ABC-UTC October 2022 Monthly Webinar: Using ABC to Address Climate Change in Alaska’s Arctic		
#	**Questions**	**Responses**
	Design	
1	Does the design incorporate future erosion of the coastline?	The causeway and the bridge are designed for local wave action, but global sea level increases would inundate the village prior to the causeway and the bridge, thus rendering the purpose of the evacuation route moot.
	Construction	
2	Why was the CM/GC (Construction Manager/General Contractor) project delivery method chosen?	CM/GC allowed the contract process to advance faster than a traditional DBB (Design-Bid-Build) contract, as well as allowing a more optimized design using the contractor's input.
3	How does CM/GC reduce risks?	Because the contractor is on-board during the design process, they can evaluate constructability concerns and the design can be altered to address the concerns accordingly. For instance, the contractor was able to determine the maximum shipping length of girder segments for this particular project, and an extra bolted field splice was added during the design phase.
4	What was the method of pile installation?	Piles were driven into place through holes (75-90% of the pile diameter) pre-drilled to the required tip elevation.
5	What is the minimum temperature for placing concrete in precast deck pockets around shear studs?	The maximum temperature for placing concrete in the deck pockets is 40°F and rising.
6	Which material was used for cast-in-situ joints? What was the temperature, and when were these joints cast?	The material for the joints was high-strength prepackaged grouted (9,000 psi). These joints were cast in September, and the required temperature was 40°F and rising.

7	Were there any issues with transport of the precast deck panels to the site in terms of condition upon arrival on site?	There was some minor transport damage to the precast deck panels, but in general they arrived in good condition. Because of the geometry and narrow width, the panels were stacked and banded together and shipped on standard 40-ft shipping container flatracks.
8	What was the biggest challenge for the project due to such cold weather?	In general, all operations take longer and are less efficient in cold weather. Equipment and tools freeze up if not properly heated, snow and ice must constantly be removed, etc.
9	What are the lessons learned from this project?	CM/GC projects can result in good collaborative relationships between owners and contractors. Reliable and involved owner project staff are crucial for successful projects. Preconceived notions of what a contractor may find easiest are not always the case.
	Questions during Webinar	
10	What do you use for ride quality on the decked bulb-tee system? Do you use a concrete or an asphalt overlay on this system? Do skews cause camber misalignment of the decked beams? Do you have issues with delaminations and/or spalling with freeze/thaw cycles that cannot be inspected under overlays?	Per Alaska's Standard Specifications, the maximum vertical offset between adjacent precast beams is 1/2 inch at midspan and 1/4 inch at the bearings. The majority of DBT (decked bulb-tee) bridges will receive an asphalt overlay; Alaska does not typically use concrete overlays. Skews can cause camber misalignments, typically on higher skews, and differential elevations are taken up in the asphalt overlay. Bridges that receive an asphalt overlay utilize a waterproofing membrane between the top of the DBT and the overlay to prevent water infiltration. Additionally, the concrete used in DBT girders has a very low water/cement ratio with 28-day strengths around 10,000 psi.
11	What do you use for ride quality on the steel beam/precast deck panel system? Do you use a concrete or an asphalt overlay on this system? Do skews cause camber misalignment of the deck panels? Do you have issues with delaminations and/or spalling with freeze/thaw cycles that cannot be inspected under overlays?	The same vertical offset requirements listed above apply (1/2-inch vertical offset at adjoining panels). These bridges are predominately used on low-volume, low-speed roads so ride quality is generally a secondary concern. These bridges are designed to received a 4-inch asphalt overlay at some time in the future; however, the as-built condition almost always has no overlay. Alaska does not generally use precast deck panels on bridges with skews. We have not seen widespread delaminations or deck panel deterioration on this type of bridge.

12	Is the connection between the pipe pile and pier cap considered to be a moment connection or a pinned connection?	It is considered to be a moment connection. The connection is first designed and analyzed for non-seismic lateral loads (wind, ice, etc.) and then detailed such that the cap beam remains capacity protected for the full overstrength plastic hinging of the pile.
13	Why was there such a small spacing between the steel girders?	The girder spacing is 7 ft 3 inches. The bridge width is fairly narrow at 27 ft - 4 inches. Alaska's preference is to use an even number of girders so they can be placed in pairs.
14	When you use transverse precast panels and the girder ends are skewed, do you have to worry about when the web is plumbed (steel dead load fit or total dead load fit)? Can you elaborate?	Since the crown of the roadway is cast directly into the deck panels, all the girders sit at the same bearing elevation with the webs plumb. Alaska has not used this system with a skewed bridge as of this time.
15	Can you restate how the panels are connected to each other, i.e., is there any post-tensioning in the deck?	The transverse connection between panels is a simple grouted shear key without any reinforcement or post-tensioning between panels or in the keyway itself.
16	Regarding the abutment details and the bearing configuration, it almost looks like a "semi-integral" abutment. How does the extreme cold impact the functionality of the bearing movement?	The abutment is essentially a semi-integral abutment. For this length bridge (184 ft) and temperature range (120°F), the anticipated thermal movement is ~1.70 inches. Alaska uses a natural grade 5 rubber for our elastomeric bearing pads and on each lot performs both a low temperature brittleness test at -70°F as well as a shear modulus test that compares the room temperature shear stiffness to that of bearings stored at -35°F for 28 days. If the shear stiffness is greater than a factor of 4 larger than the room temperature shear stiffness, the lot is rejected.
17	Can you provide highlights on the special design considerations included in the design for the precast deck panels/steel girders, columns, etc., considering extreme temperatures (cold weather)?	For sustained temperatures < -20°F, we will account for an increase in apparent material strengths for members not buried (insulated). This is important for determining demands on capacity-protected elements. Additionally, the analytic plastic hinge length is reduced at extremely low temperatures. Finally, frozen ground conditions are accounted for when determining substructure pushover responses. A bridge is usually designed for a long-term scour case (most flexible) and a frozen ground condition (least flexible) and is expected to perform under either scenario.

18	You showed where you were able to control the air temperature during concrete placement of the pile caps. What about the temperature of the surrounding ground?	Per Alaska's Standard Specifications, the subgrade below the concrete is required to be thawed to a depth of 2 feet below the concrete elevation prior to concrete placement.
19	Were the bridge curbs for the railing cast in place?	Yes. Using cast-in-place concrete curbs allows the contractor to account for any slight differential offsets in the panels and creates a nice straight line that is true to grade.
20	How much can the deck panels be adjusted with the leveling screws? What is the expected behavior of the bearings? Were there any considerations for possible bearing replacement needs?	In general, we target around a 2-inch haunch and allow for 1/2 inch in either direction. Because the panels are full depth, they must sit high enough to completely clear the splice plates and bolt heads, usually the dictating factor of the haunch thickness. However, since the leveling screws are just threaded rods or carriage bolts, there is no practical limit to the maximum adjustment. The bearings are designed to handle rotations, and lateral movements. See the response to Question 16 for more information.
21	What do you expect the life of the bridge to be, and what type of maintenance will need to be performed?	The bridge was designed for the standard AASHTO 75-year design life. Maintenance will be minimal in the future, but most likely the biggest risk for maintenance is a deterioration in the spray metallized coating that will require re-application in the future.
22	What are the codes used in the design of this bridge?	The codes for the bridge design are the AASHTO LRFD Bridge Design Specifications and the AASHTO Guide Specifications for LRFD Seismic Bridge Design.
23	What is the frequency of inspection for routine maintenance of this bridge as it is exposed to extremely low temperatures?	The inspection frequency of all bridges in Alaska follows FHWA's 24-month requirement. Maintenance frequency will likely be almost non-existent.
24	How are the grouted joints performing? Is there any water infiltration through the joints?	Alaska's experience with these joints has been positive, and they appear to be performing well. As mentioned in the presentation, our use of these panels is generally on lower ADT (average daily traffic) routes, so the limited number of cycles may be beneficial. There is generally some minor water infiltration through the joints due to shrinkage cracking.

25	Were the unreinforced transverse keyways between the precast deck panels designed to resist differential deflections under an HL-93 truck loading moving across the bridge?	The haunches that the deck panels sit on are fully grouted, so the differential movements between panels are not considered.
26	You talked about the plastic hinge at the junction between the pile and the pile cap. With the size of the structure and its mass and stiffness known, was it necessary to consider the hinging instead of just performing an elastic design of the structure?	The cap beam was designed to be a capacity-protected element and resist the full overstrength hinging force of the pile regardless of the anticipated demands. This is typical of all new bridges in Alaska.
27	Does Alaska allow for pile in-ground hinging? If not, what is Alaska's strategy for capacity protecting the pile cap where in-ground hinging may not occur during the design earthquake?	Yes, in-ground hinging is allowed and is expected to take place.
28	Is there any difference between using this design on single spans versus continuous spans, particularly regarding composite behavior?	For a continuous unit, it would be treated similar to a traditional cast-in-place bridge where composite behavior is only expected in positive moment regions. Additionally, depending on the bridge, some of these types of bridges are designed to be fully noncomposite, but are still checked for the composite condition (number of shear studs required for composite behavior, for example).