Rhode Island Stormwater Design and Installation Standards Manual

RIDOT Workshop
Case Study Exercises
E Main-Chase Road Sidewalk and Parking Lot
July 13, 2011

Horsley Witten Group, Inc.
Case Study No. 2: East Main Road, Portsmouth Sidewalk and Parking

LID, Use of Credits for Disconnecting Impervious Cover, & other Controls

Existing:
- 2 miles of existing roads (Chase Rd/E. Main & Park Ave);
- Existing narrow sidewalks both sides of the road.

Proposed:
- Sidewalk replacement and width expansion to up to 6 feet;
- New parking spaces for commuter bus stop.
- New impervious cover of just under an acre.
Stormwater Management Criteria

• What criteria apply to this project?
  - Redevelopment?
  - New development?

• How much of the stormwater management requirements can be met with QPAs?

• What other practices might make the most logic given the existing conditions?
Redevelopment Criteria Applies

- Disturbance of more than 10,000 sq ft;
- % imperious cover calculation;
  - Assume site area = total project area including roadway surface within R/W;
  - Existing impervious cover includes existing sidewalks, roadway + driveways & other paving within R/W for purpose of calculating % I;
  - Site % I > 40%; thus reduce IC within disturbed area (sidewalk) by 50% or meet Stds 2 & 3 (Re, & WQv) for 50% of Redevelopment Area
- Plus new IC.
Management Options (for $Re_v$ & $WQ_v$)

- Sheet flow to Qualified Pervious Areas (QPAs);
- Pervious pavement (asphalt, concrete, or pavers);
- Retrofit other impervious areas with appropriate controls (e.g., bioretention, dry swale);
- Reduce unnecessary existing IC.
Other Criteria

- Does the project need to provide $C_{pv}$?

- *Maybe, if new impervious cover >1 acre (within same catchment)*

- What information would we need to determine if the project must provide $Q_p$?

- *Discharge location to receiving waters*
Overbank Flood Protection

- $Q_p$ compares proposed to existing conditions, not natural conditions
- There are no exemptions for impervious cover or peak inflow rate
- A downstream analysis may allow for elimination of practices.
Soils
Commuter Parking

Chase Road

E. Main Road

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Chase Road Parking Lot Concept Plan

Bioretention with Forebay
Chase & Boyd Lane
Possible Bioretention

New Bioretention
managing new parking spaces

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Grade to flow towards curb-line

Shallow Landscape Drain
Redevelopment and LID

Avoid/Reduce/Manage?

Reduce impervious cover?
Stormwater for Chase Rd Parking Lot

- Total DA (parking + sidewalk + bus stop) = 8,830 sq ft.

- Size bioretention for this IC.

\[
WQ_v = 1"(l)/12 = 1(8,830 \text{ ft}^2)/12 = 736 \text{ ft}^3
\]

Min Surface Area \((A_f) = WQ_v(d_f)/[(k)(h_f + d_f)(t_f)]\)

\[
A_f = 736 \text{ ft}^2 (2.5')/[(1.0'/d)(0.375' + 2.5')(2 \text{ d})]
\]

\[
A_f = 320 \text{ sq ft}
\]
QPAs for Sidewalk Runoff
(not including Chase Rd parking)

- Total length of existing sidewalk = 19,600 lf
- Average width of 3.5 ft
- Total existing IC = 68,600 sq ft.
- Required IC for management (50%) = 34,300 sq ft.
- Proposed width (assume 6 feet).
- Proposed IC = 111,480 sq ft.
- Total IC for management (100% of new IC + 50% of existing IC) = (111,480 - 68,600) + 34,300 = 77,180 sq ft.
QPAs Quantified on CAD plans
E Main & Hillside Road

Sheet flow to QPA?
No. R/W < 6 ft from sidewalk

R/W > 6 ft from sidewalk
QPAs provided

- Total proposed sidewalk draining to a QPA within R/W = 1,815 lf
- Total proposed IC from sidewalk draining to a QPA = 10,890 sq ft
- Required IC needing treatment from another practice = 77,180 - 10,890 = 66,290 sq ft.

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E Main/Chase & Park Ave

Possible Bioretention Islands

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Chase Road and Park Ave (QPA or Bioretention)

QPA for sidewalk or bioretention for intersection
E Main north of Spague St (looking north)

Sheet flow to QPA within R/W (No – too narrow)
Good terrain for QPA but insufficient R/W

- Existing Landscaped Area
- QPA?
- R/W
Conversion of Landscaping to Bioretention?
E Main & Child Street

Sheet flow to QPA
E Main south of Child St

Sheet flow to QPA

Sheet flow to QPA
E Main and Village Way

Sheet flow to QPA?  No, too narrow
Sheet flow to QPA?
No, too narrow
E Main & Patriots Way

Dry Swale?
E Main Near Dexter Street

Sheet flow to QPA? (no, too narrow)
E Main & Berroth Ct
E Main and Power St
E Main & Church Ln

Ex Landscape Island

Flow Direction
Summary of QPA and Other Criteria

- Total IC for management = 77,180 sq ft.
- Total IC draining to a QPA = 10,890 sq ft.
- Net IC area for additional management = 66,290 sq ft (structural controls, IC removal or QPA for non-sidewalk areas)

- New impervious cover = 42,880 sq ft...so $C_{p_v}$ is not required.
- $Q_p$ will need to be addressed and compared against existing conditions.