

**MONTANA
DEPARTMENT OF TRANSPORTATION**

**A GUIDE TO READING
MONTANA HIGHWAY
PLANS**

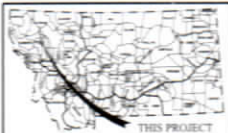


Outline

- Title Sheet
- 3 - Views
- Plan Sheet
- Profile Sheet
- Typical Section
- Cross Section
- Approaches
- Electronic Plans
- Aerial Mapping
- Field Markings
- Abbreviations
- Symbols



Title Sheet



THIS PROJECT

MONTANA DEPARTMENT OF TRANSPORTATION

FEDERAL AID PROJECT STPS 503-1(4)4
GRADE, GRAVEL, PL. MIX SURF. & STRUCTURE
FOYS CANYON ROAD
FLATHEAD COUNTY

DATE	10/1/58
BY	J. H. BROWN
CHECKED	J. H. BROWN
APPROVED	J. H. BROWN
DATE	10/1/58
BY	J. H. BROWN
CHECKED	J. H. BROWN
APPROVED	J. H. BROWN

LENGTH 3.6 MILES

SCALE:

HORIZONTAL 1" = 40'

VERTICAL 1" = 10'

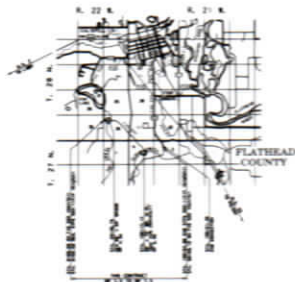
SECTION BETWEEN & FEDERAL 1" = 40'

SECTION BETWEEN & FEDERAL 1" = 40'

SECTION BETWEEN & FEDERAL 1" = 40'

SECTION BETWEEN & FEDERAL 1" = 40'

SURFACE GRADES
CONTRACTOR FURNISHES



DATE	10/1/58
BY	J. H. BROWN
CHECKED	J. H. BROWN
APPROVED	J. H. BROWN

DATE	10/1/58
BY	J. H. BROWN
CHECKED	J. H. BROWN
APPROVED	J. H. BROWN

DATE	10/1/58
BY	J. H. BROWN
CHECKED	J. H. BROWN
APPROVED	J. H. BROWN

DATE	10/1/58
BY	J. H. BROWN
CHECKED	J. H. BROWN
APPROVED	J. H. BROWN

DATE	10/1/58
BY	J. H. BROWN
CHECKED	J. H. BROWN
APPROVED	J. H. BROWN

Title Sheet (Project Information)

FEDERAL AID PROJECT STPS 503-1 (4)4
GRADE, GRAVEL, PL. MIX SURF. & STRUCTURE
FOYS CANYON ROAD
FLATHEAD COUNTY

Project Description
(Major Pay Items)

LENGTH 3.6 MILES

Project Length



Title Sheet (Design Data)

Design Year Average Daily Traffic

Design Hourly Volume

Design Speed

18,000 lb Equivalent
Single Axle Load

Actual Letting Date

Combination Scale Factor

DESIGN DATA	
PRESENT 2003 A. D. T.	= 210
LETTING 2004 A. D. T.	= 230
DESIGN 2024 A. D. T.	= 280
D. H. V.	= 80
TRUCKS = 6.5%	
V _d	= 25 mph
8 KIP ESAL'S	= 65.6 DAILY
GROWTH RATE	= 1.0% ANNUALLY

LETTING DATE - _____

CSF = 0.99925993 (RP 3.9 TO 7.6)



Title Sheet (Scales)

SCALES

	<u>RURAL</u>	<u>URBAN</u>
VERTICAL:	1" = 10'	1" = 5'
HORIZONTAL:	1" = 100'	1" = 50'
CROSS SECTION - HORIZONTAL & VERTICAL:	1" = 10'	1" = 5'

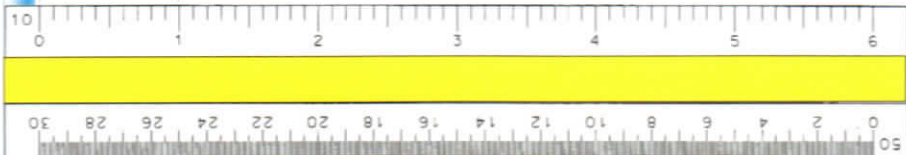
REDUCED PRINTS ONE-HALF ORIGINAL SCALE

ALL SCALES ARE APPROXIMATE

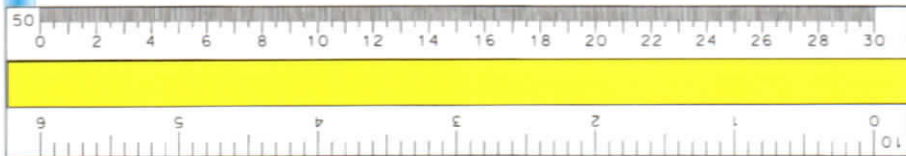


Scales

1" = 10' or 100'



1" = 5' or 50'



Title Sheet (Miscellaneous)

PLANS PREPARED BY

*Consultant Name,
Address, and
Phone Number*

For Use By
Consultants

RELATED PROJECTS

Project Splits
Projects Tied for
Letting etc....

ASSOCIATED PROJECT AGREEMENT NUMBERS

R/W&I.C.	STPS 503-11514
P E	STPS 503-11314

Other Project
Agreement
Numbers

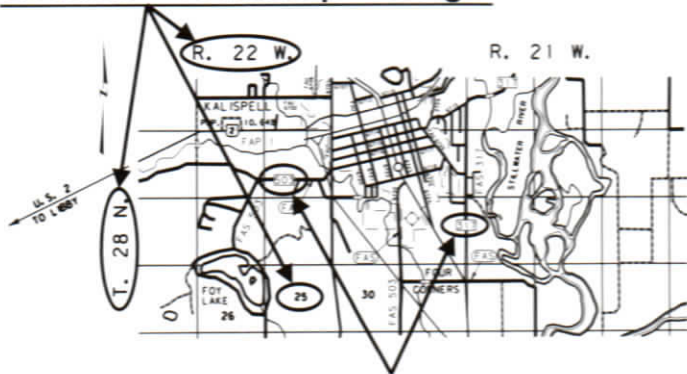
MONTANA DEPARTMENT OF TRANSPORTATION	
APPROVED: _____ 20____	
JIM LYNCH DIRECTOR OF TRANSPORTATION	
BY: _____ HIGHWAYS ENGINEER	
U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION	
APPROVED: _____	
_____ DIVISION ADMINISTRATOR	_____ DATE

Completed Only
when the
Project is Let by
MDT Contract
Plans



Title Sheet (Location Map)

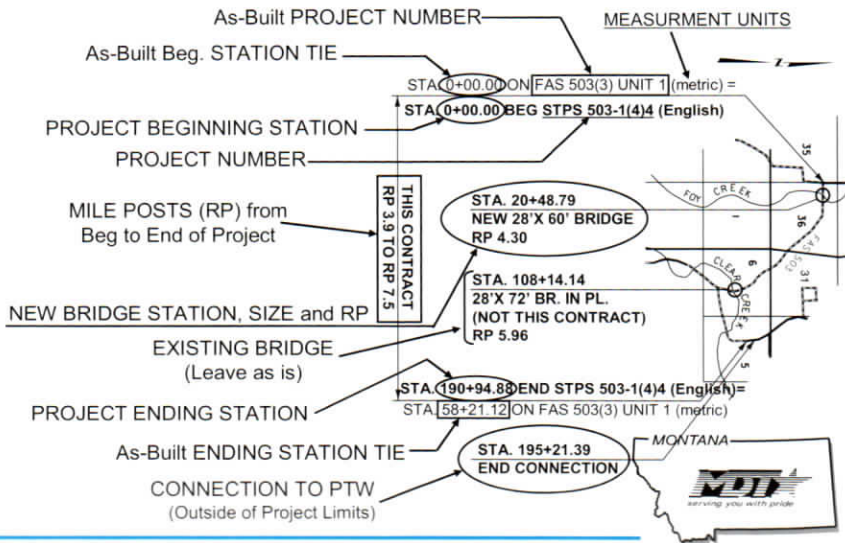
Section – Township - Range



Highway Route Numbers

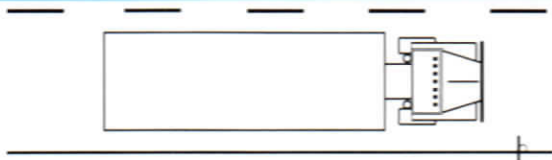


Title Sheet (Begin & End Note)



3 - Views

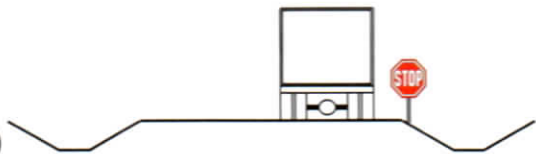
- **Plan**
(Plan Sheet)



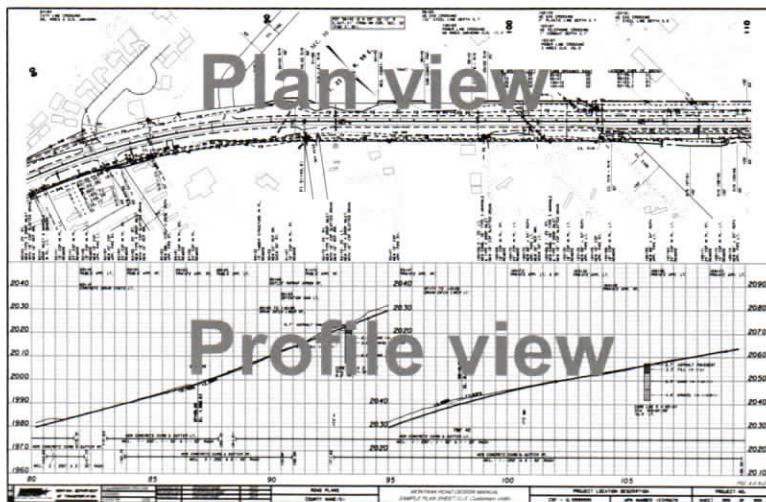
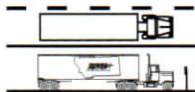
- **Profile**
(Profile Sheet)



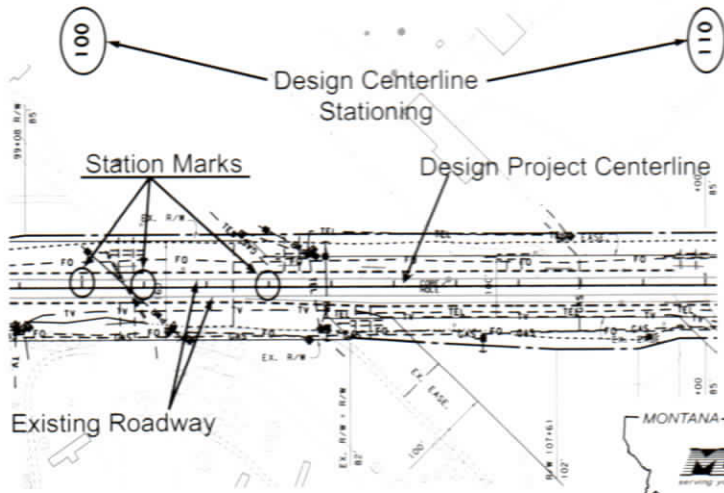
- **Section**
(Cross Section)



Plan / Profile Sheet



Plan Sheet



Centerline Stationing

What is Stationing?

This is how highway projects are measured from beginning to end. This measurement is taken along the highway project design centerline.

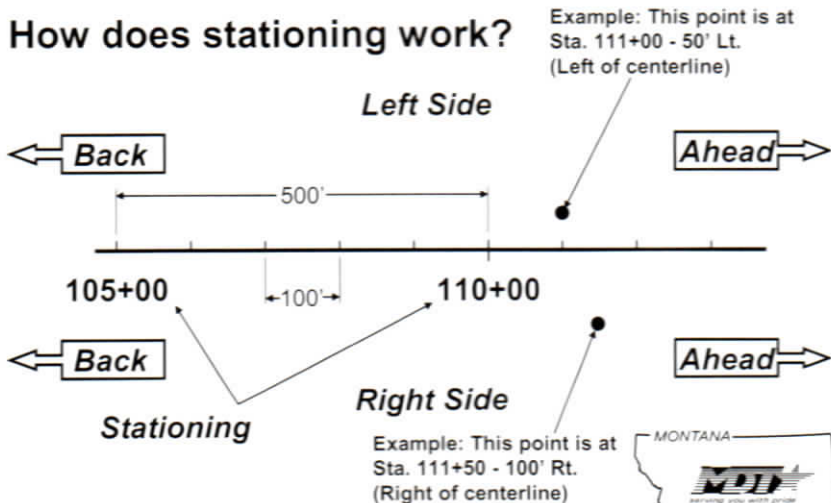
355+00

= 35,500' from station 0+00

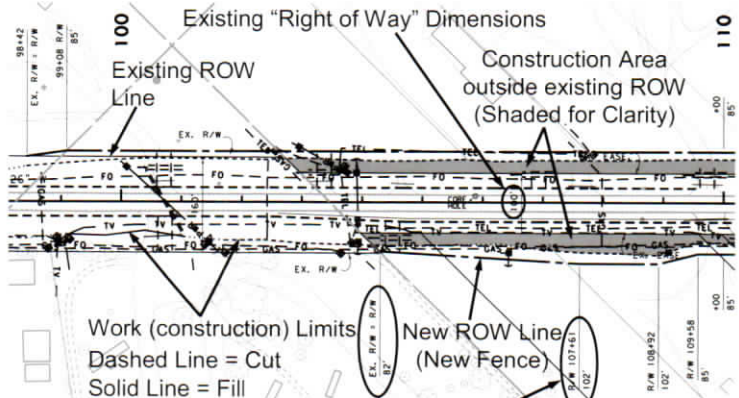
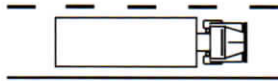


Centerline Stationing

How does stationing work?



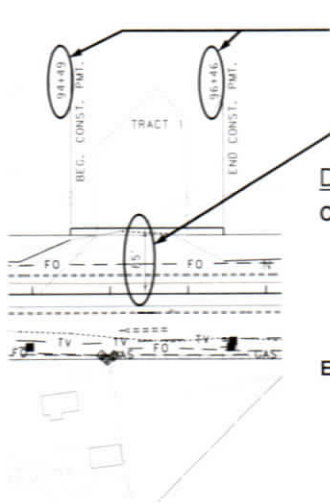
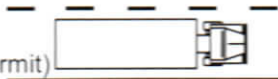
Plan Sheet



New "Right of Way" Dimensions
Station & offset from Design C.L.



Plan Sheet (Construction Permit)



Begin & Ending station of
Construction Permit

Distance from design centerline to limit
of Construction Permit

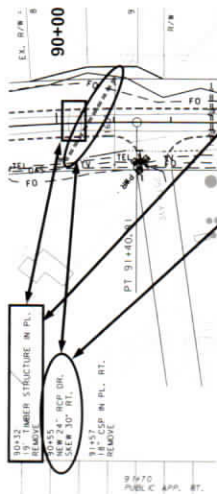
Definitions:

Construction Permit – Where land is needed solely for construction purposes, a construction permit is purchased from the adjacent landowners that allows the contractor to build the project. This permit is for a limited period of time.

Easements – A right created by a grant, reservation, agreement, prescription or necessary implication that one has in the land of another



Plan Sheet (Pipe Notes)



90+32 (Design Centerline stationing)
19' Timber Structure in Place
REMOVE

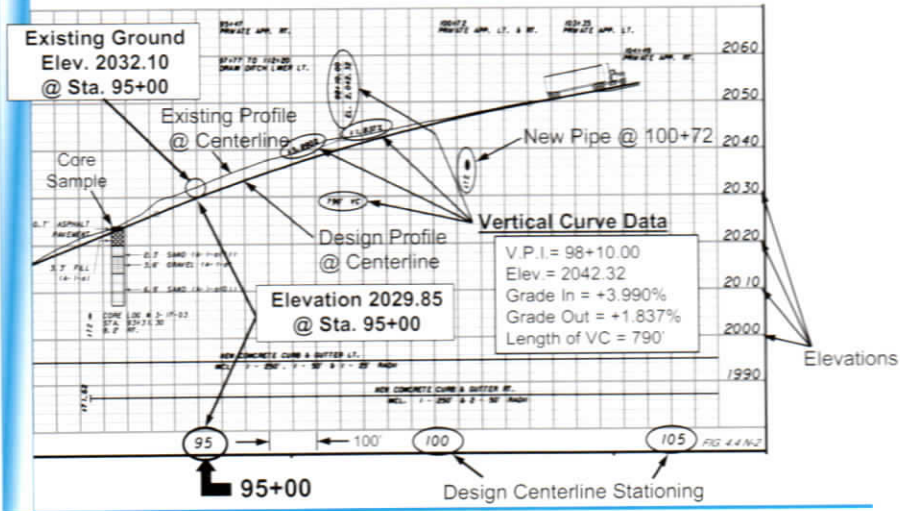
90+55 (Design Centerline stationing)
24" = New Pipe Diameter
RCP = Reinforced Concrete Pipe
30° Skew - Measured looking ahead
and perpendicular to Design
Centerline.

Symbols

- : New Pipe
- ===== : Existing Pipe
- : Existing Bridge



Profile Sheet



Typical Section

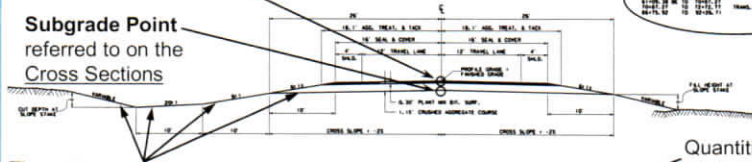


Station limits where this typical is applied

Finished Grade Point referred to on the Plan/Profile sheets

TYPICAL SECTION NO. 1

Subgrade Point referred to on the Cross Sections



22+00.00	10	28+10.00	10	TRASH, TYP. NO. 1 TO TYP. NO. 7
22+10.00	10	28+20.00	10	
22+20.00	10	28+30.00	10	
22+30.00	10	28+40.00	10	
22+40.00	10	28+50.00	10	
22+50.00	10	28+60.00	10	
22+60.00	10	28+70.00	10	

These lines are shown on the Cross Sections as dashed lines

CUT SLOPES	
1:1	1:1
1:1.5	1:1.5
2:1	2:1
3:1	3:1

Quantities								
Unit	AGGREGATE			Unit	BITUMINOUS MATERIAL		AGG. TREAT.	
	CONCR.	PLANT MAT.	EST. AGG. COURSE		SIGNAL COURSE	SEW.	SEW. PULL/PAGE	AGG. TACK
CUYD	10.00	21.0	187.0	CUYD	4.30	0.01	10	20
CUYD PER STATION	10.00	21.0	187.0	CUYD PER STATION	4.30	0.01	10	20
TOTAL PER STATION	10.00	21.0	187.0	TOTAL PER STATION	4.30	0.01	10	20

Quantities: Used to compute Pay Items

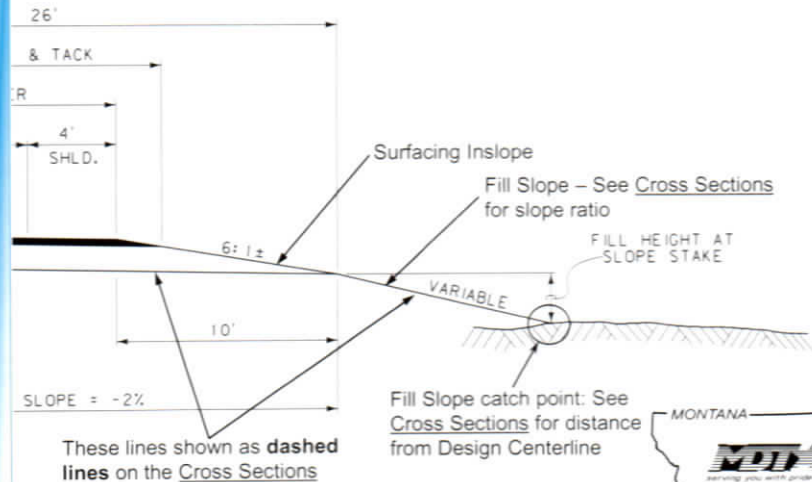
THESE QUANTITIES ARE BASED ON THE 10' SECTION WIDTH

FILL SLOPES	
1:1	1:1
1:1.5	1:1.5
2:1	2:1
3:1	3:1

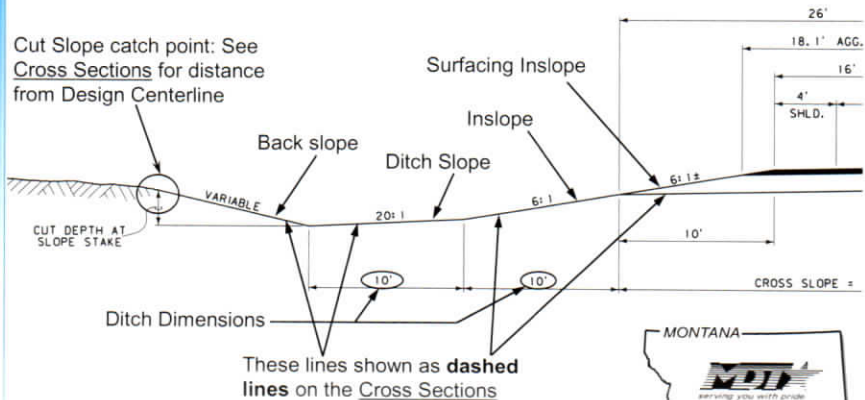
Standard cut and fill slope tables. See Cross Sections for slopes used at a particular location



Typical Section (Fill)

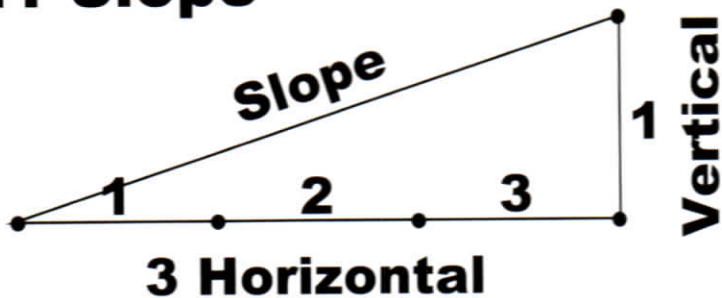


Typical Section (Cut)



Slope Ratio

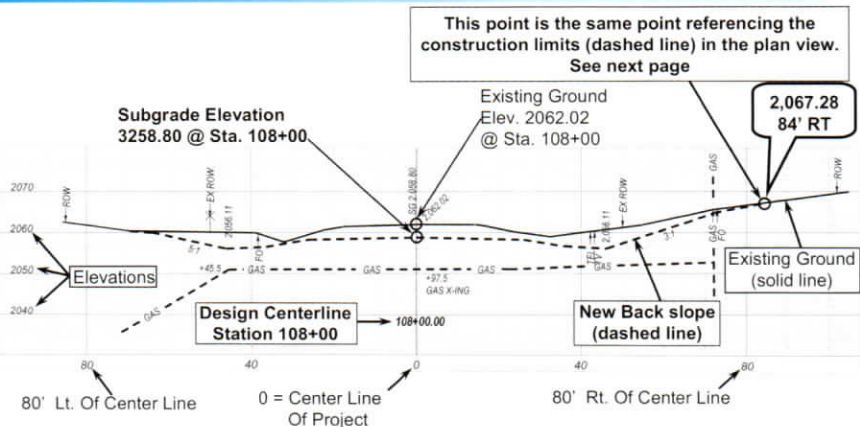
3:1 Slope



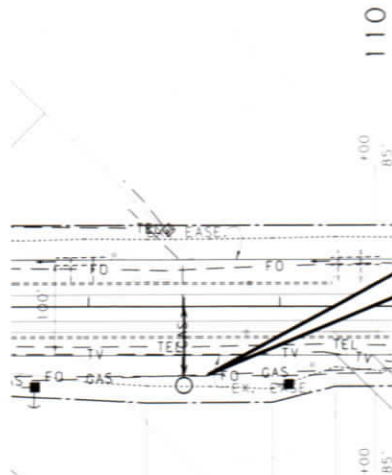
The first number is the number of feet the slope must go horizontally to raise one foot vertically.



Cross - Section



Construction Limits (Plan Sheet)



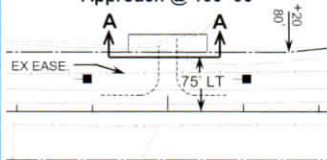
This Point is
84.0' Right of
Sta. 108+00
Elev. 2,067.28



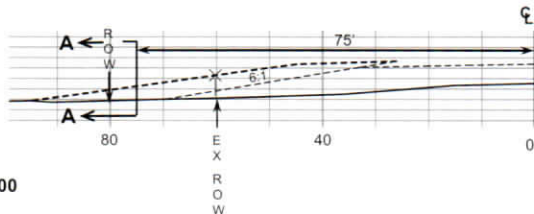
Approaches



PLAN VIEW
Approach @ 100+00

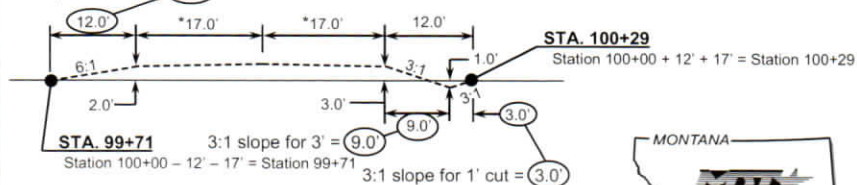


CROSS SECTION
Approach @ 100+00



SECTION A-A
75' LEFT STA. 100+00

6:1 slope for 2' fill = (12.0')



* See **NOTES** page for approach widths and surfacing requirements
Ground line computed from adjacent cross sections.



Electronic Plans

- Available in Microstation (.dgn) Format.
- Must have a signed Waiver of Liability prior to the release of any electronic files.
- Electronic files are available on CD or thru the Departments FTP site.
- Contact the Utilities Section With Project Information.



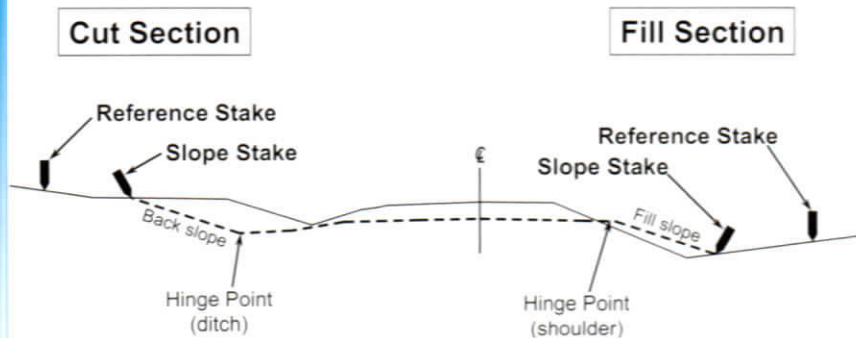
Aerial Mapping

- Is available on some projects.
- Can have a wide array of information included, depending on the projects status.
- Some things that may be available include:
 - Centerline w/ Stationing
 - Existing ROW Lines
 - New ROW Lines
 - Construction Limits
 - Utilities
 - Hydraulic Information
 - Environmental (wetland areas)

Contact the Utilities Section for project specific Aerial Mapping information.



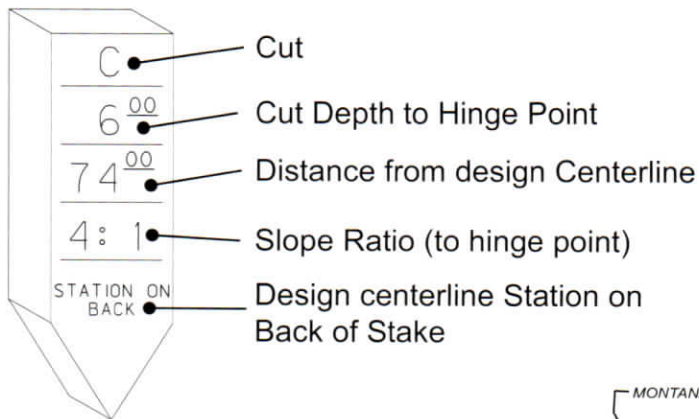
Field Markings



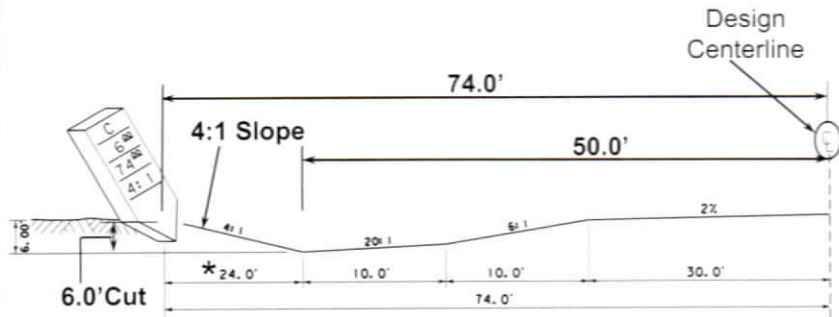
Cross - Section View



Cut Stake



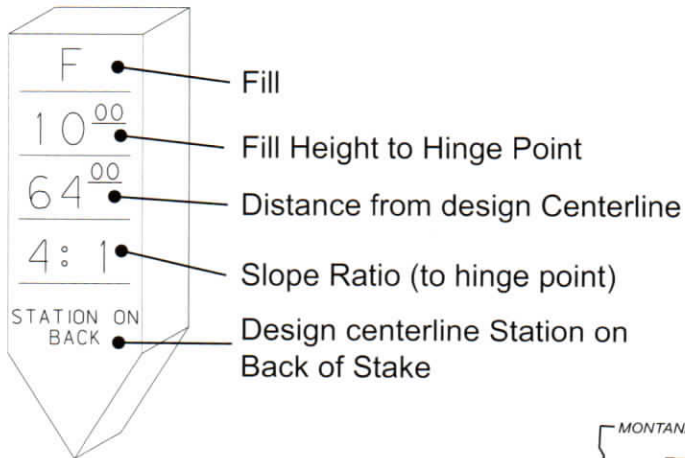
Cut Stake (Drawing)



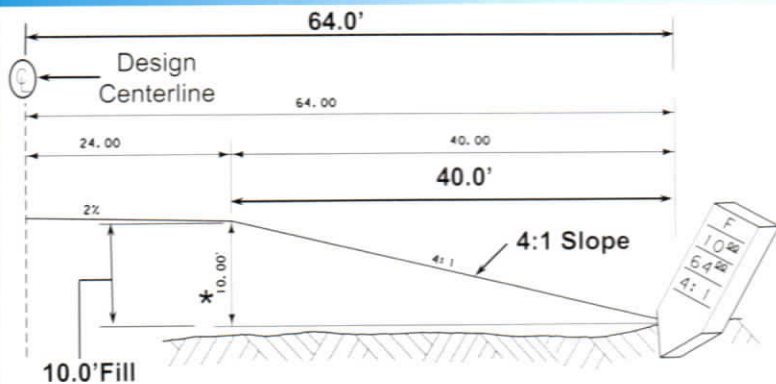
* 4:1 Slope X 6' Cut = 24.0' to Ditch (Hinge Point)



Fill Stake



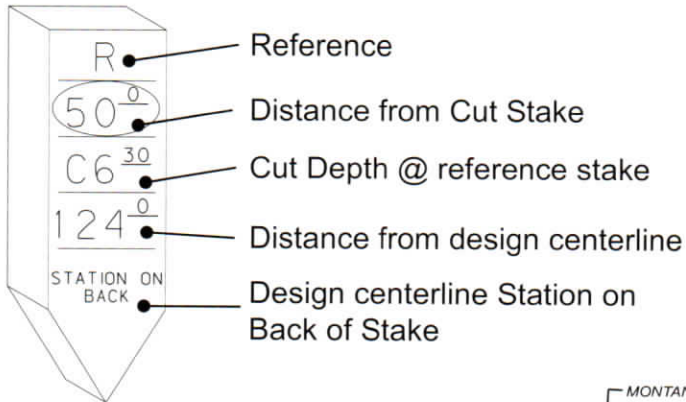
Fill Stake (Drawing)



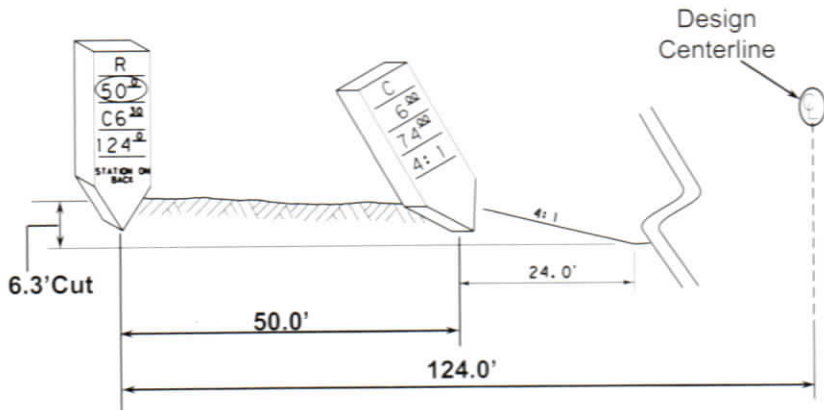
* 4:1 Slope X 10' Fill = 40.0' to Shoulder (Hinge Point)



Reference Stake



Reference Stake (Drawing)



Information

Highway Description Prefix Codes

IM – Interstate Maintenance

NH – National Highway

BRF – Bridge Replacement & Rehab

P – Urban & County Projects

Odd Numbered Highways run North & South

Even Numbered Highways run East & West

Mile Posts run West to East & South to North

Surveys run West to East & South to North



Abbreviations

ADD EXC.	Additional Excavation	CH.	Channel or Chain
A.A.D.T.	Annual Average Daily Traffic	CH.CH.	Channel Change
A.D.T.	Average Daily Traffic	C.I.	Curb Inlet
ADJ.	Adjusted	CL.	Class or Clearance
AGG.	Aggregate	C.M.P.	Corrugated Metal Pipe
AH.	Ahead	CO.	County or Company
APP.	Approach	CONC.	Concrete
APPROX.	Approximate	COND.(TEL)	Conduit (specify type)
ASTM	American Society for Testing & Materials	CONN.	Connection
AVE.	Avenue	CONST.	Construction
AVG.	Average	CONST. PMT.	Construction Permit
BEG.	Begin	COV.	Cover
B.E.	Bridge End	C.S.	Curve to Spiral
BK.	Back or Bank	C.S.F.	Combination Scale Factor
BLGD.	Building	C.S.P.	Corrugated Steel Pipe
B.L.M.	U.S. Bureau of Land Management	C.S.P.A.	Corrugated Steel Pipe Arch
B.M.	Bench Mark	CULV.	Culvert
BOT.	Bottom	DBL.	Double
BR.	Bridge	DEFL.	Deflection
C.	Cut	DET.	Detour / Detail
C&G.	Curb & Gutter	D.H.V.	Design Hourly Volume
C/L	Centerline	D.I.	Drop Inlet
CALC.	Calculated	DIA.	Diameter
C.A.P.	Corrugated Aluminum Pipe	DIST.	Distance or District
CATV	Cable TV	DR.	Drain or Drive
C.B.	Catch Basin	DT.	Ditch
		DWG.	Drawing

Abbreviations

E	East / External Distance	HG.	Headgate
EASE.	Easement	H.P.	Hinge Point
E.B.	Eastbound	HWY.	Highway
ELEV. or EL.	Elevation	I.	Interstate
EMB.	Embankment	I.C.	Incidental Construction
E.O.	Edge of Oil	INC.	Incorporated
E.P.	Edge of Pavement	INTCH.	Interchange
EQ.	Equation	INV.	Invert
EX.	Existing	IRR.	Irrigation
EXC.	Excavation	JCT.	Junction
F.	Fill	L.	Length of Curve / liter
F.E.T.S.	Flared End Terminal Section	L.C.	Long Cord
F.G.	Finished Grade	Lc	Length of Circular Curve
F.H.	Fire Hydrant	LENG.	Length – Lengthen
F.L.	Flow Line	Ls	Length of Spiral
FR. RD.	Frontage Road	LT.	Left
FUT.	Future	MH.	Manhole
G.	Grading	MIN.	Minimum, Mineral or Minute
G.L.	Gas Line	MISC.	Miscellaneous
G.P.S.	Global Positioning System	MKR.	Marker
G.R.	Guardrail	M.L.	Mainline
GR.	Grade	MNCPL.	Municipal
GRND.	Ground	MON.	Monument
G.S.	Gravel Surfacing	N.	North
G.S.P.	Galvanized Steel Pipe	N.B.	Northbound
G.V.	Gas Valve	N.C.	Normal Crown
ha	Hectare	N.E.	Northeast
HDWL.	Headwall	N.G.	Natural Gas

Abbreviations

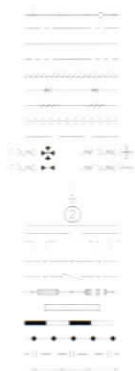
N.W.	Northwest	R.C.P.	Reinforced Concrete Pipe
O.C.	On Centers or Overhead Crossing	R.C.P.A.	Reinforced Concrete Pipe Arch
OH.	Overhang or Overhead	RDWY.	Roadway
P.	Power Cable or Pipe	REF.	Reference
P.B.	Pull Box	R.P.	Reference Point, Radius Point
P.C.	Point of Curvature (beginning)	R.R.	Railroad
P.O.C.	Point on Curve	RT.	Right or Route
P.C.C.	Point of Compound Curve or Portland Cement Concrete	RTE.	Route
P.E.	Preliminary Engineering	R/W.	Right of Way
P.I.	Point of Intersection	S	Rate of full Superelevation, Slope in ft. per ft., Span or South
P.L.	Property Line	SAN SEW.	Sanitary Sewer
P.M.B.	Plant Mix Base	S.B.	Southbound
P.M.S.	Plant Mix Surfacing	S.C.	Spiral to Curve
P.P.	Power Pole	SDWK.	Sidewalk
PROJ.	Project or Projected	S.E.	Southeast
PROT.	Protect, Protector or Protection	SEC.	Section or Second
P.O.S.	Point on Spiral	S.G.	Subgrade
P.O.S.T.	point on Semi - Tangent	SH.	Shoulder
P.O.T.	Point on Tangent	SLP. STK.	Slope Stake
PT.	Point	S.S.P.P.	Structural Steel Plate Pipe
P.T.	Point of Tangent (end of curve)	S.S.P.P.A.C.	Structural Steel Plate Pipe Arch Culvert
P.T.W.	Present Traveled Way	S.T.	Spiral to Tangent
PVC.	Polyvinyl Chloride	ST.	Street
PVT.	Private	STA.	Station
PWR.	Power (lines)	STD.	Standard
R	Range, Radius, Rise	STD. SPEC.	Standard Specifications
R.C.B.	Reinforced Concrete Box	STK.	Staked or Stake

Abbreviations

STM.	Storm Drain	V.P.I.	Vertical Point of Intersection
SUBGR.	Subgrade	V.P.T.	Vertical Point of Tangency
SURF.	Surface or Surfacing	W	West
SURV.	Survey	W.B.	Westbound
S.W.	Southwest or Sidewalk	W.L.	Water Line
T	Township, Tangent Length or Percent Trucks	WT.	Weight
TAN.	Tangent	W.V.	Water Valve
TEL.	Telephone	XING.	Crossing
TEL. C.	Telephone Cable	XSEC.	Cross Section
TELG.	Telegraph		
TEL. P.	Telephone Pole		
TEMP.	Temperature / Temporary		
TOPOG.	Topographic		
TRANS.	Transmission Line or Transition		
TRAV.	Traverse		
Ts	Length of Tangent (curve with Spirals)		
T.S.	Tangent to Spiral		
T.T.	Transmission Tower		
TYP.	Typical		
U.G.	Underground		
UNCL.	Unclassified		
V	Design Speed or Velocity		
V.C.	Vertical Curve		
VEH.	Vehicular		
VERT. or VT.	Vertical		
V.P.C.	Vertical Point of Curve		

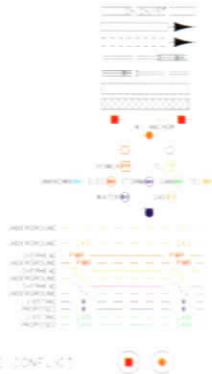
Plan Sheet Symbols

CENTERLINE & OR PROJECTED LINE
 PROPOSED RIGHT OF WAY LINE
 EXISTING RIGHT OF WAY LINE
 RAILROAD RIGHT OF WAY LINE
 EXISTING ACCESS CONTROL
 FULL ACCESS CONTROL
 LIMITED ACCESS CONTROL
 OWNERSHIP BOUNDARY
 SECTION LINE
 SECTION CORNER
 1/4 SECTION CORNER
 RIGHT OF WAY MONUMENT
 PROPERTY CORNER PIN
 PARCEL NUMBERS
 PRESENT TRAVELED WAY (P.U.T. & I)
 APPROACH: EXIST. - PROPOSED
 FENCE LINE
 GATE IN FENCE
 CATTLE GUARD: EXIST. - PROPOSED
 BRIDGES
 RAILROADS
 EXISTING QUADRAIL
 PROPOSED QUADRAIL
 EXISTING DITCH



CHANNEL CHANGES
 EXISTING CULVERT
 PROPOSED CULVERT
 DRAINAGE DITCH
 INLET DITCH
 WETLANDS NOT IMPACTED
 WETLANDS IMPACTED
 POWER POLE IN PLACE
 TELEPHONE POLE IN PLACE
 LIGHT POLE - MOUNT POLE
 PEDESTALS
 MANHOLES
 VALVES
 FIRE HYDRANT
 FIBER CABLE
 GAS
 POWER
 TELEPHONE
 TELEVISION
 WATER
 SANITARY SEWER

UTILITY POLES IN POSSIBLE CONFLICT



Notes



The Montana Department of Transportation would like to thank David R. Hausmann, Utility Coordinator, State of South Dakota, Department of Transportation, for his help in the making of this guide.

MDT attempts to provide accommodations for any known disability that may interfere with a person participating in any service, program or activity of the Dept.

Alternative accessible formats of this information will be provided upon request.

For further information call: 406-444-6080 TTY: 800-335-7592 or Montana Relay at 1-800-455-4772 or by contacting the ADA Coordinator at: 406-444-9229.

1500 copies of this document were published at a cost of \$1.55 per copy, which includes \$2,320.00 for printing and \$0.00 for distribution.