WINSOME FILING NO. 3

CULVERT CONSTRUCTION DOCUMENTS

A PORTION OF SECTIONS 13 AND 24, TOWNSHIP 11 SOUTH, RANGE 65 SOUTH, AND A PORTION OF THE WEST HALF SECTON 19, TOWNSHIP 11 SOUTH, RANGE 64 WEST OF THE 6TH P.M COUNTY OF EL PASO, STATE OF COLORADO

CONTACTS:

DEVELOPER:
WINSOME, LLC
1864 WOODMOOR DRIVE, SUITE 100
MONUMENT, CO 80132
TEL: (719) 476–0800
CONTACT: JOSEPH DESJARDIN

PLANNER/LANDSCAPE ARCHITECT:
NES, INC
619 N CASCADE AVENUE, SUITE 200
COLORADO SPRINGS, CO 80903
TEL: (719) 471–0073
EMAIL: ABARLOW@NESCOLORADO.COM
CONTACT: ANDREA BARLOW

ENGINEER:
KIMLEY–HORN AND ASSOCIATES, INC.
2 NORTH NEVADA, SUITE 300
COLORADO SPRINGS, CO 80903
(719) 453–0180
EMAIL:
KEVIN.KOFFORD@KIMLEY–HORN.COM
CONTACT: KEVIN KOFFORD

SURVEY:
EDWARD JAMES SURVEYING, INC.
926 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
TEL: (719) 576–1216
CONTACT: JONATHAN TESSIN

EL PASO COUNTY PLANNING DEPARTMENT
2880 INTERNATIONAL CIRCLE, SUITE 110
COLORADO SPRINGS, CO 80910

PLANNING REVIEWER:
NINA RUIZ
TEL: (719) 520–6313
EMAIL: NINARUIZ@ELPASOCO.COM

ENGINEERING REVIEWER:
GILBERT LAFORCE
TEL: (719) 520–7945
EMAIL:
GILBERTLAFORCE@ELPASOCO.COM

EPC DPW STORMWATER TEAM:
CHRISTINA FURCHAK
(719) 433–4863
EMAIL:
CHRISTINAFURCHAK@ELPASOCO.COM

EPC PCD INSPECTIONS SUPERVISOR:
TEM: BRAD WALTERS
(719) 520–6819
EMAIL: BRADWALTERS@ELPASOCO.COM

FALCON FIRE DEPARTMENT:
AREA: FAL D2
FIRE CHIEF T. HARWIG
7030 OLD MERIDIAN ROAD
PAYTON, CO 80831
TEL: (719) 495–4050
EMAIL:
FALCONFIRE@FALCONFIREPD.ORG

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT:
WATER QUALITY CONTROL DIVISION
4300 CHERRY CREEK DRIVE SOUTH
DENVER, CO 80246
TEL: (303) 692–3500

VICINITY MAP
1"=2,000'

SHEET INDEX:

SHEET NO.	SHEET TITLE
1	COVER SHEET
2	HORIZONTAL CONTROL
3	SITE PLAN
4	SITE PLAN
5	CULVERT 1–PLAN & PROFILE
6	CULVERT 2–PLAN & PROFILE
7	ALAMAR WAY PROFILE
8	TWINKLING STAR LANE PROFILE
9	CULVERT DETAILS
10	CULVERT DETAILS
11	CULVERT DETAILS

LEGAL DESCRIPTION

COMMENCING AT THE WEST QUARTER CORNER OF SAID SECTION 24, SAID POINT BEING THE POINT OF BEGINNING; THENCE N00°14'25"E ON THE WEST LINE OF THE NORTHWEST QUARTER OF SAID SECTION 24, SAID LINE ALSO BEING ON THE WEST BOUNDARY OF PARCEL 4, AS RECORDED UNDER RECEPTION NUMBER 218900072, A DISTANCE OF 2636.99 FEET TO THE NORTHWEST CORNER OF SAID SECTION 24; THENCE N89°21'38"E ON THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 24, A DISTANCE OF 2633.02 FEET TO THE NORTH QUARTER CORNER OF SAID SECTION 24; THENCE N00°10'29"E ON THE WEST LINE OF THE SOUTH HALF OF THE SOUTH EAST QUARTER OF SECTION 13, TOWNSHIP 11 SOUTH, RANGE 65 WEST, A DISTANCE OF 1321.95 FEET TO THE NORTHWEST CORNER OF THE SOUTH HALF OF THE SOUTHEAST QUARTER OF SAID SECTION 13; THENCE N89°20'26"E ON THE NORTH LINE OF THE SOUTH HALF OF THE SOUTHEAST QUARTER OF SAID SECTION 13, A DISTANCE OF 1873.37 FEET; THENCE S00°34'43"W A DISTANCE OF 2,706.21 FEET; THENCE S89°15'17"E A DISTANCE OF 769.17 FEET TO A POINT ON THE WEST LINE OF SECTION 19 TOWNSHIP 11 SOUTH, RANGE 64 WEST; THENCE S89°15'18"E A DISTANCE OF 1,158.32 FEET TO THE EAST LINE OF THE WEST HALF OF THE WEST HALF OF SAID SECTION 19 ; THENCE S00°17'06"W ON THE EAST LINE OF THE WEST HALF OF THE WEST HALF OF SAID SECTION 19, A DISTANCE OF 3,838.66 FEET TO A POINT 30.00 FEET NORTH OF THE SOUTH LINE OF THE SOUTHWEST QUARTER OF SAID SECTION 19; THENCE S89°55'06"W, ON A LINE 30.00 FEET NORTH OF AND PARALLEL WITH THE SOUTH LINE OF THE SOUTHWEST QUARTER OF SAID SECTION 19, ON SAID NORTHERLY RIGHT–OF–WAY LINE, A DISTANCE OF 30.00 FEET TO A POINT ON THE BOUNDARY LINE PARCEL NUMBER RW–36 AS SHOWN IN THE WARRANTY DEED AS RECORDED UNDER RECEPTION NUMBER 213096397; THENCE ON THE BOUNDARY OF SAID PARCEL THE FOLLOWING (3) THREE COURSES:

1. N00°17'06"E, 30.00 WEST OF AND PARALLEL WITH THE EAST LINE OF THE WEST HALF OF THE WEST HALF OF SAID SECTION 19, A DISTANCE OF 5.25 FEET
2. N89°47'54"W A DISTANCE OF 368.05 FEET
3. S89°14'50"W A DISTANCE OF 603.68 FEET TO A POINT BEING 30.00 FEET NORTH OF THE SOUTH LINE OF SOUTHWEST QUARTER OF SAID SECTION 19;

THENCE S89°55'06"W ON A LINE 30.00 FEET NORTH OF AND PARALLEL WITH THE SOUTH LINE OF THE SOUTHWEST QUARTER OF SAID SECTION 19, ON SAID NORTHERLY RIGHT–OF–WAY LINE A DISTANCE OF 173.03 FEET TO A POINT ON THE EAST LINE OF SAID SECTION 24; THENCE S89°30'15"W ON A LINE 30.00 NORTH OF AND PARALLEL WITH THE SOUTH LINE OF SAID SECTION 24, A DISTANCE OF 5238.44 FEET TO A POINT ON THE WEST LINE OF THE SOUTHWEST QUARTER OF SAID SECTION 24; THENCE N00°14'17"E ON THE WEST LINE OF SOUTHWEST QUARTER A DISTANCE OF 2,606.92 FEET TO THE POINT OF BEGINNING.

CONTAINING A CALCULATED AREA OF 33,455,315 SQUARE FEET OR 768.028 ACRES. COLORADO.

BENCHMARK

A 2.5" ALUMINUM CAP BEING A 30 FOOT WITNESS CORNER NORTH OF THE SOUTHWEST CORNER OF SECTION 24, TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH PRINCIPAL MERIDIAN.

BASIS OF BEARING

THE WEST LINE OF THE NORTHWEST QUARTER OF SECTION 24, TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH/ PRINCIPAL MERIDIAN BEING MONUMENTED ON THE SOUTHERLY END BY A 2–1/2" ALUMINUM CAP STAMPED "LS 28658" AND AT THE NORTHERLY END BY A 3–1/2" ALUMINUM CAP STAMPED "LS 12103" BEING ASSUMED TO BEAR N00°14'25"E A DISTANCE OF 2636.99 FEET AS SHOWN IN LAND SURVEY PLAT RECORDED UNDER RECEPTION 218900072 RECORDS OF EL PASO COUNTY.

FLOODPLAIN NOTE

FEDERAL EMERGENCY MANAGEMENT AGENCY, FLOOD INSURANCE RATE MAP, MAP NUMBER 08041C0350G, EFFECTIVE DECEMBER 7, 2018 INDICATES THE AREA IN THE VICINITY OF THIS PARCEL OF LAND TO BE IN ZONE X (AREA DETERMINED TO BE OUT OF THE 500 YEAR FLOODPLAIN). A CONDITIONAL LETTER OF MAP REVISION HAS BEEN PROCESSED AND APPROVED FOR THIS REACH OF WEST KIOWA CREEK.

Provide Grading and Erosion Control Plan with the culvert construction unless it's detailed in the early GEC request. In which case add a reference on the plans to said GEC.

Add Developer's Signature Block

Engineer's Statement

County Engineer signature block

Including legends on sheets would help with the various linetypes throughout the plan set.

Add "PCD File No. CDR-21-012"

811 Know what's below. Call before you dig.

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2–BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2021 KIMLEY–HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 300
Colorado Springs, Colorado 80903 (719) 453–0180

DESIGNED BY: KRK
DRAWN BY: JRH
CHECKED BY: KRK
DATE: 9/3/2021

WINSOME FILING NO. 3
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
COVER SHEET

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO. 196106001

SHEET
1

K:\COS_Civil\196106001_Winsome Filing No. 3\CADD\PlanSheets\Culvert CDs\196106001_CV.dwg Kofford, Kevin 9/7/2021 12:57 PM

Note on the plans that the street layout is for reference only and reference the Filing 3 construction plans for the roadway design.

Clarify timing of guardrail installation. Staff is assuming this is being installed with the bridge construction.

CULVERT CROSSING NO. 1
SCALE:1"=40'

CULVERT CROSSING NO. 2
SCALE: 1"=40'

NORTH

See ECM Chapter 2 Section 2.6.7 for railing criteria.
- Adjust the guardrail to provide 2' separation from edge of pavement to face of guard rail per ECM 2.6.7.C.7 and note 4 on CDOT Detail M-606-1.
- Provide a minimum of 2 feet of barrier-to-embankment distant (bench) to prevent the posts from coming out of the side slope upon impact per ECM Figure 2-43 and CDOT Detail M-606-1 Note 5.

Update the typical cross section and culvert length accordingly.

Label the slope

Update note to "Proposed CDOT Type 3 Guardrail"

Hydraulics report has outlet protection listed as Type L riprap. Update so plan and report match

RURAL LOCAL ROADWAY – TYPICAL CULVERT CROSSING
SCALE: NTS

811 Know what's below. Call before you dig.

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2021 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 300
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: KRK
DRAWN BY: JRH
CHECKED BY: KRK
DATE: 9/3/2021

WINSOME FILING NO. 3
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
HORIZONTAL CONTROL

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO. 196106001

SHEET 2

K:\COS_Civil\196106001_Winsome Filing No. 3\CADD\PlanSheets\Culvert CDs\196106001_HC.dwg Kofford, Kevin 9/7/2021 12:58 PM

CULVERT CROSSING NO. 1
SCALE:1"=30'

Add bar scale. Typical for all plan sheets

Know what's below. Call before you dig.

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2021 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 300
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: KRK
DRAWN BY: JRH
CHECKED BY: KRK
DATE: 9/3/2021

WINSOME FILING NO. 3
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
SITE PLAN

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196106001

SHEET
3

K:\COS_Civil\196106001_Winsome Filing No. 3\CADD\PlanSheets\Culvert CDs\196106001_SP-Exhibit.dwg Kofford, Kevin 9/7/2021 12:58 PM

3.4 STABILITY IN BENDS

Flow around a bend creates secondary currents, which impose higher shear stresses on the channel sides and bottom compared to a straight reach (Nouh and Townsend, 1979) as shown in Figure 3.3. At the beginning of the bend, the maximum shear stress is near the inside and moves toward the outside as the flow leaves the bend. The increased shear stress caused by a bend persists downstream of the bend.

Equation 3.6 gives the maximum shear stress in a bend.

$$\tau_b = K_b \tau_d \qquad (3.6)$$

where,

τ_b = side shear stress on the channel, N/m^2 (lb/ft^2)
K_b = ratio of channel bend to bottom shear stress
τ_d = shear stress in channel at maximum depth, N/m^2 (lb/ft^2)

The maximum shear stress in a bend is a function of the ratio of channel curvature to the top (water surface) width, R_c/T. As R_c/T decreases, that is as the bend becomes sharper, the maximum shear stress in the bend tends to increase. K_b can be determined from the following equation from Young, et al., (1996) adapted from Lane (1955):

Figure 3.3. Shear Stress Distribution in a Channel Bend (Nouh and Townsend, 1979)

Know what's below. Call before you dig.

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2021 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 300
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: KRK
DRAWN BY: JRH
CHECKED BY: KRK
DATE: 9/3/2021

WINSOME FILING NO. 3
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
SITE PLAN

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO. 196106001

SHEET
4

K:\COS_Civil\196106001_Winsome Filing No. 3\CADD\PlanSheets\Culvert CDs\196106001_SP-Exhibit.dwg Kofford, Kevin 9/7/2021 12:58 PM

CULVERT CROSSING NO. 1
SCALE:1"=10'

Label
Show the 100yr WSEL
Hydraulics report has outlet protection listed as Type L riprap. Update so plan and report match
based on the contour it appears the wingwall needs to be extended. Update all wingwall lengths.
Add sheet #
update the note. Is the 7322.50 the WSEL.
Maybe "Extend riprap to 7322.50 to provide 1 foot of freeboard"
Check that this label is pointing to the correct data/line
Add reference to riprap detail on detail sheet
Hydraulic report shows 0.50% slope. Revise report or plan to match
Show the 100yr WSEL on the profile.
Label proposed and existing ground
Remove "extra" profile line
Show and label outlet protection and toewall
Label grade break
Extend alignment past improvements
Show the riprap
Label profile horizontal and vertical scale.
Label ROW

KEYMAP
N.T.S.

811 Know what's below. Call before you dig.

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2021 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 300
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: KRK
DRAWN BY: JRH
CHECKED BY: KRK
DATE: 9/3/2021

WINSOME FILING NO. 3
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
CULVERT 1-PLAN & PROFILE

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196106001

SHEET
5

K:\COS_Civil\196106001_Winsome Filing No. 3\CADD\PlanSheets\Culvert CDs\196106001_SP.dwg Kofford, Kevin 9/7/2021 12:59 PM

See comment on sheet 5 and apply to this sheet.

Check that this label is pointing to the correct data/line

Check that this label is pointing to the correct data/line

Hydraulics report has outlet protection listed as Type L riprap. Update so plan and report match

Add reference to riprap detail on detail sheet

Reference sheet # for wall details

Extend profile to show and label where channel grading starts and matches existing

811 Know what's below. Call before you dig.

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

NORTH

CULVERT CROSSING NO. 2
SCALE: 1"=40'

KEYMAP
N.T.S.

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2021 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 300
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: KRK
DRAWN BY: JRH
CHECKED BY: KRK
DATE: 9/3/2021

WINSOME FILING NO. 3
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
CULVERT 2-PLAN & PROFILE

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO. 196106001

SHEET
6

K:\COS_Civil\196106001_Winsome Filing No. 3\CADD\PlanSheets\Culvert CDs\196106001_SP.dwg Kofford, Kevin 9/7/2021 12:59 PM

CULVERT CROSSING NO. 1- PROFILE

SCALE:1"=80'

Label vertical scale

Know what's **below.**
Call before you dig.

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

KEYMAP
N.T.S.

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2021 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 300
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: KRK
DRAWN BY: JRH
CHECKED BY: KRK
DATE: 9/3/2021

WINSOME FILING NO. 3
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
ALAMAR WAY PROFILE

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196106001

SHEET
7

K:\COS_Civil\196106001_Winsome Filing No. 3\CADD\PlanSheets\Culvert CDs\196106001_RD.dwg Kofford, Kevin 9/7/2021 12:59 PM

CULVERT CROSSING NO. 2-FILE

SCALE: 1"=80'

KEYMAP
N.T.S.

811 Know what's below. Call before you dig.

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2021 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 300
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: KRK
DRAWN BY: JRH
CHECKED BY: KRK
DATE: 9/3/2021

WINSOME FILING NO. 3
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
TWINKLING STAR LANE PROFILE

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196106001

SHEET
8

K:\COS_Civil\196106001_Winsome Filing No. 3\CADD\PlanSheets\Culvert CDs\196106001_RD.dwg Kofford, Kevin 9/7/2021 1:00 PM

BAR SIZE (#)	EPOXY X (FT.-IN.)	BLACK X (FT.-IN.)
4	2-4	1-11
5	2-10	2-4
6	3-5	2-10
7	4-1	3-3
8	5-3	4-3
9	6-8	5-5

GENERAL NOTES

1. ALL CONCRETE SHALL BE CLASS D (BOX CULVERT).
2. ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE FRESH CONCRETE IS PLACED.
3. ALL CONSTRUCTION JOINTS NOT SHOWN ON THE PLANS SHALL BE CONSTRUCTED ONLY IF APPROVED BY THE ENGINEER.
4. THE CONTRACTOR SHALL MAINTAIN THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION.
5. STRUCTURE EXCAVATION AND BACKFILL SHALL BE IN ACCORDANCE WITH STANDARD PLAN M-206-1.
6. FOR ANY CULVERT SPAN 20 FT. OR GREATER, A FOUNDATION INVESTIGATION AND REPORT ARE REQUIRED.
7. BACKFILL SHALL NOT BEGIN UNTIL TOP SLAB HAS REACHED DESIGN STRENGTH, f'_c.
8. SPLICE QUANTITIES FOR LONGITUDINAL AND TRANSVERSE BARS ARE NOT INCLUDED.
9. REINFORCING STEEL SHALL BE GRADE 60.
10. THE MINIMUM LAP SPLICE LENGTH FOR EPOXY COATED REINFORCING BARS SHALL BE:

BAR SIZE:	#3	#4	#5	#6	#7	#8	#9	#10	#11
SPLICE LENGTH:	1'-3"	1'-7"	2'-0"	2'-10"	3'-8"	4'-8"	5'-11"	7'-3"	

THE MINIMUM LAP SPLICE LENGTH FOR BLACK REINFORCING BARS SHALL BE:

BAR SIZE:	#4	#5	#6	#7	#8	#9	#10	#11
SPLICE LENGTH:	1'-1"	1'-4"	1'-7"	1'-10"	2'-6"	3'-1"	3'-11"	4'-10"

THE ABOVE SPLICE LENGTHS ARE FOR CLASS B SPLICES.

11. ALL DIMENSIONS ARE PERPENDICULAR TO THE CENTERLINE OF THE BOX.
12. WINGWALLS SHALL BE TIED TO CONCRETE BOX CULVERT IN ACCORDANCE WITH STANDARD PLAN M-607-60.
13. ALL TRANSVERSE REINFORCING SHALL BE NORMAL TO THE CENTERLINE OF THE BOX.
14. THE FILL HEIGHT IS THE DISTANCE MEASURED FROM THE TOP OF THE TOP SLAB TO THE TOP OF PAVEMENT.
15. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED $\frac{3}{4}$ IN.
16. FOR FILL HEIGHTS LESS THAN 2 FT, A WATERPROOFING MEMBRANE SHALL BE PROVIDED FOR THE TOP OF THE TOP SLAB AND 18" DOWN ALONG THE TOPS OF THE EXTERIOR WALLS.
17. ▲ FOR FILL HEIGHTS LESS THAN 2 FT. THE d_1 BARS FOR THE BOTTOM MAT OF THE TOP SLAB SHALL BE AS FOLLOWS:

S	6, 9, 10	14, 16, 18	20
BAR SIZE:	#5	#6	#7
SPACING:	1'-0"	1'-0"	1'-0"

DESIGN DATA: 7TH EDITION, 2014, OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS
RATING DATA: 2ND EDITION, 2013, OF THE AASHTO MANUAL FOR BRIDGE EVALUATION

LOADING DATA
f_y = 60,000 psi,
LIVE LOAD = AASHTO LRFD, HL-93 TRUCK, HL-93 TANDEM, COLORADO PERMIT TRUCK AND NRL
f'_c = 4,500 psi,
DEAD LOAD CASE 1=VERTICAL EARTH LOAD = 120 LBS./CU.FT.
HORIZONTAL EARTH LOAD = 30 LBS./CU.FT.
DEAD LOAD CASE 2=VERTICAL EARTH LOAD = 120 LBS./CU.FT.
HORIZONTAL EARTH LOAD = 60 LBS./CU.FT.
WEARING SURFACE = 12 IN. THICK CONCRETE PAVEMENT.
DEAD LOAD = TYPE 7 BARRIER.
THRUST IS NOT CONSIDERED IN THIS STANDARD, I.E. THRUST = 0.
EXTREME HEADWATER TO DEPTH RATIO IS IN ACCORDANCE WITH THE CDOT DRAINAGE MANUAL.
EXTREME HEADWATER TO DEPTH RATIO WAS INCLUDED IN THE CULVERT DESIGNS BUT EXCLUDED FROM THE RATINGS AS PER THE AASHTO MANUAL FOR BRIDGE EVALUATION.
LIVE LOAD SURCHARGE ON EXTERIOR WALLS = 2 FT.OF EARTH
★ IF HEADWALL MOUNT GUARDRAIL IS USED (SEE STANDARD PLAN M-606-1, SHEET 19 AND NOTES BELOW):
- ALL REINFORCING STEEL SHALL BE ACCORDING TO THIS BOX CULVERT PLAN.
- ANY SPECIAL DESIGN FOR STIRRUPS WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.
- HEADWALL DIMENSION AND CONCRETE QUANTITY SHALL BE ACCORDING TO STANDARD PLAN M-606-1, SHEET 19.
- POST ANCHORS SHALL BE PROVIDED ACCORDING TO STANDARD PLAN M-606-1, SHEET 19.
- POST ANCHORS AND CONCRETE FOR HEADWALL MOUNT OF GUARDRAIL WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.
- POST ANCHORS WHEN REQUIRED AND ENCASED IN HEADWALL CONCRETE, SHALL CONFORM TO ASTM A 36 OR AASHTO M 169 STEEL.

18. SEE M-603-3 FOR PRECAST CONCRETE BOX CULVERT DETAILS.

CONSTRUCTION JOINT DETAIL FOR STAGED CONSTRUCTION

NOTE: THIS DETAIL IS FOR CONSTRUCTION JOINTS INSTALLED PERPENDICULAR TO THE $\underline{\ell}$ OF THE BOX ONLY. THE CONTRACTOR CAN DESIGN AND INSTALL J BARS AT HIS EXPENSE TO SUPPORT TEMPORARY LIVE LOADS DURING STAGE 1 CONSTRUCTION. J BARS SHALL BE THE SAME SIZE AS THE TOP AND BOTTOM SLAB REINFORCING WHEN THERE ARE NO TEMPORARY LIVE LOADS TO SUPPORT.

Computer File Information	
Creation Date: 07/04/12	Initials: DDG
Last Modification Date: 04/05/19	Initials: JBE
Full Path: www.codot.gov/business/designsupport	
Drawing File Name: 601030202.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions		
	Date:	Comments
ⓡⓒⓧ	08/27/13	LRFD Design
ⓡⓒⓧ	08/01/15	Analysis Program Updates
ⓡⓒⓧ	04/05/19	Updated title sheet & for cost-effective cdot - only not for Pre-Cast CBC. Changed title and added Gen. Note 18.

Colorado Department of Transportation
2829 West Howard Place
CDOT HQ, 3rd Floor
Denver, CO 80204
Phone: 303-757-9021 FAX: 303-757-9868
Division of Project Support DDG/Bridge

TRIPLE CONCRETE BOX CULVERT (CAST-IN-PLACE)

Issued By: Project Development Branch July 4, 2012

STANDARD PLAN NO.
M-601-3
Sheet No. 1 of 2

TRIPLE CONCRETE BOX CULVERT DIMENSIONS, QUANTITIES & RATING FACTORS (EXCLUDING HEADWALL & TOEWALL QUANTITIES)

BOX SIZE S	B	HT.	WIDTH	FILL ALLOWED ft	SLAB & WALL THICKNESS t_1	t_2	t_3	t_4	t_5	TW & TW	BAR SIZES d_1	d_2	d_3	d_4	d_5	d_6	d_7	d_8	d_9	d_{10}	d_{11}	DIMENSIONS n ★	r_1	r_2	r_3	r_4	r_5	CONCRETE CY/LF	REBAR STL LBS/LF	WATERPROOF.FKG SY/LF	RATING FACTORS HL-93 INVENTORY	HL-93 OPERATING	COLORADO PERMIT	NRL VEHICLE
6	2.00	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.639	536	3.370	1.9	1.7	1.80	1.69
	2.5	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.800	536		1.9	1.7	1.80	1.69
	3.0	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.900	536		1.9	1.7	1.80	1.69
	4.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.200	536		1.9	1.7	1.80	1.69
	5.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.300	536		1.9	1.7	1.80	1.69
	6.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.400	536		1.9	1.7	1.80	1.69
8	2.00	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.639	536	3.370	1.9	1.7	1.80	1.69
	2.5	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.800	536		1.9	1.7	1.80	1.69
	3.0	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.900	536		1.9	1.7	1.80	1.69
	4.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.200	536		1.9	1.7	1.80	1.69
	5.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.300	536		1.9	1.7	1.80	1.69
	6.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.400	536		1.9	1.7	1.80	1.69
10	2.00	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.639	536		1.9	1.7	1.80	1.69
	2.5	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.800	536		1.9	1.7	1.80	1.69
	3.0	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.900	536		1.9	1.7	1.80	1.69
	4.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.200	536		1.9	1.7	1.80	1.69
	5.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.300	536		1.9	1.7	1.80	1.69
	6.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.400	536		1.9	1.7	1.80	1.69
12	2.00	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.639	536		1.9	1.7	1.80	1.69
	2.5	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.800	536		1.9	1.7	1.80	1.69
	3.0	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.900	536		1.9	1.7	1.80	1.69
	4.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.200	536		1.9	1.7	1.80	1.69
	5.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.300	536		1.9	1.7	1.80	1.69
	6.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.400	536		1.9	1.7	1.80	1.69
14	2.00	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.639	536		1.9	1.7	1.80	1.69
	2.5	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.800	536		1.9	1.7	1.80	1.69
	3.0	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.900	536		1.9	1.7	1.80	1.69
	4.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.200	536		1.9	1.7	1.80	1.69
	5.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.300	536		1.9	1.7	1.80	1.69
	6.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.400	536		1.9	1.7	1.80	1.69
16	2.00	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.639	536		1.9	1.7	1.80	1.69
	2.5	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.800	536		1.9	1.7	1.80	1.69
	3.0	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.900	536		1.9	1.7	1.80	1.69
	4.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.200	536		1.9	1.7	1.80	1.69
	5.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.300	536		1.9	1.7	1.80	1.69
	6.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.400	536		1.9	1.7	1.80	1.69
18	2.00	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.639	536	6.722	1.9	1.7	1.80	1.69
	2.5	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.800	536		1.9	1.7	1.80	1.69
	3.0	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.900	536		1.9	1.7	1.80	1.69
	4.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.200	536		1.9	1.7	1.80	1.69
	5.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.300	536		1.9	1.7	1.80	1.69
	6.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.400	536		1.9	1.7	1.80	1.69
20	2.00	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.639	536		1.9	1.7	1.80	1.69
	2.5	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.800	536		1.9	1.7	1.80	1.69
	3.0	7'-4	7'-0	∞	10	10	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	2.900	536		1.9	1.7	1.80	1.69
	4.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.200	536		1.9	1.7	1.80	1.69
	5.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.300	536		1.9	1.7	1.80	1.69
	6.0	7'-4	12'-0	18	11	11	10	5	5	6	4	4	5	5	5	5	5	5	5	5	5	5	5.68	5.3	6.4	6.9	1.4	1.0	3.400	536		1.9	1.7	1.80	1.69

HEADWALL AND TOEWALL QUANTITIES

HEADWALL BENT ANGLE	90° TO 75°			74° TO 60°			59° TO 45°		
CLEAR SPAN (S)	Z STIRRUPS	REBAR QUANT.	Z	STIRRUPS	REBAR QUANT.	Z	STIRRUPS	REBAR QUANT.
	#	# LBS/LF	#	#	# LBS/LF	#	#	# LBS/LF
8	4	19.2	5	4	23.5	7	4	34.4
10	5	23.9	6	4	28.7	9	4*	54.0
12	6	28.7	6	4	28.2	9	5*	59.2
14	6	27.9	7	4	33.5	★	★	★
16	6	27.5	8	5	44.1	★	★	★
18	7	33.0	9	5	51.8	★	★	★
20	7	32.8	★	★	★	★	★	★

CONCRETE QUANTITY = 0.086 CY/LF

NOTES

■ 1. SIX INCH SPACING AT EACH END OF THE SPAN FOR A DISTANCE OF 1/4 OF THE SPAN LENGTH;12 INCH SPACING ELSEWHERE.

2. QUANTITIES ARE GIVEN FOR ONE HEADWALL AND ONE TOEWALL AND ARE BASED ON PER LINEAR FOOT OF HEADWALL. STEEL QUANTITIES INCLUDE ALL REINFORCING. QUANTITIES SHALL BE PAID FOR AS SHOWN ON THE PLANS.

★ 3. SKEWED HEADWALLS ARE NOT RECOMMENDED FOR THESE SPANS. A SPECIAL DESIGN IS REQUIRED.

4. FOR HEADWALL AND TOEWALL DETAILS SEE M-601-3, SHEET 1 OF 2.

5. WHEN THE FILL HEIGHTS ARE LESS THAN OR EQUAL TO 2 FT, ALL REINFORCING BARS IN THE HEADWALL, ALL REINFORCING BARS DESIGNATED BY AN ASTERISK (*), AND THE d_1 BARS IN THE TOP MAT OF THE TOP SLAB SHALL BE EPOXY COATED.

6. REINFORCING QUANTITIES INCLUDE BOTH EPOXY-COATED AND UNCOATED BARS.

7. WHEN A (RISE) R OF LESS THAN 6 FT IS REQUIRED, USE THE BAR SIZES AND THE SLAB AND WALL THICKNESSES FOR THE 6 FT RISE OF AVAILABLE ON THE TABLED.

▲ 8. FOR SIZE AND SPACING OF THE BOTTOM MAT BARS IN THE TOP SLAB SEE TABLE ON M-601-3, SHEET 1 OF 2. ALL OTHER d_1 BARS ARE #4's AT 1'-0" SPACING. THE NUMBER OF BARS REQUIRED IS LISTED ON THIS SHEET AND INCLUDES BOTH #4 BARS AND THOSE FROM THE TABLE.

◆ 9. LIVE LOAD IS NEGLECTED AS PER AASHTO LRFD SECTION 3.6.1.2.6. FOR THESE STRUCTURES REFER TO THE CDOT RATING MANUAL.

10. FOR ALL NEW CULVERT DESIGNS, A RATING IS REQUIRED. THE RATING SUMMARY SHEET SHOULD BE PRINTED FROM THE COOT EXTERNAL WEBSITE AND SUBMITTED TO THE BRIDGE RATING UNIT OR INCLUDED AS PART OF A LARGER DESIGN PACKAGE. FOR ADDITIONAL INFORMATION, SEE THE CDOT RATING MANUAL.

Computer File Information	
Creation Date: 07/04/12	Initials: DDG
Last Modification Date: 04/05/19	Initials: JBE
Full Path: www.codot.gov/business/designsupport	
Drawing File Name: 601030202.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions		
	Date:	Comments
ⓡⓒⓧ	08/27/13	LRFD Design
ⓡⓒⓧ	08/01/15	Analysis Program Updates
ⓡⓒⓧ	04/05/19	Updated title sheet & for cost-effective cdot - only not for Pre-Cast CBC. Changed title and added Gen. Note 18.

Colorado Department of Transportation
2829 West Howard Place
CDOT HQ, 3rd Floor
Denver, CO 80204
Phone: 303-757-9021 FAX: 303-757-9868
Division of Project Support DDG/Bridge

TRIPLE CONCRETE BOX CULVERT (CAST-IN-PLACE)

Issued By: Project Development Branch July 4, 2012

STANDARD PLAN NO.
M-601-3
Sheet No. 2 of 2

h =	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'
a =	1'-0"	1'-2"	1'-4"	1'-6"	1'-8"	1'-10"	2'-0"	2'-2"	2'-4"	2'-6"	2'-8"	2'-10"	3'-0"
b =	1'-8"	2'-0"	2'-4"	2'-8"	3'-0"	3'-4"	3'-8"	4'-0"	4'-4"	4'-8"	5'-0"	5'-4"	5'-8"
w =	2'-8"	3'-2"	3'-8"	4'-2"	4'-8"	5'-2"	5'-8"	6'-2"	6'-8"	7'-2"	7'-8"	8'-2"	8'-8"
d-BARS	#4 @ 9"	#4 @ 9"	#4 @ 9"	#4 @ 9"	#4 @ 9"	#4 @ 9"	#5 @ 11"	#5 @ 10"	#5 @ 10"	#5 @ 8"	#6 @ 8"	#7 @ 9"	#7 @ 7"
✱ CONC. CY/LF	0.181	0.220	0.259	0.309	0.358	0.407	0.457	0.506	0.556	0.605	0.654	0.704	0.753

✱ DOES NOT INCLUDE TOE WALL QUANTITIES SEE SHEET 2 OF 2 FOR REINFORCING STEEL QUANTITY

■ REQUIRED DRAINAGE BEHIND WINGWALLS SEE NOTE 6

QUANTITIES FOR TOE WALL ONLY: CONCRETE 0.049 CU. YD./LIN. FT. REINFORCEMENT 5.1 LB./LIN. FT.

REINFORCEMENT 1.34 LB./SQ. FT.

1. D50 = MEAN PARTICLE SIZE (INTERMEDIATE DIMENSION) BY WEIGHT.
2. RIP RAP SHALL BE PER PLAN AND SHALL BE MIXED WITH 30% SOIL TO 70% RIP RAP.
3. RIP RAP SECTION THICKNESS SHALL BE 2.0 TIMES THE SPECIFIED MEAN PARTICLE SIZE (I.E. D50 X 2.0 MINIMUM) PER ECM SECTION 10.10.3.
4. ALL RIP RAP SHALL BE UNDERLAIN WITH GEOTEXTILE FILTER FABRIC FOR STABILIZATION.
5. RIP RAP SHALL WRAP AROUND AND EXTEND 2' MIN. BEHIND FLUME AND FLARED END SECTIONS.

TYPICAL RIPRAP SECTION DETAIL

Table 9.5 Recommended wingwall flare angles (θ_a or θ_b)

Skew Angle, $\theta°$	$\theta_a°$	$\theta_b°$
90	60	60
80	50	70
70	45	80
60	40	90
50	30	90
40	20	100
30	15	105
< 30	Consult the Region Hydraulic Engineer	

NO SKEW–CULVERT 2

75° SKEW–CULVERT 1

TRIPLE CONCRETE BOX CULVERT SECTION DETAIL

Update to provide bench. See redline comments on sheet 2

WINGWALL (BOX CULVERT) SECTION DETAIL

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2021 KIMLEY–HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 300
Colorado Springs, Colorado 80903 (719) 453–0180

DESIGNED BY: KRK
DRAWN BY: JRH
CHECKED BY: KRK
DATE: 9/3/2021

WINSOME FILING NO. 3
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
CULVERT DETAILS

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196106001

SHEET
10

K:\COS_Civil\196106001_Winsome Filing No. 3\CADD\PlanSheets\Culvert CDs\196106001_DT.dwg Kofford, Kevin 9/7/2021 1:00 PM

GUARDRAIL FOR CULVERTS

INSIDE MOUNT ON CBC

RAIL PLACEMENT FOR INSIDE MOUNT

BASE PLATE B
(FOR INSIDE MOUNT)

ANCHORAGE D
(FOR OUTSIDE MOUNT)

NOTES

1. LOCATION AND LENGTH OF MEDIAN GUARDRAIL APPROACHES TO CULVERTS WITH FILL HEADWALL AND WINGWALLS SHALL BE AS SHOWN FOR BRIDGES ON SHEET 15. THE GUARDRAIL TYPE 3 SHALL CONTINUE ACROSS THE CULVERT AS SHOWN ON THIS SHEET.
2. RIGHT SHOULDER BOX CULVERT TREATMENT IS SHOWN ON THIS SHEET FOR CULVERTS 20 FT. OR LESS IN LENGTH.
3. GUARDRAIL ACROSS CULVERTS WITH A LENGTH OF 20 FT. OR LESS SHALL BE AS FOLLOWS:
   A. FILL HEIGHT AT GUARDRAIL POST 4B IN. OR GREATER: CONSTRUCTION AND PAYMENT WILL BE AS GUARDRAIL TYPE 3.
   B. FILL HEIGHT AT GUARDRAIL POST LESS THAN 48 IN. AND BLOCK FACE TO HEADWALL OFFSET OF 3 FT. OR GREATER: CONSTRUCTION AND PAYMENT AS GUARDRAIL TYPE 3.
   C. FILL HEIGHT AT GUARDRAIL POST 48 IN. OR LESS AND BLOCK FACE TO HEADWALL OFFSET LESS THAN 3 FT: CONSTRUCTION ACCORDING TO HEADWALL MOUNT DETAILS AND PAYMENT AS BRIDGE RAIL TYPE 3.
4. GUARDRAIL ACROSS CULVERTS WITH LENGTH GREATER THAN 20 FT. SHALL BE AS FOLLOWS:
   A. FILL HEIGHT AT GUARDRAIL POSTS 48 IN. OR GREATER: CONSTRUCTION AND PAYMENT WILL BE FOR STANDARD GUARDRAIL TYPE 3.
   B. FILL HEIGHT AT GUARDRAIL POSTS 48 IN. OR LESS: CONSTRUCTION AND PAYMENT IN ACCORDANCE WITH THE CONTRACT BRIDGE PLANS. WHEN BLOCK FACE TO HEADWALL OFFSET IS 3 FT. OR GREATER: CONSTRUCTION AND PAYMENT AS GUARDRAIL TYPE 3.
5. ANCHORAGE D: SIX BOLTS FOR BASE PLATE "B" WITH INSIDE MOUNT. THE BOLTS SHALL BE 7/8 IN. DIA X 10 IN. HIGH STRENGTH RODS THREADED FULL LENGTH AND ALL GALVANIZED. RODS SHALL BE CAST-IN-PLACE FOR A NEW STRUCTURE. FOR AN EXISTING STRUCTURE, THE RODS SHALL BE INSTALLED IN 1-1/4 IN. DIA HOLES WITH NON-SHRINK GROUT OR EPOXY CONFORMING TO ASTM C 881.
6. THE GUARDRAIL LENGTH DIMENSION "N" IS THE LENGTH AS DETERMINED BY THE LENGTH OF NEED COMPUTATION AND IS SHOWN ON THE PLANS. THE MINIMUM IS 12 FT.-6 IN. WHERE SITE CONDITIONS ALLOW. THE OVERALL REQUIRED LENGTH OF NEED CAN INCLUDE THE LENGTH OF TRANSITION, THE LENGTH OF RAIL (N), AND ANY REDIRECTIVE LENGTH IN THE RAIL END TREATMENT.
7. ALL POSTS, BASE PLATES, AND ANCHOR BOLTS SHALL BE FABRICATED FROM ASTM A 36 STEEL. THE ABOVE MATERIAL, W-BEAM, AND ALL ANCHOR BOLTS AND MISCELLANEOUS BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION INACCORDANCE WITH SECTION 509. CONCRETE, REINFORCING STEEL, AND STRUCTURAL STEEL ELEMENTS SHALL BE IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.
8. POST ANCHORS, ENCASED IN CONCRETE, SHALL BE ASTM A 36 STEEL, AND NEED NOT BE GALVANIZED.
9. PRIOR TO FABRICATION OF BRIDGE RAIL, THREE SETS OF WORKING DRAWINGS WHICH COMPLY WITH THE REQUIREMENTS OF SECTION 105 SHALL BE SUBMITTED TO THE ENGINEER FOR INFORMATION ONLY.

Computer File Information		Sheet Revisions		
Creation Date: 11/01/18 Initials: JJP		Date:	Comments	
Last Modification Date: 12/21/18 Initials: LTA	REV	12/21/18	Deleted the Transition Type 3L and Guardrail Type 3 Approach, Headwall Mount on CBC, Headwall Mount Post, Backing Tubes End and Anchor details. Deleted previous Gen. Notes 6, 8, and 11.	
Full Path: www.codot.gov/business/designsupport	REV			
Drawing File Name: 6060101019.dgn	REV			
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	REV			

Colorado Department of Transportation
2829 West Howard Place
CDOT HQ, 3rd Floor
Denver, CO 80204
Phone: 303-757-9021 FAX: 303-757-9868
Division of Project Support JJP/LTA

MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

Issued By: Project Development Branch November 1, 2018

STANDARD PLAN NO. M-606-1

Sheet No. 19 of 19

NORMAL ROADSIDE INSTALLATION WHEN FULL REQUIRES GUARDRAIL

RESTRICTIVE ROADSIDE INSTALLATION WITH 7 FOOT GUARDRAIL POSTS
(SEE NOTE 5)

OPTION A

ROADSIDE INSTALLATION WITH EROSION CONTROL CURB

OPTION B (PREFERRED)

URBAN ROADSIDE INSTALLATION WITH CURB AND GUTTER

LOCATION	SPACING
ALL LOCATIONS EXCEPT BRIDGE RAIL LOCATIONS	6'-3"
BRIDGE OR STRUCTURE APPROACH	SEE SHEETS 11 & 19

NORMAL CENTER-TO-CENTER POST SPACING

EMBANKMENT WITH GUARDRAIL

(NOTE: THE CATCHPOINT REMAINS THE SAME AS THAT FOR "NORMAL" FILL SLOPE. FOR THE WIDER "2" DISTANCES, THE VARIABLE SLOPE MAY "CATCH" AT THE POSS.)

GENERAL NOTES (CONTINUE ON SHEET 2)

1. TOLERANCE FOR TOP OF GUARDRAIL BEAM IS ±1 IN.
2. RATE OF SLOPE DEPENDS ON GUARDRAIL LOCATION:
   A. FOR GUARDRAIL FACE 2 FT. OR LESS FROM THE NORMAL EDGE OF PAVED SHOULDER, CONTINUE THE RATE OF SLOPE OF THE NORMAL PAVED SHOULDER TO THE BREAKPOINT.
   B. FOR GUARDRAIL FACE MORE THAN 2 FT. FROM THE NORMAL EDGE OF THE PAVED SHOULDER, THE SLOPE SHALL BE 10:1 OR FLATTER.
3. WHEN SPECIFIED ON THE PLANS, EXTEND A 2 IN. MINIMUM THICKNESS PAVED SURFACE TO 1 FT. BEHIND THE GUARDRAIL POSTS OR TO THE EROSION CONTROL CURB AS SHOWN ON PLANS. ASPHALT CUTTING & PATCHING OR OTHER APPROVED METHOD SHALL BE USED TO MINIMIZE DAMAGE TO ALL PAVED SURFACES UNDER GUARDRAIL INSTALLATIONS. ALL REPAIRS TO THE PAVED AREA WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK. A MINIMUM 3 IN. THICK FIBER REINFORCED CONCRETE PAVEMENT MAY ALSO BE USED FOR PAVING BENEATH THE GUARDRAIL. INSTALL THE POST IN A 1½ IN. OVERSIZED FORMED HOLE FOR GUARDRAIL RUNS AND TERMINALS AS DIRECTED. PAYMENT FOR THIS PAVED SURFACE WILL BE MADE UNDER A PAVEMENT OR CONCRETE PAY ITEM WITH QUANTITIES SHOWN ON THE PLANS.
4. THE MINIMUM GUARDRAIL OFFSET FROM PAVED SHOULDER EDGE SHALL BE:
   0 FT. FOR SHOULDERS 8 FT. OR WIDER
   2 FT. FOR SHOULDERS 6 FT. OR LESS
   THE GUARDRAIL OFFSET FROM PAVED INSIDE SHOULDER EDGE OF A DIVIDED HIGHWAY SHALL BE;
   0 FT. MINIMUM FOR SHOULDERS 6 FT. OR WIDER
   2 FT. DESIRABLE FOR 4 FT. SHOULDERS
   THE ABOVE 2 FT. GUARDRAIL TO SHOULDER OFFSET IS DESIRABLE BUT NOT REQUIRED FOR:
   A. FOR AN EXISTING HIGHWAY WITH A DESIGN SPEED LESS THAN 50 MPH, THE MINIMUM OFFSET IS 4 FT. FROM THE TRAVELED WAY.
   B. FOR A ONE-WAY ONE-LANE RAMP, AND WHERE ONE OR MORE OF THE FOLLOWING ARE TRUE:
      (1) THE NON-OFFSET GUARDRAIL BEGINS AT LEAST 100 FT. BEYOND RAMP NOSE.
      (2) THE NON-OFFSET GUARDRAIL IS NOT LOCATED ON THE RAMP EXIT OR ENTRANCE CURVE CONNECTION TO THE MAJOR HIGHWAY.
      (3) THE RAMP SHOULDERS ARE 4 FT. OR WIDER.
   USE OF GREATER THAN MINIMUM OFFSET DIMENSIONS IS ENCOURAGED TO MEET THE DESIRABLE GOAL OF PLACING THE GUARDRAIL AS FAR AS POSSIBLE FROM THE TRAVEL WAY, EVEN FOR SHORT DISTANCES, WHILE PROVIDING A SMOOTH CHANGE IN GUARDRAIL ALIGNMENT.
5. IF 2 FT. CANNOT BE PROVIDED BETWEEN THE BACK OF THE GUARDRAIL POST AND THE BREAKPOINT, USE 7 FT. GUARDRAIL POSTS. REFER TO THE "RESTRICTIVE ROADSIDE INSTALLATION" DETAIL.
6. WHEN SPECIFIED ON THE PLANS, INSTALL A 1N. HIGH TYPE 6 CURB WITH ITS FACE AT OR BEHIND THE RAIL FACE. AS AN ALTERNATIVE WHEN SPECIFIED ON THE PLANS, INSTALL A 2 IN. x 6 IN. TREATED (AASHTO M 133) WOOD CURB. FASTEN WITH A 4 IN. LAG BOLT AND WASHER AT EACH WOOD POST, OR WITH A 1/4 IN. DIA. BOLT WITH WASHER AND NUT AT EACH STEEL POST. IF THE 2 IN. x 6 IN. WOOD CURB IS SPECIFIED, IT WILL BE INCLUDED IN THE COST OF THE GUARDRAIL. IF APPROVED BY THE ENGINEER, A 2 IN. x 4 IN. TREATED WOOD CURB MAY BE SUBSTITUTED FOR THE 2 IN. x 6 IN. CURB AND SET ON TOP OF PAVEMENT SURFACE AND ATTACHED AS DESCRIBED ABOVE. NO SPLICING SHALL BE ALLOWED IN WOOD CURBS. ADJACENT BOARDS SHALL BE BUTTED TOGETHER AND BOLTED AT A POST LOCATION. JOINTS SHALL BE LOCATED AT THE POSTS.

SECTION A-A

LEAVE-OUT AREA FOR GUARDRAIL POSTS LOCATED IN PAVEMENT

NOTE: LEAVE-OUT AREAS SHALL BE PROVIDED FOR ALL GUARDRAIL POSTS LOCATED IN PAVEMENT * TO ALLOW THE POSTS TO ROTATE IN THEIR EMBEDMENT SUCH THAT VEHICLE IMPACT LOADS ARE DISTRIBUTED THROUGH THE POST INTO THE EMBEDMENT MATERIAL PRIOR TO THE POSTS BREAKING PREMATURELY.

Computer File Information		Sheet Revisions		
Creation Date: 11/01/18 Initials: JJP		Date:	Comments	
Last Modification Date: 12/21/18 Initials: LTA	REV	12/21/18	Revised the "Option B" detail as Preferred.	
Full Path: www.codot.gov/business/designsupport	REV			
Drawing File Name: 6060101019.dgn	REV			
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	REV			

Colorado Department of Transportation
2829 West Howard Place
CDOT HQ, 3rd Floor
Denver, CO 80204
Phone: 303-757-9021 FAX: 303-757-9868
Division of Project Support JJP/LTA

MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

Issued By: Project Development Branch November 1, 2018

STANDARD PLAN NO. M-606-1

Sheet No. 1 of 19

Add all the applicable CDOT Detail M-606-1 sheets

OFFSET NOTES

1. POST OFFSET DIMENSIONS ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF POSTS.
2. THE GUARDRAIL BETWEEN POST ① THRU ⑦ IS ON A STRAIGHT LINE FLARE.

SLOTTED RAIL TERMINAL (SRT-31)
(NCHRP 350 CERTIFIED)

FLEAT 350
(NCHRP 350 CERTIFIED)

END ANCHORAGES (FLARED)

NOTES

1. THE END ANCHORAGES (FLARED) SHALL EITHER BE THE SLOTTED RAIL TERMINAL SRT-31 AS MANUFACTURED BY TRINITY HIGHWAY PRODUCTS LLC (TELEPHONE #: 800-772-7976), OR THE FLEAT-350, AS MANUFACTURED BY ROAD SYSTEMS INC. (TELEPHONE #: 432-263-2435). ONE END ANCHORAGE (FLARED) SHALL INCLUDE ALL POST, RAIL, AND ALL HARDWARE ITEMS REQUIRED FOR A COMPLETE UNIT. THE END ANCHORAGE (FLARED) SHALL BE INSTALLED CONFORMING TO THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND PARTS LIST TO THE ENGINEER PRIOR TO INSTALLATION OF THE DEVICE.
2. IN HEAVY SNOW LOCATIONS, TRIM POSTS ⑤ AND ⑥ (IF THEY ARE WOODEN) FLUSH WITH RAIL TOP AND TREAT END WITH SEALANT, IN CONFORMANCE WITH AASHTO M 133.
3. POSTS SHALL BE DRILLED FOR BREAKAWAY ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
4. SEE SHEETS 1, 3 AND 5 FOR STANDARD GUARDRAIL TYPE 3 AND INSTALLATION DETAILS.
5. RETROREFLECTOR TABS SHALL NOT BE USED ON END ANCHORAGE POSTS.
6. DELINEATION SHALL BE APPLIED TO THE END PIECE, AND SHALL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.

Computer File Information		Sheet Revisions		
Creation Date: 11/01/18 Initials: JJP		Date:	Comments	
Last Modification Date: 12/21/18 Initials: LTA	REV			
Full Path: www.codot.gov/business/designsupport	REV			
Drawing File Name: 6060101019.dgn	REV			
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	REV			

Colorado Department of Transportation
2829 West Howard Place
CDOT HQ, 3rd Floor
Denver, CO 80204
Phone: 303-757-9021 FAX: 303-757-9868
Division of Project Support JJP/LTA

MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

Issued By: Project Development Branch November 1, 2018

STANDARD PLAN NO. M-606-1

Sheet No. 6 of 19

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2021 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 300
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: KRK
DRAWN BY: JRH
CHECKED BY: KRK
DATE: 9/3/2021

WINSOME FILING NO. 3
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS
CULVERT DETAILS

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO. 196106001

SHEET 11

K:\COS_Civil\196106001_Winsome Filing No. 3\CADD\PlanSheets\Culvert CDs\196106001_DT.dwg Kofford, Kevin 9/7/2021 1:00 PM

Culvert CDs_v1 redlines.pdf Markup Summary

CDurham (33)

Subject: Text Box
Page Label: 1
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:52:05 AM
Status:
Color:
Layer:
Space:

Engineer's Statement

Subject: Text Box
Page Label: 1
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:52:17 AM
Status:
Color:
Layer:
Space:

County Engineer signature block

Subject: Text Box
Page Label: 1
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:52:27 AM
Status:
Color:
Layer:
Space:

Including legends on sheets would help with the various linetypes throughout the plan set.

Subject: Callout
Page Label: 2
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:53:02 AM
Status:
Color:
Layer:
Space:

Hydraulics report has outlet protection listed as Type L riprap. Update so plan and report match

---

Subject: Callout
Page Label: 3
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:54:15 AM
Status:
Color:
Layer:
Space:

Approved CLOMR showed concrete aprons upstream and downstream of boxes. Update to match approved design. If not needed, explain in report why not.

Subject: Callout
Page Label: 3
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:55:06 AM
Status:
Color:
Layer:
Space:

What are these linetypes? Label or remove

Subject: Callout
Page Label: 3
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:55:28 AM
Status:
Color:
Layer:
Space:

Add begin stations for guardrail

Subject: Callout
Page Label: 3
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:55:54 AM
Status:
Color:
Layer:
Space:

Add end stations for guardrail

Subject: Callout
Page Label: 4
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:56:31 AM
Status:
Color:
Layer:
Space:

Approved CLOMR showed concrete aprons upstream and downstream of boxes. Update to match approved design. If not needed, explain in report why not.

Subject: Callout
Page Label: 4
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:57:21 AM
Status:
Color:
Layer:
Space:

What are these linetypes? Label or remove

Subject: Callout
Page Label: 4
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:57:31 AM
Status:
Color:
Layer:
Space:

Label outlet protection

Subject: Callout
Page Label: 4
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:57:55 AM
Status:
Color:
Layer:
Space:

Add begin stations for guardrail

Subject: Callout
Page Label: 4
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:58:07 AM
Status:
Color:
Layer:
Space:

Add slope arrows (typ)

Subject: Callout
Page Label: 4
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:58:25 AM
Status:
Color:
Layer:
Space:

Add end stations for guardrail

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:59:13 AM
Status:
Color:
Layer:
Space:

Add sheet #

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 11:59:34 AM
Status:
Color:
Layer:
Space:

Label ROW

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:00:10 PM
Status:
Color:
Layer:
Space:

Check that this label is pointing to the correct data/line

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:00:54 PM
Status:
Color:
Layer:
Space:

Hydraulics report has outlet protection listed as Type L riprap. Update so plan and report match

---

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:01:48 PM
Status:
Color:
Layer:
Space:

Add reference to riprap detail on detail sheet

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:02:11 PM
Status:
Color:
Layer:
Space:

Extend alignment past improvements

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:02:22 PM
Status:
Color:
Layer:
Space:

Label grade break

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:03:02 PM
Status:
Color:
Layer:
Space:

Show and label outlet protection and toewall

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:03:21 PM
Status:
Color:
Layer:
Space:

Label proposed and existing ground

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:03:24 PM
Status:
Color:
Layer:
Space:

Remove "extra" profile line

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:03:34 PM
Status:
Color:
Layer:
Space:

Hydraulic report shows 0.50% slope. Revise report or plan to match

---

Subject: Callout
Page Label: 6
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:04:11 PM
Status:
Color:
Layer:
Space:

Reference sheet # for wall details

Subject: Callout
Page Label: 6
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:04:22 PM
Status:
Color:
Layer:
Space:

Check that this label is pointing to the correct data/line

Subject: Callout
Page Label: 6
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:09:06 PM
Status:
Color:
Layer:
Space:

Check that this label is pointing to the correct data/line

Subject: Callout
Page Label: 6
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:09:18 PM
Status:
Color:
Layer:
Space:

Hydraulics report has outlet protection listed as Type L riprap. Update so plan and report match

Subject: Callout
Page Label: 6
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:09:43 PM
Status:
Color:
Layer:
Space:

Add reference to riprap detail on detail sheet

Subject: Callout
Page Label: 6
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:10:08 PM
Status:
Color:
Layer:
Space:

Extend profile to show and label where channel grading starts and matches existing

---

Subject: Callout
Page Label: 6
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:10:36 PM
Status:
Color:
Layer:
Space:

shift note so all information is readable

Subject: Callout
Page Label: 6
Lock: Unlocked
Author: CDurham
Date: 10/25/2021 12:10:49 PM
Status:
Color:
Layer:
Space:

Extend profile to show extents of outlet protection & label matching location

dsdlaforce (44)

Subject: Text Box
Page Label: 1
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 2:19:48 PM
Status:
Color:
Layer:
Space:

Add "PCD File No. CDR-21-012"

Subject: Highlight
Page Label: 2
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 2:41:03 PM
Status:
Color:
Layer:
Space:

Subject: Cloud
Page Label: 2
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 2:53:00 PM
Status:
Color:
Layer:
Space:

Subject: Cloud
Page Label: 3
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:16:00 PM
Status:
Color:
Layer:
Space:

Subject: Cloud
Page Label: 3
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:16:51 PM
Status:
Color:
Layer:
Space:

Subject: Callout
Page Label: 3
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:22:20 PM
Status:
Color:
Layer:
Space:

As discussed during the 9/29/2021 meeting, the County will require riprap protection along the roadway embankment.

Subject: Polygon
Page Label: 4
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:23:45 PM
Status:
Color:
Layer:
Space:

Subject: Polygon
Page Label: 4
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:24:31 PM
Status:
Color:
Layer:
Space:

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:49:13 PM
Status:
Color:
Layer:
Space:

update the note. Is the 7322.50 the WSEL.

Maybe "Extend riprap to 7322.50 to provide 1 foot of freeboard"

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:53:01 PM
Status:
Color:
Layer:
Space:

Show the riprap

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:54:14 PM
Status:
Color:
Layer:
Space:

Show the 100yr WSEL

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:54:27 PM
Status:
Color:
Layer:
Space:

Label

Subject: Highlight
Page Label: 5
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:54:58 PM
Status:
Color:
Layer:
Space:

Subject: Highlight
Page Label: 5
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:55:09 PM
Status:
Color:
Layer:
Space:

Subject: Highlight
Page Label: 5
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:56:05 PM
Status:
Color:
Layer:
Space:

Subject: Highlight
Page Label: 5
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:56:38 PM
Status:
Color:
Layer:
Space:

Subject: Highlight
Page Label: 5
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:56:46 PM
Status:
Color:
Layer:
Space:

Subject: Highlight
Page Label: 5
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:57:27 PM
Status:
Color:
Layer:
Space:

Subject: Highlight
Page Label: 6
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:59:12 PM
Status:
Color:
Layer:
Space:

Subject: Highlight
Page Label: 6
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:59:20 PM
Status:
Color:
Layer:
Space:

Subject: Highlight
Page Label: 6
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:59:39 PM
Status:
Color:
Layer:
Space:

Subject: Highlight
Page Label: 6
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:59:42 PM
Status:
Color:
Layer:
Space:

Subject: Callout
Page Label: 5
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 3:59:45 PM
Status:
Color:
Layer:
Space:

based on the contour it appears the wingwall needs to be extended.
Update all wingwall lengths.

Subject: Text Box
Page Label: 6
Lock: Unlocked
Author: dsdlaforce
Date: 10/22/2021 4:00:51 PM
Status:
Color:
Layer:
Space:

See comment on sheet 5 and apply to this sheet.

Subject: PolyLine
Page Label: 4
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 1:03:21 PM
Status:
Color:
Layer:
Space:

Subject: Image
Page Label: 4
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 1:03:46 PM
Status:
Color:
Layer:
Space:

Subject: Callout
Page Label: 4
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 1:11:03 PM
Status:
Color:
Layer:
Space:

It seems erosion protection is required at the bend. See HEC-15 for stability in bends. Provide supporting calculation to determine whether or not this is required.

Additionally see the Drainage Criteria Manual Chapter 10 section 10.5.6 regarding superelevation along the sharp bend. Additional height on the embankment protection may be required.

Include both analysis in the hydraulic report.

Subject: Callout
Page Label: 4
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 1:35:01 PM
Status:
Color:
Layer:
Space:

As discussed during the 9/29/2021 meeting, the County will require riprap protection along the roadway embankment.

See HEC-18 Chapter 6 regarding Contraction Scour

Subject: Cloud+
Page Label: 2
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 10:13:07 AM
Status:
Color:
Layer:
Space:

See ECM Chapter 2 Section 2.6.7 for railing criteria.
- Adjust the guardrail to provide 2' separation from edge of pavement to face of guard rail per ECM 2.6.7.C.7 and note 4 on CDOT Detail M-606-1.
- Provide a minimum of 2 feet of barrier-to-embankment distant (bench) to prevent the posts from coming out of the side slope upon impact per ECM Figure 2-43 and CDOT Detail M-606-1 Note 5.

Update the typical cross section and culvert length accordingly.

Subject: Text Box
Page Label: 5
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 10:27:42 AM
Status:
Color:
Layer:
Space:

Show the 100yr WSEL on the profile.

Subject: Highlight
Page Label: 11
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 10:35:10 AM
Status:
Color:
Layer:
Space:

Subject: Highlight
Page Label: 11
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 10:35:20 AM
Status:
Color:
Layer:
Space:

Subject: Highlight
Page Label: 11
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 10:35:23 AM
Status:
Color:
Layer:
Space:

Subject: Text Box
Page Label: 11
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 10:35:54 AM
Status:
Color:
Layer:
Space:

Add all the applicable CDOT Detail M-606-1 sheets

Subject: Text Box
Page Label: 2
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 10:43:50 AM
Status:
Color:
Layer:
Space:

Note on the plans that the street layout is for reference only and reference the Filing 3 construction plans for the roadway design.

Clarify timing of guardrail installation. Staff is assuming this is being installed with the bridge construction.

Subject: Text Box
Page Label: 1
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 10:56:07 AM
Status:
Color:
Layer:
Space:

Provide Grading and Erosion Control Plan with the culvert construction unless it's detailed in the early GEC request. In which case add a reference on the plans to said GEC.

Subject: Callout
Page Label: 2
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 10:57:42 AM
Status:
Color:
Layer:
Space:

Label the slope

Subject: Text Box
Page Label: 1
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 12:47:28 PM
Status:
Color:
Layer:
Space:

Add Developer's Signature Block

Subject: Cloud
Page Label: 4
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 12:59:05 PM
Status:
Color:
Layer:
Space:

Subject: Callout
Page Label: 3
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 2:27:31 PM
Status:
Color:
Layer:
Space:

Add bar scale. Typical for all plan sheets

Subject: Text Box
Page Label: 5
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 2:28:34 PM
Status:
Color:
Layer:
Space:

Label profile horizontal and vertical scale.

Subject: Text Box
Page Label: 7
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 2:29:09 PM
Status:
Color:
Layer:
Space:

Label vertical scale

Subject: Cloud+
Page Label: 10
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 8:58:13 AM
Status:
Color:
Layer:
Space:

Update to provide bench. See redline comments on sheet 2

Subject: Callout
Page Label: 2
Lock: Unlocked
Author: dsdlaforce
Date: 10/25/2021 9:10:47 AM
Status:
Color:
Layer:
Space:

Update note to "Proposed CDOT Type 3 Guardrail"