Case Study - Route 138  8/25/2011

Rhode Island Stormwater Design and Installation Standards Manual

RIDOT Workshop
Case Study Exercises
August 25, 2011

Introduction

• Three case study exercises:
  1. Route 138: Reconstruction of Roadway, including Major Intersections
  2. East Main Rd, Portsmouth: Sidewalk and Parking
  3. Waterfront Dr, East Providence: New Road Construction
• Real project examples - but we’ve made some assumptions
• Thanks to designers for allowing us to use their plans!
  - BETA Group, GRA Designers/Green International, Maguire Group

Case Study No. 1: Route 138

Route 138 (b/w Route 2 and Route 108)
A Redevelopment Project
# Route 138 Reconstruction

- **Redevelopment Project**
  - Approx. 3 mile stretch;
  - New Roundabouts;
  - Drainage and Stormwater Improvements;
  - Drains to both Cold and Warm Water Fisheries;
  - Design is being modified to meet new requirements.
    - 75% design was done based on early draft of revised SW manual
    - 90% design is now being finalized using final SW manual
  - Still a work in progress

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![Route 138 Reconstruction Map](image1)

- Chickasaw Brook (Cold Water)

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![Route 138 Reconstruction Map](image2)

- Chassell River (Warm Water)
Stormwater Management Criteria

**Important Questions/Information**

- **Redevelopment Project**
  - Need impervious cover analysis (existing vs proposed);

- **Define Site Area (for Redevel. Criteria)**
  - If > 40% I, then need to manage 50% of existing I + all of new I;

- **Required Design Criteria**;
  - Recharge (50% of exist. + all new Imp.);
  - Water Quality (50% of exist. + all new Imp.);
  - Channel Protection (only new development where necessary);
  - Overbank Control ($Q_p$) - 10 and 100 Yr Storms (only new dev where necessary)

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**Stormwater Management Criteria (continued)**

- **Channel Protection Criteria:**
  - Necessary if new Imp area > 1.0 acre and > 2.0 cfs peak inflow rate;
  - No practical way to separate new from existing impervious cover.

- **Overbank Flood Protection**
  - Compare peaks to existing, not natural conditions;
  - Downstream analysis may allow for elimination of practices.

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**LID Site Planning and Design Criteria**

- **Avoid Impacts**
  - Grading/slopes and walls to avoid disturbance;
  - Maximize protection of waterways and wetlands (location of BMPs);
  - Minimize clearing and grading/soil compaction (location of sidewalks, construction access/staging, location of BMPs).

- **Reduce Impacts**
  - Provide low maintenance vegetation;
  - Minimize impervious surfaces (consider pervious pavements or other alternatives for traffic islands);
  - Maximize runoff time of travel ($t_c$).
LID Site Planning and Design Criteria

- Manage Impacts
  - Infiltrate precipitation near the source;
  - Disconnect impervious cover;
  - Smaller drainage areas to practices; and
  - Source controls to minimize or prevent exposure of pollutants

Additional Considerations

- Cold Water Fishery
  - No WVTS for treatment within 200' (special outlets beyond);
  - No WVTS or detention basins for CP, & QP within 200' (special outlets beyond);

- Warm Water Fishery
  - No restrictions

- High Groundwater Table

BMP Selection Criteria

- Cold Water Fishery
- Seasonal High Groundwater Table
  - Recharge: (infiltration, filtering, open channels);
  - Water Quality: (infiltration, filtering, open channels);
  - Conveyance, Channel Protection and Overbank Flood Protection (may not be necessary)
New Manual Considerations

- Water Quality Swales:
  - Pretreatment?
  - Adequate treatment area?
  - Slopes (< 4%)?
  - Dry Swales: bio soil mix & depth above gw (3 feet)?

- Infiltration:
  - Pretreatment?
  - Separation distance to gw (3 feet)?
  - Design infiltration rate?
  - On-line vs. off-line design
  - Groundwater mounding analysis needed?

New Manual Considerations (continued)

- Bioretention:
  - Pretreatment?
  - Adequate treatment area?
  - Soil (bio soil mix) specs & depth above gw (3 feet)?
  - On-line vs. off-line design?
LID for Linear Transportation Projects:
RI Stormwater Manual
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RI Stormwater Manual
BMP 21 - Wet Swale

Design Aspects of Wet Swale:
- Linear Shape?
- Pretreatment forebay
- On-line design for 2 acres of imp. cover
- Level spreader issues
- Plantings?
- Other site constraints?

Need an outlet for drawdown between storms
Too deep? What makes this a swale?
Swale Sizing

~3,200 cf Storage in Permanent Pool

• Need More Storage? Forebay?
Basin Sizing
~4,200 cf Storage below rim

Important Infiltration Issues
- Depth to SHGT
- Infiltration rate based on test pits
- Construction sequencing
- ESC measures
- Maintenance

Lessons Learned
- Project shifted from dry detention to the WQ BMPs in Chapter 5
- WQ BMPs actually allowed more flexibility in some cases (High gw) and fit in the same footprint or even smaller
- WQ BMPs worked better with the natural contours (less grading)
- Critical to set up design templates at the beginning of project to keep track of information.