The following program needs summary is a planning tool for the proposed Bear Park Permaculture Greenhouse and Gardens. This process of this document’s creation is as follows:

- Summarization of the CMC Steamboat Permaculture Team’s research and committee meetings from October 2013 – February 2014;
- Summarization of all of the ideas put forth by the attendees of the December 6, 2013 Design Charrette;
- Evaluation of those ideas in the context of CMC’s educational mission, CMC Steamboat’s goals for a permaculture-driven site and permaculture academic programs, site constraints, and budgetary constraints; and lastly,
- Prioritization of ideas as fodder for the design team to consider for the upcoming Design Development phase of the gardens site and greenhouse structure.

The major areas covered in this report are:

- Project Goals
- Anticipated Timeline
- Schematic Design
- Overall Site Design & Circulation
- Greenhouse Design
- Ancillary Structures
- Fencing
- Exterior Landscape Design & Irrigation
- Soils & Soil Amendments
- Plants
- Art
- Accessory Uses
- Use of Recycled/Sustainable Products
- Detention Pond
- Food & Routt County Environmental Health Department Regulations
- Partnerships
- Business Plans & Revenue Strategies
- Fixtures, Furniture & Equipment List – work in progress
- Plant List – work in progress

Sincerely,

The CMC Steamboat Permaculture Team
CMC Steamboat Permaculture Team

- Tina Evans, Assoc. Professor, Sustainability Studies (Lead)
- Bob Beck, CMC Steamboat Facilities Director
- Bruce Beckum, Professor, Communications and Humanities
- Whitney Chandler, Teaching Assistant, Student & Researcher
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- Tracey Hughes, Librarian
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- Cynthia Pougiales, Thira Architects
- John Saunders, Professor, Wilderness Studies
- Natalie Savage, Student & Researcher
- Tom Smiley, Assoc. Professor, Restaurant & Culinary Management
- Pete Waller, CMC Facilities Director
- Cynthia Zyzda, Professor, Visual Arts & Humanities

Project Goals

1. The Bear Park Greenhouse and Gardens are a stage for comprehensive, immersive, practical learning experiences with sustainability and permaculture principles as the solid foundation and drivers.

2. The Bear Park Greenhouse and Gardens project shall have a net zero energy impact.

3. The Bear Park Greenhouse and Gardens shall enhance and support the educational mission of Colorado Mountain College and shall facilitate developing leaders with the passion, innovative potential, and solid practical experience necessary to make effective contributions to sustainability projects that involve social, business, scientific, technological, and economic dimensions.

4. The Bear Park Greenhouse and Gardens shall offer both indoor and outdoor learning and gathering spaces for educators and students for discussions and class meetings.

5. The Bear Park Greenhouse and Gardens shall be home to an approximately 2,000 square foot, four-seasons greenhouse, that relies minimally if at all on fossil fuel heating and cooling technologies.
**Anticipated Timeline**

- October 2013 – April 2014 – CMC Permaculture Team meetings

- Feb 3, 2014: NSF grant application submitted by Tina Evans with the help of Natalie, Whitney and Marie Carroll. (NOTE: When reading the grant application, Year 1 is Fall 2014 – Summer 2015.)

- Feb 21, 2014: Greenhouse & Gardens Team Meeting

- Feb 25, 2014: Presentation to CMC President, Dr. Carrie Hauser on greenhouse & permaculture program.

- March 2014: Send email communication to Charrette group and CMC Steamboat emails.

- March 2014: Meet with immediate neighbors re greenhouse and gardens project.

- March 7, 2014: Send RFQ out for greenhouse designer and design of immediate greenhouse surrounds.

- April 2014:
  - Present greenhouse project at CMC Steamboat's Sustainability Conference.
  - Scheduled to have greenhouse design candidates present at end of Sustainability Conference on April 18, 2014.

- Late April/Early May 2014: Select greenhouse designer.

- Summer 2014:
  - Construction and completion of access just from Crawford Avenue to the site property line
  - Preliminary work on civil design plans.
  - Hear back regarding NSF grant (they have 6 months to respond which would be August 2014.
  - Greenhouse designer to work on design.
  - Members of Greenhouse & Gardens team to attend U Mass Amherst Revisioning Sustainability Conference.

- Fall – Dec 2014:
  - Work with greenhouse designer to finalize design.
  - Work with Pete Waller throughout process to pull together budget numbers for FY 15/16 budget request.

- Jan 2015: Submit budget request for greenhouse construction through Pete Waller by 1/15/15.

- Fall 2014/Spring 2015: Advertise and hire for Sustainability Faculty member and Greenhouse Manager positions.

- Summer 2015: Construction of greenhouse and begin site preparation work for outdoor gardens.
Schematic Design
Overall Site Design & Circulation

*Design Fundamentals*

1. **Visual Appeal and Impact:** The Bear Park Greenhouse and Gardens shall provide an attractive and cohesive visual entrance to the CMC Steamboat campus when viewed from Crawford Avenue.
   
   a. **Harmonious Architecture:** The greenhouse structure and all other structures on the site shall be harmonious with the Steamboat Academic Building's architectural materials and style.
   b. **360 Degree Architecture:** The visual impact of the greenhouse structure shall be positive whether viewed from the top of the parking lot stairs or from Crawford Avenue.
   c. **Vehicular Presence:** Vehicles on the site shall be minimized to the highest extent possible, including parking areas. If parking areas are on site, they shall be located to have the smallest visual impact and physical footprint.
   d. **Respect for Neighbors:** Careful consideration shall be given for the visual and sensory impact of the immediate neighbors in terms of the uses and plantings on the western, eastern and southern periphery of the site.
   e. **Balance between Site Function and Aesthetics:** Gardens are beautiful but dirty places that sometimes require items that might not be the most aesthetically pleasing! In this case, zones of accumulation, composting areas, mulch storage, etc. shall be functionally located and wherever possible, housed or shielded by aesthetically pleasing structures or elements.
   f. **Incorporation of Art:** To maximize the visual impact of the site, art shall be incorporated throughout. Such art might be functional or might be simply for art's sake, and could include a bee sanctuary, bicycle racks, signage, sculptures, and non-permanent ephemeral art installations.

2. **Site Access:**
   
   a. **Entrances:** All entrances – both pedestrian and vehicular – shall be functional, easily identifiable and visually attractive. Entrances shall be:
      
      i. **Pedestrian Entrances**
         1. From the main lower parking lot of the Steamboat Academic Building down the existing metal staircase to the site.
         2. Access directly off Crawford Avenue onto the site.
         3. Pedestrian access from Bob Adams Dr. via a short trail and gate.
      
      ii. **Bicycle Entrance**
         1. Access directly off Crawford Avenue onto the site.
         2. Plentiful, artistic and functional bicycle racks shall be provided near the bicycle entrance.
      
      iii. **Vehicular Entrances**
         1. Access driveway directly off Crawford Avenue.
         2. Drop off and pick up, extremely limited access, service and ADA accessible internal vehicular circle.
   
   b. **Security:** There shall exist the ability to close and lock the site and all structures on the site when and if necessary (i.e. locked from sundown to sunset, when extensive earthwork is being conducted, etc.).
Overall Site Design & Circulation, continued...

3. **Drainage/Water/Snow Storage & Maintenance:** The entirety of the Bear Park Greenhouse and Gardens, including the design of the greenhouse structure itself, shall optimize natural water flows which exist or might occur on the site. Permaculture principles shall drive drainage design, and examples of how drainage optimization might occur include, but are not limited to:

   a. **Swales:** Well-designed swales (Bioswales, Hugelkultured swales, etc.) slow drainage and direct water to site vegetation and planting areas to aid in plant irrigation.
   
   b. **Greenhouse Drainage Design:** Greenhouse drainage design considers use of techniques such as French drains which move water to planting areas before moving it out to stormwater system or the existing detention pond on site.
   
   c. **Permeable Surfaces:** All driving surfaces and walking paths shall have permeable and/or plant surfaces. These surfaces need to be functional year-round so that if snow removal on internal paths occurs, the surfaces do not get destroyed.
   
   d. **Water Sources:** If CMC Steamboat decides it is feasible to apply for water rights for the entire campus, the site’s drainage plan shall examine how water moves through, and is most effectively and efficiently utilized, on the entirety of the CMC Steamboat campus.
   
   e. **Snow Storage & Maintenance:** Given the high volume of snowfall in Steamboat Springs, the relationship between snow storage, roof design, circulation patterns and site uses shall be carefully evaluated to both minimize snow maintenance and maximize melting snow while keeping the site and its buildings functional year-round.

4. **Solar:** Solar gain shall be optimized for both the greenhouse structure and for the entirety of site by conducting a solar analysis during the Design Development phase and then designing and building accordingly.

5. **Wind Patterns:** Wind direction and pattern shall be studied during the Design Development phase so that permaculture principles related to wind can be implemented with regard to plant locations, microclimate creation, pollination, and for the practical purpose of mitigation of potential toilet odors.

6. **Internal Site Circulation:** Internal walking paths shall be visually appealing and highly functional. To that end, internal site circulation shall include the following types of treatments:

   a. ADA accessibility.
   
   b. Permeable and/or plant surfaces.
   
   c. Organic, curved patterns.
   
   d. Organic, potentially non-linear planting beds.

7. **Educational Value:** Much of the educational value of the site will derive from the academic curricula and hands-on experience; however, the site shall be designed with interpretive and educational signs throughout.
Overall Site Design & Circulation, continued...

**Design Considerations**

1. **Central Focal Point of Site:** Depending on the final design of the internal driving circulation, there exists an opportunity to design a strong, central focal point to the site. Possibilities for this feature include, but are not limited to:
   a. Outdoor learning center.
   b. Spiral garden.
   c. Horno oven.
   d. Solstice marker.

2. **Periphery of Site Access:** Discussion is ongoing about how, or if, there will remain a path to walk around the outside of the gardens site. There exists a path at this time from the bottom of the metal stairs, around the eastern and southern edges of the site that exits onto Crawford Avenue.

3. **Greenhouse Expansion or Future Hoop Houses:** Site planning should address and consider the future possibilities of a greenhouse structure expansion or the addition of hoop houses at a later date.

4. **Existing Vegetation.** There currently exist some trees on the east and south of the project site. Based on permaculture principles, it will need to be determined if it is best to keep this existing vegetation or to replant with different vegetation.

**Civil Engineering Considerations**

1. In a forthcoming drainage report, special consideration should be taken to analyze how/if permeable pavers and/or asphalt impacts the need to resize the current detention pond.

2. During soils testing or other processes, a feasibility study of terraced gardens or orchards on the north hillside should be conducted, as should a feasibility study of constructing an amphitheater within the terraced area on that same northern hillside.
Greenhouse Design

*Design Fundamentals*

1. **Permaculture Education Space:** The primary purpose of the greenhouse design shall result in a superior permaculture education space and a functionally optimized greenhouse.

2. **Temperature and Type of Zone:** The greenhouse shall be designed to keep a minimum temperature of 40 degrees with a Mediterranean climate.

3. **Solar Gain:** Location, orientation and design of greenhouse shall maximize the ability of sun and light to penetrate through to the back of the greenhouse because of appropriate shape, depth, height and materials.

4. **Minimum Height:** Height is a minimum of approximately 15’ to accommodate dwarf and semi-dwarf fruit trees in a food forest.

5. **Minimal Reliance on Fossil Fuels:** Greenhouse design utilizes heating and cooling techniques which minimize dependence on fossil fuels. Techniques to be used include, but are not limited to:
   
a. Operable windows.
b. Adequate venting systems which are both manually and automatically controlled.
c. Venting on the sides to create a cross breeze across the top of the building.
d. Solar powered fans to maintain air circulation.
e. Heating Sources shall be a combination of any or all of the following:
   i. Solar PV panels – to be coordinated with Chris Ellis from CMC Rifle Campus.
   ii. Radiant heat.
   iii. Climate battery.
   iv. EPA-approved rocket mass heater which doubles as a bench.
   v. Thermal mass.
   vi. Earth berm behind the greenhouse.
   vii. Insulating curtains.
   viii. Painted/colored back wall to add heat or keep heat down.
   ix. Phase change materials geared to maintaining consistent temperatures.
   x. Solar thermal along front wall, roof, flooring, back wall, or into water tanks or radiators.
   xi. Backup gas or wood or pellet stove or a boiler of some type as a backup heating source.
Greenhouse Design, continued...

6. **Interior Layout:** Inside the greenhouse, there shall be the following elements:
   
   a. An ADA accessible learning space with seating as a key element. This could take several physical forms, including, but not limited to:
      
      i. A hub and spoke design.
      
      ii. Keyhole or round design.
   
   b. Greenhouse interior layout is based on permaculture design and includes the following elements:
      
      i. Food forest.
      
      ii. Hugelkultured beds.
      
      iii. Organic, curving pathways.
      
      iv. Vermiculture composting setup.
      
      v. If possible, separate annuals and perennials for easier plant maintenance.
      
      vi. If feasible, interior terracing can be considered.

7. **Snow Shed/Roof Design:** The greenhouse roof design is multifunctional in terms of the following:

   a. Allows for adequate height for a food forest inside of the greenhouse.
   
   b. Allows for appropriate solar gain and lighting throughout the greenhouse.
   
   c. Minimizes the need for snow shoveling of the roof.
   
   d. Minimizes ice dams on the roof.
   
   e. Safely sheds snow to a location where the snow can be managed with minimal labor and to maximum outdoor plant benefit.
   
   f. Roof overhang assists in keeping solar gain in summertime in check, and if this is not possible, solar screens can be affixed to serve the same purpose.

8. **Water & Irrigation:** The greenhouse irrigation systems shall be efficient and functional year-round. Irrigation elements shall include, but are not limited to:

   a. Frost free water pump system.
   
   b. Water storage to:
      
      i. Moderately preheat winter irrigation water.
      
      ii. Assist in avoiding problems with freezing.
      
      iii. Add to thermal mass.
      
      iv. Offer an artistic treatment opportunity.
      
      v. Offer a site for potential future aquaculture.
   
   c. Consider using ollas/clay pot irrigation in beds.

9. **Security:** The greenhouse shall be able to be securely locked when necessary.

10. **Drain System:** The greenhouse shall have an interior drain system or appropriate soils to allow for hosing, spraying and cleaning without creating muddy pools.

11. **Vestibule(s).** In order to offer buffer zones for both heating and cooling purposes, at least one vestibule and possibly two vestibules must be part of the greenhouse with double doors to create an airlock when desired.
Greenhouse Design, continued...

12. **Sprinklers**: It is likely that the greenhouse structure will need to be sprinkled to be compliant with CMC’s Development Agreement with the City of Steamboat Springs. Further details on this are forthcoming.

13. **Beehives in Western Wall**: If possible, include the ability to place “see into” beehives in the western wall of the structure.
Ancillary Structures

*Design Fundamentals*

The following ancillary structures shall be present on the site. While it may make logistical and/or financial sense include them inside of or attached to the greenhouse, their location and relationship to the greenhouse has yet to be determined.

1. **Sprinklers:** It is likely that all ancillary enclosed structures on site will need to be sprinkled to be compliant with CMC’s Development Agreement with the City of Steamboat Springs. Further details on this are forthcoming.

2. **Outdoor Learning Center:** With the primary focus of the permaculture greenhouse and gardens as a learning environment, the Outdoor Learning Center (OLC) is a critically important feature of the site.
   a. **Uses:** The OLC’s uses include, but are not limited to:
      i. Teaching space.
      ii. Picnic area.
      iii. Central, sheltered outdoor harvesting zone.
      iv. Relaxing and scenic resting spot.
      v. Potential location for the horno wood-fired oven.
   b. **Shelter from the Sun:** The OLC must be able to provide shelter from the sun so that outdoor classes can meet during the summertime. The sun shelter could be a permanent roof structure, or could use sun sails or the like to provide shelter.
   c. **Structure of OLC:** The structure of the OLC shall be creatively designed to maximize functionality and visual interest. To that end, the structure of the OLC could take the form of the following:
      i. Gazebo.
      ii. Slightly sunken kiva with a living roof.
      iii. Circular structure with rooftop solar panels.
      iv. Ability to seat 20-30 people in a size TBD but estimated between 300 – 1000 square feet.
   d. **OLC Structure Requirements:** The OLC must be:
      i. ADA accessible.
      ii. Have electric, preferably solar powered electric.
      iii. Have a water source or hose access at or just adjacent to the structure.
      iv. Have a recycling area nearby.

2. **Seedhouse:** The seedhouse shall be multifunctional and have the following additional uses:
   a. Seedhouse.
   a. Office space.
   b. Partition-able quarantine space.
   c. Incubator space.
   d. Sprouting room.
   e. Working space with planting and/or worktables.
Ancillary Structures, continued...

3. **Storage:** In order to keep possessions and tools organized, secure and protected from the elements, there shall be the following storage spaces created:
   
   a. **Shed:** An approximately 200 sf passively heated lockable storage shed which is sustainably designed and built with sustainable materials to house tools, carts, gloves, hoses, tubs, plant pots, beekeeping equipment, etc. (The included draft FF&E list provides additional detail on amount of tools, although all do not have to be housed in this tool shed.)
   
   b. **Lockers/Cubbies:** Lockers or cubbies for personal belongings.
   
   c. **Coats:** Coat hooks.

4. **Restroom Facility:** There shall be a restroom facility located on site compliant with State requirements and is:
   
   a. ADA accessible.
   
   b. Uses solar or incinerator toilets if possible.
   
   c. Located such that it is fairly easily serviceable and where odor issues will be minimized.

5. **Sinks:** There shall be the following sinks located on site:
   
   a. Either in the greenhouse or the seedhouse (large, 3 compartment).
   
   b. Near or in the Outdoor Learning Center (large, 3 compartment).
   
   c. Near the horno oven (handwashing sink).

6. **Pumphouse:** In order to protect the existing water pump, a small pumphouse shall be built over the pump. It shall:
   
   a. Consider solar thermal for pumphouse flooring or passive solar heating to generate heat for pumphouse.
   
   b. Be designed to easily accommodate repairs.
   
   c. Be accessible during winter season.

7. **Compost and Planting Materials Structure:** While this structure does not need to be, and is likely not desired to be, fully enclosed, there shall be on site an area dedicated to composting and mulch/soil/organic materials storage. This area shall be:
   
   a. Centrally located on the site.
   
   b. Visually appealing to the highest degree possible.
Fencing

*Design Fundamentals*

1. **Aesthetics and Functionality:** The aesthetics and the functionality of the exterior site fencing are equally important.

2. **Purpose:** The function of the exterior site fence is 1) to keep large animals out of the gardens site, 2) to keep humans out, and 3) to serve as a planting trellis.

3. **Location:** The fence shall be around the entirety of the exterior of the site, including the detention pond.

4. **Construction:** The structure of the exterior site fence shall have the following features:
   
   a. See through so as not to obstruct views.
   b. Seven feet tall.
   c. Constructed with an electric top wire to serve as an additional bear deterrent.
   d. To prevent burrowing animals from entering the site, there shall be quarter inch mesh buried into the ground along the entire fenceline to a minimum depth of 18".
   e. The fence shall have automatically closing and latching gates to prevent unintentional access to the site.
   f. *The team currently has an estimate on an elk fence with an electrified top wire to deter bears, with an estimate of approximately $16,000 for 780 linear feet, 7 corners, and two spring loaded pedestrian gates and one car/truck gate.*

5. **Beehive Fencing:** There shall be an additional 3-4' tall, picket type fence around the beehives with the sole purpose of serving as a child barrier.

*Design Considerations*

1. **Location:** The following elements regarding the fence location are still under discussion:
   
   a. How far up the hillside by the parking lot does the fence go?
   b. Is the existing path inside the fence or outside it?

2. **Colorado Fencing Regulations:** Prior to any construction or final designs, it needs to be determined if there are any state-level fencing regulations we need to adhere to.
Exterior Landscape Design & Irrigation

Design Fundamentals

1. Permaculture Principles: Permaculture principles guide all landscape design features, irrigation, and their respective locations.

1. Aesthetics and Functionality: Particularly along the Crawford Avenue visual path, aesthetics and functionality must be well balanced. Examples of this could include the creation of bioswales planted with flowers along roadway for beauty (potentially outside of fence if necessary), and the inclusion of art whenever and wherever possible when creating a landscape design feature.

2. Design Elements: The following elements shall be present on the site, with their final locations still to be determined:

   a. Terraced gardens (planting types TBD)
   b. Spiral Garden
   c. Herb garden
   d. Food forest
   e. Culinary growing space
   f. Hugelkultured raised beds & swales
   g. Bioswales
   h. Orchards
   i. Cover crops for areas awaiting plantings
   j. Cold frames
   k. Creation of microclimates over time.
   l. Creation of a windbreak along the prevailing wind side of site.

3. Irrigation Elements - Exterior:

   a. Irrigation stubs to all planting areas shall be installed at the first practical construction phase. Temporary systems can be used while the final exterior landscape design is still in process.
   b. A drip and micro irrigation plan shall be created.
   c. Swales are a key design in the irrigation system of the site.
   d. Irrigation shall be installed in such a way that they can be expanded or modified easily.

Design Considerations

1. Graywater Use: In 2013, Colorado adopted new graywater legislation. Depending on the timeline for regulations pertaining to graywater, and the method of water access that CMC ultimately pursues, any irrigation plan shall incorporate graywater whenever and wherever feasible.

2. Metal Stair Aesthetics: The stairway from the Steamboat Academic Building parking lot to the site is functional, but offers opportunities to create a more visually interesting and pleasant entrance to the site. Potential opportunities to explore include, but are not limited to: increased greenery and signage at the top of the stairs, creation of a living/green archway over the stairs, and/or using the stairway sides as plant trellis.
Soils & Soil Amendments

Design Fundamentals

1. **Soil Preparation**: Soil is the key to any successful garden, whether in a greenhouse or outdoors. To that end, the Bear Park Permaculture Greenhouse & Gardens shall:
   
   a. Thoroughly prep the soil before starting any plantings.
   b. Take special care with regard to soil quality for perennial planting areas.
   c. Take special care for the quality and readiness of the soil in the greenhouse.

2. **Soil & Soil Amendment Sources**: In order to maximize partnerships with local business and in keeping with permaculture principles, at this time, the following soil and soil amendment sources will be utilized:
   
   a. For the greenhouse, we will use Twin Enviro compost as the primary soil amendment.
   b. For the outdoor planting areas, Twin Enviro compost will possibly be used as a supplement.
   c. Soil source is subject to change if another compost source is found that is superior and a better value.
   d. A cover crop mix will be used in rotational plantings, and prior to the final exterior landscape installation, to build soil.
   e. Manure will be used when we can be relatively certain that we will not be importing excessive or damaging weed seeds by doing so.
   f. Compost to be made on site will use the materials generated by the greenhouse and gardens staff, with a very limited amount of compostable materials harvested from the campus kitchen simply due to space considerations i.e. if the entire campus kitchen compostables were used, the greenhouse and gardens would be overwhelmed by its quantity.

Soil Considerations

1. **Pest Elimination in Soils**: Additional information is needed to determine how best to mitigate and manage pests in soil. Steam sterilization is a technique that has been discussed, but that requires more research and discussion with experienced professionals before considering as a solution.
Plants

**General Plant Categories**

1. Edible plants (including survival foods/plants)
2. Native/local plants
3. Annuals
4. Perennials
5. Medicinals
6. Herbs
7. Edge plantings
8. Cover crops
9. Food forests and forest gardens
10. Fruit trees

**Design Fundamentals**

1. **Flower Distribution:** The site shall have many flowers throughout and especially on the edges to make it visually aesthetic on the periphery and to provide good bee forage throughout the site.

2. **Exterior and interior fence plantings:** The following are recommended for functional purposes:
   
   a. Green onions or garlic planted outside of the fence, or near to the fence, to use as pest repellants.
   b. Some edibles might be planted outside the fence to keep animals from wanting to come into garden site itself.
   c. Plantings around the outside of fence should be considered for their value as bee forage.

3. **Handling of Plants:** Especially important in the greenhouse, all plants shall be quarantined to ensure they do not have pests or diseases upon purchase or introduction to the greenhouse and gardens site. The quarantine room will be used for all plants being brought into the greenhouse.

4. **Timing of Planting:** Perennials and fruit trees shall be planted as soon as feasible.

**Note:** A preliminary plant list is included with this document and is a work in progress. It is not anticipated that any final plant list will be ready until at least Spring 2015. This list can be found on Page 23.
Art

Design Fundamentals

1. **Art Throughout.** The entire Bear Park Permaculture Greenhouse and Gardens project is a form of art.

2. **Visual Connection.** Visual connections to the art on the site from Crawford Avenue shall be made whenever possible.

3. **Functional Art:** Functional art is as important as beautiful art. To that end, there exist the following opportunities for functional art on the site, with more opportunities expected to be identified throughout project development and construction:
   
   a. Bike racks.
   b. Fences.
   c. Cold frames.
   d. Archway over stairs from parking lot.
   e. Bee sanctuary.
   f. Beehives.
   g. Solstice markers.
   h. Ute medicine wheel.
   i. Interpretative signs.

4. **Permanent Art vs. Ephemeral Art:** It is anticipated that not all of the art on the site will be of a permanent nature, or in a permanent position on the site.
Accessory Uses

Design Fundamentals

1. **Beehives:** In support of the sustainability and permaculture programs and the student beekeeping club, there shall be on site:
   
   a. 1 or 2 hives that occupy an approximately 20x20 square foot area.
   
   b. Preferably located near the greenhouse for easy access during the winter season, and not located directly adjacent to any neighbors.
   
   c. Potentially be located directly against the greenhouse or integrated into the greenhouse wall to accommodate a "see into" hive into the west wall of the greenhouse.

2. **Horno oven:** In order to support the culinary and sustainability programs, a wood-fired horno oven shall be built on site and requires the following elements:
   
   a. Solid pad under it for heat and stability purposes.
   
   b. Under a non-flammable cover or roof constructed of adobe. In order to avoid deterioration of the oven, a roof cover should be constructed over it.

3. **Seating:** Ample seating shall be provided throughout the site. Seating shall be:
   
   a. On the edges of raised beds inside and outside the greenhouse.
   
   b. In the Outdoor Learning Center.
   
   c. Scattered throughout the site as feasible and appropriate.

Use of Recycled/Sustainable Products

Design Fundamentals

1. Recycled or Sustainable is First Choice. In all cases and whenever possible, recycled or sustainable materials for all site materials, features and purchases are our first choice. Examples include:
   
   a. Use of broken cement for terracing, with ancillary benefit that the thermal mass from the concrete benefits plants.
   
   b. Using Milner’s Home Resource Center as a materials source.
   
   c. Construct bike racks from recycled metal.
   
   d. Contract with local sawyers to include beetle kill wood (esp. small diameter wood) where possible.
   
   e. Use old windows for constructing cold frames
Detention Pond

At this time, the CMC Steamboat Permaculture Team is recommending that the current detention pond remain as is; future discussions of altering this existing detention pond to become a retention pond are needed due to concerns regarding creation of a wetland subsequent jurisdiction under the Army Corps of Engineers. That said, the Team believes there is potential for creation of a functional and beautiful pond here at a future time.

If current detention pond becomes a retention pond, the following are considerations:

1. **Army Corps of Engineers.** As soon as standing water is introduced, the pond will be considered a wetland. All wetlands become federal jurisdiction under Army Corps of Engineers.

2. **Lining:** Clay and silt lining the detention pond would create a wetland if the pond is filled.

3. **Protected Species:** There are no protected species in the area to worry about at this time. Leopard frogs are of interest to the state, but there are no laws governing them at this point.

4. **Current Drainage Design:** Current drainage designed for sediment to drop out before water enters river. There would be parking lot drainage to mitigate as dirty water that is not suitable for food production.

5. **Buffer Zone:** As of this time, there are no laws about buffer zone around a wetland, and thus, we could plant whatever we want up to edge of the pond.

6. **Funding:** Might be able to get some funding by creating a wetland though mitigating wetland disturbance on another property.

7. **Bee Forage:** It would be desirable to utilize plants that also provide bee forage.

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**Food & Routt County Environmental Health Department Regulations**

*Design Fundamentals*

1. **Routt County Environmental Health Department:** The team has been working closely with Jason on requirements and the following has been determined:

   a. Raw foods require no licensing and this includes harvesting and washing of produce.

   b. Use of the raw produce into value-added products will affect the applicable Health Department regulations.

   c. The Steamboat Academic Building’s commercial kitchen would likely be used for creation of any value-added products, provided the new culinary faculty is supportive.

   d. The horno oven requires:

      i. A hand sink nearby.

      ii. No further approval from the City of Steamboat Springs Fire Department as they consider it a recreational outdoor cooking device.

      iii. Further discussion with Environmental Health regarding its wood burning aspect.
Partnerships

The following partnerships are recommended for future exploration by the CMC Steamboat Permaculture Team as the project progresses forward. There is currently no timeline for exploring these partnerships, nor has there been discussion on the level of formality these partnerships might embody.

1. **Faculty:** CMC Faculty to incorporate greenhouse, gardens and permaculture into the curriculum.

2. **Campus Store:** CMC Steamboat Campus Store for sale of value added products and gardening supplies.

3. **Community:** Gardens as learning spaces in noncredit classes or workshops

4. **Northwest Colorado Food Coalition:** for food growing education & cooking classes for low income people.

5. **Area Schools:**
   a. Middle school greenhouse and garden.
   b. High school shop and woodworking classes for construction projects, and potentially to work with our engineering students.
   c. Lowell Whiteman School Sustainable Agriculture Program.

6. **Elkstone Farms:** Tour seasonally and stay in close contact for tips and shared resources.

7. **Girl and Boy Scouts:** Projects and troupe outings.

8. **Master Gardeners:** For expertise, volunteer hours and tours.

9. **Livewell Colorado:** For health benefits related to fresh, local foods.

10. **Steamboat Clay Artisans:** For pottery/planters.

11. **Bud Werner Memorial Library:** For seed library and programming partnerships.
Business & Revenue Strategies

The following are business and revenue strategies for further exploration as the project progresses. There are many questions still surrounding these strategies as seen below.

1. Business and marketing classes to do a business plan and social marketing plan for the project during Academic Year 2015/2016, with extensive work with the professors beforehand.
   a. Think about existing markets as part of the process of building greenhouse and starting production.
   b. If we did a small CSA, how much would we need to produce, how often, how many people, and who to manage it?
   c. Potential for value added products (prepared foods, seed bombs, essential oils, honey-based products).
      i. What types of value added products are realistic for us to consider and in what quantity?
   d. Management of sale of products through Yampa Valley Co-op or the Campus Store.
      i. Yampa Valley Co-op can cover the insurance for groups that don’t have their own. They are also a clearinghouse for local food products, and it makes sense to support them. They are being folded into the Community Agricultural Alliance.

2. Visitor, work & learn landscape tours.

3. Sustainability discussions & speakers.

4. Introductory & guest workshops.


Policy and Procedural Considerations

As the project progresses, this list of policy and procedural considerations is expected to grow. Thus, this is a very introductory start to the many considerations to come.

1. Ordering, shipment and unloading of plants.

2. Site rentability.

3. Allowed gardeners.

4. Allowed crop pickers.

5. Outlets for food produced.
**Fixtures, Furniture & Equipment – work in progress**

Note: It is not anticipated that any final FF&E list will be ready until Spring or Summer 2015.

### FURNITURE

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blick Sketchpad Boards</td>
<td>20</td>
</tr>
<tr>
<td>Chairs</td>
<td>TBD</td>
</tr>
<tr>
<td>Classroom stools</td>
<td>20</td>
</tr>
<tr>
<td>Classroom tables - 4 @ 8’ x 30”</td>
<td></td>
</tr>
<tr>
<td>Klopfenstein steel art horses</td>
<td>20</td>
</tr>
<tr>
<td>Picnic tables</td>
<td>5</td>
</tr>
<tr>
<td>Planting tables for seedlings</td>
<td>2</td>
</tr>
<tr>
<td>Seating benches</td>
<td>6</td>
</tr>
<tr>
<td>Work tables – 3’x12’ – 10 (may be the same as the classroom tables and seedling tables?)</td>
<td>20</td>
</tr>
</tbody>
</table>

### FIXTURES

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold frames</td>
<td>TBD</td>
</tr>
<tr>
<td>Compost bin</td>
<td>-3 compartments, approximately 16’ x 4’ x 4’</td>
</tr>
<tr>
<td>Counters</td>
<td>TBD</td>
</tr>
<tr>
<td>Fencing</td>
<td></td>
</tr>
<tr>
<td>Lighting</td>
<td>TBD but to include motion sensor lights throughout gardens to deter unwanted animals and people</td>
</tr>
<tr>
<td>Lighting, motion activated solar for paths</td>
<td>TBD</td>
</tr>
<tr>
<td>Lockers/cubbies</td>
<td>TBD</td>
</tr>
<tr>
<td>Raised Bed Containers (indoor)</td>
<td>TBD</td>
</tr>
<tr>
<td>Raised Bed Containers (outdoor)</td>
<td>TBD</td>
</tr>
<tr>
<td>Tool shed (cord wood or straw bale)</td>
<td>TBD</td>
</tr>
<tr>
<td>Vermiculture setup</td>
<td>1@ 4’ x 2’</td>
</tr>
<tr>
<td>Washing station</td>
<td>2</td>
</tr>
<tr>
<td>Water tanks</td>
<td>TBD</td>
</tr>
</tbody>
</table>

### EQUIPMENT

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple press</td>
<td>1</td>
</tr>
<tr>
<td>Broom, push</td>
<td>2</td>
</tr>
<tr>
<td>Broom, regular sweeping</td>
<td>3</td>
</tr>
<tr>
<td>Buckets, plastic</td>
<td>20</td>
</tr>
<tr>
<td>Cart, garden – 4 wheel</td>
<td>3</td>
</tr>
<tr>
<td>Claw, hand</td>
<td>15</td>
</tr>
<tr>
<td>Cleaning cloths, terry cloth</td>
<td>200 pack</td>
</tr>
<tr>
<td>Clippers</td>
<td>15</td>
</tr>
<tr>
<td>Compost – 100 cubic yards</td>
<td></td>
</tr>
<tr>
<td>Cover, row – 6’x250’ - 10</td>
<td></td>
</tr>
<tr>
<td>Digging bar – 6 feet minimum</td>
<td>2</td>
</tr>
<tr>
<td>Extension Cords (100’) - 2</td>
<td></td>
</tr>
<tr>
<td>First aid kit</td>
<td>2</td>
</tr>
<tr>
<td>Gardening gloves – 20 pairs in various sizes</td>
<td></td>
</tr>
<tr>
<td>Guest book</td>
<td></td>
</tr>
<tr>
<td>Hand crank extractor (for beekeeping)</td>
<td></td>
</tr>
<tr>
<td>Hoe, hoop</td>
<td>8</td>
</tr>
<tr>
<td>Hoe - 8</td>
<td></td>
</tr>
<tr>
<td>Honey jars – Number and size TBD</td>
<td></td>
</tr>
<tr>
<td>Hoses - 1 (25’); 2 (50’); 6 (100’)</td>
<td></td>
</tr>
<tr>
<td>Irrigation systems (drip and micro) - TBD</td>
<td></td>
</tr>
<tr>
<td>Ladder, orchard – 8’ – 3</td>
<td></td>
</tr>
<tr>
<td>Ladder, step - 3</td>
<td></td>
</tr>
<tr>
<td>Loppers, limb - 5</td>
<td></td>
</tr>
<tr>
<td>Mesh, ¼ inch metal (animal control) – 800’ in length at minimum</td>
<td></td>
</tr>
<tr>
<td>Nozzle, hose - 9</td>
<td></td>
</tr>
<tr>
<td>Pick axe - 3</td>
<td></td>
</tr>
<tr>
<td>Pitchfork - 4</td>
<td></td>
</tr>
<tr>
<td>Plant pots – 6” diameter – 2-400 packs</td>
<td></td>
</tr>
<tr>
<td>Plant labels/signs – 1000 pack</td>
<td></td>
</tr>
<tr>
<td>Pruners, hand - 18</td>
<td></td>
</tr>
<tr>
<td>Rake, flexible – 15</td>
<td></td>
</tr>
<tr>
<td>Rake, stiff – 15</td>
<td></td>
</tr>
<tr>
<td>Reference library – TBD</td>
<td></td>
</tr>
<tr>
<td>Rope – 5 of size and type TBD</td>
<td></td>
</tr>
<tr>
<td>Seeder-seeding planting/seeder machine - 1</td>
<td></td>
</tr>
<tr>
<td>Seeding flats – 100 pack</td>
<td></td>
</tr>
<tr>
<td>Sheers - 10</td>
<td></td>
</tr>
<tr>
<td>Shovels - 15</td>
<td></td>
</tr>
<tr>
<td>Shovel, snow – 3</td>
<td></td>
</tr>
<tr>
<td>Solar food dryer – 1</td>
<td></td>
</tr>
<tr>
<td>Solstice marker boulders</td>
<td>4</td>
</tr>
<tr>
<td>Snowblower/thrower</td>
<td>1</td>
</tr>
<tr>
<td>Spade, digging – 15</td>
<td></td>
</tr>
<tr>
<td>Spade, drain – 2</td>
<td></td>
</tr>
<tr>
<td>Spade, square – 6</td>
<td></td>
</tr>
<tr>
<td>Sponges – 2-6 packs</td>
<td></td>
</tr>
<tr>
<td>Sprinklers – 6</td>
<td></td>
</tr>
<tr>
<td>Stakes, bamboo garden – 2-500 packs</td>
<td></td>
</tr>
<tr>
<td>Storage bins – 20 gallon size - 10</td>
<td></td>
</tr>
<tr>
<td>Tarps (12’ x 16’) - 4</td>
<td></td>
</tr>
<tr>
<td>Tarps (20’ x 25’) - 5</td>
<td></td>
</tr>
<tr>
<td>Timers for irrigation system - TBD</td>
<td></td>
</tr>
<tr>
<td>Topsoil – 175 cubic yards</td>
<td></td>
</tr>
<tr>
<td>Tree supports - TBD</td>
<td></td>
</tr>
<tr>
<td>Trimmers, Hedge – 4</td>
<td></td>
</tr>
<tr>
<td>Trowel, hand - 15</td>
<td></td>
</tr>
<tr>
<td>Watering cans - 5</td>
<td></td>
</tr>
<tr>
<td>Weed Trimmer (electric, cordless) - 1</td>
<td></td>
</tr>
<tr>
<td>Wheelbarrow - 4</td>
<td></td>
</tr>
<tr>
<td>Wood chip mulch – 10 cubic yards</td>
<td></td>
</tr>
<tr>
<td>Wood for Hugelkultured raised beds and berms – 24 cords</td>
<td></td>
</tr>
</tbody>
</table>
Plant List – work in progress

Note: It is not anticipated that any final plant list will be ready until at least Summer 2015.

### OUTDOOR PLANTS

#### TREES
- Apple
- Apricot
- Bay leaf
- Chokecherry
- Plum
- Seaberry

#### SHRUBS
- Currants
- Gogi berries
- Gooseberry
- Hazelnut bush
- Huckleberry
- Raspberry
- Serviceberry
- Wild rose

#### HERBACEOUS
- Asparagus (10 pack)
- Chives
- Cilantro
- Giant Solomon's Seal
- Good King Henry
- Lavender (6 plants)
- Lemon balm starts
- Oregano starts
- Ramps
- Rhubarb
- Rocket, Turkish
- Sage starts
- Sorrel
- Sunchoke
- Sweet Cicely
- Tarragon
- Thyme starts
- Yam, Chinese

### GROUNDCOVER / VINE
- Cucumber
- Grapes
- Groundnut
- Hops
- Pumpkin, small sugar (from seed)
- Strawberries, bare root, Fort Laramie – 10 pack
- Malabar spinach (also an edible)
- Montmorency cherries

### MEDICINALS
- Echinacea
- Comfrey (also used as a compost aid and mulch)

### ATTRACTANTS
- Butterfly Bush
- Clover for Cover Cropping – Territorial (from seed)
- Comfrey
- Lupine (from seed)
- Yarrow
- Hollyhocks

### ANNUALS
- Beet, Early Wonder Tall Tops (from seed)
- Broccoli, Umpqua (from seed)
- Cabbage
- Carrots
- Chard (from seed)
- Garlic
- Greens
- Mushrooms (growing process TBD)
- Onion
- Peas, snow – Oregon sugar pod (from seed)
- Peas, sugar snap
- Potato (from seed)
- Radish
- Squash, Crook Neck (from seed)
- Squash, Discus Bush Buttercup (from seed)
- Squash, One Ball (from seed.)
- Turnips
- Zucchini (from seed)
PERENNIAL GREENHOUSE PLANTS

TREES
- Avocado
- Banana
- Fig
- Paw Paw

SHRUBS
- Leaf gogi

HERBACEOUS
- Eggplant
- Goldenberry
- Sweet potato
- Welsh onion

GROUNDCOVER / VINE

TBD for indoor or outdoor – ALL SEEDS
Spinach (1 lb.)
Lettuce, Tom Thumb Butter Head (1 oz.)
Cilantro, 1/2 oz.
Basil, 1/2 oz.
Tomato, Glacier, 1/4 oz.
Cauliflower, Snow Crown, 1/2 oz.
Wildflowers, 1 lb.
Rocky Mountain Fescue (1 lb+)

ATTRACTANTS
- Echinacea (from seed)
- Lupine (from seed)

ANNUALS
- Greens
- Herbs (culinary)
- Peppers
- Potato (from seed)
- Radish
- Tomatoes

End of Summary