Shoreby Club Harbor Debris Mitigation
Senior Design Proposal - Fall 2015

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Parker Hannifin
In coordination with Dr. Joe Kovach

The Problem

• Heavy rains bring trash into the harbor
• Find a way to divert and contain trash
Objectives

- Find an efficient way to collect trash
- Must be failsafe and aesthetically pleasing
- Design a system to accomplish these tasks

Challenges

- Limiting scope of problem
- Dealing with many debris sources
Challenges

• High water volume and flow

Challenges

• Huge variety in debris size and type
Challenges

• Submerged drain outlet into harbor

Current Trash Filter
Current Trash Filter

Primary Solution

Priorities for Solution

• Respect for physics
• Multi-stage
• Aesthetics align with business needs
Primary Solution
Respect for Physics

VS.

Primary Solution
Multi-stages – we can address both
Primary Solution
Aesthetically pleasing

Primary Solution
Overview
Primary Solution
Mechanical Components

Primary Solution
Electrical/Control Components
Primary Solution

Considered Variations

• Cow-catcher configuration (early)

• Installing cow-catcher at inlet rather than outlet
• Installing rigid body filters at both inlets
Secondary Solution

Ratchet-Boom System

- Contains trash on surface (~95% of debris floats)
- Zero clogging
- No flooding issues
- WYSIWYG simplicity

Secondary Solution

Components

- Polyester belting
- Steel weights and ballast chain
- Floatation devices
- Ratchets
Secondary Solution
Analysis and Concerns

• Powerful, simple way to contain debris
• Risk of flooding minimized
• Ratchets speed up clean up

Concerns
• Aesthetics – trash still on surface but contained
• Maintenance of floating line
• Efficiency
• Size of containment area – sizing correctly

BOM and Estimated Costs

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<tr>
<th>Item</th>
<th>Cost</th>
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<tr>
<td>Steel – Appx. 1,000 sq ft.</td>
<td>$7,800</td>
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<td>Underwater actuator/motor</td>
<td>$600</td>
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<td>Three electromagnetic flow sensors</td>
<td>$1600</td>
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Deliverables for Spring 2016

- Finalized design with business and cost analysis
- Design for scale model
- Working proof of concept model
- Project plan for implementing solution in Newport Harbor

Timeline for Spring 2016

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Market Potential
Mitigating debris from outlets dumping into harbors/ports etc.

115 Federal Small Harbors (1) = 115
[Great Lakes Small Harbors Coalition]

12 Ports (5) = 60
[Great Lakes Small Harbors Coalition]

125 regular harbors (3) = 375
[Great Lakes Navigation System/Army Corps of Engineers]

$10,000 - $15,000 outlet unit price
Target estimate for solution price

Subtotal estimated harbor outlets: 550

Canadian border multiplier: 1.3

Total estimated outlets: 715

$7.2 – 10.7 M market size
in Great Lakes harbors alone
Thanks!