

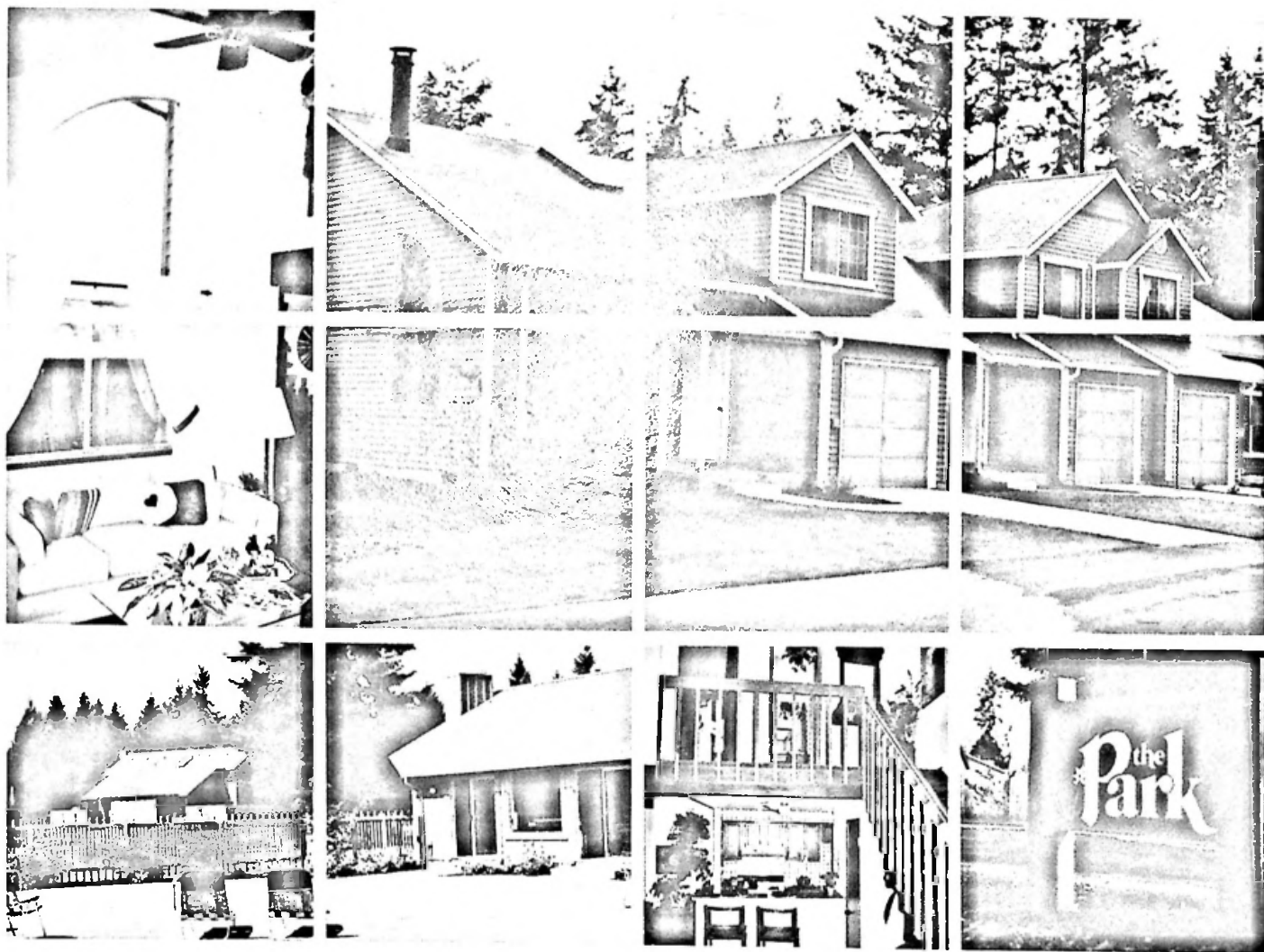


U.S. Department of Housing and Urban Development
Office of Policy Development and Research

The Affordable Housing Demonstration

Lacey
Washington

A Case Study



The Joint
Venture for
Affordable
Housing



THE SECRETARY OF HOUSING AND URBAN DEVELOPMENT
WASHINGTON, D.C. 20410

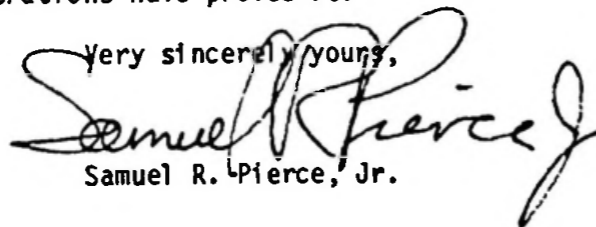
In January 1982 I announced the formation of the Joint Venture for Affordable Housing as a public-private partnership to combat the problem of high housing costs resulting from outdated and unnecessary building and land use regulations.

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

Lacey, Washington

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

December 1984

Summary v

Introduction 1

 The Joint Venture for Affordable Housing 1

 The Affordable Housing Demonstrations 1

 The Case Study Approach 2

Chapter 1: Project Description 3

 The Community - Lacey, Washington 3

 The Builder - Phillips Homes 3

 The Project - The Park 4

Chapter 2: Project History 11

 Marketing 12

Chapter 3: Innovations and Their Impact on Costs 15

 Change List Approval Process 15

 Administrative and Processing Changes 15

 Site Planning and Development Changes 16

 Building Design and Construction 20

Chapter 4: Details of Changes and Their Costs 27

 Comparison Costs 27

 Administrative and Processing Changes 27

 Site Planning and Development Changes 29

 Streets and Parking 30

 Sidewalks 31

 Sanitary Sewer 32

 Storm Water Drainage 34

 Water Service 35

 Building Design and Construction Changes 36

 Indirect Costs 37

 Cost Reduction Summary 38

This report was produced by the NAHB Research Foundation, Inc., for the United States Department of Housing and Urban Development. The views and conclusions contained herein are those of the authors and should not be interpreted as necessarily representing the official view or policies of the United States Government.

The Affordable Housing Demonstration project in Lacey, Washington, is "The Park," a 21.9 acre, 176 unit subdivision, by Phillips Homes, a well known and innovative builder in the Lacey/Olympia area.

Lacey is a suburb of Olympia, Washington's capital city, and shares the same mild climate and solid economic base. Located in the west-central part of the state in Thurston County, Lacey is about 70 miles south of Seattle. According to the 1980 U.S. Census, Lacey had a population of 13,940, Olympia 27,447, and Thurston County 124,264.

A 1981 survey indicated that about 48,000 households existed in the county, 2,100 of which were in the 25-34 age group earning over \$15,000 per year and actively searching for housing. Average home price was about \$65,000 in 1981. Phillips decided this was the proper market for the demonstration.

Lacey operates under a Council-City Manager form of government with the council chairperson given the title of mayor. The council is comprised of seven members selected at large and appoints a city manager who administers all city affairs.

Lacey's Mayor Mark O. Brown pledged cooperation in advancing innovative site planning, land development, and construction techniques. Mayor Brown expressed personal concern about

housing costs and pledged to bring the demonstration to a successful conclusion.

The demonstration consists of 64 cottages, 64 loft homes, 38 townhouses, and 10 patio homes. Sizes range from 648 square feet for a 1 bedroom, 1 bath loft home, to 1,287 square feet for a 3 bedroom, 1-1/2 bath townhouse.

Sales prices at "The Park" range from the high \$30s to low \$60s. Each unit has a fenced-in, private patio yard, wall-to-wall carpeting, appliances, and washer and dryer hook-ups. Exterior amenities include full landscaping, pool, clubhouse, and a central park area.

Costs saved through changes in processing procedures, land development standards, construction codes, and use of building practices not normally used in Lacey are estimated to be \$1,301,696 for the entire project or \$7,396 per unit. The savings include: \$449 per unit in reduction of processing time; \$3,083 per unit in land development; \$2,261 in building design and construction; and \$1,603 in indirect costs.

The grand opening of "The Park" was in April 1984, approximately 13 months after Phillips Homes joined the Affordable Housing Demonstration. By October 1984, 33 units were sold.

The Joint Venture for Affordable Housing

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

Project Description

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 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 Lacey, Washington.

The Community - Lacey, Washington

Lacey, a suburb of Olympia, Washington's capital city, is located in the west-central part of the state, about 70 miles south of Seattle. Part of fast-growing Thurston County (the average annual growth is more than 6 percent), Lacey alone accounted for more than 10 percent of the county's growth during the 1970s. Its population grew from 7,640 in 1970 to 13,940 in 1980, according to the U.S. Census, making it about half the size of Olympia. Growth in the region is expected to continue, with Thurston County's population increasing by 43,000 to 167,264 by 1990.

In 1981, there were approximately 48,000 households in Thurston County, averaging 2.66 persons each, down from 3.05 in 1970 and 3.16 in 1960. According to a Bureau of Building Market Research survey, about 2,100 households in the 25-34 age group, earning more than \$15,000, were in the active housing market. A high proportion of this market audience was single but most were couples with small families. Since the average new home price in Thurston County was about \$65,000, most in this market sector were unable to afford a new home.

Drawing primarily from government and educational offices, a recently-expanded army base (Fort Lewis, about 10 miles from Lacey), new high-technology parks (Weyerhaeuser and Burlington Northern), and older lumber mills, the Lacey/Olympia economy creates potential buyers at all income levels.

Lacey shares Olympia's mild climate and solid economic base, which makes it a desirable place to settle. In fact, Olympia (and by association, Lacey) was judged one of the most

desirable cities in which to live by both Money magazine and Rand McNally's Places Rated Almanac.

Lacey operates under a Council-Manager form of government. The governing body, the city council, is comprised of seven (7) members elected at large. At the first meeting of each new council, the members elect a chairperson, who also is given the title of mayor. The council appoints a city manager who is responsible to the council for administration of all city affairs.

The Builder - Phillips Homes

John Phillips, president of Phillips Homes, is relatively new to the area, coming to Lacey/Olympia from Detroit, Michigan, about four years ago. He typically builds homes from \$40,000 to \$90,000. He normally builds between 40 and 60 homes per year.

Phillips, a member of the National Association of Home Builders (NAHB) and a Home Owners Warranty (HOW) builder, constantly seeks ways to better use land and make more affordable homes that are "exciting architecturally and don't look like cracker boxes on small lots." He has been featured in major trade journals and is in demand as a seminar speaker.



John Phillips and press

One of his recently completed projects, The Cottages, near Lacey, won national awards for quality, design, and affordability. Designed for couples, more than half were sold to singles, which reinforced Phillips' belief that the region's one-person market was not only viable, but lucrative.

The Planning Association of Washington awarded Phillips their planning achievement award for The Park, the demonstration project, in October 1984.

The Project - The Park

John Phillips selected the name "The Park" for the Affordable Housing Demonstration project, because it reflects the natural park-like surroundings of the 21.9 acre site and Phillips' approach to the use of natural features in land planning. Located on the east side of Lacey, the site is convenient to area shopping and entertainment.



The Park entrance sign

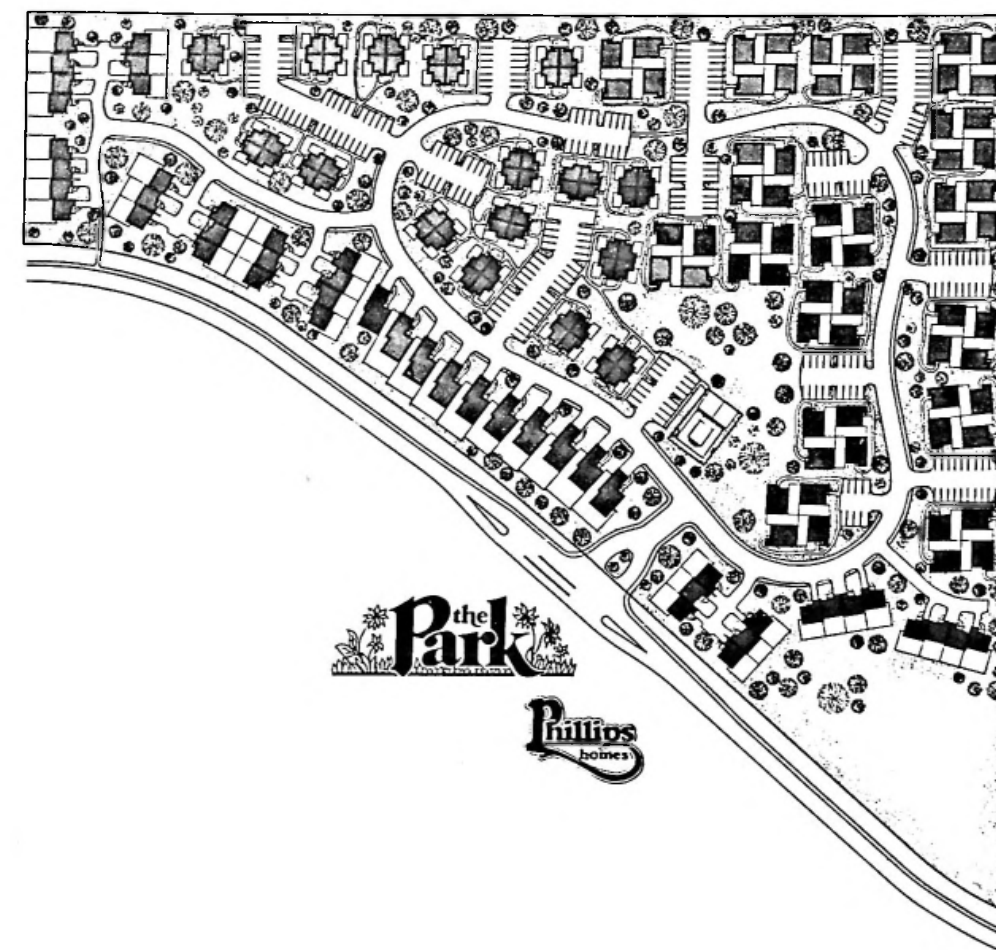
When Phillips joined the Affordable Housing Demonstration Program, The Park already had been platted for 153 detached and attached units, at about 7 units per acre, to be developed in two phases. A technical assistance team from HUD and the NAHB Research Foundation, along with David Jensen, a land planning consultant from Denver, Colorado, visited the site and recommended site plan improvements. Phillips reviewed the team's recommendations and included many of his own ideas in revising the original land plan. This revision increased the number of dwellings from 153 to 176, and raised the density from 7 to 8 units per acre.

Phillips Homes had previously built a subdivision of small, inexpensive homes outside of Lacey called The Cottages which demonstrated innovative land use through pinwheel clusters. This subdivision received national recognition and was featured in PROFESSIONAL BUILDER magazine as an award-winning project.

For the Affordable Housing Demonstration, Phillips decided to repeat the cottage concept on 64 of the 176 lots. He also built 10 zero-lot-line detached patio homes, 38 attached townhomes and 64 quadraplex units called "loft" homes. The units ranged in size from 648 square feet for the smallest loft home to 1,287 square feet for the largest townhome. The use of vaulted ceilings, lofts, and living areas opening onto outdoor patios created a feeling of openness.



Site plan (before)

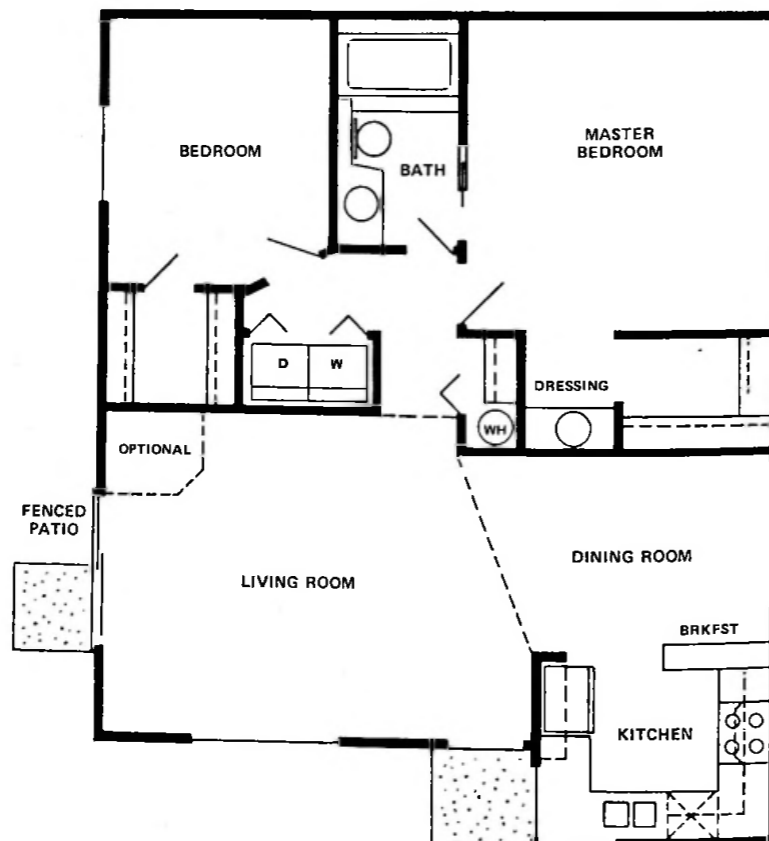


Site plan (after)

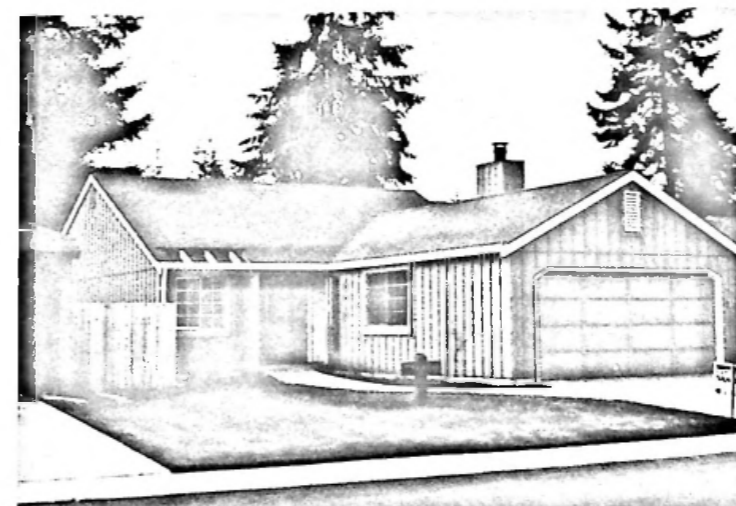
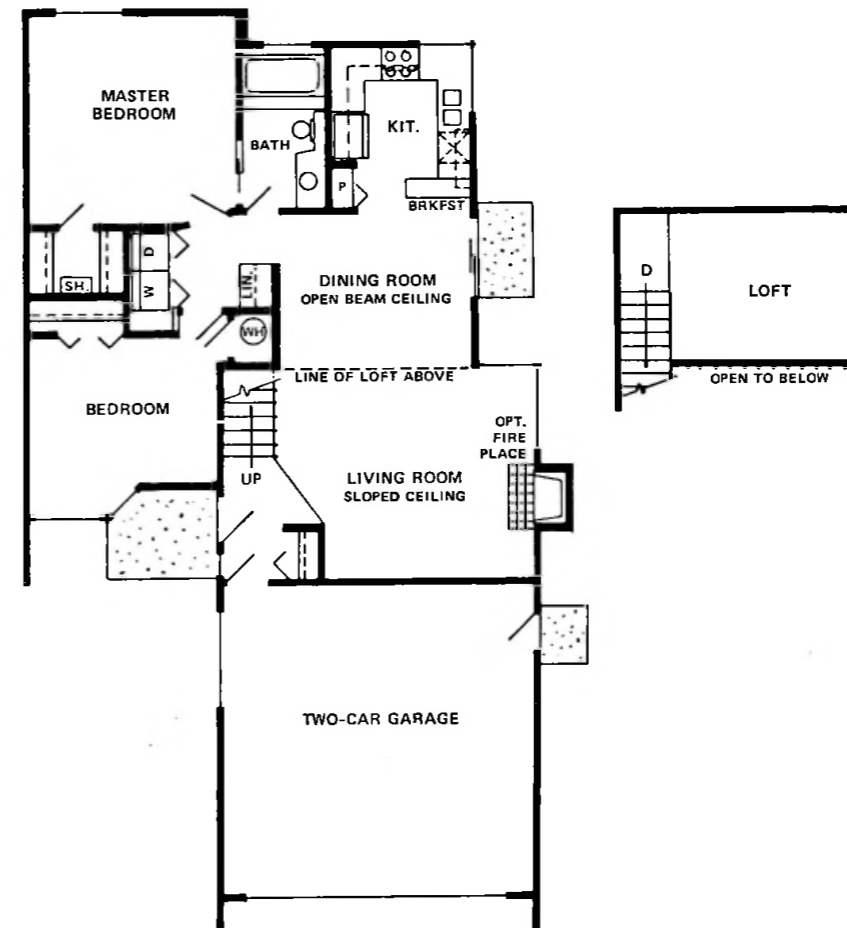
Cottages at The Park



THE COTTAGE
TWO BEDROOMS, ONE BATH
880 SQ. FT.

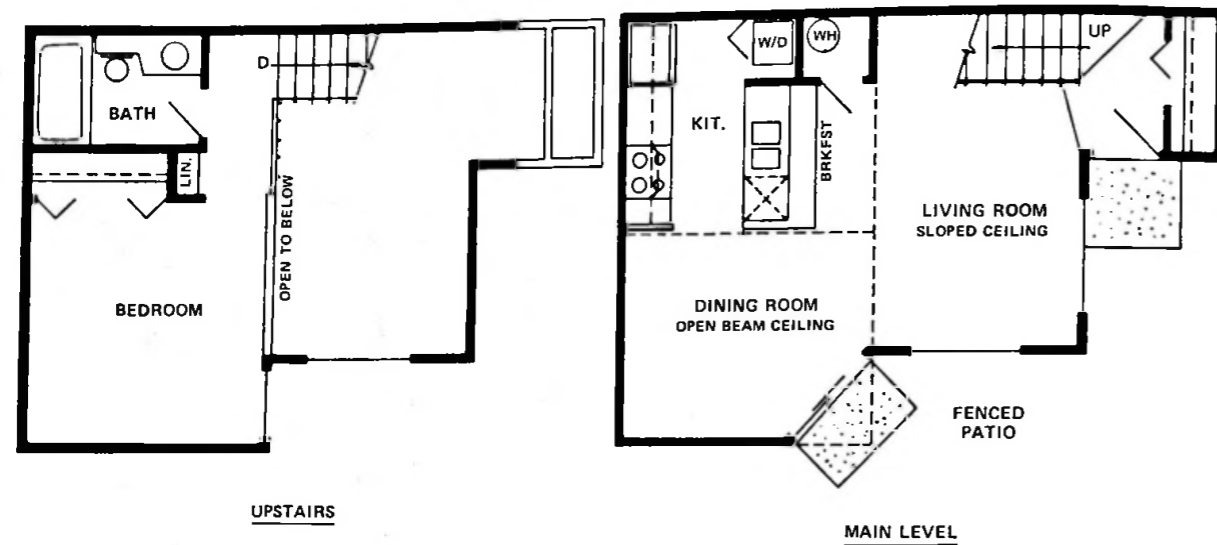


THE MALIBU
TWO BEDROOMS PLUS LOFT, ONE BATH
1136 SQ. FT.

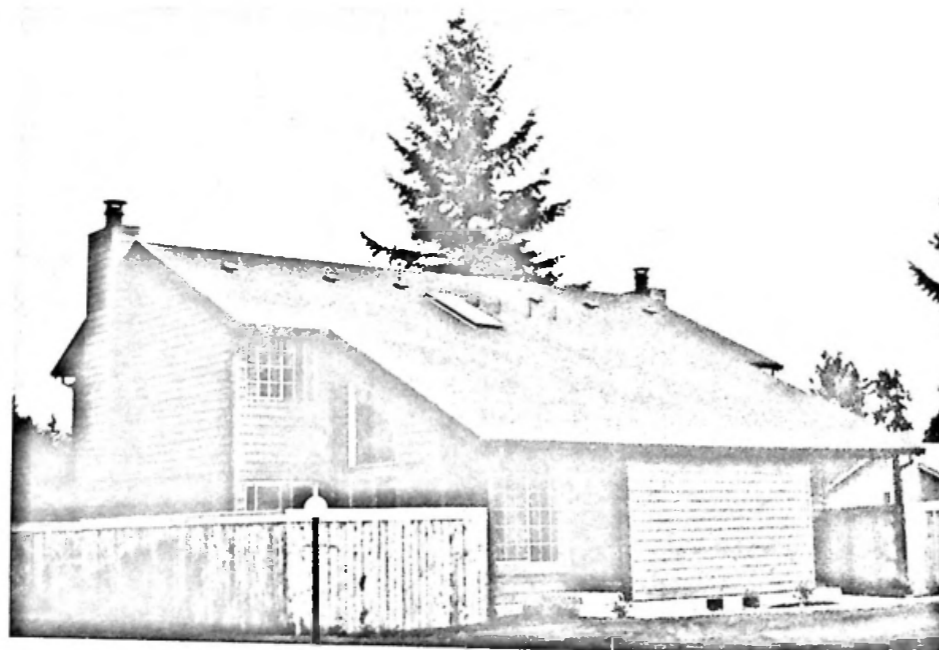


Patio home

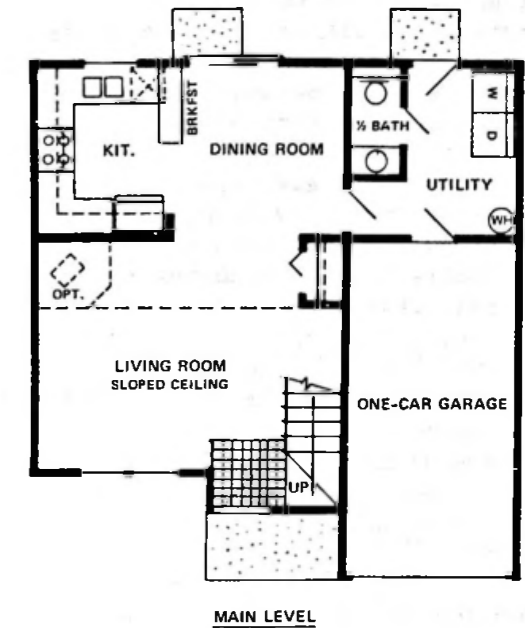
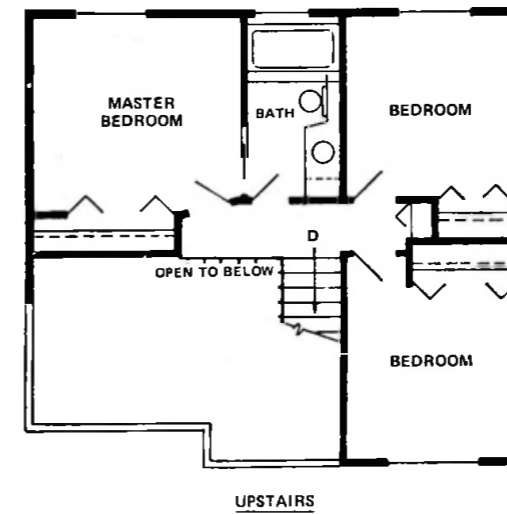
THE LOFT
ONE BEDROOM, ONE BATH
674 SQ. FT.



Fourplex Loft home



THE NEWPORT
THREE BEDROOMS, ONE AND ONE-HALF BATHS
1064 SQ. FT.



Townhouses



Project History

All units are of wood frame construction with rough sawn cedar and fir siding. They feature wall-to-wall carpeting, appliances, and washer and dryer hook-ups. Each unit has a fenced-in, private patio yard. Exterior amenities include full landscaping (with mature existing trees retained wherever possible), pool, clubhouse, and a central park area.

Designed for the market segment identified by a Bureau of Building

Market Research survey, 25 to 34 year-olds with incomes over \$15,000, the homes are priced from the high \$30s to mid \$40s for the loft homes, low \$40s to mid \$50s for the cottages, mid \$50s for the town homes, and high \$50s to low \$60s for the patio homes. Carefully managed open spaces, lofts and an indoor-outdoor living concept appealed to this target market of entry-level home buyers.



Use of windows to create feeling of space

John Phillips, president of Phillips Homes, became interested in the Affordable Housing Demonstration Program at a discussion during the 1983 NAHB Convention. After the session on the demonstration program, Phillips met with HUD representatives and indicated a desire to participate in the program.

Upon his return to Lacey, Phillips met with city officials and received enthusiastic support for the project. As a result of these meetings, Mayor Mark O. Brown wrote to HUD on March 1, 1983, pledging the city's full cooperation with Phillips in advancing innovative site planning, land development, and construction techniques. Mayor Brown indicated in his letter his commitment to reasonable development for the city and to obtaining affordable housing for first-time home buyers. With this promise of city-builder cooperation, HUD designated the Lacey project as an Affordable Housing Demonstration.



Mayor Mark O. Brown

City Manager Vernon E. Stoner was named by Mayor Brown as the official City of Lacey contact. Mr. Stoner took an active part in assuring that

the project received full support from the city staff, and worked closely with neighborhood groups to develop a feeling of confidence in the quality of the proposed project.

As noted above, Phillips had already received city council approval for a subdivision on the project site under the old procedure, which involved a formal hearing by a hearing examiner before the city council considered the project. Because he proposed to increase site density and change some features of the street and drainage designs, however, the new plat had to be resubmitted for approval. Under the usual procedure, this would have required an additional two months due to meeting schedules and the need for a new public hearing.

City Manager Stoner proposed, and the council accepted, a completely new processing procedure. A five-member site review committee with representatives of the various interested groups was appointed to work with Phillips and to review the revised plat. This committee met weekly instead of monthly, and submitted its recommendations directly to the council. The need for a separate hearing was eliminated in this revised process. As a result, when Phillips went before the council with the revised plat, it was able to hear all requests for waivers, consult the recommendations of the review committee, and grant the new plat approval immediately.

The City of Lacey has a Planned Residential Development (PRD) ordinance, giving developers considerable flexibility in the arrangement of dwelling units and open spaces within a development. Phillips utilized the PRD option both for the original plat and for the revised project design. This flexibility permitted him to offer

several different housing types on various sized lots, with a number of special site planning features adding to project interest while keeping costs down.

In its approval, the council considered 32 requests from Phillips for waivers in site planning, site design, and building construction options. Some of these were already acceptable under the PRD, some were approved for the demonstration, and some were disapproved. Chapter 3 discusses the various changes which were requested, and detailed cost benefits from the ones which were accepted and used are presented in Chapter 4.

The city council finally approved the project plat and variances in July 1983, and Phillips started land development in August. Although the city permits model home construction to start before final plat approval, Phillips waited until September to build the first four model homes.

With site development underway, another delay occurred. Although Phillips contacted the local electric power company, Puget Power, and Pacific Northwest Telephone for service once site development work started, their work took over four months to complete. Since both utilities use underground distribution on the site, their delays postponed all other site work. The final underground electrical and telephone installations were not completed until two days after the start of the fall seasonal rains.

This delay had a significant impact on the project schedule, since it meant that much of the street construction and building work could not be completed in time to permit good site access during the rainy period. The City of Lacey prohibits street paving during the rainy season due to problems of getting good

compaction in subgrade materials and poor pavement quality. However, when a short dry spell occurred during the rainy season, Phillips was able to obtain special permission from the city to complete street paving.

As a result of the project delays created by the power and telephone companies, the planned fall 1983 grand opening had to be postponed until the spring of 1984.

On August 9, 1984, The Park was officially dedicated with an on-site press conference. Speakers at the press conference included Governor John Spellman, Mayor Brown, and Gordon Walker, HUD's Deputy Under Secretary for Field Coordination.



Mayor Brown, HUD Deputy Under Secretary for Field Coordination Gordon Walker, John Phillips, Governor John Spellman

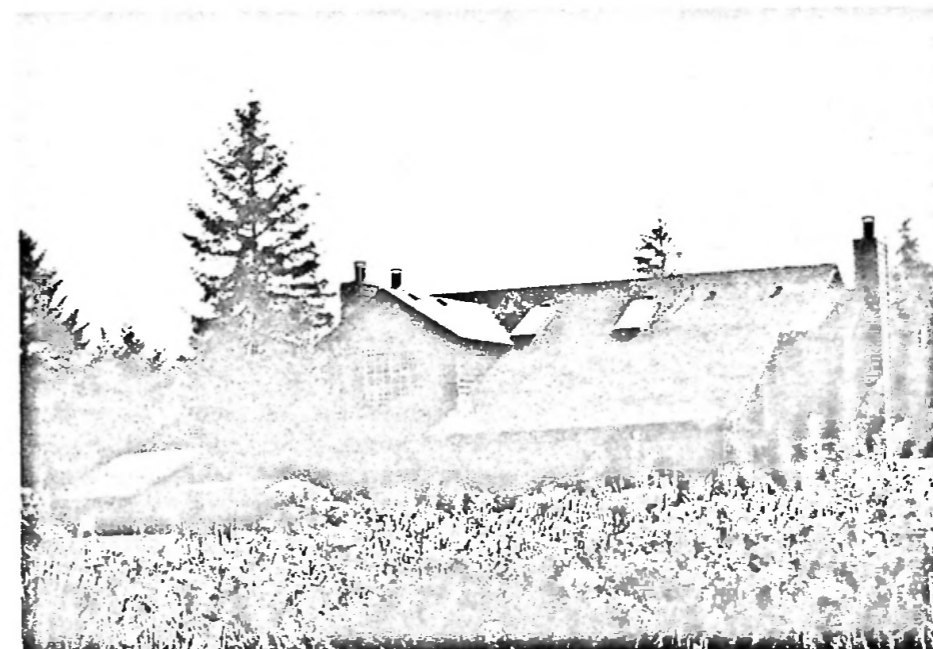
The dedication was covered by representatives of local newspapers, radio stations, and an independent television station. Among the attendees were HUD's ten Regional Administrators, who visited the project during a coordination meeting at HUD's Seattle Regional Office.

Marketing

Phillips marketed The Park through a realty company and with local newspaper advertising. Signs were placed in key locations to guide

prospective buyers to the subdivision. The clubhouse served as a sales center and furnished model homes representing each type of

unit were available for inspection. By October 1984, 33 units had been sold, primarily to the market audience discussed in Chapter 1.



The Loft homes in the natural park setting



Pool and clubhouse at The Park

Innovations and Their Impact on Costs

One purpose of the Affordable Housing Demonstration was to collect and evaluate cost data on residential development practices and construction techniques. The following analysis seeks to identify the impact of regulations, standards, and time delays to determine how these translate into extra costs for the home buyer.

Change List Approval Process

The City of Lacey was extremely cooperative and viewed the Affordable Housing Demonstration as an opportunity to review their own regulations and processing procedures with an eye toward streamlining city processing. Against this background of progressive attitudes from the mayor, city manager, planning director, and building director, The Park was developed as a test of regulatory reform.



Loft homes under construction

In April 1983, shortly after being designated as a demonstration site, Mr. Phillips submitted a request list to the city for changes in regulations and procedures that would result in cost-efficient development of The Park. The city manager formed a five member review

committee, which he chaired, to review all requested changes. The committee included Lacey's Planning Director, Jerry Herman, and Building Director, Al Hastings. The review committee submitted its recommendations to the city council.

"There is no one single way to save a lot of money. Rather, it is a combination of a lot of little things."—John Phillips

All items requested by Phillips for inclusion in the project were considered carefully and whenever revisions to existing codes or standards were denied, detailed explanations were presented to Phillips. Most requests, however, were accepted. Some were already acceptable under the Planned Residential Development (PRD) ordinance; others were accepted for the demonstration only based on documentation and logic presented by Phillips.

Administrative and Processing Changes

The normal Lacey subdivision processing procedures were not particularly excessive. Even so the Lacey City Manager developed a processing procedure that resulted in a two-month reduction in processing time as well as savings of \$34 per unit in interest and \$415 per unit in overhead, taxes, and materials and labor cost inflation.

Typically, the approval process requires a hearing by a hearing examiner and then a full city council hearing. This procedure normally takes a minimum of two months. For the demonstration, a five-member site review committee which met weekly was used. They sent recommendations

directly to the city council. Since the review committee recommended approval of The Park and most deviations from standards requested by Phillips after the first hearing, the council issued approval without delay.

"Most builders don't know the true cost of delay. Everyone assumes that it's only interest, but the true cost includes overhead, material and labor inflation, and the lost opportunity to make a profit."—John Phillips

Phillips points out that the City of Lacey was extremely cooperative in fast-tracking processing and allowing innovations but, because of utility delays, the project still was delayed for months. This was, according to Phillips, quite frustrating inasmuch as he was planning to have a grand opening in late summer of 1983. The delay caused him to postpone opening until early spring, 1984. This proves that, in some cases, a delay of several weeks can often result in an overall delay of a several months. Delays caused by the utilities resulted in increased interest not only on land but also on construction loans of houses under process. In addition, overhead, taxes, and material and labor inflation costs



Patio home under construction

were increased. Phillips estimated that these delays increased total costs by almost \$2,000 per unit.

Site Planning and Development Changes

Site planning and land development represent major areas of potential cost reduction for most builder/developers. These costs often increase in direct proportion to the complexity of local regulations, zoning requirements, and levels of required standards. Because the City of Lacey was cooperative, Phillips was able to cut the costs of developed land in The Park substantially.

"The most effective way to reduce costs is higher density. Adding more units reduces the cost of developed land per unit."—John Phillips

The Lacey PRD ordinance allows a mix of townhouses and detached units without specifying minimum lot sizes, which allowed Phillips latitude in land utilization. Savings were realized in every phase of land development -- streets and parking, sidewalks, sanitary sewers, storm water drainage, water service, and landscaping. Some savings resulted

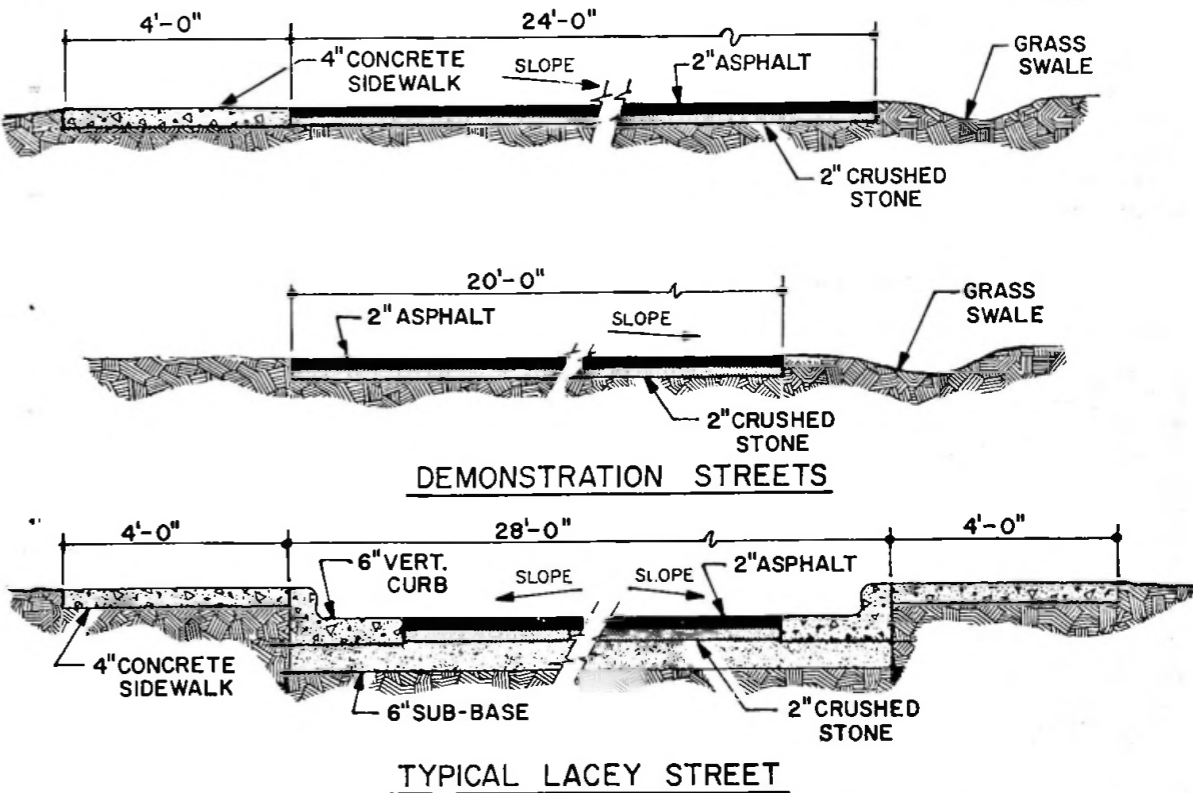
from regulatory variances and others from techniques and materials new to the Lacey/Olympia area.

The city approved, for The Park only, modification of the setback requirement from 20 feet from the right-of-way to 20 feet from street paving. The revised land plan included dead-ending of the loop street at its farthest point. The dead-end provided Phillips with a logical argument for reducing street widths based on anticipated reduced traffic flow. The dead-end also allowed use of T-turnarounds and parking at the ends of the streets. Instead of creating the cul-de-sacs that often are required on dead-end streets, Phillips used parking lots across the road from each other as

T-turnarounds to meet standards for fire engine access.

Phillips conducted soil-bearing tests throughout the site and convinced the city that the normal 6-inch thick sub-base under streets and parking areas was not required. As a result, all public and private streets and parking areas were constructed using 2 inches of crushed stone base and 2 inches of asphalt. Total street cost savings amounted to over \$61,000.

Phillips requested that all sidewalks be eliminated. The city, however, compromised by allowing no sidewalks on 22-foot wide streets and requiring sidewalks on only one side of 24-foot wide streets. This resulted in a savings of \$21,461.



In addition to reduced street widths, Phillips was allowed to reduce total paving widths in parking areas. Lacey normally requires curbs along the edges of all parking lots and concrete wheel stops 2 feet inside the curbs. For The Park, Phillips was allowed to place wheel stops near the edge of the paving and eliminate the curbs, reducing total paving widths. This resulted in a savings of 5,008 square feet of paving and crushed stone base as well as 4,936 lineal feet of extruded asphalt curb, reducing costs by \$38,000.

The city allowed surface drainage with swales on one side only and elimination of all curbs and gutters. The system was much more cost effective than a crowned street draining into swales on both sides or draining via curb and gutter. The swale system allows recharging of ground water by moving drainage slowly through the swale. During major storms, water is conveyed into a central catch basin and then into a detention basin. Drainage costs were reduced by almost \$110,000.



Sidewalk on one side only



Sloped street, grass swale drainage



Grass swale

When Phillips purchased the property, sanitary sewer mains already had been installed by the previous developer. Phillips, therefore, had to live with the basic main layout. Inasmuch as this layout did not correspond with the proposed land plan, Phillips requested that the city allow the sewer to leave the rights-of-way. The city agreed to accept all sewer lines that ran in reasonably accessible places as long as easements were provided. This allowed Phillips latitude in replatting the subdivision.

Phillips requested 6-inch diameter PVC branch sewer mains which would serve 15 to 25 dwellings. The city normally requires 8-inch sewer mains. In addition, cleanouts were requested at the end of the 6-inch lines instead of manholes. The city approved smaller and shallower manholes than normal at these locations. Conven-

tional cleanouts were not accepted, although Phillips pointed out to Lacey's planning director that the city did, indeed, have the proper equipment for cleanouts.

Curved sewer lines were used, allowing Phillips flexibility in serving more units with one lateral or branch feeder. By making minor curves in some lines, more dwellings were serviced by the same line. Phillips used the PVC pipe manufacturer's data for curving the pipe, and Lacey accepted the curved lines based upon the pipe manufacturer's recommendations.

Four-inch diameter PVC sanitary sewer laterals with 4-inch wyes to serve several detached and attached units were requested. While the city maintenance department argued that this would not work for permanent housing, and the building code official could not determine how more than one dwelling unit could be served by the same lateral if those units were owned by different people, the city manager suggested the technique be tested in the demonstration anyway.

The cost ramifications were significant because, with two, three, four, or more dwelling units running off one 6-inch branch main, V-ing or T-ing off with 4-inch laterals into the dwelling, only one trench for the 6-inch line was required. Laterals did not have to be installed on a unit-by-unit basis but rather could be placed by cluster or groups of units. Major trenches and laterals were reduced by about 75 percent over conventional use. Although this was a one-time only approval, Phillips believes that, with a good maintenance track record, the method will be approved for general use. Total sanitary sewer costs were reduced by almost \$61,000.

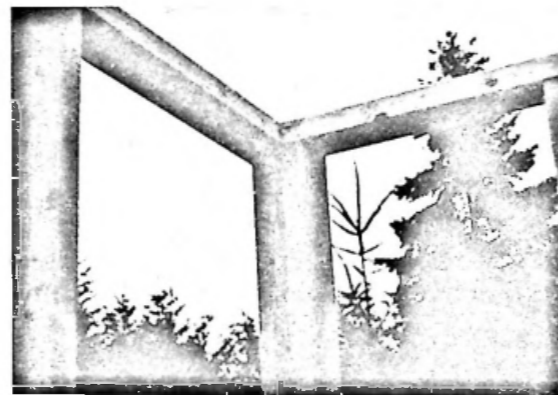
The City of Lacey requires a 10-foot separation between public water and public sewer, a state and local code provision. When a sewer lateral crosses a water main or vice-versa, a 3-foot vertical separation must be maintained. This occurred in The Park, but Phillips was unable to make the 3-foot vertical separation. Because of this, the city required a heavy gauge metal sleeve around the water pipe within 10 feet of the sewer. This apparently is a carryover requirement from the time of cast iron and concrete soil pipe, when joints often broke and leaked. However, with longer lengths of seamless PVC pipe available, the separation requirements and the need for a metal sleeve appear to be superfluous.

As was the case with sanitary sewers, most water mains were already in place when Phillips purchased the property. The city allowed water mains to leave the rights-of-way as long as easements were provided and the mains were in reasonably accessible locations.

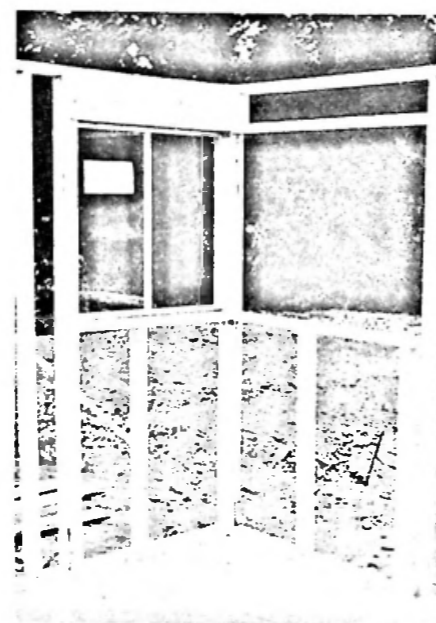
For water service, Phillips used an accepted technique of hooking one water line into two, three, or four water meters. This meant that one tap and one corporation stop were needed to serve as many as four dwellings. A typical tap on a water main costs about \$300 and a typical corporation stop costs about \$125. For the water meter itself, single service costs \$105, double service \$210, triple service \$315, and quadruple service \$420. By placing four meters on a single tap, cost per unit was reduced from \$530 to \$211, saving \$319 per dwelling. This technique would not have been practical had Phillips not grouped and clustered the units. Water service costs were reduced by over \$40,000.

Building Design and Construction

Phillips had been using Optimum Value Engineering (OVE) methods for several years prior to the demonstration. Few, if any other, builders in Thurston County were using OVE. The Park was the first project Phillips had built within the city limits of Lacey so he submitted the OVE methods as part of his request list. Most of the OVE techniques already were acceptable under the Lacey building code (which is the same as the Uniform Building Code (UBC)).



Two-stud corner



Corner with windows

The acceptable OVE methods included: 24-inch o.c. floor, wall, and roof framing; two-stud corners; elimination of cross-bridging in floors; elimination of partition posts where interior partitions abut exterior walls; and elimination of headers in non-loadbearing walls.

The only non-code-complying OVE feature was a single top plate, but Lacey approved it for in-line framing. Wall and partition framing costs were reduced by \$595 per unit when compared to conventional 16-inch o.c. methods used in the Lacey area.



Exterior wall framing

The typical foundation/floor system built in the Lacey area consists of a spread footing, a cast-in-place concrete perimeter foundation wall, a

post-and-beam center bearing girder, and 2x10 floor joists spaced 16 inches-on-center. (See Figure 1.)

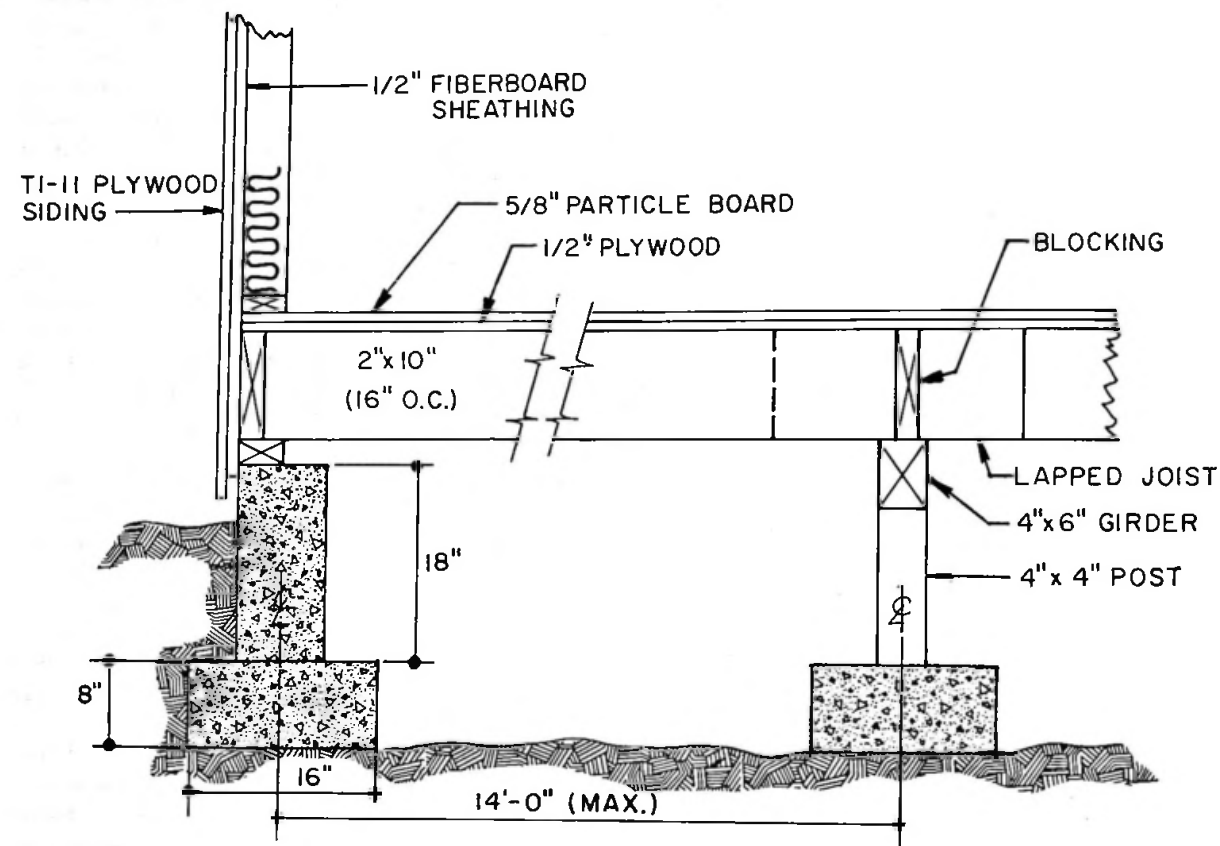


Figure 1. Conventional Post and Beam Crawl Space

Phillips submitted his proposed floor framing system to a professional structural engineer who worked out the most efficient layout. Using the engineer's documentation, Phillips had his floor framing system approved by the city building officials. The

floor system in the first three homes built used 2x6s, spaced 24 inches o.c., spanning about 8 feet between post and beam supports. The band or header joist was eliminated by using inset "pockets" in the foundation wall. (See Figure 2.)

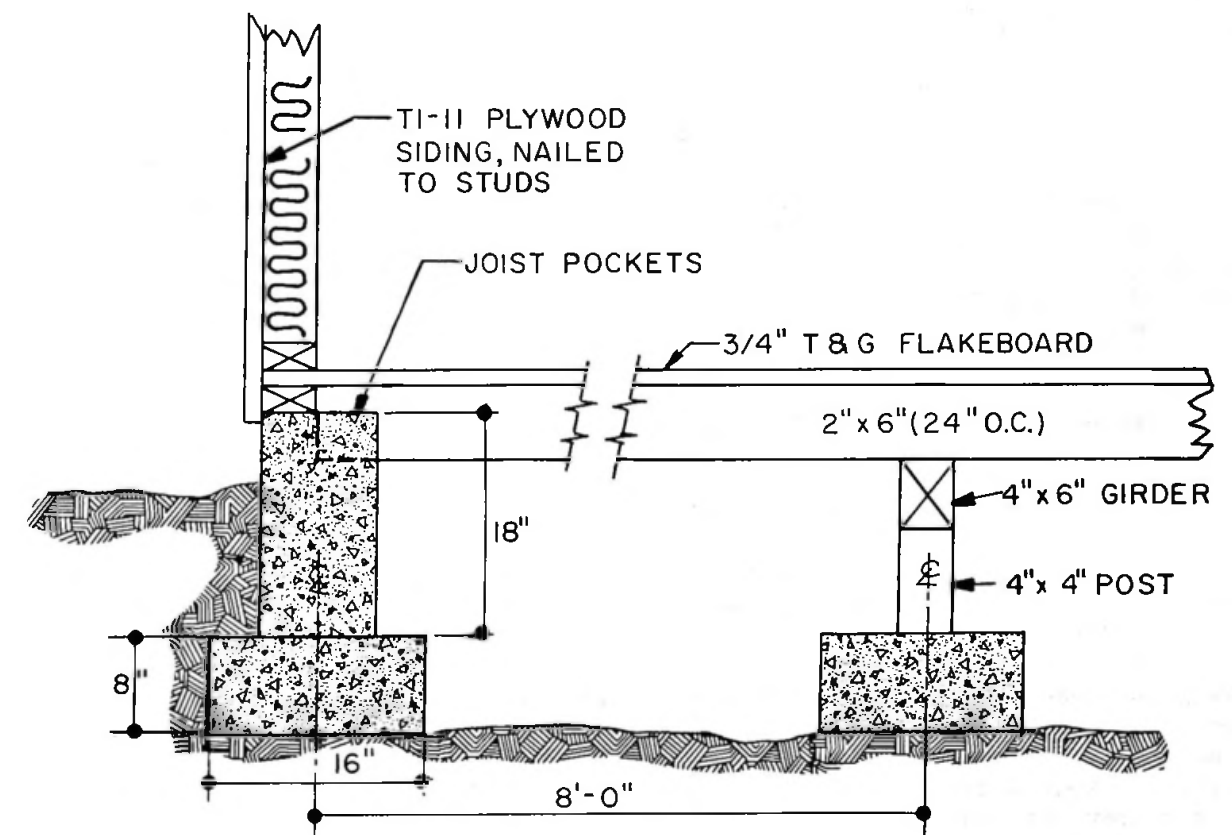


Figure 2. Alternate Post and Beam Crawl Space Used by Phillips on First Three Homes

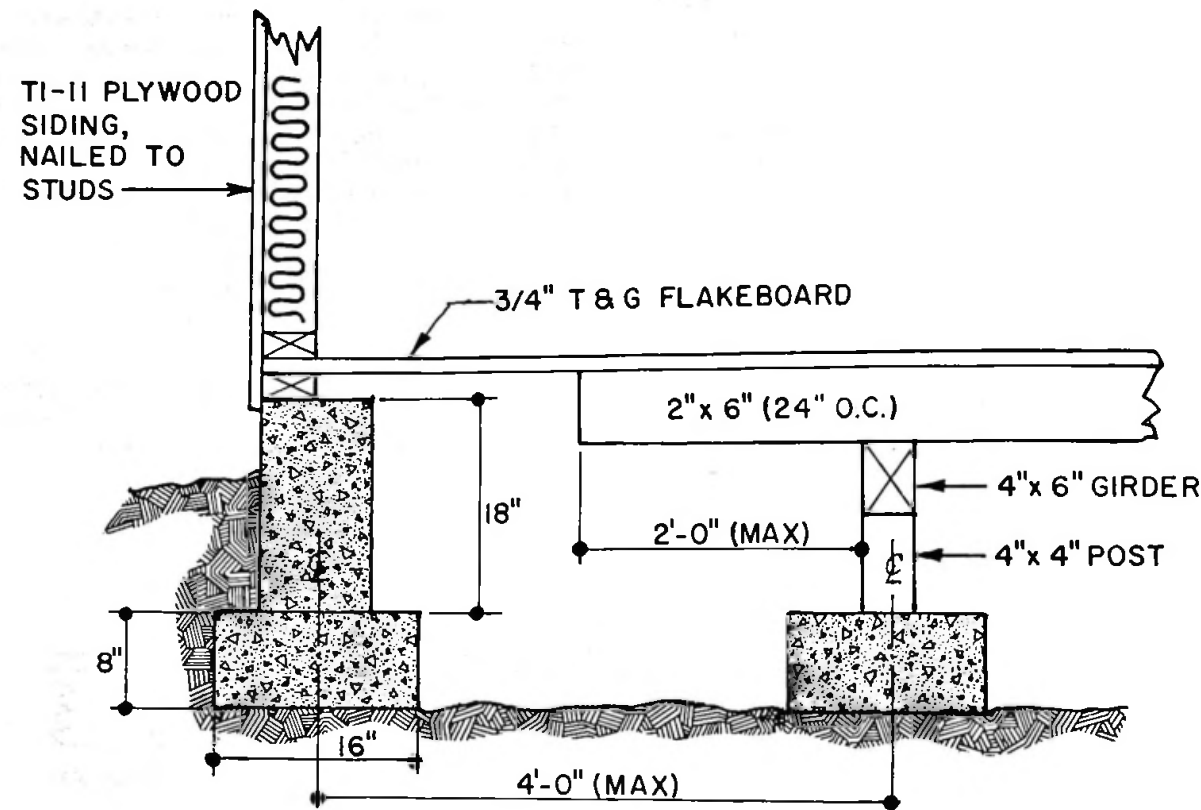
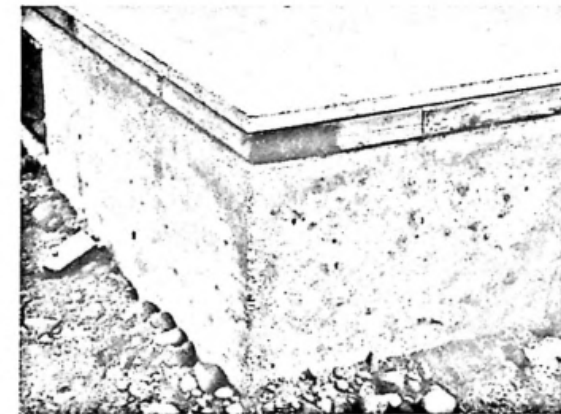


Figure 3. Redesigned Post and Beam Cantilevered Joists
Used by Phillips, Saving Approximately \$850 per Home

Phillips redesigned the floor framing system for the remainder of the demonstration project with the first interior support girder placed about 4 feet from the foundation wall. Floor joists were cantilevered about 2 feet toward the foundation wall without a band joist. The floor framing system did not come into contact with the perimeter foundation

at all. The 2-foot gaps at the end of the floor joists and the 2-foot spacing where the joists are parallel to the foundation were easily spanned with 3/4-inch tongue-and-groove underlayment-grade waferboard. (See Figure 3.) Floor construction costs were reduced by an average of \$852 per unit compared to the conventional 2x10 joist system.



Foundation and waferboard subfloor



Glued exterior wall plate



Townhouses

Exterior wall sheathing was eliminated because Phillips used sidings applied directly to the studs such as 5/8-inch reverse board and batten Tl-11 plywood siding. Although acceptable under most codes, few if any other builders in the LaCey area use this technique. In addition, 160 square feet of siding were eliminated because of Phillips' unique lowered floor system. Total wall sheathing and siding costs were reduced by \$332 per unit.

Because of the lowered floor framing system, one-step was eliminated from the concrete entrance stoop, saving \$20 per house.

The normal Lacey setback requirement is 20 feet from the rights-of-way to the structure. For the demonstration, Lacey allowed a 20-foot setback from the pavement, reducing driveway lengths by 10 feet on each of the 48 homes that have driveways. Total savings were \$6,432 for the entire subdivision or \$37 per unit for all 76 units.

The City of Lacey normally requires that fenced-in outdoor areas contain a minimum of 400 square feet. Phillips was allowed to reduce the outdoor area to 250 square feet for each of the small loft homes. In addition, the house or garage wall on zero-lot-line homes eliminated the need for a portion of fencing. Costs were reduced by an average of \$125 per unit.

Phillips developed his own scheduling and sequencing method for making sewer and water installation to the house more efficient. When the utility contractor installed mains and branches, laterals were run to the house. In typical practice, the sanitary sewer lateral is installed only to the property line so the plumber must trench from the house to the property line to make the connection, at a trenching cost of about \$300 per house.

Details of Changes and Their Costs

The Park dwellings are more energy efficient than normal because unnecessary framing with an R-value of about 2 is replaced with R-13 insulation. Uninsulated spaces, such as found with 3-stud corners and partition posts, are now insulated. Phillips estimates that, in a 1,000 square foot house, about 80 square feet of insulated wall space is gained by removing unnecessary studs, plates, cripples, headers, and corners.

Requested changes that were either denied or modified by the city included:

- o Reduction in street widths from 28 to 22 feet. The city allowed 22-foot widths on about one-half of the streets and 24-foot widths on the remainder. Had all streets been 22 feet wide, costs would have been reduced an additional \$9,000.
- o Elimination of all sidewalks. The city allowed elimination of sidewalks along 22-foot wide streets but required them on one side of 24-foot wide streets. If eliminated altogether, an addi-

tional savings of over \$19,000 would have occurred.

- o Use of cleanouts instead of manholes in sanitary sewers. The city compromised by allowing Phillips to install reduced size manholes. Had cleanouts been used instead, an additional savings of about \$1,200 would have been realized.
- o Elimination of metal sleeve where water mains cross over sewer mains or vice-versa. This request was denied by the city because of a statewide standard. If eliminated, costs would have been reduced by about \$5,000.

Total costs, therefore, could have been reduced by another \$34,200 or almost \$200 per unit had the entire change list request been accepted as presented. However, the City of Lacey is to be very strongly commended. Because of the changes they did allow and because of the innovative land plan and building techniques used by Phillips, total costs were reduced by \$7,396 per unit.

COMPARISON COSTS

In this chapter, costs of each change in Lacey's standards and Phillips Homes' typical practice are discussed and compared. Innovative techniques used by Phillips but not usually by other builders in the area are included in the comparison. The objective of the analysis is to show how much costs were reduced by comparing The Park as built to existing standards and typical Lacey practices.

ADMINISTRATIVE AND PROCESSING CHANGES

The usual Lacey processing procedure involves a hearing examiner hearing, followed by a full council hearing. For the demonstration, the city allowed Phillips to use a five-member site review committee which met weekly and sent its recommendations directly to the city council. This procedure saved Phillips at least two month's processing time. Loan interest on the land was approximately \$3,000 per month so a two-month processing time reduction resulted in a savings of \$6,000 or \$34 per unit.

Phillips estimates his total indirect costs averaged about 30 percent of the final sales price of his homes.

He also estimates that about one-half of those indirect costs continue whether or not construction is progressing on schedule. These costs include administrative overhead such as maintenance of a business office and office staff, company vehicles and equipment, general advertising, taxes, land planner and architect fees, preparation of submissions to the city, professional association dues, etc. In addition, certain construction overhead costs such as a field office and field superintendent's salary must be paid as construction start-up nears. Assuming that an average of 50 homes per year are built and sold at an average sales price of \$50,000, then constant overhead costs would be about \$32,000 per month. A two-month reduction in processing time would result in a total savings of \$64,000 or about \$365 per unit.

Over the course of a construction project, material and subcontractor costs normally increase at roughly the rate of general inflation. Phillips estimates that these cost increases would average about \$25 per month per unit. Therefore, a two-month reduction in processing would have the effect of reducing labor and material inflation costs by \$50 per unit or about \$9,000 for the project.

Reduction in Administrative and Processing Costs

	<u>Total</u>	<u>Cost Savings</u> <u>Per Unit</u>
Interest on land	\$ 6,000	\$ 34
Administrative overhead (office, staff, vehicles, equipment, field office, taxes, fees, dues, etc.)	64,000	365
Labor and material inflation	9,000	50
TOTALS	\$79,000	\$449

NOTE: The two-month time reduction because of city of Lacey cooperation would have resulted in the savings shown above. Actually, utility company delays as discussed in Chapter 3 resulted in a net project delay of about 6 months, increasing costs by about \$2,000 per unit.

SITE PLANNING AND DEVELOPMENT CHANGES

This section compares land development costs of The Park with the same project if built according to existing standards and practices.

Some 23 building lots were added because of these changes. Therefore, cost savings per unit are based on the original 153 units compared to the new 176-unit plan. Detailed analyses of each development phase follow this summary within this section.

Land Development Summary

	<u>Demonstration</u>	<u>Comparison</u>	<u>Total</u> <u>Savings</u>	<u>Savings</u> <u>Per Unit***</u>
Land	\$ 350,000	\$ 350,000	\$ -0-	\$ 299 (1)
Existing sewer and water mains	299,200	299,200	-0-	257 (1)
Streets and parking	126,498	225,561	99,063	755
Sidewalks	19,697	41,158	21,461	157
Sanitary sewer	54,758	115,680	60,922	445
Storm water drainage	56,344	166,315	109,971	767
Water service	70,951	110,998	40,047	322
Landscaping and amenities	95,000	95,000	-0-	81 (1)
TOTAL	\$1,072,448	\$1,403,912	\$331,464	\$ 3,083
Cost Per Unit	\$ 6,093*	\$ 9,176**	\$ 3,083	

*176 units

**153 units

***Reflects both infrastructure changes and density increase

(1) These line items represent fixed total costs but because of the density increase from 153 to 176 units, costs per unit were decreased.

Streets and Parking

If Phillips had built streets and parking areas in The Park according to existing Lacey standards and practices, total paving costs would almost have doubled. Arterial road improvements would have remained unchanged. Within The Park, street

widths were reduced to 22 and 24 feet from the standard 28 feet. Parking areas were reduced from 64 to 60 feet wide. Extruded asphalt curbs around all parking lots were eliminated. The major cost saving, however, was elimination of 6 inches of sub-base under all paving. Cost savings were as follows:

Street and Parking Cost Comparison			
	Demonstration	Comparison	Savings
Grading for streets	\$ 25,000	\$ 32,000	\$ 7,000
Arterial road improvements	13,150	13,150	-0-
Paving			
Equipment rental	1,900	2,150	250
6" sub-base	-0-	74,820	74,820
2" crushed rock base	18,172	20,835	2,663
2" asphalt	64,804	74,198	9,394
Wheel stops	3,472	3,472	-0-
Extruded asphalt curb	-0-	4,936	4,936
TOTAL	\$126,498	\$225,561	\$99,063
Cost Per Unit	\$ 719*	\$ 1,474**	\$ 755
*176 units			
**153 units			
NOTE: Sales tax of 7.8% does not apply to streets			

Sidewalks

Lacey normally requires sidewalks on both sides of all public streets. For the demonstration the city

allowed sidewalks on one side only and their elimination altogether along the 22-foot wide portion of the streets. Cost savings were as follows:

Sidewalk Cost Comparison			
	Demonstration	Comparison	Savings
5 foot wide concrete	\$18,272	\$38,180	\$19,908
Sales tax (7.8%)	1,425	2,978	1,553
TOTAL	\$19,697	\$41,158	\$21,461
Cost Per Unit	\$ 112*	\$ 269**	\$ 157
*176 units			
**153 units			

Sanitary Sewer

Phillips realized a savings of \$445 per unit in construction savings of sanitary sewer because of several major changes allowed by the City of Lacey. These changes included:

- o Reduction in sewer main and branch mains from 8-inch to 6-inch diameter PVC pipe,
- o Grouping 4-inch PVC laterals and tapping into single 6-inch branch mains,
- o Replacing standard manholes with reduced-depth manholes,
- o Reduction of sewer taps into the existing 8-inch main by grouping units into single 6-inch branch main,
- o Reduction of trenching and pipe bedding because of branch mains,
- o Curving 6-inch branch mains to provide more units on each branch.

Sanitary Sewer Cost Comparison

	Demonstration	Comparison	Savings
Trenching	\$ 5,345	\$ 12,210	\$ 6,865
Piping			
8" PVC main	-0-	18,243	
6" PVC main	3,777	-0-	
6" PVC branch	12,104	-0-	
4" PVC lateral	5,447	31,194	
4" PVC bends	854	-0-	
6" PVC bends	47	-0-	
6" PVC tees	992	-0-	
SUBTOTAL	23,221	49,437	26,216
Manholes/cleanouts			
Standard manholes	1,050	9,450	
Reduced manholes	3,800	-0-	
Cleanouts	900	-0-	
Extensions	300	300	
Adjustments	1,400	1,400	
Connections	2,700	2,700	
SUBTOTAL	10,150	13,850	3,700
Service taps	3,520	16,550	13,030
Pipe bedding	8,560	15,263	6,703
Sales tax (7.8%)	3,962	8,370	4,408
TOTAL	\$54,758	\$115,680	\$60,922
Cost Per Unit	\$ 311*	\$ 756**	\$ 445

*176 units

**153 units

Storm Water Drainage

The storm water drainage system devised by Phillips for The Park was the most cost-effective phase of land development. Typically in Lacey, streets are crowned to direct storm water to curbs and gutters and then to catch basins every 250 feet, discharging into underground concrete pipe. Manholes also are required

every 250 feet. In The Park, streets were sloped to one side where grass swales carried water to one catch basin. The catch basin was then drained into a retention area created by an abandoned gravel pit. A small portion of The Park was drained into an existing ditch running alongside the property. Cost savings for storm water drainage are shown below.

Storm Water Drainage Cost Comparison			
	Demonstration	Comparison	Savings
Grading	\$40,000	\$ 40,000	\$ -0-
Type I catch basin	475	5,700	5,225
Pipe and tubing			
- 18" Concrete culvert	2,989	4,788	
- 15" Concrete culvert	740	39,818	
- 12" Concrete culvert	3,266	5,221	
- Drainage tubing	3,477	-0-	
SUBTOTAL	10,472	49,827	39,355
Manholes	-0-	12,600	12,600
6" Vertical curb and gutter	-0-	39,816	39,816
6' Valley gutters	-0-	2,736	2,736
Rip rap	1,320	2,640	1,320
Sales tax (7.8%)	4,077	12,996	8,919
TOTAL	\$56,344	\$166,315	\$109,971
Cost Per Unit	\$ 320*	\$ 1,087**	\$ 767
*176 units			
**153 units			

Water Service

Had water service in The Park been installed according to existing Lacey standards and conventional practice, total costs would have been about \$40,000 higher. The major difference

between the demonstration site and conventional construction was the grouping of water service, creating 70 fewer taps into the existing main and over 3800 feet less of trench. Following is a cost analysis of water service.

Water Service Cost Comparison			
	Demonstration	Comparison	Savings
Trenching	\$ 2,452	\$ 7,157	\$ 4,705
Water service			
- 2" PVC	1,931	299	
- 1-1/2" PVC	654	7,574	
- 1" PVC	625	-0-	
- Meters	18,480	16,065	
- Misc. fittings	450	900	
SUBTOTAL	22,140	24,838	2,698
2" tap into 8" main	3,150	3,150	-0-
Disconnect and plug existing 2" service	400	400	-0-
Relocate and adjust existing air release valve	400	400	-0-
Relocate and adjust existing hydrant	2,000	2,000	-0-
Miscellaneous fitting	450	900	450
Tap into main	24,900	45,900	21,000
Corporation stop	10,375	19,125	8,750
Sales tax (7.8%)	5,134	8,028	2,894
TOTAL	\$70,951	\$110,998	\$40,047
Cost Per Unit	\$ 403*	\$ 725**	\$ 322
*176 units			
**153 units			

BUILDING DESIGN AND CONSTRUCTION CHANGES

This section looks at the cost-saving techniques used in direct construction of the dwelling units. As mentioned in Chapter 3, there was a mix of house types, with the smallest loft home containing 648 square feet and the largest town-

house containing 1,287 square feet. Because of this variety, costs in this section are averaged over all units.

The following table breaks down cost savings for individual areas of the average home in The Park. Details are discussed in Chapter 3.

Construction Cost Saving Summary

Demonstration	Comparison	Cost Savings	
		Total	Per Unit
Reduced driveway length on 48 lots due to reduced R.O.W.	10' longer driveway because of standard R.O.W.	\$ 6,432	\$ 37
Innovative floor framing system (See Figure 3, Chapter 3)	Standard floor framing (See Figure 1, Chapter 3)	101,024	574
Floor sheathing - 3/4" T&G flake-board, single layer	1/2" CDX plywood sheathing, 5/8" particleboard underlayment	48,928	278
Exterior wall framing - OVE construction 24" o.c.	Conventional 16" o.c. construction	51,392	292
No exterior wall sheathing, siding applied to studs - 160 SF siding saved due to lowered floor system	1/2" insulation board exterior wall sheathing	58,432	332
Interior partition framing - OVE construction, 24" o.c.	Conventional 16" o.c. construction	53,328	303
One step concrete stoop because of lowered floor	Typical two step concrete stoop	3,520	20

Demonstration	Comparison	Cost Savings	
		Total	Per Unit
Fencing reduction due to house wall on zero-lot-line and 250 SF loft home patio	No zero-lot-line and 400 SF lot home patio	22,000	125
Plumbing trenching done when utilities installed	Plumbing trenching done when homes are built	52,800	300
TOTAL		\$397,856	\$2,261

INDIRECT COSTS

Many builders apply a percentage factor to all direct construction costs to obtain indirect costs and profit. Phillips is no exception. His list of indirect costs included construction overhead, warranty reserve, loan interest, mortgage discount points, closing costs, sales commissions, advertising, adminis-

trative overhead, and profit. Historically, these costs have amounted to about 30 percent of direct costs. Therefore, for each dollar savings in direct costs, a corresponding savings of \$0.30 is realized in indirect costs. Since total direct cost savings amounted to \$5,344 per unit, indirect cost savings were estimated to be \$1,603.

COST REDUCTION SUMMARY

Following is a summary of cost savings realized in The Park because

of reduced governmental regulations and builder/developer changes to typical practice in the City of Lacey.

	<u>Cost Savings Per Unit</u>
Administrative and processing	\$ 449
Land development	3,083
Direct construction	2,261
Indirect costs	1,603
TOTAL	\$7,396

U.S. Department of Housing and Urban Development
Washington, D.C. 20410

Official Business
Penalty for Private Use, \$300

Postage and Fees Paid
Department of Housing
and Urban Development
HUD - 401



January 1985
HUD-PDR-940