Greening of America’s First Zoo

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Outline

• Project Introduction
• Background Information and Design Constrains
• Challenges Encountered
• Green Stormwater Infrastructure (GSI) Design and Construction
• Closing & Benefits Realized
Introduction

• Intermodal Transportation Improvements Project for Zoo

• Green Stormwater Infrastructure (GSI) is a tool that delivers “triple-bottom” line benefits
  – Environmental
  – Social
  – Economic

• Opportunity to implement GSI into the project

• Utilize GSI to meet current Stormwater Regulations
Background Information and Design Constraints
### Background Information and Design Constraints

#### Site Location and Information
- Philadelphia Zoo, Philadelphia, PA

![Girard Avenue and I-76 Ramps](image1)

![34th Street](image2)

![Zoological Street](image3)
Background Information and Design Constraints

- 683 car parking garage
- Roadway, traffic, and streetscape improvements
- Zoo entrance plaza improvements and reconstruction
Background Information and Design Constraints

Constraints

– Existing utilities
– Accelerated design and construction schedule
– Stakeholder approvals and coordination
Challenges Encountered during design and construction

- Achieving design goals
- Meeting regulation & requirements
- Existing utilities
- Existing trees
- Heavy traffic volumes (vehicular and pedestrian)
- Site topography (steep grades near entrance plaza)
- Ongoing operation of the Zoo
- Accelerated schedules
Green Street Infrastructure Design

• **Design Concept**
  – Utilize public and private ROW
  – Implement surface treatments
  – Intercept “first flush” from rain events
    • Capture and manage 1” of runoff from DCIA
    • Target loading ratio 10:1
  – Maintainability

• **GSI near the Zoo Entrance Plaza and along Zoological St.**
  – Required to meet the Stormwater Regulations
    • Water Quality Requirement
      – manage 1” over the DCIA
    • Over 20% Reduction of DCIA from Pre-to-Post Construction
Design Elements

- Rain Gardens
- Subsurface Stone Infiltration Trenches
- Stormwater Planter
- Porous Pavement
Green Street Infrastructure Design
Rain Gardens - Before and After

BEFORE

AFTER
GSI Construction – Infiltration Trenches
Infiltration Trenches - Before and After
GSI Construction – Stormwater Planter
Stormwater Planter - Before and After

BEFORE

AFTER
Rain Garden - Before and After

BEFORE

AFTER
Benefits Realized

- Zoo – superior way of arrive and leaving the Zoo
- Educational value from actually seeing the GSI function
- Reduction of stormwater runoff entering a combined sewer area
- Meeting Stormwater Regulations
- Recharging ground water through infiltration and sustaining landscaping with stormwater
- Community enhancement

4 Blocks / 2.0 ac captured
1.7M gallons per year
$500,000 GSI construction
$400,000 equivalent tank construction
$102,000 annual treatment savings