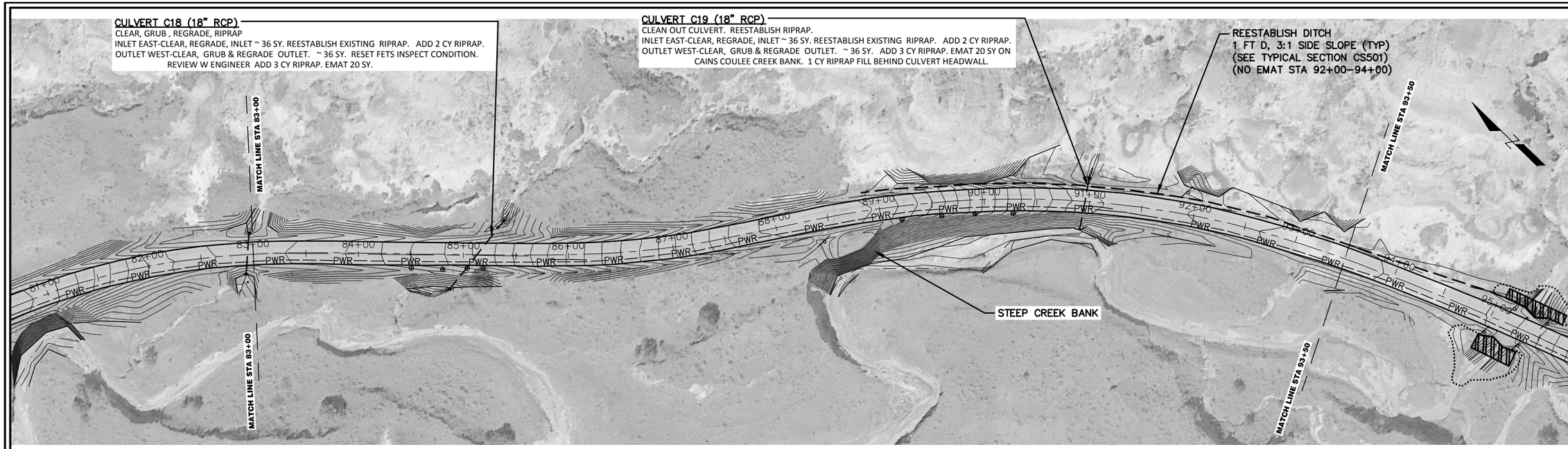


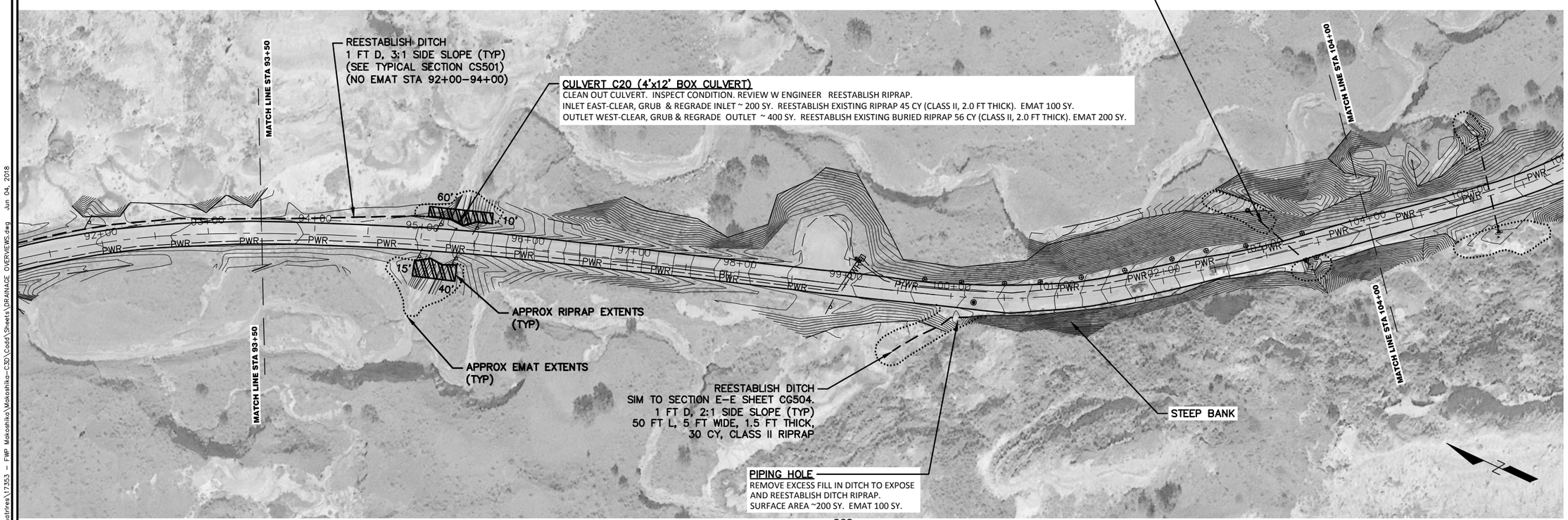
NOTES:

1. ALL CULVERTS ARE EXISTING UNLESS OTHERWISE NOTED.
2. DISPOSE OF ALL EXCESS MATERIAL OFFSITE.
3. REPLACE RIPRAP ACCORDING TO SHEET CG504.
4. REVIEW CULVERT ENDS WITH ENGINEER AFTER EXPOSING AND CLEANING. SEE SPECIAL PROVISIONS.
5. INSTALL FIBER ROLL PER SHEET CG503.

HORIZONTAL

50 0 50 100

(SCALE IN FEET)



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SYM	REVISION	BY	APPR.	DATE

R. MORTON, PE — DESIGNED BY
G. LESOFSKI — DRAWN BY
J. KEY, PE — CHECKED BY
JUNE 2018 — DATE
17353 — PROJECT NO.
DRAINAGE OVERVIEWS — FILE

PROJECT TITLE
MAKOSHIKA STATE PARK ROAD INFRASTRUCTURE REPAIRS
Glendive, Montana

SHEET TITLE
MAKOSHIKA ROAD DRAINAGE PLAN

SHEET
CG105

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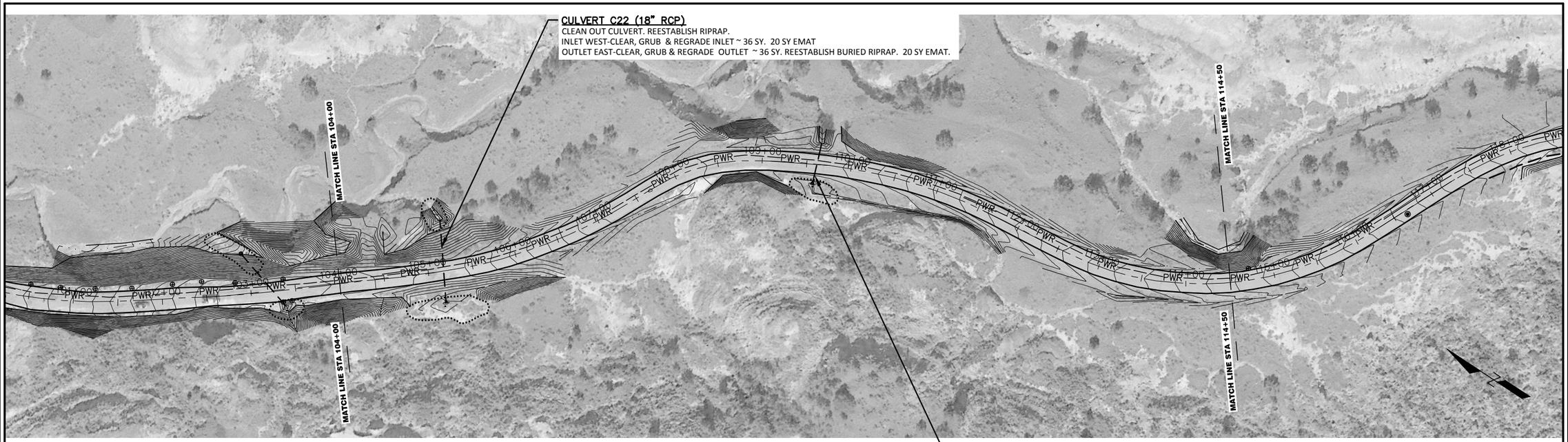

NOTES:

1. ALL CULVERTS ARE EXISTING UNLESS OTHERWISE NOTED.
2. DISPOSE OF ALL EXCESS MATERIAL OFFSITE.
3. REPLACE RIPRAP ACCORDING TO SHEET CG504.
4. REVIEW CULVERT ENDS WITH ENGINEER AFTER EXPOSING AND CLEANING. SEE SPECIAL PROVISIONS.
5. INSTALL FIBER ROLL PER SHEET CG503.

HORIZONTAL

50 0 50 100

(SCALE IN FEET)

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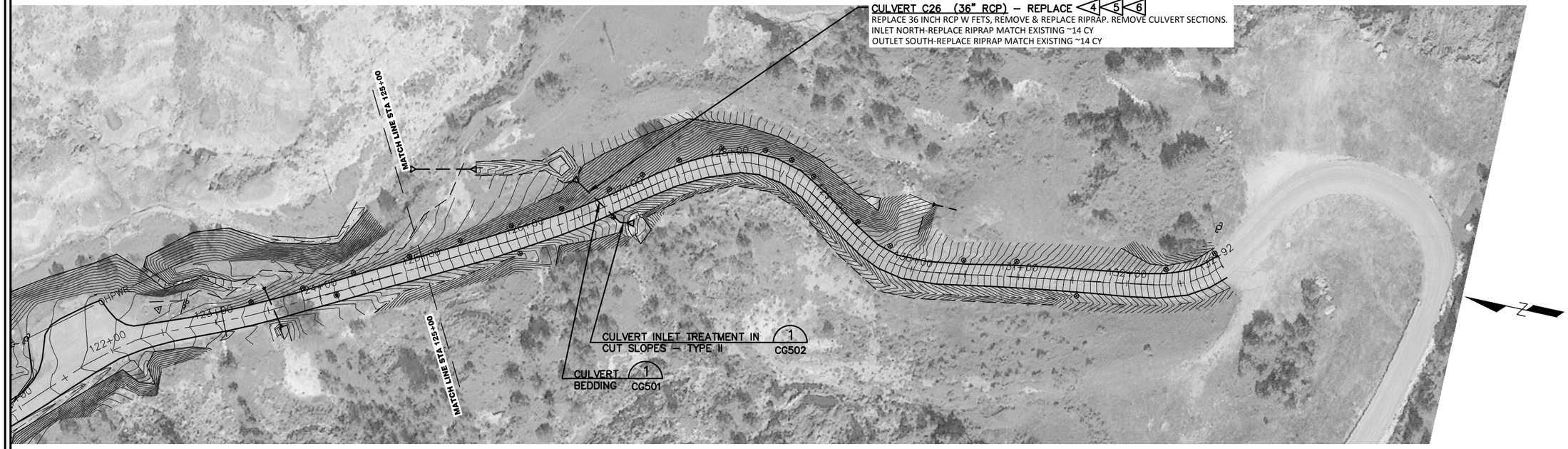
R. MORTON, PE — DESIGNED BY
G. LESOFSKI — DRAWN BY
J. KEY, PE — CHECKED BY
JUNE 2018 — DATE
17353 — PROJECT NO.
DRAINAGE OVERVIEWS — FILE

PROJECT TITLE
MAKOSHIKA STATE PARK ROAD INFRASTRUCTURE REPAIRS
Glendive, Montana

SHEET TITLE
MAKOSHIKA ROAD DRAINAGE PLAN

SHEET
CG106

F:\natrres\17353 – FWP Makoshika\Makoshika-C3D\Cadd\Sheets\DRAINAGE OVERVIEWS.dwg Jun 04, 2018



NOTES:

1. ALL CULVERTS ARE EXISTING UNLESS OTHERWISE NOTED.
2. DISPOSE OF ALL EXCESS MATERIAL OFFSITE.
3. REPLACE RIPRAP ACCORDING TO SHEET CG504.

4 TIE EACH BARREL WITH SUPPLEMENTAL CONCRETE PIPE PER SHEET CG505. COAT ALL BURIED FASTENERS.

5 USE CLASS 5 CULVERT WITH TYPE IV CEMENT.

6 PROVIDE CONC THRUST BLOCK (5 CY) ON BEND.

HORIZONTAL

50 0 50 100

(SCALE IN FEET)

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G. LESOFSKI — DRAWN BY
J. KEY, PE — CHECKED BY
JUNE 2018 — DATE
17353 — PROJECT NO.
DRAINAGE OVERVIEWS — FILE

PROJECT TITLE
MAKOSHIKA STATE PARK ROAD INFRASTRUCTURE REPAIRS
Glendive, Montana

SHEET TITLE
MAKOSHIKA ROAD DRAINAGE PLAN

SHEET
CG107

11 OF 37

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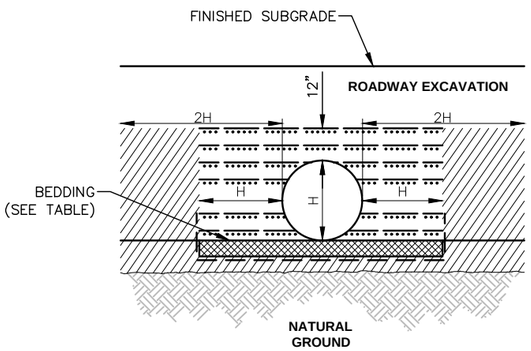
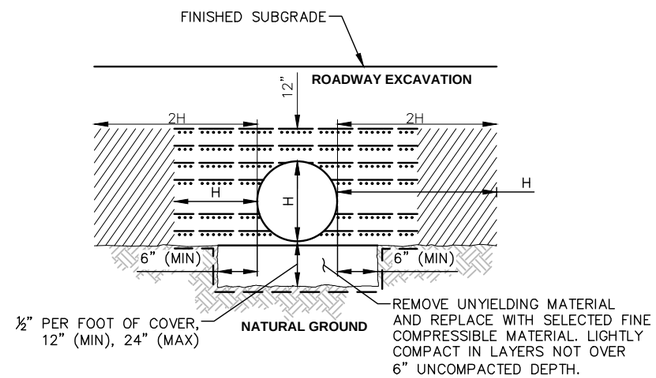


ABOVE NATURAL GROUND

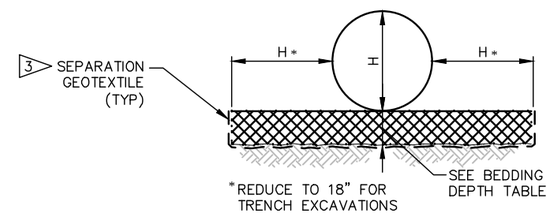


ON UNYIELDING MATERIAL

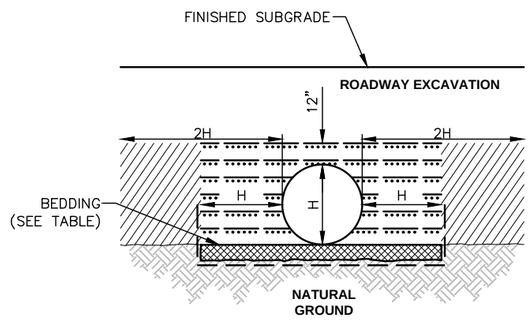
NOTES:

1. WHEN DIRECTED, CAMBER PIPE CULVERTS UPWARD FROM A CHORD THROUGH THE INLET AND OUTLET INVERTS AN ORDINATE AMOUNT EQUAL TO 1% OF THE PIPE LENGTH. DEVELOP CAMBER ON A PARABOLIC CURVE. IF THE MIDPOINT ELEVATION ON THE PARABOLIC CURVE AS DESIGNED EXCEEDS THE ELEVATION OF THE INLET INVERT, REDUCE THE AMOUNT OF CAMBER OR INCREASE THE PIPE CULVERT GRADIENT.
2. H = DIAMETER OF ALL ROUND PIPE CULVERTS OR THE RISE DIMENSION OF ALL PIPE ARCH CULVERTS.
3. USE STABILIZATION GEOTEXTILE AT SOFT SOIL CONDITIONS. USE SEPARATION GEOTEXTILE IN ALL OTHER CONDITIONS.
4. THIS SHEET REFERENCES FEDERAL HIGHWAYS ADMINISTRATION (FHWA) STANDARDS IN PUBLICATION FP–14.

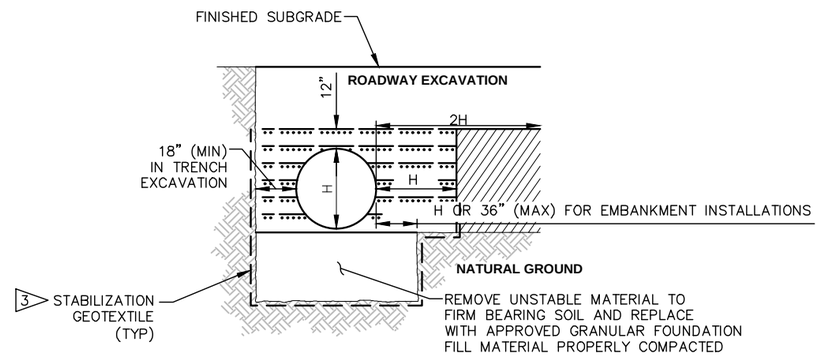
BEDDING DEPTH	
PIPE SIZE (H)	DEPTH
12" TO 54"	4"



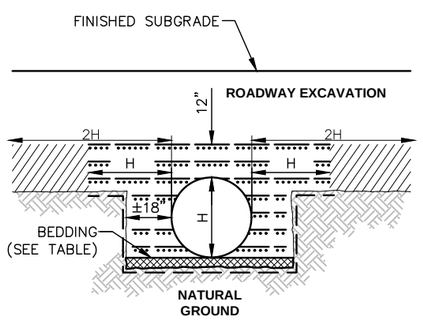
PIPE BEDDING



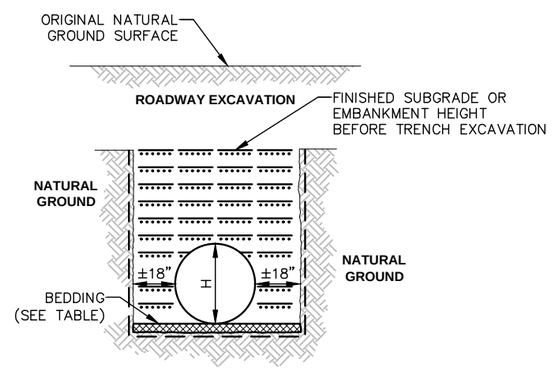
ON NATURAL GROUND



ON UNSTABLE MATERIAL



ABOVE AND BELOW NATURAL GROUND



BELOW NATURAL GROUND OR TRENCH EXCAVATION IN EMBANKMENT

BEDDING MATERIAL (UNCOMPACTED) (FHWA FP–14)

EMBANKMENT MATERIAL PLACED IN LAYERS ACCORDING TO SECTION 209 (FHWA FP–14)

COMPACTED BACKFILL MATERIAL PLACED IN LAYERS ACCORDING TO SECTION 209 (FHWA FP–14)

CULVERT BEDDING (1)

SCALE: NONE

CG103,CG107,CG502

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R. MORTON, PE — DESIGNED BY
G. LESOFSKI — DRAWN BY
J. KEY, PE — CHECKED BY
JUNE 2018 — DATE
17353 — PROJECT NO.
CG501 — FILE

PROJECT TITLE
MAKOSHIKA STATE PARK ROAD INFRASTRUCTURE REPAIRS
Glendive, Montana

SHEET TITLE
TYPICAL CULVERT INSTALLATION DETAILS

SHEET
CG501

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