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AFFORDABLE HOUSING DEMONSTRATION COST ANALYSIS MESA COUNTY, COLORADO

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PREPARED FOR

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BY

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FOREWORD

The cost data contained herein were developed from on-site studies by NAHB Research Foundation industrial engineers and from the builder's own records. Because the demonstration project was incomplete at the time of this report, interpolation of some costs were necessary. Upon completion of the project, the builder's cost data will be reexamined and, if necessary, adjustments made.

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AFFORDABLE HOUSING DEMONSTRATION

COST ANALYSIS

MESA COUNTY, COLORADO

The Mesa County Affordable Housing Demonstration project was an excellent example of how design, builder efficiency, high density and community cooperation can be combined to substantially reduce housing costs without sacrificing quality.

The project consisted of seven six unit buildings and two four unit buildings (50 total units) on a 2.86 acre parcel of land. Density was a little over 17 units per acre, equally divided between one bedroom and two bedroom units. The one bedroom units had 896 square feet on two levels and the two bedroom units contained 1088 square feet, also on two levels. All units were 16 feet wide.

The builder/developer, Roger Ladd and Company, has developed considerable in-house value engineering expertise over the years. Exact amounts of materials were ordered for the project which eliminated excessive scrap and waste. Subcontractors were expected to do the job with materials on-hand. If shortages occurred, Ladd's supervisors were expected to know the reason why. In dealing with subcontractors, Ladd knew within a few dollars how much the job should cost and did not hesitate to inform them when costs were not within an acceptable range. He promised (and provided) a well managed and scheduled job site for the best possible price of subcontracted work. Although, this management expertise cannot be quantified in dollars saved, it is likely that this builder's costs are consistently lower than the average regardless of the type of housing built.

Land

The 2.86 acre parcel of land was not inexpensive, but the high density made the cost low on a "per unit" basis. At 17.5 units per acre, land cost was $3,000 per unit. Had the project contained 14 units per acre, land cost would have been $3,750 per unit. 12 units per acre would have resulted in a cost of $4,286 while 9 units per acre would have resulted in a raw land cost of $6,000 per unit. Because density was approved without question by Mesa County, it is not possible to place an actual value on how much was saved due to high density. Depending upon the comparison base used, the higher density resulted in a savings of between $750 and $3,000 per year.

Land Development

Streets within the project were built according to Mesa County standards which were already engineered to a practical minimum for the area. Curbs and gutters, however, were changed for the demonstration. The 4" high sidewalk served as the curb with no separate gutter. Normally, Mesa County allows rolled curbs and gutters. The elimination of curbs and gutters resulted in a total savings of $5,566 for the entire project or $111.32 per unit.

Plastic underground water service pipe was used for a cost reduction of $3,152 or $63.04 per unit. Total utility installation costs for the project were reduced from $39,094 to $35,942.

General Requirements

Normal water and sewer fees in Mesa County are higher than in most other areas of the county. Typically, sewer tap fees are $1,000 per unit, sewer plant expansion fees are $750 per unit, and water tap fees are $2,800 per unit. The builder argued for reduced fees for the demonstration project on the basis that the small units would not consume as much water or produce as much sewage as average Mesa County homes. He was successful in reducing the sewer expansion fee from $750 to $540 and the water tap fee from $2,800 to $2,240. Total project savings amounted to $38,500, or $770 per unit.

Direct Construction

The dwelling units were designed with material and labor efficiency in mind. For example, the ratio of interior partitions to exterior walls was very low; 0.37 to 1.0 in the one bedroom units and 0.59 to 1.0 in the two bedroom units. The national average ratio of interior partitions to exterior walls is 0.91 to 1.0 according to the Housing Industry Dynamics survey of attached dwelling units built in 1981. This means that the demonstration units have about one-half the length of interior partitions as typical attached units.

In addition, an evaluation of framing materials in the demonstration units indicate that Roger Ladd and Company used less lumber in both exterior walls and interior partitions than the national average. In exterior walls, the average unit nationally contains 8.6 board feet per lineal foot of wall. The demonstration units contained 7.2 board feet per lineal foot. For interior partitions, the national average is 8.9 board feet per lineal foot. The demonstration units contained 6.7 board feet per lineal foot. This was accomplished by prudent use of materials, two-stud corners, drywall backup clips and 24 inch o.c. spacing for interior partitions. The two bedroom units used 662 board feet less than average and the one bedroom unit used 390 board feet less than average. Total material and labor savings averaged $237.00 per unit.

Single layer plywood siding and single layer plywood floor sheathing was used, eliminating sheathing and a separate underlayment. 3/8" plywood roof sheathing with plyclips was used instead of 1/2" plywood. Total cost saving over typical Mesa County practice was $931.40 per dwelling unit. Polybutylene water supply pipe was used instead of copper, reducing plumbing costs by $145.00.

Overhead and Indirect

The builder typically applies percentages to all costs for marketing, financing, construction field expense and general and administrative expense. The normal percentages are:

Marketing - 6%
Financing - 6%
Construction field expense - 3.5%
General and administrative expense - 2.5%.

When applied to the demonstration project, overhead and indirect costs amounted to $282,693. When applied to conventional costs, overhead and indirect costs totalled $303,014 - a difference of $20,321 or $406.42 per unit.

Table 1 illustrates the comparative costs of the demonstration project versus the same project if built conventionally with the same density of 17.5 units per acre. Table 2 shows the comparative costs of the demonstration project versus a conventionally built project had the density been 12 units per acre. Table 3 shows the actual direct construction costs of the demonstration units and Table 4 shows comparative direct costs between the demonstration units and the same units if built conventionally.

Table 1. Cost Comparison Between 50 Unit Demonstration Project and 50 Unit Conventional Project (17.5 Units/acre Each Project)

Construction Phase	Total Costs		Per Unit Costs	
	Conv.	Demo.	Conv.	Demo.
Raw Land	$150,000	$150,000	$3,000	$3,000
Land Development	79,168	70,450	1,583	1,409
Landscaping, Irrigation	72,950	72,950	1,459	1,459
Community Facility	25,000	25,000	500	500
General Requirements	245,500	207,000	4,910	4,140
Direct Construction	1,110,792	1,045,122	22,216	20,902
Overhead, Indirect, Sales	303,014	282,693	6,060	5,654
Total Costs	$1,986,424	$1,853,215	$39,728	$37,064
Cost Savings	$133,209		$2,664	

Table 2. Cost Comparison Between 50 Unit Demonstration Project (17.5 Units/acre) and 35 Unit Conventional Project (12.2 Units/acre)

Construction Phase	Total Costs		Per Unit Costs	
	Conv.	Demo.	Conv.	Demo.
Raw Land	$150,000	$150,000	$4,286	$3,000
Land Development	79,168	70,450	2,262	1,409
Landscaping, Irrigation	72,950	72,950	2,084	1,459
Community Facility	25,000	25,000	714	500
General Requirements	172,600	207,000	4,931	4,140
Direct Construction	777,554	1,045,122	22,216	20,902
Overhead, Indirect, Sales	229,909	282,693	6,569	5,654
Total Costs	$1,507,181	$1,853,215	$43,062	$37,064
Cost Savings			$5,998	

Table 3. Direct Construction Costs - Mesa County Affordable Housing Demonstration

Construction Category	1 BR Plan 601	2 BR Plan 602	Average 6 Units
Site Work			
Layout	$16.67	$16.67	$16.67
Excavation	35.83	35.83	35.83
Backfill/rough grading	35.83	35.83	35.83
Sewer & water laterals	175.00	175.00	175.00
Gas lateral	100.00	100.00	100.00
Finish grade	50.00	50.00	50.00
Foundation/Flatwork			
Concrete	350.00	350.00	350.00
Labor: Foundation	308.17	308.17	308.17
Labor: Flatwork	81.00	81.00	81.00
Sidewalks	20.17	20.17	20.17
Framing/Exterior Trim/Siding			
Floor and wall package	3,307.19	3,651.47	3,479.33
Roof trusses	270.90	299.10	285.00
Windows	559.00	617.20	588.10
Exterior doors	183.25	183.25	183.25
Labor: framing	1,124.79	1,241.87	1,183.33
Labor: exterior trim and siding	298.78	329.88	314.33
Roofing			
Materials	180.76	180.76	180.76
Labor	59.72	59.72	59.72
Plumbing	1,740.00	1,818.00	1,779.00
Heating/AC/Sheet Metal			
Heating	1,425.00	1,425.00	1,425.00
Gutters and downspouts	91.67	91.67	91.67
Electric	1,235.00	1,548.00	1,391,50
Insulation	456.00	506.00	481.00
Drywall	1,357.92	1,468.00	1,412.96
Interior Finish			
Interior doors	200.13	464.31	332.22
Window sills	34.23	22.88	28.52
Kitchen and bath cabinets	1,054.25	1,142.95	1,098.60
Kitchen and bath countertops	391.95	465.45	428.70
Painting	715.00	715.00	715.00
Finish Flooring			
Ceramic tile	118.70	173.00	145.85
Vinyl flooring	200.00	197.00	198.50
Carpet	845.00	1,212.00	1,028.50
Hardware			
Door/bath package	104.86	157.87	131.37
Mirrors	43.08	36.91	40.00
Railings	292.00	162.00	227.00

Table 3. Direct Construction Costs (continued)

Construction Category	1 BR Plan 601	2 BR Plan 602	Average 6 Units
Appliances	$842.10	$842.10	$842.10
Miscellaneous			
House cleaning	65.28	65.28	65.28
Walk-through preparation	75.00	75.00	75.00
General labor	150.00	150.00	150.00
Preclosing repairs	333.33	333.33	333.33
Temporary utilities	40.00	40.00	40.00
Trash removal	25.00	25.00	25.00
Expendable supplies	120.00	120.00	120.00
Contingencies	333.33	333.33	333.33
Totals	$19,893.89	$21,911.04	$20,902.44

Table 4. Comparative Direct Construction Costs - Demonstration Units Versus Conventional Units of Same Design

Construction Category	Conventional	Demonstration
Site Work	$413.33	$413.33
Foundation/Flatwork	759.34	759.34
Framing/Exterior Trim/Siding	7,201.74	6,033.34
Roofing	253.00	253.00
Plumbing	1,924.00	1,779.00
Heating/AC/Sheet Metal	1,516.67	1,516.67
Electric	1,391.50	1,391.50
Insulation	481.00	481.00
Drywall	1,412.96	1,412.96
Interior Finish	2,392.04	2,392.04
Painting	715.00	715.00
Finish Flooring	1,372.58	1,372.58
Hardware	398.37	398.37
Appliances	842.10	842.10
Miscellaneous	1,141.94	1,141.94
Totals	$22,215.84	$20,902.44
Cost Savings	$1,313.40	