

FOUR COUNTY WINTER GARDEN

COMMUNITY ENERGY PLAN



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Submitted To:

National Center for Appropriate Technology

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1.1

Statement of Philosophy

Presently, South Texas is one of the more depressed areas of the nation. The majority of the population which is Hispanic rely heavily on state and federal programs in order to survive. As poverty increases, this large Hispanic populations' dependency upon the larger system becomes greater and greater. This dependency fosters a need for additional funding for the programs which exist. Thus, this large population finds itself on even shakier ground as the nation moves toward more conservative policies and funding for social service programs across the board diminishes. It is sad to say that a result of some of these past programs has created a condition which many have lost the stability mechanisms which, in the past, were instrumental in seeing people through hard times.

The Hispanic population in South Texas must carefully learn the inquiry process which asks what we have, not what we hope to get, for security in the years ahead may well rely on an interdependence which has been unparalleled prior to this time.

The following proposal sets forth a new direction for the low income Mexican American in a rural South Texas region called the Winter Garden area. It attempts

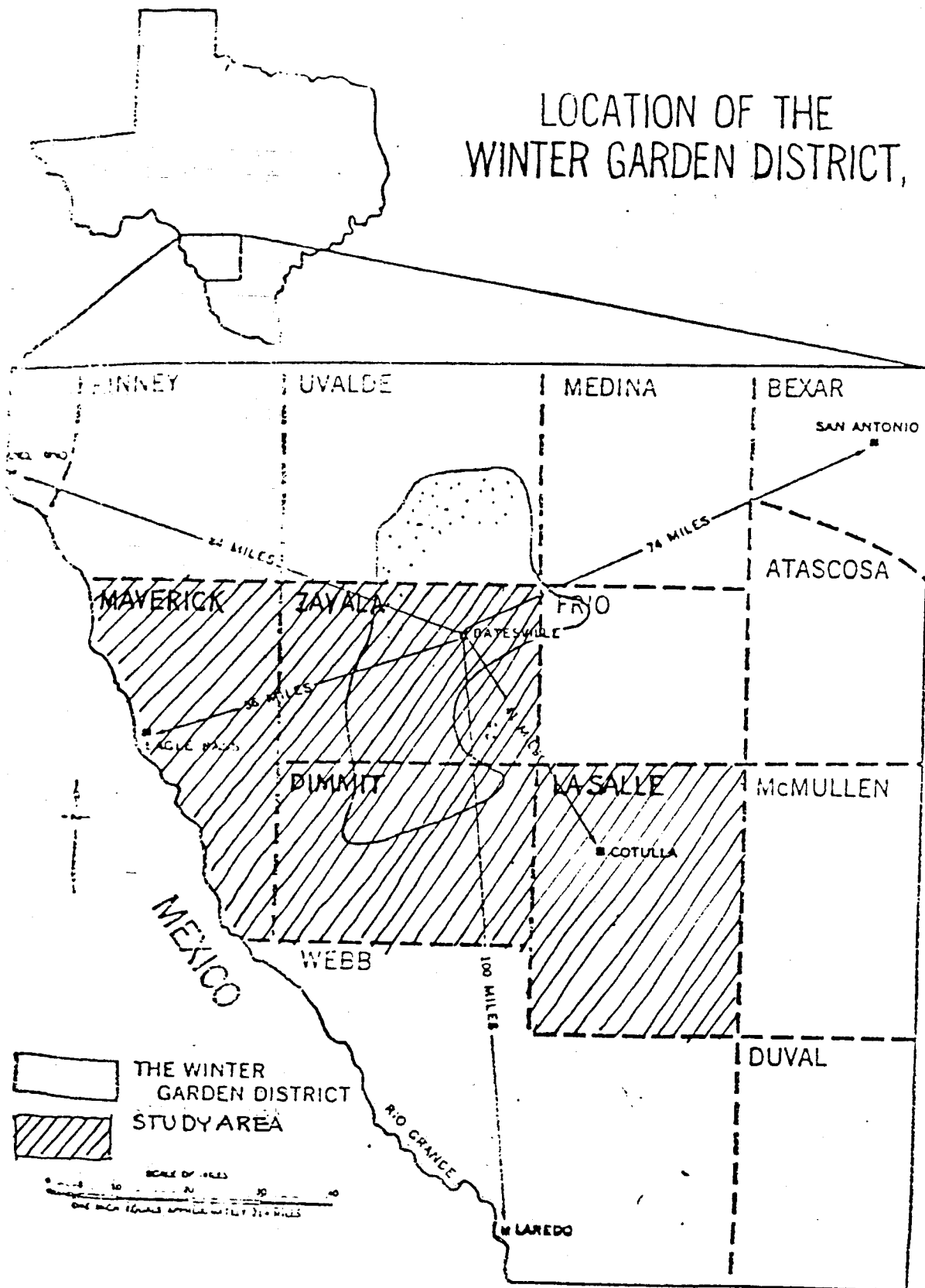
(1) to define a new set of criteria for energy and resource assessment and data collection which fits the needs in conjunction with a process which enables people to derive solutions; (2) to address questions at a series of levels in economic development which maximize local interdependence between manufacturing, distribution, and final use; (3) to initiate the development of key institutions which will support long term stability, avoiding the trap of increased use of capital, and instead foster new relationships and types of trade-offs in money, material, and energy flow; and (4) to guide government monies, if needed, into a self-perpetuating, self-help program which actually builds our communities into tightly woven loops based foremost on essential life support needs, rather than simply attracting "foreign" industries that bring us unstable money, which contributes little to supporting long-term stability or actual self-help.

1.2

Background

The recent history of the Winter Garden area is a monument to the Mexican American's strident efforts to become free of the rampant stereotypes of an illiterate, lazy laborer. These examples include high school students' strikes addressing unfair representation, agricultural workers' strikes demanding wage increases and safe working conditions, and the development of organized participation in the political process which has resulted in the gaining of several key governmental positions. (Mayors, school boards, county commissioners, to name just a few.) A result of these efforts toward self definition and determination has introduced many, though some short-lived, government-funded programs which have attempted one form of revitalization or another. Some of these programs have created an illusive picture as to what is attainable and real, while other innovative moves toward land ownership and self-controlled food marketing were stymied by conservative institutions which have struggled to perpetuate the failing economic systems. Coupled, these efforts constitute a stronghold in consciousness necessary to bring about social change and independence in the local Mexican American culture. Although not always realized by the participants themselves, these attempts have presented a mechanism of eventually eliminating the need for endless support from the biggest industry in South Texas, poverty.

LOCATION OF THE WINTER GARDEN DISTRICT,



In other ways, either because of timing or lack of foresight into what the future would really bring, these programs were incapable of creating the quality of independence inevitably sought by a predominant sector of the Mexican American population in the Southwest, and especially in Texas. The dream of owning and operating gas wells in a state controlled by some of the world's largest energy industries has been attempted and failed. The dream of obtaining control of large tracts of land in a state which views private land ownership as the pinnacle of wealth and influence has also failed. But successes have occurred; even some with little government support. Among these are migrant housing programs which, though not supporting long term, locally controlled Mexican American construction businesses and industries, have resulted in considerable housing rehabilitation and weatherization programs. One city in the Winter Garden area, Crystal City, with little government funding, probably obtains more energy per capita from renewable resources than any other town in the Southwest. Other successful milestones include Mexican American operated city governments, public libraries which highlight the Mexican-American heritage, and school curricula which do justice to the Mexican American in Texas and Southwest history.

However, there are still tremendous hurdles to surpass even within the goals and projects presented by the Mexican American leadership. Often, these projects are accepted in Washington as innovative simply because they are the only proposals received. Concepts of economic development, for example, continue relying on the traditional packaging end of housing and business development instead of asking, "What kinds of housing and will it contribute to long term benefits for our community, such as coupling job skills with available local resources rather than outside resources?" or, "What kind of industry, and how well these relate to our resource restrictions such as water as well as the highly available resources surrounding us which could in turn create a significant multiplier effect for local jobs."

Unfortunately, these questions, if they are raised at all, are looked at as secondary concerns, yet they are essential for people to gain true independence and freedom to guide their own programs which, in turn, would force the community to understand in real terms their role in the future.

2.1

The Process of Retrofitting a Region

The key to successful rural policies on resources, energy, and economic development, lies at the local level and is derived from a greater knowledge, awareness, and participation by those individuals who ultimately will trigger fundamental change.

In order to accomplish these ends, certain assumptions must be made. These are as follows:

(a) Any fundamentally new ways, culturally or technologically, of addressing basic life support must be thoroughly coupled with existing institutions so that these institutions and the individuals within them become the principal local actors;

(b) That the permanence and strength of these institutions must be ascertained, whether they be publically derived or derived at grass roots levels.

(c) That existing local skills must be identified, critiqued, and organized;

(d) That the critique of skills must derive basically from the association of these skills with long term regional resources and methods;

(e) That a permanent body or organization fully representative of major local interest groups must learn how to collect, organize, and distribute relevant information on a continuous basis and develop back-up mechanisms for their continued use.

(f) That information collection is accomplished in a manner that purposely correlates local physical resources with associated local skill listings and technologies so that this information becomes usable by all sectors from user to policy maker;

(g) That emphasis be placed equally on a clear organizational construct at one level, and hands-on demonstrations at the other level.

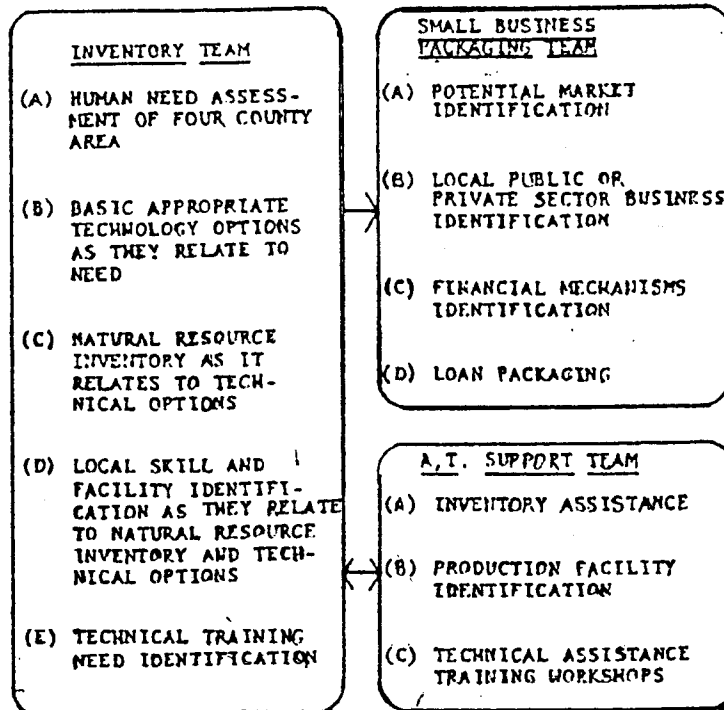
It is anticipated that the organizational format described below addresses a combination of these issues in a clear precise manner. The resulting models are relevant independent of particular life support issues and can therefore act as building blocks within an open-ended, self-organizing regional system. It is expected that the tools presented below for self-directed decision making will be a part of all attempts in the slow transition toward regionally based life support technologies.

2.2

Basic Life Support Module (BLSM)

The basic organizational building block for all activities regarding the basic life support issues of food, clothing, shelter, water, energy, transportation, health, and waste treatment is referred to as the Basic Life Support Module, or BLSM. The concept of the BLSM directly reflects assumptions listed earlier. In essence, it constitutes the operational arm of this proposal.

BASIC LIFE
SUPPORT
MODULE



The BLSM consists of three separate but closely working entities whose prime responsibility is to set the groundwork for actual local participation by people and their institutions, so they can utilize their own local resource base to supply them with their means of life support. Essentially, the BLSM takes life support inventory data and translates it into all the required conditions for developing local economic action through the use of renewable resources.

The three operating entities under the BLSM are: (1) the inventory team; (2) the small business packaging team; and (3) the A.T. support team. The functions of these three entities follow:

Inventory Team has five (5) primary responsibilities that include:

(a) An in-depth human need assessment within the four county area;

(b) A basic appropriate technology options list at it relates to need priorities;

(c) A natural resource inventory as it relates to technical options placed in spatial map form;

(d) Local skill pool and facility identification as it relates to local natural resource inventory and technical options;

(e) Training needs identification.

Small Business Packaging Team

(a) Potential market identification;

(b) Potential local public or private businesses identified as they relate to life support topics;

(c) Financing mechanisms identified;

(d) Loan packaging completed.

A.T. Support Team

(a) Inventory assistance, natural resources data collection; cartography, and technology options identification;

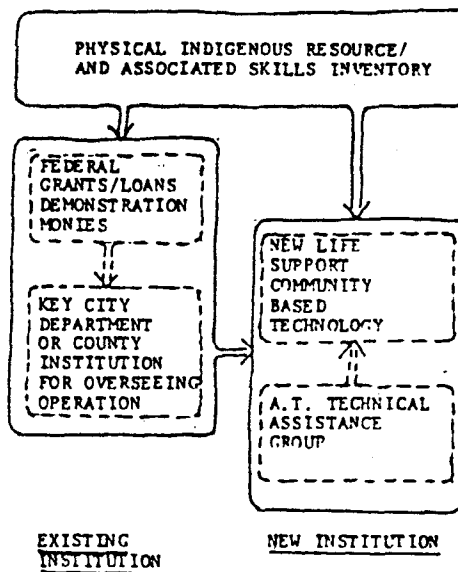
(b) Production facility identification, including physical location, physical sizing, production rate and management planning, and equipment design.

Personnel with the BLSM will work as a team, and in turn will be responsible to a policy-making commission called the Winter Garden Regional Renewable Resources Commission. The purpose of this Commission is to set general goals related to basic life support within the region. The following section explains the purpose and contents of this Commission.

2.3 Public vs. Private Life Support Modules

Life support modules can be either public or private. This choice depends on the prevailing conditions and context. Sometimes a municipal department office is the prime candidate for operating a particular life support need.

PUBLIC SECTOR LIFE SUPPORT MODULE



Certain examples can be used to illustrate how a public life support system might operate. Liquid internal combustion engine fuels are obviously needed for transportation in a rural setting. The top priority

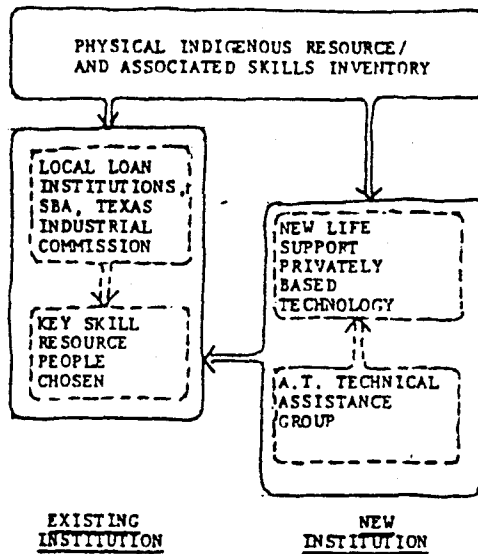
need for these fuels might be decided to be health related vehicles such as ambulances, or fire department trucks, etc. These items have high priority because they are the core to the successful operation and survival of a rural town. Without them, many other basic life support systems would be unable to exist. On top of these factors, we find that the combination of engine repair shops, gas pumps, vehicular storage, and engine mechanics co-exist within one point resource location; the city shops.

Therefore, a logical development of liquid fuels based on renewable energy resources, such as alcohol, can logically exist within this local public sector with obvious links to many other supply point resources in a region where such items as waste food products exist. Thus, a public based life support module is developed.

Other examples of life support could indicate more relationship to the private sector. For example, with the cost of building materials increasing due to rising transportation costs, local earth materials for building block is becoming more realistic. Moreover, due to the diversity of the market place from private to public clientele, local brick manufacturing could become economically viable within the

private sector. In addition, the project has discovered a local family contracting business which has been very interested in this method of building, and already has expressed a desire to finance such a venture themselves.

PRIVATE SECTOR
LIFE SUPPORT
MODULE



3.1 Winter Garden Regional Resources Commission

The Winter Garden Regional Resources Commission, WGRRC, is proposed as the managerial organization responsible for seeing that life support issues of food, clothing, energy, water, building materials, transportation, health, and waste treatment, etc., are truly representative of user needs, as well as reflective of long term regional renewable resource capabilities. The grant will fund a staff whose responsibilities will cover: (a) the development of a permanent WGRRC funding mechanism; (b) the hiring of subcontractor experts and/or the coordination of existing local institutions to supply existing data base(s); and (c) the creation and overseeing of the three discrete subcommittees which have the specific responsibilities outlined under BLSM.

The RRRC will establish a task force which will direct primary need assessment in the following areas:

- (a) Housing
- (b) Sanitation
- (c) Water
- (d) Building Materials
- (e) Energy Conservation/Weatherization
- (f) Heating/Cooling
- (g) Hot Water
- (h) Nutrition/Health
- (i) Transportation/Fuel

These key target issues are to become the base from which the BLSM Inventory Team will start their investigation. After more in-depth inventory is taken, priorities will be presented by the Inventory Team to the task force committee, to support further development by the Small Business Packaging Team and the A.T. Support Team. Finally, a complete Basic Life Support Package, developed from one or several of the nine target issues, will be presented to the Commission before final action is taken on the full working development of any life Support Module.

Last, it is expected that this Commission can help summon cooperation and support from local and county agencies such as U.S.D.A., Food for the Elderly, Health Clinics, Women, Infants, and Children, for example, which will be expected to assist in determining the importance of food issues and nutrition. Similarly, local officials, Community Based Organizations, Housing Authorities, etc. can determine needs in the housing area as they relate to material costs and financing. Other existing institutions can report on water and waste treatment and transportation issues which particularly impinge on low-income

families. Local energy issues concerning heating, hot water, cooking, electricity, cooling, etc. will be assumed through advice from weatherization and human service programs, and utility companies.

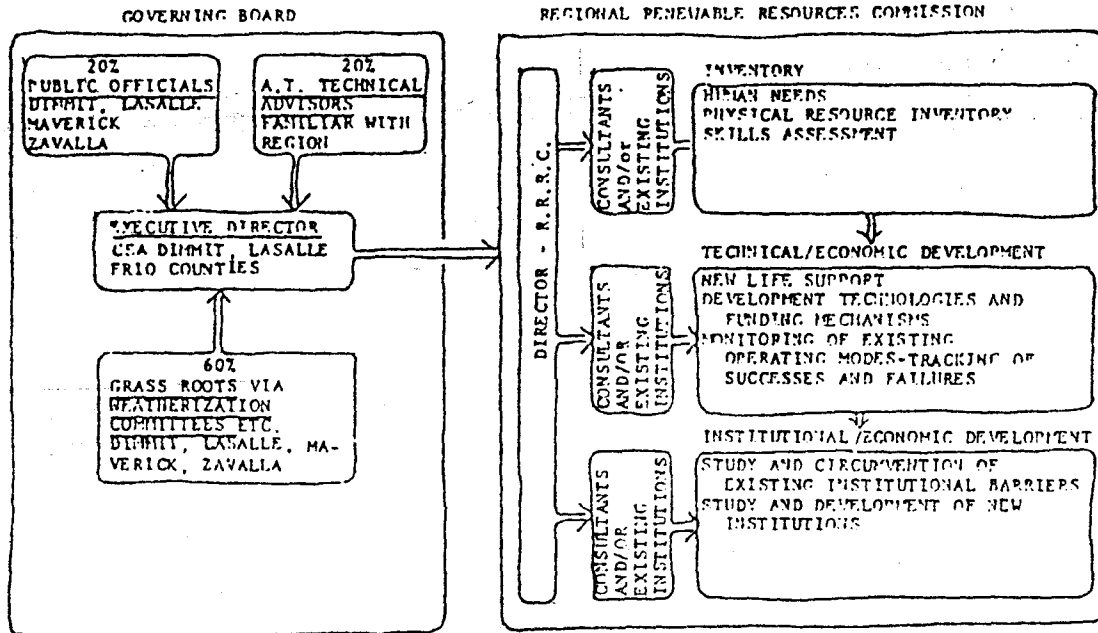
The Winter Garden Regional Resource Commission (WGRRC) will be developed by its parent organization the Community Services Agency of Dimmit and LaSalle Counties (CSA). The CSA is the existing community action agency for the two counties mentioned above. They have been very instrumental in promoting the development of appropriate technology in that part of South Texas. Some projects which they have developed or co-sponsored are:

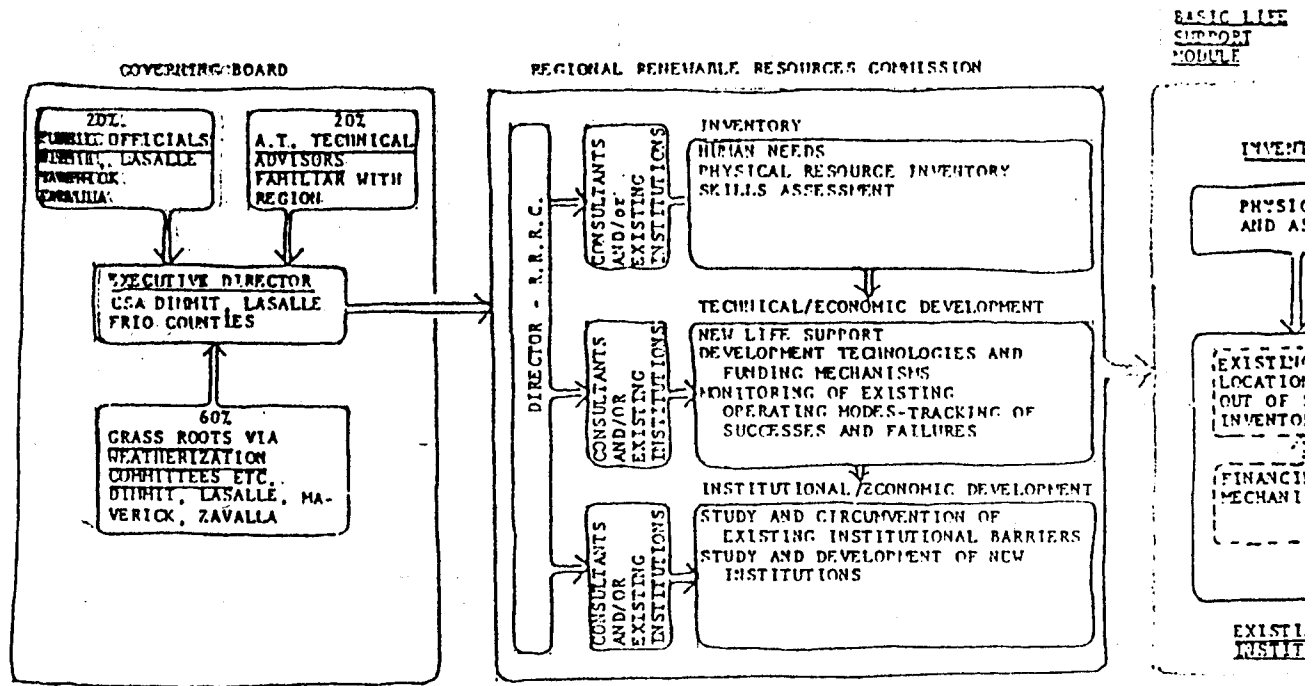
1. First South Texas Conference on Alternative Energy Resources
2. An attached solar greenhouse incorporated into a home repair program with H.U.D. CDBG funding
3. An attached solar greenhouse incorporated into a weatherization project using CSA funding
4. A wood burning water heater project for rural families with no hot water heaters
5. The installation of thirty window box solar heaters for low income elderly
6. The development of a caliche earth building for use as a girl scout building
7. The development of the use of earth materials through caliche blocks and adobe.
8. Coordination with the Crystal City Solar Factory in the installation of thirty solar water heaters in Dimmit and LaSalle Counties

Having developed an interest in AT and recognizing the potential impact a renewable energy commission will have, the CSA is committed to make this project a reality.

The WGRRC will be a part of the CSA for its first year. Part of the work program for the first year will be to develop the WGRRC into being a separate institution incorporated into a non-profit corporation. This non profit corporation will have its own board of directors from the four county area.

The executive director of the CSA will have supervisory responsibility for assuring that the proposed work program is carried out and that the WGRRC becomes a reality. Through his leadership the above mentioned projects have been developed and he has also been very instrumental in promoting AT throughout the state. For their initial participation (the first year) the executive director of the CSA will be compensated on a part time basis and for their administrative support the agency will receive an indirect cost fee. The proposed governing board of the WGRRC will consist of 20% public officials, 20% AT advisors, and 60% grass root representation. The following diagram indicates how the commission will be initially structured.





4.1 Tasks to be Performed During the Initial Year of the Energy Commission

The work schedule of the Energy Commission is composed of six goals which will be accomplished during the first year. These goals are the following.

1. Recruit and organize the energy commission board of directors and corporate structure formation.
2. Recruit and Train the energy commission staff and set up the necessary administrative office procedures.
3. Conduct Basis Life Support Economic Development Research and Planning.
4. Develop an Implementation Strategy which will focus on the Basic Life Support Module and the Accumulation of Research Data.
5. Develop a plan for alternative Funding for the Energy Commission.
6. Develop the necessary reporting procedures.

The following work schedule details the specific functions to be performed in order to successfully accomplish each goal.

Goal Number 1 - Purpose - The purpose of the first goal is to assure that the four county energy commission is incorporated into a non-profit organization according to applicable state (Texas) statutes. In order for the ~~incorporated body~~ to function properly, a board of directors representative of the different interests in the four county area will be developed.

Objectives to be performed are:

1. Initiate the recruitment of an interim board to oversee the initial operations of the commission. This interim board will develop the criterion to be used for board membership and will oversee the full board recruitment. This interim board will oversee and approve the hiring and organizational development of the commission staff. They will oversee and approve the initial research strategy and needs assessment. The interim board will oversee all the required business functions of the first quarter and they will also review preliminary organizational by-laws and corporate structures.

2. Initiate full board recruitment strategy of 20 members. This process will be initiated by the preparation of a graphic presentation which will be used as an educational tool to introduce appropriate technology and how the energy commission will develop energy self reliance. This presentation will be made to political jurisdictions, religious organizations, business and civic groups, and to neighborhood organizations. It is from these groups that the full board recruitment will take place.

3. Conduct the necessary board orientation and training. A viable organization is one that has a strong and dedicated board of directors. The energy commission will conduct the necessary board training so that its members may become strong advocates of appropriate technology and energy self reliance.

4. Hold board meetings on a regularly scheduled basis. The energy commission will hold meetings on a quarterly basis. However, the by-laws will provide for special or committee meetings as the work of the commission warrants it.

Goal Number 2 - Purpose - The purpose of the second goal is to assure that the energy commission is able to recruit the best possible applicants which will meet the necessary qualifications and assure the success of the project. A secondary function will be to assure that the proper office and administrative procedures are developed.

The objectives to be performed are:

1. Acquire the necessary office facilities and set up the necessary communication systems. The necessary office space for the main office will be obtained at this point. It is anticipated at this time that

the main office will be located at the site of a caliche earth building in Carrizo Springs. This building is presently being built with NCAT and DOE funding. The necessary telephone communication systems to meet the needs of the energy commission will be installed so that communications may begin.

2. The applications for the staff positions will be screened by the interim board and the project director. Every effort will be made to utilize as many resources as possible to secure the best possible candidates. A criterion for selection will be developed by the interim board based on the present and future needs of the commission.

3. An initial staff orientation and training will be held once the staff is on board. The training will focus on sensitivity for the staff on the importance of the energy commission and on proposed strategies which will assure the success of the commission. The interim board will be utilized to its fullest to sensitize the staff to the geographical area and its population characteristics. The implementation of the Basis Life Support Module as it relates to economic development strategies will be another important training factor.

4. Develop a VISTA project proposal. Initial talks have been developed with the area VISTA office in Austin, Texas. Their office has indicated that appropriate technology and alternative energy projects is one of their priorities. A VISTA project would be very helpful to supplement the work of the research strategy and to organize neighborhoods for implementation of the Basic Life Support Module. The initial talks have indicated that the VISTA projects are funded in cycles, so the energy commission will prepare for one of these cycles.

Goal Number 3 - Purpose - The purpose of the third goal is to develop and execute a research strategy which will be the building blocks for the actual realization of the Basic Life Support Module Concept. The research activities will focus on basic life support issues such as food, clothing, shelter, water, energy, transportation, health, and waste treatment. From the data which is collected, the board and staff will be in a position to select and prioritize implementation strategies which will realize the BLSM concept, a major purpose of the energy commission.

The objectives to be performed are:

1. Conduct needs assessment in the four county area. An indepth assessment of the four county geographical area will be done to determine resources as well as needs. The research team will do the necessary outreach to all relevant agencies and institutions. The intent of the assessment will be to correlate local physical resources with associated local skill listings and technologies so that this information becomes usable by all sectors, from user to policy maker.

2. Assimilate the data from the assessment and develop an analysis of needs. The data collected from the research strategy will be analyzed to determine specific needs which the energy commission needs to focus on. Once certain needs are identified, they will be matched with resources which are available. The appropriate technology options which can respond to these needs will also be identified.

3. Spatially map the natural resource base as it relates to technology options and identified needs. The resource base necessary to implement the appropriate technology option will be mapped out on a geographical map of the four county area. This would allow for feasibility studies to be conducted on the options.

4. Identify local skills pool as it relates to local resources and technical options. The determination of the technical and vocational skills of the population is very important. It is a pre-determined fact that the educational and vocational skills of the majority of the population are very minimal. However, they need to be measured so that the appropriate technology options may be applicable to the situation.

5. Identification of present and future training and technical assistance. Along with the identification of needs, resources, and options, it is important to determine what training and/or technical assistance will be required to realize the success of the energy commission. Once identified, the necessary contractors or consultants must be selected and their time scheduled so that they may be available when needed.

Goal Number 4 - Purpose - The purpose of the fourth goal is to allow the board of directors of the energy commission an opportunity to set policy and direction for the staff. The energy commission board will set the priorities as to what appropriate technology options will be developed during the first year and in the years to follow.

Objectives to be performed are:

1. Prepare an indepth report for presentation to the board as to findings derived from the research strategy. The staff of the energy commission will prepare a resource atlas for presentation to the board. This resource Atlas will contain all the necessary information for the board to be able to develop an appropriate technology implementation strategy.

2. The board will set the Basic Life Support priorities to be carried out by the staff. From the data presented to the board they will select two Basic Life Support ventures to be implemented by the staff. The staff will develop these ventures in the following manner:

- A. Market Research and Product Development - The staff will conduct a feasibility study to determine the impact which the venture will have. One very important aspect will be whether the product or service to be developed has a market potential. The product or service to be developed must be able to develop a life of its own and not depend entirely on the energy commission for continued sustenance.
- B. Financing - As previously stated, the energy commission may be in a position to provide equity capital to get the venture started, however, the venture must obtain its own financing so that it may be self sustaining. The staff will explore and present financing options which may be developed both public and private.
- C. Preparation of business package - The staff will prepare a business package of the proposed venture. The business package will include a

market capture strategy, financing plan, cash flow analysis, management plan, and a detailed narrative on the proposed venture.

Goal Number 5 - Purpose - The purpose of the fifth goal is to develop a plan for alternative funding to continue the work of the Energy Commission. NCAT will provide initial funds to initiate the work of the energy commission. The board and staff must develop alternatives for funding so that at the end of the first year funding the work of the commission may continue without interruptions.

Objectives to be performed are:

1. Do a feasibility study on a system for lease or rental of equipment. One of the obstacles to appropriate technology development is the lack of the necessary tools and equipment. The energy commission will explore the possibility of purchasing the necessary equipment needed to develop the proposed ventures and then leasing the equipment out. This will generate program income for the commission and at the same time assure that the necessary equipment is available.

2. Research the feasibility of developing a for profit corporation to further the economic development potentials of appropriate technology. It may be necessary to develop a for profit mechanism which will

interest private investments in the economic and business potentials of appropriate technology development. The energy cogmission would be one of the investors in this venture and any return on investment would be used to further the work of the commission.

3. Develop proposals to federal and state programs as well as to foundations. The staff will seek applicable funding sources both public and private and submit proposals for funding. These proposals will be developed to assure the continued operations of the commission.

4. Loan Packaging and Technical Assistance - The Staff of the energy commission will be available to provide packaging expertise and technical assistance in the development of appropriate technology. This technical assistance will be done on a fee basis and the income generated will go to further the work of the commission.

Goal Number 6 - Purpose - The purpose of the sixth goal is to assure compliance with all required contract compliances and reporting procedures.

The Objectives are:

1. Develop a process for quarterly report to NCAT. An internal reporting procedure will be developed

by the staff. This reporting system will insure that the necessary information is available at the time of preparing the required quarterly reports.

2. Prepare and submit the necessary reports to the board. The staff will prepare and submit to the board all the required progress and financial reports for the board meetings. These reports will be reviewed and approved by the board at their quarterly meetings.

3. Submit a Yearly Audit. The energy commission will be required to submit an approved annual audit report to NCAT. The audit will be done by a certified public accountant.

4.2

Milestone Charts

Goal #1. Recruit and Organize the Energy Commission Board of Directors and Corporate Structure

		J	F	M	A	M	J	J	A	S	O	N	D
1. Recruit Interim Board	1	←→											
2. Full Board Recruitment	2	←→			→								
3. Board Training	3	←→			←→		←→			←→			
4. Board Meetings	4			←→			←→			←→			←→

Goal #2. Recruit and Train the Energy Commission Staff and Set Up the Necessary Administrative Office Procedures

		J	F	M	A	M	J	J	A	S	O	N	D
1. Acquire Office Facilities	1	←→	→										
2. Hire Staff	2	←→	→										
3. Staff Orientation	3		←→										
4. VISTA Project Proposal	4			←→					→				

Goal #3. Conduct Basic Life Support Economic Development Research and Planning

		J	F	M	A	M	J	J	A	S	O	N	D
1. Conduct Needs Assessment	1			←→	→								
2. Analyze Data	2				←→	→							
3. Mapping of Natural Resource Base	3					←→							
4. Identify Skills Pool	4					←→	→						
5. Identify T/TA Needs	5					←→	→						

Goal #4. Develop an Implementation Strategy Which Will Focus on the Basic Life Support Module and the Accumulation of Research Data

		J	F	M	A	M	J	J	A	S	O	N	D
1. Indepth Report to Board	1							↔					
2. Set BLSM Priorities	2							←	→	→	→	→	→

Goal #5. Develop a Plan for Alternative Funding for the Energy Commission

		J	F	M	A	M	J	J	A	S	O	N	D
1. Feasibility Study on Lease System	1							↔	→				
2. For Profit Corporation	2							←	→	→	→	→	→
3. Develop Funding Proposals	3								←	→	→	→	→
4. T/TA to other Groups	4									←	→	→	→

Goal #6. Develop the Necessary Reporting Procedures

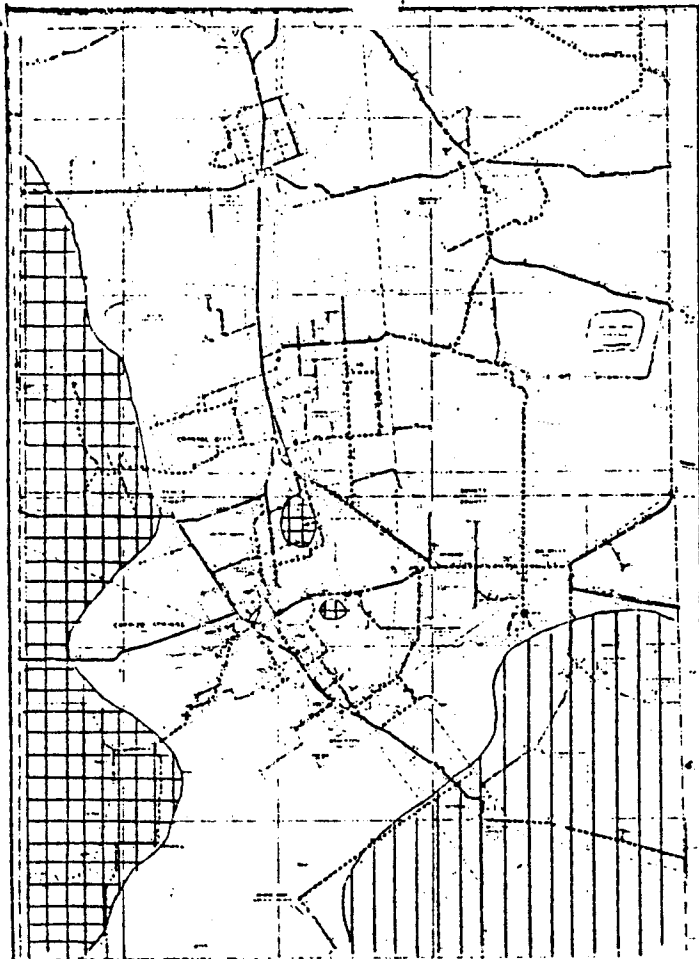
		J	F	M	A	M	J	J	A	S	O	N	D
1. Quarterly Reports	1			↔			↔			↔			↔
2. Board Reports	2			↔			↔			↔			↔
3. Audits	3												↔

The milestone charts are based on a twelve month projection. January is not the actual starting date, but is used as the starting date for illustration purposes. The actual starting date will vary according to NCAT funding schedules.

4.3 PRELIMINARY WORK ON

TWO WINTER GARDEN AREA COUNTIES:

INCOMPLETE EXAMPLES



AREA RESOURCE

LOCATION: ZAVALA-DIMMIT COUNTIES

RESOURCE: EARTH MATERIALS

☐ -CALICHE (GOOD)

▨ -ADOLE (FAIR)

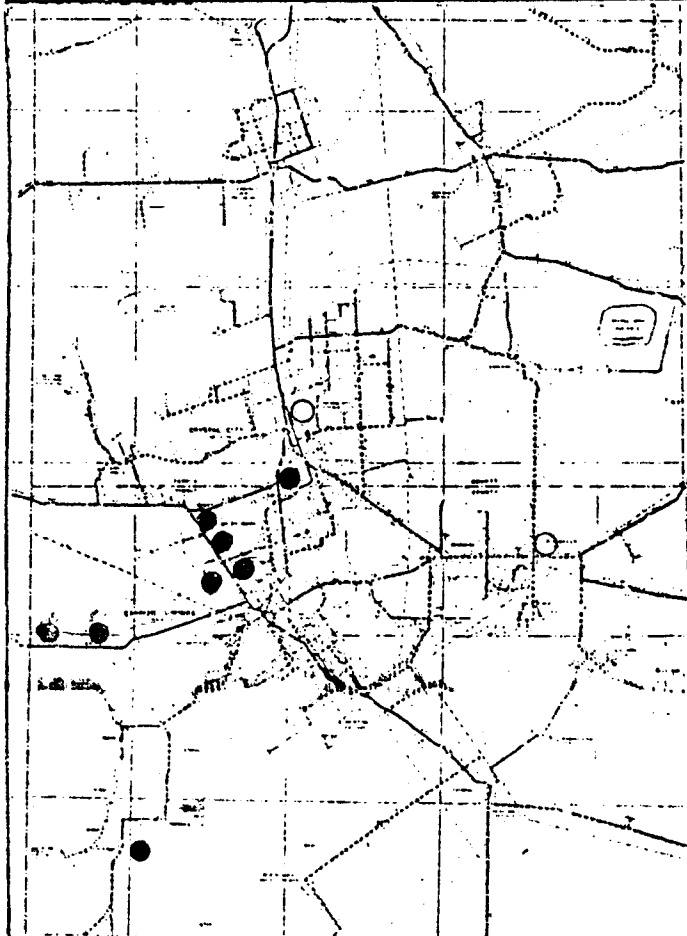
STATIC CONSTRAINTS: SLOPE ABOVE 6%

DYNAMIC CONSTRAINTS: DISTANCE ABOVE
10 MILES

NOTE: THE USE OF HIGH MASS EARTH
TYPE MATERIALS FOR PASSIVE
SOLAR IS MOST JUSTIFIED IF
THE SOURCE AND USE DO NOT
NECESSITATE HIGH TRANSPORTATION
COSTS.

APPROPRIATE TECHNOLOGIES:

- CALICHE (BLOCKS) STABILIZED
WITH 6-10% CEMENT
- CALICHE (BLOCKS) STABILIZED
WITH RIO GRANDE POZZOLAN AND
LIME
- CEMENT/LIME STABILIZED ADOLE



POINT RESOURCE

LOCATION: ZAVALA-DIMMIT COUNTIES

RESOURCE: EARTH

SOURCE:

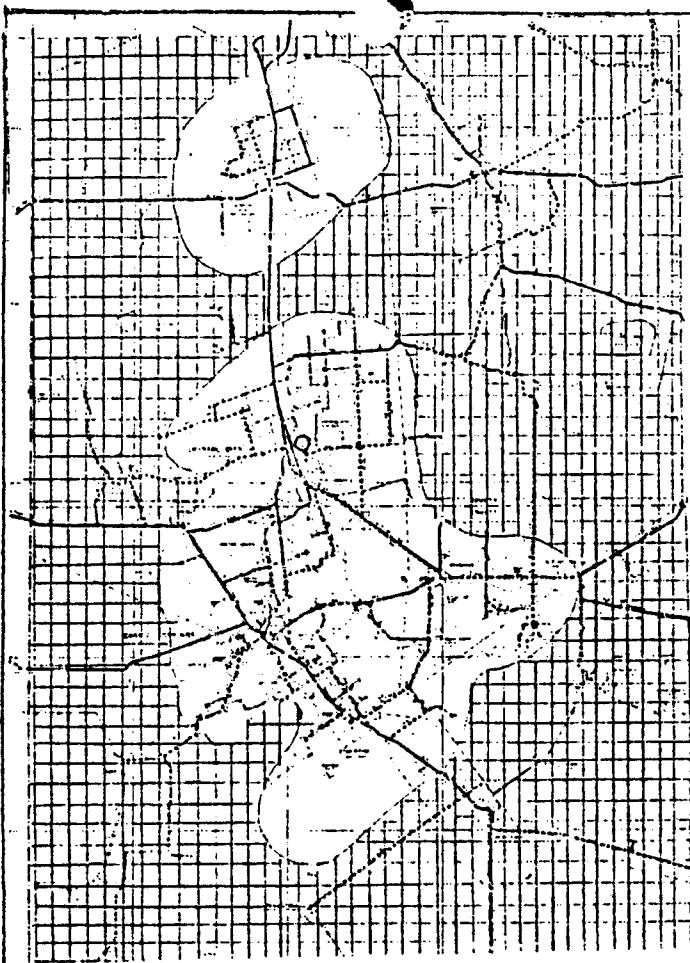
CALICHE:- PIT

- LEROY WILLIAMS
- FAITH RANCH
- STATE HIGHWAY DEPARTMENT
- LARRY STEAR, COUNTY
COMMISSIONER

ADOLE:- CSA; BIG WELLS

USE:

- GARCIA HOUSE; CRYSTAL CITY
- GREENHOUSE; BIG WELLS



AREA RESOURCE

LOCATION: ZAVALA-DINIHIT COUNTIES

RESOURCE: BIOMASS

▣ -MESQUITE

○ -MESQUITE OLD SPECIES

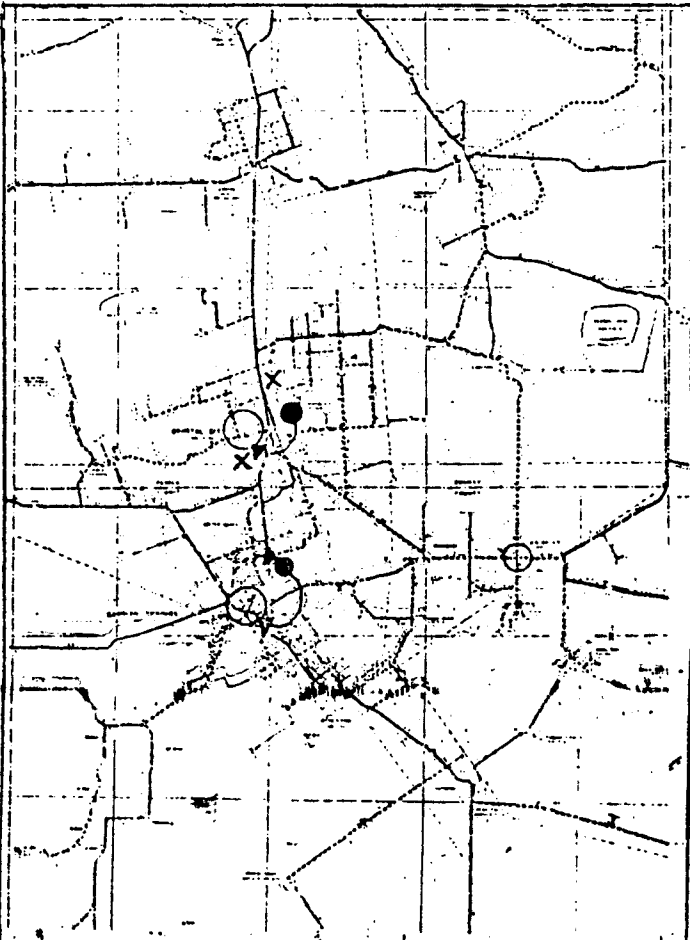
STATIC LIMITATIONS: WATER

DYNAMIC LIMITATIONS: SHALLOW GROUND

NOTE: MESQUITE MANAGEMENT SHOULD BE A CONTINUOUS PROCESS ON RANCHES. HIGH GRADE SPECIES ONLY IN SPECIALLY CONTROLLED PLANTATIONS.

APPROPRIATE TECHNOLOGIES:

- CHARCOAL PRODUCTION FOR REDUCED AIR POLLUTION
- COPPING WITHIN PLANTATIONS
- VARIABLE INSULATING STOVES
- BEAN HARVEST FOR ALCOHOL



POINT RESOURCE NETWORK RESOURCE

LOCATION: ZAVALA-DINIHIT COUNTIES

RESOURCE: BIOMASS

SOURCE: MESQUITE WOOD

-HUMAN SERVICES
CITY YARD; CRYSTAL CITY (X)

MESQUITE CHARCOAL
-CARRIZO SPRINGS CHARCOAL;
HIGHWAY 83 (X)

USE: MESQUITE

-950 CRYSTAL CITY RESIDENTS (○)

-c. 50 BIG WELLS RESIDENTS (○)

CHARCOAL (COMMERCIAL OUTLETS)

-JEB; CARRIZO SPRINGS

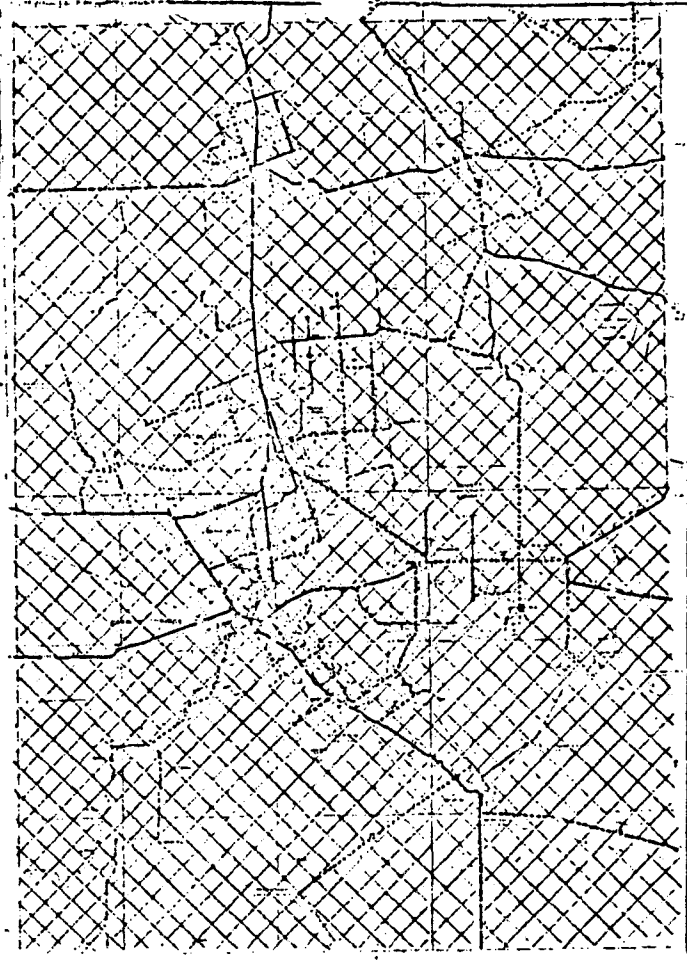
-WINNS; CARRIZO SPRINGS

POTENTIAL TECHNOLOGY SOURCES:

-STOVE MANUFACTURERS (X)

-CRYSTAL CITY WELDING SERVICE (X)

-SOLANSKI WELDING & SALVAGE (X)



AREA RESOURCE

LOCATION: ZAVALA-DIMIT COUNTIES

RESOURCE: HEAT SINK (NIGHT SKY)
SOLAR INPUT

SUMMER ☐ 100 BTU/SQ.FT./DAY @ 70°F.
1250 BTU/SQ.FT./DAY @ 78°F.

WINTER ☐ 300-350 LANGLEY/SQ.FT.

STATIC CONSTRAINTS:

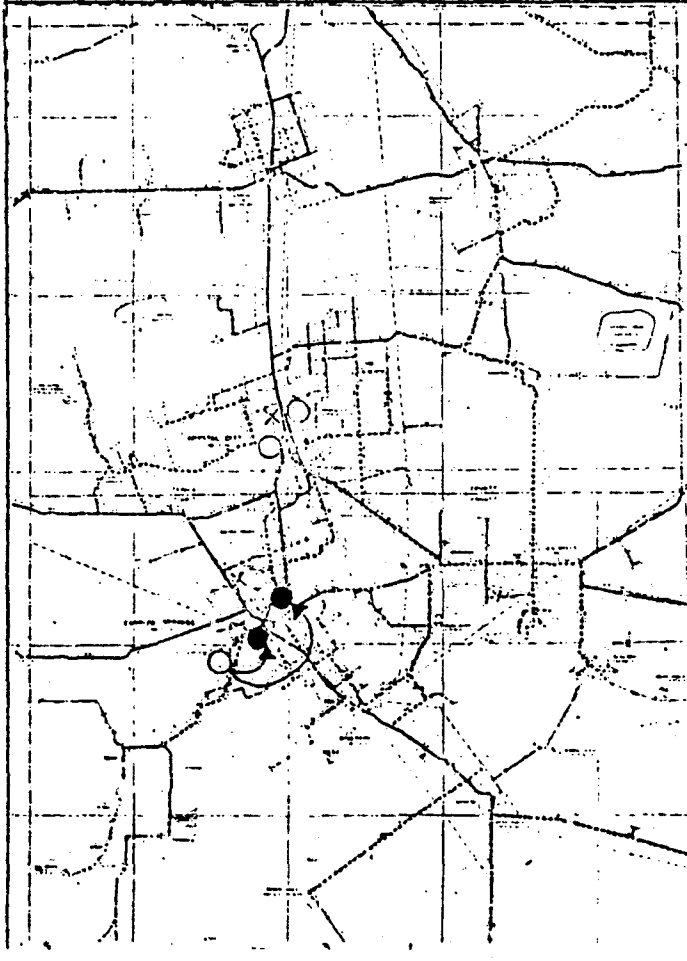
DYNAMIC CONSTRAINTS: POTENTIAL AIR POLLUTION
DUE TO MESQUITE BURNING

NOTE: THIS REGION CAN BE TOTALLY HEATED
AND COOLED WITHIN COMFORT ZONE
YEAR ROUND WITH SIMPLE HEATING
AND COOLING METHODS.

APPROPRIATE TECHNOLOGIES

COOLING:-RERADIATING ROOFS
-RECIRCULATION-NO AIR EXPOSURE
EVAPORATIVE COOLERS

HEATING:-ADAPTABLE ATTACHED GREENHOUSES
TO SCREEN PORCH
-DIRECT GAIN
-TROMBE WALL



POINT RESOURCE NETWORK RESOURCE

LOCATION: ZAVALA-DIMIT COUNTIES

RESOURCE: NIGHT SKY HEAT SINK

SOURCE: -CSA-BEHAR PROGRAM ○
-MIGRANT HOUSING ○
-CRYSTAL CITY CETA ○

USE: -GARCIA RESIDENTS: CARRIZO SPRINGS ○
-DOM/TCAT GIRL SCOUT BUILDING: CARRIZO SPRINGS ●

POTENTIAL SUPPLIES/MANUFACTURERS:

(PUMPS): -ZAVALA MUD: RT. 83, CRYSTAL CITY X
-ALLEN FOUNDRY: HWY. 83, CRYSTAL CITY X

(METAL BUILDING SUPPLIES):
-DOAZ COMPANY INC.: HWY. 277

ITEMIZED BUDGET

1. Personnel

- a. Project Supervisor - 20% of time at
18,300/year - 305/mo. x 12 = \$3,660
- b. Project Coordinator - 1,667/mo. x
12 = \$20,000
- c. Research Analyst - 1,333/mo. x 12
= \$16,000
- d. Secretary/Administrative Assistant
750/mo. x 12 = \$9,000

Total Personnel \$48,660.00

2. Fringe Benefits

@ 16% \$ 7,785.00

3. Consultants

- a. Board and Staff Training - 15
days @ 100 = \$1,500
- b. Graphic Presentation - 10
days @ 100 = \$1,000
- c. Legal - 10 days @ 100 = \$1,000
- d. Development of Research Strategy
5 days @ 100 = \$500
- e. Analysis of Raw Data - 10 days
@ 100 = \$1,000
- f. Feasibility Studies and Business
Package Development - 15 days
@ 100 = \$1,500
- g. Developing For Profit Corporations
and Investment and Leveraging
Techniques - 15 days @ 100 = \$1,500

h. County Energy Plans - 15 days
@ 100 = \$1,500

Total Consultants

\$ 9,500

4. Travel

Project Supervisor - 500 miles/mo.
x 12 mos. x 22.5¢ = \$1,350

Project Coordinator - 1,000 miles/
mo. x 12 mos. x 22.5¢ = \$2,700

Research Analyst - 800 miles/mo.
x 12 mos. x 22.5¢ = \$2,160

Data Collector - 800 miles/mo. x
6 mos. x 22.5¢ = \$2,160

Per Diem - 5 days/mo. x 12 mos.
x 50/day = \$3,000

Three in-state flights @ 100/flight =
\$300

Three trips to Washington, D.C. @
700 = \$2,100

Consultant Travel = \$2,000

Total Travel

\$15,700

5. Space Costs and Rental

Utilities - 75/mo. x 12 mos. = \$900

Typewriter - 50/mo. x 12 mos. = \$600

Slide Projector/Screen/Camera = \$1,000

Xerox - 75/mo. x 12 mos. = \$900

Office Furniture - 125/mo. x 12 mos. =
\$1,500

Office Space 225/mo. x 12 mos. =	
\$2,700	
Total Space Costs and Rental	<u>\$ 7,600.00</u>
6. <u>Consumable Supplies</u>	
200/mo. x 12 mos. = \$2,400	
Total Consumable Supplies	<u>\$ 2,400.00</u>
7. <u>Printing Reproduction</u>	
Data Materials = \$1,000	
Research Document = \$1,500	
Pamphlets = \$1,500	
Total Printing Reproduction	<u>\$ 4,000.00</u>
8. <u>Equipment</u>	<u>-0-</u>
9. <u>Purchase Parts and Materials</u>	<u>-0-</u>
10. <u>Other Direct Costs</u>	
Audit and Annual Report = \$2,000	
Liability Insurance = \$300	
Telephone = \$2,650	
Installation = \$ 250	
200/mo. x 12 = \$2,400	
Computer Services to compile data =	
\$1,000	
Total Other Direct Costs	<u>\$ 5,700.00</u>

Total Budget

\$101,345.00

Indirect Cost @ .07

\$ 7,094.15

Total Project Costs

\$108,439.15

Budget Narrative

1. Personnel

- a. The project supervisor will be the executive director of the Community Services Agency of Dimmit and LaSalle Counties. He will be compensated for 20% of his time based on his annual salary of \$18,300. This relationship will exist only for the first year after which the energy commission will be incorporated.
- b. The project coordinator will oversee the general operations of the commission, this person will be supervised by the project supervisor.
- c. The Research Analyst will be responsible for implementing the research strategy. This person will be supervised by the project coordinator.
- d. The secretary/administrative assistant will be the general office manager. This person will be supervised by the project coordinator.

2. Fringe Benefits

The fringe benefits are calculated at the rate being used by the CSA of Dimmit and LaSalle which is 16%. They include 6.65 FICA, 4.00 Texas Employment Commission, .34 Workman's Compensation, and 5.01 Insurance.

3. Consultants

- a. The board and staff will receive a series of training beginning with an initial orientation on appropriate technology and the BLSM. The board and staff will also participate in setting up the implementation priorities. Community Economic Development and business packaging will be another area.
- b. A consultant will be used to prepare a professional graphic presentation on the energy commission. This presentation will be the basis for orientation

to the public in general and for recruiting the board.

- c. Legal assistance will be used for incorporation of the commission and for legal advise on the ventures.
- d. Consultants will be used to prepare a research strategy which is oriented toward gethering the necessary data to implement the BLSM.
- e. The analysis of the data into usable form will require assistance. Included here is the possibility of the use of a computer.
- f. Technical Assistance will be required to condut feasibility studies on the proposed AT ventures. This will determine their potential in becomming self sustaining. The development of a financial business package which can be presented to financial institutions will also require technical assistance.
- g. One of potential funding sources to continue the work of the energy commission is for it to generate program income. However, it must be done through corporate structures and mechanisms which will not jeopardize the non profit status. Technical Assistance will be used to develop mechanisms which will allow the energy commission to make investments.
- h. The development of County Energy Plans will be an important mission of the energy commission. Technical Assistance will be required to undertake this objective.

4. Travel

Mileage is projected at the accepted CSA rate of 22.5 per mile. Per diem is calculated at the accepted CSA rate of \$50 per day or \$12.50 per quarter.

Three in-state flights are projected for travel to the regional offices in Dallas and the NCAT office in Fort Worth.

Three trips to Washington, D.C. to obtain support and mobilization of resources.

5. Space Costs and Rentals

Utilities are projected at 75/mo. This includes gas, water, and electricity.

A typewriter will be leased.

A slide projector, screen, and camera will be required for the public meeting and to maintain a slide library of the progress of the commission.

Xeroxing is projected @ 75/mo.

Office furniture and office space are being included in the budget in order that the commission may be assured of office space. However, there is a strong possibility that these two items may be obtained as in-kind. If this is the case, NCAT will be informed so that these expenses may be used for other purposes.

6. Consumable Supplies

Office supplies are projected at 200/mo.

7- Printing and Reproduction

Most of this line item will be used to prepare research materials and the county energy plans.

8. Equipment

No equipment is projected.

9: Purchase Parts and Materials

None projected.

10. Other Direct Costs

- a. An annual audit is projected at \$2,000.
- b. The commission will require liability and contents insurance.
- c. Telephone needs are projected at \$2,650.
- d. Computer services will be required for data analysis.

Indirect Costs

Indirect Costs are projected at .07%

6.0 APPENDICES

APPENDIX I.

PERTINENT STATISTICAL CHARTS

Table II

Mexican American Target Counties

<u>County</u>	<u>1970 Census</u>	<u>% Mexican American</u>
Dimmit	9,039	81.7
Frio	11,159	69.1
Kinney	1,448	72.1
La Salle	5,014	78.4
Maverick	18,093	90.3
Medina	20,249	48.5
Uvalde	17,348	50.7
Zavala	11,370	81.6

SOURCE: U.S. Census, 1970; Poverty in Texas, O.E.O., 1972

TABLE IV

DEMOGRAPHIC CHARACTERISTICS
(1970 Census)

Population

	<u>TOTAL</u>	<u>% NEGRO</u>	<u>% WHITE</u>	<u>% SP. AMERICAN</u>
Texas	11,196,730	12.679	68.935	18.395
→ Dimmit County	9,039	1.239	17.103	81.657
Frio County	11,159	1.111	29.787	69.101
Kinney County	2,006	6.031	21.785	72.183
→ LaSalle County	5,014	.179	21.420	78.400
Medina County	20,249	1.926	50.567	48.506
→ Maverick County	18,093	.055	9.595	90.349
Uvalde County	17,348	1.781	47.481	50.737
→ Zavala County	11,370	.334	18.091	81.574

TABLE V
POPULATION CHARACTERISTICS
1970 - Population Age Percentage
Distribution in Eight Counties

<u>County</u>	<u>Under 5 yrs.</u>	<u>5-14 yrs.</u>	<u>Under 20 yrs.</u>	<u>65 and under</u>
→ Dimmit	11.505	25.201	50.070	8.950
Frio	11.811	24.097	47.610	10.242
Kinney	8.035	23.479	43.616	11.565
→ LaSalle	10.450	23.593	45.430	10.510
Medina	9.154	22.524	44.621	11.195
→ Maverick	11.833	22.618	51.920	6.637
Uvalde	9.455	22.273	44.090	11.574
→ Zavala	11.495	25.584	50.613	7.414

Table XIV
 Below Poverty Level
 By Percent

	No. of Families	
	Total	Chicano
Texas	14.6	31.406
-> Dimmit	50.995	62.198
Frio	35.502	51.574
Kinney	44.158	63.870
-> La Salle	47.868	65.151
Medina	24.704	42.816
-> Maverick	44.200	51.213
Uvalde	28.887	45.819
-> Zavala	43.137	52.730

Table VI
 POPULATION CHARACTERISTICS
 - Counties in the Top Ten Percent with
 the most unfavorable Rating in Poverty
 Characteristics

COUNTY	No flush Toilet %	% Pop. Overcrowded Housing
→ Bimble	42.2	34.7%
Frio	24.4	30.8%
Kinney	23.4	27.0%
La Salle	33.2	30.0%
Medina	14.9	19.8%
Maverick	17.7	35.5%
Uvalde	16.2	21.0%
Zavala	30.6%	35.1%
Texas	4.4	9.2

TABLE XIII
% Chicano Families Earning
Less than \$3,000

<u>Texas</u>	28.1%
→ Dimmit	46.7
Frio	43.6
Kinney	56.8
→ LaSalle	56.2
Medina	36.1
→ Maverick	45.9
Ovalde	40.5
→ Zavala	40.6

Table XIV
 Below Poverty Level
 By Percent

	No. of Families	
	Total	Chicano
Texas	14.6	31.405
-> Dimmit	50.995	62.198
Frio	35.502	51.574
Kinney	44.158	63.870
-> La Salle	47.868	65.151
Medina	24.704	42.816
-> Maverick	44.200	51.213
Uvalde	28.887	45.819
-> Zavala	43.137	52.730

Table XV

Percent Income Distribution in 8 Counties
(Rounded to nearest .1)

	Less 1,000		1,000-2,999		3,000-5,999	
	<u>Total</u>	<u>Chicano</u>	<u>Total</u>	<u>Chicano</u>	<u>Total</u>	<u>Chicano</u>
Texas	8.4	9.7	16.5	18.4	19.7	28.6
Dimmit	13.5	14.8	26.2	31.6	30.3	37.1
Frio	13.1	14.7	23.1	28.9	30.1	38.6
Kinney	15.4	19.3	35.3	37.5	28.8	35.3
La Salle	13.0	16.3	33.2	39.9	24.5	27.4
Medina	8.8	10.9	20.1	25.2	26.1	37.5
Maverick	14.1	15.8	25.5	30.1	27.5	25.2
Uvalde	12.4	12.2	23.3	28.3	25.7	30.1
Zavala	9.2	9.4	27.9	31.2	27.4	31.3

6,000-9,999		10,000-14,999		15,000 or mor	
<u>TOTAL</u>	<u>Chicano</u>	<u>Total</u>	<u>Chicano</u>	<u>Total</u>	<u>Chican</u>
23.9	25.3	18.7	12.5	12.9	5.5
17.2	13.4	8.7	1.6	4.2	1.6
17.1	11.3	8.4	3.0	8.2	3.5
12.3	5.0	8.0	2.8	5.0	0.0
15.9	9.4	7.5	4.9	6.1	2.0
23.6	18.3	12.7	5.1	8.7	3.1
18.6	17.4	9.7	7.9	4.6	3.0
19.9	21.1	10.9	5.8	8.0	2.4
23.4	22.4	7.9	4.5	4.1	2.2

TABLE III. UNEMPLOYED - EXPERIENCED WORKERS

I T E M:	Crystal City Labor Area		Zavala County	
	Total	Female	Total	Female
Total	1280	830	740	265
Professional, Technical & Kindred	55	25	20	10
Farmers & Farm Managers	45	0	20	0
Managers, Officials & Proprs.	70	10	10	5
Clerical & Kindred	235	135	75	40
Sales Workers	340	190	105	55
Craftsmen, Foreman and Kindred	240	45	60	10
Operators and Kindred	400	205	135	70
Private Household Workers	110	95	40	35
Service Workers (exc. domestic)	195	100	45	25
Farm Laborers	280	15	100	10
Laborers, Non-Farm	410	10	125	5

TABLE XI
INCOME CHARACTERISTICS

	Median Family Income		Med. Per/Cap. Income	
	Total	Chicano	Total	Chicano
Texas	8,089	5,897	1,994	1,014
→ Dimmit	\$ 4,062	3,723	\$ 777.	\$ 627-150
Frio	4,526	3,723	984	690-294
Kinney	3,135	3,088	875	680-195
→ La Salle	4,056	3,000	942	799-143
Medina	6,362	4,378	1,080	625-355
→ Maverick	4,510	3,906	809	687-112
Uvalde	5,612	3,886	1,220	756-474
→ Zavala	4,981	3,983	983	864-119

TABLE XII
Mean Number of Children/family

County	Mean No. of Children to Women 35-44	
	Total	Chicana
Dimmit	4.8	5.4
Frio	4.5	5.6
Kinney	4.0	5.1
La Salle	4.5	5.7
Maverick	4.7	5.2
Medina	4.0	5.2
Uvalde	3.7	5.2
Zavala	4.6	5.7

Table X

Occupation Characteristics of Eight Counties
Winter Garden Area, Percent Distribution

County	Professional, Manager & Technical		Clerical & Sales		Craftsmen & Foremen		Semi-Skilled		Farm		
	Total	Chicano	Total	Chicano	Total	Chicano	Total	Chicano	Total	Chicano	
Alameda	13.9	77.19	8.59	4.79	24.3	18.3	13.7	14.3	32.1	44.2	3.8
Butte	10.3	33.5	6.4	4.5	15.5	14.8	6.7	6.0	34.5	38.5	18.4
Colusa	10.1	22.9	6.7	4.6	15.0	9.4	12.3	12.7	26.2	35.4	25.0
Contra Costa	8.1	44.2	8.7	6.2	11.2	5.7	6.2	6.0	29.4	37.7	31.0
Elle	10.0	22.6	8.7	4.3	10.8	9.5	10.9	9.7	34.7	45.1	16.4
Ellick	11.7	71.1	9.5	7.2	20.3	20.6	8.2	7.7	33.1	37.8	8.2
Ma	8.6	5.7	9.0	2.6	17.0	9.8	16.6	16.8	33.3	49.7	12.2
le	9.3	3.9	9.3	4.4	20.5	15.4	14.3	13.7	30.4	43.2	12.2
la	11.1	6.7	6.5	3.9	14.0	19.0	10.2	10.3	25.0	32.1	27.2

Table VII
POPULATION CHARACTERISTICS
HOUSING

County	Owner Occ Under 5,000 %	Owner Occ 5,000-14,999 %	Owner Occ 15,000 + %	Renter Occ Under \$40 %	Renter Occ 40-99 %
-> Dimmit	54.743	37.349	7.906	53.727	41.388
Frio	40.514	46.173	13.311	58.964	37.051
Kinney	60.066	35.643	4.290	64.285	32.857
-> La Salle	56.489	34.610	8.889	68.907	29.831
Medina	29.940	49.341	20.717	44.289	48.368
-> Maverick	27.371	55.261	17.366	44.403	45.515
Uvalde	27.879	50.491	21.628	40.862	47.891
-> Zavala	36.903	52.203	10.892	64.849	33.270

APPENDIX II.

PERTINENT ARTICLES

Wednesday, August 9, 1978

Valley residents rank poorest in n

WASHINGTON (AP) — Amid the swaying palm trees and lush farmland of Texas' Rio Grande Valley live some of the poorest people in the country.

A few hundred miles north, where the Texas terrain becomes dry, comparatively barren and occasionally sand blown, the per capita personal incomes increase dramatically.

According to the Department of Commerce, the West Texas city of Midland — where oil derricks are the rule and palm trees the noted exception — ranks ninth nationally with a per capita income of \$7,701.

Austin, with a per capita income of \$5,633, ranks 213th nationally.

The Rio Grande Valley area of McAllen-

Pharr-Edinburg barely nudged two of its neighbors for the dubious honor of finishing 266th in a listing of 266 areas.

McAllen-Pharr-Edinburg had a 1976 per capita income of \$3,338. Laredo was next-to-last with \$3,575 and Brownsville-Harlingen-San Benito a notch higher at \$3,825.

Midland was the only Texas city in the top ten although seven of the 23 Texas cities or areas listed topped the national average.

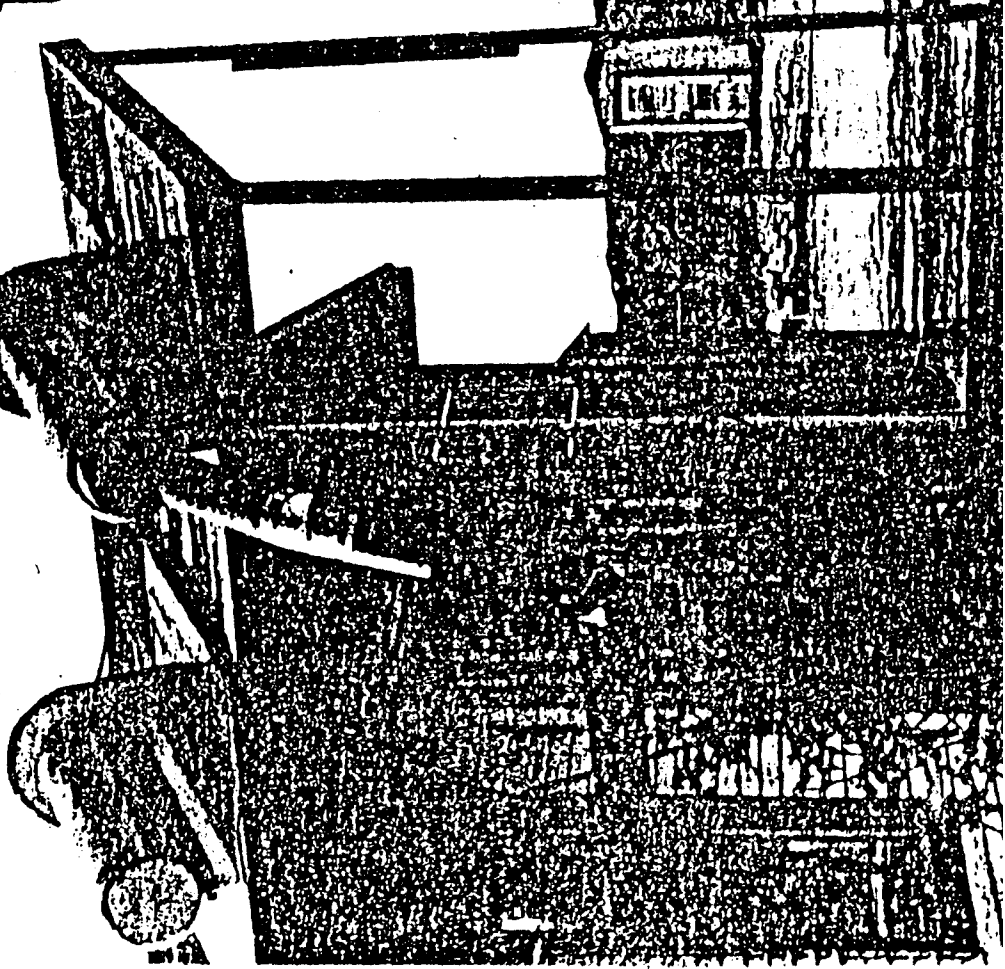
The economy's dependence on energy was reflected in the areas with the largest increases since 1975. The Beaumont-Port Arthur-Orange area increased almost 18 percent to \$6,557 in a one-year span. Houston increased more than 15 percent to \$7,617 (12th nationally). Tyler also showed an increase of

more than 15 percent, r

Anchorage, Alaska — lars poured into the co kan pipeline — led the ita income of \$10,739.

Other areas listed in tional ranking inclu (161st); Amarillo \$6,7 lege Station \$4,871 (2; \$5,668 (204th); Dalla (36th); El Paso \$4,73; Texas City \$6,808 (58; (152nd); Lubbock \$5, \$6,474 (94th); San Ange Antonio \$5,654 (208th \$5,688 (199th); Waco Wichita Falls \$6,652 (74)

The town that turned off the gas



By John Yemasu

Staff correspondent of The Christian Science Monitor

One dramatic chapter of the energy crisis story of the 1970s has been written in this small south Texas town.

Two years ago, the entire population was abruptly served from its natural gas supply and forced to find other ways to heat homes. The townspeople pulled together, and Crystal City survived. But what happened here may foreshadow the future of other rural towns in an energy-strapped era.

The episode could not have unfolded in a more uncommon setting. Driving the dusty highway recently, one could not help but notice ubiquitous oil pumps dotting the plain. Every mile or so, one sees them: they bow stiffly, up and down - giant black metal praying machines - working their hidden lodges of Texas crude oil. In other places, one can see compact, ground-bugging complexities of blue-coated pipes; these gather and dispatch natural gas from plentiful subsurface pockets. This is one of the nation's prime areas for exploration and oil production.

Yet for all the liquid energy that is tapped, the townspeople of Crystal City, the county seat, rely neither on natural gas nor crude oil distillates to heat their homes in winter. They rely on wood.

As we drive, Alejandro Perez points to a field bounded by barbed wire in which are stretched three or four dozen cords of mosquito hogs.

"Here is our supply," he announces (his English heavily flavored with Spanish words and accent, as is common in this region). "At first a lot of people - and we're talking about poor and middle class Chicanoes mostly - thought it was too primitive to use this wood for heat.

"But then," he concludes simply, "it got cold."

In the distance is an open, airy tableau of south Texas - the plateau separating the Rio Grande basin from the Chihuahuan Desert. The vista is colored primarily in the uniform pastel blues of sky and the bleached-out greens and khaki of arid land. The firmness is broken by clumps of otherworldly vegetation: gnarled live oak, thorny mesquite, pods of prickly pear, spiny century plant. Spanish dagger, yucca with tall spout of fiery flowers. A bare, globe larkly on a far-off thermal gray in the bright sky.

Ranching and irrigated farming represent one way of

How is it that a town atop the hydrocarbon-rich earth of south Texas ended up using wood?

Not really for choice. This is not an experiment by a group of '60s holdovers dabbling in an "alternative lifestyle." Instead, this is the serious and necessary way in which the largely impoverished community now copes with winter.

In the fall of 1977, Lo Vaca Gathering Co., the supplier of natural gas to Crystal City's municipally owned gas company, shut off its valves at the city limits. The city had refused to pay higher rates for the gas and had gone to court along with other cities that used the same supplier.

Lo Vaca won after a protracted fight. Unlike the other cities, however, Crystal had not been charging residents the higher rate in the interim and holding the disputed amount in escrow. The city's young, populist leaders (the Raza Unida political party had come to power in the county four years earlier) were very sure of their case. Crystal ended up without any money to settle its debt, and a judge ruled Lo Vaca could turn off the gas.

All homes were affected, rich and poor alike. (Gas did continue to flow to the city's electric generating facility, which paid the higher rates.) Still, late payments and terminated service are not new in south Texas or other parts of the country. Low-income families frequently miss utility payments and suffer service interruptions. But this was the first case in the nation where an entire community was disconnected.

Natural gas had been heating south Texas homes for as long as anyone could remember, and "lifeline" utility rates — that is, laws to keep the gas flowing during hard times as a humanitarian matter — do not exist in most locales. Still, with emergency money and a good deal of ingenuity, no one suffered too much from the cold in the winter of 1977.

Shortly after service was cut off that fall, the Community Services Administration (CSA) in Washington supplied a \$310,000 grant to the city to deal with its problem. At first, officials considered using the money to pay the past-due gas bill and resume service. But that idea was scuttled when nearby towns protested that to use federal funds in such a manner would be to reward Crystal City for negligent practices.



"We were in trouble," recalls Mr. Perez. "Winter was coming. Some of the old people had no money and no heat and didn't know what they were going to do. We had to look for new ideas."

City officials used part of the money to buy propane tanks for every household. But few people knew how to install them; moreover, the propane would prove more expensive than natural gas over the course of the winter. It was unlikely most people would have the money to refill their tanks.

Three days before Christmas, the cold weather hit. With conventional solutions escaping them, city officials made contact with a group of architects in Austin, 200 miles north, who were knowledgeable in conservation and innovative energy technology.

Architects Pliny and Daria Fisk and their associates from the Center for Maximum Potential Building Systems — a sort of backyard tinkering operation in the passive solar field at that time — hit upon the idea of using wood for heat. Army surplus stoves could be had cheaply, and mesquite was so plentiful that area ranchers considered it a nuisance. Mesquite also burns very efficiently, as anyone who has seen an old barbeque house in operation may attest.

The technology seemed appropriate. Texas churches and the Chamber of Commerce donated toward the emergency energy operation. Wood gatherers were provided by the CSA-funded Zavala County Economic Development Corp. Mr. Fisk located 1,000 Korean War tent stoves in San Antonio, bought them, and set to work installing them.

This was done amid continuing political free-for-alls.

The sometimes strident Raza Unida leaders were at odds with Texas' conservative Democratic establishment. Several months earlier, Gov. Dolph Briscoe had been irritated at a Crystal

City proposal to build a cooperative greenhouse using federal money. Mr. Briscoe warned that the Chicano activists were attempting to make south Texas "a little Cuba," and he threatened to block the spending of federal money for any other collectivist schemes. So state help was not forthcoming. Then, too, the Raza Unida leaders were far from united, often bickering among themselves over what approaches to take.

Work proceeded with the Fisks and others trying to stay out of the political fighting — a difficult task for Anglo architects in the south Texas barrios. But by the end of January, 960 stoves had been booked up, and 500 cords of wood stockpiled.

For Crystal City, the town without a gas supply, that was the beginning of the future. And the new ideas did not end in the winter of 1977.

Driving through town, Mr. Perez points out the proliferation of stovepipes poking from the rooftops of old and new homes. Soon, we arrive at a small frame house on the edge of town. It, too, uses a wood-burning stove.

Zigzagging sections of pipe lead from the stove to a rooftop water heater. The heater is covered with glass and connected to a water supply by garden hose.

This is a jerry-built system in which exhaust from the stove supplements a solar water heater. There may be many more of these in Crystal City in the next few years. Mr. Perez admits this one is not arranged very neatly. And he also has his doubts about the quality of a greenhouse that is attached to the south side of the home in an attempt to capture the sun's heat in winter. But this is a "demonstration project."

The home's owner, Marita Garcia, says she thinks this is a step in the right direction. She almost always has hot water by mid-morning, and the contraption brings visitors to her house almost every day.

"Pliny Fisk had this idea, and we experimented with Mrs. Garcia's house," Mr. Perez says. "We think it's a good start. The water heater is homemade, using salvaged materials (a conventional gas water heater with the lining removed and other modifications). We are going to hire some workers to put them together for more people. Maybe one day this will be a business for Crystal City. We certainly could use the jobs."

Mr. Perez smiles in the bright afternoon light. "We have plenty of sun in Crystal," he says.

Mr. Perez is not the only south Texan who has been converted to the "appropriate technology" philosophy. Ten miles away in the town of Carrizo Springs, the concept has its advocates. This town still uses natural gas for home heating, but the pipe system is antiquated and leaky. David Ojeda estimates that up to 50 percent of the supply escapes through faulty valves and seals. As in other small towns, gas costs are increasing, and the population is not. Thus, it is getting less and less economical for the city to operate the gas utility.

'Crystal City is an example of practically every rural town in America over the next dozen years. Energy costs are growing faster than people in these little towns, with their limited economic bases, can keep up.'

— Pliny Fisk

"The belief here has always been: 'Bring in a General Motors plant to give people jobs, then they can pay the higher bills.'" Mr. Ojeda, director of the city's Community Services Agency, says half jokingly. "But that is unrealistic. Most people during the winter have this option: will it be heat or food?"

Crystal City's experience in energy self-reliance seems to point a way out of the problem for Carrizo Springs. "We believe there's a lot of room to work in," Mr. Ojeda says. "We are looking at wood, at waste from farms, at earth materials, at solar heat. And I think it's coming from the community — people want it."

Messrs. Ojeda and Perez are attempting to develop a multi-county organization to promote alternative energy sources. A second generation of Mr. Fisk's passive-solar house is being built in Carrizo Springs. The attached greenhouse is more solid than Mrs. Garcia's: there is an air circulation system; the rooftop water heater is connected with neatly-plumbed copper pipes. While neighbors are not exactly rushing to build their own, there has been generally favorable comment, Mr. Ojeda says.

At his Austin, Texas, workshop the next day, Pliny Fisk speaks philosophically of the need for community self-reliance and inventive solutions to energy problems. He and his

wife, Daria, two assistant professors of architecture at the University of Texas, now run a nonprofit research center which looks for low-cost ways to cope with energy problems.

The gas cutoff, says Mr. Fisk, hastened Crystal City into a future other towns eventually will share.

"Crystal City is an example of practically every rural town in America over the next dozen years," he says. "Energy costs are growing faster than people in these little towns, with their limited economic bases, can keep up. And the idea of everyone in the country using the same type of energy — natural gas, heating oil, nuclear power, coal — is becoming obsolete."

What Mr. Fisk predicts is that each little town will be forced to come up with its own unique solution to its own particular energy problem. The solution, he feels, almost always will involve local resources that are now being overlooked.

If the town is Crystal City, Texas, situated as it is in the middle of mesquite country under almost cloudless skies, the solution might be to burn wood and tap into solar power.

Mr. Fisk soon will embark on a federally-funded demonstration program to build and install 120 solar water heaters in the Crystal City vicinity. The heater he has developed is encircled by old fluorescent light tubes to magnify the sunlight. Mr. Fisk estimates each unit will cost \$70 to build and install; commercial solar water heaters start at several hundred dollars.

Other unconventional ideas: using standardized trusses, an improved version of the attached greenhouse might be built to help heat houses in winter, convert to screened porches in summer, and give homeowners more living room; a portable kiln might be used to turn the mesquite into charcoal for greater energy efficiency and stove safety.

Mr. Fisk also is experimenting with ways of making bricks from native building materials, such as volcanic ash and white caliche subsoil. His latter experiment is being monitored by the United Nations, which is interested because caliche is present in great amounts in almost all arid lands.

Mr. Fisk believes that education is a key element in sparking energy innovations. Instead of teaching how to make lamps and chairs in school vocational education classes, he says, the curriculum should cover solar collectors and other homemade energy devices.

"It will take a long time for most people to come to grips with the fact that energy is a problem that eludes conventional universal solutions," he says. "What is needed is a multi-faceted approach to match social and technological needs.

"For instance, in a place like south Texas, there is a tremendous amount of mesquite and of sunlight so the idea is to be as unsophisticated as possible about it.

In New England, an airtight wood-burning stove with an afterburner costs several hundred dollars and

only six weeks of cold in Crystal City, so it would take three or four years to pay for such a stove. You've got to look at the region you're in. The technology will be very different and diversified."

As Mr. Fisk sees it, communities seeking new solutions to energy problems will reestablish their local flavor, lost in the rush of homogeneous modernity. And the likelihood that one past-due gas bill — albeit a big one — can disrupt the entire population will be decreased.

So far, Crystal City's energy future has come courtesy of federal money. But Mr. Fisk believes private businesses specializing in energy projects soon will crop up. He is optimistic that energy self-reliance is catching fire on its own. Recently, he says, he met a man in Corpus Christi, Texas, who had found out about the fluorescent-tube solar water heater through word-of-mouth and was building one on his own.

"That's the breakthrough," says Pliny Fisk. "— when people discover it for themselves, and it filters through the community, and everybody is talking about it. When they think it's their own idea, then you've begun

Valley Hispanics go to Washington

By WARD SINCLAIR
Washington Post

WASHINGTON — If there is sometimes great meaning in small events, then the humble people of the Rio Grande Valley, speaking in their native Spanish, may have touched it in the lobby of Washington's posh Mayflower Hotel.

There, light years from the unpaved streets of their waterless Texas communities, they found an assistant secretary of agriculture who not only listened Monday, but talked to them in their language.

THEY TOLD Alex Mercure, one of the highest ranking Hispanics in the Carter administration, of their dire need for help in developing their own potable water supplies.

Mercure indicated that federal assistance would be forthcoming. That pleased Fidel Velazquez and Amado Garza, who are, respectively, "presidente" and "secretario" of El Comité Para Mejoramiento de Cameron Park.

The Cameron Park Betterment Committee, representing about 175 Mexican-American families in the Village outside of Brownsville, is a tiny element of a larger political development.

GOVERNMENT has begun to listen to the voices of the estimated 12 million Spanish-speaking Americans, who will be, by the turn of the century, the country's largest minority.

In the urban barrios and the dusty byways of the Southwest, the Hispanics are organizing, learning to talk the language of the grant-approving federal government, finding the political pressure points that provide help.

So as a milestone of sorts, the National Council of La Raza, one of the country's largest Hispanic organizations, is holding its first convention this week, in Washington, at the Mayflower.

THE COUNCIL, formed 10 years ago in the Southwest, represents more than 100 community-based organizations that provide services to upwards of 1 million Hispanics. They counsel, they educate, they build.

Several hundred delegates from these local organizations are here for the speeches, the seminars and the official actions that attend most conventions.

But beyond that, as council president Raul Yzaguirre explained it, there is another point:

"We are here in Washington because we wanted to make an impact on the federal government. We are here and we are going to continue to be here."

POLITICALLY, Yzaguirre conceded, the council still has a distance to travel. Invitations to President Carter and Vice President Mondale to address the convention were rejected.

"We are very disappointed that the president failed to be here, at the largest organization representing Hispanics, or at any of the other Hispanic groups that have asked him to speak," he said.

"This administration raised a lot of expectations for Hispanics that have not been fulfilled. The Carter administration has done better, to some degree, than its predecessors. But the standard ought to be their commitment."

To prod the administration a bit, the council's board of directors over the weekend urged the president to convene a White House Conference on Hispanics as soon as possible.

FOR NOW, the administration's response to the council was to trot out most of the high-ranking Hispanics who came to Washington with Carter and make them available as seminar speakers.

Keynoting it, however, was not a hispanic, but a black — Patricia Roberts Harris, the secretary of Housing and Urban Development — who took the occasion to announce several HUD grants for Hispanic housing efforts.

Before doing so she urged La Raza's council to pull together, just as black civil-rights groups did before the Latinos got organized, to use their muscle.

She cautioned against "a new kind of prejudice" symbolized by "the acceptance of a black cabinet member but the rejection of a subsidized housing project for the poor . . . a kind of prejudice born of the false allegation that people are poor only because they choose to be so."

THAT WAS A message understood by Beatriz Chapa, who comes from the hamlet of Del Mar Heights, 12 miles north of Brownsville, in the Rio Grande Valley.

Chapa pays a man \$6 a week to deliver water to her home, where she keeps it in a tank and in large bottles. She and the 27 other families at Del Mar want a water system, but get little sympathy in their county.

"Los mayores son muy malos. The officials are very bad," she said. "They tell us we live in a slum."

Am. Statesman
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Special to the Express

AUSTIN — LoVaca Gathering said Monday it would cut off to Pearsall's natural gas system in 30 days if the city fails to pay \$108,343 in past-due bills.

But near the end of a news conference by company officials, a telephoned message arrived that Pearsall now was ready to negotiate and to make a partial payment.

Don Newquist, LoVaca vice president, said the company doesn't want "another Crystal City situation on our hands" and urged Pearsall to pay up before the indebtedness grows larger.

While he was talking, a Capitol employee brought in a note, and a company public relations man went to the telephone. He returned moments later with word that Pearsall city manager Martin Garcia had requested a Sept. 6 meeting with LoVaca and would bring a partial payment.

LoVaca cut off Crystal City's gas last year after the town failed to pay some \$800,000 in past-due bills.

However, Garcia denied late Monday that he said he'd bring partial payment to the Sept. 6 meeting.

"I said we'd get together and try to work out a payment based on our cash flow," Garcia explained.

"It was a private conversation and they (LoVaca officials) released it to make us lose our credibility."

Garcia said the entire press conference was LoVaca strategy to make

Pearsall seem less credible and force the city to drop its legal fight against the out-of-court settlement of \$1.8 billion of customer claims against LoVaca.

"We're not giving up the court fight," said Garcia.

U.S. District Judge John H. Wood Jr. has scheduled a hearing at 1:30 p.m. Wednesday to consider Pearsall's bid to stop the Railroad Commission from

approving the settlement if officials have failed to stop it in state court.

LoVaca cut off Crystal City's gas last year after the town failed to pay some \$800,000 in past-due bills and service has not been restored.

Newquist said Pearsall's reasons why it was ready to pay for February, 1978, were not good. He said as far as he knew, Pearsall was charging its gas at a proper rate.

He said LoVaca feared Pearsall was going to attempt to tie up the settlement, which the Railroad Commission recently approved.

Solar heat project eyed for city hall

Faced with another winter without heat at city hall, Assistant City Manager Ninfa Moncada said Tuesday the Crystal City council has okayed a solar energy heating system "if funds are available."

Mrs. Moncada said the system would be a demonstration project for the community so that citizens could see how such a heating system works.

Plans for the system have been drawn by the Center for Maximum Potential Building Systems of Austin. Solar collecting panels would be placed along the entire south front of the building. In addition, the plans call for the open areas between the library and city hall and police department to be covered over with plastic bubbles and be converted into greenhouses filled with house plants as well as vegetables.

Mrs. Moncada said she, along with Jose Maria Cortez of the Urban Renewal Agency, and Lupe Garza of the city, had been to New Mexico to tour solar heating projects to get ideas of how such systems could be used in Crystal City.

In the planning state, Mrs. Moncada said, are demonstration projects at six homes in the city. A solar energy greenhouse would be attached to the homes which would provide a place for vegetables to be grown, with the resulting heat being vented into the homes to provide warmth. Mrs. Moncada said that elderly people would probably be chosen to participate in the projects

since they are at home most of the time and could work in their greenhouses.

Mrs. Moncada said she isn't too encouraged about the city getting a \$950,000 Urban Development Action Grant to be used for exploration for natural gas wells.

The city had submitted its application this summer for the money with a plan to develop its own supply of natural gas. The application received preliminary approval

but Mrs. Moncada said the grant probably wouldn't be awarded as there was no private sector money involved. She said that under the guidelines there had to be some money from a private source to be used in conjunction with the public funds. She said the city had been dealing with a drilling firm since the application was submitted, but the deadline had passed for including their offer in with the application.

Census claims 15.2% of Texans in poverty

ASSOCIATED PRESS

WASHINGTON — An extensive new Census Bureau report indicates 1,870,070 Texans — 15.2 percent of the population of the state — are at or below the poverty level.

Only nine states have a higher percentage at the poverty level, the report shows. Mississippi has the highest poverty rate — 26.1 percent.

However, the report indicates the government has been overestimating the number of America's poor people by more than 7 percent.

The report also indicates the typical American household has about 3 percent more income, excluding non-monetary benefits such as food stamps, than had been previously indicated by official statistics.

Expanded

Entitled "Household Money Income in 1975," the report released Monday is based on a greatly expanded national sample of information called the Survey of Income and Education (SIE), a one-time poll ordered by Congress.

For the first time since the 1970 census, income and poverty statistics are now available for all 50 states and the District of Columbia.

The new survey shows the median household income in 1975 was \$12,158. That's \$358 more than the \$11,800 median income the Current Population Survey — the previous government study — estimated for the same year.

"That's not a small difference," said Gordon W. Green Jr., a statistician who worked on the report. "If someone put \$300 in your pocket, you'd feel it. At least I would."

At the same time, the new survey estimated there were 21 million poor Americans in 1975, compared with 25.9 million poor Americans estimated during the same year by the CPS report.

A family of four with a household income of \$1,000 or less would have been living in poverty under the Census Bureau's 1975 definition of the po-

For a complete list of the states and their poverty figures, see Page 6A

verty level.

Green said the differences in the two surveys are considerable, but they do not undermine statistical data the bureau has put out previously.

Encouraging

"The results from the new survey were very encouraging," he said. "It's an attempt to go even further and collect additional information."

Green said the Census Bureau is working with the Department of Health, Education and Welfare to develop a new income survey that will be

specifically designed to collect data on income.

"We're attempting to get more complete information on income and non-money income," he said, adding that such material will not be available for several years.

The new survey is superior to the government's regular income-counting methods in several respects, the Census Bureau said.

The Survey of Income and Education is based on interviews with 151,000 households, roughly three times the 55,000 households interviewed in the survey to obtain the 1975 CPS information.

And the CPS is primarily designed to collect unemployment information, with the income data a secondary object.

See CENSUS, Page 6A

CENSUS

Continued from Page 1A

The main objective of the new survey was to collect income data with greater precision than ever before.

The CPS was conducted in March, 1976, while the SIE was conducted from April through July of that year. Thus, respondents to the more recent survey had a chance to refer to income tax returns for precise income information.

The survey shows Alaska and Connecticut have the smallest percentage of poor residents — 6.7 percent each.

WASHINGTON (AP) — The following is a state-by-state breakdown of each state's poverty figures for 1975 by ranking from highest to lowest of the percentage of the state's population living in poverty.

- ✓ Mississippi 607,230; 26.1.
- ✓ Louisiana 719,890; 19.3
- ✓ New Mexico 222,560; 19.3.
- ✓ Arkansas 392,340; 18.5.
- ✓ Georgia 882,800; 18.0
- ✓ Kentucky 595,740; 17.7.
- ✓ South Carolina 477,860; 17.2.
- ✓ Alabama 586,780; 16.4.
- ✓ West Virginia 270,240; 15.8.
- ✓ Texas 1,870,070; 15.2.
- ✓ West Virginia 270,240; 15.1.
- ✓ North Carolina 787,650; 14.7.
- ✓ Florida 1,225,410; 14.4.
- ✓ Virginia 314,380; 12.8.

- Vermont 63,360; 11.5
- South Dakota 87,856; 13.1.
- Maine 126,170; 12.0
- Missouri 564,960; 12.0
- Montana 85,890; 11.1
- North Dakota 65,590; 10.6.
- Illinois 1,150,380; 10.5
- Virginia 513,470; 10.5
- California 2,182,170; 10.4.
- Idaho 85,330; 10.3
- Pennsylvania 1,132,900; 9.7.
- Nebraska 146,940; 9.6
- New York 1,670,600; 9.4
- Ohio 997,260; 9.4.
- Colorado 230,180; 9.1
- Michigan 820,990; 9.1
- Oregon 203,990; 8.9
- Nevada 52,800; 8.8
- Rhode Island 79,640; 8.7.
- Wyoming 32,710; 8.7.
- Washington 298,520; 8.5
- Utah 103,160; 8.5.
- Minnesota 321,690; 8.3
- Delaware 47,270; 8.2.
- Indiana 423,700; 8.1
- New Jersey 586,430; 8.1
- Kansas 177,760; 8.0.
- Hawaii 66,900; 7.9
- Iowa 225,200; 7.9.
- New Hampshire 64,670; 7.9.
- Maryland 313,430; 7.7
- Wisconsin 352,100; 7.7.
- Massachusetts 408,110; 7.1

Crystal City acting troupe satirizes recent 'brownout'

Most people would find the severe winter this season pretty hard to bear without the creature comforts they take for granted.

The people of Crystal City can't take those comforts for granted: This winter they don't have any.

1977 was the year of the blackout in New York City. 1977 was also the year of the 'brownout' in Crystal City," Gregorio Barrios told an audience at

'What you are about to see is the power the utilities have — power which is supposed to be public, but which remains private.'

the Union Theatre Friday as he introduced his play, "Dale Gas Cristal."

El Teatro Estudiantil de Cristal, a group of students directed by Barrios, performed 10 scenes set in the South Texas community.

CRYSTAL CITY has been without natural gas since Sept. 23 when Lo-Vaca Gathering Co. shut off its supply. The city refused to pay rate increases and continued to charge its residents at a rate stipulated in a 1972 contract.

Barrios, who teaches journalism and drama at Crystal City High School,

wrote the play to show how the cutoff has affected the everyday lives of the residents. "What you are about to see is the power the utilities have — power which is supposed to be public, but which remains private," he told the audience.

The opening scene depicts "Winter," covering the residents with Styrofoam "snow." An actor representing the church solemnly announces: "God will provide for us, the gas company provides thousands of jobs."

The media are represented as antagonists in the community's struggle. Business interests also are displayed in a scene in which a salesman tries to hawk his electrical appliances to a Crystal City family. "You can cook them frijoles real quick in a microwave," he tells his customers and then "marries" them to a time payment contract.

ANOTHER SCENE shows the gas company labeled as "La Vaca" (the cow), mooing into a telephone every time it hears that the Railroad Commission has approved a rate increase and expressing astonishment when it hears that Crystal City has refused to pay the increase. "Not pay? Nobody does that anymore," it shouts. The cow immediately writes a letter to the city threatening it with a gas shut-off.

"Our people can't afford these

prices," Barrios said after the performance. "Poor people everywhere can't afford these prices and there's nothing they ever will."

Pointing out that the 5 per cent increase charged by Lo-Vaca has been overturned, Barrios said, "The money is on our side and not on the side of the corporations. Time is money but it may take us a year before we get our gas back, but we're used to it."

Barrios and his acting troupe will perform the play in Uvalde next week. "We consider it important since it's the governor's hometown. Uvalde

'You can cook the frijoles real quick in a microwave,' he tells his customers and then 'marries' them to a time payment contract.

is primarily Chicano, but politically dominated by the Anglos," Barrios said.

He also hopes to take his presentation to a high school in Houston managed by the Association of African Americans. The play has been performed in Albuquerque and El Paso.

DALLAS TIMES HERALD

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DALLAS, TEXAS, SUNDAY, OCTOBER 30, 1977

18 Sections Price Thirty-Five Cents

Crystal City: It's gasless but not hopeless

By DAVE MONTGOMERY

Times Herald Austin Bureau

CRYSTAL CITY — To the frustrated housewife with the dormant oven, life without natural gas is a painful inconvenience. But to visionaries who see beyond tomorrow, it shimmers wit, inspiration and opportunity.

There is talk among some city officials of molding Crystal City into a national model for solar energy by installing giant, futuristic sunray-collectors capable of partially fueling all 8,000 residences or launching a unique municipal drilling enterprise to tap rich deposits of fossil fuel that ironically lie underneath this destitute community, which has been without natural gas for a month.

"It could be," says Mayor Francisco Benavides, "that this whole thing might be a blessing in disguise."

Since Sept. 23, when Lo-Vaca Gathering Co. switched off the gas because the city refused to pay a \$800,000 delinquent bill, Crystal City has become a mecca for energy merchants and a national cause celebre for consumer advocates.

On the West Coast, young activists led by 26-year-old Billy Chorneau of Los Angeles have formed a Crystal City United Support Committee to drum up sympathy for the beleaguered Texas community through television documentaries and speeches by Chicano leaders.

Each day, mail pours into city hall

from across the nation, offering moral support or sales pitches for alternate — and in some cases, bizarre — sources of energy.

From Montana, an energy promoter offers to solve the city's problem by converting energy from cow manure. By using 20,000 head of cattle, he says, Crystal City could generate 8,640 gallons daily of methane fuel along with a beneficial side effect: carbon monoxide from the manure could be used for greenhouses to raise food for indigent citizens.

From Fort Worth, an engineer living on Social Security says he and his partner can help the city develop a hydrogen fuel system. In exchange, he requests, "a room at a good motel, meals and a small expense account" plus royalties on plants developed under the system.

From Arizona, an Indian tribe sends a blueprint for a magic oven made of dirt.

From San Pedro, Calif., John Montgomery, "a long-time resident" whose wife, Ida, has "been singing in the Presly Church choir 27 years," promotes his portable gas containers for \$18,000. From Hico, Texas, Fleming Enterprises offers "the finest, most economical durable, cast-iron woodheaters made."

In the weekly Crystal City Sentinel, ads offering similar products beckon to the city's fuel-starved citizens:

See MANY on Page 14

Many ideas peddled to save Crystal City

cont. from page 1

Sunday, October 30, 1977, DALLAS TIMES HERALD

Flores contends a majority of the 8,000 residents supported the city administration's refusal to pay the bill.

"In the first weeks since the cutoff," he says, "the people were very calm and polite, but now that we're starting to experience a cold front, they're beginning to despair."

At the Luis Escamilla household in a westside barrio, the 28-year-old unemployed former cannery worker was forced to buy a butane tank and insulate his house to help ward off the chilly night air. His wife complains that their infant daughter has suffered respiratory ailments because of the inadequate heating.

Mrs. Eddie Zimmerman, a rancher's wife and one of the women who fought city hall last week, complains the cutoff has worked a hardship on older citizens who are unable to lug pots of water for heating. "They just got in over their head," she says of the city officials who provoked the shutoff.

Mayor Benavides counters that the dissident housewives were "just shooting off their mouth" although he concedes "they have some good questions." But despite the growing wave of pessimism and disenchantment over the city's handling of the Lo-Vaca episode, Benavides believes there is a reason for optimism as well.

The federally funded National Center for Appropriate Technologies of Butte, Montana, is working with the city to develop a long-range solar energy project which could offer both fuel and jobs to Crystal City.

The initial phase calls for the construction of solar water heaters, selling for approximately \$200 apiece and constructed by residents in the community. The system would be supplied by collectors on the fringes of the city — and when fully implemented — would constitute the most extensive municipal sun-powered operation in the country, according to Benavides.

Another tantalizing prospect is to drill for natural gas on city-owned property, which geologists believe covers rich oil and gas reserves.

"It's a big risk," says George Ozuna Jr. of San Antonio, Crystal's consulting engineer, "But our chances are better than average."

Geologists studying the land — including a 300-acre tract which once held a World War II detention camp for Japanese, German and Italian families — believe the property is above a vast deposit that already has brought fortune to private drillers.

The big holdup is money. Mayor Benavides said city officials are attempting to get backing from a Seattle bank to issue bonds to finance the \$100,000 project.

If it gets the funds, and if it strikes gas, say Benavides and Ozuna, Crystal City at least could sell low-cost gas to its residents. And conceivably, Crystal City could supply other cities, ironically competing with the same company which cut off its gas.

"If we hit gas, we could serve Crystal City for another 20 years," Ozuna ventures, envisioning an accompanying economic boom which would escalate land values and bring in new jobs.

Skeptics without a rose-colored crystal ball question the likelihood of such undertakings — particularly since Crystal City has no money to pay off even part of its debt to Lo-Vaca. The CSA grant was originally designed to pay part of the bill, but outrage from state officials and neighboring cities forced the federal government to restrict its use to finding alternate energy supplies.

In the meantime, Crystal City remains a gas-less society as its residents anxiously brace for the oncoming winter. And some now wonder aloud if the defiant challenge of Lo-Vaca was a practical defeat instead of a moral victory.

"Agreed, Crystal City lost its thing," acknowledges Paul Rich. "But they were willing to stand up and do something. If anything, all of this has at least raised the conscience of consumers."

"Join the rest of Texas. Go solar energy," an ad invites. In another issue: "Cook with newspapers. The amazing ecology grill. Cooks in minutes with nothing but newspapers."

Still other ads offer wood and coal cookstoves and butane tanks at prices ranging to \$500.

With winter fast approaching, and city officials still trying to develop a short-term alternate energy source, many residents willingly respond to the offers. Poverty attorneys with the Texas Rural Legal Aid office complain that some profiteering merchants are ruthlessly taking advantage of the situation by selling electrical appliances and butane at inflated prices.

"Consumers are open to being ripped off by a lot of people," says Paul Rich, director of the project. "None of these things really solves the long-range problem."

Though residents have begrudgingly adjusted to the cutoff by converting to electricity, butane, or wood, frustrations are beginning to gnaw away at tempers.

City officials confronted their first public outburst last week when a group of angry housewives stormed the office to complain of a pending city plan which would equip low-income residents with individual propane units.

The plan will consume nearly one-third of a controversial \$310,000 "crisis intervention" grant pledged to the city by the federal Community Services Administration and will go into effect within the next several weeks.

Under the CSA guidelines, the 25-gallon propane units, capable of delivering enough fuel for a year, will be available only to approximately 1,000 federally designated poverty residents — but opponents say another 1,000 residents above the poverty line will be bypassed.

Critics also said the propane will be selling for a staggering \$4 per thousand cubic feet — nearly twice the natural gas price sought by Lo-Vaca when the city refused to pay three years ago.

"We realize that some of these people who do not qualify for poverty are just above the poverty line and have real hardships," says City Manager Raul Flores. "But we have no other choice."

When Lo-Vaca broke its fixed-price contract with Crystal City, the town refused to pay the higher gas rates. As a reward, the courts let the company cut the gas off. But the town made it through the winter, thanks to Sen. Ted Kennedy and a group of Austin alternate-energy freaks.

The Survival of Crystal City

by Philip Russell

Fortunately for Crystal City, the town's relations with Washington are better than with the Briscoe administration.

Shortly after Lo-Vaca Gathering Co. cut off gas to Crystal City's municipally-owned gas company last fall, Sen. Edward Kennedy secured an emergency \$310,000 grant from the Community Services Administration to meet this South Texas version of the energy crisis. The first idea was to use the money to pay the gas bill, but that plan was dropped after nearby towns protested that using federal funds in that way would be too much like rewarding the scamps in Crystal City for not paying in the first place.

So instead the city decided to use its money to purchase home propane tanks with a free first-filling thrown in for every household. The installation of the tanks soon started, but there was one catch: hardly anyone in Crystal City knew how to install the damn things. Progress was painfully slow and winter was rapidly approaching.

Just before Christmas, when it became clear the propane tanks couldn't be installed in time, the Austin-based Center for Maximum Potential Building Systems (alias "Max's Pot") got a frantic call for help. Max's Pot was called since they had already been down to Crystal City and presented two plans for energy development, one short-range and one long-range. Once more, the Pot staff headed down to Crystal, as Chicanos call the town, and began to work with a 45-man crew getting emergency heating installed.

The combination they chose to heat homes was army surplus tent stoves fueled with mesquite wood. The stoves were chosen because they were cheap and government-owned, and thus immediately available. Mesquite, rather than oil or other fuels, was chosen on the same basis—availability and low cost. While part of the 45-man crew began installing stoves in homes, others fanned out through the county scavenging for dead mesquite from stream beds and hauling it back.

At the same time, work continued on the installation of propane units, producing energy-use patterns which one might call upper-, middle- and lower-class. At the top were those who only used propane, about 500 households. Next came those who used the wood stove for heating and the propane for cooking. Finally, at the bottom were about 700 homes which used only wood. Through the course of the winter several households dropped out of the middle-class, finding their propane tanks too expensive to refill.

Mesquite proved to be nearly an ideal fuel. Its supply was locally controlled and not dependent on politics or outside pricing. Also, it provided jobs for local workers during the winter slack period for farm labor. The \$45,000 spent to install the stoves and gather wood came from such groups as churches, the Chamber of Commerce and Crystal City's Community Development Agency. Because of the widespread poverty in the area, free stoves and fuel were made available to those lacking money.

Now that the winter is over, many of the stoves have been returned to warehouses, and back yard barbeque pits now reign supreme once again. However, little has been resolved in deciding on a long-range energy policy for Crystal City. Solar hucksters have descended on the town like snake oil salesmen, hoping to sell their wonder solar stove or lease their solar panel. One firm has even offered to build solar collectors in Crystal City. However, their plan called for leasing the product to residents for 10 years, confirming the widespread fears that even when solar energy comes, it still may not be free.

The only solar device actually installed is a Max's Pot-designed water heater. It was built from an old gas hot water heater whose outside lining was removed. Then a reflector was placed under the tank. As sunlight hits the reflector, heat bounces up to the tank where it heats water. Heat is retained in the system by a transparent cover, just like a greenhouse. The total cost of the system was under a hundred dollars, which might drop to a potential \$50 if the

As of now, next winter could be a repeat of this one. Presumably, mesquite will still be available, although no one really knows whether production of new wood can match consumption. Some \$120,000 of the original Community Services money is still available, but no decision has been made as to how to use it. Recent municipal elections have hopefully restored political harmony, so decisions can be made without getting bogged down in the faction fights which have hampered planning in the past year. In any case, it appears that resources will be fairly limited and that no funds will be forthcoming to carry out such projects as building a multi-million-dollar system to generate methane from sewage.

As of right now the gas cut-off has had little visible effect on Crystal City. Electricity was never affected, since the generation facility is under different ownership than the municipal gas distribution system. The 700 propane tank owners are going about their business pretty much as they were before, although ironically they are paying more for propane than the price Lo-Vaca is currently charging its customers for natural gas. Those who are not quite in the propane class are getting along with cooking on their barbeques and wood stoves, and are generally happy not to be paying gas bills. Finally, one resident, for less than \$100, is getting free hot water from his solar heater.

Interestingly enough, the most significant gas cut-offs have gone completely unreported. From San Antonio on down to the Rio Grande many more individuals have had service cut off than were in Crystal City. In San Antonio alone, last winter the equivalent of one Crystal City a month was being cut off for non-payment of bills. However, since all these individuals were cut off on an individual basis, they never made the news or had relief programs formulated for them.

APPENDIX III.

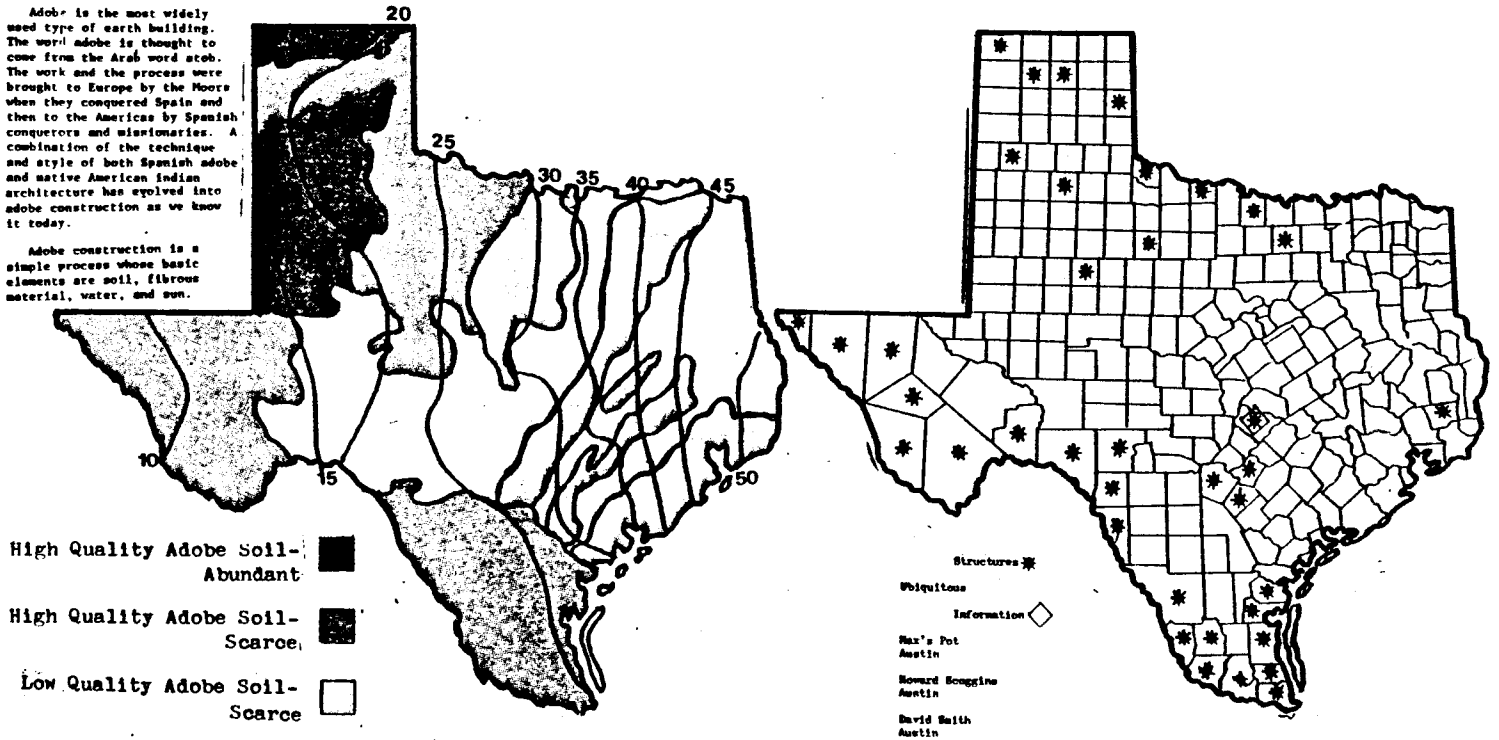
ATLAS

An Appropriate Technology
Working Atlas
For the State of Texas

Adobe

Adobe is the most widely used type of earth building. The word adobe is thought to come from the Arab word *atob*. The work and the process were brought to Europe by the Moors when they conquered Spain and then to the Americas by Spanish conquerors and missionaries. A combination of the technique and style of both Spanish adobe and native American Indian architecture has evolved into adobe construction as we know it today.

Adobe construction is a simple process whose basic elements are soil, fibrous material, water, and sun.



High Quality Adobe Soil - Abundant

High Quality Adobe Soil - Scarce

Low Quality Adobe Soil - Scarce

Structures *

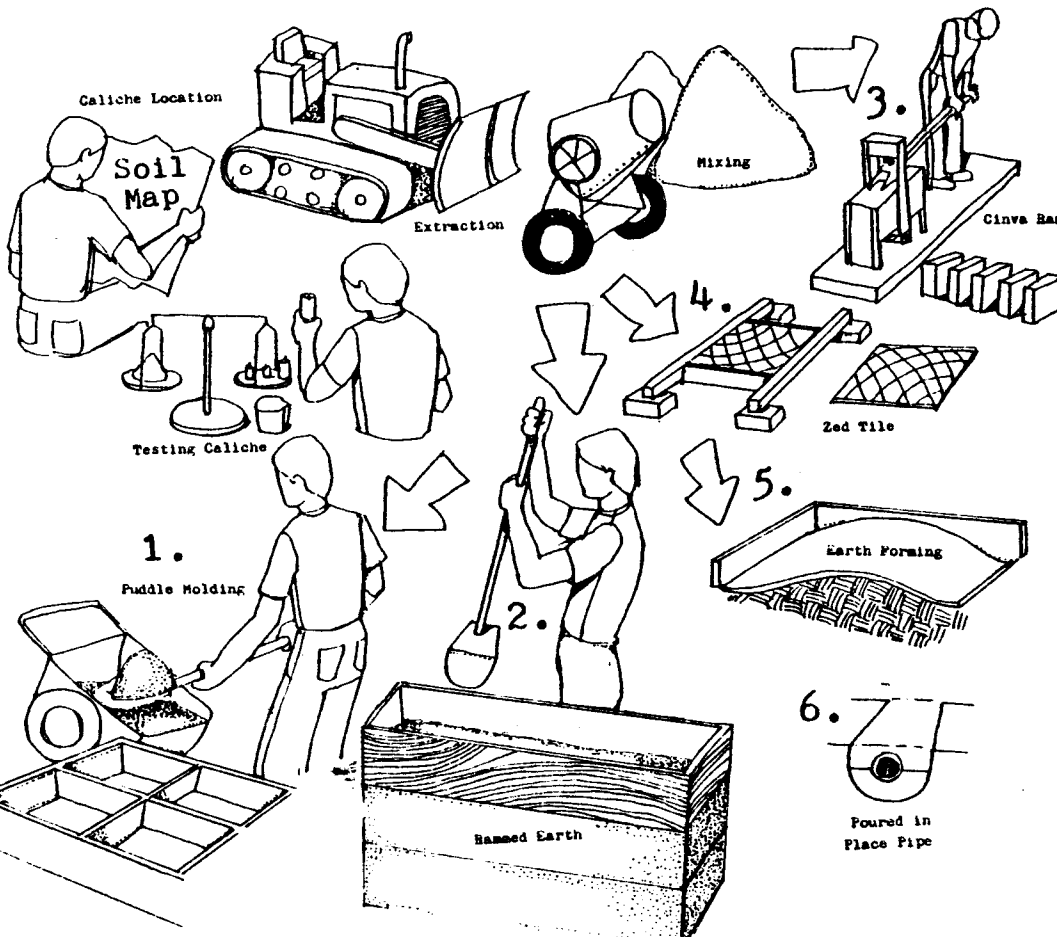
Ubiquitous

Information

Max's Pot Austin

Howard Scoggins Austin

David Smith Austin



The first chapel of the Ursuline Academy in San Antonio (now the Southeastern Crafts Center) has rammed earth walls of caliche and is the largest caliche building in the state. Numerous caliche buildings dot the state and are often inconspicuous farm buildings. County agricultural agents are often aware of their presence. Today, caliche is used primarily as a road bed building material. For this reason it is a relatively inexpensive earth material.

The first step in building with caliche is locating a sufficient quantity of the raw material. Geologic and soil maps aid this search. If a suitable caliche deposit is not found on site, caliche should be tested for its suitability for construction purposes. Soil testing can be rather involved but can be done by most laymen.

When suitable caliche is located, test blocks are made with varying ratios of caliche, sand, cement, and water to determine a suitable calcrete mixture for a particular purpose. The mix will vary depending on the caliche, the structural demands which will be made on the calcrete, and the forming technique. These methods are:

1) Puddle Holding: Calcrete mix is placed in wooden molds. The mixture is tamped into each mold, the top of the blocks levelled, and the mold removed. The blocks are then allowed to cure for about a month before use. They should be shaded and kept moist for the first three or four days to insure uniform drying.

2) Rammed Earth: A low water, low cement calcrete mix is shovelled into formwork and

compacted with a blunt instrument. Movable formwork can be used to minimize the cost of wood.

3) Clava Ram: This simple mechanical device produces blocks under 40,000 pounds of pressure with only seventy pounds of applied pressure. Exceptionally strong blocks of various configurations and compositions can be made with this ram.

4) Zed Tiles: Burlap is stretched across a rectangular frame. Calcrete is poured into the form and smoothed. The form is lifted off the ground and placed on blocks allowing the burlap to sag in the center. In a couple of days when the calcrete is relatively strong the tile is removed from the form and a dovetail tile with greater bearing capacity than a flat tile is formed.

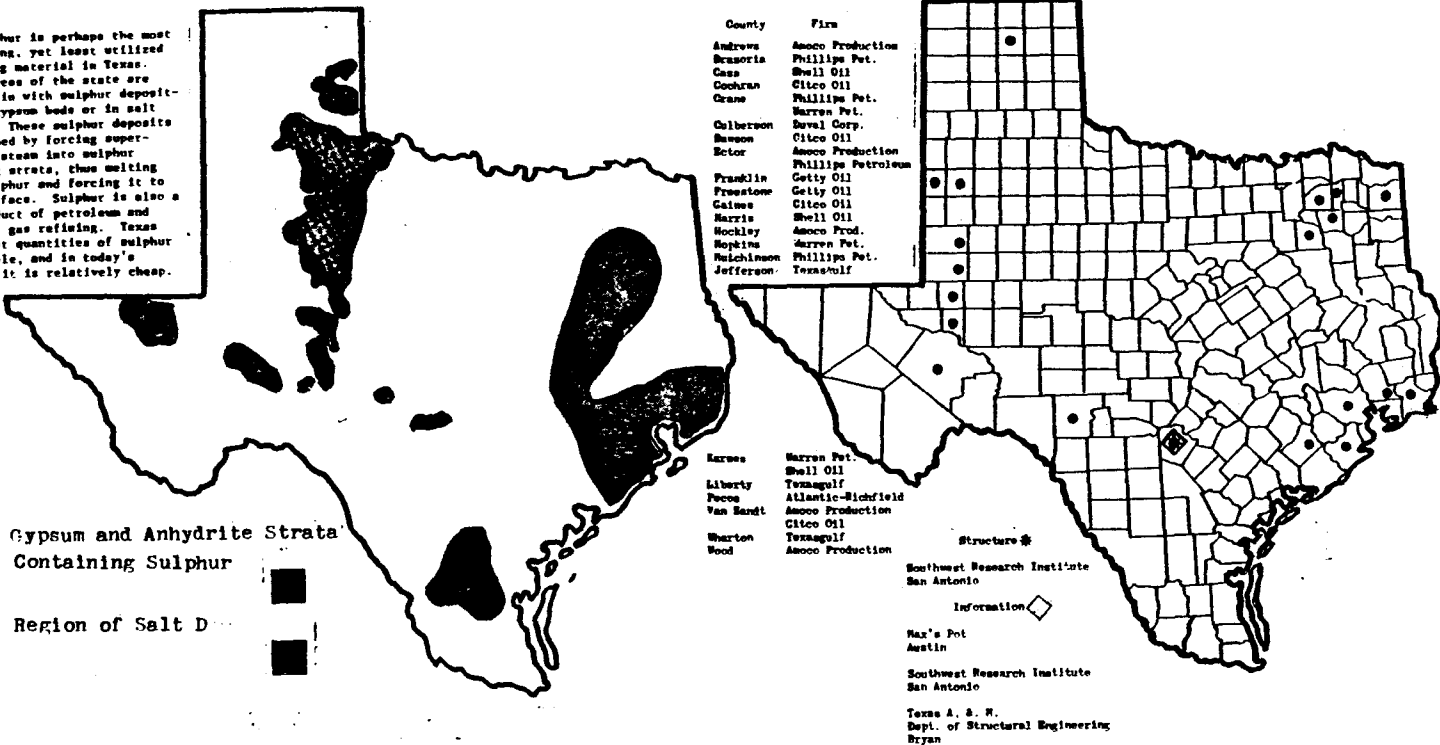
5) Earth Forming: Sand or earth is piled into a desired form. Reinforcing is placed over it, and calcrete is poured and spread over the reinforcing. After curing, the panel is lifted into position, or the sand is excavated from underneath. Large complex shells can be made in this way.

6) Poured in Place Pipe: A trench is dug and a layer of calcrete poured. Cylindrical water bags are placed linearly in the center of it. Another layer of calcrete is then poured over the bags. When the calcrete has set, the bags are popped and removed, leaving a continuous pipe.

There are other applications of caliche. Generally, as with other earth building systems, they are labor intensive and they are most economical for owner-builder or cooperative projects.

Sulphur

Sulphur is perhaps the most promising, yet least utilized building material in Texas. Huge areas of the state are underlain with sulphur deposited in gypsum beds or in salt domes. These sulphur deposits are mined by forcing superheated steam into sulphur-bearing strata, thus melting the sulphur and forcing it to the surface. Sulphur is also a by-product of petroleum and natural gas refining. Texas has vast quantities of sulphur available, and in today's market it is relatively cheap.



Sulphur has many properties which make it suitable for use in construction. It is strong, durable, waterproof, insulating, hygienic, verminproof and is easily melted and formed. Although sulphur building techniques date back to the

nineteenth century, only recently has sulphur been given serious consideration as a low-cost building material. Many buildings have been built around the world, including one on the San Antonio campus of the Southwest Research Institute, an organization which has pioneered sulphur building research.

Southwest Research Institute has developed a method of bonding building block with a low cost sulphur adhesive which makes walls with far greater strength and durability than traditional mortared walls. The block bonding system can be effectively used by unskilled labor as has been shown by the low cost housing project in Columbia.

After a foundation is built, the walls are laid out, their first course levelled in a bed of mortar and bonded to the foundation with melted sulphur. Blocks are then stacked to form the wall. Sulphur is melted, together with one of a number of possible combinations of talc, glass fiber, asbestos, and dicycloperadiene, a relatively inexpensive industrial chemical. Unfortunately the cost of these additives often far exceeds the cost of sulphur.

The block bonding mixture is then either brushed or sprayed over the surface of the block, creating a strong impervious wall.

The Minimum Cost Housing Group at McGill University in Montreal has experimented with two promising building technologies using sulphur. For the first, sulphur is used with an aggregate to make building blocks. Sulphur is melted and poured into a mixer in which sand has been heated. The sulphur concrete mixture is then poured into a mold from which it can be immediately removed as a building block, due to sulphur's quick solidification. The MCAC block is designed to be interlocking so that no mortar is needed. These blocks can be readily recycled by merely melting them.

MCAC has also experimented with the impregnation of cloth and paper with sulphur. The fabric is formed in whatever configuration desired, and is then soaked with sulphur, creating a rigid lightweight structural member. If a fabric is allowed to sag in the middle and then impregnated with sulphur, a dome shaped roof panel results.

Finally, work has been done with rigid sulphur foams. These forms have the same sort of structural, insulating, and forming properties as other plastic foams, but can be fabricated less expensively. A standard foam gun can be used with only minor modification.

Sulphur building is not without its drawbacks. Sulphur melts at 240° and thus workers must be protected to prevent burns. Also, melted sulphur has a powerful odor, which although it soon dissipates, makes construction work a smelly job. These, however, are minor problems compared with the potentials of sulphur as a building material.

1
Laying of the First Course

2
Weighing the Ingredients

3
Melting the Bonding material

TALC
DCPP
ASBESTOS
GLASS FIBERS

4
Bonding the First Course

4
Painting Stacked Block with Sulphur Bonding Material

4
Impregnating Cloth with Sulphur

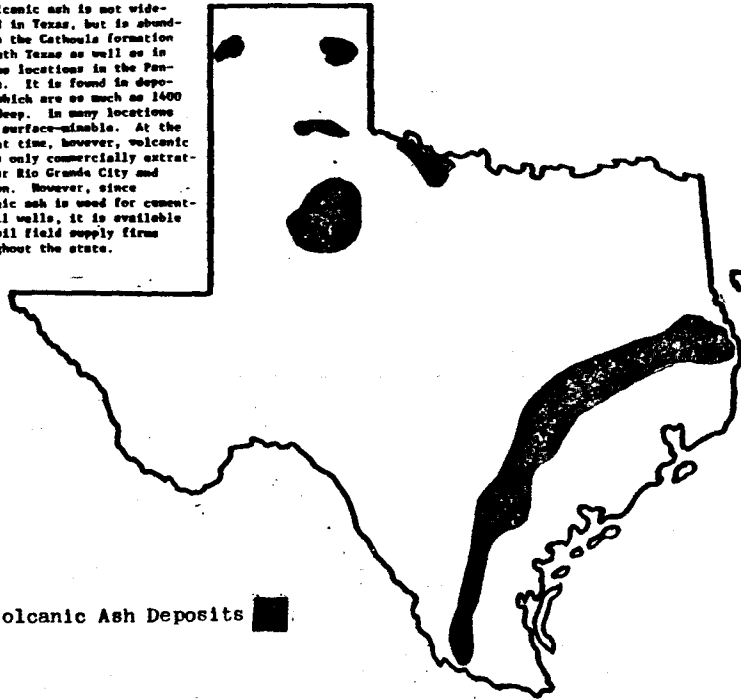
4
Making Sulphur Block

4
Spraying Sulphur Foam

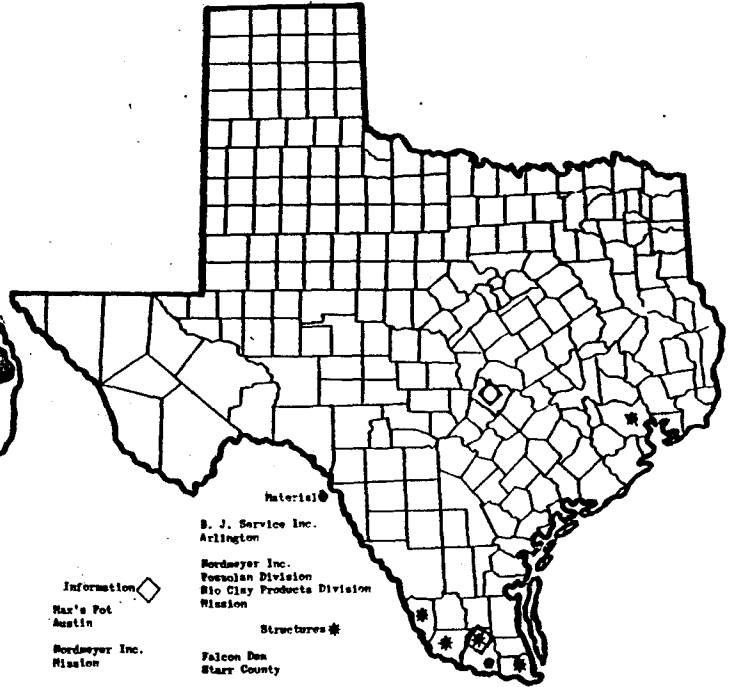
4
Spraying Stacked Block with Bonding Material

Volcanic Ash

Volcanic ash is not widespread in Texas, but is abundant in the Cathoula formation in South Texas as well as in various locations in the Permian. It is found in deposits which are as much as 1400 feet deep. In many locations it is surface-minable. At the present time, however, volcanic ash is only commercially extracted near Rio Grande City and Mission. However, since volcanic ash is used for cementing oil wells, it is available from oil field supply firms throughout the state.

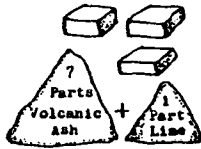


Volcanic Ash Deposits

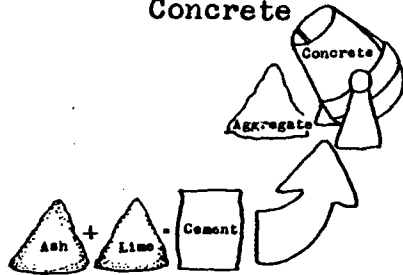


- Material
- B. J. Service Inc. Arlington
 - Wardmeyer Inc. Pecos Division Rio Clay Products Division Winslow
- Information
- Hax's Pot Austin
 - Wardmeyer Inc. Mission
- Structures
- Falcon Dam Starr County
 - Our Shell Plaza Houston
 - Throughout the Rio Grand-Valley

Volcanic Ash Building Stone



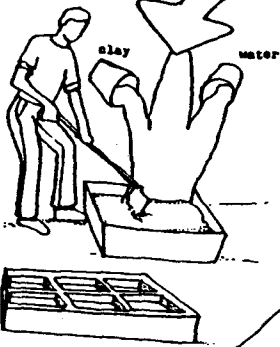
Volcanic Ash Concrete



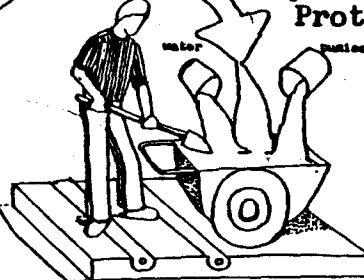
Volcanic ash has been important as a construction material since ancient Rome. In about 600 B.C., it was discovered that when finely ground ash was combined with lime, a cementitious compound resulted. This substance called Pozzolan was the first hydraulic cement. It was not until the nineteenth century that Pozzolan lost its dominance to portland cement. Numerous buildings have been built in the vicinity of the Rio Grande using pozzolan. In addition, the foundations of a number of skyscrapers in Houston, and the walls of Falcon Dam were made with pozzolan cement.

Pozzolan is used in many capacities today. Pozzolan concrete in which pozzolan and lime are substituted for some or all of the traditional cement has a number of advantages over neat concrete. It is often cheaper to use, particularly since pozzolan is substituted by volume for cement, but is less dense than cement. Pozzolan concrete has a finer texture than normal concrete and is thus more impervious to water and more tolerant of freeze-thaw cycles. It is also more resistant to chemical action, particularly to sulfates which are normally quite damaging to concrete. Pozzolan also cures more slowly than portland and since curing is accompanied by heat, is less likely to crack during curing.

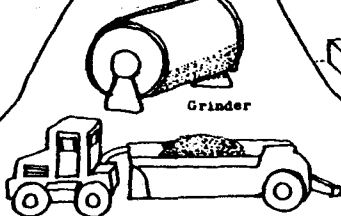
Volcanic Ash Brick



Volcanic Ash Pipe Expansion Protection



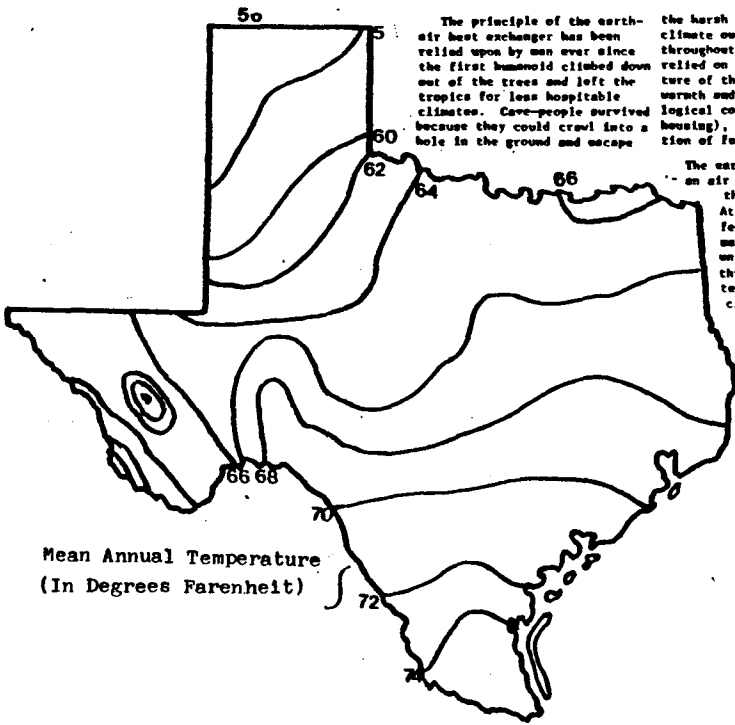
Finely Ground Volcanic Ash



Ash can be used to make bricks, when mixed with a plastic clay, and water. It can also be mixed in a seven to one ratio with lime to form a stone-like building block. Both of these blocks are stronger and more resistant than similar blocks made with portland cement. Pozzolan, mixed with vermiculite or pumice is useful in the installation of hot water pipes in concrete slabs. When applied as a coating to a pipe, this mixture allows the pipe to expand and contract without damage to the slab. This can be particularly important for solar heating systems which rely on hot water circulating through the slab.

Fly ash, a by-product of the burning of coal for electrical generators has properties similar to volcanic ash. It is often more available than volcanic ash and since it is at present considered a waste product it is often very cheap. Fly ash can be used in the same ways as volcanic ash.

Earth-Air Heat Exchanger



Mean Annual Temperature
(In Degrees Farenheit)

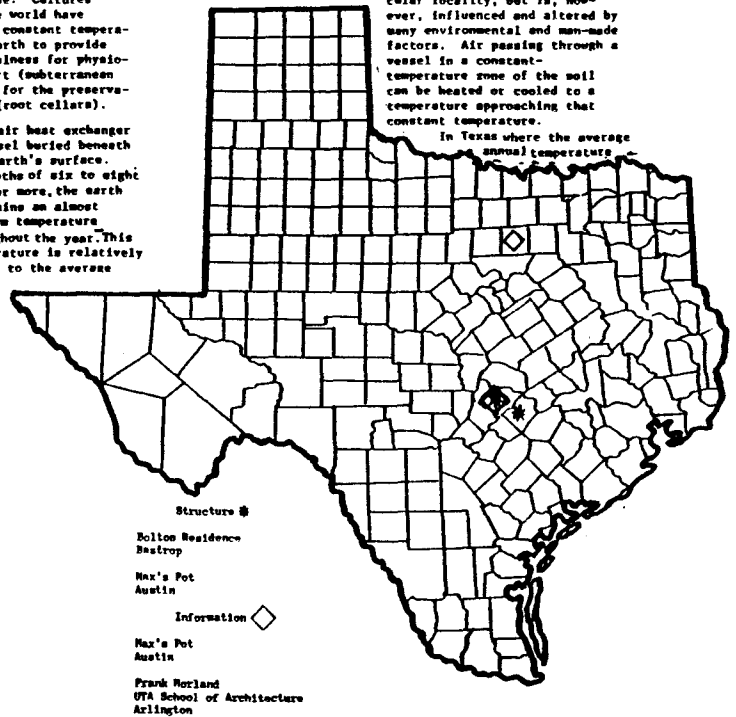
The principle of the earth-air heat exchanger has been relied upon by man ever since the first humanoid climbed down out of the trees and left the tropics for less hospitable climates. Cave-people survived because they could crawl into a hole in the ground and escape

the harsh extremes of the climate outside. Cultures throughout the world have relied on the constant temperature of the earth to provide warmth and coolness for physiological comfort (subterranean housing), and for the preservation of food (root cellars).

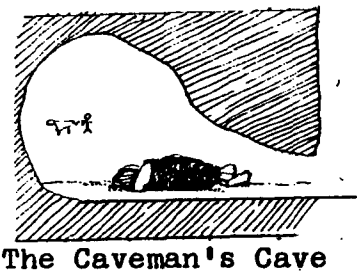
The earth-air heat exchanger is an air vessel buried beneath the earth's surface. At depths of six to eight feet or more, the earth maintains an almost uniform temperature throughout the year. This temperature is relatively close to the average

annual temperatures of a particular locality, but is, however, influenced and altered by many environmental and man-made factors. Air passing through a vessel in a constant-temperature zone of the soil can be heated or cooled to a temperature approaching that constant temperature.

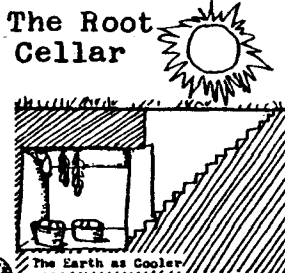
In Texas where the average annual temperatures



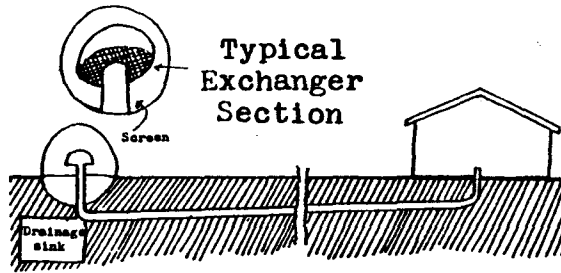
- Structure #
- Bolton Residence Bastrop
- Max's Pot Austin
- Information
- Max's Pot Austin
- Frank Norland UTA School of Architecture Arlington



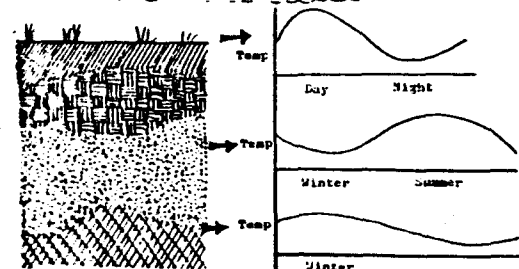
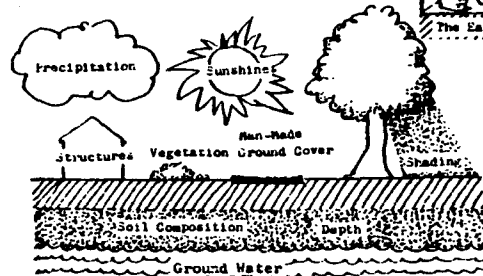
The Caveman's Cave



The Earth as Cooler

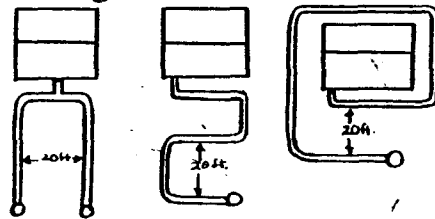


Typical Exchanger Section

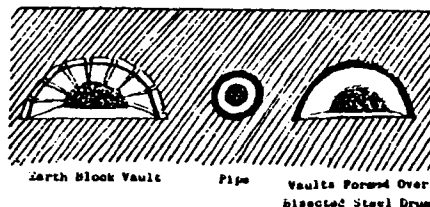


The Relationship of Depth to Soil Temperature Fluctuation

Possible Exchanger Configurations



Types of Exchanger Vessels



situ fabricated vaults. Metal and concrete pipe suitable for individual use is generally of small diameter (6"-12") and thus an exchanger must be relatively long. In a site constricted by property lines or soil conditions, the installation of a long pipe can be difficult for to prevent permanent alteration of soil temperature by the exchanger itself, these pipes should be no closer than twenty feet from each other. Vaults on the other hand can be built with large cross-sectional areas and can thus be shorter. They can be built of indigenous materials, but require much labor time to construct and are difficult to waterproof.

ranges from 56° to 74°, an exchanger can provide a great deal of the necessary heating and cooling for a house throughout the year.

The difficulty with earth-air heat exchangers at this point is determining the proper size for a particular application. An earth-air heat exchanger must have a great enough surface area to provide sufficient heat transfer between air and soil. Thus, the air vessel must be either large in cross-sectional area and relatively short, or of small diameter and relatively long. The air vessel must also be a good conductor of heat like metal, masonry, or concrete. There must also be sufficient air flow through the exchanger to provide the heating or cooling needs of the house. This requires either mechanical blowers or an arrangement such as a solar chimney. Earth-air heat exchanger siting is an involved and uncertain process which must be carefully considered.

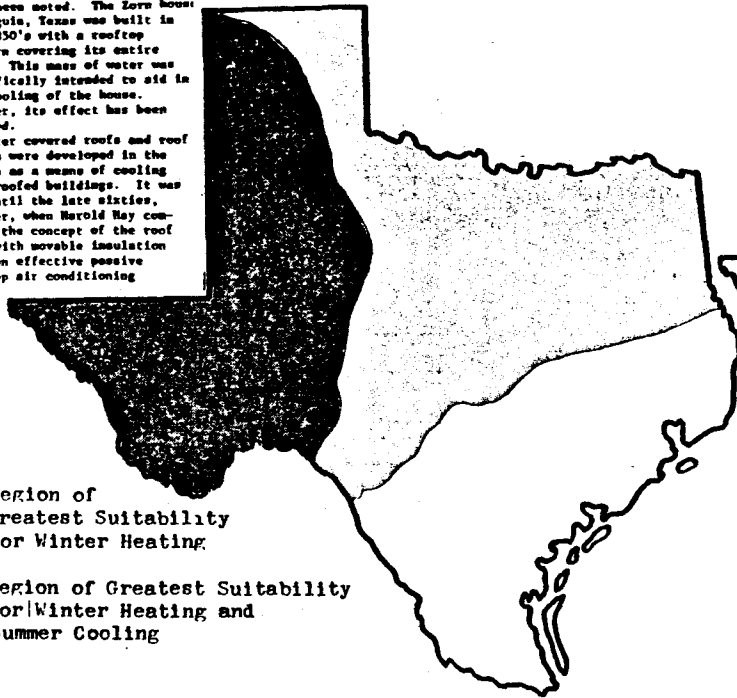
A number of exchanger air vessels have been tested, including prefabricated piping, prefabricated vaults, and in

To insure the economic feasibility and proper functioning of an earth-air heat exchanger, a number of factors must be considered. First, the exchanger must be easy to bury, i.e., there must be six to eight feet of soil above bottom. Secondly, the air vessel must be kept relatively dry and must therefore be properly drained and situated above the water table. If the exchanger is below the water table, provisions must be made to pump out the water. In this case, the exchanger could well serve as a source of water. Thirdly, the air vessel must be unobstructed and allow as free a flow of air as possible in order to minimize the size of air moving devices. Finally, the exchanger must be sealed to prevent the intrusion of insects or animals which could well cause offensive odors and health hazards. A screening of the air inlet of the exchanger is therefore essential. If carefully considered, an earth air heat exchanger should provide a long lasting maintenance free, low energy-use source of air conditioning.

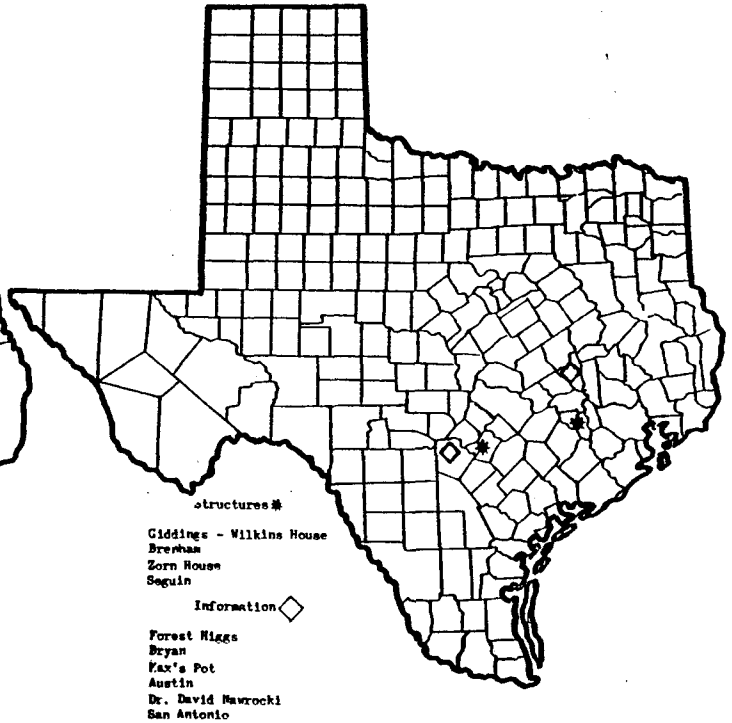
Skytherm

Roof-top cisterns have been used for centuries in many parts of the world, and their contribution to the thermal stability of a dwelling has long been noted. The Zorn house in Seguin, Texas was built in the 1850's with a rooftop cistern covering its entire roof. This mass of water was specifically intended to aid in the cooling of the house. However, its effect has been limited.

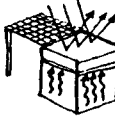
Water covered roofs and roof sprays were developed in the 1930's as a means of cooling flat roofed buildings. It was not until the late sixties, however, when Harold Hays combined the concept of the roof pond with movable insulation that an effective passive rooftop air conditioning



- Region of Greatest Suitability for Winter Heating
- Region of Greatest Suitability for Winter Heating and Summer Cooling

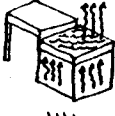


- Structures #
- Giddings - Wilkins House
 - Brenham
 - Zorn House
 - Seguin
- Information ◆
- Forest Higgs
 - Bryan
 - Yax's Pot
 - Austin
 - Dr. David Hawrock
 - San Antonio



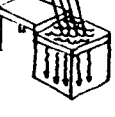
Summer Day

Insulation is Positioned Over Water Bags To Prevent Solar Heat Gain. Interior Radiates Heat to the Roof.




Summer Night

Insulation is Removed From Water and the Roof Radiates Heat to the Clear Night Sky



Winter Day

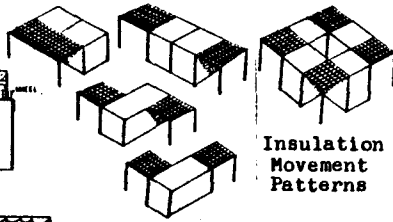
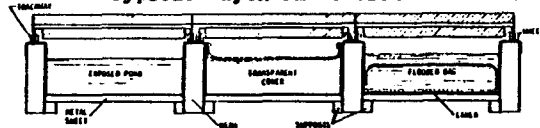
Water Bags Are Exposed to the Sun and Absorb Heat Which is Radiated to the Interior.



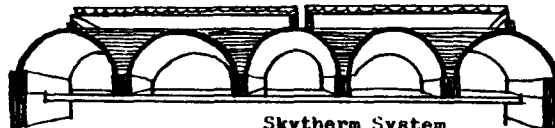
Winter Night

Insulation is Positioned Over the Water, Limiting Heat Loss. The Roof Radiates Heat to the Interior.

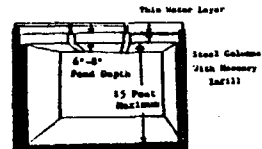
Typical Skytherm Sections



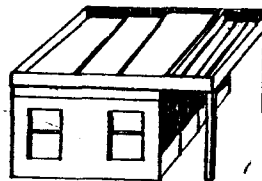
Insulation Movement Patterns



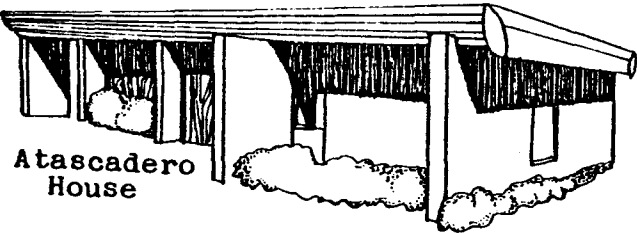
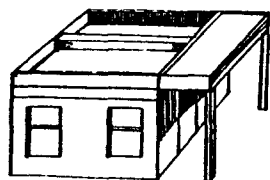
Skytherm System Using Cast Earth-Cement Vaults



Critical Design Factors



Typical Skytherm House Configuration



Atascadero House

performed by a hand crank. The movable insulation which is the key to Skytherm's operation is also its major limiting factor. Special tracks must be constructed on which to move the insulation panels, and a mechanical system devised to move it. Also, there must be an area to which the insulation can be removed when the roof is in its open configuration. The necessity provides a number of possibilities for the form of the house. The skeletal structure which supports the removed insulation can be used as a carport, or a frame for a solar still or water heating or as a shading device. The mechanical movement of the insulation as well as the flat roof necessitated by the Skytherm prevent its use in areas of relatively heavy snowfall, where ice and snow could jam the mechanism.

Another limitation of the system is the necessity of supporting the great weight of the roof ponds. Steel decking, rafter on strong beams which in turn rest on steel columns or thick heavy masonry walls. A possible alternative to the decking system is a system of earth-cement barrel vaults although this is a totally untested concept. The thermal mass of heavy masonry walls is complementary to the system's functioning and is thus preferable to a steel or wood column system with infill. Well built thick earth walls provide sufficient strength to support the roof ponds. A Skytherm system on a heavy thermal mass house which is well insulated should be able to supply most if not all of the heating and cooling requirements in a large area of West Texas, and the heating requirements in more humid eastern Texas. Its use in the Gulf Coast area is questionable due to the short heating season in this region.

system was developed. He patented his system under the name Skytherm and built the first skytherm residence in Atascadero, California.

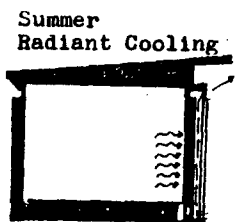
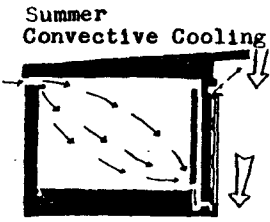
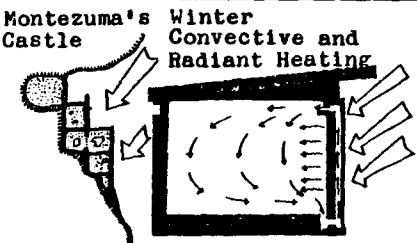
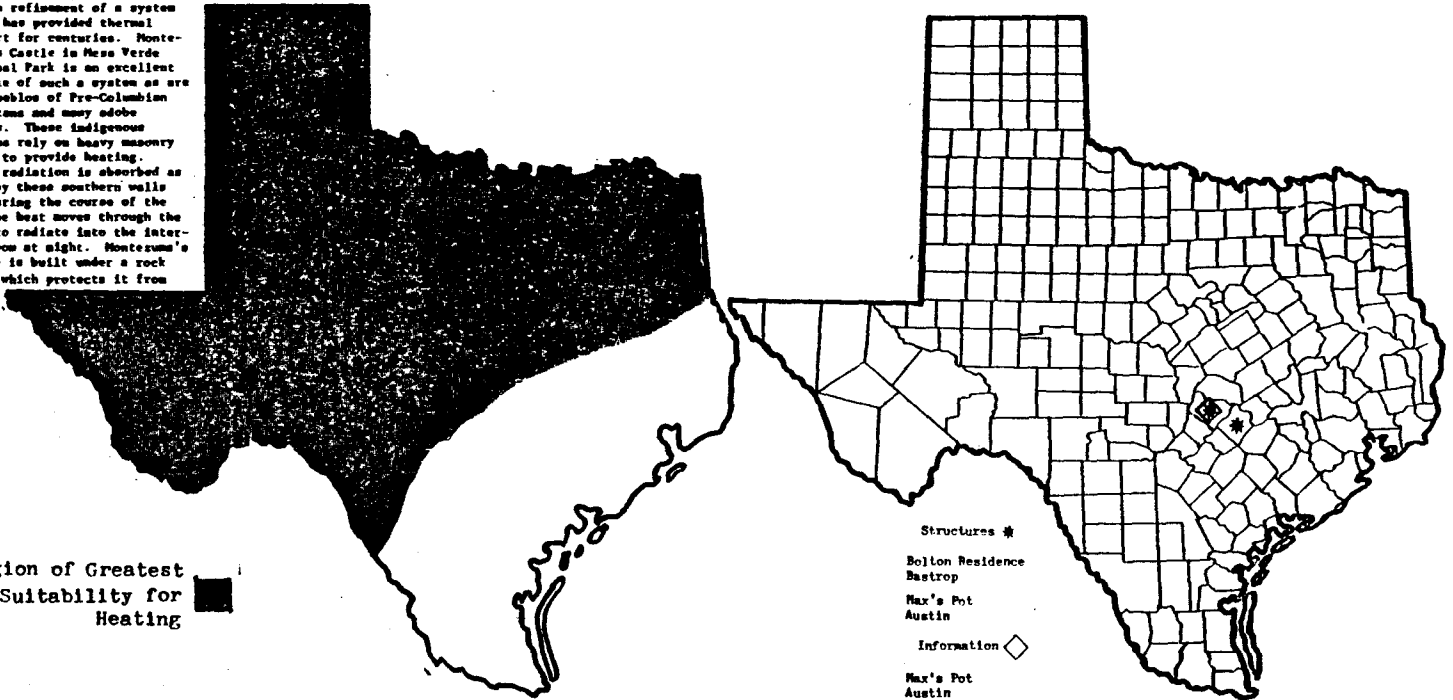
The skytherm system relies on water confined in roof ponds by black plastic liners or plastic bags which are in direct thermal contact with the spaces below for its operation. The panels are the sole heat collection, storage, and distribution elements, and provide uniform air conditioning to the area below.

Movable insulation panels above the ponds serve as thermal valves, controlling the flow of heat between the environment and the ponds. During the winter the ponds are exposed to the sun during the day and absorb heat. At night the insulation is moved over the ponds to prevent heat loss, and the ponds radiate heat to the space below. In the summer this process is reversed. At night, the ponds are exposed and lose heat to the clear night sky by both evaporation and radiation. This process can only occur effectively in areas of low humidity. During the day the insulation is moved over the ponds and the water absorbs heat from the room below. The only external energy necessary for the operation of the system is a small electric motor to move the insulation twice a day, and if desired this function can be

Trombe

The Trombe system is a modern refinement of a system which has provided thermal comfort for centuries. Montezuma's Castle in Mesa Verde National Park is an excellent example of such a system as are the pueblos of Pre-Columbian Americans and many adobe houses. These indigenous systems rely on heavy masonry walls to provide heating. Solar radiation is absorbed as heat by these southern walls and during the course of the day the heat moves through the wall to radiate into the interior room at night. Montezuma's Castle is built under a rock ledge which protects it from

Region of Greatest Suitability for Heating



the summer sun. The thermal mass of these buildings moderates the diurnal temperature fluctuation during the summer, thus keeping the interiors relatively cool.

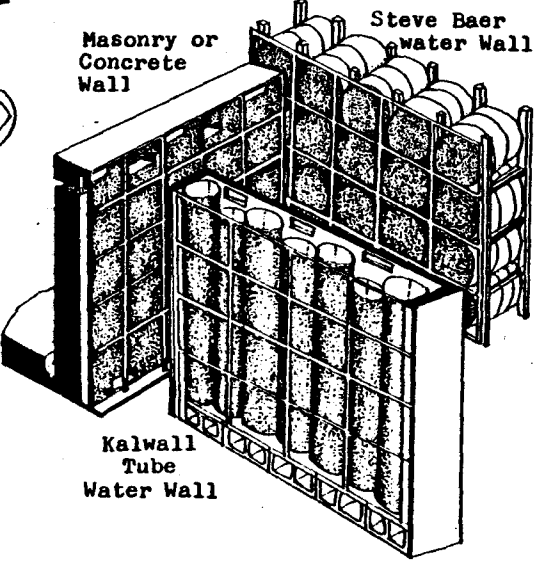
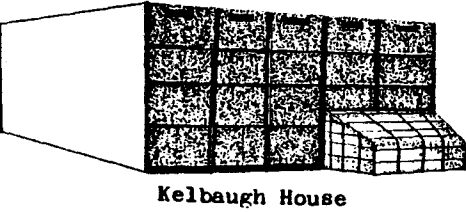
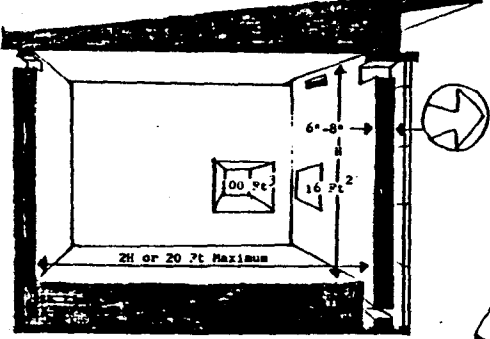
The Trombe system improves on this theory by putting glazing in front of the wall and painting the wall black. This glazing system first proposed in 1882 produces the "green-house effect" which allows the solar radiation to penetrate, but prevents its re-radiation as heat energy. Trombe's innovation was to put adjustable vents in the top and bottom of the wall. This allows a convection loop to be set up, directly heating the air in the space behind the wall. This plenum in front of the wall also provides convective ventilation during the summer when the wall is protected from direct heat gain by a roof overhang. This air flow can in some cases be used to cool the wall itself. Nonetheless, some Trombe wall configurations provide interior movable insulation to prevent radiant heat transfer during the summer.

Trombe walls built up to this time, such the first U.S. Trombe wall in the Kelbaugh residence in Princeton, New Jersey or the Trombe in the Bolton residence in Bastrop, Texas, have been cast concrete. However, masonry block walls are equally suitable. Water in containers is a far better heat storage substance than concrete or masonry, but it lacks its structural strength. The Steve Baer drum wall, while not a Trombe system, has proven the technical suitability and aesthetic desirability of using water in steel drums as a south facing collector wall.

The Trombe system, for all its technical elegance, severely limits the form of the house with which it is integrated. For optimum collection of solar energy, the Trombe wall must be erected on an east west line with a possible variation of about ten degrees. While windows may be placed in the thick wall, they must be limited in order to maximize collection area. The current rule of thumb for trombe sizing is sixteen square feet of wall for every one hundred cubic feet of interior volume. This rule is, however, based on houses built in the Pyrenees Mountains of France. To insure an effective convection loop through the space, it should be no wider than twice the height of the walls with a maximum of twenty feet. The space must be relatively unobstructed so as to allow free air circulation. For this reason Trombe houses should be only one room deep unless other means are provided to heat the northern rooms.

As with other passive system houses, Trombe houses benefit from being well insulated and thermally massive. As in adobe houses, this thermal mass helps maintain a pleasant microenvironment throughout the year, but because the Trombe system is primarily a heating system, the Trombe is best used when heating is more important than cooling.

Sizing Information



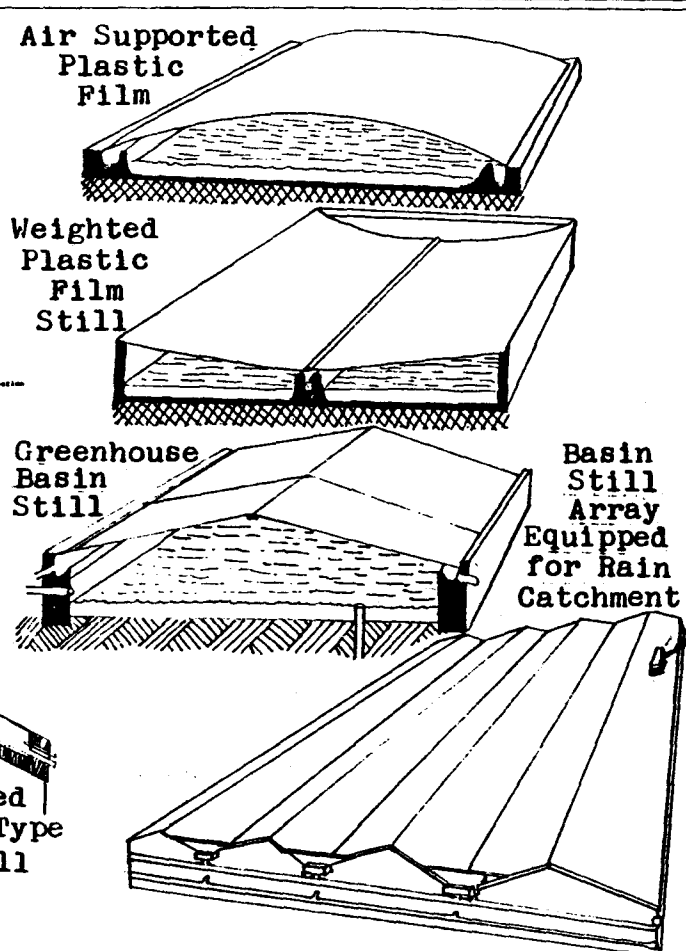
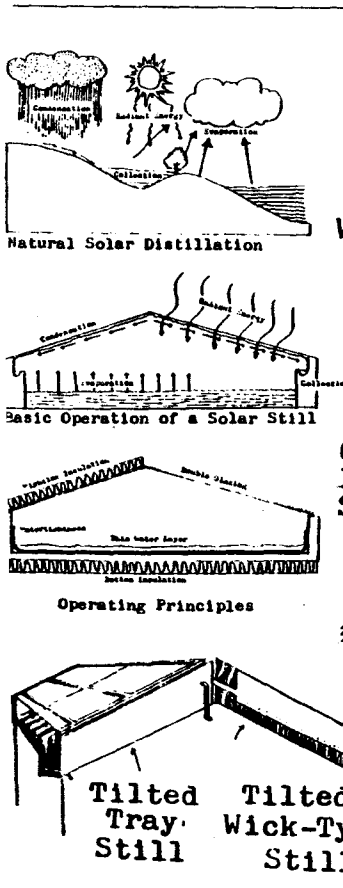
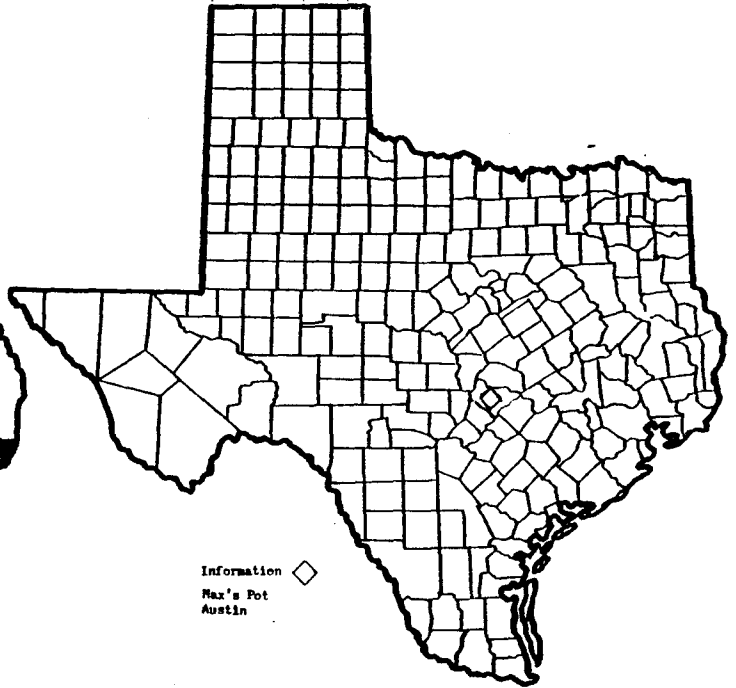
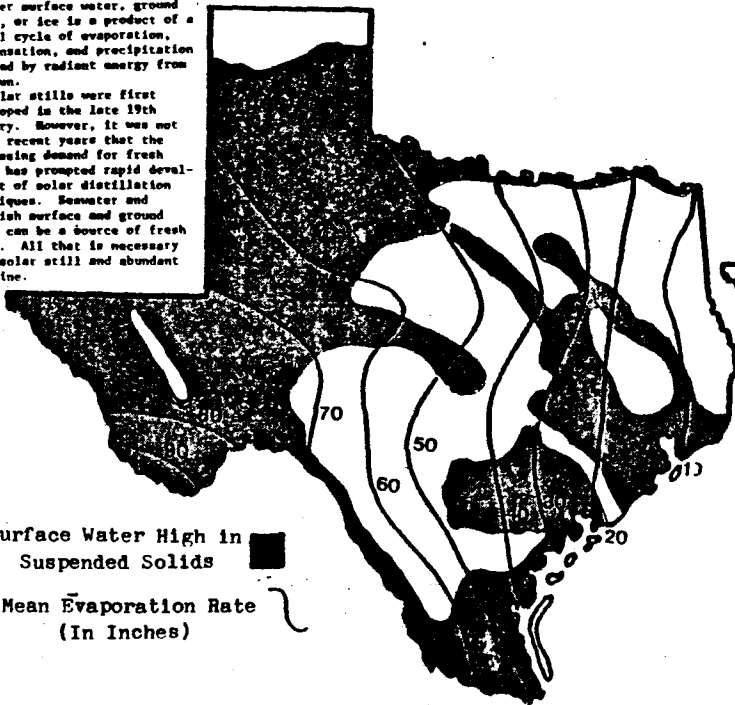
Kalwall Tube Water Wall

Kelbaugh House

Solar Still

Solar distillation is fundamental to life outside of the oceans. All naturally occurring fresh water on earth, whether surface water, ground water, or ice is a product of a global cycle of evaporation, condensation, and precipitation powered by radiant energy from the sun.

Solar stills were first developed in the late 19th century. However, it was not until recent years that the increasing demand for fresh water has prompted rapid development of solar distillation techniques. Seawater and brackish surface and ground water can be a source of fresh water. All that is necessary is a solar still and abundant sunshine.



The operation of a solar still is quite simple. Solar radiation passes through a transparent membrane (either glass or plastic) and heats a thin layer of impure water which flows over or in a heat absorbing black surface. Pure water evaporates and condenses on the membrane above, which also prevents the escape of heat energy. The condensed water then flows with gravity into a collection trough and into a storage tank.

The major drawback of solar distillation is the high initial cost of solar stills, and their low output. Twenty five gallons of water per square foot of collector per year is a reasonable estimate of solar still performance in Texas. Yields can be maximized by measures which insure minimal heat loss from the still. Insulation of the bottom of the still, movable night-time insulation, and double glazing are such techniques. A thin layer and slow flow of input water also improves still performance. Finally, the still must be watertight in order to prevent water loss by leakage.

The basin still is the basic still and the type which has been used most widely. It is most economical when used in flat terraces or on flat roofs. The greenhouse type, with glass or plastic in a rigid frame at an angle of ten to fifteen degrees from horizontal is the most popular basin still. It has the advantage of long maintenance free service, but is expensive to build. Recently, plastic films have been experimented with. Large stills can be covered with single or multiple layers of plastic which can either be stretched over a frame, inflated by small fans, or weighted

in the center to allow for runoff. These plastics greatly reduce the initial cost of solar stills but their lifetime is limited by deterioration due to solar radiation. In any type of basin still, costs can be reduced by using the earth or rooftop as the bottom of the still and insulating and waterproofing directly over it. Black plastic or asphalt are good waterproofing materials.

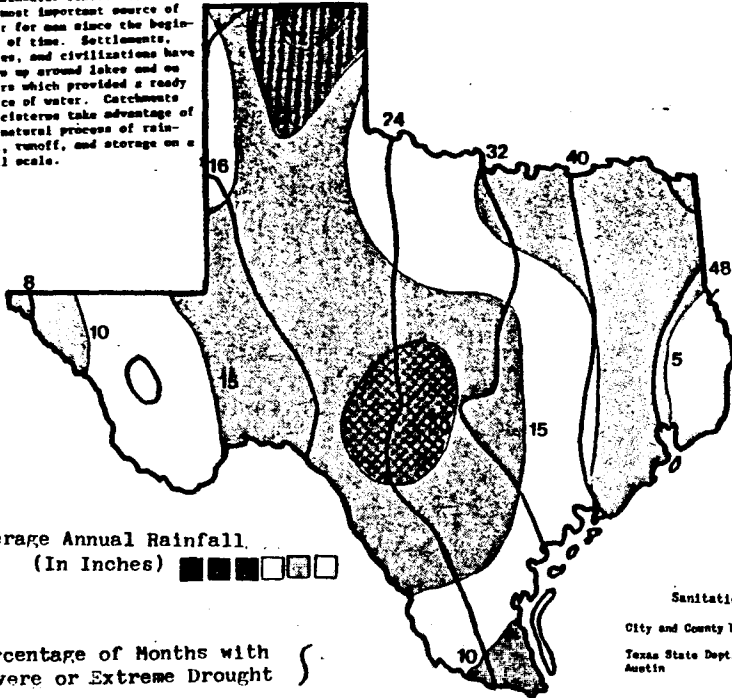
Basin stills can be built in arrays and their glazing used to collect rain water. This can significantly increase the quantity of fresh water produced by a still. In areas where rain is not frequent, the surface of the still must periodically be cleaned to remove efficiency robbing dirt.

In areas of steep terrain, frequent snowfall, or for installation on tilted roofs, basin stills often prove to be economically unfeasible. Two types of stills, the tilted wick still, and the stopped tray still can be used advantageously in these circumstances. In a wick still, impure water trickles through a porous black fabric, which allows a large surface area for evaporation, and causes the brine to flow slowly at a relatively steep angle.

The stopped tray still provides a slow flow and shallow fluid depth by means of a series of terraced trays, down which water flows. These trays can be easily fabricated by forming metal foil over a template. Tilted stills need cleaning less often, and can intercept more radiant energy than horizontal stills. As with basin stills, properly designed tilted stills can be a reliable water supply for individual applications.

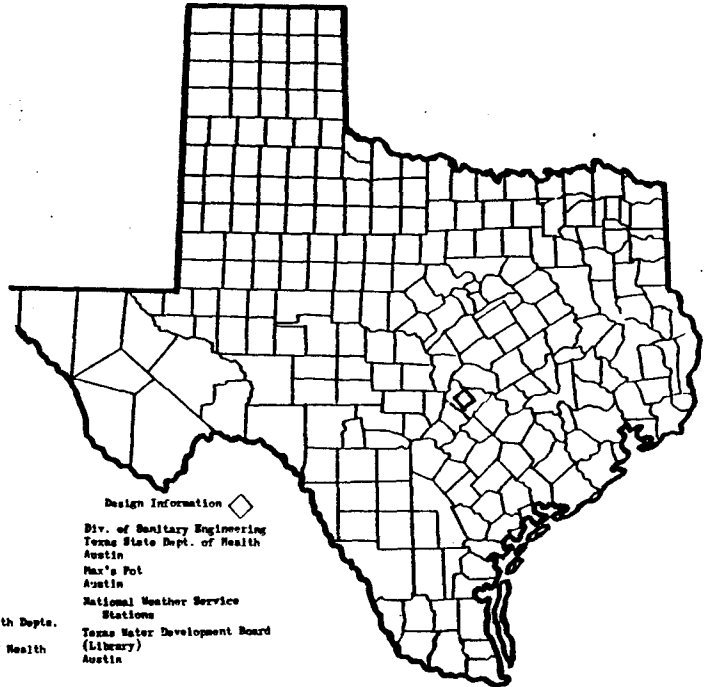
Water Catchment and Storage

Rainwater runoff has been the most important source of water for man since the beginning of time. Settlements, cities, and civilizations have grown up around lakes and on rivers which provided a ready source of water. Catchments and cisterns take advantage of the natural process of rainfall, runoff, and storage on a small scale.



Average Annual Rainfall (In Inches)

Percentage of Months with Severe or Extreme Drought



Design Information

Div. of Sanitary Engineering
Texas State Dept. of Health
Austin
Max's Pot
Austin
National Weather Service
Stations
Texas Water Development Board
(Library)
Austin

Sanitation
City and County Health Depts.
Texas State Dept. of Health
Austin

Small Watershed and Pond

Roaded Catchment

Artificially Surfaced Catchment

Water Storage Vessels

Rooftop Cistern

Filtered Underground Cistern

Rooftop Catchment with Rain Barrel and Underground Cistern

There are two basic types of catchments for small scale application: the rooftop catchment and the surface catchment. In areas of heavy precipitation the rainwater falling on the roof of a building may provide sufficient water. Roof top collectors can either be coupled with a buried cistern or the cistern and catchment can be one and the same. The Zorn house in Seguin has such a rooftop cistern. Rainbarrels, which are still common in some places, are an example of off-roof storage. A more sophisticated cistern wastes the initial roof-cleaning runoff and then passes the cleaner water through a simple sand and gravel filter into an underground cistern. The filtering helps insure pure water and the underground cistern cuts down on water loss.

The most economical way to obtain a large catchment is to use the land itself as a catchment. Stock ponds, common throughout Texas are examples of simple watershed-pond systems. To increase runoff from an area of land, several techniques have been developed. Grading the surface of the catchment area can increase its water yield. Waterproofing the soil can further improve catchment performance. This can be accomplished in a number of ways. Chemicals can be combined with the soil to make it more impervious, or asphalt or other surfacing materials can be applied. Plastic sheets or corrugated metal panels have also proved to be effective. These artificially surfaced catchment areas must be protected against destruction or contamination by animals.

In areas with infrequent or light rainfall, large catchment areas and large cisterns are necessary to provide sufficient water to carry over between periods of rainfall. In areas where extreme droughts are frequent and prolonged, and in extremely arid regions, water harvesting on a small scale often cannot be relied upon to provide a steady source of water.




Surface ponds are the simplest water storage vessel, but also allow the greatest water loss, both through evaporation and infiltration and are most likely to be contaminated. Storage in wooden tanks, masonry cisterns, or steel or concrete tanks are more reliable, if more expensive systems of storage.

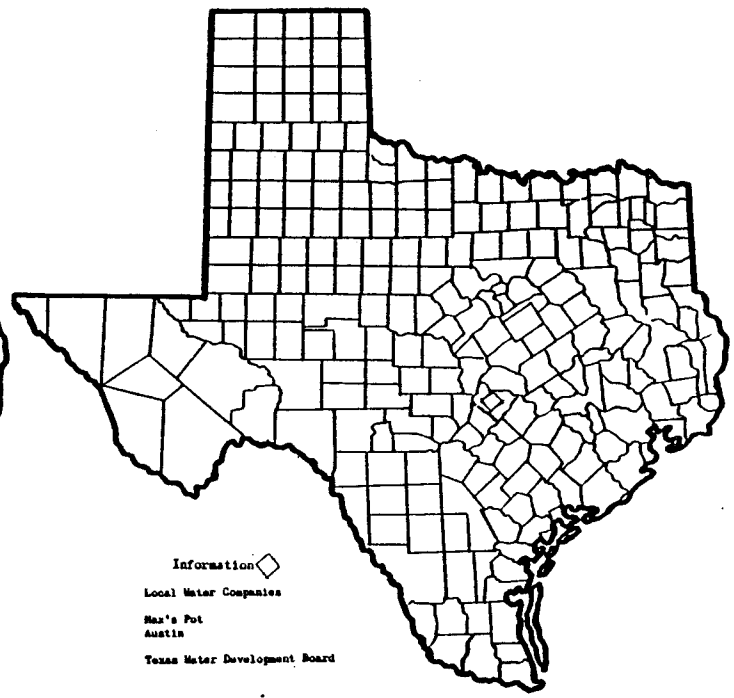
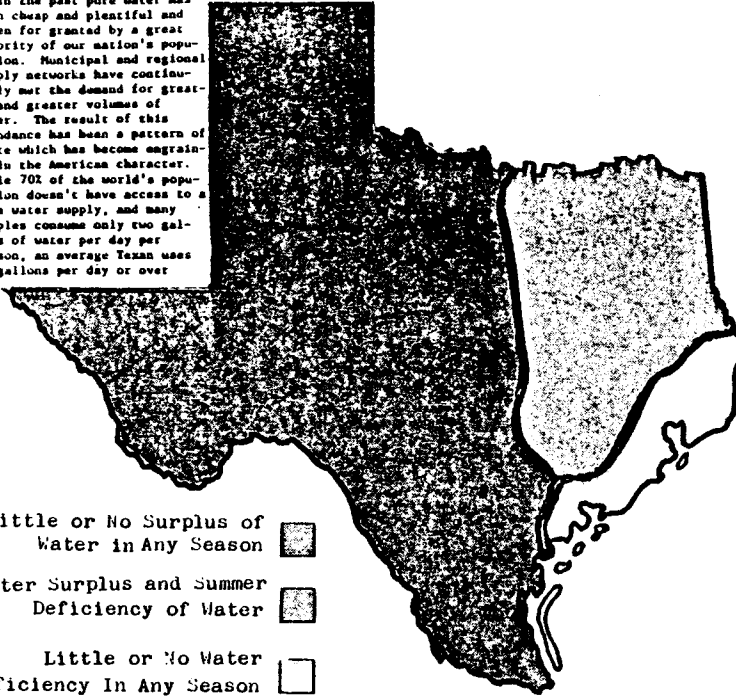
Runoff should be filtered before being stored and may require filtering or chlorination to insure purity if it is to be used for human consumption. Water quality must be carefully monitored to protect the health of the consumers.






Catchment and cistern sizing is a process with many variables. Hydrology, climate, and water demand are of utmost importance. However, economic tradeoffs with other alternate sources of water supply must be considered also. Local residents and agricultural agents can be valuable sources of information as to the advisability of building a catchment-cistern water supply system.

Water Conserving Bathrooms

In the past pure water has been cheap and plentiful and taken for granted by a great majority of our nation's population. Municipal and regional supply networks have continuously met the demand for greater and greater volumes of water. The result of this abundance has been a pattern of waste which has become engrained in the American character. While 70% of the world's population doesn't have access to a safe water supply, and many peoples consume only two gallons of water per day per person, an average Texan uses 64 gallons per day or over

- Little or No Surplus of Water in Any Season 
- Winter Surplus and Summer Deficiency of Water 
- Little or No Water Deficiency in Any Season 



Information 
 Local Water Companies 
 Max's Pot 
 Austin 
 Texas Water Development Board 

28000 gallons per year for personal "needs". In an age when unchecked growth is starting to outstrip available water supplies, this sort of profligate waste is clearly untenable. Economically viable individual water supply systems are also unlikely to be able to support such massive water wastage. Thus, steps must be taken to use water more wisely.

Studies have shown that nearly 70% of domestic water usage occurs in the bathroom. Thirty-nine percent is consumed by toilets, and thirty-one

percent is used for personal hygiene. After use the water is discarded, flushed into the sewer system and is instantly transformed from a valuable resource into an environmental and economic liability. Clearly, the bathroom must be the prime target of conservation efforts.

An alteration of Americans' bathroom habits could yield tremendous water savings. Less baths, shorter showers, limited toilet flushing, and closed water taps are a few of the many water conserving techniques. However, our toilets, showers, and sinks are, by their design, wasteful and must be altered.

The simplest and cheapest approach for homes which have

normal bathroom fixtures is to retrofit these fixtures to reduce water consumption. Flush water can be reduced by bending the armature on the float ball downward and placing water displacing objects such as bricks or sand filled plastic bottles in the tank. Inexpensive devices are now widely available which require continued pressure on the toilet lever to release flush water. In this way, only the water actually necessary for a particular flushing job is released from the tank. Combined sink-toilets which use water drained from the sink to flush the toilet can be homemade, or ordered from suppliers. Dual flush devices, tank inserts, small tanks and

other water saving devices are also readily available. Flow reducing shower heads and faucets sold under a number of commercial names can nearly halve water consumption in showers and sinks. Atomizing shower heads and foot pumps for sinks which dispense only what water is needed for rinsing can even more dramatically reduce water usage.

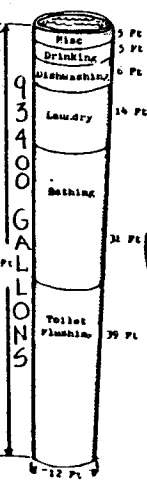
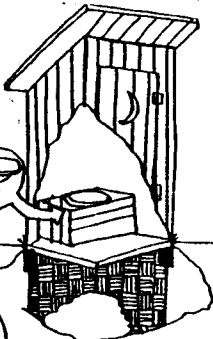
In recent years, a wide variety of alternate toilets have been developed which greatly reduce or eliminate water usage. Mechanical removal toilets collect excreta which is then periodically removed and disposed of. Chemical toilets replace water as a flushing medium with a chemical solution and this solution is recycled for further flushing. Incinerating and freezing toilets are also available, but they merely substitute energy use for water use.

A number of systems have been developed which treat human excretia not as a waste product, but rather as a resource. The ubiquitous pit latrine is by far the cheapest option and can over a period of years produce high quality compost. With a few modern adaptations and some care in siting, pit latrines can be the best alternative for many rural areas. Self composting toilets, first developed in

Europe are now available in the U.S. These toilets turn human waste and organic garbage into rich compost by means of aerobic decomposition. These units can be bought prefabricated or may be fabricated by a builder.

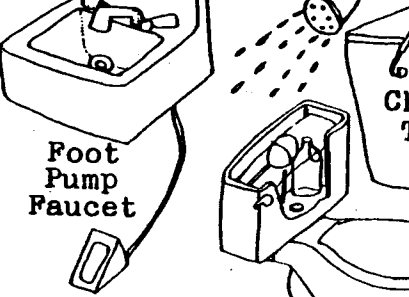
A number of integrated water production-use-recycling-disposal systems are in various stages of development. These systems deal with the entire

Pit Latrine with Odor Confining Seat



Average Annual Domestic Water Consumption for a Family of Four

Flow Reducing Shower Head



Chemical Toilet



Manual Removal Toilet

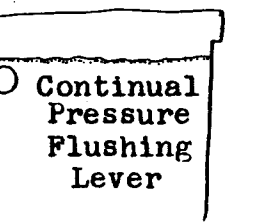


Water Disposing Bottle Placed in Conventional Toilet Tank

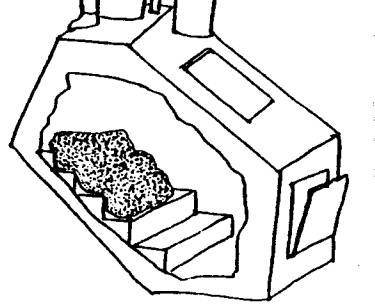


Combined Sink and Toilet

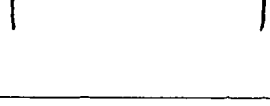
problem of water supply, usage and disposal rather than an isolated aspect of it. This sort of wholistic approach is essential to an effective and lasting solution to the water problem.



Self Composting Toilet



Continual Pressure Flushing Lever

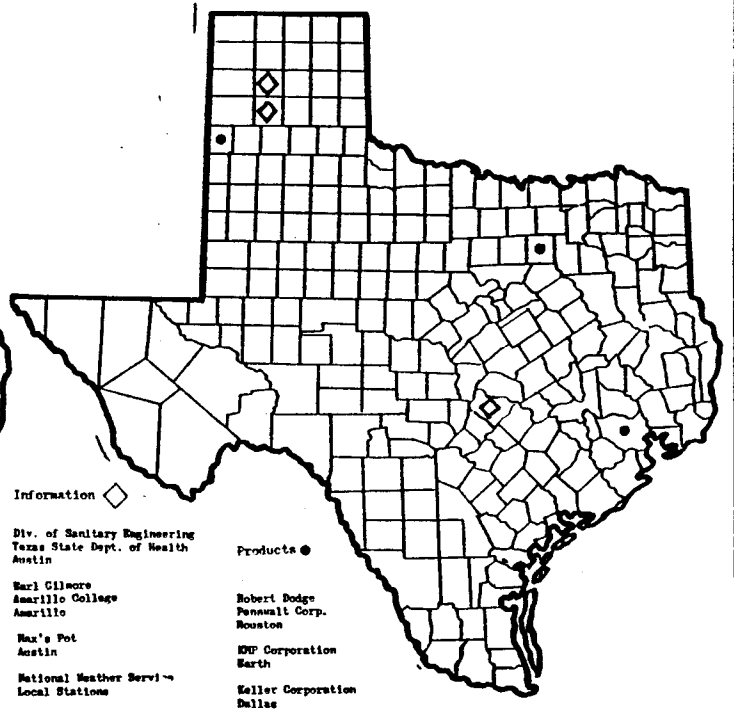
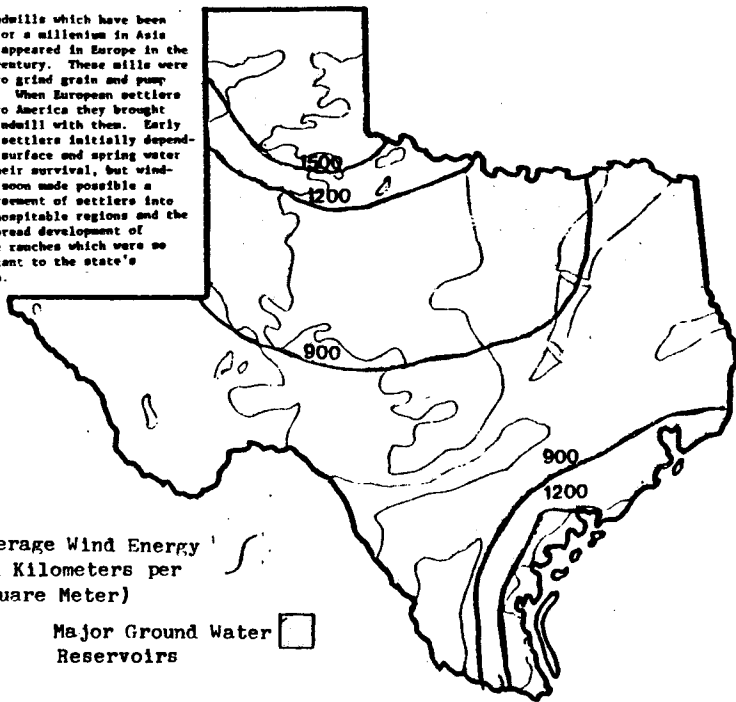


Water Pumping Windmills

Windmills which have been used for a millennium in Asia first appeared in Europe in the 14th century. These mills were used to grind grain and pump water. When European settlers came to America they brought the windmill with them. Early Texas settlers initially depended on surface and spring water for their survival, but windmills soon made possible a dispersal of settlers into less hospitable regions and the widespread development of cattle ranches which were so important to the state's growth.

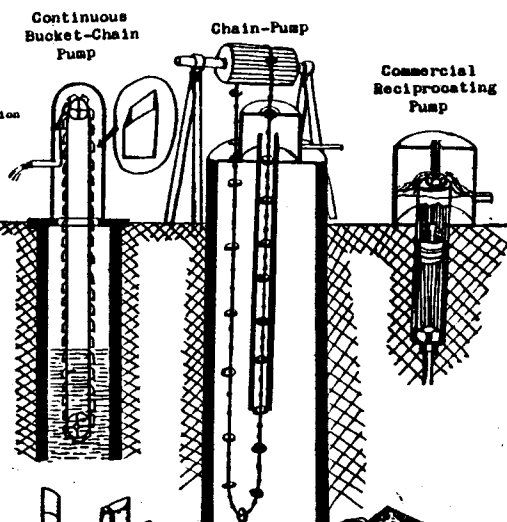
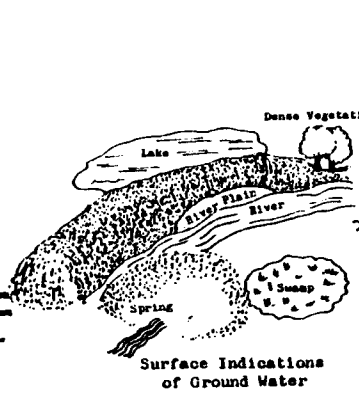
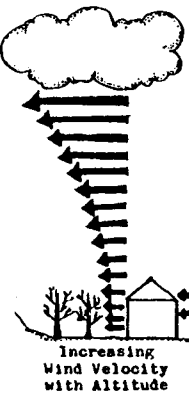
Average Wind Energy
(In Kilometers per
Square Meter)

Major Ground Water
Reservoirs



Information ◇
Div. of Sanitary Engineering
Texas State Dept. of Health
Austin
Earl Gilmore
Amarillo College
Amarillo
Max's Pot
Austin
National Weather Service
Local Stations
Vaughn Nelson
West Texas State
Canyon

Products ●
Robert Dodge
Pensacola Corp.
Houston
EDF Corporation
Earth
Keller Corporation
Dallas



Before a windmill can be considered, a suitable source of water must be located. Geologic maps of a site may aid this search as may surface indicators of ground water presence. Test pits should be dug and great care exercised in insuring the reliability of the ground water source before an expensive windmill is constructed.

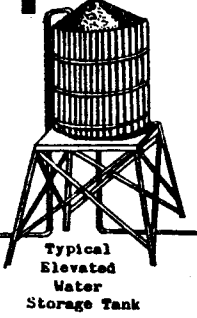
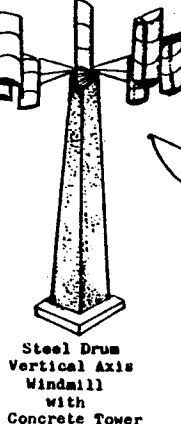
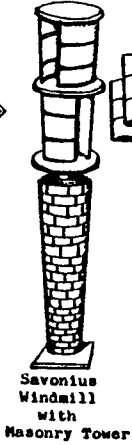
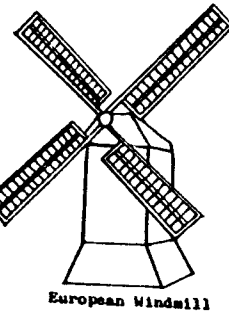
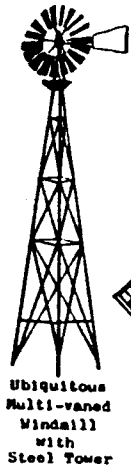
The windmill is only one quarter of a ground water pumping system. The well, pump, and storage tank are the other three components. On a site with a shallow water table, hand dug wells may be economically and technically feasible. In these cases, the continuous bucket-chain pump or chain-pipe pump, both of which can be made rather easily, may be harnessed to a windmill and prove to be a viable means of water raising. Deeper water cables generally require bored wells and commercial pumps. Deep wells can best be drilled by commercial contractors.

Windmills in Texas today are generally old vintage multi-bladed steel rotors mounted on skeletal steel towers. These windmills have devices which keep the rotors facing into the wind and which turn the mill out of high winds in order to prevent damage to the mill. Reciprocating piston pumps are combined with bored wells in order to raise water from low to medium depths. Commercial water pumping windmills are available throughout Texas through commercial well drilling and elsewhere. However, effective homemade windmills are well within the technical grasp of most reasonably dexterous individuals.

A windmill tower is essential to the efficient operation of a windmill. Both wind velocity and wind power near the ground are reduced by surface drag and ground obstructions, and above the surface wind speed increases exponentially with height. Thus an elevated windmill is necessary to take full advantage of available wind power. The tower however, is often more expensive than the windmill itself. Prefabricated steel towers are widely available, but are often prohibitively expensive. If labor is provided by the user, wooden truss towers, earth block masonry towers, and monolithically cast concrete or calcareous towers are attractive alternatives. In any case, the tower must be designed to withstand that lateral force of the wind on the mill and the tower.

Homemade windmills are of two sorts. Multi-directional windmills are useful in locations with great variability in the direction of wind. The Savonius windmill can easily be fabricated from bisected steel drums. Likewise, another vertical axis windmill can be made by attaching half drums to a radial spoke arrangement. Single direction windmills are best used in areas with a dominant wind direction such as along the Gulf Coast, or in deep valleys. Otherwise, mechanical arrangements must be devised to continually face the windmill into the wind. The sailing windmill, an easily fabricated device has triangular cloth sails with wire stays attached to radial spars.

A water storage system must be coupled with a wind powered water pumping system. Storage should be provided to provide for prolonged periods of calm. Water tanks may be of any sort, but should be elevated above the point of use to provide sufficient hydraulic head. When well constructed and maintained, windmills have proven to be a reliable source of water throughout Texas.



Ubiquitous Multi-vaned Windmill with Steel Tower

European Windmill

Savonius Windmill with Masonry Tower

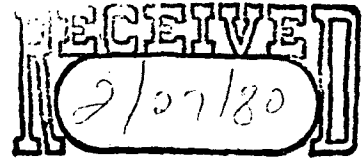
Steel Drum Vertical Axis Windmill with Concrete Tower

Sailing Windmill Mounted on a Tripod

Typical Elevated Water Storage Tank

FEBRUARY 22, 1980

MR. DAVID OJEDA
COMMUNITY SERVICES AGENCY

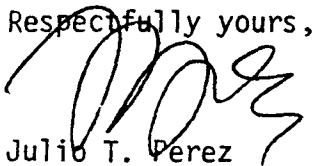


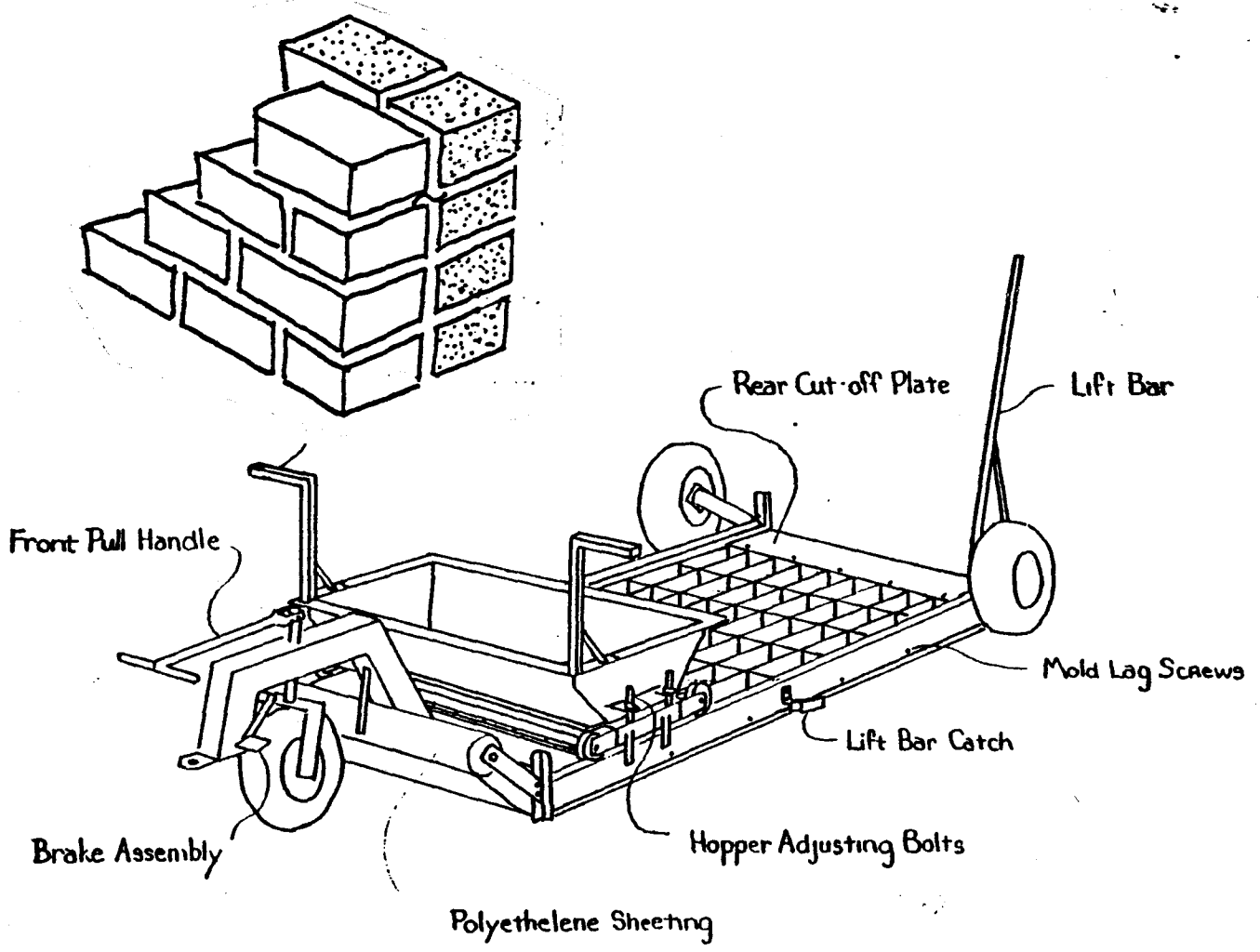
Dear David,

I will be very happy to participate in the advisory council that is to be formulated in relation to your energy projects, i.e., the four county Energy Commission.

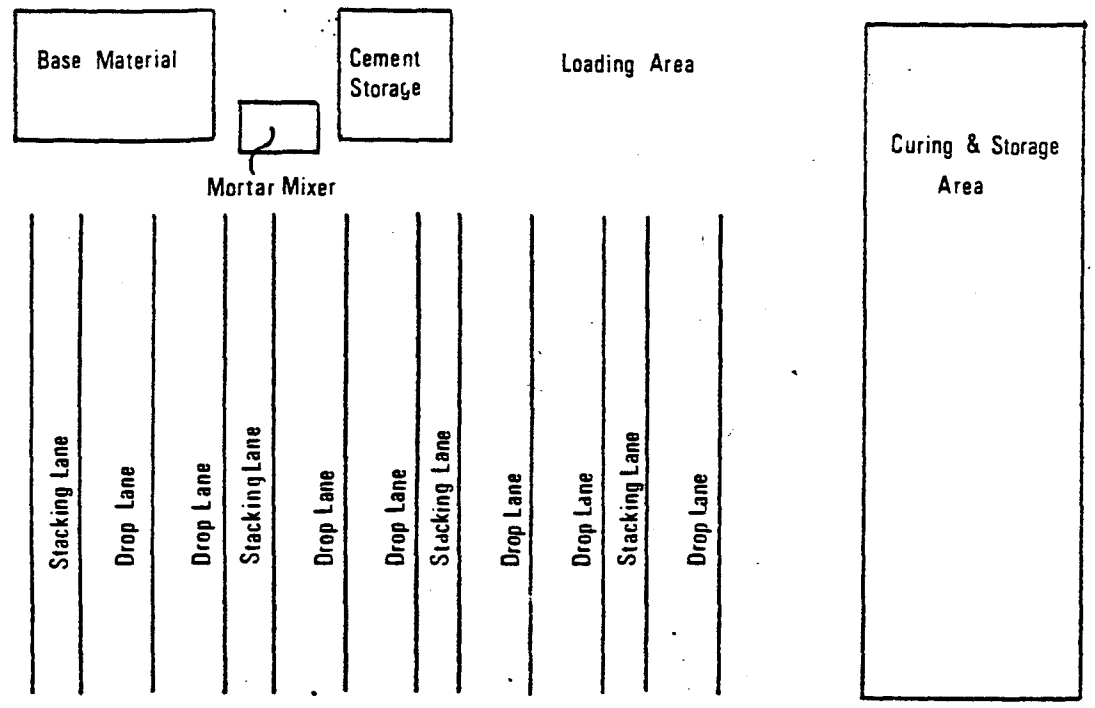
Let me know when the first meeting is to be held.

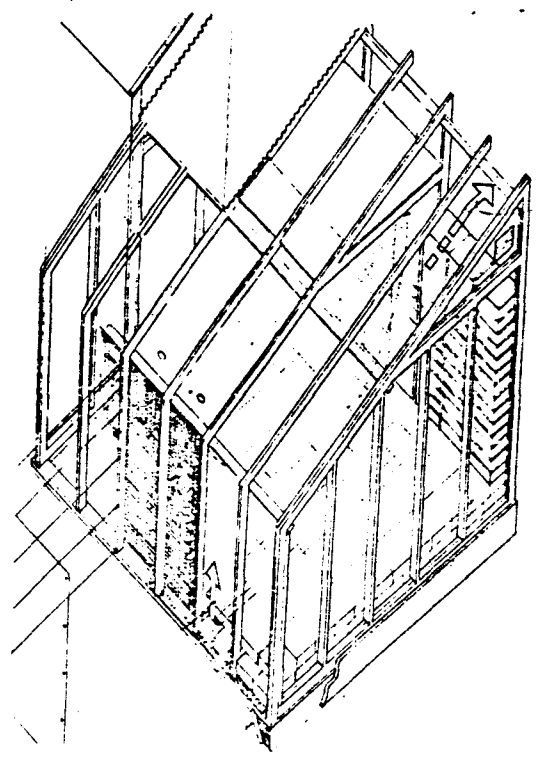
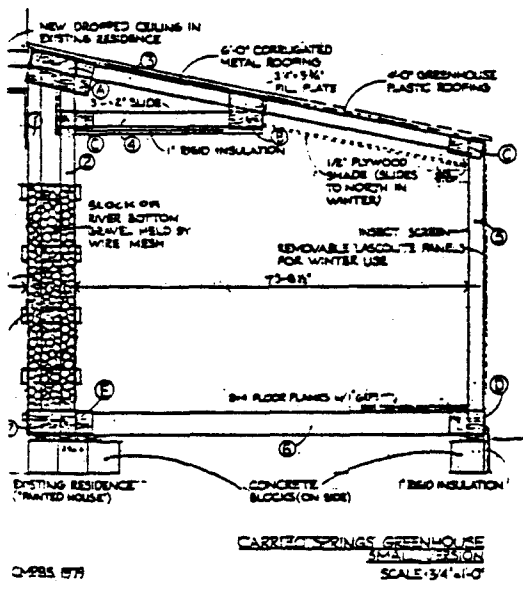
Respectfully yours,


Julio T. Perez

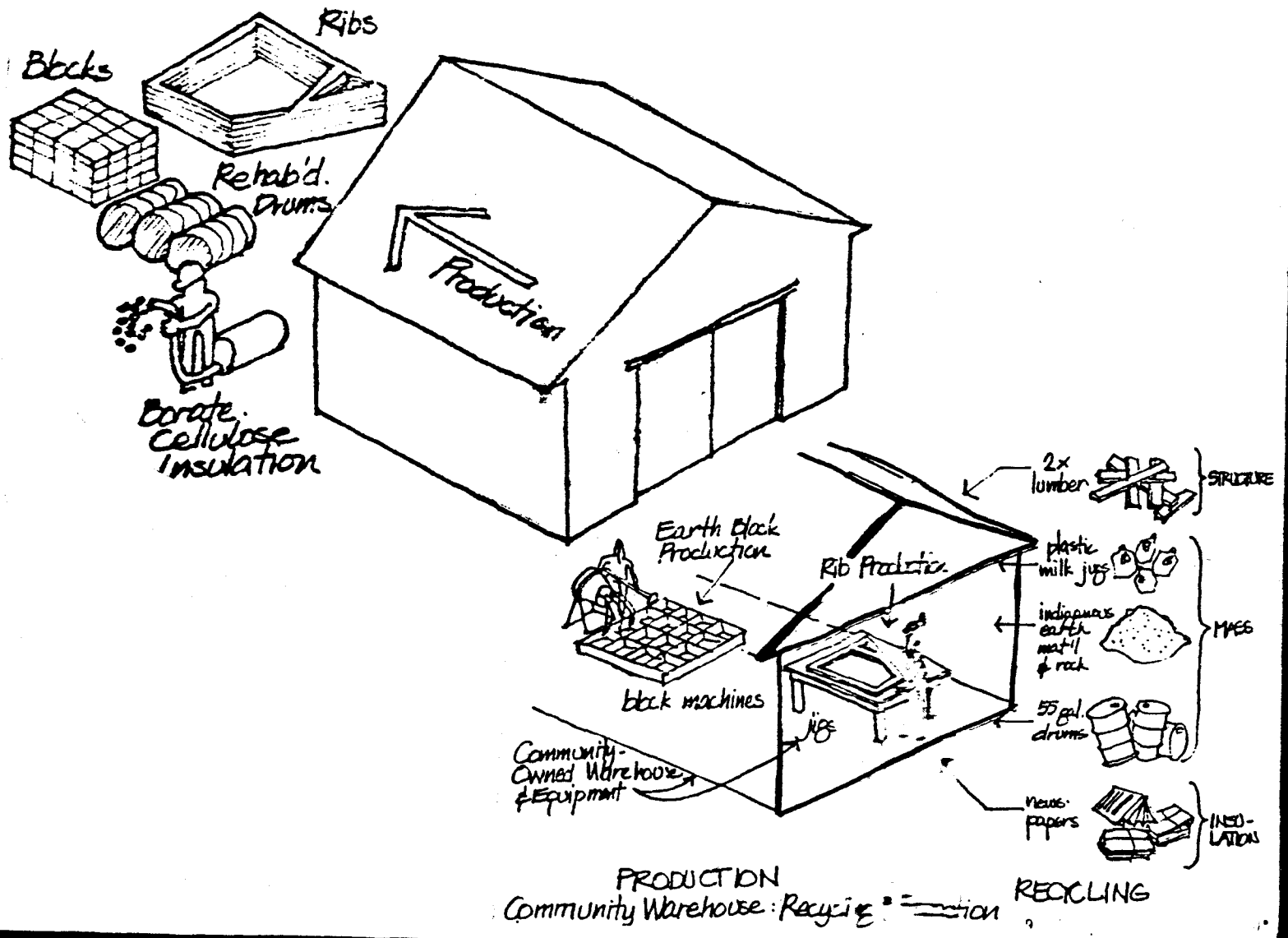


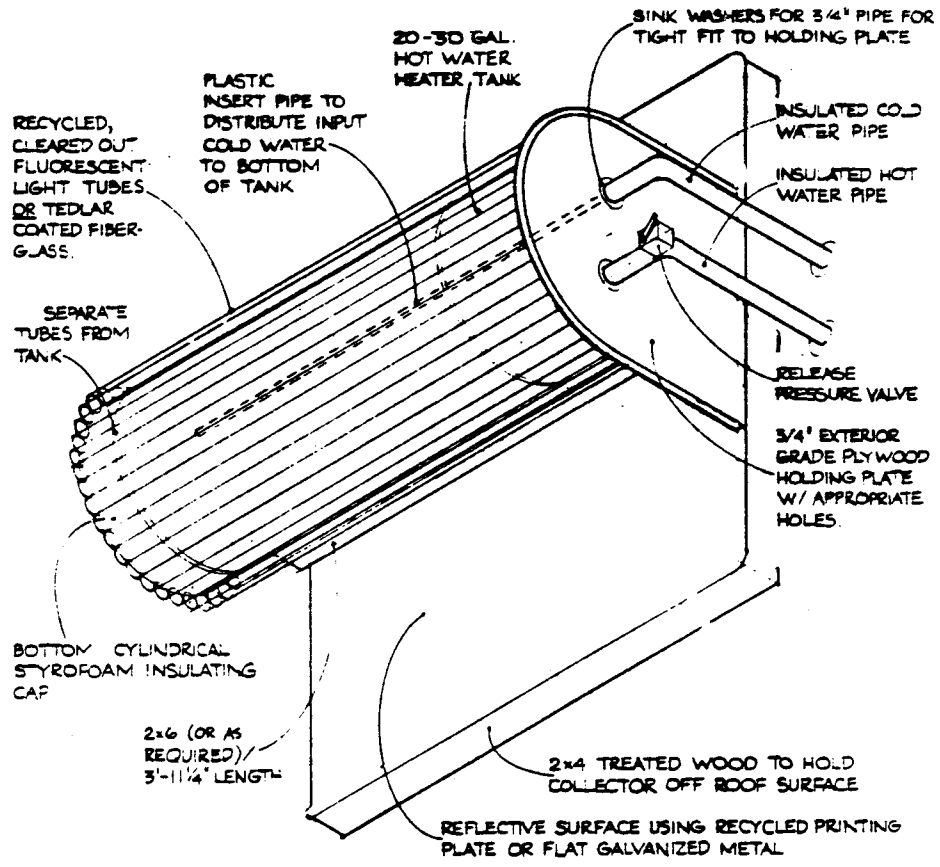
EARTH BLOCK MINI FACTORY



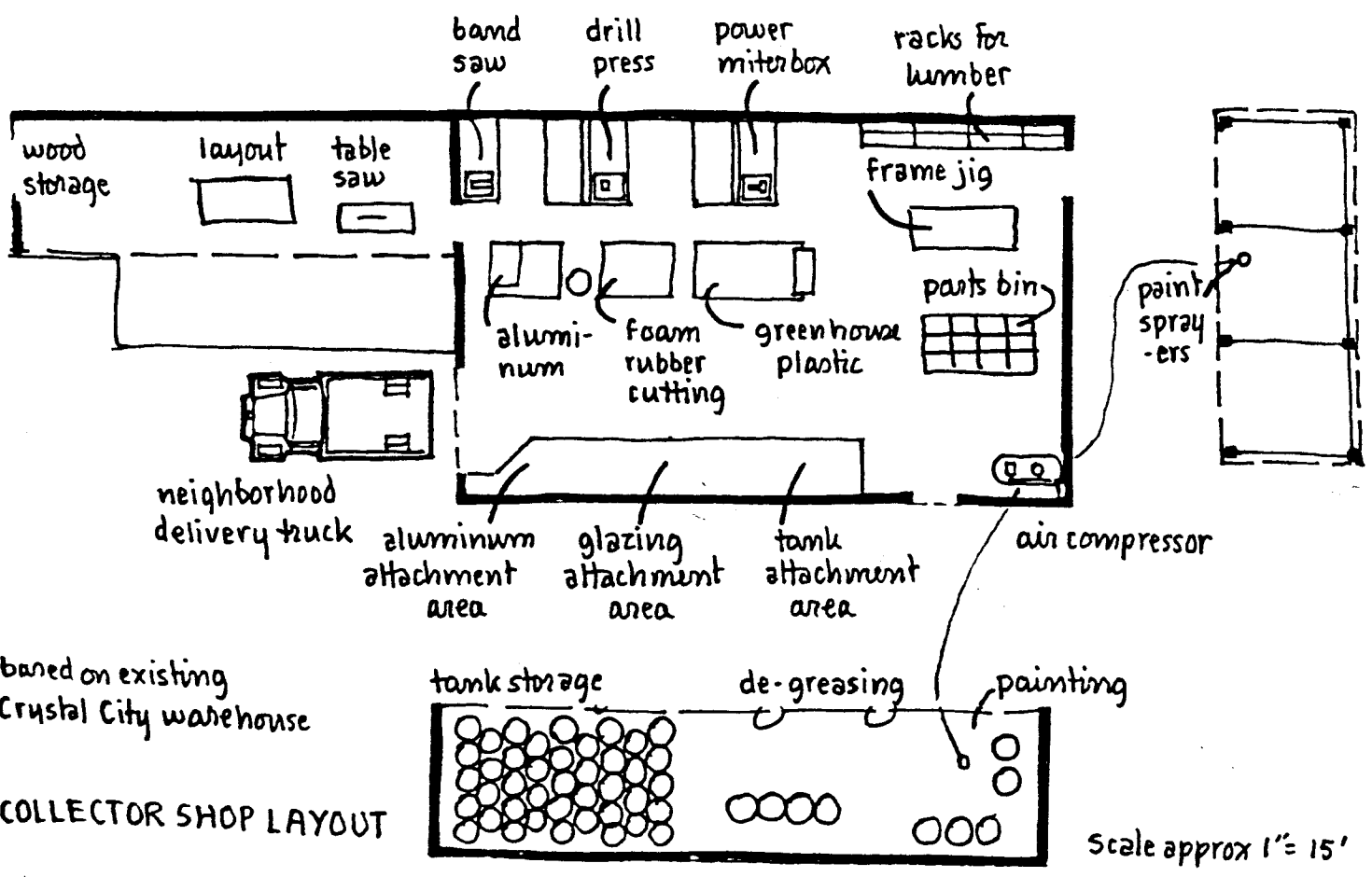


RIB TRUSS GREENHOUSE MINI FACTORY





CRYSTAL CITY COLLECTOR MINI FACTORY



COLLECTOR SHOP LAYOUT

Scale approx 1" = 15'