
CDOT
CO
COLORADO
Department of
Transportation
Inspecting Curb Ramps for Accessibility
http://codot.gov/business/civilrights/ada

Agenda

8:30	Program Overview
9:30	Break (15m)
9:45	Inspecting Curb Ramps for Accessibility
	Functional Accessibility
	M-Standards & Geometrics
10:45	Break (15m)
11:00	Intro to Survey123 App & Field Practice
12:00	Wrap Up

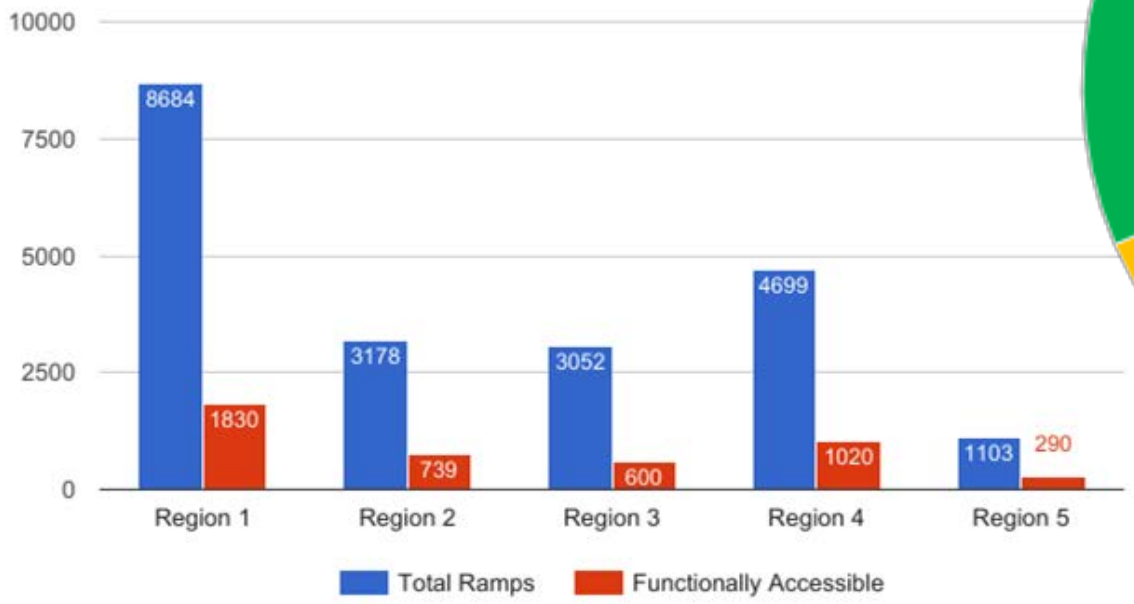
Curb Ramp
Program Overview

Statewide Curb Ramp Accessibility Program

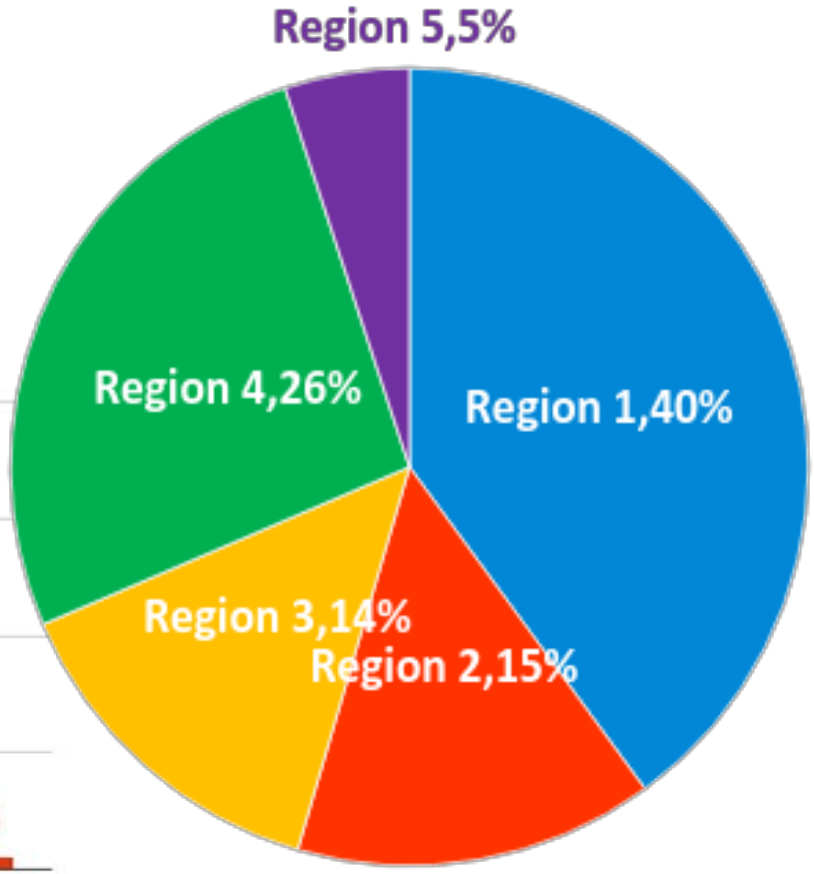
- Federal requirement - ADA
- Designing and inspecting to PROWAG standards
- CDOT taking aggressive statewide approach to becoming functionally accessible
- Prioritizing – ramps that are required but do not exist and those with running slope >12.5%

Regional Distribution

Functionally Accessible Curb Ramps by Region

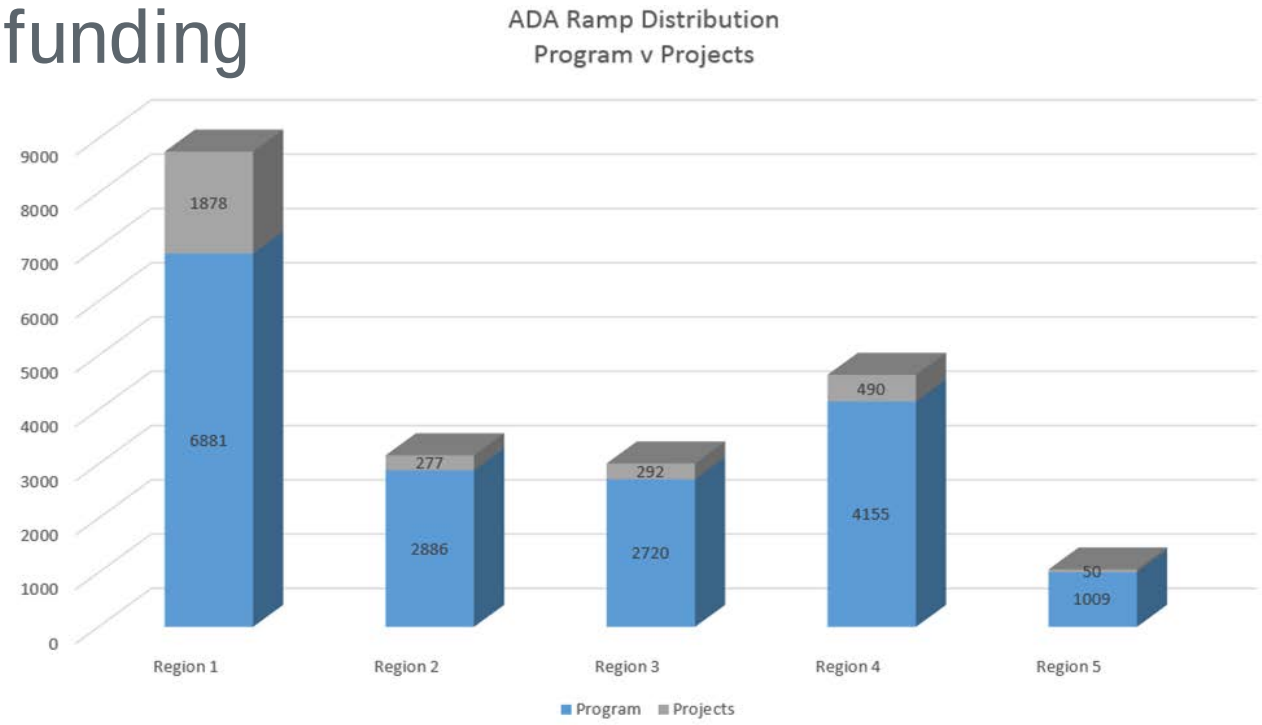


Curb Ramp Distribution by Region



Statewide Approach

- Upgrade curb ramps on all regular projects
- Program curb ramps
  - 5-year commitment
  - $85M in funding



Prioritization by Classification

Tier 1: Required but not existing, or running slope exceeds 12.5%

Red (Urban)	
Orange (Rural)	

Tier 2: Running slopes between 9% and 12.5%

Green (Urban)	
Turquoise (Rural)	

Tier 2: Running slopes between 5% and 9% with no turning space, or no turning space data is reported

Magenta (Urban)	
Yellow (Rural)	

Tier 3: Running slope between 8.33% and 9%, and all others

Grey (Urban, Rural)	Ramp exists, running slope between 8.33 and 9%
White (Urban, Rural)	Not categorized

Region Prioritization Plans

- Regional approach for next 18 months
- Compliance goals (by tier, with anticipated timeframe and budget)
- Plan to address Emerging Small Business restricted projects requirement
- RTDs and Chief Engineer approved plans & funds were transferred to each Region

Region 1 Prioritization Plan

Approach

- Begin advertising projects Spring ’17 - within CDOT or public ROW and no historic or environmental clearance concerns
- Obtain ROW and historic and environmental clearances for locations where likely to cause delays
- Investigate partnering with local agencies to leverage their program

Goals

- At least one project under construction during FY17 replacing 350+ ramps
- At least one ESB project under construction during FY17 replacing 25-30 ramps
- Address ROW and historical clearances for the remaining 572 ramps in the red and orange categories, define projects, and prepare PS&E packages
- Begin clearance process for 2,600+ ramps in subsequent categories so they are shelf ready as funding becomes available

Region 2 Prioritization Plan

Approach

- Develop a scope of work to include Survey and Survey Title Verification, General Engineering, ROW Plan Development, Post-Design Construction Services, etc.
- Select a Program Management Consultant Engineer
- Develop risk-based, programmatic approach to obtaining environmental clearances
- Establish “Early Out” projects with minimal clearance concerns to be ready for advertisement in Spring ‘18

Goals

- At least one project under construction during FY18 replacing 100+ ramps
- At least one ESB project under construction during FY18 replacing 25-50 ramps
- Address ROW, historic, and environmental clearances for the remaining 500+ Tier I ramps, define projects, and prepare PS&E packages
- Begin clearance process for 2,800+ ramps in the subsequent categories so they are shelf ready as funding becomes available

Region 3 Prioritization Plan

Approach

- Develop a scope of work to include Survey and Survey Title Verification, General Engineering, ROW Plan Development, Post-Design Construction Services, etc.
- Select a Program Management Consultant Engineer
- Develop risk-based, programmatic approach to obtaining environmental clearances
- Establish “Early Out” projects with minimal clearance concerns to be ready for advertisement in Spring ‘18

Goals

- Address highest-value ramps first
- Learn and incorporate project development and construction efficiencies

Region 4 Prioritization Plan

Approach

- Develop a scope of work and advertise for a Program Management Consultant Engineer and engineering services
- Develop programmatic processes, pre-scoping activities, scoping, ROW plans, ramp designs, utility coordination, environmental services and design support services for construction
- Coordinate with Survey and ROW region personnel as well as NPS consultants for Survey and ROW acquisition

Goals

- Begin pre-construction activities for ramps in Tiers I and II in 9 key urban areas during FY17 and FY18
- Up to 3 small (approx. $300k) projects ready for advertisement by June ‘18

Region 5 Prioritization Plan

Approach

- Concentrate efforts in: survey, ROW acquisition, design, and construction for Tier I and Tier II / Category Green ramps in 5 key urban areas
- Combine ramps with no ROW concerns into Design Build projects; combine ramps with ROW acquisition concerns into Design Bid Build projects
- Solicit local agencies for interest in partnering on projects

Goals

- At least two ESB projects under construction in FY18
- 4 projects under construction in FY17 addressing 67 ramps
- 2 projects under construction in FY18 addressing 42 ramps
- 5 DB and DBB packages in FY19 addressing 252 ramps
- Local agency projects as feasible

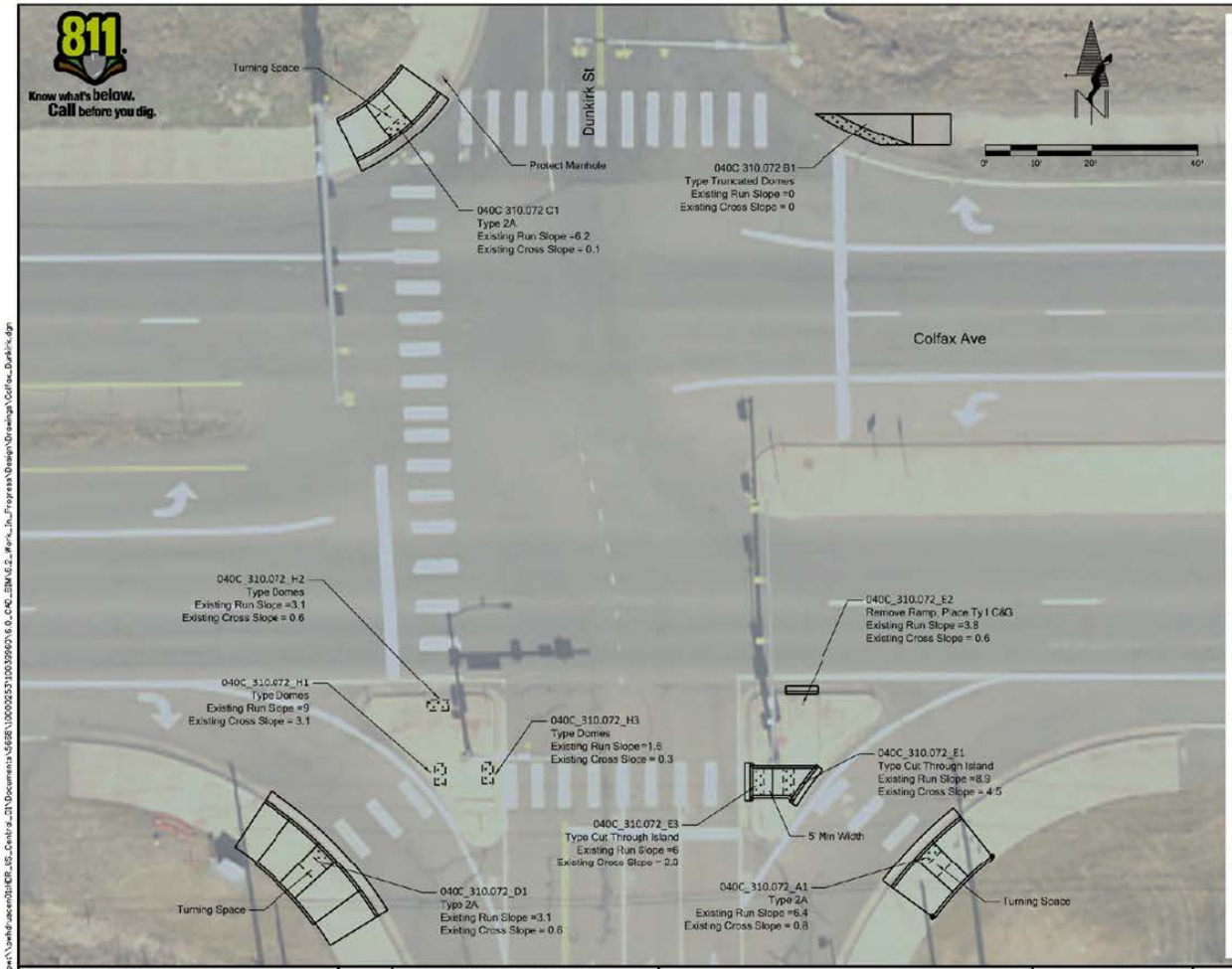
Streamlined Clearance Processes

- Right-of-Way process for ramps not in CDOT ROW
  - Follows the Uniform Act but does not require survey
  - Allows sketches for ROW plans
  - Uses expedited acquisition innovations

- Historical Clearance for ramps within CDOT's ROW
  - Programmatic Agreement between FHWA, the Advisory Council on Historic Preservation, and Colorado State Historic Preservation Officer
  - Minor highway improvement projects with no impact to historical property
  - Categorical Exclusion

Construction Data Sheet

- Ramps within CDOT ROW or requiring temporary easements
- No or minimal historic impact



040C_309.380_C1

Bid Item	tem Description	Quantity	Unit
202-00220	Removal of Asphalt Mat	16	SY
403-00720	Hot Mix Asphalt (Patching)(Asphalt)	1.3	Ton
608-00000	Concrete Sidewalk	13	SY
608-00015	Detectable Warnings	29	SF

040C_310.072_D1

Bid Item	tem Description	Quantity	Unit
202-00200	Removal of Sidewalk	12	SY
202-00203	Removal of Curb and Gutter	12	LF
202-00206	Removal of Concrete Curb Ramp	25	SY
202-00220	Removal of Asphalt Mat	7	SY
403-00720	Hot Mix Asphalt (Patching)(Asphalt)	3	Ton
608-00000	Concrete Sidewalk	12	SY
608-00010	Concrete Curb Ramp	25	SY
608-00015	Detectable Warnings	0	SF
609-21010	Curb and Gutter Type 2 (Section I-B)	0	LF
609-21020	Curb and Gutter Type 2 (Section II-B)	12	LF

040C_310.072_H2

Bid Item	tem Description	Quantity	Unit
608-00015	Detectable Warnings	8	SF

040C_310.072_H1

Bid Item	tem Description	Quantity	Unit
608-00015	Detectable Warnings	8	SF

040C_310.072_H1

Bid Item	tem Description	Quantity	Unit
608-00015	Detectable Warnings	8	SF

040C_310.072_A1

Bid Item	tem Description	Quantity	Unit
202-00206	Removal of Concrete Curb Ramp	23	SY
202-00220	Removal of Asphalt Mat	4	SY
403-00720	Hot Mix Asphalt (Patching)(Asphalt)	1.8	Ton
608-00010	Concrete Curb Ramp	23	SY

040C_310.072_E3

Bid Item	tem Description	Quantity	Unit
202-00206	Removal of Concrete Curb Ramp	4	SY
202-00220	Removal of Asphalt Mat	1.6	SY
403-00720	Hot Mix Asphalt (Patching)(Asphalt)	0.7	Ton
608-00010	Concrete Curb Ramp	4	SY

040C_310.072_E2

Bid Item	tem Description	Quantity	Unit
202-00206	Removal of Concrete Curb Ramp	8	SY
202-00220	Removal of Asphalt Mat	1.3	SY
403-00720	Hot Mix Asphalt (Patching)(Asphalt)	0.6	Ton
608-00000	Concrete Sidewalk	7	SY
609-21020	Curb and Gutter Type 2 (Section II-B)	6	LF

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Bid Item	tem Description	Quantity	Unit
202-00206	Removal of Concrete Curb Ramp	5	SY
202-00220	Removal of Asphalt Mat	1.8	SY
403-00720	Hot Mix Asphalt (Patching)(Asphalt)	0.8	Ton
608-00010	Concrete Curb Ramp	5	SY

Print Date: 6/8/2017
File Name: Colfax...Dunkirk.dgn
Horiz. Scale: 1:20 Vert. Scale: As Noted

HDR 1670 BROADWAY, SUITE 3400 DENVER, COLORADO 80202 Phone: 303-764-1520 FAX: 303-860-7139

Sheet Revisions

Date:	Comments	Init.

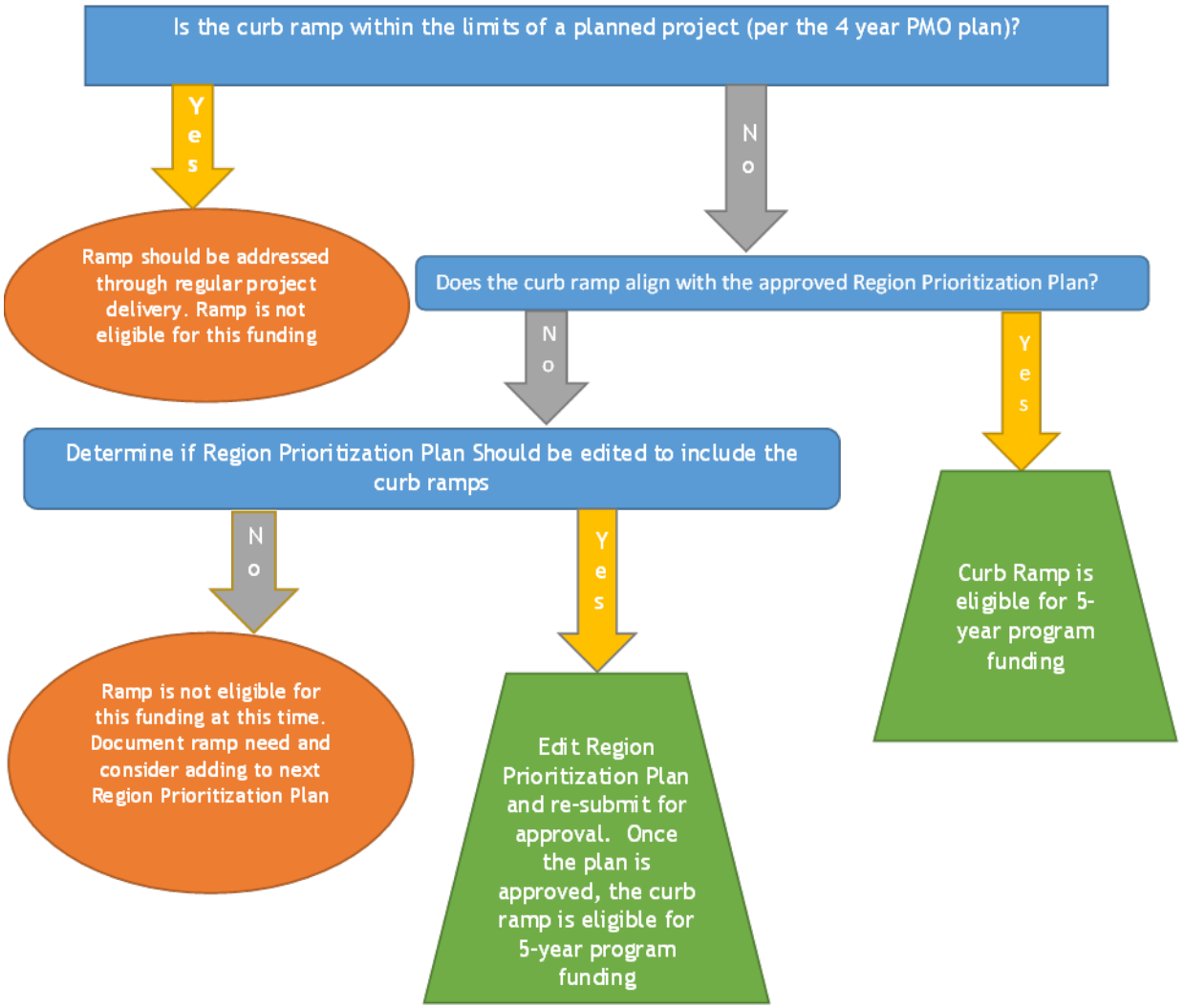
Colorado Department of Transportation
2000 South Holly Street
Denver, CO 80222
Phone: 303-757-9511 FAX: 303-757-9907
Region 1 JV

As Constructed
No Revisions:
Revised:
Void:

REGION 1
ESB RAMPS
Designer:
Detailer:
Sheet Subset:
Structure Numbers
Subset Sheets: of

Project No./Code
C R100-286
22014
Sheet Number

Funding Eligibility & Approval



Changes to CDOT Processes

- More Rigorous Inspections
    - Accountability for functional accessibility
- New Reporting and Data Management
    - Survey123 for ArcGIS linked to statewide inventory database
- New CDOT Documentation Process
    - Design Exception Variance Request (Form 464) and Curb Ramp Variance Support Document

COLORADO
Department of Transportation
Office of the Chief Engineer

ADA Curb Ramp Variance Support Document

CDOT recognizes that it is not always possible for altered elements, spaces, or facilities to fully comply with new construction requirements because of existing physical constraints. Where existing physical constraints make it impracticable for altered elements, spaces, or facilities to fully comply with the requirements for new construction, compliance is required to the extent practicable within the scope of the project. Existing physical constraints include, but are not limited to, underlying terrain, right-of way availability, underground structures, adjacent developed facilities, drainage, or the presence of a notable natural or historic feature. The proposed guidelines (PROWAG) permit flexibility in alterations to existing facilities where needed.

Date	*Project (P) #*	*Roadway Names* Include prefix and suffix	
		Primary	Secondary
City	*Subaccount #*	*Specific Curb Ramp Position ID* See Page 5	
		☐ A1 ☐ A2 ☐ A3 ☐ E1 ☐ E2 ☐ E3 ☐ B1 ☐ B2 ☐ B3 ☐ F1 ☐ F2 ☐ F3 ☐ C1 ☐ C2 ☐ C3 ☐ G1 ☐ G2 ☐ G3 ☐ D1 ☐ D2 ☐ D3 ☐ H1 ☐ H2 ☐ H3 ☐ I ☐ J ☐ K ☐ L ☐ More than one curb ramp - See attached list	

EXCEPTIONS			
	CURB RAMP MEASUREMENTS	*SLOPES*	*MEASUREMENTS*
		☐ Running Slope ☐ Cross Slope	☐ Width ☐ Length
	CURB RAMP NON-INSTALLATION OR REMOVAL	☐ Not Installed	☐ Removal of Existing
		JUSTIFICATION	
		☐ Engineering decision based on existing area and coordination with LPA (documentation required) ☐ No existing pedestrian facilities (sidewalk, transit stops, pedestrian signals) exist at this time ☐ Not encouraging pedestrians in this area at this time ☐ Reduction of possible pedestrian/vehicle conflict points	
	TURNING SPACE	*SLOPES*	*MEASUREMENTS*
		☐ Running Slope	☐ Width

https://www.codot.gov/business/civilrights/ada/documents

Roles and Responsibilities

Design Engineer	Project Engineer/ Project Manager	Inspector	CRBRC Data Manager
• Complete data tables/sheets and plan sets • For new ramps: add new record to the database • For existing ramps: confirm or edit record in database, if needed	• Review plans for site compatibility • Complete Form 464 and Curb Ramp Variance Support Document, if necessary • Review and approve inspection measurements	• Measure constructed curb ramp • Enter data into Survey123 • Communicate with PE/PM about non-compliant measurements	• QA/QC and commit to the database

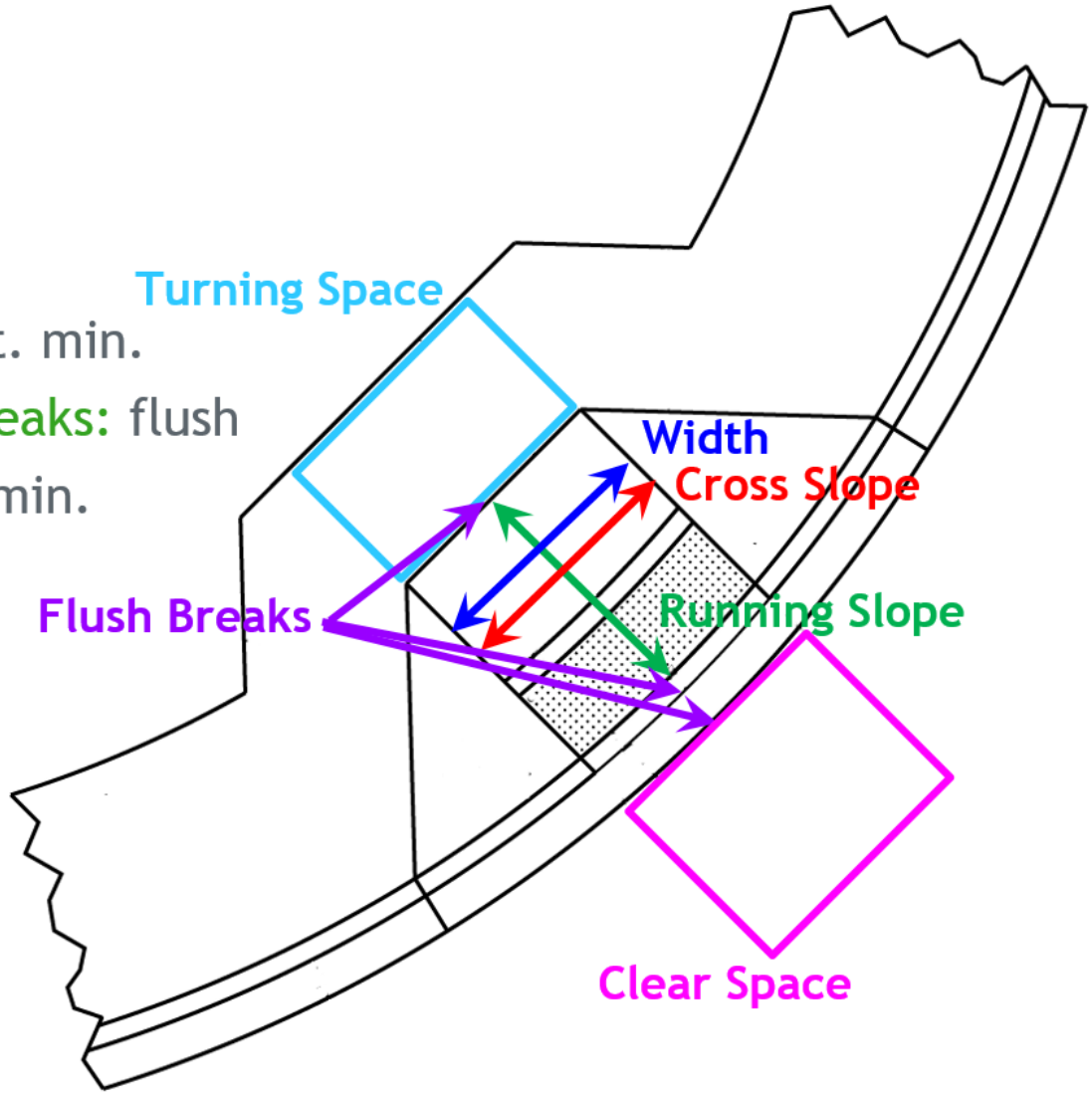
Quality Assurance

- PE/PM reviews measurements
  - Works with Contractor to resolve issues
  - Add Form 464 Design Variance and Curb Ramp Variance Support Document if necessary
- CRBRC reviews non-compliant measurements that *don't* have a Design Variance and Support Document

Inspecting Curb Ramps for Accessibility

Functional Accessibility

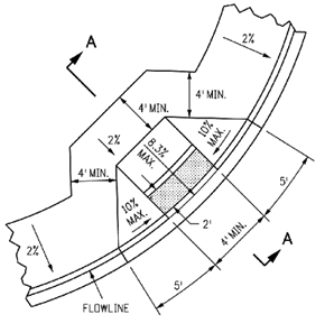
- Running Slope: 8.3% max.
- Cross Slope: 2% max.
- Width: 4 ft. min.
- Turning Space: 4 ft. x 4 ft. min.
- Ramp joints and grade breaks: flush
- Clear Space: 4 ft. x 4 ft. min.
  (diagonal ramps)



Design Variances

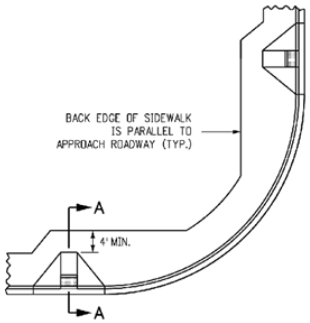
- PROWAG requires building to the maximum extent practicable
  - For new construction, designs should make every effort to meet M-Standards
  - Alterations often have more constraints; this is where we the Design Variance is meant to be used
- Forms are completed/signed by the PE/PM
- Inspectors should alert PE/PM if they notice a curb ramp needs a Design Variance but does not have one

Curb Ramp M Standards (M-608-1)

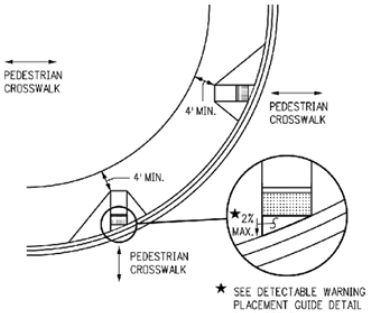


CURB RAMP TYPE 1A

SEE NOTE 9.



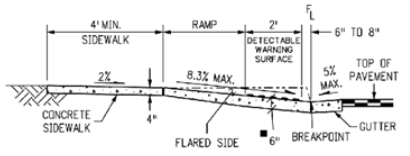
CURB RAMP TYPE 1B



★ SEE DETECTABLE WARNING PLACEMENT GUIDE DETAIL ON SHEET 7.

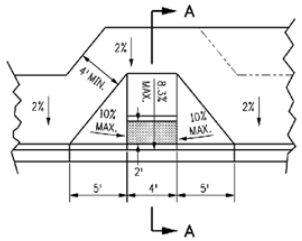
CURB RAMP TYPE 1B MODIFIED

NOTE: GRADE BREAKS SHALL NOT BE PERMITTED IN RAMPS, TURNING SPACES, AND SURFACE SLOPES.



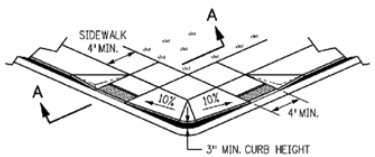
SECTION A-A

■ INCREASES TO 8" FOR BRICK PAVERS.

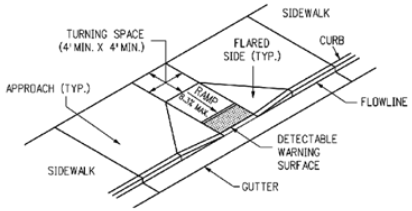


CURB RAMP TYPE 1B DETAIL

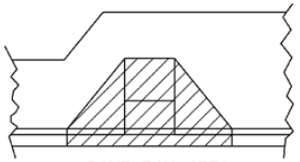
MAY BE USED IN MID-BLOCK.



CURB RAMP TYPE 1B OR 3B REDUCED CURB HEIGHT

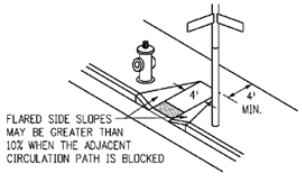


ISOMETRIC VIEW



RAMP PAY AREA

FOR CURB RAMPS TYPES 1A AND 1B.



FLARED SIDE SLOPES MAY BE GREATER THAN 10% WHEN THE ADJACENT CIRCULATION PATH IS BLOCKED

STEEP FLARED SIDE SLOPES

SEE NOTE 15.

GENERAL NOTES

1. THE DETECTABLE WARNINGS SHALL BE INSTALLED AT SIDEWALK TO STREET TRANSITIONS. THEY SHALL HAVE A TRUNCATED DOME SURFACE. THE DOMES SHALL BE IN A SQUARE GRID PATTERN AND ALIGNED WITH PEDESTRIAN TRAFFIC.
2. ALL DETECTABLE WARNING SURFACES SHALL START A MINIMUM OF 6 INCHES FROM THE FLOWLINE OF THE CURB AND NOT BE MORE THAN A MAXIMUM OF 8 INCHES FROM ANY POINT ON THE FLOWLINE OF THE CURB, WITH EXCEPTION FOR TYPES 1B MODIFIED AND 3B MODIFIED CURB RAMPS AS THIS DIMENSION MAY BE GREATER THAN 8 INCHES ON ONE SIDE OF THE RADIUS.
3. THE RAMP SLOPE AND DETECTABLE WARNING SURFACE SHALL BE 8.3% OR FLATTER.
4. TOLERANCE LIMITS ON THE RAMP RUNNING SLOPE AND FLARED SIDE SLOPES SHALL BE +0.5% MAXIMUM. THE DEPARTMENT WILL MEASURE THE SLOPES AND THOSE EXCEEDING THE MAXIMUM TOLERANCE WILL NOT BE ACCEPTED.
5. THE MINIMUM WIDTH FOR SIDEWALK IS 4 FEET.
6. DRAINAGE STRUCTURES, TRAFFIC SIGNAL EQUIPMENT, OR OTHER OBSTRUCTIONS SHALL NOT BE INSTALLED IN THE CURB RAMP OR TURNING SPACE AREAS.
7. CONSTRUCTION OF THE CONCRETE PEDESTRIAN CURB SHALL BE INCLUDED IN THE BID PRICE OF THE CONCRETE CURB RAMP.
8. IF THE PLACEMENT OF THE PEDESTRIAN PUSH BUTTON ASSEMBLY ON A TRAFFIC SIGNAL MAST POLE WILL NOT BE WITHIN EASY REACH (10 INCHES OR LESS AND UNOBSTRUCTED) OF ALL PEDESTRIANS (IN ACCORDANCE WITH THE AMERICANS WITH DISABILITIES ACT), THEN A SEPARATE PEDESTRIAN PUSH BUTTON POST ASSEMBLY (PPBPA) SHALL BE INSTALLED WITHIN ADA REACH RANGES. THE PPBPA SHALL MEET THE PROVISIONS FOUND IN "SECTION 4E.08 THROUGH 4E.13 – PEDESTRIAN DETECTORS" OF THE 2009 MUTCD MANUAL WITH REVISIONS 1 AND 2.
9. DIAGONAL CURB RAMPS (ON THE APEX) ARE NOT PREFERRED IN NEW CONSTRUCTION. A SINGLE DIAGONAL CURB RAMP (ON THE APEX) WILL ONLY BE PERMITTED DURING RECONSTRUCTION OR ALTERATION WHERE PHYSICAL OR SITE CONSTRAINTS PREVENT TWO CURB RAMPS FROM BEING INSTALLED. THE ENGINEER SHALL PROVIDE APPROVED JUSTIFICATION DOCUMENTATION (CDOT CURB RAMP DESIGN VARIANCE REQUEST FORM). ALL CURB RAMPS INSTALLED ON THE APEX MUST MEET THE STANDARDS AS DEFINED IN M-608-1.
10. CURB RAMPS (EXCLUDING FLARED SIDES OR BLENDED TRANSITIONS) SHALL BE WHOLLY CONTAINED WITHIN THE WIDTH OF THE CROSSWALK AND/OR THE PEDESTRIAN STREET CROSSING THEY SERVE.
11. ALL CURB RAMP JOINTS AND GRADE BREAKS SHALL BE FLUSH (0" +1/4"). THE JOINT BETWEEN THE ROADWAY SURFACE AND GUTTER PAN SHALL BE FLUSH.
12. THE CONTRACTOR SHALL VERIFY REMOVAL LIMITS ARE SUFFICIENT TO PROVIDE POSITIVE DRAINAGE, MAINTAIN EXISTING DRAINAGE PATTERNS, AND AVOID PONDING IN THE FINAL CONFIGURATION.
13. TO AVOID CHASING GRADE INDEFINITELY WHEN TRAVERSING THE HEIGHT OF CURB, THE RAMP LENGTH SHALL NOT EXCEED 15 FEET. ADJUST THE RAMP SLOPE AS NEEDED TO PROVIDE ACCESS TO THE MAXIMUM EXTENT TECHNICALLY FEASIBLE.
14. THE CHANGE IN GRADE AT THE BOTTOM OF THE CURB RAMP AND ADJOINING ROAD SURFACE SHALL NOT EXCEED AN ALGEBRAIC DIFFERENCE OF 13.33%. THE COUNTER SLOPE OF THE GUTTER OR ROAD AT THE FOOT OF A CURB RAMP, TURNING SPACE, OR BLENDED TRANSITION SHALL NOT EXCEED 5.0%
15. FLARED SIDE SLOPES MAY EXCEED 10% ONLY WHERE THEY ABUT A NON-WALKABLE SURFACE OR THE ADJACENT CIRCULATION PATH IS BLOCKED.
16. THE STANDARD TURNING SPACE IS 4 FEET BY 4 FEET. WHERE THE TURNING SPACE IS CONSTRAINED, THE TURNING SPACE SHALL BE 4 FEET MINIMUM BY 5 FEET MINIMUM. THE 5 FOOT DIMENSION SHALL BE PROVIDED IN THE DIRECTION OF THE RAMP RUN.

PERCENT SLOPE	1.0%	2.0%	5.0%	7.1%	8.3%	10.0%
EQUIVALENT SLOPE	100:1	50:1	20:1	14:1	12:1	10:1

SLOPE TABLE

Computer File Information		
Creation Date: 07/04/12	Initials: JBK	
Last Modification Date: 02/23/17	Initials: LTA	(R-X)
Full Path: www.coloradodot.info/business/designsupport		(R-X)
Drawing File Name: 6080101010.dgn		(R-X)
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English		(R-X)

Sheet Revisions	
Date:	Comments
02/23/17	Added and revised the Curb Ramp details and General Notes.

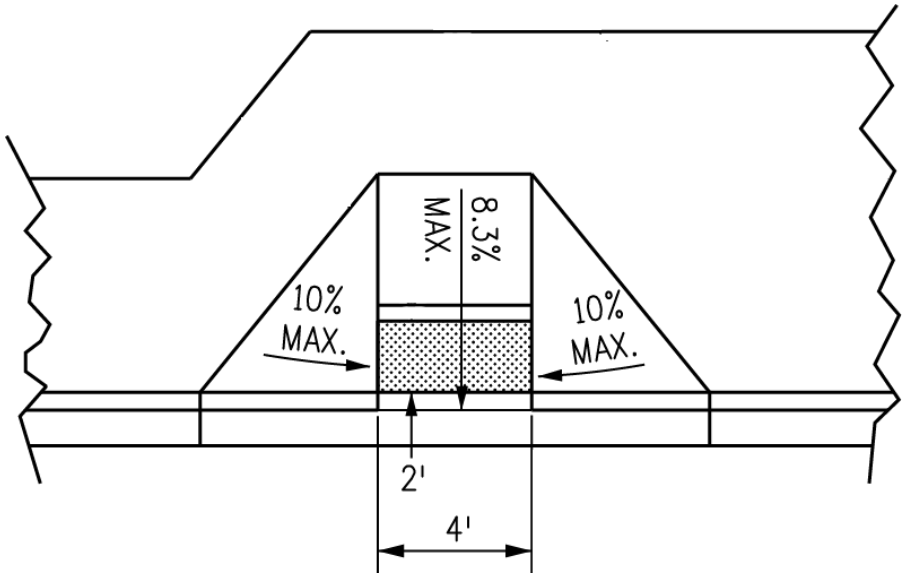
Colorado Department of Transportation
4201 East Arkansas Avenue
Denver, Colorado 80222
Phone: (303) 757-9021
Fax: (303) 757-9820
Project Development Branch JBK/LTA

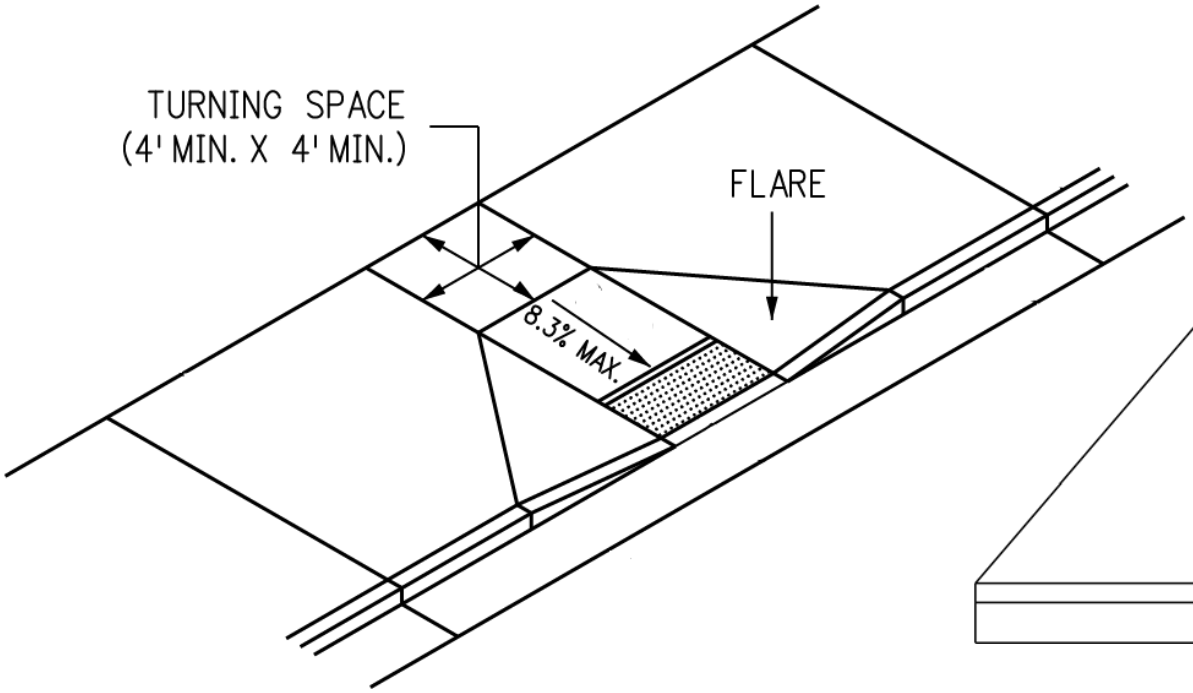
CURB RAMPS

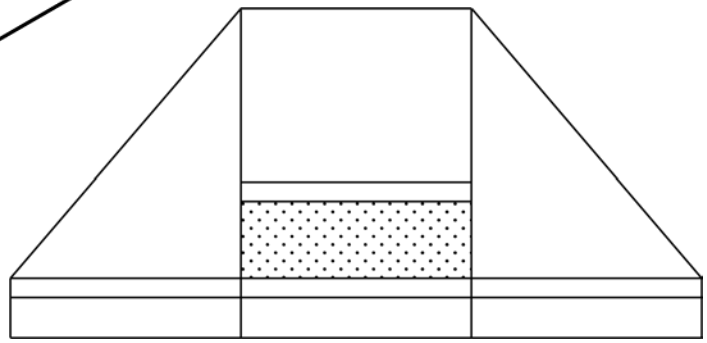
Issued By: Project Development Branch on July 4, 2012

STANDARD PLAN NO.
M-608-1
Sheet No. 1 of 10

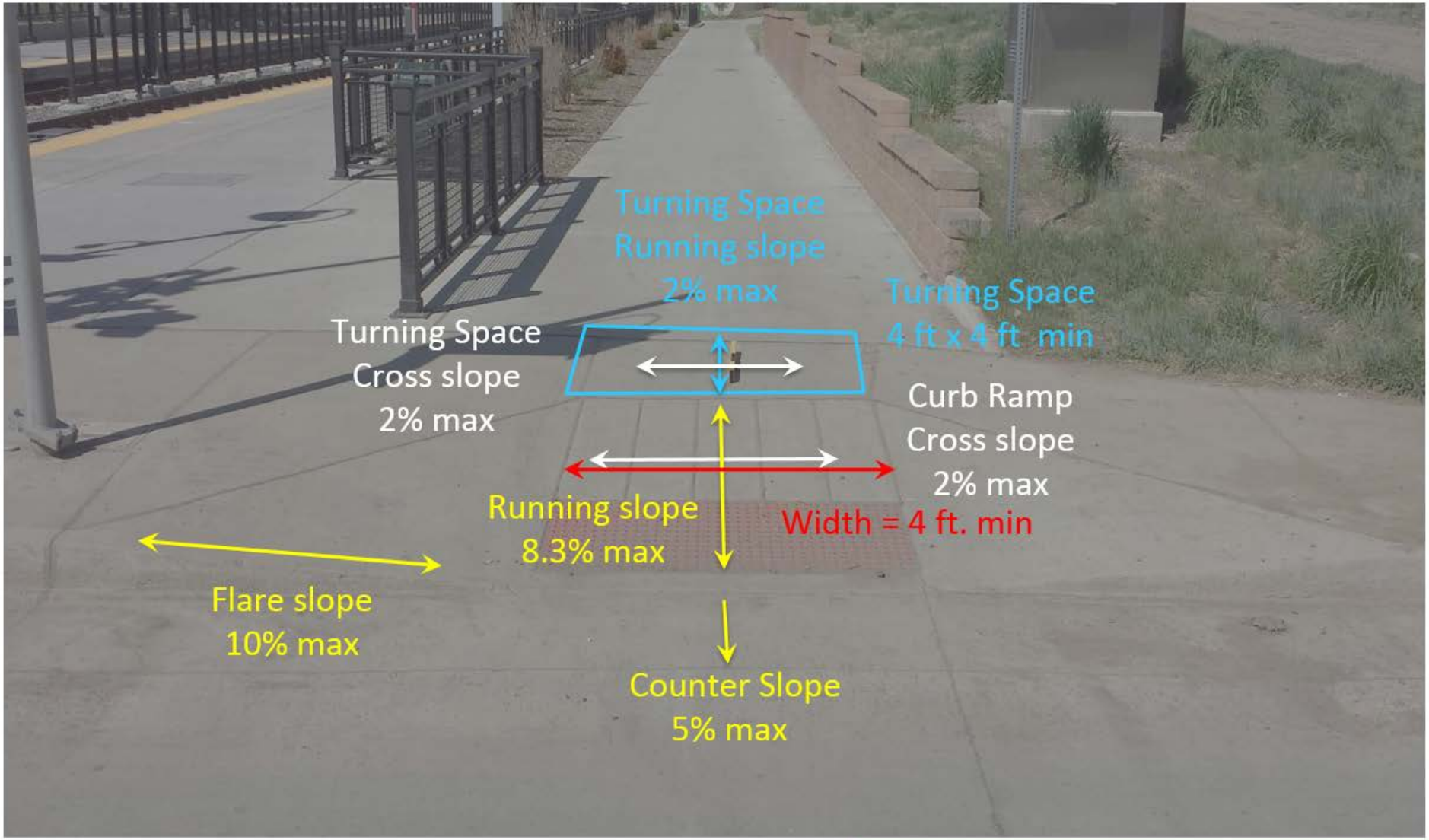
Type 1



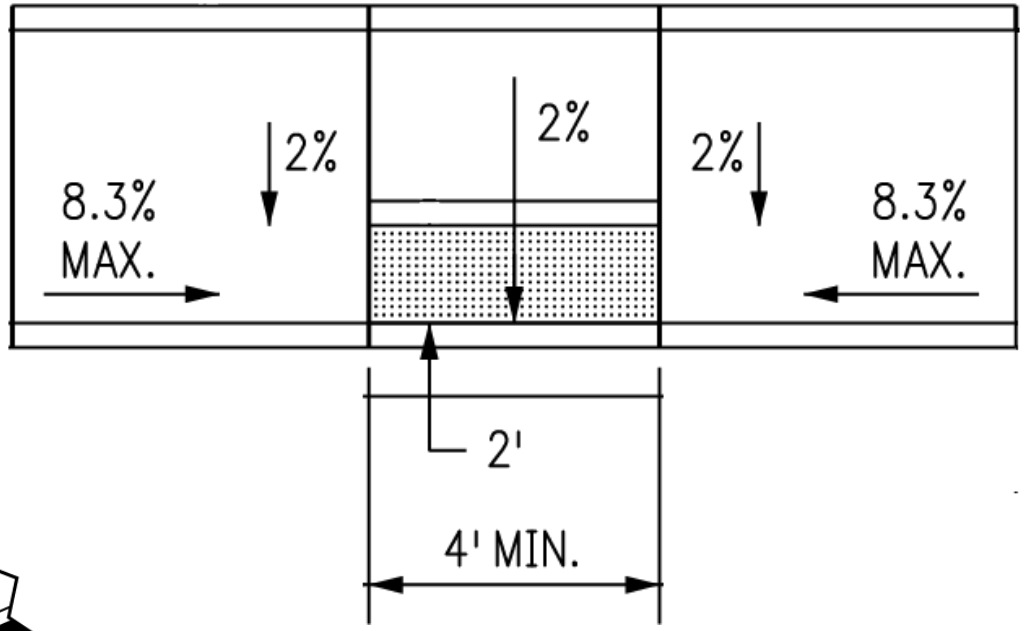


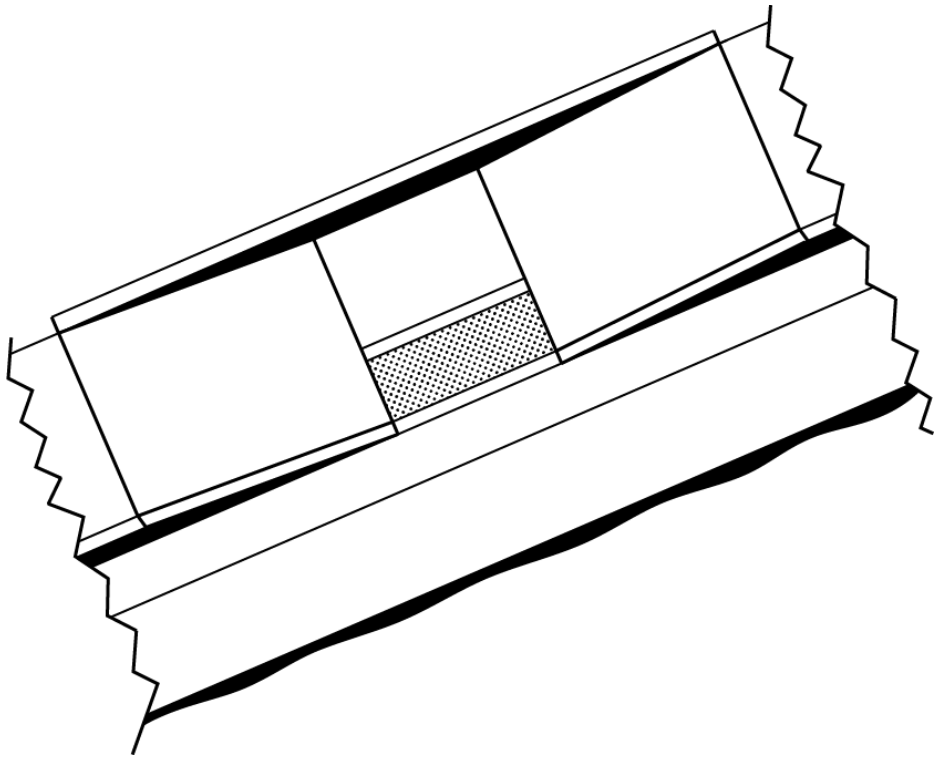


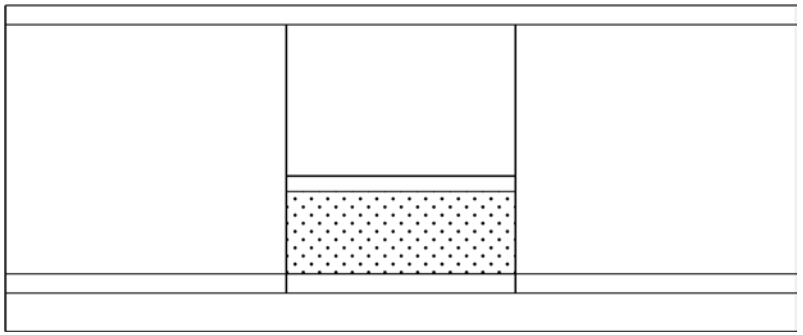
Type 1


Turning Space
Running slope
2% max
Turning Space
4 ft x 4 ft min
Turning Space
Cross slope
2% max
Curb Ramp
Cross slope
2% max
Running slope
8.3% max
Width = 4 ft. min
Flare slope
10% max
Counter Slope
5% max

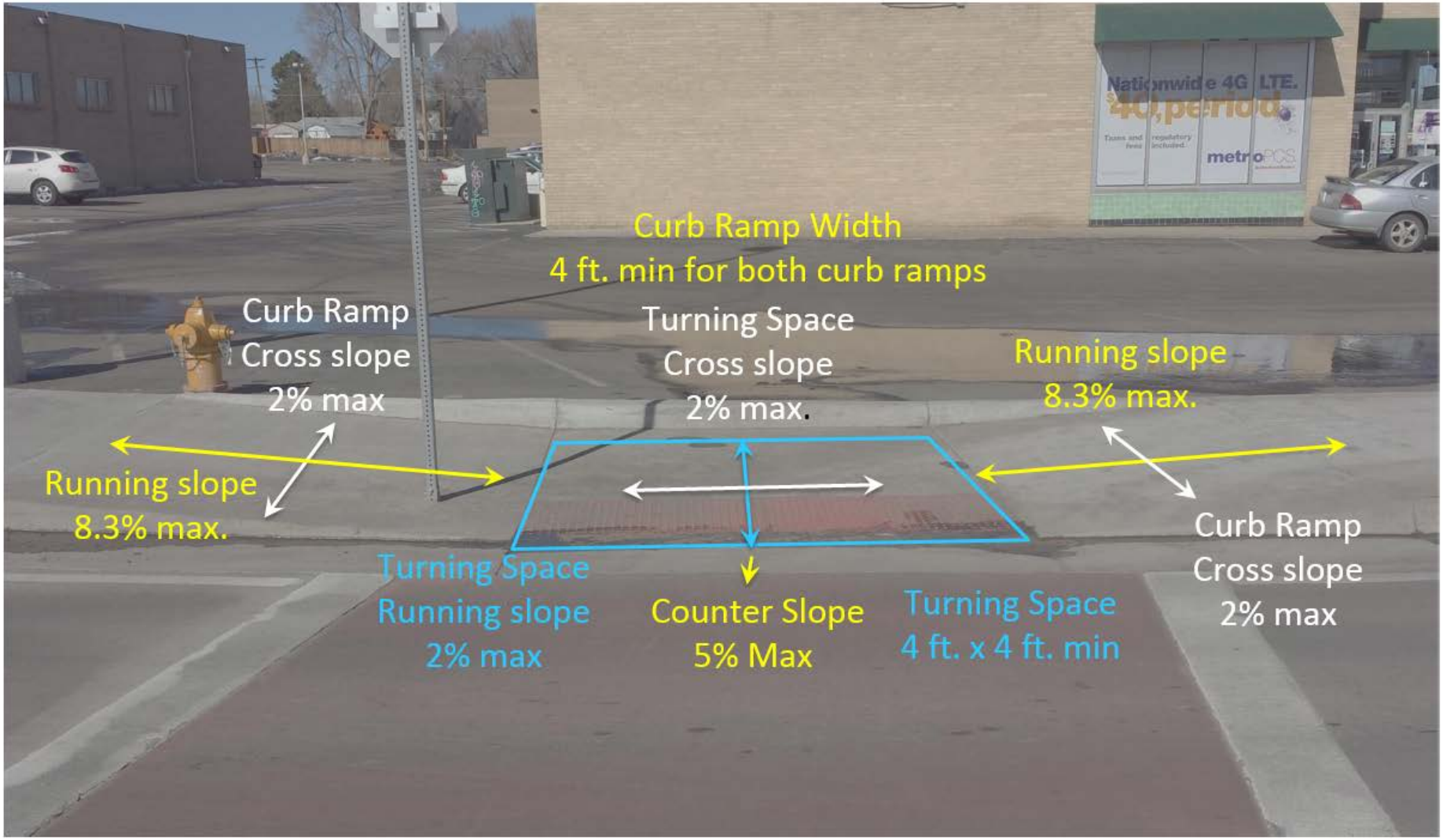
Type 2



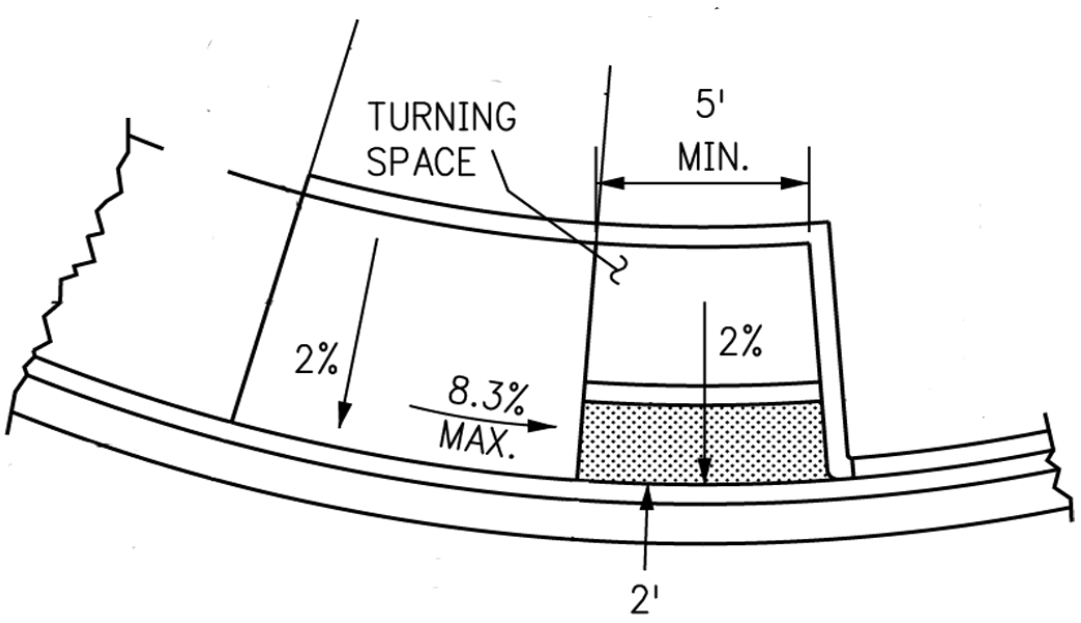


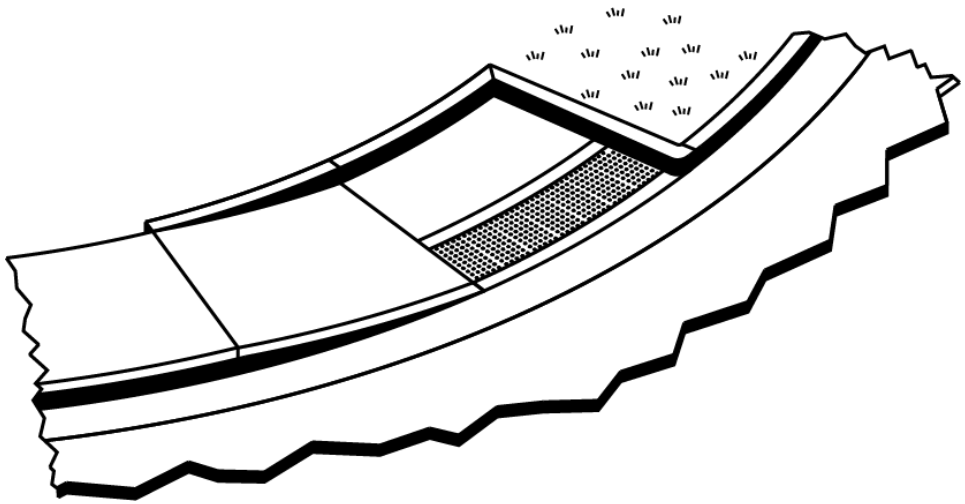


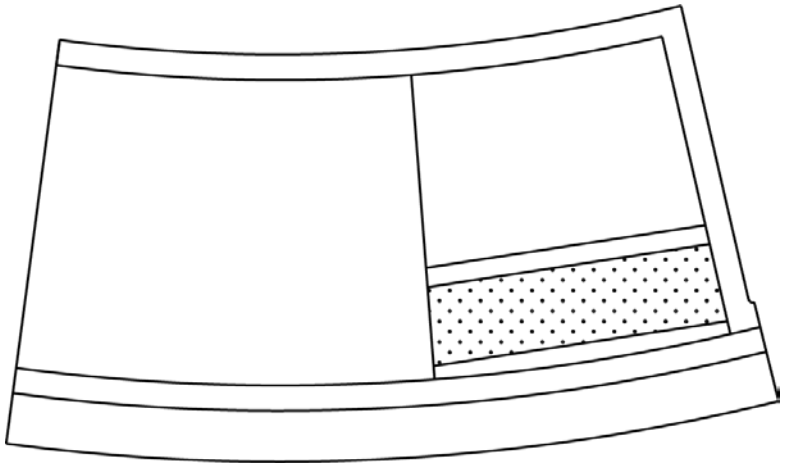
Type 2


Curb Ramp Width
4 ft. min for both curb ramps
Curb Ramp
Cross slope
2% max
Turning Space
Cross slope
2% max.
Running slope
8.3% max.
Running slope
8.3% max.
Curb Ramp
Cross slope
2% max
Turning Space
Running slope
2% max
Counter Slope
5% Max
Turning Space
4 ft. x 4 ft. min

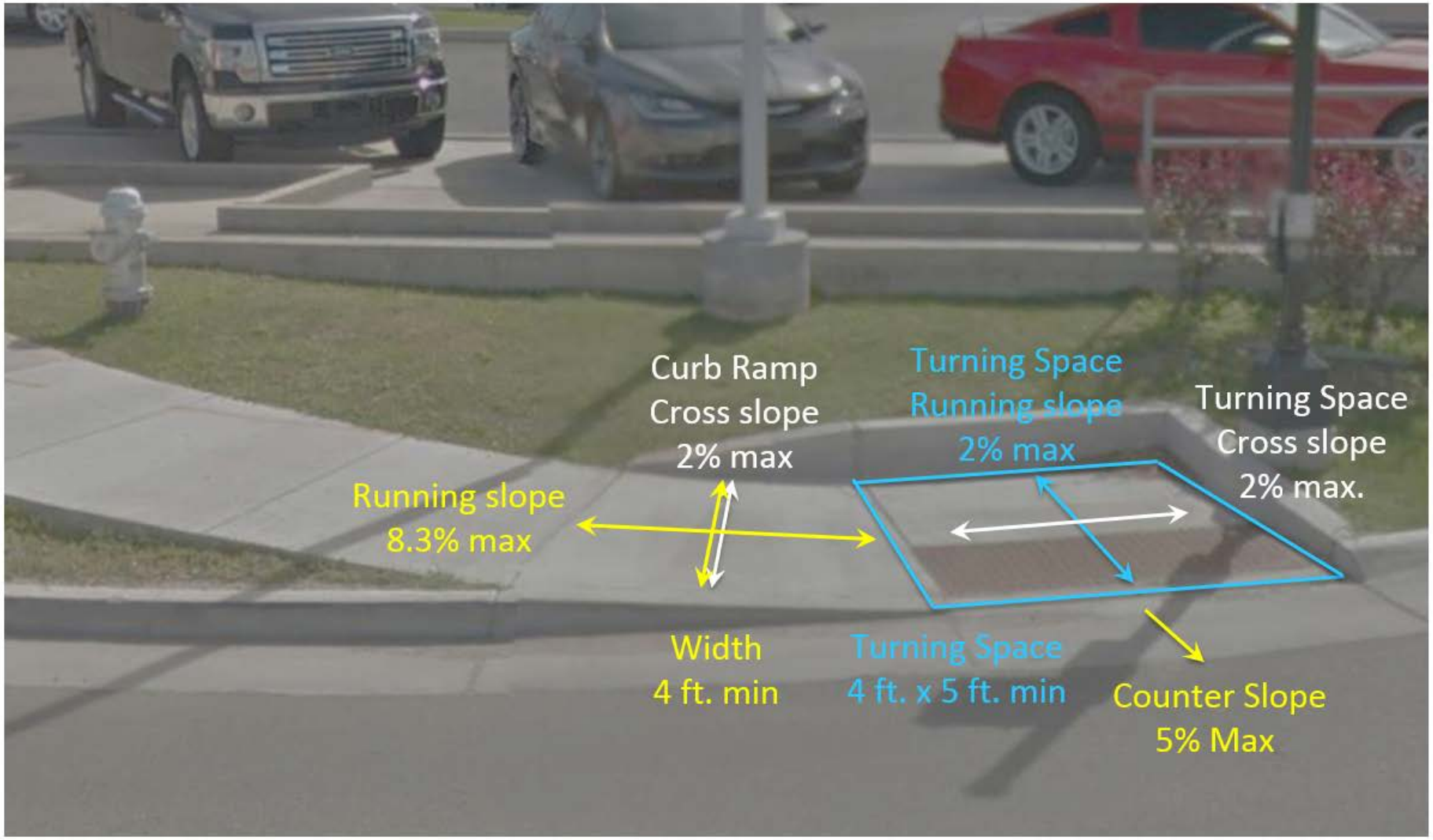
Type 2C



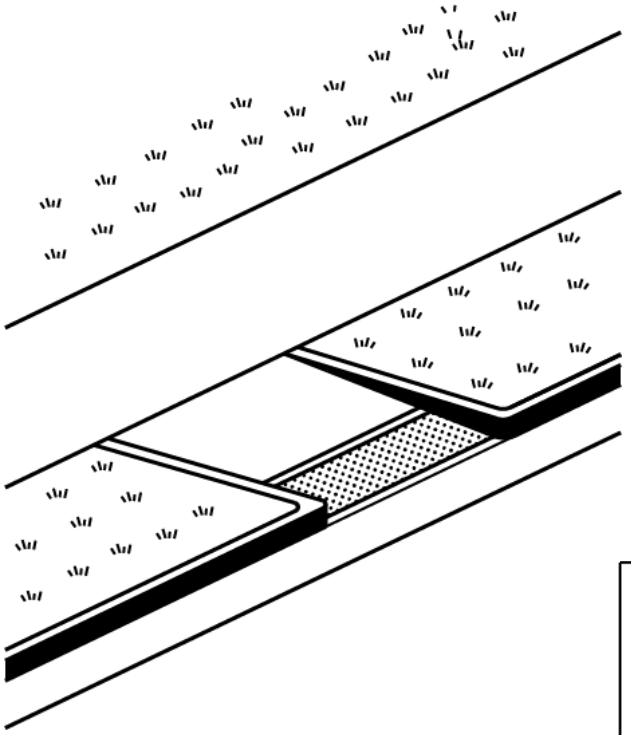


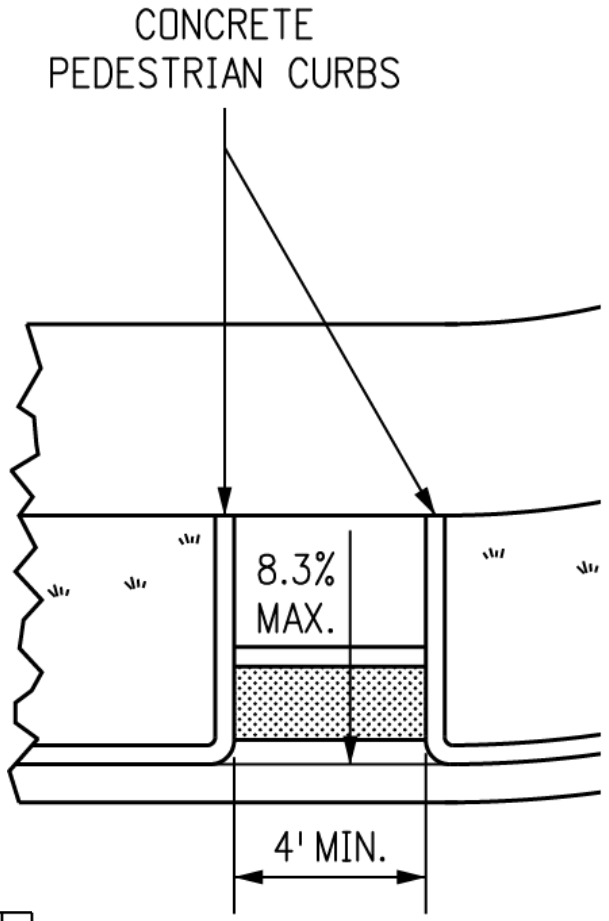


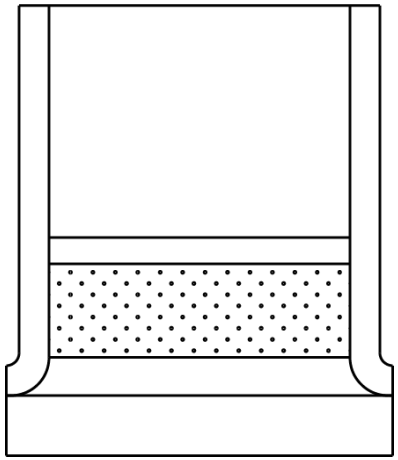
Type 2C


Curb Ramp
Cross slope
2% max
Turning Space
Running slope
2% max
Turning Space
Cross slope
2% max.
Running slope
8.3% max
Width
4 ft. min
Turning Space
4 ft. x 5 ft. min
Counter Slope
5% Max

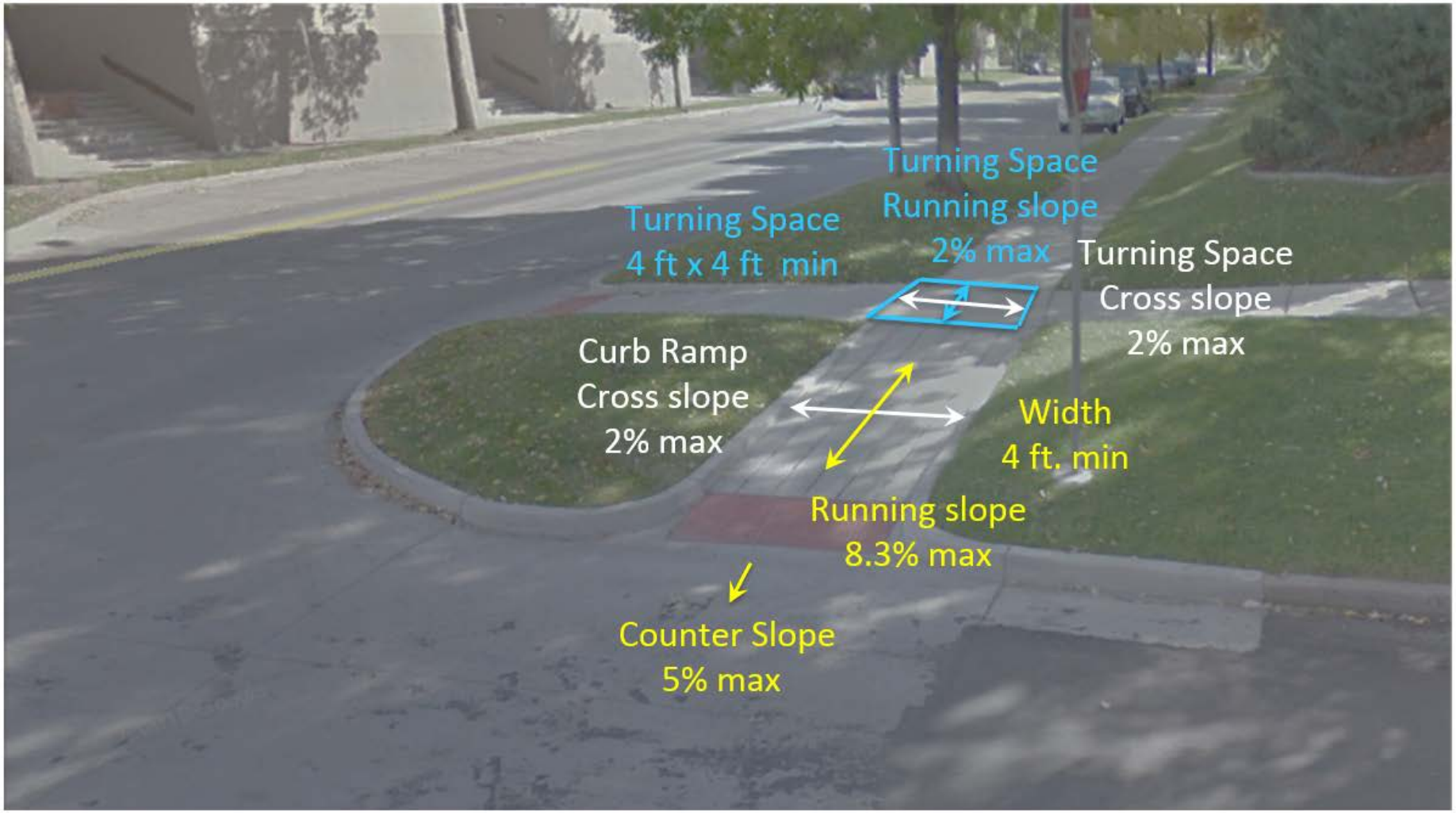
Type 3



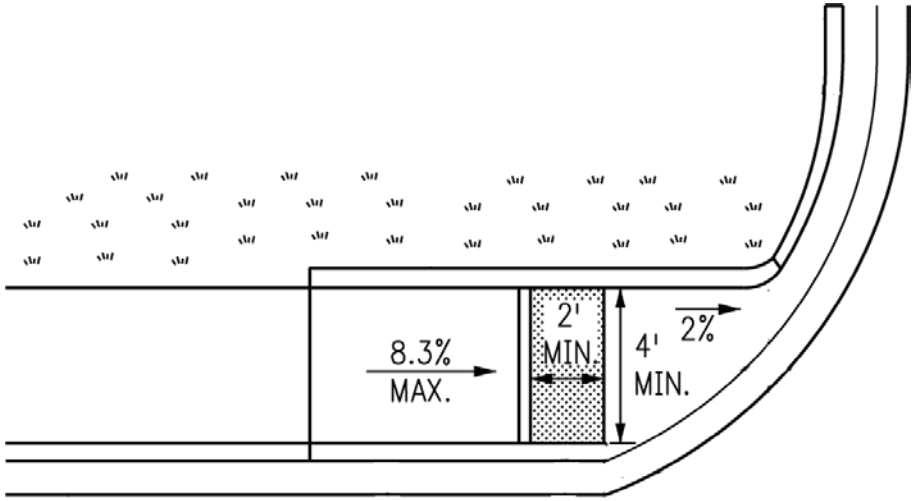


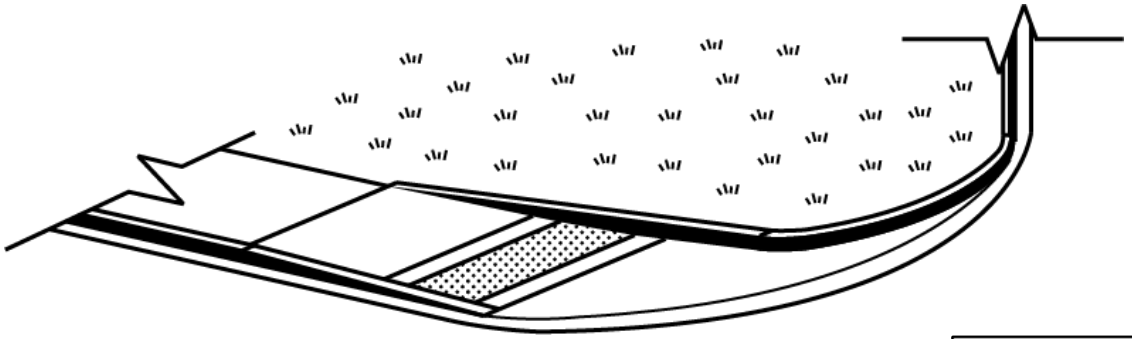


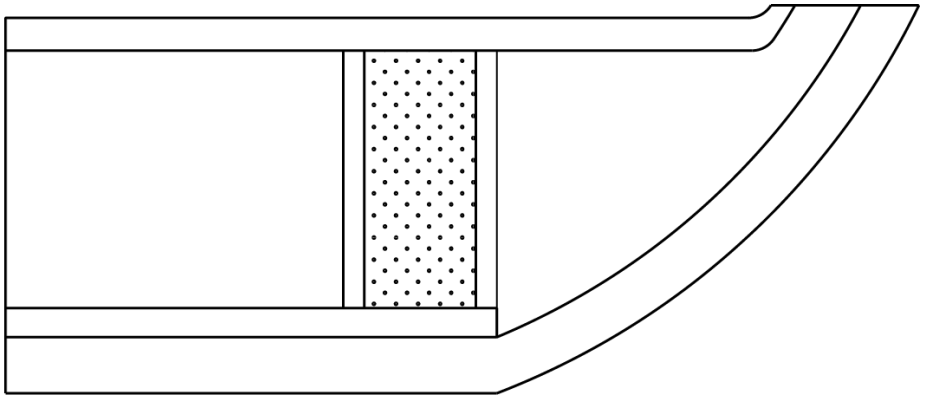
Type 3


Turning Space
4 ft x 4 ft min
Turning Space
Running slope
2% max
Turning Space
Cross slope
2% max
Curb Ramp
Cross slope
2% max
Width
4 ft. min
Running slope
8.3% max
Counter Slope
5% max

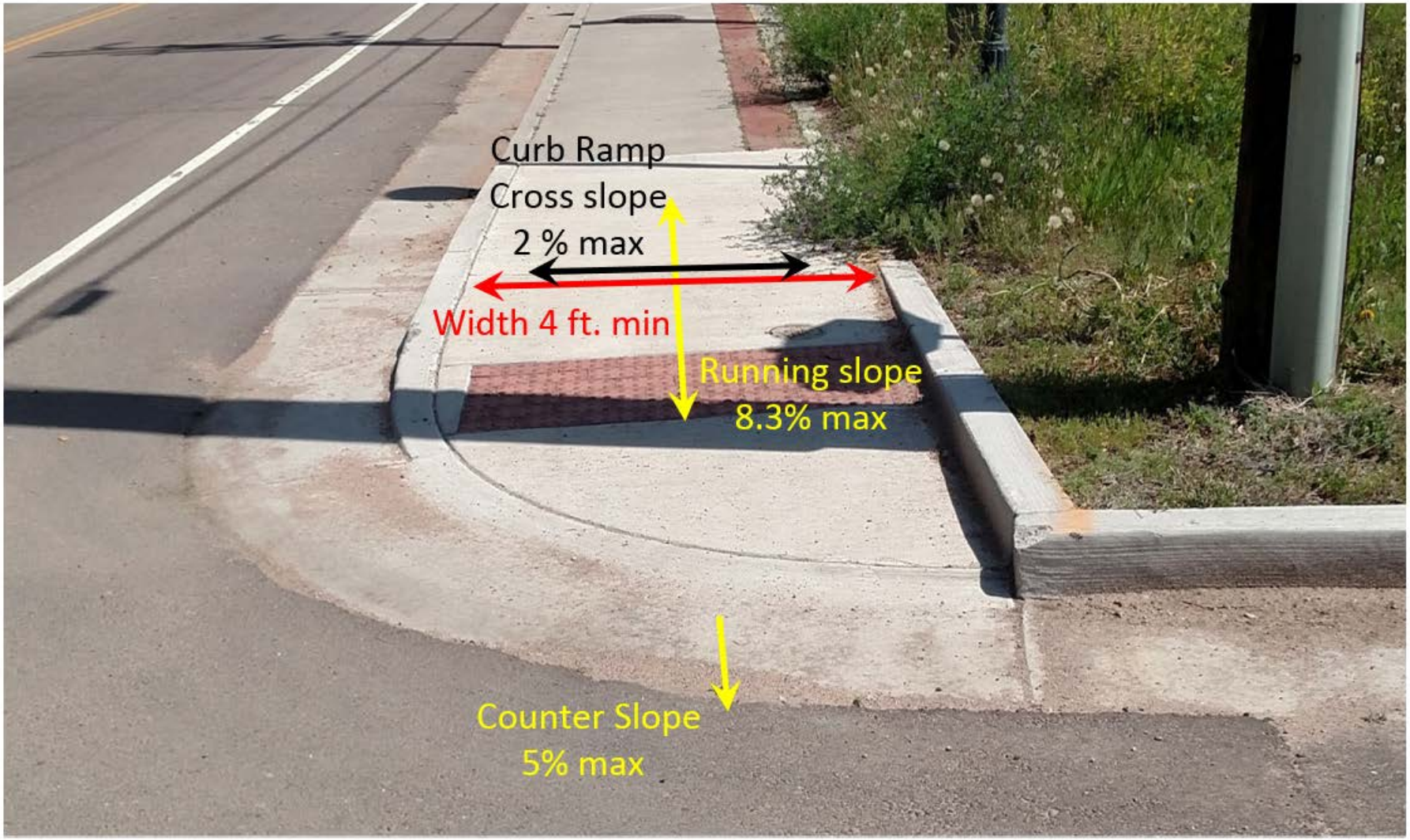
Type 4



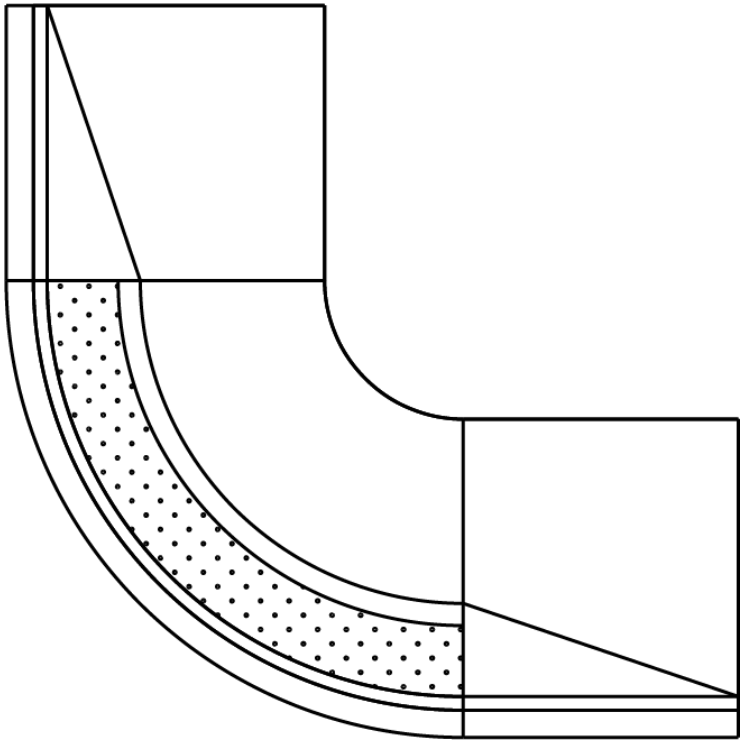


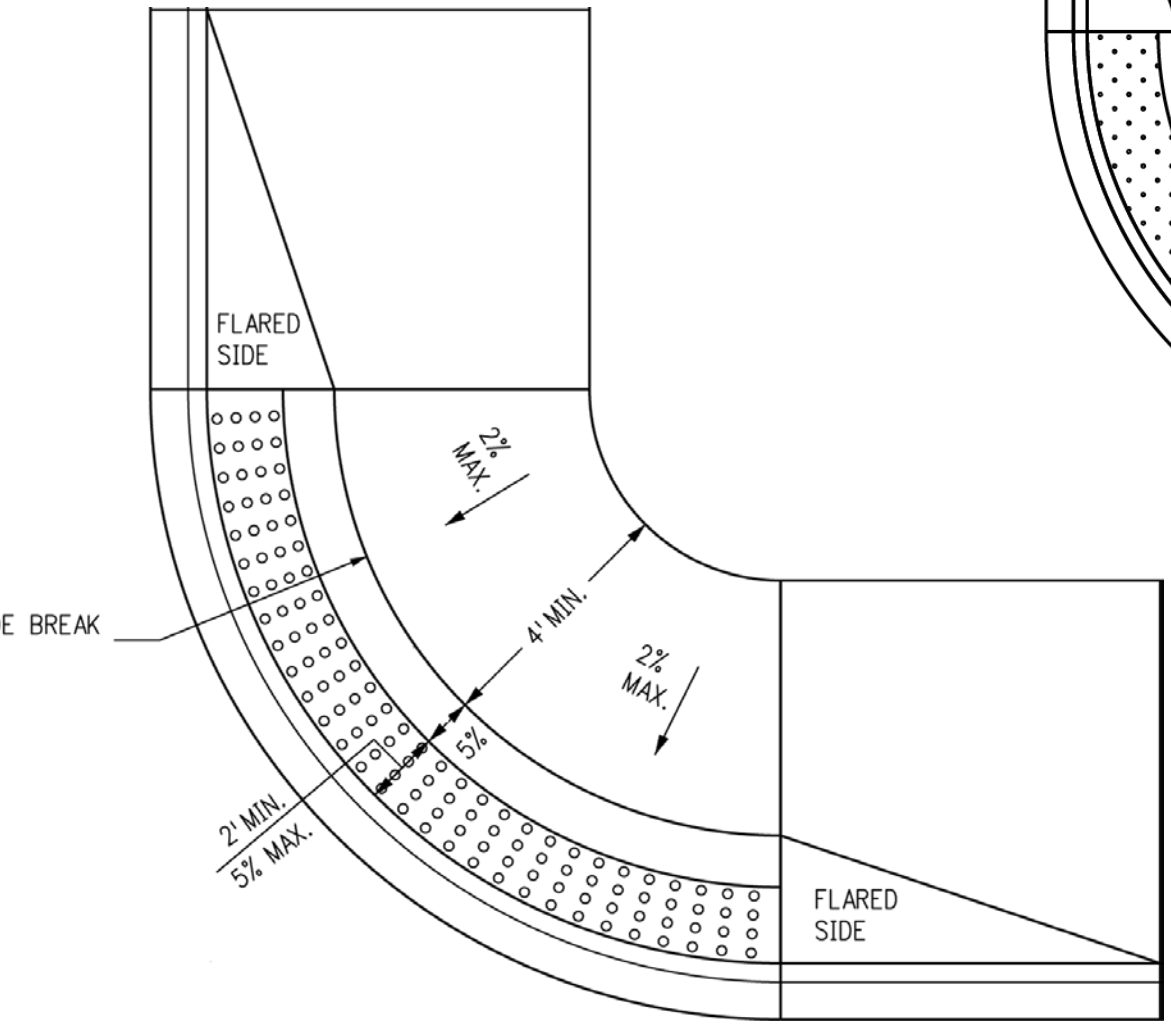


Type 4A

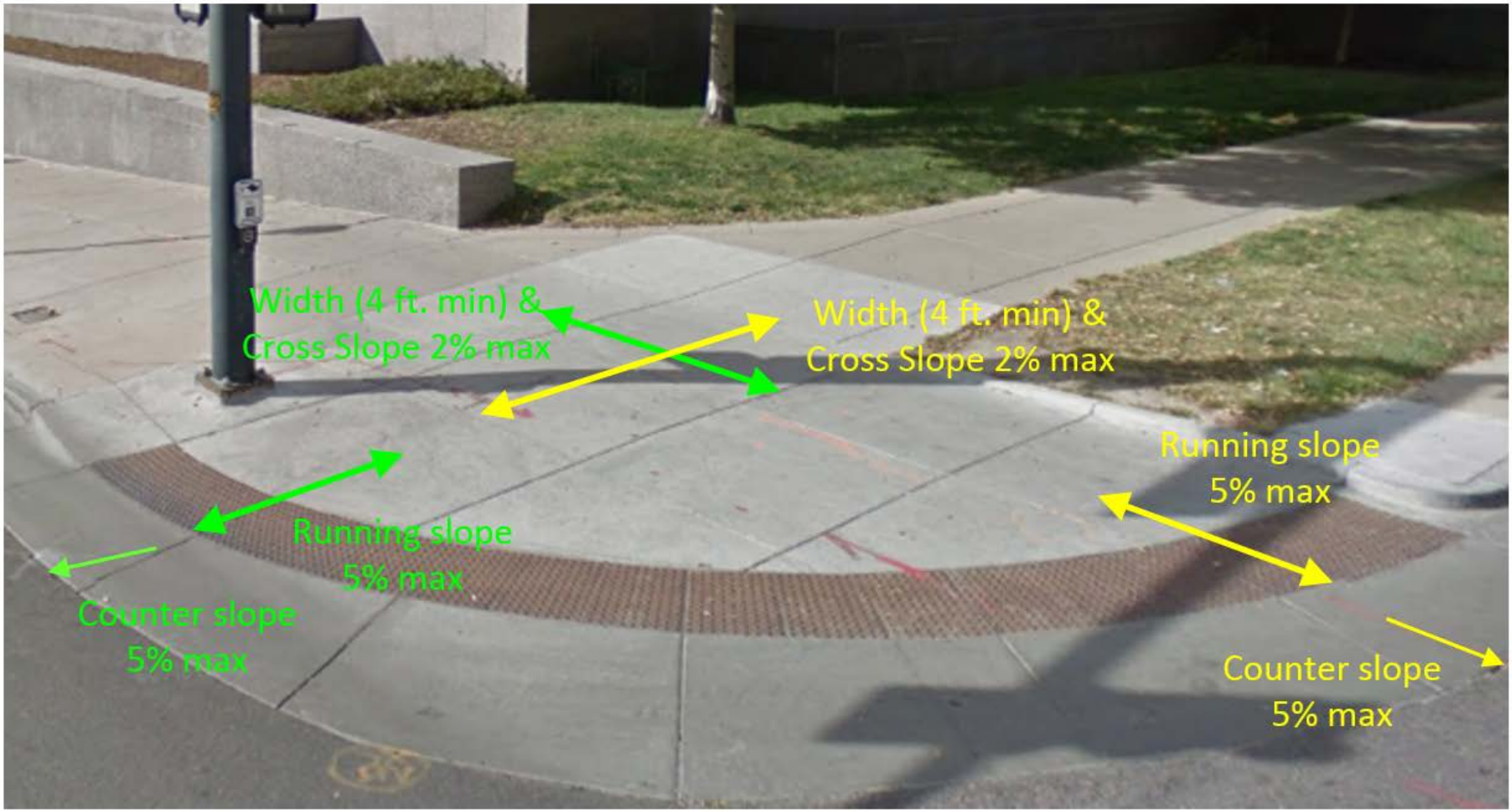

Curb Ramp
Cross slope
2 % max
Width 4 ft. min
Running slope
8.3% max
Counter Slope
5% max

Type 5A

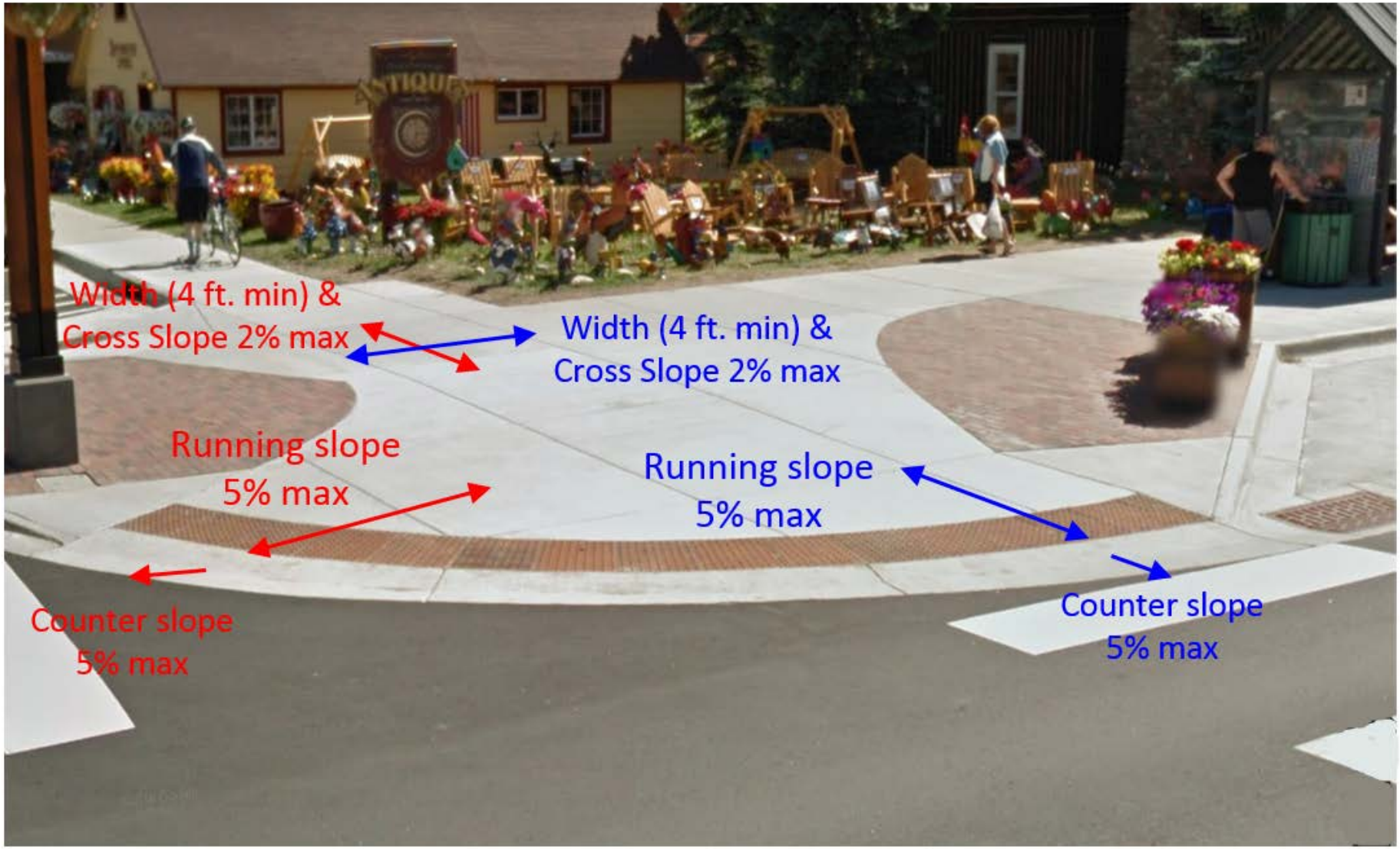




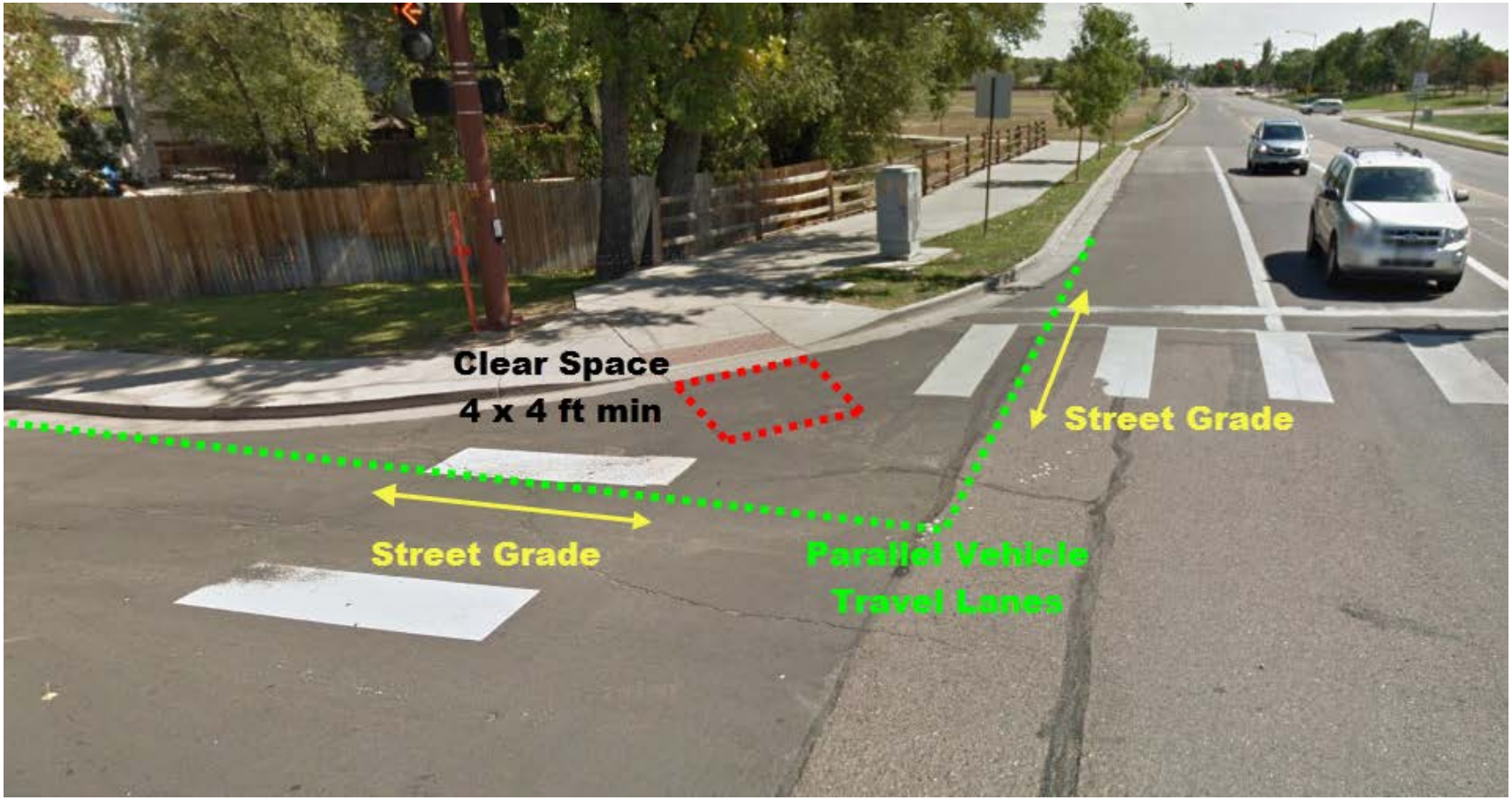
Type 5A


Width (4 ft. min) &
Cross Slope 2% max
Width (4 ft. min) &
Cross Slope 2% max
Running slope
5% max
Running slope
5% max
Counter slope
5% max
Counter slope
5% max

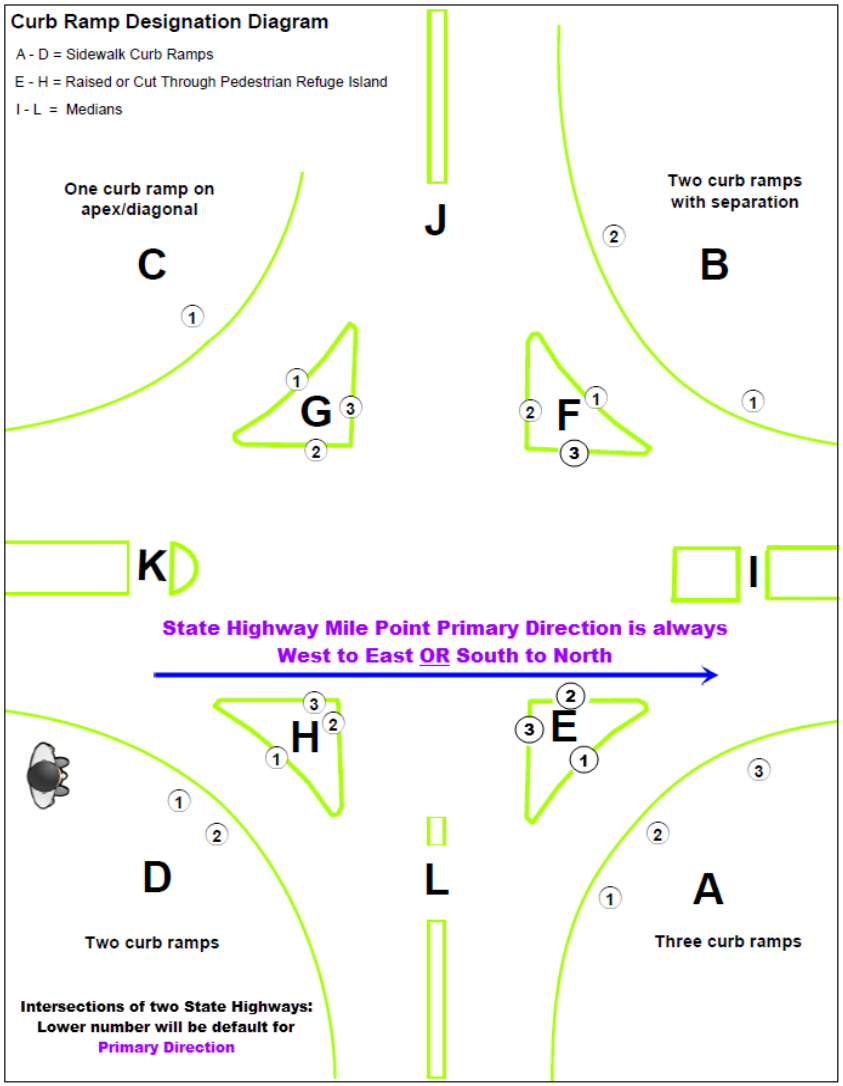
Type 5A

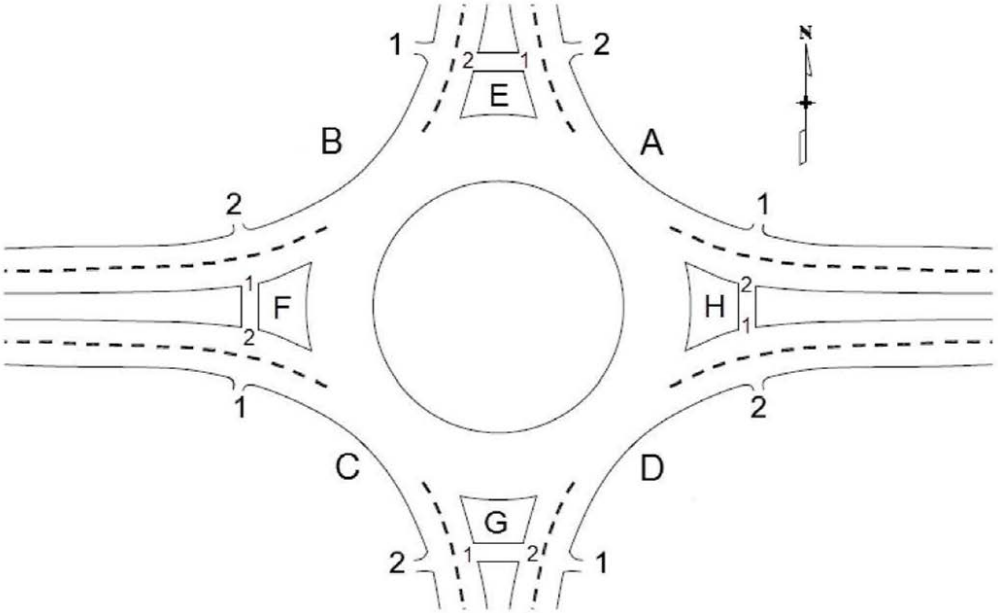

Width (4 ft. min) &
Cross Slope 2% max
Width (4 ft. min) &
Cross Slope 2% max
Running slope
5% max
Running slope
5% max
Counter slope
5% max
Counter slope
5% max

Diagonal Curb Ramps



Curb Ramp Diagram





Roundabout Curb Ramp Designation Diagram - Note North Arrow

Other Elements Part of ADA Requirements

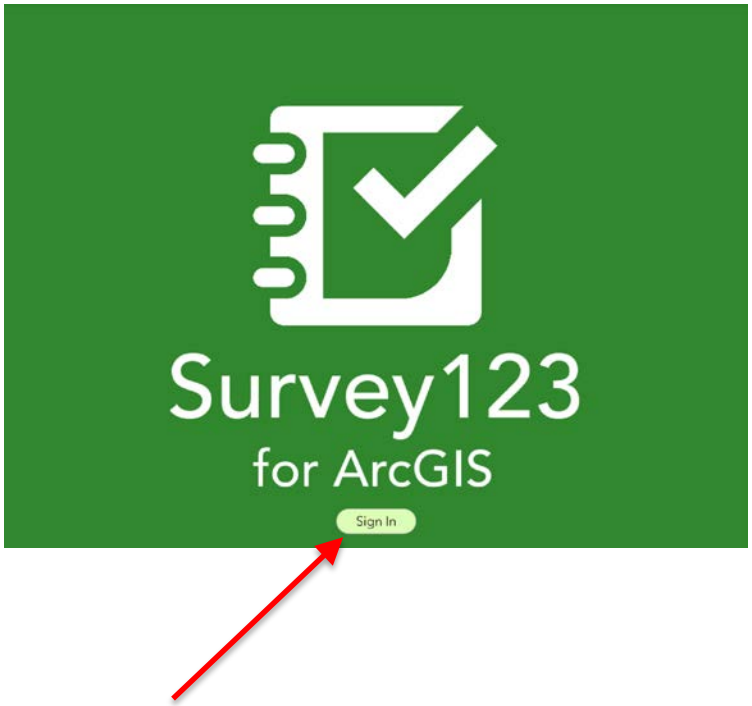
- Detectable Warnings
  - Span full width of ramp
  - 2 ft. deep min.
  - Contrasting color to curb ramp
- Pedestrian Push Buttons
  - Included in data collection and inspections
  - Review and familiarize with MUTCD Sections 4E.08 – 4E.13

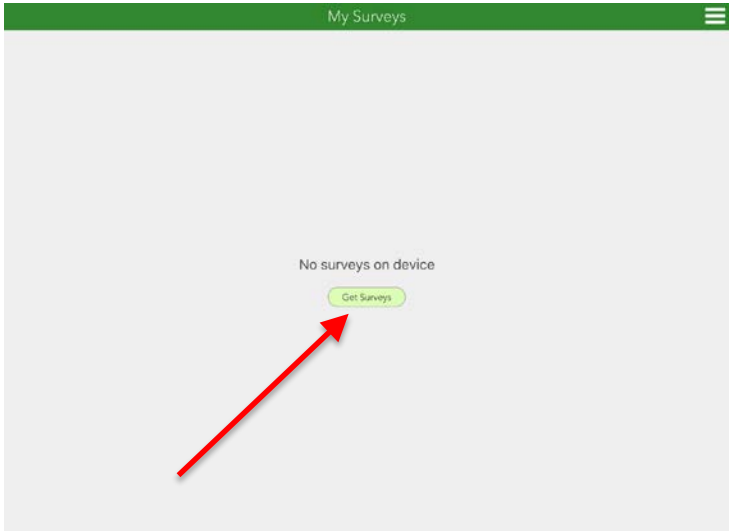
Survey123 & Field Practice

Survey123 for ArcGIS

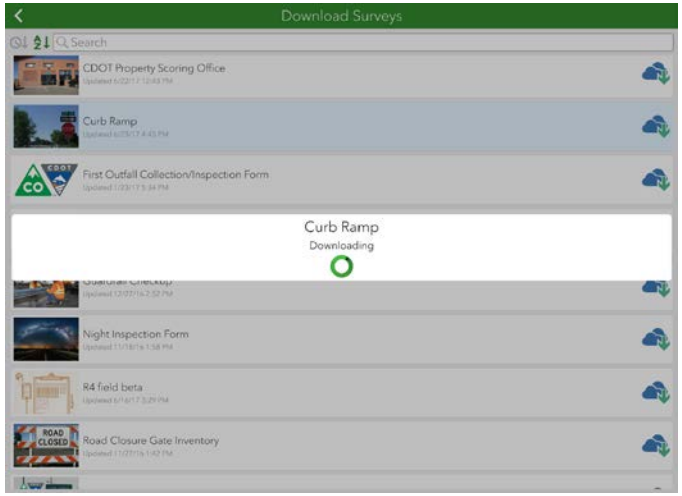
- Installation
  - iPad / Android: use app store
  - Windows: http://doc.arcgis.com/en/survey123/download/

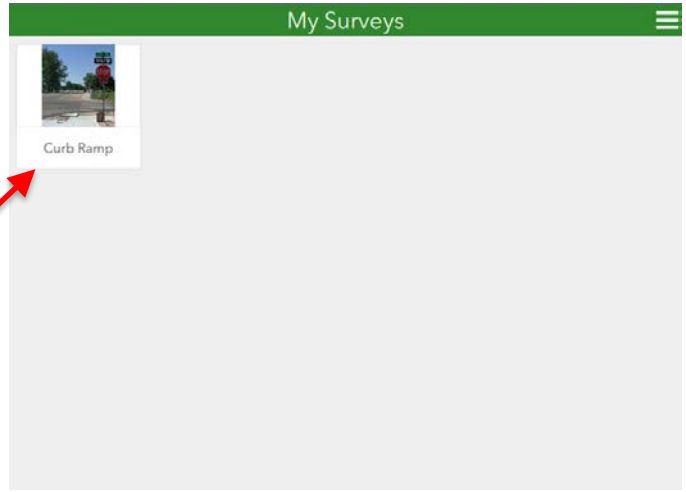
- Getting Started





Survey123 for ArcGIS



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Field Inspection & Application Practice