

## **Request for Proposal (RFP)**

LID Approach Effectiveness & Functionality Study, CEEEn-2016CPST-003

### **1. Introduction (Background Information)**

- LID Approach Effectiveness & Functionality Study, CEEEn-2016CPST-003
- Spanish Fork City provides a wide variety of services to the public from recreational facilities to essential infrastructure. Their involvement in the community is vital to the welfare and happiness of its citizens. The public works sector of Spanish Fork City is a forward-thinking team who take pride in how they serve the public. The Low Impact Development project is one example of the projects they implement.
- Low Impact Development (LID) is a term used to describe a storm drain system that takes advantage of the natural filtration systems of native soils to store and disperse storm water runoff on site instead of transporting it through pipes to some distant detention basin. This is accomplished by increasing quantity of permeable surfaces, decreasing the quantity of impermeable surfaces, and increasing the capacity of underground on-site storm water storage for gradual diffusion. Certain neighborhoods in Spanish Fork were developed using this storm drain system over the last 8 years. In theory, LID should be quite effective at its intended function. At this point in time it is necessary to run tests and analyses in order to evaluate the how effective LID actually is in these neighborhoods compared to a traditional storm drain system and if it meets the standards for storm water retention as established by the Environmental Protection Agency (EPA). This information will be obtained and provided by the Capstone group.

### **2. Project Description and Scope of Services**

- Outline: The basic concepts for constructing an LID neighborhood is to narrow the roads with increased permeable park strip width (especially at intersections), and build gutter inlets that lead to one of two underground storm water storage structures called R-tanks or Stormtech (Both of these structures the serve the same purpose in the LID design, and because of the coarse level of detail in this document, all mentions of R-tanks pertain to Stormtech as well). The runoff from a storm either infiltrates permeable surfaces of the neighborhood or travels over impermeable surfaces into R-tanks. The R-tanks store the water as it gradually seeps into the surrounding soil over time. This system should potentially eliminate all of storm water runoff coming out of these neighborhoods, which

complies with the EPA on-site minimum storm water storage requirement of 90%. However, the effectiveness of this system has yet to be proven.

- Purpose: The purpose of the project is to determine the effectiveness and functionality of LID by analyzing the storm water retention capacity against EPA standards, understanding the required level of maintenance for regular operation, and investigating improvements that could be made to the original design.
- Objective: The City of Spanish Fork is seeking a research group to perform tests that will determine the effectiveness and functionality of their most recent LID design which has been implemented in various neighborhoods.
- Description of requirements
  - Technical:
    - Estimated infiltration rate of the water from the R-tanks into the surrounding ground.
    - Infiltration rate from a percolation test on a soil sample from LID neighborhoods
    - Approximation of how much time can pass before routine maintenance is required based on silt build-up
    - Required storm water retention capacity for 5, 10, 25, 50, and 100 year storms.
    - Percentage of storm water runoff from the storms listed (5, 10, 25, 50, and 100 year storms) that can be stored on site based on current capacity of R-tanks.
  - Non-technical:
    - Explanations of improvements that could be made to LID design.
    - Report of compliance/non-compliance to the EPA standard of retaining 90% of storm water runoff on site.
    - Documentation of the social and environmental impacts of LID.
- Tasks & expectations

Each Key Milestone should be integrated into a schedule that meets the requirements for general deadlines of the project. The expectation is that the tasks listed below each milestone is completed in a timely, scheduled manner that is approved by Spanish Fork City.

- Key Milestone: Analyzing Storm Water Retention Capacity
  - Measure areas of impermeable surfaces (streets, sidewalks) and permeable surfaces (lawns, top soil, xeriscape).
  - Obtain hydrological data for the Spanish Fork City LID neighborhoods.

- Establish duration for design storms.
- Determine rainfall intensity 5, 10, 25, 50, and 100-year design storms.
- Determine runoff volume based on duration, surface areas and intensity of each design storm.
- Calculate volume of existing R-tank structures.
- Calculate storage capacity of existing R-tank structures.
- Schedule an on-site test to determine infiltration rate of R-tank structures.
- Run the on-site test to determine infiltration rate of R-tank structures.
- Collect soil sample in LID neighborhoods to run a percolation test and calculate the infiltration rate.
- Calculate the percentage of runoff that is stored in/infiltrated from the R-tank structures during each of the design storms.
- Key Milestone: Comparing Capacity to EPA standards
  - Compare the calculated percentages of runoff that is stored/infiltrated on site to the EPA standard of 90%.
- Key Milestone: Determining required level of maintenance for regular operation
  - Schedule and excavation to investigate silt build up in the pipes leading to the R-tanks.
  - Excavate and investigate the amount of silt build up in the pipes leading to the R-tanks.
  - Estimate the appropriate time intervals for routine maintenance based on silt build-up and approximations of when the silt build-up will affect the functionality of the R-tanks.
- Key Milestone: Investigating design improvements or alternative storage solutions
  - Analyze the data of the tests/analyses thoroughly and the design to generate possible improvements to any discovered shortcomings
  - Research other methods that could be potential alternative storage solutions.
- Expected Meetings & Presentations
  - Meetings will be set as required for successful completion of the project. At minimum, meetings will occur weekly and as requested by Spanish Fork City.
  - A final presentation will be given at the completion of the project. Other interim presentations that are suggested below may also take place when such form of communication seems necessary.
    - Preliminary design review at completion of initial design or plan of attack (POA)

- Critical design review when design or POA is “frozen” with no more changes
- Final review @ point of completion of POA and project tasks
- The data and resources that Spanish Fork City has provided to aid in the completion of the project and their relevancy are explained below:
  - Standard Drawings of LID Design: These drawings will help Capstone members understand what construction components are involved in LID, as well as their general sizes and dimensions. These drawings are accessed via the Spanish Fork City website and can be used to estimate volumes, identify design flaws, or understand storage processes.
  - LID Powerpoint Presentation: These slides portray the advantages, history, and functions of LID in Spanish Fork City and was sent by Chris Thompson to all Capstone members so that they could become familiarized with the forward-thinking nature of this kind of land development and why it was implemented.
  - Location of LID neighborhoods: The locations of the LID neighborhoods were provided by Chris Thompson to the Capstone members as well so they would know which areas would need to go under a hydrological analysis based on land permeability and rainfall.
- At minimum, one site visit may be required and must fulfill the following purposes.
  - Simulate a storm event to determine the effectiveness of the LID system and to calculate the infiltration rate
  - Excavate down to the pipe leading to the R-tank structure to estimate the amount of silt build-up.
  - Collect a soil sample near the R-tanks to perform a percolation test and calculate an infiltration rate.
- Statement on final product must meet or exceed project criteria described above.

### 3. Outcome and Performance Standards

- Include the following statement in the “Outcome and Performance Standards” section of the proposal:
  - *Our student team will provide the work for this Capstone project “as is”. Our results cannot be construed as work provided by licensed professionals and cannot be used as “stamped deliverables” without first being reviewed, approved and stamped by a qualified license professional engineer.*

- Note to Capstone members:
  - Student teams represent the BYU Civil & Environmental Engineering Department. As such, all Capstone students are expected to interact among their peers and customers/sponsors in a professional manner and with courtesy and respect at all times. Support for future Capstone projects can be affected by our actions
  - Team work is crucial for the success of current Capstone project as well as all future projects in the field as a professional. It is vital that each team, fosters team work, mutual respect, patience, and innovative ideas
  - Monthly status reports, written by graduate mentors, will be highly visible as they will be bundled and sent to all sponsors, Capstone committee members, faculty and potential employers who are interested in receiving Capstone status reports. Team diligence, dynamics and challenge resolutions can be a noticeable positive addition to future employers – more so than resume alone. Taking ownership of the project ensures success.
  - Do not worry about disappointing customer/sponsor as long as team members put forth their best effort. It is alright to be nervous and it is also rewarding to figure out how to tackle challenges. Important thing is to take full advantage of this opportunity to gain valuable “real world” experience. Customers understand where you are at as they have all gone through nervous experiences themselves.

**4. Deliverables**

- Deliverable specifications

<b>Type</b>	<b>Length Requirements (minimums)</b>	<b>Frequency of Delivery</b>	<b>Format</b>
Hydrological Analysis	Full Analysis of 5, 10, 25, 50, 100-year design storms with a 1-page report	Once during the duration of the project	Excel for the analysis, Word for the report
Storm water storage capacity calculations and EPA standard comparison	Required calculations/measurements with an associated paragraph of explanation	Once during the duration of the project	Excel for calculations, Word for explanation



Routine Maintenance Report	1-page report of procedures and results from excavation of pipe leading to R-tanks, and silt build-up calculations	Once during the duration of the project	Excel for calculations, Word for report
Infiltration Rate Analysis	2 page report of procedures and results from calculating infiltration rates on-site and from the percolation test	Once during the duration of the project	Excel for calculations, Word for report.

- Minimum required deliverables
    - Short monthly status reports documenting challenges, solutions & progress
      - Answers to 4 questions
        - What challenges have your team encountered in your Capstone project?
        - What actions did your team decided to do to overcome these challenges?
        - Any progress in overcoming these challenges?
        - Summarize the current status of your Capstone Project
          - Did challenges negatively impact the progress of your project?
    - A final report with design alternatives for the project that include economic and environmental considerations
      - If planned ahead and done properly, proposal and monthly status reports can provide a significant portion of the information for the final report
        - i.e. Incorporate status reports in final report as project progresses to reduce work load on final report
    - A poster reflecting a summary of your project to be presented to student, faculty and other interested individuals in the final undergraduate seminar
    - A presentation summarizing your project to be presented to your sponsor
- Before the end of winter semester both a presentation to sponsors and poster session for students, faculty and other interested people will be organized.
- All deliverables are tentatively due Monday April 10th.

**5. Contractual Terms and Conditions**

- Contract type: Non-monetary compensation with all project work on a “best effort” basis

- Term: Team members are to spend 8 hours/week/student with at least 3 hours/week working together. Class time or time spent on class assignments counts toward these hours
- Each project team consists of
  - A project manager/mentor: A graduate student who does not perform technical work on the project. He/she guides, facilitates and directs the team toward successful completion of the project by achieving customer objectives, adhering to schedule/time/cost, and promoting team unity.
  - A project team lead: An undergraduate student team member who serves as the team's spokesperson and liaison among the team, its project manager, sponsor, faculty advisor and Capstone Committee advisors
  - Two project team members/task leads who may be assigned to take lead on certain aspects of the project in addition to the project team lead. All team members, including project team lead, are to assist one another on each member's specific task assignments
    - One can take lead on analysis or data gathering, another on design/drawings, data interpretations etc.
- Customer/sponsor may require team members to sign a [non-disclosure agreement](#) that simply states the work you do belongs to the project sponsor

## 6. Payments, Incentives and Penalties

- Specify payment (grading schedule), incentives (if any), and penalties for not meeting project milestones
- Project work to be graded by graduate student mentors/project managers with potential additional inputs from sponsors, Capstone Committee members and faculty advisors
- Grading criteria
  - Team work and unity
  - Project proposal
  - Project Management Plan (PMP)
  - Monthly status report
  - Final report, poster, and presentation
  - Customer satisfaction in satisfying project objectives and required deliverables

## 7. Submittal Requirements for the Proposal

- RFP availability: Monday, October 24, 2016
- Proposal deadline: Monday, October 31, 2016 at 4:00 pm MDT
  - Three copies of proposals in accordance with guidelines & formats specified in the proposal template (to be available by Monday 10/17/2016)
- Minimum requirements for the proposal (each section must start on a new page. Details and formats will be provided in the standardize proposal template)
  - Cover page
  - Letter of submittal / introduction
  - Executive summary (one page or less)
  - Work plan
    - Proposed approach, including innovative ideas, to complete the project
    - Weekly project work schedule for individual team members
    - Weekly team work/meeting schedule
  - Section identifying necessary tools, data, equipment, etc. with brief explanations
  - Project schedule including important milestones
  - Engineering budget: Estimated hours for each phase/element of the proposed work plan
  - Outcome and Performance Standards
  - List of outside consultants (faculty, Capstone Committee member etc.) necessary for this project
  - Statement of qualifications
    - Background, experience, education and organizational structure of the team
    - Team member assignments
    - Team member collaboration plan: (How will team work together seamlessly)
  - Appendices
    - Appendix A: 1 page resume for each team member
    - Appendix B, C, etc. as necessary
- Review committee reserves the right to reject any proposal or presentation that is not submitted in a timely fashion or in accordance with instructions and requirements in this RFP

## 8. Contacts



Title	Name	Phone Number	Email
Sponsor	Chris Thompson	801-804-4556	cthompson@spanishfork.org
Graduate Mentor	John De Leon	512-576-7212	johndeleon2009@gmail.com
Capstone Member	Jingwen He	801-616-9103	jingwenhe78@gmail.com
Capstone Member	Kevin Liang	801-471-6213	kevin9kai@gmail.com
Capstone Member	Treyton Moore	801-651-9676	Treyton.M2@gmail.com

### 9. Proposal Evaluation Criteria

- Proposal will be evaluated by graduate student mentor/project manager in accordance with the following rubric, with inputs from project sponsor, Capstone Committee member and potentially faculty advisor.

<b>Timeliness</b> - 1 pt off per full hour late, up to 5.	5
<b>Grammar/Spelling</b> - 1 pt off per blatant error, up to 5.	5
<b>Cover Page</b> - Title, Data, Sponsor, Team Name, Team Members, Department of Civil & Environmental Engineering, Ira A. Fulton College of Engineering and Technology, Brigham Young University - 1 pt per piece of information included.	6
<b>Cover Letter</b> - brief letter of introduction that 1) states your intent to propose and 2) how you may be contacted.	6
<b>Executive Summary</b> 3/4 to 1 page that summarizes the contents of your proposal	12
<b>Team Abilities</b> Summary as a team of 1) relevant courses and experience, 2) abilities to complete the work on time and in a professional manner, 3) including use of specific engineering tools/software. Include résumés.	12
<b>Key Personnel</b> - 1) Identify which individuals will focus on which pieces of your potential tasks, and 2) some kind of organizational chart or visual describing how you will work together as a team.	12
<b>Project Understanding</b> - 1) Did they address specific items mentioned in the RFP? 2) Do they repeat basic background in somewhat new terms to <i>demonstrate their understanding</i> of the project? 3) Do they mention key deliverables they may need to provide? 4) Did they articulate a <i>specific</i> approach for developing design alternatives and deliverables? 6 pts max per piece.	24

<b>Formatting</b> - Does it look professional? Consistent?	6
<b>Concise vs. Wordy</b> , Meaningful vs. Fluffy, repetitive wording. 6 pts means concise, and accurate, and specific. 1 pt means often confusing, wordy, or vague.	6
<b>Clear and professional</b> flow of writing and style. 6 pts means that you would feel comfortable handing this in if it were your own; it is easy to read and understand; feels professional; 1 pt means it feels like it was cut-pasted, rushed, and done with little thought; hard to read; feels like a high school essay.	6
Total	100