



US Army Corps
of Engineers
Alaska District

Regulatory Division
CEPOA-RD
Post Office Box 6898
JBER, Alaska 99506-0898

Public Notice of Application for Permit

PUBLIC NOTICE DATE: March 26, 2020

EXPIRATION DATE: May 11, 2020

REFERENCE NUMBER: POA-2018-00190

WATERWAY: Harrison Bay

Interested parties are hereby notified that a Department of the Army (DA) permit application has been received for the discharge of dredged and/or fill materials into waters of the United States (US), including wetlands, as described below and shown on the enclosed project figures/drawings.

Comments on the described work, with the reference number (POA-2018-00190), need to reach the US Army Corps of Engineers, Alaska District (USACE) office no later than the expiration date of this Public Notice (PN) to become part of the record and be considered in the decision. Please contact Mr. Steve Moore by e-mail message at Stephen.A.Moore2@usace.army.mil, direct telephone line at 907-753-5713, toll free from within Alaska at 800-478-2712, or by fax at 907-753-5567 if you have questions or need further information concerning this public notice.

APPLICANT: ConocoPhillips Alaska, Inc. (CPAI), P.O. Box 100360, Anchorage, AK 99510-0360. The applicant's contact person is Mr. Chris Wrobel, Sr. Environmental Coordinator-NEPA projects, e-mail address Chris.P.Wrobel@conocophillips.com, direct telephone line 907-263-4691, and fax number 907-265-1515.

PROJECT NAME: Willow Development Project (Willow).

LOCATION: The project is located on the Arctic Coastal Plain of Alaska, primarily in the northeast section of the National Petroleum Reserve-Alaska (NPR-A). The Project area generally includes the full extent of the Bear Tooth Unit (BTU) and portions of the Greater Mooses Tooth Unit (GMTU) east toward the Colville River. The approximate project coordinates are Latitude 70.1303° N, Longitude 152.0429° W, Umiat Meridian.

Specific project component locations can be viewed on the project plans, here:
<https://www.poa.usace.army.mil/Missions/Regulatory/Public-Notices/>.

PURPOSE: The applicant's stated purpose is to develop hydrocarbon resources from federal oil and gas leases in the Northeast Planning Area of the NPR-A. The Project proposes a series of infrastructure components that will be constructed over an approximate 10-year period for the purpose of oil and gas development in the NPR-A.

PROPOSED WORK: The applicant proposes placement of approximately 5,055,990 cubic yards (CY) of material into 459.2 acres, 450.8 acres of which are waters of the United States (WOUS), including wetlands, to construct up to five drillsites, a central processing facility, operations center, gravel access roads, pipelines, a constructed freshwater reservoir (CFWR) perimeter berm, an airstrip, and three boat ramps. The applicant also proposes to convert 166.1 acres of WOUS from palustrine wetlands to lacustrine waters to develop a gravel mine with two gravel sites and create the CFWR. Temporary discharges are proposed for screeding activities, the trenching of power and communication cables, and constructing multiseason ice pads. Two pipeline crossings underneath the Colville River (same location), via horizontal directional drilling (HDD) will be undertaken.

The project components' footprint and associated fill requirements are listed below:

COMPONENT		DESCRIPTION
Gravel Pads	Drillsites	Five pads ranging in size from 14.4 to 17.0 acres: BT1, BT2, BT3, BT4, BT5
	WCF	22.8 acre gravel pad consisting of main plant facilities
	WOC	31.2 acre pad providing base of Project operations located near WCF
	Valve Pads	Four valve pads, 1.2 acres total: two each at Judy Creek and Fish Creek
	Water Source Access Pads	Two water source access pads, one at the CFWR and one at Lake L9911: 2.7 acres
	Pipeline Pads	Four pipeline pads: pipeline crossing pad near GMT2; two HDD pads; tie-in pad near CD4N: 2.7 acres total
	Comm Tower Pads	0.5 acre communications tower pad located adjacent to the WOC
CFWR	Other Pads	Expansion of existing Kuparuk CPF2KRU staging pad (upgrades in existing footprint)
		Excavated area (16.4 acres) near Lake M0015 with perimeter berm
Ice Pads	Seasonal	Used during construction at gravel mine, bridge crossings, HDD crossing, and other locations as needed in the Project area
	Multiseason	Seven 10-acre multiseason ice pads (70 acres total)
Pipelines	Infield Lines	43.4 total miles from the Willow drillsites and GMT2 to WCF

	Willow Pipeline	33.3 total miles from the WCF to the tie-in pad at CD4N
	Other Pipelines	4.9-mile freshwater pipeline from CFWR to WCF to WOC 2.8-mile treated water pipeline between WOC and WCF 2.8-mile fuel gas pipeline between WOC and WCF 64.3-mile seawater pipeline from Kuparuk CPF2 to WCF 34.4-mile diesel pipeline from Kuparuk CPF2 to CD1
Access	Gravel Roads: 252 acres	37.1 miles connecting drillsites to WCF, WCF to GMT2; and water source and airstrip access roads
	Vehicle Turnouts: 3 acres	Eight subsistence tundra access road pullouts with ramps
	Bridges: 679 sq. ft. (below OHW)	Seven bridges: Judy Creek, Judy Creek Kayyaaq, Fish Creek, Willow Creek 2, Willow Creek 4, Willow Creek 4a and Willow Creek 8
	Airstrip: 42.1 acres Ice Roads	6,200 × 200-foot surface area with apron Approximately 722.4 miles (total) over nine construction seasons
	Oliktok Dock Upgrades	Existing dock, modified by adding structural components and a gravel ramp within the existing footprint Screeding area adjacent to Oliktok Dock: 2.5 acres below OHW Screeding of offshore barge lightering area: 9.6 acres below OHW
	KRU Road Upgrades (4.6 acres)	Use of 46 miles of existing roads between Oliktok Dock and DS2P. Modifications will include: · Oliktok Dock to staging area · Staging area to DS2P (Meltwater and Tarn access roads)
	Boat Ramps	Three boat ramps in the Project Area at the Tijmiasiuġvik River, Judy Creek, and Fish Creek: 2.8 acres total
	Gravel Mine	Two sites (149.7 acres total) in Tijmiasiuġvik Area

All work would be performed in accordance with the enclosed plan Sheets 1-128, dated March 17, 2020.

ADDITIONAL INFORMATION: Portions of this proposal are also being evaluated with a Supplemental Draft Environmental Impact Statement (SDEIS) which is currently open for public comment. The Bureau of Land Management (BLM) is the lead agency for the EIS process. The Corps of Engineers (Corps) is a cooperating agency for the EIS and will use the information to support a permit decision.

The BLM released a Draft Environmental Impact Statement (DEIS) for the Willow Master Development Plan in August of 2019 to evaluate the proposed Project. The applicant submitted an updated project proposal to the BLM, which included new project components, in November of 2019. As a result the BLM has released a SDEIS to evaluate these proposed changes. The original DEIS and the subsequent SDEIS can be viewed here: <https://eplanning.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage¤tPageId=161457>

APPLICANT PROPOSED MITIGATION: The applicant proposes the following mitigation measures to avoid, minimize, and compensate for impacts to WOUS from activities involving discharges of dredged or fill material. The mitigation statement can be viewed here: <https://www.poa.usace.army.mil/Missions/Regulatory/Public-Notices/>.

WATER QUALITY CERTIFICATION: A permit for the described work will not be issued until a certification or waiver of certification, as required under Section 401 of the Clean Water Act (Public Law 95-217), has been received from the Alaska Department of Environmental Conservation.

CULTURAL RESOURCES: The lead Federal agency, BLM, is responsible for compliance with the requirements of Section 106 of the National Historic Preservation Act. The Corps will review BLM's documentation. A permit for the described work will not be issued until the Section 106 process has been completed and the Corps concurs with BLM's work or documentation.

ENDANGERED SPECIES: The lead Federal agency, BLM, is responsible for compliance with the requirements of Section 7 of the Endangered Species Act of 1973 (87 Stat. 844), and as such is responsible for initiating the appropriate consultation procedures with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) regarding listed or proposed threatened or endangered species and any designated or proposed critical habitat that might be effected by the proposed project. Any comments USFWS and NMFS may have concerning endangered or threatened wildlife or plants or their critical habitat will be considered in our final assessment of the described work. A permit for the described work will not be issued until BLM provides the USACE with documentation showing that the Section 7 process has been completed and the Corps concurs with BLM's work or documentation.

ESSENTIAL FISH HABITAT: The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996, requires all Federal agencies to consult with the NMFS on all actions, or proposed actions, permitted, funded, or undertaken by the agency, that may adversely affect Essential Fish Habitat (EFH).

The lead Federal agency, BLM, is responsible for compliance with the requirements of Section 305(b)(2) of the Magnuson-Stevens Act. The Corps will review BLM's documentation. A permit for the described work will not be issued until the EFH consultation has been completed and the Corps concurs with BLM's documentation.

TRIBAL CONSULTATION: The Alaska District fully supports tribal self-governance and government-to-government relations between Federally recognized Tribes and the Federal government. Tribes with protected rights or resources that could be significantly affected by a proposed Federal action (e.g., a permit decision) have the right to consult with the Alaska District on a government-to-government basis. Views of each Tribe regarding protected rights

and resources will be accorded due consideration in this process. This PN serves as notification to the Tribes within the area potentially affected by the proposed work and invites their participation in the Federal decision-making process regarding the protected Tribal right or resource. Consultation may be initiated by the affected Tribe upon written request to the District Commander during the public comment period.

PUBLIC HEARING: Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider this application. Requests for public hearings shall state, with particularity, reasons for holding a public hearing.

EVALUATION: The decision whether to issue a permit will be based on an evaluation of the probable impacts, including cumulative impacts of the proposed activity and its intended use on the public interest. Evaluation of the probable impacts, which the proposed activity may have on the public interest, requires a careful weighing of all the factors that become relevant in each particular case. The benefits, which reasonably may be expected to accrue from the proposal, must be balanced against its reasonably foreseeable detriments. The outcome of the general balancing process would determine whether to authorize a proposal, and if so, the conditions under which it would be allowed to occur. The decision should reflect the national concern for both protection and utilization of important resources. All factors, which may be relevant to the proposal, must be considered including the cumulative effects thereof. Among those are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and, in general, the needs and welfare of the people. For activities involving 404 discharges, a permit will be denied if the discharge would not comply with the Environmental Protection Agency's 404(b)(1) guidelines. Subject to the preceding sentence and any other applicable guidelines or criteria (see Sections 320.2 and 320.3), a permit will be granted unless the District Commander determines that it would be contrary to the public interest.

The USACE is soliciting comments from the public; Federal, State, and local agencies and officials; Indian Tribes; and other interested parties in order to evaluate the impacts of this proposed activity. Any comments received will be fully considered by the USACE to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments received will be used in the preparation of our decision document for the proposed action. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

AUTHORITIES: This permit will be issued or denied under the following authorities:

(X) Discharge of dredged and/or fill material into waters of the U.S. – Section 404 Clean Water Act (33 U.S.C. 1344). Therefore, our public interest review will consider the guidelines set forth under Section 404(b) of the Clean Water Act (40 CFR 230).

(X) Perform work in or affecting navigable waters of the United States – Section 10 Rivers and Harbors Act 1899 (33 U.S.C. 403).

Project drawings/figures (128 sheets), applicant proposed mitigation statement, and a Notice of Application for State Water Quality Certification are enclosed with this Public Notice.

District Commander
U.S. Army, Corps of Engineers

Enclosures

MICHAEL J. DUNLEAVY,
GOVERNOR

STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION
DIVISION OF WATER

Wastewater Discharge Authorization Program (WDAP) / 401 Certification

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WDAP/401 CERTIFICATION

555 CORDOVA STREET

ANCHORAGE, ALASKA 99501-2617

PHONE: (907) 269-6285 | EMAIL: dec-401cert@alaska.gov

NOTICE OF APPLICATION FOR STATE WATER QUALITY CERTIFICATION

Any applicant for a federal license or permit to conduct an activity that might result in a discharge into navigable waters, in accordance with Section 401 of the Clean Water Act of 1977 (PL95-217), also must apply for and obtain certification from the Alaska Department of Environmental Conservation that the discharge will comply with the Clean Water Act, the Alaska Water Quality Standards, and other applicable State laws. By agreement between the U.S. Army Corps of Engineers and the Department of Environmental Conservation, application for a Department of the Army permit to discharge dredged or fill material into navigable waters under Section 404 of the Clean Water Act also may serve as application for State Water Quality Certification.

Notice is hereby given that the application for a Department of the Army Permit described in the Corps of Engineers' Public Notice (PN) Reference Number **POA-2018-00190, Harrison Bay**, serves as application for State Water Quality Certification from the Department of Environmental Conservation.

After reviewing the application, the Department may certify there is reasonable assurance the activity, and any discharge that might result, will comply with the Clean Water Act, the Alaska Water Quality Standards, and other applicable State laws. The Department also may deny or waive certification.

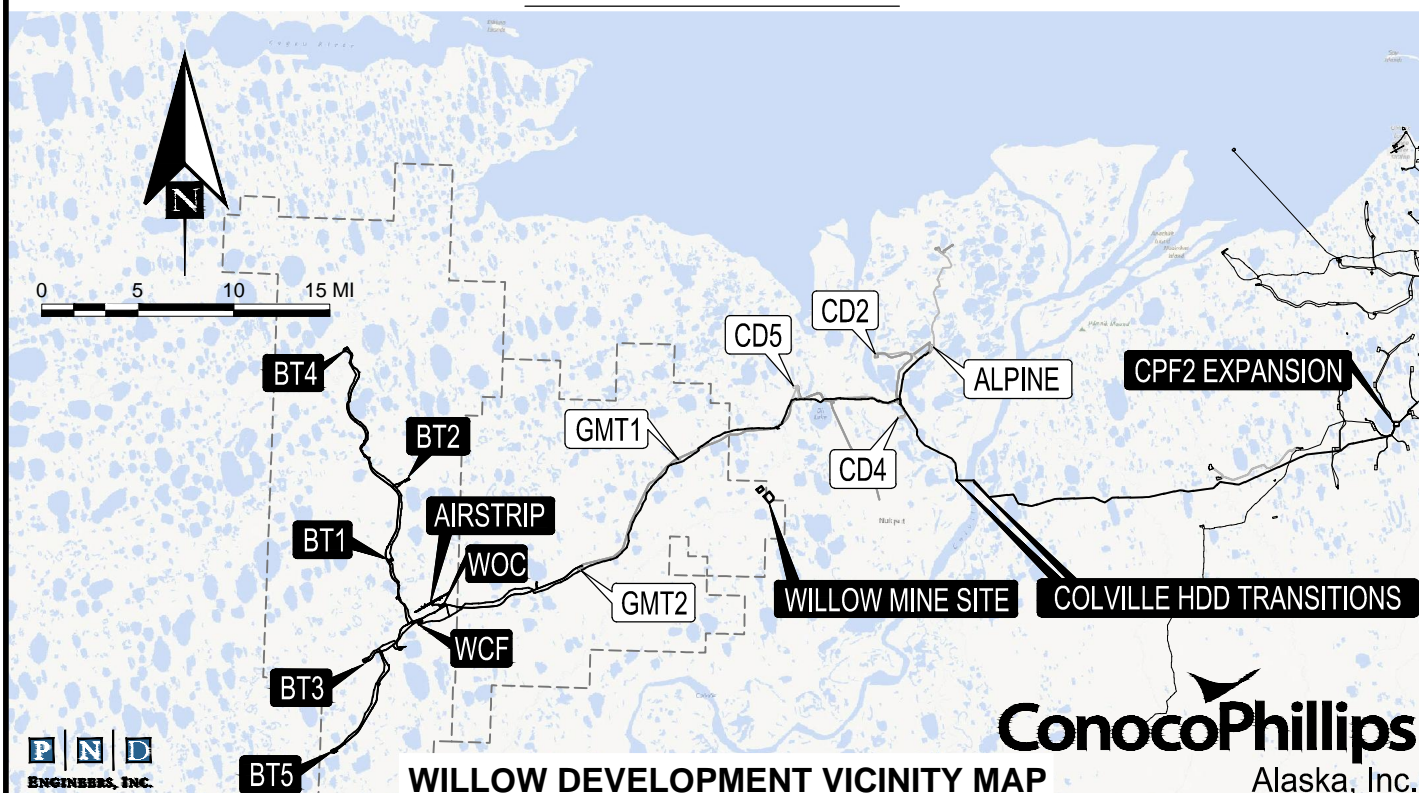
Any person desiring to comment on the project with respect to Water Quality Certification, may submit written comments to the address above or via email to dec-401cert@alaska.gov by the expiration date of the Corps of Engineer's Public Notice. All comments should include the PN reference number listed above. Mailed comments must be postmarked on or before the expiration date of the public notice.

Disability Reasonable Accommodation Notice

The State of Alaska, Department of Environmental Conservation complies with Title II of the Americans with Disabilities Act of 1990. If you are a person with a disability who may need special accommodation in order to participate in this public process, please contact Kate Orozco at 907-465-6171 or TDD Relay Service 1-800-770-8973/TTY or dial 711 within 5 days of the expiration date of this public notice to ensure that any necessary accommodations can be provided.



ALASKA VICINITY MAP



WILLOW DEVELOPMENT VICINITY MAP

ConocoPhillips
Alaska, Inc.

PURPOSE:
CONSTRUCT ROAD, PAD, AND BRIDGE
INFRASTRUCTURE FOR OILFIELD
DEVELOPMENT

DATUM: BPMSL, NAD83 ASP ZONE 4

REFERENCE: POA-####-####

APPLICANT: CONOCOPHILLIPS
ALASKA, INC (CPAI)

LOCATION:

T11N R1W, T10N R1W, T9N R1W,
T8N R1W, T9N R1E, T9N R2E,
T10N R2E, T10N R5E, T11N R4E,
T14 R2E UMIAT MERIDIAN

PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION

IN: BEAR TOOTH UNIT

COUNTY: NORTH SLOPE BOROUGH
STATE: ALASKA

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REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION

AT: ALASKA

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KUUKPIK VILLAGE CORPORATION
P.O. BOX 89187
NUIQSUT, AK 99789
(907) 480-6220
ATTN: JOE NUKAPIGAK

BUREAU OF LAND MANAGEMENT
1150 UNIVERSITY AVENUE
FAIRBANKS, AK 99709
ATTN: NICHELLE JONES

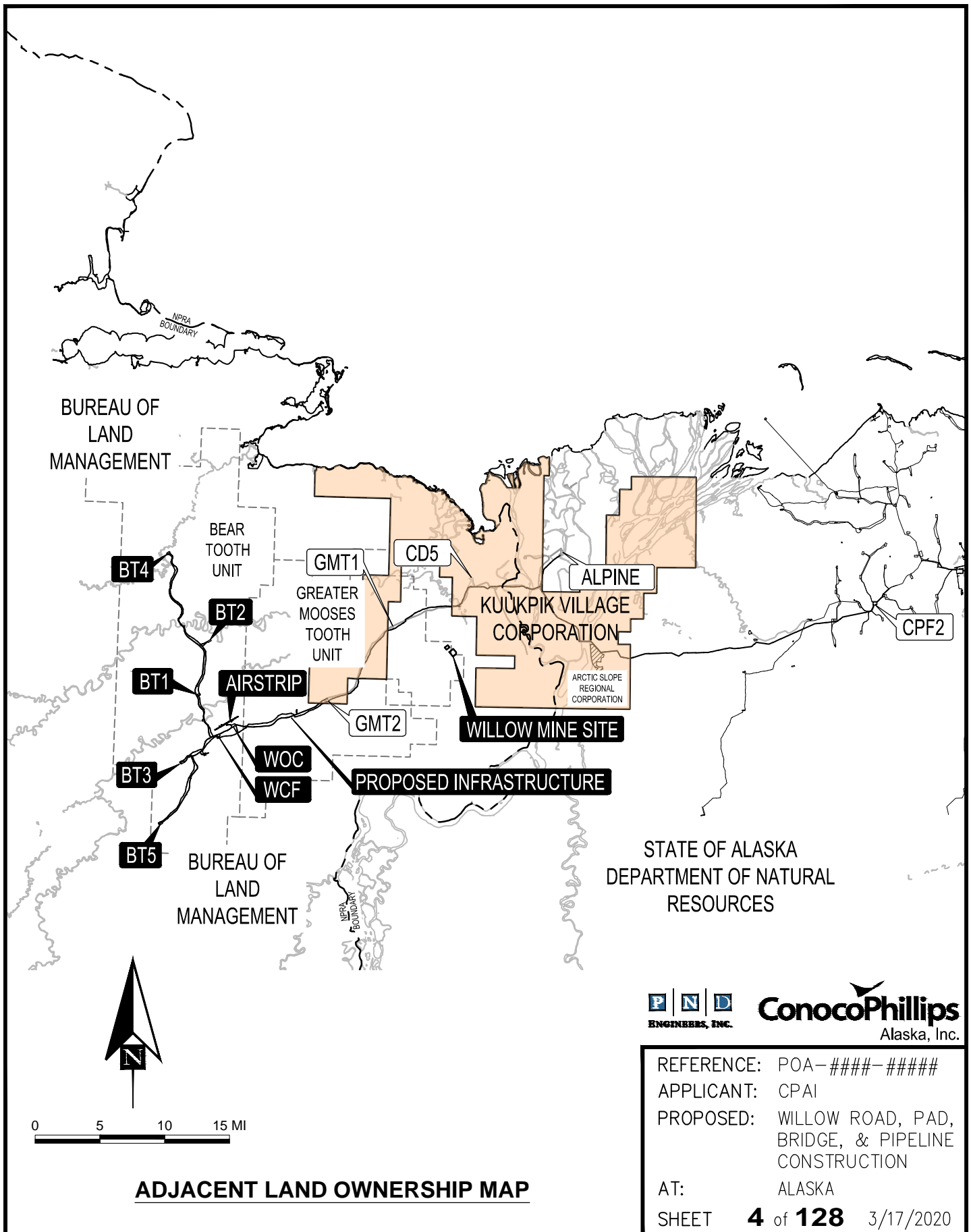
ARCTIC SLOPE REGIONAL CORPORATION
P.O. BOX 129
BARROW, AK 99723
ATTN: ERIK KENNING

STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINING, LAND & WATER
3700 AIRPORT WAY
FAIRBANKS, AK 99709
ATTN: JEANNE PROULX

ADJACENT LAND OWNERS



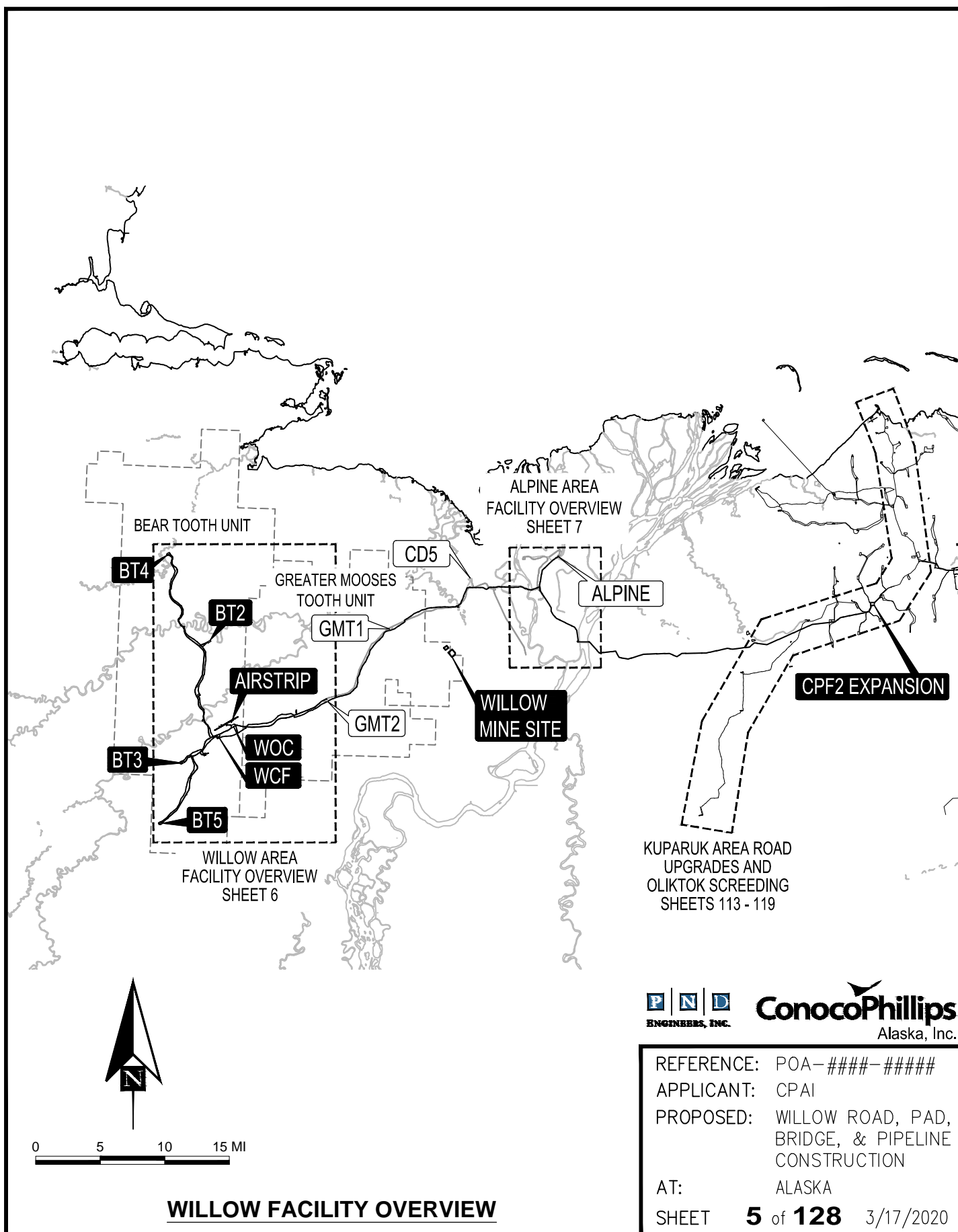
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **3** of **128** 3/17/2020



ADJACENT LAND OWNERSHIP MAP



REFERENCE: POA-####-####
 APPLICANT: CPAI
 PROPOSED: WILLOW ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
 AT: ALASKA
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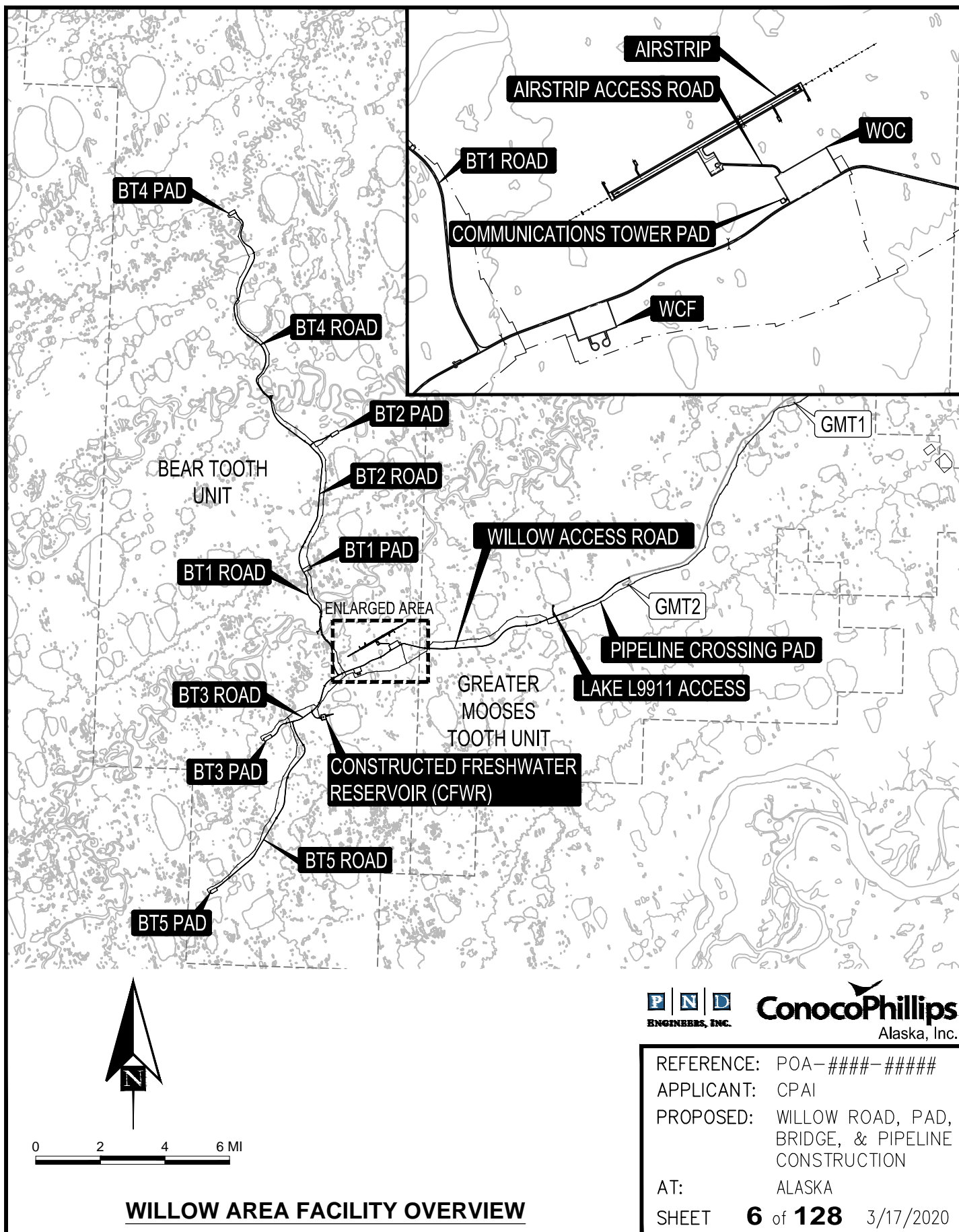


WILLOW FACILITY OVERVIEW

P | N | D
ENGINEERS, INC.

ConocoPhillips
Alaska, Inc.

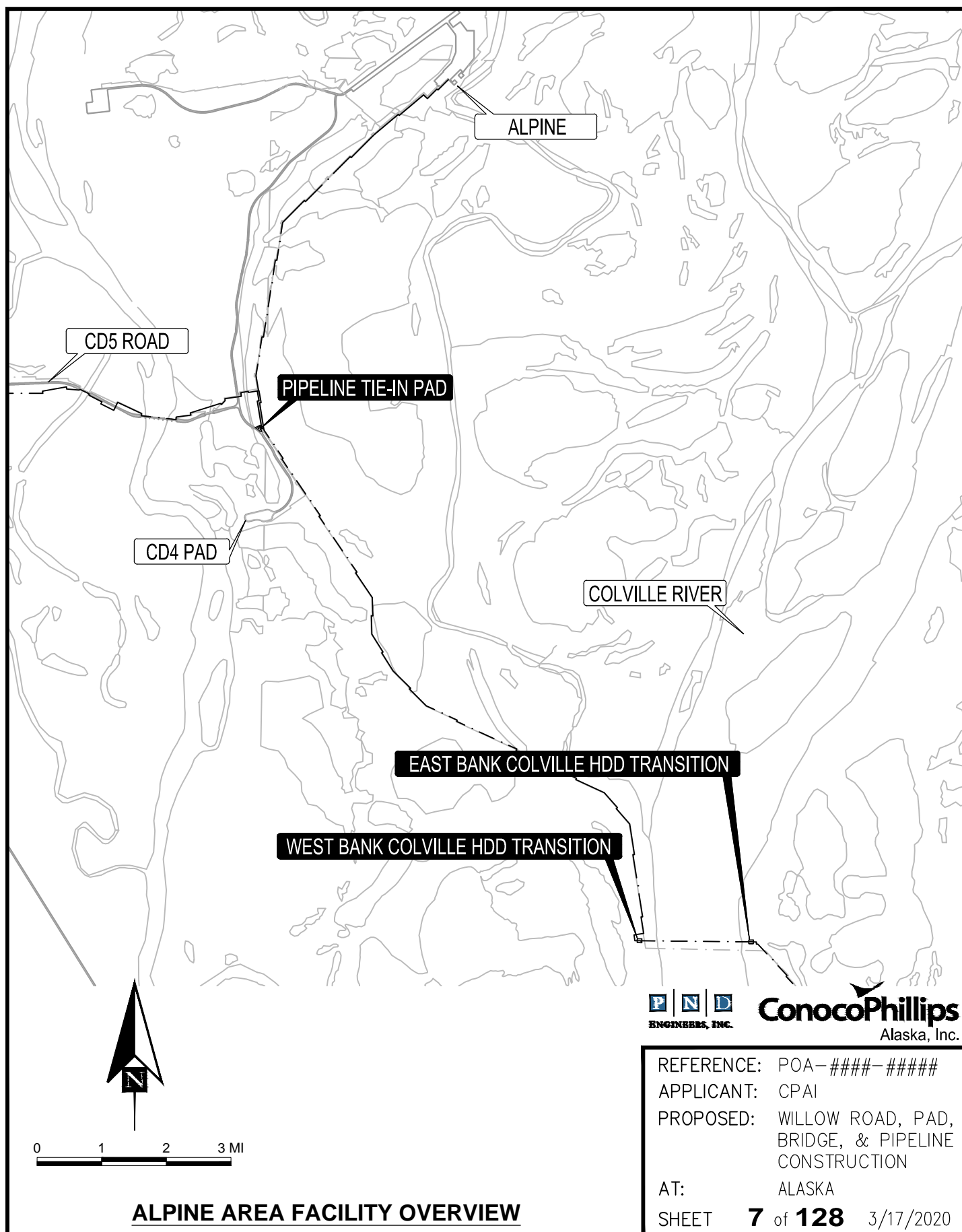
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **5** of **128** 3/17/2020



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **6** of **128** 3/17/2020

WILLOW AREA FACILITY OVERVIEW



ROADS	FOOTPRINT (AC)	FILL VOLUME (CY)	LENGTH (mi)
WILLOW ACCESS ROAD	68.4	594,000	9.3
BT1 ROAD	30.5	265,000	4.1
BT2 ROAD	36.1	310,000	4.8
BT3 ROAD	19.2	158,000	3.0
BT4 ROAD	55.8	464,000	8.7
BT5 ROAD	40.2	331,000	6.2
AIRSTrip ACCESS ROAD	2.2	18,000	0.3
CONSTRUCTED FRESHWATER RESERVOIR ACCESS ROAD	2.2	18,000	0.3
LAKE L9911 ACCESS ROAD	1.8	15,000	0.3

PADS	FOOTPRINT (AC)	FILL VOLUME (CY)
BT1 PAD	17.0	236,000
BT2 PAD	17.0	236,000
BT3 PAD	17.0	236,000
BT4 PAD	14.4	200,000
BT5 PAD	14.4	200,000
WCF PAD	22.8	346,000
WOC PAD	31.2	487,000
AIRSTrip AND APRON	42.1	588,000
VALVE PADS	1.3	16,000
CONSTRUCTED FRESHWATER RESERVOIR ACCESS PAD	1.3	12,000
LAKE L9911 ACCESS PAD	1.3	12,000
COMMUNICATIONS TOWER PAD	0.5	5,000
RESERVOIR PERIMETER BERM	3.9	31,000
CPF2 EXPANSION	1.0	13,000
WEST BANK COLVILLE HDD TRANSITION	0.8	9,000
EAST BANK COLVILLE HDD TRANSITION	0.8	9,000
PIPELINE CROSSING PAD	0.5	6,000
PIPELINE TIE-IN PAD	0.7	8,000

SUBSISTENCE ACCESS	FOOTPRINT (AC)	FILL VOLUME (CY)
VEHICLE PULLOUT/SUBSISTENCE ACCESS PADS (8 PADS)	3.0	32,000
FISH CREEK BOAT RAMP AND ACCESS ROAD	2.1	21,000
JUDY CREEK BOAT RAMP AND ACCESS ROAD	2.0	20,000
TINMIAQSIUGVIK RIVER BOAT RAMP AND ACCESS ROAD	1.8	20,000

KUPARUK AREA UPGRADES	FOOTPRINT (AC)	FILL VOLUME (CY)
ROADS, 12-ACRE PAD, AND OLIK TOK DOCK	5.0	123,900

TOTAL WILLOW INFRASTRUCTURE	FOOTPRINT (AC)	FILL VOLUME (CY)
ROADS	256.4	2,173,000
SUBSISTENCE ACCESS	8.9	93,000
PADS	188.1	2,650,000
KUPARUK AREA UPGRADES (ROADS, PAD, AND DOCK)*	5.0	123,900
PIPELINES	0.8	16,000
TOTAL	459.2	5,055,900

*A majority of the Kuparuk Area Upgrades will be constructed on existing gravel footprint.

NOTE:
1. ACREAGE AND VOLUME QUANTITIES REPORTED ABOVE ARE PROJECT TOTALS, INCLUDING FILL IN UPLANDS AS WELL AS WATERS OF THE U.S.



REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA
SHEET **8** of **128** 3/17/2020

WILLOW FACILITY QUANTITIES
(SHEET 1 of 2)

WILLOW BRIDGES	APPROX. CLEAR OPENING (FT)
FISH CREEK BRIDGE	420
JUDY CREEK BRIDGE	380
JUDY CREEK KAYYAAQ BRIDGE	75
WILLOW 2 BRIDGE	80
WILLOW 4 BRIDGE	130
WILLOW 4A BRIDGE	50
WILLOW 8 BRIDGE	40

WILLOW BRIDGE PILES BELOW OHW				
BRIDGE CROSSING	# OF PIERS BELOW OHW	# PILES PER PIER	PILE DIAMETER * (in)	PILE AREA BELOW OHW (ft ²)
FISH CREEK	4	4	60	314
JUDY CREEK	4	4	60	314
JUDY CREEK KAYYAAQ	1	4	48	50
TOTAL				679

*Pile diameter includes surface casings (pile diameter + 12") used for pile installation.

WILLOW PIPELINES	TOTAL VSM's	FOOTPRINT (AC)	SLURRY VOLUME (CY)
PIPELINES	13,000	0.8	16,000

TRENCHING	LENGTH (FT)	WIDTH (in)	TOTAL FOOTPRINT (AC)
TRENCHING	44,000	12	1.1

MATERIAL SOURCE	PERMITTED AREA (AC)
WILLOW MINE AREA 1	109.3
WILLOW MINE AREA 2	40.4
TOTAL MINE AREA (AC)	149.7
TOTAL MATERIAL AVAILABLE (CY)	5,550,000

RESERVOIR EXCAVATION	FOOTPRINT (AC)
RESERVOIR	12.9
RESERVOIR CONNECTION	3.5

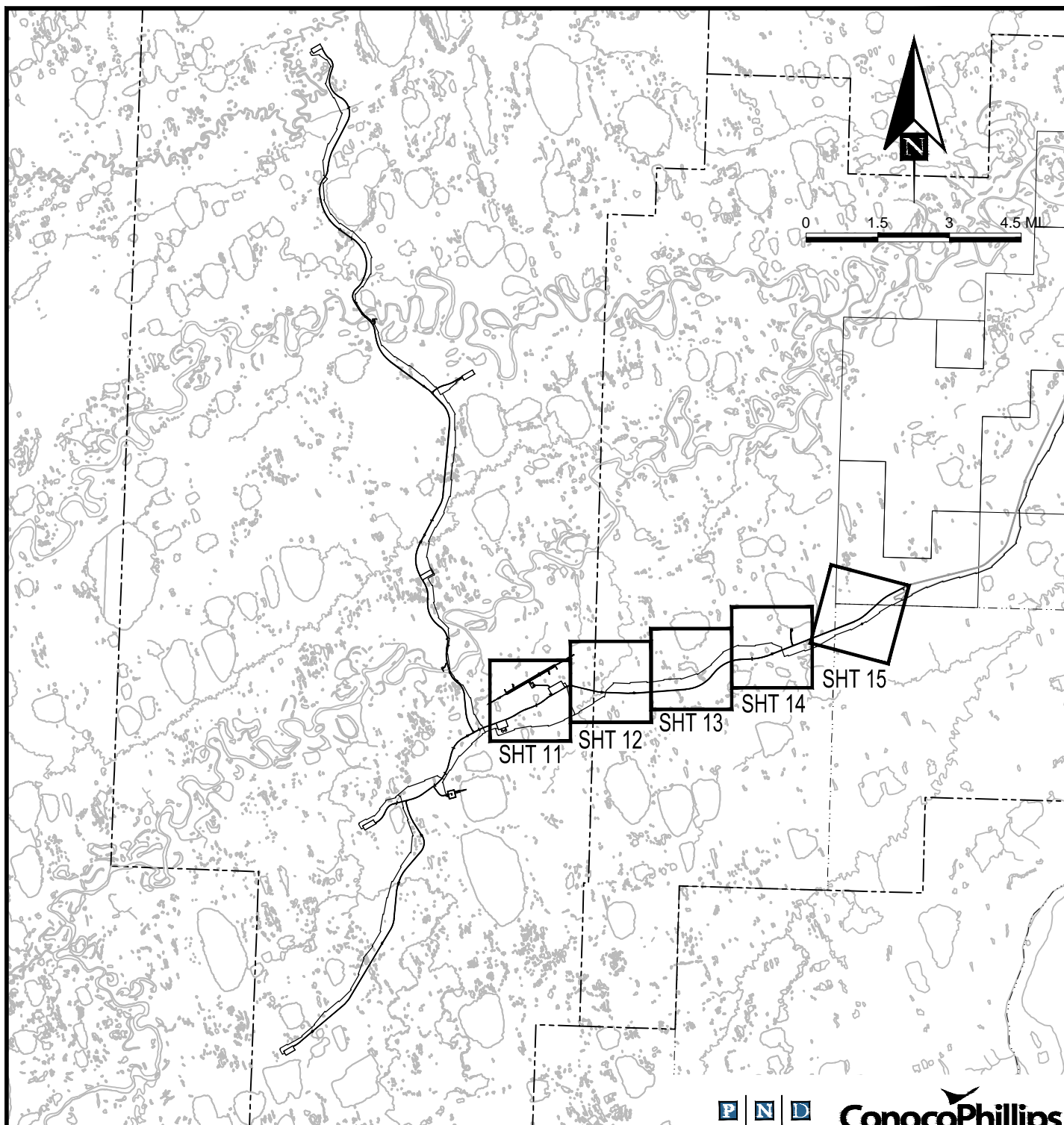
SCREEDING AREAS	FOOTPRINT (AC)
OLIKTOK DOCK	2.5
BARGE LIGHTERING AREA	9.6

NOTE:
1. ACREAGE AND VOLUME QUANTITIES REPORTED ABOVE ARE PROJECT TOTALS, INCLUDING FILL IN UPLANDS AS WELL AS WATERS OF THE U.S.

WILLOW FACILITY QUANTITIES (SHEET 2 of 2)

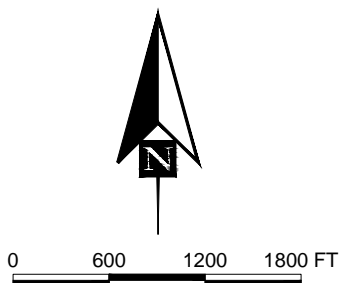
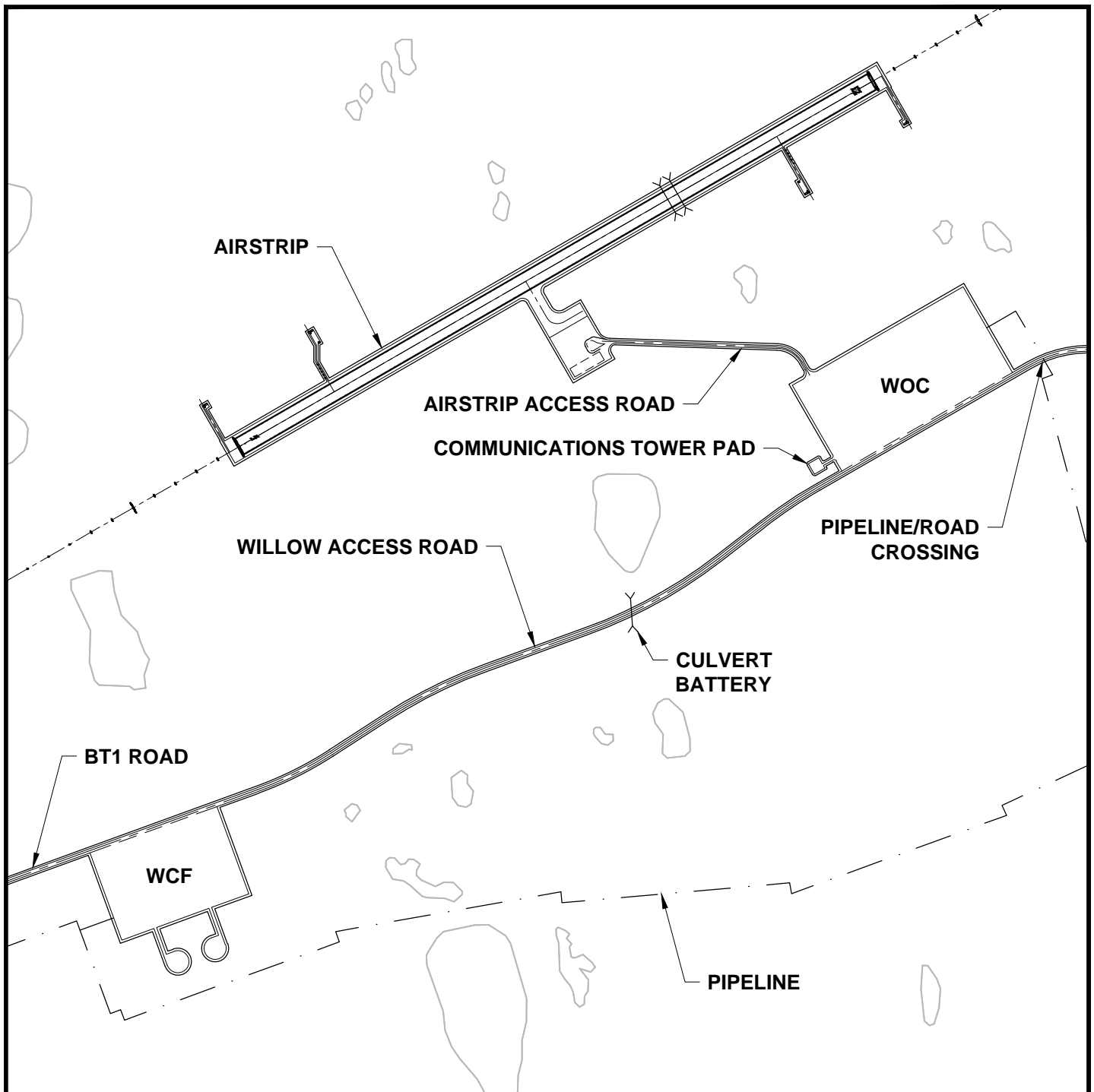


REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **9** of **128** 3/17/2020



WILLOW ACCESS ROAD KEY MAP

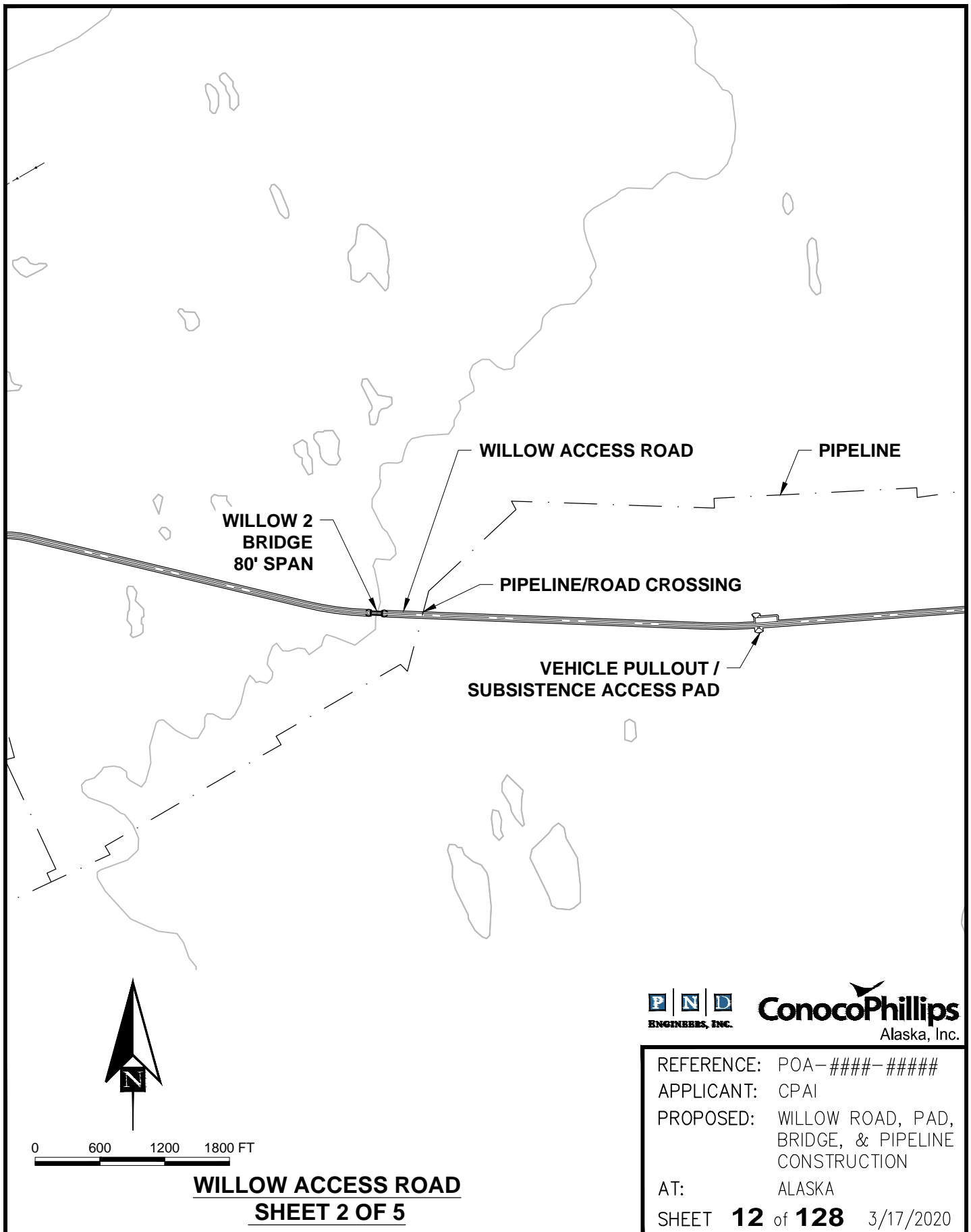
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **10** of **128** 3/17/2020

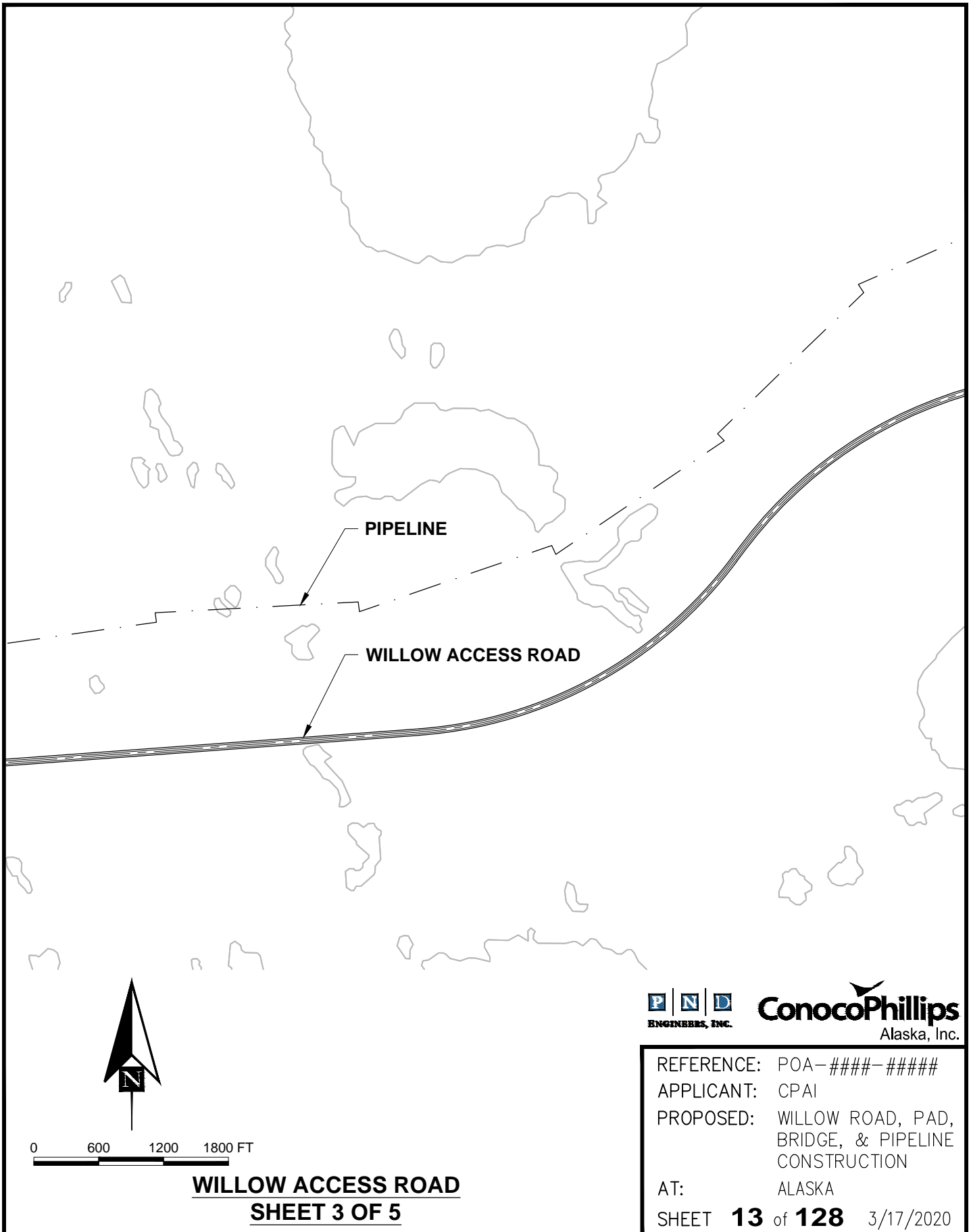


WILLOW ACCESS ROAD
SHEET 1 OF 5



REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **11** of **128** 3/17/2020

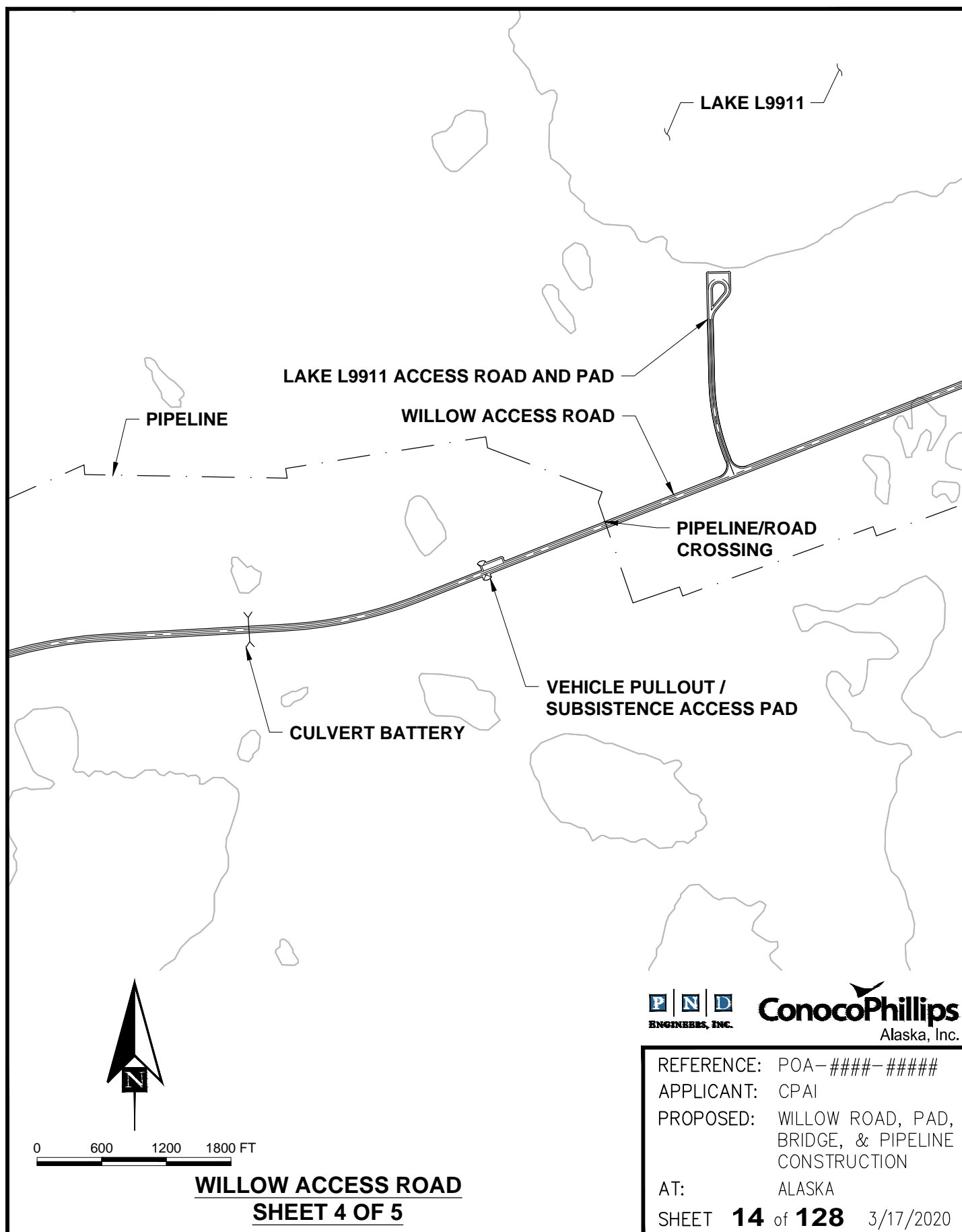




ConocoPhillips
Alaska, Inc.

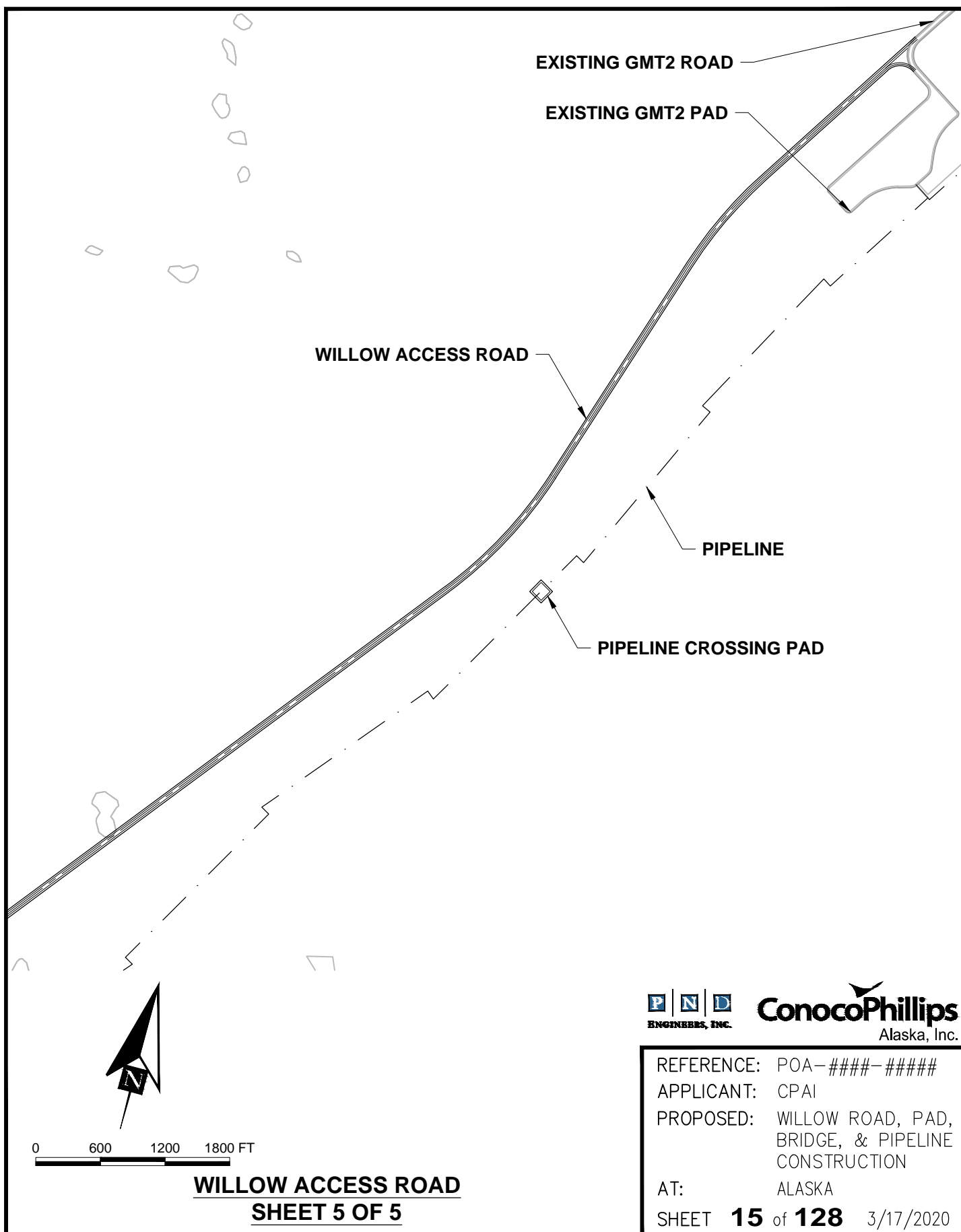
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **13** of **128** 3/17/2020

WILLOW ACCESS ROAD
SHEET 3 OF 5



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **14** of **128** 3/17/2020

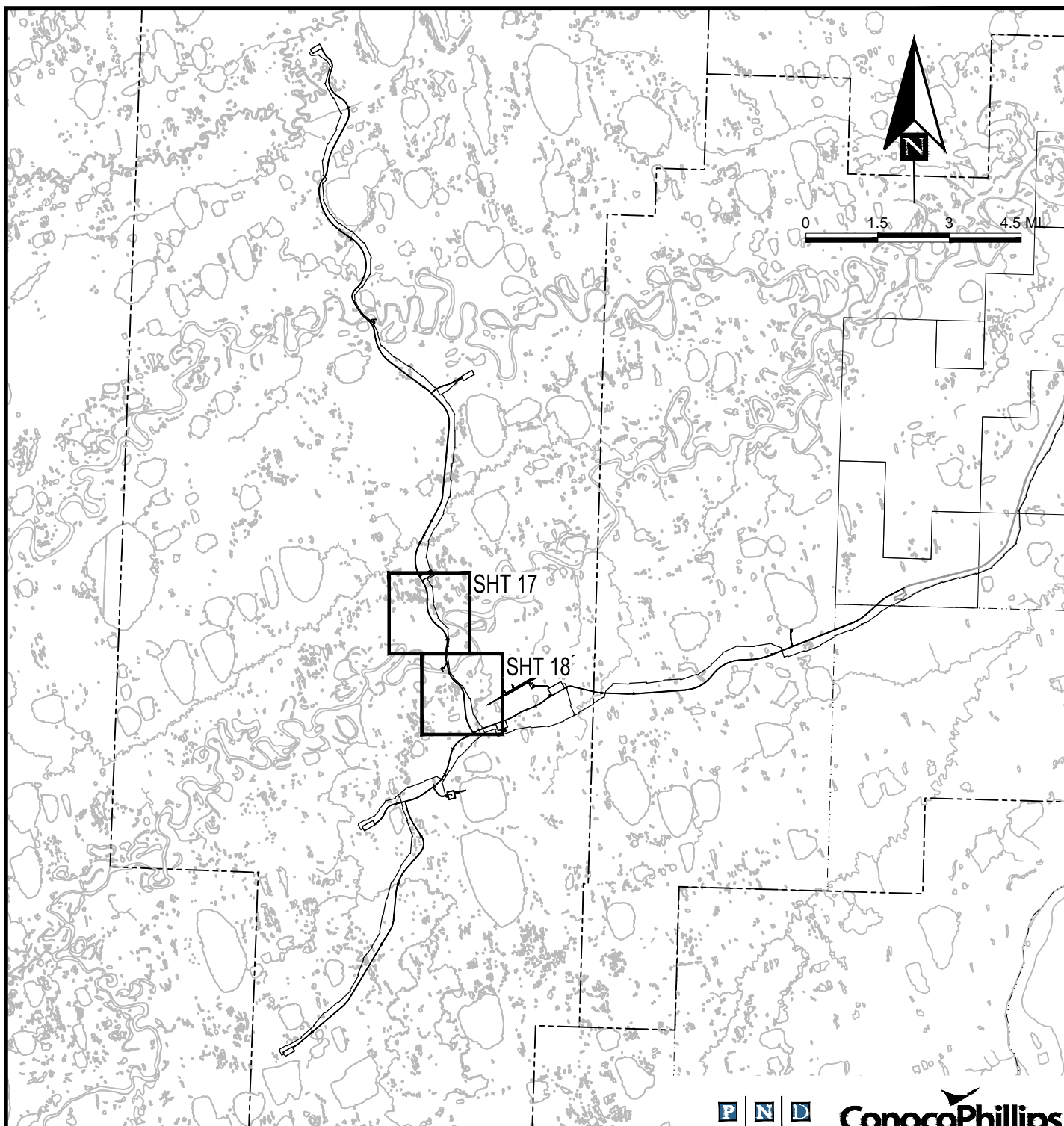


WILLOW ACCESS ROAD
SHEET 5 OF 5



ConocoPhillips
Alaska, Inc.

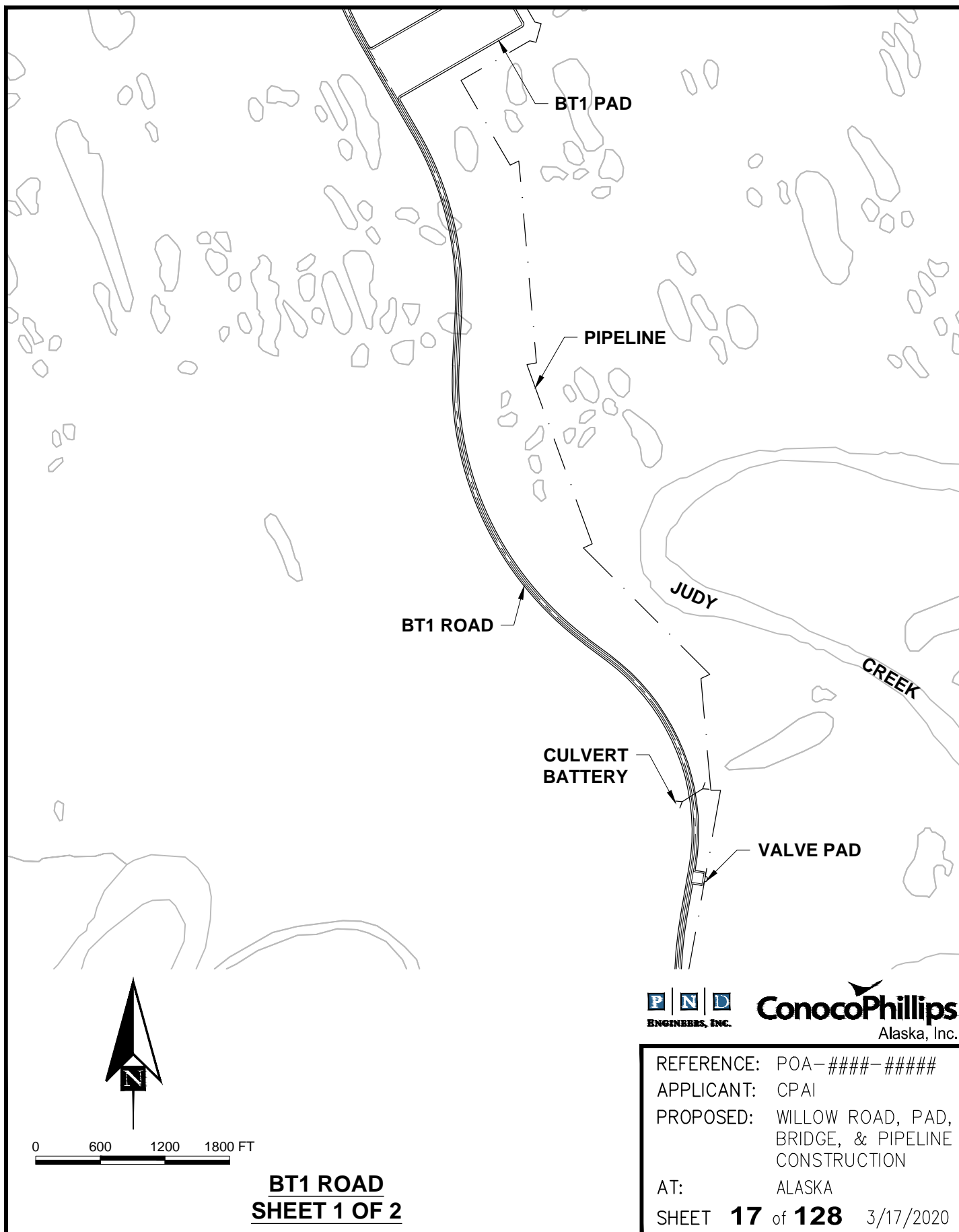
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **15** of **128** 3/17/2020



P | N | D **ConocoPhillips**
ENGINEERS, INC. Alaska, Inc.

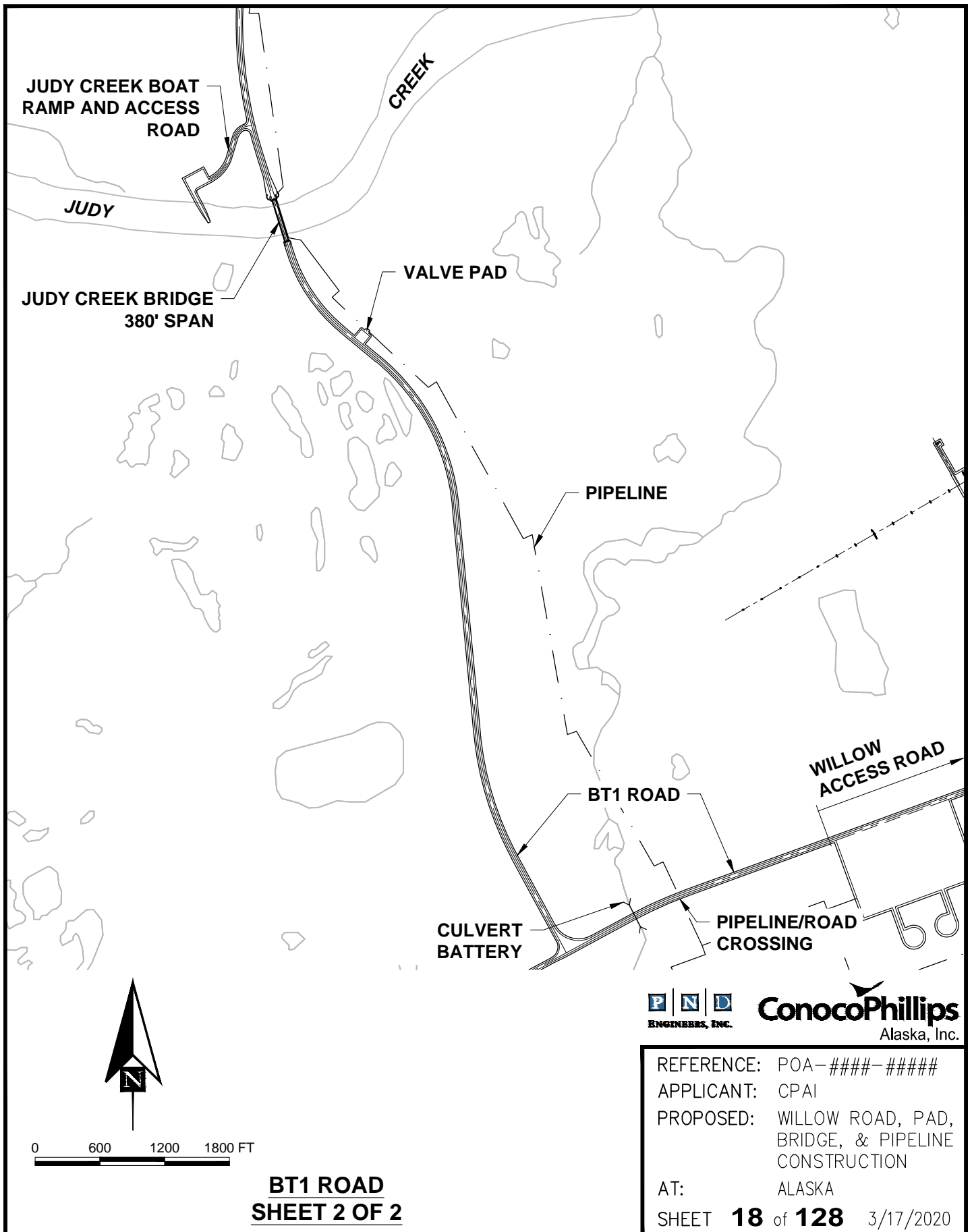
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **16** of **128** 3/17/2020

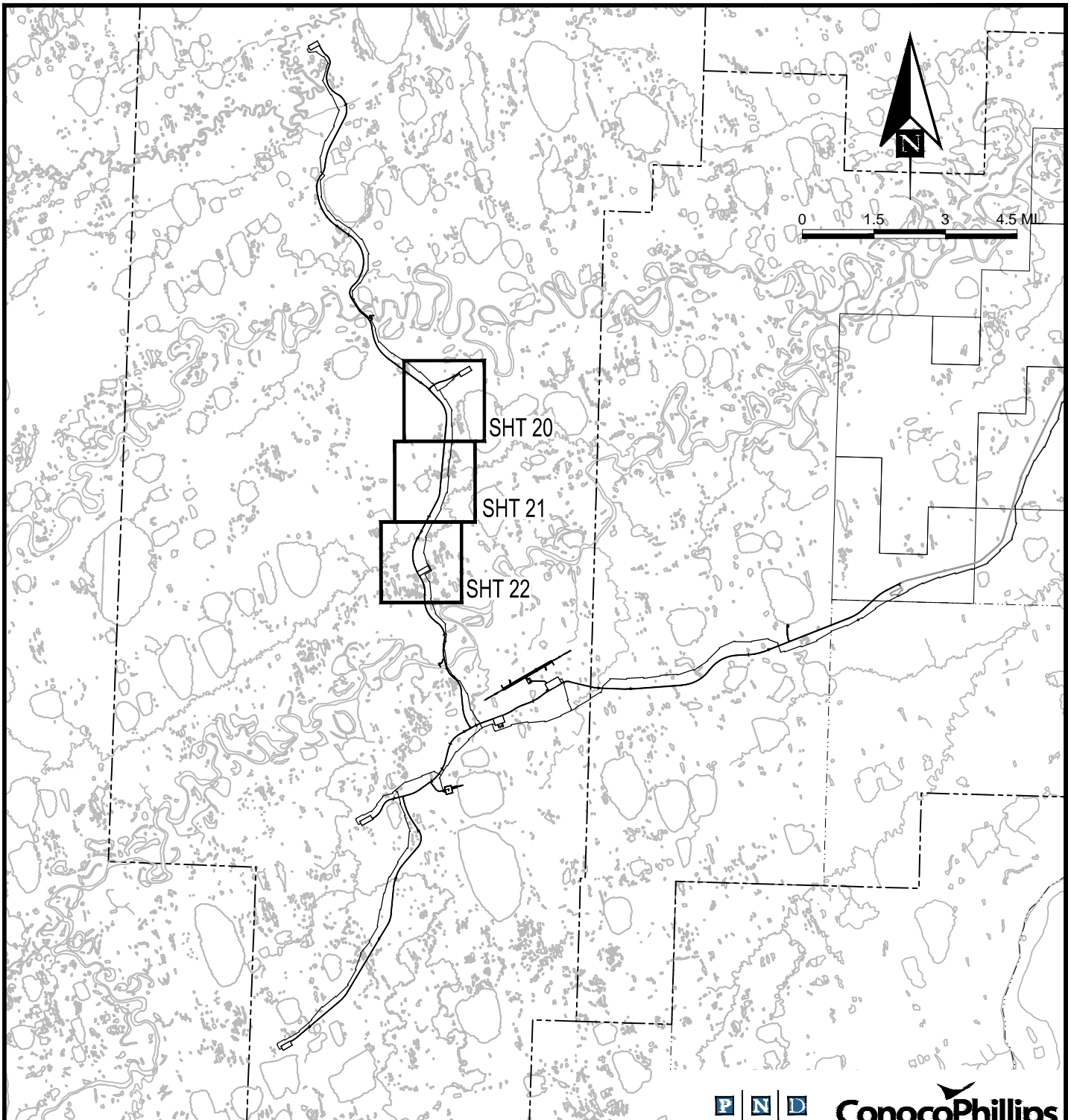
BT1 ROAD KEY MAP



P | N | D
ENGINEERS, INC. **ConocoPhillips**
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **17** of **128** 3/17/2020

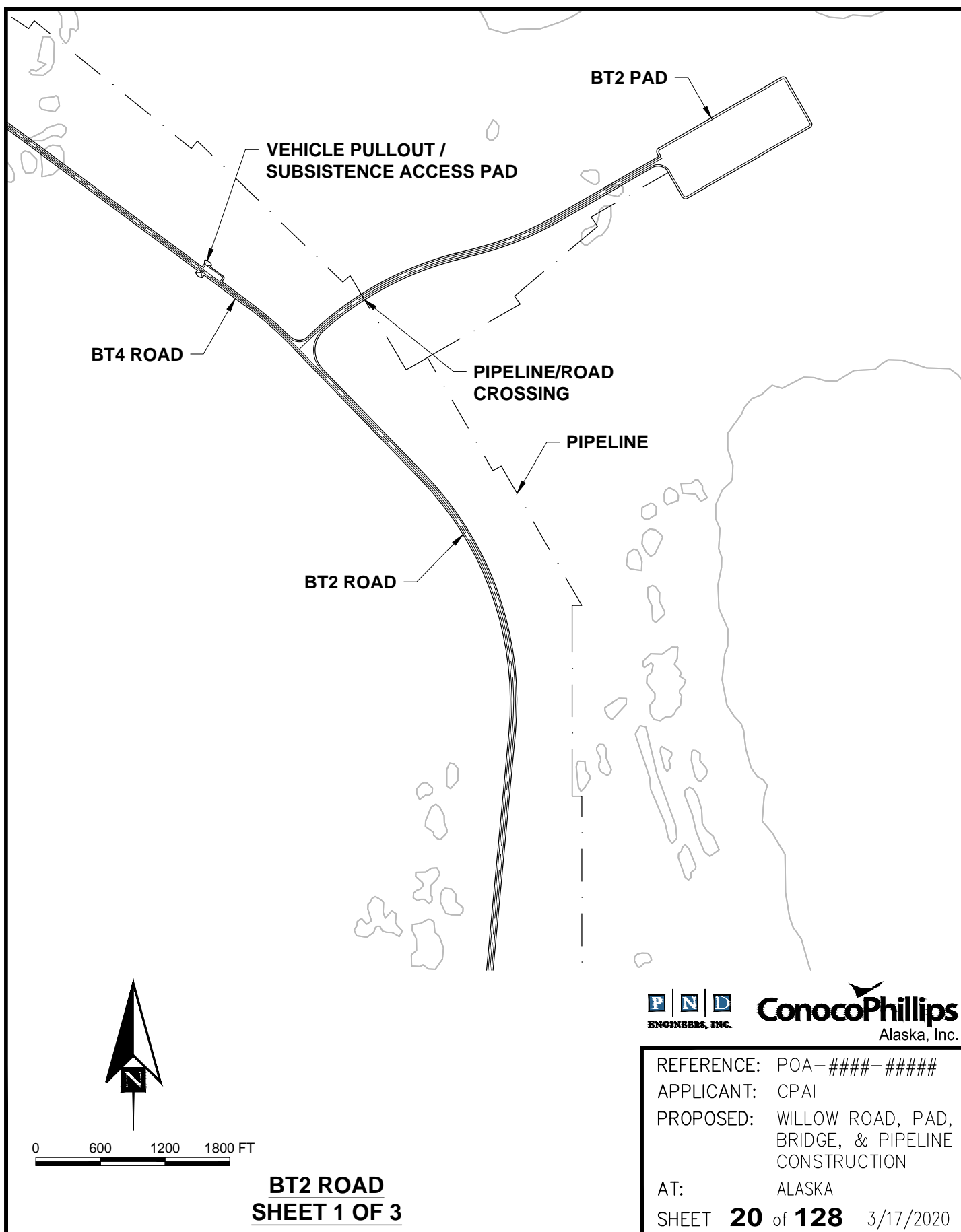




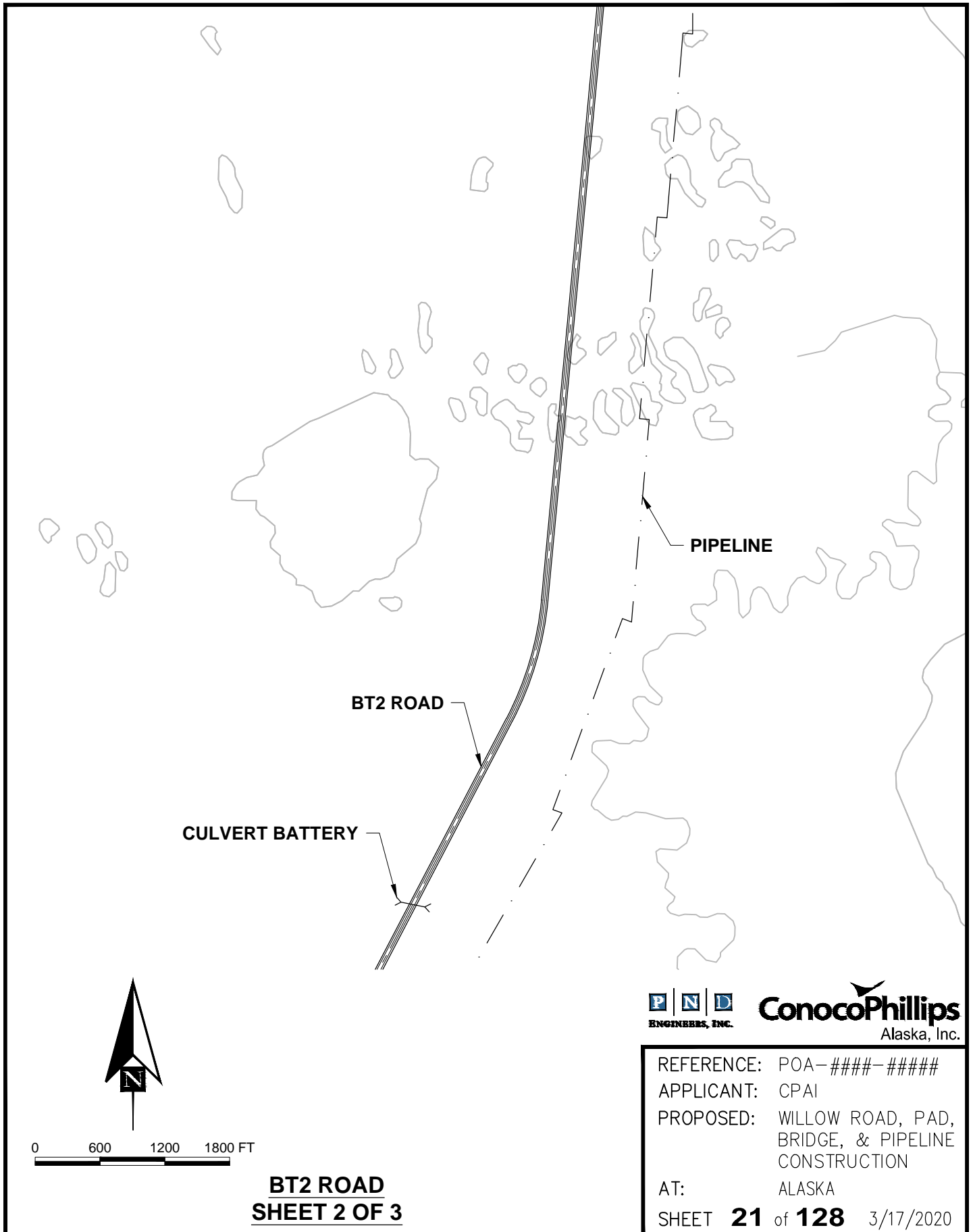
ConocoPhillips
Alaska, Inc.

BT2 ROAD KEY MAP

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **19** of **128** 3/17/2020

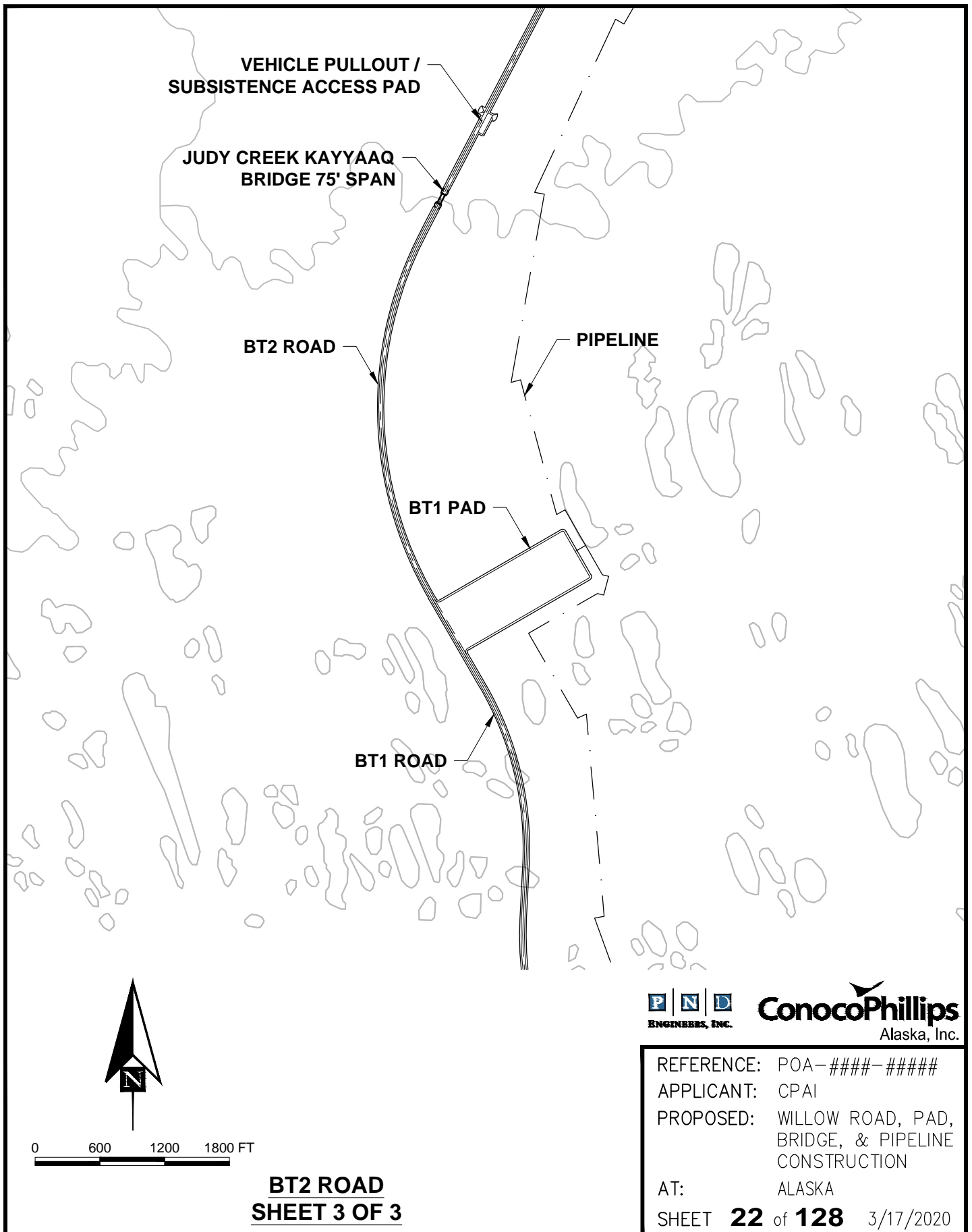


REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **20** of **128** 3/17/2020



ConocoPhillips
Alaska, Inc.

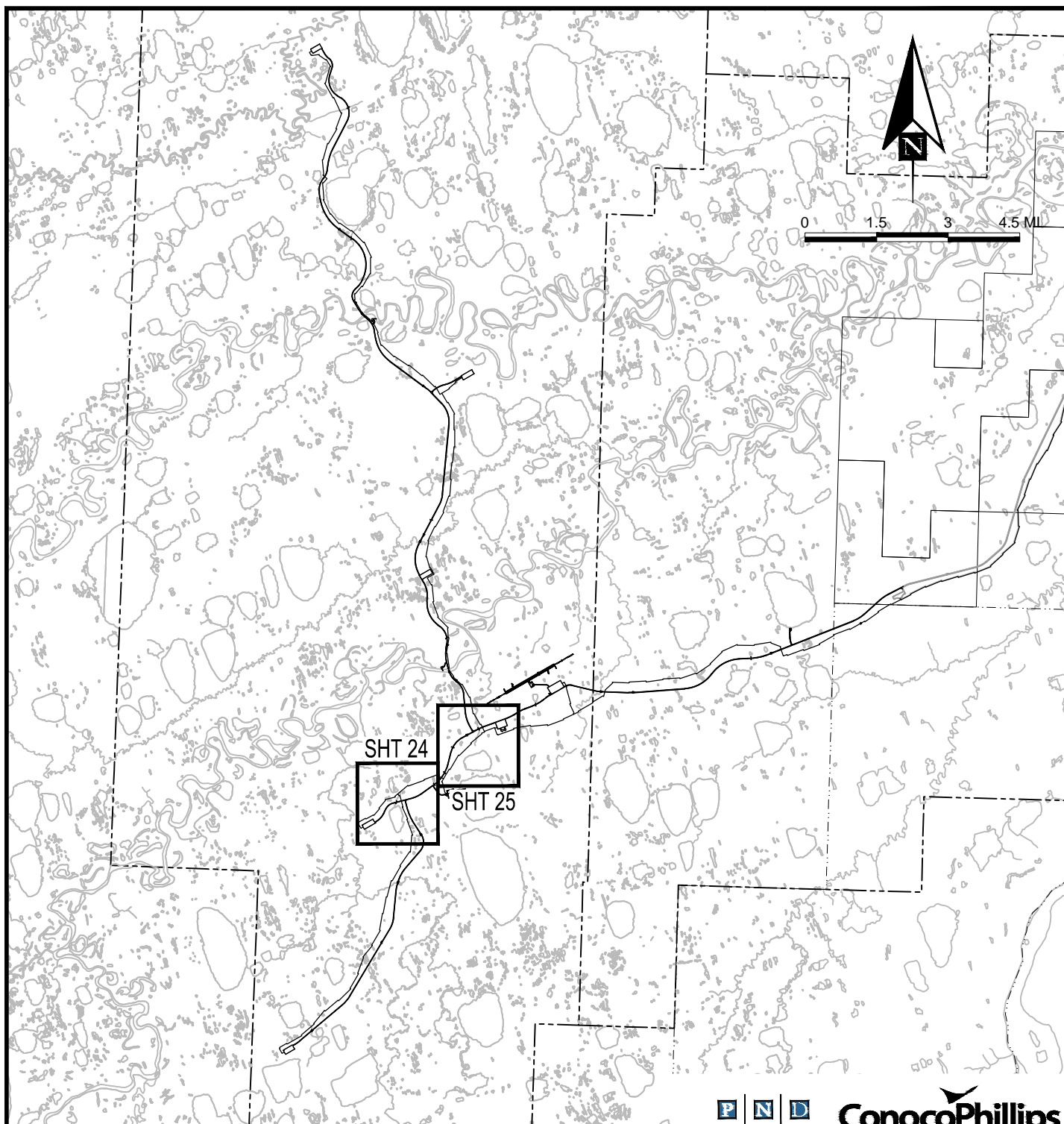
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **21** of **128** 3/17/2020



ConocoPhillips
Alaska, Inc.

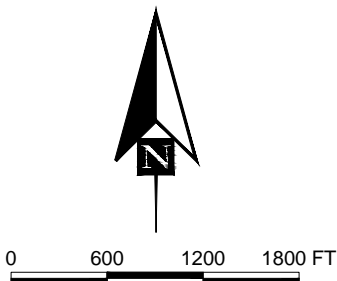
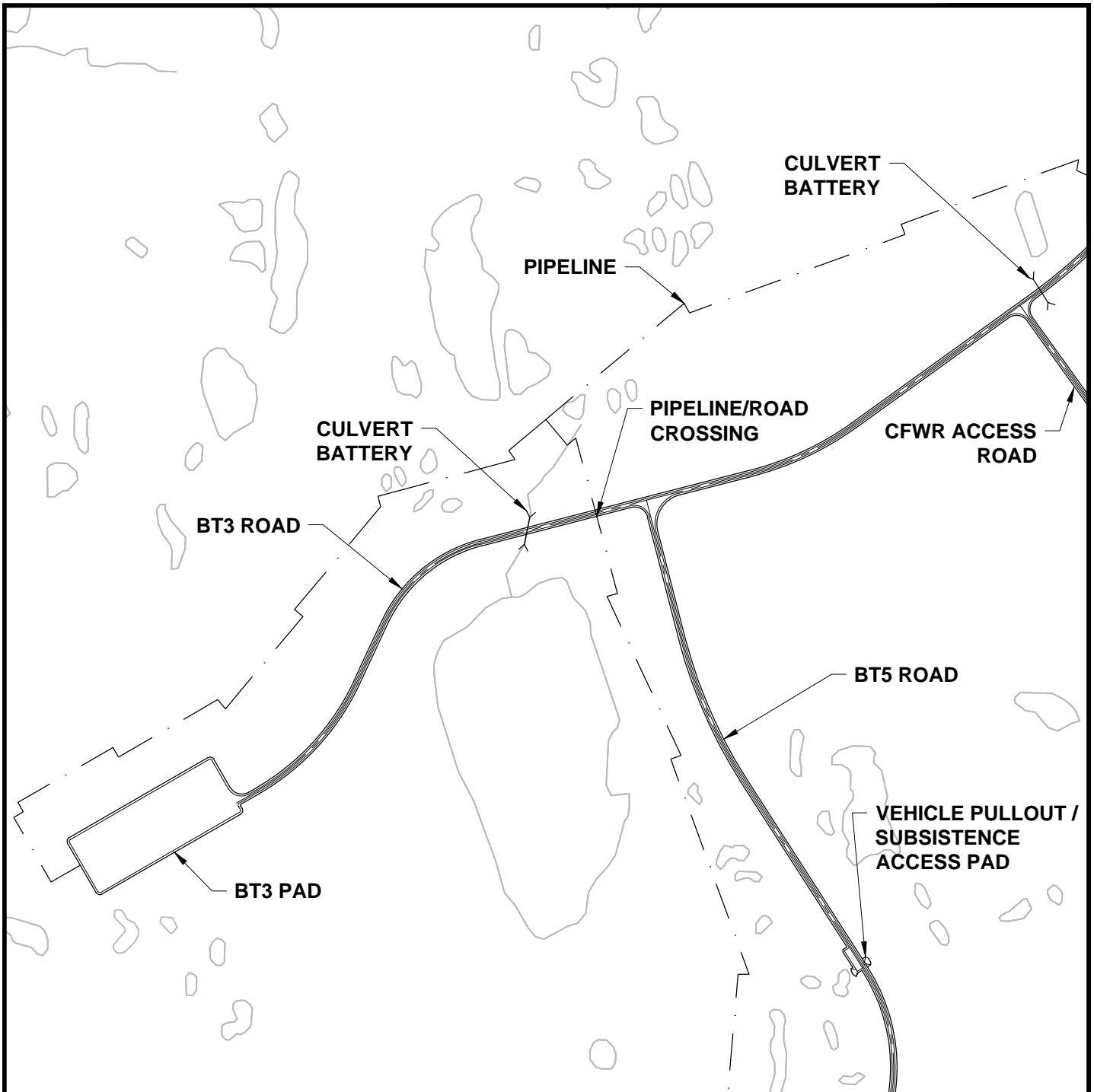
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **22** of **128** 3/17/2020

BT2 ROAD
SHEET 3 OF 3



BT3 ROAD KEY MAP

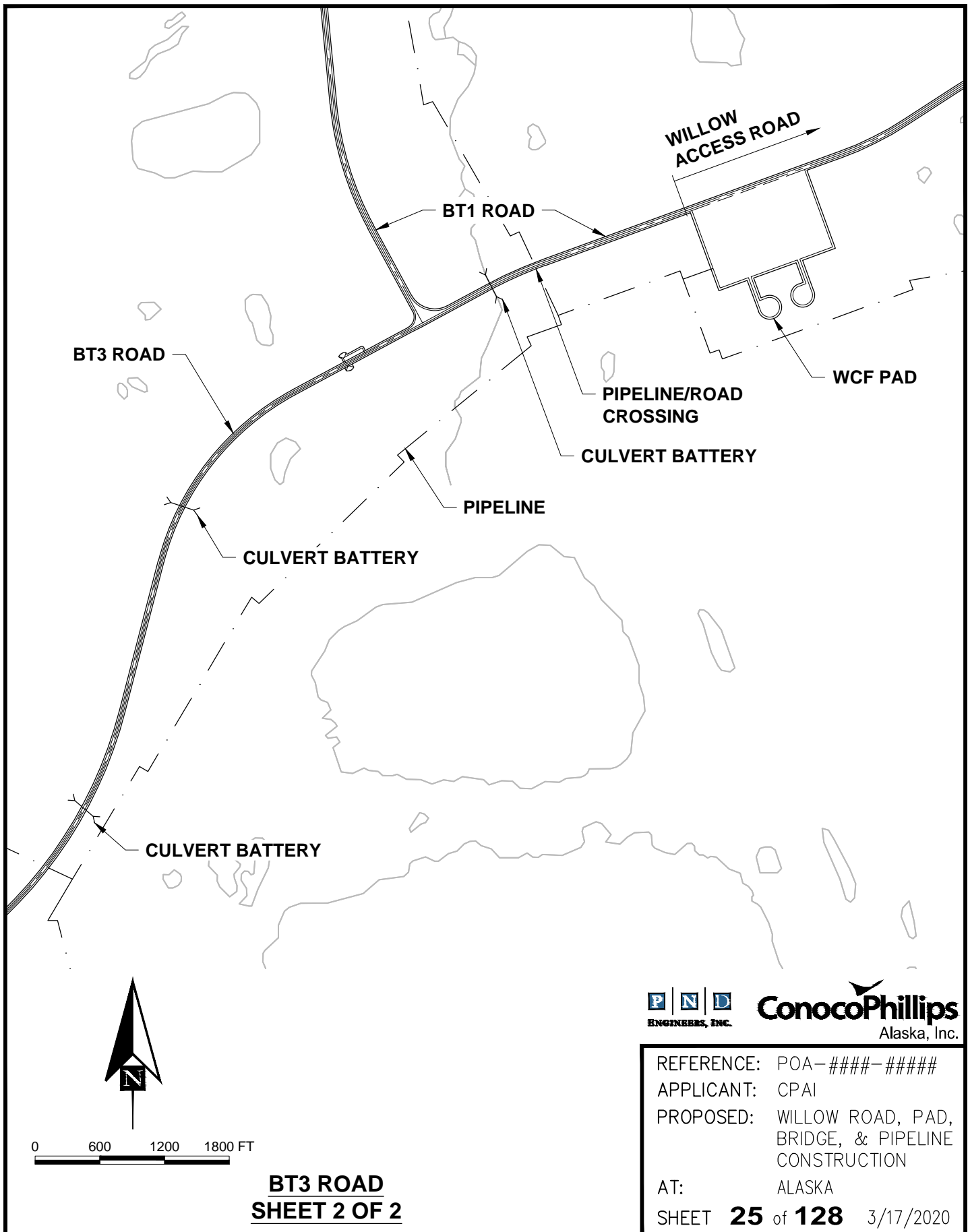
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **23** of **128** 3/17/2020



BT3 ROAD
SHEET 1 OF 2



REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **24** of **128** 3/17/2020

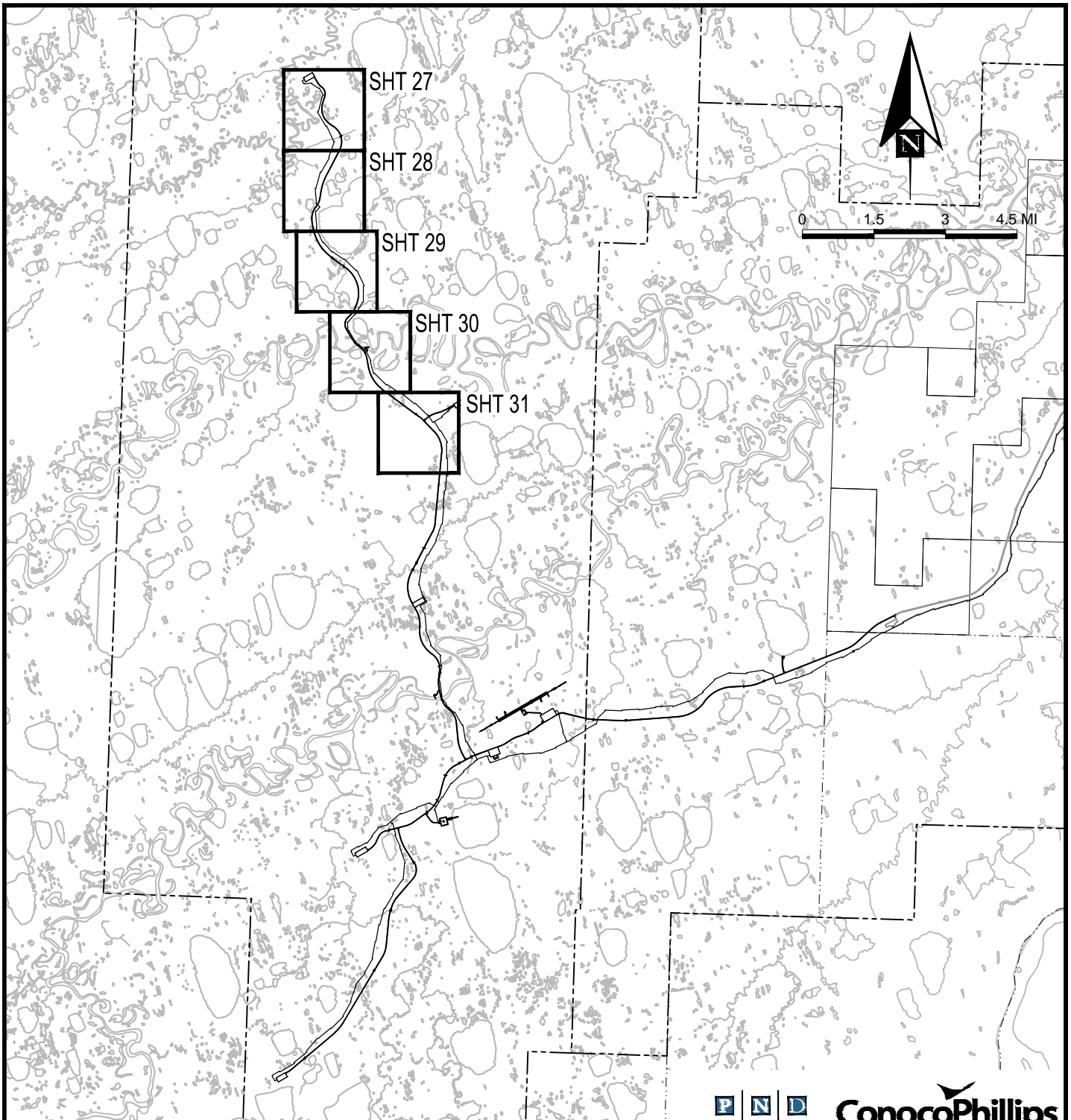


BT3 ROAD
SHEET 2 OF 2



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **25** of **128** 3/17/2020

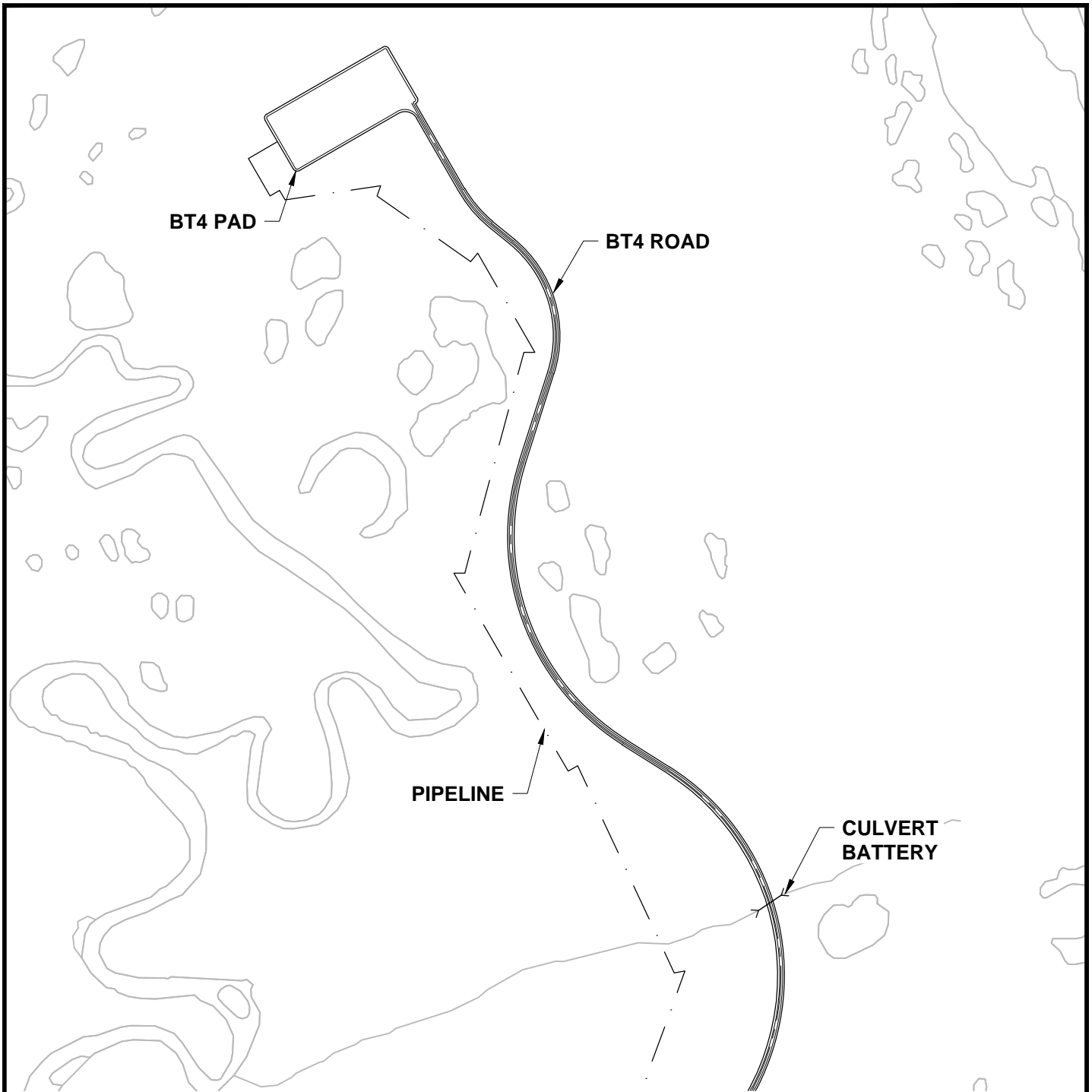


P | N | D
ENGINEERS, INC.

ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **26** of **128** 3/17/2020

BT4 ROAD KEY MAP



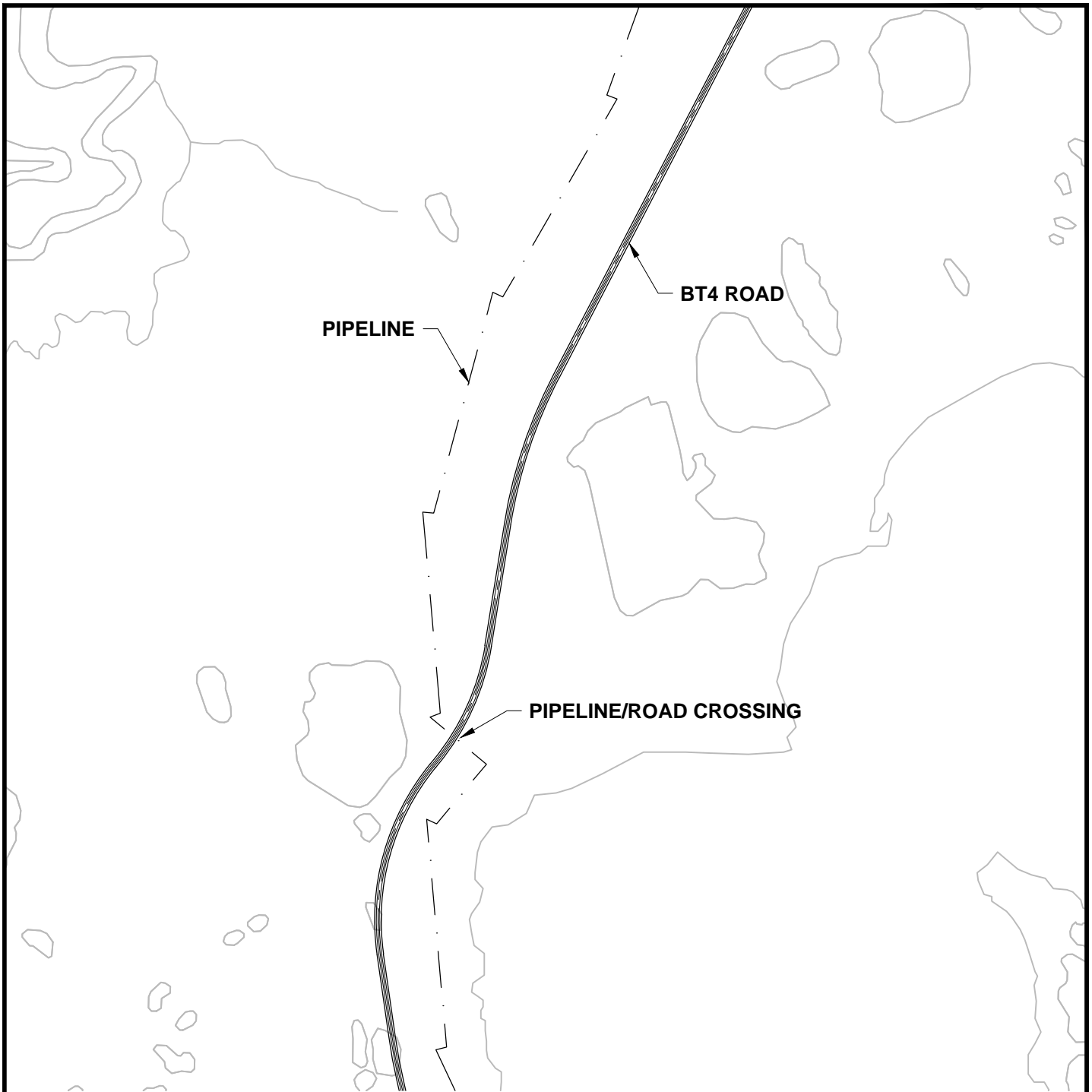
0 600 1200 1800 FT

BT4 ROAD
SHEET 1 OF 5



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **27** of **128** 3/17/2020



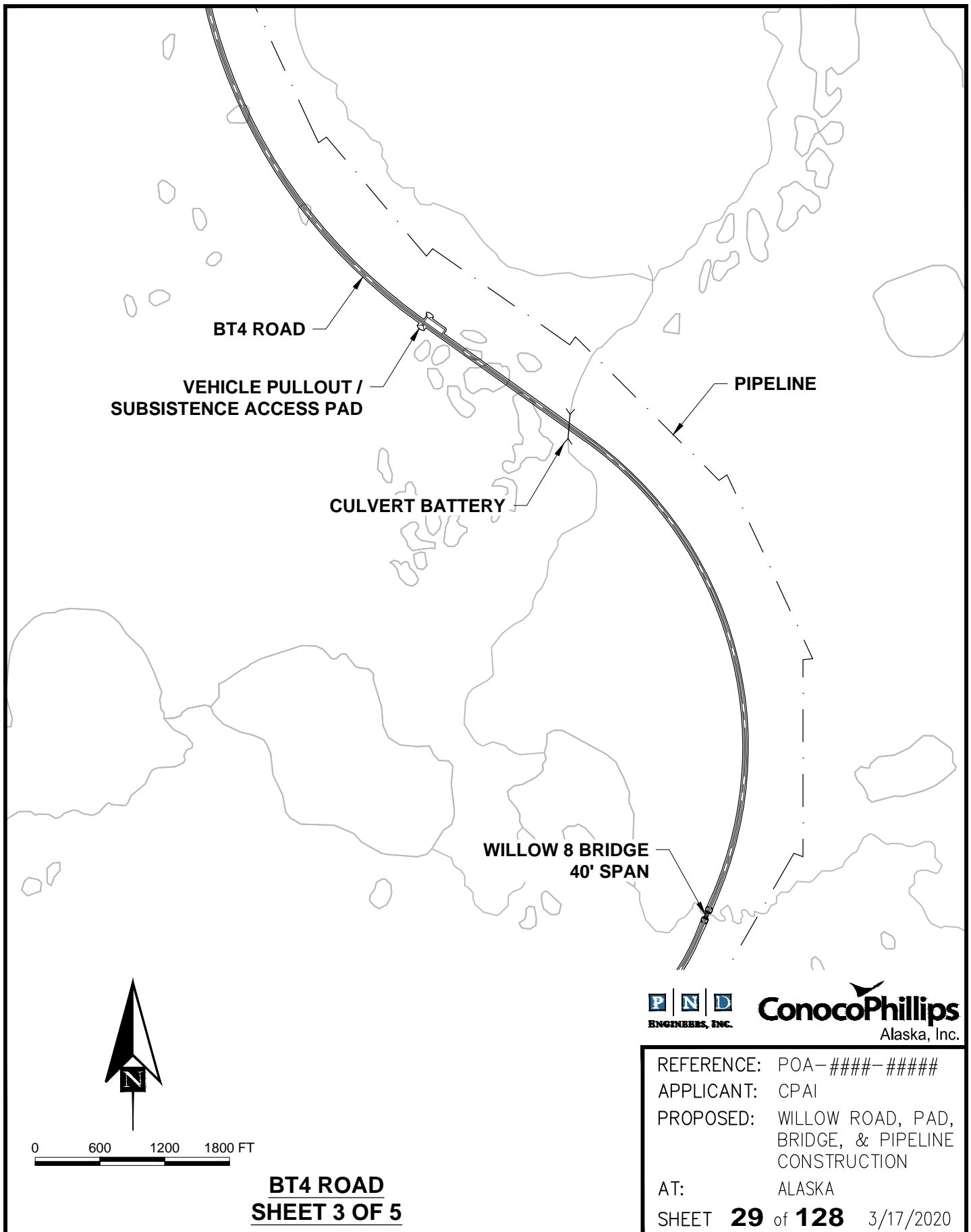
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BT4 ROAD
SHEET 2 OF 5

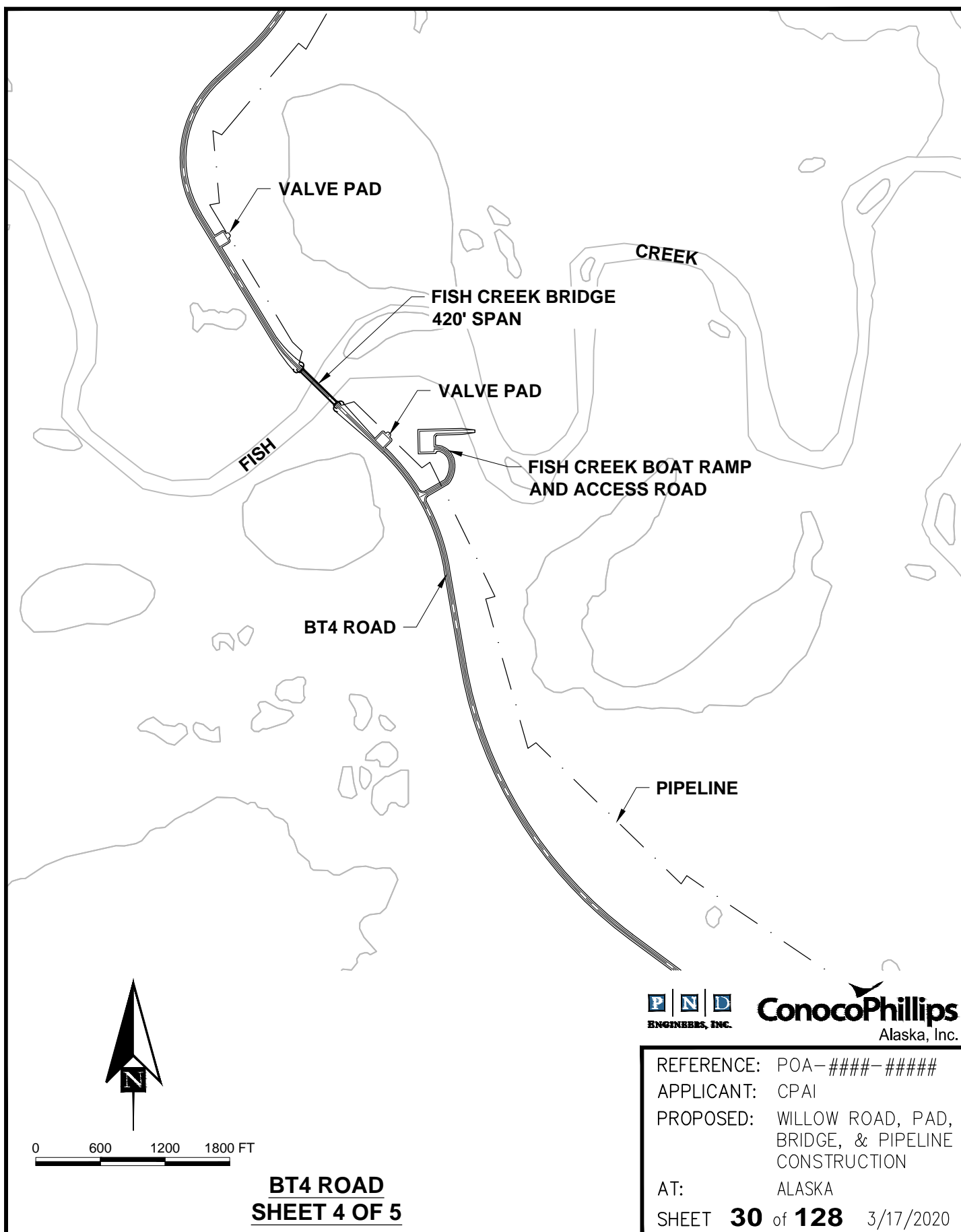


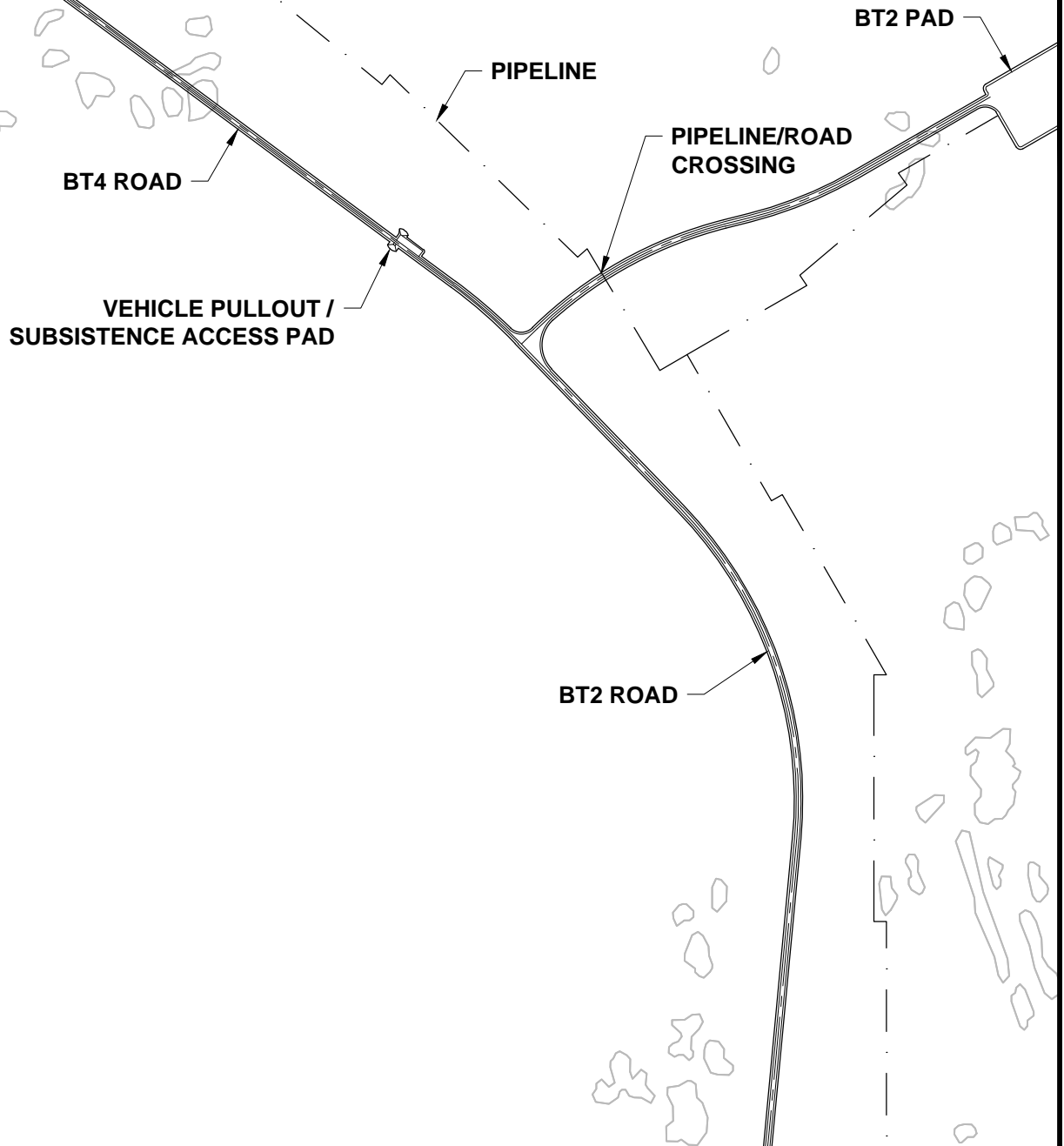
ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **28** of **128** 3/17/2020



REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **29** of **128** 3/17/2020





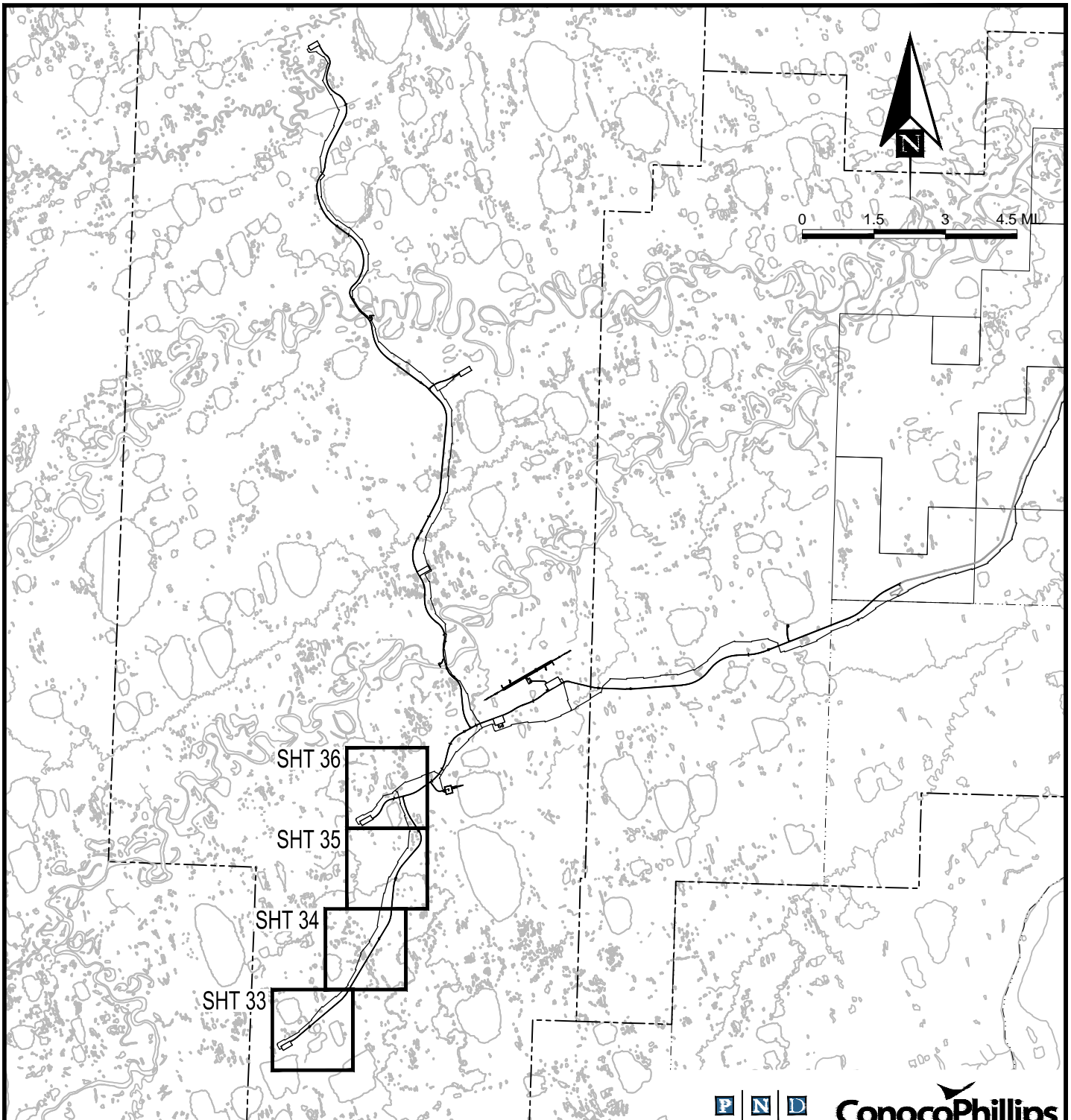
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BT4 ROAD
SHEET 5 OF 5



ConocoPhillips
Alaska, Inc.

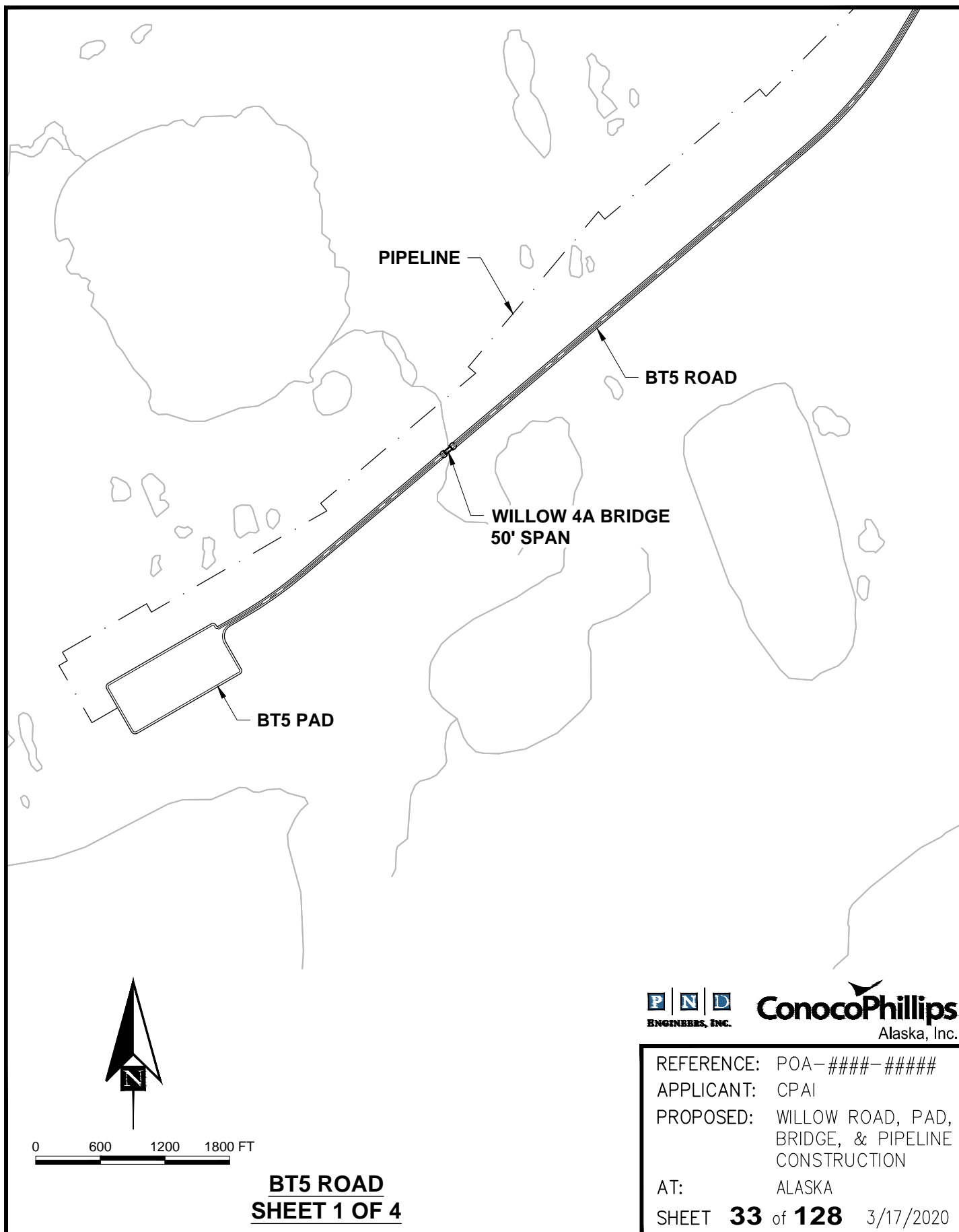
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **31** of **128** 3/17/2020

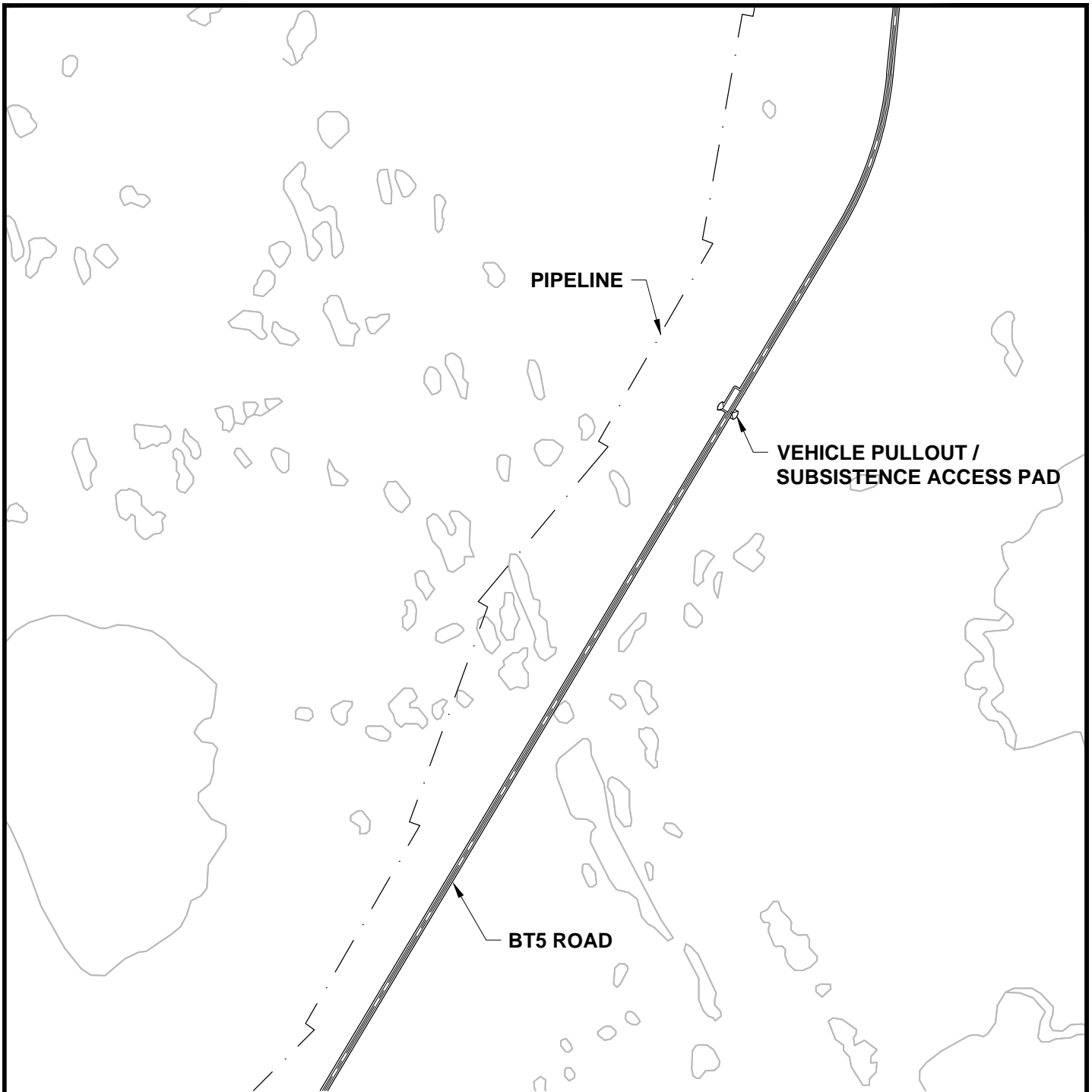


ConocoPhillips
Alaska, Inc.

BT5 ROAD KEY MAP

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **32** of **128** 3/17/2020





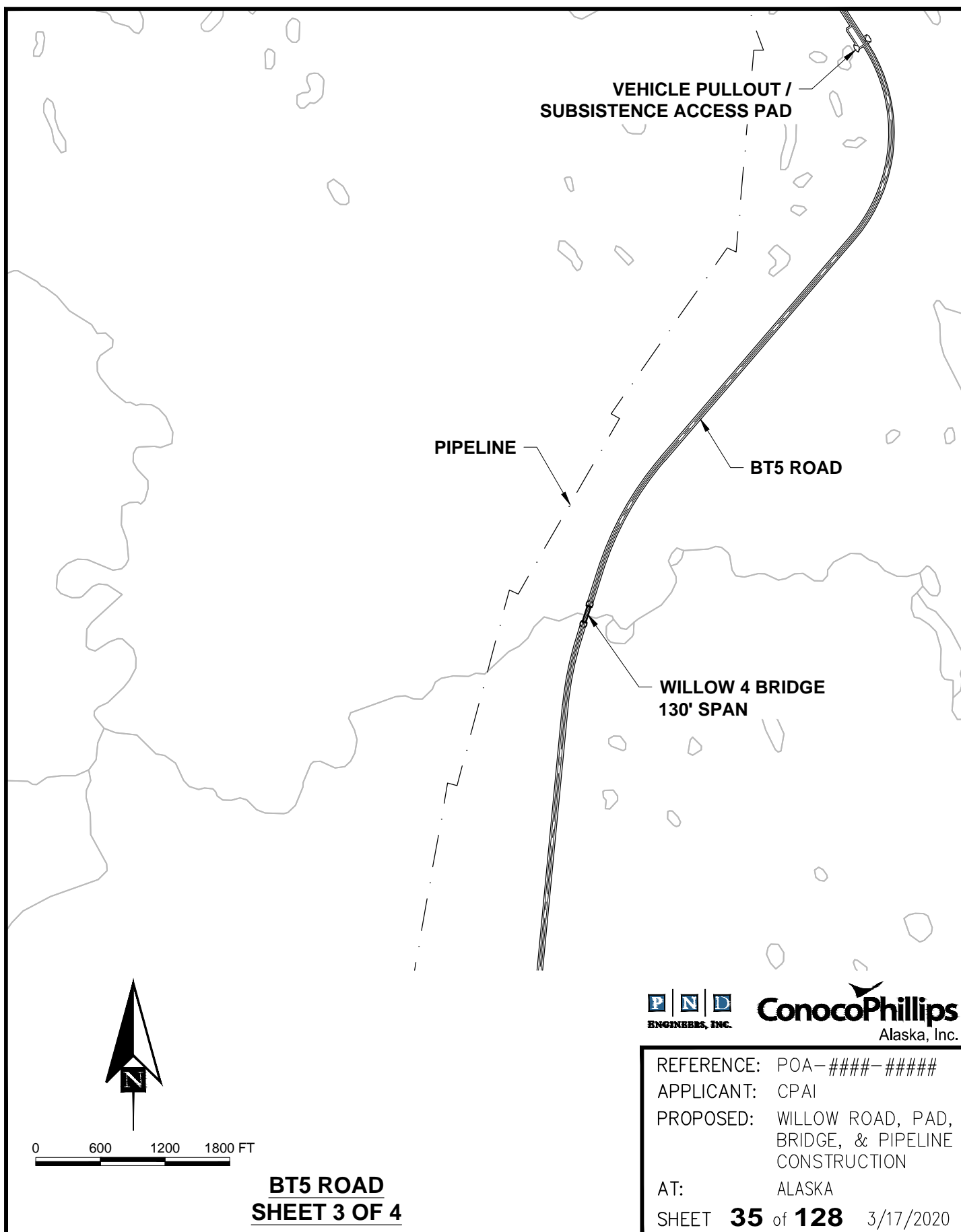
0 600 1200 1800 FT

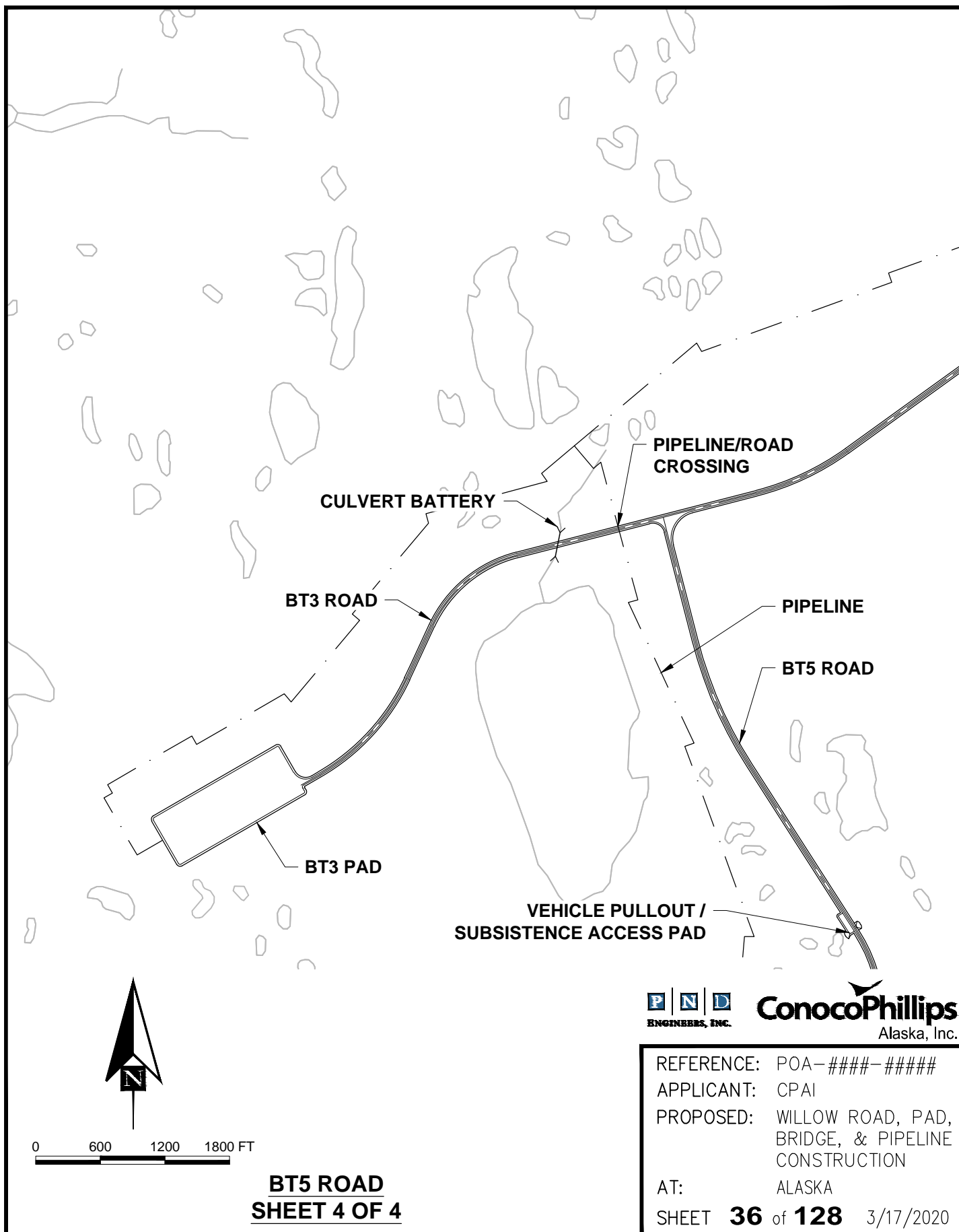
BT5 ROAD
SHEET 2 OF 4



ConocoPhillips
Alaska, Inc.

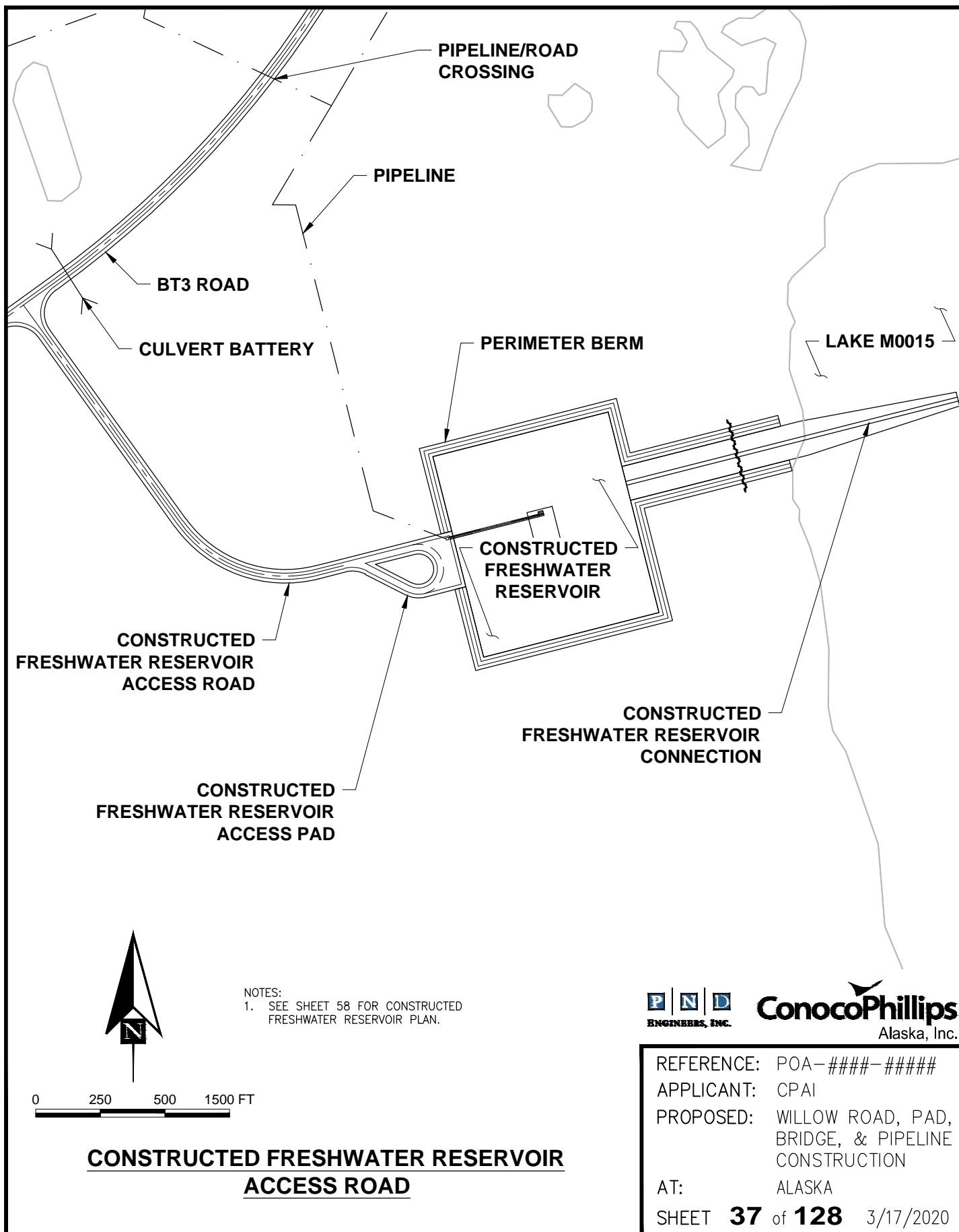
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **34** of **128** 3/17/2020

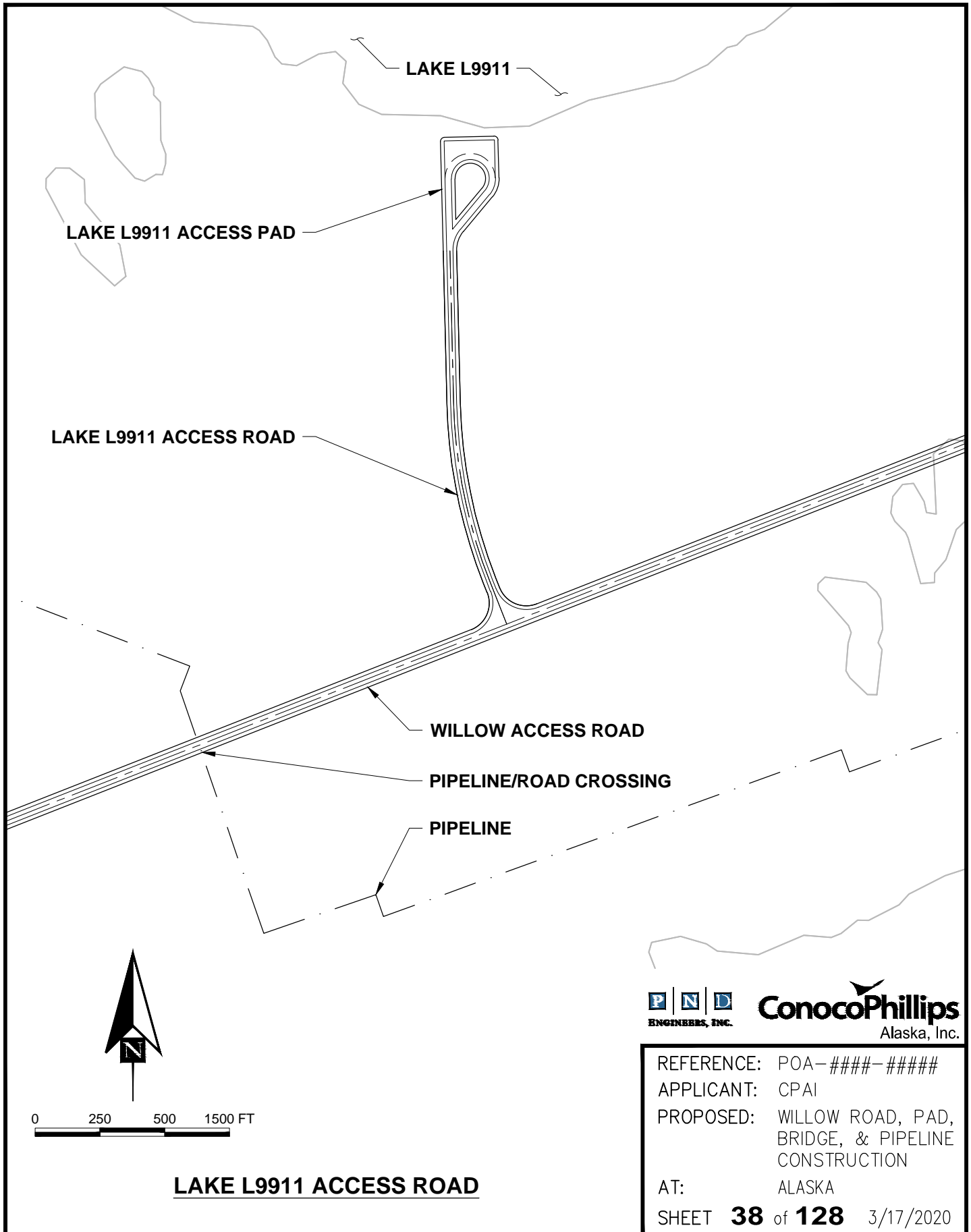


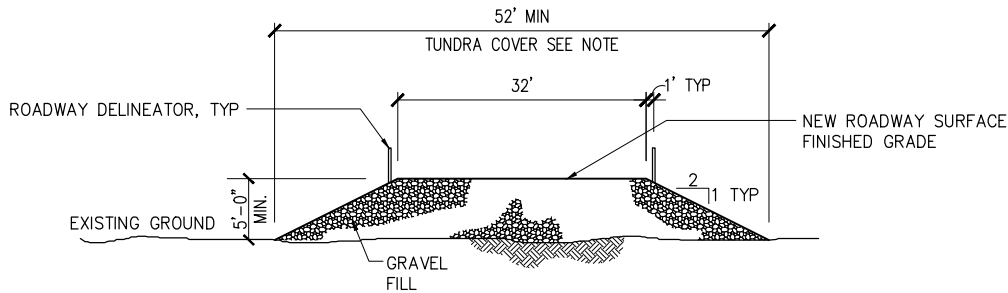


ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **36** of **128** 3/17/2020

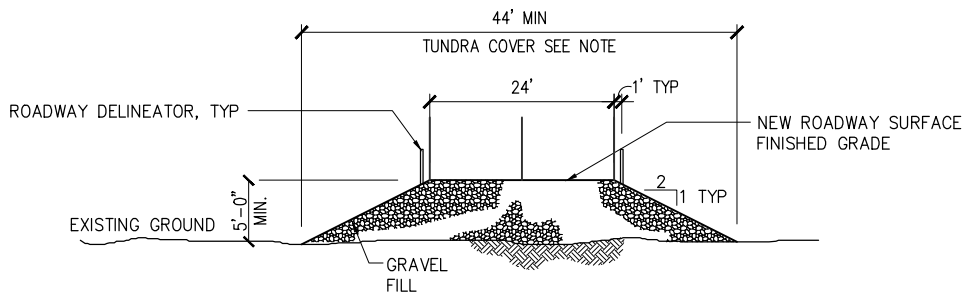






32 FT WIDE ROAD TYPICAL SECTION

NOT TO SCALE
INCLUDES WILLOW ACCESS ROAD, BT1 ROAD, AND BT2 ROAD



24 FT WIDE ROAD TYPICAL SECTION

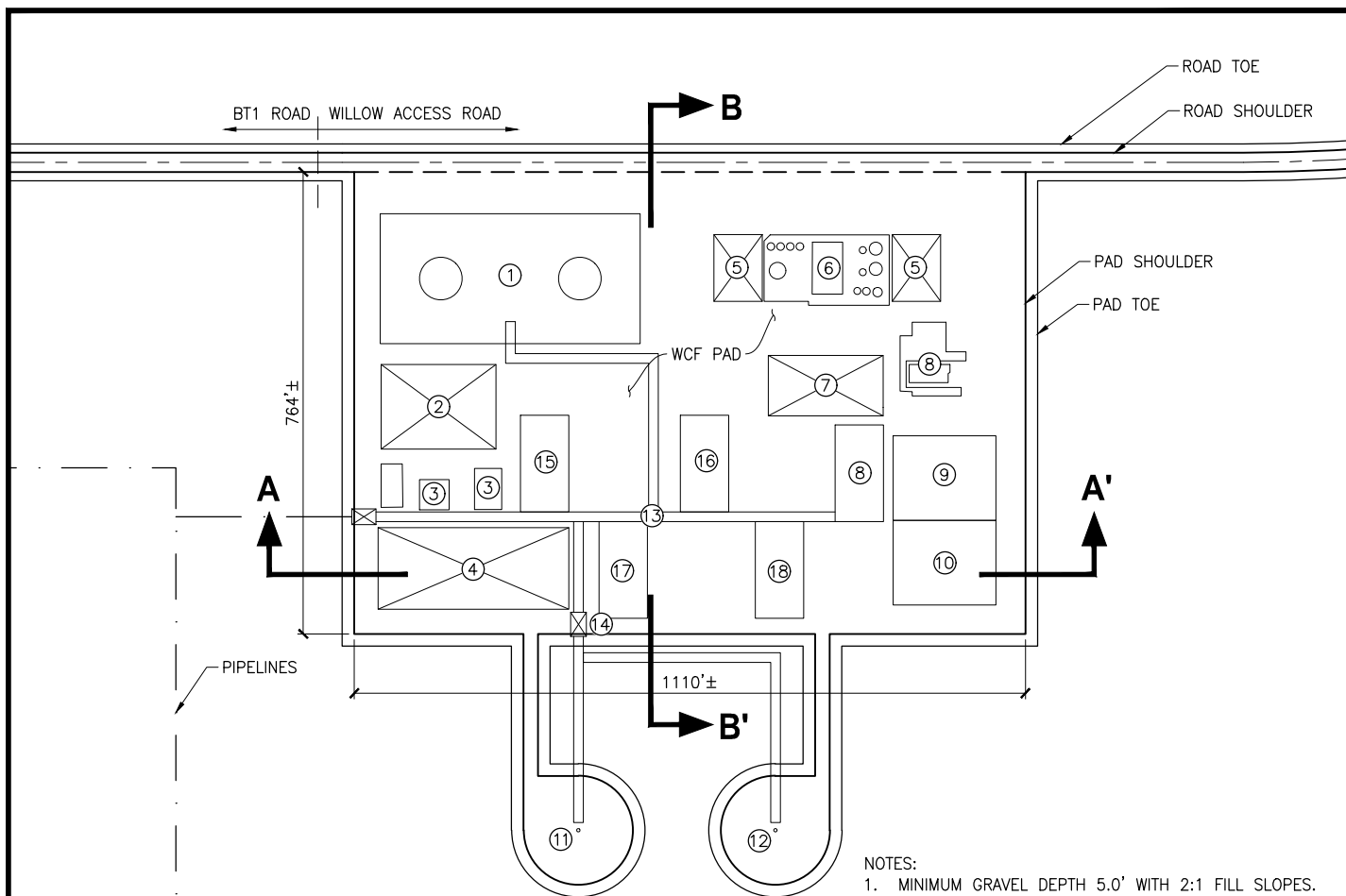
NOT TO SCALE
INCLUDES BT3 ROAD, BT4 ROAD, BT5 ROAD, AIRSTRIP
ACCESS ROAD, CFWR ACCESS ROAD, AND LAKE L9911
ACCESS ROAD

NOTE:
FILL FOOTPRINT WILL VARY BASED UPON
TOPOGRAPHY & ROAD ELEVATION.

TYPICAL ROAD SECTIONS



REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **39** of **128** 3/17/2020



- NOTES:
1. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
 2. SEE SHEET 41 FOR WCF PAD SECTIONS.

FACILITIES			
①	DIVERT TANKS & SECONDARY CONTAINMENT	⑩	CONSTRUCTION MATERIAL LAYDOWN
②	COLD STORAGE	⑪	LP FLARESTACK
③	STANDBY GENERATOR AND FUEL GAS SKID	⑫	HP FLARESTACK
④	DRILLING AND WELLS STORAGE	⑬	PIPERACK
⑤	FUTURE DEVELOPMENT TIE IN MODULES	⑭	PIPEWAY
⑥	TANK FARM AREA	⑮	GAS COMPRESSION MODULE 1
⑦	EQUIPMENT PARKING	⑯	LIQUIDS HANDLING MODULE
⑧	FUTURE DEVELOPMENT TIE IN MODULE	⑰	GAS COMPRESSION MODULE 2
⑨	CONSTRUCTION FABRICATION	⑱	ELECTRICAL GENERATION MODULE



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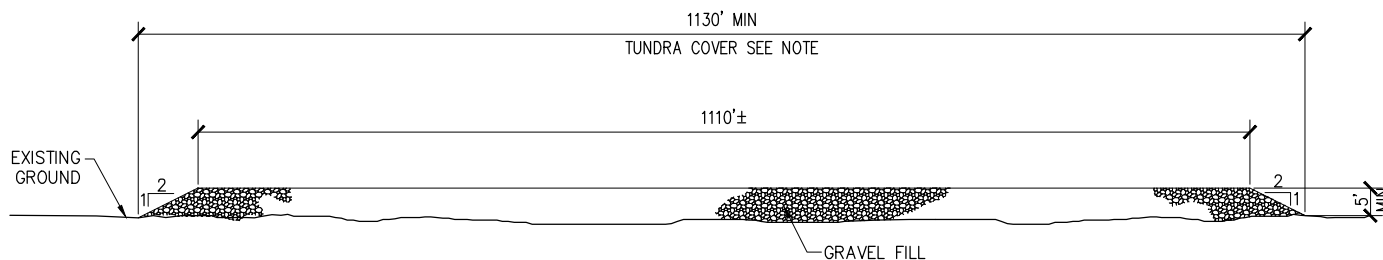
0 150 300 450 FT

WCF PAD PLAN

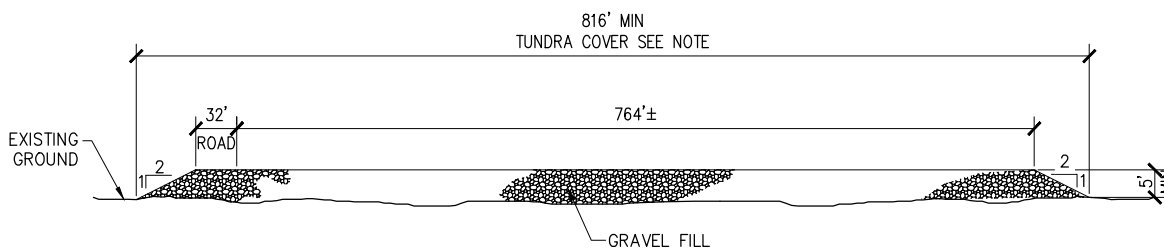
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION

AT: ALASKA

SHEET **40** of **128** 3/17/2020



SECTION A-A'
WCF PAD LONGITUDINAL SECTION
NOT TO SCALE



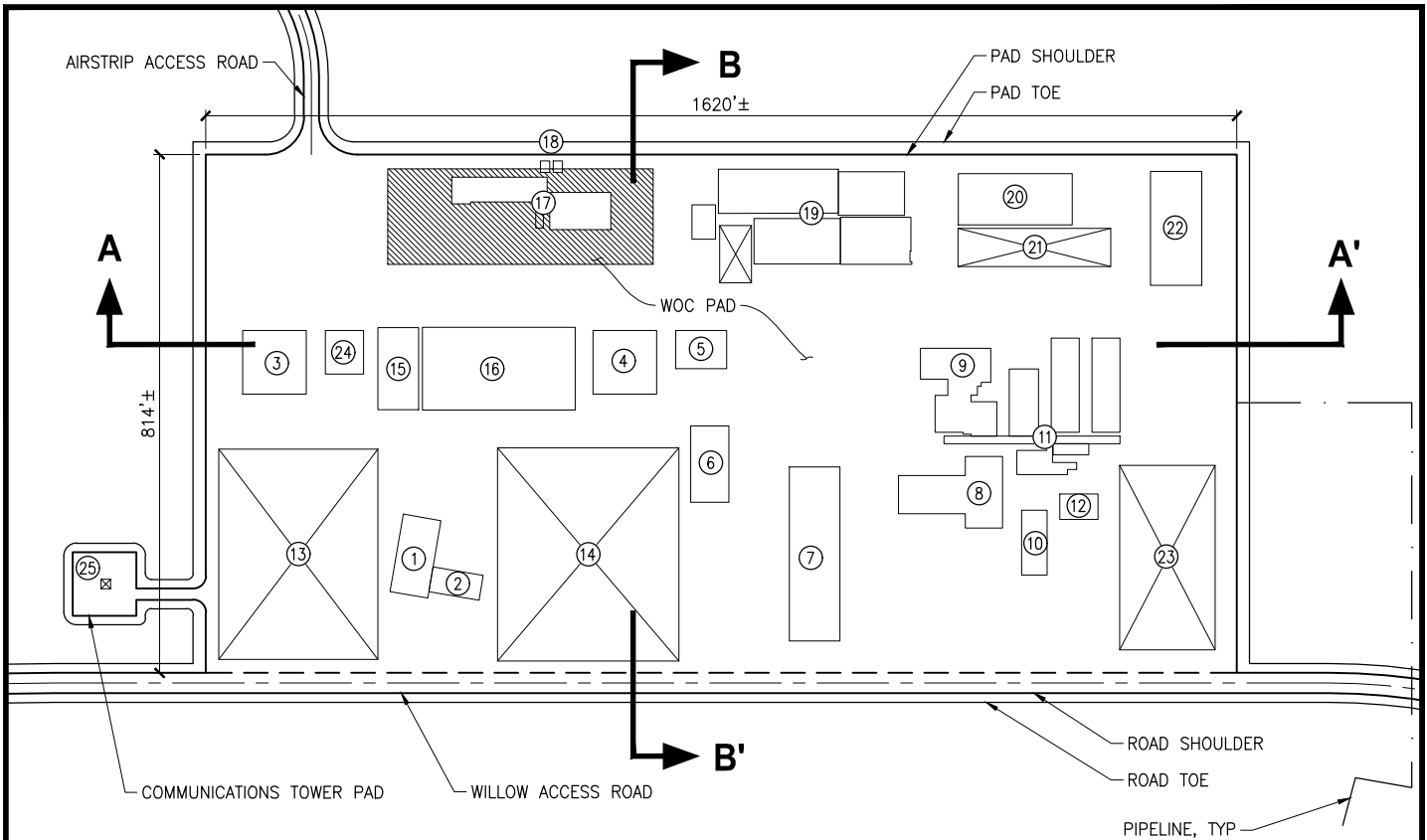
SECTION B-B'
WCF PAD TRANSVERSE SECTION
NOT TO SCALE

NOTE:
FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY
& PAD ELEVATION.

WCF PAD SECTIONS



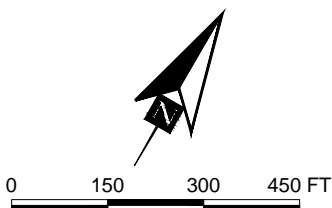
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **41** of **128** 3/17/2020



FACILITIES				FACILITIES (CONT)	
①	MUD PLANT	⑩	H2O PLANT	⑲	WASTE INJECTION FACILITY
②	DRILLING SHOP	⑪	CAMP MODULES	⑳	DRILLING FLUIDS STORAGE
③	INCINERATOR BUILDING	⑫	WASTE WATER TREATMENT PLANT	㉑	ROLLING STOCK STORAGE
④	WAREHOUSE	⑬	ROLLING STOCK STORAGE	㉒	DRILLING FLUIDS
⑤	WELD SHOP	⑭	MUD PRODUCT STORAGE	㉓	ROLLING STOCK STORAGE
⑥	FLEET MAINTENANCE BUILDING	⑮	O&M STORAGE BUILDING	㉔	POWER GENERATION/FUEL GAS CONDITIONING
⑦	ELECTRICAL/MECHANICAL/INSTRUMENT SHOPS	⑯	MATERIAL LAYDOWN AREA	㉕	COMMUNICATIONS TOWER
⑧	WPL BUILDING	⑰	DRILL RIG/PIPE SHELTER		
⑨	CONTROL ROOM	⑱	DRILL/PROD WASTE DISPOSAL WELL		

NOTES:

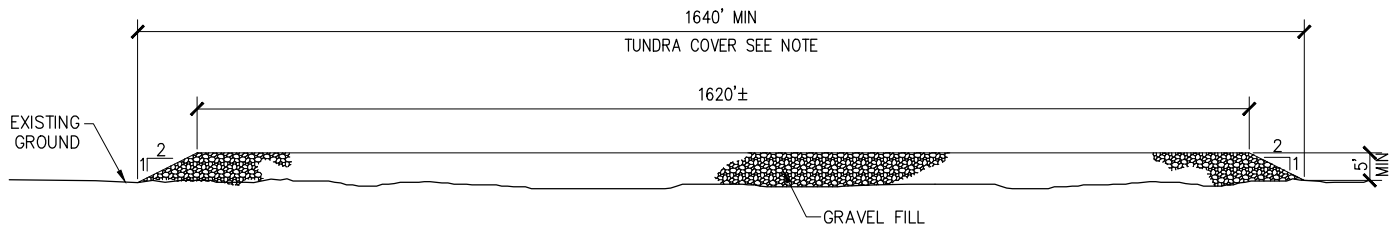
1. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
2. SEE SHEET 43 FOR WOC TYPICAL SECTIONS.



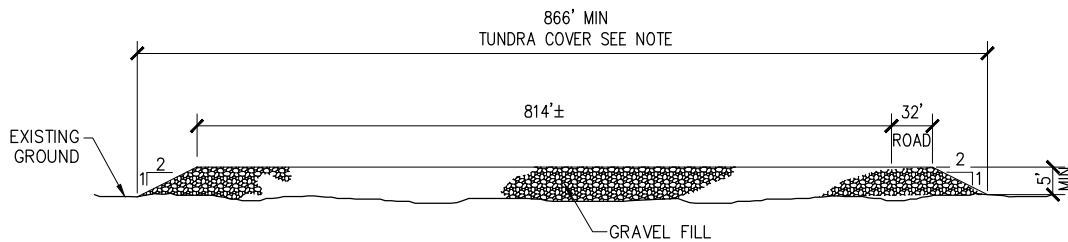
WOC PAD PLAN



REFERENCE: POA-####-####
 APPLICANT: CPAI
 PROPOSED: WILLOW ROAD, PAD,
 BRIDGE, & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **42** of **128** 3/17/2020



SECTION A-A'
WOC PAD LONGITUDINAL SECTION
NOT TO SCALE



SECTION B-B'
WOC PAD TRANSVERSE SECTION
NOT TO SCALE

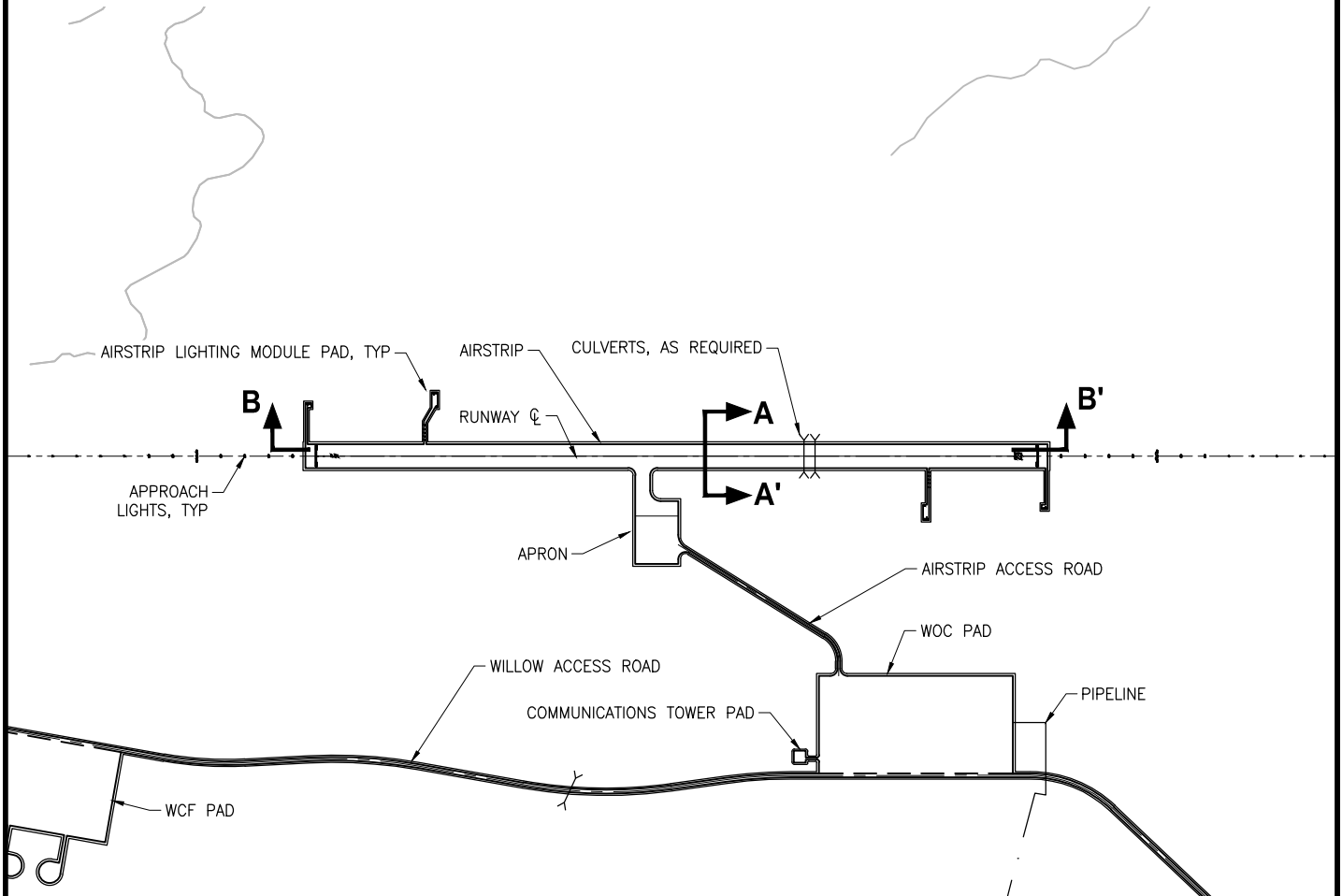
NOTE:
FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY
& ROAD/PAD ELEVATION.

WOC PAD SECTIONS

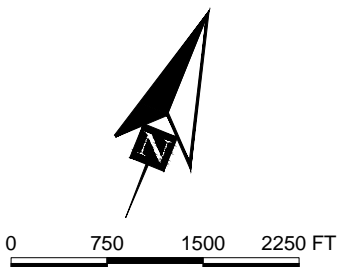


ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **43** of **128** 3/17/2020



- NOTES:
1. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
2. SEE SHEET 45 FOR APRON PLAN.
3. SEE SHEET 46 FOR AIRSTrip TYPICAL SECTIONS.

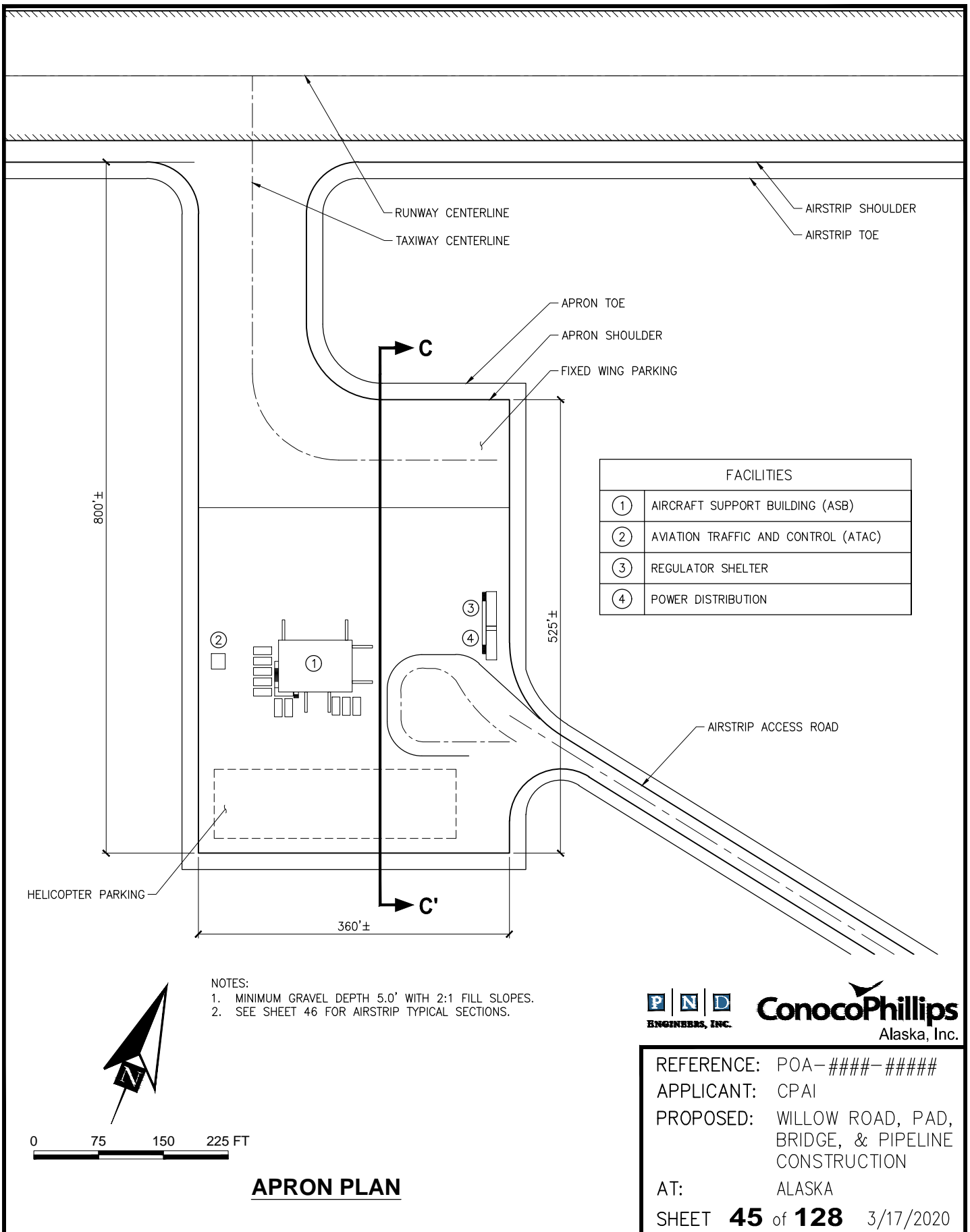


AIRSTrip PLAN



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **44** of **128** 3/17/2020

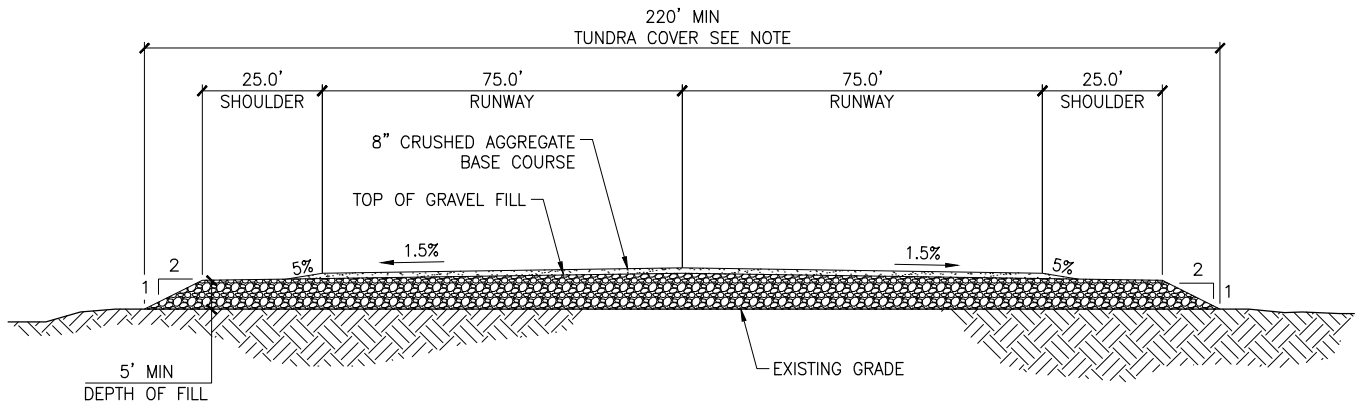


NOTES:
1. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
2. SEE SHEET 46 FOR AIRSTRIp TYPICAL SECTIONS.

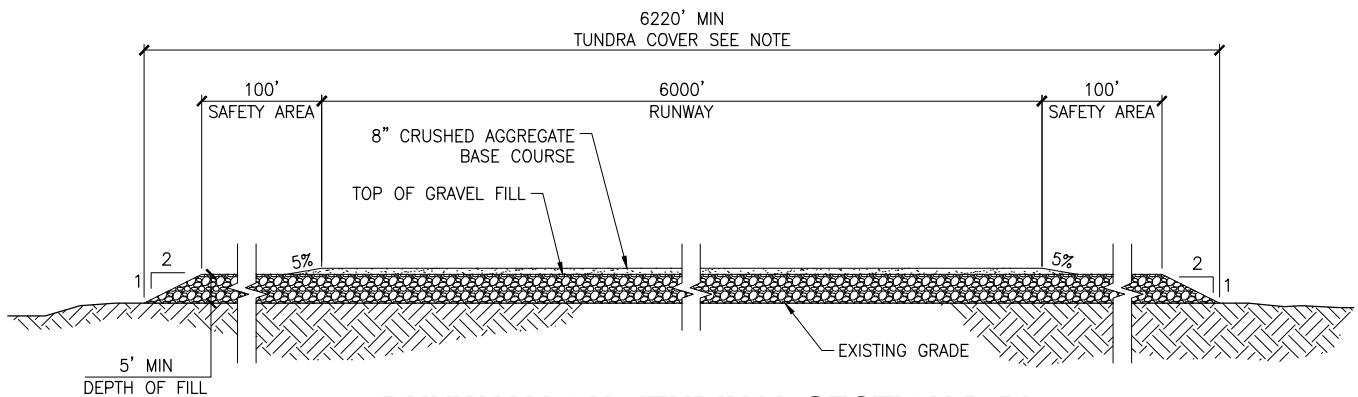
P | N | D
ENGINEERS, INC.

ConocoPhillips
Alaska, Inc.

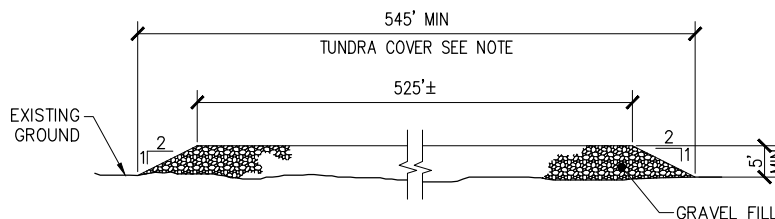
APRON PLAN



RUNWAY TRANSVERSE SECTION A-A'
NTS



RUNWAY LONGITUDINAL SECTION B-B'
NTS



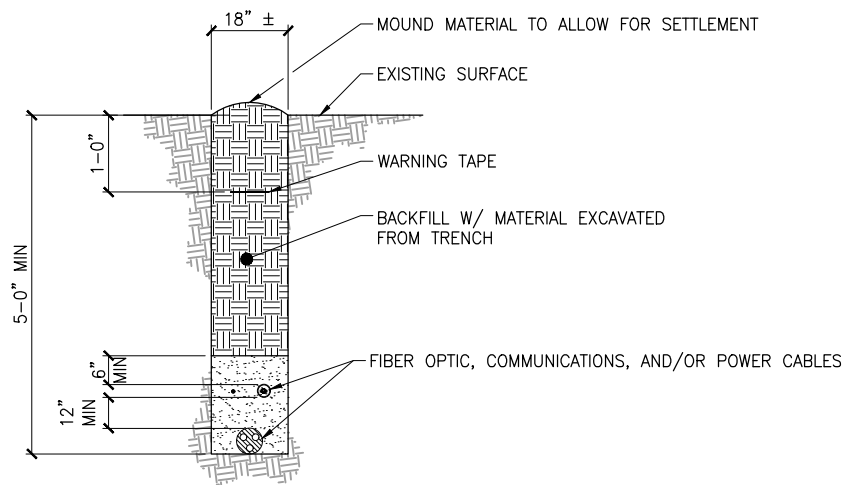
APRON SECTION C-C'
NTS

NOTE:
FILL FOOTPRINT WILL VARY BASED UPON
TOPOGRAPHY & EMBANKMENT ELEVATION.

AIRSTRIp SECTIONS

P | N | D
ENGINEERS, INC.
ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **46** of **128** 3/17/2020



TRENCH DETAIL

NTS

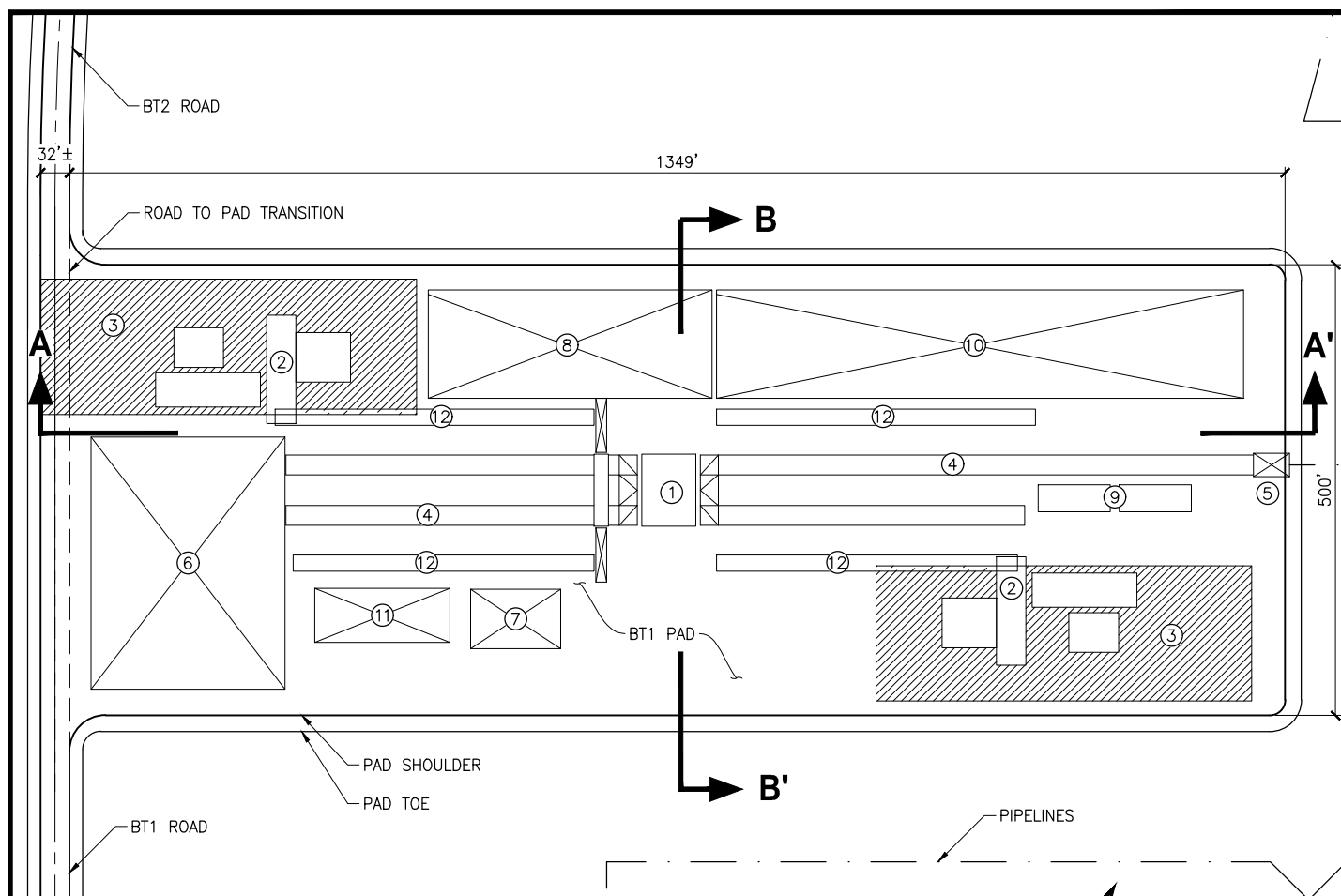
NOTE:
TRENCHING LOCATIONS TO BE DETERMINED.



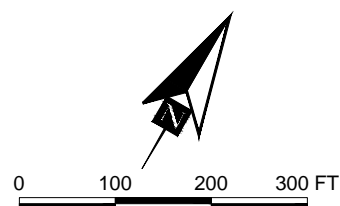
ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
 APPLICANT: CPAI
 PROPOSED: WILLOW ROAD, PAD,
 BRIDGE, & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **47** of **128** 3/17/2020

TYPICAL TRENCH DETAIL



FACILITIES	
①	MANIFOLD MODULE
②	DRILL RIG
③	DRILL RIG CLEARANCE FOOTPRINT
④	PIPE RACKS
⑤	PIPEWAY
⑥	PROPPANT STORAGE
⑦	FRAC FLOWBACK
⑧	FRAC SPREAD
⑨	SPILL RESPONSE EQUIPMENT
⑩	CASING/TUBULAR STORAGE
⑪	WELL TEST EQUIPMENT
⑫	WELL ROW



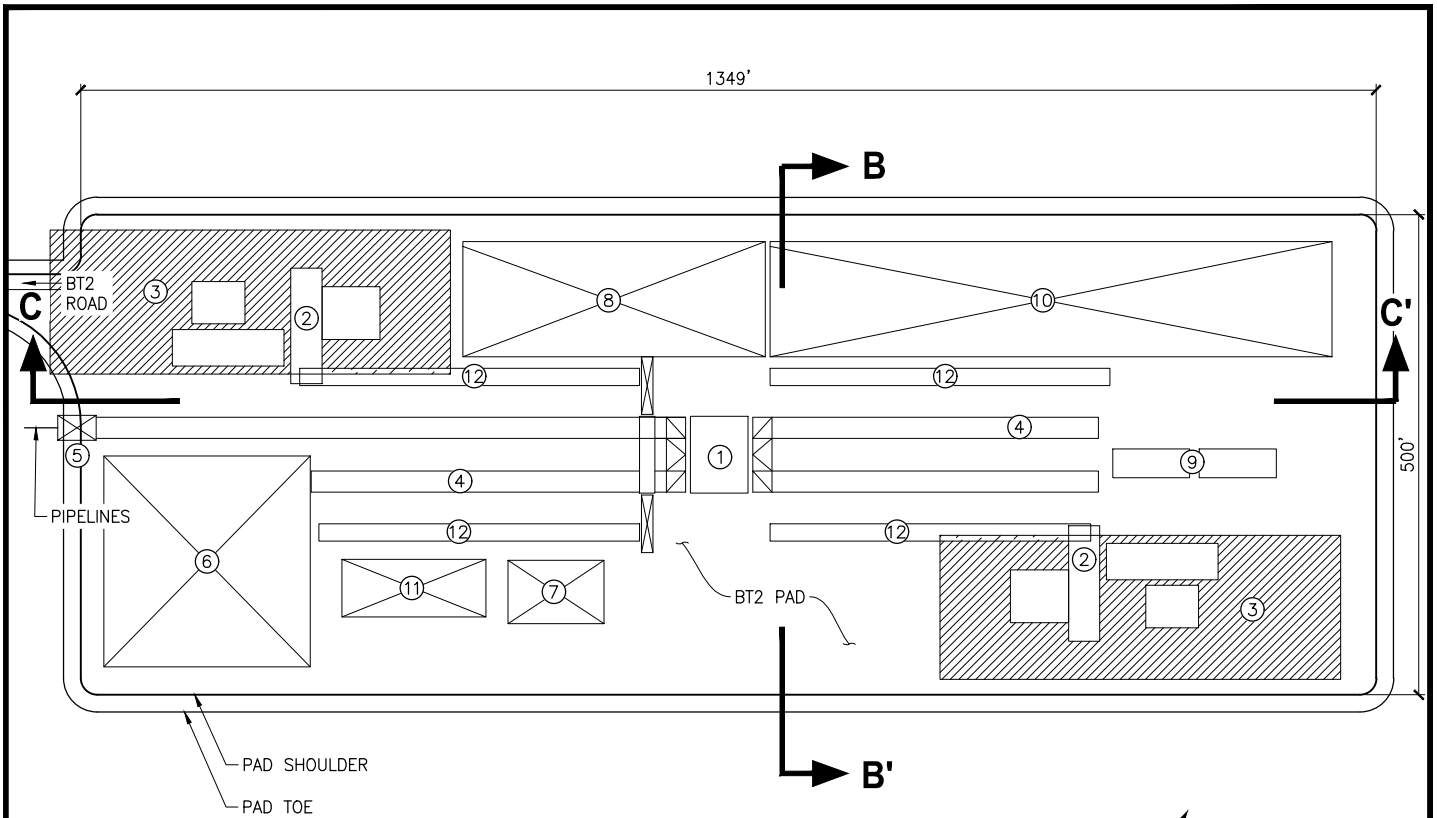
- NOTES:
1. WELL SPACING DETAILS PROVIDED IN THE PROJECT DESCRIPTION.
 2. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
 3. SEE SHEET 53 FOR BT1 PAD SECTIONS.

P | N | D **ConocoPhillips**
ENGINEERS, INC. Alaska, Inc.

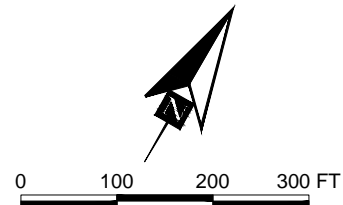
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION

AT: ALASKA
SHEET **48** of **128** 3/17/2020

BT1 PAD PLAN



FACILITIES	
①	MANIFOLD MODULE
②	DRILL RIG
③	DRILL RIG CLEARANCE FOOTPRINT
④	PIPE RACKS
⑤	PIPEWAY
⑥	PROPPANT STORAGE
⑦	FRAC FLOWBACK
⑧	FRAC SPREAD
⑨	SPILL RESPONSE EQUIPMENT
⑩	CASING/TUBULAR STORAGE
⑪	WELL TEST EQUIPMENT
⑫	WELL ROW



NOTES:

1. WELL SPACING DETAILS PROVIDED IN THE PROJECT DESCRIPTION.
2. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
3. SEE SHEET 53 FOR BT2 PAD SECTIONS.

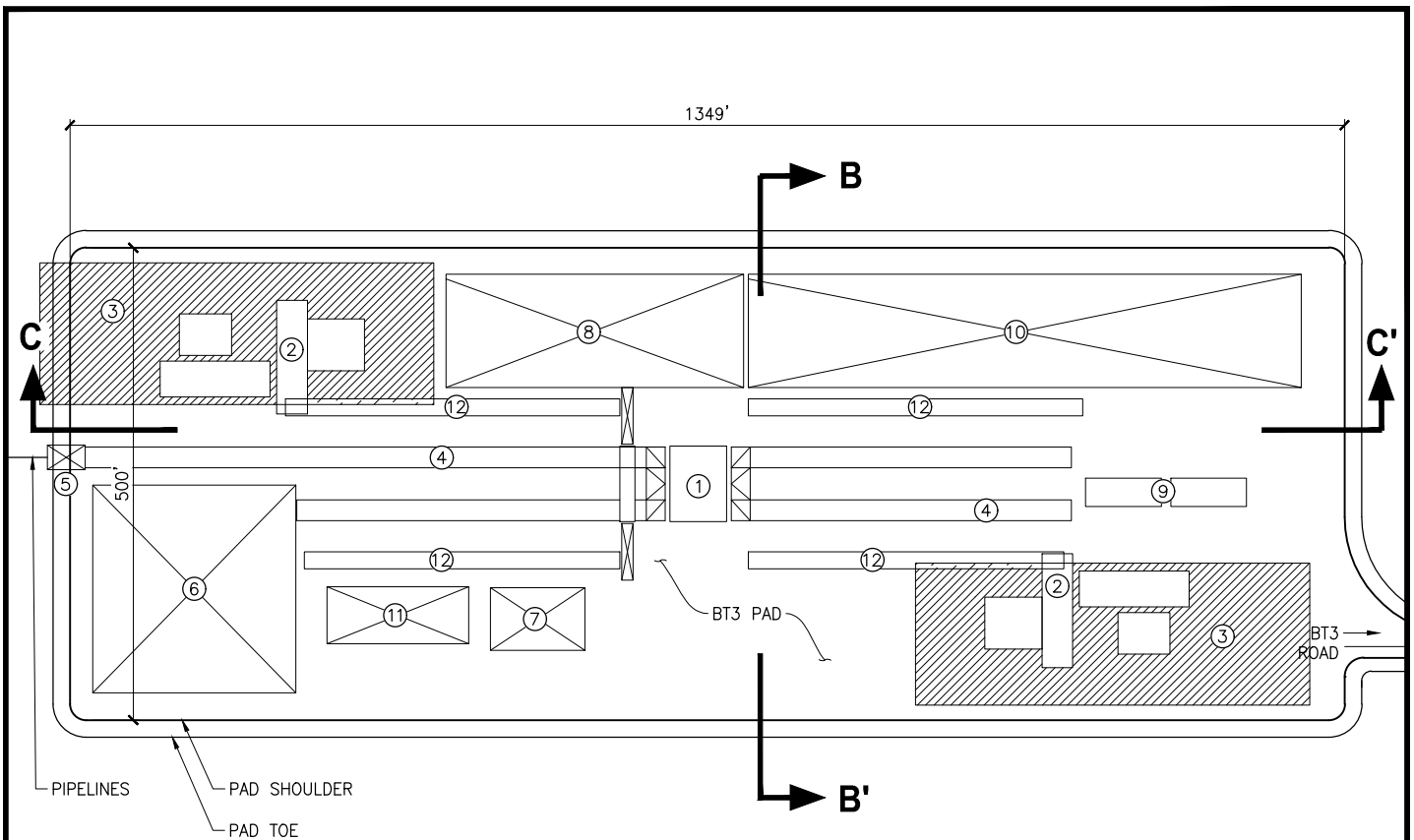


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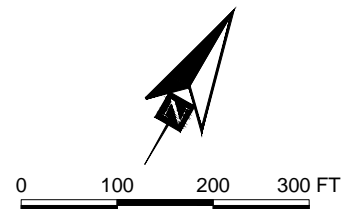
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION

AT: ALASKA
SHEET **49** of **128** 3/17/2020

BT2 PAD PLAN



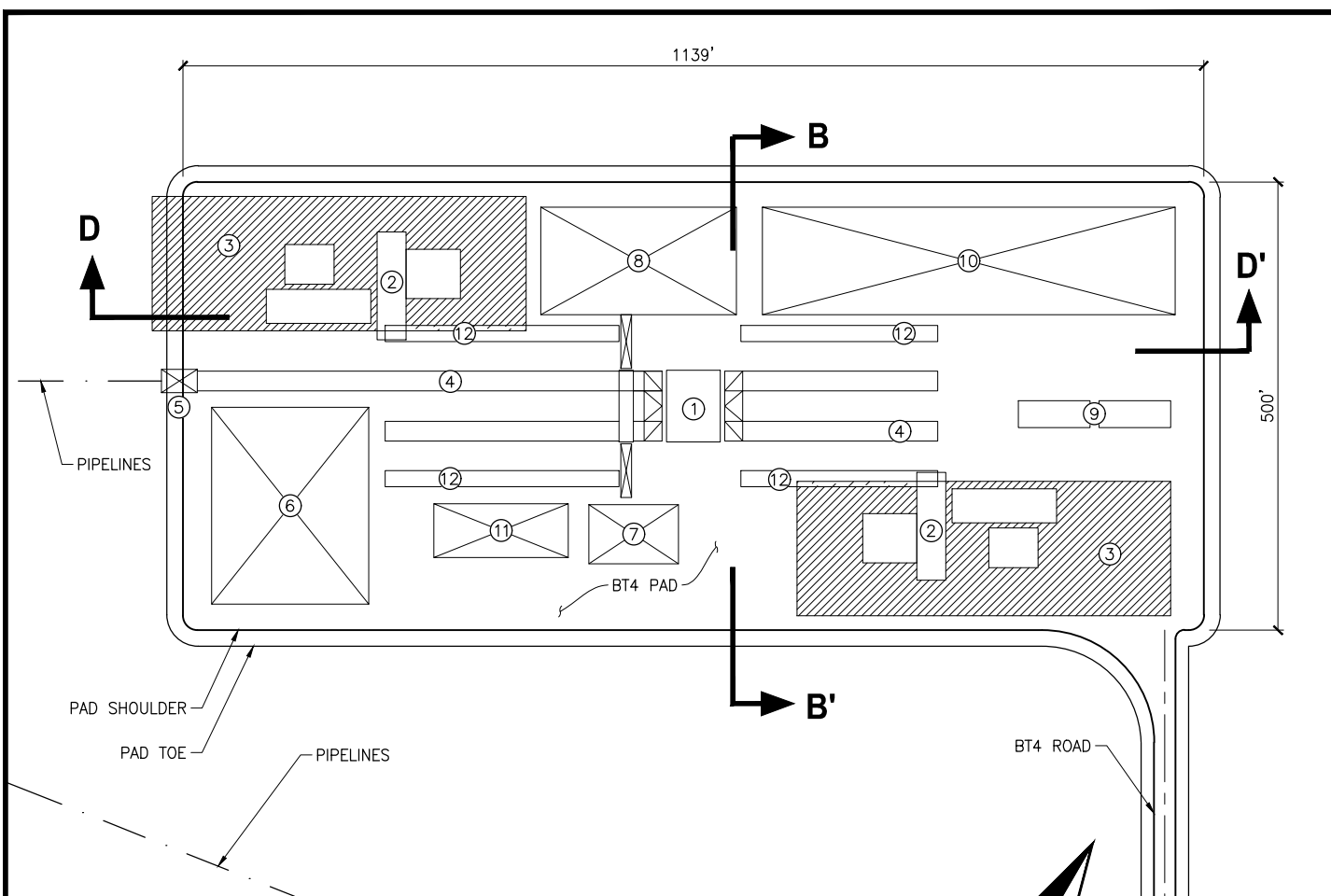
FACILITIES	
①	MANIFOLD MODULE
②	DRILL RIG
③	DRILL RIG CLEARANCE FOOTPRINT
④	PIPE RACKS
⑤	PIPEWAY
⑥	PROPPANT STORAGE
⑦	FRAC FLOWBACK
⑧	FRAC SPREAD
⑨	SPILL RESPONSE EQUIPMENT
⑩	CASING/TUBULAR STORAGE
⑪	WELL TEST EQUIPMENT
⑫	WELL ROW



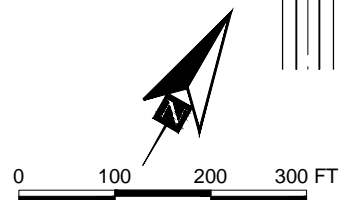
- NOTES:
1. WELL SPACING DETAILS PROVIDED IN THE PROJECT DESCRIPTION.
 2. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
 3. SEE SHEET 53 FOR BT3 PAD SECTIONS.

BT3 PAD PLAN

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **50** of **128** 3/17/2020



FACILITIES	
①	MANIFOLD MODULE
②	DRILL RIG
③	DRILL RIG CLEARANCE FOOTPRINT
④	PIPE RACKS
⑤	PIPEWAY
⑥	PROPPANT STORAGE
⑦	FRAC FLOWBACK
⑧	FRAC SPREAD
⑨	SPILL RESPONSE EQUIPMENT
⑩	CASING/TUBULAR STORAGE
⑪	WELL TEST EQUIPMENT
⑫	WELL ROW



NOTES:

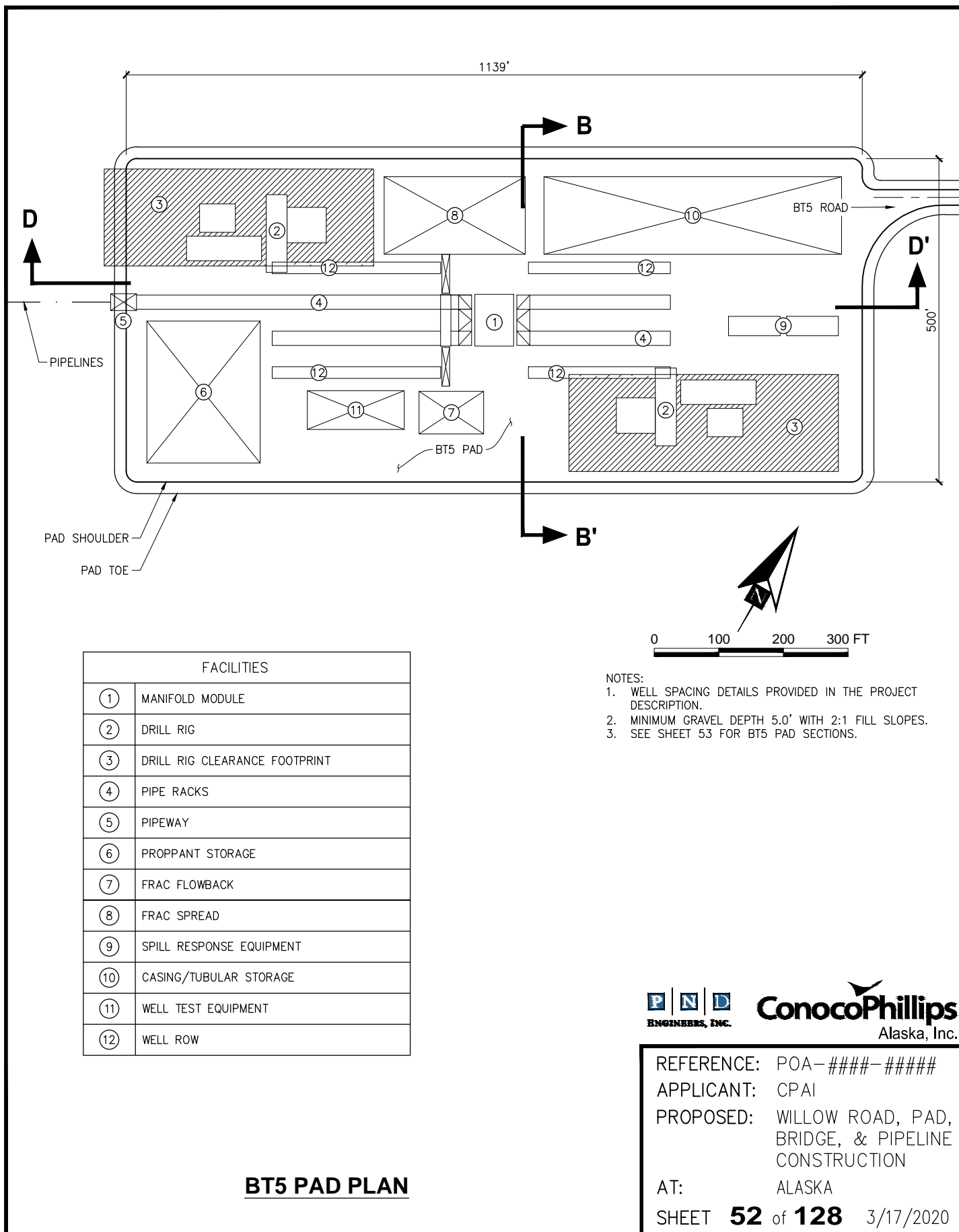
1. WELL SPACING DETAILS PROVIDED IN THE PROJECT DESCRIPTION.
2. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
3. SEE SHEET 53 FOR BT4 PAD SECTIONS.

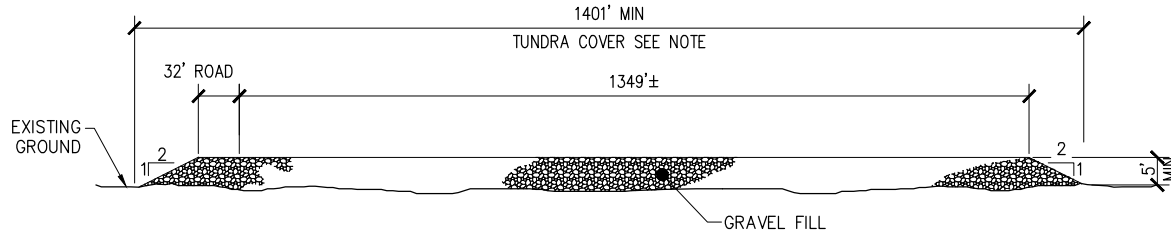


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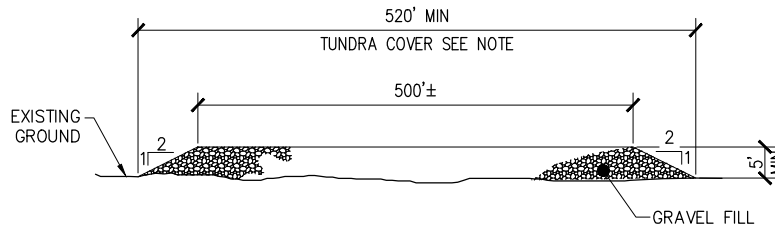
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **51** of **128** 3/17/2020

BT4 PAD PLAN

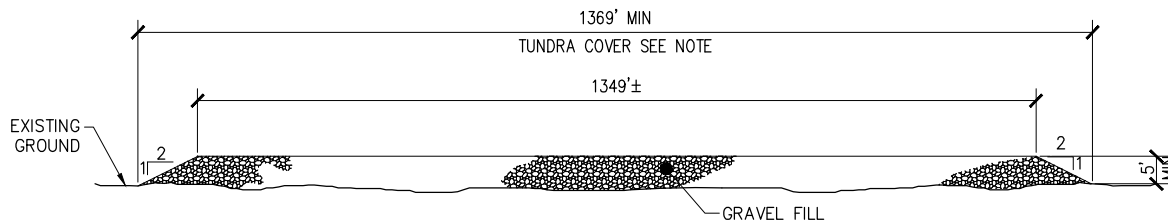




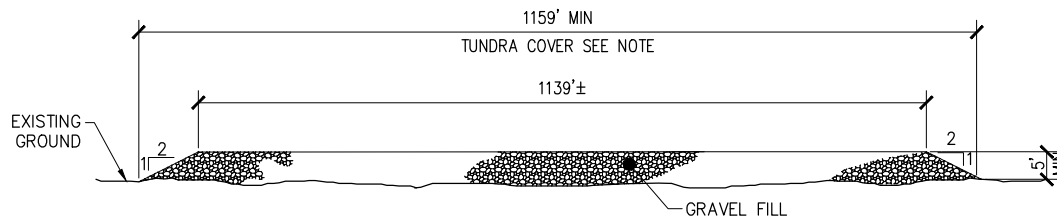
SECTION A-A'
BT1 DRILL SITE LONGITUDINAL SECTION
NTS



SECTION B-B'
TYPICAL DRILL SITE TRANSVERSE SECTION
NTS



SECTION C-C'
BT2 AND BT3 DRILL SITE LONGITUDINAL SECTION
NTS



SECTION D-D'
BT4 AND BT5 DRILL SITE LONGITUDINAL SECTION
NTS

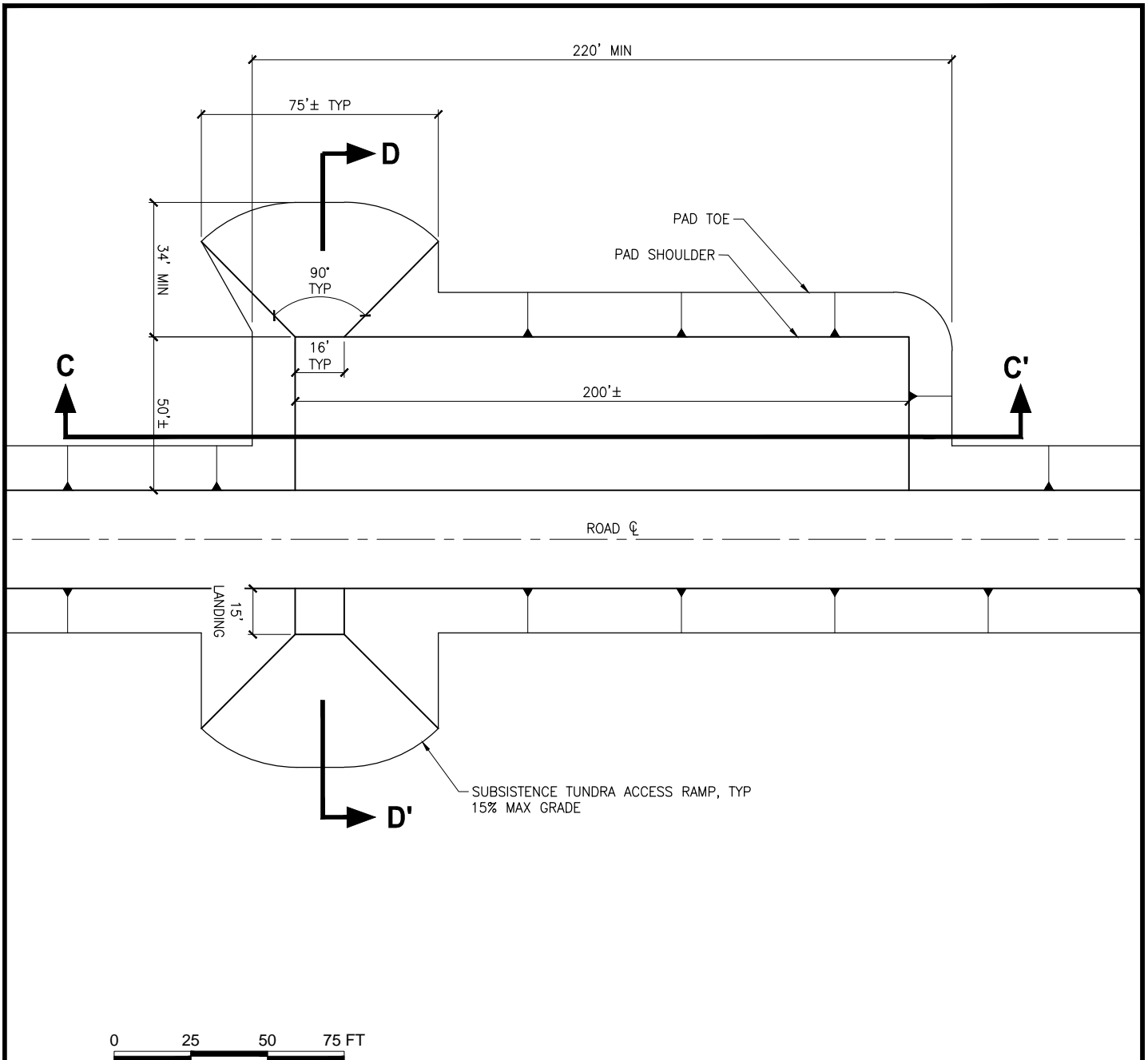
NOTE:
FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY
& ROAD/PAD ELEVATION.



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Alaska, Inc.

DRILL SITE SECTIONS

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **53** of **128** 3/17/2020



NOTES:

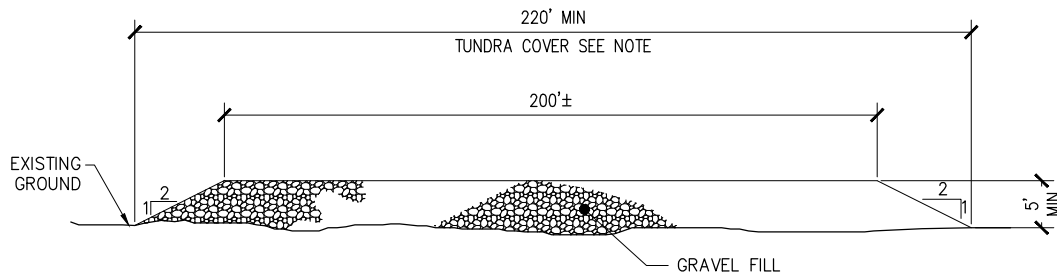
1. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
2. SEE SHEET 55 FOR SUBSISTENCE ACCESS/VEHICLE PULLOUT PAD TYPICAL SECTIONS.

**TYPICAL VEHICLE PULLOUT / SUBSISTENCE
ACCESS PAD**



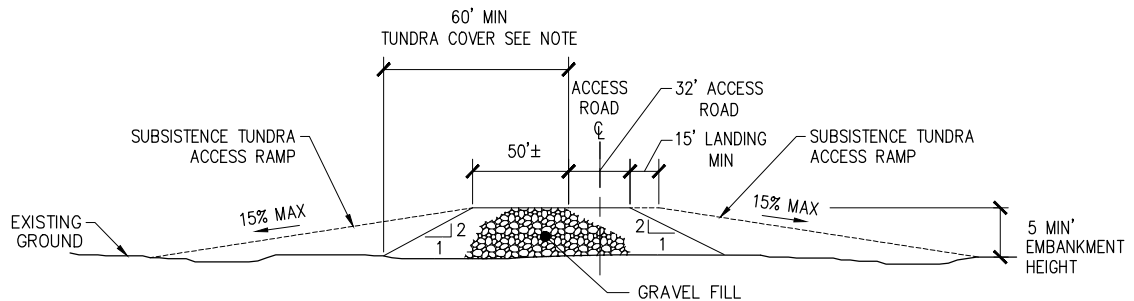
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Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **54** of **128** 3/17/2020



SECTION C-C'
VEHICLE PULLOUT / SUBSISTENCE ACCESS PAD
TYPICAL LONGITUDINAL SECTION

NTS



SECTION D-D'
VEHICLE PULLOUT / SUBSISTENCE ACCESS PAD
TYPICAL TRANSVERSE SECTION

NTS

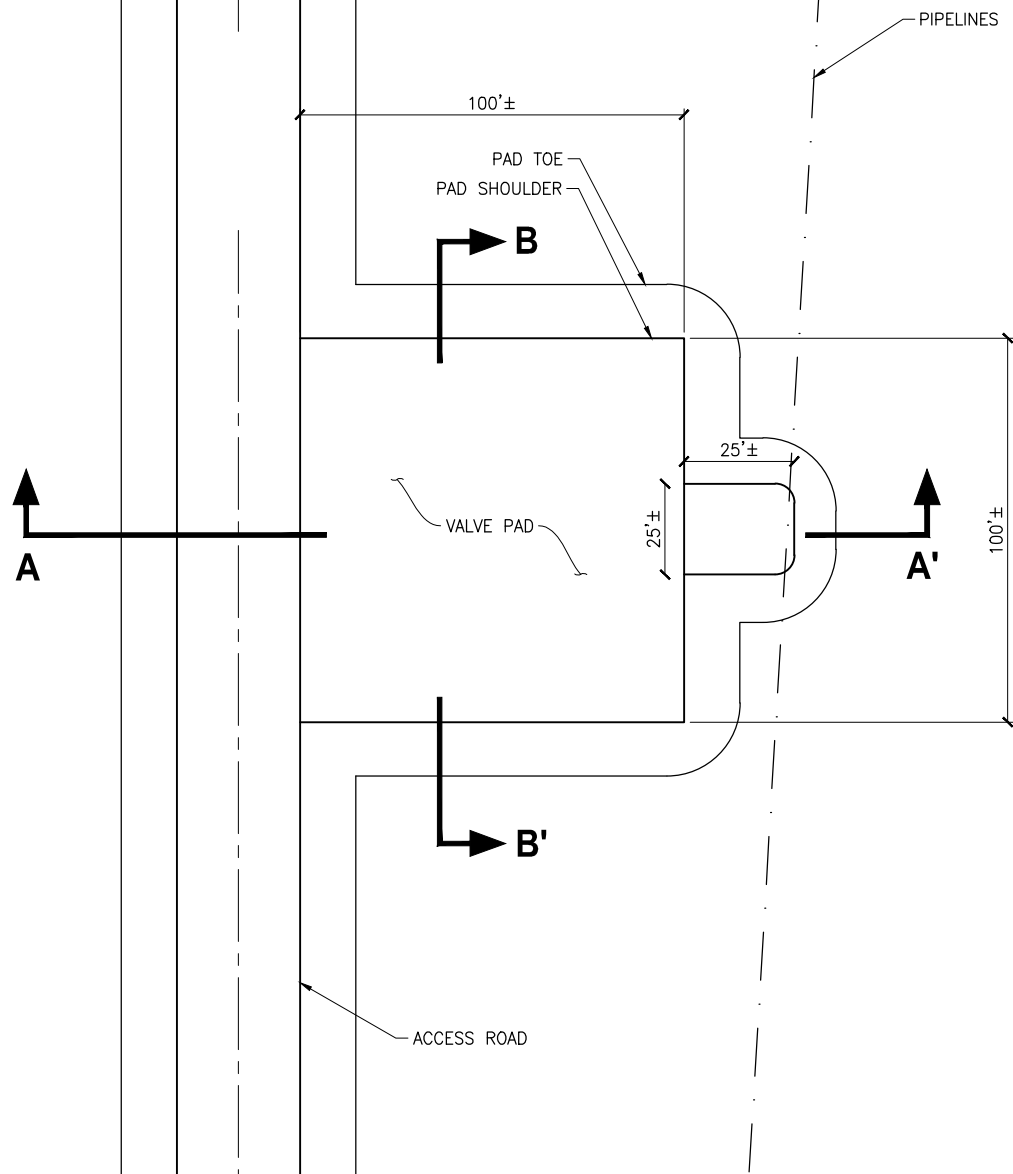
NOTE:
FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY AND ROAD/PAD ELEVATION.

VEHICLE PULLOUT / SUBSISTENCE ACCESS PAD
TYPICAL SECTIONS



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **55** of **128** 3/17/2020



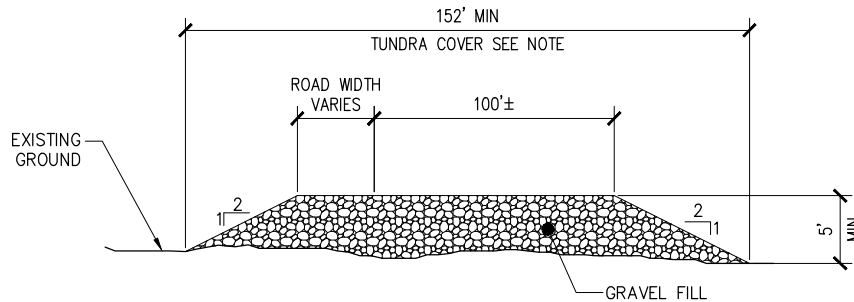
NOTES:

1. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
2. SEE SHEET 56 FOR VALVE PAD TYPICAL SECTIONS.

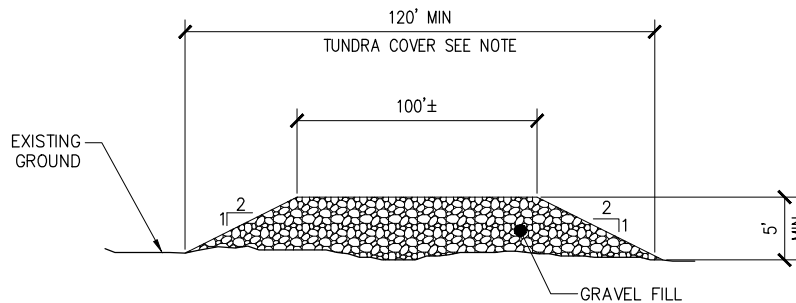


TYPICAL VALVE PAD PLAN

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **56** of **128** 3/17/2020



SECTION A-A'
VALVE PAD LONGITUDINAL SECTION
NTS



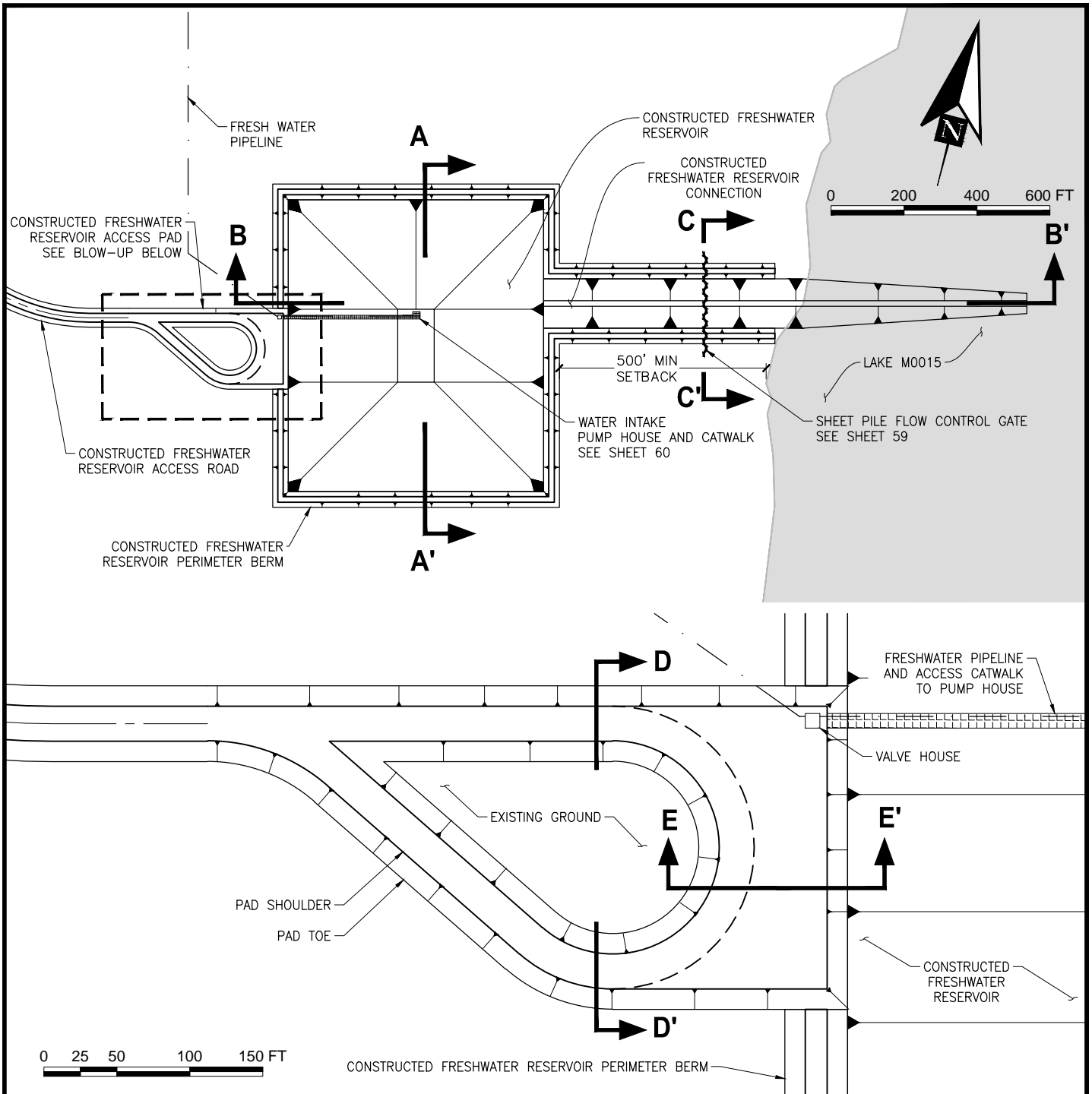
SECTION B-B'
VALVE PAD TRANSVERSE SECTION
NTS

NOTE:
FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY
AND ROAD/PAD ELEVATION.

TYPICAL VALVE PAD SECTIONS

P | N | D
ENGINEERS, INC.
ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **57** of **128** 3/17/2020



NOTES:

1. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
2. SEE SHEET 59 FOR CONSTRUCTED FRESHWATER RESERVOIR SECTIONS.
3. SEE SHEET 60 FOR CONSTRUCTED FRESHWATER RESERVOIR ACCESS PAD SECTIONS AND FOR PUMP HOUSE DETAILS.

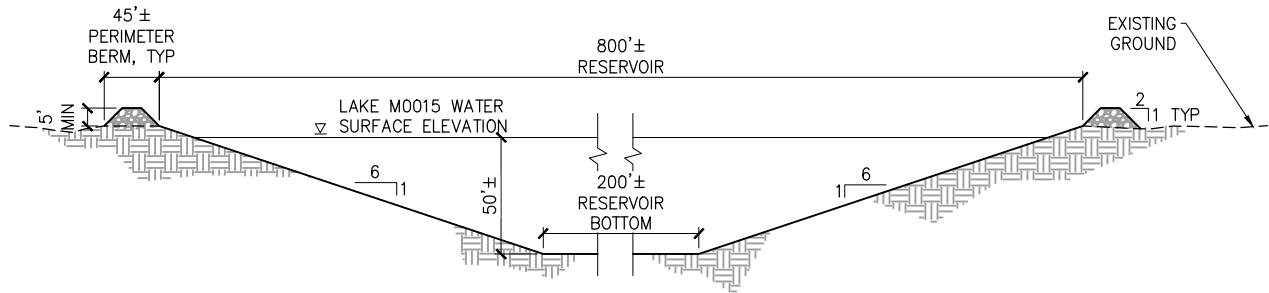


ConocoPhillips
Alaska, Inc.

CONSTRUCTED FRESHWATER RESERVOIR PLAN

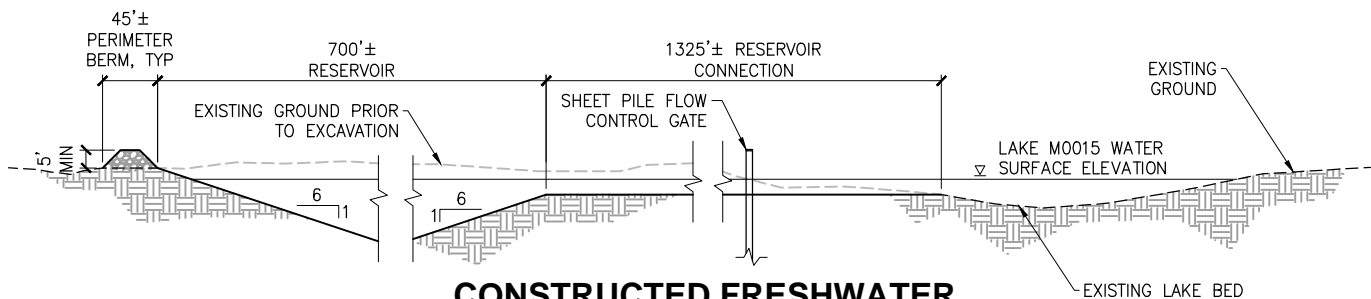
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION

AT: ALASKA
SHEET **58** of **128** 3/17/2020



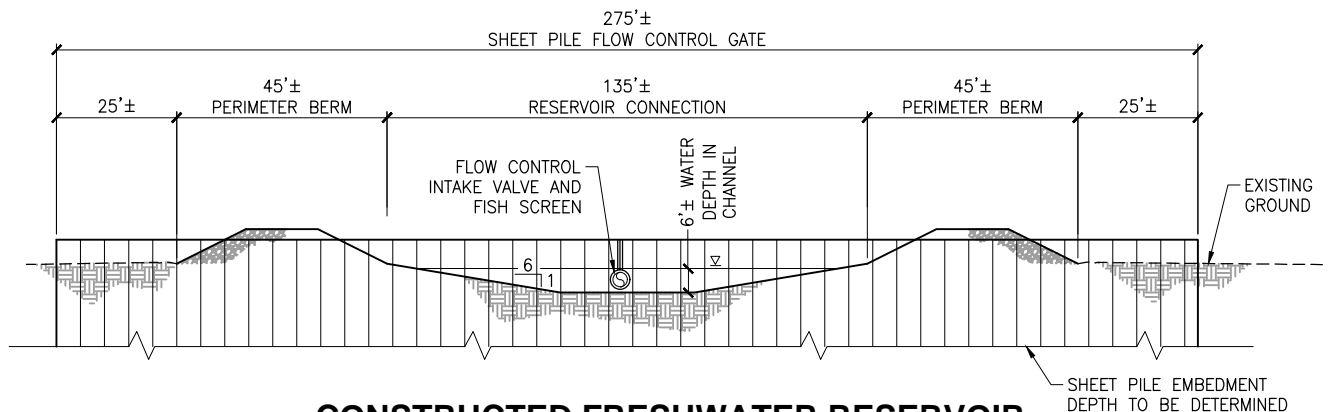
CONSTRUCTED FRESHWATER RESERVOIR SECTION A-A'

2H:1V EXAGGERATION
NTS



CONSTRUCTED FRESHWATER RESERVOIR SECTION B-B'

2H:1V EXAGGERATION
NTS



CONSTRUCTED FRESHWATER RESERVOIR CONNECTION AND FLOW CONTROL GATE SECTION C-C'

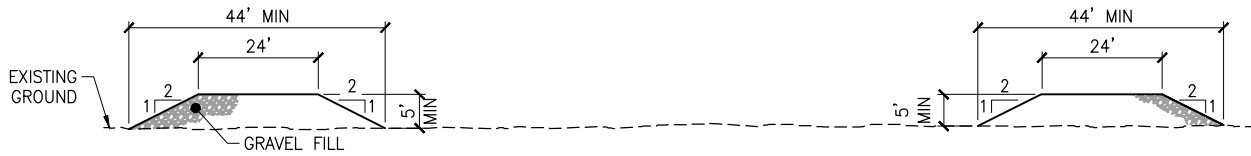
NTS



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CONSTRUCTED FRESHWATER RESERVOIR SECTIONS

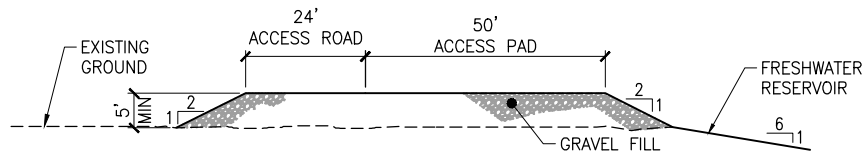
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **59** of **128** 3/17/2020



CONSTRUCTED FRESHWATER RESERVOIR ACCESS PAD

SECTION D-D'

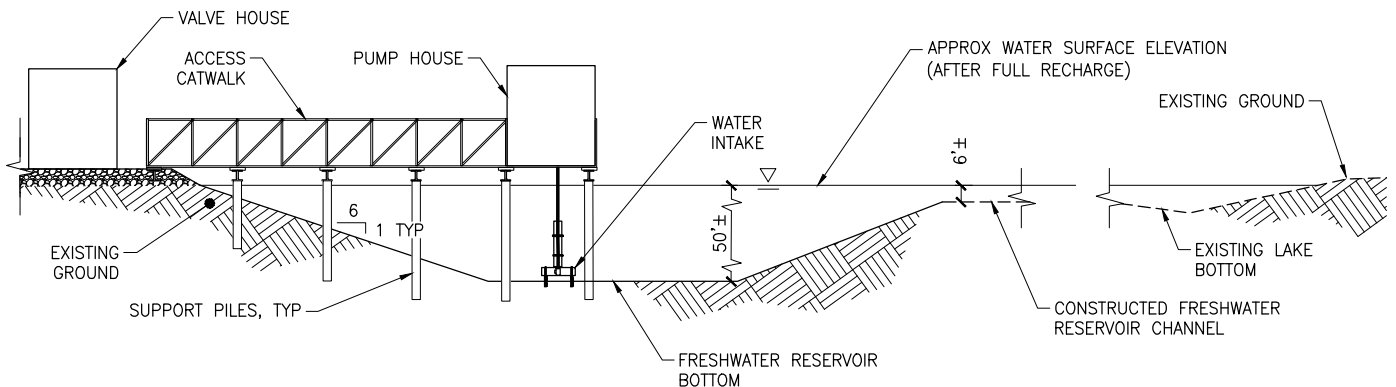
NTS



CONSTRUCTED FRESHWATER RESERVOIR ACCESS PAD

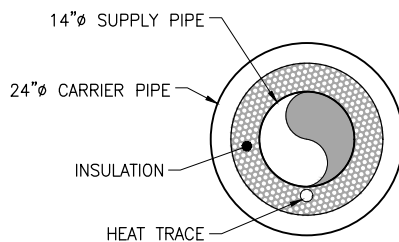
SECTION E-E'

NTS



CONSTRUCTED FRESHWATER RESERVOIR PUMPHOUSE ELEVATION

NTS



FRESHWATER PIPE SECTION

NTS

NOTE:

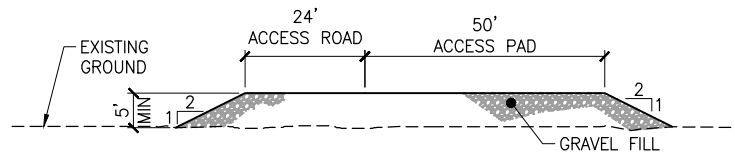
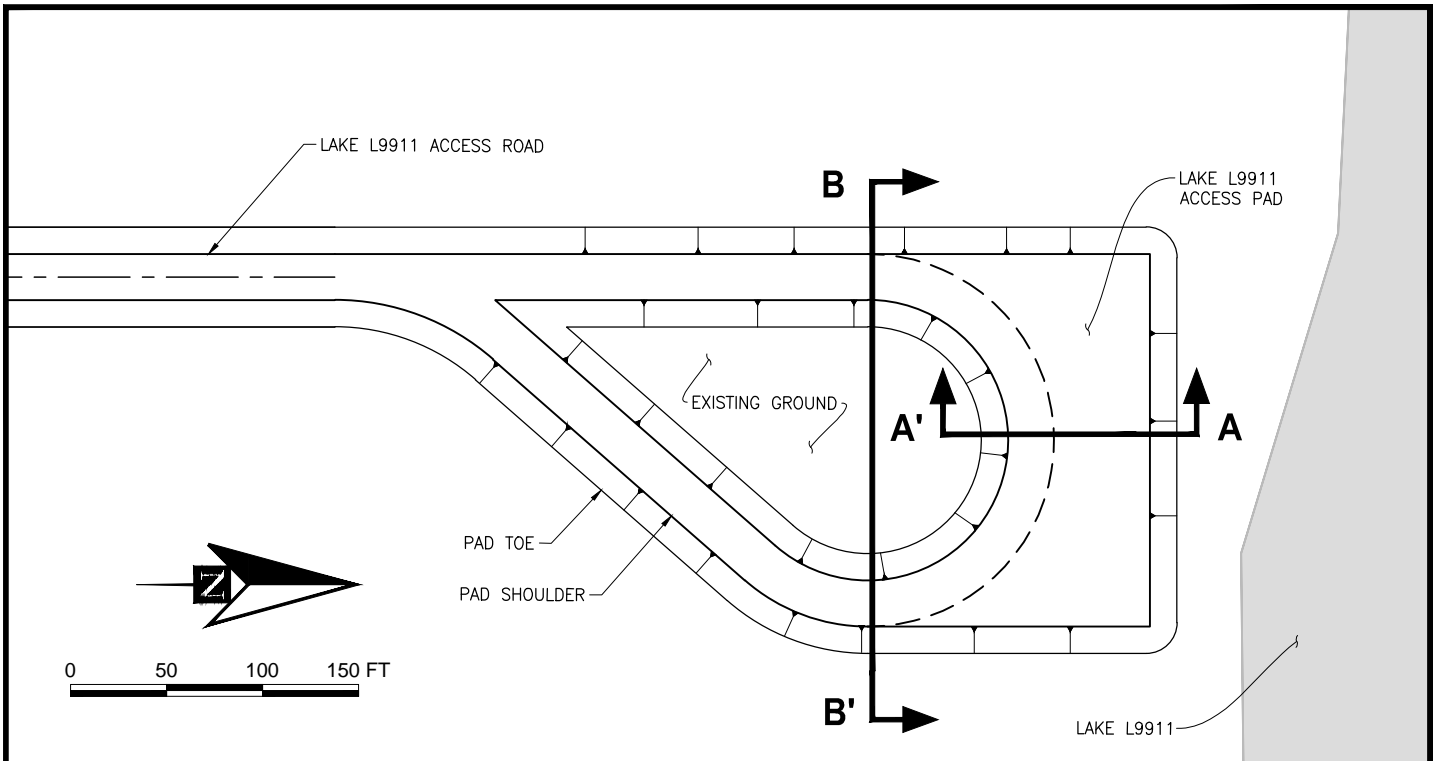
1. FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY & ROAD/PAD ELEVATION.
2. PUMP HOUSE AND INTAKE PIPE ARE SCHEMATIC, FOR INFORMATION ONLY. PUMP HOUSE AND INTAKE DESIGN TO BE DEVELOPED DURING DETAILED DESIGN.

CONSTRUCTED FRESHWATER RESERVOIR ACCESS PAD SECTIONS



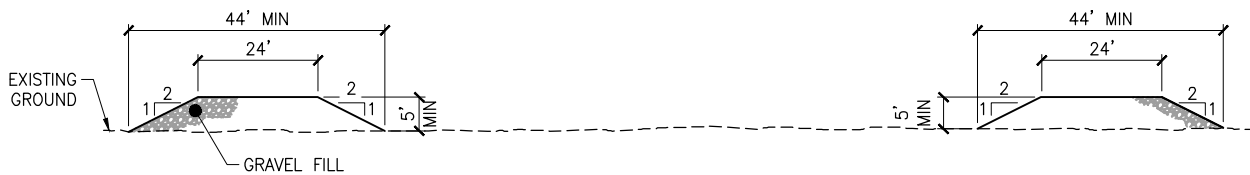
ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **60** of **128** 3/17/2020



LAKE L9911 ACCESS PAD SECTION A-A'

NTS



LAKE L9911 ACCESS PAD SECTION B-B'

NTS

NOTES:

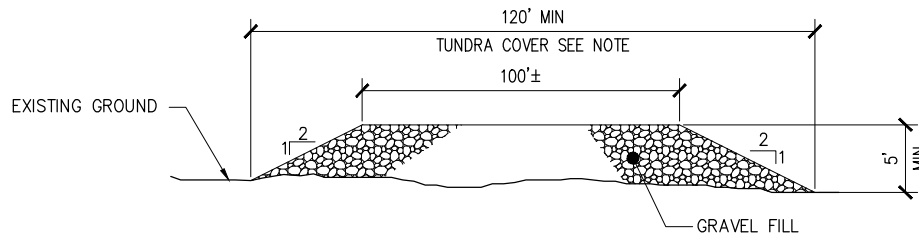
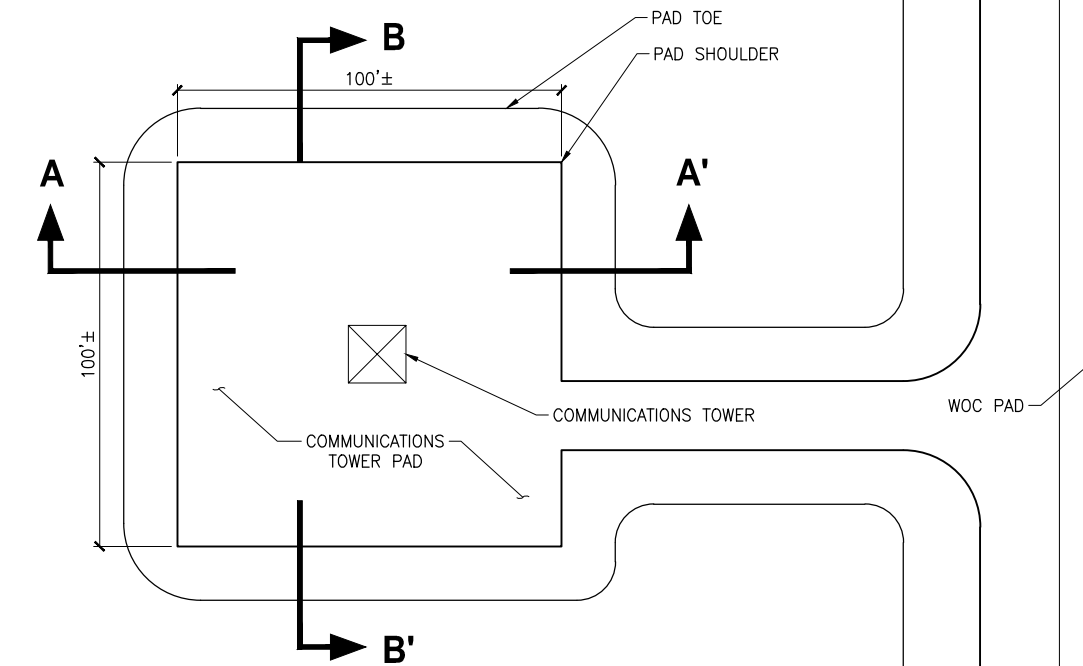
1. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.



ConocoPhillips
Alaska, Inc.

LAKE L9911 ACCESS PAD PLAN AND SECTIONS

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **61** of **128** 3/17/2020

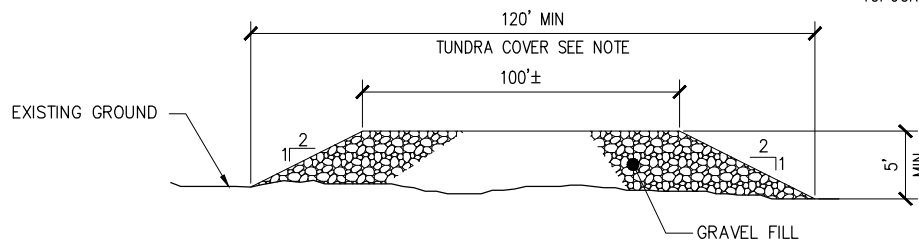


COMMUNICATIONS TOWER PAD SECTION A-A'

NTS

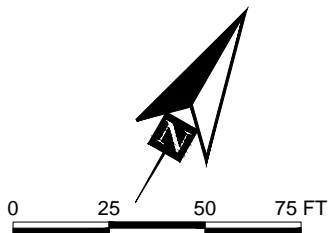
NOTES:

1. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
2. FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY & ROAD/PAD ELEVATION.



COMMUNICATIONS TOWER PAD SECTION B-B'

NTS



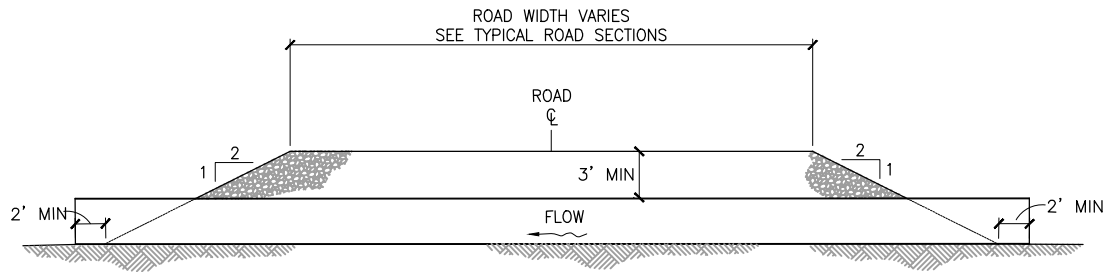
ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION

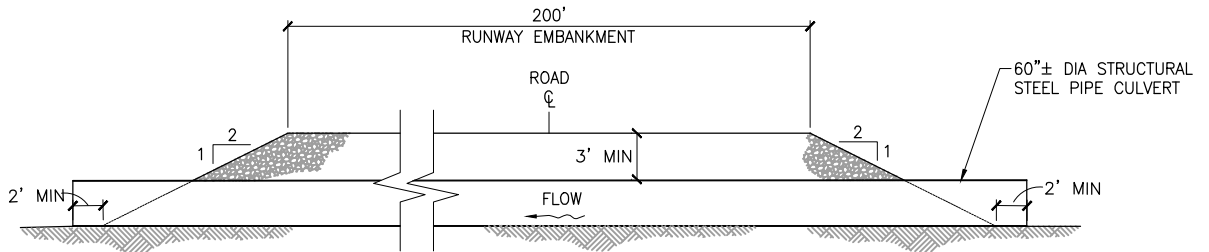
AT: ALASKA

SHEET **62** of **128** 3/17/2020

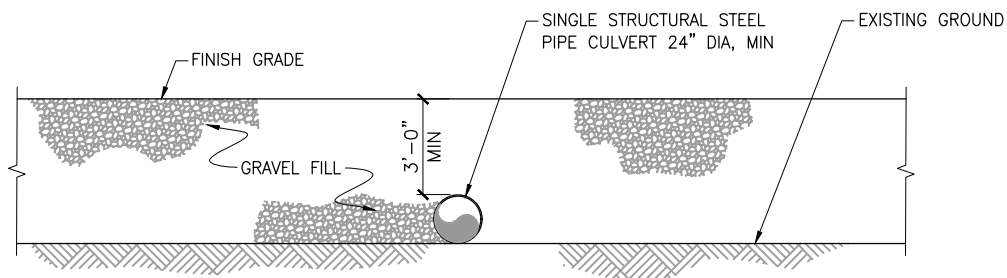
COMMUNICATIONS TOWER PAD PLAN AND SECTIONS



**TYPICAL CROSS DRAINAGE CULVERT
SECTION**



**AIRSTRIp CROSS DRAINAGE CULVERT
SECTION**



**TYPICAL CROSS DRAINAGE CULVERT
ELEVATION**

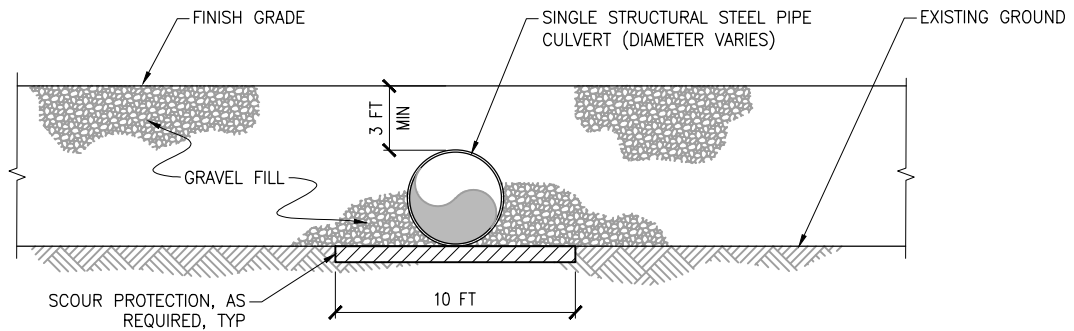
NOTE:

1. AS A GENERAL GUIDELINE, CROSS-DRAINAGE CULVERTS WILL BE SITED APPROXIMATELY EVERY 1,000 FEET OR AS NEEDED ALONG THE ALIGNMENT DURING INITIAL DESIGN EFFORTS. EXACT PLACEMENT OF CULVERTS WILL DEPEND ON ACTUAL IN-FIELD LOCAL DRAINAGE PATTERNS, AND MAY BE SPACED CLOSER OR FARTHER THAN 1,000 FEET.

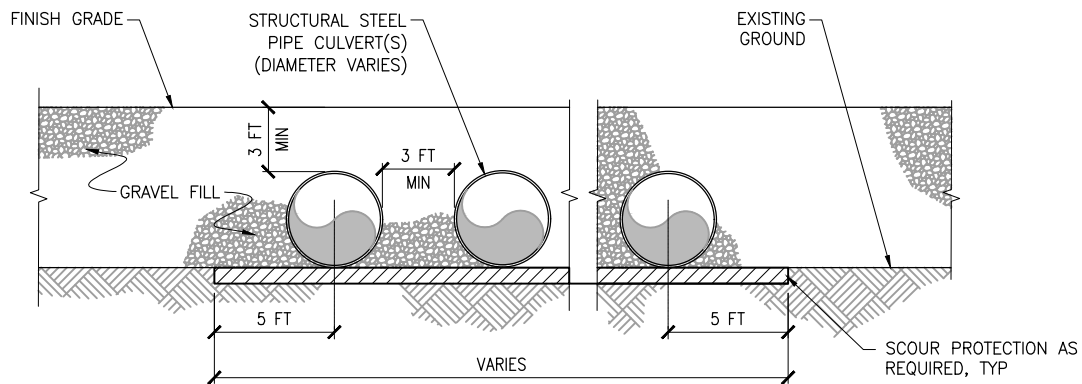


**CROSS DRAINAGE CULVERT
SECTIONS AND ELEVATION**

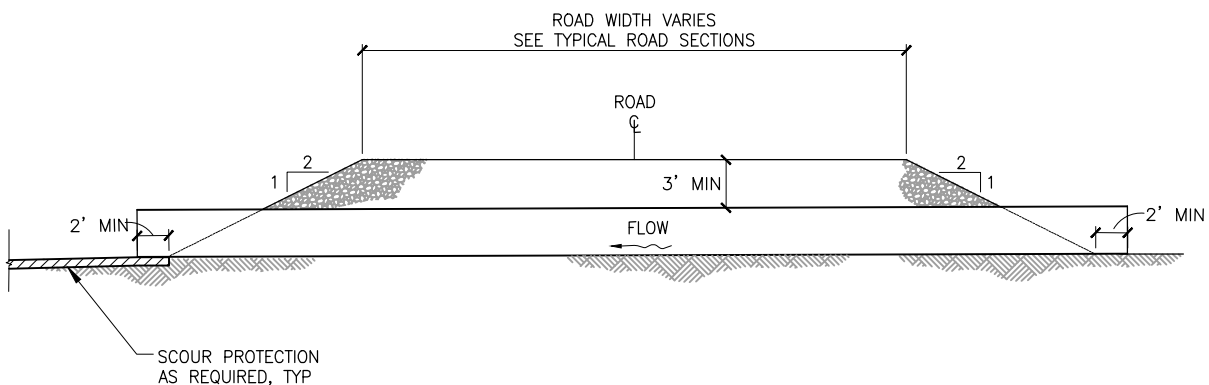
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **63** of **128** 3/17/2020



TYPICAL SINGLE CULVERT ELEVATION



TYPICAL CULVERT BATTERY ELEVATION



TYPICAL SINGLE/MULTIPLE CULVERT SECTION

NOTE:
SCOUR PROTECTION MATERIALS TO BE DETERMINED
DURING DETAILED DESIGN.

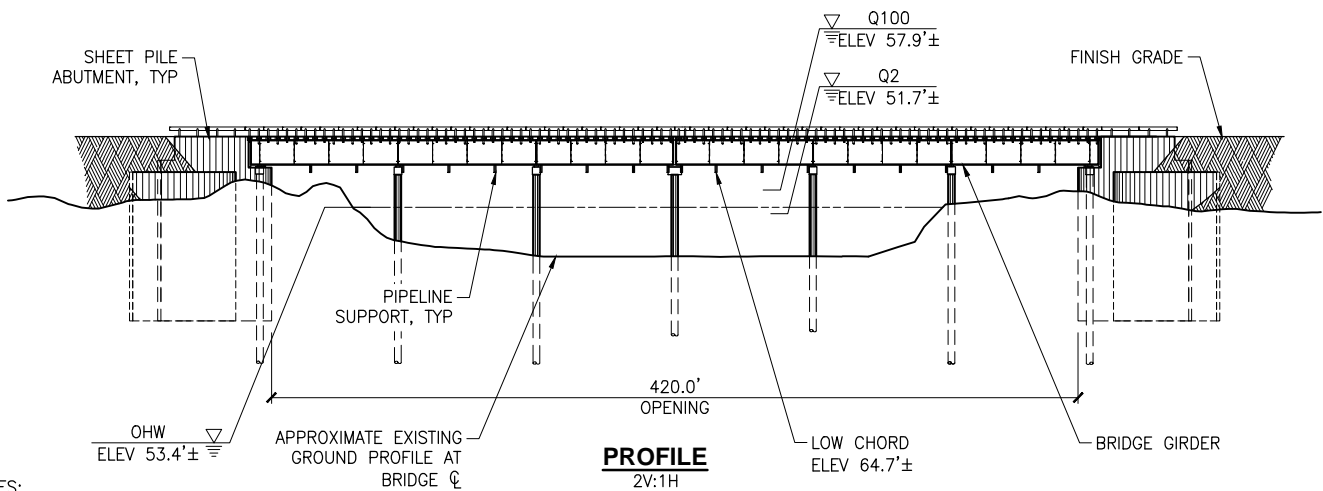
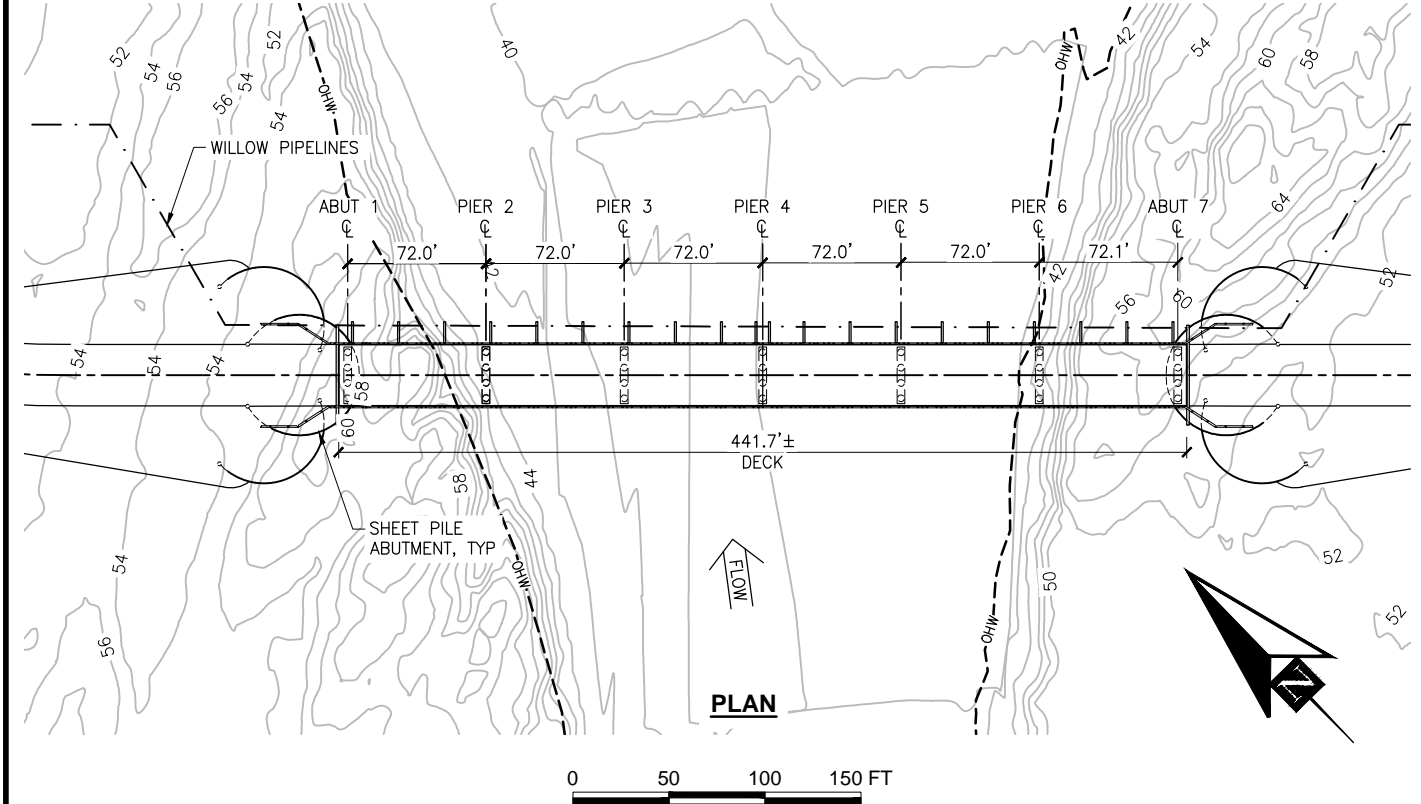


ConocoPhillips
Alaska, Inc.

**SINGLE / MULTIPLE CULVERT BATTERY
SECTIONS AND ELEVATIONS**

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **64** of **128** 3/17/2020

REFERENCE: POA-####-#####
 APPLICANT: CPAI
 PROPOSED: WILLOW ROAD, PAD,
 BRIDGE, & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **65** of **128** 3/17/2020



NOTES:

1. VERTICAL SCALE 2X HORIZONTAL SCALE.
2. BRIDGE CROSSING PROFILES ARE BASED ON TOPOGRAPHIC SURVEY DATA. VERTICAL DATUM IS NAVD 88.
3. BRIDGE LOW CHORD ELEVATION WILL BE A MINIMUM OF THIRTEEN (13) FEET ABOVE THE TWO (2) YEAR FLOOD OR FOUR (4) FEET ABOVE THE 100-YEAR FLOOD OR THREE (3) FEET ABOVE THE HIGHEST DOCUMENTED FLOOD ELEVATION, WHICHEVER IS HIGHER.
4. ORDINARY HIGH WATER (OHW) ELEVATIONS ARE APPROXIMATED BASED ON DELINEATION OF VEGETATION LIMITS (Ives et al. 2019) OVERLAID ON TOPOGRAPHIC DATA. OHW ELEVATION WAS SET BASED VEGETATION LIMITS ON THE HIGHER OF THE TWO BANKS. THIS METHOD PROVIDES THE HIGHEST POSSIBLE OHW ELEVATION.
5. FLOOD ELEVATIONS SHOWN ARE BASED ON PRELIMINARY SURVEY AND HYDROLOGIC DATA.

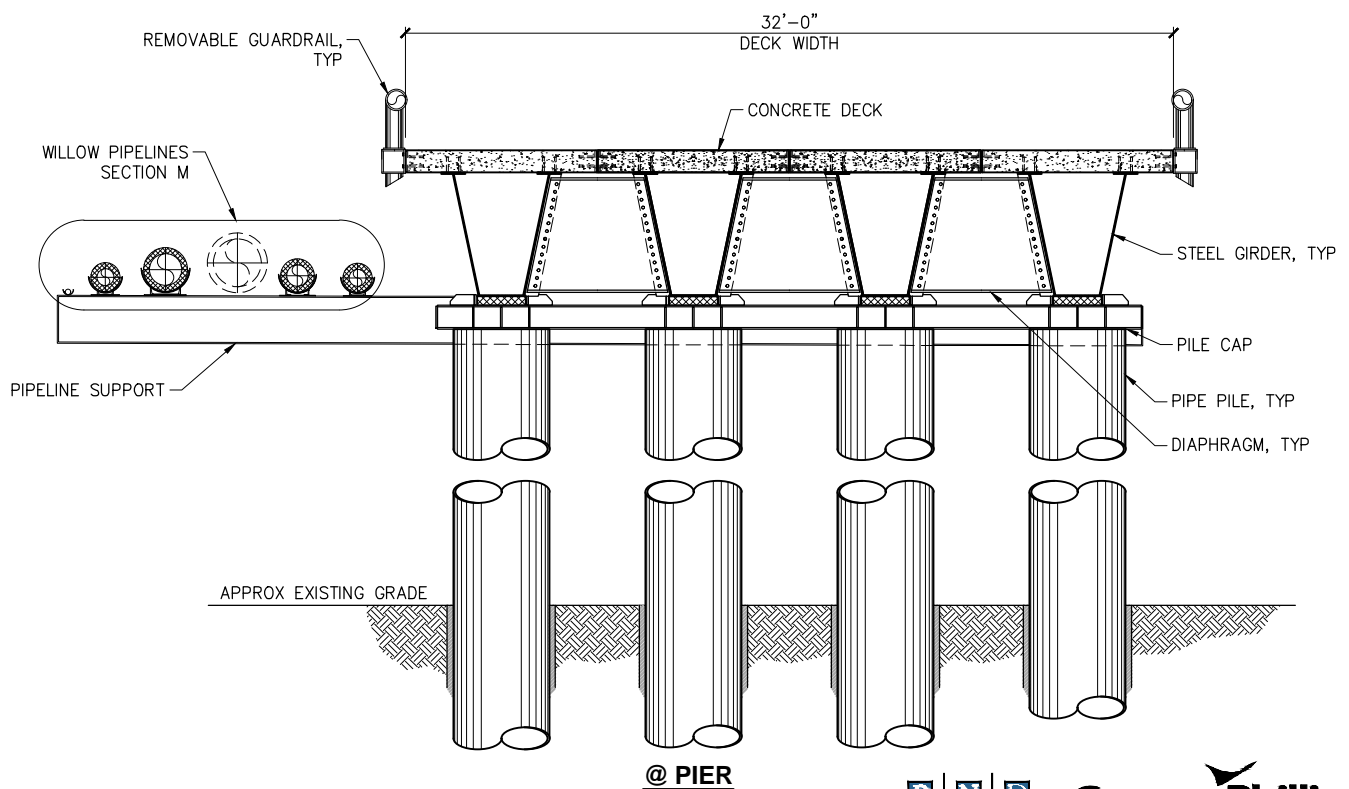
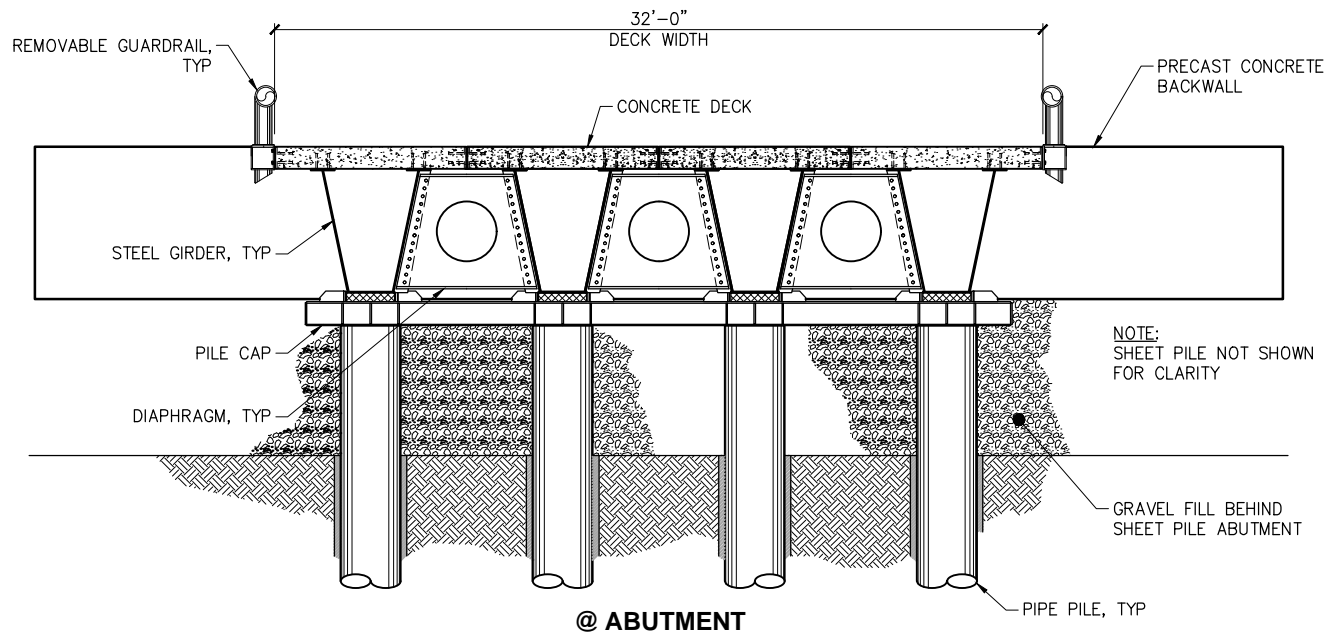
FISH CREEK BRIDGE PLAN AND PROFILE



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION

AT: ALASKA
SHEET **66** of **128** 3/17/2020



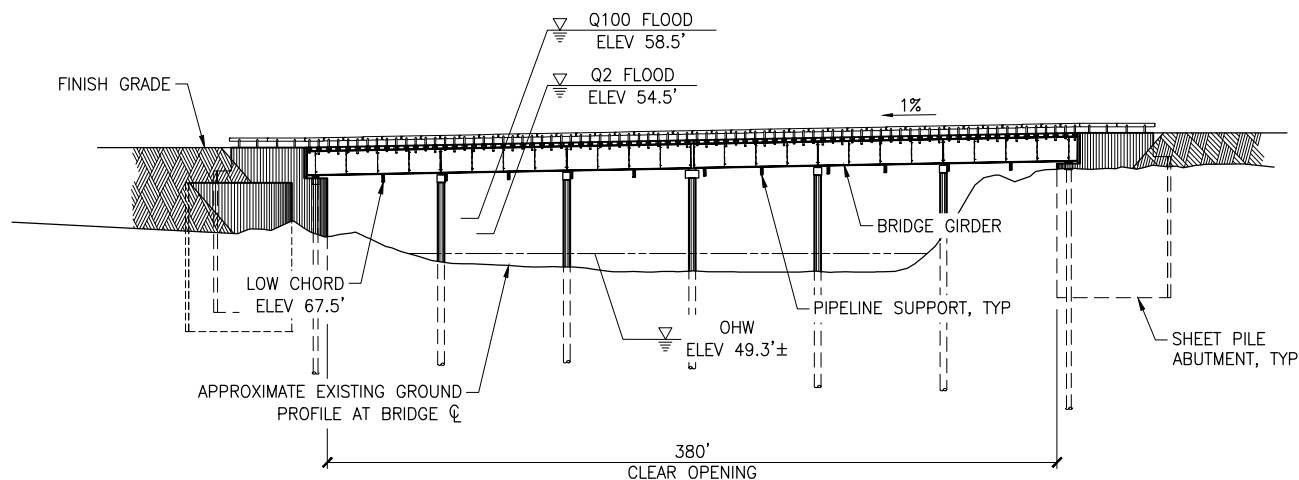
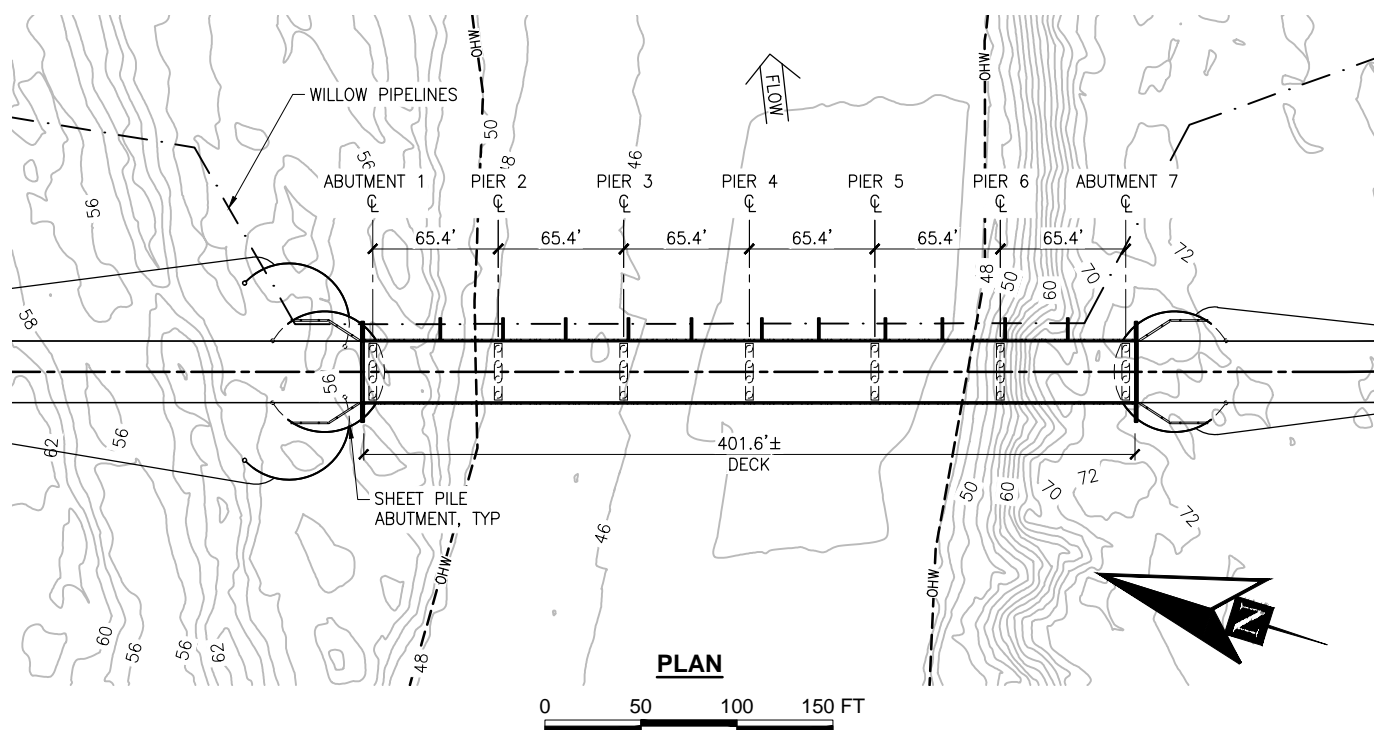
TYPICAL SECTIONS



ConocoPhillips
Alaska, Inc.

FISH CREEK BRIDGE SECTIONS

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **67** of **128** 3/17/2020



NOTES:

1. VERTICAL SCALE 2X HORIZONTAL SCALE.
2. BRIDGE CROSSING PROFILES ARE BASED ON TOPOGRAPHIC SURVEY DATA. VERTICAL DATUM IS NAVD 88.
3. BRIDGE LOW CHORD ELEVATION WILL BE A MINIMUM OF THIRTEEN (13) FEET ABOVE THE TWO (2) YEAR FLOOD OR FOUR (4) FEET ABOVE THE 100-YEAR FLOOD OR THREE (3) FEET ABOVE THE HIGHEST DOCUMENTED FLOOD ELEVATION, WHICHEVER IS HIGHER.
4. ORDINARY HIGH WATER (OHW) ELEVATIONS ARE APPROXIMATED BASED ON DELINEATION OF VEGETATION LIMITS (Ives et al. 2019) OVERLAID ON TOPOGRAPHIC DATA. OHW ELEVATION WAS SET BASED VEGETATION LIMITS ON THE HIGHER OF THE TWO BANKS. THIS METHOD PROVIDES THE HIGHEST POSSIBLE OHW ELEVATION.
5. FLOOD ELEVATIONS SHOWN ARE BASED ON PRELIMINARY SURVEY AND HYDROLOGIC DATA.

PROFILE
2V:1H

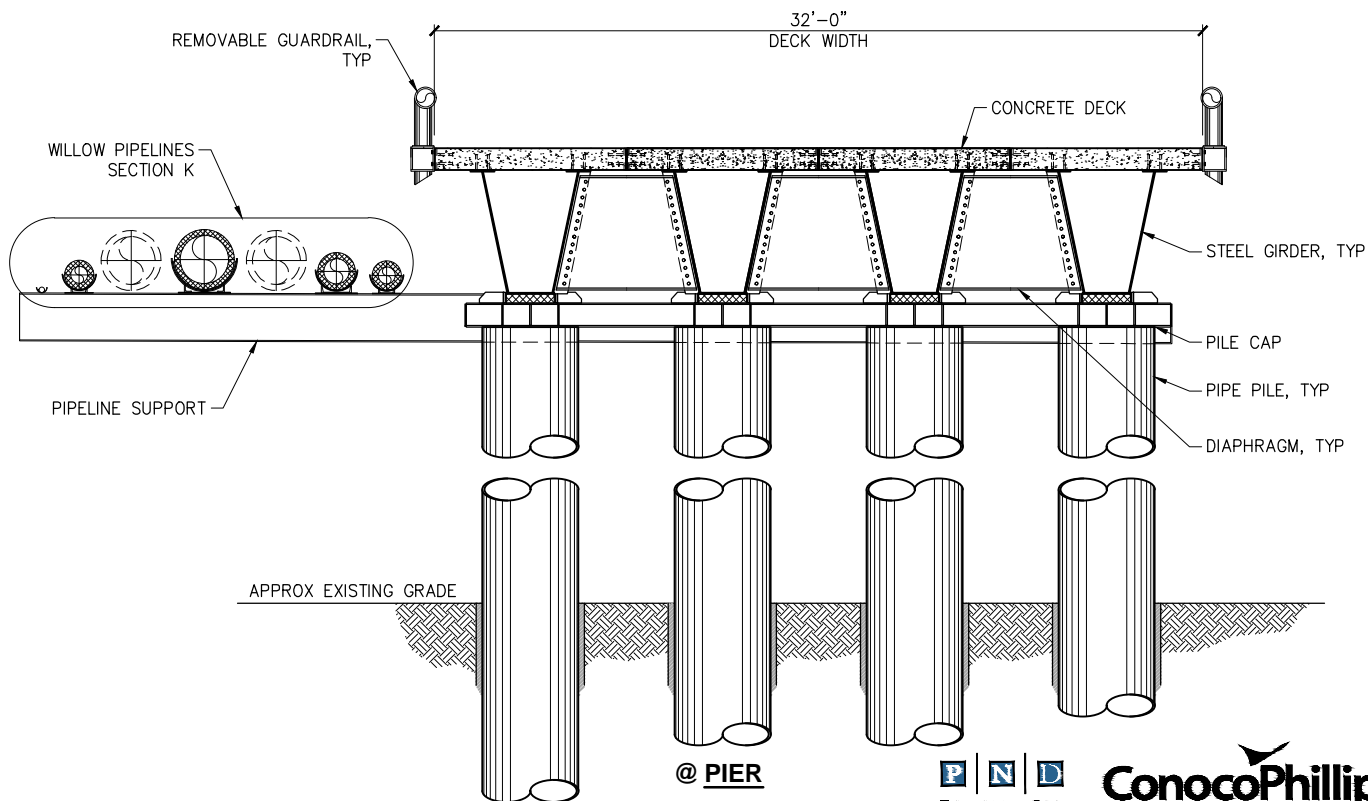
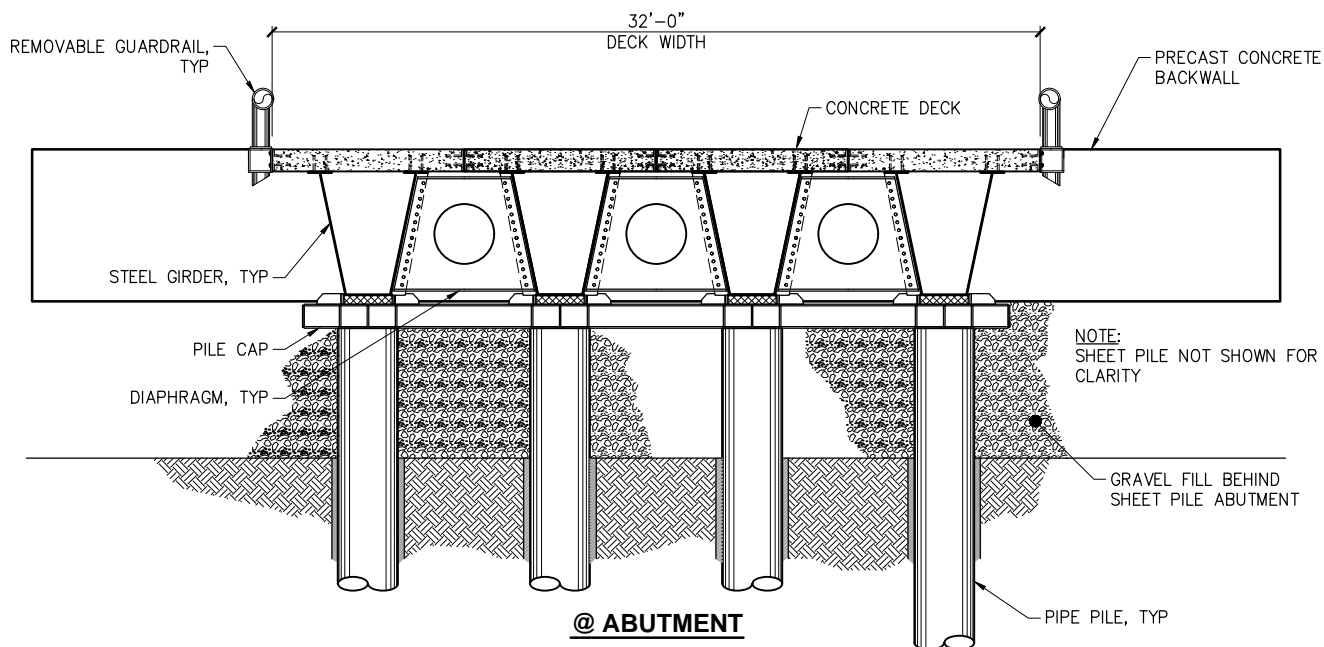


ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION

AT: ALASKA
SHEET **68** of **128** 3/17/2020

JUDY CREEK BRIDGE PLAN AND PROFILE



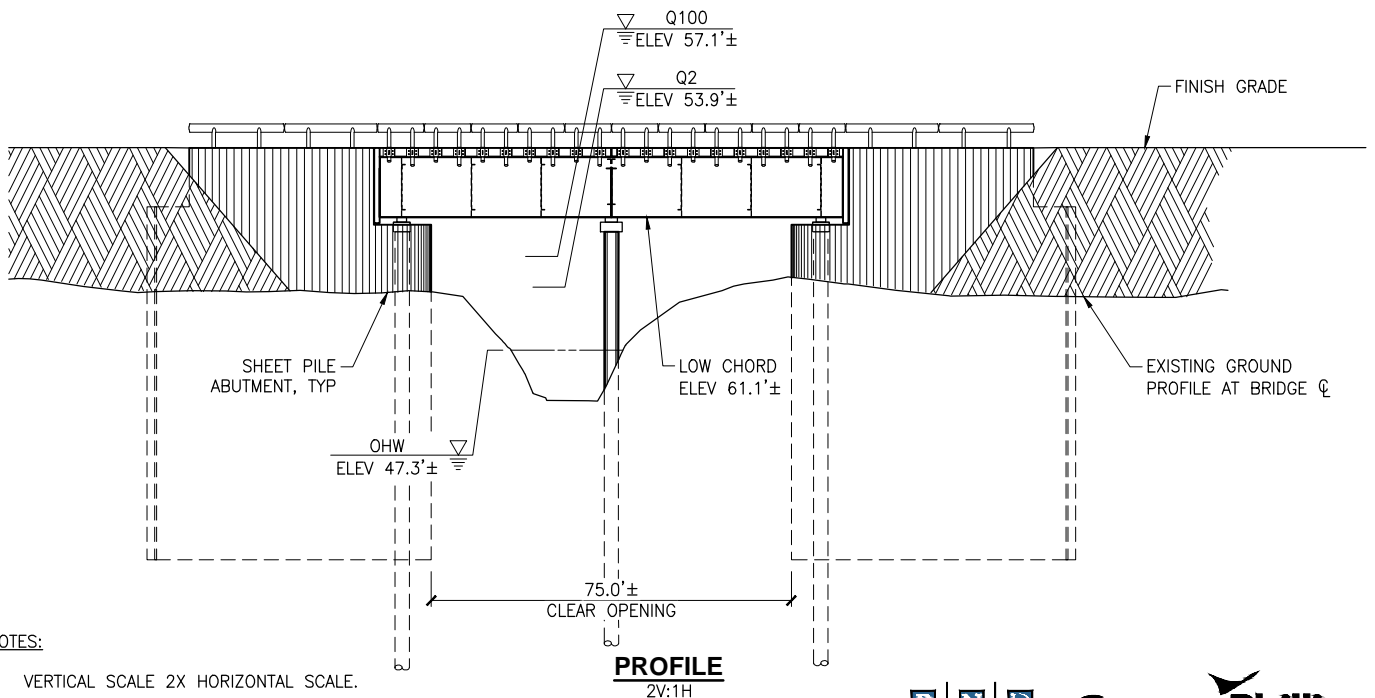
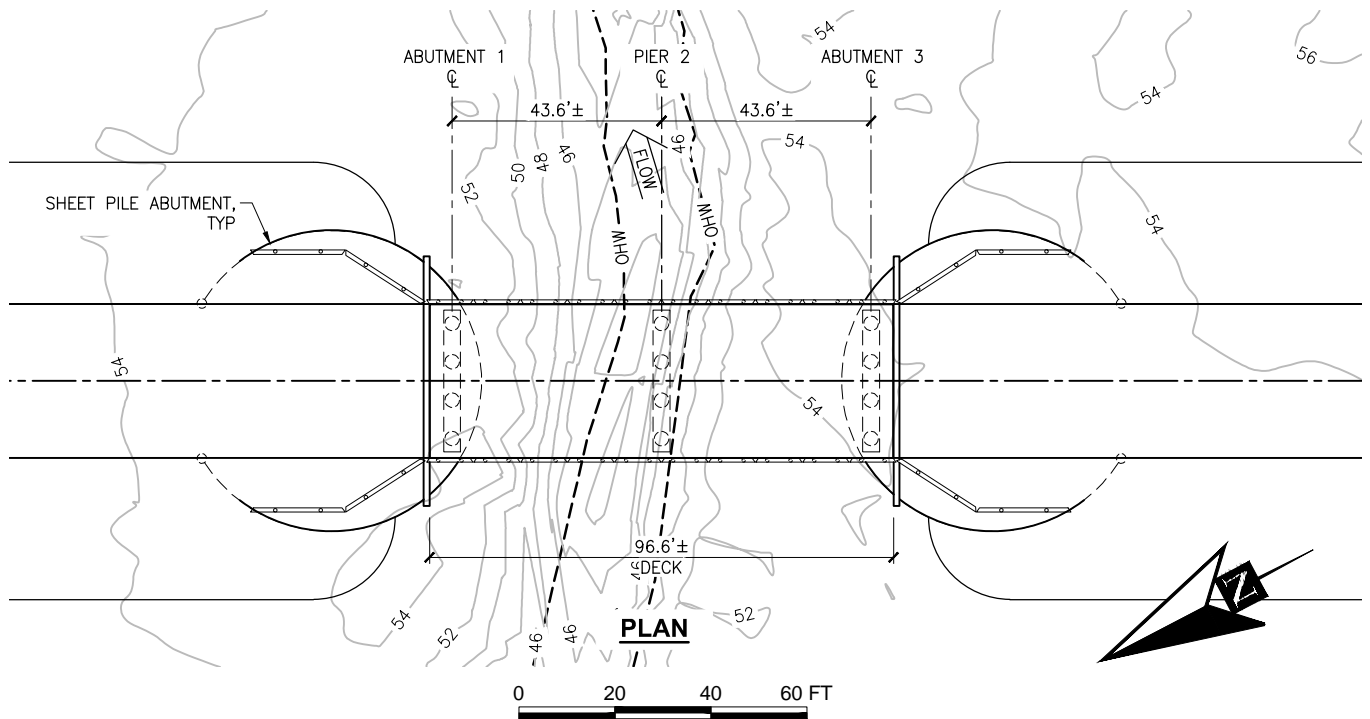
TYPICAL SECTIONS

NTS

JUDY CREEK BRIDGE SECTIONS

ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **69** of **128** 3/17/2020



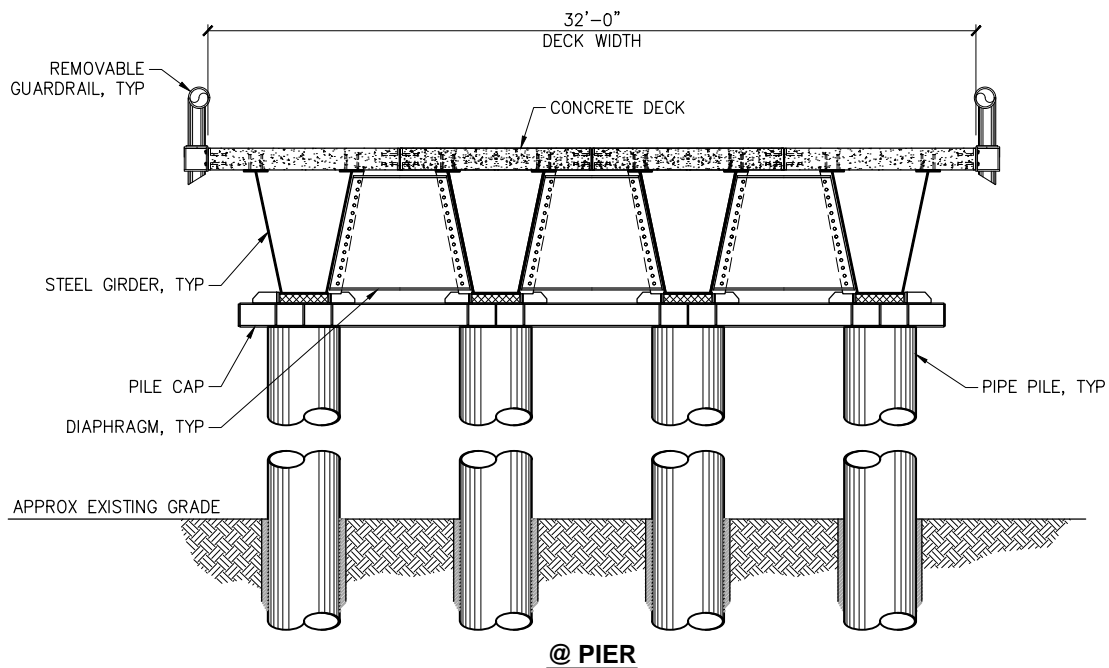
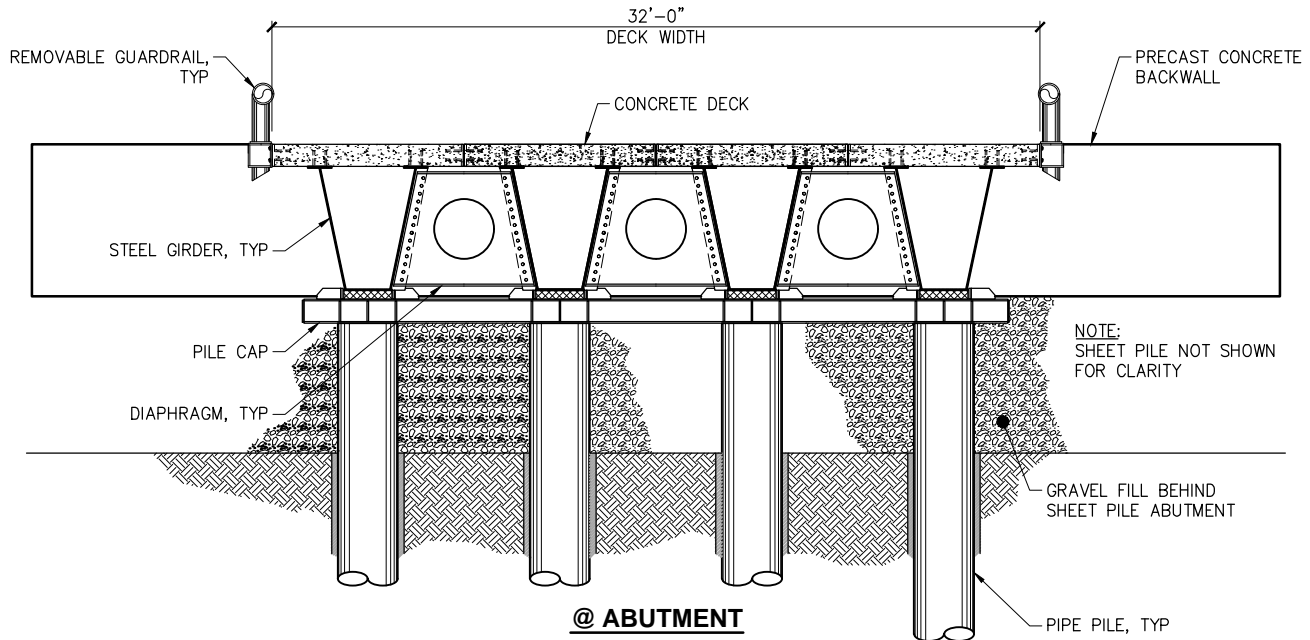
NOTES:

1. VERTICAL SCALE 2X HORIZONTAL SCALE.
2. BRIDGE CROSSING PROFILES ARE BASED ON TOPOGRAPHIC SURVEY DATA. VERTICAL DATUM IS NAVD 88.
3. BRIDGE LOW CHORD ELEVATION WILL BE A MINIMUM OF FOUR (4) FEET ABOVE THE 100-YEAR FLOOD OR THREE (3) FEET ABOVE THE HIGHEST DOCUMENTED FLOOD ELEVATION, WHICHEVER IS HIGHER.
4. ORDINARY HIGH WATER (OHW) ELEVATIONS ARE APPROXIMATED BASED ON DELINEATION OF VEGETATION LIMITS (Ives et al. 2019) OVERLAID ON TOPOGRAPHIC DATA. OHW ELEVATION WAS SET BASED VEGETATION LIMITS ON THE HIGHER OF THE TWO BANKS. THIS METHOD PROVIDES THE HIGHEST POSSIBLE OHW ELEVATION.
5. FLOOD ELEVATIONS SHOWN ARE BASED ON PRELIMINARY SURVEY AND HYDROLOGIC DATA.

JUDY CREEK KAYYAAQ BRIDGE PLAN AND PROFILE



REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **70** of **128** 3/17/2020



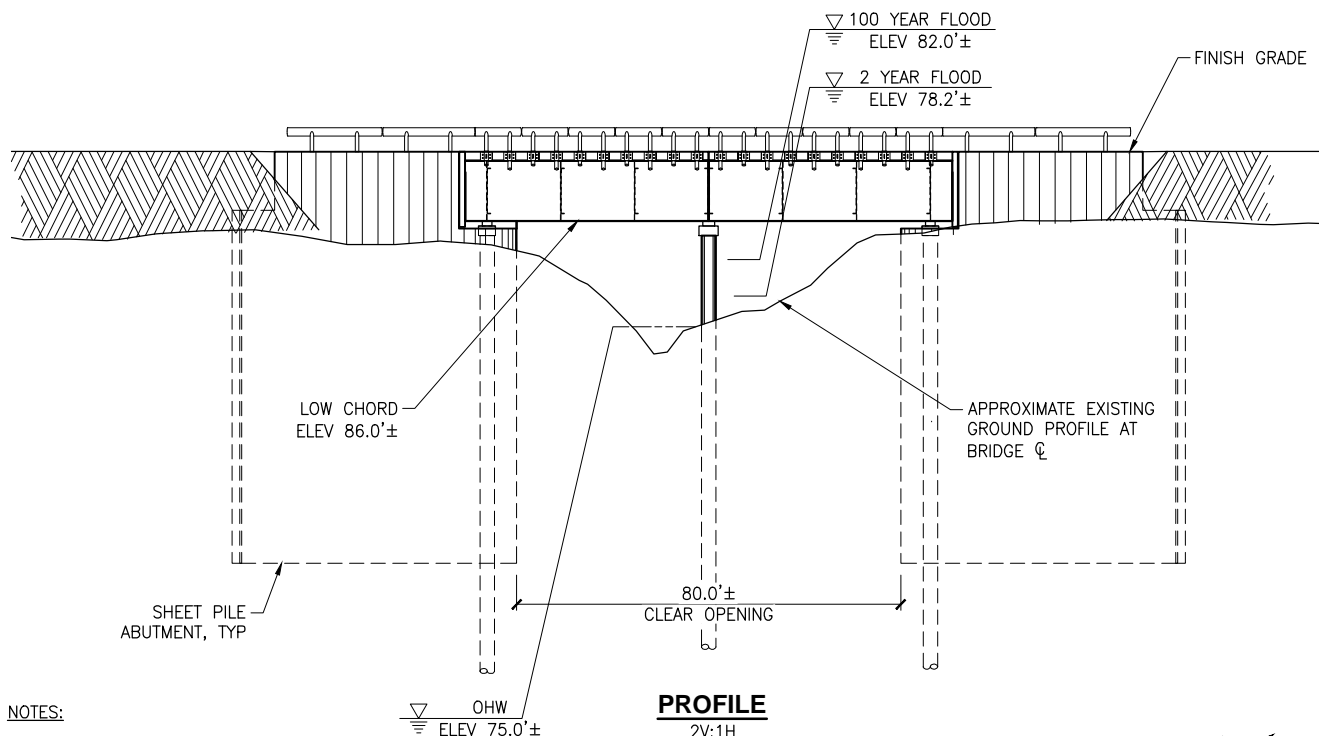
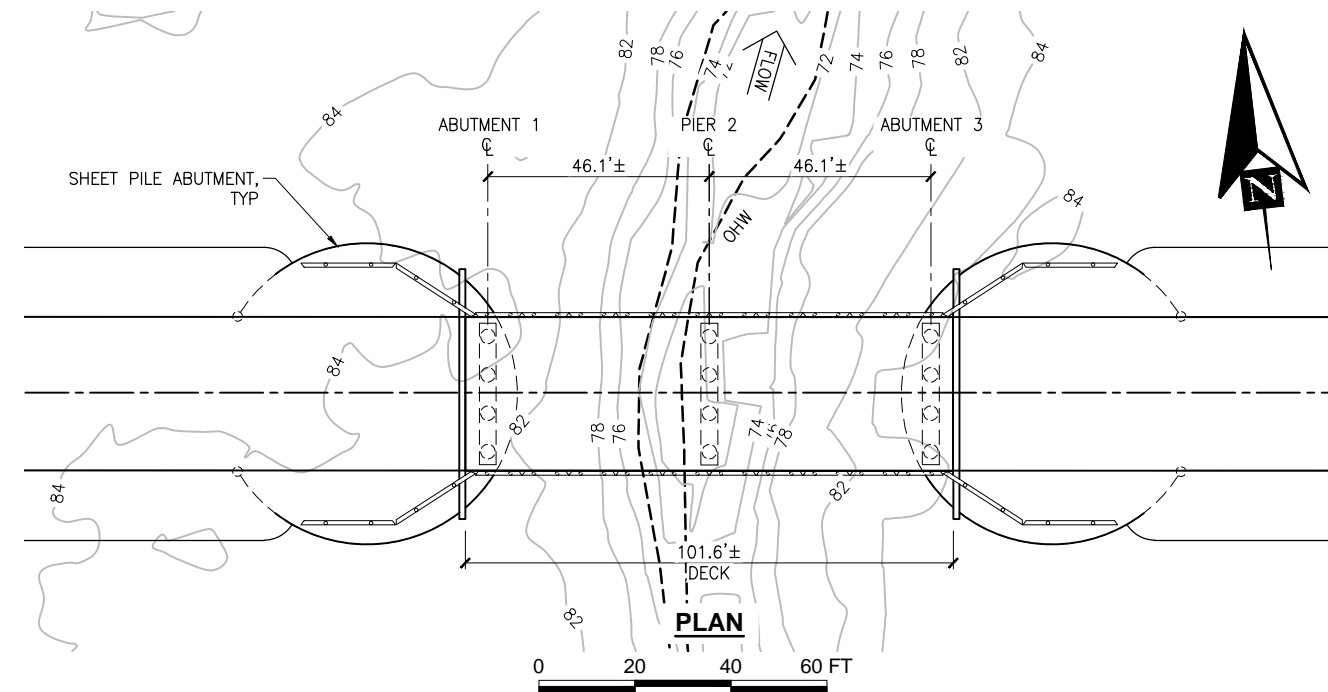
TYPICAL SECTIONS
NTS

JUDY CREEK KAYYAAQ BRIDGE SECTIONS



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **71** of **128** 3/17/2020



NOTES:

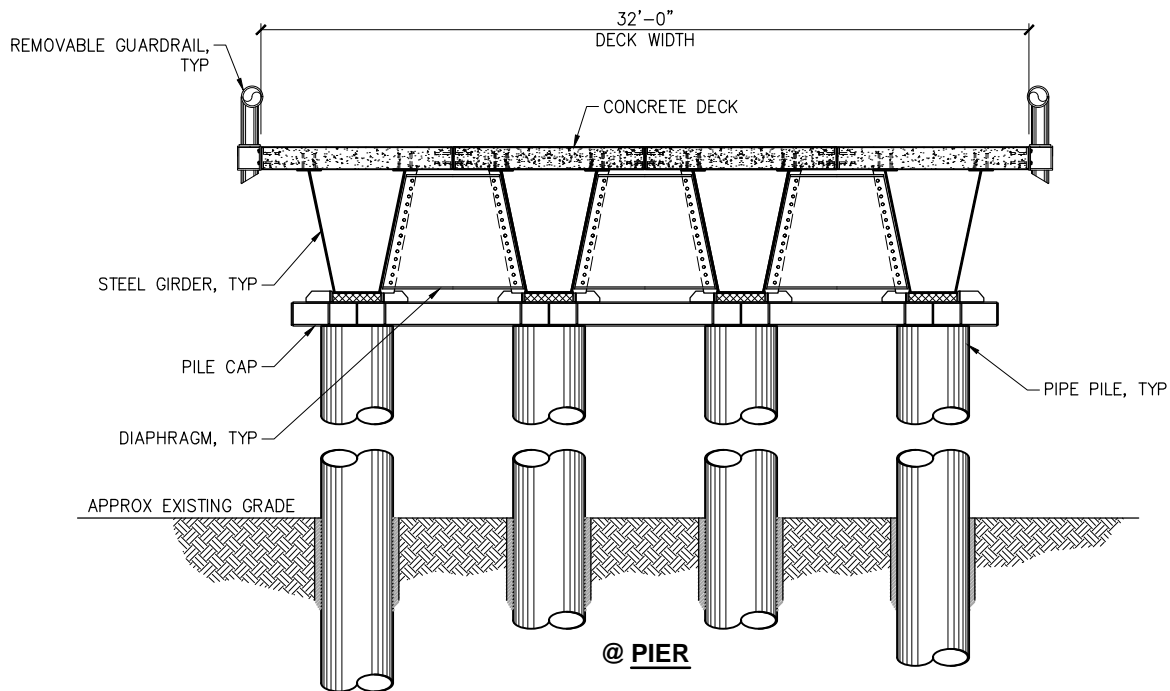
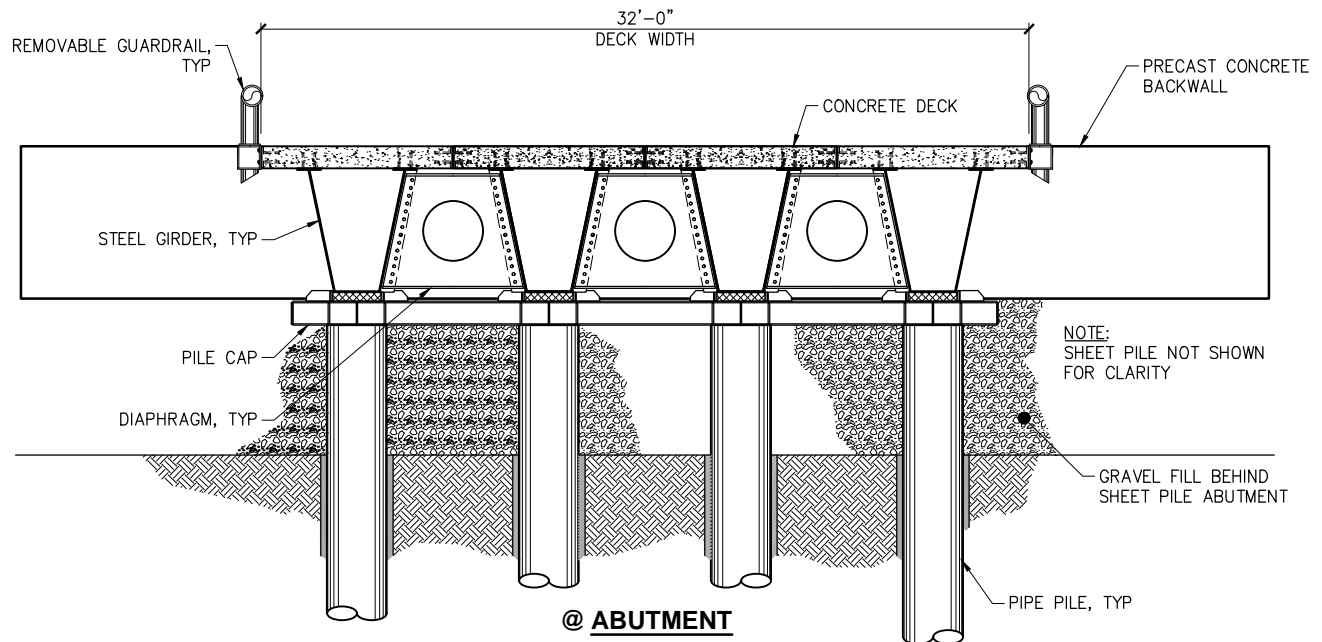
1. VERTICAL SCALE 2X HORIZONTAL SCALE.
2. BRIDGE CROSSING PROFILES ARE BASED ON TOPOGRAPHIC SURVEY DATA. VERTICAL DATUM IS NAVD 88.
3. BRIDGE LOW CHORD ELEVATION WILL BE A MINIMUM OF FOUR (4) FEET ABOVE THE 100-YEAR FLOOD OR THREE (3) FEET ABOVE THE HIGHEST DOCUMENTED FLOOD ELEVATION, WHICHEVER IS HIGHER.
4. ORDINARY HIGH WATER (OHW) ELEVATIONS ARE APPROXIMATED BASED ON DELINEATION OF VEGETATION LIMITS (Ives et al. 2019) OVERLAID ON TOPOGRAPHIC DATA. OHW ELEVATION WAS SET BASED VEGETATION LIMITS ON THE HIGHER OF THE TWO BANKS. THIS METHOD PROVIDES THE HIGHEST POSSIBLE OHW ELEVATION.
5. FLOOD ELEVATIONS SHOWN ARE BASED ON PRELIMINARY SURVEY AND HYDROLOGIC DATA.

WILLOW 2 BRIDGE PLAN AND PROFILE



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **72** of **128** 3/17/2020



TYPICAL SECTIONS

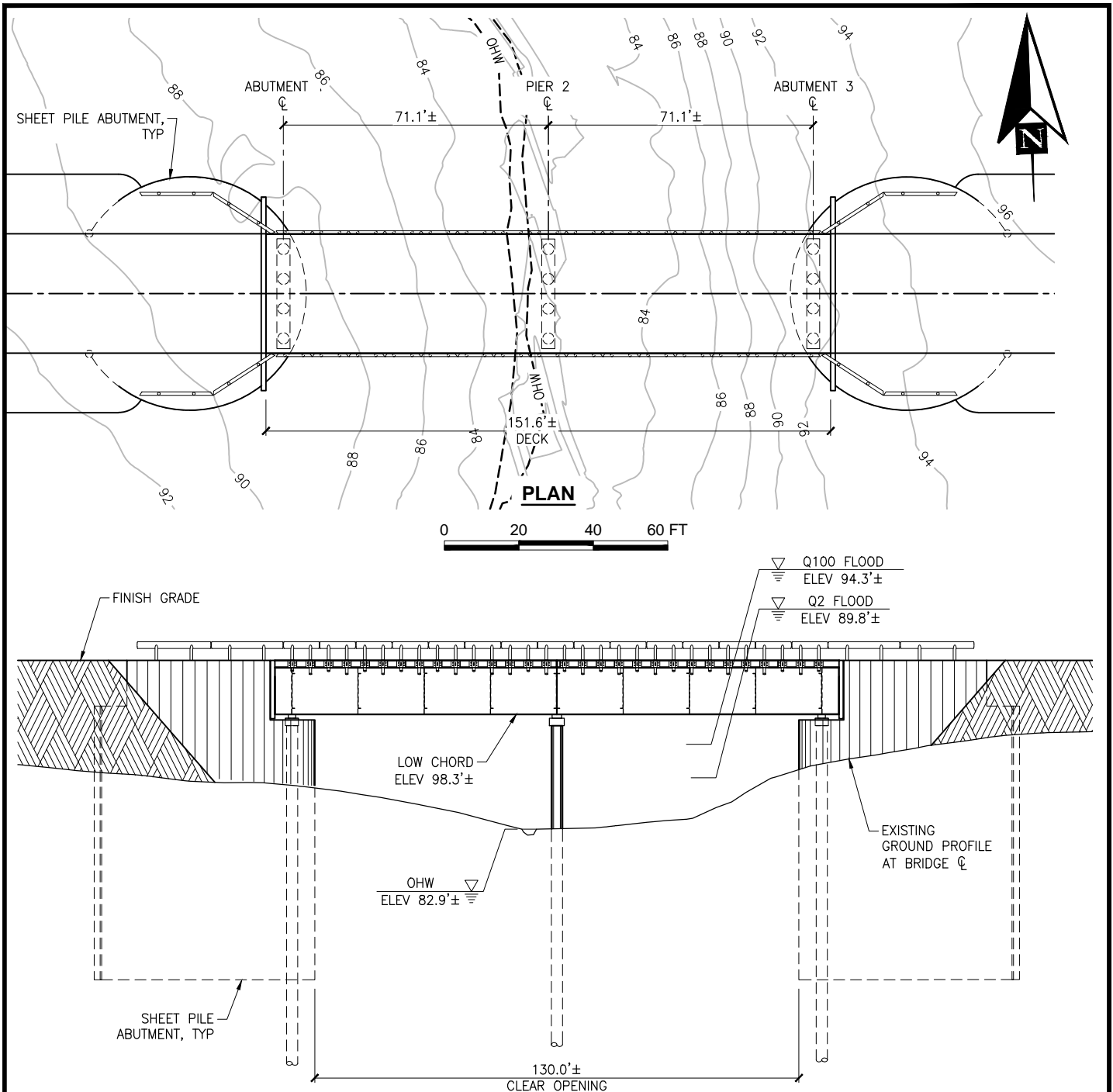
NTS



ConocoPhillips
Alaska, Inc.

WILLOW 2 BRIDGE SECTIONS

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **73** of **128** 3/17/2020



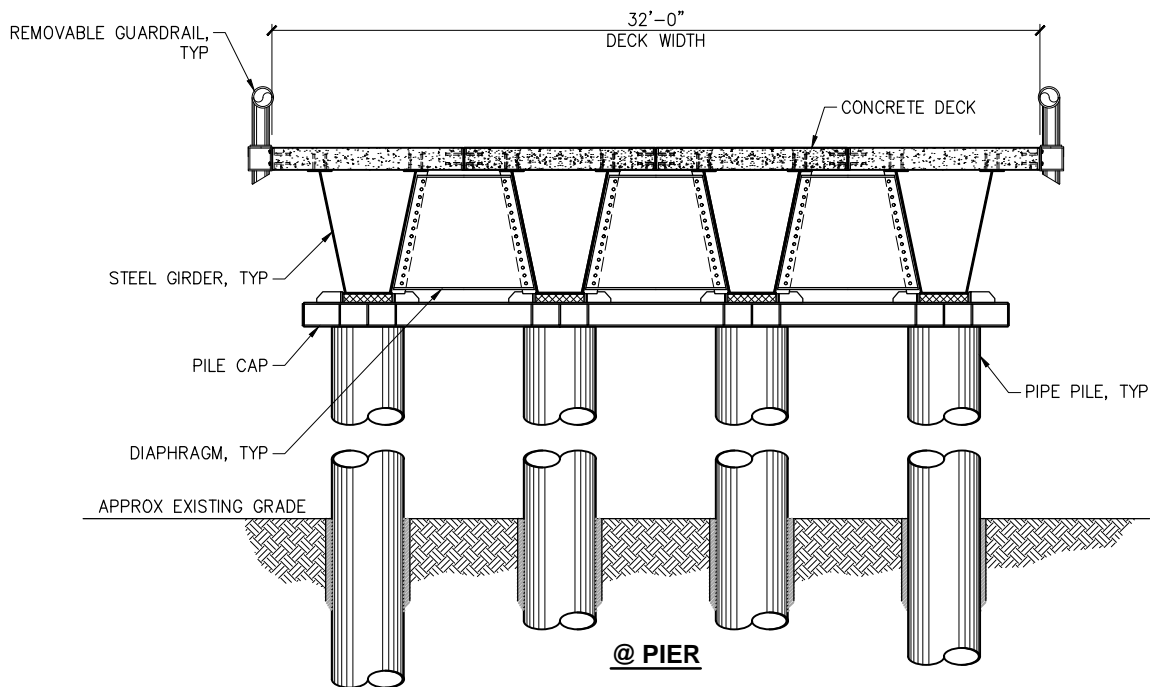
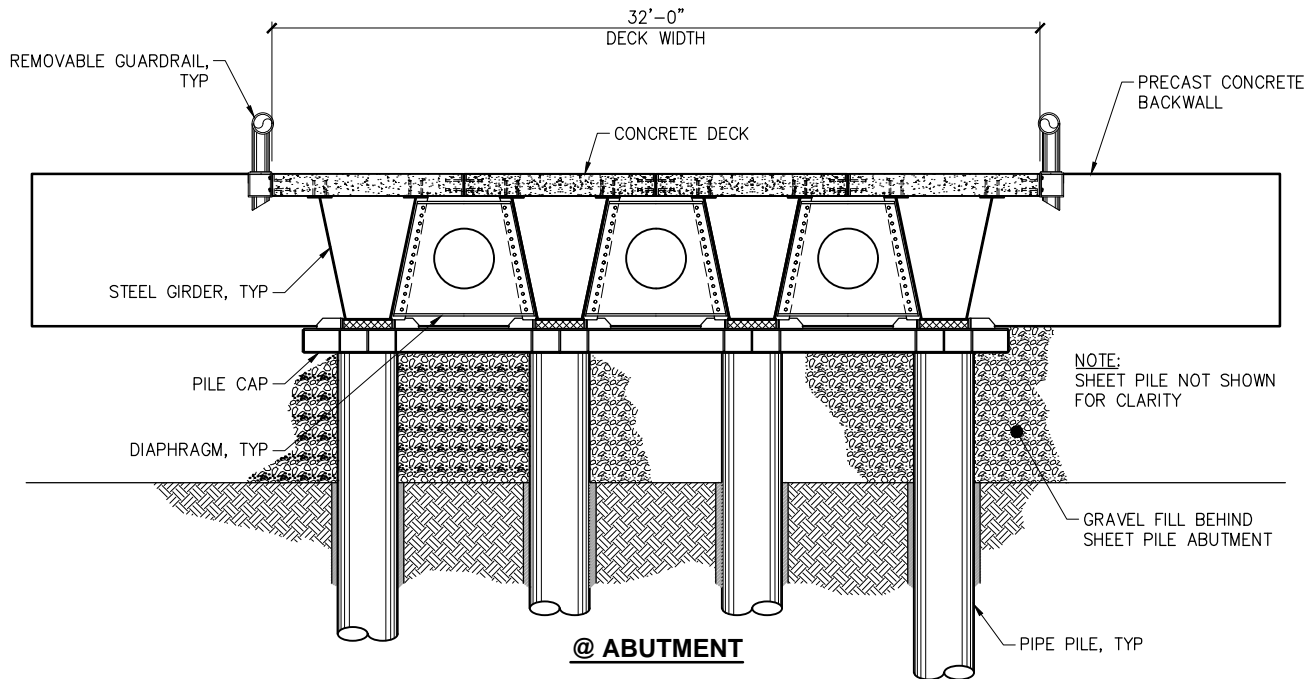
NOTES:

1. VERTICAL SCALE 2X HORIZONTAL SCALE.
2. BRIDGE CROSSING PROFILES ARE BASED ON TOPOGRAPHIC SURVEY DATA. VERTICAL DATUM IS NAVD 88.
3. BRIDGE LOW CHORD ELEVATION WILL BE A MINIMUM OF FOUR (4) FEET ABOVE THE 100-YEAR FLOOD OR THREE (3) FEET ABOVE THE HIGHEST DOCUMENTED FLOOD ELEVATION, WHICHEVER IS HIGHER.
4. ORDINARY HIGH WATER (OHW) ELEVATIONS ARE APPROXIMATED BASED ON DELINEATION OF VEGETATION LIMITS (Ives et al. 2019) OVERLAID ON TOPOGRAPHIC DATA. OHW ELEVATION WAS SET BASED VEGETATION LIMITS ON THE HIGHER OF THE TWO BANKS. THIS METHOD PROVIDES THE HIGHEST POSSIBLE OHW ELEVATION.
5. FLOOD ELEVATIONS SHOWN ARE BASED ON PRELIMINARY SURVEY AND HYDROLOGIC DATA.

WILLOW 4 BRIDGE PLAN AND PROFILE



REFERENCE: POA-####-####
 APPLICANT: CPAI
 PROPOSED: WILLOW ROAD, PAD,
 BRIDGE, & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **74** of **128** 3/17/2020



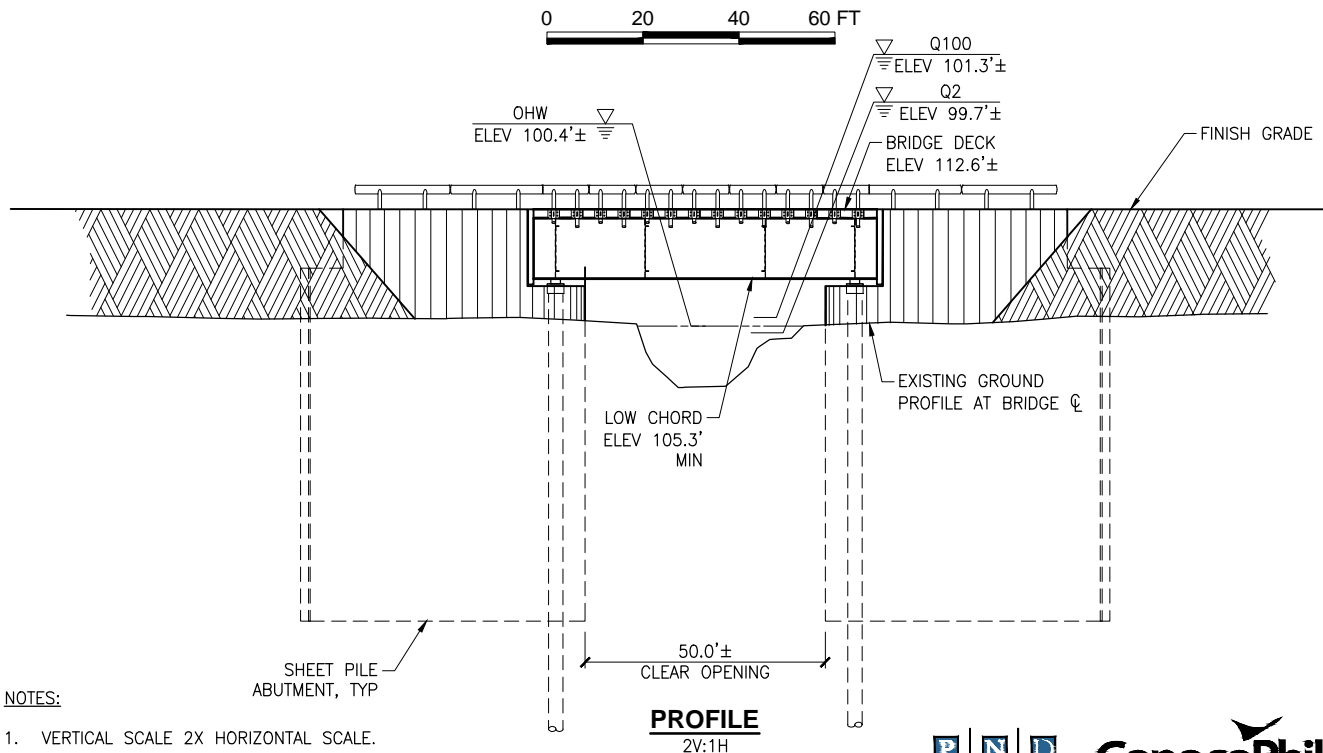
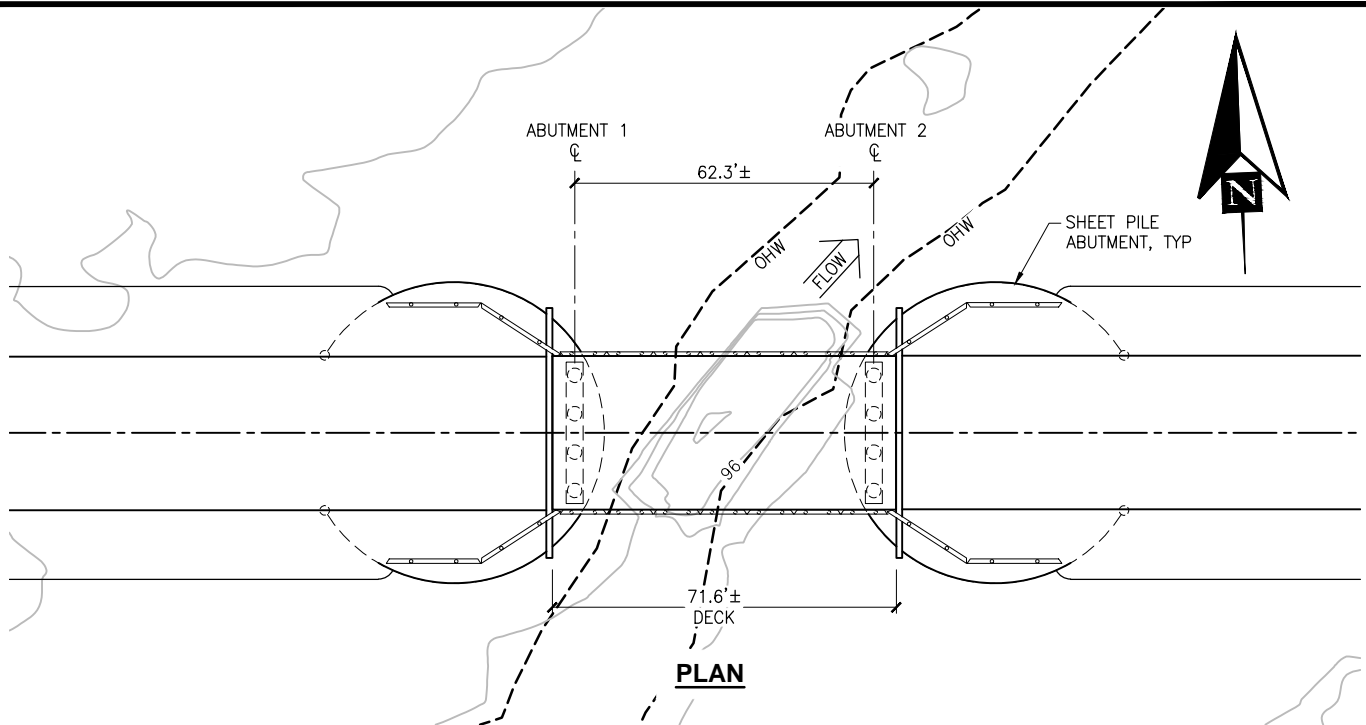
TYPICAL SECTIONS
NTS



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **75** of **128** 3/17/2020

WILLOW 4 BRIDGE SECTIONS



NOTES:

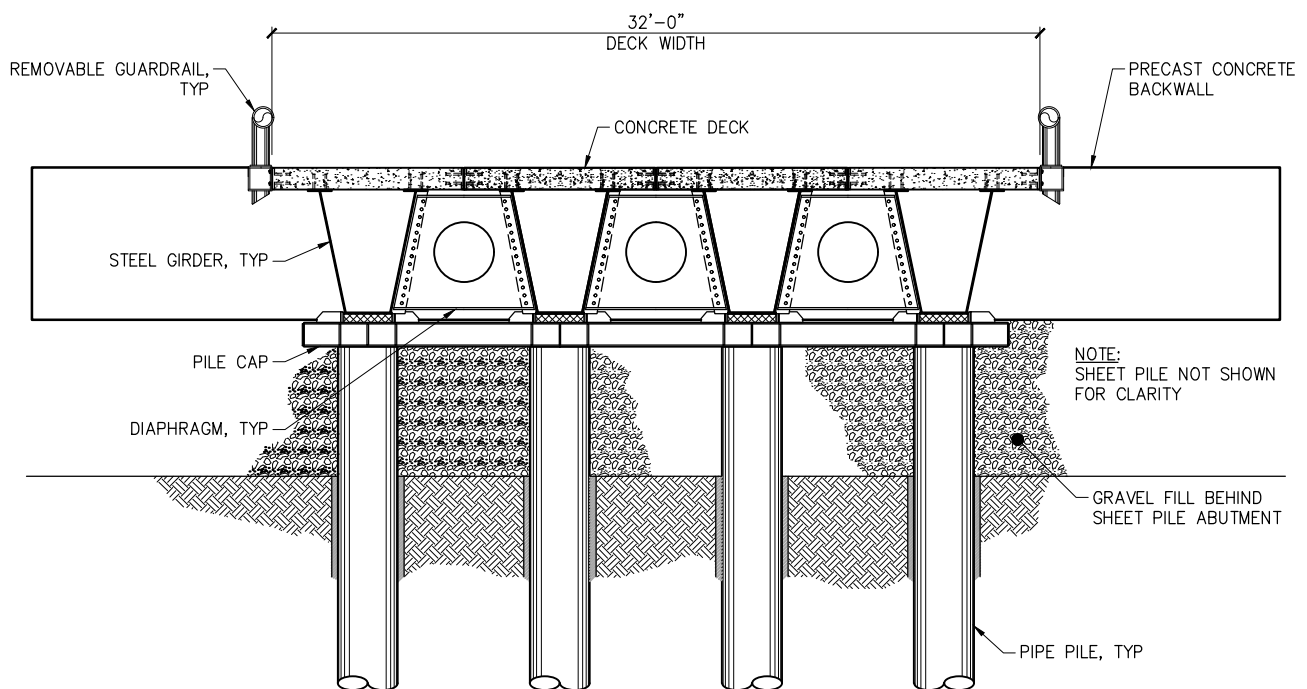
1. VERTICAL SCALE 2X HORIZONTAL SCALE.
2. BRIDGE CROSSING PROFILES ARE BASED ON TOPOGRAPHIC SURVEY DATA. VERTICAL DATUM IS NAVD 88.
3. BRIDGE LOW CHORD ELEVATION WILL BE A MINIMUM OF FOUR (4) FEET ABOVE THE 100-YEAR FLOOD OR THREE (3) FEET ABOVE THE HIGHEST DOCUMENTED FLOOD ELEVATION, WHICHEVER IS HIGHER.
4. ORDINARY HIGH WATER (OHW) ELEVATIONS ARE APPROXIMATED BASED ON DELINEATION OF VEGETATION LIMITS (Ives et al. 2019) OVERLAID ON TOPOGRAPHIC DATA. OHW ELEVATION WAS SET BASED VEGETATION LIMITS ON THE HIGHER OF THE TWO BANKS. THIS METHOD PROVIDES THE HIGHEST POSSIBLE OHW ELEVATION.
5. FLOOD ELEVATIONS SHOWN ARE BASED ON PRELIMINARY SURVEY AND HYDROLOGIC DATA.

WILLOW 4A BRIDGE PLAN AND PROFILE



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **76** of **128** 3/17/2020



TYPICAL SECTION @ ABUTMENT

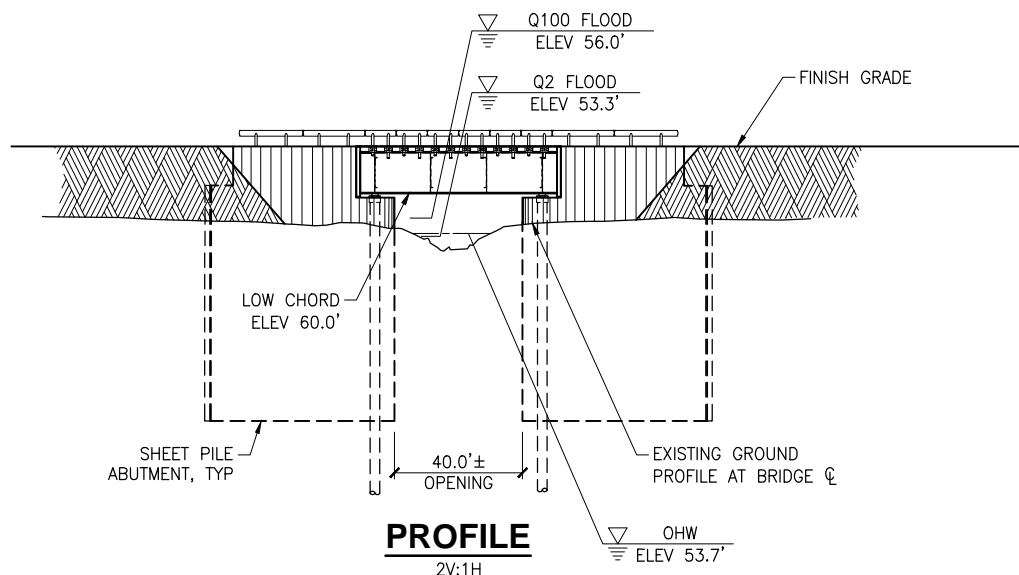
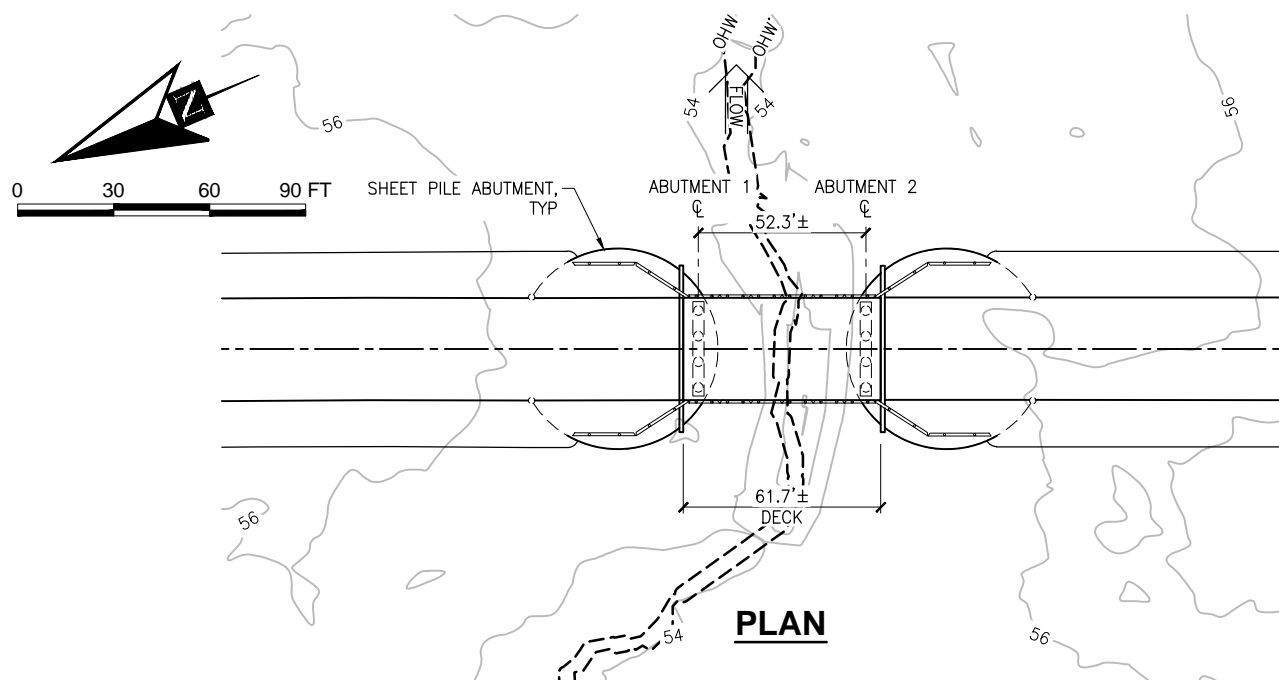
NTS

WILLOW 4A BRIDGE SECTION



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **77** of **128** 3/17/2020



NOTES:

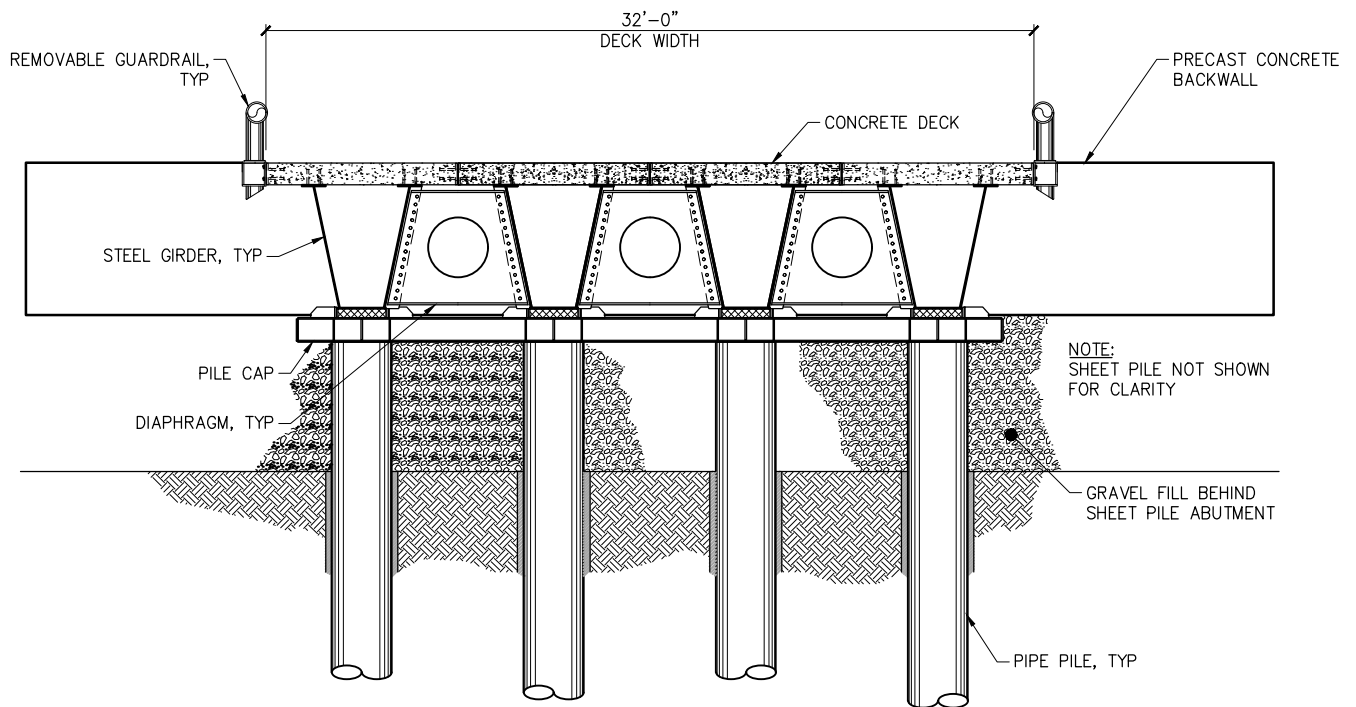
1. VERTICAL SCALE 2X HORIZONTAL SCALE.
2. BRIDGE CROSSING PROFILES ARE BASED ON TOPOGRAPHIC SURVEY DATA. VERTICAL DATUM IS NAVD 88.
3. BRIDGE LOW CHORD ELEVATION WILL BE A MINIMUM OF FOUR (4) FEET ABOVE THE 100-YEAR FLOOD OR THREE (3) FEET ABOVE THE HIGHEST DOCUMENTED FLOOD ELEVATION, WHICHEVER IS HIGHER.
4. ORDINARY HIGH WATER (OHW) ELEVATIONS ARE APPROXIMATED BASED ON DELINEATION OF VEGETATION LIMITS (Ives et al. 2019) OVERLAID ON TOPOGRAPHIC DATA. OHW ELEVATION WAS SET BASED VEGETATION LIMITS ON THE HIGHER OF THE TWO BANKS. THIS METHOD PROVIDES THE HIGHEST POSSIBLE OHW ELEVATION.
5. FLOOD ELEVATIONS SHOWN ARE BASED ON PRELIMINARY SURVEY AND HYDROLOGIC DATA.

WILLOW 8 BRIDGE PLAN AND PROFILE



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **78** of **128** 3/17/2020



TYPICAL SECTION @ ABUTMENT

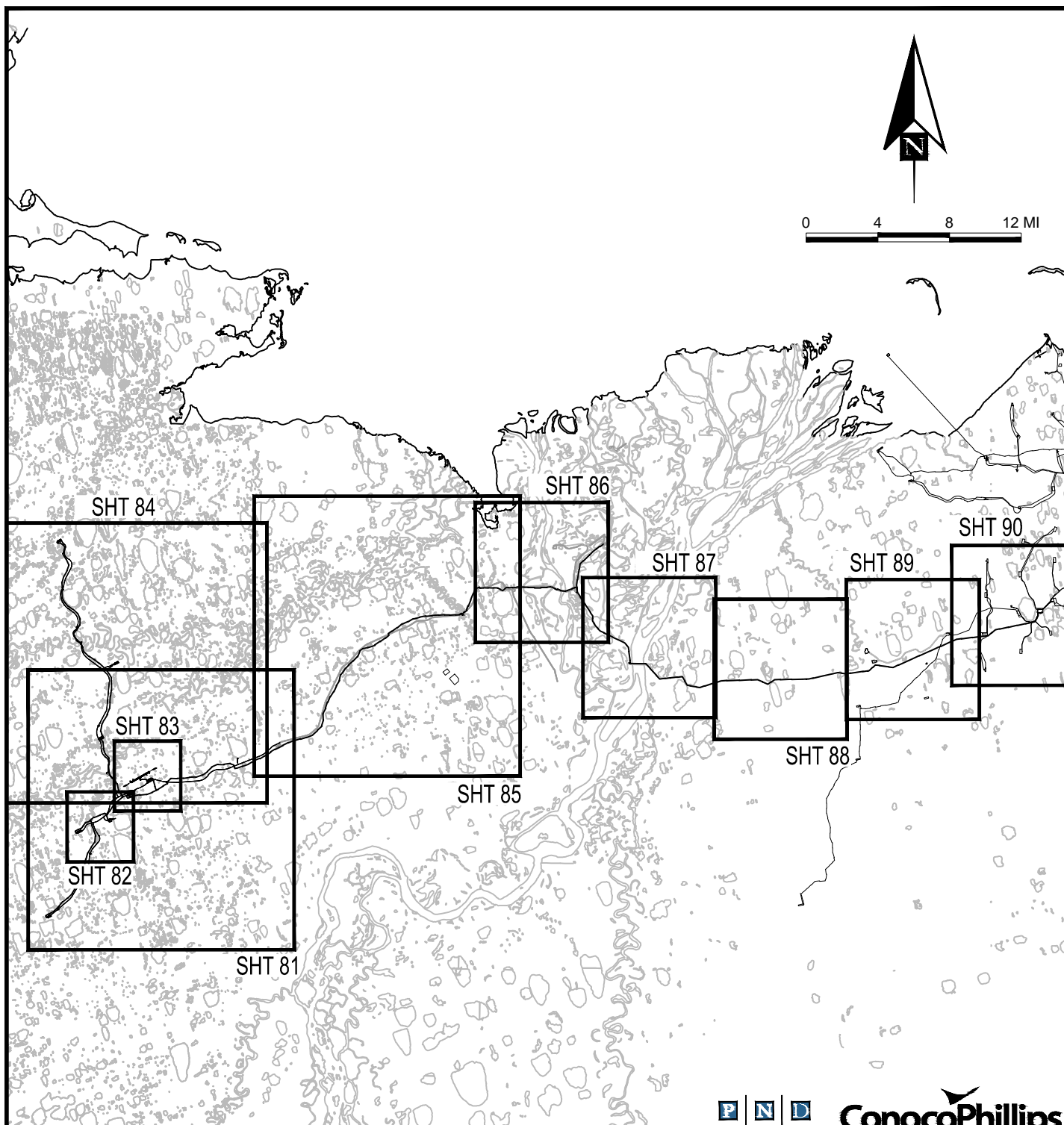
NTS



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **79** of **128** 3/17/2020

WILLOW 8 BRIDGE SECTION

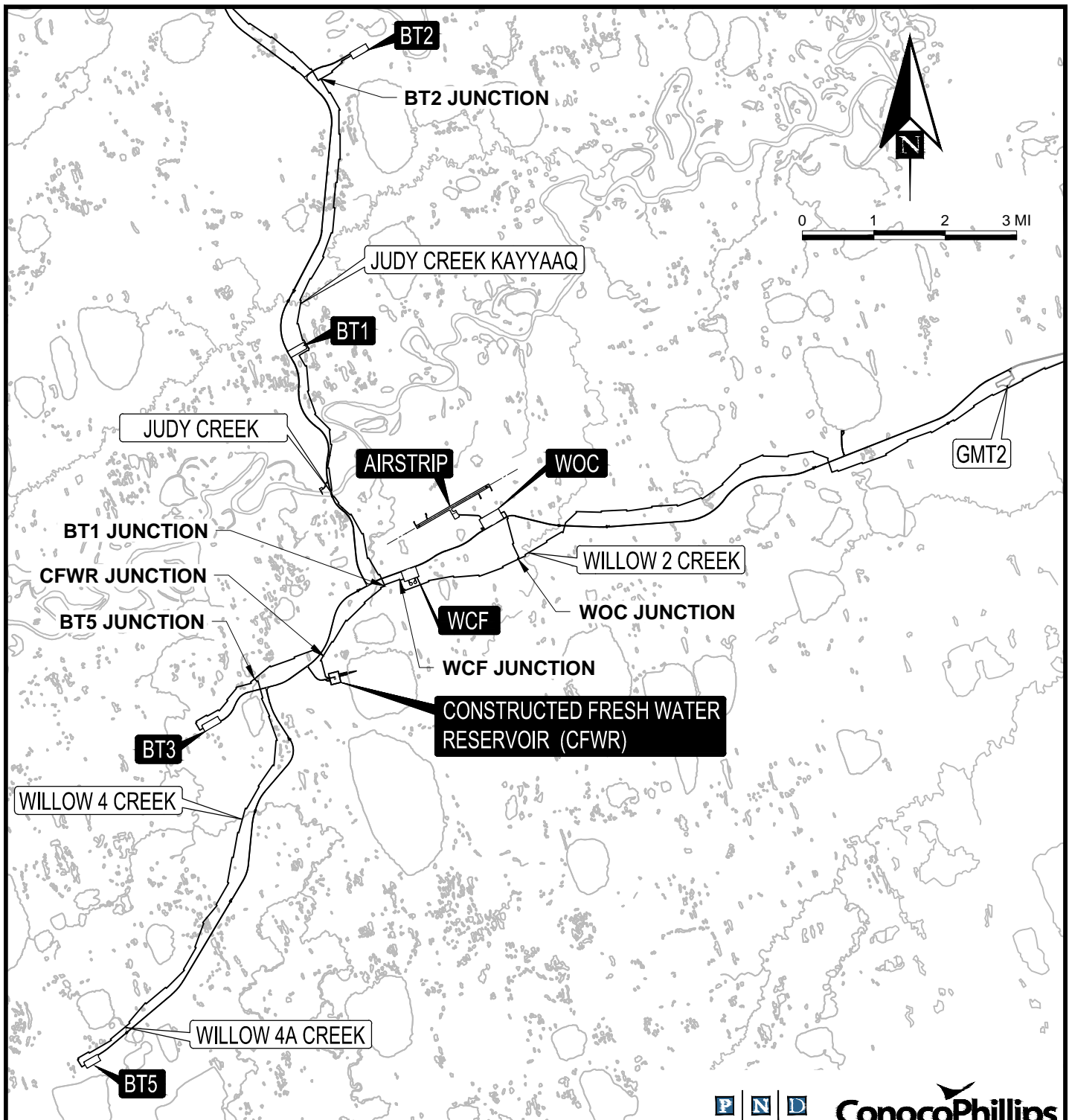


ABBREVIATIONS

FG - FUEL GAS
FOC - FIBER OPTIC CABLE
GI - GAS INJECTION
MI - MISCIBLE INJECTION
OS - OIL SALES
PO - PRODUCTION OIL
SW - SEAWATER (SOURCE WATER)
WA - FRESH WATER
WF - WATER, FIRE
WI - WATER, INJECTION
WR - WATER, RAW

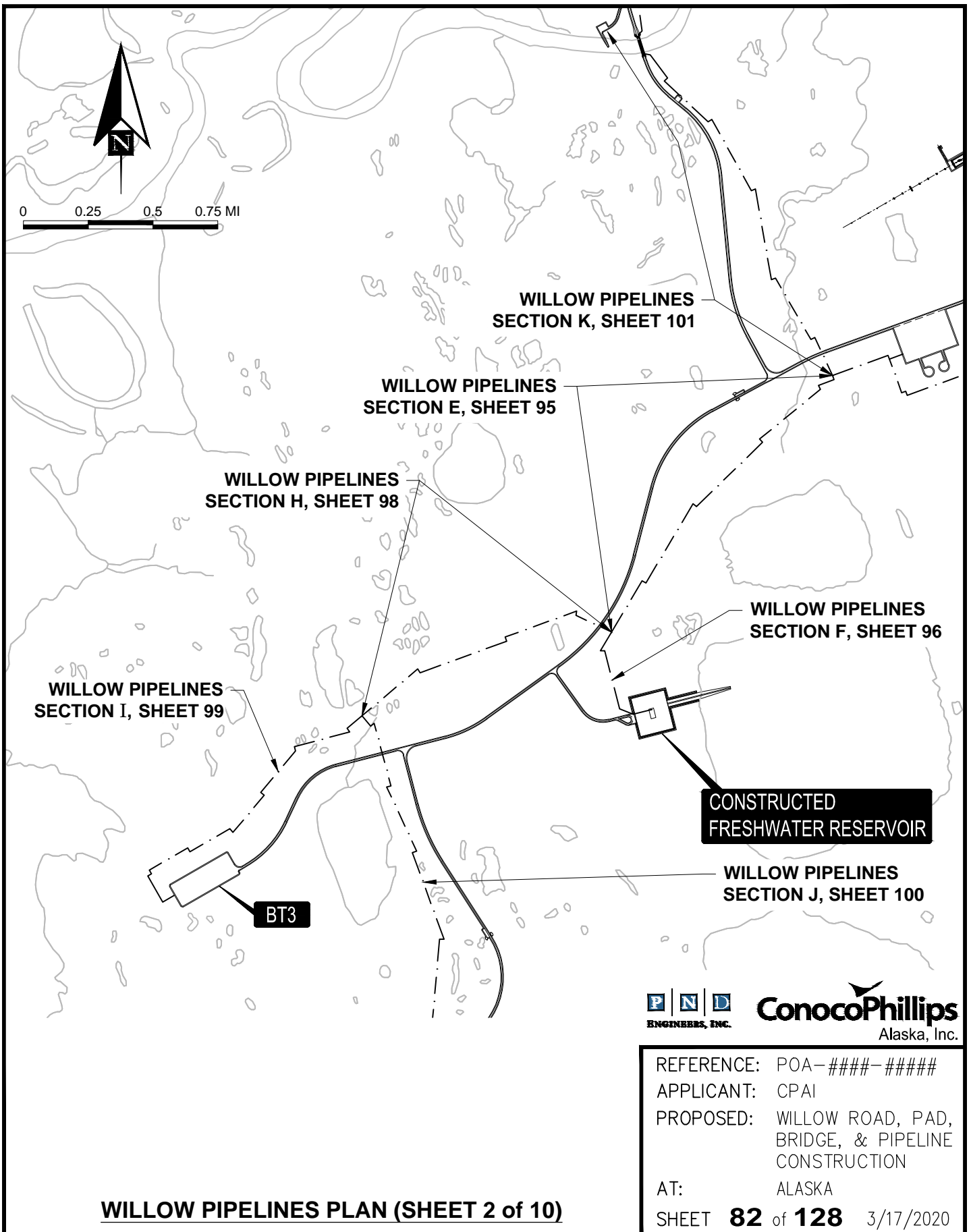


REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **80** of **128** 3/17/2020



ConocoPhillips
Alaska, Inc.

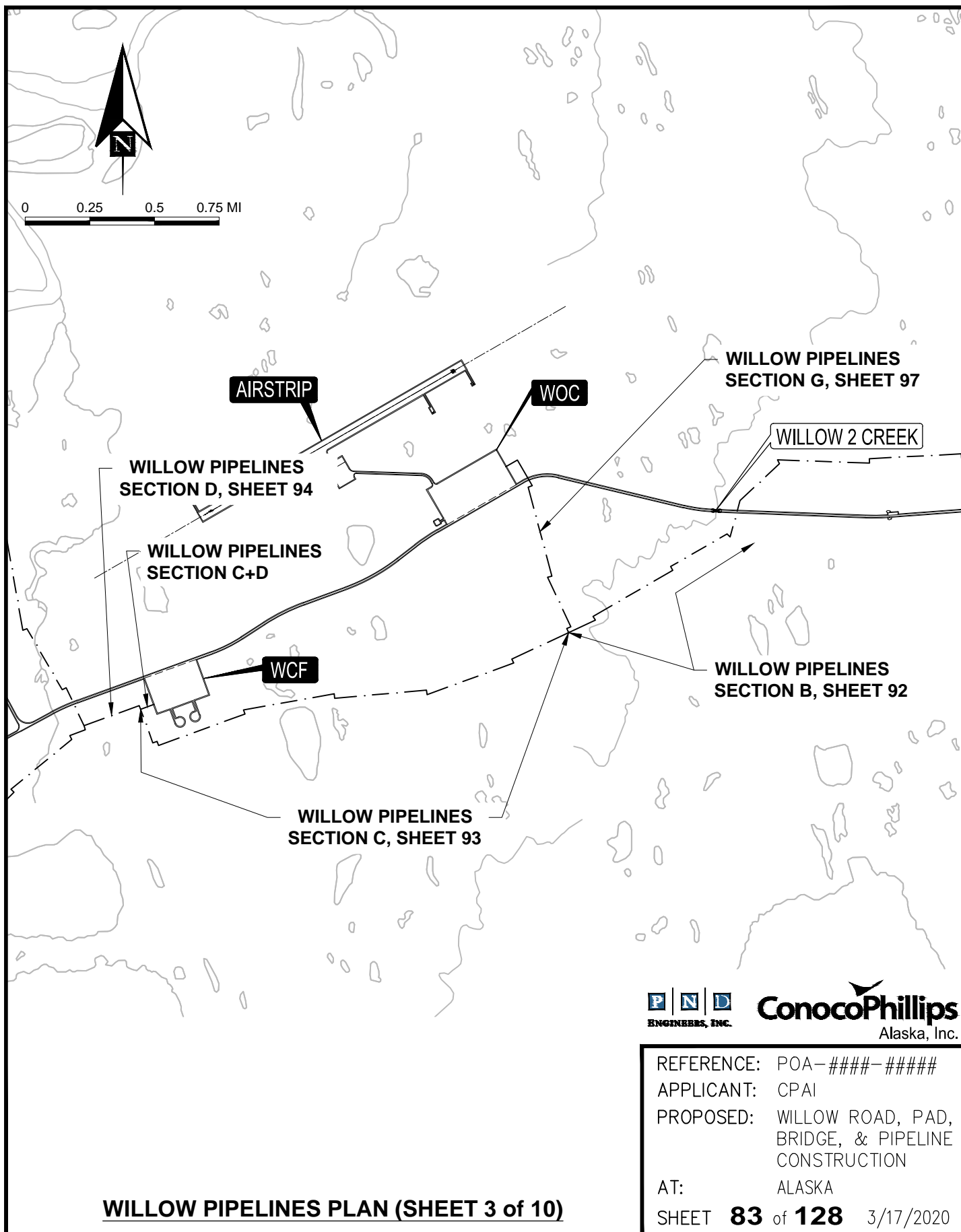
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **81** of **128** 3/17/2020



WILLOW PIPELINES PLAN (SHEET 2 of 10)

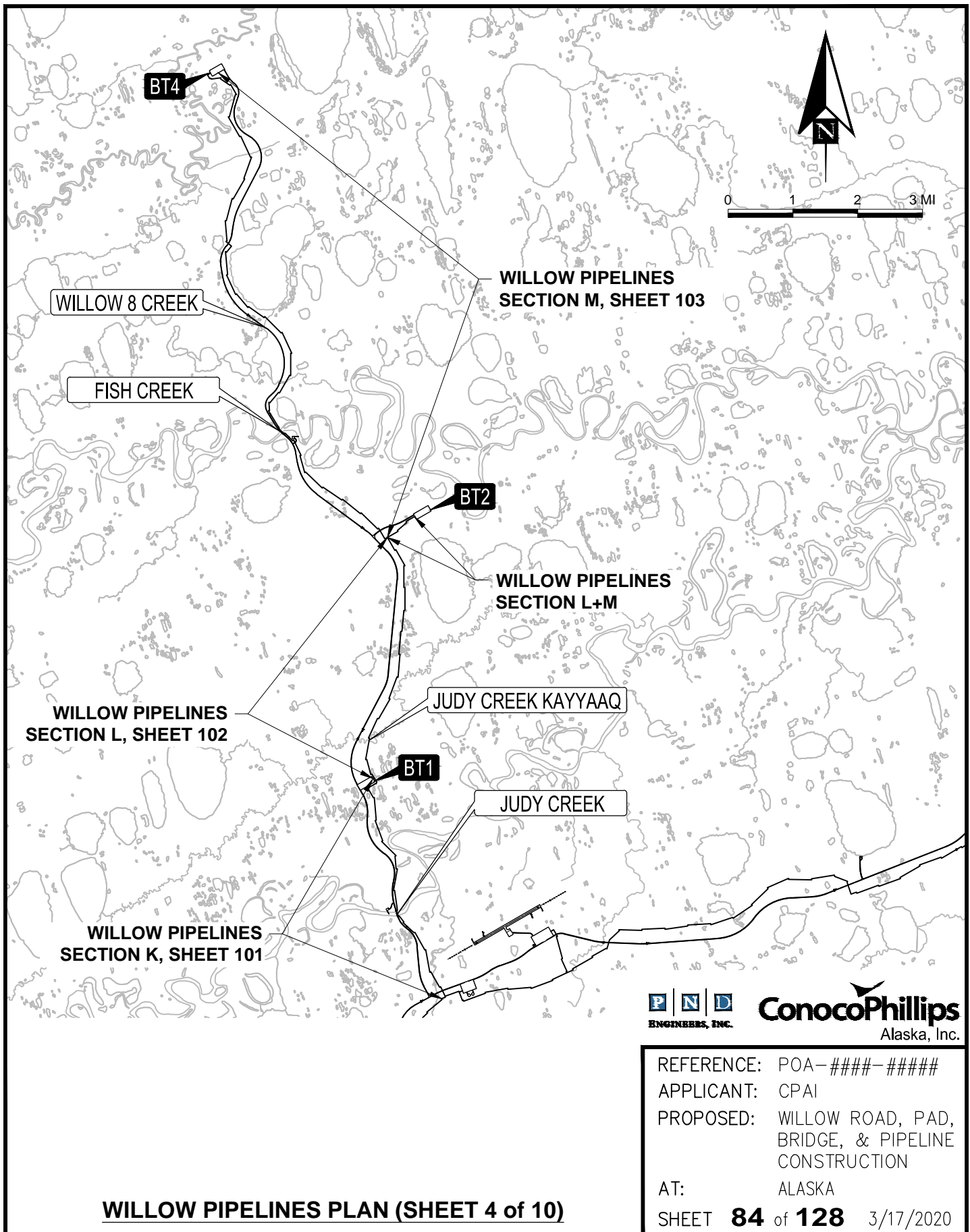


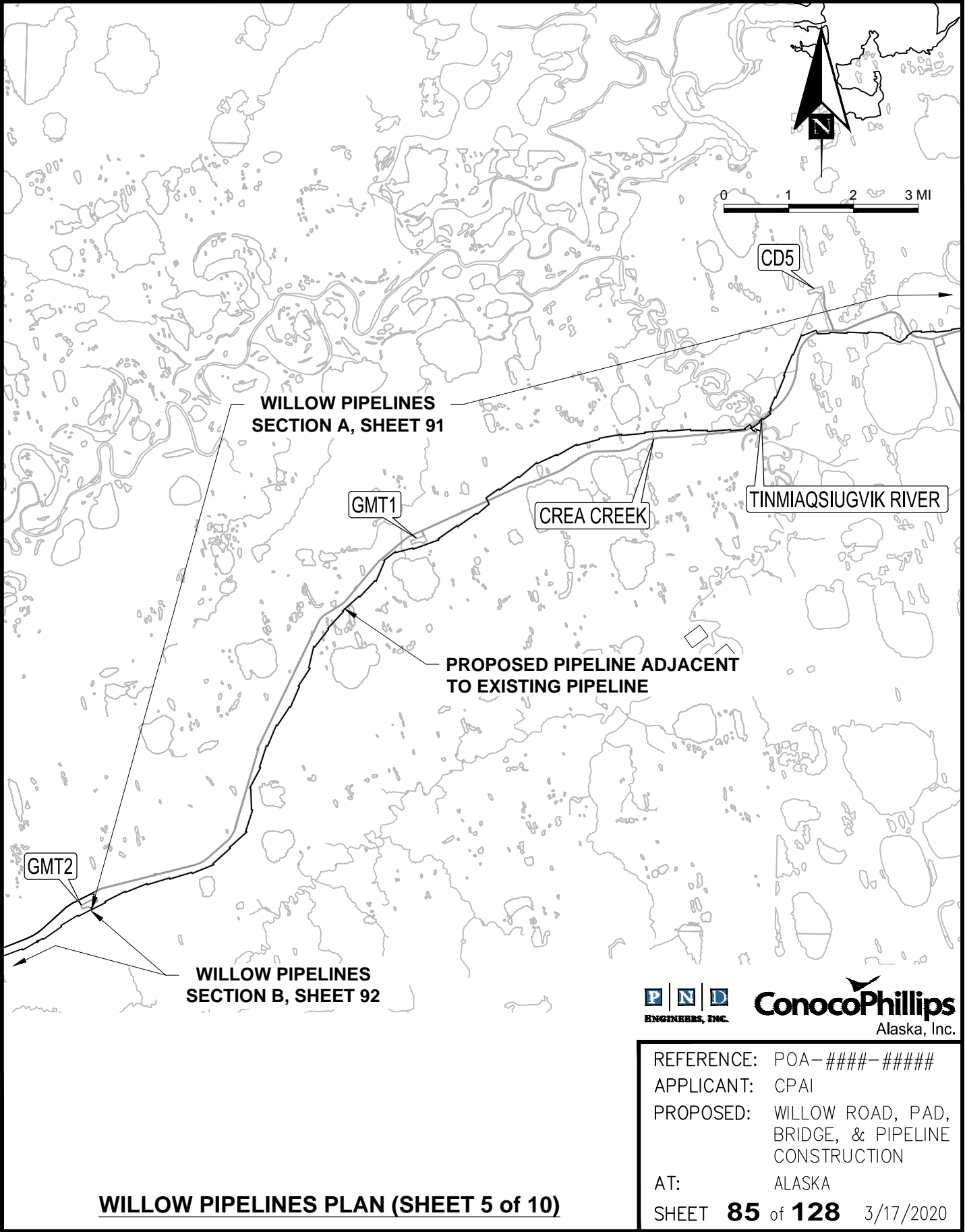
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **82** of **128** 3/17/2020

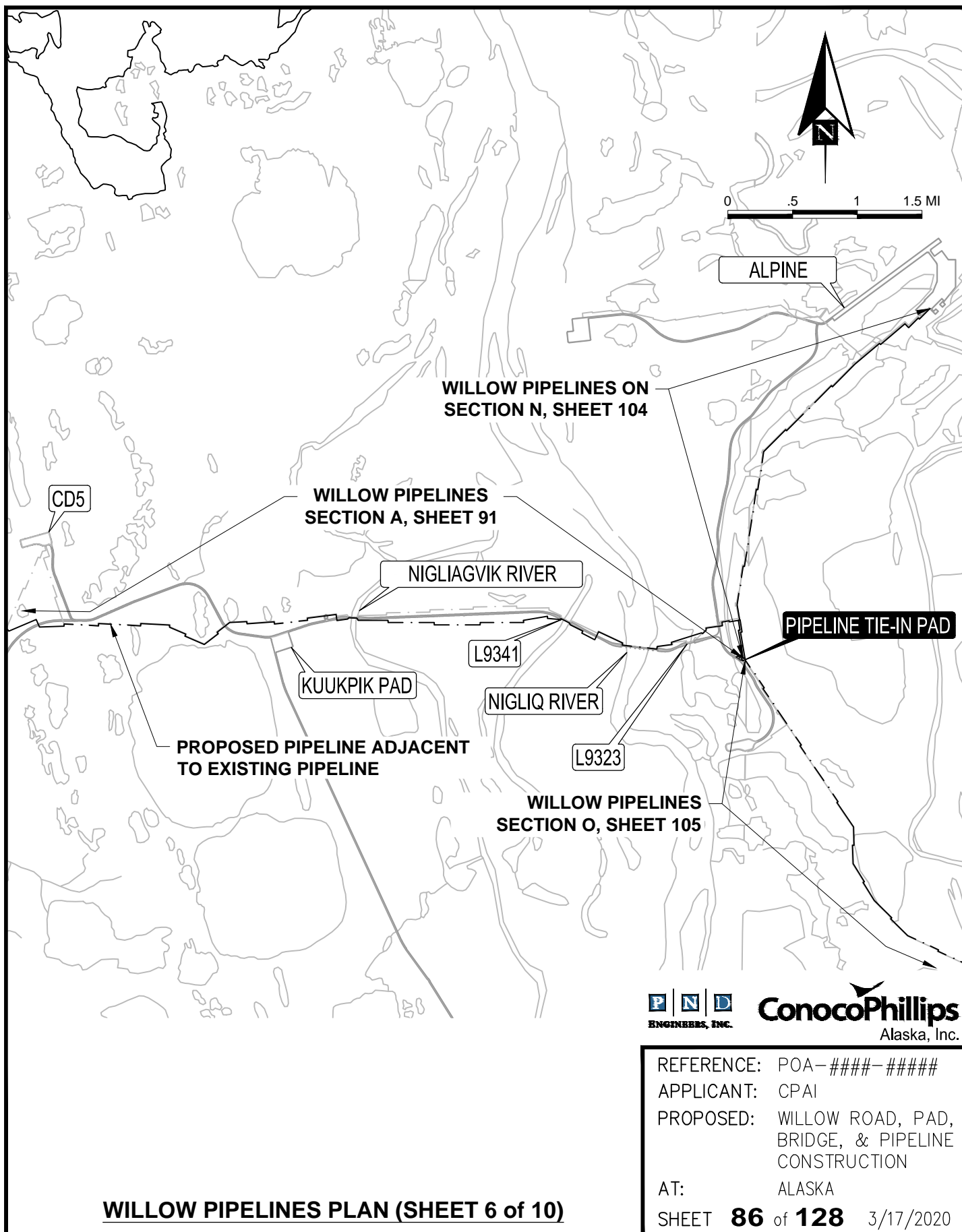


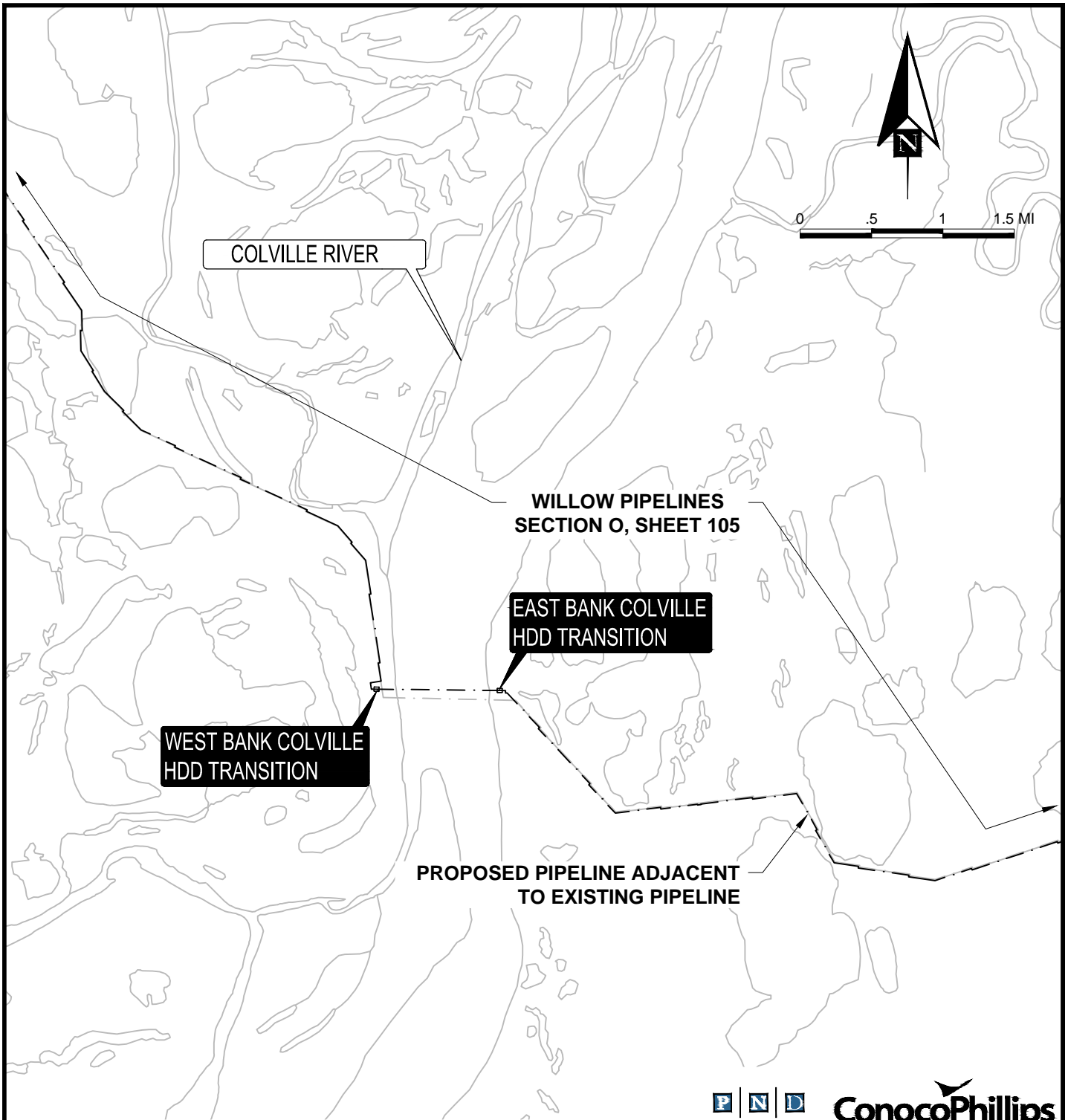
P | N | D **ConocoPhillips**
ENGINEERS, INC. Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **83** of **128** 3/17/2020

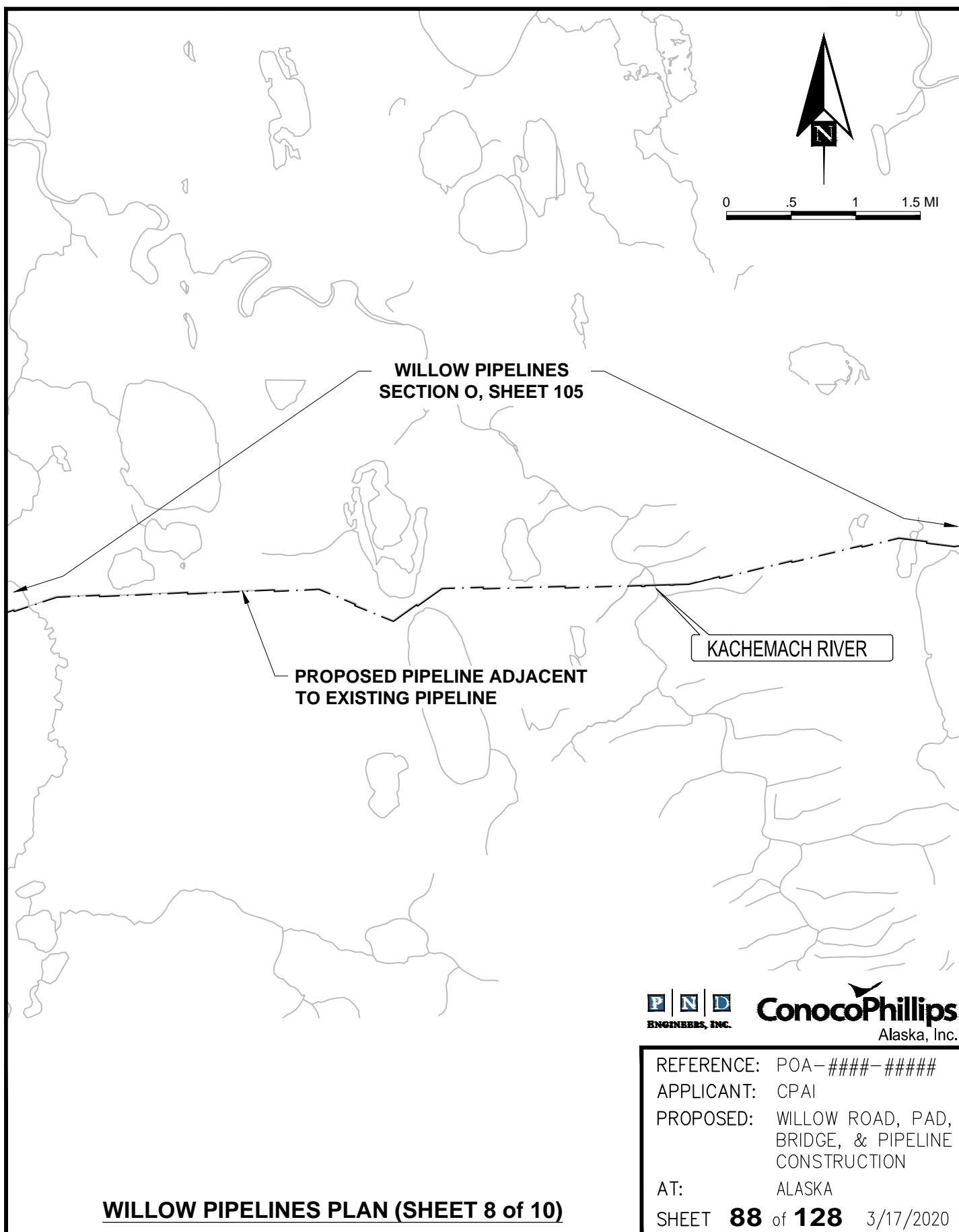


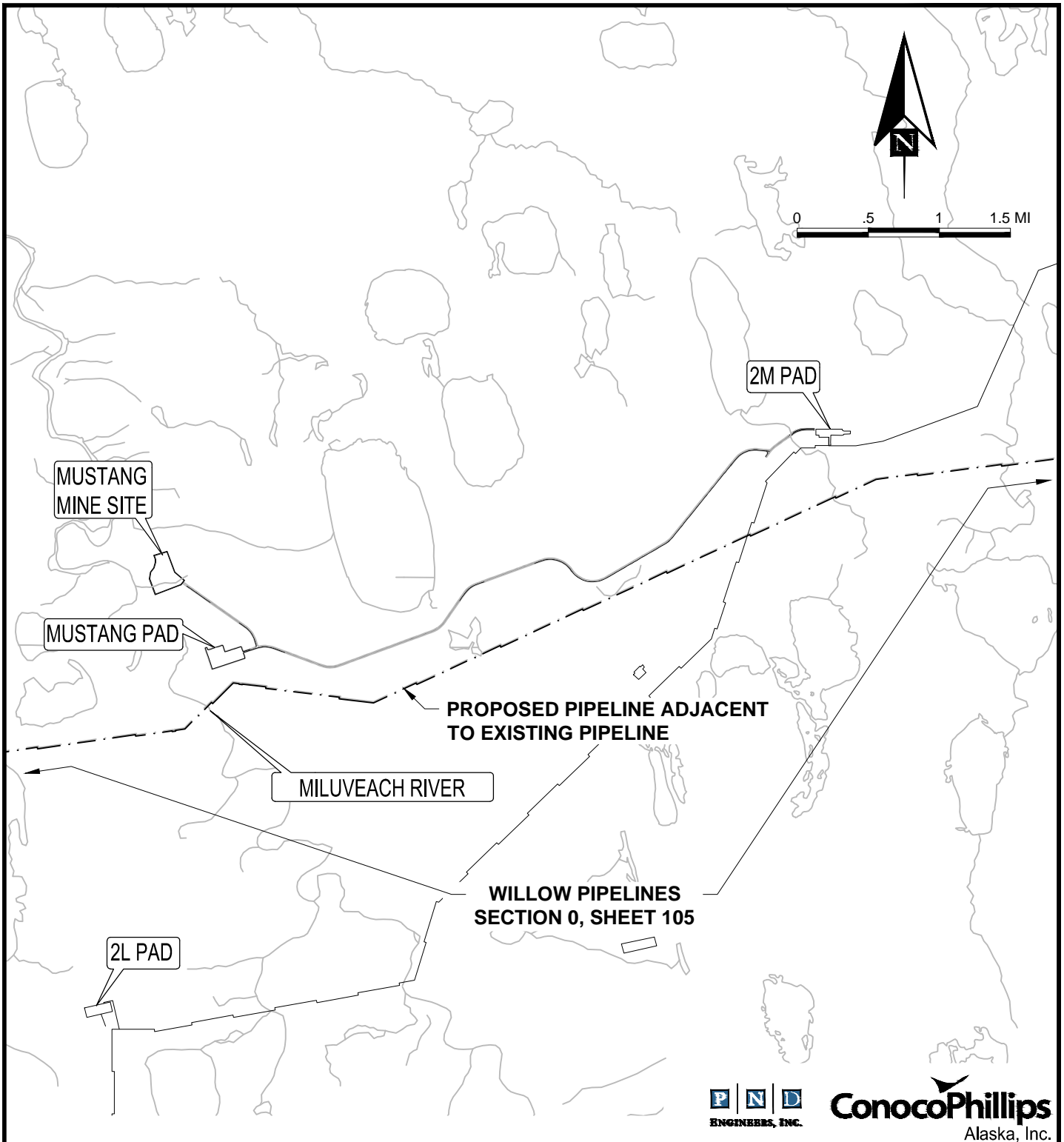






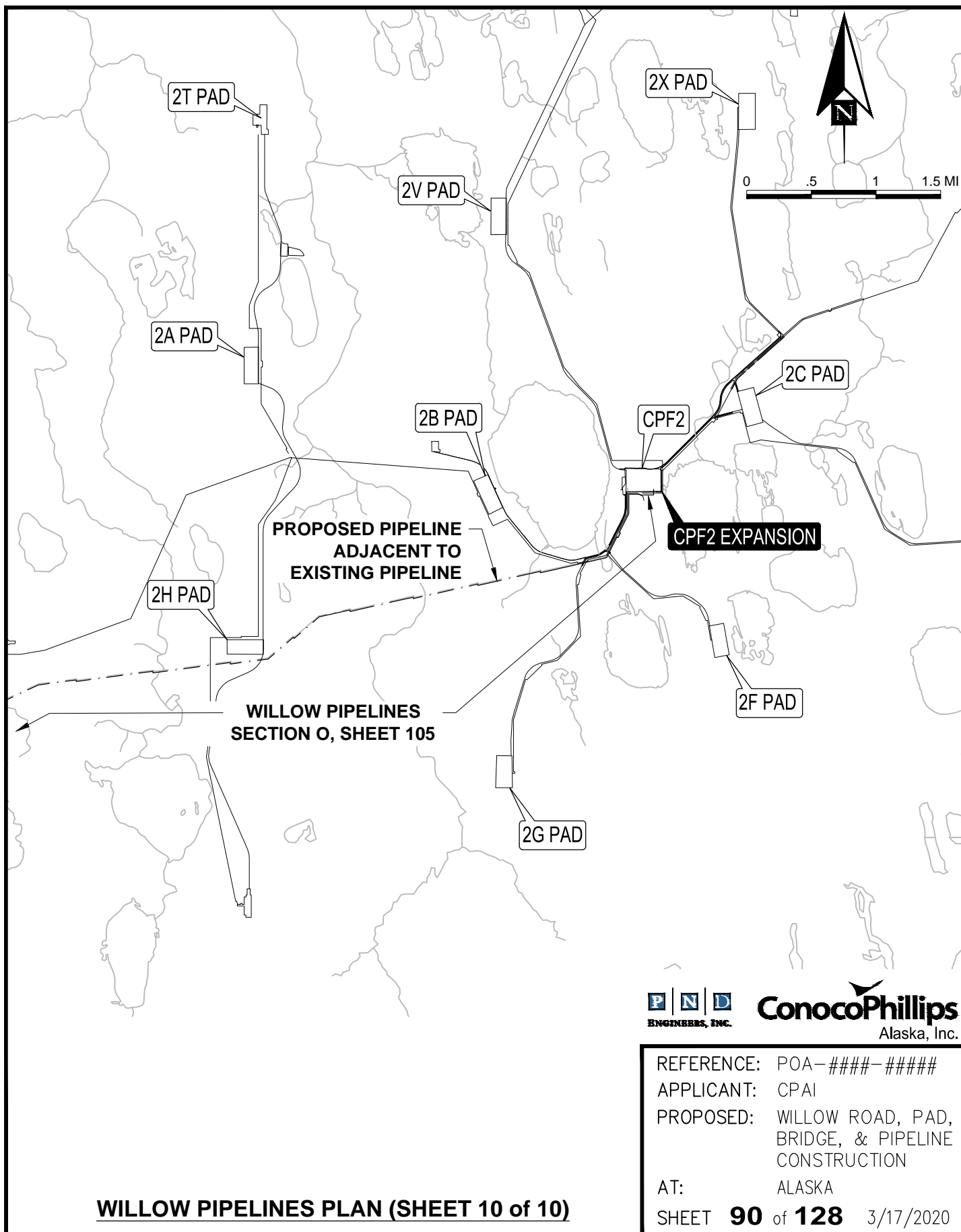
ConocoPhillips
Alaska, Inc.





ConocoPhillips
Alaska, Inc.

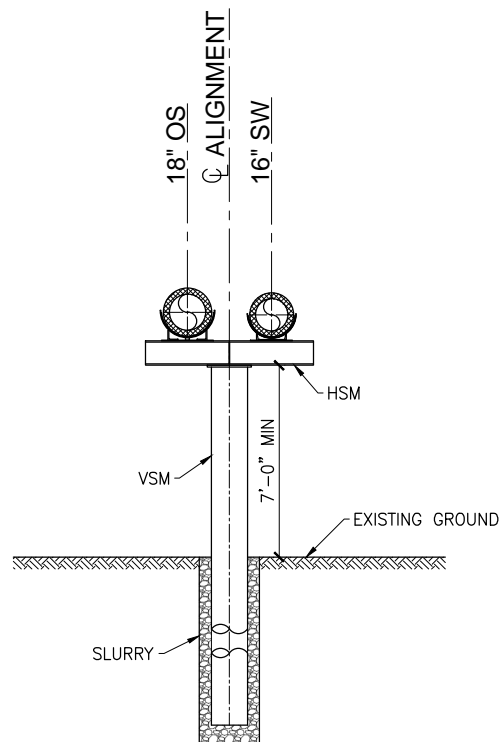
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **89** of **128** 3/17/2020



WILLOW PIPELINES PLAN (SHEET 10 of 10)

P | N | D **ConocoPhillips**
ENGINEERS, INC. Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **90** of **128** 3/17/2020



(WCF TO PIPELINE TIE-IN PAD)

WILLOW PIPELINES SECTION A

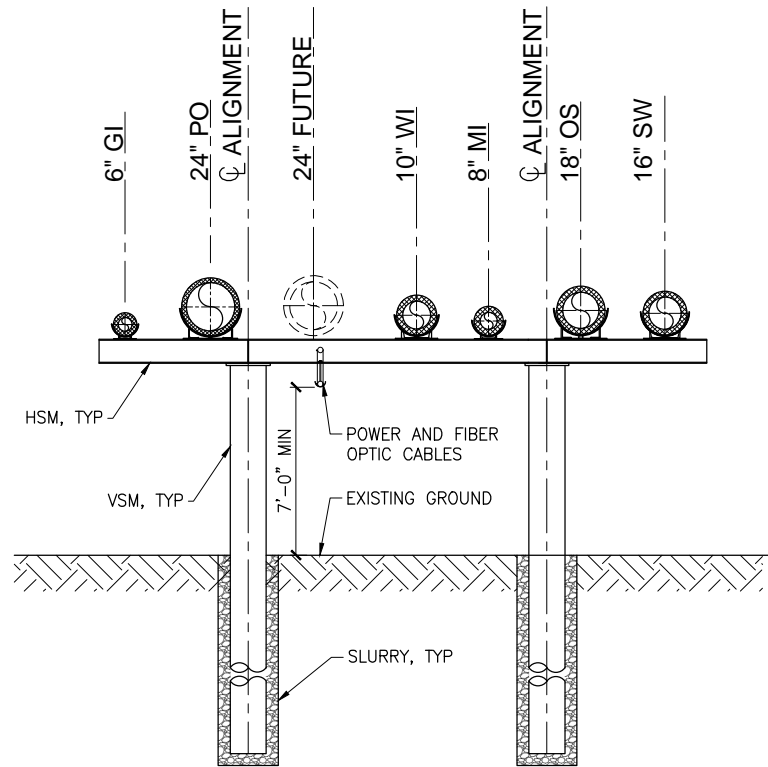
NOTES:

1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **91** of **128** 3/17/2020



(GMT2 TO WCF) (WCF TO PIPELINE TIE-IN PAD)

WILLOW PIPELINES SECTION B

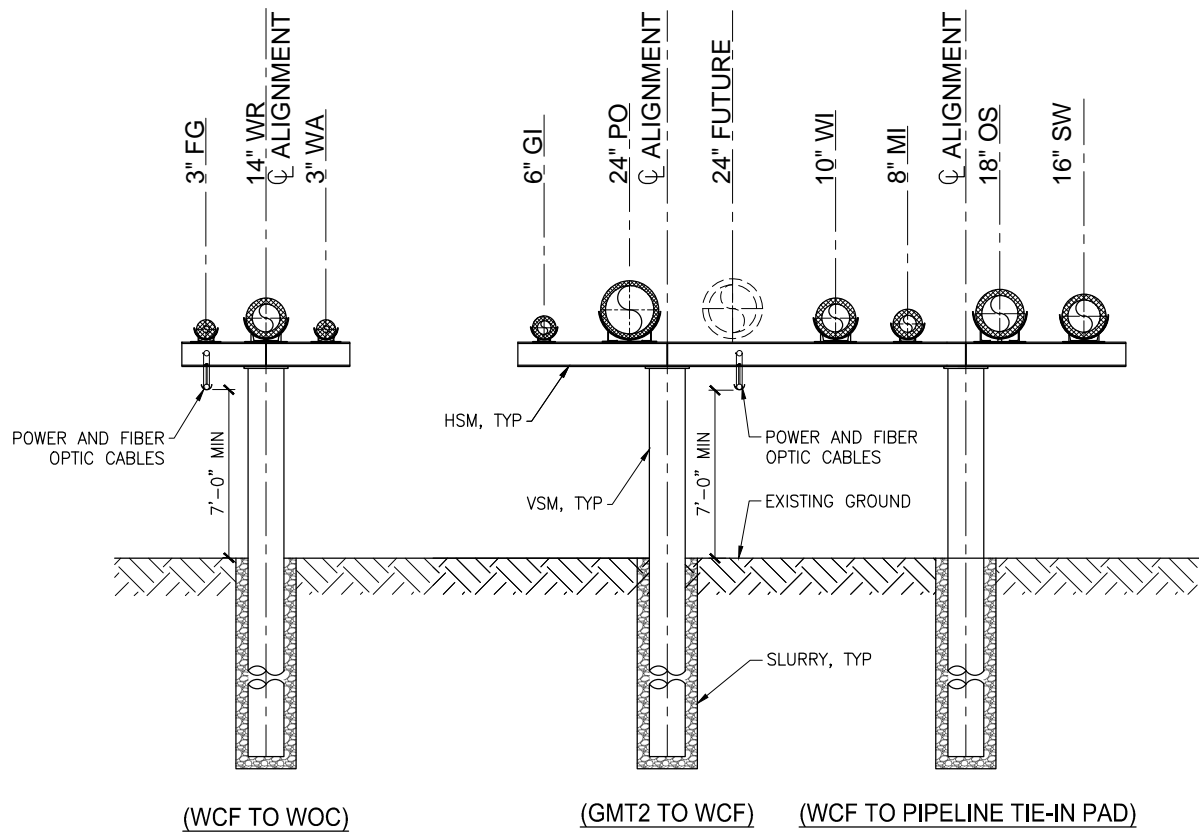
NOTES:

1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **92** of **128** 3/17/2020

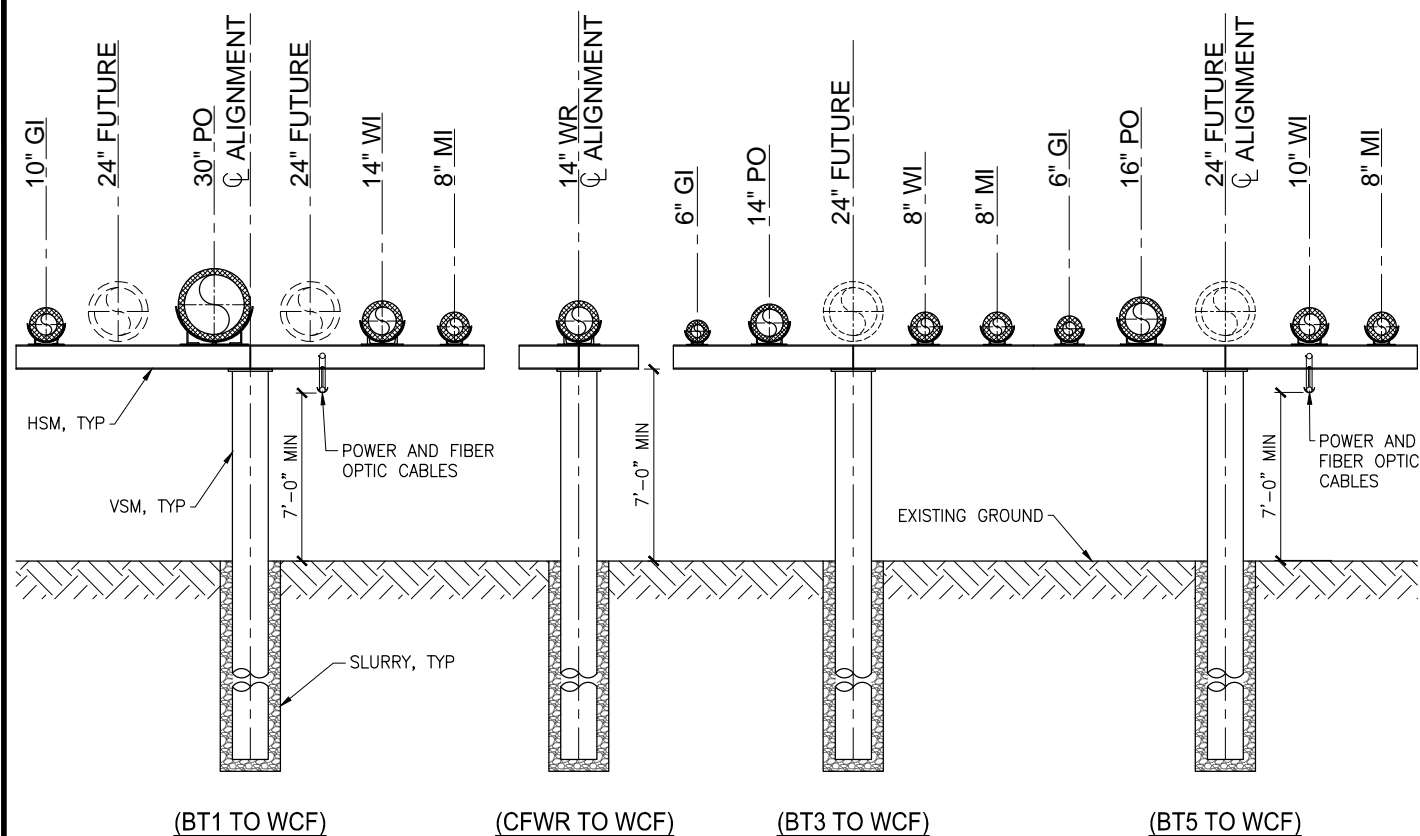


WILLOW PIPELINES
SECTION C

NOTES:
1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.

P | N | D
ENGINEERS, INC.
ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA
SHEET **93** of **128** 3/17/2020



WILLOW PIPELINES SECTION D

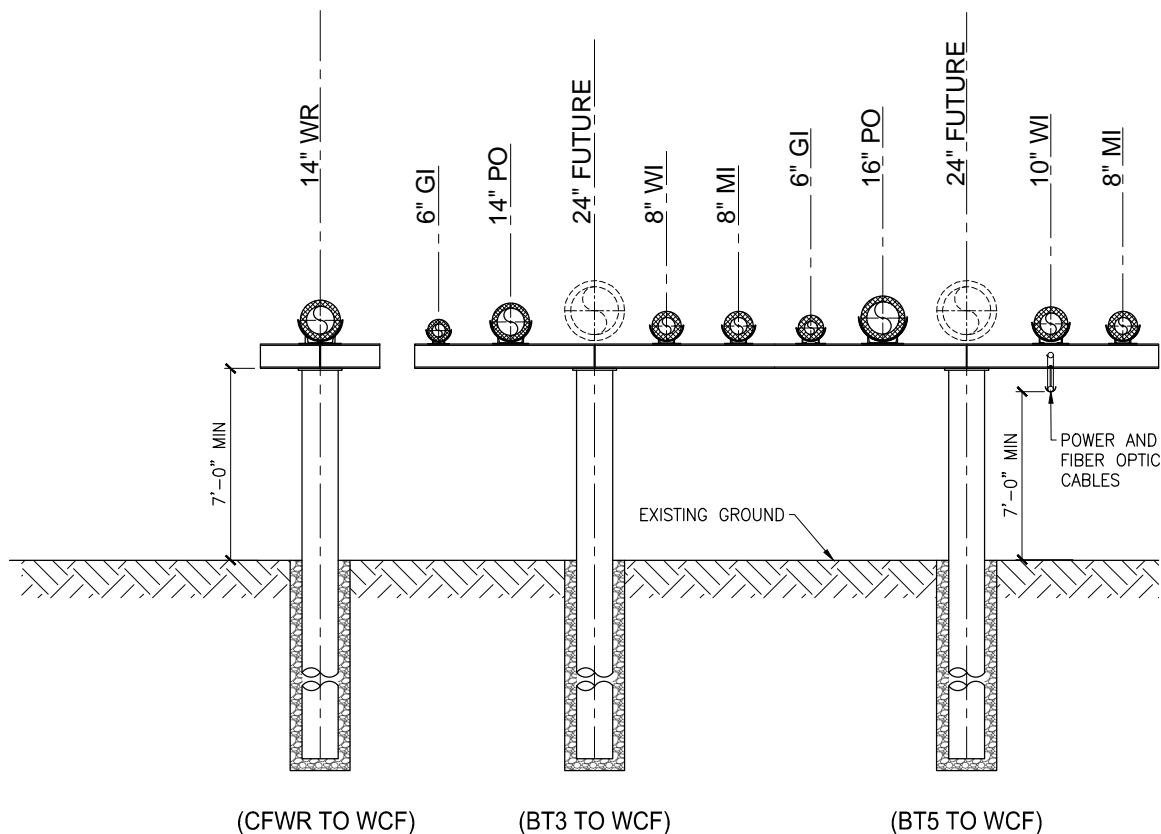
NOTES:

1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **94** of **128** 3/17/2020



WILLOW PIPELINES SECTION E

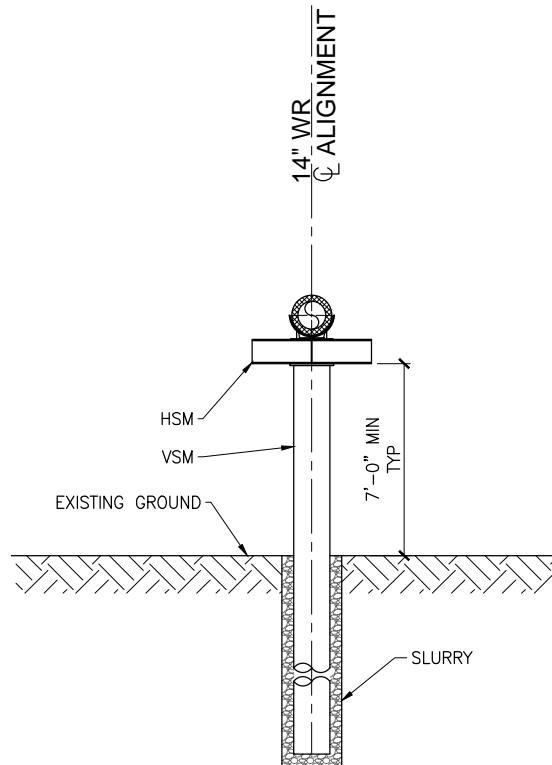


ConocoPhillips
Alaska, Inc.

NOTES:

1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **95** of **128** 3/17/2020



(CFWR TO WCF)

WILLOW PIPELINES SECTION F

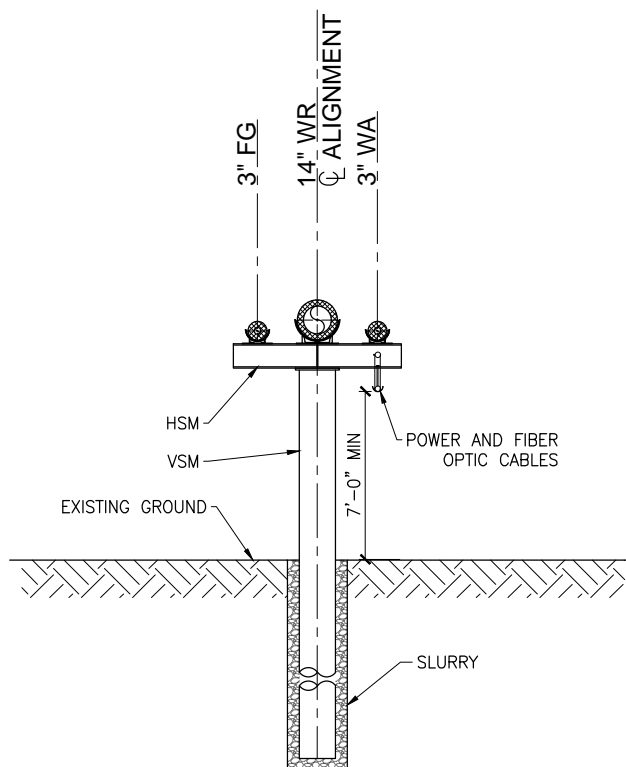
NOTES:

1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **96** of **128** 3/17/2020



(WCF TO WOC)

WILLOW PIPELINES SECTION G

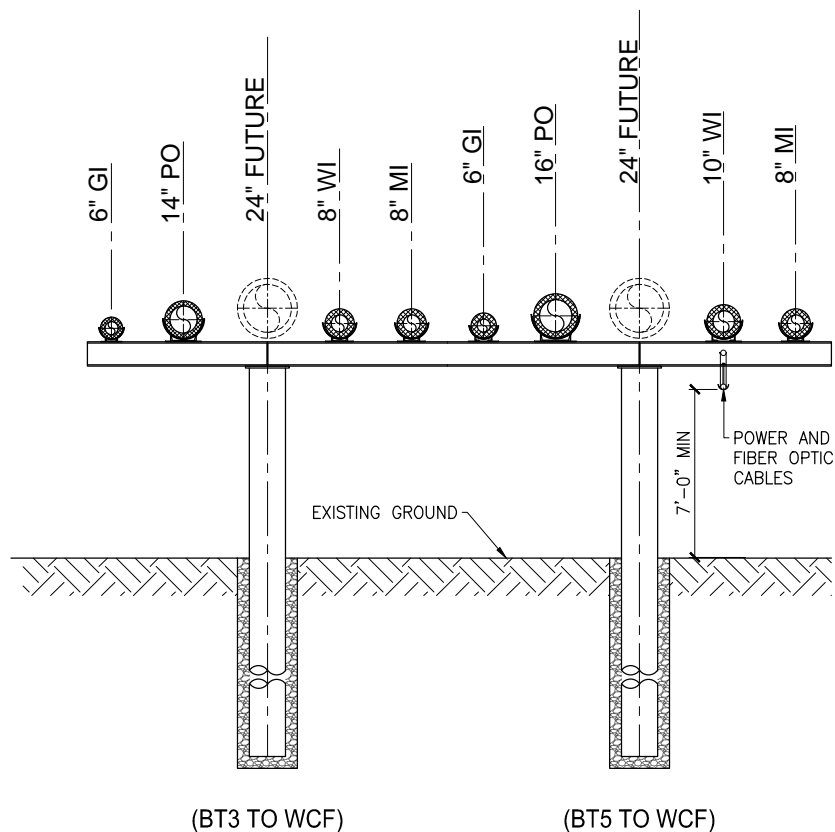
NOTES:

1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **97** of **128** 3/17/2020



WILLOW PIPELINES SECTION H

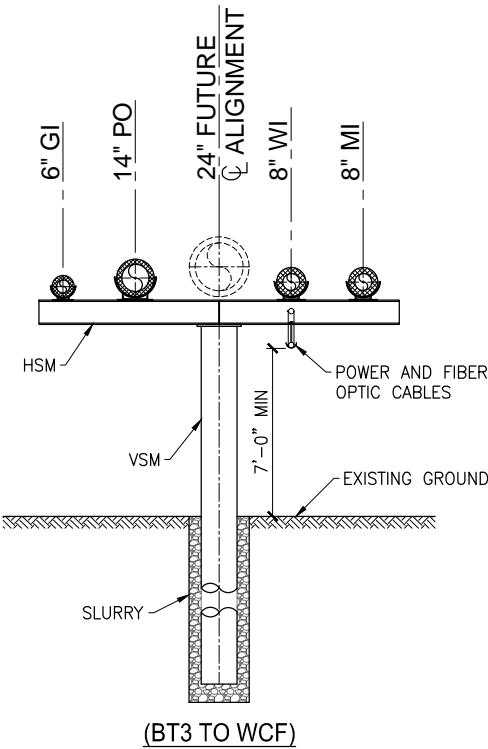
NOTES:

1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **98** of **128** 3/17/2020



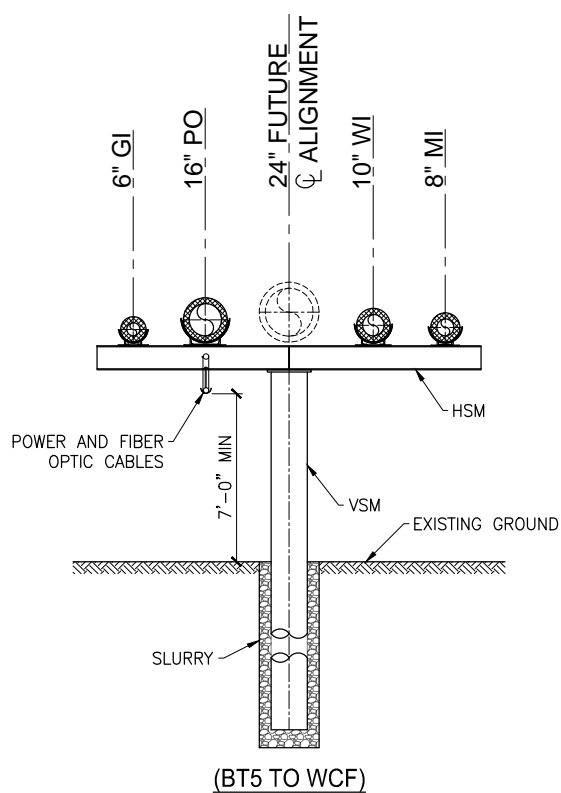
WILLOW PIPELINES
SECTION I

NOTES:

1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.



REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **99** of **128** 3/17/2020



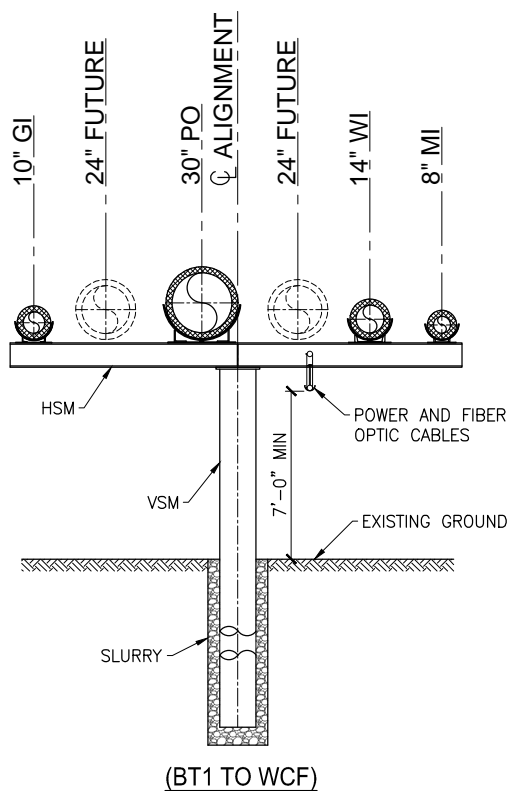
**WILLOW PIPELINES
SECTION J**

NOTES:

1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.



REFERENCE: POA-####-#####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **100** of **128** 3/17/2020



WILLOW PIPELINES SECTION K

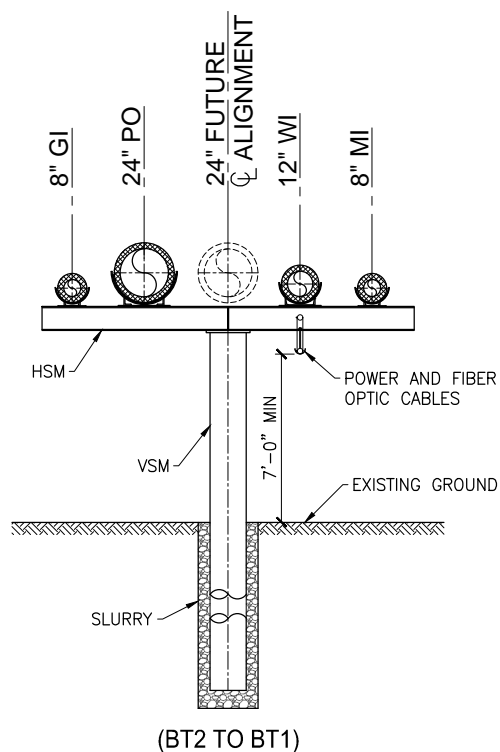
NOTES:

1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **101** of **128** 3/17/2020



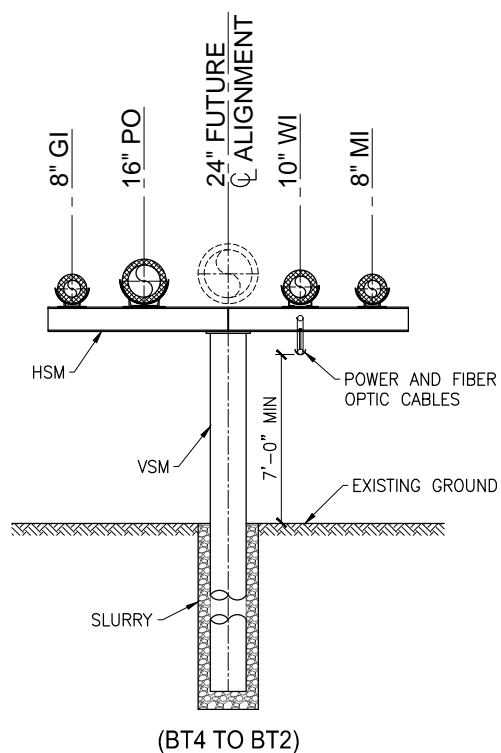
WILLOW PIPELINES
SECTION L

NOTES:

1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.



REFERENCE: POA-####-#####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **102** of **128** 3/17/2020



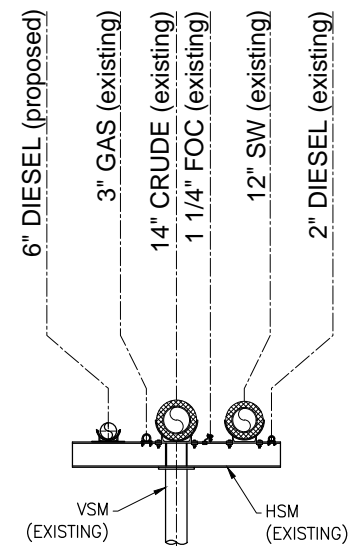
WILLOW PIPELINES
SECTION M

NOTES:

1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.



REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **103** of **128** 3/17/2020



(PIPELINE TIE-IN PAD TO ACF)

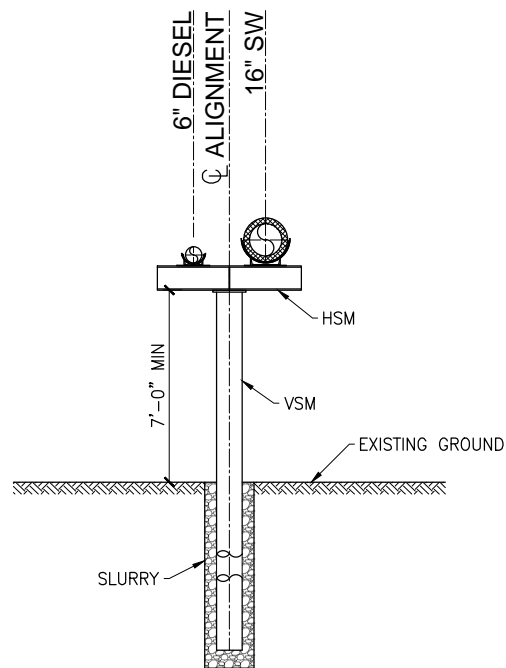
EXISTING PIPE RACK SECTION N

NOTES:

1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.



REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **104** of **128** 3/17/2020



(PIPELINE TIE-IN PAD TO CPF2)

WILLOW PIPELINE SECTION O

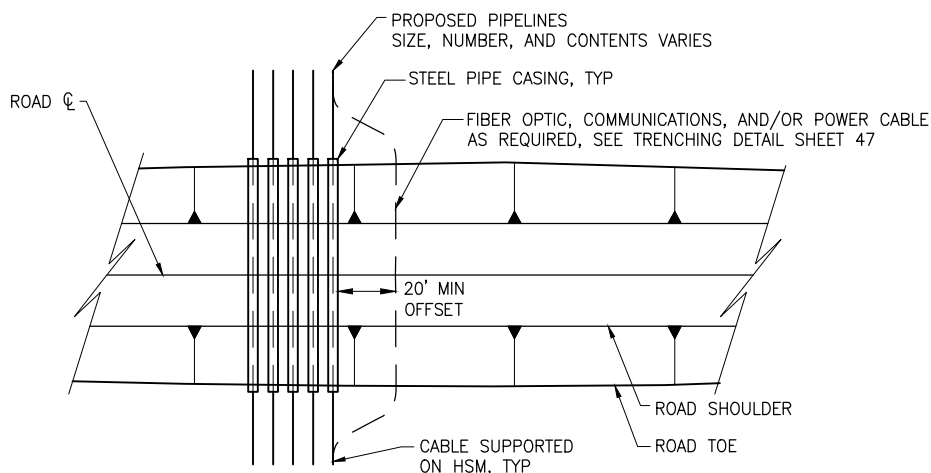
NOTES:

1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.



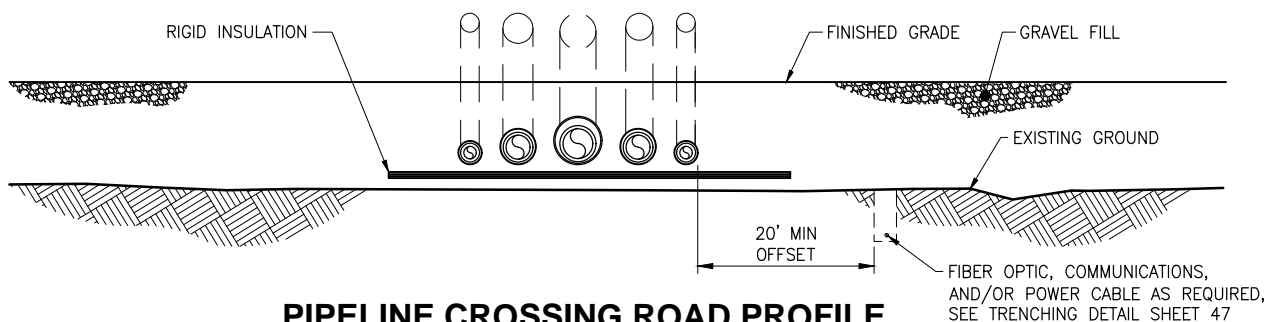
ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **105** of **128** 3/17/2020



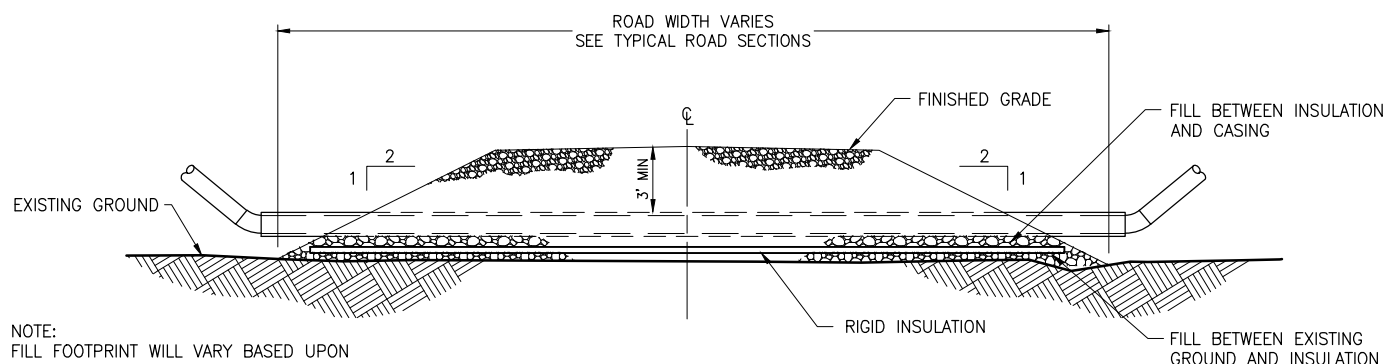
PIPELINE CROSSING ROAD PLAN

NTS



PIPELINE CROSSING ROAD PROFILE

NTS



NOTE:
FILL FOOTPRINT WILL VARY BASED UPON
TOPOGRAPHY & ROAD ELEVATION.

PIPELINE CROSSING ROAD SECTION

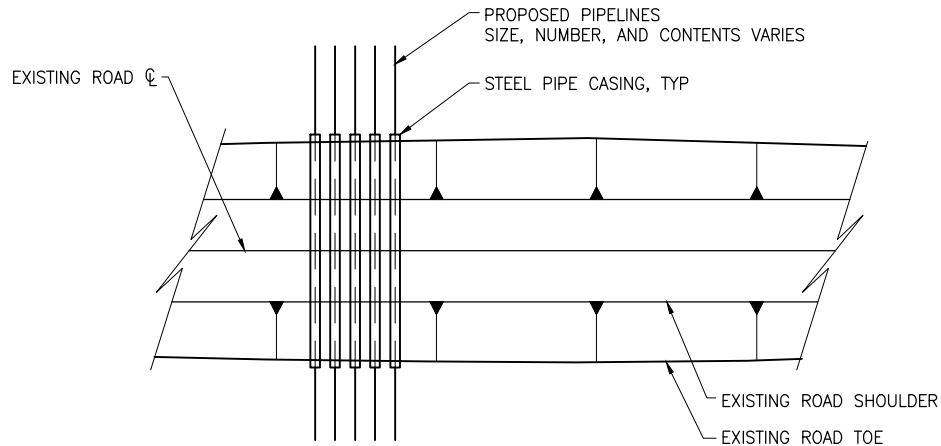
NTS



ConocoPhillips
Alaska, Inc.

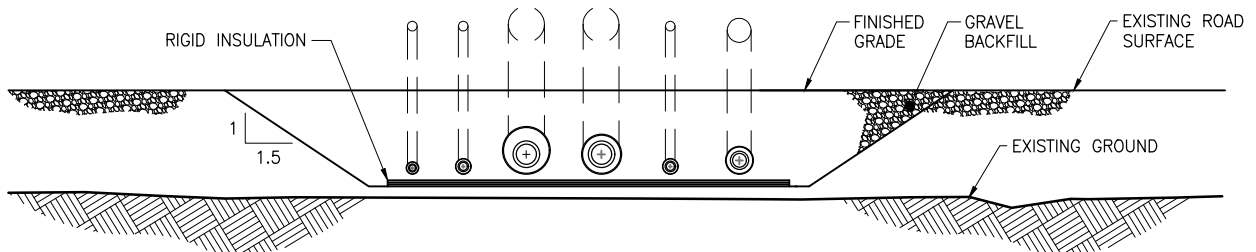
PROPOSED PIPELINE ROAD CROSSING

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **106** of **128** 3/17/2020



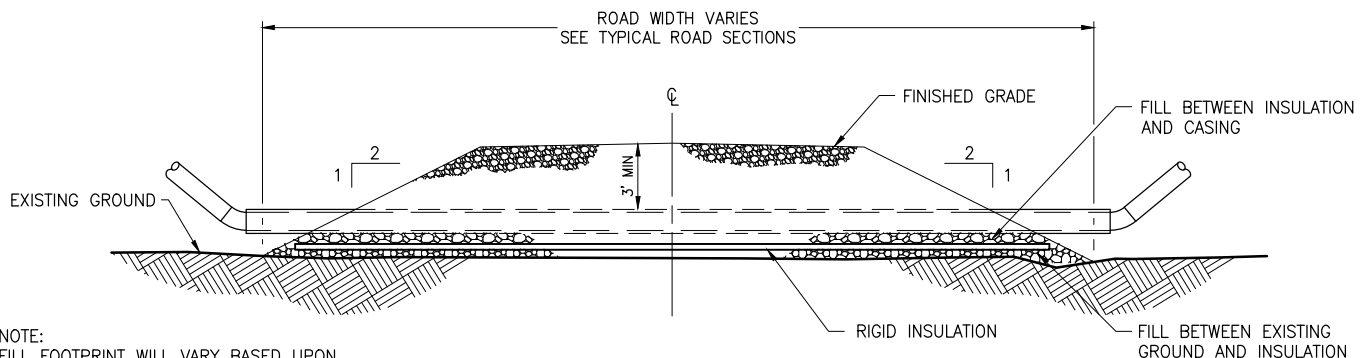
PIPELINE CROSSING EXISTING ROAD PLAN

NTS



PIPELINE CROSSING EXISTING ROAD PROFILE

NTS



NOTE:
FILL FOOTPRINT WILL VARY BASED UPON
TOPOGRAPHY & ROAD ELEVATION.

PIPELINE CROSSING EXISTING ROAD SECTION

NTS



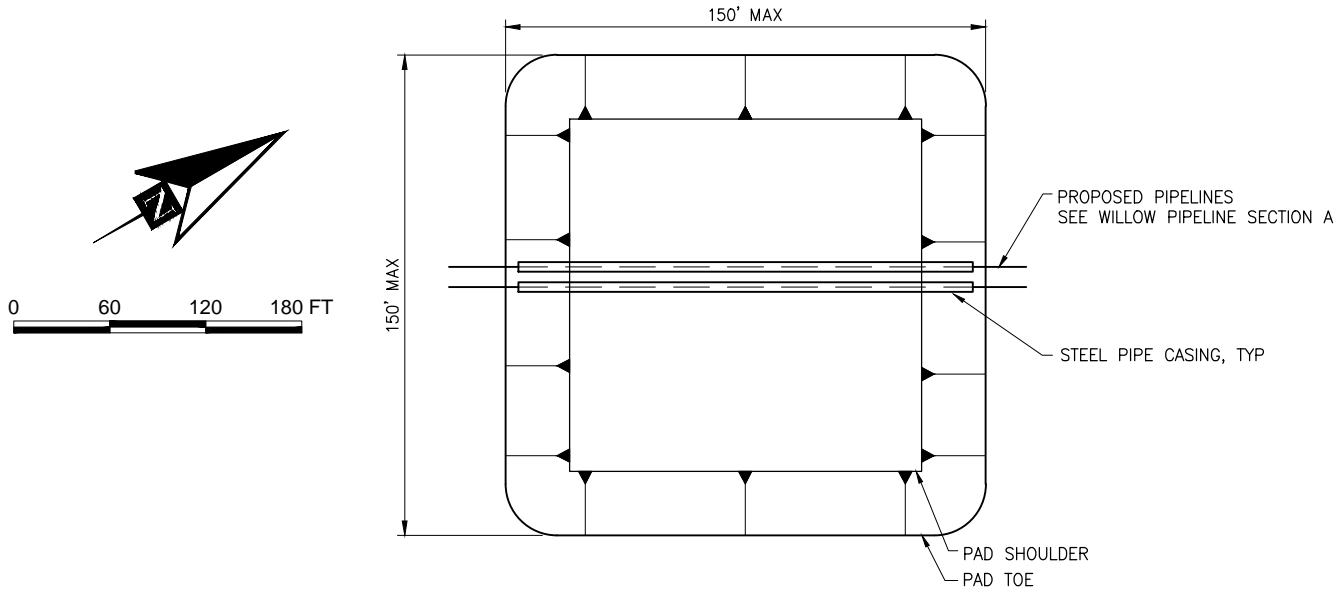
ConocoPhillips
Alaska, Inc.

PROPOSED PIPELINE EXISTING ROAD CROSSING

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION

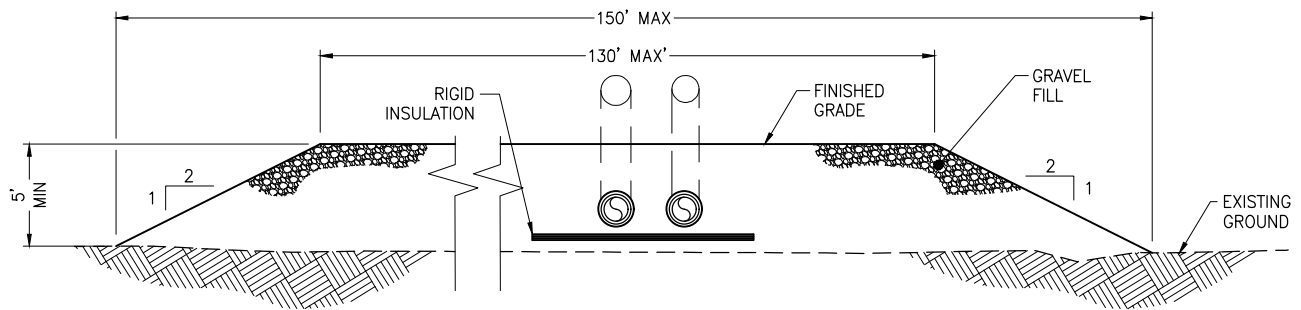
AT: ALASKA

SHEET **107** of **128** 3/17/2020



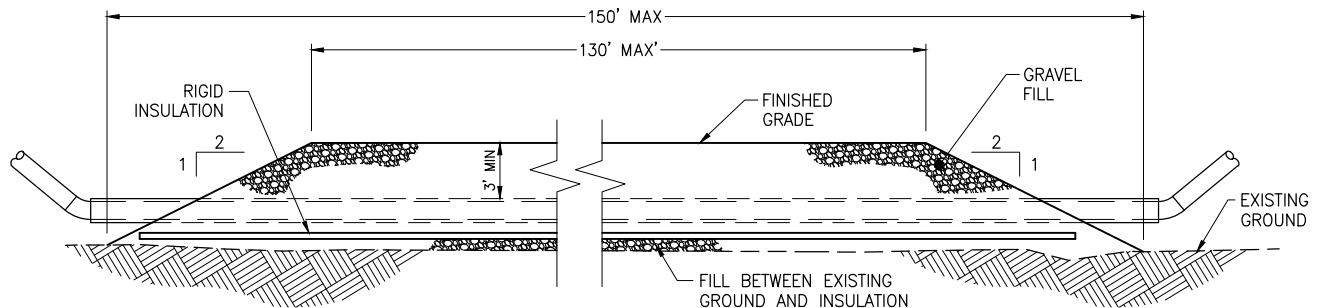
PIPELINE CROSSING PAD PLAN

NTS



PIPELINE CROSSING PAD PROFILE

NTS



PIPELINE CROSSING PAD SECTION

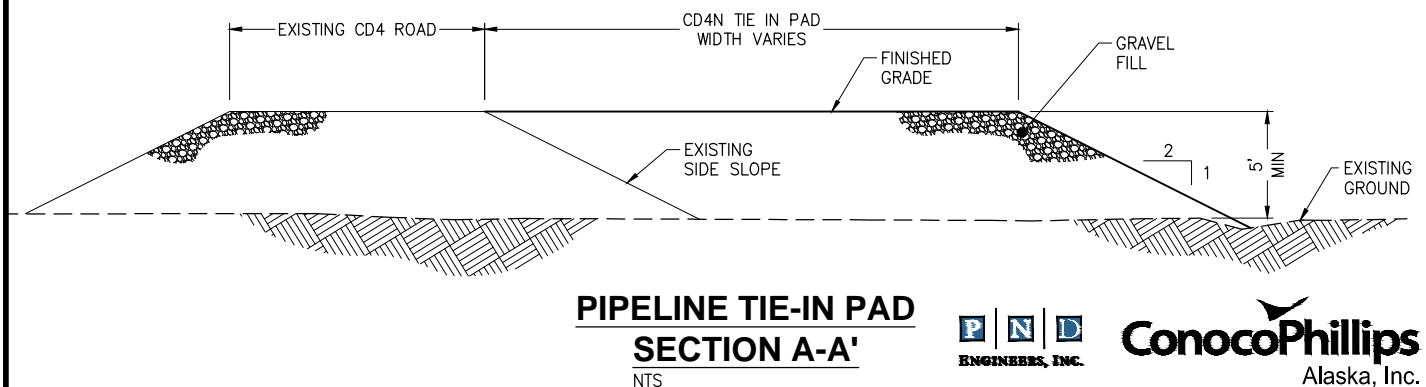
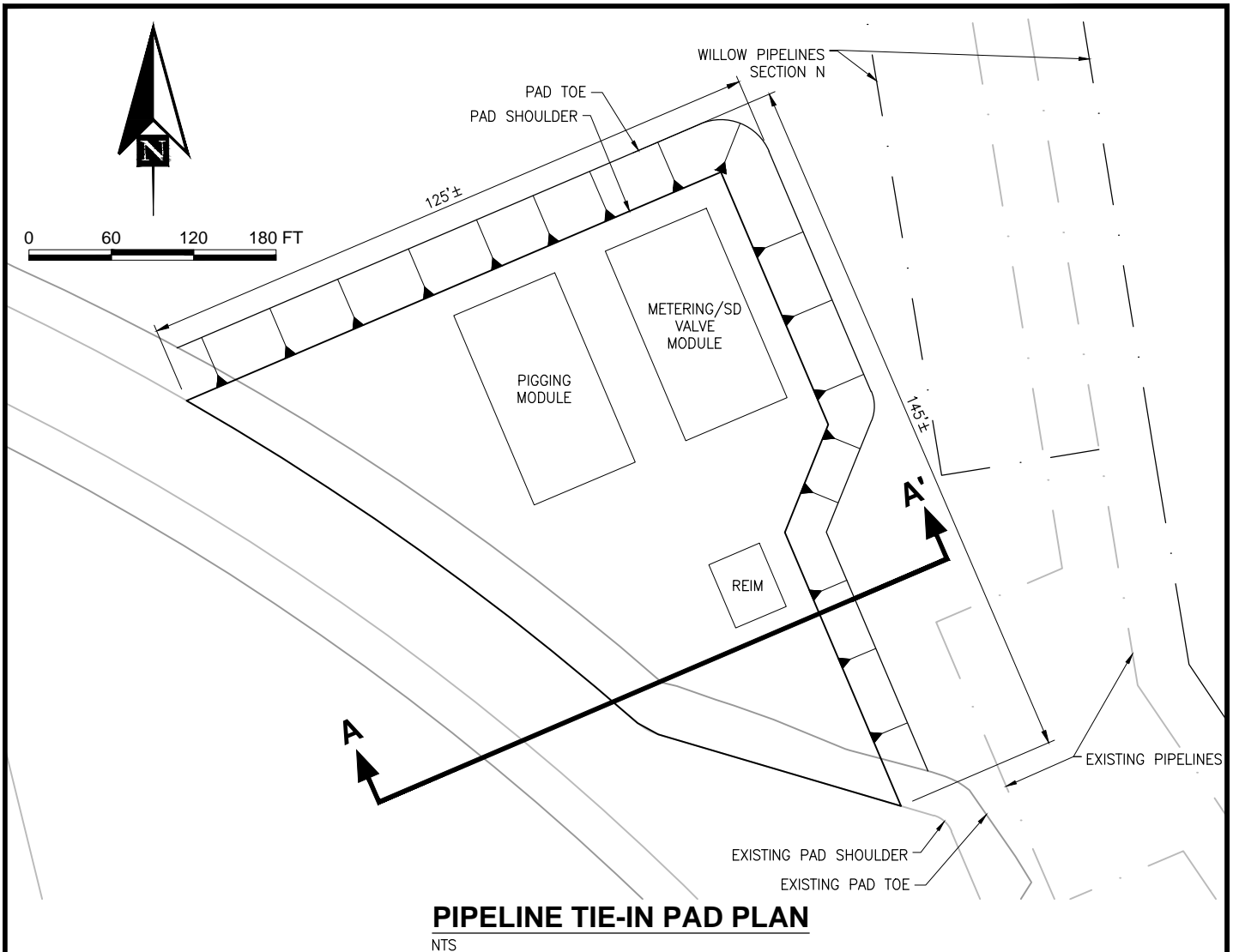
NTS



REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION

AT: ALASKA

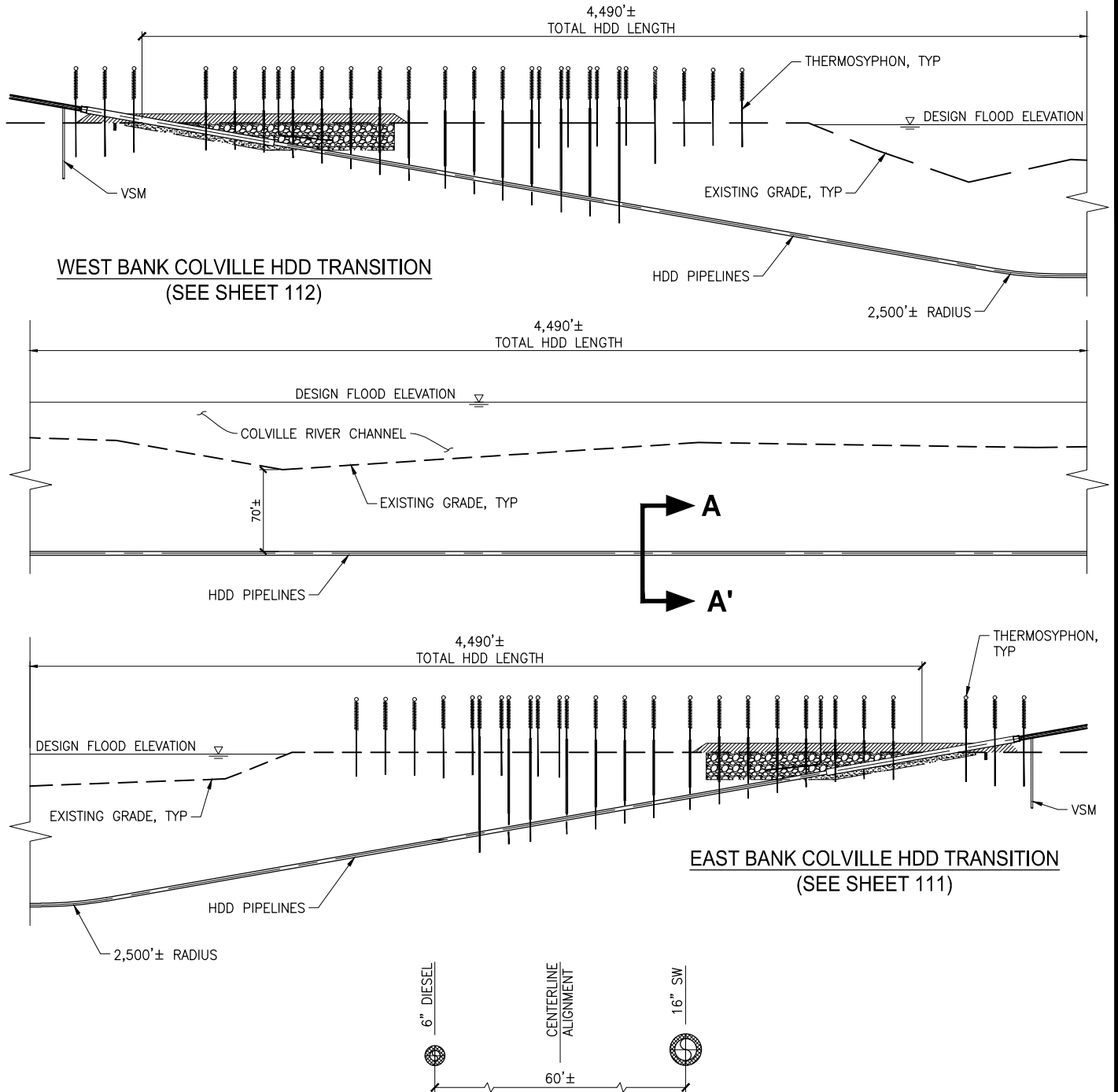
SHEET **108** of **128** 3/17/2020



PIPELINE TIE-IN PAD PLAN AND SECTION



REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **109** of **128** 3/17/2020

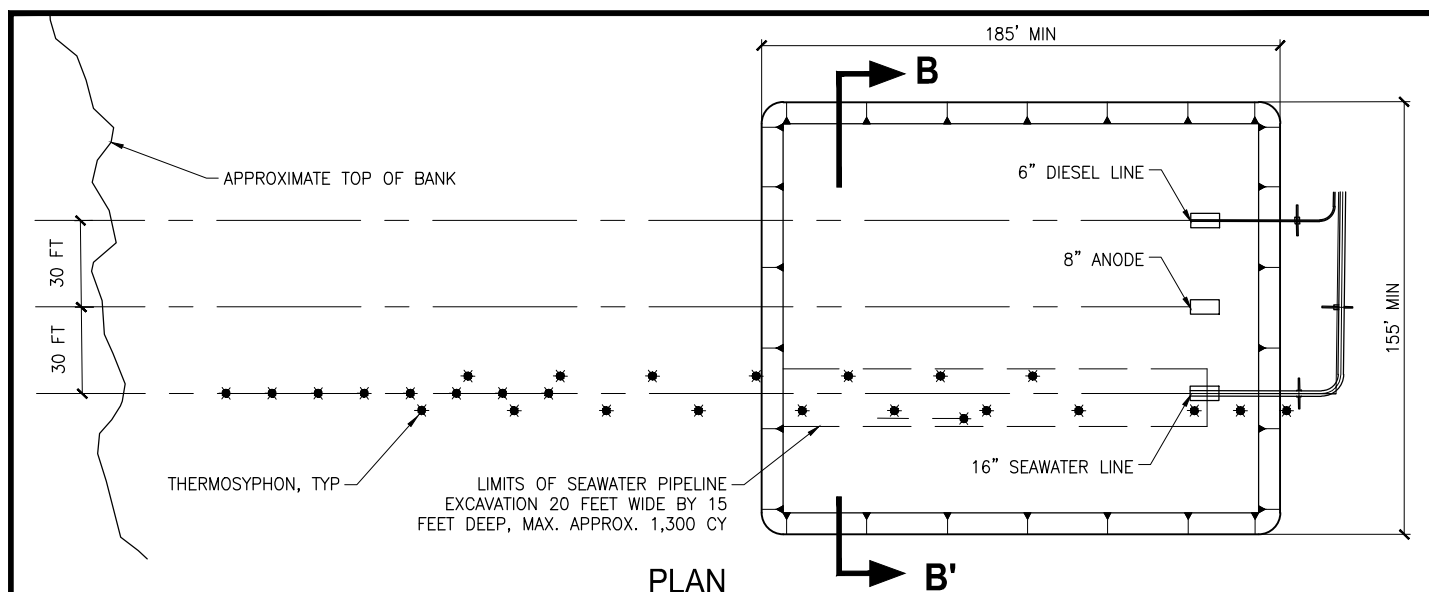


HDD PIPELINE
SECTION A-A'

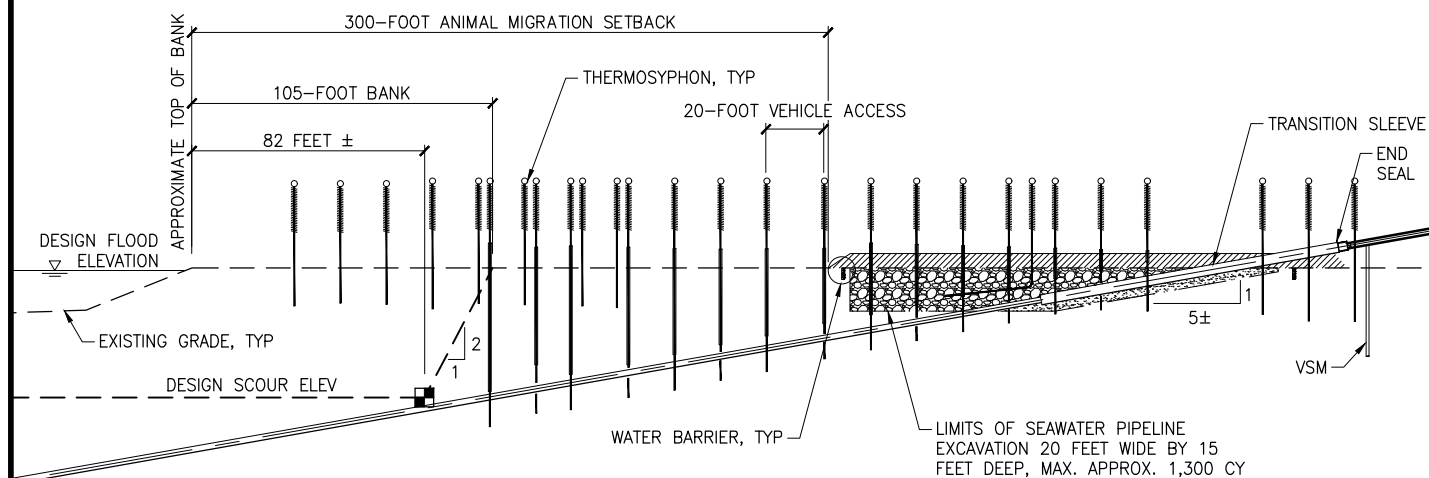


REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **110** of **128** 3/17/2020

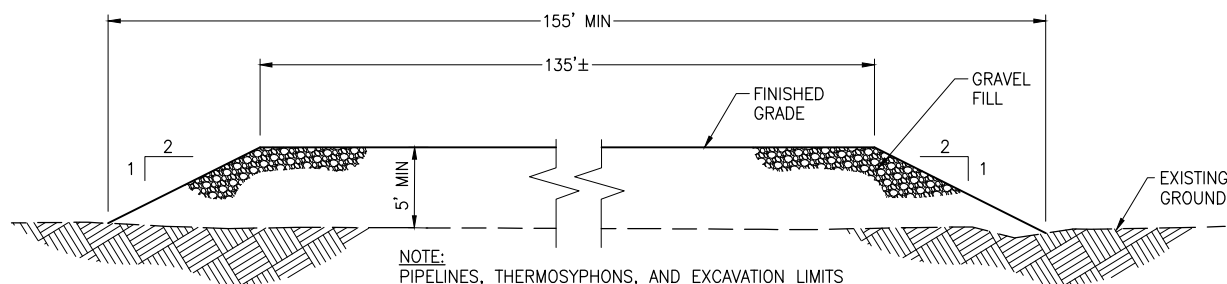
COLVILLE HDD CROSSING



PLAN



LONGITUDINAL SECTION

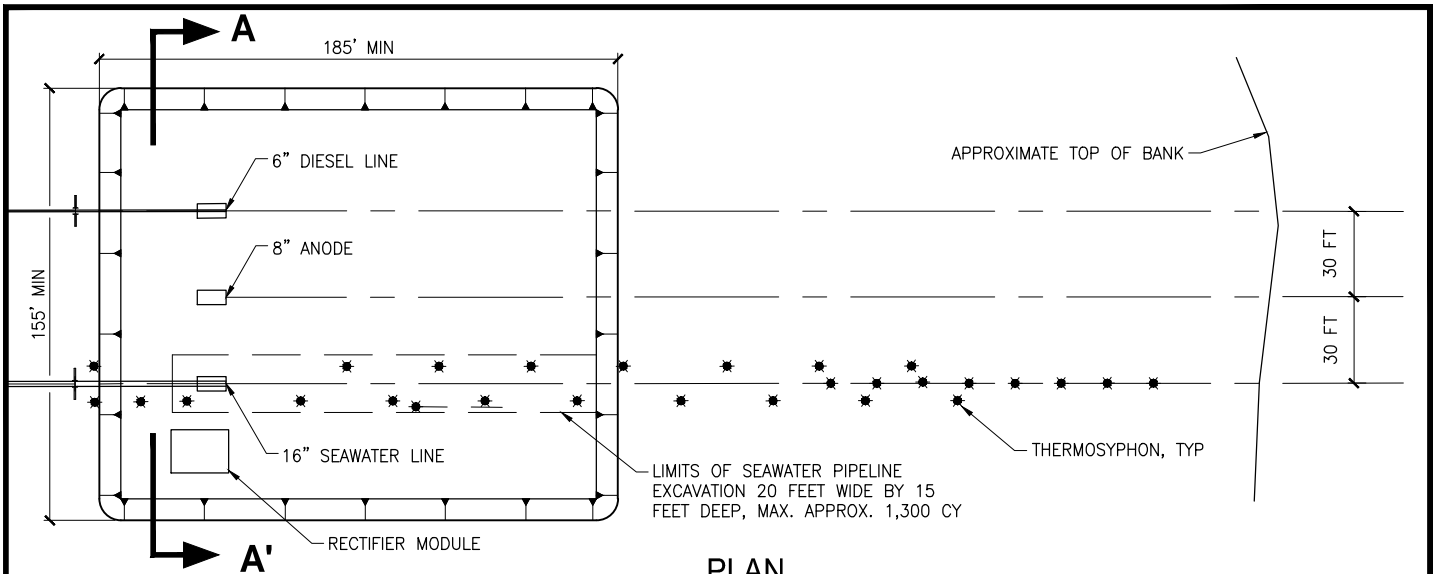


TRANSVERSE SECTION B-B'

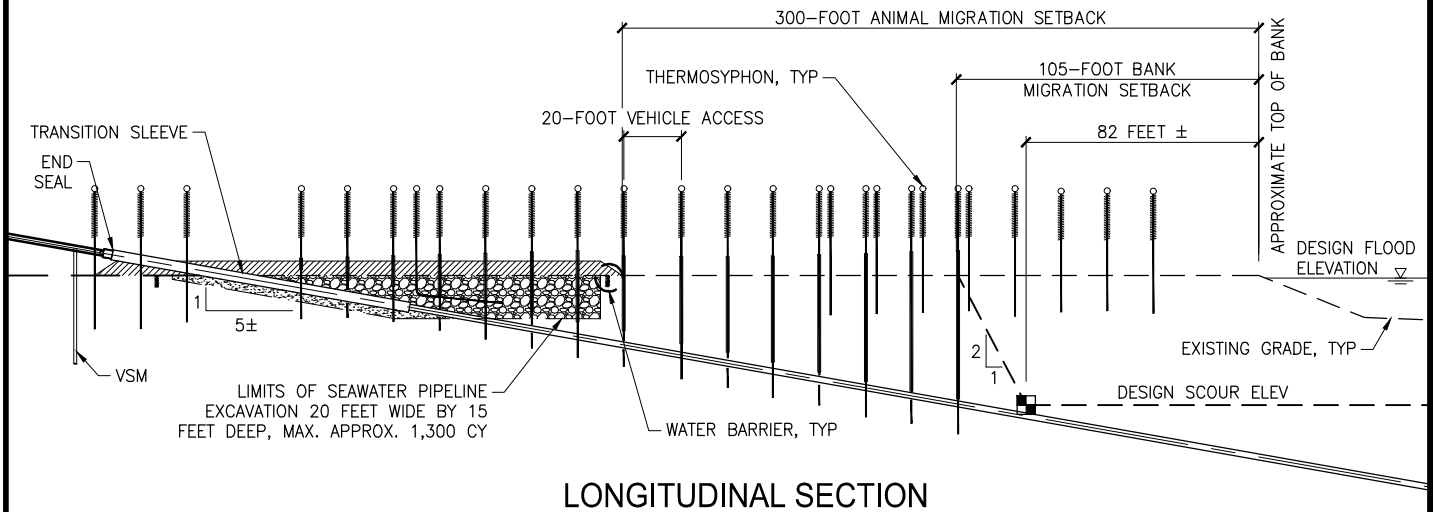


EAST BANK COLVILLE HDD TRANSITION

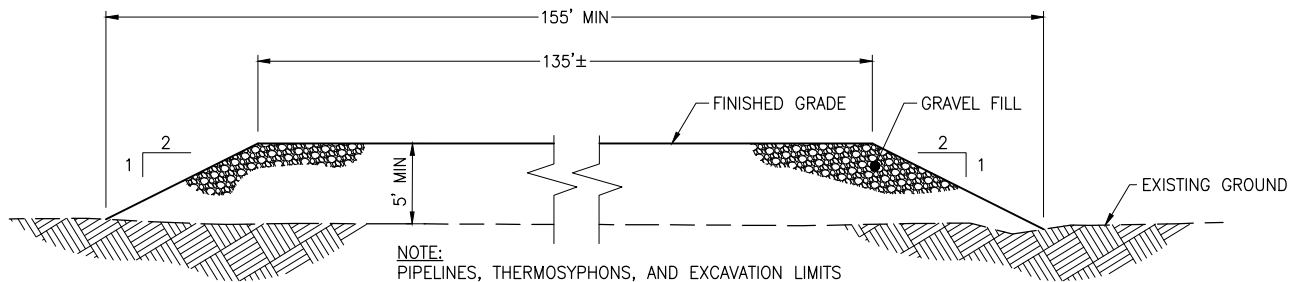
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **111** of **128** 3/17/2020



PLAN



LONGITUDINAL SECTION



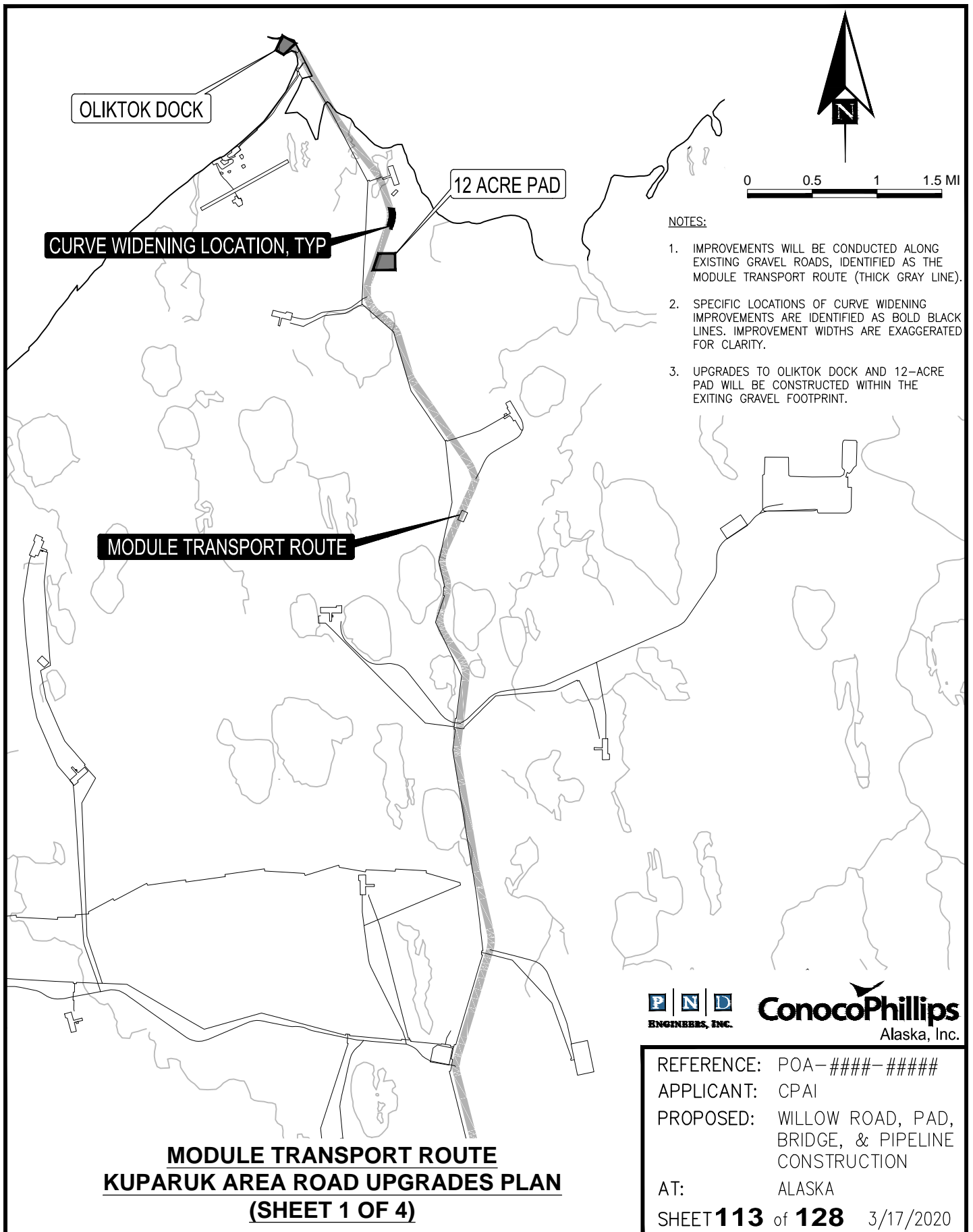
NOTE:
PIPELINES, THERMOSYPHONS, AND EXCAVATION LIMITS
NOT SHOWN FOR CLARITY.

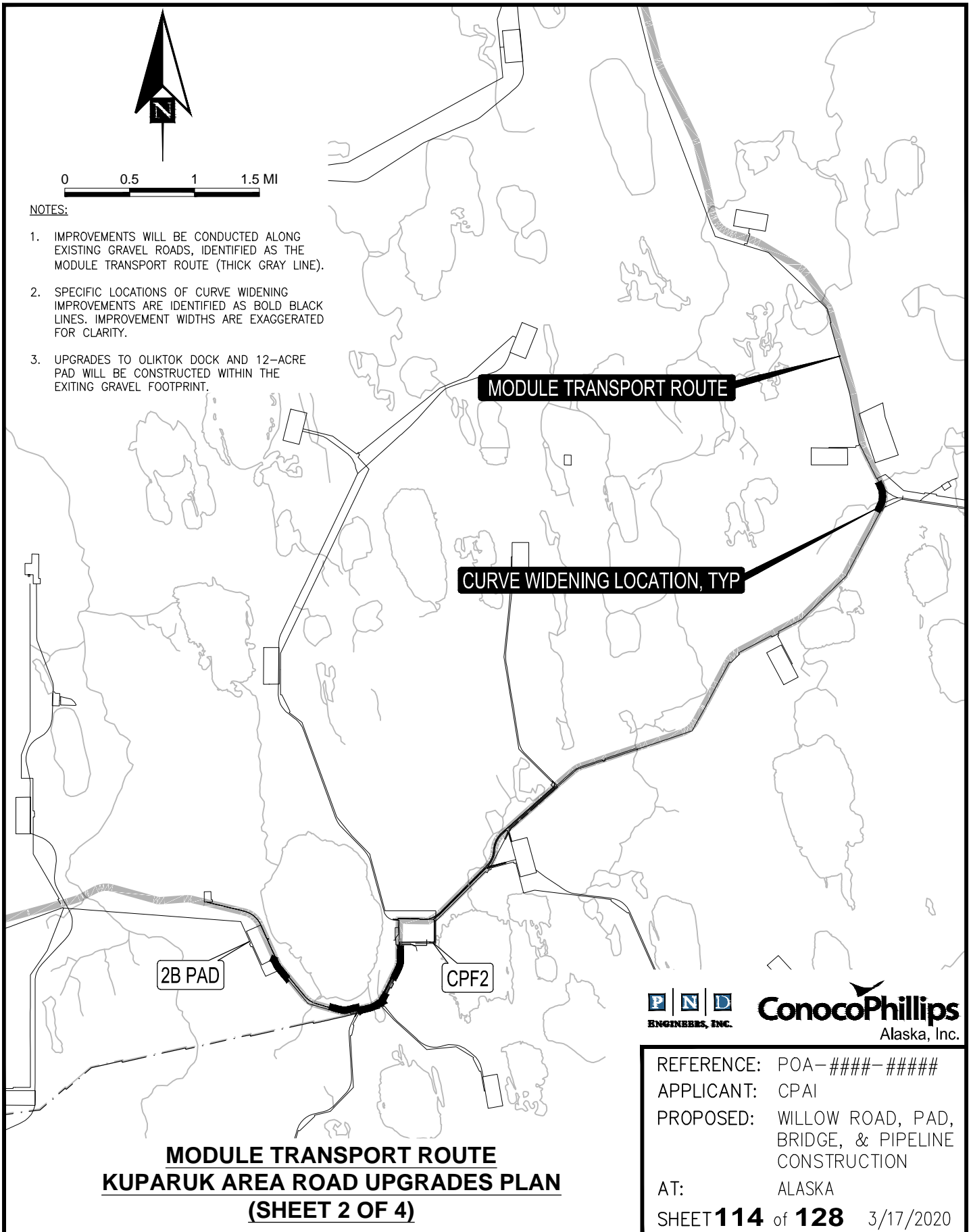
TRANSVERSE SECTION A-A'

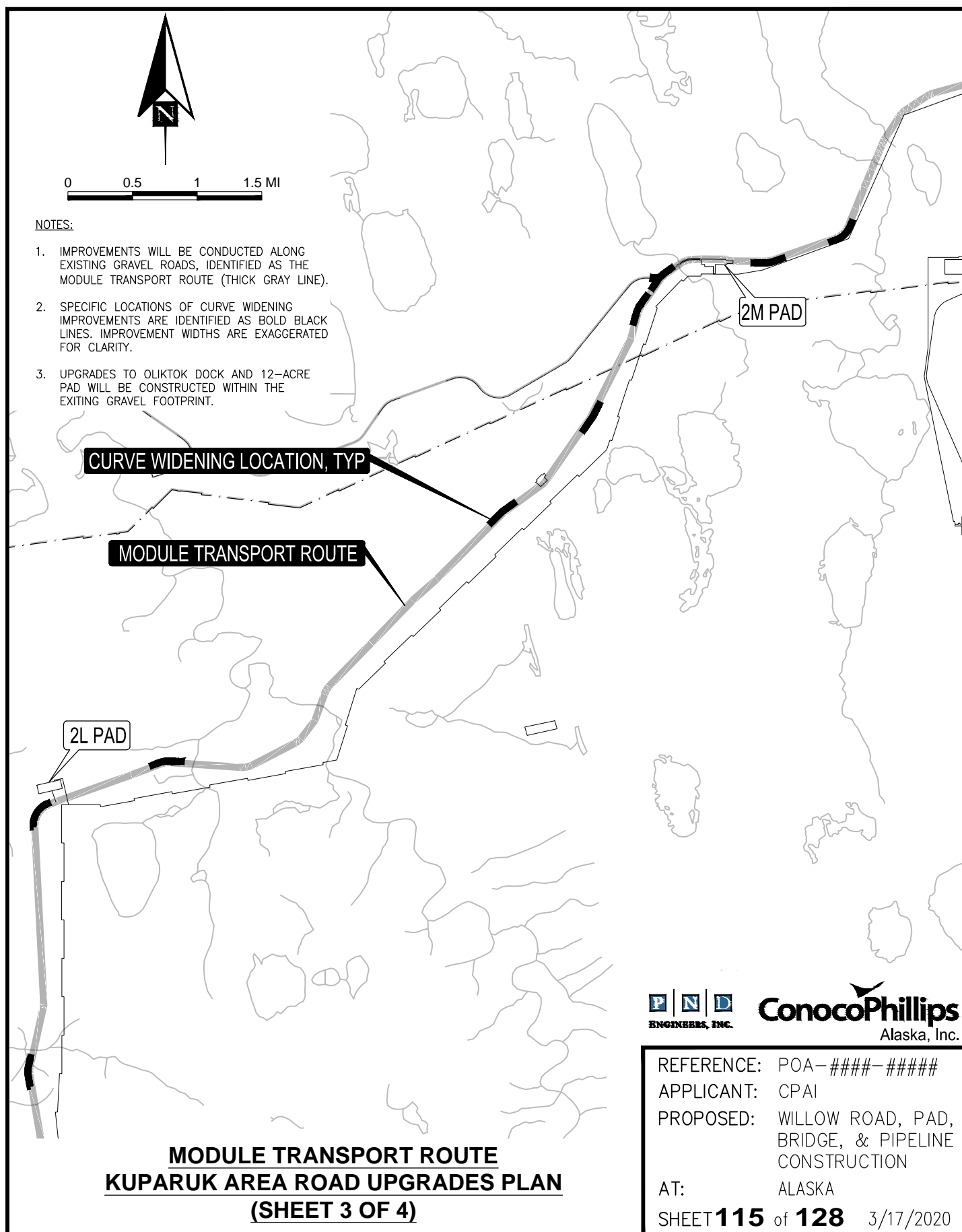


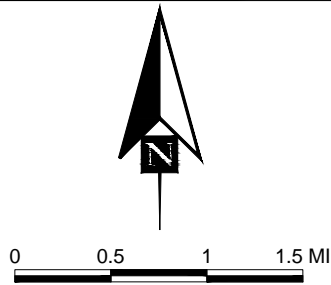
WEST BANK COLVILLE HDD TRANSITION

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **112** of **128** 3/17/2020









NOTES:

1. IMPROVEMENTS WILL BE CONDUCTED ALONG EXISTING GRAVEL ROADS, IDENTIFIED AS THE MODULE TRANSPORT ROUTE (THICK GRAY LINE).
2. SPECIFIC LOCATIONS OF CURVE WIDENING IMPROVEMENTS ARE IDENTIFIED AS BOLD BLACK LINES. IMPROVEMENT WIDTHS ARE EXAGGERATED FOR CLARITY.
3. UPGRADES TO OLIKOTOK DOCK AND 12-ACRE PAD WILL BE CONSTRUCTED WITHIN THE EXISTING GRAVEL FOOTPRINT.

CURVE WIDENING LOCATION, TYP

2P PAD

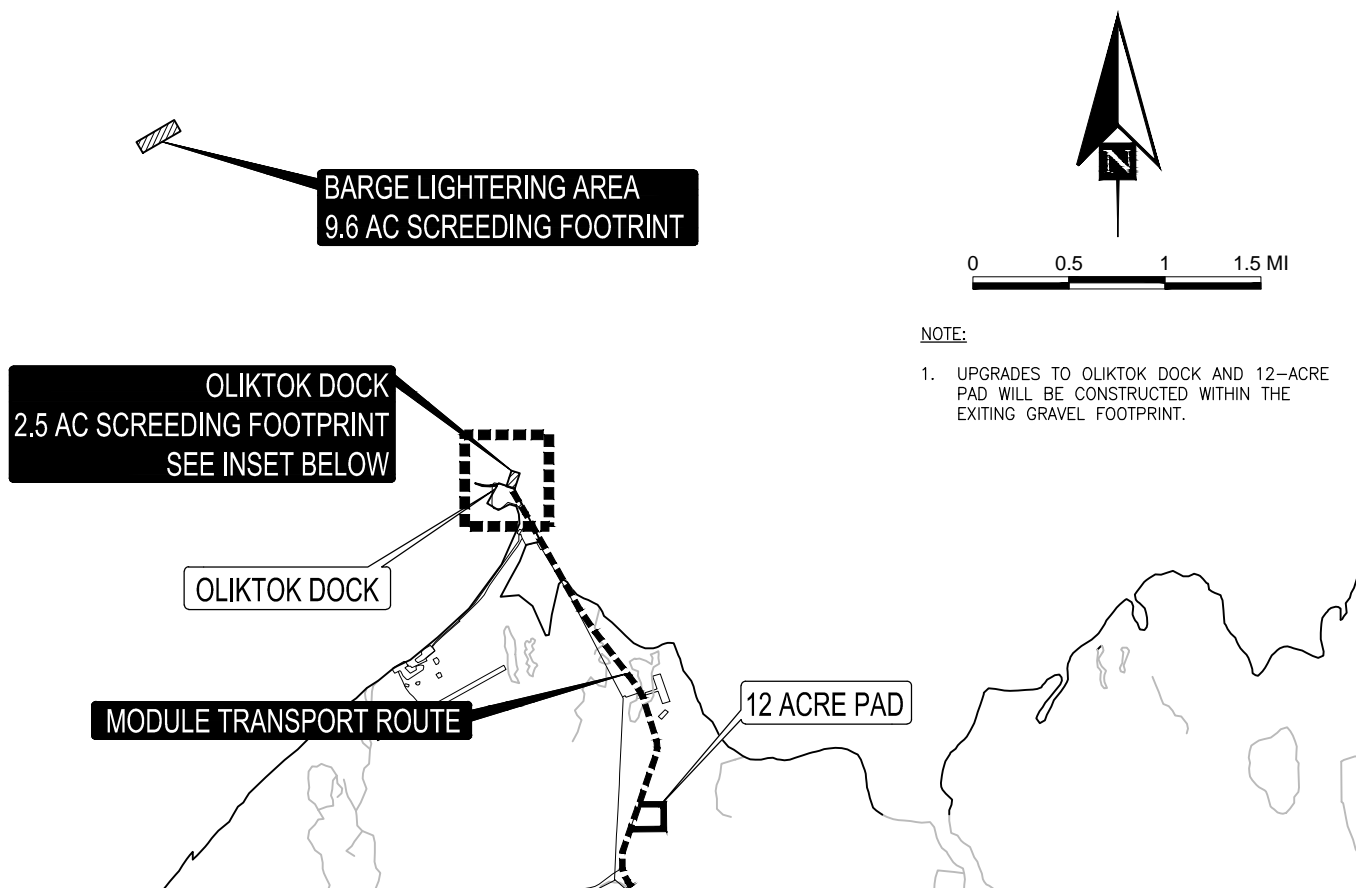
2N PAD

**MODULE TRANSPORT ROUTE
KUPARUK AREA ROAD UPGRADES PLAN
(SHEET 4 OF 4)**



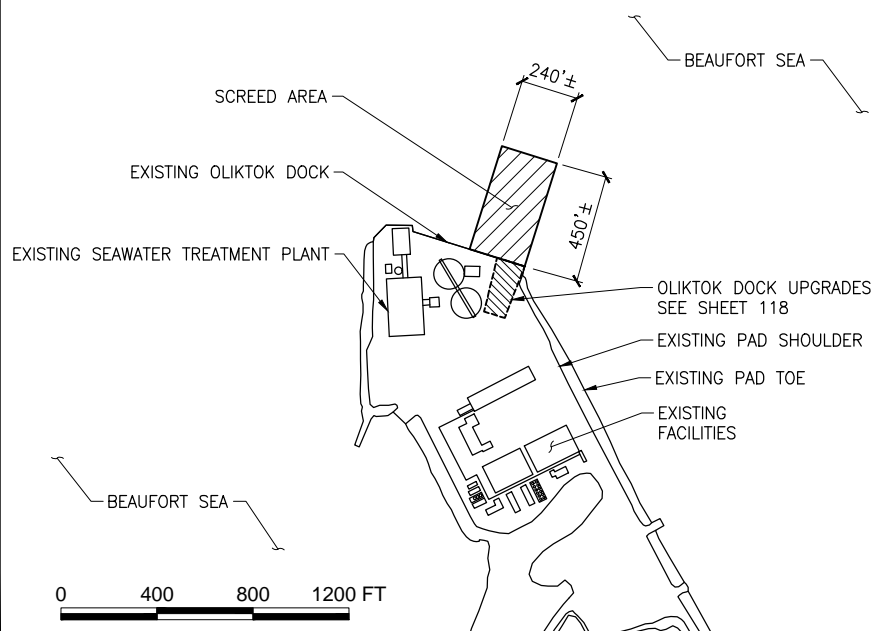
ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **116** of **128** 3/17/2020



NOTE:

1. UPGRADES TO OLIKTOK DOCK AND 12-ACRE PAD WILL BE CONSTRUCTED WITHIN THE EXISTING GRAVEL FOOTPRINT.

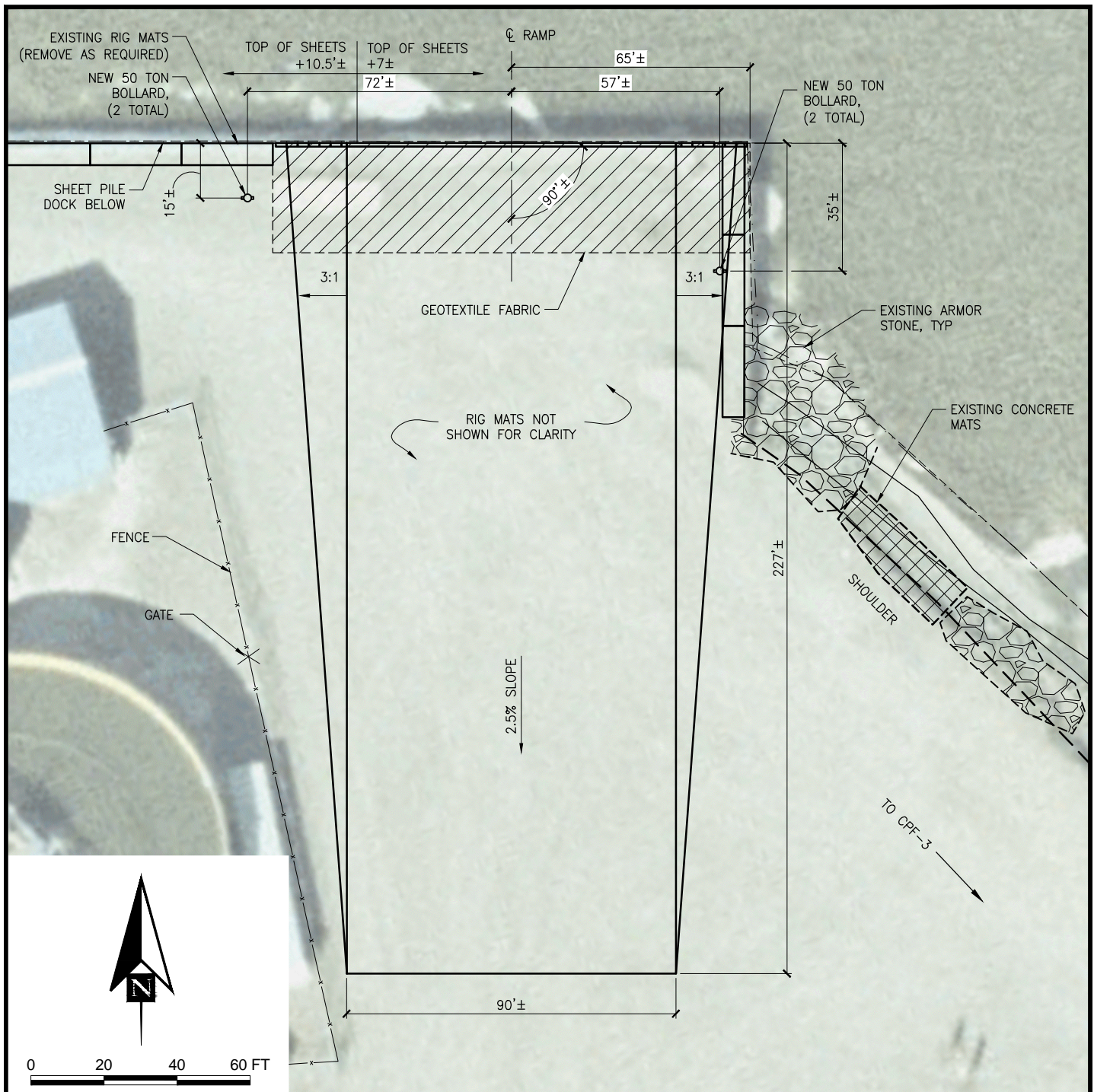


OLIKTOK DOCK SCREEDING AREAS



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **117** of **128** 3/17/2020

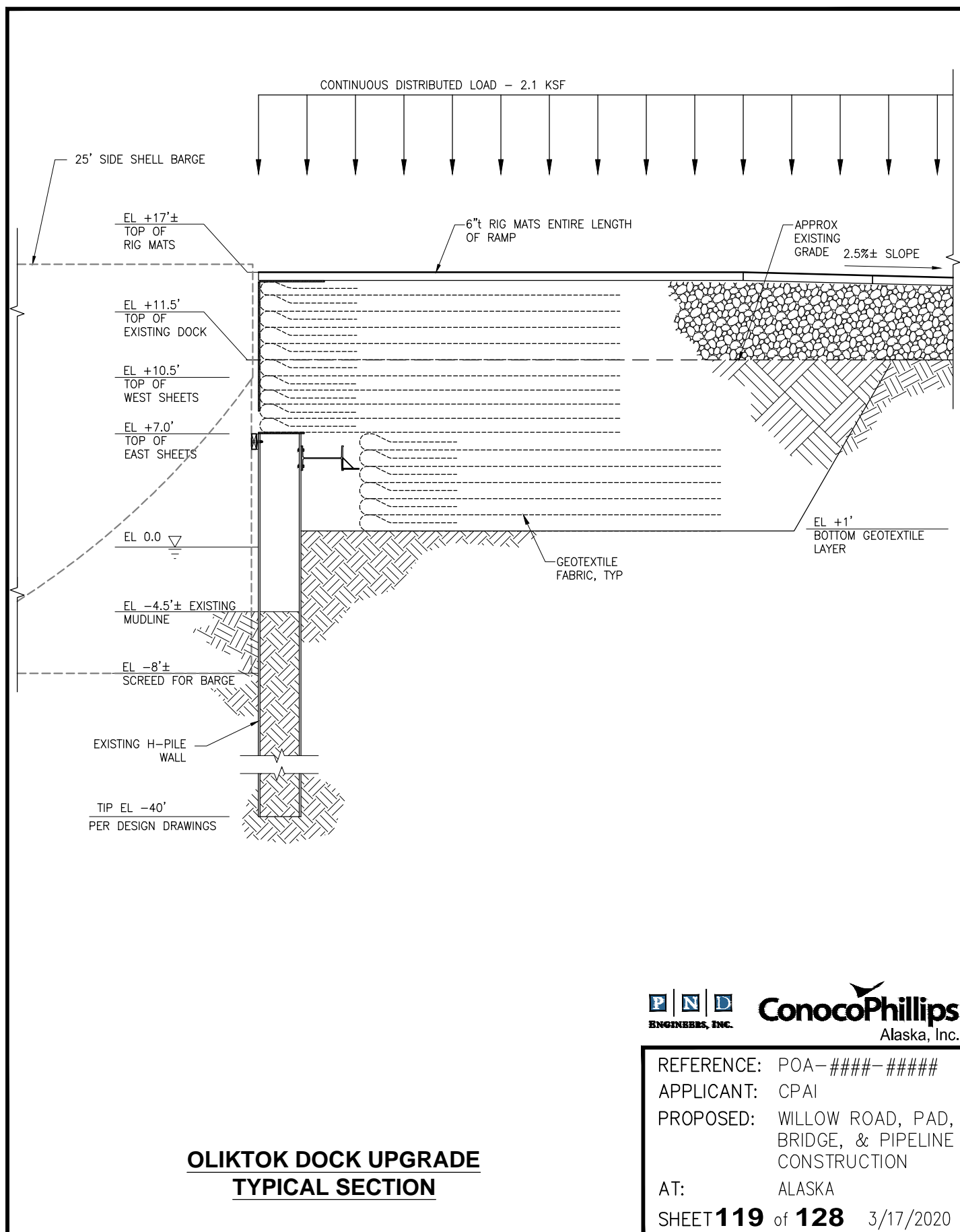


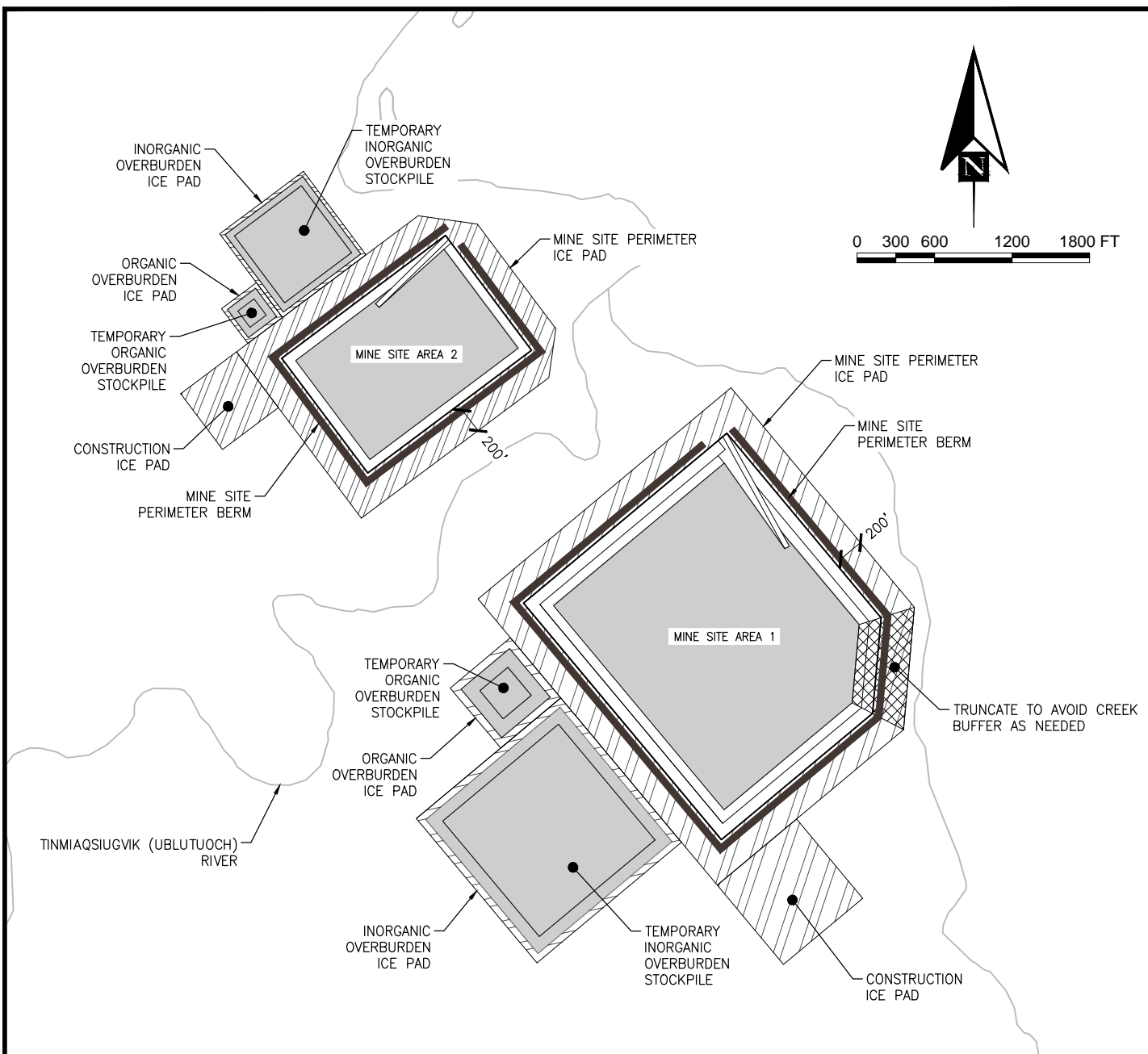
OLIKTOK DOCK UPGRADE



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **118** of **128** 3/17/2020





WILLOW MINE SITE QUANTITIES	
MINE SITE AREA 1 FOOTPRINT	109.3 AC
MINE SITE AREA 1 QUANTITY OF GRAVEL (AVAILABLE)	4.51 MCY
MINE SITE AREA 2 FOOTPRINT	40.4 AC
MINE SITE AREA 2 QUANTITY OF GRAVEL (AVAILABLE)	1.04 MCY
COMBINED MINE SITE FOOTPRINT	149.7 AC
COMBINED MINE SITE QUANTITY OF GRAVEL (AVAILABLE)	5.55 MCY

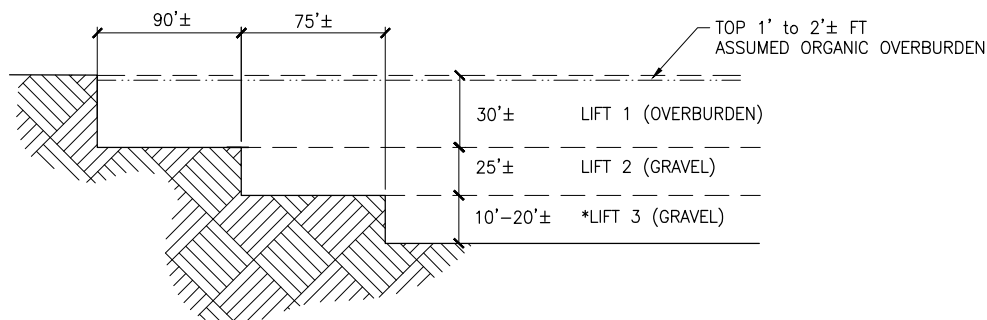
NOTES:

- GRAVEL IS PLANNED BE SOURCED FROM BOTH MINE SITE AREA 1 AND AREA 2 TO PROVIDE GRAVEL NEEDED FOR PROJECT.
- OVERBURDEN ICE PADS SIZED TO ACCOMMODATE 50% OF ESTIMATED OVERBURDEN QUANTITY.
- OVERBURDEN STOCKPILES ARE PLANNED TO REMAIN IN PLACE FOR UP TO TWO SUMMER SEASONS PRIOR TO BEING PLACED IN A PORTION OF THE EXCAVATED MINE SITE.

WILLOW MINE SITE PLAN



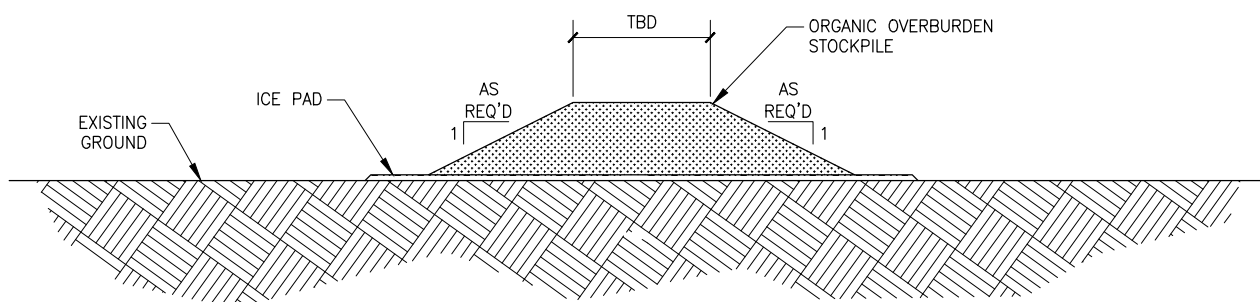
REFERENCE: POA-####-####
 APPLICANT: CPAI
 PROPOSED: WILLOW ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
 AT: ALASKA
 SHEET **120** of **128** 3/17/2020



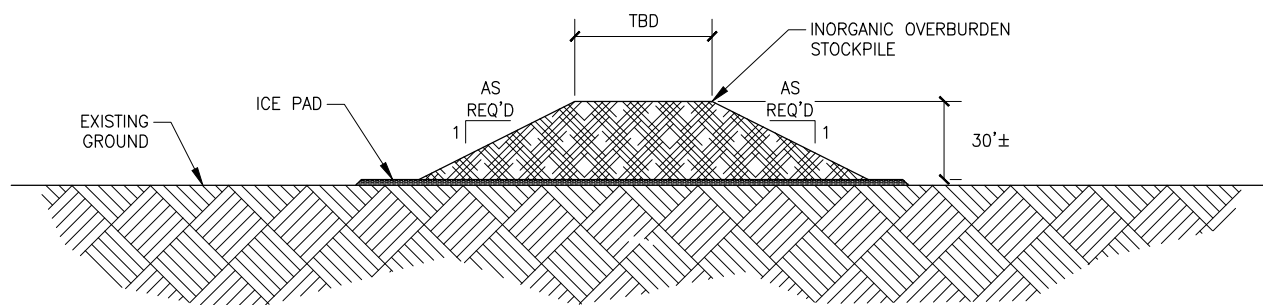
TYPICAL MINE SITE SECTION

NOTES:

1. LIFT THICKNESSES WILL VARY DEPENDING UPON LOCATION WITHIN MINE SITE.
2. SOME AREAS WITHIN MINE MAY CONTAIN A VARYING LAYER OF DELETERIOUS MATERIAL TO BE REMOVED BETWEEN LIFT 2 AND 3.
3. *LIFT 3 (GRAVEL) WILL BE EXCAVATED WHERE BOREHOLE DATA INDICATES SUITABLE GRAVEL FILL MATERIALS.



TEMPORARY ORGANIC OVERBURDEN STOCKPILE TYPICAL SECTION



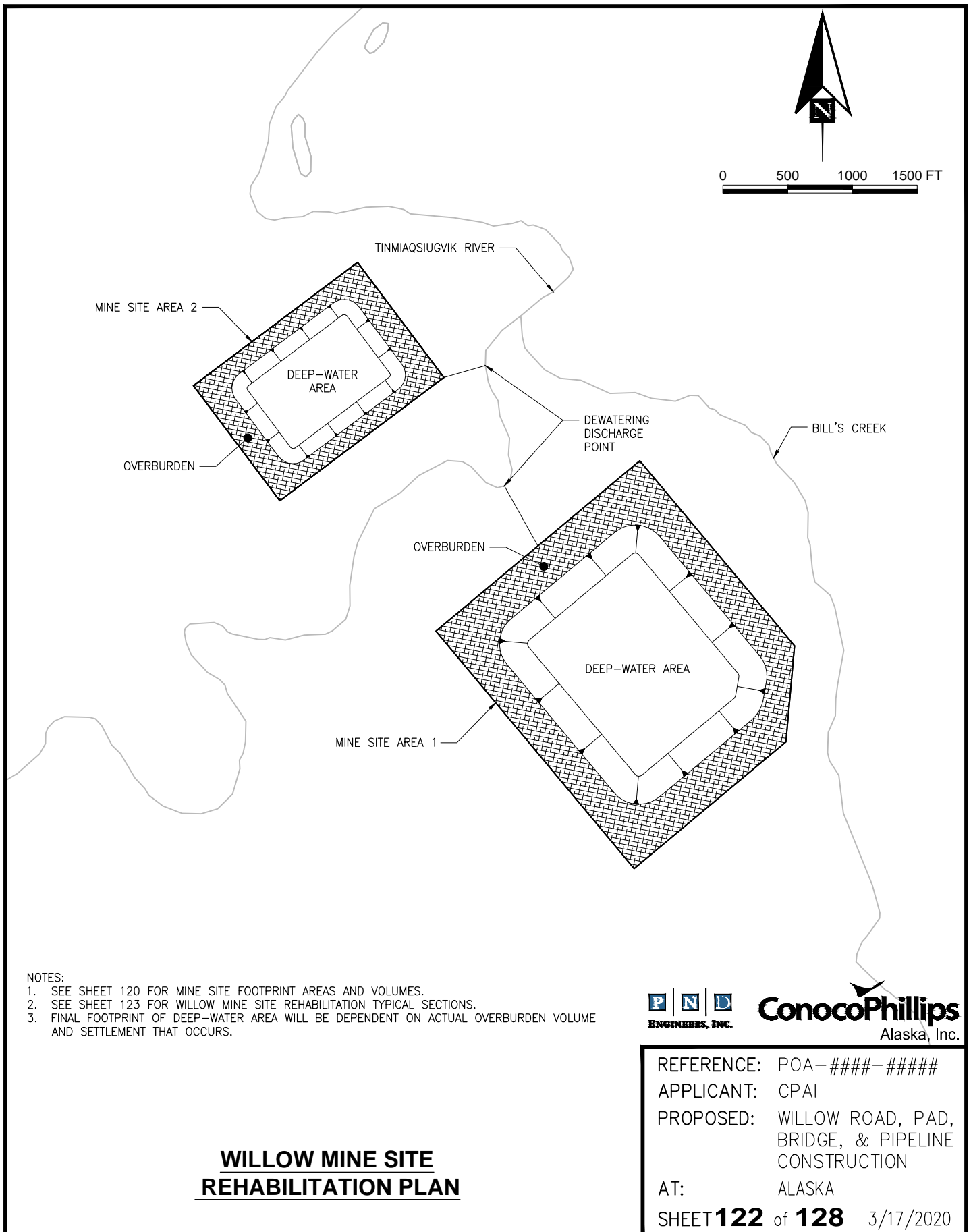
TEMPORARY INORGANIC OVERBURDEN STOCKPILE TYPICAL SECTION



ConocoPhillips
Alaska, Inc.

WILLOW MINE SITE TYPICAL SECTIONS

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA
SHEET **121** of **128** 3/17/2020



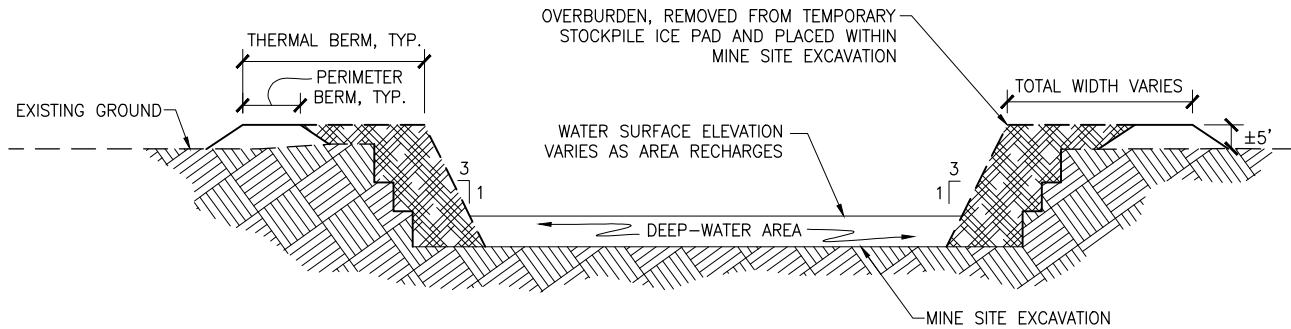
NOTES:

1. SEE SHEET 120 FOR MINE SITE FOOTPRINT AREAS AND VOLUMES.
2. SEE SHEET 123 FOR WILLOW MINE SITE REHABILITATION TYPICAL SECTIONS.
3. FINAL FOOTPRINT OF DEEP-WATER AREA WILL BE DEPENDENT ON ACTUAL OVERBURDEN VOLUME AND SETTLEMENT THAT OCCURS.

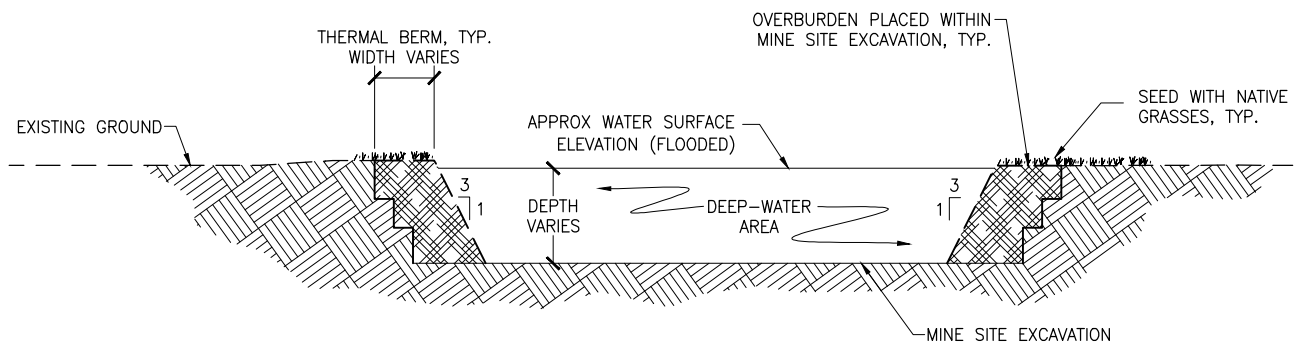
**WILLOW MINE SITE
REHABILITATION PLAN**



REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **122** of **128** 3/17/2020



TYPICAL MINE SITE REHABILITATION WATER RECHARGE SECTION



TYPICAL MINE SITE REHABILITATION FINAL SECTION

NOTES:

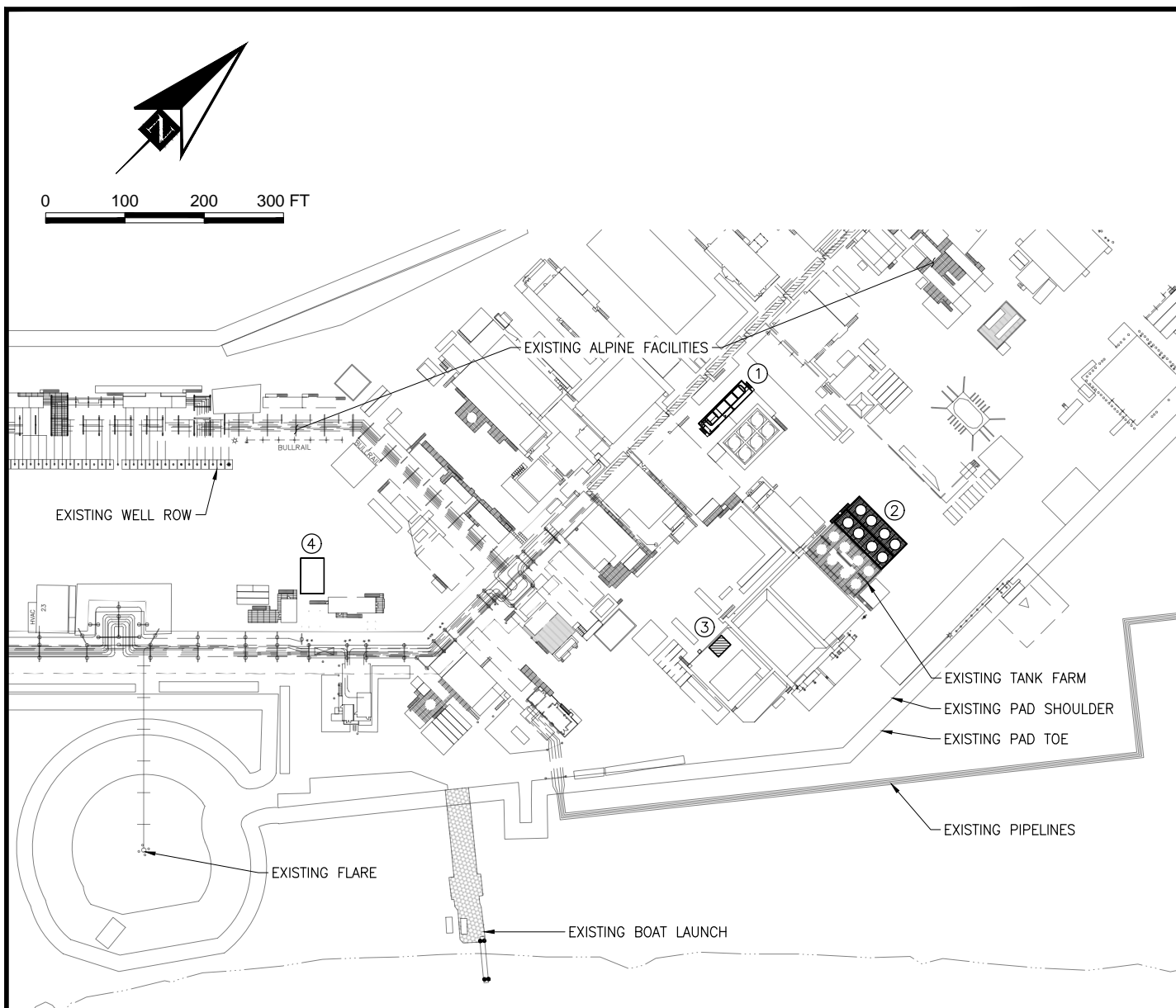
1. SECTIONS FOR MINE AREA 1 AND 2 SIMILAR.
2. WIDTH OF THERMAL BERMS IS DEPENDENT ON QUANTITY OF OVERBURDEN AVAILABLE AND AMOUNT OF THAW CONSOLIDATION THAT OCCURS.
3. DEPTH OF DEEP-WATER AREA WILL VARY BY LOCATION WITHIN THE MINE AREA. IT IS EXPECTED THAT MOST OF THE AREA WILL BE GREATER THAN 30- FEET IN DEPTH. THE MAXIMUM EXPECTED DEPTH IS APPROXIMATELY 70- FEET.

WILLOW MINE SITE REHABILITATION TYPICAL SECTION



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **123** of **128** 3/17/2020



FACILITIES	
①	CRUDE OIL SURGE VESSEL
②	ULSD AND DRA STORAGE TANKS
③	DRA SKID
④	ULSD PIGGING MODULE

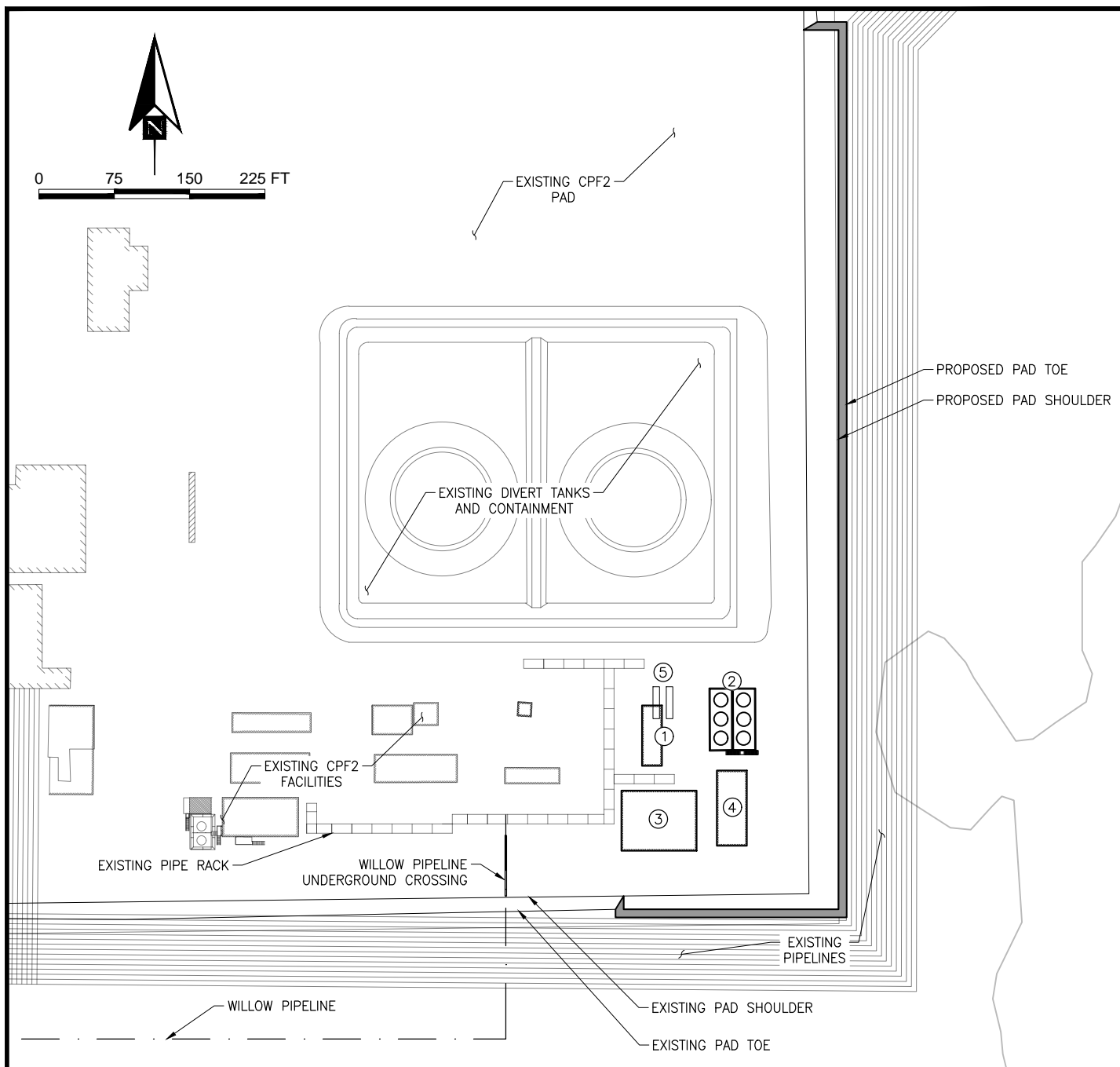
NOTES:

1. THIS SHEET HIGHLIGHTS PROPOSED FACILITIES/MODULES AT THE EXISTING ALPINE FACILITY.
2. ALL PROPOSED FACILITIES WILL BE PLACED ON EXISTING GRAVEL FILL. NO ADDITIONAL FILL/FOOTPRINT IS REQUIRED.



REFERENCE: POA-####-####
 APPLICANT: CPAI
 PROPOSED: WILLOW ROAD, PAD,
 BRIDGE, & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **124** of **128** 3/17/2020

ALPINE MODULE PLAN



FACILITIES	
①	DIESEL PUMP MODULE
②	ULSD STORAGE TANK
③	SEA WATER TRANSFER PUMP MODULE
④	SEAWATER AND ULSD PIGGING MODULE
⑤	HEATERS (TO BE DEMOLISHED)

NOTES:

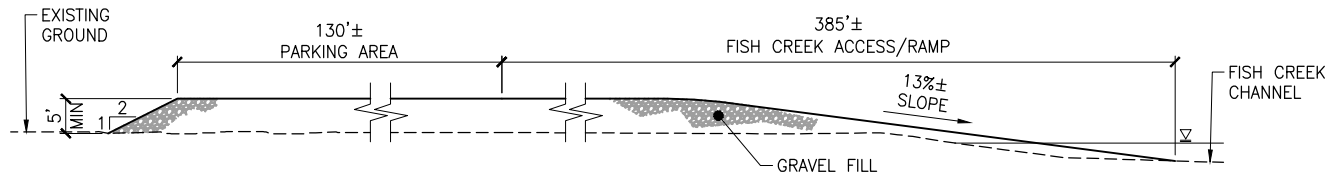
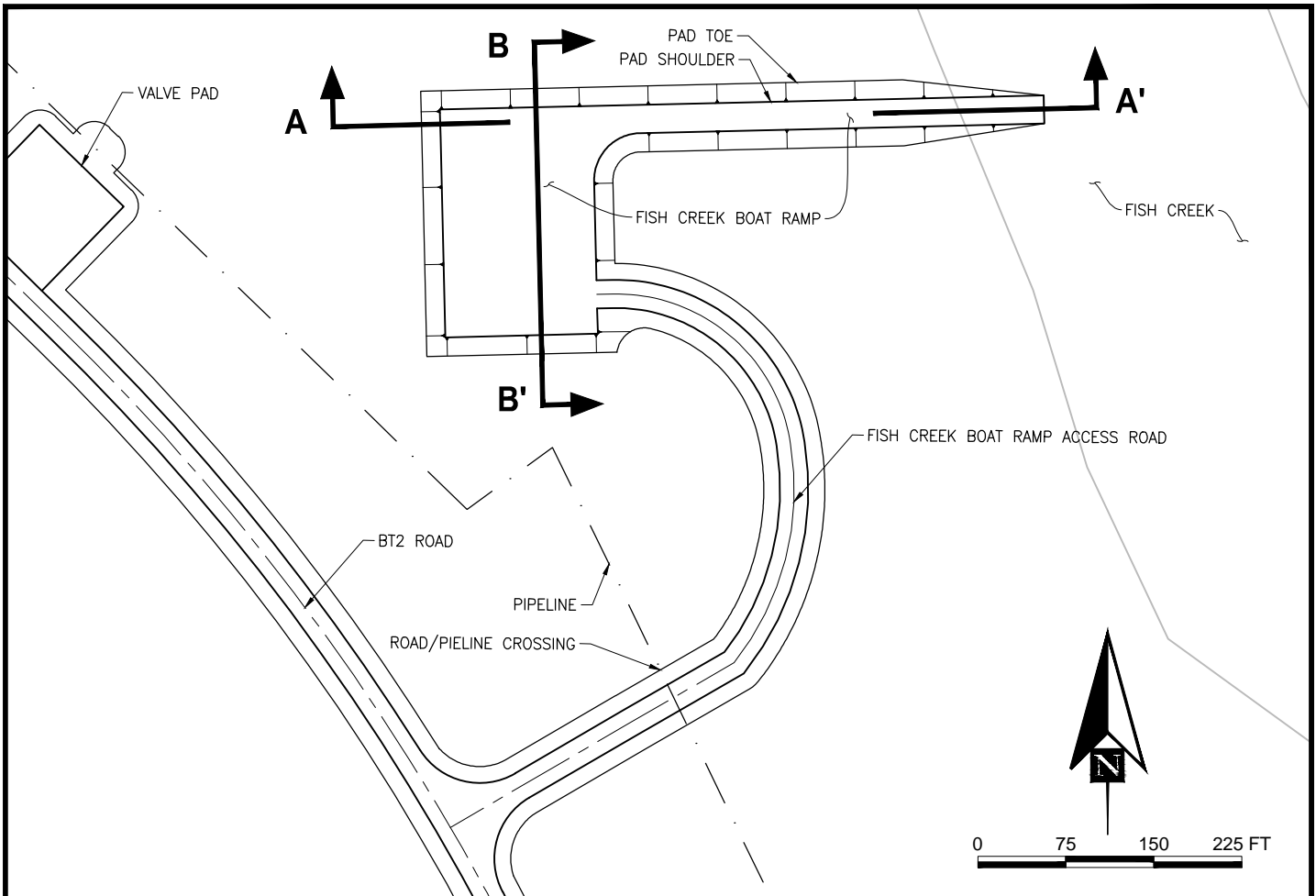
1. THIS SHEET HIGHLIGHTS THE PROPOSED CPF2 PAD EXPANSION FOOTPRINT AS WELL AS PROPOSED FACILITIES/MODULES TO BE LOCATED ON THE EXISTING CPF2 PAD.



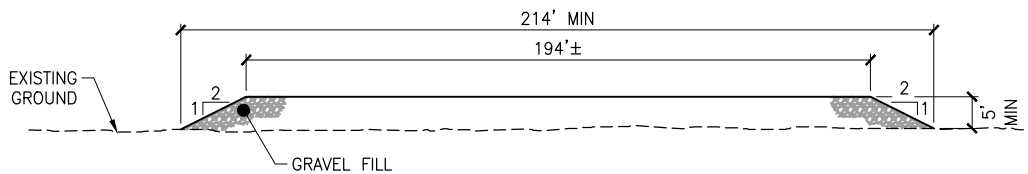
REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION

AT: ALASKA
SHEET **125** of **128** 3/17/2020

CPF2 PAD EXPANSION AND MODULE PLAN



FISH CREEK BOAT RAMP SECTION A-A'
NTS



FISH CREEK BOAT RAMP SECTION B-B'
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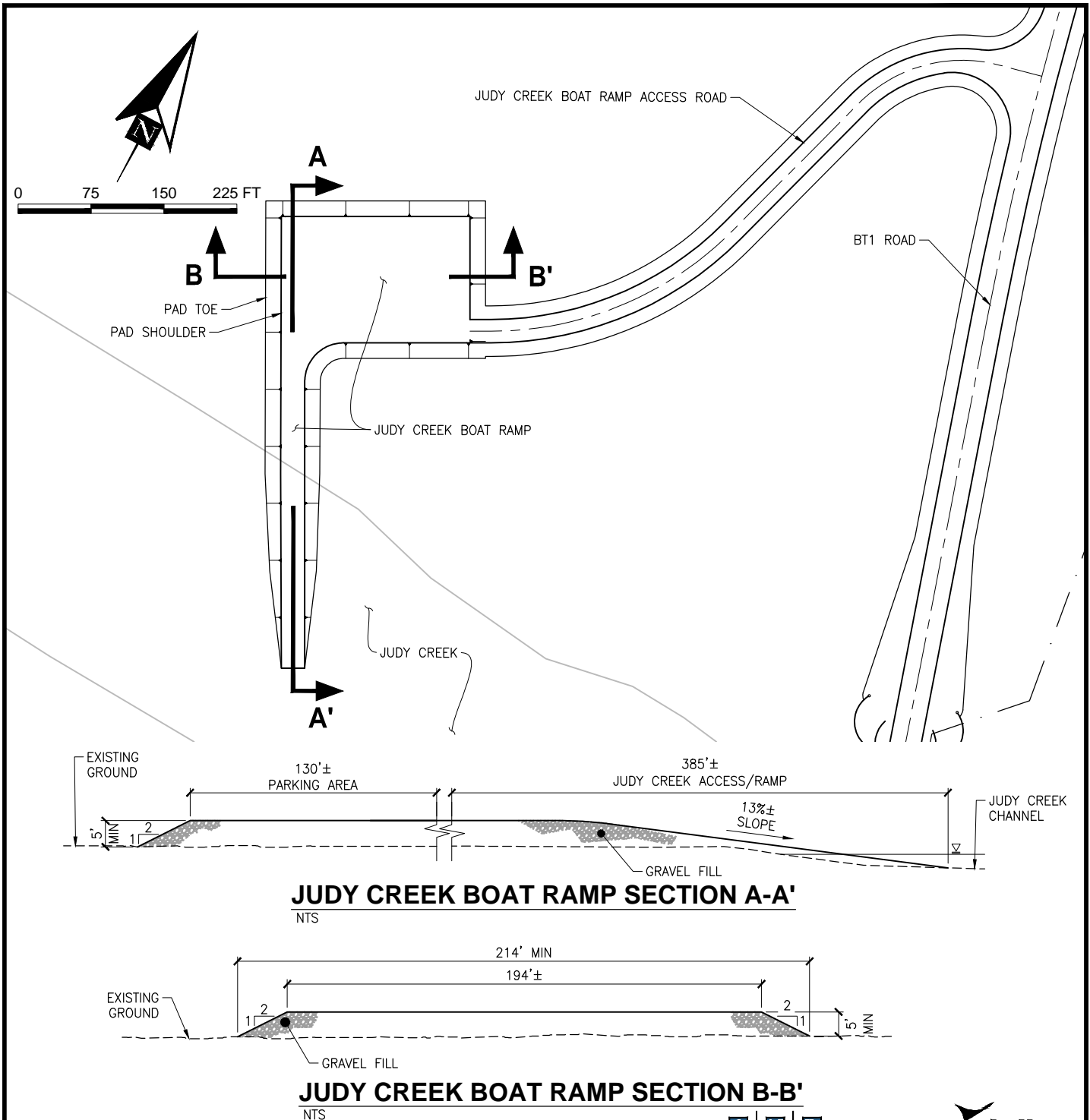
ConocoPhillips
Alaska, Inc.

NOTES:

1. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
2. THESE LAYOUTS ARE CONCEPTUAL, AND ARE SUBJECT TO SUBSTANTIAL CHANGE BASED ON SITE CONDITIONS, DESIGN DEVELOPMENT, AND STAKEHOLDER INPUT.

FISH CREEK BOAT RAMP PLAN AND SECTIONS

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **126** of **128** 3/17/2020



NOTES:

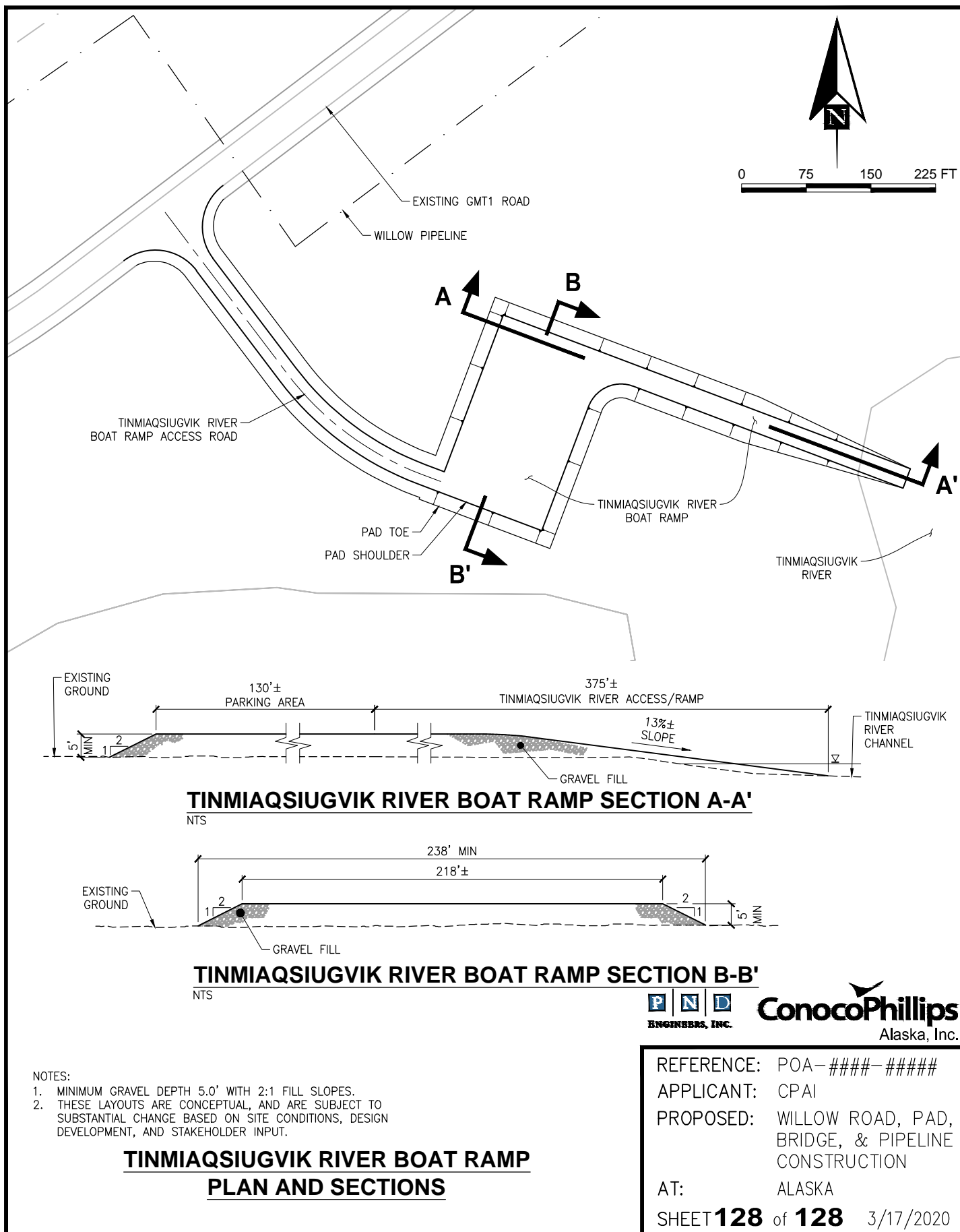
1. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
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JUDY CREEK BOAT RAMP PLAN AND SECTIONS



ConocoPhillips
Alaska, Inc.

REFERENCE: POA-####-####
APPLICANT: CPAI
PROPOSED: WILLOW ROAD, PAD,
BRIDGE, & PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **127** of **128** 3/17/2020



ConocoPhillips Alaska, Inc.
Department of the Army Permit Application
Willow Development
North Slope, Alaska

Applicants Proposed Mitigation Statements

Background:

The U.S. Army Corps of Engineers (USACE) and the Environmental Protection Agency (EPA) issued regulations that govern national compensatory mitigation policy for activities in waters of the U.S., including wetlands, authorized by USACE permits. The final mitigation rule was published in the federal register on April 10, 2008 and became effective on June 9, 2008. The final rule establishes standards and criteria for the use of appropriate and practicable compensatory mitigation for unavoidable functional losses of aquatic resources authorized by USACE permits (33 CFR Part 332). Additionally, the rule requires new information to be included in USACE permit applications and public notices to enable meaningful comments on applicant-proposed mitigation. In accordance with 33 CFR Part 325.1(d)(7), "For activities involving discharges of dredged or fill material into waters of the U.S., the application must include a statement describing how impacts to waters of the United States are to be avoided and minimized. The application must also include either a statement describing how impacts to waters of the United States are to be compensated for or a statement explaining why compensatory mitigation should not be required for the proposed impacts." For additional information, the final mitigation rule can be viewed at: http://www.usace.army.mil/cw/cecwo/reg/news/final_mitig_rule.pdf.

Mitigation is a sequential process of avoidance, minimization, and compensation. Compensatory mitigation is not considered until after all appropriate and practicable steps have been taken to first avoid and then minimize adverse impacts to the aquatic ecosystem. Please provide your proposed avoidance, minimization, and compensatory mitigation below:

Applicant's Proposed Mitigation (attach additional sheets as necessary):

1. Avoidance of impacts to waters of the U.S., including wetlands:

Please describe how, in your project planning process, you avoided impacts to waters of the U.S., including wetlands, to the maximum extent practicable. Examples of avoidance measures include site selection, routes, design configurations, etc.

The Willow Development (Project) has been located where economically recoverable oil and gas resources are found and was specifically sited in a location that optimizes not only resource recovery, but also avoidance and minimization of adverse impacts to wetlands and other resources. Because the Project drillsites must be built in the vicinity of the mineral resource to be extracted, total avoidance of impacts to WOUS is not practicable. However, ConocoPhillips Alaska, Inc. (CPAI) has taken measures to avoid impacts to WOUS to the maximum extent practicable through Project siting and design. Proposed mitigation measures specific to avoidance of impacts to WOUS are described below. Additional proposed mitigation measures pertaining to all physical, biological, and social environmental resources are described in the attached Project Avoidance and Minimization Measures table.

Facility Design

CPAI has designed the Project with the minimum pad size necessary to produce the discovered oil, within the economic and technological constraints of North Slope oil development. This includes use of directional drilling to reduce the overall pad footprint and avoid the need for additional drillsite pads and associated roads and pipelines. The drillsite footprint has been further minimized through the use of 20-foot (instead of 30-foot) wellhead spacing to reduce the overall gravel footprint for drillsite pads. Other avoidance measures include (1) minimizing the water source access pads while providing sufficient space for vehicles to access the water sources and safely turn around and (2) removing the airstrip approach lighting access facilitated by use of light-emitting diode (LED) lights in airstrip lighting, which require less frequent access for maintenance. A secondary airstrip access road was also removed to reduce wetlands footprint and potential for impacts to caribou movement.

Drillsite Bear Tooth 4 (BT4) Relocation

During the Environmental Impact Statement (EIS) alternatives development process, CPAI considered and incorporated Project refinements to avoid impacts to WOUS and associated resources. At the request of the Bureau of Land Management (BLM) and cooperating agencies, CPAI evaluated moving the BT4 drillsite out of the Teshekpuk Lake Caribou Habitat Special Area (K-5) and east of the Kalikpik River. While infrastructure and development are allowed within the K-5 area, the agencies suggested locating the drillsite outside of this area if practical. CPAI accommodated this request. The shift of the BT4 drillsite caused another evaluation of the road route between Bear Tooth 2 (BT2) and BT4, resulting in the elimination of a bridge over the Kalikpik River. The relocation reduces the overall gravel footprint and reduces impacts to caribou habitat. The removal of 20 acres of fill from the K-5 area resulted in an overall Project footprint reduction of 1.4 acres.

Road Design

Gravel roads will be built to the minimum width necessary for adequate operations and safety. The Project will avoid the need for additional gravel fill by minimizing the road footprint through use of a 32-foot surface width and a horizontal (H) to vertical (V) ratio of approximately 2H:1V for most Project roads. Roads to the water source access pads, airstrip, Bear Tooth 3 (BT3), BT4, and Bear Tooth 5 (BT5) have been reduced from 32 to 24 feet wide at the crown and from 61 to 53 feet wide at the base. Roads designed with a smaller top (crown) surface avoid additional fill placement where wider roads are not required. CPAI is proposing a 25-mile-per-hour (mph) speed limit, down from 35 mph, as a voluntary best management practice (BMP) along these 24-foot-wide road segments. The BMP is intended for health, safety, and environmental purposes, including to reduce potential impacts to vegetation from fugitive dust and to wildlife.

Following road route selection, CPAI has continued to advance engineering for the Project to further avoid and minimize impacts. In March 2019, CPAI further optimized the road alignments by incorporating topographic data gathered in summer 2018. Changes to the road alignments were made to avoid wetlands that are permanently inundated (H class water regime) or located within 500 feet of fish-bearing waters. For example, the intersection between the Bear Tooth 1 (BT1) and BT3 access roads was realigned and shifted west to locate the BT1 road outside of the 500-foot buffer of swale 2, an anadromous waterbody. These changes were made in locations where design constraints will not be compromised.

Avoid Creation of Standing Water

CPAI has designed the Project infrastructure to avoid the creation of standing waterbodies. Culvert placement and design will incorporate the findings of fish surveys and hydrologic modeling. If excess standing water is observed, CPAI will follow standard North Slope operating practices and insert additional culverts into the roadbed as needed.

Stream Crossing Designs

Culverts and bridge structures will sustain both low and high water flows, accommodate fluctuating water levels, and maintain circulation, including during flood periods. CPAI proposes construction of seven bridges as part of the Project. Bridges and river crossings will be located at narrow river sections, where practicable, to avoid placement of gravel fill and to minimize the number of piers/pilings below the ordinary high water (OHW) mark of the waterbodies crossed. Willow Creek 4a and Willow Creek 8 will have clear-span bridges. Bridges over Judy Creek, Fish Creek, Judy Creek Kayyaaq, Willow Creek 2, and Willow Creek 4 will include intermediate steel pile pier groups positioned approximately 40 to 70 feet apart. All bridges will be designed to maintain a bottom chord clearance of at least 4 feet above the 100-year design flood elevation, or at least 3 feet above the highest documented flood elevation, whichever is higher. Additionally, the Judy Creek and Fish Creek bridges will be designed to maintain bottom chord clearance of at least 13 feet above the 2-year design flood elevation (open water) to provide vessel clearance.

Culverts will be installed at defined channels to maintain hydrologic flow and as needed to maintain natural surface drainage to mitigate the risk of sheet flow interruption and thermokarsting. The estimated spacing of culverts is every 1,000 feet. However, CPAI (or its contractor) will walk the road alignment prior to construction to optimize final culvert locations, noting low areas where culverts are needed, and will review the data with regulatory agencies for concurrence. The culverts will be installed per the final design prior to breakup of the first construction season. Exact placement will be adjusted based on a field survey of local, in-field drainage patterns and additional culverts may be placed after breakup as site-specific needs are further assessed with regulatory agencies.

At Fish Creek and Judy Creek, pipelines will be placed on structural steel supports attached to the bridge girders, below the bridge deck. This will avoid placement of pipeline vertical support members (VSMs) below OHW at these creek crossings.

Use of Ice Roads and Pads

CPAI proposes the use of single-season ice roads to support winter construction of gravel roads and pipelines to avoid the need for additional gravel roads for construction. This includes avoiding construction of gravel road access to the proposed mine sites. Ice roads will be built only after the ground surface is frozen sufficiently to support the weight of heavy equipment without damaging the underlying tundra. The ice roads will be constructed of at least 6 inches of ice/compacted snow prior to use to protect the underlying vegetation and terrain. Ice roads will be routed to avoid shrub areas and large areas of tussock tundra to the extent practicable. All required permits will be obtained for ice road/pad construction and operation.

CPAI proposes the use of single-season and multiseason ice pads to support Project construction and avoid the need for permanent fill to support temporary activities. These include use of ice pads to house construction camps; to stage construction equipment; to provide short-term stockpiling of gravel and overburden during construction activities; and to support construction activities at bridge crossings, along the pipeline alignment, at the horizontal directional drill (HDD) crossing of the Colville River, and at other locations as needed near the proposed infrastructure. Like ice roads, ice pads will be built to avoid shrub areas and large areas of tussock tundra to the extent practicable and protect the underlying vegetation and terrain. Multiseason ice pads will be built in one winter, maintained over summer, used the following winter, and then allowed to melt. Thus, no single multiseason ice pad will last longer than 18 to 20 months.

Use of Existing Infrastructure

CPAI proposes the use of existing infrastructure to the maximum extent practicable, thereby eliminating the need to place fill for larger gravel pads and additional pipelines to support Project construction and operations. These include:

- Use of existing camp space at Alpine, at the Kuukpik Pad, and in Kuparuk to support Project construction
- Use of existing Alpine infrastructure, including warehouse space, a valve shop, a fleet shop, tanks, and emergency response equipment
- Use of existing Oliktok Dock, avoiding the need to construct a nearshore staging area (NSA) to accommodate Willow Central Processing Facility (WCF) and drillsite module transport to the Project area and therefore reducing the acreage of impact at the Willow gravel mine
- Use of the existing sales oil pipelines to transport oil produced by the Project from a tie-in pad near Colville Delta 4 North (CD4N) to the Trans-Alaska Pipeline System (TAPS) near Deadhorse, Alaska
- Use of existing pipeline VSMs and horizontal support members (HSMs) between CD4N and the Alpine Central Processing Facility (ACF) at Colville Delta 1 (CD1) to support the proposed diesel pipeline
- Use of an existing seawater treatment plant

In addition, VSMs for the pipelines from the WCF to the drillsites will be sized with sufficient room to allow for additional future pipeline installation. The horizontal span of the VSMs will be sufficient not only to accommodate the proposed Project pipeline infrastructure but will have space available for future pipelines. This design will allow CPAI to avoid future wetland impacts should additional National Petroleum Reserve-Alaska (NPR-A) projects be considered.

Winter Construction

CPAI will conduct gravel mining activities in winter to avoid the need to construct a gravel access road to the proposed gravel mine. Conducting mining activities in winter also allows short-term stockpile of overburden and mined gravel on ice pads to avoid the need for constructing a gravel pad, which would require placement of fill in WOUS.

Gravel placement for road and pad construction and development activities will occur in the winter months when wetlands are frozen and covered by snow and ice to minimize impacts to flow processes and wildlife, although alternative schedules may be considered through consultation with BLM and other applicable regulatory agencies. Construction will occur in areas sparsely inhabited by large fish and not during times when migratory fish are moving to and from freshwater habitats.

Construction activities such as VSM installation for pipelines will be drilled from ice roads to minimize ground disturbance and associated water resources. VSM drill cuttings will be temporarily stored on ice and removed to the gravel mine site prior to spring breakup. Power and messenger cable trenches will be dug in winter and soils will be temporarily sidecast onto plywood, plastic sheeting, or an ice pad adjacent to the trench. This will avoid a discharge of fill material into WOUS associated with sidecasting of soils as sidecasting will not change the bottom elevation of WOUS, convert WOUS to upland, or result in the loss of wetland function.

Avoid Use of Power Poles

CPAI has designed the Project so that all power lines and fiber-optic cables will be hung underneath the VSMs using messenger cables to avoid the need to install power poles, thereby eliminating the potential impact to vegetation and wetlands as well as reducing the potential for bird strikes and avoiding the creation of perches for predators.

The total amount of avoided gravel fill, in acres, is presented in Table 1.

Table 1. Acreage of Quantifiable Avoidance Measures

Measure	Acres Avoided ^a
Facility design including use of directional drilling	160.0
Road fill avoidance by designing a narrower top surface	40.2
20-foot well spacing avoids additional gravel fill	40.0
Use of 2H:1V side slopes avoids additional gravel fill	50.8
Use of shared facilities (camps, seawater treatment plant, tanks, warehouses, maintenance shops, etc.) avoids need for additional gravel fill	73.3
Material site access via ice road instead of gravel (3.7 miles × 61 feet wide)	27.4
Use of existing facilities (Oliktok Dock and 12-acre staging pad) avoids the need for an NSA	24.8
Reduction in gravel mine site footprint based on avoidance of need to mine 400,000 cy of gravel to construct NSA	6.8
Use of multiseason ice pads avoids need for permanent fill to support temporary activities	70.0
Removal of the airstrip lighting access road and secondary airstrip access road avoids need for gravel fill	5.5
BT4 relocation outside of the BMP K-5 area avoids gravel fill and a bridge across the Kalikpik River	1.4
Avoidance of permanently inundated wetlands	8.1

Table 1. Acreage of Quantifiable Avoidance Measures

Measure	Acres Avoided ^a
Avoidance of fish-bearing waters (i.e., BT1-BT3 intersection realignment, relocation of the West Bank Colville River HDD Transition Pad)	19.6
Use of existing sales oil pipelines from CD4N avoids fill for VSMs	0.3
Power pole avoidance	0.1
Pipelines attached to Judy and Fish Creek bridges avoids VSMs below OHW mark	<0.1
Total avoidance	528.3

^a Values are approximate and subject to change.

Notes: BMP: best management practice; BT: Bear Tooth; CD4N: Colville Delta 4 North; H: horizontal; HDD: horizontal directional drilling; NSA: nearshore staging area; V: vertical; VSM: vertical support member.

2. Minimization of unavoidable impacts to Waters of the United States, including wetlands:

Please describe how your project design incorporates measures that minimize the unavoidable impacts to waters of the U.S., including wetlands, by limiting fill discharges to the minimum amount/size necessary to achieve the project purpose.

Greater Mooses Tooth 2 (GMT2) Connected Roadway Impact Minimization

Because of the remote location of the Project, the proposed GMT2-connected roadway design reduces overall environmental and socioeconomic impacts and safety risks.

The roadway connection to GMT2 reduces the overall gravel volume by approximately 0.5 million cubic yards over a design that does not include a connected roadway. Gravel road access to Alpine by way of Greater Mooses Tooth Unit (GMTU) allows for a reduction in the overall gravel volume by allowing the Project to leverage existing Alpine infrastructure, which minimizes the WCF and Willow Operations Center (WOC) pad sizes and thicknesses. It also avoids the need for additional fill at the ACF at CD1 because of the ability to share a single, heavy-duty fleet shop and warehouse and maintenance space and at GMT2 to stage equipment for annual ice road construction. Reducing the amount of gravel required will also minimize impacts at the mine site.

Without a roadway connection, the volume of fresh water required would be approximately 40 percent greater over the life of the Project because of the need for annual ice roads. Thus, a road connection to GMT2 will minimize activities near freshwater lakes in the area.

The roadway design between GMT2 and Willow will include a bridge at Willow Creek 2, culverts or culvert batteries at swale crossings, and cross-drainage culverts sufficient to maintain hydrologic patterns and minimize impacts on the watershed. The culverts will be strategically placed by walking the road route and adjusting the number and location, as necessary to reduce ponding or inundation, based on observations during the first season spring breakup event.

The proposed roadway connection will result in approximately 7,500 fewer aircraft (rotary, fixed wing) trips than an alternative without a road connection to GMT2. The lower number of aircraft trips will minimize potential disturbance to subsistence hunters and residents of Nuiqsut.

The road will be separated from the pipeline by a minimum of 500 linear feet, where practicable, and the pipeline will be elevated to a minimum of 7 feet to ensure free caribou movement. CPAI assessed one pipeline that was constructed in accordance with the 7-foot minimum height requirement and found that as-built heights ranged from 7 feet to 18 feet, minimizing impacts to caribou movement and allowing for easier travel by humans and other wildlife (CPAI response to Request for Information [RFI] 56).

The road between GMT2 and Willow will be a minimum of 5 feet high with 2H:1V side slopes to protect the permafrost. The road will have a speed limit restriction of 35 mph and traffic will stop when caribou are crossing the road. Furthermore, traffic levels during operations are predicted to average fewer than 15 vehicles per hour. Based on ground vehicle traffic estimates provided to BLM in November 2019 (CPAI 2019), CPAI estimates that there will be approximately 55,000 ground trips annually during field operations, which equates to approximately 6.2 trips per hour. Additionally, only approximately one-third of those trips are anticipated to occur on the road between GMT2 and Willow (approximately 20,440 trips annually). These trips will be weighted toward the resupply road season (Alpine Resupply Road, January through April). The remaining trips will occur along the drill site access roads.

If Willow were to be developed without an all-season road connection to GMT2, then in cases of acute medical emergencies, personnel evacuations would be solely reliant on the Willow airstrip. CPAI records for 2009 through 2013 show that air travel at Alpine is restricted for 13 to 22 percent of each year, due mainly to weather. The connected roadway design will provide access to airstrips outside of Willow, should the weather demand it, for personnel evacuation.

A roadway along the pipeline between Willow and GMT2 will minimize the risk of undetected pipeline leaks and/or spills over a span of approximately 10 miles. The adjacent roadway will also provide a safe and expedient means of access to the pipeline for daily visual inspections of these pipelines to detect leaks or other problems that could cause a spill and for response in the event of a pipeline spill. In the event of a spill or other emergency event, gravel road access will reduce tundra damage associated with low-ground pressure vehicles or all-terrain vehicle (ATV) response traffic. Finally, road access will provide reliable ability to mobilize an additional relief rig.

A gravel road connection between Willow and GMT2 will allow CPAI to improve response time and provide mutual aid in the event of a fire, medical, or spill response at Willow, at Alpine, or in Nuiqsut. Road access to Willow from Nuiqsut will also enable the Nuiqsut and North Slope Borough (NSB) search-and-rescue organizations to have better access to the area to assist with rescue operations to the west of Nuiqsut. CPAI will coordinate with these organizations to provide access and resources for these situations.

Road Alignment Optimization

CPAI selected the proposed road routes to minimize the overall gravel fill footprint. Beginning in 2017, CPAI identified and screened road route options to minimize potential environmental impacts, including impacts to WOUS. Twenty-two road segments and eight potential road alignments were initially developed and screened based on several factors, including total road mileage and acreage in WOUS; a preference to avoid higher-value wetlands; integrated terrain unit habitat and wetlands mapping; hydrology studies, including minimization of the number of stream crossings and potential stream crossing impacts evaluated based on the estimated number of pier groups required; wildlife, avian, and

fish studies; subsistence survey data; and other BMPs and agency guidance as appropriate¹. CPAI's proposed alignment minimizes wetland impacts while balancing other environmental tradeoffs, including compliance with the 2013 Integrated Activity Plan (IAP) BMPs by:

- Providing the shortest road alignment from the GMTU to the proposed Willow facilities
- Providing the shortest road alignment between the WCF and drillsites
- Minimizing the length of the Judy Creek bridge (420 feet)
- Minimizing the road footprint through optimization of topography by locating the road on generally higher, drier ground

It also minimizes impacts to WOUS by selecting optimal stream crossings to minimize bridge crossing lengths and the gravel footprint within floodplains and adjacent wetlands. The proposed road alignment avoids placement of Project infrastructure in the 3-mile-wide Fish Creek setback established by IAP BMP K-1. Following road route selection, CPAI has continued to advance engineering for the Project to further avoid and minimize impacts. Updates were made to estimates of bridge lengths with specific focus on the Fish Creek crossing, reducing the bridge length from the June 2018 concept of 1,100 feet to the proposed length of approximately 420 feet. Road alignments have been further optimized to avoid areas within 500 feet of fish-bearing waters and permanently inundated wetlands.

Pipeline Routing

Pipelines will be designed to minimize redundant parallel pipelines to the extent practicable. For example, infield pipelines from BT4 will connect to BT2 infield pipelines at BT2; the BT2 infield pipelines will then tie into BT1 pipelines at BT1; and BT1 infield pipelines will connect with the WCF. Additionally, the Willow export pipeline will tie into the existing Alpine Sales Oil Pipeline at the Alpine CD4N tie-in pad to connect the Project to the TAPS. These measures minimize the number of parallel pipe racks and VSMs needed throughout the field and also minimize the number of pipelines on each pipe rack.

New pipeline VSMs for sections parallel to existing pipelines will be aligned to match existing VSMs where possible, to avoid a picket-fence effect. Where possible, roads will be constructed at least 500 feet from pipelines to minimize caribou disturbance and prevent excessive snow accumulation from snowdrifts and snow removal.

Equipment

The Project has been designed to reduce impacts from equipment by using machinery and techniques to minimize wetland impacts. This includes machines with specially designed wheels or tracks, and the use of mats under heavy machines to reduce wetland surface compaction and rutting. The construction of the Project will conform to standard North Slope project industry practices and will be subject to numerous other permitting and regulatory requirements including, but not limited to, oil spill prevention and contingency plans and appropriate tundra travel restrictions. Specialized equipment will be used to construct and maintain ice roads so that construction can occur during the winter months to avoid associated impacts. CPAI will use approved tundra travel vehicles to support construction and operations

¹ Based on the ConocoPhillips Road Route Screening Process Memo submitted to USACE and BLM on June 7, 2019.

activities when access is required off-pad. Off-road vehicle operators will be trained to avoid tight turns on tundra, minimizing the risk of tearing or otherwise disturbing tundra.

Thermal Protection

Gravel roads and pads will have a minimum thickness of 5 feet. This thickness will maintain a stable thermal regime by insulating the underlying tundra and offsetting the loss of insulating effect caused by compression of the vegetated tundra below the gravel. CPAI will also elevate heated buildings or structures on pilings to prevent or reduce heat transfer to underlying soils and preserve the thermal integrity of the permafrost. Finally, well conductor piles and thermosyphons will be installed around wells to remove unavoidable heat transfer from wellbore fluids. Pipelines at the HDD crossings of the Colville River will be installed with insulation and placed within outer pipeline casing to inhibit heat transfer to permafrost.

Erosion Control

CPAI will prepare and implement an erosion control plan, similar or supplemental to the Alpine Facilities Erosion Control Plan, to detail the ways in which it will prevent and mitigate erosion that could impact terrestrial and aquatic environments. The plan will include CPAI's operations, monitoring, and maintenance procedures that detail the actions CPAI will undertake to monitor, maintain, and, if needed, remediate gravel fill impacting surrounding tundra and wetlands.

The Facility Erosion Control Plan will contain snow removal and dust control measures. During operation, gravel roads will be watered to minimize dust and maintain integrity of the roads. CPAI implements the following procedures during dust control activities:

- Conducts annual training for dust control regarding permit stipulations, application procedures and techniques, identification of dust control areas, and location of permitted water sources
- Reduces dust control activities when precipitation (rain, snow, frost, dew, fog, etc.) provides adequate coverage
- Applies proper amount of water at appropriate rates of application to avoid the creation of localized erosion due to surface water runoff
- Collects water for dust control activities from permitted raw water sources
- Applies proper dust control frequency to individual facilities

Snow removal measures will include the use of snow-blowing equipment to minimize gravel carryover to the tundra and the placement of cleared snow in designated areas. The Facility Erosion Control Plan will discuss snow removal and gravel deposition removal. CPAI selects snow push areas annually, based on avoiding areas of thermokarst, proximity to waterbodies, and evaluating areas used in the previous year.

During breakup or periods of heavy precipitation, excess water may threaten the integrity of existing roads and pads, increase the risk of gravel washouts, and impede safe operations. Temporary sumps and diversion structures may be constructed to collect stormwater on the pad. The stormwater will be inspected for petroleum sheen prior to discharge to tundra.

- If petroleum sheen or other contaminants are observed, the water will not be discharged to tundra, but instead will be evaluated for hydrocarbon recovery, beneficial reuse, or underground injection.

- If discharged to the tundra, a filter sock or other adequate filtration/settling device will be used to collect fines and prevent sedimentation onto the tundra or into streams.
- Additionally, dispersing boards may be placed at the discharge end of the hose to ensure that the tundra and vegetation are not damaged during the discharge.
- The discharge point will be inspected regularly and moved if needed to prevent erosion.
- The pump will be placed within a drip pan to catch any oil/fuel leaks.
- Temporary sumps, well points, or similar devices will be installed when needed to collect stormwater runoff on the pad.

Wastewater Disposal

CPAI will minimize surface discharge of wastewaters through use of a disposal well, including zero discharge of produced water and drilling wastes to prevent soil surface erosion, changes in drainage patterns, and thermokarst erosion. Treated domestic wastewater will be discharged under Alaska Pollutant Discharge Elimination System (APDES) General Permit AKG332000 only in an emergency. Produced water will be re-injected into the reservoir and will not be discharged to surface lands, surface waters, or marine waters.

Freshwater Sources

To meet freshwater needs, CPAI is proposing a constructed freshwater reservoir (CFWR) in the drainage basin of Lake M0015 and Lake R0064 to ensure a reliable source of fresh water for the Project while minimizing the need for water withdrawals from Willow-area lakes. The CFWR will include a perimeter berm, a connecting surface channel to Lake M0015, and a weir and fish exclusion screen designed to limit fish access to the CFWR and prevent entrainment of fish. A flow control gate and valve will allow CPAI to restrict and reduce the velocity of flow into the CFWR based on monitoring of water levels in Lake M0015 and the lake outlet into Willow Creek 3 as adaptive management to minimize impacts if necessary. However, CPAI does not anticipate that water levels in Lake M0015 or summer flows in Willow Creek 3 would be affected by construction of the CFWR.

Mining Plan

CPAI has minimized mining-related impacts by designing the gravel mine to the minimum size necessary to construct the proposed Project. For example, since Project inception, CPAI has reduced the size of the proposed mine from approximately 230 acres to approximately 150 acres, a reduction of approximately 80 acres.

Mining disturbance will generally occur incrementally over the construction phase. Overburden removed will be reused within the gravel mine sites to minimize the overall disturbance footprint. Inorganic overburden material will be used to create water diversion as needed around the perimeter of each mine site. These dikes will prevent surface water flow into the mine, help maintain thermal stability of permafrost adjacent to the mine footprint, and safeguard the stability of the mine walls during mine operation. The dikes will be removed to within 1 foot of the original ground surface elevation on closure.

When the mine sites are no longer needed as a gravel source, they will be rehabilitated. During rehabilitation, the mine sites will be allowed to fill with water. As a result, mining activities will result in only a temporary impact as existing wetlands will be converted to a lacustrine waterbody.

Spill Prevention and Response

The Project has been designed to mitigate spills with spill prevention measures and spill response capabilities as described in detail in the Willow Development Project Description. Spill prevention and response measures that will be used during construction, drilling, and operations will be outlined in an Oil Discharge Prevention and Contingency Plan (ODPCP) and a Spill Prevention, Control, and Countermeasure (SPCC) Plan. CPAI designs and constructs pipelines to comply with applicable state, federal, and local regulations. In addition, CPAI will go beyond those minimum requirements. Pipeline valves will be installed on produced fluid pipelines at each side of the Judy Creek and Fish Creek crossings. Vertical loops or valves will be employed on the sales oil pipeline crossing of the Tiñmiaqsiugvik River and on each side of the segment crossing the Nigliagvik Channel, Nigliq Channel, and Lakes L9341 and L9323. Valves and vertical loops will minimize potential spill impacts in the event of a leak or break and reduce subsistence user concerns related to contamination downstream from the Project.

CPAI will use two methods of leak detection for the seawater and diesel pipeline crossings under the Colville River: (1) leak detect mass balance (primary), and (2) optical leak detection (secondary, within casing). In addition, pipelines at the HDD crossings of the Colville River will be inside a high-strength casing pipe. Simultaneous failure of both the pipeline and the associated casing pipe is highly unlikely. If diesel fuel or seawater leaked from the pipelines, it would be captured within the space between the outer wall of the pipelines and the inner wall of the high-strength casing pipe, rather than reaching the subsurface river environment. This design is analogous to secondary containment provided as a spill prevention technique for storage tanks.

The potential of corrosion occurring at road crossings will be reduced through pipeline design and monitoring. CPAI has and will continue to implement extensive corrosion control and inspection programs. These include ultrasonic inspection, radiographic inspection, coupon monitoring, metal loss detection pigs and geometry pigs (applicable to pig-capable pipelines), and infrared technology. The inspection programs are American Petroleum Institute (API) Standard 570-based programs that focus inspection efforts on areas of greatest potential for spills.

CPAI will implement the ODPCP and SPCC Plan to minimize accidental oil spill impacts. Spill response equipment will be pre-staged at strategic locations within the Project area as outlined in the ODPCP for an initial response. The threat to rivers and streams from a possible pipeline spill will be minimized by quickly intercepting, containing, and recovering spilled oil near the waterway-pipeline crossing points. Project roads will be used for access and staging for spill response.

Snow that contains spill residue, drill cuttings, or other contamination will be hauled to a snow melter or a temporary storage area for contaminated material to await further treatment. Similarly, ice roads and pads constructed during winter are cleaned of any materials and residual contamination to avoid discharging to the wetlands or waterbodies.

Subsistence

During design of the Project, CPAI consulted with the local community on the proposed Project features including roads and pipelines. This included consultation with the Kuukpikmuit Subsistence Oversight

Panel (KSOP), Native Village of Nuiqsut, Kuukpik Corporation, Nuiqsut whaling captains, and Nuiqsut public to mitigate potential impacts to subsistence activities.

The Project is located outside of the high-density calving areas for the Teshekpuk Caribou Herd and overlaps only slightly with the area of medium-density calving; some caribou migrate through the Willow area but fewer than 13 percent of collared Teshekpuk Caribou Herd caribou crossed the footprint of the proposed roads and pads in the Willow area. Similarly, subsistence use in the Willow area is relatively low, particularly on an annual basis. While 73 percent of Nuiqsut harvesters have reported using the Willow area over a 10-year period (1995 to 2006) for all resources, only 18 percent use the area on an annual basis (SRB&A 2010). More recently, of the 1,497 caribou use areas documented between 2008 and 2015, only 45 overlap the Willow area and respondents reported harvesting caribou from the Willow area in only 2 years (2008 and 2014) (SRB&A 2017). In those years, the harvests accounted for only 1 percent and 3 percent of the total caribou harvest, respectively.² A road connection between Nuiqsut and Willow may change use patterns in the future.

Based on stakeholder feedback, CPAI has modified its proposed Project to further minimize the potential for impacts to subsistence. For example, CPAI has relocated the WCF, WOC, and airstrip farther east into an area with lower-density calving. In addition, CPAI has removed the previously proposed NSA for module delivery³ from the Project based on feedback from stakeholders concerned with potential impacts to subsistence use of the area.

Additional design measures and operational practices further minimize potential impacts to subsistence users. For example, new pipelines will be designed with a muted (non-shiny) coating to avoid bright flashes from sunlight that may deflect caribou. The design of pipelines and separation from gravel roads will further minimize impacts to caribou movement and potential effects on subsistence users. CPAI has included eight subsistence tundra access road pullouts along the Project roads. These pullouts will be located according to community input and vegetation type, but generally every 2.5 to 3.0 miles, and will allow local residents to access the area for subsistence use. Tundra access road pullouts will be designed taking into consideration community comments and lessons learned from Greater Mooses Tooth 1 (GMT1) and GMT2.

During operations at the current Alpine development, CPAI has developed processes to consult with subsistence users regarding planned oil and gas activities through local subsistence representatives and ice road monitors to avoid interference with subsistence activities. These coordination and communication efforts assist in minimizing Alpine-related impacts on subsistence activities and are expected to continue for the Project. Additionally, CPAI will continue to provide cultural awareness training for all Project employees and contractors and prohibit employees from participating in hunting and trapping activities while on “work status” to reduce the potential for increased competition for subsistence and recreational wildlife resources.

² The mine sites are not included in these statistics because they will exist for a comparatively short time.

³ Referred to as the module transfer island (MTI) in the Willow Master Development Plan Draft Environmental Impact Statement.

Additionally, there is a countervailing effect that roads will provide benefit to subsistence activities by providing access to subsistence areas that are currently accessible only to hunters during the winter with snow machines. In recent years, use of industry roads by truck for caribou hunting has become increasingly common in Nuiqsut, particularly for individuals who previously did not have access to alternative methods of transportation such as boats, ATVs, or snowmachines. As reported by Nuiqsut Subsistence Caribou Monitoring Study respondents, the use of trucks as the method to reach use areas has increased from 1 percent (2014) to 8 percent and 13 percent (2015 and 2016, respectively) (SRB&A 2017 and 2018), which corresponds to the completion of the Colville Delta 5 (CD5), GMT1, and Kuukpik Spur roads. In 2016, despite lower than average snow amounts (which typically affects the ability to hunt in the winter), the percentage of the harvest occurring during January and February increased over previous years, most likely due to the accessibility to the Spur Road (SRB&A 2018). Travel using cars or trucks on a defined road is generally safer than off-road travel via boats, snowmachines, and ATVs because cars and trucks are more stable, enclose the user, and have more built-in safety features.

Based on Nuiqsut stakeholder engagement, CPAI has voluntarily added construction of three subsistence boat ramps in the project area to provide local residents with improved river access. The three locations include the Tinmiaqsiugvik River near the existing GMT1 access road, Judy Creek at the proposed Willow BT1 access road crossing, and Fish Creek at the proposed BT4 access road crossing.

A detailed listing of all avoidance and minimization measures to be employed is included as an attachment to this statement.

3. Compensation for unavoidable impacts to waters of the U.S., including wetlands:

Please describe your proposed compensatory mitigation to offset unavoidable impacts to waters of the U.S., or, alternatively, why compensatory mitigation is not appropriate or practicable for your project. Compensatory mitigation involves actions taken to offset unavoidable adverse impacts to waters of the U.S., including wetlands, streams and other aquatic resources (aquatic sites) authorized by Corps permits. Compensatory mitigation may involve the restoration, enhancement, establishment (creation), and/or the preservation of aquatic sites. The three mechanisms for providing compensatory mitigation are mitigation banks, in-lieu fee of mitigation, and permittee-responsible mitigation. Please see the attached definitions for additional information.

CPAI is working to identify aquatic resource sites suitable for permittee-responsible compensatory mitigation to offset permanent unavoidable wetlands impacts of the proposed Project. CPAI is working with local stakeholders in Nuiqsut to identify compensatory mitigation options that would provide both environmental and social benefits to the community. If this effort is successful, CPAI will submit a mitigation plan to supplement this application.

Applicable USACE regulations provide that “Mitigation is an important aspect of the review and balancing process on many Department of the Army permit applications” 33 CFR Section 320.4(r)(1). The District Engineer “must determine the compensatory mitigation to be required in a DA permit based on what is practicable and capable of compensating for the aquatic resources functions that will be lost as a result of the permitted activity” (40 CFR Section 230.93(a)). All compensatory mitigation “will be directly related to the impacts of the proposal, appropriate to the scope and degree of those impacts, and reasonably enforceable” (33 CFR Section 320.4(r)(2)).

In the Alaska District, implementation of regulations governing compensatory mitigation is guided by a document called the “Alaska District Compensatory Mitigation Thought Process,” (Thought Process; USACE 2018). The purpose of the Thought Process “is to guide regulatory project managers through the thought process necessary to determine whether specific Project impacts will require compensatory mitigation, the determination of whether proposed mitigation is appropriate and practicable, and the determination as to when preservation will be considered as acceptable mitigation.”

As stated above, CPAI is working with local stakeholders in Nuiqsut to identify compensatory mitigation options that would provide both environmental and social benefits to the community. No mitigation banks or in-lieu fee programs are available for compensatory mitigation on the Alaska North Slope. CPAI’s efforts to develop appropriate and practicable compensatory mitigation are focused on discussing potential permittee-responsible mitigation with landowners in the community of Nuiqsut because Nuiqsut is the closest community to the Project and will be affected the most by Project impacts.

In addition, CPAI is focused on developing appropriate and practicable compensatory mitigation in Nuiqsut because Nuiqsut is in a watershed (Colville River Delta- Frontal Harrison Bay) that is directly connected to the Colville River. The Colville River is a crucial subsistence resource for the community. The Colville River Delta-Frontal Harrison Bay watershed has the largest acreage of existing impacts associated with permanent fill (see Table 3, below) of all the watersheds connected to the Colville River. For this reason, the Colville River Delta-Frontal Harrison Bay watershed seems to be the best candidate for compensatory mitigation options. The other watersheds impacted by the Project that have a connection to the Colville River have only negligible or no impacts from existing gravel fill.

Except for the Ugnuravik River watershed,⁴ the watersheds impacted by the proposed Project that don’t connect to the Colville River have less than 0.65% existing impacts. These impacts are primarily due to existing oil and gas development infrastructure.

While the ultimate result of CPAI’s efforts identify aquatic resource sites suitable for permittee-responsible compensatory mitigation remains to be determined, we provide the following Project information for consideration under steps A through C of the Thought Process (USACE 2018).

Step A: Identify the Watershed

The proposed Project will involve placing gravel fill in portions of ten 10-digit Hydrologic Unit Code (HUC) watersheds (Table 2, below).

⁴ Although it has more existing impacts, the Project will add negligible impacts to the Ugnuravik River watershed (1.2 acre) and the Ugnuravik River watershed does not connect to the Colville River.

Table 2. 10-Digit HUCs within Willow Fill Footprint

Watershed (10-Digit HUC)
Colville River Delta-Frontal Harrison Bay (1906030413)
Kachemach River (1906030411)
Kalikpik River (1906020508)
Kalubik Creek-Frontal Harrison Bay (1906030414)
Miluveach River (1906030412)
Outlet Fish Creek (1906020507)
Outlet Judy Creek (1906020505)
Simpson Lagoon-Frontal Beaufort Sea (1906040116)
Ublutuoch River (1906020506)
Ugnuravik River (1906040115)

Notes: HUC: Hydrologic Unit Code.

Step B: Identify Types and Extent of WOUS (Area and Function) Impacts by the Project

The ten 10-digit HUCs that will be impacted by the Project have experienced 0.24 percent overall disturbance from previous activities with no individual watershed exceeding 0.62 percent disturbance, except the Ugnuravik River watershed. Constructing the Project will include disturbance of 1.2 acre in the Ugnuravik River watershed to modify the existing CPF2 pad and upgrade existing Kuparuk River Unit roads, both of which will result in an overall reduction in impact by using existing infrastructure to the extent practicable. The 10-digit HUC identifications of these watersheds and the existing disturbance are shown in Table 3.

Table 3. Existing Disturbance

Watershed (10-Digit HUC)	Total Watershed Area (acres)	Existing Disturbance (acres)	Existing Disturbance (percentage of watershed)
Colville River Delta-Frontal Harrison Bay (1906030413)	303,614.3	474.2	0.16
Kachemach River (1906030411)	145,577.7	123.6	0.08
Kalikpik River (1906020508)	233,090.1	<0.1	<0.00
Kalubik Creek-Frontal Harrison Bay (1906030414)	115,859.0	722.3	0.62
Miluveach River (1906030412)	113,932.6	178.3	0.16
Outlet Fish Creek (1906020507)	137,576.9	87.6	0.06
Outlet Judy Creek (1906020505)	246,274.6	<0.1	<0.00
Simpson Lagoon-Frontal Beaufort Sea (1906040116)	195,738.9	863.6	0.44
Ublutuoch River (1906020506)	150,954.4	87.1	0.06
Ugnuravik River (1906040115)	77,253.8	1538.5	1.99
Total existing disturbance^a	1,719,872.3	4,075.2	0.24

Notes: HUC: Hydrologic Unit Code.

^a Values may not sum to totals because of rounding.

The total fill for Willow is 459.2 acres: 450.8 acres in jurisdictional WOUS and 8.4 acres in non-jurisdictional uplands. In addition, CPAI proposes to disturb 166.1 acres of WOUS through excavation and conversion of palustrine wetlands to lacustrine waterbodies for the gravel mine sites and CFWR. As shown below in Table 4, the proposed total disturbance for Willow, combined with existing disturbance (Table 3), will result in total percent disturbance ranging from 0.01 percent to 1.99 percent in each of the individual watersheds, and 0.27 percent across all ten watersheds.

Table 4. Total Watershed Disturbance with the Proposed Project

Watershed (10-Digit HUC)	Total Watershed Area (acres)	Existing Disturbance (acres)	New Willow Disturbance (acres) ^b	Total Disturbance (percentage of watershed)
Colville River Delta-Frontal Harrison Bay (1906030413)	303,614.3	474.2	2.2	0.16%
Kachemach River (1906030411)	145,577.7	123.6	2.5	0.09%
Kalikpik River (1906020508)	233,090.1	<0.1	29.6	0.01%
Kalubik Creek-Frontal Harrison Bay (1906030414)	115,859.0	722.3	1.0	0.62%
Miluveach River (1906030412)	113,932.6	178.3	1.2	0.16%
Outlet Fish Creek (1906020507)	137,576.9	87.6	64.2	0.11%
Outlet Judy Creek (1906020505)	246,274.6	<0.1	367.2	0.15%
Simpson Lagoon-Frontal Beaufort Sea (1906040116)	195,738.9	863.6	0.1	0.44%
Ublutuoch River (1906020506)	150,954.4	87.1	155.2	0.16%
Ugnuravik River (1906040115)	77,253.8	1538.5	1.2	1.99%
Total watershed disturbance with Willow ^a	1,719,872.3	4075.2	624.4	0.27%
		4,699.7		

Notes: HUC: Hydrologic Unit Code.

^a Values may not sum to totals because of rounding.

^b Acreages include 8.4 acres of fill in uplands but exclude temporary impacts and 0.8-acre sand slurry fill for VSMs. Acreages also include 166.1 acres of disturbance due to excavation for gravel mine sites and CFWR.

The Willow Master Development Plan Draft EIS states “Project wetland conditions in watersheds with less than 5 percent cover by impervious surfaces are good (i.e., close to reference conditions which were defined as the average condition of the three least impaired wetlands; Hicks and Larson 1997).” As shown in Table 4, above, none of the watersheds receiving permanent gravel fill as part of the Project will approach the 5 percent threshold of total disturbance. Therefore, the Project, in combination with existing disturbance, will not result in any of the affected watersheds being degraded past reference conditions. Although placement of permanent fill will result in some localized functional loss, the Project will not result in a degradation of overall watershed function.

For reasons considered and discussed during evaluation of the recently approved GMT2 development, it may not be appropriate to complete a functional assessment of aquatic resource impacts using the standard method. The standard assessment method lacks the sensitivity to measure the various impacts likely to result from the Project. For example, it cannot accurately measure degrees of functional loss from placement of gravel fill associated with properly designed stream crossings. Likewise, it does not

accurately measure degrees of functional uplift gained by restoring damaged or degraded crossings, or compensatory mitigation projects that are considered out-of-kind. Stream restoration and culvert repair projects are specifically the types of mitigation projects that have been favored by the agencies. Additionally, the method does not evaluate the cultural and socioeconomic values associated with mitigation projects.

CPAI is evaluating out-of-kind and non-traditional options consistent with compensatory mitigation guidance stemming from a 2018 USACE/USEPA Memorandum of Agreement (MOA; USACE and EPA 2018). These options are appropriate and better serve the aquatic resource needs of the watersheds nearest Nuiqsut. These potential projects also address stakeholder concerns relating to traditional use and subsistence that are not evaluated in standard functional assessments. In order to meet the intent expressed in the MOA and provide meaningful compensatory mitigation that has support from the nearest impacted community, CPAI is using USACE's Thought Process to guide evaluation of Project impacts to WOUS and inform appropriate compensatory mitigation proposals. Based on consultation with agencies, CPAI understands that performing an aquatic site assessment is not necessary for the Project. However, CPAI is open to performing an approved aquatic site assessment if deemed necessary and appropriate by USACE for completing the compensatory mitigation analysis.

The gravel required for the Project will be sourced from a gravel mine with two gravel sites located in the Ublutuooh River (1906020506) watershed. Approximately 150 acres will be disturbed for construction of the mine sites. CPAI plans to reclaim the mine sites within 5 years of fill placement pursuant to a reclamation plan approved by local, state, and federal agencies with material site jurisdiction. During rehabilitation, the mine sites will be allowed to fill with water. As a result, mining activities will result in conversion of existing wetlands to a lacustrine waterbody. Similarly, 16.4 acres will be disturbed for construction of the CFWR. Similarly, this activity will result in conversion of existing wetlands to a lacustrine waterbody.

Step C: Identify How WOUS Impacts Relate to Mitigation Requirements by Regulation

Table 6-2 in the Willow Development Project Description provides the footprint of the Project in WOUS by National Wetlands Inventory (NWI) code. When impacts are determined to be more than minimal, fill placed in fish-bearing waters and jurisdictional wetlands within 500 feet of fish-bearing waters have been identified by the Thought Process (USACE 2018) as potentially requiring compensatory mitigation.

Table 5 shows the acres of permanently impacted jurisdictional wetlands and WOUS within 500 feet of fish-bearing waters by NWI code. The total footprint of permanent fill (gravel, sand slurry, or overburden) material in WOUS within 500 feet of fish-bearing waters is 38.7 acres (Table 5). Of the 38.7 acres within 500-feet of fish-bearing waters, only 7.0 acres of fill will be in WOUS within 500 feet of anadromous fish-bearing waters.

Development of new mine sites and excavation of the CFWR will result in 9.5 additional acres of impact to WOUS within 500 feet of fish-bearing waters, only 6.4 of which is within 500 feet of anadromous fish-bearing waters. As noted above, mining activities and CFWR construction will result in only a temporary impact as existing wetlands will be converted to lacustrine waterbodies.

Bridges and culverts will be constructed in consultation with the Alaska Department of Fish and Game (ADF&G) to ensure fish passage and to avoid impacts to sensitive areas.

Table 5. Total Acreage of Fill within 500 feet of Fish-Bearing Waters by NWI Type

NWI Code	Description	Gravel and Sand Slurry Fill (acres) ^a	Excavated Areas (acres)
PEM1/SS1B	Palustrine seasonally saturated persistent emergent/broad-leaved deciduous shrub meadow	16.7	7.8
PEM1/SS1D	Palustrine continuously saturated persistent emergent/broad-leaved deciduous shrub meadow	5.0	<0.1
PEM1/SS1E	Palustrine seasonally flooded-saturated persistent emergent/broad-leaved deciduous shrub meadow	1.3	—
PEM1F	Palustrine semi-permanently flooded persistent emergent meadow	7.2	—
PEM1H	Palustrine permanently flooded persistent emergent marsh	0.7	—
PSS1/EM1B	Palustrine seasonally saturated broad-leaved deciduous shrub/persistent emergent scrub	1.5	—
PSS1/EM1D	Palustrine continuously saturated broad-leaved deciduous/persistent emergent scrub	<0.1	—
PSS1/USB	Palustrine seasonally saturated broad-leaved deciduous shrub/unconsolidated shore	1.3	—
PSS1B	Palustrine seasonally saturated broad-leaved deciduous shrub scrub	0.9	0.2
PSS1C	Palustrine seasonally flooded broad-leaved deciduous shrub scrub	1.4	—
PSS1D	Palustrine continuously saturated persistent emergent meadow	0.4	—
PSS3B	Palustrine seasonally saturated broad-leaved evergreen scrub	1.8	—
PUBH	Palustrine permanently flooded unconsolidated bottom pond	<0.1	—
L1UBH	Lacustrine permanently flooded limnetic unconsolidated bottom lake	—	1.5
R2UBH	Riverine permanently flooded lower perennial stream	0.3	—
R2USC	Riverine seasonally flooded unconsolidated shore	0.3	—
Total within 500 feet of fish-bearing waters^b		38.7	9.5

Notes: HUC: Hydrologic Unit Code.

^a Includes fill footprint of gravel pads, gravel roads, and pipeline VSMs.

^b Values may not sum to totals because of rounding.

Additional information relevant to Step C of the Thought Process (USACE 2018) will be provided if and when a specific compensatory mitigation proposal is made for USACE review and evaluation.

4. References

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Willow Development
Project Avoidance and Minimization Measures

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/Minimized	Notes
Wetland Acres Avoided						
1	Avoidance	2013 IAP/ROD BMP E-5	Use of directional drilling to reduce the overall gravel footprint for drillsite pads.	Gravel infrastructure	160.0	Directional drilling allows for access to approximately three times the area of the reservoir from a given surface footprint
2	Avoidance	Project Description, 2013 IAP/ROD BMP E-1	Roads to the water source access pads, airstrip, BT3, BT4, and BT5 have been reduced from 32 to 24 feet wide at the crown and from 61 to 53 feet wide at the base. Roads designed with a smaller top (crown) surface avoid additional fill placement where wider roads are not required.	Gravel infrastructure	40.2	Reduction in average base width from 61 feet to 53 feet
3	Avoidance	Project Description	Use of 20-foot wellhead spacing (instead of 30-foot well spacing) to reduce the overall gravel footprint for drillsite pads.	Gravel infrastructure	40.0	Total gravel footprint not needed at all drillsites because of smaller wellhead spacing
4	Avoidance	Project Description	Use of 2H:1V side slopes (i.e., gravel road and pad embankment slopes) to reduce the Project's overall gravel footprint.	Gravel infrastructure	50.8	
5	Avoidance	Project Description, 2013 IAP/ROD BMP E-5	Shared use of existing equipment and facilities (e.g., camps, seawater treatment plant, warehouses, maintenance shops, emergency response equipment) to reduce the overall Project gravel pad footprint.	Gravel infrastructure	73.3	Estimated based on acreage differences between proposed Project and Alternative D and estimate of the footprint of the existing Kuparuk Seawater Treatment Plant
6	Avoidance	Project Description	Reduction in gravel mine footprint based on avoidance of need to mine 400,000 cy of gravel to construct NSA.	Gravel source	6.8	Estimated based on dimensions provided in the typical mine site sections as shown in the permit application drawings
7	Avoidance	Project Description	Use of single-season ice roads to support winter construction of gravel roads, pads, and pipelines to avoid the need for additional gravel roads for construction. This includes access to Tiŋmiasiuġvik mine sites via ice road instead of gravel.	Gravel infrastructure	27.4	Required gravel would be 3.7 miles × 61 feet wide at toe
8	Avoidance	Project Description, 2013 IAP/ROD BMP E-5	Use of the existing Oliktok Dock and staging pad for WCF and drillsite module offload to avoid the need to construct an NSA.	Construction	24.8	Avoidance of 12.8 acres of fill at NSA and 12.0 acres of fill for staging pad
9	Avoidance	Other Federal, State, or Local Requirements	Use ice pads, including multiseason ice pads, to support Project construction to avoid the need for gravel fill for temporary activities. These include use of ice pads to house construction camps; stage construction equipment; allow short-term stockpiling of gravel and mine site overburden during construction activities; and support construction activities at bridge crossings, along the pipeline alignment, at the HDD crossing of the Colville River, and at other locations as needed near the proposed infrastructure.	Construction	70.0	Total multiseason ice pad acreage
10	Avoidance	Project Description	Removal of the airstrip approach lighting access and secondary access roads from the proposed Project to reduce the gravel footprint.	Gravel infrastructure	5.5	Estimated based on footprint of features in the Draft EIS
11	Avoidance	Project Description, 2013 IAP/ROD BMP K-5	Locate drill site BT4 (and associated roads and pipelines) outside of the Teshekpuk Lake Caribou Habitat Area (BMP K-5 in BLM 2013), which will reduce the overall gravel footprint because of a shorter road alignment, eliminate need for a bridged crossing of the Kalikpik River, and avoid impacts to caribou habitat.	Gravel infrastructure	1.4	
12	Avoidance	Project Description	Avoidance of placement of fill in permanently flooded wetlands by locating Project infrastructure on higher, and relatively drier, areas when practicable. This practice applies to drillsites and other pads, road alignments, the new airstrip, and other project components.	Gravel infrastructure	8.1	
13	Avoidance	Project Description, 2013 IAP/ROD BMP E-2, USACE Mitigation Thought Process	Construct oil and gas facilities and other Project infrastructure more than 500 feet from fish-bearing waterbodies, to the maximum extent practicable. Only essential pipeline and road crossings will encroach on this minimum distance. For example, the intersection between the BT1 and BT3 access roads was realigned and shifted west to locate the BT1 road outside of the 500-foot buffer of swale 2, an anadromous waterbody.	Gravel infrastructure	19.6	
14	Avoidance	Project Description	Use of existing pipeline infrastructure including use of existing sales oil pipelines to transport oil produced by the Project from a tie-in pad near CD4N to the TAPS and use of existing VSMs and HSMs between CD4N and the ACF at CD1 to support the proposed diesel pipeline to avoid the need for additional VSMs and tundra disturbance.	Pipelines	0.3	

Willow Development
Project Avoidance and Minimization Measures

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/Minimized	Notes
15	Avoidance	Project Description, 2013 IAP/ROD BMP E-11	Suspend fiber-optic and power cables via messenger cable attached to HSMs to avoid additional fill associated with utility poles, reduce the potential for bird strikes, and avoid providing perches for predators.	Pipelines	0.1	
16	Avoidance	Project Description	At Fish Creek and Judy Creek, pipelines will be placed on structural steel supports attached to the bridge girders, below the bridge deck. This will avoid placement of pipeline VSMs below OHW mark at these creek crossings.	Pipelines	<0.1	
Wetlands Impact Minimization						
17	Minimization	2013 IAP/ROD BMP E-8	Gravel mine site design and reclamation will occur in consultation with appropriate federal, state, and NSB agencies. Mine design will minimize impacts to wildlife, air quality, and water resources and will include consideration of locations outside the active floodplain, potential for use for enhancing fish and wildlife habitat, and potential storage and reuse of sod/overburden for the mine sites or at other disturbed sites on the North Slope. Each mine site will be sited outside of the active floodplain to minimize impacts to fish, water resources, and other wildlife.	Gravel source		
18	Minimization	Project Description, 2013 IAP/ROD BMP E-8	When the mine sites are no longer needed as gravel sources, they will be rehabilitated. During reclamation, the mine sites will be allowed to fill with water. As a result, mining activities would not result in loss of WOUS but rather conversion of existing wetlands to lacustrine waterbodies.	Gravel source		
19	Minimization	2013 IAP/ROD BMP A-6	CPAI does not surface discharge any reserve pit fluids.	Waste		
20	Minimization	CPAI Best Practices, 2013 IAP/ROD BMP E-1	Roads are designed and will be constructed, maintained, and operated in ways to minimize environmental impacts and protect subsistence use areas and access. Gravel road alignments and pad layouts consider topography, maintenance of natural drainage patterns, and the effects of spring breakup and other potential flood events. Road and pad layout also avoid ponds, lakes, and streams to the extent practicable.	All		
21	Minimization	CPAI Best Practices, 2013 IAP/ROD BMP L-1	CPAI minimizes summer vehicle tundra access by restricting use to emergency response personnel or to permitted activities required by statute or regulation.	All		
22	Minimization	2013 IAP/ROD BMP B-2	The removal of unfrozen water from lakes and ice aggregate collection will be conducted consistent with BMP B-2.	Water withdrawal		
23	Minimization	2013 IAP/ROD BMP C-2	Overland moves, seismic work, and similar off-road, cross-country vehicle use will be conducted according to BMP C-2 to minimize impacts to streambanks, soil substrate, and vegetation.	Ice infrastructure		
24	Minimization	2013 IAP/ROD BMP C-3	Ice road waterway crossings will use low-angle approaches to protect streambanks. Waterway crossings reinforced with additional snow or ice ("bridges") will be removed, breached, or slotted prior to spring breakup to maintain normal spring runoff patterns and fish passage, and to protect vegetation adjacent to the crossings. All constructed ramps and bridges will be substantially free of debris.	Ice infrastructure		
25	Minimization	2013 IAP/ROD BMP C-4	Travel along streambeds will be prohibited unless it can be demonstrated that there will be no additional impacts from such travel to over-wintering fish or the invertebrates they rely on. Rivers, streams, and lakes will be crossed with ice infrastructure only at areas where waterbody or waterway ice has grounded, when practicable.	Ice infrastructure		
26	Minimization	2013 IAP/ROD BMP A-7	Produced water will be re-injected into the reservoir and will not be discharged to surface lands, surface waters, or marine waters.	Waste		
27	Minimization	CPAI Best Practices, 2013 IAP/ROD BMP E-12	CPAI has and will continue to use ecological mapping to assess wildlife habitat types to inform the design, placement, and development of permanent (i.e., gravel) infrastructure.	All		
28	Minimization	Project Description	Design and build a constructed freshwater reservoir to ensure a reliable source of fresh water for the Project while minimizing the need for water withdrawals from Willow-area lakes. The connecting surface channel to Lake M0015 will include a weir and fish exclusion screen designed to limit fish access to the reservoir and prevent entrainment of fish. A flow control gate and valve will allow CPAI to restrict and reduce the velocity of flow into the reservoir based on monitoring of water levels in Lake M0015 and the lake outlet into Willow Creek 3 as adaptive management to minimize impacts if necessary.	Water		

Willow Development
Project Avoidance and Minimization Measures

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/Minimized	Notes
29	Minimization	CPAI Best Practices	Gravel roads will be placed perpendicular to the general flow direction when crossing natural drainages to maintain the existing flow patterns and characteristics.	Gravel infrastructure		
30	Minimization	2013 IAP/ROD BMP E-6	CPAI will design and construct stream and swale crossings to ensure the free passage of fish, to minimize erosion, to maintain natural drainage characteristics, and to maintain impacts to natural stream flow. Bridges will be used to cross rivers and major streams.	Gravel infrastructure		
31	Minimization	2013 IAP/ROD BMP E-14	Stream crossings will provide for fish passage by ensuring that their designs comply with BMP E-14. Hydrologic and fish data are collected consistent with BMP E-14 to facilitate this design.	Gravel infrastructure		
32	Minimization	Other Federal, State, or Local Requirements	All culverts will be designed in consultation with ADF&G.	Gravel infrastructure		
33	Minimization	Project Description, 2013 IAP/ROD BMP E-6	Culverts will be installed as needed to maintain natural surface drainage to mitigate the risk of sheet flow interruption and thermokarsting. The estimated spacing of culverts is every 1,000 feet. However, CPAI (or its contractor) will walk road alignments prior to construction to optimize final culvert locations, noting low areas where culverts are needed, and will review the data with regulatory agencies for concurrence. The culverts will be installed per the final design prior to breakup of the first construction season, and additional culverts may be placed after breakup as site-specific needs are further assessed with regulatory agencies.	Construction		
34	Avoidance	CPAI Best Practices	Bridges and river crossings were located at narrow river sections, where practicable, to avoid placement of gravel fill and minimize the number of piers/pilings below the OHW mark of the waterbodies crossed.	Gravel infrastructure		
35	Minimization	CPAI Best Practices, 2013 IAP/ROD BMP E-6	Bridge abutments will be constructed from sheet pile to reduce the overall gravel footprint and protect the structures from embankment erosion and stream scour.	Construction		
36	Avoidance	CPAI Best Practices	Stockpiling gravel in WOUS will be avoided.	Gravel infrastructure		
37	Avoidance	CPAI Best Practices	Pipeline VSMs will be installed from ice roads and ice pads. VSM drill cuttings will be temporarily stored on ice and removed to the gravel mine site prior to spring breakup.	Construction		
38	Avoidance	Project Description	Cable trenches will be dug during the winter and trench materials will be temporarily sidecast onto plywood, plastic sheeting, or an ice pad to avoid discharge of fill in WOUS associated with sidecasting of soils.	Construction		
39	Minimization	CPAI Best Practices	Minimize heat transfer and impacts to permafrost from Project infrastructure on gravel pads by designing flare stack height to reduce radiant heating; filling the gap between well conductors and inner pipes with polyurethane foam; using thermosyphons adjacent to well rows and at-grade structures; and installing insulation below the foundation floors of heated, at-grade structures.	Construction and operations		
40	Minimization	CPAI Best Practices	Elevate on-pad heated buildings or structures using pilings, to the extent practicable, to prevent or reduce heat transfer to underlying soils and preserve the thermal integrity of the permafrost.	Facilities		
41	Minimization	CPAI Best Practices	Implement snow removal management measures to reduce the potential for gravel to be pushed off roads and pads during snow removal operations.	Construction		
42	Minimization	Other Federal, State, or Local Requirements, 2013 IAP/ROD BMP A-10	Implement dust control measures for gravel roads, pads, and mining operations to reduce fugitive dust that can settle on vegetation or snow, which could increase thermal conductivity (i.e., reduce albedo), lead to thermokarsting, and promote earlier spring thaw in affected areas.	Gravel infrastructure		
43	Minimization	Other Federal, State, or Local Requirements	Adheres to strict guidelines for travel on ice roads to avoid tundra damage, including ice road driver's training, establishing speed and weight limits, and installing delineators along both sides of the road.	Tundra travel		
44	Minimization	Project Description	Design pipelines to minimize redundant parallel pipelines to the extent practicable. For example, infield pipelines from BT4 will connect to BT2 infield pipelines at BT2; the BT2 infield pipelines will then tie into BT1 pipelines at BT1 for transport of materials to the WCF. This design minimizes the number of parallel pipe racks and VSMs needed throughout the field and the number of pipelines on each pipe rack.	Pipelines		

Willow Development
Project Avoidance and Minimization Measures

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/Minimized	Notes
45	Minimization	Project Description	Pipeline (e.g., diesel, seawater) at the HDD crossings of the Colville River will be installed inside a high-strength casing pipe. Simultaneous failure of both the pipeline and the associated casing pipe is highly unlikely. If diesel fuel or seawater leaked from the pipelines, it would be captured within the space between the outer wall of the pipelines and the inner wall of the high-strength casing pipe, rather than reaching the subsurface river environment. This design is analogous to secondary containment provided as a spill prevention technique for storage tanks.	Pipelines		
46	Minimization	Project Description, 2013 IAP/ROD BMP C-2	Develop and use ice roads that are a minimum of 6 inches thick during winter construction to eliminate or otherwise minimize impacts to wetlands and tundra.	Ice infrastructure		
47	Avoidance	Other Federal, State, or Local Requirements	CPAI will prepare and implement an erosion control plan (similar to the Alpine Facilities Erosion Control Plan) to detail ways in which it will prevent or mitigate erosion that could impact terrestrial and aquatic environments. The plan will include CPAI's operations, monitoring, and maintenance procedures that detail the actions CPAI will undertake to monitor, maintain, and, if needed, remediate gravel fill impacting surrounding tundra and wetlands.	All		
48	Avoidance	CPAI Best Practices	CPAI will place cleared snow in designated snow-storage areas and will manage stormwater from all gravel pads to prevent contaminants from being released during spring breakup. CPAI selects snow push areas annually based on avoiding areas of thermokarsting, proximity to waterbodies, and evaluating areas used in the previous year.	Facilities		
49	Minimization	Project Description	Gravel roads and pads will be a minimum of 5 feet thick to maintain a stable thermal regime by insulating the underlying tundra and offsetting the loss of insulating effect caused by the compression of the vegetated tundra beneath the gravel.	Gravel infrastructure		
50	Minimization	Project Description, 2013 IAP/ROD BMP C-2	Ice roads will be routed to avoid shrub areas and large areas of tussock tundra to the extent practicable.	Ice infrastructure		
51	Minimization	Project Description, 2013 IAP/ROD BMP E-4	Pipelines will be constructed above ground, to the extent practicable, to minimize permafrost impacts.	Pipelines		
Minimization of Wildlife Impacts						
52	Minimization	2013 IAP/ROD BMP B-1	To maintain populations of, and adequate habitat for, fish and invertebrates, CPAI will not withdraw unfrozen water from rivers and streams during winter within BLM managed lands. Removal of ice aggregate from grounded areas less than or equal to 4 feet may be authorized from rivers within BLM managed lands on a site-specific basis.	Water withdrawal		
53	Avoidance	CPAI Best Practices	All 32-foot-wide (surface width) roads will have a speed limit restriction of 35 mph and traffic will be stopped when caribou are crossing the road. On roads with a 24-foot-wide surface width, CPAI is proposing a 25 mph speed limit, down from 35 mph, as a voluntary BMP for health, safety, and environmental purposes including to reduce potential impacts to vegetation from dust and to wildlife.	Gravel infrastructure		
54	Avoidance	2013 IAP/ROD BMP E-3	Causeways or docks will not be constructed in any river mouth or delta. Causeways, docks, artificial islands, or other bottom-found structures, if employed, will be designed to ensure free passage of fish and prevent changes to water circulation patterns or water quality.	Gravel infrastructure		
55	Minimization	2013 IAP/ROD BMP F-1, USACE Public Interest Review	Willow air traffic will maintain altitudes consistent with BMP F-1 to avoid disturbing caribou, birds, aesthetics, recreation, and subsistence users whenever feasible, except during takeoffs and landings and unless doing so would endanger human life or violate safe flying practices. Some flights required to support the Project or regulatory compliance (e.g., avian, caribou, hydrology studies) and to ensure cleanup after an ice road season could require lower flying altitudes.	Air traffic		
56	Minimization	2013 IAP/ROD BMP A-8, USACE Public Interest Review	CPAI will continue to maintain and implement bear-interaction plans to minimize conflicts between bears and humans. These plans will be expanded to cover the Project.	All		

Willow Development
Project Avoidance and Minimization Measures

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/Minimized	Notes
57	Minimization	2013 IAP/ROD BMP E-7, USACE Public Interest Review	Pipeline and road design and construction will minimize disruption of caribou movement by maintaining a minimum clearance of 7 feet between the bottom of pipelines and the ground surface. The proposed pipeline route will maintain a minimum distance of 500 feet between the pipeline and roads where feasible. Anticipated deviations are noted in the Willow Development Project Description.	Pipelines		
58	Minimization	2013 IAP/ROD BMP E-9	Facilities will be designed to minimize nesting, denning, or sheltering opportunities for ravens, raptors, and foxes. Intentional wildlife feeding will be prohibited.	All		
59	Minimization	2013 IAP/ROD BMP E-10, USACE Public Interest Review	Implement a Project lighting plan that will include measures to minimize the amount of light visible from outside of facilities, including directing artificial exterior lighting inward and downward from August 1 to October 31, which will prevent waterfowl (including species listed under the Endangered Species Act) from striking facilities during low-light conditions.	All		
60	Minimization	2013 IAP/ROD BMP E-11	To minimize the take of species, particularly those listed under the Endangered Species Act and BLM Special Status Species, CPAI has and will, as required by BMP E-11, conduct eider and yellow-billed loon surveys, work with resource agencies to ensure that facilities minimize impacts to species found, ensure that off-pad utility lines are either buried or suspended from pipe racks to the extent feasible, locate towers on pads near existing buildings to the extent feasible, minimize the use of support wires for towers, and clearly mark those that are in use to prevent collisions. Buffers around loon nesting sites will be employed as required by E-11, to the extent feasible. Anticipated deviations are noted in the Willow Development Project Description.	All		
61	Minimization	2013 IAP/ROD BMP E-15	The gravel source for the Project will not result in the loss of nesting habitat for raptors because it will not take gravel from cliffs or from river and stream channels in a manner that affects river bluffs.	Gravel source		
62	Minimization	2013 IAP/ROD BMP E-16	Minimize the electrocution hazard for raptors by suspending electrical distribution lines from pipe racks or burying cables (versus the use of overhead power lines) off pad.	All		
63	Minimization	2013 IAP/ROD BMP E-19	Provide the BLM authorized officer with GIS-compatible location information to facilitate agency monitoring and assessment of wildlife movements through the Project area after Project construction.	All		
64	Minimization	2013 IAP/ROD BMP K-1, USACE Public Interest Review	Adhere to NPR-A BMP K-1 river setbacks for Judy Creek, Fish Creek, and the Tiġmiasiuġvik River, except where essential crossings are necessary. Anticipated deviations are noted in the Willow Development Project Description.	Facilities		
65	Minimization	Project Description, 2013 IAP/ROD BMP E-7	Where possible, roads will be constructed at least 500 feet from pipelines to minimize caribou disturbance and prevent excessive snow accumulation from snowdrifts and snow removal. Anticipated deviations are noted in the Willow Development Project Description.	Pipelines		
66	Minimization	Project Description	CPAI will contract with a state-registered Primary Response Action Contractor to assist with quick spill response impacts in the event of a spill.	All		
67	Minimization	Project Description	Pipe racks installed adjacent and parallel to existing pipeline racks will be aligned to match existing VSMS where possible, to avoid a picket-fence effect to reduce obstructions to caribou and subsistence user movements.	Pipelines		
68	Minimization	Project Description	Pipelines will be designed with a muted (i.e., non-reflective) coating to avoid glare.	Pipelines		
69	Minimization	2013 IAP/ROD BMPs A-1, A-2, A-8, E-9	CPAI will implement policies, procedures, and training to prevent wildlife attraction to Project facilities, including use of predator-proof dumpsters for food waste collection, a strict policy prohibiting the feeding of wildlife, and use of Ziploc bags or other sealed containers for meals-on-the-go to conceal food odors.	All		
70	Minimization	2013 IAP/ROD BMPs A-1, A-2, A-8, C-1, I-1, M-1	The CPAI Wildlife Avoidance and Interaction Plan includes procedures to eliminate, minimize, and mitigate bear interactions. CPAI has training in place on waste management practices, and has project-specific training on waste management for any new project to provide guidance to employees and contractors for managing predators.	Waste		
71	Minimization	2013 IAP/ROD BMP C-1, USACE Public Interest Review	Protect grizzly and polar bear denning sites by prohibiting cross-country travel or use of heavy equipment within 0.5 mile of a grizzly bear den and within 1.0 mile of a polar bear den. Where necessary, CPAI will conduct surveys near coastal areas to locate potential polar bear dens in consultation with the U.S. Fish and Wildlife Service and/or the National Oceanic and Atmospheric Administration-Fisheries, as appropriate, before initiating activities in coastal habitat between October 30 and April 15.	All		

Willow Development
Project Avoidance and Minimization Measures

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/Minimized	Notes
Minimization of Cultural and Subsistence Impacts						
72	Minimization	2013 IAP/ROD BMP I-1, USACE Public Interest Review	Conduct training for Project personnel on NPR-A BMPs and standards and environmental, social, traditional, and cultural concerns specific to the Project region, and will include training on community interactions. This training is designed to ensure strict compliance with local and corporate drug and alcohol policies.	All		
73	Minimization	CPAI Best Practices, 2013 IAP/ROD BMP H-3, USACE Public Interest Review	CPAI prohibits Project employees from hunting and trapping activities while employees are on active work status to avoid increased competition for subsistence and recreational wildlife resources.	All		
74	Minimization	2013 IAP/ROD BMP E-13, USACE Public Interest Review	Project design and facilities placement will continue to be informed by the results of cultural and paleontological resource surveys. The Project will avoid known cultural and paleontological resources during ground-disturbing activities, including the construction of ice roads.	All		
75	Minimization	2013 IAP/ROD BMP E-17, USACE Public Interest Review	A Visual Resources Management Plan will be submitted to minimize visual resource impacts, consistent with the Visual Resources Management class for the lands on which Project facilities will be located.	All		
76	Minimization	2013 IAP/ROD BMP M-1, USACE Public Interest Review	To protect subsistence resources, CPAI avoids disturbing caribou and strictly prohibits chasing wildlife with vehicles.	All		
77	Minimization	CPAI Best Practices, 2013 IAP/ROD BMP H-1, USACE Public Interest Review	CPAI will continue to consult with affected subsistence communities, tribes, Alaska Native Corporations, and the NSB, as well as the KSOP, Alaska Eskimo Whaling Commission, Nuiqsut Whaling Captains, and Barrow Whaling Captains to mitigate potential impacts to subsistence activities. Plans will be maintained to ensure that these consultations continue both periodically and robustly.	All		
78	Minimization	Project Description, 2013 IAP/ROD BMP H-1, USACE Public Interest Review	CPAI has and will continue to consult with the KSOP, Native Village of Nuiqsut, and Kuukpik Corporation to ensure that Project activities do not adversely affect subsistence activities. CPAI has and will continue to hold frequent public community meetings well in advance of future activities. Travel will be scheduled with flexibility and managed through the use of speed limits, rerouting, and traffic stoppages to avoid conflict with subsistence use and hunting areas during seasonal periods.	All		
79	Minimization	CPAI Best Practices, USACE Public Interest Review	CPAI will continue to provide annual funding for the KSOP to help support an executive director and coordinate KSOP activities.	All		
80	Minimization	Project Description, USACE Public Interest Review	Construction activities, including gravel mining and placement, and pipeline and facility construction, will occur primarily during the winter months, when subsistence activity levels are relatively low and disruptions to water flow can be minimized.	Construction		
81	Minimization	Project Description, USACE Public Interest Review	Gravel roads will include subsistence tundra access road pullouts located according to community input. These pullouts will allow local residents to access the areas adjacent to roadways. Tundra access road pullouts will be designed taking into consideration lessons learned from GMT1 and GMT2.	Gravel infrastructure		
82	Minimization	Project Description, USACE Public Interest Review	CPAI will prohibit the use of airboats on rivers within BLM-managed lands and within a 50-mile radius of Nuiqsut, except for emergencies and emergency response training.	All		
83	Minimization	Project Description, USACE Public Interest Review	CPAI has an internship program (CareerQuest) to introduce Nuiqsut high school students to jobs and careers in the oil fields and in their community.	All		
84	Minimization	Project Description, USACE Public Interest Review	CPAI strives to hire qualified Nuiqsut, NSB, and Alaska residents for jobs in the oil fields.	All		

Willow Development
Project Avoidance and Minimization Measures

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/Minimized	Notes
85	Minimization	Project Description, 2013 IAP/ROD BMP H-1, USACE Public Interest Review	CPAI will ensure that current communication protocols related to CPAI helicopter, fixed-wing air, and vessel traffic are adequate to address community (Nuiqsut) concerns about traffic-related impacts to subsistence activities.	Air traffic		
86	Minimization	Project Description, USACE Public Interest Review	CPAI will allow residents of Nuiqsut reasonable use of roads to access subsistence areas throughout the life of the Project.	All		
87	Minimization	Project Description, USACE Public Interest Review	CPAI will continue its philanthropy program from local oil fields to provide income and other benefits to residents of Nuiqsut.	All		
88	Minimization	NSB IHLC Guidance, USACE Public Interest Review	Development activities will implement avoidance measures to ensure protection of cultural resource sites during Project activity by establishing a 500-foot avoidance buffer (NSB Department of Planning and Community Services, Inupiat History, Language and Culture Division, Form 500).	All		
89	Minimization	Project Description, Other Federal, State, or Local Requirements, USACE Public Interest Review	All bridges will be designed to maintain bottom chord clearance of at least 4 feet above the 100-year design flood elevation, or at least 3 feet above the highest documented flood elevation, whichever is higher. Additionally, the Judy Creek and Fish Creek bridges will be designed to maintain bottom chord clearance of at least 13 feet above the 2-year design flood elevation (open water) to provide vessel clearance.	Bridges		
90	Minimization	Project Description, USACE Public Interest Review	Based on Nuiqsut stakeholder engagement, CPAI has voluntarily added construction of up to three subsistence boat ramps in the project area to provide local residents with improved river access. The three locations include the Tinimiasiuġvik River near the existing GMT1 access road, Judy Creek at the proposed Willow BT1 access road crossing, and Fish Creek at the proposed BT4 access road crossing.	All		
General Environmental Impact Minimization						
91	Minimization	2013 IAP/ROD BMP A-10, USACE Public Interest Review	Air pollution will be reduced and minimized through air quality monitoring and modeling, as appropriate. An emissions inventory will be developed and additional mitigation measures and activity modifications will be applied, as appropriate, in response to the air quality information generated. Reports are generally available to the NSB and local communities.	All		
92	Minimization	Project Description, 2013 IAP/ROD BMPs A-9, A-10	CPAI will adhere to BLM's oil and gas air resources BMPs, as applicable. These practices will minimize air emissions resulting from both Project construction and operations and will include watering gravel roads to minimize fugitive dust, using clean fuels such as ultra-low-sulfur diesel and natural gas, and the use of low-emissions emitting equipment (including maximum use of electrical power, use of Tier IV Final engines or similar emission reduction technology for drill rigs and hydraulic fracturing equipment prior to WCF facility startup, storage tank closed-vent systems to the extent practicable, and green completions).	All		
93	Minimization	2013 IAP/ROD BMP A-9, USACE Public Interest Review	CPAI will use ultra-low-sulfur diesel fuel (as defined by the Alaska Department of Environmental Conservation) in all diesel-fueled vehicles and equipment.	Facilities		
94	Minimization	Project Description	Permanent electric power generator sets will be totally enclosed or acoustically packaged to abate noise.	Facilities		
95	Minimization	Project Description, 2013 IAP/ROD BMP A-9	Following facility startup, the power plant at the WCF will be used to power drill rigs, except during periods when power from the WCF is unavailable. Prior to startup or during periods of facility maintenance, shutdowns, or upsets, portable generators will be fueled by ultra-low-sulfur diesel.	Drilling		
96	Minimization	2013 IAP/ROD BMP A-10	Vehicles and heavy equipment (i.e., rolling stock) used for oil and gas operations will be powered off when not in active use, to the extent practicable.	All		
97	Minimization	2013 IAP/ROD BMP A-10	Vehicles will be equipped with block heaters. Idling practices are to shut off and plug in vehicles in temperatures of -30°F or above to conserve fuel and reduce emissions.	All		

Willow Development
Project Avoidance and Minimization Measures

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/ Minimized	Notes
98	Minimization	Other Federal, State, or Local Requirements	The Project will use Finewater Mist for process module fire protection and a non-ozone-depleting agent for drill site and non-process module fire protection in lieu of Halon.	Gravel infrastructure		
99	Minimization	2013 IAP/ROD BMP A-2	CPAI will manage all waste in accordance with a comprehensive waste management plan to reduce impacts to human health and safety and to minimize potential effects to subsistence resources, including fish and wildlife. This will be accomplished using the "Alaska Waste Disposal and Reuse Guide" ("Red Book"). This guide addresses waste prevention and reduction, recycling, treatment, and disposal. The waste management plan will include measures to avoid attracting wildlife, disposal of putrescible waste, disposal of pumpable waste, and disposal of wastewater. As allowed, injectable waste will be injected into the subsurface via disposal wells or used for enhanced oil recovery.	Waste		
100	Minimization	CPAI Best Practices	CPAI will audit contractors' Health Safety and Environment performance to ensure that safe practices are followed.	All		
101	Minimization	CPAI Best Practices	CPAI will audit the Project on a scheduled basis to ensure compliance with all environmental laws, regulations, and local requirements; company policies and procedures; and other regulations regarding safety, land use, fire codes, etc.	All		
102	Minimization	CPAI Best Practices	CPAI will employ Field Environmental Coordinators to monitor compliance with permits and other Project requirements.	All		
103	Minimization	CPAI Best Practices	CPAI will evaluate environmental considerations when purchasing new storage tanks or adding new emissions sources that may affect the environment or operating permits.	All		
104	Minimization	CPAI Best Practices	CPAI will review new chemicals being considered for use on the Project to ensure that the materials will minimize the generation of hazardous waste or risk to employees.	All		
105	Minimization	2013 IAP/ROD BMP E-2	Construction camps will not be sited on frozen lakes or river ice.	Facilities		
Spill Mitigation Measures						
106	Minimization	2013 IAP/ROD BMP A-4, Other Federal, State, or Local Requirements	CPAI will develop and implement a spill prevention and response contingency plan for the Project (in accordance with 40 CFR 112) to reduce impacts to human health and safety and to minimize potential effects to subsistence resources, including fish and wildlife. The plan will cover Project operations and will describe spill prevention measures and on-site cleanup materials for permanent fueling stations, use of proper storage containers and liner materials, proper container identification, and notice of reportable spills. Identification of drip pans (i.e., "duck ponds") will be addressed through Project operating procedures.	Spill prevention and response		
107	Minimization	2013 IAP/ROD BMP A-3, Other Federal, State, or Local Requirements	The Project will use a hazardous-materials contingency plan (also known as a spill prevention and response contingency plan), prepared pursuant to NPR-A BMP A-3, which will detail response actions, drills, and responder training.	Spill prevention and response		
108	Minimization	2013 IAP/ROD BMP E-4, Other Federal, State, or Local Requirements	Pipelines will be built and operated with the best available technology for detecting and preventing corrosion or mechanical defects to minimize impacts related to point source pollution from oil spills or leaks.	Pipelines		
109	Minimization	Project Description	Valves will be installed on each side of pipeline crossings at Fish Creek and Judy Creek, allowing isolation of produced fluids pipelines on either side of the bridges to minimize potential spill impacts in the event of a leak or break. Isolation valves or vertical loops will be installed on the Willow Pipeline at each side of the Tin̄m̄iaq̄siūgv̄ik River, and on each side of the segment crossing the Niḡliaḡvik Channel, Niḡliq̄ Channel, and Lakes L9341 and L9323. Vertical loops will be installed on the diesel pipeline at each side of the Miluveach River, Kachemach River, and Colville River. Two methods of leak detection will be used for the seawater and diesel pipeline crossings under the Colville River: (1) leak detection mass balance (primary), and (2) optical leak detection (secondary, within casing).	Pipelines		
110	Minimization	CPAI Best Practices	CPAI will continue to implement its "Target Zero" spill prevention program designed to raise awareness around spill prevention and pass on lessons learned.	Spill prevention and response		
111	Minimization	CPAI Best Practices	CPAI will continue to implement its Fuel Transfer Standard Operating Procedure and will use secondary containment on regulated oil and hazardous materials storage tanks.	Spill prevention and response		
112	Minimization	CPAI Best Practices, 2013 IAP/ROD BMP E-4	CPAI has and will continue to implement extensive corrosion control and inspection programs. This includes ultrasonic inspection, radiographic inspection, coupon monitoring, metal loss detection pigs and geometry pigs (applicable to pig-capable pipelines), and infrared (heat signature detection) technology. The inspection programs are API Standard 570-based programs that focus inspection efforts on areas of greatest potential for spills.	Spill prevention and response		

Willow Development
Project Avoidance and Minimization Measures

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/Minimized	Notes
113	Minimization	CPAI Best Practices, Other Federal, State, or Local Requirements	CPAI will continue to implement its operating practice to immediately and completely clean up all spills, recovering 100% of spilled material for recycling when possible.	Spill prevention and response		
114	Minimization	CPAI Best Practices, 2013 IAP/ROD BMP E-4	Pipeline fluids will be periodically treated, as appropriate to product types, with chemicals to limit corrosion potential.	Pipelines		
115	Minimization	CPAI Best Practices	Oil spill response equipment intended for use in winter conditions will be equipped and maintained for effective use in Arctic conditions. Equipment will be operated and maintained in a manner as to prevent the freezing or icing of the equipment.	Spill prevention and response		
116	Minimization	Project Description	Pipelines will undergo hydrostatic testing prior to operation.	Pipelines		
117	Minimization	Project Description	Gravel road access to the GMT2 and Alpine developments will provide additional response capabilities and minimize response time in the event of a spill or other unintended release or emergency.	Spill prevention and response		
118	Minimization	Project Description, Other Federal, State, or Local Requirements	Spill response equipment will be pre-staged at strategic locations within the Project area as outlined in the ODPCP and SPCC Plan for initial spill response. Staged equipment on site will facilitate rapid deployment of equipment by response personnel and may minimize or reduce the overall impacts associated with a spill or other accidental release.	Spill prevention and response		
119	Minimization	CPAI Best Practices	The Project will have a designated Spill Response Team and Hazardous-Materials Response Team, consisting of trained volunteer spill and hazardous materials response personnel on site.	Spill prevention and response		
120	Minimization	Project Description	CPAI will continue to participate in the Mutual Aid Agreement among North Slope operators to supply labor and equipment for immediate spill response. Spill response drills and exercises will ensure response readiness and awareness; these drills will be scheduled according to the National Preparedness and Response Exercise Program guidelines and typically involve production, drilling, or pipeline spill response scenarios.	Spill prevention and response		
121	Minimization	2013 IAP/ROD BMP A-5	CPAI will not, unless approved by the BLM authorized officer, refuel equipment within 500 feet of the active floodplain of any waterbody. Fuel-storage stations, except as approved by the BLM-authorized officer, will be located at least 500 feet from waterbodies except for small caches (up to 210 gallons) for fueling motor boats, float planes, and small equipment.	Spill prevention and Response		
122	Minimization	CPAI Best Practices	Well cellars will be designed to contain drips and leaks.	Spill prevention and response		