Module I(a)
Site Analysis

ARCH 738: REAL ESTATE PROJECT MANAGEMENT

Morgan State University

Jason E. Charalambides, PhD, MASCE, AIA, ENV_SP

(This material has been prepared for educational purposes)

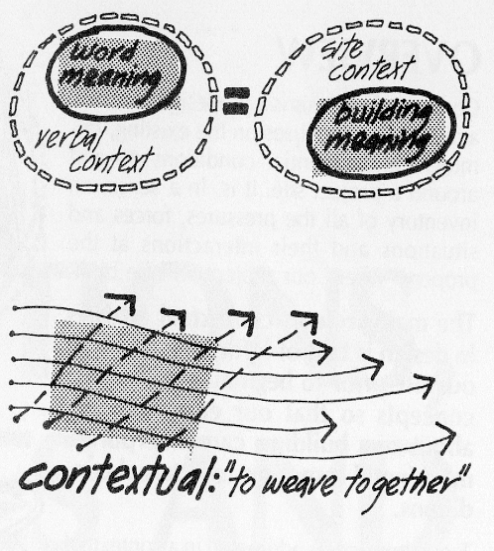
AVANT-GARDE ENGINEERING LLc
CONSULTING ARCHITECTS/ENGINEERS

Sites As Active Networks

THE CONCEPT OF CONTEXTUAL RELATIONSHIPS

CONTEXT IS DEFINED AS A "WHOLE SITUATION, BACKGROUND OR ENVIRONMENT, RELEVANT TO SOME EVENT OR PRODUCT."

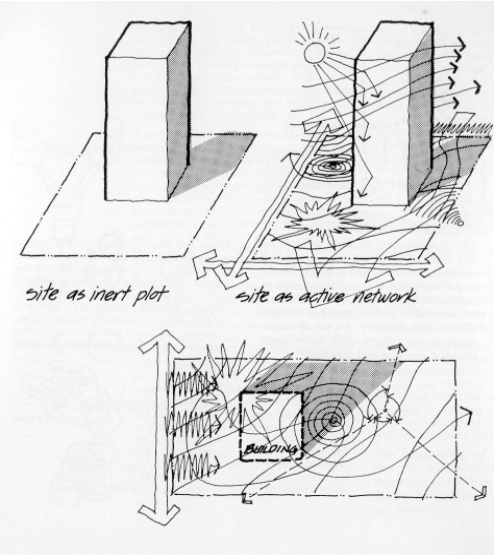
The derivation of the word means to "weave together."



SITE AS A NETWORK

A Site is never inert.

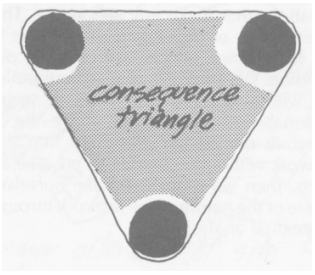
It is an ongoing set of very active networks that are intertwined in complex relationships.

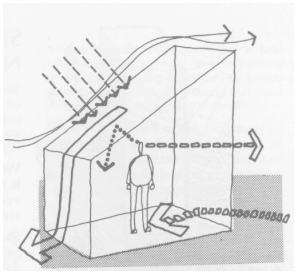


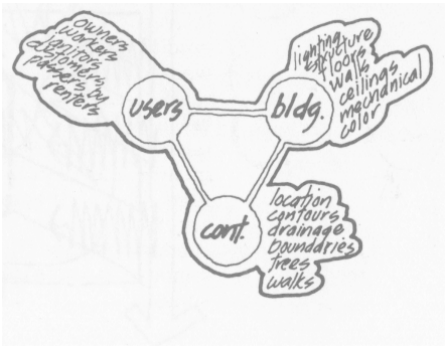
CONSEQUENCE TRIANGLE

The consequence triangle focuses in the simulation of the completed and the occupied building.

It is based on the hypothesis that it is not the design or the building itself that is our ultimate responsibility as designers but the prediction and delivery of a set of consequences or effects that have been deemed positive and possible.

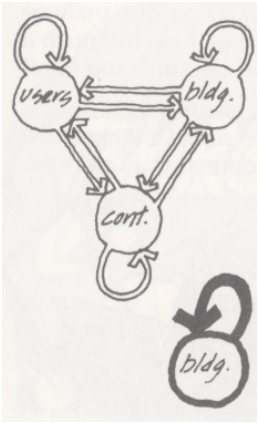


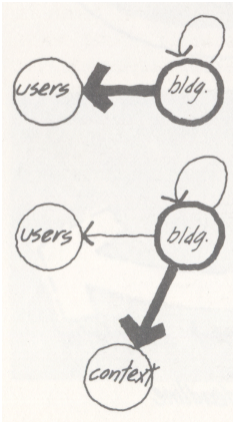




CONSEQUENCE TRIANGLE CONT

It behooves us to not only know something about the compositional characteristics of buildings, people and contexts but also how they affect themselves and each other.

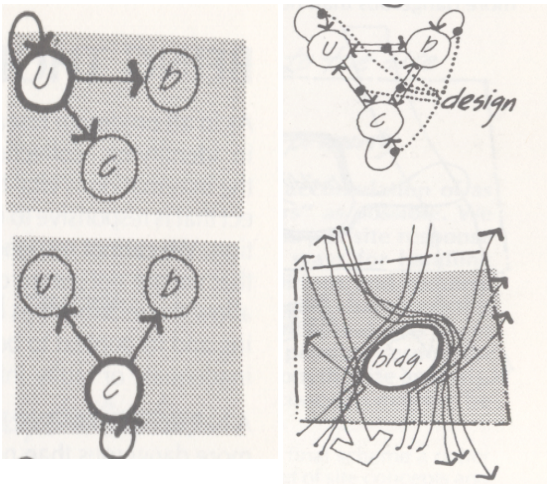




CONSEQUENCE TRIANGLE CONT

The implanting of our building on the site will always result in a remodeling of our site.

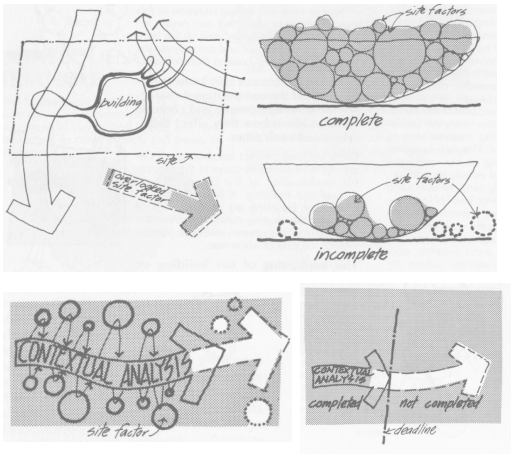
The ultimate goal is <u>to leave the site in a condition that is better than the one in which we initially found it</u>.



BEING THOROUGH

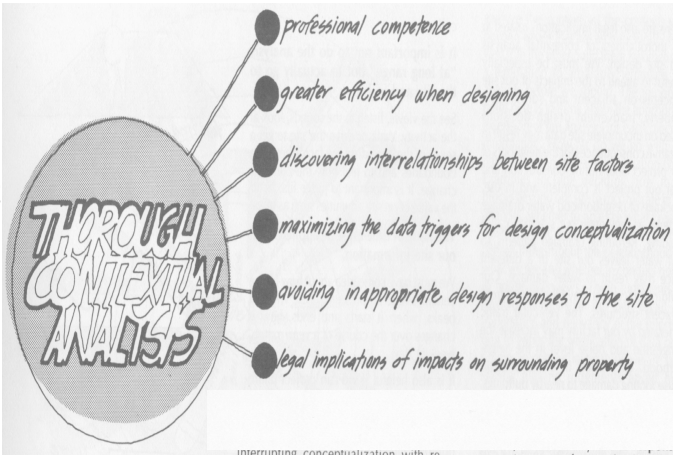
It is easy to convince ourselves that we have done our job in researching the context if we have some data (however incomplete) about our site.

We proceed with design thinking that if we deal with what we know about the site, even if we know it is an incomplete picture, we will have met our responsibilities as designers.



BEING THOROUGH

Data synthesis, comparison and manipulation are obviously much richer if we are able to perform operations with all data at hand. Missing data guarantees that certain design concepts may not be evoked.

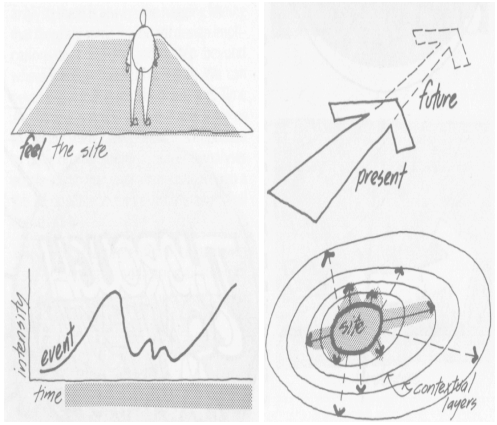


BEING THOROUGH CONT

It is important not to do the analysis “at long range” but to actually go to visit and feel the elements within the site.

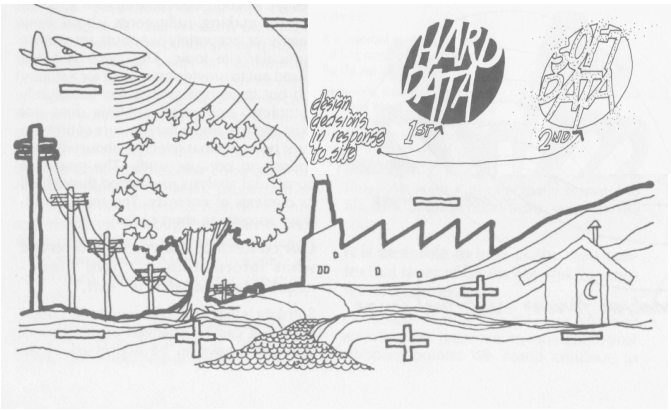
The issue of time must be applied to all our site information.

It is desired to look at the next contextual layer of issues that stand beyond the ones we are addressing.



BEING THOROUGH CONT

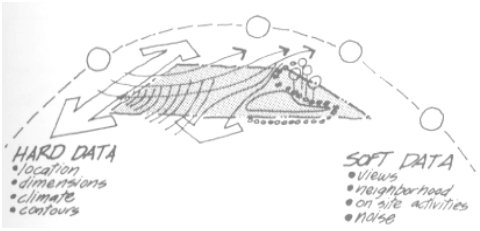
There should be a set of priorities in the information we collect and record



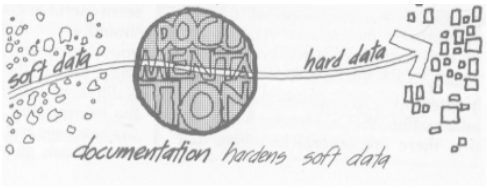
TYPES OF INFORMATION

SOFT DATA TO HARD DATA

The kinds of information collected for the contextual analysis involve an inventory of existing and projected site conditions. Data can be hard and soft; hard related to physical site conditions and soft involving value judgments that are not quantitative.



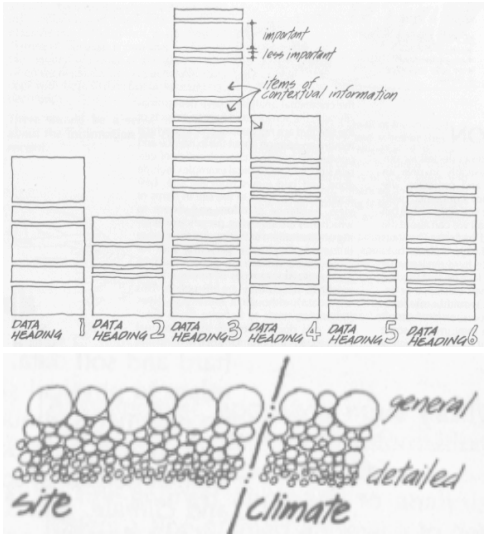
Soft data becomes hard data after it is well documented and processed.



Issues that involve opinion are open to interpretation and can be negotiable according to the metric and evaluation process applied by the decision making team.

STRATIFICTION OF TYPES OF INFORMATION

In attempting to organize the types of information that we collect about a site, there are several headings that seem useful in classifying the data. We should never expect the amount and importance of site data to be equal under each of these headings.

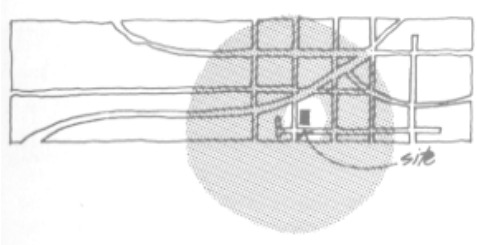


Each site is different and the imbalance in how the information is distributed among the headings and the different patterns of emphasis given to the information communicate a great deal to us when we begin to respond to the contextual analysis in design.

LOCATION

May include state map and city map showing location of site in relation to city as a whole.

City map may also show distances and travel times to related functions in other parts of the city.

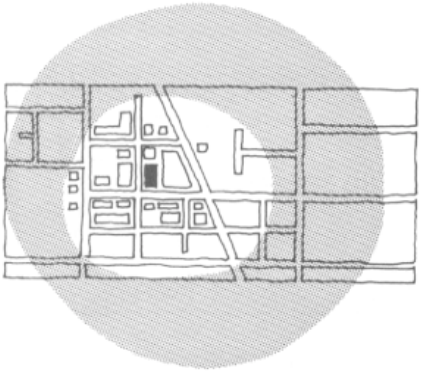


NEIGHBORHOOD CONTEXT

Presents the immediate surroundings of the site for perhaps three to four blocks beyond the site boundary.

This may be extended further to include an important factor because of the scale of the project.

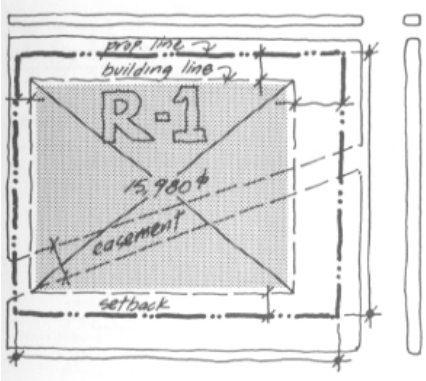
Map may show existing and projected uses, buildings, zoning and any other conditions that may have an impact on our project.



SIZE AND ZONING

Documents all the dimensional aspects of the site including boundaries, location and dimension of easements and present zoning classification with all its dimensional implications (setbacks, height restrictions, parking formulas, allowed uses, etc.) and buildable area (land available for the project after all setbacks and easements have been subtracted).

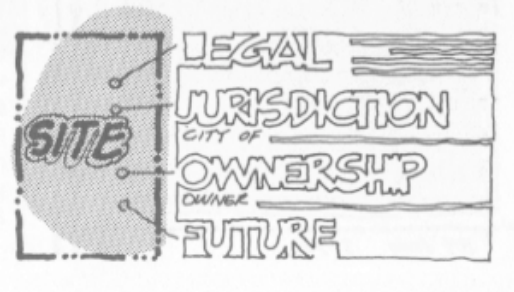
Analysis should also document the present and projected zoning trends, plans by the city transportation department to widen roads (change rights of way) and any other trend that might affect our project in the future.



LEGAL

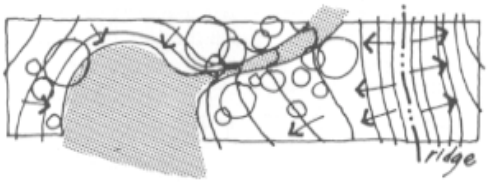
This category presents the legal description of the property, covenants and restrictions, present ownership, present governmental jurisdiction (city or county) and any future projections that may influence the project.

Those can relate to the fact that the site is in a future city urban renewal area or within the boundaries of eventual university expansion etc.



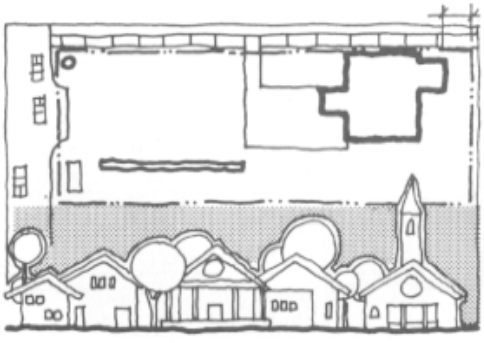
NATURAL AND PHYSICAL FEATURES

Includes contours, drainage patterns, soil type and bearing capacity, trees, rocks, ridges, peaks, valleys, pools and ponds.



MAN MADE FEATURES

Documents on site conditions such as buildings, walls, drives, curb cuts, hydrants, power poles and paving patterns.

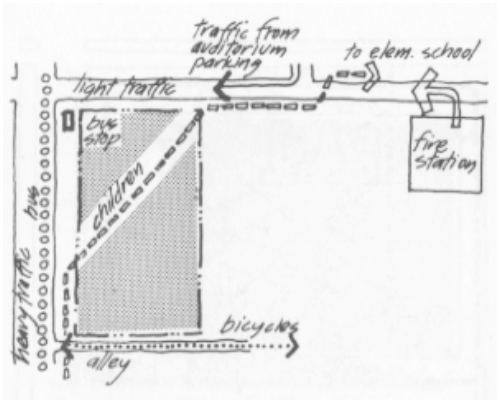


Off site features may include characteristics of surrounding development such as scale, roof forms, fenestration patterns, setbacks, materials, colors, open spaces, visual axes, paving patterns, landscaping materials and patterns, porosity and assertiveness of wall forms and accessories and details.

CIRCULATION

Presents all vehicular and pedestrian movement patterns on and around the site.

Data includes duration and peak loads for surrounding vehicular traffic and pedestrian movement, bus stops, site access edges, traffic generators, service truck access and intermittent traffic (parades, fire truck routes, concerts at nearby auditorium).

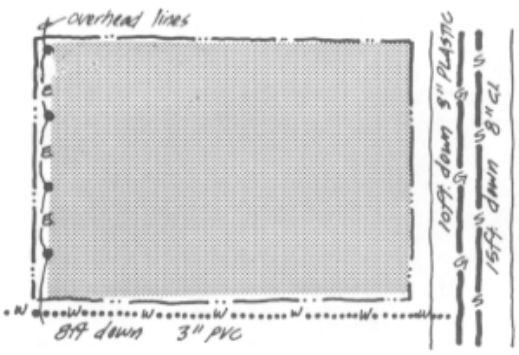


Traffic analysis should include future projections insofar as they can be made.

UTILITIES

This category deals with the type, capacity and location of all utilities on, adjacent to and near the site.

Typical utility types include electricity, gas, sewer, water and telephone. Where utilities are some distance from the site, those dimensions should be given.



It is useful to document the depths of utilities when they are underground as well as the pipe material and diameter.

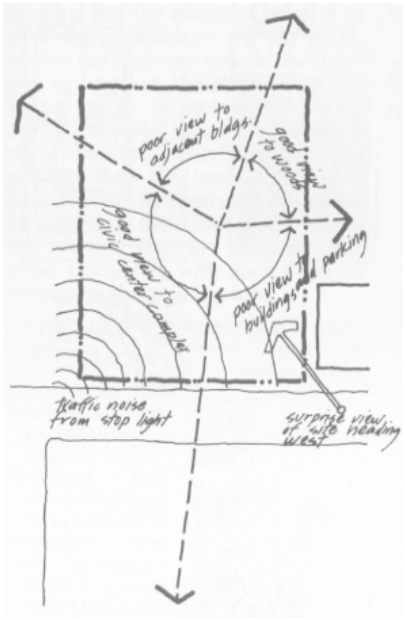
SENSORY

Documents the visual, audible, tactile and olfactory aspects of the site.

Typical issues are views to and from the site and noise generated around the site.

It is of value to record the type, duration, intensity and quality (positive or negative) of the sensory issues.

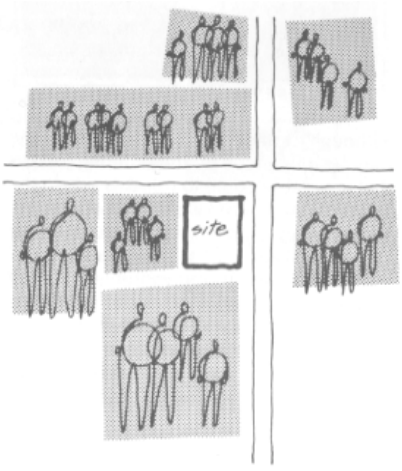
This often involves making some judgments about the relative desirability of the different sensory conditions on and around the site.



HUMAN AND CULTURAL

Includes an analysis of the surrounding neighborhood in terms of cultural, psychological, behavioral and sociological aspects.

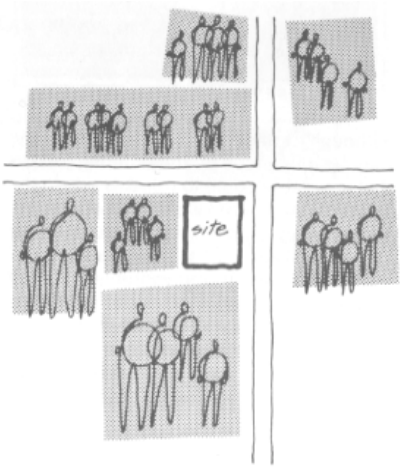
This category is different from "Neighborhood Context" listed earlier in that the latter addresses the physical while this category deals with the activities, human relationships and patterns of human characteristics.



HUMAN AND CULTURAL

Issues here might involve population age, ethnic patterns, density, employment patterns, values, income and family structure.

Also of importance are any scheduled or informal activities in the neighborhood such as festivals, parades or crafts fairs. Vandalism and crime patterns, although not pleasant, are of value to designers when conceptualizing site zoning and building design.

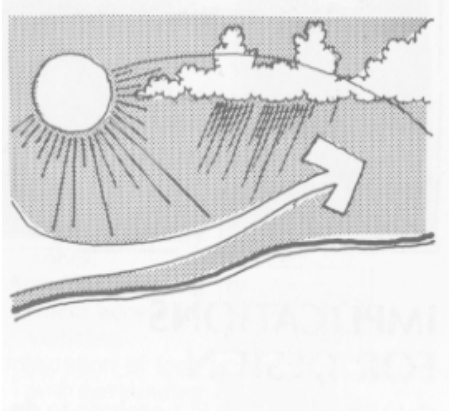


CLIMATE

Presents all the pertinent climate conditions such as rainfall, snowfall, humidity and temperature variations over the months of the year.

Also included are prevailing wind directions, sun-path and vertical sun angles as they change over the year and potential natural catastrophes such as tornados, hurricanes and earthquakes.

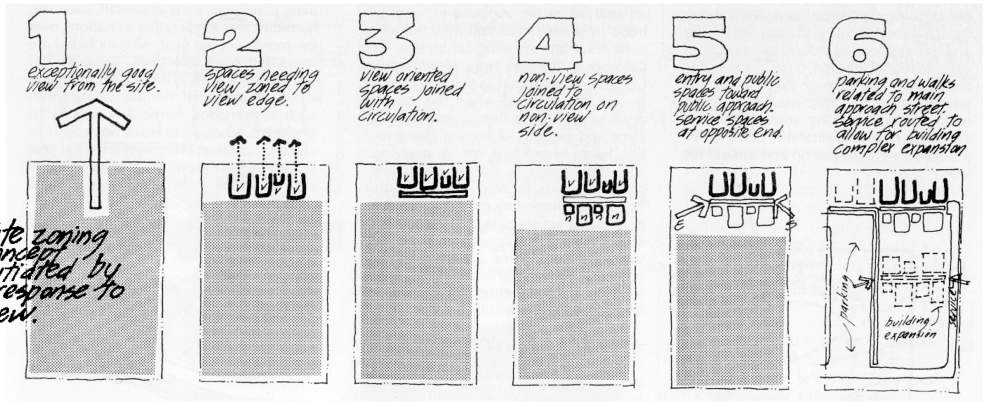
It is helpful to know not only how climate conditions vary over a typical year but also what the critical conditions might be (maximum daily rainfall, peak wind velocity).



Implications For Design

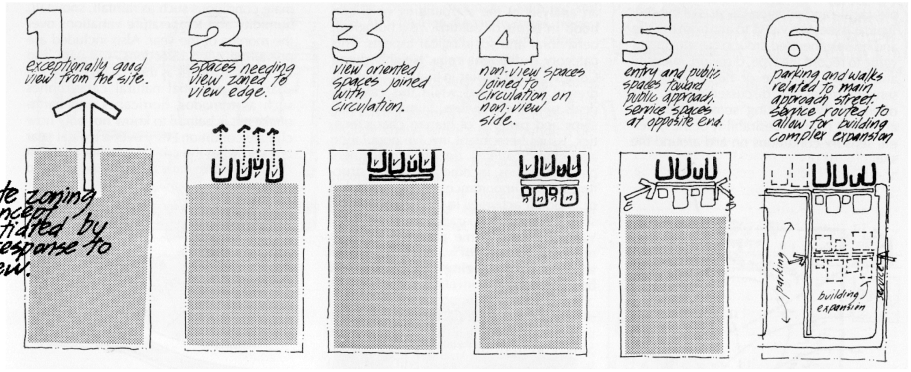
IMPLICATIONS FOR DESIGN

Contextual analysis is a prelude to designing for context. It involves knowing what we have to work with in terms of site before we begin to work with it in site zoning. Like function, image or building envelope, it is another way of entering the problem of making our first conceptual decisions which form the design-made context for subsequent decisions.



IMPLICATIONS FOR DESIGN

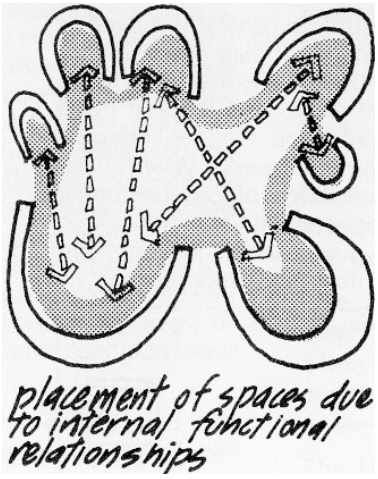
Although the facts we collect about our site may be influenced by the building images that inevitably come to mind as we do the contextual analysis, we should attempt to keep conceptualization separate from the contextual analysis. The contextual analysis should be an inventory of existing and projected conditions assuming no new building on the site so that when we begin design for the site we do not confuse what is actually there now with what we wish was there or hope to put there.



FUNCTION AND CONTEXT AS INFLUENCING FACTORS

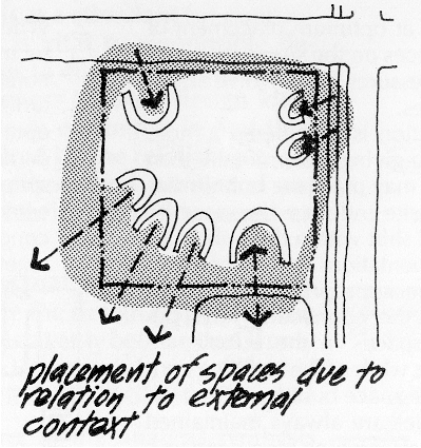
It is useful in discussing the influence of contextual analysis in design to differentiate between function and context as forces which locate building spaces and activities on the site.

Function tends to locate buildings in an introverted way in that they are primarily looking inward to each other for the rationale behind their positions in the scheme.



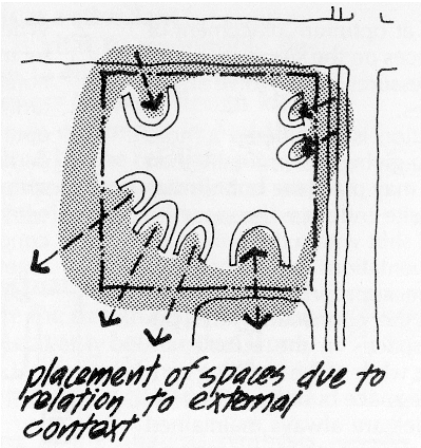
FUNCTION AND CONTEXT AS INFLUENCING FACTORS CONT

Context on the other hand, wants spaces to migrate to different positions on the site, in response to conditions outside the building. In function, the attraction is between spaces. In context, the attraction is between spaces and external site conditions.



FUNCTION AND CONTEXT AS INFLUENCING FACTORS CONT

Usually in a design problem, these two (and all the other) project issues pull and push the spaces to determine their placement in the scheme. They are in a very real sense competing with each other to determine the building form.

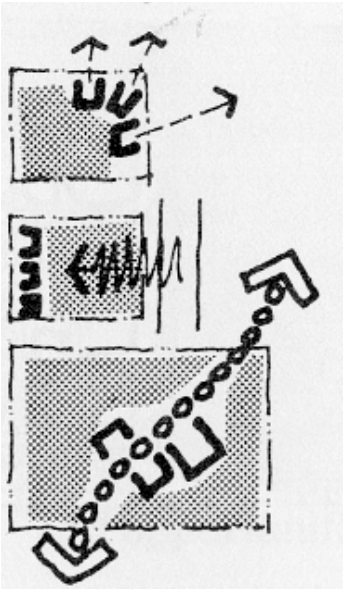


EXTERNAL LINKAGE EXAMPLES

Activities requiring or desiring a view.

Activities that need to be zoned away from noise.

Activities that should strongly relate to on site pedestrian circulation patterns.

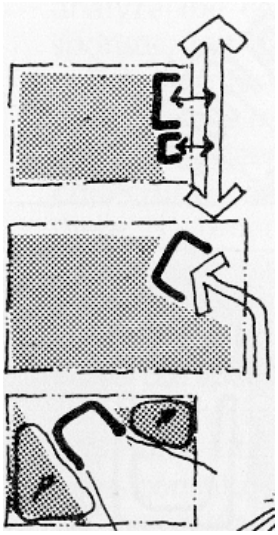


EXTERNAL LINKAGE EXAMPLES CONT

Operations needing access to delivery and pick up vehicles.

Building entry located to relate to primary approach direction.

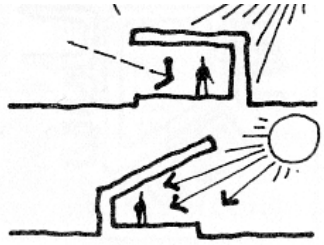
Zoning of parking areas away from view lines to building.



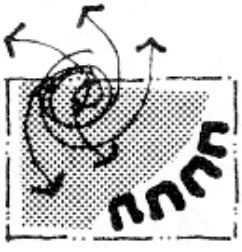
EXTERNAL LINKAGE EXAMPLES
CONT

Activities needing indirect natural lighting.

Activities needing direct sunlight.



Operations needing shelter from high activity zones.



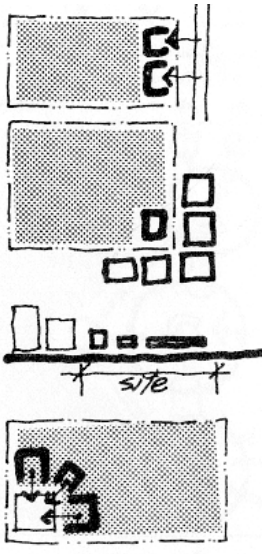
EXTERNAL LINKAGE EXAMPLES
CONT

Activities needing direct access to vehicles.

Integration of form with surrounding contextual images.

Relationship of spaces to existing scale and geometric patterns.

Spaces needing their own controlled exterior environment.

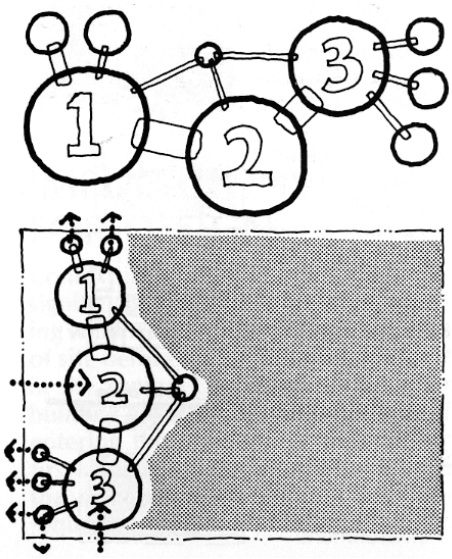


OPTIMIZING PLACEMENT OF FUNCTIONS

Our first efforts at optimum placement of functions or spaces on the site in response to contextual places may involve any of the three following approaches:

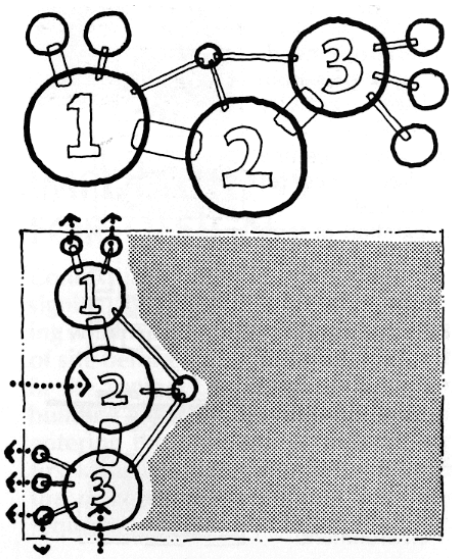
OPTIMIZING PLACEMENT OF FUNCTIONS CONT

Where function is considered a more critical form-giving determinant than context, we may place the bubble diagram on the site and allow the spaces to migrate and shift within the bubble so that their orientations and placements relate to the appropriate site conditions.



OPTIMIZING PLACEMENT OF FUNCTIONS CONT

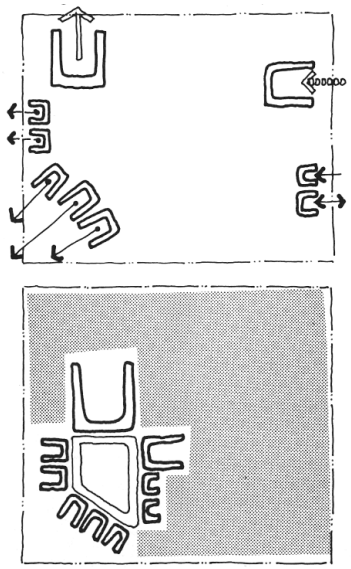
Here the connecting lines between the spaces in the bubble are made elastic while still remaining connected to the space bubbles so that the functional ties are always maintained while we are searching for a contextually responsive placement of spaces



OPTIMIZING PLACEMENT OF FUNCTIONS CONT

Where relation to context is judged to be more important than internal functional efficiency, we may take each function or space and place it in its optimum zone on the site independently of the other spaces.

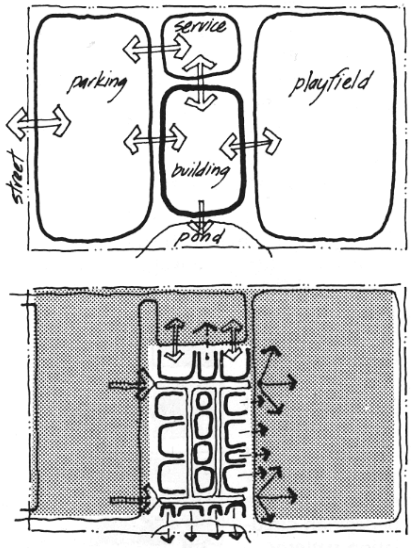
When all the spaces have been placed (including exterior spaces) then we may begin to condense our spaces and knit them together with a circulation system.



OPTIMIZING PLACEMENT OF FUNCTIONS CONT

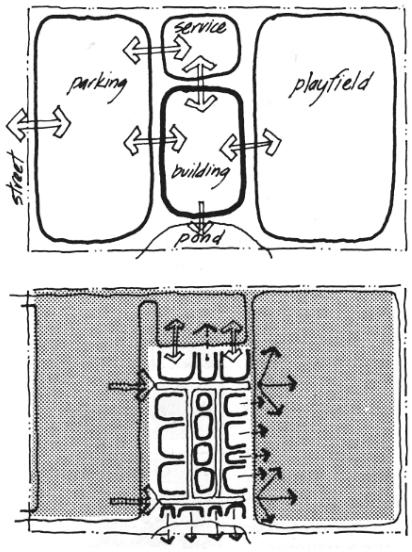
The third approach is appropriate where the project is particularly large with several site components.

Here we may need to deal with the placement of our building or buildings as wholes before we can address the location of their spaces. In this approach the principles and intentions are no different than those in the first two approaches. The scale of the components we are manipulating on the site is simply larger.



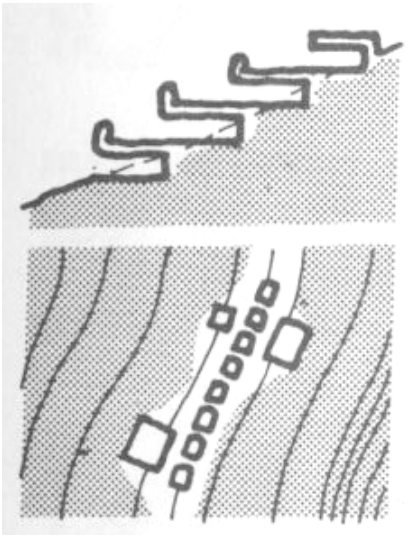
OPTIMIZING PLACEMENT OF FUNCTIONS CONT

Once our buildings are placed in zones on the site, then we may use either of the first two approaches to zone the building spaces in response to their context.



OPTIMIZING PLACEMENT OF FUNCTIONS CONT

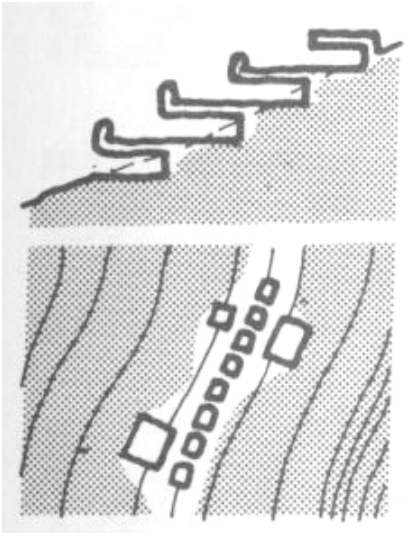
Reasons for locating a building in a particular area of the site may involve soil bearing conditions; contours that minimize earth work during construction, ridges to take advantage of views or breezes, streets or corners that ensure high visibility to the building, alleys that allow easy service access, site scars that have already caused disruption (collect existing scars with the scars caused by construction) or the avoidance of some particularly valuable asset that should be preserved (trees) or some particularly negative condition (poor view or noise).



OPTIMIZING PLACEMENT OF FUNCTIONS CONT

It is important to remember that site design and building and space placement can involve sectional issues as well as plan issues.

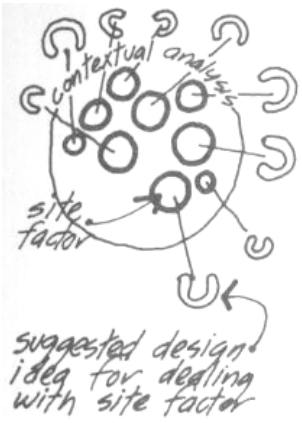
Relation of floor s to contours, heights of spaces in relation to views, stepping of spaces down hillsides and stacking of spaces in relation to contours and neighborhood scale are a few of the potential reasons to study the zoning of our facility on the site in section as well as in plan.



OPTIMIZING PLACEMENT OF FUNCTIONS CONT

A thorough contextual analysis gives us confidence that we have the site conditions all recorded. That confidence facilitates the conceptualization of site responses in design and contributes to the heuristic process of idea formulation.

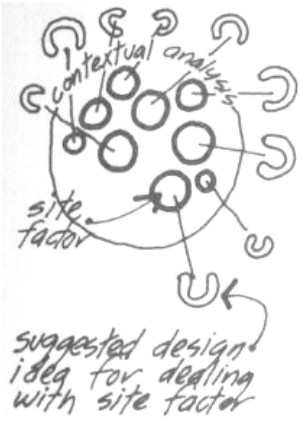
In doing the contextual analysis and engaging the site issues through diagramming, we trigger design response images for dealing with the site.



OPTIMIZING PLACEMENT OF FUNCTIONS CONT

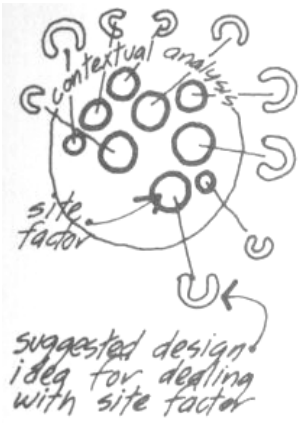
The contextual analysis acts as a switch to recall the parts of our design vocabularies that apply to the site problems and opportunities.

The role of contextual analysis as a stimulant for conceptualization is vital to responsible design. It helps to ensure that there is an appropriateness to those design ideas that surface in our minds in that they were triggered by the relevant project issues, conditions and needs and not arbitrarily fabricated and imposed on the project.



OPTIMIZING PLACEMENT OF FUNCTIONS CONT

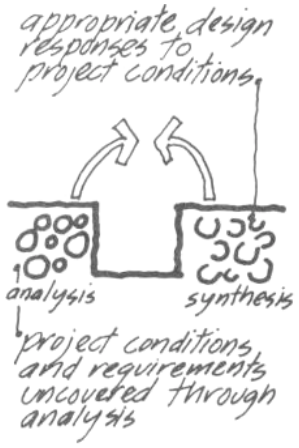
The contextual analysis itself will never create the design responses. Too often we mistakenly believe that if only we analyze long enough, we will be led to the solution. This will never happen.



OPTIMIZING PLACEMENT OF FUNCTIONS CONT

The bridging of the analysis-synthesis, “gap" has to be a two-way affair. We must analyze the context to trigger design responses, but the design responses or vocabularies must be there to be triggered.

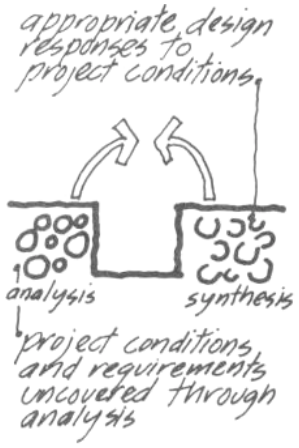
As designers we must continually work to expand and deepen our vocabulary of architectural forms and concepts so that there is something there to draw upon when we "flip the switch" through analysis.



OPTIMIZING PLACEMENT OF FUNCTIONS CONT

We should know many ways of taking advantage of a good view, numerous ways to buffer our spaces against outside noise and several ways to ascend to our building from a parking lot. These conceptual solution types constitute the design vocabulary that we accumulate from reading, travel, past projects we have designed and visiting buildings.

Analysis will give us the conditions but not the responses. It will tell us that we have a great view but not what to do about it. We must draw from our vocabulary of design responses for the appropriate concepts.

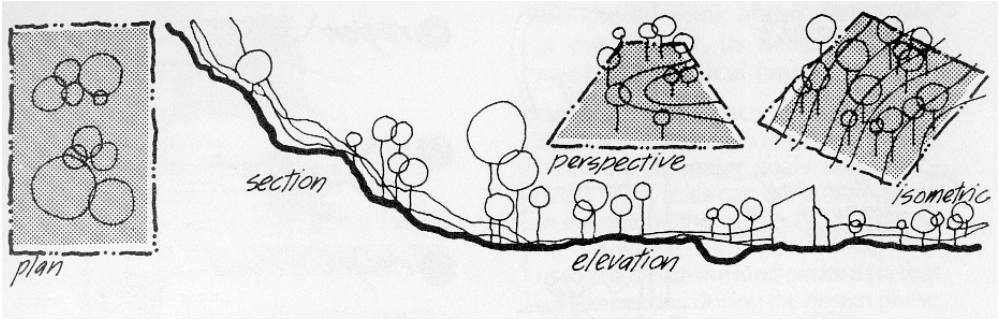


DIAGRAMMING SITE INFORMATION

OVERVIEW

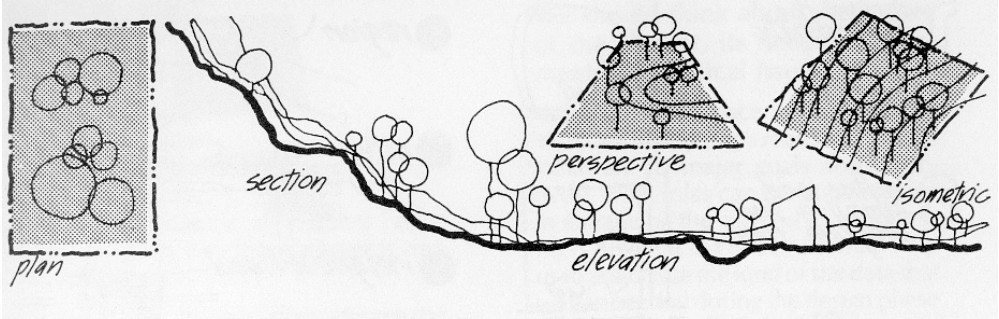
Diagramming the information learned through contextual analysis, the designer may utilize any of the conventional drawing frameworks to record the data.

It is appropriate to graphically express the site information in plan, section, elevation, perspective, isometric or any of the other types of drawings available.



OVERVIEW

The types of drawings to be used should be sympathetic to the type of information that is to be recording. Some data is better expressed in plan, some in section, some in perspective, etc.

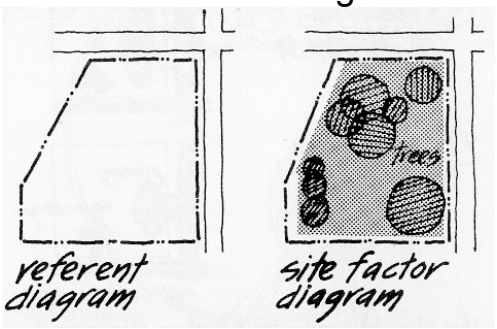


OVERVIEW CONT

Normally there are two components to any site information diagram.

First, there has to be a referent drawing of the site to provide a context for the particular site information necessary to record.

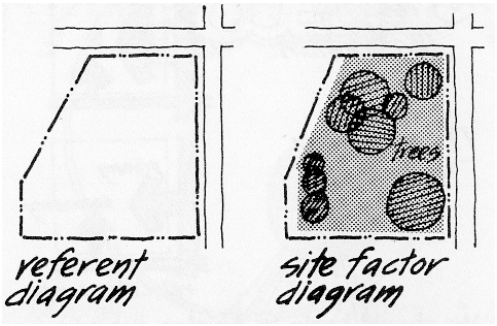
Second, the site fact itself shall be diagrammatically represented.



OVERVIEW CONT

The referent drawing may be a simple plan of the site boundaries with bordering streets or a section through the site showing only the ground plane.

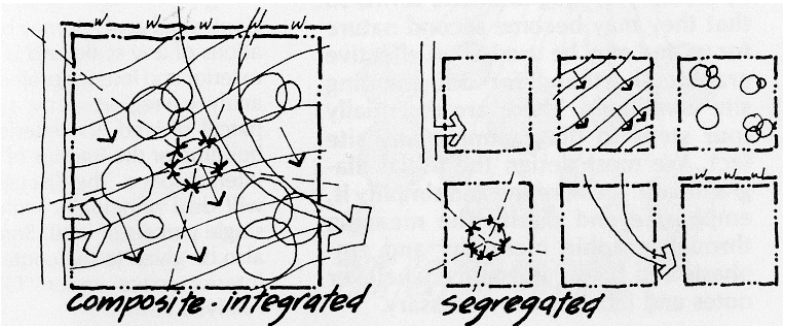
These simple site drawings can be used as frameworks for diagramming the particular site issues that need to be expressed.



OVERVIEW CONT

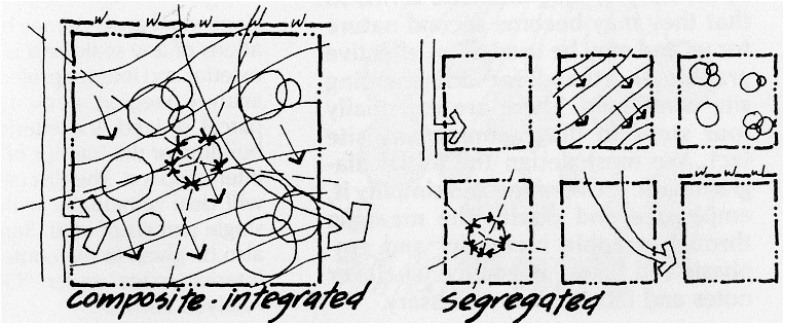
There are two rather different postures we may assume regarding the recording of the site information over these referent drawings.

The first we may call the composite or integrated approach where we attempt to diagram as many different site issues as we can over one referent drawing.



OVERVIEW CONT

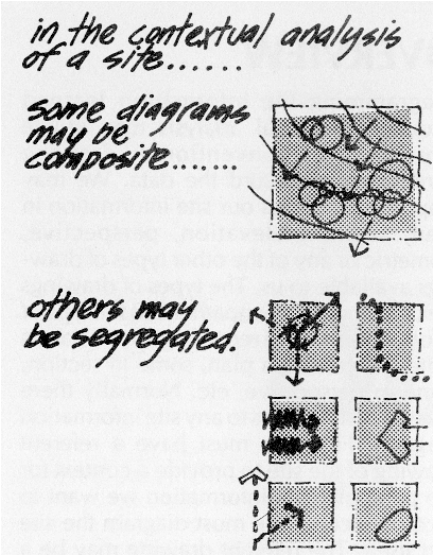
Here, different types of site data are superimposed over each other so that we can more easily see the relationships between the information. In this approach we must make sure that the drawing does not become muddied and confusing and that the most important site information has been expressed with the strongest diagrams.



OVERVIEW CONT

The second approach segregates each piece of site information to a separate referent drawing. This method values the expression of each issue separately so that it can be easily understood. By dealing with each fact individually the designer may be less likely to ignore something.

Keeping these two approaches pure and unadulterated is not important.

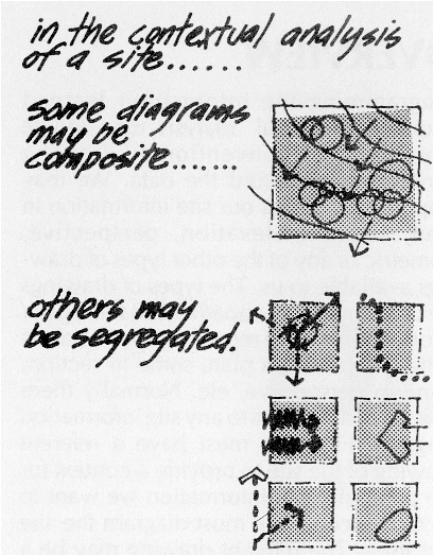


OVERVIEW CONT

Where it is appropriate to our situation it is perfectly permissible to use both methods within the same contextual analysis.

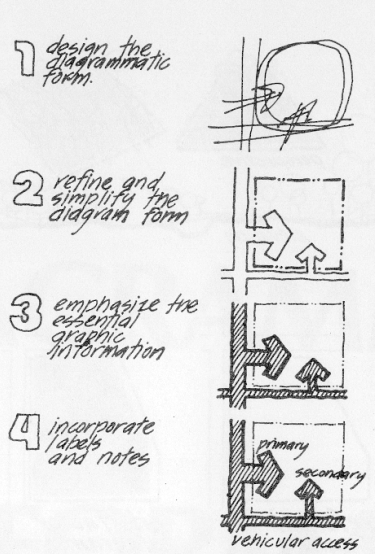
The diagrammatic forms that we may use to actually record our site information over the referent drawings are many and varied.

There are no rules for the forms these must take and no universally agreed upon vocabulary for them.



OVERVIEW CONT

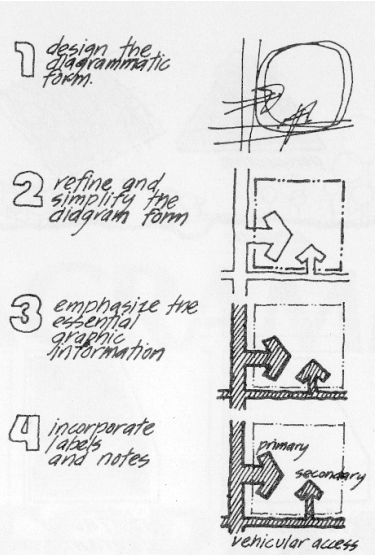
It is important to develop a vocabulary of diagrammatic forms so that they may become second nature for the user and may be used as an effective graphic shorthand for documenting site conditions.



OVERVIEW CONT

There are essentially four steps to diagramming any site fact.

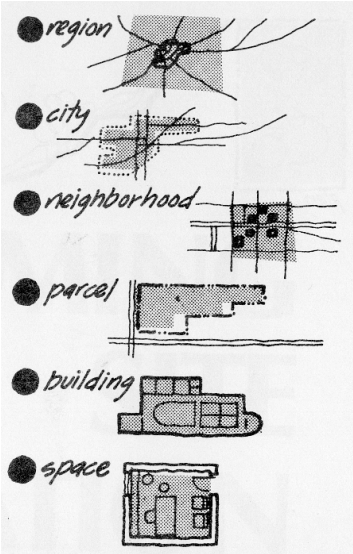
One needs to design the initial diagrammatic form, refine and simplify it, emphasize and clarify the meaning through graphic hierarchy and emphasis and finally introduce whatever notes and labelings are necessary.



OVERVIEW CONT

Contextual analysis may be applied to situations of any scale and is relevant to both exterior and interior project issues. We may analyze a region, a city, a neighborhood, a parcel of land, the interior of an existing building or the interior of a single existing interior space.

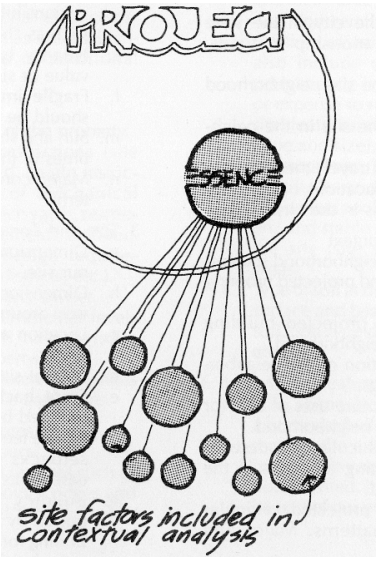
The discussion that follows will deal principally with the analysis of single parcels of land. Some attention will also be given to the contextual analysis of interior space under 'Other Contextual Analysis Forms."



PROCESS – ISSUE IDENTIFICATION

The first step in conducting a contextual analysis is to identify those issues we wish to analyze and to diagrammatically document. As discussed previously, our goal should be to analyze all relevant issues about the site because thoroughness is vital to project success.

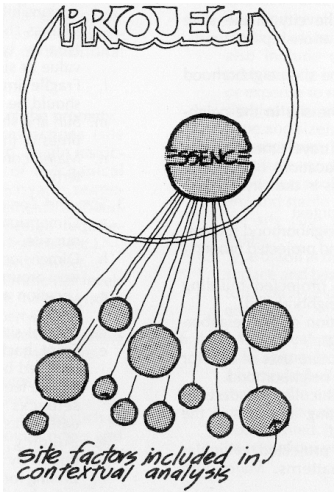
It is useful in choosing from among the available site issue categories to let. our choices be influenced by at least two important inputs:



PROCESS – ISSUE IDENTIFICATION

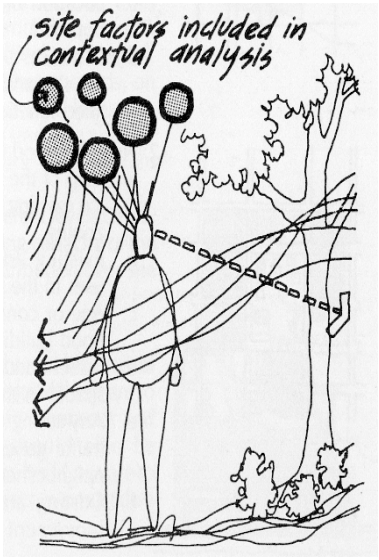
- We should think about the nature of the project, its needs, requirements and critical issues.

- What is the essence of the project? What is the building's reason for being? What are its major goals and objectives? What roles can the building play in enhancing the site and its surroundings? Al l of these concerns should help us to anticipate the kind of site data that will be needed during the design phase of the project.



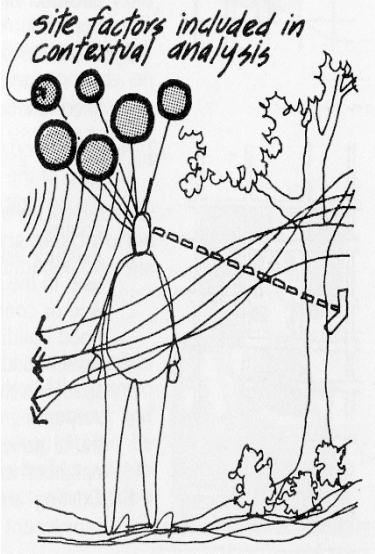
PROCESS – ISSUE IDENTIFICATION

- Site analysis should never be done at 'long range." We should always see the site first hand, walk or drive the contours and boundaries, see the views and on site amenities, listen to the sounds and personally assimilate the scale and pulse of the neighborhood.



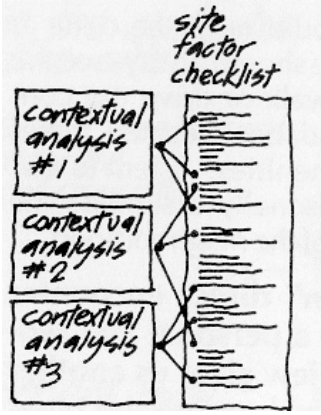
PROCESS – ISSUE IDENTIFICATION

- This "hands-on" direct encounter with site from a personal and sensory point of view gives us another set of clues for choosing the types of site information that should be addressed in our contextual analysis.
- The visit to the site allows us to develop a sense of what is unique, valuable and important about the site.



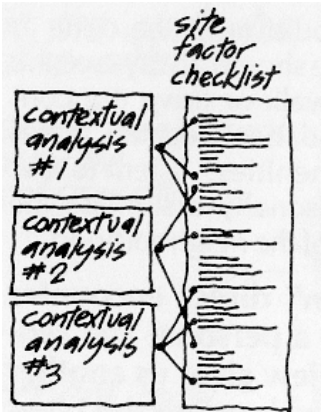
PROCESS – ISSUE IDENTIFICATION

- Both of the previous techniques for focusing on what should be analyzed may benefit from a checklist of potential contextual issues. This checklist will help ensure that we do not forget any important site factor and will assist us to more efficiently identify the site concerns to be included in our analysis.



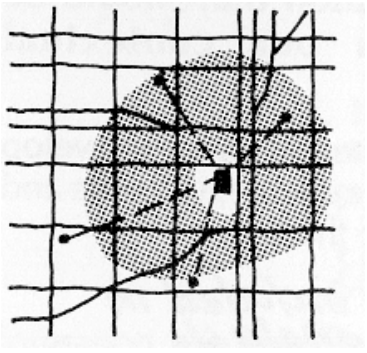
PROCESS – ISSUE IDENTIFICATION

- We should add to our list each time we encounter a new site issue so that over time the list becomes more and more comprehensive. A prototypical checklist of potential site issues follows.



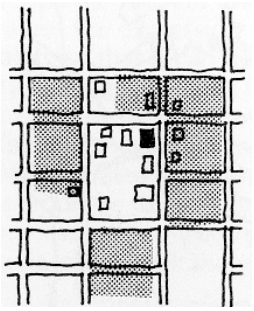
PROCESS – ISSUE IDENTIFICATION

- **1. Location**
  - Location of the city in the state including relationship to roads, cities, etc.
  - Location of the site neighborhood in the city.
  - Location of the site in the neighborhood.
  - Distances and travel times between the site and locations of other related functions in the city.



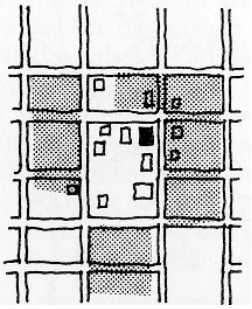
PROCESS – ISSUE IDENTIFICATION

- **2. Neighborhood Context**
  - Map of the neighborhood indicating existing and projected property zoning.
  - Existing and projected building uses in the neighborhood.
  - Age or condition of the neighborhood buildings.
  - Present and future uses of exterior spaces in the neighborhood.
  - Any strong vehicular or pedestrian traffic generating functions in the neighborhood.



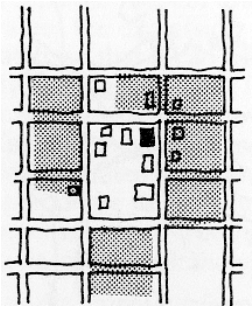
PROCESS – ISSUE IDENTIFICATION

- **2. Neighborhood Context**
  - Existing and projected vehicular movement patterns. Major and minor streets, routes of service vehicles such as trash, bus routes and stops.
  - Solid-void space relationships.
  - Street lighting patterns.
  - Architectural patterns such as roof forms, fenestration, materials, color, landscaping, formal porosity, relationship to street, car storage strategies, building height, sculptural vigor, etc.



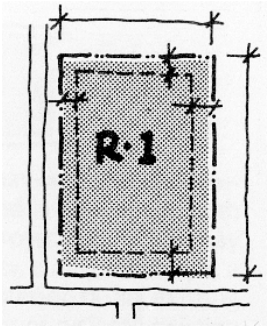
PROCESS – ISSUE IDENTIFICATION

- **2. Neighborhood Context**
  - Neighborhood classifications that might place special restrictions or responsibilities on our design work such as 'historic district.'
  - Nearby buildings of particular value or significance.
  - Fragile images or situations that should be preserved.
  - Sun and shade patterns at different times of the year.
  - Major contour and drainage patterns.



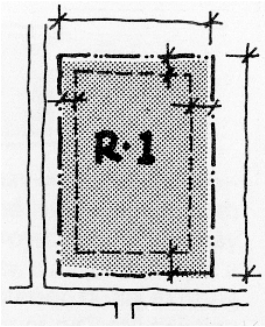
PROCESS – ISSUE IDENTIFICATION

- **3. Size and Zoning**
  - Dimensions of the boundaries of our site.
  - Dimensions of the street rights of way around our site.
  - Location and dimensions of easements.
  - Present site zoning classification.
  - Front, back and side yard setbacks required by zoning classification.



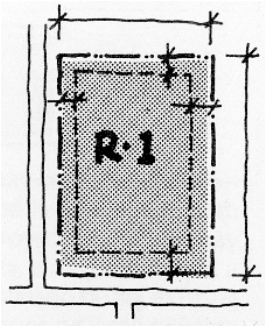
PROCESS – ISSUE IDENTIFICATION

- **3. Size and Zoning**
  - Square feet of buildable area inside setbacks (should also subtract easements).
  - Building height restrictions required by zoning classification.
  - Zoning formula for determining required parking based on the type of building to occupy the site.
  - The number of parking spaces required (if we know the building area).



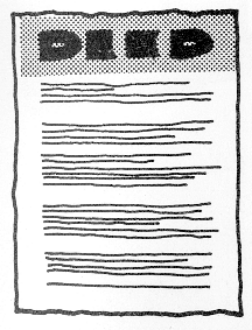
PROCESS – ISSUE IDENTIFICATION

- **3. Size and Zoning**
  - Any conflicts between what the present zoning classification allows and the functions we are planning for the site.
  - Zoning classifications that the site would need to be changed to in order to accommodate all the planned functions.
  - Any projected changes that would alter the dimensional characteristics of the site such as street widenings or purchase of additional property.



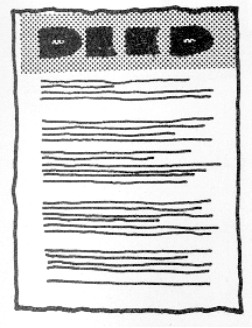
PROCESS – ISSUE IDENTIFICATION

- **4. Legal**
  - Legal description of the property.
  - Covenants and restrictions (site area usage allowed, height restrictions, screening of mechanical equipment or service yards, restrictions on rooftop elements, architectural character, design requirements in historic districts, etc.).
  - Name of the property owner.
  - Name of the governmental levels or agencies which have jurisdiction over the property.
  - Any projected or potential changes in any of the above categories.



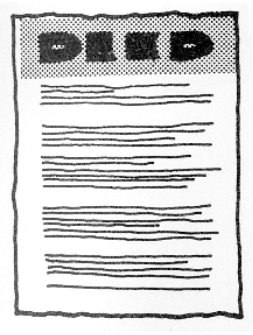
PROCESS – ISSUE IDENTIFICATION

- **5. Natural Physical Features**
  - Topographic contours.
  - Major topographic features such as high points, low points, ridges and valleys, slopes and flat areas.
  - Drainage patterns on the site including directions of surface drainage (perpendicular to contours), major and minor arteries of water collection (ditches, arroyos, riverbeds, creeks, etc.), major drainage patterns onto the site from adjacent property and from the site onto adjacent property and any neighborhood water-related patterns such as viaduct systems or storm sewers.



PROCESS – ISSUE IDENTIFICATION

- **5. Natural Physical Features**
  - Existing natural features on the site and their value in terms of preservation and reinforcement versus alteration or removal. This would also include opinions regarding permanency in terms of difficulty or expense to remove features. On site features might include trees (type and size), ground cover, rock outcroppings, ground surface texture, holes or ditches, mounds, on site water (pools, ponds, lakes, rivers) and stable or unstable areas of the site (site scars versus virgin areas).



  - Type of soil at different levels below surface and bearing capacity of the soil. Soil type distribution over site area.

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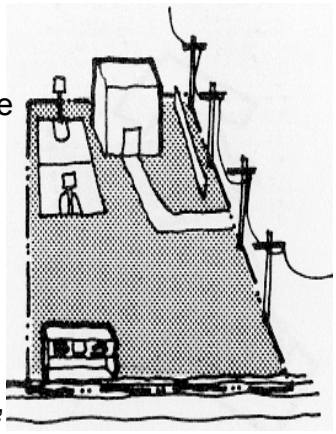
PROCESS – ISSUE IDENTIFICATION

- **6. Man-Made Features**
  - Location and size of curb cuts, power poles, fire hydrants or bus stop shelters.
  - Off site man-made features may include any of the on site items listed above and/or may involve a detailed analysis of the existing architectural character surrounding our site. This is particularly important where the architectural character will be a factor in the design of our facility (historic district, etc.). Some factors to consider in analyzing surrounding architectural character include scale, proportion, roof forms, window and door patterns, setbacks, materials, colors, textures, open space versus built space, visual axes, landscaping materials and patterns, paving textures and patterns, porosity (extent of openness) and assertiveness (ins and outs) of wall forms, connections, details and accessories, exterior lighting, outdoor furniture and car storage methods.



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PROCESS – ISSUE IDENTIFICATION

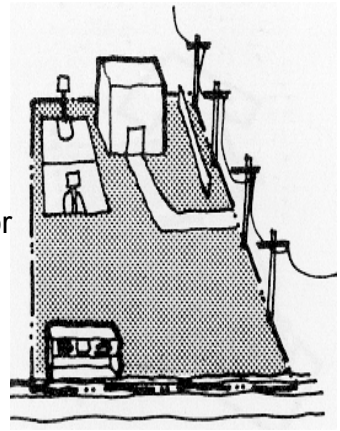
- **6. Man-Made Features**

  - Size, shape, height and location of any on site buildings. If these are to remain, the exterior character and interior layout should also be documented. If the buildings are to be part of our project, we must do a detailed building analysis of each facility.

  - Location and type of walls, retaining walls, or fences.

  - Location, size and character of exterior playfields, courts, patios, plazas, drives, walks or service areas.

  - Where it may be important to our design we should record the paving patterns of man-made surfaces.



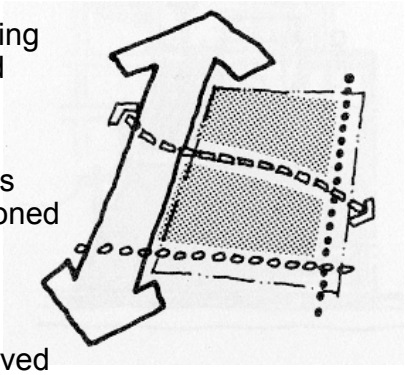
PROCESS – ISSUE IDENTIFICATION

- **7. Circulation**

  - On site sidewalks, paths and other pedestrian movement patterns including users, purposes, schedule of use and volume of use.

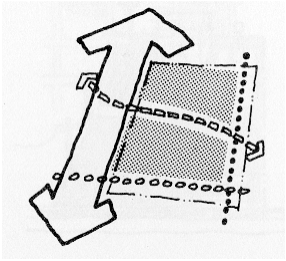
  - Off site pedestrian movement patterns using the same characteristics mentioned for on site movement.

  - If a pedestrian movement pattern is considered valuable and to be preserved or reinforced, our analysis should also include an evaluation of how the existing pattern could be improved.



PROCESS – ISSUE IDENTIFICATION

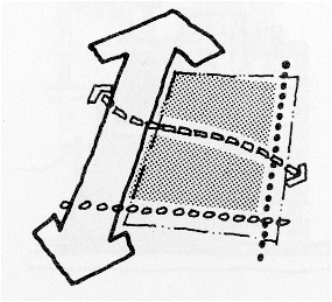
- **7. Circulation**
  - On site or adjacent vehicular movement patterns including type of traffic, origins and destinations, schedule, volume of traffic and peak loads. Also included should be intermittent traffic such as parades, festivals, concerts, fire truck routes, service truck fleets, etc.



  - Off site or neighborhood vehicular movement issues such as traffic generators (buildings or uses that are significant destinations or origins vehicular traffic) as well as the other traffic characteristics outlined under on site traffic. Adjacent or nearby parking areas that may be used for off site car storage in our project. Off site traffic patterns should also include the relation of our site to the public transportation routes, stops at or near our site, probable directions of approach to our site by the users of the new building and directions of dispersal of traffic from our building. Traffic analysis should document future projections to the extent they can be made.

PROCESS – ISSUE IDENTIFICATION

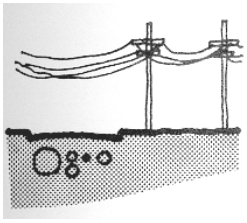
- **7. Circulation**
  - Locations of probable or optimum access to our site for each type of pedestrian and vehicular traffic that will use the new building or move through the site.



  - Travel time to walk across our site, to drive across the site or by the site where these times may be important to our design (time it takes to walk between classes at a school). It may also be useful to record the time it takes to drive to or from related locations in the city (from our site to downtown, the university, the shopping center, etc.)

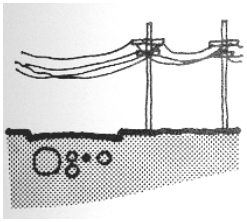
PROCESS – ISSUE IDENTIFICATION

- **8. Utilities**
  - Location, capacity and conveyance form (type of pipe, etc.) of power, gas, sewer, telephone and water utilities. This should involve the depth of each utility underground and, in the case of power, whether it is above or below grade. Location of power poles.
  - Where utility lines stop short of our site boundaries, their distances from our site should be given.



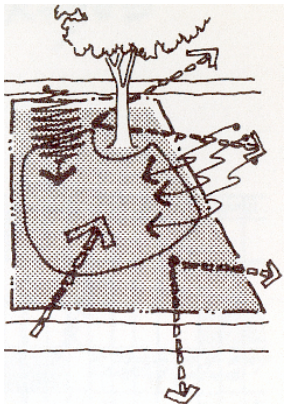
PROCESS – ISSUE IDENTIFICATION

- **8. Utilities**
  - Where there are multiple opportunities to connect to utilities that are adjacent to our site, we should record those locations or edges on our site that seem to offer the best connection opportunities. This may be due to the capacities of the utility lines, contour conditions on our site in relation to sewer, the need to minimize on site utility runs, being able to collect utility runs, bringing utilities in at the "back" of the site or dealing with site barriers or difficult soil conditions.



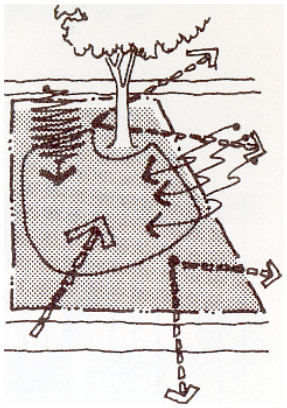
PROCESS – ISSUE IDENTIFICATION

- **9. Sensory**
  - Views from the site including positions on the site where the views are not blocked, what the views are of, whether the views are positive or negative, the angles within which the views can be found, whether the views change over time and the likelihood of view continuance for the long term.



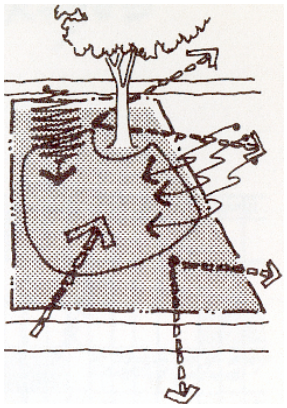
PROCESS – ISSUE IDENTIFICATION

- **9. Sensory**
  - Views to points of interest on the site from within the site boundaries. Includes what the views are of, whether the views are positive or negative, positions on the site where the views are best and where they are blocked, the angles within which the views can be found and whether the object of the views changes over time.



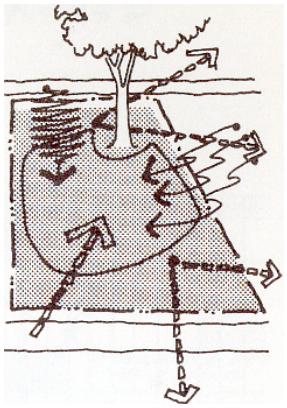
PROCESS – ISSUE IDENTIFICATION

- **9. Sensory**
  - Views to the site from areas outside the site boundaries, including streets, walks, other buildings and vistas.
  - Includes when the site is first seen, angles within which it is seen, most dramatic views of the property, best views of the site and areas that are viewable, particular points of interest that may be objects of views from outside our site and potential for these views to continue or be blocked by development outside our site over the long term.



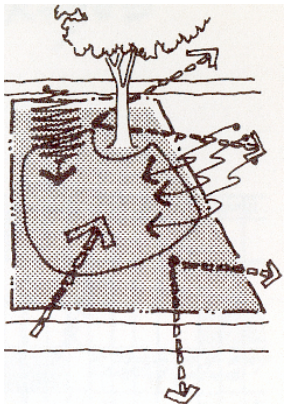
PROCESS – ISSUE IDENTIFICATION

- **9. Sensory**
  - Views through our site from positions outside the property. Involves the objects of the views and the various positions where the views occur, whether the views are positive or negative, the angles within which the views can be found, and the likelihood of the view targets as well as the view paths remaining open over the long term.



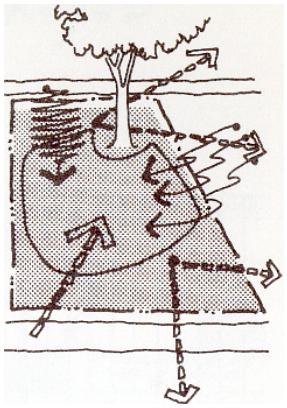
PROCESS – ISSUE IDENTIFICATION

- **9. Sensory**
  - Conditions on our site in relation to sewer, the need to minimize on site utility runs, being able to collect utility runs, bringing utilities in at the "back" of the site or dealing with site barriers or difficult soil conditions.



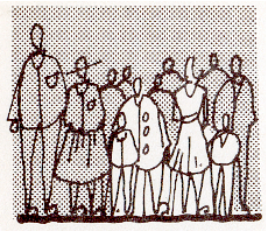
PROCESS – ISSUE IDENTIFICATION

- **9. Sensory**
  - Locations, generators, schedules and intensities of any significant odors, smoke or other airborne pollution on or around our site. This analysis should include likelihood of continuance over time.



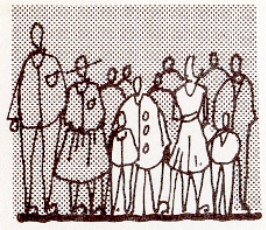
PROCESS – ISSUE IDENTIFICATION

- **10. Human and Cultural**
  - Documentation of neighborhood cultural, psychological, behavioral and sociological aspects. Potential information includes population density, age, family size, ethnic patterns, employment patterns, income, recreational preferences and informal activities or events such as festivals, parades or fairs.



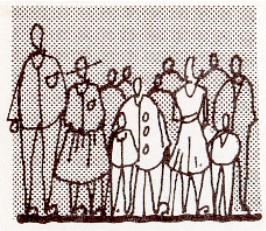
PROCESS – ISSUE IDENTIFICATION

- **10. Human and Cultural**
  - Negative neighborhood patterns such as vandalism and other criminal activities.
  - Neighborhood attitudes about the project that is about to be designed and built on our site.



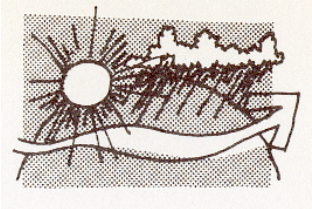
PROCESS – ISSUE IDENTIFICATION

- **10. Human and Cultural**
  - Neighborhood attitudes about what is positive and what is negative in the neighborhood.
  - Relative permanence of the neighborhood population.
  - Neighborhood trends in terms of all the factors mentioned above



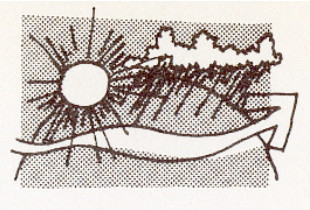
PROCESS – ISSUE IDENTIFICATION

- **11. Climate**
  - Temperature variation over the months of the year including the maximum highs and lows and the maximum and average day-night temperature swing for the days of each month.
  - Humidity variation over the months of the year including maximums, minimums, and averages for each month and for a typical day of each month.



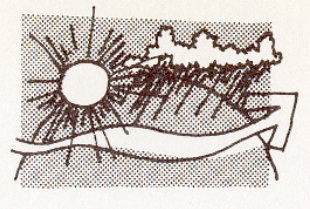
PROCESS – ISSUE IDENTIFICATION

- **11. Climate**
  - Rainfall variation over the months of the year in inches. Should include the maximum rainfall that can be expected in any one day.
  - Snowfall variation over the months of the year in inches. Should include the maximum snowfall that can be expected in any one day.



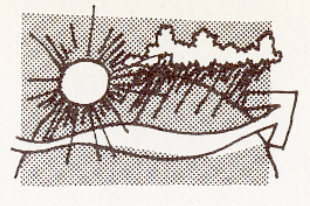
PROCESS – ISSUE IDENTIFICATION

- **11. Climate**
  - Prevailing wind directions for the months of the year including velocity in feet per minute or miles per hour and variations that can be expected over the course of the day and night. Should also include the maximum wind velocity that can be expected.



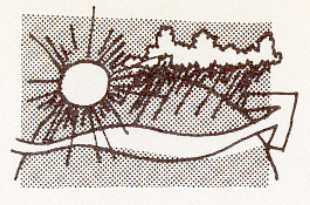
PROCESS – ISSUE IDENTIFICATION

- **11. Climate**
  - Sun path at the summer and winter solstice (high point and low point) including altitude and azimuth at particular times of the day for summer and winter (sunrise and sunset, position at 9 a.m., noon and 3 p.m.).
  - Energy related data such as degree days or BTU's of sunlight falling on our site.



PROCESS – ISSUE IDENTIFICATION

- **11. Climate**
  - Potential natural catastrophes such as earthquakes, hurricanes and tornadoes. may include documentation of earthquake zone that our site lies within and history of natural catastrophes in the area.



Module I(b)
Analysis on Sustainability and Retail Gravitation

ARCH 738: REAL ESTATE PROJECT MANAGEMENT

Morgan State University

Jason E. Charalambides, PhD, MASCE, AIA, ENV_SP

(This material has been prepared for educational purposes)

AVANT-GARDE ENGINEERING LLC
CONSULTING ARCHITECTS/ENGINEERS

Introduction

- **Retail Gravitational Analysis**
  - Retail Gravitational and Sustainability analyses can be very important aspects of "Site Analysis" that should be determining factors in the process of decision making and design process
  - For the Retail Gravitational Analysis there are three major models that can be referred to:
    - Reilly's Law of Consumer Gravitation
    - Huff's Probability Model
    - Converse's Break Even Point model.
  - For this course, focus will be given to Converse's Break-Even Point Model.

Introduction

- **Sustainability Analysis**
  - For Sustainability there are several guidelines from a number of organizations that are active on this matter. Amongst others are the following:
    - The American Council for an Energy-Efficient Economy
    - The Greenroads® Rating System
    - The Green-Technology organization
    - The U.S. Green Building Council "Leadership in Energy and Environmental Design"
    - The Institute for Sustainable Infrastructure "Envision Sustainability Rating System"
  - For this course, given the character of the project, the more holistic approach of the Envision Rating System of the Institute for Sustainable Infrastructure was selected.

Retail Gravitational Analysis

- **Reilly's Law**
  - The concept is an adaptation of Newton's law of gravitation between physical bodies.
  - The probability of a shopper being attracted to a shopping center is directly proportional to the drawing power of the shopping center and indirectly proportional to the square of the distance to the shopping center.

$$P_{ij} = \frac{A_j}{(r_{ij})^2}$$

Where:

- *P_{ij}=Probability of shopper "i" supporting center "j"*
- *A_j=Drawing power of center "j" (e.g. size, magnets)*
- *r_{ij}=Distance between "i" & "j".*

Retail Gravitational Analysis

- **Huff's Law –** *"Shopper attraction model"*
  - The proportion of consumers patronizing a given shopping area varies with the shopping area's distance.
  - The proportion of consumers patronizing various shopping areas varies with the depth and breadth of the offered merchandise.
  - The distance that consumers travel to various shopping areas varies for different types of products purchased.
  - The "pull" of any given shopping area is influenced by the proximity of competing shopping areas.

Retail Gravitational Analysis

- **Huff's Law –** *"Shopper attraction model"*

$$P_{ij}^{k} = \frac{\frac{S^{k}}{(T_{ij})^{2}}}{\sum_{j=1}^{n} \frac{S_{j}^{k}}{(t_{ij})^{\lambda}}}$$

- *i = 1,2,...m*
- *j = 1,2,...n*
- *k = 1,2,...p*

  - Where
    - P = probability a consumer at a given origin "i" traveling to a shopping area "j" for type "k" shopping trip
    - S = square footage of shopping area "j" devoted to shopping trip "k"
    - T = time for trip from pt. of origin "i" to shopping area "j"
    - λ = empirically estimated parameter to reflect the effect of traveling time on various kinds of shopping trips
    - m = number of origins in marketing area
    - n = number of shopping center clusters in marketing area
    - p = number of different types of shopping trips defined

Retail Gravitational Analysis

- **Converse's Break Even Point Model**
  - This model facilitates the calculation of the point in distance where the probability of a shopper patronizing amongst competing retail centers will be equal.
  - This break-even point method identifies the trading area boundary line between competing retail centers

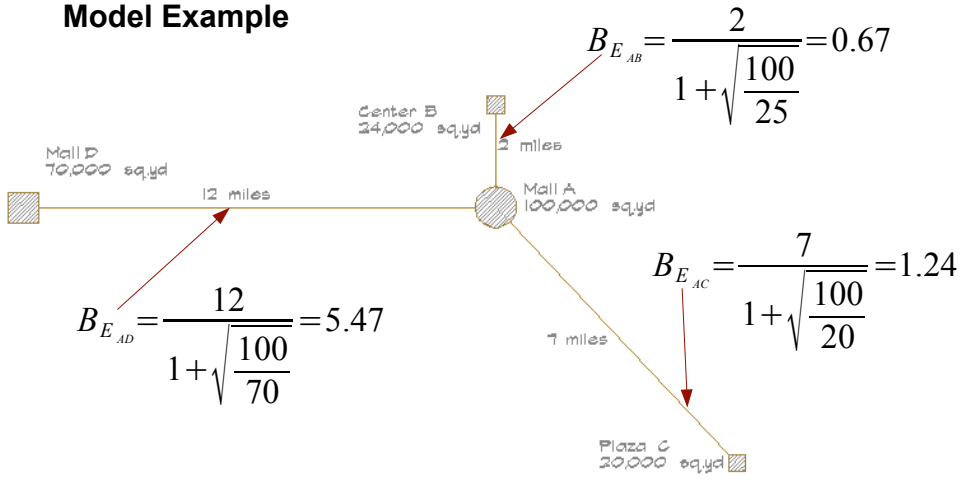
$$B_E = \frac{d}{1 + \sqrt{\frac{S_1}{S_2}}}$$

Where:

- *B_E =Break-Even point (or line) between competing centers in distance from the smaller center*
- *d = Distance between two retail centers*
- *S_1 = Size of larger retail center*
- *S_2 = Size of smaller retail center*

Retail Gravitational Analysis

- **Converse's Break Even Point Model Example**



Sustainability Analysis Using Envision System

- **What is Envision?**
  - Fundamentally, Envision is about supporting more sustainable choices in infrastructure development.
  - The system provides a flexible framework of criteria and performance objectives to aid local decision makers and help project teams identify sustainable approaches during planning, design, construction, and operation.
  - It then further guides owners, communities, and designers in collaborating to make more informed decisions about the sustainability of infrastructure

Sustainability Analysis Using Envision System

- **How can Envision be of benefit in Real Estate?**
  - Envision can benefit projects in numerous ways including:
    - Long-term viability through increased resiliency and preparedness
    - Lower costs through management and stakeholder collaboration
    - Reduced negative impacts on the community and the environment
    - Potential to save owners money over time through efficiency
    - Credibility of a third-party rating system
    - Increased public confidence and involvement in decision making

Sustainability Analysis Using Envision System

- **A Chapter on Quality of Life** **(One of the five modules addressed)**
  - 1 PURPOSE
    - QL1.1 Improve Community Quality of Life
    - QL1.2 Stimulate Sustainable Growth and Development
    - QL1.3 Develop Local Skills and Capabilities

Sustainability Analysis Using Envision System

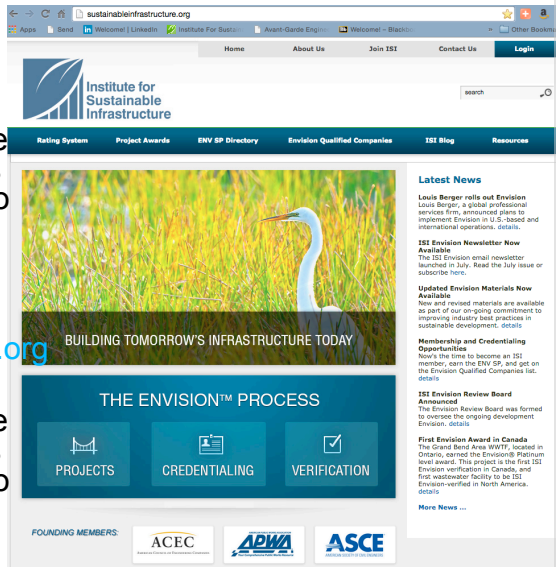
- **A Chapter on Quality of Life** **(One of the five modules addressed)**
  - 2 WELLBEING
    - QL2.1 Enhance Public Health and Safety
    - QL2.2 Minimize Noise and Vibration
    - QL2.3 Minimize Light Pollution
    - QL2.4 Improve Community Mobility and Access
    - QL2.5 Encourage Alternative Modes of Transportation
    - QL2.6 Improve Site Accessibility, Safety, and Wayfinding

Sustainability Analysis Using Envision System

- **A Chapter on Quality of Life** **(One of the five modules addressed)**
  - 3 COMMUNITY
    - QL3.1 Preserve Historic and Cultural Resources
    - QL3.2 Preserve Views and Local Character
    - QL3.3 Enhance Public Space

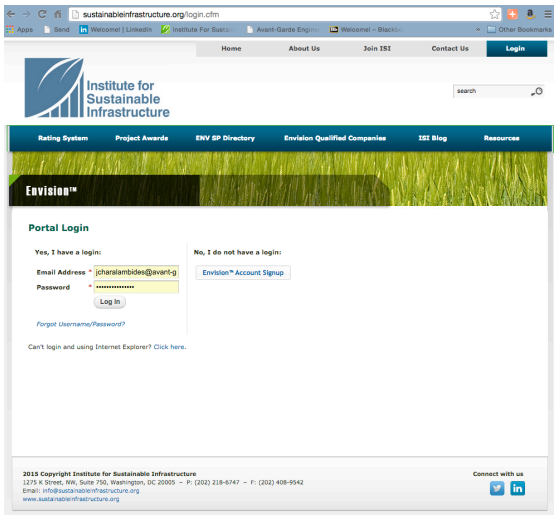
Sustainability Analysis Using Envision System

- **Accessing the Envision Guidelines**
  - As students you have the opportunity to register as members of the ISI for no charge.
  - Log in to: sustainableinfrastructure.org
  - As students you have the opportunity to register as members of the ISI for no charge.



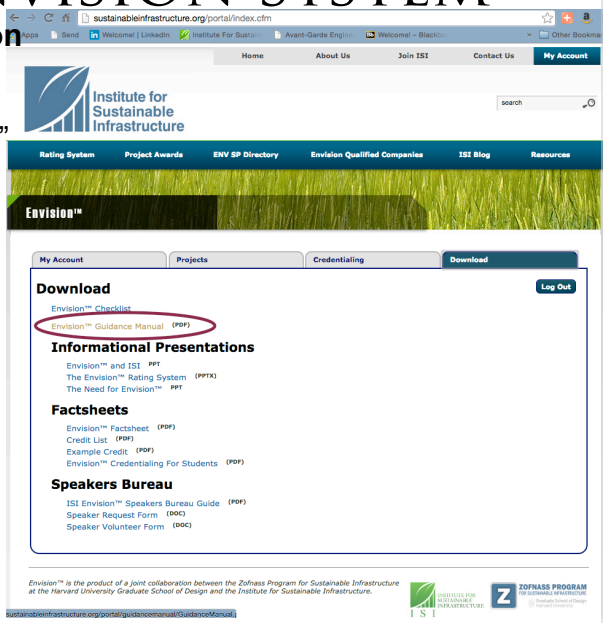
Sustainability Analysis Using Envision System

- **Accessing the Envision Guidelines**
  - Log in
    - Sign up for account
    - & follow directions



Sustainability Analysis Using Envision System

- **Accessing the Envision Guidelines**
  - Select the “Download” tag
  - Download the Guidance Manual in Adobe Acrobat (pdf) format



Assignment

Assignment for Module 1

- **Assignment for this 1st module is due in one week:**
  - As group determine which of the 11 indicated issues (Slides 68 through 98 of previous slide presentation) will be undertaken by each member
    - All 11 issues should be addressed.
    - You shall do the full Site Analysis yet. A site needs to be selected and that will probably occur after the 2nd module of "Scope & Objectives" is completed. You only need to know which tasks you will undertake
  - As a group you should select three (3) to six (6) potential sites and conduct a Gravity Model study using the Break Even point method.

INSTITUTE FOR SUSTAINABLE INFRASTRUCTURE

I S I

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University and College

Dues

- Complimentary

Benefits

- Special pricing on the ENV SP or ENV PV professional credential training and exam

- Networking opportunities with colleagues in the public and private sector infrastructure and sustainability community

Applicant Information

Name:
University/College:
Email:
Phone:

Additional Information

Faculty

Title:
Mailing Address:

Student

Year of study (circle one): *freshman sophomore junior senior graduate*
Major:
Expected Degree:

Institute for Sustainable Infrastructure • 1275 K Street, NW, Suite 750 • Washington, DC 20005
info@sustainableinfrastructure.org • 202-218-6725