Developing a Drainage Investigation Management Process to Repair SHA’s Aging Drainage Infrastructure

State Highway Administration
Office of Highway Development
Highway Hydraulics Division

Presenter:
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Highway Hydraulics Division
I. Aging SHA Drainage Infrastructure
   a. SHA’s Drainage Network
   b. Age of Drainage Infrastructure
   c. Number of Drainage Failures and the Cost

II. SHA Drainage Management (DM) Process
   a. Drainage Investigations
   b. Use of Technology
   c. Two Teams-Remediation & Proactive Approach

III. Transitioning from Reactive to Proactive
   a. District 1 Contract (Pilot)
   b. Expand Implementation
   c. Outfall Remediation by District/County
Aging SHA Infrastructure

Time and age has caused our drainage infrastructure to reach its limit.
Geography & Climate of Maryland
SHA’s Drainage Network
As of 2014, SHA’s road network includes approximately 25,000 acres of impervious surfaces

- Our drainage and stormwater assets consist of...
  - 3,300 Permanent Stormwater Management Facilities
    - Detention ponds, wet ponds, infiltration basins
  - 180,000 Hydraulic Structures
    - Inlets, manholes, endwalls
  - 100,000 Conveyances
    - Pipes, culverts, ditches
    - Over 7.5 Million linear feet of pipe
Aging SHA Stormwater Infrastructure – MD 210P
Eroded Outfall Threatening Guard Rail, Utilities and Roadway.
Aging SHA Stormwater Infrastructure – MD 202 54-inch RCP and Endwall Collapse
Aging SHA Stormwater Infrastructure – Washington Beltway (I-495) CMP failure-Undermined Shoulder of Beltway
Our Aging Infrastructure

- Poor Joints in concrete pipes
- Widespread use of CMP’s in corrosive soils or abrasive environment
- Drainage on interstates and major road expansions built in the 1950’s and 1960’s are now reaching past their life cycles
- Drainage Infrastructure Design Life is generally 50 to 100 Years
SHA Drainage Management (DM) Investigation Process

How the Highway Hydraulics Division approaches and investigates these failures
SHA Drainage Investigation Management Process

- **What are Drainage Investigations?**
  - Determine the cause of flooding
  - Determine the cause of erosion

- **Where do Drainage Complaints come from?**
  - Public
  - District Management
  - Other SHA Personnel
  - Environmental Agencies
  - Watershed Group
Number of Drainage Investigations Per Year
1994-2013

SHA averages 71 drainage investigations per year
SHA spends an Ave of $1 Million Per Year

Currently spending about $6 M to $8 M in Drainage Remediation Per Year
**SHA’s Drainage Investigation Request Form**

- **Standardized way to Log Drainage Complaints**
- **Is available on SHA’s Internal website**
- **Information is transferred to SHA’s Database.**

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**Location Information**

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<tr>
<th>District</th>
<th>Select...</th>
<th>County</th>
<th>Select...</th>
<th>HLR Year</th>
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</thead>
<tbody>
<tr>
<td>HLR Location</td>
<td>Route</td>
<td>Mile Point</td>
<td>Select...</td>
<td>HLR Year</td>
</tr>
<tr>
<td>Vicinity Location</td>
<td>ADC Map #</td>
<td>Column</td>
<td>Row</td>
<td></td>
</tr>
<tr>
<td>Street Address</td>
<td>City</td>
<td></td>
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**Is there an immediate Safety hazard?**

- Yes
- No

**Description of Issue**

- Any related projects or permits?
- Related FEMIS #'s

**Investigation Requested by (SHA Contact)**

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Title</td>
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<tr>
<td>Phone</td>
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<td>Email</td>
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**Citizen, or Complaint contact (If applicable)**

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Address</td>
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**Notes**

- Assigned to:
- HYINFO Tracking #

**Other Comments or Notes**

- Attach data files such as photos, maps, as-builds, etc.
Our Current DM Process

1. SHA receives drainage complaint
2. HHD assigns a consultant or in-house engineer to investigation
3. Type?
   - Pre-established problem
     - Investigate field conditions, gather mapping and as-builds
     - HHD calls consultant and outlines additional work
     - Further analysis necessary
   - Call from District or citizen
     - Call property owner/RME, make field visit appointment, and perform field investigation
     - Is SHA responsible?
       - Yes
         - Report brief summary and establish scope of additional analysis
           - Prepare report for HHD with sketch, pictures, computations, and recommendations
             - Is SHA responsible?
               - Yes
               - Have solutions been recommended?
                 - Yes
                 - DONE
               - No
               - No
               - No
             - No
             - Not sure
               - Perform analysis as dictated in scope
               - Have solutions been recommended?
                 - Yes
                 - DONE
                 - No
               - No
               - No
             - No
             - No
             - No
           - Yes
           - Prepare report for HHD with sketch, pictures, computations, and recommendations
             - Is SHA responsible?
               - Yes
               - Have solutions been recommended?
                 - Yes
                 - DONE
                 - No
               - No
               - No
             - No
             - No
           - No
           - Not sure
- Custom database application
- Outside divisions and districts have no access
SharePoint

- Accessible throughout SHA
- Submit new complaints
- Allows status tracking
eGIS

- Allows the use of spatial data
- Group projects together
Transitioning from Reactive to Proactive

How we are working to improve our approach and investigation process
• Frees up our resources and provides the local personnel with a sense of ownership

• HHD supplies construction funding

• Open-end construction contract of $3 million to be advertised in the Fall of 2014
Transition from Reactive to Proactive

- Cost savings
- Ability to plan better for spending
- Start of transition from reacting to drainage complaints to asset management
- Decrease response time to avoid putting off minor problems until they become urgent
Expand Implementation

- D3, D6, and D7 have expressed interest in open-ended construction contracts
- Requires buy-in from district personnel
- As the rest of the districts see the benefits, we expect all will participate in the program
Summary

I. Aging SHA Drainage Infrastructure
II. SHA Drainage Management Investigation Process
III. Transitioning from a Reactive to Proactive
Conclusion

What we hope you have taken away

We must continue to successfully manage the remediation of our aging drainage infrastructure