The Affordable Housing Demonstration

Valdosta, Georgia

A Case Study
In January 1982 I announced the formation of the Joint Venture for Affordable Housing as a public-private partnership to combat the problem of high housing costs resulting from outdated and unnecessary building and land use regulations.

In the intervening years, much has been accomplished toward this goal. One of the most satisfying and successful efforts has been the series of Affordable Housing Demonstrations carried out through the cooperative efforts of builders, developers, and local officials in all areas of the country. In project after project, builders have reported costs savings of up to 20 percent through the effective use of innovative site planning, site development, and building construction practices.

As projects are completed, case studies report the steps taken by the builders and the help that has been received from local officials. Each project is different, and each case study has its own story to tell. This case study is one of a number reporting on the second group of projects now being sold or -- in some cases -- sold out!

I urge you to read each of the case studies and to use the ideas described in them as they apply to your situation in your community. Housing costs can be reduced without Federal subsidies; the Affordable Housing Demonstrations have proved it!

Very sincerely yours,

Samuel R. Pierce, Jr.
The Affordable Housing Demonstration
A Case Study

Valdosta, Georgia

Prepared for:
U.S. Department of Housing and Urban Development,
Division of Building Technology

By:
NAHB Research Foundation, Inc.
P.O. Box 1627
Rockville, Md. 20850

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Forrestwood II, the Affordable Housing Demonstration project in Valdosta, Georgia, consists of 90 single-family detached homes. The 15.42 acre site was originally platted for 45 lots of approximately 10,800 square feet each. Once it was selected for the demonstration program, the site was replatted at twice the original density—90 homes on lots averaging 5,400 square feet. The replat of Forrestwood II included placement of the homes in a zero lot line configuration. Placement of the houses on the lot line provided larger, more usable sideyards than conventional setback placement. The increased density and the use of zero lot line configuration were made possible by a 1980 revision of the Valdosta Zoning and Subdivision Regulations which reduced processing time for the replat of Forrestwood II from three months to one month.

The $42,500 to $46,500 homes range in size from 924 square feet to 1,260 square feet. There are eight different models including both two and three bedroom designs. By increasing the density, using innovative building methods, and taking advantage of the shortened processing time, the builder, Gary Minchew, president of Minchew Homes, was able to save $9,685 per unit.

Mayor Ernest Nijem maintained a personal interest in this project from the start and C. M. Northcutt, who was then Director of Inspections, kept the processing time to a minimum so that the project proceeded efficiently.

Planning for the demonstration project began in the fall of 1982; construction of the first homes began in March 1983; a formal Grand Opening was held in May 1983; and, as of September 1984 Minchew Homes estimated that all homes would be sold by the summer of 1985.
Housing costs have risen dramatically in recent years, so that many people have been unable to buy a home. Part of this cost increase was due to the high rate of interest on home mortgages, which reached almost 20 percent in some areas of the country before dropping under 14 percent in 1983.

A large part of the increase, however, was due to other factors -- rising costs of materials and labor, a reduction in the amount of land available for housing which has drastically increased lot prices, and changes in market patterns leading to larger homes on larger lots. Studies by the President's Commission on Housing and by a special U.S. Department of Housing and Urban Development (HUD) Task Force on Housing Costs confirmed the findings of earlier studies showing that ways exist to cut the cost of housing. These studies also show, however, that out-of-date regulations and building practices frequently prevent these ideas from being applied. In fact, the studies pointed out that many builders and local officials do not even know about many of the ways that exist to reduce housing costs.

The Joint Venture for Affordable Housing was initiated by HUD Secretary Samuel R. Pierce, Jr., to correct this situation. Since affordable housing is a problem which involves all levels of government as well as the rest of the housing industry, finding an answer requires the participation of all of these elements.

Through conferences, workshops, demonstrations, publications, and similar activities, ways to cut construction costs through more effective and efficient planning, site development, and building procedures are being brought to the attention of builders and local government officials all over the country.

The Affordable Housing Demonstrations

Home builders learn from other builders; successful ideas are copied and used in new ways by other builders in many different areas of the country. The affordable housing demonstrations have been developed to illustrate ideas for reducing housing costs in real projects and to provide information on the cost savings that resulted.

The central theme of the demonstration program is that a builder and those local officials responsible for regulatory approval can, together, identify ways to reduce the cost of housing and to modify or interpret local building codes and site development regulations so that these methods can be used. In the demonstration
program, no Federal funds are provided either to the builder or to the community to support the demonstration projects. HUD and the National Association of Home Builders Research Foundation do provide technical assistance through various publications documenting previous research studies and through suggestions to the project designers, but it is the builder's responsibility to develop a list of possible cost-cutting ideas and it is the responsibility of local officials to accept those which are reasonable for that community.

Participating builders and communities have been selected for the demonstration program in several ways. Before the Joint Venture was announced in January 1982, HUD approached a number of communities which had already demonstrated, in other activities, a willingness to modify regulations and to take other steps to encourage local development. As these communities agreed to participate in the program, NAHB worked through its local associations to identify builders in the communities with reputations for quality and records of innovation. Following announcement of the first twelve communities and builders selected to participate in the demonstration program, many other communities and other builders expressed interest in joining the program. In each case, HUD required a formal commitment by the highest elected official that the local government would support the program.

Once a project was accepted, HUD and the NAHB Research Foundation assisted the builder to identify cost-cutting ideas and to develop a workable, attractive site plan. The cost-cutting measures used in the various demonstrations vary widely. In some projects, street widths, street design standards, and utility system requirements were changed to reduce costs. In other projects, unit densities have been increased to reduce the impact of land cost on the final price, while good site planning and design have made this increased density acceptable to the communities. New housing materials and construction methods were used in many projects. In addition to these changes in materials and methods, many projects benefited from improvements in local administrative procedures which reduced the time and effort needed to obtain building and land use approvals.

The Case Study Approach

Each project undertaken as an Affordable Housing Demonstration as part of the Joint Venture for Affordable Housing is being described in a case study report. The case studies are intended to be learning tools to help home builders, local officials, and others concerned about affordable housing to recognize and seize opportunities to reduce housing costs through regulatory reform and the use of innovative planning and construction techniques.
Information on the changes and their impact on costs is collected for each by the NAHB Research Foundation. Each case study describes the community, outlines the builder's experience, and discusses the specific project characteristics and history. Where possible, the cost savings resulting from the use of the various procedural, planning, development, and construction changes are calculated and reported in detail.

The following material provides this information on the Affordable Housing Demonstration project in Valdosta, Georgia.
The U.S. Department of Housing and Urban Development (HUD) announced the designation of Valdosta, Georgia, and Minchew Homes Corporation as participants in the Affordable Housing Demonstration in August 1982. The announcement pointed out that city officials, particularly Mayor Ernest Nijem and C. M. (Chuck) Northcutt, then Director of Inspections, supported the Affordable Housing Demonstration and would work with Gary Minchew, president of Minchew Homes.

The Community - Valdosta

Valdosta is the county seat of Lowndes County in south Georgia, 20 miles from the Georgia - Florida border. The U.S. Census Bureau recorded a 16-percent growth rate in the city population from 1970 (population 32,483) to 1980 (population 37,596). In 1980 the total Lowndes County population was 67,972.

Mayor Ernest Nijem heads the mayor-council form of government in Valdosta. The council employs a city manager who acts as the chief administrative officer. Both the city and the county have planning commissions that administer the street planning and zoning ordinances.

The growth of Valdosta and Lowndes County has been largely due to the industry, agribusiness, and tourism in the area as well as to the impact of Valdosta State College and Moody Air Force Base. The air force base, located 8 miles north of Valdosta, employs about 4,800 military and civilian workers. An additional 4,100 wives, children, and other relatives reside with the military families. Both the air force base and the college attract home buyers to the Valdosta housing market.

The median family income in Lowndes County in 1980 was $14,146 and in the City of Valdosta it was $14,311 according to the U.S. Census. This placed both Valdosta and Lowndes County at about the 35th percentile of family income distribution for the nation.

Residential construction activity in Valdosta is shown in the following table.

Valdosta Single Family Detached Home Building Activity

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
<td>126</td>
</tr>
<tr>
<td>1980</td>
<td>125</td>
</tr>
<tr>
<td>1981</td>
<td>103</td>
</tr>
<tr>
<td>1982</td>
<td>94</td>
</tr>
<tr>
<td>1983</td>
<td>185</td>
</tr>
</tbody>
</table>
The Builder - Minchew Homes

Gary Minchew has built a reputation as an innovative builder. He received a 1980 HUD "Building Value Into Housing" award and has been featured in the National Association of Home Builders' magazine, BUILDER, for "value engineered" construction practices. In the fall of 1981, House Beautiful published a Building Manual in which the Minchew Homes Corporation homes were featured. Minchew Homes is a member of the Home Owners Warranty (HOW) Corporation, NAHB's homeowner insurance subsidiary.

Minchew Homes Corporation was formed in 1968 and built more than 500 single family detached and attached homes through 1983. These homes were built on a speculative basis. However, beginning in 1983 Minchew switched to building on a pre-sold basis. Minchew Homes operates as a general contractor and subcontracts all aspects of the actual building process except plumbing. Plumbing work has recently been done by an employee of the company. Many of the subcontractors have been associated with Minchew Homes for years. Gary Minchew works closely with all of the subcontractors particularly when it comes to implementing innovative cost or energy saving techniques.
The Project - Forrestwood II

The site, Forrestwood II, selected and purchased by Minchew Homes for the Affordable Housing Demonstration is a 15.42 acre section of land located in the northeast portion of Valdosta about three miles from the central business district. The city had approved a plat for the site showing 45 units on lots averaging 10,800 square feet; the site had been partially developed -- streets, sewer, water, and gas already in place when Minchew bought the land.

Working with a Valdosta architect, Minchew Homes prepared and received city approval for a replat of the site as a Planned Unit Development (PUD), Forrestwood II, consisting of 90 two and three bedroom, single family detached homes placed on lots averaging 5,400 square feet and designed to sell in the $42,500 to $46,500 range.

All homes in Forrestwood II are positioned on the lot line. This zero lot line configuration provides the home owner with a larger side yard for outdoor activities than would be possible with conventional sideyard setback requirements. An eight foot easement is granted to each home owner by the adjacent lot owner to allow for maintenance or repair of the side of the house on the lot line.

The Affordable Housing Demonstration began with the selection of the site in the fall of 1982; replatting and house design approvals were received in February 1983; and construction of the homes began March 1983.

Completed Units in Forrestwood II
Completed Units in Forrestwood II
In 1979 and 1980, the City of Valdosta and the Home Builders Association of Valdosta-Lowndes County were engaged in litigation over the provisions of the city's Zoning Ordinance and Subdivision Regulations. Eventually both the city and the builders recognized that litigation was costing both parties substantial sums of money and that it would be in everyone's interest to meet privately and devise a compromise.

The result of the out-of-court settlement was a document titled "Valdosta, Georgia, Subdivision Regulations and Zoning Ordinance" which governs development in the city. Consisting of only 72 pages, it contains all of the requirements that must be met by a developer. Probably the single most important change was the inclusion of a provision for Planned Unit Development (PUD) within any residential zone. This PUD provision paved the way for single family attached housing within the city as well as flexibility in development density, lot sizes, and setback requirements.

Another major change dealt with the processing of development applications. Historically, such plans required the approval of both the Planning Commission and the City Council. The time required for this process was typically three months. Under the revised regulations, the City Council relinquished their approval authority to the Planning Commission and thereby shortened the processing time to less than one month.

This spirit of cooperation between the city government and the home builders was an important factor in the designation of Valdosta, Georgia, as one of the cities in the Affordable Housing Demonstration.

During the fall of 1982, Gary Minchew, president of Minchew Homes Corporation and the builder designated to participate in the demonstration program, selected the site on which he planned to construct the demonstration homes. The 15.42 acre area was an already platted subdivision owned by Mr. George Nichols. Mr. Nichols had developed the area to the point of having installed sewer, water, and gas plus 25-foot-wide streets with gutters and vertical curbs. The site was zoned R-6 representing residential development with 10,000-square-foot minimum lot sizes. The actual average lot size in the original plat was 10,800 square feet.

Minchew (left) discusses Forrestwood II plans with Mayor Nijem
Minchew Homes purchased the site from Mr. Nichols and enlisted the aid of the Valdosta architectural firm of Ellis, Ricket and Associates to replat the site as a Planned Unit Development (PUD). The revised plat showed 90 lots averaging 5,400 square feet, double the original number of lots. Using the zero lot line concept, 28-foot-wide units were placed on lots that were as narrow as 40 feet. The replat of the site was completed in January 1983 and increased the density from the original 2.9 units per acre to 5.8 units per acre. This meant that land and land development costs per dwelling unit were reduced by one half.

The replatted area was named Forrestwood II and the replat was submitted to the Planning Commission in early February 1983. Approval of the replat was received before the end of February. This rapid review and approval did not represent special treatment for the

Affordable Housing Demonstration. Rather, it represented Valdosta's new, efficient routine for processing a PUD rezoning request under the revised Zoning Ordinance and Subdivision Regulations.

Based on their experience, Minchew Homes believed their market to be first-time home buyers drawn primarily from Moody Air Force Base and, to a lesser extent, from the Valdosta State College. The typical family income range for these buyers was between $15,000 and $20,000. They were usually young couples with either no children or with just one child.

In order to respond to the market, Gary Minchew worked with a local architectural firm, Ellis, Ricket and Associates, and designed eight two and three bedroom models. An important feature of the design was the ample separation of living and sleeping areas within a relatively small space.
The four two bedroom models, ranging from 924 square feet to 1,058 square feet, have one bath. Three of the models are one story designs with a carport. The fourth model is a two story design with an attached one car garage.
The four three bedroom models range from 1,100 square feet to 1,260 square feet. The three one story models have one bath and a carport. The two story model has a full bath upstairs and a half bath on the lower level plus an attached one car garage.

Construction of the first homes in the Forrestwood II Subdivision began in March 1983. A formal grand opening was held in May 1983, and the first buyers moved into the homes in July 1983. As of September 1984, Minchew Homes expected that all 90 units in Forrestwood II would be sold by the summer of 1985.
One of the major goals of the Affordable Housing Demonstration is to have the city and the builder produce high quality homes at affordable prices. This goal is to be pursued by cutting costs in three areas: processing times for development plans, site development, and house construction.

**ADMINISTRATIVE AND PROCESSING**

Prior to 1980, the time required to process an application for subdivision approval through both the Valdosta Planning Commission and through the City Council was approximately three months. Since the Zoning Ordinance and Subdivision Regulations were revised in 1980, the City Council approval step was eliminated and processing time was reduced to less than one month. Minchew estimated that the pre-1980 processing schedule would have resulted in an increased cost of $300 per unit in interest costs and in lot cost inflation.

**SITE DEVELOPMENT**

The Forrestwood II Subdivision developed for the Affordable Housing Demonstration at 5.8 dwelling units per acre had previously been a platted subdivision with approximately 2.9 dwelling units per acre. By increasing the density, Minchew Homes was able to reduce the land and land development costs allocated to each completed unit by almost one half, or $7,650 per home. The introduction of the Planned Unit Development (PUD) provision into the Valdosta Subdivision Regulations and Zoning Ordinance in 1980 made this cost savings possible. In particular, the flexibility of the PUD provisions permitted the placement of the homes on the lots in a zero lot line configuration made the smaller lot sizes practical. An 8-foot easement on the lot adjacent to the house allowed access for maintenance and repair.

**BUILDING DESIGN AND CONSTRUCTION**

In Valdosta, Minchew Homes has, for many years, employed practical cost-reducing innovations as a standard practice.

**OVE Construction**

Optimum value engineered (OVE) construction refers to a systematic approach to the reduction of direct construction costs.

Exterior load bearing wall opening showing single top plate, in-line roof truss and wall stud, and open box header.
Gary Minchew adopted the OVE concept in the late 1970's and has continued to employ these methods. He pointed out that he saves 35 cents per square foot of floor area in sheathing and framing labor and materials by using the OVE techniques. Some of the specific cost-reducing construction techniques employed were:

- 24-inch module framing
- Two-stud corners with metal wall board back-up clips
- Roof trusses bearing directly over studs (i.e., in-line framing) eliminating need for double top plate on bearing walls
- Plywood box headers over openings in bearing walls
- Single layer structural sheathing and siding

**Roof Gutters**

All roofs were constructed at either 4-in-12 or 6-in-12 pitch with a 16-inch overhang. Roof gutters were offered as an added-cost option. The omission of roof gutters in itself is not an innovative construction technique but it represents an innovative cost reducing option not commonly offered to the home buyer. The 16-inch roof overhang makes it possible to produce 24 linear feet of soffit material from one 4x8 sheet of plywood with no waste.

**Foundation Design**

The foundations in all of the Forrestwood II homes were monolithic slab-on-grade as is standard practice in Valdosta. However, Minchew eliminated the welded wire mesh in the slab and the two steel reinforcing rods that were routinely placed in the slab footings without weakening the foundation.

**Plumbing Design**

In Forrestwood II homes the kitchen, bath, and laundry were close together. This design
reduced both material and labor costs for plumbing. The plumbing subcontractor previously used by Minchew, however, estimated his costs by counting plumbing fixtures and multiplying by a fixed number of dollars. This cost estimating method is commonly used but gives no credit for an efficient plumbing design. As a result, a master plumber was added to the Minchew Homes staff. This made it possible for the plumbing costs to reflect the actual labor and material used.

Energy Efficiency

Minchew Homes Corporation prides itself in producing homes that are affordable both from the standpoint of initial cost and from the standpoint of operating costs. In southern Georgia air conditioning represents a major cost of owning and operating a home. Recognizing this, all homes built by Minchew Homes are equipped with R-30 ceiling insulation and R-19 exterior wall insulation. Attic ventilation is also a very important factor in controlling air conditioning costs. Therefore, all homes are equipped with continuous ridge vents, soffit vents, and 1x6 spaced-board gable end vents. The 16-inch roof overhang provides passive solar shading during summer months.

According to Gary Minchew, these energy conserving measures resulted in an estimated air conditioning load of about 12,000 Btu per hour. Unfortunately, there were no central air conditioning systems available with this small a capacity. The result was that all homes were equipped with 18,000 Btu per hour air conditioning systems.

Material Delivery Scheduling

Minchew and his framing subcontractor had worked together for several years. The subcontractor was familiar with the OVE framing system and Minchew was familiar with the subcontractor's productivity. Working together they established a materials delivery schedule that provided the proper type, size, and amount of materials at the construction site at the right time. This technique represents a cost savings by minimizing material handing, waste, and pilferage.

A common alternative to this coordinated schedule of material deliveries is to have the complete lumber package delivered to the construction site...
site at one time. The result is increased material handling due to the large amount of material on hand; more waste due to the need for on site cutting; and more pilferage due to loose materials being left unattended over nights and weekends.
In this chapter, costs of each change in Valdosta standards and typical practice are discussed and compared. The objective of the analysis is to show how much costs were reduced by comparing Forestwood II to typically Valdosta construction practices.

**ADMINISTRATIVE AND PROCESSING**

The normal time required to process an application for subdivision approval in Valdosta was approximately three months and included approval by the City Council and by the Valdosta Planning Commission. In 1980, the City Council approval was eliminated and processing time was reduced to less than one month. Minchew estimated the interest cost on the land was $100 per lot per month and the lot cost inflation was another $50 per lot per month. Therefore total savings for the two month reduction in processing time was $27,000, or $300 per unit.

### Reduction in Administrative and Processing Costs

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Cost Savings Per Unit*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest costs on land</td>
<td>$18,000</td>
<td>$200</td>
</tr>
<tr>
<td>Lot cost inflation</td>
<td>9,000</td>
<td>100</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>$27,000</td>
<td>$300</td>
</tr>
</tbody>
</table>

*90 Units
SITE DEVELOPMENT

In the hierarchy of cost reducing techniques, higher density is usually the most important single factor. In addition, there are land development techniques that also produce savings. However, in Forestwood II, the land had been developed prior to inclusion into the Affordable Housing Demonstration program, so land development cost saving techniques could not be incorporated.

However, the builder proved that substantial savings were possible on already developed land by obtaining approval to double the density. The developer would have sold the approved 45 lots to the builder for an average cost of $16,000. By doubling the density, the developer added $350 per lot for the additional utility hook-ups and curb-cuts. Therefore, lots cost $8,350 each.

<table>
<thead>
<tr>
<th>Density Comparison</th>
<th>Demonstration*</th>
<th>Conventional**</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed lots</td>
<td>$8,350</td>
<td>$16,000</td>
<td>$7,650</td>
</tr>
<tr>
<td>*90 lots (5.8 units/acre)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>**45 lots (2.9 units/acre)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Existing vertical curb must be removed and replaced by driveway apron.
BUILDING DESIGN, CONSTRUCTION CHANGES

This section contains a discussion of cost saving techniques employed by Minchew Homes. Minchew, a long time user of the optimum value engineering (OVE) concept, developed detailed cost records on the average amount each of the OVE techniques saved in the Demonstration homes. He also initiated cost saving methods in foundation construction and plumbing. Following are the methods used.

Carpentry

As mentioned, Minchew uses the OVE method of framing and sheathing. The method includes single top plates, 24-inch on center exterior and interior wall framing, no cripples or headers in non-bearing walls, 2 stud corners with wood blocking for drywall back-up, and elimination of partition posts where interior partitions abut exterior walls. He also uses single layer plywood siding, eliminating a separate wall sheathing.

He designs all his homes to a 2-foot module thereby cutting costs through a reduction in scrap, waste, and associated labor. He also locates window and door openings to align with regular stud spacing, saving extra framing. Because of the reduction in framing lumber and sheathing, Minchew was able to renegotiate his framing subcontract to reduce rough carpentry costs from $1.25 to $0.90 per square foot of floor area. Since the average size of the Demonstration homes was 1,092 square feet, average labor savings was $382 per unit. Material savings amounted to $821 per unit.

Following are average cost savings for each of the techniques used:

<table>
<thead>
<tr>
<th>O. V. E. Cost Savings</th>
<th>Labor and Material Cost Savings Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2' modular grid system</td>
<td>$54.90</td>
</tr>
<tr>
<td>Single top plate</td>
<td>86.60</td>
</tr>
<tr>
<td>24&quot; vs. 16&quot; o.c. stud spacing</td>
<td>120.75</td>
</tr>
<tr>
<td>Elimination of headers</td>
<td>54.00</td>
</tr>
<tr>
<td>Elimination of partition posts</td>
<td>101.50</td>
</tr>
<tr>
<td>Two stud corners</td>
<td>18.40</td>
</tr>
<tr>
<td>Elimination of cripples</td>
<td>108.85</td>
</tr>
<tr>
<td>Elimination of sheathing</td>
<td>276.00</td>
</tr>
<tr>
<td>Rough carpentry labor</td>
<td>382.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$1,203.00</strong></td>
</tr>
</tbody>
</table>
Concrete Slabs-On-Grade

In Valdosta, a monolithic slab-on-grade is typically used whereby the footing/foundation/slab are all cast in place at one time rather than in three separate operations. After reviewing literature furnished by the NAHB Research Foundation dealing with slab-on-grade construction, Minchew eliminated two 5/8-inch steel reinforcement rods in the footing for an average savings of $42 per home and all welded wire mesh in the slab for a savings of $76 per unit. In addition, he previously used a metal "keyway" control joint down the center of each slab. His superintendent informed him that this joint was seldom used in other parts of the country so it was eliminated, saving another $14 per unit. Total savings in the slab amounted to $132 in labor and material.

Plumbing

Minchew clustered plumbing fixtures in a central area in order to reduce the amount of drain waste lines and vent pipe. Although advised of the simplified layout, his plumbing subcontractor would not reduce his bid because he based all his costs on a "per fixture" basis. That is, he counted the number of fixtures and multiplied by a predetermined factor to develop his bid. Because he received no credit for the efficient design of the plumbing systems, Minchew put a master plumber on his own payroll. After taking advantage of the simplified layout, Minchew found he had reduced total plumbing costs by an average of $400 per house. In addition, he found that he could add a second bathroom for only $350 because of the back-to-back layout of bathrooms and kitchens.

<table>
<thead>
<tr>
<th>Plumbing Cost Reduction</th>
<th>Cost Saving Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster plumbing</td>
<td>$400</td>
</tr>
</tbody>
</table>
Cost Saving Summary

Following is a summary of cost savings in Forrestwood II due to reduced administrative and processing times, increased density, and cost saving construction practices.

<table>
<thead>
<tr>
<th>Total Cost Savings</th>
<th>Cost Savings Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative and processing</td>
<td>$ 300</td>
</tr>
<tr>
<td>Increased density</td>
<td>7,650</td>
</tr>
<tr>
<td>Concrete</td>
<td>132</td>
</tr>
<tr>
<td>Carpentry</td>
<td>1,203</td>
</tr>
<tr>
<td>Plumbing</td>
<td>400</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$ 9,685</strong></td>
</tr>
</tbody>
</table>

The summary table points out that increased density accounts for the largest savings per unit. However, even without the savings due to increased density and reduced administrative and processing times, the builder was able to save $1,735 per unit in concrete, carpentry, and plumbing costs.
A significant portion of the details presented in this document were made available through the effort of Ms. Sandra Trancygier, Sales Manager for Minchew Homes Corporation.