A project of the
Rural-Urban Connections Strategy
(RUCS)

SACRAMENTO REGION FOOD HUB FEASIBILITY ANALYSIS

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SACRAMENTO VALLEY FOOD HUB COST ESTIMATE ANALYSIS

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The Rural-Urban Connections Strategy (RUCS) is the region's rural economic and sustainable strategy complementary to the Blueprint, the region's overall growth strategy (http://www.sacog.org/rucs/)

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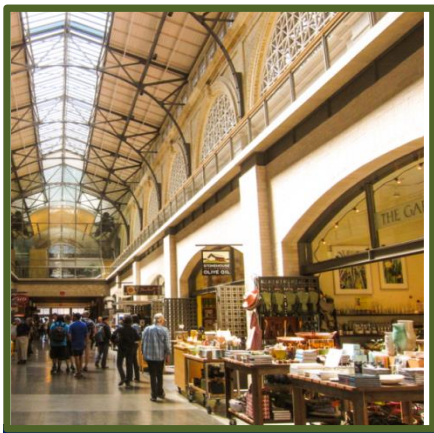


SACRAMENTO VALLEY FOOD HUB COST ESTIMATE ANALYSIS

I. INTRODUCTION

This Cost Estimate Analysis has been prepared as a component of the **Sacramento Regional Agricultural Infrastructure Project,** sponsored by the Sacramento Area Council of Governments (SACOG) through its Rural-Urban Connections Strategy (RUCS). SACOG is an association of local governments in the six county Sacramento region providing transportation planning and funding and serving as a forum for regional issues, including linking land use, transportation and air quality (see page 2 for a map of the region). The Blueprint, a signature SACOG project, is the region's long-term growth strategy. RUCS is the region's rural economic and environmental sustainability strategy complementary to the Blueprint.

Over the past several years, RUCS has identified the need for expanded regional "agricultural infrastructure" to strengthen the local and regional food system and the region's many rural communities. ***Agricultural infrastructure commonly is defined to encompass aggregation, packing, processing, storage, marketing and distribution capacity and facilities, including "food hubs."*** *Overall, agricultural infrastructure:*

- Improves the efficiency and sustainability of the local food system;
- Increases access to healthy foods, especially fresh produce (fruits and vegetables), in underserved communities;
- Supports the viability of agriculture;
- Creates new jobs and economic opportunities; and,
- Helps preserve valuable farmlands.

SACOG obtained funding from the California Department of Food and Agriculture, the California Strategic Growth Council and the U. S. Department of Housing and Urban Development to assess the feasibility and costs of models for development of new agricultural infrastructure, focusing primarily on food hubs. Food hubs help connect locally produced and source-identified foods to local markets and customers, especially by creating new market channels between smaller and medium-sized growers and larger institutional and business buyers.

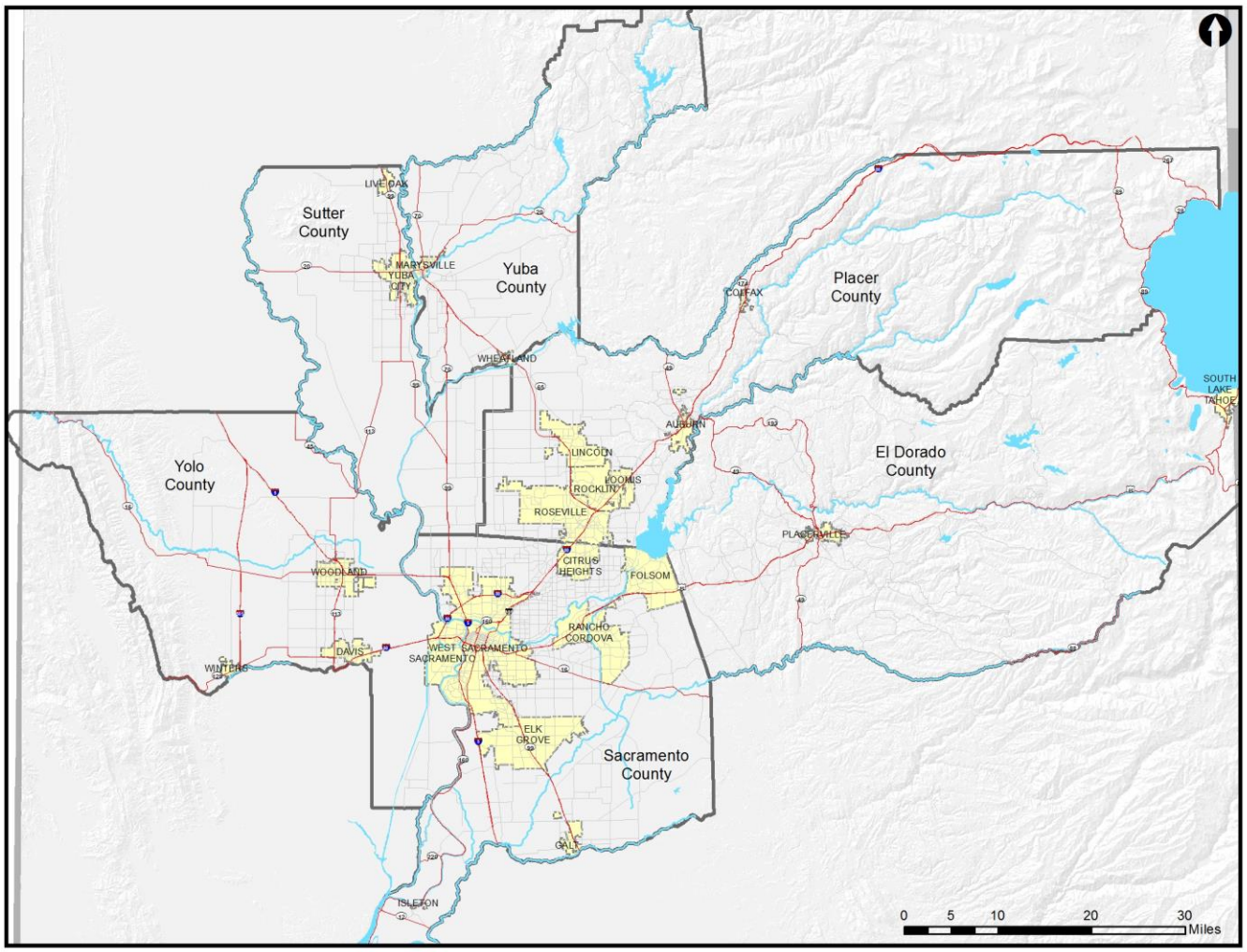
SACOG contracted with a consulting team (Project Team) led by Applied Development Economics, Inc., in partnership with Foodpro International, Inc., the Hatamiya Group, and DH Consulting, to assess the market and financial feasibility of developing regional agricultural infrastructure. As part of the project, this document presents a cost estimate analysis for capital improvements (facilities and equipment) and initial operating expenses for a hypothetical hub model – the Sacramento Valley Food Hub – as well as the description of how

the hub would operate. The analysis focuses on hub operations for specialty crops, defined by the U.S. Department of Agriculture (USDA) as fruits, tree nuts and vegetables.

The *Cost Estimate Analysis* was used as a basis for developing a business plan and financial feasibility analysis for the Sacramento Valley Food Hub. The *Business Plan* and *User Manual* (for the Financial Feasibility Tool Kit) also draws upon other analyses prepared by the Project Team and SACOG: the *Research Analysis of Food Hub Trends and Characteristics* which provides market context and examples of successful and promising types of hub business models; *Impediments to Supplying Locally Grown Food* which identifies barriers for both growers and food hubs in building the local food system; and *Food Banks and Food Hub Development* which discusses the potential role of food banks to incubate and/or support a regional food hub. The *Cost Estimate Analysis* was prepared in the fall of 2013 and reviewed with community partners. It was updated in the summer of 2014 to reflect the status of the project.

The map below shows the SACOG six county planning region.

MAP OF THE SACRAMENTO REGION



PROJECT BACKGROUND

The lack of mid-scale specialty crop handling and processing capacity is a constraint in meeting the increasing demand regionally for locally grown foods. Communities and regions across the country are facing similar constraints. In response, many innovative approaches are emerging to address these needs, including diverse models of food hubs which reflect local and regional market conditions and business structures. While the definition and practice of food hubs varies widely across the country, and continues to evolve, the U.S. Department of Agriculture (USDA) provides a working definition of a regional food hub:

> *A food hub is "…a business or organization that actively manages the aggregation, distribution and marketing of source-identified food products, primarily from local and regional producers to strengthen their ability to satisfy wholesale, retail and institutional demand."*
> *James Barham et al, Regional Food Hub Resource Guide, U.S. Department of Agriculture, Agricultural Marketing Services, April 2012, p. 4.*

Food hubs can differ from conventional food distributors by offering more varied services, such as new farmer training, marketing and technical assistance, to producers, buyers and the broader community. They often focus on building relationships with small, mid-sized and/or beginning farmers who often are overlooked by conventional distributors. Food hubs also can include expanded activities along the agricultural "value chain," such as light food processing. One of the distinguishing characteristics of food hubs is their role in maintaining the identity and story of the grower throughout the food chain.

Several types of food hub business models exist, including for-profit, non-profit and cooperative. Whatever their business type, many hubs are explicitly mission-driven around economic, social and environmental values, such as to support local growers and the regional economy, promote sustainably grown food, address community food access issues, and improve health. Food hubs are serving as a catalyst for new market and economic development opportunities by providing important elements of the "infrastructure" needed to strengthen local and regional food systems. They are the subject of a great deal of study nationally and in California, including the report *Establishing A Food Hub for the Sacramento Valley,* prepared by Soil Born Farms and Community Alliance with Family Farmers (August, 2012), which provided the initial feasibility analysis for developing and operating a Sacramento Valley Food Hub. The Agricultural Sustainability Institute at UC Davis also has prepared several research reports on food hubs and aggregation and distribution networks within the Sacramento region and Northern California.

The Project Team drew upon its extensive analysis of this and other research as well as assessment of market drivers for development of the regional food system and existing agricultural infrastructure capacity to help inform the context for the preparation of the *Cost Estimate Analysis* in terms of the focus and scope of the Sacramento Valley Food Hub model, including the target level and scale of operations for a viable, self-sufficient enterprise over the long-term (see the *Research Analysis of Food Hub Trends and Characteristics* for detail).

PROJECT PURPOSE

The purpose of the Sacramento Regional Agricultural Infrastructure Project (Ag Infrastructure Project) is to:

> ***Provide a business model, financial feasibility analytic tools and business plan for a self-sustaining mid-scale aggregation and distribution operation – a food hub with aspects of processing functions – to serve regional specialty crop producers, including small to medium-sized growers, especially those who lack the capacity to access business and institutional markets. The tools and plans have been developed by SACOG as a resource for entrepreneurs, jurisdictions, investors and other interested stakeholders to advance the development of this infrastructure.***

The objectives of the project are to create new market channels and support for small to medium-sized growers, including new farmers, economically disadvantaged farmers, veterans entering agriculture and others. The hub also is intended to be a market resource for growers of any scale. Participation of larger growers, especially in the initial phase of the hub, could help provide the product volumes necessary to achieve economies of scale. In turn, this would help create the capacity to serve larger customers with cost-competitive pricing and reliability of supply, and establish a solid market base for locally grown specialty crops and value-added produce.

COST ESTIMATE ANALYSIS RESEARCH METHODOLOGY

The approach in conducting the food hub cost estimate analysis was to define a reasonable entry point and a path to scaling up in the Sacramento region that would provide a viable level of operations and basis for future expansion, given the size of the region and the desire to focus on institutional, business, government and other markets. Several activities occurred that informed the preparation of the cost estimate by the Project Team; they included:

- Multiple site visits to the Sacramento Food Bank and Family Services, the Yolo Food Bank and the Placer Food Bank to review their facilities, operations, expansion plans, and logistics capacity, and ongoing consultation to review potential start-up costs and variables for incubating a food hub;
- Interviews with partner organizations, local elected officials, agricultural support organizations, economic development representatives, food system providers, prospective food hub project developers, professional associations (grocers, restaurants), distribution companies and those conducting research in California and nationally on food hubs;
- Research on new food hub models and emerging findings nationally, including several new in-depth reports on hub operating and financial characteristics, and feasibility studies and toolkits;
- Data gathering to inventory existing vacant cold storage and freezer space and other food processing-related facilities and sites in the region, including facilities that could be repurposed for a food hub;
- Review of cost analyses previously conducted for the region;
- Analysis of regional crop production (supply) and consumer demand (existing consumption of specialty crops), gaps between supply and demand, and target crops based on a variety of market factors that could be potential crops for a food hub facility;
- Discussions with SACOG and advisory team partners.

Foodpro also drew upon its deep experience in the design and planning of food-related facilities from its many projects conducted over the years.

The analysis took into account existing agricultural infrastructure capacity to grow and distribute fresh produce which currently exists in the region, given the strengths, quality and diversity of our agricultural economy. This includes many direct-to-consumer venues, especially a richness of farmers markets, Community Supported Agriculture (CSA) food box programs, and farm stand retail operations, along with fresh produce aggregation, distribution, and wholesaler businesses. These assets support the capacity for the region – as yet unrealized – to grow, process, and distribute a very diverse and potentially even greater number of crops and products for the local and regional market and beyond.

These are assets that most other regions in the country do not possess. Seeing the market opportunity arising from the increasing consumer demand for fresh and local produce, a variety of hub-type projects are being considered or planned in several locales throughout the region. However, there are persistent gaps and challenges in creating a more efficient and economically viable system to better connect locally grown produce and value-added products to markets within the region. This is especially true for increasing the supply of fresh produce at an economically feasible price and scale for institutions and businesses such as schools, hospitals, food service companies, restaurants, hotels, grocery stores, government, and food banks and other organizations serving underserved communities.

The Project's analysis identified the need and opportunity for the proposed food hub to provide a direct market channel for local source-identified fresh produce geared to distributors and wholesalers serving the institutional, business, government and other customers described above, as well as to larger customers directly if there is a market gap. Thus, the *Cost Estimate Analysis* is geared toward a flexible food hub model that would fill this identified market niche.

The model incorporates a continuum of activities and services beyond a basic hub facility, including light food processing that would provide the potential to capture more of the agricultural "value chain" for the region's growers, workers and the overall economy. It also includes services to help smaller growers increase their capacity to grow for the regional market and participate in the hub, and marketing activities to create a strong brand for the produce and value-added products. These services are described in the *Cost Estimate Analysis* and the *Business Plan*, and a key distinguishing feature of the food hub compared to conventional fresh produce aggregators, distributors, wholesalers and processors.

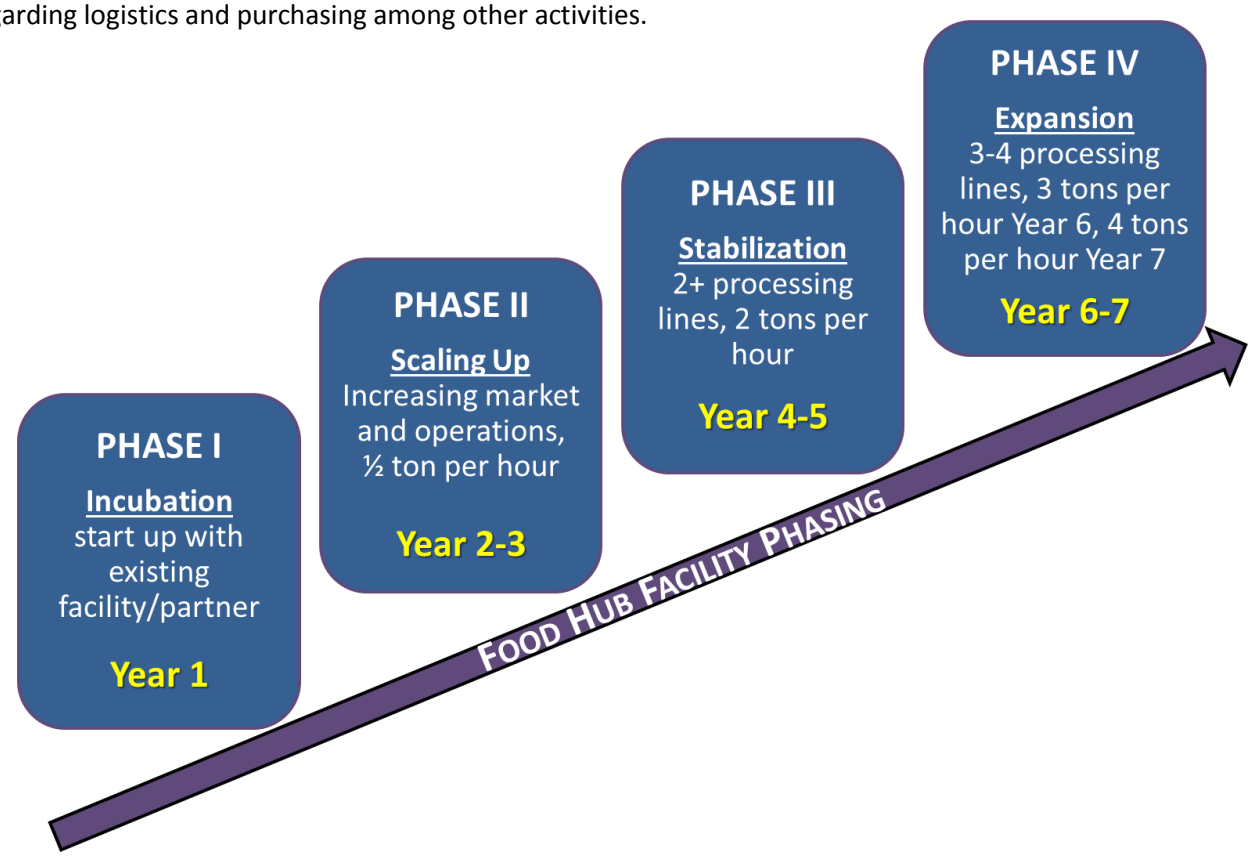
The next sections of this *Analysis* present information and assumptions on estimated project costs and operating expenses for the Sacramento Valley food hub model. They include project phasing, cumulative investments by major cost categories and phases, a description of in-depth operations of the facility, and a detailed budget with specific cost category itemization. It is important to note that the initial operating expenses contained herein have been expanded and updated for the hub pro forma financial feasibility analysis referenced in the *Business Plan*. Project costs are for the construction of a new facility, to provide a benchmark for the cost structure. Costs for retrofit of an existing facility would vary widely depending on existing building conditions and requirements to meet both regulatory requirements and the needs of the hub.

II. SACRAMENTO VALLEY FOOD HUB MODEL PROJECT PHASING

As with any business, a food hub agricultural enterprise will undergo several phases of growth once it is established. This document presents a cost analysis for estimated project investments for construction, equipment and installation expenses through four phases. The conceptual hub facility model is based on the assumption that the operation has a start-up phase (Phase I) and experiences one to two years of growth (Phase II) in a leased facility as it scales up operations. The hub moves into its own facility and adds freezing processing functions during Phase III, gaining the ability to sell consistently to larger institutional buyers with a stabilized level of operation on two+ production lines. The facility reaches full capacity on three production lines during Year 6 and expands in Year 7 with four production lines as the market grows for the hub's services and products, and there is the addition of more processing equipment (Phase IV).

These phases will be considered in determining the feasibility of the operation in terms of cash flow and the internal rate of return (IRR). With this framework in place, the requirements for start-up of the project and the different phases of operations can be estimated, based on market factors.

The graphic below illustrates the four phases of the food hub facility (plant) model and the levels of production (tons of produce per hour) that is the "throughput" for the level of operations encompassing a variety of types of fresh produce. The analysis originally looked at the potential to incubate the hub within an existing facility such as a food bank for at least the first year or two of operations, depending on the capacity and interest of the organization. Based on consultation with the food banks, this option does not appear to be likely, although it is possible that an entity such as an existing fresh produce distribution company could partner with the hub to begin developing the dedicated market channel for locally grown fresh produce. The *Food Banks and Food Hub Development* report discusses this analysis further, along with partnership opportunities with the food banks regarding logistics and purchasing among other activities.



Options for Phase II could include expansion within a partner organization facility, moving to an existing stand-alone facility, or co-locating alongside an existing aggregation/distribution hub operation. During this phase, the total volume of product moved through the hub increases as hub managers develop market and supplier networks. Some equipment is purchased for the operating lines and planning is underway for the development of the new hub facility. In Phase III the hub moves into the new facility, and capacity is added for increased throughput (tons) of fresh produce and a range of value-added activities on two+ production lines, including a variety of light food processing. There is also an increased level of services. Phase IV includes an expansion of throughput and ability to add value through an increased variety of activities on up to four production lines.

As the volume of product throughput increases with the growth of operations, there is potential for the hub to work with medium and large growers or other partners with existing agricultural infrastructure to leverage the use of their facilities as receiving stations and aggregation points for fresh produce throughout the region. This produce then would feed into the hub facility which ideally would be located close to markets and transportation. Phase IV includes expansion of space and increased processing capacity that is more mechanized, along with receiving stations located elsewhere in the region that would increase the level of product going to the facility.

As noted, the baseline cost estimate for reaching a stabilized level of operations by Year 5 in Phase III is calculated for a new building, or "greenfield plant." Options were explored such as leasing or purchasing an existing facility but a suitable facility was not identified which met needed project specifications or which could be retrofitted cost effectively. However, an exhaustive real estate inventory analysis was not conducted and it is possible that a viable facility could be identified. Another option would be to partner with an existing operation which is seeking to increase its access to source-identified locally grown produce. This strategy is finding success in other parts of the country. Analysis and interviews identified at least two local food distribution companies that had appropriate available space with cold storage for leasing.

The hub model is location neutral; however, some location alternatives with varying costs such as for permitting fees were identified which provided input data for the financial feasibility analysis.

Table 1 following provides a summary of the assumptions used to formulate the project development phasing activities that will drive the required cost category expenditures for planning and development of the food hub, including the facility and equipment.

TABLE 1. ASSUMPTIONS FOR THE SACRAMENTO VALLEY FOOD HUB PHASING DEVELOPMENT ACTIVITIES, YEARS 1-7

Year/Phase	Hub Project Development Activity Assumptions
Year 1: Phase I	There will no expenditure of funds on any construction or equipment, as the project will lease facilities and equipment. If co-locating with a partner organization such as a food bank, the hub could have access to facilities and equipment such as conveyors, forklifts, and so forth.
Year 2: Phase II	Some acquisition of basic processing equipment will take place while the project stays in the leased facility, or with a food bank/partner organization. The hub also may choose to move into larger leased space which would have existing cold storage capacities. The planning for the hub's own facility will start, and will include the identification of a site and design of the hub facility and operations.

Year 3: Phase II	Construction work will be carried out during Year 3, and the majority of the needed handling and processing equipment will be acquired and installed. Medium to large scale farmers with existing receiving and cleaning stations would or may be acting, on a contract basis, as receiving stations for the hub. Production will be about one half ton per hour.
Year 4: Phase III	Operations begin in the new facility. Each year additional investment will be made to expand the hub's processing capabilities. There will be two processing lines for tender and firm fresh produce pack and cut, and one line prepared for freezing operations. Production will be one ton per hour.
Year 5: Phase III	In Year 5, the hub reaches a point of stabilization. Produce freezing preparations would be added, with the freezing capabilities already in place due to proper planning of the refrigeration system. The line could also be adapted for drying produce. There would be a trade-off between the three lines, as capacity is scaling up – the hub would actually be using 2+ lines at any one time. Production will be two tons per hour. During the year, due to increased plant productivity, the storage capacities on the raw and finished product sides will be increased by introducing a rack storage system, thus utilizing the building height to gain additional storage space.
Year 6: Phase IV	The need for additional space will manifest itself due to the increase of the throughput (produce); thus some additional equipment would be acquired. The three lines will be running at full capacity. Production will be three tons per hour. To increase the availability of raw material (produce) sources, the use of receiving stations at more distant locations may be required. This process would formalize existing farmer owned (or other) receiving stations, which would enable growers located as far as 90 miles away to sell their produce to the facility. Or additional full-scale hubs could be developed throughout the region, focusing on particular markets niches and contributing to a "network" of hubs.
Year 7: Phase IV	The project will look into expanding its market niche and get into in-depth processing, with the most suitable and profitable options outlined in the next section of this report under "Potential Processing Lines." The Cost Estimate budget includes the most expensive of four potential processing options (freezing line), plus additional auxiliaries in support of that option. With the fourth line for a higher level of freezing capability, the third line blast freezer can be converted to a dryer for dehydration. Other options include adding a jam and sauces line, or an aseptic line for fruit and vegetable purees. Production will be four tons per hour.

Source: Foodpro International, Inc.

The next section of the analysis provides an overview of estimated food hub model costs, by major cost categories and by year as the hub scales up operations.

III. OVERVIEW OF FOOD HUB MODEL COSTS

This section provides a summary of annual estimated project investment costs for the food hub model from start-up through Year 7, and estimated cumulative investment costs required through Year 5 (Phase III), when the hub is targeted to achieve a stabilized level of operations and begins having a positive cash flow (see the *Business Plan*). Detail on facility and project operations is provided in Section IV.

As noted earlier, the Sacramento region has many valuable assets that comprise the regional food system. The proposed food hub is designed to provide a more diverse level of activities and capacity than currently exists and address gaps that would better connect growers and distributors with expanded markets. In particular, this includes distributors, institutional buyers, retailers and wholesalers that require the aggregation of fresh produce to meet their higher levels of need (volume), with some additional processing and preparation of the produce to meet varied customer needs. It also includes a variety of services to support and increase the capacity of growers.

As a point of reference, Table 2 illustrates the types of grower services and activities offered by regional food hubs, to inform the development of the Sacramento Valley Food Hub model along with the information provided in the report *Establishing a Food Hub for the Sacramento Valley*. The cost estimate budget is based on the construction costs of the facility and equipment and installation costs required to provide the desired hub functions and services, which are described in the narrative about hub operations.

TABLE 2. SERVICES AND ACTIVITIES OFFERED BY REGIONAL FOOD HUBS

Operational Services	Producer Services	Community/Environmental Services
Distribution	Actively linking producers and buyers	Increasing community awareness of "buy local" benefits
Aggregation	Transportation, on-farm pick	Distributing to nearby "food deserts"
Brokering	Production and post-harvest handling training	Food bank donations
Branding and market promotion	Business management services and guidance	Youth and community employment opportunities
Packaging and repacking	Value-added product development	SNAP (food stamp) redemption
Light processing (trimming, cutting and freezing)	Food safety and good agricultural process (GAP) training	Health screenings, cooking demonstrations
Product storage	Liability insurance	Transportation for consumers
		Recycling and composting programs

Source: "Regional Food Hub Resource Guide," USDA Agricultural Marketing Service, April 2012, p. 6

OVERALL HUB FACILITY COST ESTIMATE

The model hub facility is calculated to be approximately 22,150 square feet (SF) of space. Table 3 on the following page provides a cost estimate by major cost center categories by year for the hub for Years 2 through 7. The total estimated project investment through Year 7 is approximately $6.9 million.

TABLE 3: DRAFT SACRAMENTO VALLEY FOOD HUB PROJECT INVESTMENT COST ESTIMATE BY MAJOR COST CATEGORY BY YEAR, YEARS 2-7

Cost Center Category	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Total Cost
BUILDING* (160 x 140 SF)		$1,425,521			$392,000		$1,817,521
REFRIGERATION*		$555,012					$555,012
PRODUCTION EQUIPMENT (FRESH & FROZEN)	$498,482		$144,966	$245,154	$48,000		$936,602
PRODUCE HANDLING/STORAGE				$175,480			$175,480
FIRE PROTECTION		$193,602					$193,602
AUXILLIARY SYSTEMS & EQUIPMENT	$59,200	$586,730	$325,730	$2,000		$78,000	$1,051,660
POTENTIAL PROCESSING LINES & AUXILIARIES					$240,000	$675,000	$915,000
PROJECT SUB-TOTAL	**$557,682**	**$2,760,865**	**$ 470,696**	**$422,634**	**$680,000**	**$753,000**	**$5,644,877**
MOBILIZATION (permits, testing,		$48,593	$2,353	$2,113	$3,400	$3,765	$60,224
ENGINEERING & MANAGEMENT	$265,484	$165,927	$61,191	$54,943	$88,400	$97,890	$733,835
PROJECT TOTAL	**$823,166**	**$2,975,385**	**$534,240**	**$479,690**	**$771,800**	**$854,655**	**$6,438,936**
CONTINGENCY (@ 7.5%)	$61,737	$223,154	$ 40,068	$35,977	$57,885	$64,099	$482,920
GRAND TOTAL PROJECT VALUE (CAPITAL TO BUILD & INSTALL)*	**$884,903**	**$3,198,539**	**$574,308**	**$515,667**	**$829,685**	**$918,754**	**$6,921,856**

Source: Foodpro International, Inc.

*Includes structures and general mechanical, engineering and plumbing (MEP). Does not include Traceability and Inventory Software. Sales Tax rate (Sacramento County) – 8%

There are many variables at play which could alter the hub facility cost estimate, including costs of land, permits, and infrastructure. There also is a potential for cost reductions based on possible incentives such as land write-downs by a jurisdiction, permit streamlining, new incentive programs such as sales tax exemptions for the purchase of manufacturing equipment, and energy and utility rebates and incentive programs. This Cost Estimate budget also contains an overview of operating costs that the project would be incurring on a regular basis (see Section IV). This information is expanded upon significantly in the hub pro forma feasibility analysis.

In terms of the first year costs, the Project Team developed an initial budget that included an estimate for a standalone operation and one that could be incubated within a food bank, thereby reducing initial entry and operating costs. It was determined that there were essentially no capital costs incurred in Year 1, whether or not the hub is a stand-alone operation or incubated within a food bank or other operation. However, assuming that the hub is a for-profit entity (see the *Business Plan* for an explanation of the recommended for-profit model), the food banks expressed concerns about keeping brands differentiated due to the different missions of a for-profit and a nonprofit. Another concern was whether or not it would be more difficult for a food bank to receive donations or obtain lower costs for food if the hub were paying growers a higher price for the same crops. Estimated start-up (first year) costs are addressed as one of the variables in the pro forma analysis for the hub.

HUB FACILITY COST ESTIMATE, PHASE III

Phase III is a snapshot of the hub at a stabilized level of operations after scaling up and moving into the new facility. By now, the hub will be operating with three packing and processing lines and a variety of pre-cooler, cooler and freezer space for raw produce and finished produce, with a production of two tons per hour. There is additional space to accommodate dry storage and an outside facility area for outdoor pre-grading as part of a receiving station. This time point was selected as the target scale at which the hub needs to operate to reach a sustainable level of production.

Table 4 provides a summary of the key budget cost categories for the estimated overall project investment through Year 5. The total estimated project investment at the targeted Phase III level of operation is approximately $5,173,000. The project investment estimate is based on construction of a new facility, not including acquisition of land, but including costs of utilities and water and wastewater infrastructure. It includes all costs for equipment, fire protection, auxiliary systems, office and employee space, engineering and permitting costs, and contingencies.

Development costs will vary depending on whether or not the facility is developed at a site that is already serviced with infrastructure, or where infrastructure needs to be provided. For purposes of this analysis, it is assumed that the site will be serviced with existing infrastructure. If not, additional infrastructure costs must be added for water and wastewater treatment; cost categories are provided for these items in the budget estimate detail. Selection of potential sites should differentiate between an acceptable site and a better site based on criteria such as availability of infrastructure and size of site.

TABLE 4. DRAFT PROJECT INVESTMENT BUDGET ESTIMATE BY MAJOR COST CATEGORY AT PHASE III (YEAR 5)

Cost Center Category	*Total Cost*
BUILDING* (160 x 140 SF)	$ 1,425,521
REFRIGERATION*	555,012
PRODUCTION EQUIPMENT (FRESH & FROZEN FRUITS/VEGETABLES/GREENS)	888,602
PRODUCE HANDLING/STORAGE	175,480
FIRE PROTECTION	193,602
AUXILLIARY SYSTEMS & EQUIPMENT	973,660
MOBILIZATION	53,059
ENGINEERING & MANAGEMENT	547,545
CONTINGENCY	360,936
TOTAL	**$ 5,173,417**

**Includes structures and general mechanical, engineering and plumbing (MEP)*

Source: Foodpro International, Inc.

A more detailed construction and equipment investment budget estimate by cost category and year is provided in Section V, Table 5 of the report. Leasing or buying and modifying an existing facility might reduce the investment required, depending on retrofitting needs and other requirements, if an appropriate facility could be located. Incentives, rebates and sales tax exemptions for equipment are or may be available that would reduce

capital outlay. Some of these potential opportunities are discussed in the *Business Plan* and *Impediments to Supplying Locally Grown Foods.*

Given the size of the facility and needs for outdoor uses on the site, such as truck parking and circulation, employee and customer parking, waste disposal, external pre-grading station, possible equipment storage and repair, and at least one refrigeration pad, five acres would be sufficient for the site for Phase III operations, allowing room for expansion. More specific site location requirements are discussed later in this report.

Details on operating expenses and assumptions are provided in Section VI. These estimates are refined in the pro forma financial feasibility analysis conducted for the *Business Plan*, but the original estimates are presented in the *Cost Estimate Analysis* to reflect the assumptions regarding the development of the estimates.

IV. HUB FACILITY PROJECT OPERATIONS

OVERVIEW OF HUB OPERATIONS

As described in the previous section of this document, the proposed food hub is designed to undergo several phases of operations, from basic aggregation, packing, packaging and distribution activities during the start-up and early expansion phases, to gradually put in place increased value-added activities such as light processing that will position the hub to develop a viable regional market niche for fresh produce. This section describes functional operations when the hub facility reaches this level of scale during Phase III.

There are five primary functions that will be targeted for the proposed food hub facility model in Phase III. It will be important to select products for this venture that can be marketed either fresh or frozen, to provide flexibility for changing market conditions, and to extend seasonality and shelf life. The *Business Plan* provides an analysis based on a mix of target crops that reflects a variety of market factor and analyses, which are described therein. The flow of operations and labor requirements are addressed for the following functions, which represent a continuum of services:

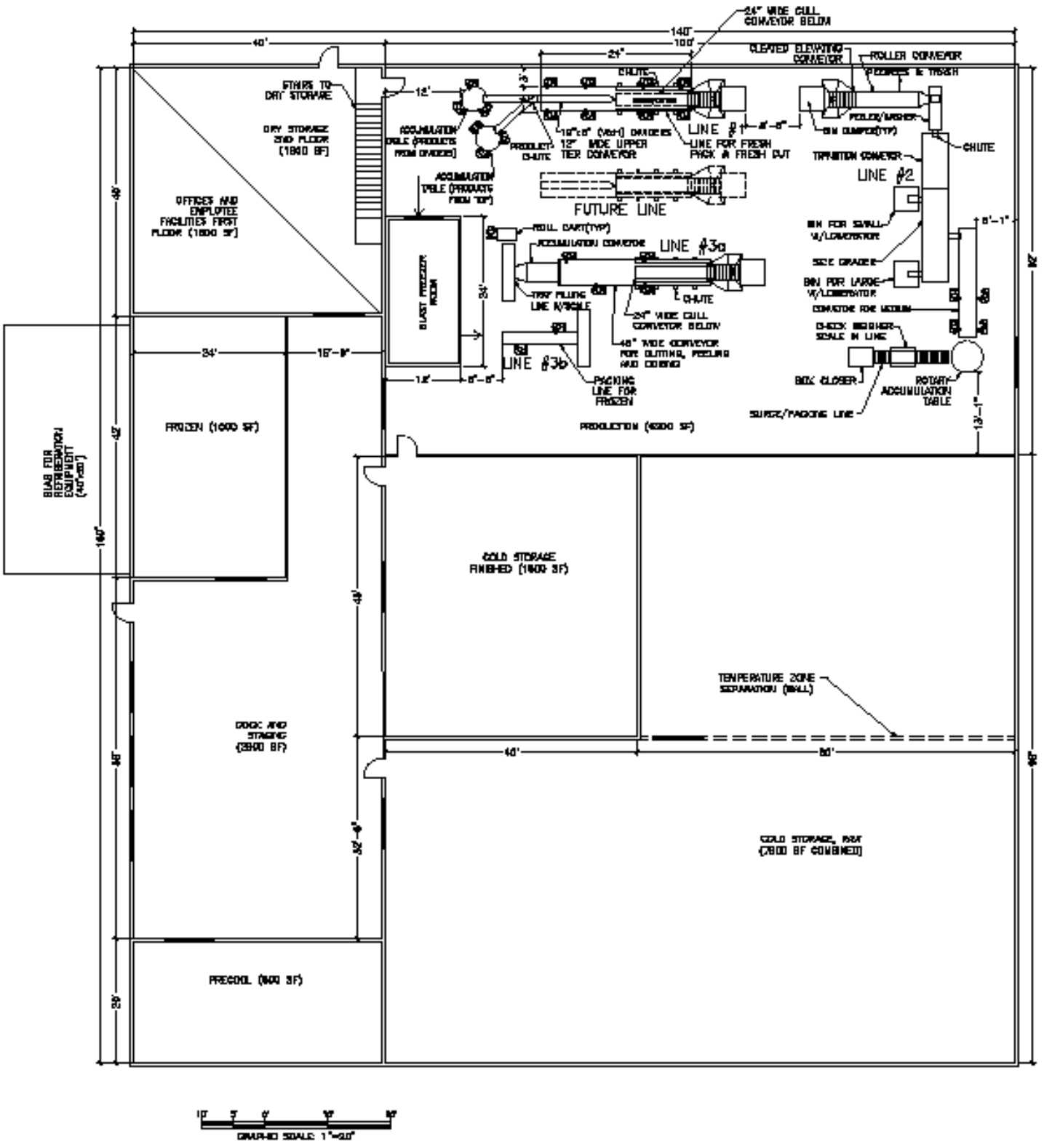
- Receiving and aggregating the produce
- Pre-cooling
- Packaging, packing, and/or adding value such as through peeling and cutting
- Processing
- Storing and shipping

The schematic on page 14 provides a conceptual layout of the hub facility (plant). The plant is designed for flexibility to accommodate diverse types of produce. It illustrates areas for loading docks and staging, various levels of cold storage, frozen storage and packing and processing, office space, and a mezzanine for dry storage, as well as proposed layout for placement of equipment for packaging and other operations. If the operations for Phase III do not immediately require all the storage space, there is potential for this space to be sub-leased until this capacity is needed. There is ability for additional space and equipment to be added in Phase IV.

The plant layout and budget estimates are provided for operations that are estimated to occur between Years 3-5. This would represent an expansion of the plant's capacity for input of product from one ton an hour in Phase II to two tons an hour in Phase III. Installation of additional equipment and development (construction or retrofit) of a large hub facility (more than 22,000 S.F.) would enable the plant to operate at this larger volume in Phase III. There is capacity to increase production for 3 tons an hour on three lines at full operation in Year 6. In Year 7 and beyond, the building could be expanded and additional, more mechanized equipment added in order to double the throughput capacity from Year 5, to four tons per hour (Phase IV), as the market increases for the facility's products and services.

The narrative below provides an overview of some of the key elements for the plant, from the receiving station which is part of the hub, through the different stages of handling produce within the facility. Each element will be important for the food hub's success. The overview will be followed by a more detailed explanation of project operations.

PACKING/PROCESSING CENTER LAYOUT



Receiving Stations

In the early Phases 1-2, the food hub will include a receiving station, which will be the point of entry for produce from the general area where the plant will be located, within approximately a 30 mile radius. This will provide the hub with the volume of produce needed for the projected input of one ton per hour in Phase II. The hub also will rely on informal or smaller "satellite" locations throughout the region, including those hosted by partners such as farmers, processors and other agricultural-related businesses and food banks/non-profits with excess capacity. These smaller locations will have contracts with the hub to receive, wash and store product from smaller nearby producers and transfer the produce to the hub.

As the food hub grows, the satellite receiving stations may become more formalized, with the hub providing capital to increase receiving station capacity and working with larger growers with existing infrastructure capacity throughout the region. The expansion of plant operations in Phase IV assumes an increased volume of produce received from these and additional receiving stations located throughout the region. These receiving stations would be the point of entry for produce from contiguous areas which represent potential expanded input for the plant. They would allow different types of produce that are grown in various parts of the region to be aggregated, packed, stored and processed at the plant, and help gain efficiencies in the transportation of produce throughout the region and beyond. It is estimated that this expansion would provide access to the volume of produce needed to increase throughput from two to three to four tons an hour.

A case study prepared by SACOG for Yuba County contains an expanded cost estimate for a hub facility option that includes a receiving/transfer station function that could increase the hub's access to fresh produce from the northern part of the region. This would include nearby counties such as Butte, Sutter and Colusa Counties.

Perhaps more important will be the inclusion of an agricultural "advisor" to serve the receiving station at the main hub facility, satellite locations, and eventually, the remote receiving stations. This position will help assure that the grower follows through to provide the produce to the plant; that the grower plants the right crops and achieves maximum yield; that waste is reduced; and that the grower receives the assistance needed to participate effectively. The advisor will grade the produce, make sure the field heat is removed and, finally, ensure that the grower is paid promptly for acceptable product delivered. The equipment at the receiving stations will enable the operator to separate the product by attributes such as size, color, quality and grade as needed and move it into cold storage. This will enable the grower to know which of the product meets the procurement standards and the amount of the payment for the grower. Any product not meeting the standards remains the property of the grower.

The design and analysis for the hub is location neutral, but should be in a location central with good transportation networks for receiving produce from the Sacramento Valley, foothills and contiguous areas, and reaching customer markets in the region and beyond. With the hub and some satellite receiving stations, the growers northeast of Sacramento likely would have to travel a bit more than 30 miles to deliver their produce to the hub but most others would be within 30 miles. This would cover a wide swath of the productive area from the Butte County area on the north to the Modesto area on the south, to the Foothills of the Sierra and the eastern part of the Bay Area.

The equipment at the remote stations will be similar to the "outdoor pre-handling" equipment planned for the plant. The plan is to locate the remote receiving stations next to a cold store so that once the produce is classified and the payment to the grower settled, the product can be stored to facilitate the logistics of supplying the plant with raw material (fresh produce).

Pre-Cooling Capacity and Storage

From the beginning of operations, a central component of the success of the food hub will be the use of pre-cooling equipment. The plant will have a modern dock for the receiving and shipping of produce. It is highly recommended that truck pick-up and delivery of product be coordinated and scheduled by the hub staff. Adequate space in the design has been provided on the dock for the pre-staging of product once it has been received or is in preparation for shipping. Arriving product that has not had the field heat removed will be moved to the pre-cooling room to have its internal temperature lowered and thus start the cold chain. This is essential to ensure adequate shelf life, optimize freshness, and reduce food waste. All customers will be pleased with the extended shelf life; some will insist on it.

With the field heat greatly diminished, the produce will be stored in one of two cold stores, depending on the storage needs for that product, in preparation for packing/processing. One room will be maintained at about 50 degrees Fahrenheit (F), while the other will be at about 34 degrees F. As scheduled, the product will be moved to operations for packaging, packing and/or processing. Scheduling the truck pick-up and delivery of the produce will be part of the overall logistics process coordinated and managed by the hub.

Processing Capacity

Basically, the operation is comprised of three lines in Phase III, each with the capacity of processing a ton per hour. While this provides a potential plant capacity of three tons per hour, it is not likely that more than two lines will be operating at any given time until Year 6, when capacity will increase to 3 tons per hour. The lines are described as follows:

Line Number One (Packaging, Packing, Fresh-Cut for Tender Produce): In general, line number one is planned for the packing of and adding value to fruits and vegetables that are more susceptible to bruising and other handling damage. The value added would primarily be limited to special packaging and packing as requested by clients, but could include special slicing and dicing as for fresh cut.

Line Number Two (Packaging, Packing, Fresh-Cut for Firm Produce): This line is planned for all other fruits and vegetables, primarily those that are more rigid or forgiving with respect to handling. Primarily, this line will produce product in special packages to facilitate the needs and desires of customers, but will also add value through peeling (e.g., onions and carrots), slicing and dicing.

Line Number Three (Freezing): The third line will be for adding more value in that the product will be prepared for freezing individual pieces of fruits or vegetables on trays in a blast freeze tunnel. This line can also be used for the preparation of produce for drying when the operation is expanded in a later phase (Phase IV), when additional freezing equipment is added, by converting the blast freezer enclosure to a dryer.

Packing and Storage

Cartons will be set up and dispensed from the dry storage area over the office which is where the fiber for the boxes is stored. The cartons will be set up and fed to each line by gravity which will keep the floor space free for processing and packing rather than for pallets of fiber and boxes. Once the product is cleaned, classified and/or has value added, it will be packed in a carton and unitized on a pallet near the end of each line. As each pallet is filled, it will be moved to storage, either in the fresh finished goods store or the store for frozen product. From storage, the product will be moved to the dock as scheduled for shipping, where it will be pre-staged to await the arrival of the truck.

Pallet racks will be placed in each of the storage rooms so that the plant can take advantage of the 24 feet of clear stacking height available. Initially, there will most likely be sufficient storage capacity without the racks but it will probably be necessary to start adding racks during the first year of operations; all racks will probably be needed by the end of the second year. If the hub is in an existing facility, it would be preferable to have 24 feet clear stacking to facilitate the use of pallet racks and floor drains in the process area.

Other Value-Added Activities

Other things to consider for a future expansion will include a line for the cooking, pulping and finishing of fruits and vegetables to produce a product generally classified as a puree, from which sauces, hummus, jams, jellies and a variety of other products can be made. Also to be considered for the next phase will be the replacement of the blast freeze enclosure with a modern IQF (Individually Quick Frozen) tunnel and the addition of dehydration equipment through conversion of the blast freeze enclosure. The layout for the hub facility shown above includes space for a fourth line, to be added in the future as operations expand. Cost estimates are provided for options such as equipment for the IQF freezer tunnel, the conversion for a dryer, a jams and sauce line, an aseptic line for fruit and vegetable purees, and boiler systems. A cost estimate for a production line for processing and bottling fresh produce was prepared for the Yolo Food Bank and provides another indication of the cost for the types of equipment needed for these other value-added activities. See the *Food Banks and Food Hub Development Report* for this information.

DETAILED PROJECT OPERATIONS

The following section describes in more detail the flow of operations for the plant.

Aggregating and Receiving the Produce

Most product (produce) will be delivered directly to the plant's dock, especially by the larger growers who have equipment to clean and grade the produce. Typically, the produce will be tipped from baskets onto the pre-grading line, but some will be tipped from pallet bins. Any very small produce items (commonly known as "pee-wees"), trash and culls will be removed from the flow of product, which will then be passed over a de-stoner, washed, classified as necessary on a conveyor, and dropped into a pallet bin and weighed. It will then be placed into cold storage to await transportation to the plant.

Meanwhile, based on the weight or the piece count, a settlement will be made with the farmer. Acceptable produce will be delivered to the dock either by growers, by company trucks bringing in produce by satellite locations (or other receiving stations in Phase IV), or by electric pallet jack from the receiving station at the plant.

The dock will be well equipped, with the floor of the dock about 49" above the concrete approach apron. There are three doors, each equipped with seals, a dock leveler, easy lift doors and a light. Product will arrive in baskets unitized on a pallet as well as in pallet bins. Trucks will be unloaded by electric pallet jacks and the pallets of produce will be staged on the deep dock (40') until the truck is unloaded and a receiving slip prepared.

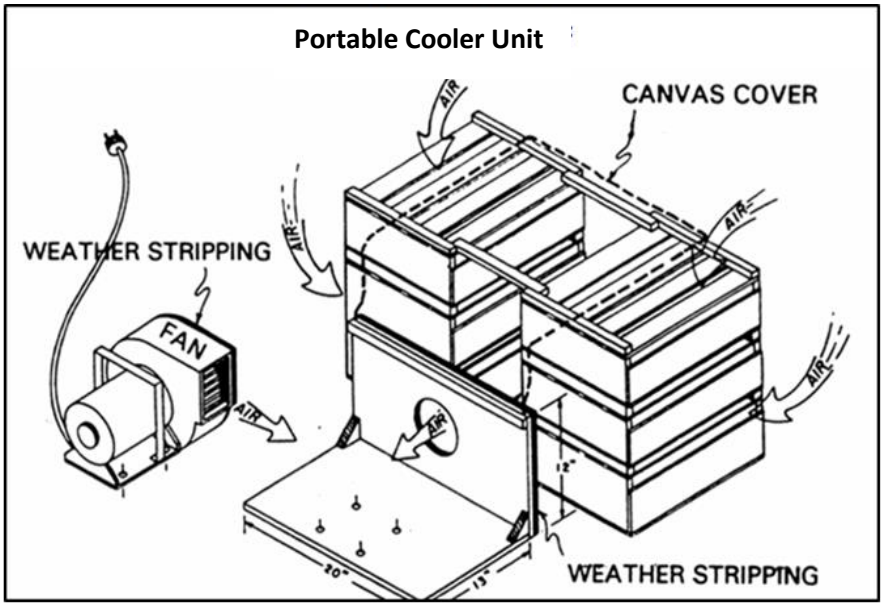
Product will also be staged on the dock by electric pallet jack until all from such lot has been accumulated. It also will be checked and a receiving slip prepared. When product is received - either from the field or other storage facilities - the truck will back up to the dock (or park in front for side loaded trucks), with product either in baskets or in pallet bins. If in baskets, they should be unitized on pallets but if not, this will need to be done as they are received. Providing the growers with plastic crates is an important part of the plan as not only will it make it easier to handle the produce as it is received at the plant but it will be a very important part of the effort to gain the loyalty of the growers. Use of the crates which will be washed every cycle will be an important part of the food safety assurance program.

Pre-Cooling

A forklift will then be used to move the palletized produce to either the pre-cooling room, the high temp (48°F.) store or the low temp (34°F.) store. Removal of the field heat takes place in the pre-cooling room where the product is lined up, one pallet deep and two high, on both sides of a slot in the plenum wall. Eight double stacks of pallets are lined up on each side of the slot and a canvas is rolled from the plenum wall along the top of the two lines of palletized product which are separated by about four feet and down over the end of the two rows of product on pallets stacked two high, basically forming a tunnel between the two rows.

The air circulating fan connected to the coil is then turned on causing chilled air to be sucked through the slot in the plenum wall which makes the canvas cover cling to the pallets of product so that no air can by-pass. The air then passes through the coil to an opening in the top of the wall, thereby supplying chilled air to the room. This air has no way to return to the coil except to pass through the product lined up along both sides of the "tunnel" between the two lines of product on pallets.

Once the temperature of the product has been reduced to the proper level, the product is moved by forklift to one of the two raw material storage rooms. This pre-cooling process is essential since it will at least double the shelf life of the produce, giving the end user time to use the product in an orderly manner. It is so important that it needs to be accomplished from the start. Unfortunately, the pre-cooler described above cannot be justified initially. Therefore, the portable unit



Source: Parsons, R.A. and Kasmire, R.F. 1974. Forced-air unit to rapidly cool small lots of packaged produce. University of California Cooperative Extension, OSA #272.

shown here is recommended for the initial phase of the operation.

This small system can be used to remove the field heat from produce items during the initial phase of the operation. The produce, either in a perforated box or a perforated pallet bin, is placed against the unit as shown. The canvas cover rolled over the top and open end forces the air to pass through the produce. This must be accomplished in a refrigerated room in order for the air to remove the field heat from the product.

Packaging, Packing and/or Adding Value

As scheduled, a forklift will be used to remove the product from the storage rack in which it was placed and stage it on the floor, to be moved to one of three lines in the process area by an electric pallet jack or a Big Joe forklift, depending on whether the produce is in baskets or a pallet bin. Pallets of product in baskets will be placed on the floor alongside the hoppers feeding the lines, while product in pallet bins will be placed into a bin tipper. The operator at the feed end of the line will either operate the bin tipper to transfer the load to the hopper as needed, or will commence tipping baskets of product into the hopper as needed to keep the line properly fed.

Processing

The plant will have three processing lines in Phase III, described below.

Line One: Tender fruits and vegetables packing and/or packaging: The product is moved to the line by an electric pallet jack and set beside the feed hopper. If the product is in baskets, the line operator will empty the baskets into the feed hopper to feed the line at a steady aggressive speed. If in a pallet bin, a Big Joe forklift in the area will be used to place the bin in the bin tipper and the line operator will use the control to tip the bin at a rate needed to keep the hopper full. At the bottom of the hopper belt with cleats moves the product from the hopper to the line as needed to keep the crew working at an efficient pace. Sufficient personnel will be assigned to the first conveyor to handle the necessary tasks which vary according to the quality of the produce. From one to six people can work on this line but the standard crew is four.

The produce will be split into two streams by a divider on the conveyor, one stream on each side. The personnel will remove culls and any other undesirable material from the flow of product and drop it into a slot on the side of the conveyor, which guides it onto a belt conveyor below the primary conveyor and moves it into a bin located to the side of the line. This crew can sort product into an isolated lane at the center of the main conveyor or onto a narrow conveyor mounted about a foot above the main conveyor. That way, they can sort by grade, color, defect or size depending on the raw material or the specifications for the finished product.

The main flow of product on the first conveyor will be directed onto the second conveyor which can also have up to six people working along the two sides. These people can be doing one of a number of chores, from placing fruit such as peaches in bags, and packing product such as tomatoes in trays, to packing product in cartons by hand. The line is very flexible and can be used to grade and pack almost any kind of produce item in a variety of ways. It can also be used to package produce items in a variety of packages (clam shells, trays, bags, etc.), to fresh cut and bag products such lettuce, apples and the like and even to prepare produce for freezing in the blast freeze tunnel when line three is down or more capacity is needed. Finished product can be packed in cartons or can be packaged directly from the second conveyor or from one or both of the rotary accumulation tables.

Line Two: Firm fruit and vegetable packing and/or packaging: In much the same manner as Line One, fruits or vegetables will be fed to this line from either pallet bins or baskets at a rate needed to keep the line working efficiently. Upon the product's arrival in baskets, the person feeding the line will pick up a basket of product and tip the contents into the receiving hopper. The conveyor in the bottom of this hopper will transfer the product to the trash (and pee-wees) eliminator. In addition to any trash and very small sized product, one or two workers will pull unacceptable product from the conveyor and drop it to the belt below the roller conveyor via slides. The trash and eliminated product will be conveyed to the side into a pallet bin.

The produce, as fed from the hopper by a belt with cleats, will feed a powered roller conveyor that will allow the very small produce items (pee-wees) to fall between the rollers. This conveyor at the feed end of the line will also provide the opportunity to get rid of trash and culls before the produce is washed at the next station.

The clean produce is then conveyed via a transfer conveyor to a size grader where it is separated into four sizes. The predominant size (small, medium or large) will be conveyed to the packaging line. The other three sizes (including jumbo over the end) will be dropped into pallet bins via a special articulated conveyor known as a "lowerater" to minimize damage to the produce. At a later time (usually near the end of the shift), the other sizes will be run over the line for packaging and/or packing.

Following size grading, a special piece of equipment can be inserted into the line for removing the peel from the produce items. This can range from peeling carrots and potatoes with an abrasive peeler to the peeling of onions with air pressure. Once the product is bagged, tray packed, wrapped, or placed in a clam shell, it will be packed from a rotary accumulation table into cartons. The packed cartons will be unitized on a pallet and moved to the finished goods storage room by an electric pallet jack where it will be staged until it is placed into a rack by a forklift. Early on the day it is scheduled for shipping, it will be moved to the dock and staged waiting for the arrival of a truck to pick it up.

Line Three: Preparation line for adding value to product destined to be frozen: In the same manner as described for Line One, product will be fed to this line. However, this is special product that is destined to be reduced in size by slicing and/or dicing and the individual pieces frozen on trays in a blast freeze tunnel. In some cases, the product will be peeled prior to being cut into smaller pieces. Although the end product is not what is commonly known as individually quick frozen (IQF) product since it is accomplished on trays rather than on a fluidized bed, it actually is individual pieces of product which are quickly frozen (quick but not quite as quick as on a fluidized bed). Peel and other trimmings will be dropped through slots on the side of the conveyor onto a collection conveyor mounted below the principal conveyor and will be conveyed to the feed end of the conveyor where it will be transferred into a pallet bin.

The vegetables which will be processed on this line will include spinach, broccoli and cauliflower while the fruits would include peaches, nectarines, strawberries and other varieties of berries. It will be important to select products for this venture that can be marketed either fresh or frozen. This flexibility is important because when the fresh market is slow or there is a glut of a product, it can be frozen to extend the shelf life. It is also important to note that, as the business grows and future phases of growth are implemented, this line can also feed a dehydrator. At that time, the blast freeze tunnel may be replaced by an IQF tunnel with a fluidized bed

conveyor. In that case, the tunnel can be used as a dehydrator and the trays and racks can be used for the dehydration operation.

There are two conveyors which are used to grade the produce and prepare it for freezing. The product will fall from the last of these conveyors onto a surge belt conveyor from which the trays will be filled. A plastic liner will be placed in each tray prior to filling it with about five pounds of product. Filled trays will be placed in mobile racks, 30 trays per rack. The loaded racks will be pushed into the blast freeze tunnel which has the capacity to hold 14 racks. The doors will be closed and the freezing cycle will start and last for about half an hour, more or less, depending on the product.

The racks of product, once the product is frozen, will then be moved to a stripping line where the plastic liner will be pulled from the tray allowing the frozen product on it to fall onto the conveyor. The product will be conveyed to the other end of the line where it will be packed into cartons in much the same manner as the filling of the trays with product prior to freezing.

Regarding the options for Year 7 expansion, since the marketing of the IQF product will be restricted due to the fact that freezing on trays in the rack in the blast freeze tunnel will not meet the specifications by many companies for IQF product, there will be a strong incentive to purchase and install a modern IQF tunnel. When that occurs, the earlier investment in the trays, racks, and blast freeze tunnel can be utilized for drying fruits and vegetables since it is just a matter of replacing the refrigeration coils with dehydration coils in the blast freeze tunnel to make it a drying tunnel. The trays and racks are used in a similar manner for both operations.

Storing and Shipping

Each package of the finished product will be sealed and labeled, and then, product will be unitized on pallets at the end of each line. When a pallet is full, it will be moved to one of the storage rooms via an electric pallet jack, frozen product to the freezer and fresh finished product to the finished goods warehouse. The pallet of product will be set on the floor of the room and when available, a forklift will move the pallet of product into a rack or will double stack it.

When scheduled for shipping, the product will be moved to the pre-staging area of the dock early in the day by a forklift to await the arrival of the truck picking it up. Normally, forklifts will only be used for raising and lowering things and electric pallet jacks for moving product from place to place horizontally. However, since the freezer and the finished goods store are so close to the dock, the forklift used to remove the product from the rack will generally also move it to the dock.

Material Handling Equipment

Overall, there will most likely be two fork lift trucks involved in the operation (perhaps only one initially), two electric pallet jacks, one Big Joe forklift and about four manual pallet jacks. Most likely, it will be necessary to add an extension to the dock for battery charging and to provide a place for the refrigeration equipment. The Big Joe will primarily be used to load pallet bins into the bin dumpers and remove them when they are empty. Electric pallet jacks are the most effective handling since they are quicker than forklifts and cost much less to procure and maintain.

The next section provides the investment detail for the facility budget.

V. HUB INVESTMENT BUDGET DETAIL

Table 5 which begins on the following page provides the budget detail for each cost center category of the food hub facility for the investment required from project start up (Phase I) to the establishment and operations of Phase III and expansion in Phase IV. This information includes overall quantity, number of units needed and per unit cost (or price per square foot), and total investment costs for each line item. Detail is provided for construction, equipment and installation, as well as associated expenses, such as auxiliary systems, including utilities, permits, design services, and contingency.

The items which have a unit cost provided but no quantity (and therefore no cost) shown are included as a cost category because they may be a possible cost, depending on the location of the facility and the status of utilities and infrastructure to and on the site. For example, if the facility was built in an area served by municipal utilities, a storm water pond would not be needed, but one would need to be developed if the facility was located in a rural area that was not serviced. If there is not city or county water, then it is recommended to drill a well. If there is no service for waste water, a septic tank with leach lines for the “black” waste is recommended and a parcel for the disposal of process water (either more land or a neighboring grove/parcel for irrigation).

In terms of other utilities requirements, there should be a gas line relatively close to the facility and 2,000 amps of electrical service available in the area.

It should be noted that there may be slight changes in the final cost estimates used in the hub facility pro forma analysis, based on updated market information and refinement of the project concept and budget items.

TABLE 5. SACRAMENTO VALLEY FOOD HUB FACILITY CONSTRUCTION BUDGET ESTIMATE, BY YEAR, YEARS 2-7

Job-Cost-Center Category	Unit-Cost	YEAR 2		YEAR 3		YEAR 4		YEAR 5		YEAR 6		YEAR 7		Total Cost
		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	
BUILDING* (160 x 140 SF)	**$64**		**$ -**	**22,144SF**	**$1,425,521**		**$ -**		**$ -**		**$392,000**		**$ -**	**$1,817,521**
Production space, fresh pack	$50			6,200 SF	$310,000									
Pre-cooler space	$50			814 SF	$40,700									
Cooler, raw produce (total two temperature zones)	$50			7,900 SF	$395,000									
Cooler, finished produce	$50			1,810 SF	$90,480									
Freezer, finished produce	$75			1,000 SF	$75,000									
Shipping dock & prestaging area	$50			2,800 SF	$140,000									
Cold Store Doors, Horizontal Slide, 8x10, installed	$9,456			6 EA	$56,736									
Freezer Store Doors, Horizontal Slide, 8x10,installed	$10,590			1 EA	$10,590									
Blast Freezer Tunnel Doors, 5x8, installed	$3,743			2 EA	$7,487									
Rapid Rollup Door, Staging Area, 8X10	$12,000			1 EA	$12,000									
Rollup Door, Dry Storage, 8x8	$4,562			1 EA	$4,562									
Sectional Door, Vertical lift, 12x12, insulated	$6,020			1 EA	$6,020									
Man doors, 3x8, cold store, installed	$1,605			4 EA	$6,422									
Man doors, 3x8, freezer, installed	$2,045			1 EA	$2,045									
Dock equipment (doors, seals, levelers)	$12,000			3 EA	$36,000									
Offices & Employee facilities w/MEP	$50			1,600 SF	$80,000									
Blast Freezer Tunnel enclosure (no equipment)	$35			288 SF	$10,080									
Mezzanine	$40			1,600 SF	$64,000									
Depressed truck dock approach	$35			1,440 SF	$50,400									
Slab on grade w/canopy for outdoor pre-grading	$35			800 SF	$28,000									
Addl. construction years later	$70									5600 SF	$392,000			

*Includes structures & general MEP.

Job-Cost-Center Category	Unit-Cost	YEAR 2		YEAR 3		YEAR 4		YEAR 5		YEAR 6		YEAR 7		Total Cost
		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	
REFRIGERATION*	**$8,500**		**$ -**	**65.30**	**$555,012**		**$ -**		**$ -**		**$ -**		**$ -**	**555,012**
Pre-cooler, 300 SF/TR				2.71 TR										
Raw produce storage, 385 SF/TR				20.52 TR										
Finished produce storage, 385 SF/TR				4.70 TR										
- freezer storage, 435 SF/TR				2.30 TR										
Staging area & dock, 200 SF/TR				14.00 TR										
Freezing process				6.97 TR										
Process area at 50 dF, 440 SF/TR				14.09 TR										
BASIC PRODUCTION EQUIPMENT (FRESH & FROZEN FRUITS/ VEGETABLES/GREENS)			**$498,482**	**$ -**			**$144,966**		**$245,15**		**$48,000**	**$ -**		**$936,602**
OUTDOOR PRE-GRADING			*$113,580*											*$113,580*
Destoner	$20,000	1 EA	$20,000											
Washer for field dirt removal	$34,020	1 EA	$34,020											
Sanitation system for washer	$7,560	1 EA	$7,560											
Dewatering	$27,000	1 EA	$27,000											
Grading conveyor	$ 25,000	1 EA	$25,000											
PACKING LINE #1, SOFT FRUITS/VEGETABLES	*1 TON/HR*		*$ -*		*$ -*		*$66,815*		*$ -*		*$ -*		*$ -*	*$66,815*
Receiving hopper w/cleated take-away conveyor	$5,500					1	$5,500							
Grading/sorting conveyor	$1,200					25	$30,000							
Transfer conveyors & chutes	$500					20	$10,000							
Rotary accumulation table, 4 ft dia.	$4,000					2	$8,000							
Closer applicator	$3,500					1	$3,500							
Manual scales	$350					8	$2,800							
Inkjet coder, industrial	$1,615					1	$1,615							
Trash conveyor	$600					9	$5,400							
PACKING LINE #2, FIRM FRUITS/VEGETABLES	*1 TON/HR*		*$157,920*		*$ -*		*$ -*		*$ -*		*$48,000*		*$ -*	*$205,920*
Receiving hopper w/cleated take-away conveyor	$7,500	1 EA	$7,500											

*Includes materials and installation

Job-Cost-Center Category	Unit-Cost	YEAR 2		YEAR 3		YEAR 4		YEAR 5		YEAR 6		YEAR 7		Total Cost
		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	
Peewees/trash/cull take-away conveyor	$350	10 LF	$3,500											
Brush washer	$24,000									1 EA	$24,000			
Peeler	$24,000									1 EA	$24,000			
Combo washer/peeler (Magnuson), 1 Ton/Hr	$36,000	1 EA	$36,000											
Transfer conveyor (vibratory)	$10,000	1 Ton/Hr	$10,000											
Size-grading conveyor (e.g. Kerian)	$27,346	1 Ton/Hr	$27,346											
Take-away conveyors, variable speed, 6 ft, 30" w	$3,000	3 EA	$9,000											
Bin fill lowerator	$10,000	2 EA	$20,000											
Borting conveyor	$1,000	20 LF	$20,000											
Rotary accumulation table, 4 ft dia.	$4,000	1 EA	$4,000											
Roller conveyor, caster stand, 12 ft, 30" wide	$9,000	1 EA	$9,000											
Roller conveyor, caster stand, 24 ft, 24"-30" wide	$15,000	0 EA	$ -											
Metal detector & check weigher combo	$6,000	1 EA	$6,000											
Inkjet coder, industrial	$1,615	1 EA	$1,615											
Inkjet coder, handheld	$350	0 EA	$ -											
Carton closer/sealer, mech'l	$2,160	1 EA	$2,160											
Carton sealer, handheld	$200	2 EA	$400											
Manual scales	$350	4 EA	$1,400											
PACKING LINE #3, REPACK OR FOR FREEZING	*1 TON/HR*		*$ -*		*$ -*		*$ -*		*$57,800*		*$ -*		*$ -*	*$57,800*
Receiving hopper w/cleated take-away conveyor	$5,500							1 EA	$5,500					
Grading conveyor	$1,600							10 LF	$16,000					
Sorting conveyor	$1,600							10 LF	$16,000					
Surge conveyor	$1,000							6 LF	$6,000					
Tray filling skate wheel conveyor, 30" wide	$3,500							1 EA	$3,500					
Tray fill scale	$1,300							1 EA	$1,300					
Frozen repack conveyor	$1,000							6 LF	$ 6,000					

Job-Cost-Center Category	Unit-Cost	YEAR 2		YEAR 3		YEAR 4		YEAR 5		YEAR 6		YEAR 7		Total Cost
		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	
Tray filling for finished, scate wheel conveyor, 30" wide	$3,500							1 EA	$3,500					
PRODUCTION RELATED SYSTEMS & EQUIPMENT			*$15,900*		*$ -*		*$34,560*		*$ -*		*$ -*		*$ -*	*$50,460*
Drip pans	$80	80 LF	$6,400											
QC check weighing cart	$1,500	1 EA	$1,500											
Metal detectors	$4,000	2 EA	$8,000											
Box making machine	$34,560					1 EA	$34,560							
CONTRACTOR SERVICES			*$202,460*		*$ -*		*$40,550*		*$185,620*		*$ -*		*$ -*	*$428,630*
Mechanical Installation, Process Equipment		40%	$114,960			40%	$40,550	40%	$23,120					
Electrical Installation	$250	350 Amps	$87,500					650	$162,500					
FREIGHT		*3%*	*$8,622*		*$ -*	*3%*	*$3,041*	*3%*	*$1,734*		*$ -*		*$ -*	
PRODUCE HANDLING/STORAGE			**$ -**		**$ -**		**$ -**		**$175,480**		**$ -**		**$ -**	**$175,480**
Racks, Cooler, raw produce	$200							650 postn	$130,000					
Racks, Cooler, finished produce	$200							156 postn	$31,200					
Racks on wheels for IQF, 14 per freezing batch	$150							28 EA	$4,200					
Trays for freezing racks, 30 ea. per rack	$12							840 EA	$10,080					
FIRE PROTECTION			**$ -**		**$193,602**		**$ -**		**$ -**		**$ -**		**$ -**	**$193,602**
Sprinkler system	$3			22,144	$62,002									
Fire extinguishers - allowance	$300			8	$2,400									
Fire hydrant system	$170			760	$129,200									
AUXILIARY SYSTEMS & EQUIPMENT			**$59,200**		**$586,730**		**$325,730**		**$2,000**		**$ -**		**$78,000**	**$1,051,660**
Power service (PG&E), 3/480, 1000 Amps	$50,000			1 cnnct	$50,000									
NG service (PG&E), 2000 MBTUH, allowance	$50,000			1 cnnct	$50,000									
Crate Washer	$40,000			1 EA	$40,000									
Crates	$15			2000 EA	$30,000	2000 EA	$30,000					2000	$30,000	
Pallets	$65			898 EA	$58,370	898 EA	$58,370							
Pallets Bins	$120			78 EA	$9,360	78 EA	$9,360							
Jet Precooler (Blast Fan, no	$12,200	1 EA	$12,200											
Hot water pressure washer, electric, portable	$12,000	1 EA	$12,000											

Job-Cost-Center Category	Unit-Cost	YEAR 2		YEAR 3		YEAR 4		YEAR 5		YEAR 6		YEAR 7		Total Cost
Forklift trucks, electric, w/misc. attachments	$36,000					2 EA	$72,000					1 EA	$36,000	
Pallet jacks, electric	$12,000			1 EA	$12,000	1 EA	$12,000					1 EA	$12,000	
Pallet jack, manual	$2,000			1 EA	$2,000	1 EA	$2,000	1 EA	$2,000					
"Big Joe" lift truck	$15,000	1 EA	$15,000											
Forklift battery charging stn	$10,000	1 EA	$10,000											
Floor scale, for pallets	$12,000					1 EA	$12,000							
Truck scale	$75,000													
Air compressor, packaged unit	$1,000					30 HP	$30,000							
Compressed air piping system, installed	$500					100 CFM	$50,000							
Water well	$50,000													
Water treatment allowance	$40,000													
Wastewater treatment allowance	$25,000			1 LOT	$25,000									
Septic system (for black sewer)	$40,000			1 LOT	$40,000									
Site grading incl. for retent. ponds & bldg pad prep.	$120,000			1 LOT	$120,000									
Industrial water retention pond	$120,000													
Storm water retention pond	$220,000													
Site fencing	$15			2000 LF	$30,000									
Pavement (roads & parking)	$3			40000 SF	$120,000									
OFFICE & EMPLOYEE SPACE														
Furniture (allowance)	$4,000	1 LOT	$4,000			1 LOT	$4,000							
Computers & other hardware (allowance)	$6,000	1 LOT	$6,000			1 LOT	$6,000							
Lunch room equipment, counters & cabinets	$40,000					1 LOT	$40,000							
Commissary kitchen	$ -													
POTENTIAL PROCESSING LINES & AUXILIARIES			**$ -**		**$ -**		**$ -**		**$ -**		**$240,000**		**$675,000**	**$915,000**
Remote Receiving Stations	$120,000									2 EA	$240,000			
Opt. 1. IQF Freezer Tunnel (mechanical), 1 Ton/Hr	$250,000											1 EA	$250,000	
Opt. 2. Convert Blast Freezer enclosure to Dryer	$100,000											1 EA	$100,000	

Job-Cost-Center Category	Unit-Cost	YEAR 2		YEAR 3		YEAR 4		YEAR 5		YEAR 6		YEAR 7		Total Cost
Opt. 3. Add jams & sauces line (*)	$200,000											1 EA	$200,000	
Opt. 4. Add aseptic line for fruit & vegetable purees (*)	$360,000											1 EA	$360,000	
CIP skid (For Opts. 3 & 4)	$75,000											1 EA	$75,000	
Steam or Hot Water Boiler system supply, 2 MMBTUH	$110,000											1 EA	$110,000	
Boiler system & distribution piping installation	$130,000											1 EA	$130,000	
PROJECT SUB-TOTAL			**$557,682**		**$2,760,865**		**$470,696**		**$422,634**		**$680,000**		**$753,000**	**$5,644,877**
MOBILIZATION			**$ -**		**$48,593**		**$2,353**		**$2,113**		**$3,400**		**$3,765**	**$60,224**
Permits, 0.5% OF VALUATION				0.5%	$16,593		$2,353		$2,113		$3,400		$3,765	
Testings	$7,000			1 Prjct	$7,000									
Surveys, stacking, temp. facilities, etc.	$25,000			1 Prjct	$25,000									
ENGINEERING & MANAGEMENT			**$265,484**		**$165,927**		**$61,191**		**$54,943**		**$88,400**		**$97,890**	**$733,835**
Design svcs, 8% of project		8%	$265,484		$ -	8%	$37,656	8%	$33,811	8%	$54,400	8%	$60,240	
Construction Management, 5% of project			$ -	5%	$165,927	5%	$23,535	5%	$21,132	5%	$34,000	5%	$37,650	
PROJECT TOTAL			**$823,166**		**$2,975,385**		**$534,240**		**$479,690**		**$771,800**		**$854,655**	**$6,438,936**
CONTINGENCY		**7.5%**	**$61,737**	**7.5%**	**$223,154**	**7.5%**	**$40,068**	**7.5%**	**$35,977**	**7.5%**	**$57,885**	**7.5%**	**$64,099**	**$482,920**
GRAND TOTAL PROJECT VALUE (CAPITAL TO BUILD & INSTALL)**			**$884,903**		**$3,198,539**		**$574,308**		**$515,667**		**$829,685**		**$918,754**	**$6,921,856**

(*) requires boiler system upgrade

(**) Does not include traceability & inventory software

Sales Tax Rate (Sacramento County) 8%

VI. HUB OPERATING EXPENSES

This section presents an initial estimate of the hub facility's operating expenses as of Phase III, Years 4 and 5 of operations. It also describes the assumptions for labor and other expenses. The general assumptions regarding the level of production at the facility, estimated revenues, costs of raw material (cost of goods sold - COGS), packaging and goods sold, and earnings before interest, taxes, depreciation and amortization (EBITDA) – an indicator of potential profitability, are set forth below. Additional market analysis and assessment of the supply of raw material (input) conducted by the Project Team, as described in the *Research Analysis of Food Hub Trends and Characteristics* and in the *Business Plan*, provides a more refined estimation of the costs and margins for these items. Tables 6 summarizes the overall assumptions for the hub's operations in Year 5.

TABLE 6. GENERAL PROJECT/FACILITY ASSUMPTIONS, PHASE III

Production of two tons of produce (input) per hour = 4,160 tons per year = 8,320,000 pounds per year
Revenue is $2,000 per ton, based on two tons per hour = $8,320,000 revenue per year
Cost of goods sold (COGS) averages 53.5% of revenue
EBITDA of between 15% & 30% of revenue (Earnings before interest, taxes, depreciation and amortization)

Table 7 below provides a summary of total estimated labor costs at Phase III, with 35 employee having varying levels of skills. While the wage rates may be a bit low, the allowance for payroll costs and fringe benefits is not. On average, a food hub that has food processing functions can provide opportunities for higher annual wages than for other occupations along the agricultural value chain, such as distribution functions.[1] It will be important to have professional staff who are able to develop and nurture a personal relationship with the growers as well as potential customers, including institutions which may have customized needs.

TABLE 7. ESTIMATED LABOR EXPENSES FOR PHASE III

POSITION	NUMBER	SALARY/HR.	SALARY/YEAR
Manager	one	$27	$ 57,000
Supervisor	one	20	41,600
Sales and Marketing	two	20	83,200
Unskilled	twenty	10	416,000
Skilled	five	15	156,000
Bookkeeper	one	20	41,600
Clerical	two	12	49,920
Operator, Receiving Station	one	15	31,200
Agricultural Advisor	one	20	41,600
Truck Driver	one	15	31,200
TOTAL			949,320
Payroll costs including fringe benefits (@ 40%)	Thirty-five		379,728
Total estimated labor cost			**$ 1,329,048 = 16% of revenue**

[1] Marquez, Michelle. Environmental Scan, Agriculture Value Chain, California. Center of Excellence, California Community Colleges, June 2011, pp. 15-16.

In terms of staffing related to transportation, the potential to lease trucks or hire a trucking service should be explored, along with the opportunity to partner with the food banks using their logistics capacity, routes and expertise. Table 8 below is a summary of other expense items in addition to labor.

TABLE 8. ASSUMPTIONS - OTHER ESTIMATED PROJECT EXPENSE ITEMS

ASSUMPTIONS	
EXPENSE ITEMS	**ANNUAL COST/$**
Utility cost @ 1.5% of revenue	$120,000
Maintenance supplies @ 2% of equipment cost	17,760
Transportation cost @ 1.75% of revenue (one truck with driver and three automobiles)	145,600
Advertising and promotion costs @ 1.5% of revenue	124,800
Insurance and legal costs @ 0.5% of revenue	41,600
Costs of permits and licenses @ 0.2% of revenue	16,640
Miscellaneous annual supplies (pallets, bins, baskets, hair nets, paper towels, etc.) @ 0.75 of revenue	58,240
Other Expense Items = 6.3% of revenue	$524,640
Total Operating Expenses, with Labor expenses = 22.2% of revenue	**$1,843,688**

Combining labor and other expenses, total estimated annual operating expenses would be **$1,853,688.** The numbers for these estimated operating expenses should function as a means for stimulating discussions. While the estimates are based on solid theory, determining the actual amounts to be assigned to each expense item for a particular company is almost an art and requires a great deal of reckoning. The purpose of this narrative is to explain the rationale for each line item.

In order to determine other costs as a percent of revenue (or equipment cost), in most cases the actual amount was calculated and then converted to a percent. To facilitate this, Phase III revenue was assumed to be $8,320,000 (two tons per hour @ $2,000/ton as noted above in Table 6). The utility cost is estimated to be $10,000 per month or 1.5% of revenue. Maintenance, on the other hand, is for expendables only and figured at 2% of equipment cost. The other operating expense items also are estimated as a percent of the assumed revenue for Phase III. The equivalent annual dollars are also shown for each line item.

The amount of acreage required to support the volume of input (produce) for Phase III is small enough that all the raw material can be aggregated within a 30 mile radius of the plant (see the *Business Plan* for an estimate of acreage based on a target crop mix identified in the pro forma analysis). Therefore, only one receiving station (at the plant) will be needed for this phase. Nevertheless, it is important to include an estimate of the cost to pick up some raw material from the field and to deliver most of the finished goods to customers. It has been determined that one truck with a driver will be more than sufficient to handle this work. However, it will be necessary to include three automobiles, one for each sales person and one for the agricultural advisor. It is estimated that these vehicles can be leased and maintained at an annual cost of $145,600 which, for purposes of this analysis, is 1.75% of revenue.

It is important to the success of the proposed operation to invest in promotion. Therefore, two people are included in the staffing for the development of new business; they will need a healthy budget for advertising and promoting. It is

proposed that this will require 1.5% of the assumed revenue, or $124,600. Assumptions for other expenses are explained in Table 8.

OTHER ASSUMPTIONS

For the purposes of discussion, some additional general assumptions are provided related to other items which will help determine the feasibility of this venture. These include the cost of goods sold (COGS), which in turn includes the cost of raw materials (produce) and the cost of packaging.

Cost of Raw Materials

Foodpro prepared a review of information provided by SACOG and other data on the cost of the raw material which, along with the cost of packaging, makes up the cost of goods sold (COGS). This information includes the costs for sourcing many different types of fruits and vegetables, with an estimate of the cost of each item at the farm gate and at wholesale, as well as the price that the retailer is willing to pay for each item, and the retail price for each product.

While it may not always be possible to buy at the farm gate price, it should not be necessary to pay the wholesale price, which is much higher. Even so, either one provides for rather large margins. It is Foodpro's experience that the cost of the raw material, although variable (from about 40 to 70% of revenue), should average about 50% of the revenue. Together with the packaging material, the cost should average about 53.5% for the COGS at the volume assumed for Phase III. In addition, the plant will be adding value which will increase the margin even more. The purpose of mentioning this is to caution that the analysis leading to the revenue for each product, and especially the COGS, needs to be done with great care so as to determine the most accurate costs and margins. The more refined analysis is included in the Business Plan.

Packaging Materials

Packaging material is not considered to be an operating expense but is part of the cost of goods sold (COGS). It needs to be estimated along with the operating expenses. Considering that a carton will be needed for every 40 pounds of product, 208,000 cartons will be needed annually. These will be medium strength cartons and should be two piece telescoping cartons. The cost of one dollar per carton has been verified by carton manufacturers. Additionally, some of the produce will be bagged, tray packed, wrapped, etc. (although some will be packed bulk with no "secondary" packaging), and the average cost per carton for such packaging is estimated at $0.40. The annual cost for packaging is estimated to be $291,200 for Phase III, which would be 3.5% of the assumed project revenue.

EBITDA

The EBITDA (earnings before interest, depreciation, and amortization) should run between 15 and 30% depending on the state of development of the venture. However, there is every reason to believe that the EBITDA for Phase III will be towards the upper end of that range. The mix of crops, cost of goods sold, cost to process the crops and other factors affect the EBITDA. The *Business Plan* pro forma contains a detailed analysis of a potential crop mix for each production line and the potential economic viability of each.

VII. SUMMARY

The cost estimate for a Sacramento Valley Food Hub facility is based on assumptions for construction of and equipment for a new facility. Costs might be reduced if an appropriate facility were found and could be leased, or an existing facility could be purchased and used as is or retrofitted. Indications are that there are not that many appropriate facilities available but this merits further exploration. Costs also could be reduced based on the potential to receive sales tax exemptions such as for purchase of manufacturing (processing) equipment, incentives and rebates for resource-efficient building and system design, waste utilization, and renewable energy for transportation such as Renewable Natural Gas.

Based on the location of the facility and ability to meet eligibility criteria, it is possible that some grant funding or a low interest business loan would be available through a federal, state, local or other program to assist with development costs. The *Business Plan* addresses the potential to prototype a sustainable facility and operation, including the possibility of utilizing technology innovations for food processing building design and operations working with UC Davis.

The *Business Plan* explores a range of services that could be provided through the hub, some of which could provide an additional revenue stream, such as providing assistance with Good Agricultural Practices (GAP) certification and liability insurance. It also describes the need to partner with organizations such as non-profits that are already providing valuable technical support, training and services to growers, new farmers, and others in the food system value chain.

The Appendix contains background information on IQF refrigeration capacity sizing requirements for the facility model which would be added in Phase IV.

APPENDIX A: REFRIGERATION REQUIREMENTS

IQF (INDIVIDUALLY QUICK FROZEN) REFRIGERATION CAPACITY SIZING

	DESIGNATION	Q-TY	UNITS
FINISHED STORAGE NEEDS	Racks per freezing batch	14	EA.
	Trays per rack	30	EA.
	Produce weight per tray	5.0	LBS
	Freezing batch, product input	2,100	LBS
	Freezing time	1	HR
	Freezing, throughput	2,100	LBS/HR
	Initial produce temperature	60.0	dF
	Produce freezing point temperature, average	30.5	dF
	Final produce temperature	15.0	dF
	Heat of respiration (above freezing), average	20,000	BTU/(day-ton)
	Specific heat above freezing, average	0.95	BTU/(lb-dF)
	Specific heat below freezing, average	0.45	BTU/(lb-dF)
	Refrigeration load, respiration	875	BTU/HR
	Refrigeration load, cooling to freezing point	58,853	BTU/HR
	Refrigeration load, cooling below freezing point	14,648	BTU/HR
	Total refrigeration load	74,375	BTU/HR
	Allowance for cooling of racks & trays	12.5%	
	Total refrigeration load to freeze a batch	**6.97**	TR