SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1.1 SUMMARY

A. Design Team shall provide documentation to assure that Builder conducts construction waste management and disposal in accordance with Owner requirement for LEED Silver Certification and in accordance with this Section.

B. Section includes administrative and procedural requirements for the following:

1. Construction Waste Management Plan.
2. Salvaging nonhazardous demolition and/or construction waste.
3. Recycling nonhazardous demolition and/or construction waste.
4. Disposing of nonhazardous demolition and/or construction waste.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Contractor: The term Contractor shall refer to the entity with a Contract with the Owner to perform the Work, whether that be the Construction Manager, Lead Contractor, or General Contractor.

C. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

D. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

E. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

F. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

G. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 QUALITY ASSURANCE

A. Waste Management Coordinator: Assure that Contractor engages a LEED Accredited Professional, certified by the USGBC, as the Waste Management Coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project. Waste Management Coordinator may also serve as LEED coordinator.

B. Refrigerant Recovery Technician Qualifications: Assure that Contractor engages a Certified by EPA-approved certification program.

C. Regulatory Requirements: Assure that Contractor complies with hauling and disposal regulations of authorities having jurisdiction.

D. Waste Management Conference: Contractor's Waste Management Coordinator shall conduct a conference at Project site prior to the start of any work, to review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss draft waste management plan including responsibilities of waste management coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.
6. Representatives from the University Office for Sustainability as well as the Design Team LEED Coordinator must be present at these conferences.

1.4 PERFORMANCE GOALS AND REQUIREMENTS

A. End-of-Project Salvage/Recycle Goal: The University desires to strive for exemplary performance of 95% of all demolition and/or construction waste to receive an innovation point/credit.

B. End-of-Project Salvage/Recycle Minimum Requirement: 75% of all demolition and/or construction waste.

1.5 ACTION SUBMITTALS

A. Draft Waste Management Plan: Assure that Contractor prepares and presents draft Waste Management Plan at Waste Management Conference for review and discussion.

B. Final Waste Management Plan: Assure that Contractor submit final Waste Management Plan within fourteen (14) days of the Waste Management Conference.

1.6 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, Contractor shall submit report. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste salvaged, both estimated and actual in tons.
5. Quantity of waste recycled, both estimated and actual in tons.
6. Total quantity of waste recovered (salvaged plus recycled) in tons.
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated

by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. LEED Submittal: LEED letter template for Credit MR 2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.

H. Qualification Data: For waste management coordinator and, if appropriate, refrigerant recovery technician.

I. Statement of Refrigerant Recovery, if included in the Work: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 WASTE MANAGEMENT PLAN

A. General: Develop a Waste Management Plan for both demolition and construction waste, according to the USGBC and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:

1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in hauling and tipping fees by donating materials.
7. Savings in hauling and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

E. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Documentation of each training class shall be submitted to Owner and the Architect's LEED Coordinator for record.
2. The status of this training shall be an agenda item at every Progress Meeting.

F. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1.8 SALVAGING NONHAZARDOUS CONSTRUCTION AND/OR DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale and/or Donation: Not permitted on Project site.

C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.

3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's on-campus storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

F. Plumbing Fixtures: Separate by type and size.

G. Lighting Fixtures: Separate lamps by type and protect from breakage.

H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

1.9 RECYCLING GENERAL OFFICE, NON-CONSTRUCTION WASTE

A. General: Recycle general office paper, plastic, metal, glass, and cardboard used by on-site workers.

1. Contractor may use Owner’s Recycling Center for this purpose.

1.10 RECYCLING AND DISPOSAL OF NONHAZARDOUS DEMOLITION AND/OR CONSTRUCTION WASTE

A. Recycling: Contractor shall engage the services of a Construction/Demolition Waste Recycling Company to:

1. provide dumpster(s) to the job for the use of all construction personnel;
2. remove and sort contents of dumpster(s) at their own, off-site, local facility, on a regular basis, recording and recycling/disposing of the contents of the dumpster(s);
3. recycle all waste that can be recycled and legally dispose of all waste that cannot be recycled, and;
4. submit their Recycling and Processing Records as well as their Landfill and Incinerator Records, demonstrating their efforts to meet or exceed the goals, to the Owner and Architect on a monthly basis.

END OF SECTION

SECTION 01 77 00 - CLOSEOUT PROCEDURES

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Definitions.

   a. Substantial Completion.
   b. Punch List.
   c. Final Completion.

2. Substantial Completion Procedures.

   a. Submittals Due.
   b. Procedures Due.
   c. Request for Punch List Inspection.

3. Final Completion Procedures.

   a. Correction of Punch List items.
   b. Re-Inspection.
   c. Final Application for Payment.

4. All submittals shall include one (1) digital format (PDF, unless specified otherwise) and two (2) hard copies.

1.2 DEFINITIONS

A. Substantial Completion: That point in time, as determined by the Owner and Design Team, that the Contract Work, or an agreed upon portion of the Contract Work, is found to be completed enough that the Owner may legally occupy the space of the Contract Work and use that space for the purpose for which it was intended. There must be only minor items left to be repaired or installed.

B. Punch List: A list of items to be completed or corrected before the Contract Work shall be considered Finally Complete.

C. Final Completion: That point in time, as determined by the Owner and Design Team, when all Punch List items have been resolved to the Owner's satisfaction and the Contract Work is found to be complete and all Contract requirements satisfied.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

A. Submittals Due: Prior to requesting a Punch List Inspection, Contractor shall prepare/obtain and submit the following items to the Owner, via the Architect.

1. Contractor's List of Incomplete Items: Contractor shall prepare a list of all remaining items to be completed and corrected, indicating the value of each item on the list and reasons why the Work is incomplete.

2. Certificates of Release: Contractor shall obtain and submit all releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Such releases shall include but are not limited to:

    a. Occupancy Permits.
    b. Operating Certificates.

3. Closeout Submittals: Contractor shall obtain and submit all closeout submittals indicated throughout the Contract Documents. Such submittals shall include but are not limited to:

    a. Project (Contractor, Subcontractors and Suppliers) Directory.
    b. Project Record Documents.
    c. Operation and Maintenance Data.
    d. Damage or Settlement Surveys.
    e. Property Surveys.
    f. Warranties.
    g. Workmanship Bonds.
    h. Maintenance Service Agreements
    i. Maintenance material specified in individual Sections, including but not limited to:

        1) Tools.
        2) Spare Parts.
        3) Extra materials.

4. Tests/Adjust/Balance Records: Contractor shall obtain and submit all test/adjust/balance records.
5. Sustainable Design Submittals: Contractor shall obtain and submit all sustainable design submittals required in Division 01 Sections as well as individual Sections throughout the Specification.
6. Changeover Information: Contractor shall obtain and submit all changeover information related to Owner's occupancy, use, operation, and maintenance.

B. Procedures Due: Prior to requesting a Punch List Inspection, Contractor shall complete the following procedures and submit written evidence to the Owner, via the Architect, verifying that each procedure has been completed or satisfied.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups,

construction tools, and similar elements.

9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

C. Request for Punch List Inspection: After the above items and procedures have been completed, submitted, and accepted by the Owner, Contractor shall submit a written request to the Architect for a Punch List Inspection to determine if the Contract Work is Substantially Complete.

1. Upon receipt of this written request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements that, in their opinion, indicate that the Punch List Inspection would be premature.
2. If the Architect proceeds with the inspection, they will prepare a Punch List of minor items that are unacceptable, incomplete or missing. They will also prepare a Certificate of Substantial Completion indicating that they found the Contract Work to be Substantially Complete with the exception of the minor items contained in the Punch List.

1.4 FINAL COMPLETION PROCEDURES

A. Correction of Punch List items: Contractor shall correct or complete all Punch List items, to the satisfaction of the Owner, within thirty (30) days of the date of Substantial Completion, unless otherwise agreed to in writing by the Owner.

B. Re-inspection: When the Contractor has corrected or completed all the Punch List items, they shall submit a written request to the Architect for a re-inspection of the Punch List items to verify that the Contract Work is Finally Complete.

1. Upon receipt of this written request, Architect will either proceed with re-inspection or notify Contractor of unfulfilled requirements that, in their opinion, indicate that the re-inspection would be premature.
2. If the Architect verifies that all Punch List items have been corrected or completed, they shall notify the Owner and Contractor in writing of their finding and declare the Contract Work Finally Complete.

C. Final Application for Payment: If the Architect's re-inspection indicates that the Contract Work has been found to be Finally Complete, then the Contractor may submit their Final Application for Payment.

END OF SECTION

SECTION 01 81 10 – HIGH PERFORMANCE BUILDING STANDARDS

1.1 SUMMARY

A. In March of 2007, Case Western Reserve University established the following set of High Performance Building Standards. The Architect or Engineer in Responsible Charge shall assure, to the greatest extent practical, that these ideals are goals and strategies are incorporated into the design and construction of all New Construction and Major Renovation Projects on this Campus.

B. Unless directed otherwise in writing, all renovation and new construction on this Campus shall be designed to achieve USGBC LEED Silver.

1.2 SITE DEVELOPMENT

A. Site Development Goals:

1. Build near existing public utilities and street infrastructure; avoid building in environmentally sensitive areas such as wetlands or animal habitats.
2. Maintain or restore the ecology of the site.
3. Respond to the microclimate such as solar and wind orientation, to improve energy efficiency and comfort.

B. Site Development Strategies:

1. Build on sites with existing municipal services.

   a. Reuse existing, available and appropriate urban and industrial in-fill sites instead of building on environmentally sensitive areas or green spaces.

      1) Build on land that was previously built upon and attached to municipal services.
      2) Build on land that was not previously built upon but is or was attached to municipal services.

2. Maintain and enhance the biodiversity and ecology of sites.

   a. Assure that development enhances the existing biodiversity and ecology of the site by strengthening the existing natural site systems and making connections to the surrounding site context.

      1) Select a site were the development process will cause minimum alteration and ecological disturbance.
      2) Design the site to reconnect fragmented landscapes and establish contiguous networks with other natural systems both within the site and beyond its boundaries.
      3) Avoid major alterations to significant and/or sensitive topography, vegetation, riparian corridor, and wildlife habitat.
      4) Preserve ecologically significant and/or sensitive topography, vegetation, riparian corridor, and wildlife habitat.

5) Minimize the area of the site dedicated to the building, parking, and access roads.
6) Increase the size of usable open space on-site, compared to previous site use.
7) Develop the site to create traffic patterns that cause minimum site disruptions.
8) Site the building(s) to create minimal impact on the natural ecology of the site.

3. Use microclimate and environmentally responsive site design strategies.

   a. Develop the site and site elements to optimize site-specific microclimate conditions such as solar and wind.

      1) Locate trees and shrubs to support passive heating and cooling in outdoor spaces and buildings, and to create seasonally appropriate heat sinks and natural ventilation corridors.
      2) Locate site features such as walks, plazas, patios, etc. to take advantage of seasonal sun angles, solar access, and solar orientation.
      3) Locate site elements at the appropriate elevation to maximize heating and cooling benefits, reduce erosion, ensure drainage, and to make pedestrian/vehicular movements safe and coherent.
      4) Design the overall site to reduce the "heat island" effect. Provide shade on at least 30% of the non-roof impervious surfaces on the site such as parking, walkways, plazas, etc., use light colored high-albedo materials with at least 30% reflectance, use high-reflectance roofing, and/or consider other related alternatives.
      5) Design site lighting to eliminate light trespass from building and site and to minimize impact on nocturnal environments, while always maintaining campus safety.
      6) Orient buildings to attain maximum interior benefit of daylight.

4. Use native trees, shrubs, and plants.

   a. Develop site with native, climatically appropriate, vegetation to conserve water, reduce pesticide use, reduce plant mortality, and lower operational maintenance costs.

      1) By species, assure that a minimum of 75% of all species planted on the site are Mediterranean Type (low irrigation plants) or native plants.
      2) By quantity, assure that a minimum of 75% of all trees and shrubs are native materials.
      3) Develop an integrated pest management system to be used to reduce the need for chemical pest control and to reduce site toxicity.

5. Develop the site to encourage the use of resource efficient modes of transportation.

   a. Assure that alternative forms of transportation to the automobile are included in the design of the site to discourage dependence on the automobile, reduce the amount of pavement impacting natural systems, and to allow for more ecologically responsive approaches to the site.

      1) When possible, site building(s) within 1/4 mile of bus stops or light rail stations, and within 1/4 mile of retail and public services.

2) Provide carpool parking to encourage its use by occupants. Carpool parking, pick-up areas, and covered waiting spaces shall be clearly marked and within close proximity of the building entrance. Work with Campus Services and Parking.

1.3 WATER MANAGEMENT

A. Water Management Goals:

1. Preserve site watersheds and groundwater aquifers.
2. Conserve and re-use storm water.
3. Maintain appropriate levels of water quality on the site and in the building(s).
4. Reduce potable water consumption.
5. Reduce off-site treatment of waste water.

B. Water Management Strategies:

1. Manage site storm water

a. Select a site that will require minimum alterations and ecological impacts to the watershed.
b. Develop design strategies that minimize disturbances to the watershed.
c. Use biologically based storm water management features such as swales; sediment control ponds, pools, and wetlands along drainage courses; and infiltration basins to retain and treat storm water on site.
d. Retain and/or maximize pervious and vegetated areas of the site.
e. Minimize hardscapes and use permeable paving and surface materials to maximize site water absorption.
f. Design pavements and locate them in such a manner as to reduce storm water velocity between pavements and to facilitate water infiltration into the soil.
g. Capture rainwater from impervious areas of the building for groundwater recharge.

2. Minimize irrigation and specialty-water use.

a. Try to eliminate the need for irrigation through selection of drought resistant plant species and/or use systems that maximize efficient use of water in the landscape.
b. If irrigation cannot be eliminated, apply options below that are appropriate to the project:

1) Specify irrigation systems and vegetation that minimizes water consumption such as drip irrigation, and systems with moisture sensor controls and weather data based controls.
2) Use cisterns to collect rainwater for irrigation purposes.
3) Use rainwater for non-potable water uses such as irrigation, toilets, vehicle washing, sewage transport, HVAC/process make-up water, etc.
4) Use re-circulating water in fountains and water displays.

3. Control erosion.

a. Prevent soil erosion before, during, and after construction by controlling storm water runoff and wind erosion. Consider silt fencing, sediment traps, construction phasing, stabilization of slopes, and maintain and enhancing vegetation and groundcover.

b. Protect hillsides using adequate erosion control measures such as hydroseeding, erosion control blankets, and/or sedimentation ponds to collect runoff.

4. Conserve building water consumption.

a. Design strategies and systems to exceed the building water conservation requirements of the *Energy Policy Act (EPACT) of 1992* (not including irrigation).

1) Use low flow or dual flush toilets. EPACT requirement is 1.5 gallons per flush (gpf) maximum.
2) Use lavatory faucets with flow restrictors for a maximum rate of 0.5 gallons per minute (gpm), or use metering faucets at 0.25 gallons per cycle.
3) Use infrared faucet and flush valve sensors.
4) Use domestic dishwashers that use 10 gallons per cycle or less.
5) Use commercial dishwashers (conveyor type) that use 120 gallons per hour or less.
6) Use low flow showerheads.
7) Use low flow kitchen faucets.
8) Do not use waterless urinals.

5. Conserve cooling tower water consumption.

a. Select cooling tower systems that maximize water conservation (i.e. automated blowdown systems, conductivity probes, deduct water meters, and delimiters to reduce drift and evaporation).

1) Orient HVAC equipment to permit capture of condensate from AHUs to be pumped into cooling tower sumps as make up water. Where possible, use gravity piping systems.
2) Design piping systems to return condensate from AHUs to cooling towers as make up water. Where possible, use gravity piping.

1.4 ENERGY MANAGEMENT

A. Energy Management Goals:

1. Reduce total energy consumption of buildings.
2. Reduce air pollution, contributions to global warming, and ozone depletion impacts of energy sources.
3. Reduce depletion of fossil fuels reserves.

B. Energy Management Strategies:

1. Reduce building energy loads.

a. Optimize building placement and configuration for energy performance.

1) Place, orient, and configure the building on the site to minimize energy use by means of daylighting, solar heating, natural ventilation, and shading from vegetation or other buildings.
2) Place, orient, and configure the building on the site to optimize passive solar opportunities for heating, cooling, and daylighting.

a) Maximize opportunities for daylighting and desired solar heat gain.
b) Maximize passive solar gains and/or control unwanted solar heat gain (including the use of existing vegetation, land forms, and buildings to provide shading).
c) Minimize thermal losses due to wind-driven infiltration.
d) Maximize opportunities for natural ventilation.

b. Optimize building envelope thermal performance.

1) Reduce heating and cooling energy consumption by heat losses or heat gains through the building envelope. Ensure the integrity of the building envelope to provide thermal comfort and prevent condensation.

a) Size openings, select glazing, and utilize shading devices (interior or exterior) to optimize daylighting and glare control while minimizing unwanted heat loss and heat gain. Glazing with a high Visible Transmittance (VT) is desirable for daylighting.
b) Solar Heat Gain Coefficient (SHGC) and Shading Coefficients (SC) requirements depend on desire for maximizing passive solar heating (higher SHGC) or minimizing heat gain (lower SHGC).
c) Install glazing with a low U-Factor to minimize energy use and optimize HVAC equipment requirements.
d) Optimize insulation amounts to reduce heating and cooling energy consumption by heat losses or heat gains through opaque portions of the building envelope.
e) Moderate interior temperature extremes by using thermal mass where appropriate.
f) Ensure the integrity of the building envelope to provide thermal comfort and prevent condensation.
g) Use best air/vapor barrier practices and avoid thermal bridging.
h) Install roofing technologies which have high albedo levels to reduce "heat island" effect, or vegetative materials to maximize cooling, absorb rainwater, and sequester CO2.

c. Provide daylighting integrated with electric lighting controls

1) Design building to maximize daylighting. Assure that daylighting is designed in coordination with the electric lighting system to reduce energy consumption while maintaining desired lighting characteristics.

a) Shape the architectural plan and section and use appropriate strategies to maximize the amount of useful, controlled daylight that penetrates into occupied spaces (roof monitors, clerestory windows, atriums, and courtyards).
b) Use shading devices such as overhangs on south elevations, vertical fins on east and west elevations, and/or vegetation to let in natural light but reduce glare and overheating.
c) Use light shelves combined with higher, more reflective ceilings, to bring natural light deeper into perimeter spaces and control glare and excessive contrast.
d) Use daylight sensors that adjust electric lighting in response to available daylight.

2. Design efficient systems.

a. Provide efficient electric lighting systems and controls.

1) Minimize electric lighting energy use while still meeting project requirements and improving visual quality. The electric lighting systems and components are designed for optimum efficiency and human comfort.

a) Use high efficiency lamps and luminaires with electronic ballasts.
b) Install controls to reduce energy consumption of lighting system (e.g. dimmers, occupancy sensors, photocells, energy management system, and time clocks).
c) Use low levels of ambient light with task lighting where appropriate. Direct/indirect lighting fixtures illuminate ceilings and walls producing low level ambient light that minimizes glare in workplaces.
d) Lighting power density levels shall conform to current ASHRAE Standard 90.1.

b. Maximize mechanical systems performance.

1) Design the building mechanical systems to minimize energy usage while maintaining standards for indoor air quality and occupant comfort.

a) Design boilers and chillers using high efficiency equipment, multiple modular boilers (to allow more efficient partial-load operation), and high efficiency condensing boilers.
b) Modulate ventilation air according to occupancy, activities, and operations.
c) Zone the building to use separate air handling units for areas with different hours of occupancy and loads. Use occupancy sensors or other demand ventilation technologies and variable-air-volume distribution systems to minimize unnecessary heating and cooling.
d) Use heat recovery systems, thermal storage (ice or water to reduce peak loads), and desiccant dehumidification to reduce heating and cooling energy use.
e) Install glycol based “closed loop” cooling systems for all process cooling loads. These systems should be designed to facilitate free cooling in the winter months and be tied to campus central chilled water in the summer months.
f) Use high efficiency motors and variable speed drives in the mechanical system equipment.
g) Use zero CFC-based refrigerants in HVAC and refrigeration equipment. Complete a comprehensive CFC phase out conversion.

c. Use efficient equipment and appliances.

1) Design and/or select all building equipment and appliances to minimize energy usage.

a) Select equipment with high efficiency motors and variable speed drives.
b) Select equipment and appliances that meet Energy Star criteria.
c) Install steam and water converters to heat and supply service water to building.

3. Use energy sources with low environmental impact.

a. When possible, use renewable or other alternative energy sources.

1) Consider the application of renewable energy sources such as photovoltaic panels, wind turbines, fuel cells, and geothermal energy to minimize environmental impacts of burning fossil fuels such as air pollution and global warming.

a) Where feasible, supply 10% - 30% of the building's total energy load through building-integrated or utility provided renewable or other low impact energy systems.

4. Simulate "Total Building Energy Use."

a. Integrate all systems and reduce total building energy use.

1) Reduce total energy consumption of building by using computer simulations and analysis of total performance with integrated systems. A building energy analysis is conducted to evaluate and optimize the building energy performance.

a) Building energy consumption should meet or exceed the requirements of current, applicable ASHRAE Standards.

1.5 INTERIOR ENVIRONMENT QUALITY

A. Interior Environment Quality Goals:

1. Design/Engineer environments that enhance human comfort, well-being, performance, and productivity.
2. Minimize production and transmission of air pollution.
3. Provide the full range of supportive sensory conditions, olfactory, thermal, vibroacoustic, tactual, and visual for occupants.
4. Provide appropriate operational control of systems to occupants.

B. Interior Environment Quality Strategies:

1. Provide good indoor air quality.

a. Provide for a clean and healthy environment.

1) Provide good indoor air quality by minimizing and controlling air pollution from the site and surroundings.

a) Minimize air pollution from the building site by analyzing and/or testing to identify potential sources of air pollution using current, applicable ASHRAE Standards.
b) Work with the Owner to eliminate as many pollutant-generating activities from the building as feasible. If they must occur within the building, they should be zoned to an isolated area of the building having a separate ventilation system. Use low VOC emitting materials.
c) Clean the air with filtration systems that meet or exceed the efficiency ratings of the current, applicable ASHRAE Standards.

b. Control moisture to prevent microbial contamination.

1) Provide good indoor air quality by controlling moisture and microbial contamination. Where moisture precautions are needed, materials should be specified to discourage microbial growth. Mechanical systems shall be designed in compliance with current, applicable ASHRAE Standards and recommendations for prevention of standing water. Where a cooling tower has been used it shall be designed in compliance with current recommendations and specifications for the prevention of Legionnaires Disease.

c. Provide proper ventilation for pollutant control and thermal comfort.

1) Design mechanical systems to provide proper ventilation to maintain indoor air quality free from particulates, VOCs, and fumes.

a) Design and engineer ventilation systems to comply with current, applicable ASHRAE Standards for Ventilation for Acceptable Indoor Air Quality.
b) Design and engineer carbon dioxide detectors to be used to assess air quality and air ventilation rates.
c) Design and engineer air intakes to be separated from pollution sources with an adequate separation distance to minimize risk of capture of contaminated air.
d) Design and engineer ducted return air systems within the building.
e) Do not design or engineer internal duct insulation.

2. Provide for quality human comfort.

a. Provide appropriate thermal conditioning.

1) Create a healthy, comfortable, supportive and flexibly controllable thermal environment for the users.

a) Design and engineer mechanical systems to comply with current ASHRAE Standard 55, *Thermal Environmental Conditions for Human Occupancy*.
b) Assure that the thermal design addresses environmental and seasonal considerations for dry bulb temperature and radiant temperature profile, relative humidity, and occupants' activities and mode of dress.

b. Provide effective electric lighting.

1) Assure visual performance and comfort for occupants by providing light levels and control of those levels in the most energy efficient manner.

a) Employ design strategies and features to assure that the Illuminance Levels and Luminance Ratios are appropriate for the users, activities, and tasks. The Illuminating Engineering Society of North America (IESNA) Recommended that Illuminance Categories and Weighting Levels be used to determine appropriate illuminance levels for different users, activities, and tasks.

b) Employ design strategies and features to assure that color temperature, color rendering, and modeling of light are appropriate for the users, activities, and tasks.
c) Employ design strategies and features (e.g. selection of lighting fixtures, installations, and controls) to avoid glare and veiling reflections and render the environment in ways that support the program, user purposes, and preferences.

c. Provide appropriate building acoustical and vibration conditions.

1) Provide an interior environment with acoustic and vibration qualities that are healthy and functionally supportive of the user and programmed activities of the building.

a) Employ design features and strategies to control sources of externally and internally induced vibrations from wind loads, passing traffic, interior foot traffic, building HVAC systems, and interior machinery.
b) Employ design features and strategies to control sources of noise from mechanical and electrical equipment and from sources exterior to the building. Develop wall and partition assemblies with appropriate Sound Transmission Class (STC) ratings based on the conditions of the site, building program, and activities. Address noise elimination, control, or isolation from equipment through acoustic zoning, equipment selection, construction, and appropriately designed ducts, piping, and electrical systems.
c) Employ design features and strategies to create appropriate sound reverberation levels, background sound levels, sound rendition, and speech interference levels so as to produce the proper "soundscape" for the building program and expected variations in user activities.
d) Design interior spaces to minimize room to room sound transmission through walls, partitions, ceilings, borrowed lites, and doors.

d. Provide views, view spaces, and connection to the natural environment.

1) Provide access to windows and natural views to assure a high level of visual and psychological comfort; enhance occupant wellbeing; and improve human performance and satisfaction with the built environment.

a) Employ design strategies to provide windows, skylights, and/or clerestories for outside view access from all work areas or regularly occupied spaces or to provide contact with patterns and textures of the natural world through interior recreations (e.g. atria, plazas, gardens, courtyards, plantings, and similarly restorative interior design treatments).
b) Employ design strategies to create connected interior and exterior view spaces which provide the proper combinations of spaciousness, privacy, personal security, visual access to routes and settings within and to the outside of the building.

1.6 PRODUCT AND MATERIAL SELECTION

A. Product and Material Selection Goals:

1. Minimize consumption and depletion of non-renewable material resources.
2. Maximize the use of recycled, renewable, and re-used materials.
3. Minimize the life cycle impact of materials on the environment.
4. Minimize the impact of materials on indoor environment quality.

B. Product and Material Selection Strategies:

1. Manage the extraction of raw materials.

   a. Select new products and materials with low environmental impact during their life cycle.

      1) Select building products and materials manufactured with a low environmental impact during their life cycle. The phases of the life cycle are: Raw Material Extraction, Production, Distribution, Installation, Use and Maintenance, and Eventual Reuse or Recycling. Low environmental impact refers to reducing greenhouse gas and toxic air emissions, water pollutants, and minimizing waste in each phase.

         a) Materials shall be evaluated using a life-cycle methodology (such as Athena or BEES assessment tools) focusing on those used in large quantities or with significant negative environmental impact.

2. Manage the production of products and materials.

   a. Select salvaged and remanufactured products and materials where appropriate.

      1) Conserve the embodied energy of salvaged products and materials (such as floor tile, granite, marble, brick, timber, windows, doors, door frames, bathroom accessories, toilet partitions, sinks, lavatories, cabinets, furniture, and hardware) instead of consuming natural resources to manufacture new materials. Use remanufactured products and materials in order to extend the life of an existing product and reduce the amount of raw materials required on the project.

         a) Salvaged Products and Materials: For new construction, 10% of total products and materials used are made up of salvaged building products and materials. For renovations, 10% of total products and materials used are made up of existing building products and materials or salvaged products and materials from an off-site source.
         b) Remanufactured Products and Materials: For new construction, 10% of total products and materials used are remanufactured building products and materials. For renovations, 10% of products and materials used are made up of existing building products and materials, or remanufactured products and materials from an off-site source.

   b. Select recycled content products and materials where appropriate.

      1) Use products and materials with a recycled content instead of those manufactured using virgin materials.

a) 50% of total products and materials used contain at least 10% post-consumer recycled content or a minimum of 50% post-industrial recycled content.

c. Select products and materials made from renewable sources where appropriate.

1) Use products and materials made from renewable resources, especially those that are agriculturally based. Avoid building materials manufactured from raw materials that are scarce or finite, which include concrete, steel, and petroleum-based materials.

a) 10% of products and materials are from renewable raw sources (e.g. certified wood, wheat, cotton, cork, bamboo, etc.).

3. Manage the distribution of products and materials.

a. Select locally manufactured products and materials where appropriate.

1) Use products and materials manufactured locally to save energy and resources in the transportation of those products and materials as well as the installation of those products and materials. This goal includes locally supplied or manufactured products and materials that are supported by local installers and reuse or recycling programs.

a) 25% of the products and materials are manufactured withing 500 miles of the Project site.

4. Manage the installation of products and materials.

a. Select low VOC emitting products and materials.

1) Select products that have minimal chemical emissions and emit low or no volatile organic compounds (VOCs) and install materials with minimal VOC producing compounds or no-VOC mechanical attachment methods to contribute to good indoor air quality during building operations.

a) At a minimum, all adhesives and sealants must meet VOC limits of the current Ohio EPA.
b) At a minimum, all paints, coatings, carpet, and furniture systems must meet the requirements of State of Washington Department of General Administration Indoor Air Quality "Compliance Table."
c) Carpet must conform to the current Carpet and Rug Institute and EPA VOC emission rate of 0.5 milligrams per square meter per hour.
d) Material Safety Data Sheets (MSDS) for all materials contributing significantly to indoor air quality are submitted.

2) Select materials from manufacturers who have reduced toxicity emissions at their manufacturing plants and whose products do not contain toxic compounds and ingredients.

5. Select durable products and materials.

a. Conserve natural resources by specifying materials that are durable and long lasting instead of those that need to be replaced frequently which consumes additional natural resources.

1) 50% of total products and materials are durable with a life cycle of at least 50 years.
2) Design interior surfaces that do not require repetitive maintenance (over and above routine cleaning) such as painting, stripping, or refinishing. Examples include but are not limited to glass, masonry, ceramic, or metal.

6. Select products and materials that are reusable, recyclable, or biodegradable.

a. Select products and materials that are reusable, recyclable, and biodegradable materials to reduce the consumption of natural resources and decrease the landfilling of building materials. Reusable, recyclable, and biodegradable materials are used to conserve energy and reduce the consumption of natural resources.

1) 30-60% of total materials are reusable, recyclable, or biodegradable.

1.7 WASTE MANAGEMENT

A. Waste Management Goals:

1. Minimize waste of resources.
2. Minimize waste generated from construction, renovation, and demolition of buildings.
3. Minimize waste generated during building occupancy.
4. Direct better waste management.

B. Waste Management Strategies:

1. Design to conserve resources.

a. Reuse existing buildings where appropriate.

1) Conserve the existing building's embodied energy by reusing existing buildings where appropriate.

b. Design for less material use.

1) Reduce the consumption of natural resources by designing materials efficient structural systems, avoiding materials which serve no functional purpose, or are sized inefficiently.

a) Employ design strategies to use less materials, including reducing the size of the building and spaces; eliminating unnecessary structural, architectural, and finish materials; using modular and standard dimensioning; and using strategies that decrease waste during construction.

c. Design building(s) for adaptability.

1) Design the building to accommodate modifications and upgrades that will satisfy changing programmatic, spatial, and infrastructure needs, and to facilitate flexible occupation throughout the life of the building. Interior or exterior design options are incorporated into the project to facilitate building adaptability.

    a) Consider site planning and building configuration to accommodate future additions and alterations.
    b) Plan for maximum standardization or repetition of building elements and details to increase the ease of adapting the structure for future alterations and upgrades.
    c) Design cladding to accommodate future alterations and upgrades such as shading devices, more efficient glazing, and lighting controls.
    d) Design cladding systems that are fixed by snap release connectors, friction, or other joints that do not require sealants. Use joints and connections that facilitate adaptability, including bolts, screws, and clips.
    e) Consider spatial configurations, floor deck, structure, mechanical, and ceiling options to facilitate adaptability (13-14 feet maximum is common).
    f) Provide a plenum space between the ceiling to floor level for structure, sprinklers, supply and return ductwork, lighting fixtures, and ceiling system, allowing the space to be more easily altered.
    g) Provide a raised floor systems for power and telecommunications wiring to accommodate reconfiguration of spaces and information technology support.
    h) Provide modular space planning and partitions.

d. Design building(s) for disassembly.

1) Design the building to use components, assemblages, and systems to facilitate disassembly for reuse (i.e. fixtures, hollow metal frames, trusses, casework, etc.), salvage (i.e. timber frame, carpet, countertops), or recycling (i.e. metals, glass, concrete materials). Interior or exterior design options are incorporated into the project to facilitate building disassembly.

    a) Provide structural systems, cladding systems, and non-load bearing partition systems that facilitate disassembly.
    b) Provide structure/shell systems that maintain integrity when demounted or disassembled (i.e. steel, glass, or concrete and panel claddings).
    c) Select products, materials, systems, and components that can be recycled or reused in whole or in part.
    d) Select products, materials, systems, and components that are durable, weather well, and last more than one building lifetime (including masonry, steel, glass, and some timer products such as beams, columns, floorboards, etc.).
    e) Select products, materials, systems, and components that can be assembled or fastened in a manner that facilitates reassembly into new construction or remodeling.
    f) Select snap release connectors, friction, or other joints which do not require sealants.
    g) Select joints and connections that facilitate disassembly, including bolts, screws, and clips.

h) Select homogeneous materials rather than composite materials, as they are easier to separate and recycle. Avoid materials that are composites such as reinforced plastics and carpet fibers and backing which are generally more difficult to recycle than homogeneous materials.
i) Select modular systems and materials to facilitate deconstruction and reuse of building materials.
j) Consider labeling building materials with identification information to facilitate recycling.

2. Include waste management directions.

a. Provide for the salvaging and recycling of demolition waste.

1) Conserve resources by salvaging building materials (brick, wood flooring, windows, doors, cabinets, plumbing fixtures, lighting fixtures, mechanical and electrical equipment, ductwork, framing lumber, hardware, wiring, piping, and other materials) for reuse on-site or resale. The goal is also to recycle or divert from landfill demolition waste such as metals, wood, or carpet.

a) 50% by volume of demolition waste is diverted from landfill through salvage, recycling and/or recovery.

b. Provide for the salvaging and recycling of construction waste.

1) Conserve resources and save money by recycling construction waste (including metals, wood, concrete, and cardboard).

a) 50% by volume of waste from construction is diverted from landfills through recycling and/or recovery.

c. Provide for the reduction and recycling of packaging waste.

1) Reduce and recycle construction packaging waste and encourage manufacturers to ship their products using reusable, recyclable, returnable, or recycled content packaging.

a) 50% of all packaging material, by weight, is reused or returned to suppliers or manufacturers.

d. Provide for the reduction and recycling of waste from building users.

1) Reduce water production and encourage recycling of waste from building users (e.g. white and mixed paper, aluminum cans, plastic, glass, corrugated cardboard, and organic food waste).

a) Dedicated recycling facilities are provided for processing of aluminum, glass, plastic, white and mixed paper and cardboard.
b) Design infrastructure to process waste streams efficiently.

END OF SECTION

SECTION 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS

1.1 SUMMARY

A. Case Western Reserve University has established a requirement that all new Construction and Major Renovations shall be LEED Silver Certified, unless directed otherwise in writing.

B. Design Team shall design the Project in accordance will all applicable sustainability guidelines so that this LEED Silver Certification can be achieved.

C. Design Team shall prepare appropriate Contract Documents and provide appropriate direction to the Builder so that this LEED Silver Certification is achieved.

D. The University has used the USGBC LEED Checklist to prepare a University Master LEED Checklist, indicating the sustainability items that are important to them and that they have had success with in the past. A copy of that Checklist is included herein as Attachment 01 81 13.01. The Design Team shall use this University Master LEED Checklist as a guide, both in their design considerations and in completing the actual USGBC LEED Checklist for submittal to the USGBC for LEED Silver Certification.

E. The Design Team shall develop the building envelope and mechanical systems such that the final facility exceeds the current ASHRAE 90.1 requirements by at least 30%.

F. Design Team shall include in their Contract Documents, general requirements and procedures for compliance with USGBC LEED prerequisites and credits needed for Project to obtain LEED Silver certification based on USGBC's "LEED 2009 for New Construction and Major Renovations."

1.2 SUBMITTALS

A. LEED Checklist / Scoresheet: Design Team shall register the Project with the USGBC and complete a LEED Checklist / Scoresheet demonstrating strategies for achieving LEED Silver Certification.

1. This LEED Checklist / Scoresheet shall be submitted for Owner review and comment, with the 100% Design Development Documents.

1.3 QUALITY ASSURANCE

A. LEED Coordinator: Design Team shall engage an experienced LEED-Accredited Professional to act as the LEED Coordinator for this Project.

1.4 COMMISSIONING AGENT

A. The Owner will engage the services of an independent Commissioning Agent (CxA). This CxA shall be notified of the Project Kick-Off Meeting, and all Design Review Meetings so that they may be in attendance.

B. The Owner may choose to go for Basic Commissioning or Enhanced Commissioning.

END OF SECTION