1.0 General Requirements

Because the County will maintain the traffic control devices on public rights-of-way, all traffic control devices shall be fabricated and installed in accordance with Douglas County Standards (See Appendix A, Signage and Striping Notes, Note A). The Douglas County Signage and Striping Notes shall be included in all sets of construction plans.

The "Engineer" refers to the Douglas County Engineer and/or authorized agent or representative.

Permanent signage and striping shall be completely in place before any new roadway is opened to the public. These standards are to be used in conjunction with other applicable Douglas County Standards.

Signage installed onto traffic signal equipment shall conform to the Colorado Department of Transportation standards and specifications and the Douglas County Signal Specifications.

All traffic control devices shall conform to the most recent version of the federal Manual on Uniform Traffic Control Devices (MUTCD), the "Colorado Supplemental MUTCD", the Douglas County "Roadway Design and Construction Standards Manual" and the "Douglas County Signage and Striping Supplement". Further specifications and illustrations are located in the Colorado Department of Transportation (CDOT) "M and S Standards".

A field inspection of location and installation of all signs & markings shall be performed by Douglas County. All discrepancies identified during the field inspection must be corrected before the two-year warranty period will begin.

2.0 Signage Criteria

2.1 Sign Material

2.1.1 Sign Blanks

Aluminum blanks shall be 0.080 gauge. (See Drawing Number SS-2)

2.1.2

Diamond grade material shall be used on all stop signs and overhead signs. All other roadside traffic control devices shall be high intensity prismatic retroreflective.

2.1.3

Where stop sign control is appropriate, 36" stop signs shall be used for approaches to any roadway that is classified as a collector or greater.

2.1.4 Street Name Signs

2.1.4.1

Street names are to be obtained from the Douglas County Community Development Department for all intersections. Urban Arterials shall have block numbers. To obtain block numbers, contact Douglas County Addressing Department.

2.1.4.2

A 7-foot minimum height shall be maintained from bottom of sign panel to the top grade of sidewalk (at top grade of pavement edge where no sidewalk exists). (SS-1)

2.1.4.3
Refer to Street Name Sign Drawings SS-2 and SS-3 for street name assembly requirements and sizes. When street name assembly is combined with regulatory sign(s), regulatory sign placement shall govern. Signfix support brackets may be used when requested by Douglas County Traffic Engineering.

2.1.4.4
All public road street name signs shall include the Douglas County logo (except for allowances listed below in Section 2.40). When arrows are used/required, DC Logo will be omitted. All public road street name signs shall have Douglas county logo on left side of sign.

2.1.4.5
All ground mount street name signs shall be high intensity prismatic material. All overhead mounted street name signs shall be Diamond Grade-Long Distance Performance (LDP) material or equivalent. For additional information on overhead mounted street name signs, refer to the Douglas County Traffic Signal Standards and Specifications.

2.1.4.6
Street name sign coloring shall be white legend on green background, unless approved otherwise.

2.1.4.7
Special care shall be taken in sign location to ensure an unobstructed view of each sign.

2.1.4.8
All removed signs shall be returned to Douglas County Traffic Service, call 303-663-6237 for drop off location.

2.1.4.9
CIP and/or Special project for roadway improvements shall require all existing traffic signs to be replaced with new traffic signs. All signs shall be returned to Douglas County Traffic Service.

2.2 Posts and Anchor Posts

2.2.1
All ground mounted signs shall be mounted on standard 12-gauge, two inch by two-inch (2"x2") galvanized square steel tube posts, all four sides punched with 3/8" holes at one-inch (1") centers. Posts must be of appropriate length to pass the MUTCD specifications for the location, and must meet the Federal breakaway standards. Anchor posts are to be two and one-quarter inch by two and one-quarter inch by three feet (2 ¼" x 2 ¼" x 3') square tubing with all four sides punched with 3/8" holes at one-inch (1") centers, driven down to 4" above grade. Longer anchor posts may be required by the Engineer because of soil composition and compaction.

2.2.2
For all signs installed with raised median islands and roundabouts mounted in concrete the "KLEEN BREAK MODEL 425" anchors also need to be installed (per Xccessories Squared Development and Manufacturing Inc. Drawing #XKB425-20-CI "Square Post Sign Support Installation Instructions") at time of island construction for all known future signs.

2.2.3
Xcessories Squared 1.25" Aluminum Sign Brace Non-Perforated (or equivalent) shall be used on all signs that are >= 1,152 sq. in (or as directed by Douglas County Engineering). Install per manufacturers recommendations/specifications.

2.3 Criteria on Special Allowances for Street Name Sign Variances

2.3.1
Plans for any variances must be submitted to and reviewed by the Douglas County Department of Public Works. Engineering Specific variances from County standards must be listed in the special footnote box on the first page of the plans.

2.3.2
Only Metro Districts may apply for variances. The Metro District must submit a draft agreement to be reviewed by the Engineering Division and the County Attorney.

2.3.3
The agreement is to be addressed to the Department of Public Works Engineer. It must specify that it is the requesting Metro District's responsibility for maintenance and supply in perpetuity of their specific signs and materials. It must stipulate that the District shall respond within 24 hours after notification by the Douglas County Traffic Services Division that maintenance or repair is required.

2.3.4
This agreement will be recorded; and notification of the book and page number will be returned to the Metro District.

2.4 Designer's Responsibility
These standards are intended for typical applications of signage and striping for standard conditions. These standards do not alleviate the responsibility of the designer from sound engineering judgment, or from exceeding minimum standards in specific cases where conditions warrant.

3.0 Striping Criteria

3.1 Material
Approved striping materials:

- Waterborne traffic paint (prefer Ennis Flint #980601W, 980602YE or Swarco Colorado Paints #1160 Series)
- Paint Bead – Colorado blend 40%(T-20 coated or equivalent)
- Preformed thermoplastic
- Inlay tape (Stamark or approved equivalent)
- Epoxy paint (Modified Epoxy Pavement Marking, see latest CDOT section 627 & 713)
- Epoxy Bead – Colorado blend 40%(T-20 coated or equivalent)
- Methyl-mythacralate (MMA)
- MMA Bead – Swarco #3131 Blend (T-13') or Potters Visiblend MMA AC 20's
- Other as specified by Engineer

3.2 Dimensions & Application

The following striping widths shall be used unless otherwise directed by the Engineer.

Edge Line	5”
Skip/Lane Line	5”
White Channelizing	8”
Bike Lane	6”
Double Yellow	5” (3” Gap)
Stop Bar	24” (4” from crosswalk)
Diagonal Shoulder Marking	4”
Yield Line	16” x 24” layout based on lane widths and/or size to be determined by the County Engineer
Crosswalk Bar*	2’x10’ on Arterials, all others to be 2’x8’, (Centered in lane) layout and/or size to be determined by the County Engineer.

Note: Broken and/or Dotted marking patterns shall be per CDOT specs

*Unless otherwise directed by the County Engineer.

3.2.1 Applications

Thickness	
Paint	15-19 Mils
MMA	50-70 Mils (RMV or 4:1) Spray application only
Preform Thermo Plastic Pave-Mark	90 Mils
Epoxy	16-18 Mils per 90-100 Sq. ft.
Inlay Tape	Per manufacturer specification
Beads	
Paint	7-8 lbs. per Gal
MMA	11.5-12.5 per 100 Sq. ft. (Pressurized bead applicator)
Epoxy	18-20 lbs. per 90-100 Sq. ft.

3.3 Surface Preparation

Note: Surface preparation includes clean up and disposal of removed material.

3.3.1

New concrete pavement shall have all residues removed, such as mud, dirt, curing compound, etc. Removal shall be by water blasting, sand blasting or other method approved by the Engineer.

3.3.2

New asphalt pavements shall be dry and free of dirt and debris.

3.3.3

For all re-striping on existing concrete or asphalt pavement, the surface shall be clean, dry and free of debris. Cleaning shall be by water sweeping, water or air blasting, or other method approved by the Engineer. Surface grinding shall be performed where directed by the Engineer.

3.3.4
Surface temperatures shall be 50° F and rising for all pavement marking applications.

3.3.5
When the surface temperature does not reach 50° F (seasonal), the Contractor may, on approval of the Engineer, substitute designated pavement markings with temporary marking materials to be replaced with permanent materials when weather dictates. Temporary pavement markings shall be refurbished as determined by the Engineer.

3.4 Installation
All pavement markings shall be applied per the manufacturer's recommendations, unless otherwise authorized by the Engineer.

3.5 Pavement Marking Warranty
The following warranty is required for pavement marking installations:

Two year with normal traffic wear. Material shall not peel or lift in this time period. Approval of all work must be obtained from the Douglas County Traffic Services Division of Public Works Engineering prior to the start of this warranty period.

4.0 Legends
4.1 Use of Stop Bars
4.1.1
Any stop sign controlled approach to a crosswalk adjacent to a school shall include a stop bar.

4.1.2
Any multi-way stop controlled approach shall include a stop bar.

4.1.3
Any approach to a signalized intersection which does not have a crosswalk shall include a stop bar.

4.1.4
Stop lines may be staggered longitudinally on a lane-by-lane basis or as determined by Douglas County Traffic Engineering.

4.2 Word or Arrow Pavement Marking
Any approach to signalized intersection, pavement arrow shall be placed 70 ft. back of stop bar or crosswalk. See MUTCD Section 3B.20 for all other word or arrow pavement marking placement or as determined by Traffic Engineering.

5.0 Bike Lanes
Bike lanes are lanes that have been designated with pavement markings for the preferential use of bicyclists. They are typically one-way facilities located to the right of the general travel lanes on both sides of two-way streets.

5.1 Bike Lane Width

The minimum bike lane width on a roadway with no curb and gutter is 4 feet. On roadway with curb and gutter, the minimum width of a bike lane is 5 feet, measured from the face of curb. All exception's to be approved by Douglas County Traffic Engineer on a case by case.

5.2 Designating Bike Lanes

Bike lanes shall be designated with the bicycle symbol with the directional arrow (shown in SS-10). Using the directional arrow encourages bicyclists to ride with traffic, as the law requires.

Bicycle lane markings should be placed after intersections and major driveways (see Traffic Engineer for placement). In rural areas, the maximum spacing of bike lane markings should not exceed 1500 feet. In urban areas, the spacing should not exceed 700 ft. or as determined by Douglas County Traffic Engineer.

The 6-inch white stripe on the left of the bike lane should become dotted (2-foot line with a 6-foot gap) at improved bus stops with pads to clarify that buses are to move right to allow transit riders to disembark off the roadway.

5.3 Bike Lanes at Driveways and Intersections

In Colorado, bicycles are vehicles and are required to follow the rules of the roadway when riding on the streets. Consequently, the striping and marking of bike lanes at intersections should support the operations of bicycles as vehicles, and the safe mixing of bicyclists with motorists at conflict points such as driveways and intersections.

For both motor vehicles and bicycles the approach to a right turn and a right turn shall be made from as close as practicable to the right-hand curb or edge of the roadway. To support crossing a bike lane at a right turn the bike lane striping is either terminated or becomes dotted on the approach to the intersection. The length of the dotted line can be varied based upon the speed of the approaching roadway. A minimum 50-foot dotted line should be provided.

When motorists cross a bike lane to move into a right turn lane, motorists are required to yield the right of way to bicyclists in the bike lane. This means the use of the BEGIN RIGHT TURN LANE YIELD TO BIKES sign (R4-4) (shown in SS-10) is appropriate when it is added to a roadway where a turn lane is added. However, in the trap lane condition (shown in SS-13) the through bicyclists must cross the motorists' path to continue through the intersection. In this case, the bicyclists must yield to the motorist before moving left; therefore, the R4-4 is not appropriate in these conditions.

5.4 Shared Lanes

A shared lane is a lane of a traveled way that is open to bicycle travel and vehicular use. On local roadways with low volumes and speeds, a shared lane may be all that is needed to comfortably accommodate a bicyclist.

Refer to the SS-17 and SS-18 for proper placement of SHARED LANE MARKINGS.

5.5 Buffered Bike Lanes

A buffered bike lane that is separated from adjacent through lanes by a striped out buffer area (SS-19). In some locations it may be desirable to use less that the full space available for a bike lane. The buffer markings consist of two longitudinal white lines and may incorporate an interior diagonal cross hatch

or chevron. These transverse markings shall be included when the buffer space is greater than 3 feet width. Douglas County prefers 3-foot maximum buffer lane or as determined by DC Traffic Engineer.

5.6 Design of Bicycle Signs

If the sign or plaque applies to motorists and bicyclist, then the size of sign shall be as shown for the conventional roads per MUTCD in Tables 2B-1, 2C-2 or 2D-1.

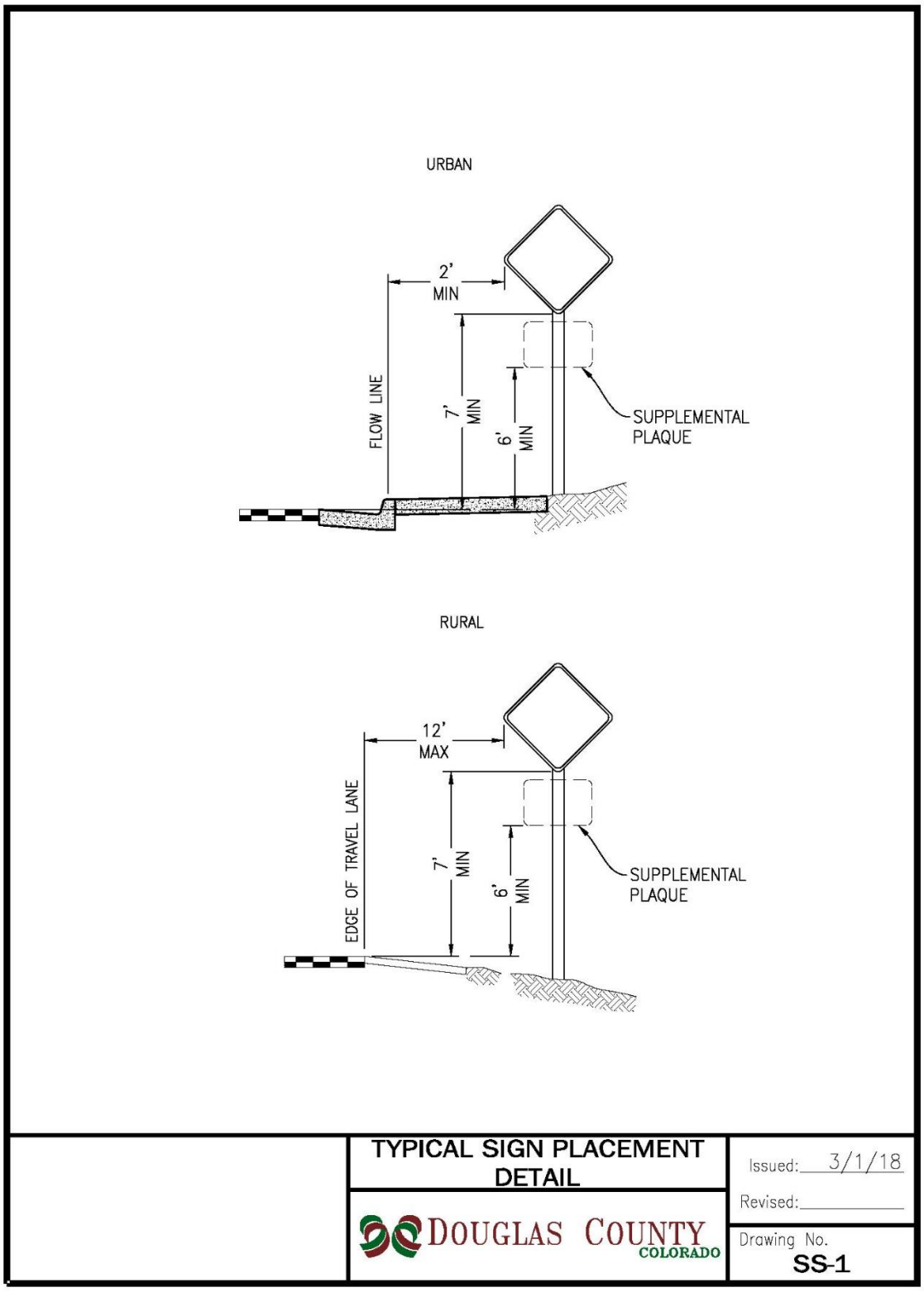
The minimum sign and plaque sizes for shared-use paths shall be those shown in MUTCD Table 9B-1, and shall be used only for signs and plaques installed specifically for bicycle traffic applications. The minimum sign and plaque sizes for bicycle facilities shall not be used for signs or plaques that are placed in a location that would have any application to other vehicles.

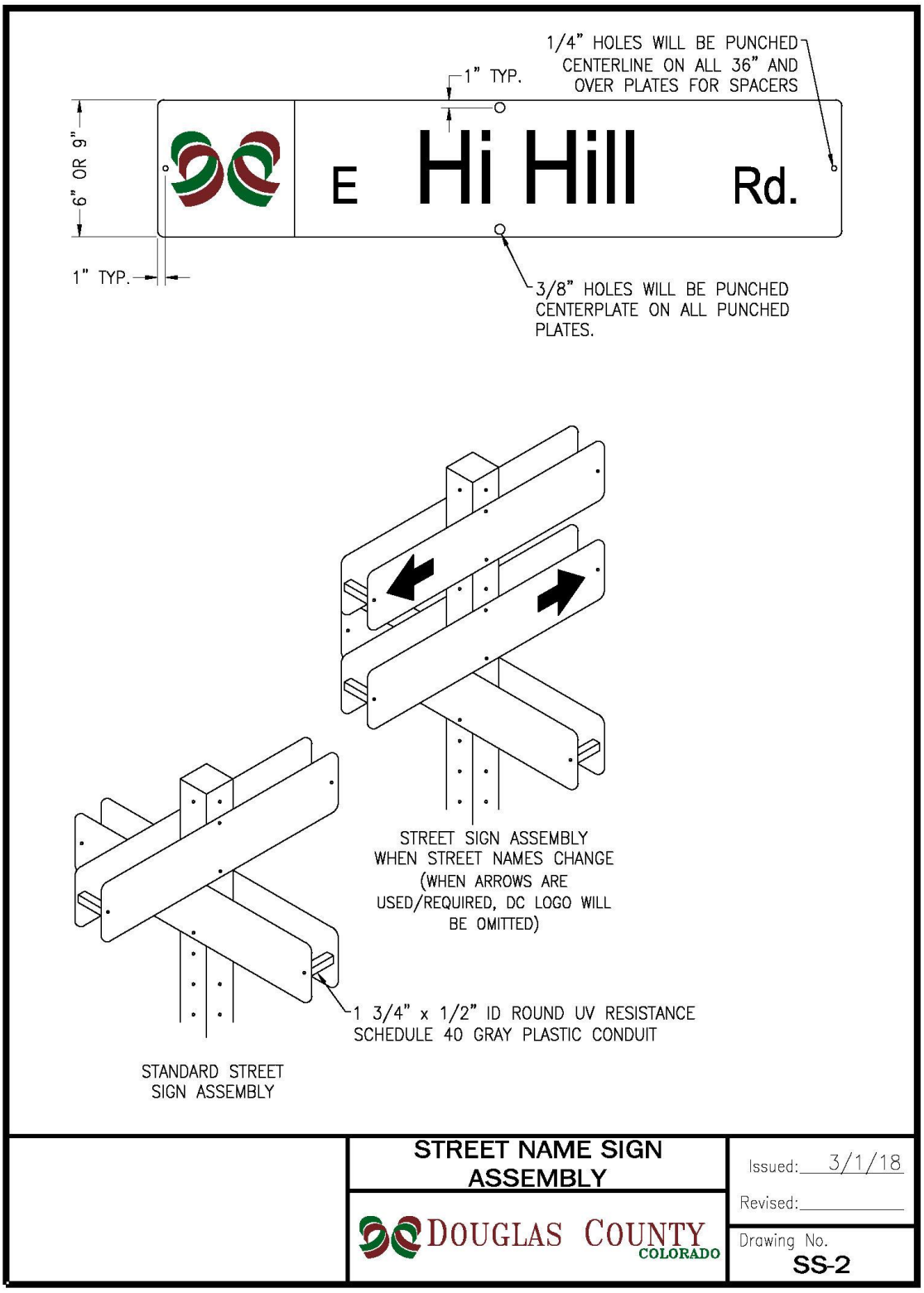
Signage and Striping Notes

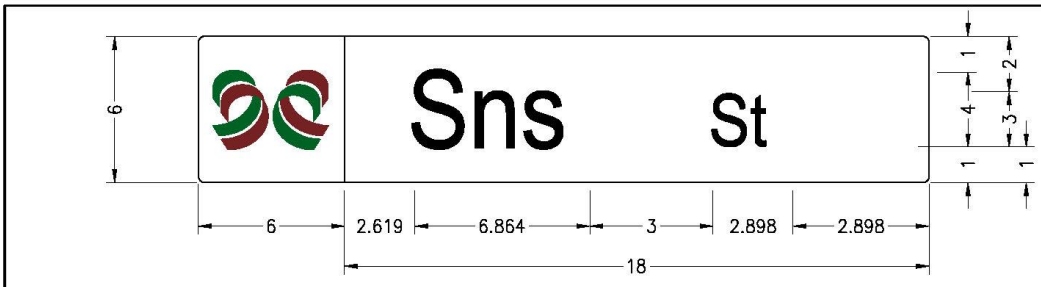
A. ALL TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE MOST RECENT VERSION OF THE FEDERAL MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), THE "COLORADO SUPPLEMENTAL MUTCD", THE DOUGLAS COUNTY "ROADWAY DESIGN AND CONSTRUCTION STANDARDS MANUAL" AND THE "DOUGLAS COUNTY SIGNAGE AND STRIPING SUPPLEMENT". FURTHER SPECIFICATIONS AND ILLUSTRATIONS ARE LOCATED IN THE COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) "M AND S STANDARDS".
B. A FIELD INSPECTION OF LOCATION AND INSTALLATION OF ALL SIGNS & MARKINGS SHALL BE PERFORMED BY DOUGLAS COUNTY. ALL DISCREPANCIES IDENTIFIED DURING THE FIELD INSPECTION MUST BE CORRECTED BEFORE THE TWO-YEAR WARRANTY PERIOD WILL BEGIN.
C. THE CONTRACTOR INSTALLING SIGNS SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL UNDERGROUND UTILITIES.
D. TYPE III LIGHTED BARRICADES SHALL BE SET AT ENDS OF ROADWAYS, SEPARATING FINISHED (AND/OR ACCEPTED) AND UNFINISHED CONSTRUCTION AREAS AND SHALL BE MAINTAINED BY THE CONTRACTOR/DEVELOPER. A "ROAD CLOSED AHEAD" WARNING SIGN SHALL BE INSTALLED APPROPRIATELY IN ADVANCE OF THE TYPE III BARRICADES.
E. SPECIAL CARE SHALL BE TAKEN IN SIGN LOCATION TO ENSURE AN UNOBSTRUCTED VIEW OF EACH SIGN.
F. WHERE STOP SIGN CONTROL IS APPROPRIATE, 36" STOP SIGNS SHALL BE USED FOR APPROACHES TO ANY ROADWAY THAT IS CLASSIFIED AS A COLLECTOR OR GREATER.
G. A 7-FOOT MINIMUM HEIGHT SHALL BE MAINTAINED FROM BOTTOM OF SIGN PANEL TO THE TOP GRADE OF SIDEWALK (AT TOP GRADE OF PAVEMENT EDGE WHERE NO SIDEWALK EXISTS).
H. DELINEATION OF ROADWAYS WITHOUT CURB AND GUTTER SHALL BE AS SPECIFIED IN THE CDOT "M AND S STANDARDS". SEE (SS-7) FOR RAISED MEDIAN SIGNS AND DELINEATION.
I. SIGNAGE AND STRIPING HAS BEEN DETERMINED BY INFORMATION AVAILABLE AT THE TIME OF REVIEW. PRIOR TO INITIATION OF THE ANY WARRANTY PERIOD, DOUGLAS COUNTY RESERVES THE RIGHT TO REQUIRE MODIFICATIONS TO EXISTING, OR INSTALLATION OF, ADDITIONAL SIGNAGE

AND/OR PAVEMENT MARKING IF IT IS DETERMINED THAT AN UNFORESEEN SAFETY CONDITION WARRANTS SUCH MODIFICATION ACCORDING TO THE MUTCD OR THE CDOT M AND S STANDARDS. ALL SIGNAGE AND STRIPING SHALL FALL UNDER THE REQUIREMENTS OF THE TWO (2) YEAR WARRANTY PERIOD FOR NEW CONSTRUCTION. ADDITIONALLY, ALL PAVEMENT MARKINGS SHALL NOT LIFT OR PEEL DURING THE FIRST YEAR AFTER INSTALLATION.

J. DIAMOND GRADE MATERIAL SHALL BE USED ON ALL STOP SIGNS AND OVERHEAD SIGNS. ALL OTHER ROADSIDE TRAFFIC CONTROL DEVICES SHALL BE HIGH INTENSITY PRIZMATIC RETROREFLECTIVE.
K. ALL PUBLIC ROAD STREET NAME SIGNS SHALL HAVE DOUGLAS COUNTY LOGO ON LEFT SIDE OF SIGN.
L. ALL REMOVED SIGNS SHALL BE RETURNED TO DOUGLAS COUNTY TRAFFIC SERVICES, CALL 303-663-6237 FOR DROP OFF LOCATION.
M. CROSSWALKS: SHALL BE CONSTRUCTED OF MATERIAL SPECIFIED BY DOUGLAS COUNTY.
N. SHALL BE "LONGITUDINAL" TYPE.
O. SHALL LINE UP WITH HANDICAP RAMPS.
P. SHALL BE CENTERED ON LANE LINES SO AS TO BE STRADDLED BY VEHICLES.
Q. ALL PAVEMENT MARKING MATERIAL (INCLUDING WORDS AND SYMBOLS) SHALL BE AS FOLLOWS:
R. METHYL-MYTHACRALATE (MMA), EPOXY PAINT, PREFORMED THERMOPLASTIC, INLAY TAPE (STAMARK OR APPROVED EQUIVALENT), WATERBORN TRAFFIC PAINT (PER CDOT SPECIFICATIONS), GLASS BEADS OR AS SPECIFIED BY ENGINEER.
S. (SAND OR WATER BLAST CURING COMPOUND PRIOR TO INSTALLATION OF MARKINGS)
T. INSPECTION AND APPROVAL OF STRIPING AND CROSSWALK LAYOUT TO BE DONE BY DOUGLAS COUNTY ENGINEERING INSPECTION DEPARTMENT (CALL 303-660-7487) PRIOR TO APPLICATION OF FINAL STRIPING.

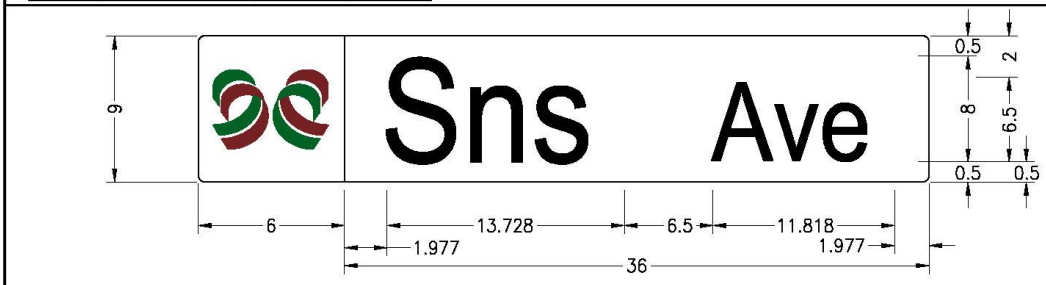

URBAN
2'
MIN
FLOW LINE
7'
MIN
6'
MIN
SUPPLEMENTAL
PLAQUE
RURAL
12'
MAX
EDGE OF TRAVEL LANE
7'
MIN
6'
MIN
SUPPLEMENTAL
PLAQUE
TYPICAL SIGN PLACEMENT
DETAIL
DOUGLAS COUNTY
COLORADO
Issued: 3/1/18
Revised:
Drawing No.
SS-1


1/4" HOLES WILL BE PUNCHED CENTERLINE ON ALL 36" AND OVER PLATES FOR SPACERS
1" TYP.
6" OR 9"
E Hi Hill Rd.
1" TYP.
3/8" HOLES WILL BE PUNCHED CENTERPLATE ON ALL PUNCHED PLATES.
STREET SIGN ASSEMBLY WHEN STREET NAMES CHANGE (WHEN ARROWS ARE USED/REQUIRED, DC LOGO WILL BE OMITTED)
1 3/4" x 1/2" ID ROUND UV RESISTANCE SCHEDULE 40 GRAY PLASTIC CONDUIT
STANDARD STREET SIGN ASSEMBLY
STREET NAME SIGN ASSEMBLY
DOUGLAS COUNTY COLORADO
Issued: 3/1/18
Revised:
Drawing No. SS-2



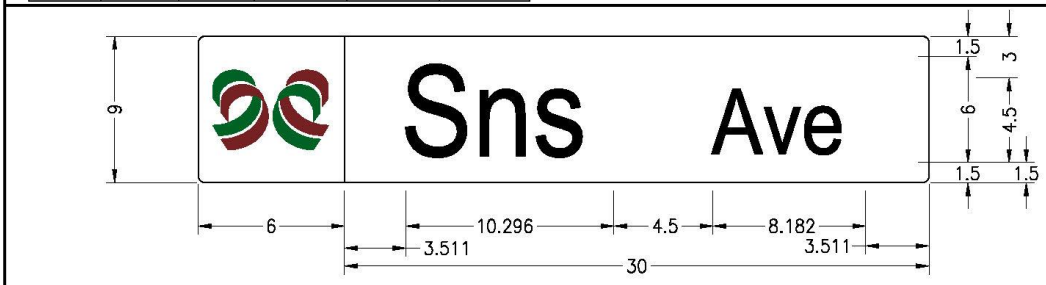
1.000" Radius, No border, White on White:
No border, White on Green;
"Sns" DMV Series C; "St" RMV Series C; Standard highway fonts Series C
Table of letter and objects lefts.

S	n	s	S	t
2.619	5.392	7.801	12.483	14.324



1.000" Radius, No border, White on White:
No border, White on Green;
"Sns" DMV Series C; "Ave" RMV Series C; Standard highway fonts Series C
Table of letter and objects lefts.

S	n	s	A	v	e
1.977	7.523	12.341	22.205	26.599	30.810



1.000" Radius, No border, White on White:
No border, White on Green;
"Sns" DMV Series C; "Ave" RMV Series C; Standard highway fonts Series C
Table of letter and objects lefts.

S	n	s	A	v	e
3.511	7.670	11.284	18.307	21.349	24.264

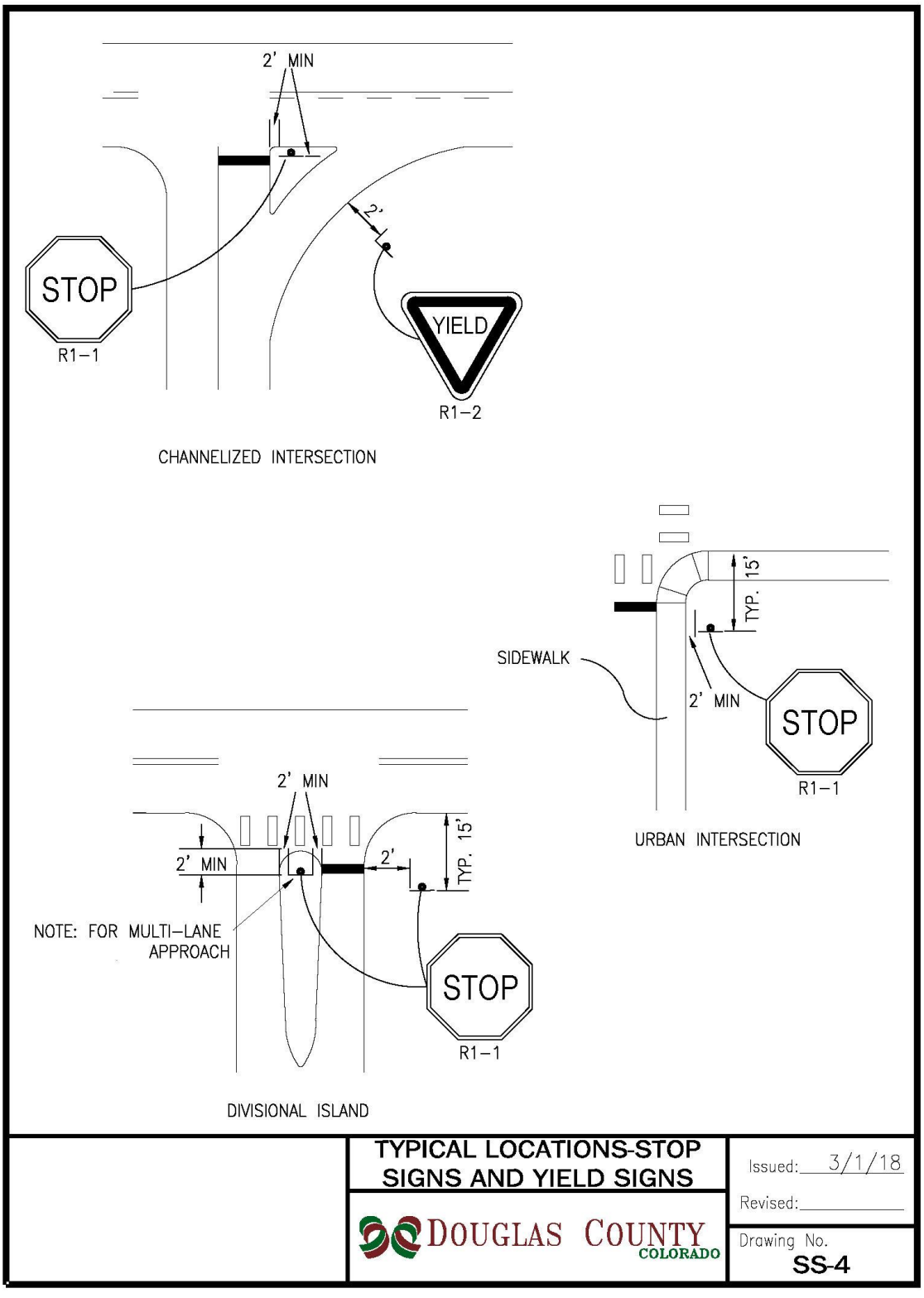
GROUND MOUNTED STREET NAME SIGN DETAIL

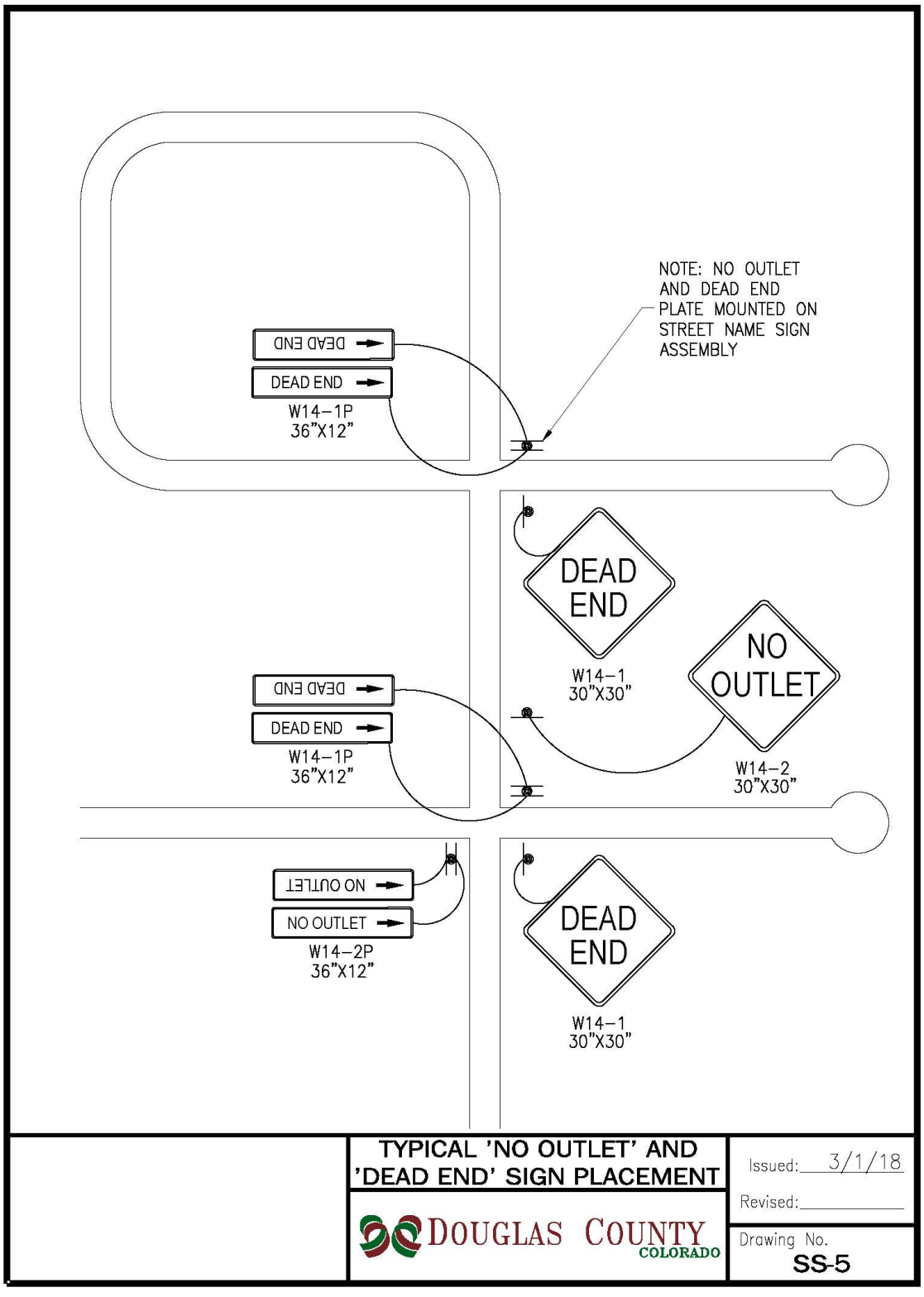
DOUGLAS COUNTY COLORADO

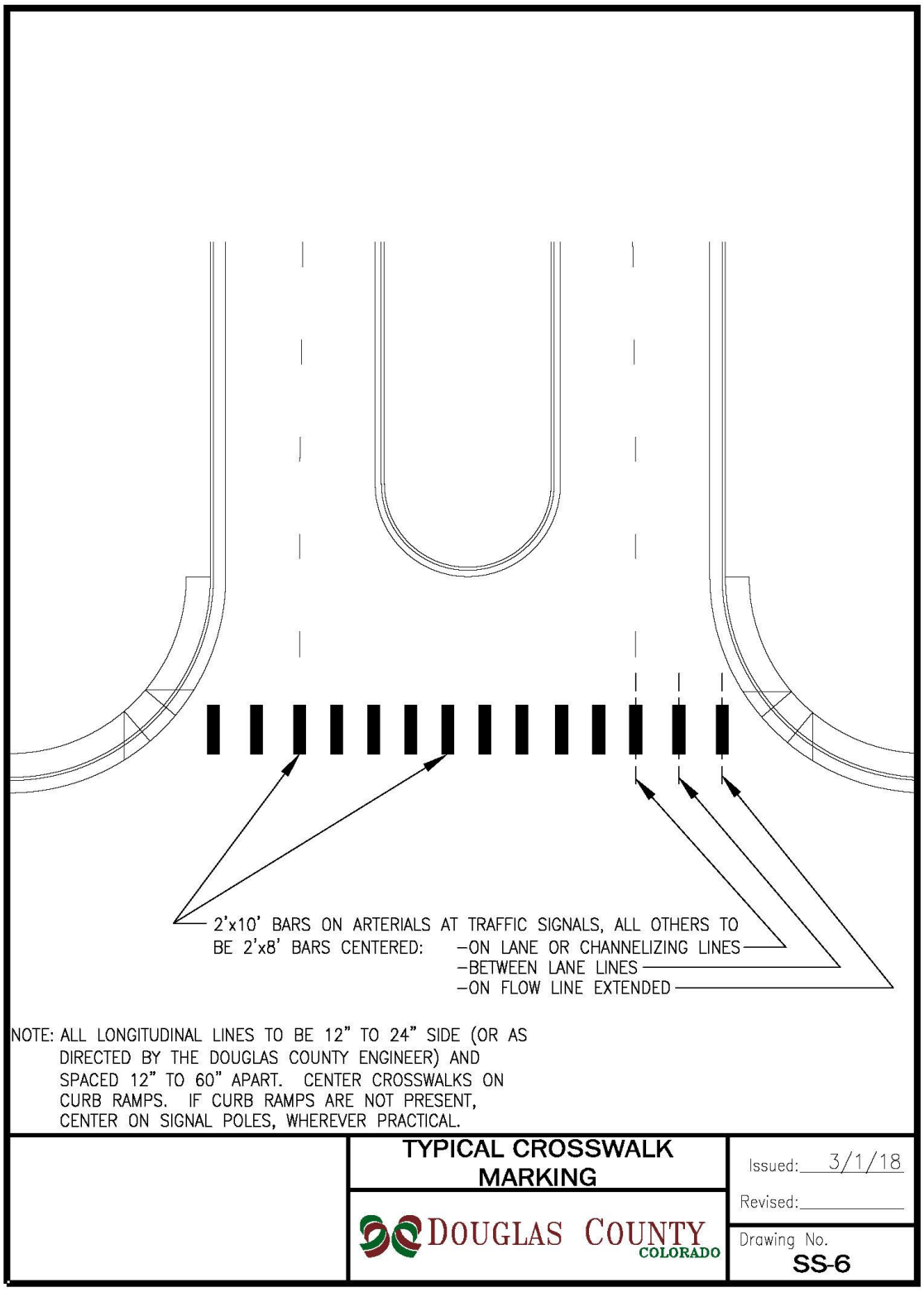
Issued: 3/1/18

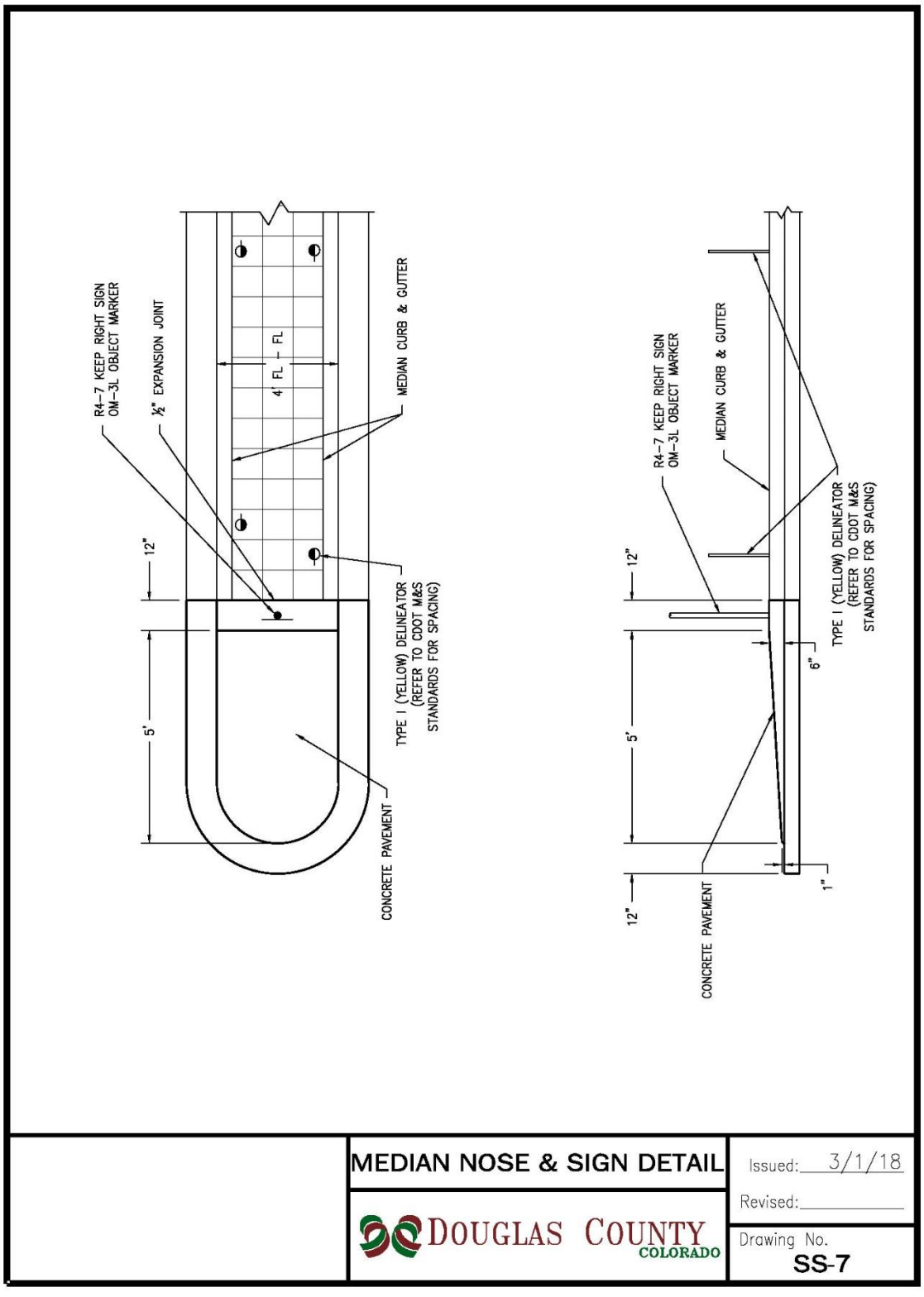
Revised:

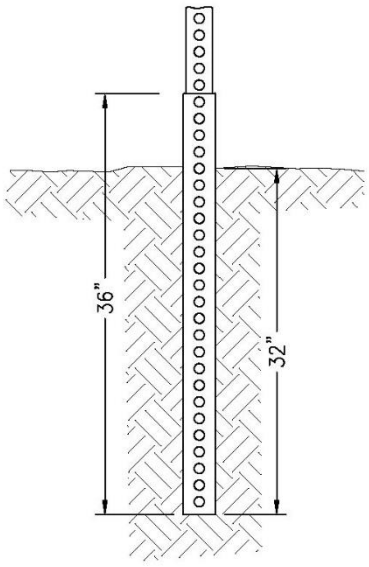
Drawing No. SS-3


2' MIN
2'
STOP
R1-1
YIELD
R1-2
CHANNELIZED INTERSECTION
TYP. 15'
SIDEWALK
2' MIN
STOP
R1-1
URBAN INTERSECTION
2' MIN
2' MIN
2'
TYP. 15'
NOTE: FOR MULTI-LANE APPROACH
STOP
R1-1
DIVISIONAL ISLAND
TYPICAL LOCATIONS-STOP SIGNS AND YIELD SIGNS
DOUGLAS COUNTY COLORADO
Issued: 3/1/18
Revised:
Drawing No.
SS-4


NOTE: NO OUTLET AND DEAD END PLATE MOUNTED ON STREET NAME SIGN ASSEMBLY
DEAD END
DEAD END
W14-1P
36"X12"
DEAD END
W14-1
30"X30"
NO OUTLET
W14-2
30"X30"
DEAD END
DEAD END
W14-1P
36"X12"
NO OUTLET
NO OUTLET
W14-2P
36"X12"
DEAD END
W14-1
30"X30"
TYPICAL 'NO OUTLET' AND 'DEAD END' SIGN PLACEMENT
DOUGLAS COUNTY COLORADO
Issued: 3/1/18
Revised:
Drawing No.
SS-5

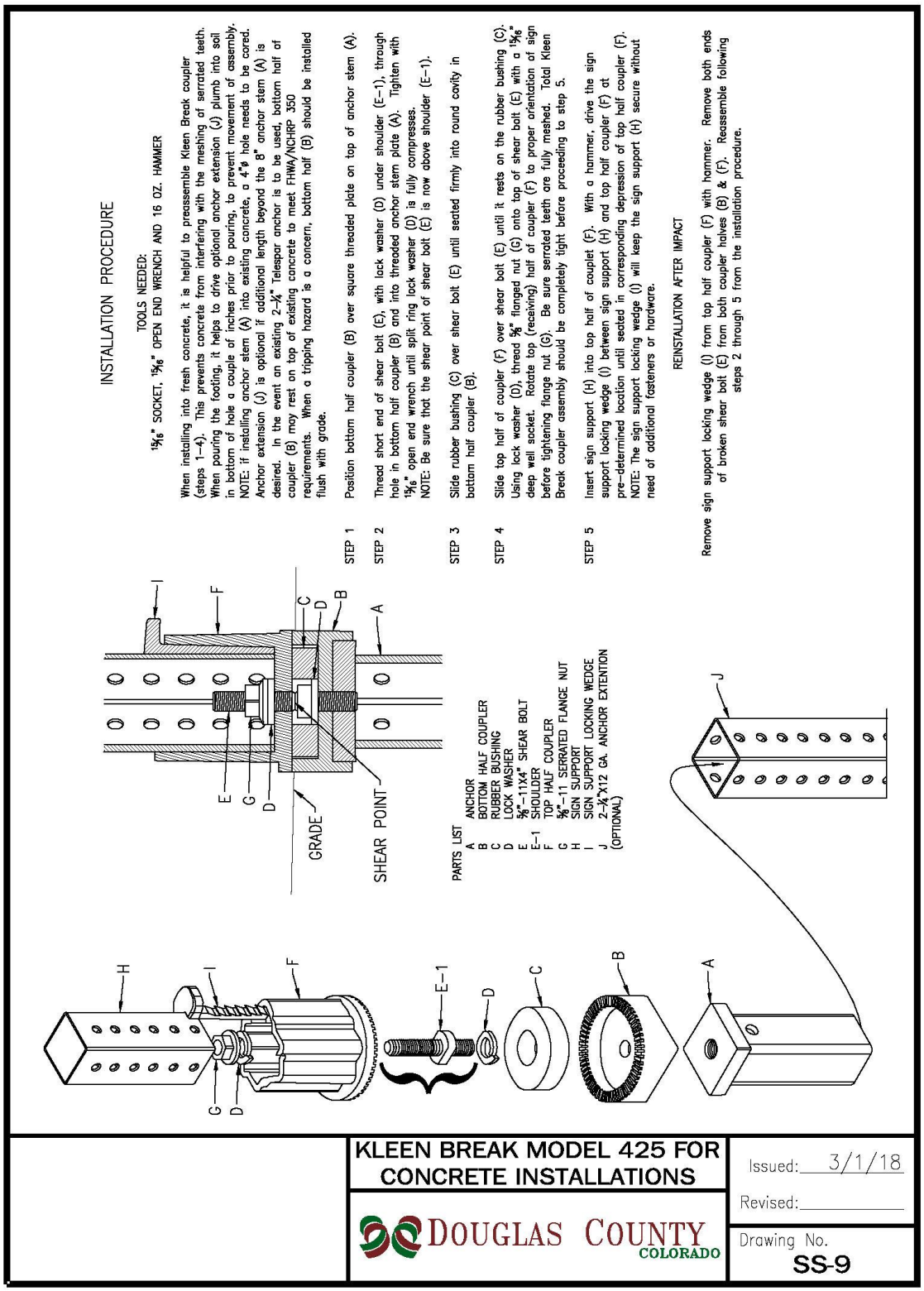

2'x10' BARS ON ARTERIALS AT TRAFFIC SIGNALS, ALL OTHERS TO BE 2'x8' BARS CENTERED:
–ON LANE OR CHANNELIZING LINES
–BETWEEN LANE LINES
–ON FLOW LINE EXTENDED
NOTE: ALL LONGITUDINAL LINES TO BE 12" TO 24" SIDE (OR AS DIRECTED BY THE DOUGLAS COUNTY ENGINEER) AND SPACED 12" TO 60" APART. CENTER CROSSWALKS ON CURB RAMPS. IF CURB RAMPS ARE NOT PRESENT, CENTER ON SIGNAL POLES, WHEREVER PRACTICAL.
TYPICAL CROSSWALK MARKING
DOUGLAS COUNTY COLORADO
Issued: 3/1/18
Revised:
Drawing No. SS-6

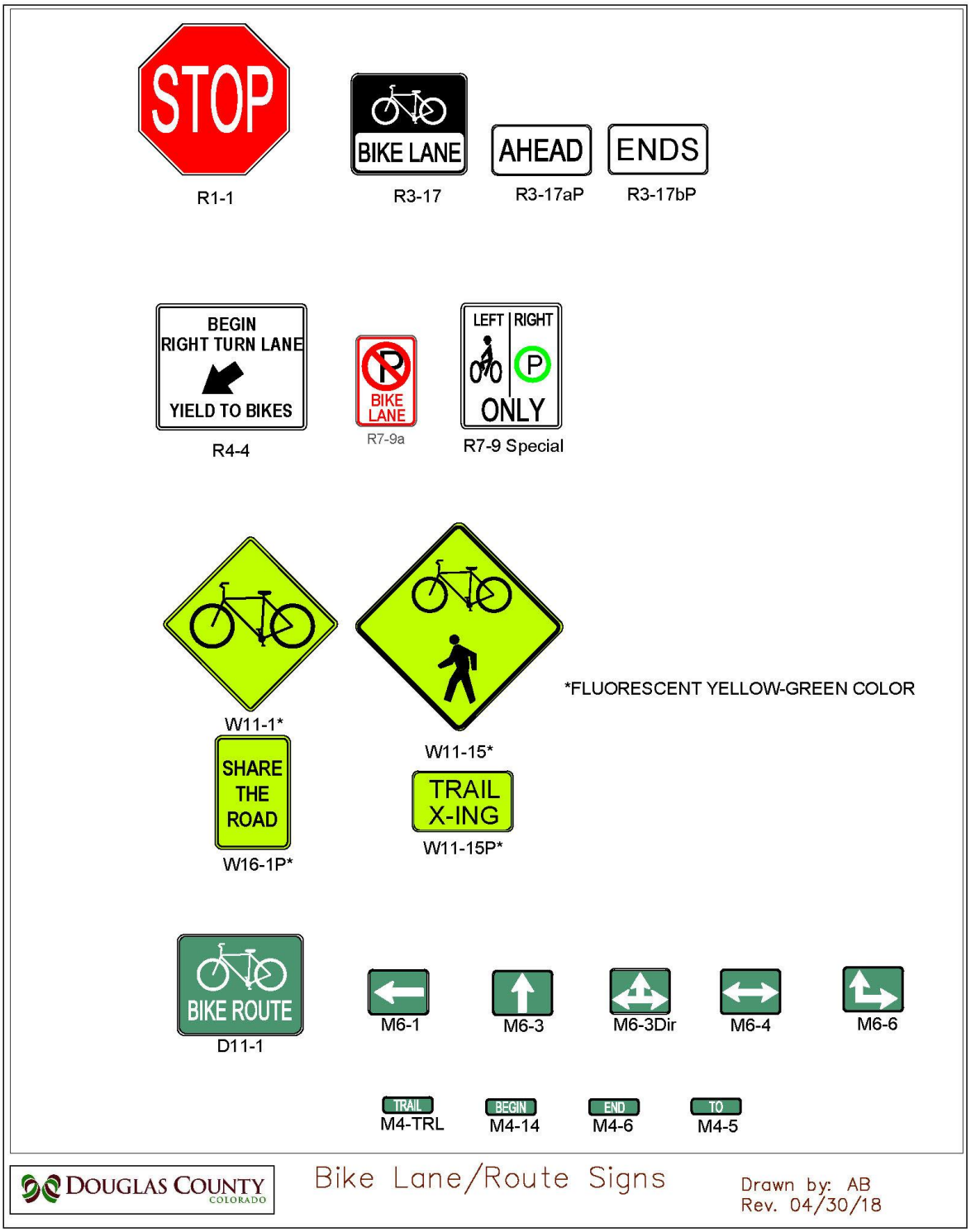

R4-7 KEEP RIGHT SIGN
OM-3L OBJECT MARKER
½" EXPANSION JOINT
4' FL - FL
MEDIAN CURB & GUTTER
12"
5'
TYPE I (YELLOW) DELINEATOR
(REFER TO CDOT M&S
STANDARDS FOR SPACING)
CONCRETE PAVEMENT
R4-7 KEEP RIGHT SIGN
OM-3L OBJECT MARKER
MEDIAN CURB & GUTTER
12"
5'
6"
TYPE I (YELLOW) DELINEATOR
(REFER TO CDOT M&S
STANDARDS FOR SPACING)
1"
12"
CONCRETE PAVEMENT
MEDIAN NOSE & SIGN DETAIL
Issued: 3/1/18
Revised:
DOUGLAS COUNTY
COLORADO
Drawing No.
SS-7



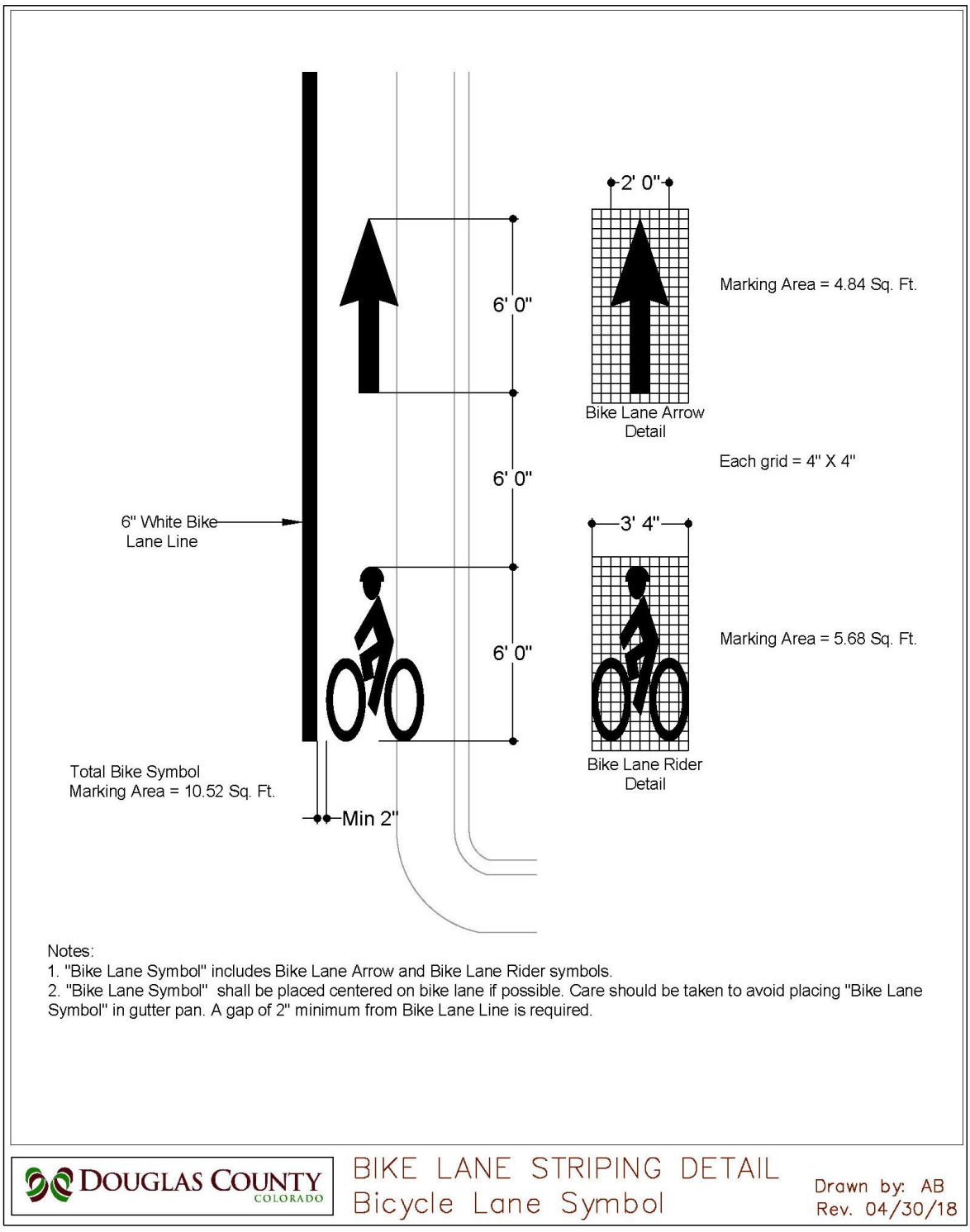
POST ANCHOR DETAIL

	POST ANCHOR DETAIL	Issued: 3/1/18
	DOUGLAS COUNTY COLORADO	Revised:
		Drawing No. SS-8

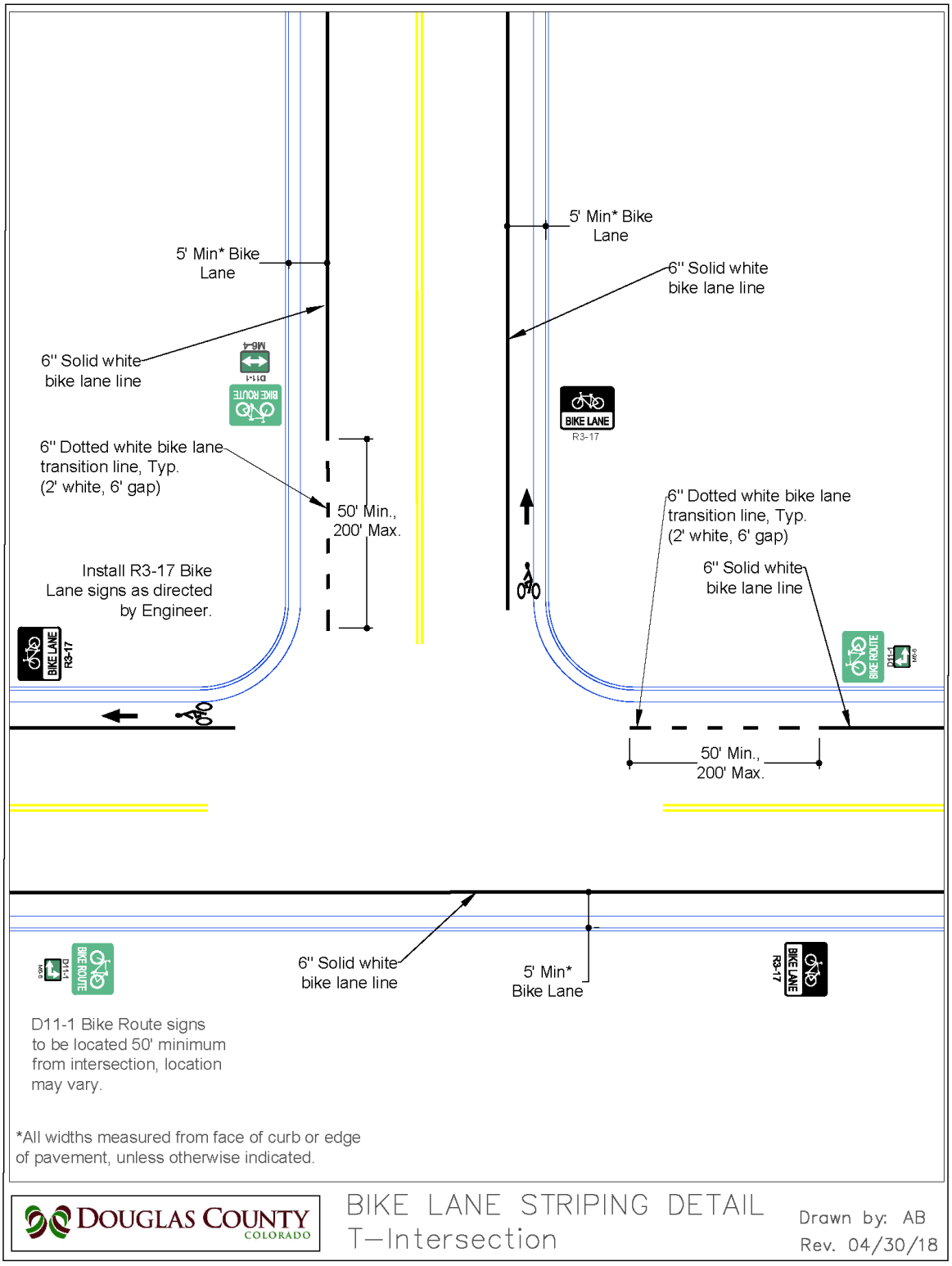

INSTALLATION PROCEDURE
TOOLS NEEDED:
15/16" SOCKET, 15/16" OPEN END WRENCH AND 16 OZ. HAMMER
When installing into fresh concrete, it is helpful to preassemble Kleen Break coupler (steps 1–4). This prevents concrete from interfering with the meshing of serrated teeth. When pouring the footing, it helps to drive optional anchor extension (J) plumb into soil in bottom of hole a couple of inches prior to pouring, to prevent movement of assembly. NOTE: if installing anchor stem (A) into existing concrete, a 4" ø hole needs to be cored. Anchor extension (J) is optional if additional length beyond the 8" anchor stem (A) is desired. In the event an existing 2-¼" Telespar anchor is to be used, bottom half of coupler (B) may rest on top of existing concrete to meet FHWA/NCHRP 350 requirements. When a tripping hazard is a concern, bottom half (B) should be installed flush with grade.
STEP 1 Position bottom half coupler (B) over square threaded plate on top of anchor stem (A).
STEP 2 Thread short end of shear bolt (E), with lock washer (D) under shoulder (E–1), through hole in bottom half coupler (B) and into threaded anchor stem plate (A). Tighten with 15/16" open end wrench until split ring lock washer (D) is fully compresses. NOTE: Be sure that the shear point of shear bolt (E) is now above shoulder (E–1).
STEP 3 Slide rubber bushing (C) over shear bolt (E) until seated firmly into round cavity in bottom half coupler (B).
STEP 4 Slide top half of coupler (F) over shear bolt (E) until it rests on the rubber bushing (C). Using lock washer (D), thread 5/8" flanged nut (G) onto top of shear bolt (E) with a 15/16" deep well socket. Rotate top (receiving) half of coupler (F) to proper orientation of sign before tightening flange nut (G). Be sure serrated teeth are fully meshed. Total Kleen Break coupler assembly should be completely tight before proceeding to step 5.
STEP 5 Insert sign support (H) into top half of couplet (F). With a hammer, drive the sign support locking wedge (I) between sign support (H) and top half coupler (F) at pre-determined location until seated in corresponding depression of top half coupler (F). NOTE: The sign support locking wedge (I) will keep the sign support (H) secure without need of additional fasteners or hardware.
REINSTALLATION AFTER IMPACT
Remove sign support locking wedge (I) from top half coupler (F) with hammer. Remove both ends of broken shear bolt (E) from both coupler halves (B) & (F). Reassemble following steps 2 through 5 from the installation procedure.
PARTS LIST
A ANCHOR
B BOTTOM HALF COUPLER
C RUBBER BUSHING
D LOCK WASHER
E 5/8"-11X4" SHEAR BOLT
E-1 SHOULDER
F TOP HALF COUPLER
G 5/8"-11 SERRATED FLANGE NUT
H SIGN SUPPORT
I SIGN SUPPORT LOCKING WEDGE
J 2-¼"X12 GA. ANCHOR EXTENTION (OPTIONAL)
GRADE
SHEAR POINT
KLEEN BREAK MODEL 425 FOR CONCRETE INSTALLATIONS
DOUGLAS COUNTY COLORADO
Issued: 3/1/18
Revised:
Drawing No. SS-9


STOP
R1-1
BIKE LANE
R3-17
AHEAD
R3-17aP
ENDS
R3-17bP
BEGIN
RIGHT TURN LANE
YIELD TO BIKES
R4-4
BIKE LANE
R7-9a
LEFT
RIGHT
P
ONLY
R7-9 Special
W11-1*
W11-15*
*FLUORESCENT YELLOW-GREEN COLOR
SHARE THE ROAD
W16-1P*
TRAIL X-ING
W11-15P*
BIKE ROUTE
D11-1
M6-1
M6-3
M6-3Dir
M6-4
M6-6
TRAIL
M4-TRL
BEGIN
M4-14
END
M4-6
TO
M4-5
DOUGLAS COUNTY
COLORADO
Bike Lane/Route Signs
Drawn by: AB
Rev. 04/30/18

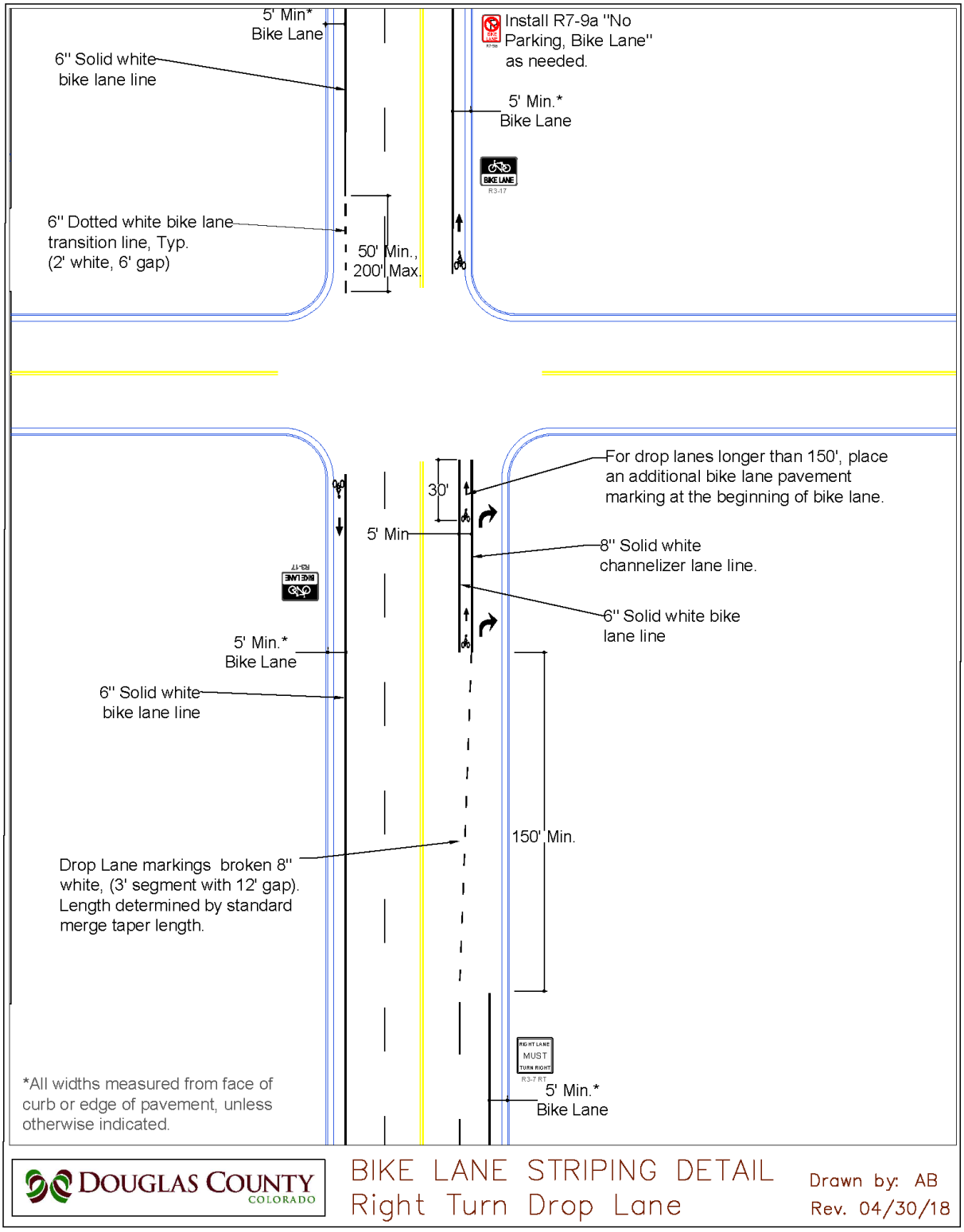
SS-10


2' 0"
6' 0"
Marking Area = 4.84 Sq. Ft.
Bike Lane Arrow Detail
Each grid = 4" X 4"
6' 0"
6" White Bike Lane Line
3' 4"
6' 0"
Marking Area = 5.68 Sq. Ft.
Bike Lane Rider Detail
Total Bike Symbol Marking Area = 10.52 Sq. Ft.
Min 2"
Notes:
1. "Bike Lane Symbol" includes Bike Lane Arrow and Bike Lane Rider symbols.
2. "Bike Lane Symbol" shall be placed centered on bike lane if possible. Care should be taken to avoid placing "Bike Lane Symbol" in gutter pan. A gap of 2" minimum from Bike Lane Line is required.
DOUGLAS COUNTY COLORADO
BIKE LANE STRIPING DETAIL
Bicycle Lane Symbol
Drawn by: AB
Rev. 04/30/18

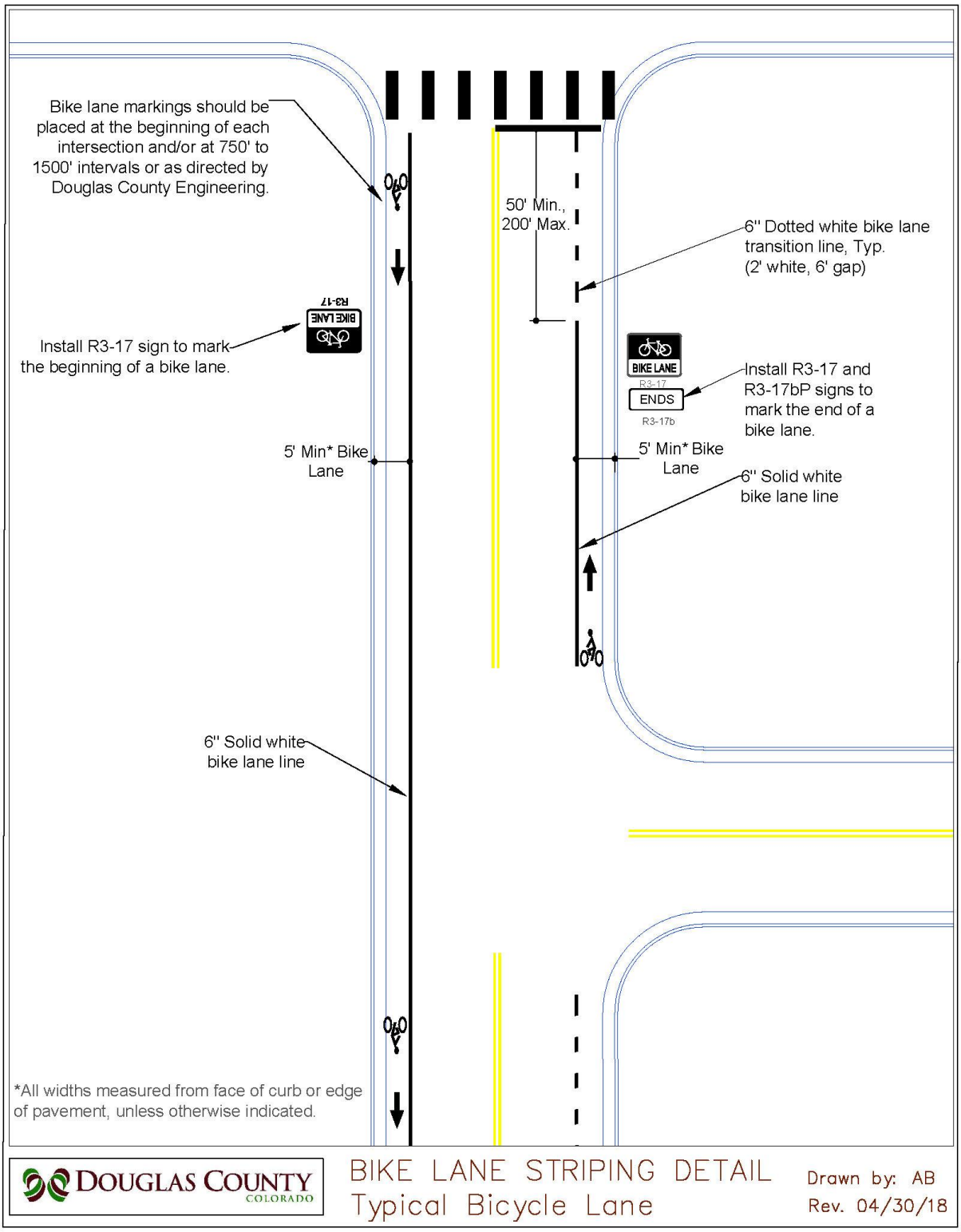
SS-11


5' Min* Bike Lane
6" Solid white bike lane line
6" Dotted white bike lane transition line, Typ. (2' white, 6' gap)
50' Min., 200' Max.
Install R3-17 Bike Lane signs as directed by Engineer.
BIKE LANE
R3-17
BIKE ROUTE
D11-1
M6-4
M6-3
5' Min* Bike Lane
6" Solid white bike lane line
6" Dotted white bike lane transition line, Typ. (2' white, 6' gap)
6" Solid white bike lane line
50' Min., 200' Max.
6" Solid white bike lane line
5' Min* Bike Lane
D11-1 Bike Route signs to be located 50' minimum from intersection, location may vary.
*All widths measured from face of curb or edge of pavement, unless otherwise indicated.
DOUGLAS COUNTY COLORADO
BIKE LANE STRIPING DETAIL
T–Intersection
Drawn by: AB
Rev. 04/30/18

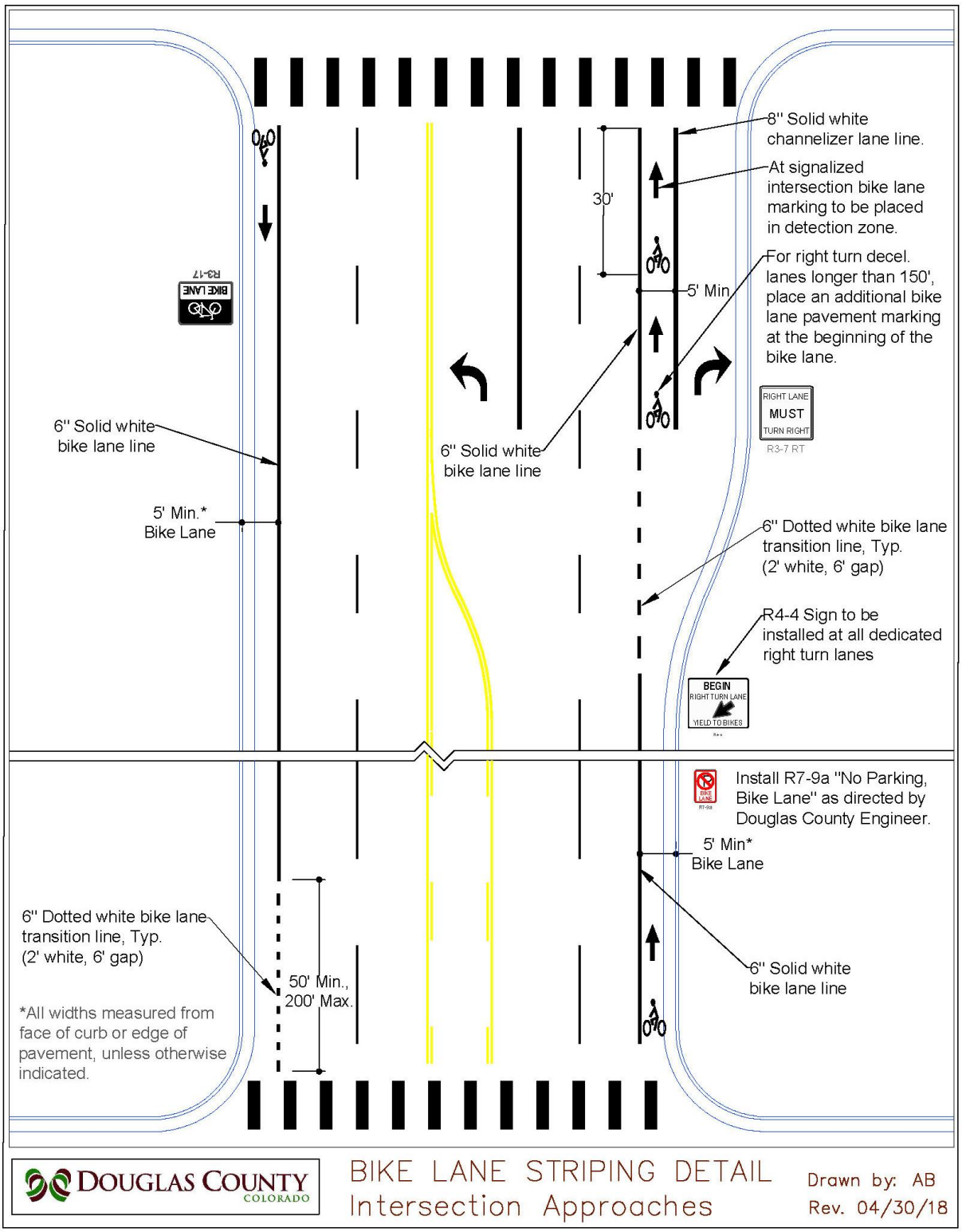
SS-12


5' Min*
Bike Lane
6" Solid white
bike lane line
Install R7-9a "No
Parking, Bike Lane"
as needed.
5' Min.*
Bike Lane
BIKE LANE
R3-17
6" Dotted white bike lane
transition line, Typ.
(2' white, 6' gap)
50' Min.,
200' Max.
30'
For drop lanes longer than 150', place
an additional bike lane pavement
marking at the beginning of bike lane.
5' Min
8" Solid white
channelizer lane line.
6" Solid white bike
lane line
5' Min.*
Bike Lane
6" Solid white
bike lane line
150' Min.
Drop Lane markings broken 8"
white, (3' segment with 12' gap).
Length determined by standard
merge taper length.
RIGHT LANE
MUST
TURN RIGHT
R3-7 RT
5' Min.*
Bike Lane
*All widths measured from face of
curb or edge of pavement, unless
otherwise indicated.
DOUGLAS COUNTY
COLORADO
BIKE LANE STRIPING DETAIL
Right Turn Drop Lane
Drawn by: AB
Rev. 04/30/18

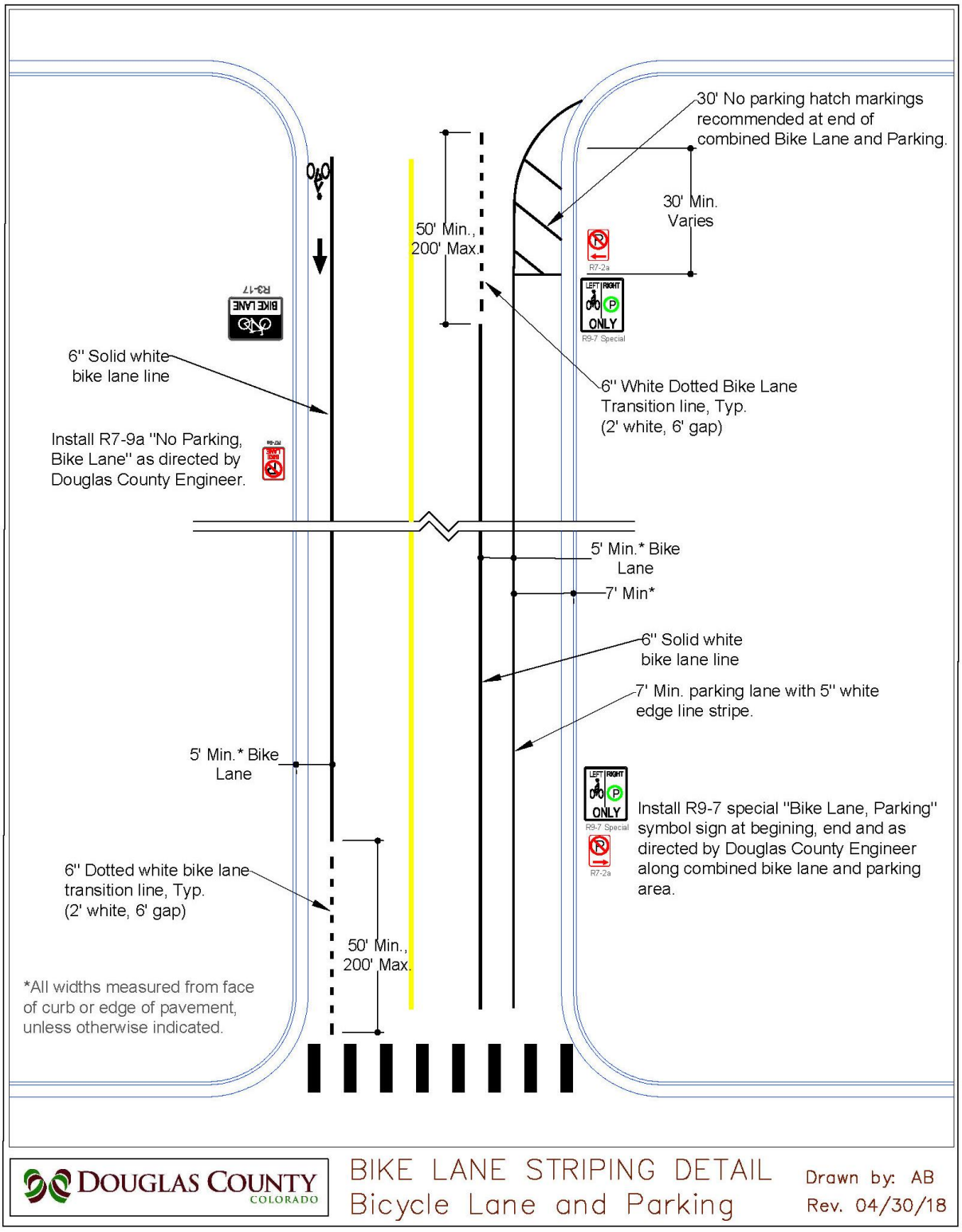
SS-13


Bike lane markings should be placed at the beginning of each intersection and/or at 750' to 1500' intervals or as directed by Douglas County Engineering.
50' Min., 200' Max.
6" Dotted white bike lane transition line, Typ. (2' white, 6' gap)
R3-17
BIKE LANE
Install R3-17 sign to mark the beginning of a bike lane.
BIKE LANE
R3-17
ENDS
R3-17b
Install R3-17 and R3-17bP signs to mark the end of a bike lane.
5' Min* Bike Lane
5' Min* Bike Lane
6" Solid white bike lane line
6" Solid white bike lane line
*All widths measured from face of curb or edge of pavement, unless otherwise indicated.
DOUGLAS COUNTY
COLORADO
BIKE LANE STRIPING DETAIL
Typical Bicycle Lane
Drawn by: AB
Rev. 04/30/18

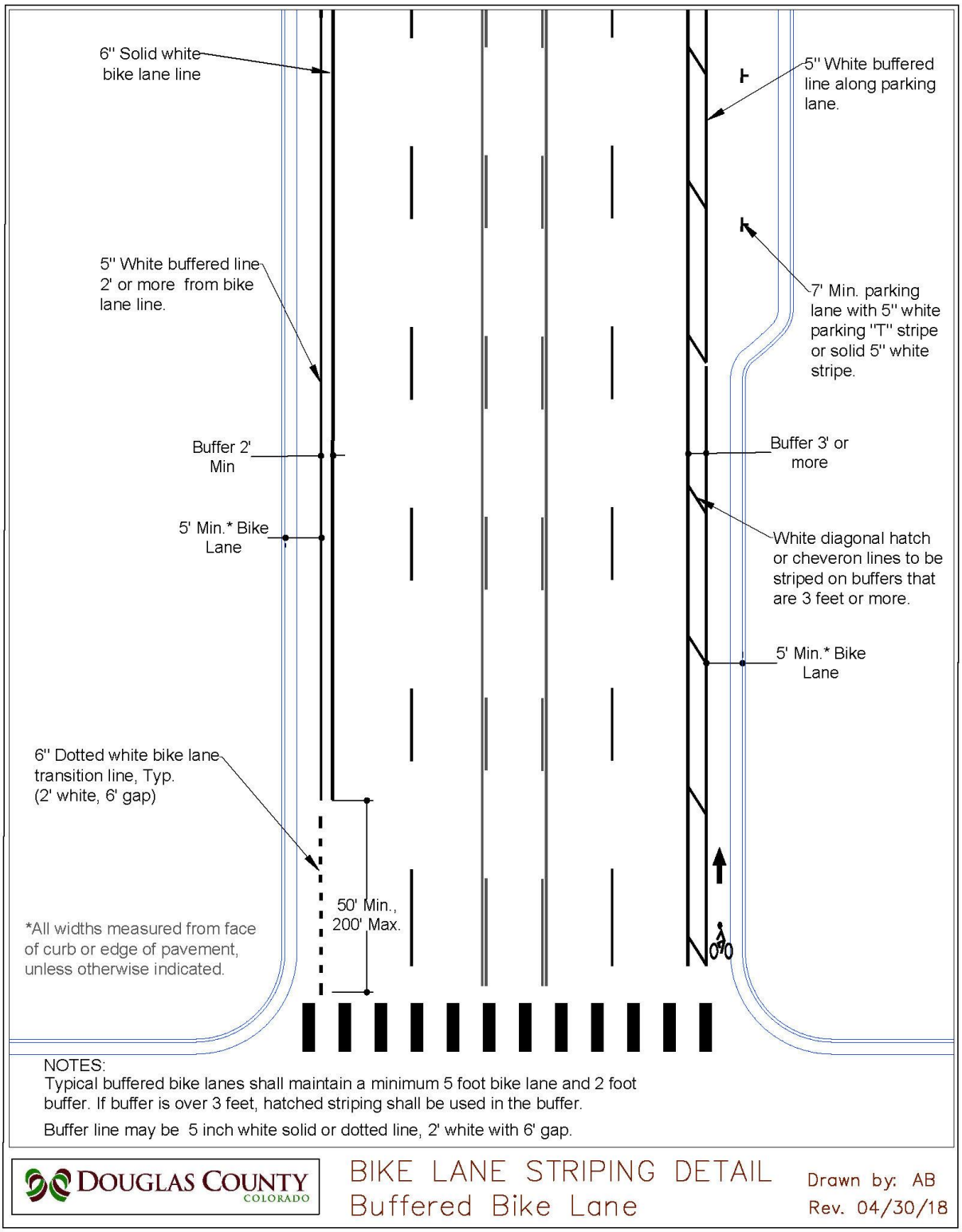
SS-14


8" Solid white channelizer lane line.
At signalized intersection bike lane marking to be placed in detection zone.
30'
5' Min
For right turn decel. lanes longer than 150', place an additional bike lane pavement marking at the beginning of the bike lane.
R3-17
BIKE LANE
RIGHT LANE MUST TURN RIGHT
R3-7 RT
6" Solid white bike lane line
6" Solid white bike lane line
5' Min.* Bike Lane
6" Dotted white bike lane transition line, Typ. (2' white, 6' gap)
R4-4 Sign to be installed at all dedicated right turn lanes
BEGIN RIGHT TURN LANE YIELD TO BIKES
Install R7-9a "No Parking, Bike Lane" as directed by Douglas County Engineer.
5' Min* Bike Lane
6" Dotted white bike lane transition line, Typ. (2' white, 6' gap)
50' Min., 200' Max.
6" Solid white bike lane line
*All widths measured from face of curb or edge of pavement, unless otherwise indicated.
DOUGLAS COUNTY COLORADO
BIKE LANE STRIPING DETAIL
Intersection Approaches
Drawn by: AB
Rev. 04/30/18

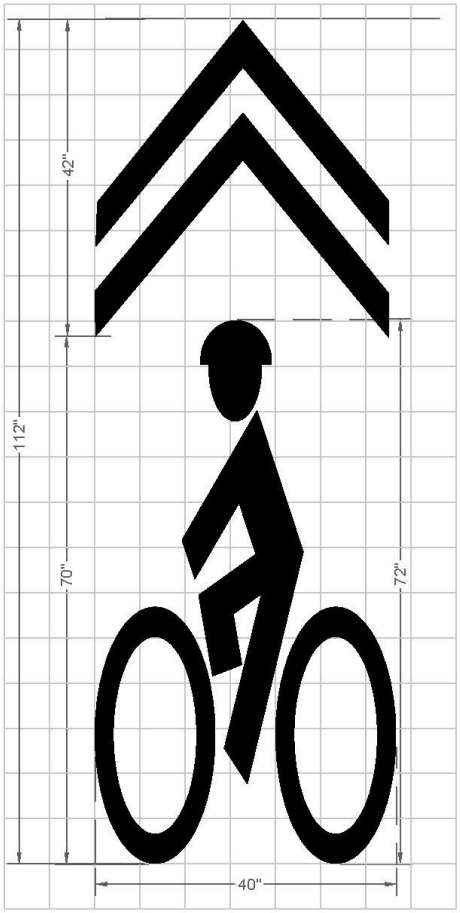
SS-15


30' No parking hatch markings recommended at end of combined Bike Lane and Parking.
30' Min. Varies
50' Min., 200' Max.
R7-2a
LEFT RIGHT
ONLY
R9-7 Special
R3-17
BIKE LANE
6" Solid white bike lane line
6" White Dotted Bike Lane Transition line, Typ. (2' white, 6' gap)
Install R7-9a "No Parking, Bike Lane" as directed by Douglas County Engineer.
5' Min.* Bike Lane
7' Min*
6" Solid white bike lane line
7' Min. parking lane with 5" white edge line stripe.
5' Min.* Bike Lane
Install R9-7 special "Bike Lane, Parking" symbol sign at begining, end and as directed by Douglas County Engineer along combined bike lane and parking area.
6" Dotted white bike lane transition line, Typ. (2' white, 6' gap)
50' Min., 200' Max.
*All widths measured from face of curb or edge of pavement, unless otherwise indicated.
DOUGLAS COUNTY COLORADO
BIKE LANE STRIPING DETAIL
Bicycle Lane and Parking
Drawn by: AB
Rev. 04/30/18

SS-16


6" Solid white bike lane line
5" White buffered line along parking lane.
5" White buffered line 2' or more from bike lane line.
7' Min. parking lane with 5" white parking "T" stripe or solid 5" white stripe.
Buffer 2' Min
Buffer 3' or more
5' Min.* Bike Lane
White diagonal hatch or cheveron lines to be striped on buffers that are 3 feet or more.
5' Min.* Bike Lane
6" Dotted white bike lane transition line, Typ. (2' white, 6' gap)
50' Min., 200' Max.
*All widths measured from face of curb or edge of pavement, unless otherwise indicated.
NOTES:
Typical buffered bike lanes shall maintain a minimum 5 foot bike lane and 2 foot buffer. If buffer is over 3 feet, hatched striping shall be used in the buffer.
Buffer line may be 5 inch white solid or dotted line, 2' white with 6' gap.
DOUGLAS COUNTY COLORADO
BIKE LANE STRIPING DETAIL
Buffered Bike Lane
Drawn by: AB
Rev. 04/30/18

SS-17



GRID 6" X 6"

PROJECT NAME: SHARED LANE MARKING DETAILS

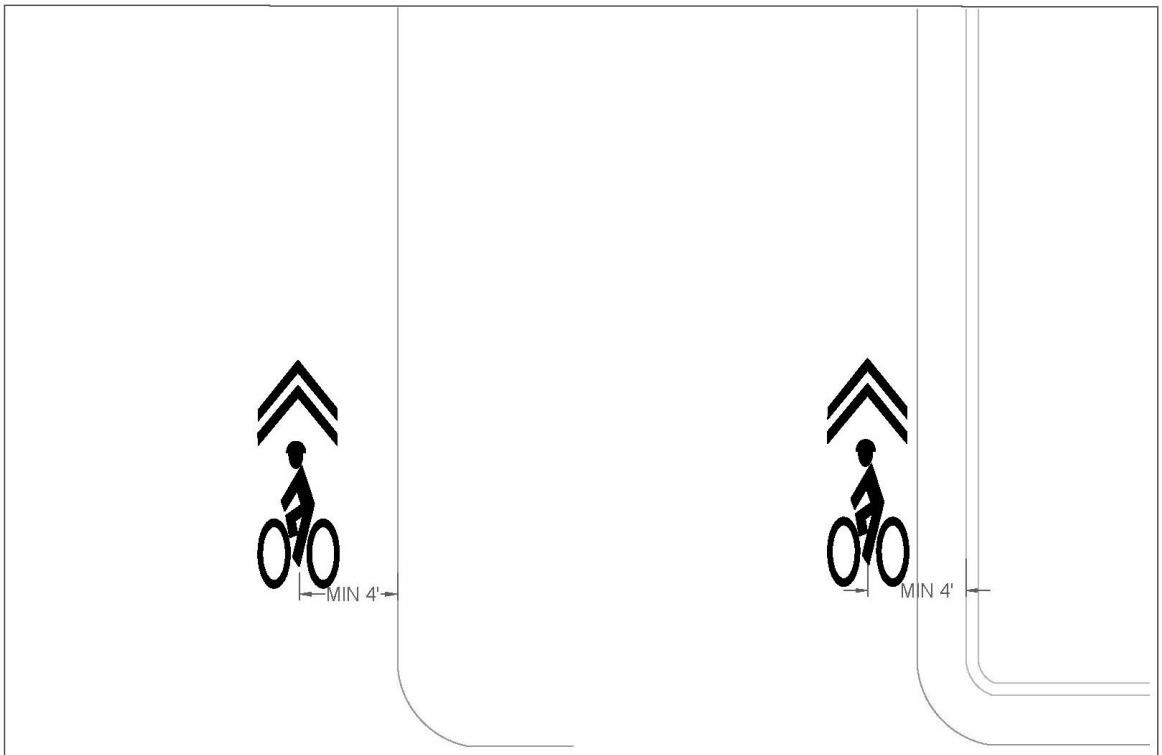
DESIGNER: SDK
CREATION DATE: 2/23/12

DOUGLAS COUNTY

FILE NAME: O:\PW\PW\Bicycle Lanes\Bike Standard

Scale: N/A

SS-18



EDGE OF PAVEMENT
Details

FACE OF CURB
Details

Standard:
Shared Lane Marking shall not be used on shoulders or in designated bicycle lanes.

Placement Guidelines:
Bike Sharrows to be installed outside wheel track or where indicated by Douglas County Traffic Engineering.

If used, in a shared lane with on street parallel parking, Shared Lane Markings should be placed so that the centers of markings are at least 11 ft from face of curb or from edge of pavement where there is no curb.

If used, on a street without on street parking that has an outside travel lane that is less than 14 ft wide, the centers of the Shared Lane Markings should be at least 4 ft from face of curb, or from the edge of pavement where there is no curb.

If used, the Shared Lane Markings should be placed immediately after an intersection and spaced at intervals not greater that 250 ft thereafter or engineering judgement.

PROJECT NAME SHARED LANE MARKINGS FOR NO ON-STREET PARKING

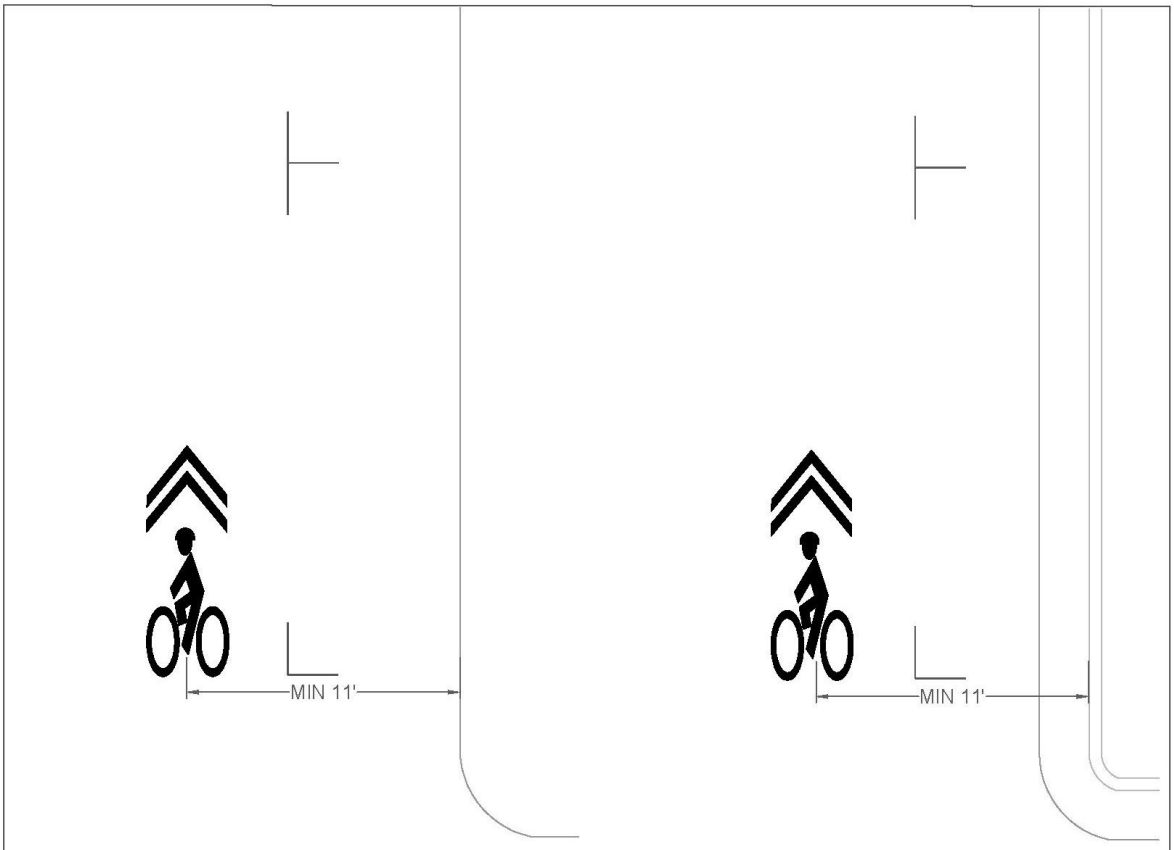
DESIGNER: SDK
CREATION DATE: 2/23/12

DOUGLAS COUNTY

FILE NAME: O:\PW\PW\Bicycle Lanes\Bike Standard

Scale: N/A

SS-19



EDGE OF PAVEMENT
Details

FACE OF CURB
Details

Standard:
Shared Lane Marking shall not be used on shoulders or in designated bicycle lanes.

Placement Guidelines:
Bike Sharrows to be installed outside wheel track or where indicated by Douglas County Traffic Engineering.

If used, in a shared lane with on street parallel parking, Shared Lane Markings should be placed so that the centers of markings are at least 11 ft from face of curb or from edge of pavement where there is no curb.

If used, on a street without on street parking that has an outside travel lane that is less than 14 ft wide, the centers of the Shared Lane Markings should be at least 4 ft from face of curb, or from the edge of pavement where there is no curb.

If used, the Shared Lane Markings should be placed immediately after an intersection and spaced at intervals not greater that 250 ft thereafter or engineering judgement.

PROJECT NAME SHARED LANE MARKINGS FOR ON-STREET PARKING

DESIGNER: SDK
CREATION DATE: 2/23/12

DOUGLAS COUNTY

FILE NAME: O:\PW\PW\Bicycle Lanes\Bike Standard

Scale: N/A

SS-20