Design and Construction Surveying for ADA Projects

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Key Messages

- We need both elevation and horizontal accuracy for design surveys.
- Correct location of surface utilities.
- Sidewalk profiles and adjacent right of way tie-ins in your plans.
- New survey technologies.
## Levels of Detail

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
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</thead>
</table>
| • Curb ramps line up with inplace sidewalks  
• Contractor builds according to standard plans with a tabulation  
• Surveys not required | • When ramp layouts differ from standard plans and for all signalized intersections  
• 20-scale detail provided in plan  
• Ramp slope ranges and working points provided | • When slopes are non-compliant or there’s a tie-in point (such as a doorway)  
• 20-scale detail provided in plan  
• Specific ramp slopes if non-compliant and working points provided |
Level 1 (Standard Plan) Ramps
Level 2 Ramps
Level 3 Ramps
Surveyed Intersections

- Site may contain numerous features
- Surveys should locate:
  - All utilities including handholes, manholes, hydrants, gate valves, drainage structures, signal poles/cabinets, light poles, loop detectors, telephone/cable boxes, fiber optic vaults, and irrigation/sprinkler heads or services
  - Buildings and doorways, other permanent features in sidewalk areas such as landscaping, retaining walls, benches, sign posts, etc.,
  - Crosswalk striping, curb and gutter, sidewalk edges 30’ in both directions(mainline and side street), Median locations
  - ROW in areas where the construction limits may fall close to or outside existing ROW
A surveyed distance of approximately 50 ft from the PT is usually sufficient. Distance needed from back of walk depends on the environment (generally 10 ft urban; 20 ft suburban or rural).
Level 3 Roadway Survey needed for all critical tie-ins (doorways, steps etc.), curb line changes, and all medians and porkchops.

Topo the road surface at 5, 10, and 15 feet out from the inplace curb and gutter and around the crowns.
ADA Topos: Utilities

- Always shoot the center of unobstructed structures such as hand holes and the corners on structures such as cabinets, cabinet bases and vaults.

- **Accuracy is key!**
ADA Topos: Signal Bases

- Additional signal base shots needed to obtain exact signal and pedestal locations
ADA Topos: Doorways

- Tie-in elevations at entrance
- Height and tread width of bottom step
Matching Steps Example
Construction Plans: Doorways

1. Match walk at existing elevation.
2. Match walk to bottom of existing step.
3. Match walk at existing elevation.

Elevations:
- 80.17 (621)
- 81.11 (627)
- 80.67 (624)

Gradients:
- 0.6%
- 1.8%
- 1.7%
Elevations
Elevations

Actual Grade 7%
2% Correct
Gutter Flow Line
Eliminate

<table>
<thead>
<tr>
<th>POINT NUMBER</th>
<th>ELEVATION</th>
</tr>
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<tbody>
<tr>
<td>120</td>
<td>1324.11</td>
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<tr>
<td>121</td>
<td>1324.04</td>
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<td>122</td>
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## ADA Survey Accuracy

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Vertical</th>
<th>Horizontal</th>
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<tbody>
<tr>
<td>Total Station</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>Terrestrial LIDAR</td>
<td>0.04–0.05</td>
<td>0.10</td>
</tr>
<tr>
<td>Mobile LIDAR</td>
<td>0.05–0.06</td>
<td>0.10</td>
</tr>
<tr>
<td>VRS</td>
<td>0.20</td>
<td>0.10</td>
</tr>
<tr>
<td>Mapping</td>
<td>0.30–0.50</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Total station equipment and LIDAR are the only acceptable survey methods.

A 6 ft length ramp designed at 7.5% could very well be non-compliant using VRS or mapping.
The survey technology is only as good as the accuracy of the project control.

Relative accuracy within a project is what's needed for desired results (not absolute MSL).

Designers need to know and document:
- Method of collection used
- Stated vertical and horizontal accuracy
- Date of collection (year and time of season)

Pros and Cons for all surveying methods such as cost, project schedule, personnel hours, worker’s safety.
ADA Survey Accuracy

- Terrestrial scanning needs multiple setups to get backsides of medians, pork chops and shaded areas.
- Mobile scanning needs free rights and side streets.
- Both may need to be augmented with total station.
- Working with automation users group to determine ADA best practices. (i.e. scaling, symbols and data collection methods).
Construction Staking: PAR

13%  1.7%
Construction Staking: PAR

2.0% Max
Sidewalk Profiles

[Diagram showing sidewalk profiles with elevation changes and percentage slopes.]
Sidewalk Profiles

- 5% Max
- 1.5%
- 8% Max
Entrance Tie-ins
Questions?

Your Destination...Our Priority