Alaska Department of Transportation & Public Facilities

Chena River Bridge at University Ave

Jesse Escamilla III, P.E., S.E.

September 7th, 2017

Keep Alaska Moving through service and infrastructure

Project Team

Owner

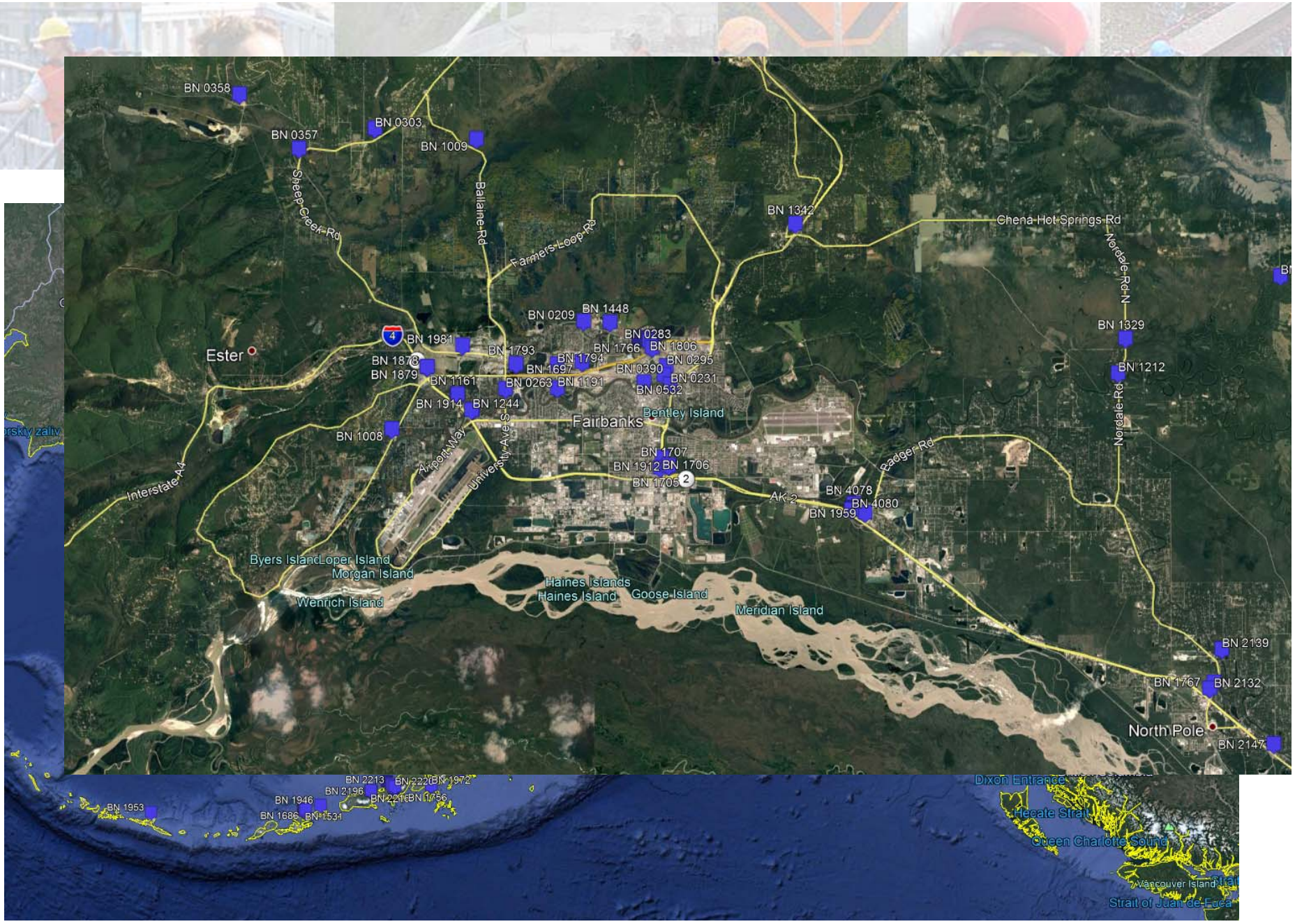
Prime Contractor

Bridge Sub Contractor

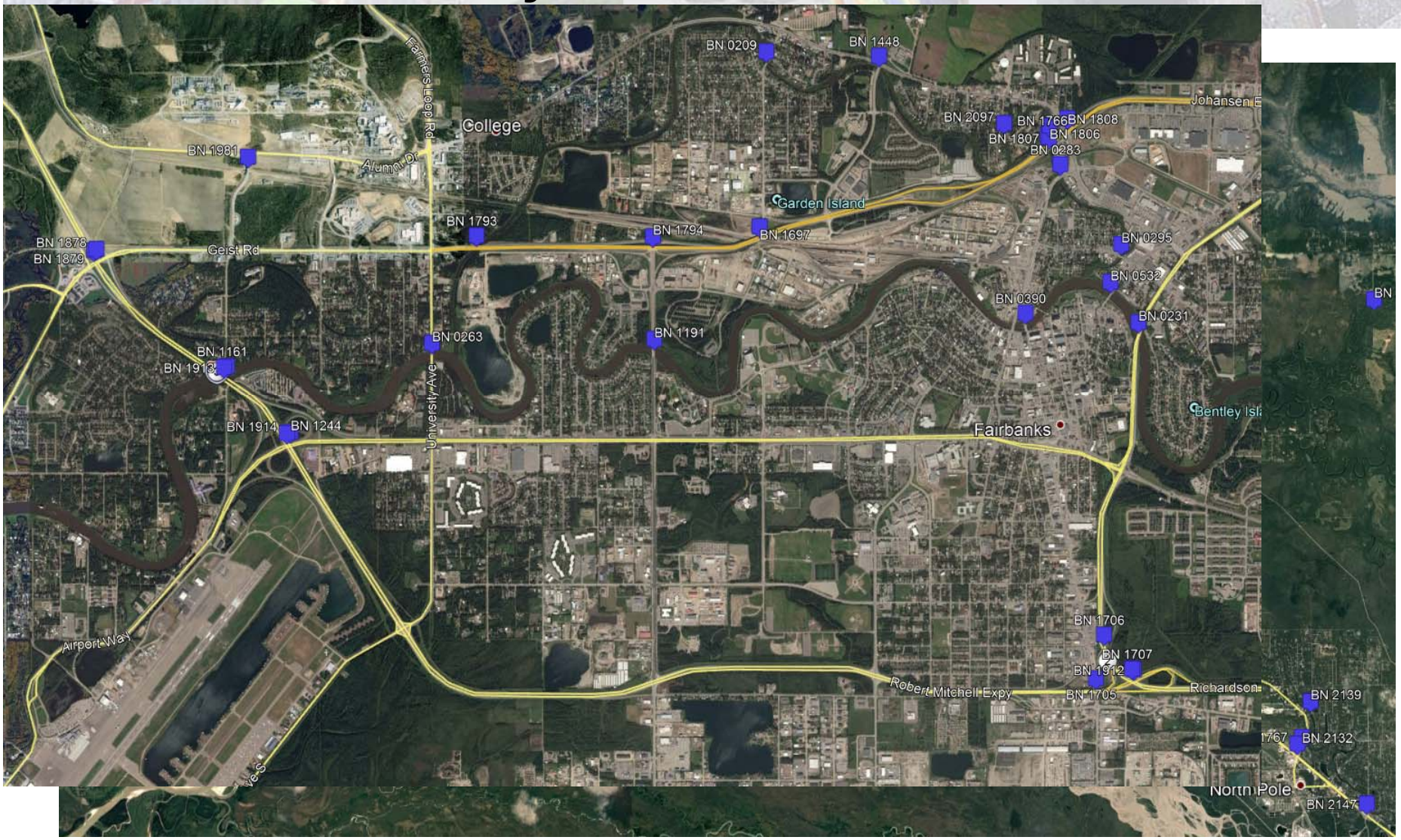
CMGC Facilitator

Civil Engineer

Independent Cost Estimator


BN 0358
BN 0357
BN 0303
BN 1009
Sheep Creek Rd
Ballaine Rd
Farmers Loop Rd
BN 1342
Chena Hot Springs Rd
Nordale Rd N
BN 1329
BN 1212
Nordale Rd
BN 0209
BN 1448
BN 0283
BN 1766
BN 1806
BN 1794
BN 0295
BN 1697
BN 0390
BN 0231
BN 0263
BN 1191
BN 0532
BN 1981
Ester
BN 1878
BN 1879
BN 1161
BN 1793
BN 1914
BN 1244
Fairbanks
Bentley Island
BN 1008
Airport Way
University Ave S
Badger Rd
BN 1707
BN 1912
BN 1706
BN 1705
AK 2
BN 4078
BN 4080
BN 1959
Interstate A4
Byers Island
Loper Island
Morgan Island
Wenrich Island
Haines Islands
Haines Island
Goose Island
Meridian Island
BN 2139
BN 1767
BN 2132
North Pole
BN 2147
BN 2213
BN 2221
BN 1972
BN 2196
BN 1946
BN 2211
BN 1756
BN 1953
BN 1686
BN 1534
Dixon Entrance
Hecate Strait
Queen Charlotte Sound
Vancouver Island
Strait of Juan de Fuca

Project Location



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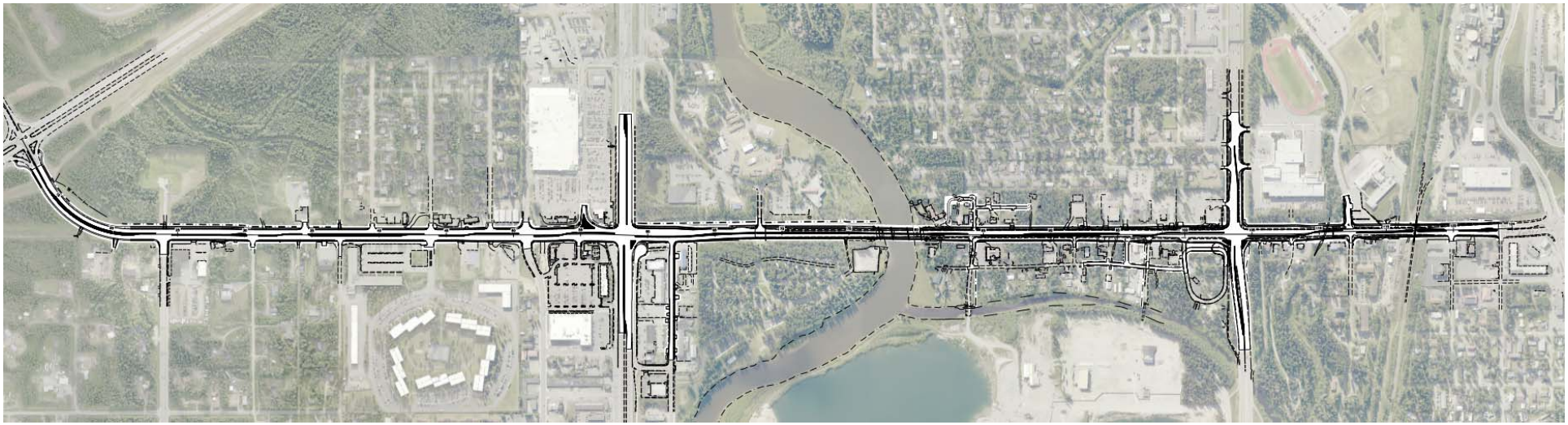


Project Background

Project has been kicked around for 30+ years:

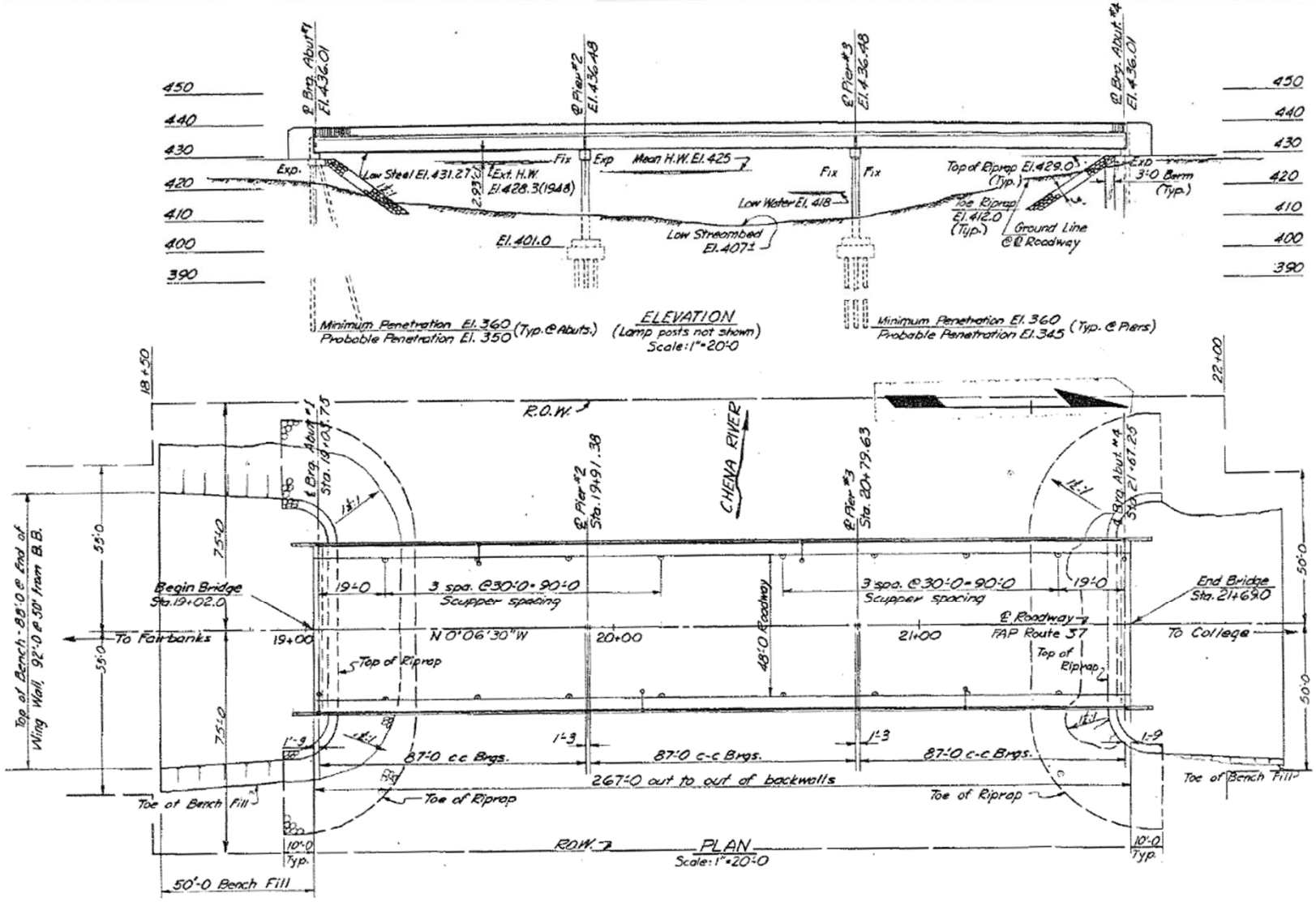
- 11/18/1985 - Original ATP.
  - Original scope – Widen University Ave to 5 Lanes with intersection improvements.
- 1993 – Preliminary Geotech Report
- 2007 – Preliminary Cost Estimate
- 2010 – Value Engineering Study
- May 2015 – CMGC Kickoff meeting
- June 2015 – RFP Released
- September 2015 – Contractor Selected

Project Background

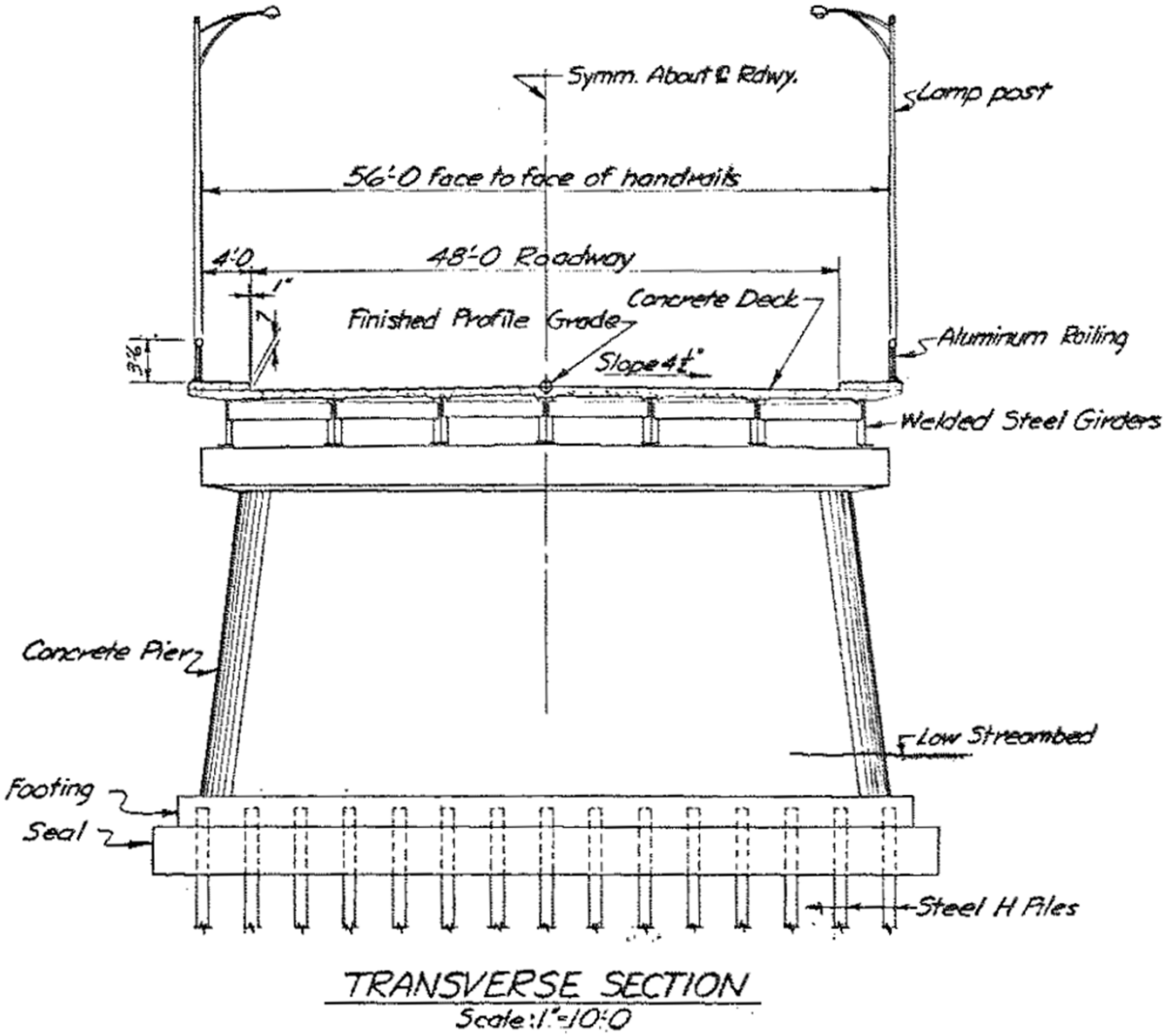
Departments Purpose – Improve **safety** and **mobility** through this high-volume route. Proposed improvement include:

- Widening University Ave to include a raised center median
- Addition of left turn lanes at non-signalized intersections
- Expansion of intersections
- **Replacement of functionally obsolete Chena River Bridge**
- **Addition of 4’-6” Shoulders**
- **Sidewalk expansion; 8’-0” on the West and 6’-0” on the East side of University Ave**
- Relocation of driveways
- Side street improvements

Existing Bridge



Existing Bridge



TRANSVERSE SECTION
Scale: 1"=10'-0

Existing Bridge

Existing Bridge

Existing Bridge

Existing Bridge

Existing Bridge

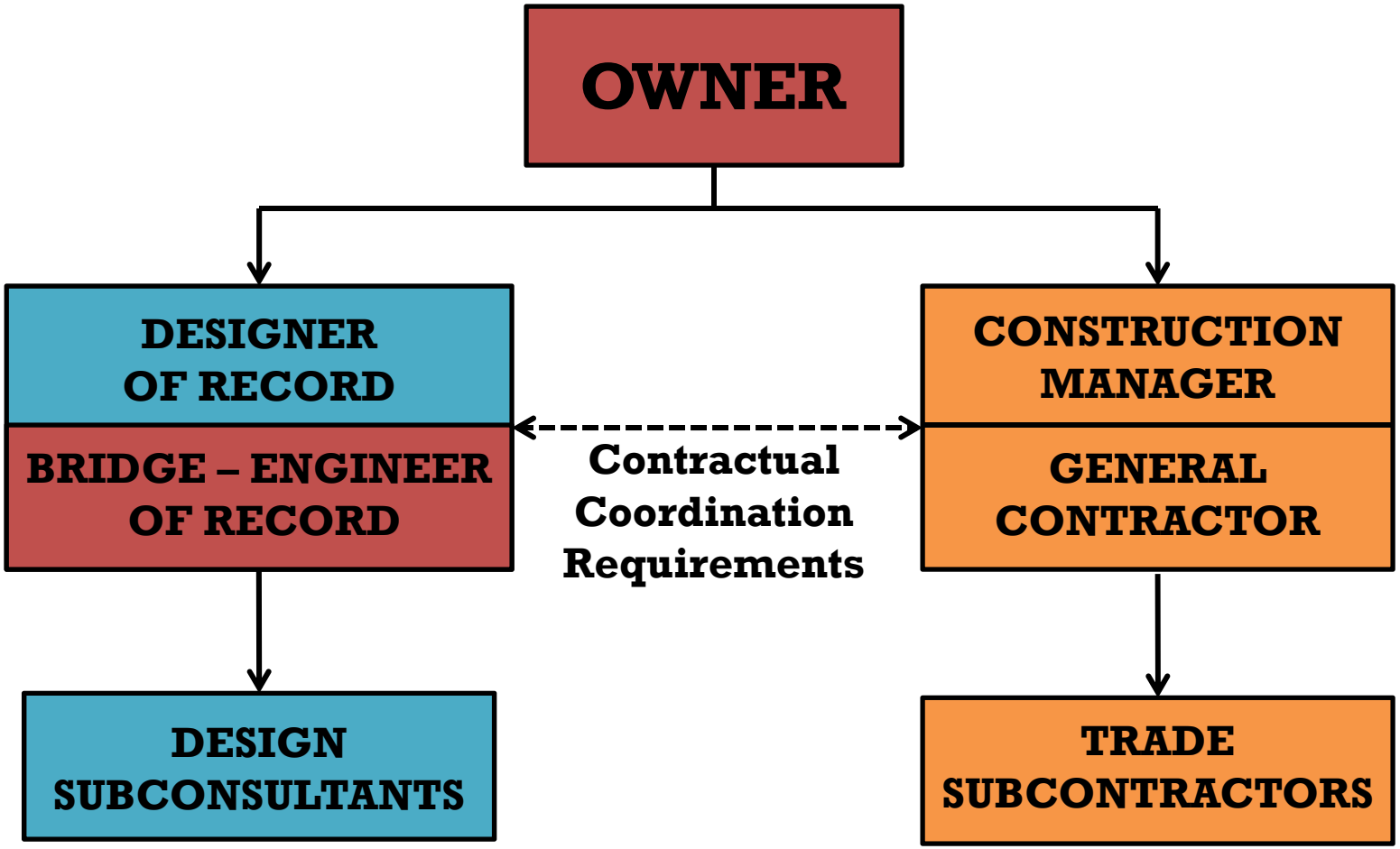
Existing Bridge

Procurement Comparison

	Design-Bid-Build		Design Build		CMGC	
	Owner	Contractor	Owner	Contractor	Owner	Contractor
Preliminary Design	✓		✓		✓	
Detailed Design	✓			✓	✓	✓
RFP/Bid/GMP	✓	✓	✓	✓	✓	✓
Construction		✓		✓		✓

CMGC **Requires** Collaboration During Detailed Design

"Alaska" CMGC Method



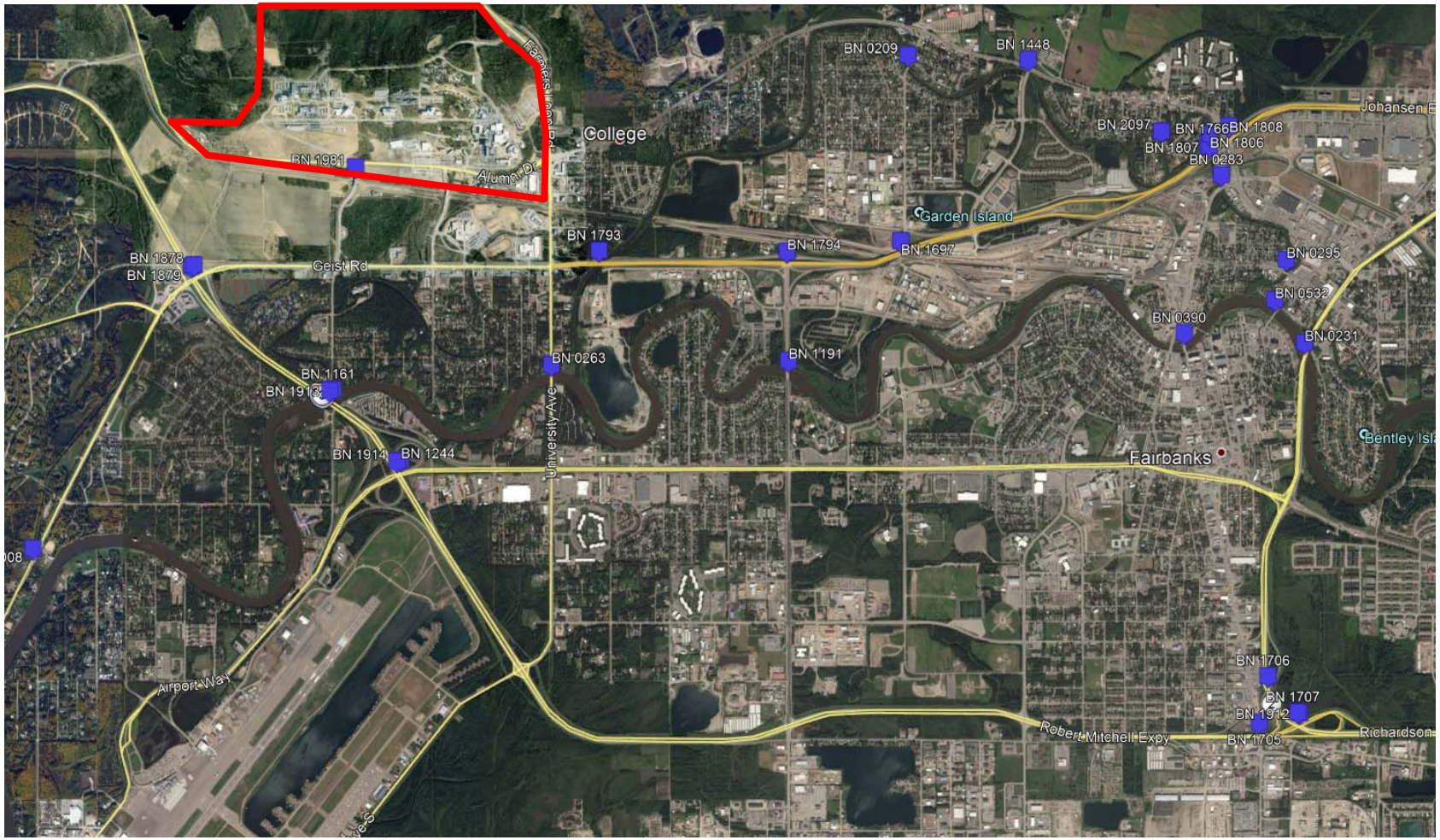
CMGC Process

Project Challenges: Restrictive ROW

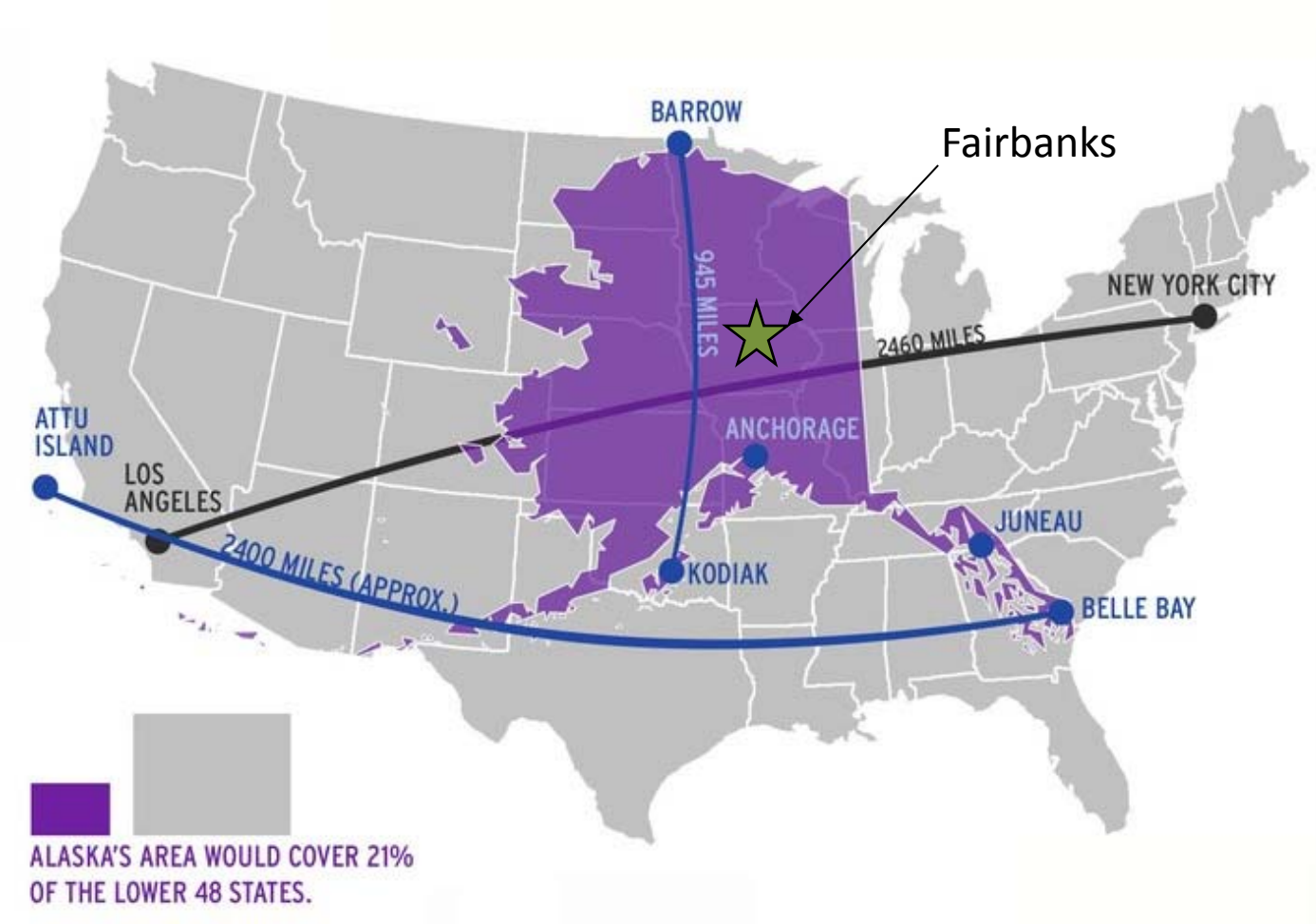
Project Challenges: High Voltage Power Lines

CMGC Process

Project Challenges: Traffic (Vehicular & Ped.)



Project Challenges: Location

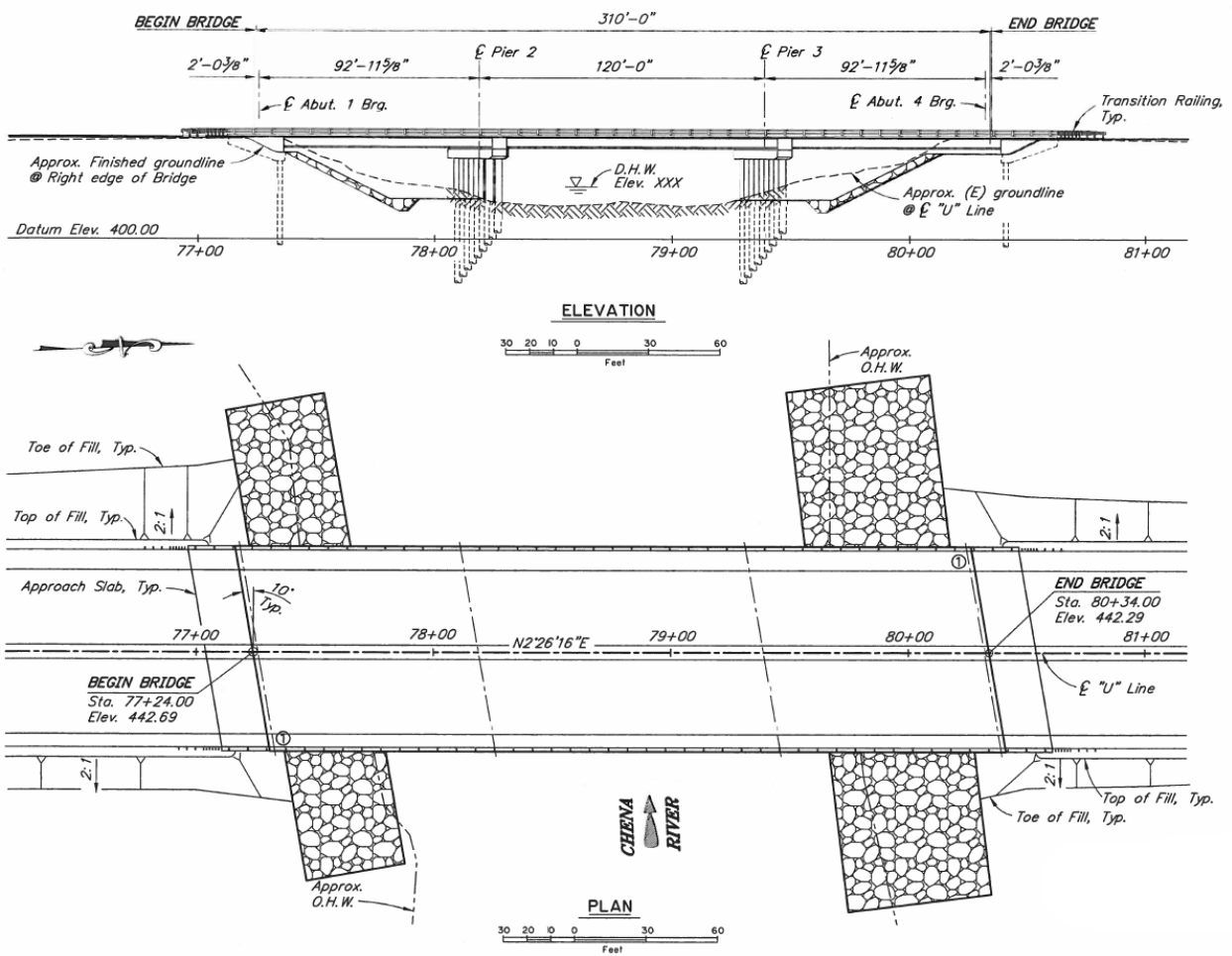


CMGC Process

Project Challenges: Short Construction Season

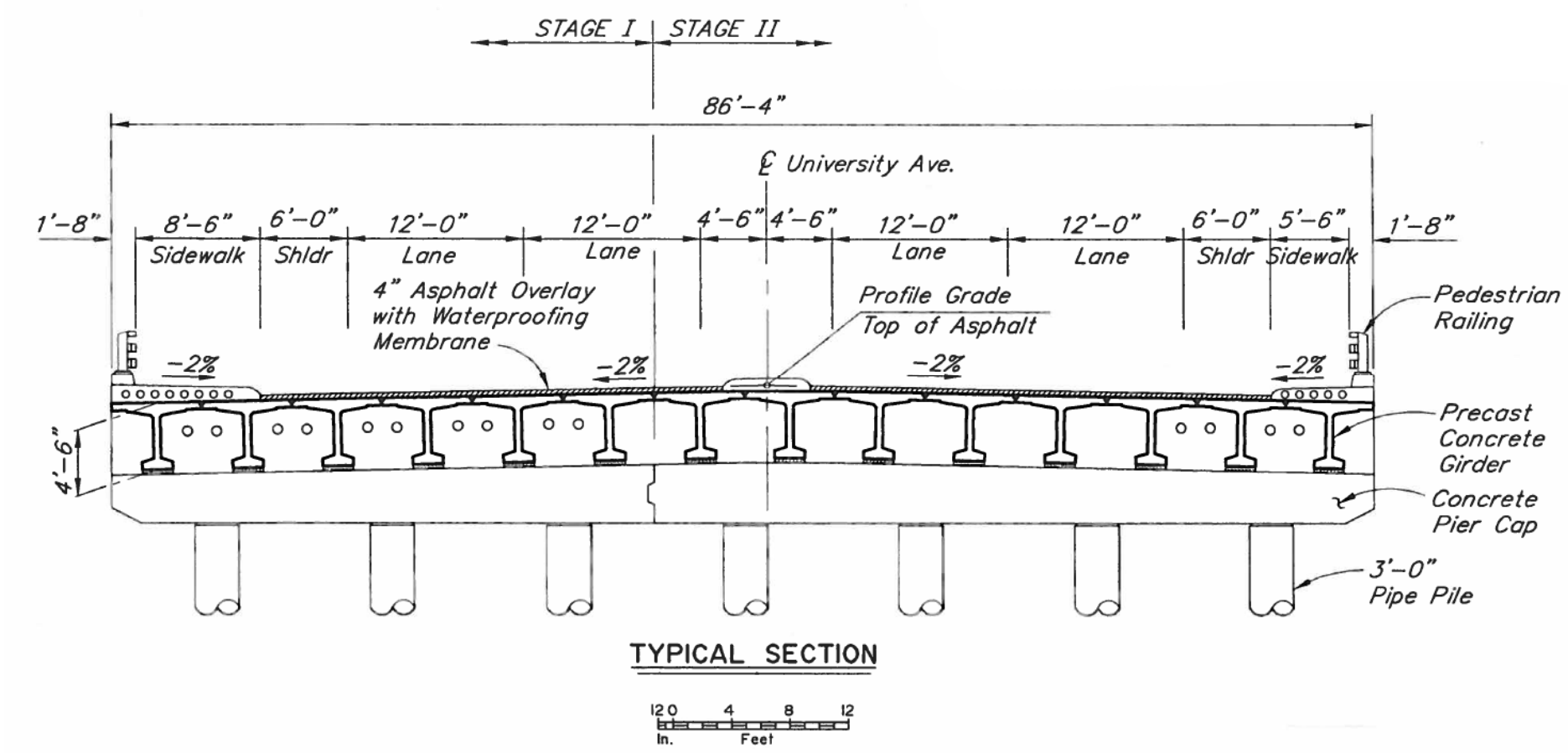
CMGC Process

RFP Bridge Concept: Plan & Elevation

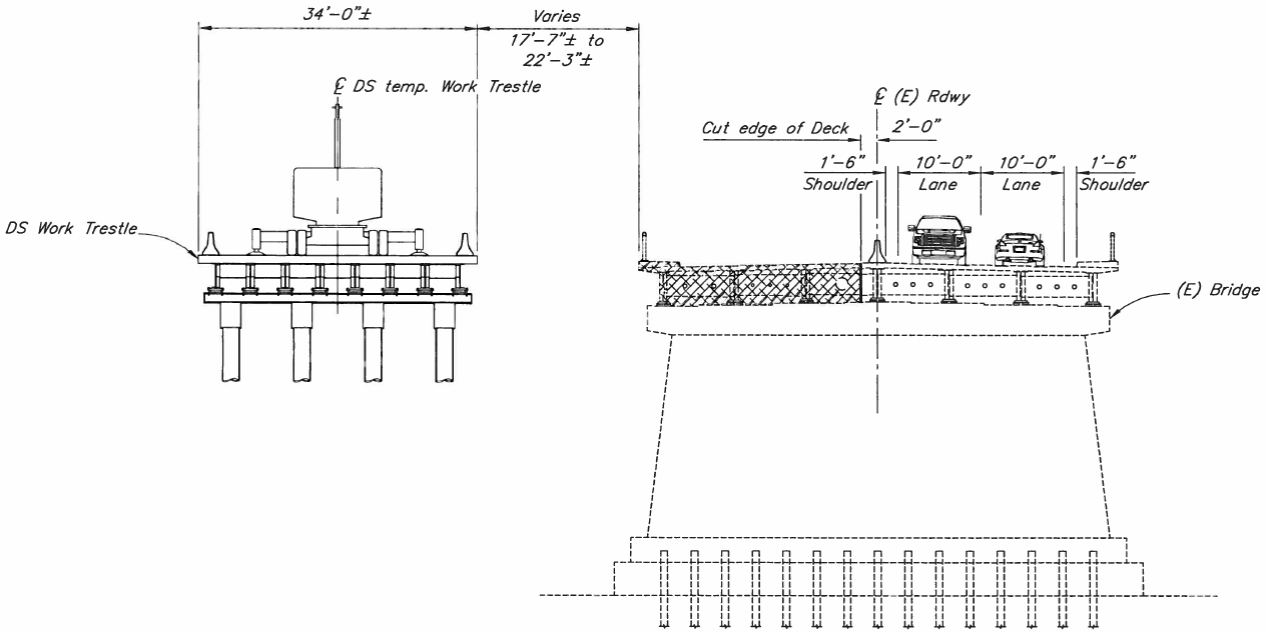


CMGC Process

RFP Bridge Concept: Typical Section



RFP Bridge Concept: Phasing



CMGC Process

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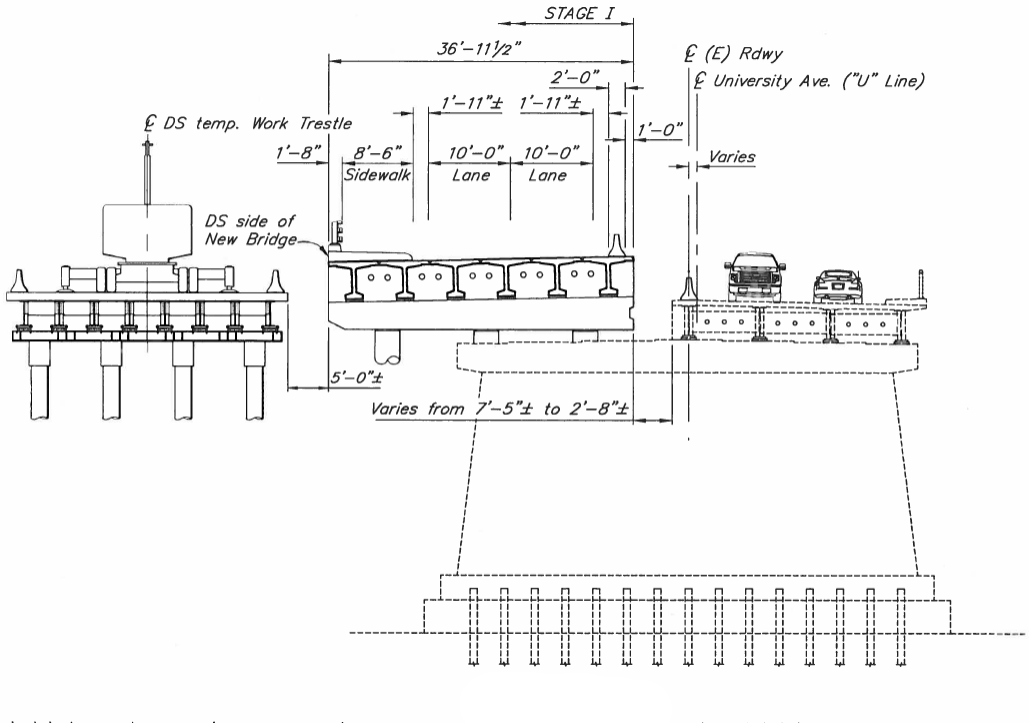

CMGC Process

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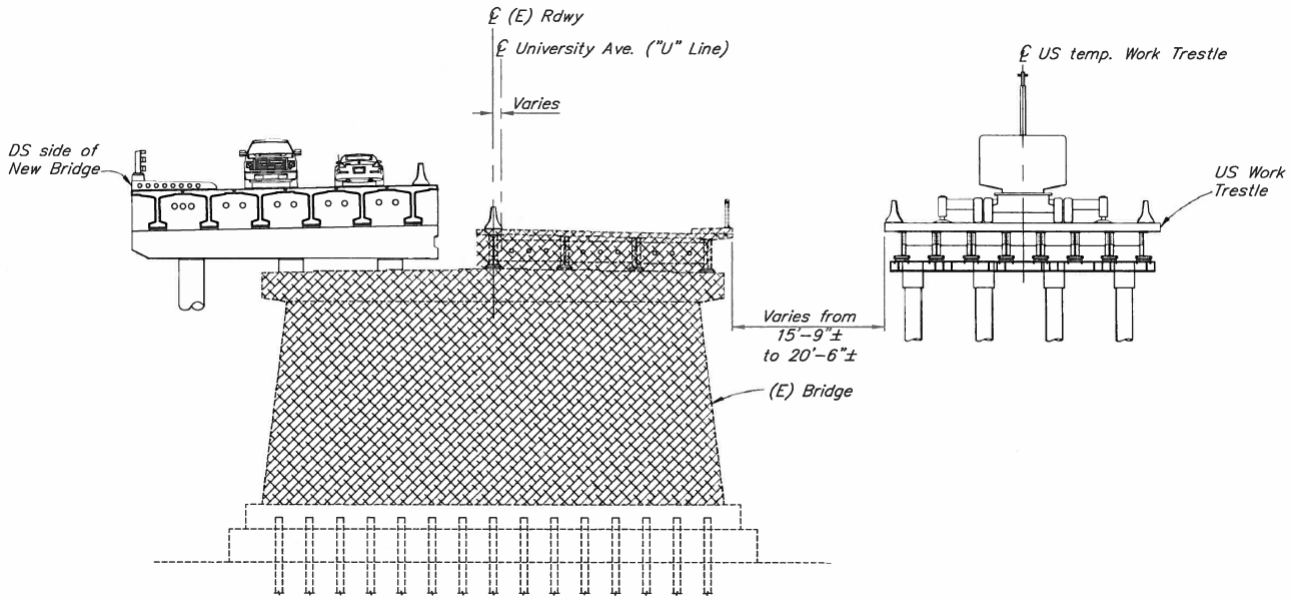

CMGC Process

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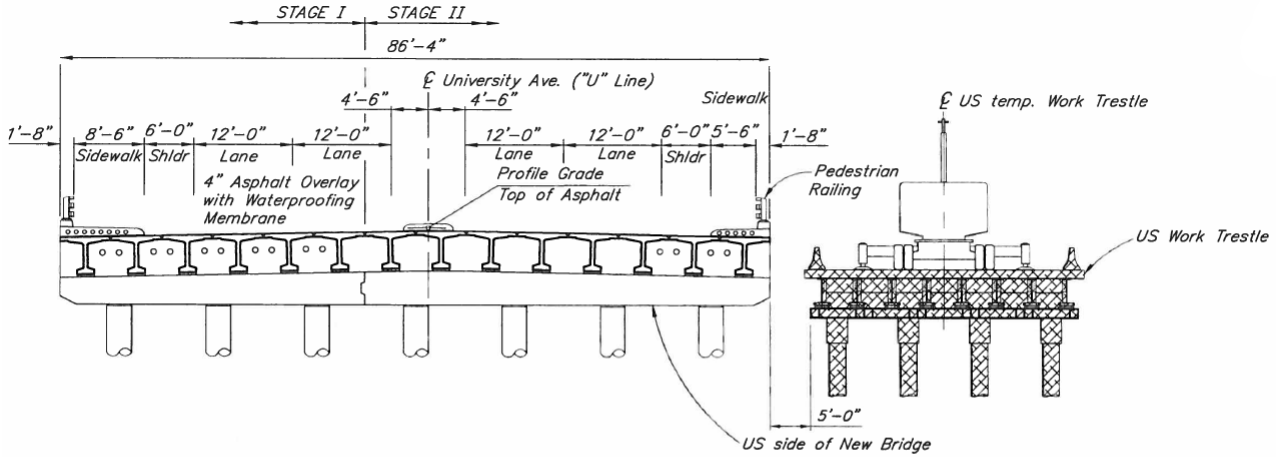
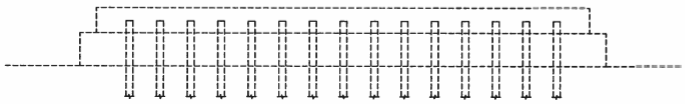




CMGC Process

Innovative Process: 42 Innovative Activities

University Avenue Rehabilitation and Widening CMGC		Innovation List - 85% PS&E Update				1526	($9,816,901)		March 13, 2017
No.	Innovation	Impacts	Potential Risks	Feasible	Priority	Time Impact (Days)	Cost Impact ($)	Status/Current Action	Responsibility
1	~~Bridge on Alignment/Current Plan~~	OHE shoe-fly with two University Avenue crossings; two season construction.		Yes		n/a	n/a	Drop from consideration due to University Avenue closure at the bridge.	
2	~~OHE Transmission line relocation - taller and longer OHE span to cross river~~	span distance is not the limiting factor; pole height and additional ROW (due to sway) are the limiting factors	Any restrictions in running the OHE over a house? No, not in the code, however most utility companies do not want a house in their ROW. Doing so also limits expansion and access.	Yes		n/a	n/a	Drop from consideration due to proposed bore installation method.	
3	OHE Boring Option	OHE Bore yes. Investigating boring comm too.	Bore failure, extended construction duration and cost	Yes	High	Unknown	Unknown	Accepted	
4	Close University Avenue at Bridge	This option would only require one work trestle and could allow construction to be completed in one season. The bridge construction cost savings is approximately 30-40%. The roadway cost savings is approximately 5%. A temporary pedestrian bridge and water line relocation would be completed beforehand.	This is an aggressive schedule and high risk. The design currently calls for 45 girders and there are only three girder trucks in Alaska. Kinney can investigate the traffic impacts of closing the bridge for a season. They will estimate how much traffic will be diverted to other intersections	Yes	High	365	($3,291,349)	Plan approved by DOT&PF leadership on 2/3/16. Some improvements will be required at adjacent impacted intersections. See Kinney email and figures dated 2/2/16.	
5	~~Bridge Slide~~	More expensive than other options. Not feasible due to construction footprint. Not as feasible over water as over a roadway.		No		n/a	n/a	Drop from consideration due to increased cost and lack of feasibility.	
6	~~Temporary detour alignment~~	Two season construction. Requires temporary pedestrian crosswalks. More cost. Detour through the park.		Yes		n/a	n/a	Drop from consideration due to increased cost and more impacts over other options.	
7	~~Shift alignment to the East~~	Increases separation from OHE. Easier to bore OHE.		Yes		n/a	n/a	Drop from consideration due to increased cost and more impacts over other options.	
8	Super Structure Options: Deck Bulb Tee	less girder lines, shorter spans, 11-14-11 girder lines		Yes	High		($324,334)	Number of girder lines has been updated.	
9	~~Super Structure Options: WashDOT wide flange girder~~	They are more efficient and may only require 11 girder lines. The weights are pretty efficient		Yes	High	n/a	n/a	HCo to price this option.	
10	~~Super Structure Options: Steel Tied Arch~~	Portions of the superstructure could be fabricated off site. The deck consists of pre-cast concrete panels with a concrete overlay on top. Transporting the pre-fabricated superstructure to the site will be difficult due to their large size. This bridge would be unlike any others in Fairbanks which may not be desirable. More expensive		Yes		n/a	n/a	Drop from consideration due to increased cost, constructability challenges and lack of benefits over other options.	
11	~~Super Structure Options: Cast In Place Concrete~~	Does not offer any advantages over other options		Yes		n/a	n/a	Drop from consideration due to increased cost, constructability challenges and lack of benefits over other	
12	Girder configuration optimization	Optimize girder configuration to minimize number of girders required.		Yes	High			Accepted	Same as #8
13	Early girder and pile	Eliminate schedule delays associated with grider		Yes	High	365	($1,889,998)	Accepted	

CMGC Process

Innovative Process: Concepts

- Transmission Line Relocation
- Transmission Line Bore

CMGC Process

Innovative Process: Concepts

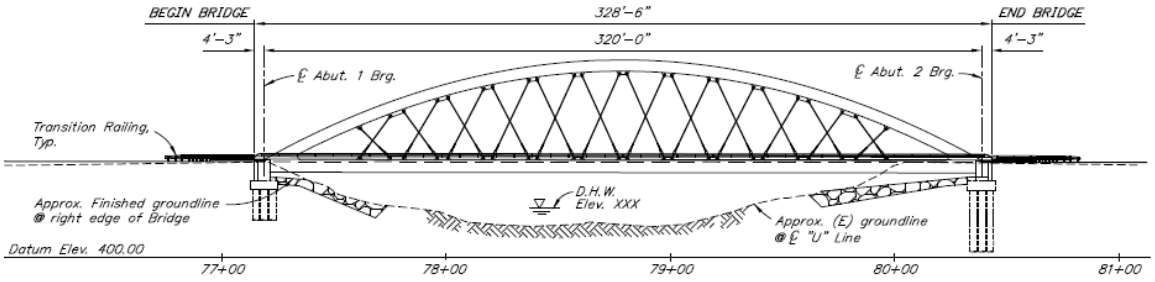
CMGC Process

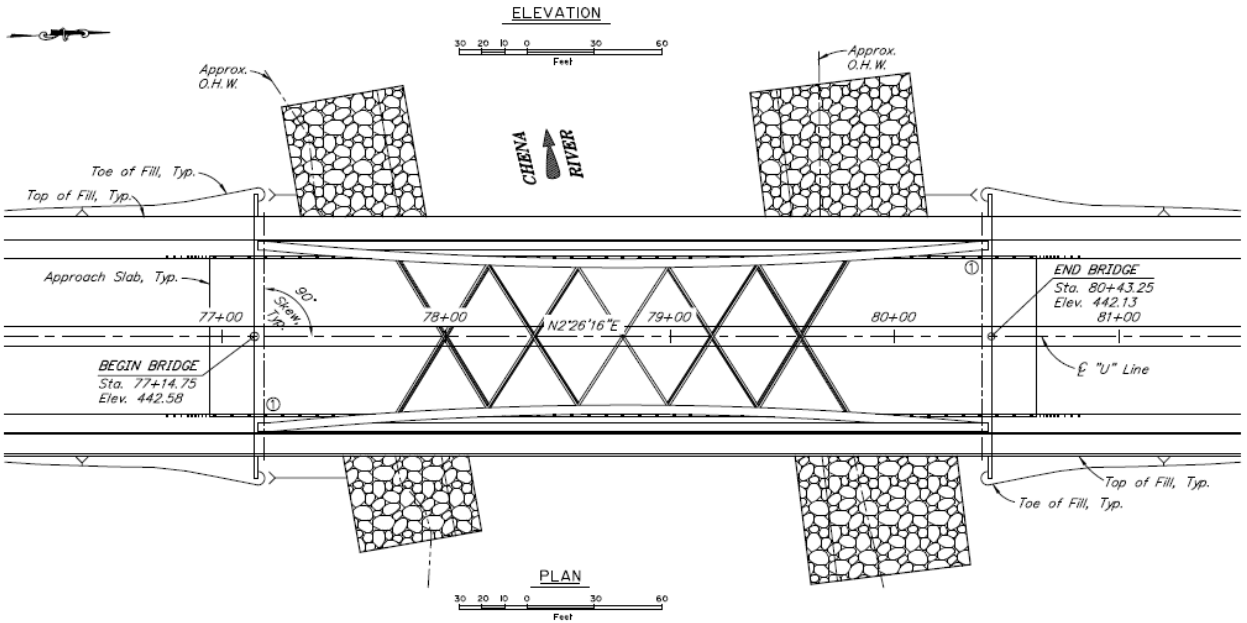
Innovative Process: Concepts

- ~~Transmission Line Relocation~~
- Transmission Line Bore
- Slide-in Bridge Option
- Single Span Bridge (Steel/Arch/Post Tension/etc)
- Close University Ave

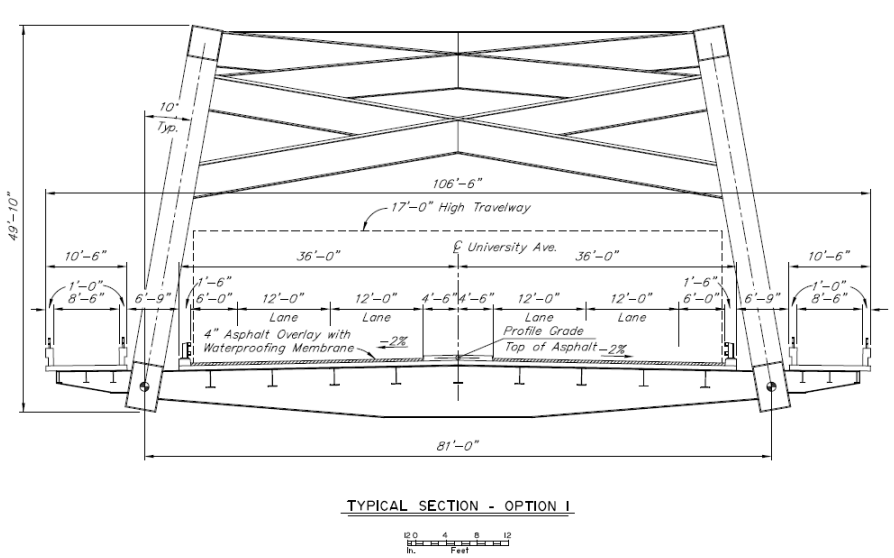
CMGC Process

Innovative Process: Concepts

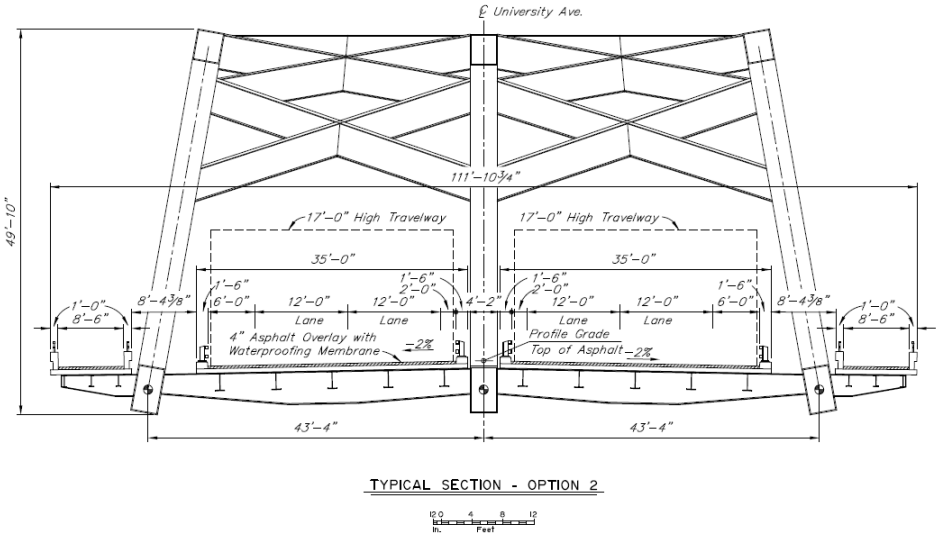




Innovative Process: Concepts



TYPICAL SECTION - OPTION 1



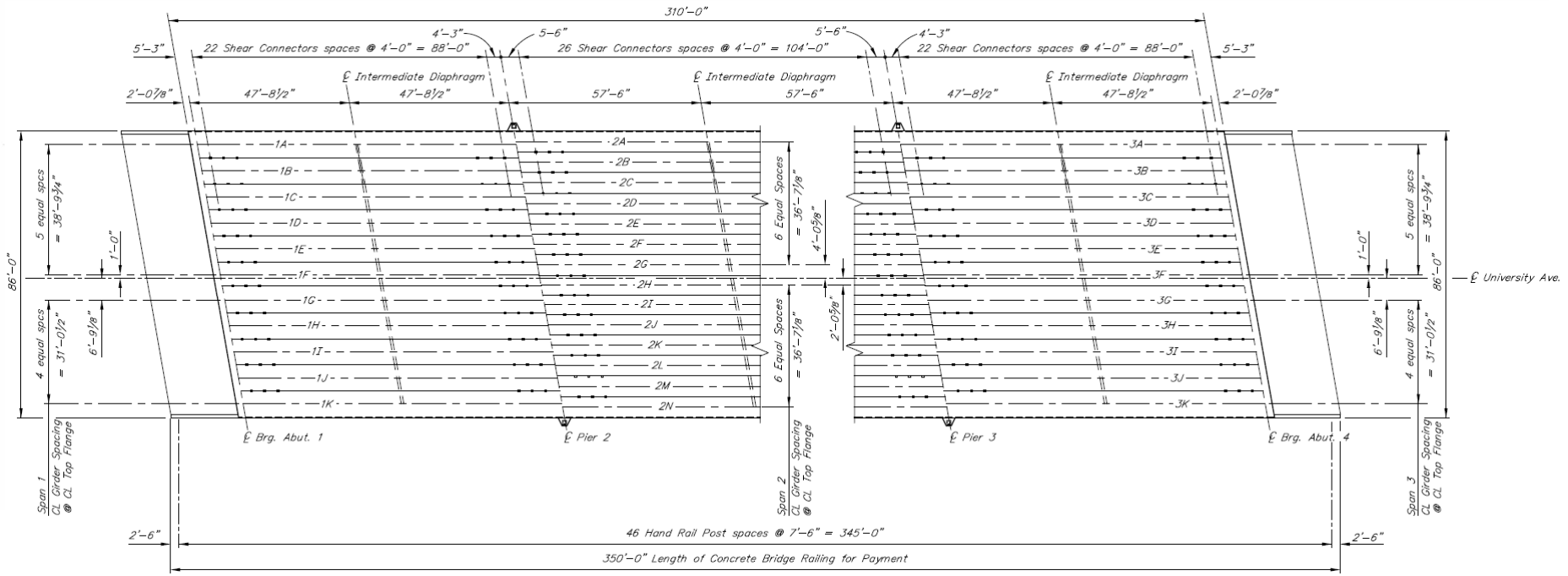
TYPICAL SECTION - OPTION 2

CMGC Process

Innovative Process: Concepts

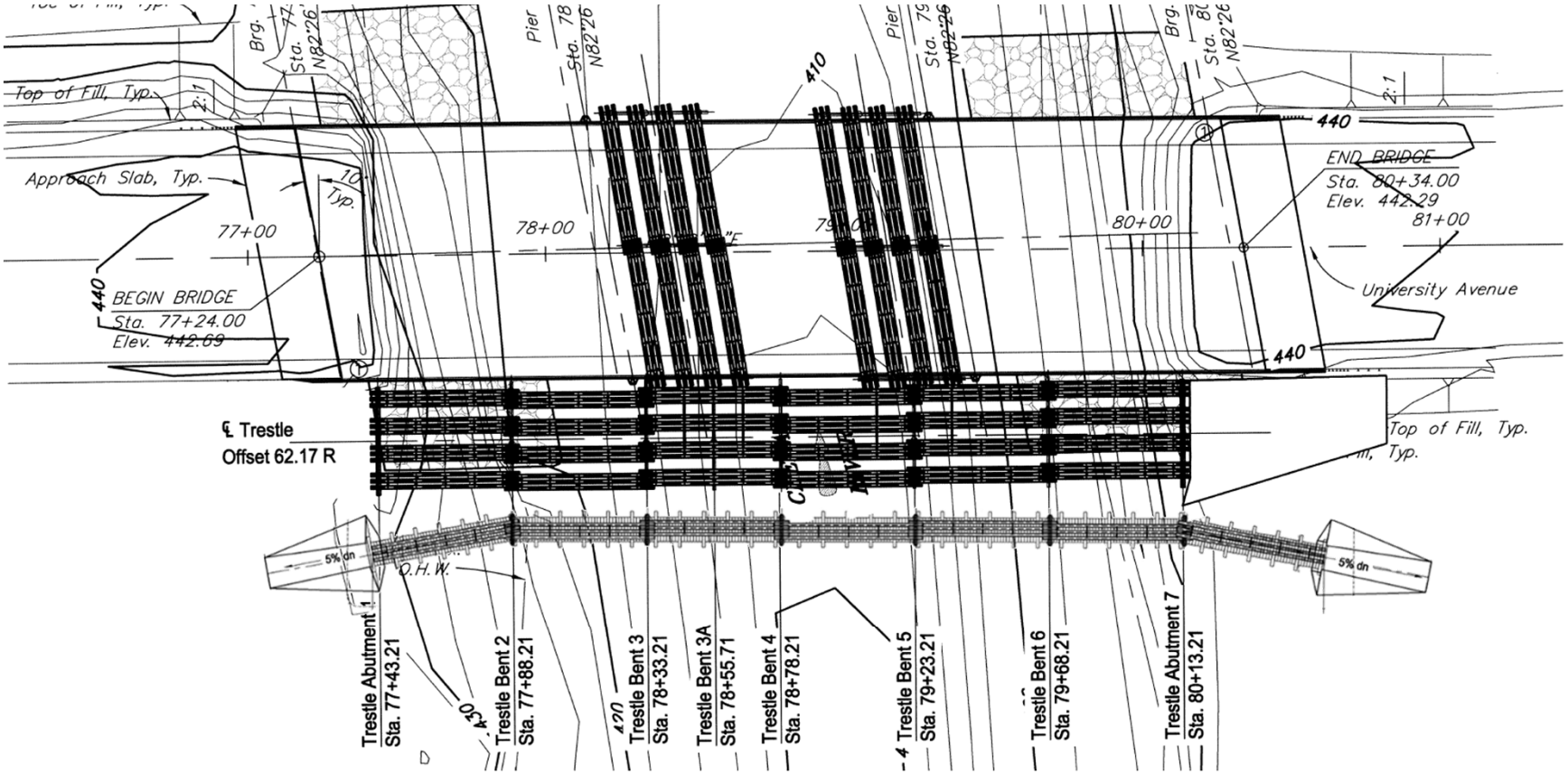
- ~~Transmission Line Relocation~~
- Transmission Line Bore
- ~~Slide-in Bridge Option~~
- ~~Single Span Bridge (Steel/Arch/Post Tension/etc)~~
- Close University Ave
- Girder Line Optimization
- Girder Launching / Work Bridge / Temporary Ped Bridge

Innovative Process: Concepts



CMGC Process

Innovative Process: Concepts



CMGC Process

Innovative Process: Concepts

- ~~Transmission Line Relocation~~
- Transmission Line Bore
- ~~Slide-in Bridge Option~~
- ~~Single Span Bridge (Steel/Arch/Post Tension/etc)~~
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- Girder Line Optimization
- ~~Girder Launching~~ / Work Bridge / Temporary Ped Bridge
- Cable Car/Tram Ped Crossing
- Barge/Boat Ped Crossing

CMGC Process

Innovative Process: Concepts

- ~~Transmission Line Relocation~~
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CMGC Process

Risk Register: 71 Active Risks

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Risk Register																		
2	Project Name	University Avenue Rehabilitation and Widening CMGC - Segment 1A 95% PS&E																	
3	Date Revised	20-Apr-17														$ 1,880,100	$ 1,285,400	$ 63,500	$ 53
4					Risk Identification					Risk Response			Risk Assessment				Risk Allocation		
6	Status		Category	Title	Risk Statement	Definite Cause	Uncertain Event	Effect on Objective	Current status/assumption	Strategy	Response Actions	Risk Owner	Probability	Time Impact	Cost Impact	Factored Cost Impact	DOT&PF Risk	Shared Risk	Contractor Risk
7	Retired	1	Construction	Close University Avenue at Chena River Bridge	As a result of closing the road, unreasonable traffic impacts may occur, which would lead to public outcry, additional costs to mitigate and reduced credibility with the public.	closing the road	unreasonable traffic impacts	public outcry, additional costs to mitigate and reduced credibility with the public	Moving forward with this option.	Accept	Early materials procurement, complete design early, detailed cpm schedule, schedule management, contingent sum item, risk pool, establish baseline NTP date, additional construction resources, allow limited traffic on bridge	DOT&PF	0%			$ -	$ -	$ -	$
8	Active	2	Construction	Transmission Line Bore fails	As a result of using an HDD to cross the Chena with the electric transmission and communications utilities, "frac-out" (release of drilling mud into the soil substrate or the Chena River) may occur, which would lead to reduced production, increased installation cost and remediation.	using an HDD to cross the Chena with the electric transmission and communications utilities	"frac-out" (release of drilling mud into the soil substrate or the Chena River)	reduced production, increased installation cost and remediation	Based on AK Road bore feedback, appears to be feasible. Frac-out unlikely given soils.	Mitigate	Early work package (can go to plan B if needed), investigate likelihood of failure, geotech information, Involve subcontractor in preconstruction activities	DOT&PF				$ -	$ -	$ -	$
9	Active	3	Construction	Girder damage in transit	As a result of not bracing or protecting the girders, damage (spalled concrete, broken girder) may occur, which would lead to project delays (repair girder or cast a new girder) and additional cost.	not bracing or protecting the girders	damage (spalled concrete, broken girder)	project delays (repair girder or cast a new girder) and additional cost	If girder damaged between GNI yard and job, will need 60 days to cast and deliver another girder, which results in one additional season of bridge construction.	Mitigate	Early materials procurement, perhaps stockpile at GNI yard	Contractor	10%	365	$ 1,900,000	$ 190,000	$ -	$ -	$ 1
10	Active	4	Construction	Piles don't get capacity	As a result of differing soil conditions, the piles not achieving capacity may occur, which would lead to increased duration for this activity, and require procuring additional pile.	differing soil conditions	the piles not achieving capacity	increased duration for this activity, and require procuring additional pile	Sarah to investigate state furnished materials requirement, options for purchasing back unused materials. Draft foundation report available; doesn't suggest we will encounter any issues.	Mitigate	Early foundation report, early materials procurement, additional materials on-hand, conservative design, can be used on other projects	DOT&PF/Contractor	5%	21	$ 210,000	$ 10,500	$ -	$ 10,500	$
11	Active	5	PM	Funding	As a result of unknown political and social factors, reduced or eliminated funding may occur, which would lead to reduced project scope or project	unknown political and social factors	reduced or eliminated funding	reduced project scope or project termination	Continue to monitor.	Mitigate	Advance project development; demonstrate progress	DOT&PF				$ -	$ -	$ -	$
	Active	6	Construction	Traffic impacts cause other roads to exceed capacity	As a result of closing the road, unreasonable traffic impacts to other roads may occur, which would lead to public outcry, additional costs to mitigate and	closing the road	unreasonable traffic impacts to other roads	public outcry, additional costs to mitigate and reduced credibility with the public	Kinney investigated traffic impacts; other intersections are impacted but do not exceed capacity	Mitigate	Early traffic analysis, public involvement, improvments to alternate routes	DOT&PF	5%		$ 100,000	$ 5,000	$ 5,000	$ -	$

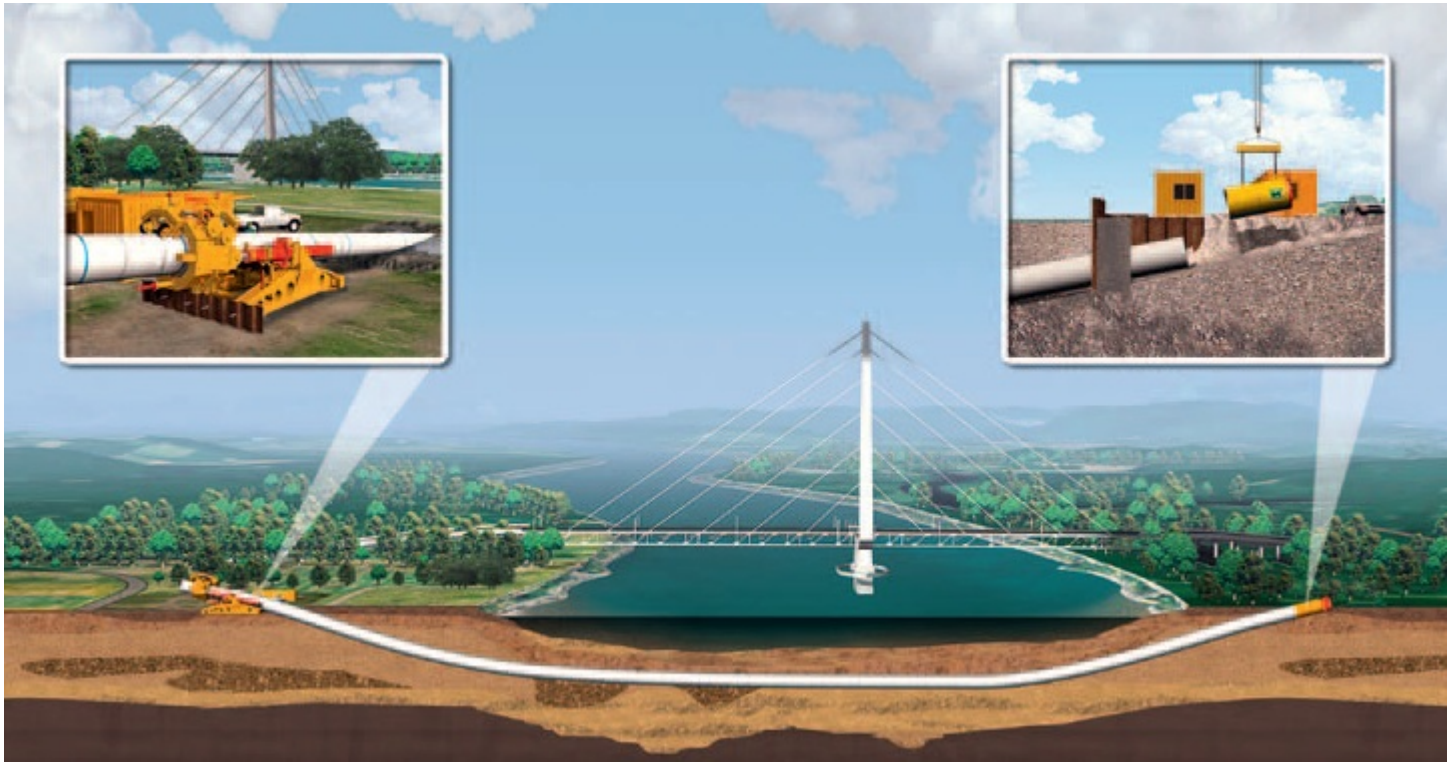
CMGC Process

Innovative Process: Active Risks

- Transmission Line Bore Failure

CMGC Process

Innovative Process: Active Risks



CMGC Process

Innovative Process: Active Risks

- Transmission Line Bore Failure
- Girder Damage In Transit

CMGC Process

Innovative Process: Active Risks

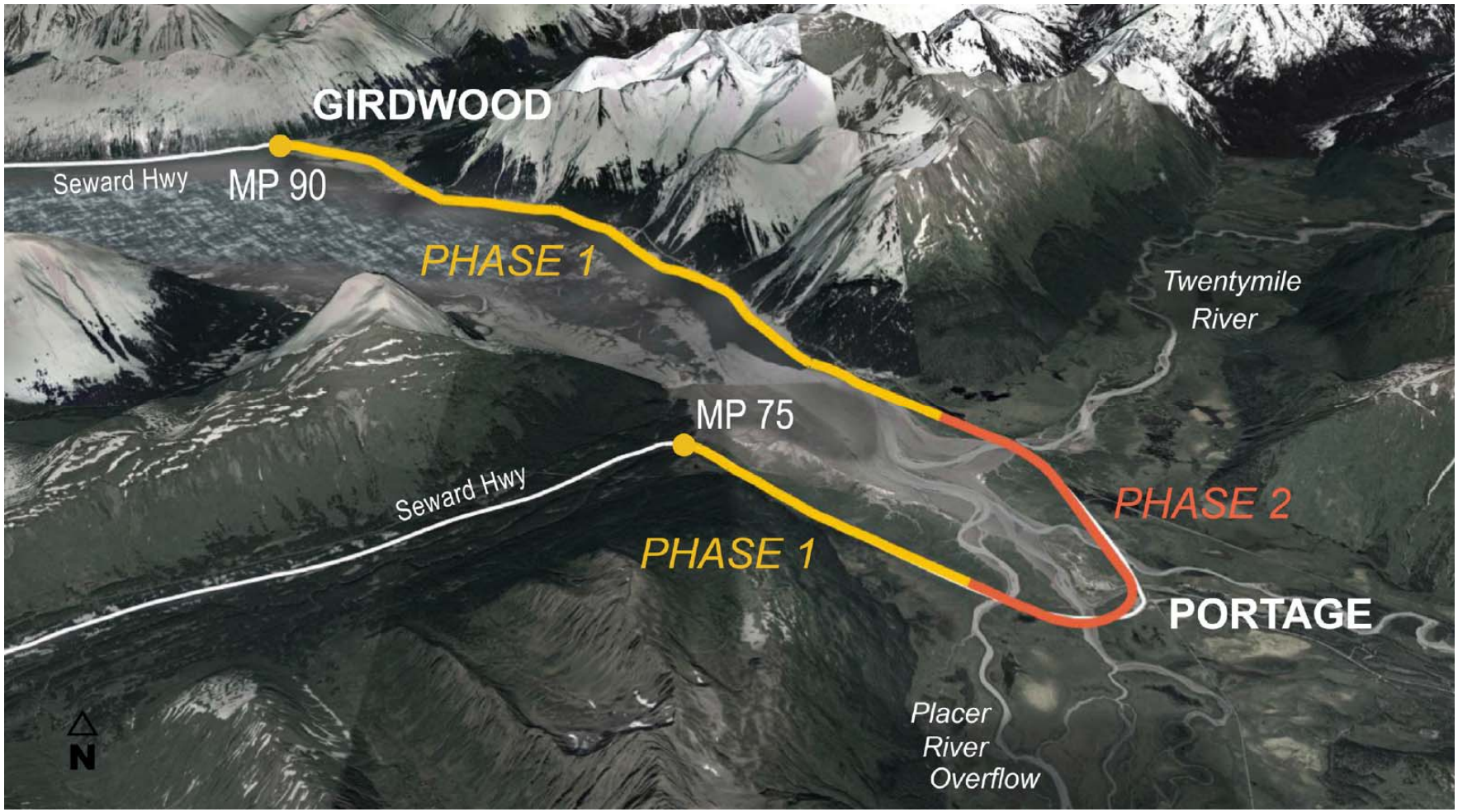
CMGC Process

Innovative Process: Active Risks

- Transmission Line Bore Failure
- Girder Damage In Transit
- Piles Don’t Get Capacity
- Concurrent Construction of Seward 75-90

CMGC Process

Innovative Process: Active Risks



CMGC Process

Innovative Process: Active Risks

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Innovative Process: Active Risks

- Transmission Line Bore Failure
- Girder Damage In Transit
- Piles Don’t Get Capacity
- Concurrent Construction of Seward 75-90
- High Demand for Portable Message Boards
- Unrealistic Bridge Construction Schedule
- Ice Loading Damaging Ped/Work Trestle

Innovative Process: Active Risks

CMGC Process

Innovative Process: Active Risks

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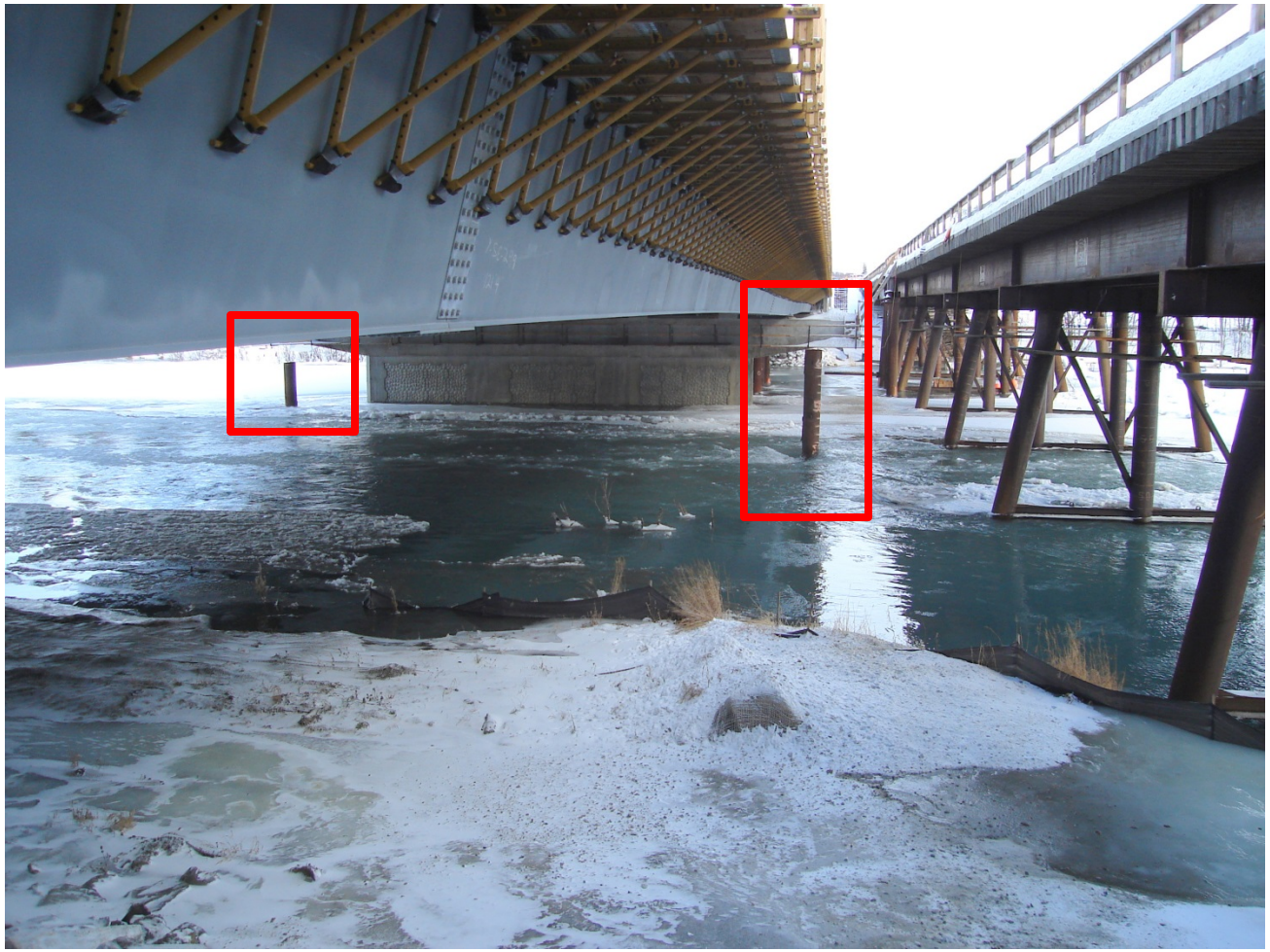
Innovative Process: Active Risks



CMGC Process

Innovative Process: Active Risks

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CMGC Process

Where We Are Today:

- 90% Design
- Total Structure Estimate ≈ $11.0M to $12.5M
- Temporary Structures Estimate ≈ $4M
- Bridge Rail May Change
- Anticipated Construction – 2019
- Typical “Alaska Style Bridge” Construction

Conclusions

Questions?