

ASCE Sustainable Solutions Competition
Tiny House Challenge
2022 Rules



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Section 1: Mission

The American Society of Civil Engineers (ASCE) Sustainable Solutions Competition challenges students to develop a stronger understanding of sustainability and learn to incorporate sustainable solutions into everyday problems that engineers incur. Students are encouraged to be creative in their solutions and use all resources available.

Section 2: Problem Statement

Homelessness is a pervasive problem in our society. In the United States, there are over 580,000 homeless individuals¹, while the UN reports 1,600,000,000 globally are living in “inadequate housing conditions”² in 2020. While the problem is multifaceted, one hurdle is the ability of people to find a new job without a permanent address.

In the City of ASCE, the rate of homelessness is higher than average. The City is fully committed to addressing this issue to make life better for all residents. One tactic the City is implementing is creating a transitional housing site for families suffering from homelessness. This site would provide temporary housing (and a permanent address) to those seeking jobs and allow them to better have a chance at securing their own residence, independence, and future success.

Considering space, financial, and material requirements, the City is billing this site as a tiny house community. A tiny house is considered a dwelling with a footprint less than 400ft². Tiny homes are generally more affordable than traditional homes, they have a smaller carbon footprint, and are quicker and easier to construct. For these reasons, tiny homes have been employed to combat the homeless crisis.

The City of ASCE has posted a Request for Proposals (RFP) for a site design for a tiny-home community. This will serve as a pilot project and inform future sites in the City pending community approval and support.

Client Requests:

1. Provide general site design that incorporates Envision® standards.
2. Design to accommodate 10 – 400ft² tiny house units.
3. Dedicate a portion of the site to a common space where residents can build community and share responsibility.
4. Contain all stormwater runoff generated by the design storm within the site boundaries.
5. Provide access to public transportation or ridesharing.

The rules are intended to simulate an RFP that responds to a real-world challenge. The sustainability goals for the competition are an integral part of these rules. The purpose of this rules document is to provide students with intentionally general guidelines and encourage teams to rely heavily on their engineering judgment and creativity. Each section in these rules is intended to guide the student teams

¹ <https://www.huduser.gov/portal/sites/default/files/pdf/2020-AHAR-Part-1.pdf>

² <https://www.un.org/development/desa/dspd/2020/03/resolution-homelessness/>

in the development of their proposal submission. Student teams should read these rules thoroughly and seek clarifications as necessary.

This document is also available on the [ASCE Student Conferences, Symposia, and Competitions page](#) of the ASCE Website.

Section 3: Eligibility

Only one entry per student chapter may compete in the competition. A student chapter may compete in only one ASCE Student Symposium. The teams shall consist of undergraduate students enrolled during all or part of the current competition academic year. Graduate students may serve as advisors. Each team must have at least one captain. Students must be members of an ASCE Student Chapter in good standing and be Society Student Members of ASCE. Conference assignments and student symposium host chapters are listed [here](#).

ASCE Student Chapters hosting symposia may invite Official Guest teams, which are teams from colleges or universities that have an official ASCE Student Chapter that is not assigned to any Student Conference. Official Guest teams are eligible (if they meet the other requirements, including eligibility standards to advance to Society-wide finals) to be invited to the Society-wide competition. Official Guest teams may compete in only one student symposia per year. ASCE Student Services shall be notified by the ASCE Student Symposium host school of an Official Guest team prior to the start of the student symposium. Notification can be by e-mail to student@asce.org.

3.1 Levels of Competition

There are two levels of competition: ASCE Student Symposia and a Society-wide Finals. The Society-wide Finals will be conducted at a common location in conjunction with other Society-wide Final student competitions. Winning teams from the student symposia may be invited to a Society-wide Finals event. To advance to Society-wide competition, teams must meet [ASCE eligibility standards](#).

The student symposium host student chapter shall promptly submit the completed official scoring spreadsheet for the conference competition to student@asce.org. Teams will not be invited to the Society-wide Finals event until this spreadsheet is received and eligibility is confirmed.

3.2 Wildcard Selection

In addition to the 1st place team from each symposium, additional teams may be eligible for a wildcard invitation to participate in the Society-wide Finals.

3.3 Awards and Recognition

The winners of the Society-wide Finals Sustainable Solutions Competition shall be determined by compiling a team's total number of points. ASCE shall award \$3,000 in cash prizes to the Society-wide Finals winning teams' ASCE Student Chapter.

Total prizes shall be distributed as follows:

- 1st place overall winner: \$1,500 and trophy
- 2nd place overall winner: \$1,000 and trophy
- 3rd place overall winner: \$500 and trophy

Section 4: Ethics

This competition is to be conducted with the highest regard for ethical responsibility per [ASCE's Code of Ethics](#). All members of ASCE, regardless of their membership grade or job description, commit to all the ethical responsibilities in this Code. All ASCE members should make themselves familiar with ASCE's Code of Ethics.

Section 5: Safety

Safety is the highest priority and risk of personal injury will not be tolerated. Judges and student symposium hosts are empowered to prohibit any activity which is deemed to be hazardous.

All participants are responsible for complying with all campus protocols and procedures including but not limited to COVID-19 guidelines related to in-person meetings, masking, social distancing, etc., at all times in connection with planning, preparation, or participation in the competition.

Given the continually changing environment surrounding COVID-19, virtual competition provisions are provided in the rules and may be activated in coordination with ASCE.

Section 6: Judging

The student symposium host shall recruit judges. Three to five judges are recommended. The judging panel shall include educators and professionals and have at least one member experienced in site design and well-versed in sustainability. Local support for the Sustainable Solutions Competition is an essential element for the ongoing development of the contest and the development of an innovative community.

Student symposium hosts shall provide access to the online submissions through ASCE's Cerberus file transfer protocol (ftp) server for judges at least three weeks prior to the competition. Judges will be expected to conduct an initial review of the submitted content and be prepared to complete all scoring within the time provided during the contest. Judges have authority over conduct of the competition as well as interpretation of the rules. The student symposium host will ensure all judges are fully informed of the rules and procedures and are fully equipped to complete their tasks. Judges should consider the innovative nature and completeness of the presentation of the ideas.

Judges will provide teams with a deduction sheet (Appendix A) at the conclusion of their interview. Teams may appeal judge decisions by submitting Appendix B to the judges. The appeal must be provided to the judges by the deadline determined by the symposium host at the competition. The head judge has final say over deductions and appeals.

Section 7: Requests for Information

Requests for information (RFI) should be sent to student@asce.org with the subject line “SSC RFI”. Clarifications will be posted on the [Sustainable Solutions Competition Collaborate Site](#) every other Friday starting October 8, 2021 until February 11, 2022. Each post will address the questions received from the previous two weeks through the Wednesday before 11:59 PM Eastern Time.

Section 8: Site Constraints

The 1.07 acre site plan view (Appendix C) is the starting point for the site design proposal. Existing site conditions are given in Appendix D. The site must include:

- 10 tiny house units each with a 400ft² footprint
- Community activity area(s), with a combined footprint of at least 10% of the total site area
- A stormwater management strategy that retains all runoff on the site
- Access from tiny homes to community activity area(s)
- Access to public transportation or ridesharing area(s)

The parameters provided are intended to be general and provide students with a starting point for their design. Students are expected to use their engineering judgment to make reasonable assumptions for any additional parameters. Additional site parameters will not be provided by the Rules Committee and should not be requested via RFIs. Students have the latitude and are highly encouraged to make informed, reasonable assumptions in the development of their designs.

Section 9: Competition Components

The competition is divided into three major components and scoring of each are:

- Sustainability (40%)
- Design Proposal (35%)
- Interview (25%)

Descriptions of each component and what judges will score for each are in the following sections.

Section 10: Sustainability

10.1 Envision Checklist

Teams will download and use the Envision Checklist Excel file (Appendix E) to guide them in the development of the site design. The Envision categories break major themes of sustainable design into action items.

Each team will complete the Envision Checklist based on their proposed site design. For each credit, teams will answer yes or no questions about their proposal to determine the point value awarded. It is not reasonable to assume that a single project would be awarded points for every credit in the Checklist. Some Envision credits may not apply to the proposal. Teams should be more concerned

with the clear application of credits in their proposal than the inclusions of every credit in the Checklist. Teams are encouraged to strive for as many credits as they can appropriately justify in their proposal. The minimum point requirement teams must meet for each category of the Checklist is provided below:

Category	Minimum Point Value
Quality of Life	54
Leadership	91
Resource Allocation	57
Natural World	73
Climate and Resilience	43

10.2 Envision Documentation

As part of the Technical Design Proposal (Section 11), teams are asked to document the Envision credits they submitted in the Envision Checklist. Teams will explain how each of the credits applies or is evident in their design. Teams should clearly and specifically describe how they would fulfill these requirements if the project were approved and constructed. The feasibility and rationale of this justification will be the basis for the team’s Sustainability score in the competition. Judges will review each description to verify that the proposed design does fit the selected criterion and award points accordingly. Teams who exceed minimum point requirements and incorporate innovative solutions will receive higher scores in the Sustainability component of the competition.

Section headings for Envision justification in the Technical Design Proposal should include the criteria designation and criteria name followed by a detailed discussion of how the team feels the identified credit values is credible. An example justification is provided below:

LD1.3 – Provide for Stakeholder Involvement

Explanation of how credit applies and answers questions from checklist.

A 10 point deduction will occur if Envision justifications do not follow format requirements.

Section 11: Design Proposal

11.1 Public Outreach Poster

Teams must create a 24 in. x 36 in. poster intended to inform the public of the different aspects of the proposed design. The poster should be used to help the residents of the City of ASCE to understand the benefits of the housing project to the community.

The poster must be printed and will be displayed at the competition location. A plan view of the entire site should be featured prominently. On the poster, vignettes of important aspects of the site should include but are not limited to:

- Plan view of the entire site
- Team organization chart
- Source of inspiration for the overall design
- Sustainable aspects of the design
- Representative elevation view of one tiny house unit
- Stormwater management strategy
- Community activity area(s)
- Public transportation or ridesharing area(s)

Posters will be scored on inclusion of the items in this section, clarity of information, overall aesthetics, and Fan Favorite (see Section 11.1.A). The poster must be printed and will be displayed at the competition location.

A 10 point deduction will occur if the poster does not follow format requirements.

11.1.A Fan Favorite

Symposium attendees will vote on each poster to determine the “Fan Favorite” and votes will be factored into final scores. Voting ballots are in Appendix F and must be printed and provided by the student symposium host. All registered student symposium attendees may participate in the voting. However, judges may not participate in the voting. Voters may not vote for their own school’s team. The votes will be collected by the student symposium host and tallied by the judges to incorporate into the final score.

Virtual Scenario: Poster will be presented remotely according to student symposium host guidelines. If symposium is virtual, the following section “Fan Favorite”, will be removed from the event and final scoring.

11.2 Technical Design Proposal

A technical summary must be submitted by each team. This technical summary must include the following:

- Executive Summary (1 page maximum)
- Design Calculations (5 page maximum)
- Cost Estimate (2 page maximum)
- Envision Criteria Justifications (8 page maximum)

Technical Design Proposal must be written in English using at least 11-point font. Margins must be at least 0.50 in. on all sides. Submissions must have a cover page that includes the team’s school name, team member names, and member grade levels. This document must be submitted as a PDF at least three weeks before the competition. Deadlines are determined and distributed by the student

symposium host. The Technical Design Proposal will be scored on the inclusion of all items in this section, thoroughness of design considerations, formatting, and justification of design decisions.

A 10 point deduction will occur if submissions do not follow the formatting requirements provided in this section.

A 5 point deduction will occur for each day that submissions are received past the deadline.

11.2.A Executive Summary

The executive summary should include the overall design process and choices made to determine the final design. This document should include methodologies and analyses used during the project while highlighting innovative elements.

11.2.B Design Calculations

Following the Executive Summary, teams must include all the design calculations used to complete the project. These must be clearly labeled and may be represented as typed or hand-written legibly and scanned. The selected stormwater management strategy and corresponding calculations should be clearly presented.

11.2.C Cost Estimate

Teams will calculate a total construction cost estimate for the proposed design. Unit prices should be investigated and based on general standards and guidelines local to each team. A reference for each line-item cost is required. RSMeans may be used as a reference to develop cost estimates.

Teams must include a PDF version of Appendix G, Cost Estimate Template, with the submission of the Technical Summary. Teams are encouraged to seek out guidance from their local practitioners to determine the appropriate sources of cost information in the region. Teams are not expected to design the interior and exterior of the tiny homes, but a referenced unit cost for each tiny home must be incorporated.

Cost estimates must be in US dollars (\$) and will be scored on completeness and thoroughness of reference research.

11.2.D Envision Criteria Justifications

Requirements for this section are in Section 10. This section of the competition is scored in the Sustainability category but will be submitted as a portion of the Technical Design Proposal and must follow all formatting requirements provided.

Section 12: Interview

12.1 Presentation

A presentation not to exceed seven minutes shall be required for each participating team. All presentations shall be conducted in a professional manner (defined as a presentation that a professional engineer would give to a prospective client or community group). Oral presentations shall be in English. The presentation order of the teams shall be randomly selected before the competition begins and shall be provided no later than the beginning of the symposium. Immediately following the presentation, judges will be given five minutes to ask questions to the presentation team. Teams can have a minimum of three and a maximum of five presenters. All presenters must speak during the presentation or interview. Teams will be scored on presentation skills, quality and integration of the 3D site walkthrough, and responses to judges' questions.

A 5 point deduction will occur for each of the following:

- Presentation is longer than 7 minutes and 5 seconds
- Presentation teams has fewer than three or more than five members
- Presentation team includes members who do not speak during the presentation or interview

12.2 3D Site Walkthrough

As part of the presentation, teams are required to include a video showing a walkthrough generated from a 3D model of their site. Videos can be up to two minutes in length. At a minimum, videos should include:

- A bird's eye view of the entire site
- A first person view from at least 4 different locations of interest on the site, including a tiny house unit

Models must be created using a version of Trimble SketchUp: 3D Modeling Software. Free versions of this software are available online.

Virtual Scenario: Interview will be presented remotely according to student symposium host guidelines.

Section 13: Submittals

Prior to the competition, teams will submit the following materials via a unique link to ASCE's Cerberus ftp server per instructions provided by the student symposium host:

- Technical Design Proposal (PDF)
- Envision Checklist Documentation (Excel Spreadsheet)
- Public Outreach Poster (PDF)

During the competition, teams will present to judges:

- Public Outreach Poster
- Interview Presentation (Including 3D Site Walkthrough)

Section 14: Student Symposium Host Information

The student symposium host will facilitate submissions and communication with judges prior to the competition date. The symposium host will coordinate with ASCE to provide access to ASCE's Cerberus ftp server for all submissions. The student symposium host will be required to secure a space for the poster and presentation events.

Appendix A: Deductions

Instructions: Judges, check box for deductions that apply.

School Name: _____

Section 10: Sustainability

Envision justifications do not follow format requirements. (10 points)

Section 11: Design Proposal

Public Outreach Poster does not follow format requirements. (10 points)

Technical Design Proposal submission does not follow the formatting requirements. (10 points)

Submission received past deadline. (5 points per day)
_____ Days _____ Points

Section 12: Interview

Presentation is longer than 7 minutes and 5 seconds. (5 points)

Presentation teams has fewer than three or more than five members. (5 points)

Presentation team includes members who do not speak during the presentation/interview. (5 points)

Head Judge Signature

Team Captain Signature

Appendix B: Appeals

Request for Clarifications and Appeals

Instructions: Please provide completed form to head judge. Requests will not be considered once the competition has ended and a winner has been awarded. Appeals must only involve your own team.

School Name:

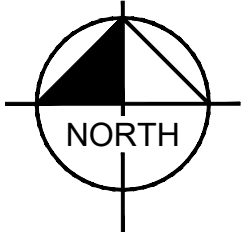
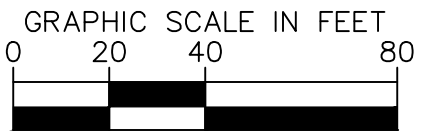
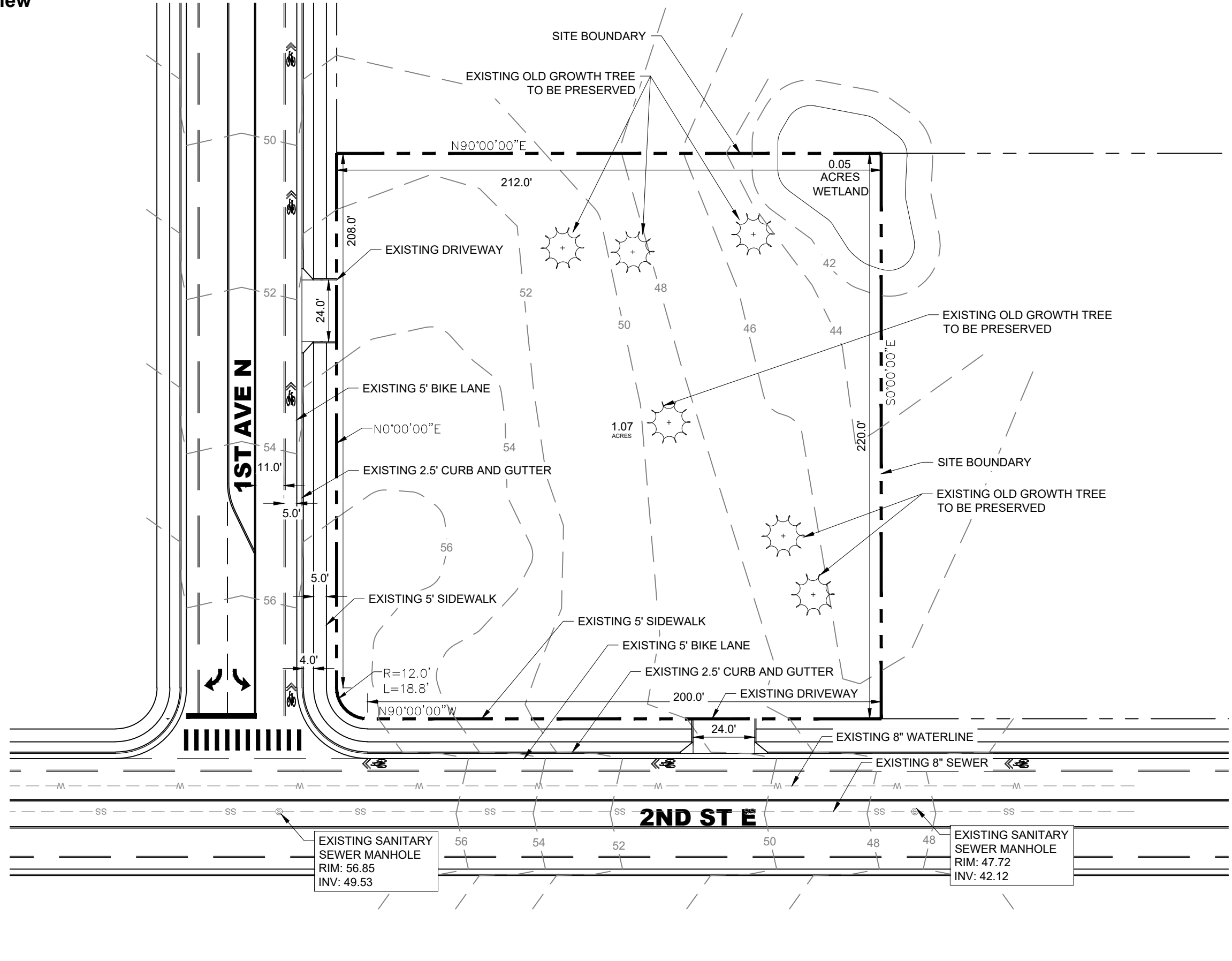
Team Captain(s):

Contact Information:

Briefly describe nature of clarification or appeal:

Head Judge Response:

Head Judge Signature



Appendix D: Existing Conditions Report

The site (approximately 1 acre) is located at the northeast corner of two collector roads and is overgrown with grass and brush. The existing low point of the site is the wetland located at the northeast corner. The general slope of the site from southwest to northeast at 3%. No grading (or other land development activity) is permitted within 30 ft of the wetland boundary. There are 6 mature trees on the site that may not be disturbed. No grading (or other land development activity) is permitted within 20 ft of the center of each tree. Paths, sidewalks, or other structures may not be built within 10 ft of the center of each tree. An environmental impact study showed that there are no protected species present. The City of ASCE does not require any sort of permitting for this project.

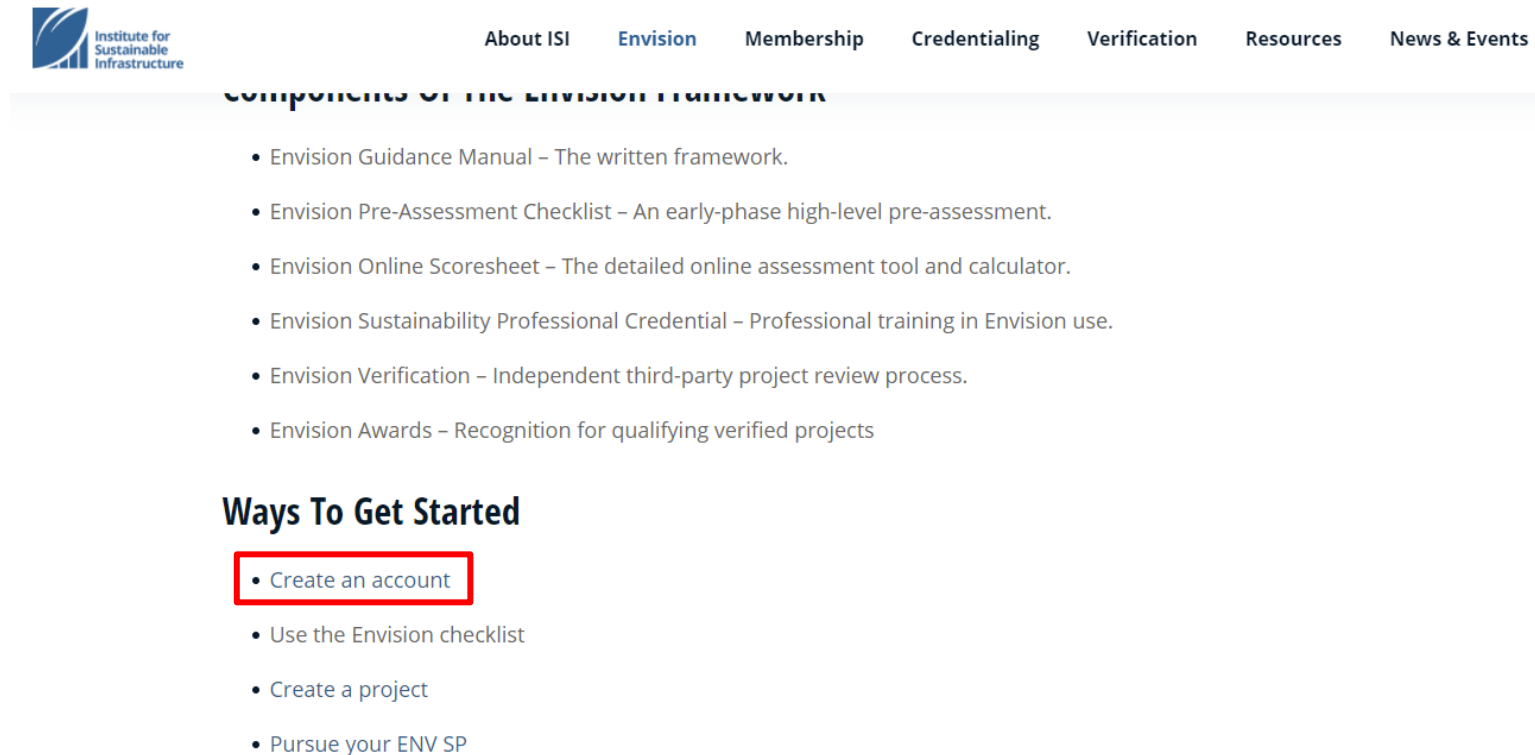
Geotechnical reports show that the site consists of well-draining soil (i.e. USDA Group A soil). The site is considered a closed basin, and the regional standard design storm is a 24-hour 2 in. rainfall event with a rainfall intensity of 0.50 in./hour. The seasonal-high groundwater table is at elevation 40. Any site modifications must be at least 2 ft above the seasonal-high groundwater table.

The City of ASCE has specified the following requirements for the proposed site design:

1. Provide general site design that incorporates Envision® standards.
2. Design to accommodate 10 – 400ft² tiny house units.
3. Dedicate a portion of the site to a common space where residents can build community and share responsibility.
4. Contain all stormwater runoff generated by the design storm within the site boundaries.
5. Provide access to public transportation or ridesharing.

Appendix E: Envision Checklist Download

Information about Envision and the Checklist can be found here: <https://sustainableinfrastructure.org/envision/use-envision/>
To download the Checklist, click “*Create an account*” at the bottom, below “*Ways To Get Started*”.



The screenshot shows the website header with the Institute for Sustainable Infrastructure logo and navigation links: About ISI, Envision, Membership, Credentialing, Verification, Resources, and News & Events. Below the header is a section titled "Components of the Envision Framework" with a list of six items:

- Envision Guidance Manual – The written framework.
- Envision Pre-Assessment Checklist – An early-phase high-level pre-assessment.
- Envision Online Scoresheet – The detailed online assessment tool and calculator.
- Envision Sustainability Professional Credential – Professional training in Envision use.
- Envision Verification – Independent third-party project review process.
- Envision Awards – Recognition for qualifying verified projects

Below this is a section titled "Ways To Get Started" with a list of three items:

- Create an account
- Use the Envision checklist
- Create a project
- Pursue your ENV SP

Follow this tutorial to create a free account:

https://sustainableinfrastructure.org/wp-content/uploads/2019/12/Web-Tutorial_Create-a-New-ISI-Account.pdf

Once logged in, your Dashboard will have several Envision links under the “Resources Tab”. Click the arrow to download. The checklist to be used for the Sustainable Solutions Competition is “Envision Checklist (v3)”. The “Envision Guidance Manual” provides helpful information on how to incorporate Envision into each project from beginning to end.

Your Dashboard

The dashboard is titled "Your Dashboard" and features a "New Project" button in the top right corner. On the left, there is a profile section with a blue circular placeholder for a profile picture, the text "PROFILE NAME", and an "Edit profile" button. Below this, the "ENV SP STATUS" is shown as "NON-ENV SP" with a sub-header "Complete the Envision Training course to earn your credential" and a "View Details" link. The "MEMBERSHIP" section shows "NON-MEMBER" and the text "You are not connected to an organization." At the bottom left of the profile area is a "Terms and Conditions" link.

The main content area is divided into several sections:

- Available Credits:** Shows "ENV SP TRAINING CREDIT" with a value of "0" and a help icon.
- Expand your Account:** Includes a link icon and text: "Select an option below to either connect to an existing member organization or to become a new member organization. To learn more about what type of membership your organization qualifies for, review our membership page." Below are "Connect Organization" and "Become a member" buttons.
- Become an ENV SP:** Includes a graduation cap icon and text: "Take the Envision Sustainability Professional (ENV SP) training course and earn your ENV SP credential." Below is a "Become an ENV SP" button.
- Resources:** A list of downloadable files with expandable/collapsible arrows:
 - ENVISION
 - Envision Guidance Manual (v2) 17.67 MB
 - Envision Guidance Manual (v3) 24.54 MB
 - Manuel de référence Envision v3 9.34 MB
 - Envision Checklist (v2) 0.65 MB
 - Envision Checklist (v3) 0.41 MB** (highlighted with a red box)
 - VERIFICATION RESOURCES
 - PRESENTATIONS AND BROCHURES
 - MEMBERSHIP RESOURCES

Appendix F: Poster Voting Ballots

Notes to the Student Symposium Host:

Print enough ballots for attendees to vote. Encourage attendees to participate in the poster display event and voting for “Fan Favorite”. Ballots may be updated as needed if they include the required information.

Sustainable Solutions Competition Fan Favorite Poster Ballot

Name of Registered Participant: _____

Participant’s School: _____

Fan Favorite *Not your own school* _____

Appendix G: Cost Estimate Table Template

No.	Line Item	Quantity	Unit	Cost/Unit	Total	Source
1						
2						
...						
				Total Cost		