'Accounting for Tolerances within ADA Design Criteria'

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Design professionals designing ADA compliant sidewalks sometimes(often) design at the maximum allowable values. The maximum ADA values do not take into account the allowable tolerances of ACI 117 Specifications For Tolerances for Concrete Construction and Materials. This puts the Contractor and the Design Professional in a loose-loose situation.

What is the ADA Design Criteria for Sidewalks and Ramps?

There are three numbers that cover most everything we will be dealing with on sidewalks and ramps.

- Maximum Cross Slope: 2.0%
- Maximum Slope in direction of travel for any distance: 5.0%
- Maximum Slope in direction of travel for a maximum of 30’ is : 8.33%, at 30’ a 5’ x 5’ landing is required with a maximum of 2.0% slope in any direction.

ACI 117.1R-14

Table 5.8.1.1b—ADA/ABA-AG requirements for surface accessibility

Element	Requirement
Running slope of walking surfaces	1:20, maximum (5 percent)*
Cross slope of walking surfaces	1:48, maximum (2 percent)
Accessible parking spaces and access aisles	1:48, maximum (2 percent)
Ramp slopes	1:12, maximum (8.33 percent)
Ramp cross slope	1:48, maximum (2 percent)
Curb ramps	1:12, maximum (8.33 percent)
Flared sides of curb ramps	1:10, maximum (10 percent)
Counter slopes of gutters and roads adjacent to curb ramps	1:20, maximum (5 percent)
Change in level, vertical offset	1/4 in. (6.4 mm), maximum
Openings in surface in direction of travel	1/2 in. (13 mm), maximum

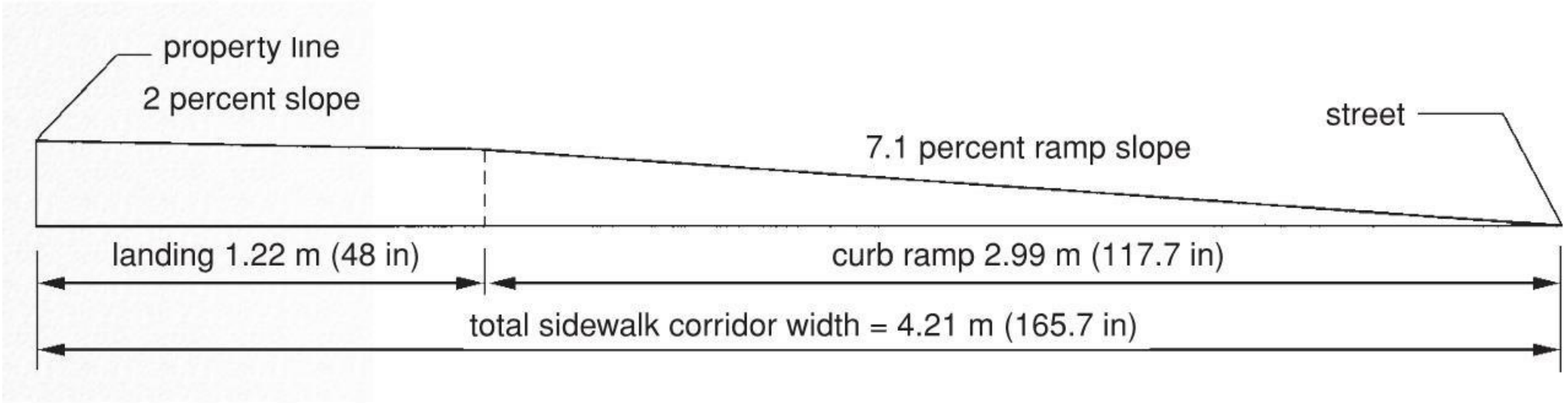
*When sidewalks are adjacent to a street, the sidewalk may follow the grade of the street.

So what is a Reasonable Constructability Tolerances for Sidewalks and Ramps?

The FHWA Best Practices says:

"For new construction, ADAAG 4.7 permits a maximum curb ramp slope of 8.3 percent. However, in practice, 8.3 percent is rarely treated as a maximum but is used as the design standard that does not allow for construction tolerances. Therefore, rather than using 8.3 percent for designing curb grade, a grade of 7.1 percent is recommended to allow a construction tolerance."

The FHWA Best Practices says:



"Therefore, rather than using 8.3 percent for designing curb grade, a grade of 7.1 percent is recommended to allow a construction tolerance."

So what is a Reasonable Constructability Tolerances for Sidewalks and Ramps?

The ACI 117.1R-14 says:

"A maximum overall design running slope for exterior accessible ramps of 7.5 percent is recommended."

"A maximum design cross slope for walks, accessible exterior ramps, and other pedestrian paving of 1.5 percent is recommended."

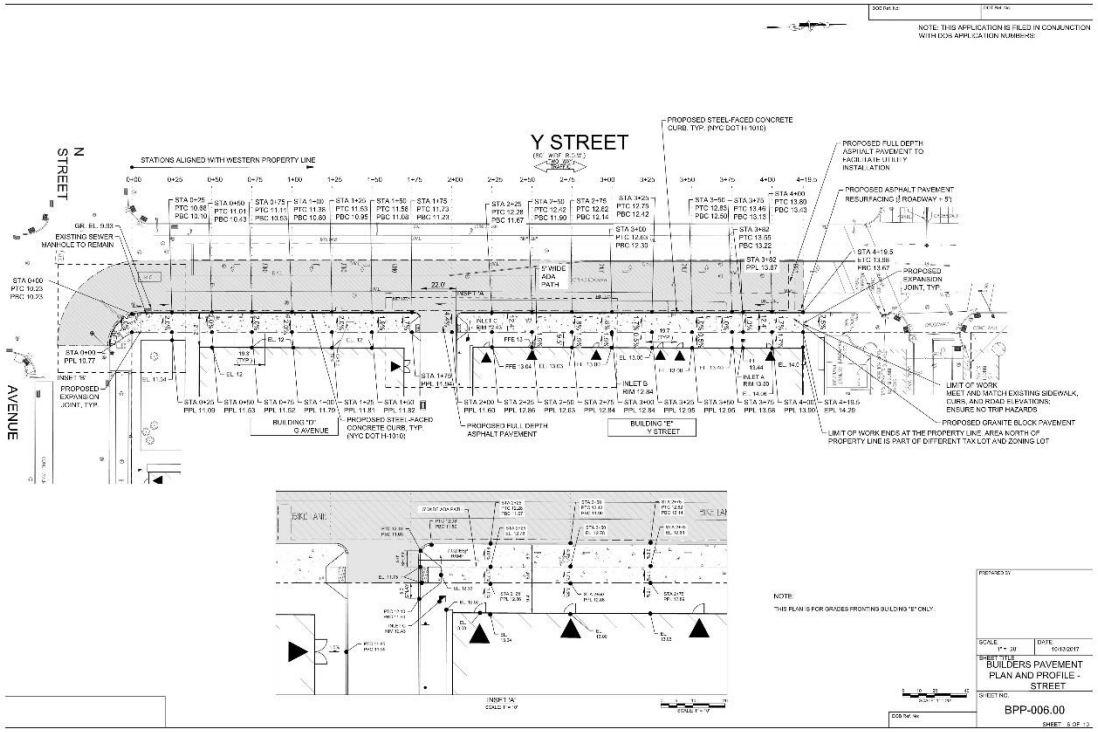
So what is a reasonable constructability tolerances?

- Cross Slope: +/-0.5%?
- Slope in direction of travel for any distance: +/-1.2%?

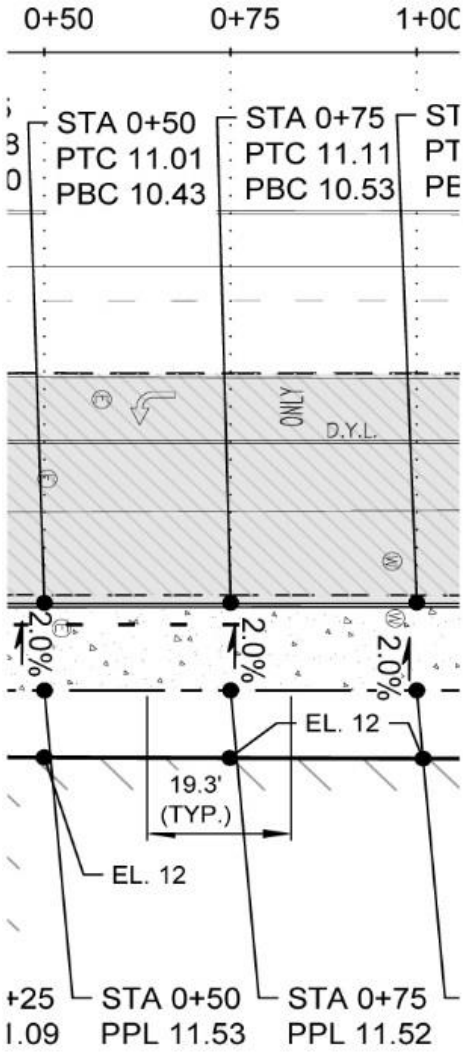
If we agree that this is reasonable, then.

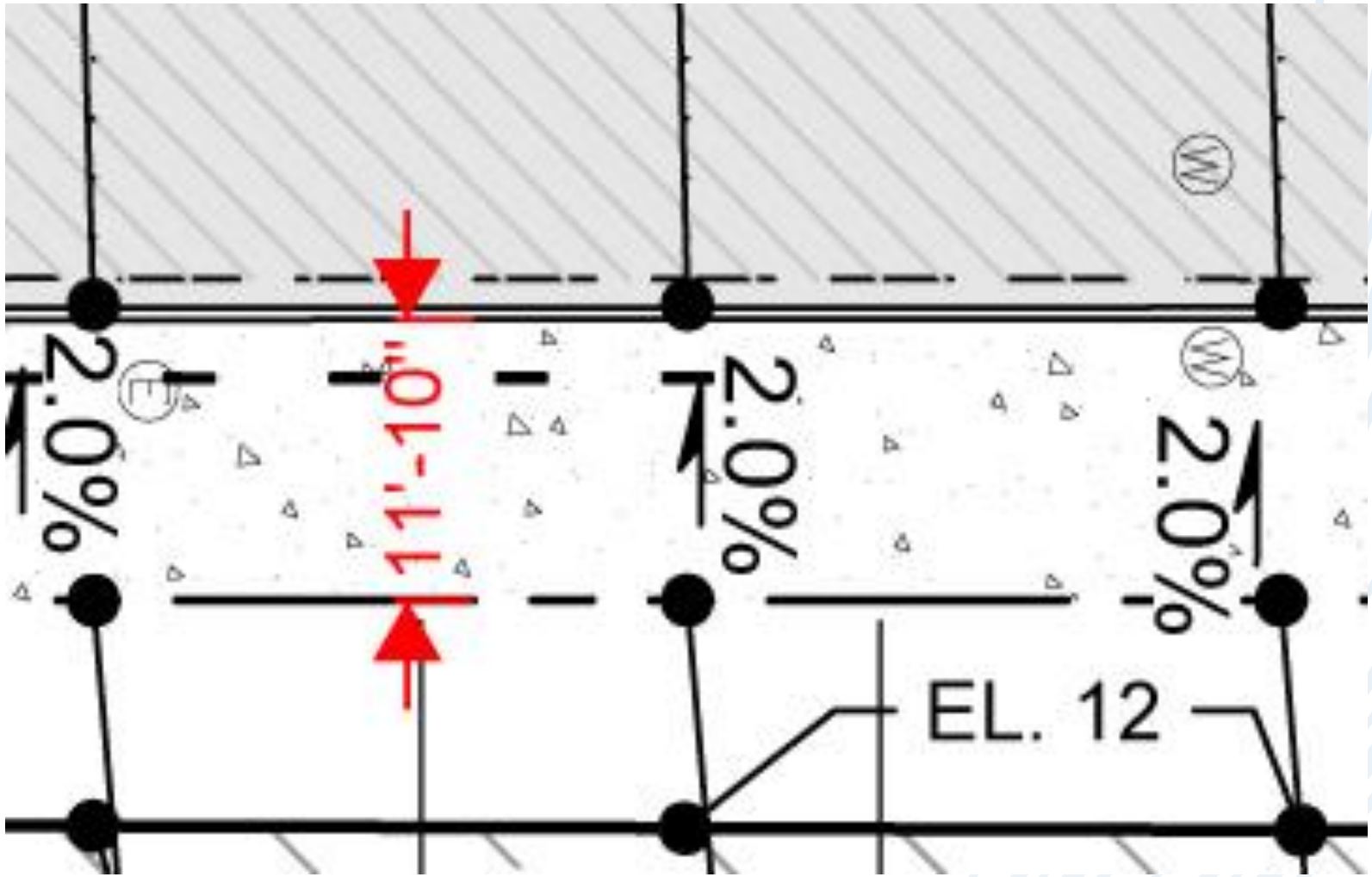
- Design Cross Slope should be: 1.5%
- Design Slope in direction of travel should be: 3.8%, or 7.1%

Designing to the maximum allowable values.



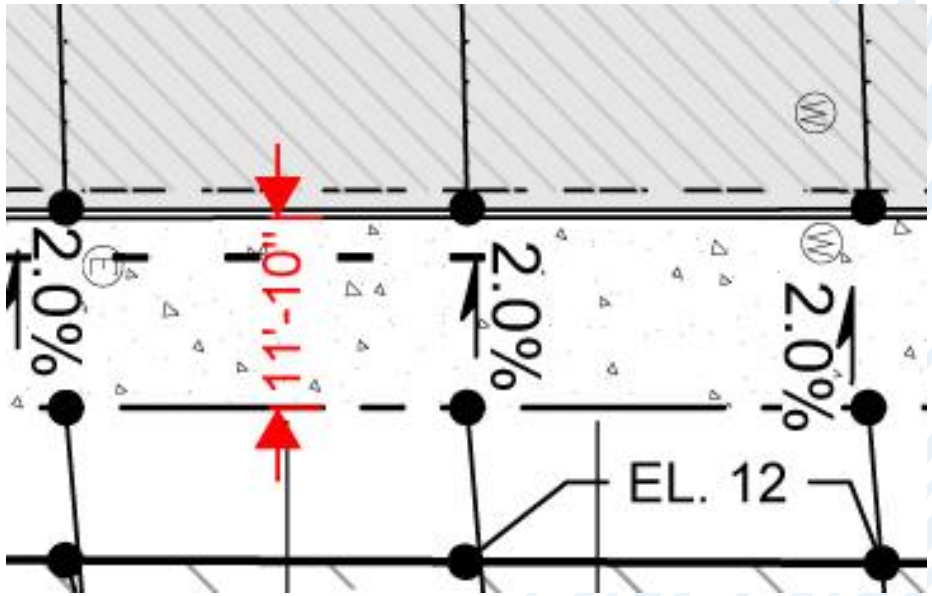
Does 2% really mean 2%?



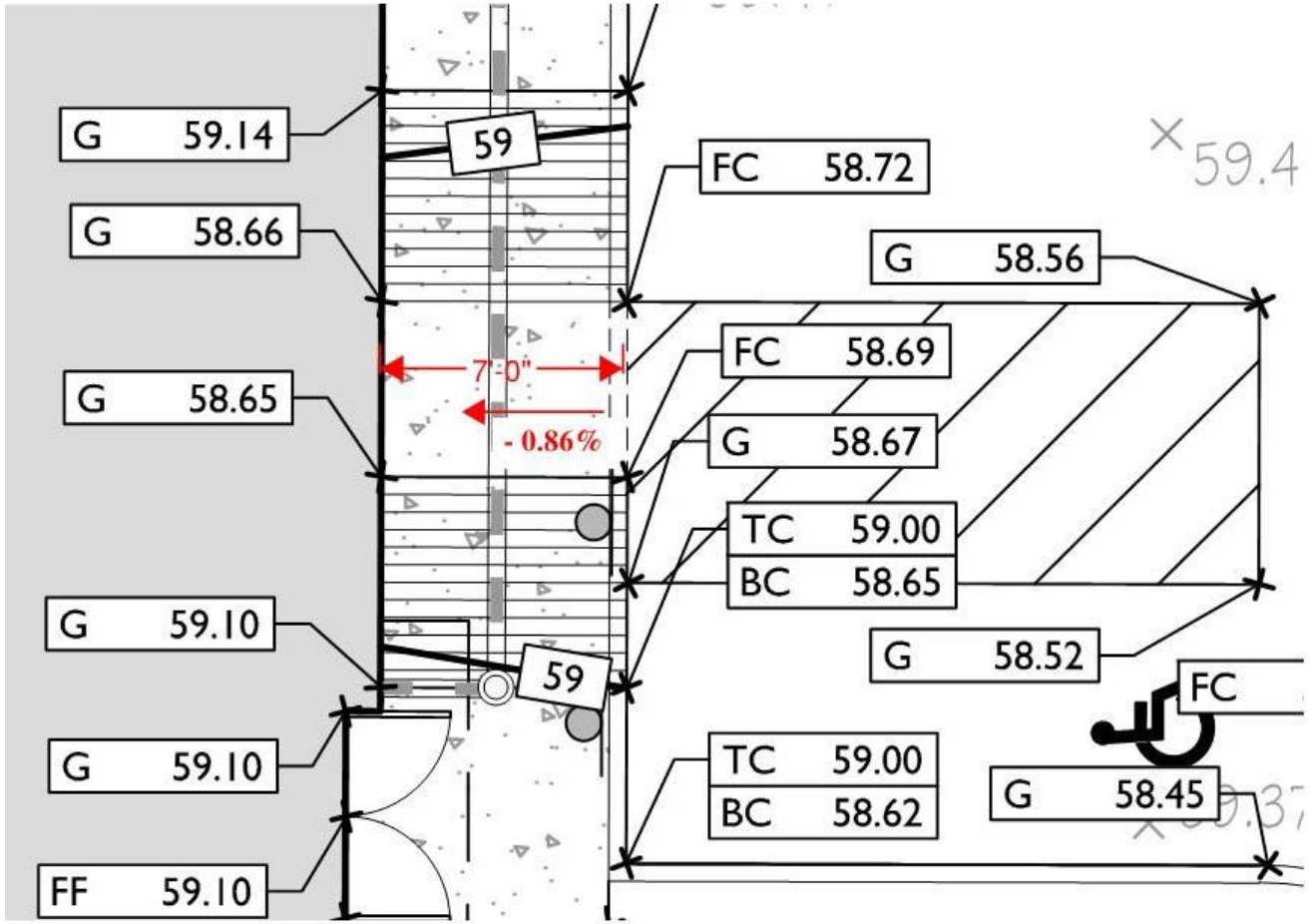


Does 2% really mean 2%?

- Elevation at the edge of the sidewalk 11.52
- Elevation at the curb -11.11
- Difference in elevation of .41
- Distance ÷11.83
- Multiply by 100 and your percent slope is! 3.46%



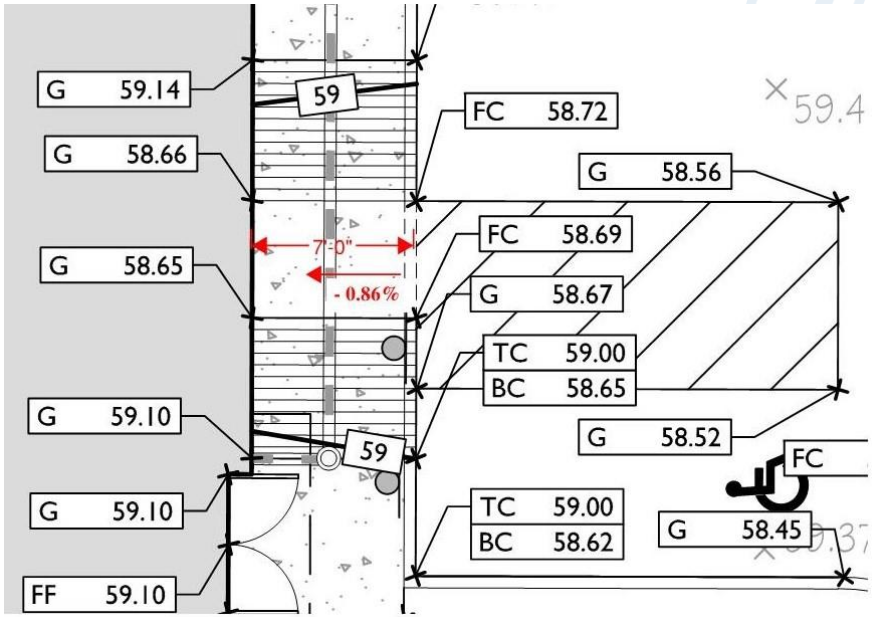
Or You Get This



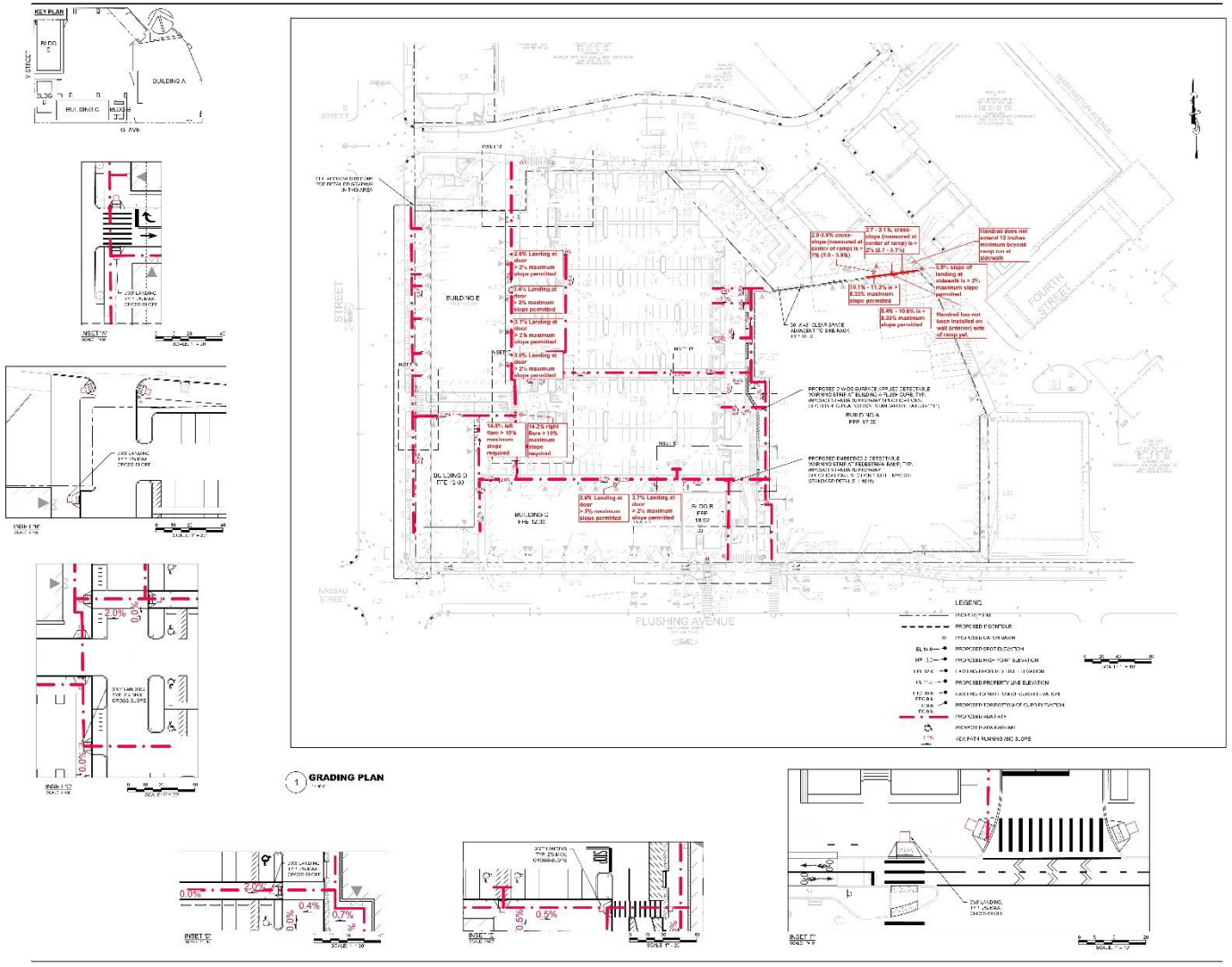
Or You Get This

- Elevation at the edge of the sidewalk 58.72
- Elevation at the curb -58.66
- Difference in elevation of .06
- Distance ÷ 7.00
- Multiply by 100 and your percent slope is! 0.86%

- Now what happens



The Contractor Gets Something That Looks Like This



Or This

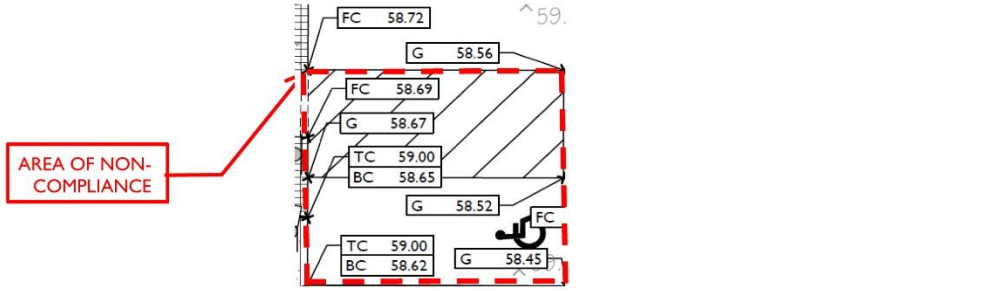
EXTERIOR PUNCHLIST SUMMARY

[redacted]
New York City, New York
August 28th, 2018

[redacted] performed a field evaluation of the subject location to determine whether the constructed site includes all proposed improvements and all relevant improvements are consistent with the 2010 ADA standards for accessibility design and civil design prepared by our office, dated June 13th, 2018. Please note the following items which require reconstruction to meet these requirements:

Section 1: ADA Requirements

1. The ADA parking area exceeds the maximum allowable slope of 2.0% in all directions. The asphalt should be reconstructed to provide slopes not exceeding 2.0% in all directions.



[redacted]

6. Landing exceeds the maximum 2.0% slope in all directions. Landing should be reconstructed to provide slopes not exceeding 2.0% in all directions.

[redacted]

Lets look at that report a little closer.

How do we read this?
What is the inspector implying?

Is the slope 2.8%?

Or is it 2.5%?

Maybe its 3.1%!

What's the next step?

Demolition, Cost, Lost Time, and Unhappy Owner.

Okay so how do we avoid these problems?

Designers:

- Lets not design to the maximum allowable values with out consideration for constructability tolerances.
- Lets not indicate a value on the documents that does not represent the true value of the elevations on the site.
- If we can't get the numbers to work on the drawings, there is a great likelihood that it won't be built correct in the field.

Okay so how do we avoid these problems?

Contractors:

- Review the contract documents before installing concrete and verify that designed slopes allow for constructability tolerances.
- We need to train our people better, our field crew need to understand how critical ADA requirements are.
- When we see a problem address it with the design team.

Thank You

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