

DESIGN INNOVATION FOR WILDLIFE CROSSING INFRASTRUCTURE AT THE TRANS-CANADA HIGHWAY **CALGARY COLAB**



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



TO: Jill Robertson, Principal, DIALOG Design; Antonio Gomez-Palacio, Principal, DIALOG Design

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

CC: Neil Robson (DIALOG Design), Chelsea Whitty (DIALOG Design), Marta Brocki (Ecological Design Lab / ARC Solutions), Alexander Furneaux (Ecological Design Lab / Ryerson University), Alyssa Cerbu (Ecological Design Lab / Ryerson University)

RE: Design Innovation for Wildlife Crossing Infrastructure – Calgary CoLab
Trans-Canada Highway east of Banff National Park Design Review Recommendations

EVENT DATE: December, 2018

BACKGROUND

The Ecological Design Lab, along with ARC Solutions were invited by Jill Robertson and Antonio Gomez-Palacio, to lead a professional CoLaboratory (CoLab) workshop with the purpose to develop design solutions for the Trans-Canada Highway (TCH) wildlife crossing project (east of Banff National Park in the Bow River Valley of Alberta).

A team of practitioners representing the Ecological Design Lab, ARC Solutions and DIALOG Design 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, including but not limited to: planning, ecology, landscape, architecture and engineering professionals. The purpose 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 (approximately 20 in total) were divided into two working teams, balanced in the range of expertise represented on each team, including, but not limited to: engineering, ecology, planning policy, landscape architecture, road ecology and community engagement.

- Ecological Design Lab / ARC Solutions Team
- DIALOG Design (Calgary, Toronto and Edmonton Studios)
- Regional agencies (Y2Y, Miistakis)
- Landscape architects and designers
- Civil engineers and architects
- Planning and policy experts
- Conservation organizations and wildlife management agencies
- Construction and industry representatives





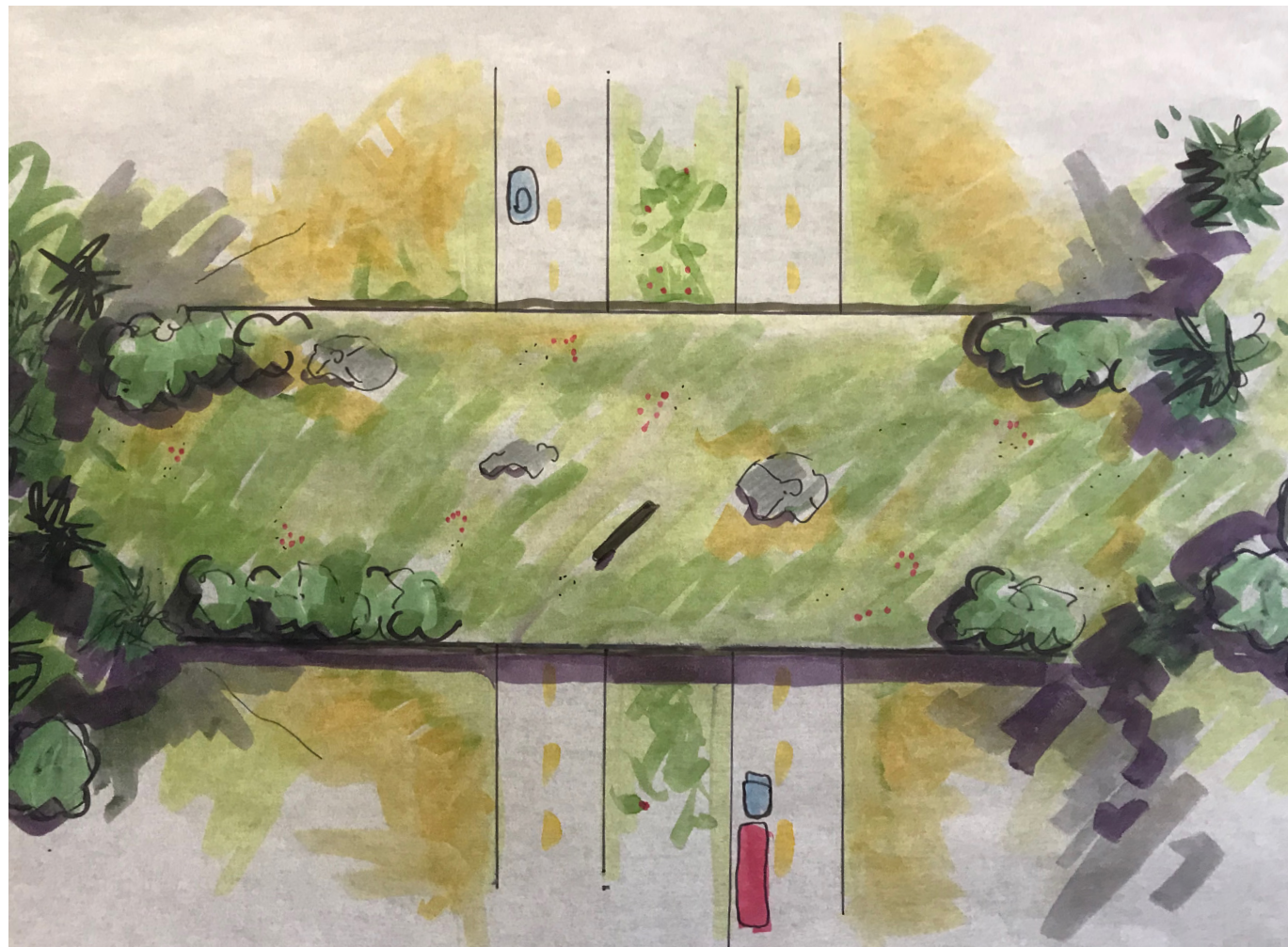
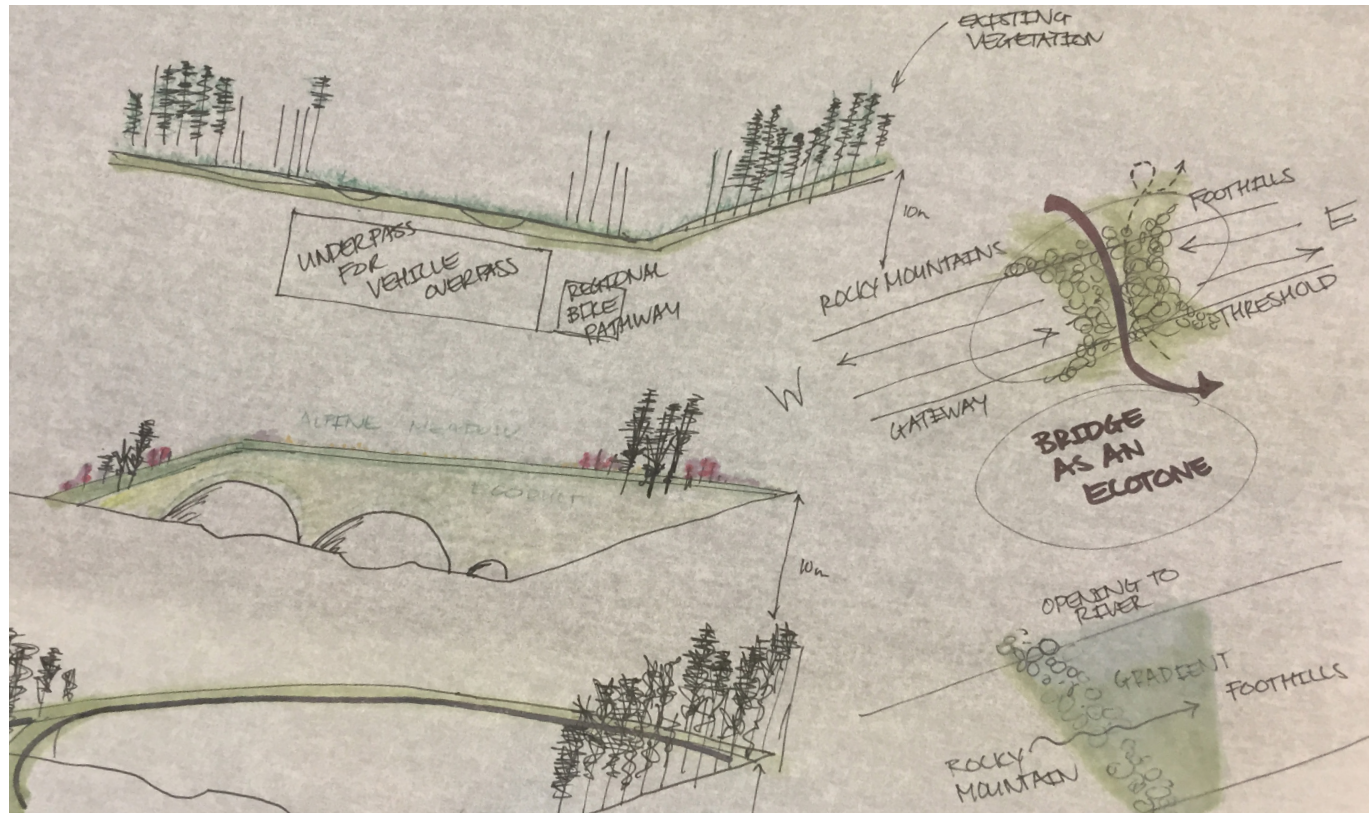
PURPOSE

The Trans-Canada Highway (TCH) east of Banff National Park in the Bow River Valley of Alberta is a key access point to the mountain parks of the Canadian Rockies. It also provides connections to Calgary, various local communities, and the Stoney Indian Reserve. The area is rich in wildlife, including both large and small mammals. With a high rate of wildlife vehicle collisions (WVC), DIALOG has engaged with Alberta Transportation to design a new overpass structure for mitigation. 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 both humans and wildlife.

By engaging in the CoLab process, DIALOG Design sought to ensure that the crossing sets a model worldwide for excellence in design, engineering, quality and effectiveness. The stated objective of the Calgary CoLab was to design a wildlife overpass structure that will be appropriate to span four, six or eight lane highway cross sections, and consider an adjacent multi-use trail. Participants were told that the design response should consider a number of factors, including, but not limited to: constructability, structural stability, life cycle and long term durability, aesthetics and design impact, ecological connectivity, landscape architecture and integration with the surrounding environment.

The CoLab format provides a peer-review mechanism for external experts to provide feedback to DIALOG, identify opportunities, challenges and collaboratively work towards innovative design solutions. The design concepts and implementation recommendations generated in the workshop are outlined in this report.

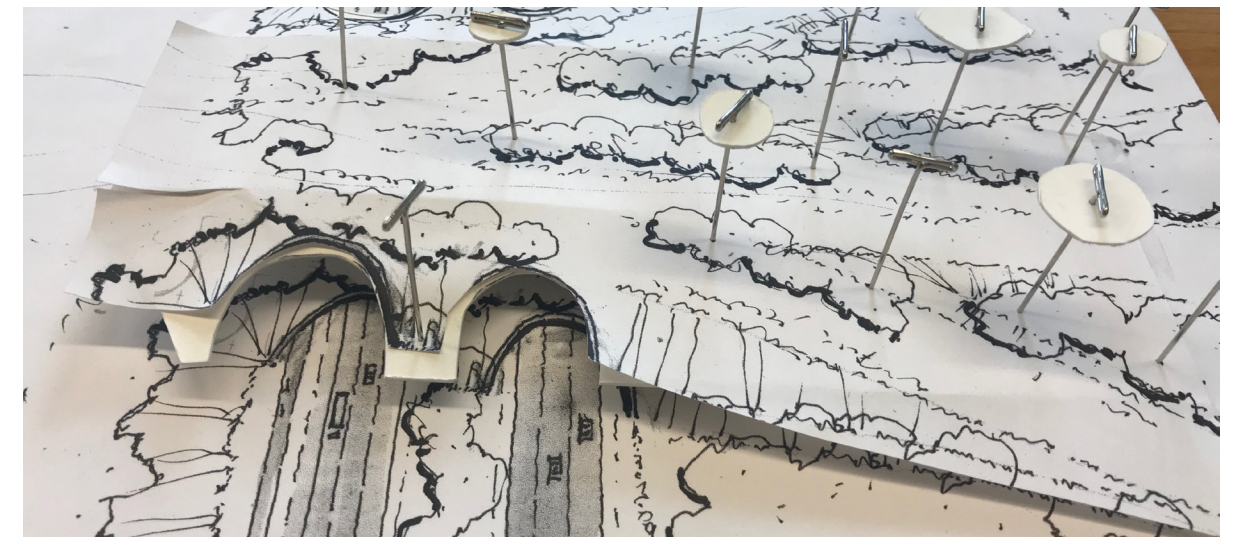




DESIGN CONSIDERATIONS

The following recommendations pertain to the design of the wildlife structure, investigated by both the CoLab teams:

- Potential limitations:
 - E.g., structural (loading, landing points, replicability, soil, weight), landscape (soil quality, climate change, biomass, microbial properties, nutrient retention), sound (absorb, bounce, cover), cost (construction quality and loading weight) and innovation factors (transportation, change in transport volumes, road modifications, sound)
- User experience (the driver, the vehicle, the animal)
 - Each of these users has inherently different and complex needs. How might they mutually benefit from a crossing structure?
- Design aesthetic: naturalistic or purposefully provoke attention?
 - Both teams questioned whether an effective crossing should look natural to fit in with the landscape or purposefully provoke attention from human road users and visitors
 - Public art was discussed as a way to incorporate and to create an interpretive experience
- Design specifications:
 - Each team had variations on their designs, but maintained the following:
 - Berm versus bridge design. This affected the overall structure of the crossing and would depend on the number of new lanes of traffic added
 - Utilized the tilted plane to take advantage of the natural change in grade and topography on the site
 - The bridge crossed two different ecotones and could therefore, employ different landscaping features



COMMUNICATIONS CONSIDERATIONS

The following pertain to communication considerations. Both groups acknowledged the emphasis that must be placed on a public awareness campaign to promote the crossing and the protection of wildlife in the region.

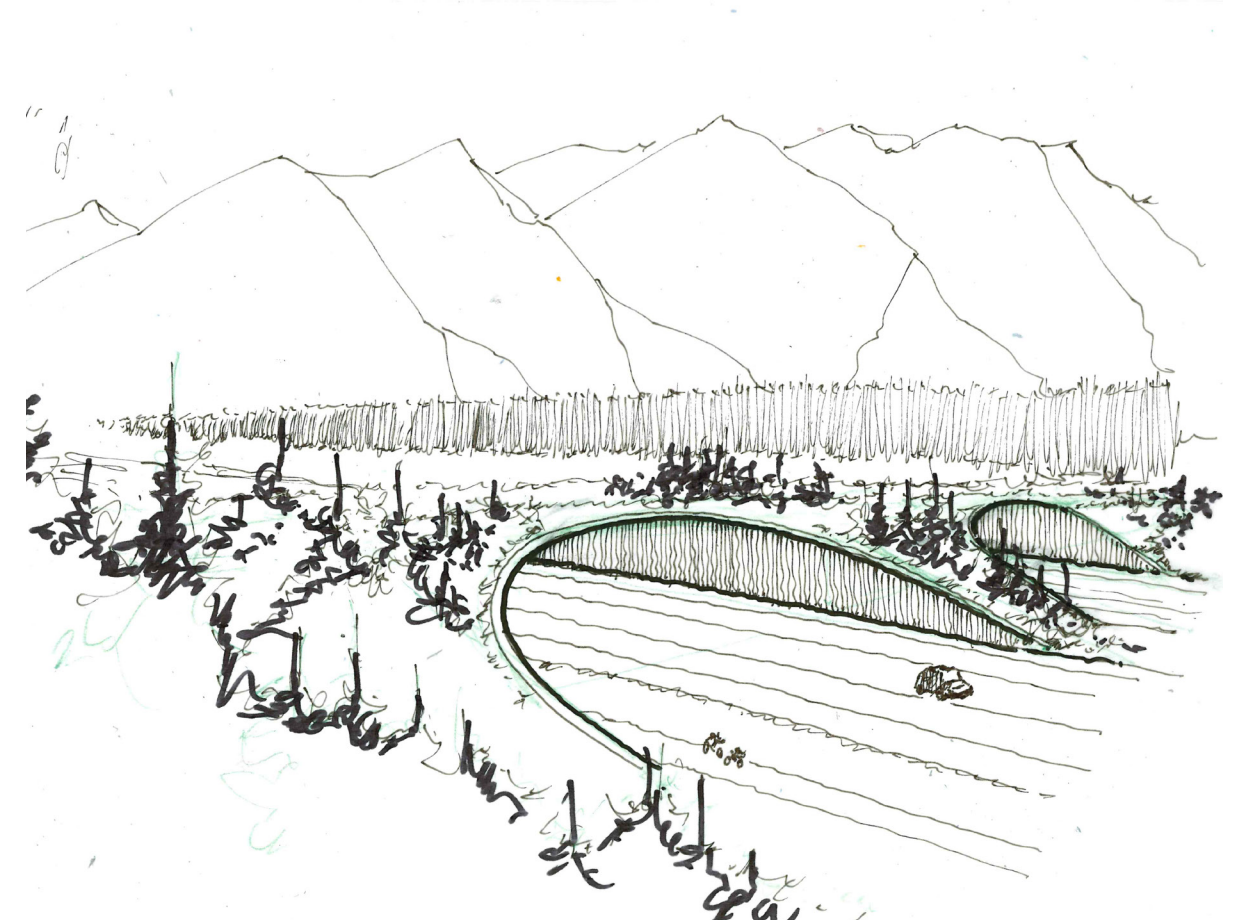
- Public engagement campaign is needed to promote participation and education:
 - Teams both explored targeting a diverse age range, including children, and incorporating wildlife awareness into education curriculums
- Data could be publicized so the public could track wildlife:
 - A monitoring component of wildlife crossings could spark road watch initiatives, community movements and citizen science
- Success stories could be publicized:
 - Stories could draw emotional appeal for animals, as well as the harmful impacts related to collisions for people and wildlife
 - Success stories promote awareness for existing crossings and leverage their success to advocate for new structures



PROCUREMENT CONSIDERATIONS

Teams discussed agency and procurement for wildlife structure design, implementation and construction. The following key takeaways were found:

- Teams noted that there is a lack of clarity pertaining to the direct agency for wildlife structures
 - Teams was unsure if crossings were within the responsibilities of the Alberta Transportation, Parks Canada or another agency
 - The lack of certainty and clarity highlights a clear need for change
 - It was also noted that it would be ideal if a crossing study was triggered from a road widening or expansion application
- Interagency coordination is required in order to get projects off the ground and maximize their results
 - This collaboration may require redefining the mandate and / or mission statement of the organizations involved
 - New agencies may need to be created that deal specifically with wildlife crossings
- Incorporating wildlife crossing into city planning and design should become a standard practice and the norm



PROCESS CONSIDERATIONS

The following takeaways pertain to the CoLab process itself. As previously noted, the two teams were multidisciplinary. Therefore, group dynamics facilitated collaboration and communication, and each team took a slightly different approach to problem-solving wildlife crossing design.

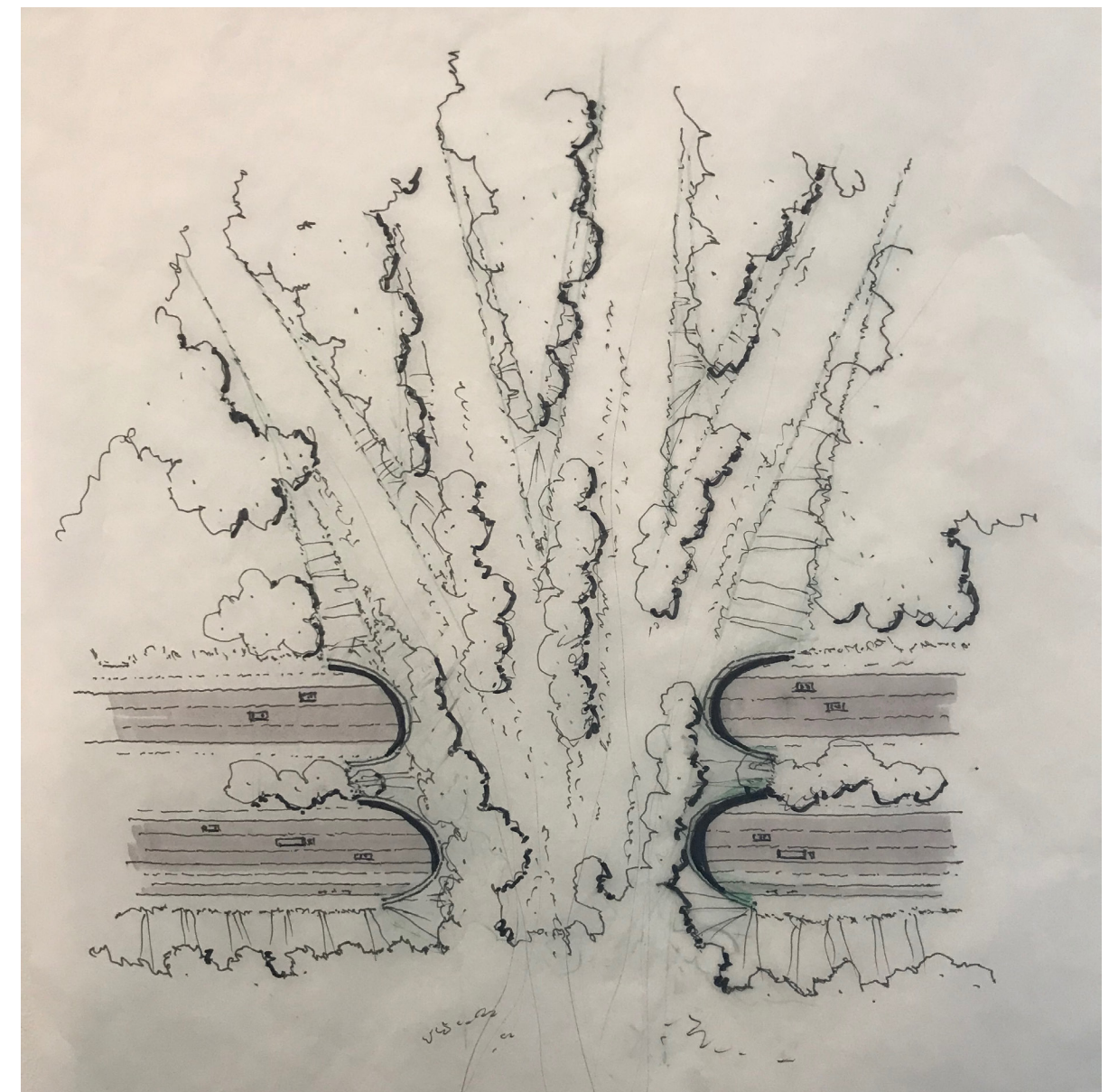
- Defining the problem was a key element of the CoLab process:
 - Both teams began and spent a significant portion of time defining the problem itself before moving into solutions generation phases
- Team dynamics and styles varied by group:
 - The green team experienced a more cohesive group dynamic, centered around negotiation on problem identification, earlier in the process
 - This facilitated an understanding of goals and expectations for the group
 - Set up rules of engagement concerning what participants were anticipating their designs may turn out to be
 - Resulted in stronger conceptual structures, schedules and frameworks
 - The red team was more results-oriented and explored a wider range of high-level topics, rather than fewer in more detail. As such, their deliverables were less cohesive and coordinated
 - Resulted in a greater quantity of deliverables (e.g., included separate policy marketing and design solutions for wildlife crossings), but would have benefited from a clearer and concise narrative
- All individuals recognized the limits of their professional knowledge
 - Individuals would consult the person in their group who held expertise outside of their profession, thereby furthering collaboration possibilities
- Both groups wished to challenge the status quo
 - Both teams challenged preconceived ideas of what wildlife crossings could and should look like



NEXT STEPS

The Ecological Design Lab and ARC Solutions are interested in ongoing collaboration with the DIALOG Design team and supporting the implementation of the Highway 1 crossing. Future collaboration between these organizations can consider the development of:

- Participation of a select group of representatives on an advisory committee to the project team (throughout the project design and implementation)
- Referral of additional expert advisors to support decision-making
- Assistance in the development of a Request for Proposals to address design challenges





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Website:
ecologicaldesignlab.ca

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