



SKANSKA

ASC Student Competition

Sparks, NV

February 6-7, 2025

Open Competition

Sustainable Building

Welcome to the 2025 ASC Open Competition Sustainable Building Problem Statement

We are excited that you've chosen to compete in this problem category. Skanska continues to be an industry leader in sustainable construction. We strive to create projects that have minimal impact on the environment throughout their construction and lifecycle. Sustainable construction continues to expand and encompasses a wide reach of topics including reducing waste, resiliency, carbon neutral practices, and occupant well-being. In participating in this problem statement, we hope that you will gain a better understanding and appreciation of the green building methods that the construction industry can employ in our day-to-day operations. More than that, we hope that you will look to implement these ideas into your careers and daily lives outside the workplace.

Like last year, we've organized the problem statement into three major categories – People, Planet, and Profit. We hope you enjoy this problem statement we have assembled for you.



Sustainable Building Problem Statement Schedule

Thursday, February 06, 2025

6:30am	Introduction in Southern Pacific EF, and Issue RFP via Procore
11:00am	Breakout Session in Southern Pacific EF
1:00pm	Early Deliverable due via Procore
5:00pm	RFI Deadline for Proposals
9:00pm	Proposals due via Procore
9:00pm	Oral Presentation Order Assignment in Southern Pacific EF
9:30pm	Issue Oral Presentation Notice via Procore
11:00pm	RFI Deadline for Oral Presentations

Friday, February 07, 2025

6:00am	Presentation materials due via Procore
7:00am	Presentations start in Southern Pacific EF
5:00pm	Presentations End
6:00pm	Problem Statement Recap in Southern Pacific EF
7:00pm	Skanska Hospitality Event in Southern Pacific EF

Saturday, February 08, 2025

9:00am	Skanska Career Fair
12:15pm	Awards Ceremony

ASC Competition Rules

- Student teams must comply with ASC Competition Rules (revised for 2025). These are linked in Procore for reference and can also be found at: <https://asc67.org/rules.html>
- Once the kick-off meeting concludes, and until a team's oral presentation is completed, only the students identified as being team members shall be present in the team's room(s) or shall collaborate on the team's response to the problem statement. No additional person(s) may perform as a helper, runner, or assistant for any team for either the regional or open competitions. Teams will be disqualified if any team has more than 6 members participating in the process of creating a competition solution in any way. This includes food and supply runs! The use of cell phones to contact outside persons is not permitted except in an emergency or as deemed appropriate by the problem sponsor. Faculty advisor(s) may not interact with their teams once the competition has begun.
- Use of the internet is allowable and may be necessary for certain components of the problem.
- Use of AI is permitted in preparation of written deliverables; however, bidders must indicate on a section-by-section basis where AI was used.
- No phone calls or emails may be made to the Owner, Construction Manager, Architect, Civil, or Structural Engineer, or any other design consultants listed on the Drawings.
- A one-half (1/2) point deduction will be taken for each minute that the solution statement is turned in past the time that it is due. **Solution statements are due Thursday at 9:00pm PST via Submittals in Procore.** If internet issues arise, solutions can be submitted on a USB drive in the Southern Pacific EF room. The 9:00 pm deadline and point penalties listed above apply to USB submission as well. Other deliverable items, if applicable, will be due as specified.
- The Oral Presentation will be released by 9:30pm Thursday night. Presentation times will be determined Thursday evening. Presentation materials must be uploaded to Procore by 6:00am Friday morning. Skanska will provide the computer with all presentation materials for each team. No additional materials are allowed to be distributed or presented. Any additional equipment required for a presentation will be the responsibility of each team.
- Only registered participants accepted by ASC are allowed in a school's presentation room per ASC 2025 rules. Violation of this rule shall be cause for immediate disqualification from the competition.
- While the judges will endeavor to administer the problem with all fairness and appreciation for the team's perspectives, the decisions of the judges shall be final when deciding conflicts and scoring.

Request for Proposal Guidelines

Requests for Information:

RFIs will be asked and answered using the RFI tool in Procore. All RFIs submitted and answered will be viewable by the Skanska project team and all students participating in the sustainability competition.

Supplemental Information:

Some of the problems have additional supplemental information, reference materials, drawings, etc. They can be found in the Documents tool on Procore.

Supplemental Problems:

Supplemental Problems may be provided during the problem statement competition.

Supplemental Problems may be additional information about a changing condition that needs to be incorporated into a team's final solution statement. A Supplemental Problem may also be requiring a response and/or solution to accompany the solution statement or may have an earlier deadline during the day. Student teams will need to make note of the conditions and requirements set forth in the individual supplemental problems issued and provide an appropriate response. Note: Supplemental Problems are not 'extra credit' and are accounted for in the total possible points related to their respective category.

Solution Submission Guidelines:

Solutions will be submitted as a submittal via Procore. Each team must create their own submittal via the instructions provided in the Documents section of Procore. All electronic submissions must be in the form of a PDF or other electronic format as stipulated in the problem statement. Other formats may be accepted on a case-by-case basis. Requests for an alternate format should be made before the RFI deadline.

Format of Submission:

In addition to the requirements for electronic submission noted above, the following proposal formats must be adhered to:

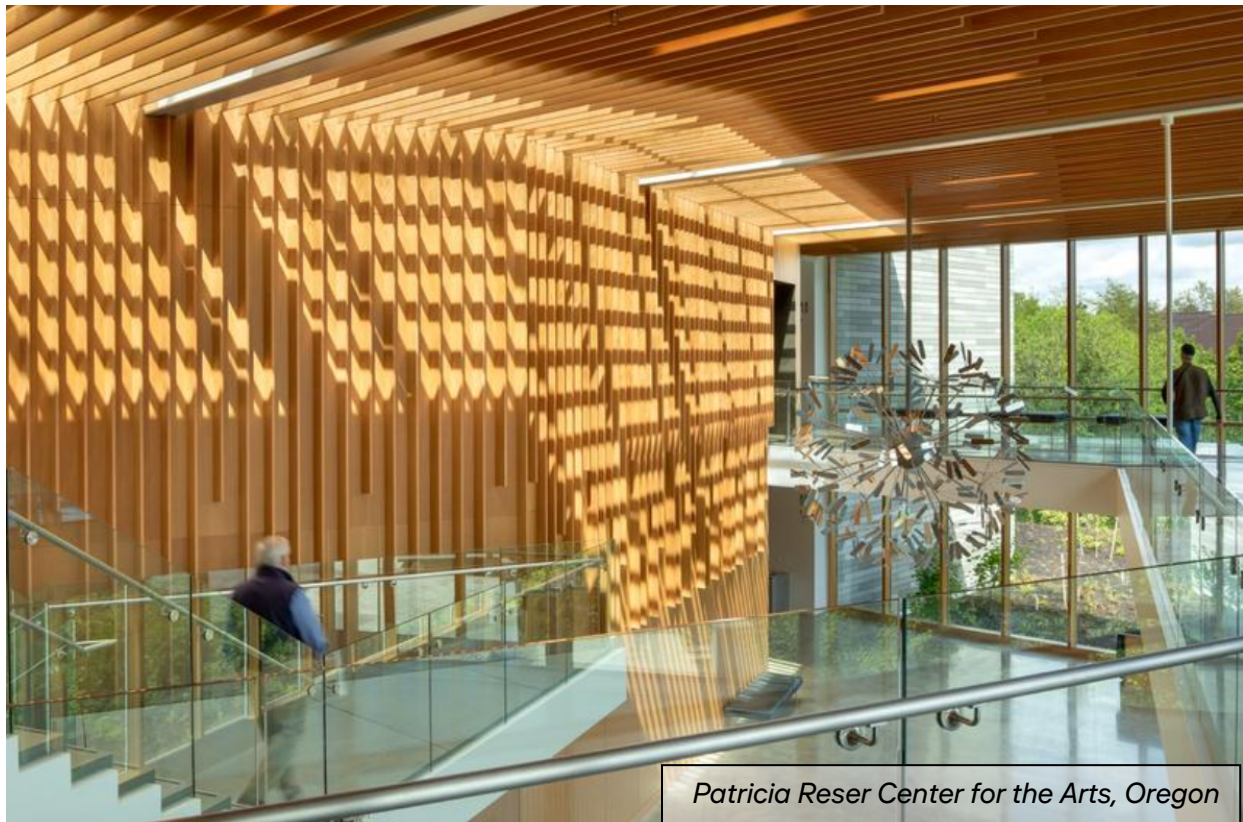
1. 11-point Arial font
2. 1-1/4" border around all documents, left justified
3. Maximum submission of 25 pages, including cover page, cover letter, schedules, or other documentation necessary to support your submission. All pages submitted will count unless specifically excluded in the written problem statement.

A two (2) point deduction from the overall team score will be assessed for each page over the page limit described above.

Scoring

Point Scales will be assigned to several elements of the written and oral problem statements. Awards will be provided to the three teams scoring the most overall points; 1st place, 2nd place, and 3rd place. Additionally, the judges may award a Judge's Selection award to a fourth team at their discretion.

Category	Points Possible
Prequalification Statement	5
Planet	33
People	33
Profit	34
Oral Presentation	20
Maximum Points Possible	125



Patricia Reser Center for the Arts, Oregon

Project Information

This year's problem statement focuses on two Skanska projects. More information about the Center for the Deaf and Hard of Hearing Youth (CDHY) is provided below:

Center for the Deaf and Hard of Hearing Youth (CDHY)

Located in Vancouver, WA, The Center for the Deaf and Hard of Hearing Youth (CDHY) is 2-story 53,000SF new build that consists of a new academic and physical education building connected by a canopy. With Skanska serving as the design-builder, the project scope includes a gymnasium, library, art lab, biology lab, and support spaces for the deaf community.



Project Information

This year's problem statement focuses on two Skanska projects. More information about 6th Street Bridge is provided below:

6th Street Bridge

A joint venture by Skanska-Stacy and Witbeck, The Sixth Street Viaduct is the largest bridge project in the history of Los Angeles, at \$588-million. This project reached Envision Platinum and addresses community needs, adding significant public space and amenities, and improves community safety and resiliency. This project includes widened sidewalks on each side, bike lanes, a 3.5 level east ramp, five sets of stairs, and ten pairs of arches that support the bridge deck with a network hanger system.



Profit Portion

Profit Question 1 – Billable Timesheet

The Sustainability Team appreciates your participation in addressing this problem. Our first focus is on an often-overlooked aspect of efficiency—time. Effective time management can significantly contribute to a more efficient and sustainable job site. We encourage you and your team to keep this in mind throughout today's task.

To begin, please navigate to the project Procore → Documents → "Timesheet" and download the file. The questions below will guide you through today's task related to this document.

- 1) Please list all project team members and assign a position to each member of the team in the box to the right.
 - a) Must have at least (1) Project Manager and (1) Superintendent
- 2) Utilize Time Sheet pages below for each team member throughout the day. Please make sure to make time breakdowns as accurate as possible (round to nearest quarter hour or 15 minutes). You are also responsible for filling out the header of each timesheet and applying the appropriate rates from the tables on the right.
- 3) At the end of the day, compile team hours and put together on "Owner Bill" sheet. Print PDF and include in final PDF submission. Please also submit your final completed excel document to the "Submittals" tab on the project in Procore. Please ensure document is titled "School_ Team Name".

Profit Question 2 – 6th Street Bridge Renovation

- 1) The 6th Street Bridge, like many areas in Los Angeles, plays a significant role in the city's culture and community, serving as a hub for music, art, parades, and film. The bridge, which cost approximately \$588 million to construct, has faced criticism from community leaders who feel it lacks representation of the local culture, describing it as merely "a large slab of plain asphalt and concrete."
 - a) Propose a brief and concise renovation plan to enhance the existing structure and improve its facade to better reflect the community's identity.
 - b) Please provide a short proposal, keeping in mind the potential costs of the project, and include a rationale for your cost estimates.
 - c) Additionally, city leaders have suggested implementing a \$4.50 toll for vehicles crossing the bridge to fund the renovation. With an estimated 74,000 vehicles using the bridge daily, calculate how long it would take to fund your proposed project. Is this funding model feasible?
- 2) The 6th Street Bridge was featured in many music videos (mainly the original 1932 bridge, but also now the '22 version) as a team decide what the best song filmed on the bridge was and why?

Profit Question 3 – Company Vehicles

You just got promoted to Superintendent at Skanska! As a perk of this new promotion, the company is providing you with a company-branded truck to be used for work-related purposes, including commuting to and from work. You are given the option to choose between a gas-powered truck or an electric truck. The gas-powered option is a Ford F-150 and the electric version is a Ford Lightning. The table below summarizes the price and average MPG/MPGe for each of these trucks.

	2025 Price	MPG/MPGe (average)	Gas (\$)	Electricity (\$/kWh)	Time to full (min)
Ford F-150 XLT	\$45,595	23	3.24	N/A	5
Ford Lightning XLT	\$62,995	68.5	N/A	0.45	540

Your jobsite is 27 miles from home, mostly freeway driving. Skanska is also going to provide you with a gas card for your new truck. This card allows you to purchase gasoline or electricity to fill up your tank on the company's dime.

- 1) With the data provided above, determine which vehicle would provide the quickest ROI for the company, and how long that would take. Provide a list of at least (3) additional factors that would affect the overall cost/ROI of the vehicle.
- 2) The average cost to manufacture an F-150 is around \$30,000. The Lightning costs about \$50,000 to manufacture. The components that make up an electric vehicle have a higher upfront cost than that of a gas vehicle; however, electric vehicles have a lower maintenance cost. Consider the cost to build and maintain each vehicle, including the necessary components that go into each. How does the lithium battery of the electric vehicle contribute to the overall sustainability compared to the internal combustion engine of the gas vehicle? Consider the cost, functionality, and sustainability efforts needed to maintain each type of vehicle. Determine which truck you would recommend the company purchase.
- 3) Propose a different vehicle model/type. Note Skanska contracts with Ford, so the option must be from Ford's line of vehicles. Explain why and include cost values.

Profit Question 4 – Wind Delays

Your schedule accounts for a week (working days) of weather days wherein work is delayed, reduced, modified, or cancelled because of forces you can't control. So far in the project, you've had to use (3) of these days to shut down the jobsite due to snow and ice. The weather forecast

predicts strong winds in the morning for the next (4) days. The schedule shows this week's activities to include the most critical crane picks of the project, and this activity is on the critical path.

In hopes of working around this, your superintendent works with the crane operator and steel subcontractor to adjust the working hours for this week to perform the work later in the day. The team agrees that it would be best in the interest of the schedule, and the crane hours adjust to start at 10am and work until 7pm.

Day one of this plan worked great – the wind stopped by 9am and work commenced as planned at 10am. On day two, the crew was prepared to boom up the crane at 10am as planned, but the wind hindered the operation and didn't die down until noon. Days three and four experienced a good morning with the crane and crews beginning at 10am, but the wind picked back up at 2pm and did not allow for any further crane activity or elevated exterior work.

A week later, you get a change order from your steel subcontractor stating inefficiency in their work. The schedule also pushes as a result of the wind event.

- 1) **EARLY DELIVERABLE (submit by 1pm):** Determine if this is a valid cost from the steel subcontractor. Also come up with a plan to make up the lost days so that the end date of the project doesn't push.

Profit Question 5 – CDHY Restrooms

The deaf and hard of hearing community has been advocating for their new building and managed to receive a grant to incorporate educational and life skills. They've requested these funds be put toward a culinary lab. It's been decided that the new lab will be put in place of the restrooms across from the gym (reference the revised floor plan in the drawings). While this design change is accepted, you're being told that the restrooms still need to remain part of the design to meet accessibility and capacity limits.

- 1) Propose a new location for these restrooms. Determine if the currently designed restroom layout or a separated layout would be most cost effective for the project from a sustainability point of view (consider cost of use, maintenance costs, material costs, etc.).
- 2) Design the type of restroom you decided is best in your proposed location. Ensure you meet ADA requirements.

Profit Question 6 – Owner Request – Addition of a Photovoltaic System

The Center for Deaf and Hard of Hearing Youth Academic and Physical Education Building is a 50,000-square-foot facility located in Washington state. The building is designed with modern features that emphasize sustainability and energy efficiency. As part of the project, you have been tasked with determining the photovoltaic (PV) system requirements to offset the building's annual energy consumption.

The owner has presented an opportunity to incorporate a photovoltaic (solar panel) system into the scope of work mid-construction (structure is up, roofing almost complete, site work ongoing/hardscape started). This addition aligns with their sustainability goals and is supported by a state grant of \$800,000, which will be issued as a change order.

The owner has also outlined specific expectations and conditions:

- 1) Energy Contribution Target: The solar array must meet or exceed 10% of the building's yearly electrical energy consumption.
- 2) Financial Structure:
 - The grant amount will be supplemented by 50/50 sharing of buyout savings, with the owner's share added back to contractor's contingency.
 - Any unused contingency at the project's conclusion will be fully returned to the owner.
- 3) Maintenance Requirements:
 - A 5-year maintenance and servicing agreement for the solar array must be included.
 - An extended roofing warranty against water intrusion is required if roof-mounted panels are selected.

Task for Competitors:

- 1) Bid Evaluation:
 - Review the provided proposals from potential subcontractors/vendors and select the most appropriate bid based on quality, cost, and alignment with project requirements.
See Following Page for PV Bids Received

- 2) Solar Array Optimization:

Using the provided energy model and data from the selected bid, determine the optimal solar array size (panel count) to:

- Meet or exceed the 10% energy contribution target
- Calculate the total system size (kW) needed to offset the building's annual energy consumption
- Estimate monthly energy production and compare it to the building's consumption
- Maximize buyout savings for the project

- 3) Financial Analysis:

Please calculate the following:

- a) The buyout savings resulting from the selected scope of work.
- b) The final potential contingency remaining after the change order and buyout savings are applied.

Key Considerations:

- Competitors must balance short-term construction costs with long-term operational benefits.
- The owner places a high priority on sustainability, durability, and cost efficiency.
- Ensure compliance with the owner's conditions for maintenance and warranty coverage.
- All companies must be a certified DBE/WBE/SME for installers.
- Photovoltaic System is considered a delegated design scope and must have special engineering by supplier

- A Prime can have this requirement waived if they have a sub-tier who meets this qualification and will be the primary installer
- Primes can be the primary materials supplier

Profit Question 6 – Owner Request – Addition of a Photovoltaic System Reference Information

PV System Design Parameters (Basis of Design)

- *Solar Irradiance in Washington*
 - *Average annual solar irradiance: ~4.2 kWh/m²/day.*
 - *Monthly variation: ~3.0 kWh/m²/day in winter, ~6.0 kWh/m²/day in summer.*
- *Solar Panel Specifications*
 - *Panel efficiency: 20%.*
 - *Standard panel size: 1.7 m².*
 - *Rated output: 400 W per panel under standard test conditions.*
- *Tilt and Orientation*
 - *Optimal tilt angle for Washington: ~35° (latitude-based).*
 - *Roof-mounted panels are installed at a fixed tilt.*
 - *Ground-mounted panels can use adjustable tilts for seasonal optimization.*
- *System Losses*
 - *Derate factor: ~15% (including inverter losses, dirt, and wiring).*

Building Energy Model

Month	Energy Consumption (kWh)
January	50,000
February	45,000
March	48,000
April	46,000
May	40,000
June	38,000
July	35,000
August	36,000
September	38,000
October	42,000
November	46,000
December	52,000
Total	516,000

Summary of PV proposals with key notes

Bidder	Base Bid	Alternates	PV Panels	Production %	System Type	Warranty	Prequalification Value	SME/DBE/BE	Key Notes
Solar Systems LLC	\$702,000	1. Reduce Maintenance Agreement from 10 years to 5 years – (\$30,000) 2. Add special water intrusion warranty for racking penetrations – \$12,000 3. Alternate to have roofer do TPO penetration – (\$20,000)	612	11%	Roof Mounted – Racks	25 years parts and labor 10 years maintenance agreement	\$700,000	Yes	No lead time on panels Will partner with prime contractor at no cost
Advanced PV Technologies of America	\$540,200	1. Credit if mounted on ground – (\$10,000) 2. Alternate to include 5 years maintenance agreement - \$50,000	590	8% to 12% *Dependent on system type	Roof Mounted Slab on Grade Mounted	15 years parts and labor	\$1,000,000	No	Will not partner with a sub-tier unless paid a enhanced premium to be negotiated Lead time on panels acceptable
Sun Light Corp.	\$630,000	1. Alternate to remove special roofing warranty for penetrations – (\$25,000)	690	15%	Roof Ballasted System	25 years parts and labor 5 years maintenance agreement	\$2,000,000	No	Panels readily available Will partner with sub-tier at 5% fee
Insight Sun Technologies	\$812,000	1. Alternate to remove special roofing warranty for penetrations – (\$70,000)	702	19%	Roof Mounted	25 years parts and labor 10 years maintenance agreement 25 years special roofing warranty for racking penetrations	\$600,000	Yes	Lead time on panels: 5 weeks Will partner with prime contractor at no cost
Solar Phase	\$692,000	1. Add maintenance agreement of 5 years – \$30,000	600	8%	Roof Ballasted System	15 years parts and labor 5-years maintenance agreement	\$800,000	Yes	Panel lead time: 6 weeks Will partner with prime contractor at no cost

Profit Question 7 – CDHY Wood vs. Steel

Given the base purchase order amount for the CLT and Glue-Laminated Construction system is \$983,766, and considering the outlined factors (see below), what would be the estimated cost for switching to a steel framing system? Additionally, what are the financial, operational, and environmental implications of this change for the project in state of Washington?

Based on the provided scope of work and pricing details (see Exhibit A in Documents Folder of Procore), develop a cost-benefit analysis for switching from the current Cross-Laminated Timber (CLT) and Glue-Laminated Construction system to a steel framing system for the project in Washington state.

Answers must be submitted in table format comparing each factor that is shown below. Consider the following factors in your analysis:

- 1) Material Costs:
 - a) Compare the costs of CLT and Glue-Laminated Construction (as provided in the purchase order) with an estimated cost for structural steel framing and metal fabrications.
 - b) Include variations in steel prices due to market fluctuations or regional factors.
- 2) Installation and Labor:
 - a) Evaluate labor and installation costs for CLT versus steel framing, considering the specialized expertise required for mass timber versus traditional steel construction methods.
- 3) Durability and Maintenance:
 - a) Assess the long-term maintenance costs of both materials, particularly in the humid climate of Washington.
 - b) Include considerations such as the durability of timber (with hydrophobic coatings and edge protection) versus steel (with hot-dip galvanization and shop-primed finishes).
- 4) Sustainability:
 - a) Compare the environmental benefits of timber (renewable resource, carbon sequestration) with steel (recyclability, embodied energy).
 - b) Include potential implications of removing sustainability certifications (e.g., FSC, SFI) as noted in the contract documents.
- 5) Schedule and Logistics:
 - a) Analyze the impact on the project schedule, considering lead times for material procurement and the complexity of BIM coordination, shop drawings, and erection planning for both systems.
 - b) Evaluate shipping costs and requirements (e.g., timber wrapping versus standard steel transport).
- 6) Alternates and Adjustments:
 - a) Incorporate alternate costs outlined in the purchase order for CLT and Glue-Laminated Construction.

- b) Propose comparable adjustments or upgrades for the steel system, such as fireproofing or coatings.

People Portion

People Question 1 – Public Interface

For questions about the Public Interface, focus on either the 6th St Bridge or Center for Deaf and Hard of Hearing Youth (CDHY) for the entirety of the section.

1) Site Logistics Plan

A contractor must be able to efficiently complete a project while also minimizing the jobsite's impact on the public. Whether it is through pedestrian detours, water impacts, or noise disturbances, construction work can affect the public in a variety of ways.

- a. Provide a site logistics plan that addresses impacts to the public while also meeting the needs of the jobsite. At the minimum, include:
 - Legend
 - Environmental protections
 - Traffic routes and material laydown
 - Jobsite facilities
 - Potential crane locations
 - Key Notes

2) Noise Complaints

The owner has received several complaints from nearby residents about the noise generated by construction activities.

- a. Prepare a plan describing how you will mitigate noise impacts. The plan should include a list of noisy construction activities and how they will be mitigated.
- b. Identify if there are any noise ordinances that need to be followed.
- c. Identify any portions of the project that may require off-hours work. Off-hours work includes night work and/or weekend work.
- d. Will there be an impact on the schedule if work must be strictly performed during normal working hours (weekdays during the day)?
- e. Identify how the noise impacts the nearby wildlife.

3) Traffic Control Plan

Throughout the various phases of a project, there will be times when you need to close adjacent and nearby roads, affecting the public. Pick a relevant phase of construction and create a traffic control plan.

- a. At the minimum, include:
 - Emergency vehicle routes
 - Traffic signage locations
 - Affected roads
 - Pedestrian and vehicular detours

- b. Include a short narrative or table illustrating the differences between a site logistics plan and a traffic control plan.

People Question 2 – Accessibility

Center for Deaf and Hard of Hearing Youth (CDHY)

- 1) ADA (Americans with Disabilities Act) Standards
 - a) Review the CDHY signage plans. Using the ADA 2010 Design Standards, list five (5) ADA sections that the plans comply to and how.
 - b) The project's steel fabricator has submitted shop drawings for the stairs. See Attachment: "CDHY Stair Shop Drawings". Perform a submittal review using the ADA 2010 Design Standards for reference. Determine if the submittal is of "Approved" or "Revise and Resubmit" status. Provide markups if necessary.
 - c) Draft a brief narrative to explain the importance of accessibility throughout the design and construction process to building occupancy.

2) DeafSpace Design Guidelines

The CDHY project serves youth that require different learning and communication styles. As such, certain features of the building are designed to accommodate. The design team has cited the DeafSpace Design Guidelines (DSDG) in creating the CDHY design and environment. The DSDG outlines five major principles: Space and Proximity, Sensory Reach, Mobility and Proximity, Light and Color, and Acoustics.

- a) Choose one of the five principles and identify three (3) CDHY features that address the topic and why.
- b) The owner is considering pursuing a WELL certification for the CDHY project. Some DSDG principles intersect with WELL certification categories. Discuss two (2) areas of overlap between the DSDG and WELL and how the CDHY project satisfies both.
- c) Envision is another certification that the owner is interested in obtaining. Confirm if credit QL2.6 is applicable and satisfied by DSDG principles and provide reasoning.

People Question 3 – Resiliency for 6th St. Bridge

It is a contractor / designer's responsibility to ensure that the project meets the state and federal codes as well as can be maintained for its intended lifespan.

- 1) Natural Disaster Preparation
 - a) Southern CA-specific design requirements: What codes would you use for the build of the bridge?
 - b) Community impacts: What impacts will happen if the bridge is damaged? What else can be done to protect the surrounding community?
 - c) We have had numerous disasters over the course of the year, fire, hurricanes etc. How would your construction be able to mitigate these potential disasters? Do you have any innovative thoughts that would protect your project and the surrounding community?

- 2) Bridge Maintenance
 - a) Impacts of lane closures to paint, graffiti removal, etc. Provide a plan on how you would stage maintenance.
- 3) Envision
 - a) Fill out scorecard – Which sections would apply to the bridge for resiliency ONLY?
 - b) List applicable credits and provide a justification for each credit.
- 4) How would you extend the life expectancy of the bridge / design it for a longer life. Pick either design or maintenance innovations.

Planet Portion

Planet Question 1 – LEED V5 Analysis

The new LEED V5 system is nearly open for registration (early 2025). Assess the new LEED v5 BD+C New Construction scorecard against the LEED v4 scorecard. Write a paragraph (around 250-500 words) describing key differences between v4 and v5. How do the point allocations and prerequisites indicate the evolution of the rating system? Include your opinion on the LEED v5 system.

Planet Question 2 – CDHY LEED V4 Scorecard

Take a look at the LEED scorecard provided for CDHY (found in the documents tab of Procore). Currently CDHY is predicted to receive 51 of 110 points, earning them a Silver Certification. The owner is curious about what it would take to get a Gold Certification. Develop a strategy to share with the owner. Assume the project has broken ground but is still early in the project schedule. Clearly communicate the following:

- a) What additional points should the project pursue to achieve a Gold Certification?
- b) Explain whether each additional point is a low/no cost strategy, and which additional points have greater cost implications. Provide your response in a T-Chart.
- c) If the owner is interested in achieving LEED Gold for the lowest additional cost to the project, what would you recommend?
- d) Update the LEED scorecard with the additional points you recommend (this scorecard will not count towards your final deliverable page limit.)
- e) Of the credits you recommend the owner pursues, pick one credit and do a cost analysis. Provide justification for the cost, and how your strategy gets the owner additional points.

Planet Question 3 – 6th Street Bridge Credit Achievement

The 6th Street Bridge received a Platinum Envision Rating. One of the credits the team excelled in was *NW3.3 Maintaining Floodplain Functions*, where they received 14/14 points.

- a) List the Criteria required to receive a Restorative Level of Achievement for this Credit
- b) Demonstrate how the project met all the criteria required to achieve all 14 points.

Planet Question 4 – 6th Street Bridge Demolition

During the initial stages of planning the Sixth Street Viaduct Project, the project owner identified that, in addition to the demolition of the existing Sixth St Viaduct, 13 adjacent buildings will need to be demolished during the early stages of the construction process.

- 1) The current plan for most of this work will be conducted via deconstruction demolition: strategically removing large sections of the existing bridge and buildings, utilizing cranes.

The owner estimates more than 48,000 CY of concrete and 5,500 TN of steel/rebar will be removed from just the existing bridge.

- a) Explore at least 2 avenues for recycling removed material (options being concrete, structural steel, and/or rebar) removed from a project that can be utilized elsewhere on the project or within the greater LA area. These avenues do not have to be ones that were utilized previously – the owner appreciates innovation from the project team and is interested in finding a sustainable solution for the using the concrete waste and rubble generated from the demolition process.
 - i) Identify 2 avenues for recycling concrete and/or structural steel
 - ii) Expand past the idea of recycling to explain how these avenues could be considered sustainable for the project. Envision credits may be a helpful tool in aiding this explanation
- 2) Though the current plan for demolition is strategic removal of sections, the owner has received several community complaints that the 9-months that it will take to demo and remove debris on the project is too long of a duration for the overall schedule and impacts to the community. The owner is open to considering alternative contractor means and methods for demolition, such as 'energetic felling,' that have been utilized on other projects around the country (i.e., Skanska's Kosciuszko Bridge project in New York City, 2017).
 - a) Explore 1 alternative demolition method for the removal of the existing bridge and/or buildings on the project.
 - b) The owner's primary concern during this process is the impact on the surrounding environment. Focus on the environmental and safety impacts of both methods and provide a comparison for the owner.
 - c) Briefly consider the cost, schedule, and community impacts of the current method vs. the alternative being considered. (The owner does not need a full analysis, but would like assurance that the project team has taken these considerations into account)
 - d) With the above considerations, particularly regarding environmental impacts, the owner asks you to propose which methods should be used on the project – the current plan or the explored alternative. Any reference to sustainability from the previous question will be given bonus consideration by the owner. Additionally, your project team's proposed material submittal does not need to match the page length and content depth of the existing material submittals but should demonstrate that your team was able to find a similar material that meets the criteria of the problem.

Planet Question 5 – CDHY – Project Materials

During the bidding and procurement stages of the CDYH project, several subcontractors have provided that their materials be submitted towards the overall project LEED credits. Following your analysis in Planet Question 2, the owner requests that you research specific material opportunities that would improve the overall LEED score for the project.

Navigate to the project Procore → Project Tools → Documents to view available specifications and materials that can be selected for this problem. The project team will need to reference the "Planet Question 5 – Specification Sections" file and the "Project Material Submittals" Folder for this problem.

- a) Under the “Planet Question 5 – Specification Sections” and within the “Project Material Submittals” Folder, select (1) specification section and (1) corresponding material that your team would like to investigate further, in order to improve upon the project sustainability credits. Additional details for each Specification can be found under Project Tools → Specifications.
- b) With the resources available to your project team, the owner asks you to research and propose (1) alternative material that fits the selected specification. Once you have selected an alternative material, the owner asks you to Submit a product data sheet identifying and describing the material. This can be a standard product data sheet available from the material manufacturer. This should be a separate submittal from your final deliverable and does not count towards your final page limit.

The proposed alternative material should be an improvement upon the LEED credits and overall sustainability for the project. Describe the reasoning behind your selection and explain why this alternative should be selected.

Planet Question 6 – Carbon Reduction Opportunities

The United Nations Environment Programme credits the built environment with 39% of gross annual carbon emissions worldwide. This includes both operational carbon (carbon emitted to operate/maintain a structure) and embodied carbon (the carbon emitted to extract, transport and manufacture the materials used in construction). Please provide a short narrative for each project (Sixth Street Viaduct Project and CDHY) on potential opportunities to reduce carbon emissions during construction. The narratives should be 300 to 500 words each and reference location/state specific opportunities and/or project logistics/material specific opportunities

Planet Question 7 – 6th Street Bridge Carbon Emissions Calculations

Part 1 - Two facilities are able to manufacture the steel beams required for the Sixth Street Bridge Project. The owner requests a quantitative analysis to determine which alternative transportation method (rail/plane/trucking) used to transport the beams results in the lowest carbon emissions, along with which facility is preferable.

Assume the following emission rates:

- Flatbed Truck/Trailer – 161.8 g CO₂ per mile
- Railcar Flatbed – 35 g CO₂ per km
- Air Transport – 246 g CO₂ per km

Assume the following distances:

- Raw iron ore is mined in Utah. The approved mine is 602 road miles from Facility A and 550 road miles from Facility B. Assume trucking is the only option to transport the iron ore to the manufacturing facility.
- Facility A is 160 miles by truck from the nearest freight rail station, with the most direct train route being 210 miles long. The facility is 89 miles by truck from the nearest cargo airstrip, with the most direct flight traversing 345 miles. The facility is 390 road miles from the project site if driven directly.

- Facility B is 98 miles by truck from the nearest freight rail station, with the most direct train route being 360 miles long. The facility is 56 miles by truck from the nearest cargo airstrip, with the most direct flight traversing 402 miles. The facility is 410 road miles from the project site if driven directly.
- Assume the project site is within 20 miles of both a rail station and a cargo airstrip.

Part 2 – Provide a narrative explaining your calculations and offering recommendation to the owner. Additionally, provide a list of potential emissions during transportation not included in your calculations.