



# Tactical Green Infrastructure

**A Pacific Rim Superstudio**

March 2021



## Tactical Green Infrastructure:

### A Viable Tool for our Western Region?

In the last two decades, the design community has been on the forefront of the design and implementation of urban green infrastructure. However, the use of green infrastructure on a widespread level has been grossly piecemeal, selective to mainly large-city locales, more reactive than proactive, and is often expensive and time consuming to complete. If green infrastructure is to be a viable tool for addressing the negative effects of urbanization, green equity, and the climate crisis, we as designers need to respond quickly, cost-effectively, and inclusively whether in a big city or small town. With thousands of our schools, roads, parks, and other civic space infrastructure either breaking down and/or simply inefficiently designed, there is an incredible opportunity to boldly retrofit these spaces with a new green infrastructure implementation approach. This approach is called *Tactical Green Infrastructure*.

Tactical Green Infrastructure is a specialized design-build methodology that allows students and professional design practitioners to work together to identify, design, and construct expedited green infrastructure demonstration projects. These small-scale projects convert both paved and existing underutilized green space into highly functional rain garden landscapes within a couple of months. This highly-interactive design and implementation process often enlists the effort of volunteer personnel, procures donated construction materials, identifies potential project funding sources, and helps educate the general public on the basic principles of green infrastructure.

In 2015, a student group called the *California Student Leadership in Green Infrastructure* was formed at the University of California, Davis under the direction of Kevin Robert Perry. This student-practitioner collaboration began implementing small-scale Tactical Green Infrastructure projects throughout the university campus and the surrounding community. The goals of these projects are to:

**Demonstrate**, through built example how green infrastructure can be quickly implemented, with little expenditure, and with highly impactful results using student and community volunteer labor.

**Teach** local design students and emerging young professionals how to design, build, maintain, and advocate for green infrastructure projects using a hands-on teaching approach.

**Promote** the use of Tactical Green Infrastructure by inviting others to participate in the design-build process and tell our story to a wide audience ranging from the local level to an international stage.

Having had several meetings between the various municipalities, design firms and non-profit agencies, there may be a groundswell of interest to expand the concept of Tactical Green Infrastructure, and the student-practitioner formula, throughout the western United States and Canada.

## The Pacific Rim Tactical Green Infrastructure Superstudio

The Pacific Rim Tactical Green Infrastructure Superstudio is a multi-month design collaboration between selected universities, design firms, and volunteer organizations from at least three different west coast locations to develop build-ready concept plans for small but highly visible spaces college campuses using the same Tactical Green Infrastructure approach that has been successfully developed at UC Davis. The choice of focusing on schools is deliberate in that these assets are highly visible and cherished public spaces, visited by a large cross section of the surrounding community, often have inefficiently design spaces that have high potential for stormwater capture and environmental education, and are typically underfunded landscapes. The concept plans would subsequently be used to build each respective green infrastructure project utilizing community-based volunteer efforts during a future implementation phase. Once implemented, these small-scale retrofit projects, generally under 1,500 square feet of area, would intercept stormwater runoff buildings, play areas, sidewalks, plazas, or other impervious hardscape surfaces and direct into simple, creatively designed, and beautiful rain garden installations. Not only would these projects provide direct stormwater management benefits, but they would allow students, design practitioners, and the public to work together in a hands-on environment to quickly improve the quality of their local parks and schools. In addition, project partners would work with public agencies to gauge their willingness to fund Tactical Green Infrastructure projects at a regional/national scale.

# Project Summary

If proven beneficial, the impact of this research could suggest that Tactical Green Infrastructure is a valuable design methodology to quickly retrofit the urban fabric, combat the negative effects of urbanization and climate change, and provide the impetus to expand this research towards a broader Tactical Green Infrastructure Program.

## Project Schedule

We foresee the following schedule of tasks to complete the six-month design process. This would include identifying project retrofit sites, conducting multiple webinars between student-practitioner groups as well as generating public participation/feedback, developing preliminary and final concept plans, and compiling the design products and process into a website and video.

**Month 1:** Confirm participating design firm and university collaborators

**Month 2:** Desktop analysis of potential school retrofit sites  
Superstudio introduction webinar  
University design student and stakeholders recruitment  
In-person site analysis of school retrofit sites  
Final site selection, base map measurements  
Brainstorming session webinar

**Month 3:** Preliminary concept design development  
Preliminary concepts review webinar  
Internal feedback of preliminary concepts  
Final concept design development  
Review/workshop

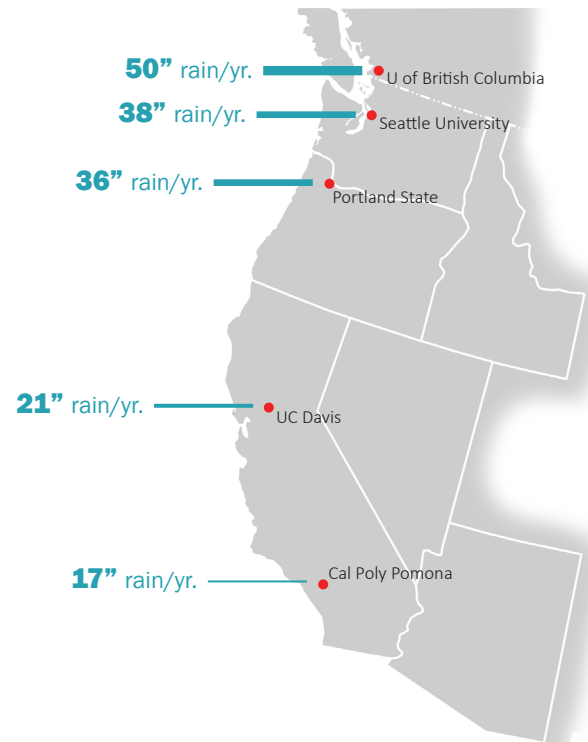
**Month 4:** Compilation of project deliverables and process  
Final concepts review webinar

## Project Deliverables

Currently we have identified the following deliverables for the project. We anticipate that this will be mostly the responsibility of the design students to deliver with assistance from the design firms to help guide the process.

- Existing site retrofit opportunities and constraints analysis
- Preliminary concept plan (site plan, grading concept, planting plan, sketches, any supplemental design details).
- Final concept plan
- Overall website/social media development
- Overall video of designs and process (if we have the energy to do it).

## Project Map/Identified Design Firm & University Collaborators



- 1 Berger Partnership**  
*Seattle University*  
*University of British Columbia*
- 2 Urban Rain Design**  
*All selected universities*
- 3 RIOS**  
*Cal Poly Pomona*



## California Avenue Rain Garden

University of California, Davis | 2015-2016

During the Spring of 2015, the *California Student Leadership in Green Infrastructure* began the installation of a green street stormwater retrofit along California Avenue at the west side of UC Davis' Robbins Hall. The project converted 1,000 square feet of conventional lawn into both a rain garden and drought-tolerant landscape. The student-practitioner group removed the turfgrass, excavated soil, graded the rain garden, installed a drip irrigation system and concrete paver pathway, and completed a first-phase planting 10 weeks. Campus crews then installed a trench drain that intercepts stormwater runoff from the gutter of California Avenue and allows it to enter the rain garden before it reaches the storm drain system. The project exemplifies a basic green infrastructure strategy to retain shallow amounts of runoff within the landscape so that it can be slowed, cleaned, and allowed to soak into the soil where it can ultimately help replenish our aquifers. At a total cost of under \$5,000, projects like the California Avenue Rain Garden are great opportunities for students to gain more "hands-on" experience in installing simple green infrastructure projects and allows the community to see first-hand simple green infrastructure retrofit implementation.



*UC Davis students, many of which had never worked on a rain garden construction project before, learn how to shape the soil to allow stormwater to collect and slowly soak into our underground aquifers.*



*Prior to construction, this portion of California Avenue featured only water-thirsty turfgrass and street stormwater runoff was allowed to flow directly into an underground pipe system.*



*After the completion of the student-built rain garden, the project transformed this 1,000 square foot space into a rain garden filled with both drought and wet tolerant plant species as well as many different kinds of pollinator plants.*



## Social Sciences and Humanities Rain Garden

University of California, Davis | 2017-2018

In 2017, the *California Student Leadership in Green Infrastructure* completed its second successful green infrastructure retrofit on the UC Davis campus. Located on the south side of the Social Sciences and Humanities Building, the team transformed a former triangular-shaped lawn area into a functional rain garden space actively capturing stormwater runoff from one of the building's roof downspouts and adjacent sidewalk areas. This retrofit project features a curvilinear rain garden that is defined by a metal edge restraint retaining the soil grade surrounding the site's existing oak tree. A new pervious paver pathway crossing the triangle area responds to the predominate pedestrian traffic flow of the site where before people would trample through worn grass. The rain garden project was built for under \$2,000 and received donated building materials from various product industry companies.



Students learn how to install an accessible pervious pavement pathway that runs through the Social Sciences and Humanities Rain Garden site. This new pathway now gives pedestrians the ability to easily move through the rain garden space without needing to walk through the previous eroded turfgrass condition.



**Before**  
A building downspout at UC Davis' Social Sciences and Humanities Building directs stormwater runoff across a walkway and into an under-performing turf area. The California Student Leadership in Green Infrastructure immediately recognized the potential to transform the bland, non-functional space into a project with high environmental and placemaking value.



**After**  
Within a few months, the same Social Sciences and Humanities Building space is completely transformed into a vibrant rain garden that showcases a range of color, form, texture, and plant biodiversity. This is now a place to visit and observe rather than a place to quickly pass through.



## Young Hall Rain Garden

University of California, Davis | 2018-2019

Young Hall was previously an overgrown and forgotten landscaped space. The *California Student Leadership in Green Infrastructure* utilized the Tactical Green Infrastructure methodology to completely transform this existing underutilized space into a high-performance green infrastructure demonstration project. The defining features of design are a series of acute angles that transect the site. These angles are formed with both hardscape/landscape materials and grade change that match the bold angles of the Young Hall courtyard railings. To accentuate this bold angular form, a 15-foot long wooden “stormwater runnel” directs downspout water towards the rain garden where it can cascade into the new rain garden. The Young Hall Rain Garden features low-water succulents, pollinator plants, and a small paved area with a relocated memorial bench for seating. This project took approximately four months to construct and cost less than \$5,000 to create. As the third retrofit project at the UC Davis campus, the Young Hall Rain Garden demonstrates that simple, cost-effective design, can be also be visually intriguing.



The October 26, 2018 groundbreaking for the Young Hall Rain Garden. Our multi-disciplinary student-practitioner team banded together to build our third campus retrofit and demonstrate the power of transforming underutilized spaces with Tactical Green Infrastructure.



The Young Hall project site met many criteria for creating an outstanding Tactical Green Infrastructure project. It was located in a highly visible location, had a manageable construction footprint, could easily capture large quantities of stormwater runoff, already had an irrigation system in place, and was an overall under-performing landscape space.



The California Student Leadership in Green Infrastructure transformed the Young Hall courtyard space into a dynamic rain garden over several months with only \$3,300 of investment. This Tactical Green Infrastructure project was featured in the September 2019 issue of *Landscape Architecture Magazine*.



## Davis Senior High School Rain Garden

University of California, Davis | 2019-2020

The *California Student Leadership in Green Infrastructure* collaborated with Davis Senior High School students, teachers, and staff to design and implement a rain garden at a highly visible and central courtyard space on the school campus. Prior to its transformation, this space flooded during the rainy season, had significant pedestrian circulation/erosion/soil compaction problems, and lacked any significant planting to promote biodiversity and habitat value. The redesign of this space called for a 1,150 square foot rain garden designed to capture impervious area runoff from nearby sidewalks and rooftops, solved site circulation and erosion problems, and created an aesthetically pleasing landscape area that can adapt to both drought and wet conditions. This rain garden project allowed both university and high school students to gain first-hand construction experience with green infrastructure and climate change mitigation. The project cost less than \$6,500 to install.



*Davis High School students and the California Leadership in Green Infrastructure in the process of installation pervious paving that flank all sides of the new rain garden space.*



*The highly visible existing courtyard space at Davis Senior High School was previously a highly compacted soil condition without any significant ground plane landscaping. During even mild rain events, this space would turn into a muddy mess and caused soil to be eroded and enter the piped storm drain system.*

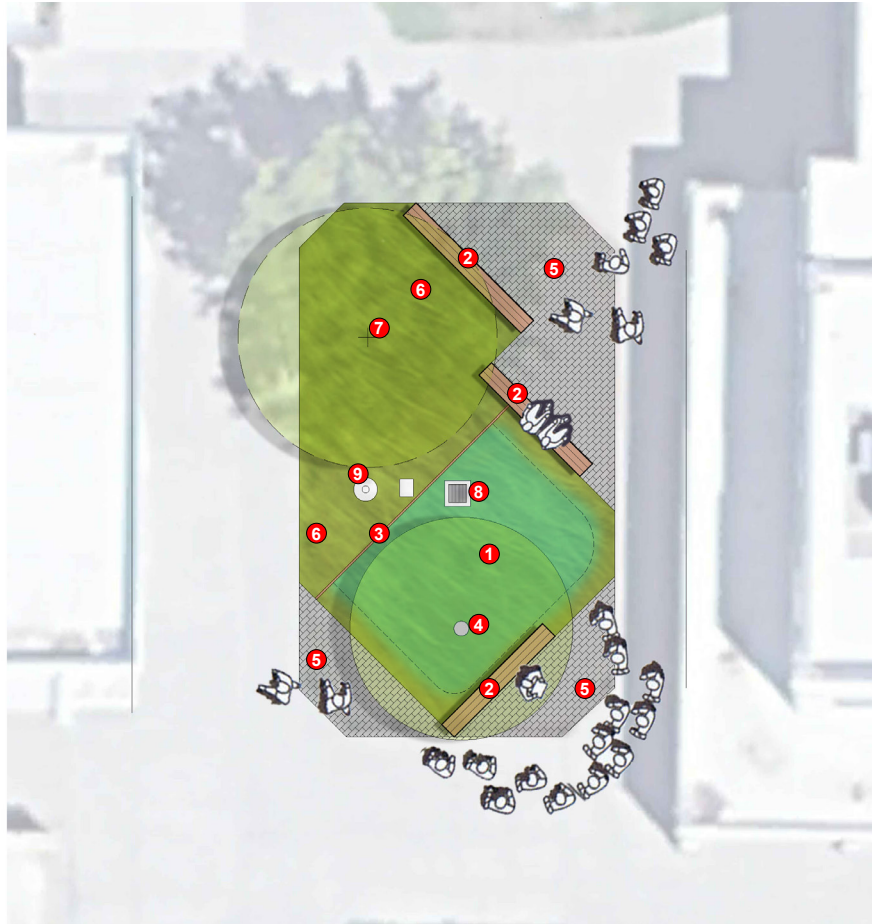


*The new rain garden courtyard space features a rain garden and pervious paving system to collect, slow, and infiltrate stormwater. A series of strategically placed seatwalls direct pedestrian traffic around the newly transformed landscape area and create a beautiful space for students, teachers, and the overall community to enjoy.*



## Davis Senior High School Rain Garden

University of California, Davis | 2019-2020



### Davis High School Rain Garden (Simple)



- 1 Recessed rain garden landscape area retains up to 4" of water
- 2 18" high wood benches
- 3 Wood or metal header vertically retains grade between existing soil and recessed rain garden elevation
- 4 New small to medium size tree
- 5 Pervious paver walkways
- 6 Drought-tolerant part shade to full sun plantings
- 7 Existing tree to remain
- 8 Existing storm inlet to remain
- 9 Existing light pole and utility box to remain



Existing site in dry conditions



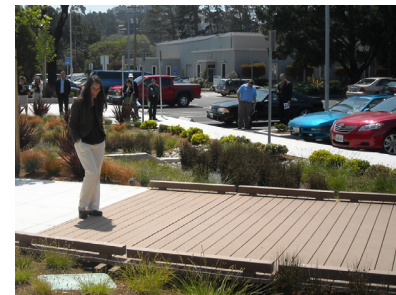
Existing site in storm event conditions



California full-sun adaptable plantings



Interpretative signage



Stormwater boardwalk overlook



Pervious paver pathway

Urban Rain | Design Inc.  
The Office of Kevin Robert Perry, FASLA

California  
**SLGI**  
STUDENT LEADERSHIP IN GREEN INFRASTRUCTURE™







## Davis Senior High School Rain Garden

University of California, Davis | 2019-2020





**Davis Senior High School Rain Garden**  
University of California, Davis | 2019-2020

**Actual Built Project**

