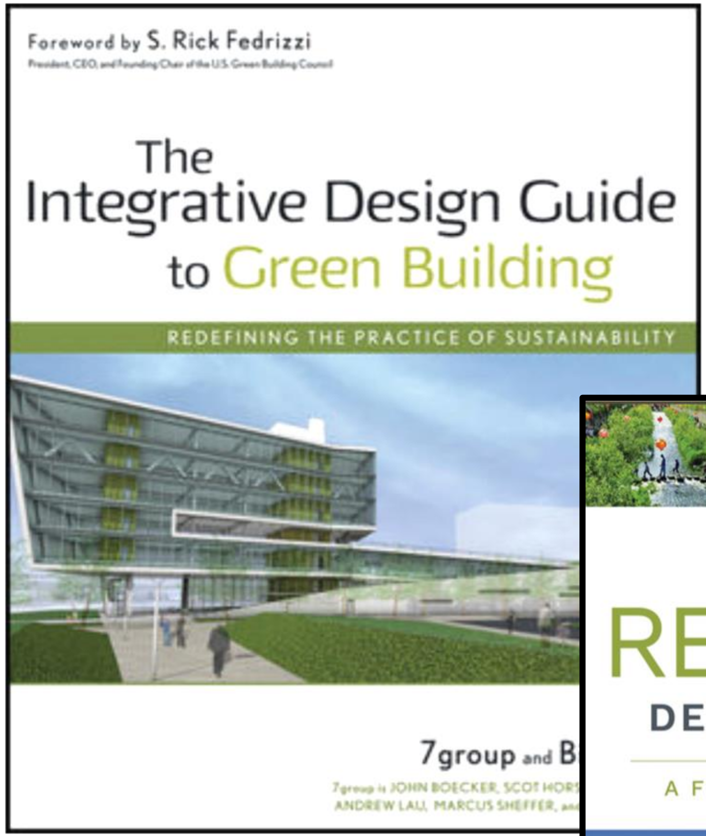
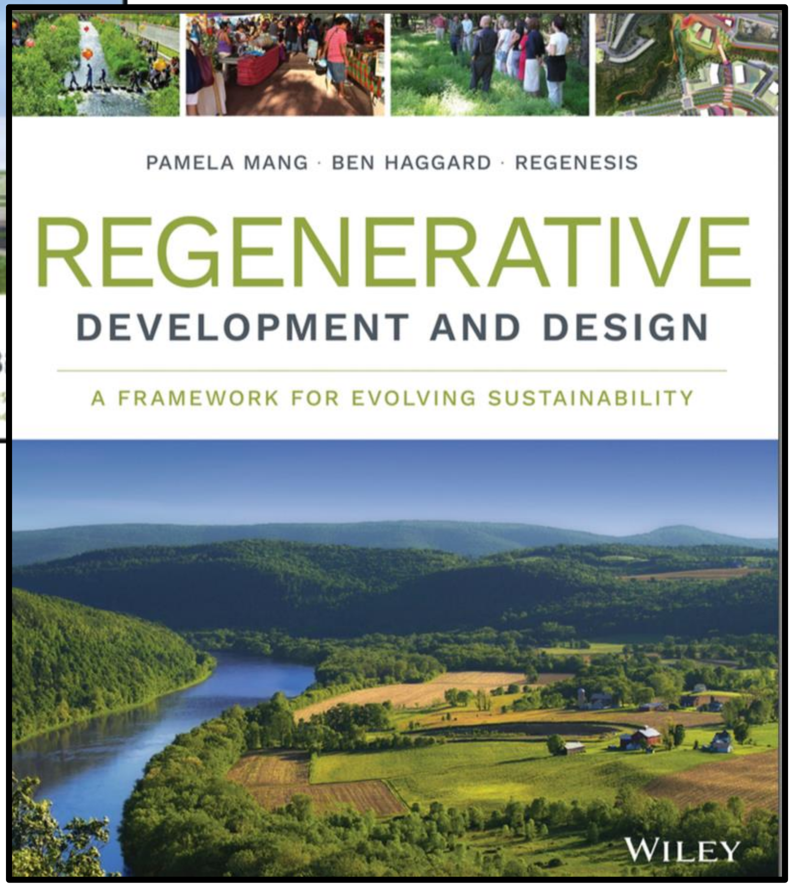
Conceptual Design Phase

جلسه دهم- مبانی طراحی محیطی، نظریه ها و روشها

اردیبهشت ماه 1398





Introduction

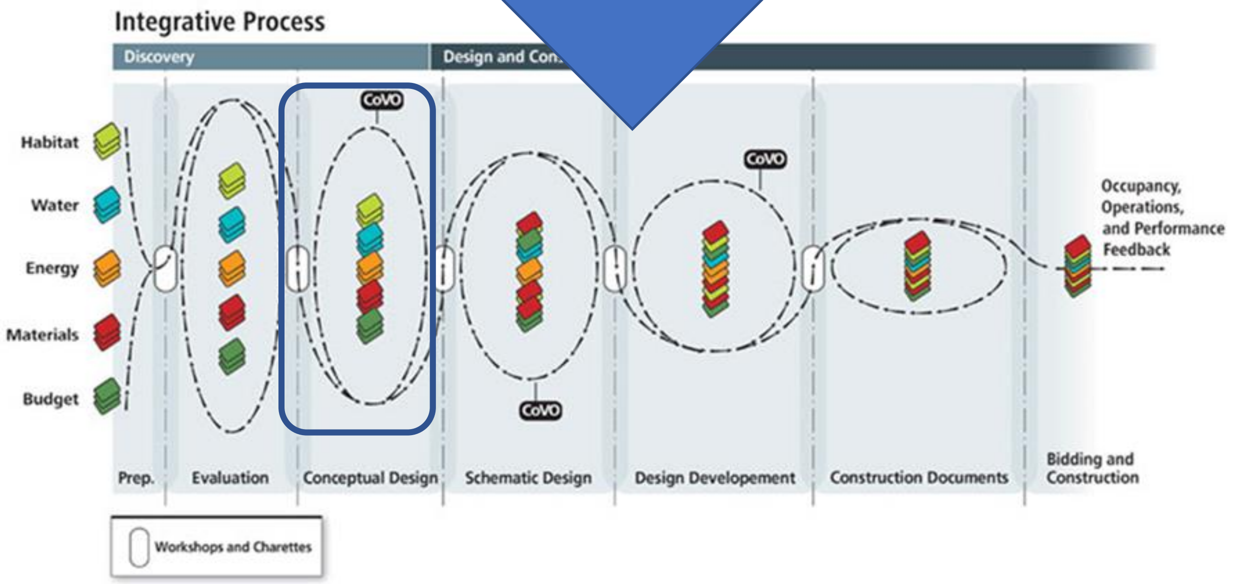
- Conceptual Design Charrette
- Third Research & Analysis Phase: Testing Conceptual design Ideas

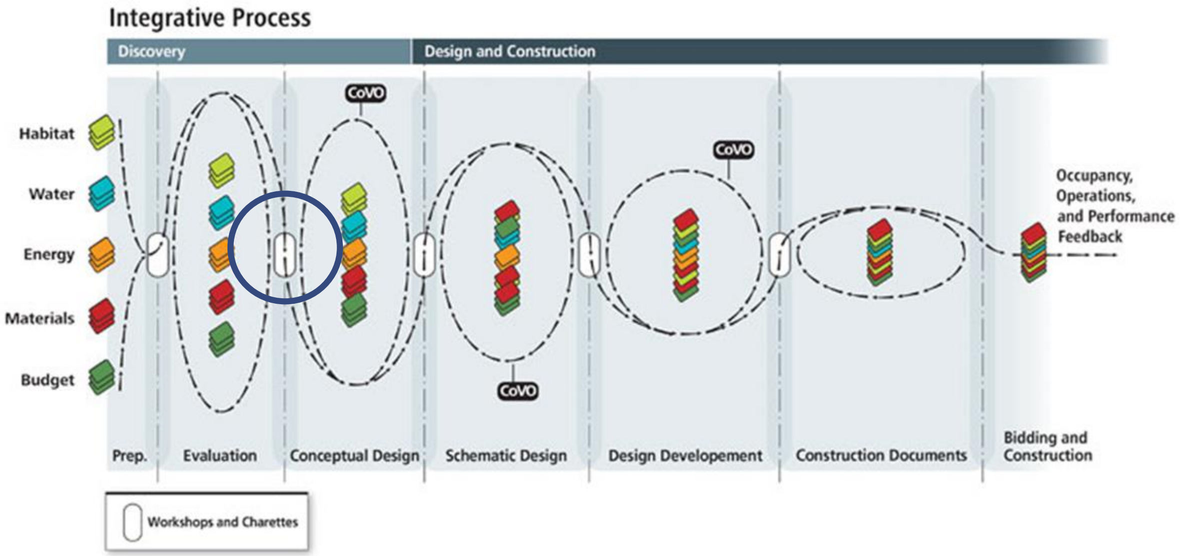
MENTAL MODEL
Client, design, and building teams' mind-set, attitude, and will

PROCESS
Integrated, all parties engaged-system optimization through iterative analysis

TOOLS
Metrics, benchmarks, modeling programs-analytical methods for materials and costing

PRODUCTS/ TECHNOLOGIES
Things and stuff, technologies and techniques





Conceptual Design Workshop

Stage A.4

Workshop No. 2: Conceptual Design Exploration

A.4.1 Workshop No. 2: Activities

- Assess the findings from Stage A.3 (Research and Analysis) of the four key subsystems:
  - Habitat
  - Water
  - Energy
  - Materials
- Generate conceptual site and building design concepts from:
  - Touchstones and Principles
  - Site forces
  - Community and watershed living-system patterns
  - Functional program
  - Breakout group working sessions
- Confirm alignment with Touchstones, Principles, Metrics, Benchmarks, and Performance Targets
- Review integrative cost-bundling studies in progress
- Review and adjust the Process Road Map
- Provide time for reflection and feedback from client and team members
- Commissioning: Review Owner's Project Requirements (OPR)

A.4.2 Principles and Measurement

- Document adjustments to Performance Targets to reflect input from Workshop No. 2
- Commissioning: Adjust OPR to reflect input from Workshop No. 2

A.4.3 Cost Analysis

- Update any required integrative cost-bundling templates to reflect input from Workshop No. 2

A.4.4 Schedule and Next Steps

- Update Integrative Process Road Map to reflect input from Workshop No. 2
- Distribute Workshop No. 2 Report

Generate Conceptual Design Concepts from:

- Touchstones and Principles
- Site forces
- Community and watershed living system patterns
- Functional program
- Breakout group working sessions

Site Forces

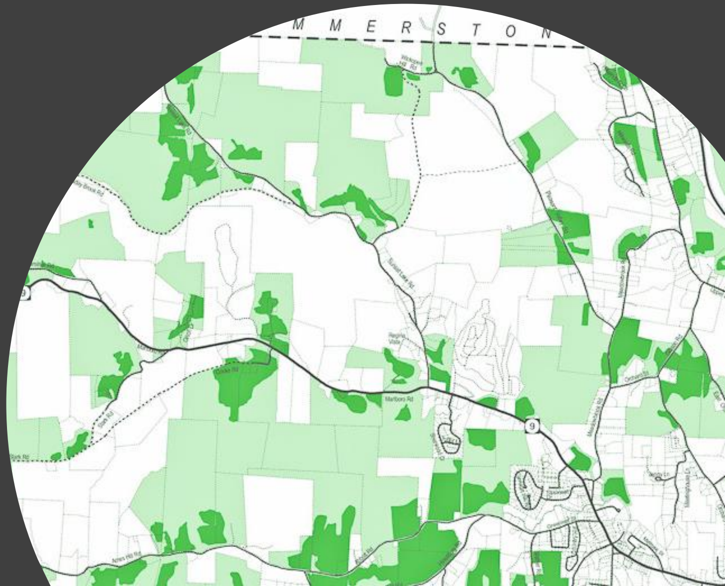
- Solar orientation
- Prevailing winds
- Pedestrian and/or vehicular circulation,
- Public transportation access
- Utilities access
- Topography
- Stormwater flows
- Views
- Noise sources
- Neighborhood connections

Community and watershed Liv patterns

- Have a team member (e.g. system ecologist, permaculturist, biologist, …) present to the team an assessment of site and neighborhood interrelationships.
- Try to understand the essence of the place:
  - What gives it vitality?
  - Viability?
  - What is the source of its potential to evolve?
  - Elicit from people what they love about where they live.

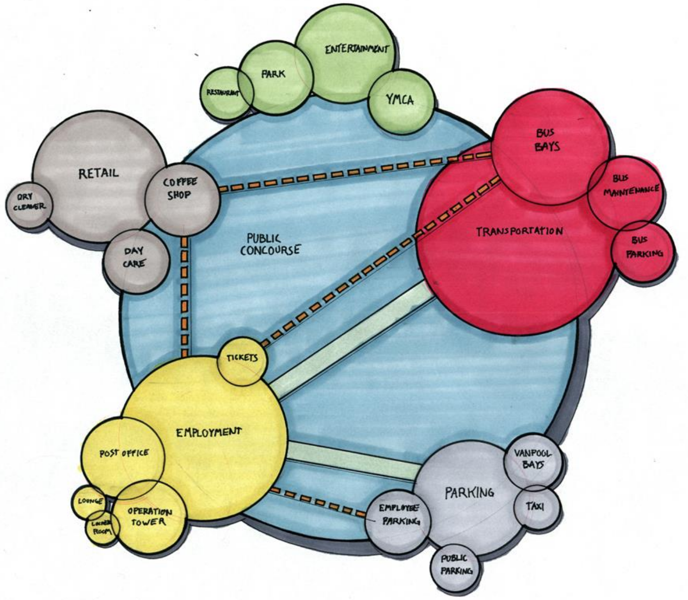
- “Biologically, life is not maintenance or restoration of equilibrium but is essentially maintenance of disequilibria….Reaching equilibrium means death and consequent decay….”

Ludwig von Bertalanffy (1968), General System Theory: Foundations, Developmnet, Applications

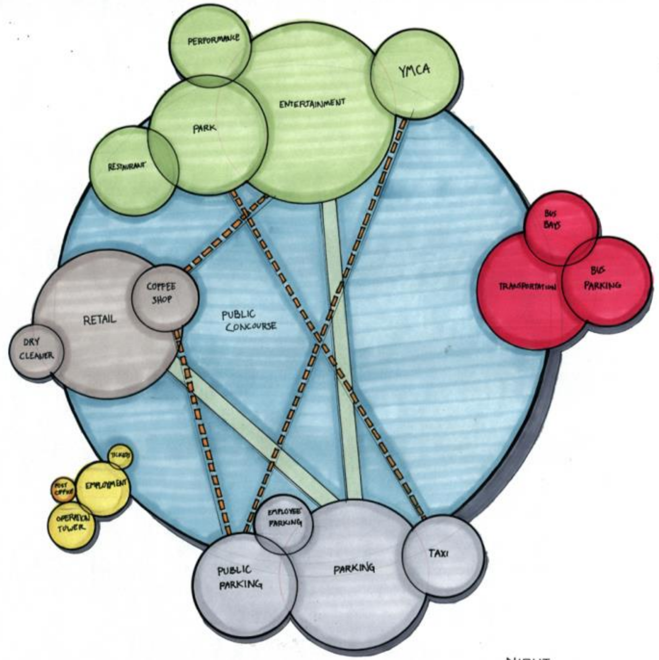


Functional Program

- The above research and discoveries often inform and generate adjustments to aspects of the project's functional program.
- e.g. similar occupancy schedules for several programmed spaces may suggest groupings of functions into adjacent or consolidated mechanical zones to improve the efficiency of both distribution components and operations.
- A group exercise that focuses on any potential adjustments to the functional program can be useful.
- The exercise can help clarify the functional "unknowns" or to refine the entire program.
- Defining the functional program collectively, can benefit all project team members in terms of reaching a deeper understanding of the project's purpose.



MORNING



NIGHT

Breakout Group Working Sessions

What you need:

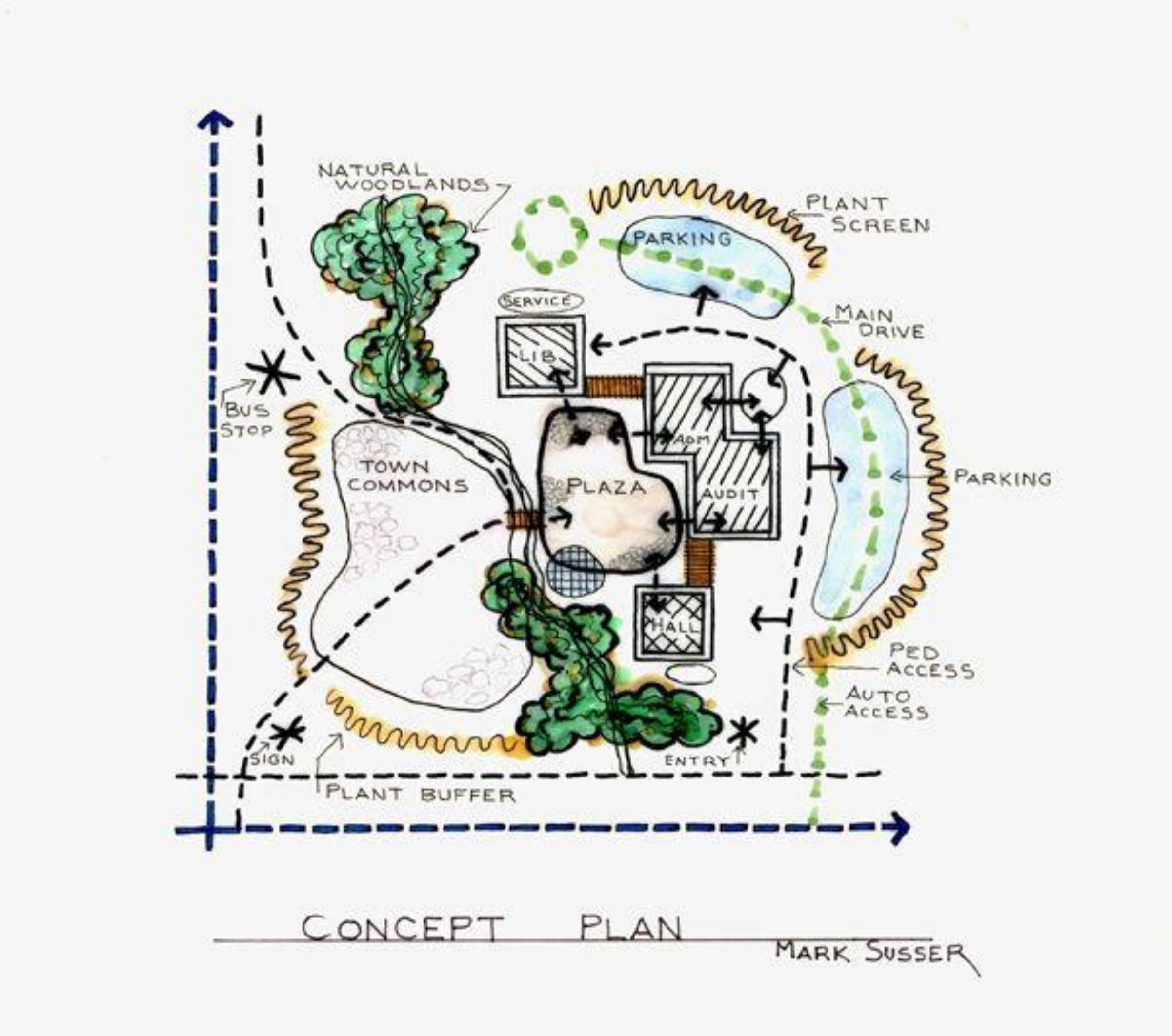
- Tracing paper, markers, colored pencils,….
- Project’s touchstones
- Principles and performance targets
- Information from the site forces exercise, and functional program review

Issues to consider:

- Site connections to the neighborhood
- Contextual remedies
- Functional and program components (in large chunks)
- Strategies aimed at achieving sustainability targets
- Parking, transportation, and service locations and solutions
- Image and character

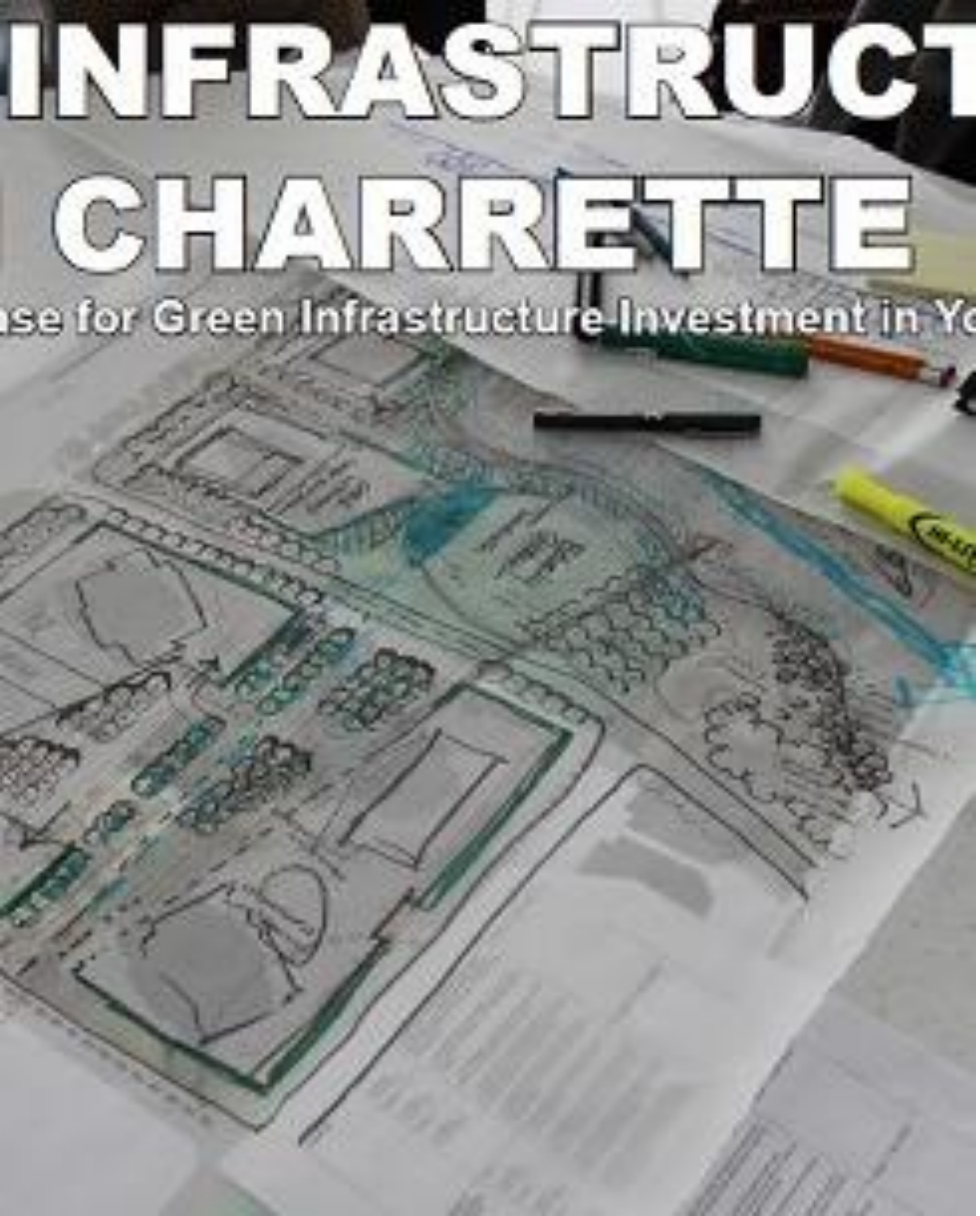
Breakout Group Presentations

- The outcome should be a single consolidated sketch from each small group for presentation to the large group.
- This site plan sketch should clearly depict the overarching design idea and identify all key strategies, proposed site solutions, and chunks of program elements.
- Solicit reflections from the larger group.
- “green hat”/ “red hat” exercise.
- How the “want-to-keep” concepts can best work together to create more whole solutions.
- Second round of breakout groups can be followed.



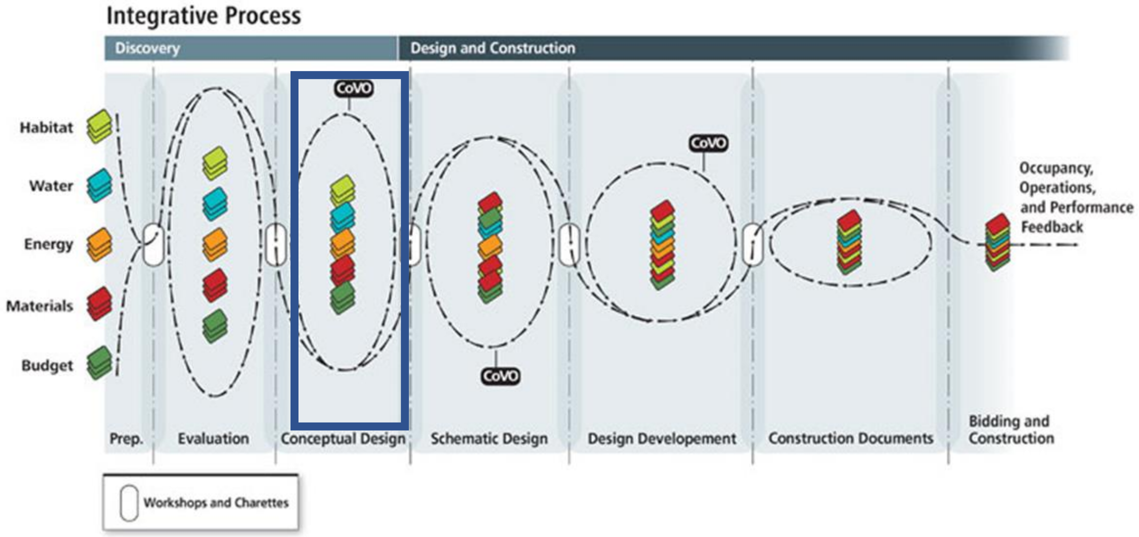
Other Workshop Activities

- Confirm alignment with Touchstone, Principles, Metrics, Benchmarks, and Performance Targets.
- Review/adjust integrative cost-bundling studies in progress.
- Provide time for reflection and feedback from client and team members.
- Commissioning: Review/adjust Owner's Project Requirements (OPR)
- Update integrative Process Road Map to reflect input from Workshop No. 2.



Distribute Workshop No. 2 Report

- Meeting agenda
- Lists of attendees
- Photos of activities
- Site forces exercise sketch
- Images of all conceptual sketches
- Meeting notes recording additional findings, results, reflections, “what to keep”, etc.
- Touchstones, Principles, Metrics, Benchmarks, Performance Targets- Including updated LEED checklist, if applicable
- Updated integrative cost-bundling template
- Process Road Map spreadsheet of schedule and tasks
- Next steps



Stage A.5

Research and Analysis: Testing Conceptual Design Ideas

A.5.1 Research and Analysis Activities: Explorations within individual disciplines and smaller related groups

- Test Conceptual Design schemes from Workshop No. 2 within the realities of the program and guiding principles relative to the four key subsystems:
  - Habitat
  - Water
  - Energy
  - Materials
- Coalesce findings and bring analysis to a reasonable conclusion before beginning the Schematic Design phase

A.5.2 Principles and Measurement

- Confirm and solidify Metrics, Benchmarks, and Performance Targets
- Commissioning: Develop Basis of Design (BOD)

A.5.3 Cost Analysis

- Put a price tag on every strategy and subsystem, then aggregate them into integrated cost bundles

A.5.4 Schedule and Next Steps

- Update Integrative Process Road Map in preparation for Workshop No. 3
- Prepare Agenda for Workshop No. 3

Research & Analysis: Testing Conceptual Design Ideas

Test Conceptual Design Schemes within the realities of the program and guiding principles relative to the four key subsystems

- More detailed analysis of the four key subsystems to test the feasibility of the ideas in terms of meeting:
  - Programmatic requirements
  - Budget
  - Principles
  - Performance targets
- Includes small cross-disciplinary group sessions
- Informed by using various **tools**

Habitat (biotic systems other than human)

- Look for multiple ways to use a unit of water to support life before it leaves the site:
  - Irrigation
  - Habitat for constructed wetlands
  - Vegetated roof(s)
  - Groundwater recharge
  - On-site pond
  - Rain gardens and bioswales
- Investigate planting materials appropriate to the microclimates that may result from the design of the building itself.
- Look for opportunities for restoring plant habitat in conjunction with integrating stormwater management opportunities.

Habitat (Biotic systems other than human)- Tools (examples)

- Floristic Quality Assessment

-Coefficients of conservatism (C value) range from 0 to 10 and represent an estimated probability that a plant is likely to occur in a landscape relatively unaltered from what is believed to be a pre-settlement condition.

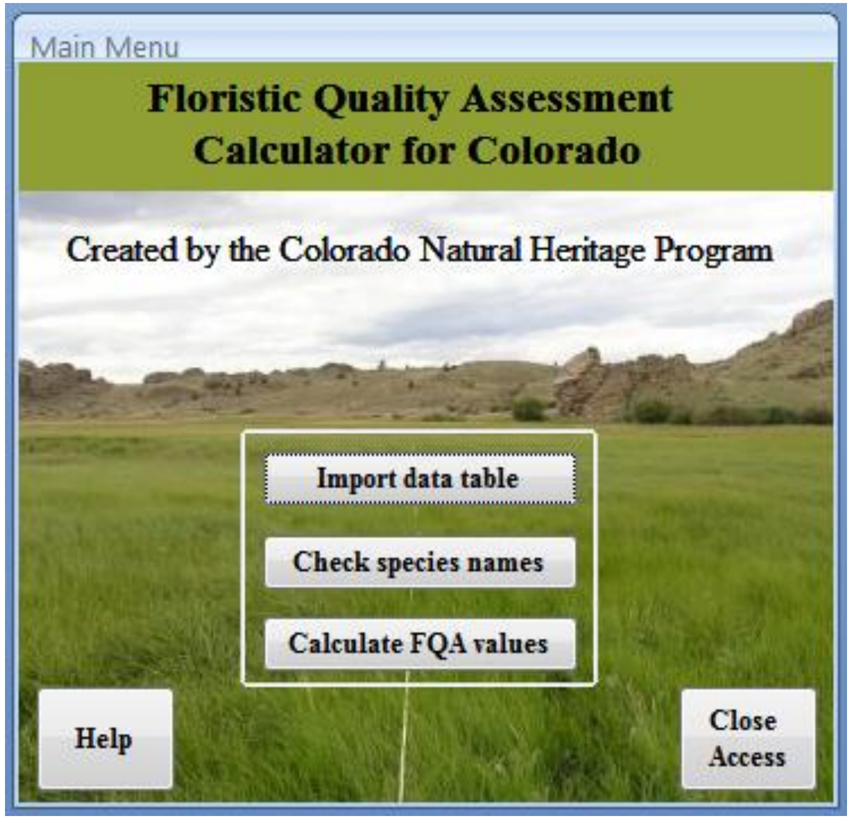
-Floristic Quality Index (FQI): $\bar{C}\sqrt{n}$

n: total number of species

- Observation of living systems

-data or facts alone, do not reveal patterns

- Consolidated Inventories of soil, plant species, animal habitat, microclimates, and evolutionary interaction of people in the project's place over time.

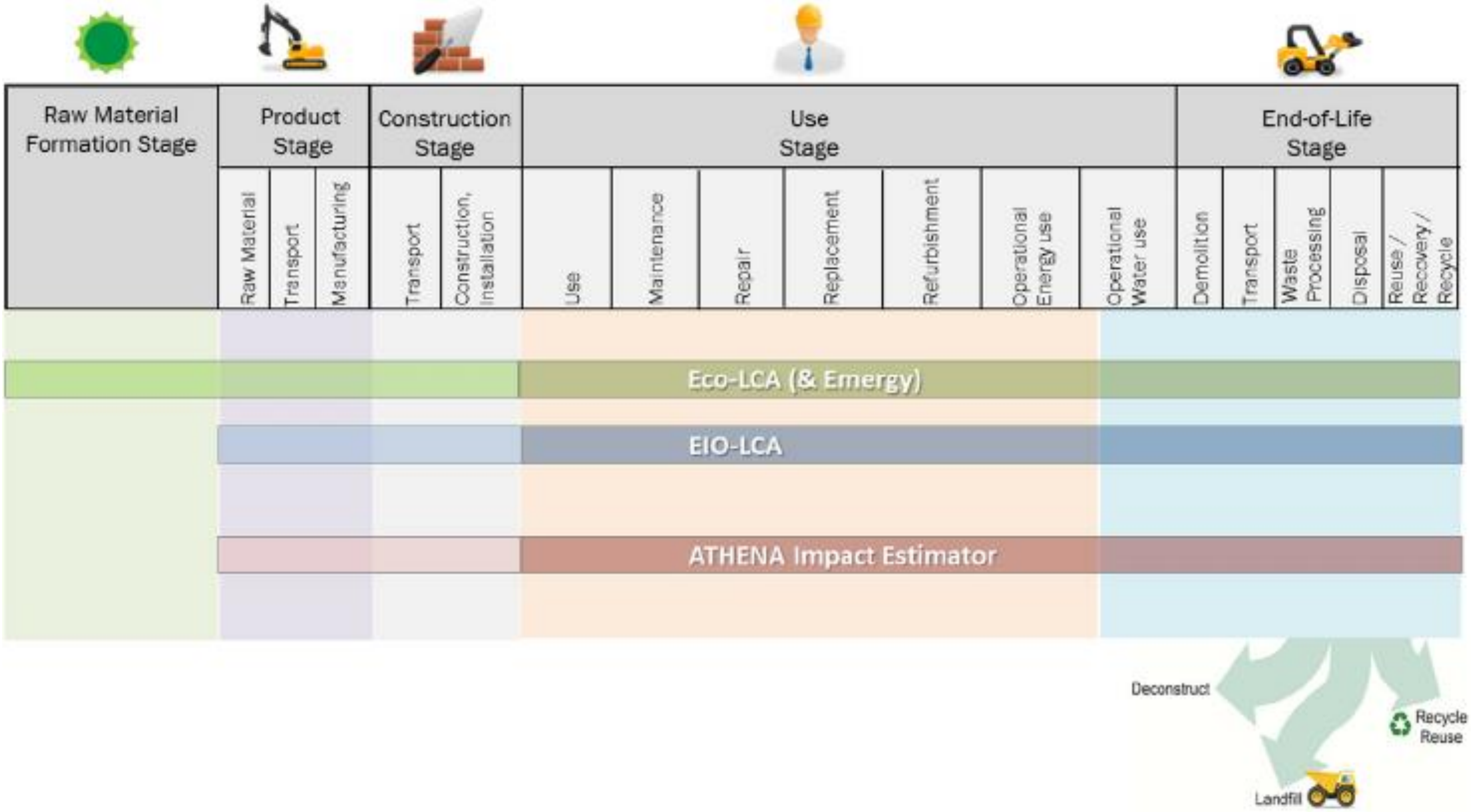


Habitat (Human)

Example of issues to be tested and examined in more detail:

- Indoor air quality
- Ventilation
- Thermal comfort
- Lighting
- Acoustics
- Odor
- Vistas and views
- Inter-relationships between the project and the community
- Toxicants in materials (extraction, production, use, and disposal)

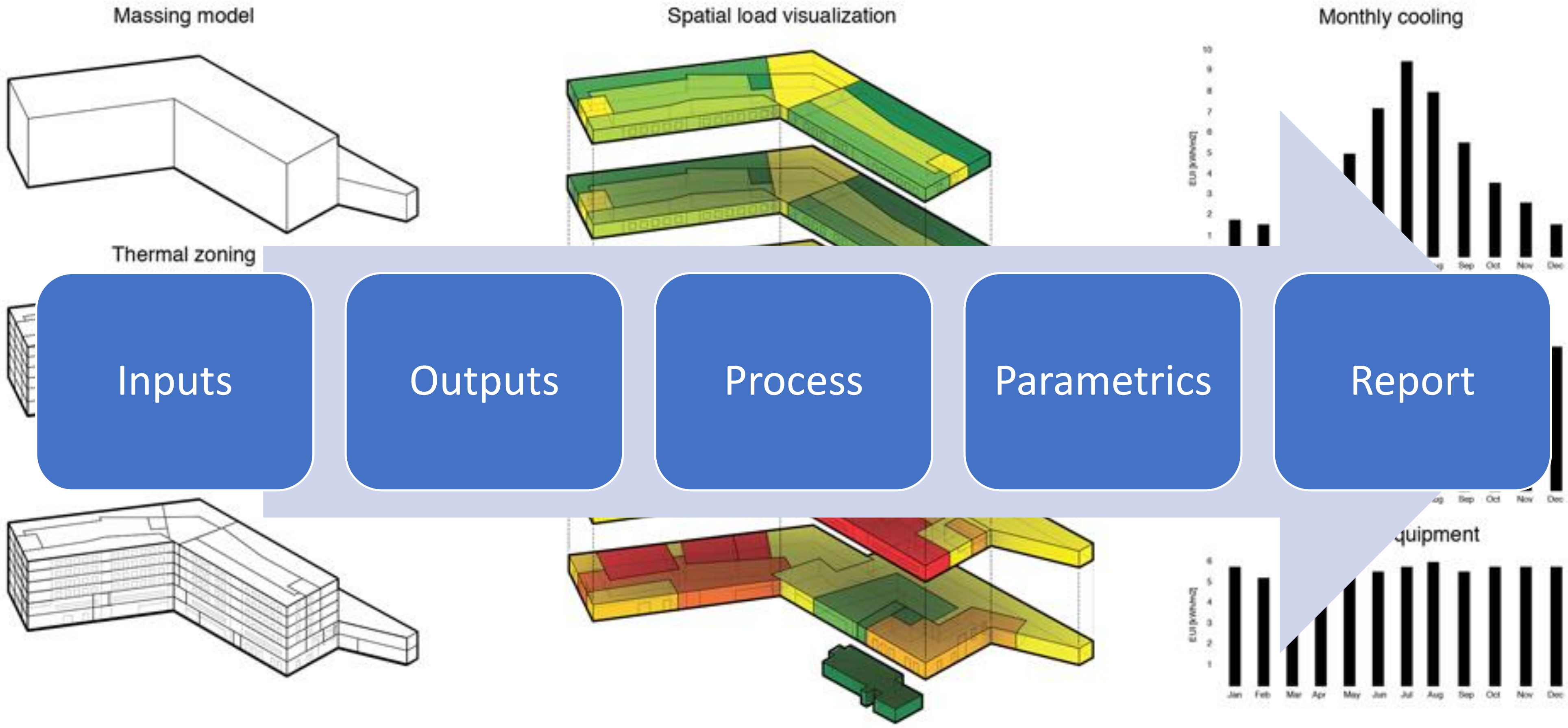
Habitat (Human)- Tools (Examples)- Toxicants



Energy

- Modeling runs to evaluate the effectiveness of individual strategies.
- Determine an appropriate baseline for comparison.
- Reduce, Reduce, Reduce!
- Prioritize Energy-efficiency measures (EEMs)
- HVAC system options should be evaluated after all loads have been reduced via the most promising combination of EEMs.

Energy Simulation Tools



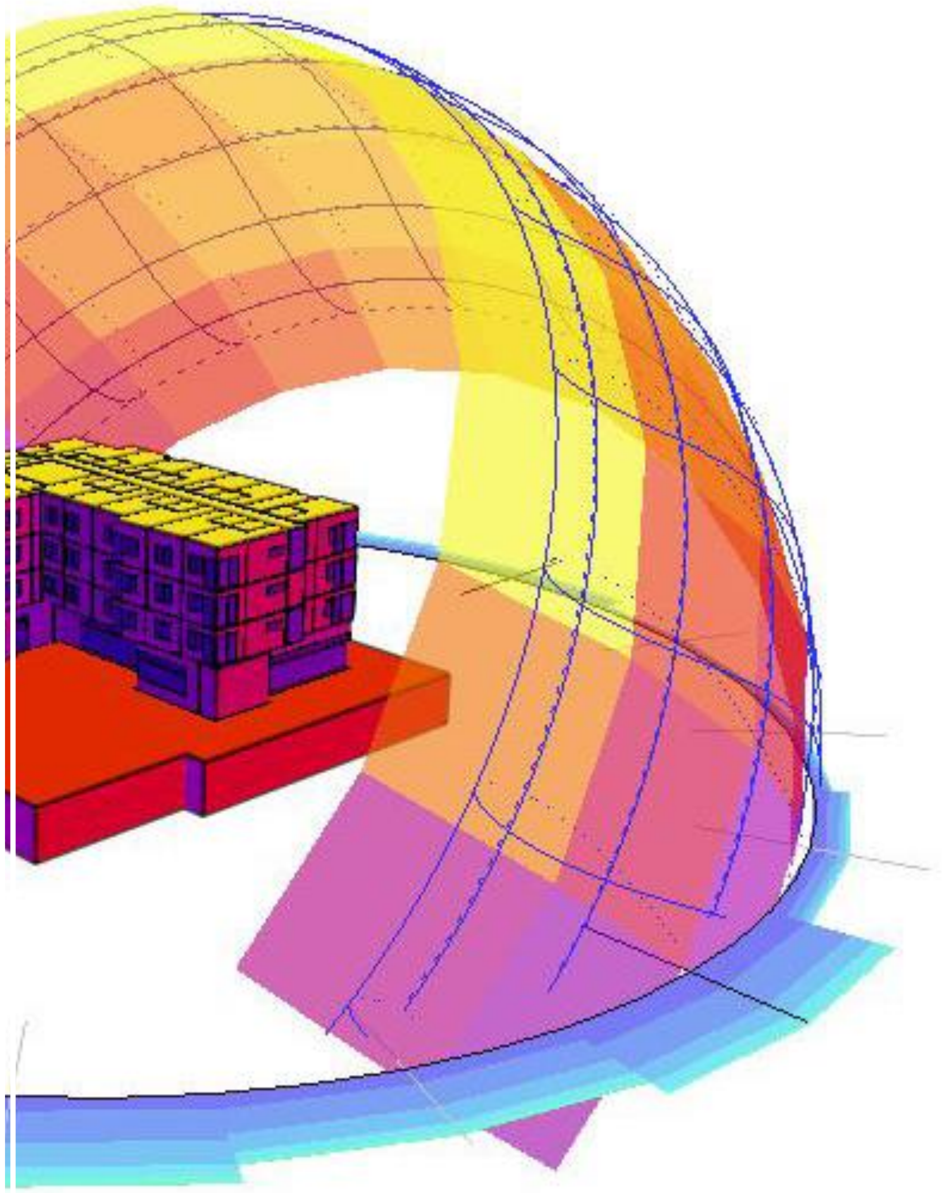
Inputs → Outputs → Process → Parametrics → Report

Archsim Energy Modeling for Grasshopper © Timur Dogan

Image credits: Aiko Nakano, Denise Rivas, Manos Saratsis, Julia Sokol

Energy Modeling- Inputs

- **Envelope data (U value and thermal mass inputs)**
- **Areas of floor, wall, roof, and glazing, etc, by zone and orientation.**
- **U-value, Tvis, and SHGC for glazing**
- **Internal gains such as people and equipment**
- **Lighting loads and schedules**
- **Weather data such as insolation, Heating degree days, cooling degree days, wind rose charts**
- **Seasonal design temperatures**
- **Indoor conditions- occupied and unoccupied temperature set points**
- **Utility rates**
- **Ventilation quantities and schedules**
- **Ventilation equipment recovery efficiency**
- **Infiltration assumption**
- **Distribution equipment types and efficiencies, including fans and pumps, economizer settings, ….**
- **HVAC equipment type, efficiencies, and details regarding settings.**



Energy Modeling- Outputs

Monthly & annual energy consumption for the following end uses:

Space heating

Space cooling

Fans and pumps

Domestic hot water (DHW)

Interior lighting

Exterior lighting

Equipment, including plug loads

Other ancillary or miscellaneous loads

Heating and cooling loads by building assembly type

Energy Modeling Process

Review the outputs to see how they compare with experience and data from actual buildings of similar occupancy (such as energy use data in Target finder).

We want to convince ourselves fist the model is realistic and then we want to be able to design parametric runs to look at variations.

Metrics Comparison for Your Property & Your Target

Metric	Baseline (May 2011)	Current (May 2013)	Target*	Median Property*
ENERGY STAR score (1-100)	72	67	75	50
Source EUI (kBtu/ft²)	210.7	225.4	204.1	276
Site EUI (kBtu/ft²)	119.6	139.7	126.5	171.1
Source Energy Use (kBtu)	24073025.7	25750203.4	23315771.7	31529412
Site Energy Use (kBtu)	13657396.1	15954800.9	14450980.5	19545950.7
Energy Cost ($)	0	0	0	0
Total GHG Emissions (MtCO2e)	1439.5	1583.4	1433.78738412	1939.7964222

* To compute the metrics at the target and median levels of performance, we will use the fuel mix associated with your property's current energy use.

Energy modeling Parametrics- Report

Ferguson Elementary
eQuest v3.6 Modeling Results Summary
Building Energy Enduse Summary for Individual Energy Efficiency Measures (EEMs)

Individual EEM Design Runs	Base Building ASHRAE 90.1-2004 Appendix G w/ modified HVAC	EEM-1 R20 Roof	EEM-2 R30 Roof	EEM-3 Triple Pane Windows	EEM-4 Reduced Lighting LPD=0.75 W/sqft	EEM-5 LPD=0.75 w/ Daylight On/Off Controls	EEM-6 Increased Wall Insulation to overall Rt=18.5	EEM 7 Slab on Grade Edge Insulation	EEM 8 Elim Bridge & South Stair Glazing
Estimated Operating Costs									
Electric	$70,611	$70,472	$69,838	$72,361	$61,214	$58,646	$70,959	$71,583	$68,914
Gas	$68,210	$67,155	$65,771	$55,850	$71,150	$71,620	$63,631	$46,499	$65,424
Total	$138,821	$137,627	$135,609	$128,211	$132,364	$130,266	$134,590	$118,082	$134,338
Cost/SqFt	**$1.56**	**$1.55**	**$1.52**	**$1.44**	**$1.49**	**$1.46**	**$1.51**	**$1.33**	**$1.51**
Consumption									
Site (kBtu / SqFt / Yr)	91.4	90.6	89.1	80.9	90.6	90.2	87.5	71.2	87.8
Building Electric Use (kWh)									
Total	726,722	730,864	725,871	754,987	634,267	610,662	734,861	730,443	701,324
Building Gas Use (Therms)									
Total	56,587	55,704	54,547	46,290	59,033	59,424	52,772	38,497	54,265
EEM Economics									
EEM Savings	NA	$1,194	$3,212	$10,610	$6,457	$8,555	$4,231	$20,739	$4,483

EEM Descriptions

EEM 1 - ASHRAE Baseline but with R20 roof insulation
EEM 2 - ASHRAE Baseline but with R30 roof insulation
EEM 3 - ASHRAE Baseline but with Triple pane windows, Pella Designer Series LowE IG w/ argon w/ 3rd LowE pane, U=0.16, SHGC=0.37, Vt=0.61
EEM 4 - ASHRAE Baseline but with reduced lighting power density (LPD) to 0.75 W/sqft
EEM-5 - ASHRAE Baseline but with reduced lighting power density (LPD) to 0.75 W/sqft and Daylighting On/Off controls for 1/3 of lights in perimeter spaces
EEM-6 - ASHRAE Baseline but with Wall insulation increased such that the overwall wall R=18.5
EEM-7 - ASHRAE Baseline but with R10 24" vertical and horizontal edge insulation added to slab on grade
EEM-8 - ASHRAE Baseline but eliminating all of the bridge windows and 75% of the windows in the South Stairwell.

Figure 5-49 These sample parametric energy modeling runs analyzed individual energy-efficiency measures (EEMs) to evaluate energy savings relative to a baseline (see also Figure 5-50). *Image courtesy of Sheila Sagerer.*

Energy modeling Report- Cumulative effects of combination of chosen EEMs on energy savings

Ferguson Elementary
eQuest v3.6 Modeling Results Summary
Building Energy Enduse Summary for Energy Efficiency Measure (EEM) Combinations

Combined EEM Design Runs	Base Building ASHRAE 90.1-2004 Appendix G w/ modified HVAC	EEM Combo 1 EEM 2, 3, 5, 6, 7, 8 w/ modified HVAC	EEM Combo 2 EEM 2, 3, 5, 6, 7, 8 w/ groundsource heatpumps & Heat recovery on ded OA
Estimated Operating Costs			
Electric	$70,611	$55,864	$64,652
Gas	$68,210	$27,188	$1,280
Total	**$138,821**	**$83,052**	**$65,932**
Cost/SqFt	**$1.56**	**$0.93**	**$0.74**
Building Energy Use (MBtus)			
Site (kBtu / SqFt / Yr)	91.4	46.5	26.7
Building Electric Use (kWh)			
Total	**726,722**	**555,385**	**671,554**
Building Gas Use (Therms)			
Total	**56,587**	**22,409**	**836**
EEM Economics			
EEM Savings	NA	$55,769	$72,889

EEM Descriptions

Baseline building uses ASHRAE design as described on "Baseline Input Summary" tables.

EEM Combo 1 - ASHRAE building with chiller & boiler HVAC system, applying EEMs 2, 3, 5, 6, 7, & 8: R30 Roof, Pella Designer Series Triple Pane Windows U=0.16, SHGC=0.37, VLt=0.61, LPD reduced to 0.75 W/sqft, Daylight On/Off Controls for 1/3 of lights in perimeter spaces, wall insulation to overall Rt=18.5, R10 24" vertical and horizontal edge insulation, and eliminating all windows in bridge connector and 75% of windows in South Stairwell

EEM Combo 2 - ASHRAE Baseline but with GSHPs and heat recovery on dedicated OA units and applying EEMs 2, 3, 5, 6, 7, & 8: R30 Roof, Pella Designer Series Triple Pane Windows U=0.16, SHGC=0.37, VLt=0.61, LPD reduced to 0.75 W/sqft, Daylight On/Off Controls for 1/3 of lights in perimeter spaces, wall insulation to overall Rt=18.5, R10 24" vertical and horizontal edge insulation, and eliminating all windows in bridge connector and 75% of windows in South Stairwell

Energy-Tools

- Energy-10
- E-Quest
- VisualDOE
- HAP
- TRACE
- EnergyPlus (BLAST+DOE-2)
- TRaNsient Systems Simulation (TRANSYS)

Impact Estimator
- Sample Building #1 (4.87 KiloTonnes)
  - Columns and Beams (427.88 Tonnes)
  - Floors (1.1 KiloTonnes)
  - Roofs (19.41 Tonnes)
  - Foundations (232.67 Tonnes)
  - Walls (3.1 KiloTonnes)
  - Extra Materials (13.88 KiloGrams)
- Sample Building #2 (2.13 KiloTonnes)

1 of 1 | 100% | Find | Next

Summary Measure Table By Life Cycle Stages

Project Sample Building #1

	Manufacturing			Construction			Maintenance			End - Of - Life			Operating Energy	
Summary Measures	Material	Transportation	**Total**	Material	Transportation	**Total**	Material	Transportation	**Total**	Material	Transportation	**Total**	Annual	**Total**
Fossil Fuel Consumption (MJ)	3.33e+07	1.53e+06	**3.48e+07**	1.56e+06	1.80e+06	**3.36e+06**	8.93e+06	6.20e+05	**9.55e+06**	1.92e+06	6.73e+05	**2.59e+06**	6.04e+06	**5.98e+**
Global Warming Potential (kg CO2 eq)	3.32e+06	8.80e+04	**3.41e+06**	1.07e+05	1.30e+05	**2.37e+05**	9.96e+05	4.57e+04	**1.04e+06**	1.29e+05	5.18e+04	**1.81e+05**	3.52e+05	**3.48e+**
Acidification Potential (moles of H+ eq)	1.36e+06	3.58e+04	**1.40e+06**	5.12e+04	4.20e+04	**9.33e+04**	7.28e+05	1.46e+04	**7.43e+05**	6.93e+03	1.59e+04	**2.28e+04**	1.43e+05	**1.41e+**
HH Criteria (kg PM10 eq)	2.33e+04	4.69e+01	**2.34e+04**	4.24e+01	5.46e+01	**9.70e+01**	2.25e+04	1.90e+01	**2.25e+04**	9.29e+01	2.06e+01	**1.14e+02**	5.00e+02	**4.95e+**
Eutrophication Potential (kg N eq)	1.75e+03	3.91e+01	**1.79e+03**	4.96e+01	4.57e+01	**9.53e+01**	2.52e+02	1.59e+01	**2.68e+02**	6.95e+00	1.50e+01	**2.20e+01**	1.86e+01	**1.84e+**
Ozone Depletion Potential (kg CFC-11 eq)	1.52e-02	3.59e-06	**1.52e-02**	7.55e-07	5.20e-06	**5.96e-06**	4.41e-03	1.82e-06	**4.41e-03**	5.64e-06	2.06e-06	**7.70e-06**	2.97e-07	**2.94e-**
Smog Potential (kg O3 eq)	3.24e+05	1.98e+04	**3.44e+05**	2.78e+04	2.25e+04	**5.03e+04**	1.02e+05	7.81e+03	**1.10e+05**	6.74e+02	8.44e+03	**9.12e+03**	1.81e+03	**1.79e+**

Page 1 of 1

Materials-Tools (example)

Athena Impact Estimator for Buildings

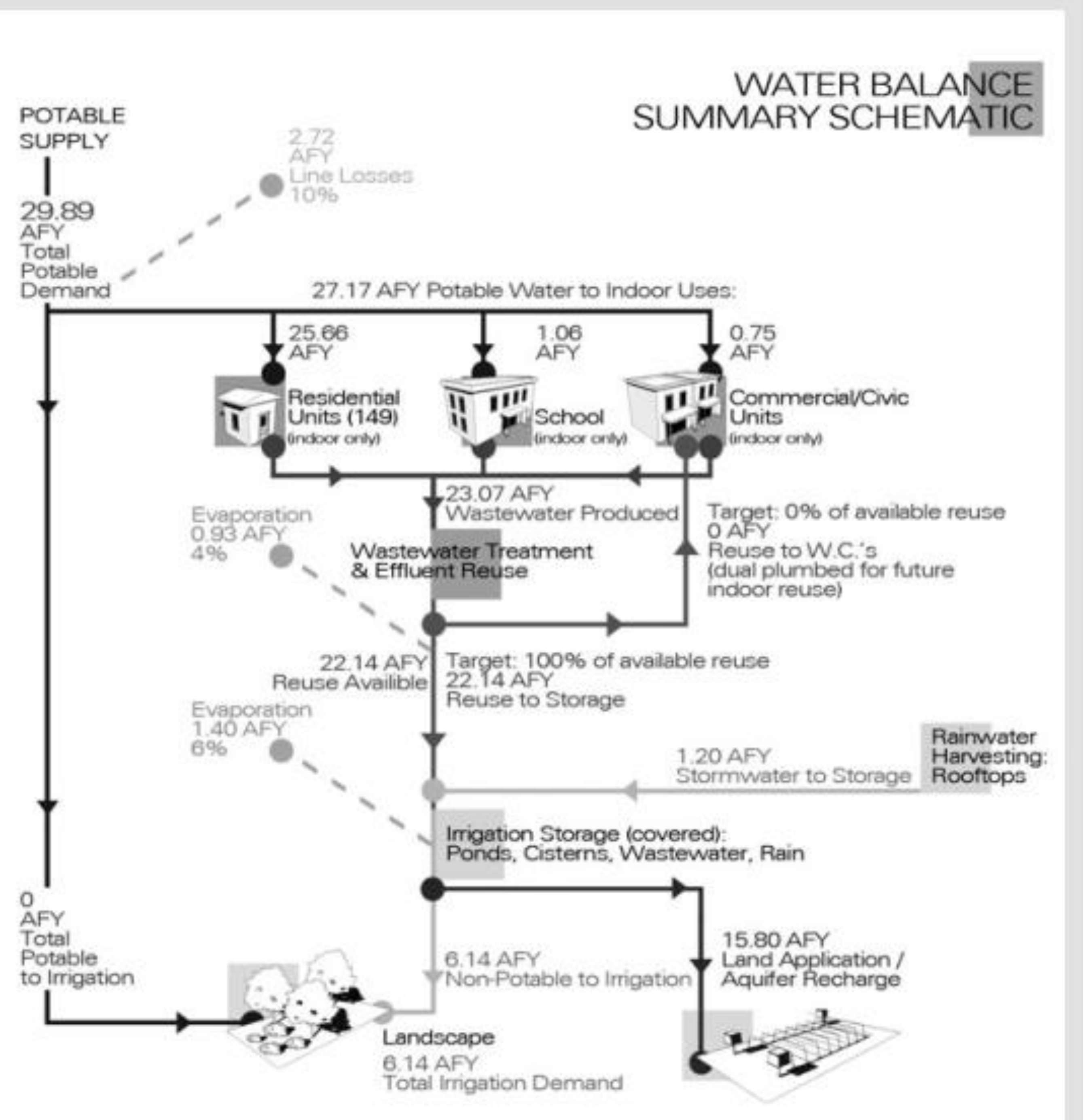
Athena Pavement LCA

Athena EcoCalculator for Commercial Assemblies

Athena EcoCalculator for Residential Assemblies

Water- Tools (example)

Water-balancing diagrams



Water-Tools (example)-

Water-balancing spreadsheets

DEP Norristown Office Building: Monthly Stormwater Harvesting Predictions

New Hard Roof Area - Total	23,629	sq. ft.
Green Roof Area - Total	850	sq. ft.
Hard Roof Run-off	95	percent
Green Roof Run-off	50	percent
Annual Toilet Demand	250,000	gal. (See WEc2)
Daily Toilet Demand	1,000	gal. (See WEc2)
Daily Hose Bibb demand	50	gal. Atrium planting hose bibb at 5 gpm x 10 minutes/day = 50 gal/day
Annual Work days	250	
Cistern Usable Storage Capacity	4,250	gal. 5,500 gal. nominal capacity x 85% actual: sized to accommodate 4-day demand of 1,050 gal/day x 4 = 4,200 gal.

Hard Roof Default Run-off Coeff.	95.00%
Stormwater Reused	41.47%
Adjusted Hard Roof Run-off Coeff.	53.53%

Month	Average Rain Inches	Rain cu ft	Rain gal.	Green Roof stormwater gal/month	Hard Roof stormwater gal/month	Total Roof stormwater gal/month	Average Work Days per month	Daily Toilet Demand gal/day	Daily Hose Bibb Demand gal/day	Monthly Toilet Demand gal/month	Monthly Hose Bibb Demand gal/month	Total Greywater Demand gal/month	% Stormwater Recovered
Jan	3.3					**47,049**	20.83	1,000	50	20,833	1,042	**21,875**	**46.49**
Hard Roof		6,498	48,605		46,175								
Green Roof		234	1,748	874									
Feb	3					**42,772**	20.83	1,000	50	20,833	1,042	**21,875**	**51.14**
Hard Roof		5,907	44,186		41,977								
Green Roof		213	1,590	795									
Mar	3.5					**49,900**	20.83	1,000	50	20,833	1,042	**21,875**	**43.84**
Hard Roof		6,892	51,551		48,973								
Green Roof		248	1,854	927									
Apr	3.7					**52,752**	20.83	1,000	50	20,833	1,042	**21,875**	**41.47**
Hard Roof		7,286	54,496		51,772								
Green Roof		262	1,960	980									
May	4.2					**59,880**	20.83	1,000	50	20,833	1,042	**21,875**	**36.53**
Hard Roof		8,270	61,861		58,768								
Green Roof		298	2,225	1,113									
Jun	3.6					**51,326**	20.83	1,000	50	20,833	1,042	**21,875**	**42.62**
Hard Roof		7,089	53,023		50,372								
Green Roof		255	1,907	954									
Jul	4.5					**64,158**	20.83	1,000	50	20,833	1,042	**21,875**	**34.10**
Hard Roof		8,861	66,279		62,965								
Green Roof		319	2,384	1,192									
Aug	4.1					**58,455**	20.83	1,000	50	20,833	1,042	**21,875**	**37.42**
Hard Roof		8,073	60,388		57,368								
Green Roof		290	2,172	1,086									
Sept	4.1					**58,455**	20.83	1,000	50	20,833	1,042	**21,875**	**37.42**
Hard Roof		8,073	60,388		57,368								
Green Roof		290	2,172	1,086									
Oct	3					**42,772**	20.83	1,000	50	20,833	1,042	**21,875**	**51.14**
Hard Roof		5,907	44,186		41,977								
Green Roof		213	1,590	795									
Nov	3.8					**54,177**	20.83	1,000	50	20,833	1,042	**21,875**	**40.38**
Hard Roof		7,483	55,969		53,171								
Green Roof		269	2,013	1,007									
Dec	3.6					**51,326**	20.83	1,000	50	20,833	1,042	**21,875**	**42.62**
Hard Roof		7,089	53,023		50,372								
Green Roof		255	1,907	954									
Annual Totals	44.4	90,572	677,481	11,762	621,258	**633,021**	250			250,000	12,500	**262,500**	**41.47**
Annual totals adjusted for runoff coefficient				5,881	590,195	**596,077**							

PART A—

Confirm and solidify Metrics, Benchmarks, and Performance Targets

- LEED targets may not always be appropriate for a project’s goals.

➢ Dive into the details embedded within the benchmarks by LEED defined.

- e.g. baseline parameters identified by ASHRAE 90.1 , Appendix G.

Commissioning: Develop Basis of Design (BOD)

- The BOD is intended to provide a technical narrative explanation of the design parameters and quantified performance objectives established for the project.

Sample Basis of Design Outline

The following sample BOD outline, when tailored to the specifics of a project, provides a framework for documenting the technical design parameters and quantified performance objectives.

1. Primary design assumptions

a. Space use based on OPR
b. Redundancy level
c. Diversity issues
d. Climatic conditions
e. Space zoning
f. Occupancy types and schedules
g. Special requirements for indoor environmental conditions

2. Standards

a. General building codes, guidelines, regulations
b. LEED related additional requirements (i.e., energy-use reduction, water-use reduction, etc.)
c. Industry-related requirements (i.e., hospital, information technology (IT), manufacturing standards)

3. Narrative descriptions and performance requirements (chronological descriptions of the main systems as they evolve over the phases of project design and construction)

a. Architectural systems
b. HVAC systems
c. Building automation systems
d. Lighting systems
e. Water systems
f. Power systems (normal/emergency, special metering)
g. Communications systems
h. Information technology systems
i. Security and life-safety systems

Cost Analysis

Put a price tag on every strategy and subsystem, then aggregate them into integrated cost bundles.

Certain strategies are essential to making critical path design decisions, while others can wait!

Questions to Consider for writing the Reflections:

ESTABLISH INITIAL BENCHMARKS, AND PERFORMANCE TARGETS FOR ANY OF THE FOUR KEY SUBSYSTEMS IN YOUR STUDIO PROJECT.

WHAT IS THE ESSENCE OF PLACE IN TALESH? TRY TO DESCRIBE IT IN ONE WORD!

Preparation Reading for Next Class:

Subject:

Schematic Design Phase in IDP process