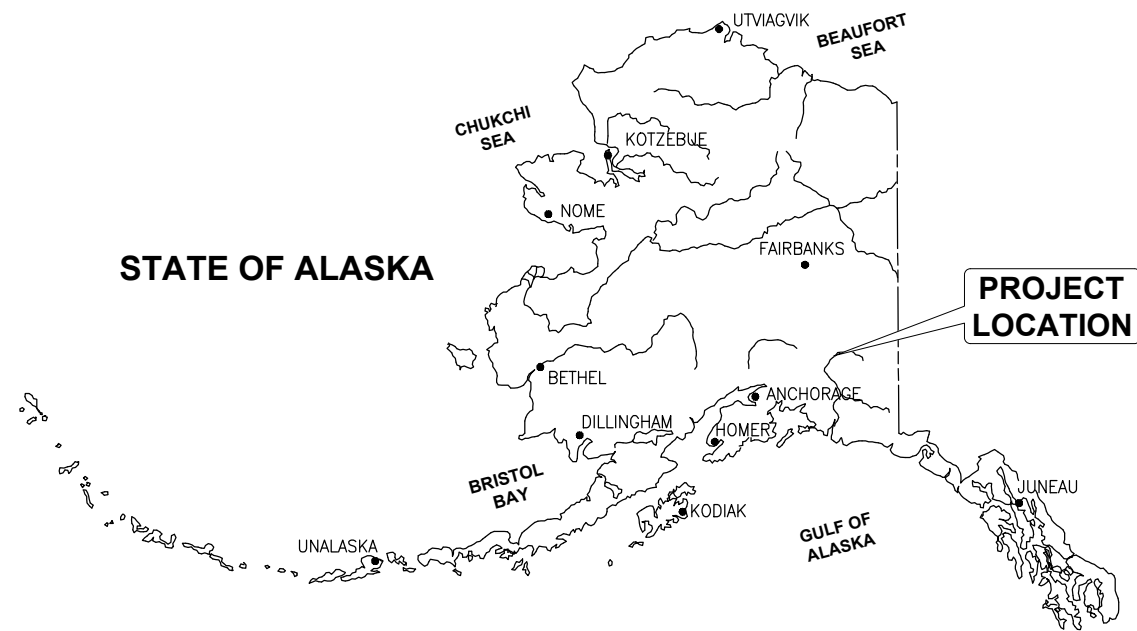


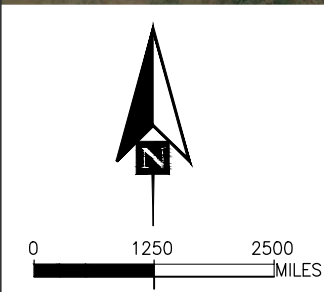
# CHISTOCHINA RIVER AND SINONA CREEK FLOOD AND EROSION MITIGATION

SEPTEMBER 2025



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Phone: 907.561.1011  
www.pndengineers.com  
AK LIC# AECC250



PROJECT:  
**CHISTOCHINA RIVER AND SINONA CREEK  
FLOOD AND EROSION MITIGATION**













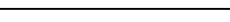

TITLE:  
**COVER SHEET AND INDEX**

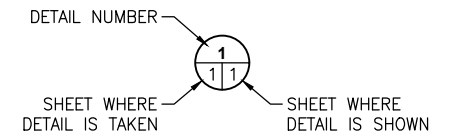
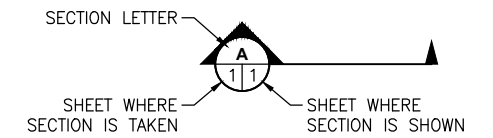
DESIGNED BY:	AG	DATE:	09/30/2025	SHEET NO:	01	OF	15
CHECKED BY:	EP	PROJECT NO:	241094				

# ABBREVIATIONS

AK	ALASKA
BOP	BEGINNING OF PROJECT
E	EASTING
ELEV	ELEVATION
EOP	END OF PROJECT
FT	FEET
GNSS	GLOBAL NAVIGATION SATELLITE SYSTEM
GPS	GLOBAL POSITIONING SYSTEM
H	HORIZONTAL
INV	INVERT
L	LENGTH
LAT	LATITUDE
LON	LONGITUDE
LT	LEFT
MAX	MAXIMUM
MIN	MINIMUM
N	NORTHING
NAD83	NORTH AMERICAN DATUM OF 1983
NAVD88	NORTH AMERICAN VERTICAL DATUM OF 1988
NGS	NATIONAL GEODETIC SURVEY
NO	NUMBER
NTS	NOT TO SCALE
PC	POINT OF CURVATURE
PI	POINT OF INTERSECTION
PT	POINT OF TANGENCY
PVI	VERTICAL POINT OF INTERSECTION
PVIE	VERTICAL POINT OF INTERSECTION ELEVATION
PVIS	VERTICAL POINT OF INTERSECTION STATIONING
PVT	POINT OF VERTICAL TANGENT
R	RADIUS
RT	RIGHT
S	SOUTHING
SQ MI	SQUARE MILES
STA	STATION
T	TANGENT
TYP	TYPICAL
USFWS	US FISH & WILDLIFE SERVICE
V	VERTICAL
VC	VERTICAL CURVE
W	WESTING
XS	CROSS-SECTION
℄	CENTERLINE
Δ	DELTA ANGLE

# LEGEND

EXISTING		PROPOSED	
	MAJOR CONTOUR		MAJOR CONTOUR
	MINOR CONTOUR		MINOR CONTOUR
			FILL/EXCAVATION LIMITS
			RIPRAP, CLASS III
			RIPRAP, CLASS II
			FILTER BLANKET
			BORROW, TYPE A (RIVER-RUN GRAVEL)
			BACKFILL (EXCAVATED MATERIAL)
			IN-SITU MATERIAL
			CENTERLINE
			GRAVEL CORE SHOULDER
			SPUR DIKE TIE IN



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PROJECT: **CHISTOCHINA RIVER AND SINONA CREEK FLOOD AND EROSION MITIGATION**

TITLE: **GENERAL NOTES, ABBREVIATIONS, AND LEGEND**

DESIGNED BY: AG	DATE: 09/30/2025	SHEET NO: <b>02</b> OF 15
CHECKED BY: EP	PROJECT NO: 241094	

SURVEY CONTROL

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
201	3137245.576	1866874.712	1894.21	RBR SET 5/8" PND CONTROL
202	3141905.008	1868331.652	1915.31	RBR SET 5/8" PND CONTROL
203	3145035.535	1868967.326	1936.40	RBR SET 5/8" PND CONTROL
204	3139651.244	1870375.245	1900.21	RBR SET 5/8" PND CONTROL

RECOVERED MONUMENTATION

POINT #	NORTHING	EASTING	DESCRIPTION
701	3152281.831	1877148.995	FAC [2.5" DOT/PF 2005, POT 1227+45 48LT LS 10684]
702	3144850.349	1869060.473	FAC [2.5" DOT/PF 2005, POT 1117+53.3 42LT LS10684]
703	3141085.995	1868132.538	FBC [3" DOT/PF 2005, EL1914.33 LS10684]
704	3138383.599	1866906.175	FBC [3 1/4" BLM 1971, T9N R4E S4]
705	3143661.789	1866786.416	FBC [3 1/4" BLM 1971, T9N R4E S4]
706	3140767.971	1868126.929	FBC [3 1/4" BLM 1952 1971, S3156 C1]
* 707	3145550.852	1869824.586	FBC [3" ADOT 2005, EL=1936.89 LS10684]
* 708	3147315.840	1871440.004	FAC [3.25" ADOT LS10684 2005, PC 1151+80 50LT]
710	3141218.694	1868151.392	FAC [2.5" ADOT 2005, PC 1079+23.52 20LT LS10684]
711	3136349.053	1866740.671	FBC [3.25" BLM RM5, C5 S5524 174.6FT]
712	3137837.537	1867126.896	FBC [3.25" BLM 1976, C4 S5362]
713	3138315.769	1867245.887	FBC [3.25" BLM 1976, C5 S5362]
714	3140233.200	1867883.405	IP [2" NO CAP, BENT]
715	3140347.805	1867935.455	FBC [3.25" BLM 1974, C4 S5196/C1 S5362]
716	3141494.049	1868457.594	FBC [3.25" BLM 1952, C1 S3222]
717	3142101.596	1868518.613	FBC [3.25" BLM 1952, C1 S3222]
718	3142808.060	1868234.794	FBC [3.25" BLM 1954, C9 L305 S3319]
719	3143037.590	1868341.196	FAC [2.5" ADOT 2005, PC 1097+86.55 48LT LS10684]
720	3142312.666	1868350.124	FAC [2.5" ADOT 2005, PT 1090+61.5 53LT LS10684]
721	3141574.038	1868164.151	FBC [3.25" BLM 1954, C2 S3319 L1 BENT]

POINT #	NORTHING	EASTING	DESCRIPTION
722	3139020.197	1867154.241	FAC [2" ABILITY 7610-S SURVEYS, L7 2003]
723	3137006.977	1866596.651	FAC [2" ABILITY 7610-S SURVEYS, L9 2003 BENT]
724	3136229.217	1866401.448	FAC [2" ABILITY 7610-S SURVEYS, L23 2003]
* 725	3135730.638	1866276.334	FAC [2" ABILITY 7610-S SURVEYS, RW 2003]
* 726	3135923.528	1866538.927	FAC [2.5" ADOT 2005, POT 1023+70 63RT LS10684]
727	3138579.558	1870499.541	FBC [3.25 BLM 1976, C2 S5862]
728	3137819.484	1864281.742	FAC [2" ABILITY SURVEY 2003, 7610-S RW]
729	3136633.908	1864982.427	FAC [2" ABILITY SURVEY 2003, 7610-S RW L22]
730	3139721.534	1866522.322	FBC [3 1/4" BLM, S3319 C5 L1]
731	3139783.417	1866386.632	FAC [2" ABILITY SURVEY, L17]
733	3141883.135	1867507.981	FBC [3 1/4" BLM 1954, S3319 C6 LIC10 1954]
734	3142813.023	1867683.264	FBC [3 1/4" BLM 1954, S3319 C8 L3]
* 735	314445.848	1866262.900	FBC [3 1/4" BLM 1968, S5524 L2 C3]
736	3138367.216	1867263.329	FAC [3" SURVEY ALASKA GOOZEN, S3520-S]
737	3138993.664	1867471.192	FAC [3" SURVEY ALASKA GOOZEN, S3520-S L2]
* 738	3131849.330	1865119.851	IP [2" AL PIPE NO CAP, ]
* 739	3133081.313	1865920.075	FBC [3 1/4" BLM 1971, T9N R4E CC S9 S16 S5524 L1]

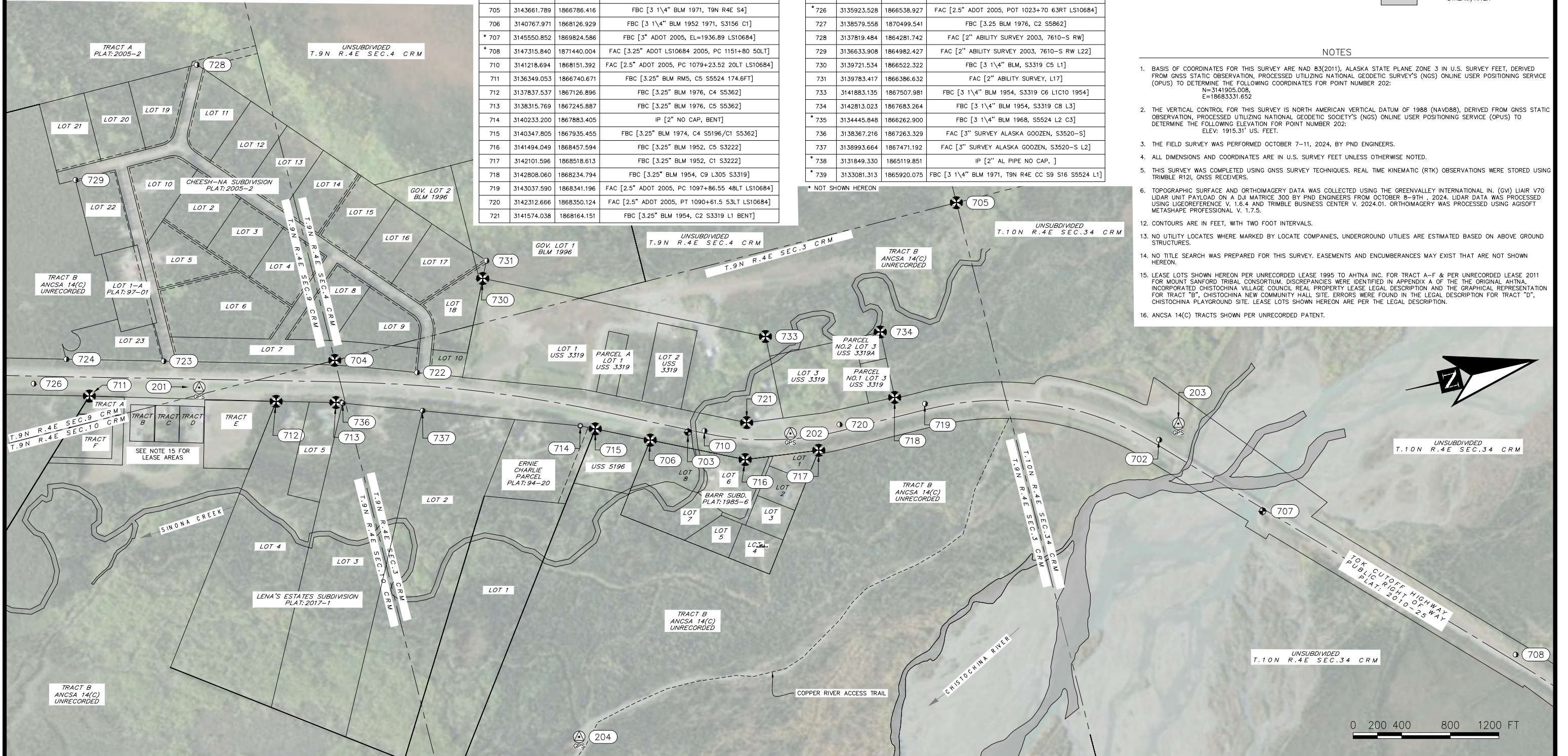
\* NOT SHOWN HEREON

LEGEND

	PRIMARY GPS CONTROL		RECORD STATUS
	BLM/GLO MONUMENT FOUND		CENTERLINE
	RECOVERED PRIMARY MONUMENT AS DESCRIBED		EASEMENT
	ALUMINUM CAP FOUND		TRAIL
	REBAR OR PLASTIC CAP FOUND		SECTION LINE
	RECOVERED IRON PIPE		STREAM/RIVER

NOTES

- BASIS OF COORDINATES FOR THIS SURVEY ARE NAD 83(2011), ALASKA STATE PLANE ZONE 3 IN U.S. SURVEY FEET, DERIVED FROM GNSS STATIC OBSERVATION, PROCESSED UTILIZING NATIONAL GEODETIC SURVEY'S (NGS) ONLINE USER POSITIONING SERVICE (OPUS) TO DETERMINE THE FOLLOWING COORDINATES FOR POINT NUMBER 202:  
N=3141905.008,  
E=1868331.652
- THE VERTICAL CONTROL FOR THIS SURVEY IS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), DERIVED FROM GNSS STATIC OBSERVATION, PROCESSED UTILIZING NATIONAL GEODETIC SURVEY'S (NGS) ONLINE USER POSITIONING SERVICE (OPUS) TO DETERMINE THE FOLLOWING ELEVATION FOR POINT NUMBER 202:  
ELEV: 1915.31' US. FEET.
- THE FIELD SURVEY WAS PERFORMED OCTOBER 7-11, 2024, BY PND ENGINEERS.
- ALL DIMENSIONS AND COORDINATES ARE IN U.S. SURVEY FEET UNLESS OTHERWISE NOTED.
- THIS SURVEY WAS COMPLETED USING GNSS SURVEY TECHNIQUES. REAL TIME KINEMATIC (RTK) OBSERVATIONS WERE STORED USING TRIMBLE R121, GNSS RECEIVERS.
- TOPOGRAPHIC SURFACE AND ORTHOREGISTRY DATA WAS COLLECTED USING THE GREENVALLEY INTERNATIONAL (GVI) LIAIR V70 LIDAR UNIT PAYLOAD ON A DJI MATRICE 300 BY PND ENGINEERS FROM OCTOBER 8-9TH, 2024. LIDAR DATA WAS PROCESSED USING LIGEOPREFERENCE V. 1.6.4 AND TRIMBLE BUSINESS CENTER V. 2024.01. ORTHOREGISTRY WAS PROCESSED USING AGISOFT METASHAPE PROFESSIONAL V. 1.7.5.
- CONTOURS ARE IN FEET, WITH TWO FOOT INTERVALS.
- NO UTILITY LOCATES WHERE MARKED BY LOCATE COMPANIES. UNDERGROUND UTILITIES ARE ESTIMATED BASED ON ABOVE GROUND STRUCTURES.
- NO TITLE SEARCH WAS PREPARED FOR THIS SURVEY. EASEMENTS AND ENCUMBRANCES MAY EXIST THAT ARE NOT SHOWN HEREON.
- LEASE LOTS SHOWN HEREON PER UNRECORDED LEASE 1995 TO AHTNA INC. FOR TRACT A-F & PER UNRECORDED LEASE 2011 FOR MOUNT SANFORD TRIBAL CONSORTIUM. DISCREPANCIES WERE IDENTIFIED IN APPENDIX A OF THE ORIGINAL AHTNA, INCORPORATED CHISTOCHINA VILLAGE COUNCIL REAL PROPERTY LEASE LEGAL DESCRIPTION AND THE GRAPHICAL REPRESENTATION FOR TRACT "B", CHISTOCHINA NEW COMMUNITY HALL SITE. ERRORS WERE FOUND IN THE LEGAL DESCRIPTION FOR TRACT "D", CHISTOCHINA PLAYGROUND SITE. LEASE LOTS SHOWN HEREON ARE PER THE LEGAL DESCRIPTION.
- ANCSA 14(C) TRACTS SHOWN PER UNRECORDED PATENT.



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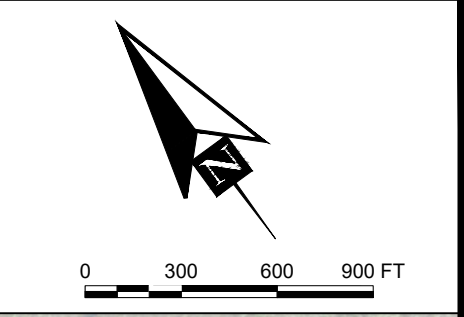
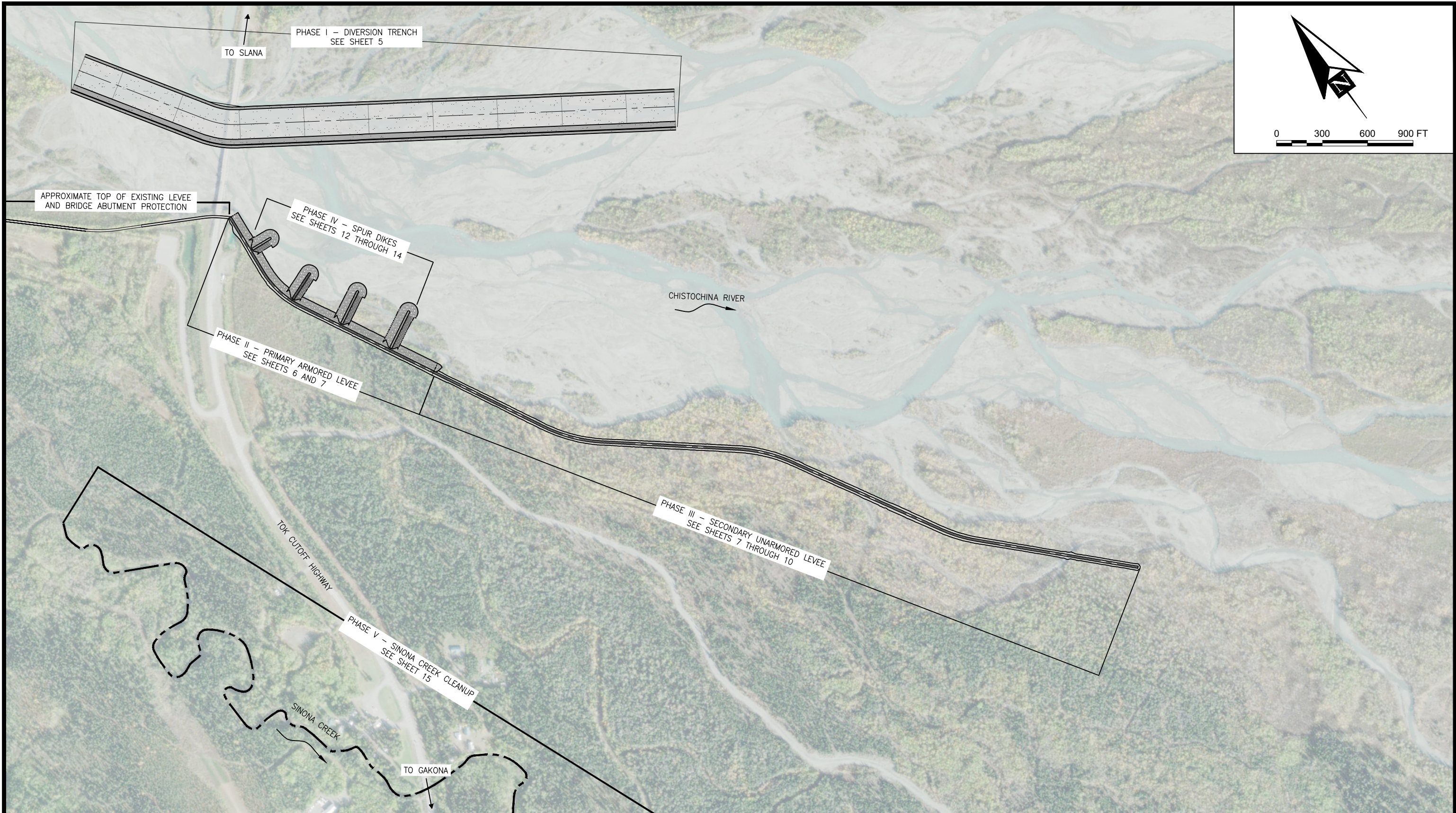


PROJECT: **CHISTOCHINA RIVER AND SINONA CREEK FLOOD AND EROSION MITIGATION**

TITLE: **SURVEY CONTROL**

DESIGNED BY: AG DATE: 09/30/2025 SHEET NO: **03** OF 15

CHECKED BY: EP PROJECT NO: 241094



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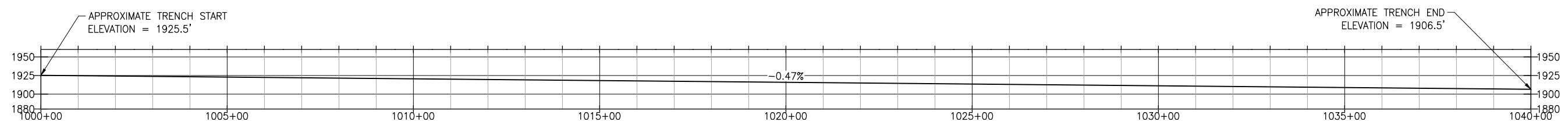
PROJECT: **CHISTOCHINA RIVER AND SINONA CREEK FLOOD AND EROSION MITIGATION**

TITLE: **PROJECT OVERVIEW**

DESIGNED BY: AG	DATE: 09/30/2025	SHEET NO: <b>04</b> OF 15
CHECKED BY: EP	PROJECT NO: 241094	

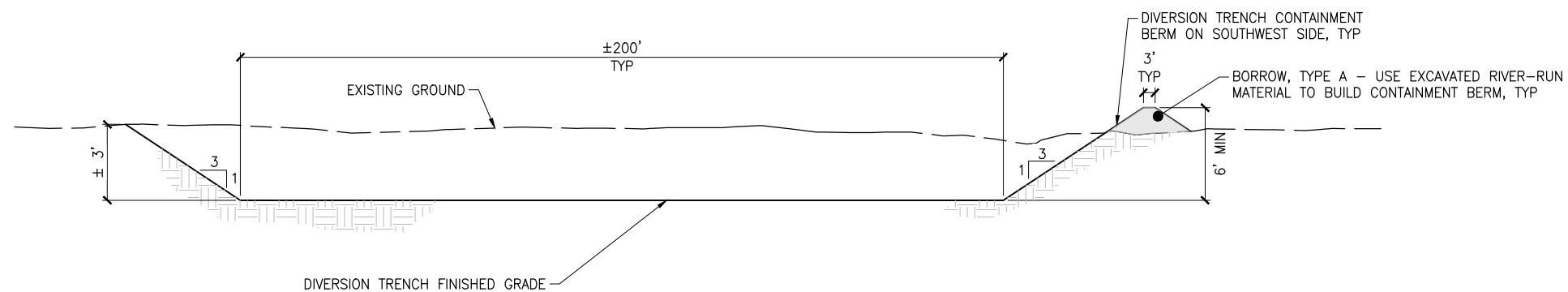


**CONCEPTUAL DIVERSION TRENCH PLAN**



**CONCEPTUAL DIVERSION TRENCH PROFILE**

1H:2V



**CONCEPTUAL DIVERSION TRENCH TYPICAL SECTION**

1H:2V

**NOTES:**

1. DIVERSION TRENCH PRESENTED IS CONCEPTUAL. NATURAL GEOMETRY AND FLOW PATTERNS THROUGHOUT THE CHISTOCHINA RIVER ALLUVIAL PLAIN MAY BE SUBSTANTIALLY DIFFERENT AT TIME OF CONSTRUCTION THAN IS PRESENTED HERE.
2. CONTRACTOR IS RESPONSIBLE FOR BOTH DESIGNING AND OBTAINING PERMITS FOR A DIVERSION CHANNEL CAPABLE OF HANDLING THE 5-YEAR FLOOD (12,000 CFS) WITH 1 FOOT OF FREEBOARD ON THE CONTAINMENT BERM ALONG THE SOUTHWEST SIDE OF THE CHANNEL. CONTRACTOR SHALL ALSO OBTAIN APPROVAL FOR THE DESIGN FROM THE OWNER OR THEIR APPROVED REPRESENTATIVE.
3. CLEAN MATERIAL EXCAVATED OR DREDGED OUT OF THE DIVERSION CHANNEL MAY BE UTILIZED AS BORROW, TYPE A FOR THE PRIMARY LEVEE AREA, SECONDARY LEVEE AREA, AND SPUR DIKES.

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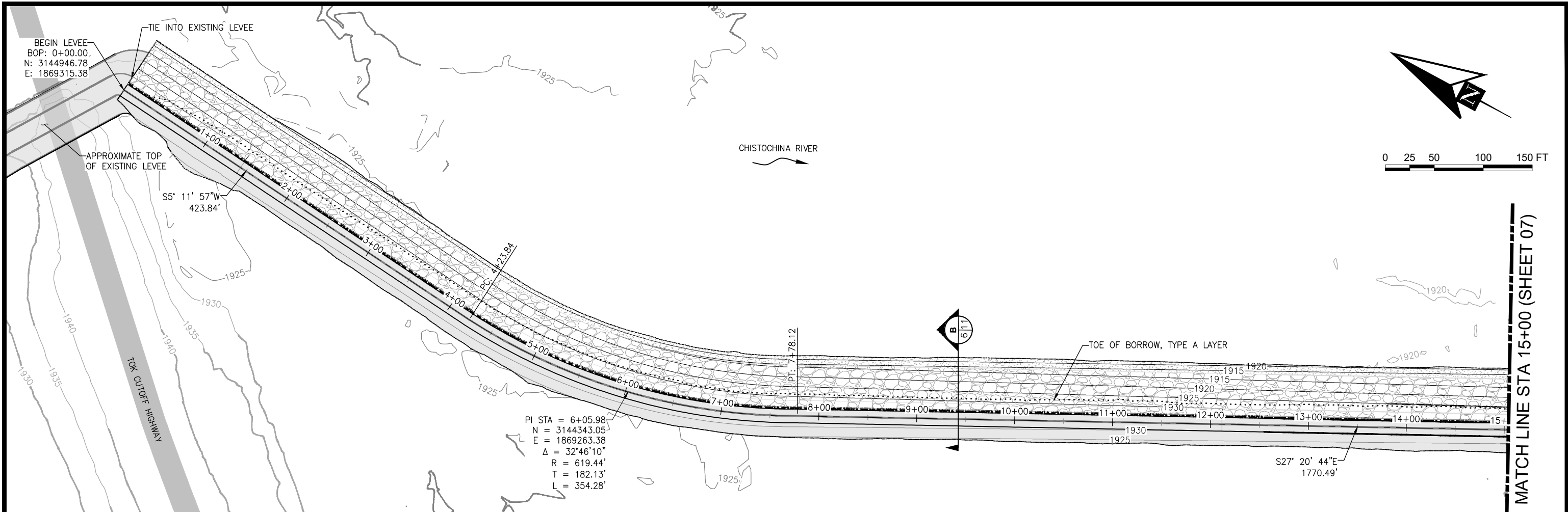
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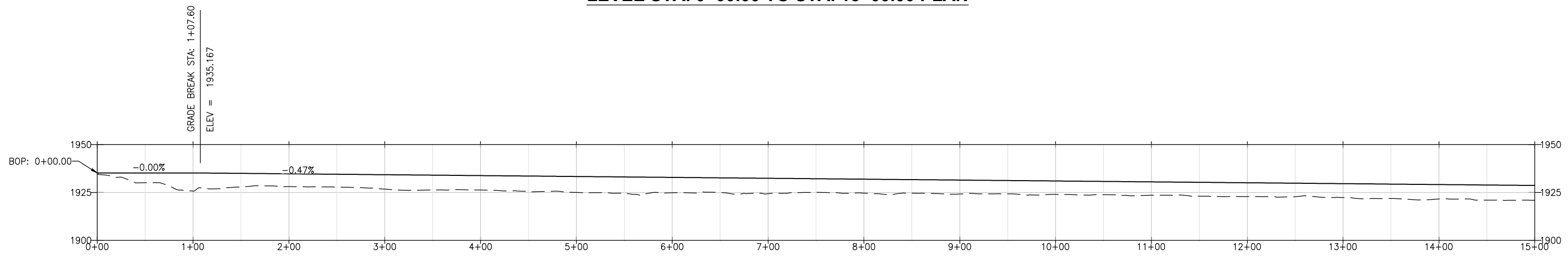
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<b>PROJECT:</b>		<b>CHISTOCHINA RIVER EROSION MITIGATION</b>	
<b>TITLE:</b>		<b>CONCEPTUAL DIVERSION TRENCH PLAN, PROFILE, AND SECTION</b>	
DESIGNED BY: AG	DATE: 9/30/2025	SHEET NO:	<b>05</b> OF 15
CHECKED BY: EP	PROJECT NO: 241094		



**LEVEE STA. 0+00.00 TO STA. 15+00.00 PLAN**



**LEVEE STA. 0+00.00 TO STA. 15+00.00 PROFILE**

1H:2V

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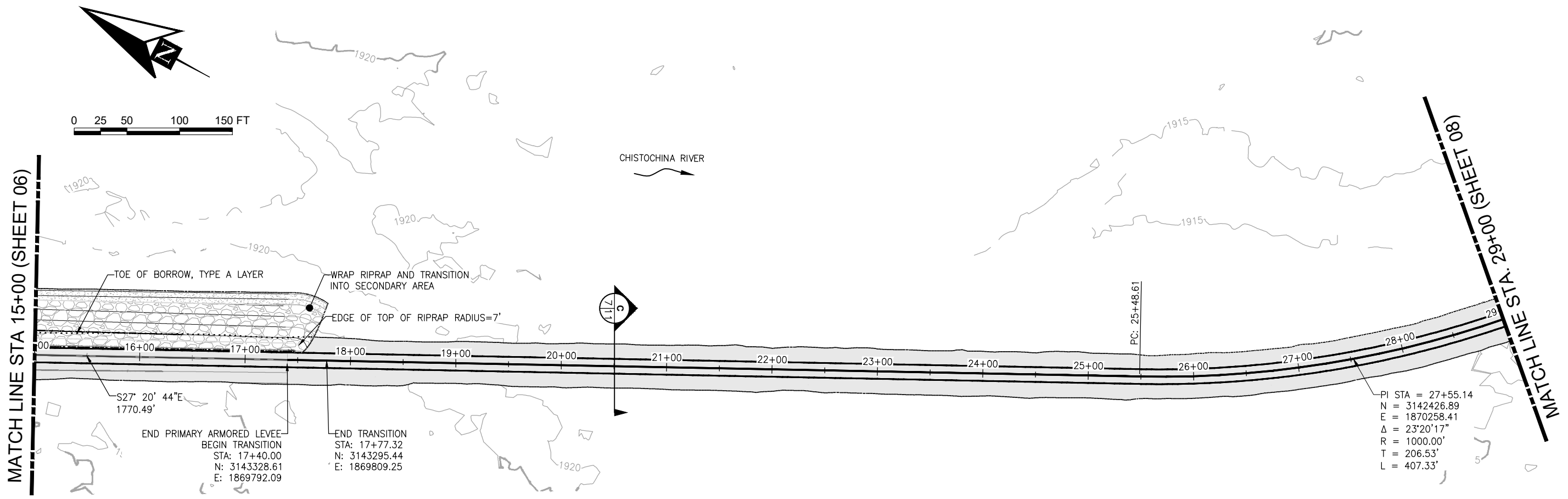
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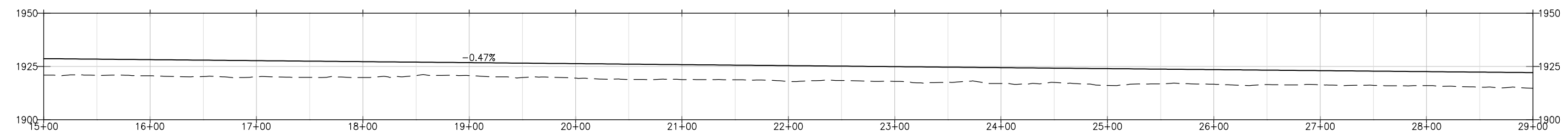
PROJECT:  
**CHISTOCHINA RIVER AND SINONA CREEK  
FLOOD AND EROSION MITIGATION**

TITLE:  
**PRIMARY ARMORED LEVEE AND SECONDARY  
UNARMORED LEVEE (1 OF 5)**

DESIGNED BY: AG	DATE: 09/30/2025	SHEET NO: <b>06</b>
CHECKED BY: EP	PROJECT NO: 241094	OF 15



**LEVEE STA. 15+00.00 TO STA. 29+00.00 PLAN**



**LEVEE STA. 15+00.00 TO STA. 29+00.00 PROFILE**  
1H:2V

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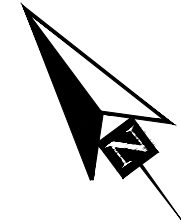
**PROJECT:**  
CHISTOCHINA RIVER AND SINONA CREEK  
FLOOD AND EROSION MITIGATION

**TITLE:**  
PRIMARY ARMORED LEVEE AND SECONDARY  
UNARMORED LEVEE (2 OF 5)

**DESIGNED BY:** AG    **DATE:** 09/30/2025  
**CHECKED BY:** EP    **PROJECT NO.:** 241094

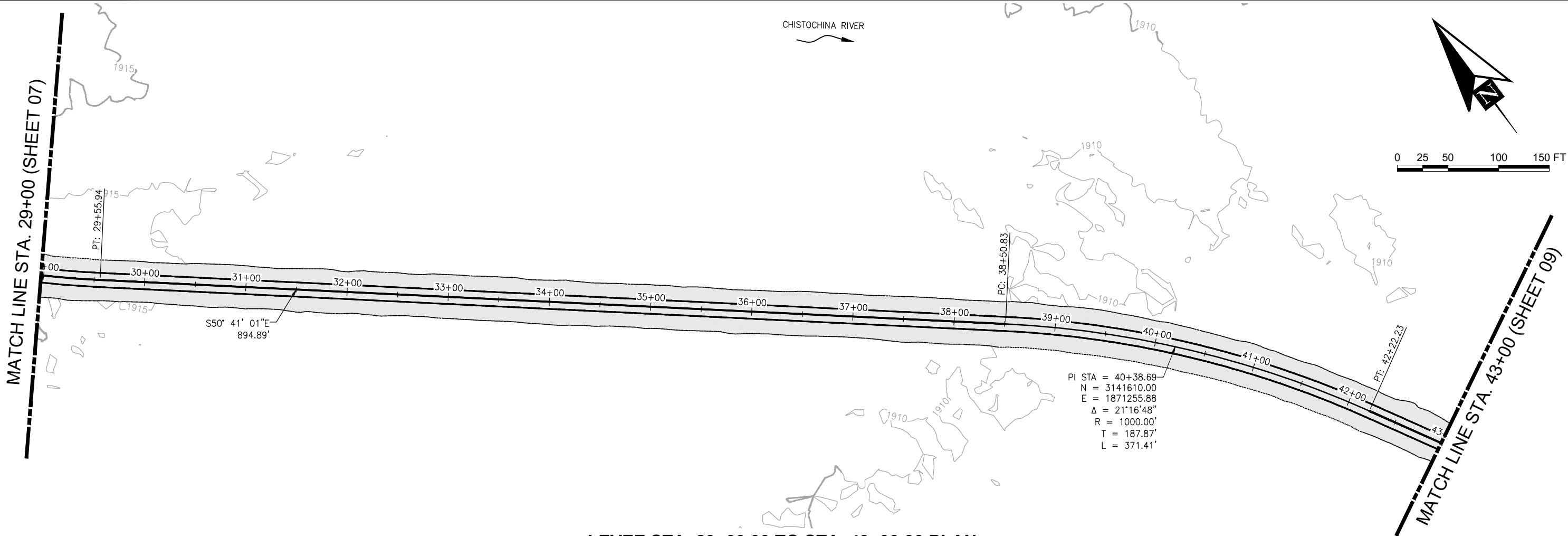
**SHEET NO.:** 07 OF 15

CHISTOCHINA RIVER



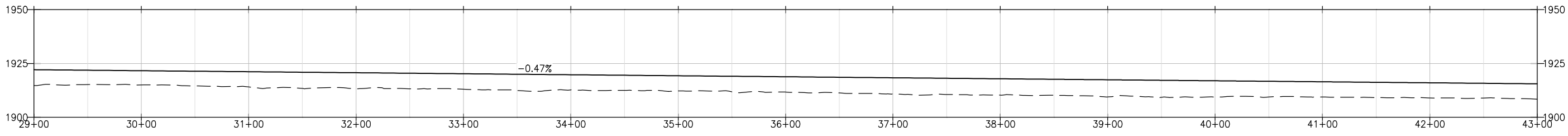
MATCH LINE STA. 29+00 (SHEET 07)

MATCH LINE STA. 43+00 (SHEET 09)



PI STA = 40+38.69  
 N = 3141610.00  
 E = 1871255.88  
 $\Delta$  = 21°16'48"  
 R = 1000.00'  
 T = 187.87'  
 L = 371.41'

**LEVEE STA. 29+00.00 TO STA. 43+00.00 PLAN**



**LEVEE STA. 29+00.00 TO STA. 43+00.00 PROFILE**  
 1H:2V

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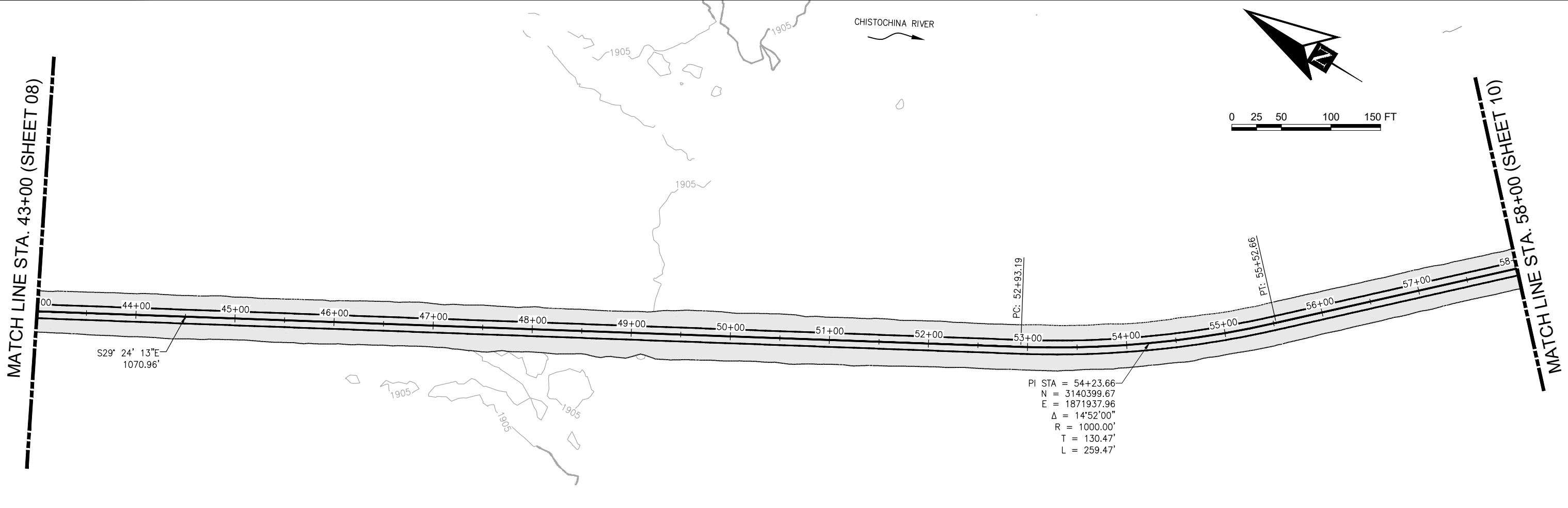
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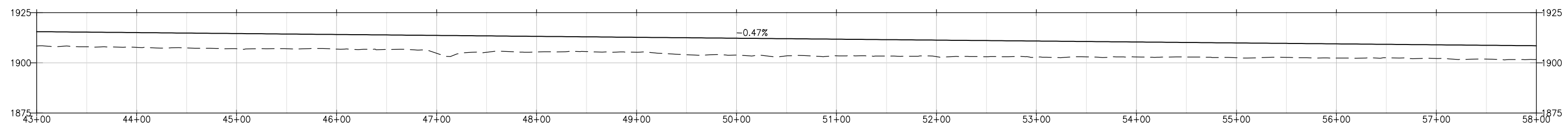


PROJECT:  
**CHISTOCHINA RIVER AND SINONA CREEK FLOOD AND EROSION MITIGATION**  
 TITLE:  
**PRIMARY ARMORED LEVEE AND SECONDARY UNARMORED LEVEE (3 OF 5)**

DESIGNED BY: AG	DATE: 09/30/2025	SHEET NO: <b>08</b> OF 15
CHECKED BY: EP	PROJECT NO: 241094	



**LEVEE STA. 43+00.00 TO STA. 58+00.00 PLAN**



**LEVEE STA. 43+00.00 TO STA. 58+00.00 PROFILE**

1H:2V

**DRAFT 95%**  
09/30/2025

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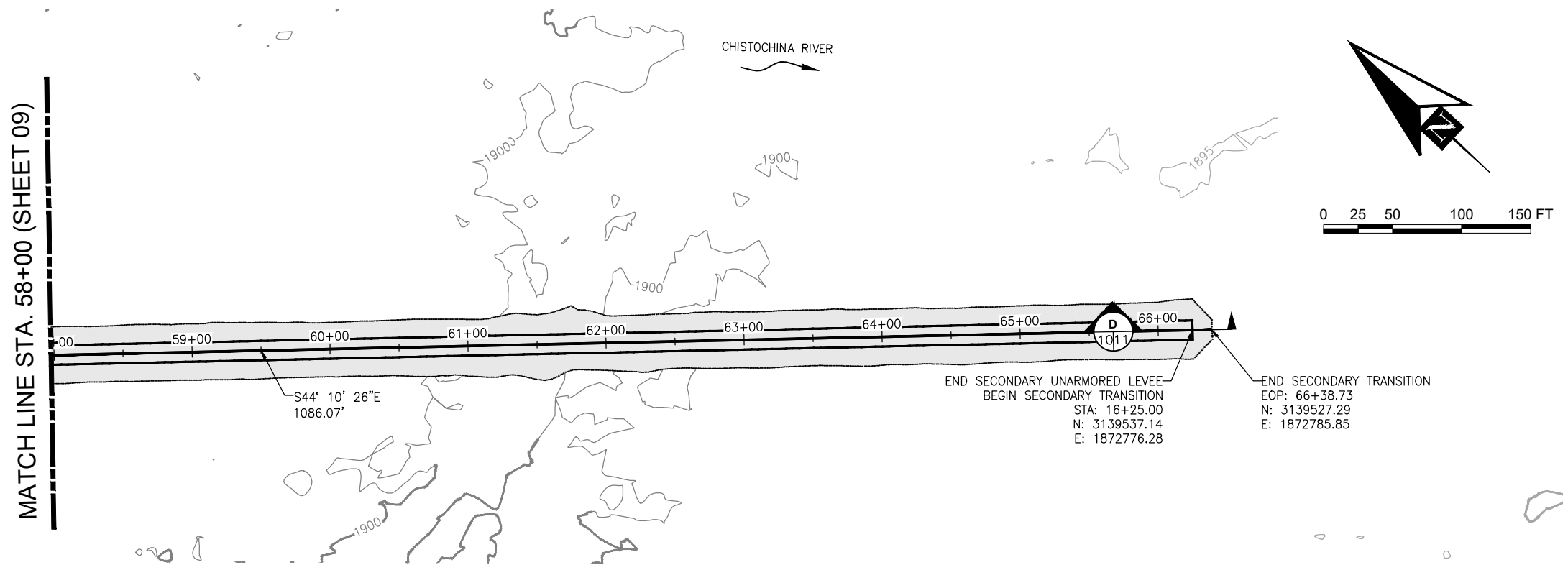
DATE: \_\_\_\_\_

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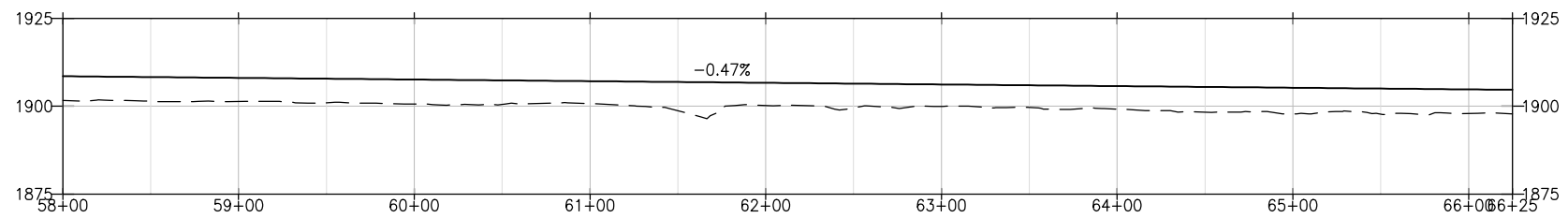


PROJECT: **CHISTOCHINA RIVER AND SINONA CREEK FLOOD AND EROSION MITIGATION**  
TITLE: **PRIMARY ARMORED LEVEE AND SECONDARY UNARMORED LEVEE (4 OF 5)**

DESIGNED BY: AG	DATE: 09/30/2025	SHEET NO: <b>09</b> OF 15
CHECKED BY: EP	PROJECT NO: 241094	



**LEVEE STA. 58+00.00 TO STA. 66+38.73 PLAN**



**LEVEE STA. 58+00.00 TO STA. 66+38.73 PROFILE**

1H:2V

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DATE: \_\_\_\_\_

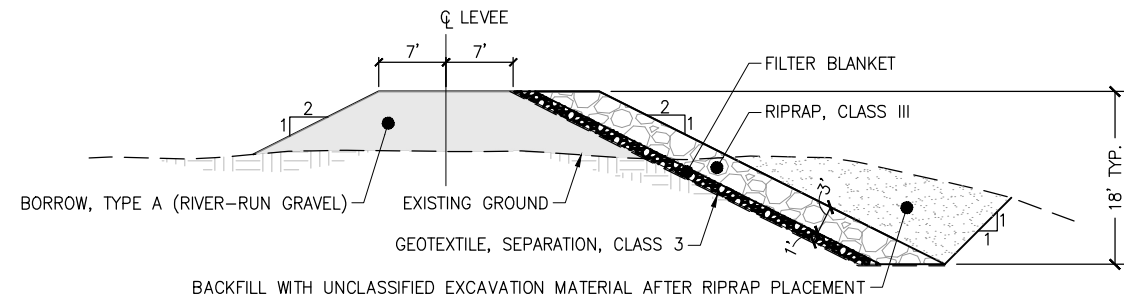
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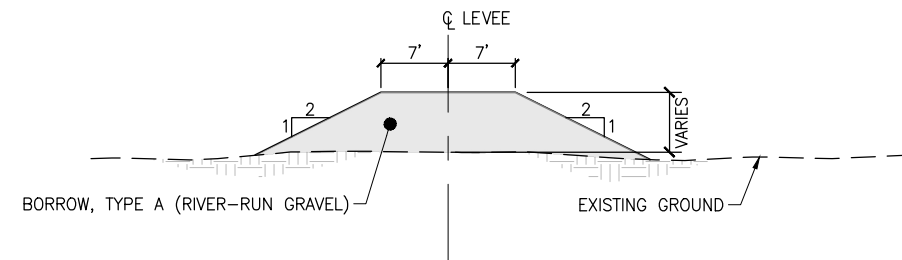
PROJECT: **CHISTOCHINA RIVER AND SINONA CREEK FLOOD AND EROSION MITIGATION**

TITLE: **PRIMARY ARMORED LEVEE AND SECONDARY UNARMORED LEVEE (5 OF 5)**

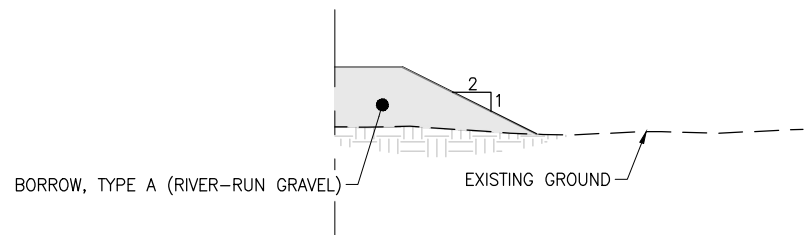
DESIGNED BY:	AG	DATE:	09/30/2025	SHEET NO:	<b>10</b> OF 15
CHECKED BY:	EP	PROJECT NO:	241094		



**B**  
**6** **ARMORED LEVEE TYPICAL SECTION**  
NTS  
STA. 0+00.00 TO 17+40.00



**C**  
**7** **UNARMORED LEVEE TYPICAL SECTION**  
NTS  
STA. 17+77.32 TO 66+25.00



**D**  
**10** **SECONDARY TRANSITION TYPICAL SECTION**  
NTS  
STA. 66+25.00 TO 66+38.73

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**09/30/2025**

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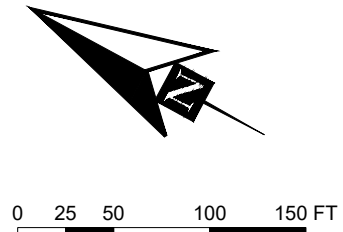
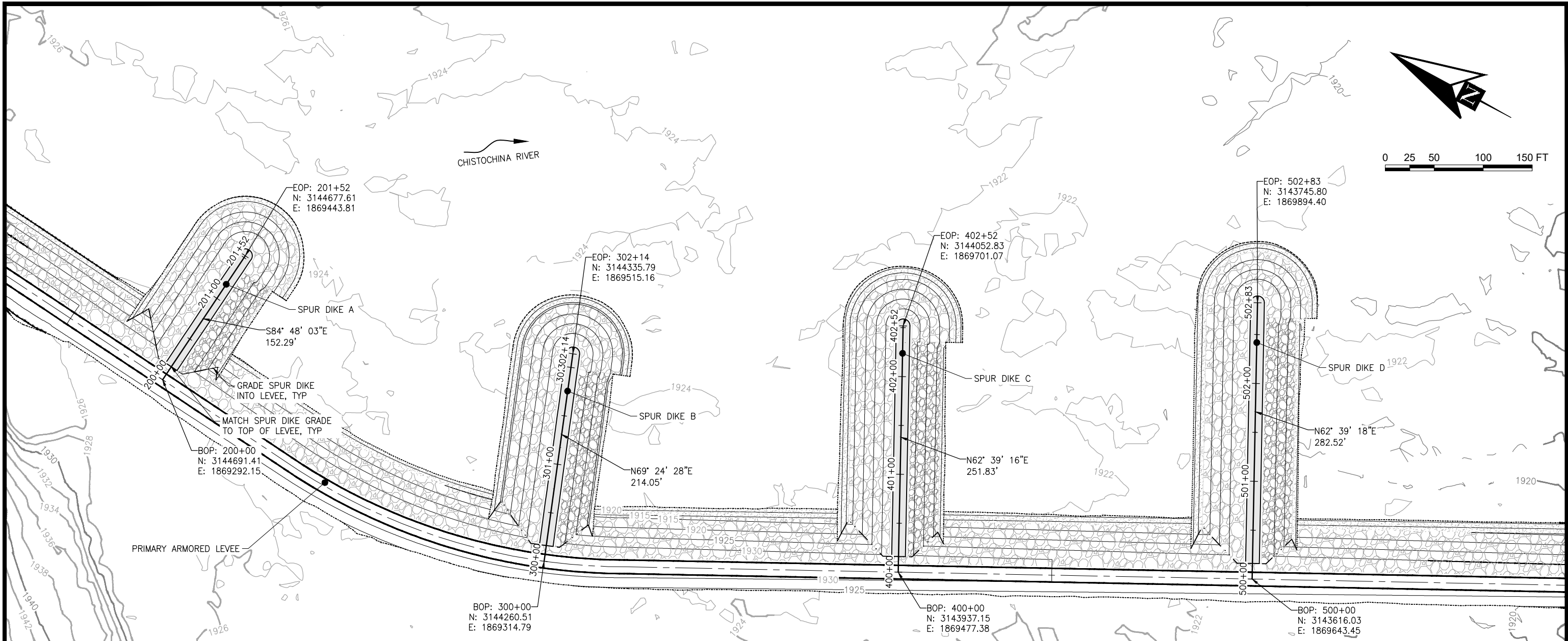
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PROJECT: **CHISTOCHINA RIVER AND SINONA CREEK FLOOD AND EROSION MITIGATION**

TITLE: **LEVEE TYPICAL SECTIONS**

DESIGNED BY: AG	DATE: 09/30/2025	SHEET NO: <b>11</b>
CHECKED BY: EP	PROJECT NO: 241094	OF 15



**SPUR DIKES PLAN**

- NOTES:
- SEE SHEETS 13-14 FOR SPUR DIKE SECTIONS AND TYPICAL DETAILS.
  - SPUR DIKE ALIGNMENTS CORRESPOND TO THE FOLLOWING LEVEE STATIONS:  
LEVEE STA. 2+56.42 = START OF SPUR DIKE A  
LEVEE STA. 6+92.80 = START OF SPUR DIKE B  
LEVEE STA. 10+54.88 = START OF SPUR DIKE C  
LEVEE STA. 14+16.40 = START OF SPUR DIKE D
  - TOP ELEVATIONS OF SPUR DIKES ARE AS FOLLOWS:  
SPUR DIKE A 1934.40'  
SPUR DIKE B 1932.40'  
SPUR DIKE C 1930.75'  
SPUR DIKE D 1929.05'

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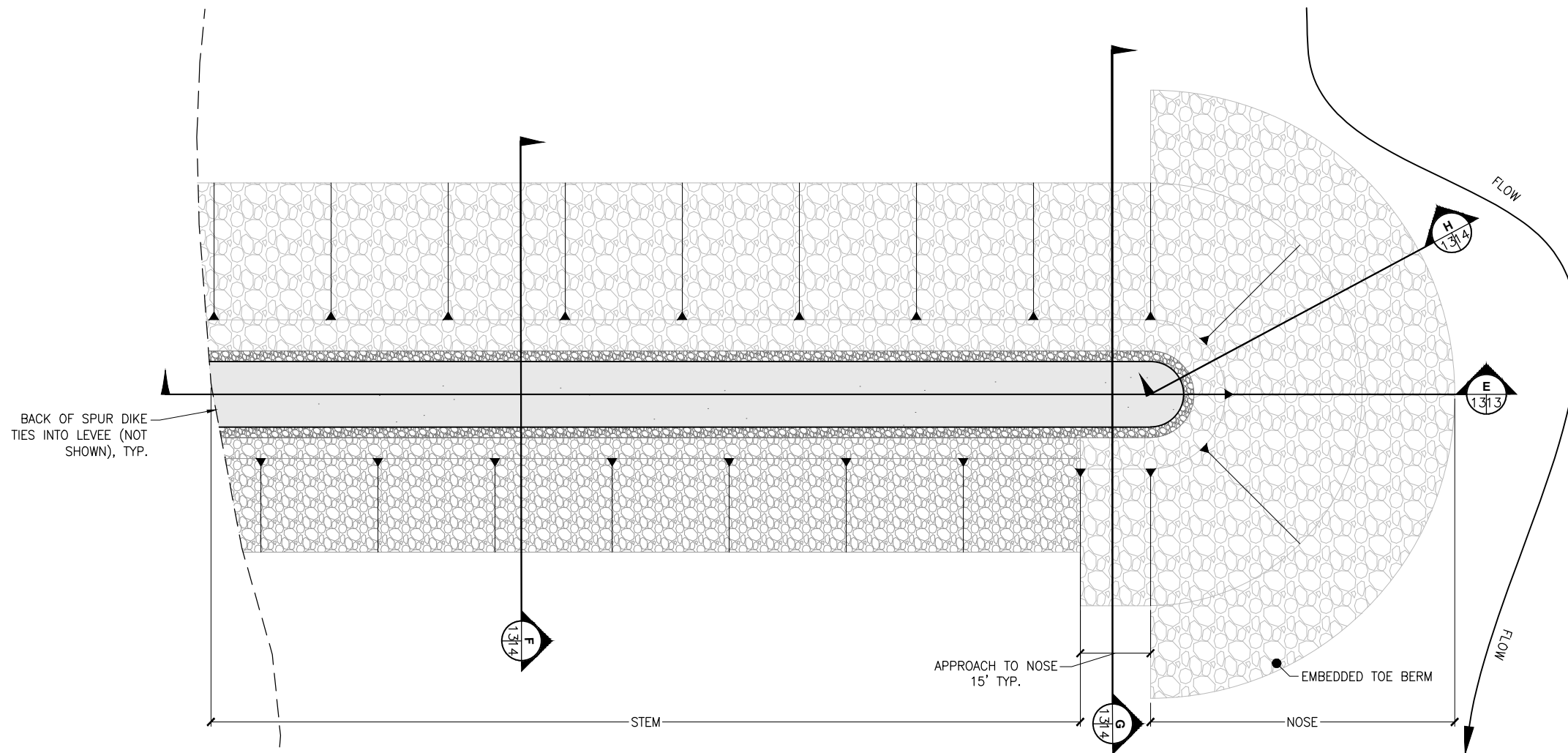
PROJECT: CHISTOCHINA RIVER AND SINONA CREEK FLOOD AND EROSION MITIGATION

TITLE: SPUR DIKES PLAN

DESIGNED BY: AG DATE: 09/30/2025

CHECKED BY: EP PROJECT NO: 241094

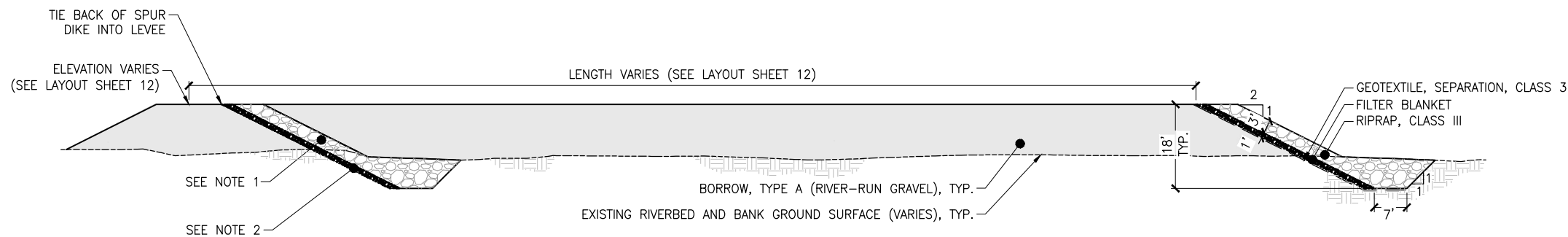
SHEET NO: 12 OF 15



**TYPICAL DIKE PLAN**

NOTES:

1. IF CONSTRUCTED IN PHASES, REMOVE AFFECTED RIPRAP AND FILTER BLANKET FROM FACE OF LEVEE FOR REUSE, AS PRACTICAL, PRIOR TO BUILDING SPUR DIKE.
2. IF LEVEE AND SPUR DIKES ARE CONSTRUCTED IN A SINGLE PROJECT, DO NOT PLACE RIPRAP OR FILTER BLANKET ALONG LEVEE WHERE SPUR DIKE FILL WOULD COVER OVER IT



**E 13 SPUR DIKE TYPICAL SECTION**  
CENTERLINE PROFILE

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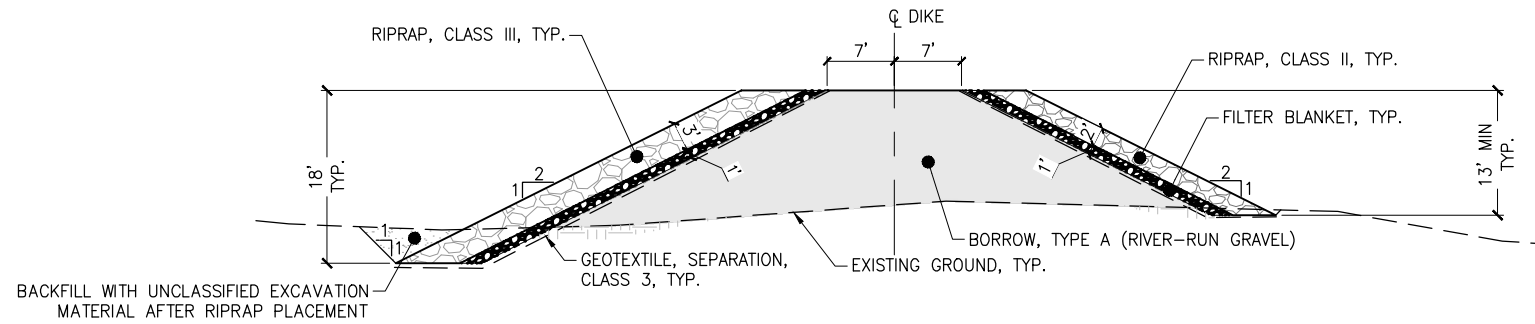
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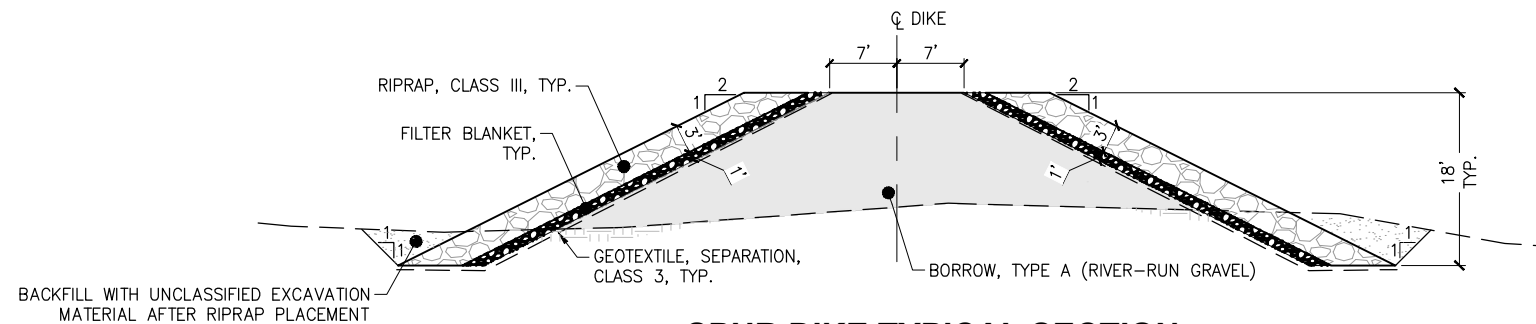
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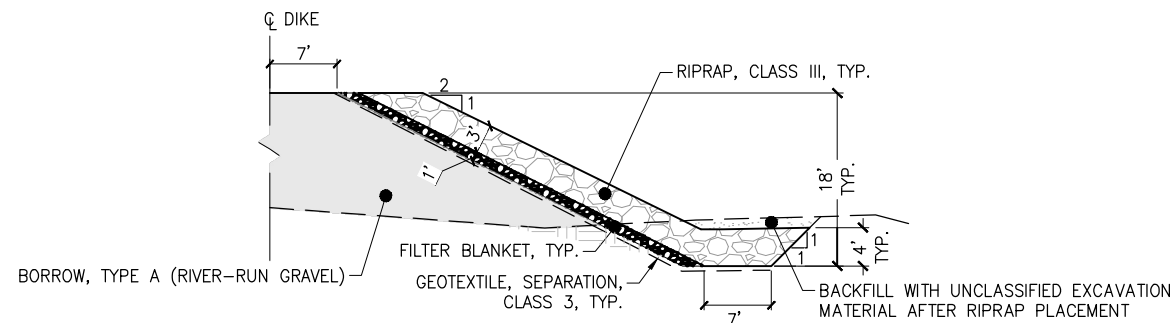
PROJECT:		<b>CHISTOCHINA RIVER EROSION MITIGATION</b>	
TITLE:		<b>SPUR DIKE TYPICAL SECTIONS AND DETAILS (1 OF 2)</b>	
DESIGNED BY:	AG	DATE:	9/30/2025
CHECKED BY:	EP	PROJECT NO:	241094
SHEET NO:			<b>13</b> OF 15



**F**  
13 **SPUR DIKE TYPICAL SECTION**  
STEM



**G**  
13 **SPUR DIKE TYPICAL SECTION**  
APPROACH TO NOSE



**H**  
13 **SPUR DIKE TYPICAL SECTION**  
NOSE

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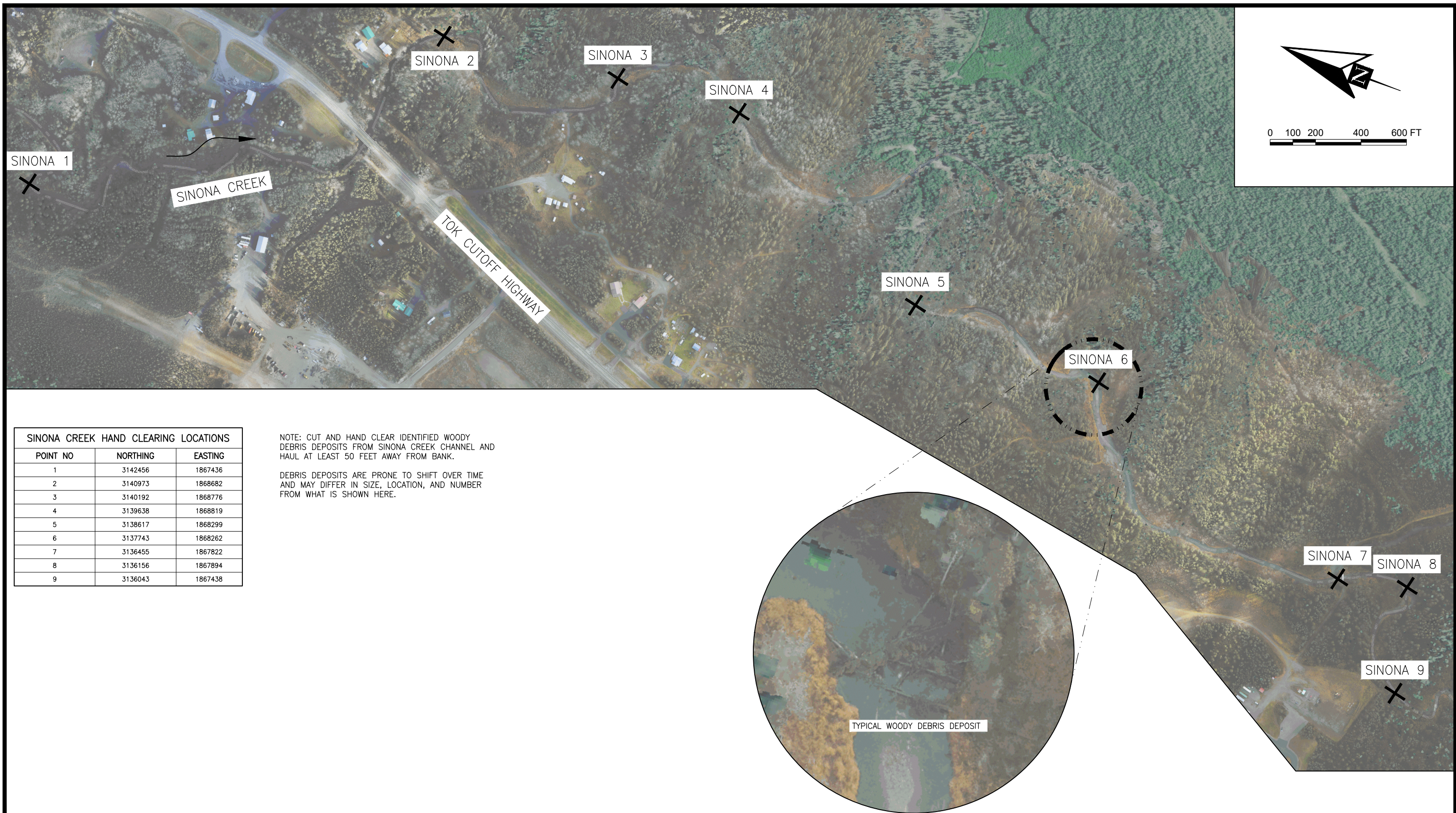
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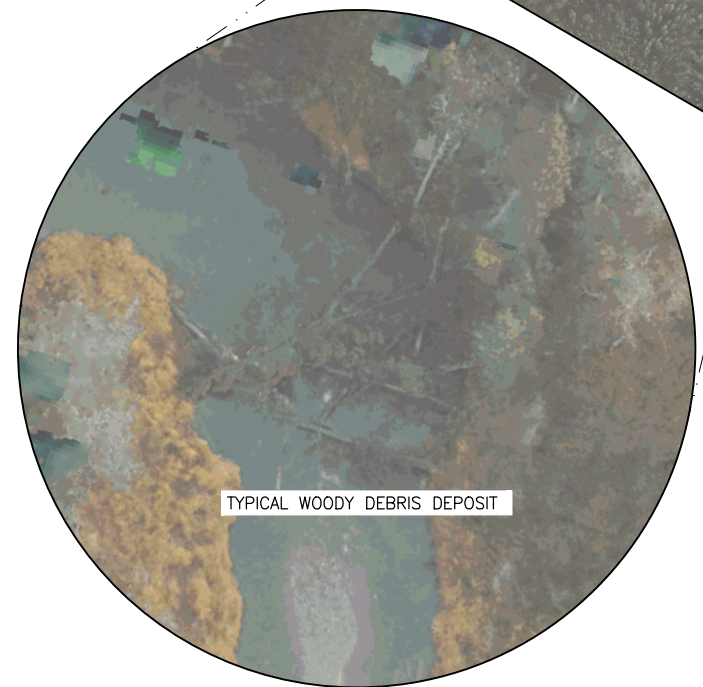
PROJECT:		<b>CHISTOCHINA RIVER EROSION MITIGATION</b>	
TITLE:		<b>SPUR DIKE TYPICAL SECTIONS AND DETAILS (2 OF 2)</b>	
DESIGNED BY:	AG	DATE:	9/30/2025
CHECKED BY:	EP	PROJECT NO:	241094
SHEET NO:			<b>14</b> OF 15



SINONA CREEK HAND CLEARING LOCATIONS		
POINT NO	NORTHING	EASTING
1	3142456	1867436
2	3140973	1868682
3	3140192	1868776
4	3139638	1868819
5	3138617	1868299
6	3137743	1868262
7	3136455	1867822
8	3136156	1867894
9	3136043	1867438

NOTE: CUT AND HAND CLEAR IDENTIFIED WOODY DEBRIS DEPOSITS FROM SINONA CREEK CHANNEL AND HAUL AT LEAST 50 FEET AWAY FROM BANK.

DEBRIS DEPOSITS ARE PRONE TO SHIFT OVER TIME AND MAY DIFFER IN SIZE, LOCATION, AND NUMBER FROM WHAT IS SHOWN HERE.



TYPICAL WOODY DEBRIS DEPOSIT

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PROJECT: **CHISTOCHINA RIVER AND SINONA CREEK FLOOD AND EROSION MITIGATION**

TITLE: **SINONA CREEK CLEANUP PLAN AND DETAILS**

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