The UConn Stormwater Corps

Integrating Undergraduate Student Training into Municipal Stormwater Retrofit Planning

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Presentation for NEWWA Conference & Stormy Awards, Newport RI

December 5, 2024

Climate

Brownfields

Stormwater

ENVIRONMENT CORPS

Filling the local environmental capacity gap **&** providing valuable experience

Two semester model

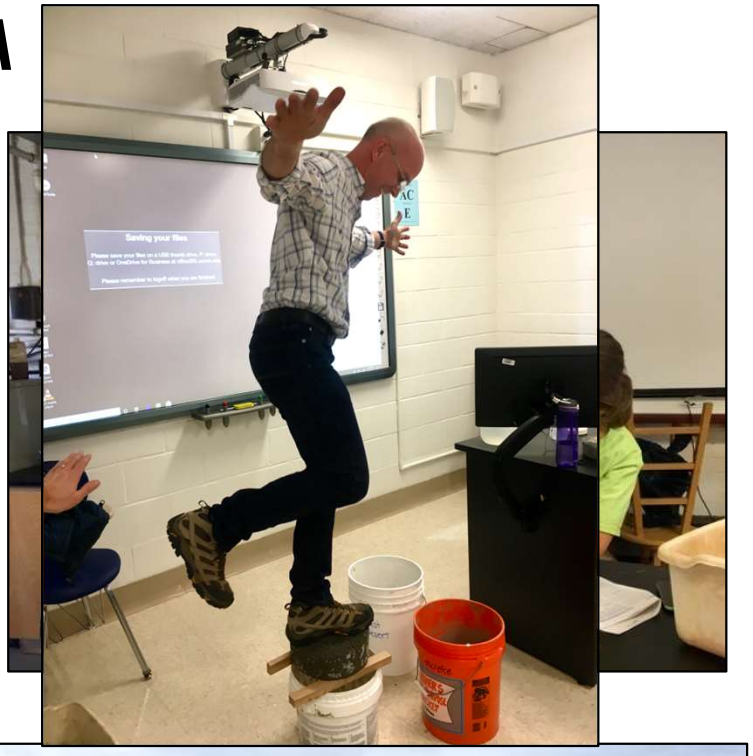
Classroom Semester

Practicum Semester

Classroom semester (Spring)

Week	Day	Topic	Reading	Homework
Section 1		DEFINING THE PROBLEM		
1	Section 2	LOW IMPACT DEVELOPMENT PRACTICES		
	Section 3	LID APPLICATIONS & ISSUES IN THE FIELD		
	10	3/23/2021	**PANEL DISCUSSION**		
		3/25/2021	Reading a site plan		
2	5	11	3/30/2021	Role Play		5
		4/1/2021	Role Play		6
	6	12	4/6/2021	**Remote:** Rapid assessment techniq	North Haven report	
3			4/8/2021	**Remote:** Rapid assessment technique-field techniques & sizing		
	7	13	4/13/2021	**SPRING BREAK**		
4						
	8		4/15/2021	**SPRING BREAK**		
	9	14	4/20/2021	**Remote:** Office hrs for project		
			4/22/2021	**Remote:** Presentations		
		15	4/27/2021	**Remote:** Presentations		7

CLASSROOM SEMESTER



Practicum semester (Fall)

- Brief review of retrofit assessment process
- Form teams, assign to towns
- Desktop analysis, meet with town
- Field visits
- Finalize calculations and report
- Present to town
- Rinse and repeat!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Sizing and estimating benefits

2. Drainage area *(Google Maps)*

Drainage area (sq ft)	Suggested green infrastructure	Annual gallons treated	Annual Nitrogen reduction (lb N/yr)	Annual phosphorus reduction (lb P/yr)	Suggested Practice Size (sq ft)
12,240	Rain garden	311,329	2.118	0.150	2,040

- ❑ Go to Maps.google.com
- ❑ Under the burger menu (3 horizontal lines), select "your places"
- ❑ Under the maps
- & give your ma
- ❑ Navigate to you
- ❑ Select the "Sate
- ❑ Zoom into your
- ❑ Select the "draw
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- ❑ Name your drai
- ❑ The size of your
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- ❑ Write the size in
- description box
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- drainage area b

map title draw line tool search box

3. Sizing the garden *(calculations)*

- ✓ Rain gardens in Connecticut are supposed to be, at minimum, sized to handle a 1" rainstorm event. The majority of pollutants are carried in the
- treating quit
- storm for a g
- the drainage
- ✓ To get the W
- ✓ Rain gardens
- "footprint" t
- would have t
- aesthetics ar
- either. So, a g
- Divide your V
- 0.50 ft = 215

** NOTE*
the des
sizing t

(1294 ft²) (

4. Annual gallons treated: *total annual runoff*

- ✓ This figure is calculated
- cumulative impact.
- ✓ Take the average annu
- ✓ Multiply your drainage
- Because this is a totally
- would be runoff withou
- more step (next page).

5. Estimating nutrient load reductions

Drainage area (sq ft)	Suggested green infrastructure	Annual gallons treated	Annual Nitrogen reduction (lb N/yr)	Annual phosphorus reduction (lb P/yr)	Suggested Practice Size (sq ft)
12,240	Rain garden	311,329	2.118	0.150	2,040

In addition to calculating the volume of water that your proposed LID/GSI practice will infiltrate into the ground (and thus keep out of the stormwater system and waterways), you can estimate how much of a given pollutant contained in that water will also be kept out of the local waterways. Two pollutants of particular concern are nitrogen (N) and phosphorous (P), both nutrients that in excess can stimulate levels of algal growth that are unhealthy for aquatic life.

You have already calculated your annual reduction in runoff in Step 4. You need only multiply this by the estimated concentration of N and P in that water to get the total amount of pollutant removed. To do this, the Stormwater Corps uses a 1991 (?!) paper by Charles Frink that summarizes CT research looking at nutrient concentrations by major type of land cover. The key numbers are in Table 2.

The Frink annual nutrient export coefficients are in kilograms/hectare. For your report we want to convert these figures to lbs/ft². Use the "Urban" land use coefficients (right). Let's do P as an example.

- Step 1. Convert kilograms to pounds. 1 kg = 2.2 pounds so:
  - (1.7 kg/ha)(2.2 lbs/kg) = 3.74 lbs/ha
- Step 2. Convert hectares to square feet. 1 hectare = 107,639 square feet so:
  - (3.74 lbs/ha)/(107,639 ft²/ha) = 0.0000347 lbs/ft²
- Step 3. Multiply by the drainage area of your practice from Step 3, 1294 ft²:
  - (0.0000347 lbs/ft²)(1294 ft²) = 0.045 lbs per year
- Repeat for N using the value of 13.4 kg/ha

(NOTE: don't be worried that the numbers are small. This example used a small rain garden, and every little bit helps!

Table 2. Nutrient export coefficients estimated for Connecticut lakes (CAES), Chesapeake Bay (CB), and Long Island Sound (LIS).

Land use	CAES†	CB‡	LIS§
	kg ha⁻¹		
Annual P export			
Urban	1.70 ± 0.21	0.56–3.36	1.5
Agriculture	0.54 ± 0.15	0.28–5.60	0.39
Wooded	0.10 ± 0.03	0.06–0.34	<0.01
Annual N export			
Urban	13.4 ± 2.6	5.6–28.0	9.6
Agriculture	7.6 ± 2.2	5.6–78.4	20.6
Wooded	2.4 ± 0.5	0.2–5.6	0.1

† From Norvell et al. (1979) for (P) and present study (N) with standard errors.
‡ Donigian et al. (1990).
§ Farrow et al. (1986). Calculated from export coefficients for subareas 3 to 10 occupying about 712 000 ha in New York and Connecticut.

Final deliverable

Stormwater Runoff Reduction Plan

Hamden, Connecticut

Created by: Emma Saavedra, James Sheridan, Katherine Nee, and RosaLinda Sibilio -UConn undergraduate students. Mike Dietz, David Dickson, Chester Arnold, and Amanda Ryan - UConn Center for Land Use Education and Research.

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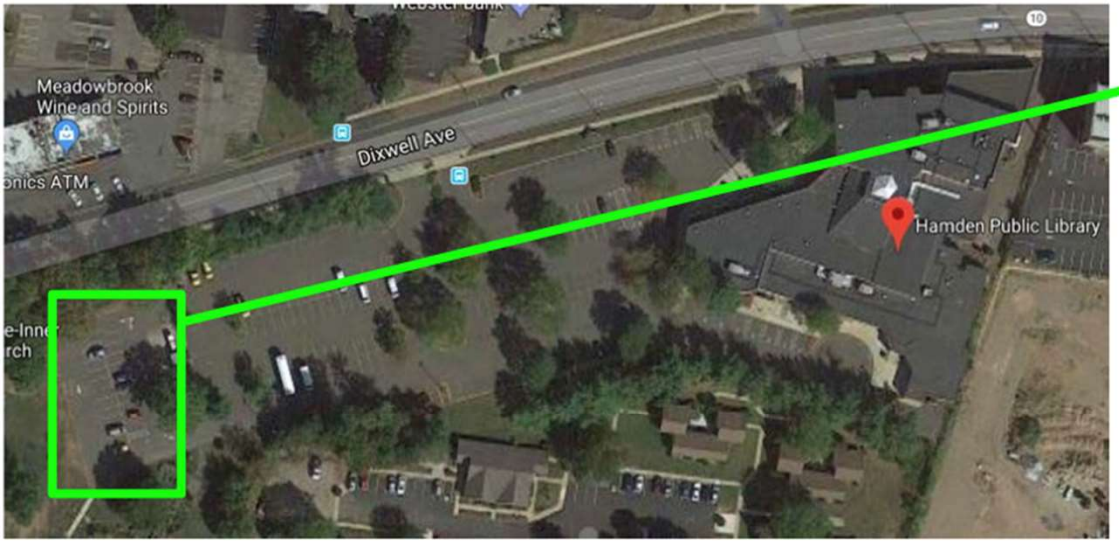
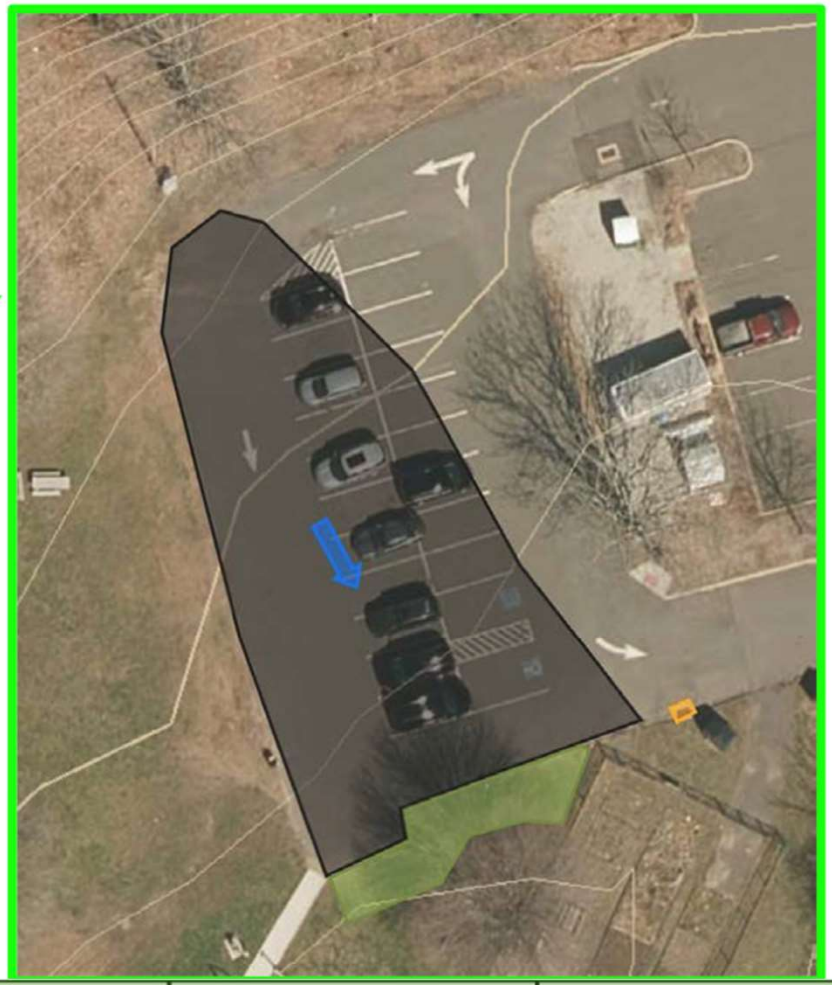
Details for each site





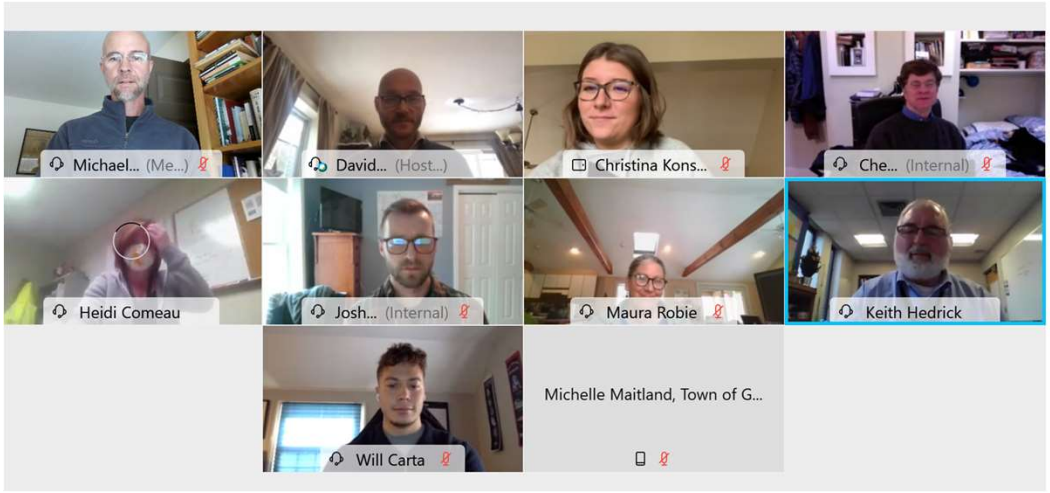
Drainage Area (sq ft)	Suggested Green Infrastructure	Annual Gallons Treated	Annual Nitrogen Reduction (lb N/yr)	Annual Phosphorus Reduction (lb P/yr)	Suggested Practice Size (sq ft)
7,361	Rain Garden	220,241	1.274	0.090	1,230

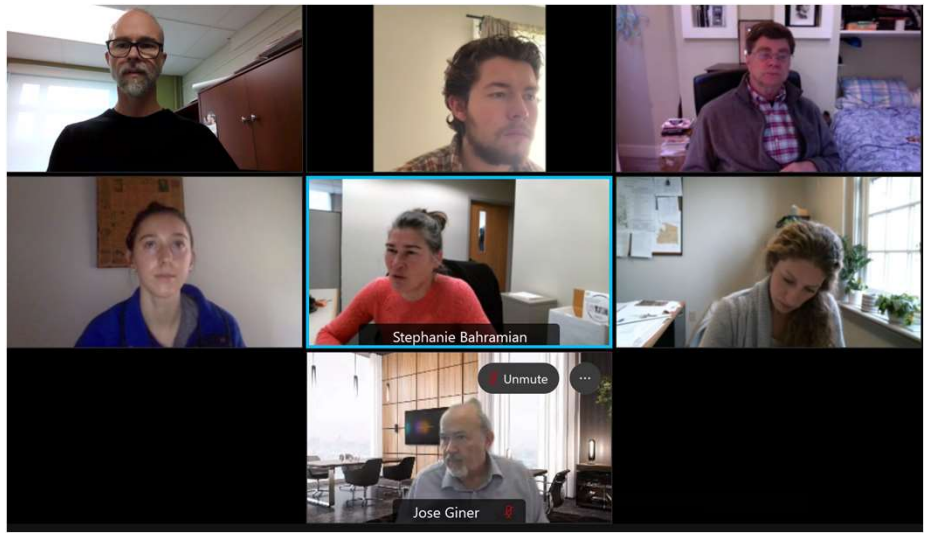
Summary sheet

Site Recommendation Figures

		Total Disconnection (sq. ft)	Phosphorus Nutrient Reduction (lb P/yr)	Nitrogen Nutrient Reductions (lb N/yr)	Gallons Treated per Year	Estimated Cost
Walter C. Polson Middle School	North Lot Entrance Road	25,482	0.88	6.97	670,930	$6,868-27,472
	North Lot Parking Area	16,378	0.56	4.48	431,227	$5,420-21,680
	West Lot Parking Area	10,890	0.38	2.98	286,730	$3,400-14,400
	Total for all	**52,750**	**1.82**	**14.43**	**1,388,887**	**$15,688-63,552**
Surf Club Park	Strong Field	11,543	0.20	1.58	152,560	$5,401-21,606
	West Lot Parking Area	4,051	0.14	1.11	106,678	$3,000-18,000
	West Lot Road	2,419	0.08	0.67	64,236	$14,000-36,000
	Total for all	**17,839**	**0.42**	**3.36**	**323,474**	**$22,401-75,606**
Madison Senior Center	Front Parking Area	13,982	0.49	3.82	368,210	$6,190-24,760
	Front Building Rain Garden	1,742	0.06	0.48	45,883	$1,567-4,630
	Northeast Drain Rain Barrel	653	-	-	400 gal/week	$500-1,000
	Total for all	**16,377**	**0.55**	**4.30**	**414,093**	**$8,257-30,390**
Ryerson Elementary	Lane on the Inside	4,007	0.14	1.10	105,503	$1,332-5,328
	Lane on the Outside	3,964	0.14	1.08	104,344	$1,316-5,264
	Total for all	**7,971**	**0.28**	**2.18**	**209,847**	**$2,648-10,592**
DPW Garage	Front Entrance	7,884	0.27	2.16	207,610	$3,944-15,744
	Side Parking Area	10,280	0.36	2.81	270,704	$5,140-20560
	Total for all	**18,164**	**0.63**	**4.97**	**478,315**	**$11,600-46,400**

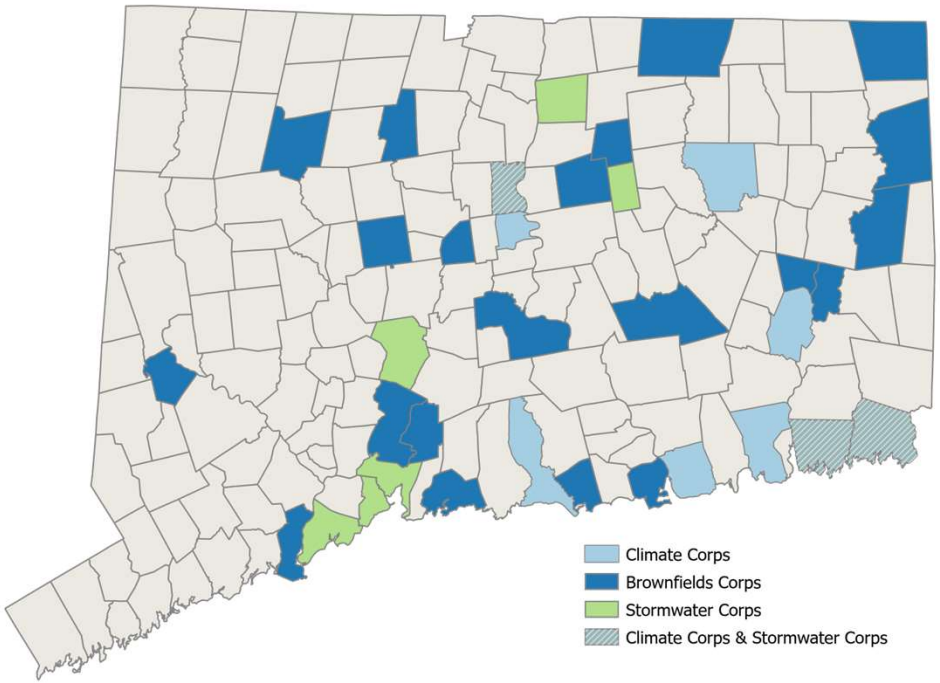
Final presentations by students





Community impacts

- ✓ 76 town projects
- ✓ 60 towns & organizations



Multiple benefits

- Provides a USABLE product for municipalities at no cost
  - Helps them to meet MS4 requirements
- Gives real-world experience to students
- Towns and others have leveraged these projects into actual implementation!

Towns love it

"I would like to thank the whole team for the work you have done for Bloomfield. This is an invaluable service that you have provided us. I already have plans to work with our tree and beautification committees to look at those raingardens sites and they are excited about the project.

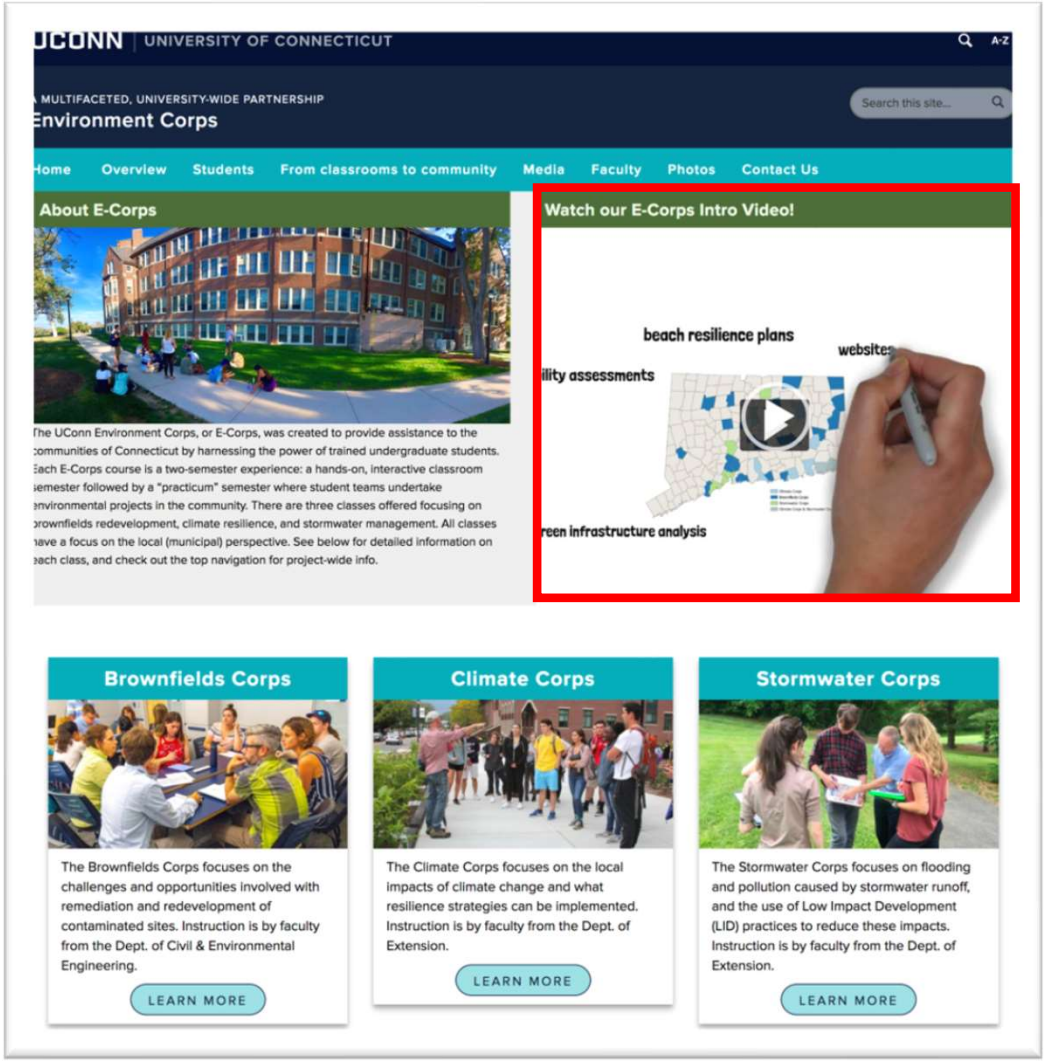
I look forward to working with the E-corps again in the future."

-Stephanie Bahramian, Town of Bloomfield CT

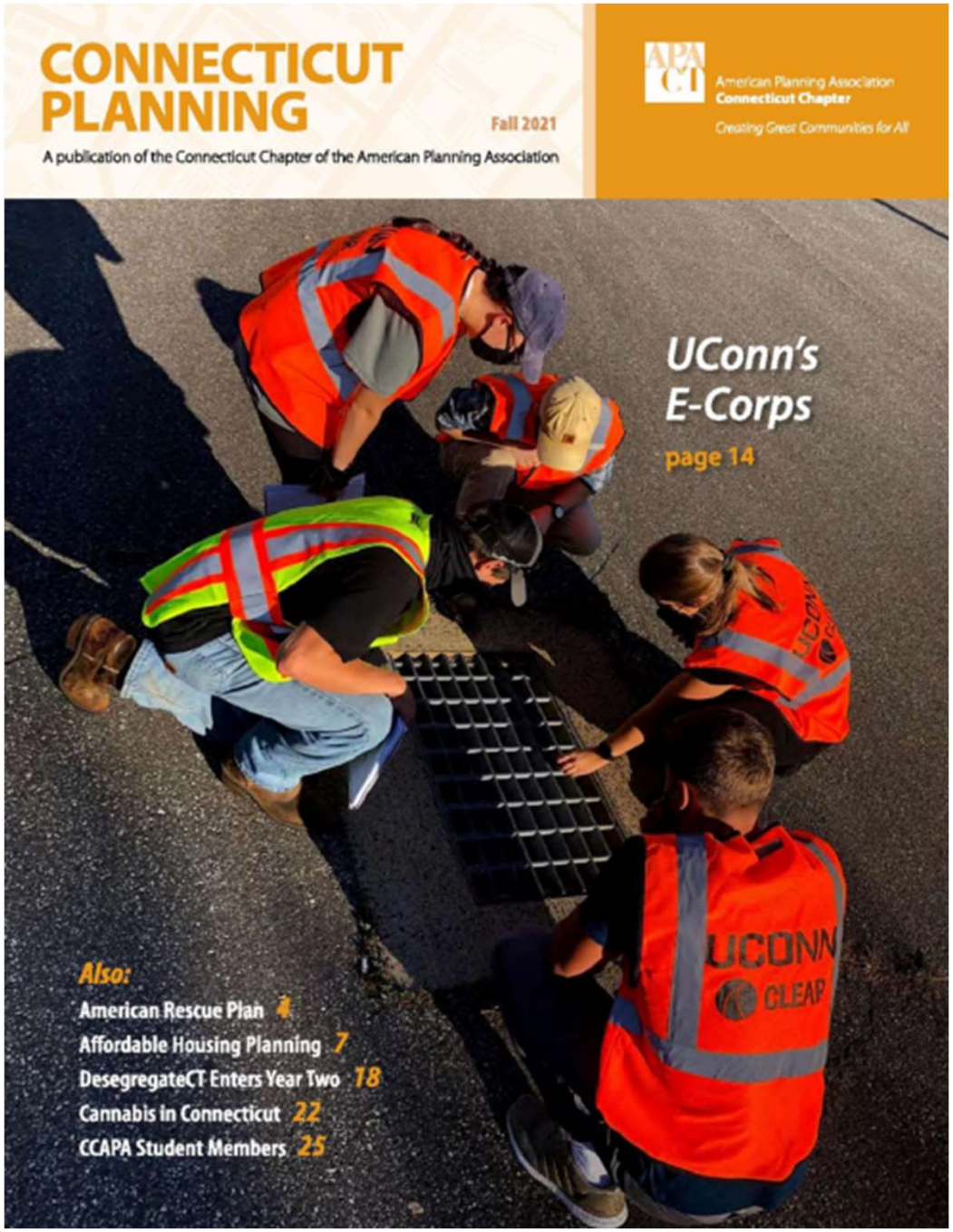
Students love it

- E-Corps graduates reported that the course had a substantial impact on their **KNOWLEDGE**.
- E-Corps graduates reported that the course had a substantial impact on their development of **PROFESSIONAL SKILLS**, and that they are using these skills.
- E-Corps graduates often pursue **GRADUATE DEGREES** in environmental fields, and over half of those that do say E-Corps had a large influence on their decision.
- E-Corps graduates overwhelmingly choose **ENVIRONMENTAL CAREER PATHS**, and two-thirds of them say E-Corps greatly influenced their decision to do so.
- Most E-Corps graduates say that the course influenced their interest in **ADDRESSING ENVIRONMENTAL ISSUES AS A CITZEN**. And many are turning that interest into action.

ecorps.initiative.uconn.edu



Award # 1915100



https://ct.planning.org/knowledge-center/ct-planning-magazine

Thank you!!

Questions?

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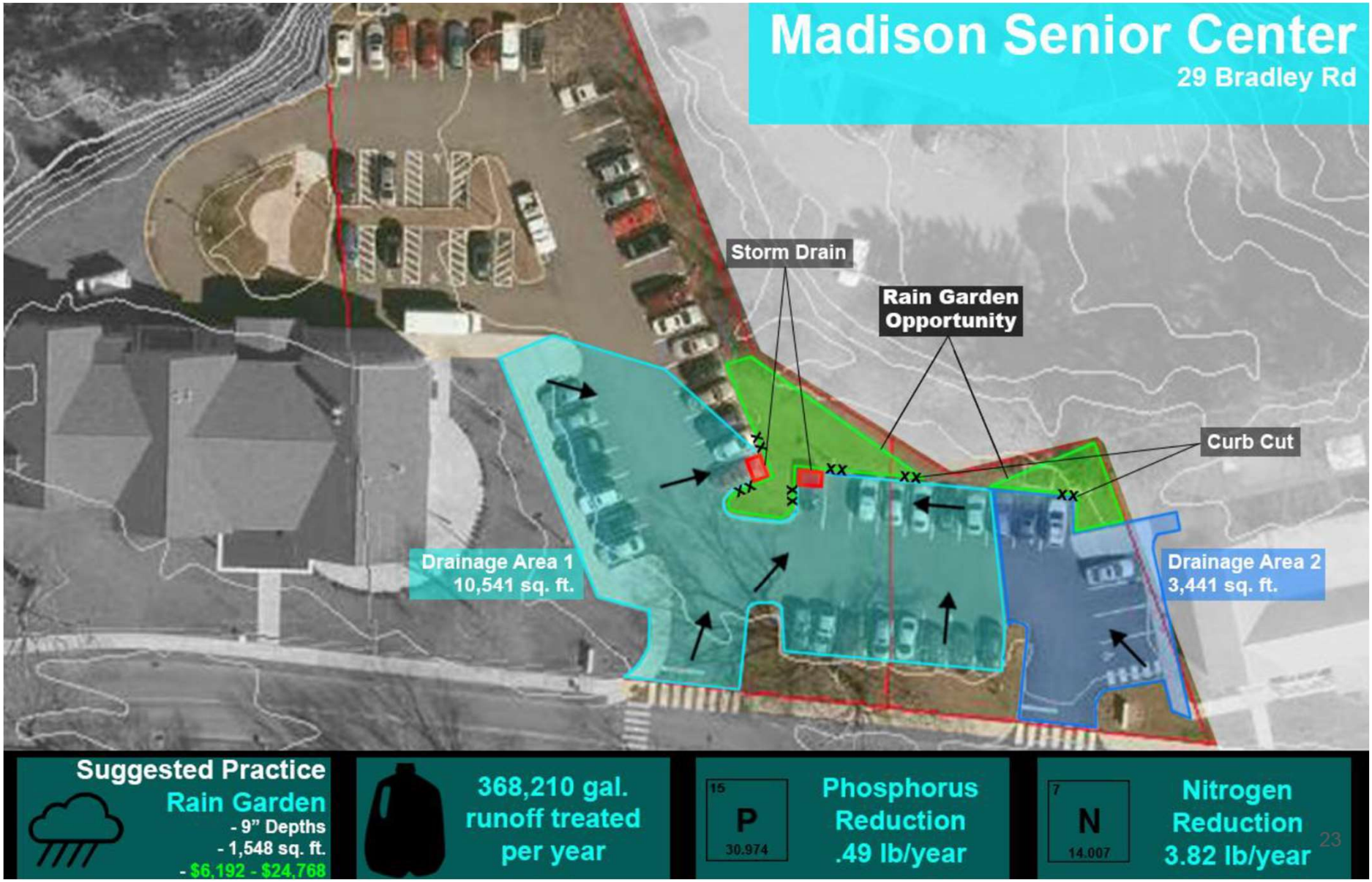
Details for each site



Final deliverable

Hebron Stormwater Runoff Reduction Plan Fall 2021

University of Connecticut Stormwater Corps | November 2021

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