

Mid-Atlantic ADA Center
Promoting Independence and Access Through
Responsible Design
Part 2: Safe and Accessible Intersections
Tuesday, May 14, 2019

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So let's get our session for today started, Promoting Independence and Access through Responsible Design. Our presenter today is Melissa Anderson. Melissa is a professional engineer specializing in pedestrian safety and access for people with disabilities. She was the transportation engineer for the U.S. Access Board and worked to develop the most recent version of the proposed Public Rights-of-Way Accessibility Guidelines. Melissa currently owns her own company, providing pedestrian accessibility training across the country and assisting state and local agencies in assessing and writing policies and updating transition plans. She also serves as a third-party consultant when clients find themselves facing compliance reviews or other enforcement actions.

So without further ado, I am going to turn our session over to Melissa.

>> MELISSA ANDERSON: Thank you, Nancy. So

we are going to -- this is Part 2 of a four-part series, our Webinar Series, and last week we talked about the Obligations and Sidewalk Basics. Today we are going to talk about Safe and Accessible Intersections, and the next time we will talk about Curbside Access, and then finally, how you actually make this work within your organization.

So slide 16, today we are going to talk about Safe and Accessible Intersections. We are going to do a really brief review of the legal obligations, and we talked about those in depth last week, so this is just really quick to help us better understand how the curb ramp standards and guidelines work. We are going to talk about the technical requirements for curb ramps, street crossings, and pedestrian signals.

So first just a little bit of background, just a review of the federal civil rights laws. So there's another one besides what's up here, the Architectural Barriers Act was in 1968, and it only applied to federal agencies and facilities built with federal funds. So this is slide 17. 1973, we had the Rehabilitation Act, and Section 504 prohibits discrimination in programs and activities receiving federal funds, and it's enforced by the U.S. DOT or Federal Highway Administration. In 1990, the Americans with Disabilities Act was passed by Congress, and it also prohibits discrimination, and it prohibits discrimination in the provisions of facilities, services, and programs. So it has a lot of different chapters to it, and we are going to focus primarily on Title II. Title II applies to how state and local governments provide access for people who have disabilities, and the Americans with Disabilities Act is enforced by both the Department of

Justice under the programmatic access requirements of the ADA, and sometimes they pass that enforcement along to DOT or Federal Highway, and when I say Federal Highway, I mean DOT, and vice versa.

So slide 18. How do we know what's accessible? There are standards and guidelines, and if you meet those standards, then your facility is considered accessible. In 1973, the Access Board was developed, and it's an independent federal agency, and they are responsible for developing the guidelines to determine the minimum level of access for a facility. Those guidelines -- they also enforce the Architectural Barriers Act, so those guidelines become standards for federal agencies. But the guidelines primarily are adopted as standards by other agencies, federal agencies with enforcement authority. So the 2004 ADA/ABA guidelines that were published were adopted by the Department of Justice, and they sent them out for public comment, went through their rulemaking process, and were developed into the 2010 ADA Standards. In 2016, the Department of Transportation did the same thing, and they have a 2006 ADA Standards for transportation facilities. So these standards apply to buildings and sites. So there is nothing that specifically applies to the public right-of-way that is currently a standard.

The Access Board has been working on guidelines for the public right-of-way, but they are not final yet. They are still in a proposal form. So they are not final guidelines. They haven't been published as a final guideline for DOT or DOJ to pick up and turn into a standard, and in themselves, they are not standards.

So slide 19. If we don't have standards in the public right-of-way, how are we supposed to know how to make it accessible? And the ADA, the Rehabilitation Act, they require agencies, Title II agencies, to make all of their facilities accessible. The regulations also very specifically require curb ramps to comply with the 2010 ADA Standards, and you can find that in 28 CFR 35.151. But there's flexibility in design for areas that aren't covered, like curb ramps. So like the curb ramps are covered, and other areas are not. So what are you supposed to do in the public right-of-way? In the past, the Federal Highway Administration wrote a memo that supported using the public right-of-way guidelines that were available at the time as a best practice. You are going to hear -- because there gets to be a lot of confusion across the country on what people are supposed to do, and you hear different things. When I heard the following information, I was a little concerned, so I called Federal Highway. They are not going to come out and directly say that the Public Right-of-Way Guidelines are best practice, and it's not because they don't believe that they are best practice. They are still not standards. And so when they -- when the guidelines are published and Federal Highway picks them up to go through rulemaking process, they need to -- people need to know that their comments will be considered and changes could be made. But it doesn't mean that they aren't good guidelines to follow and might still be considered best practice.

So what are you supposed to do? For curb ramps, you need to follow the 2010 ADA Standards. You need to use those as a minimum or go above and beyond. But

for everything else, you know, you have flexibility. You can use the 2010 ADA Standards, but they don't cover street crossings and pedestrian signals and the types of things we find in the right-of-way. You can also use the proposed public right-of-way guidelines. Another good resource for information is the Manual on Uniform Traffic Control Devices or the MUTCD. And other resources that you can look to are published by AASHTO, which is the American Association of State and Highway Transportation Officials, and they have design guidance out there for engineers for highways and streets and pedestrian facilities and bicycle facilities. So those are resources that primarily talk about engineering design, and they don't specifically focus on accessibility. A lot of times they just refer back to whatever guidance has come out from the Access Board. And I know that the pedestrian and bicycle facility designs either have been recently updated or are going through the process. But they are good resources for a lot of good ways to think through how to design a facility.

So regardless of how you choose to develop your standards, you have an obligation for access, and this obligation comes through the Rehab Act, it comes through the ADA. New construction is required to be accessible. But new construction is defined pretty narrowly, and we talked about this last week, but it's where you have no existing constraints. So if you are platting out a new road or new subdivision, that's new construction because you don't have lot lines, you don't have utilities. If you have no sidewalk but you are putting sidewalk in an established neighborhood, that's not new construction; it's an

alteration to the right-of-way. So the expectation for things to be fully accessible really applies where you don't have existing constraints. An alteration is a change to an existing facility, and you are obligated to, when you alter an existing facility, make it accessible to the maximum extent practicable within the scope of the project. And if you have existing facilities, they can't deny access to a person who has a disability. So that's where the transition plan comes in that we talked about last week. And we are going to spend some time talking about alterations because with curb ramps, one of the primary points of discussion is when -- what is an alteration that -- what is an alteration that requires me to put in curb ramps? So an alteration is a change that affects the usability of a facility. So if you resurface a street, you have improved the use of that facility, and if people are crossing that facility, you have a change in the surface and it's more usable. And again, it might not be possible to meet all the accessibility requirements, so you have to meet the new construction requirements to the extent that you can within the scope of the project.

But DOJ has said that curb ramps are within the scope of a resurfacing project if that resurfacing is an alteration. And their regulation say if you alter a street, you have to provide a curb ramp. They also say if you alter a sidewalk, you have to provide a curb ramp to the street. You are basically providing access to all the crosswalks. So when is street resurfacing considered an alteration? And in 2013 -- oh, slide 22. In 2013, there were a lot of questions about, well, what's an alteration, and what's just maintenance on streets? And DOJ and DOT came up

with a technical memo, a Technical Assistance Memo. It didn't change anything. It just explained their interpretation. In 2015, they came out with questions and answers that supplement the technical memo, and two of the important parts of it are that the alteration or the resurfacing has to span from one intersection to another, and it provides an additional layer of material to the roadway. But if you are just doing maintenance, you are not required to include curb ramps in your resurfacing project.

So a little more detail on that, and I am not going to read these to you because this is right out of the technical memo. This is on slide 23. Resurfacing is an alteration that requires the addition of curb ramps if it affects a roadway and spans one intersection to another and adds material to the road, with or without milling. Those kinds of treat might be a milling overlay. They could be concrete rehabilitation. They could be a thin overlay. But they have laid out specific treatments that constitute alterations in their opinion.

But what's street maintenance? Like I said, you don't have to change your curb ramps or upgrade your curb ramps if you are only doing maintenance. So in their Technical Assistance Memo, they said that maintenance does not significantly affect the public's access to or usability of the road. So if you are just painting or striping, filling potholes or doing crack sealing, you are not adding material to the road really that adds any significance, that's just maintenance. And anytime you are not sure of where your project falls, contact the DOT. You can find the state highway division numbers on

Federal Highway's website. Or if you are a local agency, you can go through your state agency. So I just put a few of them up here to talk about just to save you guys from typing them in later.

When a municipality is resurfacing a street and there are curb ramps or sidewalks that are not compliant or when there are no curb ramps at all at intersections or at street crossings, what's the municipality's responsibility to correct the sidewalks and/or curb ramps? So sidewalks are not pulled into the project by the regulations. Curb ramps are. So if there are curb ramps there and they do not meet either a previous standard or your current policies, then they should be upgraded at the time of the resurfacing. Sidewalks are not included. So a lot of agencies, because they have concrete work going on at the time of their resurfacing, will do sidewalk improvements at the same time. A lot of other agencies will go through and look for barriers. So actual barriers that will prevent a person from getting down the street, whether there's a step or a really severe tree heave or a utility pole right in the middle of the sidewalk. So that's kind of a choice in how you want to manage that. Everything you don't improve in your sidewalks that's not compliant then goes to your transition plan.

What about installing new curb ramps? So if you don't have a curb ramp but there's one required to get access between the street and the sidewalk, then you are required to add those curb ramps.

And does the source of funding matter? And the source of funding and resurfacing really doesn't matter. If you have federal funding or if you have, say, a local

improvement tax, the fact is you are doing an alteration to the street, and it falls under the ADA regulations. And who is ultimately responsible for ensuring the correct process is followed? So the person -- or the agency during the resurfacing is ultimately responsible for making sure that people know that the sidewalk or the curb ramps are noncompliant, and you need to work with your state/Federal Highway division office to really determine their expectations. If you are doing resurfacing but you do not own the right-of-way, what are those expectations? So I don't have all the answers, guys. Sorry.

So now we are going to talk about scoping and technical. And we are on slide 26. So I went out on a limb here on these, and I have couple up with a different format and a way that I -- because I want you to really understand how to look at the technical requirements when you don't have any standards. So I boiled it down to a lot of people will use the Proposed Public Right-of-Way Accessibility Guidelines as their method of design. Curb ramps have to be done by the ADA Standards or the DOT standards where they are noted. But it also -- kind of gone out on a limb and saying okay, guys, considering PROWAG, considering ADAAG, best practice -- and this best practice is my personal opinion. It's based on knowledge and a lot of experience, and hopefully you can see that it's just common sense when you look at the standards. So even though it says best practice, it's kind of based on my considerations of best practice, but I think you will see why they make sense.

So are you allowed to cherry-pick between standards and guidelines and proposed guidelines? So generally,

when you pick a standard, you have to follow it. But all of the regulations allow you to provide equal or better access. So if you are following the ADA Standards for your curb ramp but PROWAG provides you something better, you can still follow PROWAG for that element, and you will see what I am talking about. So can you cherry-pick to reduce accessibility? No. You'll probably get caught at that. Can you cherry-pick to increase accessibility? Yes, you can, and there's logic behind it.

So on slide 28, where are curb ramps required? So curb ramps are required whenever you construct or alter a street or a roadway and there's a barrier to entry to the sidewalk. They're also required when you construct or alter a pedestrian walkway. Then you have to provide curb ramps to allow access to the streets. So basically, the curb ramps are required at all crosswalks, and we are going to talk about the definition of a crosswalk a little bit later.

Slide 29. So scoping. First we need to know how many curb ramps are we supposed to fit in? And the Public Right-of-Way Guidelines say one for each street crossing. So if you are at an intersection of two streets and you have pedestrian access across each street, you need a curb ramp for each of those crosswalks. But where you have an alteration and it's not technically practical to put in a curb ramp for each street crossing, you can do a single diagonal curb ramp. Now, if you are following the ADA Standards, which remember, we said you have to for curb ramp, it's not actually specified how many curb ramps to put in. The way you get to scoping for curb ramps -- and I had to actually make a call to the

Access Board and say wait, how do I even get there following the rules? So the number of curb ramps aren't specified, but they are part of an accessible route. So your accessible route goes from the sidewalk into the street, and you need to make sure that you have access between the two using a curb ramp. It does allow you to use diagonal curb ramps, where PROWAG says you can only do it if you can't make single curb ramps.

So what's the best practice? You can follow the PROWAG because it exceeds what's required in the ADA Standards. So you can still say in general you are following the ADA Standards, but PROWAG gives you more information and provides better access by requiring a curb ramp for each street crossing.

Slide 30. So this is why it's important to provide a curb ramp for each street crossing. If you look at the red line, if my friends from the Access Board were going to lunch, I am going to walk across that intersection using the direction of that red line. My friends who use wheelchairs and mobility devices, they can't do that because there's a curb there, and so they have to go down the diagonal ramp, back up the street to the crosswalk, and then back down to the center of the apex of the corner and then back up to the sidewalk. So you can see that there's a lot of outer direction travel and a higher vulnerability to moving traffic. So it's best to have a curb ramp for each street crossing.

And here's some illustrations. So if you look at the top left-hand picture, there's a picture of a blended transition, which is a type of curb ramp sort of. But it provides access to two street crossings. You don't have

to come down the apex to the corner and then make a turn to adjust to one of the corners. You can go straight into the crosswalk. You look at the top right-hand corner, this curb ramp is bad for all kinds of reasons, which I hope most of you know, but there's one curb ramp, and it's providing access to two crosswalks. So if a person is turning to the right in the picture, they have to come down towards the bottom of the picture, turn in the street, and then go in the street to the other crosswalk. That's bad. And a curb ramp for each street crossing can look something like the picture in the lower left. And the curb ramps are not directly behind the back of the curb. They lead down to a blended transition or a turning space landing area. But you are still providing a curb ramp for each crossing and direct access.

Slide 32. So different types of curb ramps. Public right-of-way guidelines give you three specific kinds of curb ramps -- perpendicular, parallel, and then blended transitions. If you look at the ADA Standards, they are not specific, but they are also not prohibitive, so they don't tell you you can't design parallel curb ramps or blended transitions, but they talk mostly and show pictures of perpendicular curb ramps. So what's the best practice? You have to follow ADAAG, but the public right-of-way guidelines are more specific. So you can follow ADAAG but use the information from PROWAG as exceeding the minimum requirements.

Slide 33. Here are two different types of perpendicular curb ramps, and a perpendicular curb ramp is either perpendicular to the curb or to the street you are crossing. So on the left-hand side you can see that the

curb ramp is truly perpendicular to the street that you are crossing or parallel to the crosswalk. The picture on the right, the curb ramp is parallel -- or is perpendicular to the back of the curb. so a person goes up or down that curb ramp directly across the curb.

Slide 34, here's an illustration of a parallel curb ramp. And if you printed these off, please change to perpendicular at the bottom to parallel. A perpendicular curb ramp has the ramps parallel to the curb or street. So that's my mistake there. So you can see that the ramps are basically parallel to the street. So you come down the ramp. At the bottom, it requires a turning space so that you can turn and enter the sidewalk. Or enter the crosswalk.

A blended transition isn't really a curb ramp but provides access between the sidewalk and the street at a slope that is less than 5%. So this isn't specifically called out in the ADA Standards, but an accessible route is always allowed to be less than 5%. So it still fits and you can still say you are meeting your ADA requirements.

So a blended transition can be like the left, where you have a slope of up to 5%, but you have to have a pedestrian access route that goes around the corner without losing your 2% crosswalk. So you have to have kind of a bypass sidewalk. Or you can have your entire sidewalk ramp down to a depressed corner that has a maximum of 2% in each direction because you have your crosswalks there, and it would be less than 5, so it's a blended transition.

Okay. So now we are going to get into -- we are on slide 36, and we are going to go through the technical

requirements. So I just told you what kind of curb ramps there are, but in reality, when I look at curb ramps, I don't generally put a name to them. I don't care if they are parallel or if they are perpendicular. I do care if they are blended transitions because they are a little bit different. But the requirements are basically the same. Your slopes are the same, turning spaces are required where you might need to turn, and so we are going to go through surface, width, slopes, turning spaces, grade breaks, clear spaces, flares, and detectable warnings and counter slope.

Slide 37. Curb ramp surface requirements. Public Right-of-Way Guidelines and the ADA Standards say they have to be firm, stable, and slip resistant, and that's part of every successful route or pedestrian access route. PROWAG says you can't have grade breaks on the ramp runs. The ADA Standards say there are no changes in level on ramp runs. It's kind of the same. A change in level is where you may have a surface discontinuity,. A grade break is where the slope changes. And so the ADA Standards also say landings cannot accumulate water. So if you are developing policy locally, how do you put all that together? So you can follow the ADA because you are supposed to put curb ramps, but you can also allow that there are no grade breaks allowed on the ramp runs. So you are going above and beyond what you are required to do. But it makes it accessible, and it is really important not to have grade breaks on a curb ramp.

Another best practice is just concrete or a paved surface is the easiest to form and is more likely to comply than some of the other materials. So if you look at the

brick curb ramp on the left-hand side, it looks okay now. It's going to be a bumpy ride for somebody coming up and down those bricks that have bevels on the edges. But maintenance over time will probably be an issue. No matter how they are put in there, when you put bricks or pavers, they tend to shift over time.

Slide 38, width requirements. So this is a good place where this format really is beneficial. If you are using the Public Right-of-Way Guidelines, it requires curb ramps be a minimum width of 48 inches. It also addresses the 2013 supplement to the right-of-way guidelines addresses shared use paths. So if you have a shared use path, you want your curb ramp to be the full width of that shared use path. That's because you don't want -- you know, you have a lot of wheeled devices on a shared use path. There might be people using wheelchairs or scooters, or they can be bicycles or strollers, and you don't want all those people to have to converge down to a 48-inch curb ramp. So the ADA Standards only require a 36-inch minimum width on your curb ramp. So I am going to cherry-pick, and even though I have to follow the ADA Standards, I am going to use PROWAG because it's better. It provides information for shared use paths and also provides better access. So best practice is -- and you are still using the ADA Standards, but you are exceeding them by also using the Public Right-of-Way Guidelines.

Another thing to think about as you are building the width of your curb ramp or your sidewalks or anything is to add just a little bit more. So the requirement is 48 inches in Public Right-of-Way Guidelines or 36 if you choose to

use the ADA Standards, but when you form up your boards, if you put them 48 inches apart, I know people who go out and do curb ramp inspections who will say that, okay, the part of the sidewalk on the very edge that bevels down doesn't count as usable surface, and they will consider that noncompliant. So anything you can do -- we talked about minimum design and building and construction tolerance. Add just a little bit. Maybe you make all of your sidewalks 50 inches. The cost of the concrete is minimal. The cost of tearing them out is significant. And when you look at local policies or if you are looking at some of the engineering design guidelines, they usually require sidewalks to be much more than four feet. So you want a curb ramp that accommodates your sidewalks.

And running slope. So running slope on a curve ramp is if you are going up or down that curb ramp, you are going along the running slope. It's parallel to the uphill or downhill. The maximum allowed is 1:12 or 8.3%. And that's true in PROWAG or the ADA Standards. Public Right-of-Way Guidelines has an allowance for a 15-foot rule where you can have a steeper slope, and I am going to explain that in a little bit. The ADA Standards say in alterations, there is an exception when you have a space limitation. So if you are only going up a 6-inch rise, you can have up to 10%. If you are going up a 3-inch raise, you can add up to 12.5%. So 12.5% is the very maximum allowed in the ADA Standards. But there's no 15-foot rule that makes it possible to go even steeper.

So what's the best practice? We always fall back to

because the ADA remembers you to follow the 2010 standards if you follow the ADA, but you always use the flattest slope possible, and you need to work that language into your policies. Steeper slopes are only allowed if it's technically impracticable to make it within the scope requirements, or if you have space limitations. So if you are trying to make it steeper based on the ADA Standards, it's because you have a constraint of your space. And if you are trying to make it steeper because of PROWAG, you also have a space problem and technical impracticality. So one of the things to consider as you are designing to take into account construction tolerance is to have your design slope less than the maximum, and a lot of agencies will use 7.5% maximum. Now, you can't just say that. You have to actually show that on your design plans because if you expect contractors to build it that way but you haven't given them the room because, obviously, a flatter curb ramp takes up more space and needs more length, you know, you really need to take that into account during design. But in either case, there is no maximum length for a curb ramp. So when you read the Public Right-of-Way Guidelines, it says that the curb ramp slope maximum is 8.3%, but you are not required to make it more than 15 feet. But it doesn't say that your curb ramp can't be more than 15 feet. It just means that at 15 feet you can make your curb ramp steeper than 8.3. So whenever you can't meet the regular 1:12 or 8.3 maximum requirements, document, whether it's a space limitation or you are using the 15-foot rule, document why you are doing what you are doing. Because if someone comes out ten years later and looks

at the slope of your curb ramp, they are not going to know why it's that way unless there's documentation somewhere.

Running slope examples. The running slope is the slope going up or down the ramp or the transition. And here are the exceptions. The top chart is right out of the 2010 ADA Standards in Section 405.2, and chasing grade. The chasing grade or 15-foot rule was put into effect because a lot of times people were doing curb ramps as part of their resurfacing project, and if you have steep sidewalks, it's not always possible to connect to the existing grade without going an extended length down the street. So the hope is that, you know, you are not going to be repaving the world just to do why you are curb ramp. You are allowed to stop at 15 feet and make it steeper.

Slide 42. We are going to talk about cross slope requirements. So the maximum cross slope in the ADA is 2%. And cross slope is, as you are going up the curb ramp, it's to the side. If you stick your arms out like an airplane and tip one way or the other, that's your cross slope. So Public Right-of-Way Guidelines allow you to have -- it's 2% also if traffic is stopped or has to yield as they go over the crosswalk. If there's no traffic control or there's no stop or through condition, then the cross slope of the curb ramp can be up to 5%. The 5% is not allowed in the ADA, and this is the place where 5% does not provide better access than 2%. So you really need to follow the ADA. And how are you going to get to 5% if you need to or the cross slope on your crosswalk or the running grade of your road are 10%? It's technically infeasible to make it 2%, so then you have to make it

accessible to the maximum extent practical, and you have to document it. Again, to allow for construction tolerance, don't tell people to build something at the maximum allowed slope. A lot of agencies will use 1.5% to allow for some construction tolerance. And if you are building a curb ramp, and if you look at this picture, how much cross slope do you think you'd need for water to run down that curb ramp? We put cross slope on. Flat is best for people who use wheelchairs. And we talked about this with sidewalks last week. But we have a little bit of cross slope so that we can drain the water off because we are in an outdoor condition. But your curb ramp is fairly short. You are not going to create a stormwater flume. You really don't need cross slope on a curb ramp except to meet your street at the bottom.

Slide 43, here are some cross slope examples. 2% max, 1.5% better. The least cross slope that you can get to meet your needs. Flatter is always better. That's the ADA standard. But reality is that you have to tie into a street with a steep running slope, you've got to make that transition from meeting the street up to your tongue space at the top at 2%. You are going to have some warping. You are not going to be at 2% all the way down the ramp. That's the reality. That's where it's technically infeasible to meet the standard.

Turning spaces. The required -- in the right-of-way guidelines, they are required at the top of the perpendicular curb ramp and bottom of a parallel curb ramp. 4 by 4 minimum, 4 by 5 if constrained, and the cross slope is allowed to be 2% under the same conditions we talked about for curb ramp. The cross slope is 2%

unless it's adjacent to the road like on a parallel ramp, and it's a condition for cars, then it can be 5%.

ADA Standards require a turning space at the top of the curb ramp, and that's because they don't really talk about parallel curb ramps at all. The minimum size is 36 by 36. Now, obviously, 4 foot by 4 foot is more accessible. And it also says that if there isn't any landing or you have less than 36 inches, then people can use the flares to traverse sideways over that curb ramp, and the flares are a maximum of 1:12. Then again, the crosswalk is required to be 2% in the standards.

So best practice, I would follow the 2010 ADA Standards for slopes because it's required, and I would follow PROWAG for dimensions. So we are cherry-picking the best of each one of them to provide the maximum level of access. You always have a landing. Don't make flatter -- excuse me. Don't make flatter flares. In the absence of a landing, if you cannot provide the landing at the top or bottom of a curb ramp, you probably need to look at a different design. 1:12 flares with no landing means someone has to go up, a compound slope. It's really difficult for somebody to do that. A compound slope means they are going uphill and turning at the same time. And again, allow for construction tolerance in all your design standards.

Slide 45, so here are some examples. And on the left-hand side, this comes out of the 2010 standards, 36-inch minimum turning space, the full width of the curb ramp, and 2% maximum slope. So it's basically a level landing. Public Right-of-Way Guidelines want a bigger turning space, and if there are constraints -- and I will tell

you that in the Public Right-of-Way Guidelines, in this section, the pictures that you see here are not correct. The dimensions on the left-hand corner that you are seeing say 5 foot parallel to the roadway, and it really should be 5 foot perpendicular to the roadway, parallel to the crosswalk when you have constraints. 2% maximum slope, 5% if you have a -- if you are on the turning space and a parallel curb ramp. 5% if your crosswalk is allowed to be 5%. That can vary with your crosswalk type.

This is a lot of information to kind of throw at you with lots of words and numbers on it, so I think if you go back and look at these and think about how it's divided up, it will make good sense.

So this is why turning spaces matter. If you have a slope and you are expecting people to use the flares to get to the sidewalk on each side, it's going to be really, really difficult.

And grade break requirements. So the Public Right-of-Way Guideline comes right out and says that grade breaks at the top and bottom of the curb ramp have to be perpendicular to the ramp running slope, and you have to have flush transitions. So grade break is anywhere the slope changes. If you are going from 2% cross slope at the space at the top or 2% slope in your turning space at the top to an 8% running slope on your curb ramp, where those change, that joint in your sidewalk, needs to be flush, and it needs to be perpendicular with the path of travel up and down that ramp. And you can see the picture at the bottom shows one wheel of the wheelchair is elevated, making it very unstable, and that's because there's not a perpendicular

grade break in that case. The ADA Standards say you'd have to have a flush transition. They don't come out and say you have to have perpendicular grade breaks, but the requirement for a 2% cross slope and an accessible route will essentially result in a perpendicular grade break.

Otherwise you get the instability that you see in the picture. So best practice on this is to follow PROWAG because it exceeds the ADA Standards. And you have to think about the instability.

Here's some grade break examples. If you have a perpendicular curb ramp approaching an intersection on a wide radius, like the picture at the top left, your grade break at the bottom of that ramp is not going to be at the back of the curb. Your grade break is going to be at the bottom of the ramp, generally starting at the corner where it first touches the back of the curb. The funky triangle that's in front of that is just part of your pedestrian access route. So it needs to be 5% maximum slope. Just like the rest of your pedestrian access route.

Another example of the perpendicular grade break is if you are like on the top right-hand side -- if your curb ramp is perpendicular to the curb, it's easy. It just ends at the back of your curb. So at the bottom it shows a flush transition. As you are changing from one slope to another, you can't have a bump. So no lips at the bottom of the curb ramp. No quarter-inch surface differential allowed for continuity. You can't have a half-inch bevel. It has to be flush. You need to be able to move smoothly from the curb ramp through the gutter flow. The picture at the bottom right is a picture of a person using their wheelchair, and the back tip wheel is caught at the top of

the lip. It used to be a standard to put like a half an inch lip at the bottom of curb ramps to help keep some of the water out. That's not allowed. If you have curb ramps like that, they can be ground out to get rid of that lip and improve safety.

Okay. Clear space. A clear space and a turning space are not the same thing. So PROWAG requires a clear space at the bottom of a curb ramp. 4 by 4 minimum, outside the parallel vehicle travel lane, and within the crosswalk. The ADA Standards only really require at the bottom of a diagonal curb ramp, and there's a good picture. We saw it earlier. The clear space only has to be 36 inches wide and 48 inches in depth. It's outside the active lanes of travel and within the crosswalks, and the standards say if it's marked then it has to be.

So the best practice is to follow PROWAG, and you follow PROWAG because it requires a larger space, it requires the 4 by 4. They both require them to be outside the traffic lane and within the crosswalk. But you have to know that there are no slope requirements in them. So whatever your surface slope has to be for that area, which is your regular pedestrian access route cross slopes and running slopes and surface continuity, that applies to that clear space.

And here are some examples. So the clear space we are going to use 48 by 48 inches minimum. You get down to the bottom of the curb ramp, and then you have your clear space. So part of it might be on that funky triangle. Part of it may run through your curb and gutter, and that's okay. The parallel traffic is the traffic moving in

the same direction as the person crossing the street. And the picture on the right is clear space at the bottom of a diagonal curb ramp, and that comes out of the 2010 standard. So you are required to have that 48 inches in depth. If you have a parallel curb ramp that clear space is actually behind the back of the curb, so you come down the ramp, you have a clear space where you are outside of traffic where you can make your maneuvers to center up on your crosswalk. And here are some examples. These are bad example. So detectable warning bad on the picture on the left. If you were to go draw a square four feet out and four foot wide beyond the end of that curb ramp, you would fall outside that crosswalk. Sop that would mean that people who are crossing that crosswalk toward the top of the page are going to be outside of the crosswalk. So it doesn't meet the requirements. The picture on the left is actually during a construction project, so they built their curb ramp and were going to come back and resurface the road and restripe the crosswalk. But in the meantime, the curb ramp actually lays outside of the crosswalk.

Slide 52. So flares. Now, this is worth noting, that flares are required under the Public Right-of-Way Guidelines whenever a period circulation path crosses the curb ramp. So if I can walk down the sidewalk and walk across the curb ramp without any obstruction, then the flare slope has to be 0% max, and it's measured parallel to the curb. The ADA Standards say that wherever you provide a curb ramp, the flare slope has to be 10%. So if you provide a flare -- so you can follow PROWAG and ADAAG. You provide flares where the curb ramp sites

are traversable, and make all of your flares 10% max. So if you look at the picture at the bottom, you can see where a person can walk sidewalks across that curb ramp, and that's where it's important to have those 10% flares.

Here are some other examples on slide 53 where the flares on the left-hand picture, they are not required because there's no pedestrian access route that crosses that curb ramp. But in accordance with the ADA Standards because you put flares in there, they would have to be at 10% max. So if you put flares in, build them at 1:10 or 10%, but make sure that you put them in where they are needed where a curb ramp is traversable. If it's not traversable, you can just use a vertical curb, and you don't have to worry about the conflicting guidance.

Slide 54. So both the ADA, the Public Right-of-Way Guidelines and the ADA Standards and the DOT ADA Standards have the same general specifications. The domes have to be the same size, they have to be the same distance apart. 2-foot minimum in the direction of travel. They both require contrasting surface. Full width of the curb ramp. And -- or a blended transition. And the PROWAG goes on to provide more guidance. They require them also at railroad crossings and boarding platforms, and they provide guidance -- PROWAG provides guidance on the location, where you put them on your curb ramp. So best practice is to follow PROWAG because it exceeds the ADA Standards. It gives you location guidance that you don't find in the building standards. The best practice is to make sure that -- make sure that you protect the full opening of that curb. So there is an advisory in the Public Right-of-Way Guidelines

that say some manufactures require a 2-inch surrounding area. That was based on research from a long time ago. Right now there are plenty of detectable warnings out there that do not require a 2-inch border on them, so they will provide you better access by going from edge to edge on your pedestrian access route.

Slide 55. If you have a blended transition or a parallel curb ramp, the detectable warnings go at the back of the curb on your clear space or on the space that's less than 5%.

If you have a perpendicular curb ramp, it gets a little more complicated. If you have a directional curb ramp, then if the bottom of the curb ramp is less than 5 feet from the back of the curb on both sides, like on the left-hand side, then you put the detectable warnings at the bottom of the ramp, on the ramp at the grade break. If that funky triangle has a length of more than 5 feet, then the detectable warnings go at the back of the curb. So that's important. But both of them are acceptable.

And here are some examples. Parallel curb ramp, like the top left, you have the yellow detectable warnings right behind the back of the curb. Top right you have a directional curb ramp, and you can see where the detectable warnings come straight across at the grade break, but only one corner is at the back of the curb. Because you have that funky triangle. There's a blended transition on the bottom left, and they have done a really good job of making the detectable warnings go clear across that curb opening. They come in different sizes, so you can fit any width you need. It's okay to cut them. Make sure you follow manufacturers' recommendations on

that. Then just a regular perpendicular curb ramp on the bottom right where your detectable warnings are at the back of the curb.

Counter slope requirements. 5% maximum in PROWAG and the standards, and flush at the transitions. So if your counter slope -- you need have less than 13% algebraic difference. If you have an 8% curb ramp and a 5% counter slope, you are really close on a person who is using a wheelchair either tipping backwards or hitting the foot plates as they make that slope transition. So the picture on the left shows a best practice from an old Federal Highway manual, Designing Sidewalks and Trails for Access, and it shows a 2-foot transition because road grade is steep.

Curb ramp maintenance. Once you put them in, you still own them. They are like children. Once you have them, they are always yours. So you've got to maintain them. It's important to maintain the detectable warnings. It's important to maintain the surface of the curb ramps. And even temporary things that can be put at the top of the curb ramp or in the bottom of the curb ramp, you need to watch and develop policies that, like the middle picture, where it shows two big banners plopped right at the top of the curb ramp blocking the turning space. You can't let this happen. And it's your -- the right-of-way belongs to the local agency or the state agency, and they are responsible for developing policies to ensure this doesn't happen. That maintenance is important.

Objection. So now we are going to talk about street crossings, and we are on slide 60. Street crossings can be really simple or they can be really complex. And

something that seems simple to one person can seem really complex to another.

So you can see the variety of street crossings, including roundabouts. Street crossings are covered in the Public Right-of-Way Guidelines; they are not covered in the ADA Standards. So best practice is to follow PROWAG. We are going to drop our discussion on the ADA Standards because they don't apply anymore, and we need to look to the Manual on Uniform Traffic Control Devices, which is the MUTCD, to find the definition of a crosswalk, and a crosswalk is the extension of a sidewalk across a roadway, and if you don't have a sidewalk, then pedestrians are walking in the street. So it's an extension of that side of the street across the roadway. If you have a crosswalk, people need access to it from the pedestrian access route. If there are no sidewalks at all, you still have crosswalks. If you have sidewalks on one side -- we are going to look at slide 62 -- if you have sidewalks on a T extension that extend from one direction across the longer, say the major side of the T, you still have crosswalks, even if you don't mark them, and you need to provide curb ramps. So if one of my friends in a wheelchair is coming down the sidewalk on the lower side of that picture, but my best friend lives in the cul-de-sac towards the top of the picture, they need to be able to get across that street to use the other sidewalk. Because there are no -- if you look at the right-hand side of that same picture, there are no sidewalks that come up from the bottom of the picture. So the only crosswalks by definition is in the direction of the red arrow. And if you don't want people to cross the street because potentially

there's a safety issue, then you need to prohibit that crossing for everyone. So if my friends who use wheelchairs don't get a curb ramp to walk across the street, then I shouldn't be able to walk across the street either.

Slide 63. And technical requirements for crosswalks, marked and unmarked, surface, width, running slope, and cross slope. We are going to talk about those.

So there's no accessibility information that specifically addresses whether or not to mark a crosswalk. If you look at Part 3 of the Manual on Uniform Traffic Control Devices, it will tell you how to mark them, and there's research from the Transportation Research Board that will tell you when to mark them. And a lot of times it comes down to engineering judgment, and there are some charts that kind of give you some guidelines, but a lot of whether you mark or don't mark a crosswalk is engineering judgment.

And we are on slide 65. The crosswalk surface is just part of the pedestrian access route. So it has to be firm, stable, and slip resistant. You are allowed to have the surface discontinuity of a quarter inch or a half an inch beveled, same as we talked about on sidewalks. You can't have any large openings or gaps. You have to have a minimum 48-inch-wide width, or it has to be the full width of a shared use path. Now, the MUTCD requires a minimum 6-foot-wide width on marked crosswalks. And you also have to look at a crosswalk that goes through a refuge island is required to be at least 5 feet wide. And you can look at surface condition in the picture on the left, and that intersection is just worn out. It's been patched

together a hundred times. It's going to be very uncomfortable for a person in a wheelchair to cross.

Slide 66. This is just simple. The maximum running slope on a crosswalk is 5%. Just like on every pedestrian access route. And the crosswalk cross slope -- remember, the cross slope is your sideways slope. Just like the curb ramp, if a car drives across that crossing without stopping, then you are allowed to have 5% cross slope on your crosswalk, and 2% cross slope is the maximum if cars stop every time. So if you look at the picture, this is on a really steep road, and you can see the intersection is tabled, and the expectation is that the intersection is tabled for cars so they all fit on a flat surface, that that flat surface should extend beyond the crosswalk marking. So if you have a condition like this where you have a green cycle and on your traffic signal cars can go through without stopping, you are allowed to have 5% cross slope. But if your road is 10%, you are still creating a table situation.

Slide 68. Median is just a division for traffic, and you have to make sure the pedestrians can get across the full street crossing. There is no pedestrian wait area and no detectable warnings are required if it's less than 6 feet wide. A refuge island actually provides a refuge area for pedestrians, so it has to be at least 6 foot in depth so someone can stop there comfortably. 5-foot-wide minimum, and it requires detectable warnings. So if you have less than 6 foot width, or walking distance in your refuge aisle in your median, you don't have detectable warnings. If you have at least 6 feet, you do have detectable warnings. So you want to make sure there's at

least a 2-foot space without detectable warnings.

And pedestrian crossings at roundabouts, there are two important things in the Public Right-of-Way Guidelines, and one is that the sidewalk has to be separated from the roadway so that a person can actually find where the crosswalk is because they are offset around the circle. And if you have a multilane crosswalk, you have to have pedestrian-activated signal. Now, a lot of research has been done since the last public right-of-way came out, and you can always rely on research to provide more information.

Now we are going to talk a little bit about pedestrian signal. So the regulations in the ADA require effective communication, and they say that a public entity has to ensure communications with members of the public with disabilities are as effective as communications with others; and if it is necessary, they have to provide auxiliary aids and services. So that means if an agency provides me with information about when it's my turn to walk across the street, a person that is blind or has a visual impairment needs to have that same information. And there are two ways to look at pedestrian signals. The fact that they are accessible to and usable by a pedestrian applies to every pedestrian pushbutton and signal out there. An accessible pedestrian goes beyond that. So accessible to and usable by means it's connected to a pedestrian access route. The one that's in the picture is definitely not. Has surface slope requirements, reach range requirements, and operable parts requirements. In addition to that, to have an accessible pedestrian signal, you add locator tones, audible indicators, and vibrotactile

indicators.

Slide 72. So here's an illustration of the reach range from a clear space. So this clear space is required to be 30 by 48 inches and within a 10-inch sideways reach of your pedestrian pushbutton. If you approach from the front, you have to be directly adjacent to your curb ramp. (No audio)

Sorry, folks. If you have to approach the pedestrian pushbutton at a forward approach, then your clear space has to be directly adjacent to the plumb line of that pedestrian pushbutton. If you can approach from the side, then you are allowed to have 10 inches. And the operable parts requirements are no tight grasping, twisting, or pinching, which is the same for all operable parts.

Your clear space is required to be 30 by 48. If it's in an alcove like the picture here, then you need additional maneuvering space, so it has to be wider than -- it has to be 36, and I believe 54, depending on which way it's constrained. A maximum cross slope of 2%. Now, when you look at the maximum cross slope of the clear space, it gets a little bit tricky because that cross slope depends on which way you are setting. So best practice would be for your clear space to access pedestrian pushbuttons to be 2% in both directions, cross slope and running slope.

Slide 74, a usable pedestrian signal has a button that faces -- that's parallel to the crosswalk, mounted -- MUTCD says 24 inches, but you are allowed to have it as high as 48 inches. It used to be 54 inches in the ADA Standards, and that changed. So somewhere between 42 and 48, and those are maximum numbers, so 47 is

great. 46 is great. Put it where you can use it. Maximum 5 pounds of pressure. And it has -- MUTCD requires it to have a sign that explains its purpose and use and has to clearly indicate the crosswalk direction. So those are not necessarily accessibility requirements, but they are requirements in the MUTCD.

And slide 75, this is -- the way the MUTCD manual on traffic control devices is written, it has standards and guidance. So the following information is found in guidance. People accept that in different ways, but this is what they have in the MUTCD. You do have to have an accessible route between the button and the crossing, and that's an ADA requirement because you have to have the route between accessible elements. It has to be reachable from 10 inches from a clear space. Ideally, you would fit your pedestrian signal within 5 feet of the outside edge of the crosswalk extended, and 1.5 to 6 feet from the edge of the curb to the pavement. The 1.5 to 6 feet is not very realistic, so I would tell you that the rest of this guidance is really good, but I just told you to make your curb ramp flatter, which means they are going to be longer than 6 feet, even if you are in a flat area going over a 6-inch curb. So MUTCD used to be within 10 feet, 1.5 to 10 feet, and it will probably go back to that. That's more realistic. The whole point was to try to provide some standardization.

Slide 76, these are the additional features that make a pedestrian signal accessible, so it has a locator tone, which is a slow percussive tone, so a person who is blind can actually find it. An intersection, some intersection corners are pretty big and pretty complex, and they've got

a lot going on, so the locator tone allows a person to find that button. Audible and vibrotactile detectors are required, so you have the locator tone, but you also have an audible indication when the walk sign has come on. So I can see it as long as I have my glasses on, but if I can hear it too, it gives reinforcement to what I am supposed to do. For a person who is blind, you know, that audible indication is really important. There's also a requirement from vibrotactile, so if you are at an accessible pedestrian signal and you reach over and touch the pushbutton when the walk signal comes on, it should be vibrating. So in a noisy environment, it gives you additional information that the walk signal has come on. Ideally, the pushbuttons at intersections that serve two crossings should be at least 10 feet apart. If they are not 10 feet apart, then they are required to have speech messaging rather than a rapid tick sound. And the speech walk criteria is in the MUTCD in 4E.11. It's important that the volume adjust for ambient noise. I know that people in the surrounding area can be really annoyed if the locator tone is constantly beeping at a volume that gets into the building. Ideally it should be adjusted so that it's heard within 6 to 12 feet of the pushbutton.

And the suppliers and traffic engineers, they can all help you adjust those volumes if you are having complaints or having problems. There are also extended press features. If you press the button for an extended period of time, sometimes you can get extra walk time. But if the signal is set up that way, that should be explained on the sign. And an accessible pedestrian pushbutton has a

tactile arrow that indicates the direction. Again, that direction will be parallel with the crosswalk.

Slide 77, signals and alterations get to be complicated, and there's always a lot of questions about that. What's required? I alter the street, do I have to put in a pushbutton. If I put in a pushbutton, do I have to put in a curb ramp? If I put in a curb ramp, do I have to fix my pushbuttons? The answer to all of those is it depends on the scope. If you have an improvement project and you are only putting in a signal, it might be the scope of the project only allows you to do the signal. However, if you are tearing up concrete to get the wiring and conduit in there, you should probably consider putting in the curb ramps, or in some people's positions, you might have bought a curb ramp when you did that. If you put in a crosswalk because someone requested better visibility, that may not include accessible pedestrian signal work. So it really depends. Anytime you have questions on whether you should do something or don't need to do something, feel free to reach out. The Access Board is a great source of information, and your Federal Highway Division Office is also great.

So that concludes most of our information for today. There are a lot of really good resources out there. The Access Board and Federal Highway should be your primary source of information for transportation engineering questions. DOJ provides some technical assistance. As far as I know, they don't have any transportation engineers. Federal Highway, of course, is full of them. Scott Windley at the Access Board is great. You can send questions to them and they will answer you

in an email. Now, I have a lot of other specific resources, and I think that the Mid-Atlantic Center, TransCen, is going to make those available. I need to update my handout before I give them to you because Federal Highway has updated their webpage, so a lot of my links have changed. We will get that out to you as soon as we can.

And now we have about 15 minutes for questions. So Nancy, have you had any questions come in?

>> NANCY HORTON: Yes, we have, Melissa, and thank you so much for all of that information. We do have several questions. A couple of questions that have come in I think you have actually answered in the meantime, but we do have several. To start with, we have a question about a crosswalk. If you are simply adding crosswalk markings to a previously unmarked crossing location, would you consider that an alteration or a maintenance activity?

>> MELISSA ANDERSON: I would say to talk to your Federal Highway Division Office. You could see it either way. Because you could see it as you haven't changed the usability because the walking surface hasn't really changed. You've increased visibility for the drivers and potentially the pedestrians. So it could go either way. If you are just marking a crosswalk, I don't know that I can really give you an answer on that.

>> NANCY HORTON: Well, thank you. We have another question about landings on curb ramps. You talked a little bit about constraints. Could you talk a little bit more about what you mean by constraints? What kind of things would be constraints in a situation like that?

>> MELISSA ANDERSON: So a constraint is if you

have a curb or a building or something that limits your ability to get on to a turning space and then have the kick plates of a wheelchair turn to make that movement to go up a curb ramp, or at the top of a curb ramp, if you have a building there and you really don't have that 48 inches to make that turn onto the sidewalk. So a constraint is something that keeps you from making those turning movements. You just need more space.

>> NANCY HORTON: Great. Thank you. That's helpful.

We had somebody ask you talked a little bit about diagonal curb ramps and how they can create difficulty, especially for maneuvering for people who use wheelchairs or mobility devices. Could you talk a little bit about are diagonal curb ramps problematic for people with vision disabilities?

>> MELISSA ANDERSON: So diagonal curb ramps overall are bad. Don't build them unless you have to. A person who has a visual impairment, if they have to use the at this agonal curb ramp, let's say you have a separated sidewalk and the only way to get into the street is on the diagonal curb ramp, it really gets them out of position. So if they are going straight down the sidewalk, now they have to go down the diagonal curb ramp, and it doesn't send someone into the center of the intersection. Because people with vision impairments know that us engineers do a lot of weird stuff, and they don't trust us at all. But it does mean that they have to go down that curb ramp. Once they get in the street, they have to reorient themselves to figure out which way they are going and to get across the road in a -- where the crosswalk is intended

to be. So a lot of times if you have a diagonal curb ramp and the entire corner is paved, a person who is blind or has a visual impairment, they don't need the curb ramp. They can generally step off the curb. So that's why when you look at the diagram in the 2010 standards, there's 24 inches required of sidewalk within the crosswalk so that a person doesn't have to use the curb ramp. They can just continue straight in the direction that they are going or make a 90-degree turn and maintain better orientation.

>> NANCY HORTON: Oh, thank you. That is really helpful.

We have another question about curb ramps where the PROWAG is talking about the 48-inch minimum. But if you have a sidewalk that's leading up to a curb ramp and the sidewalk itself is 5 feet wide, for example, is the curb ramp required to be the same width as the sidewalk that it connects to?

>> MELISSA ANDERSON: So that's a really good question. The minimum width in PROWAG is 4 feet, but the width in the ADA does say the full width -- or it says the width of the sidewalk. So it would be best to make it the full width of the sidewalk, and I think that's probably the right answer. If you have a 5-foot sidewalk, make your curb ramp 5 feet. But if you have a sidewalk that's maybe 12 feet wide from the face of a building to the back of the curb in, say, a downtown area, you don't need your curb ramp to be that full width. So it needs to be -- you can always make it wider, but it has to be at least 4 feet wide.

>> NANCY HORTON: Great. Thank you.

We have a question about you talked a little bit about

a situation where you had sort of a T road where you said, well, if you don't want people crossing, you know, it's kind of a mid-block crossing there, and you really don't want people crossing there, so you put curb ramps there, or if you just say wheelchair shouldn't cross, so nobody can cross there, are there things that should be done or could be done from a design perspective to prevent ambulatory pedestrians from crossing at points like that?

>> MELISSA ANDERSON: So you can use a barrier like the one that I showed. And this comes from a state agency that actually used a crash-approved mailbox holder to mount their crossing closed signs. So you can put a physical barrier. I have seen people that have put chains across. I have seen fencing across the areas where people tend to cross. You can also just pull your sidewalk away from the back of the curb and leave grass or greenspace because that clearly indicates that everyone is supposed to continue in a straight direction. Now, one thing to take into consideration, a T intersection is an intersection. It's not a mid block crossing. So it kind of feels that way, but it's not. It's a true intersection, and it has a crosswalk if there are sidewalks there.

>> NANCY HORTON: Excellent information. Thank you so much.

Let's see. We have a question about if you've got a brand-new subdivision is about to be developed, so you've got boundaries established. But it's all new construction. Because you have a plat, you have boundaries that have been determined and defined, is all of that work considered to be an alteration?

>> MELISSA ANDERSON: So if it's all the work that's

on the sidewalk, you know, some of this is perspective, and if you have a newly platted subdivision, and let's say you had the outside boundaries of the entire subdivision, but when you go to lay out the lot lines and the street right-of-way for that subdivision, you have the ability to take accessibility into consideration, and you are going to be held to a higher level of meeting the new construction requirements. Terrain can still be an issue. You may have other physical constraints that you can't control. But if you have a huge subdivision, you have the ability when making those other surveying decisions to accommodate access, and if you don't do it, you know, I would consider it probably a questionable practice. So you want to make sure you can -- you accommodate those needs when you have the opportunity to do it.

>> NANCY HORTON: Great answer. Thank you.

I think we have time at least for one more question. We have a question about crosswalks and requirement for the maximum 5% running slope. Does this ever create conflicts when you have roads with crowns designed for drainage?

>> MELISSA ANDERSON: So generally when people design a brand-new road, they don't put a crown that's 5%. So the -- when you look at all of these standards, they are really designed for new construction. And everything else is doing the best you can given the circumstances. So if you are building a new road, you make sure that your crown is less than 5%. If you are doing resurfacing that allows you to flatten that crown, you should do that because it would be within the scope of an alteration. Generally, if it's more than 5%, that has

happened based on resurfacing practice over time. I used to work for a couple small cities, and they both did their street pavement maintenance in different ways, their resurfacing, and one of them (?) along the face of the gutter and overlaid which constantly made the crown steeper than the sides. So it made a really steep crown. So if you have that situation, you may need to look at your paving practices. If you have an alteration that allows you to flatten that out, then you would do it. If you don't have an alteration that does it, you do the best you can.

>> NANCY HORTON: Thank you so much, Melissa. I think we only have a couple of moments left. If we didn't get to your question, I apologize. We are just -- had so many good questions and so much good information, but I am afraid we are going to have to wrap up now. Don't forget that we still have two more sessions in our series. Our next, Part 3, we are going to be talking about Curbside Access. We are going to be talking about transit stops, parking, passenger loading zones. And our final session, Part 4, we are going to be talking about Ensuring Access on Public Right-of-Way Projects, design decisions, construction inspection, and best practices. So we still have a lot more good information to come.

For the -- the code word for today, if you are a person who is getting the certificate of participation or the AIA credit, the word for the day's session is "safe." "Safe." So please consult the reminder email that you received about this session for instructions on how to obtain your certificate of participation or your AIA credit for this session. Please email the code above -- again, the word is "safe" to adatrainig@transcen.org by 5:00 p.m.

Eastern Time on Monday, May 20.

Again, today's session has been presented by the Mid-Atlantic ADA Center, a project of TransCen Inc. Please feel free to contact us with additional questions. And again, thank you all for joining us, and most especially a million thanks to Melissa for all of this fantastic information that she shared with us today.

>> MELISSA ANDERSON: Thank you, Nancy.

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