BUILDING A NORLD OF DFFERENCE

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AN INTEGRATED WATERSHED WET WEATHER APPROACH THAT VISUALIZES AND QUANTIFIES THE BENEFITS OF GREEN INFRASTRUCTURE

JIM SCHLAMAN, BLACK & VEATCH MEL MENG, BLACK & VEATCH



AGENDA

- Overview of Integrated Planning
- Discussion of Integrated Planning Tools

Green Infrastructure Locator Integrated 2D Collection System Modeling and BMP Impact Tool

• Bring it All Together – Omaha Example



INTEGRATED WET WEATHER PLANNING ENCOMPASSES MANY COMPONENTS



Optimized Green and Gray Infrastructure



Integrated Stormwater/ Flooding CSO/SSO Plans



Water Quality Enhancements -Contaminants of Concern -Source Tracking



Real Time Control and Smart Integrated Infrastructure



Integrated Financial Capabilities Analysis



Asset Management and Criticality Assessments



TRADITIONAL SOLUTIONS TYPICALLY DO NOT PROVIDE A WET WEATHER SOURCE CONTROL

- Retention and treatment of in-system flows
- Volume of runoff into sewers is the same
- Sewer system storage and treatment capacity is increased
- Less focus on source control







GREEN SOLUTIONS ARE DESIGNED TO MIMIC NATURAL SYSTEMS

- Bioretention basins
- Rain gardens
- Bioswales
- Stormwater wetlands
- Green streets
- Stormwater tree trenches
- Curb extensions
- Downspout disconnection
- Porous pavement
- Green roofs
- Rain barrels
- Rainwater catchment



POTENTIAL BENEFITS OF GREEN SOLUTIONS

- CSO/SSO source control
- Water Quality Improvements
- Sewer Back-Up Relief
- Recreational amenities
- Reclaimed park land
- Drinking water supply protection
- Energy demand reduction
- Green collar job creation
- Natural habitat protection
- Increased property values
- Public support for improvement projects

Glencoe Rain Garden; Portland, OR

HOW CAN GREEN INFRASTRUCTURE BE SITED?

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THE GREEN INFRASTRUCTURE LOCATOR IS A GEOGRAPHIC INFORMATION SYSTEM (GIS) MODEL THAT IDENTIFIES AND RANKS PARCELS FOR BMP INSTALLATION



Quickly Finds Opportunities!

GREEN INFRASTRUCTURE LOCATOR – HIGH VALUE GREEN SOLUTION OPPORTUNITIES WERE IDENTIFIED



BASIN WIDE GREEN SOLUTION PLAN CAN BE QUICKLY FORMULATED FROM BMP LOCATOR



- Reclaim existing amenities
- Green solutions as part of the conveyance sewer improvements
- BMP plan to meet stormwater regulations

HOW CAN YOU QUANTIFY THE BENEFIT GREEN INFRASTRUCTURE?

H&H MODELS SIMULATE COLLECTION SYSTEM RESPONSE TO RAINFALL

HYDROLOGY

HYDRAULICS





Simulation models are critical for CSO/Stormwater planning to develop effective control measures.



SYSTEM MODELING & CSO/STORMWATER **CONTROLS CAN INCLUDE ALL COMPONENTS OF A CONVEYANCE SYSTEM**



- Primary Conveyance (1D)
 - Pipes/Sewers
 - Pumping Stations
 - Tunnels
- Secondary Conveyance (2D)
 - Streets
 - Inlets
 - Overland Flow Paths
 - Roof tops, Driveways, etc.

Secondary Conveyance can easily be evaluated using 2D surfaces and elements!



BOTH GREEN & GRAY INFRASTRUCTURE CAN BE OPTIMIZED WITH INTEGRATED MODELING

GREEN INFRASTRUCTURE SOLUTIONS ARE DESIGNED TO MIMIC NATURAL SYSTEMS





TRADITIONAL GRAY SOLUTIONS DO NOT PROVIDE SOURCE CONTROL

Green Infrastructure primarily consists in the Secondary Conveyance system!



2D MODELING CAN INCORPORATE THE SECONDARY CONVEYANCE SYSTEM ELEMENTS INCLUDING GREEN INFRASTRUCTURE





INTEGRATED 2D MODELS HELP TARGET PROBLEM AREAS



Integrated solutions can help address multiple objectives.

BRINGING IT ALL TOGETHER

PAXTON BASIN MODELING -CITY OF OMAHA



THE PAXTON BASIN BY THE NUMBERS



- Drainage Area = 1400 ac
- **Proposed Separation Area** = 1220 ac
- **Primarily serviced via Combined Sewer**
- Partial Storm Sewer
- **Existing Storage Facilities**
 - Lake James Park Detention
 - Fontenelle Park Lagoon
- **1500 Storm Inlets**
- **Historic Basement Backup** & Street Flooding Issues



SEPARATION PLAN TO ADDRESS MULTIPLE OBJECTIVES

- CSO Control
- Basement Backup Control
- Flood Control/Conveyance
- Quality of Life



A successful separation plan for the Paxton Basin must address several competing objectives.

TRADITIONAL STORM SEWER "FULL" SEPARATION APPROACH INCREASES ASSUMPTIONS AND COSTS



- Assumed "full" separation of basin
- Assumed volume reduction to Combined Sewer System
- Design is conservative to meet project objectives
- May not fully utilize existing infrastructure
- Model only included proposed infrastructure



FULL SEWER SEPARATION PLAN REMOVES STORM INFLOWS TO CSS BUT IS EXPENSIVE



A FULLY INTEGRATED MODEL WAS CONSTRUCTED TO OPTIMIZE COSTS AND BENEFITS



Department Party C. (Property) 173483-Planton (GISUT_MVD)Planton_Basin_Store_Substativitients.mod.

INTEGRATED MODELING APPROACH OPTIMIZES AND REDUCES COSTS



- Pipe Reduction = 12,600 feet (57%)
- Construction Cost Savings = \$10 million (41% reduction)
- Reduces Street Flooding
- Alleviates Basement Backups
- Provides sufficient inflow reduction to meet CSO objectives
 - Captures 55% of CSO Event
 - 74% of 10-yr Event



INTEGRATED MODEL CAN BE UTILIZED IN ALL PHASES OF PLANNING & DESIGN

- Pipe Design
- Inlet Design
- Street Design
- Detention/Retention Facility Design
- Green Infrastructure Design
- Level of Service Analyses
- Risk or Flooding Analyses

Integrated model ensures changes in design still meet project objectives.



WHY UTILIZE AN INTEGRATED 2D MODEL AS A PLANNING AND DESIGN TOOL?

- Identifies Deficiencies
- Realizes System Impacts
- Optimizes Existing Infrastructure
- Steers Planning & Design
- Reduces Costs

Maximizes the use of existing infrastructure and reduces proposed infrastructure helping to drive down program costs!



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Building a world of difference. Together



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INTEGRATED 2D MODELING ALLOWS DOWNSTREAM IMPACTS TO BE REALIZED



Integrated model optimizes solutions!

FONTENELLE PARK WILL BE A MULTI-BENEFIT FACILITY



Real-Time Controls Will Help To Optimize the Downstream CSS and Save Money



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ESTABLISHING EXISTING CONDITIONS ALLOWS FOR OPTIMIZATION OF THE SYSTEM



Edu Copil Ward St. Maplet 817345, ML, Parton, Stormatic, Consequence, Seven GS 01764p20commits MC 454, LDS, Report Continue, Seven Context, Parton, Contributed Seven, Excelling, and



THE PAXTON BASIN BY PHOTOGRAPH

Fontenelle Park



Paxton Boulevard



Typical Residential Street





GREEN INFRASTRUCTURE TO BE INCORPORATED IN THE PAXTON BASIN



Integrated Basin Models allow optimization of all alternatives and tools!

