Appendix A Roadway Design and Construction Standards

- Standard Drawings

Appendix A. Roadway Design and Construction Standards – Standard Drawings

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Appendix A. Roadway Design and Construction Standards – Standard Drawings

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THE FOLLOWING NOTES ARE APPLICABLE TO ALL ROADWAY SECTIONS (LOCALS, COLLECTORS, AND ARTERIALS), UNLESS MODIFICATIONS ARE APPROVED IN WRITING BY THE DIRECTOR OF PUBLIC WORKS.

NOTES:

- 1. GUTTERS SHALL BE AT LEAST 6" THICK.
- 2. ALL CURBS SHALL USE THE CATCH SECTION UNLESS OTHERWISE NOTES.
- 3. ALL COMBINATION CURB, GUTTER AND SIDEWALKS TO BE 6" THICK (MIN.) SIDEWALKS WITH VERTICAL CURB AND GUTTER TO BE 6" THICK (MIN.).
- NON-LANDSCAPED MEDIAN ISLANDS SHALL BE COVERED WITH AN ACCEPTABLE IMPERMEABLE SURFACE.
- 5. IF ANY SECTION OF A DETACHED SIDEWALK IS TO BE PLACED OUTSIDE OF THE ROAD RIGHT-OF-WAY, THEN A SIDEWALK EASEMENT SHALL BE REQUIRED TO MAINTAIN PUBLIC USE.
- 6. TOTAL PAVEMENT THICKNESS TO BE DETERMINED BY PAVEMENT DESIGN PROCEDURES IN CHAPTER 10.
- 7. PLACEMENT, MOISTURE AND DENSITY CONTROL FOR SUBGRADE, SUBBASE, AND SURFACING MATERIALS SHALL BE IN CONFORMANCE WITH THE REQUIREMENTS OF CHAPTER 12.
- 8. GUTTER THICKNESS SHALL BE INCREASED TO MATCH CONCRETE PAVEMENT THICKNESS.
- 9. FOR ALL CONCRETE PAVEMENTS, DATE AND COMPANY NAME STAMP MUST BE APPLIED AT 100' INTERVALS ALONG NEW ROADWAYS. FOR REPAIR WORK, DATE AND COMPANY NAME STAMP MUST BE APPLIED AT EACH CONTIGUOUS SECTION.

APPROVED BY THE CITY OF CASTLE PINES

Larry G Vinno Larry Nimmo

Director of Public Works

DATE Oct 14, 2025

ROADWAY NOTES

CASTLE PINES

Revised: 10/14/2025

110/14/2020

Standard Drawing No.

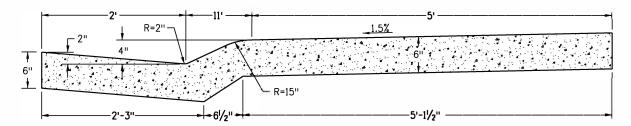
SD.1

Issued:___ 6/15/2022_

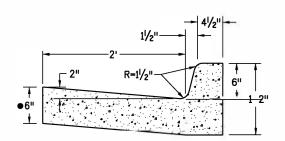
-5'SIDEWALK (MINIMUM)

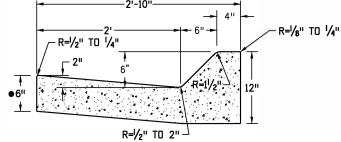
IF USED FOR PEDESTRIAN/BICYCLE COMBINED SIDEWALK, WIDTH SHALL BE 10'.

ATTACHED OR DETACHED SIDEWALK



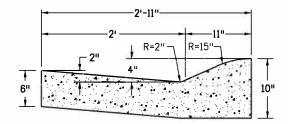
COMBINATION CURB, GUTTER & SIDEWALK



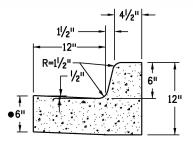


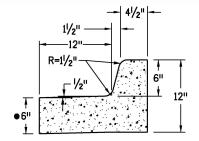
VERTICAL CURB & GUTTER

HIGH SPEED MOUNTABLE CURB & GUTTER (DESIGN SPEED OF 45 M.P.H. OR HIGHER)



LOCAL MOUNTABLE CURB & GUTTER





MEDIAN CURB & GUTTER (CATCH)

MEDIAN CURB & GUTTER (SPILL)

NOTES:

- IF A SIDEWALK IS PLACED BEHIND THE CURB BUT IS NOT PLACED MONOLITHICALLY, EXPANSION JOINT MATERIAL AND A SILICONE BASE SEALER MUST BE APPLIED BETWEEN THE SIDEWALK AND THE CURB.
- SEE DRAWING NUMBER SD.8a and SD.8b FOR TRENCH DRAIN. SEE DRAWING NUMBER SD.16 AND SD.17 FOR CONCRETE JOINTS
- GUTTER THICKNESS SHALL BE INCREASED TO MATCH CONCRETE PAVEMENT THICKNESS

APPROVED BY THE CITY OF CASTLE PINES

Larry of Vimmo

Larry Nimmo Director of Public Works

DATE Oct 14, 2025

CURB & GUTTERS AND SIDEWALKS



Issued: __6/15/2022

Revised: 10/14/2025

Standard Drawing No.

CURB RAMP GENERAL NOTES:

- IN ACCORDANCE WITH CRS43-2-107(2), ADA COMPLIANT CURB RAMPS SHALL BE PROVIDED AT ALL PEDESTRIAN CROSSINGS AND AT PUBLIC
 TRANSPORTATION STOPS WHERE WALKWAYS INTERSECT A CURB. THESE LOCATIONS USUALLY INCLUDE, BUT ARE NOT LIMITED TO STREET
 CROSSINGS AT INTERSECTIONS AND AT DESIGNATED MID-BLOCK LOCATIONS.
- 2. THE FOLLOWING CURB RAMP TYPES ARE GENERAL REPRESENTATIONS. COLORADO DEPARTMENT OF TRANSPIRATION (CDOT). M STANDARD PLANS, LATEST EDITION PROVIDE ADDITIONAL ACCEPTABLE DETAILS. SEE DETAILED RAMP LAYOUTS ON THE PLANS FOR CONSTRUCTION.
- 3. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE CITY OF CASTLE PINES.
- 4. SIDEWALK SHALL BE RAMPED WHERE A DRIVEWAY IS EXTENDED ACROSS THE WALK.
- 5. DETAILS SHOWN IN THE PLAN SHALL APPLY TO ALL CONSTRUCTION OR RECONSTRUCTION OF STREET, CURBS OR SIDEWALKS PER CURB RAMP DETAILS.
- 6. IN NEW CONSTRUCTION, RAMP AND CURB MAY BE POURED MONOLITHICALLY.
- 7. RAMP AND WINGS SHALL BE POURED MONOLITHICALLY.
- 8. MINIMUM WIDTH OF RAMPS SHALL BE 4 FEET AND RAMP SLOPES SHALL NOT BE STEEPER THAN 7.5%.
- 9. MAINTAIN BACK OF WALK ELEVATION AT 1.5% SLOPE FROM TOP OF CURB.
- 10. CONCRETE FOR SIDEWALK RAMPS SHALL BE CLASS "D".
- 11. A 1/2" EXPANSION JOINT SHALL BE REQUIRED WHERE THE CONCRETE RAMP JOINS ANY RIGID PAVEMENT OF STRUCTURE.
- 12. DRAINAGE STRUCTURES SHALL NOT BE PLACED IN LINE WITH RAMPS. LOCATION OF THE RAMP SHALL TAKE PRECEDENCE OVER LOCATION OF THE DRAINAGE STRUCTURE.

1/2" EXPANSION
JOINT

doi

DETECTABLE

ISOMETRIC VIEW

WARNING AREA

DETECTABLE WARNING AREA NOTES

- DETECTABLE WARNING AREAS SHALL BE INSTALLED WITHIN CURB RAMPS AT ALL SIDEWALK/STREET TRANSITIONS, AS DESCRIBED BY THE AMERICAN'S WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG), LATEST REVISION.
- 2. DETECTABLE WARNING DEVICES SHALL BE TRUNCATED DOME WARNING DEVICES. COLOR SHALL BE BRICK RED, TILE RED, OR OTHER EQUIVALENT COLOR TO PROVIDE COLOR CONTRAST WITH ADJACENT SURFACES, AS REQUIRED BY ADAAG SECTION 4.29.2. THE CITY MUST APPROVE THE TRUNCATED DOME WARNING AREA COLOR PRIOR TO CONSTRUCTION.
- 3. CONTRACTION COLOR REQUIREMENT SHALL BE MET BY TRUNCATED DOME SECTIONS AND NOT BY USE OF COLORED CONCRETE.
- 4. DETECTABLE WARNING SHALL BE ON COOT'S APPROVED MATERIALS LIST. A SAMPLE OF THE DETECTABLE WARNING (TRUNCATED DOMES) TO BE USED ON THE PROJECT SHALL BE SUBMITTED TO AND ACCEPTED BY THE CITY PRIOR TO CONSTRUCTION.
- 5. ALL DETECTABLE WARNING AREAS SHALL START A MINIMUM OF 6 INCHES AND A MAXIMUM OF 5 FEET FROM THE FLOW LINE OF THE CURB UNLESS INSTALLED AT CUT-THROUGH REFUGE ISLANDS, IN WHICH CASE THE DETECTABLE WARNING AREA WILL START AT THE EDGE OF THE ISLAND. ALL DETECTABLE WARNING AREAS SHALL BE 24 INCHES IN LENGTH AND COVER THE COMPLETE WIDTH OF THE RAMP AREA ONLY.
- 6. SURFACE APPLIED TRUNCATED DOME PANELS ARE ONLY ALLOWED ON PRE-EXISTING CURB RAMPS AND ARE NOT ALLOWED IN NEW CONSTRUCTION.

APPROVED BY THE CITY OF CASTLE PINES

Larry 9 Nimmo

Larry Nimmo

Director of Public Works

DATE Oct 14, 2025

CURB RAMP & DETECTABLE WARNING AREA NOTES

CASTLE PINES

Issued: <u>6/15/2022</u>

Revised: <u>10/14/2025</u>

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Standard Drawing No.

SD.3a

PANEL INSTALLATION NOTES:

- DETECTABLE WARNING PANELS, 24" X 24" OR 24" X 30" IN SIZE, SHALL BE PREFABRICATED REDDISH WITH TRUNCATED DOMES AND COMPLY WITH ADA REQUIREMENTS. ONLY FULL PANELS SHALL BE USED TO OBTAIN SPECIFIC RAMP THROAT WIDTH. (I.E. TWO 24" PANELS FOR A 4'RAMP, TWO 30" PANELS FOR A 5'RAMP, ETC.)
- 2. PRIOR TO START OF WORK, CONTRACTOR SHALL SUBMIT, TO THE CITY OF CASTLE PINES FOR APPROVAL, A SAMPLE PANEL AND DOCUMENTATION FROM THE MANUFACTURER. PANEL SURFACE SHALL HAVE A MINIMUM OF 70% LIGHT REFLECTIVITY CONTRAST WITH THE ADJOINING SURFACE. PANELS SHALL ONLY BE SELECTED FROM THE APPROVED PRODUCT LIST BELOW:

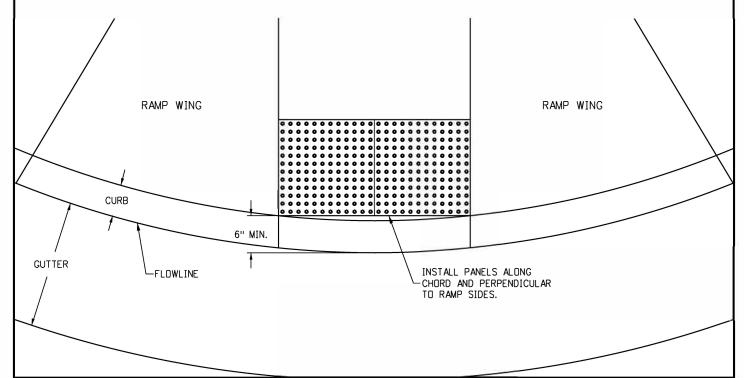
PRODUCT NAME
CAST-DWD
Cast-In-Place Tactile
DURALAST
Detectable Warning Paving Slob
TekWay Dome-Tiles

TufTile Cast Iron Tile/Radius-Wedge (CIP)

MANUFACTURER
Pioneer Detectable, LLC
ADA Solutions, Inc.
EJ USA, Inc.
StoneBilt Concepts
StrongGo LLC
TufTile, Inc.

PRODUCER SUPPLIER CODE GENI30004 GENI00123 GENI30020 GENI00341 GENI00343 GENI50088

- 3. PANELS SHALL BE PLACED AS SHOWN, WITH DOME PATTERN IN A SQUARE GRID AND ALIGNED IN THE DIRECTION OF TRAVEL. A STEEL TEMPLATE SHALL BE USED TO ENSURE PROPER ALIGNMENT AND UNIFORM GRADE.
- 4. REMOVE THE PROPER AMOUNT OF CONCRETE WITHIN THE TEMPLATE FOR AN ACCURATE INSTALLATION. ONCE TO THE PROPER DEPTH, FLOAT THE AREA TO RECEIVE THE PANELS UNTIL A SMOOTH PASTE HAS DEVELOPED.
- 5. WET THE BACK SIDE OF EACH PANEL AND TROWEL SOME CONCRETE PASTE OF APPROVED BONDING AGENT OVER THE WET SURFACE FOR BETTER ADHERENCE.
- 6. SET THE FIRST PANEL ON THE FRESHLY PREPARED SURFACE. DO NOT PRESS DOWN HARD ON THE PANEL, BUT PREFERABLY TWIST FROM SIDE TO SIDE. SET PANEL WITH RUDDER MALLET TO PROPER DEPTH SO THAT THE BASE OF THE TRUNCATED DOME IS AT THE SAME ELEVATION AS THE ADJOINING RAMP SURFACE.
- 7. SET SUCCESSIVE PANELS WITH A TIGHT BUTT JOINT AGAINST THE PREVIOUSLY SET PANEL. PROVIDE A 1/8" GAP BETWEEN PANELS.
- 8. FLOAT FRESH CONCRETE AROUND PANELS. FINISH AND BROOM SURROUNDING CONCRETE AS SPECIFIED. CLEAN ANY CONCRETE OFF PANELS WITH A SPONGE.
- 9. PROVIDE 1" DEEP TOOL JOINTS AT CORNERS OF DETECTABLE WARNING AREA, AND TOOL AROUND PANELS WITH 1/8" RADIUS EDGER.
- 10. WHEN CUT PANELS ARE REQUIRED, CUT SECTIONS SHALL NOT SIGNIFICANTLY IMPACT OVERALL TRUNCATED DOMES PATTERN AND CUT DOMES SHALL BE BEVELED AT A 45-DEGREE ANGLE TO CREATE A SMOOTH TRANSITION.
- 11. ANY PANELS THAT ARE DAMAGED DURING TRANSPORT OR INSTALLATION WILL BE REJECTED AND SHALL NOT BE INSTALLED.
- 12. CLEAN OUT 1/8" JOINT(S) BETWEEN PANELS AND SEAL WITH EPOXY.
- 13. SETTING TRUNCATED DOME PANELS IN SAND BEDDING OR OTHER NON-CEMENTITOUS BEDDING MATERIALS SHALL NOT BE ALLOWED.



APPROVED BY THE CITY OF CASTLE PINES

Larry G Nimmo

Larry Nimmo Director of Public Works

DATE Oct 14, 2025

CURB RAMP WITH PANEL DETECTABLE WARNING AREA INSTALLATION

CASTLE PINES

Issued: ___6/15/2022

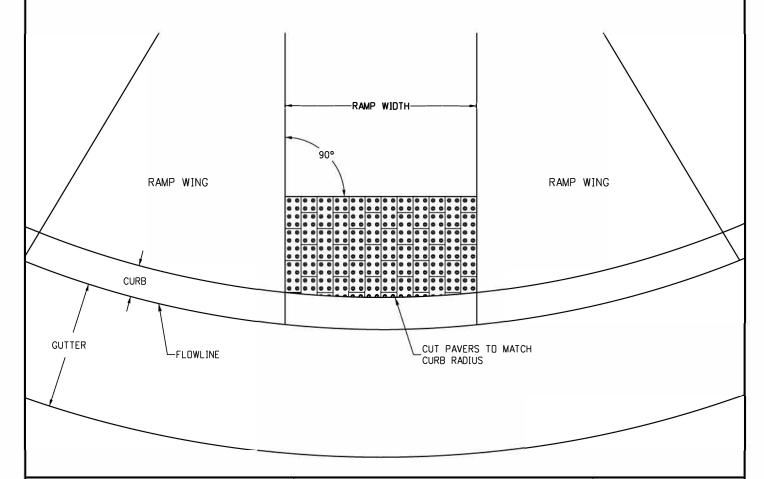
Revised: <u>10/14/2025</u>

Standard Drawing No.

SD.3b

PAVER INSTALLATION NOTES:

- DETECTABLE WARNING PAVERS SHALL BE PREFABRICATED REDDISH INTEGRALLY COLORED TRUNCATED DOMES SURFACED CONCRETE OR MASONRY PAVERS. PAVERS SHALL MEET THE REQUIREMENTS OF ASTM C 902 OR ASTM C 936 AND COMPLY WITH ADA REQUIREMENTS.
- 2. PRIOR TO START OF WORK, CONTRACTOR SHALL SUBMIT, TO THE CITY OF CASTLE PINES FOR APPROVAL, A SAMPLE PAVER AND DOCUMENTATION FROM THE MANUFACTURER. PAVERS SURFACE SHALL HAVE A MINIMUM OF 70% LIGHT REFLECTIVITY CONTRAST WITH THE ADJOINING SURFACE.
- 3. WELL FOR PAVERS SHALL BE ACCURATELY BLOCKED OUT TO ENSURE PROPER DEPTH, ALIGNMENT, AND UNIFORM GRADE. ONLY FULL WIDTH PAVERS SHALL BE USED TO OBTAIN SPECIFIED RAMP THROAT WIDTH.
- 4. PAVERS SHALL BE PLACED IN THE RUNNING PATTERN SHOWN, DOMES PLACED IN A SQUARE GRID AND ALIGNED IN THE DIRECTION OF TRAVEL.
 PAVERS SHALL BE INSTALLED SO THAT THE BASES OF THE TRUNCATED DOMES ARE AT THE SAME ELEVATION AS THE ADJOINING RAMP SURFACE.
- 5. SAND FOR BEDDING MATERIAL SHALL CONFORM TO ASTM C 33.SAND TO BE PLACED BETWEEN JOINTS SHALL CONFORM TO ASTM C 144.
- 6. BEDDING SAND SHALL BE SCREED TO THE APPROPRIATE DEPTH PRIOR TO THE PAVERS INSTALLATION. A PLATE VIBRATOR SHALL BE USED TO EMBED THE PAVERS INTO THE SAND, ANY PAVERS THAT ARE DAMAGED DURING. TRANSPORTATION OR INSTALLATION WILL BE REJECTED AND SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
- 7. WHEN CUT PAVERS ARE REQUIRED, CUT SECTIONS SHALL NOT SIGNIFICANTLY IMPACT OVERALL TRUNCATED DOMES PATTERN AND CUT DOMES SHALL BE BEVELED AT A 45-DEGREE ANGLE TO CREATE A SMOOTH TRANSITION.
- 8. JOINT SPACING SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, BUT SHALL NOT BE MORE THAN 1/8". JOINTS SHALL BE FILLED COMPLETELY WITH SAND. EXCESS SAND SHALL BE REMOVED BY SWEEPING.
- 9. DETECTABLE WARNING PAVERS SHALL ONLY BE USED WITH PRIOR APPROVAL BY THE CITY.



APPROVED BY THE CITY OF CASTLE PINES

Larry G Nimmo

Larry Nimmo
Director of Public Works

DATE Oct 14, 2025

CURB RAMP WITH PAVER DETECTABLE
WARNING AREA INSTALLATION

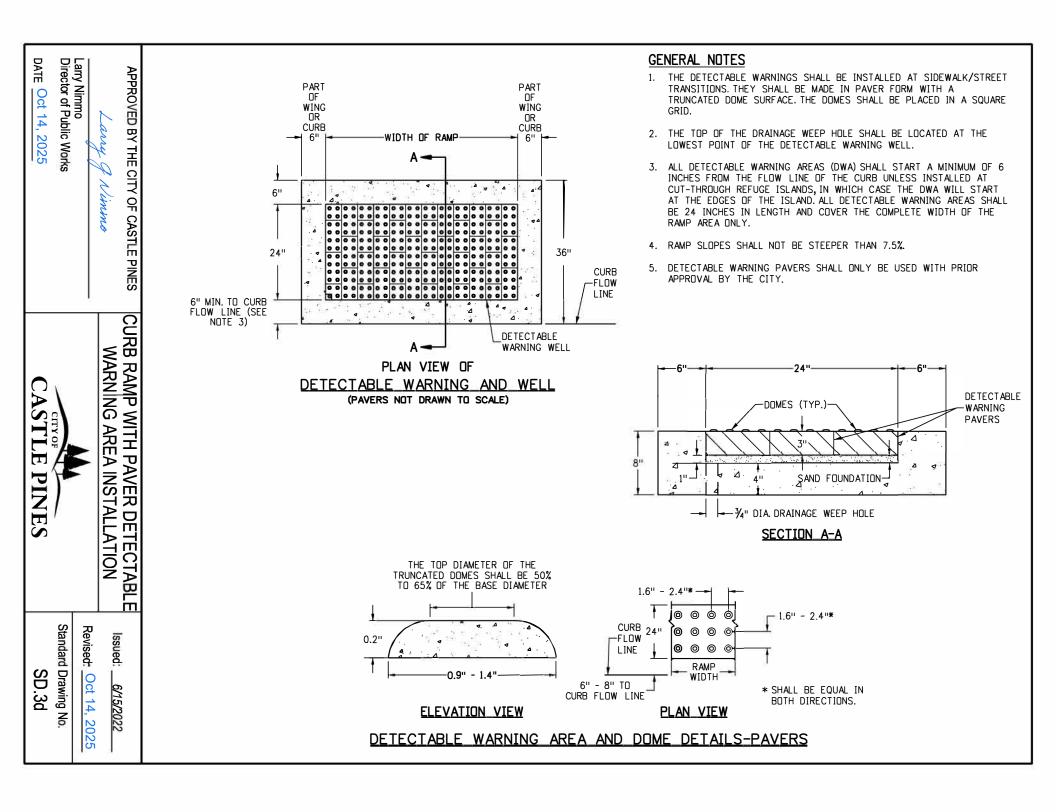
CASTLE PINES

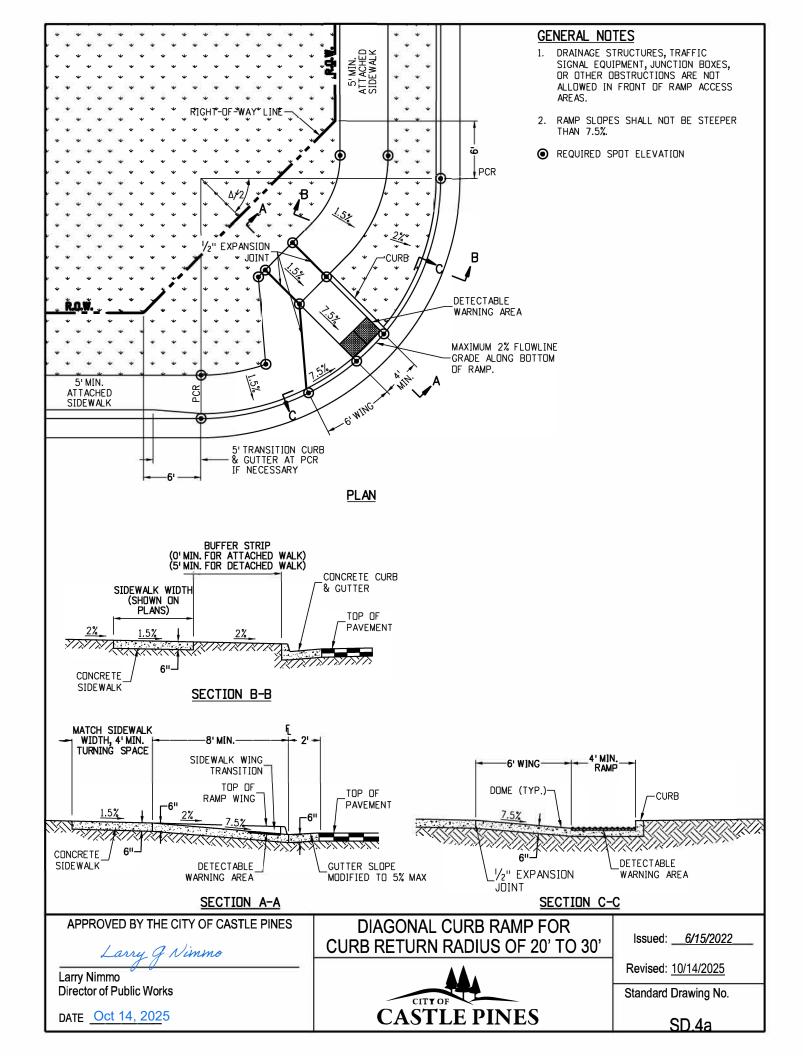
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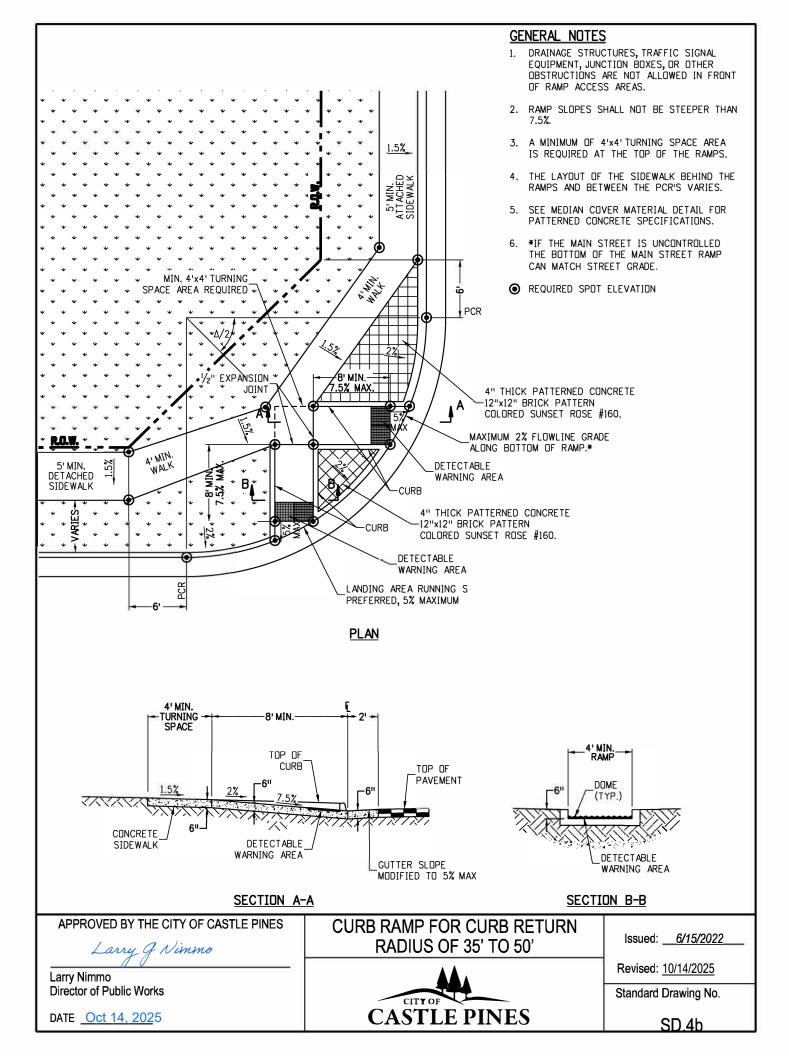
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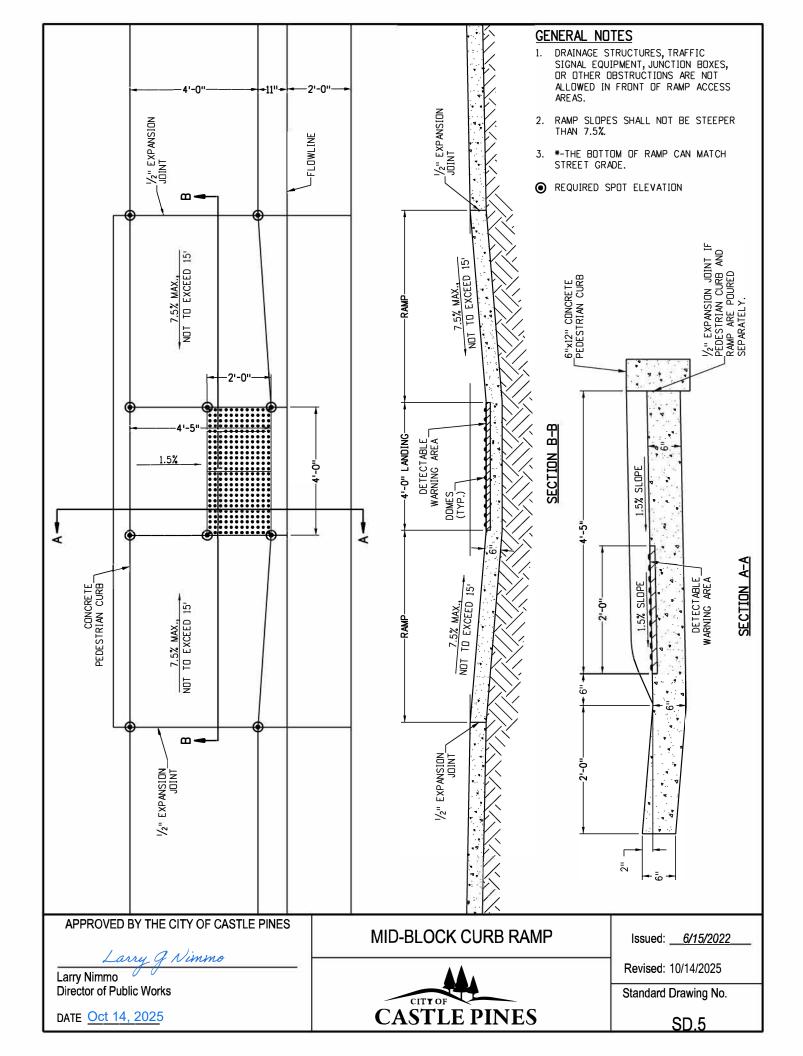
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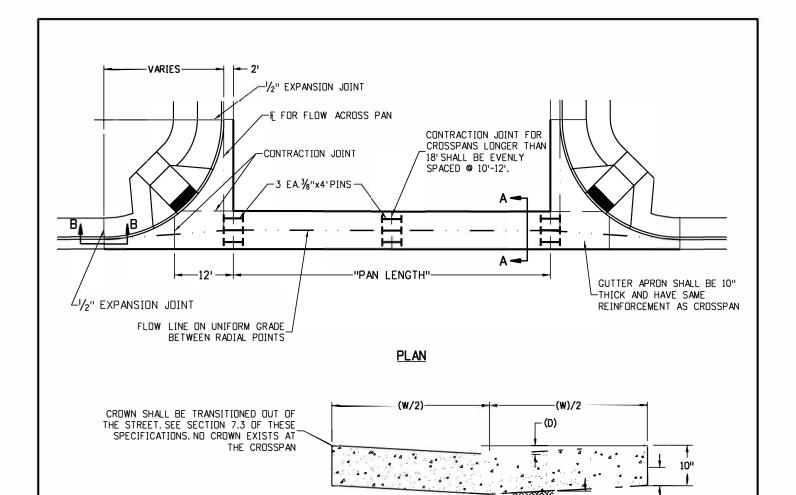
SD.3c





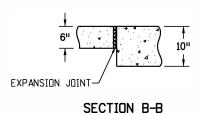






SECTION A-A FIBERMESH MIXED AI 11/2 LBS. / C.Y. CONCRETE

2" MIN. CLASS 6 ROADBASE (IF -REQUIRED FOR SOIL CONDITION)



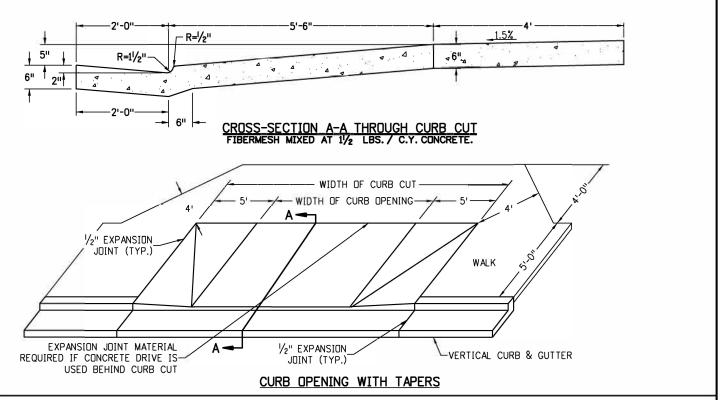
WIDTH (W)	DEPTH (D)	THICKNESS (T)
8'	2"	10"
10'	21/2"	10"

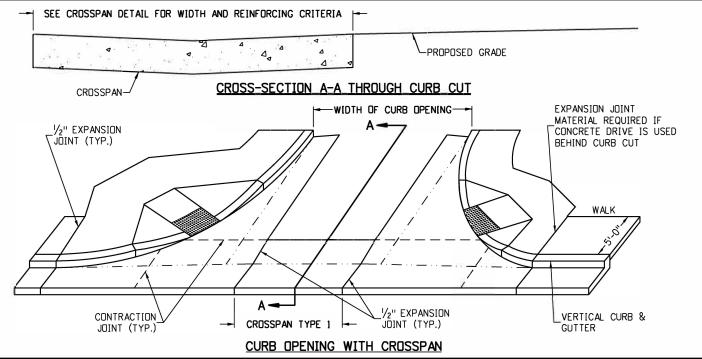
3" CLR. →

SD.6

NOTE: LOCAL STREET INTERSECTIONS REQUIRE AN 8' CROSSPAN. COLLECTOR STREET INTERSECTIONS REQUIRE AN 10' CROSSPAN. CROSSPANS ARE NOT ALLOWED AT ANY ARTERIAL STREET INTERSECTION.

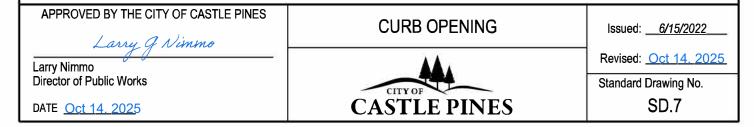
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APPROVED BY THE CITY OF CASTLE PINES Larry G Vinno	CROSSPAN	lssued: <u>6/15/2022</u>
Larry Nimmo	11	Revised: Oct 14, 2025
Director of Public Works	CITY OF	Standard Drawing No.
DATE Oct 14, 2025	CASTLE PINES	en e

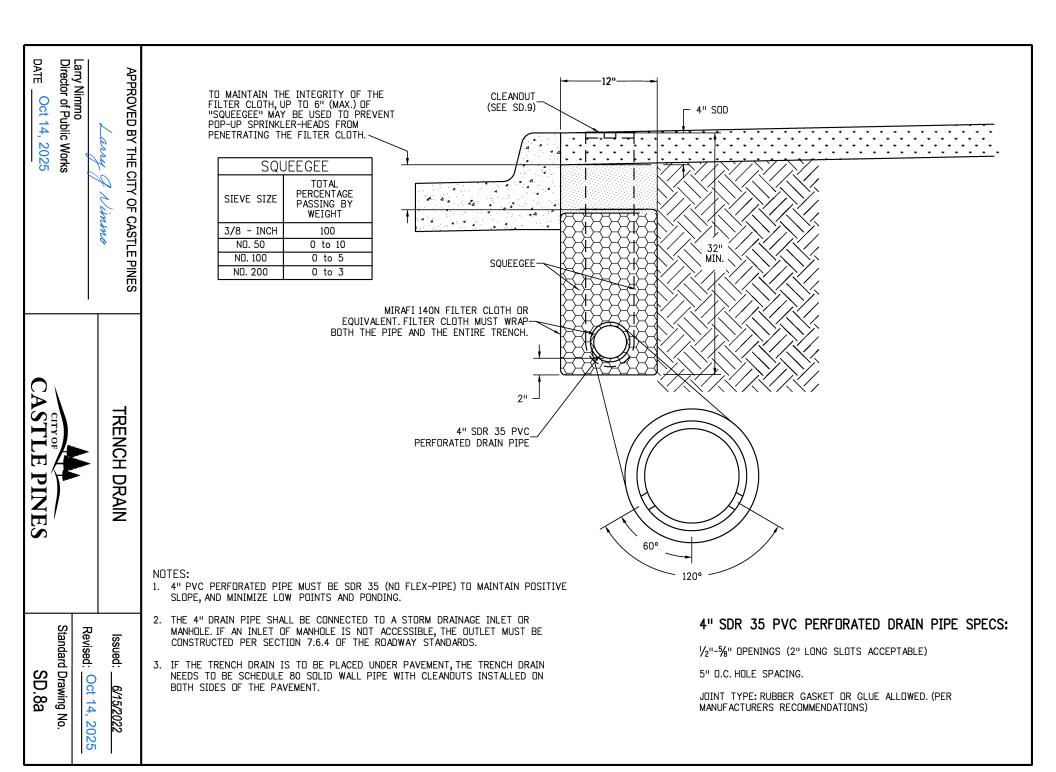


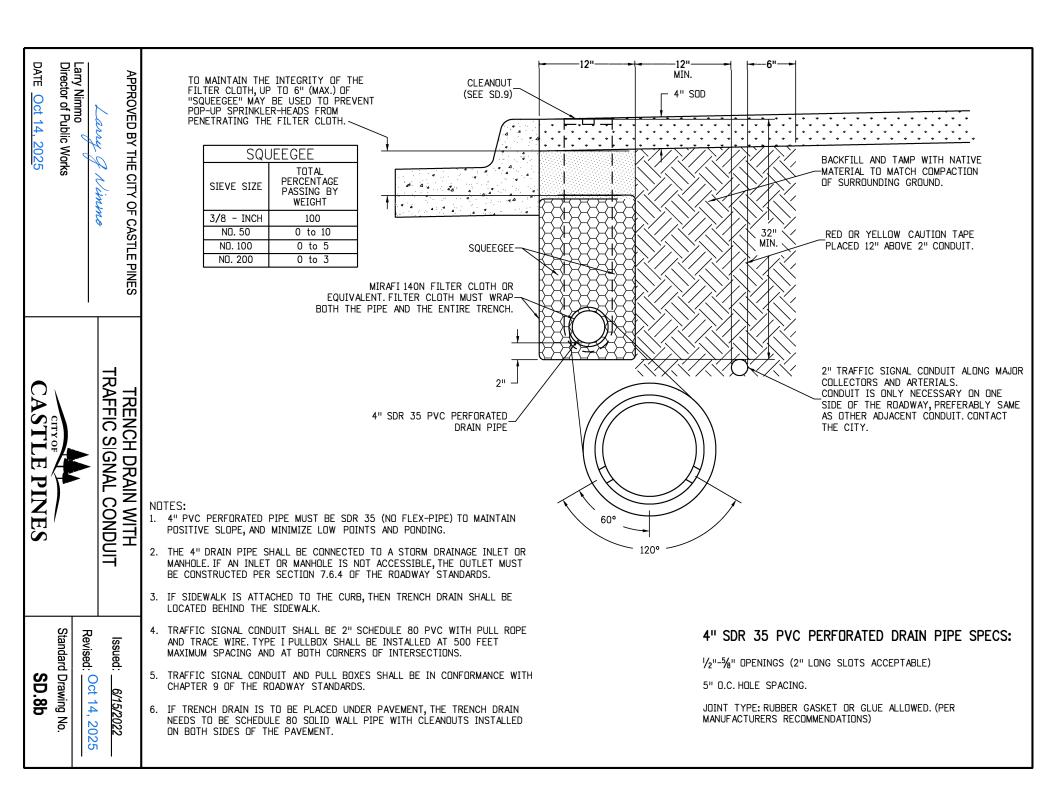


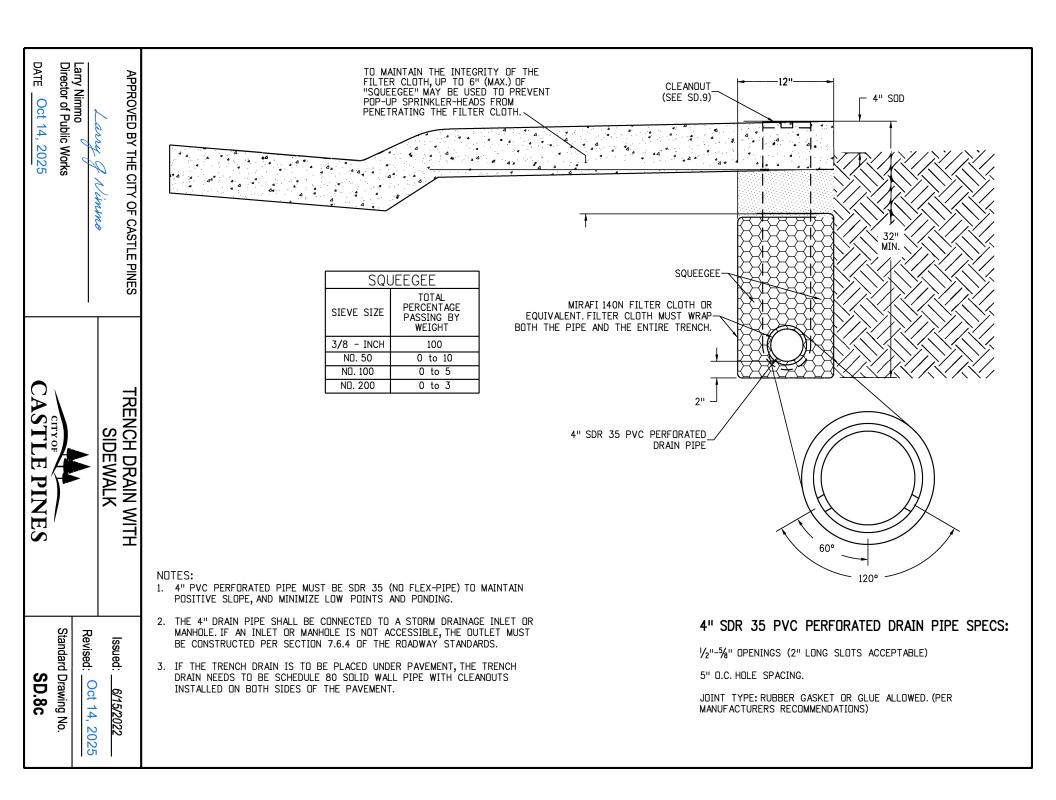
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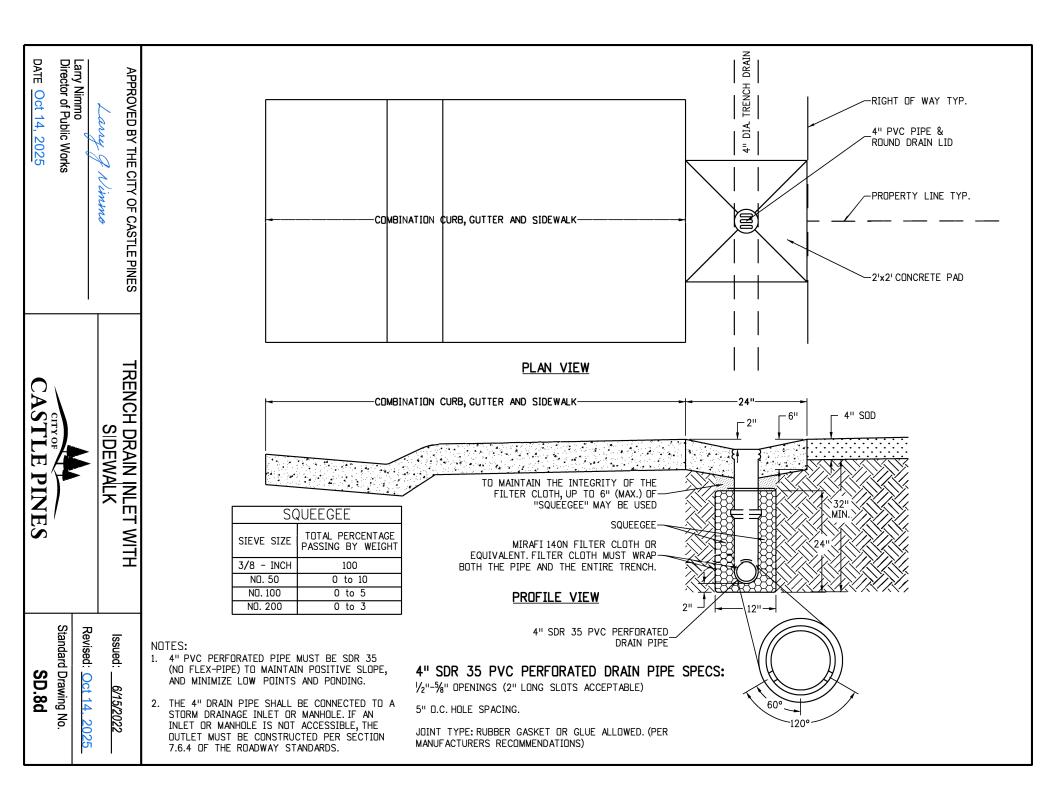
- 1. BACK OF CURB CUT EXTENDS TO BACK OF WALK OR BACK OF BICYCLE PATH. IF NO WALK IS PRESENT, EXTEND BACK OF CURB CUT TO 5'-6" BEHIND FLOWLINE OR TO R.O.W. LINE, WHICHEVER IS GREATER.
- 2. CITY SHALL APPROVED LOCATION OF CURB CUT BEFORE CONSTRUCTION.
- 3. CURB OPENINGS OF 30'OR MORE MUST BE CONSTRUCTED WITH A MINIMUM 20'RADIUS CURB RETURN.
- 4. DESIGN ENGINEER MUST DEMONSTRATE THAT STREET DRAINAGE STAYS WITHIN THE STREET RIGHT-OF-WAY.

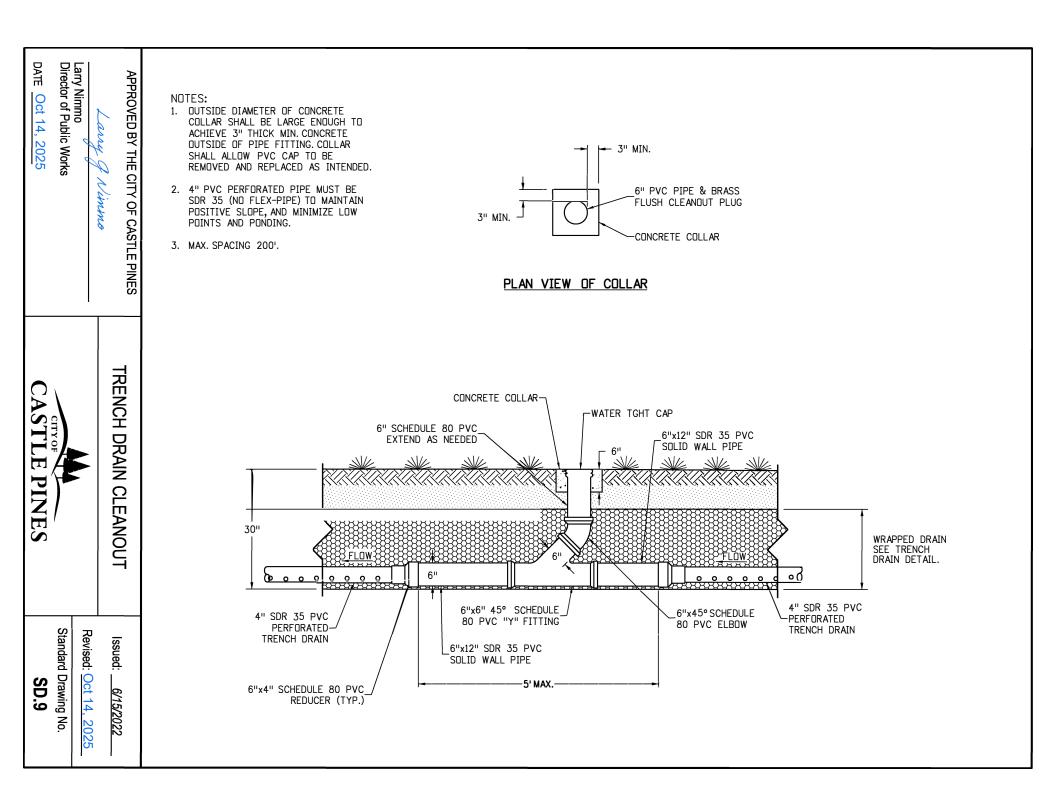


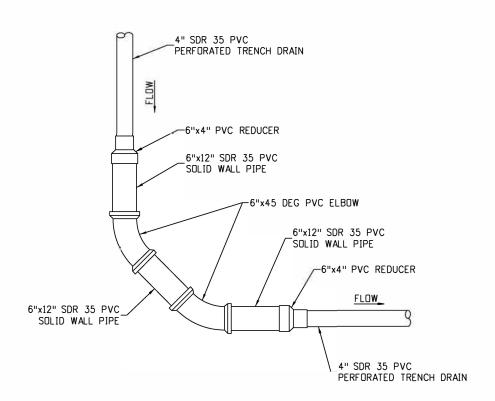












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Larry G Nimmo

Larry Nimmo Director of Public Works

DATE Oct 14, 2025

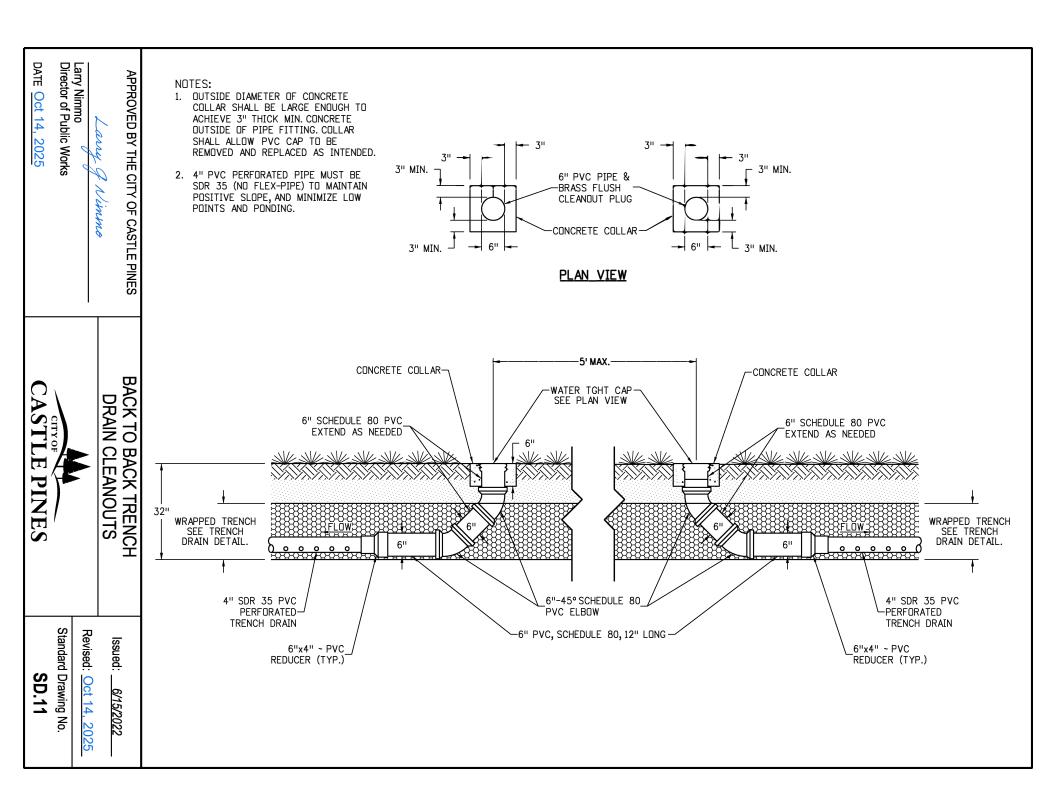
TRENCH DRAIN 90° CORNER

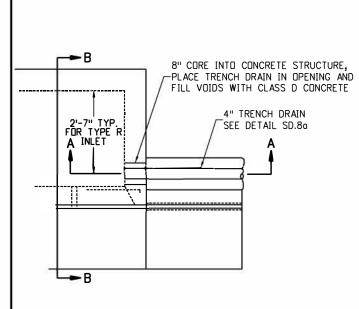


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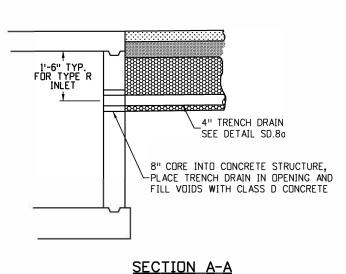
Revised: Oct 14, 2025

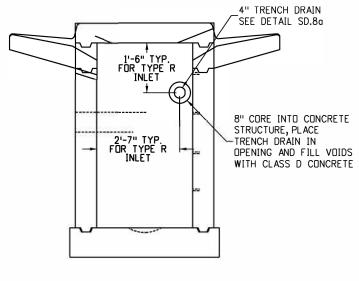
Standard Drawing No.





PLAN VIEW





SECTION B-B END_VIEW

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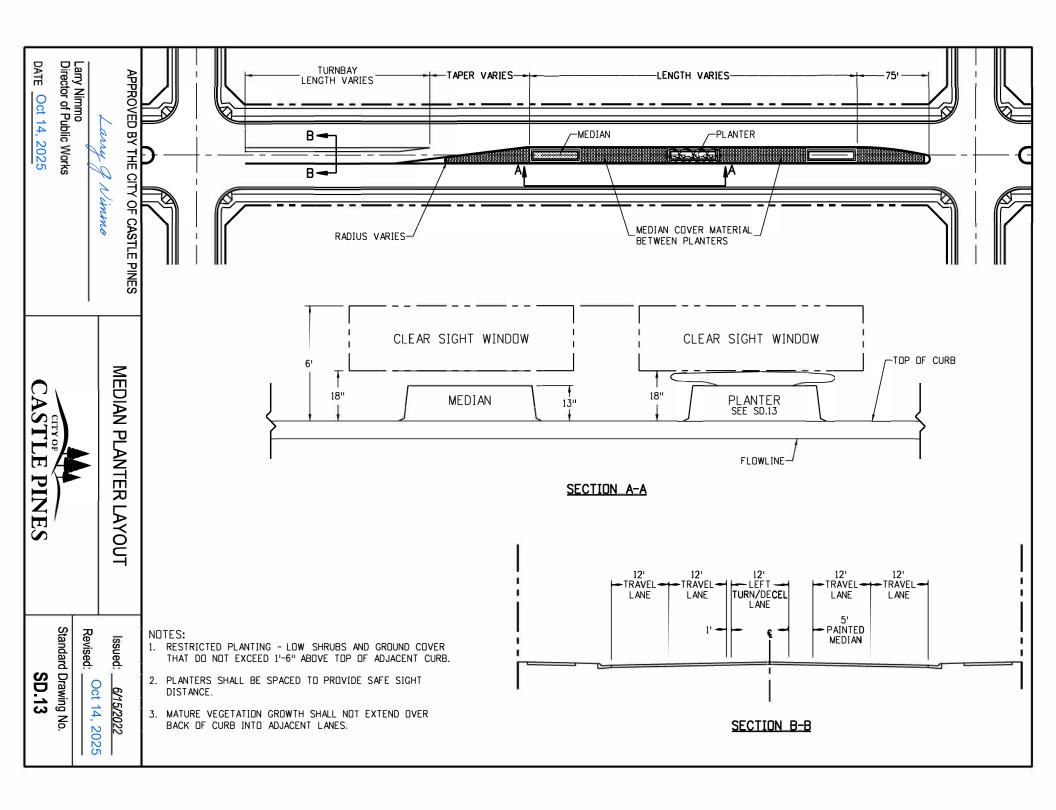
TRENCH DRAIN CONNECTION TO INLET OR MANHOLE

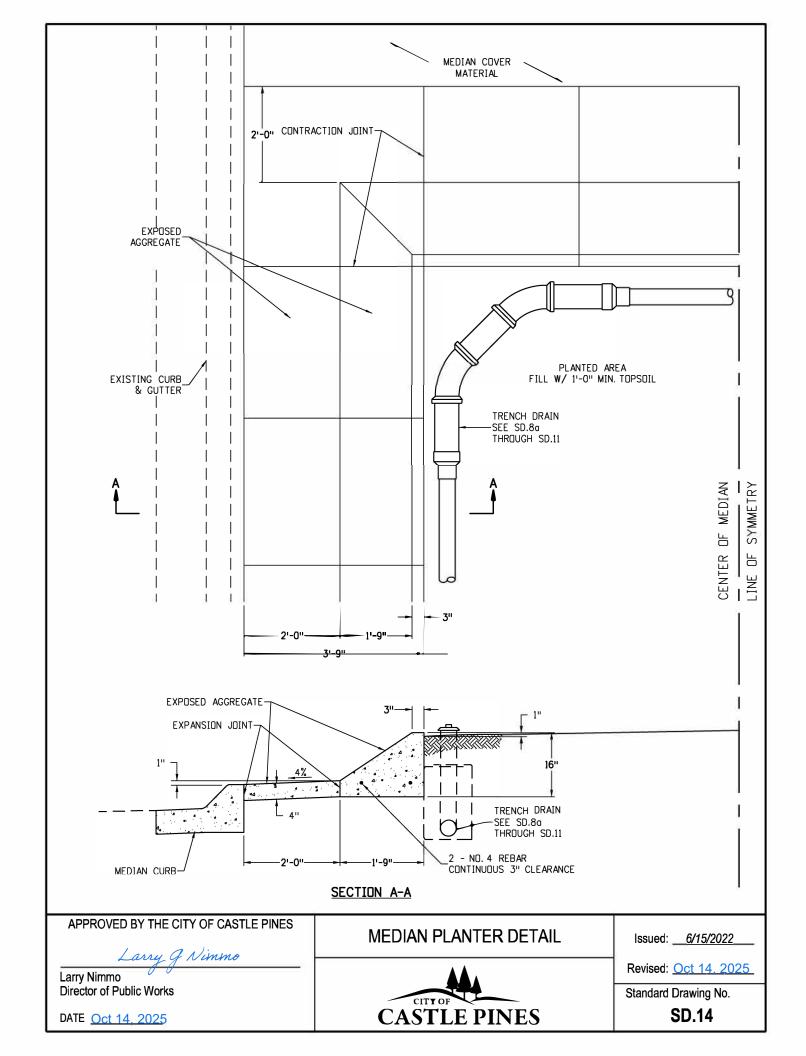


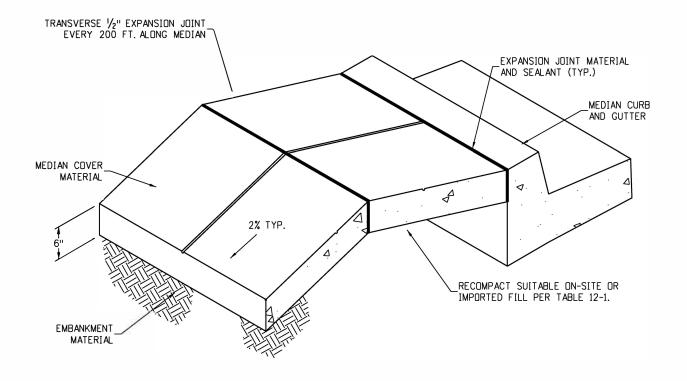
Issued: __6/15/2022_

Revised: Oct 14, 2025

Standard Drawing No.







NOTES:

- 1. MEDIAN COVER MATERIAL SHALL BE CLASS D OR CLASS P CONCRETE.
- 2. INSTALL $\frac{1}{2}$ "x6" EXPANSION MATERIAL AT MEDIAN NOSES, FIXED OBJECTS, AND AT TRANSVERSE JOINTS AT 200 FT. INTERVALS (MAXIMUM) ALONG THE MEDIAN.
- 3. CONCRETE IS TO BE COLORED SUNSET ROSE #160 OR APPROVED EQUAL WHEN MEDIAN IS IN A CONCRETE ROADWAY.
- 4. FOR WEED CONTROL PRIOR TO MEDIAN PAVING, APPLY A PRE-EMERGENT HERBICIDE TO MEDIAN SUBGRADE AREA PER MANUFACTURER'S SPECIFICATIONS FOR PAVING UNDER THE BARRIER 50 LABEL (PBI GORDAN). TRIFLURALIN IS LABELED FOR USE UNDER ASPHALT UNDER THE TREFLAN 4EC LABEL (EIANCO).

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DATE Oct 14, 2025

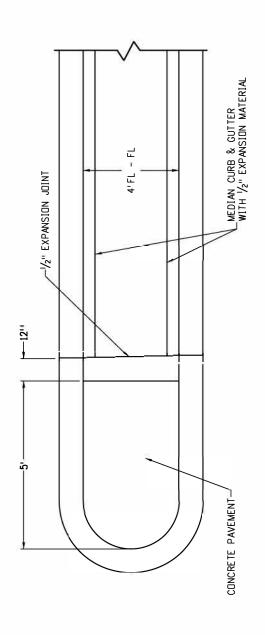
MEDIAN COVER MATERIAL

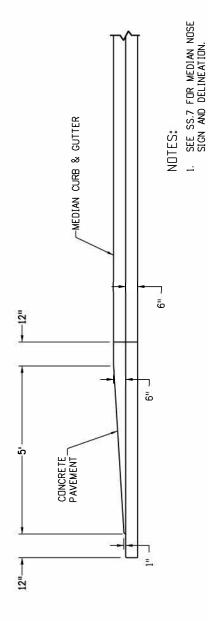
CASTLE PINES

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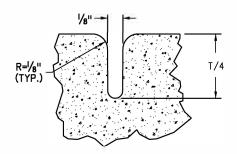
MEDIAN NOSE DETAIL



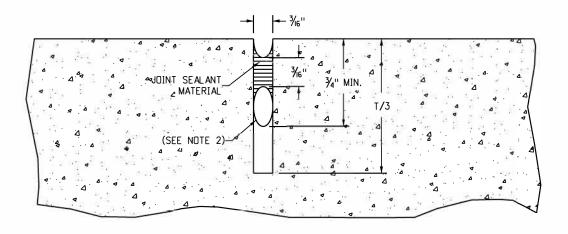
Issued: __6/15/2022

Revised: Oct 14, 2025

Standard Drawing No.

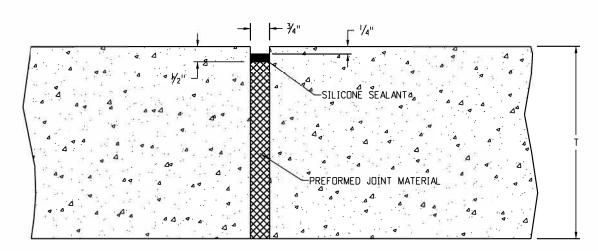


CONTRACTION OR WEAKEN PLANE JOINT N.T.S.



NOTE: WASH & BLOW OUT WITH FORCED AIR UNTIL DRY BEFORE APPLYING SEALANT MATERIAL.

SAWED JOINT N.T.S.



EXPANSION JOINT

NOTES:

- 1. JOINT SEALANT MATERIAL MUST BE ON COOT APPROVED PRODUCTS LIST.
- 2. 3/8" DIA. BACKER ROD.

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Larry Nimmo Director of Public Works

DATE Oct 14, 2025

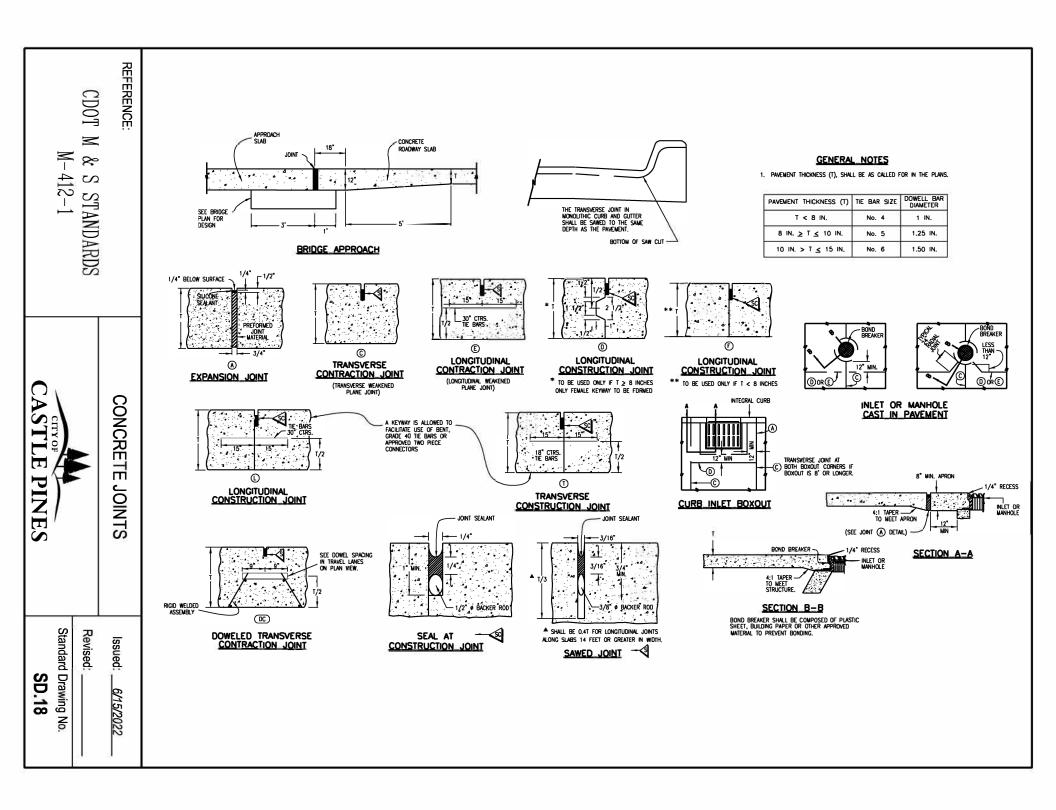
CONCRETE JOINTS

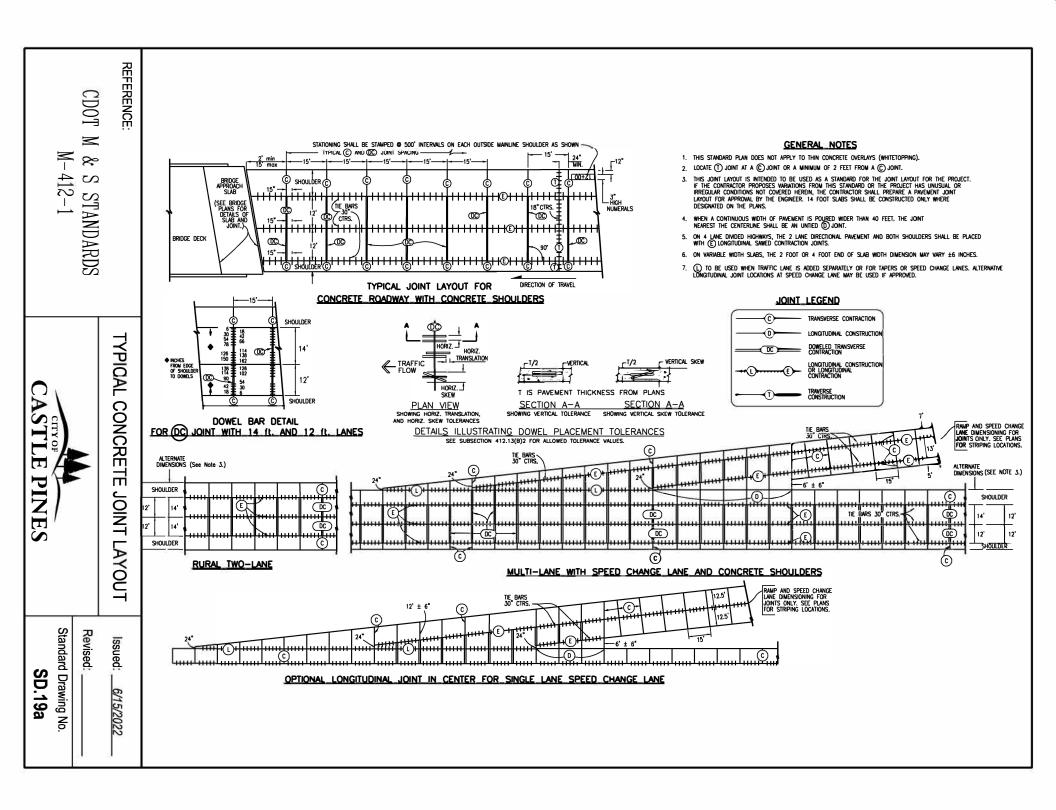
CASTLE PINES

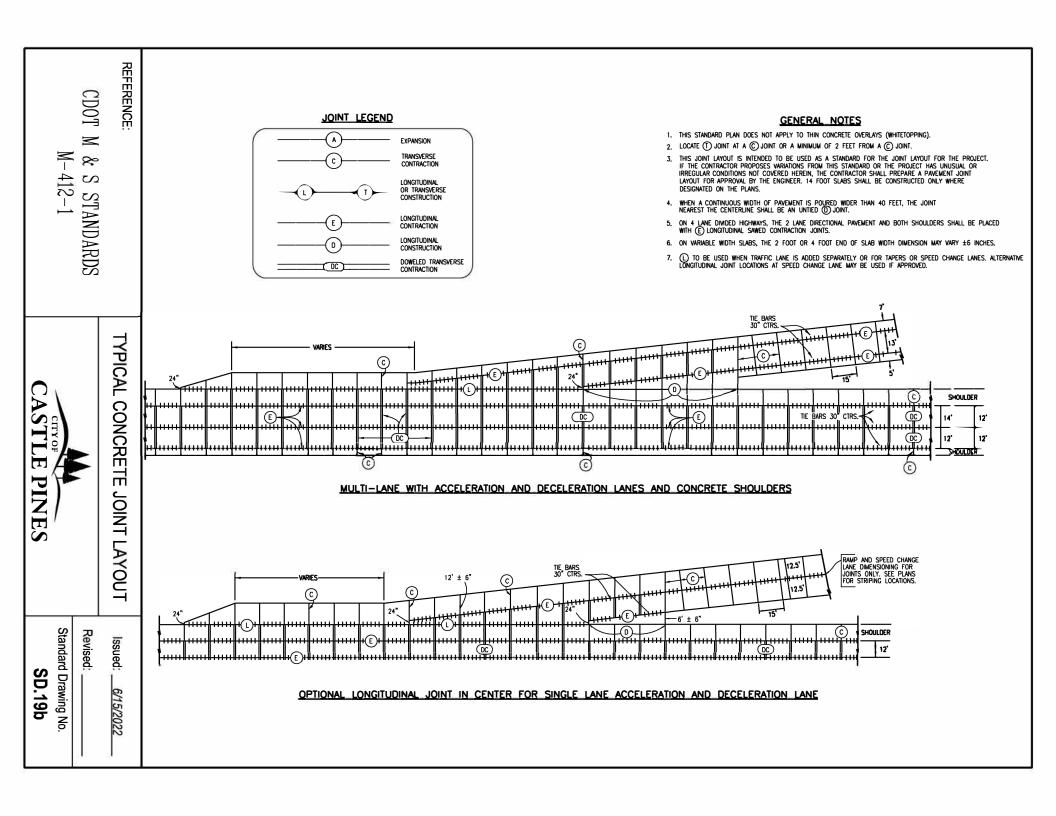
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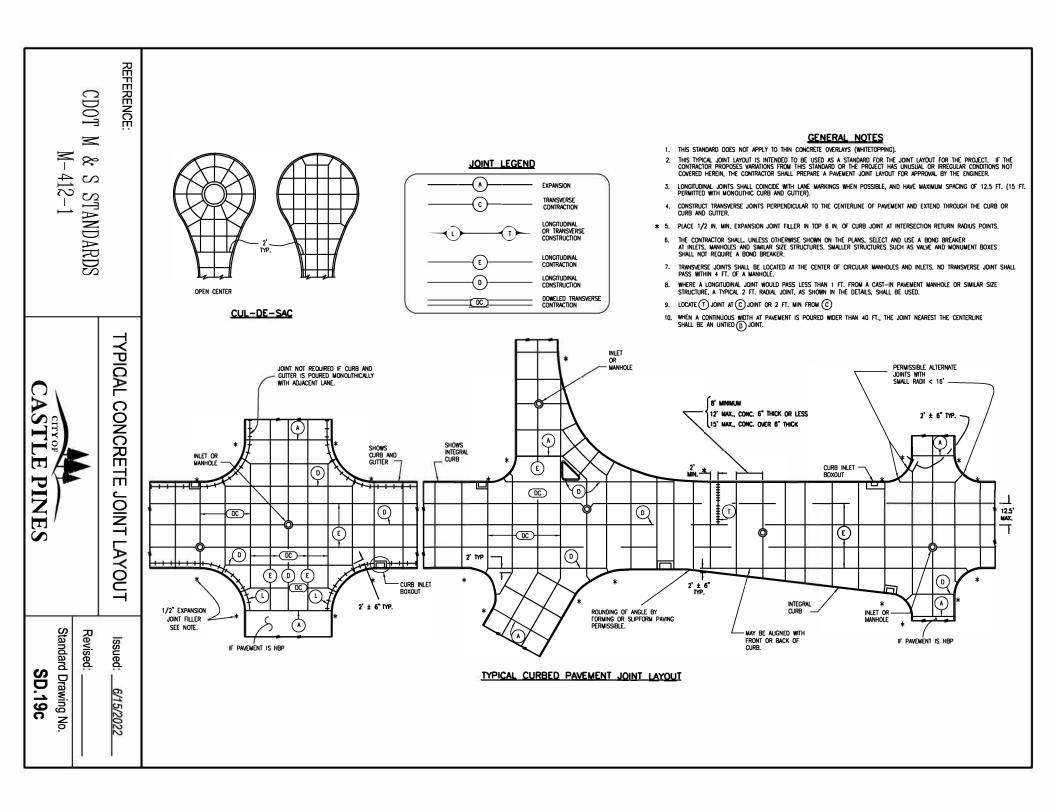
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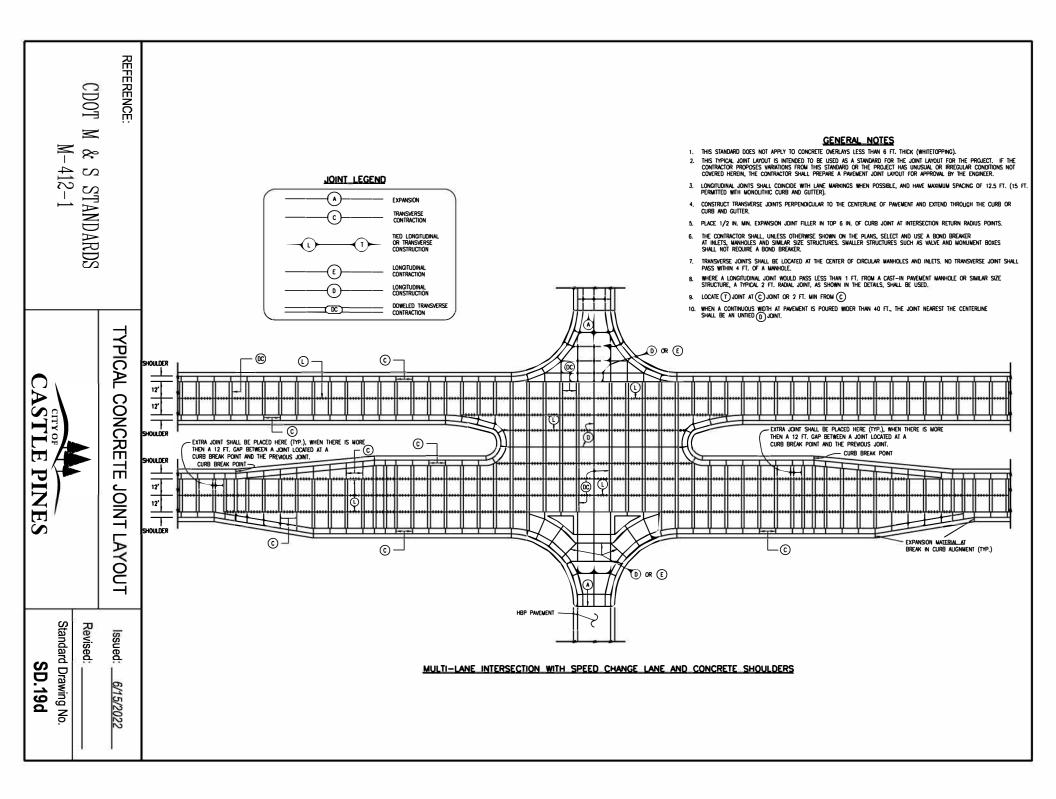
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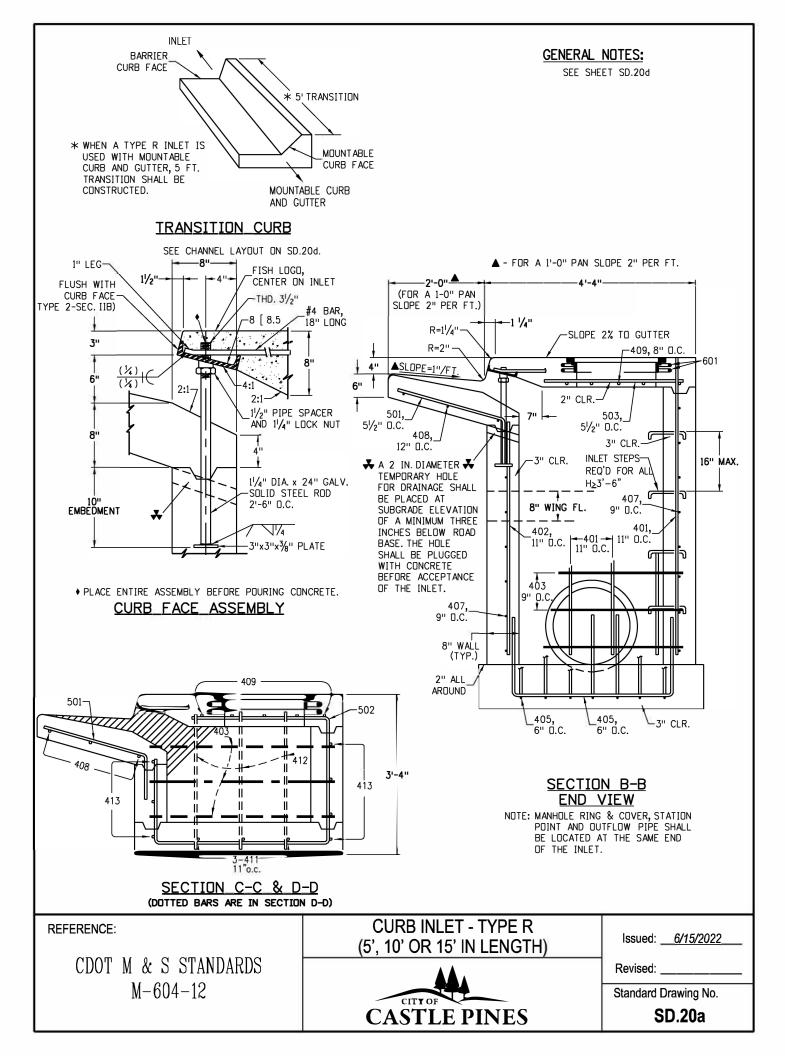


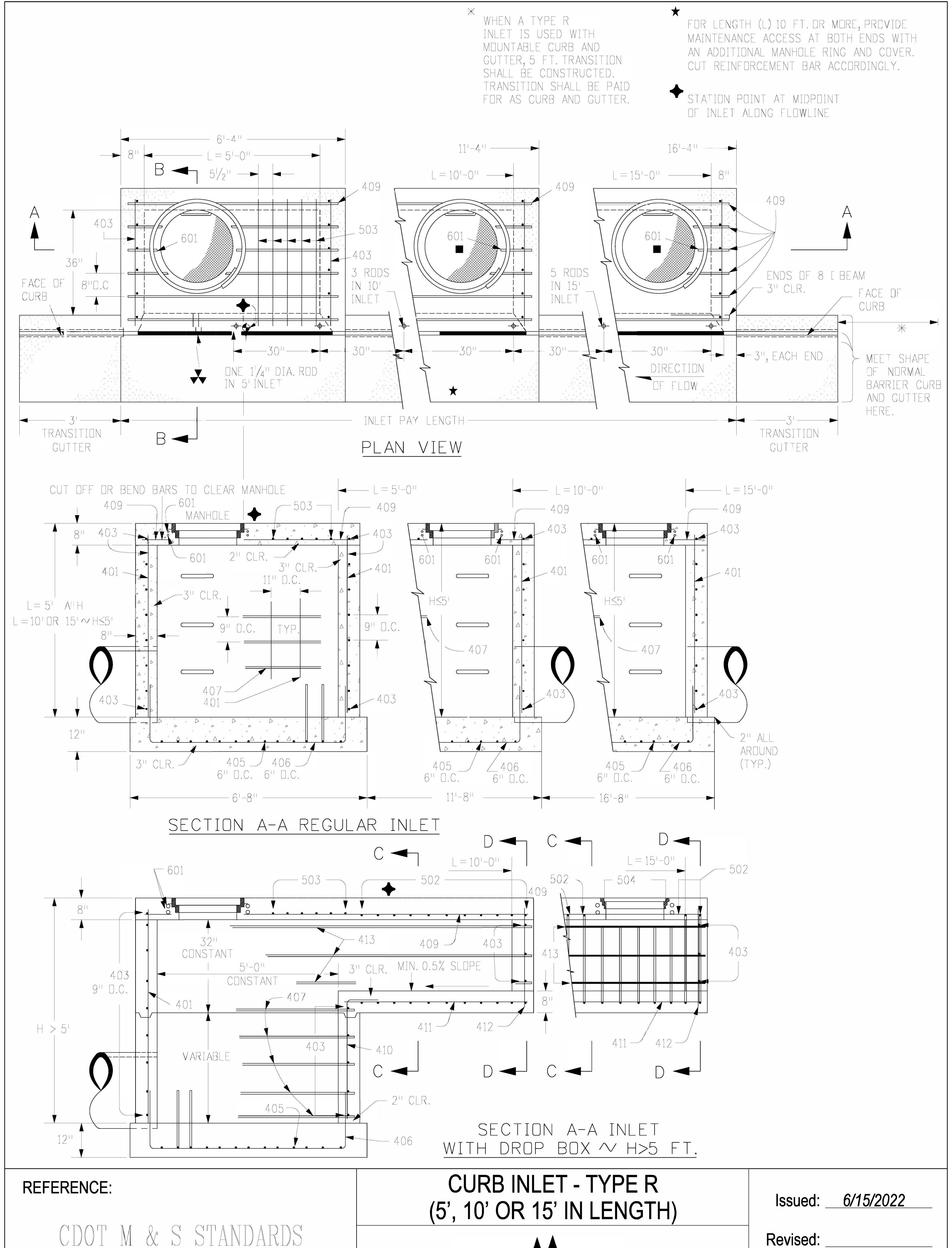












CDOT M & S STANDARDS

M-604-12



i veviseu.

Standard Drawing No.

SD.20b

	BAR #	0.C.		ALL INI	_ETS	II.	INLETS: H ≤ 5 FT.				INLETS: H > 5 FT.			
MARK	OR	SPACING	TYPE	L = 5	L = 5 FT.		L = 10 FT. L = 15 FT.		5 FT.	L = 1	0 FT.	L = 15 FT.		
	SIZE			NO. REQ'D.	LENGTH	NO. REQ'D.	LENGTH	NO. REQ'D.	LENGTH	NO. REQ'D.	LENGTH	NO. REQ'D.	LENGTH	
401	4	1 1"	II	15	*	21	*	26	*	11	*	11	*	
402	4	1 1"	П	7	*	13	*	18	*	7	*	7	*	
403	4	9 "	- 11	*	4'-0"	*	4'-0"	*	4'-0"	*	4'-0"		4'-0"	
405	4	6 "	VI	11	6'-10"	21	6'-10"	31	6'-10"	11	6'-10"	11	6'-10	
406	4	6 "	VIII	7	8'-10"	7	13'-10"	7	18'-10"	7	8'-10"	7	8'-10"	
407	4	9 "	П.,	*	5'-10"	*	10'-10"	*	15'-10"	*	5'-10"		5'-10"	
408	4	12"	II	3	6'-10"	3	11'-10"	3	16'-0"	3	11'-10"	3	16'-0"	
409	4	8 "	Ш	6	5'-10"	6	10'-10"	6	15'-10"	6	10'-10"	6	15'-10"	
410	4	1 1"	VII							3	*	3	*	
411	4	1 1"	11							3	5'-2"	3	10'-2"	
412	4	11"	II .							3	2'-9"	3	2'-9"	
413	4	9 "	II							7	10'-10"	7	15'-10"	
501	5	5 ¹ /2"	IV	11	3'-4"	22	3'-4"	33	3'-4"	22	3'-4"	33	3'-4"	
502	5	51/2"	III		,		J .		J +	11	11'-5"	17	11'-5"	
503	5	51/2"	- 11	5	3'-6"	16	3'-6"	27	3'-6"	6	3'-6"	6	3'-6"	
504	5	51/2"	ΙX							3		5	8'-4"	
601	6	21/2"	V	2	8'-10"	2	8'-10"	2	8'-10"	2	8'-10"	4	8'-10"	
■8[8.5				1	5'-10"	1	10'-10"	1	15'-10"	1	10'-10"	1	15'-10"	
			- "	2 BARS, 1 ROD		4 BARS, 3 RODS		8 BARS, 5 RODS		4 BARS, 3 RODS		8 BARS, 5 RODS		

^{*} VARIABLE, REFER TO TABLE TWO.

REGULAR INLETS

DROP BOX INLETS

TABLE ONE ~ BAR LIST FOR CURB INLETS, TYPE "R"

			Q'D.	L=5'		L=10)'	L=	15'				
'H'	401	402	410	REGUL 403	.AR 407	DROP E	30X 407	CONC. CU. YDS.	STEEL LBS.	CONC. CU. YDS.	STEEL LBS.	CONC. CU. YDS.	STEEL LBS.
3'-0"	2'-8"	1'-8"		10	7			3.2	285	5.3	497	7.4	706
3'-6"	3'-2"	2'-2"		10	. 7			3.4	305	5.7	528	7.9	747
4'-0"	3'-8"	2'-8"		12	9			3.7	326	6.0	559	8.4	786
4'-6"	4'-2"	3'-2"		12	9			3.9	334	6.4	571	8.8	803
5'-0"	4'-8"	3'-8"		14	11			4.1	354	6.7	602	9.3	844
5'-6"	5'-2"	4'-2"	3'-5"	16	13	15	6	4.4	375	6.0	607	7.4	850
6'-0"	5'-8"	4'-8"	3'-11"	16	13	16	6	4.6	382	6.2	616	7.6	860
6'-6"	6'-2"	5'-2"	4'-5"	18	15	18	8	4.8	402	6.4	637	7.8	880
7'-0"	6'-8"	5'-8"	4'-11"	20	17	19	10	5.0	423	6.6	654	8.0	897
7'-6"	7'-2"	6'-2"	5'-5"	20	17	20	10	5.3	430	6.9	664	8.3	907
8'-0"	7'-8"	6'-8"	5'-11"	22	19	22	12	5.5	451	7.1	684	8.5	927
8'-6"	8'-2"	7'-2"	6'-5"	24	21	23	14	5.7	471	7.3	702	8.7	944
9'-0"	8'-8"	7'-8"	6'-11"	24	21	24	14	6.0	479	7.6	711	9.0	954
9'-6"	9'-2"	8'-2"	7'-5"	26	23	26	16	6.2	499	7.8	732	9.2	974
10'-0"	9'-8"	8'-8"	7'-11"	28	25	27	18	6.4	520	8.0	749	9.4	992
10'-6"	10'-2"	9'-2"	8'-5"	28	25	28	18	6.7	527	8.3	759	9.7	1001
11'-0"	10'-8"	9'-8"	8'-11"	30	27	30	20	6.9	547	8.5	779	9.9	1022

Notes: For L=5 ft., L=10 ft., and L=15 ft.

Regular inlets: Total quantities needed are outside the heavy black line.

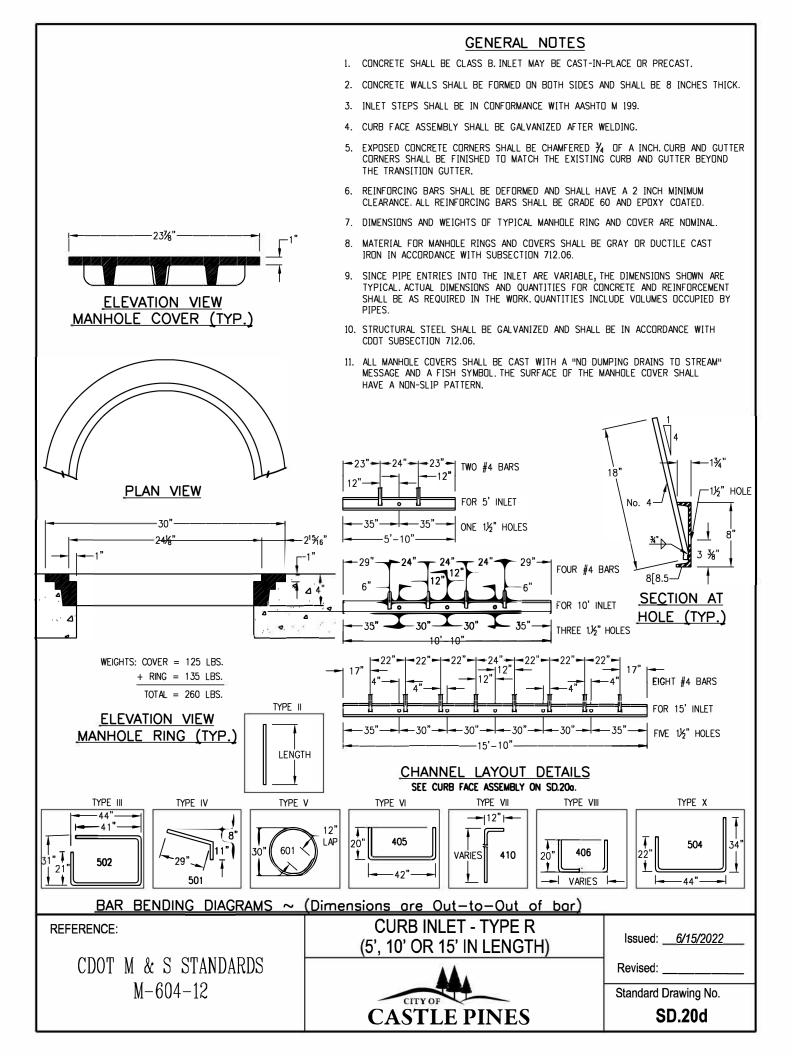
Drop box inlets: Total quantities needed are inside the heavy black line.

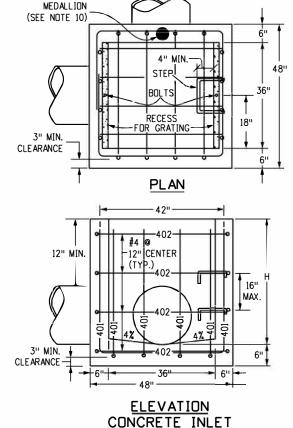
STEEL WEIGHTS DO NOT INCLUDE STRUCTURAL STEEL CHANNEL.

TABLE TWO ~ BARS AND QUANTITIES VARIABLE WITH "H"

CDOT M & S STANDARDS M-604-12	(5', 10' OR 15' IN LENGTH)	Revised: Standard Drawing No.
M 001 18	CASTLE PINES	SD.20c

 $[\]blacksquare$ INCLUDE #4, 18 IN. BARS (SEE CHANNEL LAYOUT).





GENERAL NOTES

- INLET TYPE C IS NOT HS-20 RATED AND SHALL NOT BE PLACED IN PAVED ROADWAYS. THIS INLET SHALL BE USED ONLY OUTSIDE PAVED ROADWAYS.
- 2. CONCRETE SHALL BE CLASS B. INLET MAY BE CAST-IN-PLACE OR PRECAST.
- REINFORCING BARS SHALL BE GRADE 60, EPOXY COATED, AND DEFORMED #4, AND SHALL HAVE A MIN. 2 INCH CLEARANCE. CUT OR BEND AROUND PIPES AS REQUIRED.
- 4. CONCRETE SLOPE AND DITCH PAVING SHALL BE IN ACCORDANCE WITH SECTION 507. REINFORCEMENT FOR CONCRETE SLOPE PAVING SHALL BE 6 X 6 - W1.4 X W1.4 OR 6 X 6 - W2.1 X W2.1.
- STRUCTURAL STEEL FOR GRATES AND GRATE INSTALLATION HARDWARE SHALL BE GALVANIZED, AND SHALL BE IN ACCORDANCE WITH SUBSECTION 712.06.
- 6. THE STANDARD INLET GRATES SHALL BE USED ON ALL TYPE C INLETS UNLESS CLOSE MESH INLET GRATES ARE ACCEPTED BY THE CITY OF CASTLE PINES THROUGH WRITTEN VARIANCE
- 7. CLOSE MESH GRATES ARE RECOMMENDED WHERE FOOT TRAFFIC OR BICYCLE ROUTES ARE IN CLOSE PROXIMITY TO GRATE. THIS GRATE IS NOT ADA COMPLIANT OR BICYCLE FRIENDLY AND SHALL NOT BE PLACED DIRECTLY IN SIDEWALKS, CROSSWALKS OR BIKE PATHS.
- 8. STEPS SHALL BE PROVIDED WHEN INLET DIMENSION "H" IS EQUAL TO OR GREATER THAN 3 FEET 6 INCHES AND SHALL CONFORM TO AASHTO M 199.
- SEE STANDARD DETAIL SD.22a, SD.22b, AND SD.22c, FOR REINFORCEMENT AROUND THE PIPE OPENING.
- 10. ALL INLETS SHALL HAVE A 4 INCH DIA METAL MEDALLION WITH A "NO DUMPING DRAINS TO STREAM" MESSAGE ON IT. THE MEDALLION SHALL HAVE A FISH SYMBOL WITH A BLUE BACKGROUND. IT SHALL BE FIRMLY ATTACHED TO THE TOP OF THE INLET WITH A PERMANENT FASTENER.

QUANTITIES FOR ONE INLET

	▼	•	
Н	CONCRETE (CU. YDS.)	STEEL (LBS.)	ND. STEPS REQ'D.
2'-6"	1.0	76	0
3'-0"	1.1	81	0
3'-6"	1.2	97	0
4'-0"	1.3	102	1
4'-6"	1.5	117	2
5'-0"	1.6	123	2
5'-6"	1.7	138	2
6'-0"	1.9	143	3
6'-6"	2.0	159	3
7'-0''	2.1	164	3
7'-6"	2.2	180	4
8'-0"	2.4	185	4
8'-6"	2.5	200	4
9'-0"	2.6	206	5
9'-6"	2.8	221	5
10'-0"	2.9	236	6
11'-6"	3.3	252	6

▼ PIPE INSIDE DIAMETER SHALL BE 30 IN. OR LESS. CONCRETE AND STEEL QUANTITIES ARE FOR ONE ENTIRE INLET BEFORE DEDUCTION FOR VOLUME OCCUPIED BY PIPE. WEIGHT OF STEEL INCLUDES A RING FOR THE MAXIMUM PIPE DIAMETER.

BAR LIST FOR H = 2 FT.-6 IN. AND BENDING DIAGRAM

MARK	NO. REQ'D.	HEIGHT	LENGTH						
401	2	2'-21/2''	8'-0"						
401	6	2'-7"	8'-8"						
402	4	''U''	15'-4"						
"U" INC	NO. 401 NO. 401 "U" INCREASE DIMENSION 6 IN. FOR EACH 6 IN. INCREASE OF "H" ABOVE 2 FT6 IN.								
INCRE		02 -	6" MIN. 12" MIN. ACH FT. OVE						

402 BARS SHALL BE EQUALLY SPACED FROM EACH OTHER.

REFERENCE	Ξ:
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CDOT M & S STANDARDS M-604-10 **INLET - TYPE C**

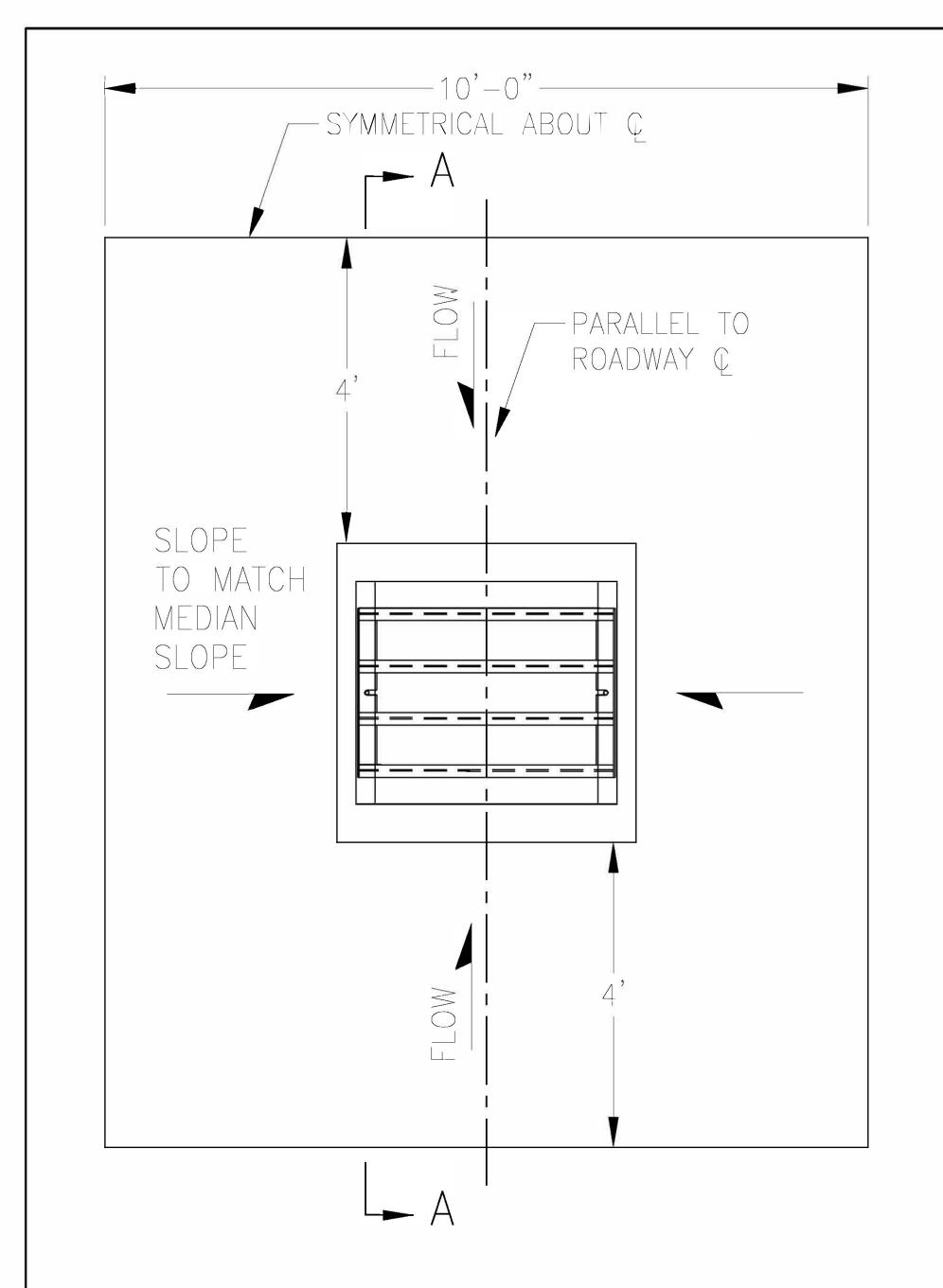


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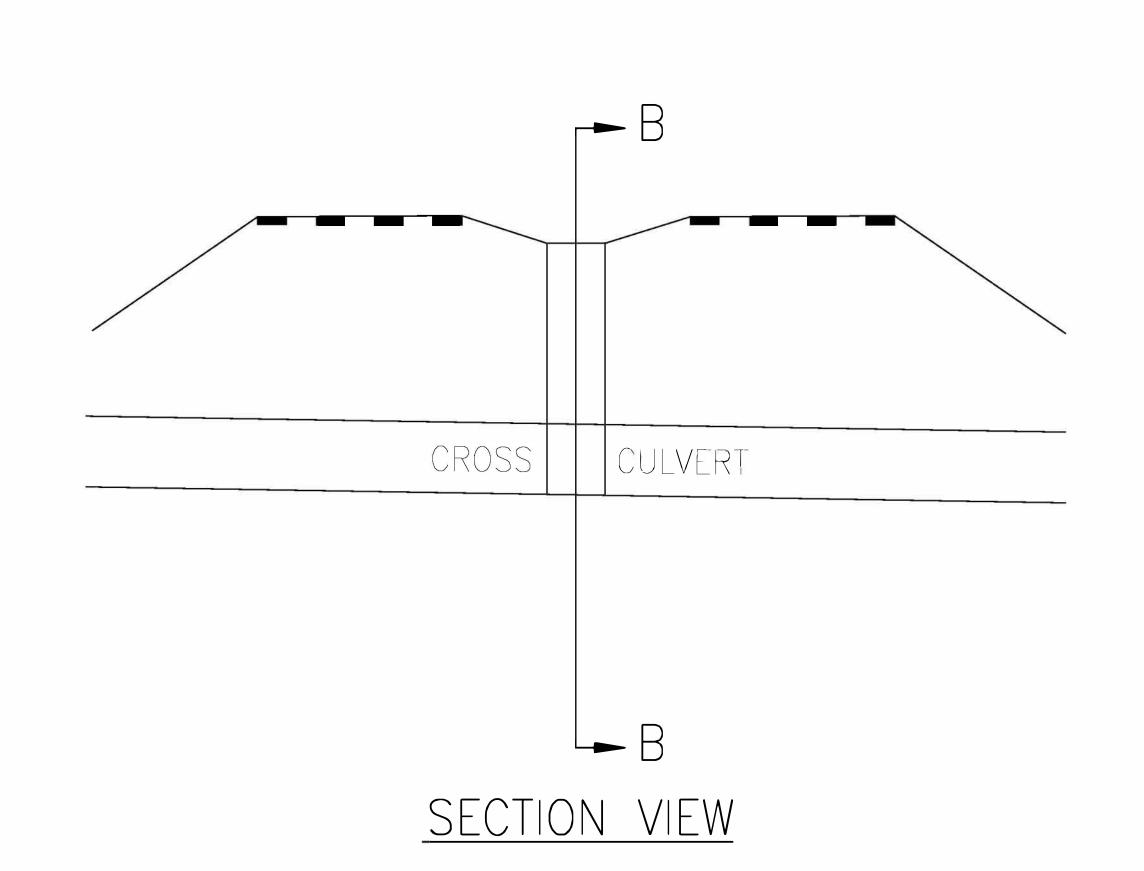
Revised: ____

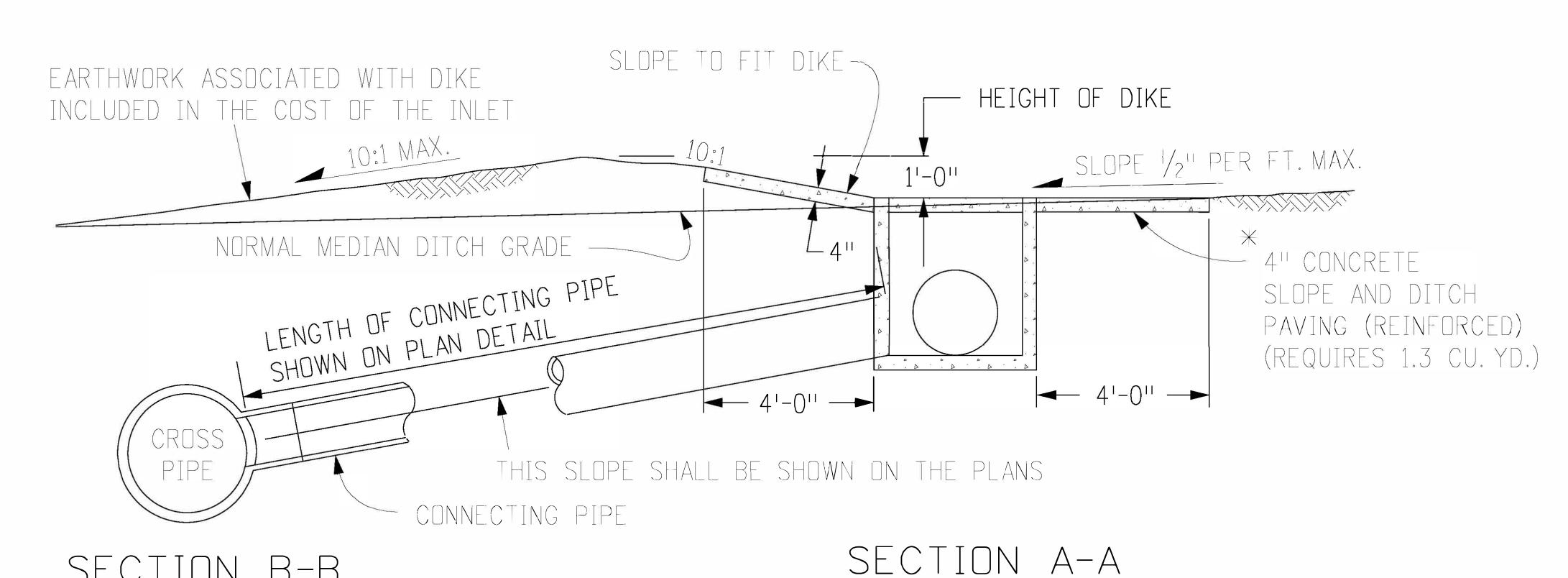
Standard Drawing No.

SD.21a



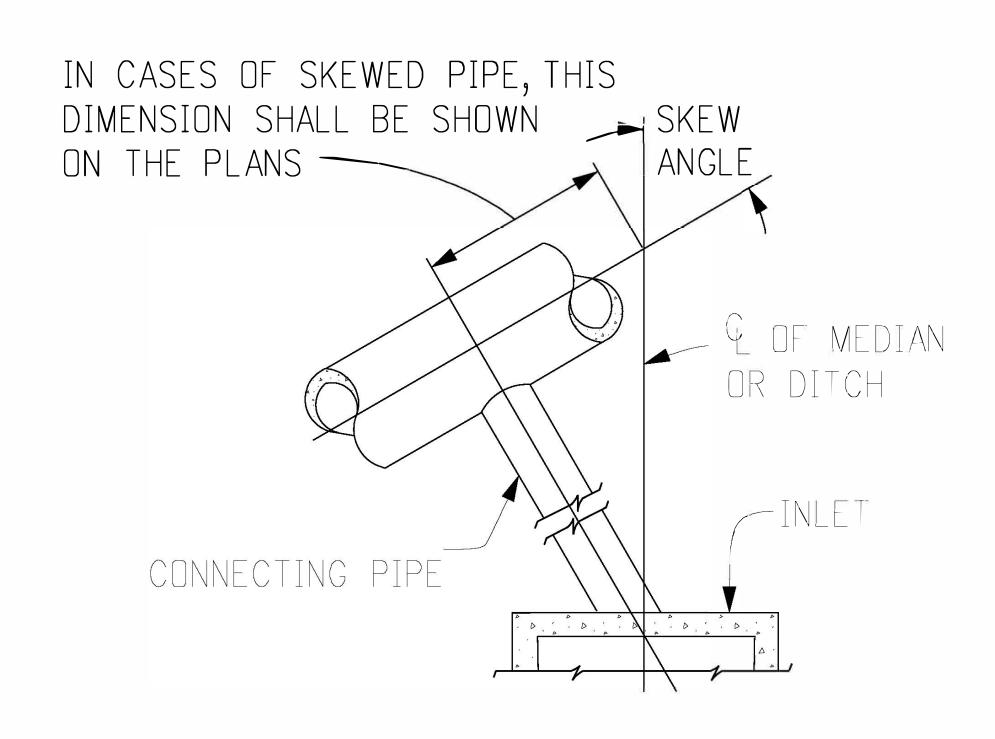
INLET WITH DITCH PAVING



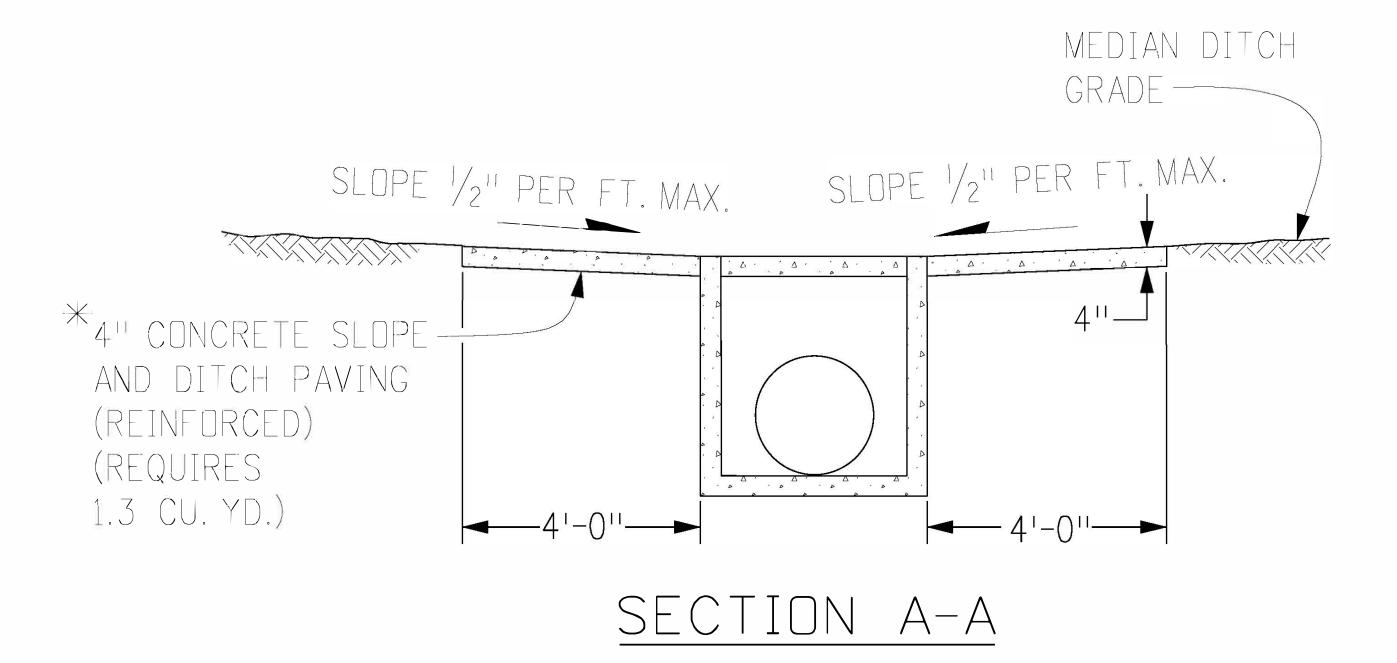


SECTION B-B
INLET CONNECTED
TO A CROSS PIPE

INLET ON GRADE (FLOW FROM ONE DIRECTION)



INLET CONNECTED TO A SKEWED CROSS PIPE



*CONCRETE SLOPE AND DITCH PAVING WILL BE REQUIRED WHEN SHOWN ON THE PLANS.

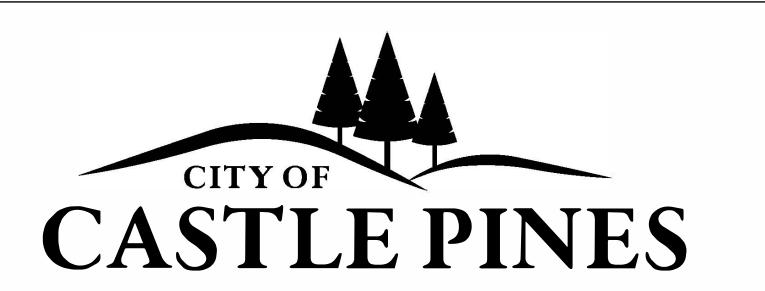
INLET AT BOTTOM OF VERTICAL CURVE (FLOW FROM TWO DIRECTIONS)

REFERENCE:

CDOT M & S STANDARDS

M-604-10

INLET - TYPE C

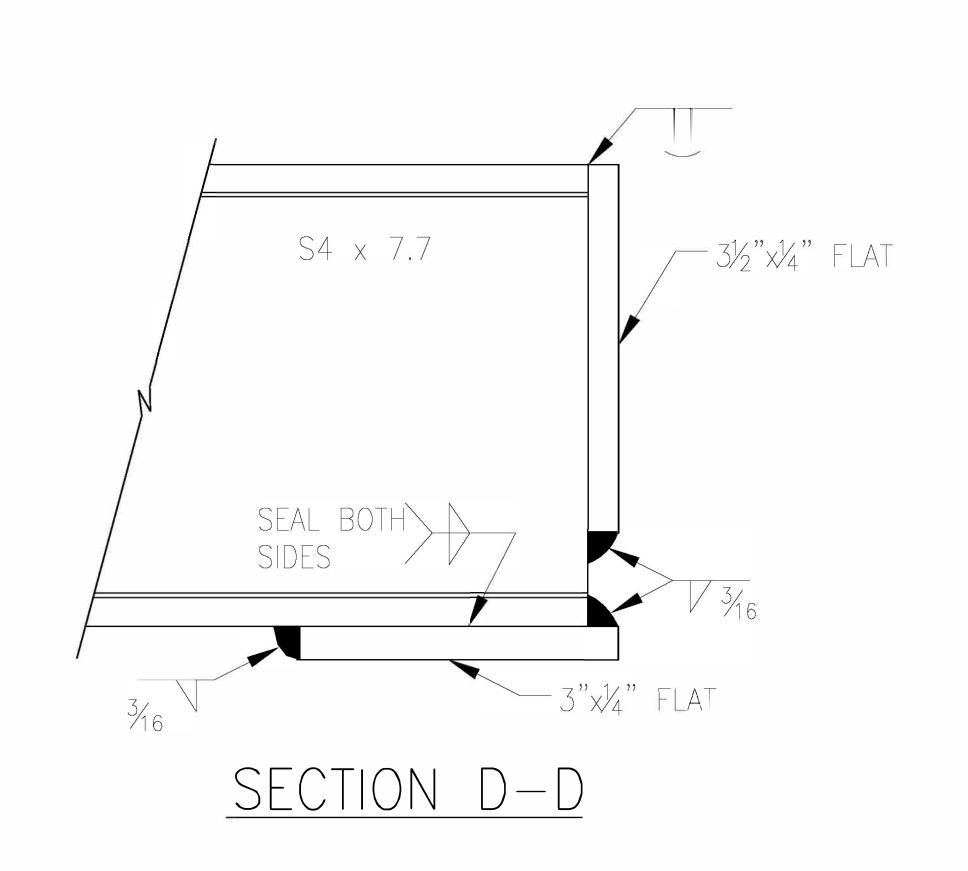


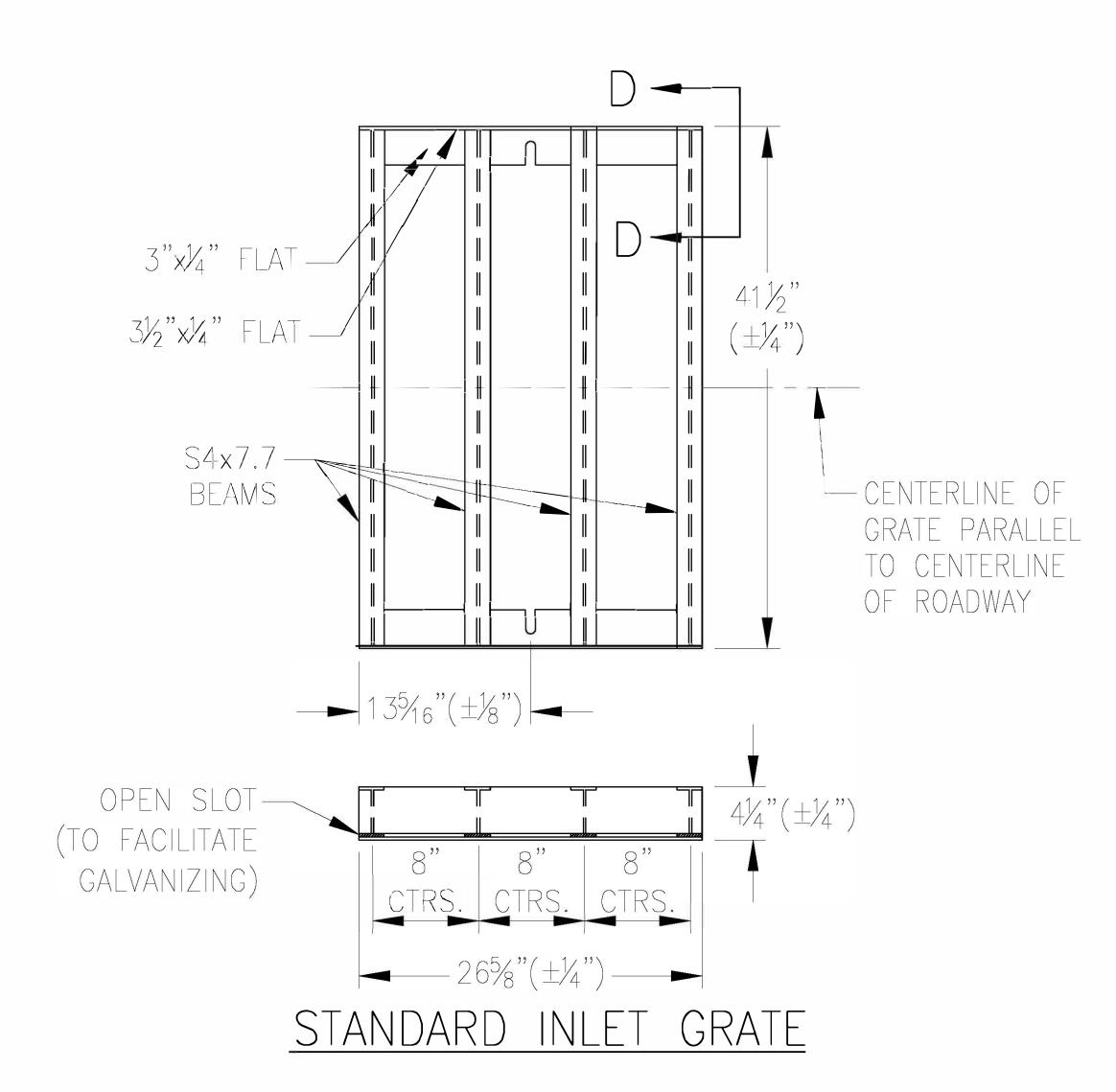
Issued: <u>6/15/2022</u>

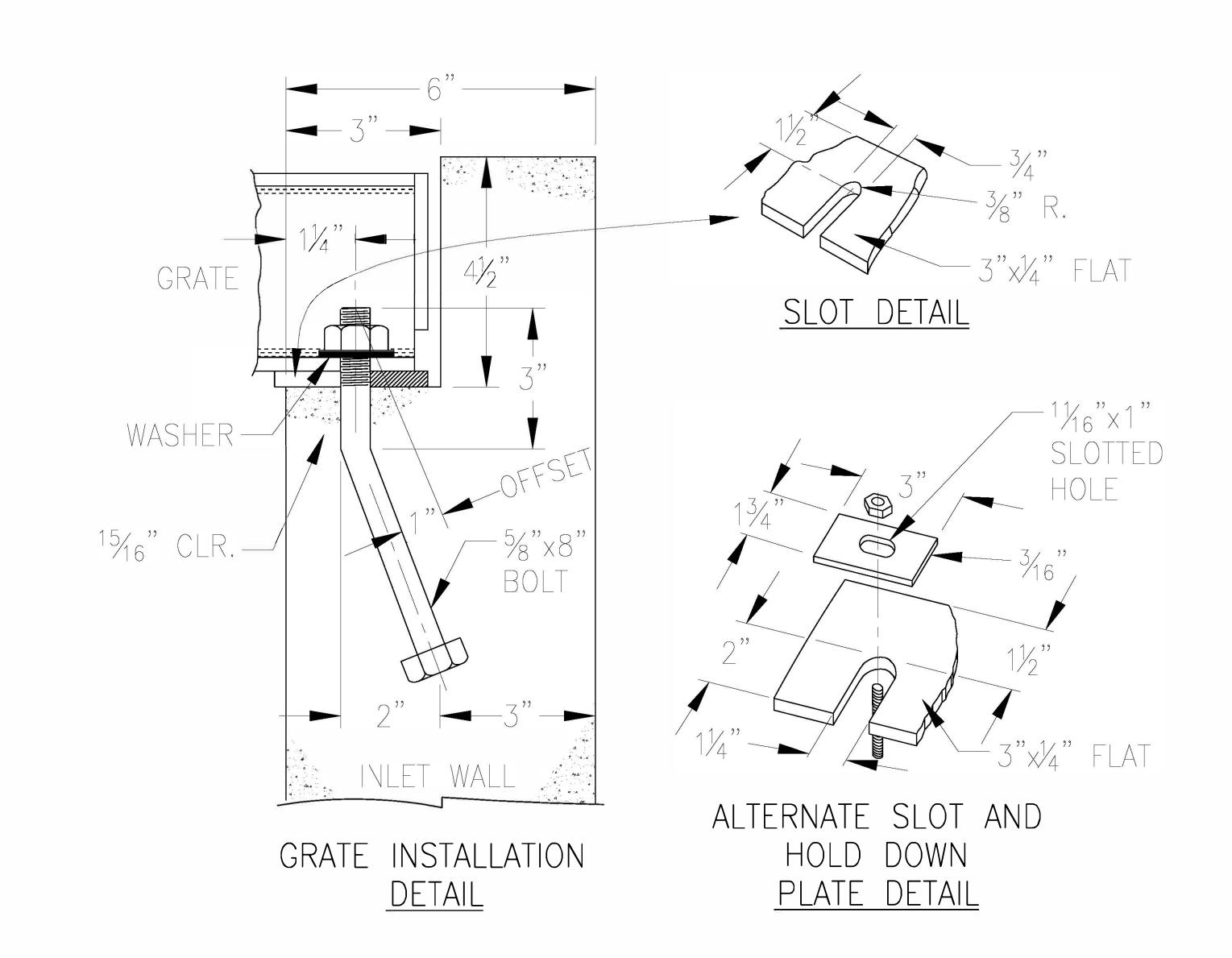
Revised:

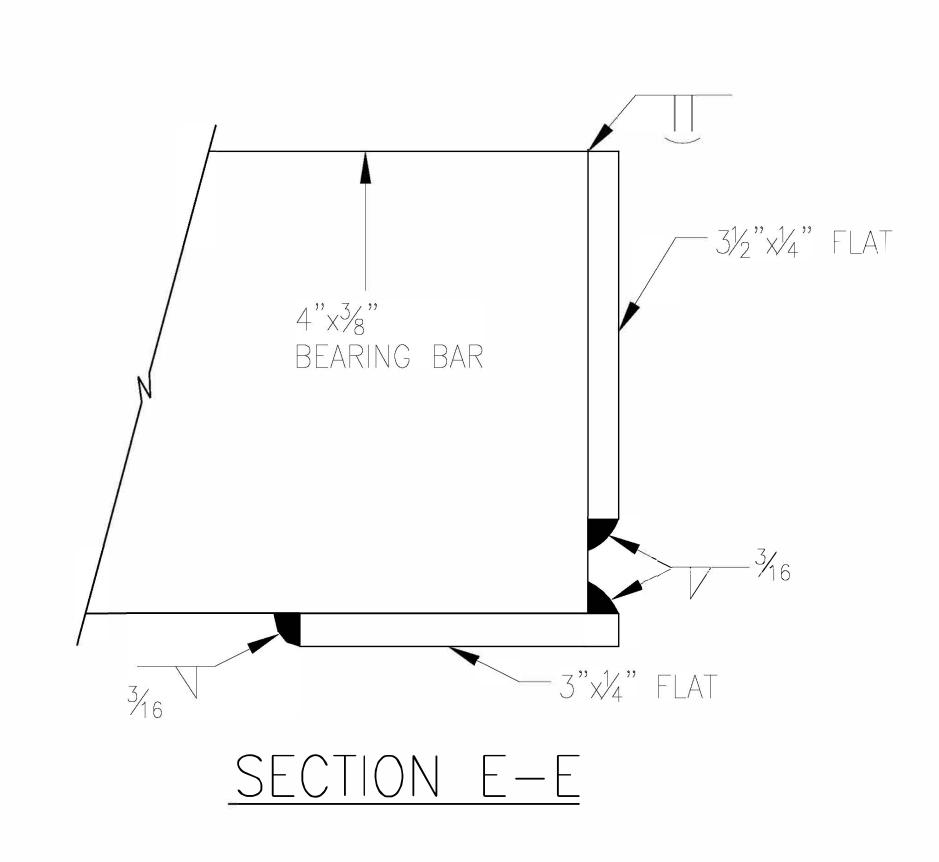
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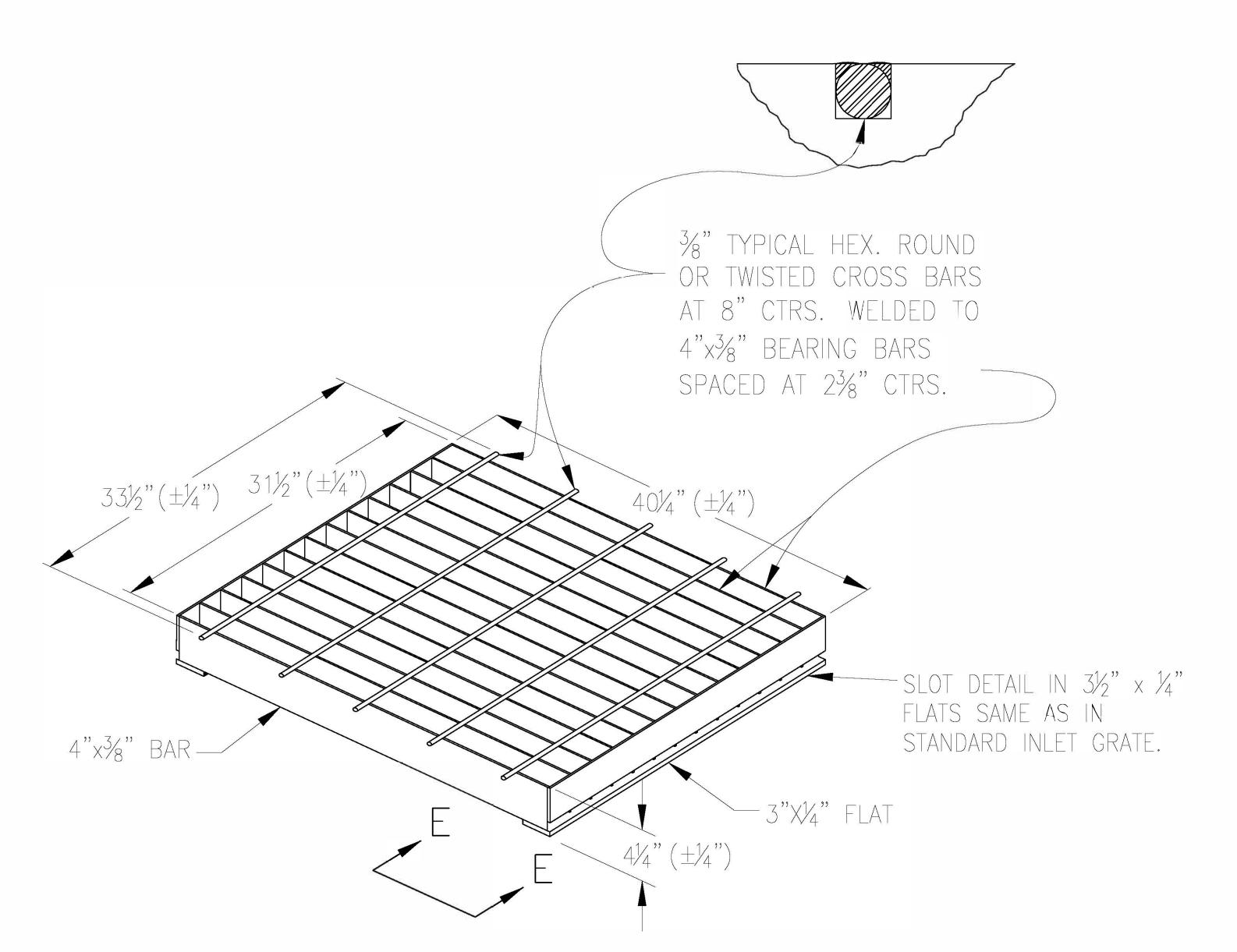
SD.21b











CLOSE MESH GRATE

USE FOR PEDESTRIAN AND BICYCLE AREAS ONLY.

CDOT M & S STANDARDS

M-604-10

INLET - TYPE C

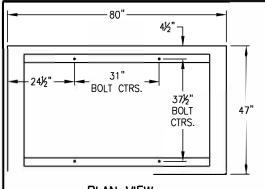


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Revised:

Standard Drawing No.

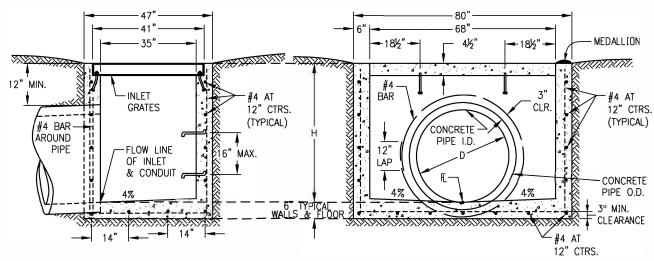
SD.21c



PLAN VIEW
(SHOWING ANCHOR BOLT LAYOUT)

GENERAL NOTES

- INLET TYPE D IS NOT HS-20 RATED AND SHALL NOT BE PLACED IN PAVED ROADWAYS. THIS INLET SHALL BE USED ONLY OUTSIDE PAVED ROADWAYS.
- 2. CONCRETE SHALL BE CLASS B. INLET MAY BE CAST-IN-PLACE OR PRECAST.
- 3. SEE PLANS FOR SIZE AND LOCATION OF PIPE.
- 4. STRUCTURAL STEEL FOR GRATES AND GRATE INSTALLATION HARDWARE SHALL BE GALVANIZED AND SHALL BE IN ACCORDANCE WITH SUBSECTION 712.06.
- STANDARD INLET GRATES SHALL BE USED ON ALL TYPE D INLETS UNLESS CLOSE MESH GRATES ARE ACCEPTED BY THE CITY OF CASTLE PINES.
- 6. CLOSE MESH GRATES ARE RECOMMENDED WHERE FOOT TRAFFIC OR BICYCLE ROUTES ARE IN CLOSE PROXIMITY TO GRATE. THIS GRATE IS NOT ADA COMPLIANT OR BICYCLE FRIENDLY AND SHALL NOT BE PLACED DIRECTLY IN SIDEWALKS, CROSSWALKS OR BIKE PATHS.
- 7. STEPS SHALL BE PROVIDED WHEN INLET DIMENSION "H" IS EQUAL TO CLEARANCE OR GREATER THAN 3 FEET-6 INCHES AND SHALL CONFORM WITH AASHTO M 199.
- REINFORCING BARS SHALL BE GRADE 60, EPOXY COATED, AND DEFORMED #4, AND INLET WALL ALTERNATE SLOT AND HOLD DOWN PLATE DETAIL 12" CTRS. SHALL HAVE A 2 INCH MIN. CLEARANCE. CUT OR BEND BARS AROUND PIPE AS REQUIRED.
- ALL INLETS SHALL HAVE A 4 INCH DIA METAL MEDALLION WITH A "NO DUMPING DRAINS TO STREAM" MESSAGE ON IT. THE MEDALLION SHALL HAVE A FISH SYMBOL WITH A BLUE BACKGROUND. IT SHALL BE FIRMLY ATTACHED TO THE INLET'S SURFACE WITH A PERMANENT FASTENER.



OUTLET PIPE

INSIDE DIA. IN. – "D"

30

36

42

MIN. "H"

> FT. 3.0

> 3.5

4.0

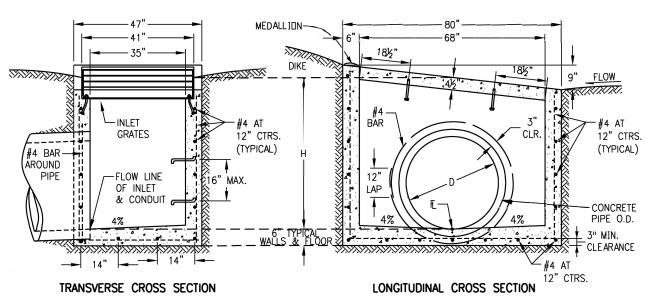
4.5

5.0

TRANSVERSE CROSS SECTION

LONGITUDINAL CROSS SECTION

LEVEL GRATE INSTALLATION



SLOPING GRATE INSTALLATION

REFERENCE:

CDOT M & S STANDARDS M-604-11 INLET - TYPE D

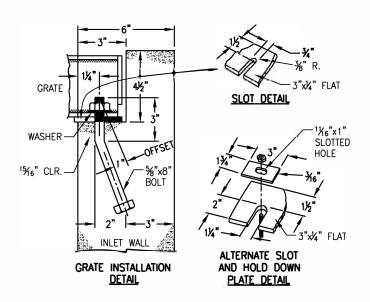
CASTLE PINES

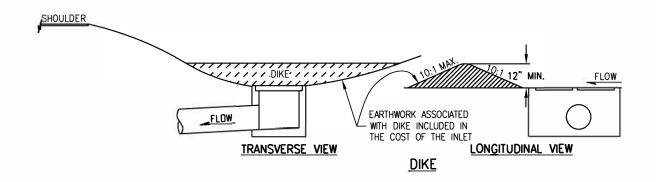
Issued: <u>6/15/2022</u>

Revised: __

Standard Drawing No.

SD.22a





QUANTITIES FOR ONE INLET

CIRCULAR PIPE RANGE CONCRETE STEEL CU. YD. LB. INSIDE DIA., IN. -127 18 3.5 4.0 18-24 1.7 149 157 18-30 4.5 5.0 179 18-36 187 18-42 5.5 208 2.6 215 18-42 6.5 2.8 236 18 - 427.0 243 18-42 3.1 3.3 7.5 264 18-42 8.0 271 18-42 8.5 3.5 3.6 292 18-42 9.0 299 18-42 9.5 320 18-42 10.0 4.0 327 18-42

▼ CONCRETE AND STEEL QUANTITIES ARE FOR ONE ENTIRE INLET BEFORE DEDUCTION FOR VOLUME OCCUPIED BY PIPE. WEIGHT OF STEEL INCLUDES A RING FOR THE MAXIMUM PIPE DIAMETER.

REFERENCE:

CDOT M & S STANDARDS M-604-11 **INLET - TYPE D**

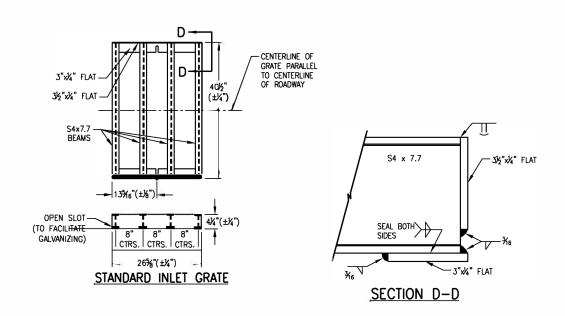
CASTLE PINES

Issued: <u>6/15/2022</u>

Revised: _____

Standard Drawing No.

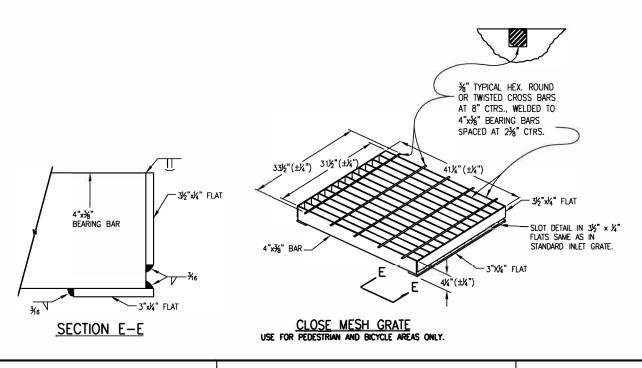
SD.22b



QUANTITIES: 2 STEEL GRATES PER INLET

NO. PIECES	DESCRIPTION	LENGTH	LB. PER FT.	WEIGHT (LBS.)		
8	S4x7.7 BEAM	40"	7.70	7.70 206		
4	3½″x¼″ FLAT	26%"	2.98	26		
4	3"x¼" FLAT	26%"	2.55	24		

TOTAL 256 LBS.



REFERENCE:

CDOT M & S STANDARDS M-604-11 INLET - TYPE D

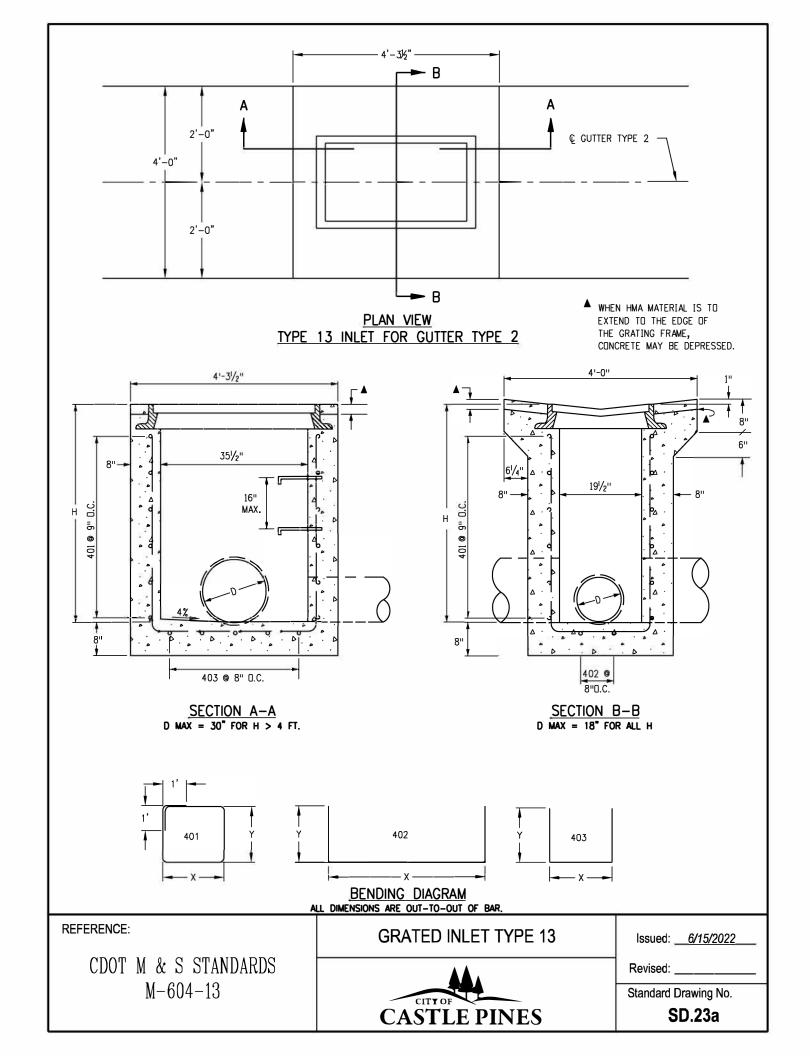
CASTLE PINES

Issued: __6/15/2022_

Revised: _____

Standard Drawing No.

SD.22c

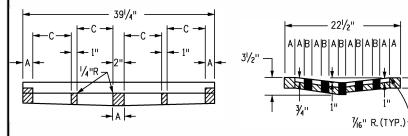


D WASTE I DRAINS TO STREAM A=1¾" $B = 1^1 1_{6}$ $C = 7^{1} \%_{6}$ CORNERS RELIEVED 3/6" TO PREVENT ROCKING

NO. 13 GRATE

GENERAL NOTES

- 1. CONCRETE SHALL BE CLASS B. INLET MAY BE CAST-IN-PLACE OR PRECAST.
- 2. CAST-IN-PLACE CONCRETE WALLS SHALL BE FORMED ON BOTH SIDES.
- 3. EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 3/4 OF A INCH.
- 4. REINFORCING BARS SHALL BE DEFORMED #4 AND SHALL HAVE A 2 INCH MINIMUM CLEARANCE. ALL REINFORCING BARS SHALL BE GRADE 60 AND EPOXY COATED.
- 5. STEPS SHALL BE PROVIDED WHEN INLET DIMENSION "H" IS EQUAL TO OR GREATER THAN 3 FEET-6 INCHES AND SHALL CONFORM TO AASHTO AASHTO M 199.
- 6. ALL GRATES AND FRAMES SHALL BE GRAY OR DUCTILE CAST IRON IN ACCORDANCE WITH SUBSECTION 712.06. GRATES AND FRAMES SHALL BE DESIGNED TO WITHSTAND HS 20 LOADING.
- 7. STATION POINT IS AT THE CENTER OF THE INLET.
- 8. GRATE SHALL HAVE "DUMP NO WASTE DRAINS TO STREAM" MESSAGE CAST ON SURFACE.



SECTION D-D

SECTION C-C

39% NO. 13 GRATING & FRAMES

QUANTITIES

17		REINFORCING	NO. OF	MAXIMUM	PIPE I.D.	
н	CONCRETE	STEEL	401 BARS	SEC. A-A	SEC. B-B	
	CU. YD.	θ LB.	REQ'D.	IN.	IN.	
3'-0"	1.3	72	4	18	18	
3'-6"	1.5	76	4	24	18	
4'-0"	1.6	90	5	30	18	
4'-6"	1.8	104	6	30	18	
5'-0"	1.9	109		30	18	
5'-6"	2.1	122	7	30	18	
6'-0"	2.2	136	8	30	18	
6'-6"	2.4	141	8	30	18	
7'-0"	2.5	154	9	30	18	
7'-6"	2.7	168	10	30	18	
8'-0"	2.8	173	10	30	18	
8'-6"	3.0	187	11	11 30		
9'-0"	3.1	200	12	30	18	
9'-6"	3.3	205	12	30	18	
10'-0"	3.4	219	13	30	18	

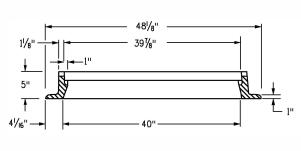
θ INCLUDES 1% FOR OVERRUN.

NOTE: CONCRETE QUANTITIES INCLUDE VOLUME OCCUPIED BY PIPE.

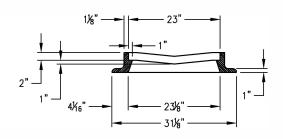
BAR LIST FOR H=3'-0"

MARK	NO.	DIMENS	LENGTH	
WANN	REQ'D.	X	Υ	LENGIH
401	4	3'-6"	2'-2"	13'-4"
402	2	3'-4½"	*2'-6½"	8'-5½"
403	5	2'-½"	*2'-7"	7'-2½"

*ADD 6 IN. TO THIS DIMENSION FOR EACH 6 IN. INCREASE OF "H" OVER 3 FT.-O IN.



SECTION E-E APPROX. WEIGHT 590 LBS.



SECTION F-F

REFERENCE:

CDOT M & S STANDARDS M-604-13

GRATED INLET TYPE 13

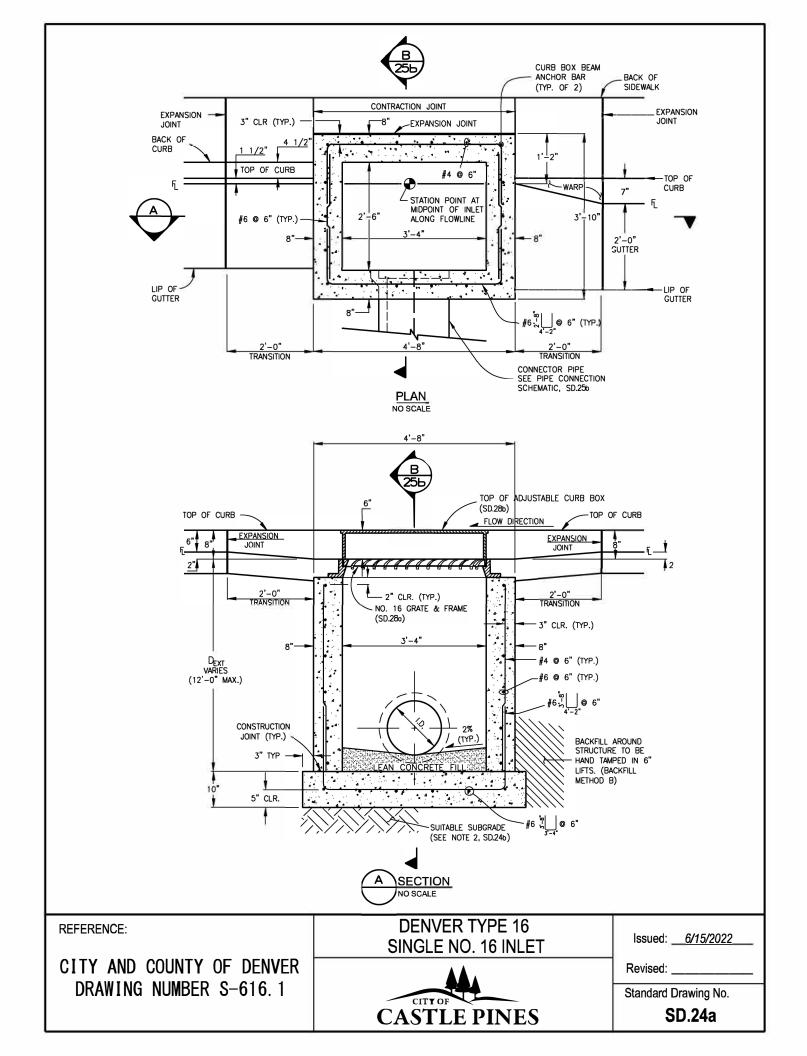
CASTLE PINES

Issued: __6/15/2022

Revised:

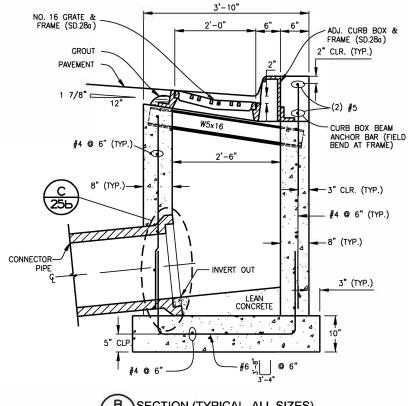
Standard Drawing No.

SD.23b



SINGLE NUMBER 16 INLET NOTES

- FOR PAYMENT PURPOSES, INLET STRUCTURES SHALL ALSO INCLUDE 2'-0" CURB & GUTTER TRANSITION SECTION AT EACH END OF INLET PLUS SIDEWALK SECTIONS WHERE REQUIRED BEHIND INLET STRUCTURE AND TRANSITION SECTIONS.
- 2. SUB-GRADE SHALL BE 6-12" OF CLASS B BEDDING COMPACTED PER THE CITY AND COUNTY OF DENVER DOTI STANDARD CONSTRUCTION SPECIFICATIONS, ON SUITABLE, UNDISTURBED MATERIAL. IF SUBGRADE IS UNSUITABLE, THE SUBGRADE SHALL BE OVEREXCAVATED AND STABILIZED WITH CLASS B BEDDING PER THE CITY AND COUNTY OF DENVER DOTI STANDARD CONSTRUCTION SPECIFICATIONS.
- 3. FLOOR SLOPE MAY BE POURED MONOLITHIC WITH BASE.
- 4. Sc = SLOPE OF CONNECTOR = 2% MIN.
- 5. UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS OR OTHERWISE APPROVED, ALL NO. 16 INLETS SHALL BE CONSTRUCTED WITH AN ADJUSTABLE CAST IRON CURB BOX (STANDARD DETAIL SD.28a AND SD.28b).
- DESIGN CONDITIONS FOR INLET ALLOWS DEPTHS OF 12'-0" (MAX.). FOR INLETS MORE THAN 12'-0" FEET IN DEPTH, SHOP DRAWINGS AND DESIGN ANALYSIS SHALL BE SUBMITTED FOR APPROVAL.
- ALL REINFORCING STEEL SHALL BE ASTM, A-615, GRADE 60 DEFORMED BARS. DIAMETER OF BEND MEASURED ON THE INSIDE OF THE BAR SHALL BE A MINIMUM OF 6 BAR DIAMETER.
- ALL SHALL CONFORM TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION, 2017.
- 9. NO FORMWORK SHALL WORK REMAIN INSIDE STRUCTURE WHEN COMPLETE.
- 10. CONCRETE MIX FOR GUTTER AND ANY ADDED STREET PANELS SHALL MEET CLASS 2 REQUIREMENTS FOR SULFATE RESISTANCE IN ACCORDANCE WITH CDOT STANDARD 601.04 ON STREETS WHERE MAGNESIUM CHLORIDE CHEMICAL DEICERS ARE APPLIED. REFER TO DOTI STANDARD CONSTRUCTION SPECIFICATIONS SECTION 11 FOR REQUIREMENTS FOR SULFATE RESISTANCE IN CONCRETE EXPOSED TO EARTH.
- SPLICING OF REINFORCING STEEL SHALL BE PERMITTED ONLY WHERE DETAILED IN DRAWINGS.
- 12. INLET WALLS SHALL BE FORMED BOTH INSIDE AND OUTSIDE. CASTING OF SIDEWALLS AGAINST EARTH IS NOT PERMITTED.
- 13. LEAN CONCRETE FILL TO BE F'C = 2000 PSI. INLET STRUCTURE, LID, STREET CURB AND GUTTER, AND PAVEMENT TO BE F'C = 4,500 PSI, MAX W/CM = 0.45 AND AIR ENTRAINED 5% TO 8%. F'C = 28 DAY COMPRESSIVE STRENGTH REQUIREMENT FOR MIX DESIGN, FIELD ACCEPTANCE
- 14. FOR THROUGH STRUCTURES, BENCHES MUST COME TO TOP OF PIPE.
- 15. NO CORNER PENETRATIONS ON STRUCTURE.
- 16. SEE DOTI STANDARD CONSTRUCTION SPECIFICATIONS SECTION 11.04 STORM INLETS FOR MORE INFORMATION. USE OF THIS DETAIL WITHOUT SPECIFICATIONS SHALL BE CONSIDERED NON-COMPLIANT.
- SEE (STANDARD DETAIL SD.25o AND SD.25b) FOR REBAR PLACEMENT AT WALL PENETRATION DETAIL.
- REFER TO "CITY OF CASTLE PINES ROADWAY AND CONSTRUCTION STANDARDS" FOR ADJACENT ROADWAY AND SIDEWALK DESIGN CRITERIA.



B SECTION (TYPICAL, ALL SIZES)
NO SCALE

REFERENCE:

CITY AND COUNTY OF DENVER DRAWING NUMBER S-616.1

DENVER TYPE 16 SINGLE NO. 16 INLET

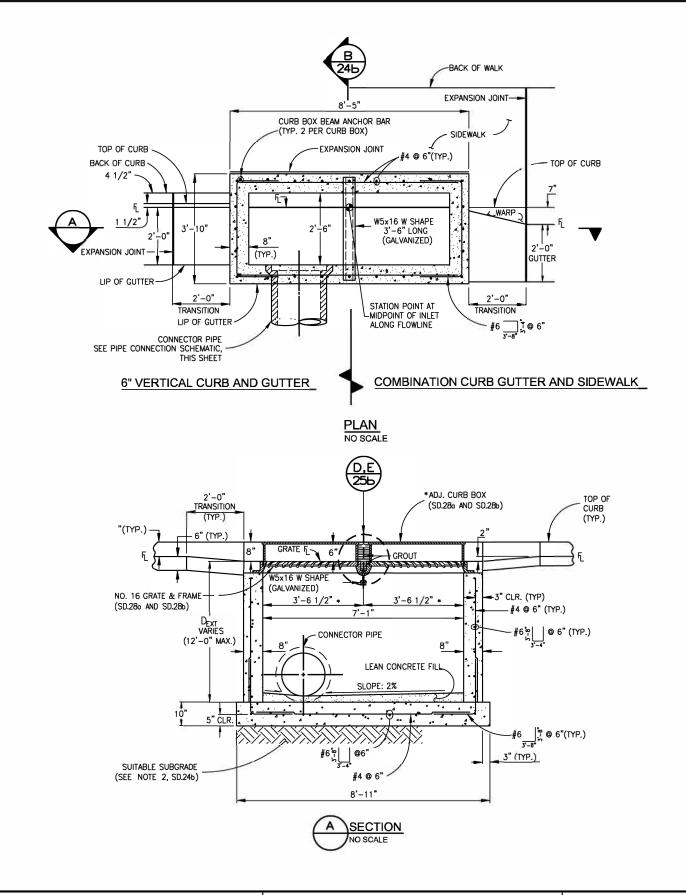


Issued: <u>6/15/2022</u>

Standard Drawing No.

Revised:

SD.24b



CITY AND COUNTY OF DENVER DRAWING NUMBER S-616.2

DENVER TYPE 16 DOUBLE NO. 16 INLET

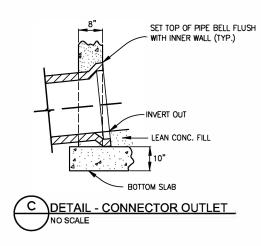


Issued: <u>6/15/2022</u>

Revised: _____

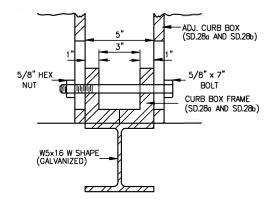
Standard Drawing No.

SD.25a

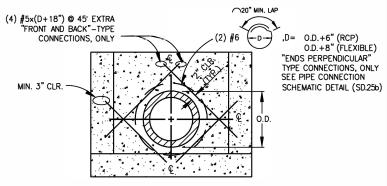


DOUBLE NUMBER 16 INLET NOTES

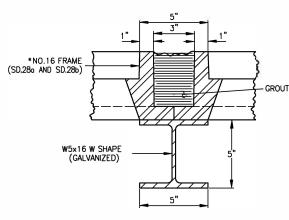
- SEE DETAIL SPECIFICATIONS SECTION 11.05 STORM INLETS FOR MORE INFORMATION.
 USE OF THIS DETAIL WITHOUT SPECIFICATIONS SHALL BE CONSIDERED NON-COMPLIANT.
- 2. SEE GENERAL NOTES ON STANDARD DETAIL SD.240 AND SD.24b.
- 3. EXPANSION JOINT MATERIAL SHALL BE PLACED FULL DEPTH OF THE CURB AND GUTTER, SIDEWALK, CONCRETE PAVEMENT, AS APPLICABLE. THE TOP PORTION OF THE JOINT SHALL BE SEALED WITH SILICONE SEALANT.
- SEE STANDARD DETAIL SD.24o AND SD.24b FOR REBAR PLACEMENT AT WALL PENETRATION DETAIL.
- * STANDARD DETAIL SD.280 AND SD.280 APPLIES TO ALL OF THE GRATE & FRAME GEOMETRIC DIMENSIONS FOR THE DOUBLE NUMBER 16 INLET EXCEPT FOR THE FRAME LENGTH. FRAME LENGTH SHOULD BE MANUFACTURED FOR THE DIMENSIONS CALLED OUT ON THIS SHEET.



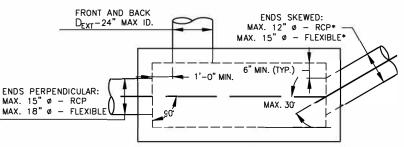
DETAIL - PLACEMENT OF ADJ. CURB
BOX ON SUPPORT RAIL (TYP.)
NO SCALE



DETAIL - REBAR PLACEMENT AROUND CONNECTOR PIPE NO SCALE



DETAIL - FRAME PLACEMENT
ON SUPPORT RAIL (TYP.)
NO SCALE



*ANGLED CONNECTIONS REQUIRE CITY APPROVAL.

PIPE CONNECTION SCHEMATIC (NO. 16 INLET)
THIS DIAGRAM IS PROVIDED FOR GENERAL GUIDANCE ONLY. THE
DESIGNER IS RESPONSIBLE FOR VERIFYING PROJECT SPECIFIC
GEOMETRY.

REFERENCE:

CITY AND COUNTY OF DENVER DRAWING NUMBER S-616.2

DENVER TYPE 16 DOUBLE NO. 16 INLET

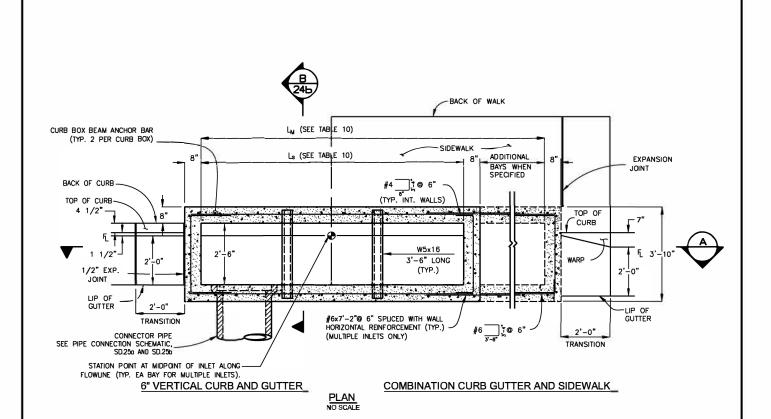


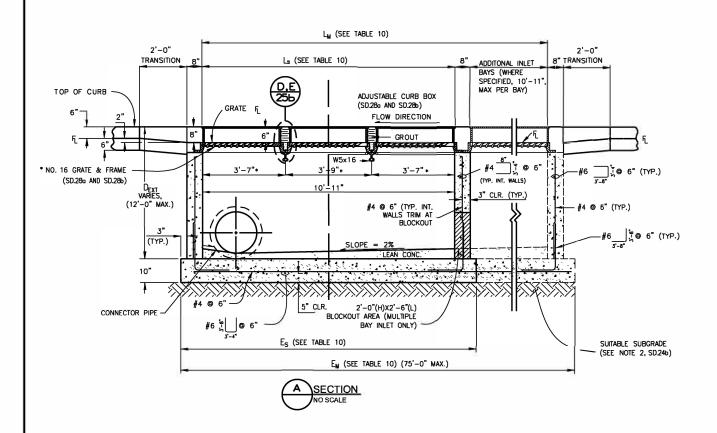
Issued: <u>6/15/2022</u>

Revised: ___

Standard Drawing No.

SD.25b





CITY AND COUNTY OF DENVER DRAWING NUMBER S-616.3

DENVER TYPE 16 TRIPLE NO. 16 INLET



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Revised: _____

Standard Drawing No.

SD.26a

TRIPLE NUMBER 16 INLET NOTES

- SEE WCPM STANDARD CONSTRUCTION SPECIFICATIONS SECTION 11.05 STORM INLETS FOR MORE INFORMATION. USE OF THIS DETAIL WITHOUT SPECIFICATIONS SHALL BE CONSIDERED NON-COMPLIANT.
- 2. SEE GENERAL NOTES ON STANDARD DETAIL SD.240 AND SD.24b.
- EXPANSION JOINT MATERIAL SHALL BE PLACED FULL DEPTH OF THE CURB AND GUTTER, SIDEWALK, CONCRETE PAVEMENT, AS APPLICABLE. THE TOP PORTION OF THE JOINT SHALL BE SEALED WITH SILICONE SEALANT.
- 4. SEE STANDARD DETAIL SD.250 AND SD.256 FOR REBAR PLACEMENT AROUND CONNECTOR PIPF
- * STANDARD DETAIL SD.280 AND SD.280 APPLIES TO ALL OF THE GRATE & FRAME GEOMETRIC DIMENSIONS FOR THE TRIPLE NUMBER 16 INLET EXCEPT FOR THE FRAME LENGTH. FRAME LENGTH SHOULD BE MANUFACTURED FOR THE DIMENSIONS CALLED OUT ON THIS SHEFT

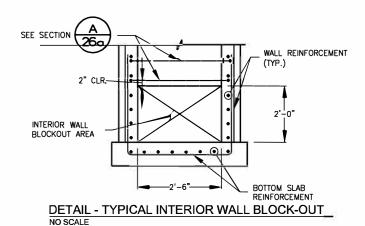


TABLE 10. NO. 16 TOTAL INLET LENGTH

INLET CONFIGURATION

L₃ OR Lտ INLET LENGTH

■ E₅ OR Eտ TOTAL BOTTOM SLAB LENGTH

TRIPLE NO. 16

10'-11"

12'-9"

NO. 16 3-3-2
(EXAMPLE CONFIGURATION)

NO. 16 ----(CONFIGURATION TEMPLATE)

LՖ, LՖ, LՖ

=3"+8"+L₅+8"+L₅+8"+L₅+8"+S"

■MAX. BOTTOM SLAB LENGTH = 75'-0"

REFERENCE:

CITY AND COUNTY OF DENVER DRAWING NUMBER S-616.3

DENVER TYPE 16 TRIPLE NO. 16 INLET

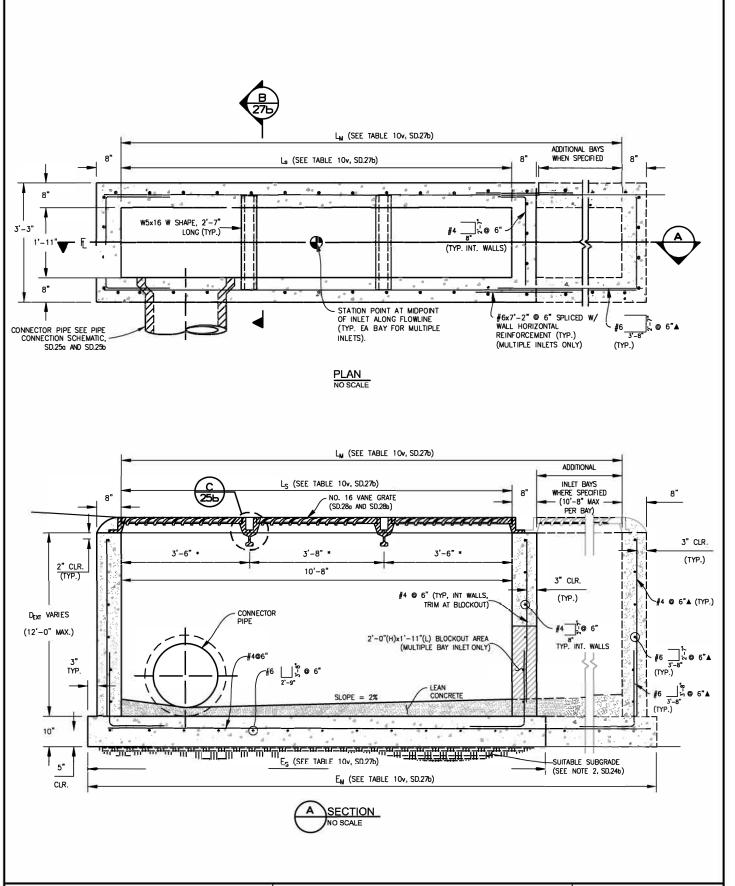


Issued: <u>6/15/2022</u>

Revised: _____

Standard Drawing No.

SD.26b



CITY AND COUNTY OF DENVER DRAWING NUMBER S-616V

DENVER TYPE 16 SINGLE, DOUBLE & TRIPLE NO. 16 INLET VALLEY



Issued:	6/15/2022

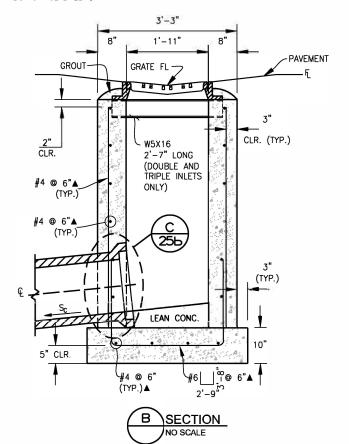
Revised: _____

Standard Drawing No.

SD.27a

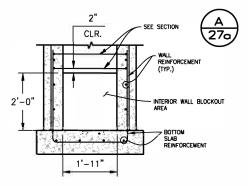
TABLE 10v. NO. 16 VALLEY TOTAL INLET LENGTH INLET CONFIGURATION L₃ OR L՚ INLET LENGTH □ES OR E՚ TOTAL BOTTOM SLAB LENGTH TRIPLE NO. 16 VALLEY 10'-8" 12'-6" NO. 16 VALLEY 3-3-2 (EXAMPLE CONFIGURATION) NO. 16 VALLEY ---- (CONFIGURATION TEMPLATE) L₃ L₃ = 3"+8"+L₃+8"+L₃+8"+L₃+8"+J₃+8"+J₃

■ MAX. BOTTOM SLAB LENGTH = 75'-0"

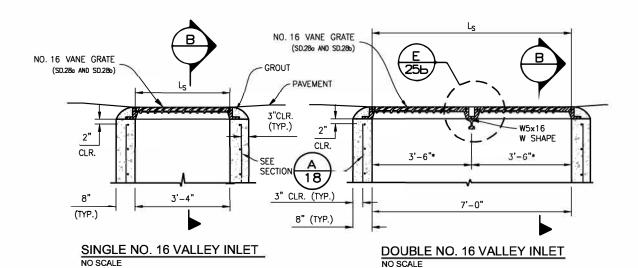


NUMBER VALLEY 16 INLET NOTES

- SEE WCPM STANDARD CONSTRUCTION SPECIFICATIONS SECTION 11.05 STORM INLETS FOR MORE INFORMATION. USE OF THIS DETAILS WITHOUT SPECIFICATIONS SHALL BE CONSIDERED NON-COMPLIANT.
- SEE GENERAL NOTES ON STANDARD DETAIL SD.24a AND SD.24b.
- SEE STANDARD DETAIL SD.28a AND SD.28b FOR FRAME AND GRATE DETAILS.
- SEE STANDARD DETAIL SD.240 AND SD.24b FOR ADDITIONAL STRUCTURE AND BACKFILL NOTES.
- * STANDARD DETAIL SD.280 AND SD.280 APPLIES TO ALL OF THE GRATE AND FRAME GEOMETRIC DIMENSIONS FOR THE NUMBER 16 VALLEY INLET EXCEPT FOR THE FRAME LENGTH, FRAME LENGTH SHOULD BE MANUFACTURED FOR THE DIMENSIONS CALLED OUT ON THIS SHEET.
- A REINFORCEMENT ALSO APPLICABLE TO SINGLE AND DOUBLE NO. 16 VALLEY INLETS.



DETAIL-TYPICAL INTERIOR
WALL BLOCK-OUT
NO SCALE



REFERENCE:

CITY AND COUNTY OF DENVER DRAWING NUMBER S-616V

DENVER TYPE 16 SINGLE, DOUBLE & TRIPLE NO. 16 INLET VALLEY

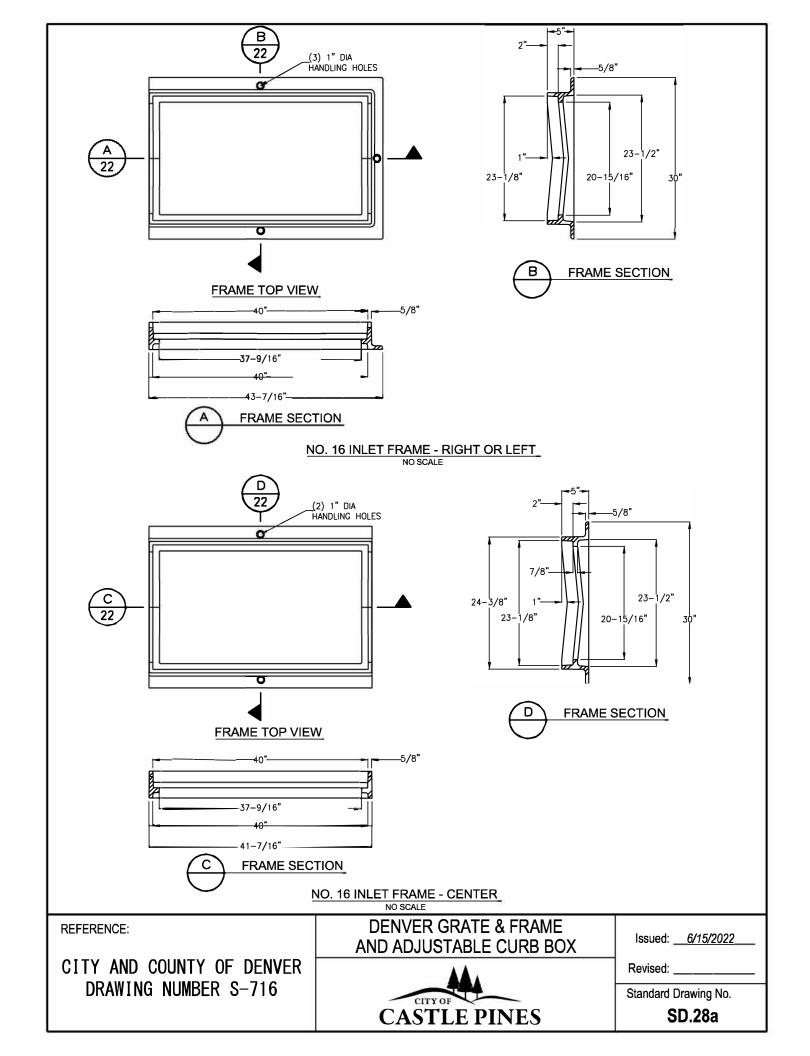


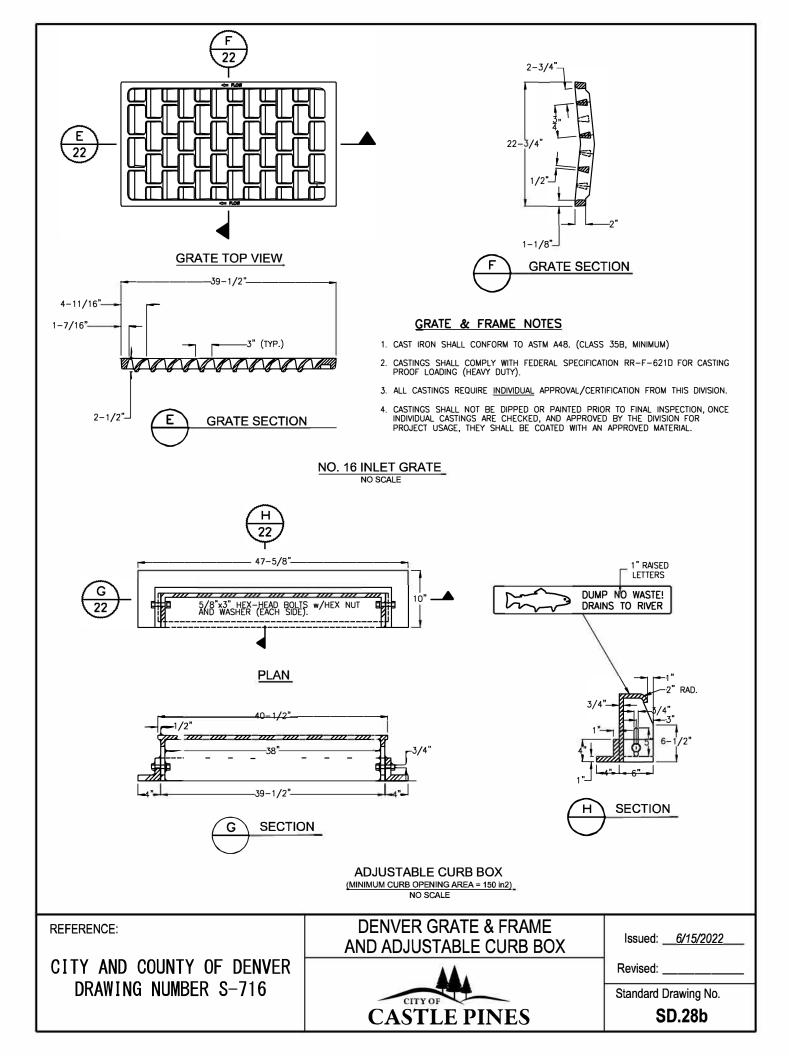
lssued: __6/15/2022_

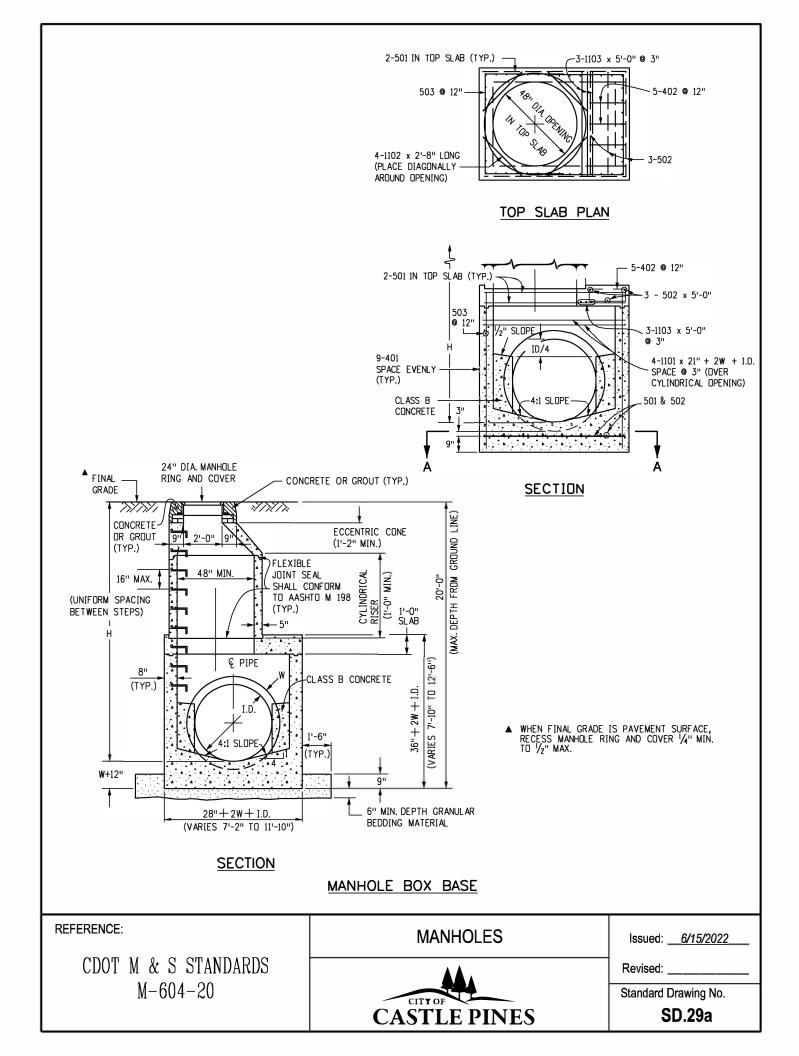
Revised: .

Standard Drawing No.

SD.27b

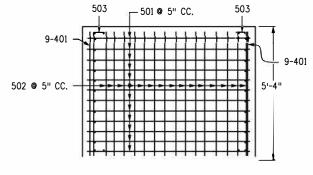




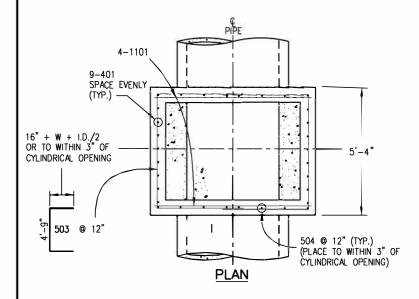


GENERAL NOTES

- SINCE ALL PIPE ENTRIES INTO THE BASE ARE VARIABLE, THE DIMENSIONS SHOWN ARE TYPICAL ACTUAL DIMENSIONS AND QUANTITIES FOR CONCRETE AND REINFORCEMENT SHALL BE AS REQUIRED IN THE WORK.
- 2. THE PRECAST FLAT TOP MAY BE USED ON ANY MANHOLE. THE ECCENTRIC CONE MAY BE USED WHEN THE MANHOLE "H" HEIGHT IS AT LEAST 8 FT.
- 3. THE MANHOLE RING FRAME SHALL BE SET IN A BED OF GROUT. THE FRAME SHALL BE SURROUNDED WITH A CEMENT GROUT IN UNPAVED AREA, OR A CONCRETE COLLAR IN PAVED AREA, SEE DETAILS ON STANDARD DETAIL SD.29e.
- 4. DESIGN OF BOX BASE IS BASED ON STRAIGHT RUNS OF PIPE OR CHANGE IN DIRECTION OF LESS THAN 45°. SPECIAL DESIGN IS REQUIRED FOR 45° OR GREATER
- PRECAST MANHOLES AND REINFORCEMENT SHALL CONFORM TO AASHTO M 199 (ASTM C 478).
- 6. CAST-IN-PLACE MANHOLES SHALL BE CLASS B CONCRETE.
- STEPS SHALL BE REQUIRED WHEN THE MANHOLE DEPTH EXCEEDS 3 FT.-6 IN. AND SHALL CONFORM TO AASHTO M 199.
- 8. ALL REINFORCING STEEL SHALL BE GRADE 60 AND EPDXY COATED. VERTICAL STEEL SHALL BE PLACED AT CENTERLINE OF WALL ALL BARS SHALL HAVE A 2 IN MINIMUM CLEARANCE.
- 9. ALL PIPE ENTRIES INTO THE BASE OF MANHOLE SHALL BE CONNECTED BY OPEN CHANNELIZATION ADJUSTED FOR PIPE SIZE, SHAPE, SLOPE, AND DIRECTION OF FLOW. DETAILS SHOWN ARE TYPICAL FOR INSTALLATIONS WITH ALL INVERTS OF SAME RELATIVE ELEVATION. FOR EXCESSIVE ELEVATION DIFFERENCE BETWEEN INVERTS, SPECIAL BASE/CHANNEL DETAILS WILL BE SHOWN ON THE PLANS.
- FLOW CHANNELS AND INVERTS SHALL BE FORMED BY SHAPING WITH CLASS B CONCRETE OR APPROVED GROUT.
- STUB-OUTS SHALL EXTEND 2 FT. MINIMUM BEYOND OUTSIDE WALL SURFACE OF MANHOLE AND BE SATISFACTORILY PLUGGED.
- 12. THE SLOPE OF THE MANHOLE COVER SHALL MATCH THE ROADWAY PROFILE AND CROSS SLOPE.



SECTION A-A (STEEL IN BOTTOM OF BASE)



REFERENCE:

CDOT M & S STANDARDS M-604-20 **MANHOLES**

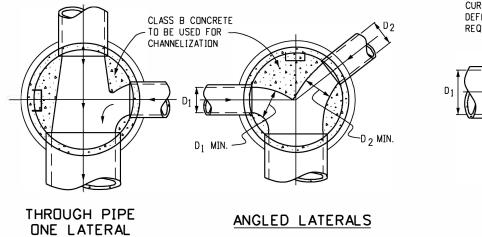
CASTLE PINES

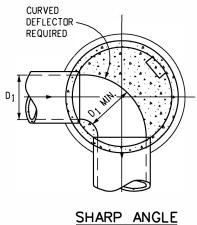
lssued: ___6/15/2022__

Revised: ____

Standard Drawing No.

SD.29b



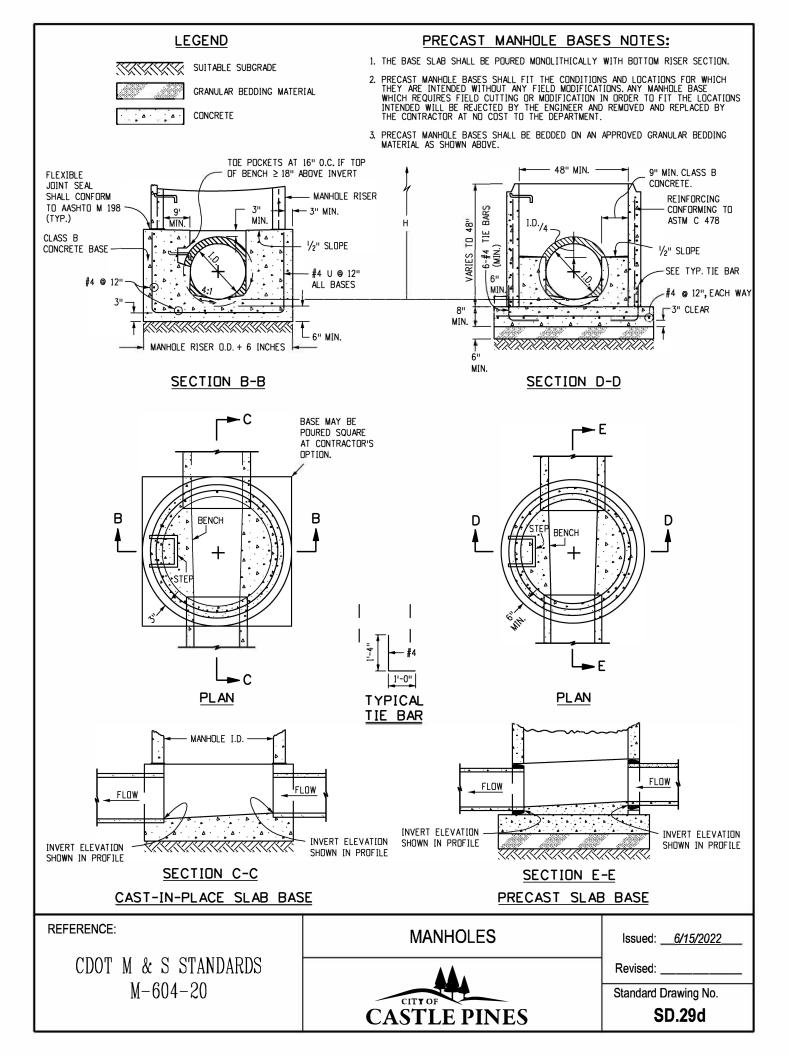


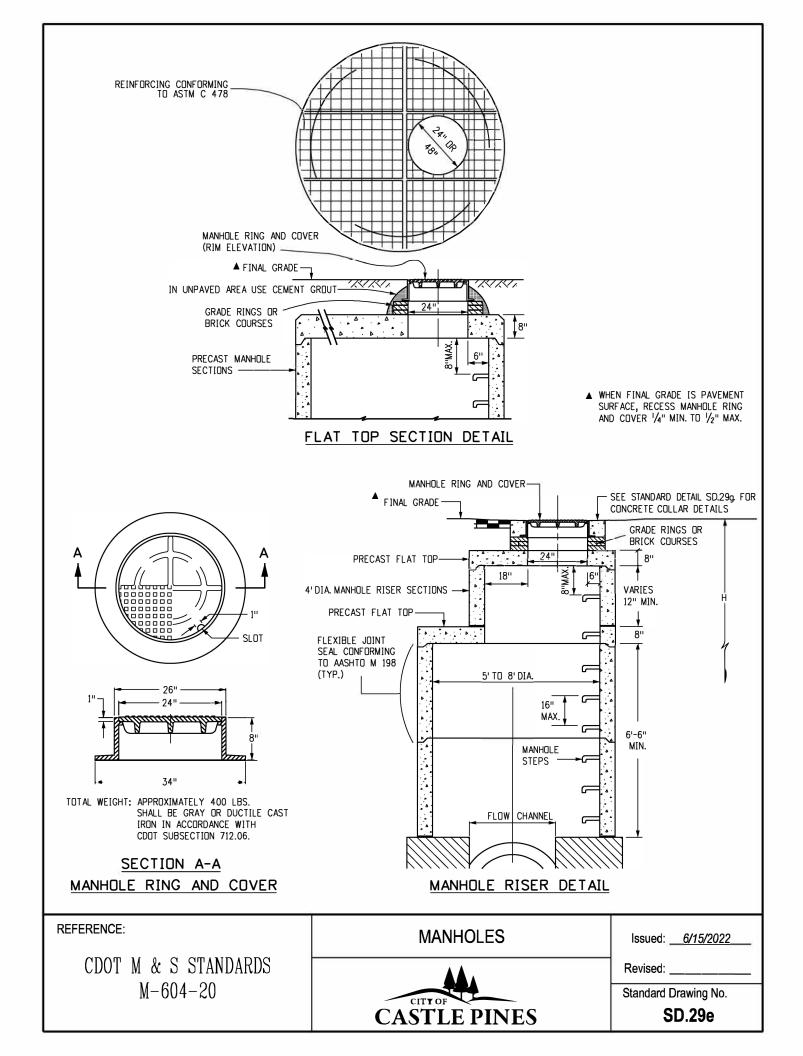
TYPICAL CHANNELIZATION DETAILS

MARK	SIZE	TYPE	WT.	BARS	I.D.						FORMULAS
MARK	SIZE	TIPE	#/FT.	DAKS	54"	60"	66"	72"	84"	96"	FURMOLAS
401	4	I	0.668	(NO. REQ'D. {LENGTH WEIGHT *	18 8'-1'' 97.2	18 8'-8" 104.2	18 9'-3'' 111.2	18 9'-10'' 118.2	18 11'-0" 132.3	18 12'-2" 146.3	401 BAR LENGTH = 32" + 2W + I.D.
402	4	III	0.668	(NO. REQ'D. LENGTH WEIGHT *	5 5'-5" 18.1	5 6'-0" 20.0	5 6'-7" 22.0	5 7'-2" 23.9	5 8'-4" 27.8	5 9'-6" 31.7	402 BAR LENGTH = I.D. + 2W
501	5	I	1.043	{NO. REQ'D. {LENGTH WEIGHT *	17 7'-5" 131.5	17 8'-0" 141.8	17 8'-7'' 152.2	17 9'-2" 162.5	17 10'-4" 183.2	17 11'-6" 203.9	501 BAR LENGTH = 24" + I.D. + 2W
502	5	I	1.043	(ND. REQ'D. {LENGTH W EIGHT *	22 5'-0'' 114.7	23 5'-0" 119.9	25 5'-0" 130.4	26 5'-0'' 135.6	29 5'-0" 151.2	32 5'-0" 166.9	502 NUMBER BARS REQ'D. = 3 + $\left(\frac{24+I.D.+2W}{@5"}+I\right)$
503	5	II	1.043	(ND. REQ'D. LENGTH WEIGHT *	16 12'-10' 214.2	16 13'-5" 223.9			20 15'-9" 328.5	24 16'-11" 423.5	503 NUMBER BARS REQ'D. = 2 (13+1.D.+2W
504	5	I	1.043	(ND. REQ'D. {LENGTH W EIGHT *	12 8'-1" 101.2	14 8'-8" 126.6	14 9'-3" 135.1	16 9'-10" 164.1	18 11'-0'' 206.5	20 12'-2" 253.8	504 NUMBER BARS REQ'D. = $2\left(\frac{2W+1.D4}{@ 12"}+1\right)$ BAR LENGTH = $32"+2W+1.D.$
1101	11	I	5.313	(NO. REQ'D. {LENGTH W EIGHT *	4 7'-2" 152.3	4 7'-9" 164.7	4 8'-4'' 177.1	4 8'-11" 189.5	4 10'-1'' 214.3	4 11'-3" 239.1	1101 BAR LENGTH = 21" + 1.D. + 2W
1102	11	I	5.313	(ND. REQ'D. LENGTH WEIGHT *	4 2'-8" 56.7	4 2'-8" 56.7	4 2'-8" 56.7	4 2'-8" 56.7	4 2'-8" 56.7	4 56.7 2'-8"	BENDING TYPE I STRAIGHT
1103	11	I	5.313	(ND. REQ'D. {Length W EIGHT *	3 5'-0'' 79.7	3 5'-0" 79.7	3 5'-0" 79.7	3 5'-0'' 79.7	3 5'-0" 79.7	3 5'-0" 79.7	TYPE II 16"+W+I.D./2
REIN	ORCING	STEEL	TOTAL	*	965.6	1,037.5	1,127.2	1,204.0	1,380.2	1,601.6	12" 12" 12" 1
CONCR	ETE - (CUBIC Y	'ARDS -	TOTAL	6.0	6.6	7.3	8.0	9.5	11.1	TYPE III 12"
NOTE: QUANTITIES ARE BASED ON SAME SIZE PIPE ENTRANCE TO AND EXIT FROM, BASE AND A 4 FT. MANHOLE ENTRANCE INTO TOP SLAB OF BASE.									I.D.+2₩-38" →		

QUANTITIES FOR CONCRETE MANHOLE BOX BASE

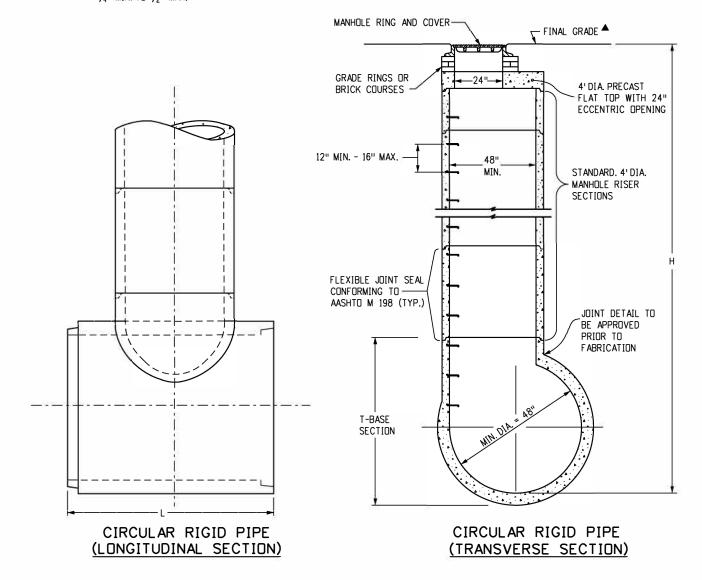
REFERENCE:	MANHOLES	Issued:6/15/2022
CDOT M & S STANDARDS	A A.	Revised:
M - 604 - 20	CITY OF	Standard Drawing No.
	CASTLE PINES	SD.29c





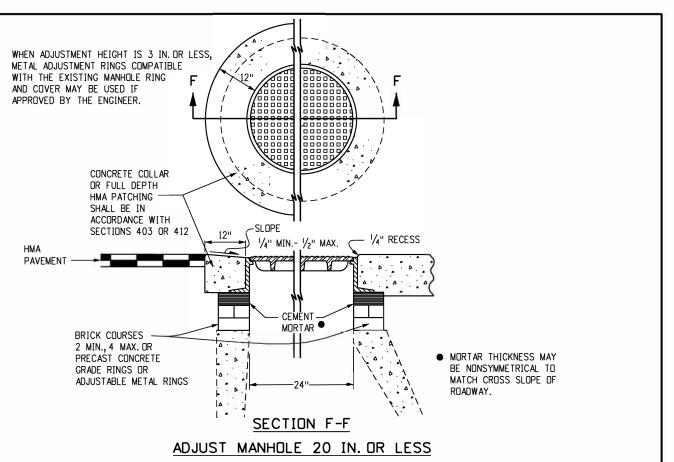
T-BASE MANHOLES NOTES:

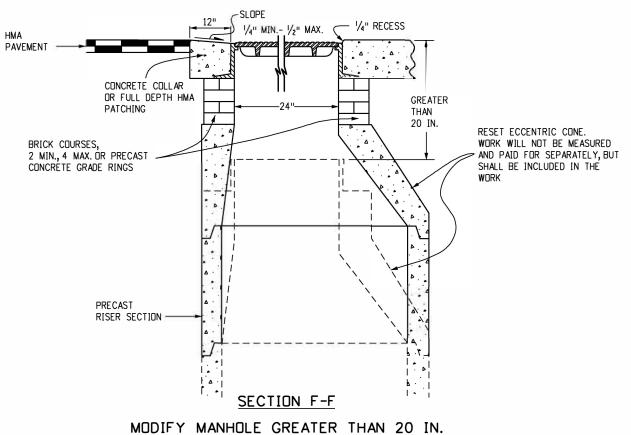
- 1. THE T-BASE SECTION SHALL BE SHOP-FABRICATED FOR DELIVERY TO THE CONSTRUCTION SITE AS A COMPLETE UNIT.
- 2. THESE DETAILS SHOW ONLY THE CONCEPTUAL AND STANDARD DIMENSIONAL REQUIREMENTS FOR TYPE T-BASE MANHOLES. THE CONTRACTOR SHALL FURNISH DETAILED SHOP DRAWINGS FOR APPROVAL PRIOR TO FABRICATION. THE DETAILS SHOWN HEREIN APPLY ONLY TO 48 IN. AND GREATER DIAMETER PIPES.
- 3. EXCEPT FOR CLASS OF PIPE, SPECIFICATIONS FOR THE MANHOLE SHALL BE THE SAME AS THOSE REQUIRED FOR THE ADJOINING PIPE.
- 4. THE T-BASE SECTION SHALL MAINTAIN ITS INTERNAL SHAPE AND FLOW AREA. GROUTING OR FILLING SHALL BE APPLIED SO AS TO NOT DISTURB THE NORMAL FLOW OR REDUCE THE AREA.
- ★ WHEN FINAL GRADE IS PAVEMENT SURFACE, RECESS MANHOLE RING AND COVER 1/4" MIN. TO 1/2" MAX.



MANHOLE T-BASE

REFERENCE:	MANHOLES	Issued: <u>6/15/2022</u>
CDOT M & S STANDARDS		Revised:
M - 604 - 20	CITYOF	Standard Drawing No.
	CASTLE PINES	SD.29f





CDOT M & S STANDARDS M-604-20 MANHOLES

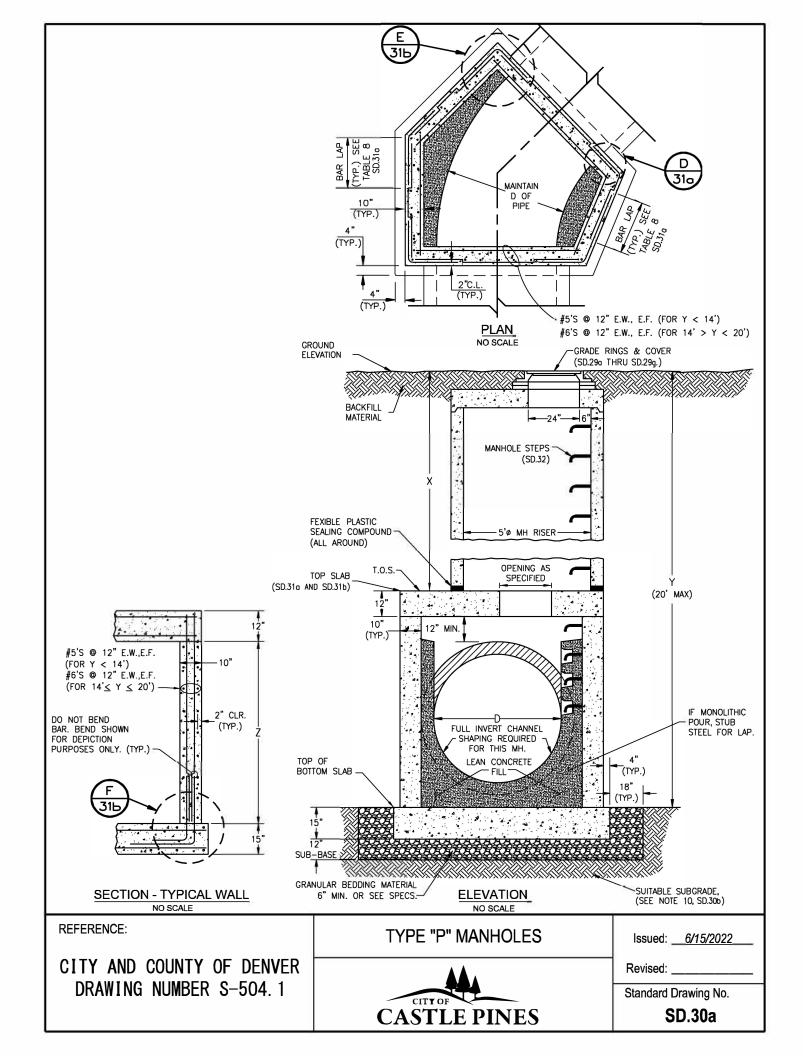
CASTLE PINES

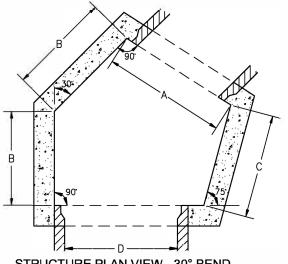
Issued: ___6/15/2022_

Revised: ___

Standard Drawing No.

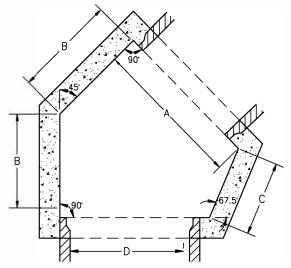
SD.29g





STRUCTURE PLAN VIEW - 30° BEND

TABLE 7A. TYPE P MH - 30° BEND STRUCTURE						
DIMENSIONS						
PIPE SIZE A B C						
42"	4' - 6"	3' - 4"	4' – 2"			
48"	5' – 1"	3' - 6"	4' - 2"			
54"	5' - 8"	3' - 8"	4' - 2"			
60"	6' - 3"	3' - 10"	4' - 2"			
66"	6' - 10"	4' - 0"	4' - 2"			
72"	7' – 5"	4' - 2"	4' - 2"			
78"	8' - 0"	4' - 4"	4' - 2"			



STRUCTURE PLAN VIEW - 45° BEND_ NO SCALE

TABLE 7B. TYPE P MH - 45° BEND STRUCTURE DIMENSIONS							
PIPE SIZE A B C							
42"	4' - 6"	3' - 6"	3' - 0"				
48"	5' - 1"	3' - 9"	3' - 0"				
54"	5' - 8"	4' - 0"	3' - 0"				
60"	6' - 3"	4' - 3"	3' - 0"				
66"	6' - 10"	4' - 6"	3' - 0"				
72"	72" 7' - 5" 4' - 9" 3' - 0"						
78"	8' - 0"	5' - 0"	3' - 0"				

TYPE P MANHOLE NOTES

- THIS STANDARD MANHOLE DETAIL IS APPLICABLE TO CIRCULAR PIPES WITH 42" I.D. AND LARGER, AND NON-CIRCULAR PIPES WITH A SPAN OF 42" I.D. AND LARGER.
- FOR "Y" DEPTH OVER 20' SHOP DRAWINGS ALONG WITH CALCULATIONS FOR DESIGN OF WALLS, TOP AND BASE SLAB SHALL BE SUBMITTED FOR APPROVAL.
- 3. SET TOP SLAB TYPE B ELEVATION NO MORE THAN 12"± BELOW FINISHED GRADE I.E. ALLOW ENOUGH COVER TO ADD MH RINGS AND COVER.
- 4. PRECAST MANHOLE RISERS AND TOP SECTIONS SHALL CONFORM TO ASTM C-478. IN ADDITION MANHOLE STEPS, RISERS, SHIPLAP JOINTS, RING AND COVER SHALL CONFORM TO APPLICABLE WMD STANDARD DETAILS.
- 5. CONCRETE IN TOP SLAB AND WALLS SHALL BE CLASS D CONCRETE AND HAVE A 28 DAY STRENGTH OF 4500 PSI. PERMISSIBLE SLUMP WILL BE 3" TO 5", AND AIR ENTRAINMENT WILL BE 5% 8%.
- 6. LEAN CONCRETE FILL SHALL HAVE A 28 DAY STRENGTH OF 2000 PSI. (TYPE II CEMENT).
- 7. REINFORCING STEEL BARS SHALL CONFORM TO ASTM A-615 GRADE 60 DEFORMED BARS. CLEAR COVER REQUIREMENT (UNLESS OTHERWISE NOTED) TO BE 2" (3" FROM BOTTOM OF FOUNDATION SLAB.) REINFORCING BARS WILL BE SPLICED ONLY AT LOCATIONS SHOWN AND DETAILED ON THE DRAWINGS. BARS WILL BE WIRE-TIED, NO TACK WELDING WILL BE PERMITTED.
- 8. ALL STRUCTURES SHALL BE BENCHED TO TOP OF PIPE.
- 9. ALL MANHOLES & SPECIAL STRUCTURES TO BE PLACED ON SUITABLE SUBGRADE MATERIAL. IF SUBGRADE CONDITIONS WARRANT, UNSUITABLE FOUNDATION MATERIAL WILL BE OVEREXCAVATED, & SELECT SUBGRADE MATERIAL WILL BE PLACED AS PER SECTION 5.00 OF THE WCPM STANDARD CONSTRUCTION SPECIFICATIONS.
- GRANULAR BEDDING MATERIAL SHALL BE COMPACTED TO 90% MAXIMUM DRY DENSITY IN ACCORDANCE WITH AASHTO T-180.
- STRUCTURE WALLS SHALL BE FORMED BOTH INSIDE AND OUTSIDE. CASTING OF SIDEWALLS AGAINST EARTH IS NOT PERMITTED.
- 12. LATERAL SUPPORT SHALL BE PROVIDED AND MAINTAINED FOR WALLS DURING BACKFILLING OPERATIONS.
- MAX LATERAL SHALL BE 24" OR SMALLER. IF LARGER, A SPECIAL STRUCTURAL DESIGN IS REQUIRED. SEE STANDARD DETAIL SD.26a AND SD.26b. FOR PENETRATION DETAIL.
- 14. SEE STANDARD DETAIL SD.310 AND SD.31b. FOR REINFORCEMENT DETAILS.

<u>LEGEND</u>

D= INSIDE DIAMETER OF PIPE

X= DEPTH OF MANHOLE RISER

Y= TOTAL DEPTH OF MANHOLE

E.F.= EACH FACE

E.W.= EACH WAY

REFERENCE:

CITY AND COUNTY OF DENVER DRAWING NUMBER S-504.1

TYPE "P" MANHOLES

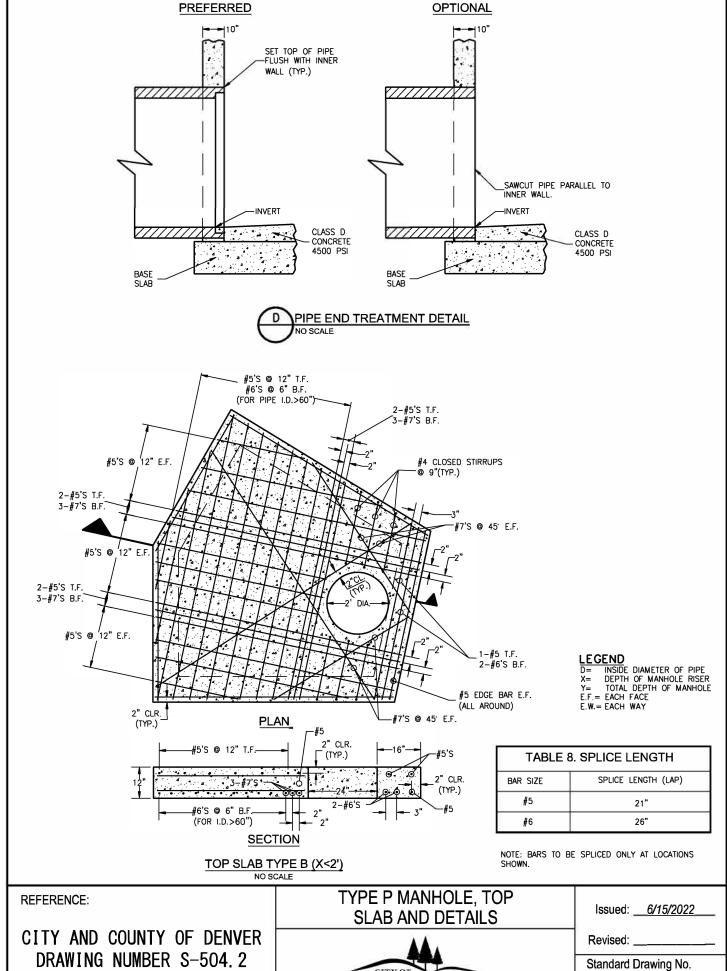
CASTLE PINES

lssued: <u>6/15/2022</u>

Revised:

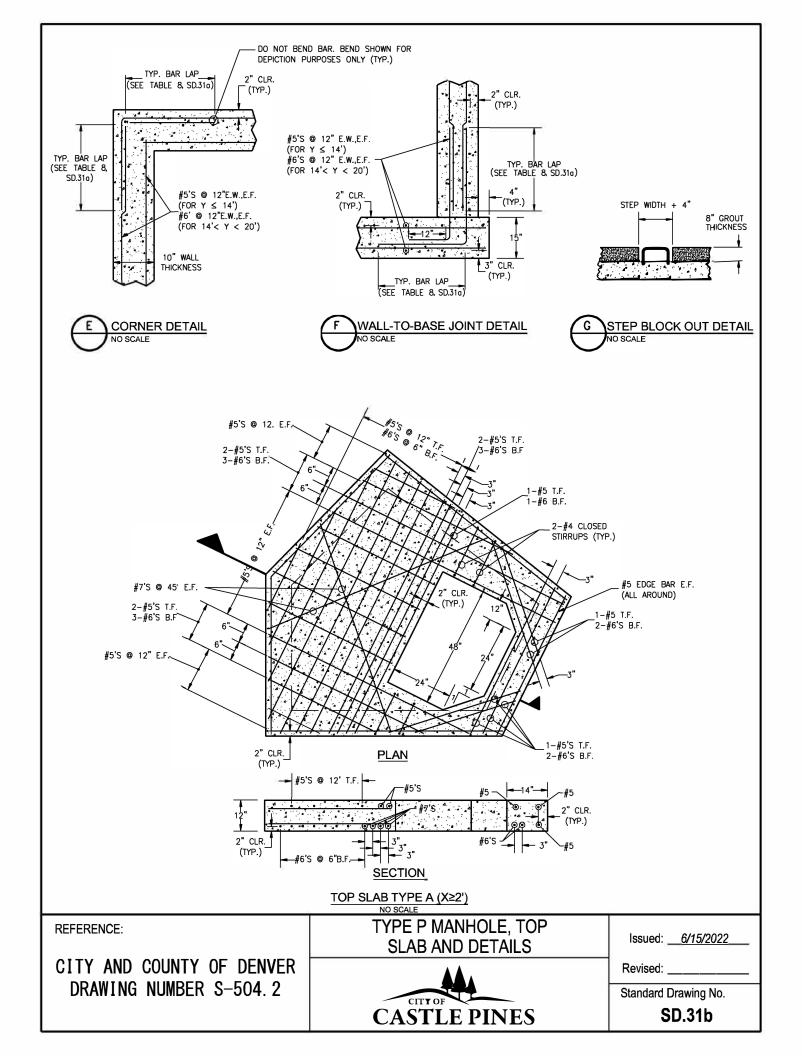
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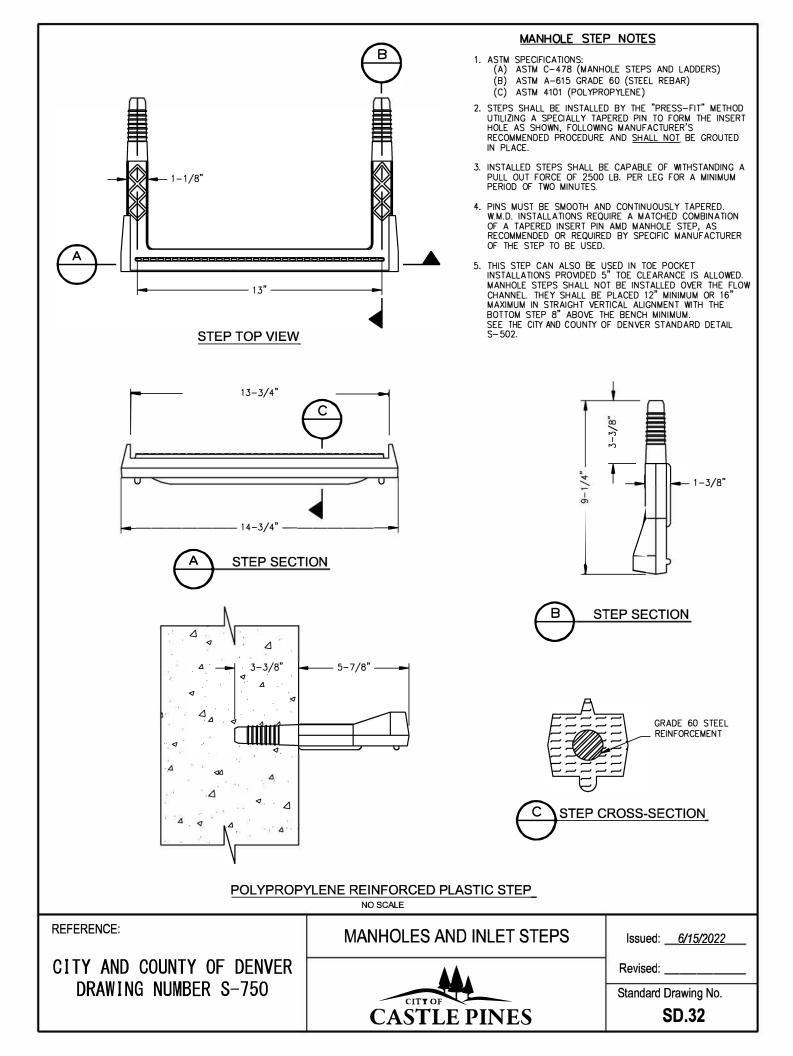
SD.30b

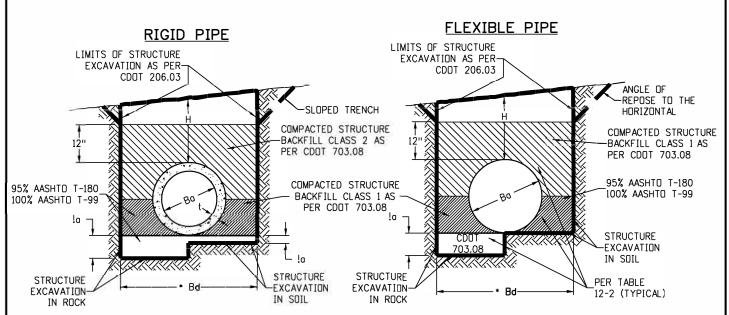




SD.31a







MAXIMUM HEIGHT OF FILL OVER TOP OF PIPE IN FEET

78

84

9.50

10.00

REINFORCED CONCRETE

STEEL - 2 2/3" x 1/2" CORRUGATIONS H ABOVE TOP OF PIPE IN FEET

	Min.	.01 INCH	CRACK	D-LOAD	
Ba	Bd	1350	2000	3000	
in.	in.	PIPE CLASS			
	**	III	IV	٧	
18	35	19	28	43	
24	42	18	28	42	
30	50	18	28	42	
36	59	18	27	41	
42	68	18	27	41	
48	78	18	27	41	
54	89	17	26	40	
60	98	17	26	40	
66	108	. 17	26	40	
72	117	: 17	26	40	
78	125	17	26	40	
84	135	17	26	40	
90	154	17	26	40	
96	163	17	26	40	
108	173	17	26	40	
120	191	. 17	26	40	
132	208	17	26	40	
144	224	17	26	40	

** BASED ON Bd=1.33(Ba+2t). WALL THICKNESS CAN VARY BETWEEN MANUFACTURERS.

- 1	_							
	Ba Bd I	1-15	16-20	21-25	26-30	31-35	36-40	
	111.	10.	THICKNESS IN INCHES					
	18-48	4-7	.064	.064	.064	.064	.064	.064
	54	7.50	.079	.079	.079	.079	.079	.079
	60	8.00	.079	.079	.079	.079	.109	.109
	66	8.50	.079	.079	.109	.109	.138	.138
	72	9.00	.079	.109	.109	.138	.168	.168

.138 .168

.138

.168

RCP DESIGN CRITERIA

SAFETY FACTOR = PER ASTM C76 SOIL WEIGHT = 120 LB. PER CU. FT. BEDDING = TYPE 2

ALL UTILITY REPAIRS MUST BE BACKFILLED WITH CLSM. SEE CITY OF CASTLE PINES ROADWAY DESIGN AND_ CONSTRUCTION STANDARDS MANUAL FOR SPECIFIC DETAILS.

CSP DESIGN CRITERIA

.109

.109

3"x1" CORRUGATIONS: 60 TO 84 PIPE SHALL BE .064" THICK (16 GAUGE) TO H=40 FT.

.168

SOIL WEIGHT = 120 LB, PER CU, FT. SAFETY FACTOR FOR SEAM STRENGTH = 2.00 BUCKING STRESS LEVEL = 1/2 YIELD STRENGTH LOAD FACTOR (BACKFILL) = 95% STANDARD DENSITY, AASHTO-T 99 (K=0.86)

H = HEIGHT OF FILL OVER TOP OF PIPE Ba = INSIDE DIAMETER (I.D.) OF PIPE * Bd = TRENCH WIDTH t = WALL THICKNESS OF PIPE CLSM = CONTROLLED LAW STRENGTH MATERIAL a = LOOSE GRANULAR BEDDING, AS FOLLOWS: a=0" FOR FLEXIBLE CULVERTS IN SOIL. a=3" FOR RCP CULVERTS IN SOIL. a=12" FOR CULVERTS IN ROCK.

* TRENCH WIDTHS

RCP: Bd = MIN. OF 1.33(Bo+2f), OR (Bo+2t)+12"(PER AASHTO SECTION 17) CSP: Bd = MIN. OF Bo+4' (PER AASHTO SECTION 12)

- BEDDING MATERIAL FOR SOIL SHALL BE STRUCTURAL BACKFILL CLASS 1 DR 2.
- BEDDING MATERIAL FOR ROCK SHALL BE STRUCTURAL BACKFILL CLASS 1.

NOTES:

- ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS APPLICABLE TO THE PROJECT.
- ALL TRENCH INSTALLATIONS SHALL BE IN ACCORDANCE WITH OSHA AND COLORADO DEPARTMENT OF TRANSPORTATION REGULATIONS.
- THE USE OF NON-REINFORCED CONCRETE PIPE WILL NOT BE ALLOWED IN THE CITY OF CASTLE PINES.

NOTE: ALL TRENCHING SHALL COMPLY WITH ALL STATE, FEDERAL AND O.S.H.A. SAFETY REQUIREMENTS. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MEET ALL SAFETY REQUIREMENTS.

TO BE USED IN OPEN FIELDS OR PRIOR TO PAVING ROADS

APPROVED BY THE CITY OF CASTLE PINES

Larry of Vimmo

Director of Public Works DATE 10/14/2025

Larry Nimmo

PIPE INSTALLATION IN TRENCH



Issued: __6/15/2022_

Revised: _10/14/2025

Standard Drawing No.

SD.33a

NOTES:

- 1. THIS TRENCH BACKFILL DETAIL SPECIFIES REQUIREMENTS IN ADDITION TO THOSE SPECIFIED IN THE LATEST EDITION OF THE COLORADO DEPARTMENT OF TRANSPORTATION'S STANDARD FOR ROAD AND BRIDGE CONSTRUCTION.
- 2. A CONSTRUCTION TRAFFIC CONTROL PLAN SHALL BE SUBMITTED TO AND APPROVED BY THE CITY OF CASTLE PINES PRIOR TO ISSUANCE OF CONSTRUCTION PERMITS IN THE CITY RIGHT-OF-WAY.
- 3. TRENCH SHALL BE BRACED OR SHORED AS NECESSARY FOR THE SAFETY OF THE WORKERS AND PROTECTION OF OTHER UTILITIES OR STRUCTURES IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL SAFETY REGULATIONS.
- 4. THE TRENCH WIDTH SHALL BE CONFINED TO THOSE MINIMUM DIMENSIONS, WHICH WILL PERMIT PROPER INSTALLATION AND ACCEPTABLE PIPE LOADING AS ESTABLISHED BY CURRENT LOCAL STATE AND FEDERAL SAFETY REGULATIONS.
- 5. BACKFILL COMPACTION REQUIREMENTS: MINIMUM DENSITY WILL BE DETERMINED IN ACCORDANCE WITH AASHTO T 99 OR T 180 AS DEFINED BY COOT STANDARD SPECIFICATIONS SECTION 203.07 AND COOT 703.03. EXCEPT FOR CLSM.
- 6. PAVEMENT EDGES SHALL BE SAW-CUT. EDGES SHALL BE TACK COATED PRIOR TO PATCHING.
- 7. ALL STORM SEWERS SHALL BE CONSTRUCTED SO THAT A MINIMUM COVER IS MAINTAINED TO WITHSTAND AASHTO HS-20 LOADING ON THE PIPE. THE MINIMUM COVER TO WITHSTAND LIVE LOADING DEPENDS UPON THE PIPE SIZE, TYPE AND CLASS, AND SOIL BEDDING CONDITION, BUT SHALL BE NOT LESS THAN 1-FOOT AT ANY POINT ALONG THE PIPE. OTHER FACTERS THAT AFFECT THE DEPTH OF THE PIPE ARE HYDRAULIC GRADE LINE ELEVATIONS, INLET DEPTHS, ADJACENT UTILITIES OR UTILITY CROSSING, INCLUDING WATER AND SEWER SERVICES LINES ALONG RESIDENTIAL STREETS, AND CONNECTIONS TO EXISTING STORM SEWER SYSTEMS. THE ROADWAY SUBGRADE, WHICH SUPPORTS THE PAVEMENT SECTION IS TYPICALLY PLOWED TO A CERTAIN DEPTH, MOISTURE TREATED AND COMPACTED PRIOR TO THE PLACEMENT OF THE SUB-BASE, BASE COURSE, AND SURFACING. THERE ARE ALSO INSTANCES WHERE THE SUBGRADE MATERIAL MUST BE EXCAVATED AND REPLACED OR TREATED TO A CERTAIN DEPTH TO MITIGATE SWELLING SOILS. THESE EFFORTS CAN IMPACT THE STORM SEWER SYSTEM IF IT HAS NOT BEEN DESIGNED WITH ADEQUATE DEPTH. THE DESIGN ENGINEER SHALL USE THE BEST INFORMATION AVAILABLE, INCLUDING PAVEMENT DESIGN OR SOILS REPORTS (IF AVAILABLE) TO ENSURE THAT STORM SEWER PIPES HAVE ADEQUATE DEPTH.
- 8. CHANGES IN DESIGN CRITERIA WILL REQUIRE COMPENSATING CHANGE IN PIPE DESIGN.
- 9. WHEN PIPE SEWER IS TO BE EXTENDED OR REPLACED WITH PIPE OF DIFFERENT MATERIAL, THE CONNECTIONS SHALL CONFORM TO THE DETAIL SHOWN ON PLANS OR BE APPROVED THROUGH CASTLE PINES PUBLIC WORKS.
- 10. WHEN TWO OR MORE CONDUITS ARE LAID SIDE-BY-SIDE, THEY SHALL BE PLACED SO THAT THEY ARE $\frac{1}{2}$ OUTSIDE DIAMETER, OR $\frac{1}{2}$ OUTSIDE SPAN, OR 3' APART, WHICHEVER IS LESS. HOWEVER, IF END SECTIONS ARE USED, THE MINIMUM SPACING SHALL BE 1' BETWEEN THE OUTSIDE EDGE OF END SECTIONS.
- 11. TRENCH INSTALLATION (PER OSHA STANDARDS):
 - O. TRENCHES OVER 5 FEET IN DEPTH SHALL BE EITHER SHORED OR THE TRENCH WALLS SHALL BE SLOPED NO STEEPER THAN 3:1 TO THE ANGLE OF REPOSE. IF SLOPED, THE BOTTOM OF THE SLOPE SHALL BE A MINIMUM OF 1 FOOT ABOVE THE TOP OF THE PIPE.
 - b. SHORING WILL BE REQUIRED WHEN THE BOTTOM OF THE SLOPE IS MORE THAN 3 FEET ABOVE THE BOTTOM OF THE TRENCH.
 - c. ALL SHEETING OR SHORING TO BE REMOVED.
- 12. CLSM MAY USED IN PLACE OF STRUCTURAL BACKFILL.
- 13. CLSM SHALL NOT EXCEED A STRENGTH OVER 100 P.S.I.

REFERENCE: CITY OF CASTLE PINES DRAINAGE MANUAL AND COLORADO DEPARTMENT OF TRANSPORTATION "M" STANDARDS.

TO BE USED IN OPEN FIELDS OR PRIOR TO PAVING ROADS

APPROVED BY THE CITY OF CASTLE PINES

arry of Vimmo

Larry Nimmo
Director of Public Works

DATE 10/14/2025

PIPE INSTALLATION IN TRENCH NOTES

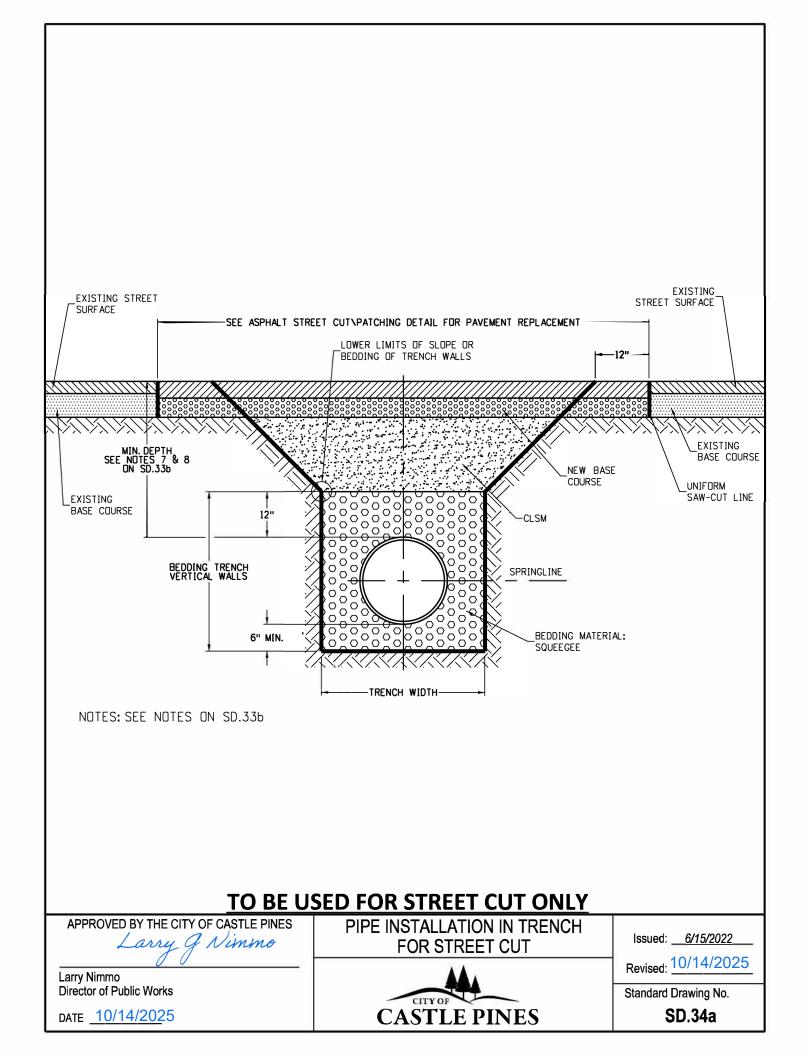
CASTLE PINES

Issued: <u>6/15/2022</u>

Revised: 10/14/2025

Standard Drawing No.

SD.33b



NOTES:

- THIS PIPE INSTALLATION DETAIL SPECIFIES REQUIREMENTS IN ADDITION TO THOSE SPECIFIED IN THE LATEST EDITION OF THE COLORADO DEPARTMENT OF TRANSPORTATION'S STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
- A CONSTRUCTION TRAFFIC CONTROL PLAN SHALL BE SUBMITTED TO AND APPROVED BY THE CITY OF CASTLE PINES PRIOR TO ISSUANCE OF CONSTRUCTION PERMITS IN THE CITY RIGHT-OF-WAY.
- 3. PIPE SHALL BE BEDDED FROM 6" BELOW THE BOTTOM OF THE PIPE TO 12" ABOVE THE TOP OF PIPE.
- 4. TRENCH WIDTH SHALL NOT BE MORE THAN 16" AND NOT LESS THAN 12" WIDER THAN THE LARGEST OUTSIDE DIAMETER OF THE PIPE.
- 5. ALL STORM SEWERS SHALL BE CONSTRUCTED SO THAT A MINIMUM COVER IS MAINTAINED TO WITHSTAND AASHTO HS-20 LOADING ON THE PIPE. THE MINIMUM COVER TO WITHSTAND LIVE LOADING DEPENDS UPON THE PIPE SIZE, TYPE AND CLASS, AND SOIL BEDDING CONDITION, BUT SHALL BE NOT LESS THAN 2-FOOT AT ANY POINT ALONG PIPE.
- 6. FOR WATER AND SANITARY SEWER PIPES, REFER TO THE MAINTAINING DISTRICT STANDARDS FOR PIPE BEDDING MATERIALS.
- 7. PAVEMENT EDGES SHALL BE SAW-CUT AND KEPT TO A NEAT VERTICAL EDGE PRIOR TO PAVING.
- 8. EDGES SHALL BE TACK COATED PRIOR TO PATCHING.
- 9. WHEN STORM SEWER PIPE IS TO BE EXTENDED OR REPLACED WITH PIPE OF DIFFERENT MATERIAL, THE CONNECTIONS SHALL CONFORM TO THE DETAIL SHOWN ON PLANS OR BE APPROVED THROUGH CASTLE PINES PUBLIC WORKS.
- 10. WHEN TWO OR MORE CONDUITS ARE LAID SIDE-BY-SIDE, THEY SHALL BE PLACED SO THAT THEY ARE 1/2 OUTSIDE DIAMETER, OR 1/2 OUTSIDE SPAN, OR 3' APART, WHICHEVER IS LESS. HOWEVER, IF END SECTIONS ARE USED, THE MINIMUM SPACING SHALL BE 1' BETWEEN THE OUTSIDE EDGE OF END SECTIONS.
- 11. TRENCH INSTALLATION PER OSHA STANDARDS.

TO BE USED FOR STREET CUT ONLY

APPROVED BY THE CITY OF CASTLE PINES

arry & Nimmo

Larry Nimmo
Director of Public Works

DATE 10/14/2025

PIPE INSTALLATION IN TRENCH FOR STREET CUT

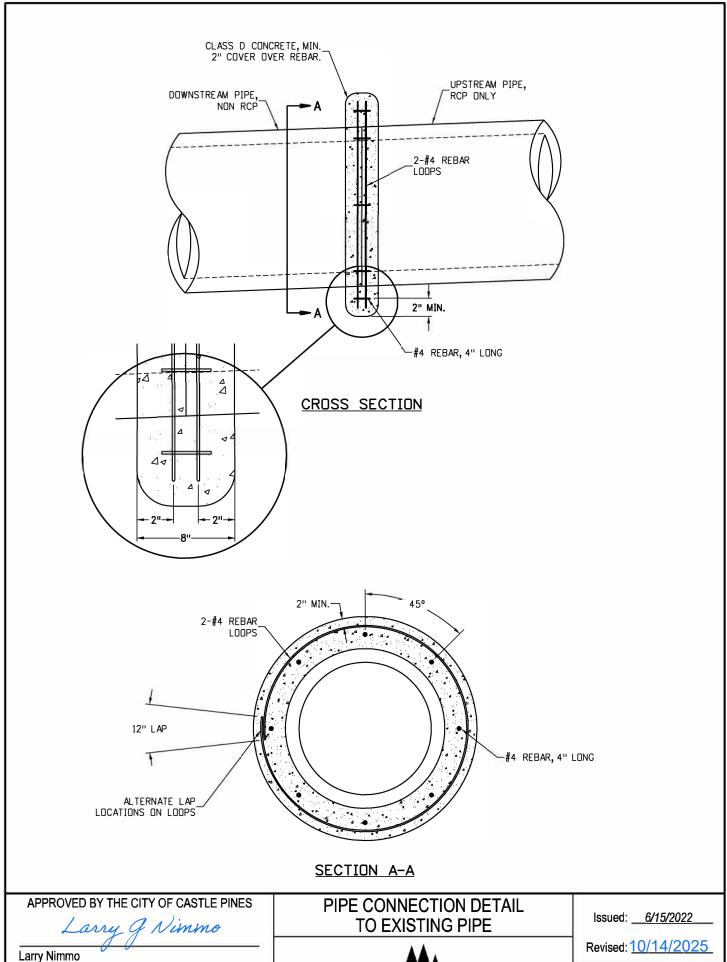
CASTLE PINES

Issued: __6/15/2022_

Revised: 10/14/2025

Standard Drawing No.

SD.34b



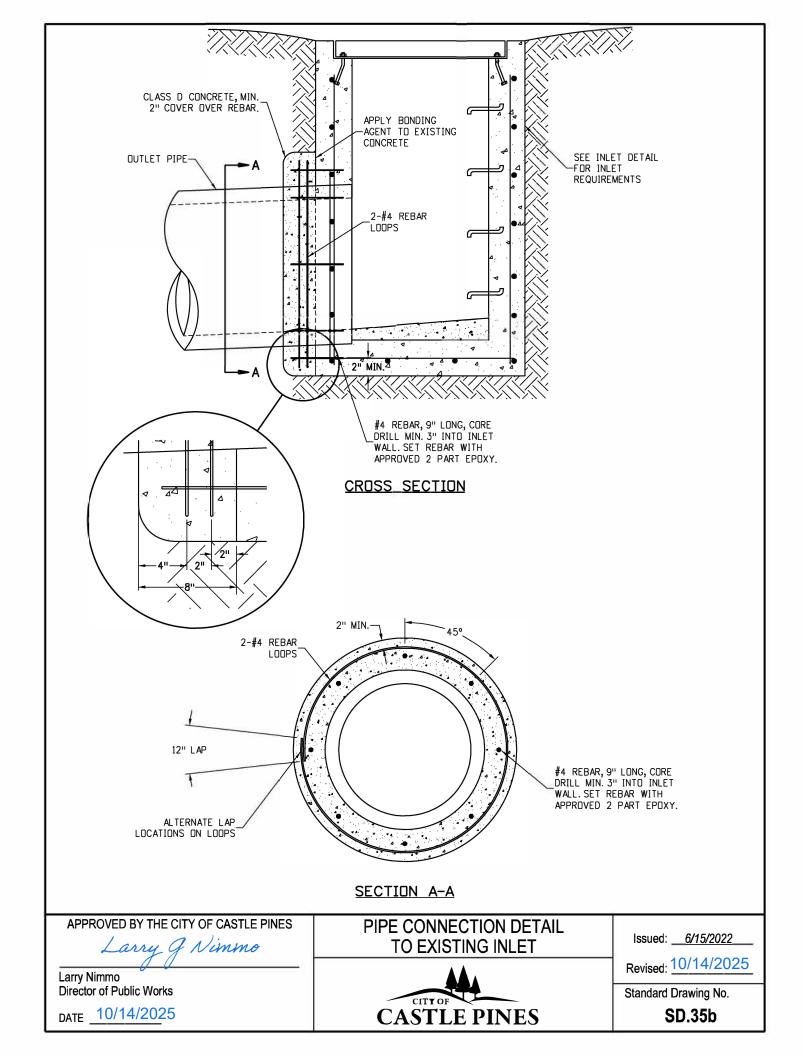
Director of Public Works

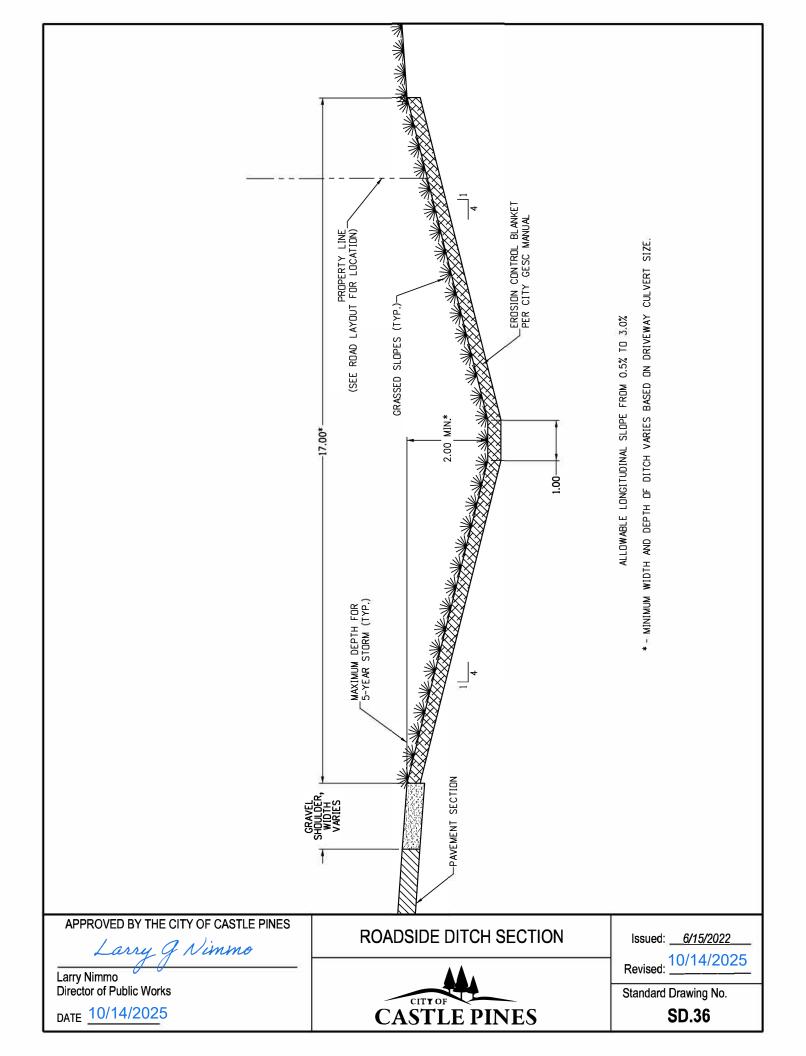
DATE 10/14/2025

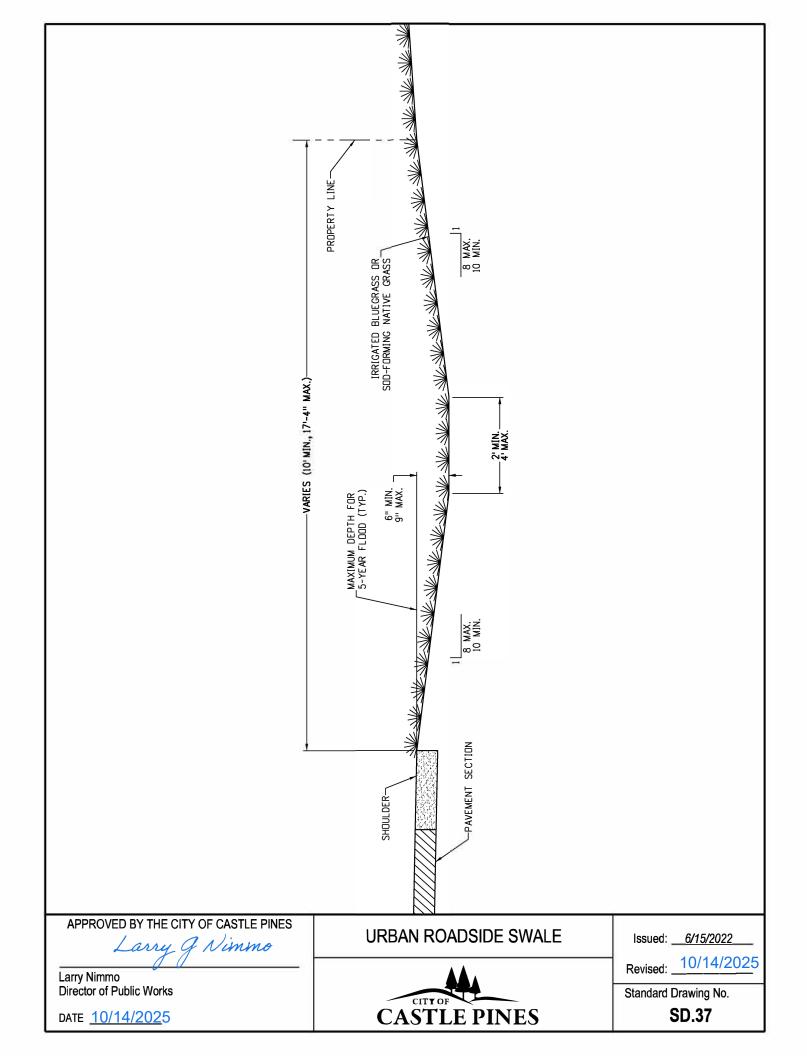


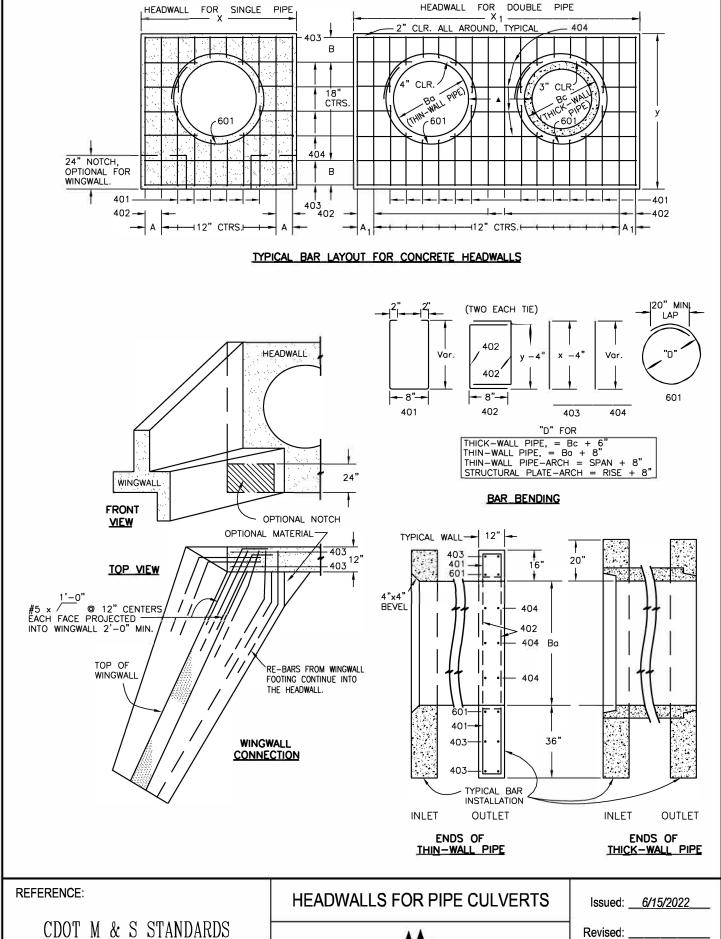
Standard Drawing No.

SD.35a









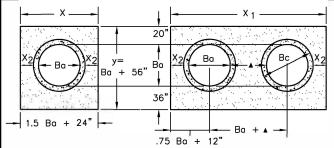
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Revised:

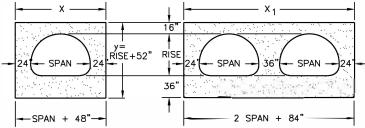
Standard Drawing No.

SD.38a



DIME	NSIO	NS							Q	UANTIT	IES	
ř.						1 1				CRETE	STE	ELo
Ba	Bc	X	Α	X ₁	A ₁	у	B	X 2	SGL	DBL	SGL	DBL
in.	in.	ftin	in.	ftin.	in.	ftin	in.	in.	cu.yd	cu.yd	lbs.	lbs.
54	65	8-9	81/2	15-6	7	9-2	17	20	2.12	3.55	209	364
60	72	9-6	7	17-0	10	9-8	11	21	2.35	3.99	236	414
66	79	10-3	111/2	18-6	7	10-2	14	22	2.60	4.44	249	453
72	86	11-0	10	20-0	10	10-8	17	23	2.85	4.91	270	476
78	93	11-9	81/2	21-3	11	11-2	11	24	3.11	5.29	306	527
84	100	12-6	7	22-6	7	11-8	14	25	3.38	5.68	333	572
90	107	13-3	111/2	23-9	81/2	12-2	17	26	3.66	6.08	335	593
96	114	14-0	10	25-0	10	12-8	11	27	3.94	6.48	379	649
102	121	14-9	81/2	26-3	111/2	13-2	14	28	4.24	6.89	400	664
108	128	15-6	7	27-6	7	13-8	17	29	4 54	7 30	424	דחק

DIMENSIONS QUANTITIES EQUIV SPAN RISE CONCRETE STEEL 🗖 SGL DBL SGL DBL ft.-in 10-9 8 ½ 11-3 11½ 11-9 8 ½ 12-7 7½ 81 59 20-6 5.10 467 17 1/2 9-7 10½ 9-7 12½ 95 3.08 5.79 290 547 67 10-3 10-7 103 3.30 6.21 591 90 321 10-7 16 ½ 10-11 9 ½ 96 25-8 606 6.65 8 1/2 117 79 13-9 26-6 3.63 6.86 356 672 102 108 128 83 14-8 8 28-4 12 11-3 111/2 3.96 7.51 376 699



HEADWALL FOR THIN - WALL PIPE ARCH

TYPICAL TOP-VIEW 16 -Ba Ba - Bc Ba Ba+52" 36' 2Ba+ Ba + 48" 48"

HEADWALL FOR THICK - WALL ROUND PIPE

'			1		1					- 1			
DIN	DIMENSIONS QUANTITIES												
Ba	х	Α	х.	Α,	v	В	CONC	RETE	STEE	LO			
in.	ftin.	in.	ftin.	1 in.	ftin.	in.	SGL cu.yd.	DBL cu.yd.	SGL lbs.	DBL lbs.			
54	8-6	7	15-3	111/2	8-10	15	2.19	3.81	211	358			
60	9-0	10	16-6	7	9-4	18	2.38	4.25	217	396			
66	9-6	7	17-9	8 1/2	9-10	12	2.58	4.70	252	454			
72	10-0	10	19-0	10	10-4	15	2.78	5.17	255	472			
78	10-6	7	20-0	10	10-10	18	2.98	5.56	276	499			
84	11-0	10	21-0	10	11-4	12	3.19	5.95	297	553			
90	11-6	7	22-0	10	11-10	15	3.40	6.36	317	571			
96	12-0	. 10	23-0	10	12-4	18	3.62	6.79	321	597			
102	12-6	7	24-0	10	12-10	12	3.84	7.21	364	663			
108	13-0	10	25-0	10	13-4	15	4.06	7.63	362	678			

HEADWALL FOR THIN - WALL ROUND PIPE

- WHEN TWO OR MORE CONDUITS ARE LAID SIDE BY SIDE, THEY SHALL BE PLACED SO THAT THE ADJACENT PIPES WILL BE 1/2 INSIDE DIAMETER OR 1/2 INSIDE SPAN OR 3 FEET APART (INCLUDING WALL THICKNESS) WHICHEVER
- ADD 0.89 x (X OR X1) (LB.) WHEN APRON IS REQUIRED.

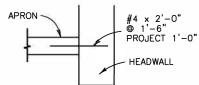
DIN	MENSIONS	5		QUANTITIES								
EQ	V. SPAN	RISE	x	Α	Χ,	Α,	v	В	CONCRETE		STEEL @	
Ba ir		ft.—in			^1 ft.—in.		ft.—in.		SGL cu.yd.	DBL cu.yd.	SGL lbs.	DBL lbs.
6	6 6-1	4-7	10-1	101/2	19-2	11	8-11	151/2	2.52	4.70	232	424
7	5 7-0	5-1	11-0	10	21-0	10	9-5	91/2	2.80	5.25	282	509
8	4 7-11	5-7	11-11	91/2	22-10	9	9-11	121/2	3.08	5.79	291	540
9	3 8-10	6-1	12-10	9	24-8	8	10-5	151/2	3.36	6.33	309	622
10	2 9-9	6-7	13-9	81/2	26-6	7	10-11	91/2	3.63	6.86	379	673
11	1 10-11	7-1	14-11	91/2	28-10	9	11-5	12 1/2	4.05	7.67	377	711
12	0 11-10	7-7	15-10	9	30-8	8	11-11	15 1/2	4.36	8.28	395	731
13	2 12 – 10	8-4	16-10	9	32-8	8	12-8	11	4.75	9.03	441	839
14	1 14-1	8-9	18-1	101/2	35-2	11	13-1	131/2	5.17	9.86	448	931
15	0 15-4	9-3	19-4	12	37–8	8	13-7	16 1/2	5.69	10.88	490	953
15	9 15-10	9-10	19-10	9	38-8	8	14-2	11	5.89	11.25	5.34	1019

HEADWALL FOR STRUCTURAL PLATE ARCH

SKEW ANGLE A*	FACTOR (cosecA')
90 850 750 665 550 450 330	1.000 1.004 1.015 1.035 1.064 1.103 1.155 1.221 1.305 1.414 1.556 1.743 2.000

SKEW FACTOR **TABLE**

HEADWALL SHALL BE PERPENDICULAR TO THE CULVERT CENTERLINE UNLESS OTHERWISE SPECIFIED. TABULATED DIMENSIONS AND QUANTITIES MUST BE ADJUSTED FOR SKEWED INSTALLATIONS.



WHEN APRON IS REQUIRED

GENERAL NOTES

- CONCRETE SHALL BE CLASS D
- HEADWALL SHALL BE PERPENDICULAR TO THE CULVERT & UNLESS OTHERWISE SHOWN ON THE PLANS. TABULATED DIMENSIONS AND QUANTITIES MUST BE ADJUSTED FOR SKEWED INSTALLATIONS.
- 3. FOR WINGWALL DETAILS, SEE STANDARD M-601-20.
- VOLUME OCCUPIED BY PIPE HAS BEEN DEDUCTED FROM STEEL AND CONCRETE QUANTITIES.
- EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED ¾".
- ALL BARS SHALL HAVE A 2" MINIMUM CLEARANCE.
- YEAR OF CONSTRUCTION STAMPED ON DOWNSTREAM HEADWALL PER CASTLE PINES.

REFERENCE:

CDOT M & S STANDARDS M - 601 - 10

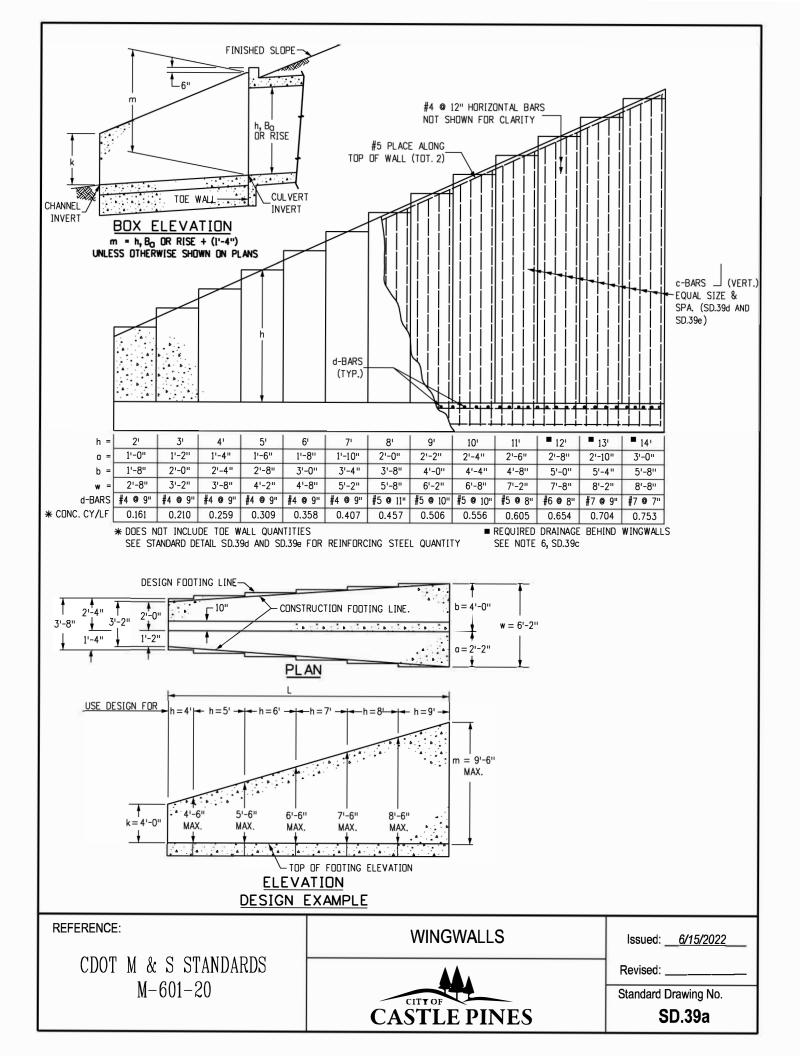
HEADWALLS FOR PIPE CULVERTS

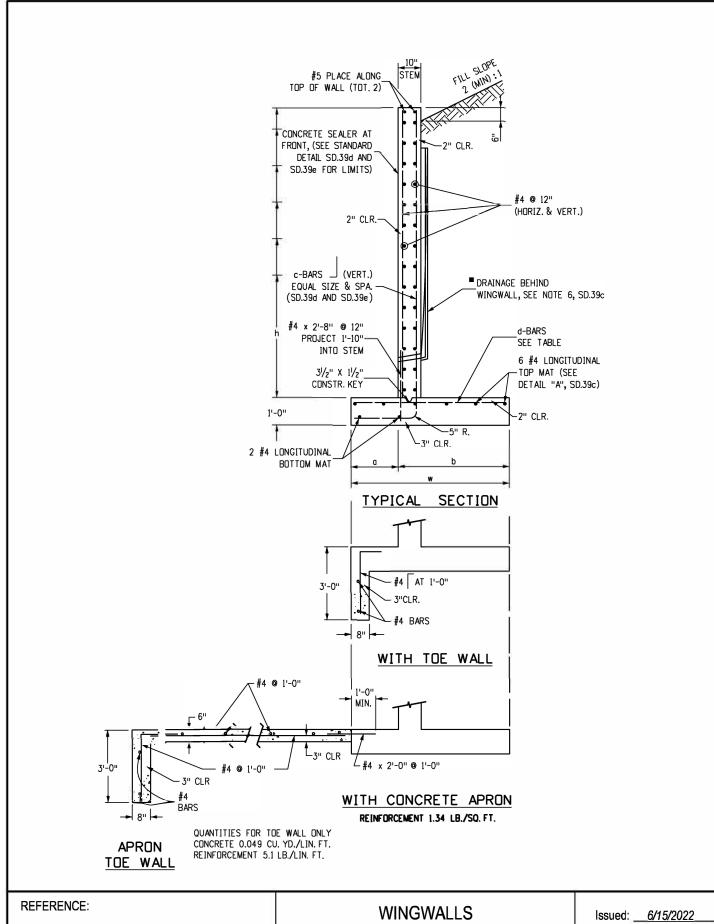
CITYOF **CASTLE PINES** Issued: __6/15/2022

Revised:

Standard Drawing No.

SD.38b





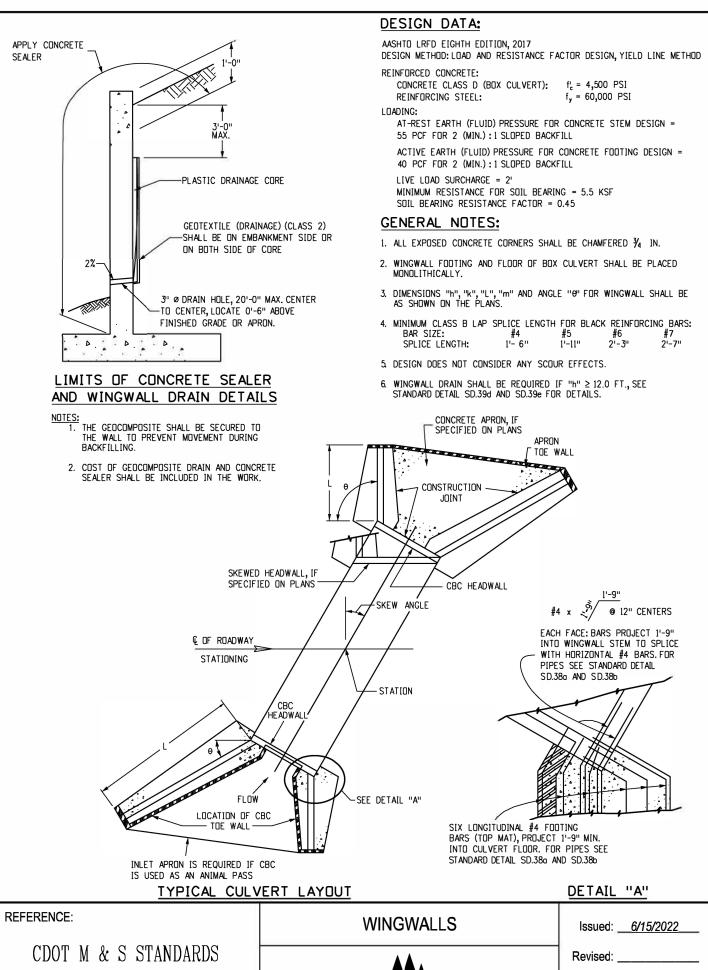
CDOT M & S STANDARDS M - 601 - 20

CASTLE PINES

Revised:

Standard Drawing No.

SD.39b



M-601-20

CASTLE PINES

Standard Drawing No.

SD.39c

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

L (MULTIP	LE OF m)	≤ (1.0	x m)	≤ (1.25	5 x m)	≤ (1.5	x m)	≤ (1.75	x m)
(- -)			* REINF.		* REINF.		* REINF.		* RE INF
m (FT)	k (FT)	c-BARS	LB./L.F.	c-BARS	LB./L.F.	c-BARS	LB./L.F.	c-BARS	LB./L.F
	4	#4 @ 10"	53.60	#5 @ 10"	57.95	#5 @ 10"	57.10	#5 @ 8"	60.22
l	5	#4 @ 10"	55.86	#5 @ 10"	60.46	#5 @ 10"	59.60	#5 @ 8"	62.89
	6	#5 @ 10"	64.43	#6 @ 10"	70.60	#6 @ 10"	69.69	#6 @ 8"	74.93
14	7	#5 @ 10"	67.29	#6 @ 10"	73.76	#6 @ 10"	72.83	#6 @ 8"	78.32
	8	#5 @ 8"	74.71	#6 @ 8"	83.46	#6 @ 7"	87.09	#6 @ 6"	92.54
	9	#5 @ 8"	78.10	#6 @ 8"	87.23	#6 @ 7"	91.03	#6 @ 6"	96.72
	4	#4 @ 10"	50.51	#4 @ 10"	49.25	#5 @ 10"	53.71	#5 © 10"	53.09
	5	#4 @ 10"	52.66	#4 @ 10"	51.37	#5 @ 10"	56.09	#5 @ 10"	55.46
}	-	#4 @ 10"	54.92	#5 @ 10"		#5 @ 9"	60.31	#6 @ 9"	67.56
13	6	-		-	59.48	-			
-	7	#4 @ 10"	57.36	#5 @ 10"	62.16	#5 @ 9"	63.05	#6 @ 9"	70.66
	8	#5 @ 10"	66.39	#6 @ 10"	72.82	#6 @ 8"	77.97	#6 @ 7"	81.68
	9	#5 @ 10"	69.37	#6 @ 10"	76.10	#6 @ 8"	81.49	#6 @ 7"	85.37
	2	#4 @ 10"	43.91	#4 @ 10"	42.65	#4 @ 10"	41.82	#4 @ 10"	41.22
	3	#4 @ 10"	45.82	#4 @ 10"	44.55	#4 @ 10"	43.71	#4 @ 10"	43.11
	4	#4 @ 10"	47.80	#4 @ 10"	46.51	#4 @ 10"	45.65	#5 © 10"	50.06
12	5	#4 @ 10"	49.84	#4 @ 10"	48.53	#4 @ 10"	47.66	#5 © 10"	52.33
12	6	#4 @ 10"	51.99	#4 @ 10"	50.65	#5 @ 10"	55.34	#5 @ 8"	58.41
	7	#4 @ 10"	54.30	#5 @ 10"	58.80	#5 @ 10"	57.87	#5 @ 8"	61.10
	8	#5 @ 10"	62.91	#5 @ 10"	61.45	#5 @ 7"	67.46	#5 @ 6"	70.68
	9	#5 @ 10"	65.64	#5 @ 10"	64.15	#5 @ 7"	70.44	#5 @ 6"	73.82
	2	#4 @ 10"	41.70	#4 @ 10"	40.42	#4 @ 10"	39.57	#4 @ 10"	38.96
1	3	#4 @ 10"	43.57	#4 @ 10"	42.27	#4 @ 10"	41.40	#4 @ 10"	40.79
- 1	4	#4 @ 10"	45.48	#4 @ 10"	44.16	#4 @ 10"	43.28	#4 @ 10"	42.66
-	5	#4 @ 10"	47.46	#4 @ 10"	46.10	#4 @ 10"	45.21	#4 @ 10"	44.58
11	6	#4 @ 10"	49.52	#4 @ 10"	48.14	#4 @ 9"	48.23	#5 @ 10"	51.88
-	7	#4 @ 10"	51.73	#4 @ 10"	50.31	#4 @ 9"	50.43	#5 @ 10"	54.29
-		#4 @ 10"	-	#5 @ 10"	-			#5 @ 8"	
-	8	- "	54.00	<u> </u>	58.44	#5 @ 10"	57.45		60.64
	9	#4 @ 10"	56.20	#5 @ 10"	60.87	#5 @ 10"	59.85	#5 @ 8"	63.21
	2	#4 @ 10"	39.84	#4 @ 10"	38.53	#4 @ 10"	37.65	#4 @ 10"	37.03
	3	#4 @ 10"	41.68	#4 @ 10"	40.35	#4 @ 10"	39.47	#4 @ 10"	38.84
	4	#4 @ 10"	43.58	#4 @ 10"	42.22	#4 @ 10"	41.31	#4 @ 10"	40.67
10	5	#4 @ 10"	45.53	#4 @ 10"	44.14	#4 @ 10"	43.21	#4 @ 10"	42.56
	6	#4 @ 10"	47.58	#4 @ 10"	46.14	#4 @ 10"	45.20	#4 @ 10"	44.53
	7	#4 @ 10"	49.79	#4 @ 10"	48.31	#4 @ 10"	47.34	#5 @ 10"	51.97
	8	#4 @ 10"	52.06	#4 @ 10"	50.54	#4 @ 10"	49.54	#5 @ 10"	54.43
	2	#4 @ 10"	38.01	#4 @ 10"	36.75	#4 @ 10"	35.85	#4 @ 10"	35.21
	3	#4 @ 10"	39.93	#4 @ 10"	38.56	#4 @ 10"	37.64	#4 @ 10"	36.99
	4	#4 @ 10"	41.81	#4 @ 10"	40.40	#4 @ 10"	39.47	#4 @ 10"	38.81
9	5	#4 @ 10"	43.75	#4 @ 10"	42.30	#4 @ 10"	41.35	#4 @ 10"	40.67
ŀ	6	#4 @ 10"	45.79	#4 @ 10"	44.30	#4 @ 10"	43.31	#4 @ 10"	42.62
	7	#4 @ 10"	48.04	#4 @ 10"	46.50	#4 @ 10"	45.49	#4 @ 10"	44.77
	8	#4 @ 10"	50.43	#4 @ 10"	48.84	#4 @ 10"	47.80	#4 @ 10"	47.06
		#4 @ 10"	36.41	#4 @ 10"	35.01	#4 @ 10"	34.08	#4 @ 10"	33.42
}	3	#4 @ 10"		#4 @ 10"		#4 @ 10"	35.85	#4 @ 10"	
-	4		38.23		36.80			-	35.18
8			40.09	#4 @ 10"	38.61	#4 @ 10"	37.64	#4 @ 10"	36.95
	5	#4 @ 10"	41.99	#4 @ 10"	40.47	#4 @ 10"	39.47	#4 @ 10"	38.76
	6	#4 @ 10"	43.97	#4 @ 10"	42.40	#4 @ 10"	41.36	#4 @ 10"	40.64
	7	#4 @ 10"	46.19	#4 @ 10"	44.56	#4 @ 10"	43.49	#4 @ 10"	42.74
	2	#4 @ 10"	34.90	#4 @ 10"	33.44	#4 @ 10"	32.47	#4 @ 10"	31.78
	3	#4 @ 10"	36.73	#4 @ 10"	35.23	#4 @ 10"	34.23	#4 @ 10"	33.53
7 [4	#4 @ 10"	38.59	#4 @ 10"	37.04	#4 @ 10"	36.01	#4 @ 10"	35.29
	5	#4 @ 10"	40.48	#4 @ 10"	38.86	#4 @ 10"	37.80	#4 @ 10"	37.06
	6	#4 @ 10"	42.39	#4 @ 10"	40.71	#4 @ 10"	39.61	#4 @ 10"	38.84

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

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 = $(2.12 \times m)$, USE L $\leq (2.25 \times m)$ 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.

REFERENCE:

CDOT M & S STANDARDS M-601-20 **WINGWALLS**

CASTLE PINES

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SD.39d

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

-						1=114									
L (MULTIP	LE OF m)	≤ (2.0	x m)	≤ (2.25	x m)	≤ (2.5	x m)	≤ (2.75	x m)	≤ (3.0	x m)	≤ (3.25	5 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.
	4	#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	#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
14	6	#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
14	7	#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	#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	#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
	4	#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	#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	#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
13	7	#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	#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	#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
	2	#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
1	3	#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	#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	#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
12	6	#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	#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 @ 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 9 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
\vdash	2	#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
1 1	3	#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 @ 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 @ 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
11	6	#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	#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
1 1	8	#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	#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
\vdash	2	#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 9 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"	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
10	5	#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
10	6	#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 9 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
1	8	#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
\vdash	2	#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"	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"	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
9	5	#4 @ 10"	40.17	#4 @ 10"	39.78	#4 9 10"	39.47	#4 @ 10"	39.20	#4 @ 9"	39.86	#5 @ 10"	43.28	#5 @ 10"	43.12
"	6	#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"	45.12
	7	#5 @ 10"	49.29	#5 @ 10"	48.86	#5 @ 10"	48.53	#5 @ 10"	48.24	#4 9 9	48.03	#5 @ 10"	47.84	#5 @ 10"	47.67
	8	#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
\vdash	_	#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"	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"	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
8	5	#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"	40.10	#4 @ 10"	39.68	#4 @ 10"	39.35	#4 @ 10"	39.07	#4 @ 10"	43.33	#4 @ 10" #5 @ 10"	43.13	#5 @ 10"	42.96
	7	#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
\vdash						-			18					#4 @ 10"	
	2	#4 @ 10"	31.27	#4 @ 10"	30.86	#4 @ 10"	30.54	#4 @ 10"	30.27	#4 @ 10"	30.06	#4 @ 10"	29.88	-	29.72
,	3	#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
7	4	#4 @ 10"	34.75	#4 @ 10"	34.33	#4 @ 10"	33.99	#4 @ 10" #4 @ 10"	33.71	#4 @ 10" #4 @ 10"	33.50	#4 @ 10"	33.31	#4 @ 10" #4 @ 10"	33.14
	5	#4 @ 10"	36.50		36.07	#4 @ 10"	35.73		35.44		35.22	#4 @ 10"	35.03	-	34.86
	6	#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

^{*} REINFORCING STEEL QUANTITY INCLUDES STEM AND FOOTING QUANTITIES, BUT DOES NOT INCLUDE TOE WALL QUANTITIES.

REFERENCE:

CDOT M & S STANDARDS M-601-20 WINGWALLS

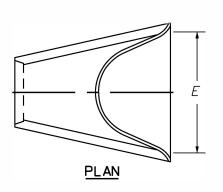


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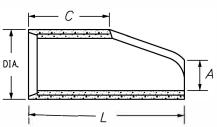
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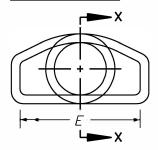
SD.39e



PIPE	DIMENSIONS										
I.D.	Α	С	L	Ε							
IN.											
18 10 48 78 36											
24	10	48	78	48							
30	14	36	96	60							
36	18	36	96	72							
42	24	36	96	78							
48	28	24	96	84							
54	30	36	96	90							
60	36	36	96	96							
72	34	20	96	108							
DEIN		ED (CONC	DETE							

REINFORCED CONCRETE CIRCULAR PIPE





SECTION X-X

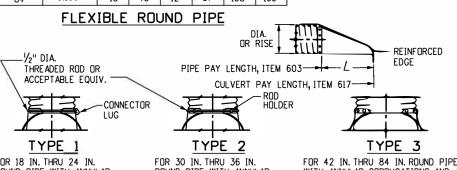
END VIEW

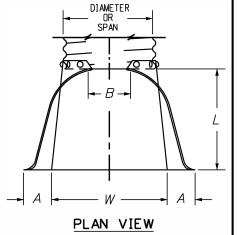
END SECTION FOR REINFORCED CONCRETE CIRCULAR PIPE

PIPE		DIMENSIONS							
DIA.	THICKNESS	Α	В	Н	L	W	T		
IN.									
12	0.064	6	6	6	21	24	34		
18	0.064	8	10	6	31	36	46		
21	0.064	9	12	6	36	42	52		
24	0.064	10	13	6	41	48	58		
30	0.079	12	16	8	51	60	70		
36	0.079	14	19	9	60	72	94		
42	0.109	16	22	11	69	84	106		
48	0.109	18	27	12	78	90	112		
54	0.109	18	30	12	84	102	124		
60	0.109	18	33	12	87	114	136		
66	0.109	18	36	12	87	120	142		
72	0.109	18	39	12	87	126	148		
78	0.109	18	42	12	87	132	154		
84	0.109	18	45	12	87	138	160		

GENERAL NOTES

- 1. DIMENSIONS OF END SECTIONS MAY VARY SLIGHTLY FROM THOSE SHOWN ON THE TABLES DUE TO DIFFERENT MANUFACTURERS' CONFIGURATIONS.
- 2. CONCRETE END SECTIONS SHALL BE FURNISHED WITH TONGUE OR GROOVE AS REQUIRED.
- 3. DESIGN LENGTH OF PIPE OR SIDE DRAIN IS BASED ON LENGTH OF END SECTION SHOWN IN TABLE. ANY ADDITIONAL PIPE REQUIRED TO PROVIDE THE DESIGN LENGTH SHALL BE FURNISHED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE PROJECT.
- 4. THE INSIDE CONFIGURATION AND THE JOINT OF CONCRETE END SECTION AND PIPE SHALL MATCH.
- 5 END SECTIONS FOR CMP ARCH PIPE SHALL MATCH THE DIMENSIONS OF THE PIPE SHOWN ON THE PLANS.
- 6. GALVANIZED TOE PLATE AS SHOWN IS REQUIRED ON END SECTIONS FOR CORRUCATED STEEL PIPE AND SHALL BE THE SAME THICKNESS AS END SECTIONS. TOE PLATE SHALL BE FIELD-BOLTED TO END SECTION WITH 1/4 IN. GALVANIZED BOLTS, NUTS AND WASHERS.
- GALVANIZED STEEL SHALL CONFORM TO AASHTO M 111, M 218 OR M 232.
- 8 CONCRETE PIPE JOINT FASTENERS, WHERE SHOWN ON PLANS, SHALL BE INSTALLED SO THAT A MINIMUM OF 15 LINEAR FEET OF THE OUTLET END OF THE PIPE ARE MECHANICALLY LOCKED TOGETHER. END SECTION LENGTHS WHEN USED, SHALL BE INCLUDED IN THE 15 LF REQUIREMENT.
- 9. CONNECTIONS OF METAL END SECTIONS TO PLASTIC PIPE SHALL BE APPROVED BY THE ENGINEER. PLASTIC END SECTIONS SHALL NOT BE USED.
- 10. THE END SECTION STYLE, EITHER REGULAR OR SAFETY, SHALL BE AS SHOWN ON THE PLANS.
- 11. AT THE OPTION OF THE CONTRACTOR AND APPROVAL OF THE CDOT PROJECT ENGINNER, REINFORCED CONCRETE END SECTIONS MAY BE MADE WITH SYNTHETIC FIBERS INSTEAD OF STEEL FOR PIPES 36 INCHES IN DIAMETER AND SMALLER, AND CONFORM TO AASHTO M 86 AND SUBSECTION 601.03.





FOR 18 IN. THRU 24 IN. ROUND PIPE WITH ANNULAR CORRUGATIONS. NOT TO BE USED ON HELICALLY-FORMED PIPE UNLESS RECORRUGATED.

FOR 30 IN. THRU 36 IN.
ROUND PIPE WITH ANNULAR
CORRUGATIONS. NOT TO BE USED
ON HELICALLY-FORMED PIPE
UNLESS RECORRUGATED.

FOR 42 IN. THRU 84 IN. ROUND PIPE
WITH ANNULAR CORRUGATIONS AND ALL
SIZES WITH HELICAL CORRUGATIONS AND FOR
ALL METAL PIPE ARCH CULVERTS. SHOP ATTACH
A 24 IN. MIN. LENGTH OF ANNULAR PIPE WITH
GALV. RIVETS OR BOLTS, SPOT WELDS, OR
2 IN. LONG SKIP WELDS ON 8 IN. CTRS.
REPAIR BURNT GALVANIZING IN ACCORDANCE
WITH SUBSECTION 707.09.

TYPICAL CONNECTIONS

END SECTION AND CONNECTION DETAILS FOR ROUND AND ARCH METAL PIPES

REFERENCE:

CDOT M & S STANDARDS M-603-10 CONCRETE OR METAL END SECTIONS

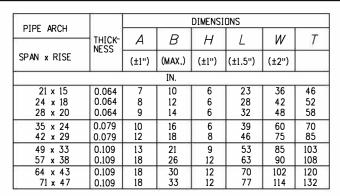
CASTLE PINES

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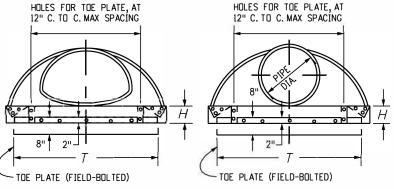
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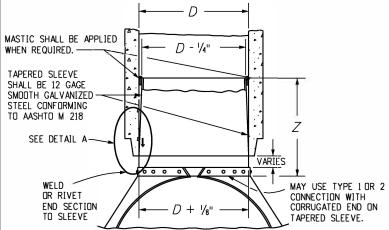
SD.40a



FLEXIBLE PIPE ARCH



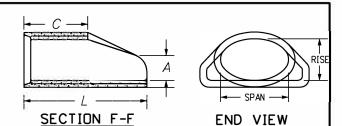
ELEVATIONS



NOTE: METAL END SECTION SHALL
BE FIRMLY WEDGED INTO
PIPE END BEFORE BACKFILLING.

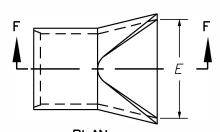
1	D	Z (MIN.)
Ì	IN.	
1	18 - 24	12
	30 AND 36	16
	42 AND LARGER	24

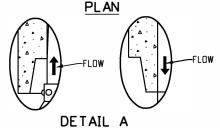
STEEL END SECTION FOR CONCRETE CIRCULAR PIPE (ALTERNATIVE FOR CONCRETE END SECTION)



EQUIVALENT	DIMENSIONS								
CIRCULAR DIA.	NOM: SPAN >		А	С	L	Ε			
IN.									
24	30	19	9	33	72	48			
30	38	24	10	18	72	60			
36	45	29	12	24	84	72			
42	53	34	16	36	96	78			
48	60	38	21	36	96	84			
54	68	43	26	36	96	90			
60	76	48	30	36	96	96			

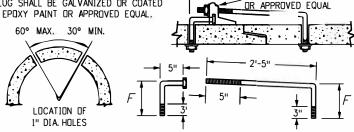
END SECTION FOR REINFORCED CONCRETE ELLIPTICAL PIPE





PIPE	F
DIAMETER	10 10
IN.	
18 - 30	5
36 - 42	6
48 - 60	7
72 - 84	9

¾" GALVANIZED ANCHOR BOLTS,
NUTS AND WASHERS, MILD STEEL, ASTM A 307.
ROD LUG SHALL BE GALVANIZED OR COATED
WITH EPOXY PAINT OR APPROVED EQUAL.



CONCRETE JOINT FASTENER (TWO PER JOINT)

REFERENCE:

CDOT M & S STANDARDS M-603-10 CONCRETE OR METAL END SECTIONS



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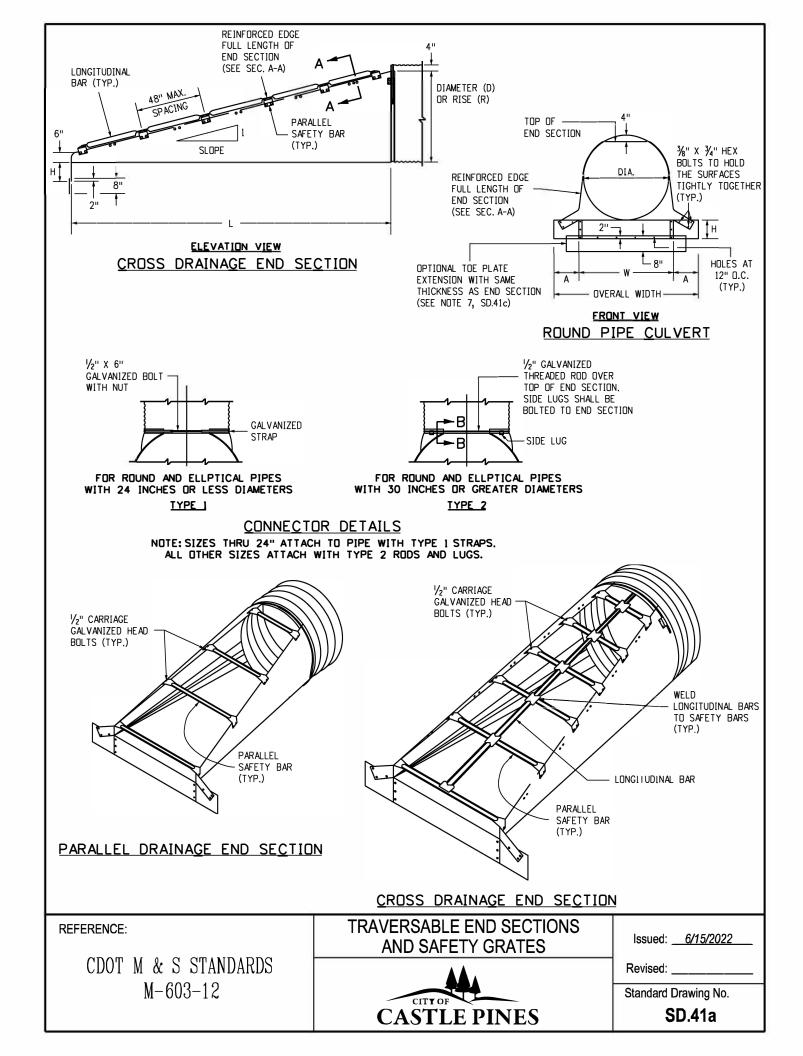
-7" ± 1"

¾" CANOPY TYPE ROD LUG

Standard Drawing No.

Revised:

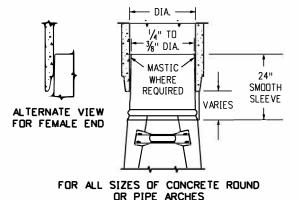
SD.40b



SLOPE 1 A A DIA OR RISE PARALLEL SAFETY BAR (TYP.) ELEVATION VIEW PARALLEL DRAINAGE END SECTION

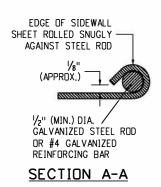
GENERAL NOTES

- USE END SECTIONS ON 1V:4H TO 1V:6H SLOPES ONLY. USE TOE PLATE EXTENSION WHERE SHOWN ON THE PLANS.
- FABRICATE SAFETY AND LONGITUDINAL BARS FROM STEEL PIPE CONFORMING TO ASTM A53 SCHEDULE 40 SPECIFICATIONS. GALVANIZE BARS HOT DIPPED AFTER FABRICATION.
- A LONGITUDINAL BAR IS REQUIRED FOR CROSS DRAINAGE END SECTIONS WHEN THE SPAN IS GREATER THAN 30 INCHES. USE ADDITIONAL LONGITUDINAL BARS IF SPACING EXCEEDS 30 INCHES ON LARGER FND SECTIONS.
- 4. SAFETY AND LONGITUDINAL BARS ARE NOT REQUIRED ON 30 INCHES AND SMALLER CROSS DRAINAGE END SECTIONS.
- SAFETY BARS ARE NOT REQUIRED ON 18 INCHES AND SMALLER PARALLEL DRAINAGE END SECTIONS.
- 6. WHEN REQUIRED, TOE PLATE EXTENSIONS SHALL BE THE SAME GAGE AS END SECTIONS. DIMENSIONS SHALL BE OVERALL WIDTH LESS 6 INCHES BY 8 INCHES HIGH.

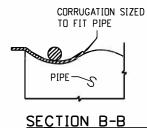


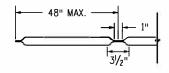
TAPER SLEEVE CONNECTION

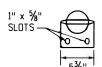
METAL END SECTIONS FOR ROUND PIPE CULVERT								
PIPE DIA.	METAL	DIMENSIONS IN INCHES						
SIZE	THICK MIN. (INCH/GAGE)	А	H W DVERALL Slop	w			-	
(INCHES)				WIDTH	Slope = 4	Slope = 6		
18	0.064/16	8	6	24	40	32	47	
24	0.064/16	8	6	30	46	55	83	
30	0.109/12	12	9	36	60	79	118	
36	0.109/12	12	9	42	66	102	154	
42	0.109/12	16	12	48	80	126	189	
48	0.109/12	16	12	54	86	150	224	
54	0.109/12	16	12	60	92	173	260	
60	0.109/12	16	12	66	98	197	295	

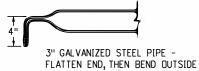


METAL END SECTIONS FOR PIPE ARCH CULVERT									
PIPE	SIZE (INC	HES)	METAL	DIMENSIONS (INCHES)					
EQUIV. DIA.	SPAN	RISE	THICK MIN. (INCH/GAGE)	Α	н	w	OVERALL WIDTH	Slope = 4	Slope = 6
18	21	15	0.064/16	8	6	27	43	20	30
24	28	20	0.064/16	8	6	33	49	40	60
30	35	24	0.109/12	12	9	40	64	55	83
36	41	29	0.109/12	12	9	47	71	75	112
42	48	32	0.109/12	16	12	54	86	90	136
48	56	37	0.109/12	16	12	62	94	110	165
54	63	42	0.109/12	16	12	69	101	130	195
60	70	46	0.109/12	16	12	76	107	146	218
72	82	56	0.109/12	16	12	88	120	185	278









LONGITUDINAL DRAINAGE BAR

PARALLEL BARS

SAFETY BAR DETAILS

REFERENCE:

CDOT M & S STANDARDS M-603-12 TRAVERSABLE END SECTIONS AND SAFETY GRATES



Issued: <u>6/15/2022</u>

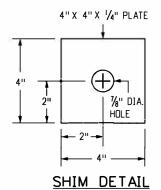
4" TO MATCH END SECTION SIDES

Revised: __

Standard Drawing No.

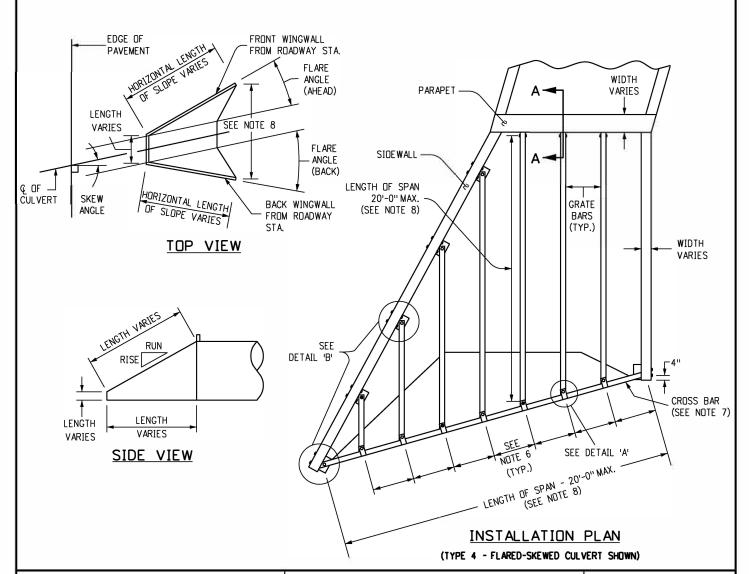
SD.41b

GRATE & CROSS BAR SIZE REQUIREMENTS					
LENGTH OF SPAN	NOMINAL PIPE SIZE (SEE NOTE 7)	O.D. SIZE			
LESS THAN 12'	3.0"	3.0"			
12' - 16'	3.5"	3.5"			
CREATER THAN 16'	4.0"	4.0"			



NOTES

- 1. SHOP DRAWINGS SHALL BE SUBMITTED PER 105.02
- HARDWARE SUCH AS BOLTS, WASHERS, AND LOCK NUTS SHALL BE HOT-DIPPED GALVANIZED PER ASTM A123
- INTENDED FOR USE ON TERRAIN XX SLOPES WITH A CLEAR RUNDUT FOR ERRANT VEHICLES. GUARDRAIL IS THE PREFERRED OPTION ON STEEPER TERRAIN OR WITH HIGHER TRAFFIC VOLUMES
- 4. MINIMUM SCHEDULE 40 PIPE SHALL BE UED. GALVANIZE ALL PIPES, FITTINGS AND HARDWARE AFTER ALL CUTTING, WELDING, DRILLING, AND FABRICATION.
- 5. BOTH ENDS OF CULVERT SHALL BE TREATED TO PREVENT DEBRIS FROM ENTERING
- EQUALLY SPACED 24 INCHES MIN. TO 30 INCHES MAX. FROM EDGE OF SIDEWALL TO CENTER OF BRACKET, OR FROM CENTER TO CENTER OF BRACKET.
- 7. THE CROSS BAR DIAMETER SHALL BE EQUAL TO OR GREATER THAN THE GRATE BAR DIAMETER.
- 8. IF MORE THAN 20 FEET THAN A MIDSPAN SUPPORT SHALL BE REQUIRED. SEE SHEETS 3 AND 4.
- 9. DRILL HOLES USING EQUIPMENT DESIGNED TO CUT THROUGH CONCRETE AND REINFORCING STEEL
- 10. A 34 INCH BOLT, LOCK NUT AND WASHERS. ALL HOLES ARE TO BE 1/8 INCH IN DIAMETER.
- 11. BEND PLATES OR STRIPS WITHOUT CRACKING MATERIAL.
- I2. SHIM THICKNESS EQUALS THE DIFFERENCE IN DIAMETERS OF THE GRATE BAR AND CROSS BAR.



REFERENCE:

CDOT M & S STANDARDS M-603-12 TRAVERSABLE END SECTIONS AND SAFETY GRATES

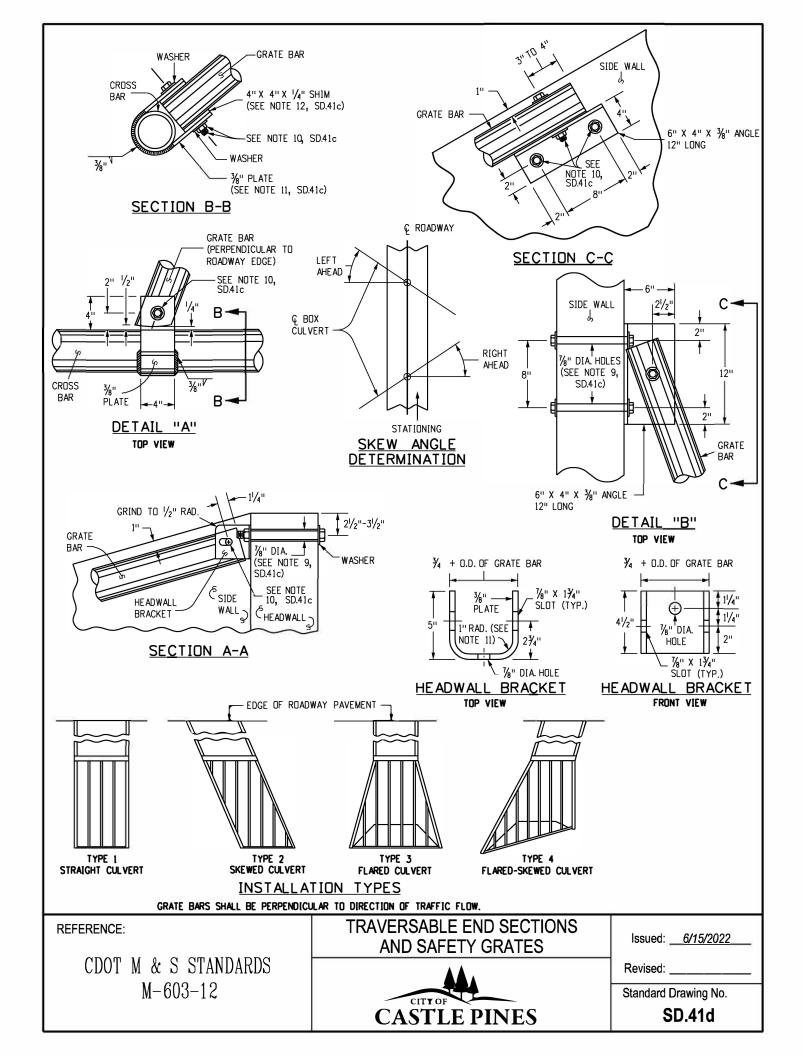


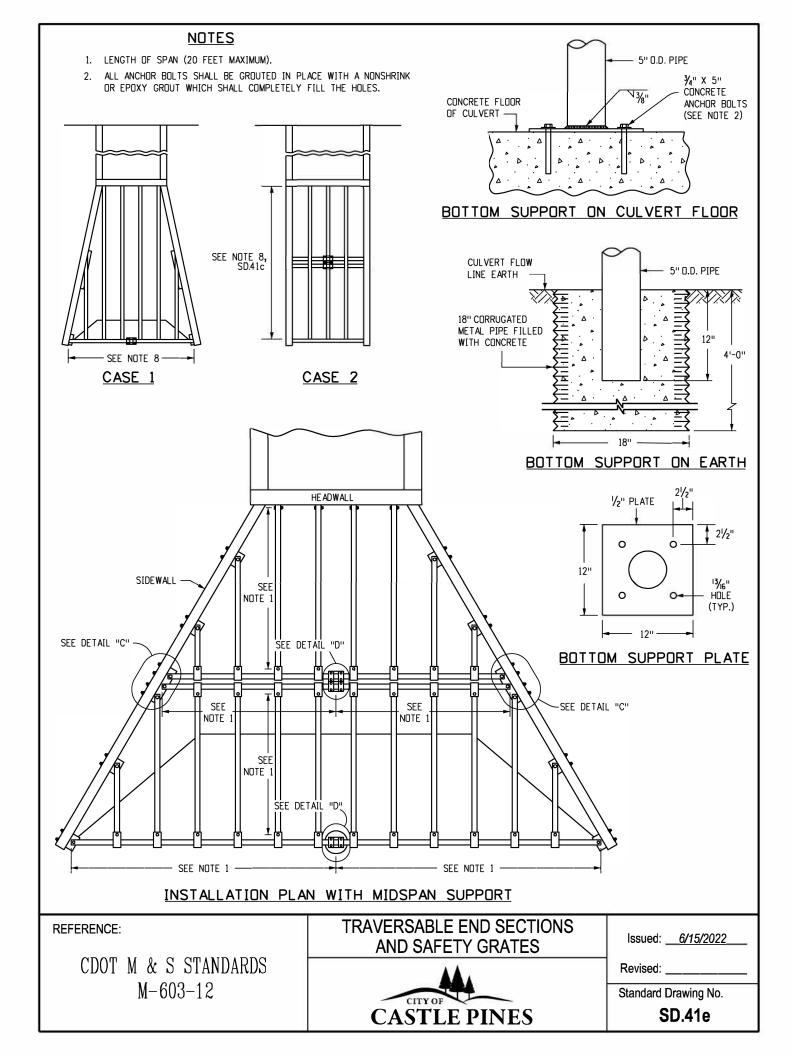
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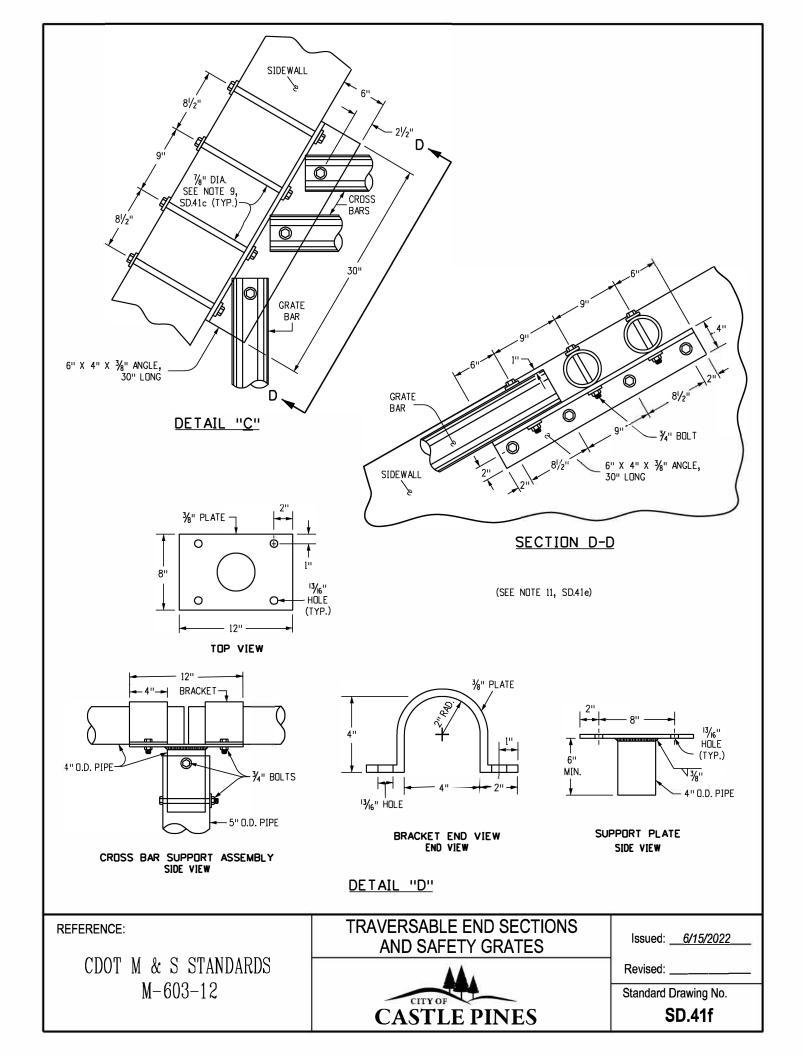
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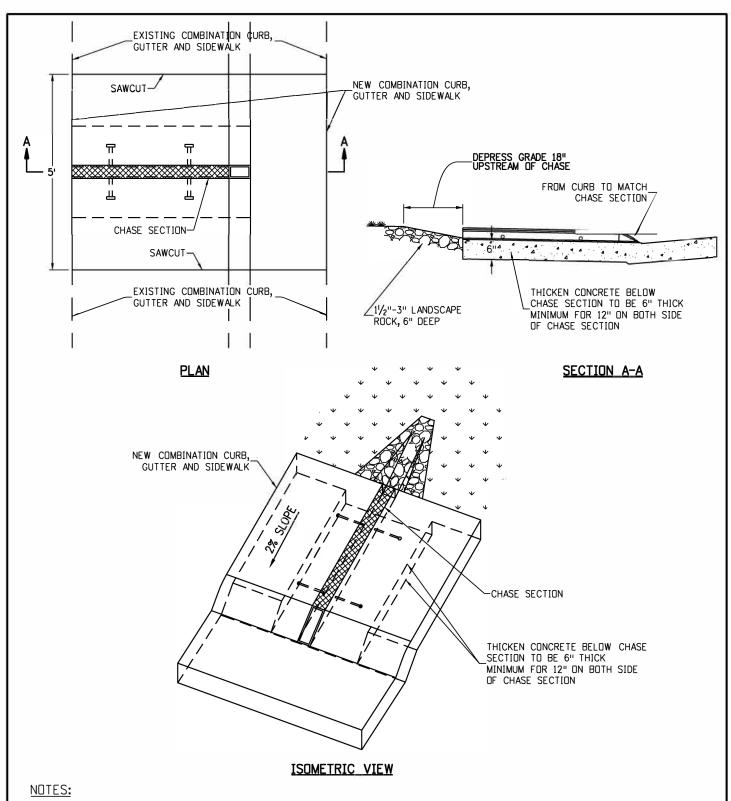
Standard Drawing No.

SD.41c

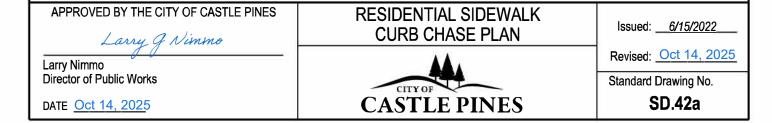


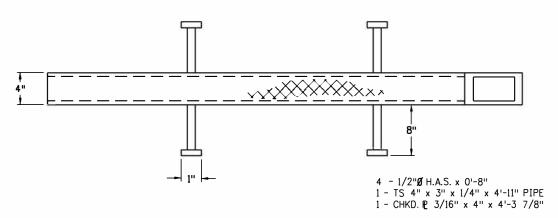




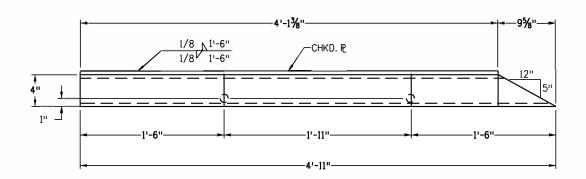


- 1. SAWCUT ALL AREAS TO RECEIVE CHASE SECTION.
- 2. THE USE OF THIS DETAIL MUST BE PREAPPROVED BY CASTLE PINES PUBLIC WORKS DEPARTMENT PRIOR TO CONSTRUCTION IN R.O.W.
- 3. DIRECT CONNECTION TO YARD PIPES WILL NOT BE ALLOWED.
- 4. CHASE DRAIN SHALL BE LOCATED 2.5' MIN. FROM PROPERTY LINE.





<u>PLAN</u>



SECTION

GALV. AFTER FAB. M 111-68 / A 123-68

APPROVED BY THE CITY OF CASTLE PINES

Larry G Nimmo

Larry Nimmo

Director of Public Works

DATE Oct 14, 2025

RESIDENTIAL SIDEWALK CURB CHASE DETAIL

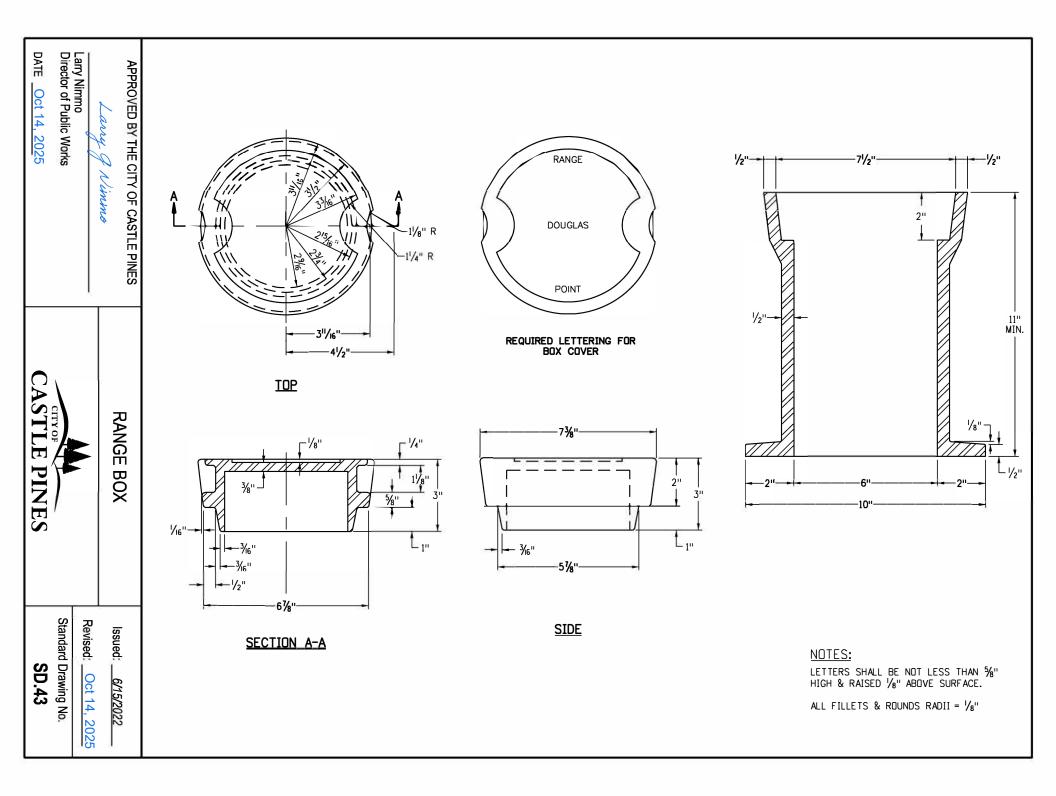


Issued: <u>6/15/2022</u>

Revised: Oct 14, 2025

Standard Drawing No.

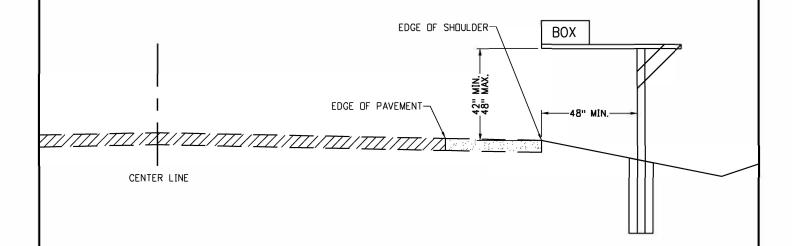
SD.42b



NOTICE

RECOMMENDED MAILBOX INSTALLATIONS

TO AVOID DAMAGE TO YOUR MAILBOX AND ALSO ALLOW THE SNOWPLOWS TO REMOVE THE SNOW FROM UNDER YOUR MAILBOX, THE FOLLOWING DIMENSIONS ARE RECOMMENDED.



PLACING MAILBOX A SHORT DISTANCE AWAY FROM DRIVEWAYS AND INTERSECTIONS HELPS TO AVOID VISION-RESTRICTING SNOWBANKS AND ALSO DAMAGE TO YOUR MAILBOX. THE BOX AND BASE SHOULD BE STRONG ENOUGH TO WITHSTAND FLYING SNOW AND SLUSH TRAFFIC AND SNOWPLOWS.

APPROVED BY THE CITY OF CASTLE PINES

Larry Q Vimmo

Director of Public Works

DATE Oct 14, 2025

MAILBOX SUPPORT

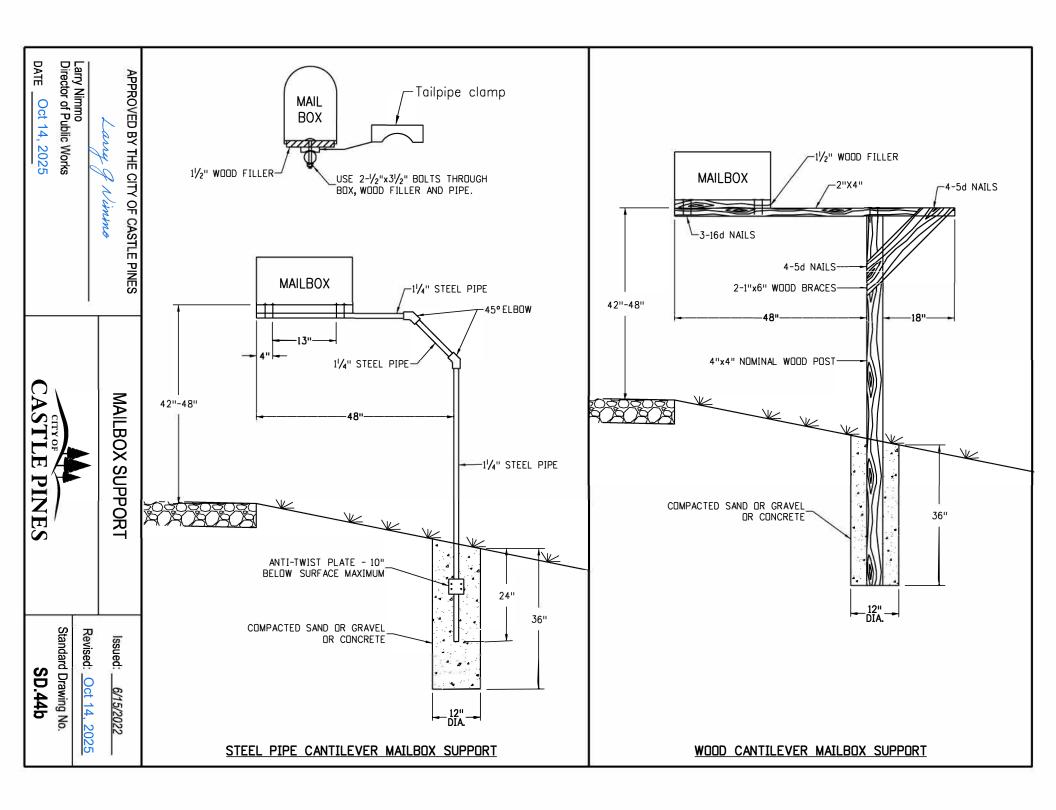
CASTLE PINES

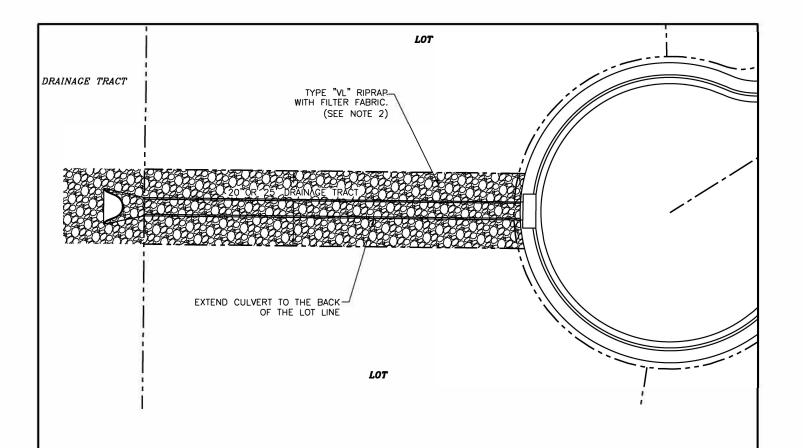
Issued: __6/15/2022_

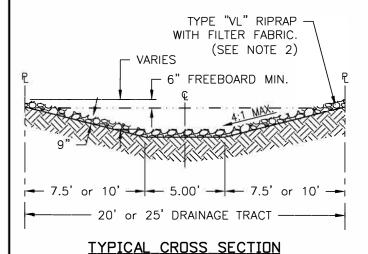
Revised: Oct 14, 2025

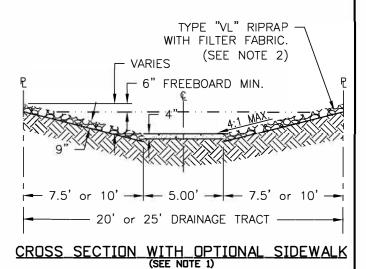
Standard Drawing No.

SD.44a









NOTES:

- 1. OPTIONAL 4" CONCRETE SIDEWALK MAY BE USED ONLY WITH THE CITY'S APPROVAL.
- 2. FILTER FABRIC IS TARABOND #1112-12-4 OR EQUIVALENT.
- 3. LONGITUDINAL SLOPE SPECIFICATION, MIN. 2% MAX. 25%.

APPROVED BY THE CITY OF CASTLE PINES

Larry of Nimmo Larry Nimmo

Director of Public Works DATE Oct 14, 2025

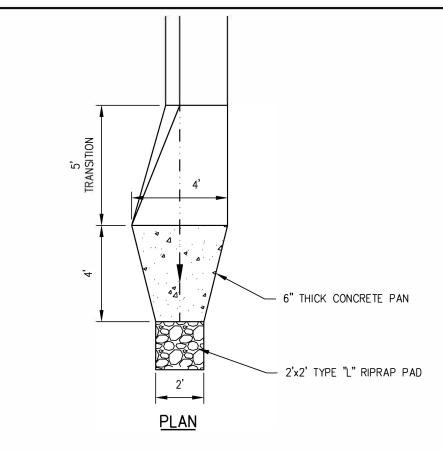
EMERGENCY OVERFLOW CHANNEL (IN DRAINAGE TRACT)

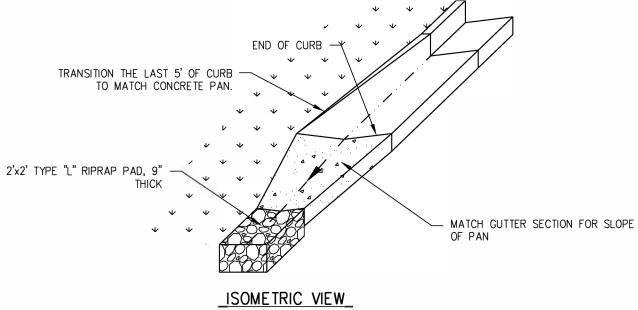


Issued: __6/15/2022

Revised: Oct 14, 2025

Standard Drawing No.





NOTES:

ADDITIONAL EROSION CONTROL PROTECTION SHALL BE SUBMITTED FOR COMMENTS.

EROSION CONTROL PROTECTION MUST BE PROVIDED TO TOP OF SLOPE OR NATURAL DRAINAGE.

APPROVED BY THE CITY OF CASTLE PINES

Larry G Nimmo

Larry Nimmo Director of Public Works

DATE Oct 14, 2025

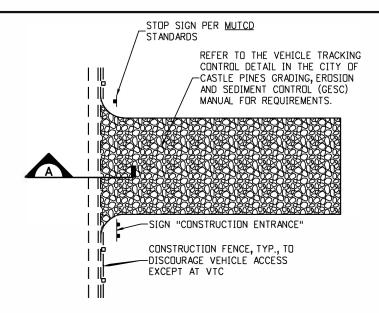
CURB TRANSITION TO DITCH

CASTLE PINES

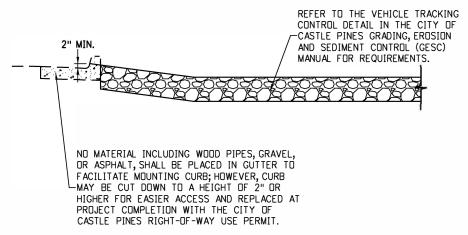
Issued: __6/15/2022_

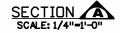
Revised: Oct 14, 2025

Standard Drawing No.



PLAN SCALE: 1"=1'-20"





VEHICLE TRACKING CONTROL INSTALLATION NOTES

- VEHICLE TRACKING CONTROL PADS SHALL BE INSTALLED AT EVERY ACCESS POINT TO SITE.
- ANY CRACKED OR DAMAGED CURB AND GUTTER AND SIDEWALK SHALL BE REPLACED BY PERMITTEE.
- A STOP SIGN INSTALLED IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), AS AMENDED, SHALL BE INSTALLED FOR EXISTING TRAFFIC AT THE VTC.

APPROVED BY THE CITY OF CASTLE PINES

Larry G Nimmo

Larry Nimmo

Director of Public Works

DATE Oct 14, 2025

CURB CUT

CASTLE PINES

Issued: ___6/15/2022_

Revised: Oct 14, 2025

Standard Drawing No.

NOTES:

- 1. THIS STREET CUT/PATCHING DETAIL SPECIFIERS REQUIREMENTS IN ADDITION TO THOSE SPECIFIED IN THE LATEST EDITION OF THE COLORADO DEPARTMENT OF TRANSPORTATION'S STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
- 2. A CONSTRUCTION TRAFFIC CONTROL PLAN SHALL BE SUBMITTED TO AND APPROVED BY THE CITY OF CASTLE PINES PRIOR TO ISSUANCE OF CONSTRUCTION PERMITS IN THE CITY RIGHT-OF-WAY.
- 3. PAVEMENT EDGES SHALL BE SAW-CUT AND KEPT TO A NEAT VERTICAL EDGE PRIOR TO PAVING.
- 4. EDGES SHALL BE TACK COATED PRIOR TO PATCHING.

APPROVED BY THE CITY OF CASTLE PINES

Larry Olimmo

Larry Nimmo

Director of Public Works

DATE Oct 14, 2025

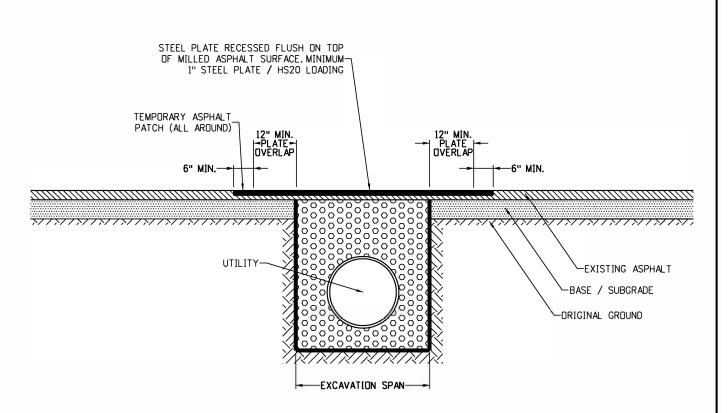
ASPHALT STREET CUT/PATCHING



Issued: <u>6/15/2022</u>

Revised: Oct 14, 2025

Standard Drawing No.



NOTES:

- 1. MAY ONLY BE USED FROM MAY 15 TO OCTOBER 15.
- 2. MUST HAVE PRIOR APPROVAL BY THE CITY OF CASTLE PINES.

APPROVED BY THE CITY OF CASTLE PINES

Larry G Vimmo
Director of Public Works

DATE Oct 14, 2025

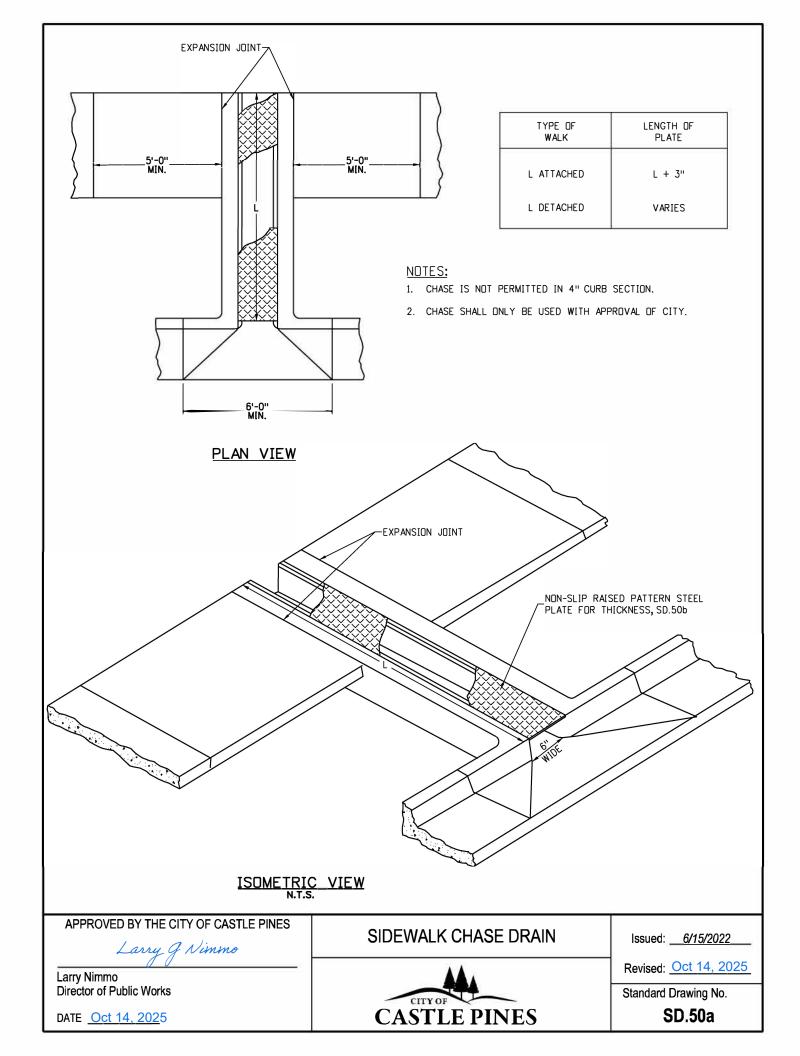
TEMPORARY STEEL PLATE

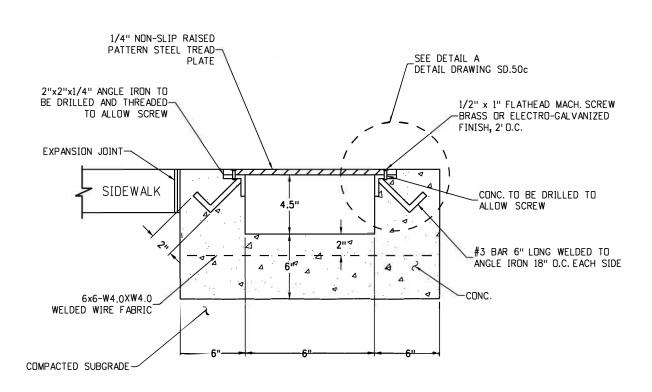
CASTLE PINES

Issued: __6/15/2022_

Revised: Oct 14, 2025

Standard Drawing No.

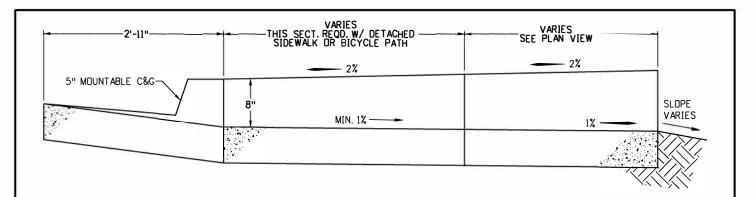




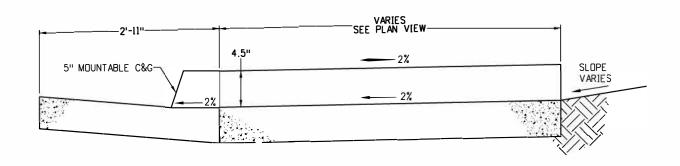
SIDEWALK CHASE DETAIL

APPROVED BY THE CITY OF CASTLE PINES SIDEWALK CHASE DRAIN Issued: __6/15/2022 Larry & Nimmo Revised: Oct 14, 2025 Larry Nimmo Director of Public Works Standard Drawing No. CASTLE PINES **SD.50b**

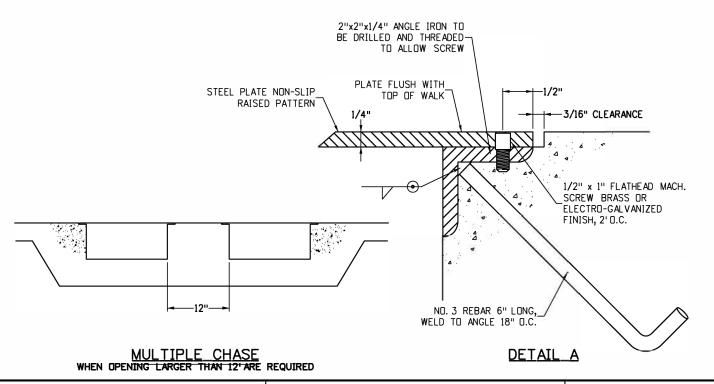
DATE Oct 14, 2025



FLOW FROM GUTTER



FLOW TO GUTTER



APPROVED BY THE CITY OF CASTLE PINES

Larry G Nimmo

Larry Nimmo
Director of Public Works
DATE Oct 14, 2025

SIDEWALK CHASE DRAIN

CASTLE PINES

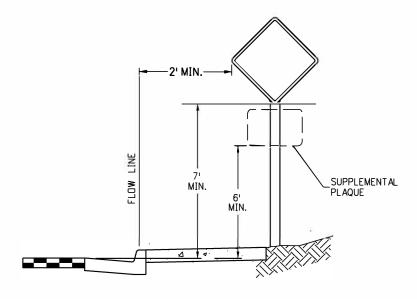
Issued: <u>6/15/2022</u>

Revised: Oct 14, 2025

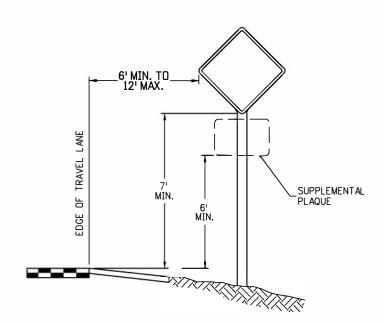
Standard Drawing No.

SD.50c

URBAN



RURAL



APPROVED BY THE CITY OF CASTLE PINES

Larry G Nimmo

Larry Nimmo Director of Public Works

DATE Oct 14, 2025

TYPICAL SIGN PLACEMENT DETAIL

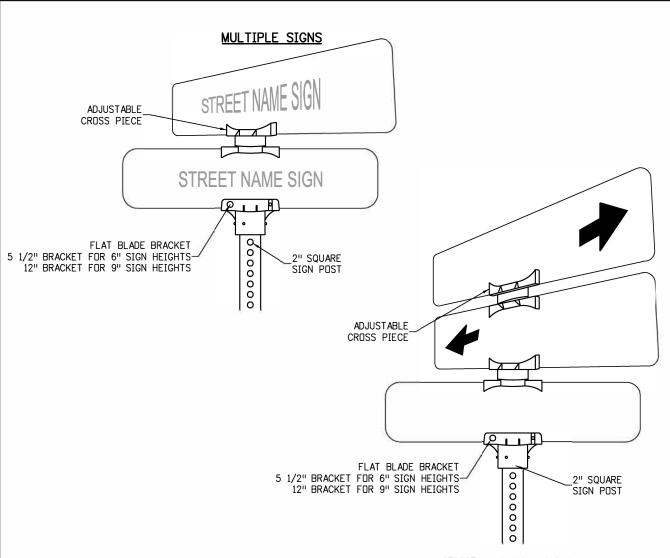


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Revised: Oct 14, 2025

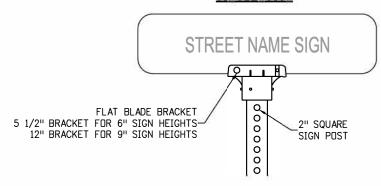
Standard Drawing No.

SS.1



STREET NAME SIGN ASSEMBLY
WHERE STREET NAMES CHANGE
(WHEN ARROWS ARE REQUIRED, DMIT CASTLE PINES LOGO)

SINGLE SIGN



NOTE: DO NOT PUNCH HOLES IN SIGN IF NOT REQUIRED BY BRACKET MANUFACTURER.

APPROVED BY THE CITY OF CASTLE PINES

Larry & Nimmo

Larry Nimmo
Director of Public Works

DATE Oct 14, 2025

STREET NAME SIGN ASSEMBLY



Issued: ___6/15/2022_

Revised: Oct 14, 2025

Standard Drawing No.

SS.2



9"h fitted to lengths 36", 42", 48", 54", 60"
.080 Aluminum
3/4" Radius
High Intensity Prismatic
No Border

6"h Logo Pantone 132 + Pantone 554

6"h Highway Gothic Series C fonts name 4"h Highway Gothic Series C fonts suffix



6"h fitted to lengths 24", 30", 36", 42"
.080 Aluminum
3/4" Radius
High Intensity Prismatic
No Border

4"h Logo Pantone 132 + Pantone 554

4"h Highway Gothic Series C fonts name 3"h Highway Gothic Series C fonts suffix

APPROVED BY THE CITY OF CASTLE PINES

Larry G Nimmo

Larry Nimmo Director of Public Works

DATE Oct 14, 2025

GROUND MOUNTED STREET NAME SIGN DETAIL

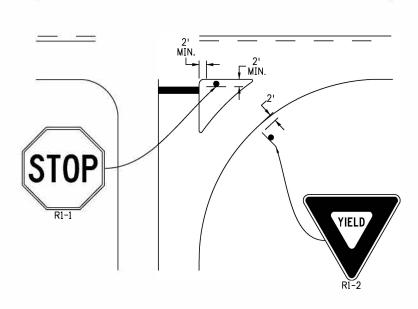


Issued: <u>6/15/2022</u>

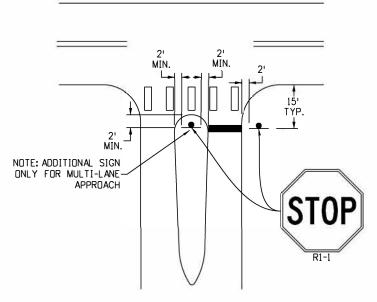
Revised: Oct 14, 2025

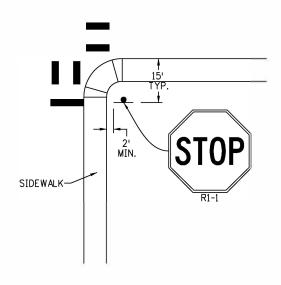
Standard Drawing No.

SS.3



CHANNELIZED INTERSECTION





URBAN INTERSECTION

RAISED MEDIAN ISLAND

APPROVED BY THE CITY OF CASTLE PINES

Larry G Nimmo

Larry Nimmo

Director of Public Works

DATE Oct 14, 2025

TYPICAL LOCATIONS FOR STOP SIGNS AND YIELD SIGNS

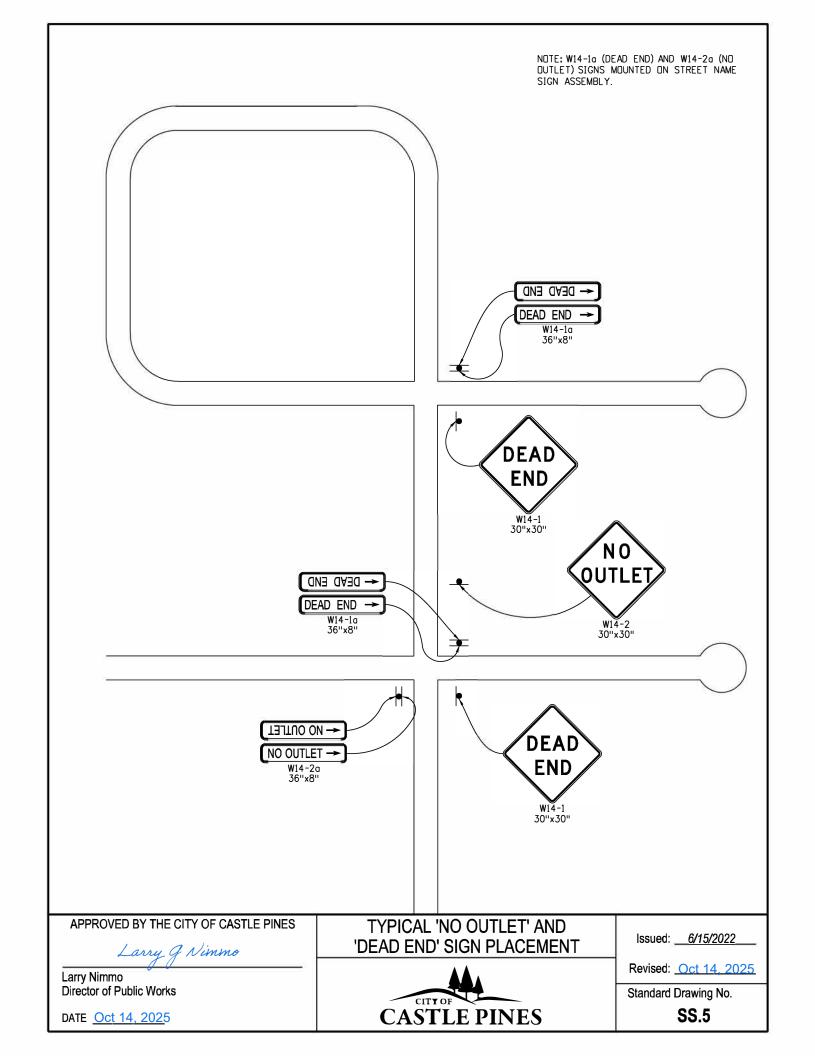


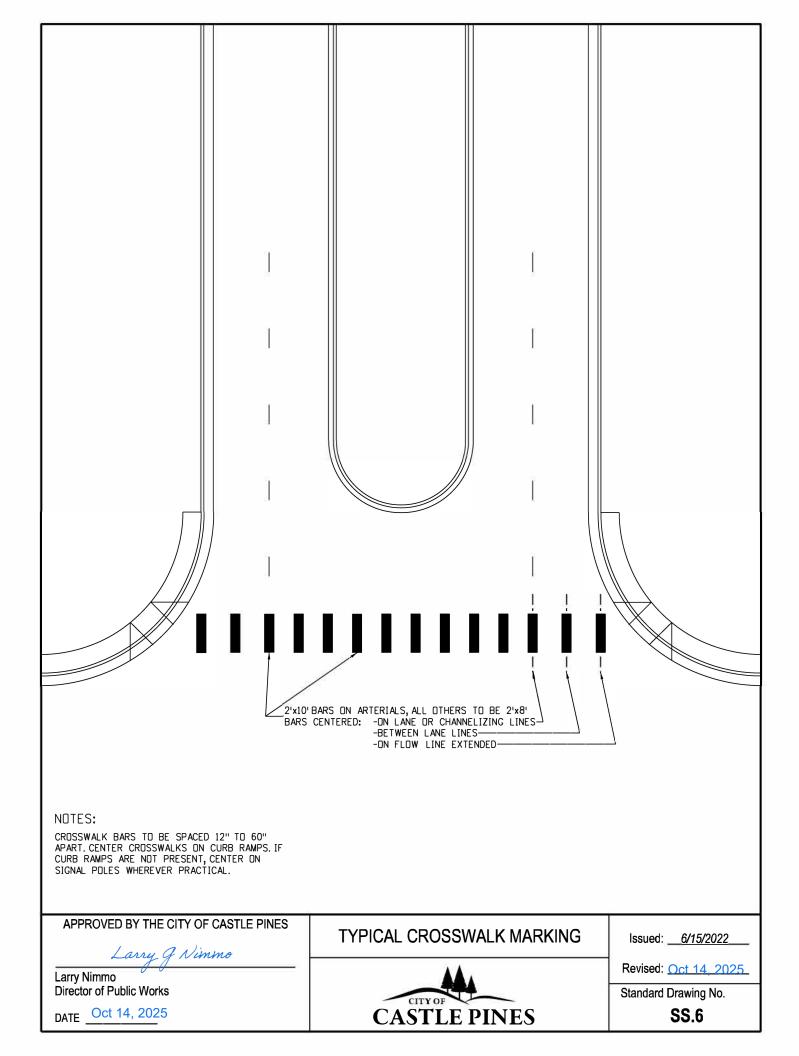
Issued: __6/15/2022_

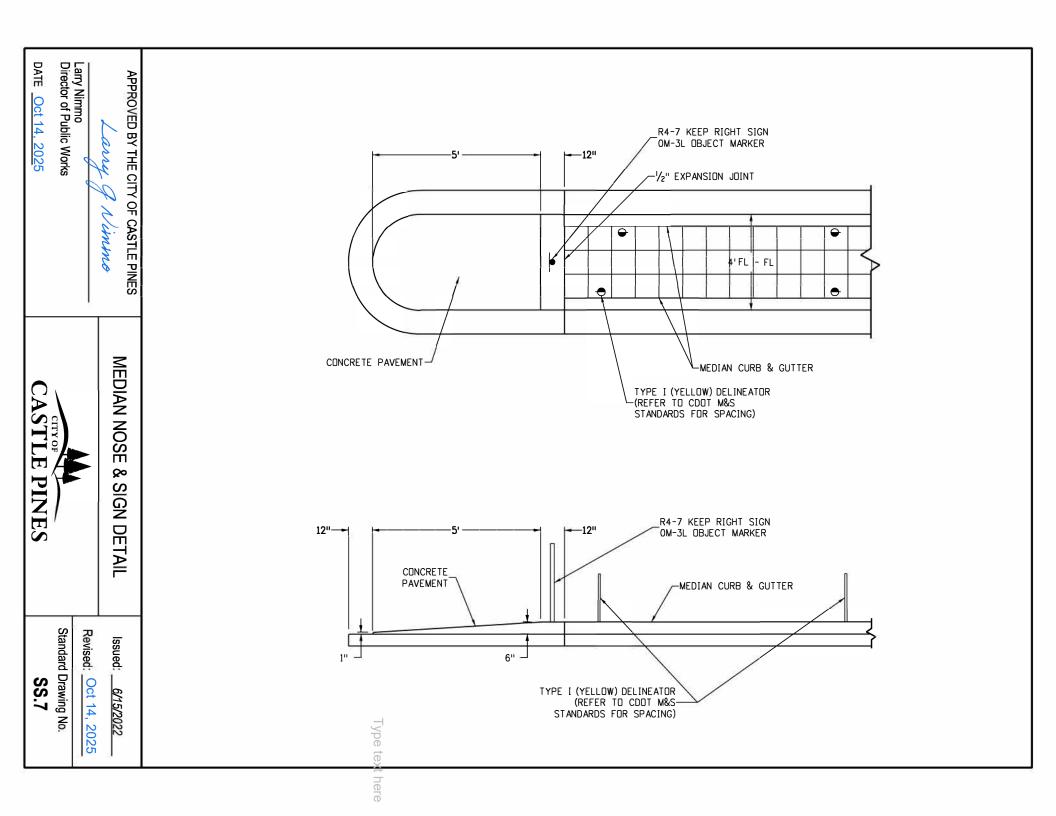
Revised: Oct 14, 2025

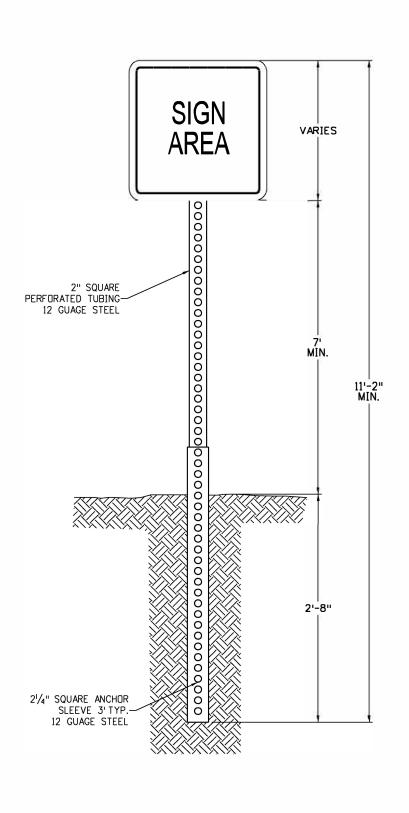
Standard Drawing No.

SS.4









APPROVED BY THE CITY OF CASTLE PINES

Larry G Nimmo

Director of Public Works

DATE Oct 14, 2025

POST ANCHOR DETAIL

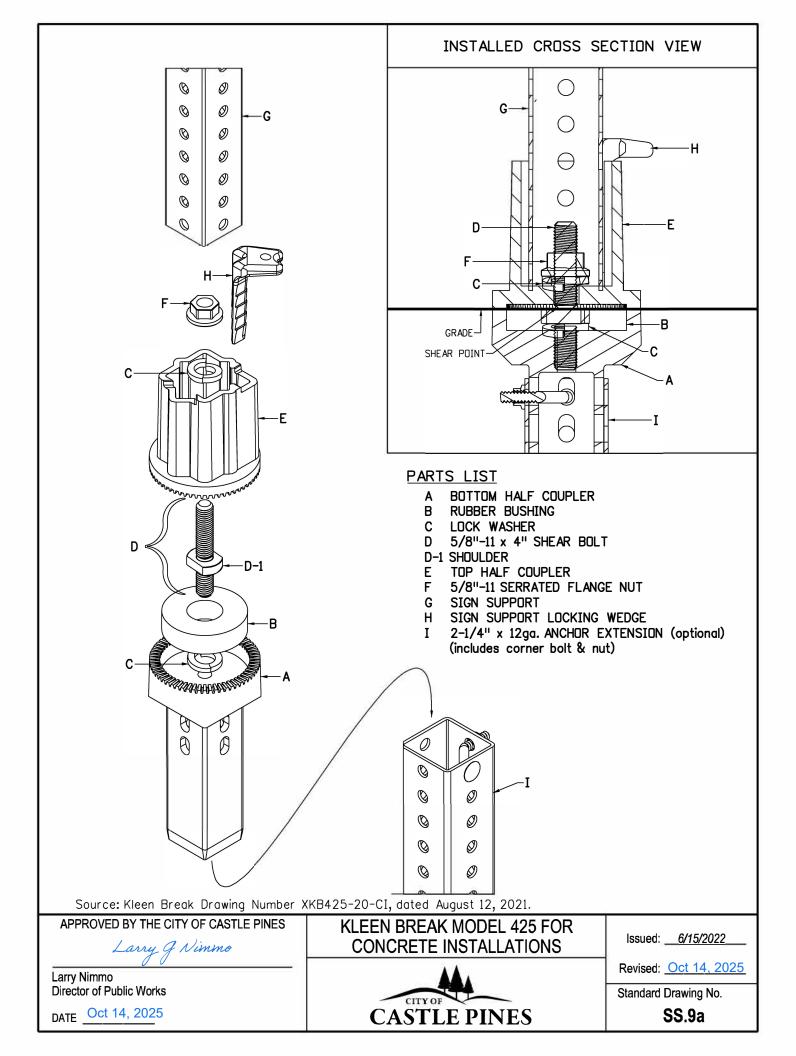


Issued: __6/15/2022_

Revised: Oct 14, 2025

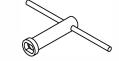
Standard Drawing No.

SS.8





INSTALLATION PROCEDURE



TOOLS NEEDED: XKBW-SOCKET Kleen Break Socket or XKBW-1516 KLEEN BREAK WRENCH, and HAMMER

WHEN INSTALLING INTO FRESH CONCRETE, IT IS HELPFUL TO PREASSEMBLE KLEEN BREAK COUPLER (STEPS 1-3). THIS PREVENTS CONCRETE FROM INTERFERING WITH THE MESHING OF SERRATED TEETH WHEN POURING THE FOOTING. IT HELPS TO DRIVE OPTIONAL ANCHOR EXTENSION (I) PLUMB INTO SOIL IN BOTTOM OF HOLE A COUPLE OF INCHES PRIOR TO POURING, TO PREVENT MOVEMENT OF ASSEMBLY.

NOTE: IF INSTALLING BOTTOM HALF COUPLER (A) INTO EXISTING CONCRETE, A Ø4" HOLE NEEDS TO BE CORED. ANCHOR EXTENSION (I) IS OPTIONAL IF ADDITIONAL LENGTH BEYOND THE 8" BOTTOM HALF COUPLER STEM (A) IS DESIRED. IN THE EVENT AN EXISTING 2-1/4" PSST ANCHOR IS TO BE USED, BOTTOM HALF OF COUPLER (A) MAY REST ON TOP OF EXISTING CONCRETE TO MEET FHWA/NCHRP 350 REQUIREMENTS. WHEN A TRIPPING HAZARD IS A CONCERN, BOTTOM HALF (A) SHOULD BE INSTALLED FLUSH WITH GRADE.

STEP 1 THREAD SHORT END OF SHEAR BOLT (D), WITH LOCK WASHER (C) UNDER SHOULDER (D-1), INTO THREADED HOLE IN BOTTOM HALF COUPLER (A). TIGHTEN WITH (XKBW-SOCKET) KLEEN BREAK SOCKET OR A KLEEN BREAK WRENCH (XKBW-1516) UNTIL SPLIT RING LOCK WASHER (C) IS FULLY COMPRESSED.

NOTE: BE SURE THAT THE SHEAR POINT OF SHEAR BOLT (D) IS NOW ABOVE SHOULDER (D-1).

- STEP 2 SLIDE RUBBER BUSHING (B) OVER SHEAR BOLT (D) UNTIL SEATED FIRMLY INTO ROUND CAVITY IN BOTTOM HALF COUPLER (A).
- STEP 3 SLIDE TOP HALF OF COUPLER (E) OVER SHEAR BOLT (D) UNTIL IT RESTS ON THE RUBBER BUSHING (B). USING LOCK WASHER (C), THREAD 5/8" FLANGE NUT (F) ONTO TOP OF SHEAR BOLT (D) WITH A KLEEN BREAK SOCKET OR A 15/16" DEEP WELL SOCKET. ROTATE TOP RECEIVING HALF OF COUPLER (E) TO PROPER ORIENTATION OF SIGN BEFORE TIGHTENING FLANGE NUT (F), NOT TO EXCEED 110 FT.-LBS. BE SURE COUPLER TEETH ARE FULLY MESHED. TOTAL KLEEN BREAK COUPLER ASSEMBLY SHOULD BE COMPLETELY TIGHT BEFORE PROCEEDING TO THE NEXT STEP.
- STEP 4 INSERT SIGN SUPORT (G) INTO TOP HALF OF COUPLER (E). LOCKING WEDGE (H) SHOULD BE POSITIONED AT A CORNER OF THE SIGN SUPPORT (G). WITH A HAMMER, DRIVE THE SIGN SUPPORT LOCKING WEDGE (H) BETWEEN SIGN SUPPORT (G) AND TOP HALF COUPLER (E) AT PRE-DETERMINED LOCATION UNTIL SEATED IN CORRESPONDING DEPRESSION OF TOP HALF COUPLER (E).

NOTE: IT IS NOT NECCESSARY TO DRIVE THE LOCKING WEDGE (H) UNTIL IT HAS BOTTOMED OUT IN THE POST RECEIVING COUPLER (E). DUE TO THE TOLERANCE WHEN HOT DIP GALVANIZING (THICKNESS, RUNS, OR DRIPS) THE LOCKING WEDGE (H) CAN BE FULLY ENGAGED AT DIFFERENT DEPTHS.

NOTE: THE SIGN SUPPORT LOCKING WEDGE (H) WILL KEEP THE SIGN SUPPORT (G) SECURE WITHOUT NEED OF ADDITIONAL FASTENERS OR HARDWARE.

NOTE: LOCKING WEDGE (H) CAN BE REMOVED BY USING A LIGHT DUTY WEDGE PULLER.

REINSTALLATION AFTER IMPACT

REMOVE SIGN SUPPORT LOCKING WEDGE (H) FROM TOP HALF COUPLER (E) WITH HAMMER. REMOVE BOTH ENDS OF BROKEN SHEAR BOLT (D) FROM BOTH COUPLER HALVES (A) & (E). REASSEMBLE FOLLOWING STEPS 1 THROUGH 4 FROM THE INSTALLATION PROCEDURE.

Source: Kleen Break Drawing Number XKB425-20-CI, dated August 12, 2021.

APPROVED BY THE CITY OF CASTLE PINES

Larry of Nimmo

Larry Nimmo Director of Public Works

DATE Oct 14, 2025

KLEEN BREAK MODEL 425 FOR CONCRETE INSTALLATIONS

CASTLE PINES

Issued: 6/15/2022

Revised: Oct 14, 2025

Standard Drawing No.

SS.9b





















TRAIL

X-ING

*FLUORESCENT YELLOW-GREEN COLOR

















BEGIN MA-14

TRAIL M4-TRI

NOTE: DISCUSS NEED FOR AND LOCATION OF BIKE ROUTE SIGNS WITH THE CITY PUBLIC WORKS DEPARTMENT.

APPROVED BY THE CITY OF CASTLE PINES

Larry & Vimmo

Larry Nimmo Director of Public Works

DATE Oct 14, 2025

BIKE LANE / ROUTE SIGNS

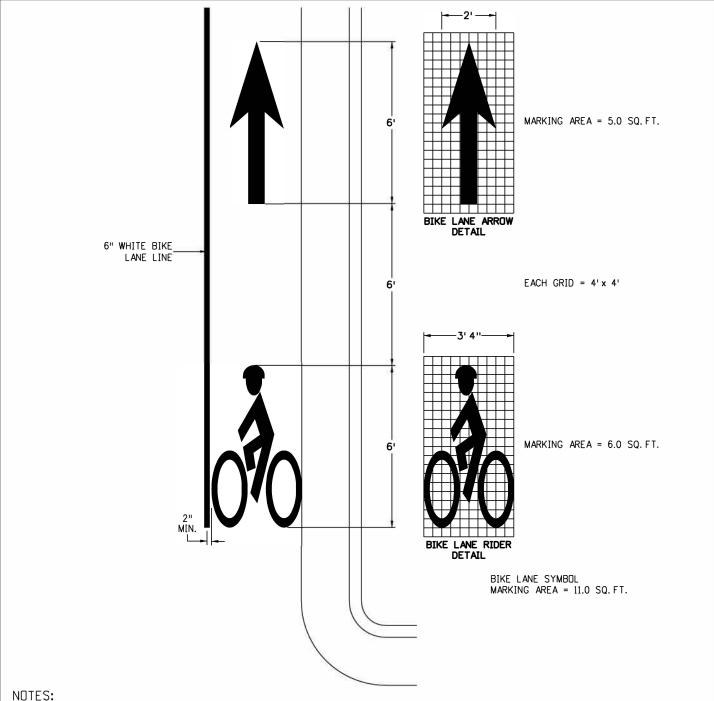
CASTLE PINES

Issued: __6/15/2022_

Revised: Oct 14, 2025

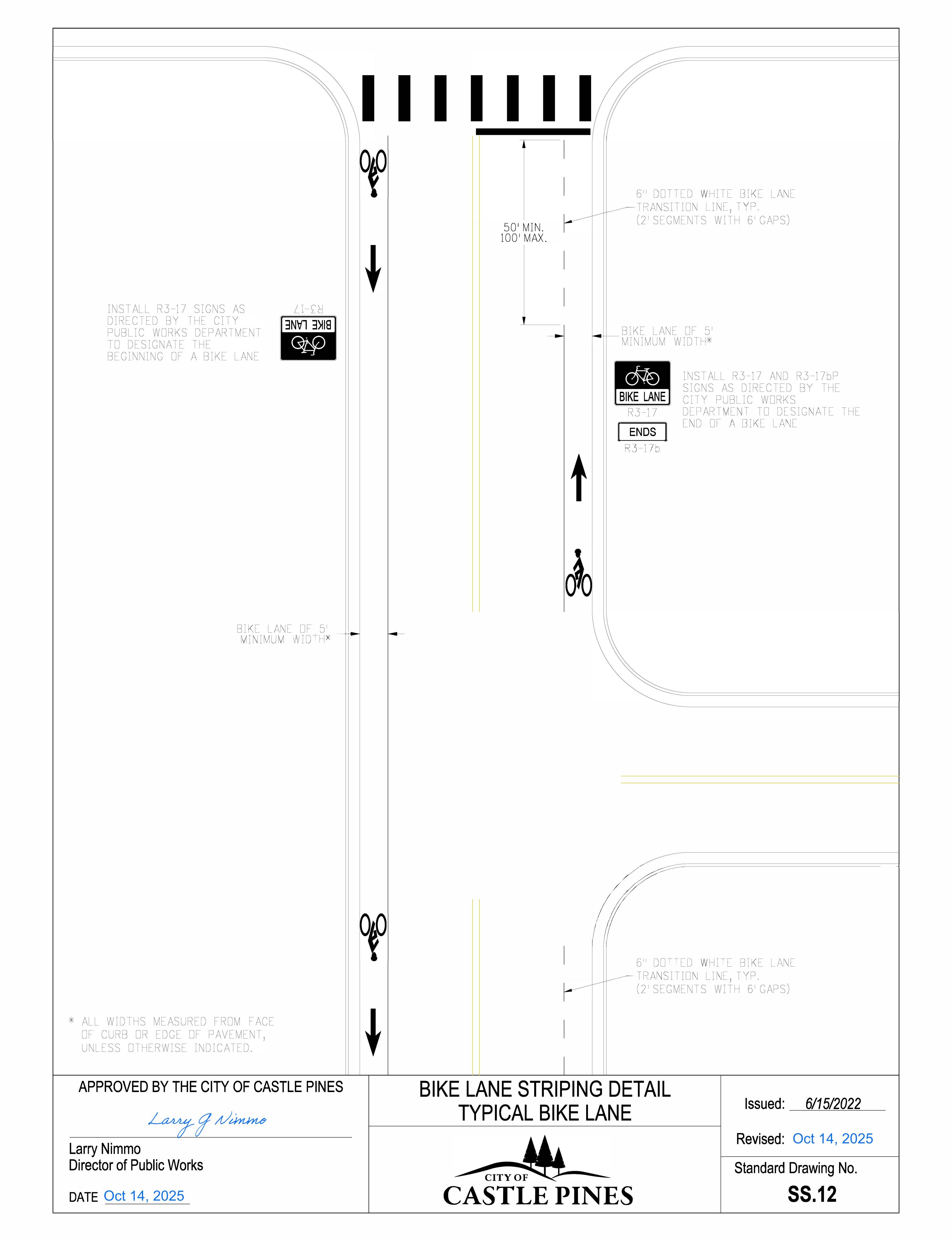
Standard Drawing No.

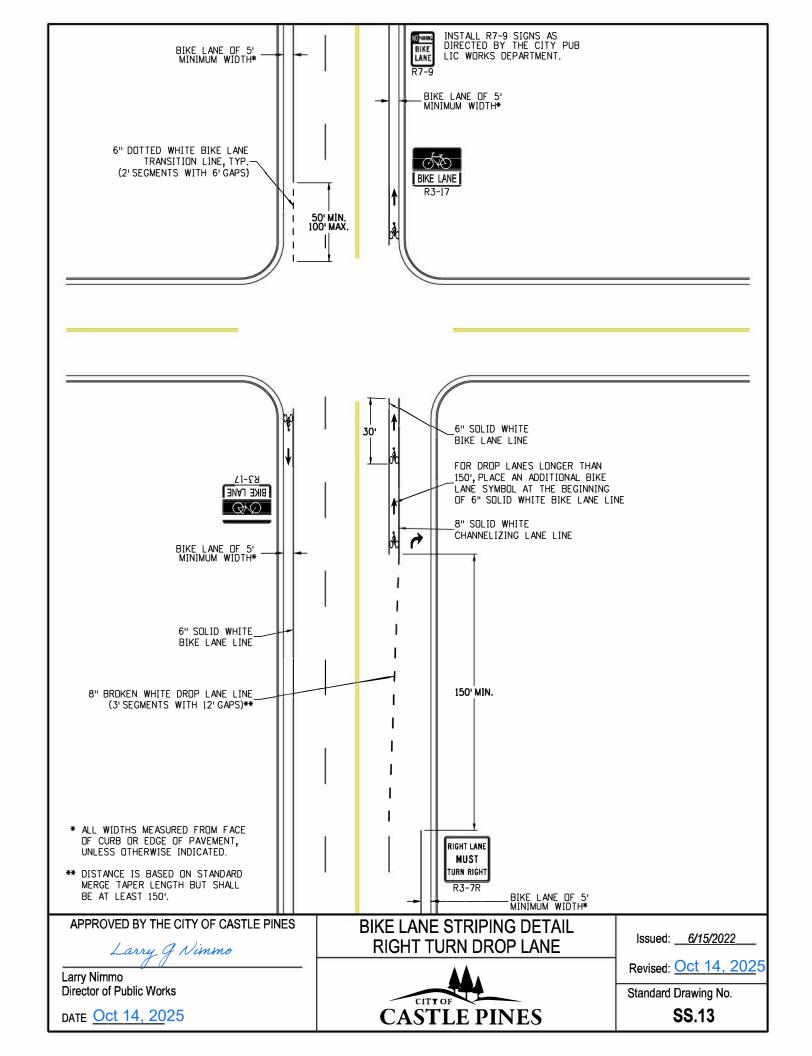
SS.10

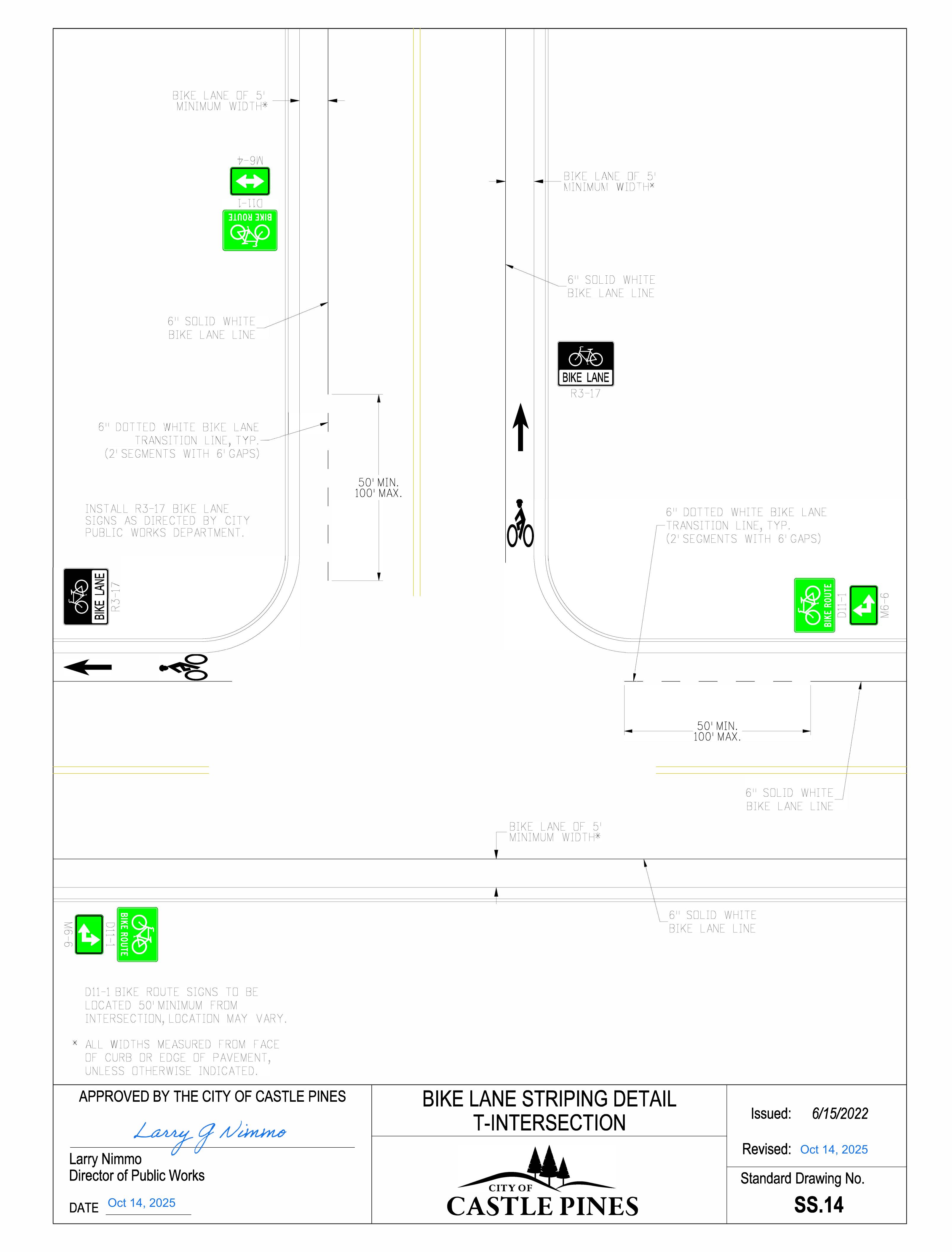


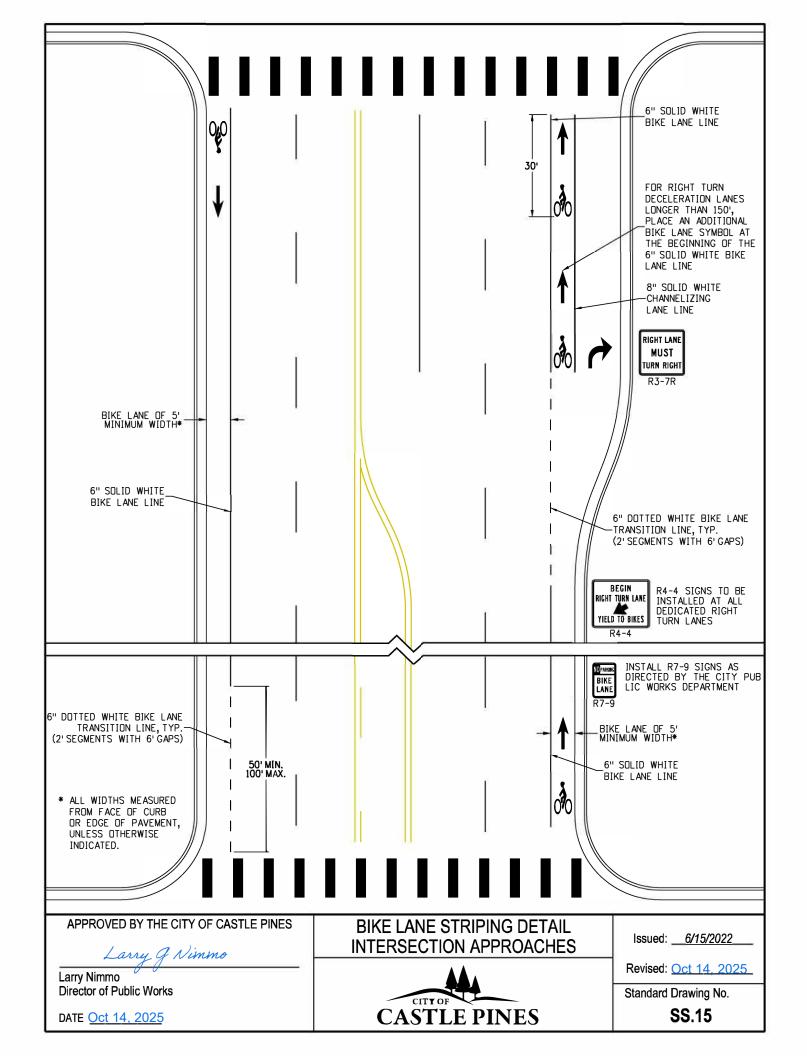
- 1. BIKE LANE SYMBOL INCLUDES BIKE LANE ARROW AND BIKE LANE RIDER SYMBOLS.
- 2. BIKE LANE SYMBOL SHALL BE CENTERED IN BIKE LANE IF POSSIBLE AND PLACED WITH A MINIMUM 2" SEPARATION FROM THE BIKE LANE LINE.
- 3. DO NOT PLACE BIKE LANE SYMBOL IN GUTTER PAN.
- 4. BIKE LANE SYMBOLS SHALL BE PLACED IMMEDIATELY BEYOND INTERSECTIONS AND MAJOR DRIVEWAYS, LOCATED ADJACENT TO THE BEGINNING OF THE BIKE LANE LINE.
- AT INTERSECTION APPROACHES WHERE THE BIKE LANE IS BETWEEN A RIGHT-TURN LANE AND A THROUGH LANE, PLACE THE BIKE LANE SYMBOL A DISTANCE OF 30 FEET IN ADVANCE OF THE STOP BAR. AT SIGNALIZED INTERSECTIONS, PLACE THE BIKE LANE SYMBOL IN THE DETECTION
- IN RURAL AREAS, PLACE BIKE LANE SYMBOLS AT MAXIMUM INTERVALS OF 1500 FEET OR AS DETERMINED BY THE CITY PUBLIC WORKS DEPARTMENT. IN URBAN AREAS, PLACE BIKE LANE SYMBOLS AT MAXIMUM INTERVALS OF 700 FEET OR AS DETERMINED BY THE CITY PUBLIC WORKS DEPARTMENT.

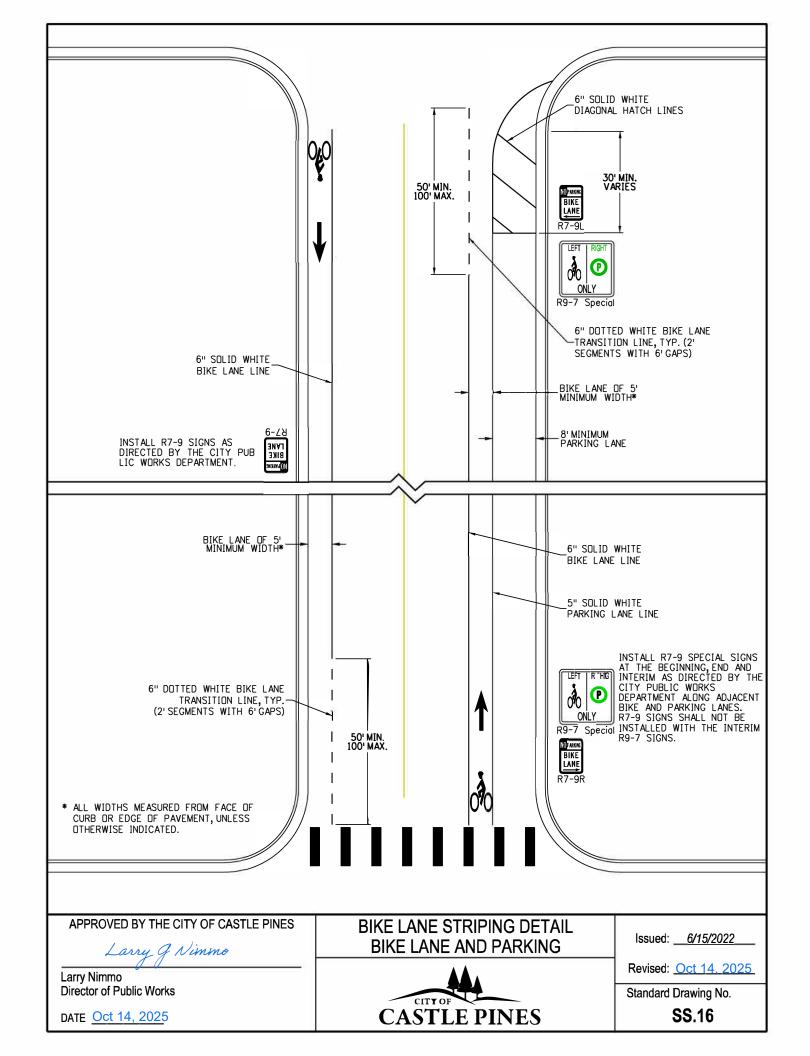
BIKE LANE STRIPING DETAIL APPROVED BY THE CITY OF CASTLE PINES Issued: <u>6/15/2022</u> **BIKE LANE SYMBOL** Larry of Nimmo Revised: Oct 14, 2025 Larry Nimmo Director of Public Works Standard Drawing No. **CASTLE PINES SS.11** DATE Oct 14, 2025

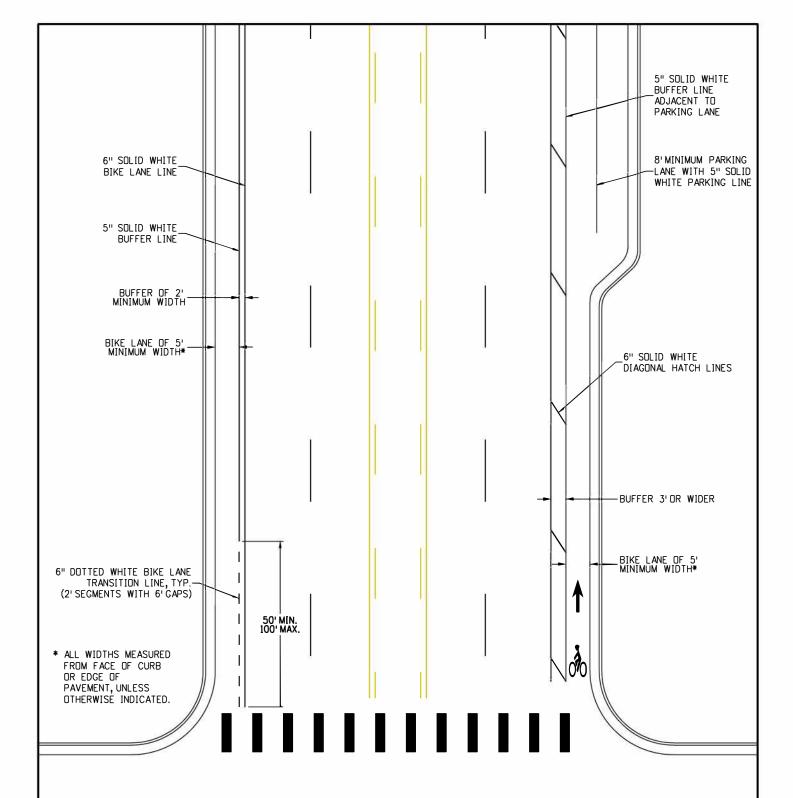






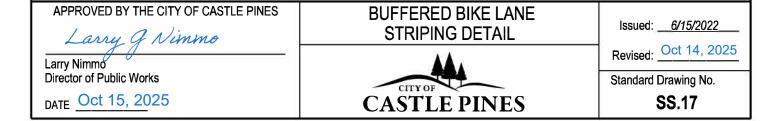


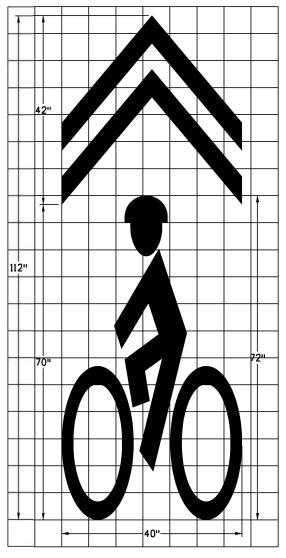




NOTES:

- WHERE THERE IS 7 FEET OF ROADWAY WIDTH AVAILABLE FOR A BIKE LANE, INSTALL A BUFFERED BIKE LANE INSTEAD OF A CONVENTIONAL BIKE LANE.
- 2. BUFFERED BIKE LANE CONFIGURATIONS PREFERABLY CONSIST OF A 5 FEET OR WIDER BIKE LANE AND A 2 FEET OR WIDER BUFFER.
- 3. FOR BUFFERS THAT ARE 3 FEET OR WIDER, INSTALL DIAGONAL HATCHED STRIPING INSIDE THE BUFFER.





GRID 6" x 6"

MARKING AREA = 10.0 SQ. FT.

NOTES:

- 1. SHARED LANES ARE INTENDED FOR USE ON STREETS WITH A MAXIMUM POSTED SPEED OF 35 MPH, BUT PREFERABLY ON STREETS WITH A POSTED SPEED LIMIT OF 25 MPH, AND FOR LANES UP TO 15 FEET WIDE. FOR LANES 15 FEET AND WIDER, STRIPE A 5 FOOT BIKE LANE INSTEAD OF TREATING THE LANE AS A SHARED LANE.
- 2. SHARED LANE MARKINGS SHALL BE INSTALLED OUTSIDE WHEEL TRACKS OR WHERE INDICATED BY CITY OF CASTLE PINES PUBLIC WORKS. SHARED LANE MARKINGS SHALL NOT BE PLACED IN GUTTERS, SHOULDERS OR IN DESIGNATED BIKE LANES.
- 3. WHERE A PARKING LANE IS ADJACENT TO A SHARED LANE, PLACE SHARED LANE MARKINGS SUCH THAT THE CENTER OF THE MARKING IS AT LEAST 12 FEET FROM THE FACE OF CURB OR FROM THE EDGE OF PAVEMENT IF CURB AND GUTTER IS NOT PRESENT.
- 4. WHERE THERE IS NO ON-STREET PARKING AND THE TRAVEL LANE IS 13 FEET OR WIDER, PLACE SHARED LANE MARKINGS SUCH THAT THE CENTER OF THE MARKING IS AT LEAST 4 FEET FROM THE FACE OF CURB OR FROM THE EDGE OF PAVEMENT IF CURB AND CUTTER IS NOT PRESENT.
- 5. SHARED LANE MARKINGS SHALL BE PLACED IMMEDIATELY BEYOND AN INTERSECTION AND SPACED AT INTERVALS NO GREATER THAN 250 FEET THEREAFTER OR AS DETERMINED BASED ON CITY PUBLIC WORKS DEPARTMENTING JUDGMENT.
- 6. SHARED LANE MARKINGS MAY BE SUPPLEMENTED WITH SIGNS, ESPECIALLY BICYCLES MAY USE FULL LANE (R4-11) SIGN.

APPROVED BY THE CITY OF CASTLE PINES

Larry G Vinno

Larry Nimmo
Director of Public Works

DATE Oct 15, 2025

SHARED LANE MARKING
NOTES AND DETAIL

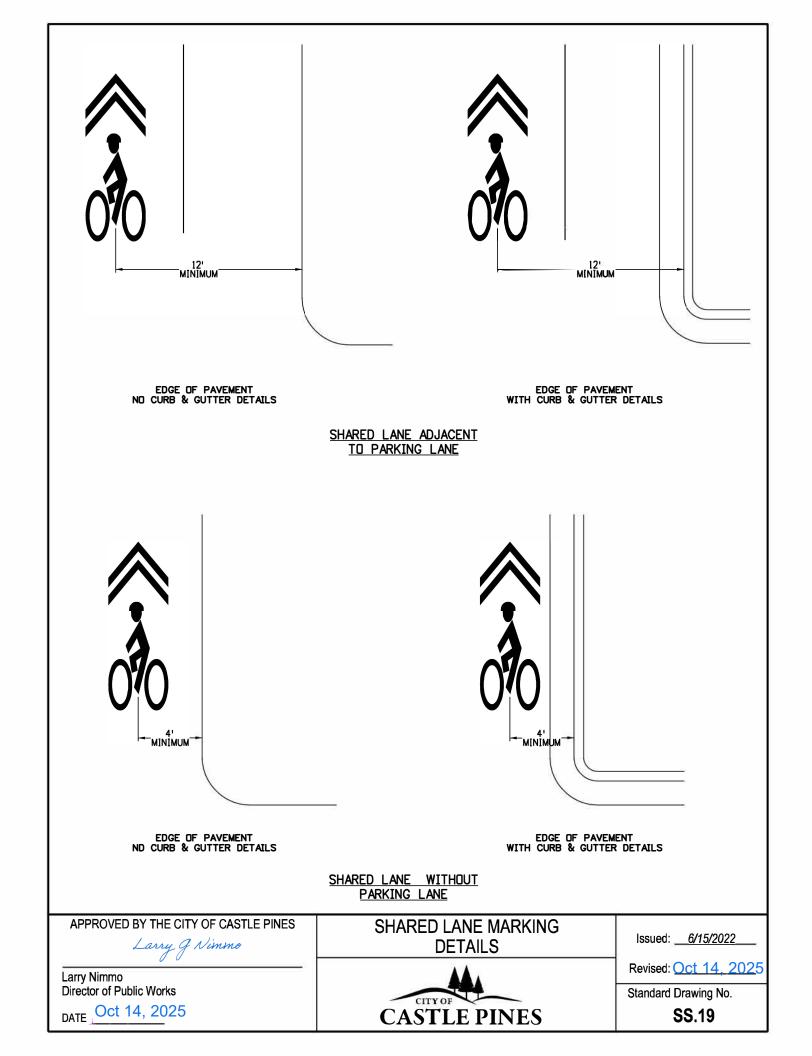
Revised: 6/15/2022

Revised: 0ct 14, 2025

Standard Drawing No.

Standard Drawing No.

SS.18



PAVER INSTALLATION NOTES:

- 1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CITY OF CASTLE PINES (CP) STANDARDS AND SPECIFICATIONS. THE LATEST EDITION OF THE MUTCD, AND THE PROJECT CONSTRUCTION DRAWINGS AND SPECIFICATIONS INCLUDED HEREIN. IN CASES OF OMISSION FROM CP STANDARDS AND SPECIFICATIONS, THE MOST CURRENT EDITION OF THE COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AND THE LATEST EDITION OF THE COOT STANDARDS PLANS, M&S STANDARDS SHALL APPLY.
- 2. THE BID QUANTITIES OF THE PROJECT ARE THE RESULT OF A CAREFUL QUANTITY TAKEOFF BY THE PROJECT ENGINEER. THE CONTRACTOR SHALL, HOWEVER, SATISFY HIMSELF AS TO THE ACCURACY OF ALL QUANTITIES AND BRING ANY DISCREPANCIES TO THE ATTENTION OF THE PROJECT ENGINEER, IN WRITING, AT HIS EARLIEST OPPORTUNITY.
- ALL LABOR, EQUIPMENT, INCIDENTAL MATERIAL AND WIRING NECESSARY FOR THE INSTALLATION OF TRAFFIC SIGNAL PÓLE, SIGNAL HEADS, CABINET MODIFICATIONS (INCLUDING SIGNAL PHASE CHANGES AND VEHICLE DÉTECTION MODIFICATIONS) AND OTHER DEVICES SHALL BE PROVIDED BY THE CONTRACTOR AND SHALL NOT BE PAID FOR SEPARATELY, BUT INCLUDED IN THE COST
- 4. THE CONTRACTOR SHALL PROVIDE MATERIAL SUBMITTALS TO CP PUBLIC WORKS FOR APPROVAL ON ALL EQUIPMENT PRIOR TO INSTALLATION. THE CITY SHALL REVIEW THE REQUIRED MATERIAL SUBMITTALS AND RETURN COMMENTS WITHIN 5 BUSINESS DAYS.
- 5. ALL TRAFFIC SIGNAL EQUIPMENT WILL BE MEASURED BY THE VARIOUS TYPES INSTALLED AND SHALL INCLUDE ALL INCIDENTAL MATERIALS AND WIRING NECESSARY FOR THE INSTALLATION AND OPERATION OF EACH ITEM.
- 6. THE UTILITY INFORMATION SHOWN ON THE SIGNAL PLANS IS APPROXIMATE ONLY AND IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. TO AVOID ANY DAMAGE TO A UTILITY, THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING THE EXACT LOCATION OF UTILITIES BEFORE COMMENCING ANY DRILLING, BORING, TRENCHING OR OTHER EXCAVATION TYPE OF WORK. THE CONTRACTOR SHALL CONTACT COLORADO 811 AT 811 OR 1-800-922-1987.
- 7. CONTRACTOR SHALL COORDINATE WITH XCEL ENERGY OR INTERMOUNTAIN RURAL ELECTRIC ASSOCIATION (IREA) TO INITIATE ELECTRICAL POWER APPLICATION PROCESS AND DETERMINE POWER SOURCE LOCATION.
- 8. THE POWER SOURCE SHALL BE 120/240 VOLT 60 AMP METERED SERVICE. IT SHALL INCLUDE A WEATHERPROOF METERED CIRCUIT DISCONNECTED BOX AND TYPE III PULL BOX. LOCATION OF METERED CIRCUIT DISCONNECT BOX TO BE DETERMINED BY CP PUBLIC WORKS AND SHALL NOT BE PLACED FURTHER THAN 75 FEET FROM THE SIGNAL CABINET.
- 9. UPON COMPLETION OF WORK, CONTRACTOR SHALL PROVIDE RECORD AS-BUILT DRAWING, CORRECTED PLANS AND ANY OTHER ADDITIONAL DATA REQUIRED BY THE CITY.
- 10. TRAFFIC SIGNAL INSTALLATION AND ALL ASSOCIATED WORK SHALL BE 100% COMPLETE PRIOR TO FLASH TURN ON. THIS INCLUDES ALL PUNCH LIST ITEMS AND OPERATIONAL LUMINARIES.
- 11. ALL SIGNAL POLE AND CONTROLLER CABINET LOCATIONS SHOWN IN THE PLANS ARE APPROXIMATE ONLY. ACTUAL LOCATIONS SHALL BE APPROVED IN THE FIELD BY CP PUBLIC WORKS PRIOR TO ANY DRILLING OR EXCAVATION. LOCATION OF EACH SIGNAL POLE FOUNDATION SHALL BE POTHOLED, PRIOR TO DRILLING TO VERIFY WHETHER ANY UTILITY CONFLICTS
- 12. ALL NON-FUNCTIONING TRAFFIC OR PEDESTRIAN SIGNAL HEADS AND PEDESTRIAN PUSH BUTTONS SHALL BE BAGGED WHILE UNDER CONSTRUCTION. BAGS SHALL BE DRANGE PLASTIC.
- 13. MAST ARMS SHALL BE OF SUFFICIENT LENGTH TO ALLOW A SIGNAL HEAD TO BE MOUNTED IN THE CENTER OF THE INSIDE LEFT TURN LANE. TO ENSURE PROPER MAST ARM LENGTHS, THE CONTRACTOR SHALL FIELD VERIFY THE EXACT LOCATION OF THE POLE FOUNDATIONS WITH PROJECT AND CP PUBLIC WORKS (PRIOR TO ORDERING THE SIGNAL POLES AND MAST ARMS).
- 14. THE CONTRACTOR IS RESPONSIBLE FOR STORAGE AND ULTIMATE DELIVERY OF NEW TRAFFIC POLES AND MAST ARMS TO THE PROJECT SITE UNLESS OTHERWISE APPROVED BY CP PUBLIC
- 15. ALL ELECTRICAL SYSTEMS SHALL BE PROPERLY GROUNDED IN ACCORDANCE WITH LATEST CASTLE PINES DESIGN AND CONSTRUCTION STANDARDS, CHAPTER 9 AND THE CP SIGNAL DETAILS. A GROUND ROD SHALL BE INSTALLED FOR EACH POLE AND CONTROLLER CABINET FOUNDATIONS.
- 16. ALL SIGNAL CABLE IS CONTINUOUS FROM CONNECTIONS MADE IN THE HAND HOLE COMPARTMENT OF THE SIGNAL POLE BASE TO THE TERMINAL COMPARTMENT IN THE CONTROLLER CABINET. SPLICING SHALL NOT BE PERMITTED UNLESS SPECIFICALLY APPROVED BY THE CP PUBLIC WORKS.
- 17. ALL HAND HOLE SPLICES SHALL BE BUCHANAN TYPE USING THE PRES-SURE-TOOL PART #C-24 CRIMPING TOOL SHALL BE STORED IN THE "UP" ORIENTATION.
- 18. WHENEVER MULTIPLE CABLES FEED EQUIPMENT ON A SINGLE POLE, EACH CABLE SHALL CONTAIN A NEUTRAL WIRE.
- 19. THE CONTRACTOR SHALL PROVIDE THE LUMINAIRE WIRING AND FINAL HOOK UP. LUMINAIRE FIXTURE SHALL BE APPROVED LED TYPE. EXISTING STREET LIGHTS SHALL NOT BE REMOVED UNTIL LUMINARIES ARE OPERATIONAL.
- 20. SIGNAL HEADS SHALL BE WIRED SEPARATELY FROM THE SIGNAL HEAD TO THE ABOVE GROUND HAND HOLE AT THE BASE OF THE SIGNAL POLE (NO OVERHEAD SPLICES). A SEPARATE 25 CONDUCTOR CABLE SHALL RUN FROM THE CONTROLLER CABINET TO THE TRAFFIC POLE HAND HOLE WITH NO SPLICES. WIRING SHALL BE LANDED AND LABELED IN ACCORDANCE WITH THE LATEST CP DESIGN AND CONSTRUCTION STANDARDS, CHAPTER 9 AND THE CP SIGNAL DETAILS.

- 21. EACH VEHICLES SIGNAL HEAD ON MAST ARMS SHALL HAVE A LOUVERED ALUMINUM BACKPLATE, BLACK IN COLOR, WITH 2 INCH FLUORESCENT YELLOW, DIAMOND GRADE RETROREFLECTIVE
- 22. SIGNAL HEAD HOUSINGS SHALL BE POLYCARBONATE AND BLACK IN COLOR. MAST ARM MOUNTED SIGNAL HEADS AND SIGNS SHALL PELCO ASTRO-BRAC OR SKY-BRAC TYPE MOUNTING BRACKETS
- 23. ALL VEHICLES AND PEDESTRIAN INDICATIONS SHALL BE APPROVED SOLID STATE LED TYPE. ALL VEHICLE INDICATIONS SHALL BE 12-INCH. ALL PEDESTRIAN INDICATIONS SHALL BE 16-INCH WITH A COUNTDOWN TIMER.
- 24. EACH APPROACH SHALL INCLUDE OPTICOM DETECTION IN ACCORDANCE WITH LATEST CP RDADWAY DESIGN AND CONSTRUCTION STANDARDS (CHAPTER 9).

 CHECK IF NOTE 24 IS APPLICABLE TO THIS PROJECT.
- 25. THE CONTROLLER CABINET SHALL BE 332D CABINET PAINTED CDOT SILVER AN ANTI-GRAFFITI COATING AND A PAINTED WHITE INTERIOR IN ACCORDANCE WITH THE LATEST CP ROADWAY DESIGN AND CONSTRUCTION STANDARDS (CHAPTER 9) AND DETAILS. THE CONTROLLER CABINET SHALL BE INSTALLED SUCH THAT, WITH THE FRONT DOOR OPEN, A TECHNICIAN CAN VIEW BOTH THE CONTROLLER AND THE SIGNAL OPERATIONS. CABINET BASE SHALL BE APPROVED POLYMER
- 26. THE TRAFFIC SIGNAL CONTROLLER SHALL BE A TRAFFICWARE/NAZTEC 2070 LITE TYPE PER CALTRAN STANDARDS WITH FIREWARE COMPATIBLE WITH SIGNAL SYSTEM SOFTWARE. CONFLICT MONITOR PROVIDED SHALL BE THE RENO MODEL 2018E
- 27. AN UNINTERRUPTABLE POWER SOURCE (UPS) SHALL BE INSTALLED IN THE CONTROLLER CABINET. THE UPS SHALL BE IN ACCORDANCE WITH THE LATEST CP ROADWAY DESIGN AND CONSTRUCTION STANDARDS (CHAPTER 9).
- 28. COMMUNICATION AND ALL INTERCONNECT EQUIPMENT INSTALLED INSIDE AND OUTSIDE THE CONTROLLER CABINET SHALL BE IN ACCORDANCE WITH THE LATEST CP ROADWAY DESIGN AND CONSTRUCTION STANDARDS (CHAPTER 9).
- 29. THE TRAFFIC SIGNAL CABINET, CONTROLLER AND ANCILLARY CABINET EQUIPMENT NEEDED TO PROVIDE PLANNED SIGNAL OPERATIONS SHALL BE DELIVERED TO THE CITY OF CASTLE PINES PUBLIC WORKS FOR INSPECTION, PROGRAMMING AND TESTING. MAXIMUM OF 15 BUSINESS DAYS SHALL BE ALLOWED PRIOR TO SUBSEQUENT PICKUP BY CONTRACTOR. ANY CABINET, CONTROLLER OR OTHER EQUIPMENT ERRORS WILL RESULT INA RETURN OF THE CABINET ASSEMBLY TO CONTRACTOR AND A RESTART OF 15 BUSINESS DAYS FOR REINSPECTION, PROGRAMMING AND TESTING UPON SUBSEQUENT DELIVERY.
- 30. ALL PULL BOXES AND CONDUIT SHALL BE IN ACCORDANCE WITH THE LATEST CP ROADWAY DESIGN AND CONSTRUCTION STANDARDS (CHAPTER 9). ALL MULTIPLE CONDUIT RUNS SHALL BE INSTALLED IN A COMMON BORE OR TRENCH.
- 31. ALL CONDUIT SHALL HAVE PULL TAPE IN ACCORDANCE WITH THE LATEST CP ROADWAY DESIGN AND CONSTRUCTION STANDARDS (CHAPTER 9) LEFT INSIDE CONDUIT WHEN CONSTRUCTION IS COMPLETED.
- 32. ALL INTERCONNECT CONDUIT TO INCLUDE A #14 AWG SOLID COPPER WIRE, IN ACCORDANCE WITH THE LATEST CP ROADWAY DESIGN AND CONSTRUCTION STANDARDS (CHAPTER 9), THROUGH ENTIRE RUN TO FACILITATE FUTURE LOCATING.
- 33. CONTRACTOR SHALL INSTALL CITY PROVIDED DELINEATORS ON ALL PULL BOXES. COST OF INSTALLATION SHALL BE INCLUDED IN THE COST OF THE PULL BOX.
- 34 WHEN FIBER INTERCONNECT IS BEING INSTALLED, A MINIMUM OF 100 FEET SHALL BE COILED IN EACH COMMUNICATION VAULT, A MINIMUM OF 50 FEET IN EACH PULL BOX AND A MINIMUM OF 10 FEET IN THE CONTROLLER CABINET.
 - ☐ CHECK IF NOTE 34 IS APPLICABLE TO THIS PROJECT.
- 35. VEHICLE DETECTION AND ASSOCIATED HARDWARE SHALL BE IN ACCORDANCE WITH THE LATEST CP ROADWAY DESIGN AND CONSTRUCTION STANDARDS (CHAPTER 9). STOP BAR DETECTION SHALL BE PROVIDED FOR ALL APPROACHES AND ADVANCE DETECTION AS SPECIFIED IN DESIGN PI ANS
- 36. CONTRACTOR SHALL COORDINATE WITH VEHICLE DETECTION MANUFACTURER REPRESENTATIVE TO DETERMINE FINAL PLACEMENT AND OPERATION OF DETECTION. VEHICLE DETECTION REPRESENTATIVE SHALL BE PRESENT FOR DETECTION SET UP AND INITIAL OPERATION.
- 37. THE CONTRACTOR SHALL INSTALL ACCESSIBLE PEDESTRIAN PUSH BUTTONS, PEDESTRIAN SIGNAGE AND ASSOCIATED RACK MOUNTED EQUIPMENT AND WIRING IN ACCORDANCE WITH THE LATEST CP ROADWAY DESIGN AND CONSTRUCTION STANDARDS (CHAPTER 9). ☐ CHECK IF NOTE 37 IS APPLICABLE TO THIS PROJECT.
- 38. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL STRIPING WITH THE CITY OF CASTLE PINES ENGINEER PRIOR TO REMOVAL AND INSTALLATION. CONTACT THE CITY OF CASTLE PINES ENGINEER TO COORDINATE.
- 39. APPROPRIATE REGULATORY SIGNS, WARNING SIGNS AND PAVEMENT MARKINGS (ARROWS, SYMBOLS, ETC.), APPROVED BY THE CITY OF CASTLE PINES. SHALL BE IN PLACE PRIOR TO SIGNAL OPERATION
- 40. STRIPING AND MARKING LEGENDS MAY BE SUBJECT TO MATERIALS CHANGES DUE TO SEASON AND OR WEATHER. TEMPORARY STRIPING MAY BE REQUIRED. FINAL SPECIFIED MATERIALS SHALL BE INSTALLED WHEN WEATHER/SEASON ALLOWS AS APPROVED BY CP PUBLIC WORKS.
- 41. FOR ALL DESIGN OR CONSTRUCTION INQUIRIES CONTRACT THE CITY PUBLIC WORKS DEPARTMENT.

CASTLE PINES STANDARD NOTES:

- THE CASTLE PINES DEVELOPMENT REVIEW ENGINEER SIGNATURE AFFIXED TO THIS DOCUMENT INDICATES THE CITY PUBLIC WORKS DEPARTMENT HAS REVIEWED THE DOCUMENT AND FOUND IT IN GENERAL CONFORMANCE WITH THE CITY OF CASTLE PINES ROADWAY DESIGN AND CONSTRUCTION STANDARD APPLICABLE MUNICIPAL CODE, AND ANY ASSOCIATED AGREEMENT (SUCH AS A DEVELOPMENT AGREEMENT) OR ACCEPTED VARIANCES TO THOSE REGULATIONS. THROUGH ACCEPTANCE OF THIS DOCUMENT, THE CITY ASSUMES NO RESPONSIBILITY, OTHER THAN STATED ABOVE, FOR THE COMPLETENESS AND/OR ACCURACY OF THESE DOCUMENTS. THE OWNER AND ENGINEER ADEQUACY OF THE FACILITIES DEPICTED IN THIS DOCUMENT LIES SOLELY WITH THE PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF COLORADO WHOSE STAMP AND SIGNATURE IS AFFIXED TO THIS DOCUMENT.
- 2. ALL CONSTRUCTION SHALL CONFORM TO CITY STANDARDS. ANY CONSTRUCTION NOT SPECIFICALLY ADDRESSED BY THESE PLANS AND SPECIFICATIONS WILL BE BUILT IN COMPLIANCE WITH THE LATEST EDITION OF THE MOST STRINGENT OF THE FOLLOWING: -THE CITY OF CASTLE PINES ROADWAY DESIGN AND CONSTRUCTION STANDARDS -THE COLORADO DEPARTMENT OF HIGHWAYS STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION
 - -THE COLORADO DEPARTMENT OF TRANSPORTATION M STANDARDS
- ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY THE CITY PUBLIC WORKS DEPARTMENT AS APPLICABLE. THE CITY RESERVES THE RIGHT TO ACCEPT OR REJECT ANY SUCH MATERIALS AND WORKMANSHIP THAT DOES NOT CONFORM TO ITS STANDARDS AND SPECIFICATIONS.
- THE CONTRACTOR SHALL NOTIFY THE CITY PUBLIC WORKS DEPARTMENT A MINIMUM OF 24 HOURS AND A MAXIMUM OF 72 HOURS PRIOR TO STARTING CONSTRUCTION OF ELEMENTS THAT REQUIRE REVIEW AND INSPECTION NOTIFICATION SHALL CONSIST OF THE CONTRACTOR'S CONTACTING THE CITY PUBLIC WORKS DEPARTMENT AND RECEIPT OF ACKNOWLEDGEMENT BY THE CITY. THE CONTRACTOR SHALL NOTIFY THE CITY WHEN WORKING DUTSIDE OF THE PUBLIC RIGHT-OF-WAY ON ANY FACILITY THAT WILL BE CONVEYED TO THE CITY, MHFD, OR OTHER SPECIAL DISTRICTS FOR MAINTENANCE. FAILURE TO NOTIFY THE CITY TO ALLOW INSPECTION OF THE CONSTRUCTION MAY RESULT IN NON-ACCEPTANCE OF THE FACILITY OR INFRASTRUCTURE BY THE CITY, MHFD, OR BOTH.
- CONSTRUCTION SHALL NOT BEGIN UNTIL ALL APPLICABLE PERMITS HAVE BEEN ISSUED. IF A CITY ENGINEERING INSPECTOR IS NOT AVAILABLE AFTER PROPER NOTICE OF CONSTRUCTION ACTIVITY HAS BEEN PROVIDED, THE PERMITTEE MAY COMMENCE WORK IN THE INSPECTOR'S ABSENCE. HOWEVER, THE CITY RESERVES THE RIGHT NOT TO ACCEPT THE IMPROVEMENT IF SUBSEQUENT TESTÍNG REVEALS AN IMPROPER INSTALLATION.
- 6. THE LOCATION OF EXISTING UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO ACTUAL CONSTRUCTION.FOR INFORMATION CONTRACT COLORADO 811 AT 811 OR 1-800-922-1987
- 7. THE CONTRACTOR SHALL HAVE ONE (1) COPY OF THE PLANS SIGNED BY THE CITY, ONE (1) COPY OF THE ROADWAY DESIGN AND CONSTRUCTION STANDARDS, AS AMENDED AND ALL APPLICABLE PERMITS AT THE JOB SITE AT ALL TIMES.
- A TRAFFIC CONTROL PLAN, IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, SHALL BE SUBMITTED TO THE CITY FOR ACCEPTANCE WITH THE RIGHT-OF-WAY PERMIT APPLICATION. A RIGHT-OF-WAY PERMIT WILL NOT BE ISSUED WITHOUT AN ACCEPTED TRAFFIC CONTROL PLAN FOR TRAFFIC CONTROL DURING CONSTRUCTION
- 9. THE CONSTRUCTION PLAN SHALL BE CONSIDERED VALID FOR THREE (3) YEARS FROM THE DATE OF CITY ACCEPTANCE. AFTER WHICH TIME THESE PLANS SHALL BE VOID AND WILL BE SUBJECT TO RE-REVIEW AND RE-ACCEPTANCE BY THE CITY.
- 10. THE CITY OF CASTLE PINES STANDARD DETAILS SHALL NOT BE MODIFIED. ANY NON-STANDARD DETAILS WILL BE CLEARLY IDENTIFIED AS SUCH.
- 11. STANDARD CITY OF CASTLE PINES HANDICAP RAMPS ARE TO BE CONSTRUCTED AT ALL CURB RETURNS AND AT MID-BLOCK LOCATIONS OPPOSITE OF ONE OF THE CURB RETURNS OF ALL "T" INTERSECTIONS AS IDENTIFIED ON THESE PLANS.
- 12. THE PROFESSIONAL ENGINEER, REGISTERED IN THE STATE OF COLORADO, SIGNING THESE PLANS IS RESPONSIBLE FOR ENSURING THAT THE DETAILS INCLUDED ARE COMPATIBLE WITH THE STANDARD THE CITY OF CASTLE PINES DETAILS CONTAINED IN THE LATEST VERSIONS OF THE CRITERIA MANUALS THIS INCLUDES, BUT IS NOT LIMITED TO:
 - -THE CITY OF CASTLE PINES ROADWAY DESIGN AND CONSTRUCTION STANDARDS
 - -THE CITY OF CASTLE PINES STORM DRAINAGE DESIGN AND TECHNICAL CRITERIA
 - -THE CITY OF CASTLE PINES GRADING, EROSION AND SEDIMENT CONTROL CRITERIA -CDOT M & S STANDARDS
 - -MUTCD
- -URBAN STORM DRAINAGE CRITERIA MANUAL VOLUMES 1,2 & 3
- 13. A TEMPORARY CONSTRUCTION ACCESS PERMIT FROM THE CITY OF CASTLE PINES MAY BE REQUIRED FOR ANY PROJECT.

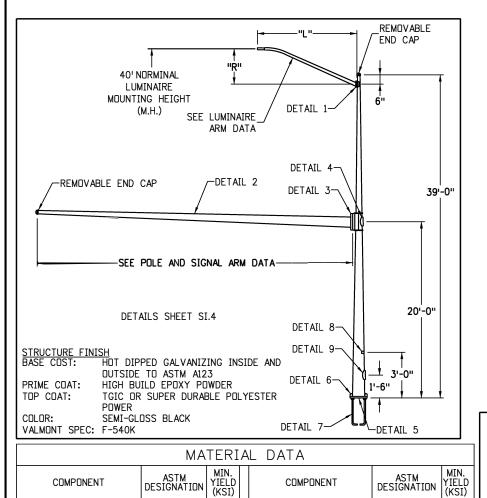
PIN

Larry Nimmo 6 Director of Public Works

NOTES GENERAL

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Standard | Revised:



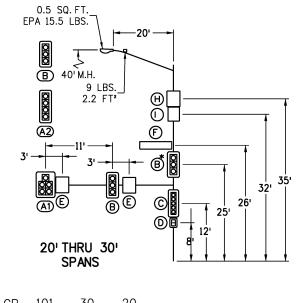
COMPONENT

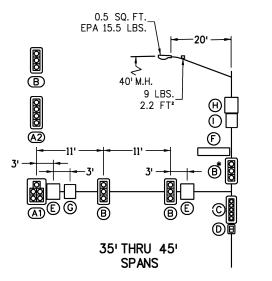
GNAL ARM ATTACHMENT GNAL ARM CONN. BOLTS

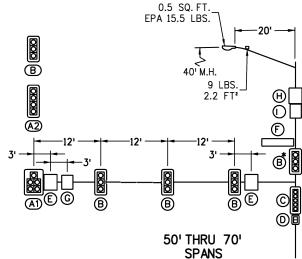
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ALL TAPERED SHAFTS

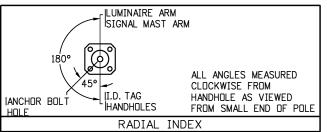


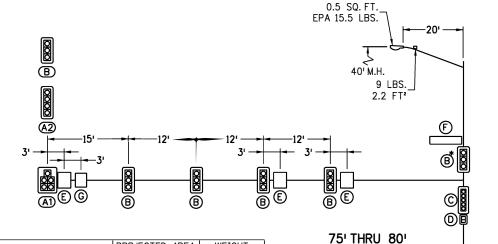






DEVICE





WEIGHT

					P	OLE A	AND	SIGNAL AI	RM	ATA(
POLE TUBF POLE BASE ANCHOR BOLT SIGNAL ARM TUBE																
POLE DESIGN AND SPANS	BASE DIA. (IN)	TOP DIA. (IN)	LENGTH (FT)	GAUGE OR THK. (IN)	SQUARE "S" (IN)	BOLT CIRCLE "Y" (IN)	THK. "M" (IN)	HOLE / SLOT "Z" (IN)	DIA. "K" (IN)	LENGTH "J" (IN)	HOOK "H" (IN)	THREAD LENGTH "U" (IN)	FIXED END DIA. (IN)	FREE END DIA. (IN)	GAUGE OR THICK (IN)	SPAN (FT)
	17.00	11.54	39.00	0.250	23.00	23.00	2.00	2.00	1.75	84.00	6.00	8.00	8.00	5.20	7	20.00
CP-101	17.00	11.54	39.00	0.250	23.00	23.00	2.00	2.00	1.75	84.00	6.00	8.00	10.00	6.50	7	25.00
20'-40'	17.00	11.54	39.00	0.250	23.00	23.00	2.00	2.00	1.75	84.00	6.00	8.00	11.00	6.80	7	30.00
	17.00	11.54	39.00	0.250	23.00	23.00	2.00	2.00	1.75	84.00	6.00	8.00	12.50	7.60	5	35.00
	17.00	11.54	39.00	0.250	23.00	23.00	2.00	2.00	1.75	84.00	6.00	8.00	13.00	7.40	3	40.00
	18.50	13.04	39.00	0.250	25.00	24.00	2.00	2.25	2.00	84.00	6.00	10.00	12.50	6.56	DET. 2	45.00
	18.50	13.04	39.00	0.250	25.00	24.00	2.00	2.25	2.00	84.00	6.00	10.00	13.00	6.36	DET. 2	50.00
CP-201	18.50	13.04	39.00	0.250	25.00	24.00	2.00	2.25	2.00	84.00	6.00	10.00	14.00	6.66	DET. 2	55.00
45'-70'	18.50	13.04	39.00	0.250	25.00	24.00	2.00	2.25	2.00	84.00	6.00	10.00	14.50	7.40	DET. 2	60.00
	18.50	13.04	39.00	0.250	25.00	24.00	2.00	2.25	2.00	84.00	6.00	10.00	15.00	6.26	DET. 2	65.00
	18.50	13.04	39.00	0.250	25.00	24.00	2.00	2.25	2.00	84.00	6.00	10.00	15.50	6.06	DET. 2	70.00
CP-301	20.00	14.54	39.00	0.313	27.00	26.00	2.00	2.50	2.25	89.00	7.00	12.00	16.50	6.36	DET. 2	75.00
75'-80'	20.00	14.54	39.00	0.313	27.00	26.00	2.00	2.50	2.25	89.00	7.00	12.00	17.50	6.66	DET. 2	80.00

ASTM DESIGNATION

COMPONENT

LUMINAIRE CONN. BOLTS GALVANIZING-HARDWARE

YIELD (KSI)

36 --

		(F I)	(LD3)
(A1)	12"-5 SEC. SIGNAL WITH BACKPLATE (STACKED)	13.72	96.00
(A2)	12"-4 SEC. SIGNAL WITH BACKPLATE (VERTICAL)	10.22	57.00
B	12"-3 SEC. SIGNAL WITH BACKPLATE (VERTICAL)	8.14	45.00
©	12"-5 SEC. SIGNAL WITH BACKPLATE (VERTICAL)	13.33	96.00
0	DUAL-2 SECPEDESTRIAN *	8.00	80.00
Ē	30"x36" REGULATORY SIGN	7.50	25.00
Ē	21"x144" BACK TO BACK STREET NAME SIGNS	21.00	200.00
©	24"x30" REGULATORY SIGN	5.00	20.00
Θ	36"x36" REGULATORY SIGN	9.00	30.00
0	18"x30" REGULATORY SIGN	3.75	15.00
		<u>Note</u>	<u> </u>

3° RISE	√ RE	NOM. STRAIG FORMED TO 2		<u></u>							
ARM SPAN "L"											
20.00'	1'-6"										
LUMINAIRE ARM DATA											

DESCRIPTION

PROJECTED AREA

BOTTOM OF ALL SIGNAL HEADS SHALL HJAVE A MINIMUM VERTICAL CLEARANCE FROM PAVEMENT OF 17 FEET AND A MAXIMUM VERTICAL CLEARANCE FROM PAVEMENT OF 19 FEET AND SHALL BE ON THE SAME HORIZONTAL PLANE.

SPANS

(B) THIS SIGNAL INDICATION OPTIONAL BASED ON INTERSPECTION GEOMETRICS. IF NOT REQUIRED, MOUNT STREET NAME SIGN AS SPECIFIED ON SHEET 17, ADJUST REGULATORY SIGNS DOWN ACCORDINGLY.

SEE LATEST EDITION OF CHAPTER 9, CASTLE PINES ROADWAY DESIGN AND CONSTRUCTION STANDARDS

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SIGNAL HEADS **ARM AND**

CASTLE PINES STANDARD SIGNAL DETAILS

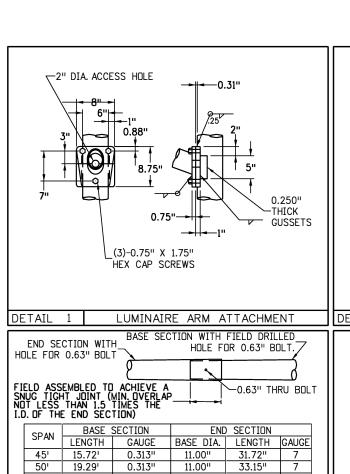
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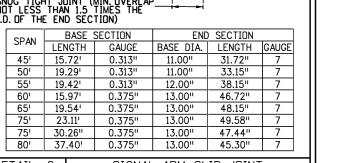
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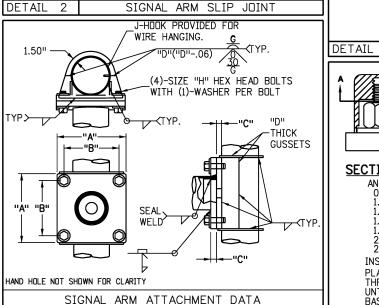
MAST

 $\overline{\mathbf{S}}$

Revised: Standard [







1.750"

2.000"

2.000"

"D"

0.500"

0.625"

0.625"

SIGNAL ARM ATTACHMENT

1.25" X 3.75"

1.50" X 4.25"

1.50" X 4.25"

"B"

18.50"

20.50"

23.00"

POLE TYPE

CP-101

CP-201

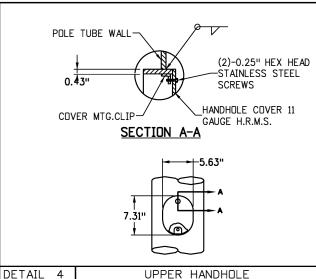
CP-301

DETAIL

21.75"

24.25"

26.75"



WELD

POLE BASE INSIDE DIAMETER

SECTION A:A

MINUS 1.00" MIN.

POLE BASE

PLASTIC NUT COVER

ANCHOR BOLT PROJECTION ABOVE TOP OF BASE PLATE 0.75" DIA. ANCHOR BOLT - 1.25" MIN. / 1.75" MAX. 1.00" DIA. ANCHOR BOLT - 1.75" MIN. / 2.50" MAX. 1.25" DIA. ANCHOR BOLT - 2.00" MIN. / 2.75" MAX. 1.50" DIA. ANCHOR BOLT - 2.25" MIN. / 3.00" MAX. 1.75" DIA. ANCHOR BOLT - 2.25" MIN. / 3.00" MAX. 2.00" DIA. ANCHOR BOLT - 2.50" MIN. / 3.25" MAX. 2.25" DIA. ANCHOR BOLT - 3.00" MIN. / 3.75" MAX. 2.25" DIA. ANCHOR BOLT - 3.00" MIN. / 3.75" MAX. 3.50" MIN. / 3.75" MAX.

PLACE COVER OVER ANCHOR BOLT. ENGAGE EXPOSED THREADS OF ANCHOR BOLT AND ROTATE CLOCKWISE UNTIL BOTTOM OF COVER SITS FLUSH WITH TOP OF BASE PLATE. ONCE RIBS INSIDE ARE ENGAGED WITH ANCHOR BOLT NUT, LOCKING ACTION OCCURS AND COUNTER-CLOCKWISE ROTATION IS INHIBITED.

NUT COVER

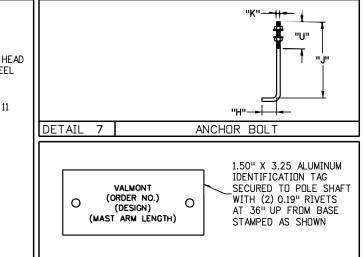
─BASE PLATE

INSTALLATION INSTRUCTIONS

SECTION B:B

DETAIL 6

-BACK-UP RING



DETAIL 8

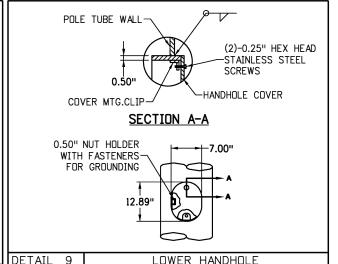
THESE TRAFFIC SIGNAL SUPPORT STRUCTURES ARE DESIGNED IN THESE TRAFFIC SIGNAL SUPPORT STRUCTURES ARE DESIGNED IN ACCORDANCE WITH LOADING AND ALLOWABLE STRESS REQUIREMENTS OF 2001 AASHTO "STANDARDS SPECIFICATION FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS. LUMINAIRES AND TRAFFIC SIGNALS". FOURTH EDITION. WIND LOADS ARE BASED ON A BASIC WIND SPEED OF 100 MPH WIT A RECURRENCE INTERVAL OF 50 YEARS, AND A FATIGUE CATEGORY OF 2. FATIGUE LOADS ARE BASED ON THE REQUIREMENTS OF SECTION 11.7 AND THE FOLLOWING DESIGN LOADS:

VORTEX SHEDDING: NOT APPLICABLE FOR STRUCTURES WITH A TAPER OF AT LEAST 0.14 IN/FT. PER AASHTO.

NATURAL WIND GUSTS: THE YEARLY MEAN WIND SPEED FOR NATURAL WIND GUSTS WILL BE ASSUMED TO BE 11.2 MPH.

TRUCK- INDUCED GUST: STRUCTURES ARE DESIGNED TO INCLUDE TRUCK-INDUCED GUSTS. (THE SPECIFIED AVERAGE TRUCK SPEED IS 65 MPH)

AASHTO 2001 SPECIFICATIONS



I.D. TAG

	POLE TUBE WALL
	(2)-0.25" HEX HEAD STAINLESS STEEL SCREWS
	COVER MTG.CLIP— HANDHOLE COVER
	SECTION A-A
	0.50" NUT HOLDER WITH FASTENERS FOR GROUNDING 12.89"
	DETAIL 9 LOWER HANDHOLE
J	

			F	POLE AND	SIG	NAL A	RM D	ATA					
		POL	E BASE			ANCHO	R BOLT		SIGNAL ARM TUBE				
POLE DESIGN AND SPANS	SQUARE "S" (IN)	BOLT CIRCLE "Y" (IN)	THK. "M" (IN)	HOLE / SLOT "Z" (IN)	DIA. "K" (IN)	LENGTH "J" (IN)	HOOK ''M'' (IN)	THREAD LENGTH "U" (IN)	FIXED END DIA. (IN)	FREE END DIA. (IN)	GAUGE OR THICK (IN)	SPAN (FT)	
	23.00	23.00	2.00	2.00	1.75	84.00	6.00	8.00	8.00	5.20	7	20.00	
	23.00	23.00	2.00	2.00	1.75	84.00	6.00	8.00	10.00	6.50	7	25.00	
CP-101 20'-40'	23.00	23.00	2.00	2.00	1.75	84.00	6.00	8.00	11.00	6.80	7	30.00	
20 .0	23.00	23.00	2.00	2.00	1.75	84.00	6.00	8.00	12.50	7.60	5	35.00	
	23.00	23.00	2.00	2.00	1.75	84.00	6.00	8.00	13.00	7.40	3	40.00	
	25.00	24.00	2.00	2.25	2.00	84.00	6.00	10.00	12.50	6.56	DET.2	45.00	
	25.00	24.00	2.00	2.25	2.00	84.00	6.00	10.00	13.00	6.36	DET.2	50.00	
CP-201	25.00	24.00	2.00	2.25	2.00	84.00	6.00	10.00	14.00	6.66	DET.2	55.00	
45'-70'	25.00	24.00	2.00	2.25	2.00	84.00	6.00	10.00	14.50	6.46	DET.2	60.00	
	25.00	24.00	2.00	2.25	2.00	84.00	6.00	10.00	15.00	6.26	DET.2	65.00	
	25.00	24.00	2.00	2.25	2.00	84.00	6.00	10.00	15.50	6.06	DET.2	70.00	
CP-301	27.00	26.00	2.00	2.50	2.25	89.00	7.00	12.00	16.50	6.36	DET.2	75.00	
75'-80'	27.00	26.00	2.00	2.50	2.25	89.00	7.00	12.00	17.50	6.66	DET.2	80.00	

		┕
		VEN.
ΓUΒΕ	<u> </u>	f
JGE R [CK N)	SPAN (FT)	ATTACHM
7	20.00	
7	25.00	ARM
7	30.00	AF
5	35.00	
3	40.00	MAST
T.2	45.00	Ž
T.2	50.00	
T.2	55.00	
T.2	60.00	
T.2	65.00	
T.2	70.00	
T.2	75.00	

Oct 14, 2 Drawing No. Standard [Revised:

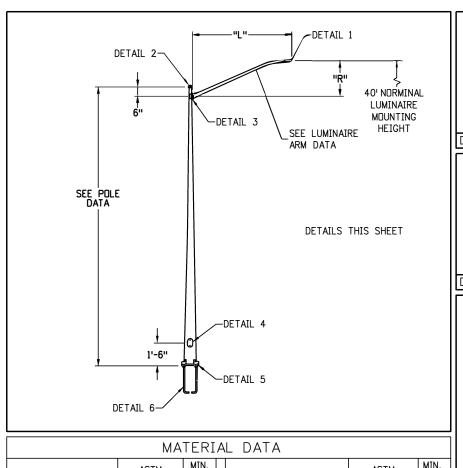
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AND POLE BASE

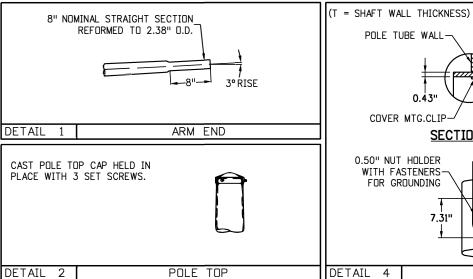
CASTLE PINES STANDARD SIGNAL DETAILS

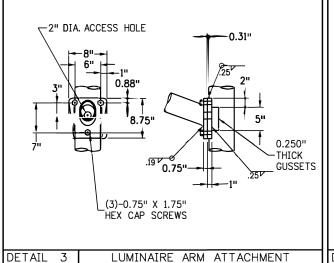
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APPROVED BY THE CITY



MATERIAL DATA													
COMPONENT	ASTM DESIGNATION	MIN. YIELD (KSI)		COMPONENT	ASTM DESIGNATION	MIN. YIELD (KSI)							
POLE SHAFT	A595 GR.A	55		GUSSET PLATES	A36	36							
ARM SHAFT	A595 GR.A	55		LUMINAIRE CONN. BOLTS	SAE GR.5								
POLE BASE	A572 GR.50	50		ANCHOR BOLTS	F1554 GR.55								
SIMPLEX PLATE	A36	36		GALVANIZING-HARDWARE	A153	55							





	TUBE WALL THK. + 0.06" TUBE WALL THK.
	POLE BASE DIA.+ 0.06" "S"
	DETAIL 5 POLE BASE
\neg	IIIVII II I

SCREWS

GAUGE H.R.M.S.

HANDHOLE

HANDHOLE COVER 11

(2)-0.25" HEX HEAD -STAINLESS STEEL

POLE TUBE WALL-

COVER MTG.CLIP-

(4)-ANCHOR BOLTS WITH (2) HEX NUTS AND (2) WASHERS PER BOLT WITH THREADED END GALVANIZED AT LEAST 12.00".

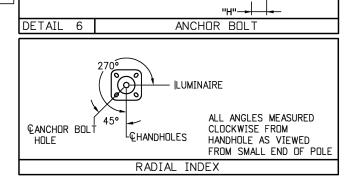
SECTION A-A

		POLE AND LUMINAIRE ARM DATA																	
				POLE	TUBF			PO	LE BAS	E		ANCHOR	BOLT			LUMIN	AIRE AR	M TUBE	
	DESIGN	POLE TYPE	BASE DIA. (IN)	TOP DIA. (IN)	LENGTH (FT)	GAUGE OR THINK (IN)	SQUARE "S" (IN)	BOLT CIRCLE "Y" (IN)	THK. "M" (IN)	HOLE / SLOT "Z" (IN)	DIA. "K" (IN)	LENGTH "J" (IN)	HOOK "H" (IN)	THREAD LENGTH "U" (IN)	FIXED END DIA. (IN)	FREE END DIA. (IN)	GAUGE DR THICK (IN)	SPAN "L" (FT)	RISE "R" (FT)
ĺ	CP-01	32	11.00	5.54	39.00	7	15.00	15.00	1.25	1.75	1.50	54.00	6.00	8.00	5.22	2.40	11	20.00	1.50

STRUCTURE FINISH
BASE COST: HOT DIPPED GALVANIZING INSIDE AND OUTSIDE TO ASTM A123
PRIME COAT: HIGH BUILD EPOXY POWDER
TOP COAT: TGIC OR SUPER DURABLE POLYESTER POWER

VALMONT SPEC: F-540K

CP - 0132 - 20LUMINAIRE ARM LENGTH - POLE TYPE (01 DESIGNATES AASHTO YEAR) - CASTLE PINES POLE SERIES



LUMINAIRE POLE

OF CASTLE PINES STANDARD SIGNAL DETAILS

Revised: Oct 14, 2025 Standard Drawing No.

<u>SI.4</u>

	EXISTING MAST ARM DRILLED PIER SCHEDULE													
DO DWO	PNI F	EXISTING MAST ARM	SHAFT					DESIGN SERVICE LOADS						
DC DWG	POLE SERIES/TYPE	LENGTH (FT)	DIAMETER (IN)	L (FT)	LBR (FT)	VERTICAL	HORIZONTAL TIES	AXIAL (LBS)	SHEAR (LBS)	TORSION (FT/LB)	MOMENT (FT/LB)			
DB00349	CP 1, 2 & 3	0-60	42	14'-0	6'-0	(19) #8	#5 @ 6 1/4" DC	4,681	4,708	119,317	115,994			
DB00349	CP 4 & 5	65-70	42	14'-6	6'-0	(19) #8	#5 @ 5 1/2" DC	5,109	4,564	144,316	126,674			

	NEW MAST ARM DRILLED PIER SCHEDULE													
DO DINO	PNI F	EXISTING MAST ARM	SHAFT	SHAFT	LENGTH	REIN	IFORCING		DESIGN SER	VICE LOADS				
DC DWG	POLE SERIES/TYPE	MAST ARM LENGTH (FT)	DIAMETER (IN)	L (FT)	LBR (FT)	VERTICAL	HORIZONTAL TIES 'S'	AXIAL (LBS)	SHEAR (LBS)	TORSION (FT/LB)	MOMENT (FT/LB)			
	CP 101	20 - 40	36	14'-6	6'-0	(16) #8	#5 @ 8" DC	4,836	5,328	59 , 407	125,353			
DB00798	CP 201	45 - 70	42	16'-0	7'-0	(19) #8	#5 @ 6" DC	6 , 555	5,585	128,708	162,241			
	CP 301	75 - 80	42	17'-0	7'-6	(23) #8	#5 @ 4 3/4" DC	7,981	5,960	169,316	212,572			

GENERAL NOTES

1. THE GEOTECHNICAL REPORT PREPARED BY YEH AND ASSOCIATES, INC. NUMBER 28-033, DATED MARCH 19 2008 PROVIDED CRITERIA FOR THE FOUNDATION DESIGN FOR THE PROJECT. RE: DRILLED PIER TABLE FOR SOIL INPUT DATA FOR L- PILE COMPUTER PROGRAM.

A. DRILLED PIER TABLE:

MATERIAL	c (PSF)	Ø	yt	KS	E50	SOIL TYPE
SOIL	0	28	110	90		1
CLAY	750	0	100		0.01	2
BEDROCK	3000	0	120		0.005	3

C - COHESION INTERCEPT (PSF)Ø - ANGLE OF INTERNAL FRICTION

Y_T - TOTAL UNIT WEIGHT (PCF)

 K_S - INITIAL MODULES OF HORIZONTAL SUBGRADE REACTION (PCI) - STATIC

SOIL TYPES:

A. SAND (REESE)

SOFT CLAY

STIFF CLAY W/O FREE WATER

- GEOTECHNICAL ENGINEER SHALL BE PRESENT FULL TIME AT SITE DURING PIER DRILLING FOR DRILLED PIER SHAFT OBSERVATION AND INSPECTION.
- TESTING AGENCY SHALL BE USED TO SAMPLE AND TEST CONCRETE BEING PLACED ON SITE TO VERIFY CORRECT MIX, SLUMP AND DESIGN STRENGTH.
- PIER HOLES SHALL BE PROPERLY CLEANED PRIOR TO PLACEMENT OF CONCRETE.
- CONCRETE SHALL BE PLACED IN HOLE FULL HEIGHT SAME DAY AFTER DRILLING WITH NO CONSTRUCTION JOINTS.
- 6. TREMIE METHOD OF CONCRETE PLACEMENT SHALL BE USED IF MORE THAN 3" OF WATER IS PRESENT AT BOTTOM OF PIER.
- 7. DRILLED PIER LENGTH 'L' IS THE MINIMUM REQUIRED LENGTH AND INCLUDES 2'-0 OF MATERIAL DISCOUNTED FOR DESIGN. IF SOIL MATERIAL IS LOOSE FILL DEEPER THAN 2'-0, DRILLED PIER LENGTH SHALL BE EXTENDED SAME AMOUNT OVER THE 2'-0, LENGTH IF BEDROCK IS ENCOUNTERED MINIMUM LENGTH IN BEDROCK 'LDR' SHALL BE PROVIDED.
- REINFORCING STEEL SHALL CONFORM TO ASTM A615/A615M, GRADE 60 DEFORMED.

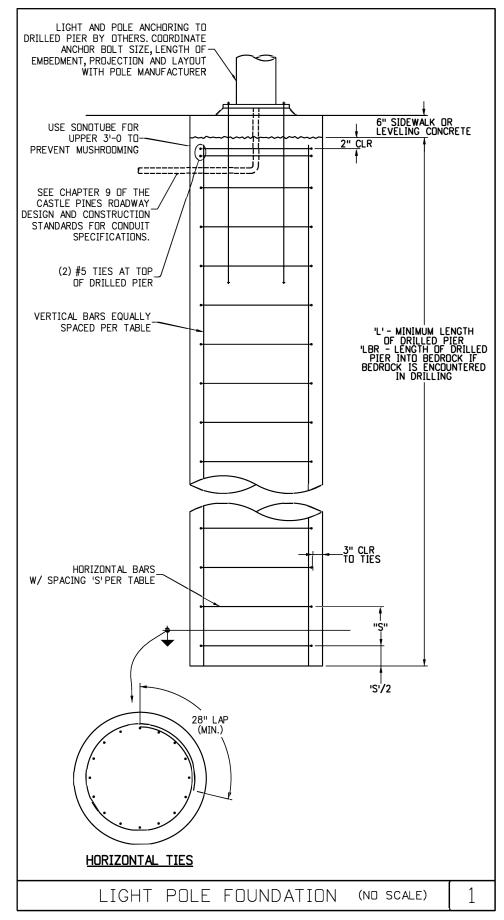
9. NO SPLICING OF VERTICAL REINFORCEMENT IS PERMITTED.

10. CONCRETE MIX REQUIREMENTS:

_	OUNTE IE MILK		, TI (I I I								
TYPE	INTENDED USE	28 DAY STRENGTH F'C (KSI)	CONC. TYPE LIGHTWEIGHT (LW) NDRMAL WT. (NW)	MAX W/C (INCLUDING FLY ASH)	MIN. CEM. MTRL (#/CY) (INC. FLY ACH)	MAX AGGR. (IN) (1)	SLUMP LIMITS (IN) (0", -2")	TOTAL AIR LIMITS (%) (2)	CEMENT TYPE	REQ'D ADMIXTURES	OTHER REQUIREMENTS (3)
1	DRILLED PIERS	3	NW		470	1	7	6	II	(4)	HRNP

NOTES:

- (1) FOR THE MAXIMUM COARSE AGGREGATE SIZE INDICATED, USE THE FOLLOWING AGGREGATE SIZE NUMBERS PER ASTM C33: 3/4" #67 AGGREGATE
 1" #57 AGGREGATE
- (2) TOTAL AIR CONTENT LIMITS INCLUDE BOTH ENTRAINED AND ENTRAPPED AIR +/- 1 1/2%. 'N' IN COLUMN INDICATES ADDITION OF ENTRAINED AIR IS NOT PERMITTED.
- (3) ABBREVIATIONS FOR OTHER REQUIREMENTS AS FOLLOWS:
 HRNP = HIGH RANGE WATER REDUCING ADMIXTURE SHALL NOT BE
 USED TO OBTAIN HIGH SLUMP UNLESS DATA ARE SUBMITTED
 DEMONSTRATION SLUMP IS NOT LOST UNTIL CONCRETE IS
 OVER 90 MINUTES OLD.
- (4) FOR DRILLED PIERS REQUIRED TO BE CASED PROVIDE CONCRETE MIX WITH FLOWABILITY TO PREVENT ARCHING WHEN CASING IS PULLED.



T ARM POLE FOOTINGS (20' THROUGH 80')

MAST

2025

Oct 14, Drawing No.

Revised: Standard I \overline{S}



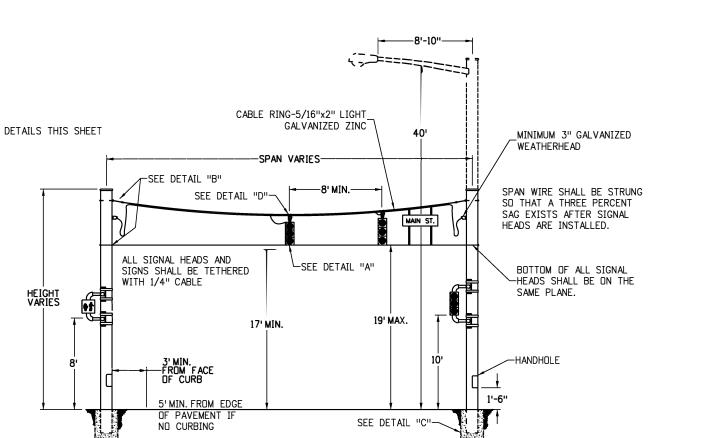
LE PINES

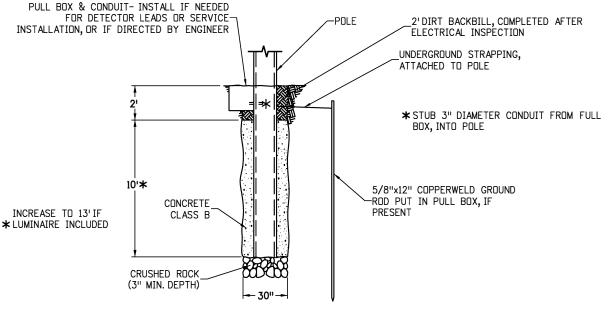
CASTLE PIN

SPAN WIRE POLE

2025 TEMPORARY

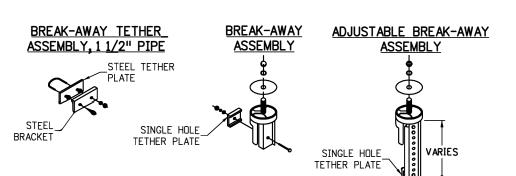
Revised: Oct 14, 2025
Standard Drawing No.
SI,6



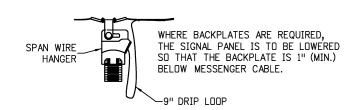


DETAIL "C"

TYPICAL TRAFFIC SIGNAL
SPAN WIRE POLE FOOTING
(CAST IN PLACE)

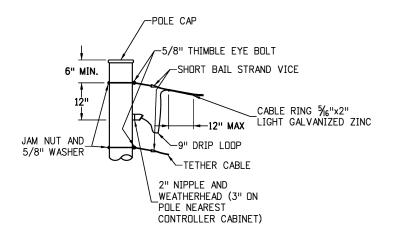


DETAIL "A"
TETHERING OPTIONS



DETAIL "D"

TYPICAL SPAN WIRE MOUNTING



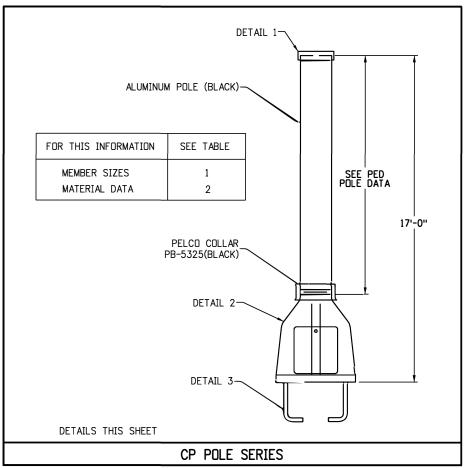
DETAIL "B"
TYPICAL CABLE AND TETHER INSTALLATION

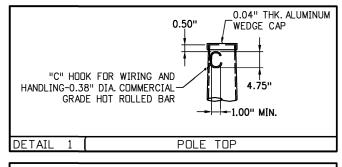
GENERAL NOTES

- 1. SPAN WIRE POLE SHALL BE FINISHED PER THE CITY OF CASTLE PINES' PAINT SPECIFICATION OR APPROVED EQUAL.
- 2. DESIGN CRITERIA SHALL MEET LATEST AASHTO EDITION OF "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS," FOR A WIND VELOCITY OF 90 MPH.
- 3. SPAN WIRE POLES SHALL BE FABRICATED OF STEEL WITH A MINIMUM YIELD STRENGTH OF 35 KSI. AND A MINIMUM WEIGHT PER LINEAR FOOT AS FOLLOWS: 40.4 POUNDS FOR 10 INCH DIAMETER POLES AND 49.5 POUNDS FOR 12 INCH DIAMETER POLES. POLES SHALL BE INSTALLED SO THAT THEY WILL BE PLUMB WHEN DEFLECTED BY THE INSTALLED LOAD. SPAN WIRE CABLE SHALL BE A MINIMUM OF 3/8 INCH DIAMETER, RATED AT A MINIMUM OF 13,000 POUNDS.
- 4. SPAN WIRE SIGNAL HEADS SHALL HAVE ONE POWER FEED WIRE IN AND OUT PER HEAD. CONNECTIONS SHALL BE MADE ONLY ON THE SIGNAL HEAD TERMINALS, WITH NO EXTERNAL SPLICES.
- 5. ALL SIGNAL INDICATIONS SHALL BE WIRED INDEPENDENTLY AND TERMINATED IN THE HANDHOLE WITH NO EXTERNAL SPLICES.

TEMPORARY SPAN WIRE POLE DETAIL

(FOR SPECIAL USE, WITH PRIOR APPROVAL OF THE CITY ONLY)





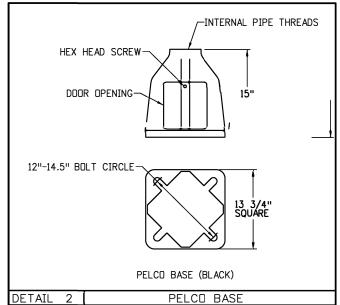


	TABLE 1: POLE SCHEDULE									
DESIGN	ATION			POLE D	ATA	ANCHOR BOLT DATA				
POLE SERIES	POLE TYPE	BASE DIA. (IN)	TOP DIA. (IN)	LENGTH (FT)	THICK (IN)	BASE TYPE	DIA. "K" (IN)	LENGTH "ال" (IN)	HOOK "H" (IN)	THREAD LENGTH "U" (IN)
PELCO	AL	4.50	4.50	15.83	0.337	PELCO	0.75	18	3	7

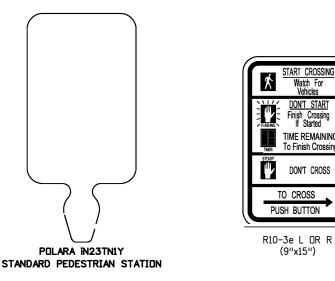
TABLE 2: MATERIAL DATA					
COMPONENT	DESIGNATION	MIN. YIELD (KSI)			
4" NOMINAL ALUM. SCH 80 PIPE	ASTM B249 (BLACK)	35			
ALUM. PELCO BASE	PB-5334(BLACK)				
ANCHOR BOLTS	AASHTO M314 GR.55	55			
STRUCTURE FINISH BLACK (PELOC SPECIFICATION 3099)					

PEDESTRIAN POLE

CITY OF CASTLE PINES STANDARD SIGNAL DETAILS

Issued: 6/15/2022

Revised: Oct 14, 2025
Standard Drawing No.
SI.7



WHEN MOUNTING (2) PEDESTRIAN PUSH BUTTON ASSEMBLIES ON A 4.5" O.D. PEDESTRIAN POLE, APPROVED STAND-OFF MOUNTING BRACKETS (POLARA INPBF2S-4.5B OR EQUIVALENT) SHALL BE USED TO ACCOMMODATE THE 9"x15"

Finish Crossing

TIME REMAININ

To Finish Crossing

DON'T CROSS

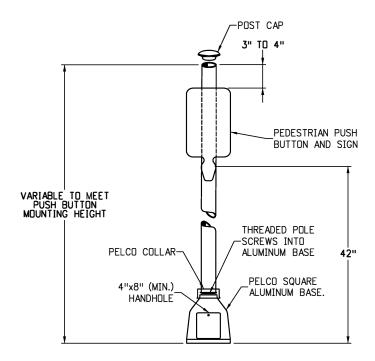
TO CROSS

PUSH BUTTON

(9"x15")

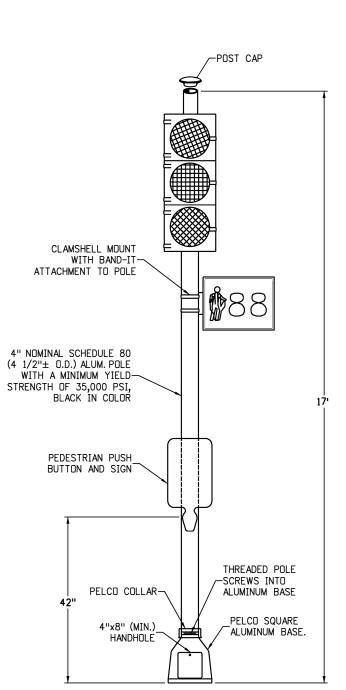
TYPICAL PEDESTRIAN PUSH-BUTTON STATION AND SIGN

SIGNS SHALL BE MOUNTED SQUARE TO POLE.



PEDESTRIAN PUSH BUTTON POLE SHALL BE ALUMINUM (BLACK) ON PELCO BASE (BLACK)

FINISH REQUIREMENTS ALL PEDESTRIAN PUSH BUTTON AND PEDESTAL POLES SHALL BE FACTORY FINISHED (BLACK)



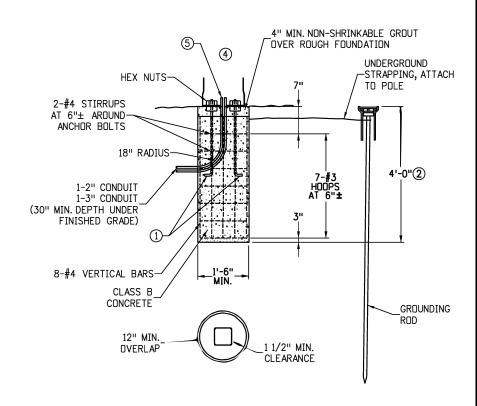
TYPICAL PEDESTRIAN POLE DETAIL

1/4" SPLIT PIN SHALL BE INSTALLED IN THE UPPER PORTION OF THE ALUMINUM BASE AND SHALL COMPLETELY PENETRATE BASE AND POLE TO SECURE POLE TO PREVENT MOVEMENT OR TWISTING. PELCO COLLAR TO BE INSTALLED.

SHALL BE ALUMINUM (BLACK) ON PELCO BASE (BLACK)

FOOTING NOTES

- ANCHOR BOLTS (FURNISHED WITH POLE) PER MANUFACTURER'S TEMPLATE.
- THESE DESIGN REQUIRE THAT THE FOOTING BE FOUNDED IN COMPACT SAND. CLAY OR SANDY CLAY, AND BE LOCATED ABOVE THE WATER TABLE.IF, BY VISUAL INSPECTION OF THE HOLE OTHER MATERIAL IS PRESENT, THE FOUNDATION DESIGN MAY NEED TO BE MODIFIED.
- 5/8"x8' COPPERWELD GROUND ROD THROUGH GROUND, OR DRIVEN IN ADJACENT PULL BOX AND BONDED TO POLE WITH UNDERGROUND STRAPPING.
- HANDHOLE SHALL BE PROVIDED.
- 3" MINIMUM CONDUIT HEIGHT ABOVE FOUNDATION.



TYPICAL PEDESTRIAN POLE FOOTING (CAST IN PLACE)

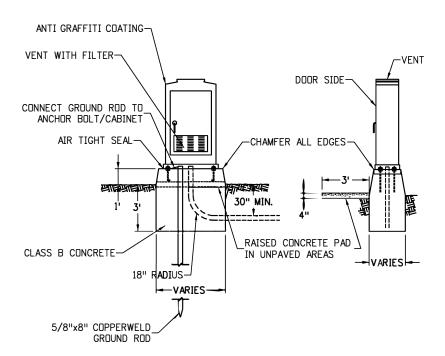
PEDESTRIAN PUSH BUTTON POLE PEDESTAL POLE

Oct 14, 2

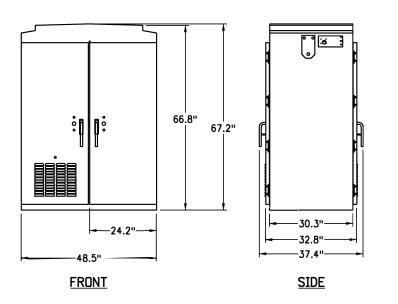
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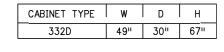
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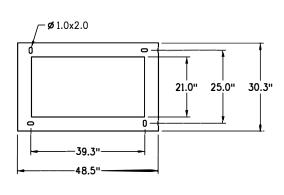
TYPICAL SIDE-OF-POLE MOUNTED CONTROLLER CABINET (FOR SPECIAL USE, WITH PRIOR APPROVAL OF THE CITY ONLY)



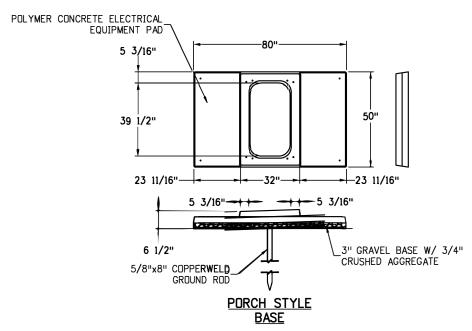
BASE MOUNTED CONTROLLER CABINET INSTALLATION AND CONCRETE FOUNDATION (FOR SPECIAL USE, WITH PRIOR APPROVAL OF THE CITY ONLY)







BASE



TYPICAL BASE MOUNTED CONTROLLER CABINET INSTALLATION

NOTE: FIBERGLASS BASE MAY BE SUBSTITUTED ONLY IF DIRECTED BY ENGINEER

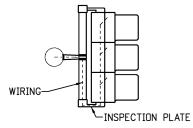
CONTROLLER CABINET INSTALLATION

CITY OF CASTLE PINES STANDARD SIGNAL DETAILS

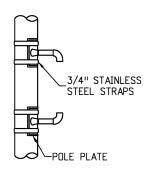
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Revised: Oct 14, 2025 Standard Drawing No.

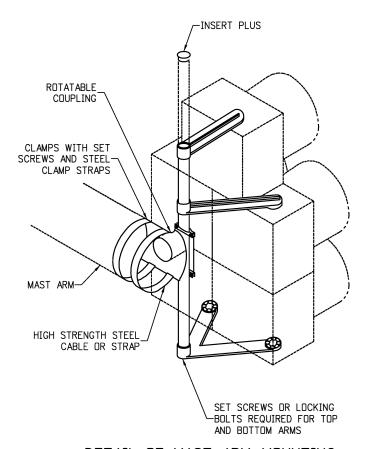
DETAIL OF MAST ARM MOUNTING FOR IN-LINE SIGNAL HEAD (3-SECTION, 4-SECTION OR 5-SECTION)



WIRING DIAGRAM



TYPICAL SIDE OF POLE SIGNAL MOUNTING



DETAIL OF MAST ARM MOUNTING FOR DOGHOUSE SIGNAL HEAD (5-SECTION)

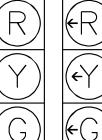
MOUNTING NOTES

- 1. PIPE COUPLINGS FOR SIGNAL BRACKETS SHALL BE EITHER 1-1/2 OR 2 INCH DEPENDING UPON THE SIGNAL HEAD TO BE INSTALLED. SIGNAL BRACKETS SHALL BE FURNISHED BY THE MANUFACTURER OF THE SIGNAL HEADS.
- 2. UNLESS OTHERWISE SPECIFIED, ALL TRAFFIC SIGNALS MOUNTED ABOVE THE ROADWAY SHALL BE APPROXIMATELY LEVEL WITH ONE ANOTHER AND HAVE A HEIGHT OF 17'TO 19' ABOVE THE PAVEMENT GRADE AT THE ROADWAY CENTER, ALL SIDE-OF-POLE MOUNTED TRAFFIC SIGNALS SHALL HAVE A HEIGHT OF 10' ABOVE GROUND LINE AND PEDESTRIAN SIGNALS SHALL HAVE A HEIGHT OF 8' ABOVE GROUND LINE AS MEASURED TO THE BOTTOM OF THE SIGNAL HEAD HOUSING OF BRACKET.
- MAST ARM MOUNTED SIGNAL HEADS SHALL USE ASTRO-TYPE MOUNTING BRACKETS. ALL SIGNAL HEADS SHALL BE MOUNTED IN SUCH A MANNER AS TO BE EASILY REMOVED FROM THEIR SUPPORTING STRUCTURE.
- 4. GASKET SEALING COMPOUND SHALL BE USED IN ADDITION TO ANY LEAD WASHERS REQUIRED FOR CREATING A WATER-TIGHT CONNECTION BETWEEN THE SIGNAL HEAD AND MOUNTING BRACKET.
- 5. SIGNAL HEADS SHALL BE SECURELY AFFIXED BY USE OF A SERRATED COUPLING OF OTHER ACCESSORIES RECOMMENDED BY THE SIGNAL MANUFACTURER.
- 6. WIRING FROM INSIDE MAST ARM THROUGH A 1" FIELD DRILLED HOLE IN ARM SHALL BE BROUGHT THROUGH THE MOUNTING SUPPORT TUBE AND LOWER ARM (AS SHOWN). FIELD DRILLED HOLES SHALL HAVE RUBBER GROMMETS INSTALLED.

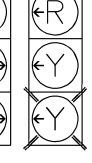
NOTES

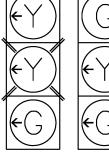
- ALL VEHICLE SIGNAL HEADS SHALL BE POLYCARBONATE AND BLACK IN COLOR WITH 12" SECTIONS AND TUNNEL VISORS. ALL SIGNAL FACES SHALL BE LED.
- ALL OVERHEAD SIGNAL HEADS SHALL HAVE LOUVERED BACKPLATES WITH A 2" DIAMOND GRADE FLUORESCENT YELLOW RETROREFLECTIVE BORDER.
- ALL PEDESTRIAN HEADS SHALL BE POLYCARBONATE AND BLACK IN COLOR. PEDESTRIAN SIGNAL FACES SHALL BE LED.
- 4. SIDE OF POLE MOUNT SHALL BE 90° MOUNT. NO "T"S ALLOWED. SEE "TYPICAL SIDE OF POLE SIGNAL MOUNTING" DRAWING.

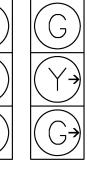


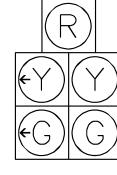














TYPICAL PEDESTRIAN AND VEHICLE SIGNAL HEADS

GENERAL WIRING NOTES

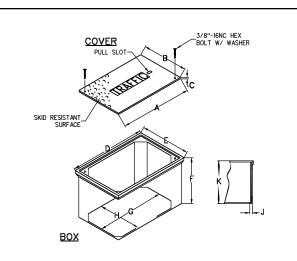
- TRAFFIC SIGNAL CONDUIT SHALL NOT CARRY WIRING OF OTHER UTILITIES.
- ALL SPLICES SHALL BE IN HANDHOLES AT POLE BASES AND NOT IN PULL BOXES.
- 3. PEDESTRIAN AND VEHICLE SIGNAL HEADS SHALL BE INDIVIDUALLY WIRED FROM THE POLE BASE TO THE SIGNAL HEAD.
- CONTRACTOR SHALL PROVIDE TWO WIRING DIAGRAMS OF THE SIGNAL INSTALLATION TO THE CITY.
- 5. UNLESS ALLOWED BY THE ENGINEER, WIRE SHALL NOT OCCUPY MORE THAN 40% OF THE INSIDE AREA OF CONDUIT.

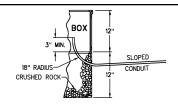
SIGNAL HEADS AND MOUNTING GENERAL WIRING NOTES

6/15/2022

Revised: Oct 14, 2025 Standard Drawing No. Ы

SIGNAL HEAD MOUNTING
SHALL BE ALUMINUM (BLACK) ON PELCO BASE (BLACK)





TWO BOXES AND EXTENSION

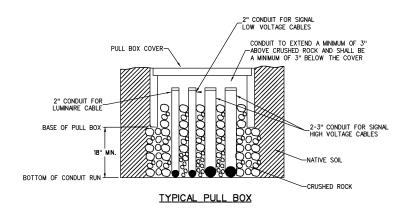
GENERAL NOTES

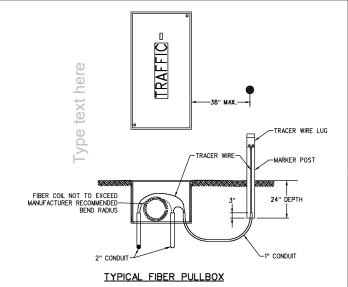
 PAVEMENT HOLE FOR PULL BOX SHALL BE SAWCUT TO FULL DEPTH, IN A RECTANGLE THAT EXTENDS 6" BEYOND THE EXPANSE OF THE PULL BOX

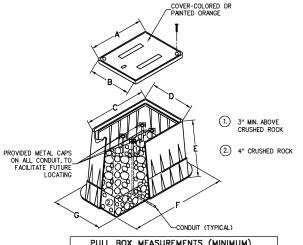
TABLE OF DIMENSIONS (MINIMUMS)

TYPE DESCRIPTION		DIMENSIONS (IN.)										
	DESCRIPTION	-	١	В	C	D	E	F	G	Н	7	K
IS	LARGE 17x30x12	30	1/2	17 1/2	2	32 1/4	19 1/4	12	26 1/2	13 1/2		
IF	LARGE/DEEP 17x30x18 FOR FIBER OPTICS	30	1/2	17 1/2	2	32 1/4	19 1/4	18	26 1/2	13 1/2		
IF2	LARGE/XTRA DEEP 17x30x24 FOR FIBER OPTICS RUNS	30	1/2	17 1/2	2	32 1/4	19 1/4	24	26 1/2	13 1/2		
п				13 3/4		25	15 1/2	12	19 1/4	9 3/4		
ш	SMALL 12x12x12-FOR DETECTORS & ELECTRICAL SERVICE	12	7/8	12 7/8	5/8	14	14	12 3/4	10 1/2	10 1/2	1	12
VAULT	30x48x18 FOR HOME RUN/FIBER SPLICE	47	5/8	30 1/8	3	49 5/8	32 1/8	18	45 5/8	28 1/8		

PERMANENT (PRECAST) PULL BOX (FOR USE WITH ALL OPERATIONAL SIGNALS) FIBERGLASS REINFORCED POLYMER CONCRETE DESIGNED FOR SERVICE LOAD (MINIMUM) OF 22,500 LBS, OVER A 10" SQUARE







PULL BOX MEASUREMENTS (MINIMUM)						
Α	В	С	D	E	F	G
11"	11"	12"	12"	13"	12"	12"

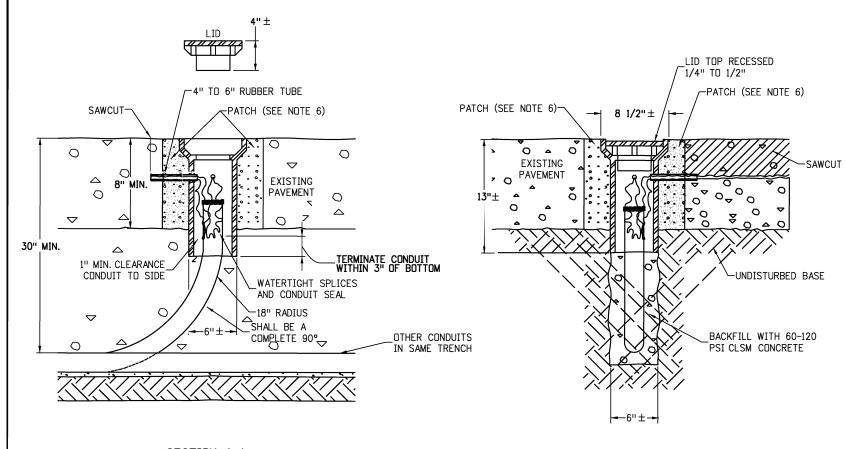
TEMPORARY (PLASTIC) PULL BOX DETAIL (FOR USE WHEN APPROVED BY THE CITY FOR SPECIAL INSTALLATIONS) Carror ASTLE PINES

DATE OCT

PERMANENT (PRECAST) PULL BOX TEMPORARY (PLASTIC) PULL BOX

Revised: 9/9/2025
Standard Drawing No.
S1.11

TOP VIEW

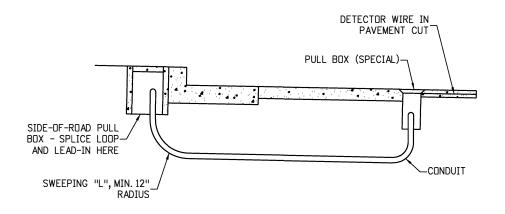


SECTION A-A SECTION B-B

PULL BOX (SPECIAL)

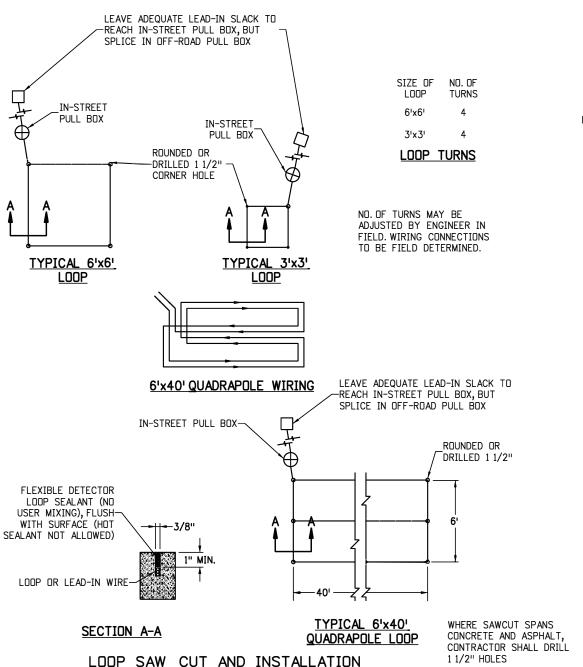
GENERAL NOTES

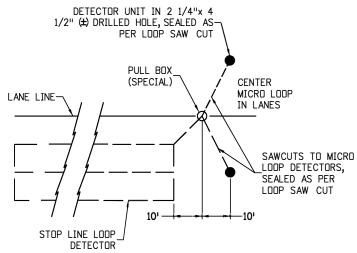
- PULL BOX (SPECIAL) SHALL BE A WATER VALVE STEM TYPE PULL BOX MADE OF CAST IRON OR STEEL. THE PULL BOX SHALL HAVE CAPABILITY OF ACCEPTING RISER RINGS FOR FUTURE OVERLAYS. THE LID SHALL HAVE THE WORD "TRAFFIC" PRINTED ON IT.
- 2. PULL BOXES SHALL HAVE 3/4" TO 1" DIAMETER HOLES DRILLED OR TORCHED 3" FROM TOP TO ACCEPT A 4" TO 6" RUBBER TUBE (3/4" GARDEN HOSE). THE NUMBER OF HOLES SHALL BE AS PER PLANS OR AS DIRECTED BY THE ENGINEER.
- 3. CARE SHALL BE TAKEN DURING BACKFULL COMPACTION PREVENT COLLAPSE OF
- 4. 2' MINIMUM SLACK OF LOOP WIRES IS TO BE PROVIDED SO THAT ALL TESTING CAN BE DONE OUTSIDE OF THE PULL BOX. SPLICE DETECTOR LEADS IN SIDE-OF-ROAD PULL BOX, NOT IN PULL BOX SPECIAL.
- 5. PULL BOX IS TO BE LOCATED IN AN AREA OF THE STREET NOT HEAVILY TRAVELED. FOR EDGE-OF-ROAD LOCATIONS, MAINTAIN A MINIMUM OF 12" FROM CONCRETE GUTTER PAN.
- 6. PAVEMENT HOLE FOR PULL BOX SHALL BE EITHER CORE DRILLED TO FULL DEPTH, OR SAW CUT TO FULL DEPTH IN 12"x12" SQUARE WITH NO OVERLAPPING CUTS. FOR CORE DRILLING AND SAWCUT, GROUT PULL BOX IN PLACE.



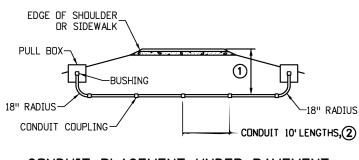
LOOP DETECTOR LEAD-IN

Oct 14, 2 I Drawing No. S Revised:





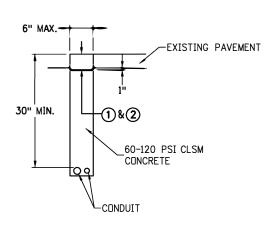
MICRO LOOP DETECTOR



CONDUIT PLACEMENT UNDER PAVEMENT OR SIDEWALK

NOTES

- MINIMUM UNDFR UNDER CONDUIT **PAVEMENT** SIDEWALK DEPTH: 30" 24"
- ALL PVC CONDUIT SHALL BE SCHEDULE 80.



CONDUIT TRENCH DETAIL-WITHOUT PAVEMENT FABRIC

-6" MAX. TOP ASPHALT LIFT -1717722) 272777 EXISTING FABRIC -EXISTING ASPHALT REPLACEMENT MAINTAIN EXISTING FABRIC-FABRIC INTEGRITY PHILLIPS "PETROMAT" OR APPROVED 60-120 PSI CLSM **EQUIVALENT** CONCRETE CONDUIT (MIN. 30" BELOW PAVEMENT SURFACE)

CONDUIT TRENCH DETAIL-WITH PAVEMENT FABRIC

- ALL DETECTOR LOOP WIRE SHALL MEET IMSA SPECIFICATION 51.5, ENCASED IN PVC OR POLYETHYLENE TUBING.
- IMMEDIATELY BEFORE LAYING THE LOOP CABLE, THOROUGHLY CLEAN WITH WATER AND DRY SAW CUT WITH HIGH PRESSURE DIL-FREE COMPRESSED AIR.
- LOOP WIRE IN ADJACENT LOOPS SHALL BE LAID UNIFORMLY IN EITHER A CLOCKWISE OR COUNTER-CLOCKWISE DIRECTION AND THE LOOP TAGGED TO
- 4. USE A BLUNT, NON-METALLIC INSTRUMENT TO PUSH WIRE INTO SLOT. DO NOT COIL LEADS.
- LOOP WIRE SHALL BE CONTINUOUS (NO SPLICES) FOR THE PULL BOX. SPLICES IN PULL BOX SHALL BE WATERPROOFED WITH SPLICE KIT.
- CONTINUITY TEST FOR EACH LOOP SHALL BE CONDUCTED 1) BEFORE ANY LOOP SEALER IS INSTALLED AND 2) AFTER LOOP SEALER IS INSTALLED AND LEAD-IN CABLE IS SPLICED AND TRAINED TO THE CONTROLLER. "RESISTANCE-TO-GROUND" AND "INDUCTANCE" SHALL BE MEASURED AND RECORDED OFR EACH TEST.
- 7. DETECTOR WIRE ACROSS BRIDGE JOINTS SHALL BE ENCASED IN A 122" SECTION OF 3/4" PVC PIPE THAT SPANS THE JOINT AREA.

<u>NOTES</u>

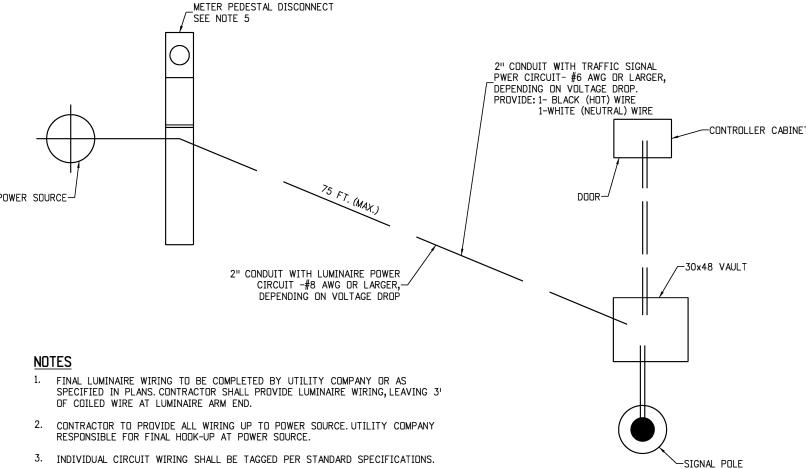
- HOT BITUMINOUS PAVEMENT (PATCHING) OR PORTLAND CEMENT CONCRETE PATCH, FULL DEPTH PLUS 1" (4" MIN.). MATCH EXISTING
- FOR ASPHALT PATCH, 48 HOUR NOTICE TO THE ENGINEER REQUIRED PRIOR TO INSPECTION.

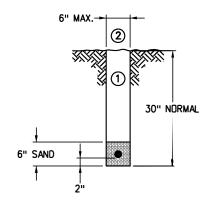
DETECTORS CONDUIT INSTALLATION

CASTLE PINES STANDARD SIGNAL DETAILS

Oct 14.

I Drawing No.
SI. 13 Revised: Standard [





UNDER GRASS/GROUND TRENCHING DETAIL

NOTES

- BACKFILL AND TAMP WITH NATIVE MATERIAL TO MATCH COMPACTION OF SURROUNDING GROUND.
- RESEED OR RESOD SURFACE AT DIRECTION OF THE ENGINEER.

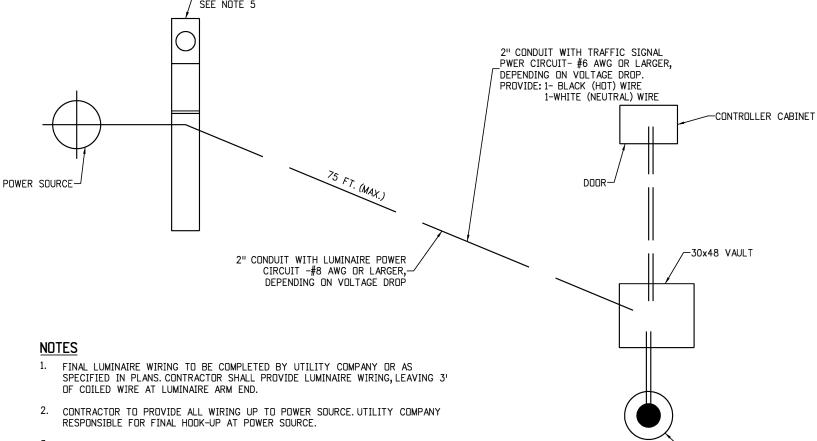
UNDERGROUND POWER SCHEMATIC-SIGNALS / GROUND TRENCHING

Oct 14, 2025 Drawing No. Revised: Standard [

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UNDERGROUND POWER SOURCE SCHEMATIC FOR SIGNALS

(ND SCALE)



4. IF POWER DOES NOT FEED DIRECTLY INTO CONTROLLER PULL BOX, PROVIDE A SEPARATE 2" CONDUIT FOR POWER SOURCE, THROUGH INTERMEDIATE PULL BOXES,

7. CONTRACTOR SHALL STRICTLY ADHERE TO THE CITY OF CASTLE PINES ELECTRICAL INSPECTION REQUIREMENTS. CONTACT THE CITY OF CASTLE PINES

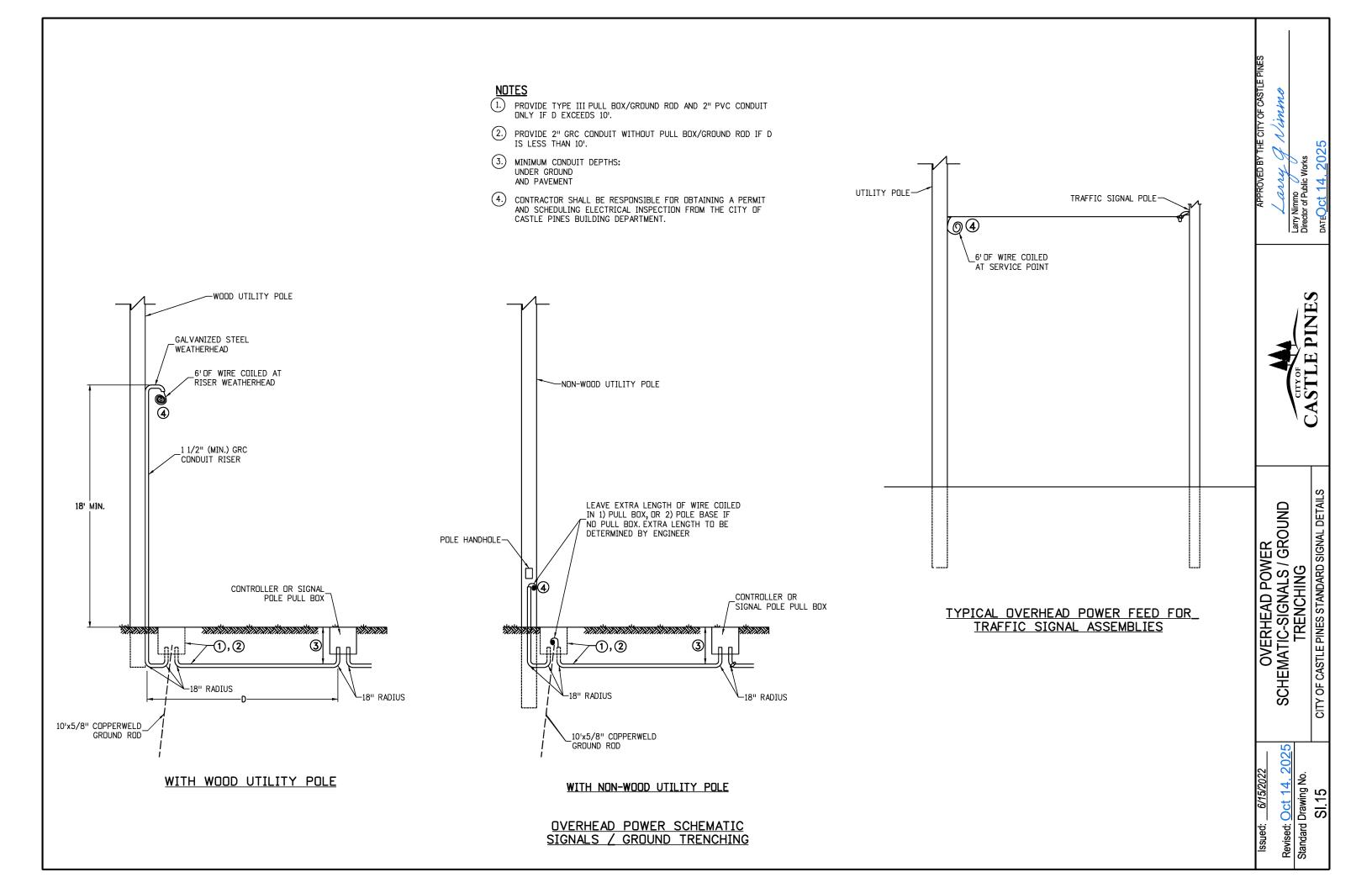
WHERE REQUIRED BY UTILITY COMPANY, CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING PERMIT AND INSPECTION FROM THE CITY OF CASTLE PINES.

5. MATER PEDESTAL/DISCONNECT NO FURTHER THAN 75 FT. FROM

BUILDING DEPARTMENT FOR FURTHER INFORMATION.

TO CONTROLLER PULL BOX.

VAULT/CABINET/HOMERUN PULLBOX.

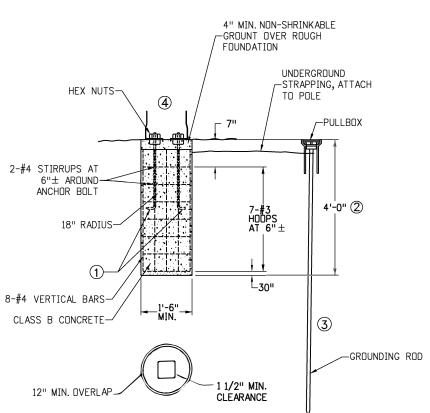


FLASHING BEACONS

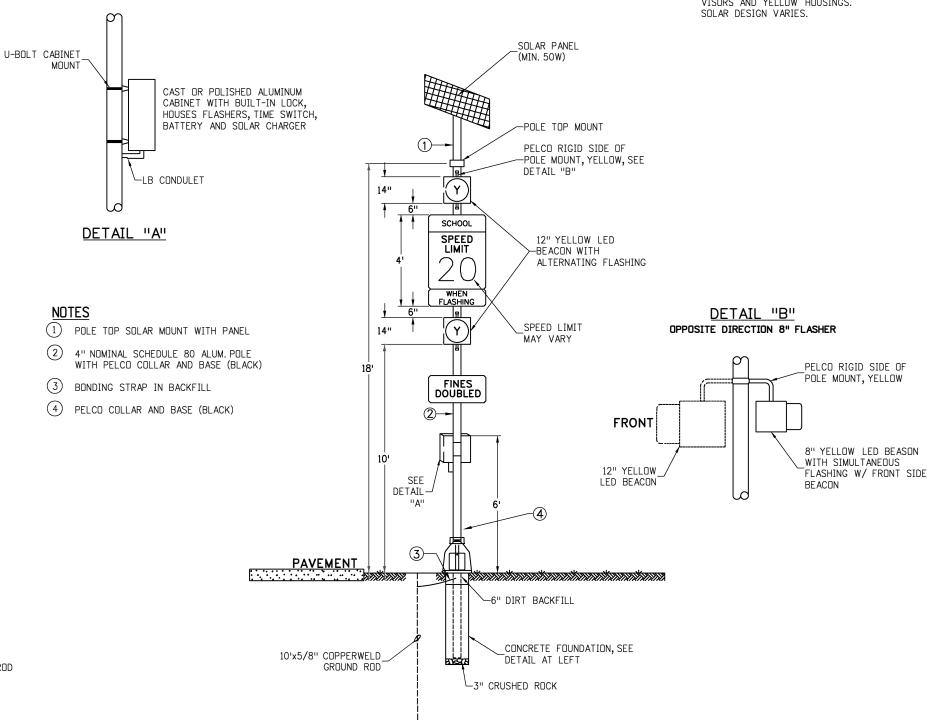
ALL FLASHING BEACONS SHALL BE POLYCARBONATE WITH TUNNEL VISORS AND YELLOW HOUSINGS.

FOOTING NOTES

- ANCHOR BOLTS (FURNISHED WITH POLE PER MANUFACTURER'S TEMPLATE.
- THESE DESIGN REQUIRE THAT THE FOOTING BE FOUNDED IN COMPACT SAND, CLAY OR SANDY CLAY, AND BE LOCATED ABOVE THE WATER TABLE. IF, BY VISUAL INSPECTION OF THE HOLE OTHER MATERIAL IS PRESENT, THE FOUNDATION DESIGN MAY NEED TO BE MODIFIED.
- 3 5/8"x8'COPPERWELD GROUND ROD THROUGH GROUND OR DRIVEN IN ADJACENT PULL BOX AND BONDED TO POLE WITH UNDERGROUND STRAPPING.
- (4) HANDHOLE SHALL BE PROVIDED.



TYPICAL POLE FOOTING (CAST IN PLACE)



SCHOOL FLASHING BEACON ASSEMBLY
SIDE OF ROAD

SCHOOL FLASHING BEACONS SIDE OF ROAD

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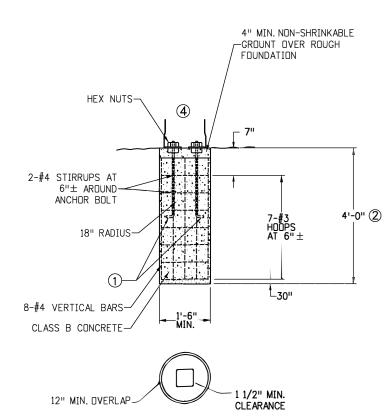
Oct 14, 2025 Drawing No.

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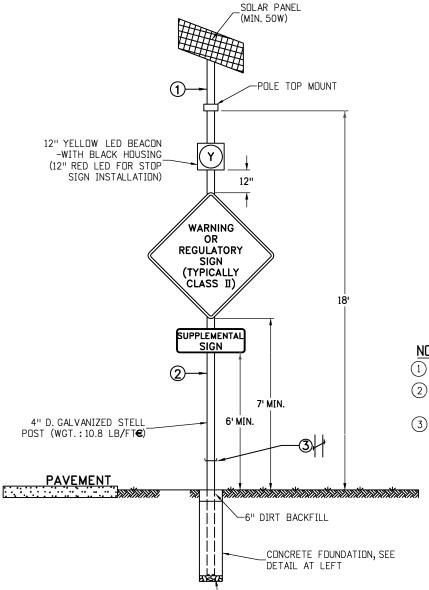
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FOOTING NOTES

- ANCHOR BOLTS (FURNISHED WITH POLE PER MANUFACTURER'S TEMPLATE.
- THESE DESIGN REQUIRE THAT THE FOOTING BE FOUNDED IN COMPACT SAND, CLAY OR SANDY CLAY, AND BE LOCATED ABOVE THE WATER TABLE. IF, BY VISUAL INSPECTION OF THE HOLE OTHER MATERIAL IS PRESENT, THE FOUNDATION DESIGN MAY NEED TO BE MODIFIED.
- HANDHOLE SHALL BE PROVIDED.



TYPICAL POLE FOOTING (CAST IN PLACE)



NOTE: ALL LONGITUDINAL LINES TO BE 12" SIDE (OR AS DIRECTED BY THE CITY PUBLIC WORKS DEPARTMENT) AND SPACED 12" TO 60 APART, CENTER CROSSWALK ON CURB RAMPS, IF CURB RAMPS ARE NOT PRESENT, CENTER ON SIGNAL POLES, WHEREVER PRACTICAL.

TYPICAL CROSSWALK MARKING (SEE CHAPTER 9 OF THE CASTLE PINES ROADWAY AND CONSTRUCTION STANDARDS FOR COMPLETE SIGNING AND STRIPING STANDARDS)

NOTES

- POLE TOP SOLAR MOUNT WITH PANEL
- 4" NOMINAL SCHEDULE 80 ALUM. POLE WITH PELCO COLLAR AND BASE (BLACK)
- PELCO COLLAR AND BASE (BLACK) OR BREAKAWAY SLIP BASE PER PLAN.

11,111,111111 2'x10' BARS ON ARTERIALS AT TRAFFIC SIGNALS, ALL OTHERS TO BE 1'x10' BARS CENTERED: -ON LANE OR CHANNELIZING LINES -BETWEEN LANE LINES -ON FLOW LINE EXTENDED

WARNING / REGULATORY FLASHING BEACON TYPICAL CROSSWALK MARKING

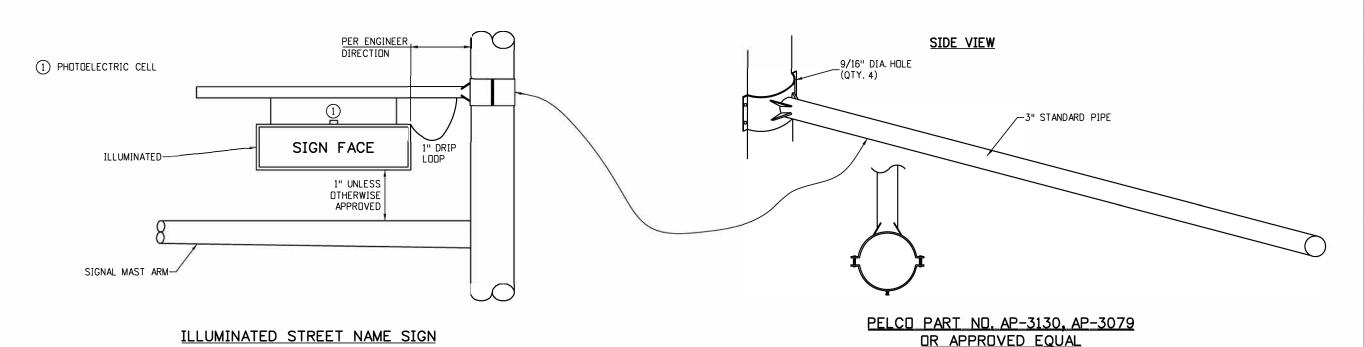
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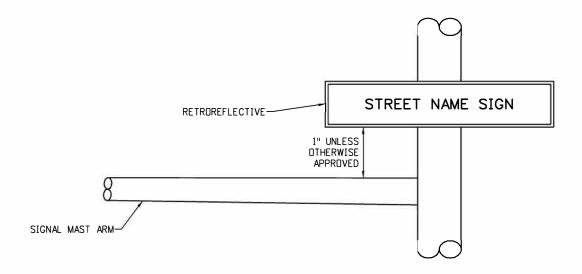
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WARNING OR REGULATORY SIGN FLASHING BEACON ASSEMBLY

└─3" CRUSHED ROCK

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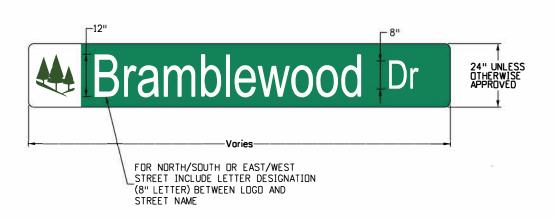






NOTES

- 1. FOR ILLUMINATED STREET NAME SIGN SPECIFICATIONS, SEE CHAPTER 9
 OF THE CASTLE PINES ROADWAY DESIGN AND CONSTRUCTION STANDARDS.
- FOR STANDARD STREET NAME SIGN SPECIFICATIONS, SEE CHAPTER 9 OF THE CASTLE PINES ROADWAY DESIGN AND CONSTRUCTION STANDARDS.



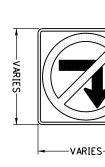
TYPICAL SIGN LAYOUT

STREET NAME SIGNS

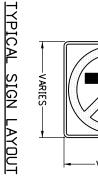
CITY OF CASTLE PINES STANDARD SIGNAL DETAILS

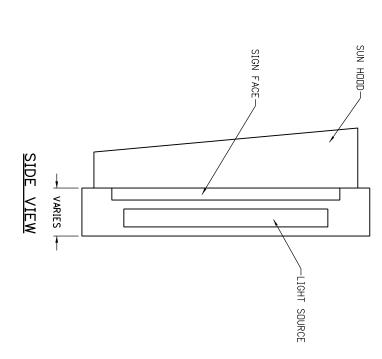
Revised: Oct 14, 2025 Standard Drawing No. SI.18

- SIGN MAY BE SINGLE-SIDED OR DOUBLE SIDED PER ENGINEER'S DIRECTION.
- SIGN COLOR, LEGEND AND SIZE PER ENGINEER'S DIRECTION.



SAMPLE LEGEND





GENERAL NOTES

- SIGN FIXTURE AND PANELS SHALL WITHSTAND 90 MPH WIND LOADING, WITH STRUCTURAL REQUIREMENTS MEETING AASHTO "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS," LATEST EDITION. HOUSING SHALL BE CONSTRUCTED OF ALUMINUM UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- NEOPRENE GASKETS SHALL BE INSTALLED BETWEEN THE SIGN PANEL AND FIXTURE HOUSING TO PREVENT WATER ENTRANCE. SCREENED WEEP HOLES SHALL BE PROVIDED ON HOUSING BOTTOM FOR DRAINAGE.
- BLANKOUT REGULATORY/WARNING SIGNS SHALL BE MOUNTED WITH ASTROTYPE MOUNTING BRACKETS. SEE "SIGNAL HEADS AND MOUNTING GENERAL WIRING NOTES" SHEET FOR FURTHER DETAIL.
- BLANKOUT SIGN SHALL BE WIRED AS SPECIFIED IN THE PLANS.

<u>NOTES</u>

LIGHT SOURCE SHALL BE LIGENGINEER. SIGN FACE SHALL IGHT-EMITTING DIDDE (LED). PER DIRECTION OF LE COMPLETELY DARK WHEN NOT ENERGIZED.

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- LED'S SHOULD BE WIRED TO ISOLATE LED FAILURES OR A OPERATE NORMALLY. LIGHT SOURCE SHALL BE READILY ACCESSIBLE THROUGH HINGED DOORS OR SLIDING PANELS.
- HOUSING COLOR PER DIRECTION OF THE ENGINEER.

Issued: <u>6/15/2022</u> Revised: Oct 14, 2025

SI.19

Standard Drawing No.

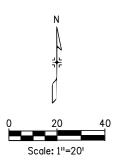
BLANK-OUT REGULATORY/WARNING SIGN

CITY OF CASTLE PINES STANDARD SIGNAL DETAILS



APPROVED BY THE CITY OF CASTLE PINES Vimmo

Larry Nimmo 0 0 0 Director of Public Works DATE Oct 15, 2025



SIGNAL PHASING

() IS MAIN PHASE

IF MAIN PHASE IS NORTHBOUND

Q 1 S/B LEFT TURN

ℚ 2 N/B THROUGH

Ŋ 3 W/B LEFT TURN

Q 4 E/B THROUGH

Ø 5 N/B LEFT TURN

0 6 S∕B THROUGH

Q 7 E/B LEFT TURN ù 8 W∕B THROUGH

IF MAIN PHASE IS EASTBOUND

Q 1 W/B LEFT TURN

Q 2 E/B THROUGH

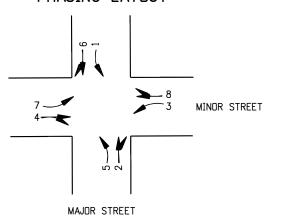
Q 3 N/B LEFT TURN

Q 4 S/B THROUGH

Ø 5 E/B LEFT TURN 0 6 W/B THROUGH

Q 7 S/B LEFT TURN 0 8 N/B THROUGH

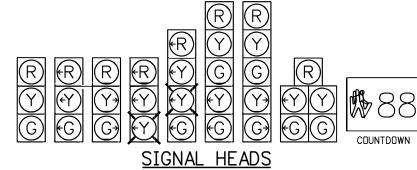
PHASING LAYOUT



NOTES

- 1. ALL VEHICLE SIGNAL HEADS SHALL BE POLYCARBONATE WITH 12" SECTIONS AND TUNNEL VISORS.
- ALL VEHICLE AND PEDESTRIAN SIGNAL HEADS SHALL BE 3. BLACK IN COLOR.

BACKPLATES WHERE INDICATED SHALL BE LOUVERED TYPE, WITH 2" DIAMOND GRADE FLUORESCENT YELLOW RETROREFLECTIVE TAPE BORDER.



CITY OF CASTLE PINES SIGNALIZED INTERSECTION STANDARD WIRING

MAIN STREET	CONDUCTOR COLOR	CONDUCTOR #
MAIN STREET GREEN BALL	GREEN	4
MAIN STREET YELLOW BALL	DRANGE	5
MAIN STREET RED BALL	RED	3
MAIN STREET LT GREEN ARROW	BLUE	6
MAIN STREET LT YELLOW ARROW	BLACK	1
MAIN STREET FLASHING YELLOW ARROW	ORANGE/GREEN	21
MAIN STREET LT RED ARROW	RED/GREEN	20
MAIN CIRET WALK	ODEEN AWATE	
MAIN STREET WALK	GREEN/WHITE	14
MAIN STREET DON'T WALK	RED/WHITE	13
SIDE STREET		
SIDE STREET GREEN BALL	GREEN/BLACK	9
SIDE STREET YELLOW BALL	ORANGE/BLACK	10
SIDE STREET RED BALL	RED/BLACK	8
SIDE STREET LT GREEN ARROW	BLUE/RED	19
SIDE STREET LT GREEN ARROW	ORANGE/RED	18
SIDE STREET ET TELLUW ARROW SIDE STREET FLASHING YELLOW ARROW	BLACK/RED	16
SIDE STREET FLASHING FELLOW ARROW	RED (2)	24
SIDE STREET ET RED ARROW	NLD (Z)	<u> </u>
SIDE STREET WALK	BLUE/WHITE	15
SIDE STREET DON'T WALK	BLACK/WHITE	12
RIGHT TURN		
RIGHT TURN OL GREEN ARROW	BLUE/BLACK	11
RIGHT TURN OL YELLOW BALL	BLACK (2)	22
AC-RETURN	\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	
AC-RETURN	WHITE	2
AC-RETURN	WHITE (2)	23
SPARE		
SPARE	WHITE/BLACK	7
SPARE	WHITE/RED	17
SPARE	GREEN (2)	25

INTERSECTION APPROACH HAND HOLE AND PULLBOX

TAPE	COLOR	
RED		NORTH
DRANGE		EAST
GREEN		SOUTH
BLUE		WEST
WHITE		LEFT TURN
YELLOW		PED INDICATION
YELLOW	YELLOW	PED PUSH BUTTON
BROWN		RIGHT TURN
PURPLE		SPARE

Type text here

LEGEND

LEGEND	
0	TRAFFIC SIGNAL POLE
•	SPAN WIRE POLE
0	MAST ARM AND POLE
-	TRAFFIC SIGNAL FACE
+	TRAFFIC SIGNAL FACE WITH BACKPLATE
+	TRAFFIC SIGNAL FACE FOR TURNING MOVEMENT
'	PEDESTRIAN SIGNAL FACE
\triangleright	PEDESTRIAN PUSH BUTTON & SIGN
$\bigcirc \hspace{-1em} -\hspace{-1em} \bigcirc$	LUMINAIRE
\bowtie	TRAFFIC SIGNAL CONTROLLER & CABINET
-\(\mathbb{O}, d\(\mathbb{S} \)	MAST ARM, POLE MOUNTED SIGN W/IDENTIFIER
→ ISN	ILLUMINATED STREET NAME SIGN
→ BOR	BLANK-OUT REGULATORY SIGN
— вож	BLANK-DUT WARNING SIGN
<u> </u>	METER PEDESTAL
	PULL BOX (TYPE I)
	PULL BOX (TYPE II)
	PULL BOX (TYPE III)
\otimes	PULL BOX (SPECIAL)
	30x48 VAULT
40'	LOOP DETECTOR (6'x40')
30'	LOOP DETECTOR (6'x30')
	LOOP DETECTOR (6'x6')
	CAMERA DETECTION
>	RADAR DETECTION
	MICRO LOOP DETECTOR W/ SAW CUT LEAD
	CONDUIT-SCHEDULE 80 PVC
•	OPTICOM DETECTOR
G SF-X	SCHOOL FLASHING BEACON (TYPE X)
b	
d WF	WARNING FLASHING BEACON
Q RF	REGULATORY FLASHING BEACON
-+++	RADIO ANTENNA
■.	TRAVEL TIME DEVICE
	PTZ CAMERA
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SIGNAL PHASING / STANDARD INTERSECTION WIRING / TYPICAL LEGEND

Revised: Standard Drawing No.

SI.20

6/15/2022