

# SMART SCALE Round 7: Comparison of Pre-Application and Final Application Cost Estimates

Prepared by the VDOT Culpeper District

## Background

At the MPO Policy Board meeting in August, the Policy Board requested additional information regarding a comparison of pre-application and application costs by phase for SMART SCALE projects submitted within the Culpeper Construction District. This information is provided, as well as some additional analysis that has been completed by the Culpeper District Planning staff.

There are a few important aspects of pre-application cost development that are important to understand as part of this review:

- Pre-application cost estimates are not reviewed for accuracy or reasonableness. Placeholder estimates are permitted at time of pre-application.
- The Culpeper District aims to establish reasonable costs at pre-application based on costs of other projects that are similar in scope. These pre-application cost estimates will not account for any location specific complexities such as sensitive environmental or historic features that need to be considered, extensive right-of-way negotiations that may be needed, utility impacts, etc.
- Pre-application cost estimates are based on general, high-level assumptions about projects based on the understood project scope at time of pre-application submission. Project scopes are often not finalized at the time that pre-applications are submitted, which will also impact cost estimates.

## Methodology

Overall, 22 applications were submitted in the Culpeper District in SMART SCALE Round 7. The full list of applications with all the information used to complete the following described analysis is included as Appendix A. The Culpeper District grouped applications in several different ways to assess whether there was any clear correlation in the types of projects that experienced cost increases between pre-applications and final applications.

The groupings analyzed included the following:

- Planning District location: Whether the project was located within the Thomas Jefferson Planning District Commission or the Rappahannock-Rapidan Regional Commission.
- Application Type: Whether the project was a new submission, partial resubmission, or full resubmission of a previously prepared application.
- Area Type: Whether the project could be considered as being within an urban or rural area. Projects that were location within a 2020 census-identified urban area were considered urban.
- Project Cost: Whether the final cost estimate developed for the project exceeded \$20 million, which would indicate higher level of impacts and greater project complexity.

## Results

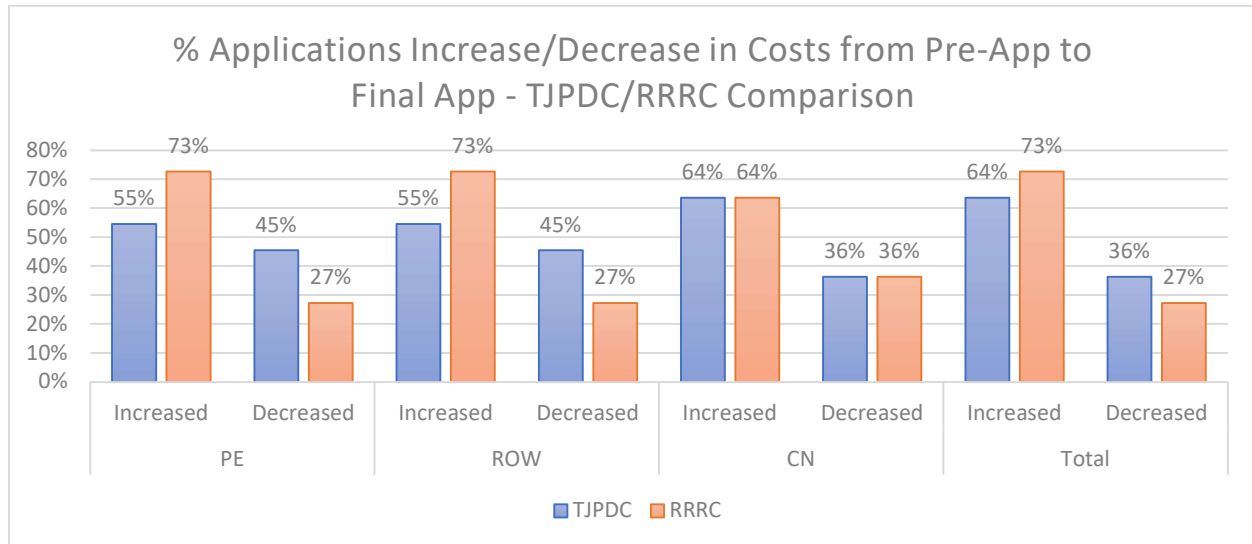
Table 1 shows a summary of the number of projects in each grouping category that increased/decreased in cost estimate between the pre-application and final application by project phase. Graphs were prepared to more easily compare the differences among the grouping categories. The percentage reported on the y-axis is the overall number of projects that experienced a net increase/decrease and does not reflect the amount of the change.

*Table 1. Summary of project cost changes based on different grouping considerations.*

|       |                     | TJPDC   | RRRC    | Full Resubmission | Partial Resubmission | New Submission | Urban    | Rural   | Low Total Project Cost (<\$20M) | High Total Project Cost (>\$20M) |
|-------|---------------------|---------|---------|-------------------|----------------------|----------------|----------|---------|---------------------------------|----------------------------------|
| Phase | Total # Submissions | 11      | 11      | 5                 | 3                    | 14             | 15       | 7       | 12                              | 10                               |
| PE    | Final Increased     | 6 (55%) | 8 (73%) | 3 (60%)           | 1 (33%)              | 10 (71%)       | 10 (67%) | 4 (57%) | 6 (50%)                         | 8 (80%)                          |
|       | Final Decreased     | 5 (45%) | 3 (27%) | 2 (40%)           | 2 (67%)              | 4 (29%)        | 5 (33%)  | 3 (43%) | 6 (50%)                         | 2 (20%)                          |
| ROW   | Final Increased     | 6 (55%) | 8 (73%) | 2 (40%)           | 2 (67%)              | 10 (71%)       | 9 (60%)  | 5 (71%) | 5 (42%)                         | 9 (90%)                          |
|       | Final Decreased     | 5 (45%) | 3 (27%) | 3 (60%)           | 1 (33%)              | 4 (29%)        | 6 (40%)  | 2 (29%) | 7 (58%)                         | 1 (10%)                          |
| CN    | Final Increased     | 7 (64%) | 7 (64%) | 1 (20%)           | 1 (33%)              | 12 (86%)       | 9 (60%)  | 5 (71%) | 5 (42%)                         | 9 (90%)                          |
|       | Final Decreased     | 4 (36%) | 4 (36%) | 4 (80%)           | 2 (67%)              | 2 (14%)        | 6 (40%)  | 2 (29%) | 7 (58%)                         | 1 (10%)                          |
| Total | Final Increased     | 7 (64%) | 8 (73%) | 1 (20%)           | 1 (33%)              | 13 (93%)       | 10 (67%) | 5 (71%) | 6 (50%)                         | 9 (90%)                          |
|       | Final Decreased     | 4 (36%) | 3 (27%) | 4 (80%)           | 2 (67%)              | 1 (7%)         | 5 (33%)  | 2 (29%) | 6 (50%)                         | 1 (10%)                          |

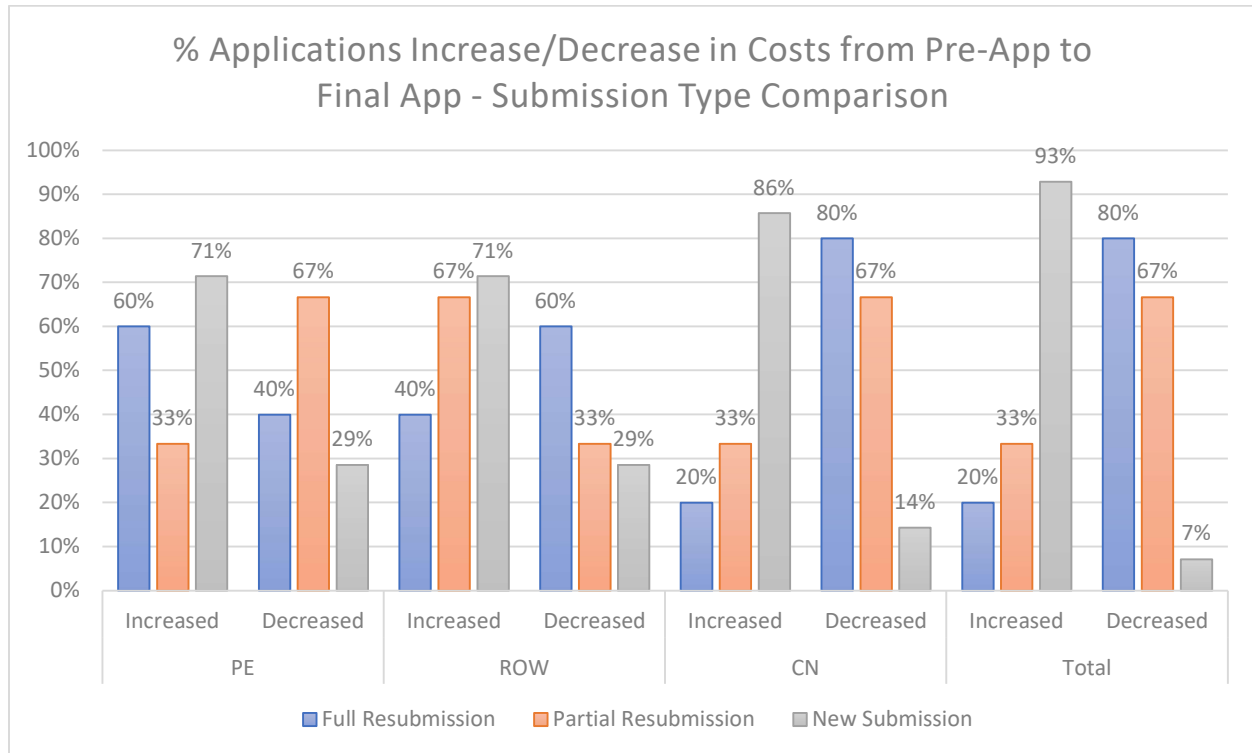
The first comparison was between the Thomas Jefferson Planning District Commission and the Rappahannock Rapidan Regional Commission. Each of the regional bodies had eleven applications submitted within their boundaries. Both planning district commissions showed that there was a higher percentage of projects that experienced an increase in estimated cost between the pre-application and the application submission, although the RRRC saw one additional application increase in total cost compared to the TJPDC region. There does not appear to be a strong correlation based on the planning district that the projects are located within.

Figure 1. Application Cost Change Comparison by Planning District.



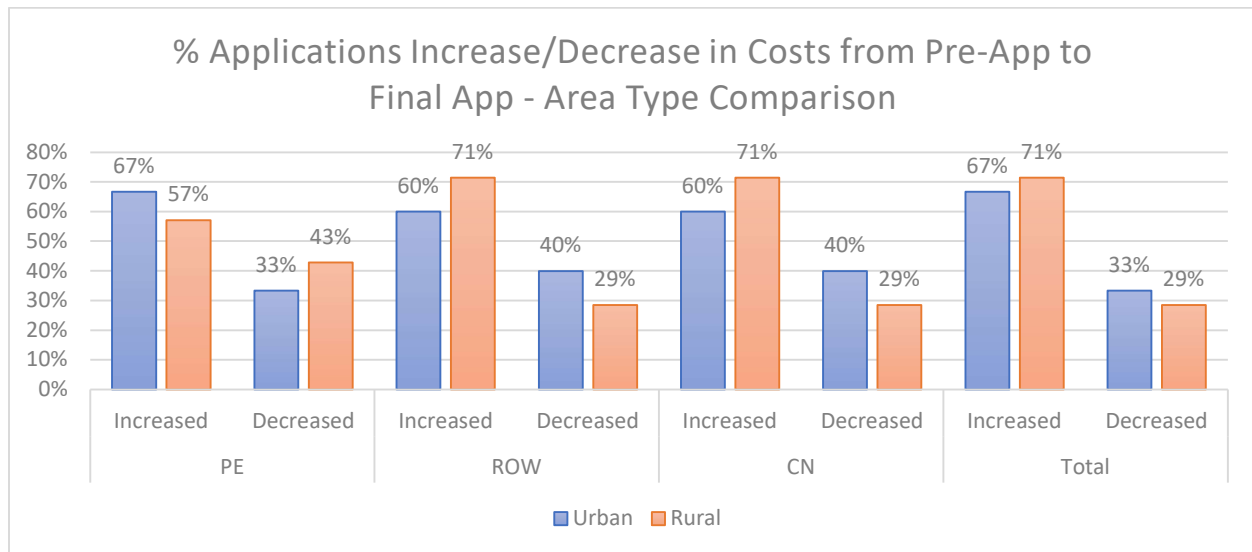
As would be expected, there is a strong correlation related to the type of application submissions. In Round 7, projects that were full or partial resubmissions were more likely to decrease in cost between the pre-application and final application submissions. For the pre-application, the VDOT estimators were able to utilize the existing information that had been prepared previously to revise and update the cost estimates. There were reductions in the assumed inflation used for Round 7, which would account for a high portion of the cost reductions that were realized between the pre-application and final application submissions. Overall, there was one full application resubmission that increased in cost between the pre-application and final application submission, and it only increased by an amount of 3.94%. There was also one partial resubmission that experienced a cost increase between the pre-application and application submission. The change represents a 44.8% increase, but it should also be noted that the total amount of the cost estimate change was just over \$3 million, meaning that one of the reasons the percentage change was so high was due to the low overall cost of the project. In comparison there was only 1 new submission project that experienced a decrease in overall cost between the pre-application and final application.

Figure 2. Application Cost Change Comparison by Submission Type.



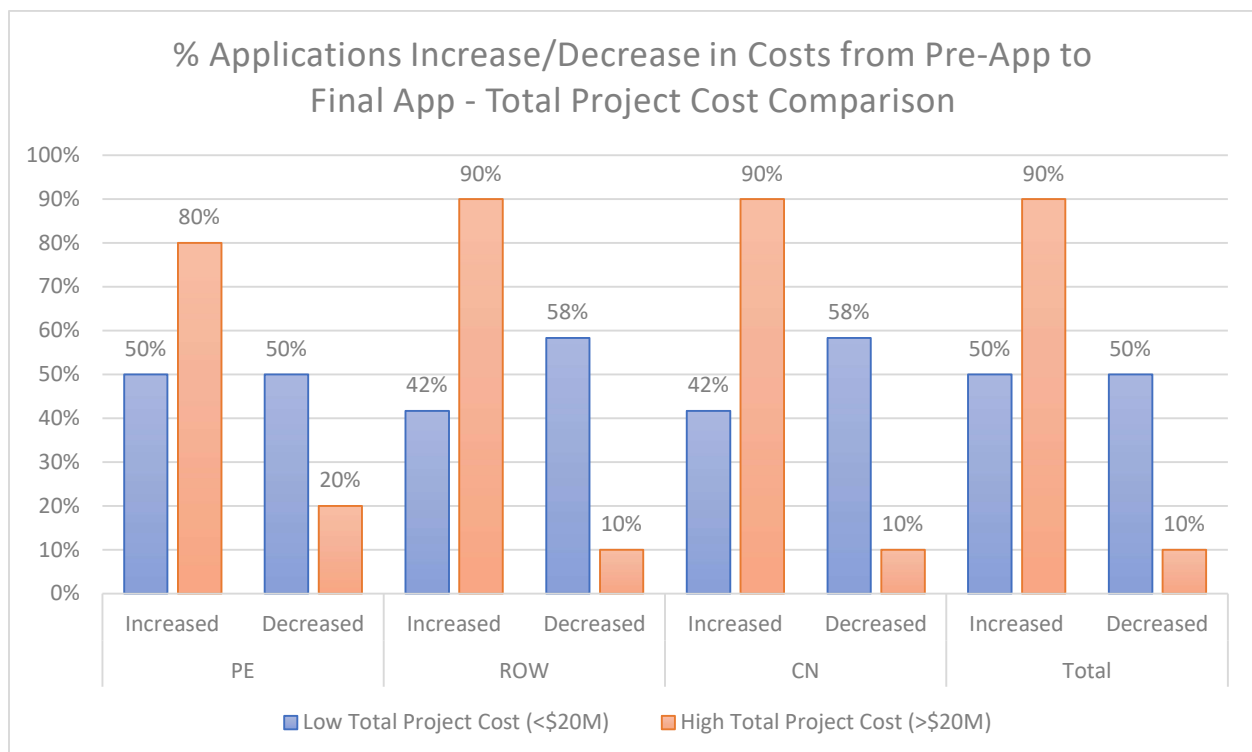
Projects were then grouped based on whether they were located within an urban area as defined in the 2020 census to determine if there was a correlation between cost estimate increases and area type. Fifteen of the 22 projects submitted within the Culpeper District were considered to be urban based on this criteria. Looking at the overall trends shown in Figure 3 both urban and rural located projects show similar percentages of projects that increase/decrease between pre-application and final application submissions. Considering the low number of applications that would be considered rural, there does not appear to be a correlation between project cost increases and area type.

Figure 3. Application Cost Change Comparison by Area Type.



Finally, project costs were compared based the overall final cost estimate of the project at final submission to determine whether there was a difference in the number of projects that increased in costs based on overall project size. There were twelve projects submitted that were less than \$20 million at final submission, and ten that were more. Figure 4 below shows that while there was a fairly even number of projects estimated at less than \$20 million that increased/decreased between the pre-application and final application submission, 90% of higher cost projects experienced cost estimate increases.

Figure 4. Application Cost Change Comparison by Total Final Project Cost.



Based on this review, applications that would be most likely to see an increase in costs between the pre-application and final application would be new submissions with a high amount of impacts/project complexity as identified by overall final cost estimate.

In conducting a final review of the full data set, there were five projects that demonstrated an increase of more than 100% between the pre-application cost estimate and final cost estimate for either the total project cost or a single phase. Of those five projects, four were high cost projects (total cost estimate exceeded \$20 million) and all five of them were new submissions. The one low cost project only experienced this increase in the ROW phase, and the total increase in the cost estimate for the project was less than 10 percent from the pre-application estimate. Three of the projects would be considered urban, while two were rural, and four of the five projects were within the RRRC planning district.

## Conclusions

While two factors were strongly correlated with cost estimate increases between pre-application and final application submissions for Round 7, it is difficult to draw widespread conclusions based on such a small data set. VDOT has a well-established process for developing cost estimates using a standardized methodology, and final SMART SCALE project cost estimates are reviewed by either the District or Central Office depending on the level of project complexity for conformance with established estimating policies. While there are countless variables that influence how project costs change as the project scopes are finalized, understanding major factors that influence application changes between pre-application and final application submission can help manage expectations as projects move from pre-application to final application.

## Appendix A – Full Pre-Application and Final Application Cost Estimates

|       |                              |                |                       | PE - Loaded Estimate Plus Inflation |             |          | RW - Loaded Estimate Plus Inflation |              |          | Construction - Loaded Estimate Plus Inflation |              |          | Total Project Cost |              |          |
|-------|------------------------------|----------------|-----------------------|-------------------------------------|-------------|----------|-------------------------------------|--------------|----------|-----------------------------------------------|--------------|----------|--------------------|--------------|----------|
| PDC   | Partial or Full Resubmission | Urban or Rural | Cost Range (Low/High) | Pre-App                             | Full-App    | % Change | Pre-App                             | Full-App     | % Change | Pre-App                                       | Full-App     | % Change | Pre-App            | Full-App     | % Change |
| TJPDC | Full                         | Urban          | Low                   | \$2,135,636                         | \$2,294,670 | 7.45%    | \$1,177,860                         | \$927,440    | -21.26%  | \$12,769,344                                  | \$11,224,540 | -12.10%  | \$16,082,840       | \$14,446,650 | -10.17%  |
| TJPDC | No                           | Urban          | High                  | \$3,624,110                         | \$3,824,450 | 5.53%    | \$3,570,359                         | \$4,179,350  | 17.06%   | \$30,785,773                                  | \$32,620,000 | 5.96%    | \$37,980,242       | \$40,623,800 | 6.96%    |
| TJPDC | No                           | Urban          | High                  | \$2,566,140                         | \$2,731,750 | 6.45%    | \$1,552,330                         | \$2,985,250  | 92.31%   | \$12,769,344                                  | \$16,962,400 | 32.84%   | \$16,887,814       | \$22,679,400 | 34.29%   |
| TJPDC | Partial                      | Urban          | Low                   | \$2,025,900                         | \$1,857,590 | -8.31%   | \$1,241,864                         | \$597,050    | -51.92%  | \$10,470,102                                  | \$5,411,560  | -48.31%  | \$13,737,866       | \$7,866,200  | -42.74%  |
| TJPDC | Partial                      | Urban          | High                  | \$5,400,241                         | \$4,480,070 | -17.04%  | \$858,677                           | \$1,013,439  | 18.02%   | \$38,446,113                                  | \$33,924,800 | -11.76%  | \$44,705,031       | \$39,418,309 | -11.83%  |
| TJPDC | No                           | Urban          | Low                   | \$2,228,490                         | \$2,076,130 | -6.84%   | \$776,165                           | \$597,050    | -23.08%  | \$7,659,706                                   | \$8,732,290  | 14.00%   | \$10,664,361       | \$11,405,470 | 6.95%    |
| TJPDC | No                           | Urban          | High                  | \$2,718,082                         | \$3,715,180 | 36.68%   | \$1,552,330                         | \$11,224,540 | 623.08%  | \$17,119,535                                  | \$31,315,200 | 82.92%   | \$21,389,947       | \$46,254,920 | 116.25%  |
| TJPDC | No                           | Urban          | High                  | \$2,566,140                         | \$2,513,210 | -2.06%   | \$1,009,014                         | \$1,106,910  | 9.70%    | \$13,605,432                                  | \$16,962,400 | 24.67%   | \$17,180,586       | \$20,582,520 | 19.80%   |
| TJPDC | No                           | Urban          | Low                   | \$2,228,490                         | \$2,622,480 | 17.68%   | \$1,492,625                         | \$1,074,690  | -28.00%  | \$10,470,102                                  | \$13,934,800 | 33.09%   | \$14,191,217       | \$17,631,970 | 24.25%   |
| RRRC  | No                           | Urban          | Low                   | \$1,423,757                         | \$1,420,510 | -0.23%   | \$1,343,362                         | \$579,650    | -56.85%  | \$3,154,332                                   | \$4,298,760  | 36.28%   | \$5,921,451        | \$6,298,920  | 6.37%    |
| RRRC  | Full                         | Urban          | Low                   | \$1,991,684                         | \$2,185,400 | 9.73%    | \$3,049,970                         | \$2,550,460  | -16.38%  | \$12,288,593                                  | \$11,343,950 | -7.69%   | \$17,330,247       | \$16,079,810 | -7.22%   |
| RRRC  | Partial                      | Urban          | Low                   | \$1,890,840                         | \$1,966,860 | 4.02%    | \$1,492,625                         | \$2,318,600  | 55.34%   | \$3,781,398                                   | \$6,089,910  | 61.05%   | \$7,164,863        | \$10,375,370 | 44.81%   |
| RRRC  | No                           | Urban          | Low                   | \$2,135,636                         | \$2,185,400 | 2.33%    | \$1,397,097                         | \$1,507,090  | 7.87%    | \$11,480,375                                  | \$11,105,130 | -3.27%   | \$15,013,108       | \$14,797,620 | -1.44%   |
| RRRC  | No                           | Urban          | High                  | \$2,543,630                         | \$3,605,910 | 41.76%   | \$776,165                           | \$1,671,740  | 115.38%  | \$9,424,992                                   | \$22,181,600 | 135.35%  | \$12,744,787       | \$27,459,250 | 115.45%  |
| RRRC  | No                           | Urban          | Low                   | \$2,016,896                         | \$2,403,940 | 19.19%   | \$1,940,412                         | \$4,521,270  | 133.01%  | \$12,086,538                                  | \$10,700,130 | -11.47%  | \$16,043,846       | \$17,625,340 | 9.86%    |
| RRRC  | No                           | Rural          | High                  | \$2,166,587                         | \$2,403,940 | 10.96%   | \$1,707,563                         | \$2,507,610  | 46.85%   | \$12,560,322                                  | \$18,267,200 | 45.44%   | \$16,434,472       | \$23,178,750 | 41.04%   |
| RRRC  | No                           | Rural          | Low                   | \$1,547,562                         | \$1,529,780 | -1.15%   | \$691,818                           | \$927,440    | 34.06%   | \$4,180,184                                   | \$7,403,420  | 77.11%   | \$6,419,564        | \$9,860,640  | 53.60%   |
| RRRC  | No                           | Rural          | High                  | \$3,235,812                         | \$3,387,370 | 4.68%    | \$2,328,495                         | \$2,029,970  | -12.82%  | \$13,078,443                                  | \$30,010,400 | 129.46%  | \$18,642,750       | \$35,427,740 | 90.03%   |
| RRRC  | No                           | Rural          | High                  | \$2,718,082                         | \$5,244,960 | 92.97%   | \$5,760,338                         | \$6,686,960  | 16.09%   | \$15,098,989                                  | \$41,753,600 | 176.53%  | \$23,577,409       | \$53,685,520 | 127.70%  |
| TJPDC | Full                         | Rural          | Low                   | \$1,869,455                         | \$1,857,590 | -0.63%   | \$1,275,298                         | \$695,580    | -45.46%  | \$10,836,207                                  | \$8,478,110  | -21.76%  | \$13,980,960       | \$11,031,280 | -21.10%  |
| TJPDC | Full                         | Rural          | High                  | \$2,718,082                         | \$2,841,020 | 4.52%    | \$6,376,494                         | \$6,955,800  | 9.09%    | \$14,530,196                                  | \$14,758,800 | 1.57%    | \$23,624,772       | \$24,555,620 | 3.94%    |
| RRRC  | Full                         | Rural          | Low                   | \$2,243,796                         | \$2,185,400 | -2.60%   | \$1,486,176                         | \$1,854,880  | 24.81%   | \$10,506,839                                  | \$9,075,160  | -13.63%  | \$14,236,811       | \$13,115,440 | -7.88%   |