

ADA Training

Federal Highway Administration

PART 4 – Grades and Running Slopes

11-18-2010

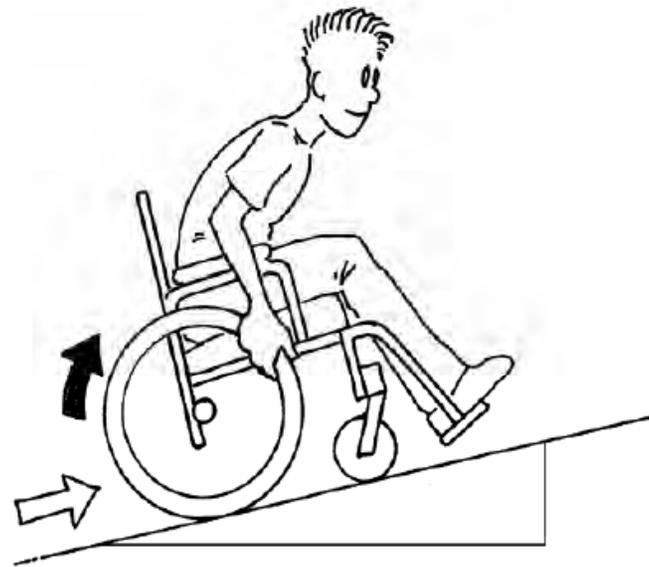
Presented by:
Jason Giard, PE – Operations Engineer
Federal Highway Administration – Idaho Division



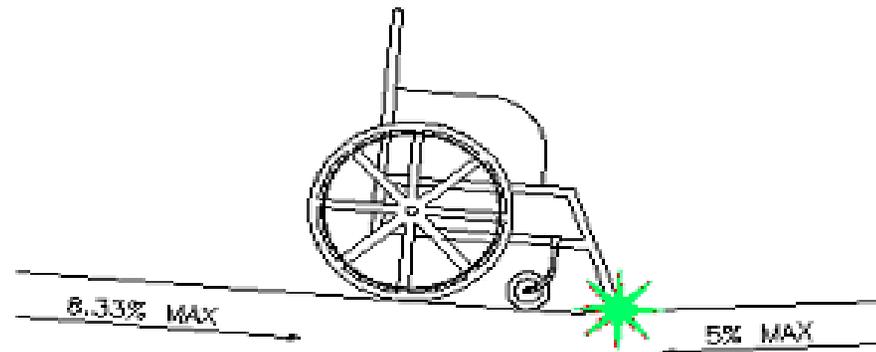
R301.4 Walkway Grade & Cross Slope

R301.4.2 Street or Highway Grade

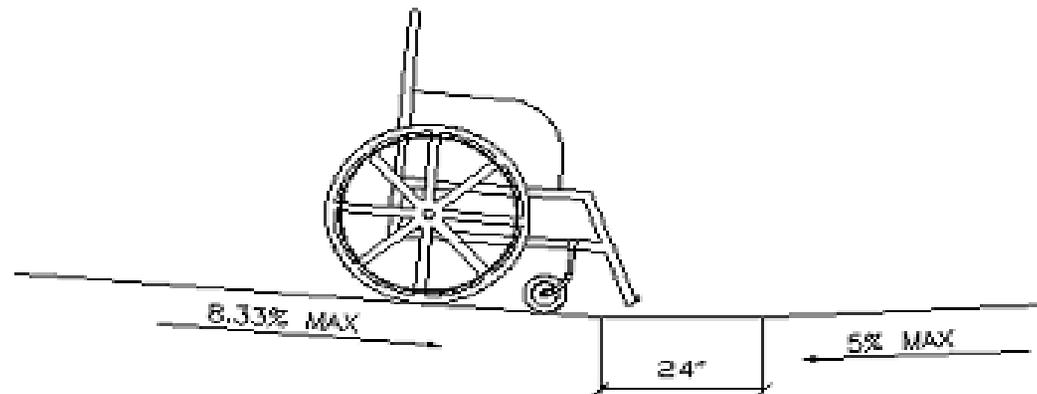
- Where the walkway of a pedestrian access route is contained within a street or highway border, its grade shall not exceed the general grade established for the adjacent street or highway.
- 5% maximum grade away from roadway (ADAAG 4.3.7)



Sectional view of wheelchair at a counter slope condition with grades indicating the algebraic differences and limitations. Second view showing double grade break.



ALGEBRAIC DIFFERENCE
GREATER THAN 11% NOT
PERMITTED

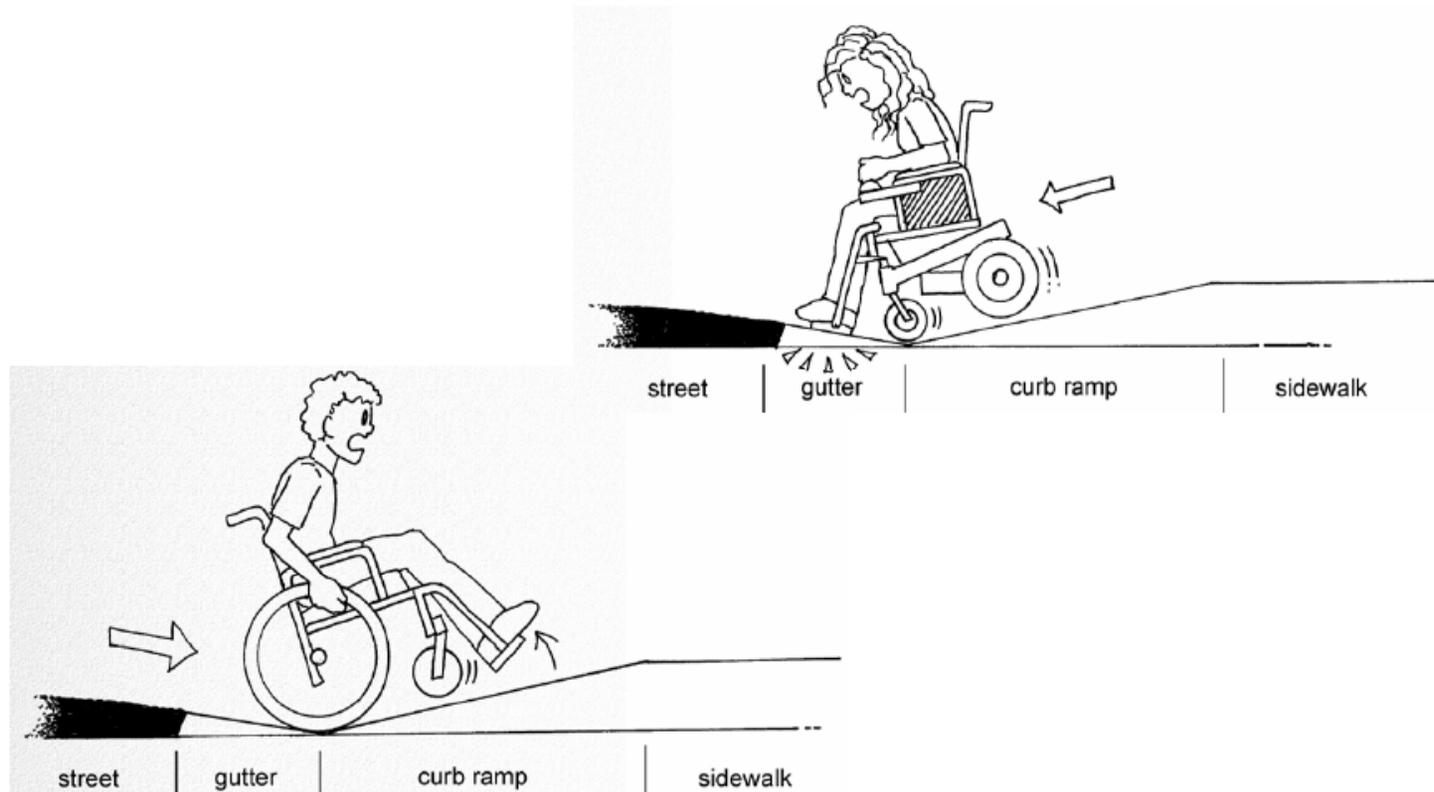


PROVIDE 24" LEVEL STRIP IF
ALGEBRAIC DIFFERENCE
EXCEEDS 11%



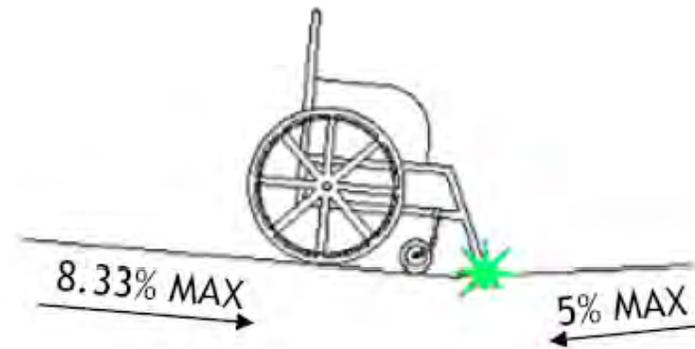
Change of Grade

Abrupt changes of grade are difficult to use and can cause wheelchairs to flip over backward or forward



Change of Grade

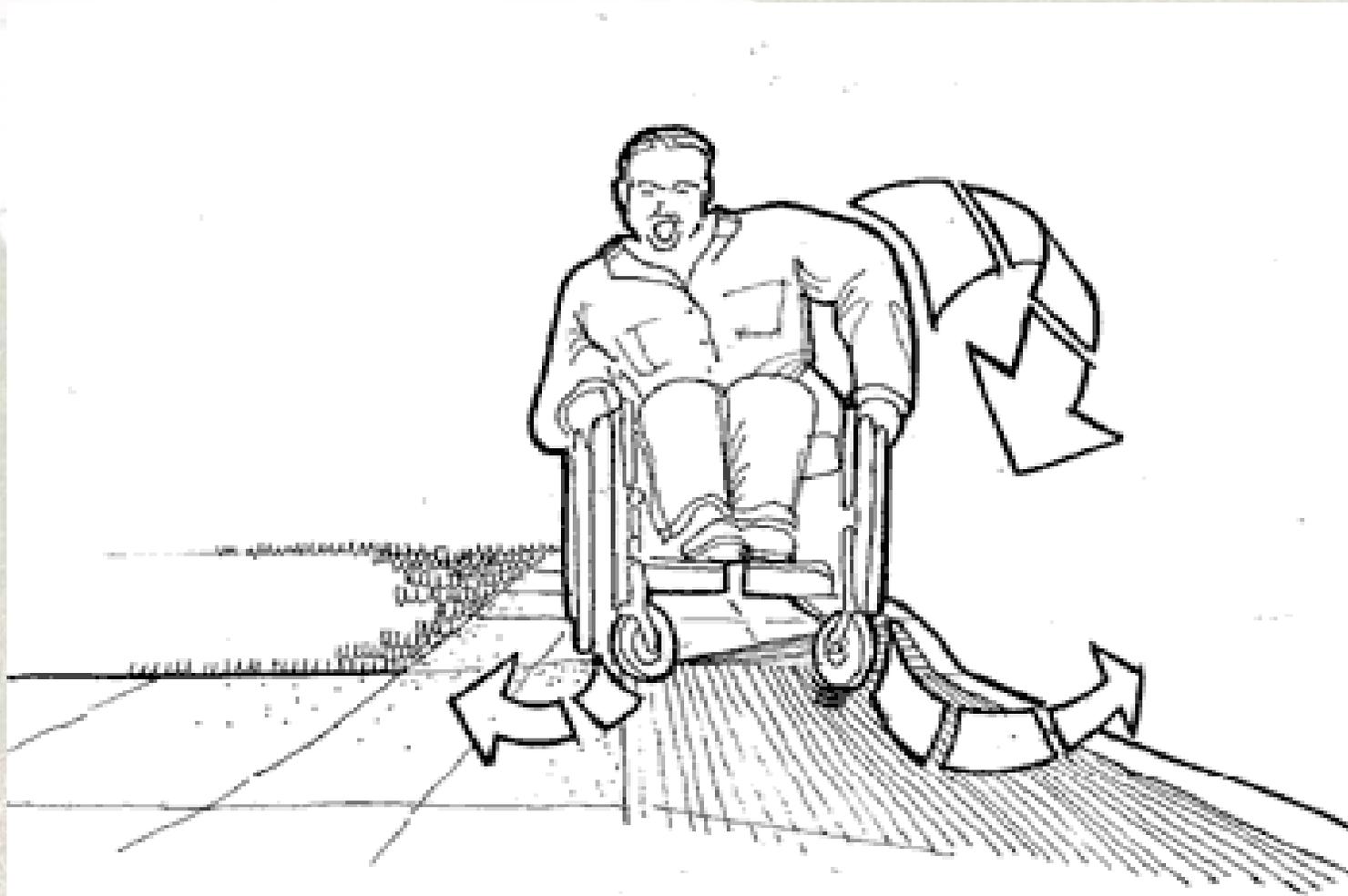
- PROWAG allows 8.3% ramp plus 5% grade at the adjacent street = 13.3%
- Recommendation calls for:
 - 11% maximum
 - Provide 2' level area if greater than 11%



Driveways



Driveway Entrances



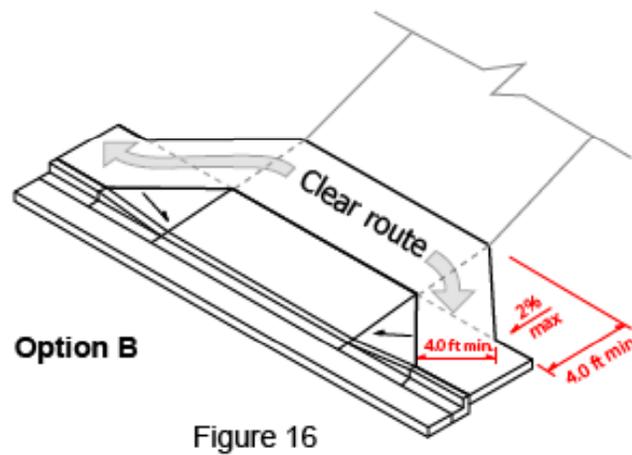
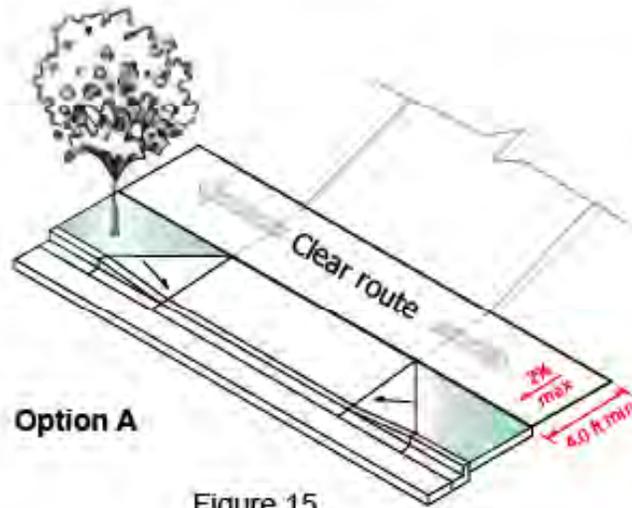


**Cross slope on Driveways
2% maximum slope**



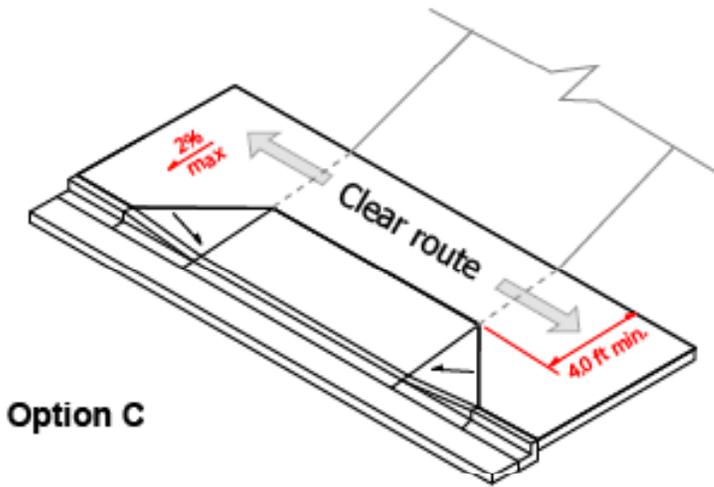
DRIVEWAYS

Design. There are four basic approaches to designing driveway cuts that meet ADA. The most important element of these solutions is to provide a continuous clear route of travel with a minimum width of 4.0 ft.



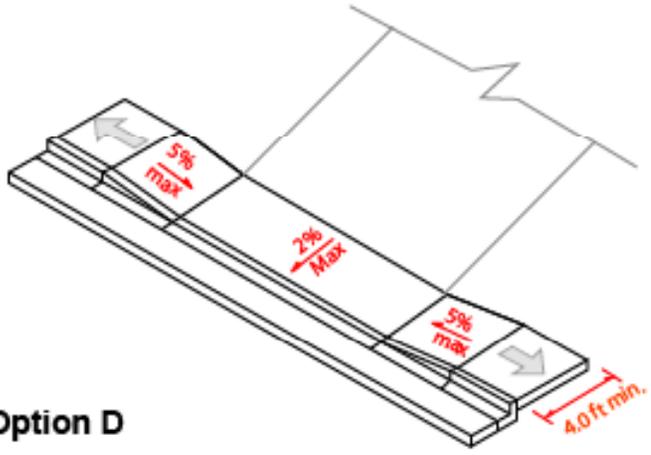


DRIVEWAYS



Option C

Figure 17



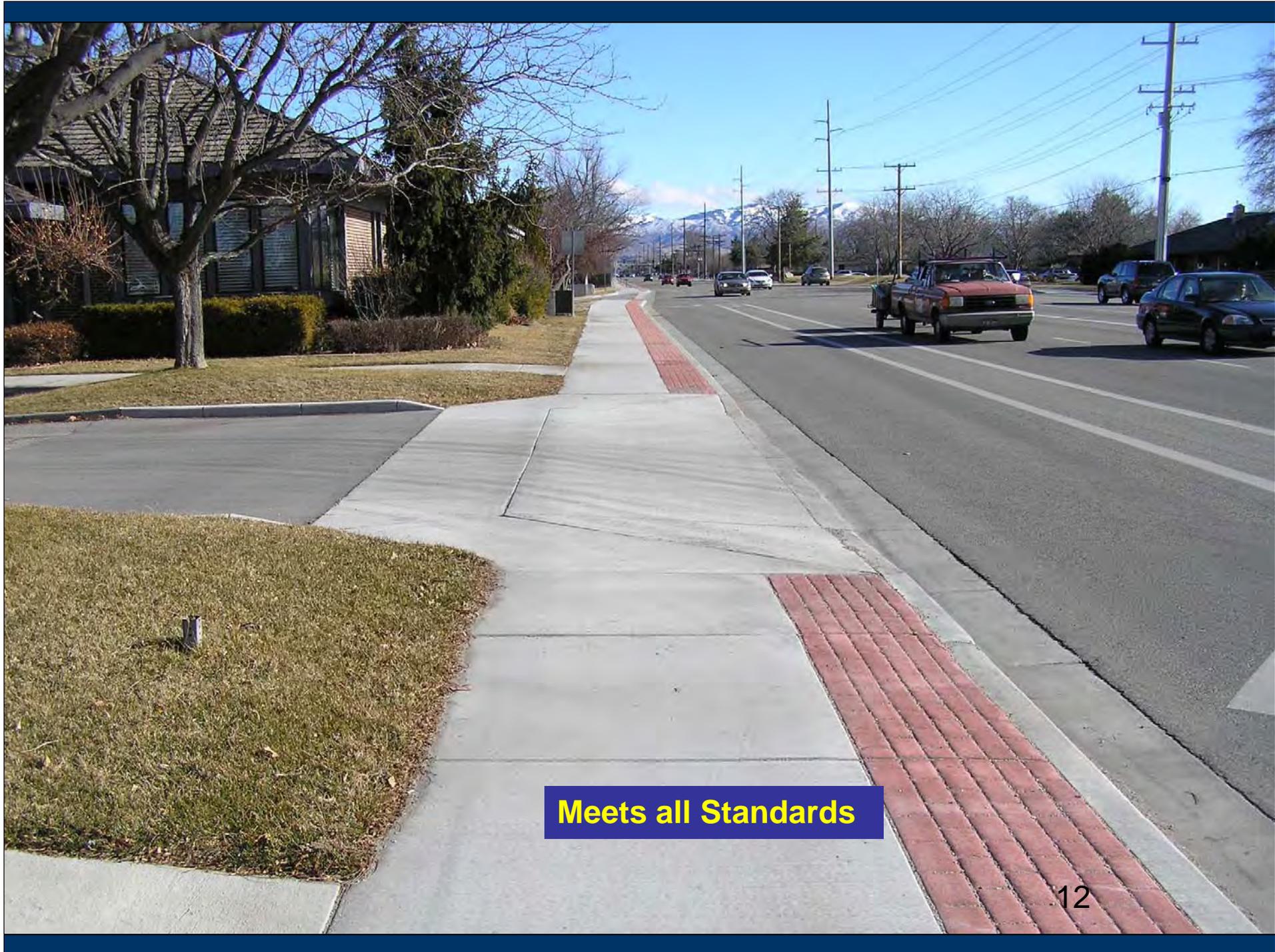
Option D





Meets all standards





Meets all Standards



Meets all standards but loses water from the curb

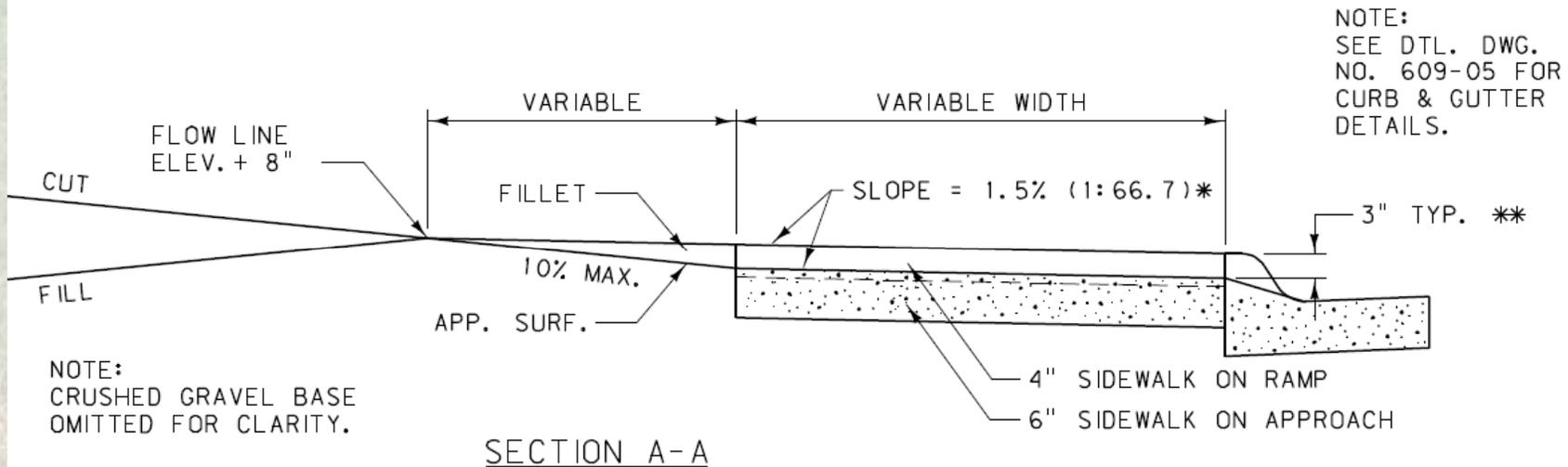


1.5%

Curb should have a 3" lip to keep water in the curb

Driveway across Sidewalk

SECTION OF SIDEWALK





Driveway and sidewalk meets all standards



3-inch curb height



Any water deeper than 2" will run away from the curb



Ramp at 9.1% Running Slope



Cross Slope at 4.1 %

Crosswalks



R305.2 Crosswalks

- Crosswalks shall comply with R305.2 and shall contain a pedestrian access route that connects to departure and arrival walkways through any median or pedestrian refuge island.
- R305.2.1 Width. Marked crosswalks shall be 6 ft wide minimum.



Safety Effects for Marked vs. Unmarked Crosswalks at Uncontrolled Locations: Executive Summary and

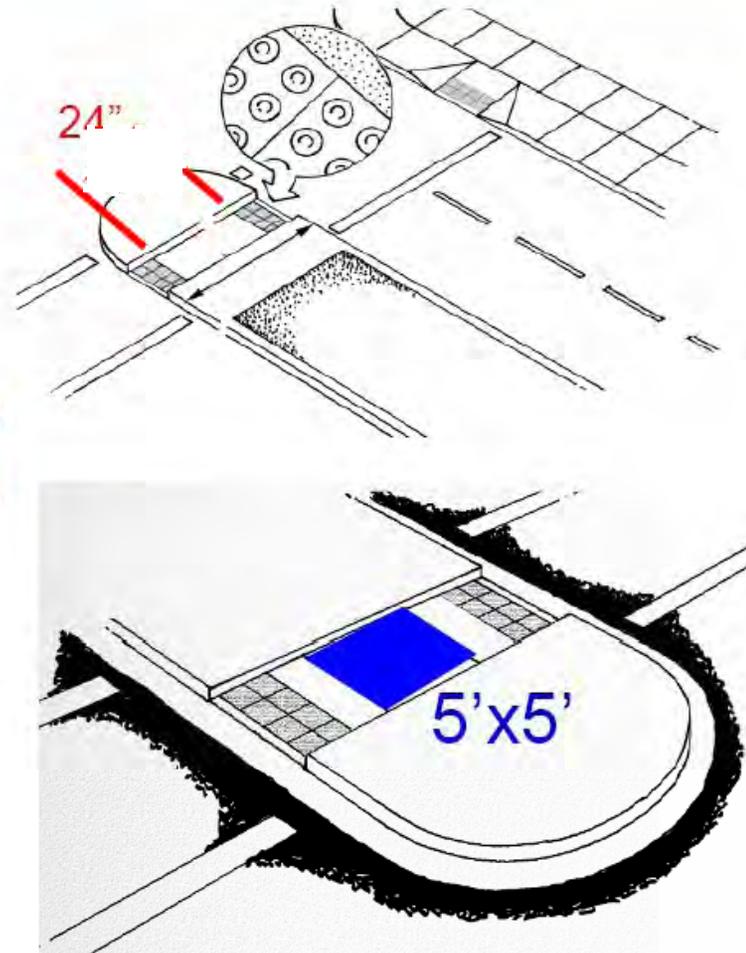
Recommended Guidelines

<http://www.tfhrc.gov/safety/pubs/04100/04100.pdf>



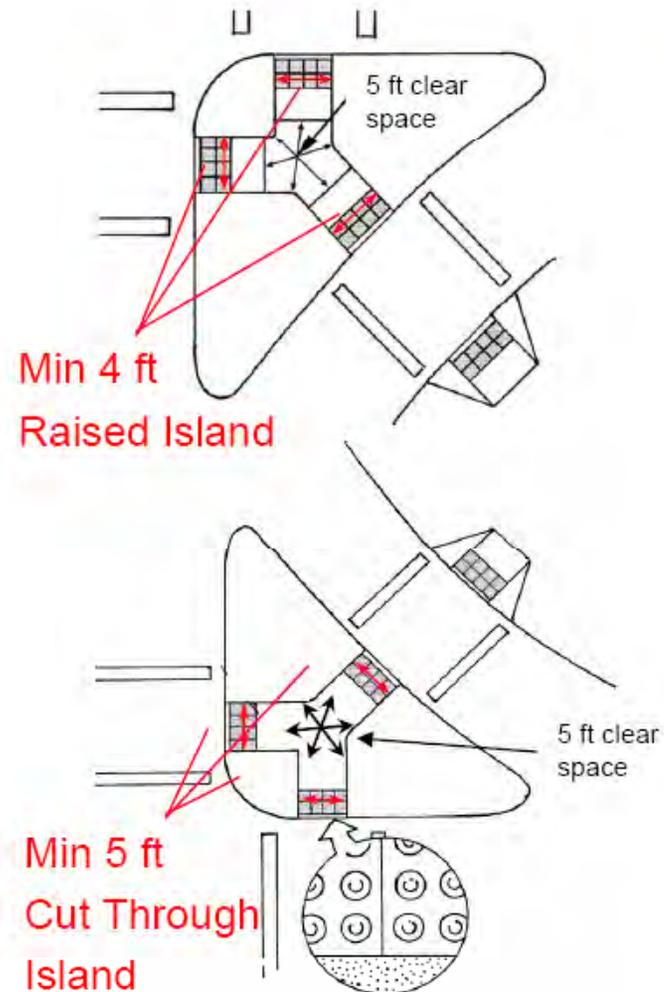
Crossing Island & Median Design

- 24" DW required at both openings
 - Provide 24" smooth pavement in center (if possible)
- If ramped, use landing (5' x 5' min) between ramps
 - Landing need not be full median height; 3" is enough



Cut-Through or Raised Corner Islands

- With slip lanes, always use raised islands (not painted)
- Ramps must be at least 4 ft. wide
- For cut-through: must be 5 ft. wide
- Provide at least 5 feet of clear (turning) space or level landing
- Provide a 2 foot strip of detectable warnings at end of cut-through or at bottom of ramp
- Align cut-through or ramps with crosswalks



R305.4 Medians and Pedestrian Refuge Islands

- Medians & Refuge Islands shall:
 - contain a pedestrian access route
 - be 6-feet minimum in length in the direction of pedestrian travel



Crossing Island & Median Design



Crosswalk Markings

- Although the MUTCD provides for design options, research and observation indicate that the continental and ladder designs are the most visible to drivers
- These “longitudinal” markings also improve guidance for pedestrians with low vision and cognitive impairments



Textured crosswalks

- Textured crosswalks are not recommended
- Textures are aesthetically pleasing and are used to:
 - Distinguish pedestrian and vehicle space
 - Make crossings more visible in theory, but...



Textured Crosswalks



- If textured crosswalks are used, outline with white



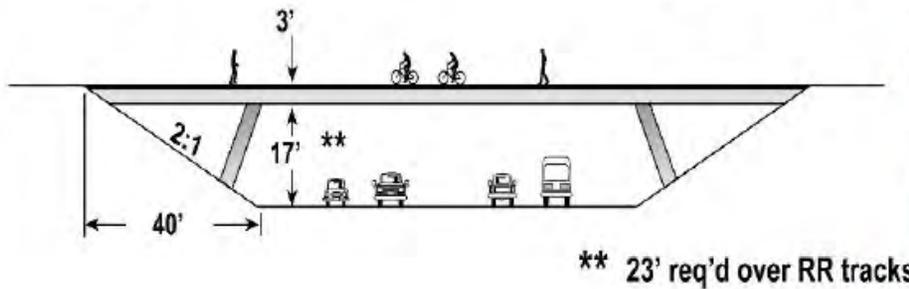
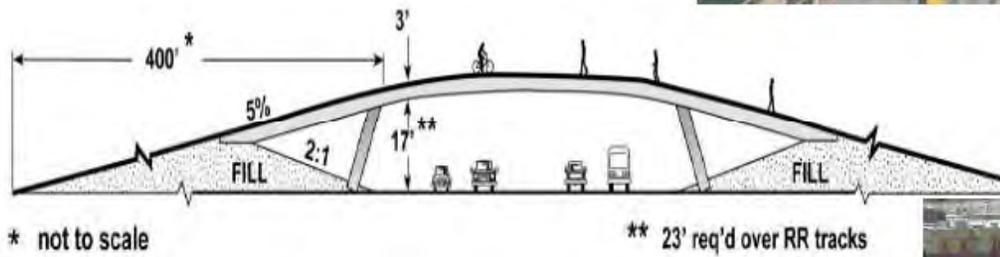
Inaccessible Crosswalk: Crosswalk exceeds 2% cross-slope



Ramps



Overpasses

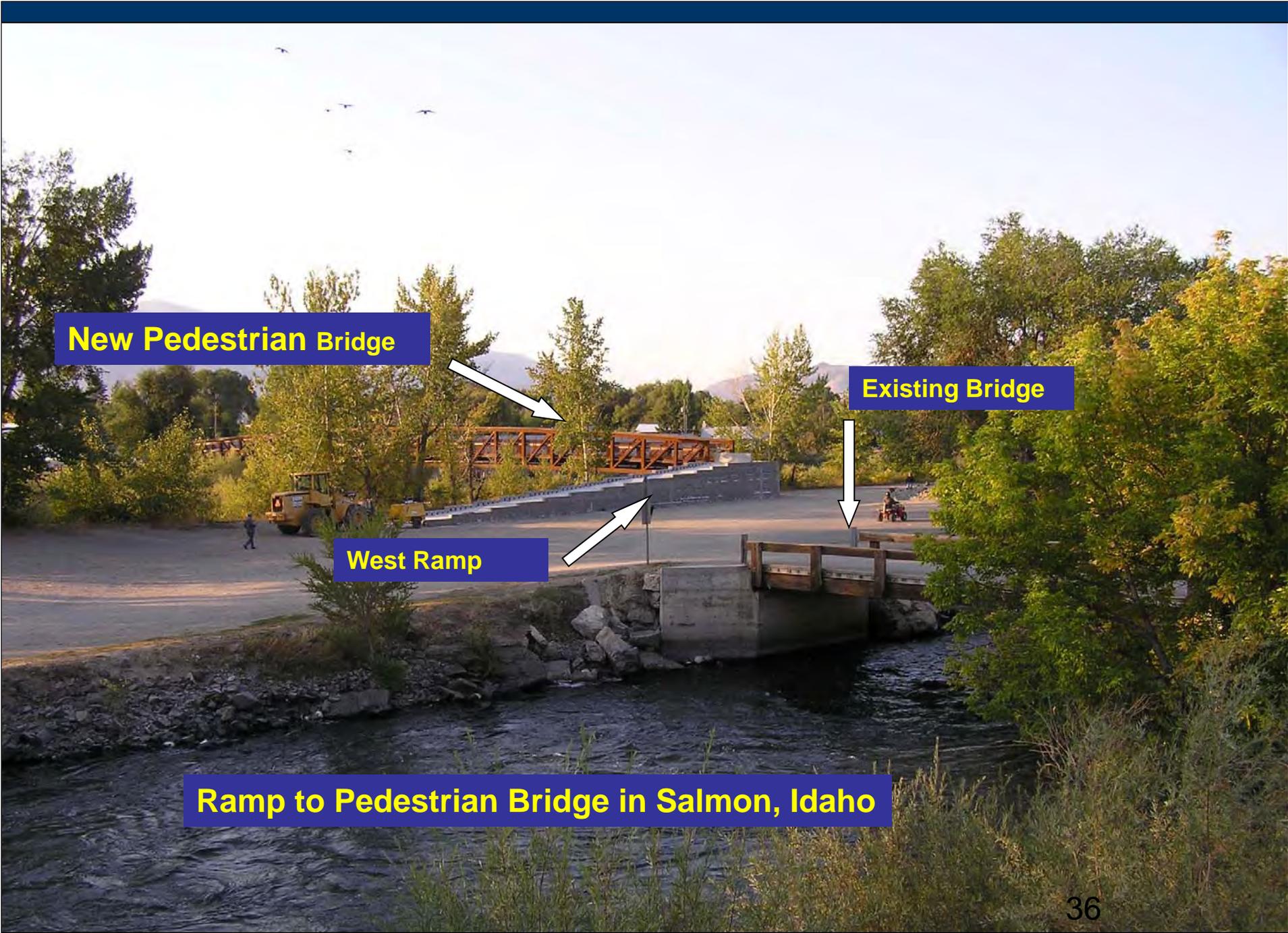




Is this grade steeper than 5%?



Is this grade steeper than 5%?

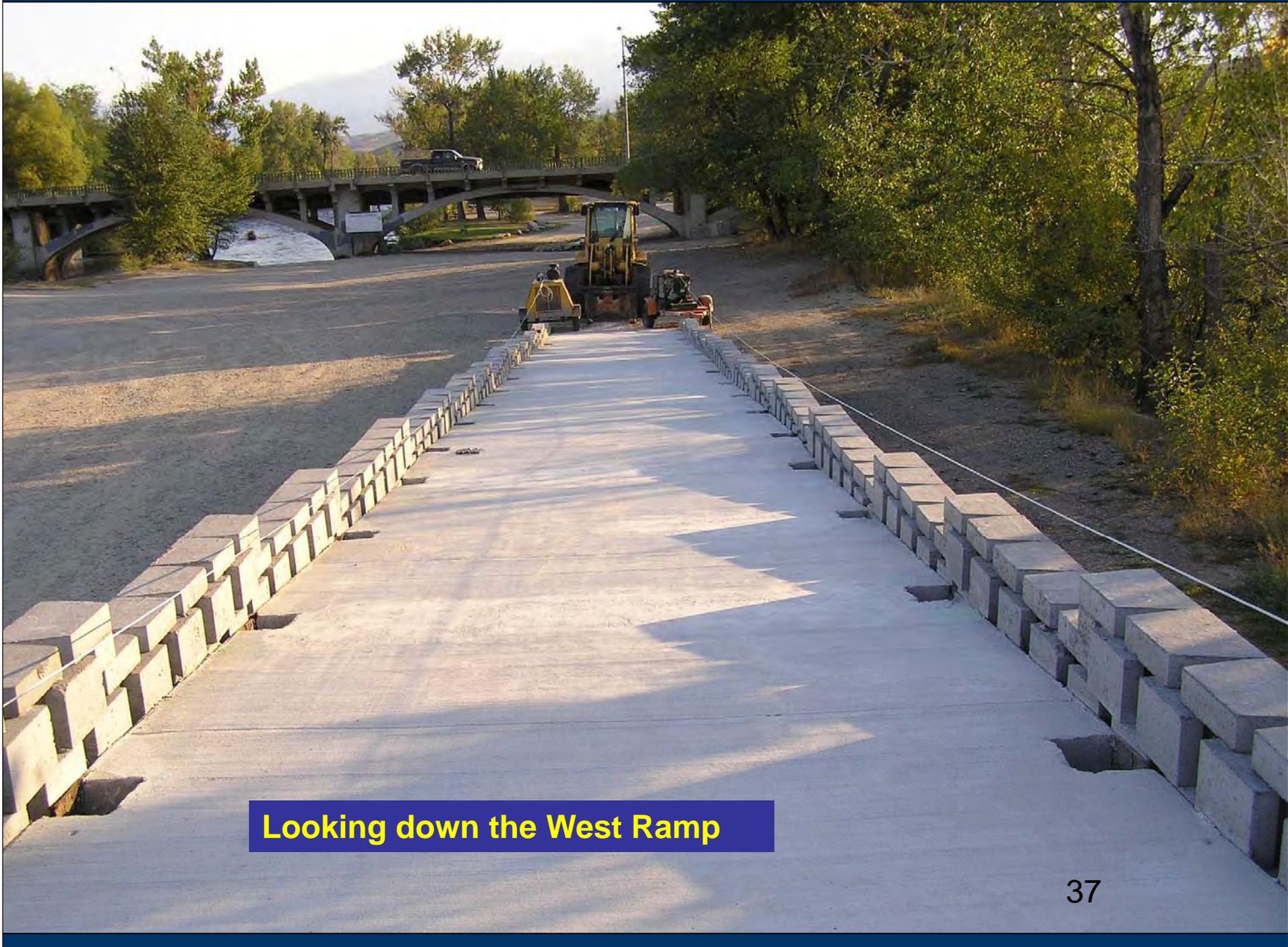


New Pedestrian Bridge

Existing Bridge

West Ramp

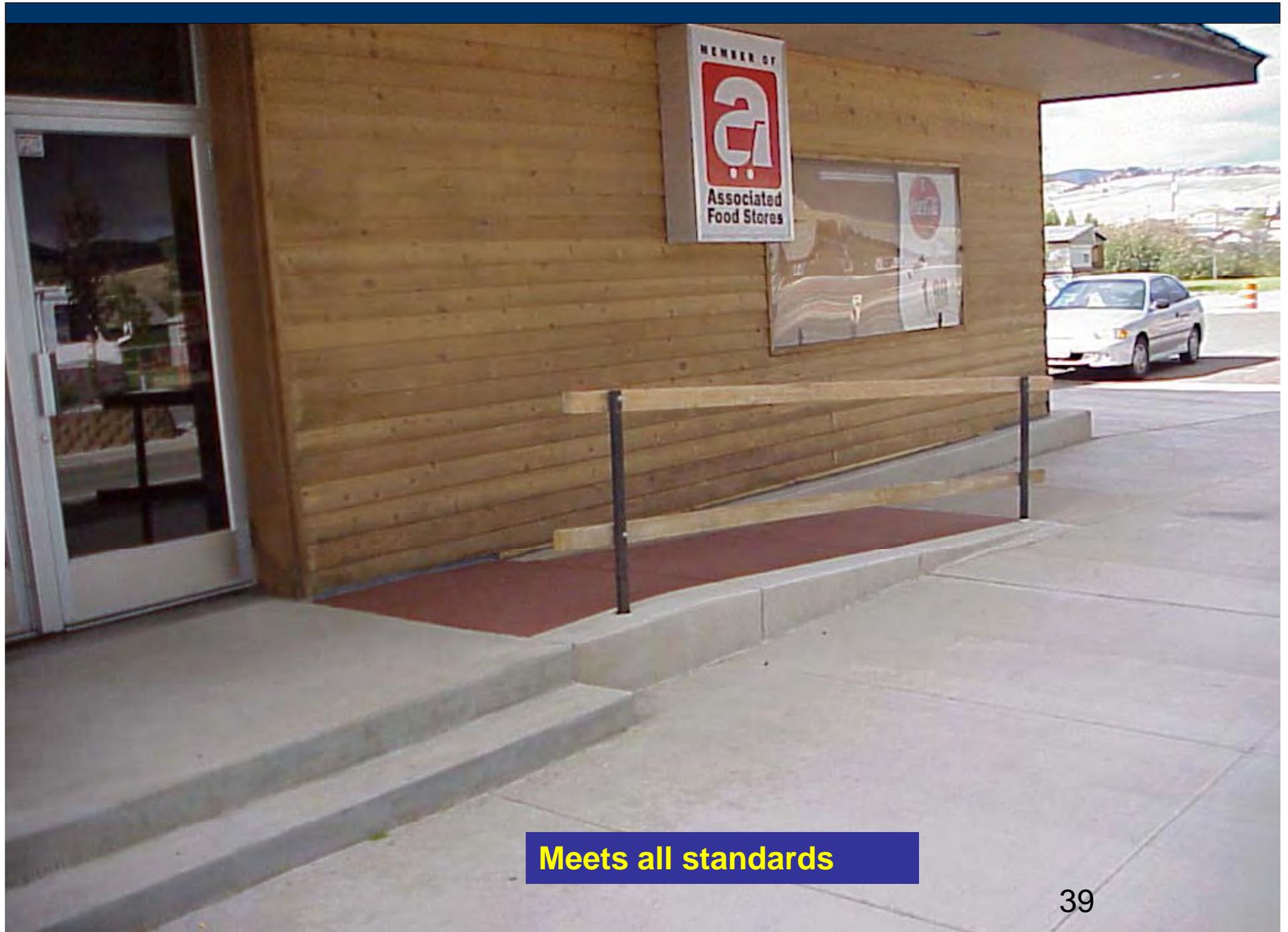
Ramp to Pedestrian Bridge in Salmon, Idaho



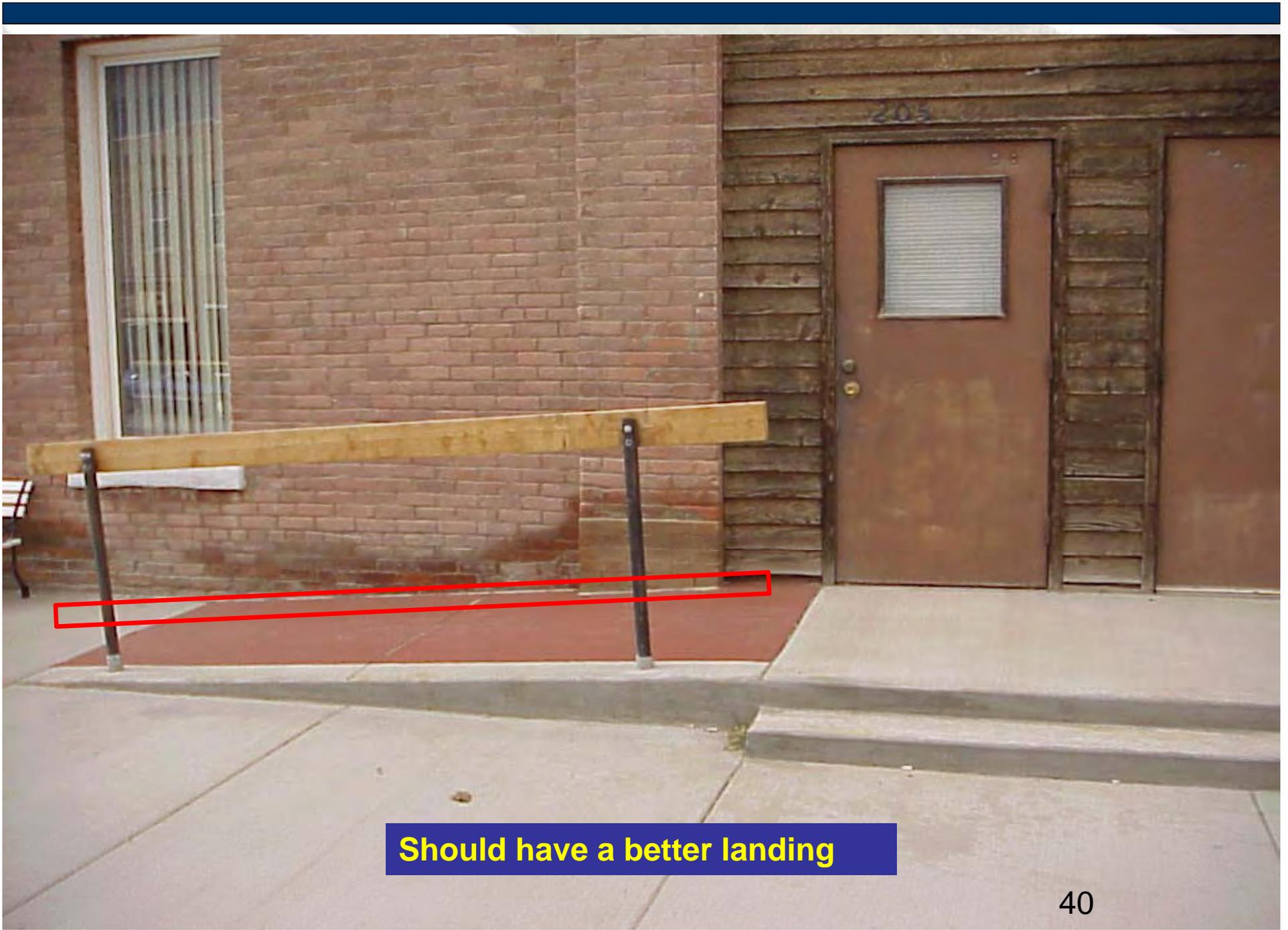
Looking down the West Ramp



Landing Steeper than 2 % and not 60 inches



Meets all standards



Should have a better landing



Meets all standards

Accessible Pedestrian Signals

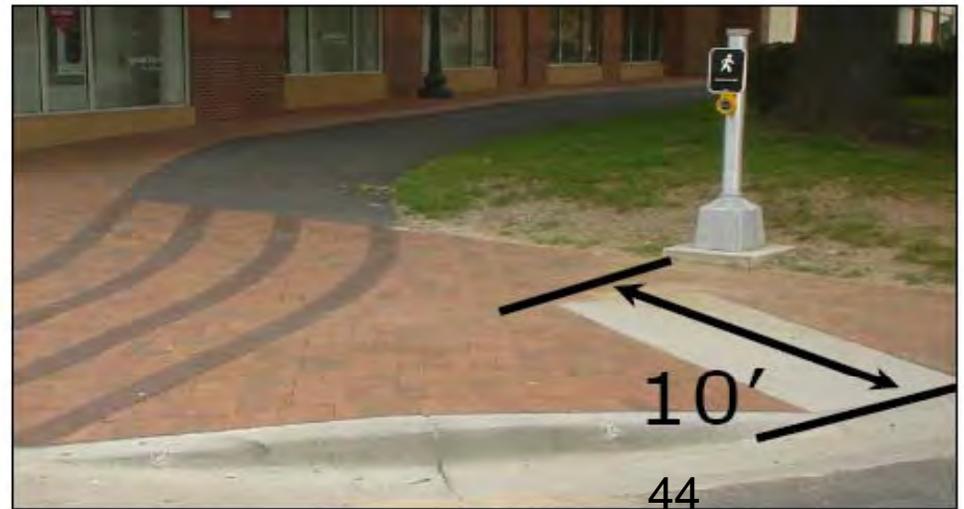
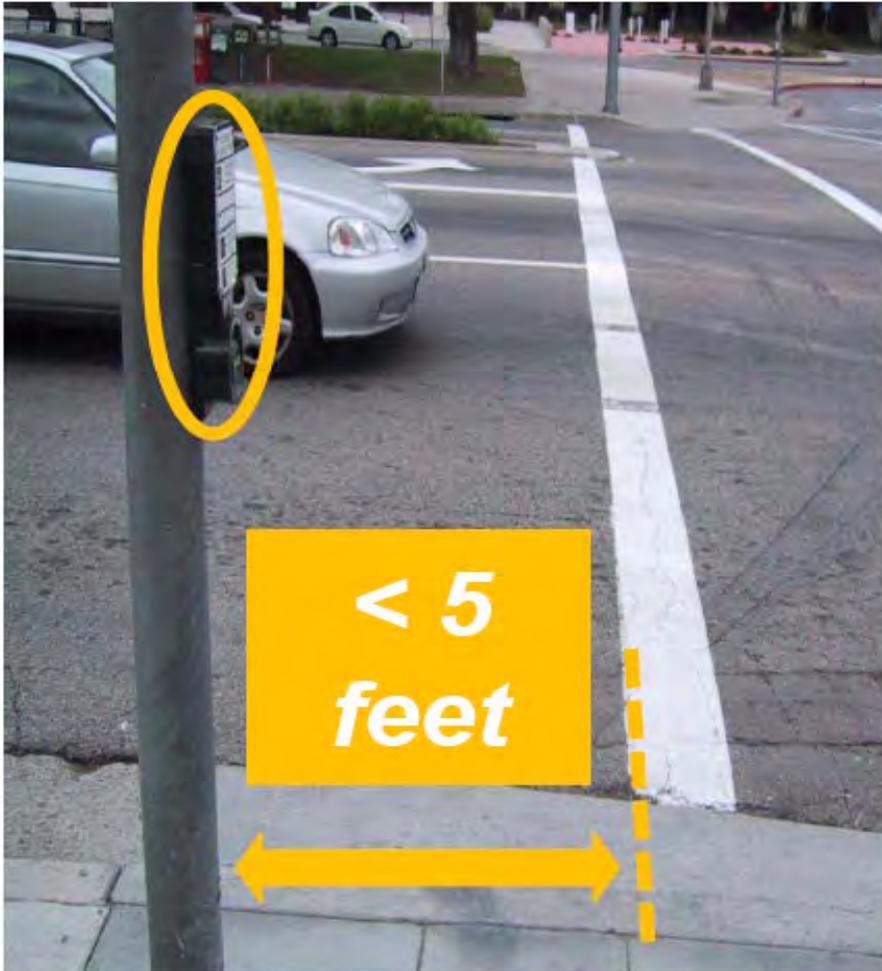


Pushbutton Location - Proposed 2009 MUTCD

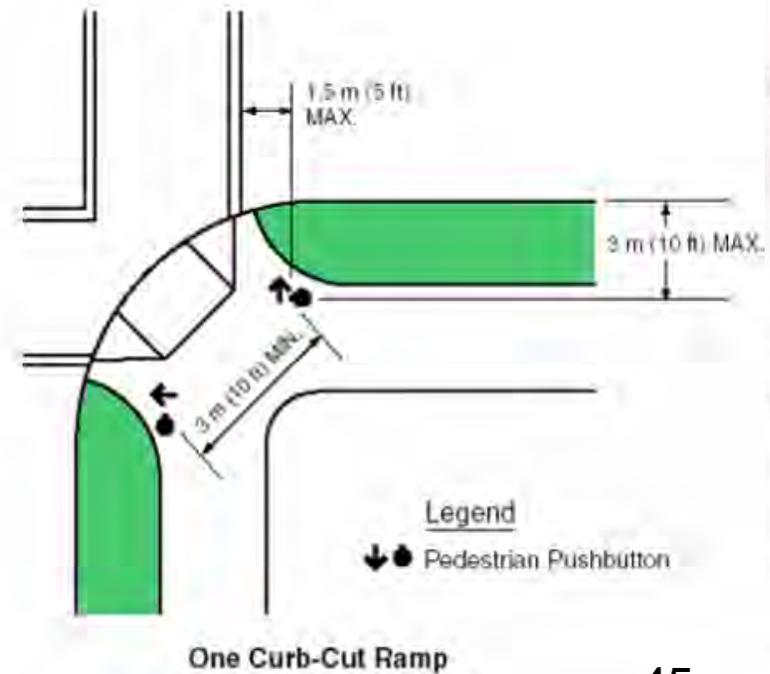
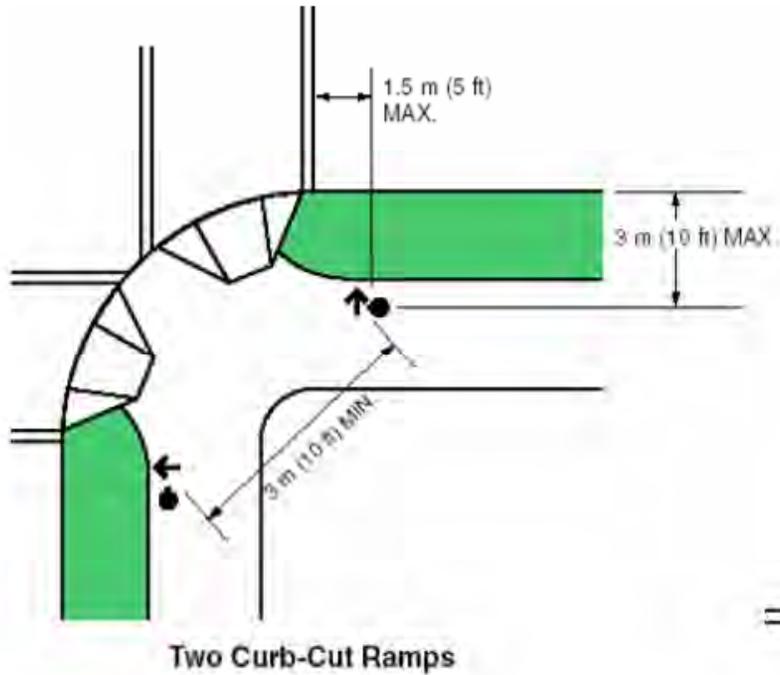
- ...pedestrian pushbuttons shall be located to meet all of the following criteria:
 - Unobstructed & adjacent to level all-weather surface
 - Accessible wheelchair route from pushbutton to curb ramp
 - Between edge of crosswalk line & side of curb ramp (no more than 5 feet)
 - Between 1.5 and 6 feet from edge of curb, shoulder, pavement
 - Face of pushbutton parallel to crosswalk to be used
 - Maximum mounting height of 4 feet



APS Location Examples



Pushbutton Location Examples - 2009 MUTCD



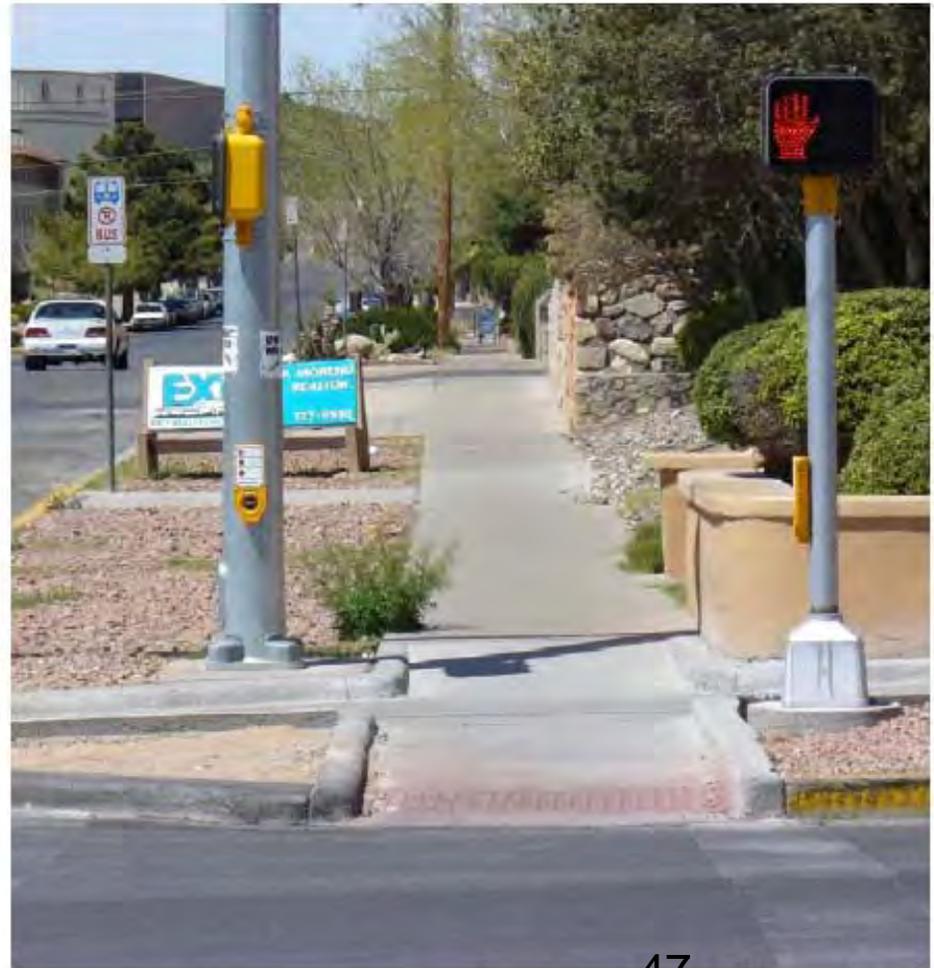
APS Pushbutton Location - Mounting Height

- Vertical reach
 - MUTCD: 42 inches
 - ADAAG/PROWAG: 48 inches maximum
- Horizontal reach
 - PROWAG: 10 inches maximum



Good Pushbutton & Pedestrian Signal Head Placement

- Good:
 - Pushbutton separation
 - Mounting height
 - Horizontal reach (right)
 - Visual display location
- Pretty Good:
 - Horizontal reach (left)



Obstructions



OBSTRUCTIONS

There are three basic types of obstruction, "Flat", "Upright" & "Protruding".



Figure 24

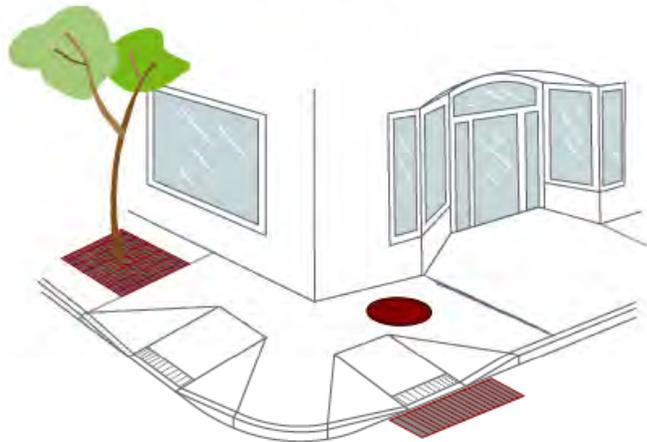


Figure 25

Examples of "Flat" obstructions are: hole/depression, valve cover, grate, slope, lip/gap and manhole.

OBSTRUCTIONS

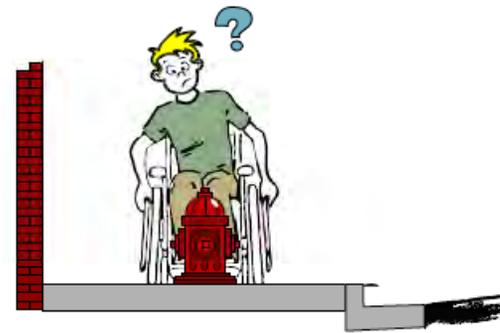


Figure 26

Examples of "Upright" obstructions are: utility poles, signs supports, tree, fire hydrant, cabinet, mail box, phone booth, stand, water fountain, stairs and furniture.

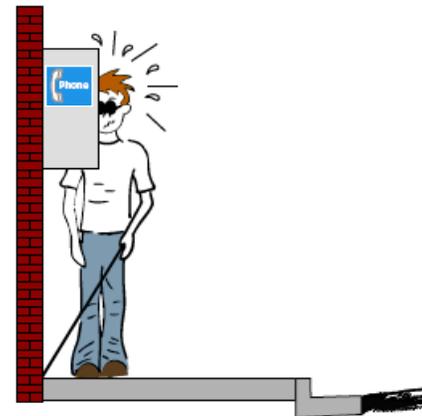
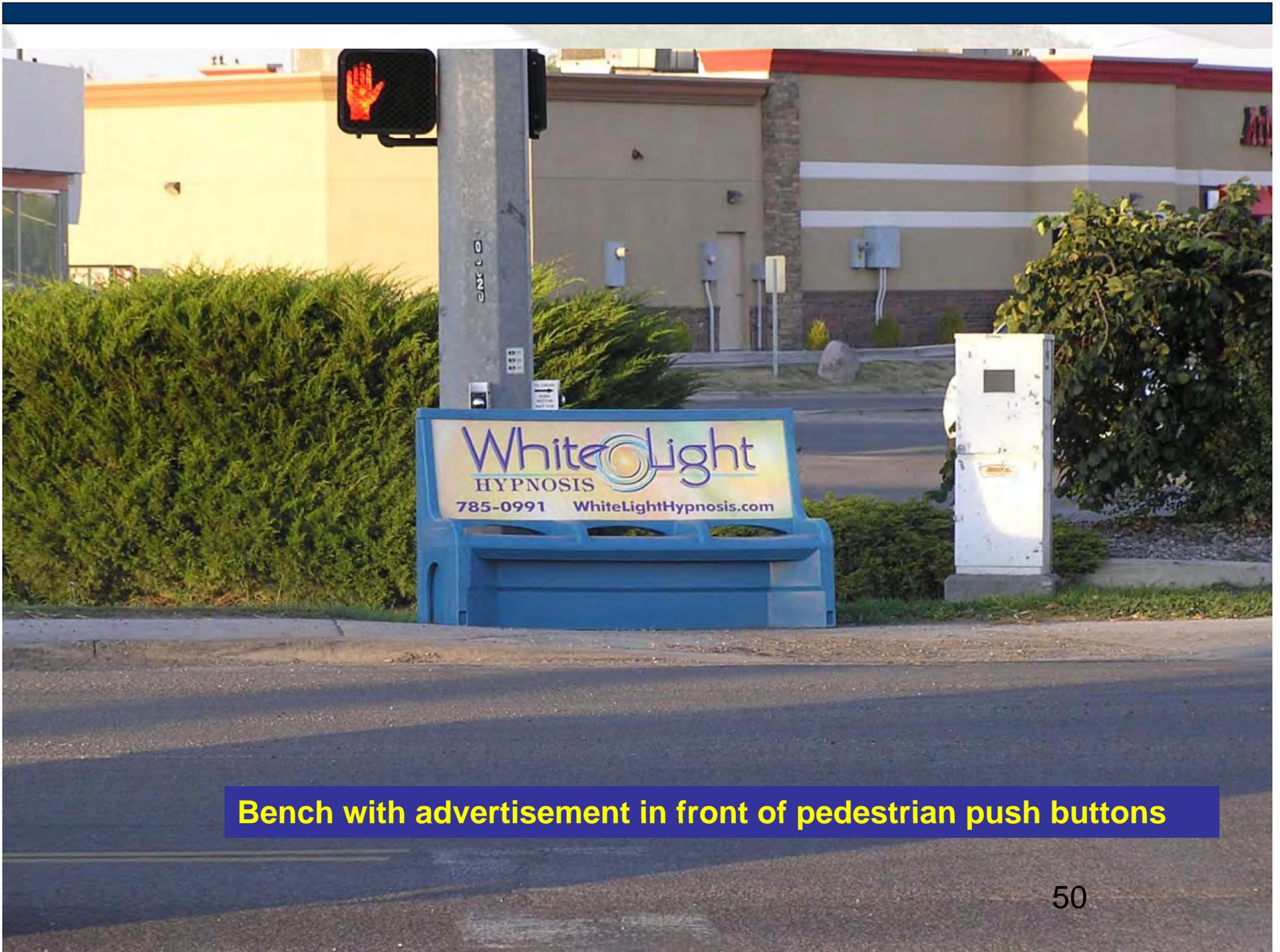


Figure 27

Examples of "Protruding" obstructions are: guy wire, tree limb, sign, wall phone, water fountain and mounted cabinet.





Bench with advertisement in front of pedestrian push buttons



Obstructions on sidewalk

References

- Title II of ADA Technical Assistance Manual
 - <http://www.ada.gov/taman2.html>
- Draft Public Rights-of-Way Accessibility Guidelines, 11/23/05
 - <http://www.access-board.gov/prowac/draft.htm>
- FHWA Memo-Clarification of FHWA's Oversight Role in Accessibility, 9/16/06
 - http://www.fhwa.dot.gov/civilrights/ada_memo_clarificationa.htm
- FHWA Memo-Clarification of FHWA's Oversight Role in Accessibility, 9/16/06-Questions and Answers About ADA/Section 504
 - http://www.fhwa.dot.gov/civilrights/ada_qa.htm#q31
- AAHST Guide for Planning, Design, and Operation of Pedestrian Facilities
 - https://bookstore.transportation.org/item_details.aspx?id=119



References

- **Public ROW Access Advisory Committee's Report on Accessible Public ROW Planning & Designing for alterations**
–<http://www.access-board.gov/prowac/alterations/guide.htm>
- **FHWA Memo: Preventive Maintenance Eligibility, 11/26/01**
–<http://www.fhwa.dot.gov/preservation/memos/011126.cfm>
- **FHWA Memo: Snow Removal on Sidewalks Constructed with Federal Funding, 8/27/08**
–<http://www.fhwa.dot.gov/preservation/082708.cfm>
- **Common Problems Arising in the Installation of Accessible Pedestrian Signals**
–<http://www.access-board.gov/research/pedestrian-signals/bulletin.htm>
- **ADA and ABA Accessibility Guidelines Homepage**
–<http://www.access-board.gov/ada-aba/>



References

- Idaho Transportation Department online manuals
 - <http://itd.idaho.gov/manuals/ManualsOnline.htm>
- Uniform Federal Accessibility Standards (UFAS)
 - <http://www.access-board.gov/ufas/ufas-html/ufas.htm>
- FHWA 's Parts I and II of “Designing Sidewalks and Trails for Access”
 - www.fhwa.dot.gov/environment/bikeped/access-1.htm
 - www.fhwa.dot.gov/environment/sidewalk2/pdf.htm
- US Department of Justice
 - www.ada.gov
- US Department of Transportation/FHWA
 - <http://www.dot.gov/ost/docr>
 - <http://www.fhwa.dot.gov>



Contact information

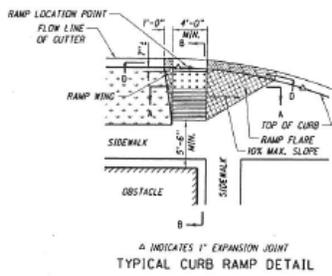
- Jason Giard, P.E.
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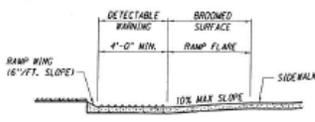
Standard Drawings



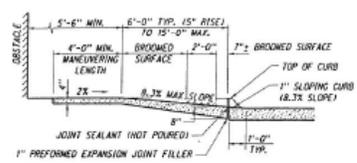
Roadway Design Division



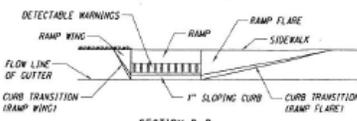
TYPICAL CURB RAMP DETAIL



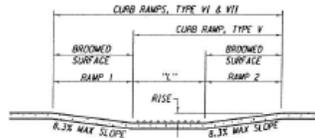
SECTION A-A
TYPICAL RAMP CROSS SECTION



SECTION B-B
TYPICAL RAMP PROFILE

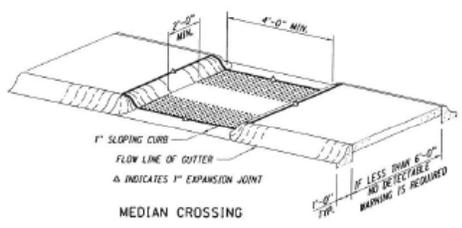


SECTION D-D
TYPICAL RAMP CROSS SECTION
(SHOWING CURB TRANSITION)

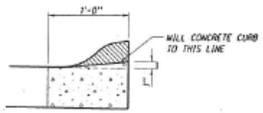


CURB RAMP	RISE	RAMP 1	RAMP 2
TYPE V	3"	VAR.	4'-0"
TYPE VI	3"	5'-0"	4'-0"
TYPE VII	5"	5'-0"	6'-0"

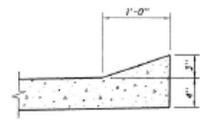
SECTION C-C
TYPICAL RAMP CROSS SECTION



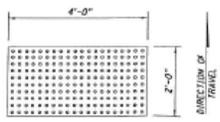
MEDIAN CROSSING



NOTE:
COMBINATION CONCRETE CURB AND CUTTER MAY BE REMOVED AND REPLACED IN LIEU OF MILLING.
CURB REMOVAL DETAIL



3" CONCRETE SLOPING CURB DETAIL



DETECTABLE WARNING PANEL

- LEGEND**
- DETECTABLE WARNING PANEL
 - BROOMED CURB RAMPS
 - BROOMED RAMP WINGS & FLARES
 - MILLED CONCRETE
 - GRASS OR NON WALKING SURFACE
 - CURB TRANSITION

NOTES:

THE NORMAL CUTTER LINE PROFILE SHALL BE MAINTAINED THROUGH THE AREA OF THE CURB RAMPS.

THE SURFACE OF ALL CURB RAMPS SHALL BE BROOMED PERPENDICULAR TO THE SLOPE OF THE CURB RAMP. ALL FLARES AND WINGS SHALL BE BROOMED PERPENDICULAR TO SLOPE.

CARE SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE CURB RAMPS, FREE OF SACS AND SHORT GRADE CHANGES.

THE RAMP FLARES SHALL BE CONSTRUCTED WITH A 10% SLOPE AT RIGHT ANGLES TO THE SLOPE OF THE CURB RAMPS, TYPES VI, VII AND IV.

THE SLOPE OF SIDEWALKS APPROACHING CURB RAMPS FOR THEIR FLARES SHALL BE FLAT ENOUGH TO PROVIDE RECOVERY AREAS FOR WHEELCHAIRS ENTERING OR EXITING THE RAMPS.

THE WORK OF CONSTRUCTING THESE RAMPS SHALL BE MEASURED AND PAID FOR AS A PART OF THE WORK FOR "CONCRETE SIDEWALKS", "CONCRETE MEDIAN SURFACING" OR "CONCRETE SIDEWALK". THE WORK OF MODIFICATION OR NEW OR EXISTING CURB WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER ITEMS OF WORK FOR WHICH DIRECT PAYMENT IS MADE.

DETECTABLE WARNING PANEL:

- SHALL BE PAID FOR BY THE SQ. FT.
- SHALL BE FROM THE APPROVED PRODUCT LIST
- SHALL BE A CONTRASTING COLOR TO THE SURROUNDING SURFACING
- SHALL EXTEND THE FULL WIDTH OF THE 1" SLOPING CURB.

ON THE RADIUS THE CORNERS SHOULD BE LOCATED SO THAT THEY ARE 6" TO 8" FROM THE BACK OF CURB.

NEW CURB RAMPS SHALL HAVE CAST IN CONCRETE DETECTABLE WARNING PANELS.

• INDICATES 2% SLOPE TOWARDS STREET.

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF ROADS
STANDARD PLAN NO. 303
CURB RAMPS

FHWA APPROVED:		1 2
JAMES J. ANDT F-462		

WARTH 22, 2010
DATE

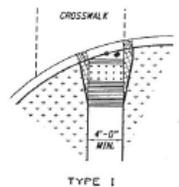
ORIGINAL:
MARCH 22, 2010
DATE



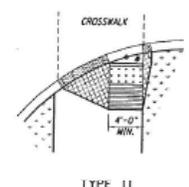
Roadway Design Division

3/11/07-2010 11117

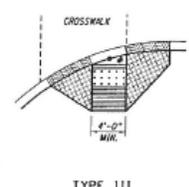
SHEET 2 OF 2



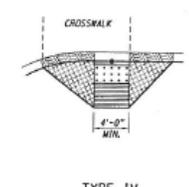
TYPE I



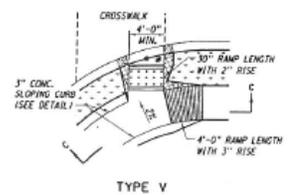
TYPE II



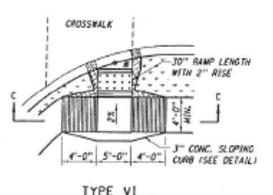
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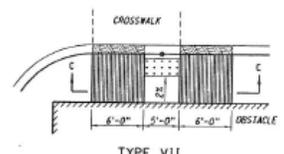
TYPE IV



TYPE V



TYPE VI



TYPE VII

- LEGEND
- DETECTABLE WARNING PANEL
 - BROOMED CURB RAMPS
 - BROOMED RAMP WINGS & FLARES
 - MILLED CONCRETE
 - GRASS OR NON WALKING SURFACE
 - CURB TRANSITION

REV. NO.	DATE	DESCRIPTION OF REVISION		
NEBRASKA DEPARTMENT OF ROADS STANDARD PLAN NO. 303 CURB RAMPS				
PROFESSIONAL CIVIL ENGINEER 		FHWA APPROVED: MARCH 22, 2010 DATE ORIGINAL: MARCH 22, 2010 DATE		
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Summary



Design Criteria for Ramps

- **Determine project scope of work**
 - Structural roadway improvement (0.2' overlay)?
 - Is there sidewalk?
 - Is there curb and gutter?
 - Is there pedestrian travel?
- **Determine pedestrian path of travel**
- **Determine existing right-of-way**
- **Make decisions at Preliminary Field Review (early in the design) on new and existing ramps**



Design Specifications:

- Ramp running slope = 8.3% Max. (7.3%+/-1% rec.)
- Ramp width = 4 foot minimum width (5 foot rec.)
- Landing width = 4 foot minimum width (5 foot rec.)
- Flare slope = 10% maximum (9% +/- 1% rec.)
- Cross slope = 2% maximum (1.5% +/- 0.5% rec.)
- Truncated Domes = 24 in. (full width of ramp)



Common Ramp Errors

- **Not providing a landing**
- **Cross Slope is too steep (2% maximum)**
- **Lip in Curb Line**
- **Not reviewing the pedestrian path of travel with the design**
- **Not reviewing drainage features especially cross slopes on ramps**
- **Not using retaining walls for difficult locations**
- **Selecting the wrong ramp type**
- **Not working around existing obstructions**
- **A smart level is a necessity for design and construction**



END PART 4

Questions?

Thank You !

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