

Report of Summer 2022 Curb Ramp Field Data Collection

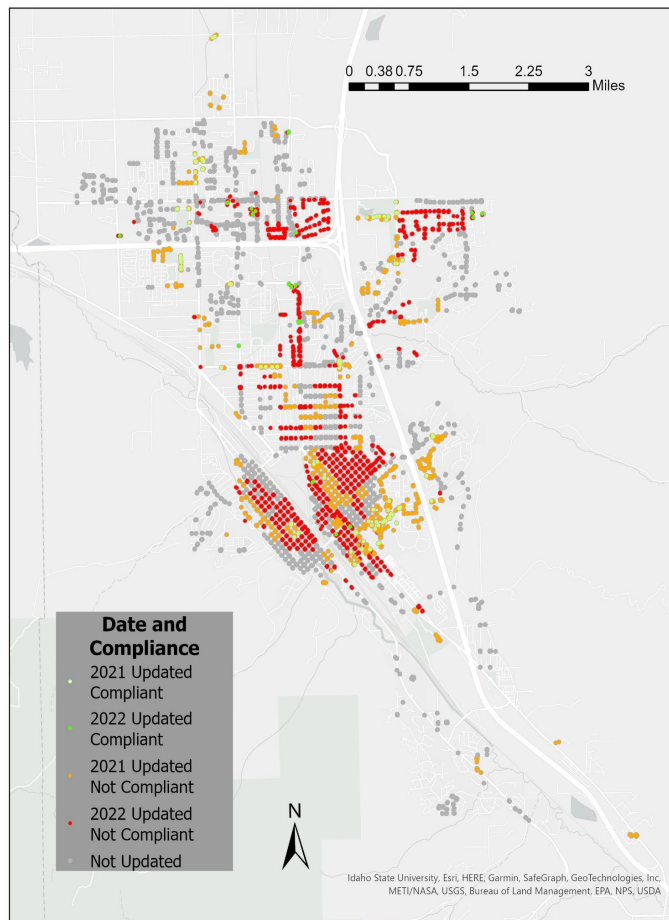
In total 1,498 curb ramps were updated during the summer of 2022 by ISU's GIS TReC. Of the 4,400 ramps currently in inventory, 137 of these met the 2010 ADA compliance test. This test used an SQL expression executed against the ramps table as follows:

```
TurningSpaceWidth >= 4.0 And TurningSpaceLength >= 4.0 And  
Running_Slope <= 8.3 And Left_Flare_Slope <= 10 And Right_Flare_Slope  
<= 10 And CounterSlope <= 5 And DetectableWarningWidth >= 2.0 And  
Ramp_Width >= 4.0 And TruncatedDome = 1 And ContrastingColor = 1
```

The result of only 137 ramps meeting ADA compliance is misleading however as the majority of curbs were not updated during the summer of 2021 or the summer of 2022 ramps ($n = 2,902$). In addition, many of the curb ramps in inventory did not include the attributes necessary to determine compliance. It is also important to note that construction on some non-compliant ramps took place over the summer of 2022. The data collected for these ramps may have occurred before construction was completed. Lastly, the compliance test used rules set in 2010 and sidewalk ramps built prior to 2010 should not be expected to comply with these rules. Re-evaluating ADA compliance for only those curb ramps updated during the summer of 2022 shows 29 ramps met the 2010 ADA compliance test. This is a compliance rate of 2%.

Map of Compliant Curb Ramps

The areas with the highest concentration of compliant and non-compliant ramps are shown in **Map 1**, below. Based on these data the Old Town and southern parts of Pocatello (excluding the university area) appear to have the highest concentration of non-compliant curb ramps.



Map 1. Areas with compliant/non-compliant curb ramps based upon 2021-2022 field collection

Summary of Compliance factors

To better understand the curb ramp compliance factors, a series of independent SQL expressions were executed generating the following results (Table 1).

Table 1. Breakdown of individual compliance factors evaluated for all ramps in this study (n = 4,400).

Compliance factor	Ramps in compliance (n =)
Turning space length/width	1,206
Running slope	2,506
Left/Right Flare slope	1,750
Counter slope	1,894
Detectable warning width	1,672
Ramp width	3,298
Truncated dome present	949
Contrasting color present	671

When comprehensively evaluated only 137 curb ramps were found to be fully compliant. By looking at each individual factor it appears the presence of a truncated dome detectable warning with contrasting color is the primary bottle neck or limiting factor. This may also be a low-hanging fruit type of scenario as these results suggest complete replacement of curb ramps may not be necessary in many instances but rather it might be possible to increase the compliance rate by installing truncated dome detectable warnings with contrasting color to the existing ramp. This is not necessarily a simple process but is certainly less difficult and less costly than replacing the entire curb return area.

Summary statistics of various measurements made for each curb ramp (Table 2) shows the mean values for each criterion sampled in 2022 (n = 1,498).

Table 2. Statistics describing measurements made for all curb ramps updated in 2022 (n = 1,498)

Compliance factor	Mean measured value	Compliance value
Turning space length/width	4.15/5.23	≥ 4.0
Running slope	7.61	≤ 8.3
Left/Right Flare slope	8.03/8.13	≤ 10.0
Counter slope	5.00	≤ 5.0
Detectable warning width	4.04	≥ 2.0
Ramp width	4.99	≥ 4.0

Additional summary statistics for all ramps in inventory were calculated and compared against 2010 ADA guidelines (Table 3) (n=4,400).

Table 3. Statistic describing measurements made for curb ramps collected over all time, compliant and not. (n=4,400)

Compliance factor	Mean measured value	Compliance value
Turning space length/width	4.69/5.65	≥ 4.0
Running slope	5.93	≤ 8.3
Left/Right Flare slope	6.35/6.58	≤ 10.0
Counter slope	3.96	≤ 5.0
Detectable warning width	4.21	≥ 2.0
Ramp width	5.57	≥ 4.0

Tables 2 and 3 suggest the majority of curb ramps should be considered compliant. However, it was brought to my attention that while a left and right flare is not required, the presence of a null value in the geodatabase table

might invalidate the SQL query and return that record as non-compliant. To address this, the SQL query was executed again in a step-wise fashion allowing null values to be retained as *potentially* compliant.

Beginning with all ramps updated in 2022 ($n = 1,498$):

```
(TurningSpaceWidth >= 4.0 Or TurningSpaceWidth IS NULL) (n = 885)
(TurningSpaceLength >= 4.0 Or TurningSpaceLength IS NULL) (n = 710)
(Running_Slope <= 8.3 Or Running_Slope IS NULL) (n = 838)
(Left_Flare_Slope <= 10 Or Left_Flare_Slope IS NULL) (n = 748)
(Right_Flare_Slope <= 10 Or Right_Flare_Slope IS NULL) (n = 713)
(CounterSlope <= 5 Or CounterSlope IS NULL) (n = 914)
(DetectableWarningWidth >= 2.0 Or DetectableWarningWidth IS NULL) (n =
1,201)
(Ramp_Width >= 4.0 Or Ramp_Width IS NULL) (n = 1,314)
```

As a result of this analysis, the ramps updated in 2022 show at least half of those records are *potentially* compliant with each individual factor. However, when the SQL expressions were executed together, only 83 of 1,498 ramps or 6%, were found to be *potentially* compliant with the 2010 standard. Recall also that many of the sidewalks and ramps in Pocatello and Chubbuck, Idaho were constructed before 2010. Those curb ramps are not expected to comply with the 2010 standard. Instead, curb ramps need to comply with the standard set in 1991 (if the curb ramp was constructed on or after 1991). A modified SQL query was executed resulting in 317 of 1,498 ramps, or 21%, records found to be compliant with the 1991 standard.

```
(Updated = 1) And (n = 1,498)
(Ramp_Width >= 3 Or Ramp_Width IS NULL) And (n = 1,386)
(Detectable_Warnings >= 2 Or Detectable_Warnings IS NULL) And (n =
1,305)
(Left_Flare_Slope <= 10 Or Left_Flare_Slope IS NULL) And (n = 748)
(Right_Flare_Slope <= 10 Or Right_Flare_Slope IS NULL) And (n = 713)
(Running_Slope <= 8.3 Or Running_Slope IS NULL) (n = 838)
```

Note: the SQL queries shown in this report are provided as a project deliverable for your convenience.

The same two SQL expressions were then executed on all ramps ($n = 4,400$). The first SQL expression (2010 standard) found ramp compliance to be 1,401 ramps for turning space width, 1,214 ramps for turning space length, 2,506 for running slope, 2,084 for left flare slope, 2,010 for right flare slope, 1,894 for counter slope, 1,672 for detectable warning width, and 3,298 for ramp width. When the entire SQL expression was executed for all ramps, 205 records were found to be compliant with the 2010 ADA requirements (5%).

The second SQL expression (1991 standard) found 2,637 updated ramps and ramp compliance to be 3,386 for ramp width, 3,773 for detectable warning, 2,804 for left flare slope, 2,010 right flare slope, and 2,506 for running slope. When the entire SQL expression was executed for all ramps, 876 ramps were found to be compliant with the 1991 ADA requirements (20%).

Horizontal and Vertical Positional Accuracy

Throughout the summer 2022 field collection, an external Trimble R1 GNSS receiver was used to improve the positional accuracy of these data. After reviewing the data collected it was found only 348 points used the external Trimble R1 receiver. The other 1,150 points used positioning from the integrated GNSS chip within the smartphone used for data collection. This affected the position accuracy, making horizontal positional accuracy higher than expected. The GNSS metadata was evaluated, showing median horizontal positional accuracy for all 1,498 ramps was 3.33 meters, median vertical positional accuracy was 4.16 meters, and the median number of positions used for each collection was five. In many ways the poor horizontal accuracy does not affect the data

collected over the summer of 2022 as the ramp (point) location was not updated but rather its attributes were updated. Thus, the positional accuracy did not degree the ramps feature class.

Summary of ADA Curb Ramp Compliance Across Zoning Areas

A zoning polygon layer for the City of Pocatello was used to assess ADA curb ramp compliance within each zoning types. Out of the 4,400 ramps, 3,331 are within the City of Pocatello with 94 considered fully compliant. A zoning polygon layer for the City of Chubbuck was also used to assess ADA curb ramp compliance within each zoning types. Out of the 4,400 ramps, 1,069 are within the City of Chubbuck with 29 considered fully compliant. **Figure 1** and **Figure 2** took only compliant ramps in each zone and was divided by total number of compliant ramps for each Pocatello and Chubbuck to get the percentage shown in the pie charts below.

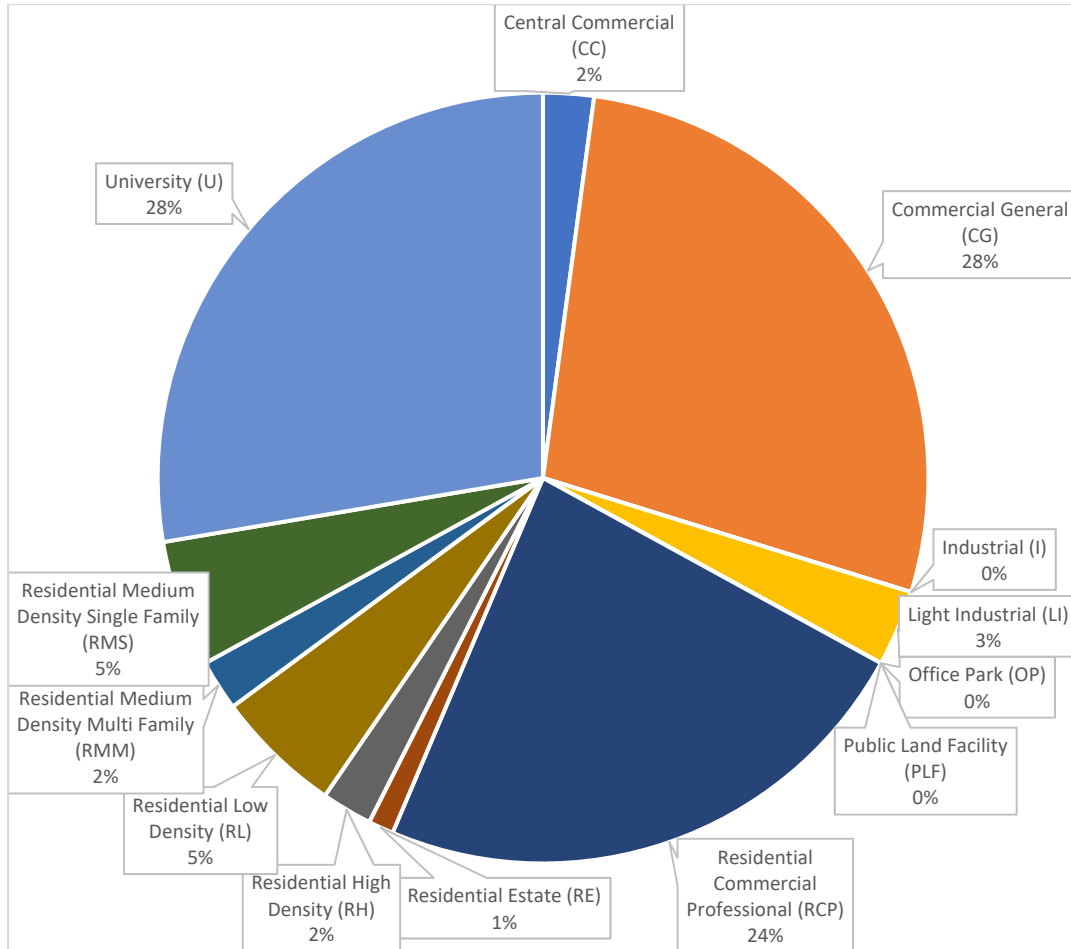


Figure 1. Using only ADA compliant ramps (n = 94), this pie chart summarizes compliance in Pocatello by zoning type using standard values.

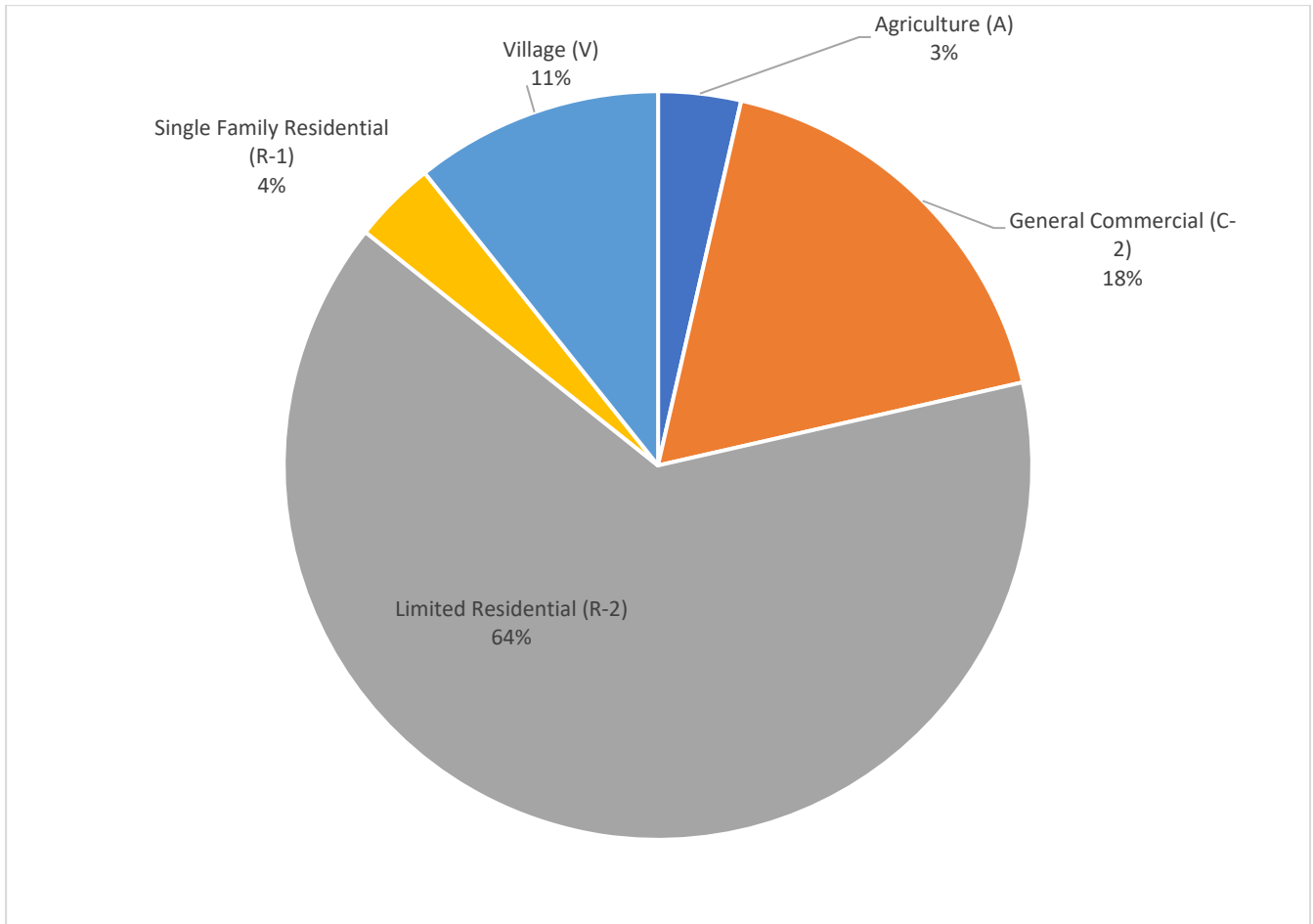


Figure 2. Using only ADA compliant ramps (n = 29), this pie chart summarizes compliance in Chubbuck by zoning type using the standard values.

This approach may be misleading however as each zoning type (commercial, residential, etc.) occupies different total areas within the City of Pocatello. To address this, a modified analysis was completed using a weighted area approach (**Figure 3** and **Figure 4**) (Note: data used to create this figure can be found in the project geodatabase as a table under Summary_RampsXzoning_Poc and Summary_RampsXzoning_Chu). From **Figure 3**, one can see the Commercial General Professional zone has the highest percentage of ADA compliant ramps in Pocatello. Using area weighted percent for the zoning areas in Chubbuck did not change the overall results by much, but a pie chart for this is still included in **Figure 4**. The data from these charts were then used to create **Figure 5**.

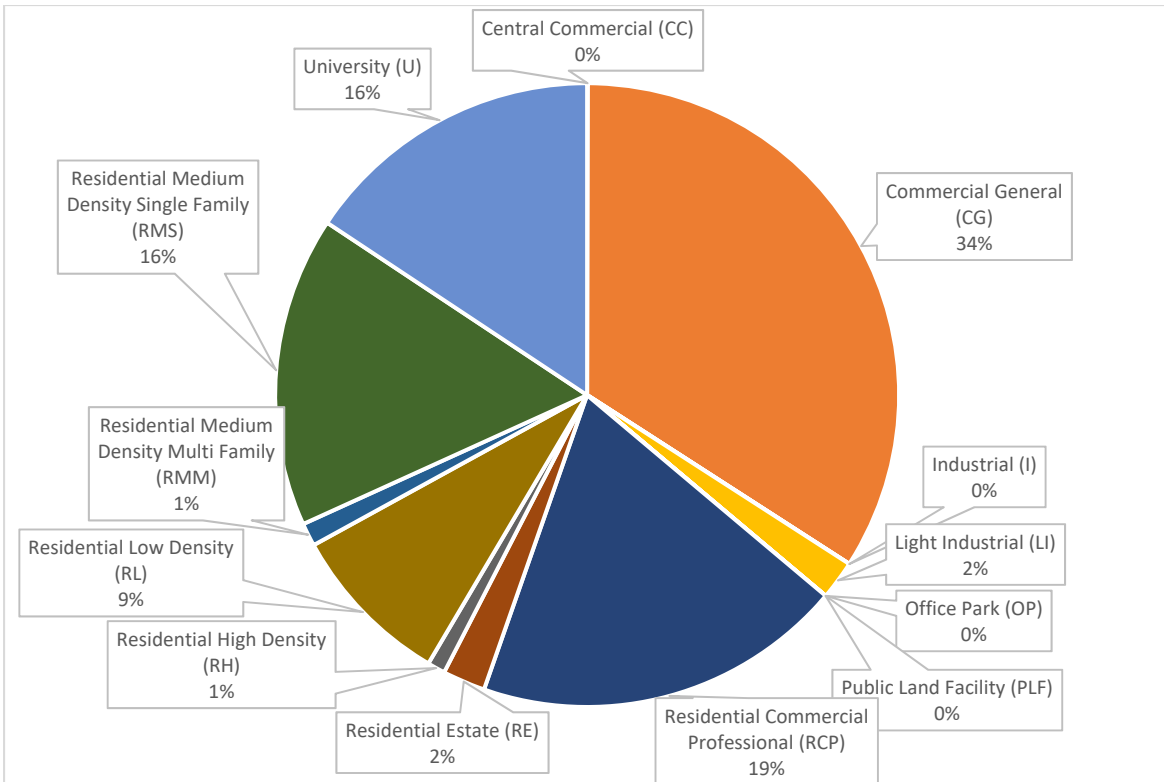


Figure 3. Using only ADA compliant ramps (n = 94), this pie chart summarizes compliance in Pocatello by zoning type weighted by zoning type.

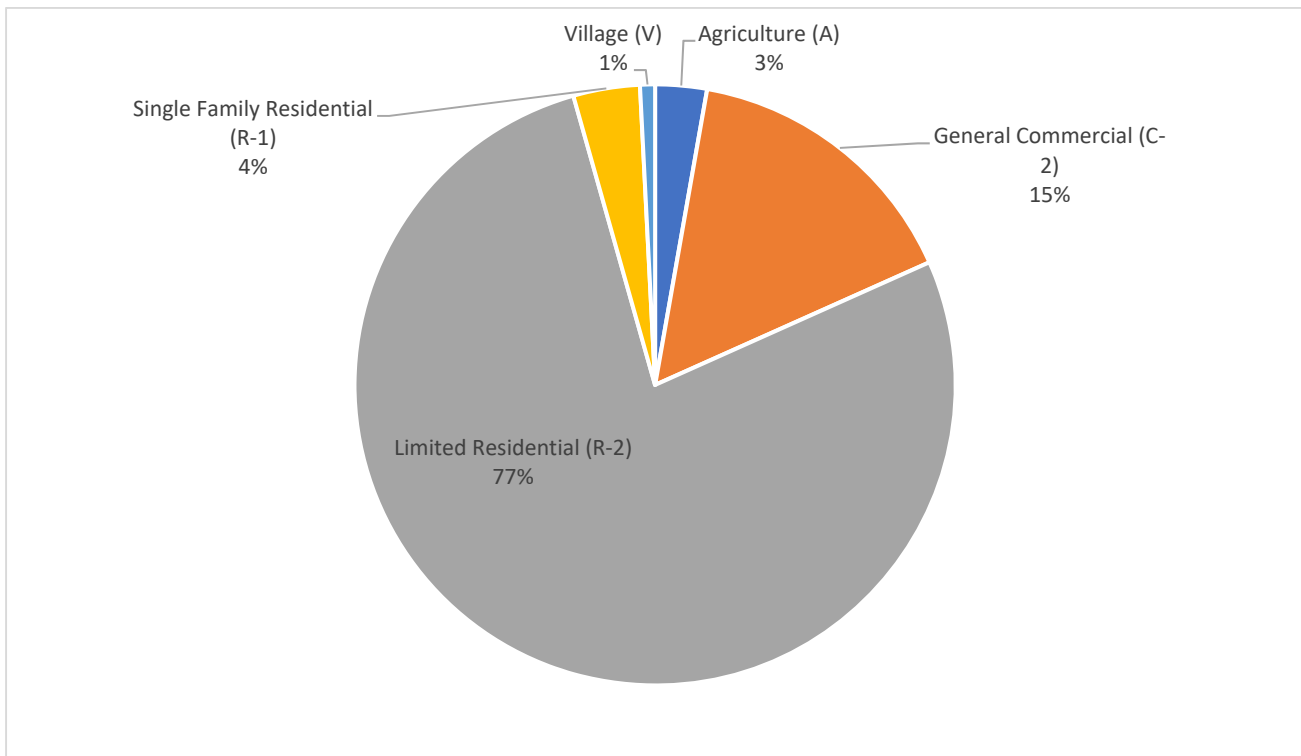


Figure 4 Using only ADA compliant ramps (n = 29), this pie chart summarizes compliance in Chubbuck by zoning type weighted by zoning type.

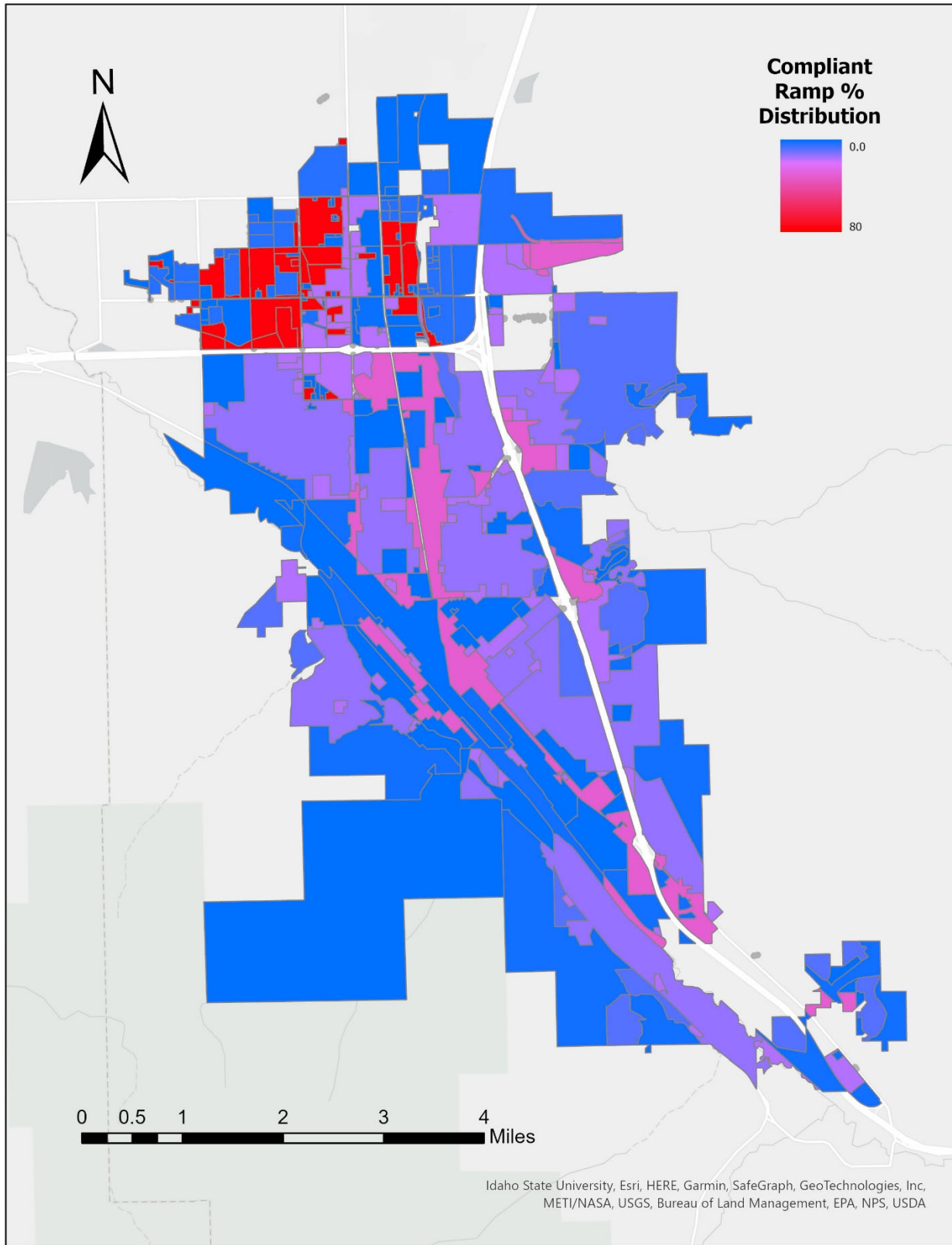


Figure 4. Zoning areas showing distribution of ADA compliant ramps ($n = 137$) using area weighted values.