



Associated
Engineering



Platinum
member



Interim Intersection Design Considerations for Long-Term Interchange Site (St Albert Ray Gibbon Drive and Fowler Way Intersection Staging)

John Maree, P.Eng., M.Eng.

February, 2023

Index

1. Sustainable development
2. Background to project (challenges)
3. Options
4. Closing remarks



Sustainability



“Sustainability
compromising the

resent without



Introduction to Sustainable roads



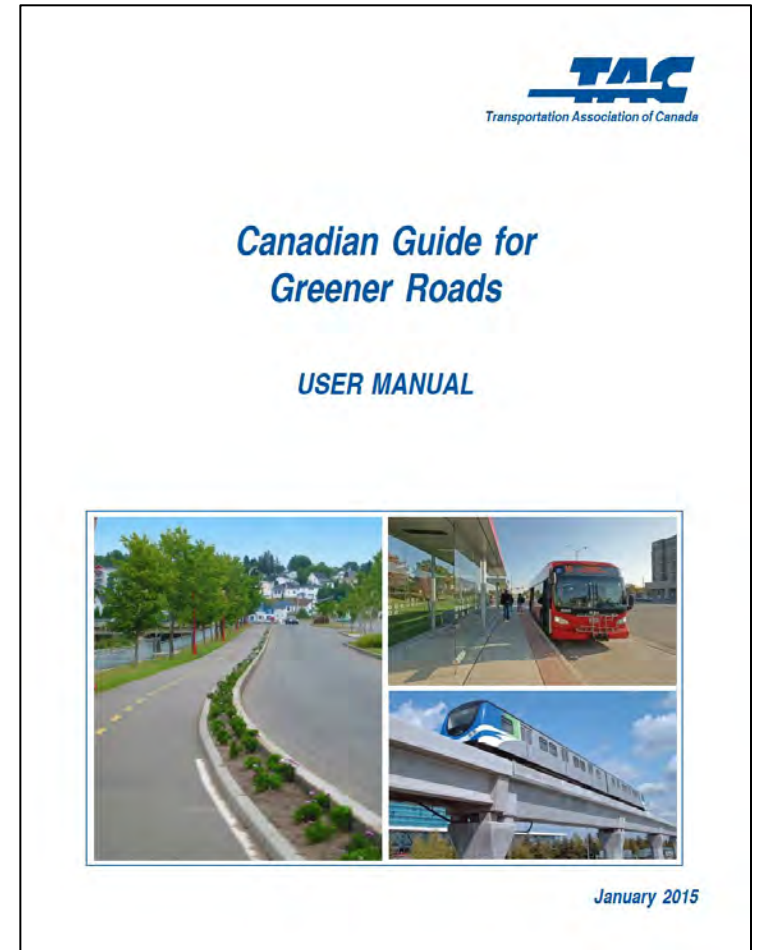
“A sustainable highway should satisfy lifecycle functional requirements of societal development and economic growth while reducing negative impacts to the environment and **consumption of natural resources.**”



“Using recycled materials has the potential to deliver significant benefits including cost savings, reducing landfill, protecting the environment and our lifestyle, network performance, circular economy and reducing emission.”

Introduction to Sustainable roads

“..respects traditional objectives (e.g. safety, efficiency, capacity, maintenance) while also integrating newer objectives such as compatibility, liveability, universal accessibility, modal equity, **conservation of resources**, affordability on a full life-cycle basis, and environmental protection.”



Sustainable roads

Road construction material – reduce carbon footprint

Glass, Crumb rubber, Hot-in-place asphalt recycling, Reclaimed asphalt pavement, In-situ stabilisation, Construction and demolition waste, Rubblisation, Fly ash and blast furnace slag, Plastics, etc.



Sustainable roads

Construction considerations to reduce carbon footprint

- Construction detour
- Traffic accommodation (speed vs idling)
- Construction duration
- What type of machinery
- Etc.

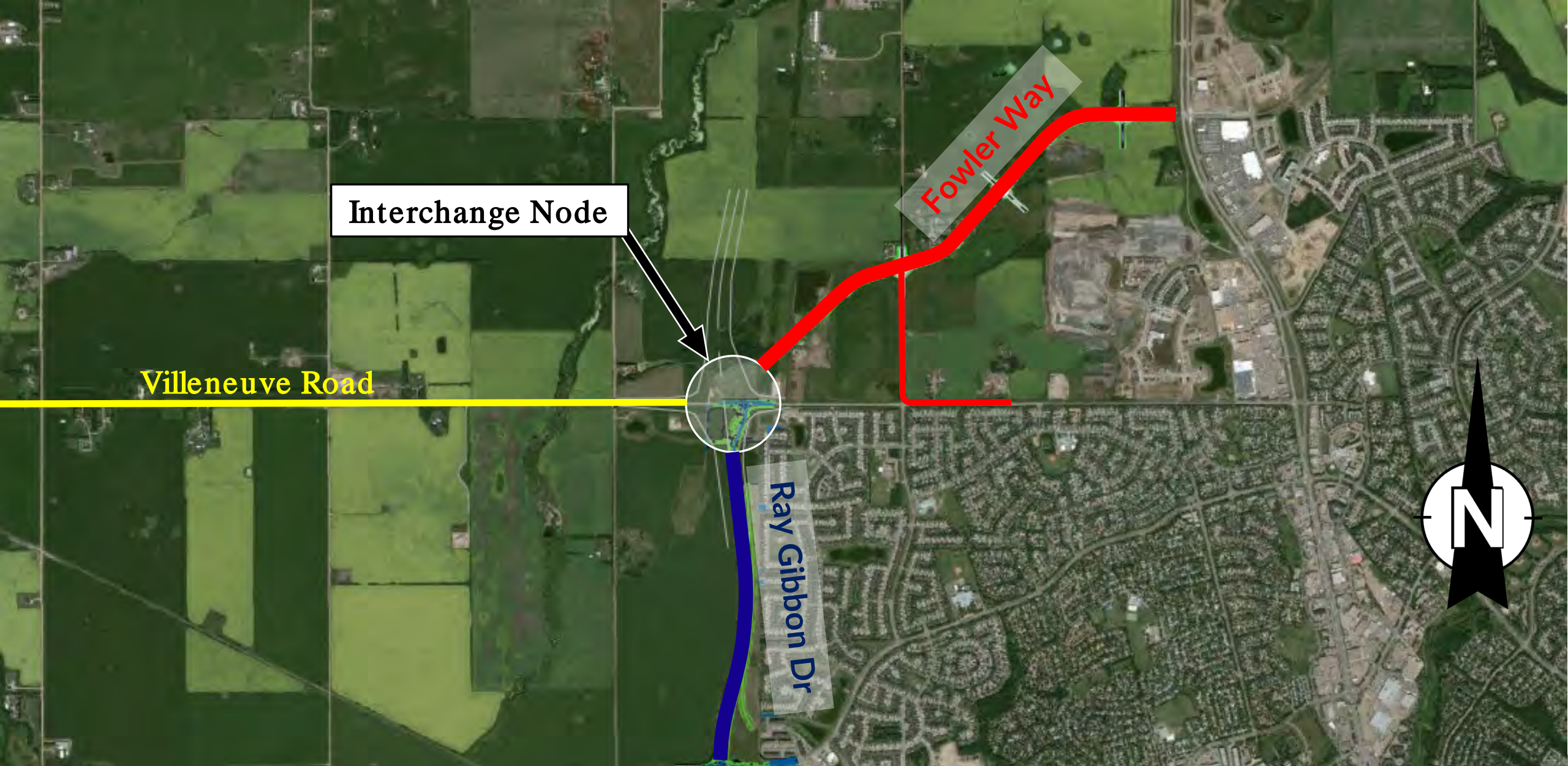


Sustainable roads

What part does the
Geometric Designer play in
sustainable roads?



Background to project



Project challenge

- Project challenges:
 - Limited ROW
 - Limit throw away costs between current/ interim/ ultimate
 - Client budget, expectations and requirements
 - Future traffic demands – factor of uncertainty



Background to Project

Interim

At-grade intersection

Ultimate

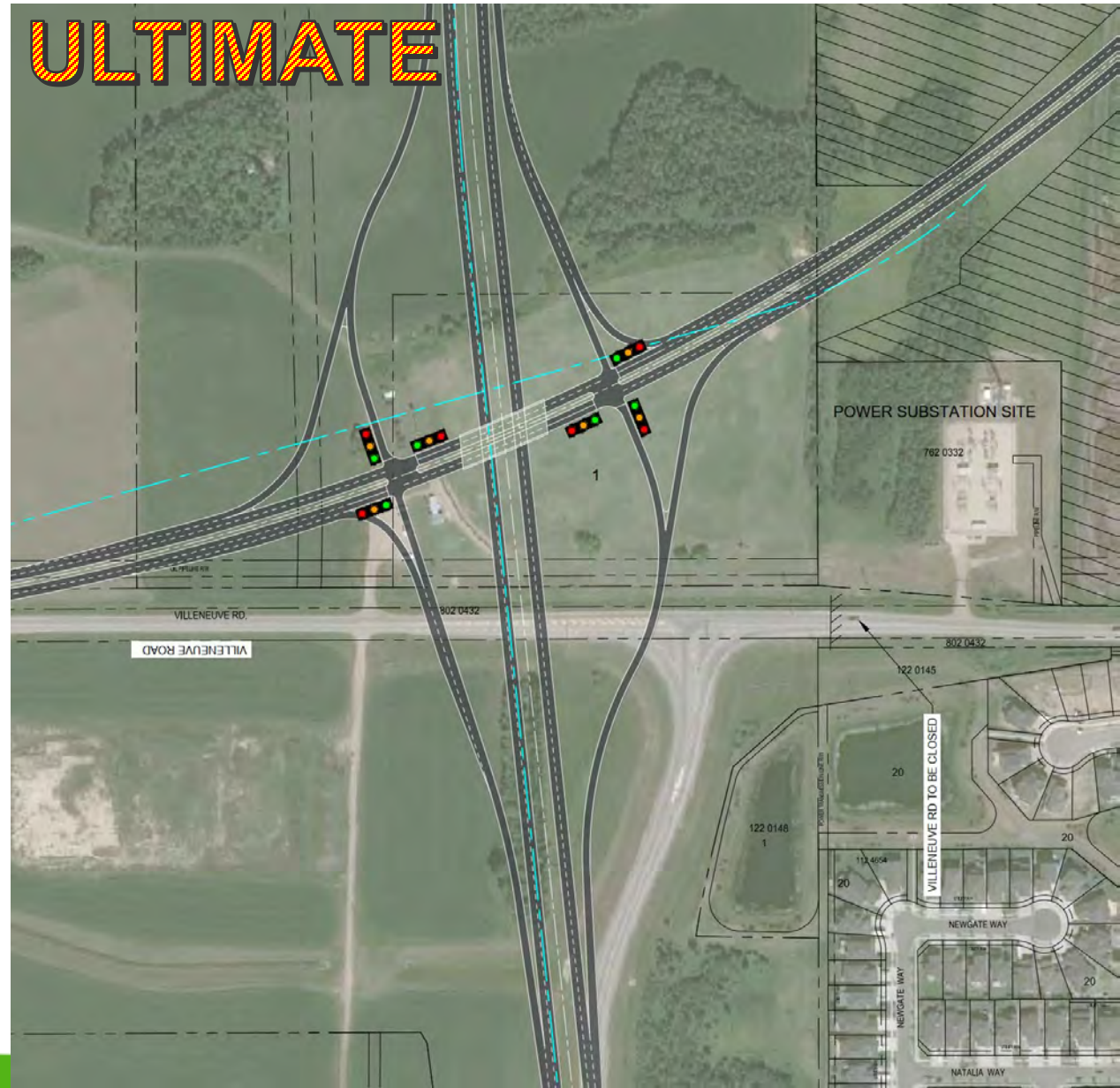
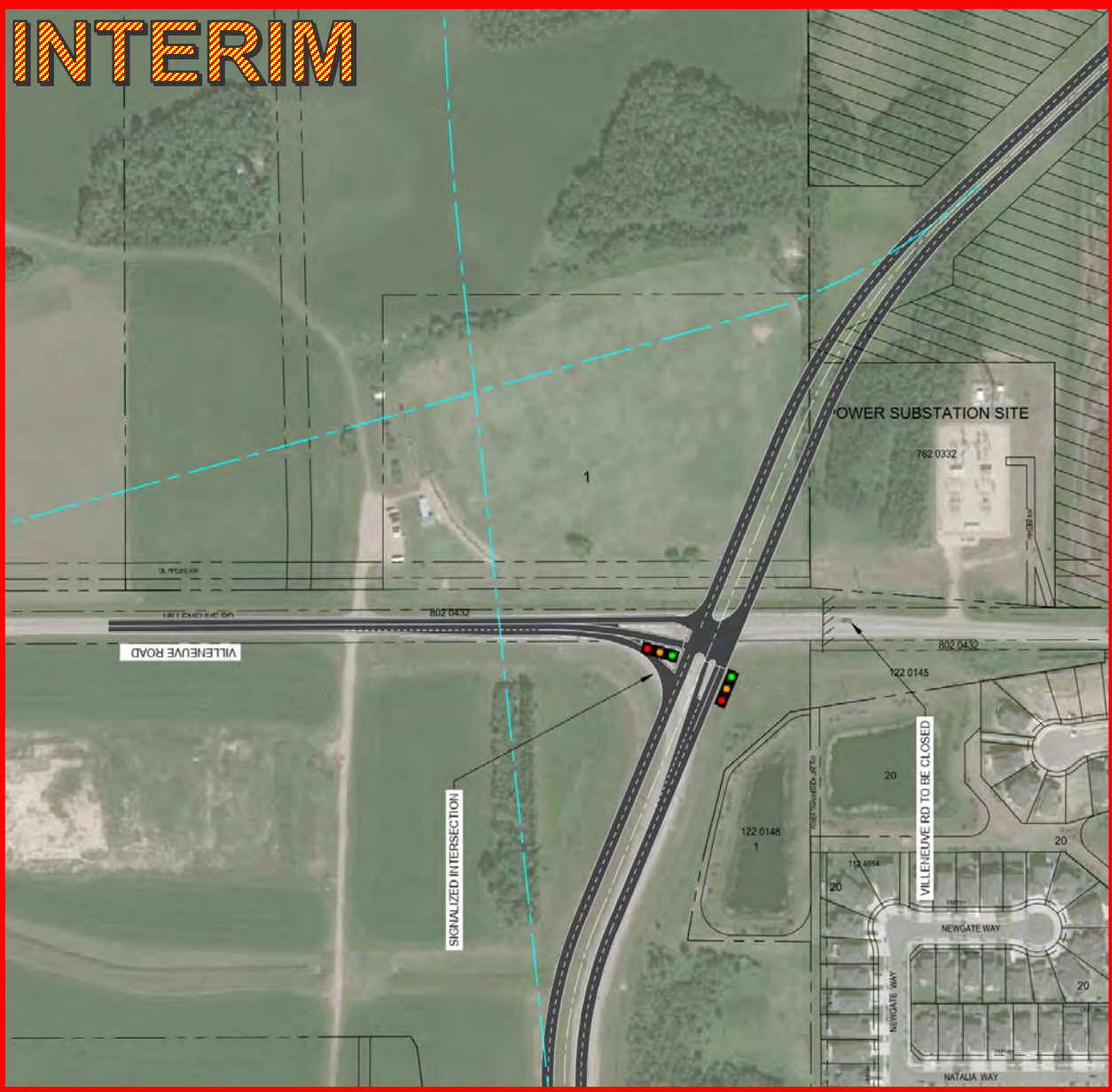
Interchange



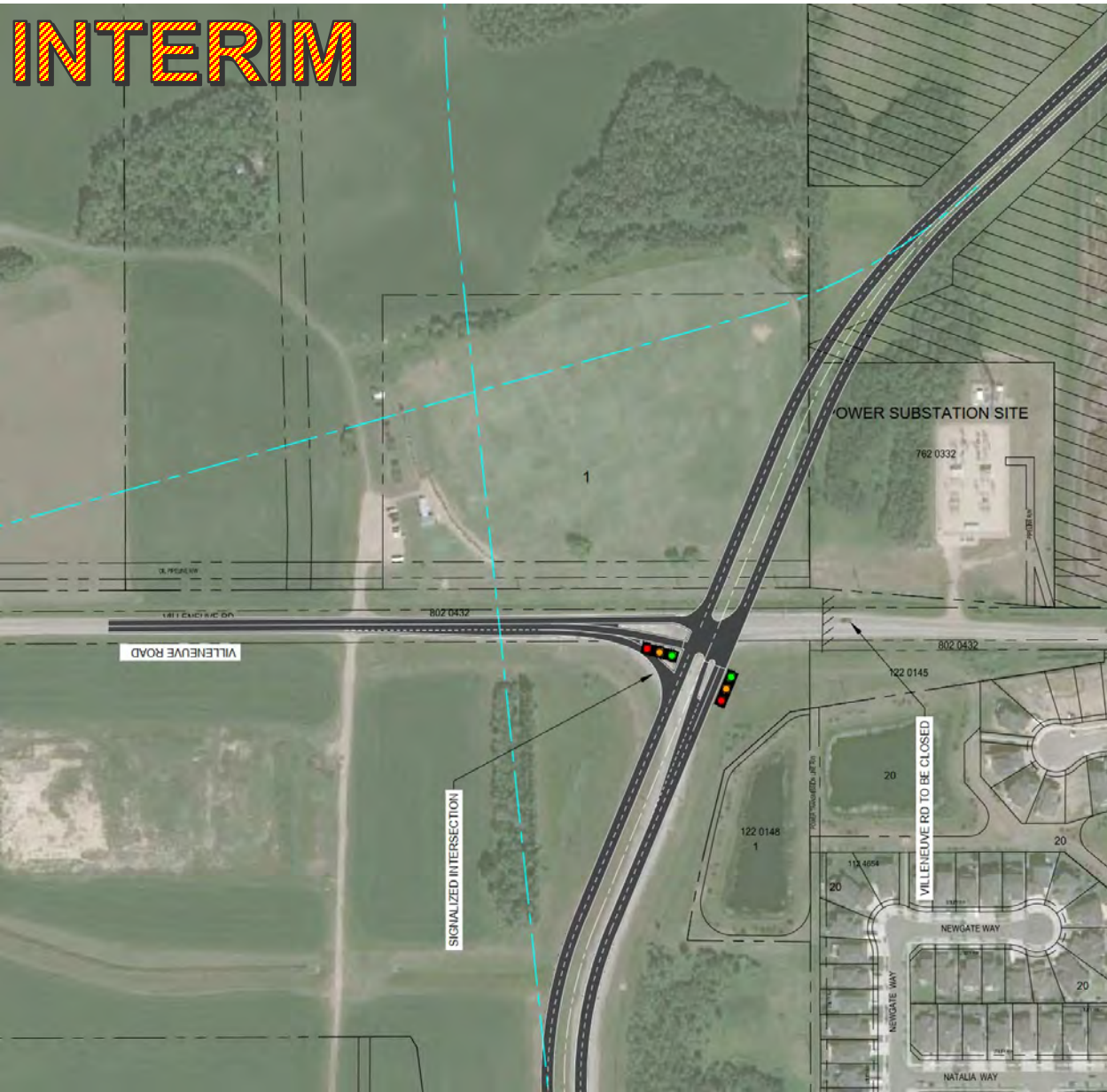
Options

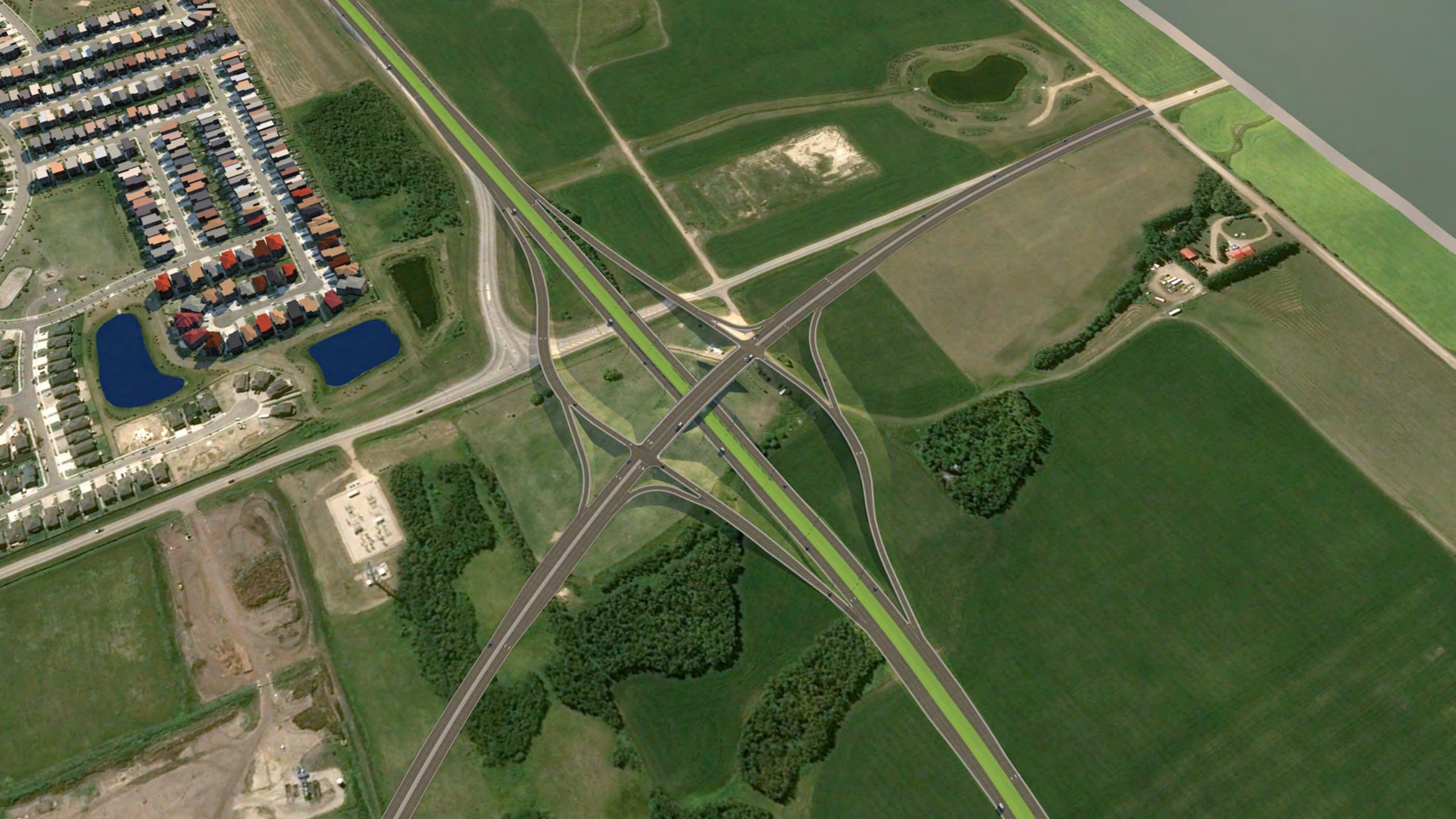
Interim Phase	Ultimate Phase	
Roundabout	Standard Diamond Interchange (FW over RGD) RGD Original alignment	
Roundabout	Single-point Diamond Interchange (FW over RGD) RGD Original alignment	
Roundabout	Standard Diamond Interchange (FW over RGD) RDG realigned	
Roundabout	Single-point Diamond Interchange (FW over RGD) RDG realigned	
Roundabout	Parade (one B-loop) (RGD over FW) RDG realigned	
Signalized Intersection	Standard Diamond Interchange (FW over RGD) RGD Original alignment	✓
Roundabout (off centre position)	Standard Diamond Interchange (FW over RGD) RGD Original alignment	✓
Signalized Intersection (Couplet)	Standard Diamond Interchange (RGD over FW) RGD Original alignment	✓

Option 1 (Signalised IS / Diamond IC)

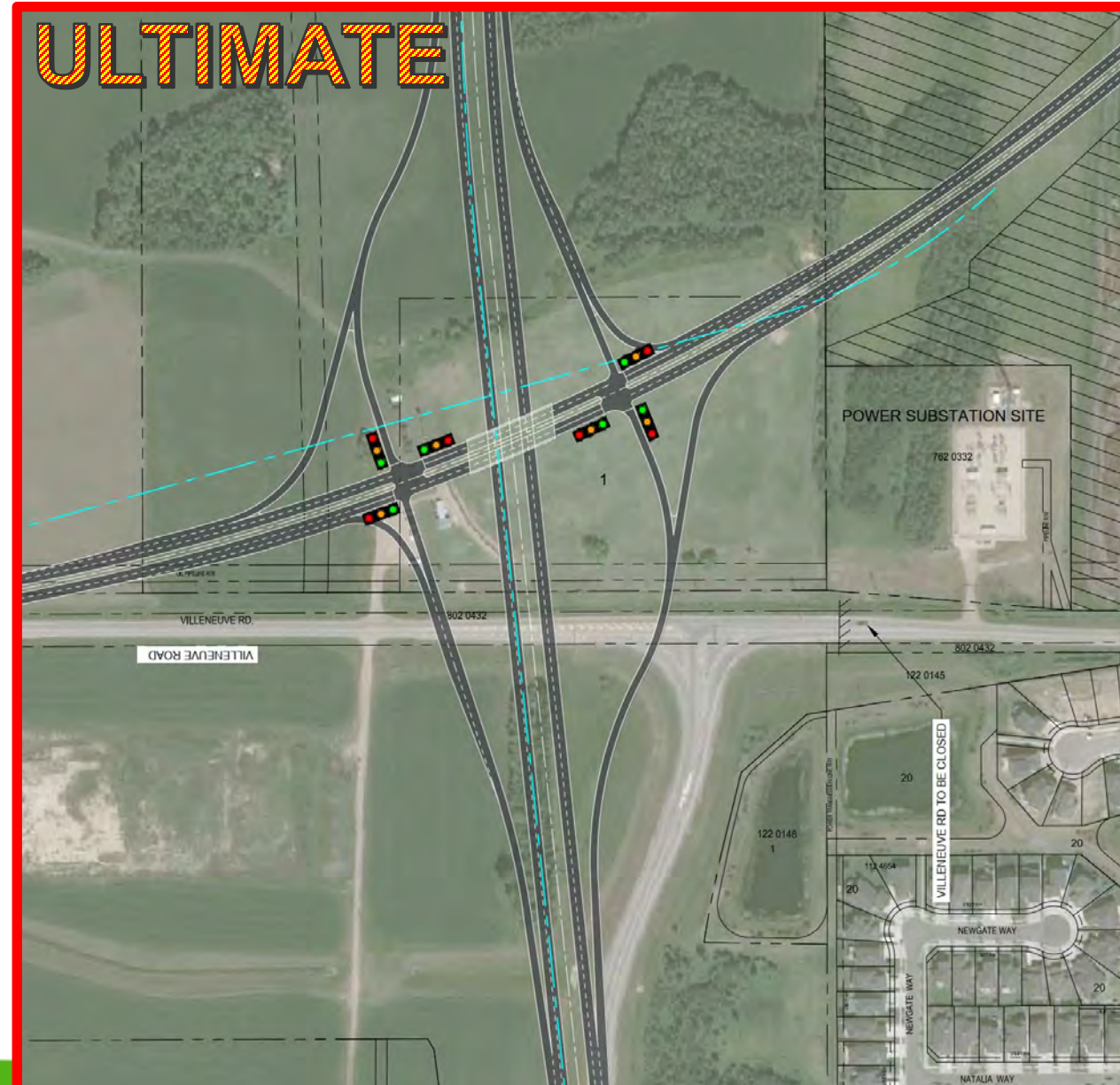
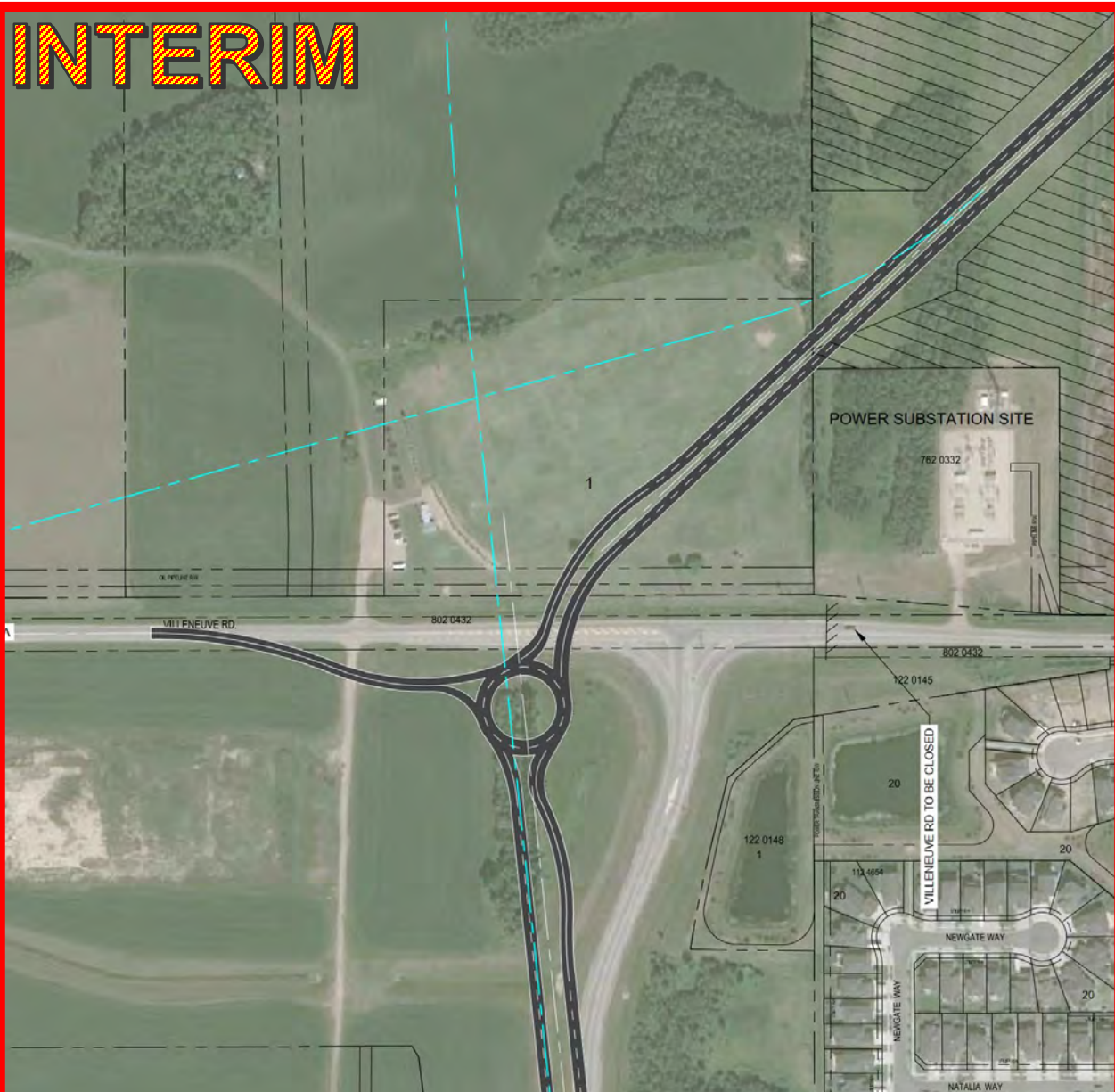


Option 1 (Signalised IS / Diamond IC)



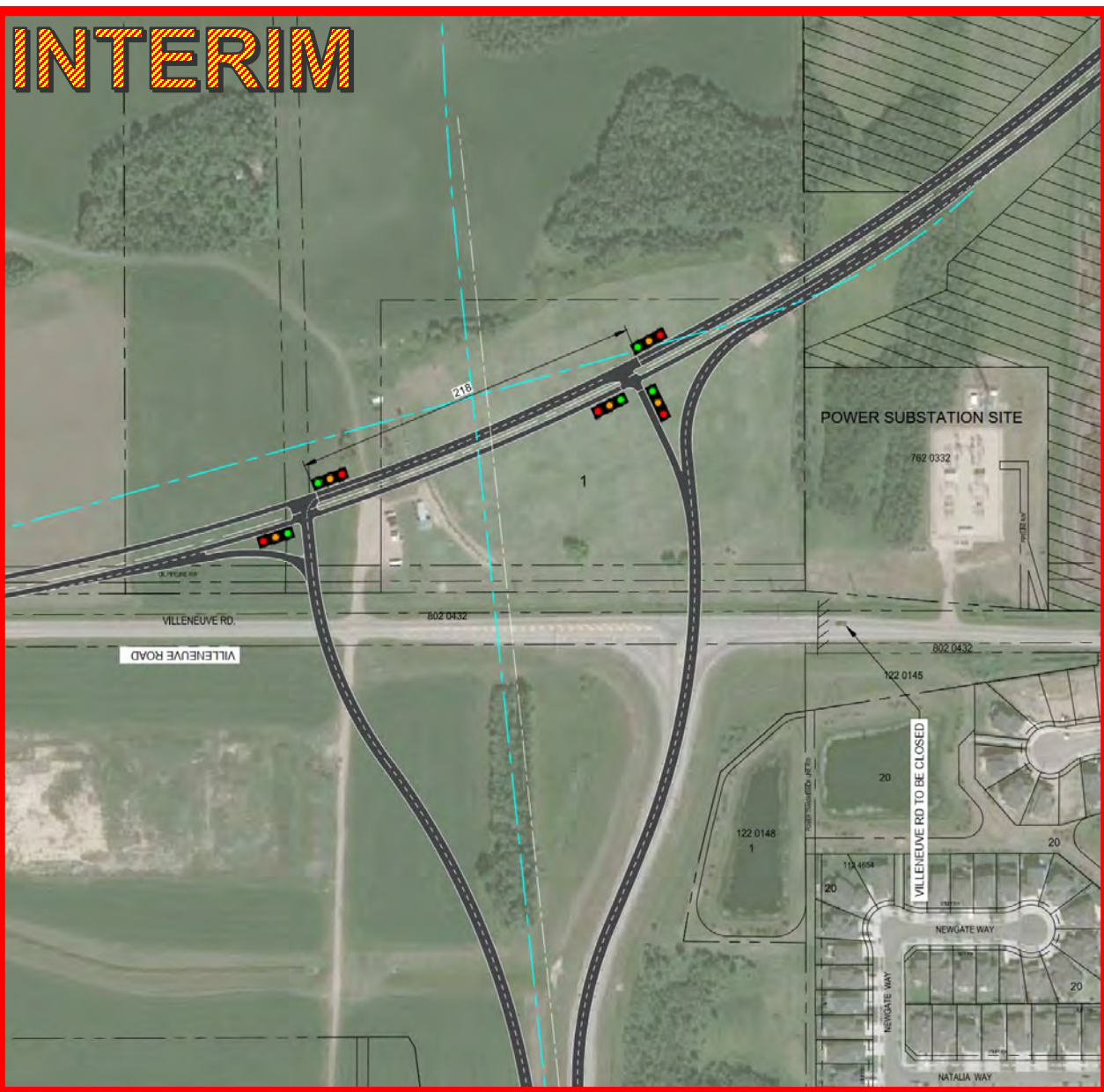


Option 2 (Roundabout / Diamond IC)



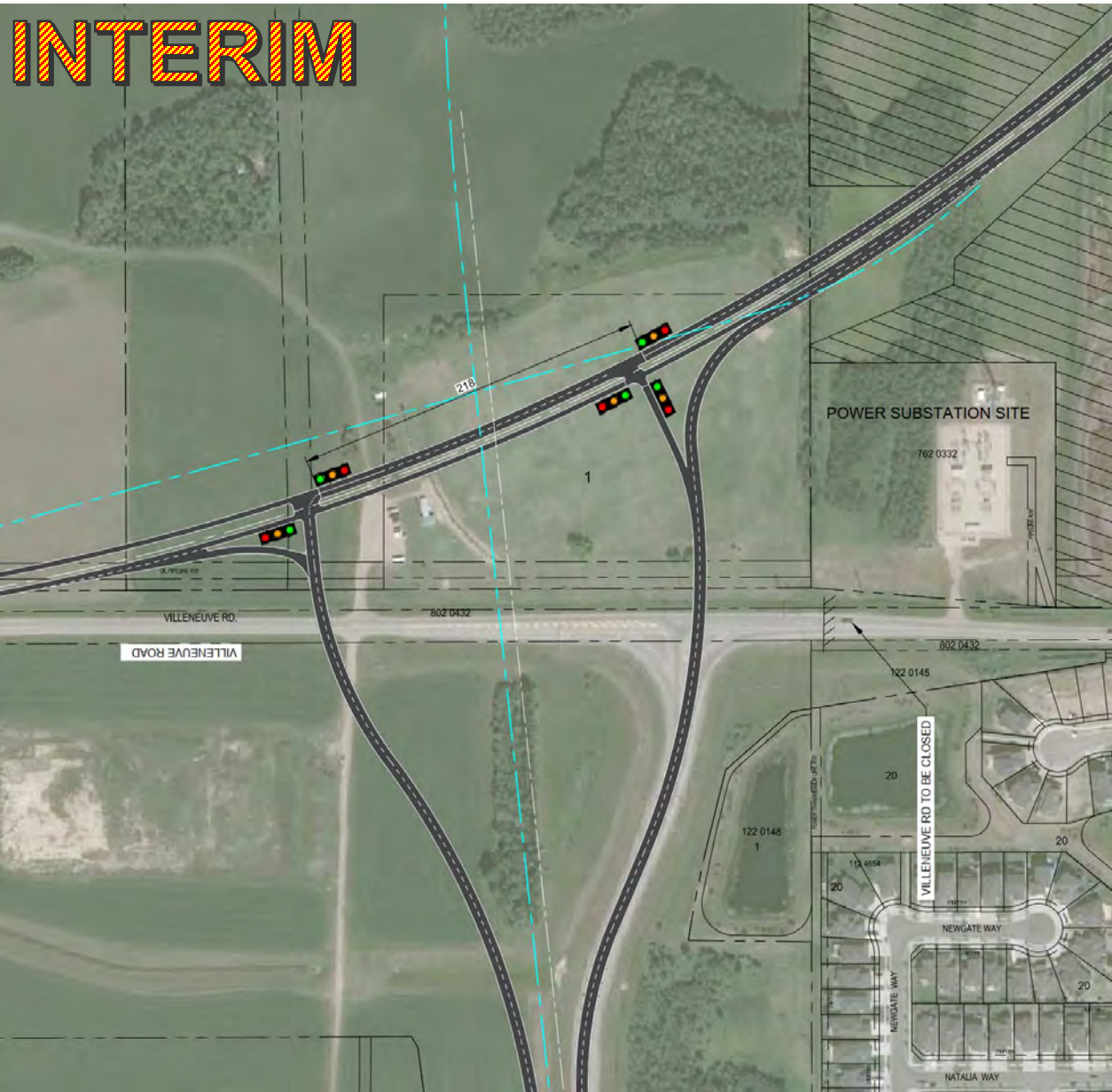


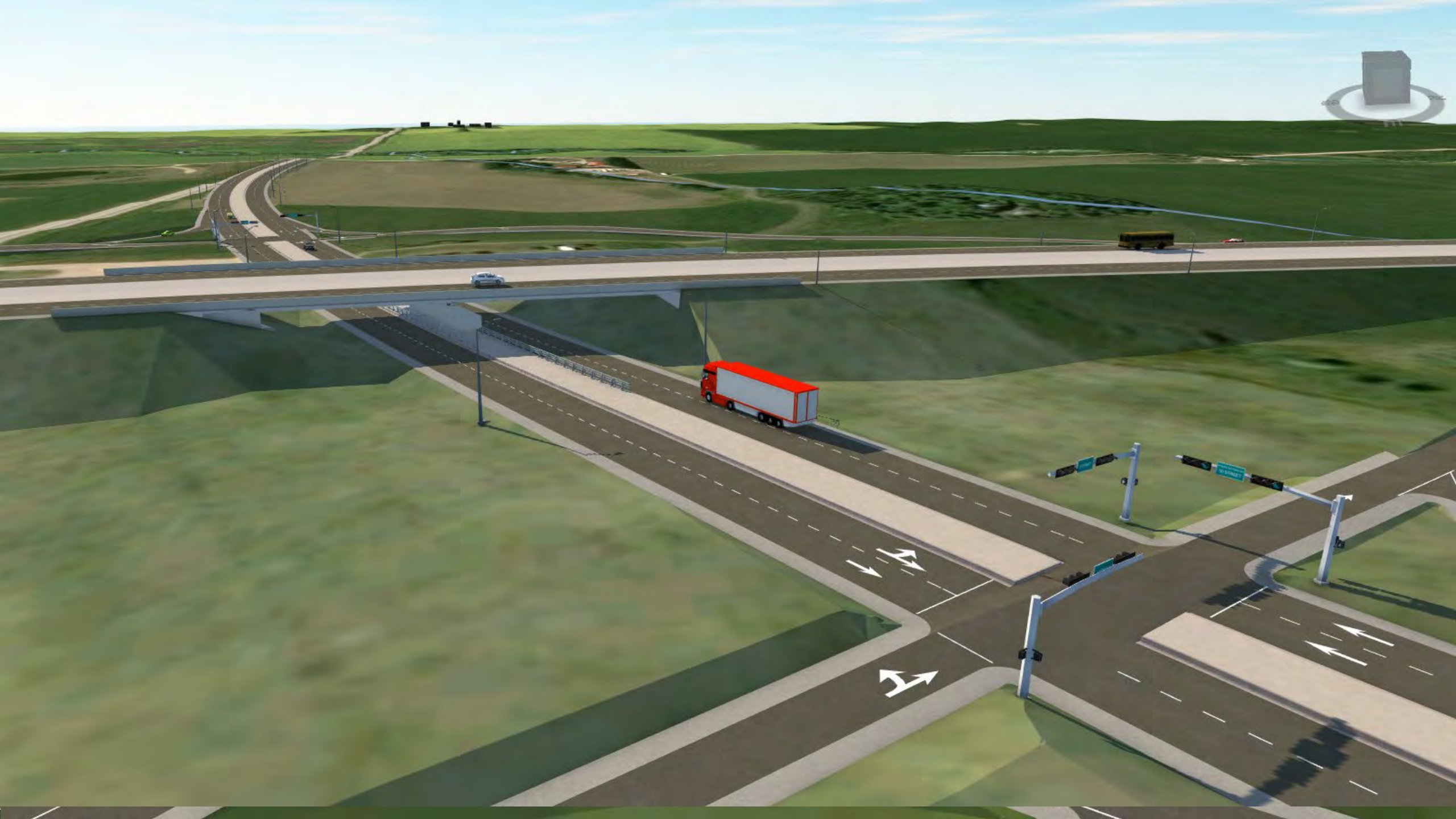
Option 3 (Couplet 2 x IS / Diamond IC)



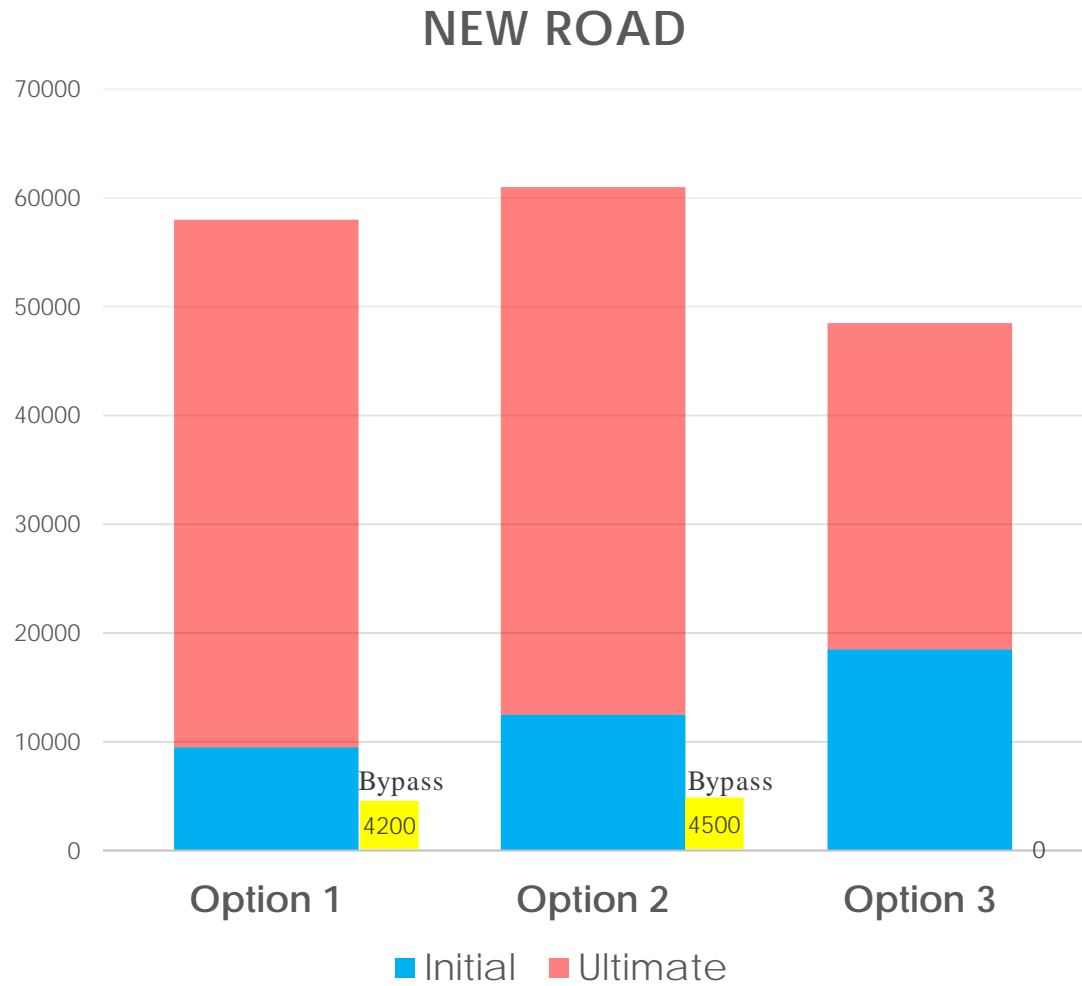


Option 3 (Couplet 2 x IS / Diamond IC)



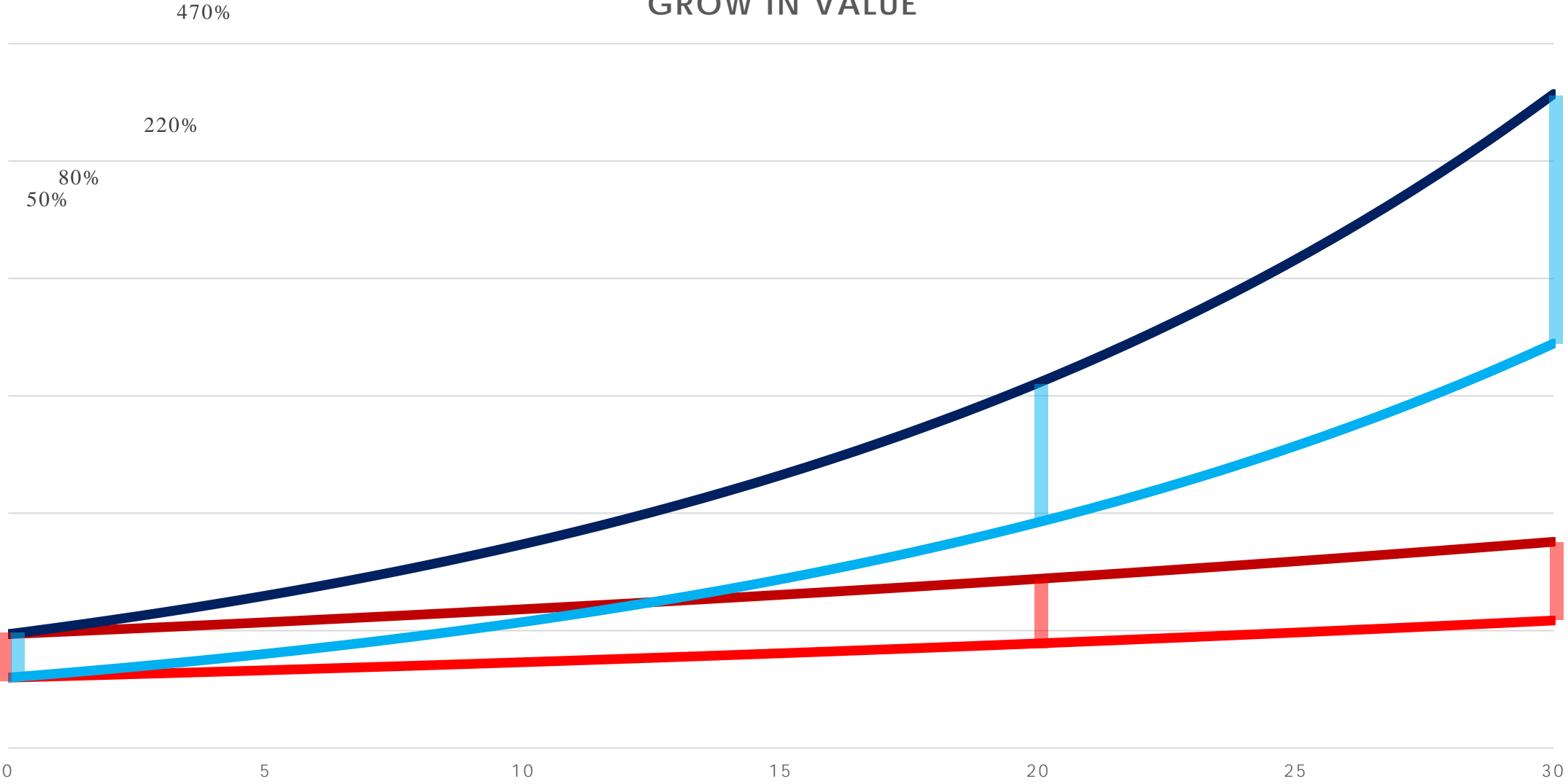


Comparison



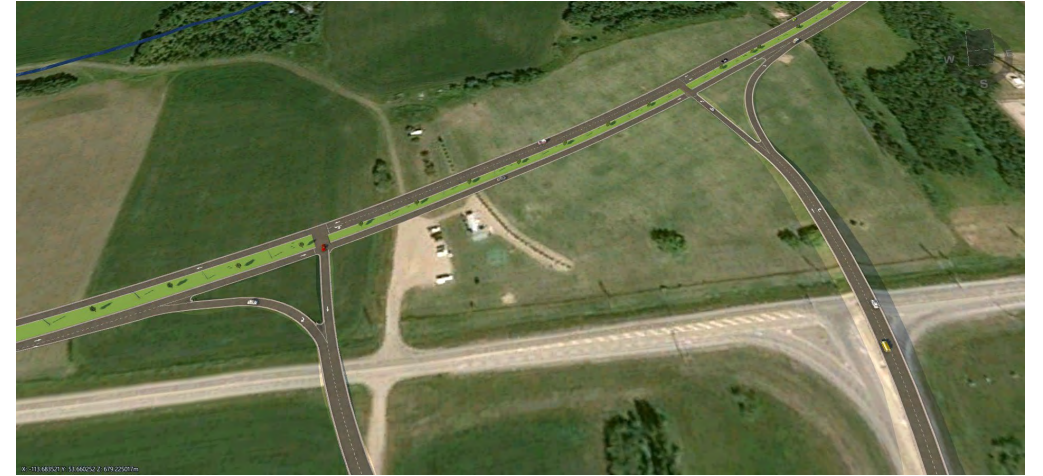
Comparison

GROW IN VALUE



Conclusion

1. Option 3 has the smallest total carbon footprint:
 - a) Land requirements are very similar to other options
 - b) Least amount of rework
 - c) Least amount of total new road surface
 - d) Most sustainable road



Closing

What role can a Geometric Designers play in creating sustainable roads?

1. Reduce carbon footprint by reducing required road surface
2. Design roads with future upgrades taken into consideration, and not just budget
3. Spending upfront can save a lot more overall.
4. Discussion with the road owner and the advantages of alternative designs



ACKNOWLEDGEMENTS:

Dean Schick C.E.T

City of St. Albert - *Manager of Transportation*

Sean Wills

City of St. Albert – *Transportation*

Christel Lope C.E.T

Associated Engineering – *Transportation Technologist*

Shawn Xue E.I.T

Associated Engineering - *Transportation Engineer-in-Training*



Questions?

Contact John Maree, mareej@ae.ca