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New AS Recycling Center
Feasibility Report

Prepared for Associated Students,
California State University Northridge, Inc.

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TerraSolutions
Environmental Analysis, Advice & Action
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I. Executive Summary

INTRODUCTION
CSUN’s Associated Student’s Recycling Center has been in operation since 1991. In 2009 the Associated Students decided to fund a feasibility study as the first step in the process of design, funding and construction of a new AS Recycling Center. After RFQs and interviews, TerraSolutions Consulting was selected to prepare the study. The objective of the study is to provide AS and CSUN with the requisite background information to be able to issue an RFQ for an Architectural and Engineering firm to design a new Recycling Center.

EXISTING CONDITIONS
It is remarkable that the existing recycling staff have been able to do so much with so little for so long. Continuous operation of recycling has occurred at the current site since 1991. The quantity and type of materials processed has grown due to the resourcefulness and dedication to the mission of recycling by students and staff. The office and tool storage reside in a large shipping container with no HVAC or lighting. The current yard area is approximately 6,000sf of existing paving with a 10’ perimeter chain link fence paved yard area. The yard has a collection of containers, tables, awnings and support equipment to allow extensive sorting and handling of incoming recyclable materials. The AS Recycling Center is operated by staff and part-time student employees.

CHALLENGES
In California recycling has become a priority over the last few years due to regulatory compliance requirements, economies of landfill hauling costs, recyclable commodity markets (often an income source) and the globally heightened awareness and concern to minimize our negative impacts on our environment. Effective recycling is quickly shifting from a “good” to an “urgent” activity integrated into an overall program of environmental responsibility.

In the last two years CSUN faculty and students through their actions have shown an increasing awareness of and support for sustainable initiatives including recycling. To meet the changing needs over the next 5-10 years, the new Recycling Center must be flexible and scalable.

The new AS Recycling Center “will be a multi-functional space, serving primarily as the central collections location for many of the campus recyclables. It will also serve as the administrative hub of the Center and its programs and services and as a focal point for the University community for educational programs, services and issues related to the environment.”

1 source is CSUN document “CSUN Recycling Center Program Statement – 030309”
Study Scope
As part of the study, TerraSolutions delved into areas beyond the specifics of the physical AS Recycling Center and its current operations. This was done to gain the best possible understanding and insights regarding the CSUN campus and auxiliary organizations and their potential participation in recycling. This also included an examination of the collection, transportation and related management of materials vital to a complete understanding of what feeds into the center at the present time and what would be the best options for future logistics.

The 3 key recommendation areas presented in the study are: Collection and Transportation, Sorting and Handling and Optimal Divestiture of Recycled Commodities.

Findings and Recommendations
The new AS Recycling Center should be constructed at the existing location which is at the campus interior and located to minimize distance covered for the collection or recyclables on campus. It is anticipated that the available space will meet the increasing campus and auxiliary demand for the next 15 years. If this facility were to serve both the campus and the community another location would need to be considered.

Recycling represents one of the green collar employment growth areas. The new Recycling Center will be a multi-functional space, used for education, training and operations. The center is in an area of campus with other notable sustainable projects, like the new Student Recreation Center and the Fuel Cell/ Rainforest. The center will be visited by many prospective students.

The facility and the building will have to present a front of house to visitors and those attending training. The building design and materials for the west and north elevations will need to present an attractive appearance which compliments adjacent buildings. The south and east elevations are back of house and can be more functional in design and material selection. The indoor and outdoor spaces on the site will need to flow together to meet overlapping functional requirements.

US Green Building Council’s LEED Certification may be considered and the principals of sustainable design will be important including, the use of local materials, energy saving space conditioning, day lighting, energy efficient equipment, and water conservation and reuse. The building design will also comply with current CSU requirements for mechanical peer review, basis of design life-cycle cost analysis and overall energy conservation exceeding Title 24 by a minimum of 20%.

The yard and operations areas will be shaded and provided with misters and large fans to assist in natural climate control. Opportunities for use of offsite gray water for irrigation and operations will be considered.

End of Executive Summary
II. Definitions & Abbreviations

Associated Students Campus Recycling Services: AS Recycling or AS-CRS
Associated Students, California State University, Northridge, Inc.: AS or A.S.
B/C: Bottles & Cans
Campus Community: may include CSUN students, staff, and faculty
Cart: A rolling, open container that can transport recycling and trash from one location to another.
Commodities: The type of material that has a market for recycling, such as mixed paper, metal, bottles/cans.
Construction and Demolition: Materials composed of clean lumber, sheet rock, cement, metal, and other material generated at a construction site; C & D
Container: Anything that holds trash or recyclables.
CSUN: California State University, Northridge
DOC: Department of Conservation (DOR-Division of Recycling)
DORRR: Effective January 1, 2010 the new name of the DOC will be the Department of Resources Recycling and Recovery (CalRecycle)
Front Loader: A large container used for trash or recycling, that is on wheels and lifted by forklift type arms, up and over the front of the truck to empty.
HHW: Household hazardous waste
Inert: Material comprised of dirt, rock or Concrete.
LTCs: Laser Toner Cartridges:
Market: This is referred to the pricing and programs available for recycling.
Material: A term that can be used for items in the trash or recycling.
Mixed Paper: Includes materials such as White Paper, Colored Paper, Shredded Paper, Newspaper, Magazines, and Cereal Boxes.
MRF: Materials Recovery Facility, where materials collected from consumer sources (businesses, residences, institutions) are sorted into appropriate commodity categories and subsequently recycled. A “Dirty MRF” sorts recyclables plus compostables and/or trash; a “Clean MRF” manages recyclable streams with no compostable content or trash.
OCC: Old Corrugated Containers
PPM: Physical Plant Management
RFO: Recycling Field Office/Yard where recyclables are brought for sorting and preparation for market.
RRB: Residential Rent-A-Bin Roll Off Services, Inc.; provides bins and hauling services for recyclables and trash.
SRC: Student Recreation Center
SSU: Satellite Student Union
Tilt: tilt ‘n wheel, 50 gallon collection container for mixed paper, a brand name for a bin manufactured by Continental Manufacturing.
Toter: Usually a 32, 64 or 96 gallon container on wheels that holds recycling and trash. It is a name brand for recycling containers much like what is used in a residential program.

TUC: The University Corporation

UBC: Used Beverage Containers

USU: University Student Union
III. Background

A. AS Infrastructure
Associated Students (AS) is a 501(c)(3) nonprofit corporation governed by a student-based Board of Directors, who are the decision makers and the ones who fund the AS-CRS program. Cynthia Signett (Recycling Coordinator) reports directly to David Crandall, AS General Manager. There is one Recycling Center Field Supervisor, Rolando Valiente who works closely with Ms. Signett and with staff that does the actual labor. There are five (5) regular student staff members plus two (2) student leads.

B. Recycling Center
The AS Recycling Center was started back in the 1970’s by establishing a drop-off center located at the corner of Plummer and Etiwanda. Due to lack of personnel oversight, this drop off center became more of a dumping ground for items that were not recyclable. In the 1980’s, this site was closed due to misuse.

On May 8, 1990, the AS Senate approved a campus-wide recycling proposal, which was initiated by David Weiss (senate member) who worked with university administration to come up with a white paper and bottle/can pilot recycling program.

In March 1991, collaborative efforts between the University administration and Associated Students began by diverting paper from three buildings and bottle & can bins at 10 locations. The program today is very similar in stature to the one started in 1991, with the exception of more materials being accepted and recycled from more than 175 collection locations throughout campus.

This recycling program was established to divert recyclable materials from the University waste stream and to promote the benefits of recycling.

The overall purpose and goal of the AS Recycling Program is to implement a comprehensive program to inform, educate, and encourage the campus community to recycle. As a campus community, CSUN sets an example to others by active participation to decrease adverse impacts on our environment and conserve precious natural resources.

The programs and services offered by the AS Campus Recycling Services benefits the students and the University by providing a greater awareness of recycling through education, participation in activities, charitable contributions, outreach to the community, practical work experience, and residential and campus collection services just to name a few.
C. Feasibility Study
The Associated Student Board of Directors, AS Campus Recycling Services staff, Campus Community, CSUN faculty and Associated Student Board of Directors believed the best way to approach building a new center was to have a recycling feasibility study performed to ensure all angles of an expanded new recycling program and physical center were addressed.

Associated Students (AS) hired TerraSolutions Consulting, LLC, an environmental consulting firm, to help determine what a proposed California State University Northridge (CSUN) AS Recycling Center should be, specifically “to determine the capacity of a renovated facility to meet growth of programs over the next five (5) and ten (10) years”. This includes the creation of “models of current and future quantities of recycled material.”

D. Visioning Session
Visioning sessions were held soon after TerraSolutions was hired and assisted in developing the ideas of staff, faculty and students. The sessions began with a History of (AS) Recycling at CSUN, followed by Visioning guidelines and framework. During the next hour attendees contributed their ideas about recycling on campus, captured on two “Mind Maps”. Mr. Kuhn managed the Mind Mapping component while Ms Bills recorded comments and offered additional perspectives to further the group’s participation.] The final 15 minutes all attendees were encouraged to write a fictitious, visionary article in the year 2015 describing the key factors to what by then would be known as a fantastically successful CSUN environmental and recycling program, renowned nationwide.

All of the ideas and thoughts which were discussed during the visioning sessions and defined in this report will be used as a basis for the AS Recycling Center Feasibility Study. Understanding the desires of the students, staff and faculty, combined with an understanding of the sustainability goals at CSUN, will further enhance this feasibility study; and, in turn, the future AS Recycling Center and its programs. In addition, the direction provided with these ideas establishes a platform for the University to develop a sustainability plan.

For the full report of the visioning session, please refer to the CSUN website, at http://www.csunas.org.
E. June Meeting Recap and Overview of Results

On June 17th, 2009, a diverse and representative group of students, staff, faculty and other interested parties came together for a half-day SWOT analysis session. All CSUN participants individually wrote what they felt were the Strengths, Weaknesses, Opportunities & Threats, both at a CSUN-as-a-larger-community level perspective and as those might pertain to the AS Recycling Program “as it stands today”. The results (as written):

**STRENGTHS**
- Campus-wide support of the existing program
- Creation of the Institute of Sustainability
- CSUN Energy Program, which reduces consumption
- Open-mindedness to change sustainability
- Positive change with chemical usage – more sustainable

**WEAKNESSES**
- No classroom/hallway recycling currently in place
  ……and could do more in Housing
- No composting
- Lack of education or awareness
- Lack of collaboration among key players

**OPPORTUNITIES**
- Education a) of students on campus to let them know what our recycling program (is) b) student-led involvement, student research to join the students to the program
- Program – eliminating the use of bags, more bins, moving into buildings – more collectables
- Beautification of yard and campus
- Admin/Finance – better budget, vendors
- Renewable Energy – solar power…….

**THREATS**
- Funding
- Physical/Natural threats (Health/Safety) leading to operational threats
- Indifference (lack of knowledge/awareness)
- Some don’t care (don’t want it)
- Apathy
- State/Federal influences/regulations
  [the following 2 are AS Recycling Program-specific]
- Not Profitable
- Impatience

Then the attendees split arbitrarily into four groups, each identifying the common perceptions. Finally, those teams merged into two and tackled two of the characteristics
in relation to each other. The first team identified the following synergies between the consensuses on:

**STRENGTHS ↔ WEAKNESSES**
- Classroom/Hallway – currently in place
- Education + [more] courses in Sustainability
- Lack of Collaboration – collaboration brings together the individuals to start a program (PPM, AS,…)
- Composting

**OPPORTUNITIES ↔ THREATS**
- Indifference/Apathy – helped by education
- Funding – better budget
- Natural threat -- beautification

**IV. Recap of AS Recycling Program**
The AS-CRS currently provides service to over 200 locations throughout campus to collect recyclables, which are taken back to their Recycling Yard to sort. Locations vary from student housing, food services, campus buildings and onsite recycling throughout the campus. AS Recycling currently has a primary focus on servicing exterior recycling containers; however, special pick up services are available for current program commodities from campus departments upon request.

The program services mixed paper, bottles/cans (aluminum, glass, #1 & #2 plastic), cardboard, cell phones, laser, toner, ink jet cartridges and pallets. In addition, the AS Recycling Center staff will take pallets to the recycling center for reuse or to the Physical Plant Management (PPM) yard for storage. They are later picked up by the vendor for reuse and recycling.

AS Recycling coordinates with Physical Plant Management and other facilities such as The University Corporation to provide an extensive paper recycling program throughout all campus departments, labs and faculty offices.

Additionally, there is a mail service system on campus managed by PPM in which faculty and staff can place one item (cell phone, ink jet or laser cartridges) in Campus mail per day. PPM picks up these items and places them in a special storage container in the PPM yard. The AS CRS staff will pick up the material from the PPM yard and take it over to the AS Recycling Center for storage. In Housing, there are drop off locations within each residential building, AS recycling checks and pulls ink jet and cell phones from these locations on a regular basis.

**V. Current Recycling Center Site analysis**
There are currently 1,484 square feet of black top space, which is used for sorting the recyclables and storing materials. There is an 8x28 foot storage unit that is used as an
office and storage area, which takes up 288 square feet of the property. The Recycling Center is enclosed by metal fencing with mesh material in-between to hide the site. There is also a forty yard debris box to store cardboard, a 100 square foot area for toner cartridge storage which is shaded, sorting tables and three yard bins for beverage container recycling. There are pallets stored at PPM and additional space in Housing which is primarily used for storage. Below is the estimated square footage for the current recycling center.

- Corrugated Cardboard = 300SF (debris box)
- Unloading Area w/ shade cooling = 288SF
- Sorting Area w/ shade cooling (2-10x10 shade canopies) = 144SF
- Storage Bins = 384SF
- Storage Area with Shade cooling = 80SF
- Storage Unit with Shade Cooling = 288SF

To learn more about the Recycling Center view the AS Recycling Center Program Statement located in Addendum 1.

A. Recycling Program Management of Materials

1. Cardboard
The Recycling staff currently picks up cardboard from 16 locations and delivers to two central locations (recycling yard and bookstore) then place in a forty yard debris box for OCC only. AS-CRS requires participating locations break down the OCC prior to pick up. At some of the locations, staff must walk through gates and often around kitchen supplies and material to pick up the cardboard. There are also times when the cardboard is not broken down and the staff needs to do that. When this happens staff will wait 1-3 days and if still not flattened, will talk with the area manager; provide a free box-cutter knife, review criteria for pick up; and any other necessary training to ensure cardboard is broken down. To complete the daily OCC route, it can take staff up to 4 hours to service the cardboard. RRB services the two central location forty yard debris boxes and to Valley Recycling Center.

2. Beverage Containers
AS Recycling staff picks up recycling at 55 campus and 15 housing exterior locations and 26 internal building locations (on an on-call basis). All recyclables are transported to the RFO Yard via the electric cart. The recyclables are dumped into plastic tabletop bins and sorted.
Glass is sorted by color (clear, green, brown) and the #1 and #2 plastics are source separated as well. All glass and plastic are sorted into three-yard, front load containers. Aluminum and tin cans are sorted separately into bags. All are picked up by Valley Recycling Center, a certified “recycling center” by the Department of Conservation (DOC). The AS Recycling staff relies on USU maintenance to move front loader containers onto the Valley Recycling truck by using their fork lift. The recycling company then takes the front loaders off-site, empties them and then brings the containers back to the Center. This service is provided at no extra cost to AS Recycling. AS Recycling is certified by the Department of Conservation as a Community Service program and designation is based on amount of UBC recycled by AS recycling.

3. Mixed Paper

Golden State Fibers services 24 front load bins (bins are provided at no charge) at 21 locations throughout the campus. Most staff and faculty have small under-the-desk mixed paper recycling containers that they are responsible for emptying into a centrally located, larger recycling container inside the building. These centrally located containers (tilt-n-wheel) are emptied by facilities staff into external locked, three-yard mixed paper front loaders. Golden State Fibres, paperstock vendor, requires 12 full containers to schedule a pick up due to increased transportation and fuel costs. During this time frame, there will be three-yard containers that are full and the facilities staff is unable to empty into the centrally located bins. When external location bins are full, a facility manager can call or email a special request for a tilt ‘n wheel; and AS Recycling picks up the tilt, empties into nearby empty three yard bin and returns the empty tilt bin to its original location. AS Recycling staff estimates may need to service full tilts six to eight times a month.

All external three yard bins are checked weekly (Tuesday) for “fullness”, each noted on a paper bin checklist. When 9-12 bins are ¾ full, Golden State Fibres is called to schedule a bin exchange within two-four days.

In order to avoid unnecessary injury, paper may be recycled by hand from full tilt bins into the external three-yard bins. Once the load is lightened, the tilt bin can be lifted and paper recycling placed into three yard bins. In addition, there is a lower contamination rate due to process of transporting tilts to outside three yard bins by custodial staff. AS Recycling Services receives revenue from the paper recycling. Paper for document destruction is managed by Shred It and Valley Recycling Center. Locked containers are provided by both service companies. Shredded paper weights are provided by Valley and Shred-It and are incorporated with the mixed paper numbers.


Cell Phones, ink jet and laser toner cartridges are serviced a variety of ways at CSUN. Primarily, one item per day can be placed in each campus department mail, picked up by PPM mail services personnel, returned to PPM facilities yard for storage, and
subsequently pick up by AS Recycling staff. Cartridges are picked up daily together with cardboard recycling pickups from the PPM yard.

When there are 200-300 ink jet and laser toner cartridges, or about every six weeks, Printing Technologies, Inc., current vendor for ink jet and laser toner cartridges, is scheduled to pick up when there are 200-300 units, approximately every 6 weeks. Laser Toner and Ink Jet cartridges are normally left in their original boxes; if not they are placed in a bag or box to avoid staff (PPM and AS) from getting toner spilled on themselves and other areas. Laser toner cartridges are stored under a shade canopy to avoid exposure to heat and rain. Ink jet and cell phones are stored inside, to protect against weather extremes.

AS Recycling staff currently drops off the cell phones with Planet Green at their Chatsworth location for reuse or recycle. Drop-off occurs when there are at least 50-100 phones, which is every two-three months or approximately four to six times a year. There is an option to mail cell phones in boxes provided by the vendor.

5. Pallets
The AS Recycling Center transports pallets to PPM facilities yard for pick up by vendor who reuses, rebuilds or recycles the pallets. There are currently 3 pick-up locations. AS Recycling staff places the pallets in the back of the electric cart and transport them to either the PPM yard or to the AS Recycling Center. Currently San Fernando Valley Pallet Company picks up at the PPM yard every two months servicing between 200-300 pallets. A PPM employee and forklift is enlisted to load pallets on to their flatbed truck. The vendor reuses, rebuilds, and/or recycles the pallets.

6. Electronic Waste
CSUN electronic waste is collected 2-4 times per year and is currently managed through Asset Management in PPM. This program provides a way for CSUN staff and faculty to recycle old PC’s, broken keyboards, mouses, and cables, along with other electrical and electronic appliances. This will typically include such items as stereos, microwaves, etc. that are no longer functional. The program is not currently offered to students. In addition, AS Recycling has been approached by several vendors such as Goodwill, Planet Green, 1-800-Got Junk, and Apple Computers to help set up a program for collecting student and staff (personally) owned computers and electronics.
7. Physical Property Management
Physical Plant Management (PPM) yard is not the responsibility of AS Recycling; and it is managed as its own Department. PPM yard houses different debris boxes and locations for recycling. There is an area for Compact Florescent Lamps and Florescent Tube drop off, which are taken by the CSUN Environmental Health and Safety Department and properly recycled. This drop off is exclusively for the University buildings and departments only. CSUN Environmental Health & Safety provides complete services for all hazardous materials generated by CSUN. There is a location for usable and broken pallets which are combined from three different locations and dropped off by the AS Recycling Services staff.

There are two ten yard dirt boxes, a thirty yard green waste box and one thirty yard trash debris box located at the PPM yard and serviced by Consolidated Disposal on an on-call basis.

There is an area to place surplus items and old broken material from University Departments. There is a surplus materials program on campus for all CSUN/State owned property, which is managed by PPM Asset Management. There is a huge yard with tractor and equipment, a part of PPM Grounds, Facilities, and Plumbing Shops.

8. Special Event Recycling
The AS Recycling Center staff will provide 32 gallon blue brute recycling containers or black DOC bins for special events. These containers are typically used for bottle and can recycling which are partnered with a recycling and trash container. Containers are currently provided for Freshman Orientation, Big Show, commencement, Matador Nights, EarthFair, and other special events throughout the year. AS Recycling subscribes to the campus special events list that they monitor in order to offer services when able.

9. Hazardous Material & E-Waste Collections
The Los Angeles HazMobile has provided HHW & e-waste services for the community and campus personnel through special collection events one to two times per year. CSUN hosts the site and the City does all of the work. In order to participate, one must be an LA City resident.
Site Map of Most Recycling Locations (effective 4/30/09)
AS Recycling Carts, Vehicles and Management of Materials
The AS Recycling Center staff currently uses electric flatbed carts to collect the recycling commodities from the collection containers throughout the campus. The staff services cardboard, beverage containers, cell phones, ink jet and laser toner cartridges and brings all material back to the Center. Pallets are also serviced and are brought back to either PPM or the Recycling Center.

Cardboard is serviced on a daily basis, beverage containers a couple of four times per week, and pallets, cell phones, ink jet and laser toner cartridges on an as needed basis, although checked daily at the PPM yard. Each commodity is serviced separately, with the exception of the cell phones, ink jet and laser toner cartridges, which are picked up all at one time.

The cardboard is transferred from wood recycling containers created by AS Recycling staff, placed in the electric cart, taken back to the Recycling Center, and placed in a forty yard cardboard debris box. Any cardboard generated south of the Bookstore is placed in a second forty yard debris box located behind the Matador Bookstore.

The beverage containers are also serviced with the electric cart by placing small (30-gallon) bins from inside the campus recycling containers on the bed of the cart. Staff removes the bin from the campus UBC container, empties the material into the small bin on the back of the electric car, and replaces it immediately. Once the bins on the cart are full, the cart goes back to the Recycling Center and empties the material into small plastic storage bins used for sorting. The use of 30-gallon bins on the cart has replaced the use of plastic garbage bags for transport, allowing for a smoother transition of material while creating less waste.

Mixed paper is a separate commodity that is serviced in partnership with PPM and other auxiliary facilities personnel and regularly by Recycling Staff. This material is transported from within campus buildings via the Tilts, and is not brought back to the Recycling Center, but emptied into one of the external front load containers marked specifically for mixed paper. If a front-load container is full, AS-CRS does offer special exchange services to alleviate any inconvenience of not being able to empty a full Tilt. The Recycling Staff drives the electric carts on small cement/asphalt paths that are also used by students. There are a variety of ways to streamline the process in order to efficiently service the recycling, while maintaining the time and distance traveled on these paths. Such examples of things that can be changed are:
Using special cart style containers for cardboard collection so the material can be moved by being hooked up to the electric cart. This can allow for a variety of containers to be placed on the back of the cart and towed once, instead of making three or four different trips by using just the flatbed of the electric cart.

Servicing material during non-peak or slower times to alleviate any safety problems with large number of students walking around campus. (early morning/late at night)

**Cell phones, ink jet and laser toner cartridges** are serviced as needed when staff or faculty calls in the request to the Recycling Center for a large volume pick up. A majority of the time these materials are sent via the campus department mail, which is picked up by PPM mail services. The items are taken back to the PPM facilities yard for storage and picked up by AS Recycling staff. The Recycling staff will do large volume pick-ups as well as stop by the PPM yard daily to transport the materials to the Recycling Center.

**Pallets** are picked up from three different locations, placed on the electric cart, and taken to either the PPM yard or the Recycling Center. Although recycling staff checks each location daily, they may have no pallets to move.

**Electronic Waste** is currently serviced by PPM Asset Management on an as-needed basis. Recycling staff currently does not manage this process.

Safety is also a concern while using the electric carts on the paths during busy/peak times at school. Safety appeared to be a priority and was witnessed the few times TerraSolutions visited the campus. The staff that was observed was cautious and safely managed the electric carts around students throughout campus.

Recommendations for changes in the current management and routing of materials and carts can be viewed in Section XII.

**C. AS Recycling list of Recycling Equipment**

The AS Recycling Center staff currently use a variety of equipment to help with the management of their job. The list shown in Table 1 reveals all of the items currently used at the Recycling Center. This list was provided by Rolando Heriberto Valiente, AS Recycling Field Supervisor.
VI. AS Recycling Program Routing

A. Current Routing System

In order to figure out high traffic areas, AS Recycling staff observed traffic patterns and spoke with its own students and others regarding what paths were most frequently traveled. This feedback was used to establish proper routing for the electric carts, as well as re-evaluating new locations to place bottle and can recycling containers for students to use. Additionally, the staff evaluated how full the recycling containers were when serviced and moved those from locations that did not capture a lot of recycling. This level of assessment is a perfect match and can be used successfully when evaluating locations for new recycling containers as well as the proper routing when picking up recycling. It is recommended to continue this level of review two times a year to fine tune the program.

VII. Visual Waste Audit, Characterization and Site Visit Feedback

A. Visual Waste Audit

In May 2009, TerraSolutions toured the campus and performed very simple visual waste audits to get a sense of what is in campus and residential life, trash bins. Although this
visual audit is not performed nor resembles a full waste characterization study in analytical breadth, it provides a general sense of what is in the container and reveals opportunity to divert the material from the waste stream which is considered the “low-hanging fruit”.

The visual audits were performed from four locations on campus and six trash containers. These locations consisted of the University Club, food services Satellite Student Union\(^2\), the Oviatt Library and Housing Building #12. Table 2 below reflects the material found in each container.

Table 2 – Visual Waste Audit Results

<table>
<thead>
<tr>
<th></th>
<th>Cardboard</th>
<th>Compostables</th>
<th>Mixed Paper</th>
<th>Newspaper</th>
<th>Beverage Containers</th>
<th>Milk Cartons</th>
<th>Film Plastic</th>
<th>Poly Plates</th>
<th>Cups</th>
<th>Yard Waste</th>
<th>Textiles</th>
<th>Trash</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Club</td>
<td>25%</td>
<td>50%</td>
<td>10%</td>
<td>2%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13%</td>
</tr>
<tr>
<td>Satellite Student Union</td>
<td>2%</td>
<td>30%</td>
<td>2%</td>
<td>1%</td>
<td>10%</td>
<td>50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5%</td>
</tr>
<tr>
<td>Dorms Bldg 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>19%</td>
</tr>
<tr>
<td>Dorms Bldg 12</td>
<td>1%</td>
<td>5%</td>
<td>3%</td>
<td>2%</td>
<td>15%</td>
<td>5%</td>
<td>10%</td>
<td>15%</td>
<td>10%</td>
<td></td>
<td></td>
<td>8%</td>
</tr>
<tr>
<td>Dorms Bldg 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>61%</td>
</tr>
<tr>
<td>Oviatt Library</td>
<td></td>
<td>40%</td>
<td>30%</td>
<td>15%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14%</td>
</tr>
</tbody>
</table>

The assessment of the visual waste audits show that more can be done in educating and administering recycling within the offices and classrooms of CSUN. Examples of ways to improve recycling within these areas include more outreach to students, faculty and staff; place more visible signage near the interior recycling stations; add more interior recycling containers, place a more public face on recycling by sending out emails and talking with staff, faculty and students; and consider switching to a “dirty” Material Recovery Facility for the trash containers (instead of going to the landfill), which would pull any recyclables out of the waste stream.

\(^2\) Food Services were closed on the day the visual audit was done due to construction.
B. Waste Characterization Study

Two waste characterization studies were completed on April 21, 2009 by CSUN students at Sierra and Juniper Halls, which are business and academic buildings. These results help evaluate the current recycling program and to find out what is still being placed in the trash. Waste characterization studies are a more intense sort with all material taken out of the trash container and placed in specific cans according to material type. This material is then weighed and placed in percentage categories.

Juniper Hall / Noski Auditorium (an academic building) trash was comprised of mostly clean and soiled paper, with some clean cardboard and plastics in the mix. Sierra Hall trash (located next to Sierra Center (a food service area) was comprised of a large number of compostables with some plastics, cardboard and clean paper.

As with the visual audits done, these waste characterization audits reveal a large amount of recyclable material placed in the trash. It is recommended to perform a waste audit for the remainder of the campus within the next year, which will provide a solid baseline for what material is currently still in the waste stream. These waste audits can be performed by students, which will ease the cost of hiring a consulting firm. Once these have been completed, decipher what needs to be changed to enhance the current recycling program. Six to nine months after any changes have been implemented it is advised to perform another set of waste characterization audits on each of the trash containers. The rule of thumb for wastes audits is to conduct them only after something has changed in your program or you have specific information you are seeking. TerraSolutions recommends performing a waste characterization audit every two to three years depending on the growth of the recycling program and the change in materials or commodity types being accepted.
C. Site Visit Observations

- Mr. Kuhn and Ms. Bills were impressed with both the structure and the very high morale of virtually all personnel involved with the AS Recycling program. From the first tour of the campus led by Salvador Preciado (AS Recycling Student Staff Assistant Lead) on April 3rd, 2009, to subsequent meetings and the Visual Audit tour on May 6th, we found a well thought-out flow and an inspired creative staff.
- Staff works hard moving cardboard and there are a variety of different processes that would ease work load and improve productivity.
- The paper transfer continues to be labor-intensive and a concern with the manual lifting of carts that occurs.
- The manual process of sorting the bottles and cans, while labor-intensive, provides excellent diversion, with glass sorted by color (green, brown, clear), cans, bottles and non-recyclable plastics and other debris sorted appropriately. The laser toner and ink-cartridge handling appeared minimal, though we did not see berms or other such containment features in case of inclement weather combined with potentially compromised printer cartridges.
- Weather protection and other aspects of providing a favorable work environment for sorting were evident—resourcefully added to the processing area for the workers’ comfort including misters.
- Lots of opportunity for standardized signage with pictures or more information.
- Partnering all trash with recycling containers should be considered in order to improve the success of the program.
- There is a lot of paper still in the trash. Providing more outreach to faculty, staff and students is important for diversion.
- Housing needs more recycling containers for mixed paper and other multi-family generated recyclables. A more thought out process is recommended to capture the recycling.

VIII. Explanation of current flow, volumes & commodities

A. Current Quantities of Material

The commodities reflected below are those that are currently recycled at the CSUN campus. The 2008 figures were provided by AS Recycling staff and the 2004 – 2007 tonnages were retrieved from the California Integrated Waste Management Board AB75 Annual Reports for CSUN. AS Recycling collected a total of 430,204 pounds or 215 tons in 2008 and 335,974 or 168 tons in 2007, which includes all commodities, along with shredded paper and tin.
ASSOCIATED STUDENTS, INC.
CALIFORNIA STATE UNIVERSITY, NORTHRIDGE
NEW RECYCLING CENTER FEASIBILITY STUDY

Cardboard
Cardboard is serviced two times a month from forty yard debris boxes. According to AS Recycling staff the total 2008 tonnages for cardboard was 77.79 tons or approximately 6.48 tons of cardboard per month, which equals an average of 1.6 tons per haul for each 40 yard container. CSUN averages this amount on a yearly basis, although in 2006 the weight was almost triple from the year before.
- 2008 = 77.79 tons
- 2007 = 64 tons
- 2006 = 159 tons
- 2005 = 45.5 tons
- 2004 = 66 tons

Beverage Containers
Bottles and cans serviced by the AS Recycling staff appear to be comprised of a very small amount of material. There are almost 100 bottle and can recycling containers around campus and a total of 6.43 tons was recycled in 2008 according to AS Recycling staff, which averages .54 tons or 1072 pounds each month. The decrease in weight is due to the rise in use of plastic bottles and aluminum cans reflected in a decrease of glass collected. The tonnages for these materials fluctuate from year to year however show a major increase in the last two years.
- 2008 = 6.42 tons
- 2007 = 4.73 tons
- 2006 = 2 tons
- 2005 = 1.8 tons
- 2004 = 9 tons

Mixed Paper
Mixed paper is serviced from 24 three yard front-loader containers. These containers are picked up on an on-call basis once CSUN has twelve full bins, which is on average two times a month. According to AS Recycling staff, the total 2008 tonnage for mixed paper (which includes all shredded paper) is 95.99 tons. With an average of 12 three yard containers being emptied two times a month, a conversion factor was run and it is estimated that 16,000 pounds (or 8 tons) of mixed paper is generated each month. CSUN has increased their mixed paper tonnages in the past three years according to the previous annual reports.
- 2008 = 95.99 tons
- 2007 = 86 tons
- 2006 = 83 tons
- 2005 = 65 tons
- 2004 = 71 ton

---

3 AS Recycling Center reported 63 tons
4 AS Recycling Center reported 62 tons
Cell Phones, Ink Jet and Laser Toner Cartridges
Toner cartridges are serviced from 25 campus and housing drop off areas. The vendor picks up the material on average of every 4-8 weeks. Cell phones are picked up from the same locations and are dropped off by AS Recycling staff at the vendor’s yard. According to AS Recycling staff, 7,000 pounds or 3.5 tons of material was recycling in 2008 and 1,600 pounds or 0.8 tons was recycled in 2007.
- 2008 = 3.5 tons
- 2007 = 0.8 tons

Pallets
Approximately 250 pallets are picked up from the CSUN campus every two months. Each pallet weighs approximately 50 pounds, which means that 1.94 tons are either reused or recycled during the month and 23.25 tons is recycled yearly.
- 2008 = 929 pallets or 23.25 tons
- 2007 = 696 pallets or 17.4 tons

Electronic Waste
E-waste is collected throughout the year by PPM / Asset Management for the faculty and staff campus departments. There were approximately 71 tons of e-waste recycled in 2007 according to the AB75 Annual Report, which is the highest amount ever recorded.
- 2007 = 71 tons
- 2006 = 1.3 tons
- 2005 = 10.3 tons
- 2004 = 28 tons

B. Vendors
Allied Waste services 29 of the University Corporation, University Student Union trash containers located throughout campus. Locations of the trash containers on campus include:
- 4 – three yard bins at the University Student Union serviced six days a week
- 3 – three yard bins at the Satellite Student Union serviced six days a week
- 11 – three yard bins at various food service locations as part of the University Corporation
- 3 - four yard bins at the Sierra Center serviced five days a week
- 4 - four yard bins and 1 - three yard bin at the Matador Bookstore Building serviced five days a week
- 1 - 4 yard bin and 1 - three yard bin at the Arbor Court serviced five days a week
- 1 - three yard bin at the University Club serviced five days a week
Consolidated Disposal services 48 of the Physical Plant Management, University Park and University Village Apartments trash containers located throughout campus serviced 5 days a week.

Valley Recycling services all beverage containers sorted at the AS Recycling Yard; and services all bi-metal food containers at Satellite Student Union, University Club and other TUC Food Services, which is picked up free of charge. They are also the recipient of the cardboard that is dropped off by Residential Roll Off.

Golden State Fibres services mixed paper from 27 front load bins at 24 locations throughout campus, with 12 bins serviced two times a month. All bins are provided free of charge.

Residential Rent-A-Bin Roll Off Services, Inc., services two forty yard debris boxes of cardboard and transports it to Valley Recycling between two and six times per month; one at the bookstore and the other at AS Recycling Yard. Both debris boxes are provided free of charge; cost to haul the bins is $125 per pull.

San Fernando Valley Pallet Company services pallets approximately every two months from one location in the PPM yard. No cost for pick up.

Printing Technology, Inc. picks up ink jet and toner laser cartridges every four to eight weeks from AS Recycling Yard. PTI provides free storage bins and no charge for pick up.

Planet Green will accept cell phones for recycle. The AS Recycling staff drops of cell phones every two to three months. There is an option to mail in cell phones in boxes provided by Planet Green free of charge.
C. Faculty Staff and Student Population

The data in Table 3 shows the faculty, staff and student census\textsuperscript{5} from 2004 to 2008. Staffing numbers are down a bit from 2007 to 2008 with faculty and student population increasing. Overall, as student enrollment increases the number of faculty increases as well, with the exception between 2005 and 2006. Staff population seems to stay consistently the same. Due to the current economic conditions, enrollment is expected to decrease in the 2009/2010 academic year.

\begin{table}
\begin{tabular}{|c|c|c|}
\hline
 & Faculty\textsuperscript{6} & Staff\textsuperscript{7} & Students\textsuperscript{8} \\
\hline
2009 & 2,105 & 1,716 & 35,198 \\
2008 & 2,202 & 1,742 & 36,208 \\
2007 & 2,159 & 1,757 & 35,446 \\
2006 & 1,998 & 1,757 & 34,560 \\
2005 & 2,021 & 1,735 & 33,243 \\
2004 & 1,821 & 1,689 & 31,312 \\
\hline
\end{tabular}
\end{table}

\textsuperscript{5} Data retrieved from the CSUN Office of Institutional Research website
\textsuperscript{6} Includes full time and part-time faculty.
\textsuperscript{7} Includes full time and part-time staff.
\textsuperscript{8} The number represents the count for ALL students during the Fall semester.
In addition to analyzing the last five years of population numbers, it is important to reach farther into the past to get a clear understanding of the trends in student population. Student enrollment numbers were pulled from the CSUN Office of Institutional Research website to assist with future forecasting by evaluating the trend from past years.

The number of students has increased approximately 500 to 1000 students each year. A recession can increase or decrease student numbers, depending on the University. It is anticipated that the numbers will be a bit lower this year than last. The student enrollment for 2008 is approximately 1,000 students less, although numbers may increase once school has started. Student enrollment will more than likely remain lower for the next year or two until the recession declines.

<table>
<thead>
<tr>
<th>Year</th>
<th>Students Enrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>36,208</td>
</tr>
<tr>
<td>2007</td>
<td>35,446</td>
</tr>
<tr>
<td>2006</td>
<td>34,560</td>
</tr>
<tr>
<td>2005</td>
<td>33,243</td>
</tr>
<tr>
<td>2004</td>
<td>31,312</td>
</tr>
<tr>
<td>1997</td>
<td>27,659</td>
</tr>
<tr>
<td>1996</td>
<td>27,189</td>
</tr>
<tr>
<td>1989</td>
<td>30,674</td>
</tr>
<tr>
<td>1988</td>
<td>31,575</td>
</tr>
<tr>
<td>1987</td>
<td>29,719</td>
</tr>
<tr>
<td>1980</td>
<td>28,417</td>
</tr>
<tr>
<td>1979</td>
<td>26,029</td>
</tr>
<tr>
<td>1978</td>
<td>27,869</td>
</tr>
<tr>
<td>1977</td>
<td>28,023</td>
</tr>
<tr>
<td>1973</td>
<td>24,990</td>
</tr>
<tr>
<td>1967</td>
<td>15,521</td>
</tr>
<tr>
<td>1965</td>
<td>12,690</td>
</tr>
<tr>
<td>1964</td>
<td>12,206</td>
</tr>
<tr>
<td>1957</td>
<td>2,925</td>
</tr>
<tr>
<td>1956</td>
<td>1,384</td>
</tr>
</tbody>
</table>

**Table 4: Total Number of Students Enrolled**

D. Estimation in Future Flow Quantities and Volumes

The future flow of waste and recycling materials will depend upon the number of students, staff and faculty at the school. With the economic downshift, the number of students will decrease over the next few years until the economy turns around. Additionally, those students able to pay for school may not be able to afford food or drinks on campus. It is anticipated that initially the tonnages for organic materials (food), recyclables and trash will decrease in the short term, but increase once the economy improves.

The future flows and volumes of material is an estimated number according to historical references of student enrollment, faculty and staff numbers, tonnages of each commodity during that same time frame and logical statistics. The actual forecast is
difficult to assess because of the change in market, type of materials accepted into the system, type of material purchased at the University and the expansion of a sustainability plan which will assist with reduction in materials. It is recommended to use the figures in Table 5 as a basis for the years to come, knowing there are too many variables to advise on a specific number of recycling and trash tonnage.

<table>
<thead>
<tr>
<th></th>
<th>Faculty</th>
<th>Staff</th>
<th>Students</th>
<th>Trash Tonnage</th>
<th>Recycling Tonnage</th>
<th>Total Tonnage</th>
<th>Diversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>2,202</td>
<td>1,742</td>
<td>36,208</td>
<td>1,520</td>
<td>4,119</td>
<td>5,639</td>
<td>73%</td>
</tr>
<tr>
<td>2007</td>
<td>2,159</td>
<td>1,757</td>
<td>35,446</td>
<td>1,806</td>
<td>2,050</td>
<td>3,856</td>
<td>53%</td>
</tr>
<tr>
<td>2006</td>
<td>1,998</td>
<td>1,757</td>
<td>34,560</td>
<td>2,628</td>
<td>7,614</td>
<td>10,242</td>
<td>74%</td>
</tr>
<tr>
<td>2005</td>
<td>2,021</td>
<td>1,735</td>
<td>33,243</td>
<td>2,628</td>
<td>7,614</td>
<td>10,242</td>
<td>74%</td>
</tr>
<tr>
<td>2004</td>
<td>1,821</td>
<td>1,689</td>
<td>31,312</td>
<td>1,721</td>
<td>15,369</td>
<td>17,090</td>
<td>90%</td>
</tr>
</tbody>
</table>

The actual volumes of specific commodities can be estimated for future years by reviewing Section VIII, revealing a significant increase in tonnages over the past four years for all commodities and a direct decrease in trash.

E. Potential new materials to recycle

Commodity types change every few years depending on the market price, new socially accepted recycling programs, local vendor capabilities and new system designs which can improve sorting and management of materials. There are always haulers and material recovery facilities that push the envelope with innovation. With that being said, the materials listed below can and most likely will change years down the road. TerraSolutions cannot foresee the future nor know what markets will be including any new-up-and-coming hot item. However, by understanding the material generated at CSUN and what the Sustainability Committee would like to see changed within the system, a list of suggestions can be made.

- **Food scrap recycling** – although this commodity would not necessarily be handled by the AS Recycling staff or in the AS Recycling Center, it should be added none the less. It is believed a large percentage of the food court and dining common areas can divert a majority of this material.
- **Clothing and shoes** – it was mentioned during the visioning session many of the residents in on-campus housing have a lot of clothes that they either throw away or take to the Goodwill. It is suggested that a donation box be placed in the AS Recycling Center for students to donate this material. By contacting a reuse organization such as Planet Aid or DARE they can provide donation boxes for housing and other locations like the one located at Lindley and Lassen.
#3-#7 Plastics – these plastics comprise a lot of the material that is or can be generated on-campus. It is recommended that a market is found and a hauler hired to take this material for recycle.

Shrink Wrap – if this material is generated on campus, it can be placed in with the cardboard or baled separately. Shrink wrap is a high dollar recyclable and many haulers, Valley Recycling included, would pay back for this material. A forty yard container will yield about ¼ bale so it does not make sense to bale alone, however it can usually be placed inside cardboard.

Cooking Oil – this material is currently taken off site from TUC, through the vendor Biotane Pumping. They take the “waste” product and turn it into biodiesel. Another alternative is to process used oil onsite, via one of the specialists. We are currently researching this avenue, including one service provider Filta Environmental Kitchen Solutions. Yet another path may be to process the used oil into fuel locally, such as the recently launched MicroFueler does for fermentable waste products containing high sugar content, turning those into ethanol.

Batteries – it is recommended to consider working with Health and Safety, as well as the LA City or County Hazardous Materials Program to see if you can participate in recycling batteries on campus. This will assist with batteries used by faculty and staff, as well as have an outlet for students who use a lot of batteries and my not choose to look for a place to recycle them.
IX. Recommendation for Management of Recyclables

Cardboard

Recycling Center:
TerraSolutions recommends to start with debris boxes like the current system, to assist with the ease of the new Recycling Center. Once the management has become routine, a horizontal baler (shown adjacent picture) should be installed and used, operated by AS Staff.

Additionally, the use of a fork lift will be required in order to efficiently move the bales to a safe location to store before pick up. The cardboard brought back to the Recycling Center in the electric carts can be placed directly into the baler. Forklift training will be required along with specific safety instructions being followed. OSHA guidelines should certainly be consulted prior to any Staff operating the forklift (http://www.osha.gov/SLTC/poweredindustrialtrucks/). One idea would be to ask PPM to come over once a week to move bales, or train recycling staff who could borrow the forklift one time a week, instead of purchasing the forklifts initially. Using a pallet jack would be a cheaper and easier way to move bales providing you don’t need to stack them.

Service:
It is recommended to use small carts at each cardboard location that can hook onto electric cart and towed back to the Recycling Center, which will allow Staff to move material only once out of the cart and into the baler. By purchasing a few extra carts, the empty ones can be switched out with the full ones so Staff does not need to go back, which will increase efficiency while decreasing worker injury. The same routing will be used in Phase I and once the baler is put in place, staff will be required to haul all material from the South side of campus to the Recycling Center for baling. At the time of this writing, information on carts compatible
Bottles and Cans
Recycling Center:
It is recommended to use the same system as currently being used in Phase 1. In Phase 2 add a few sorting belts and additional containers to capture all #1-#7 plastics (keeping separate #1 & #2). The idea is to save enough plastic containers in three-yard bins until the volume is large enough to bale. The bales should be separated by #1, #2 and #3-#7 plastics. Additionally, there should be a front load container for mixed paper and a front load container for soil contaminated paper, which will be sorted out from the recycling. Outreach does assist with educating students and staff, however there is always a high probability that students will accidentally place mixed paper into the program and there needs to be a place in the sorting area to capture this material.

Service:
It is recommended to keep the same exterior bottle and can services throughout campus, with the exception of the housing/dormitory areas. These areas should have larger bottle and can recycle containers available and should relocate the current small bins being used. Those bins are too small and too difficult for students to place large volumes of recycling in (currently using a grommet based system which only accepts one can or bottle at a time) however perfect for entering or exiting the dormitories. If the material is relatively clean, it is recommended to use 32 gallon Toters with open tops or a system that can have a 32 gallon garbage can placed inside it, which can be removed easily and placed in the back of the Electric Cart to be sorted at the Recycling Center. If the material has a lot of contamination and/or there are too many containers for the staff to service, it is recommended that a third party hauler service them. Having locked containers in this type of program is not recommended.

Additional recycling containers should be placed in centralized areas within the offices and academic buildings. Those containers can be serviced by the Recycling Center Staff by using the electric carts. Taking a few empty ones, they can unhook the carts, roll into the buildings and empty the interior containers, hook up to the electric cart and take back to the Recycling Center.

Co-locating recycling and trash containers throughout campus should be a priority and will increase recycling and decrease contamination levels. It is recommended for recycling staff to devise a plan on how many more containers will need to be added or switched out (depending on the recycling containers needed), how much money that will cost and how that money should be raised.
#3-7 Plastics
Recycling Center:
Add a sort line for all plastics #3-7, which will include a location for a front load container. Store this material in three yard containers that have wheels or can be moved by a pallet jack or fork lift. It is recommended to bale material once ready for Phase 2. The different types of plastic accepted in this program are dependent on what your local recycleries will accept and should be negotiated when initiating a contract.

Service:
Allow for students to recycle all beverage containers and plastics #1-7 in the campus recycling containers. The recycling staff will service the on campus containers the same, take back to the Recycling Center and sort just as they always have, with the exception that the #3-7 plastics will be placed in a recycling container and not in the trash container.

Mixed Paper
Recycling Center:
One of the two mixed paper front loaders shall remain at the Recycling Yard and be used for clean mixed paper and the second container shall be used for soiled paper and placed in the composting when initiated. These containers will be used for the material that is accidentally placed in the bottle and can containers from campus and housing containers. It is not recommended to transport any of the mixed paper back to the Recycling Center from the offices or classrooms.

Service:
It is recommended that the mixed paper service remain the same. The current service allows for the custodial staff to manage the program and alleviate any additional time commitment on the AS Recycling Staff. The one change that is recommended is to add a few more front load containers into areas that have front loaders full prior to service. Currently, once these containers are full, the recycling staff must assist by taking the full mixed paper tilts to a location where the front loaders are not full. If you add a few more front loaders in these key areas or increase the front loader size, recycling staff will not need to intervene and custodial staff will be able to manage their job without having to contact the AS Recycling Center.

TerraSolutions would like to see more recycling containers for mixed paper at student housing. Using front load containers will allow the students to recycle cardboard as well as mixed paper and can be serviced by the same company. This should increase diversion, decrease recyclables going into the trash and provide more revenue.

Cell Phones, Ink Jet and Laser Toner Cartridges
Recycling Center:
There shall be an area that is caged and locked off and keep the elements out, including sun, rain and wind. Service shall still be managed through the campus department mail and AS Recycling Staff.
Service:
It is recommended to work with the hauling company to pick up cell phones and/or send them back in mailing boxes provided by vendor, instead of recycling staff driving it to the facility. Having a company come and pick up the ink jet and laser toner cartridges works well and is recommended to see if they will pick up the cell phones at the same time.

Pallets
Recycling Center:
All pallets should be taken to the PPM yard and stored prior to pick up from third party hauler as currently occurs. If the AS Recycling staff were trained on using a forklift, went through all of the OSHA standards and alleviated any Risk Management issues, prior to the completion of the Recycling Center, the AS Recycling Center staff should consider managing at minimum the transport of the pallets in collaboration with PPM. It is not recommended to store the pallets at the Recycling Center in this initial stage due to space constraints, student activity in the Center, the progression of the Center into a Buy Back area and managing the pallet recycling program while getting use to the flow of the new facility. Once the staff is familiar with the flow and design of the center, and the program is running smoothly, the Recycling Center staff should consider managing the material at the new Recycling Center.

Service:
It is recommended that the PPM staff initially service all pallets and the AS Recycling Staff assist by reporting a pick up to the PPM staff when noticed. Due to the ease of servicing pallets with a forklift compared to managing it with the electric carts, it makes more sense to have PPM manage this material. It would require AS staff to purchase their own forklift, as well as train their staff on proper use, which creates more liability and management than working collaboratively with PPM. Additionally, the pallets should be serviced with a forklift first thing in the morning to ease worker injury, allow for the transport of many pallets at once and to avoid any contact with students while transporting material. Should the Recycling Center purchase a forklift and desire to manage the pallets on their own, another look at the site, the logistics of the program and the maintenance of the forklift and staff should be considered prior to establishing this program.

When storing the pallets, the vendor recommended stacking the same size pallets together and having different piles for different sizes. Any broken pallets shall be placed in a location that does not disrupt the pile.

E-Waste Recycling
Recycling Center
It is recommended that an e-waste recycling drop off be considered for students and faculty at the new Recycling Center. Initially it should be an event that is held a handful
of times during the year and established through a reputable e-Waste collection company. By using the company to run the event, the AS Recycling Center will not need to go through the paperwork to become an electronic waste drop off. It will also provide insight on how to manage a program, what is involved, and the amount of hours it would entail.

Once a buy back center is established, it should be considered to have an Electronic Waste drop off with set hours during the week. This will need to be staffed by the Recycling Center and manifests will need to be kept to report all materials being taken. Prior to opening the drop off, paperwork will need to be filed with the State of California to ensure the Recycling Center is an approved e-Waste drop off and recycling center (http://www.erecycle.org/want_be.htm).

Service
This service shall be a free drop off for all electronics considered under the State Regulations. Currently the e-Waste service is provided through PPM Asset Management for staff and faculty. This can still be managed as it currently is, or can be included in the new drop off program. If that is decided, AS Recycling may need to pick up e-waste when called in to Center. It should be considered all profits made by any materials being managed through the AS Recycling Center shall be a part of the AS Recycling Center annual budget. This money will be crucial for the upkeep and maintenance of the recycling program and center.

Clothing and Shoes
Recycling Center:
It is recommended that the AS Recycling Center consider partnering with an organization that reuses clothing and shoes and provides a container for the material to be placed in. This container shall be located where students and faculty can drop off at any time and should not necessarily be monitored by recycling staff.

Service:
The organization that provides the drop off container shall have its own route to be able to empty the bins without recycling staff managing. The only staff time that should be considered as part of this service would be a phone call to inform the organization that the container is full and in need of service.

During move in and move out days, it is recommended to continue partnering with Goodwill Industries to provide a large drop off box or a monitored recycling trailer (as found in many store parking lots) for students to place any unwanted items into. It might be worth asking Goodwill if they could staff a trailer on a regular basis just on the outskirts of the University Property so students as well as neighbors can use.
Planet Aid is a large organization that provides drop-off boxes for clothes and shoes, which seems like a great fit for the Recycling Center. Extensive research should be done when selecting one of the reuse organizations that may be able to provide donation boxes for clothing collection. There are many such organizations in the Los Angeles County area and may be found at:


X. Descriptions of market and hauling availability
Northridge is located in a certain part of Los Angeles County that is not necessarily serviced by the vast numbers of haulers located within it. In the past number of years, finding reliable local haulers can be difficult and a tenuous task. Unfortunately CSUN does not have a dozen options available; however, there are some things that can be done to assist with ensuring CSUN receives market price for all of its commodities and is able to achieve the services that will not only streamline the system but make it much more productive, efficient and profitable.

TerraSolutions researched the local market by calling a handful of local haulers and recyclers within a 35 mile radius. Questions that were asked consisted of: understanding what the business will accept, how they will accept the material, would they come to pick up the material, and most importantly, payment for the different commodities. Businesses were found that are willing to service the Northridge area and the variety of materials currently recycled. This initial research was done to gauge how local businesses want the material they service to be prepared when picked up and any fees or buyback availability.

In addition, all of the current vendors servicing CSUN (mentioned in Section VIIIIB) were extremely cooperative and answered all of TerraSolutions questions. It appears all of the CSUN vendors are willing to do whatever is needed to assist CSUN with any new changes to the AS Recycling Center program.


XI. Estimated costs for each commodity with respect to the different equipment and the containers that can be serviced

A. Estimated costs for purchasing of containers

Compactors
Compactors cannot significantly compress cardboard, aluminum cans or plastic bottles, though they're useful for reducing landfill container hauling costs. These range from approximately $12K to $25K.
Vertical Balers
These are handy to compress cardboard into containers ranging from three six yard containers and typically are self-contained. Material such as OCC is broken down and fit in through an access door, baling wire is threaded in; and when enough product is in place, the OCC is compressed into a bale. While bale sizes are available from 30” wide on up to 84”, the standard is a 60” wide x30”x48” bale. Vertical balers in the size applicable for institutions such as CSUN fall in the $15-$20K range. Unfortunately they do not compress with sufficient pressure to make tight mixed paper or plastic bottle bales.

Horizontal Balers
These balers—in the size appropriate for institutional service—use two platens and about 50% more pressure than their vertical counterparts. This allows them to create reasonably solid mixed paper and PET or HDPE bales. They bale OCC at a higher density too, yielding about a 1,200 lb bale vs. 800 lb produced by a vertical baler.

B. Recommendations of Containers to be used

Cardboard
Baler Recommended for Recycling Center: It is recommended to use a baler for OCC and store in the far side of the service center until pick up. A 60 inch horizontal baler is preferred over a vertical baler due to the variety of materials you can bale and the increase in compaction and pressure which will yield heavier bales. Cardboard bales are approximately 1,200 lbs. and can be easily stored. The cost of a baler is reasonable with the Return On Investment offset by approximately $5-6,000 CSUN pays annually in pickup charges. The price per dense bale is typically worth about 15-25% more, compared to loose or compacted cardboard.

Note the following prices are a typical comparison only. Prices change considerably from week to week, and throughout the year the entire market price may drop to a negligible dollar value for any commodity.

Baled OCC – $90 a ton
Compacted OCC - $80 a ton
Loose (Debris Box) OCC - $75 a ton

A baler is never removed as is a debris box or compactor, allowing staff to use it at all times. Although there are a few downsides to using a baler such as needing a pallet jack or forklift to move the bales around, the need to hire a hauling company which has a forklift on their truck (unless the Recycling Center staff will load the bales onto the flatbed truck for them) plus the chance that the baler could break down interrupting the flow of recyclables through the Center, overall it is felt a baler would provide the most efficient management of material with the highest level of payback.
Other Alternatives:

Debris Boxes: A forty yard debris box can be provided free of charge, so there is no necessity without the need to purchase. This box can be serviced by a roll off company. There is no need for the hauler to transport a fork lift to manage. It is recommended that the AS Recycling Center continue using the debris boxes until the new Center is done and after a few months of getting use to the flow, switch over to a baler. The downside is that you do not receive as much money with a debris box; and it requires more room for storage and flexibility for the hauler to move their trucks around to service. It also requires the box to be moved for an hour or two while it is being emptied and you pay for a hauler fee.

Compactors: They are expensive (see Section XI. A), the Return On Investment period would be too long to actually recoup the cost and repairs would begin becoming a necessity. They are also a bit more difficult for the hauler to manage. However, they are easy for staff to use and don’t require boxes to be broken down prior to placing in compactor.

Front Load Containers: You can easily place broken down cardboard into the three yard mixed paper front loaders and have it hauled off with the mixed paper. You will be able to receive money back for the paper, however, OCC is such a high valued paper stock; you would get more money by keeping it separate, which is recommended.

Bottles and Cans (All Beverage Containers)

Front Load Containers Recommended for the Recycling Center:

Front load containers are recommended for the Recycling Center site. The volume is currently manageable and the front loaders can be moved around with a fork lift and/or pallet jack. It is recommended to find a hauler with their own fork lift and can service the containers themselves, instead of relying on PPM or USU staff. These front loaders are provided at no additional charge and the payment received for the sorted materials is at market value. In Phase 1 the same system would be in place, however, in Phase 2, these front load containers would hold the material until enough was generated to create a bale. Then the vendor would service the bales and not the three-yard containers.

Baler: Using a baler is not recommended for the Recycling Center solely for the purpose of baling bottles and cans due to the small volume of material that is generated. It would take a significant amount of time to save up material in order to bale it. However, if a baler was purchased for cardboard and it would bale plastics and aluminum, it would be worth considering using the baler. A front load container would still be needed to store until enough volume is captured for the bale.
Other Alternatives

Debris Box: Using a debris box is too bulky for all of the different commodities needed and would take up a significant amount of space in the Recycling Center. Additionally, it would not be able to be easily moved in case more room would be needed. However, should the volumes increase drastically or if the Recycling Center staff decides to change to mixed recyclables (bottles, cans and plastics), it is recommended to consider increasing to a small debris box with a tipper. You can use a twenty or potentially a thirty yard debris box with a tipper, but not a forty yard. Debris boxes are provided at no charge through the hauling company and the payback would be the same price for mixed recyclables per ton whether in a front loader or debris box. There is a fee of approximately $120 a pull for hauling the debris box compared to no fee for servicing front load containers, thus using a debris box would decrease the profitability. Additionally, the pay back for materials separated at the Recycling Center provides a higher pay back than the mixed recycling which requires sorting offsite thus higher labor costs for the processor and lower pay back to CSUN.

Compactor: A compactor could be used only if the Recycling Center had mixed recyclables (bottles, cans and plastic) serviced. It does not make sense to use for single commodities because the volume is too small. A compactor can have a tipper attached to it and is easy to store. Compactors are expensive and unless you are using a free compactor through a hauler, it does not make sense to pay the money.

Mixed Paper:

Front Load Containers Recommended:
There is a very high volume of mixed paper throughout the campus. It is recommended to continue using the front load container system, which will be much more effective for custodial staff. Money is still being paid back for the paper at approximately $25 a ton and the front loaders are provided at no charge. Additionally, 12 front loaders are serviced at the same time on an on-call basis, instead of a weekly scheduled pick up. This saves the number of trucks on campus during the week as well as decreases CSUN’s carbon footprint.

Other Alternatives

Compactor and Debris Boxes: Due to the high volume of mixed paper throughout campus, it is better to provide containers at each building rather than to try to consolidate it to a couple of locations. By decreasing the number of containers that are available, it will increase the recycling process to become a burden for the custodial staff who currently services them. Additionally, the Return On Investment for purchasing one of these containers would be exceedingly long for the amount actually paid out for the mixed paper.

Baler: If a horizontal baler was purchased, it could bale paper adequately; however, a vertical baler is only good for baling OCC. The cost and time it would take for the Recycling Staff to bring the mixed paper back to the Recycling Center to be baled, would become too labor intensive and not worth the small amount of money that would
be paid back. If the Recycling Center becomes significantly bigger and is able to sort the different types of paper, then a baler might be useful. At this time, it is not recommended to spend the time sorting or baling this commodity.

**Cell Phones, Ink Jet and Laser Toner Cartridges:**
Enclosed rolling metal racks are preferred for these materials and placed in an area that keeps the LTCs out of the elements. The rolling racks allow freedom of movement for storage and shipping. Depending what haulers you use, they may have their own requirements, such as a pallet or Gaylord boxes. The area these items will be stored in will be the same amount of space regardless of what you use.

Ink Jet cartridges and cell phones are packed separately in smaller boxes and stored in the RFO until ready for vendor pick up with the LTCs. Cell phones are either delivered to Planet Green or may be shipped at no cost according to company specifications.

**Pallets**
No containers are needed for the pallets.

**E-Waste:**
Electronic Waste will more than likely need to be placed onto a pallet and shrink wrapped. It might be easier to store in a rolling cart and then transfer onto a pallet once you have enough equipment for pick up.

**Clothing and Shoes:**
The vendor who services these materials should provide their own container for service. If the Recycling Center decides to manage this program on their own and have the nonprofit company come pick up bags, it would make most sense to use rolling janitorial carts.

**XII. Recommendations for Future Routing, Collection Points & Container Strategies**
There are quite a few options available to AS which will affect the new AS Recycling Center in different ways. The decision on which direction to go in with the design, is also to understand the importance of where the costs will be spent. Does it make more sense to pay for labor or for equipment? When going through these recommendations, keep that in mind.

There are three keys to the material collection’s success: 1) Always co-locate containers whenever possible (exceptions are in areas where food is absolutely forbidden or collection is very undesirable). This means adjacent to each other, not across the walkway. 2) Populate all facilities and the outdoor areas, including parking lots with collection clusters, with sufficient density to provide convenient access for disposal of all common goods yet balanced to minimize pick-up routes. TerraSolutions recognizes that CSUN AS Recycling Staff has tried this on several occasions with little success. It is recommended to give it another try once a good marketing push for
recycling has been developed. 3) Have clear signage identifying the cluster from afar, the specific containers’ function and any nearby needed alternate collection containers where applicable.

**Re-Usables at Campus Housing**

It is not unusual to find items that are functional and simply not wanted by the person disposing them. However in the school environment the percentage of items that could be reused by others peaks at semester/trimester ends, when students clean out their living quarters. There appeared to be little in place to redirect such goods to organizations, or through processes where they could find a second (or third) life. It is recommended to see if a company like Goodwill would place a trailer on the outskirts of campus but by the dormitories permanently, so this material will be captured and not thrown in the trash. AS Recycling and Housing currently works with Goodwill during move-out.

**Dormitory Recycling – Material Management**

The current practice of having the students take out their recycling to the outdoor container clusters has a two-fold benefit: Labor for custodial staff is kept to a minimum; second, the students will have more ownership and connected to the AS Recycling program. It is often the case that diversion rates improve as the consumers become increasingly involved in the recycling process. Increasing the number and style of recycling containers outside will increase the amount of recyclables actually received and directly decreasing the trash volume and cost.

**Dormitory Recycling – Bottles & Cans**

The dormitory recycling for bottles and cans should be increased to provide interior recycling containers in the common areas, plenty of exterior recycling containers, and signage that will engage the students to do the right thing.

**Food Scrap Waste stream**

Currently leftovers from the dining services are put straight in with the trash, as is food-soiled paper (e.g., pizza boxes, etc.). This appeared to account for approximately 3-5% of the trash found in the three yard trash containers examined in the dorm areas; 30-50% in the dining commons and University Club containers.
XIII. Recommendations for New AS Recycling Center

A. Proposed site boundaries for future recycling facility
The outdoor yard utilizes approximately 4,000SF in this concept sketch.
B. External requirements for pickup and drop off, vehicle and cart access

Container and Truck Dimensions and Requirements
In order to properly assess the space that will be needed in the new Recycling Center, it is imperative to understand the dimensions for the containers and trucks entering the area. The dimensions listed below may change depending on the style container and the company that provides the container.

Things to keep in mind when building the outside area of the Recycling Center:

- To prevent outside storm water runoff from entering the enclosure, install slope gradient at enclosure entrance of 2% to 4%.
- No storm or sanitary drains are permitted within the area. Any seepage from the dumpster or from any rinse water must be vacuumed or mopped up—not directed outside of the enclosure.
- Use 8” high curb or bumpers to prevent damage from the walls.
- A 20 foot vertical clearance (to approach) and 32 foot vertical clearance (when servicing front load containers) of overhead obstructions is necessary. Generally, the driver will move the container out away from the enclosure about eight feet before emptying.
- Collection trucks require a 40 foot clearance and 46 foot turning radius.
- Allow for adequate space between bins and Toters—1.5 feet between bins and carts.
- The concrete or asphalt in the Recycling Center that holds containers and has the potential of a truck access should be able to withstand up to 20,000 pounds of direct force from a single axle truck. The entry area should withstand up to 62,000 pounds of Gross Vehicle Weight (GVW). These are estimates according to research; however, it is important to review local laws and regulations to ensure the concrete or asphalt used by trucks is adequate.

Cart / Toter Containers
Dimensions:

<table>
<thead>
<tr>
<th>Gallons</th>
<th>Depth (inches)</th>
<th>Height (inches)</th>
<th>Width (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>96</td>
<td>28</td>
<td>48</td>
<td>24</td>
</tr>
<tr>
<td>64</td>
<td>23</td>
<td>43</td>
<td>25</td>
</tr>
<tr>
<td>32</td>
<td>16</td>
<td>39</td>
<td>17</td>
</tr>
</tbody>
</table>
Clearance for Cart Containers:
- Allow for adequate space between bins and Toters; from 0.5 to 1.0 feet between carts.
- For a 96 gallon cart 30-inch by 36-inch space with 60" height clearance shall be needed for each cart.

**Front End Loader Containers**
Dimensions:

<table>
<thead>
<tr>
<th>Cubic Yards</th>
<th>Depth (inches)</th>
<th>Height (inches)</th>
<th>Width (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>31</td>
<td>40</td>
<td>72</td>
</tr>
<tr>
<td>2</td>
<td>39</td>
<td>52</td>
<td>72</td>
</tr>
<tr>
<td>3</td>
<td>47</td>
<td>60</td>
<td>72</td>
</tr>
<tr>
<td>4</td>
<td>57</td>
<td>67</td>
<td>72</td>
</tr>
<tr>
<td>6</td>
<td>68</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>7</td>
<td>75</td>
<td>80</td>
<td>72</td>
</tr>
</tbody>
</table>

(***) Note: add eight inches to the overall width to include four inch pockets on each side.

- Clearance for Front End Loading Vehicles:32 foot long, 8 foot wide and 13.4ft in height (overall length including fork is 36ft)
- Overhead Clearance when container is in raised position is 18.5ft
- 1.5-yd bins need 6.5 ft. vertical clearance.
- 3-yd bins need 9 ft. vertical clearance
- 4-yd bin need 10.5 ft. vertical clearance
- 6-yd bins need 11.6 ft. vertical clearance
- Vertical (Approach and Exit) 15’ High
- Vertical (When dumping bin) 22’ High
- Lateral 15’ Wide
- 15’ Vehicle Width Requirement front loader
- Turning Radius is 46ft
- Turning Diameter is 97ft
Debris Box / Roll Off Containers

Dimensions:

<table>
<thead>
<tr>
<th>ROLL OFF [DEBRIS] BOXES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cubic Yards</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>14</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>30</td>
</tr>
<tr>
<td>40</td>
</tr>
</tbody>
</table>

Clearance and Dimensions for Roll Off Vehicles:
- 35ft long, 11ft wide (with mirrors) and 12ft in height
- Vertical (Approach and Exit) 14’ High
- Vertical (Rails raised with bin) 25’ High
- Lateral 10’Wide
- Overhead Clearance is 18-24ft
- Service Area Length and Turning Radius is a Minimum of 65ft Long
- Allow 10’ wide access for driver to check the rear of bin before loading onto vehicle and 5’ to open gates.
- Allow a minimum of 65’ to load/unload container safely. Truck rails may extend to 25’ high when servicing container. – roll off container
- Total Length with Container on bed is approximately 52ft

Baler Dimensions

The horizontal baler proposed includes a conveyor, hopper fed at one end, and a cart-tipper, to feed the hopper. Its footprint is approximately 14’ x 31’, height about 12’.

Compactor Dimensions

Compactor sizes vary greatly in relation to their specific function. A pre-crusher unit may be about 12’ wide by 24’ deep plus the container size.

C. Employee and visitor pedestrian access and circulation

Main access to the facility will be through the west side of the building. The architect should pay particular attention to both the street view, so that it speaks “Enter Here” even before signage directs visitors and to the eye-level appeal from the grassy “park” area and nearby sidewalk. Visitors may all have access, with permission, to the courtyard, shown in the plan above and described in the Narrative at the end of this report.
If and when a buy-back station is developed on the northeast quadrant just outside the recycling yard perimeter, visitors will access it from the new fire road, with parking in front. They can walk to the opposite (west) side to enter the building, though parking at the buy-back center would be “Freight loading/unloading only”.

Employees will access the yard directly through one or two doors on the east and south sides of the building. The one on the south side will provide access to the ink/toner cartridge and tool storage part of the yard. The east door leads out by the baler and sorting areas. Forklift travel safety zones shall be marked out in the yard as it is shared by footed workers.

D. AS Recycling block plan / adjacency diagram of the site

This document captures a look at some key components of both the building and recycling yard functions. Bubbles are not in relationship to size rather they are placed with 1, 2 or 3 lines between them. These suggest the importance of them being together. The courtyard is shown only with one adjacency; to the Conference area (room) due to the value of having it as setting through which to observe the recycling operations and as a natural buffer setting to enhance the conferencing atmosphere. All building users would, of course, enjoy the space.
E. AS Recycling Center list of Recommended Recycling Equipment

Current Needs for New Recycling Center

Table 6 reflects the list of items identified by AS Recycling staff that is used in the current AS Recycling Center.

<table>
<thead>
<tr>
<th>TABLE 6</th>
<th>Current Items Used at Recycling Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Carts</td>
<td>Under bed containers as sorting tool</td>
</tr>
<tr>
<td>Gloves (latex, cloth, heavy duty)</td>
<td>5 gal buckets (4) for liquid disposal</td>
</tr>
<tr>
<td>Clipboards</td>
<td>Bags</td>
</tr>
<tr>
<td>Box Cutters</td>
<td>Hand Sanitizer</td>
</tr>
<tr>
<td>Lubricant</td>
<td>Soap</td>
</tr>
<tr>
<td>Rags</td>
<td>Paper Towel</td>
</tr>
<tr>
<td>Simple Green</td>
<td>Tilt ‘n’ wheels for paper</td>
</tr>
<tr>
<td>Sprayer</td>
<td>Pressure washer</td>
</tr>
<tr>
<td>Route Sheet</td>
<td>Goggles</td>
</tr>
<tr>
<td>Sorting Tables</td>
<td>Pallet Jack</td>
</tr>
<tr>
<td>Brooms</td>
<td></td>
</tr>
</tbody>
</table>
Table 7 reflects the list of items identified by AS Recycling staff needed for the new AS Recycling Center.

<table>
<thead>
<tr>
<th>TABLE 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recycling Center Needs <em>(Preliminary)</em></td>
</tr>
<tr>
<td>Outside Sink (washing station for hands)</td>
</tr>
<tr>
<td>Sorting table and belts</td>
</tr>
<tr>
<td>Eye-washing station</td>
</tr>
<tr>
<td>Ramp for forty yard debris box – easier to unload</td>
</tr>
<tr>
<td>Power Washer System</td>
</tr>
<tr>
<td>Gray Water &gt; plants, etc.</td>
</tr>
<tr>
<td>Scale</td>
</tr>
<tr>
<td>Protective items</td>
</tr>
<tr>
<td>Tools</td>
</tr>
<tr>
<td>Fatigue Mats</td>
</tr>
<tr>
<td>Containers</td>
</tr>
<tr>
<td>Printer Cartridge Towers</td>
</tr>
<tr>
<td>Electric Pallet Jack</td>
</tr>
</tbody>
</table>

The provision and installation of a horizontal baler may provide considerable cost-savings and will generate more income for CSUN. Details are described in Sections XI. A and XV. B

**F. AS Recycling Center flow diagram of recycling components within the site**

See graphic plan in Section XV A for a layout of key recycling functional components.

**G. Buy Back Center and Redemption Machines**

A buy back center is a great way to generate revenue, employment, and goodwill with the students, faculty, staff and surrounding community, however it can be labor intensive depending on the system that is designed. During Phase 1 of the Recycling Center construction, this buy back center should be placed on the back burner and is recommended to be more of a Phase 3, once the new Recycling Center is established, the horizontal baler in place, and all are running smoothly. It would be at that time to
take a look and consider what types of effort, money and labor AS and the Recycling Staff would like to see.

There are two ways you can design a buy back center: hands on or hands off. If the choice is hands off, using a reverse-vending machine might be the perfect answer. You can purchase or rent these reverse-vending machines for aluminum, glass and plastics. The machine can then generate a voucher which would be redeemable at either the AS Recycling office or, more preferred a cashier in administration or the Associated Students offices. The machines are quite small, weather resistant and easy to manage. They could also be placed in an area of the Recycling Center where they could be accessed any time of the day. The material inside the vending machine would still need to be managed by the Recycling Center Staff, however, it would be a task to complete during the day and only take a small amount of time.

If AS Recycling wanted to increase the volume and scope of who could recycle, you could open up a center that would allow for drop off of all different types of recyclables to the CSUN population and the surrounding community. There may be an opportunity to involve the City or County of Los Angeles in this project, which could provide some additional revenue to fund the buy-back center. If this scenario was chosen, it would make sense to have a separate area for drop-off that does not allow for entrance to the actual Recycling Center. It is recommended to place a large fenced in area on the Southern / Northern corner of the Center. This would allow for 96 gallon carts and front loaders for each separate commodity to be placed, an area to weigh and provide a voucher or cash for redemption, and not allow the public access to the yard. There should be a rolling gate on the West/East side fences, to allow for access in and out of the buy-back area, as well as moving the materials over to the baler.

There were a couple of Reverse Vending Machines that were researched, although the pricing was not available and a quote will need to be requested with specific information required. The below websites reflect the different companies who manufactures these reverse vending machines, and the illustration below provides an example of what they might look like.

- [http://www.can-machines.com/](http://www.can-machines.com/)
- [http://envipco.com/reverse.asp](http://envipco.com/reverse.asp)
- [http://www.reversevending.co.uk/](http://www.reversevending.co.uk/)
H. Educational Center

LCD or similar displays showing:

- Environmental and LEED features of the new center

- Green performance of the new AS Recycling Center. This may include:
  - Electrical consumption and creation via PV’s, etc.
  - Thermal performance of building
  - Benchmarking against typical and new facility
  - Material flows – In/Out per month

- Electronic sign-up for AS/CSUN Environmental News

- Environmental Programs on campus

- Campus Sustainability programs in place, and planned

- Hands-on exhibits with materials used, insulation, PV samples and mini-educational displays (three minute educational pods)
While most of these would be indoors, a screen (behind tempered glass) facing the street can display current green statistics along with promoting green events, classes and the program itself. If a buy-back program is implemented that can be advertised here, too.

Exhibits shall be developed by students, working under the guidance of the selected architects and the CSUN Campus Architect, which will inform visitors of the unique aspects of the building plus insights into materials, fixtures, and furnishing used.

The facility itself should be labeled with the specifics of the materials and systems used. In this way, visitors get a first-hand look at, and understanding of, the elements of a green building.

A kiosk indoors can also be created to display an ongoing loop with the history of the AS Recycling program and in the context of the overall sustainability movement.

A team of students may want to develop a carbon-footprint of the building and its construction. Compared to conventional facilities, the use of such items as low energy-embedded materials, components sourced locally, and reused materials will tell a sparkling story about how we can do things differently to promote environmental, personal and community health.

I. Interior AS Recycling Center Building Ideas

Foyer/Lobby

Clerestory windows throughout the space should provide an abundance of natural lighting. Energy engineering permitting, there should be high visibility between the outdoor “park” area and the main rooms on the west side of the building. These will bring the outside “green” in and highlight the building to passersby. Extremely high R-Value windows, such as those currently being developed in the U.S. by the California firm Serious Materials (http://www.seriouswindows.com/html/com_overview.html), should be considered, as that is the single element most responsible for heat loss/gain in an otherwise well-designed and constructed building. Flooring reused from a nearby deconstruction or—if thermal mass—containing material salvaged from local construction, e.g., ground up concrete content from a demolition, is preferable. Contained water elements can also be used to capture and later distribute heat is another possibility. The first impression should be a strong statement that “something is different here”. Not loud, not bright colors but a well-balanced inviting space requiring almost little if any artificial light during the day, same with a refreshing absence of forced air or other mechanical equipment-produced heating and cooling. For thoughts on the information presented to visitors refer to previous section.
Offices
Because daylight access as well as exterior views are vital in a healthy work environment, attention should include proper treatment of same. Furniture and lighting, marker boards, etc., shall lend themselves to full flexibility in work patterns for individual contributors and teams. They shall meet LEED requirements, preferably locally manufactured or handmade.

Training/Meeting Room(s)
There are “green” projectors now available, both for superior energy efficiency and recycled content. The ideas presented in the previous section apply here too.

Restrooms
The current best practices in place at CSUN shall apply, improved with AirBlade or other hand-drying efficiency advances plus natural light.

Energy Management System (EMS)
The AS Recycling Center’s lobby (or other area/s as deemed appropriate) shall feature the EMS real-time monitoring system displays on an integrated LCD or LED screen. This feature will promote the breadth and depth of AS Recycling’s work while offering both historical and current information about volumes, flows, commodities, environmental impacts, related legislature and community highlights. Noteworthy will be the ability to see and understand, real-time, the energy-efficiency of the facility compared to some standard benchmarks. Examples of such systems have been implemented by Santa Clara University’s Solar Decathlon House team.

J. Preliminary consideration of Building Codes, and Fire and Life Safety Standards
The key areas to be addressed in the design of the new center should include the fire hazards associated with paper and cardboard storage and the containment of printer/copier toner and ink cartridges stored and staged for recycling. Similar concern should even be incorporated while identifying any improvements to the vehicles used in the transportation of those materials as well as the collection locations of same. While the latter does not fall into the scope of this study, ensuring the safety of the people, facilities, and the protection of the environment and community are imperative.

Handling of broken glass and aluminum cans, etc. call for strict OSHA worker protection practices. These include, but are not limited to, both eye and hand protection at all relevant times. Hard-toed shoes may be required when maneuvering any heavy containers or dollies.
XIV. Five Year Plan Recommendations & Variables for Additional Recycling Program Activities

A. The University Corporation Food Services (TUC)

There are a few things that The University Corporation can do in their food services departments by recycling and purchasing products that are made with recycled content and/or can be recycled or reused. The following recommendations bring together both of these components.

- Purchase containers that assist with sorting beverage containers and food scrap / compostable materials in the different dining areas. Organize trash and recycling containers so there are three side-by-side containers for placing beverage containers, food scrap / compostable and trash. Make sure all of the recycling stations are the same with good signage that explains what is accepted in the program. They currently have recycle bins for UBC in the Arbor Court, Matador Bookstore Complex and Sierra Center. TUC is currently researching and gathering more information on dealing with food scrap/compostable materials.

- Continue to use bulk condiment dispensers for customers to use in the Sierra Center, Pub, Arbor Grill & Athletic Concessions. These dispensers should be considered for special events.

- **TUC currently** purchases paper products that are “partially recycled and from renewable sources and no longer uses Styrofoam”

- Ensure employees breakdown cardboard and place it in the appropriate recycling location by having staff meetings specifically to provide ongoing training to discuss process. Also making sure signs are placed next to the cardboard container for reminders.

- Evaluate current recyclable materials within kitchen and make sure a recycling container is set up. The kitchens are currently recycling all #1/#2 plastics, glass, aluminum, bi-metal food containers and corrugated cardboard. All #2 plastics generated at the TUC coffee houses are recycled by TUC/AS Recycling. With the expansion of the AS Recycling program, other recyclable materials may be added to the recycling containers; however, check with AS Recycling Center staff first. It is recommended to have AS Recycling Center staff provide a list of current
recyclable materials to TUC every 6 months to a year, to ensure the staff is kept in the loop of what can be recycled.

- AS Recycling Center currently collects from TUC: cardboard at all food service locations and the Bookstore; tin/steel is recycled from most of TUC food services; and #2 plastics that are generated at TUC coffee houses.

B. University Student Union

- Review key locations for beverage container and mixed paper recycling. Ensure the USU courtyards, meeting rooms and common areas are set up with easy access of containers and good signage. The satellite student union should also be evaluated, including the cafeteria.
- Have staff review what recyclable materials are being generated and evaluate how those materials should be captured.
- Coordinate with USU/AS Recycling for special event and/or meeting room recycling.

C. Classroom, Conference Room, Assembly Areas

It became clear during the Visioning Sessions that recycling containers need to be reasonably accessible throughout classrooms, conference, and assembly rooms. Even though CSUN regulations discourage the use of beverage and food containers in those areas, students do indeed bring them in. Reviewing where current containers are located and evaluating key locations will be important to the success of this program. The intention of adding additional indoor recycling containers is to ensure a majority of recyclables is captured in the recycling bin. Should the data support most students take their recycling to a nearby exterior recycling station, and not place it in the interior trash container, then consideration should be given to the number of recycling stations that actually need to be added.

- Rather than assume that students habits, and perhaps needs, will change in the short-term, we recommend populating these facilities with the eco-stations, providing all three or four choices for disposal of unwanted items such as mixed paper, beverage containers, compostables and trash. This will not only improve landfill diversion significantly but will also involve the students more responsibly as environmental stewards.
- It is often desirable to keep both the beverage and compostables out of the classrooms, for instance, to minimize the intrusion of pests, particularly ants. This strategy demands clear signage to direct users to the appropriate close-by locations to dispose of those two types of materials.
D. Offices

- Due to both occasional consumption of food and the regular consumption of beverages at the workstations and desks, it is recommended that strategies similar to those mentioned in the previous section be implemented. Allowances should be made as well for larger-than-normal quantities of items such as used pizza boxes, which can be placed with other compostables. The mini-bin system can be used to assist with under the desk recycling.
- Send out emails to staff to ensure everyone has a mixed paper recycling container. In this email explain how the program works, what is expected of the employee and a list of what is accepted and not accepted. Try some new approaches to your outreach and marketing.
- Consider placing all shredded paper in clear plastic bags for easy removal from the mixed paper at the recyclery. This may increase the payment you receive from the hauler, as well as keep the ground area clean near the recycling container. This has been done by AS Recycling staff and is a reminder to continue doing.

E. Student Housing

Dorm Rooms

Student housing generates a lot of garbage and recycling on-site with very little recycling containers available. Housing is a key component to the success of sustainability and the recycling program at CSUN, and requires a large level of support from all involved within housing such as management, resident advisors, custodial staff, etc. Furthermore, we find that by establishing a structure that both individuals and micro-communities (i.e., each housing unit) can follow and one that can provide quantifiable accountability, a more inspired, long-lasting and self-sustaining diversion program will endure. This often leads to a friendly competitive spirit between those micro-communities as they strive to excel in their environmental prowess.

- We recommend the design and implementation of a process whereby students (and R.A.’s) are provided with the education and tools to manage their own recycling efficiently. This would likely involve special small washable containers placed in each room and a clear and convenient process to dispose of all non-used items. Stanford University has just started using these recycling containers and their Housing Department has the container placed on the “in-room” items that must be left when the student moves out. They also include information on what to place in the container and where to take it to empty.

Common Areas
The strategies laid out and implemented for the common areas in the housing units can serve to unify the residents while offering an opportunity to practice shared responsibilities as a micro-community. Ideally, such best practices will also significantly reduce the load as the waste stream is separated into recyclable and compostable categories—managed by the students—and the landfill waste stream is reduced to near-zero.

**Computer Workrooms**
These workrooms do not have printers available therefore do not generate paper for recycling. Should this change, it is recommended that recycling containers be made available to students in those rooms.

**Exterior Recycling**
In order to capture more recyclables and improve the overall recycling program within on-campus housing, it is recommended to add different style mixed paper and bottle/can recycling containers, and to provide instruction to students and staff on what and how to recycle. More information on what containers to use and how to service can be seen in Section IX.

It is recommended to move the UBC and Mixed Paper stations placed by the dormitory trash enclosures since they are not the most effective containers for this type of location. Relocate these existing collection containers and place them throughout the exterior building common areas. These containers have clean material in them and appear to be conducive to a successful program. All containers will be taken back to the Recycling Center for emptying and sorting. Proper signage to identify the material type should be placed on the container. These containers should be used for students and staff to place an empty beverage container in when walking to or from class. For different materials such as bi-metal food cans, yogurt cups and other bottle/can style containers, larger recycling front loaders should be used.

There are four three-yard front loaders for each trash enclosure; with minimal recycling. It is recommended to keep two three yard front loaders for trash and switch the remaining two containers to one three yard front loader for mixed paper and one three yard container for bottles, cans and plastics. These containers will be extremely easy for students to use, will allow plenty of room for larger amounts of material and can be easily serviced by the current haulers. Golden State Fibers currently services the University’s paper recycling and Valley Recycling currently services the Satellite Student Union bi-metal and plastic recycling.

The dormitories have kitchens in most of the buildings but the new ones. The Geronimo’s cafeteria, which is part of the TUC food program, is housed in the Satellite Student Union and there are no inside recycling containers. It is recommended to place bottle/can/plastic* recycling containers in Geronimo’s,
as well as the kitchen prep and cooking areas to capture this material and then transport to the front load container currently provided for tin and bimetal cans.

Once the University starts food scrap recycling, it is recommended that the cafeteria set up recycling containers in the kitchen and by the interior trash containers to try and capture the compostable material. Also, consider having a competition between dormitories on who recycles more material during America Recycles Day or Earth Day.

**Move in / Move out**
Move in / Move out days for the dormitories consist of AS or Housing contracting with Goodwill to have a location on campus to drop off used items, including electronic waste. They do monitor trash to pull cardboard out. It would be a great idea to have centers during move out/in with all types of containers for recycling. Hand out information a few weeks before to get students involved. Consider having the Los Angeles HazMobile come to service during this time to collect electronic waste and related items.

**Comprehensive Sustainability Plan**
It is recommended that Student Housing develop their own sustainability plan which collaborates with CSUN’s overall sustainability plan. Working with the AS Recycling Center in developing and researching will require foresight, initiative and planning in order to ensure proper infrastructure and staffing are in place.

- An initial overview of exterior recycling will be simple by working with the current third party hauler in providing outside containers and the AS Recycling Center who already provide smaller exterior recycling containers placed closer to the buildings for students coming and going to class. This first part would not add additional costs for housing because the containers from the hauler would be free and the containers provided by the AS Recycling Center already exist. Additionally, it would not take too much time from staff to contact the 3rd party hauler to request delivery of outside recycling containers and the removal of a few of the trash containers.

- The second phase would be increasing the recyclable materials at the Satellite Student Union and Geronimo’s Cafeteria, ensuring that a majority of recycling is taking place. The AS Recycling Center will work with kitchen staff to ensure they know what materials are acceptable and provide a liaison to the 3rd party hauler.

- The third phase would be placing central recycling stations inside the dormitories. Working with the AS Recycling Center would provide valuable assistance with their understanding of what containers will need to be purchased and which style containers would be best for housing.
• The last phase would be initiating in-room recycling containers for all students to properly recycle. This phase would cost money due to the purchase of these containers, and it is recommended that research be done to understand what the exact costs would be, along with a plan to be put in place on how to manage them.

F. Special Events

It is recommended that CSUN events, such as soccer, football, spirit rallies, and Student Events work with AS Recycling to assist with more recycling containers. It should also become part of the CSUN sustainability plan and policy as a requirement to enforce the importance and unity of recycling on campus as an entire campus activity. Recent notifications show that CSUN has started working towards this goal, which is a perfect start; don't lose the momentum.

✓ Put together a comprehensive event recycling program and add onto the website.
✓ Put together an event guide for faculty, staff and students to use when planning events. Place on website.
✓ Require any events on campus to follow specific guidelines regarding event recycling.

G. Marketing and Outreach

A campaign should be developed to promote awareness of the AS Recycling program. It must have a strong branding element, very possibly around the Matador or AS, which will visually help connect the various recycling messages across the spectrum of containers, cluster location signage, posters, CSUN websites and email communications.

Along with a consistent logo or other visual element, the marketing plan should have a changing special feature or fresh messages to keep awareness from growing stale. These could change quarterly and could be custom tailored for special events. Properly designed and managed, the campaign will have students looking forward to latest buzz, the cool messages and adopt the program devotedly.

Planning should include how to promote recycling—as done at CSUN—throughout the local community as well as on a national intercollegiate lever. Effective actions will evolve out of those plans. Such outreach is increasingly part of current environmental program best practices.

H. Signage

In conjunction with the visual program developed through the Marketing campaign, the specific signage on each container—and container clusters—must be graphic in nature for fastest comprehension, supplemented with text,
preferably multilingual. Color coding is also recommended to provide the information consistent and clear (i.e., “Which container do I use to dispose of what I’m holding in my hand?”). This minimizes guesswork and increases diversion rates. The graphic and color scheme should be incorporated through the entire program, including into the material handling section of the new AS Recycling Facility, identifying AS-owned containers accordingly.

I. Academic Opportunities

1. Research Projects
Studies can be done in classes for credit that could benefit the new Center. This may include:
(1) Flow Optimization Analysis – to determine the best volume to attain prior to sorting, any applications of Queuing Theory. This field of study, taught in Operations Management classes and included in most MBA’s, identifies factors such as optimal number of receptacles for a given flow of recyclables and students in a particular geography, e.g., at an outdoor eating area, and provides solutions to maximize the capture of these commodities. It can also determine optimal pick-up strategies for container collection and emptying.
(2) User psychology in the devoted recyclers vs. the inconsiderate nature of various consumers on campus (i.e. non-recyclers). Analyzing the reasons for those participating in the recycling program and those who ignore guidelines, throwing trash into recycling containers and vice versa.
(3) Waste Characterization studies can be performed to help establish a baseline of where CSUN is today and then again in a year or two once changes have been made to the recycling program.
(4) Accounting practices on cost benefits of adding a buy-back center.

2. Curricula
There are a variety of classes that can be added to the current curriculum at CSUN. Sustainability is such a huge topic and going Green is on the forefront of people’s minds. Many individuals are going back to school to study about sustainability concepts. Adding courses in Green Building, Energy Efficiencies, Solar Design, Resource Management, Market Research on commodities and how the Economy affects more than just costs, Environmentally Preferred Purchasing, Plastics and more Plastics, ordinances/regulations and how they affect our State, etc.

3. Internships
Internships are a large part of how students learn and how they find their first, full-time permanent job. It is an outstanding way to network and become intertwined within the industry you want to establish a career in. Many cities and counties have established internship programs, along with businesses that see value in hiring students to help with specific projects at a cheaper
cost than full-time employees. Internships should be encouraged and established throughout the CSUN community. By the University reaching out to local businesses and asking them to help CSUN's efforts with sustainability, these internships will train the next generation and develop an outstanding reputation for a University who actively seeks in helping its students get the proper training in their field. There are many Universities that want the name of being the greenest or having the best sustainability/environmental program. In order for CSUN to be a part of that, it is important to establish active and abundant environmental and sustainability internships.
XV. Five year plan

A. Graphic

B. Narrative

The new center is to be a notable example of sustainable building design. In the US Green Building Council’s LEED set of green building criteria, such factors as water runoff, color and reflectivity of surrounding paving, and avoiding any nighttime up lighting are pursued. Thus, this opportunity of a comparatively smaller campus building (<5,000 SF) and the interwoven function of the predominantly outdoor recycling facility make this a great candidate for USGBC’s LEED Certification. The architects selected for the building design and specifications should be selected for their ability to maximize utilization, reuse and/or re-purposing of existing regional materials for the construction of the building and yard. They must have a track record in passive solar design.

One architectural feature we propose is the inclusion of a small central courtyard (see Graphic in “A” above). Nestled between the building and the courtyard, it will serve as both a connection to and a buffer from, the outdoor working yard. Honoring the regional
cultural heritage, it will soften the somewhat harsh nature of working outdoors on paved areas, providing the opportunity to bring indigenous plants and even a small fountain (solar-powered pump, recycled water) for acoustic and visual relief. With some small benches and a packed-sand/gravel surface, the courtyard will provide an outdoor vantage point from which students and visitors may observe the recycling operation in action, in safety.

The yard consists primarily of a large square area off to the east of the building for the main recycling operation, with a leg on the south side providing dedicated space for less space-intensive functions without high adjacency requirements to the main functions. This narrow rectangular space on the south side allows specific controls for these functions which may include lockable tool and supplies storage and a bermed area for ink/toner cartridge staging, protecting nearby storm drains from unwanted runoff.

The new Recycling yard features a horizontal baler. Already in use on the Loyola-Marymount and Long Beach campuses, a baler provides a number of advantages over the other main equipment options. Whereas a compactor may be handy for compostables and landfill trash, balers package materials compactly, offering mobility and increased dollar value in the reselling of recyclable commodities.

A vertical baler operates at about 1,000 psi, compacting cardboard, for instance, into 800lb bales. A standard bale (referred to as “Export Standard”) is 60”x30”x48”. Baling PET bottles (e.g., water bottles) tends to form a somewhat loose bale, with more “litter” in the form of squashed bottles falling from the bale. White paper baling is even messier with a vertical baler.

While a vertical baler has a much smaller footprint than a horizontal baler, the latter has some very significant advantages, a few mentioned here. With a compression force of 3,000 psi, the horizontal system uses a fast-loading hopper and a conveyor, which helps break up clumping cardboard, then automatically shears the larger pieces to fit properly for baling. Cardboard bales come out in the 1,200 lb range, same standard size. This higher compression allows the horizontal baler to bale PET, HDPE, mixed paper and cardboard. This is particularly critical because it gives AS Recycling the flexibility to adapt and redirect as commodity markets shift and offers complete scalability. This is vital to support shifting flow volumes which can even include community recycling outreach and support, a synergy identified during the June ’09 SWOT sessions.

The operation of the yard incorporates the proven Japanese Kanban process flow principles which improve efficiencies and quality control. This calls for keeping a minimum of material in process at hand. For the Recycling operation, this translates to having an area dedicated to staging sorted material in quantities just large enough to feed a bale of each. Larger volumes of material, both incoming and outgoing are staged further away from the active, hands-on work area. Essentially the Kanban principle means the sorters simply go pull the next needed bin into their area and sort
vs. being surrounded by an excess of bins full of unsorted commodities. The result is a tighter, more efficient space and less clutter. This includes sorting, baling and related activities.

A Buy-back center shall be located at the northeast corner of the yard as parking is available there and real-estate allocation is more flexible in that quadrant. Both automated (credit slips redeemable at a cashier on campus) and provisions for manual redemption (supporting publicized and greater community CRV redemption) should be planned. This also puts the materials collected in ideal proximity to the appropriate staging areas within the yard.

Security for the materials in the yard area may be enhanced with solar-powered motion sensing flood lights.

The yard surface shall be very flat to enable smooth operation of a pallet jack, without bumps, dips, or sudden changes in angle. Paving material shall be permeable and contain lower-energy ingredients such as recycled glass in asphalt or fly ash in concrete at a minimum. Drainage should be planned to feed into nearby bioswales, for instance, between the yard edge and the adjacent parking spaces. A bioswale is a long, narrow, and shallow drainage trough with gently sloped sides, filled with vegetation and/or rubble. This allows water runoff to be captured, held for slow drainage and naturally filtered—to some extent—locally.

Protection from excess sun shall be provided by raised platform roof sections of varying heights. These may feature some vegetation and/or solar photovoltaics (PV’s). While most PV’s are tied back into the electrical grid it is conceivable, that with the higher efficiency battery banks now available, an off-grid solar charging station for Electric Vehicles (EV’s) could be designed and engineered as an integral part of the new facility. The pallet jack, a forklift and the EV’s used for transporting materials and staff could be charged here when not in use. The nature of the platform roof sections should be designed as elements of the overall building roof system, matching or complementing the built structure’s roof system.

The building structure itself should be designed and built based on thorough passive solar design principles. This will eliminate the bulk of the building’s heating and cooling requirements while providing the superior comforts levels afforded by the materials’ radiant heat properties, versus heated forced air. The key differences lie in the temperature of the building’s interior surrounding materials, vs. air temperatures, i.e, traditional forced air heating and air-conditioning. Being in a room with warmer walls and floors with cooler air, is more comfortable and healthier than our typical “comfort control” of heating and cooling the air while surfaces remain significantly lower as they
absorb our body heat giving us a sense of “chill” during the winter even with air temperatures in the 80’s and 90’s Fahrenheit. Instead, the building materials—through careful sizing, placement and exposure to sunlight and air currents (e.g., cooling currents during the summer) can provide a wonderful sense of comfort year-round while vastly reducing the purchased-energy costs to heat and cool the space.

Landscaping will also be an interwoven component to the building’s natural heating and cooling program, allowing increased sunlight on South-facing walls during the winter, blocking minimizing it during the summer. Additional deciduous landscaping may channel air currents to flow through the building during the summer, providing additional convective cooling.

C. Building Process

1. Architectural & Engineering Contract
An architectural firm shall be selected to engage in taking the TerraSolutions Consulting’s AS Recycling Center Feasibility Study Final Report, data from CSUN and their professional experience to plan, design, and create stamped Construction Documents ready for local Building Department Permit Approval. See Addendum 3 for the CSUN Scope document “Narrative Exhibit for Future Architecture contract Exhibit A”, published by the CSUN Campus Architect, Facilities Planning Design & Construction, Nathaniel Wilson, AIA AICP, for specifics defining the architect’s mission. A Commissioning Agent shall be employed during the design phase to ensure the environmentally successful systems such as the HVAC are woven into the design specifications.

2. Construction Documents
The architectural firm, along with its civil, structural, mechanical, piping, electrical, fire protection, and other needed trades professionals shall create the needed documentation to allow a qualified construction firm to build the facility.

3. Funding Sources (Grants, etc)
Various programs, individuals and other funding sources will be researched to determine which ones may help build, equip, furnish or otherwise develop the new Center. Applications for grants and other potential sources of financial contributions will be filled out and submitted. This may take approximately six months. There are a number of organizations that offer listings of grant opportunities. One of these is “Environmental Grantmaking Foundations”, published annually by the Environmental Data Research Institute, which summarizes information on private/nonprofit foundations with environmentally related grant programs. Topics include coastal and ocean issues, capacity building, conflict resolution, databases, ecosystem restoration, growth management, and more. The guide is available for a fee in booklet or CD-ROM form, which allows users to perform searches.
4. Construction, Systems Validation & Furniture Installation

This phase shall include the temporary relocation of the existing Recycling Center assets and operation, facilities deconstruction (fencing, trailers, etc.) and site preparation for both yard and enclosed building structure.

The Commissioning Agent (preferably the one used in the Design phase) shall also ensure that HVAC systems and such are managed appropriately during the construction phases and brought online properly for the most successful facilities performance, employee health, and energy efficiency.

Construction of the facility is currently estimated to take approximately ten months.

XVI. Conclusion

As validated in the SWOT sessions, the CSUN community’s strengths and readiness to engage in change position it ideally to take this project to a new level. Not just “recycling more and better” but actually catalyzing a culture shift that—based on the higher level perspectives of the Visioning session participants—is sure to spread its influence well into the surrounding community. The inspiration which welled up during those forward-thinking exercises must be captured, held on to, and nurtured. CSUN stakeholders were almost unanimously intent on becoming a defining benchmark; a model to which other institutions would look. The sustainability model for the recycling center developed and outlined in this report, and built on the vision of the Campus Architect, AS Recycling Coordinator, and several other staff and students, is at once a guideline, a set of goals, and a fabric of underlying strategies and intents that will promote the new Center's success.

XVII. Recommendations

All recommendations for each phase listed below have been mentioned in the above report. This is a recap and a consolidation to provide an easier way to review concepts:

- **Phase 1 – Status Quo**
  - The same process shall remain in place before and during construction of the new Recycling Center.
  - Assess which mixed paper front loaders fill up first and ask for vendor to deliver a few more containers.
  - Continue development of marketing materials, container signage and outreach plan.
  - Research electric trucks and carts to assist with the cardboard recycling, once decided upon, purchase.
  - Research & develop adding inside recycling containers for offices, classrooms academic buildings, and dormitories.
  - Add additional exterior recycling containers for Housing and Campus.
  - Purchase a tipper to be used for the mixed paper Tilt ‘n Wheel carts.
Phase 2 – After Construction is Complete
- Negotiate with current vendors and consider accepting bid proposals from various local vendors to ensure the best prices and services are being used at CSUN.
- Work with Goodwill or another reuse organization to see if they would establish a full time on-campus recycling trailer.
- Work with campus events to establish a well rounded program that will add to the revenue of AS Recycling, as well as maintain sustainability policies on campus.
- Publicize the recycling of cartridges and cell phones to increase the profit for the Center.

Phase 3 –
- Add the horizontal baler
- Begin baling OCC; and when ready, plastics, aluminum and tin.
- Consider managing all pallets at Recycling Center.
- Work with campus to add a food scrap recycling program.

Phase 4 -
- Consider adding in a buy back center, an electronic waste program and a clothing donation program.
- Consider adding a battery recycling program.

XVIII. Potential Resources

Local:
- City of Los Angeles Database of Recycling Haulers
  http://dpw.lacounty.gov/epd/brtap/recyclingsite/results.cfm?search=metal
- City of Los Angeles Recycling Program:
  http://www.lacitysan.org/solid_resources/recycling/index.htm
- City of Los Angeles Recycling Search:
  http://ladpw.org/epd/brtap/recyclingsite/results.cfm?search=electronics
- Burbank Recycling (Kreigh Hampel (818) 238-3900),
  http://www.burbankrecycling.com
- Community Recycling & Resource Recovery (Eric Wilhite or Nicole Valverde (818) 767-1203): http://www.communityrecycling.net
- Crown Disposal Co., Inc. (Tim Frye (818) 504-1414):
  http://www.crowndisposal.com
Internet:

- 2010 California Higher Education Sustainability Conference web site:
  http://2010higheredsustainabilityconference.org/

- Agromin:
  http://www.agromin.com (composting, green materials)

- California Resource Recovery Association:
  http://www.crra.com

- Department of Resources, Recycling & Recovery:
  http://www.calrecycle.ca.gov

- Ecco-Technologies:
  http://www.ecco.technologies.com

- Video Links to compactors
  http://www.youtube.com/watch?v=RoqntDW_qtM - Cardboard Compactor
  http://www.youtube.com/watch?v=fxJyurv4SJI - Valpak Cardboard Compactor
  http://www.youtube.com/watch?v=M9I_u78c818 - Valpak General Waste Compactor
  http://www.youtube.com/watch?v=2_RMr_HgBUA - Wood/General Waste Compactor
  http://www.youtube.com/watch?v=SaorHtUoRoo - Cardboard Screw Compactor
  http://www.youtube.com/watch?v=fzHyMwfUNbc - Cardboard Screw Compactor

Other University Recycling Programs:

- CSU Chico Recycling:
  http://www.aschico.co/de

- Stanford University Recycling:
  http://recycling.stanford.edu/

- Harvard Recycling:
  http://www.law.harvard.edu/about/administration/facilities/energy/recycling.html

- CSU Long Beach Recycling:
  http://daf.csulb.edu/offices/ppfm/facilitiesmanagement/recycling/asi.html

- ASI Recycling Center, CSU Long Beach: (Lee Johnson (562) 985-5461),
  http://www.csulb.edu/divisions/students/asi/recycling/about.html
• USC Recycling: http://www.green trojans.com/resources/recycling/usc/

UC Davis Recycling: http://r4.ucdavis.edu/


• Loyola-Marymount University (Bill Stonecypher (310) 338-3023): http://www.lmu.edu/Page664.aspx

• Orange Coast College (Michael Carey (714) 432-5131): http://www.orangecoastcollege.edu/about_occ/facilities/recycling_center/

CSUN Information:

• CSUN Sustainability Course: http://www.csun.edu/sustainability/

• CSUN Green Team: http://www.csun.edu/~alliance/Green_Coreteam/

CSUN Institute of Sustainability: http://www.csun.edu/sustainability
Addendum 1 – Program Statement

ASSOCIATED STUDENTS
CALIFORNIA STATE UNIVERSITY, NORTHRIDGE
RECYCLING CENTER


The Associated Students Recycling Center at California State University, Northridge will be a multi-functional space, serving primarily as the central collections location for many of the campus recyclables. It will also serve as the administrative hub of the Center and its programs and services and as a focal point for the University community for educational programs, services and issues related to the environment.

The greatest use of space in the Center will be the campus transfer location for on-campus collections of glass, plastic, metal, cardboard and other materials. Center staff and on-campus partners will deliver materials in carts, fork-lifts and trucks to the Center and off-campus partners will come to take the materials away. The Center will therefore have large vehicular access for deliveries and for truck roll-off pick-ups. It will also contain up to one dozen various sizes of containers for the temporary storage and sorting of these materials.

To fulfill these functions, the Center will be 6,000 square feet in area. Its site will be centrally located to the core of the CSUN campus with access for large motor vehicles from off-campus vendors and suppliers.

The Center will contain an environmentally advanced building (2500-3000 sq. ft.) that will house the offices of the Center’s administrative staff, storage, a lounge for student employees and interns, a kitchenette and bathroom, and a meeting or seminar room for educational and administrative functions. Water and electricity will be available in the building and from it to the outdoor portion of the Center.

For safety and aesthetic reasons, the area will need to be high-fenced and gated. The building will be accessible from both within the Center and from outside. At least one street entry will need to accommodate large delivery and pick-up vehicles, as well as pedestrian traffic. The external facades of the Center will visually emphasize the natural resources of Southern California through landscaping and art.

All materials and systems in use in the Center will attend to the highest standards of sustainability and energy-efficiency.
Addendum 2 – Architect’s Scope of Work

Exhibit ‘A’ - Scope of Work
Associated Students Recycling Center
CSU Northridge

1. General:
Provide complete architectural/engineering design services (schematic, preliminary, construction documents, bidding, construction administration and as-builts) for the new AS Recycling Center project. The site is approximately 14,000 sf located south of Campus Road C and north of the Plaza del Sol Performance Hall.

The layout of the site will need to serve the functional and operational needs of AS Recycling. Layout and coordination of equipment, compactors, bailers, sorting tables, storage bins, etc. is part of the design work. Site design will provide for recycling/resource recovery hauler vehicle pick up, ramps, and/or docks; AS recycling carts / bicycle and wagon drop off; and visitor and pedestrian access. The site will need to be secured by an enclosure and landscaped to be attractive to surrounding campus. There is no parking associated with this project since those working at this location or visiting will use existing campus parking.

The site is served by dedicated firewater, domestic water, natural gas, sewer and electric utilities. There are hydronic lines from the central plant serving the USU Student Recreation Center with capacity for this project.

2. Design Basis:
The A/E should rely on the feasibility study by Terra Solutions for program areas, detailed functional requirements and relationships. Site and concept study information in this document are provided for reference. This facility will be operated by the Associated Students. CSUN and the Associated Students have demonstrated a strong commitment to sustainable building design and operations. The Associated Students have indicated that this project must utilize sustainable design principals including natural ventilation systems, passive-solar heating, day lighting, and high performance low energy solutions for each of the project’s various HVAC requirements.

The project includes a new single story freestanding structure to meet the stated functional and program requirements. These requirements are contained in the Terra Solutions Feasibility Study, Program table. The building will be approximately 3,500 gross square feet. The outdoor work areas will be shaded by a combination of
shade structures and trees. AS recycling has requested that this building be a working example of current sustainable building technologies including, day lighting, demountable building components, energy efficient lighting, operable windows, and energy efficient HVAC systems.

3. Design Style:
The facility and the building will have to present a front of house to visitors and those attending training. The building design and materials for the west and north elevations will need to present an attractive appearance which complements adjacent buildings. The south and east elevations are back of house and can be more functional in design and material selection. The indoor and outdoor spaces on the site will need to flow together to meet overlapping functional requirements.

4. Phasing:
There are no phasing requirements for this project. The building and site improvements will be completed at one time under the contract for construction.

5. Existing Site:
The existing site is largely undeveloped. Current recycling operations are within approx 6,000 sf of fencing and a storage container. The existing street and sidewalk to the north will remain. The Student Recreation Center (SRC) will construct a new Fire Access road to the east. The north and west site boundaries are important pedestrian circulation routes that will remain.

6. Investigation into Existing Conditions:
A soils report for the SRC is available. The Associated Students will provide additional geotechnical investigation if requested by the A/E to confirm building and structural requirements.

7. Site Design:
Describe scope and extent. Identify extent and general location of parking to be provided.

Example: Some site design is a part of this work. The design shall address approach, circulation and service access throughout the facility. Service area and limited special permit parking design shall be developed as necessary. The bulk of user parking is remote and existing. Parking design and construction shall include path of travel. It is envisioned that some remote-site modifications will be required for ADA compliance and DSA approval of this project.

8. Landscape Design:
Complete landscape design of hardscape, softscape, shade structures, water misters and site lighting are a part of this work.
9. Basis of Design Reports:
   Energy efficiency is an important component in the effort to minimize the cost of operation of this building. It is imperative that the university understands the implications of design decisions being made during the design process. Especially in the early stages of design, it is important that the architect/engineer provide insights into the implications of a given choice, e.g. materials, building skin, mechanical systems, etc. To achieve this, the architect/engineer shall develop basis of design reports for key building systems. These reports are due during the initial stages of schematic design and provide the basis for the university’s acceptance of design submittals. Design reports for this project include, Building envelope, Outdoor climate moderation, Lighting design, and daylighting options. The basis of design report for the HVAC system proposed will need to consider using the campus central plant hydronic loop and provide the most energy efficient alternative system for comparison.

10. Interior Design:
   Complete Interior design of all public and tenant spaces including finishes for floors, walls and ceilings and the design of all built-in casework as a part of this work including specification and coordination of all Group II furniture and Group I equipment for recycling operations.

11. Furnishing and Equipment:
   The architect and consultants shall develop a complete furniture plan for building spaces and a complete site equipment plan for functional recycling operations. The specific design, selection, and coordination of the moveable furnishings and equipment (i.e., desks, tables and chairs) are a part of A/E services for this project. The purchasing and installation will be part of Group II project budget.

12. Hazardous Materials Abatement:
   No hazardous material is expected to be encountered in the scope of this project.

**Modifications to Rider A, Agreement General Provisions**
For this Agreement the following sections are revised and shall read as follows:

Section 1.4.1 Normal Consulting and Engineering Services. Add to this section;
Recycling Equipment Design and A/E coordination.

Section 2.2 Consultants. Add to this section;
Prior to the execution of this agreement the Architect/Engineer shall submit for review the names and contracts for all proposed sub-consultants including structural, mechanical, electrical, plumbing, landscape, and food service design.

End of changes
“Make no little plans; they have no magic to stir men’s blood and probably in themselves will not be realized. Make big plans; aim high in hope and work remembering that a noble, logical diagram once recorded will never die.” - Daniel Hudson Burnham