Baselines:

Required for

1. Fundamental building commissioning
2. Water use reduction
3. Optimize energy performance
4. Basis Of Design (BOD) – development of BOD
5. Focus of BOD: Validating systems energy and environmental performance
6. Comparison of installation and performance of commissioned systems

- **WE**
- Identify what are base levels for comparison to obtain LEED points
- WE 3.1 and 3.2 for plumbing fixture/water consumption based on Energy Policy ACT 1992
- 20% -→ ---- 30% to 40% EP
- Water closets were 5 gpf to 3.5 gpf to 1.6 gpf (1992) to 1.28 gpf (1.6 * (1-0.2)), and 1.0 gpf (1.60 (1-0.3)).
- **EA**
- Prerequisites 2: Minimum energy level based on Appendix G of ASHRAE 90.1 (Same as EA1)
- EA6 Green Power based on DOE- CBECS
-
- **FTE: Full Time Equivalent**
- WE3.1 and WE3.2 and WE 3 EP Water use reduction
- SSC4 Alternative Transportation:
  - 4.2 Bicycle storage and changing room
  - 4.3 Low Emission and fuel-efficient vehicle
  - 4.4 Parking capacity
- **Area**
- MR 1 Building Reuse 1.1 (75%), 1.2(95%): Structural, 1.3(50% interior)
- **Volume or Weight**
- MR 2 Construction Waste 2.1 (50%), 2.2 (75%), EP (95%)
- **Cost**
- Material Resources
  - 3 Reuse 3.1 (5%), 3.2 (10%), EP (15%)….. 5% increment
  - 4 Recycled 4.1 (10%), 4.2 (20%), EP (30%) …10%
  - 5 Regional 5.1 (10%), 5.2 (20%), EP (40%) …10% & 20%
  - 6 Rapidly Renewed 2.5%, EP (5%) … 2.5%
  - 7 Certified Wood 50%, EP (95%)

LEED AP:

To register a project: Name, Company, Description of Role, Copy of Certificate
You do not need a LEED AP for any project, however based on IDC2, you get one LEED point.

LEED AP Function/Task:
" LEED AP to coordinate and integrate decision making processes of design team"
Documentation, registration, advocate of USGBC, resolving dispute by all parties

- Leed AP is involved in very late stage of project will be very inefficient.
- What is strategy:
  - Get sooner than later: sustainable design process and consideration of LEED goals and objectives
  - Provide fostering and facilitating collaboration, interdisciplinary communication
  - Depart from existing segregating and serial process
  - Delegate all responsibility to each LEED sub team addressing credits
  - Provide final submittal goals and efforts

- What type of Leed certification and building rating: CS, NC, CI, EB
- An old 49 years old office HVACs due to high repair or bad efficiencies. If firm decides to implement green policies. What application policy and track to be used? Just HVACs system. Not a single floor of a building is not equal to EB.
- If renovation is major and lighting also involved, one may alter the selection to NC.
- CI: commercial interior: An Existing tenant occupied by one business and reoccupied by another (even if type of use ids different).
- CS: Core and Shell covers base building elements such as structure, envelope, and HVAC systems.
- NC: New construction or major hvac systems significant envelope modifications, and major interior rehabilitation, not minimal HVAC to major remodel.

Communications With LEED
- Communication with LEED certification manager:
  - US Mail or Express Mail services
- Registration – Online
- CIR – Online
- Registration provides with (after welcome packet)
  - 2 CIR free
  - Access to LEED letter template
  - Establishment of USGBC & designated project contract "Project Administrator"
  - LEED rating system
    - (downloads) project certification process PDF, Individual Accreditation process

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LEED Benefits:

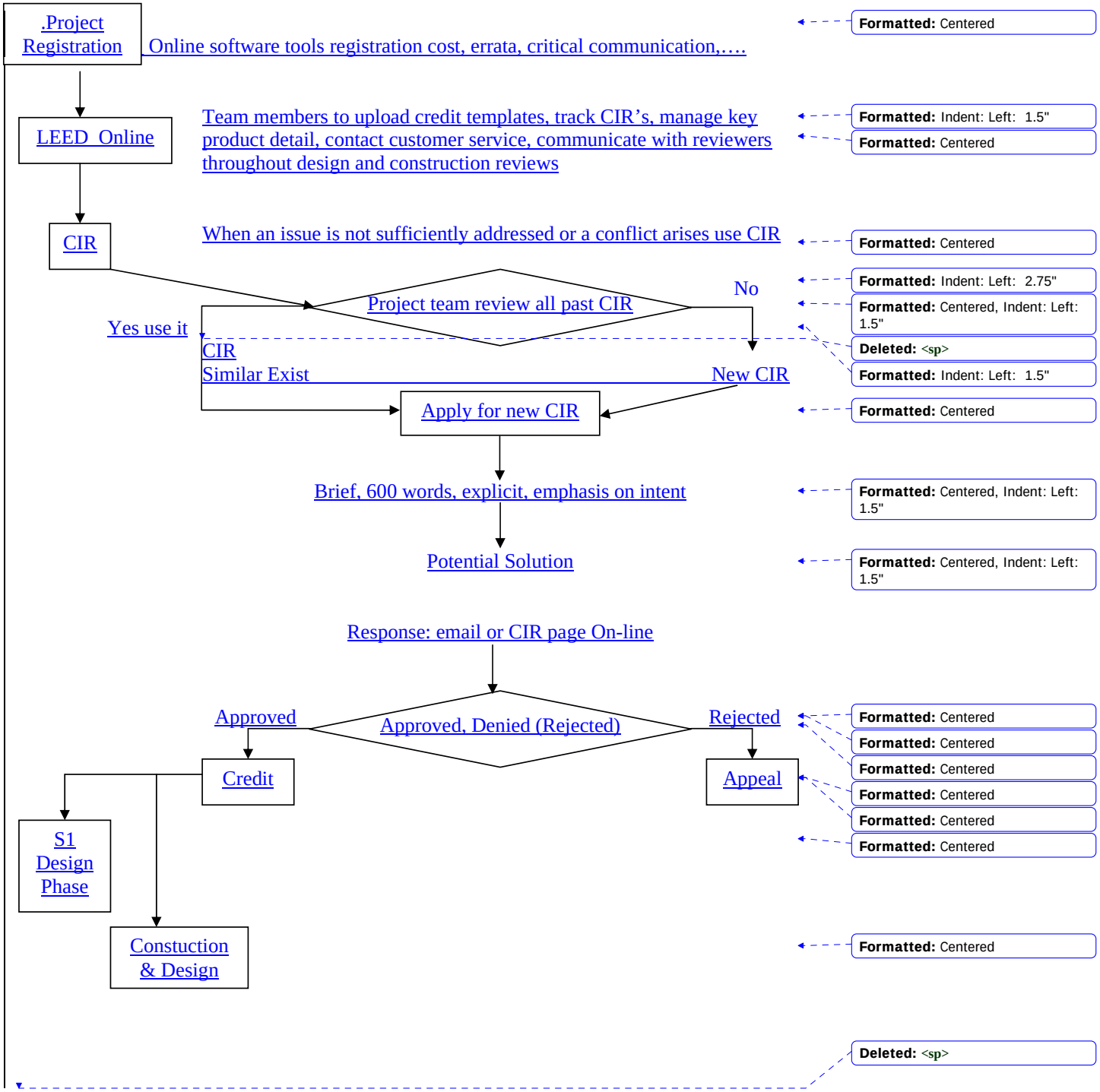
- Stabilize and reduce insurance claims
- Change building to green application
- Educate building owners and occupants on "green" applications (i.e. recycling, …) Building was evaluated by third party and evaluates building performance against a known rating system

Process:

- Questions: "To obtain Leed Certificate, … needs to successfully:"
- First question is who does it and how many ways can the response vary and still be fine? Most common response
  - Register with USGBC
  - Pay fees
  - Gather all data to meet prerequisites
  - Gather all data to meet minimum of 26 out of 69 available
- What is the action before beginning LEED?
  - Project administrator must add to insure that there is a valid Leed project.
- Once registered: Team obtains "LEED Welcome Project"
- The Process is:
  - LEED Online is designed to permit project administrators and team members access to the LEED Online. Project administrator must insure project team members are assigned to correct project. Project team member then log in to manage credits that are assigned to them. Website requires username and password. project administrator is required to add team members to project LEED Online system.
  - Early registration increases goals
  - Documentation can be in two phases
  - Project can be submitted in one step
  - Submittal includes: (1) site plan, (2) rendering, (3) typical elevations, (4) photo during construction, (5) at least 3 project highlight

Certification Project Process – Submittals

- Narrative describing overall project and at least three project highlights
- Completed, printed, signed LEED letter template and required submittals for prerequisites and credits placed in a binder and separated by labeled tabs
- LEED project score card or checklist indicating project status of achieving means of prerequisites and credits and their projected sum total
- Even if LEED letter template control the submittals, a very organized notebook with full documentation towards requested credit must be generated and may be requested by LEED, USGBC for verification of credit or audit in future
- Letter templates: Provide reference for frequently cited characteristics of project, then input automatically updates other templates.



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Project Registration:

"Register >> Pay fees >> Gather data for prerequisites >> Gather all data to meet 26 points"

- First thing is to do is register ONLINE via USGBC website
- Registration fees are **$450** for members, **$600** for non-members
- Certification fee depends on LEED Rating System (NC, EB, CS, etc.) and building sq. ft. (let me reiterate - building square footage!)
  - paid in different stages (i.e. design and construction phase)
- *Certification* fees are waived if project receives Platinum LEED Certification
- You could submit in two phases (for design submittal and then again for construction) **OR** submit in one phase (design and construction submittals together)
- After design phase - USGBC will mark each credit as ***credit anticipated*** **or** ***credit denied***. They cannot actually reward credits after the design phase.
- After construction phase - this is when USGBC makes a ruling on each credit as ***credit achieved*** **or** ***credit denied***.
- Registration during early phases of project design ensures maximum potential for achieving certification.
- Registration establishes point of contact with USGBC and provides access to essential information, software tools and communications.

Registration also provides access to a database of existing Credit Interpretation Requests and Rulings

LEED Registration:

- Online only
- Website used for membership
- Personal accounts
- Project registration
- Web account
- Registration provides access to Credit Templates online
  - 4 sections of Credit Templates:
    - template status
    - manage template
    - required documents
    - documentation status

  - LEED registration information
    - Project contact
    - Project type
    - Project size
    - No. of occupants
    - Rate of completion, etc.

Maximize Credit for LEED:

- Start early
- Gaining access to CIR
- Maximize potential for achieving LEED
- Project accesses to software tool (LEED online, CIR, strategies, …)
- ..

USGBC Website Offers:

- Leed Case Studies Provide:
  - Project photograph
  - Statistics
  - Strategies and results
  - May provide cost data
  - Square footage
  - Project Team Information
  - Region
  - Construction type
  - Building Type
  - Building use
  - List of all appeals (by area) and CIR's

CIR:

- Must be submitted online with LEED application
- Was established for applicants seeking technical and administrative guidance on how LEED credits apply
- Applicant must fill demonstrate and document of credit requirement for award
- Cir is not a letter: Only the inquiry, essential background, supporting, relevant project information/details
- Inquiry can be for more than one credit only (if there is synergy)
- During the certification process, if it is unclear whether or not a strategy applies to a given credit, a CIR can be submitted and the ruling will determine the suitability of the approach.
- CIR rulings will never guarantee or award any credits - it just provides specific information regarding applicability.
- **IMPORTANT** - Before submitting a CIR, check the online resource for previous CIRs logged by other projects on relevant credits *first* . Only if a similar credit interpretation has not been logged or does not answer your inquiry sufficiently, then a new CIR via *LEED-Online* should be submitted.
- Pay fees (2 CIR free). CIRs are **$220** for each one
- Each CIR should refer to only one LEED credit and one primary related strategy
- The inquiry should only include essential project strategy and background information and should be presented in the context of the credit intent. (600 max words?)
- Submissions of drawings, cut-sheets, or other attachments is NOT permitted.
- CIRs can be *viewed* by all USGBC members, non-members with registered projects, and workshop attendees.
- CIRs can only be *requested* by LEED Registered Project Team Members.
- CIR can be viewed by
  - USGBC members
  - Non USGBC members, not part of registration project
  - Only online requests
  - Only requested by project team of LEED project
-

Certification Fees:

- No. of CIR's,
- No. of Appeals
- Square footage (primary cost)
- No. of credits earned (26, 33, 39, 52)
- USGBC membership
  - If platinum awarded.
    - Cost of building certification is returned, therefore, credits/points is a function of cost and type of award
-

A complete *LEED-Online* submittal:

- over all project narrative including at least three project highlights
- drawings and photos illustrating the project, including:
  1. site plan
  2. typical floor plan
  3. typical building section
  4. typical or primary elevation
  5. photo or rendering of the project

WE 1

- 50% reduction in water consumption is 1 point
- Project team needs or needed to reduce the need for landscaping: Irrigation efficiency, density factor, species factor
- Vegetated swales, xeriscape, rainwater capture
- WE1.1 and 1.2 needs: Micro irrigation system, treated system, recycled system
- WE1.1: **Use native plants**, Alternative mowing, micro misters
- No irrigation: 2 points
- Total Water Applied: a) total non-potable water supply available for irrigation, b) design case- twa
- Sources for Greywater:
    1. Bathroom sink
    2. Laundry Sink
    3. Recycled Waste water
    4. Public water non-potable
    5. Captured rain water
- Sources for blackwater: Kitchen sink, urinal, water closet
- Cannot use grey water from great water
- Civil Engineer is responsible for piping outside of building
- Registration establishes point of contact with USGBC and provides access to essential information, software tools and communications.
- Xeriscape= Affects
    - SS6.1 and 6.2 storm water quality and control
    - WE c1.1 Water efficient landscaping
    - Drought resistance plants or eliminate water

If Wc1.1 id denied: Appeal after e

Appeal after appeal after final review or after design phase review

WE 2

- 50% reduction of wastewater is one point
- Project baseline requires following calculation (see Baseline)
  - Greywater collection
  - Number of FTE and transients
  - Gender
  - Volume of daily waste water
  - Annual workdays
  - Use spreadsheet for all calculations

- Not needed for this credit
  - Total volume processed
  - Total Wastewater processed or generated
  - Flow rate of sprinkler head

WE 3

- Epact 1992: 2.5 gpm showerhead, 1.6 gpf WC, and ? gpm faucet
- Needed to reduce water consumption interior of building 20%, 30% EP (40%)
  - Number of FTE and Transients
  - Gender
  - Workdays
  - GPF of Urinal, Water closet, gpm of faucets, etc.
  - Daily uses
  - Occupancy
  - Ratio of man to woman
  - Occupants
  - Non0potable water supply for sewage conveyance
  -
- Not needed
  - Square footage

- Toilets consume most water in commercial buildings
- Low flush toilets 1 gpf?
- 40% exemplary means the 400,000 gallon is reduced to 240,000 gallons (=400,000* (1-0.4))
- Dishwasher, cloth washer, and dishwasher are excluded from WE3.1 and 3.2
- Dishwasher, cloth washer, and dishwasher maybe included in the exemplary
- Epact 1992- Females use WC= three times a day (or 1.6*3 gallons/day)
- Educational facility with exemplary get 4 points: 1 for educational and 3 for exemplary (20, 30, and 40%)
- 25% reduction is only one point

MR P1

- Very different wording used to describe Storage and collection of recyclables
- At minimum: paper (not different sorts of paper, just paper), corrugated cardboard, glass, plastics, metals
- Metal, plastic, glass (not ferrous, PVC, etc..)
- Aluminum??
- Location:
  - Protection from elements
  - Security for high value materials
  - Signage to prevent from contamination
  - Designed by architect
  - Easily accessible area
  - Serving the entire building
  - Dedicated for recycling

MR General

- For cost, LEED NC 2.2: use 45% of total costs (including labor and equipment) to establish default total material cost
- Structural timber salvaged from demolition site: MR3 Reuse & MR% regional
- Natural Fiber Benefits: MR6: Rapidly Renewable, and EQ4.3 Low emitting materials EQc4.3, must comply with CRI for limiting voc
- 30,000 wood frames warehouse, 50,000 sqft new construction
    - Replace windows from next City maker
    - Reduces wood floors from local company
        1. Credits MR3Resource, MR5 Regional material. MR2 Construction Waste
- Analysis on selection of materials
    - Evaluations must consider
        1. First costs, including installation
        2. maintenance costs including maintenance efforts and material used
        3. Life expectancy and replacement cost

- Courtroom to be built with steel or concrete
    - Construction waste material C2 almost in all cases apply
    - Resource use C3 nearly all times sometimes with verbiage
    - Local and regional material C5 it almost is the answer with C3 at all times
    - Do Not Use Rapidly Renewed Material C6. Hint: Steel or concrete
    - Almost never ID point
    - No building reuse, since the construction is ground up
    -

MR 1 Building Reuse (remember **BR** yan)

- Use of foundation of shell and structure of existing building
  - All brick and mortars crushed and reused as material
  - Some walls are removed and sent to recycling centers
  - Identification of volume of structural foundations, columns, and beams reused
  - Area of roof, exterior walls reused
  - Volume of roof, floor, and roof decks reused

- Building reuse credit:
  - Existing ceiling tiles (not panels, ductworks, labor, …)
  - Building reuse is based on area/volume not cost, FTE's, etc…
- Percent of existing walls, floors, roof maintained for MRC1.1= 0.75 or 75%
- Windows and doors (interiors) are excluded from building reuse calculations
- To 1M square feet office * 95% of existing walls, floors, and roofs= 950K sqft
- Building reuse does not have a baseline model
- Existing building information must be available MR1.2 structural only:
  - Window assemblies
  - Exterior skin and framing
  - Structural floor and roof decking
  - Major structural elements
  - Windows and exterior doors are needed to exclude from areas (interior doors are not included)
  - Ceiling tiles and lay-in tiles are structural 1.1 and 1.2.
- A warehouse being remodeled
  - New windows and non-structural roof needed
  - Used donated reclaimed flooring
  - What credits can be used
    - 1.1 Building Reuse
    - 1.2 Building Reuse
    - 1.3 Resource Reuse (donated flooring)
- A 40,000 sqft building renovation to use interior of building
  - If total non-structural is 30,000 sqft
  - 50% of 30,000 sqft needed to meet interior non-structural area reused credit
- 20,000 sqft building of reuse non-structural interior elements. Partial building addition of project is allowed if less than 2 times (2*20,000 sqft= 40,000 sqft).

- Building reuse technical analysis:
  - Structural elements, shell elements, in square feet
  - Square feet of reused/ total available square feet prior to demolition

MR 2 Construction Waste Management (**CWM**)

- Materials donated will assist in construction waste management
- Contractor to sort waste credit to construction waste management
- Plastic, concrete, wallboards, insulation, will contribute to MR2
- Tree stumps, earth work, excavated soil, land work, debris, hazardous material do not meet MR2
- Diverted materials (i.e. concrete) contribute to MR2
- Submitted template:
  - General description of each type and category of waste
  - Location of receiving agent (recycling/refill)
  - Quantity of waste diverted (tons/cubic yard)
  - Do not include hazardous material
  - Fill dirt does not qualify
  - 1.6 tons of steel and 6 cubic yard of wallboard cannot be the correct answered, since the units are not consistent
  -

MR 3 Material Reuse (remember **MR**.)

- MEP not included in MR3
- Furniture can be used from MR3 to MR7 furniture can be included if consistent
- Decorative components are considered as reuse
- Cost of on-site salvaged material is based on replacement value
- Bricks are reused resources
- Opportunities: Beams, posts, flooring, paneling, doors, frames, cabinets, furniture, bricks, architectural details
- If the existing building does not meet MRC1.1 building reuse, possible credits are:
  - 2.1 Construction Waste Management
  - 3.1 Material reuse
  - 3.2 Material Reuse
- Material reuse of 10M$ (cost of building construction)
  - 3.1 5% 0.05*10M$= 0.5M$
  - 3.2 10% 0.10*10M$= 1.0M$
  - EX 15% 0.15*10M$= 1.5M$
  - % reused material=
  - ++ Greater of the actual cost of the replacement value
  - cost of reused material (replacement)/total cost of material
- The material reuse can be reused as a different product: Fire door to counter top
- All factors are based on cost
- Salvaged wood flooring is material reuse
- No Salvaging: Wiring, copper, pipes, elevators, specialty items
- Bricks are ok
- Salvaged electrical panels may or may not be used?
- The material reuse and regional materials can be two points at all times
- Old doors contribute to
  - C2.1 Construction Waste Management
  - C5.1 Regional Materials
  - C3.1 Material Reuse
  - On Site doors and salvaged materials automatically qualify for MR5 regional materials
  - Material Reuse of doors to tables, sections, etc. can earn MR3
  - Building reuse credit:

MR 4 Recycling 10% ->20% ->EP 30% (RC)

- Standard: International organization for standardization document ISO 14021, Environmental Label Declaration
- Use CSI Master format 1995 Division 2-10 to determine material costs * 0.45
- Recycling philosophy: Value of recycling construction waste= Modest
  - = function of (regional markets, significant saving, hauling costs can be realized)
  - = Costs (avoid tipping)
  - = Improved packing capacity and efficiency of dumpsters thus reduced cost of hauling)
    - Key = Improved packing efficiency
- Use 45% of total cost (include labor and equipment)
  - MR3 Material Reuse
  - MR4 Recycled Material
  - MR5 Regional Material
  - Furnishing can be used if consistent MR3 to 7
- Example :
  - Post consumer by weight 5% floor
  - Pre-consumer waste by weight 10% decking
  - 5% post consumer + ½ (10% pre-consumer) = 10%
  - Floor + Decking = 10% of $12000 = $1,200.00
- Recycled content of Steel as recycled credit
  - Use 25% recycled content… if no information known, use 25% content of material
- Flooring, restroom partitions is recycled content, not EMP, appliance, plumbing,
- Only include permanent materials except furniture
- 10% of product by weight has recycled content
  - 0.10 (cost of $100 total) = 10$ of recycled content value
- Recycled content value = material cost
  - [Post Consumer %weight + ½ pre-consumer % weight]
- Content (Pre Consumer): Material diverted from waste stream during manufacturing process
- Post Industrial Content
  - Blue jean factory --→ fabric scrap --→ cotton insulation
  - Small mill --→ wood chip saw dust --→ composite board manufactured
  - Incinerator coal burning -→ fly ash -→ concrete
  - Tire Plant → Rubber → Carpet
  - Carpet and textile -> Waste Fiber -> carpet padding
  - Sawdust from sawmill -→ composite board
  - Lumber Mill Board -→ Pine bark mulch & nuggets → Landscaping
  - Textile manufacturing plant -→ waste fiber -→ carpet padding
  - Newspaper print overrun -> wood - > cabinets

MR 4

- Post Industrial not used as
  - Existing recycled cannot be used in materials again
  - Recycled pop bottles → carpet… Cannot use recycled material … No Leed
  - Carpets made from nylon scraps of a production
  - Steel beams created from metal reclaimed from manufacturing line
  - Metal studs contain known percentage of scraps and trimming collected and fed back into manufacturing process
  - Crushed bricks recovered from a building demolished to make way for the current project and used as drainage base for previous courtyard of new building
  - Extra drywall from a residential projects → drywall not post consumer
  - Wooden pallets used by a shopping company pallets are post consumer and shipping did not make them
  - Manufacturer of stud ---←--scraps and trimming ←- back to factory
  - Building demolished -→ Crushed brick --→ drainage base (this is not manufactured. Cannot use.
  - Brewery --- > Spent grain --- > Use as FEED.. No LEED for FOOD
  - Materials made from rework, regrind, or scrap generated to the other factors
  - Same process products rework, regrind, scraps generated, one process backing → process
  - WWW.ciwmb.ca.gov/rcp
  - Ca.integ.waste management board.
  - Scraps from reclaimed and used to make same items, not appliances.
- Heavy Steel Frames: High scrap material = Recycled material MR4
- Fly Ash = Recycled content, Innovative Design (not exemplary)
- ISO organization for Recycled Content
- Material: to evaluate recycling
- Documentation required
  - Summary of diversion rates from recycler for commingled recycling
  - Waste haul receipt for recycled material
  - Commingled is opposite of “on-site separation”
  - Crushed and reused concrete (if done on site) and masonry or asphalt
  - Bricks from demolition to buyers who sell or donate bricks for other construction site: construction waste management
  - Submittal templates require:
    - Quantity of diverted/Recycled Waste …. No approximation

MR 5 Regional Material (remember **RM** **(Ronald McDonald.)**

- Refurbished doors offside MR5 regional and MR3 Reused
- Salvaged materials: cannot comply with MR3 with MR 1,2, 3, 6, or 7. (Only MR5)
- 20% manufactured, 50% extracted within 500 miles
- Place of manufacturing, extraction, …, 500 miles radius
- To calculate regional material
  - Material salvaged within 500 miles
  - Costs of materials extracted and manufactured within 500 miles
  - Total cost of materials
  - You cannot call it "purchased" within 500 mile since origin of material is not known
  - Innovative Design is 40%
    - $1,000,000.00 building: *0.45 = $450,000 Material cost
    - For ID, 0.40 * $450,000 = $180,000.00 Regional Material
    -

MEP not included in MR3

MR 6 Rapidly Renewable Materials 2.5% EP 5%

- Rapidly Renewable Materials: Bamboo, wool, wool carpet, bamboo walls, wheat board grass, cotton, agri-fiber, linoleum, rosins, jute, wheat board, strawboard, cork, limestone, oil, sun flour, seed board
- Not rapidly renewable:
  - Pine Flooring, recycled flooring, light bulbs, granite counter top, brick, asphalt
  -
- 10 year life cycle
- MR6 is based on cost (cost of material and equipment and labor)
- 2M$ = cost of material, 2.5% = 50,000$
- $10M material cost
  - *2.5% = $250,000 MR6
  - *5% = $500,000 MR6 EP

At minimum

MR 7 Certified Wood 50% ->95% EP

- Chain of Custody (COC) documents needed
- Qualification of MR7:
  - Weight of certified wood as fraction of all wood-based product
  - Value of all salvaged and refurbished wood products used on a project cannot be used
  - COC certificate number: Numbers for all certified wood products
  - Specification and submittal highlighting installed certified wood based materials
  - Spread sheet of all wood-based materials relevant calculations
  - Documentation showing 5% of wood based materials are certified Forest Stewardship Guidelines (Council)
  - 200K$ new wood and 10,000 $ reclaimed wood flooring
    - 0.50* 200,000 $= $100k Certified wood
    - Reclaimed wood does not account
    - Leed AP must verify:
      - Must only verify virgin wood
        - Rough Carpentry
        - Wood Doors and frames
      - Not used as MR7
        - Salvaged/refurbished wood
        - Recycling wood fiber protein

Site Boundary

- SSC2 Development Density & Community Connectivity
- SSC8 Light Pollution Reduction
- SSC5 Site Development: Maximize Open Space
- SS4.1 Alternative Transportation: Public Transportation Access
- SSC3 Brown Field Redevelopment
-
- 3 credits SS in design phase:
  - SS4.1 Alternative Transportation- Public transportation –acee
  - SS6.2 Storm Water Quality
  - SS2 Dvelopment density and community connectivity
  -

- # SSP1 ECS 2003 EPA Construction General Permit
  - Planting grass is only addresses prerequisite ECS
  - Storm water management for construction activities standard for ECS
  - Loss of soil, characteristics for erosion, sedimentation, & air pollution
  - Submittal: NPDES compliance, drawings showing implementation
  - Non-structural controls
    - Permanent seeding, soil-crete(does not exist), temporary seeding
    - Structural = silt fence, sediment trap, earth pike
  - Two type of ESC, SSP1
      - Structural controls: berm, earthdike, silt, fences
      - Stabilization: seeding, mulching
  - Permanent seeding = Stabilization of erosion & sedimentation
  - Structural = Sediment Basin
    - SS6.2 (Treating Storm Water Runoff 90% of the ave. annual rainfall using BMP
    - SS5.1 Covering 50% of site w/ native vegetation
    - SS6.1 Smaller footprint

SSC1 Site Selection (CFR)

- Project team action: Explain any site characteristics & non-standard tactics to reach intent
- If word is developed, site does not have to meet SSC1
  Farmland, Species, Wetland
- Office near lake, prime tract of undeveloped real estate 40 ft. from lake. 1/8 from 3 bus stop.
  - Possible credits App.
    - SS4.1
    - SS6.2 Storm
    - WE2 Innov.

  Does Not Apply
  SSC1→50' From Lake
  MRC1.1→Building Reuse (New Bldg.)
- Best qualifies SSC1 previously (near) developed site
  Not: -3 ft. above 100 yr. flood plane
  -Land rare species habitat
  -10 acre park
  -6 acre farm
- SSC Qualification: Not within 100' of wetland
  Not on prime park or farm
  Below 5' of 100 yr. storm/flood

- SSC2 Development density and Community Connectivity
  - Gross building 300 Ksqft, project site 0.5 acre, total building area within density radius 900Ksqft, total site area within density radius 12 ac, undeveloped public area=200 k sqft
      - Development density
        - = Gross building 300K/Project site area 0.5 ac=600Ksqft /ac
      - Density Radius = 3 sqrt [project site area]=3*sqrt[0.5*43560ft sq]=441 ft
      - Surrounding Area, ac= Total site area within radius - undeveloped area
        - = 12ac – [200ksqft/43560 in ac] = 12- 4.49= 7.51 ac undeveloped
        - Surrounding Site devel[pment density, 441 ft radius=
          - 900k sqft/[7.51 ac]p[[

- SSC3 Brownfield ASTM Phase II Environmental EPA, or other agencies
  - EPA office local or state
  - Appropriate letters and documentation needed for supporting land
  - Lower property cost as advantage
  - Declaration of all remedial measures
  - Major risk of contamination and site affected
  - Civil Engineer Cannot mark property as Brownfield
  - Brownfield with certain legal exclusion and addition: Brownfield means real property, expansion, redevelopment or reuse of which may be complicated by presence of hazardous substance, pollutants or contaminants
  - State/local agencies and S/ME E1903-97 Phase II Environmental assessment
  - BMP= Methods determined to be most effective, practical, means of preventing or reducing pollution from non point resources
  -

- SSC4.1 Alternative Transportation-
  - Public Transportation ½ mile with 2 commuter rail **or**
  - ¼ mile with 1 or more bus lines
  - Exemplary Point: 2 or more bus stops for 4 bus lines with 200 transit rides per day
  - Submittal: Vicinity map with commuter rails or bus lines and may be drawings required
  - Exemplary Performance: Demonstrate a quantifiable reduction in personal automobile use
  - Distance is to building entrance is critical for the design

- # SSC4.2 Alternative Transportation- Bike Storage and Changing Rooms
  - Commercial Bicycle rack 5% of FTE (200 yard) and shower/changing room for 5% of FTE
  - Residinetial: 15% covered parking for residences
  - 180 FTE+40 part time+30 transients= Commercial
    - 180+40/2+ 0 for transients= 200 FTE
  - 660 office occupants:
    - 0.05*660= # of bicycle racks + shower
    - For residential: 660*0.15 = # of bicycles+ no publis shower
      ¼ mile with 1 or more bus lines
  - 100 full time plus 60 part time + 30 peak= 100+60/2+30 peak visitors ?=160
    - 160*0.05 = # of shower/bike rack
  - Residential 1000 ocupant with 50 storage covered racks:
    - needs (1000 * 0.15) -50 additional covered storage racks
  - If number of changing room+shower+shower+racks are for new building but can use the existing campus facilities if the
    - It meets the 5% of FTE + existing usage rule
    - It is maximum 200 yards to the door of the new building
  - 420 students, 20 FTE, 10 part ime staff office
    - (420+20+10/2)* 0.05= # of shower/bicycles
    - Residential: 15% covered parking for residences
  - Visitors do not need shower or change rooms

- # SSC4.3 Alternative Transportation- Low Emission and Fuel Efficient Vehicle
  - LE/EF 3% FTE+ Preferred Parking Or
    - 5% LE/Fe preferred parking capacity on site or
      - 3% fuel station of the parking capacity
  - 1000 FTE: gives 30 cars LE/EF or 50 preferred parking or 30 Fuel station
  - Fuel Efficient vehicles
  - Electric vehicle relatesd to alternate transportations
  - Mixed use: No difference, even if underground parking
  - Parking shall never exceed the local ordinance
  - Narrative: # of FTE+Car Pools+Preferred parking
  - Highlight drawings
  - Copy of local zone ordinance
  - All local parking guidelines are based on FTE's
  - Documentations:
    - Space allotted for options 1, 2, or 3
    - Project drawings to show locations of preferred
  - FTE= Full time + Part time /2 (50%)
  - Hybrid engine: uses gasoline engine which is used to drive generator and storage batteries, both of which drive the car through an electric motor
  - Fuel efficient vehicles: Minimum Green score of 40 or more: American Council for Energy Efficient Economy (ACEEE) Rating (FE cars)
  - Fuel efficient vehicles: Zero Emission Vehicles (ZEV): California Air Resource Board
  - FTE is used: WE2, WE3, SSC4.2, SS4.3, SS4.4
  -

- SSC4.4 Alternative Transportation- Parking Capacity
  - 5% 5% 5%
  - Commercial:
    - Option 1: PC no more than local Zoning
    - Preferred Parking for 5% of spaces
    - Or
    - Option 2: Less than 5% FTE Preferred Parking for carpool
  - Residential
    - Option 3: PC no more than local zoning +Infrastructure for ride sharing
  - Option 4
    - No Parking
  - Factory with multi shift, with no local zoning, must use the worst case for calculations. Try both options – commercial. Use FTE.
  - 3 Methods to reduce environmental impact of parking
    - No new parking on plans
    - Near bus lines/public transportation
    - Ride sharing arrangement
    -

SS5.1 Site Development- Reducing Site Disturbance- Protect and Restore Habit 50%, EP 75%

- Option 1:
  - 10’ from walkways, 15’ Main Street, 25’ permeable surface, 40’ ?
- Option 2: Restore and protect 50% of site SS6.2 may apply there if the plants are native and adapted
- 185,000 sqft site, foot print of building = 85,000 sqft
  - 50% -→ [185k-85k] *0.50 = 50 k restored 1 credit
  - 75% -→ [185k-85k] *0.75 = 75 k restored 2 credit (1+1EP)
- Rural school plan for a Greenfield site
  - SS5.1 Protect and Restore habitat One point
  - Prerequisite No point
- Site Selection: Site related issues
  - SS4.1 Alternative Transportation ACCESS
  - SSC3 Brownfield
  - SSC5.1 Reduced Site Disturbance Protect open space
- Shopping center: distance from parking area= 10 ft
- Strategy Acceptable:
  - Share facilities
  - Use tuck under the building
  - Clearly mark construction boundaries
  - Place building to minimize disruption of eco system
- Strategy Not Acceptable:
  - Use Pervious Paving
  - While grading use bio fertilizer
- Qualifications:
  - Previously graded site, 50% restored with native vegetation
  - 1000,000 sqft warehouse on previously developed site with 500,000 sqft covered with native plants (50 of site)
  - Military base of 500,000 sqft need 500K sqft of equal space vegetation
  - 100,000 sqft office space with requirement for open space = 100K*0.2= 20k open
- If site = 600,000 sqft, building foot print for exemplary points is:
  - Assume 200 K building:
  - 200k building * 2 times for EP= 400 K open space
  - 400k open space + 200 K footprint= 600 k is ok
- 80,000 sqft building, local zoning 15% of total size, 4 floors, 10,000 sqft footprint
  - Must exceed by 25% of local ordinance for SSC5.2
- Jerkwater does not affect SSC5.2 however if affects WE 1.1, WE2, WE3, SSC5.1

- # SS5.2 Site Development- 50%, EP 75%
- Option1: Reduce hardscape or 25% more than zoning
- Option 2: No local zoning & landscaping required Vegetated space= building footprint
- Option 3: Local Zoning= No landscape zoning= 20% of the site= vegetated area
-
- No local architectural zoning requirement, 20% open space= one point
- Strategy to increase open space
  - Vegetated roof
  - Share facilities with neighboring office
  - Vegetated pond with minimum slope
  - Pedestrian hardscape
- If 100,000 sqft (exclude foot print)= 0.75*100,000= 75 k open space
- Site area calculations are required for
  - SSC5.2 Site development
  - SSC2 Development Density
- SS4.1 Alternative Transportation- Does not use site for Transportation Access
- MR 1.3 Does not value of site area
- SS6.1 Does not use site area for quality of storm water
- SS5.2 Footprint means one need 50k of vegetated area
- Site area *0.20= 1000,000*0.20= 200,000 sqft green area +200,000 (EP) = 400K 2 points

- SS6.1 Stormwater

- Option1: is the land 75% impervious…> if yes Post development pollution =< predevelopment peak load
- Option 2: Storm water management that protects receiving stream channels from erosion/quantity control measures (i.e. infiltration trench)
- Option 3: if existing impervious is less than 50% …..> if yes, then reduce post runoff by 25% for 2 year 24 hour storm
- Building area: gross exterior dimension of building
- Decreased permeability increases column of storm water on site

SS6.2 Stormwater

- Capture and treat 90% and reduce TSS by 80% and total phosphorous
- Existing has 25% imperviousness
  - Redevelopment discharge rate = 8000 gallons
  - 50% = 8000 gallons (2*@25%)= 16000 gallons or 8000 gallons added
- To reduce stormwater column and treatment
  - Reduce amount of impervious area
- Total Site Area:
  - SS2 Development Density
  - SS6.1 Stormwater Management: Quantity
  - SS5.2 Reduced Site Disturbance
- Civil Engineer to submit:
    - List of structural control
    - Description of pollutant Control
    - Percent of annual rainfall treated
    - Declaring and demonstrating stormwater management strategies resulting 25% decrease in rate in rate of runoff
- Greenfield site:
    - Rain garden
    - Disconnection of imperviousness
    - Rainwater cycling
- Stormwater SS6.1 assists
  - WE1.2 no irrigation landscape
  - Stormwater diverted to cisterns/storage tanks
  - Vegetated roof assist SS6.1
- If totally paved (>50%) & 10,000 gallons rain, now must be 25% less after completion
    - 10,000 (1-0.25) =7500 gallons after completion
- Vegetated Roof (Architect, Structural Engineer, Civil Engineer, Energy Consultant, General Contractor)
    - SSC7.1 Heat Island Effect: Roof
    - SSC6.1 Stormwater Design: Quantity Control
    - EAC1 Optimize Energy Performance
    - SSC5 Site development
- Non-Structural reduction of water pollution
    - Rain garden
    - Vegetated swales
    - Rainwater recycling
    - Disconnection of imperviousness

    - Vegetated roof
    -
- Submittals
    - Best BMP for functions
    - % of annual rate treated
- BMP's
    - Monitoring Data showing compliance
    - Follow State and local programs
    -
- Reducing storm water
    - Install biowales
    - Smaller footprints
    - Retention ponds
- Submittals:
    - Narrative describing project conditions: measure taken, controls installed
    - Pre and post runoffs and quantities
- Storm Water Management
    - Low impact strategies
    - Biowales
    - Porous pavement
    - Mimic natural hydrological conditions
    - Infiltration basin
    - Vegetated roof
    - Constructed wetlands
    - Calculations Demonstrating existing imperviousness is less than 50%
    - Vegetation type and slope of berms
    - Slope and runoff coefficient for pervious courtyard
- Heat Island reduction
    - Evapotraspiration
    - Increased Albedo
    - Increased imperviousness
    - Civil Engineer to submit:
        - List of structural control

SS7.1 Heat Island- Non roof

- Solar Reflectance Index : index of a roof material as a measurement to determine whether or not roofing material comply with SS credit 7.2 calculated by ASTM 80
- Standard White = 100, and Standards black – 0.0
- Options:
  - Option 1:
    - 50% site harscape: do not include the building
    - Shade within 5 years
    - Paving material with SRI >= 29
    - Open Grid paving, with 50% open
- Minimum 50% parking area space under cover with a roof top (SRI >= 29)
- Heat island effect can vary temperature by 10 degrees F
- Minimum 50 % parking space under cover with a roof top of SRI >=29
- Exemplary: 100% non-roof high albedo and/or open grid system green shaded within 5 years or 100% parking cover
- Exemplary point for SS&.1:
    - 50% underground or covered to 100% parking covered
    - Plant trees with full shade in 5 years
- Equations: Total qualifying area > 50% total hardscape areas
  - T= sum of total non roof hardscape
  - O= Hardscape with 50% open grid
  - R= Hardscape with SRI >=29
  - S= Summer Solstice mean @10 am, 12 noon, and 3 pm
  - Q= sum of open paving high SRI paving, and shaded area
  - Q= O+R+S >= T/2
  - Submittal package/calculations required
    - Total area of all hardscape with SRI >=29
    - Total Area of all non-roof hardscape on project site
    - Total effective shaded area of hardscape features shaded by trees and other landscape features
    - Total area of hardscape and surface with open grid paving system @least 50% of pervious site
    - Building ?
- Only Large shrubs account for heat island (not small or medium)
- LEED SSC7.1: Albedo of imperviousness or area or shading from site trees
- Consolidating building footprint and underground parking assts in
  - SS7.1 Heat Island – Non roof
  - SS6.1 Stormwater design: Quality control

- Decision makers: Least involved = mechanical engineer
- Storm water management relates to porous paving +SS7.1
- Complex with 500 parking. Select SS7.1 and pollution (option2):
  - Underground parking 500 * 0.50 = 250 underground parking
- Only 50% of parking to be covered with albedo over the parking deck
- Only 50% parking to be covered with SRI of 29
- Heat Island contributes:
  - Microclimate disturbances ,
  - sever weather,
  - High energy loads,
  - Not pollution?
- k
- Gravel: Most porous material
- Porous Material used in:
  - Island heat
  - Minimize impact of microclimate
  - Minimize the impact on humans and wildlife
  - No correlation to SS4: alternative transportation
- To meet SS7.1:
  - Need of High albedo impervious paving materials
  - Need for area of shading from suite trees
- Decision maker: Owner: involved mostly in everything
- All decision makers are: contractor, civil engineer, owner, mechanical engineer, electrical engineer, other consultants
- In LEED: individuals “pursue” credit
- Least Likely= Decision makers not to pursue point
- LEED AP understands importance of integrated design and consider interaction between perquisites, credits, and their respective criteria
- Building footprint reduction and addition of underground parking:
  - SS6.1 Stormwater quality control
  - Heat island effect SS7.1 (non-roof)
    - It is not correlated with parking capacity SS4.4 and EA3- enhanced commissioning
- Non roof: Cover parking deck with SRI >=29 more than 50% of the parking area
- Roof Low sloped covered with SRI >=78
- All Parking under the building SRI >= 78 makes it two credit SS7.1 and SS7.2
- Submittal templates
  - Emissivity= ability of a material to shed infra red radiation or heat
  - Visible transmittance= visible transmitted/visible light striking surface

- Planting small shrubs do not contribute with SSC7.1
- Commercial Park with 4 acre of hardscape:
  - 2 acres of open grid pavement
  - Paving material with SRI >= 29
  - Shade 2 acres of hardscape in 5 years

SS7.2 Heat Island- Roof

- 75% of roof (<2:12 low slope with SR>=78) or (>2:12 steep slope with SRI >=29)
- Or 50% Vegetated Roof or
- High albedo +green roof combination
- Combo formula: {area High albedo Roof/0.75]+{area Green roof/0.50]= total roof area
- Exemplary: 100& of roof= green. Exclude mechanical skylight, photovoltaic, etc.
- Reflective roofing material: same as SRI= Percent of roof is based on SRI
- Do not use vegetated area as reflective roof
- Non SRI roofs are not albedo
- Solar Reflectance: Reflected Solar Energy/Incident Solar energy
  - = Ability to reflect sunlight to incoming solar energy zero to one
  - = Higher solar reflectance= better control of heat gain
  - Solar reflectance include:
    - Visible light
    - Infra red heat
    - Ultra violet wavelength
    - = albedo= Product that reflects high amount of sunlight or "high" green of light reflectance
    - Not the same as emissivity, similar but not the same
    - Index : Standard White = 100, and Standards black – 0.0
- Vegetated Roof= Potential contribution to
  - SS6 Storm water management
  - SS7 Heat island effect
  - EQ4 Low Emitting materials
- Team members to design vegetated roof: Architect, Engineers: structural, civil, energy, and general contractor
- If project earns SSC2, development density and community connectivity. What additional credit can be achieved by vegetated roof
  - SS5.1 Site development open space
  - SS5.2 Site development protect habitat
  - SS7.2 Heat island effect- Roof
- Early design review to consolidated footprint of building and underground parking
  - SS7.1 Heat Island non-roof
  - SS6.1 Storm Water design – Quality control
- Living roof: landscape and exterior design to reduce heat island
- Office space with 65k sqft and roof 5K mechanical sqft and 10k skylight wants to meet 7.2:
  - Available roof area = 65-10 skylight-5mechanical = 50 k roof
  - 50/2 = 25 k for vegetated roof

  - 50*0.75 K for albedo SRI >=78
  - Combination 50 K sqft= Albedo roof/0.75 + Vegetated Roof/0.5
  - Exemplary credit: 50 ksqft vegetated roof
  - Exemaplary credit: 50 Ksqft very high albedo roof
- Strong participation of general contractor:
  - SS7.2 Heat Island Roof
  - SS5.1 Site development, project, restore habitat
  - SS7.1 Heat island- non roof
  - Not answers: “involved strongly: ss1 site selection; SSC3 Brownfield, SS6.1 Stormwater management
  -
- Low slope roof, 30 k sqft
  - Option 1: 0.75*30k= 22.5 k SRI >=78
  - Option 2: 30k*0.50= 15k Vegetated roof
  - Option 3: 12k/0.75 + 8k/0.50 ==== verify 30k combination
  - tins:
  - s
  -

EQP1 Minimum IAQ Performance

- **ASHRAE 62.1-2004 Section 4 through 7**
  Naturally Ventilated Buildings ASHRAE 62.1 Paragraph 5.1
- Other Prerequisites:
  - ASHRAE 62.1-2004 EQP1 Minimum IAQ Performance
  - ANSI/ASTM E779-03 Residential Building Sites Meet ETS, EQP2 Control
  - ASHRAE 90.1-2004 EAP2
  - EPA 2003 Construction General Permit or Local More Stringent
  - No Commissioning Authority Reference Guide
  - South Coast Rule 1186 VOC Set Limits
  - Each Enhanced Refrigeration Management Table I for Fund. Ref.

- 90% of times American's are indoors
- U Measure of heat loss
- Sick Building Syndrome: Asthma, Lung Cancer, Allergies

EQP2 ETS: Preventing Smoke to Contaminate Non-Smoking Area

- Minimum Distance From Designated Smoking Area = 25 ft
- Having Low or Zero ODP
  Environmental Tobacco Control ETS
- Responsibility:
  - Owner: Prohibiting Smoking Policy
    Area Dedicated for Recycling Area
  - Mech. E: Installation, Design, Control or Zones for CO_2 Monitoring
  - Architect: Parking Meets or Exceeds Zoning

• EQC1 Outdoor Monitoring

- Install CO_2 Monitoring 3'-6' Above F.F.
  Same for Naturally Vented Areas
- Two Standards for Metabolic Rates of Humans to Verify CO_2 Rate Control
  - ASHRAE 55
  - ASHRAE 62.1
- Provide Continuous Adjustment to Building Ventilation Based on CO_2 Readouts

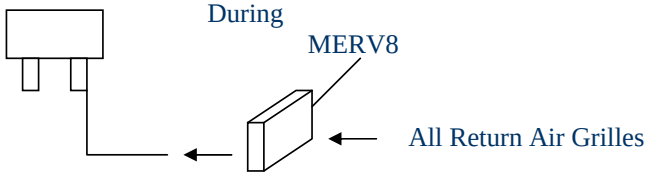
• EQC2 Increased Ventilation (30% Increase)

- 90% of Space Must be Ventilated
- Increase in CFM Impacts EAC1 Performance Energy
- Size of Fan Applies to this Credit
- Additional Heat Recovery from Motor of the Fan Can Cause (a) Higher Energy or (b) Harvest for Heating Energy Consumption
- EQC2 Natural Ventilation:
  - C1BSE AM-10
  - Documentation Using Macroscopic, Multi-zone, Analytic Model that Predicts Room by Room Outdoor Air Flow Rate
    - ASHRAE 62.1-2004 Chapter 6

- # EQC3.1 Construction IAQ Management Plan

SMACNA ASHRAE 55.2
During Construction

- General Contractor impacts most of this credit
- Mechanical Engineer provides IAQ plan and/or references SMACNA Guidelines
- Permanently installed A.H. = Minimum MERV = 8 Needed
- Submittal: List of Filters & Mfg. Rating; IAQ Management Plan; IFAHU = Permanent; Photos Highlighting
- Meet or exceed SMACNA IAQ Guidelines under construction
- Protect absorptive materials stored on site or installed from moisture damage during construction
- MERV13 Filter Installation After Construction
- MERV, AHSRAE 55.2
  - Methods for measuring the performance of air cleaners based on the ability of a device to remove particles from air stream & devices for resistance to air flow
- Contractor shall NOT perform bake out of all building controls during construction
- Bake out: Act of using heat (& vacuum) to release volatile compounds from something
  - An artificial acceleration of out gassing
- Contractor will:
  - Seal all return on HVAC Ducts
  - Minimum IAQ Testing before occupancy
  - Perform flush out before occupancy
- Photo needed for LEED submittal
- MERV 8 & Onsite HVAC Protection

- Construction IAQ Management Plan
  - During Construction
  - Before Occupancy
    - 

    - During:
      SMACNA IAQ Guidelines for Occupied Buildings Under Construction
  - During:
    Stored on site, or installed, all absorptive materials kept dry

- # EQC3.2 Construction IAQ Management

- Before Occupancy
  Before Flush Out: Clean & Install Carpet or Any High VOC
  Non-fixed partitions are encouraged, not required
- G.C. will perform testing & submit IAQ report
- SMACNA IAQ Guidelines for occupied buildings under construction, 1995 Chapter 3
- Before MERV8 on each return grille

  During Construction
- 14000 ft3/sq. ft. required for flushing
- MERV13 can give IAQ EQC3.1 & EQC3.2
- Options of EQC3.2:
  - (a) Flush out 14000 ft3/ϕ
  - (b) Air quality testing
- Maintain-60% Humidity or lower
  -60°F internal temp.
  -14000 ft3/ft2
- EQC3.2 Option 2 Testing
  - 4PCH-(4 Phenylclohexene) used for carpeting
    - If no carpet-No testing required for this material
- Chemicals Needed Testing
  - Formaldehyde
  - Total Volatile Organics-VTOC
  - Particulate (PM10)
  - Carbon Monoxide (CO)
  -

- After Construction, Before Occupancy: 14000 CF/ϕ @ 60°F, 60% Humidity w/ Occupancy
  Option: Test for Contaminants
  Option: 3500 CF/OSA/ϕ, 0.3 CFM/ϕ/3 hrs. till 14000 CF/ϕ Total

  Options: Before Occupancy
  After Early Occupancy

EQC4

• Low VOC EQC4.1 Adhesives & Sealants

- 4.1: VOC Limit for Stains & Sealers: Clear Wood Finish, Floor Coating, Sealers, Shellac, Stains, SCAQMD 1113
- SCAMQD1168 or Bay Area AQMD "Not a Standard" Regulation 8 Rule 51
- Green Seal Standard GS-36 "Standard" greenseal.org/certification/environmental.cfm
- VOC content material, submittal, cut sheets, MSDS are not required for submittal till USGBC audits
- LEED AP pursuing VOC/LOW/EQ4:
  - (a) Inventory all paints, adhesives, sealants to be used
  - (b) Develop a project outline specs to include criteria for low VOC products
- EPA, ASHRAE, CIBSE not involved in EQ4
- Low VOC materials are:
  - (a) Adhesives & sealants
  - (b) Paints & coating
  - (c) Carpets & cushions
- VOC from wall/roof insulation, radon from concrete no accounted.
- Acceptable cut sheets for VOC are: product cut sheet, MSDS, specifications
- GS=Green Seal, Non-profit Environmental Organization
- Air quality in a class room
  Interior Paint GS-11, CR1 Green Label Program (VOC Limit), & Reg. & Rule 51, Bay Area AQMD sealants VOC limit
- VOC levels: Product emission test data & MSDS
- Brick Lower VOC than: Carpet, Paint, Vinyl

• Exterior Low VOC: Within building envelope weather seal to meet EQ4.1 Standards & Regulations

- # Low VOC EQC4.2 Paints & Coating

  Green Seal Standard GS_11 Commercial Paints

  - If high VOC paint is already there, use high VOC paint into overall calculations for VOC
  - Only interior paints are accounted for
    (i) Anti-corrosive paint on interior metal
    (ii) Anti-rust paint in mechanical room
  - Pre-finished furniture, cabinets were already painted outside & are not include in VOC calculations
  - ASHRAE, Green Guard, EPA are not involved
  - GC-03 Anti-Corrosive Paint

Low VOC EQC4.3 Carpets

- Carpet & Rug institute green label plus green label for carpet cushion (pads) green label (not green store, Green-C)
  - Green Label: Only for Cadet System
  - Green Label Plus: Cadets
  - Green Label: For Cushions
  - Off-gassing Rate: Micro/m^2HR = Offset = Off-gassing, Urea F.

- # Low VOC EQC4.4 Agri-Fiber
  - No Urea Formaldehyde Resins
  - Inside building weather proofing systems
  - No Urea Formaldehyde =
  - 4.4: EQC4.4 Composite Wood: Straw Board, OSB, Wheat Board, Plywood I-Beam
    Pine Molding $\neq$ Composite Wood

- Particle board, MDF, Plywood, Wheat board, Strawboard, Panel, Substrate, Door Cores, Furniture not included

• EQC5 Indoor Chemical & Pollutant Source Control

- (a) Employ a permanent entryway system to capture dirt, particulates, etc.
- (b) Where chemicals are present, provide deck to deck partitions & negative pressure exhaust system
- (c) Provide separate drains plumbed appropriately where water & chemicals concentrate mix occurs
- (d) MERV13 or more in a mechanically vented area required
- (e) 100% exhaust out
- (f) Roll out mat @ entry ways if maintained weekly
- (g) Minimize Cross contamination in building
- (h)Pressure differential = 7 Pa or 5 Pa
  (Same as ETS Room EQP2).
  If △ P = 2 Pa → Increase another 3 Pa to get to 5 Pa
  What about 7 Pa?
- (i) MERV13 is required (ASHRAE 52.2)
  Minimum efficiency reporting valve
  For: EQC5 Indoor Chemical MERV13
  EQC3.1 During Construction MERV13
  EQC3.2 Before Construction MERV13
- If school construction delays: LEED Credit/Points affected are:
  - (a) EQC3.2: Construction IAQ
  - (b) EAC3: Additional Commissioning

- (c) SSC5.2: Reduced Site Disturbance

EQC6.1 Lighting Controllability (No Standard)

- Lighting levels
- IESNA Regulates Light
- Requires one operable window & one lighting control zone per 200 sq. ft. of occupied perimeter zone (20'x10'), 15' wide
- 90% of individuals w/ LTG. Control
- Desktop Lamps are acceptable as task lighting
- Daylight technology & strategy can be integrated with this credit
- For good office
  - EAC2 Effectiveness of Ventilation
  -Controllability of systems C6.1, C6.2
  -EQ4.1 → 4.4 Low VOC EM
- Other interrelated to EQC6.1
  - EQ8.1 Daylight & Views Photocell Control
  - EAC1 Optimize energy
  - EQC6.1 Task, Ambient Lighting
    Photocell Lighting Control

• EQC6.2 (Thermal Comfort) Controllability

- 50% of Occupants
- Promotes Productivity, comfort, well being
- High level of the thermal ventilation
- Operable windows (does not mandate controls)
  If occupant area is 20' wide & 10' on either side of windows
- Designer should evaluate thermal comfort ASHRAE 55 & 62.1
  Acceptable indoor air quality
- Numerous Strategies:
  - Under floor air distribution
  - Operable windows
  - Task lighting
  - Private office in core & open office near perimeter
  - Photocell lighting control
  - EQC2 Ventilation Effectiveness
  - EQC6 Controllability of Systems
  - EAC1 Optimize Energy Performance
- Least important in thermal comfort, air quality
  Most important: Humidity, temp., air velocity
- Occupancy based HVAC Control C6.2 = Controllability of Systems

EQC7.1 Thermal Comfort

- ASHRAE 90.1 (Energy T-24); ASHRAE 55-Comfort
  - Humidity Level 30-60%
  - ASHRAE 55 - Temperature & Humidity
  - Both natural ventilation & HVAC mechanical system approach must be used
  - 80% of the occupants must be in "comfort"
  - Temperature, radiation, humidity, air speed, & personal factors, activities, clothing, body metabolic
  - High performance windows reduce heat transfer, reduce energy cost, promote daylight & views
  - Worst thermal Mass

- # EC7.2 Thermal Comfort-Verify
  - (a) Corrective plans if 20% or more are dissatisfied
  - (b) Survey building occupants with 6 to 18 months
  - (c) Thermal comfort EC7.2 & EQC1 CO_2 monitoring & EQ 6.2 controllability of systems are interrelated