# Glenn Highway-Fort Richardson Interchange Redesign

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Client: Sophia Lee, EIT, 673d Civil Engineer Squadron
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## Abstract

The D Street exit for Joint Base Elmendorf-Richardson (JBER) is due for redesign and realignment. This stop-sign controlled interchange, located 3 miles north of the Muldoon interchange, sees a large amount of traffic from the JBER gate causing it to become congested onto the Glenn Highway. Additional confusion to the on/off ramps are caused by the intersection with the Richardson Frontage Road and Bear Run Lane (Figure 1). Our project aims to mitigate the confusion with a proposed roundabout and an added deceleration lane to the Glenn Highway before the off-ramp.

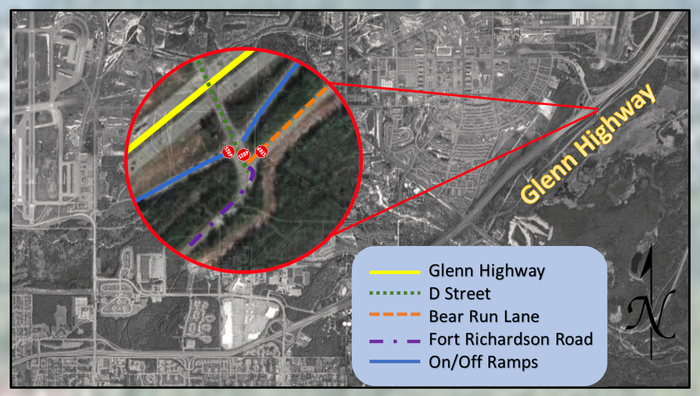
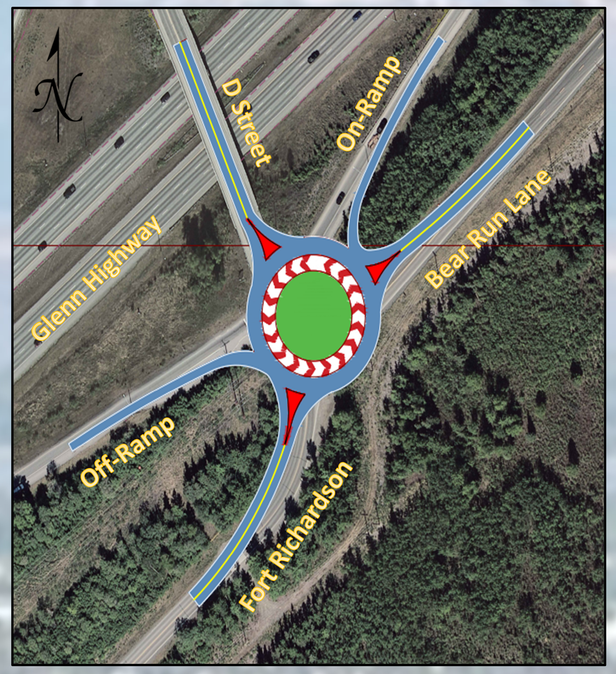



*Figure 1: Project location with focus on 3-way stop-sign interchange.*

## Existing Conditions

Our team needed to accommodate the constraints of the existing bridge and overhead electric wires within our design. The vehicles that utilize the range on Bear Run Lane are military vehicles, which are quite specialized and have as many as 12 axles on the largest vehicle. There are also platoons and marching groups that occasionally utilize the area, but since they will always have the right-of-way and will be led by a pilot car, we discovered there was no need for pedestrian infrastructure such as a sidewalk.

## Proposed Roundabout

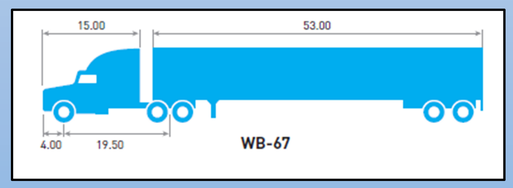



### Design Criteria and Considerations

Our firm, Nakuuruk Engineering, proposed five design alternatives. The first alternative was leave as-is, the second and third alternatives recommended removing the off-ramp and adding a new exit near or to the Arctic Valley exit, the fourth was to place a roundabout at the current location, and the fifth was to place a roundabout at the current location but with the off-ramp looped under the bridge.

The fourth alternative was approved by our client; with this design, minimal impacts to utilities were seen and four of the five legs of the roundabout will need to be realigned.

Design criteria:
- Design vehicle: WB-67
- Circulatory lane width: 12 ft
- Diameter of inscribed circle: 120 ft




*Meet the team! From left to right, top to bottom: Katherine, David, Lisa, Ryan, Dr. Vasudevan, and Will.*

## Pavement Design

The pavement design shown in Figure 2 was chosen as it is specialized for the unique challenges that Alaska faces in the winter months, especially the thin 3-inch asphalt surface that is designed to resist thermal cracking due to freezing and thawing of water beneath its surface.

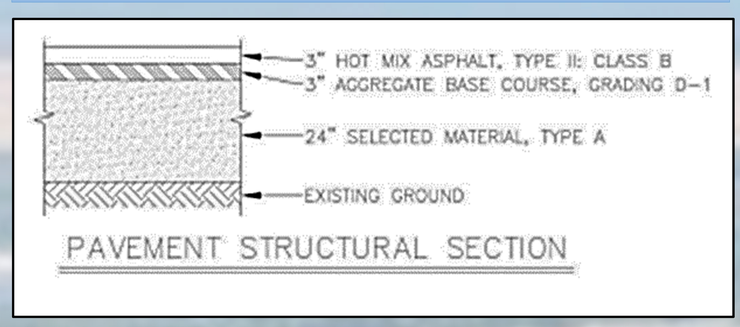



*Figure 2 (Above): Diagram with pavement design section.*
*Figure 3 (Below): Table with total project cost estimate.*

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|---|---|---|
| PROJECT SUMMARY | BASIC BID (BB) TOTAL | $2,583,496.00 |
| | PROJECT CONTINGENCY - 20% OF BB | $516,699.20 |
| | DESIGN SERVICES - 5% of BB | $129,174.80 |
| | CONSTRUCTION ADMINMINISTRATION - 10% of BB | $258,349.60 |
| | PROJECT TOTAL | $3,487,719.60 |

## Conclusion

After identifying the concerns that needed to be addressed, analyzing the initial conditions, and identify the constraints of the area, our team was able to produce alternatives to present to the client. Once an alternative was chosen, we were able to produce the design criteria needed to create our design. Finally, designed the pavement and roundabout.

## Acknowledgements

**We wish to thank our professional mentor Will Webb PE PTOE, our project faculty advisor Dr. Vinod Vasudevan, our instructor Dr. Scott Hamel, all our previous instructors and advisors, and our families for helping us get to where we are today. We couldn't have done this without your constant support, thank you!**