Skagit Valley
Migrant Worker Housing

Project Proposal to

Catholic Community Services

Engineering Design Teams 15.7 and 15.8

December 4, 2014
December 4, 2014  
Catholic Community Services  
100 23rd Ave S  
Seattle, WA 98144

Re: Project Proposal Report for Skagit River Migrant Worker Housing

Dear Mrs. Gloria Burton,

Catholic Community Services (CCS) works to develop affordable and humane housing for the less fortunate who struggle with poverty and social injustices. In Skagit County, numerous migrant workers live in farmer-provided housing that is substandard and does not meet Temporary Worker Housing Code. Seattle University Civil and Environmental Engineering (CEE) Design Teams 15.7 and 15.8 are pleased to submit the following proposal for the design of an alternative temporary worker housing (TWH) community model. The alternative housing model would assist in increasing the livability and create a community feel for the temporary workers. In addition, a cost and feasibility analysis of CCS's proposed revisions to the Temporary Worker Housing Code will be utilized to aid CCS in obtaining funding for the community model. This will ultimately create a safe and stable living environment for the migrant farm workers and their families.

This proposal addresses key background information regarding the migrant workers’ current housing situation as well as identifies the means by which we plan to research options that could add ecologic value and humane living conditions to the lives of migrant workers. We have met with and reviewed CCS’s requests and propose to assist in meeting the project development needs by providing the following deliverables:

- Cost-benefit analysis of CCS’s proposed revisions to the TWH Code.
- 30% structural design plans for the alternative housing model
- 30% civil site design for the alternative housing model
- Poster visuals of cultural village designs

The Seattle University CEE Design Teams are eager to provide consulting work in collaboration with the identified CCS needs and request. We thank CCS for this opportunity to work together and look forward to working toward the successful completion of your project.

Sincerely,

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CEE 15.7 and 15.8 Fall Proposal
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Chapter I: Introduction

Every year, farmers living in the Skagit River Valley of Washington State hire hundreds of workers to manually harvest seasonal fruits and vegetables. For the duration of the harvest period, which begins in May and can extend as late as November, farmers provide migrant workers with temporary worker housing (TWH). Unfortunately, the condition of this housing does not provide safe or comfortable living environments for these migrant workers or their families.

Migrant housing is required to be registered with, and regulated by the Washington State Department of Health. Currently, TWH code does not provide safe, healthy, or humane living conditions. Furthermore, regardless of whether or not housing camps are registered the living conditions are far below standards set by residential or international building codes. Also, because the housing units are only occupied for six months out of the year, there are certain portions of the International Building Code (IBC) and International Residential Code (IRC) that the TWH code is exempt from, such as ventilation and minimum required room size. These exemptions only add to the substandard living conditions the migrant workers and their families’ experience. Catholic Community Services (CCS) and the Youth Migrant Project (YMP) are non-profit organizations that are proposing a new model for migrant housing standards for the welfare of the occupants. To achieve this goal, CCS is seeking state or private funding to implement housing for migrant workers that is non-farmer provided, in the form of a cultural village. For the interim, CCS has proposed revisions to housing codes to improve the current farmer-provided housing.

CCS and YMP have tasked Engineering Design Teams CEE 15.7 and 15.8 to provide a cost-benefit analysis on revisions to the TWH codes, along with conceptual designs of the cultural village. The cost-benefit analysis team 15.8 will perform is based on elements of the TWH code such as ventilation or insulation. This analysis will provide justification for implementing these changes throughout Washington State. The cultural village will include housing in possible forms of standalone family units, duplex, triplex, quad, or multistory structures. The decision between these options will be chosen based on cost per unit. There will be a community center that will provide services for the workers, such as classrooms, gathering spaces, kitchen space, laundry facilities, and a market place. Team 15.7 will be creating a civil site design for the cultural village by developing plans for utilities, drainage, grading, parking, and paving. Team 15.8 will perform a cost-benefit analysis of proposed TWH code changes put forth by CCS and Columbia legal services (CLS), a law firm who is advocating for the rights of migrant farm workers. The team will also develop the structural designs for sustainable housing and the community center. The deliverables for this project are to evaluate the proposed TWH code
revisions, conceptual design of alternative housing models, site plans, a technical summary, and recommendations that will assist our client in seeking funding for land acquisition and site development. The ultimate vision of CCS and goal of this project is to provide assistance to migrant farmworkers by providing a more stable and safe living environment.

Background

Reasons for Migration

Every year millions of people migrate from different areas of Mexico to the United States to find work harvesting fruits and vegetables. Approximately 95% of agricultural workers are from Mexico and 52% of these workers are undocumented (Holmes, 2013). This fact brings a negative disposition towards these people causing them to be treated poorly and are denied rights to health care and education. Due to the lack of opportunities for work and education in their own country, many people struggle to provide for their families. One contributing factor of this considerably complex issue is the North American Free Trade Agreement (NAFTA) between the United States of America, Canada, and Mexico, which was signed in 1994. This agreement eliminated tariffs, but allowed the American government to subsidize crops to the point where consumers in Mexico could purchase American crops for less than it would cost to grow their own. Systemic barriers such as NAFTA have weakened the economic outlets for many families in Mexico and other Latin American countries and have forced millions to migrate to the United States for work, both legally and illegally.

Farm Hierarchy and Picking Quota

After entering the United States, migrant workers who are employed in the farming industry are introduced to a system of hierarchical segregation based on perceived ethnicity and citizenship. This system is enacted through the types of work available to them, their pay structures, and the quality of housing provided to them. Figure 2 shows this hierarchy and the associated social and health aspects. The lower groups within the hierarchy experience harder work, less pay, and inferior housing compared with those above them.

Groups at the bottom of the hierarchy are the indigenous Mexicans (Mixtec and Triqui) who manually harvest fruit and vegetables. These groups are required to pick a certain quota of crops every day and price the migrant workers are paid per piece varies by crop. Since farmers are required by law to pay temporary workers state minimum wage, a quota to be picked per hour or day is set to allow workers to earn state minimum wage. Oftentimes, these quotas require workers to pick for longer hours, at a very rapid pace, and to forgo breaks. For example, in Washington State, a worker would be required to pick up to 50 pounds of blueberries per hour to earn the minimum wage (Bacon, 2014). It is often the case that workers who do not
meet the daily picking quota are given a warning and are told that they must pick the set amount or they will be fired. This causes many other issues in its wake, not only will the farmworker lose their job but also housing for them and their families.

The hierarchy of the farm also corresponds with the housing that is provided by the farmers. A person's rank within this hierarchy determines the housing with which they are provided. When workers are fruit and vegetable pickers, their family housing usually consists of a unit covered with a tin roof and with no insulation or heating. Field supervisors are typically provided upgraded housing with wood under the tin roof, but still without insulation or heating.

Due to these conditions on farms in the Skagit Valley, there have been ongoing strikes since 2013. In the summer of 2013, temporary workers went on strike demanding better pay along with other requests, such as better housing conditions. The farmworkers have banded together to form a union, that is currently recognized by the Washington State Labor Council, but some farms in the Skagit Valley will not negotiate with these workers. Tensions still exist in the Skagit

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1 Indigenous refers to the Mixtec and Triqui people from Mexico.
Valley with strikes continuing in the summer of 2014, with workers walking off the farm in protest.

Current Living Conditions
Historically, farmers provide TWH for migrant workers for the duration of their employment. However, high operation and maintenance costs combined with the decline of small farms in a globalized economy are making it more difficult for farmers to provide adequate housing. Such housing typically consists of a 10 foot by 12 foot "shack" for one family. Generally, these structures are made of plywood sheets and a tin roof. Oftentimes there are more than one migrating family that will live in these housing units making the living space cramped and lacks any individual privacy. Therefore this housing does not comply with current spacing requirements for the TWH code. This violation continues today because the Washington State Department of Health only has two inspectors to enforce the regulations of the TWH code for all of Washington, therefore the current state of housing is often overlooked in many places. Figure 3 provides an example of some of the temporary housing units in Skagit Valley.

![Figure 3. Temporary worker housing unit in Skagit Valley](image)

A typical housing unit usually consists of an old mattress or bunk bed, oftentimes a small sink, an outdated refrigerator, and a dual burner camp-style gas stove. The temporary worker housing units have communal bathrooms and showers in separate buildings with plywood walls and concrete flooring.
Current Temporary Worker Housing Codes

Since TWH is not occupied for the entire year, Washington State building codes do not apply for these types of housing units. The lack of enforcement of required codes and the minimal requirements within the existing codes lead to deficiencies in many if the existing TWH locations. The Department of Health and the Department of Labor and Industries are currently in the process of updating the Temporary Worker Housing code since it has not been updated since the 1950's. CCS and YMP have submitted proposed revisions to the State of Washington to augment current codes to improve the health, safety and living conditions for the emigrant communities.

CCS and YMP, along with Columbia Legal Services (CLS), are working toward bridging the gap between TWH codes and the local building codes. Currently, a farmer must comply with the TWH code, which has exemptions from traditional state building codes and energy related building standards (RCW 70.114A). This provision allows farmers to forgo particular portions of typical residential codes. To address this issue, CCS and CLS have proposed amendments to elements of the current TWH code in order to clarify and improve regulations regarding housing for migrant workers.

Cultural Village

CCS aims to separate farmers' control over migrant worker housing by locating a cultural village on a plot of non-farmer owned land. Within the cultural village, the workers will have housing, land for growing their own food, raising livestock, and a community center. In doing so this will empower migrant workers to take pride in ownership, potentially leading to better maintenance and operations of housing units. The goal of Teams 15.7 and 15.8's is to develop and design the plans for this cultural village.

The cultural village will contain 15 to 20 housing units, each with three bedrooms, a kitchen, and a bathroom. Outside of the housing units, land will be allocated for a central community center and space for growing food to sell in an open marketplace to the rest of the community. The community center will include an educational space to be used by YMP, and general gathering spaces to increase community involvement.

The design teams will develop plans for the hypothetical site shown in Figure 4. This site is co-located behind the St. Charles Catholic Church, approximately one mile west of Interstate 5 at milepost 230 in Burlington, WA. Although the teams’ plans will be specific to this site, CCS is presently seeking other real estate to purchase for the construction of the proposed cultural village scheme. The teams’ analysis will also include a cost summary that can be utilized to
develop a baseline unit price that the CCS can use in other feasibility studies to assist in determining land procurement.

![Outline of proposed cultural village site (Image from Google Maps)](image)

**Figure 4. Outline of proposed cultural village site (Image from Google Maps)**

**Sustainability**

Teams 15.7 and 15.8 will approach this project with sustainable development in mind. Using guidance from Fenner, et al. (2006), adopting a sustainable development perspective means ensuring that the needs of all present end users are met while recognizing the impacts on both the natural environment and future generations. Approaching the design from this perspective means reaching beyond traditional engineering challenges. To achieve a sustainable design, more options will need to be considered and evaluated than what is traditionally necessary in engineering design. Unfortunately, sustainable design options are not always feasible so multiple designs will be investigated.

To implement sustainability into this project, we will be looking into alternative building materials for the cultural village, as well as non-traditional heating and cooling solutions. Both teams will be looking into holistic site design, such as building orientation, low impact development, and layout. This holistic site design is used to encourage community building between migrant workers and the greater Skagit Valley community to reduce isolation the workers may experience.

**Purpose of Project**

Teams 15.7 and 15.8 have partnered with CCS and YMP to improve housing conditions for migrant farm workers and their families in the Skagit Valley and across the state of Washington. Two Seattle University CEE design teams, with mentoring from engineers at Parsons
Corporation, will be working on this project. Team 15.7 will develop a conceptual site design for potential land acquisition, permitting, utilities, and other elements that will improve the living conditions and environment for migrant workers and their families. Team 15.8 will perform a cost analysis on revised elements of the current TWH code. This cost analysis is intended to assist CCS in convincing the Washington State legislature to implement these revisions. Team 15.8 will also complete a conceptual design of a sustainable cultural village, which includes plan and material options and a community center building design for the migrant workers and their family needs.

Table 1 shows the tasks for Teams 15.7 and 15.8.

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<th>Team 15.7</th>
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<td>Code Quantification</td>
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<td>• Utility plan</td>
<td>• 30% design of housing</td>
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<td>• Design renderings</td>
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<td>plan</td>
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Chapter II: Civil Scope of Work
Overview
Team 15.7 will evaluate and utilize Chapter 296-307 Washington Administrative Code (WAC) Part L, Temporary Worker Housing, which is currently being developed by the Department of Health and Department of Labor and Industries. Using this code as the baseline, Team 15.7 will look at standard development codes for the area to determine suitable living conditions for migrant workers. Team 15.7 will research permit code requirements, existing zoning codes, utilities on the site, and a price per unit. The goal is to develop a dignified cultural village with utilities, roadways, and drainage up to a 30% design civil site plan.

Task 1: Zoning
The site is currently zoned for single-family residential homes, which means that there can be one home per 9600 square feet. Team 15.7 will propose rezoning the site for agricultural land
use. Although the project goal is to implement better housing standards than those required by the TWH code, zoning the site for agricultural land use is preferable because it allows more units than the current zoning. This rezoning process requires meeting with the Burlington planning committee to determine whether the zone change meets the Burlington Comprehensive Plan requirements. This also requires a submittal of the Rezone Application, a list from the County Assessor's office of residents within 600 feet of the site, and an Environmental Review. If the site cannot be rezoned for agricultural land use, Team 15.7 will continue to design the cultural village assuming the rezoning will ultimately be successful.

Deliverable 1
1.1: An assessment of current site zoning

Task 2: Site Plan (30% design)

Task 2.1: The Layout
A design of the layout for the cultural village will be based on the zoning requirements stated in Task 1. Assuming the site is rezoned for agricultural land use, TWH code requirements will be utilized for setbacks and spacing between housing units. Team 15.7 will employ a combination of the TWH Code, Burlington Municipal Code, and International Building Code (IBC) to design a dignified and economically feasible cultural village.

Task 2.1.1: Density
Team 15.7 will propose the implementation of 15-20 units on the five acre site. Each unit will have approximately six occupants. Therefore, the number of occupants will be 120 at most. This is not permitted under the Burlington Municipal Code, but is acceptable under the TWH code.

Task 2.1.2: Setbacks
The spacing between the houses and the property line will depend on the footprint of each housing unit and the community center. Team 15.8 will provide the footprint options for both facilities. There are no provisions in the TWH code for the amount of housing units allowed, the distance from property lines, or how far apart the units must be from one another. Team 15.7 will review the Burlington Municipal Code for the setback requirements necessary in the design of the cultural village. Since the site will be rezoned for agricultural land use, the Burlington Municipal Code, Chapter 17.28 OSP Open Space, Parks, and Agriculture district, will be referenced to determine the minimum setback requirements for buildings and other structures. This code requires a minimum setback of 50 feet from any property line in a residential zone.
Task 2.1.3: Roadways
There are no existing regulations in the TWH code for roadway or street requirements. Team 15.7 will, therefore, refer to the Burlington Municipal Code. The streets within the village will be functionally classified as access streets. Access streets will provide movement within the village and usually end in culs-de-sac with an average daily traffic of 500 vehicles per day or less. The design of the access streets will follow the Burlington Municipal Code 12.28.150 Geometric design standards. These design standards have general requirements. For instance, street widths shall allow access for emergency vehicles, garbage trucks, and city service vehicles. Table 2 shows the minimum width requirements for access streets that the team will follow in the design.

Table 2. Minimum requirements for access streets

<table>
<thead>
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<td>Two-way traffic</td>
<td>10 feet minimum</td>
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<tr>
<td>Parking lane</td>
<td>8 feet minimum</td>
</tr>
<tr>
<td>Pavement width</td>
<td>36 feet minimum</td>
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</tbody>
</table>

The structural design standards of access streets, such as pavement requirements and grading, will follow the Burlington Municipal Code 12.28.160. Team 15.7 will recommend pursuing an agreement with the church to allow for visitor parking for the cultural village.

Deliverable 2.1
2.1.1: A layout of a cultural village, including roadways and allowable density

Task 2.2: Utility Connections
Based on the TWH code, Chapter 296-307 WAC Part L, the minimum requirements will be met for potable water supply, sewage disposal, and other utilities. The site is currently connected to public water and sanitary sewer. However, there will be connection fees owed to public water and sewer if the current supply does not meet our demand and additional connections must be installed for this property. The overall goal is to connect gas, electricity, phone, internet, and cable to each unit in addition to water and sewer.

Task 2.2.1: Water Supply
Water is currently supplied to the church through the southwest corner of the building, as highlighted in Figure 5. Since public water is available to the site, Team 15.7 will analyze the cost to connect each unit to the system. According to WAC 296-307-16130, there must be cold, potable, running water under pressure (minimum of 20 psi) within 100 feet of each housing unit and at least one drinking fountain per 100 workers. There must also be a supply of hot water for bathing, food handling, and laundry. To comply with Burlington’s fire code IBC-903, a
fire connection, such as a fire hydrant, will be necessary on the street side of the buildings so that the connection is completely visible from the street. Depending on the size and expected occupancy of the community center, IBC-903 may call for a sprinkler system to be set up in the center.

If Team 15.7 is unable to support these requirements with the current public water system, the team will need to upgrade the system to accommodate the cultural village. Upgrades may include resizing pipes or looking for other possible connections that could support the village.

Figure 5. St. Charles Site Plan

Task 2.2.2: Sewage Disposal
A cost analysis for implementing sewer service to each of the units within the cultural village will be performed. In order to do this, the location and pipe sizes for the existing sewer connections for the property must first be determined. This information will be obtained after consulting with the sewer purveyor of Skagit Public Utility District. Since the site is currently connected to public sanitary sewer, there will be a need to extend the existing on-site utilities to serve the units. The cost of these additional connections will be included in the cost analysis.

In the event that it is too costly to implement sewer service to each of the units, designs for community bathrooms will be considered. Proposed revisions to the current code call for at least one bathroom per six workers, as outlined in WAC 296-307-16115. The revisions also
include providing one hand washing sink for every six workers and one showerhead for every ten workers.

Deliverable 2.2

2.2.1: A cost analysis for connecting utility pipelines to each house, along with a community water system option that takes into account the current code and proposed code revisions.

Task 2.2.3: Other Utilities

Team 15.7 will research and assess which utilities should be connected to each housing unit in order to significantly improve the living conditions of the migrant workers. The overall goal is to connect each unit with gas, electricity, phone, internet, and cable. The team will also abide by the current code, WAC 296-307-16135, which states that electricity must be connected to all housing units, common areas, and kitchen, bathroom, and laundry facilities.

In collaboration with Team 15.8, Team 15.7 will consider different forms of renewable energy for the site, such as geothermal energy. Since the housing will be designed as temporary housing units, the payback on using renewable energy may be longer than desired. Thus, a cost analysis of utilizing renewable energy on the site must be performed and then compared with a cost analysis of connecting each unit to public power lines. Then, the team will determine the most beneficial option for the workers and farmers alike.

Task 2.3: Drainage System

The site is located on a 100- to 500-year floodplain with a portion of the site located in a flood zone. Buildings that are located in the flood zone will be raised two to three feet to ensure that the first floors are elevated above the base flood elevation in compliance with FEMA standards.

Team 15.7 will also assess runoff management and storm drainage for the site. The team will complete a stormwater site plan in compliance with the 2013 Burlington Stormwater Management Program to control runoff and stormwater. The Stormwater Management Program is updated regularly and includes references to standards for managing runoff during construction and for stormwater drainage designs and implementation. In order to minimize the amount of runoff entering the drainage system, Low Impact Development practices, such as permeable pavement, will be considered as well.

Deliverable 2.3

2.3.1: A 30% site plan which will include utility, drainage, grading, and parking and paving plans.
Chapter III: Structural Scope of Work

Overview
Team 15.8 has two main tasks for this project. The first task is to perform a cost-benefit analysis on three to five specific revisions of CCS’ proposed revisions to the TWH code. These three to five revisions will be selected by CCS and CLS. The second task is to develop a 30% level, or conceptual, design of the community center and the housing units that make up the cultural village.

Task 1: Code Quantification
As requested by CCS, Team 15.8 will perform an analysis of proposed revisions to the Temporary Worker Housing Code. Team 15.8 will be provided three to five of the proposed code revisions suggested to the State of Washington by CCS. Our team will assess the cost of implementing these revisions and review the benefits (monetary, health, etc.) of these revisions. Task 1 will be subdivided into three elements.

Task 1.1: Identify Relevant Codes
Team 15.8 will be provided three to five proposed revisions that have the most significant impact on migrant workers’ health and standard of living by CSS. To aid this decision, Team 15.8 will coordinate with CCS, YMP, CLS, and the migrant workers through meetings and discussion. In coordination with these organizations, Team 15.8 will be able to provide assistance to decide on the prioritization of the selected revisions to choose for review and cost-benefit analysis. The codes requiring review for applicability are the Temporary Worker Housing (TWH) code, International Residential Code including City/County amendments (IRC) and the International Building Code including City/County amendments (IBC). The most recently published editions of each code that have been adopted by the jurisdiction will be used for review.

For example, the current temporary worker housing code has no requirements for ventilation. Catholic Community Services has proposed that the TWH code should follow the International Building Code (IBC) for ventilation requirements. Proper ventilation is an important aspect of housing, with associated health benefits, and is an example of a code element that Team 15.8 may be requested to review.

Deliverable 1.1
1.1.1: A memorandum summarizing which codes team 15.8 will collaborate to review with CCS.
**Task 1.2: Cost of Implementation**

Team 15.8 will quantify the costs of implementing these changes after identifying codes to analyze. The team will utilize unit cost information for labor and materials that is readily available to the public. Parsons will assist in providing historical construction costs to develop cost estimations. In addition, consultation with material vendors and/or contractors will be utilized to verify current costs. These two resources shall provide the basis for cost estimating and should provide a reasonable cost comparison.

**Deliverable 1.2**

1.2.1: A cost analysis of the proposed code revisions.

**Task 1.3: Benefits of the Code Revisions**

Following the teams analysis for the anticipated cost impact of the code revisions, Team 15.8 will determine the benefits of implementing the revisions. Determining these benefits will be completed utilizing two distinct approaches. First, Team 15.8 will review health related benefits that result from implementing the code revisions. Next, Team 15.8 will analyze the cost benefits related to energy savings and life-cycle costs for the housing units.

The current TWH code allows for poor housing design that can lead to adverse health impacts (i.e. lack of ventilation or insulation). There are certain health clinics in the city of Burlington that specifically serve migrant workers and Team 15.8 anticipates meeting and discussing with these health clinics to broadly identify the health issues exhibited by the migrant worker population. Additionally, the team will review publically available literature regarding the health impacts of different housing and energy standards. For each of the codes, the team will compare the cost per installation versus the cost of health clinics providing medical assistance for these health issues. This will require medical statistics such as price per clinical visit, the amount of people seeking care per season, and the time lost in productivity for workers seeking care.

When analyzing the cost-benefits of energy savings and life-cycle costs, Team 15.8 will research each of the revised code provisions identified. For energy, this research will look into the differences in energy use pre- and post-installation according to the revised code provisions. For life-cycle costs, research will also be presented on the longevity of the housing units and their components pre- and post-installation according to the revised code provisions. These comparisons will assist in recommending the economic benefits of the proposed code revisions as requested by CCS. It is important to note that each quantifiable benefit (health, energy, service life) may not apply to all proposed code revisions. For example, code changes regarding
ventilation may not have significant benefits for the service life of the housing units, but it will have health and energy related benefits.

**Deliverable 1.3**
1.3.1: A cost-benefit analysis summary of the CCS’ selected proposed revisions.

**Task 2: Cultural village**
The cultural village will include two structure types: the housing units and the community center. While designing both of these structures, Team 15.8 plans to determine and make recommendations for items that would be most effective in comparing the TWH and the IBC/IRC codes. Bridging the gap between these codes is important because, as argued by CCS, CLS, and the migrant workers, the current TWH code does not provide housing that is dignified or healthy. The IBC, however, has requirements that are unnecessary and too expensive for migrant workers but would improve overall livability. These codes establish the bookends for the analysis and will assist in making recommendations for a cost effective solution for the design of these components of the housing. Team 15.8 intends to design the structural components to meet the Washington State Building Code and its various amendments to the IBC and IRC. The conceptual design of these housing units and community center will be broken down into five elements. These elements include: building footprints and layouts, sustainable design options, community center design, housing design, and presentable models.

**Task 2.1: Footprints and Layouts**

**Task 2.1.1: Housing Units**
CCS envisions a housing system where every family will have a separate and private living space. The housing units would preferably be designed as separate living spaces that provide a village-like environment. Each unit must have all necessary facilities to allow for independent functionality. Therefore, every unit will consist of a kitchen and a full or 3/4 bathroom. In addition, CCS wants the units to have three bedrooms that will allow two people per room. The village density for this site will consist of 15 to 20 families. Besides the preceding accommodations of each unit, there will also be a living room, dining room, a utility closet, storage closets (as space allows), and lockers in each bedroom as required by the current TWH code.

The proposed TWH code, as shown in Table 3, requires 100 square feet of living space for the first worker and adds 50 square feet for every additional worker (Chapter 296-307 WAC Part L, 2014). Assuming six workers, this adds up to a total area of 350 square feet. On the other hand, the International Building Code (IBC) addresses floor area allowances per occupant in section...
1004.1.1 that prescribes 200 square feet for each occupant. For six occupants, this adds to 1200 square feet. The goal of team 15.8 is to find a reasonable floor plan in between these two extremes. A reasonable approach would be to use the IBC’s section 1208.3 on habitable living area that requires one bedroom to be no less than 120 square feet and additional bedrooms of at least 70 square feet. In addition, a full bathroom would be at least 45 square feet (House Plans Helper), the kitchen, and eating area should be at least 140 square feet (Minimum Requirements for Lot and Building Size, 1954). Assuming three bedrooms, each unit will have a minimal footprint of approximately 515 square feet plus 25 square feet for utility closets and other nuances, for a total of 535 square feet per unit. This square footage will allow for improved privacy and living conditions from the TWH code while also being realistic in terms of the construction costs.

Table 3. Temporary Worker Housing Maximum Capacity (Chapter 296-307 WAC Part L, 2014)

| Worker Capacity: determine total square footage and total facility to worker ratio |
|---------------------------------------------------------------|-----------------|---------------------------------|
| **Floor Space Requirements**                                  |                 |                                 |
| Sleeping room only                                            |                 |                                 |
| 50 square feet per worker                                      |                 |                                 |
| Sleeping room with kitchen                                     |                 |                                 |
| 100 square feet per temporary worker                           |                 |                                 |
| **Facility requirements**                                     |                 |                                 |
| Toilets                                                       |                 |                                 |
| Hand wash Sinks                                               |                 |                                 |
| Bathtubs or Showers                                           |                 |                                 |
| **Common Facilities**                                         |                 |                                 |
| Male                                                          | Female          | Male                            | Female                       |
| 2 minimum 1 per 15 workers                                    | 2 minimum 1 per 15 workers | 1 per 6 workers                 | 1 per 6 workers              |
| Male                                                          | Female          | Male                            | Female                       |
| 1 per 6 workers                                               | 1 per 6 workers | 1 per 10 workers                | 1 per 10 workers             |
| Male                                                          | Female          |                                 |                              |
| Each Family Shelter                                           | 1, if provided  | 1                               | 1, if provided               |

Permanent housing appliances including kitchenware, bathroom vanities, smoke detectors, beds, and tables will need to be durable and require minimal maintenance. The flooring will be kept simple with a possible combination of carpet and linoleum; although not as plain and uninviting as bare concrete that is commonly used in other TWH units. Finally, the housing units will be grouped into quads to minimize construction costs and maximize land utilization. Other configurations will be considered such as duplex, triplex, and multistory structures.

**Deliverable 2.1.1**

2.1.1.1: Multi-Family Unit Floor plans
Task 2.1.2: Community Center

As the cornerstone of the cultural aspect of the village, the community center will promote social activity for the temporary workers and function as a bridge for contact with the surrounding communities of Skagit Valley. This standalone structure will consist of an open gathering space, kitchen, laundry facility, daycare facility, clinic, and public bathrooms. In terms of promoting and providing language education, the option of either using the open area or adding additional classrooms would be considered, as displayed in Figure 4. During work hours, the classrooms may also be used as daycare facilities.

![Diagram of Community Center](image)

**Figure 6. Bubble diagram space layout for the community center**

To promote accessibility and openness for a wide variety of activities in the open gathering space, this hall will feature extensive openings (such as garage doors) on exterior walls. Target events for the community center include farmer markets, community or family gatherings, and as a general everyday meeting area. The laundry room will serve the entire community so it will be critical to gage its size for the demand.

**Deliverable 2.1.2**

2.1.2.1: Conceptual Community Center Floor plan/Footprint

Task 2.2: Sustainable Design Options

The goal of integrating sustainability into this design is to minimize the lifetime cost of a structure by initially investing into smart construction methods that will pay off during the operation of the building. Three overarching design aspects for the cultural village will be approached from the perspective of sustainability. This includes energy, holistic site design, and materials/construction methods. The following sections highlight the prospective options that need to be considered. These listings are not exhaustive or final, therefore upon further research or recommendation, other options may be considered.
Energy
The first category addresses the energy consumption of housing to maintain a comfortable interior climate. Concepts to be evaluated include standard heating approaches to creative solutions involving minimizing heat loss. Table 4 briefly summarizes the options with their benefits and negatives. Every option will be appropriately weighed through pricing and feasibility analysis once material and construction methods have been determined.

Table 4. Potential energy and heating options.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portable heaters</td>
<td>oil or electric standalone heater unit</td>
<td>No installation required</td>
<td>Take up floor space Slow to heat large volume</td>
</tr>
<tr>
<td>Electronic Resistance</td>
<td>permanent electric unit</td>
<td>Simple to install</td>
<td>Inefficient</td>
</tr>
<tr>
<td>Furnace</td>
<td>heated air forced through ducts</td>
<td>Standard heating method</td>
<td>The more efficient, the more expensive</td>
</tr>
<tr>
<td>Radiant Heating</td>
<td>heated water is moved throughout the house</td>
<td>On average 15% more efficient than forced air(^1)</td>
<td>high initial cost</td>
</tr>
<tr>
<td>Heat pump</td>
<td>Heat transfer from ground to house</td>
<td>30-40% more efficient electric heating(^2)</td>
<td>high initial cost</td>
</tr>
<tr>
<td>Passive housing</td>
<td>Over insulate house</td>
<td>Substantial lowering of required heating</td>
<td>high initial cost</td>
</tr>
</tbody>
</table>


Holistic Site Design
When approaching sustainability from a holistic site design perspective, Team 15.8 will evaluate how the built environment can affect community building. The team will research how to create a lively, safe, healthy and sustainable cultural village. This will be completed through research, as well as with input from the migrant farmers on how they want to use the space that will be made available to them. The intention of holistic site design is also to optimize the passive solar efficiency of the buildings during the time of seasonal occupancy. Designing the
landscape to achieve the desired effects of cooling during the warm months and heating during the colder months can also maximize heating and cooling efficiency.

Materials and Construction

Materials options for the construction of the housing units start from the standard wood frame built on site houses to more ambitious plans like rammed earth. Table 5 categorizes materials into two groups of wood frame and other materials. Each method type is then briefly described. Phase 4 and 5 describe how these options will be evaluated.

<table>
<thead>
<tr>
<th>Table 5. Potential material options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category</strong></td>
</tr>
<tr>
<td>Wood frame</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Alternatives</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

*Deliverable 2.2*

2.2.1: A memorandum discussing energy, holistic design, and material option.
Task 2.3: Community Center Design
The design of the community center will begin by assuming wood frame construction. Next, developments in material research will either confirm or alter this decision. The size of the community center will be presented along with any unique elements developed toward inspiring community.

Structural design of the community center will follow the Washington State Building Code. Team 15.8 will first determine the load demands on the building (i.e. wind load, snow load, seismic load, etc.). Team 15.8 will appropriately design the capacity of the building to meet the demand requirement.

Deliverable 2.3
2.3.1: 30% Community Center Plans
These Plans will include at a minimum:
- Plan View
- Elevation View
- Typical Footing and Wood Floor Detail or Slab on Grade Detail
- Typical Wall Detail
- Typical Window or Door Header Detail
- Typical Roof Detail

2.3.2: 30% Community Center Structural Calculations

2.3.3: Cost estimates for construction of the community center

Task 2.4: Housing Unit Design
The first stage of designing the housing units involves evaluating material choices. This includes establishing a rough cost estimate and performing a feasibility check. Cost estimates will consist of using square footage pricing to allow for direct comparison. Feasibility encompasses determining the reality of utilizing a particular material for the city of Burlington. This includes seeking out local contractors or manufacturing companies that have experience with the particular method. In addition, some material choices may be ruled out due to climatic and site conditions like humidity and flooding potential. This procedure will narrow the scope down to three candidates that will then be researched more thoroughly by gathering quotes from contractors and manufacturers.

The structural design of the housing units will follow the Washington State Building Code. Demand and capacity of the housing units will be calculated following the same methods used for the community center. Some of the materials Team 15.8 will design with may not have specific design code standards (i.e. rammed earth and straw bale). For this case, Team 15.8 will
research best-practice methods and academic journals that address appropriate construction methods for the specific material that will be used.

**Deliverable 2.4**

2.4.1: 30% Housing Design Plans

These Plans will include at a minimum:

- Plan View
- Elevation View Material 1 including cost/sf based on material
- Elevation View Material 2 including cost/sf based on material
- Elevation View Material 3 including cost/sf based on material

2.4.2: Cost estimates for construction of individual and entire community of units

**Task 2.5: Marketing Visuals**

Once the designs have been established and drafted in Revit 2014, the next step will involve creating renderings in Piranesi 6 and compiling visual aids. Presentable visuals will assist CCS in securing funds for the cultural village from government agencies or private investors with a more convincing argument.

**Deliverable 2.5**

2.5.1: Three to five rendered images of housing and/or community center of client (CCS) choosing
Chapter IV: Deliverables

Seattle University Civil and Environmental Engineering Design Teams 15.7 and 15.8 will develop the following:

**Structural Aspects**
- Cost-benefit analysis of chosen TWH code revisions
- 30% housing designs
- 30% plans and structural considerations for a community center
- Construction cost estimates for the structures

**Civil Aspects**
- 30% civil site design for alternative housing model
  - Site plan
    - Based on the footprint from Team 15.8
  - Wet and dry utility plans
    - Service to site and units proposed
  - Drainage plan
    - Utilizing existing on-site drainage facilities
    - Minimizing sub-surface detention facilities
    - Review Low Impact Development Options
  - Grading plan
  - Parking and paving plan
- Technical report
  - Zoning code assessment
  - Permitting requirements
  - Cost analysis
    - Price per unit
  - Recommendations

**Overall deliverables**
- Visuals for securing financing
  - Renderings
  - Designed posters
Chapter V: Budget

Table 6. Combined Team Budget

<table>
<thead>
<tr>
<th>Type</th>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Materials</td>
<td>Fresh Fruit, Broken Bodies by Seth Holmes</td>
<td>$118.80</td>
</tr>
<tr>
<td>Office Supplies</td>
<td>Photocopying</td>
<td>$250.00</td>
</tr>
<tr>
<td></td>
<td>Printing</td>
<td>$250.00</td>
</tr>
<tr>
<td></td>
<td>Calculation Paper</td>
<td>$100.00</td>
</tr>
<tr>
<td></td>
<td>Piranesi 6 Rendering Software</td>
<td>$270.00</td>
</tr>
<tr>
<td></td>
<td>(Student Version)</td>
<td></td>
</tr>
<tr>
<td>Expendable Supplies</td>
<td>Reprographics - For Students, Faculty, and Project Client (CCS)</td>
<td>$600.00</td>
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<td></td>
<td>Binding</td>
<td>$22.00</td>
</tr>
<tr>
<td></td>
<td>Parking for Sponsors</td>
<td>$40.00</td>
</tr>
<tr>
<td></td>
<td>Travel</td>
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<tr>
<td></td>
<td>USB Drive</td>
<td>$100.00</td>
</tr>
<tr>
<td></td>
<td>Revit/CAD Training</td>
<td>$200.00</td>
</tr>
<tr>
<td>Total Project Budget</td>
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<td>$2,850.80</td>
</tr>
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</table>

Chapter VI: Schedule

Team 15.7
Fall quarter consists of understanding zoning requirements for the site (Task 1), proposal writing, and creating a presentation. Winter quarter will include a layout for the cultural village (Task 2.1), research of utility connections (Task 2.2), and an assessment of the drainage system (Task 2.3). By the end of spring, a final report will be created and include a recommendation for the tasks.

Team 15.8
Fall quarter involves determining building footprints (Task 2.1), writing the proposal, and improving our project presentation. Winter quarter will begin with sustainability research (Task 2.2) and code section quantification (Task 1) split among the team members.

Code quantification will segue into community center design (Task 2.3) while those working on sustainability research will go into housing unit design (Task 2.4). The design phase will constitute the majority of the winter quarter and will continue into spring quarter as deemed necessary. Creating marketing visuals (Task 2.5) will begin at a point near the end of winter.
quarter when one or two members will begin renderings and visual compilations. Final report writing will follow a similar schedule as Task 2.5.

Table 7. Schedule of project managers for the duration of the project

<table>
<thead>
<tr>
<th>Project Manager Schedule</th>
<th>Team 15.7</th>
<th>Team 15.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>September – December</td>
<td>Mia Bernardino</td>
<td>Robert Long</td>
</tr>
<tr>
<td>January – February</td>
<td>Demetria Swendseid</td>
<td>Slavic Rubashka</td>
</tr>
<tr>
<td>March – April</td>
<td>Kelsey Rau</td>
<td>Jordan Sewell</td>
</tr>
<tr>
<td>May – June</td>
<td>Evan Yamamoto</td>
<td>Hillary Tervet</td>
</tr>
<tr>
<td>Task Name</td>
<td>Duration</td>
<td>Start</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>----------</td>
<td>------------</td>
</tr>
<tr>
<td>Total Housing Codes</td>
<td>6 days</td>
<td>Tue 11/4/14</td>
</tr>
<tr>
<td>Burlington Site Codes</td>
<td>5 days</td>
<td>Thu 11/6/14</td>
</tr>
<tr>
<td>Choose Code/Zoning</td>
<td>7 days</td>
<td>Thu 11/13/14</td>
</tr>
<tr>
<td>Current utilities</td>
<td>1 day</td>
<td>Sat 11/15/14</td>
</tr>
<tr>
<td>Housing and cultural footprint</td>
<td>18 days</td>
<td>Wed 11/19/14</td>
</tr>
<tr>
<td>Proposal Presentation</td>
<td>0 days</td>
<td>Fri 12/3/14</td>
</tr>
<tr>
<td>Refining housing footprint</td>
<td>21 days</td>
<td>Mon 1/3/15</td>
</tr>
<tr>
<td>Code Analysis</td>
<td>36 days</td>
<td>Mon 1/5/15</td>
</tr>
<tr>
<td>Material Analysis</td>
<td>41 days</td>
<td>Mon 1/5/15</td>
</tr>
<tr>
<td>30% Cultural Center</td>
<td>61 days</td>
<td>Wed 1/14/15</td>
</tr>
<tr>
<td>30% Housing Design</td>
<td>61 days</td>
<td>Wed 1/21/15</td>
</tr>
<tr>
<td>30% Site Design</td>
<td>43 days</td>
<td>Wed 1/14/15</td>
</tr>
<tr>
<td>Water</td>
<td>30 days</td>
<td>Mon 2/2/15</td>
</tr>
<tr>
<td>Sewer</td>
<td>30 days</td>
<td>Mon 2/2/15</td>
</tr>
<tr>
<td>Electrical</td>
<td>30 days</td>
<td>Mon 2/2/15</td>
</tr>
<tr>
<td>Drainage</td>
<td>30 days</td>
<td>Mon 2/2/15</td>
</tr>
<tr>
<td>Incorporate LID Technologies</td>
<td>30 days</td>
<td>Mon 2/2/15</td>
</tr>
<tr>
<td>Telephone/Cable</td>
<td>30 days</td>
<td>Mon 2/2/15</td>
</tr>
<tr>
<td>Rendering</td>
<td>48 days</td>
<td>Mon 2/16/13</td>
</tr>
<tr>
<td>Site Design Visual</td>
<td>35 days</td>
<td>Mon 3/30/15</td>
</tr>
<tr>
<td>Design Visuals</td>
<td>30 days</td>
<td>Mon 3/30/15</td>
</tr>
<tr>
<td>Final Report</td>
<td>35 days</td>
<td>Mon 3/30/15</td>
</tr>
<tr>
<td>Final Presentation</td>
<td>0 days</td>
<td>Fri 6/5/15</td>
</tr>
<tr>
<td>Robert Long</td>
<td>53 days</td>
<td>Wed 9/24/14</td>
</tr>
<tr>
<td>Slavic Rubashka</td>
<td>37 days</td>
<td>Mon 1/5/15</td>
</tr>
<tr>
<td>Jordon Sewell</td>
<td>37 days</td>
<td>Wed 2/25/15</td>
</tr>
<tr>
<td>Hillary Teyet</td>
<td>36 days</td>
<td>Fri 4/17/15</td>
</tr>
<tr>
<td>Mia Bernardino</td>
<td>53 days</td>
<td>Wed 9/24/14</td>
</tr>
<tr>
<td>Demetria Swendesd</td>
<td>37 days</td>
<td>Mon 1/5/15</td>
</tr>
<tr>
<td>Kelsey Rau</td>
<td>37 days</td>
<td>Wed 2/25/15</td>
</tr>
<tr>
<td>Evan Yamamoto</td>
<td>36 days</td>
<td>Fri 4/17/15</td>
</tr>
</tbody>
</table>

Figure 7. Team schedule
Chapter VII: Project Summary

Teams 15.7 and 15.8 are pleased to provide Catholic Community Services with this proposal for a cost benefit analysis of the revisions of the Temporary Worker Housing Code and design of an alternative temporary worker housing model in the form of a cultural village. The current relationship between the farmers and migrant workers is strained due to the workers' desire for improved living and working conditions and this cultural village aims to alleviate this tension by separating farmer control over migrant worker housing. The cultural village will also develop stronger community ties and help eliminate hierarchical segregation between migrant workers and the communities within the surrounding area of Burlington. By partnering with Catholic Community Services, the engineering design teams intend to improve the living conditions of the migrant workers and their families in Skagit Valley and throughout Washington State.
Appendix A: Request for Proposal

SCIENCE AND ENGINEERING PROJECT CENTER
MASTER PROJECT AGREEMENT

EXHIBIT A: COMMITMENT AND SCOPE OF PROJECT AGREEMENT

This Agreement is entered into by and between Seattle University, a Washington nonprofit corporation (hereafter referred to as "SU"), and the undersigned (hereafter referred to as "Sponsor").

1. **Scope of Project.** SU and Sponsor agree that the following Sponsored Project will be supervised by an SU faculty member and the Sponsor liaison.

Sponsored Project Title: **Study which would examine the financial and health effects of the Washington State code revisions that the Youth Migrant Project and Catholic Community Services are developing to the temporary worker housing code.**

Sponsored Project Term: From September, 2014 to June, 2015.

Sponsored Project Description:

**Organization Sponsoring / Underwriting Project:**

*Parsons*
600 University Street, Suite 1130
Seattle, WA 98101

Sponsor Liaison: **Jeffrey Dye, PE**
[Jeff.Dye@Parsons.com](mailto:Jeff.Dye@Parsons.com)
Office: 206.494.0912  Mobile: 206.743.6136

**Organizations Supporting Project**

- **Youth Migrant Project at St. Charles Catholic Church** – 935 Peterson Rd, Burlington, WA 98233 – Contact: Jose Ortiz – 360.333.5015
- **Catholic Community Services – Catholic Housing Services of Western Washington** – 100 – 23rd Ave S, Seattle, WA 98144 – Contact: Gloria Burton – 206.328.6088 or 206.799.0875

**Migrant Farmers in Skagit County Housing**

Migrant farmers in Skagit County currently have substandard housing located at the Sakuma Company Farm which is the fruit company in the Skagit Valley. These Migrant Farmers are in need of all kinds of buildings including school space, day care space, adequate and dignified
housing. The Senior Design Project will involve prioritizing the projects and developing a structural design for the priority projects.

The History of the Youth Migrant Project

This project began in 1985 when a parishioner from St. Joseph Church in Lynden noticed that migrant infants and pre-schoolers were left alone in vehicles in the hot sun while their parents worked in the fields. Through the collaboration of interested youth ministers and the support of Catholic Community Services, the Lynden Migrant La Paloma Day Care began in the basement of St. Joseph Parish. During 1986-1992, 200+ youth per summer spent a week in Lynden caring for the migrant children.

Due to the decreasing number of migrant workers and the creation of the Washington Migrant Council Day Care Facility (in Lynden), the daycare at St. Joseph was no longer needed. As a result, the youth service program was discontinued after the summer of 1992. In 1993, the Youth Migrant Project relocated in the Skagit Valley. Participants assisted in the four Washington State Migrant Council daycare centers.

At the present time, this program runs from mid-June until early-September. The youth continue to serve in the daycare centers, as well as working at the food bank at St. Charles, visiting the migrant camps and providing donations. In order to make this experience available to more parishes, the Lynden program was restarted in 1998.

2. Commitment

Sponsor hereby pledges the amount of $______ to the Science and Engineering Project Center of SU, for use in connection with the Sponsored Project defined in Section 1. This contribution will be paid in accordance with one of the following selected payment schedules:

___ 1) In three payments:
   
   Payment One: $______ by __________
   Payment Two: $______ by __________
   Payment Three: $______ by __________

___ 2) In two payments:
   
   Payment One: $______ by __________
   Payment Two: $______ by __________

___ 3) In one lump sum of: $______ by __________

Page 2 of 3

SCIENCE AND ENGINEERING PROJECT CENTER
901 12th Avenue P.O. Box 222000 Seattle, WA 98122-1090 www.seattleu.edu/projectcenter (206) 296-2822 Fax (206) 296-2179
Billing Contact: **JEFFREY DYE**
E-mail: **Jeff.Dye@Parsons.com**

Purchase Order Number (if applicable): __________

**SPONSOR**

Sponsor Name: **Parsons**

By: __________

Title: **Senior Project Manager, PM**

Date: **Sept 3, 2014**

**SEATTLE UNIVERSITY**

By: **William J. Hemeny**

Title: **Associate Provost for Research & Graduate Education**

Date: **05-28-2014**

Checks payable to: **Seattle University**

Mail checks to:

Attn: Ernie Lou, Corporate Relations Manager
Science and Engineering Project Center
Seattle University
901 12th Avenue
PO Box 222000
Seattle, WA 98122-1090
Appendix B: Code References

Table 8. Temporary Worker Housing Code Reference

<table>
<thead>
<tr>
<th>Code Reference Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAC 296-307 Part I</td>
<td>Temporary Worker Housing Code</td>
</tr>
<tr>
<td>WAC 296-307-16115</td>
<td>Bathrooms per Person</td>
</tr>
<tr>
<td>WAC 296-307-16130</td>
<td>Potable Water Requirements</td>
</tr>
<tr>
<td>WAC 296-307-16135</td>
<td>Electricity Requirements</td>
</tr>
<tr>
<td>WAC 296-307-16125</td>
<td>Occupants per House</td>
</tr>
<tr>
<td>WAC 246-290</td>
<td>Definition of Group A Water Systems</td>
</tr>
<tr>
<td>WAC 246-291</td>
<td>Definition of Group B Water Systems</td>
</tr>
</tbody>
</table>
Appendix C: Survey Plan of Site

Figure 8. Survey Site Plan
Appendix D: Citations


"Temporary Worker Housing - Health and Safety Regulation." *Chapter 70.114A RCW*: Web. 11 Nov. 2014.
Svyatoslav (Slavic) Rubashka

4228 S 340th Pl
Auburn, WA 98001
253.797.1688
rubashka@seattleu.edu

SUMMARY OF QUALIFICATIONS
Senior in Civil Engineering at Seattle University; possess a strong work ethic, work well independently and in groups, proficient under pressure, and capable of meeting deadlines. Residential construction experience from family business.

WORK EXPERIENCE
Seattle Department of transportation
Engineering Intern – Traffic Operations
Applying engineering judgment to resolve transportation issues
Responding to customer service requests
Drawing roads from scratch in AutoCAD
Flagging, striping layout, creating work orders for temporary signage

Skagit Valley Housing for Seasonal Workers – Catholic Community Services, sponsored by Parsons
Team Member - Senior Capstone Project
Applying engineering education to a social problem, researching economically feasible housing

EDUCATION
Seattle University – Seattle, WA
Bachelors of Science in Civil Engineering (GPA = 3.2)
Graduation spring 2015

Current Courses: Structural Analysis, Environmental Engineering

Dean’s List of the College of Science and Engineering
fall 2013

Bannan Scholarship
2013 – Current
Awarded for merit and community involvement, volunteering at Bailey Gatzert Elementary School

Highline Community College – Des Moines, WA
Associate of Science with emphasis in Engineering (GPA = 3.72)
fall 2010 – spring 2013

Vice President’s Honor Roll, (HCC)
fall 2010, fall 2011 – spring 2013
Academic recognition for maintaining a 3.5-3.9 GPA for the quarter

COMMUNITY VOLUNTEER SERVICE
Rhododendron Species Foundation and Botanical Garden – Federal Way, WA
fall 2011 – 2013
Spent over 120 hours interacting with professional gardeners and horticulturalists, operated tools and vehicles independently

COMPUTER SKILLS
Robert Long
1611 26th Ave, Seattle, WA 98122
longr1@seattleu.edu
360.719.8022

SUMMARY
I am a senior at Seattle University Studying Civil and Environmental Engineering. I have excellent interpersonal and professional skills that I have acquired from my past work experiences and I utilize these skills be an effective team member.

EDUCATION
Seattle University, Seattle, WA
Bachelor of Science in Civil Engineering with Minor in Mathematics
September, 2011—June 2015
GPA: 3.46

RESEARCH EXPERIENCE
Department of Civil and Environmental Engineering, Seattle University
January, 2014 - Present
Undergraduate Research Assistant, Dr. Jhon P. Smith
- Determining the effect of live load on the seismic response of storage structures.
- Developing numerical solution for dynamics of one-story structures supporting sliding blocks.
- Interpreting results from shake table tests.

WORK EXPERIENCE
Jacobs Associates, Seattle, WA
Engineering Intern
- Assisted professional engineers in updating finite element models, creating boring logs, responding to RFI’s, calculating peak surface runoff rates, calculating tieback loads in excavations, and editing reports.
- Develop phased construction plans for a slurry wall in a deep excavation.

New Student & Family Programs, Seattle, WA
Orientation Advisor
- Provided information about Seattle University to new students and made them feel welcome and comfortable.
- Developed effective communication skills, strong conflict resolution skills, and great interpersonal skills.

Seattle University Math Corps, Seattle, WA
Math Tutor
- Taught, mentored, and promoted mathematics to children at Bailey Gatzert Elementary 2-3 times a week.
- Created a useful and efficient math curriculum by working closely with kids, teachers, and other Seattle University Math Corps team members.

COMPUTER SKILLS
- Proficient with – Excel: Visual Basic for Applications (VBA), Microsoft Office, Shoring Suite
- Familiarity With – AutoCAD & Revit, SAP 2000, EPANET, ANSYS, Phase 2, gINT

EXTRA CURRICULAR ACTIVITIES / LEADERSHIP EXPERIENCE
Concrete Canoe, Seattle University
Construction Lead
- Collaborating with Seattle University carpenters to fabricate a wooden construction mold.
- Managing the construction process and ensuring quality construction of the canoe.

Board of Trustees: Facilities Committee, Seattle, WA
Student Representative, Facilities Committee Member
- Attend Facilities Committee meetings with Seattle University’s Board of Trustees and university president.
- Provide student input and feedback on various university affairs regarding campus facilities.

Seattle University Men’s and Coed Club Soccer, Seattle, WA
Active Member
Hillary Tervet
32835 7th CT SW, Federal Way, WA. 98023
terveth@seattleu.edu
(206) 351-6908

SUMMARY OF QUALIFICATIONS
Civil and Environmental Engineering senior with interests in Structural Engineering and Sustainable Design. Excellent communication skills from experience in extracurricular activities and work experience.

EDUCATION

Seattle University, Seattle, WA
Bachelor of Science in Civil Engineering
- Relevant coursework: Mechanics of Materials I & II, Transportation Engineering, Residential Design
- President, American Society of Civil Engineers; Vice President, Engineers for a Sustainable World
- Dean’s List, Winter 2014
- 2nd place, ITE Student Night Competition 2014

Bryn Mawr College, Bryn Mawr, PA
- On track to graduate as Mathematics and Growth and Structure of Cities double major
- Relevant coursework: Form of the City, Topics of Mathematics: Sustainability, Educating for Ecological Literacy, Building Green, Discrete Mathematics, Topology, Multivariable Calculus

Highline Community College, Des Moines, WA
Associate of Arts in Mathematics
- Member of Phi Theta Kappa
- Graduated as Honors Scholar

WORK EXPERIENCE

Seattle University, Seattle, WA
Grader
- Grade homework assignments and laboratory reports for Mechanics of Materials I Lab

Sound Transit, Seattle, WA
Structural Intern
- Determined foundation type and size for potential art piece by performing loading calculations
- Modified design plans using AutoCAD
- Reviews plan sets and technical specifications for multiple projects

King County Metro, Seattle, WA
Transit Systems and Traffic Engineering Intern
- Performed data collection and analysis to optimize bus performance using Transit Signal Priority
- Mapped data in GIS and created maps for project reports
- Using data collected and analyzed, created report summarizing findings on performance of lines

Highline Community College, Des Moines, WA
Honors Teaching Assistant
- Provided guidance and feedback to students on coursework for Introduction to Honors class

COMPUTER SKILLS
- Proficient in Microsoft Office Suite
- Experience with AutoCAD, Revit, SAP2000, ArcGIS, Processing
SUMMARY OF QUALIFICATIONS
· Civil Engineering student with emphasis on Structural Engineering
· Experience in AutoCAD, SAP2000, and Revit through courses taken
· Leadership experience through work experience and extracurricular activities
· Excellent communication skills and enthusiasm to learn

EDUCATION
Seattle University, Seattle WA,
B.S. in Civil Engineering
· Structural Mechanics, Mechanics of Materials 1 and 2, Residential Design, Economics
· Student Member of ASCE
· Member of the Seattle University Steel Bridge team, for 2014-2015 school year
· Musician and event coordinator for the Seattle University Drum line for 2013 -2015 school years
Seattle University, Seattle WA,
B.S. in Civil Engineering
· Structural Mechanics, Mechanics of Materials 1 and 2, Residential Design, Economics
· Student Member of ASCE
· Member of the Seattle University Steel Bridge team, for 2014-2015 school year
· Musician and event coordinator for the Seattle University Drum line for 2013 -2015 school years

Oregon Institute of Technology, Portland, OR, Concentration in Electrical Engineering
February 2009 - June 2012
South Seattle Community College Seattle, WA,
Associates of Science Degree
· Dean’s list, Fall 2009- Spring 2010

WORK EXPERIENCE
Oregon Institute of Technology, Portland OR, Concentration in Electrical Engineering
September 2011 - June 2012
Application of Circuit Theory
· Assembled circuits using resistors, inductors, and capacitors.
· Validated electrical circuit theory using voltmeter, ammeter, and oscilloscope.
Residential Electrical Distribution
· Application of switches, cables, circuit breakers, and basic wiring.
· Built residential circuits on bare wall studs according to national electric code.
· Performed voltage and current measurements using digital multimeters.
Level Line Gutters Summer 2009 – 2011
· Utilized different tools and operated manufacturing equipment.
· Gained experience in providing a quality product and service.

COMPUTER SKILLS
AutoCAD, Revit, Microsoft office, SAP2000, JAVA programming
Amabella ‘Mia’ Bernardino  
3168 Fiji Lane, Alameda, CA, 94502 | bernard2@seattleu.edu | (323) 868-9435

SUMMARY OF QUALIFICATIONS

- Accomplished in leading projects by combining a strong technical background with management methods
- Confident public speaker with excellent presentation skills
- Successful in working independently and with a team

EDUCATION

Seattle University, Seattle, WA  
Sept., 2013—June, 2015

Bachelor of Science in Civil Engineering with an Environmental Engineering Specialty  
Minor in Mathematics, Core Honors Program

Overall GPA: 3.86

- Trustee’s Scholarship
- Bannan Scholarship
- Core Honors Scholarship
- Madden Scholarship
- Romano Scholarship

- Tau Beta Pi Leroy E. Record Scholarship
- Association for Women in Science-Seattle Malala Yousafzai Scholarship
- American Public Works Association-Seattle Jack Pittis Scholarship
- Screen Actors Guild John L. Dales Scholarship

WORK EXPERIENCE

Massachusetts Institute of Technology Office of Engineering Outreach Programs, Cambridge, MA  
Summer 2014

Probability and Statistics Instructor for MIT STEM Program

- Exposed students entering the eighth grade to probabilistic and statistical concepts and their application in everyday life
- Designed course curriculum, lesson plans, and hands-on activities to engage students in active learning
- Served as a mentor and role model for middle school students, especially from underrepresented and underserved backgrounds

Seattle University Center for Environmental Justice and Sustainability, Seattle, WA  
Sept., 2013—Present

Intern

- Organize and promote events, such as a benefit concert for Typhoon Haiyan relief – raised $7,500
- Supervise the marketing plan for use by all employees
- Write articles for and edit the website
- Lead tours of the Bullitt Center – The Greenest Commercial and Most Sustainable Building in the World

DOER Marine, Alameda, CA  
Summer 2012, Summer 2013

Engineering Intern

- Researched, developed, and presented TULES, a Terrestrial and Underwater Evaluation System, which features sensor technology
- Arranged and led meetings with private and public environmental agencies
- Used AutoCAD to create electrical schematics for submersibles

Actress, Los Angeles/San Francisco, CA  
1999—2011

- Previous work experience has been in the area of theater, communication, and advertising
- Some production companies involved include Nickelodeon, Disney Channel, The CW, Got Milk, etc.

COMPUTER SKILLS

- Math/Science: AutoCAD, Revit, Visual Basic for Applications, Mathematica, Matlab, SPSS, GIS, HEC-HMS/RAS
- General: Microsoft Office (Excel, PowerPoint, Word, Outlook), Ektron

ACTIVITIES

- President, Tau Beta Pi Engineering Honor Society, Washington Gamma Chapter
- Member, Society of Women Engineers
- Member, Association for Women in Science-Seattle
- Member, American Society of Civil Engineers

- Member, United Filipino Club, Seattle University
- Member, Screen Actors Guild-American Federation of Television and Radio Arts
- Volunteer, Bailey Gatzert Elementary School
- Volunteer, Disabilities Services, Seattle University
Kelsey Rau
School Address: 505 13th Ave, Apt. 6, Seattle, WA 98122
Permanent Address: 4100 E Old Settlers blvd, Round Rock, TX 78665
rauk@seattleu.edu | (512) 743-2021

EDUCATION
Seattle University, Seattle, WA   Expected Graduation, Jun 2015
Studying: Environmental Engineering   GPA: 2.999
• Awarded Seattle U Grant and Bellarmine Leadership Scholarship.
• Awarded the Lydia Pickup Memorial Scholarship through Society of Women Engineers
• Dean’s List Fall 2011.

WORK EXPERIENCE
Opener/ In-Shop, Jimmy John’s Gourmet Sandwiches, Seattle, WA   Jul 2013- Present
• Arrived before store hours to prepare for the business day.
• Worked in the shop making sandwiches and cleaning as needed.
• Trusted to take the deposit to the bank and had my own key to the shop.

Office Assistant, SU Undergraduate Admissions, Seattle, WA   Oct 2012- Jun 2014
• Open, Scan and file mail.
• Proficiency with Datatel and ImageNow computer programs.
• Various other tasks around the office.

NW Lab Assistant, Center for Environmental Justice and Sustainability, Seattle, WA
• Determined whether the Grey Water system met city water standards.
• Worked with a team to take water samples and run tests including BOD, COD, TSS, and Total Nitrogen.
• Keep organized data from each sampling.

Day Care Worker, Central Baptist Church, Round Rock, TX   Jan 2010-Aug 2011
• Watched over children of various ages from 0-6-year olds.
• Checked-in kids as they arrived.
• Organized and carried out lesson plans and activities.
• Advised and led volunteers.

LEADERSHIP EXPERIENCE
Financial Director, Seattle University Teens for Justice and Service, Seattle University   Sep 2011-Mar 2012
• Managed the club’s accounts and acquired financial assistance.
• Organized and carried out two events each month.
• Developed a draft for a grant, with which we were awarded $5,000.
• Designed a protocol for future financial directors.

President of SU Club Kayak Team   Sep 2011-Feb 2012
• Organized practice times and transportation.
• Delegated tasks to other officer positions and maintained safety during practices.

Secretary, Seattle University Rotaract Club   Oct 2011-Jun 2014
• Keep organized and detailed notes.
• Schedule meetings, book rooms, and record attendance.
• Assist in planning both social and volunteering events.

ADDITIONAL SKILLS
• Experience with AutoCAD, Revit, ArcGIS, SAP 2000, Datatel, and ImageNow computer programs.
• Proficient in Microsoft Office.
• Ability to learn quickly.
SUMMARY OF QUALIFICATIONS
• Project experience with Seattle University
• Fluent in Spanish

EDUCATION
Seattle University, Seattle, WA Sept. 10—Present
Bachelor of Science in Civil Engineering
• Timber Design
• Residential Design (autocad)
• Water resources I and II (ARC-GIS and HEC)
• Environmental Engineering
  Principles
  Chemistry
• Core Honors

Universidad Del Pais Vasco, San Sebastian, Spain September 2013 – May 2014
Spanish Studies Program
• Spanish 305-306
• Intro to Basque Language

College of Civil Engineering
• Computer programming (VBA)
• Differential Equations

WORK EXPERIENCE
Mother’s Place, Seattle, WA June 2012—present
Substitute Teacher
• Responsible for classrooms of up to 24 children

Mt. Rose Ski Resort, Reno, NV December 2007 – April 2011
Snowboard Instructor
• Responsible for teaching children how to snowboard

COMPUTER SKILLS
Familiar with:
• Autocad
• ARC-GIS
• Revitt
• SAP
• SPSS
SUMMARY OF QUALIFICATIONS

- Communicates effectively with others using clear verbal and written skills
- Able to multi-task and prioritize projects and assignments
- Creative thinker able to analyze and solve problems to meet objectives and goals

EDUCATION

Seattle University, Seattle, WA  Sept, 2011—June 2015
Bachelor of Science in Civil Engineering with Environmental Engineering Specialty

- Relevant course work: Water Resources I and II, Residential Design, Fluid Mechanics, Geology, Soil Mechanics,
- Member of the Seattle University club baseball team.
- Member of the Seattle University Concrete Canoe team, for 2014-2015 school year.

WORK EXPERIENCE

311th Signal Command, Ft Shafter, HI  June, 2012 — September 2012
Program Assistant (Federal Job)
Pay Grade: GS-0303-04

- Help revise, edit, and finalize memorandums
- Worked with computer programs such as power point, excel, and word
- Operate machinery to scan, copy, and shred paper
- Helped and played an important role with the hiring for the Information Technology Specialist recruitment process
- Worked 40 hours per week ($13.68 p/h)

Office Support Clerk (Federal Job)  June, 2011 — September, 2011
Pay Grade: GS-0303-03

- Same as above
- Worked 40 hours per week ($11.62 p/h)

Zippy’s Fast Food Restaurant, Honolulu, HI  June, 2010 — September, 2010
Counter/Cashier

- Organize and package food accurately and quickly
- Perform basic cash accounting on register
- Worked 15 hours per week ($8.00 p/h)

COMPUTER SKILLS

- AutoCAD, Revit, Microsoft office, Matlab, SPSS, GIS, HEC-HMS/RAS