Neighborhood Drainage Infrastructure Improvements Using Green Initiatives

Village of Hinsdale, IL
Presentation Agenda

- Project Overview
- Goals and Objectives
- Design Approach
- Public Coordination
- Recap
- Questions
Project Location
Project Location

PHASE I – 7TH STREET BASIN
Previous Studies

- **September 2008 Drainage Study**
  - Reconstruct roadways with curb and gutter
  - Traditional storm sewer conveyance
  - Large storm sewers with underground detention were required
  - Design provided collection and conveyance of 100-year, 24-hour duration storm
  - 2008 Cost estimate for drainage improvements - $24.4 Million

- **December 2009 Feasibility Study**
  - Focused on “green initiatives”
  - Combination of rain gardens, permeable pavers, and underground storage was utilized to model 100-year, 24-hour duration storm
  - Projected costs for drainage improvements - $15.0 Million
Existing Conditions
Existing Conditions
Existing Conditions
Existing Conditions
Existing Conditions
Existing Conditions
Existing Conditions
Goals and Objectives

- Maintain Subdivision Characteristics
- Minimize increase in impervious area
- Stay within ROW
- Minimize Storm Sewers
- Maximize BMP’s for infiltration and storage
- Minimize Tree impacts
- Minimum 10-year storm with no surcharge
Design Approach

- Identify flooding locations
- Delineate sub-watershed areas (approx. 1 – 2 acres max.)
- Develop flow path and correlate to flooding locations
- Develop concept BMP’s (type and location)
- Verify suitability for infiltration using soil borings
- Review conveyance path
- Series of staff meetings and public meetings
- Finalize concept BMP’s
- Develop a XP-SWMM model
- Finalize stormwater management plan and design
Concept Exhibit
Concept Exhibit

Legend - BMP Target Areas
- Permeable Paver: W/out Storage
- Permeable Paver: With Storage
- Bio-Swale: W/out Storage
- Rain Garden: W/out Storage
- Rain Garden: With Storage

- Proposed Underdrain / Storm Sewer
- Proposed Inlet / Catch Basin
- Sheet Flow Route
- Concentrated Flow Route
- Time of Concentration Flow Route
- Waterfowl Sub-Area Delineation
- Indicates Direct Tree Impact (Pruning or Removal Required)
- Indicates Location of Observed Drainage Issues (Larger to be Investigated for Drainage Solution in Conjunction with Roadway Drainage Design)

[Map and diagram of a drainage system with labeled areas and annotations]

[HRGreen logo]

Est. 1913
Model Set-up

Build the Model
XP SWMM model of Phase 1
North System

50-year Storm
South System

50-year Storm
## North System

### Measurement Point

<table>
<thead>
<tr>
<th>Event</th>
<th>Peak Flow Without BMPs</th>
<th>Peak Flow With BMPs</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-year 2-hour</td>
<td>69.85 cfs</td>
<td>23.45 cfs</td>
<td>66%</td>
</tr>
<tr>
<td>10-year 2-hour</td>
<td>35.25 cfs</td>
<td>15.87 cfs</td>
<td>55%</td>
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South System

<table>
<thead>
<tr>
<th>Event</th>
<th>Peak Flow Without BMPs</th>
<th>Peak Flow With BMPs</th>
<th>% Reduction</th>
</tr>
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<tbody>
<tr>
<td>50-year 2-hour</td>
<td>44.04 cfs</td>
<td>15.67 cfs</td>
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<tr>
<td>10-year 2-hour</td>
<td>22.98 cfs</td>
<td>9.47 cfs</td>
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Hydrographs
Landscape Approach and Concept

Conventional methods - Collect, concentrate and convey polluted runoff directly to our lakes, streams and groundwater.

NEW WAY – Rain gardens and bio-swales
- filter the pollutants
- cool the water down
- infiltrate into the sub-surface

Native landscape plants are often used in these stormwater features.

Water temperature increases and lawn fertilizer, motor oil, anti-freeze, paint, pesticides, detergents, pet waste flow into our water bodies.
Landscape Approach and Concept

Mix of Non-Native Plants….

…and Illinois Native Plants
Landscape Approach and Concept

The landscape palette needed to blend in with this manicured neighborhood…
BE CAREFUL WITH THE LANDSCAPE!
Native landscape plants look like weeds to most people…
Landscape Approach and Concept

Turf grass roots - 2” to 4” max
Non-native shrubs - 1’ to 3’ max
Native Plants - 3’ to 12’ +
Landscape Approach and Concept

KEY ELEMENTS OF THE RAIN GARDENS AND BIO-SWALES

SOIL MIXTURE
30% sand, 30% compost and 40% topsoil

NATIVE PLANT MIX (low areas only)

<table>
<thead>
<tr>
<th>COMMON NAME</th>
<th>BOTANICAL</th>
<th>PERCENTAGE</th>
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</thead>
<tbody>
<tr>
<td>Nodding Wild Onion</td>
<td>(Allium cernum)</td>
<td>25%</td>
</tr>
<tr>
<td>Blue Flag Iris</td>
<td>(Iris virginica)</td>
<td>25%</td>
</tr>
<tr>
<td>Common Fox Sedge</td>
<td>(Carex stipata)</td>
<td>25%</td>
</tr>
<tr>
<td>Foxglove Beardtongue</td>
<td>(Penstemon digitalis)</td>
<td>25%</td>
</tr>
</tbody>
</table>
During construction – under drains are critical with poor sub-surface soils (i.e. clay).
Landscape plant palette was modified above large underground storage units.
Under construction.
- The goal was to have a more “clean look” than all native plants that may appear “weedy” in a more urban environment.
- Maintenance is key for long term success.
Public Coordination

- 2005 – Drainage and Woodlands Improvement Task Force (DWIT)
- 2007 – Woodlands-Highlands Drainage Study (Traditional Study)
  - Questionnaires – 217 residences (82 responses)
- 2009 – Woodlands Green Initiatives for Stormwater Management Study
  - Neighborhood Meeting (s) – support for Green Initiative
Public Coordination

- 2011 - The Woodlands Phase 1 Design -
  - May 2011 - Concept Plan Review w/ Arborist, Village Engineer, Village Manager, Public Works Director
  - June 2011 – Neighborhood Meeting
    - Improvements Concept Plan
    - Roadway Typical Section
    - Rain Garden/Bio-swale Details
    - Planting Species & Details
    - Special Service Area
Public Coordination

- Summer 2011 – Neighborhood Survey
  - Proposed Concept Improvements
  - Special Service Area (SSA)
- Winter 2011 - Project Concept/SSA Concurrence
- Feb. 2012 – Neighborhood Meeting
  - 60% Plans & Specifications
  - Planting Plans & Details
- Summer 2012 – Phase 1 Construction
  - Field Stake Rain Gardens/Bio-swales
  - Field Meetings - Individual Residences
  - Field Adjustment of Design Elements
Recap

- Green Initiatives, a viable cost effective tool for stormwater management
- Potential 20% to 40% cost savings over traditional stormwater management
- Start public coordination early and make it an ongoing process during the design and implementation of your project
- Make your BMP details and specifications as clear as possible including effective erosion control management during construction
QUESTIONS?