

BUILDING A BRIDGE TO THE FUTURE HIGHWAY 101 WILDLIFE OVERPASS LIBERTY CANYON COLAB

*SAFE PASSAGES: EXPLORING NEW MATERIALS FOR THE INTEGRATION OF
LANDSCAPE AND INFRASTRUCTURE*





TO: Beth Pratt, Regional Executive Director, National Wildlife Federation

FROM: Nina-Marie Lister, Director, Ecological Design Lab (Ryerson University); Partner, ARC Solutions and Jeremy Guth, Founding Partner, ARC Solutions; Trustee, Woodcock Foundation

CC: Robert Ament (Western Transportation Institute / ARC Solutions), Matthew Bell (Montana State University), Marta Brocki (Ecological Design Lab / ARC Solutions), Renee Callahan (ARC Solutions / Center for Large Landscape Conservation), Damon Fick (Montana State University), Aaron Hernandez (Ecological Design Lab / University of Toronto), Nik Luka (McGill University), Robert Rock (Living Habitats / ARC Solutions)

RE: Building a Bridge to the Future - Liberty Canyon CoLab
Highway 101 Wildlife Overpass Design Review Recommendations

EVENT DATE: May, 2019

BACKGROUND

The Ecological Design Lab, along with ARC Solutions were invited by Beth Pratt to lead a professional CoLaboratory (CoLab) workshop to review and respond to the design developed to date for the Highway 101 wildlife crossing project at Liberty Canyon, located northwest of Los Angeles, California.

A team of experts and practitioners representing the Ecological Design Lab and ARC Solutions was assembled to support the workshop goals, contribute individual subject-matter expertise, and facilitate the participation of the project team, the invited experts, and the community representatives throughout the CoLab process.

The CoLab is an interdisciplinary collaborative workshop, and is used as a team-based method for design research and development across fields including, but not limited to: planning, ecology, landscape, architecture and engineering. The intent is to advance integrated strategies and solutions to complex problems for which there currently few protocols and little or no agency practice. In this context, the CoLab workshop is also an experiential learning process and professional development opportunity to evolve interdisciplinary design solutions.



COLAB ATTENDEES

Participants were divided into four working groups, balanced in the range of expertise represented on each team, including but not limited to: engineering, ecology, wildlife biology, landscape architecture, urban planning, road ecology, and community engagement

- Ecological Design Lab / ARC Solutions Team
- Liberty Canyon project partners:
 - National Wildlife Federation
 - CalTrans, National Park Service
 - Santa Monica Mountain Conservancy
 - City of Agoura Hills
- Project Team:
 - CalTrans
 - National Park Service
 - National Wildlife Federation
 - Resource Conservation District of Santa Monica Mountains
 - Santa Monica Mountain Conservancy
 - Federal Highway Administration
- Legislative Representatives
- Community leaders from the Agoura Hills area
- Conservation organizations and wildlife management agencies
- Landscape architects and designers
- Experts and scholars in road ecology
- Construction and industry representatives



PURPOSE

The wildlife crossing at Liberty Canyon will be one of the largest in the world, the first in California, and an unprecedented milestone for urban wildlife conservation. This high profile and large- scale project will set a precedent for future work in reconnecting landscapes and green infrastructure for the safe passage of humans and wildlife. By engaging in the CoLab process the project team sought to ensure that the crossing sets a model worldwide for excellence in design, engineering, quality and effectiveness.

The stated objective of the Liberty Canyon CoLab was to review the current design and plans from Caltrans Phase 2, Project Approval & Environmental Document (PAED), and identify ways to improve, innovate, and reduce costs where appropriate. The CoLab format provides a peer-review mechanism for external experts to provide feedback to the project team, identify opportunities, challenges, and collaboratively work towards solutions. The design concepts and implementation recommendations generated in the workshop are outlined in this report.



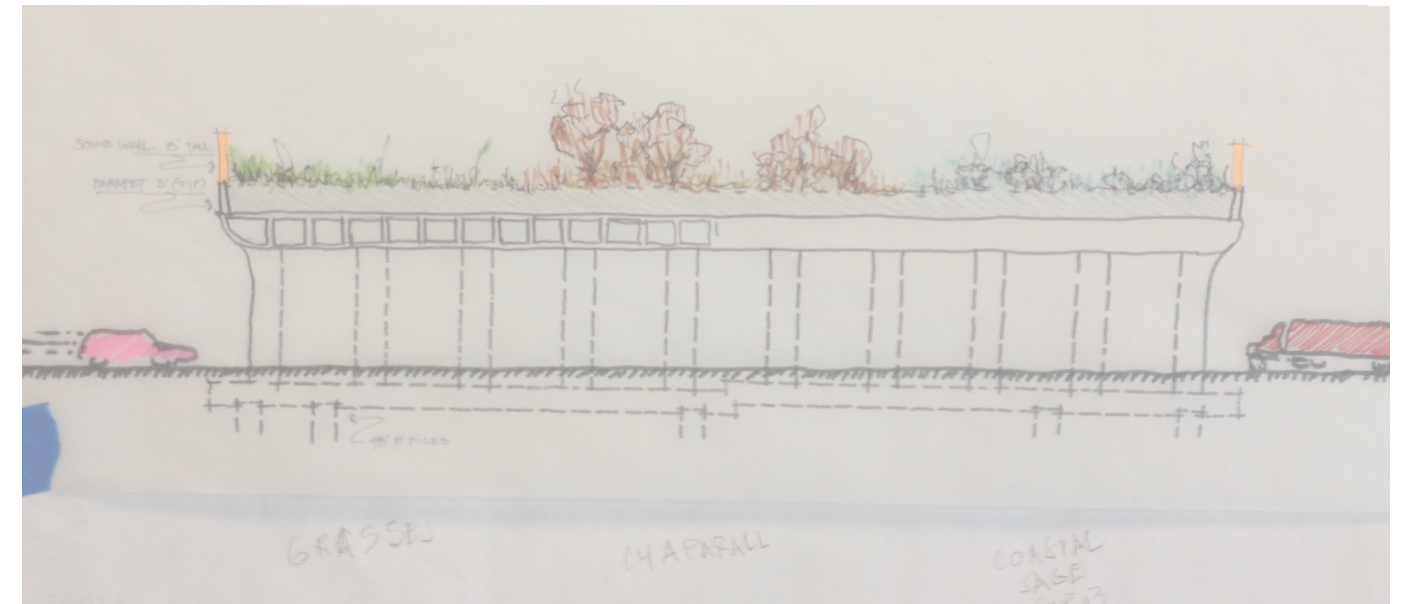
DESIGN CONSIDERATIONS

The following recommendations pertain to the design of the structure, including the approach, the landscape surface, and the sub-and-superstructure elements of the crossing.

Leading with Landscape

Wildlife crossings represent a unique category of infrastructure designed to accommodate the safe passage of two clients on our roads: human motorists and wildlife, moving across our landscapes. As such, wildlife crossings require the integration of a unique set of design considerations. The following considerations were proposed for consideration by the project team to refine the overpass design:

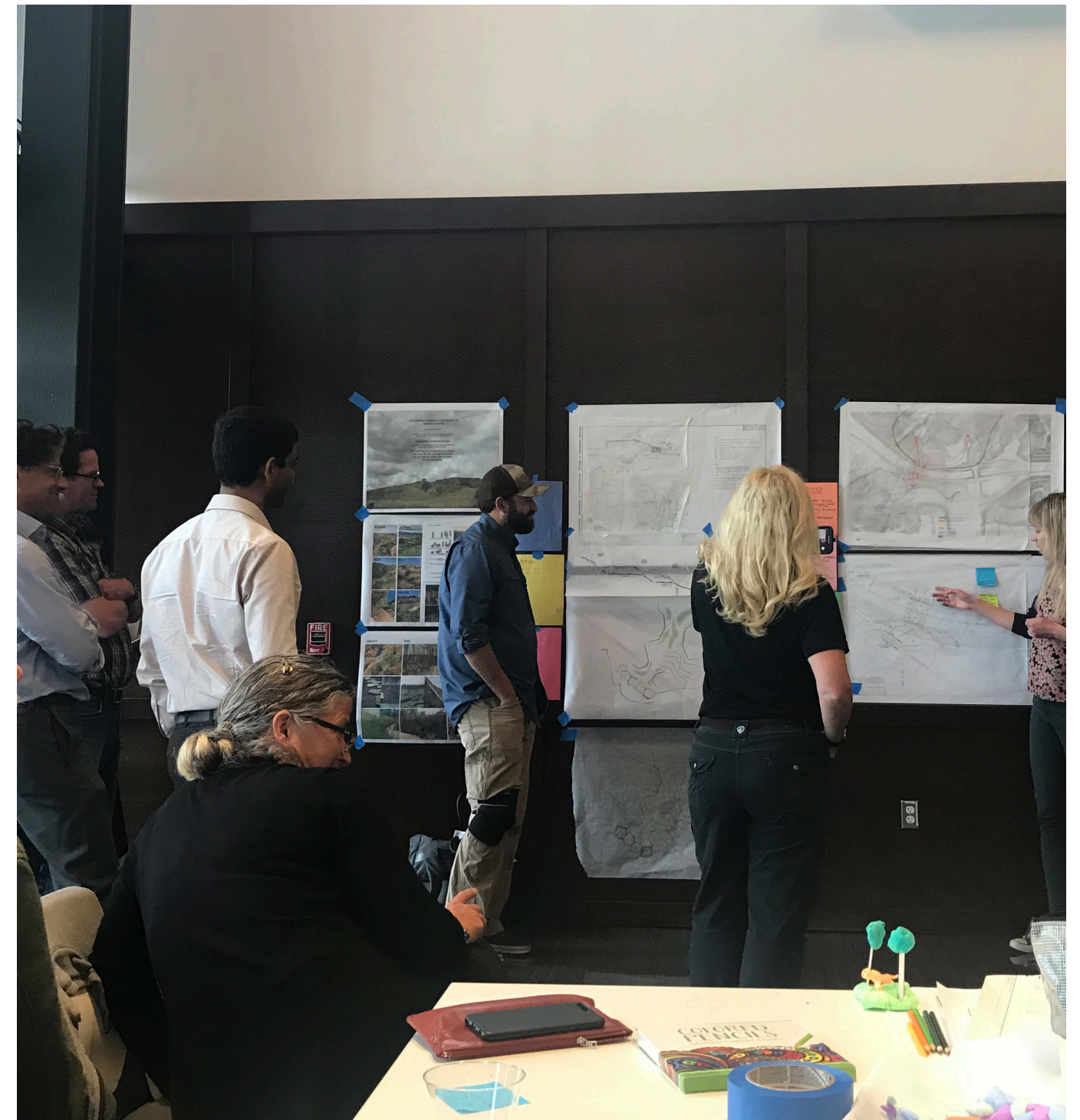
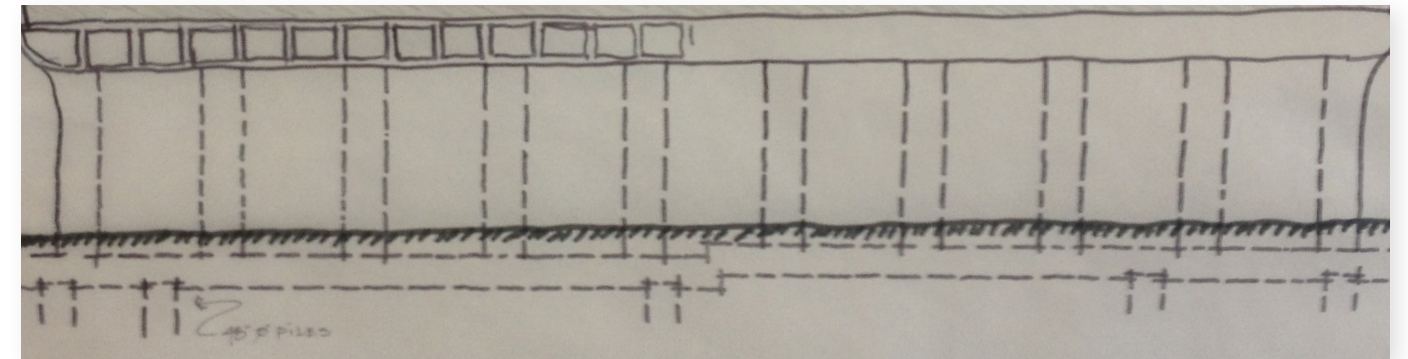
- Ensure that the landscape approach on both sides of the roadway is integrated into the design of the structure
 - Restore and enhance the adjacent creek and riparian zone on both sides of the crossing
 - Provide a diverse range of landscape and habitat typologies in the planting regime to ensure that the structure is appropriate for a wide range of target species
- Identify additional locations for a future network of crossing mitigation
- Integrate fencing, sidewalls, and banks into the landscape design to guide wildlife movement, and reduce road light and noise infiltration on and surrounding the structure
- Minimize the impact of the slope severity at the north-side approach
 - Produce scaled drawings that identify the slope of the approach, and the impact on the adjacent stream and live oak trees
 - Identify maximum slopes that enable and encourage wildlife crossing
- Limit human use
 - The proposed structure is not intended to be dual-use (for human movement, recreation). Design considerations should include elements that appropriately direct non-wildlife movement near the structure and discourage human presence on the structure



Structural Considerations

Several opportunities to improve the efficiency of the structure were raised by CoLab participants. A more efficient structure may lead to a reduction in materials and construction costs, and also result in design solutions that have the potential to enhance the ecological function of the structure and improve motorist safety. The following considerations were proposed for consideration by the project team to refine the overpass design:

- Choose precast concrete construction:
 - This will reduce the overall height of the crossing by 2 ft. through the elimination of shoring requirements necessary for cast-in-place concrete construction instead, and supports accelerated bridge construction technologies
- Reduce the 4' deep soil load proposed along the entire span of the structure:
 - Match soil depth to planting design to support the needs of vegetation
 - Minimizing the soil depth at the north end of the crossing will reduce the slope of the approach slab
 - It is critical that this determination on soil depth and soil structure be integral with the landscape performance metrics. Artificial reduction in the structural overburden without a robust discussion with landscape architectural expertise could result in a non-performing solution and / or potential for erosion and impacts to the superstructure
- Consider relocation of oaks trees:
 - This would prevent the loss of heritage trees and simplify landscape design (eliminate need for deep tree wells)
- Reduce the span of the overpass where possible
 - E.g., through road realignment or possible repositioning of the overpass structure
- Consider a single, 200 ft. span crossing (contingent on reducing overall load)
 - The superstructure becomes deeper, more expensive, and less conducive for prefabricated accelerated bridge construction, however the elimination of a center support could increase construction efficiency
- Explore the use of lightweight fill materials (e.g., expanded shale to replace conventional and/or heavier bulk fill materials, where possible)
- Realigning Agoura Hills Road to reduce the slope of the north-side approach



COMMUNICATIONS CONSIDERATIONS

The high profile nature of this project and its proximity to one of the most highly urbanized landscapes in the world provides a powerful educational, public awareness and storytelling opportunity. The crossing structure design has the power to communicate the significance of the surrounding landscape, habitats and wildlife, as well as the history of the land, acknowledging local Native American tribes to serve as an expression of the shared values of the community, and highlight the global significance of this effort to reconnect a landscape. As such, communication recommendations discussed included to:

- Design a structure that is visually compelling, iconic, and a source of pride for the current community and future generations
- Ensure that all elements of external communications (with funders, the public) are consistent with the overall vision for the structure, and internally consistent with one another (e.g., models, technical drawings, conceptual designs, etc.)
- Mitigate the public perception of increased fire risk associated with the structure
- Consider placemaking / identity adjustments that take the crossing from being “Hwy 101” to “Liberty Canyon” or Agoura Hills” - emphasizing local pride and connection
- Prepare an active and post construction press strategy to keep the message relevant and display the new benchmark that others need to follow
 - For example: In this age of global crises – a climate crisis and global biodiversity crash – this project represents a significant and game-changing investment in green infrastructure which reconnects wildlife to place. In doing so, this project saves lives through safe passage for all. This is a powerful message of social, ecological and economic investment, as much as one of hope, collaboration and community.





PARTNERSHIP AND PROCUREMENT CONSIDERATIONS

The project partners and current project team represent a wide range of allied agencies and integrates diverse disciplinary expertise. The following recommendations pertain to the management of the design and implementation process, as well as the suggested methods that will further support the project team in delivering the highest quality design.

Leveraging Project Funding Structure

By using minimal state funding, allocated specifically for conservation purposes, and no federal funding, the project team has taken significant measures to avoid the perception of the wildlife crossing project reducing funding availability for other critical public services. The Liberty Canyon project has the potential to show what is possible with robust funding allocated towards joint conservation and public safety initiatives, and to inspire confidence in the value of integrating the implementation of crossing infrastructure into the course of day-to-day roadway construction, as well as the management by public agencies.

Publicly funded projects are often hindered in their ability to implement innovative solutions. Such solutions may be determined to be expendable in the course of value engineering or are precluded by agency restrictions that require the pursuit of the lowest-cost-bid. The project team has a unique opportunity to delineate non-negotiable elements of the overpass design that may otherwise not be represented in a traditionally funded and procured public infrastructure project.

As the funding agent, it is vital that the project team press for innovation over lowest-cost or baseline utility. Utility often translates to cost effective and “trusted” or “budget” methods. However, when viewed through a lens of innovation, budget prompted fallbacks on utility can generate new solutions if given the flexibility. Utility should inform design solutions, not drive the project. The Liberty Canyon project must be designed for the next century of infrastructure!

The novelty and scale of this undertaking presents an opportunity to expand the project team to increase the scope of expertise represented. Engaging outside experts may take the form of:

- Issuing a Request For Proposals to engage consultants in resolving challenges identified by the project team and CoLab participants
- Creating an advisory committee to provide ongoing peer-review opportunities that support the design and implementation of the structure
- Formalizing the role of Native representatives throughout the project design process

Monitoring

Depending on the target species (should one exist), commencement in the use of a crossing often lags behind the construction of the structure. Long-term monitoring is critical for tracking the performance of the crossing, both to inform adaptive management of the structure and to serve as a proof of concept for future crossing and mitigation projects. The need for monitoring should be included both in the design of the landscape surface and the approach, as well as in the allocation of funding plans and responsibilities associated with the maintenance of the structure.



NEXT STEPS AND OPPORTUNITIES FOR ONGOING COLLABORATION

The Ecological Design Lab and ARC Solutions are interested in ongoing collaboration with the Liberty Canyon Project team and supporting the implementation of the Liberty Canyon wildlife crossing. This collaboration may take a variety of forms, near and long term, including:

- Participation of a select group of EDL / ARC representatives on an advisory committee to the project team as the project design and implementation progresses
- Referral of additional expert advisors to support decision-making
- Assistance in the development of a Request for Proposals to address design challenges identified





· · · **ECO/**
· · · **LOGICAL**
· · · **DESIGN**
· · · **LAB**

Website:
ecologicaldesignlab.ca

Twitter:
[@EcoDesignLabTMU](https://twitter.com/EcoDesignLabTMU)

Instagram:
[@ecodesignlabtmu](https://www.instagram.com/ecodesignlabtmu)