Webinar for Final Design of Pedestrian Facilities

The presentation will start shortly. Audio will be available over the WebEx conference call. To listen on phone:

- Dial 1-844-633-8697 & use meeting ID 642 747 190
- Press # when asked for a password to join
- Please mute your phone

We will open up a chat box for questions.
Welcome to the Webinar on Final Design of Pedestrian Facilities
We will be opening up a chat box and you can send us your questions.
We’ll spend about a half hour at the end of the presentation answering questions.
We will not be taking questions from the phone lines during the presentation.
At the end of the presentation we’ll post up a list of persons you can contact with questions, if we don’t get to your question during today’s webinar.
There will be a 15 question quiz at the end.
PE’s, RLA’s, and LS’s may earn 1.5 Professional Development Hours (PDH’s) for today’s course.
To qualify, you must be in a moderated group, sign the sign in sheet, and take the quiz.
This is the third in a series of 3 courses we are offering. Each webinar is being given twice.
Today’s presenters are:
Rick Wilder, PE, Director of NYSDOT Design Services Bureau
Valerie Ashline, PE, Design Squad Leader in the NYSDOT Design Services Bureau
Chris Modafferi, PE, Design Squad Leader in the NYSDOT Design Services Bureau
While ADA applies to all public facilities, regardless of funding, this course is targeted to Design Staff working on NYSDOT projects.

The designer should be familiar with the previously offered webinar on Preliminary Design and Construction Inspection. In addition, the designer should be familiar with American with Disabilities Act (ADA) and the Public Rights-of-Way Accessibility Guidelines by reading ED 15-004, portions of HDM Chapter 18, the Section 608 Specs, and the 608 series standard sheets.

This webinar will cover
• Field data collection methods for projects that require additional terrain data
• Introduction to Manual Method for collecting terrain data
• Comparison of automated and manual methods
• Creating a 3D curb ramp model
• Developing contract proposal and plan sheets
• Use of the 608 standard sheets & specifications
• Estimating curb ramps
• Evaluating the existing ramps is a separate process  
  • It was covered in detail in the preliminary design webinar  
• For final design it is assumed that curb ramps have already been evaluated and non-
standard ramps have been identified for replacement  
• This webinar covers Final Design of those curb ramps
• Designers are required to meet additional standards and tighter tolerances, set by ADA and PROWAG and displayed on the revised 608 Standard Sheets
• Most projects will require additional design resources to ensure that the design being produced is compliant
  • This may go beyond simply drawing ramps in 2D that “fit” the sites horizontal constraints
• Sometimes the existing terrain data is just not accurate enough to use as a basis for a ramp design that a designer can assure will be compliant to the new standards
  • Additional terrain data may need to be obtained
• Each method of terrain data acquisition has an established level of accuracy as shown in the NYSDOT Highway Design Manual Chapter 21.

• Sometimes the existing terrain data is just not accurate enough for detailed design of a curb ramp in a constrained area
  • If ROW is wide, and terrain is flat, photogrammetry of +/-0.3 ft vertical existing ground may be appropriate to produce a compliant design
  • If there is a combination of limited ROW and steep terrain then this +/-0.3 ft vertical existing ground may not be appropriate to produce a compliant design
• 1R projects may not have any existing terrain data and there may be non compliant sidewalks that need to be replaced
• Chart above shows situations when additional terrain data is recommended to produce a compliant curb ramp design
• It is a function of embankment width between back of sidewalk and ROW line, and embankment slope.
  • Less than 3’ between back of sidewalk and ROW line → Obtain terrain data
  • Over 10’ between back of sidewalk and ROW line → Additional terrain data not required
  • Between 3’ and 10’ between back of sidewalk and ROW line → Check embankment slope and obtain terrain data if shown in the table

<table>
<thead>
<tr>
<th>Embankment Width (FT)</th>
<th>Embankment Slope (Between Sidewalk and AADT/IID)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3</td>
<td>0-25% (0-1:4)</td>
</tr>
<tr>
<td>3 to 6</td>
<td>&gt;25% - 33% (1:4 - 1:3)</td>
</tr>
<tr>
<td>6 to 10</td>
<td>&gt;33% - 50% (1:3 - 1:2)</td>
</tr>
<tr>
<td>&gt;10</td>
<td>&gt;50% (1:2)</td>
</tr>
</tbody>
</table>

Notes:
1. Terrain data may be needed if street trees, retaining walls, utilities etc. located within the embankment slope will be negatively impacted by regrading.
• There are various methods available to Design staff to acquire additional terrain data during the design process
• Each method has its advantages and disadvantages
There are various methods available to Design staff to acquire additional terrain data during the design process.

- Each method has its advantages and disadvantages.
• The updated PROWAG and ADA tolerances are too strict to rely on photogrammetry alone for curb ramp design
• 1R projects without survey and higher level projects without supplementary survey (SDTM) will require additional field data to be collected using:
  • Manual method – introduced later – allows for Design staff to collect their own data
  • Total Station – submit traditional survey request
  • LIDAR – submit traditional survey request
• Its not possible nor practical to use the best technology for every single site
• Some sites may have wide ROW and minimal elevation change
  • These may not require additional field survey
• Other sites may have terrain and ROW limitations
  • Additional data will need to be obtained to ensure compliant ramp design
• Designer will have to determine and prioritize which sites require additional data collection
• A Manual Method for obtaining field data has been developed
• It is intended to be used by Design staff, not Survey staff
  • It uses traditional survey and layout tools
  • Dedicated Survey staff have access to more advanced tools and they should not
    be expected to use the Manual Method
• The manual method should be used in cases where additional data is required but Survey is not able to obtain automated data to meet the project schedule
• Accurate layout procedure necessary when ROW or terrain constraints limit the design for a proposed ramp, and traditional survey cannot be completed in time
• We want to be SURE that a proposed ramp that meets standards will fit within the existing terrain and ROW.
• Method involves non-automated survey tools and will be time consuming for design staff
• Complete step-by-step procedure is posted on the NYSDOT Highway Design Manual Chapter 18 website
• Use as a fall back when other methods of terrain data acquisition are not feasible
• Due to the resources required for this process - Limit the field data collection for ONLY the ramps that REQUIRE it
• Prepare labeled orthoimages to assist locating and identifying the ramps that require field data collection
  • Do your legwork ahead of time so you can easily find the sites and ramps that require field data collection
  • These maps can double as location plans in the proposal
• Standard field PPE for DOT employees working in the public ROW
• Measuring tools
  • Survey Tape for longer distances
  • Standard Tape for short distances
  • Folding stick ruler for vertical measurements
• Digital level
  • Calibrate the digital level in the office before hand on a level surface
  • Straight edge to hold the digital level on when measuring on surfaces less than 4’ long or where detectable warning units interfere with flush digital level placement
• Survey level
  • Optical level in carrying case (leave it in the carrying case and try to minimize time outside of the case to limit dust & potential for harm)
    • Tripod
    • Level Rod
      • There are various types of Level Rod – know which type you are using!
        • Engineers Rod (numbers increase from bottom to top)
        • Direct reading Rod (numbers increase from top to bottom)
• Data Sheet, Clipboard, writing instruments
  • Chalk works well for marking points on existing asphalt or concrete surfaces
  • Pins or small steaks work well for marking points in unfrozen ground
• Some “yard tools” may come in handy for clearing dirt, leaves, snow, or other debris from points of interest
• Standard field data collection sheet
  • Shows two intersecting roads at a right angle for simplicity
  • Both legs have sidewalk.
  • This data sheet can be used for ANY intersection
• Each quadrant of the intersection is depicted on the field data collection sheet.
  • A 4 way intersection with a sidewalk behind all 8 curb lines would require 4 data collection sheets to do the whole intersection (if terrain/ROW requires it)
• Data collection sheet also contains:
  • Boxes to label the roadways
  • Perspective convention for photos
• Provides a uniform field data collection sheet for all intersections
• There are many possible combinations of sidewalk, curb, and buffer zone on any given quadrant
• The data points in this shell enable the designer to collect valuable information to cover many cases and then lay them out in CADD software
• The data collection sheet obtains points to calculate the intersecting angle of sidewalks and can be used for any intersection angle.
  • Not all sidewalks intersect at 90 degrees
  • Not all sidewalks are parallel to the curb
• Data sheet accounts for all of this.
• Link to field data collection sheet is posted on the NYSDOT HDM Chapter 18 website
• Take standard photos from established perspectives
  • It will make referring back to them easier for yourself/your design team.
• Special emphasis photos should be taken for any existing feature that could potentially impact the curb ramp design.
• Its much easier to get extra photos while you are at the site then to come back later to get ones you missed!
• We will zoom in on the legend
• Note the measurements are color coded for ease of understanding
  • Slopes = blue
  • Offset = black
  • Rod Readings = red
• Be sure to check off the type of rod used
• Clean the area of debris (leaves, snow, sand, etc.)
• Use the survey tape as a taut line along back of one sidewalk leg to define Axis A
• Mark the first sidewalk joint at least 25’ from the curb face.
  • This will be point #2
• Repeat for the other sidewalk (which will be be Axis B and point #3)
• The intersection of these axes, which is also the intersection of the back of sidewalk lines, will be point #1.
• Points 1, 2, and 3 are the three major points that need to be determined. All other points are offsets and can be tied back to one of these points.
• The intersection of the back of sidewalk axes, which is also the intersection of the back of sidewalk lines, will be point #1.
• Check off the box for this location of POINT 1.
• When only one sidewalk leg is present, there isn’t an intersection point of two legs
• We have established POINT 1 as being 5’ back from the curb face along the back of sidewalk axis.
• Check off the box for this location of POINT 1.
• Use an existing tooled joint in the sidewalk for the tie-in if possible
  • These are usually perpendicular and will aid in laying out the offsets to additional points.
• When laying out the back of sidewalk axis, it may be convenient to mark the 10’ offset at the same time since the tape is already there.
• Take horizontal measurements; do not just lay the tape on the ground
• Always pull the tape taut!
• Measurements that cannot be taken with a loose tape can be obtained with a folding stick ruler that is more rigid
• Use the tape measure for this and hold tape taut and horizontal for an accurate reading
• In areas of steep terrain, the folding stick rule can be used as a vertical straight edge to mark the point of interest
• In most cases existing tooled sidewalk joints will be perpendicular to the back of sidewalk and can be used as a reference to hold the tape perpendicular
• Photo of situation where back of curb and front of sidewalk point are the same
• Zoom in on a portion of the field data collection sheet showing sidewalk, buffer zone, and curb.
• If sidewalk is adjacent to curb with no buffer zone, the front edge of sidewalk and back edge of curb points will overlap. One set of points may be crossed out.
• As a general rule, if parts of the field data collection sheet are not used, then draw an X through that section. Don’t leave it blank because this may be misunderstood as readings that were overlooked.
• In areas with a paved buffer zone or concrete extending from curb line to building face (such as in an urban area) points should be measured at the edge of the 4’ Pedestrian Accessible Route.
• It will be useful to create the model as the entire concrete width does not have to be accessible
• Curb radii will differ and cannot be determined from measurements at a uniform distance or angle
• Horizontal measurements are taken from already established points to points on the curb radius in a circular path along the curb radius
• Each point will have a known distance to two other points and can be then be modeled in CADD software
• The full written procedure explains this in detail and is posted on the NYSDOT Highway Design Manual Chapter 18 website
• Sidewalk leg or legs will lay at an angle that can be determined from the points already measured, and the law of cosines
  - If 2 legs are present, the angle between the two legs (facing the curb radius) will be calculated
  - For intersection quadrants with only 1 sidewalk leg, the angle between the back of sidewalk line and the curb face will be calculated
• Knowing this angle will enable the designer to lay out the sidewalks accurately in CADD software.
Determine the Skew Angle

- The Law of Cosines is used to determine this angle based on measured horizontal distances.
- The information to calculate the skew angle has already been measured and recorded in the Point-to-Point measurements table.
- The data can simply be plugged into the formula.

Distances required for the formula:
- Leg A - Point 1 → Point 9
- Leg B – Point 1 → Point 5
- Leg C – Point 5 → Point 9
• Ensure that the digital level is calibrated correctly prior to use
• Clean surface to put the digital level on prior to taking the measurement
• Grade (running slope) and cross slope readings are the blue boxes on the field collection data sheet
• Note the lower side of the digital level (or the direction water will flow) and circle the corresponding arrow on the field data collection sheet.
• Set up the tripod in a safe location outside the vehicle and pedestrian paths
• For low volume intersections the best location is across the intersection where you can see the entire quadrant from the tripod location
• For congested or large intersections, it may not be practical to sight across multiple lanes of busy traffic.
  • Set up the tripod on the same quadrant as the curb ramp, but outside the limits of the desired measurements
  • Try to set up the tripod within the ROW. The buffer zone between curb and sidewalk is ideal
  • If the tripod must be set up on private property, a right-of-entry letter can be obtained
• If there is a significant change in elevation on the quadrant being field measured, take care to set up the level in a position that can sight the rod at all elevations (from low to high).
• Benchmarks may not be available consistently and the effort to determine their elevations is not necessary.
• All rod readings will be subtracted to determine differences in elevation so any vertical errors will subtract out.
• Record all rod readings in the Red Boxes on the field data collection sheet.
• Example of a filled out field data collection sheet
• Text is written in from the perspective of standing on the sidewalk, looking AWAY from the intersection
• We will zoom in and go over things to note on the next few slides
• Things to note:
  • Type of rod is checked off
• Things to note:
  • Arrows are circled for grade directions
• Things to note:
  • Street names are filled in
Things to note

- Curb radius chart is filled out and points are circled to indicate which points the measurements were taken between
- Manual method
  - Will use a lot of resources and production is low
- Total Station
  - Existing department Survey Staff are familiar with equipment
- LIDAR
  - Not all department staff are familiar with equipment
  - High cost of purchasing equipment
  - Higher cost to consult out
  - Can obtain a lot of data in a short time frame

<table>
<thead>
<tr>
<th>Method</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
</table>
| Manual Method | • Accurate  
• Can be scheduled quickly using existing staff | • Most time consuming  
• Uses Design staff who may be unfamiliar with survey equipment |
| Total Station | • Fairly Accurate                        | • More time consuming  
• Lead time for survey request may interfere with job milestones |
| LIDAR     | • Can obtain a lot of data quickly     | • Higher cost  
• Not all Survey staff are familiar with equipment |
• Use automated methods wherever possible
• On 1R projects where additional survey cannot be obtained, the manual method may be used to obtain needed data
• On 2R/3R the projects will be surveyed so curb ramp terrain data should be collected at the same time.
  • 2R/3R are less critical because ROW can be obtained where necessary to build a compliant ramp
• The designer has multiple methods available to collect additional terrain data where required.
• No individual method is the perfect fit for all projects – designer must use good judgement!
• I will now turn things over to Valerie Ashline to discuss:
  • Final design modeling
  • Plan and proposal sheet generation
  • Estimating
Terrain information will likely be unavailable for the majority of 1R projects and survey might not be completed within the time frame allotted for a particular curb ramp. For curb ramps close to the AHB/HB lines, field data will need to be collected to determine if the proposed curb ramps can be installed to the 2011 PROWAG standards within the available footprint.

**This section assumes that the designer is familiar with Bentley Microstation and is comfortable drafting in 3D space.**
To Create 3D model from Manual method explained by Chris Modaferri (for 1R jobs):

1. Choose baseline height as datum for existing curb ramp elevations. As mentioned previously, the field data is collected without a known benchmark and therefore, the values on the data sheet are relative grade changes. You will subtract the rod readings from your baseline height – take note type of rod used when collecting field data.
2. Using a hidden Microstation line level, create the existing curb ramp in 3D space using the given rod readings and offsets from the Completed Field Data Sheet. Make your existing sidewalk/curb ramps/curbs a different color from your Datum lines to make it easier to see. In this example, the Datum and rod reading lines are in dark blue and the existing sidewalk, curb ramps, and curbs are in black. You want to use different Microstation line levels for the existing ramp and the proposed ramp so you can display the correct lines on your detail sheet.
3. Replacement ramps must meet 2011 PROWAG standards. The 608 Standard sheets have been revised to meet ADA criteria and include new ramp configurations.

The designer will use the 608 Standard Sheets to choose which standard curb ramp most matches the existing ramp. You may have to slightly modify a standard ramp based on existing terrain, natural features, utilities, drainage, etc., but this gives you a basic template to work with.
In this case, the Type 5 curb ramp is the closest configuration to the existing sidewalk and curb ramps.
4. Hold the elevations of the roadway at the curb line and layout proposed curb ramp following PROWAG standards for cross slopes and running slopes.

Even if you mill and fill the adjacent roadway, these elevations will still be very close to what was measured in the field at the time of inspection and will be the basis for all slopes/grades necessary for installation.
Note: There are no longer “landings” at curb ramps, these are now known as two separate areas: Turning space and Clear space and these are required for all ramps. These may overlap for some curb ramp configurations or may be two separate areas, as shown here in a Type 5 curb ramp configuration.

The Turning Space MUST have a maximum of 1.5% slope in any direction so a person can orient themselves to the direction of travel, rest, or wait before crossing the road.

If the Clear Space is at the bottom of a ramp, the counter slope can be have a maximum slope of 4.5%. The Clear space can include the area of the detectable warning, but must be completely outside of the parallel vehicular travel lane.
5. Once the appropriate curb ramp length is determined, based on the standard cross slopes and running slopes, match the existing sidewalk width and cross slope over a 10 foot transition.
6. Be sure to show any cut/fill lines necessary for installation. This is particularly important for curb ramp locations without known highway ROW boundaries or with natural terrain conflicts, as you need to make sure this new ramp will “fit” in the existing footprint.
7. If there are features that cannot be met with new construction, these must be justified on a Non-Standard Justification Form.

A justification of Nonstandard Features form has to be completed for each noncompliant feature, but multiple nonstandard features for the SAME ramp can be on one justification form.

This form is electronic and can be found on the webpage for the Highway Design Manual chapter 2.
A general plan sheet and detail sheet will be made for each curb ramp (Note: 1R projects are proposal projects and are on 8.5” x 11” sheets).

• The general plan sheet will include the layout of the curb ramp on the available base mapping/location data with item numbers pertaining to the work being done and some basic dimensions. A north arrow shall be shown for orientation.

• The detail sheet will include all dimensions, widths, cross slopes, running slopes, and any specific utility/drainage/natural features that will directly affect the installation of the curb ramp. This location has a mature tree and fire hydrant in the snow storage area that needs to be displayed. The turning and clear spaces will be labeled and/or outlined on this sheet as well. Drainage flow lines will be displayed from all roadway directions. It is important to know where the water is flowing to because there should not be ponding/low points at the end of the curb ramp (i.e. the clear space) when the surface water has drained. AHB and HB lines will be displayed on this detail if known or a note shall be written with this information (i.e. approx highway boundary is at the back edge of the existing sidewalk).

• Both are scaled drawings and shall show a scale of 1”=10’.
Design has begun laying out curb ramps in 3D where terrain information is available either through photogrammetric data or direct survey data. These 3D models take approximately 2 days to design from start to a deliverable detail for PS&E.

**This section assumes that the designer is familiar with modeling software and is comfortable creating alignments, templates, corridors, and surface DTMs. This procedure does not go into detail about how to make**

**If a standard curb can be installed within the criteria in the table at the beginning of the presentation (slide 9), a detail will not be included in the plan set and the curb ramp shall be installed according to the 608 standard sheets.**

Details will only be created for curb ramps with specific ROW, utility/drainage, or natural terrain restrictions in which the designer would have to prove a standard curb ramp could be installed. For example, if the ROW lines are less than 3 feet from the back of the existing curb/sidewalk, the designer should show in the detail that the cut/fill lines from installing a standard curb ramp from the 608 standard sheets would remain within the NYS DOT ROW or that installing a retaining wall/back curb will keep them within the NYS DOT ROW.

**Note: Curb ramps with justified non-standard features will have details, but all details will not necessarily have non-standard features (i.e. the detail proves that a standard curb ramp does fit within the given footprint).**
To Create 3D model from Survey Data (for 2R+ jobs):

1. Since there is available terrain information for these projects, the designer can create a horizontal and vertical alignment for the curb ramp based on the existing elevations of the terrain and proposed elevations of the roadway. The alignment will be along the front of the curb face where it connects to the highway pavement. The elevations here will be controlled by the top of the pavement after paving. There may be multiple alignments depending on the standard curb ramp chosen for the particular site.
2. Replacement ramps must meet 2011 PROWAG standards. Using the 608 Standard Sheets, choose which standard curb ramp will fit this particular site. You may have to slightly modify a standard ramp based on existing terrain, natural features, utilities, drainage, etc.

In this example, there is no snow storage, so a Type 4 Configuration is the closest match.
3. Using modeling software (such as Bentley SS2 or SS4, Autodesk Civil 3d) create templates of the curb and sidewalk. The template will have the width and cross slope of 1.5% (*design value) for the sidewalk “built” into it, as well as the various cut and fill lines to determine if the curb ramp fits within the ROW boundaries. Make sure to include snow storage areas in your template depending on the curb ramp type chosen. If the width varies for your sidewalk or snow storage, you can modify the template after it is dropped with point controls.

4. This sidewalk and curb will be treated as its own corridor so you can run these template(s) along the alignment you created. The origin point will run along the alignment that you create for a particular curb ramp. You may have multiple templates for the same curb ramp depending on site conditions. Creating these as their own corridor lets you vary the template drop rate as necessary, if you were to try to run the curb ramp as a linear template off of the roadway corridor, you cannot vary the template drop rate and could have problems along radii or angles.

NOTE: A template can be used for multiple curb ramps as long as they have the same basic layout. You will change the running slope and curb length ramps using point controls. You can also “delete” the snow storage area by point control by making the width zero.
5. The designer will use horizontal and vertical point controls to create the running slopes of the curb ramps starting at the elevation points at the crosswalk as these will match the roadway elevation. The design value for running slope on curb ramps is 7.5%, but this can exceed 8.3% if the curb ramp is 15'-1" long.

**The running slope may match the roadway, regardless of grade and if that is the case, the curb ramp maximum length is 15'-1” for design. This is still standard even though the grade exceeds 8.3%!**
Crosswalk design is an important component of the design process. Crosswalk design will be dependent on good roadway design because it will be part of the roadway corridor. The designer should know the basic locations of the curb ramps before roadway design takes place, so you have stations for the cross walk template drops in the roadway corridor. The running slope can be “built” into the template for the crosswalk and the cross slopes can be controlled by point controls.

Cross Slopes will be based on how the intersection is controlled: Stop/Yield max cross slope 1.5%, Signal max cross slope 4.5%, midblock max cross slope = highway grade

NYSDOT uses three basic types of crosswalk markings.  
**S types** are usually used for side streets and highways with low volumes and low speeds.  
**L types** are common in cities.  
**LS types** are used for higher speed or higher volume crossings.
These marking types are found in the 685-01 standard sheets.

Minimum inside width of a crosswalk is 6' wide. The curb ramp’s width (excluding flares) and the clear space must fit entirely within the marked crossing. 6’ is only the minimum width – crossings can be made wider to accommodate clear spaces and wider curb ramps.

There should be no gaps greater than ½” within the surface of the crossing. This includes grates – they can be located under the outside (transverse) lines, but preferably not under the bars. Any grates with openings greater than ½” shouldn’t be located within the Pedestrian Access Route.
6. The turning space and/or clear space will be part of this curb ramp layout (depending on curb ramp type this might be the same area) and must be maximum cross slope of 1.5% in any direction.
7. If the cut and fill lines go beyond the ROW boundaries for a particular location, you can add a back curb or retaining wall to the template to keep the design within the ROW limits and 2011 PROWAG standard.

The back curb would be attached to the sidewalk, but a retaining wall could be offset from the sidewalk with turf/concrete/asphalt in between. This could be done right in your template and you can use point controls for varying widths, etc.

Back curb Max height = 12” Standard Sheet 608-01 (Sheet 3 of 9 and 9 of 9)
8. Once the curb ramps are all in place, a terrain model/surface DTM can be created of the entire project area.
9. The designer will label all of the necessary dimensions and grades necessary for the detail that will be included in the contract plans.

If there are features that cannot meet 2011 PROWAG standards with new construction, these must be justified on a Non-Standard Justification Form. This should be kept to a minimum since this in new construction.
This is an example contract set for a bridge replacement. It has 11”x17” plans. 1R projects will have 8½” x 11” proposal sized details. The next few slides will provide insight on what will be provided in future contracts.
Curb ramp locations will be called out on the General Plans by number, which will correspond with the individual ramp on the detail sheet, if a detail is necessary.

Label on this sheet whether the curb ramp will be on a detail sheet or will use the 608 standard sheets only.
Curb Ramp locations will also be shown on the utility plans.
Pay special attention to elevations where utilities will be within or under pedestrian facilities.

Test pits may be necessary to determine depths of underground utilities where curb ramp excavation is proposed. Coordinate with the Regional utility coordinator in the event that utilities are in conflict and need to be relocated.
Design has begun creating special details for curb ramps. These curb ramps may have non-standard features that are being retained or they may be standard ramps that are adjacent to ROW boundaries, have specific utility/drainage concerns, have specific terrain/grading concerns, or other site specific concerns and need to be proven to fit within the available footprint.

Not all curb ramps will be modeled; the contractor will be guided to the 608 standard sheets for installation for most standard curb ramps.

If you have difficulties applying the standard sheets, contract the EIC, the Designer and the ADA Specialists.
These ramp numbers correlate with the numbers shown on the general plan sheet and the details should be shown numerically in order, if possible. The scale of these sheets shall be 1"=10'.

What needs to be on this sheet:
1. Layout of curb ramp including sidewalk on either side of curb ramps
2. Alignment with stationing and cardinal points - make the station equation different for each curb ramp
3. Curve data box
4. Elevations along the top of curb at each grade break where it meets with sidewalk. i.e. Turning Space, Clear Space, and end of curb ramps (these are the ONLY elevations, do not put in elevations of the backside, the Contractor can calculate these using the slopes and widths as these given elevations may slightly change during installation of the roadway pavement)
5. Running slope and cross slope of each curb ramp piece including sidewalk beyond curb ramp. Label grades and direction arrow
6. Length of each piece on the backside of the sidewalk (which should be minimum width based on geometrics of a curve...center line or front side would be longer since it’s a curve)
7. Width of sidewalk
8. Detectable warning area
9. Cut/Fill lines
10. Highway boundary lines and any additional ROW takings as part of the project
11. Drainage flow lines around curb ramp, including high spots if applicable – Do not want water ponding in the clear space after storm has passed
12. Cross walk paint lines
13. Any utilities or drainage structures that could affect the installation of the curb ramp, also
have to be careful with what type of drainage grates are adjacent to cross walks. Typical highway grates do NOT meet ADA requirements. Orientation is important for wheelchair movement and for pedestrians with mobility assistance devices (i.e. canes and walkers). Try to move curb ramp opening away from drainage structures if possible. Drainage grate may not be between crosswalk stripes, but the edge stripes may go over the grate.

14. Profile of curb line with vertical alignment data and cardinal points
15. Any notes necessary for the curb ramp installation
16. Any additional details necessary per individual curb ramp. For example: Retaining Wall detail with notes

****Note: Maybe we will put asterisk next to curb ramps that will have detail in ADA Reporting table under notes column – “See MSD-XX”.

If you have difficulties applying the standard sheets, contract the EIC, the Designer and the ADA Specialists.
Alignment with stationing and cardinal points - make the station equation different for each curb ramp
Curve data box for the horizontal alignment
Elevations along the top of curb at each grade break where it meets with sidewalk. i.e. Turning Space, Clear Space, and end of curb ramps (these are the ONLY elevations, do not put in elevations of the backside, the Contractor can calculate these using a digital level)
Running slope and cross slope of each curb ramp piece including sidewalk beyond curb ramp. Label grades and direction arrow.
Length of each piece on the backside of the sidewalk (which should be minimum width based on geometrics of a curve...center line or front side would be longer since it’s a curve)
Width of sidewalk – If it doesn’t vary, just one dimension on either ends of the curb ramp is sufficient.
Detectable warning area
Cut/Fill lines

Highway boundary lines and any additional ROW takings as part of the project
Drainage flow lines around curb ramp, including high spots if applicable – Do not want water ponding in the clear space after storm has passed.
Label Cross walk paint lines
Any utilities or drainage structures that could affect the installation of the curb ramp.

*Note: Have to be careful with what type of drainage grates are adjacent to cross walks. Typical highway grates do NOT meet ADA requirements. Orientation is important for wheel chair movement and for pedestrians with mobility assistance devices (i.e. canes and walkers). If there is an existing drainage structure, try to move curb ramp opening away from it, if possible. Drainage grate may not be between crosswalk stripes, but the edge stripes may go over the grate.
Profile of curb line with vertical alignment data and cardinal points. Also label the centerline of the turning space on the profile and the stationing for the curb ramps. This will make it easier for the contractor to install the curbing, as that is typically installed first.
Any notes necessary for the curb ramp installation. Do not duplicate notes from the 608 standard sheets. These are project specific notes.
Any additional details necessary per individual curb ramp. For example: Retaining Wall detail with notes.
To sum up the detail sheets:

- Ramp elevations shown on curbside.

- Drainage flow lines and a profile of the curb line are shown.

- Critical values are the slopes, widths and grades.

- A 10’ transition can be used to match the new work into existing sidewalk. If you are installing new sidewalk as part of this project refer to other contract documents for additional details.

The back of the forms should be set using a digital level as standard survey equipment is not accurate enough to ensure a slope to within 1/10th of a percent.
In the miscellaneous tables, most plans on state highways will have a table of sidewalk and/or curb ramps. Now an additional table is needed on the miscellaneous tables sheet called the “ADA Reporting Table – Curb Ramps”. This table keeps track of the curb ramp installations for the Transition Plan.

If the ADA Reporting Table is not in the plans, it should be in the supplemental information and in the construction folder in ProjectWise.
Here is a close up of this table.
The table includes the information needed for curb ramps along state owned highways and it allows the Department to update our transition plan.
The coordinates are Northings and Westings based on Google earth and not state plane coordinates. Station and Coordinates are in the center of the curb ramp, likely the turning space or clear space.

This table is required by HDM Chapter 7, which is currently being updated. Post construction, this finalized table must go from the EIC back to the ADA Coordinator for the particular Region to update the Transition Plan.

Note: In Column “New or Replacement”: New = new construction 2R+ project, Replacement = 1R project
Designers should be familiar with the specifications used on the project.

- Concrete is paid for by the cubic yard under the current standard specifications – Item 608.0101 – Concrete Sidewalks and Driveways.

- NYSDOT has special specifications that pay for sidewalk by the square foot, linear foot – Some of these are PIN Approval Special Specs.
  - Item 608.01010002 – Concrete Sidewalks – Americans with Disabilities Act – SF
  - Item 608.01100015 – Concrete Sidewalk – LF (SRTS Only)
  - Item 608.01100409 – 4 Inch Thick Concrete Sidewalk – SF (ADA Specific & Limited PED Facility Projects)

- Special specifications pay for curb ramps by the square foot or each – Some of these are PIN Approval Special Specs.
  - Item 608.0105NN09 – Curb Ramp – Each
  - Item 608.0105XX05 – Curb Ramp – SF (ADA Specific & Limited PED Facility Projects)
Items involved in installation of curb ramp:
608.0105NN09 – Curb Ramp (PIN Approval) – This item is an “all-in-one” serialized item, which will match all the different types of curb ramp configurations on standard sheet 608-01. Includes all work associated with curb ramp, turning/clear spaces, curbing: demolition, saw cutting, excavation, disposal, fill, subbase material, compaction, and construction of new curb ramps, turning/clear spaces, and associated curbing. Also included: Detectable warning units, repairs to affected asphalt, topsoil, establishing turf, and finish work. Utility or drainage adjustments are paid for under their own separate items. This item goes from end of curb ramp to end of curb ramp, therefore additional sidewalk will be paid for under separate items, as well as any additional survey, curb, topsoil, and turf necessary.

There is a new 608 Special Spec being written and is currently under clearance review.
Here are some examples of the standard computation sheets being used for Highway projects. Clearly using Item 608.0105NN09 makes the computations much easier since it is an “all-inclusive” each item.

Beyond the curb ramps, the designer will have to estimate each component separately; sidewalk, curb, subbase, excavation, top soil/turf establishment, etc.
Today's focus was on requirements under the blue heading, for new and replacement facilities on 1R, 2R, or 3R jobs.

You'll see that there is a reference column, followed by a column for design and layout limits and a column for work acceptance limits.

The design and layout value is generally a more conservative value, that allows for a "built-in" construction tolerance.

The work acceptance value is the value stated in the ADA Guidelines, that will absolutely be required for the facility to be acceptable as ADA compliant.
If you find during design that something won’t meet one of the limits the most obvious thing, if possible, is to adjust the design.

You may have to modify the curb ramp type you’ve chosen or choose a completely different ramp type to fit your specific location.

If it’s not as easy as that, need to talk with the ADA Specialist. They may have another idea for design that would result in as few non-standard features as possible.

If, after all that, it’s determined that it’s a physical constraint (rather than a layout issue or a design issue) the noncompliant element can be formally justified.
References

- Engineering Directive 15-004
- HDM Chapter 18 web page
  - FAQ on ADA Topics
  - Critical Elements for the Design and Layout of Pedestrian Facilities Sheet
  - Field Data Manual Method Sheet
  - Procedure for Manual Method
- 608 Standard Specs – Sidewalks, Driveways, etc.
- 608 Standard Sheets – Sidewalks, Driveways, etc.
- ADA Specialists

References that may be useful
Resources include

Accessibility Board Website – guideline we use most often for the public ROW
DOJ website – Guidelines for Government sites and facilities – tends to apply more to buildings
Our own website for Highway design Manual Chapter 18 - Pedestrian Facilities
There will be a 15 question quiz at the end. PE’s, RLA’s, and LS’s may earn 1.5 Professional Development Hours (PDH’s) for today’s course. To qualify, you must be in a moderated group, sign the sign-in sheet, and take this quiz.
1. A curb ramp detail will be created for what type(s) of situations?

a. All situations. A curb ramp detail will be created for every ramp for every project.
b. Only 1R projects.
c. In areas where there are 1:6 grades and ROW is 10 feet from the back of the existing sidewalk.
d. On any 1R, 2R, or 3R project in which a curb ramp has specific ROW, utility/drainage, or natural terrain concerns and needs to fit within a limited footprint.
2. Which combinations are standard curb ramp values?

a. Running Slope = 7.5%, Curb Ramp length = 5'
b. Running Slope = 5.0%, Curb Ramp length = 7' 8"
c. Running Slope = 10.22%, Curb Ramp length = 15' 1"
d. All of the above
2. Which combinations are standard curb ramp values?

a. Running Slope = 7.5%, Curb Ramp length = 5'
b. Running Slope = 5.0%, Curb Ramp length = 7'-8"
c. Running Slope = 10.22%, Curb Ramp length = 15'-1"
d. All of the above
3. What feature should not be included on a curb camp detail sheet?

a. Running slope of the curb ramp.
b. Elevations at the back of sidewalk
c. Drainage flow lines.
d. AHB/HB boundary lines.
3. What feature should not be included on a curb camp detail sheet?
   
a. Running slope of the curb ramp.
b. Elevations at the back of sidewalk
c. Drainage flow lines.
d. AHB/HB boundary lines.
4. What length transition does the designer have to work with to transition from a new curb ramp to the existing sidewalk on 1R projects?

a. 7 feet  
b. 10 feet  
c. 5 feet  
d. 20 feet
4. What length transition does the designer have to work with to transition from a new curb ramp to the existing sidewalk on 1R projects?

a. 7 feet  
b. 10 feet  
c. 5 feet  
d. 20 feet
5. True or False? The cross slope of cross walks at intersections must match the highway grade.
5. True or False? The cross slope of cross walks at intersections must match the highway grade.
False. Only cross walks at midblock crossings can have a cross slope that matches the highway grade.
6. True or False? The slope of a turning space in any direction can be a maximum of 2.5%.
6. True or False? The slope of a turning space in any direction can be a maximum of 2.5%.

False. The maximum slope in any direction is 1.5%
7. True or False? If there is a curb ramp detail in the contract plans, then there must be a non-standard feature within that curb ramp that needs to be retained.
7. True or False? If there is a curb ramp detail in the contract plans, then there must be a non-standard feature within that curb ramp that needs to be retained.

False. Some curb ramp details will have non-standard features that need to be retained, but some may be detailed just to show that they fit within a constrained footprint with ROW, utility, or terrain restrictions.
8. True or False? The designer can create one sidewalk/curb ramp template and use it for multiple curb ramps.
8. True or False? The designer can create one sidewalk/curb ramp template and use it for multiple curb ramps.

True! The running slopes, curb ramp lengths and snow storage widths can all be controlled by point controls after the template has been dropped into a corridor.
9. The Manual Method of field data collection would be appropriate for what type of project?

a. A 3R interchange project on an interstate with no pedestrian accommodation
b. A 3R village project with existing photogrammetry and hard survey at all intersections
c. A 1R overlay project on a rural highway and no pedestrian accommodations
d. A 1R overlay project on a rural highway through a village with sidewalks
9. The Manual Method of field data collection would be appropriate for what type of project?

a. A 3R interchange project on an interstate with no pedestrian accommodation
b. A 3R village project with existing photogrammetry and hard survey at all intersections
c. A 1R overlay project on a rural highway and no pedestrian accommodations
d. A 1R overlay project on a rural highway through a village with sidewalks
10. The Manual Method of field data collection should be used when:
   a. Roadway side slopes are flatter than 1:6
   b. ROW extends at least 10' behind back of sidewalk
   c. The curb ramps shown on the 608 standard sheets will not fit within the existing ROW
   d. Letting is far enough out that there is ample time to acquire terrestrial or mobile LiDAR
10. The Manual Method of field data collection should be used when:

a. Roadway side slopes are flatter than 1:6
b. ROW extends at least 10' behind back of sidewalk
c. The curb ramps shown on the 608 standard sheets will not fit within the existing ROW
d. Letting is far enough out that there is ample time to acquire terrestrial or mobile LiDAR
11. When using the Manual Method, the reference line (axis) is established on the:

a. Front edge of sidewalk  
b. Back edge of curb  
c. Front edge of curb  
d. Back edge of sidewalk
11. When using the Manual Method, the reference line (axis) is established on the:

a. Front edge of sidewalk  
b. Back edge of curb  
c. Front edge of curb  
d. Back edge of sidewalk
12. When filling out the Field Collection Data Sheet, direction of slope should be noted by:

a. Using a +/- notation where positive is always away from the curb line
b. Circling the arrow on the field data sheet to indicate the direction water will drain
c. Using a +/- notation where positive will match the positive roadway cross slope as viewed from centerline
d. Drawing arrows on the field data collection sheet to indicate the direction water will drain
12. When filling out the Field Collection Data Sheet, direction of slope should be noted by:

a. Using a +/- notation where positive is always away from the curb line
b. Circling the arrow on the field data sheet to indicate the direction water will drain
c. Using a +/- notation where positive will match the positive roadway cross slope as viewed from centerline
d. Drawing arrows on the field data collection sheet to indicate the direction water will drain
13. True or False? The calibration of a digital level should be checked on a level surface prior to using the level for field measurements.
13. True or False? The calibration of a digital level should be checked on a level surface prior to using the level for field measurements.
True.
14. True or False? Photogrammetry DTM's are sufficient for design of all curb ramps since you have an Existing Ground DTM.
14. True or False? Photogrammetry DTM’s are sufficient for design of all curb ramps since you have an Existing Ground DTM
False. Vertical accuracy of photogrammetry DTM is not precise enough to design a compliant curb ramp in all situations. Additional terrain data may be required.
15. True or False? Standard photos should be taken for every curb ramp that is investigated.
15. True or False? Standard photos should be taken for every curb ramp that is investigated.

True.
More Questions?

Copies of this presentation will be posted on the NYSDOT Highway Design Manual Chapter 18 Internet Page.

https://www.dot.ny.gov/divisions/engineering/design/dqab/ndm/chapter-18

Contact Info:
Valerie Ashline – valerie.ashline@dot.ny.gov
Chris Modafferi – christopher.modafferi@dot.ny.gov