



The data shown in the figure above is supplemented by a County-wide broadband survey that includes Ookla speedtest results from individual responders, shown in the figure below.

The County's survey results show general alignment with the state's broadband maps, but also show a more pervasive issue across many areas that the state reflects as served, but in which residents and businesses indicate are not receiving speeds are incumbent-reported levels.

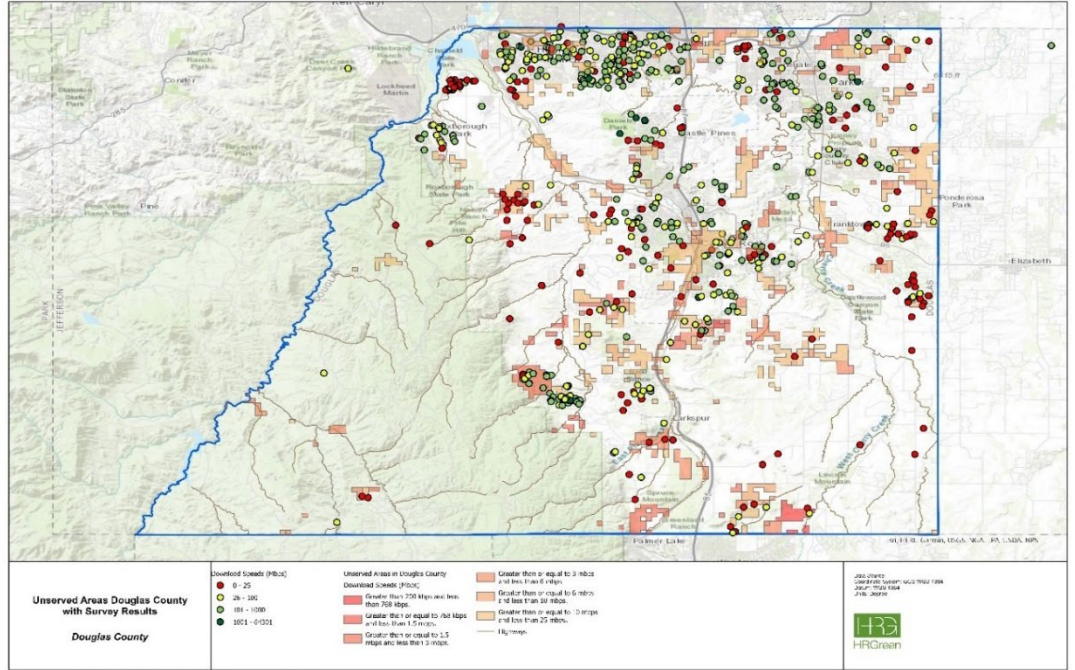


Figure 2: Unserved and Underserved Areas - Survey Results

In short, there is a meaningful, unmet need for improved broadband in Douglas County.

Based on these findings, HR Green proposed the following Targeted Service Areas (TSAs) as separate designations for broadband investment and facilitation of service on a regional basis.

Identification of TSAs considers factors such as unserved and underserved areas eligible for grant funding and areas where is community demand and local leadership, not including areas where projects are already planned by a service provider, remote areas with population density of less than 15 persons per square mile, or population-dense areas that have multiple competitive providers. In addition, the figure (3) includes the locations of County facilities and anchor institutions.

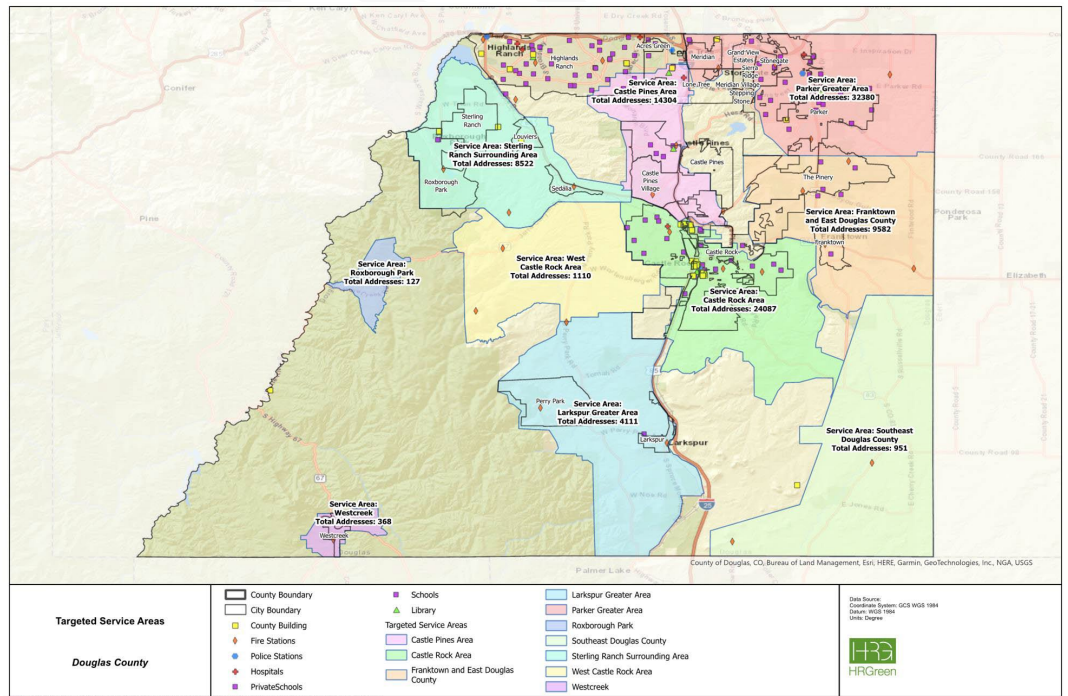


Figure 3: Targeted Service Areas for Broadband Improvement



## Exploring the Range of Possible Options

In considering the potential options open to Douglas County for facilitating broadband service expansion to its residences and businesses, academic literature offers a spectrum of possible actions that a public entity can explore, taking into account factors such as financing and other available resources, capital and operational expenditures, ownership structures, and operational designation of authority. The following figure shows the complexity of these options. Between the range of a full municipal broadband model and a full private broadband model, Model 2: Publicly-Owned, Privately-Serviced is where a public entity invests in a network operated by a private entity that also extends service to end customers, Model 3: Hybrid Ownership involves public and private investment for both CAPEX and OPEX, and Model 4: Private Developer Open Access where a public entity offers benefits or incentives to a private developer to build and operate a network for end customers.

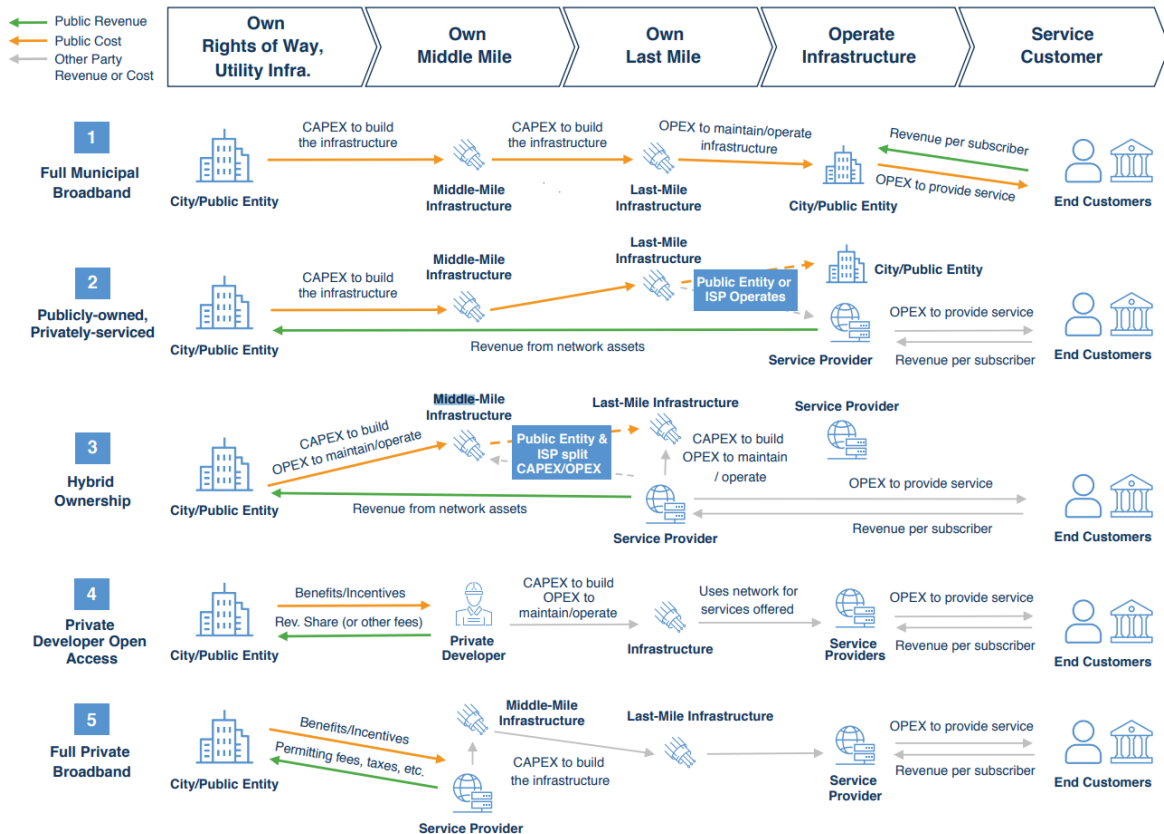


Figure 4: [BROADBAND MODELS FOR UNSERVED](#) by US Ignite and Altman Solon.

Douglas County is currently limited by a Colorado state law to pursue many of these options due to a barrier in facilitating telecommunications services to residents. As such, HR green recommends Douglas County to forth a ballot measure in the November 2022 election to become exempt from SB-152 and expand its range of options.

## Recommendation #1: Pursue SB-152 Exemption

Douglas County is not currently exempt from the provisions of Colorado's SB-152 law, which prevents public sector entities from operating communication facilities to provide service to the public. This prohibition also broadly applies to working with the private sector to facilitate service to the public, including engaging in facilitating open-network public private partnerships or leasing excess County fiber. The limitations of the state law limit the variety of partnership options available to Douglas County that have been successfully used elsewhere in the country and other parts of Colorado that have exempted themselves from the 2005 law. The ability to apply for emerging streams of federal broadband grant funding may also be compromised by the County's public service prohibition, depending on the terms of the applications. Many grant opportunities will be project-based, meaning the municipal and County governments that are eligible to apply for broadband deployment projects within an



**Estimated Materials Required for Each Phase**

Segment Description	Existing Underground Conduit Feet	New Underground Conduit Feet	New Overhead Fiber Feet	Blended Path Feet	Poles	Hand Holes	Splice Points	Service Locations	Special Crossings Locations
Phase I	0	292,945	0	292,945	0	294	67	0	9
Phase I Adder	0	203,008	0	292,945	0	205	47	0	3
Phase II	0	328,236	0	328,236	0	330	74	0	1
<b>Overall Total</b>	0	824,189	0	914,126	0	829	188	0	13

**Cost Estimates for Each Phase with Construction Costs and Varying Fiber Counts**

Segment Description	Estimated 96ct or 24ct Material Costs	Estimated 144ct or 24ct Material Costs	Estimated 288ct or 24ct Material Costs	Estimated Backbone Installation Cost (no splicing)	Estimated Design Engineering and PMO Labor Cost	Estimated 96ct Total Backbone Segment w/Splicing Cost	Estimated 144ct Total Backbone Segment w/Splicing Cost	Estimated 288ct Total Backbone Segment w/Splicing Cost
Phase I	\$735,546.93	\$1,335,062.46	\$1,775,890.10	\$5,589,810.00	\$1,397,452.50	<b>\$8,742,722.37</b>	<b>\$9,526,005.46</b>	<b>\$10,382,363.86</b>
Phase I Adder	\$509,726.78	\$925,185.14	\$1,230,674.35	\$3,825,994.00	\$956,498.50	<b>\$5,995,153.21</b>	<b>\$6,539,013.40</b>	<b>\$7,135,619.54</b>
Phase II	\$824,158.06	\$1,495,897.06	\$1,989,831.07	\$6,126,948.00	\$1,531,737.00	<b>\$9,604,631.36</b>	<b>\$10,480,296.26</b>	<b>\$11,433,879.68</b>
<b>Overall Total</b>	<b>\$2,069,431.76</b>	<b>\$3,756,144.66</b>	<b>\$4,996,395.52</b>	<b>\$15,542,752.00</b>	<b>\$3,885,688.00</b>	<b>\$24,342,506.94</b>	<b>\$26,545,315.13</b>	<b>\$28,951,863.08</b>

**Option 2 – Targeted Direct Grants on a Neighborhood Level**

Douglas County has access to \$68.2 million in ARPA funding, \$8 million of which is being considered for use in broadband projects, as well as the upcoming funding from the Capital Projects Fund and the Infrastructure Act. The County would like to leverage these funds to create immediate impacts in partnership with the private sector and its diverse and active HOAs, Metro Districts, and other partners.

The County must establish the level of funding for this program, and create a process by which funds can be equitably distributed to projects which will improve service in those TSAs selected. The following three examples are intended to demonstrate realistic applications of broadband investment in different areas of Douglas County. The first two examples offer a high-level estimate of a potential Fiber to the Home (FTTH) deployment cost on a neighbor level. The two neighborhoods were chosen because the broadband study survey findings showed a high density of unserved households and no presence of fiber infrastructure. The third example demonstrates the cost of extending the middle-mile fiber network presented in Option 1 to two addresses in Sandstone Ranch Open Space, an area identified in a previous part of the study as benefitting from extending fiber capacity for internal county use.

The first example neighborhood, shown in the following figure, has many areas which are considered unserved by wireline service (shown in the orange blocks), and will be eligible for upcoming grant programs.

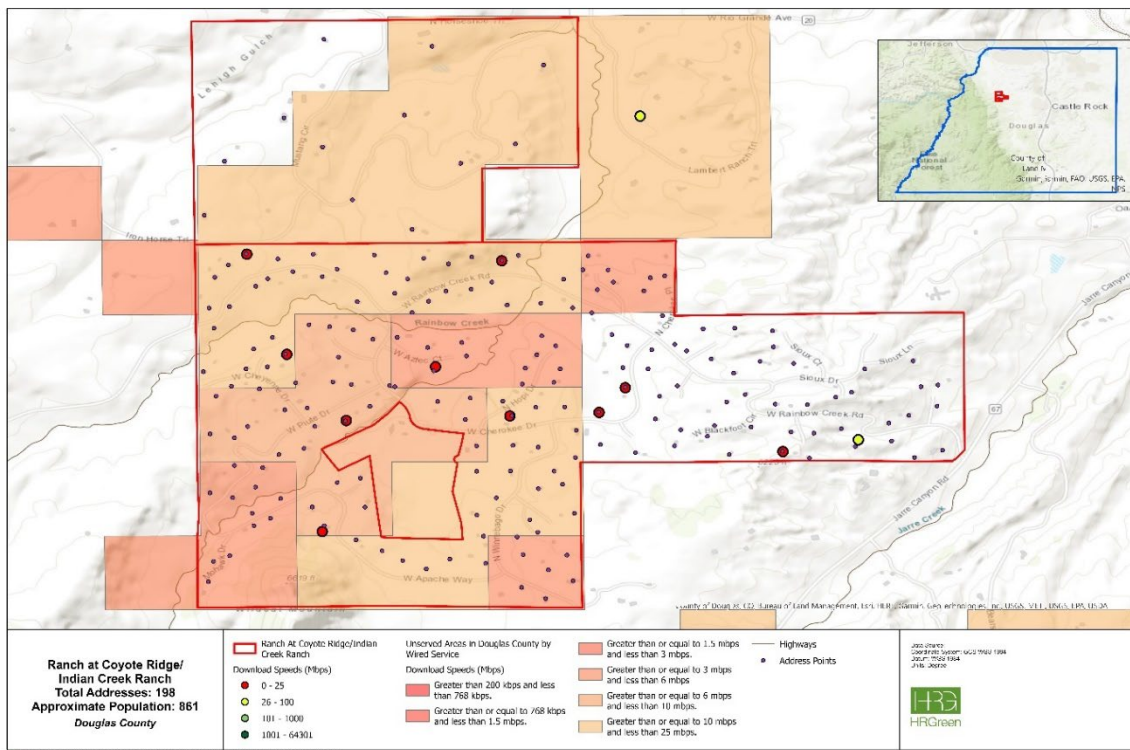


Figure 6: Example 1 of a Neighborhood-Level Cost Estimate for Broadband Investment

The second example neighborhood, shown in Figure 7 below, does not have any areas the state considers unserved, but the broadband study survey results demonstrate a high density of unserved households in the area.

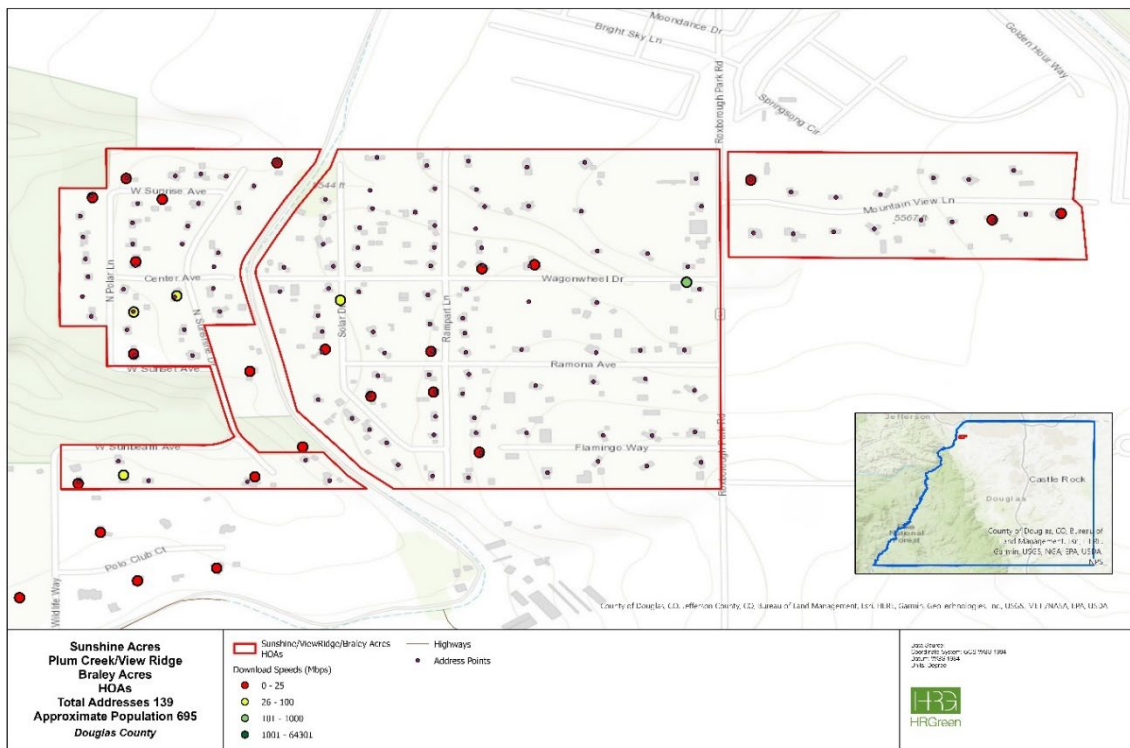


Figure 7: Example 2 of a Neighborhood-Level Cost Estimate for Broadband Investment

Within these two examples, the estimated range of possible costs are included in the table below. In example 1, the estimated range of costs is between \$316,800-\$455,400, and in example 2, the estimated costs are between \$222,400-319,700.





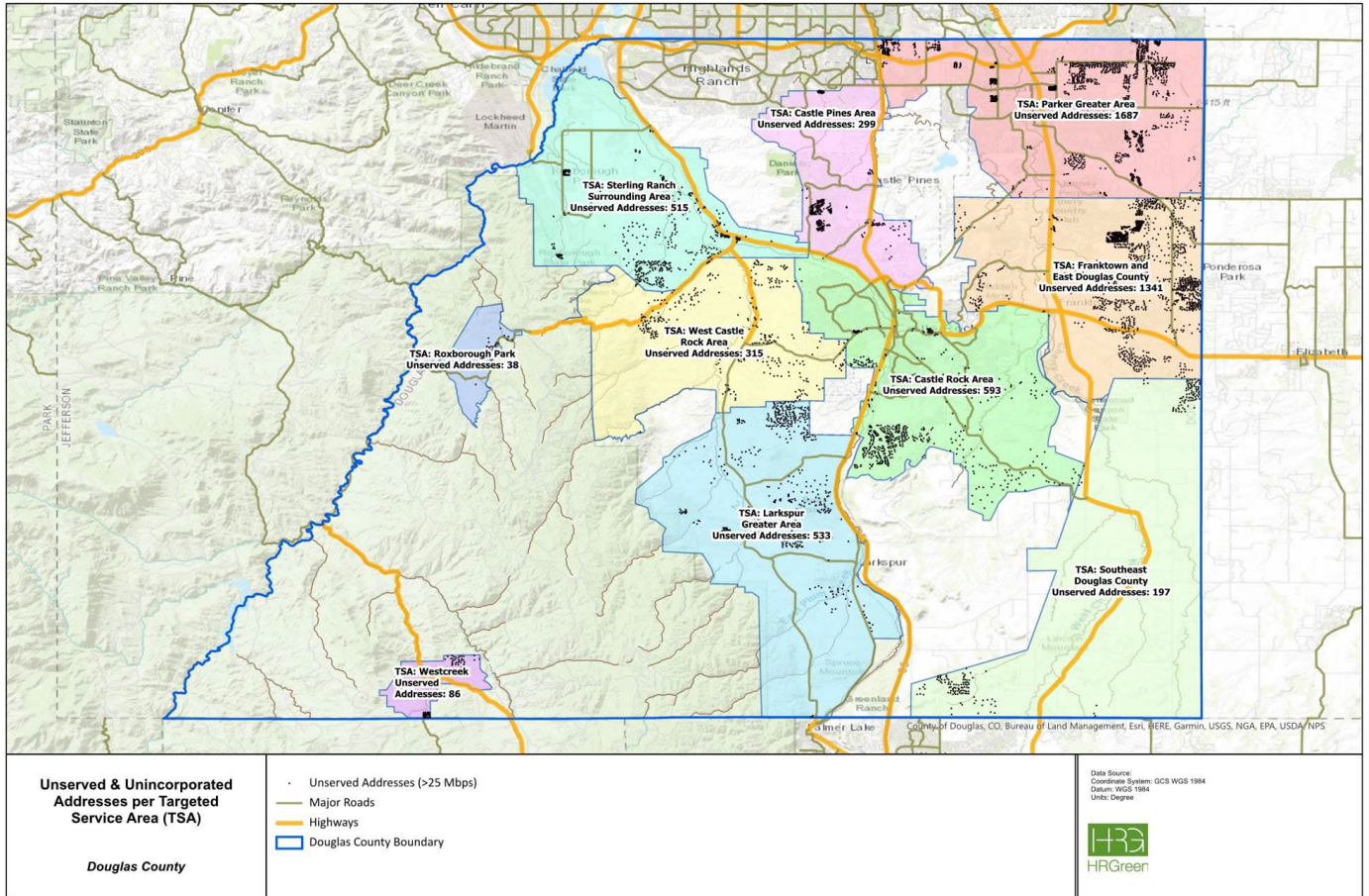


Figure 9: Count of Unserved Addresses per TSA

**Estimated Costs of Providing Service to Unserved Addresses per TSA**

Name	Unserved Addresses Count Per TSA (Unincorporated)	Approximate Cost Per Passing – Low Estimate (\$1,600 per Home)	Approximate Cost Per Passing – High Estimate (\$2,300 per Home)
Sterling Ranch Surrounding Area	515	\$824,000.00	\$1,184,500.00
West Castle Rock Area	315	\$504,000.00	\$724,500.00
Castle Pines Area	299	\$478,400.00	\$687,700.00
Larkspur Greater Area	533	\$852,800.00	\$1,225,900.00
Castle Rock Area	593	\$948,800.00	\$1,363,900.00
Parker Greater Area	1,687	\$2,699,200.00	\$3,880,100.00
Franktown and East Douglas County Area	1,341	\$2,145,600.00	\$3,084,300.00
Southeast Douglas County Area	197	\$315,200.00	\$453,100.00
Westcreek Area	86	\$137,600.00	\$197,800.00
Roxborough Park Area	38	\$60,800.00	\$87,400.00
<b>(Plus Backhaul)</b>			
<b>Total</b>	<b>5,604</b>	<b>\$26,545,315.13</b>	<b>\$28,951,863.08</b>

According to this method of calculation, it would take between \$26 million and \$42 million dollars to deploy the infrastructure necessary to serve every **unserved** address by wired internet service in the County.



Beyond the most critically unserved in the County, there are another 27,605 addresses that do not meet the federal government grant eligibility definitions of 100/20 Mbps for wireline service. The following data represents cost estimates for providing service to **underserved** households in the county. Underserved addresses include all addresses that receive less than 100 Mbps, which include all unserved addresses in the table above as well.

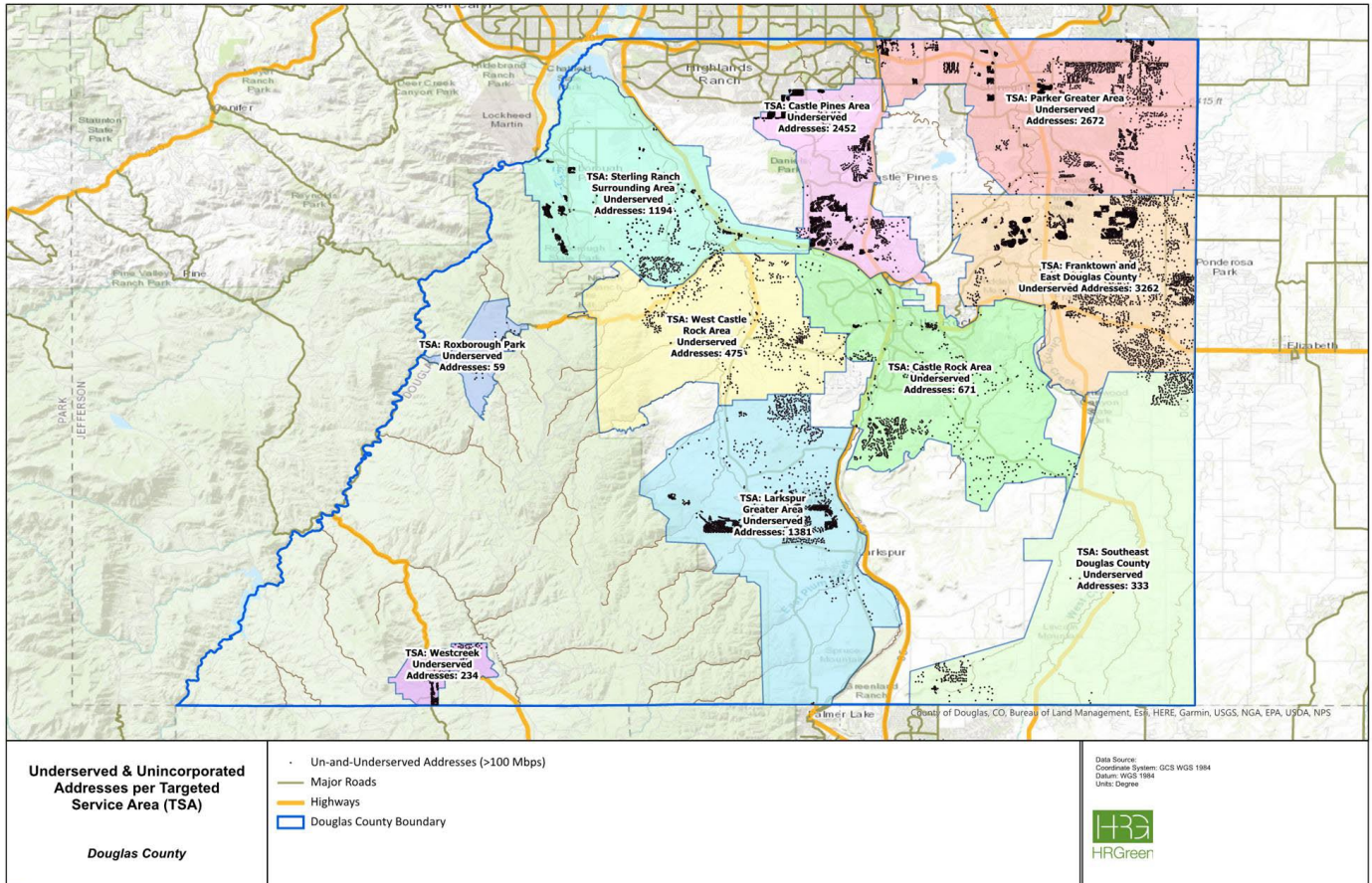


Figure 10: Count of Underserved Addresses per TSA

**Estimated Costs of Providing Service to Underserved Addresses per TSA**

Name	Number Underserved Addresses (Unincorporated)	Estimated Cost (Low \$1,600 per Passing)	Estimated Cost (Low \$2,300 per Passing)
Sterling Ranch Surrounding Area	1,194	\$1,910,400.00	\$2,746,200.00
West Castle Rock Area	475	\$760,000.00	\$1,092,500.00
Castle Pines Area	2,452	\$3,923,200.00	\$5,639,600.00
Larkspur Greater Area	1,381	\$2,209,600.00	\$3,176,300.00
Castle Rock Area	671	\$1,073,600.00	\$1,543,300.00
Parker Greater Area	2,672	\$4,275,200.00	\$6,145,600.00
Franktown and East Douglas County Area	3,262	\$5,219,200.00	\$7,502,600.00
Southeast Douglas County Area	333	\$532,800.00	\$765,900.00
Westcreek Area	234	\$374,400.00	\$538,200.00
Roxborough Park Area	59	\$94,400.00	\$135,700.00
<b>(Plus Backhaul)</b>		\$26,545,315.13	\$28,951,863.08
<b>Total</b>	<b>12,733</b>	<b>\$46,918,115.13</b>	<b>\$58,237,763.08</b>

According to this method of calculation, it would take between \$47 million and \$58 million to serve every underserved address in the County.

### Option 3 - County provides grant support to neighborhoods, HOAs, Districts by contracting with grant specialists

Option 3 includes the possibility of the County providing support to private providers and local officials. Under this option, the County would provide short-term (1-3 years) support to those interested in creating projects by providing support such as information and data. In this model, temporary contract staff would provide information like the design information supplied for Option 2 above, as well as grant writing and other professional services. Staff would help providers and local governmental and quasi-governmental entities apply for grants by designating staff to provide any necessary information, support, and engineering resources to help providers apply for grants on a project-basis.

### Recommendation #3: Develop County Broadband Program Management Plan

In addition to the options outlined in the previous section, HR Green also recommends a long-term thinking approach to broadband availability challenges in the unserved and underserved areas in the County. As the County looks to implement any potential next steps in broadband expansion, it will be come necessary to develop a programmatic approach to oversee this multi-year program. It is likely that the majority of available funding will come to market in the next 2-5 years, requiring the development and execution of a program management office to oversee progress, ensure desired movement of the program, and provide close coordination with the County’s partners. The following timeline can potentially serve as a starting point for the County’s long-term vision.



Figure 11: Proposed Timeline for a County Broadband Management Plan

### Analysis of Broadband Options

County staff requested a range of options for review by County Commissioners, which have been outlined above for consideration.

First, it is clear that the County’s current SB-152 status creates barriers. To improve the County’s flexibility in the broadband areas, the County should pursue a limited-scope ballot initiative in November, 2022 to remove this barrier.

Second, the creation of a formal model to manage the implementation of the County’s broadband strategy, whatever option is preferred by County Commissioners, forms a strong basis under which the County can move forward.

Finally, the HR Green has provided a review of the relative advantages and disadvantages of each of the potential broadband partnership models to help guide policy decision making. The table below reflects our analysis of the three partnership options.

Option	Pros	Cons
<b>Option 1 – Invest in a Ring Fiber Network to Create Public-Private Partnerships for Broadband Expansion</b>	<p>Significantly increases the likelihood of aligning future builds to rural areas most in need of service.</p> <p>Option would leverage pending state broadband grant funds at a match level generally aligned with County’s \$8MM budgeted ARPA broadband allocation</p>	<p>Contingent on SB-152</p> <p>Requires third-party contract with private company for network operation and maintenance</p> <p>Contingent on receipt of broadband grants</p>



	<p>Direct investment into broadband infrastructure aligns with “project-based” funding model for future grant funding programs.</p> <p>Enables County technology-based transportation and utility networks to improve government services</p>	<p>May not be aligned with policy preference of County Commissioners</p>
<p><b>Option 2 – Targeted Direct Grants on a Neighborhood Level</b></p>	<p>Increased time to deploy available ARPA funding</p> <p>Lower complexity</p>	<p>Overall impact of available \$8MM in ARPA funding is limited to roughly 10% of the county.</p> <p>Does not leverage pending state broadband grant funding</p> <p>Contingent on SB-152</p> <p>May create public criticism of cherry picking some neighborhoods over others</p>
<p><b>Option 3 - County provides grant support to neighborhoods, HOAs, Districts by contracting with grant specialists</b></p>	<p>Not Contingent on SB-152</p>	<p>Risk low participation from providers</p> <p>Lowest likelihood of expanding broadband</p>

HR Green would like to express our concern with Option 2 based on its understanding of the Commissioners’ stated policy goal of bringing better broadband to all residents and businesses in the County. It is our view that the deployment of direct grants would create some improvements, but that the overall impact of these projects might affect only 10 percent of the county’s population base, while leaving millions of dollars in state broadband improvement dollars unleveraged.

## Appendix A: Analysis of Approximate Costs to Serve Douglas County Subdivisions

HOA Name	Unserved Addresses	Unserved Aprox Cost Per Passing – Low Est (\$1,600)	Unserved Aprox Cost Per Passing – High Est (\$2,300)	Underserved-Only Addresses	Total Unserved and Underserved	Underserved Aprox Cost Per Passing – Low Est (\$1,600)	Underserved Aprox Cost Per Passing – High Est (\$2,300)
<b>THE PINERY HOA</b>	1,093	\$1,748,800.00	\$2,513,900.00	\$262.00	\$1,355.00	\$2,168,000.00	\$3,116,500.00
<b>HIGHLANDS RANCH COMMUNITY ASSOC</b>	1037	\$1,659,200.00	\$2,385,100.00	\$47.00	\$1,084.00	\$1,734,400.00	\$2,493,200.00
<b>CASTLE PINES HOA</b>	608	\$972,800.00	\$1,398,400.00	\$183.00	\$791.00	\$1,265,600.00	\$1,819,300.00
<b>PERRY PARK ACC</b>	301	\$481,600.00	\$692,300.00	\$63.00	\$364.00	\$582,400.00	\$837,200.00
<b>ROXBOROUGH PARK FOUNDATION</b>	256	\$409,600.00	\$588,800.00	\$25.00	\$281.00	\$449,600.00	\$646,300.00
<b>DEERFIELD HOA</b>	96	\$153,600.00	\$220,800.00	\$87.00	\$183.00	\$292,800.00	\$420,900.00
<b>HAPPY CANYON HOA</b>	87	\$139,200.00	\$200,100.00	\$20.00	\$107.00	\$171,200.00	\$246,100.00
<b>PERRY PARK EAST HOA</b>	86	\$137,600.00	\$197,800.00	\$49.00	\$135.00	\$216,000.00	\$310,500.00
<b>RUSSELLVILLE HOA</b>	67	\$107,200.00	\$154,100.00	\$64.00	\$131.00	\$209,600.00	\$301,300.00
<b>HIDDEN FOREST HOA</b>	65	\$104,000.00	\$149,500.00	\$18.00	\$83.00	\$132,800.00	\$190,900.00



<b>PINEWOOD KNOLLS ECC</b>	60	\$96,000.00	\$138,000.00	\$17.00	\$77.00	\$123,200.00	\$177,100.00
<b>HIGH PRAIRIE FARMS HOA</b>	58	\$92,800.00	\$133,400.00	\$16.00	\$74.00	\$118,400.00	\$170,200.00
<b>GRANDVIEW ESTATES HOA</b>	52	\$83,200.00	\$119,600.00	\$19.00	\$71.00	\$113,600.00	\$163,300.00
<b>HIDDEN VILLAGE POA</b>	52	\$83,200.00	\$119,600.00	\$75.00	\$127.00	\$203,200.00	\$292,100.00
<b>OAK HILLS HOA</b>	47	\$75,200.00	\$108,100.00	\$8.00	\$55.00	\$88,000.00	\$126,500.00
<b>KEENE RANCH HOA</b>	41	\$65,600.00	\$94,300.00	\$182.00	\$223.00	\$356,800.00	\$512,900.00
<b>PONDEROSA HILLS CIVIC ASSOC</b>	39	\$62,400.00	\$89,700.00	\$238.00	\$277.00	\$443,200.00	\$637,100.00
<b>BURNING TREE RANCH HOA</b>	37	\$59,200.00	\$85,100.00	\$32.00	\$69.00	\$110,400.00	\$158,700.00
<b>BANNOCKBU RN HOA</b>	36	\$57,600.00	\$82,800.00	\$51.00	\$87.00	\$139,200.00	\$200,100.00
<b>INDIAN CREEK RANCH IMPROVEME NT ASSOC</b>	33	\$52,800.00	\$75,900.00	\$125.00	\$158.00	\$252,800.00	\$363,400.00
<b>STONEGATE HOA</b>	30	\$48,000.00	\$69,000.00	\$202.00	\$232.00	\$371,200.00	\$533,600.00
<b>SPIRIT RIDGE</b>	27	\$43,200.00	\$62,100.00	\$87.00	\$114.00	\$182,400.00	\$262,200.00

<b>CRESTVIEW ESTATES HOA</b>	22	\$35,200.00	\$50,600.00	\$24.00	\$46.00	\$73,600.00	\$105,800.00
<b>BELL CROSS RANCH HOA</b>	21	\$33,600.00	\$48,300.00	\$21.00	\$42.00	\$67,200.00	\$96,600.00
<b>STERLING TREE FARM HOA</b>	14	\$22,400.00	\$32,200.00	\$26.00	\$40.00	\$64,000.00	\$92,000.00
<b>PARKER VIEW ESTATES HOA</b>	13	\$20,800.00	\$29,900.00	\$15.00	\$28.00	\$44,800.00	\$64,400.00
<b>HILLS AT BAYOU GULCH HOA</b>	10	\$16,000.00	\$23,000.00	\$25.00	\$35.00	\$56,000.00	\$80,500.00
<b>LIVENGOOD HILLS HOA</b>	10	\$16,000.00	\$23,000.00	\$84.00	\$94.00	\$150,400.00	\$216,200.00
<b>BEAR CANYON RANCH HOA</b>	9	\$14,400.00	\$20,700.00	\$26.00	\$35.00	\$56,000.00	\$80,500.00
<b>CONESTOGA PINES HOA</b>	9	\$14,400.00	\$20,700.00	\$9.00	\$18.00	\$28,800.00	\$41,400.00
<b>RANCH AT COYOTE RIDGE HOA</b>	6	\$9,600.00	\$13,800.00	\$3.00	\$9.00	\$14,400.00	\$20,700.00
<b>SIERRA VISTA HOA</b>	5	\$8,000.00	\$11,500.00	\$7.00	\$12.00	\$19,200.00	\$27,600.00
<b>HILLS AT BAYOU GULCH A &amp; E COMM (F002)</b>	4	\$6,400.00	\$9,200.00	\$40.00	\$44.00	\$70,400.00	\$101,200.00
<b>ALLIS RANCH HOA</b>	1	\$1,600.00	\$2,300.00	\$8.00	\$9.00	\$14,400.00	\$20,700.00
<b>CASTLE PINES</b>	297	\$475,200.00	\$683,100.00		\$297.00	\$475,200.00	\$683,100.00



<b>NORTH MASTER ASSOCIATION</b>							
<b>SAGE PORT HOA</b>	103	\$164,800.00	\$236,900.00		\$103.00	\$164,800.00	\$236,900.00
<b>SURREY RIDGE HOA</b>	95	\$152,000.00	\$218,500.00		\$95.00	\$152,000.00	\$218,500.00
<b>MCARTHUR RANCH HOA</b>	52	\$83,200.00	\$119,600.00		\$52.00	\$83,200.00	\$119,600.00
<b>FOREST PARK MASTER ASSOCIATION</b>	41	\$65,600.00	\$94,300.00		\$41.00	\$65,600.00	\$94,300.00
<b>CHARTER OAKS HOA</b>	38	\$60,800.00	\$87,400.00		\$38.00	\$60,800.00	\$87,400.00
<b>ROXBOROUGH VILLAGE FIRST HOA</b>	20	\$32,000.00	\$46,000.00		\$20.00	\$32,000.00	\$46,000.00
<b>CHERRY CREEK HIGHLANDS HOA</b>	16	\$25,600.00	\$36,800.00		\$16.00	\$25,600.00	\$36,800.00
<b>HOCKADAY HEIGHTS HOA</b>	15	\$24,000.00	\$34,500.00		\$15.00	\$24,000.00	\$34,500.00
<b>PINE CREEK WEST HOA</b>	11	\$17,600.00	\$25,300.00		\$11.00	\$17,600.00	\$25,300.00
<b>KELTY FARMS HOA</b>	8	\$12,800.00	\$18,400.00		\$8.00	\$12,800.00	\$18,400.00
<b>SURREY RIDGE ESTATES HOA</b>	7	\$11,200.00	\$16,100.00		\$7.00	\$11,200.00	\$16,100.00

<b>BEVERLY HILLS HOA</b>	4	\$6,400.00	\$9,200.00		\$4.00	\$6,400.00	\$9,200.00
<b>STORNOWAY HOA</b>	1	\$1,600.00	\$2,300.00		\$1.00	\$1,600.00	\$2,300.00
<b>WILDCAT RIDGE HOA</b>	1	\$1,600.00	\$2,300.00		\$1.00	\$1,600.00	\$2,300.00

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