Addendum # 2

City of Greeley Colorado

Project Information

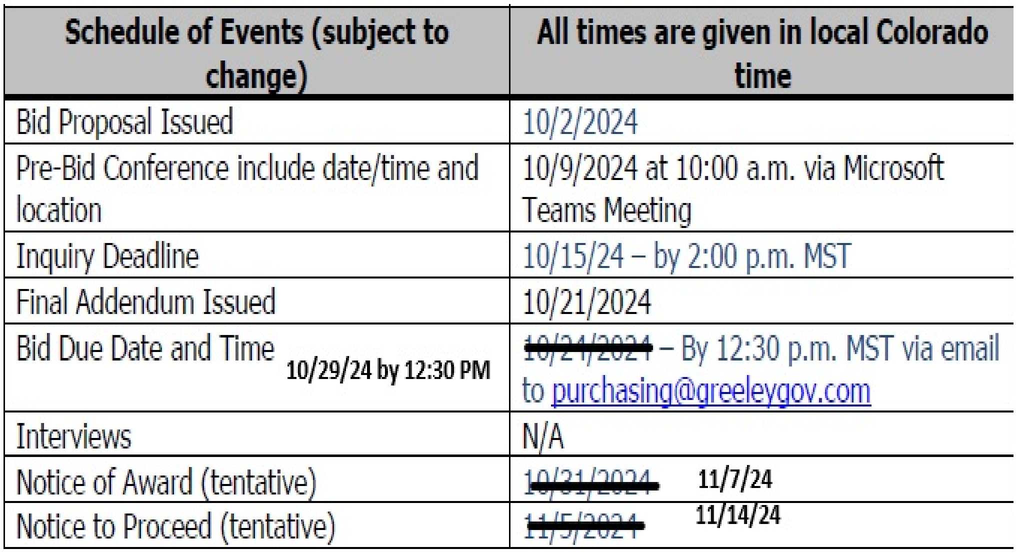
Project Name:	Sheepdraw Trails Connection
Bid Number:	F24-10-084
Date:	October 23, 2024
Project Manager:	Steven Younkin

Addendum Questions

Question #1	No spot(s) on bid sheet for the following info: testing/quality control, tree/stump removal, clearing/grubbing? How would you like these cost capured due to this.
Answer	Testing is incidental to completing the work within applicable bid items. Clearing/Grubbing and Tree/Stump Removal will be incidental to item P.4: Excavation and Grading.
Question #2	Provide details on the concrete reinfocement of the trail.
Answer	Concrete trail shall include fiber reinforcement per the attached, City of Greeley Design Criteria and Construction Specifications Volume I July 2015, Section 03310 2.2.B. (page 3-8) Reference the Plan Set, Sheet 9 (page 9) A1
Question #3	Are drone photos required of the site? Photos are listed in special provision and this is a small job, is this necessary?
Answer	Aerial photos are defined, but not listed as required in the special provisions. Aerial photos will not be required for this project. Other types of photo documentation as indicated in the special provisions will be required.

Item #4

Project Soliciation schedule has been updated:



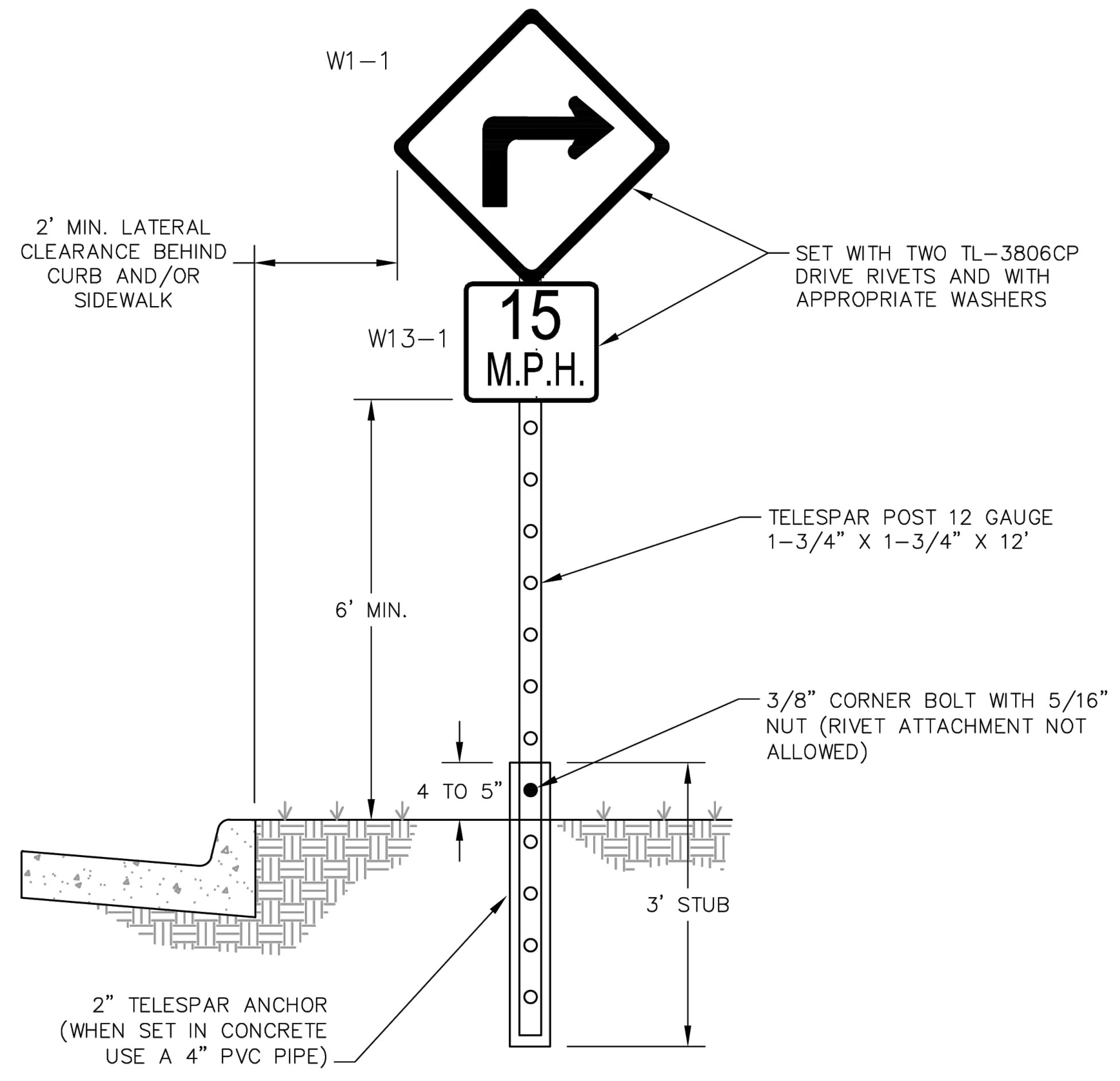
Schedule of Events (subject to change)	All times are given in local Colorado time
Bid Proposal Issued	10/2/2024
Pre-Bid Conference include date/time and location	10/9/2024 at 10:00 a.m. via Microsoft Teams Meeting
Inquiry Deadline	10/15/24 – by 2:00 p.m. MST
Final Addendum Issued	10/21/2024
Bid Due Date and Time **10/29/24 by 12:30 PM**	~~10/24/2024~~ – By 12:30 p.m. MST via email to purchasing@greeleygov.com
Interviews	N/A
Notice of Award (tentative)	~~10/31/2024~~ **11/7/24**
Notice to Proceed (tentative)	~~11/5/2024~~ **11/14/24**

K2-4514
SIZE: 12"x12"

SIGN NOTES:
1. THE MATERIALS USED MUST MAINTAIN THE SPECIFIED COLOR THROUGHOUT THEIR USABLE LIFE.
2. TRAFFIC CONTROL SIGNS SHALL BE INSTALLED IN ACCORDANCE WITH MUTCD MANUAL, LATEST EDITION.

K2-4514 "LOW WATER CROSSING" SIGN DETAIL

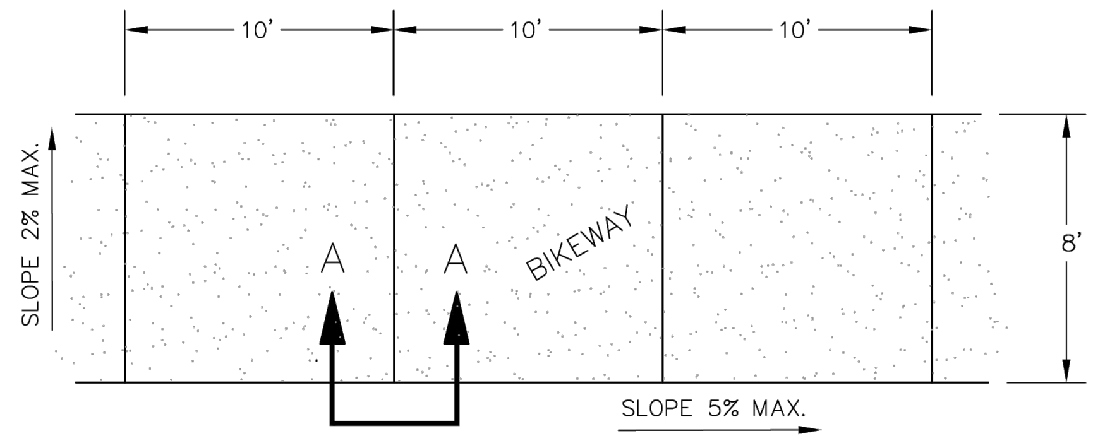
NTS



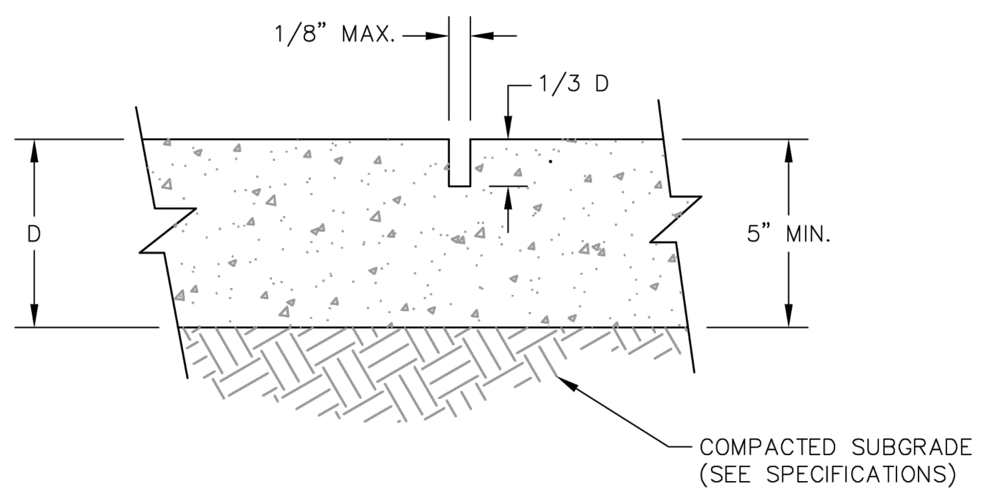
NOTES:
1. SIGN SHOULD BE SET AT AN ANGLE OF 90° AND VISIBLE TO APPROACHING TRAFFIC.
2. ALL SIGNS SHALL MEET THE MOST CURRENT MUTCD STANDARDS.

City of Greeley Colorado

TYPICAL DIAMOND SIGN INSTALLATION
DETAIL NO. S-43
DATE: JULY, 2015 SCALE: N.T.S.



PLAN VIEW

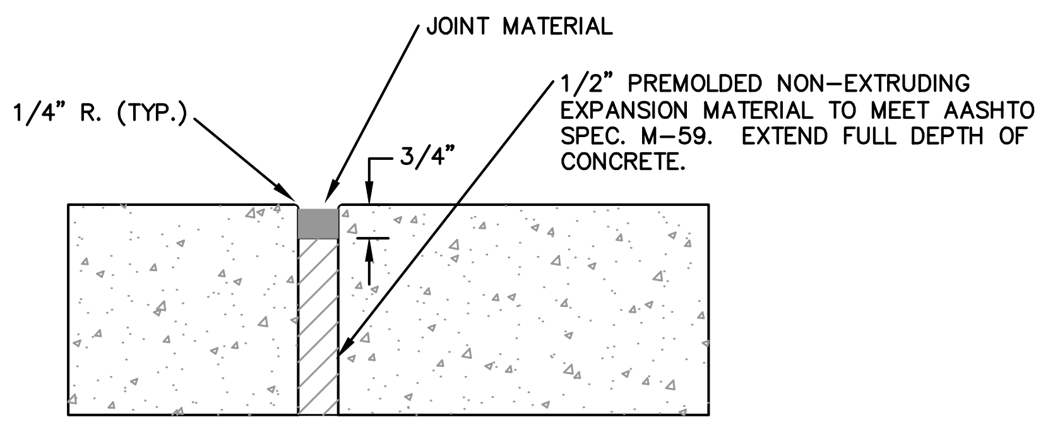


SECTION A-A

NOTES:
1. SAWCUT, REMOVABLE PLASTIC DUMMY JOINT STRIPS OR OTHER APPROVED JOINTS AT 10' O.C.
2. EXPANSION JOINTS REQUIRED AT 200 FOOT SPACING AND ADDITIONAL JOINTS MAY BE REQUIRED AT THE DISCRETION OF THE CITY. SEE JOINT DETAILS.
3. CONCRETE SHALL BE FIBER REINFORCED AS APPROVED BY THE CITY.
4. BIKE PATHS WITH GREATER THAN 5% SLOPE SHALL REQUIRE A SPECIAL DESIGN AND MUST COMPLY WITH ALL ADA REQUIREMENTS.
5. CONCRETE SURFACES TO RECEIVE A LIGHT BROOM FINISH.

City of Greeley Colorado

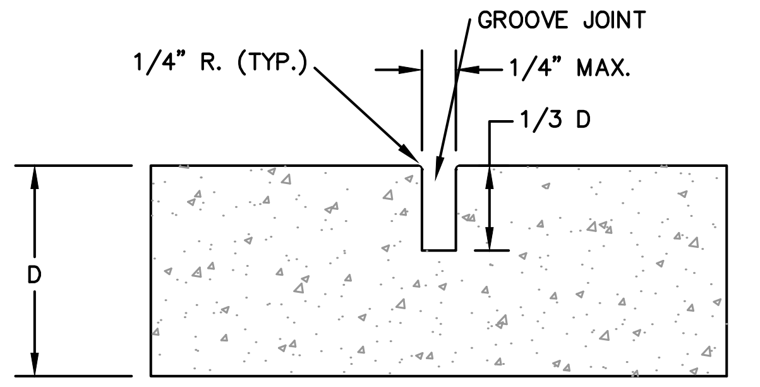
BIKEWAY DETAIL
DETAIL NO. S-29
DATE: JULY, 2015 SCALE: N.T.S.



EXPANSION JOINT

NOTE FOR EXPANSION JOINTS:

EXPANSION JOINTS REQUIRED AT 400 FOOT MAXIMUM SPACING. ADDITIONAL JOINTS MAY BE REQUIRED AT THE DISCRETION OF THE ENGINEER.



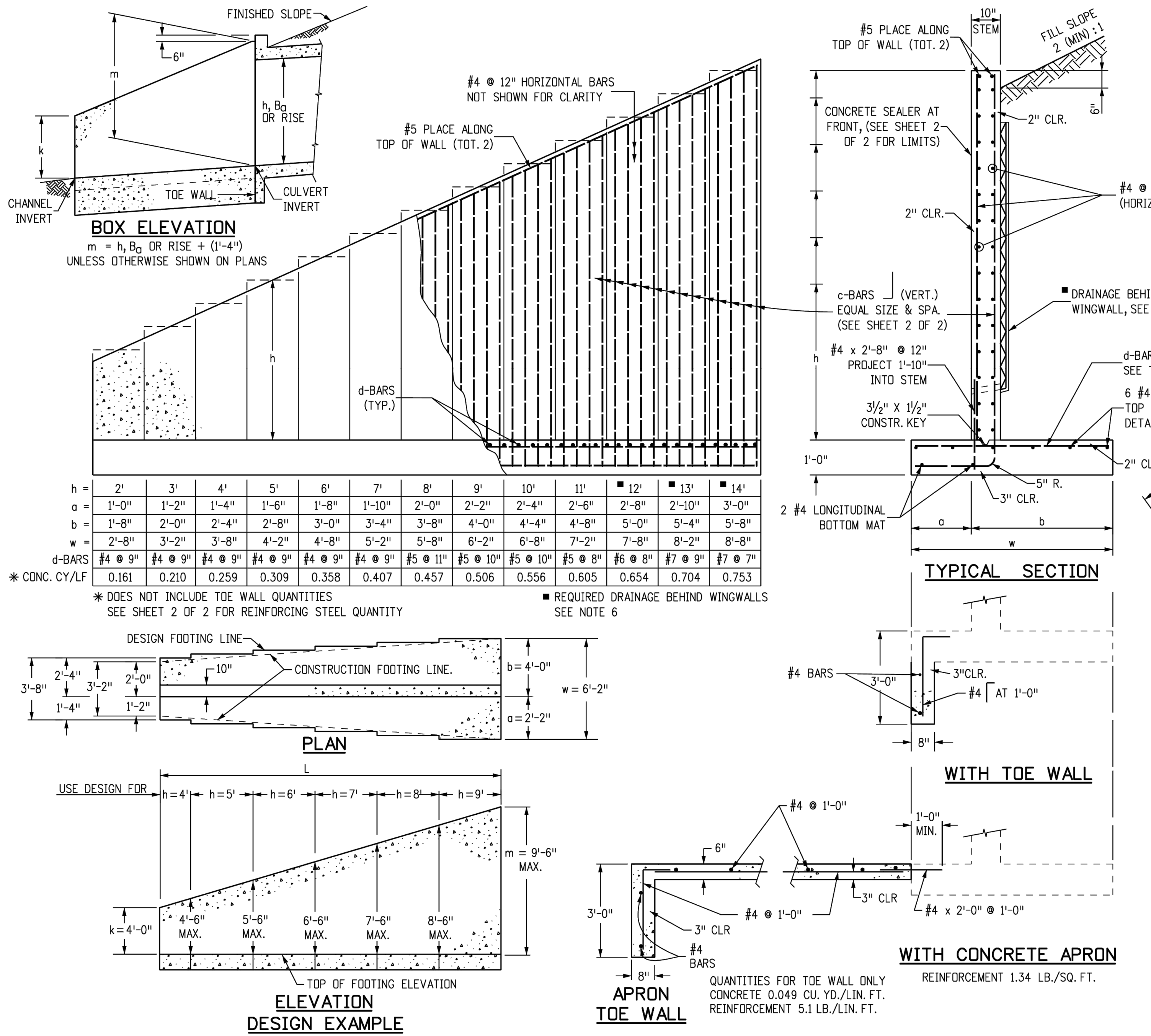
CONTRACTION JOINT

NOTES FOR CONTRACTION JOINTS:
1. FORM WITH TOOL TEMPLATE OR SAWCUT JOINTS.
2. SAWCUT JOINTS, IF USED, SHALL BEGIN AS SOON AS CONCRETE IS HARDENED SUFFICIENTLY TO PERMIT SAWING WITHOUT EXCESSIVE RAVELING AND BEFORE UNCONTROLLED CRACKING OCCURS.
3. MAXIMUM DISTANCE BETWEEN JOINTS IS TEN (10) FEET AND MINIMUM DISTANCE IS FIVE (5) FEET.

City of Greeley Colorado Great. From the Ground Up.

CONCRETE JOINT DETAILS FOR SIDEWALKS, CURBS, GUTTERS AND CROSS PANS
DETAIL NO. S-22
DATE: JULY, 2015 SCALE: N.T.S.

1



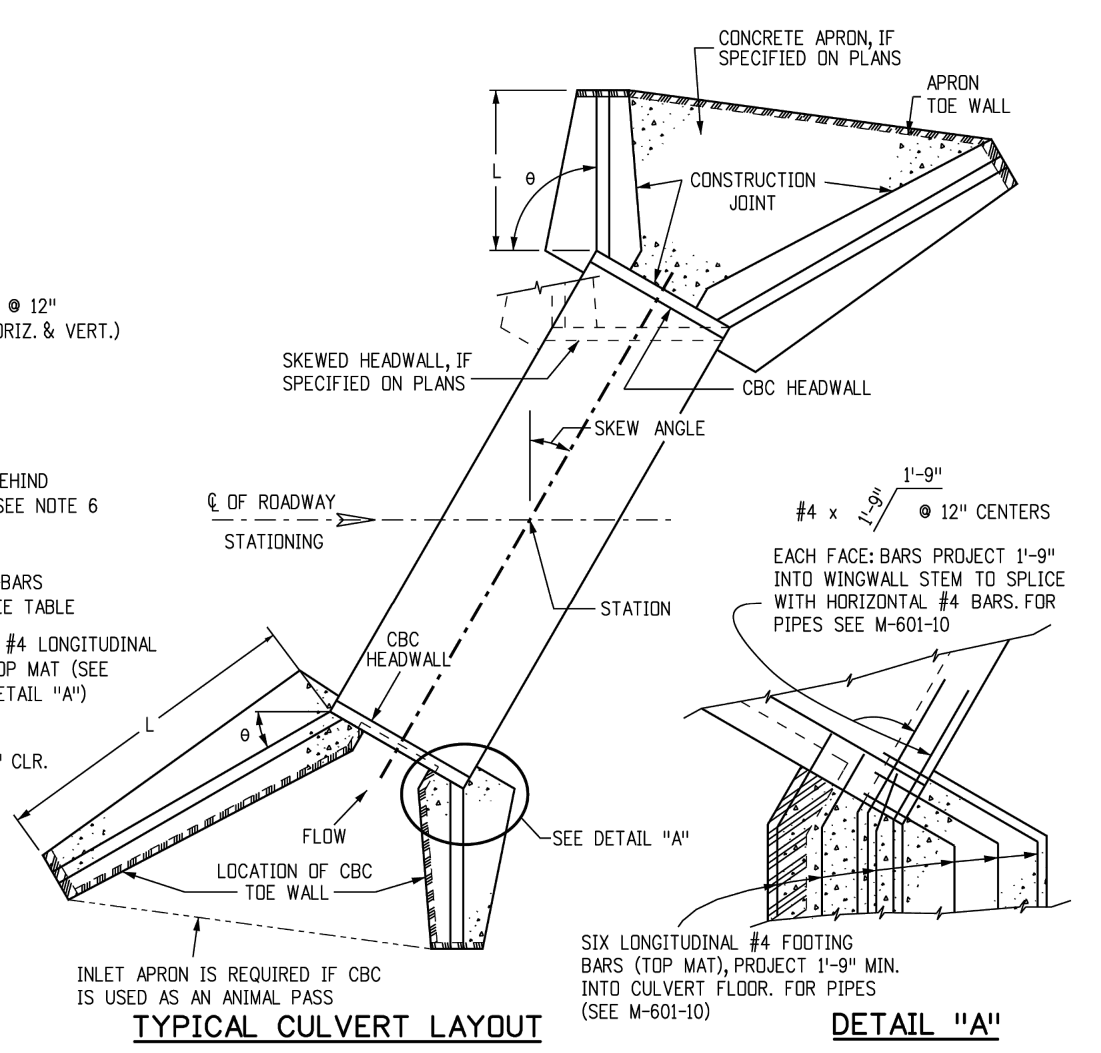
h =	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	■ 12'	■ 13'	■ 14'
a =	1'-0"	1'-2"	1'-4"	1'-6"	1'-8"	1'-10"	2'-0"	2'-2"	2'-4"	2'-6"	2'-8"	2'-10"	3'-0"
b =	1'-8"	2'-0"	2'-4"	2'-8"	3'-0"	3'-4"	3'-8"	4'-0"	4'-4"	4'-8"	5'-0"	5'-4"	5'-8"
w =	2'-8"	3'-2"	3'-8"	4'-2"	4'-8"	5'-2"	5'-8"	6'-2"	6'-8"	7'-2"	7'-8"	8'-2"	8'-8"
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	0.161	0.210	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.



TYPICAL CULVERT LAYOUT

DETAIL "A"

DESIGN DATA:

AASHTO LRFD EIGHTH EDITION, 2017
DESIGN METHOD: LOAD AND RESISTANCE FACTOR DESIGN, YIELD LINE METHOD

REINFORCED CONCRETE:
CONCRETE CLASS D (BOX CULVERT): f'_c = 4,500 PSI
REINFORCING STEEL: f_y = 60,000 PSI

LOADING:
AT-REST EARTH (FLUID) PRESSURE FOR CONCRETE STEM DESIGN = 55 PCF FOR 2 (MIN.) : 1 SLOPED BACKFILL
ACTIVE EARTH (FLUID) PRESSURE FOR CONCRETE FOOTING DESIGN = 40 PCF FOR 2 (MIN.) : 1 SLOPED BACKFILL
LIVE LOAD SURCHARGE = 2'
MINIMUM RESISTANCE FOR SOIL BEARING = 5.5 KSF
SOIL BEARING RESISTANCE FACTOR = 0.45

GENERAL NOTES:

1. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED ¾ IN.
2. WINGWALL FOOTING AND FLOOR OF BOX CULVERT SHALL BE PLACED MONOLITHICALLY.
3. DIMENSIONS "h", "k", "L", "m" AND ANGLE "θ" FOR WINGWALL SHALL BE AS SHOWN ON THE PLANS.
4. MINIMUM CLASS B LAP SPLICE LENGTH FOR BLACK REINFORCING BARS:

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

5. DESIGN DOES NOT CONSIDER ANY SCOUR EFFECTS.
6. WINGWALL DRAIN SHALL BE REQUIRED IF "h" ≥ 12.0 FT., SEE SHEET 2 OF 2 FOR DETAILS.

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 07/31/19	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

Colorado Department of Transportation
2829 West Howard Place
CDOT HQ, 3rd Floor
Denver, CO 80204
Phone: 303-757-9021 FAX: 303-757-9868
Project Development Branch JBK

WINGWALLS FOR PIPE OR BOX CULVERTS
Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
M-601-20
Standard Sheet No. 1 of 2
Project Sheet Number:

---

c-BARS AND REINFORCING STEEL QUANTITY (EXCLUDE TOE WALL)

✱ REINFORCING STEEL QUANTITY INCLUDES STEM AND FOOTING QUANTITIES, BUT DOES NOT INCLUDE TOE WALL QUANTITIES.

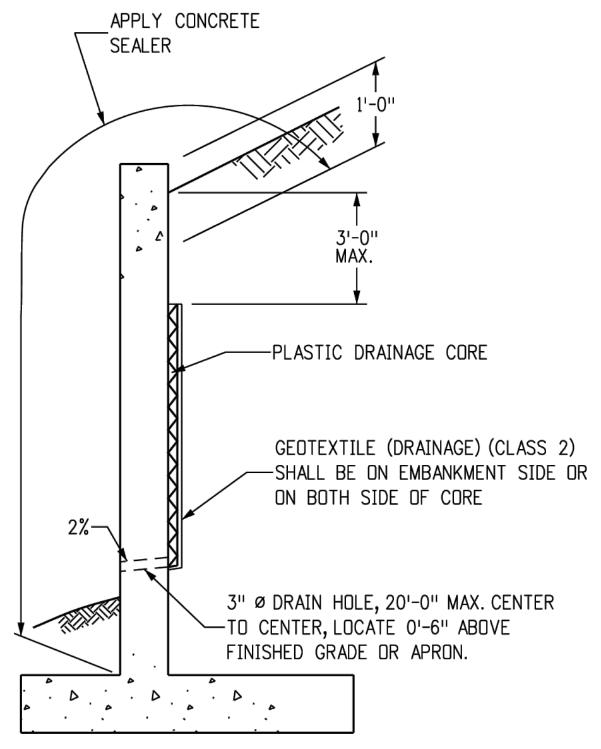
L (MULTIPLE OF m)		≤ (1.0 x m)		≤ (1.25 x m)		≤ (1.5 x m)		≤ (1.75 x m)		≤ (2.0 x m)		≤ (2.25 x m)		≤ (2.5 x m)		≤ (2.75 x m)		≤ (3.0 x m)		≤ (3.25 x m)		≤ (3.5 x m)	
m (FT)	k (FT)	c-BARS	✱ REINF. LB./L.F.	c-BARS	✱ REINF. LB./L.F.	c-BARS	✱ REINF. LB./L.F.	c-BARS	✱ REINF. LB./L.F.	c-BARS	✱ REINF. LB./L.F.	c-BARS	✱ REINF. LB./L.F.	c-BARS	✱ REINF. LB./L.F.	c-BARS	✱ REINF. LB./L.F.	c-BARS	✱ REINF. LB./L.F.	c-BARS	✱ REINF. LB./L.F.	c-BARS	✱ REINF. LB./L.F.
14	4	#4 @ 10"	53.60	#5 @ 10"	57.95	#5 @ 10"	57.10	#5 @ 8"	60.22	#5 @ 7"	62.43	#5 @ 7"	62.09	#5 @ 6"	65.38	#5 @ 6"	65.15	#6 @ 8"	67.10	#6 @ 8"	66.94	#6 @ 7"	70.66
	5	#4 @ 10"	55.86	#5 @ 10"	60.46	#5 @ 10"	59.60	#5 @ 8"	62.89	#5 @ 7"	65.23	#5 @ 7"	64.88	#5 @ 6"	68.34	#5 @ 6"	68.11	#6 @ 8"	70.17	#6 @ 8"	70.00	#6 @ 7"	73.90
	6	#5 @ 10"	64.43	#6 @ 10"	70.60	#6 @ 10"	69.69	#6 @ 8"	74.93	#6 @ 8"	74.45	#6 @ 7"	78.30	#6 @ 6"	83.64	#6 @ 6"	83.40	#6 @ 6"	83.22	#6 @ 6"	83.05	#7 @ 7"	89.64
	7	#5 @ 10"	67.29	#6 @ 10"	73.76	#6 @ 10"	72.83	#6 @ 8"	78.32	#6 @ 8"	77.84	#6 @ 7"	81.87	#6 @ 6"	87.45	#6 @ 6"	87.21	#6 @ 6"	87.02	#6 @ 6"	86.86	#7 @ 7"	93.73
	8	#5 @ 8"	74.71	#6 @ 8"	83.46	#6 @ 7"	87.09	#6 @ 6"	92.54	#7 @ 7"	99.47	#7 @ 7"	99.08	#7 @ 6"	107.11	#7 @ 6"	106.86	#7 @ 6"	106.66	#7 @ 6"	106.49	#7 @ 6"	106.35
	9	#5 @ 8"	78.10	#6 @ 8"	87.23	#6 @ 7"	91.03	#6 @ 6"	96.72	#7 @ 7"	103.93	#7 @ 7"	103.54	#7 @ 6"	111.90	#7 @ 6"	111.65	#7 @ 6"	111.45	#7 @ 6"	111.28	#7 @ 6"	111.13
13	4	#4 @ 10"	50.51	#4 @ 10"	49.25	#5 @ 10"	53.71	#5 @ 10"	53.09	#5 @ 10"	52.36	#5 @ 9"	53.85	#5 @ 8"	55.54	#5 @ 7"	57.85	#5 @ 7"	57.67	#5 @ 7"	57.51	#6 @ 9"	59.93
	5	#4 @ 10"	52.66	#4 @ 10"	51.37	#5 @ 10"	56.09	#5 @ 10"	55.46	#5 @ 10"	54.99	#5 @ 9"	56.29	#5 @ 8"	58.08	#5 @ 7"	60.51	#5 @ 7"	60.33	#5 @ 7"	60.17	#6 @ 9"	62.72
	6	#4 @ 10"	54.92	#5 @ 10"	59.48	#5 @ 9"	60.31	#6 @ 9"	67.56	#6 @ 9"	67.08	#6 @ 9"	66.70	#6 @ 8"	69.53	#6 @ 8"	69.28	#6 @ 7"	73.12	#6 @ 7"	72.95	#6 @ 7"	72.81
	7	#4 @ 10"	57.36	#5 @ 10"	62.16	#5 @ 9"	63.05	#6 @ 9"	70.66	#6 @ 9"	70.16	#6 @ 9"	69.78	#6 @ 8"	72.75	#6 @ 8"	72.50	#6 @ 7"	76.52	#6 @ 7"	76.35	#6 @ 7"	76.20
	8	#5 @ 10"	66.39	#6 @ 10"	72.82	#6 @ 8"	77.97	#6 @ 7"	81.68	#6 @ 7"	81.19	#6 @ 6"	86.67	#6 @ 6"	86.37	#7 @ 7"	93.18	#7 @ 7"	92.97	#7 @ 7"	92.80	#7 @ 7"	92.64
	9	#5 @ 10"	69.37	#6 @ 10"	76.10	#6 @ 8"	81.49	#6 @ 7"	85.37	#6 @ 7"	84.87	#6 @ 6"	90.59	#6 @ 6"	90.29	#7 @ 7"	97.39	#7 @ 7"	97.18	#7 @ 7"	97.00	#7 @ 7"	96.85
12	2	#4 @ 10"	43.91	#4 @ 10"	42.65	#4 @ 10"	41.82	#4 @ 10"	41.22	#4 @ 10"	40.78	#4 @ 9"	41.29	#5 @ 10"	44.61	#5 @ 10"	44.37	#5 @ 10"	44.18	#5 @ 10"	44.01	#5 @ 10"	43.87
	3	#4 @ 10"	45.82	#4 @ 10"	44.55	#4 @ 10"	43.71	#4 @ 10"	43.11	#4 @ 10"	42.66	#4 @ 9"	43.22	#5 @ 10"	46.75	#5 @ 10"	46.51	#5 @ 10"	46.32	#5 @ 10"	46.15	#5 @ 10"	46.01
	4	#4 @ 10"	47.80	#4 @ 10"	46.51	#4 @ 10"	45.65	#5 @ 10"	50.06	#5 @ 10"	49.59	#5 @ 10"	49.23	#5 @ 10"	48.94	#5 @ 10"	48.69	#5 @ 9"	50.00	#5 @ 8"	51.72	#5 @ 8"	51.57
	5	#4 @ 10"	49.84	#4 @ 10"	48.53	#4 @ 10"	47.66	#5 @ 10"	52.33	#5 @ 10"	51.85	#5 @ 10"	51.48	#5 @ 10"	51.19	#5 @ 10"	50.94	#5 @ 9"	52.33	#5 @ 8"	54.14	#5 @ 8"	54.00
	6	#4 @ 10"	51.99	#4 @ 10"	50.65	#5 @ 10"	55.34	#5 @ 8"	58.41	#5 @ 8"	57.93	#6 @ 10"	60.60	#6 @ 10"	60.29	#6 @ 9"	62.42	#6 @ 9"	62.22	#6 @ 9"	62.04	#6 @ 8"	64.89
	7	#4 @ 10"	54.30	#5 @ 10"	58.80	#5 @ 10"	57.87	#5 @ 8"	61.10	#5 @ 8"	60.61	#6 @ 10"	63.43	#6 @ 10"	63.11	#6 @ 9"	65.35	#6 @ 9"	65.15	#6 @ 9"	64.97	#6 @ 8"	67.96
	8	#5 @ 10"	62.91	#5 @ 10"	61.45	#5 @ 7"	67.46	#5 @ 6"	70.68	#5 @ 6"	70.20	#6 @ 7"	76.44	#6 @ 7"	76.13	#6 @ 7"	75.87	#6 @ 6"	81.30	#6 @ 6"	81.12	#6 @ 6"	80.98
	9	#5 @ 10"	65.64	#5 @ 10"	64.15	#5 @ 7"	70.44	#5 @ 6"	73.82	#5 @ 6"	73.33	#6 @ 7"	79.86	#6 @ 7"	79.54	#6 @ 7"	79.28	#6 @ 6"	84.95	#6 @ 6"	84.77	#6 @ 6"	84.62
11	2	#4 @ 10"	41.70	#4 @ 10"	40.42	#4 @ 10"	39.57	#4 @ 10"	38.96	#4 @ 10"	38.50	#4 @ 10"	38.15	#4 @ 10"	37.87	#4 @ 10"	37.63	#4 @ 9"	38.25	#5 @ 10"	41.46	#5 @ 10"	41.31
	3	#4 @ 10"	43.57	#4 @ 10"	42.27	#4 @ 10"	41.40	#4 @ 10"	40.79	#4 @ 10"	40.33	#4 @ 10"	39.97	#4 @ 10"	39.69	#4 @ 10"	39.45	#4 @ 9"	40.12	#5 @ 10"	43.54	#5 @ 10"	43.39
	4	#4 @ 10"	45.48	#4 @ 10"	44.16	#4 @ 10"	43.28	#4 @ 10"	42.66	#4 @ 9"	43.09	#5 @ 10"	46.57	#5 @ 10"	46.27	#5 @ 10"	46.02	#5 @ 10"	45.82	#5 @ 10"	45.65	#5 @ 10"	45.50
	5	#4 @ 10"	47.46	#4 @ 10"	46.10	#4 @ 10"	45.21	#4 @ 10"	44.58	#4 @ 9"	45.06	#5 @ 10"	48.74	#5 @ 10"	48.44	#5 @ 10"	48.19	#5 @ 10"	47.99	#5 @ 10"	47.81	#5 @ 10"	47.67
	6	#4 @ 10"	49.52	#4 @ 10"	48.14	#4 @ 9"	48.23	#5 @ 10"	51.88	#5 @ 10"	51.38	#5 @ 9"	52.57	#5 @ 9"	52.27	#5 @ 8"	53.99	#5 @ 8"	53.79	#5 @ 7"	56.16	#5 @ 7"	56.01
	7	#4 @ 10"	51.73	#4 @ 10"	50.31	#4 @ 9"	50.43	#5 @ 10"	54.29	#5 @ 10"	53.78	#5 @ 9"	55.04	#5 @ 9"	54.73	#5 @ 8"	56.55	#5 @ 8"	56.35	#5 @ 7"	58.84	#5 @ 7"	58.70
	8	#4 @ 10"	54.00	#5 @ 10"	58.44	#5 @ 10"	57.45	#5 @ 8"	60.64	#5 @ 7"	62.92	#5 @ 6"	66.25	#5 @ 6"	65.94	#5 @ 6"	65.69	#6 @ 8"	67.76	#6 @ 8"	67.57	#6 @ 7"	71.45
	9	#4 @ 10"	56.20	#5 @ 10"	60.87	#5 @ 10"	59.85	#5 @ 8"	63.21	#5 @ 7"	65.60	#5 @ 6"	69.09	#5 @ 6"	68.78	#5 @ 6"	68.52	#6 @ 8"	70.69	#6 @ 8"	70.51	#6 @ 7"	74.57
10	2	#4 @ 10"	39.84	#4 @ 10"	38.53	#4 @ 10"	37.65	#4 @ 10"	37.03	#4 @ 10"	36.57	#4 @ 10"	36.20	#4 @ 10"	35.91	#4 @ 10"	35.67	#4 @ 10"	35.48	#4 @ 9"	36.07	#4 @ 9"	35.93
	3	#4 @ 10"	41.68	#4 @ 10"	40.35	#4 @ 10"	39.47	#4 @ 10"	38.84	#4 @ 10"	38.36	#4 @ 10"	38.00	#4 @ 10"	37.71	#4 @ 10"	37.46	#4 @ 10"	37.27	#4 @ 9"	37.91	#4 @ 9"	37.76
	4	#4 @ 10"	43.58	#4 @ 10"	42.22	#4 @ 10"	41.31	#4 @ 10"	40.67	#4 @ 10"	40.19	#4 @ 10"	39.82	#4 @ 10"	39.53	#4 @ 10"	39.28	#4 @ 10"	39.08	#4 @ 9"	39.77	#4 @ 9"	39.63
	5	#4 @ 10"	45.53	#4 @ 10"	44.14	#4 @ 10"	43.21	#4 @ 10"	42.56	#4 @ 10"	42.07	#5 @ 10"	46.44	#5 @ 10"	46.13	#5 @ 10"	45.87	#5 @ 10"	45.67	#5 @ 10"	45.49	#5 @ 10"	45.34
	6	#4 @ 10"	47.58	#4 @ 10"	46.14	#4 @ 10"	45.20	#4 @ 10"	44.53	#4 @ 10"	44.03	#5 @ 10"	48.67	#5 @ 10"	48.35	#5 @ 10"	48.08	#5 @ 10"	47.88	#5 @ 10"	47.69	#5 @ 10"	47.54
	7	#4 @ 10"	49.79	#4 @ 10"	48.31	#4 @ 10"	47.34	#5 @ 10"	51.97	#5 @ 10"	51.45	#5 @ 10"	51.04	#5 @ 9"	52.29	#5 @ 9"	52.03	#5 @ 8"	53.79	#5 @ 8"	53.61	#5 @ 7"	56.00
	8	#4 @ 10"	52.06	#4 @ 10"	50.54	#4 @ 10"	49.54	#5 @ 10"	54.43	#5 @ 10"	53.89	#5 @ 10"	53.47	#5 @ 9"	54.80	#5 @ 9"	54.53	#5 @ 8"	56.39	#5 @ 8"	56.20	#5 @ 7"	58.72
9	2	#4 @ 10"	38.01	#4 @ 10"	36.75	#4 @ 10"	35.85	#4 @ 10"	35.21	#4 @ 10"	34.73	#4 @ 10"	34.36	#4 @ 10"	34.06	#4 @ 10"	33.81	#4 @ 10"	33.61	#4 @ 10"	33.44	#4 @ 10"	33.30
	3	#4 @ 10"	39.93	#4 @ 10"	38.56	#4 @ 10"	37.64	#4 @ 10"	36.99	#4 @ 10"	36.51	#4 @ 10"	36.13	#4 @ 10"	35.83	#4 @ 10"	35.58	#4 @ 10"	35.38	#4 @ 10"	35.21	#4 @ 10"	35.06
	4	#4 @ 10"	41.81	#4 @ 10"	40.40	#4 @ 10"	39.47	#4 @ 10"	38.81	#4 @ 10"	38.31	#4 @ 10"	37.93	#4 @ 10"	37.63	#4 @ 10"	37.37	#4 @ 10"	37.17	#4 @ 10"	36.99	#4 @ 10"	36.84
	5	#4 @ 10"	43.75	#4 @ 10"	42.30	#4 @ 10"	41.35	#4 @ 10"	40.67	#4 @ 10"	40.17	#4 @ 10"	39.78	#4 @ 10"	39.47	#4 @ 10"	39.20	#4 @ 9"	39.86	#5 @ 10"	43.28	#5 @ 10"	43.12
	6	#4 @ 10"	45.79	#4 @ 10"	44.30	#4 @ 10"	43.31	#4 @ 10"	42.62	#4 @ 10"	42.10	#4 @ 10"	41.71	#4 @ 10"	41.39	#4 @ 10"	41.12	#4 @ 9"	41.82	#5 @ 10"	45.46	#5 @ 10"	45.30
	7	#4 @ 10"	48.04	#4 @ 10"	46.50	#4 @ 10"	45.49	#4 @ 10"	44.77	#5 @ 10"	49.29	#5 @ 10"	48.86	#5 @ 10"	48.53	#5 @ 10"	48.24	#5 @ 10"	48.03	#5 @ 10"	47.84	#5 @ 10"	47.67
	8	#4 @ 10"	50.43	#4 @ 10"	48.84	#4 @ 10"	47.80	#4 @ 10"	47.06	#5 @ 10"	51.83	#5 @ 10"	51.40	#5 @ 10"	51.05	#5 @ 10"	50.77	#5 @ 10"	50.54	#5 @ 10"	50.35	#5 @ 10"	50.18
8	2	#4 @ 10"	36.41	#4 @ 10"	35.01	#4 @ 10"	34.08	#4 @ 10"	33.42	#4 @ 10"	32.92	#4 @ 10"	32.54	#4 @ 10"	32.23	#4 @ 10"	31.97	#4 @ 10"	31.77	#4 @ 10"	31.59	#4 @ 10"	31.44
	3	#4 @ 10"	38.23	#4 @ 10"	36.80	#4 @ 10"	35.85	#4 @ 10"	35.18	#4 @ 10"	34.67	#4 @ 10"	34.28	#4 @ 10"	33.97	#4 @ 10"	33.70	#4 @ 10"	33.50	#4 @ 10"	33.32	#4 @ 10"	33.17
	4	#4 @ 10"	40.09	#4 @ 10"	38.61	#4 @ 10"	37.64	#4 @ 10"	36.95	#4 @ 10"	36.44	#4 @ 10"	36.04	#4 @ 10"	35.72	#4 @ 10"	33.45	#4 @ 10"	35.25	#4 @ 10"	35.07	#4 @ 10"	34.91
	5	#4 @ 10"	41.99	#4 @ 10"	40.47	#4 @ 10"	39.47	#4 @ 10"	38.76	#4 @ 10"	38.24	#4 @ 10"	37.83	#4 @ 10"	37.50	#4 @ 10"	37.23	#4 @ 10"	37.02	#4 @ 10"	36.84	#4 @ 10"	36.68
	6	#4 @ 10"	43.97	#4 @ 10"	42.40	#4 @ 10"	41.36	#4 @ 10"	40.64	#4 @ 10"	40.10	#4 @ 10"	39.68	#4 @ 10"	39.35	#4 @ 10"	39.07	#4 @ 9"	43.33	#5 @ 10"	43.13	#5 @ 10"	42.96
	7	#4 @ 10"	46.19	#4 @ 10"	44.56	#4 @ 10"	43.49	#4 @ 10"	42.74	#4 @ 10"	42.18	#4 @ 10"	41.75	#4 @ 10"	41.41	#4 @ 10"	41.13	#4 @ 9"	45.65	#5 @ 10"	45.45	#5 @ 10"	45.28
7	2	#4 @ 10"	34.90	#4 @ 10"	33.44	#4 @ 10"	32.47	#4 @ 10"	31.78	#4 @ 10"	31.27	#4 @ 10"	30.86	#4 @ 10"	30.54	#4 @ 10"	30.27	#4 @ 10"	30.06	#4 @ 10"	29.88	#4 @ 10"	29.72
	3	#4 @ 10"	36.73	#4 @ 10"	35.23	#4 @ 10"	34.23	#4 @ 10"	33.53	#4 @ 10"	33.00	#4 @ 10"	32.59	#4 @ 10"	32.26	#4 @ 10"	31.99	#4 @ 10"	31.78	#4 @ 10"	31.59	#4 @ 10"	31.43
	4	#4 @ 10"	38.59	#4 @ 10"	37.04	#4 @ 10"	36.01	#4 @ 10"	35.29	#4 @ 10"	34.75	#4 @ 10"	34.33	#4 @ 10"	33.99	#4 @ 10"	33.71	#4 @ 10"	33.50	#4 @ 10"	33.31	#4 @ 10"	33.14
	5	#4 @ 10"	40.48	#4 @ 10"	38.86	#4 @ 10"	37.80	#4 @ 10"	37.06	#4 @ 10"	36.50	#4 @ 10"	36.07	#4 @ 10"	35.73	#4 @ 10"	35.44	#4 @ 10"	35.22	#4 @ 10"	35.03	#4 @ 10"	34.86
	6	#4 @ 10"	42.39	#4 @ 10"	40.71	#4 @ 10"	39.61	#4 @ 10"	38.84	#4 @ 10"	38.26	#4 @ 10"	37.82	#4 @ 10"	37.47	#4 @ 10"	37.17	#4 @ 10"	36.95	#4 @ 10"	36.75	#4 @ 10"	36.58

EXAMPLE:

SELECT THE c-BARS SIZE, SPACING AND STEEL QUANTITY FOR A 25.0 FEET LONG WINGWALL WITH m = 11.8 FT. AND k = 6.3 FT.

SOLUTION:

1. DETERMINE WINGWALL LENGTH IN MULTIPLE OF m:
   L / m = 25.0 / 11.8 = 2.12
   L = (2.12 x m), USE L ≤ (2.25 x m)
2. ROUND TO REAREST WHOLE NUMBER FOR m AND k:
   m = 11.8 FT., USE m = 12.0 FT.
   k = 6.3 FT., USE k = 6.0 FT.
3. DETERMINE c-BARS BY USING THE TABLE:
   L ≤ (2.25 x m)
   m = 12
   k = 6
   c-BARS: #6 @ 10"
   REINF. STEEL = 60.60 LB / LF
4. DETERMINE REINFORCING STEEL QUANTITY OF WHOLE WINGWALL:
   REINFORCING STEEL QUANTITY = 25.0 x 60.60 = 1,515 LB.



LIMITS OF CONCRETE SEALER AND WINGWALL DRAIN DETAILS

NOTES:
1. THE GEOCOMPOSITE SHALL BE SECURED TO THE WALL TO PREVENT MOVEMENT DURING BACKFILLING.
2. COST OF GEOCOMPOSITE DRAIN AND CONCRETE SEALER SHALL BE INCLUDED IN THE WORK.

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 07/31/19	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

Colorado Department of Transportation
2829 West Howard Place
CDOT HQ, 3rd Floor
Denver, CO 80204
Phone: 303-757-9021 FAX: 303-757-9868
Project Development Branch JBK

WINGWALLS FOR PIPE OR BOX CULVERTS
Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
M-601-20
Standard Sheet No. 2 of 2
Project Sheet Number:

NO.	REVISION	DATE
1	ADDENDUM NO.2	10/23/2024

DESIGN BY: SHOROWITZ
DRAWN BY: AJIGGETTS
CHECKED BY: DRAJAT
SCALE: NONE
JOB NUMBER: 581055

TRC
TRC ENVIRONMENTAL CORP.
1526 COLE BLVD, BLDG. 3, SUITE 150
LAKEWOOD, CO 80401
303-792-5555

SCOTT HOROWITZ
64207
EXP 10/31/2025
10/23/24

CITY OF GREELEY
GREELEY, COLORADO
SHEEP DRAW TRAIL CONNECTION PROJECT
DETAILS

City of Greeley Colorado

SHEET
9 OF 9

OCTOBER 2024

SECTION 03310

CURBS, GUTTERS, SIDEWALKS, VALLEY GUTTERS, BIKEWAYS, DRIVEWAY AND ALLEY APPROACHES

PART 1 – GENERAL

1.1 DESCRIPTION

Curbs, gutters, sidewalks, valley gutters, bikeways, driveway and alley approaches constructed within the Urban Growth Area of the City of Greeley shall be concrete unless approved otherwise by the Engineer.

PART 2 – MATERIALS

2.1 REFERENCES

Materials and construction methods shall meet the requirements of the CDOT Standard Specifications except as noted herein.

Concrete shall meet or exceed the requirements of the latest edition of MGPEC Item 11 – PCCP.

2.2 MIX DESIGN

A. All concrete shall be ready mixed concrete. Concrete mix designs consist of selecting the aggregates appropriate for the concrete application, and performing a mix design to determine the properties of the proposed mix. The proposed mix shall be tested in accordance with ACI code requirements. The Contractor must submit one (1) mix design per each concrete type intended for use within the public rights-of-way at the start of each calendar year. **No concrete shall be placed prior to the submittal of such mix designs.**

B. Concrete for bikeways shall be fiber reinforced. The fibers shall be as per manufacturer's specifications and as approved by the Engineer.

2.3 ADDITIVES

A. Admixtures shall meet the requirements of MGPEC Item 11 – PCCP. Exception: Calcium chloride or admixtures containing chloride shall not be allowed in reinforced concrete and is strictly prohibited in the production of high early strength concrete.

B. Additives for concrete, other than those specified in the mix design, shall not be used without prior written approval of the Engineer. When approved for use, chemical admixtures or additives shall comply with applicable ASTM or AASHTO standards. Application of admixtures shall be as per manufacturer's specifications.

C. Coloring for colored concrete shall be accomplished by the addition of an approved commercially pure or synthetic mineral pigment as specified in the contract documents.

PART 3 – EXECUTION

3.1 BATCHING

Batching of concrete shall conform to CDOT Standard Specifications, Section 601.06.

3.2 MIXING

A. Mixing of concrete shall conform to CDOT Standard Specifications, Section 601.07.

B. The Contractor shall submit to the City the ready mix delivery ticket for each load upon request by the City indicating the following:

1. Supplier's name and date.
2. Truck number.
3. Project number and location.
4. Concrete class designation.
5. Cubic yards batched.
6. Mix design identification.
7. Type, brand, and amount of cement.
8. Brand and amount of all admixtures.
9. Weights of fine and coarse aggregates.
10. Moisture content of fine and coarse aggregates.
11. Gallons of batch water.
12. Time at which water was added.
13. Elapsed time between when water was added and concrete load was in place.
14. Amounts of initial water and the maximum number of gallons of supplemental water allowed to be added for each truck at the job site.
15. Name of individual authorizing supplemental water.
16. Numerical sequence of delivery by indicating cumulative yardage delivered on each ticket.
17. Provide the following titles with blank space to record discharge time, water-cement ratio, air content, slump, and revolutions.

3.3 LIMITATIONS OF PLACING CONCRETE

Refer to MGPEC, Item 11 – PCCP.

3.4 PREPARATION OF SUBGRADE

A. *Subgrade preparation* – Subgrade preparation shall be completed in accordance with Section 02225, Subsection 3.1 of these specifications entitled "Preparation of Subgrade".

B. No pea gravel, sand, or other material with less than ten (10%) percent passing the #100 sieve will be allowed as bedding beneath any concrete within the City right-of-way.

C. If in the opinion of the City, the foundation soil is of such character that it will swell or shrink with changes in its moisture content to such an extent that the concrete may be damaged; the soil shall be excavated as directed by the City refilled and compacted with material which meets the requirements of these specifications.

D. The subgrade and/or sub-base shall be brought to a firm and unyielding condition with a uniform density. All soft and yielding material and other portions of the subgrade that will not compact readily when rolled or tamped shall be removed and replaced with suitable material. Concrete shall not be placed on a soft, spongy, frozen, or otherwise unsuitable subgrade. Before placing any concrete, the subgrade shall be tested for conformity with the cross-section shown on the plans, using an approved template, or other approved method. The finished subgrade shall be kept smooth, damp, and compacted prior to placing concrete.

E. *Construction Sequence* – All curb, gutter, valley gutters, and sidewalk (where attached) shall be constructed after installation of sanitary sewer and storm sewer mains, laterals, and service lines have been installed and properly compacted in accordance with these specifications. Water mains and service lines which cross curb, gutter, attached walks, and driveways shall also be installed and properly compacted prior to installation of said curb, gutter, attached walks, and driveway approaches. Tunneling under curb, gutter, and walks will not be allowed. Water valve boxes and manholes should be adjusted to final grade after installation of curb and gutter and pavement. Electrical services should be installed after water services, but prior to installation of curb radii except where previous arrangements for use of conduit have been made and approved by the electric company.

F. Prior to constructing the infrastructure, the area in the right-of-way should be brought to ±6" of finished subgrade.

3.5 CONSTRUCTION OF CURBS, GUTTERS, SIDEWALKS, VALLEY GUTTERS, BIKEWAYS, DRIVEWAY AND ALLEY APPROACHES

A. Construction requirements for concrete curbs, sidewalks, and bikeways shall conform to MGPEC Item 11 - PCCP except as modified by these specifications.

B. Where a section of concrete sidewalk, curb and gutter, valley gutter, bikeways, driveway, or alley approach has been disturbed, it shall be removed to a joint, if the joint is situated within five feet of the proposed or existing cut, otherwise a full depth straight line shall be saw cut prior to replacement.

Where new construction abuts existing, the work shall be accomplished so that the variance in grade between the old and new work does not exceed one quarter (1/4") inch.

3.6 PLACING CONCRETE

A. *Alignment and Grades* – The alignment and grade elevations of the forms shall be checked by the Contractor immediately ahead of concrete placement and necessary corrections will be made. Any forms that have been disturbed or subgrade that has become unsuitable shall be corrected, forms reset, and rechecked. Any variations in grade and alignment shall be subject to approval by the City prior to placing the concrete. Forms shall be oiled prior to placement of concrete. The subgrade shall be moist but not wet prior to placing concrete. After the City has approved the forms and subgrade, the concrete shall be deposited on the subgrade to the required depth and width in successive batches and in a continuous operation. The concrete shall be placed as uniformly as possible to minimize the amount of spreading necessary. While being placed, the concrete shall be consolidated or vibrated with suitable tools to prevent the formation of voids or honeycomb.

All curves with radii less than two-hundred (200) feet shall be constructed with flexible forms.

Curb ramps shall not have a lip between the flowline of the gutter and the ramp approach.

The flowline of all new valley gutters shall be a straight-line grade between the gutters at each end of the new valley gutter. The Contractor is required to set finishing screed points at minimum intervals of ten (10') feet along the flowline to control the finished elevation. The screed points shall be removed or driven through the plastic concrete into the subgrade after the concrete has been finished to the required elevation. The use of timber screed points is expressly prohibited.

No low spots, which cause water to pond, will be acceptable.

Sidewalk, curb and gutter, valley gutters, bikeways, driveways, and alley approaches shall be formed and placed true to line, grade, and cross section. The finished surface must be straight and true to within one-quarter (1/4") inch along any ten-foot length of the new concrete in the vertical or horizontal plane. Forms for sidewalks (attached or detached) shall be so set that the sidewalk shall have a slope toward the street of 1:50 or 2 percent. Bikeways shall have a side slope of 1:50 or 2 percent.

The maximum extended running slope of sidewalks (attached or detached) and bikeways shall not exceed 1:20 or 5 percent.

B. *Construction Stakes* – The Contractor/Owner shall provide all construction stakes required for curbs, gutters, walks, and structures and will furnish all necessary information relating to lines and grades.

The Contractor shall be held responsible for the reasonable preservation of all such stakes. The Contractor shall not remove stakes until three working days after placement of the concrete unless approved by the City.

C. Concrete shall be thoroughly vibrated or properly consolidated. Care shall be taken in vibrating concrete to bring only a continuous film of mortar to the surface. Vibration shall stop before any segregation of the concrete occurs.

Any evidence of lack of consolidation or over-consolidation shall be regarded as sufficient reason for requiring the removal of the section involved and its replacement with new concrete at the Contractor's expense.

3.7 TEST REQUIREMENTS

A. The Contractor shall provide quality control testing (see Table in Appendix). Copies of quality control test results shall be kept in a notebook which is kept onsite at all times by the contractor. Formal test results shall be sent to the City on a weekly basis.

The City of Greeley will provide acceptance testing associated with placing of concrete, base course subgrade preparation, and trench compaction. The Contractor shall coordinate with the City as to when he or she is ready for acceptance tests.

The Contractor/Owner shall furnish the concrete necessary for acceptance testing. The Contractor/Owner shall be responsible for the costs associated with re-testing due to failed acceptance tests.

B. Concrete acceptance testing to be completed by the City will follow recognized ASTM, AASHTO or ACI procedures.

Concrete that does not meet the acceptance criteria shall be removed and replaced.

3.8 FINISHING CONCRETE

A. *Finishing* – After the concrete has been placed and consolidated in the forms, it shall be finished. A wood float shall be used to bring the surface of the concrete to its final form; excessive working of the surface will not be permitted. The Contractor is cautioned against the use of a steel trowel for floating the finished concrete. This practice can excessively seal and trap moisture beneath the surface. Premature surface spalling may occur. Repair of such spalling will be the responsibility of the Contractor/Owner.

The final texture of all exposed surfaces shall be obtained by light brooming. For sidewalks, bikeways, and driveway, broom the surface in the direction perpendicular to the main traffic flow. For all concrete surfaces that are designed to carry storm water; such as, curbs and gutters, valley gutters, and crosspans, broom the surface in the direction of flow.

After completion of brooming and before the concrete has taken its initial set, all edges in contact with the forms shall be tooled with an edger having a one-quarter (1/4") inch radius. No dusting or topping of the surface or sprinkling with water to facilitate finishing will be permitted.

B. *Remove Forms* – Face forms for concrete curb may be removed for finishing curb face and fillets as soon as the concrete will retain its shape. Do not remove the back forms for concrete curbs until the concrete has been in place for at least six (6) hours.

3.9 JOINTS

A. *Transverse Joints* – See Standard Detail S-22. Transverse joints (contraction joints) shall be located at intervals of ten (10') feet in curbs, gutters, and crosspans. When combination curb, gutter, and walk are used, the joint shall be continuous through all three elements. Joint depth shall be a minimum of one-third (1/3) the thickness of the concrete. Joint width shall be a maximum of one-quarter (1/4") inch wide except at expansion joints. For tooled joints, the edges adjacent to joint shall be rounded with an edger of one-quarter (1/4") inch radius.

Joints for Bikeways shall be removable plastic dummy joint strips or saw-cut at ten (10') feet intervals, tooled joints shall not be allowed on any bikeway except at expansion joints. See Standard Detail S-29.

Saw cutting of joints shall be performed as soon as the concrete surface is hard enough to allow the sawing operation without otherwise marring the concrete surface, prior to any development of shrinkage cracks. Saw-cutting shall proceed around the clock if necessary to meet these requirements.

B. *Expansion Joints* – Expansion joints shall be required as shown on Standard Detail S-22.

Expansion joints, where required, shall be filled with one-half (1/2") inch thick full depth, preformed expansion joint material as per CDOT Standard Specifications, Subsection 705.01. Expansion joint material must be set vertical and with the top edge 3/4-inch below the finished surface. The joint shall be edged with a one-quarter (1/4") inch radius edging tool.

3.10 CURING

A. Curing of the concrete shall meet the requirements of MGPEC, Item 11 –PCCP.

Concrete shall be cured by protecting it against loss of moisture, rapid temperature change, freezing, rain or hail, flowing water, and mechanical injury. The edge of concrete exposed by the removal of forms shall be protected immediately to provide these surfaces with continuous curing treatment. The coating shall be protected against marring for a period of at least five (5) days after application. Any coating marred, or otherwise disturbed, shall be given an additional coating.

It shall be the Contractor's responsibility to protect the concrete being cured from the elements, traffic, and vandalism.

The Contractor shall have the equipment needed for adequate curing available before commencing concrete placement. Inadequate protection by the Contractor shall be cause for suspension of concreting operations and damaged concrete shall be removed and replaced at the Contractor/Owner's expense.

3.11 DRIVEWAY INSTALLATIONS

See Standard Details S-26 and S-27. All driveways constructed of concrete within public right-of-way shall conform to the requirements of these specifications. When constructed of concrete, the thickness shall not be less than six (6") inches. Driveways abutting a curb, gutter, and sidewalk combination or drive-over curb and gutter or driveway gutter pan or any cross gutter shall have a strip of non-extruding expansion joint material one-half (1/2") inch thick, conforming to the cross-sections of the driveway, placed between the driveway and the sidewalk or curb or cross gutter so as to provide for the expansion of the concrete driveway. See Standard Detail S-22.

3.12 ALLOWABLE CURB CUTS

See Standard Detail S-24. Curb cuts will be allowed only with authorization from the City. The City may permit valley gutter or any other types of curb cuts which best serve the property owner.

3.13 PROTECTION/DEFACED/DAMAGED OR DEFECTIVE CONCRETE

The Contractor shall be responsible for taking adequate steps to protect concrete placed during precipitous, hot, or cold weather. Limitations on the placing and protecting of concrete shall conform to MGPEC Item 11 - PCCP Any concrete damaged by precipitation or extreme temperatures or otherwise defective shall be removed and replaced at the Contractor/Owner's expense.

A. *Cold Weather Concreting* – Cold weather concreting requirements shall start when the ambient temperature is less than 40 degrees F. Concrete shall not be placed when the ambient temperature falls below 35 degrees F.

When the ambient temperature drops to or is below 35 degrees F, the contractor shall maintain the concrete surface temperature above 50 degrees F until the concrete reaches a field compressive strength of 4000 psi. It shall be the Contractor’s responsibility to determine for himself the necessity of undertaking protective measures and the type of protective measures to be used. Once the concrete reaches a field comprehensive strength of 4000 psi, the cold weather protection can be discontinued.

B. *Potential Frost Damage* – The following procedures shall be followed if the temperature of the surface of the concrete falls below 32 degrees F before the concrete reaches the required compressive field strength of 4000 psi.

1. The Contractor will take cores at locations designated by the City.
2. The City will take immediate possession of the cores and submit the cores to a petrographer for examination in accordance with ASTM C 856.
3. All costs associated with coring, transmittal of cores, petrographic examination, and reports shall be borne by the Contractor regardless of the outcome of the petrographic examination.
4. Concrete damaged by the frost as determined by the petrographic examination shall be removed and replaced at the Contractor’s expense.

3.14 BACKFILLING

Once the concrete has gained sufficient strength to not be damaged, the space adjoining the concrete shall be backfilled with suitable material, properly compacted, and brought flush with the surface of the concrete and adjoining ground surface. In embankments, the backfill shall be level with the top of the concrete and the maximum slope shall be 4:1. Where detached walks occur, the space between the curb and walk shall be backfilled on a straight line from the top of walk to the top of curb not to exceed 4:1 slope.

3.15 OPENING TO TRAFFIC

Walks and bikeways shall not be opened to pedestrian or bicycle traffic for at least twenty-four (24) hours after placement; driveways, curb, gutter, and valley gutters shall not be opened to vehicular traffic for at least seven (7) days after placement or until field-cured test cylinder breaks show an average compressive strength of 80% of the 28th day mix design strength psi. Exception will be made where high-early quick strength cement is used. In cases where high-early strength cements are used, the Contractor shall request a variance from the Engineer for opening to traffic sooner. The Contractor shall maintain suitable barricades to comply with the foregoing requirements. (See Traffic Control, Construction & Road Maintenance Activity Schedule for authorized work activity within project limits.)