

# Using a Priority Ladder to Aid Project Decision Making

Terwillegar Drive Stage 2  
Design and Construction

Presented by

Rob Gibbard, P.Eng, Senior Project Manager  
February 28, 2023



Engineering  
for people

A green rectangular street sign with white text and a white arrow pointing left. The sign is mounted on a white pole. The background shows a residential street with houses and trees under a blue sky with light clouds.

Terwillegar  
Drive



# What do you cut to stay within budget?

## Terwillegar Drive Stage 2 Design and Construction

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# Agenda

Terwillegar  
Drive program  
overview

Stage 2 project  
overview

Project Goals

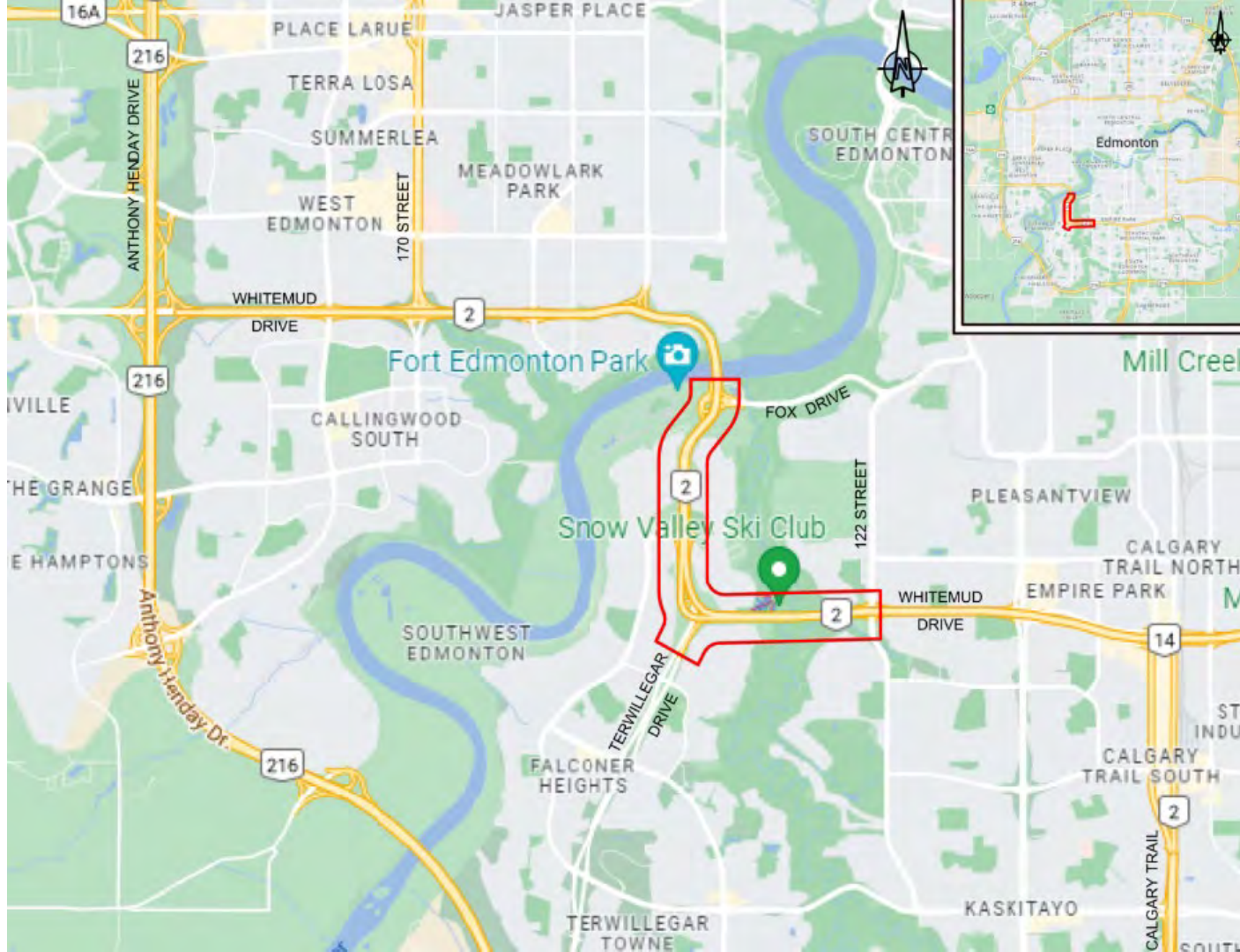
Priority ladder  
process

Priority ladder  
results

Conclusion

# 01

## TWD Program Overview



170 STREET

WINDERMERE BLVD

ANTHONY HENDAY DRIVE

RABBIT HILL ROAD



WHITEMUD DRIVE

HADDOW ROAD

23 AVENUE

TERWILLEGAR DRIVE

40 AVE

RIVERBEND RD

WHITEMUD DRIVE

RABBIT HILL ROAD

53 AVENUE

142 Street  
Pedestrian /  
Cyclist Bridge

Rainbow  
Valley  
Bridges

FOX DRIVE

ELLERSLIE ROAD

**LEGEND:**

- Stage 1
- Stage 2
- Stage 3
- Intersection
- Interchange
- 142 Street Pedestrian / Cyclist bridge
- Rainbow Valley Bridges

119 STREET

122 STREET

WHITEMUD DRIVE

170 STREET

WINDERMERE BLVD

ANTHONY HENDAY DRIVE

RABBIT HILL ROAD



WHITEMUD DRIVE

HADDOW ROAD

23 AVENUE

TERWILLEGAR DRIVE

40 AVE

RIVERBEND RD

WHITEMUD DRIVE

RABBIT HILL ROAD

Stage One

Terwillegar Drive Expressway  
(Anthony Henday Drive to Whitemud Drive)

- Northern Segment  
(Rabbit Hill Road to Whitemud Drive)
- South Segment  
(Anthony Henday Drive to Rabbit Hill Road)

142 Street  
Pedestrian /  
Cyclist Bridge

Rainbow  
Valley  
Bridges

53 AVENUE

FOX DRIVE

LEGEND:

- Stage 1
- Stage 2
- Stage 3
- Intersection
- Interchange
- 142 Street Pedestrian/  
Cyclist bridge
- Rainbow Valley Bridges

119 STREET

122 STREET

WHITEMUD DRIVE

170 STREET



WHITEMUD DRIVE

Stage Three

- Anthony Henday Drive Interchange Upgrades
- Terwillegar Drive / 170 Street Widening

WINDERMERE BLVD

ANTHONY HENDAY DRIVE

RABBIT HILL ROAD

HADDOW ROAD

23 AVENUE

TERWILLEGAR DRIVE

40 AVE

RIVERBEND RD

WHITEMUD DRIVE

RABBIT HILL ROAD

53 AVENUE

142 Street  
Pedestrian /  
Cyclist Bridge

Rainbow  
Valley  
Bridges

FOX DRIVE

ELLERSLIE ROAD

WHITEMUD DRIVE

119 STREET

122 STREET

LEGEND:

	Stage 1		142 Street Pedestrian/ Cyclist bridge
	Stage 2		Rainbow Valley Bridges
	Stage 3		
	Intersection		
	Interchange		



170 STREET

WINDERMERE BLVD

ANTHONY HENDAY DRIVE

RABBIT HILL ROAD



WHITEMUD DRIVE

- Stage Two
- Whitemud Drive / Terwillegar Drive Interchange Upgrades
  - Whitemud Drive Upgrades
  - Rainbow Valley Bridges Widening / Renewal  
Pedestrian / Cyclist Bridge over Whitemud Drive

HADDOW ROAD

23 AVENUE

TERWILLEGAR DRIVE

40 AVE

RIVERBEND RD

ELLERSLIE ROAD

RABBIT HILL ROAD

WHITEMUD DRIVE

142 Street  
Pedestrian /  
Cyclist Bridge

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Bridges

53 AVENUE

FOX DRIVE

- LEGEND:
- Stage 1
  - Stage 2
  - Stage 3
  - Intersection
  - Interchange
  - 142 Street Pedestrian/  
Cyclist bridge
  - Rainbow Valley Bridges

119 STREET

122 STREET

WHITEMUD DRIVE

# Terwillegar Drive Stage 2

## Ultimate Concept Plan

- Widen Whitemud Drive westbound to 4 lanes between 122 Street and Terwillegar Drive
- Widen Whitemud Drive eastbound to 5 lanes between Terwillegar Drive and 122 Street
- Widen and rehabilitate the Rainbow Valley bridges
- Reconfigure and widen the Terwillegar Drive/Whitemud Drive Interchange
- Add bus on shoulder lane from Fox Drive to 53 Avenue
- Add bus only lane from 53 Avenue to Terwillegar Drive



# Terwillegar Drive Stage 2

## Ultimate Concept Plan

- Adds noise barriers on east and west side of Whitemud Drive as needed
- Add a separate pedestrian/cyclist bridge over Rainbow Valley and over Whitemud Drive at 142 Street
- Add retaining walls and safety improvements as needed throughout
- Replace removed trees and landscaping
- Adjust streetlighting and stormwater infrastructure as needed
- Relocate impacted utilities



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## Stage 2 Project Goals

# Stage 2 Project Goals

## Primary Goal

*The primary goal of the Terwillegar Drive expansion plan is to provide for the efficient and safe movement of all users, including transit users, motorists, pedestrians, and cyclists, as well as to alleviate congestion.*



# Stage 2 Project Goals

## Overarching goals

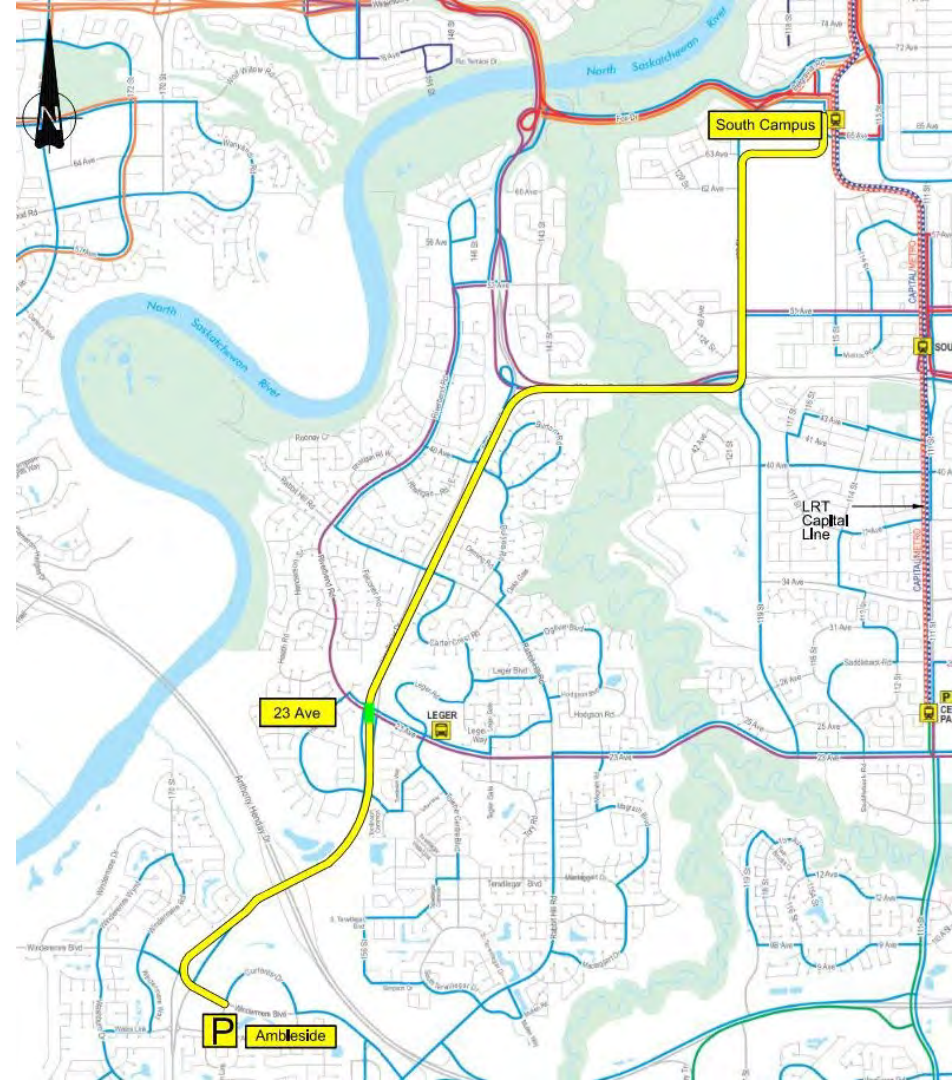
- Accommodate future traffic demand
- Reduce congestion and delays and improve safety.



# Stage 2 Project Goals

## Overarching goals

- Accommodate future traffic demand
- Reduce congestion and delays and improve safety.
- Accommodate rapid-bus service to minimize travel times and improve transit reliability.



# Stage 2 Project Goals

## Overarching goals

- Accommodate future traffic demand
- Reduce congestion and delays and improve safety.
- Accommodate rapid-bus service to minimize travel times and improve transit reliability.
- Improve facilities for pedestrians and cyclists.





# Stage 2 Project Goals

## Rainbow Valley Bridge Goals

- Extend the service life of the bridges by 50 - 75 years.
- Bring the bridges up to current standards.
- Enhance safety for motorists and pedestrians.
- Preserve and enhance the environment



# Stage 2 Project Goals

## Design Consultant Goals

- Achieve the best value approach for design within the City's available funding envelope
- Minimize capital and lifecycle costs of the bridges
- Optimize the design and constructability of the project.
- Minimize construction and detouring impacts for all users



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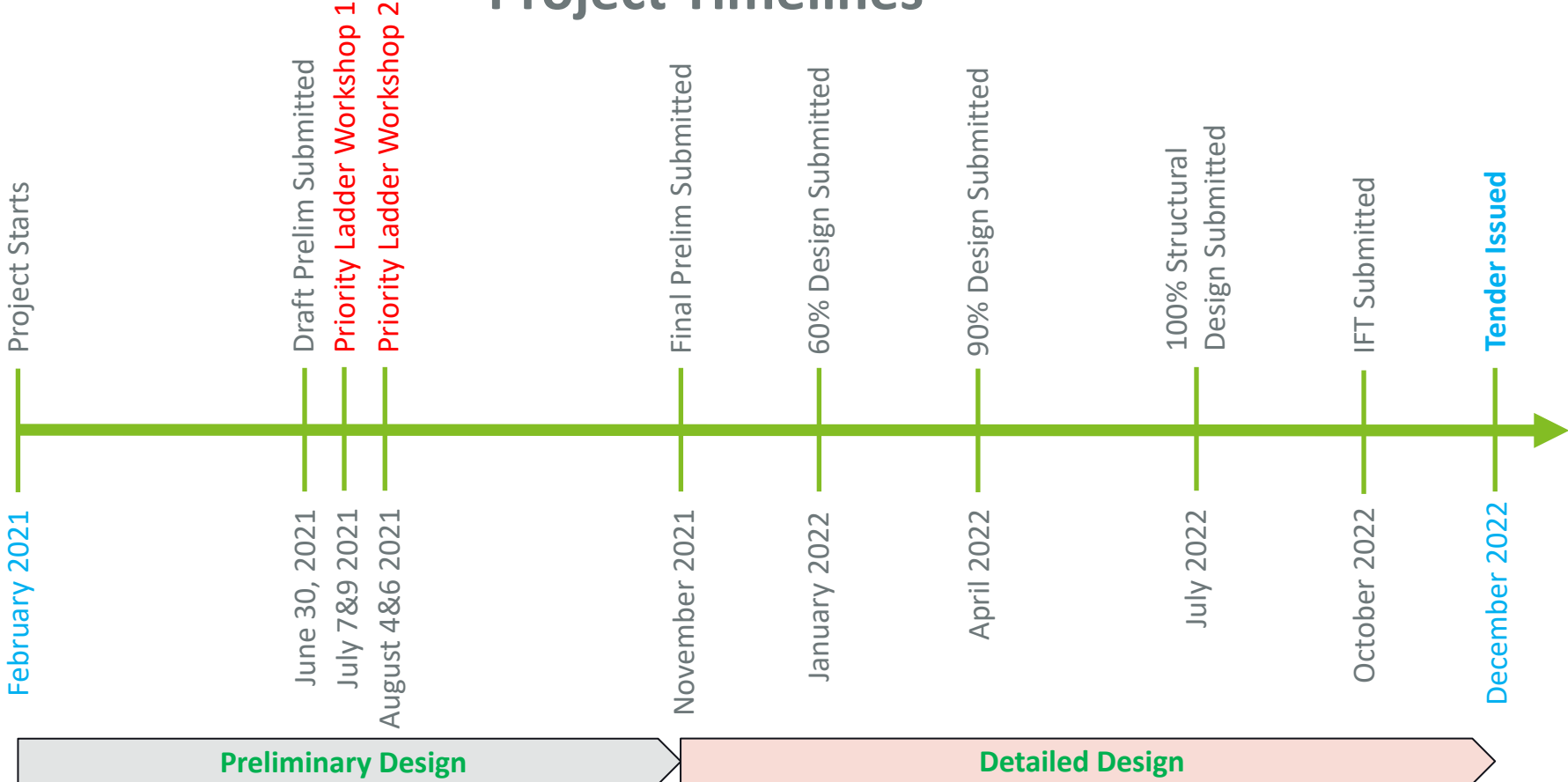
## Priority Ladder Process

# Priority Ladder

- Arrive at an Interim Plan within the fixed budget
- Use Value Engineering to refine the design
- Define critical evaluation parameters
- Establish relative priorities of project elements



# Project Timelines



# High Level Process

Develop discrete geographic packages of work that could be constructed independently



Develop construction cost estimates



Develop evaluation criteria and supporting data for each package

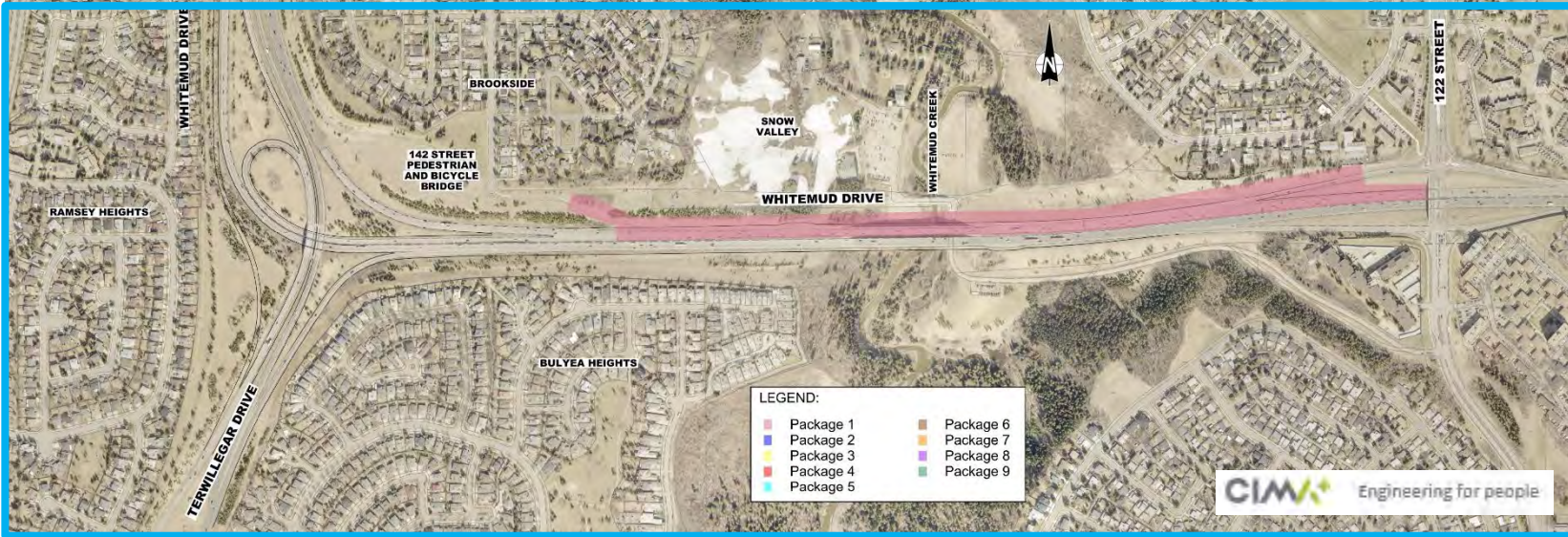


Hold a Value Engineering review to refine the details for each package



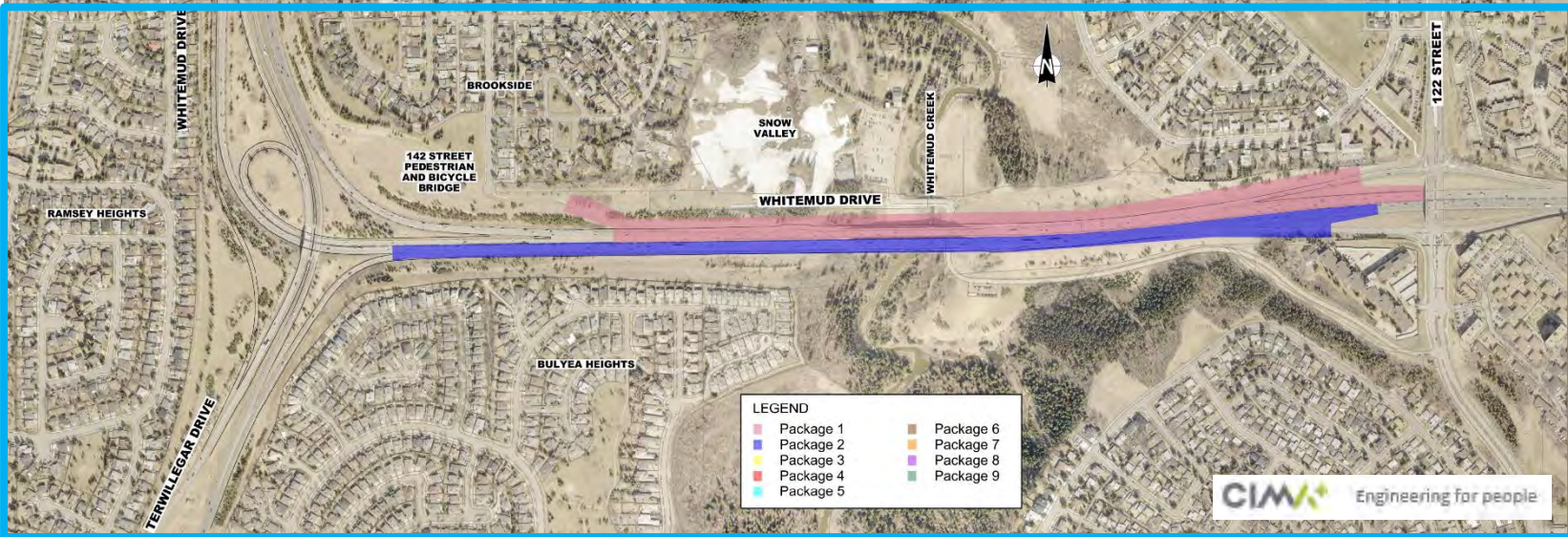
Hold final priority workshop to identify the Interim plan



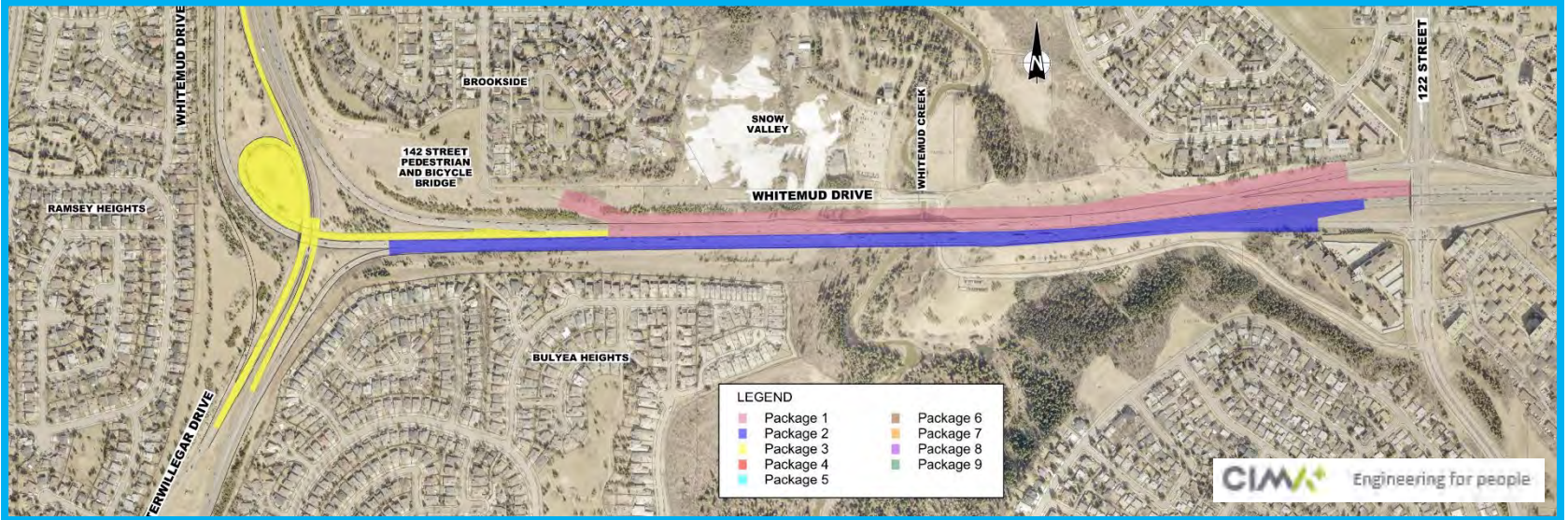


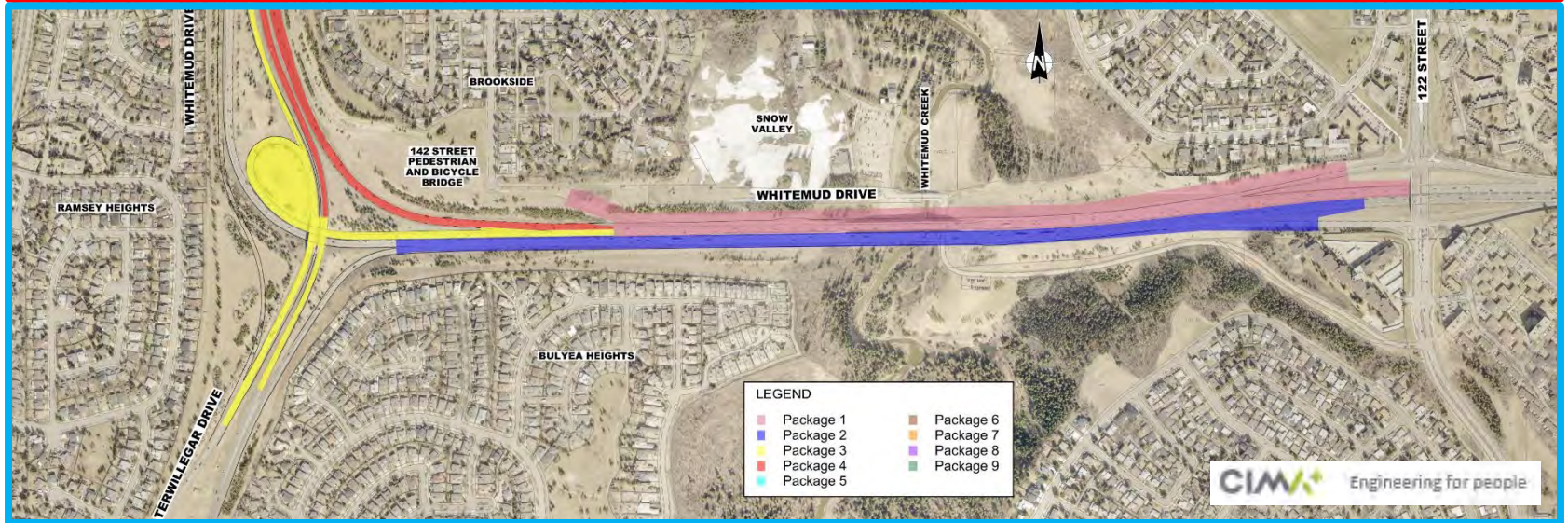
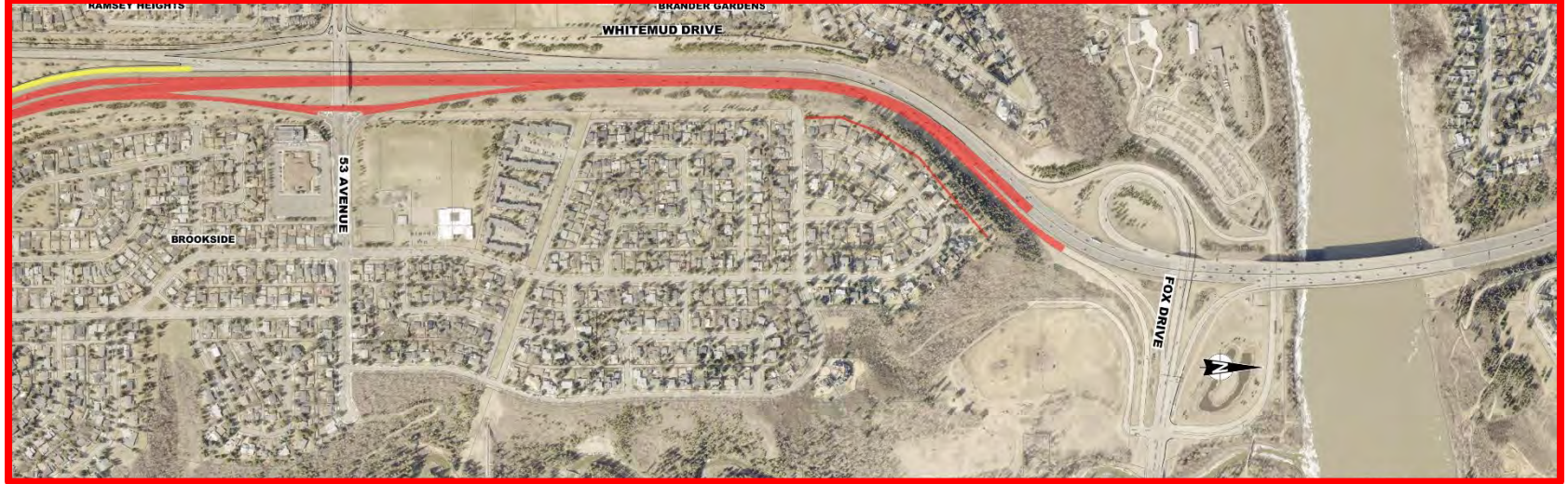
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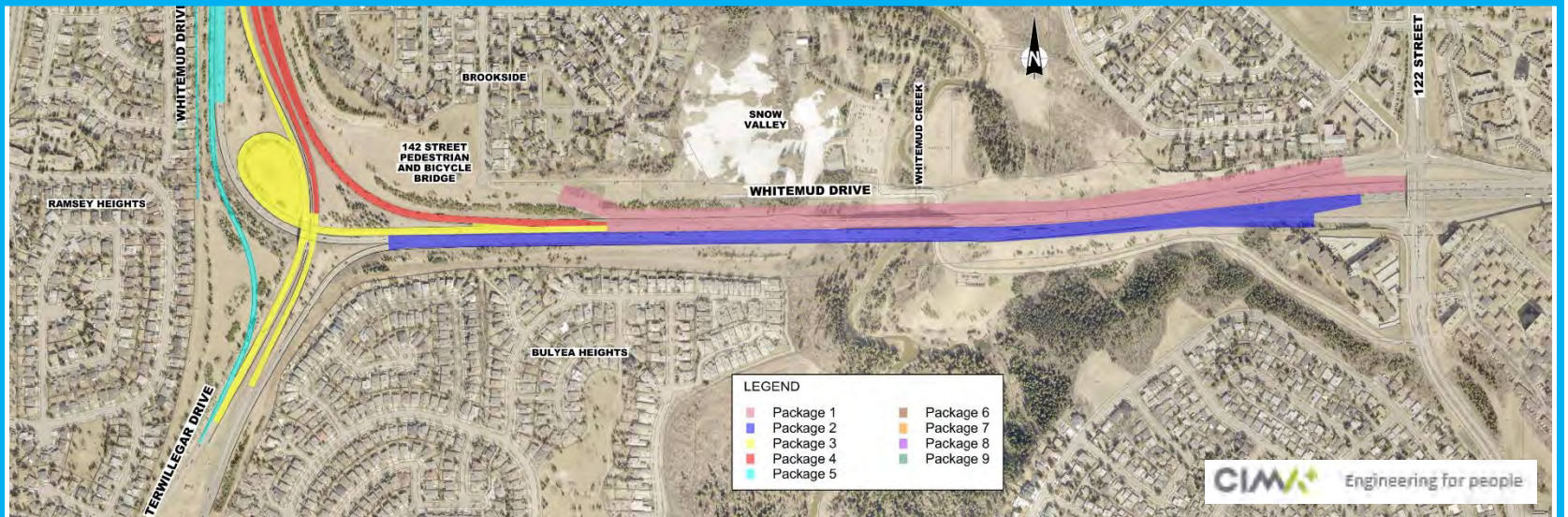
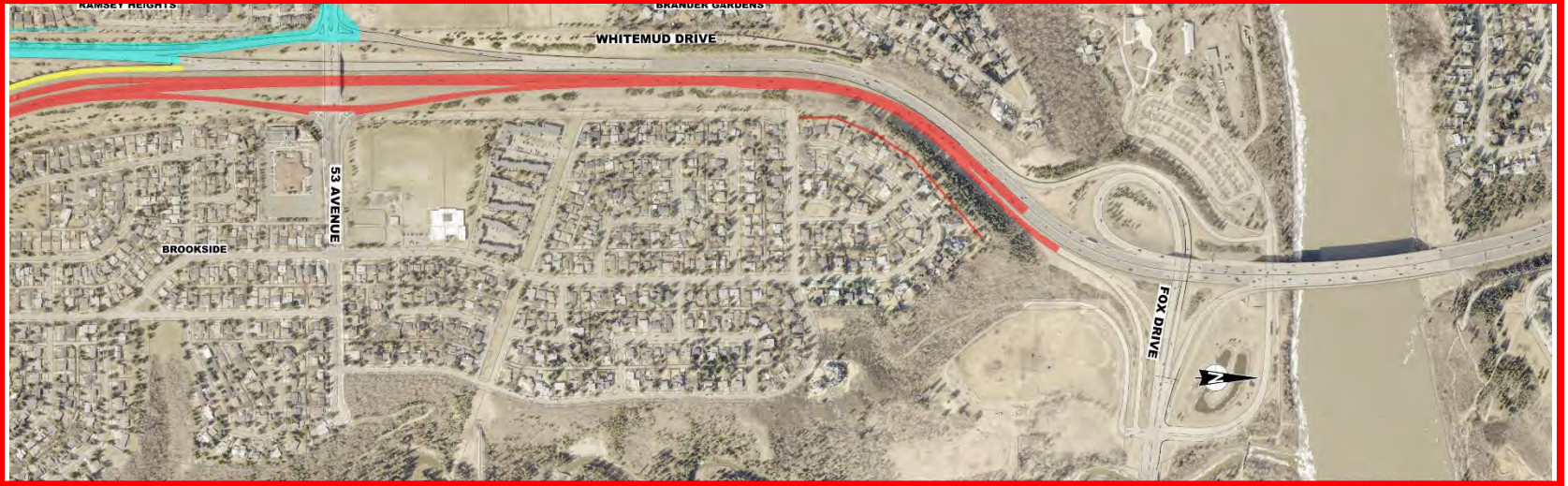
- Package 1
- Package 2
- Package 3
- Package 4
- Package 5
- Package 6
- Package 7
- Package 8
- Package 9

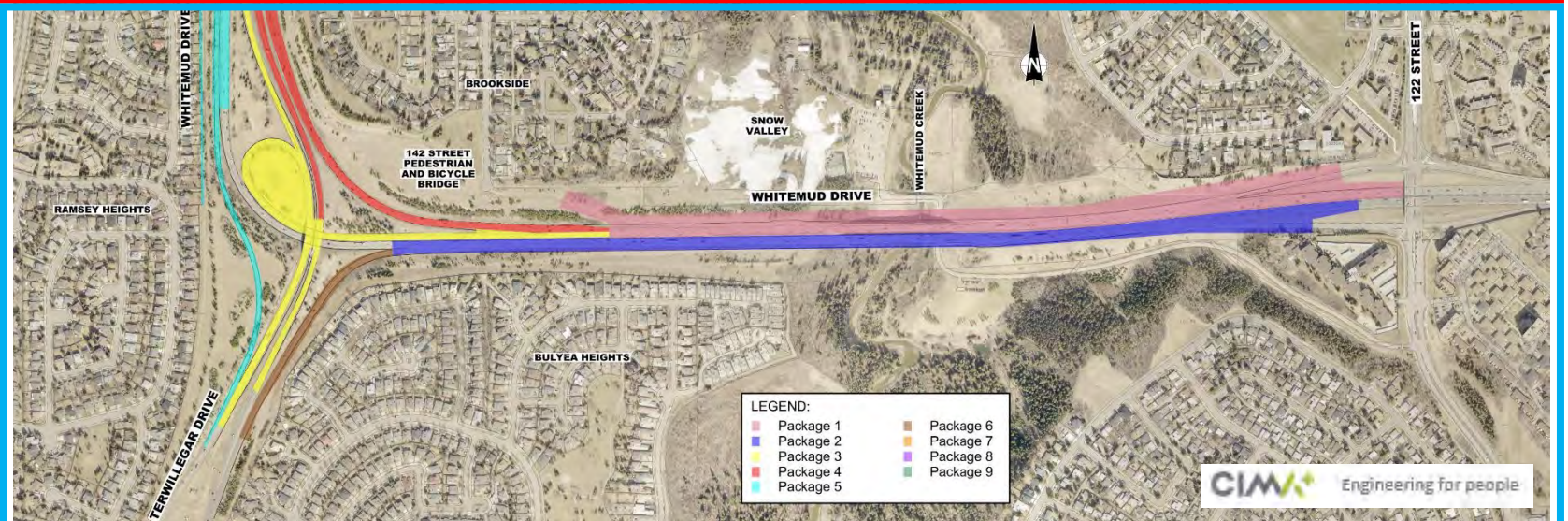


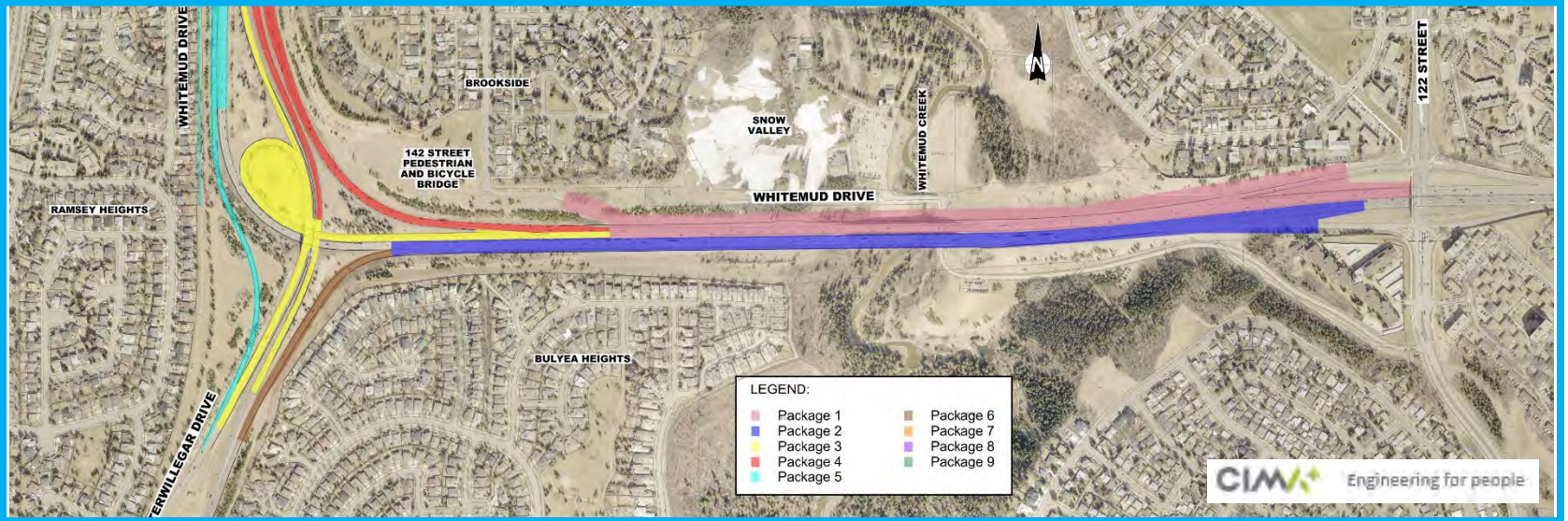
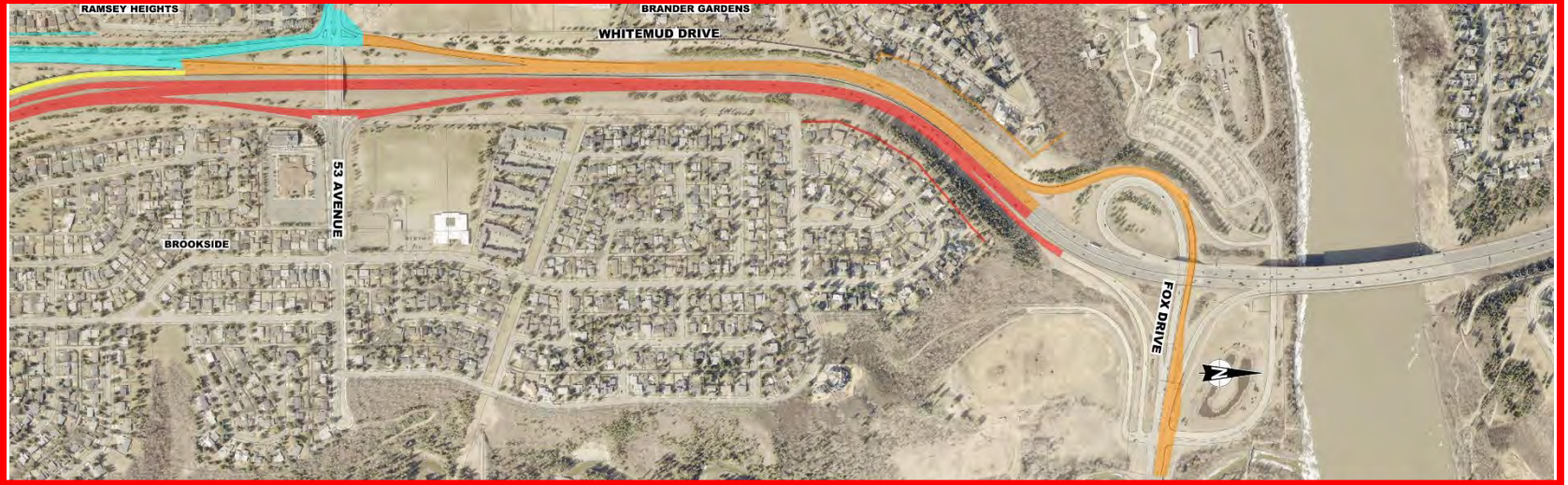


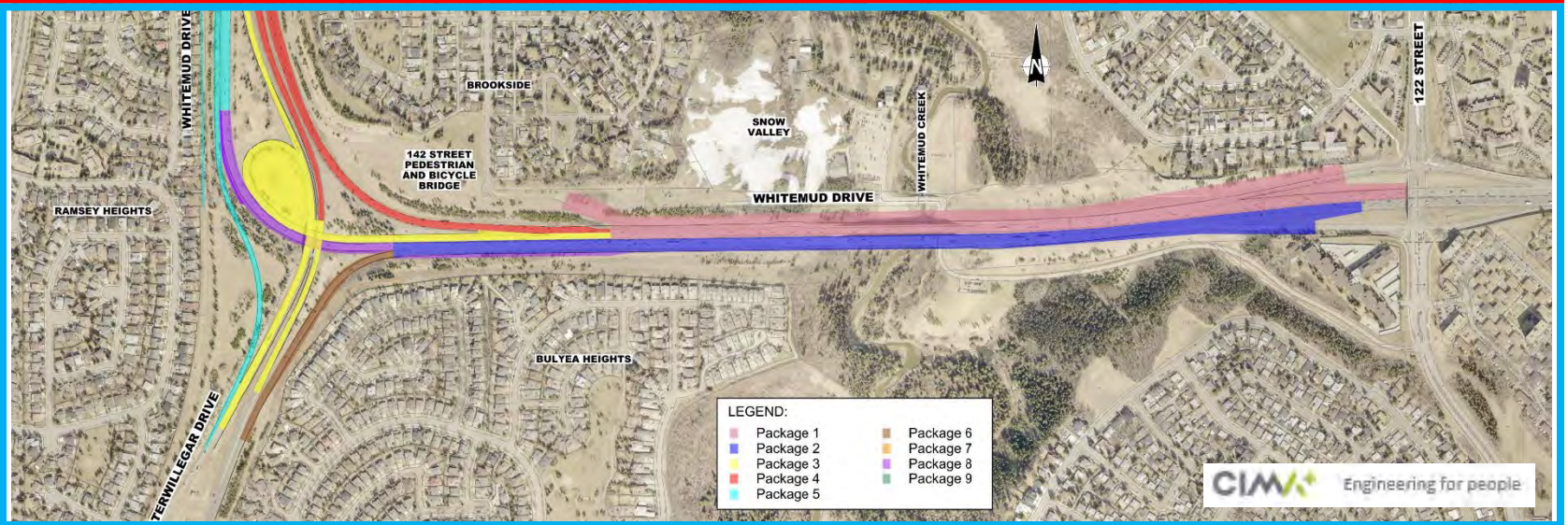
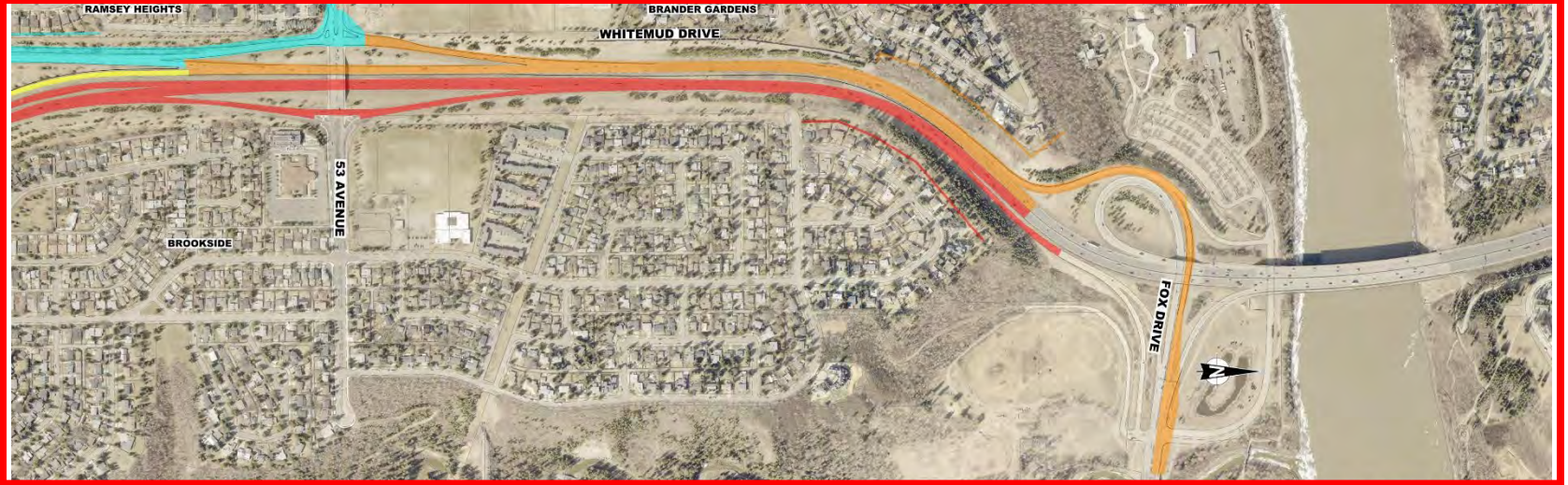


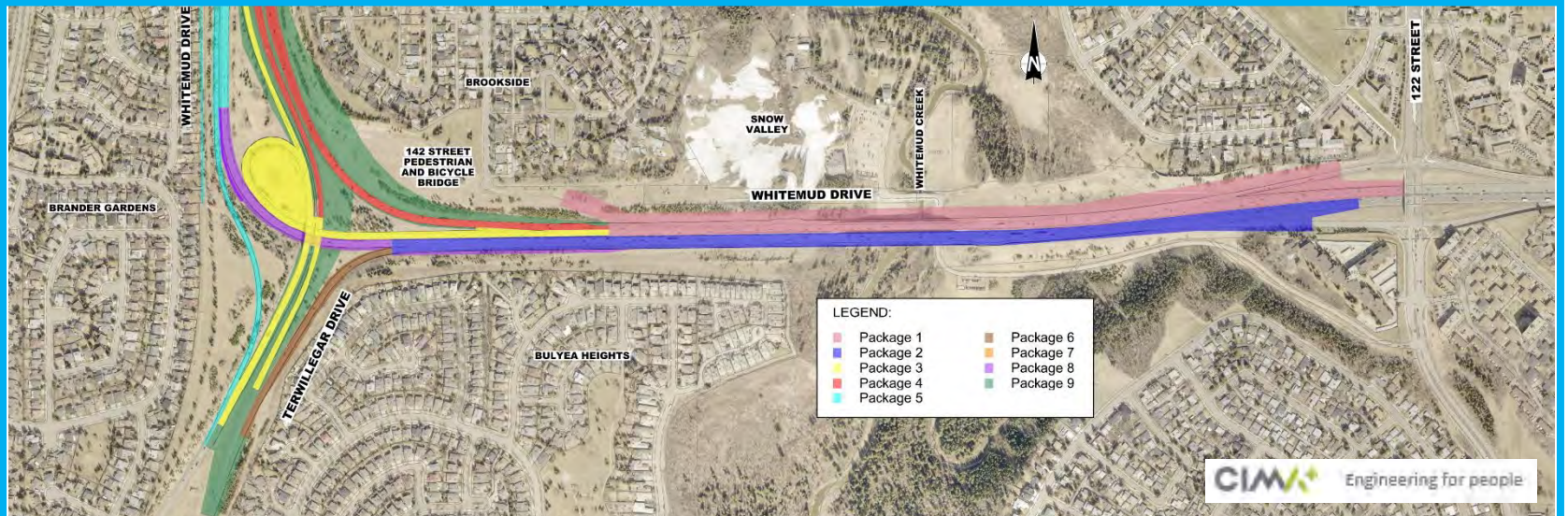
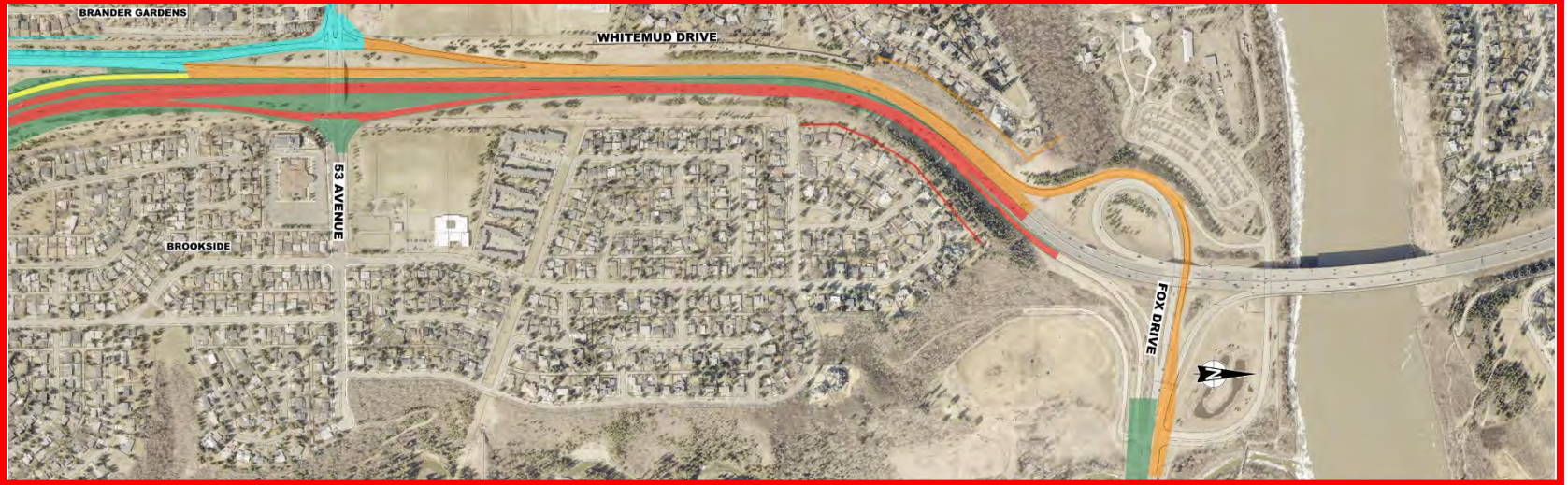












# Value Engineering Steps

1. Information Phase – Define the project, packages, goals and costs for all participants
2. Functional Analysis – explore objectives that the project is trying to achieve
3. Creativity Phase – explore ways to improve each package
4. Evaluation Phase – evaluate the ideas, group and eliminate those that may not be helpful
5. Development Phase – develop the ideas further between workshops
6. Proposal Evaluations – review final ideas and agree on those to advance into the design.



# Value Engineering | Functional Analysis



Restated project goals to bring meaning for the group



Developed 31 functions that the project must meet



Grouped the functions into 6 overall functions

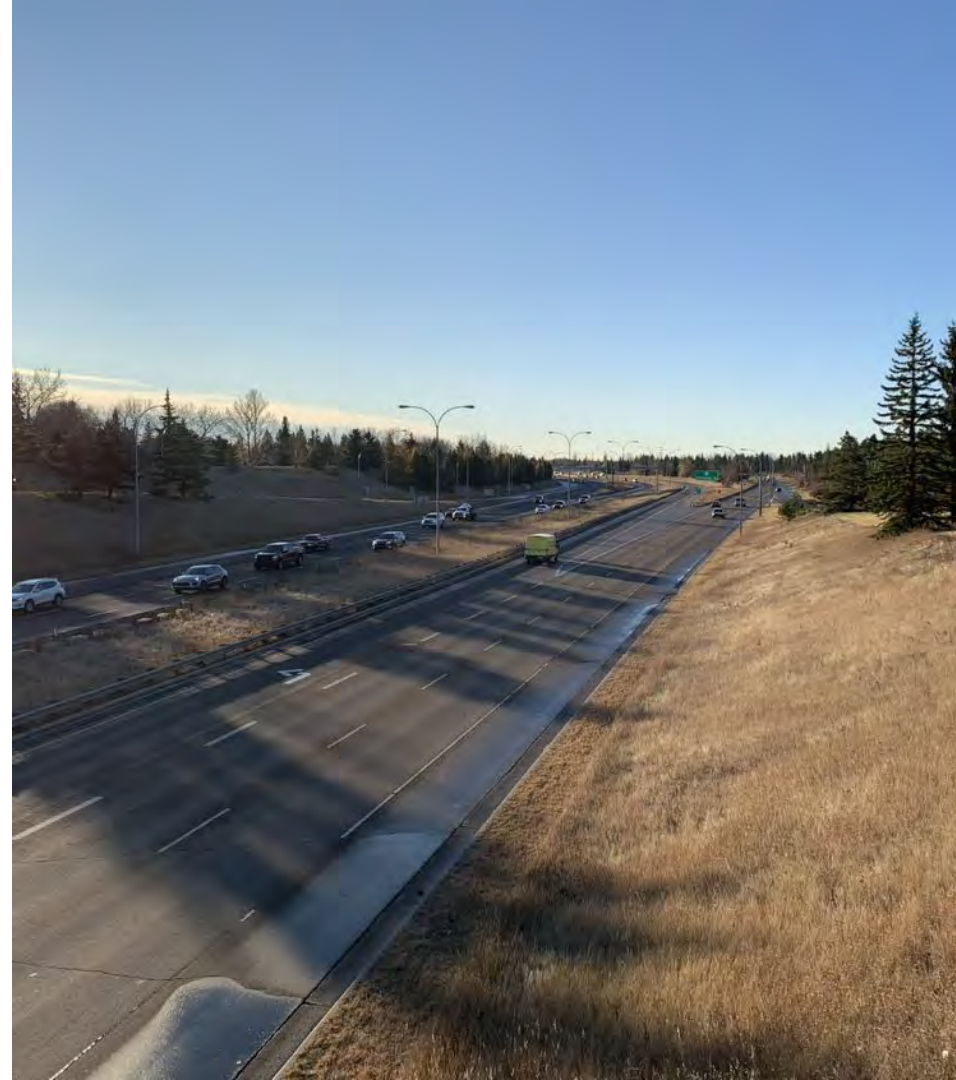
# Value Engineering | Overall Functions

- Improve safety
- Reduce congestion
- Accommodate transit
- Accommodate pedestrians
- Improve Asset
- Preserve Environment

# Value Engineering

## Creativity Phase

- Examined work packages and brainstormed 222 improvement ideas
- Filtered these down to 22 proposals to examine in more detail



# Value Engineering

## Evaluation Phase

- The 22 improvement proposals were evaluated with a goal to reduce construction delays and reduce costs.
- Resulting in a total of 12 approved proposals that could be included in the design
- Additional work was completed on the approved proposals between workshops



# Value Engineering

## Approved Proposal Themes

- Supply Chain issues
- Early works
- Modify Design to save money
- Reimagine Package 7
- Delete walls and impact trees



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## Priority Ladder Results

# Priority Ladder Results

## Guiding Statements Considered

- Build what has been promised to the public
- Build more than promised if surplus budget exists
- Minimize throwaway costs between this phase and the ultimate phase
- Little desire to increase budget

# Priority Ladder Results

Work Packages	Option 1	Option 2	Option 3	Option 4	Option 5
Packages 1 to 6	\$59,200,000	\$65,400,000	\$65,400,000	\$65,400,000	\$65,400,000
Package 7	\$7,000,000	\$7,000,000	\$7,000,000	N/A	N/A
Package 8	\$3,000,000	N/A	N/A	N/A	N/A
Package 9	\$32,700,000	N/A	N/A	N/A	N/A
Package 9a	N/A	N/A	\$15,000,000	N/A	\$15,000,000
Subtotal	\$101,900,000	\$72,400,000	\$87,400,000	\$65,400,000	\$80,400,000
Drainage	\$5,000,000	\$5,000,000	\$5,000,000	\$5,000,000	\$5,000,000
Trees	\$8,000,000	\$8,000,000	\$8,000,000	\$8,000,000	\$8,000,000
Total	\$114,900,000	\$85,400,000	\$101,400,000	\$78,400,000	\$93,400,000

Packages 1 through 6 were considered CORE to the project.

\*Packages 3 and 4 are excluded if Package 9 is included

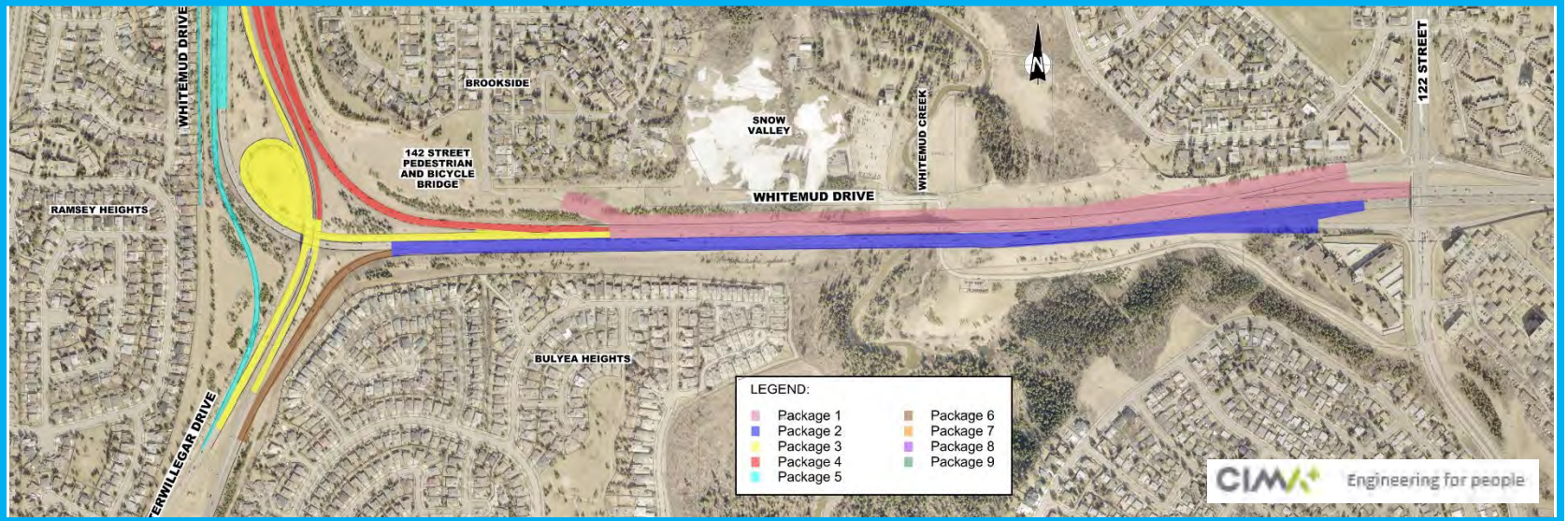
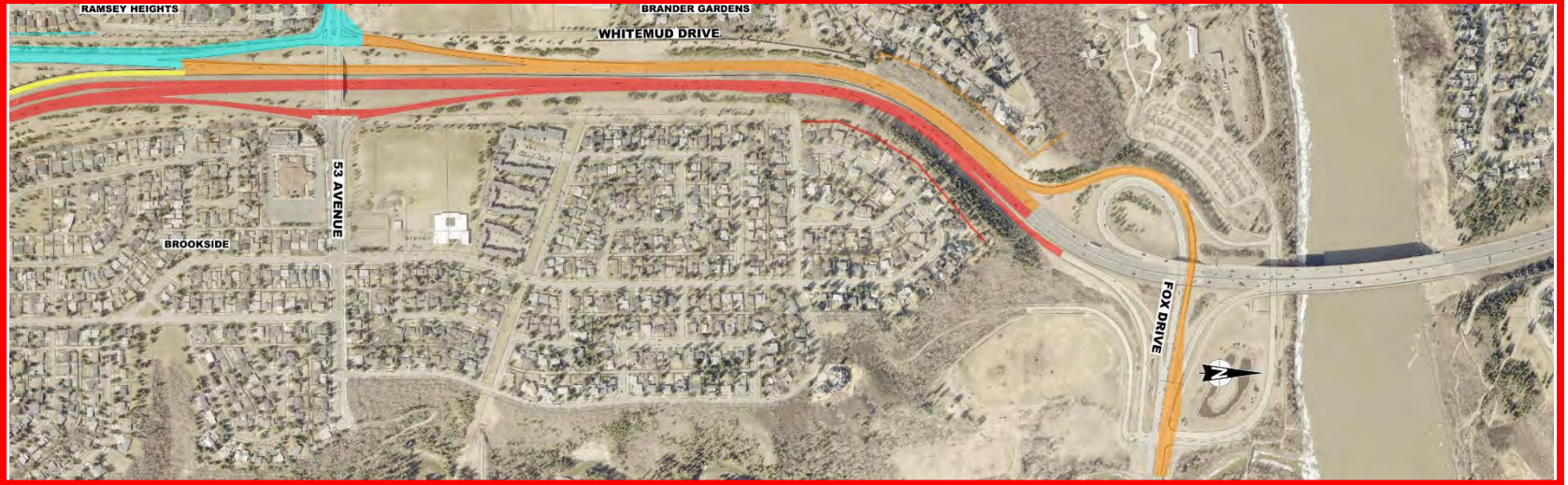


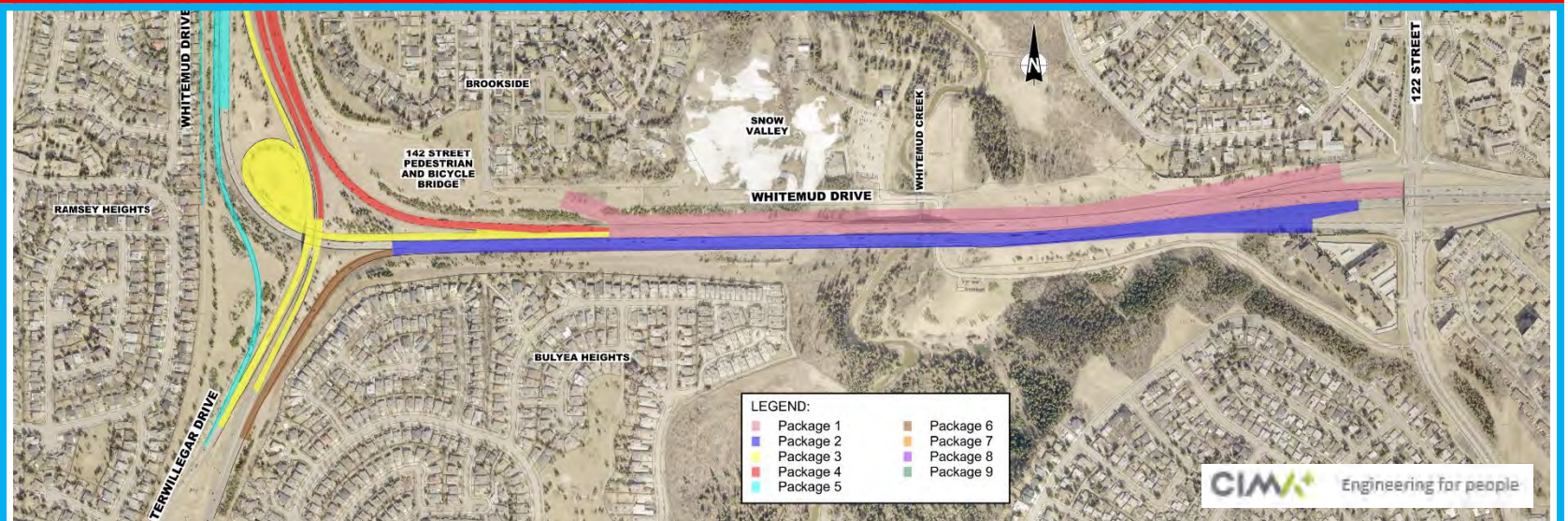
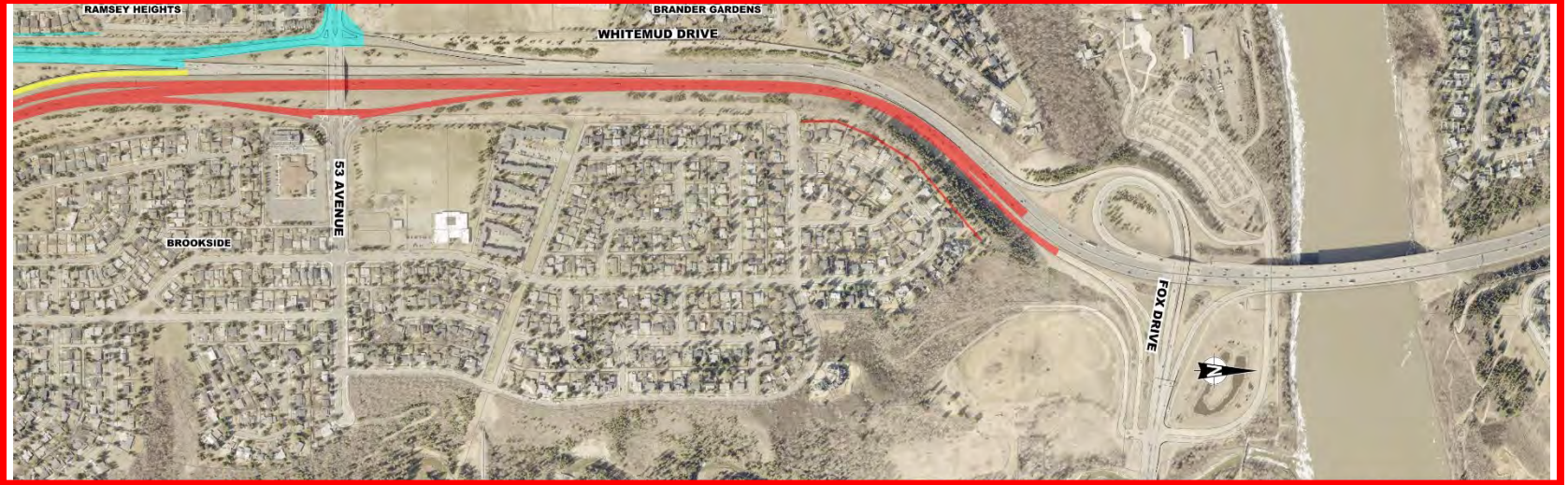
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## Conclusions

# Conclusions

- The scope within projects sometimes needs to be reduced due to budgetary constraints
- A systematic Value Engineering approach to changing or removing project elements can help identify issues with the design and can reduce costs
- Working through a deliberate evaluation of the project elements will help identify what is most important for the project
- The priority ladder process acknowledges and provides the above, while gaining buy-in with your client and the decision makers

