Feasibility Study
Affordable Housing Development
Using GrowthPoint Shipping Containers

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Figure 1. GrowthPoint Structures State of the Art classroom from repurposed shipping containers.

EXECUTIVE SUMMARY

The Los Angeles Council of the Society of St. Vincent de Paul commissioned this report to analyze the feasibility of using shipping containers for construction of multifamily affordable housing—specifically the adaptability for building projects for permanent supportive housing. We analyze the process and product developed by the local firm, GrowthPoint Structures, to evaluate its methods and the financial and operational advantages its product may offer.

The report describes the advantages of shipping containers repurposed for commercial, industrial, institutional and single family construction, a construction trend which is growing worldwide. These advantages include building efficiency and time savings, increased seismic and fire safety, and the environmental benefits of structures built mostly from strong and enduring recycled products.

We examine the GrowthPoint Structures product, which until now has been used for school facilities and commercial projects. The structural elements of the GrowthPoint design have been developed according to strict engineering standards governing schools, established at the State level. These approved designs are adaptable for multifamily residential construction.

The GrowthPoint building is highly feasible based on cost and project streamlining: a school project completed recently in Ventura County was built and installed in three months, at considerably less expense than a standard site-built project. The GrowthPoint building will pay off in the long run, too: windows systems, advanced insulation, cool roofs, and advanced heating/cooling units will provide cost savings due to reduced reliance on external energy sources for cooling, lighting and heating. The building has already won awards for environmental sustainability, and is expected to be graded "LEED Platinum" (an internationally recognized standard for sustainability).

To determine the economic feasibility of the GrowthPoint product, we compared the cost of development and ongoing operation of a GrowthPoint container-based project to a similar project built on site of wood frame construction. We estimated construction cost per square foot, with "Alternative 1"—a "simple wood-frame" building—coming in at $126 per square foot, compared to $139 per square foot for the GrowthPoint design. This advantage is reversed to GrowthPoint's favor, however, if the wood-frame design is upgraded to meet the energy-saving standards for LEED certification—LEED Gold (Alternative 2, $145 per square foot) and LEED Platinum (Alternative 3, $151 per square foot). The GrowthPoint cost does not change, since the design already features the energy-saving elements without additional investment.

Other factors favor the GrowthPoint product: we project energy costs in GrowthPoint's operating budget, and estimate a first-year savings of $9,000. These savings compound over time, and they may be conserved to insulate the project from inflation or energy shocks, or they may be used to pay off private debt.

We look at the benefits of lowered operating costs and sustainability bonuses in the marketplace of affordable housing finance. The investment in sustainable design may carry a premium with investors, State and Federal finance agencies,

and private lenders. GrowthPoint's innovative technology may open the door to new sources of finance, and increase the funds available for construction.

In addition to describing the GrowthPoint technology and its use in commercial and institutional projects, we also surveyed comparable modular and shipping container projects to identify "best practices" in adapting this established construction process to multifamily housing. We provide case studies of several projects, with lessons learned from each.

Finally, we contacted a number of persons in the Ventura County community to measure interest and support for a shipping container projects. The County recently saw the installation of an award-winning school construction project that was completed by GrowthPoint at low cost, in record time, and there is excitement about use of this technology to address the community's pressing housing needs.

INTRODUCTION

As part of its mission to serve the homeless and to secure their stability, health and wellbeing, the Los Angeles Council of the Society of St. Vincent de Paul has rehabilitated and constructed several projects to provide transitional and permanent housing. This study was commissioned by the Society of St. Vincent de Paul to determine the feasibility of developing additional affordable housing using shipping containers, specifically those designed and fabricated by the local firm of GrowthPoint Structures. The Society's experience working with homeless individuals and families with very low income in Los Angeles, Ventura and Santa Barbara Counties reflects the need for more affordable housing, especially permanent supportive housing designed for persons with mental and/or physical disabilities.

In this report, we will examine the potential to use GrowthPoint Structure's container product to build superior multifamily residential buildings. GrowthPoint has designed its product to meet the needs of commercial and institutional developers, establishing high standards of construction and energy efficiency; it has processed engineering plans at the State level, which facilitates plan check and inspection. GrowthPoint's modular units are produced in its own factory, an efficient process which leads to savings. If it is feasible to build affordable housing using GrowthPoint's product, we can develop better projects: efficiently designed, faster built, greener, with reasonable development costs and lower operating costs.

To determine the feasibility of the construction method, we have estimated the cost of developing a project with GrowthPoint containers, comparing this to the cost of a comparable site-built wood frame structure. In addition to evaluating the direct cost of construction, we have looked at other cost/benefit factors: reduced development costs due to GrowthPoint's streamlined and shorter construction process, and the long-term savings in the operating budget due to

energy savings. We also have evaluated how the innovative energy-saving design might increase opportunities to finance such a project.

We have interviewed a number of professionals from the US and Canada with experience in shipping container construction and modular housing—architects, contractors, developers and building officials—to study how these techniques have been the basis of groundbreaking residential projects.

Since the opening of GrowthPoint's Oak Park School District project in Thousand Oaks, community members, advocates, and newspaper editorials have touted shipping containers as a way to meet affordable housing needs. As part of this study, we have engaged local community leaders, homeless and housing advocates, professional designers, and City and County officials to measure support for adopting GrowthPoint's model to specifically address Ventura County's critical housing needs. Because no multi-family housing project has been built in California using shipping technology, actual implementation of this goal will require a consistent effort in developing a project: identifying an appropriate site, site due diligence, community outreach, development of design concepts, obtaining financing from a variety of sources, and constructing the project.

Figure 2. Shipping container lifted by crane

THE TECHNOLOGY: ADAPTIVE REUSE OF SHIPPING CONTAINERS

Shipping containers originally were developed for trade, to carry large amounts of goods across oceans and great distances with modular efficiency. Taking advantage of steel technology called Cor-Ten, today's shipping containers are designed to be uniform, reusable, naturally weather- and corrosion-resistant, and virtually indestructible. Currently, shipping containers are increasingly used as the central structural elements of construction for commercial, institutional and single family home projects throughout the US and the world, and they have been used to build notable school projects in Ventura and Orange Counties. The strength and versatility of the containers has many advantages: the speed of planning and construction, the structural integrity of the finished building, and the potential for significant cost savings. In addition, repurposing shipping containers furthers important goals of sustainable development, since the materials are not sent to landfill and reuse does not require new energy and materials for production. To date, there are few examples of container use in multi-family residential projects or affordable housing developments, but the potential is significant.

Figure 3. Oak Park High School site with GrowthPoint container readied by crane operator to place on foundation.

Recycling and Reuse of Surplus Shipping Containers

Millions of shipping containers arrive in the US every year, with hundreds of thousands unloaded in the Ports of Los Angeles and Long Beach. Due to weak export of US goods, these containers return virtually empty, or are decommissioned due to the cost of shipping them back. Some of these are "one-way" containers, which have made only one trip. Others have been reused many times, for up to ten years. The average purchase price for a used "one-way" container is $4,200-$5,000. For a container which is retired after 10 years, the average price is $2,000.

Alternative uses for surplus containers:

- Containers are sold for reuse for storage or other purposes.
- Containers are stored in bulk.
- Containers may be recycled, but melting down Cor-Ten steel is an energy-intensive, expensive process, so this is not an economical alternative.
- Containers are adaptable for reuse in construction, creating structures which exceed 80% recycled content.

Figure 4. Rustic family home built from shipping container

Characteristics of Shipping Containers; Suitability for Reuse

Size and capacity: Standard-size containers are eight feet wide, with two standard lengths, 20-feet and 40-feet. Standard units measure eight feet high, or a "high cube" unit of 9 ½ feet. Each 40-foot container weighs approximately 8,300 pounds, and can hold up to 58,000 pounds. Full containers may be stacked up to nine high.

Design Elements and Impact on Community: Shipping containers may be seen as inflexible units for design, however they may be combined to create gracious and livable spaces, accommodating apartments from studios to several bedrooms. Designers who have built homes from repurposed containers have generally opted for a homey, warm "feel" in the interior of the unit. In designing the exterior, some projects have presented a unique, high-tech image to the street and community, while others have opted for a design very much like a standard wood-frame project. Some, like the Oneesan project in Vancouver, discussed later in a case study, show off the industrial origin of the building, but decorate the façade with imagery that is consistent with local culture.

Repurposed shipping container projects must comply with planning regulations, just as projects built using standard techniques. Due to their standardized dimensions, they would not typically violate planning regulations related to side yards, height, or other restrictions.

Structural Integrity and Life Safety: Container units are designed to be impervious to water and to carry extremely heavy loads. Incorporated as the frame of a building, the structure is estimated to exceed California earthquake standards by 106%. In addition, the structure of the container-based building is steel, highly fire resistant compared to standard wood-frame construction.

Construction: The development of Cor-Ten steel, also known as "weathering steel", was the basis for invention of the shipping container over 50 years ago. Cor-Ten is rigid, durable, and weather and corrosion resistant. Manufacturers designed containers which would protect shipped goods and minimize labor in

loading and unloading goods. The container is a steel shell, generally with a wooden floor. Units are meticulously inspected for conformity and structural integrity at the point of manufacture. Usage and cargo are tracked and recorded for the life of the container. When sealed, the units are waterproof and they even float.

- While Cor-Ten steel develops an oxidized patina which protects it from corrosive rust, care must be taken in insulating the walls in order to prevent condensation which could impair the steel's resistance. Another effective option for rust-proofing is paint.
- Shipping Containers marketed for re-use in construction generally have been used for shipping dry goods. Inspection of shipping records and testing for contaminants is required prior to purchase, and the wood flooring is encapsulated or stripped and recycled to prepare the container for reuse.

Fabrication in factory or onsite construction: Shipping containers can be outfitted in a factory, with benefits of standardization, less reliance on fair weather, and more regularized inspection. Alternatively, construction can be completed at the building site.

Manufactured Housing: Residences constructed from shipping containers are considered manufactured housing. Plan check and building inspections may be completed by State or Federal agencies, according to their building standards. Once details of standardized drawings are approved, the stamped plans can expedite later approval processes and provide overall time savings.

Figure 5. GrowthPoint prefabricated container arriving at construction site.

Planning Considerations—Flexibility in Location

Shipping containers are used worldwide to build a variety of projects: hotels, dormitories, high-end residences, and permanent or temporary commercial facilities. While the containers are highly standardized design elements, they may be assembled to create a variety of unit types, from studios to multiple-bedroom units. These units have many advantages for rental housing, and may be specially designed to serve the needs of low income residents, and residents with disabilities.

Emergency Housing Shipping container technology would be extremely useful in building emergency housing. GrowthPoint's product is the fastest high-quality construction available. In cases where families are at risk of homelessness, the GrowthPoint home could be a life-saver.

Infill Housing Due to the rigid structure of the 8' by 40' containers, they may be easily adapted to fit in irregular or narrow lots which would not otherwise have economic use—the Atira Oneesan project described later in a case study is an example of a project built on a 25-foot wide brownfield site in Vancouver.

Single Family Housing Repurposed shipping containers are used worldwide as the structure for single family homes. These range from improvised DIY projects to "cost is no object" architect-designed homes.

Medium-Scale Affordable Housing Typically, affordable housing developers develop a range of building sizes they are able to develop and manage economically. Operating large buildings bring economies of scale, and, frankly, serve the needs of more people. These factors are counterbalanced by the need to minimize impacts on the community, and the need to foster community within the project. For many nonprofit developers, 25 to 30 units is an ideal size for a mid-sized project, one that can employ a full-time manager and support staff.

Later in this report, we provide an estimate for the construction of a 30-unit project based on GrowthPoint's shipping containers. The technology which GrowthPoint has perfected is well-suited for a two-story building, and this would be an excellent trial project for the development and refinement of residential shipping container construction.

High-density, Mixed-use Projects Shipping container construction can be the central part of a high-density residential or mixed-use project. New momentum and financial resources dedicated to transit oriented development will open up opportunities for joint ventures in new mixed use projects. These master-planned communities will likely have an urban feel where a shipping container building would be a welcome distinctive element, and would provide a variety of community resources which residents sorely need.

Figure 6. Twenty-one Growthpoint prefabricated containers were trucked in and placed on foundation at Oak Park High School site in one day.

GROWTHPOINT STRUCTURES

After six years of research and development and millions of dollars spent, GrowthPoint Structures started in 2009 to provide shipping container technology for building schools, residential buildings and homes, commercial facilities and other projects. Headquartered in Los Angeles, its facility includes offices, model units, and a factory which can process 26 units simultaneously. Initially, GrowthPoint prepared designs to submit to California's Division of the State Architect (DSA) in response to an exploding market for school construction. Each building element—floors, ceilings, walls, windows, doors, insulation, cool roof, electrical and HVAC, conduits, waterproofing, fasteners and welds to join the modules, connections to the foundation—was designed and engineered, planned and approved at the State level by the DSA.

Sustainability Features In the world of community development and affordable housing, sustainability is measured by energy efficiency standards, LEED or (in California) GreenPoint rating. LEED stands for Leadership in Energy and Environmental Design, established by the US Green Building Council. The GrowthPoint design prioritizes energy efficiency and sustainability, including solar readiness, extensive insulation, recycled content, and efficient lighting and

building systems which reduce reliance on outside energy sources. A large portion of the completed building is a recycled steel container, so the end product is a natural candidate for high LEED rating. During container construction, many other sustainability measures are implemented. For instance, removed flooring and building parts are recycled to limit impact on landfills.

A number of features of GrowthPoint's LEED rating are due to the shipping container construction: insulation required to inhibit condensation and rusting, naturally strong structure to support rooftop solar, recycled content, etc. However, other features like split-system ductless HVAC are components that GrowthPoint has specified as part of its program which emphasizes sustainability and energy sufficiency. GrowthPoint has demonstrated that its product is "LEED Platinum Attainable", meaning that it meets the highest standards related to building construction and energy efficiency.

Figure 7. Students of Oak Park High School and new GrowthPoint Classrooms.

Work Example, Oak Park School District, Thousand Oaks, CA

The advantages of GrowthPoint's design are evident in the recently completed public project where GrowthPoint built seven schoolrooms in record time. The school district needed to replace temporary classrooms and wanted to provide a more useful environment than the typical modular structure. They also were

committed to sustainable design by completing a project which would maximize solar energy and other conservation measures. The Oak Park School District project was recognized with a Green Award from the Central Coast chapter of the US Green Building Council.

Beginning the contract in April, 2014, the general contractor for the Oak Park School District project prepared the site—including grading, excavation, installation of utilities and foundation—while GrowthPoint prepared and adapted the 21 container modules at its factory. Installation of the units began in July, 2014, a three-week process. The units were ready for the start of school in the fourth week of August, 2014. According to Tony Knight, the Oak Park School District Superintendent, the $2 million project cost significantly less than conventional construction, and was completed in a fraction of the time. The 30- to 50-year life of the GrowthPoint shipping container structure will significantly exceed a typical temporary structure, which would have an expected life of only fifteen years.

Figure 8. Twenty-one containers were used for construction at Oak Park.

GrowthPoint's summary of its Oak Park buildings' benefits:

- *106 times stronger than building code requirements and designed to withstand earthquakes, hurricanes and tornados in the harshest environments.*
- *Cool roof technology which reduces heat absorption by over 90%, reducing air conditioning electricity bills by 20%.*
- *Ductless HVAC system requires 50% less energy consumption compared to standard systems and maintenance costs are significantly reduced.*
- *Lighting system saves 33% energy costs over standard lighting.*
- *85% of all components are reclaimed/recycled materials reducing landfill impact by 22-tons per classroom.*
- *50% faster construction than site-built and 25% faster than standard modular construction.*

- *Unique education tool - each container has a permanent tag of what countries it has visited in its travels and this tag can be incorporated in the learning program for students.*
- *Thermostats in the classrooms use infrared sensors to monitor body heat and determine cooling levels.*

The schoolrooms are bright and airy. The design features a wall of windows with operable transoms, double-pane low-E glass—this allows classes to be conducted using abundant natural light. Each classroom is made from three containers, a total of 960 square feet. A cool roof (polymer membrane) extends to provide shade. Sensors trigger the heating and cooling system, based on the body temperatures of the occupants. The thick insulation which is essential to the container reuse design makes the spaces extremely efficient to heat and cool—it also provides excellent sound insulation. The roof is ready for installation of solar collectors, which are installed by a separate contractor. The Oak Park School District estimates that energy use will exceed "net zero", generating more energy than the project consumes.

For the Oak Park School District, GrowthPoint used "one-way" containers that were decommissioned after only one transoceanic trip. These containers are graded and evaluated before purchase—historic bills of lading are examined to ensure that no hazardous materials have been transported, and that there have been no accidents. The units are inspected for structural flaws, contamination, or other issues. Where panels on the units are removed or altered, the frame is reinforced to maintain structural integrity. Fasteners are welded or bolted to ready the containers for installation. For the school project each stage of the fabrication process was monitored by an inspector from the Division of the State Architect.

Representatives of the general contractor and the school district noted that the uniformity of the units and finish contributed to the speed of the installation process, which was completed in three weeks. Units were carted to the site on

standard width trucks, lifted by crane, and installed on the foundation prepared by the general contractor. The units were welded together, three containers were used to create each classroom. Utilities were connected, and the final fixtures installed. There were no change orders.

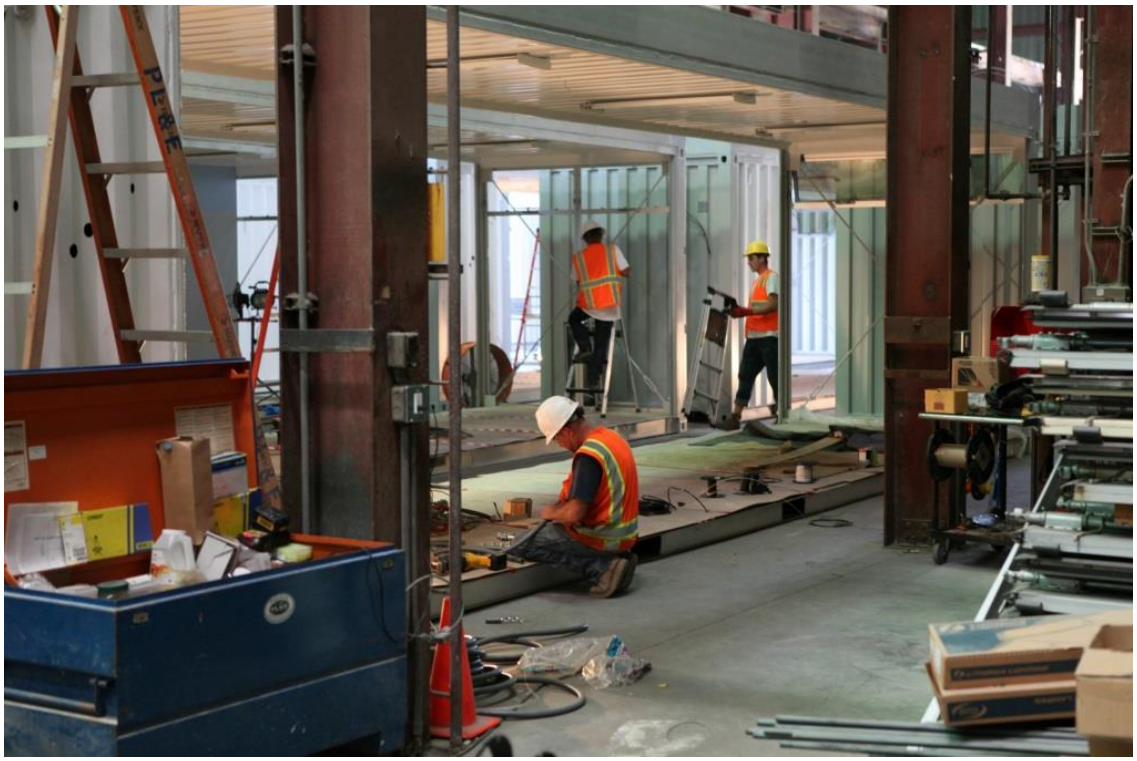

Figure 9. Construction workers at GrowthPoint's Los Angeles factory are able to work on multiple shipping containers to adapt them into highly efficient buildings.

EVALUATING THE GROWTHPOINT MODEL

We studied those factors which distinguish GrowthPoint's repurposed shipping container product from standard construction methods. We asked how the GrowthPoint process increases project feasibility over standard site-built construction methods. We will discuss our observations in this section, and where possible, we will attempt to evaluate their cost impact.

Questions examined:

1. Sustainability What are the advantages of GrowthPoint's development model, which combines sustainable design with a streamlined construction process?
2. Benefits in Design and Safety
3. Efficiency How may the GrowthPoint process expedite design, predevelopment and construction, and what are the benefits? How does

expedited construction save costs in finance and staff time? How does the GrowthPoint process differ from standard construction?

4. Savings in Operations We estimate the potential savings for a hypothetical 30-unit SRO project.
5. Advantages in Access to Capital We show that the energy efficiency and high sustainability features of the GrowthPoint project qualify it for a broad array of financing sources, and increased funding amounts.
6. Construction Cost Comparison What are hard costs (brick and mortar construction costs) of a container project compared to a comparably scaled site-built project?

1. Sustainability—GrowthPoint's Green Advantage

GrowthPoint's shipping container product is designed keeping the goal of attaining LEED sustainability standards in mind. The base design includes an array of energy-saving features including use of recycled materials, High-E windows, layered insulation, and energy-efficient fixtures and systems. In addition, GrowthPoint sponsors innovative employee training programs, and uses smart building methods to minimize waste and site impacts.

The GrowthPoint structure is the central component of a LEED-compliant project with many additional features. Additional factors like building orientation, neighborhood characteristics and landscaping also count heavily in LEED certification. GrowthPoint claims that its design is "Platinum-attainable", i.e., that it obtains maximum points for factors related to construction and building type.

The standard Type V building project lacks these features—modifying the Type V design to attain LEED Gold or Platinum status requires increased budget for structural changes, upgraded fixtures, upgraded building systems and insulation. In the comparative construction cost of GrowthPoint's product to Type V construction which we present later, we assume cost increases to adapt the Type V design to match the LEED status of GrowthPoint's product.

Figure 10. The GrowthPoint Structures Factory in Los Angeles, California.

2. Benefits in Design and Safety

Structural Integrity In earthquake country, opting for the highest level of seismic safety is a no-brainer. The building designs based on the GrowthPoint shipping container exceed California Building Code seismic standards by up to 106%. This is largely due to the shipping container itself. It is a rigid structure, already fabricated to exact dimensions and inspected for structural integrity. Removal of panels to join containers changes their structural quality, and GrowthPoint has designed connections and welds which maintain and reinforce the structural integrity. Once joined together with welds and specialized fasteners, units maintain the same or greater structural integrity. This contrasts to the construction of a Type V wood-frame structure, which is built according to approved plans and by hand, from the bottom up.

3. Efficiency—Faster Planning and Construction

GrowthPoint's product may benefit from streamlined plancheck and building inspections in many jurisdictions. Since it falls under the classification of

"manufactured housing", the structure and construction may be approved by the California Department of Housing and Community Development (HCD).

Savings in Project Development Costs

In project development faster completion reduces many costs. Rapid completion of a project also reaps economic benefits sooner, and has both quantifiable and practical benefits. We conservatively estimate that fabrication and installation of GrowthPoint's product cuts six months off the standard construction schedule. This time frame is supported by Growthpoint's success in constructing schoolrooms for the Oak Park School District—planning, fabrication and installation of a 7,000 square foot building took only three months.

The short construction period for the schoolrooms provided special benefits: construction could be completed during the summer recess, without interruption of classes; and more than a semester of classes have been held in the new, modernized environment. Earlier completion provides different benefits for a multifamily affordable housing project: Earlier project rent-up and cash flow, earlier earning of developer fees, and the months of safe, decent, affordable housing for a vulnerable population.

Savings during construction

Design, construction and installation of GrowthPoint's project for the Oak Park School District took four months from start to finish allowing the school usage of its classrooms a full semester early. Inspections of the GrowthPoint product caused less disruption and delay because fabrication of the classrooms were inspected at the factory and onsite for installation by the Division of the State Architect which has jurisdiction over school projects. Due to the coordinated production process at the plant, one inspector was assigned full-time to inspect the fabrication. In addition, GrowthPoint simultaneously worked on building units at the factory while the general contractor prepared the site and foundations.

Other construction cost savings include:

- Reduced overhead costs associated with general contractor's contract.
    - Overhead and profit are factored into GrowthPoint's contract.
    - General contractor's overhead costs apply to a shortened construction period.
- Reduced fees for architectural supervision and construction management due to shorter construction period.

Savings in Construction Interest

Affordable housing projects generally obtain permanent financing through a combination of public funding and low income housing tax credits. Most developers obtain a private bank loan to fund a portion of construction costs, and interest on this debt is a substantial cost. Reviewing comparable projects, we assumed an average interest cost of $10,000 per month construction interest. Under this assumption, the shorter construction schedule of the GrowthPoint project would save $60,000 in interest alone.

Savings Due to Early Completion

Early completion benefits the project and its operations, the intended residents, and the organization/developer of the project.

- Nonprofit developers rely on developer fees to fund their staff and overhead, and the schedule for pay-in of those fees is a negotiation point in tax credit agreements. Shorter construction time reduces the cost of staff (project manager, construction manager) and the final equity payment is paid earlier.
- Faster completion of projects in the pipeline is a way a nonprofit can more efficiently increase production.
- Faster construction means the nonprofit developer establishes full occupancy much earlier (we assume six months), carries construction debt

for a shorter period, closes permanent financing, and collects developer fees earlier.

- **Most importantly**, earlier occupancy provides the greatest benefits to the new residents, who may have been underhoused or homeless, or at risk of homelessness.

4. Savings in Operations—Reduced Energy Costs

After the completion of construction, GrowthPoint's design pays off in operations due to reduced energy savings. The LEED Platinum model provides significant savings over unrated projects. In surveying local nonprofit organizations who have completed ambitious LEED projects, we were unable to determine dollar savings, since LEED-certified projects have not been in operation for long, and post-occupancy studies of energy use have not yet been completed.

We therefore took a different approach, comparing the Utility Allowances for affordable housing provided for Ventura County by HUD with the California Energy Commission's Alternative Utility Allowance. HUD computes utility allowances based on local data, providing standardized prices for utility charges paid by tenants. In the absence of historic project data, these allowances provide a good approximation of utility costs. Using this method to determine costs, we projected that utility costs for a 30-unit Type V project in Ventura County would be $18,000 per year, or $600 per unit per year.

The Alternative Utility Allowance computes energy use of LEED and GreenPoint-certified projects on a project-specific basis, based on calculations of energy savings. The Alternative Utility Allowance is approved for use in a LEED or GreenPoint-certified project by the California Tax Credit Allocation Committee and other funding agencies. We compiled data and projected savings from six fully completed LEED-rated affordable housing projects, and found that these average about 49.6% of the Type V utility costs, about $9,000 per year for a 30-unit project. . These savings would help to ensure the long-term viability of the project.

5. Advantages in Access to Capital

There are many advantages in seeking funding from public and private lenders, and tax credit investors for a sustainable project with low energy costs.

- Controlling energy costs reduces lender risk considerably, since this is an area of operating costs which has been volatile in the past.
- Reducing operating costs results in increased net operating income, and this may leverage a larger permanent loan from a bank.
- More funds may be available from public funding agencies for projects with high sustainability factors.

A sustainability bonus can open new areas of funding development for nonprofit developers. The new Cap and Trade lending program proposes to set aside $400 million for sustainable development affordable housing projects linked to Transit Oriented Districts (TOD). Also, sustainability points could make up for ranking disadvantages when applying for 9% tax credits: tax credit scoring emphasizes rich neighborhood amenities which are most common in dense urban settings, earning sustainability points could help a Ventura County project qualify in the highly competitive 9% awards competition.

Innovation carries a premium with some lenders, investors and grants managers. Funding a project with potential to be a "best practice" for faster, more economical, more sustainable development is attractive for many funders in the affordable housing community.

Layered Financing of Affordable Housing Development

Affordable housing and permanent supportive housing are financed from an array of sources: grants and loans from local and state sources, federal tax credits, rental subsidies and others. Each funding agency evaluates a proposed project on the target population, multiple factors of location and community, project readiness, and the soundness of the proposed plans for finances and operations. Sustainability and energy savings are increasingly important factors

in funding decisions. We discuss below how the high-sustainability ranking of GrowthPoint's shipping container project can provide advantages in each stage of the financing process.

Predevelopment funding: Projects initiated by St. Vincent de Paul will serve a very low-income population, with an emphasis on the formerly homeless. The model of management and services will be based on the principals of permanent supportive housing, which provides an array of services including "whatever it takes" 24/7 crisis intervention to assist formerly homeless residents to live and thrive in permanent housing. Foundations like the Corporation for Supportive Housing (CSH) provide low interest 2-3 year "Project Initiation Loans" loans to finance preliminary design, site investigation, feasibility and other project costs. These loans of $50-100,000 are carried at a low rate, and in some cases they are forgivable if the project is infeasible. Once a project is developed further, CSH, Enterprise Foundation, and other agencies provide acquisition and predevelopment financing under favorable terms. As with charitable grants, innovation is a plus for these organizations: if shipping container technology leads to faster, cheaper, stronger housing, the model can be adapted nationwide.

California's Multifamily Housing Program (MHP) The State Department of Housing and Community Development is currently advertising $47.5 million for Supportive Housing projects through the Multifamily Housing Program (MHP)—awards will provide up to $35,000 per unit (for the first 30 units). Many aspects of the project are rated in the evaluation of each application, and funds are highly competitive. Points are awarded for percent served of supportive housing tenants, project readiness, committed financing, etc. Sustainability may be granted up to ten points, which could ensure that the project would be funded. For a 30-unit project, this would be an award of $700,000.

Low Income Housing Tax Credits/SB 862 Cap and Trade:

Low Income Housing Tax Credits (LIHTC) are a major piece of project financing for most affordable housing. Tax credits are awarded to nonprofit housing developers through state agencies, and shares of the project are sold to investors who can take advantage of the tax benefits. There are two classes of tax credits, 9% and 4%. 9% credits usually are a richer source of financing, providing equity to pay for 50-90% of project costs. However, in the competitive California market,9% credits are awarded to projects with "perfect scores", with additional competitive points categorized as "tie-breakers". Noncompetitive 4% credits must meet less stringent requirements, but they pay for only 20-40% of project costs.

An area like Ventura County with mixed-urban/suburban/agricultural land use has many potential sites which are far from community amenities which are ranked in the 9% competition (stores, health services, libraries, educational facilities, etc.). Gaining points for LEED certification (10 points for LEED Gold) can make the difference in the project qualifying for valuable 9% tax credits.

Additional new resources directed at sustainability and linkages to public transportation will fund more complex projects. These projects will likely qualify easily for 9% tax credits. The Cap and Trade program authorized by SB 860 will provide significant resources for affordable housing as part of Transit Oriented Development strategies (TOD). Preliminary rules indicate that the program will direct funds to mixed use projects within one quarter mile of public transit (in Ventura County this includes MetroLink stops and commuter bus stops). The program was allocated $130 million for 2015, and loans will be significantly higher than MHP limits, up to $55,000 per unit.

For-profit developers are likely to target the TOD sites for mixed-use developments. However, affordable housing is required as an element of each award, and this opens up opportunities for public/private partnerships in mixed use projects.

Permanent Loans from Commercial Banks

The majority of affordable housing project finance comes from public funding and low income housing tax credits. However, projects which project positive cash flow in long-term operations qualify for permanent loans from private banks. Projects which primarily serve homeless and very low income tenants often do not generate enough cash flow to support this debt.

Verified projected savings in energy may make a private bank loan feasible, or it may increase the amount of private financing available for the project. For example, assuming a 30-year bank loan at 8% interest the estimated savings of $9,000/year which we cite above would support an additional $90,000 in debt, thus reducing dependence on public finance.

Gap Financing—Federal Home Loan Bank Affordable Housing Program:

The Federal Home Loan Bank's Affordable Housing Program (AHP) is an example of "gap financing" which may increase awards to a project with certification of strong sustainability features. AHP is heavily weighted in favor of housing for the homeless, special needs housing, and projects serving very low income families. "Subsidy per unit" is another large factor, representing up to 12 of a possible 62 ranking points. AHP will subsidize from $10,000 to 40,000 per unit, but larger subsidies cost points in the highly competitive process.

A 30-unit project would be able to request $300,000, or $10,000 per unit, and still earn 12 points. Increasing the request to $450,000, $15,000 per unit, would earn 10 points ($20,000 per unit earns 8 points).

AHP also values sustainability—a project rated LEED Gold certification earns 3 points. The project's sponsor could request a larger loan amount, knowing that the loss in points for "subsidy" would be balanced out by additional points for "sustainability".

Potentially, the applicant could increase the request from $300,000 to $600,000, a bonus for the project.

6. Construction Cost Comparison—Comparison of Estimates

To evaluate the difference in construction costs, we prepared a conceptual analysis of two cost estimates, one for a 30-unit SRO project using conventional site-built Type V (wood frame, fire-rated) construction, and one for a comparable building from GrowthPoint. In addition to the Type V estimate, we compare the Growthpoint cost to a Type V project redesigned to meet LEED Gold and LEED Platinum standards.

Comparison of estimates

		Alternative 1	Alternative 2	Alternative 3
	GrowthPoint "LEED-Platinum Attainable"	TYPE V "Minimum Building Code"	TYPE V LEED Gold + 15%	TYPE V LEED Platinum + 20%
Hard Costs Only	$2,397,000	$2,171,000	$2,497,000	$2,606,000
Hard Costs/ Square Foot	$138.74	$125.66	$144.51	$150.79
$ Total Cost *	$3,280,000	$2,949,000	$3, 371,000	$3,491,000
Per Square Foot	$189.82	$170.66	$195.05	$202.03
Per Unit	$109,334	$98,299	$112,350	$116,368

* Construction cost and relevant soft costs, rounded where appropriate.

Appendix 1 details methodology, Appendix 2 details comparative costs.

Summary of Estimates

Construction cost of the 30 unit GrowthPoint design is $2,397,000, compared to the estimate for the 30 unit site-built "Type V" estimate, $2,171,000. Overall, this reflects an approximate $226,000 increase, or about 10.4% higher ("hard costs" only). It should be noted that the cost per unit for both of these options are relatively modest, $109,334 per unit for GrowthPoint, $98,299 per unit for Type

V design (adding relevant soft costs yields a comparison of $3,280,000 for the Growthpoint model and $2,949,000 for Alternative 1, and the per unit cost is based on these figures. The cost of land and other elements are unknown, so we did not prepare an overall project budget.) Of the three compared alternatives, Type V wood-frame is less expensive, but does not have the LEED attainable efficiencies of the GrowthPoint model.

The figures in the above chart are "ballpark estimates". They are based on a simple design concept and very general specifications. Although GrowthPoint's product comes in about 10% above Alternative 1, other factors erase that advantage.

- GrowthPoint's numbers are based on the company's known costs, while the Type V estimate is based on historic costs and industry averages. The Type V estimate is more likely to vary at bid time.
- Costs of GrowthPoint and Alternative 1 are both modest; the $226,000 difference is likely not significant in financing the project.
- Energy savings, reduced operating costs and time savings will increase the competitiveness of a project seeking public financing, private bank loans and tax credits. Increased net operating income would allow the project to carry larger debt, making a 10% difference in construction cost between GrowthPoint and Alternative 1 less relevant.

Alternatives 2 and 3 include upgrades to attain LEED Gold and Platinum ratings and add substantial costs to the traditional Type V project. Upgrades would require additional insulation, more expensive building systems, upgraded windows, and other features to obtain a rating. The GrowthPoint model already incorporates these features, and require no cost increase.

Comparative Value of Alternatives The least expensive approach, Alternative 1, is based on a model which complies with, and may exceed the building code. This alternative will become obsolete as California codes change to require "Net Zero"

energy use for multi-family residential projects by 2020. The GrowthPoint product meets or exceeds the standards of the more expensive Alternatives 2 and 3, at a lower cost.

GrowthPoint offers cost savings because its basic structural unit comes prefabricated. Containers that are adapted in the factory offer additional cost savings, and GrowthPoint can work on up to 26 containers at once per single labor shift—volume is increased with additional shifts. Production is standardized and efficient.

Prevailing wages are not required for factory production, but we assume they will be required for work completed onsite installing GrowthPoint's finished modules. We assume that prevailing wages add 20% to onsite construction costs. This is discussed further in Addendum 1.

SUMMARY COST ANALYSIS

A project based on Growthpoint's shipping containers is competitive compared to standard site-built construction, our "Alternative 1". While GrowthPoint's construction cost is about 10% ($226,000) more expensive than the "Alternative 1" estimate, other factors favor the GrowthPoint product. The LEED alternatives exceed the cost of the GrowthPoint product. Because the cost of the GrowthPoint product is modest, and the advantages of its sustainable design provide actual financial benefits, the GrowthPoint project is more feasible than the site-built alternatives.

The Summary of Benefits table below shows the additional savings using the Growthpoint product:

- **Construction Cost Savings** Reduced time and lower contract cost for the general contractor create $178,000 in savings. In addition, shorter construction period would create $60,000 in savings. These savings are reflected in the Cost Comparison itemized in Appendix 2.

- **Additional Assumed Benefits** We can anticipate savings in staff time and consultant billings due to shorter predevelopment and construction time. These savings are difficult to estimate—we show a savings of $17,000 based on six months of salary for a project manager responsible for 3 projects (burdened salary, $100,000, 6 months, 1/3 of workload). The potential cost savings for the contracted design team are likely, but it is premature to provide an estimate.
- **Access to Finance** The developer may be able to increase borrowing when seeking competitive financing, trading extra points for sustainability in exchange for losing points for "leverage".
    - We have estimated a possible increase in one source, the Affordable Housing Program (AHP), of $300,000.
    - The State of California's Multifamily Housing Program (MHP) provides up to $35,000 per unit in forgivable loans, for the first 30 units—a project which can access the new Cap and Trade program instead of MHP will be able to increase its loan request to $55,000 per unit, an increase in $600,000.
    - Many projects obtain permanent loans from private banks, based on positive cash flow. We have estimated that savings of $9,000 per year in energy costs would support an additional $90,000 in borrowing.
    - Nonprofit developers earn developer fees, generally paid in small increments, with a final payment after the project is completed, lien free and fully occupied. Earlier payment of the developer fee facilitates the organization's operations.
- **Ongoing Savings in Operations** As noted above, we project a savings of about $9,000 per year in energy costs for the 30-unit building which we modeled. This may allow the organization to obtain long-term financing, or it may help to balance the operating budget, minimizing expenses so that costs do not have to be passed on to residents.

Summary of Benefits, GrowthPoint

Construction Cost Savings	Amount	Comment
Construction Overhead Cost	$178,000	See Above
Construction Period Interest	$60,000	See Above
A**ssumed Benefits**		
Staff Savings	$17,000	1/2 FTE project manager, 6 months
Savings in Architectural and Engineering		Should be achievable
Design and Construction Oversight		Should be achievable
Benefits in Access to Finance		
Increased Borrowing, Permanent Loan	$90,000	See Above
Gap Financing	$300,000	See Above AHP Program
Potential access to 9% Tax Credits		
Potential access to TOD Funding	$600,000	Advantage over MHP funding
Earlier Pay-in of Developer Fee		Early close of Permanent Financing
Benefits in Operations		
Earlier Rentup		Operational Benefit
Reduced Energy Expenses	$9,000	Per Year, See Above

Cost Comparison Conclusions The largest benefit in using the GrowthPoint product is in access to finance—we estimate nearly $1 million in additional financing which could be available. While some of these funds are not in place yet, we have shown that the AHP funds are likely to be awarded. An additional $300,000 in financing would counterbalance the $226,000 in additional construction costs.

The rough estimate of $17,000 in staff savings is a small amount, but it does reflect greater efficiency in the development process. There will be additional savings in the long run if the organization can complete projects faster. Similarly, an almost 50% reduction in projected energy costs is an important way to deal with one of the most volatile costs a nonprofit housing manager must address.

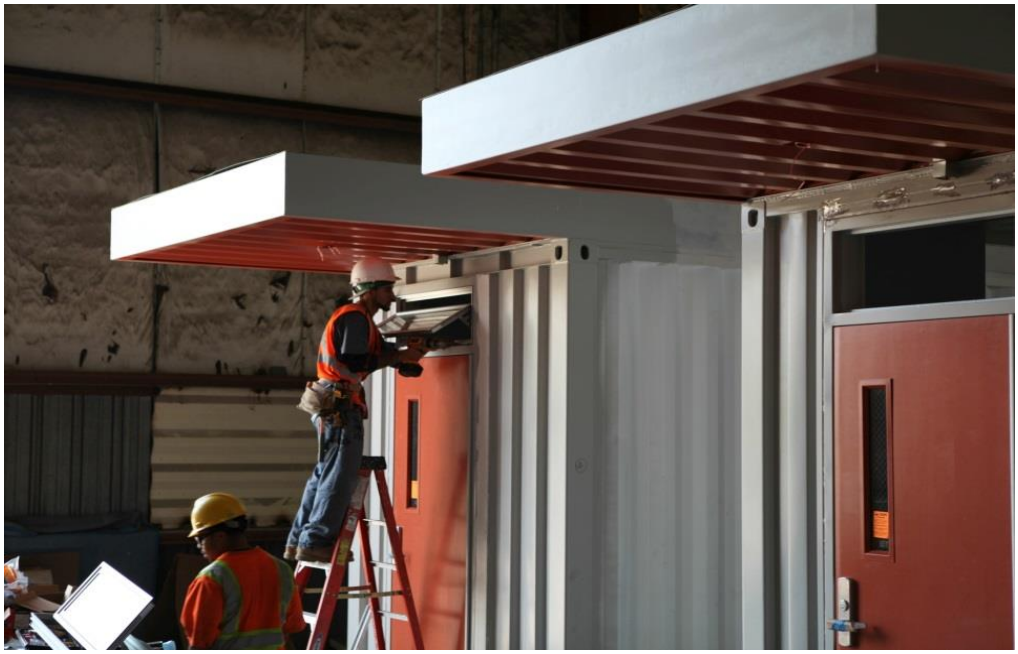

Figure 11. Workers at GrowthPoint Structures' factory in Los Angeles

CASE STUDIES—SUSTAINABLE MODULAR PROJECTS

Perspectives gained from other modular/shipping container projects:

We are evaluating relatively new technology, and it looks promising. We have visited GrowthPoint's factory, seen its container products, and evaluated the design and economic feasibility of using its products in an affordable housing/supportive housing context. While GrowthPoint is impressive, it is a small organization, and its completed projects are smaller than the 30-unit building upon which we based our estimate. We spoke to developers, owners, and architects who have successfully completed modular projects—mostly shipping containers, one modular—to examine their experiences and "lessons learned" in developing their projects. The first project we discuss, the Oneesan Container Housing Project, was extensively documented, describing the process of construction, the design approach, and the cost comparison to standard building methods.

Case Study: Atira Women's Resource Society—Oneesan Container Housing Project:

The Atira Women's Resource Society of Vancouver completed the first multi-family residential project in North America in 2013, an 18-unit supportive housing project. Atira published a report documenting the planning and finances of the project, and also was available to answer questions in depth during a phone call with Dave Ryan and Ron Mulvihill.

Figure 12. Atira's Women's Supportive Housing apartments in Vancouver, BC Canada completed in 2013.

Atira's Oneesan project ("big sister" in Japanese) was built with donated shipping containers which were older than the one-way containers GrowthPoint uses. The design was constrained by a narrow site, only 25' X 117', with adjacent single room occupancy units (SRO's) on each side. This mandated careful placement of the new units for fire safety, light, and air circulation. In terms of design, Atira's goal was to create a homey environment indoors, and provide a unique structure facing the outside world. Due to space constraints, Atira constructed two separate 3-story buildings, and created space and variety by joining two side-by-side containers with an offset 4-feet at each end (see diagram). Each unit is 16 feet wide, and half the length of the 40-foot container. Designing the units with one at each end, and creating an "L", Atira was able to provide windows on three sides, with excellent natural light and air circulation.

Atira documented the hard costs incurred in completing the project, and provide comparisons of those costs with the cost of traditional building methods. Its final figure of $185 per square foot ($218 Canadian) is higher than our final estimate. However, Atira's costs are affected by other site-specific factors like demolition and disposal of an existing structure. When these factors are removed, it cites a cost of $168 per square foot, still higher than the Growthpoint estimate of $139 per square foot. This cost difference is partly explained by the Atira project being split into two buildings, requiring separate stairs and other construction. In the Vancouver market, Atira found that its product had a comparable cost to typical construction costs for a Type V, 2-story townhome: $168 per square foot vs. $163 per square foot for wood-frame construction. Further, the product was far more economical than steel-frame, poured concrete apartment projects, at $223 per square foot.

Janice Abbott, Atira's CEO, points out that a more important indicator of project cost is the cost per unit, $70,040 (converted to US dollars) for the Oneesan project. Having completed the post-construction analysis of costs, Ms. Abbott advises us to focus on the cost per unit figure, since per square foot comparisons are made against projects with larger units and other cost efficiencies.

Atira will continue with development of shipping container housing, proposing four more projects (one for each climate zone of Canada) and will profit from lessons learned from its first project.

Figure 13. Atira's container preparation for construction site in Vancouver, Canada.

Atira's Oneesan and GrowthPoint Comparison and Analysis:

The analysis we completed for the GrowthPoint model does not have exactly the same elements as Atira's post-construction study. Atira's cost summary only includes hard costs, while the GrowthPoint estimate includes LEED consultants, financing costs, and other soft costs which are sensitive to shorter construction schedules. Atira acted as its own general contractor. GrowthPoint's project (and its alternatives) need to comply with prevailing wages for onsite work.

Atira's Oneesan project has gracious design, with windows on three sides. Modest-sized apartments are created combining two containers side-by-side, but usable space is created by offsetting the containers a few feet. Oneesan does not disguise the corrugated texture of the container sides, but it does dress it up with decorative facing which highlights the local culture. Atira used many-times recycled containers, while GrowthPoint uses one-way containers. Atira performed much construction work onsite, while GrowthPoint prepares its units in the factory, delivering them mostly complete. GrowthPoint's projects in California will need to comply with high standards for sustainability, including LEED or CalGreen Certification. Fundamentally, Atira's costs are the result of a very different site and design, as well as a different system of finance and regulatory environment.

Figure 14. Star Apartments in downtown Los Angeles developed from modular units by Skid Row Housing Trust

Case Study: Skid Row Housing Trust—Star Apartments

Another notable modular project was completed in 2014 by Skid Row Housing Trust in Los Angeles ("the Trust"). The Star Apartments, while not a container-based project, provides a very strong vision. The project is complex, with commercial, institutional, recreational and residential components. It is large, housing 102 individuals or couples, and provides four stories of housing above two stories of services and neighborhood facilities. The project was based on prefabricated modules, not shipping containers, but it is noteworthy for its ambition and complexity.

Construction included renovation of a ground-floor building, and construction of an additional floor to be used as a gymnasium, library, computer room, with garden space, etc. The first two stories were Type I concrete construction, and the residential units were built above. The project had goals of community

revitalization, including maintaining the ground floor health clinic, adding useful retail space, providing community recreation space, and building a distinctive structure for residents. Parking was provided at grade. Sustainability was a critical goal of this project, and it will be certified LEED Platinum.

Final estimates of construction cost were $230 per square foot—this figure is not directly comparable to our estimates, since the project is a mixed building type. The construction process was not as easy or predictable as expected, and the schedule was delayed. The Trust used a fabricator based in Idaho for construction of the modules, and the contractor was limited in storing the units, which caused delays. The modular units were inspected by inspectors from the California Department of Housing and Community Development, but the construction and installation onsite was done by City of Los Angeles inspectors. The Trust reported that plan check and inspection were time consuming due to the uniqueness of the project. In addition, coordinating the construction contract for onsite work and the contract with the fabricators created delays.

The Star Apartments is already a landmark, and its 102 units all occupied. The project manager, Sasha Truong, is familiar with GrowthPoint and its product, and would consider using GrowthPoint in the future.

Figure 15. Waldorf School under construction from shipping containers in Costa Mesa, California.

Waldorf School, Costa Mesa

The Waldorf School of Costa Mesa needed to expand its classrooms. It commissioned the architect, S3 Advisors, to plan the project with Kraus Construction. The project included two classroom buildings and an auditorium. The Waldorf School project maintained a rapid construction schedule, although the contractors used older containers and performed much of the construction work onsite. The team met the client's needs, and provided an auditorium, also made of shipping containers.

The project received awards for Green construction from the City of Costa Mesa, and exceeded the school's expectations of budget and schedule.

Factors unique to the Waldorf School Project:

- Waldorf classroom areas were developed using standard "High-C" 9'6" containers. They did not use one-way containers. They used multi-use recycled containers.
- One issue Waldorf encountered was variance of container length, with up to an inch variance.

- The auditorium was built with containers stacked two high, with an arched wood-framed roof. The design features a mix of surfaces; some painted corrugated steel (highlighting the shipping container structure) and some stucco disguising the container.
- Kraus Construction modified the containers at a Wilmington, CA factory. It constructed the necessary framing and installed the electrical system, but completed most of the project after delivery of the modules. The project architect mentioned that a little-recognized advantage of factory production is the reduction of injuries during construction. Factory production provides a controlled environment and fewer potential hazards.
- Kraus used a spray-on insulation, similar to the Oneesan project.
- The project is unique in that the Waldorf School leases its land, and the modules can be relocated if the school chooses to end the lease.
- Plan check for the project was submitted to the City of Costa Mesa Building Department. Inspections were completed by an independent inspection firm, which expedited the inspection process.
- The architect and contractor had not processed drawings to the City prior to the start of the project, but they were able to obtain plan approval relatively quickly.
- The project was completed in about 5 months. The architect and school feel that they saved 30% in total project costs using shipping container construction.
- Kraus staff advised that the design and installation of a two-story structure is more complex, and assembly more difficult.

The Waldorf School is an example of a highly successful project. The contractor mentioned that it required additional labor to retrofit the shipping containers

used. GrowthPoint's practice of using one-way shipping containers seems preferable. Also, GrowthPoint completes most of the modification in its factory, and this provides great advantages in efficiency and standardization.

Figure 16. Marengo Structures Market Apartments, New Haven Connecticut.

Case Study: Marengo Structures Market Apartments, New Haven, CT

One architect/developer has constructed small multi-family container projects in New England. Marengo Structures has worked out its own approach to the design and engineering of shipping container housing, and has built two of the three completed multi-family residential shipping container projects in North America.

Information from the project:

- Christian Salvati, the principal of Marengo Structures, has developed plans and procedures to build residential housing based on shipping containers.
- Mr. Salvati compares his price to standard Type V wood-frame in his area, and claims he can build at $140 per square foot, vs. $180 per square foot.

- Mr. Salvati has processed his plans through local city building departments, at some expense.
- To accommodate the New England weather, Salvati researched codes for insulation in North Dakota, and provided a similar level of insulation, R-50, in his units.
- Heating is electric, radiant heat located in floor panels.
- Mr. Salvati estimates preparation of one container takes about 2 weeks of labor (80 hours).
- Mr. Salvati mentions that there is a quick learning curve, his first floor modules took four hours to install, the second floor modules took two hours, the third floor 2 ½ hours.
- Mr. Salvati also uses one-way containers, which are sold for $4,200 in his area.

Summary and Lessons Learned from other Projects/Case Studies

The Atira, Waldorf School, and Marengo Apartments are completed projects, and claim that they are the same or less expensive than traditional construction methods. Comparing GrowthPoint to standard construction methods shows similar results.

GrowthPoint's "Best Practices":

- Fabrication in the factory, including major systems and drywall. This provides a standardized product which is easily installed at the site. It is easily inspected, weather does not affect production, and the factory provides local jobs. GrowthPoint is centrally located in the Los Angeles area, so transportation charges are minimized. Sustainability is evident.
- Use of one-way, High-C containers. The cost difference between a container which may have carried goods 5,000 miles and a container

being reused for ten years is about $3,000—we have more confidence in the one-way container.

- Pre-approved plans. This is a great advantage for GrowthPoint's product. Engineered drawings of connections and calculations of loads have been examined, reworked, and approved.
- GrowthPoint has an excellent track record, with projects meeting schedules and budgets.

Figure 17. GrowthPoint exterior

Figure 18. GrowthPoint Structures rendition of a multilevel apartment complex.

COMMUNITY ADVOCATES

GrowthPoint Structures' model has had a great impact in Ventura County and Los Angeles. The Ventura County Star chronicled the grand opening of the Oak Park School District's annex, and later called for affordable housing to be developed with the same technology. Many community leaders and homeless and housing advocates attended that opening, and others have visited GrowthPoint's facility to see the manufacturing process first hand. National advocate Phillip F. Mangano, the President and CEO of the American Roundtable on Homelessness, visited the GrowthPoint factory, and declared it a "no-brainer" that models of shipping container housing should be developed throughout the country.

We spoke with many members of the community about the potential of developing shipping container housing to address critical housing needs. We received a wide variety of responses, mostly enthusiastic. A summary of our communication follows:

- Tony Knight, Superintendent of the Oak Park School District, praised the product and the capacity of GrowthPoint Structures. The school district needed a quick response to replace outmoded temporary facilities. Mr. Knight said that building a permanent structure would likely have cost 3 times as much. The Oak Park School District is committed to sustainability and has won awards for its efforts. It expects to benefit from the project design and energy-saving features, with no ongoing cost for lighting or heating.
- Phillip Mangano, President of the National Roundtable to Abolish Homelessness, strongly supports development of shipping container buildings as needed around the country, to meet the goal of abolishing homelessness.
- Mary Kirchen, founder of HousingWorks, visited the GrowthPoint factory, and felt that use of the containers for housing locally and around the country was a "no-brainer".
- Jim MacDonald, Manager of the County of Ventura Building Department, expressed admiration for the Oak Park school project. He mentioned that if his agency were responsible for reviewing the building plans, it would likely be a lengthy project, due to the innovative design and features.
- Timothy Hawkins, Director of Operations at Community Action of Ventura County, expressed strong support for the container product to meet emergency housing needs. He mentioned the advantage of modular units that can be adapted and added to in case of emergency or increased need.
- Karol Schulkin, Homeless Services Coordinator of the County of Ventura Human Services Agency, expressed strong support for the GrowthPoint buildings, due to their potential for infill development,

flexibility and speed of construction, high quality of construction and clean design.

- Dan Hardy, Senior Developer of the City of San Buenaventura Housing Authority, admired the GrowthPoint product, and advised that resources are limited in the Ventura County communities most impacted by homelessness. Local funds, augmented by state and federal funds, are competitive and other projects currently are already in development.
- Amy Luoma, the Housing Specialist of Ventura's Homeless to Home project was very supportive of the method that would bring urgently needed housing online earlier and at moderate cost.
- Meg Kimball-Drewry of the County of Ventura CEO's office also expressed her strong support.
- Achin Kundu is an area architect specializing in affordable housing. He is intrigued by the design, and mentioned that shipping containers could be used to address permanent housing and emergency housing worldwide. He discussed approaches to design container projects that would fit in and be complementary and sensitive to the existing community.

Figure 19. Cité A Docks Student Housing by Cattani Architects, Le Havre, France

BUILDING FOR TOMORROW

Conclusion:

GrowthPoint Structure's shipping container construction is highly competitive with traditional, site-built methods. As project costs rise to meet new energy-saving requirements, GrowthPoint's product already exceeds those requirements. In terms of seismic safety and integration of cutting-edge technology, GrowthPoint's product is simply "better".

Because Growthpoint has planned carefully, the modular fabrication process speeds up development time; GrowthPoint's groundwork in pre-approving its engineered plans will yield time savings. The efficiency of the GrowthPoint process has additional benefits, like reduced carrying costs for loans and earlier pay-ins of developer fees. Finally, the quality of the Growthpoint product and construction speed will provide solid affordable homes for the neediest.

Figure 20. GrowthPoint's three-container studio model

Application in the Real World

Shipping containers are used worldwide to build a variety of projects: hotels, dormitories, high-end residences, and permanent or temporary commercial facilities. We are concerned with rental housing, and serving the needs of low income residents, generally with disabilities. They deserve the best, and the GrowthPoint product is perfectly suited to house our residents.

Medium Scale Affordable Housing The analysis we have done applies to a conceptual project, a 30-unit, two-story building a little larger than 17,000 square feet. We would like to see a project of that scale in Ventura County, and more in the Los Angeles area. Our analysis shows that GrowthPoint's shipping container project is a highly competitive product, built fast, relatively modest construction costs, high efficiency, and with less risk.

Emergency Housing In addition, shipping container technology will be extremely useful in building emergency housing: GrowthPoint's product is one of the fastest high-quality construction techniques available. In cases where families are at risk, the Growthpoint home could be a life-saver.

Figure 21. Puma City, 24 containers - transportable retail and event building that is traveling around the world.
http://www.residentialshippingcontainerprimer.com/Puma%20Flexible%20Container%20Retail

High-density, mixed-use projects On the model of the Star Apartments, shipping container construction can be the central part of a high-density residential or mixed-use project. GrowthPoint's plans have been approved for two-story construction, and these can be adapted for taller structures. Financing is available to create livable communities, integrating affordable housing. Our long-term goal should be to develop the model of adaptive reuse of shipping containers, and replicate that model.

GrowthPoint's plans have been approved for two-story construction, and these can be adapted for taller structures. Financing is available to create livable communities, and integrate affordable housing. The long-term goal of the Society should be to develop the model of adaptive reuse of shipping containers, and replicate that model as needed.

APPENDIX 1

METHODOLOGY, COST COMPARISON

The cost comparison was completed based on the following methodology:

- The two estimates are not based on formal bids. GrowthPoint provided an estimate for a project, and we compared this to an estimate provided by a private contractor with extensive and recent building experience in Ventura County. The result is a conceptual comparison meant to illustrate the comparative advantages.
- Rather than provide elaborate specifications, we used a rule of thumb provided by the nonprofit affordable housing developer, Many Mansions of Ventura County: "solid, durable, middle of the road quality products".
- We specified that each building would have the same 2-story building envelope, with 30 apartments; 29 studio units each 480 square feet, and one 2-bedroom manager's unit, 960 square feet. Each unit has a kitchen and one full bathroom. Total building square footage is 17,280 square feet.
- The "Site-Built, Type V" estimate was completed by Todd Temanson of Harly Homes, based on historic costs of a 100-unit project completed in Ventura in 2012. Per-square-foot costs were adjusted to account for inflation and to reflect the smaller scale of the proposed project, which might result in higher per-unit costs. This estimate was then compared to current costs for the Los Angeles area using Xactware cost estimating software. Any variation greater than 5% was considered and adjustments were made.
- GrowthPoint provided a lump-sum estimate of the cost of its contract, based on the same building envelope as the Type V estimate. Work completed onsite by the general contractor—including site preparation, excavation, foundations and connections—is assumed to have the same cost for the Growthpoint alternative and the site-built alternatives.
- We assume that public funding will require payment of prevailing wages to work completed onsite. The estimate for Alternative 1, the "Site-Built Type V" estimate was based on a project which did not require prevailing wages, so we added an additional 20% to the hard costs of onsite work for both development models. This increased both estimates—$285,000 for the

Alternative 1, Type V estimate and $72,000 for the GrowthPoint estimate (the 20% increase applied only to the general contractor's onsite work).

- Prevailing wages affect all of the labor costs of the site-built model. The GrowthPoint product is built in the factory, and prevailing wages are not required for work related to the factory fabrication of the container product. Construction work with prevailing wage requirements for the GrowthPoint project would include site preparation, excavation and grading, foundation, provision of utilities, landscaping and installation of the GrowthPoint units.
- GrowthPoint's product is subject to State and local sales taxes. Due to the nonprofit use of the final product, LA County will charge 40% of the applicable 9% tax rate.
- Our comparison of estimates includes hard costs (the actual cost of the shipping container project or the labor and materials supplied by the general contractor), profit and overhead, and some "soft costs", including architecture and engineering, LEED Certification costs, construction period interest, permits and fees, etc.
- Transaction soft costs like legal fees, consultant, and finance fees, are not included in the comparison since these depend more on the structure of project financing and land costs, rather than construction cost, and not useful for the comparison of construction modes.
- In completing our cost analysis, we assumed one project budget for GrowthPoint, a "LEED-attainable" design. This was compared to "Alternative 1", the estimate for a standard wood-frame Type V structure which meets current California building code and energy efficiency requirements. We then assumed increased construction cost for the Type V project to achieve LEED rating: 15% increase for LEED Gold and 20% for LEED Platinum (Alternatives 2 and 3, respectively).

APPENDIX 2
COST COMPARISON

	QTY	TYPE V UNIT RATE/COST	GENERAL CONTRACTOR ESTIMATE: TYPE V Minimum Building Code Alternative 1	TYPE V LEED GOLD (Sustainability Standard) Alternative 2 -- 15% Increase	TYPE V LEED Platinum Alternative 3 -- 20% Increase	QTY	GrowthPoint UNIT RATE/COST	GrowthPoint "LEED Platinum Attainable" Total
Growthpoint Structures--Direct Cost, Fabrication								$1,659,212
"Hard Costs", General Contractor								
Slab	8,640	$5.61	$48,470	$55,741	$58,164	8,640	$ 5.61	$48,470
Earthwork	17,280	$1.40	$24,175	$27,801	$29,010	17,280	$ 1.40	$24,175
Erosion Control	900	$5.84	$5,256	$6,044	$6,307	900	$ 5.84	$5,256
Building Excavation & Back Fill	8,640	$1.23	$10,627	$12,221	$12,753	8,640	$ 1.23	$10,627
Grading	8,640	$0.79	$6,826	$7,849	$8,191	8,640	$ 0.79	$6,826
Wall	8,640	$0.70	$6,048	$6,955	$7,258	8,640	$ 0.70	$6,048
Caulking and sealants	17,280	$0.34	$5,875	$6,756	$7,050	17,280	$ -	$0
Stairs/Handrails	8,640	$0.20	$1,728	$1,987	$2,074	8,640	$ 0.20	$1,987
Wood Framing	17,280	$17.42	$301,018	$346,170	$361,221	17,280	$ -	0
Drywall	17,280	$6.80	$117,504	$135,130	$141,005	17,280	Included	Included
Roof - Structural, Edge Blocking, Access	8,640	$0.75	$6,480	$7,452	$7,776	8,640	$ -	$ -
Sheathing	17,280	$1.75	$30,240	$34,776	$36,288	8,640	$ -	$ -
Siding & Exterior Trim	17,280	$2.25	$38,880	$44,712	$46,656	8,640	$ -	$ -
Finish Carpentry	17,280	$4.44	$76,723	$88,232	$92,068	17,280	Included	Included
All Insulation	17,280	$1.09	$18,835	$21,660	$22,602	17,280	Included	Included
Stucco/EFIS/Other	17,280	$4.88	$84,326	$96,975	$101,192	17,280	$ -	$ -
Roof System	17,280	$3.19	$55,123	$63,392	$66,148	17,280	Included	Included
***Window System**	17,280	$6.78	$117,158	$134,732	$140,590	17,280	Included	Included
Hardware	17,280	$0.40	$6,912	$7,949	$8,294	17,280	$ -	$ -
Flooring	17,280	$1.04	$17,971	$20,667	$21,565	17,280	Included	Included
Painting	17,280	$1.82	$31,450	$36,167	$37,740	17,280	Included	Included
Cabinets	4,320	$2.73	$11,794	$13,563	$14,152	4,320	Included	Included
Furnishing	17,280	$2.74	$47,347	$54,449	$56,817	17,280		$ -
Fire Suppression Piping	2,180	$1.42	$3,096	$3,560	$3,715	2,180	Included	Included
Plumbing	17,280	$10.31	$178,157	$204,880	$213,788	17,280	Included	Included
HVAC	17,280	$3.12	$53,914	$62,001	$64,696	17,280	Included	Included
Electrical	17,280	$7.00	$120,960	$139,104	$145,152	17,280	Included	Included
Container Fabrication--Growthpoint only								
Metal Trim Pieces Finish	17,280	$0.99	$0	$0	$0	17,280	Included	Included
General Steel	17,280	$10.22	$0	$0	$0	17,280	Included	Included
Steel Container 40Ft HC	17,280	$13.19	$0	$0	$0	17,280	Included	Included
Stiffeners Steel	17,280	$0.01	$0	$0	$0	17,280	Included	Included
Welding Steel	17,280	$1.28	$0	$0	$0	17,280	Included	Included
Metal Studs Steel	17,280	$0.67	$0	$0	$0	17,280	Included	Included
Metal Studs Steel	17,280	$0.40	$0	$0	$0	17,280	Included	Included
Woodwork	17,280	$1.32	$0	$0	$0	17,280	Included	Included
Fabrication	17,280	$13.91	$0	$0	$0	17,280	Included	Included
Connections (completed onsite by General Contractor)	54	$0.00	$0	$0	$0	17,280	$15.00	$259,200
Prevailing Wages	20%	-	$285,379	$328,185	$342,454	20%		$72,518
General Contractor Direct Constr. Cost			$1,712,271	$1,969,112	$2,054,726			$435,107
General Contractor Profit, Overhead and General Conditions-- 14% maximum	14%		$239,718	$275,676	$287,662	14%	Onsite Contractor	$60,915
Bond and Insurance--General Contractor	3%		$58,560	$67,344	$70,272	3%	Onsite Contractor	$14,881
Construction Contingency, General Contractor	8%		$160,844	$184,971	$193,013	8%		$40,872
Total Contract Costs *General Contractor*			$2,171,393	$2,497,102	$2,605,671			$551,775
Growthpoint Construction Costs (includes profit and overhead)								$1,659,212
Bond and Insurance--Growthpoint	3%					3%	Growthpoint	$49,776
Subtotal Growthpoint--modules only			$0	$0	$0			$1,708,988
Construction Contingency Growthpoint Contract	8%		$0	$0	$0	8%	Growthpoint	$136,719
Total Contract Costs *Growthpoint*			$0	$0	$0			$1,845,707
Total Contract Costs-- *Growthpoint Plus Contractor*			*$2,171,393*	*$2,497,102*	*$2,605,671*			*$2,397,482*
Hard Costs Per Square Foot			*$125.66*	*$144.51*	*$150.79*			*$138.74*
Soft Costs								
Permit Fees	17,280	$20.09	$347,155	$347,155	$347,155	17,280	$20.09	$347,155
Municipal Bonding	17,280	$0.67	$11,578	$11,578	$11,578	17,280	$0.67	$11,578
LEED Certification	1	$60,000	N/A	$60,000	$60,000	1	$60,000	$60,000
Carry Costs/Finance Charges	18	$10,000	$180,000	$180,000	$180,000	12	$10,000	$120,000
Shipping (Growthpoint)						54	$500	$27,000
Sales Tax (40% of LA County 9% Tax)	9%					9%	$ -	$59,732
Architectural Fees	8%		$173,711	$199,768	$208,454	8%		$191,799
Engineering Fees	3%		$65,142	$74,913	$78,170	3%		$71,924
Subtotal SOFT COSTS			$777,586	$873,414	$885,357			$889,187
		Total:	$2,948,979	$3,370,516	$3,491,028		Subtotal:	$3,286,669
		Total PSF:	$170.66	$195.05	$202.03		Subtotal PSF:	$190.20
Percent difference GrowthPoint v. Site-Built			11.5%	-2.5%	-5.9%			
		Per Unit Cost	$98,299	$112,351	$116,368			$109,556
		Cost difference compared to GrowthPoint	($337,690)	$83,847	$204,359			

Growthpoint Contract includes profit, overhead, general conditions

Estimates are exclusive of land and transaction costs

Appendix 3

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