Impacts on Critical Infrastructure Systems: Innovative Approaches to Sustainability and Resilience

Stevens Institute of Technology

PRESENTER

Indira Prasad, PhD

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Assessing Climate Change Impacts on Critical Infrastructure System Innovative Approaches to Sustainability and Resilience

Revolutionizing Infrastructure – Harnessing AI and Human Intelligence to Combat Climate Change

Background

Recent years have seen unprecedented challenges and uncertainties due to climate change's impact on civil infrastructure. Integrating climate science, AI, data analytics, and business strategies can help nations address these vulnerabilities and build a resilient, sustainable future.

Source: Adapted from ... Fifth National Climate Assessment, 2023
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Figure 1: Rising Temperature, Precipitation Changes Likely to Affect the Entire US. Expected extreme weather and prolonged climate stressors through 2100, by state.

Artificial Intelligence - AI

Artificial Intelligence (AI) replicates human intelligence processes through machines, particularly computer systems. AI systems consume large amounts of labeled data, examine the data for correlations and patterns, and use those patterns to predict future states. Below figure has captured the positioning of Augmented Intelligence.

AI generates solutions using existing data, while humans can think creatively and invent new concepts. Human intelligence includes emotional understanding, empathy, and complex social interactions, aspects that AI currently cannot replicate. By leveraging AI, we can predict climate-related risks more accurately, optimize resource usage, and design more resilient structures.

Historical & Performance Driven Data

AI uses machine learning to identify patterns in disaster data, enabling us to build resilient and sustainable infrastructure for handling climate change-induced disasters.

- GIS& GPS Technology
- BIM
- Historical Data
- IoT Sensors
- Intelligent Trans. System
- Weather System Data
- Asset Management System
- UAV & LiDAR

Data Lake (Large set of data from Multiple Systems

- Climate-related disaster forecasting
- Risk Assessment
- Mitigation Strategies
- Disaster Recovery
- Sustainability & Resilience

AI has gained much attention lately due to its potential to revolutionize many sectors, including critical infrastructure sectors.

AI & The Power Of Predicting The Future

Auckland Harbor Bridge Tsunami. Artist: Warwick [105]

AIs predictive power for Natural Disasters:

- Hurricanes – Track & Intensity Forecasting
- Earthquakes – Advanced prediction
- Floods – Predict Flood Timing, Severity & Damage
- Wildfires – Identify Wildfire hotspots
- Volcanic Eruptions- Sensors provide rich datasets
- Fires – Sensors provide datasets to detect chemicals, smoke particles, and gases

AI & Critical Civil Infrastructure

AI introduces a new era in civil engineering, transforming the field by optimizing design and simulation and processing large amounts of data on material, cost, and environmental impact.

- Enhanced Predictive Capabilities and Early Warning Systems
- Real Time Monitoring and Adaptation
- Enhanced Risk Evaluation
- Safety: Minimizes accidents by handling risky tasks and detecting hazards.
- Efficiency: Automates repetitive tasks, accelerating construction speed
- Improved Asset Management
- Cost Efficiency: Enhances Resource Utilization and reduce expenses
- Climate Resilient Design: Incorporate resilience into design & construction.
- Resilience Planning: Support effective decision-making for resilience.
- Efficient Inspection & Maintenance Process
- Post-disaster Assessment: Facilitates rapid damage evaluations.

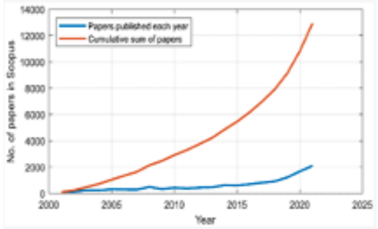
Emerging Technologies for Climate and Infrastructure Resilience [105]

		Emerging Technologies Enhancing different phases of Life Cycle Climate Resilience	
Phases of Resilience	Traditional Management Ramifications	Emerging Digital Technologies	Resilience Enhancement - Example
Plan/ Prepare	Climate Change leading to decrease performance | Reduced knowledge of aging, accelerated ageing, increased demand.	BIM | Data Analytics| Digital twins| AI & Machine Learning | Agent based modelling	Climate preparedness for multiple stressors| accurate evaluation of infrastructure exposure |better clarity on interdependencies.
Absorb / Respond	Excessive Losses due to inadequate preparedness and high vulnerabilities.	Phone metadata | crowdsourcing /social media |data analytics | Unmanned aerial vehicle (UAV) | AI & Machine Learning | Light Detection and Ranging (LiDAR)	Reduced losses due to early warning or monitoring interdependencies.
Recover	Delayed commencement of recovery due to uncertainties in understanding asset condition | Slow recovery due to inefficient prioritization and allocation of resources.	UAV | LiDAR | Satellites | Aerial imagery | AI & Machine Learning	Smaller idle time due to rapid post-disaster assessment | Fast recovery by guiding response | drones using AI-Machine learning for damage detection.
Adapt	Inadequate information for asset performance and interdependies | Subjective allocation of resources.	Agent-Based modelling | Augmented and mixed reality | Sensors from connected vehicles | AI & Machine Learning	Data-Driven adaptation enhanced by Innovative/Sustainable Solutions | Monitoring of infrastructural, Technological, Social, Informational, and Environmental Dependencies

Boosting Climate Resilience with Digital Technologies

Published Articles in Scopus Using AI in the Civil Engineering Field

The surge in AI studies shows the growing momentum in Infrastructure, suggesting that AI's role will expand, driving innovations and applications in the future.



Source: [92]

Climate Threat, Major Triggers, & Projection Parameters

Climate threat	Major Climate triggers	Relevant Climate Change Projection Parameter
Coastal Flooding & Erosion	Storm surge	Sea level rise & change in coastal erosion rate
Fluvial flooding	Heavy rainfall	Change in the number of very wet days and seasonal change in rainfall
Pluvial flooding	Periods of intense precipitation	Change in rainfall intensity and change in number of very wet days
Bridge scour	Flooding, high river flow	Change in number of very wet days
Extreme storms	High wind speed	Change in extreme wind speeds
Cold spells	Temperature below 0°C	Change in number of ice and frost days
Heatwaves and drought	Long period of high temperature and low rainfall	Change in seasonal daily maximum temperature and number of consecutive dry days
Landslide	Heavy rainfall	Change in seasonal rainfall

AI Technologies for Early Warning Systems in Climate Change Adaptation [Shao et al., 2021; Islam, 2022; Perez-Jacome et al., 2022; Angeroudis et al., 2022] [18]

Research Highlights

Hypothesis: AI-driven solutions can significantly reduce the climate-related impacts on civil infrastructure by optimizing cost efficiency and enhancing sustainability, leading to more resilient and adaptable infrastructure in the future.

Methods: Data Analytics, Modeling & Simulation, Case Studies, Surveys & Interviews, Field Study, Geospatial Analysis, Policy Analysis, Economic Analysis.

Data: Both Qualitative & Quantitative Data will be used for the study.

Research Question:
•What are the primary climate change factors affecting civil infrastructure?
•How do these factors impact different types of civil infrastructures?
•How can AI-driven techno-economic solutions mitigate the climate-related impacts on civil infrastructure, particularly for cost efficiency and sustainability?

Expected Research Impact: This research is expected to offer invaluable insights, enabling policymakers and infrastructure teams to design and maintain sustainable and resilient systems with greater efficiency and effectiveness through the strategic application of Artificial Intelligence.

Power of AI for Smart Infrastructure Maintenance

AI transforms infrastructure assessment and maintenance through predictive maintenance, data analytics, resource optimization, and inspection automation [25]. AI-driven data analytics enables proactive maintenance and early detection of vulnerabilities, ensuring infrastructures not only withstand but adapt to changing conditions, fostering sustainability and resilience.

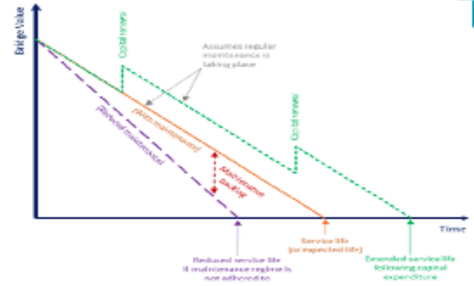


Fig: Life Cycle Principles & Optimized Infrastructure Asset Management
Asset renewal for Extended Service Life

Envision Rating System

Quality of Life:
QL 1.1 Improve Community Quality of Life
QL 2.1 Improve Community Mobility & Access
QL 2.2 Encourage Sustainable Transportation
QL 0.0 Innovate or Exceed Credit Requirements

Leadership:
LD 1.1 Provide Effective Leadership & Commitment
LD 1.2 Foster Collaboration & Teamwork
LD 1,3 Provide for Stakeholder Involvement
LD 2.1 Establish a Sustainability Management Plan
LD 2.2 Plan for Sustainable Communities
LD 2.3 Plan for Long-Term Monitoring & Maintenance
LD 3.1 Stimulate Economic Prosperity & Development
LD 3.3 Conduct a Life-Cycle Economic Evaluation

Climate & Resilience:
CR 2.1 Avoid Unsuitable Development
CR 2.2 Assess Climate Change Vulnerability
CR 2.3 Evaluate Risk and Resilience
CR 2.4 Establish Resilience Goals and Strategies
CR 2.5 Maximize Resilience
CR 2.6 Improve Infrastructure Integration
CR 0.0 Innovate or Exceed Credit Requirements

AI in Real-Life Use Cases for Climate Prediction & Implementation Challenges [44]

Use Case 1. Predicting Sea Level Rise in Tonga: Modeling & Predicting Sea Level Rise with AI & Data Visualization. Rising sea levels severely threaten Tonga. RSS-Hydro, in a collaborative effort with the Commonwealth and Nvidia, developed a 3D visualization to analyze the impact of climate change on Tonga. The application's geospatial methods and modeling intelligence capture critical information well in advance to protect infrastructure and local communities.

Use Case 2: Mapping floods: The United Nations Satellite Center's (UNOSAT) FloodAI enables high-frequency flood reports that have improved disaster response in Asia and Africa. UNOSAT utilizes AI for quicker, more detailed analysis using deep learning and SAR imagery.

Implementation Challenges:

- Insufficient availability of labeled data, such as annotated flood map
- System integration with existing infrastructure
- Data Protection & Security
- High Initial Investment Cost
- Complex legal and regulatory hurdles
- Shortage of Skilled Professionals
- Vulnerable to Cyber Attacks

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Indira Prasad ( ), PhD Student, Stevens Institute of Technology, Civil, Environmental, and Ocean Engineering
Dr. Yi Bao, Associate Professor, Stevens Institute of Technology, Civil, Environmental, and Ocean Engineering

Integrating Remote Sensing and AI to Balance Natural and Built Environments: Assessing Ecological Vulnerability and Future Planning in Dhaka City's Urban Wetlands

University of Cincinnati, School of Planning

PRESENTER

Kazi Farha Farzan Suhi

CONTRIBUTORS: Prof. Sangyong Cho, School of Planning

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Integrating Remote Sensing and AI to Balance Natural and Built Environments: Assessing Ecological Vulnerability and Future Planning in Extended Area of Dhaka City

Natural and Built Environment

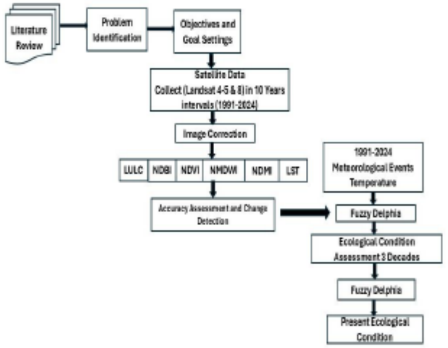
Introduction

Rapid urbanization is transforming landscapes globally, impacting biodiversity and ecological stability. Dhaka, Bangladesh's capital, illustrates this trend, with unplanned growth altering land use in its periphery. Population growth and industrialization have encroached on wetlands, vegetation, and open spaces. This study examines Dhaka's extended area—1,317 square kilometers bordered by rivers like the Turag and Buriganga. Using satellite and meteorological data from 1991 to 2024 with remote sensing and AI, this research assesses the ecological impacts of Dhaka's expansion to support sustainable planning that balances development with environmental preservation.

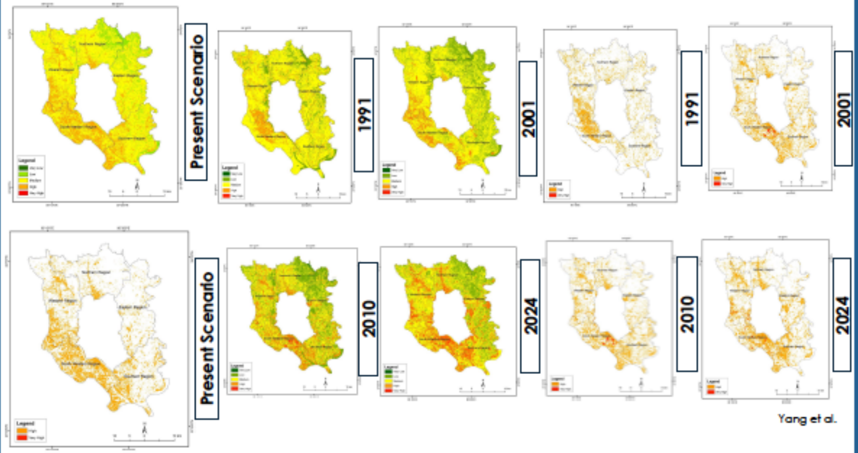
Study Area

Methodology

A logical framework for data analysis is applied, where remote sensing indices are calculated using AI techniques. Based on 15 expert opinions, weighted values are used to construct a fuzzy matrix, enabling a detailed assessment of ecological vulnerability in Dhaka's extended areas.

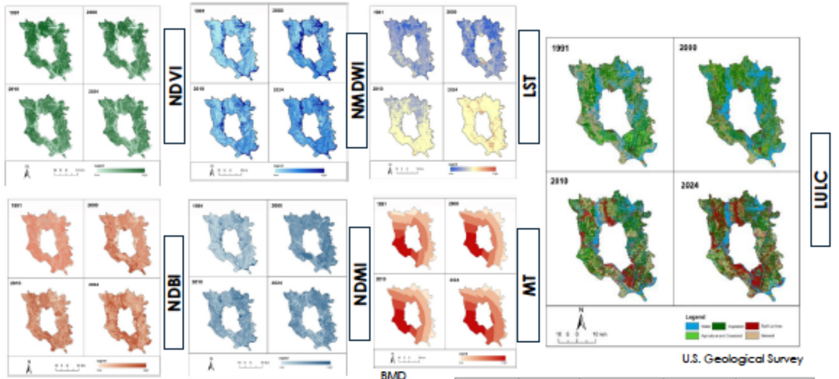


Results



Yang et al.

Variables



BMD

U.S. Geological Survey

Threshold Value of Different Indexing from 1991 to 2024

Index	1991	2000	2010	2024
MNDWI	≥0.05	0.02	≥0.04	≥0.035
NDBI	≥0.12	≥0.06	≥0.165	≥-0.06
NDMI	≥0	≥0	≥0	≥0
NDVI	≥0.152	≥0.265	≥0.224	≥0.205

Class Name	1991 (%)	2000 (%)	2010 (%)	2024 (%)
Water	21.82	24.19	18.19	16.65
Vegetation	31.40	29.48	28.52	27.80
Grassland & Agriculture	14.31	23.52	8.42	7.11
Built-Up Area	3.08	4.64	16.35	26.40
Bare soil	29.40	18.16	28.52	22.05

Source: Result from Landsat Image Analysis

Discussion

Ecological vulnerability in Dhaka's extended areas has intensified, with high-impact zones rising from 16.90% in 1991 to 25.68% in 2024, while medium-impact areas dominate, covering 65.79% of the region. This trend underscores the need for targeted sustainable interventions to mitigate escalating ecological risks.

Present Ecological Scenario

Ecological Impact	Area (Sq.km)	Area (%)
Very Low	0	0
Low	157.23	11.89
Medium	870.14	65.79
High	295.13	22.31
Very High	0.19	0.014

Ecological Scenario (1991-2024)

Code	Ecological IMPACT	1991		2000		2010		2024	
		Area (Sq.km)	Area (%)	Area (Sq.km)	Area (%)	Area (Sq.km)	Area (%)	Area (Sq.km)	Area (%)
1	Very Low	0.07	0.01	0.03	0.00	6.74	0.51	0.27	0.02
2	Low	211.95	16.02	328.12	24.81	405.68	30.67	286.47	21.66
3	Medium	886.51	67.02	853.30	64.51	598.26	45.23	687.88	52.01
4	High	223.56	16.90	141.21	10.68	306.38	23.16	339.69	25.68
5	Very High	0.60	0.05	0.03	0.00	5.64	0.43	8.38	0.63
Total		1322.69	100.00	1322.69	100.00	1322.69	100.00	1322.69	100.00

Conclusion

Dhaka's extended areas show significant urban growth, with built-up areas rising from 3.08% in 1991 to 26.40% in 2024, leading to declines in water bodies, vegetation, and agricultural land. Rising land surface temperatures and ecological vulnerability (from 16.09% to 25.68% highly impacted areas) emphasize the need for sustainable planning to balance urban expansion with environmental preservation.

References

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Sangyong Cho, Assistant Professor, Landscape Architecture Program, School of Planning, University of Cincinnati

Paths – A Waterfront Revitalization Project

Cal Poly San Luis Obispo

PRESENTERS

Kelly Chew

Ryan Hanlon

PATHS - A WATERFRONT REVITALIZATION PROJECT

PAVING THE WAY TO A SUSTAINABLE & VIBRANT COMMUNITY IN THE CITY OF ASCE

Cal Poly SLO Sustainable Solutions Team: Ryan Hanlon, Kelly Chew, Andrew Rasas, Cassie Eckelman, Karlee Nakamura, Josh Lung, Sam Gregory, Liberty Boston, Nat Conti, & Ankur Hangal

CAL POLY

PATHS strives to breathe life into the City of ASCE by weaving community together with sustainability. The project attracts visitors and offers essential residential amenities. It provides a historical museum to preserve predecessors of the past and engender engagement with the Northern Chumash tribe. It implements green infrastructure and stormwater management systems. This balanced approach promotes community well-being, cultural preservation, and environmental resilience. The Cal Poly SLO Sustainable Solutions team presents *PATHS*.

35% INCREASE IN PERVIOUS AREA

79% reduced emissions

WATER DETAINED: 243,000 FT^3

GREEN ROOFS MINIMIZE RUNOFF

200 FT. BUFFER WITH NATIVE PLANTS

STORMWATER MANAGEMENT

- Detention area mitigates flooding and water contamination.
- Elevating buildings above floodplain.

SUSTAINABILITY FEATURES

- Solar panels on apartments
- Reuse of demolished materials
- Composting and recycling programs

PLATINUM ENVISION RATING

$145M COST ESTIMATE

100 YEAR STORM DESIGN

PROJECT BENEFITS

COMMUNITY ENHANCEMENT — PROVIDES NEW AMENITIES AND RECREATIONAL OPPORTUNITIES FOR CITIZENS, PROMOTES LONG-TERM BENEFITS FOR STAKEHOLDERS, AND CELEBRATES LOCAL HERITAGE

ENVIRONMENTAL SUSTAINABILITY — INCORPORATES GREEN INFRASTRUCTURE, ACTIVE TRANSPORTATION, AND SUSTAINABLE PRACTICES TO MINIMIZE ENVIRONMENTAL IMPACT AND RESTORE NATURAL HABITATS

ECONOMIC STIMULATION — ALLOWS RESIDENTS NEW OPPORTUNITIES TO PARTICIPATE IN THE LOCAL ECONOMY AND SUPPORTS LOCAL BUSINESSES WITHIN THE CITY OF ASCE

NEW SITE AMENITIES

- 2 LARGE RETAIL SPACES
- 4 RESTAURANTS
- 8 SMALL RETAIL SPACES
- 350 APARTMENT UNITS
- 5 OUTDOOR GREEN SPACES

KEY FEATURES

1. APARTMENT COMPLEX
2. MARKETPLACE
3. COMMUNITY CENTER
4. HISTORICAL MUSEUM
5. CULTURAL GAZEBO
6. COMMUNITY GARDENS
7. SHARED-USE PATH
8. DOG PARK
9. BIKE FACILITIES
10. DETENTION BASIN
11. BIOSWALES
12. PLAYGROUND
13. SCULPTURE GARDEN
14. OUTDOOR SEATING AREA

COMMEMORATIVE ELEMENTS

- Museum educates on land use history and Chumash heritage.
- Gazebo featuring canoe-style seating around the outside.
- Murals celebrate Chumash Tribe culture across site.

COMMUNITY GARDEN & PUBLIC GREEN SPACES.

BUILT FOR THE COMMUNITY

- Community center includes fitness center, library, daycare, and computer access.
- Local business marketplace onsite.
- Multimodal access via bike and pedestrian roads and nearby bus stop.

2+ MILES OF PATHS ADDED

SOURCES OF INSPIRATION

School of Art, Design, and Media
NTU, Singapore

Ferry Building Marketplace
San Francisco, CA

Ex Conterie
Venice, Italy

Overlooked Material Innovation to Address Social Justice, Surface Water Quality and Improve Human Resilience

Short Elliot and Hendrickson, Inc.

PRESENTER

Tom Ennis

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Overlooked Material Innovation

To Address Social Justice, Natural World, & Improve Human Resilience

Material of Concern: Asphalt Pavement Sealers

- Black, liquid top dressing to maintain asphalt
- Typically used on parking lots, playgrounds, & low volume roadways
- Legal for nearly 300 million Americans

Chemicals of Concern:

- Family of chemical called Polycyclic aromatic hydrocarbons (PAHs)
- Primary source is the coking of coal for steel production

Known Effects

- Toxic
- Mutagenic (causes mutations)
- Carcinogenic
- Teratogenic (birth defects)

Product Application

Key Findings

- NIOSH: unsafe for workers
- WSU: causes fish kills
- USGS: damages fish DNA
- Dept. of Interior: environmental justice issue
- Baylor: significant exposure for children
- State of MN: cleanup costs in $ Billions in Twin Cities
- AMA: calls for end of use

Product Wear-off

Envision Checks

With Non-Toxic Products

Meets

- QL: 1.1, 1.2, 1.3, 1.6, 2.2, 3.1,
- LD: 1.1, 1.3, 2.1, 2.3, 2.4, 3.3,
- RA: 1.1, 2.1,
- NW: 1.1, ,2.2, 2.4, 3.2,
- CR: 1.2, 1.3, 2.5

PAH Tumors

Link

One Link with 20 References

https://ia800305.us.archive.org/26/items/usgs-research-influence/USGS_research_influence.pdf

Tom Ennis, PE (IL), LEED AP, ENV SP, Water Stewardship Engineer, SEH, Inc.

PROFESSIONAL

Poster Session

Thursday, November 7 | 2:00 pm – 2:30 pm ET

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Advancing Sustainable Bus Rapid Transit: A Guide to Best Practices

PRESENTERS

Jason Leung
AECOM

Katherine Lee
AECOM

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Advancing Sustainable Bus Rapid Transit A Guide to Best Practices

Introduction

The goal of this poster is to present a customized menu of sustainable design best practices for bus rapid transit (BRT) systems, enabling transit agencies to select solutions that align with their unique requirements. This project is applicable to Envision, a framework for sustainable infrastructure, and the best management practice solutions are organized into the Envision categories of Resource Allocation, Quality of Life, Climate Resilience, and Natural World.

Analysis and Findings

Resource Allocation

Materials

- Provide both trash and recyclable receptacles at station areas to facilitate the separation and diversion of recyclable materials from general trash, thereby reducing the amount of waste sent to landfills.
- Minimize material use by incorporating recycled and third-party verified sustainability programs (e.g., Forest Stewardship Council (FSC), Green Seal, EcoLogo, Underwriters Laboratory, National Biosolids Partnership (NBP), Concrete Sustainability Council (CSC), etc.).

Energy

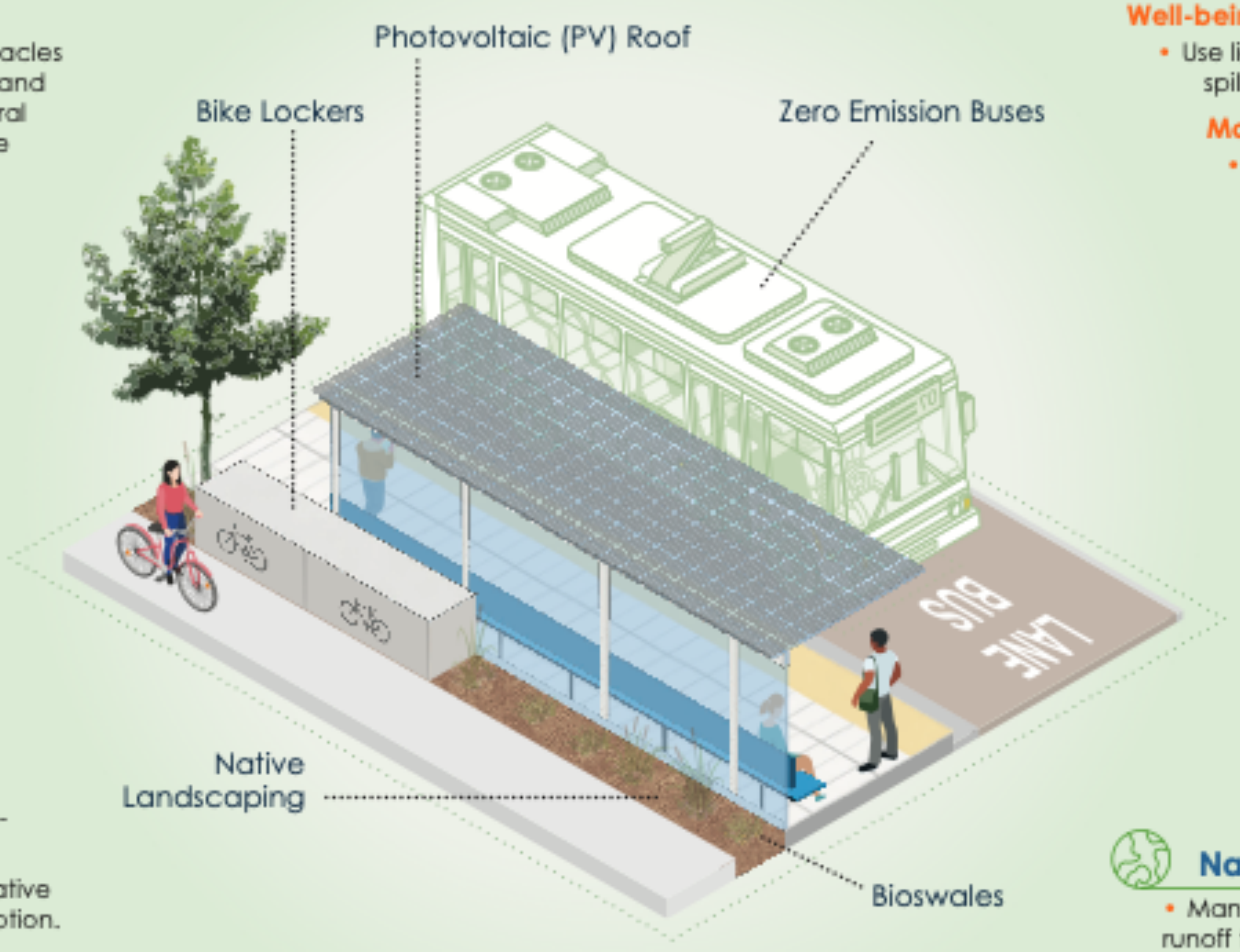
- Install PV panels on bus shelters for on-site renewable energy generation.
- Upgrade vehicle and station light fixtures to energy-efficient light-emitting diodes (LED).

Water

- Utilize smart irrigation controller installations to manage real-time stormwater flow adjustments, irrigation restrictions, and recycled water.
- Install real-time water monitoring for leak detection and flow optimization.
- Select plants from the local microclimate (native plants) to reduce operational water consumption.

Climate Resilience

- Convert bus fleet to zero-emissions or low-emissions (battery-electric or hydrogen).



Conceptual Station Design

Quality of Life

Well-being

- Use lighting fixtures that minimize upward spillage to reduce light pollution.

Mobility

- Provide covered shelters or walkways for weather protection.
- Incorporate secure bike lockers and racks to promote shared transportation.
- Design stations with clear sightlines from public streets.
- Providing subsidized fare programs, partnerships with ride-sharing services, off-board ticket purchasing via mobile apps, sustainable transportation discounts, and real-time arrival updates can improve ridership.
- Emphasize accessibility for people with vision and hearing disabilities at station areas.

Community

- Enhancing public spaces around station areas by commissioning community-specific artwork from local artists.

Natural World

- Manage stormwater and remove contaminants from runoff through implementation of low impact development applications such as bioswales and bioretention basins.
- Select biofiltration plants that tolerate dry and submerged conditions to slow water flow and filter particulates.

Main Takeaways

- The most sustainability opportunities in BRT design are in energy, water quality, and landscaping.
- These recommendations are intended for transit agencies, requiring further coordination and permitting with relevant agencies having jurisdiction.

Future Direction

- Provide design solutions for different cost levels (low, medium, and high).
- Include solutions beyond design practices for construction, maintenance, and Leadership categories.
- Explore potential roll-out of net positive energy bus shelters that support electric vehicle (EV) charging, vehicle-to-grid technology (V2G), and generate renewable energy credits (REC).

Acknowledgments

- We'd like to acknowledge John Swartz, Roland Wiley, and Nancy Michali for their valuable ideas that contributed to the development of this poster.
- This project drew inspiration from the Envision Platinum-verified BRT system, King County Metro's RapidRide H Line.

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Sustainability Through Public Transit for All, Historic Preservation, and Community Connectivity – A Case Study of the Times Square Shuttle Project Post-Construction Envision Award

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2024
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Realizing the Vision

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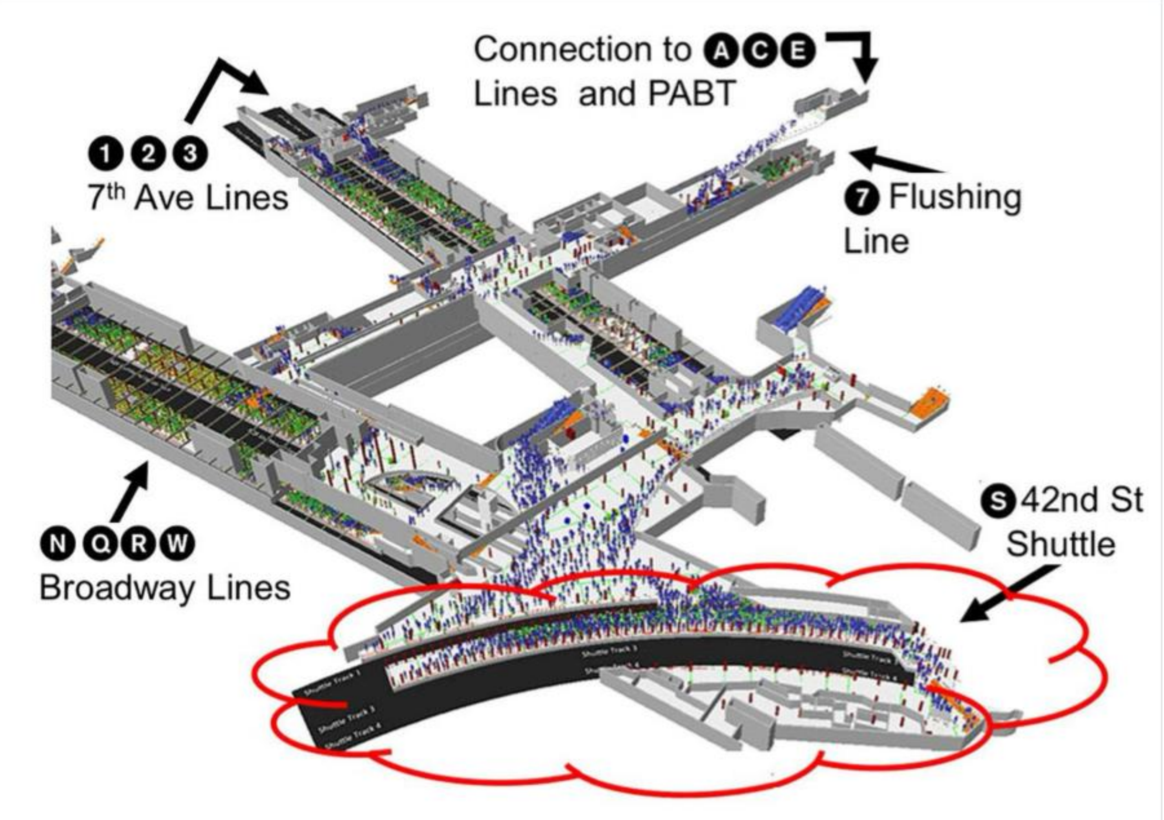
Sustainability Through Public Transit for All, Historic Preservation, and Community Connectivity

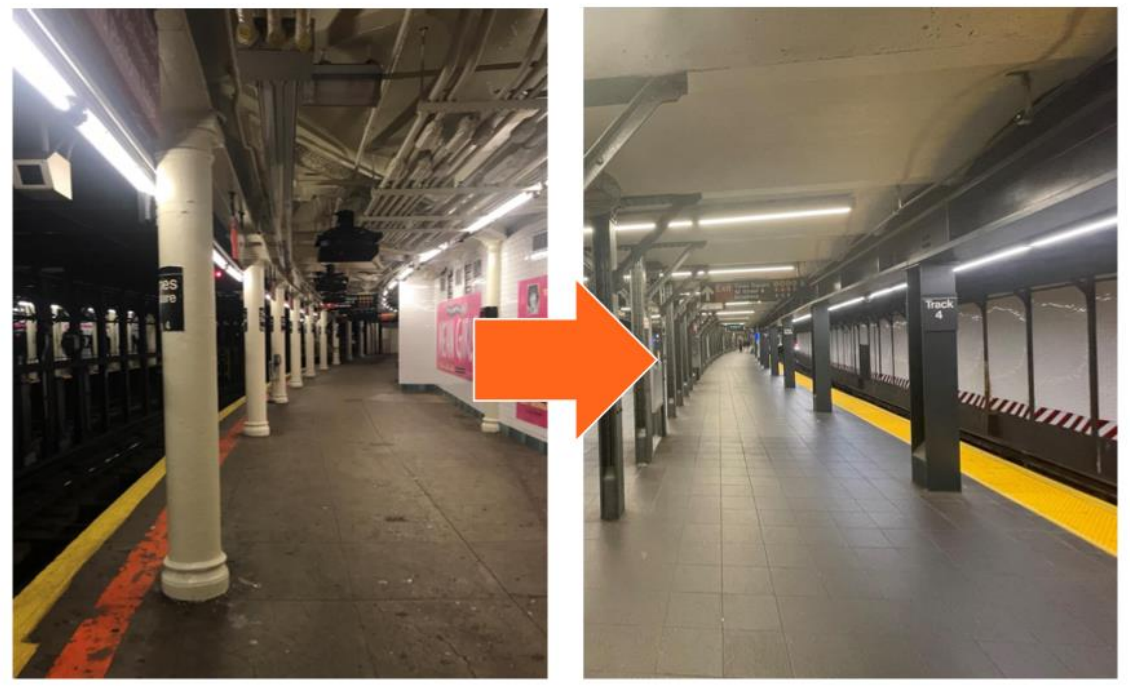
A Case Study of the Times Square Shuttle Project Envision Award

Times Square Shuttle

Corridor connects Times Square to Grand Central and the Port Authority Bus Terminal (PABT)
- 19 total Subway Lines
- Regional Bus (PABT)
- Commuter Rail (Metro North/LIRR)



Upgrade improvements:
- Minimized Platform Gaps
- Improved Sight Lines
- Reduced Columns
- Expanded Concourse Walkways
- Reconstructed platforms for 2 tracks
- More efficient train maintenance operations



Benchmark Design

Right Team

Documentation Challenges

Collaboration

Future Submittals

Quality of Life

WELLBEING - MOBILITY - COMMUNITY

QL1.6 Minimize Construction Impacts (Superior)
- Comprehensive stakeholder engagement with residents and local businesses

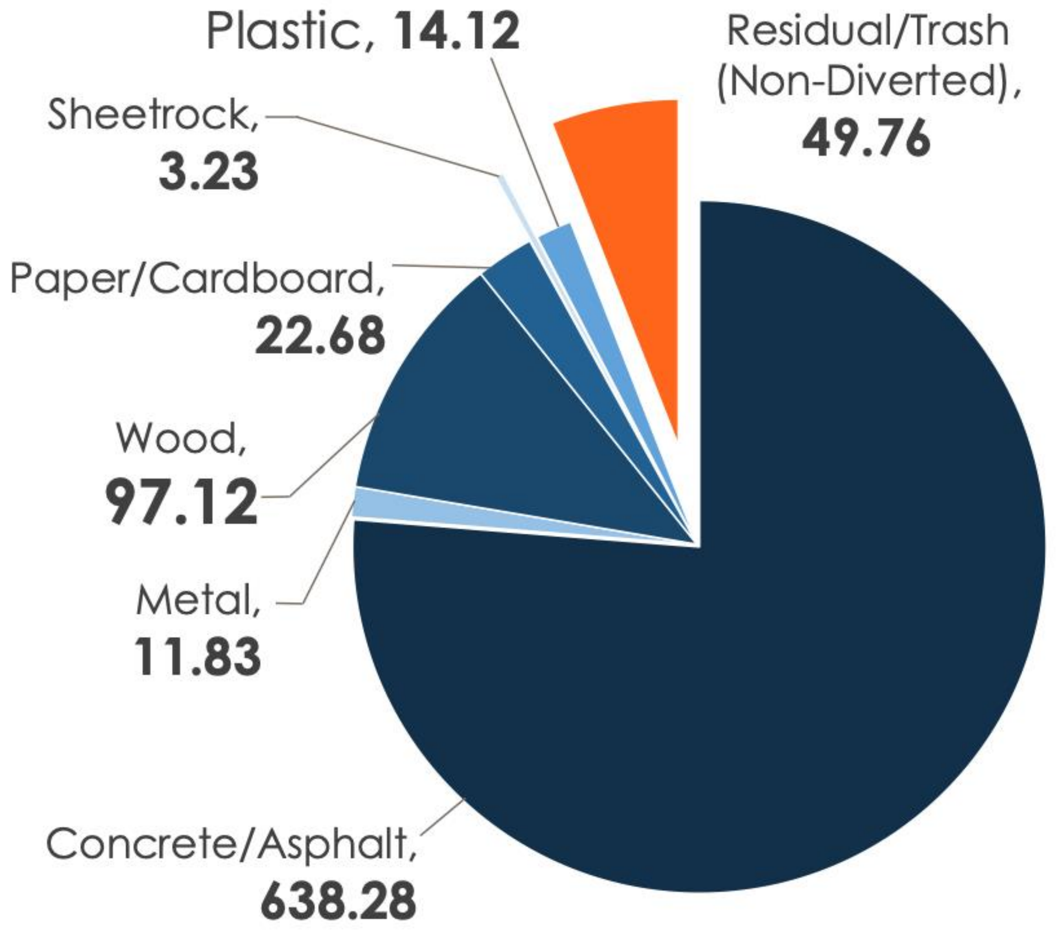
QL2.1 Improved Community Mobility and Access (Restorative)
- Station ADA Accessibility
- Improved Passenger Circulation

QL2.2 Encourage Sustainable Transportation (Restorative)
- Easier transfers to greater transportation system
  (commuter railroads, regional bus)

QL3.4 Enhance Public Space and Amenities (Restorative)
- Artist installation representing local character and color.
- Preserved and restored iconic historical station elements

Resource Allocation

Total Project Waste Diverted (Tons)

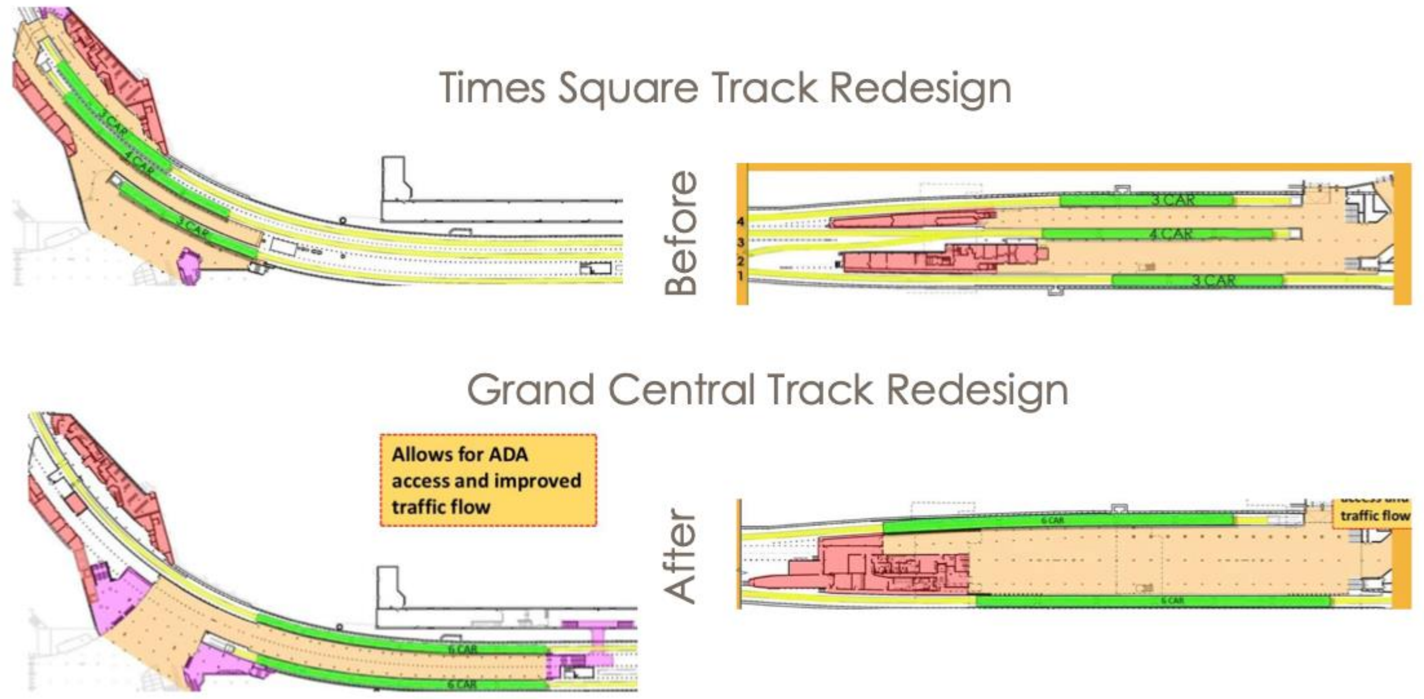


RA1.4 (Superior)

Climate and Resilience

TSS Greenhouse Gas Reductions	Project Baseline Per Rider (MT CO2e)	Projected Per Rider (MTCO2e)
Off-Site Energy Generation	5.13E-06	3.38E-06
Operations Transportation Emissions	3.27E-05	1.46E-05
Total	3.79E-05	1.79E-05
Net Change	53%	

CR1.2 (Superior)
- Longer Trains
  (4 cars to 6 cars)
- Reduced tracks
  (3 tracks to 2 tracks)
- Increased Ridership
  (50% increase)
- LED Lighting



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Debunking the "Ideal Lawn": The Benefits of Rewilding Community Green Spaces

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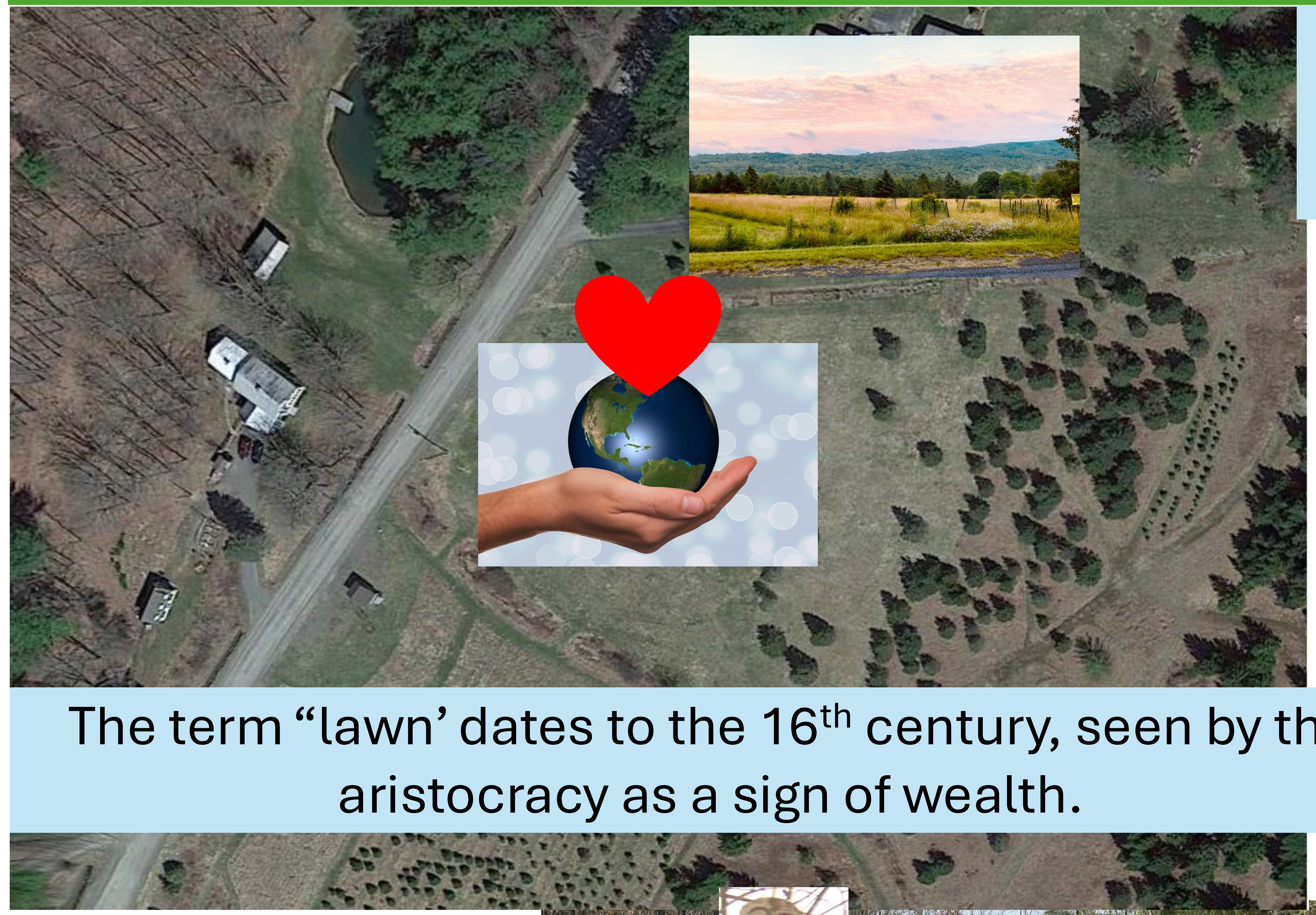
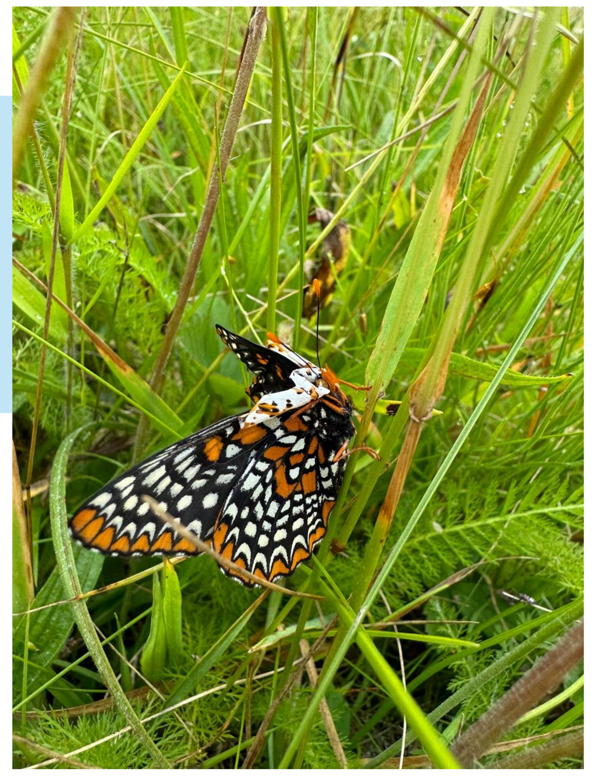
The Philosophy Family Farm, LLC

Unlawning: Stop Cutting and Start Engaging!

From our farm to sustainable communities

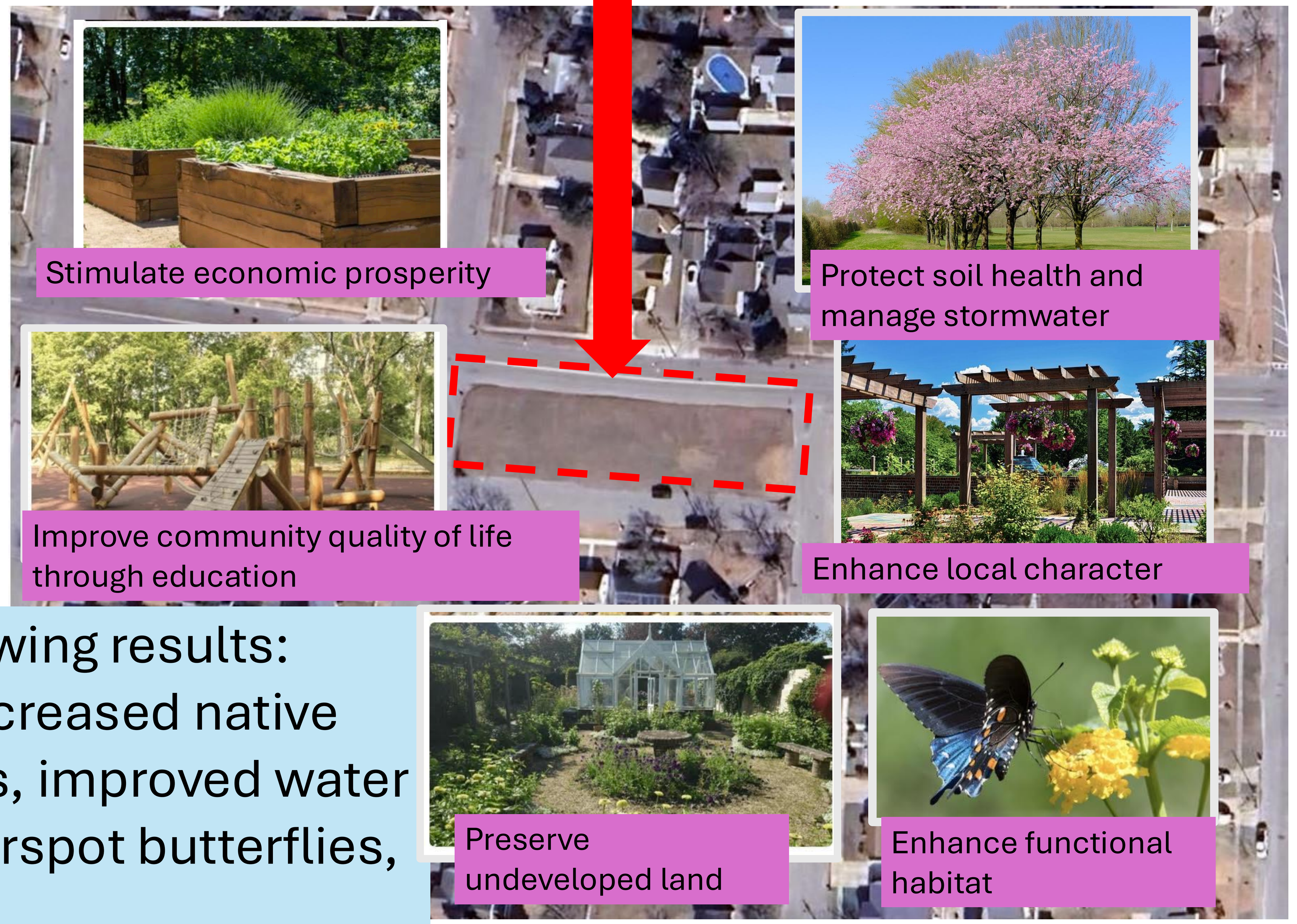


Today, lawns are considered by ecologists to be "biological deserts" and a cause of severe biodiversity loss



Envisioning community engagement through unlawning a half acre public space

The term "lawn' dates to the 16th century, seen by the aristocracy as a sign of wealth.



On the farm, we have unlawned 5-acre, 1-acre, and tiny yard plots with the following results: return of endangered Bobolinks and Bobwhites, regenerated soil and habitat, increased native pollinating plants with a marked increase of pollinators, created wildlife shelters, improved water quality, and reduced TSS, regenerated habitat for endangered Baltimore Checkerspot butterflies, etc.

Zach Schmitt, The Philosophy Family Farm, LLC
Chris Schmitt, GZA GeoEnvironmental, Inc

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