

# SHEET INDEX

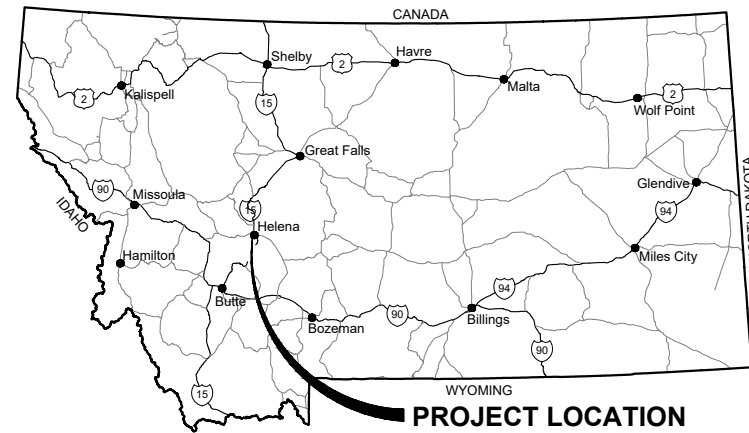
PROJECT: 1-17277-TO12

DATE: APRIL 21, 2023

SHEET 1  
SHEET 2  
SHEET 3  
SHEET 4  
SHEET 5

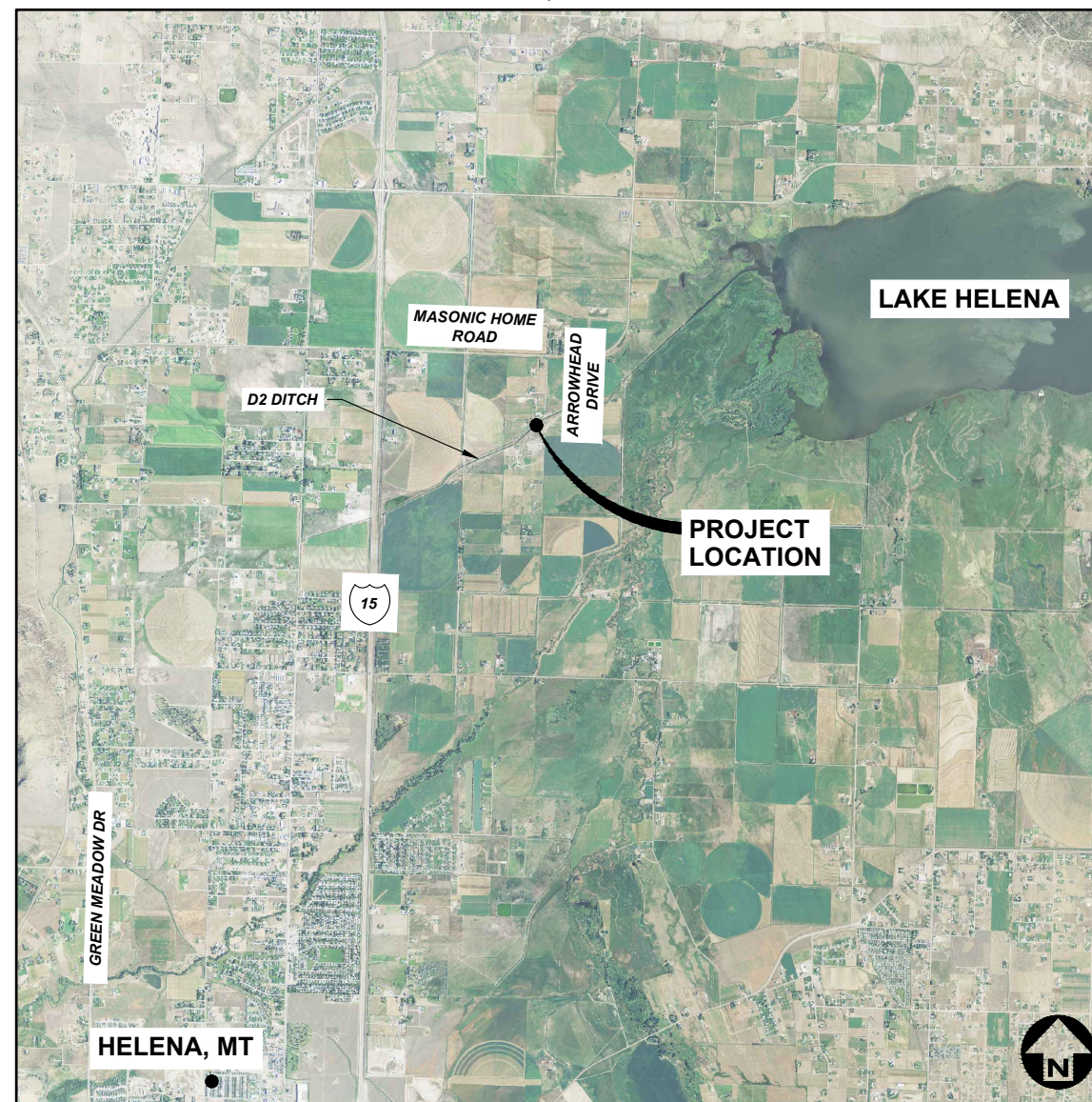
COVER  
LEGEND AND GENERAL NOTES  
ARROWHEAD DRIVE PLAN & PROFILE  
D2 DITCH PLAN & PROFILE  
DETAILS

# LEWIS AND CLARK COUNTY ARROWHEAD DRIVE CULVERT



PROJECT LOCATION

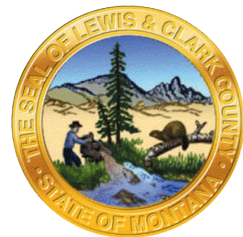
LATITUDE: 46.683557° NORTH, LONGITUDE: 111.990823° WEST



NOT TO SCALE

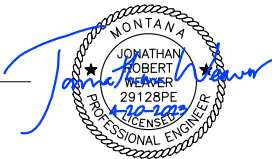
**PLANS PREPARED FOR:**

LEWIS & CLARK COUNTY



**APPROVED BY:**

JONATHAN WEAVER, P.E.  
GREAT WEST ENGINEERING



**QA/QC BY:**

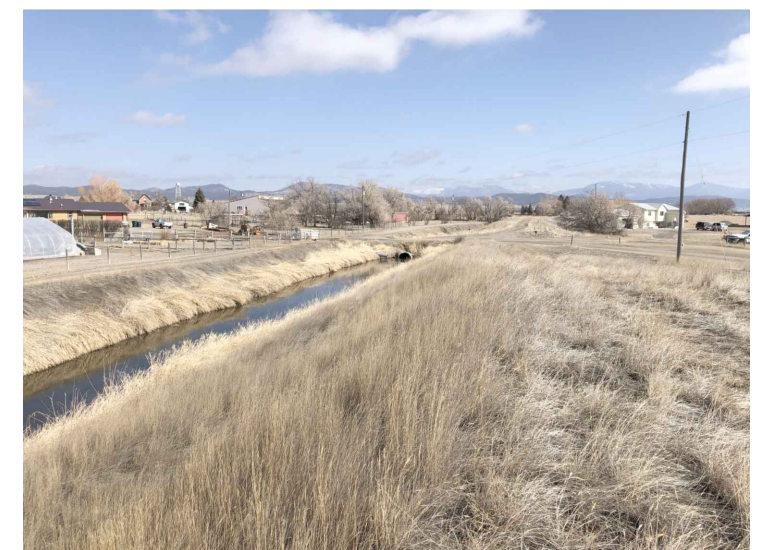
KARL YAKAWICH, P.E.  
GREAT WEST ENGINEERING

**PLANS PREPARED BY:**

EVAN CARROLL, E.I.  
LISBETH OLSEN, E.I.



VIEW OF EXISTING CULVERT - LOOKING SW



VIEW OF EXISTING CULVERT - LOOKING NE

NO.	REVISION DESCRIPTION	BY	DATE	SET NO.
△				SHEET NO. <b>1</b>
△				
△				
△				
△				
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Y:\Shared\Helena Projects\1-17277-L&C Bridge On-Call 2017\TO 12 - Arrowhead Drive Bridge\CADD 1-17277-TO12\Sheets\1-17277-TO12-01 - Cover.dwg

# ABBREVIATIONS

⊙	AT	LPG	LIQUID PROPANE GAS
Δ	ANGLE OF DEFLECTION, DELTA ANGLE	LT	LEFT
<PT	ANGLE POINT	MAX	MAXIMUM
AB	ANCHOR BOLT	MD	MEASURE DOWN
ABDN	ABANDON	MFD	MANUFACTURED
AC	ASBESTOS CONCRETE	MFR	MANUFACTURE, MANUFACTURER
ADDN	ADDITIONAL	MH	MANHOLE
ADJ	ADJACENT	MIN	MINIMUM
AFF	ABOVE FINISHED FLOOR	MISC	MISCELLANEOUS
ALT	ALTERNATE	MJ	MECHANICAL JOINT
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	MOV	MOTOR OPERATED VALVE
APPROX	APPROXIMATE	MPWSS	MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS
APVD	APPROVED	N	NORTH
ARCH	ARCHITECTURE, ARCHITECTURAL	NE	NORTHEAST
ASPH	ASPHALT	NG	NATURAL GAS
AVE	AVENUE	NIC	NOT IN CONTRACT
AVG	AVERAGE	NO	NUMBER
BFV	BUTTERFLY VALVE	NOM	NOMINAL
BLDG	BUILDING	NTS	NOT TO SCALE
BLK	BLOCK	NW	NORTHWEST
BLVD	BOULEVARD	OC	ON CENTER
BM	BEAM, BENCHMARK	OD	OUTSIDE DIAMETER
BOT	BOTTOM	OF	OVERFLOW
BRG	BEARING	OH	OVERHEAD
BRKT	BRACKET	OHP	OVERHEAD POWER
BVC	BEGIN VERTICAL CURVE	OHT	OVERHEAD TELEPHONE
C-C	CENTER TO CENTER	OPNG	OPENING
CHAN	CHANNEL	PC	POINT OF CURVATURE
CHK	CHECK	PCC	POINT OF COMPOUND CURVATURE
CI	CAST IRON	PE	PLAIN END, POLYETHYLENE
CIPC	CAST-IN-PLACE CONCRETE	PERP	PERPENDICULAR
CIRC	CIRCULAR	PI	POINT OF INTERSECTION
CJ	CONSTRUCTION JOINT, CONTROL JOINT	PL	PROPERTY LINE
CL	CENTER LINE	PNL	PANEL
CLR	CLEAR, CLEARANCE	PRC	POINT OF REVERSE CURVATURE
CMP	CORRUGATED METAL PIPE	PREFAB	PREFABRICATED
CMU	CONCRETE MASONRY UNITS	PRELIM	PRELIMINARY
CO	CLEANOUT	PREP	PREPARE, PREPARATION
COL	COLUMN	PROP	PROPERTY
CONC	CONCRETE	PRV	PRESSURE REDUCING VALVE
CONSTR	CONSTRUCTION	PSF	POUNDS PER SQUARE FOOT
CONT	CONTINUE, CONTINUED, CONTINUOUS	PSI	POUNDS PER SQUARE INCH
CONTR	CONTRACTOR	PT	POINT, POINT OF TANGENCY
COORD	COORDINATE	PVC	POLYVINYL CHLORIDE
CP	CONTROL PANEL, CONTROL POINT	PVI	POINT OF VERTICAL INTERSECTION
CPLG	COUPLING	PVMT	PAVEMENT
CTR	CENTER	R, RAD	RADIUS
CTV	CABLE TELEVISION	RC	REINFORCED CONCRETE
CU	CUBIC, COPPER	RCP	REINFORCED CONCRETE PIPE
CF	CUBIC FEET	RD	ROAD
CULV	CULVERT	RDCR	REDUCER
CY	CUBIC YARD	REBAR	REINFORCEMENT BAR
DET	DETAIL	REF	REFERENCE
DI	DUCTILE IRON, DRAIN INLET	REINF	REINFORCE
DIA, ∅	DIAMETER	REQD	REQUIRED
DIAG	DIAGONAL	RR	RAILROAD
DIM	DIMENSION	RST	REINFORCING STEEL
DR	DRIVE	RT	RIGHT
DWG	DRAWING	R/W	RIGHT-OF-WAY
E	EAST	S	SOUTH, SANITARY SEWER
EA	EACH	SAN	SANITARY
EL, ELEV	ELEVATION	SCH	SCHEDULE
ELB	ELBOW	SD	STORM DRAIN
ELEC	ELECTRIC, ELECTRICAL	SDWK	SIDEWALK
ENCL	ENCLOSE	SE	SOUTHEAST
ENGR	ENGINEER	SECT	SECTION
EOP	EDGE OF PAVEMENT	SF	SQUARE FOOT
EQ	EQUAL, EQUALLY	SHT	SHEET
EQ SP	EQUALLY SPACED	SIM	SIMILAR
EQUIP	EQUIPMENT	SLP	SLOPE
EQUIV	EQUIVALENT	SPEC	SPECIFICATION
EVC	END VERTICAL CURVE	SQ	SQUARE
EW	EACH WAY	SSTL	STAINLESS STEEL
EXC	EXCAVATE	STA	STATION
EXP	EXPANSION	SS	SANITARY SEWER SERVICE
EXP JT	EXPANSION JOINT	STD	STANDARD
EXST	EXISTING	ST	STREET
FCV	FLOW CONTROL VALVE	STL	STEEL
FD	FLOOR DRAIN	STRUCT	STRUCTURE
FDN	FOUNDATION	SW	SOUTHWEST
FES	FLARED END SECTION	SYM	SYMMETRICAL
FET	FLARED END TERMINAL	TB	THRUST BLOCK
FF	FINISHED FLOOR	TBC	TOP BACK OF CURB
FG	FINISH GRADE	TBM	TEMPORARY BENCH MARK
FHYD	FIRE HYDRANT	TEL	TELEPHONE
FJ	FLANGE JOINT	TEMP	TEMPORARY
FL	FLOW LINE	THRU	THROUGH
FLEX	FLEXIBLE	TYP	TYPICAL
FM	FORCEMAIN	UG	UNDERGROUND
FT	FOOT, FEET	UGP	UNDERGROUND POWER
FO	FIBER OPTIC	UGT	UNDERGROUND TELEPHONE
FTG	FOOTING, FITTING	UTIL	UTILITY
G	NATURAL GAS	V	VALVE, VOLT
GA	GAGE, GAUGE	VB	VALVE BOX
GAL	GALLON	VERT	VERTICAL
GALV	GALVANIZED	VOL	VOLUME
GND	GROUND	W	WEST, WATER
GVL	GRAVEL	WTR	WATER
HB	HOSE BIB	WD	WOOD
HDPE	HIGH DENSITY POLYETHYLENE	W/	WITH
HOR, HORIZ	HORIZONTAL	W/O	WITHOUT
Hwy	HIGHWAY	WL	WETLAND
HYD	HYDRANT	WM	WIRE MESH, WATER METER
ID	INSIDE DIAMETER	WS	WATERSTOP, WATER SURFACE, WATER SERVICE
IE	INVERT ELEVATION	WT	WEIGHT
IN	INCH	WV	WATER VALVE
INV	INVERT	WWF	WELDED WIRE FABRIC
JB	JUNCTION BOX	WWM	WELDED WIRE MESH
JT	JOINT	XFMR	TRANSFORMER
K	RATE OF VERTICAL CURVATURE	X-ING	CROSSING
LBS	POUNDS	XS	CROSS SECTION
LF	LINEAR FEET	YD	YARD
LN	LANE		

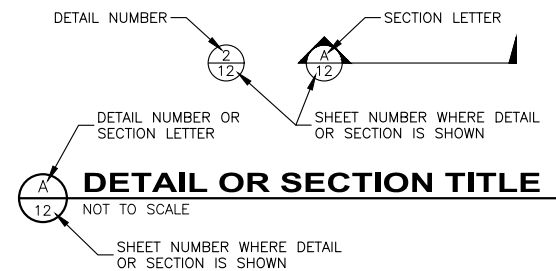
# LEGEND

EXISTING	PROPOSED	DESCRIPTION	EXISTING	PROPOSED	DESCRIPTION
---	---	MAJOR CONTOUR	⊙	⊙	STUMP
---	---	MINOR CONTOUR	⊙	⊙	SHRUB/BUSH
---	---	OVERHEAD TELEPHONE	☀	☀	TREE--CONIFER
---	---	UNDERGROUND TELEPHONE	☀	☀	TREE--DECIDUOUS
---	---	CABLE TELEVISION	☀	☀	TREE LINE
---	---	FIBER OPTIC	⊙	⊙	COMMUNICATION MANHOLE
---	---	NATURAL GAS	⊙	⊙	COMMUNICATION VAULT
---	---	OVERHEAD POWER	⊙	⊙	TELEPHONE RISER
---	---	UNDERGROUND POWER	⊙	⊙	CABLE TV RISER
---	---	SANITARY SEWER	⊙	⊙	NATURAL GAS METER
---	---	SANITARY SEWER SERVICE	⊙	⊙	NATURAL GAS RISER
---	---	SANITARY SEWER FORCEMAIN	⊙	⊙	NATURAL GAS VALVE
---	---	STORM DRAIN	⊙	⊙	LIGHT POLE
---	---	STORM CULVERT	⊙	⊙	STREET LIGHT POLE
---	---	WATER	⊙	⊙	POWER RISER
---	---	WATER SERVICE	⊙	⊙	PAD MOUNTED TRANSFORMER
---	---	CHAINLINK FENCE	⊙	⊙	POWER VAULT
---	---	BARBED WIRE FENCE	⊙	⊙	UTILITY POLE
---	---	WOOD FENCE	⊙	⊙	GUY WIRE
---	---	PAVED ROAD	⊙	⊙	SANITARY MANHOLE
---	---	GRAVEL ROAD	⊙	⊙	SANITARY CLEANOUT
---	---	PROPERTY/LOT LINE	⊙	⊙	SANITARY LAMPHOLE
---	---	PROPERTY EASEMENT	⊙	⊙	STORM MANHOLE
---	---	PROPERTY SETBACK	⊙	⊙	STORM ROUND INLET
---	---	RIGHT-OF-WAY	⊙	⊙	STORM SQUARE INLET
---	---	CITY LIMIT/DISTRICT BOUNDARY	⊙	⊙	STORM CATCH BASIN
---	---	RAILROAD	⊙	⊙	11.25' ELBOW
---	---	DITCH	⊙	⊙	22.50' ELBOW
---	---	WATER EDGE	⊙	⊙	45' ELBOW
---	---	WETLAND	⊙	⊙	90' ELBOW
---	---	BUILDING	⊙	⊙	TEE
---	---	BENCHMARK	⊙	⊙	CROSS
---	---	CONTROL POINT	⊙	⊙	CAP
---	---	PROPERTY PIN	⊙	⊙	FIRE HYDRANT
---	---	BORING	⊙	⊙	GATE VALVE
---	---	MONITORING WELL	⊙	⊙	REDUCER
---	---	TEST PIT	⊙	⊙	WATER METER
---	---	BOLLARD	⊙	⊙	WELL
---	---	MAIL BOX	⊙	⊙	CURB STOP
---	---	SIGN	⊙	⊙	FROST FREE HYDRANT

## GENERAL NOTES:

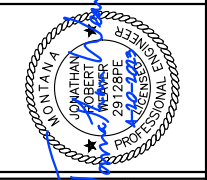
- THIS IS A STANDARD LEGEND AND ABBREVIATION LIST. THEREFORE, NOT ALL SYMBOLS AND ABBREVIATIONS MAY BE USED ON THIS PROJECT.
- UNLESS MODIFIED BY THE CONTRACT DOCUMENTS, ALL WORK WILL CONFORM TO THE MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS, SIXTH EDITION, APRIL 2010 (REFERRED TO COLLECTIVELY AS MPWSS).
- EXISTING UNDERGROUND UTILITIES SHOWN ARE FROM THE BEST INFORMATION AVAILABLE. THIS INFORMATION IS APPROXIMATE AND MAY BE INCOMPLETE. FOR ACCURATE LOCATION, THE CONTRACTOR SHALL CONTACT, PRIOR TO EXCAVATION, THE UTILITIES UNDERGROUND LOCATION CENTER AT: 1-800-424-5555.

## GENERAL DESIGN DESIGNATIONS:



NO.	REVISION DESCRIPTION	BY	DATE

PROJECT: 1-17277-TO12
DESIGNED: EAC
DRAWN: EAC
CHECKED: KFY
APPROVED: JRW
DATE: APRIL 21, 2023



**LEWIS AND CLARK COUNTY**  
**ARROWHEAD DRIVE CULVERT**  
**LEGEND AND GENERAL NOTES**

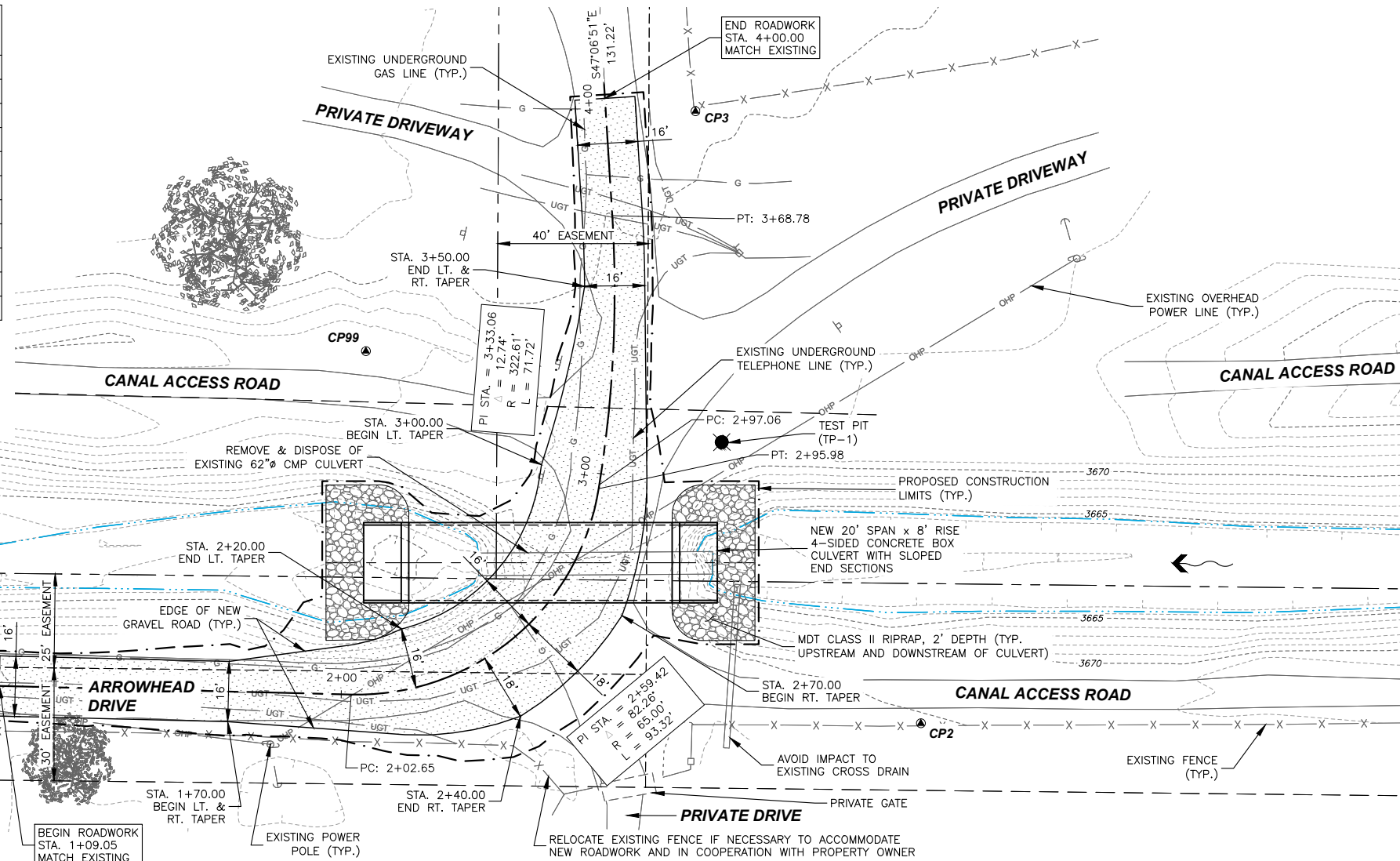
SHEET NO.  
**2**  
 OF 5

**CONTROL TABLE**

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	897,350.746	1,344,060.804	3,670.27	REBAR W/ CAP
2	897,094.389	1,343,706.593	3,669.92	REBAR W/ CAP
3	897,017.692	1,343,862.021	3,670.08	REBAR W/ CAP
4	896,780.760	1,344,095.506	3,670.79	REBAR W/ CAP
10	897,110.624	1,343,846.522	3,672.08	REBAR W/ CAP
11	896,789.450	1,344,148.466	3,671.29	REBAR W/ CAP
12	897,535.228	1,344,642.597	3,673.47	REBAR W/ CAP
14	897,294.325	1,343,895.749	3,670.16	REBAR W/ CAP
15	897,360.518	1,343,815.237	3,673.27	REBAR W/ CAP
99	897,124.227	1,343,881.652	3,673.39	REBAR W/ CAP

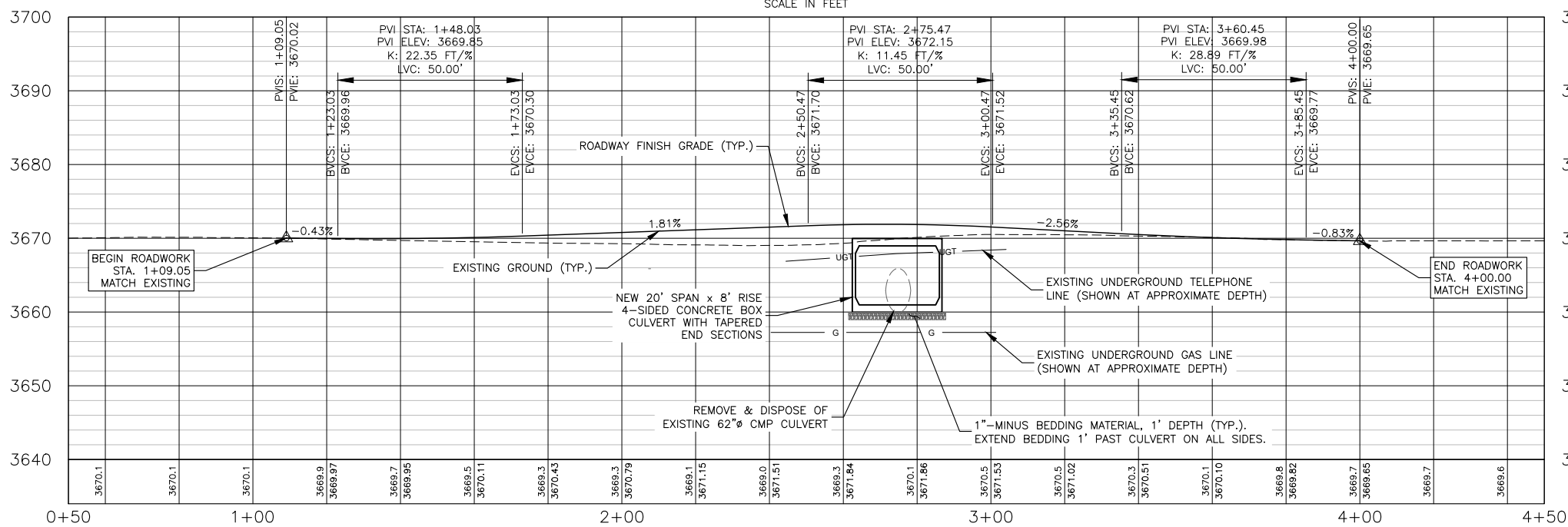
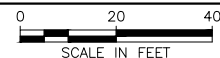
**SURVEY NOTES:**

- THIS PROJECT IS ON THE MONTANA COORDINATE SYSTEM OF NAD83 GEOID 12B. NORTHING AND EASTING COORDINATES ARE EXPRESSED IN UNITS OF INTERNATIONAL FEET. ELEVATIONS ARE REFERENCED TO THE NAVD88 VERTICAL DATUM.
- DIMENSIONS SHOWN ON THE PLANS ARE GRID. ALL SURVEY AND STAKING REQUIRE THE USE OF A COMBINATIONS SCALE FACTOR (CSF) TO CONVERT GRID DIMENSIONS TO GROUND DIMENSIONS (GRID DISTANCE/CSF = GROUND DISTANCE). THE CSF FOR THIS PROJECT IS 0.999235958984.



**PLAN VIEW OF ARROWHEAD DRIVE - STA. 0+50 TO STA. 4+50**

**NOTE:** DESIGN VEHICLE FOR HORIZONTAL TURNING MOVEMENT IS WB-62.



**PROFILE VIEW OF ARROWHEAD DRIVE - STA. 0+50 TO STA. 4+50**

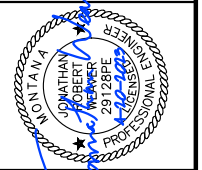
HORIZONTAL SCALE: 1" = 40'  
VERTICAL SCALE: 1" = 20'

**CONCRETE BOX CULVERT NOTES:**

- THE SUPPLIER IS RESPONSIBLE FOR THE FINAL DESIGN OF THE PRECAST BARREL SECTIONS, SLOPED END SECTIONS, AND CUTOFF WALLS, AS WELL AS JOINT CONNECTIONS. THE FINAL DESIGN AND FULL SHOP DRAWINGS SHALL BE PREPARED BY A LICENSED ENGINEER REGISTERED IN THE STATE OF MONTANA.
- ALL LOADING, DESIGN METHODS AND MATERIAL MUST COMPLY WITH ASTM C1577. CONCRETE BOX SHALL BE DESIGNED FOR HL-93 LIVE LOADING.
- THE SLOPED END SECTIONS AND CUTOFF WALLS SHALL BE DESIGNED AND FABRICATED BY THE PRECAST MANUFACTURER.
- THE STRUCTURE SHALL BE ASSEMBLED AND INSTALLED IN ACCORDANCE WITH THE SHOP DRAWINGS PROVIDED BY THE MANUFACTURER AND PER THE MANUFACTURER'S RECOMMENDATIONS.
- THE STRUCTURE SHALL BE BACKFILLED USING CLEAN, WELL GRADED ROAD MIX OR OTHER GRANULAR MATERIAL THAT MEETS THE REQUIREMENTS OF AASHTO M145 FOR SOIL A-1, A-3, A-2-4, OR A-2-5. BACKFILL MUST BE PLACED SYMMETRICALLY ON EACH SIDE OF THE STRUCTURE IN 6-8 LOOSE INCH LIFTS. EACH LIFT SHALL BE COMPACTED TO A MINIMUM OF 95% OF MAXIMUM DENSITY AT +/- 2% OF OPTIMUM MOISTURE.
- FOR CULVERT BEDDING MATERIAL, FURNISH GRANULAR BEDDING IN ACCORDANCE WITH THE MDT STANDARD SPECIFICATIONS SUBSECTION 701.04.3.

NO.	REVISION DESCRIPTION	BY	DATE

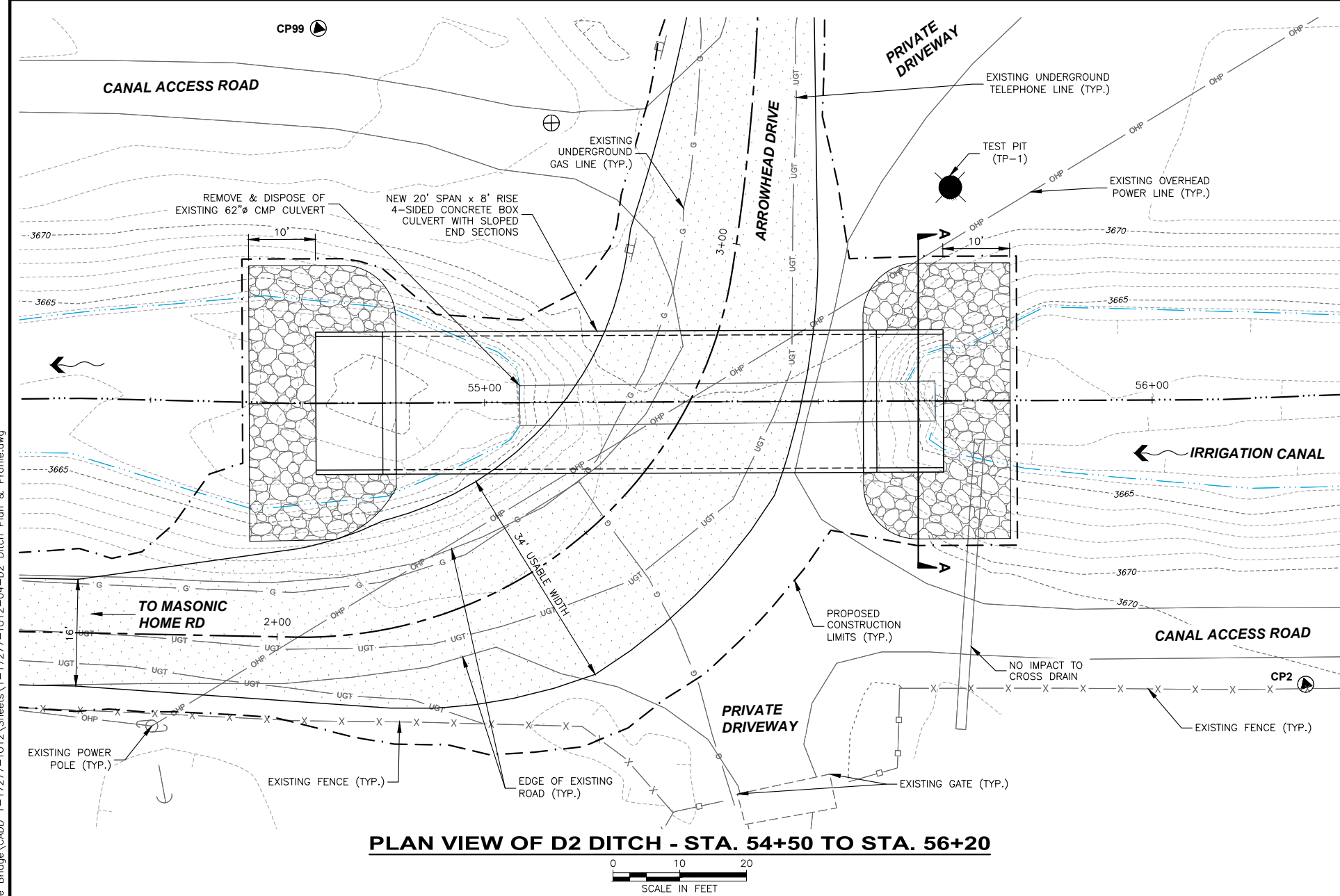
PROJECT: 1-17277-T012  
DESIGNED: EAC  
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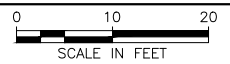
LEWIS AND CLARK COUNTY  
**ARROWHEAD DRIVE CULVERT**  
ARROWHEAD DRIVE PLAN & PROFILE

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ARROWHEAD DRIVE PLAN & PROFILE

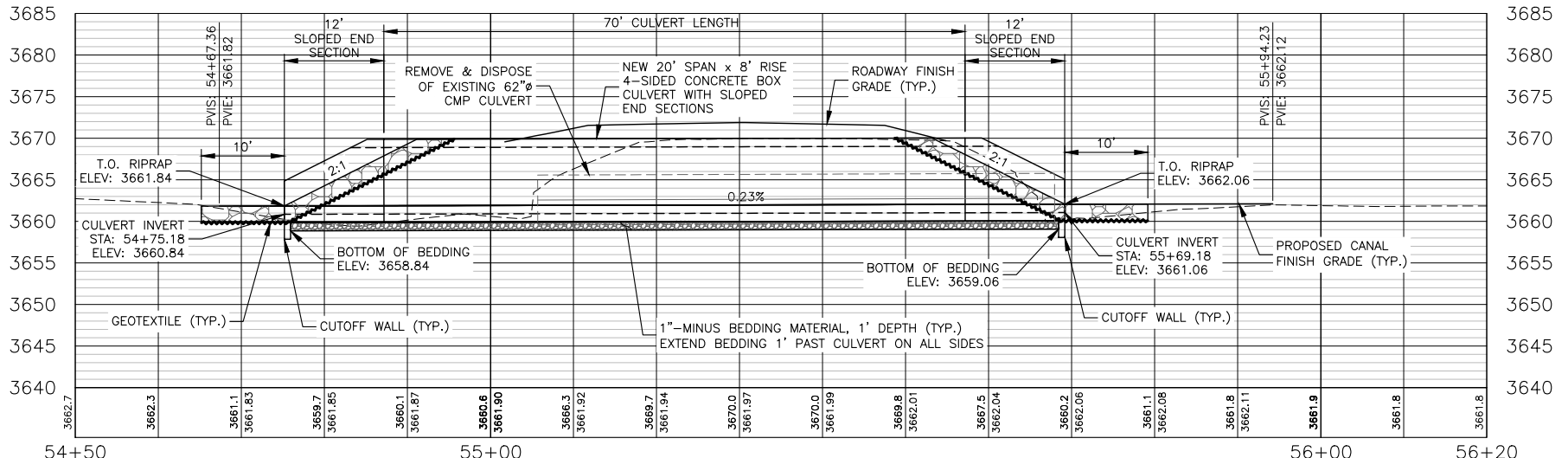
Y:\Shared\Helena Projects\1-17277-L&C Bridge On-Call 2017\TO 12 - Arrowhead Drive Bridge\CADD 1-17277-TO12-Sheets\1-17277-TO12-D2 Ditch Plan & Profile.dwg



**PLAN VIEW OF D2 DITCH - STA. 54+50 TO STA. 56+20**

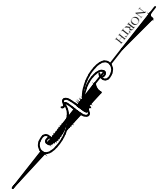


ESTIMATED QUANTITIES		
TOTAL STRUCTURE EXCAVATION	1353	CY
CRUSHED AGGREGATE SURFACING	60	CY
CRUSHED BASE COURSE	131	CY
STRUCTURAL BACKFILL	937	CY
ROADWAY EMBANKMENT	127	CY
1"-MINUS BEDDING MATERIAL	118	CY
CLASS 2 RIPRAP	95	CY
GEOTEXTILE	39	SY



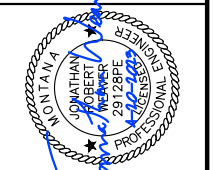
**PROFILE VIEW OF D2 DITCH - STA. 54+50 TO STA. 56+20**

HORIZONTAL SCALE: 1" = 20'  
VERTICAL SCALE: 1" = 20'



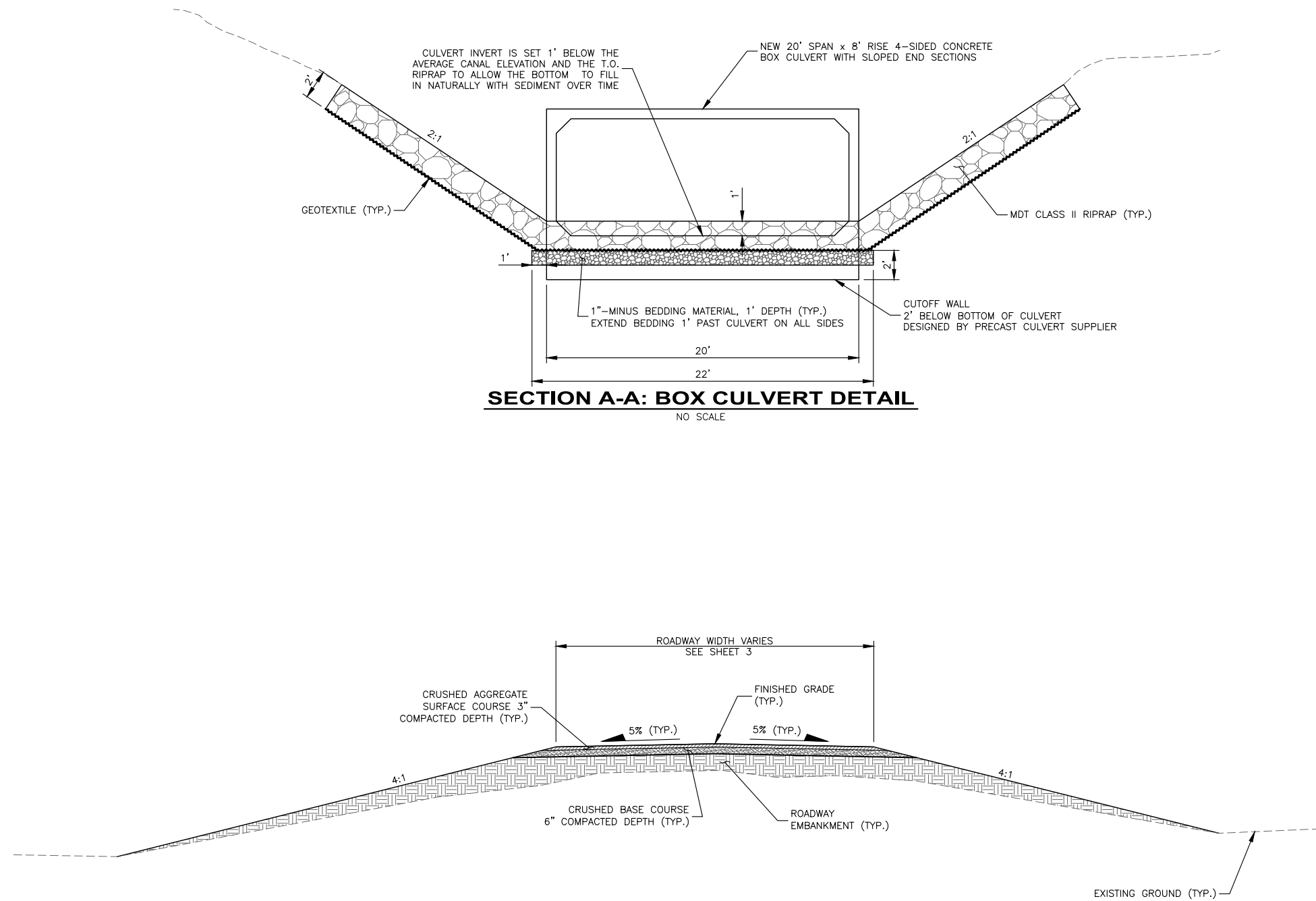
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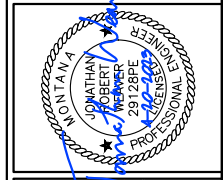
**LEWIS AND CLARK COUNTY**  
**ARROWHEAD DRIVE CULVERT**  
D2 DITCH PLAN & PROFILE

Y:\Shared\Helena Projects\1-17277-L&C Bridge On-Coll 2017\TO 12 - Arrowhead Drive Bridge\CADD 1-17277-T012-Sheets\1-17277-T012-05-Details.dwg



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**LEWIS AND CLARK COUNTY**  
**ARROWHEAD DRIVE CULVERT**  
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